



OFFICIAL  
ELECTRONIC

# Elektrolytické kondenzátory

Distributor elektronických součástek

## SERIES CHART

### Green-Cap (ELECTRIC DOUBLE LAYER CAPACITORS)

EDLC (Green-Cap)				
<b>DM</b> 23 Green-Cap Module	<b>UPGRADE</b> <b>DH</b> 24 65°C 1500h Threaded Type	<b>UPGRADE</b> <b>DH</b> 25 65°C 1500h Weldable Type	<b>DB</b> 26 70°C 1000h Snap-in Type	<b>DS</b> 27 70°C 1000h Radial Type

### ALUMINUM ELECTROLYTIC CAPACITORS

#### SOLID TYPES

#### CHIP TYPES

Conductive Polymer (HI-CAP)		85°C Product	105°C Product		High Reliability
<b>FA</b> 37 SMD Type Standard	<b>FB</b> 45 Lead Type Standard	<b>SC</b> 55 2000h Standard	<b>RC</b> 58 1000h Standard	<b>ZC</b> 58 5.5mmL, 1000h Low Impedance	<b>UPGRADE</b> <b>UC</b> 75 125°C 2000h High Temp.
<b>FH</b> 39 SMD Type Large Capacitance	<b>UPGRADE</b> <b>FJ</b> 47 Lead Type Large Capacitance		<b>JC</b> 59 2000h High CV	<b>CK</b> 59 2000h Low Impedance	<b>CF</b> 76 130°C High Temp.
<b>FT</b> 41 SMD Type 125°C 1000h	<b>UPGRADE</b> <b>FV</b> 49 Lead Type 5000h Long Life		<b>JH</b> 61 2000h High CV, Ripple	<b>CD</b> 71 2000h Extremely Low Impedance Long Life	<b>CT</b> 77 130°C High Temp. Low Impedance
<b>FZ</b> 42 SMD Type 5000h Long Life		<b>Non-Polarized</b> <b>NC</b> 79 85°C 2000h, 5.5mmL Non-polarized	<b>NEW</b> <b>JM</b> 83 3000h Long Life	<b>CM</b> 73 5000h Extremely Low Impedance	<b>CW</b> 78 150°C High Temp.
<b>FN</b> 44 SMD Type 4.5mmL	<b>FC</b> 50 SMD Type 1000h	<b>CN</b> 80 105°C 1000h, 5.5mmL Non-polarized	<b>CA</b> 85 5000h Long Life, High CV	<b>JL</b> 87 10000h Long Life	
			<b>CB</b> 86 5.5mmL, 5000h Long Life		

#### MINIATURE RADIAL LEAD TYPES

85°C General Use	105°C General Use	Low Profile	Low Impedance		
<b>SD</b> 87 2000h Standard	<b>RD</b> 92 2000h Standard	<b>ZS</b> 98 7mmL, 2000h Low Imp. High Ripple	<b>RZ</b> 103 105°C, 5000h Low Impedance Standard	<b>LK</b> 112 105°C, 5000h Ultra Low Impedance	<b>ML</b> 122 105°C, 10000h Ultra Low Impedance Long Life
<b>SS</b> 90 7mmL, 2000h	<b>RM</b> 95 2000h Miniature	<b>ZL</b> 100 7mmL, 3000h Low Imp. High Ripple	<b>WL</b> 105 105°C, 5000h Low Impedance Wide Voltage	<b>MK</b> 114 105°C, 5000h Ultra Low Impedance Miniature, High Ripple	<b>MN</b> 124 105°C, 5000h Ultra Low Impedance Miniature, High Ripple
<b>SE</b> 91 5mmL, 2000h	<b>RK</b> 97 7mmL, 1000h	<b>ZE</b> 101 5mmL, 2000h Low Imp. High Ripple	<b>RP</b> 108 105°C, 10000h Extremely Low Impedance Long Life	<b>NEW</b> <b>MQ</b> 116 105°C, 5000h Ultra Low Impedance High Ripple	<b>MD</b> 125 105°C, 2000h Ultra Low Impedance Miniature, High Ripple
	<b>RE</b> 98 5mmL, 1000h		<b>WF</b> 110 105°C, 10000h Low Impedance Long Life	<b>MZ</b> 118 105°C, 5000h Ultra Low Impedance Miniature, High Ripple	
				<b>LZ</b> 120 105°C, 10000h Ultra Low Impedance Long Life	



## ■ ALUMINUM ELECTROLYTIC CAPACITORS

### ● MINIATURE RADIAL LEAD TYPES

LED, PSU, Charger, Adapter			Special Applications		
<b>SJ</b>	<b>NEW PQ</b>	<b>NEW BD</b>	<b>LU</b>	<b>CH</b>	<b>RB</b>
85°C, 8000h For PSU	105°C, 5000h For PSU High Ripple	105°C, 12000h High Ripple Long Life	105°C, 2000h For Slim PSU	85°C, 2000h For Charger and Adapter	125°C, 2000h High Temperature
<b>BA</b>	<b>BL</b>	<b>BK</b>	<b>LB</b>	<b>CS</b>	<b>UPGRADE WT</b>
105°C, 2000h Standard	105°C, 10000h For PSU Long Life	125°C, 5000h High Temp.	105°C, 10000h For Slim PSU Long Life	105°C, 2000h For Charger and Adapter	125°C, 5000h High Temp. Low Imp. Long Life
<b>RH</b>	<b>NEW BG</b>	<b>BM</b>	<b>UT</b>	<b>NEW PF</b>	<b>VA</b>
105°C, 5000h For PSU	105°C, 10000h For PSU Long Life	150°C, 2000h High Temp.	105°C, 2000h For Flame Retardancy	105°C, 10000h High Ripple Long Life	130°C, 4000h High Temperature
<b>RU</b>	<b>BJ</b>	<b>NEW LY</b>			<b>VB</b>
105°C, 5000h For PSU High Ripple	105°C, 12000h For PSU Extremely Long Life	105°C, 10000h Miniature Long Life			155°C, 1000h High Temperature
<b>BH</b>		<b>NEW LQ</b>			
105°C, 5000h For PSU High Ripple		105°C, 10000h For LED Low Impedance			

Non-Polarized			Low Leakage Current	
<b>NP</b>	<b>BP</b>	<b>NF</b>	<b>LL</b>	<b>RL</b>
85°C, 2000h Standard	85°C, 2000h Crossover Network	85°C, 2000h Horizontal Deflection Current Correction	85°C, 2000h Standard	105°C, 1000h Standard
<b>NS</b>	<b>RN</b>	<b>NH</b>	<b>LS</b>	
7mmL, 2000h	105°C, 1000h Standard	105°C, 2000h Horizontal Deflection Current Correction	85°C, 2000h 7mmL	
<b>NE</b>	<b>BR</b>		<b>LE</b>	
5mmL, 1000h	105°C, 2000h Crossover Network Wide Voltage		85°C, 1000h 5mmL	

### ● LARGE TYPES

Snap-in Terminal		Screw, Lug Terminal			Special Application
<b>UPGRADE HC</b>	<b>HE</b>	<b>LM</b>	<b>GT</b>	<b>CU</b>	<b>LW,SW</b>
85°C, 2000h Standard	105°C, 2000h Standard	85°C, 2000h Lug Terminal	85°C, 2000h For Inverter	105°C, 2000h Wide Temp.	85°C, Welding Machine
<b>UPGRADE HJ</b>	<b>UPGRADE HK</b>	<b>GM</b>	<b>GK</b>	<b>EV</b>	<b>AM</b>
85°C, 3000h Miniature	105°C, 3000h Miniature	85°C, 2000h Miniature	85°C, 2000h For Inverter, High Ripple	105°C, 5000h Long Life	85°C, 2000h For Audio
<b>HV</b>	<b>NEW HG</b>	<b>GF</b>	<b>GH</b>	<b>EY</b>	<b>DF</b>
105°C, 3000h Miniature	105°C, 3000h High Ripple	85°C, 5000h For Inverter	85°C, 5000h Miniature, High Ripple	105°C, 7000h Long Life	For Photo Flash
<b>HY</b>	<b>UPGRADE HL</b>	<b>NEW GQ</b>	<b>GN</b>		<b>AR</b>
105°C, 7000h Long Life	105°C, 5000h Long Life	85°C, 5000h High Ripple	85°C, 5000h Miniature, High Ripple		85°C, 3000h For Air- conditioning system
<b>HB</b>			<b>GL</b>		<b>AH</b>
125°C, 1000h High Temp.			85°C, 20000h Long Life		105°C, 3000h For Air- conditioning system

# CONTENTS

## 1 Green-Cap (Electric Double Layer Capacitors)

★ New series  
☆ Upgrade series

Series	Features	Operating Temperature Range (°C)	Voltage Range (VDC)	Capacitance Range (F)	Load Life Time (hours)	Page
Series chart						2
Application guidelines						18-20
Part number system, Lead forming, Cutting, Taping and Packaging						21-22
DM	Green-Cap Module	Green-Cap modules are supplied on custom-made basis.				23
DH ☆	Threaded type, High power density	-40 ~ 65	2.7	1200 ~ 3000	1500	24
DH ☆	Weldable type, High power density	-40 ~ 65	2.7	1200 ~ 3000	1500	25
DB	Snap-in type, Standard series	-25(-40) ~ 70(60)	2.5(2.7)	100 ~ 400	1000	26
DS	Lead type, OEM product	-25(-40) ~ 70(60)	2.5(2.7)	3 ~ 60	1000	27

## 2 Polymer Aluminum Electrolytic Capacitors

Series	Features		Operating Temperature Range(°C)	Voltage Range (VDC)	Capacitance Range (μF)	Load Life Time (hours)	Page
Series chart							2
Application guidelines							31
Packaging qty(pcs) / box							34
SMD	FA	Chip type, with conductive polymer (HI-CAP)	-55 ~ 105	2.5 ~ 25	3.3 ~ 1500	2000	37
	FH	Chip type, with conductive polymer (HI-CAP), large capacitance, low ESR	-55 ~ 105	2.5 ~ 16	39 ~ 2700	2000	39
	FT	Chip type, with conductive polymer (HI-CAP), high temp.	-55 ~ 125	10 ~ 35	8.2 ~ 82	2000	41
	FZ	Chip type, with conductive polymer (HI-CAP), long life	-55 ~ 105	4 ~ 25	10 ~ 680	5000	42
	FN	Chip type, with conductive polymer (HI-CAP), 4.5mmL	-55 ~ 105	2.5 ~ 25	15 ~ 150	1000	44
LEAD type	FB	Lead type, with conductive polymer (HI-CAP)	-55 ~ 105	2.5 ~ 25	6.8 ~ 3300	2000	45
	FJ ☆	Lead type, with conductive polymer (HI-CAP), Large Capacitance, Low ESR	-55 ~ 105	2.5 ~ 16	100 ~ 2700	2000	47
	FV ☆	Lead type, with conductive polymer (HI-CAP), long life	-55 ~ 105	2.5 ~ 16	100 ~ 820	5000	49
SMD	FC	Chip type, with conductive polymer (HI-CAP)	-40 ~ 105	2 ~ 16	2.2 ~ 470	1000	50

## 3 Surface Mount Aluminum Electrolytic Capacitors

Series	Features	Operating Temperature Range (°C)	General	Miniature	Long Life	Sealed Prod	Voltage Range (VDC)	Capacitance Range (μF)	Load Life Time (hours)	Page
Series chart										2
Application guidelines, General introduction										9
Part number system										52
Taping specification & Packaging quantity										53
SMD	SC	Standard	-40 ~ 85	●		●	4 ~ 450	0.1 ~ 2200	2000	55
	RC	Standard, wide temp.	-55 ~ 105	●		●	6.3 ~ 50	0.1 ~ 1000	1000	58
	JC	Chip type, wide temp. high CV	-55(-40) ~ 105		●	●	4 ~ 450	3.3 ~ 2200	2000	59
	JH	Chip type, high ripple	-55 ~ 105			●	6.3 ~ 100	10 ~ 2200	2000	61
	JM ☆	Chip type, long life	-25 ~ 105		●	●	6.3 ~ 100	10 ~ 2200	3000	63
	CA	Chip type, long life	-55 ~ 105		●	●	6.3 ~ 50	10 ~ 1000	5000	65
	CB	Chip type, long life, 5.5mmL height	-55 ~ 105	●	●	●	4 ~ 50	0.1 ~ 100	5000	66
	JL	Chip type, long life, for ECU	-40 ~ 105		●	●	10 ~ 50	33 ~ 470	10000	67
	ZC	5.5mmL chip type, low Impedance	-55 ~ 105			●	6.3 ~ 35	1.0 ~ 100	1000	68
	CK	Chip type, low Impedance, high CV	-55 ~ 105			●	6.3 ~ 100	10 ~ 1500	2000	69
	CD	Chip type, extremely low Impedance	-55 ~ 105			●	6.3 ~ 50	10 ~ 1500	2000	71
	CM	Chip type, extremely low Impedance, long life	-55 ~ 105		●	●	6.3 ~ 50	10 ~ 1000	3000 ~ 5000	73
	UC ☆	Chip type, high temp. for 125°C use	-40 ~ 125			●	10 ~ 400	3.3 ~ 1000	2000	75
	CF	Chip type, high temp. for 130°C use, long life	-40 ~ 130		●	●	10 ~ 50	22 ~ 1000	2000 ~ 5000	76
	CT	Chip type, high temp. for 130°C use, low Impedance	-40 ~ 130			●	10 ~ 50	33 ~ 470	2000	77
	CW	Chip type, high reliability	-40 ~ 150			●	10 ~ 50	33 ~ 1000	1000	78
	NC	5.5mmL chip, non-polarized	-40 ~ 85			●	6.3 ~ 50	0.1 ~ 47	2000	79
	CN	5.5mmL chip type, wide temp. non-polarized	-55 ~ 105			●	6.3 ~ 50	0.1 ~ 47	1000	80

## 4 Miniature Aluminum Electrolytic Capacitors

Series	Features	Operating Temperature Range (°C)	General	Miniature	Long Life	Sealed Prod	Voltage Range (VDC)	Capacitance Range (μF)	Load Life Time (hours)	Page
Series chart										2-3
Application guidelines, General introduction										9
Part number system										82
Lead forming, Taping & Packaging quantity										83
General Type(65°C)	SD	Standard	-40(-25) ~ 85	●		●	6.3 ~ 500	1.0 ~ 22000	2000	87
	SS	Standard, height 7mmL	-40 ~ 85		●	●	4 ~ 63	0.1 ~ 220	2000	90
	SE	Standard, height 5mmL	-40 ~ 85		●	●	4 ~ 63	0.1 ~ 330	2000	91
General Type(105°C)	RD	Standard, wide temp	-55(-40,-25)~105	●		●	6.3 ~ 500	2.2 ~ 22000	1000 ~ 2000	92
	RM	Wide temp. capacitance wide range, miniature	-55(-40) ~ 105		●	●	6.3 ~ 450	1.0 ~ 22000	1000 ~ 2000	95
	RK	Wide temp. range, height 7mmL	-55 ~ 105		●	●	4 ~ 63	0.1 ~ 68	1000	97
	RE	Wide temp. range, height 5mmL	-55 ~ 105		●	●	4 ~ 50	0.1 ~ 220	1000	98



Series	Features	Operating Temperature Range(°C)	General	Miniature	Long life	Solvent Proof	Voltage Range (VDC)	Capacitance Range (μF)	Load Life Time (hours)	Page
Low Impedance	ZS Height 7mmL, low impedance, high ripple	-40 ~ 105	●	●	●	●	6.3 ~ 50	2.2 ~ 330	2000	99
	ZL Height 7mmL, low impedance, high ripple	-40 ~ 105	●	●	●	●	6.3 ~ 50	2.2 ~ 330	3000	100
	ZE Height 5mmL, low impedance, high ripple	-55 ~ 105	●	●	●	●	6.3 ~ 35	1.0 ~ 100	2000	101
	RZ Extremely low impedance, high reliability	-55 ~ 105	●	●	●	●	6.3 ~ 63	1.0 ~ 15000	2000 ~ 5000	103
	WL Extremely low imp., miniaturized, wide voltage	-40(-25) ~ 105	●	●	●	●	6.3 ~ 500	0.22 ~ 15000	2000 ~ 5000	105
	RP Extremely low impedance, long life	-55 ~ 105	●	●	●	●	6.3 ~ 50	1.0 ~ 15000	4000 ~ 10000	108
	WF Extremely low impedance, miniaturized, long life	-40 ~ 105	●	●	●	●	6.3 ~ 100	0.47 ~ 15000	5000 ~ 10000	110
	LK Extremely low impedance, high ripple	-40 ~ 105	●	●	●	●	6.3 ~ 100	1.0 ~ 6800	2000 ~ 5000	112
	MK Ultra low impedance, miniaturized, high ripple	-40 ~ 105	●	●	●	●	6.3 ~ 100	0.22 ~ 15000	2000 ~ 5000	114
	MQ* Ultra low impedance, miniaturized, high ripple	-40 ~ 105	●	●	●	●	6.3 ~ 50	4.7 ~ 2200	2000 ~ 5000	116
	MZ Ultra low impedance, miniaturized, high ripple	-40 ~ 105	●	●	●	●	6.3 ~ 100	0.47 ~ 15000	2000 ~ 5000	118
	LZ Ultra low impedance, long life	-40 ~ 105	●	●	●	●	6.3 ~ 50	10 ~ 8200	6000 ~ 10000	120
	ML Ultra low impedance, long life	-40 ~ 105	●	●	●	●	6.3 ~ 100	10 ~ 10000	6000 ~ 10000	122
	MN Ultra low impedance, high ripple	-40 ~ 105	●	●	●	●	6.3 ~ 25	220 ~ 3300	5000	124
PSU, Charger, Adapter, LED	MD Ultra low impedance, high ripple	-40 ~ 105	●	●	●	●	6.3 ~ 16	470 ~ 3300	2000	125
	SJ* For PSU applications, long life	-25 ~ 85	●	●	●	●	450 ~ 500	10 ~ 120	8000	126
	LY* For LED lighting applications, long life	-25 ~ 105	●	●	●	●	10 ~ 50	1 ~ 330	10000	127
	LQ* For LED lighting applications, Ultra low imp., high ripple	-40 ~ 105	●	●	●	●	6.3 ~ 100	8.2 ~ 8200	6000 ~ 10000	128
	BA For PSU applications, smaller case size	-40 ~ 105	●	●	●	●	160 ~ 450	1.0 ~ 220	2000	130
	RH For PSU applications, high ripple current	-40(-25) ~ 105	●	●	●	●	160 ~ 500	1.0 ~ 220	5000	131
	RU For PSU applications, high ripple current	-40(-25) ~ 105	●	●	●	●	160 ~ 500	3.3 ~ 150	5000	133
	BH For PSU applications, high ripple current	-25 ~ 105	●	●	●	●	200 ~ 400	2.2 ~ 120	5000	134
	PQ* For PSU applications, high ripple current	-25 ~ 105	●	●	●	●	400 ~ 450	22 ~ 150	5000	135
	BL For PSU applications, long life	-25 ~ 105	●	●	●	●	160 ~ 500	4.7 ~ 150	10000	136
	BG* For PSU applications, long life, miniature	-25 ~ 105	●	●	●	●	400 ~ 450	22 ~ 150	10000	137
	BJ For PSU applications, extremely long life	-40(-25) ~ 105	●	●	●	●	160 ~ 500	4.7 ~ 220	12000	138
	BD* For PSU applications, extremely long life, high ripple current	-25 ~ 105	●	●	●	●	400 ~ 450	22 ~ 100	12000	140
	BK For PSU applications, high temp. for 125°C use	-25 ~ 125	●	●	●	●	160 ~ 450	2.2 ~ 47	2000 ~ 5000	141
Special Applications	BM For PSU applications, high temp. for 150°C use	-25 ~ 150	●	●	●	●	160 ~ 400	2.2 ~ 47	2000	142
	LU For slim PSU	-40(-25) ~ 105	●	●	●	●	200 ~ 500	16 ~ 150	2000	143
	LB For slim PSU, long life	-40(-25) ~ 105	●	●	●	●	250 ~ 500	16 ~ 180	5000 ~ 10000	144
	PF* High ripple current, long life	-40 ~ 105	●	●	●	●	160 ~ 275	10 ~ 150	10000	145
	CH,CS For charger, adapter	-25 ~ 85,105	●	●	●	●	400,450	2.2 ~ 68	2000	146
	RB High temp. range, for 125°C use, miniaturized	-55(-40) ~ 125	●	●	●	●	6.3 ~ 250	0.47 ~ 15000	1000 ~ 2000	147
	WT* High temp. range, for 125°C use, long life, low impedance	-40 ~ 125	●	●	●	●	6.3 ~ 100	10 ~ 3300	1000 ~ 5000	150
	VA High temp. range, for 130°C use, low impedance	-40 ~ 130	●	●	●	●	10 ~ 35	220 ~ 4700	2000 ~ 4000	152
	VB High temp. range, for 155°C	-40 ~ 155	●	●	●	●	10 ~ 100	1.0 ~ 4700	1000	154
	UT For flame retardancy	-25 ~ 105	●	●	●	●	400 ~ 450	2.2 ~ 150	2000	156
	NP Standard	-40 ~ 85	●	●	●	●	6.3 ~ 250	0.47 ~ 10000	2000	157
	NS Height 7mm	-40 ~ 85	●	●	●	●	6.3 ~ 63	0.1 ~ 47	2000	159
	NE Height 5mm	-40 ~ 85	●	●	●	●	6.3 ~ 50	0.1 ~ 47	1000	160
	BP For crossover networks	-40 ~ 85	●	●	●	●	25,50,100,200	1.0 ~ 100	2000	161
Non-polarize	RN Wide temp. range	-40 ~ 105	●	●	●	●	6.3 ~ 100	0.1 ~ 10000	1000	162
	BR For crossover networks, wide temp.	-40 ~ 105	●	●	●	●	200	3.3 ~ 100	2000	164
	NF For horizontal deflection current correction	-40 ~ 85	●	●	●	●	25, 50	1.0 ~ 10	2000	165
	NH For horizontal deflection current correction	-40 ~ 105	●	●	●	●	25, 50	1.0 ~ 10	2000	166
	LL Low leakage current, standard	-40 ~ 85	●	●	●	●	10 ~ 100	1.0 ~ 4700	2000	167
	LS Low leakage current, height 7mm	-40 ~ 85	●	●	●	●	6.3 ~ 63	0.1 ~ 100	2000	169
	LE Low leakage current, height 5mm	-40 ~ 85	●	●	●	●	4 ~ 50	0.1 ~ 100	1000	170
	RL Low leakage current, wide temp. range	-55 ~ 105	●	●	●	●	10 ~ 50	0.1 ~ 330	1000	171
Low Leakage										

## Large Aluminum Electrolytic Capacitors

Series	Features	Operating Temperature Range(°C)	General	Miniature	Long life	Solvent Proof	Voltage Range (VDC)	Capacitance Range (μF)	Load Life Time (hours)	Page
Series chart										3
Part number system										174
Packaging q'ty(pcs) / box										175
Snap-In Terminal	HC <sup>☆</sup> Standard	-40(-25) ~ 85	●	●	●	●	6.3 ~ 550	47 ~ 100000	2000	178
	HJ <sup>☆</sup> Miniaturized	-40(-25) ~ 85	●	●	●	●	10 ~ 450	56 ~ 56000	3000	181
	HE Wide temp. range, standard	-40(-25) ~ 105	●	●	●	●	6.3 ~ 500	47 ~ 68000	2000	184
	HK <sup>☆</sup> Wide temp. range, miniaturized	-40(-25) ~ 105	●	●	●	●	6.3 ~ 500	47 ~ 68000	3000	187
	HV Wide temp. range, miniaturized	-40(-25) ~ 105	●	●	●	●	250 ~ 450	47 ~ 1500	3000	190
	HG* Wide temp. range, high ripple current	-40(-25) ~ 105	●	●	●	●	250 ~ 450	180 ~ 680	3000	192
	HL <sup>☆</sup> Wide temp. range, miniaturized, long life	-40(-25) ~ 105	●	●	●	●	10 ~ 450	47 ~ 56000	5000	193
	HY Wide temp. range, long life	-40(-25) ~ 105	●	●	●	●	160 ~ 450	47 ~ 1800	7000	196
	HB High temp. range, for 125°C use	-40 ~ 125	●	●	●	●	10 ~ 250	100 ~ 15000	1000	198
	LM For general use	-40(-25) ~ 85	●	●	●	●	16 ~ 450	68 ~ 150000	2000	200
	GT Standard	-40(-25) ~ 85	●	●	●	●	16 ~ 500	180 ~ 680000	2000	202
	GK High ripple current	-25 ~ 85	●	●	●	●	350 ~ 450	180 ~ 10000	2000	205
	GM High ripple current, miniaturized	-25 ~ 85	●	●	●	●	350 ~ 450	820 ~ 10000	2000	207
	CU Wide temp. range, standard	-40(-25) ~ 105	●	●	●	●	16 ~ 400	220 ~ 470000	2000	209
Screw Terminal	GF For inverter circuits, long life	-25 ~ 85	●	●	●	●	350 ~ 600	1000 ~ 12000	2000 ~ 5000	211
	GH For inverter circuits, long life, high ripple	-25 ~ 85	●	●	●	●	400 ~ 500	1800 ~ 12000	2000 ~ 5000	213
	GN For inverter circuits, long life, high ripple, miniaturized	-25 ~ 85	●	●	●	●	400 ~ 500	1800 ~ 12000	2000 ~ 5000	215
	GQ* For inverter circuits, long life, high ripple, miniaturized	-25 ~ 85	●	●	●	●	400 ~ 450	1800 ~ 12000	5000	217
	GL High ripple, long life	-25 ~ 85	●	●	●	●	350 ~ 450	1500 ~ 12000	20000	219
	EV For inverter circuits, long life	-25 ~ 105	●	●	●	●	400 ~ 500	1000 ~ 6800	5000	221
	EY For inverter circuits, long life	-25 ~ 105	●	●	●	●	350 ~ 450	1500 ~ 12000	7000	222
	LW,SW For Welding Machine	-25 ~ 85	●	●	●	●	315, 475	225 ~ 2200	-	224
	AM For audio equipment	-40 ~ 85	●	●	●	●	16 ~ 100	470 ~ 33000	2000	225
	DF For photo flash	-20 ~ 55	●	●	●	●	330, 360	200 ~ 1500	-	227
	AR,AR For inverter Air-conditioning system	-25 ~ 85,105	●	●	●	●	-	-	-	229



# 1

## Green-Cap(ELECTRIC DOUBLE LAYER CAPACITORS)

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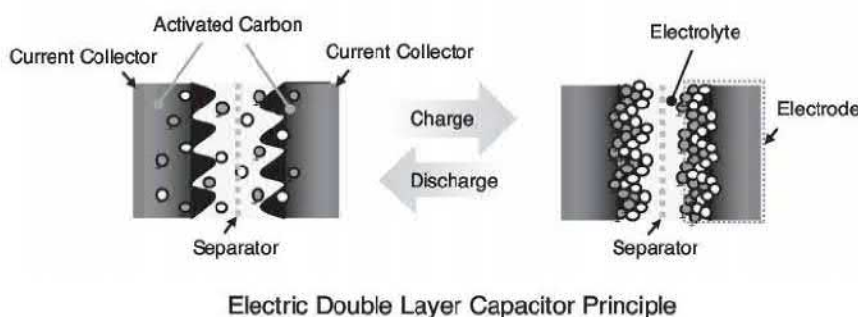


## Green-Cap (ELECTRIC DOUBLE LAYER CAPACITORS)

Electric double layer capacitor(EDLC) is a next-generation energy storage device. In recent years, there has been much exploration of new uses for EDLC, and it is expected that they will become even more commonly used in the future.

### What is electrical double layer capacitor (EDLC)?

A conventional capacitors have a dielectric sandwiched between two opposing electrodes. An aluminum electrolytic capacitor, as an example, uses an aluminum oxide film as a dielectric. However, EDLC does not have a dielectric. EDLC uses the electric double layer to function as the dielectric of activated carbon, therefore EDLC does not use a chemical reaction such as a redox reaction but rather store electricity by means of the physical adsorption of ions to the large specific surface area of activated carbon. EDLC consists of environmentally friendly active carbon and an organic solvent, whereas a conventional battery is made from heavy metals such as lead. EDLC does not harm the environment.



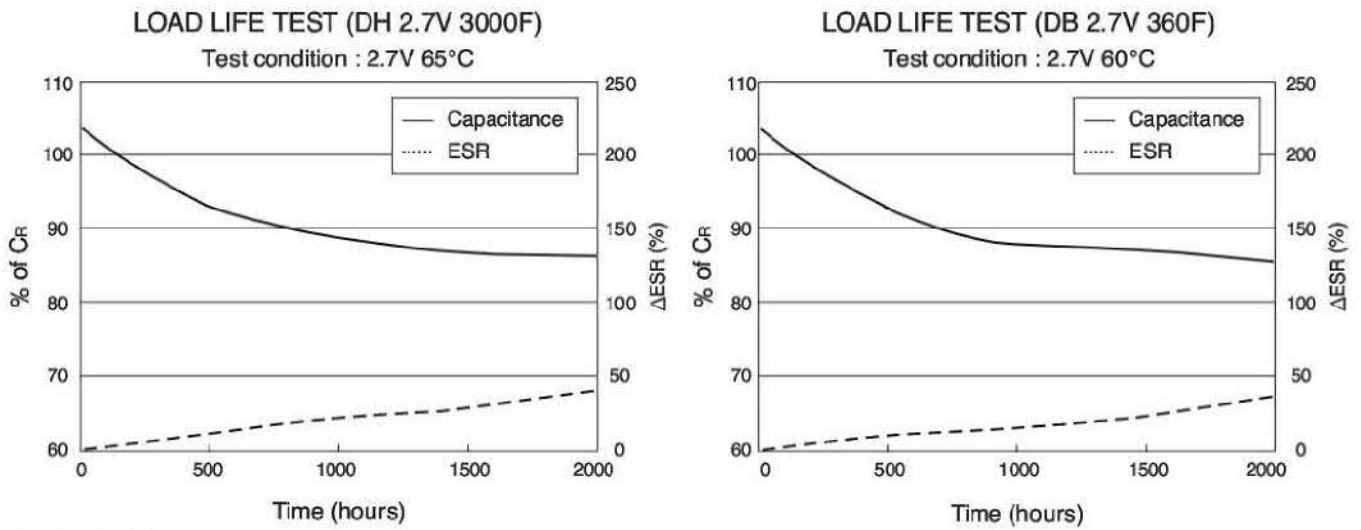
### Product Features

- ▷ Stable charge and discharge cycle  
Life is not affected by charging/discharge cycles because there is no chemical reaction
- ▷ The advantages of EDLCs over rechargeable batteries
  - Very safe, No risk of explosion or ignition
  - Environmentally-friendly, with no heavy metals used
  - Rapid charging and discharging (at heavy current )
  - Long cycle life, charging / discharging tens of thousands of times
  - Wide range of temperatures, operation even at low temperatures
  - Recycling is unnecessary (required for batteries)
- ▷ Character of Energy storage Device

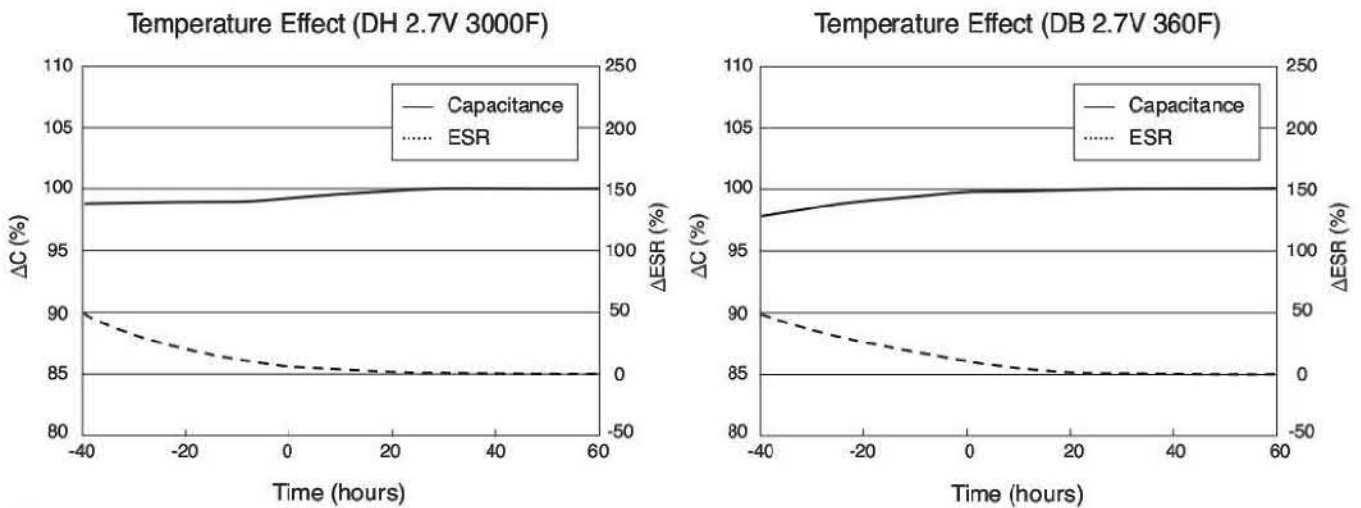
Section		EDLC	NI-MH	LIB
Voltage (Operating Range)		2.7 (2.7 ~ 0)	1.2 (1.4 ~ 0.9)	3.7 (4.2 ~ 3.0)
Operating Temperature Range		-40 ~ 65°C	Charge : 0 ~ 45°C	Charge : 0 ~ 45°C
High Temperature Spec.	Test Condition	Max. Operating Temp. and Max. Operating Voltage	Cycle life by Temperature	Max. Operating Temp. and Max. Operating Voltage
	Guarantee	1000hrs	0 ~ 20°C: 500 cycle	168hrs
Electrolyte	Solvent	AC / PC	KOH	EC
	Salt	Salt		LiPF6
Dangerous		None	Corrosiveness	Firing, Explosion
Eco - friendly		Very good	Good	Bad

## Technical Data

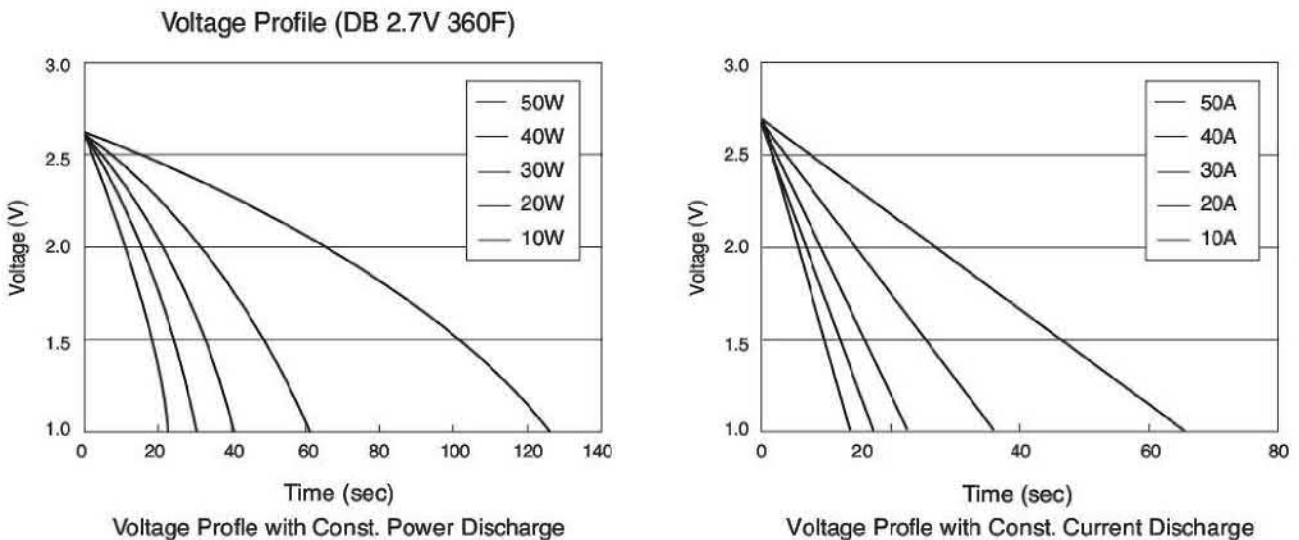
### CHART 1



### CHART 2



### CHART 3





### Green-Cap (Electric Double Layer Capacitors)

#### 1. Polarity

Be sure verify the polarity of the capacitor before use. If a reverse voltage is applied for a long time, capacitor lifetime is shortened and serious damage such as electrolyte leakage may occur.

Further more, there may be leftover electric charge from capacitor testing that could damage other circuit components such as the low-withstanding voltage parts of semiconductors, etc.

#### 2. Voltage

If a Green-Cap is used at a voltage exceeding its rated voltage, not only is its life shortened, but depending on the actual voltage, gas generated by electrochemical reactions inside the capacitor may cause it to leak or rupture

#### 3. Ambient Temperature

(1) Capacitor life is affected by operating temperature. In general, lowering ambient temperature by 10°C will double the life of a capacitor. Use the capacitor at the lowest possible temperature under the maximum guaranteed temperature.

(2) Operation above the maximum specified temperature not only shortens capacitor life, but can also cause serious damage such as electrolyte leakage.

Verify the operating temperature of the capacitor by taking into consideration not only the ambient temperature and temperature inside the unit, but also the radiation from heat generating elements inside the unit (power transistors, IC's, resistors, etc.) and self-heating due to ripple current.

Be careful not to place heat-generating elements across from the capacitor on the opposite of the PCB.

#### 4. Ripple Current

Green-Cap has a higher internal resistance than do electrolytic capacitors and are more susceptible to internal heat generation when exposed to ripple current. When the temperature of the element rises, a reacting current flows inside the Green-Cap, generating reaction products and raising internal resistance even further. This makes it difficult to maintain capacitance. Set the allowable limit for the ripple current-induced rise in capacitor temperature to 3°C measured at the surface of the capacitor

#### 5. Heat Stress During Soldering

Excessive heat stress may result in the deterioration of the electrical characteristics of the capacitor, loss of air-tightness, and electrolyte leakage due to the rise in internal pressure

(1) If the tip of the soldering iron touches the capacitor's external sleeve, the sleeve will melt or break.

(2) Use the general reference chart below to set soldering temperature and time.

(3) When soldering with a soldering iron, do not touch the tip to the body of the capacitor.

Minimize the time that soldering iron is in contact with the capacitor terminals.

(4) When using equipment such as a UV curing oven for pre-heating and adhesive hardening, do not set the temperature above 150°C.

If the temperature is higher than this, the external sleeve may crack and the end seal may suffer reduced performance.

(5) Never perform reflow soldering on Green-Cap using infrared or atmospheric methods.

#### 6. Circuit Board Cleaning

Circuit board can be immersed or ultrasonically cleaned using suitable cleaning solvents for up to 5 minutes and up to 60°C maximum temperature. The board should be thoroughly rinsed and dried. Recommended cleaning solvent include. Pine Alpha ST-100S, Sunelec B-12, DK beclear CW-5790, Aqua Cleaner 210SEP, Cold Cleaner P3-375, Telpen Cleaner EC 7R, Clean-thru 750H, Clean-thru 750L, Clean-thru 710M, Techno Cleaner 219, Techno Care FRV-1

- Consult with us if you are using a solvent other than any of those listed above
- The use of ozone depelling cleaning agents are not recommended in the interest of protecting the environment

## PART NUMBER SYSTEM

## Single Cell Part Number System

<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
1	2	3	4	5	6	7	8
Series Name	Rated Voltage	Capacitance	Cap. Tol.	Case Diameter	Case Height	Terminal Configurations	Internal Control Code

## 1 Series Name

See page 4.

## 2 Rated Working Voltage

WV	2.5	2.7	3.0
CODE	0E	5U	0U

## 3 Capacitance

ex)	1F	105
	10F	106
	100F	107
	1000F	108

## 4 Capacitance Tolerance

Tolerance (%)	±20	0~20%
Code	M	W

## 5 Case Diameter

ex)	Ø10	10
	Ø16	16
	Ø18	18

## 6 Case Height

ex)	20mm	020
	25mm	025
	30mm	030

## 7 Terminal Configurations

Terminal Configurations	Code
Radial Type(LEAD)	BB
Lug Terminal for Soldering	HA
Screw Terminal Type	SB
Threaded Terminal Type	TH
Weldable Terminal Type	WD

## Module Part Number System

<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
1	2	3	4	5	6	7
Series Name	Rated Voltage	Capacitance	Cap. Tol.	Revision Number	Single Cell Number in Module	Internal Control Code

## 1 Series Name

See page 4.

## 2 Rated Working Voltage

ex)	5.0V	0050
	13.5V	0135
	135V	1350

## 3 Capacitance

ex)	1.6F	0016
	16F	0160
	160F	1600

## 4 Capacitance Tolerance

Tolerance (%)	0 ~ +20
Code	W

## 5 Revision Number

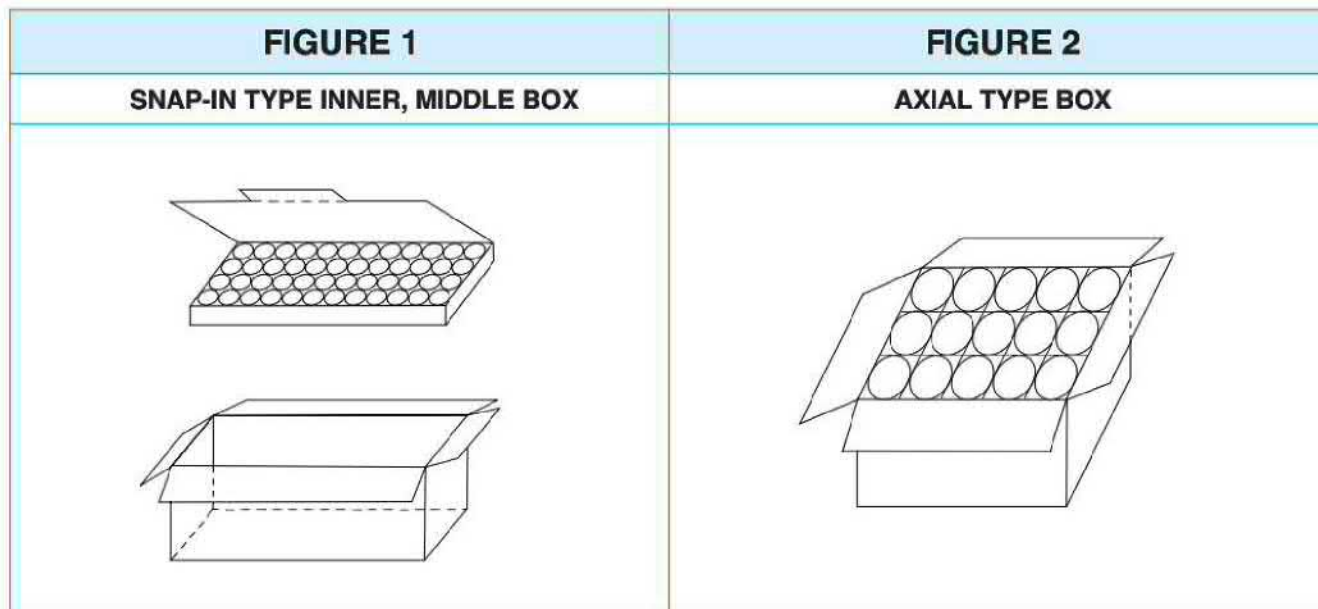
ex) 01, 02

## 6 Single Cell Number in Module

ex) 10ea 010

# PACKING

## ● BLUCK TYPE PACKING



## ● SNAP-IN TYPE(DB series) PACKING Quantity (pcs) / BOX (FIGURE 1)

SIZE		SNAP-IN(QUANTITY)	
ØD	L	INNER BOX	MIDDLE BOX
22	35, 45	150	450
30	45	50	200
	60	50	150
35	50 ~ 60	50	150

## ● AXIAL TYPE(DH series) PACKING Quantity (pcs) / BOX (FIGURE 2)

SIZE		AXIAL(QUANTITY)
ØD	L	
60	51 ~ 138	20

## ● RADIAL TYPE PACKING

### ● DS series BULK PACKING QUANTITY (pcs) / BOX

SIZE		BULK(QUANTITY)		
ØD	L	V-Bag	INNER BOX	MIDDLE BOX
8	20	300	2400	9600
10	20	200	1600	6400
	30	200	1200	4800
16	25	50	500	2000
18	40	50	300	1200



## DM Green-Cap Module

- Low internal resistance
- Balancing and overvoltage protection of individual cell
- Efficient heat Transfer to outside

### Application

- Next Generation Vehicle(FCEV, HEV) & Heavy Duty Transportation
- Short term UPS and telecommunications
- Portable Power Tool
- Wind Turbine Pitch System
- Electric Scooter
- Heavy Duty Transportation
- Golf Car



### Product & Spec.

Item	Characteristics	
Capacitance tolerance	0% ~ +20%	
Operating temperature range	-40 ~ 60°C or -40 ~ 65°C or -25 ~ 70°C	
Storage Temperature Range	-40 ~ 70°C	
Temperature characteristics	Capacitance change	Within $\pm 5\%$ of initial value at +20°C
	Internal resistance	Within 150% of initial value at +20°C
Endurance(60°C)	Test time	1000 hours
	Capacitance change	Within $\pm 30\%$ of initial specified value
	Internal resistance	Within 100% of initial specified value
Shelf life (60°C)	After 1000 hours no load test same as endurance	
Life Time at RT <sup>(1)</sup>	10 years	(1) $\Delta CI < 30\%$ and $\Delta ESR < 200\%$ of initially specified value, respectively and $LC < \text{specified value}$
Cycle Life (25°C) <sup>(1),(2)</sup>	500,000 cycles	(2) Cycle : between rated voltage and half rated voltage under constant current at 25°C

Part Number	Rated Voltage	Max. Operating Voltage	Capacitance (F)	ESR, 1KHz (mΩ)	ESR, DC (mΩ)	Max. Continuous Current (A)	Max. Peak Current (A)	Stored Energy (Wh)	Specific Energy (Wh/kg)	Cell Composition		Dimension(mm)			Weight (kg)
										ITEM	EA	L	W	T	
DM00500015W01002	5	5.4	1.5	110	143	0.2	3.1	0.005	1.47	2.7V 3F	2	23	10	18	0.0034
DM00500025W01002	5	5.4	2.5	53	69	0.3	5.3	0.009	1.80	2.7V 5F	2	23	12	22	0.005
DM01500666W01006	15	16.2	66.6	18	30	20	167	2.43	4.05	2.7V 400F	6	117	81	80	0.6
DM01505000W01006	15	16.2	500	1.7	2.4	150	1705	15.63	2.61	2.7V 3000F	6	417	68	157	6
DM04501111W01018	45	48.6	111.1	5.6	8.1	100	1316	31.25	2.40	2.7V 2000F	18	418	191	121	12
DM04501666W01018	45	48.6	166.6	5.2	6.3	150	1705	46.88	3.13	2.7V 3000F	18	481	191	157	14
DM07500266W01060	75	81	26.6	75	52.5	40	333	20.83	2.60	2.7V 400F	60	372	316	90	8
DM12500600W01050	125	135	60	15	20	150	1705	130.21	2.00	2.7V 3000F	50	1000	350	310	70

Note: Other Green-Cap modules are supplied on custom-made basis. Dimension and Weight could be changed without notice.

## Green-Cap (ELECTRIC DOUBLE LAYER CAPACITORS)

Upgrade

**DH**

Threaded Terminal Type,  
High Power Density Type

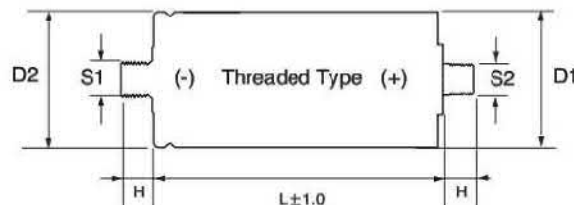
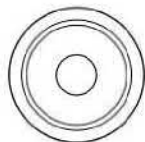
- High Power Density
- Rapid charge and discharge
- Ultra-low internal resistance



Item	Characteristics	
Operating temperature range	-40 ~ 65°C	
Rated Voltage	2.7 VDC	
Capacitance tolerance	0% ~ +20%	
Temperature characteristics	Capacitance change	Within $\pm 5\%$ of initial value at +20°C
	Internal resistance	Within 150% of initial value at +20°C
Endurance (65°C)	Test time	1500 hours
	Capacitance change	Within $\pm 30\%$ of initial specified value
	Internal resistance	Less than 100% of initial specified value
Shelf life (70°C)	After 1500 hours no load test same as endurance	
Life Time at RT <sup>(1)</sup>	10 years	(1) $\Delta CI < 30\%$ and $\Delta ESR < 200\%$ of initially specified value, respectively and $LC <$ specified value
Cycle Life (25°C) <sup>(1)(2)</sup>	500,000 cycles	(2) Cycle : between rated voltage and half rated voltage under constant current at 25°C

### DRAWING

Unit : mm



Size(mm)		
H	D1	D2
( $\pm 0.2$ )	( $\pm 0.2$ )	( $\pm 0.5$ )
13.0	$\varnothing 60.4$	$\varnothing 60.7$

Terminal Configurations		
Code	S1	S2
TH 100	M12×1.75	M12×1.75
TH 200	M16×2.0	M12×1.75

### CHARACTERISTIC LIST & DIMENSIONS

Rated Voltage	Capacitance (F)	ESR, 1KHz (mΩ)	ESR, DC (mΩ)	LC (72hr) (mA)	Max Continuous Current(A)	Max Peak Current(A)	Specific Energy		Weight (g)	Volume (ml)	Dimension $\varnothing D \times L$ (mm)
							(Wh/kg)	(Wh/L)			
2.7	1200	0.35	0.50	2.7	63	955	3.86	5.73	315	212	60.4 × 74
	1600	0.30	0.45	3.0	85	1233	4.63	6.65	350	244	60.4 × 85
	2000	0.25	0.35	4.2	106	1588	4.94	6.93	410	292	60.4 × 102
	3000	0.20	0.28	5.2	150	1975	5.63	7.68	540	395	60.4 × 138



Weldable Terminal Type,  
High Power Density Type

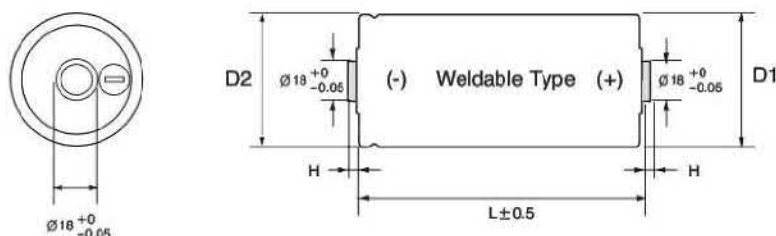
- High Power Density
- Rapid charge and discharge
- Ultra-low internal resistance



Item	Characteristics	
Operating temperature range	-40 ~ 65°C	
Rated Voltage	2.7 VDC	
Capacitance tolerance	0% ~ +20%	
Temperature characteristics	Capacitance change	Within $\pm 5\%$ of initial value at +20°C
	Internal resistance	Within 150% of initial value at +20°C
Endurance (65°C)	Test time	1500 hours
	Capacitance change	Within $\pm 30\%$ of initial specified value
	Internal resistance	Less than 100% of initial specified value
Shelf life (70°C)	After 1500 hours no load test same as endurance	
Life Time at RT <sup>(1)</sup>	10 years	(1) $ \Delta C  < 30\%$ and $\Delta ESR < 200\%$ of initially specified value, respectively and $LC < \text{specified value}$
Cycle Life (25°C) <sup>(1)(2)</sup>	500,000 cycles	(2) Cycle : between rated voltage and half rated voltage under constant current at 25°C

## DRAWING

Unit : mm



Size(mm)		
H	D1	D2
( $\pm 0.2$ )	( $\pm 0.2$ )	( $\pm 0.5$ )
3.0	$\phi 60.4$	$\phi 60.7$

## CHARACTERISTIC LIST & DIMENSIONS

Rated Voltage	Capacitance (F)	ESR, 1KHz (mΩ)	ESR, DC (mΩ)	LC (72hr) (mA)	Max Continuous Current(A)	Max Peak Current(A)	Specific Energy		Weight (g)	Volume (ml)	Dimension $\phi D \times L$ (mm)
							(Wh/kg)	(Wh/L)			
2.7	1200	0.35	0.50	2.7	63	955	3.92	5.73	310	212	60.4 × 74
	1600	0.30	0.45	3.0	85	1233	4.70	6.65	345	244	60.4 × 85
	2000	0.25	0.35	4.2	106	1588	4.94	6.93	410	292	60.4 × 102
	3000	0.20	0.28	5.2	150	1975	5.68	7.68	535	395	60.4 × 138



## Green-Cap (ELECTRIC DOUBLE LAYER CAPACITORS)



Snap-in Terminal Type,  
Standard Series

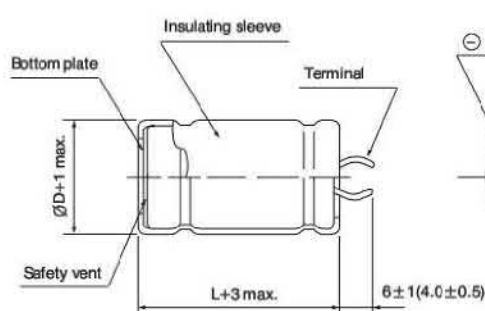


- Endurance : 2.5V 70°C 1000 hours, 2.7V 60°C 1000 hours
- The middle size and high capacitance, low resistance
- Charge and discharge efficiency are higher than in batteries

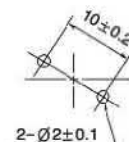
Item	Characteristics	
Operating temperature range	-25 ~ +70°C	-40 ~ +60°C
Rated Voltage	2.5 VDC	2.7 VDC
Capacitance tolerance	-20 ~ +20% or 0% ~ +20%	
Temperature characteristics	Capacitance change	Within $\pm 5\%$ of initial value at +20°C
	Internal resistance	Within 150% of initial value at +20°C
Endurance(2.5V:70°C, 2.7V:60°C)	Test time	1000 hours
	Capacitance change	Within $\pm 30\%$ of initial specified value
	Internal resistance	Less than 100% of initial specified value
Shelf life(2.5V:70°C, 2.7V:60°C)	After 1000 hours no load test same as endurance	
Life Time at RT <sup>(1)</sup>	10 years	(1) $I\Delta C < 30\%$ and $\Delta ESR < 200\%$ of initially specified value, respectively and $LC < \text{specified value}$
Cycle Life (25°C) <sup>(1)(2)</sup>	500,000 cycles	(2) Cycle : between rated voltage and half rated voltage under constant current at 25°C

### DRAWING

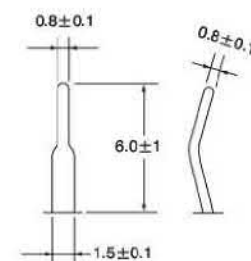
Unit : mm



### PC Board Mounting Holes



### Terminal



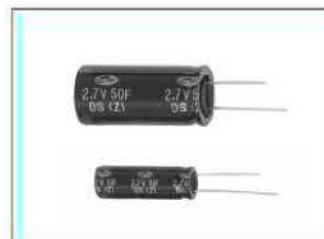
### CHARACTERISTIC LIST & DIMENSIONS

Rated Voltage	Capacitance (F)	ESR, 1KHz (mΩ)	ESR, DC (mΩ)	LC (72hr) (mA Max.)	Max Continuous Current(A)	Max Peak Current(A)	Specific Energy		Weight (g)	Volume (ml)	Dimension ØD×L(mm)
							(Wh/kg)	(Wh/L)			
2.5	100	15.0	35.0	0.25	5.3	27.7	3.62	5.07	24	17	22 × 45
	200	10.0	20.0	0.50	10.4	50.0	4.13	5.46	42	32	30 × 45
	300	6.0	15.0	0.75	15.3	68.2	4.20	5.41	62	48	35 × 50
	360	6.0	12.0	0.90	18.5	84.6	4.17	5.41	75	58	35 × 60
	400	6.0	10.0	10.0	20.8	100.0	4.63	6.01	75	58	35 × 60
2.7	100	8.0	10.0	0.27	6.4	67.5	4.82	5.92	21	17	22 × 45
	200	7.0	9.0	0.54	12.3	96.4	5.33	6.37	38	32	30 × 45
	300	3.5	5.0	0.91	18.8	162.0	5.33	6.31	57	48	35 × 50
	360	3.2	3.8	0.97	22.7	205.2	5.21	6.31	70	58	35 × 60
	400	3.2	3.8	1.08	25	214.2	5.79	7.02	70	58	35 × 60

※ Ø35 4 pin type terminal drawing is same see pages 178.

## DS Radial Type, Standard Series

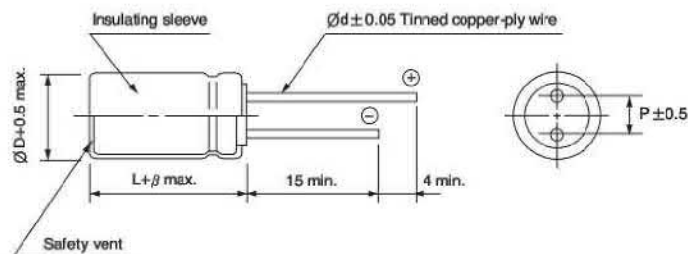
- Endurance : 2.5V 70°C 1000 hours, 2.7V 60°C 1000 hours
- The small size and high capacitance, low resistance
- Can be charge and discharge more times than secondary batteries
- OEM product



Item	Characteristics	
Operating temperature range	-25 ~ +70°C	-40 ~ +60°C
Rated Voltage	2.5 VDC	2.7 VDC
Capacitance tolerance	-20 ~ +20%	
Temperature characteristics	Capacitance change	Within $\pm 5\%$ of initial value at +20°C
	Internal resistance	Within 150% of initial value at +20°C
Endurance (2.5V:70°C, 2.7V:60°C)	Test time	1000 hours
	Capacitance change	Within $\pm 30\%$ of initial specified value
	Internal resistance	Less than 100% of initial specified value
Shelf life (2.5V:70°C, 2.7V:60°C)	After 1000 hours no load test same as endurance	
Life Time at RT <sup>(1)</sup>	10 years	(1) $\Delta C < 30\%$ and $\Delta ESR < 200\%$ of initially specified value, respectively and LC < specified value
Cycle Life (25°C) <sup>(1)(2)</sup>	500,000 cycles	(2) Cycle : between rated voltage and half rated voltage under constant current at 25°C

## DRAWING

Unit : mm



ØD	8	10	16	18
P	3.5	5	7.5	7.5
Ød	0.6	0.6	0.8	0.8
β	1.5	2.0		

## CHARACTERISTIC LIST & DIMENSIONS

Rated Voltage	Capacitance (F)	ESR, 1KHz (mΩ)	ESR, DC (mΩ)	LC (72hr) (mA Max.)	Specific Energy		Specific Power		Weight (g)	Volume (ml)	Dimension ØD × L (mm)
					(Wh/kg)	(Wh/L)	(W/kg)	(W/L)			
2.5	3	140	350	0.008	1.63	2.59	1,339	2,132	1.6	1.0	8 × 20
	5	110	250	0.013	1.97	2.76	1,364	1,910	2.2	1.6	10 × 20
	10	65	120	0.025	2.48	3.68	1,786	2,653	3.5	2.4	10 × 30
	25	35	65	0.063	2.89	4.32	1,538	2,296	7.5	5.0	16 × 25
	60	20	30	0.150	3.77	5.12	1,812	2,456	13.8	10.2	18 × 40
2.7	3	60	90	0.008	2.17	3.02	6,943	9,669	1.4	1.0	8 × 20
	5	50	70	0.014	2.41	3.22	5,951	7,956	2.1	1.6	10 × 20
	10	30	50	0.027	3.49	4.30	6,033	7,426	2.9	2.4	10 × 30
	25	20	35	0.068	3.78	5.04	3,730	4,972	6.7	5.0	16 × 25
	50	10	20	0.140	4.40	4.97	3,803	4,297	11.5	10.2	18 × 40

## 2 CONDUCTIVE POLYMER ALUMINUM ELECTROLYTIC CAPACITORS

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## Hi-CAP (Conductive Polymer Aluminum Electrolytic Capacitor)

**Hi-CAP** is an electrolytic capacitor that uses a highly electric conductive polymer as its electrolyte.

**Hi-CAP** has excellent temperature and load life characteristics due to adoption of stable polymer in high temperature.

Compared to other electrolytic capacitors, the **Hi-CAP** is a low impedance capacitor suitable for high frequency making it ideal for digital circuit.

### 1. Circuit design

- (1) The conducting polymer capacitor cannot be used in circuits that undergo frequent charging and discharging because the resulting internal heat buildup can cause capacitor failure.
- (2) Do not use the capacitor in time-constant or coupling circuits. In these type of circuit, electrical characteristics such as capacitance can change under certain environmental conditions.

### 2. Capacitor handling techniques

#### (1) Capacitor insertion

Incorrect land size may cause problems with capacitor placement and mountability.  
Refer to the land size table for appropriate design dimensions.

#### (2) Soldering

When using a soldering iron, set the tip temperature to no more than 300°C, and work in as short a time as possible under 10 seconds. While soldering, do not apply strong force to the capacitor.

#### Reflow soldering

The conducting polymer capacitor is designed specifically for reflow soldering.

Maintain soldering conditions (pre-heating, reflow temperature, time) within the range indicated in the product specifications. If soldering time is lengthened or temperature is higher, the heat can damage the capacitor element and / or the molded case.

Do not perform reflow soldering more than twice.

#### (3) Circuit board cleaning

Capacitors can withstand immersion in solvent at 60°C or under for up to 5 minutes.

Be sure to sufficiently wash (about 3 min. with water) and dry (20 min. at 100°C) the board afterward.

### 3. Electrical characteristics comparison of Capacitors

Species	High Frequency	Temperature	Allowable ripple	Miniaturized
Al Electrolytic capacitor	○	○	⊙	●
MLCC	●	○	—	⊙
Film Capacitor	●	●	—	○
Tantal Capacitor	⊙	⊙	○	⊙
Hi-CAP	●	●	●	⊙

※ ● Superior    ⊙ Ordinary    ○ Inferior

## PRECAUTIONS AND GUIDELINES (Conductive Polymer)

The **Hi-CAP** is a Conductive Polymer Solid Aluminum Capacitor that uses highly conductive polymer electrolytic material.

Please read the following in order to get the most out of your **Hi-CAP** capacitor. For aluminum electrolytic capacitors, please refer to PRECAUTIONS AND GUIDELINES

### 1. Designing Device Circuits

#### 1) Types of Circuits Where Hi-CAP Capacitors are Not to be Used

The leakage current in conductive polymer solid aluminum capacitors(hereafter called Hi-CAP) may vary depending on thermal stresses during soldering. Avoid the use of capacitors in the following types of circuits:

- ① High-impedance circuits that are to sustain voltages.
- ② Coupling circuits
- ③ Time constant circuits

Because the capacitance varies depending on the environment the capacitors are used in, there is a possibility that the capacitor can affect a time constant circuit where sensitivity to variation in capacitance is required.

- ④ Other circuits that are significantly affected by leakage current

#### 2) Circuit Design

Verify the following before designing the circuit:

- ① The electrical characteristics of the capacitor will vary depending on differences in temperature and frequency. You had better design after verifying the scope of these factors.
- ② When connecting two or more capacitors in parallel, ensure that the design takes current balancing into account.
- ③ When two or more capacitors are connected in series, variability in applied voltage may cause over-voltage conditions. Contact Samwha before using capacitors connected in series.
- ④ Avoid putting heat generating parts either around the capacitor or on the reverse of the circuit board

#### 3) Use in High Reliable and Critical Applications

Consult with Samwha before using these capacitors in applications involving human life: Aviation/space equipment, Nuclear power equipment, Medical equipment and Automotive equipment, or in applications where capacitor failure could have a major impact

#### 4) Polarity

The Hi-CAP is a polarized solid aluminum electrolytic capacitor. Do not apply either reverse voltages or AC voltages to the polarized capacitors, using reversed polarity may cause a short circuit. Refer to the catalog product specifications or capacitor body to confirm the polarity prior to use

#### 5) Operating Voltage

Do not apply a greater than rated voltage, if a voltage greater than the rated voltage is suddenly applied the leakage current increases causing shorting. The peak voltage of superimposed AC voltages(ripple voltages) on DC voltages must not exceed the full rated voltage. While there are specifications for surge voltages exceeding the rated voltage, usage conditions apply, and continued operation for extended periods of time under such conditions cannot be guaranteed.

#### 6) Ripple current

Do not apply currents in excess of the rated ripple current. The superimposition of a large ripple current increases the rate of heating within the capacitor. When excessive ripple current is imposed the internal temperature increases which can shorten life and shorting may occur.



### 7) Operating temperature

Use within the stated category temperature range, if used outside this range, characteristics can deteriorate potentially leading to problems.

### 8) Charging and Discharging in Capacitor

Do not use the Hi-CAP in circuits where the capacitor is repetitively charged and discharged rapidly. Repetitively charging and discharging the capacitor rapidly may reduce the capacitance or may cause damage due to internal heating. Use of a protective circuit to ensure reliability is recommended when rush currents exceed 20A.

### 9) Leakage current

The leakage current may increase when the capacitors are subjected to the conditions below. After that, however, the leakage current will gradually decrease by self-healing action of the dielectric oxide layer when the capacitors are applied with a voltage less than the rated voltage within the Category Temperature range. As the voltage is closer to the rated voltage and the temperature is closer to the upper limit of Category Temperature range, the leakage current decreases faster.

The leakage current will increase by the following factors,

- ① Soldering
- ② Testing of high temperature exposure with no voltage applied, high temperature/humidity storage, temperature cycles, etc.

### 10) Failures and Service Life

Based on the KS C 6032 Standard, the failure rate for Hi-CAP(with a 60% reliability standard) is as follows: 0.5%/1,000 hours(applied the rate voltage at the upper limit of Category Temperature range)

#### (1) Failure Modes

- ① The principal failure mode is wear-out failure, that is, capacitance decreases and ESR increases, and eventually the capacitors become open circuit failure. In addition, short circuit failure may happen with over-voltage and excessive current applied to the capacitors.
- ② The failure rate would be reduced by reducing ambient temperatures, ripple current and applying voltage.
- ③ If the short-circuited capacitor, which may be caused by over-voltages higher than the rated voltage or other conditions, has a large amount of current passed through, the aluminum can of the capacitor bulges and might be expelled with odor gas emitted.
- ④ The product contains flammable materials. If the short causes a spark it may ignite. Please be careful when installing the product, its position and the layout design.
  - ▶ Increase safety by using in conjunction with a protective circuit or protective equipment.
  - ▶ Install measures such as redundant circuits so that the failure of a part of the equipment will not cause unstable operation.

#### (2) Service Life

Hi-CAP uses rubber as the sealing material, so the service life depends on the thermal integrity of this rubber. Consequently, it is recommended to use the capacitor at a lower temperature than the maximum temperature for the capacitor category.

### 11) Capacitor Insulation

Insulation of the capacitor's case is not guaranteed. Ensure electrical insulation between the capacitor case, negative electrode, positive electrode and circuit pattern.

### 12) Capacitor Usage Environment

Do not use/expose capacitors to the following conditions.

- ① Oil, water, salty water, take care to avoid storage in damp locations.
- ② Direct sunlight
- ③ Toxic gases such as hydrogen, sulfide, sulfurous acids, nitrous acids, chlorine and chlorine compounds, bromine and bromine compounds, ammonia, etc.
- ④ Ozone, ultraviolet rays and radiation.



## 13) Storage

### (1) SMD Type

- ① Do not store the Hi-CAP at high temperatures and high humidity. Avoid direct sunlight.  
(Recommendable conditions 5 to 35°C, 45 to 75% RH)
- ② To keep good solderability, store the Hi-CAP not more than 6 months after delivery and 30 days after unseal.

	Before unseal	After unseal
A period of storage (SMD)	Within 6 months after delivery (Sealed conditions)	Within 30 days of unseal (Packaged condition with carrier tape)

- ③ The Hi-CAP should not be direct contact with water, salt spray, oil spray or high humidity.
- ④ The Hi-CAP must not be exposed to toxic gases such as hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, ammonia, etc.

### (2) LEAD Type

- ① Do not store the Hi-CAP at high temperatures and high humidity. Avoid direct sunlight.  
(Recommendable conditions 5 to 35°C, 45 to 75% RH)
- ② To keep good solderability, store the Hi-CAP not more than 1 year after delivery and 7 days after unseal.

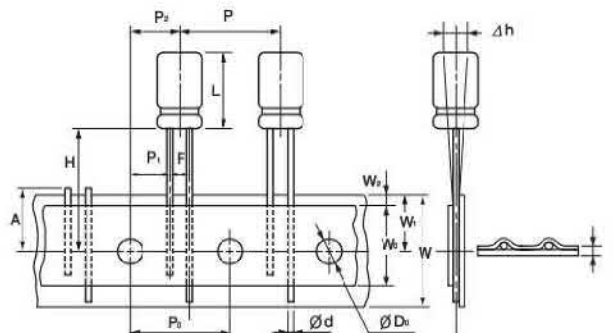
	Before unseal	After unseal
A period of storage (LEAD)	Within 1 year after delivery (Sealed conditions)	Within 7 days of unseal

- ③ The Hi-CAP should not be direct contact with water, salt spray, oil spray or high humidity.
- ④ The Hi-CAP must not be exposed to toxic gases such as hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, ammonia, etc.

# CONDUCTIVE POLYMER ALUMINUM ELECTROLYTIC CAPACITORS

## Taping Specifications for Lead Type Polymer Capacitors

**DRAWING I**



Applicable Drawing No.			I				
Description		Symbol	Tolerance	Ø6.3	Ø8		Ø10
Body Height		L	+1	6, 8	9	12	13
Lead Dia.		Ød	±0.05	0.45	0.60	0.60	0.6
Body Pitch		P	±1.0	12.7			
Feeding Hole Pitch		P <sub>0</sub>	±0.2	12.7			
Feeding Hole Alignment		P <sub>1</sub>	±0.7	5.1			3.85
Feeding Hole Alignment		P <sub>2</sub>	±1.0	6.35			
Lead Center Spacing		F	+0.6/-0.2	2.5	3.5		5.0
Body Inclination		Δ h	±2.0	0			
Tape Width		W	±0.5	18.0			
Adhesive Tape Width		W <sub>0</sub>	min.	9.5	12.5		
Feeding Hole Alignment		W <sub>1</sub>	±0.5	9.0			
Adhesive Tape Margin		W <sub>2</sub>	max.	2.0			
Length from Seating Plane		H	±0.5	17.5	20.0		18.5
Feeding Hole Dia.		ØD <sub>0</sub>	±0.2	4.0			
Total Tape Thickness		t	±0.2	0.7			
Cut Lead Height		A	max.	11.0			
Taping Code	Ammo	⊕ leader		PC	PF		PA

## PACKAGING Q'ty(pcs.) / BOX

Size		Ammo			
ØD	Case Height	L	H	W	Q'ty
6.3	6	332	230	42	1500
	8	332	230	49	1500
8	9	332	230	49	1000
	12	332	230	49	1000
10	13	332	190	51	500



## BULK PACKING QUANTITY(PCS) / BOX

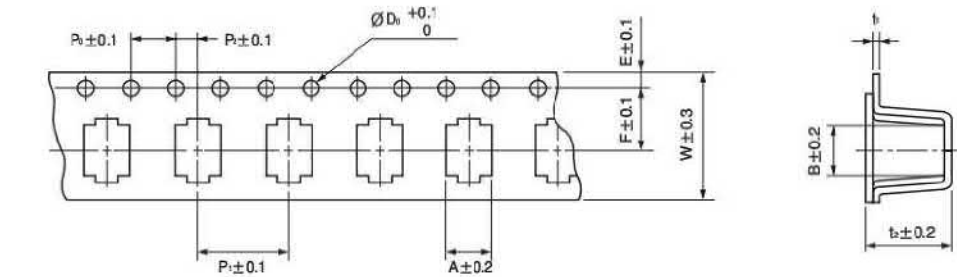
Size		V-BAG	INNER BOX	MIDDLE BOX
D	L			
6.3	6	750	6000	24000
	8	750	6000	24000
8	9	400	2800	11200
	12	400	2800	11200
10	13	250	1500	6000

## CUTTING PACKING QUANTITY(PCS) / BOX

Size		V-BAG	INNER BOX	MIDDLE BOX
D	L			
6.3	6	750	6000	24000
	8	750	6000	24000
8	9	500	4000	16000
	12	400	3200	12800
10	13	250	1500	6000

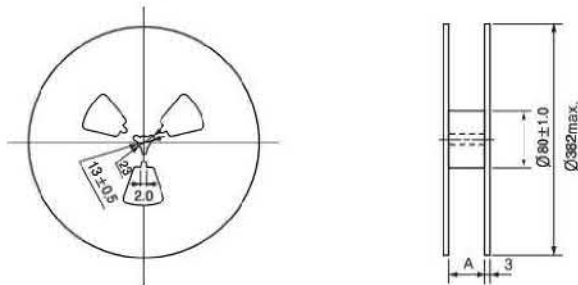
## Taping Specifications for SMD Type Polymer Capacitors (Vertical type)

### Carrier Tape



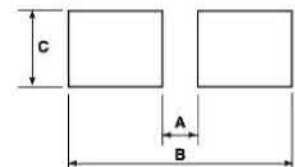
ØD×L	A	B	ØD <sub>0</sub>	E	F	P <sub>0</sub>	P <sub>1</sub>	P <sub>2</sub>	t <sub>1</sub>	t <sub>2</sub>	W
4×5.4	4.7	4.7	1.5	1.75	5.5	4	8	2	0.4	5.7	12
5×5.9	5.7	5.7	1.5	1.75	7.5	4	8	2	0.4	6.3	16
6.3×4.5	6.9	6.9	1.5	1.75	7.5	4	12	2	0.4	4.7	16
6.3×5.9	7.0	7.0	1.5	1.75	7.5	4	12	2	0.4	6.3	16
8×6.9	8.7	8.7	1.5	1.75	11.5	4	12	2	0.4	7.2	24
8×11.9	8.7	8.7	1.5	1.75	11.5	4	16	2	0.4	12.3	24
10×7.9	10.7	10.7	1.5	1.75	11.5	4	16	2	0.4	8.2	24
10×12.6	10.7	10.7	1.5	1.75	11.5	4	16	2	0.5	13	24

### Reel(Taping Code : VR)



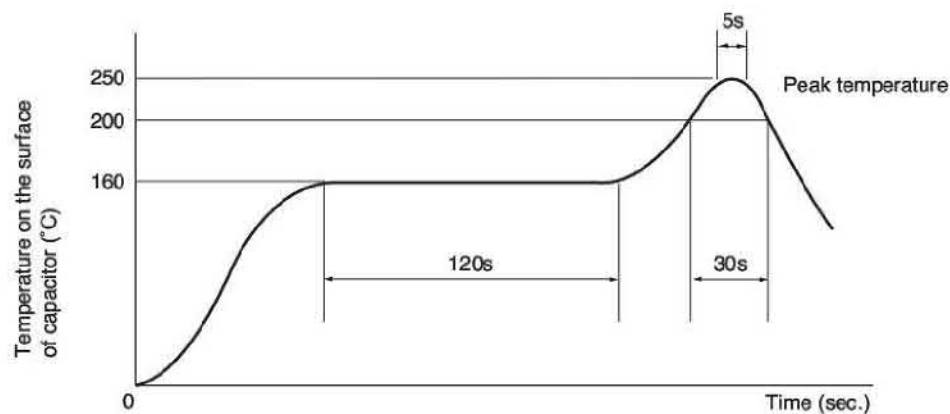
ØD×L	A	ØD×L	Q'ty/Reel(pcs)	Q'ty/Box(pcs)
4×5.4	13	4×5.4	2000	20000
5×5.9	17	5×5.9	1500	15000
6.3×4.5	17	6.3×4.5	1000	10000
6.3×5.9	17	6.3×5.9	1000	10000
8×6.9	25	8×6.9	1000	10000
8×11.9	25	8×11.9	400	4000
10×7.9	25	10×7.9	500	5000
10×12.6	25	10×12.6	400	4000

### Recommended Land Size



ØD×L	A	B	C
4×5.4	1.0	6.2	1.6
5×5.9	1.4	7.4	1.6
6.3×4.5	2.1	9.1	1.6
6.3×5.9	2.1	9.1	1.6
8×6.9	2.8	11.1	1.9
8×11.9	2.8	11.1	1.9
10×7.9	4.3	13.1	1.9
10×12.6	4.3	13.1	1.9

## Recommendable reflow soldering temperature

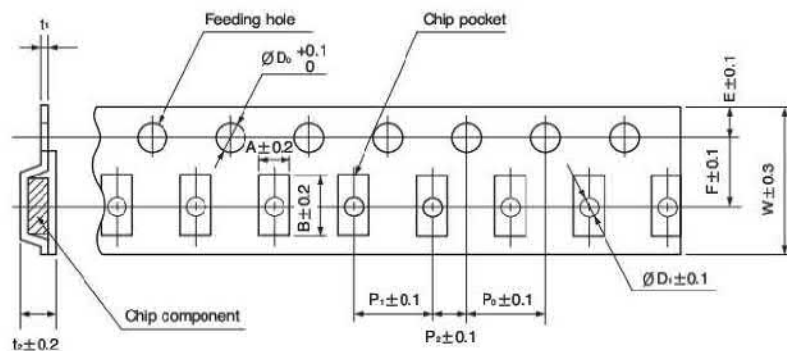




## CONDUCTIVE POLYMER ALUMINUM ELECTROLYTIC CAPACITORS

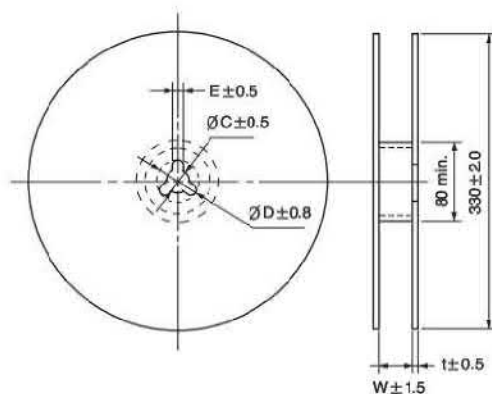
### Taping Specifications for SMD type Polymer Capacitors (Horizontal type)

#### Carrier Tape



Size code	A	B	$\varnothing D_0$	$\varnothing D_1$	E	F	$P_0$	$P_1$	$P_2$	$t_1$	$t_2$	W
A	4.7	7.7	1.5	1.6	1.75	5.5	4.0	8.0	2.0	0.3	2.2	12.0
C	4.7	7.7	1.5	1.6	1.75	5.5	4.0	8.0	2.0	0.3	3.4	12.0
D	4.7	7.7	1.5	1.6	1.75	5.5	4.0	8.0	2.0	0.3	4.5	12.0

#### Packaging Specifications



Size code	Q'ty / Reel
A	3000 pcs.
C	2000 pcs.
D	2000 pcs.

$\varnothing C$	$\varnothing D$	E	W	t
13.0	21.0	2.0	14.0	2.0



## Chip type, With Conductive Polymer Series

- Low ESR, high ripple current
- Designed for surface mounting on high density PC board
- Load life for 2000 hours at 105°C
- Complied to the RoHS directive

Hi-CAP



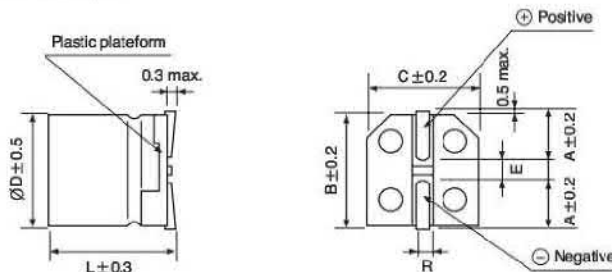
Item	Characteristics	
Operating temperature range	-55 ~ +105°C	
Leakage current max.*	Less than or equal to the value of Table1	
Capacitance tolerance	±20% at 120Hz, 20°C	
Dissipation factor max.	Less than or equal to the value of Table1	
ESR	Less than or equal to the value of Table1	
Temperature characteristics (Impedance ratio at 100kHz)	Z-55°C / Z+20°C	Z+105°C / Z+20°C
	0.75 ~ 1.25	0.75 ~ 1.25
Load life (after application of the rated voltage for 2000 hours at 105°C, in case of 25WV is applied 20V)	Leakage current	Less than specified value
	Capacitance change	Within ±20% of initial value
	tanδ	Less than 150% of specified value
Resistance to soldering heat (Refer to Page 35 for soldering recommendation)	Leakage current	Less than specified value
	Capacitance change	Within ±10% of initial value
	tanδ	Less than 130% of specified value

\* In case of some problems for measured values, measure after applying rated voltage for 2.5 to 20V products or 20V derating voltage for 25V products for 120 minutes at 105°C.

## DRAWING

Unit : mm

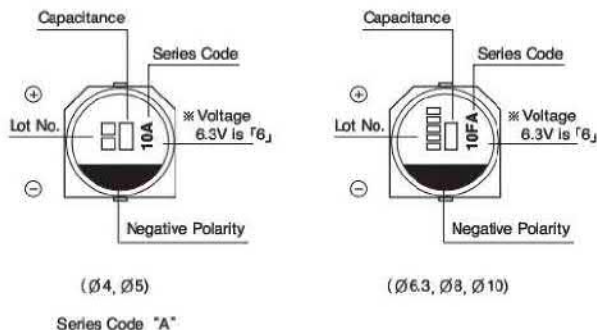
### < Dimensions >



### PART NUMBER SYSTEM (See Page 52)

Size	ØD	L	B	C	E	A	R
4×5.4	4	5.4	4.3	4.3	1.0	1.9	0.5~0.8
5×5.9	5	5.9	5.3	5.3	1.4	2.2	0.5~0.8
6.3×5.9	6.3	5.9	6.6	6.6	2.2	2.45	0.5~0.8
8×6.9	8	6.9	8.3	8.3	3.2	2.9	0.5~0.8
8×11.9	8	11.9	8.3	8.3	3.2	2.9	0.8~1.1
10×7.9	10	7.9	10.3	10.3	4.6	3.2	0.8~1.1
10×12.6	10	12.6	10.3	10.3	4.6	3.2	0.8~1.1

### < Marking >



# CONDUCTIVE POLYMER ALUMINUM ELECTROLYTIC CAPACITORS

**FA** Series

● Table 1. FA(SMD type) Series Characteristics List

WV	μF	ØD(mm)	L(mm)	ESR(mΩ)max. 100~300kHz	Ripple current (mA rms)at 105°C 100kHz	Dissipation factor 120Hz	Leakage Current (μA)(max.) after 2 minutes
2.5	220	6.3	5.9	23	2390	0.12	110
2.5	680	8	11.9	13	4520	0.15	340
2.5	1500	10	12.6	12	5440	0.18	750
4	33	4	5.4	200	740	0.15	66
4	39	5	5.9	70	1100	0.12	78
4	68	5	5.9	60	1400	0.12	136
4	150	6.3	5.9	40	1810	0.12	120
4	150	8	6.9	35	2560	0.12	120
4	330	8	6.9	35	2560	0.12	264
4	560	8	11.9	13	4520	0.15	448
4	680	10	7.9	25	3700	0.12	544
4	1200	10	12.6	12	5440	0.18	960
6.3	22	4	5.4	200	740	0.12	69.3
6.3	47	5	5.9	70	1100	0.12	148
6.3	82	6.3	5.9	45	1700	0.12	103
6.3	100	6.3	5.9	40	1810	0.12	126
6.3	120	6.3	5.9	17	2780	0.12	151
6.3	220	8	6.9	35	2560	0.12	277
6.3	220	10	7.9	25	3700	0.12	277
6.3	330	10	7.9	25	3700	0.12	416
6.3	470	10	7.9	25	3700	0.12	592
6.3	470	8	11.9	15	4210	0.12	592
6.3	820	10	12.6	12	5440	0.15	775
10	4.7	4	5.4	240	670	0.08	23.5
10	6.8	4	5.4	240	670	0.08	34
10	10	4	5.4	220	700	0.09	50
10	15	4	5.4	200	740	0.10	75
10	33	5	5.9	70	1100	0.10	165
10	47	6.3	5.9	50	1620	0.12	94
10	56	6.3	5.9	45	1700	0.12	112
10	120	8	6.9	35	2560	0.12	240
10	150	8	6.9	35	2560	0.12	300
10	150	10	7.9	30	3020	0.12	300
10	270	10	7.9	25	3700	0.12	540
10	330	10	7.9	25	3700	0.12	660
10	330	8	11.9	17	3950	0.15	660
10	560	10	12.6	13	5230	0.15	840
16	3.3	4	5.4	260	660	0.07	26.4
16	15	5	5.9	120	1020	0.10	120
16	22	5	5.9	90	1060	0.10	176
16	39	6.3	5.9	50	1620	0.10	125
16	56	8	6.9	45	1890	0.12	179
16	82	8	6.9	40	2120	0.12	262
16	100	10	7.9	35	2670	0.12	320
16	150	10	7.9	30	3020	0.12	480
16	180	10	7.9	30	3020	0.12	576
16	180	8	11.9	20	3640	0.15	576
16	330	10	12.6	16	4720	0.15	792
20	10	5	5.9	120	1020	0.10	100
20	22	6.3	5.9	60	1450	0.10	88
20	27	6.3	5.9	60	1450	0.10	108
20	33	8	6.9	45	1890	0.12	132
20	47	8	6.9	45	1890	0.12	188
20	56	10	7.9	40	2400	0.12	224
20	68	10	7.9	40	2400	0.12	272
20	100	8	11.9	24	3320	0.15	400
20	150	10	12.6	20	4320	0.15	600
25	6.8	6.3	5.9	80	1200	0.10	85
25	10	8	6.9	60	1500	0.10	125
25	22	10	7.9	50	2000	0.10	275
25	33	8	11.9	30	2980	0.12	413
25	56	10	12.6	28	3800	0.12	700

● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	120Hz	1kHz	10kHz	100 ~ 500kHz
Coefficient	0.05	0.3	0.7	1





Chip type, Large Capacitance, Low ESR Series

- Large capacitance, Low ESR than FA Series
- Complied to the RoHS directive

Hi-CAP

FA → FH  
Large Capacitance



SOLID TYPES

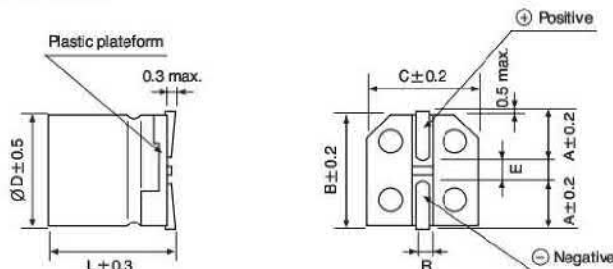
Item	Characteristics	
Operating temperature range	-55 ~ +105°C	
Leakage current max.*	Less than or equal to the value of Table1	
Capacitance tolerance	±20% at 120Hz, 20°C	
Dissipation factor max.	Less than or equal to the value of Table1	
ESR	Less than or equal to the value of Table1	
Temperature characteristics (Impedance ratio at 100kHz)	Z-55°C / Z+20°C	Z+105°C / Z+20°C
	0.75 ~ 1.25	0.75 ~ 1.25
Load life (after application of the rated voltage for 2000 hours at 105°C)	Leakage current	Less than specified value
	Capacitance change	Within ±20% of initial value
	ESR	Less than 150% of specified value
	tanδ	Less than 150% of specified value
Resistance to soldering heat (Refer to Page 35 for soldering recommendation)	Leakage current	Less than specified value
	Capacitance change	Within ±10% of initial value
	tanδ	Less than 130% of specified value

\* In case of some problems for measured values, measure after applying rated voltage for 120 minutes at 105°C.

## DRAWING

Unit : mm

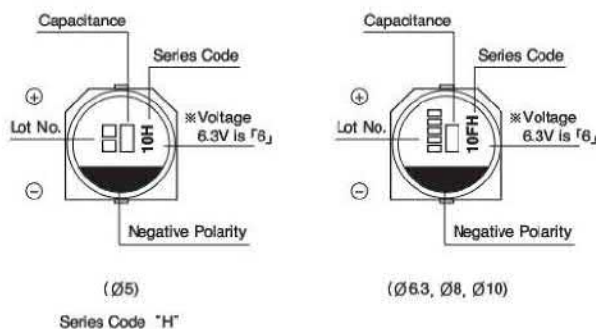
### < Dimensions >



### PART NUMBER SYSTEM (See Page 52)

Size	ØD	L	B	C	E	A	R
5×5.9	5	5.9	5.3	5.3	1.4	2.2	0.5~0.8
6.3×5.9	6.3	5.9	6.6	6.6	2.2	2.45	0.5~0.8
8×6.9	8	6.9	8.3	8.3	3.2	2.9	0.5~0.8
8×11.9	8	11.9	8.3	8.3	3.2	2.9	0.8~1.1
10×12.6	10	12.6	10.3	10.3	4.6	3.2	0.8~1.1

### < Marking >



## CONDUCTIVE POLYMER ALUMINUM ELECTROLYTIC CAPACITORS

### FH Series

Table 1. FH(SMD type) Series Characteristics List

WV	$\mu\text{F}$	Size		ESR(m $\Omega$ )max. 100kHz~300kHz	Ripple current (mA rms) at 105°C, 100kHz	Dissipation factor at 120Hz (max.)	Leakage Current ( $\mu\text{A}$ )
		$\varnothing$ D(mm)	L(mm)				
2.5	180	5	5.9	24	2200	0.12	300
2.5	330	6.3	5.9	15	3160	0.12	500
2.5	390	6.3	5.9	25	2410	0.12	300
2.5	680	8	6.9	20	3370	0.12	500
2.5	820	8	11.9	9	5380	0.15	500
2.5	1500	8	11.9	10	5150	0.15	750
2.5	2700	10	12.6	12	5080	0.15	1350
4	150	5	5.9	23	2240	0.12	300
4	330	6.3	5.9	21	2630	0.12	300
4	560	8	6.9	22	3220	0.12	500
4	560	8	11.9	9	5380	0.15	500
4	1200	8	11.9	12	4700	0.15	960
4	1500	8	11.9	12	4700	0.15	1200
6.3	100	5	5.9	25	2150	0.12	300
6.3	220	6.3	5.9	15	3110	0.12	300
6.3	330	6.3	5.9	17	3390	0.12	416
6.3	390	8	6.9	22	3220	0.12	491
6.3	820	8	11.9	12	4700	0.15	1033
10	68	5	5.9	30	1970	0.12	300
10	120	6.3	5.9	27	2320	0.12	300
10	270	8	6.9	22	3220	0.12	500
16	39	5	5.9	35	1820	0.12	300
16	68	6.3	5.9	30	2200	0.12	300
16	120	8	6.9	27	2900	0.12	500

### FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	120Hz	1kHz	10kHz	100~500kHz
Coefficient	0.05	0.3	0.7	1



Chip type, Guaranteed at 125°C Series

- The FT Series is very reliable, guaranteeing performance
- Suitable for use in smoothing circuits of vehicle-mounted equipment, industrial equipment, etc
- Complied to the RoHS directive

Hi-CAP

FA → FT  
High Temp.



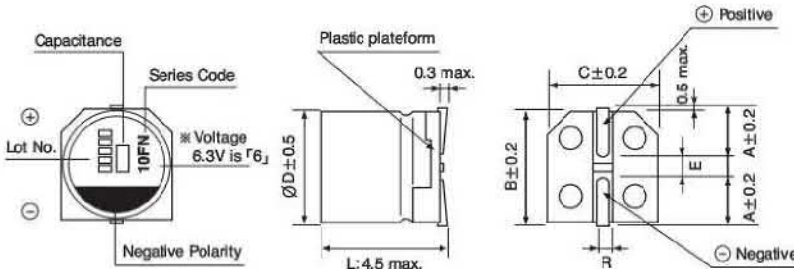
SOLID TYPES

Item	Characteristics	
Operating temperature range	-55 ~ +125°C	
Leakage current max.*	Less than or equal to the value of Table1	
Capacitance tolerance	±20% at 120Hz, 20°C	
Dissipation factor max.	Less than or equal to the value of Table1	
ESR	Less than or equal to the value of Table1	
Temperature characteristics (Impedance ratio at 100kHz)	Z-55°C / Z+20°C	Z+125°C / Z+20°C
	0.75 ~ 1.25	0.75 ~ 1.25
Load life (after application of the rated voltage for 2000 hours at 125°C)	Leakage current	Less than specified value
	Capacitance change	Within ±20% of initial value
	ESR	Less than 200% of specified value
	tanδ	Less than 200% of specified value
Resistance to soldering heat (Refer to Page 35 for soldering recommendation)	Leakage current	Less than specified value
	Capacitance change	Within ±10% of initial value
	tanδ	Less than 130% of specified value

\* In case of some problems for measured values, measure after applying rated voltage for 120 minutes at 125°C.

## DRAWING

Unit : mm



## PART NUMBER SYSTEM (See Page 52)

Size	ØD	L	B	C	E	A	R
6.3×5.9	6.3	5.9	6.6	6.6	2.2	2.45	0.5~0.8
8×6.9	8	6.9	8.3	8.3	3.2	2.9	0.5~0.8
8×11.9	8	11.9	8.3	8.3	3.2	2.9	0.8~1.1
10×7.9	10	7.9	10.3	10.3	4.6	3.2	0.8~1.1
10×12.6	10	12.6	10.3	10.3	4.6	3.2	0.8~1.1

Table 1. FT(SMD type) Series Characteristics List

WV	μF	ØD (mm)	L(mm)	ESR(mΩ)max. 100~300kHz	Rated ripple current (100kHz)(mA) 105°C < Tx ≤ 125°C	Allowable ripple current (100kHz)(mA) Tx ≤ 105°C	Dissipation factor 120Hz	Leakage Current (μA)(max.) after 2 minutes
10	56	6.3	5.9	45	538	1700	0.12	112
16	82	8	6.9	40	670	2120	0.12	262
25	10	6.3	5.9	65	474	1500	0.10	50
25	22	8	6.9	48	580	1835	0.10	110
25	39	10	7.9	45	664	2100	0.10	195
25	47	8	11.9	30	943	2980	0.12	235
25	82	10	12.6	28	1202	3800	0.12	410
35	8.2	8	6.9	70	400	1300	0.10	57
35	18	10	7.9	60	550	1800	0.10	126
35	22	8	11.9	50	700	2300	0.12	154
35	47	10	12.6	30	1150	3650	0.12	329

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	120Hz	1kHz	10kHz	100~500kHz
Coefficient	0.05	0.3	0.7	1



# CONDUCTIVE POLYMER ALUMINUM ELECTROLYTIC CAPACITORS

**FZ**

Chip type, Guaranteed at 105°C 5000 hours Series

**Hi-CAP**



- Series has long life time than the FA Series
- Suitable for use in flat panel TV set and the others industrial equipments, etc
- Complied to the RoHS directive

FA → FZ  
Long life

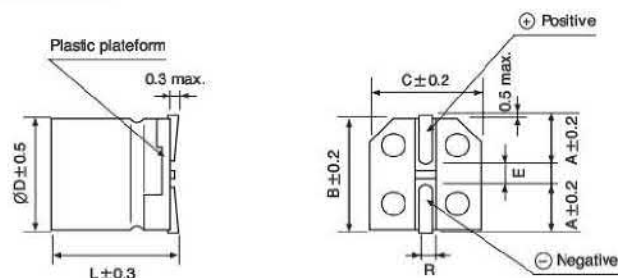
Item	Characteristics	
Operating temperature range	-55 ~ +105°C	
Leakage current max.*	Less than or equal to the value of Table1	
Capacitance tolerance	±20% at 120Hz, 20°C	
Dissipation factor max.	Less than or equal to the value of Table1	
ESR	Less than or equal to the value of Table1	
Temperature characteristics (Impedance ratio at 100kHz)	Z-55°C / Z+20°C	Z+105°C / Z+20°C
	0.75 ~ 1.25	0.75 ~ 1.25
Load life (after application of the rated voltage for 5000 hours at 105°C)	Leakage current	Less than specified value
	Capacitance change	Within ±20% of initial value
	ESR	Less than 200% of specified value
	tanδ	Less than 200% of specified value
Resistance to soldering heat (Refer to page 35 for soldering recommendation)	Leakage current	Less than specified value
	Capacitance change	Within ±10% of initial value
	tanδ	Less than 130% of specified value

\* In case of some problems for measured values, measure after applying rated voltage for 4 to 20V products or 20V derating voltage for 25V products for 120 minutes at 105°C.

## DRAWING

Unit : mm

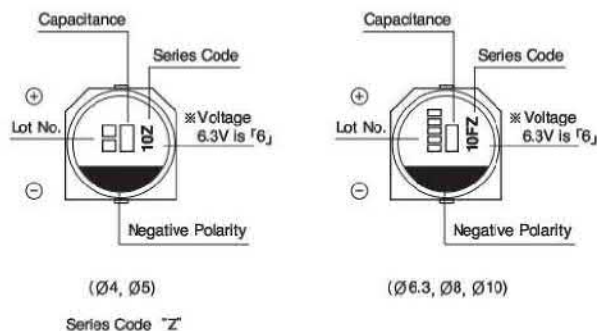
### < Dimensions >



### PART NUMBER SYSTEM (See Page 52)

Size	ØD	L	B	C	E	A	R
4×5.4	4	5.4	4.3	4.3	1.0	1.9	0.5~0.8
5×5.9	5	5.9	5.3	5.3	1.4	2.2	0.5~0.8
6.3×5.9	6.3	5.9	6.6	6.6	2.2	2.45	0.5~0.8
8×6.9	8	6.9	8.3	8.3	3.2	2.9	0.5~0.8
10×7.9	10	7.9	10.3	10.3	4.6	3.2	0.8~1.1

### < Marking >



## FZ Series

● Table 1. FZ(SMD type) Series Characteristics List

WV	$\mu\text{F}$	$\varnothing\text{D(mm)}$	L(mm)	ESR(m $\Omega$ )max. 100~300kHz	Ripple current (mA rms)at 105°C 100kHz	Dissipation factor 120Hz	Leakage Current ( $\mu\text{A}$ )(max.) after 2 minutes
4	33	4	5.4	200	740	0.15	66
4	68	5	5.9	30	1970	0.12	300
4	150	6.3	5.9	22	2570	0.12	300
4	270	8	6.9	22	3220	0.12	500
4	680	10	7.9	20	4130	0.12	544
6.3	22	4	5.4	200	740	0.12	69.3
6.3	47	5	5.9	30	1970	0.12	300
6.3	120	6.3	5.9	22	2570	0.12	300
6.3	220	8	6.9	22	3220	0.12	500
6.3	470	10	7.9	20	4130	0.12	592
10	10	4	5.4	220	700	0.1	50
10	15	4	5.4	200	740	0.1	75
10	33	5	5.9	70	1100	0.12	165
10	68	6.3	5.9	30	2200	0.12	300
10	150	8	6.9	30	2760	0.12	500
10	150	10	7.9	30	3020	0.12	300
10	330	10	7.9	24	3770	0.12	660
16	22	5	5.9	90	1060	0.1	176
16	39	6.3	5.9	24	2460	0.12	300
16	82	8	6.9	30	2760	0.12	262
16	100	10	7.9	35	2670	0.12	320
16	180	10	7.9	29	3430	0.12	576
20	22	6.3	5.9	60	1450	0.1	88
20	47	8	6.9	45	1890	0.12	188
25	10	8	6.9	60	1500	0.1	125

● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	120Hz	1kHz	10kHz	100~500kHz
Coefficient	0.05	0.3	0.7	1

# CONDUCTIVE POLYMER ALUMINUM ELECTROLYTIC CAPACITORS



Chip type, Height 4.5mmL  
Series

- Low ESR, high ripple current
- Designed for surface mounting on Notebook PC
- Complied to the RoHS directive

Hi-CAP

FA → FN  
Height  
4.5mmL

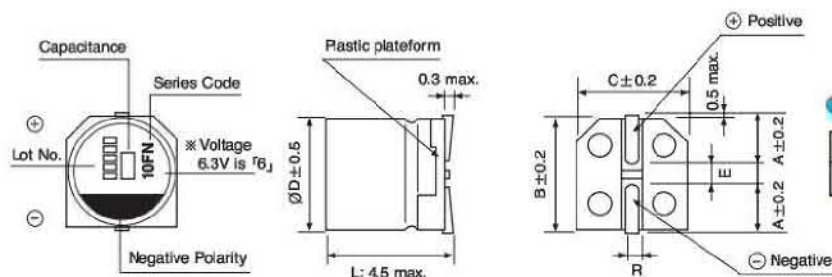


Item	Characteristics	
Operating temperature range	-55 ~ +105°C	
Leakage current max.*	Less than or equal to the value of Table1	
Capacitance tolerance	±20% at 120Hz, 20°C	
Dissipation factor max.	Less than or equal to the value of Table1	
ESR	Less than or equal to the value of Table1	
Temperature characteristics (Impedance ratio at 100kHz)	Z-55°C / Z+20°C	Z+105°C / Z+20°C
	0.75 ~ 1.25	0.75 ~ 1.25
Load life (after application of the rated voltage for 1000 hours at 105°C. In case 25WV is applied 20V)	Leakage current	Less than specified value
	Capacitance change	Within ±20% of initial value
	ESR	Less than 150% of specified value
	tanδ	Less than 150% of specified value
Resistance to soldering heat (Refer to Page 35 for soldering recommendation)	Leakage current	Less than specified value
	Capacitance change	Within ±10% of initial value
	tanδ	Less than 130% of specified value

\* In case of some problems for measured values, measure after applying rated voltage for 120 minutes at 105°C.

## DRAWING

Unit : mm



## PART NUMBER SYSTEM (See Page 52)

Size	ØD	L	B	C	E	A	R
6.3×4.5	6.3	4.5	6.6	6.6	2.2	2.45	0.5~0.8

Table 1. FN(SMD type) Series Characteristics List

WV	µF	ØD (mm)	L(mm)	ESR(mΩ)max. 100~300kHz	Ripple current (mA rms) at 105°C 100kHz	Dissipation factor 120Hz	Leakage Current (µA)(max.) after 2 minutes
2.5	150	6.3	4.5	38	1710	0.12	188
4	120	6.3	4.5	38	1710	0.12	240
6.3	100	6.3	4.5	40	1670	0.12	315
10	47	6.3	4.5	41	1560	0.12	235
16	22	6.3	4.5	45	1490	0.12	176
20	15	6.3	4.5	55	1650	0.12	150
25	15	6.3	4.5	55	1650	0.12	188

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	120Hz	1kHz	10kHz	100~500kHz
Coefficient	0.05	0.3	0.7	1



## FB Lead type, With Conductive Polymer Series

- Low ESR, high ripple current
- Load life for 2000 hours at 105°C
- Complied to the RoHS directive

Hi-CAP

FB

→ FJ  
Low ESR  
High Cap.

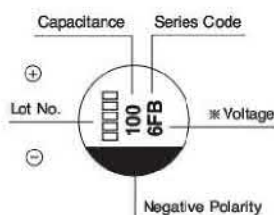
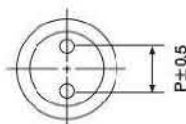
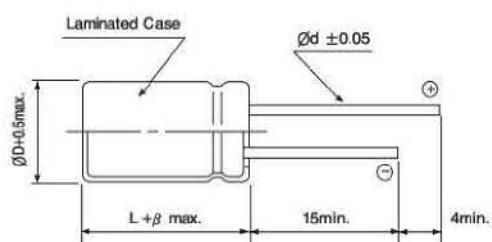


Item	Characteristics	
Operating temperature range	-55 ~ +105°C	
Leakage current max.*	Less than or equal to the value of Table1	
Capacitance tolerance	±20% at 120Hz, 20°C	
Dissipation factor max.	Less than or equal to the value of Table1	
ESR	Less than or equal to the value of Table1	
Temperature characteristics (Impedance ratio at 100kHz)	Z-55°C / Z+20°C	Z+105°C / Z+20°C
	0.75 ~ 1.25	0.75 ~ 1.25
Load life (after application of the rated voltage for 2000 hours at 105°C, In case of 25WV is applied 20V)	Leakage current	Less than specified value
	Capacitance change	Within ±20% of initial value
	tanδ	Less than 150% of specified value

\* In case of some problems for measured values, measure the after applying rated voltage for 2.5 to 20V products or 20V derating voltage for 25V products for 120 minutes at 105°C.

## DRAWING

Unit : mm



## PART NUMBER SYSTEM (See Page 52)

Size	ØD	L	P	Ød	β
6.3×6	6.3	6.0	2.5	0.45	0.5
6.3×8	6.3	8.0	2.5	0.45	0.5
8×9	8.0	9.0	3.5	0.60	0.5
8×12	8.0	12.0	3.5	0.60	0.5
10×13	10.0	13.0	5.0	0.60	0.5

# CONDUCTIVE POLYMER ALUMINUM ELECTROLYTIC CAPACITORS

## FB Series

Table 1. FB(Lead type) Series Characteristics List

WV	$\mu$ F	ØD(mm)	L(mm)	ESR(mΩ)max. 100~300kHz	Ripple current (mA rms)at 105°C 100kHz	Dissipation factor 120Hz	Leakage Current ( $\mu$ A)(max.) after 2 minutes
2.5	390	6.3	8	20	3160	0.10	195
2.5	560	8	9	7	6100	0.10	280
2.5	680	8	9	7	6100	0.10	340
2.5	820	8	9	7	6100	0.10	410
2.5	1000	8	9	7	6100	0.10	500
2.5	1500	8	12	8	5500	0.10	750
2.5	2700	10	13	8	5560	0.10	1350
2.5	3300	10	13	8	6650	0.10	1650
4	100	6.3	6	40	1810	0.10	80
4	150	6.3	6	40	1810	0.10	120
4	220	6.3	8	35	2560	0.10	176
4	270	6.3	8	20	3160	0.10	216
4	330	6.3	8	24	3300	0.10	264
4	390	6.3	8	24	3300	0.10	312
4	470	8	9	8	5700	0.10	376
4	560	8	9	7	6100	0.10	448
4	680	8	9	7	6100	0.10	544
4	1200	8	12	8	5700	0.10	960
6.3	82	6.3	6	45	1700	0.10	103
6.3	150	6.3	8	35	2560	0.10	189
6.3	220	6.3	8	20	3160	0.10	277
6.3	330	8	9	28	3190	0.10	416
6.3	470	8	9	8	5700	0.10	592
6.3	680	8	9	7	6640	0.10	857
6.3	820	8	12	7	6640	0.10	1033
6.3	1000	8	12	8	6100	0.10	1260
6.3	1200	10	13	10	5560	0.10	1520
6.3	1500	10	13	10	5560	0.10	1890
10	47	6.3	6	25	2820	0.10	94
10	56	6.3	6	25	2820	0.10	112
10	68	6.3	6	25	2820	0.10	136
10	100	6.3	8	25	2820	0.10	200
10	120	6.3	8	35	2560	0.10	240
10	150	6.3	8	25	2820	0.10	300
10	270	8	12	9	4710	0.10	540
10	330	8	12	9	4710	0.10	660
10	390	8	12	9	5650	0.10	780
10	470	8	12	8	5650	0.10	940
10	560	10	13	8	5650	0.10	1120
10	680	10	13	7	6100	0.10	1360
16	39	6.3	6	50	1620	0.10	124
16	82	6.3	8	25	2120	0.10	262
16	100	6.3	8	25	2820	0.10	320
16	180	8	12	16	4360	0.10	576
16	270	8	12	11	5000	0.10	864
16	330	10	13	10	6100	0.10	1056
16	470	10	13	10	6100	0.10	1504
20	22	6.3	6	60	1450	0.12	88
20	47	6.3	8	25	2820	0.12	188
20	56	6.3	8	25	2820	0.12	224
20	68	6.3	8	25	2820	0.12	272
20	100	8	12	24	3320	0.12	400
20	150	10	13	20	4320	0.12	600
25	6.8	6.3	6	80	1200	0.12	85
25	10	6.3	8	60	1500	0.12	125
25	18	6.3	8	40	2230	0.12	225
25	22	8	12	40	2230	0.12	275
25	33	8	12	30	2980	0.12	413
25	56	8	12	30	3800	0.12	700
25	68	8	12	25	3320	0.12	850
25	100	8	12	20	4320	0.12	1250

● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT (See Page 48)



Lead type, With Conductive Polymer Series

- Low ESR, high ripple current
- Load life for 2000 hours at 105°C
- Complied to the RoHS directive

**Hi-CAP**

FB → **FJ**  
Low ESR  
High Cap.

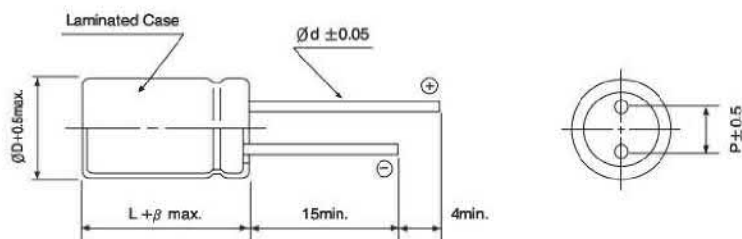


Item	Characteristics	
Operating temperature range	-55 ~ +105°C	
Leakage current max.*	Less than or equal to the value of Table1	
Capacitance tolerance	±20% at 120Hz, 20°C	
Dissipation factor max.	Less than or equal to the value of Table1	
ESR	Less than or equal to the value of Table1	
Temperature characteristics (Impedance ratio at 100kHz)	Z-55°C / Z+20°C	Z+105°C / Z+20°C
	0.75 ~ 1.25	0.75 ~ 1.25
Load life (after application of the rated voltage for 2000 hours at 105°C)	Leakage current	Less than specified value
	Capacitance change	Within ±20% of initial value
	ESR	Less than 150% of specified value
	tanδ	Less than 150% of specified value

\* In case of some problems for measured values, measure after applying rated voltage for 120 minutes at 105°C.

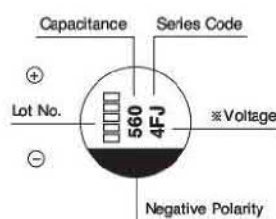
## DRAWING

Unit : mm

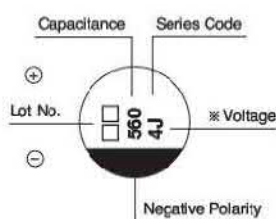


## PART NUMBER SYSTEM (See Page 52)

Size	ØD	L	P	Ød	β
5×8	5.0	8.0	2.0	0.45	0.7
6.3×8	6.3	8.0	2.5	0.45	0.5
8×9	8.0	9.0	3.5	0.60	0.5
8×12	8.0	12.0	3.5	0.60	0.5
10×13	10.0	13.0	5.0	0.60	0.5



(Ø6.3, Ø8, Ø10)



(Ø5)

Series Code "J"



## CONDUCTIVE POLYMER ALUMINUM ELECTROLYTIC CAPACITORS

### FJ Series

Table 1. FJ(Lead type) Series Characteristics List

WV	$\mu\text{F}$	$\varnothing\text{D(mm)}$	L(mm)	ESR(m $\Omega$ )max. 100~300kHz	Ripple current (mA rms) at 105°C 100kHz	Dissipation factor 120Hz	Leakage Current ( $\mu\text{A}$ )(max.) after 2 minutes
2.5	330	6.3	8	7	5600	0.10	500
2.5	560	6.3	8	7	5600	0.10	500
2.5	560	8	9	8	4700	0.10	280
2.5	820	6.3	8	7	5600	0.10	513
2.5	820	8	9	5	7200	0.10	500
2.5	820	8	12	5	7200	0.10	500
2.5	1000	8	9	7	6100	0.10	500
2.5	2700	10	13	10	5560	0.10	1350
4	560	6.3	8	7	5600	0.10	560
4	560	8	9	5	7200	0.10	500
4	560	8	12	5	7200	0.10	500
4	680	8	12	5	7200	0.10	544
4	820	10	13	7	6640	0.10	656
6.3	270	5	8	7	3700	0.10	500
6.3	330	5	8	7	3700	0.10	416
6.3	390	5	8	11	3100	0.10	130
6.3	470	8	9	8	5700	0.10	592
6.3	470	8	12	8	5700	0.10	592
6.3	560	8	9	7	6100	0.10	706
6.3	680	10	13	7	6640	0.10	857
6.3	1500	10	13	10	5560	0.10	1890
16	100	6.3	8	10	4680	0.10	500
16	180	8	12	16	4360	0.10	576
16	270	8	12	11	5000	0.10	864
16	470	10	13	10	6100	0.10	1504

### FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	120Hz	1kHz	10kHz	100~500kHz
Coefficient	0.05	0.3	0.7	1



Lead type, With Conductive Polymer Series

Hi-CAP



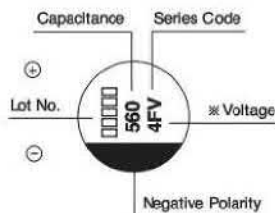
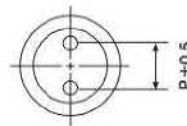
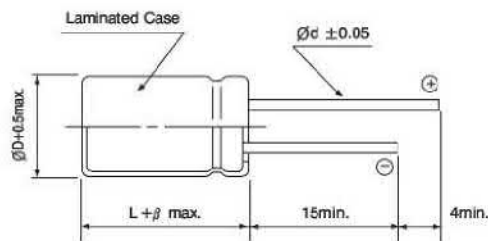
- Load life for 5000 hours at 105°C
- Mother board and VGA card for computer

FB  $\Rightarrow$  FV  
Long life

Item	Characteristics	
Operating temperature range	-55 ~ +105°C	
Leakage current max.*	Less than or equal to the value of Table1	
Capacitance tolerance	±20% at 120Hz, 20°C	
Dissipation factor max.	Less than or equal to the value of Table1	
ESR	Less than or equal to the value of Table1	
Temperature characteristics (Impedance ratio at 100kHz)	Z-55°C / Z+20°C	Z+105°C / Z+20°C
	0.75 ~ 1.25	0.75 ~ 1.25
Load life (after application of the rated voltage for 5000 hours at 105°C)	Leakage current	Less than specified value
	Capacitance change	Within ±20% of initial value
	ESR	Less than 150% of specified value
	tanδ	Less than 150% of specified value

## DRAWING

Unit : mm



## PART NUMBER SYSTEM (See Page 52)

Size	ØD	L	P	Ød	β
6.3×8	6.3	8.0	2.5	0.45	0.5
8×9	8.0	9.0	3.5	0.60	0.5
8×12	8.0	12.0	3.5	0.60	0.5

Table 1. FV(Lead type) Series Characteristics List

WV	μF	ØD(mm)	L(mm)	ESR(mΩ)max. 100~300kHz	Ripple current (mA rms) at 105°C 100kHz	Dissipation factor 120Hz	Leakage Current (μA) (max.) after 2 minutes
2.5	820	6.3	8	7	5000	0.10	500
		8	9	7	6100	0.10	410
4	560	6.3	8	7	5000	0.10	500
		8	9	7	6100	0.10	410
6.3	470	6.3	8	8	4700	0.10	592
	560	6.3	8	8	4700	0.10	706
	560	8	9	8	6100	0.10	706
16	100	6.3	8	25	2820	0.10	320
	270	8	12	11	5000	0.10	864

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	120Hz	1kHz	10kHz	100~500kHz
Coefficient	0.05	0.3	0.7	1

# CONDUCTIVE POLYMER ALUMINUM ELECTROLYTIC CAPACITORS



Chip type, With Conductive Polymer Series

Hi-CAP

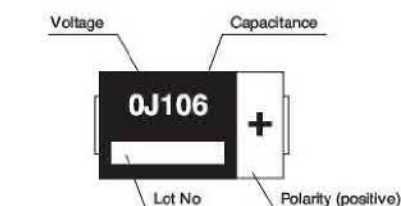


- Low ESR, high ripple current
- Excellent noise-absorbent characteristics
- Very stable capacitance, impedance and ESR against temperature
- Designed for use smoothing circuit of power supplies and noise limiter
- Complied to the RoHS directive

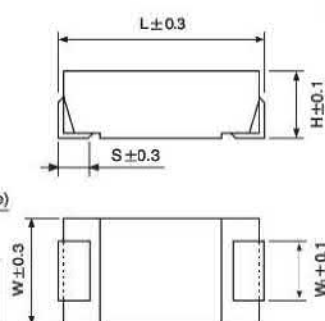
Item	Characteristics			
Operating temperature range	-40 ~ +105°C			
Leakage current max.	$I = 0.04CV$ or $3\mu A$ whichever is greater (after 2 minutes)			
Capacitance tolerance	$\pm 20\%$ at 120Hz, 20°C			
Dissipation factor max.	0.06 max. at 120Hz, 20°C			
ESR	ESR at 20°C 100kHz, as per table below			
Load life (after application of the rated voltage for 1000 hours at 105°C)	Leakage current	Less than specified value		
	Capacitance change	Within $\pm 20\%$ of initial value		
	$\tan\delta$	Less than 150% of specified value		
Moisture resistance (after leaving capacitors under no load at 60°C for 500 hours 90% R.H.)	Leakage current	Less than 300% of specified value		
	Capacitance change of Initial value	2, 2.5V.DC	4V.DC	6.3V.DC 8~16V.DC
		+70, -20%	+60, -20%	+50, -20% +40, -20%
	$\tan\delta$	Less than 150% of specified value		

## DRAWING

Unit : mm

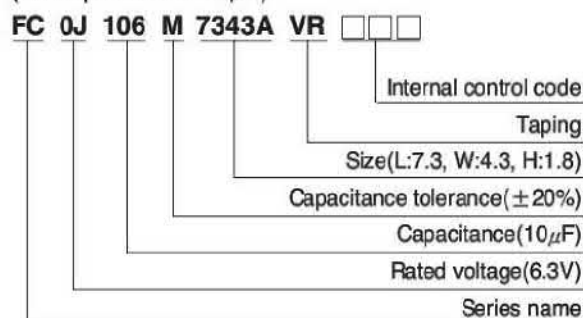


Size Code	L	W	W <sub>i</sub>	H	S
A	7.3	4.3	2.4	1.8	1.3
C	7.3	4.3	2.4	2.8	1.3
D	7.3	4.3	2.4	4.2	1.3



## PART NUMBER SYSTEM (See page 52)

(Example : 6.3V 10 $\mu$ F)



## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu F$ \ WV	2			2.5			4			6.3			8			12.5			16		
2.2																		110	1000	A	
4.7																80	1000	A	80	1000	A
6.8																			70	1000	A
8.2													55	1400	A				45	1300	A
10										55	1400	A				60	1000	A			
15							55	1400	A				40	1600	A	50	1300	A			
22				55	1400	A				40	1600	A	28	2000	A	30	1600	A			
33	55	1400	A				40	1600	A	28	2000	A	18	2500	A						
47				40	1600	A	28	2000	A	18	2500	A									
56	40	1600	A																		
68				28	2000	A	18	2500	A												
82	28	2000	A	18	2500	A															
100	18	2500	A							10	3500	C	18	2500	D						
120																					
150							10	3500	C	10	3500	D	15	3000	D						
180							7	3700	D	7	3700	D									
220	10	3500	C	10	3500	C	7	3700	D												
330	10	3500	C	7	3700	D															
390	7	3700	D	7	3700	D															
470	7	3700	D																		

Size code

Ripple current (mA rms) at 105°C, 100kHz

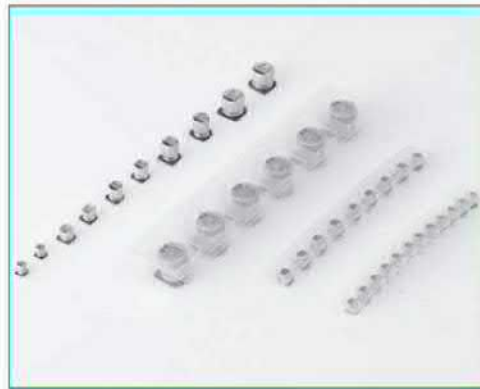
ESR (mΩ ) max. at 20°C, 100kHz

Size code  
Ripple current (mA rms) at 105°C, 100kHz  
ESR (m $\Omega$ ) max. at 20°C, 100kHz



# 3 SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

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## PART NUMBER SYSTEM

### Part Number System

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Series Name	Rated Voltage	Capacitance	Cap. Tol.	Case Diameter	Case Height	Taping Code	Internal Control Code

**1** Series Name  
See page 4.

**2** Rated Working Voltage

WV	4	6.3	10	16	25	35	50
Code	0G	0J	1A	1C	1E	1V	1H

WV	63	100	160	200	250	400	450
Code	1J	2A	2C	2D	2E	2G	2W

**6** Case Height

ex) 5.3mm 005  
5.8mm 006  
6.2mm 06B  
7.7mm 07K  
10mm 010  
13.5mm 13M

**7** VR (Reel Type)

**3** Capacitance

ex) 0.47 $\mu$ F 474  
4.7 $\mu$ F 475  
47 $\mu$ F 476  
470 $\mu$ F 477  
4700 $\mu$ F 478

**4** Capacitance Tolerance

Tolerance (%)	$\pm 20$
Code	M

**5** Case Diameter

ex)  $\varnothing 4$  04  
 $\varnothing 5$  05  
 $\varnothing 6.3$  6L  
 $\varnothing 8$  08  
 $\varnothing 10$  10  
 $\varnothing 12.5$  12

## ● Taping Specifications for Chip Type Capacitors

### ● Carrier Tape

Fig.1

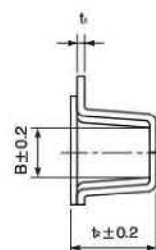
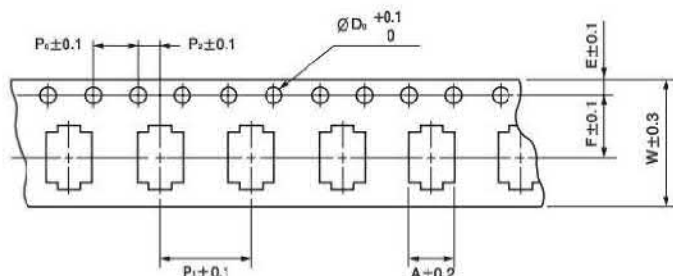
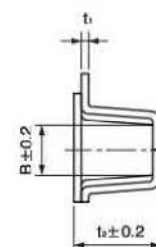
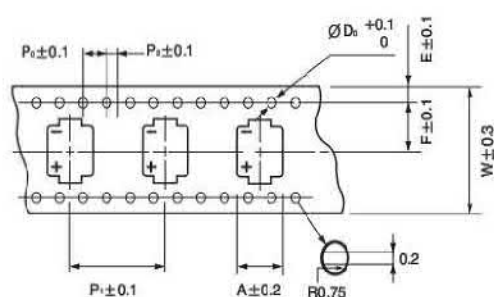
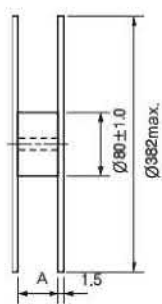
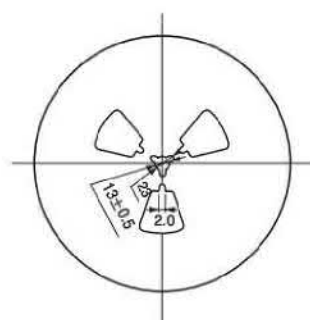


Fig.2

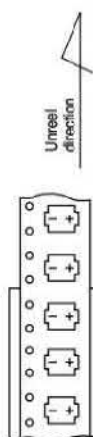


ØD×L	A	B	ØD0	E	F	P0	P1	P2	t1	t2	W	Fig.
4 × 5.3	4.7	4.7	1.5	1.75	5.5	4.0	8.0	2.0	0.4	5.7	12.0	1
5 × 5.3	5.7	5.7	1.5	1.75	5.5	4.0	12.0	2.0	0.4	5.7	12.0	
6.3 × 5.3	7.0	7.0	1.5	1.75	7.5	4.0	12.0	2.0	0.4	5.7	16.0	
6.3 × 5.8	7.0	7.0	1.5	1.75	7.5	4.0	12.0	2.0	0.4	6.3	16.0	
6.3 × 7.7	7.0	7.0	1.5	1.75	7.5	4.0	12.0	2.0	0.4	8.2	16.0	
8 × 6.2	8.7	8.7	1.5	1.75	7.5	4.0	12.0	2.0	0.4	6.8	16.0	
8 × 10	8.7	8.7	1.5	1.75	11.5	4.0	16.0	2.0	0.4	11.0	24.0	
10 × 10	10.7	10.7	1.5	1.75	11.5	4.0	16.0	2.0	0.4	11.0	24.0	2
12.5 × 13.5	14.0	14.0	1.5	1.75	14.2	4.0	24.0	2.0	0.5	14.0	32.0	

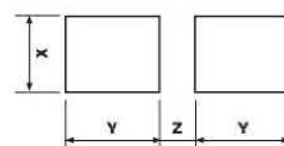
### ● Reel (Taping code : VR)



### ● Polarity



### ● Recommended Land Size



ØD×L	A	ØD×L	Q'ty/Reel(pcs.)	Q'ty/Box(pcs.)
4 × 5.3	14	4 × 5.3	2000	20000
5 × 5.3	14	5 × 5.3	1000	10000
6.3 × 5.3	18	6.3 × 5.3	1000	10000
6.3 × 5.8	18	6.3 × 5.8	1000	10000
6.3 × 7.7	18	6.3 × 7.7	900	9000
8 × 6.2	18	8 × 6.2	1000	10000
8 × 10	26	8 × 10	500	3000
10 × 10	26	10 × 10	500	3000
12.5 × 13.5	34	12.5 × 13.5	200	1000

ØD×L	X	Y	Z
4 × 5.3	1.6	2.6	1.0
5 × 5.3	1.6	3.0	1.4
6.3 × 5.3	1.6	3.5	2.0
6.3 × 5.8	1.6	3.5	2.0
6.3 × 7.7	1.6	3.5	2.0
8 × 6.2	2.5	4.0	2.0
8 × 10	2.5	3.5	3.0
10 × 10	2.5	4.0	4.0
12.5 × 13.5	4.0	7.5	7.0



## Reflow soldering method for the chip aluminum electrolytic capacitor

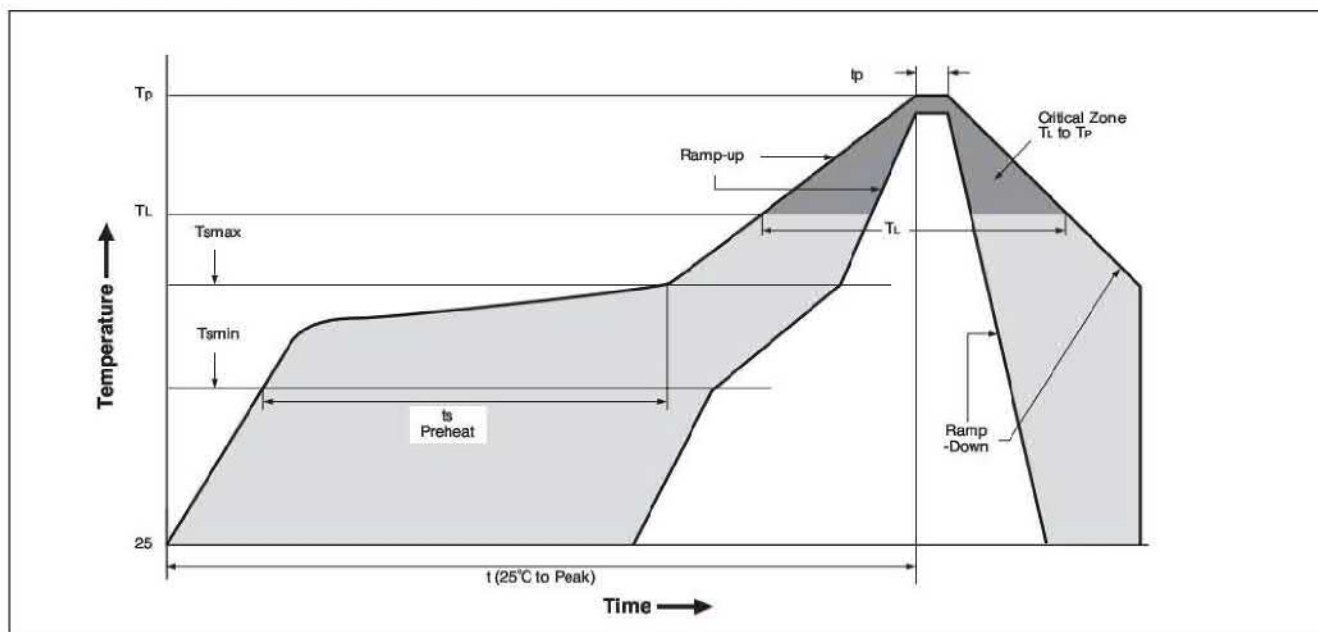
### 1. Recommended conditions for reflow soldering

The chip aluminum electrolytic capacitor is subjected to soldering by reflow method.

Temperature and time conditions of reflow soldering shall be set as per each temperature profile shown below as a standard. The following are recommended conditions in the case of reflow soldering method for the chip aluminum electrolytic capacitor.

- (1) The capacitor shall not be subjected to either flow or dip soldering method.
- (2) Avoid soldering twice by reflow. The number of reflow time for chip aluminum electrolytic capacitor shall be once basically. If this type of capacitor has to be inevitably subjected to the reflow twice, enough cooling time between the first and the second reflow (at least more than 30 minutes) shall be taken to avoid the consecutive reflows by all means.
- (3) The touch up work with a soldering iron is allowed after the reflow soldering (Temperature of soldering iron : MAX 400°C, Time : 5 sec.), provided that carefully attention shall be paid lest a soldering iron should directly touch the capacitor body or its resin bottom base.

### 2. RECOMMENDED REFLOW SOLDERING CONDITIONS



Profile Feature		Soldering condition	
		Ø4 ~ Ø10	Ø12.5
Average Ramp-up Rate (T <sub>L</sub> to T <sub>P</sub> )		3°C / second max.	3°C / second max.
Preheat	Temperature Min. (T <sub>s</sub> min)	150°C	150°C
	Temperature Max. (T <sub>s</sub> max)	200°C	200°C
	Time (T <sub>s</sub> min to T <sub>s</sub> max)	60 ~ 150 seconds	40~120 seconds
T <sub>s</sub> max to T <sub>L</sub> -Ramp-up Rate		3°C / second max.	3°C / second max.
Time maintained above	Time (T <sub>L</sub> )	217°C	217°C
	Time (t <sub>L</sub> )	60 ~ 90 seconds	40 ~ 60 seconds
Peak/classification Temperature (T <sub>P</sub> )		250°C	240°C
Time within 5°C of actual peak temperature(T <sub>P</sub> )		10 seconds max.	10 seconds max.
Ramp-Down rate		3°C / second max.	3°C / second max.
Time 25°C to peak temperature		8 minute max.	8 minute max.



Chip type, Standard Series



- Chip type higher capacitance in larger case size
- Designed for surface mounting on high density PC board
- Applicable to automatic insertion machine using carrier tape
- Complied to the RoHS directive

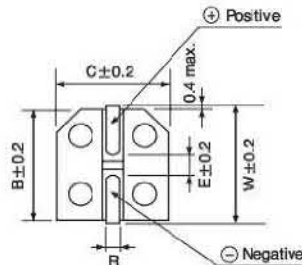
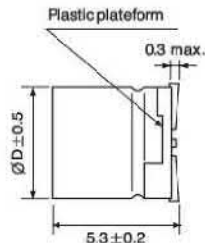
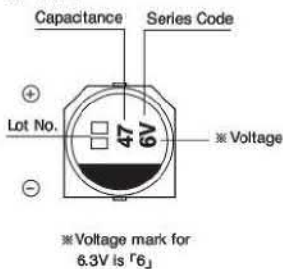


Item	Characteristics														
Operating temperature range	-40 ~ +85°C														
Leakage current max.	WV ≤100 I = 0.01CV or 3μA whichever is greater (after 2 minutes) WV ≥160 I = 0.04CV + 100μA(after 1 minutes)														
Capacitance tolerance	±20% at 120Hz, 20°C														
Dissipation factor max. (at 120Hz, 20°C)	WV	4	6.3	10	16	25	35	50	63	100	160	200	250	400	450
	tanδ	0.40	0.35	0.24	0.20	0.16	0.15	0.12	0.12	0.12	0.20	0.20	0.20	0.25	0.25
Low temperature characteristics (Impedance ratio at 120Hz)	WV			4	6.3	10	16	25	35 ~ 100	160 ~ 250	400 ~ 450				
	Z-25°C/Z+20°C			6	5	4	3	2	2	3	6				
	Z-40°C/Z+20°C			12	10	8	6	4	3	6	10				
Load life (after application of the rated voltage for 2000 hours at 85°C)	Leakage current						Less than specified value								
	Capacitance change						Within ±20% of initial value (Small size : ±25%)								
	tanδ						Less than 200% of the specified value								
Shelf life(at 85°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.														
Resistance to soldering heat	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 250°C for 10 seconds.														
	Leakage current						Less than specified value								
	Capacitance change						Within ±10% of initial value								
	tanδ						Less than specified value								

## DRAWING -Series code of SC is "V"

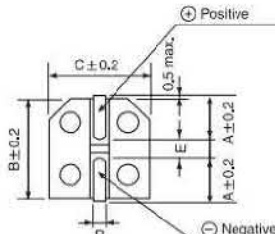
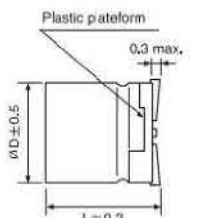
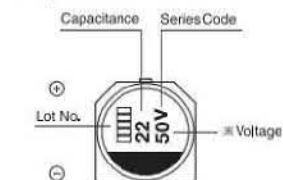
Unit : mm

(Ø4, Ø5)

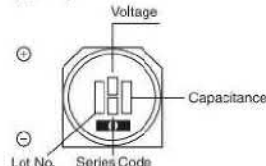


ØD×L	W	A	B	C	E	R
4×5.3	4.8		4.3	4.3	1.0	0.5~0.8
5×5.3	5.8		5.3	5.3	1.4	0.5~0.8
6.3×5.3		2.4	6.6	6.6	2.2	0.5~0.8
6.3×5.8		2.4	6.6	6.6	2.2	0.5~0.8
6.3×7.7		2.4	6.6	6.6	2.2	0.5~0.8
8×6.2		3.3	8.3	8.3	2.3	0.5~0.8
8×10		2.9	8.3	8.3	3.1	0.8~1.1
10×10		3.2	10.3	10.3	4.5	0.8~1.1
12.5×13.5		4.6	12.8	12.8	4.5	0.8~1.4

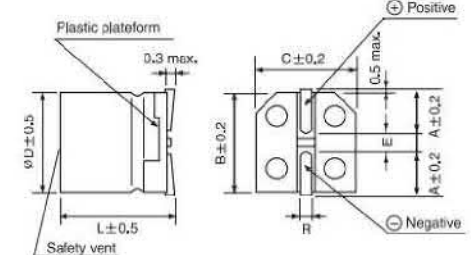
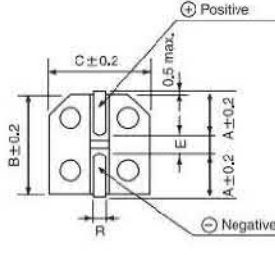
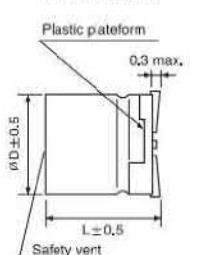
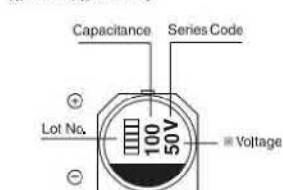
(Ø6.3, Ø8×6.2)



(Ø12.5)



(Ø8×10, Ø10×10)



# SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

**SC** series

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV μF	4		6.3		10		16		25		35		50	
0.1													4×5.3	3.2
0.22													4×5.3	4.7
0.33													4×5.3	5.7
0.47													4×5.3	6.8
1.0													4×5.3	10
2.2											4×5.3	11	4×5.3	15
3.3									4×5.3	15	4×5.3	16	4×5.3	18
4.7							4×5.3	16	4×5.3	18	4×5.3	19	4×5.3 5×5.3	24 25
10	4×5.3	16	4×5.3	19	4×5.3	21	4×5.3	21	4×5.3 5×5.3	24 30	4×5.3 5×5.3	27 32	5×5.3 6.3×5.3	41 43
22	4×5.3	24	4×5.3	29	4×5.3 5×5.3	28 36	4×5.3 5×5.3	30 41	5×5.3 6.3×5.3	41 53	6.3×5.3	55	6.3×5.3 6.3×5.8	71 73
33	4×5.3	29	4×5.3 5×5.3	30 41	4×5.3 5×5.3	34 44	5×5.3 6.3×5.3	43 58	5×5.3 6.3×5.3	50 64	6.3×5.3 6.3×5.8	65 67	6.3×7.7 8×6.2	94 95
47	4×5.3	35	4×5.3 5×5.3	36 48	5×5.3 6.3×5.3	47 62	5×5.3 6.3×5.3	52 69	6.3×5.3 6.3×5.8	70 72	6.3×7.7 8×6.2	94 105	6.3×7.7 8×10	105 140
100	5×5.3 6.3×5.3	54 68	5×5.3 6.3×5.3	60 82	6.3×5.3 6.3×5.8	80 82	6.3×5.3 6.3×5.8	88 91	8×6.2	145	6.3×7.7 8×10	132 175	8×10 10×10	181 195
220	6.3×5.3	93	6.3×5.8	91	6.3×7.7 8×6.2	173 175	6.3×7.7 8×10	162 215	8×10 10×10	232 250	10×10	265	10×10	320
330			6.3×7.7 8×6.2	188 190	8×10	240	8×10	270	10×10	305	10×10	360	12.5×13.5	600
470			8×10	265	8×10	290	8×10 10×10	307 330	10×10	400	12.5×13.5	600		
1000			8×10 10×10	370 400	10×10	454	12.5×13.5	710	12.5×13.5	820				
1500			10×10	480	12.5×13.5	850	12.5×13.5	870						
2200			12.5×13.5	890	12.5×13.5	960								

Ripple current (mA rms) at 85°C, 120Hz  
 Case size øD x L (mm)



## SC series

### ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu F$ WV	63		100		160		200		250		400		450	
2.2													10×10	85
3.3			6.3×5.8	29							10×10	90	10×10	100
4.7	6.3×5.8	31	6.3×5.8 8×6.2	35 40			10×10	100	10×10	100	12.5×13.5	115	12.5×13.5	115
10	6.3×5.8	46	8×10	77	10×10	100	12.5×13.5	150	12.5×13.5	150				
22	8×6.2	96	8×10	100	12.5×13.5	240	12.5×13.5	260						
33	8×10	117	10×10	130	12.5×13.5	260								
47	10×10	140	10×10	155	<div> <div></div> <div>Ripple current (mA rms) at 85°C, 120Hz</div> <div></div> <div>Case size ØD x L (mm)</div> </div>									
68	10×10	160	12.5×13.5	350										
100	12.5×13.5	370	12.5×13.5	420										
220	12.5×13.5	550												

### ● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	300Hz	1kHz	10kHz≤
Coefficient	0.70	1.00	1.17	1.36	1.50

# SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

## RC

Chip type, Wide Temperature Range Series

- Wide operating temperature range of -55 ~ +105°C
- Designed for surface mounting on high density PC board
- Applicable to automatic insertion machine using carrier tape
- Complied to the RoHS directive



Item	Characteristics						
Operating temperature range	-55 ~ +105°C						
Leakage current max.	I = 0.01CV or 3μA whichever is greater (after 2 minutes)						
Capacitance tolerance	±20% at 120Hz, 20°C						
Dissipation factor max. (at 120Hz, 20°C)	WV	6.3	10	16	25	35	50
	tanδ	0.27	0.23	0.19	0.15	0.13	0.11
Low temperature characteristics (Impedance ratio at 120Hz)	WV	6.3	10	16	25	35	50
	Z-25°C/Z+20°C	3	3	2	2	2	2
	Z-40°C/Z+20°C	8	5	4	3	3	3
Load life (after application of the rated voltage for 1000 hours at 105°C)	Leakage current			Less than specified value			
	Capacitance change			Within ±25% of initial value			
	tanδ			Less than 200% of specified value			
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.						
Resistance to soldering heat	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 250°C for 10 seconds.						
	Leakage current			Less than specified value			
	Capacitance change			Within ±10% of initial value			
	tanδ			Less than specified value			

## DRAWING (See page 55)

Unit : mm

-Series code of RC is "F"

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu F$	WV	6.3	10	16	25	35	50
0.1							4×5.3 2
0.22							4×5.3 3
0.33							4×5.3 4
0.47							4×5.3 5
1.0							4×5.3 7
2.2							4×5.3 11
3.3							4×5.3 13
4.7					4×5.3 13	4×5.3 14	5×5.3 18
10				4×5.3 17	5×5.3 23	5×5.3 24	6.3×5.3 31
22	4×5.3	22	5×5.3 27	5×5.3 30	6.3×5.3 39	6.3×5.3 42	6.3×5.8 45
33	5×5.3	31	5×5.3 33	6.3×5.3 43	6.3×5.3 48	6.3×5.8 52	6.3×7.7 60
47	5×5.3	36	6.3×5.3 46	6.3×5.3 51	6.3×5.8 59	6.3×5.8 63	6.3×7.7 63
100	6.3×5.3	50	6.3×5.8 64	6.3×5.8 64	6.3×7.7 91	8×10 296	10×10 295
220	6.3×7.7	86	6.3×7.7 105	6.3×7.7 105	8×10 340	10×10 435	
330	6.3×7.7	105	8×10 305	8×10 340	10×10 360		
470	8×10	330	10×10 340	10×10 470			
1000	10×10	475					

Ripple current (mA rms) at 105°C, 120Hz  
Case size (D×L) (mm)

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	300Hz	1kHz	10kHz≤
Coefficient	0.70	1.00	1.17	1.36	1.50



Chip type, Higher Capacitance Range Series

- Chip type higher capacitance in large case sizes
- Designed for surface mounting on high density PC board
- Applicable to automatic insertion machine using carrier tape
- Complied to the RoHS directive

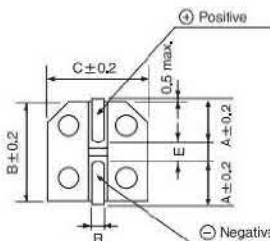
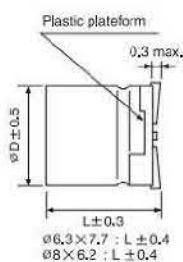
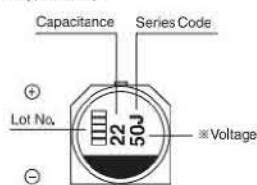


Item	Characteristics														
Operating temperature range	WV ≤ 100 : -55 ~ +105℃ WV ≥ 160 : -40 ~ +105℃														
Leakage current max.	WV ≤ 100 I = 0.01CV or 3μA whichever is greater (after 2 minutes) WV ≥ 160 I = 0.04CV + 100μA(after 1 minutes)														
Capacitance tolerance	±20% at 120Hz, 20℃														
Dissipation factor max. (at 120Hz, 20℃)	WV	4	6.3	10	16	25	35	50	63	100	160	200	250	400	450
	tanδ	0.37	0.28	0.24	0.20	0.16	0.13	0.12	0.10	0.10	0.15	0.15	0.15	0.20	0.20
Low temperature characteristics (Impedance ratio at 120Hz)	WV			4	6.3	10	16	25 ~ 50		63 ~ 100		160 ~ 250		400 ~ 450	
	Z-25℃/Z+20℃			6	3	3	2	2		3		3		6	
	Z-40℃/Z+20℃			12	8	5	4	3		4		6		10	
Load life (after application of the rated voltage for 2000 hours at 105℃)	Leakage current						Less than specified value								
	Capacitance change						Within ±20% of initial value								
	tanδ						Less than 200% of specified value								
Shelf life(at 105℃)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20℃ by the KS C 6035 clause 5.4.														
Resistance to soldering heat	The following specifications shall be satisfied when the capacitors are restored to 20℃ after exposing them at 250℃ for 10 seconds.														
	Leakage current						Less than specified value								
	Capacitance change						Within ±10% of initial value								
	tanδ						Less than specified value								

## DRAWING -Series code of JC is "J"

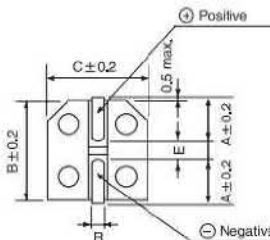
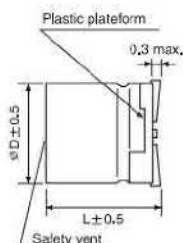
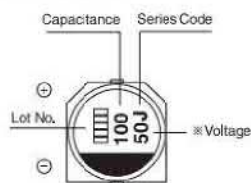
Unit : mm

(Ø6.3, Ø8×6.2)

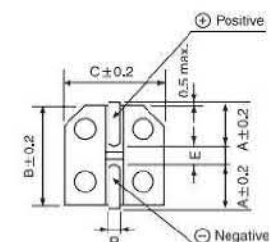
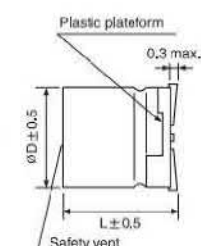
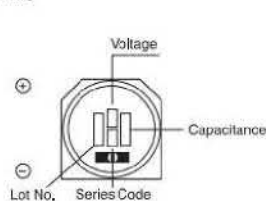


ØD×L	A	B	C	E	R
6.3×5.8	2.4	6.6	6.6	2.2	0.5~0.8
6.3×7.7	2.4	6.6	6.6	2.2	0.5~0.8
8×6.2	3.3	8.3	8.3	2.3	0.5~0.8
8×10	2.9	8.3	8.3	3.1	0.8~1.1
10×10	3.2	10.3	10.3	4.5	0.8~1.1
12.5×13.5	4.6	12.8	12.8	4.5	0.8~1.4

(Ø8×10, Ø10×10)



(Ø12.5)





# SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS



## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu F$ \ WV	4		6.3		10		16		25		35		50	
10													6.3×5.8	30
22									6.3×5.8	38	6.3×5.8	42	8×6.2	67
33							6.3×5.8	40	6.3×5.8	48	8×6.2	76	8×10	133
47					6.3×5.8	46	6.3×5.8	50	8×6.2	79	8×10	124	10×10	180
100	6.3×5.8	60	6.3×5.8	60	6.3×5.8	60	8×10	148	8×10	181	10×10	304	10×10	310
220			8×10	161	8×10	173	10×10	330	10×10	351	10×10	450	12.5×13.5	480
330			8×10	288	10×10	318	10×10	441	10×10	372	12.5×13.5	500		
470			10×10	340	10×10	351	10×10	489	10×10	450	12.5×13.5	600		
680			10×10	408	10×10	392	12.5×13.5	500	12.5×13.5	500				
1000			10×10	495	10×10	550	12.5×13.5	600						
1500			10×10	560	12.5×13.5	650								
2200			12.5×13.5	730										

$\mu F$ \ WV	63		100		160		200		250		400		450	
3.3									10×10	30	12.5×13.5	30	12.5×13.5	40
4.7							10×10	45	12.5×13.5	65				
10	8×6.2	32			10×10	45	12.5×13.5	75						
22	8×10	60	8×10	90	12.5×13.5	85	12.5×13.5	85						
33	8×10	110	10×10	120	12.5×13.5	95	← Ripple current (mA rms) at 105°C, 120Hz							
47	10×10	130	12.5×13.5	250	↑ Case size ØD x L (mm)									
68	10×10	160	12.5×13.5	300										
100	12.5×13.5	270												

## ● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	300Hz	1kHz	10kHz $\leq$
Coefficient	0.70	1.00	1.17	1.36	1.50



Chip type, High Ripple Current Series



- High Ripple current Compared with JC series
- Designed for surface mounting on high density PC board
- Applicable to automatic insertion machine using carrier tape
- Complied to the RoHS directive

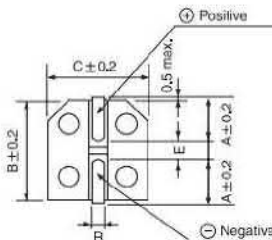
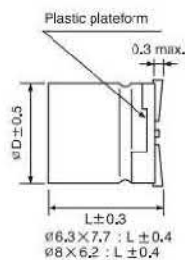
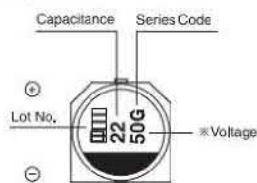


Item	Characteristics								
Operating temperature range	-55 ~ +105°C								
Leakage current max.	I = 0.01CV or 3μA whichever is greater (after 2 minutes)								
Capacitance tolerance	±20% at 120Hz, 20°C								
Dissipation factor max. (at 120Hz, 20°C)	WV	6.3	10	16	25	35	50	63	100
	tanδ	0.28	0.24	0.20	0.16	0.13	0.12	0.10	0.10
Low temperature characteristics (Impedance ratio at 120Hz)	WV	6.3	10	16	25 ~ 50		63 ~ 100		
	Z-25°C/Z+20°C	3	3	2	2		3		
	Z-55°C/Z+20°C	8	5	4	3		4		
Load life (after application of the rated voltage for 2000 hours at 105°C)	Leakage current			Less than specified value					
	Capacitance change			Within ±20% of initial value					
	tanδ			Less than 200% of specified value					
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.								
Resistance to soldering heat	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 250°C for 10 seconds.								
	Leakage current			Less than specified value					
	Capacitance change			Within ±10% of initial value					
	tanδ			Less than specified value					

## DRAWING -Series code of JH is "G"

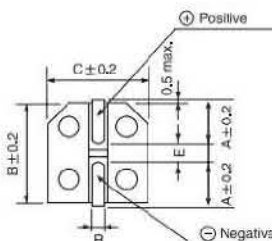
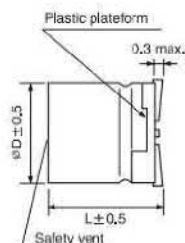
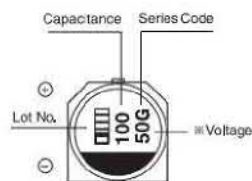
Unit : mm

( $\phi 6.3, \phi 8 \times 6.2$ )

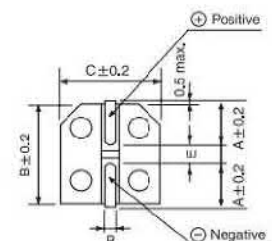
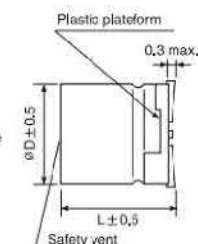
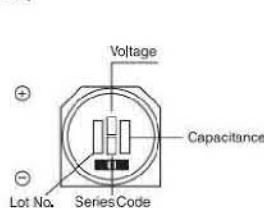


$\phi D \times L$	A	B	C	E	R
6.3×5.8	2.4	6.6	6.6	2.2	0.5~0.8
6.3×7.7	2.4	6.6	6.6	2.2	0.5~0.8
8×6.2	3.3	8.3	8.3	2.3	0.5~0.8
8×10	2.9	8.3	8.3	3.1	0.8~1.1
10×10	3.2	10.3	10.3	4.5	0.8~1.1
12.5×13.5	4.6	12.8	12.8	4.5	0.8~1.4

( $\phi 8 \times 10, \phi 10 \times 10$ )



( $\phi 12.5$ )



## SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

**JH** series

### ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu F$ \ WV	6.3		10		16		25		35	
10										
22							6.3×5.8	57	6.3×5.8	63
33					6.3×5.8	60	6.3×5.8	72	8×6.2	114
47			6.3×5.8	69	6.3×5.8	75	8×6.2	120	8×10	186
100	6.3×5.8	90	6.3×5.8	90	8×10	222	8×10	270	10×10	456
220	8×10	242	8×10	260	10×10	495	10×10	525	10×10	675
330	8×10	432	10×10	477	10×10	660	10×10	558	12.5×13.5	750
470	10×10	510	10×10	527	10×10	735	10×10	675	12.5×13.5	900
680	10×10	612	10×10	588	12.5×13.5	750	12.5×13.5	750		
1000	10×10	743	10×10	825	12.5×13.5	900				
1500	10×10	840	12.5×13.5	975	<div> <div></div> <div>Ripple current (mA rms) at 105°C, 120Hz</div> <div></div> <div>Case size <math>\varnothing D \times L</math> (mm)</div> </div>					
2200	12.5×13.5	1095								

$\mu F$ \ WV	50		63		100	
10	6.3×5.8	45	8×6.2	48		
22	8×6.2	100	8×10	90	8×10	135
33	8×10	200	8×10	165	10×10	180
47	10×10	270	10×10	195	12.5×13.5	375
68	10×10	315	10×10	240	12.5×13.5	450
100	10×10	465	12.5×13.5	405		
220	12.5×13.5	720				

### ● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

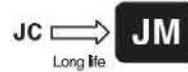
Frequency	50Hz	120Hz	300Hz	1kHz	10kHz $\leq$
Coefficient	0.70	1.00	1.17	1.36	1.50





Chip type, Long Life Series

- Long Life Compared with JC series
- Designed for surface mounting on high density PC board
- Applicable to automatic insertion machine using carrier tape
- Complied to the RoHS directive

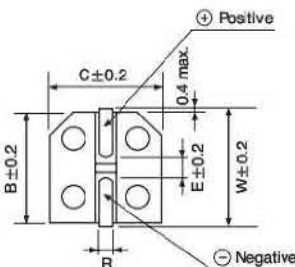
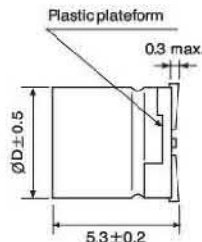
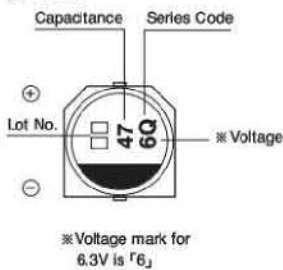


Item	Characteristics								
Operating temperature range	-25 ~ +105°C								
Leakage current max.	I = 0.01CV or 3μA whichever is greater (after 2 minutes)								
Capacitance tolerance	±20% at 120Hz, 20°C								
Dissipation factor max. (at 120Hz, 20°C)	WV	6.3	10	16	25	35	50	63	100
	tanδ	0.32	0.28	0.21	0.21	0.18	0.18	0.12	0.12
Low temperature characteristics (Impedance ratio at 120Hz)	WV	6.3	10	16	25 ~ 50		63 ~ 100		
	Z-25°C/Z+20°C	8	8	6	4		3		
Load life (after application of the rated voltage for 3000 hours at 105°C)	Leakage current				Less than specified value				
	Capacitance change				Within ±30% of initial value				
	tanδ				Less than 300% of specified value				
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.								
Resistance to soldering heat	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 250°C for 10 seconds.								
	Leakage current				Less than specified value				
	Capacitance change				Within ±10% of initial value				
	tanδ				Less than specified value				

## DRAWING -Series code of JM is "Q"

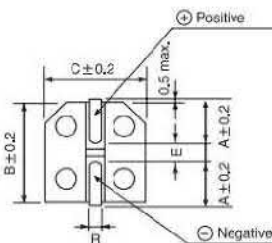
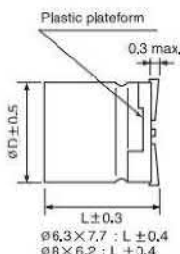
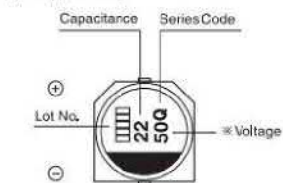
Unit : mm

( $\varnothing 4$ ,  $\varnothing 5$ )

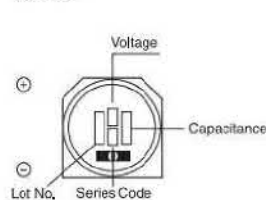


$\varnothing D \times L$	W	A	B	C	E	R
4×5.3	4.8		4.3	4.3	1.0	0.5~0.8
5×5.3	5.8		5.3	5.3	1.4	0.5~0.8
6.3×5.3		2.4	6.6	6.6	2.2	0.5~0.8
6.3×5.8		2.4	6.6	6.6	2.2	0.5~0.8
6.3×7.7		2.4	6.6	6.6	2.2	0.5~0.8
8×6.2		3.3	8.3	8.3	2.3	0.5~0.8
8×10		2.9	8.3	8.3	3.1	0.8~1.1
10×10		3.2	10.3	10.3	4.5	0.8~1.1
12.5×13.5		4.6	12.8	12.8	4.5	0.8~1.4

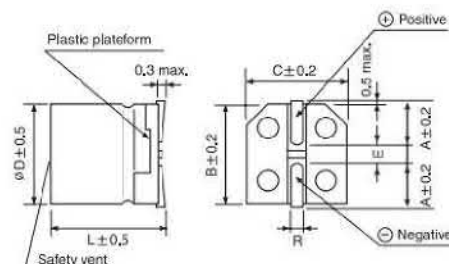
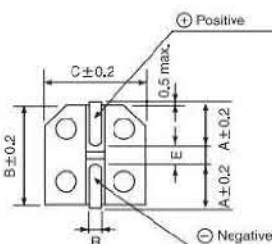
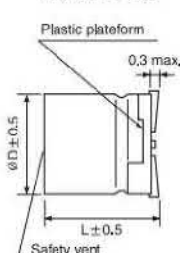
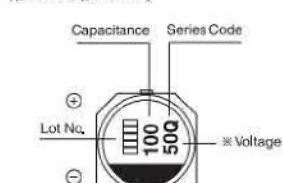
( $\varnothing 6.3$ ,  $\varnothing 8 \times 6.2$ )



( $\varnothing 12.5$ )



( $\varnothing 8 \times 10$ ,  $\varnothing 10 \times 10$ )



## SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

**JM** series

### ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu F$ \ WV	6.3		10		16		25		35	
10	4×5.3	10	4×5.3	15	4×5.3	19	5×5.3	24	6.3×5.3	26
22	4×5.3	25	5×5.3	30	5×5.3	33	6.3×5.3	38	6.3×5.8	42
33	5×5.3	35	5×5.3	38	6.3×5.3	42	6.3×5.8	48	8×6.2	76
47	5×5.3	42	6.3×5.3	52	6.3×5.8	60	8×6.2	79	8×10	124
100	6.3×5.8	60	6.3×5.8	60	8×10	148	8×10	181	10×10	310
220	8×10	161	8×10	173	10×10	330	10×10	351	10×10	480
330	8×10	288	10×10	318	10×10	441	10×10	372	12.5×13.5	500
470	10×10	340	10×10	351	10×10	489	10×10	450	12.5×13.5	600
680	10×10	408	10×10	392	12.5×13.5	500	12.5×13.5	500		
1000	10×10	495	10×10	550	12.5×13.5	600				
1500	10×10	560	12.5×13.5	650	<div> <div></div> <div>Ripple current (mA rms) at 105°C, 120Hz</div> </div> <div> <div></div> <div>Case size <math>\varnothing D \times L</math> (mm)</div> </div>					
2200	12.5×13.5	730								

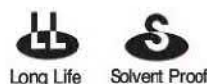
$\mu F$ \ WV	50		63		100	
10	6.3×5.8	30	8×6.2	32		
22	8×6.2	67	8×10	60	8×10	90
33	8×10	133	8×10	110	10×10	120
47	10×10	180	10×10	130	12.5×13.5	250
68	10×10	200	10×10	160	12.5×13.5	300
100	10×10	310	12.5×13.5	270		
220	12.5×13.5	480				

### ● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	300Hz	1kHz	10kHz $\leq$
Coefficient	0.70	1.00	1.17	1.36	1.50

## CA Chip type, Long Life Series

- Chip type, long life capacitance in large case sizes
- Chip type with load life of 5000 hours at +105°C
- Designed for surface mounting on high density PC board
- Applicable to automatic insertion machine using carrier tape
- Complied to the RoHS directive

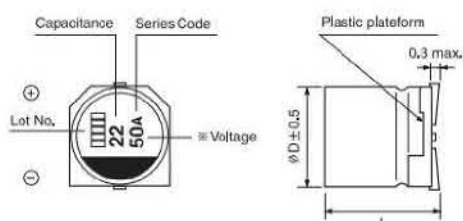


Item	Characteristics						
Operating temperature range	-55 ~ +105°C						
Leakage current max.	I = 0.01CV or 3μA whichever is greater (after 2 minutes)						
Capacitance tolerance	± 20% at 120Hz, 20°C						
Dissipation factor max. (at 120Hz, 20°C)	WV	6.3	10	16	25	35	50
	tanδ	0.28	0.24	0.2	0.16	0.13	0.12
Low temperature characteristics (Impedance ratio at 120Hz)	WV	6.3	10	16	25	35	50
	Z-25°C/Z+20°C	4	3	2	2	2	2
	Z-40°C/Z+20°C	10	7	5	3	3	3
Load life (after application of the rated voltage for 5000 hours at 105°C)	Leakage current		Less than specified value				
	Capacitance change		Within ±30% of initial value				
	tanδ		Less than 300% of specified value				
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.						
Resistance to soldering heat	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 250°C for 10 seconds.						
	Leakage current		Less than specified value				
	Capacitance change		Within ± 10% of initial value				
	tanδ		Less than specified value				

## DRAWING

Unit : mm

-Series code of CA is "A"



\* Please refer to drawing for CK Series in page 69 for detail drawing.

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu F$	WV	6.3	10	16	25	35	50
10							
22					6.3×5.8	38	6.3×5.8
33				6.3×5.8	40	6.3×5.8	42
47			6.3×5.8	46	6.3×5.8	50	6.3×7.7
100	6.3×5.8	60	6.3×7.7	81	6.3×7.7	81	8×10
220	6.3×7.7	101	8×10	141	10×10	216	10×10
330	8×10	160	10×10	238	10×10	238	10×10
470	10×10	254	10×10	254	10×10	254	10×10
1000	10×10	313					

← Ripple current (mA rms) at 105°C, 120Hz  
Case size  $\varnothing D \times L$  (mm)

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	300Hz	1kHz	10kHz $\leq$
Coefficient	0.70	1.00	1.17	1.36	1.50



# SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS



Chip type, Long Life Series



- Chip type with load life 5000 hours at 105°C
- Chip type with 5.5mmL Height
- Designed for surface mounting on high density PC board
- Applicable to automatic insertion machine using carrier tape
- Complied to the RoHS directive



Item	Characteristics							
Operating temperature range	-55 ~ +105°C							
Leakage current max.	I = 0.01CV or 3μA whichever is greater (after 2 minutes)							
Capacitance tolerance	± 20% at 120Hz, 20°C							
Dissipation factor max. (at 120Hz, 20°C)	WV	4	6.3	10	16	25	35	50
	tanδ	0.24	0.22	0.19	0.16	0.14	0.12	0.11
Low temperature characteristics (Impedance ratio at 120Hz)	WV	4	6.3	10	16	25 ~ 50		
	Z-25°C/Z+20°C	2	2	2	2	3		
	Z-55°C/Z+20°C	4	4	4	3	3		
Load life (after application of the rated voltage for 5000 hours at 105°C)	Capacitance change			Within ±30% of initial value				
	tanδ			Less than 300% of the specified value				
	Leakage current			Less than specified value				
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.							
Resistance to soldering heat	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 250°C for 10 seconds.							
	Leakage current			Less than specified value				
	Capacitance change			Within ±10% of initial value				
	tanδ			Less than specified value				

## DRAWING (See page 55)

Unit : mm

-Series code of CB is "B"

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV	4		6.3		10		16		25		35		50	
μF														
0.1													4×5.3	2
0.22													4×5.3	3
0.33													4×5.3	4
0.47													4×5.3	5
1.0													4×5.3	7
2.2													4×5.3	11
3.3													4×5.3	14
4.7									4×5.3	14	4×5.3	15	5×5.3	19
6.8									4×5.3	17	5×5.3	21	6.3×5.3	26
10							4×5.3	19	5×5.3	24	5×5.3	26	6.3×5.3	33
15					4×5.3	22	5×5.3	28	5×5.3	31	6.3×5.3	37	6.3×5.3	40
22	4×5.3	24	4×5.3	25	5×5.3	30	5×5.3	33	6.3×5.3	42	6.3×5.3	45		
33	5×5.3	33	5×5.3	35	5×5.3	38	6.3×5.3	48						
47	5×5.3	40	5×5.3	42	6.3×5.3	52	6.3×5.3	57						
68	5×5.3	48	6.3×5.3	55	6.3×5.3	63								
100	5×5.3	55	6.3×5.3	67	6.3×5.3	72								

Ripple current (mA rms) at 105°C, 120Hz  
Case size ØD×L(mm)

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	300Hz	1kHz	10kHz ≤
Coefficient	0.70	1.00	1.17	1.36	1.50



Chip type, Long Life Series

- Chip type, long life capacitance in large case size
- For ECU
- Application to automatic insertion machine using carrier tape
- Complied to the RoHS directive



Long Life



Solvent Proof



Item	Characteristics					
Operating temperature range	-40 ~ +105°C					
Leakage current	I = 0.03CV or 4μA whichever is greater (after 2 minutes)					
Capacitance tolerance	±20% (20°C, 120Hz)					
Dissipation factor max. (at 120Hz, 20°C)	Rated Voltage(V)	10	16	25	35	50
	tanδ	0.32	0.24	0.21	0.18	0.18
Low temperature characteristics (Impedance ratio at 120Hz)	WV	10	16	25	35	50
	Z-40°C/Z+20°C	12	10	8	6	6
Load life (after application of the rated voltage for 10000 hours at 105°C)	Leakage current	Less than specified value				
	Capacitance change	Within ±30% of the initial value				
	tanδ	Less than 300% of the specified value				
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.					
Resistance to soldering heat	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 250°C for 10 seconds.					
	Leakage current	Less than specified value				
	Capacitance change	Within ±30% of the initial value				
	tanδ	Less than 300% of the specified value				

## DRAWING (See page 55)

Unit : mm

-Series code of JL is "P"

CHIP TYPES

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu F$	WV	10		16		25		35		50	
33										8×10	75
47								8×10	90	8×10	90
100				8×10	270	8×10	163	10×10	132	10×10	167
220		8×10	270	8×10	270	10×10	200	10×10	249		
330		8×10	270	10×10	315	10×10	304				
470		10×10	315	10×10	315						

↑ ↑  
Ripple current (mA rms) at 105°C, 120Hz  
Case size  $\varnothing D \times L$ (mm)

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	300Hz	1kHz	10kHz $\leq$
Coefficient	0.70	1.00	1.17	1.36	1.50

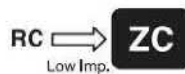


# SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS



Height 5.5mmL, Low Impedance Series

- Chip type, low impedance temperature range up to 105°C
- Designed for surface mounting on high density PC board
- Applicable to automatic insertion machine using carrier tape
- Complied to the RoHS directive



Item	Characteristics					
Operating temperature range	-55 ~ +105℃					
Leakage current max.	I = 0.01CV or 3μA whichever is greater (after 2 minutes)					
Capacitance tolerance	±20% at 120Hz, 20℃					
Dissipation factor max. (at 120Hz, 20℃)	WV	6.3	10	16	25	35
	tanδ	0.22	0.19	0.16	0.14	0.12
Low temperature characteristics (Impedance ratio at 120Hz)	WV	6.3	10	16	25	35
	Z-25℃/Z+20℃	2	2	2	2	3
	Z-55℃/Z+20℃	4	4	3	3	3
Load life (after application of the rated voltage for 1000 hours at 105℃)	Leakage current			Less than specified value		
	Capacitance change			Within ±20% of initial value		
	tanδ			Less than 200% of specified value		
Shelf life (at 105℃)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20℃ by the KS C 6035 clause 5.4.					
Resistance to soldering heat	The following specifications shall be satisfied when the capacitors are restored to 20℃ after exposing them at 250℃ for 10 seconds.					
	Leakage current			Less than specified value		
	Capacitance change			Within ±10% of initial value		
	tanδ			Less than specified value		

## DRAWING (See page 55)

Unit : mm

-Series code of ZC is "Z"

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu F$	WV	6.3			10			16			25			35		
1.0														4×5.3	5.0	50
1.5														4×5.3	5.0	50
2.2														4×5.3	5.0	50
3.3														4×5.3	5.0	50
4.7											4×5.3	5.0	50	4×5.3	5.0	50
6.8											4×5.3	5.0	50	5×5.3	2.6	80
10								4×5.3	5.0	50	5×5.3	2.6	80	5×5.3	2.6	80
15								5×5.3	2.6	80	6.3×5.3	1.3	75	6.3×5.3	1.3	115
22	4×5.3	5.0	50	5×5.3	2.6	80	5×5.3	2.6	80	6.3×5.3	1.3	115	6.3×5.3	1.3	115	
33	5×5.3	2.6	80	5×5.3	2.6	80	6.3×5.3	1.3	115	6.3×5.3	1.3	115	6.3×5.3	1.3	115	
47	5×5.3	2.6	80	6.3×5.3	1.3	115	6.3×5.3	1.3	115							
68	6.3×5.3	1.3	115	6.3×5.3	1.3	115										
100	6.3×5.3	1.3	115													

Ripple current (mA rms) at 105°C, 100kHz

Impedance ( $\Omega$ ) at 20°C, 100kHz  
Case size  $\phi D \times L$ (mm)

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	300Hz	1kHz	10kHz $\leq$
Coefficient	0.35	0.5	0.64	0.83	1.00





Chip type, Low Impedance, High CV Series



Low Impedance



Solvent Proof



- Chip type, low impedance temperature range up to 105°C
- Designed for surface mounting on high density PC board
- Applicable to automatic insertion machine using carrier tape
- Complied to the RoHS directive

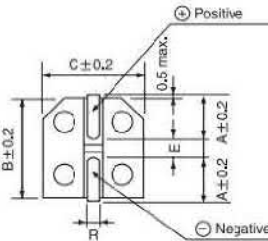
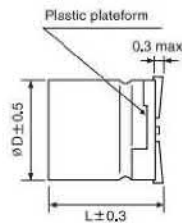
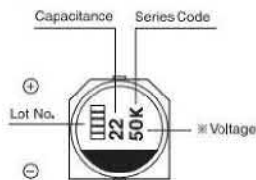
ZC → CK  
Low Imp.

Item	Characteristics									
Operating temperature range	-55 ~ +105°C									
Leakage current max.	I = 0.01CV or 3μA whichever is greater (after 2 minutes)									
Capacitance tolerance	±20% at 120Hz, 20°C									
Dissipation factor max. (at 120Hz, 20°C)	WV	6.3	10	16	25	35	50	63	80	100
	tanδ	0.24	0.19	0.16	0.14	0.12	0.12	0.10	0.10	0.10
Low temperature characteristics (Impedance ratio at 120Hz)	WV		6.3	10	16	25	35	50	63~100	
	Z-25°C/Z+20°C		2	2	2	2	2	2	3	
	Z-55°C/Z+20°C		3	3	3	3	3	3	4	
Load life (after application of the rated voltage for 2000 hours at 105°C)	Leakage current				Less than specified value					
	Capacitance change				Within ±25% of initial value					
	tanδ				Less than 200% of specified value					
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.									
Resistance to soldering heat	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 250°C for 10 seconds.									
	Leakage current				Less than specified value					
	Capacitance change				Within ±10% of initial value					
	tanδ				Less than specified value					

## DRAWING -Series code of CK is "K"

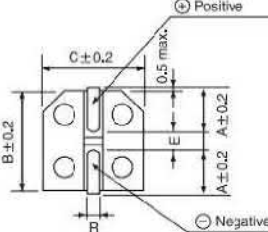
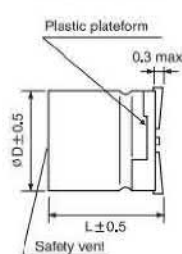
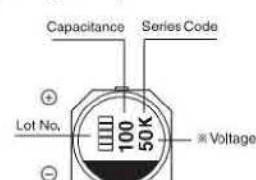
Unit : mm

( $\phi 6.3, \phi 8 \times 6.2$ )

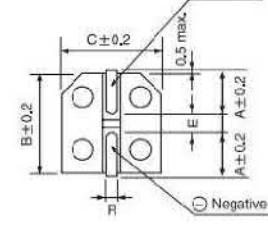
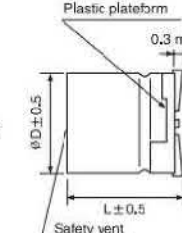
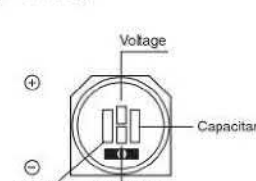


$\phi D \times L$	A	B	C	E	R
6.3×5.8	2.4	6.6	6.6	2.2	0.5~0.8
6.3×7.7	2.4	6.6	6.6	2.2	0.5~0.8
8×6.2	3.3	8.3	8.3	2.3	0.5~0.8
8×10	2.9	8.3	8.3	3.1	0.8~1.1
10×10	3.2	10.3	10.3	4.5	0.8~1.1
12.5×13.5	4.6	12.8	12.8	4.5	0.8~1.4

( $\phi 8 \times 10, \phi 10 \times 10$ )



( $\phi 12.5 \times 13.5$ )



# SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

**CK** series

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu F$ \ WV	6.3			10			16			25			35			50		
10																6.3×5.8	0.88	165
15																6.3×5.8	0.88	165
22																6.3×5.8	0.88	165
33							6.3×5.8	0.44	230	6.3×5.8	0.44	230	6.3×5.8	0.44	230	6.3×7.7	0.68	280
																8×6.2	0.63	300
47				6.3×5.8	0.44	230	6.3×5.8	0.44	230	6.3×5.8	0.44	230	6.3×5.8	0.44	230	6.3×7.7	0.68	280
																8×6.2	0.63	300
68	6.3×5.8	0.44	230	6.3×5.8	0.44	230	6.3×5.8	0.44	230	6.3×5.8	0.44	230	6.3×7.7	0.34	280	8×10	0.34	450
													8×6.2	0.26	300			
100	6.3×5.8	0.44	230	6.3×5.8	0.44	230	6.3×5.8	0.44	230	6.3×7.7	0.34	280	8×10	0.17	450	10×10	0.18	670
										8×6.2	0.26	300						
150	6.3×5.8	0.44	230	6.3×5.8	0.44	230	6.3×7.7	0.34	280	8×10	0.17	450	8×10	0.17	450			
							8×6.2	0.26	300									
220	6.3×5.8	0.44	230	6.3×7.7	0.34	280	6.3×7.7	0.34	280	8×10	0.17	450	10×10	0.09	670			
				8×6.2	0.26	300	8×6.2	0.26	300									
330	6.3×7.7	0.34	280	8×10	0.17	450	8×10	0.17	450	10×10	0.09	670						
	8×6.2	0.26	300															
470	8×10	0.17	450	8×10	0.17	450	10×10	0.09	670									
680	8×10	0.17	450	10×10	0.09	670												
1000	10×10	0.09	670															
1500	10×10	0.09	670															

$\mu F$ \ WV	63			80			100		
10	6.3×5.8	2.3	80	6.3×7.7	2.4	60			
22	6.3×7.7	2.1	120	8×10	1.3	130	8×10	1.3	130
33	8×10	0.9	250	8×10	1.3	130	10×10	0.7	200
47	8×10	0.9	250	10×10	0.7	200	12.5×13.5	0.45	500
68	10×10	0.45	400	12.5×13.5	0.45	500	12.5×13.5	0.45	500
100	10×10	0.45	400	12.5×13.5	0.45	500			
150	12.5×13.5	0.32	800	12.5×13.5	0.45	500			
220	12.5×13.5	0.32	800						

↑ ↑ ↑  
Ripple current (mA rms) at 105°C, 100kHz  
Impedance ( $\Omega$ ) at 20°C, 100kHz  
Case size  $\varnothing D \times L$  (mm)

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	300Hz	1kHz	10kHz $\leq$
Coefficient	0.35	0.5	0.64	0.83	1.00



Chip type, Extremely Low Impedance Series

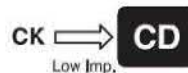


Low Impedance



Solvent Proof

- Chip type, low impedance temperature range up to 105°C
- Designed for surface mounting on high density PC board
- Applicable to automatic insertion machine using carrier tape
- Complied to the RoHS directive



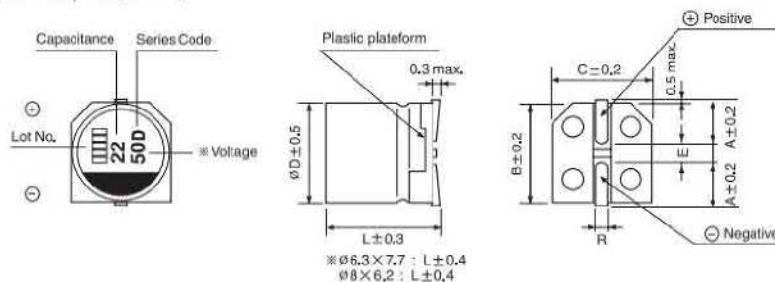
Item	Characteristics						
Operating temperature range	-55 ~ +105°C						
Leakage current max.	I = 0.01CV or 3μA whichever is greater (after 2 minutes)						
Capacitance tolerance	±20% at 120Hz, 20°C						
Dissipation factor max. (at 120Hz, 20°C)	WV	6.3	10	16	25	35	50
	tanδ	0.24	0.19	0.16	0.14	0.12	0.12
Low temperature characteristics (Impedance ratio at 120Hz)	WV	6.3	10	16	25	35	50
	Z-25°C/Z+20°C	2	2	2	2	2	2
	Z-55°C/Z+20°C	3	3	3	3	3	3
Load life (after application of the rated voltage for 2000 hours at 105°C)	Leakage current			Less than specified value			
	Capacitance change			Within ±25% of initial value			
	tanδ			Less than 200% of specified value			
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.						
Resistance to soldering heat	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 250°C for 10 seconds.						
	Leakage current			Less than specified value			
	Capacitance change			Within ±10% of initial value			
	tanδ			Less than specified value			

## DRAWING

Unit : mm

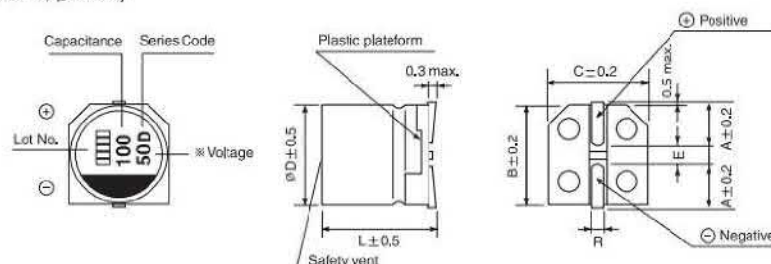
-Series code of CD is "D"

( $\phi 6.3 \times 5.8$ , 7.7,  $\phi 8 \times 6.2$ )



$\phi D$	A	B	C	E	R
6.3×5.8	2.4	6.6	6.6	2.2	0.5~0.8
6.3×7.7	2.4	6.6	6.6	2.2	0.5~0.8
8×6.2	3.3	8.3	8.3	2.3	0.5~0.8
8×10	2.9	8.3	8.3	3.1	0.8~1.1
10×10	3.2	10.3	10.3	4.5	0.8~1.1

( $\phi 8 \times 10$ ,  $\phi 10 \times 10$ )





# SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

**CD** series

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu F$ \ WV	6.3			10			16			25			35			50		
10																6.3×5.8	0.86	170
15																6.3×5.8	0.86	170
22																6.3×5.8	0.86	170
33							6.3×5.8	0.39	240	6.3×5.8	0.39	240	6.3×5.8	0.39	240	6.3×7.7	0.66	280
																8×6.2	0.63	300
47				6.3×5.8	0.39	240	6.3×5.8	0.39	240	6.3×5.8	0.39	240	6.3×5.8	0.39	240	6.3×7.7	0.66	280
																8×6.2	0.63	300
68	6.3×5.8	0.36	240	6.3×5.8	0.36	240	6.3×5.8	0.36	240	6.3×5.8	0.36	240	6.3×7.7	0.32	290	8×10	0.32	350
100	6.3×5.8	0.36	240	6.3×5.8	0.36	240	6.3×5.8	0.36	240	6.3×7.7	0.32	290	8×10	0.16	600	10×10	0.16	700
										8×6.2	0.26	300						
150	6.3×5.8	0.36	240	6.3×5.8	0.36	240	6.3×7.7	0.32	290	8×10	0.16	600	8×10	0.16	600			
220	6.3×5.8	0.36	240	6.3×7.7	0.32	290	6.3×7.7	0.32	290	8×10	0.16	600	10×10	0.08	850			
				8×6.2	0.26	300	8×6.2	0.26	300									
330	6.3×7.7	0.32	290	8×10	0.16	600	8×10	0.16	600	10×10	0.10	850						
	8×6.2	0.26	300															
470	8×10	0.16	600	8×10	0.16	600	10×10	0.08	850	<div><div></div><div>Ripple current (mA rms) at 105°C, 100kHz</div></div> <div><div></div><div>Impedance (<math>\Omega</math>) at 20°C, 100kHz</div></div> <div><div></div><div>Case size <math>\varnothing D \times L</math> (mm)</div></div>								
680	8×10	0.16	600	10×10	0.08	850												
1000	10×10	0.08	850															
1500	10×10	0.08	850															

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	300Hz	1kHz	10kHz $\leq$
Coefficient	0.35	0.5	0.64	0.83	1.00

## CM Chip type, Extremely Low Impedance Long Life Series

**IZI** Low Impedance **S** Solvent Proof



- Chip type, low impedance temperature range up to 105°C
- Designed for surface mounting on high density PC board
- Applicable to automatic insertion machine using carrier tape
- Complied to the RoHS directive

CD  $\Rightarrow$  **CM**  
Long life

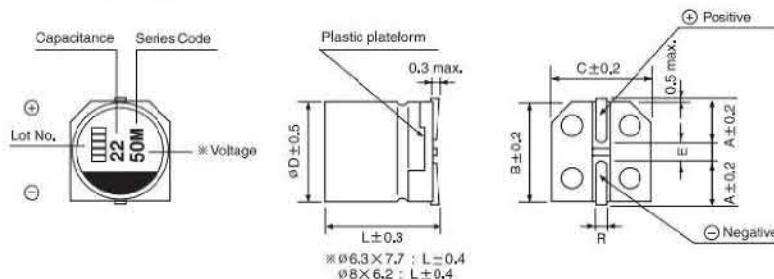
Item	Characteristics						
Operating temperature range	-55 ~ +105°C						
Leakage current max.	I = 0.01CV or 3μA whichever is greater (after 2 minutes)						
Capacitance tolerance	± 20% at 120Hz, 20°C						
Dissipation factor max. (at 120Hz, 20°C)	WV	6.3	10	16	25	35	50
	tanδ	0.26	0.19	0.16	0.14	0.13	0.12
Low temperature characteristics (Impedance ratio at 120Hz)	WV	6.3	10	16	25	35	50
	Z-25°C/Z+20°C	2	2	2	2	2	2
	Z-55°C/Z+20°C	4	4	4	3	3	3
Load life (after application of the rated voltage for 5000 hours at 105°C)	Leakage current		Less than specified value				
	Capacitance change		Within ±30% of initial value				
	tanδ		Less than 250% of specified value				
	ØD		ØD ≤ 6.3, Ø8 × 6.2mmL			ØD ≥ 8	
	Life time		3000 hours			5000 hours	
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.						
Resistance to soldering heat	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 250°C for 10 seconds.						
	Leakage current		Less than specified value				
	Capacitance change		Within ± 10% of initial value				
	tanδ		Less than specified value				

### DRAWING

Unit : mm

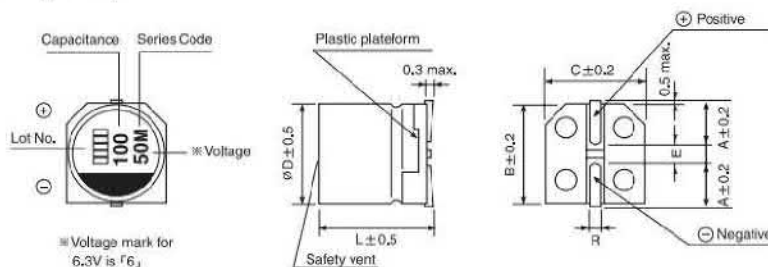
-Series code of CM is "M"

( $\phi 6.3 \times 5.8, 7.7, \phi 8 \times 6.2$ )



$\phi D$	A	B	C	E	R
6.3×5.8	2.4	6.6	6.6	2.2	0.5~0.8
6.3×7.7	2.4	6.6	6.6	2.2	0.5~0.8
8×6.2	3.3	8.3	8.3	2.3	0.5~0.8
8×10	2.9	8.3	8.3	3.1	0.8~1.1
10×10	3.2	10.3	10.3	4.5	0.8~1.1

( $\phi 8 \times 10, \phi 10 \times 10$ )



# SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

**CM** series

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu F \backslash WV$	6.3			10			16			25			35			50		
10															6.3×5.8	0.86	170	
15															6.3×5.8	0.86	170	
22															6.3×5.8	0.86	170	
33							6.3×5.8	0.39	240	6.3×5.8	0.39	240	6.3×5.8	0.39	240	6.3×7.7	0.66	280
															8×6.2	0.63	300	
47				6.3×5.8	0.39	240	6.3×5.8	0.39	240	6.3×5.8	0.39	240	6.3×5.8	0.39	240	6.3×7.7	0.66	280
															8×6.2	0.63	300	
68	6.3×5.8	0.36	240	6.3×5.8	0.36	240	6.3×5.8	0.36	240	6.3×5.8	0.36	240	6.3×7.7	0.32	290	8×10	0.32	350
100	6.3×5.8	0.36	240	6.3×5.8	0.36	240	6.3×5.8	0.36	240	6.3×7.7	0.32	290	8×10	0.16	600	10×10	0.16	700
										8×6.2	0.26	300						
150	6.3×5.8	0.36	240	6.3×5.8	0.36	240	6.3×7.7	0.32	290	8×10	0.16	600	8×10	0.16	600			
220	6.3×5.8	0.36	240	6.3×7.7	0.36	290	6.3×7.7	0.32	290	8×10	0.16	600	10×10	0.08	850			
				8×6.2	0.26	300	8×6.2	0.26	300									
330	6.3×7.7	0.32	290	8×10	0.16	600	8×10	0.16	600	10×10	0.08	850						
	8×6.2	0.26	300															
470	8×10	0.16	600	8×10	0.16	600	10×10	0.08	850	<div><div></div><div>Ripple current (mA rms) at 105°C, 100kHz</div><div></div><div>Impedance (<math>\Omega</math>) at 20°C, 100kHz</div><div></div><div>Case size <math>\varnothing D \times L</math> (mm)</div></div>								
680	8×10	0.16	600	10×10	0.08	850												
1000	10×10	0.08	850															

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	300Hz	1kHz	10kHz $\leq$
Coefficient	0.35	0.5	0.64	0.83	1.00





Chip type, High Reliability Series

- Chip type, high temperature range, for +125°C use
- Designed for surface mounting on high density PC board
- Applicable to automatic insertion machine using carrier tape
- Complied to the RoHS directive



Item	Characteristics							
Operating temperature range	-40 ~ 125°C							
Leakage current max.	I = 0.03CV or 4μA whichever is greater (after 2 minutes)							
Capacitance tolerance	±20% at 120Hz, 20°C							
Dissipation factor max. (at 120Hz, 20°C)	WV	10	16	25	35~50	63~100	160~200	250~400
	tanδ	0.32	0.24	0.21	0.18	0.12	0.2	0.24
Low temperature characteristics (Impedance ratio at 120Hz)	WV	10	16	25	35~50	63~100	160~200	250~400
	Z-25°C/Z+20°C	8	6	4	4	3	3	6
	Z-40°C/Z+20°C	12	8	6	4	4	6	10
Load life (after application of the rated voltage for 2000 hours at 125°C)	Leakage current		Less than specified value					
	Capacitance change		Within ±30% of initial value					
	tanδ		Less than 300% of specified value					
Shelf life (at 125°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.							
Resistance to soldering heat	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 250°C for 10 seconds.							
	Leakage current		Less than specified value					
	Capacitance change		Within ±10% of initial value					
	tanδ		Less than specified value					

## DRAWING (See page 59)

Unit : mm

-Series code of UC is "U"

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu F$	WV	10	16	25	35	50	63
10						8×6.2 65	8×6.2 40
22						8×6.2 65	8×10 67
33					8×6.2 65	8×10 125	8×10 67
47				8×6.2 65	8×10 125	10×10 200	10×10 115
68			8×6.2 65	8×6.2 65	10×10 200	12.5×13.5 525	12.5×13.5 335
100	8×6.2 65	8×10 125	8×10 125	10×10 200	12.5×13.5 525		
220	8×10 125	10×10 200	10×10 200	12.5×13.5 525			
330	10×10 200	10×10 200	12.5×13.5 525				
470	10×10 200	12.5×13.5 525					
1000	12.5×13.5 525						

↑ Ripple current (mA rms) at 125°C, 120Hz  
Case size  $\phi D \times L$ (mm)

$\mu F$	WV	80	100	160	200	250	400
3.3							12.5×13.5 30
4.7						12.5×13.5 45	12.5×13.5 30
10	8×10 45	8×10 45	10×10 45	10×10 45	12.5×13.5 85		
22	8×10 45	10×10 80	12.5×13.5 85	12.5×13.5 85			
33	10×10 80	10×10 80					
47	10×10 80	12.5×13.5 300					
68	12.5×13.5 300	12.5×13.5 300					

↑ Ripple current (mA rms) at 125°C, 120Hz  
Case size  $\phi D \times L$ (mm)

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	300Hz	1kHz	10kHz≤
Coefficient	0.70	1.00	1.17	1.36	1.50

# SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

**CF**

Chip type, High Temperature, Long Life, Series

**LL**

Long Life

**S**

Solvent Proof



- Chip type, high temperature range, for + 130°C use
- For ECU
- Application to automatic insertion machine using carrier
- Complied to the RoHS directive

UC

Wide temp  
Long life

**CF**

Item	Characteristics					
Operating temperature range	-40 ~ +130°C					
Leakage current	I = 0.03CV or 4μA whichever is greater (after 2 minutes)					
Capacitance tolerance	± 20% (20°C,120Hz)					
Dissipation factor max. (at 120Hz, 20°C)	Rated Voltage(V)	10	16	25	35	50
	tanδ	0.32	0.24	0.21	0.18	0.18
Low temperature characteristics (Impedance ratio at 120Hz)	WV	10	16	25	35	50
	Z-40°C/Z+20°C	12	11	8	6	6
Load life (after application of the rated voltage for 5000 hours at 130°C)	Leakage current		Less than specified value			
	Capacitance change		Within ±30% of initial value			
	tanδ		Less than 300% of the specified value			
	ØD	Ø8×6.2mmL	Ø8×10mmL		ØD ≥ 10	
	Life time	2000 hours	3000 hours		5000 hours	
Shelf life (at 130°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.					
Resistance to soldering heat	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 250°C for 10 seconds.					
	Leakage current		Less than specified value			
	Capacitance change		Within ±10% of initial value			
	tanδ		Less than specified value			

## DRAWING (See page 59)

Unit : mm

-Series code of CF is "H"

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu F$ \ WV	10	16	25	35	50
22					8×6.2 28
33				8×6.2 41	8×10 75
47				10×10 90	10×10 90
68		8×6.2 50	8×6.2 45	10×10 105	12.5×13.5 132
100	8×6.2 48	8×10 66	10×10 163	10×10 132	12.5×13.5 167
220	8×10 90	10×10 163	10×10 200	12.5×13.5 249	
330	10×10 125	10×10 200	12.5×13.5 304		
470	10×10 150	12.5×13.5 304			
1000	12.5×13.5 405				

Ripple current (mA rms) at 130°C, 120Hz  
Case size  $\phi D \times L$ (mm)

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	300Hz	1kHz	10kHz $\leq$
Coefficient	0.70	1.00	1.17	1.36	1.50



## CT Chip type, High Temperature, Low Imp., Series

**IZI** Low Impedance **S** Solvent Proof

- Chip type, Low Impedance temperature range up to 130°C use
- For ECU
- Application to automatic insertion machine using carrier tape
- Complied to the RoHS directive

CF → **CT**  
Low Imp.



Item	Characteristics					
Operating temperature range	-40 ~ +130°C					
Leakage current max.	I = 0.03CV or 4μA whichever is greater (after 2 minutes)					
Capacitance tolerance	± 20% ( 20°C, 120Hz)					
Dissipation factor max. (at 120Hz, 20°C)	Rated Voltage(V)	10	16	25	35	50
	tanδ	0.32	0.24	0.21	0.18	0.18
Low temperature characteristics (Impedance ratio at 120Hz)	WV	10	16	25	35	50
	Z-40°C/Z+20°C	12	10	8	6	6
Load life (after application of the rated voltage for 2000 hours at 130°C)	Leakage Current	Less than specified value				
	Capacitance Change	Within ±30% of initial value				
	tanδ	Less than 300% of specified value				
Shelf life (at 130°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.					
Resistance to soldering heat	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 250°C for 10 seconds.					
	Leakage Current	Less than specified value				
	Capacitance Change	Within ± 10% of initial value				
	tanδ	Less than specified value				

### ● DRAWING (See page 59)

Unit : mm

-Series code of CT is "C"

CHIP TYPES

### ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu F$ \ WV	10			16			25			35			50		
33													8×10	0.6	270
47										8×10	0.6	270	10×10	0.5	315
68				8×10	0.6	270	8×10	0.6	270	10×10	0.5	270	10×10	0.5	315
100	8×10	0.6	270	8×10	0.6	270	8×10	0.6	270	10×10	0.5	315	12.5×13.5	0.4	345
220	8×10	0.6	270	8×10	0.6	270	10×10	0.5	315	12.5×13.5	0.4	345			
330	10×10	0.5	315	10×10	0.5	315	12.5×13.5	0.4	345						
470	10×10	0.5	315	12.5×13.5	0.4	345									

← Ripple current (mA rms) at 130°C, 100kHz

Impedance (Ω) at 20°C, 100kHz

Case size  $\phi D \times L$  (mm)

### ● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	300Hz	1kHz	10kHz $\leq$
Coefficient	0.35	0.5	0.64	0.83	1.00



# SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS



Chip type, High Reliability  
Series

- Chip type, high temperature range, for +150°C use
- Applicable to automatic insertion machine using carrier tape
- Complied to the RoHS directive



Item	Characteristics					
Operating temperature range	-40 ~ +150°C					
Leakage current	I = 0.03CV or 4μA whichever is greater (after 2 minutes)					
Capacitance tolerance	±20% at 120Hz, 20°C					
Dissipation factor max. (at 120Hz, 20°C)	WV	10	16	25	35	50
	tanδ	0.30	0.20	0.16	0.14	0.14
Low temperature characteristics (Impedance ratio at 120Hz)	WV	10	16	25	35	50
	Z-40°C/Z+20°C	12	10	8	6	6
Load life (after application of the rated voltage for 1000 hours at 150°C)	Leakage current	Less than specified value				
	Capacitance change	Within ±30% of initial value				
	tanδ	Less than 300% of the specified value				
Shelf life (at 150°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.					
Resistance to soldering heat	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 250°C for 10 seconds.					
	Leakage current	Less than specified value				
	Capacitance change	Within ±10% of initial value				
	tanδ	Less than specified value				

## DRAWING (See page 59)

Unit : mm

-Series code of CW is "W"

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu F$ \ WV	10		16		25		35		50	
33									10×10	75
47							10×10	90	10×10	90
68							10×10	105	12.5×13.5	132
100					10×10	160	10×10	132	12.5×13.5	167
220			10×10	163	10×10	200	12.5×13.5	249		
330	10×10	183	10×10	200	12.5×13.5	304				
470	10×10	218	12.5×13.5	304						
1000	12.5×13.5	405								

Ripple current (mA rms) at 150°C, 120Hz  
Case size  $\phi D \times L$ (mm)

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	300Hz	1kHz	10kHz $\leq$
Coefficient	0.70	1.00	1.17	1.36	1.50

## NC Chip type, Non-polarized Series

- Chip type with 5.5mmL height
- Designed for surface mounting on high density PC board
- Applicable to automatic mounting machine using carrier tape
- Complied to the RoHS directive

**NP** Non-polarized **S** Solvent Proof

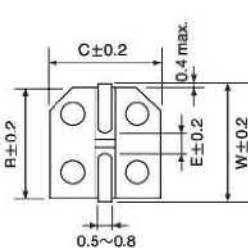
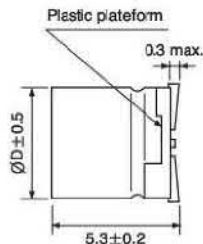
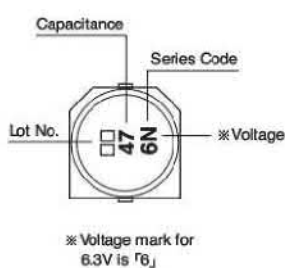


Item	Characteristics						
Operating temperature range	-40 ~ +85°C						
Leakage current max.	I = 0.05CV or 10μA whichever is greater (after 2 minutes)						
Capacitance tolerance	± 20% at 120Hz, 20°C						
Dissipation factor max. (at 120Hz, 20°C)	WV	6.3	10	16	25	35	50
	tanδ	0.24	0.20	0.17	0.17	0.15	0.15
Low temperature characteristics (Impedance ratio at 120Hz)	WV	6.3	10	16	25	35	50
	Z-25°C/Z+20°C	4	3	2	2	2	2
	Z-40°C/Z+20°C	8	6	4	4	3	3
Load life (after application of the rated voltage for 2000 hours at 85°C)	Leakage current			Less than specified value			
	Capacitance change			Within ±20% of initial value			
	tanδ			Less than 200% of specified value			
	Test method			Polarity reverse each 250 hours			
Shelf life (at 85°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.						
Resistance to soldering heat	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 250°C for 10 seconds.						
	Leakage current			Less than specified value			
	Capacitance change			Within ±10% of initial value			
	tanδ			Less than specified value			

### DRAWING

Unit : mm

-Series code of NC is "N"



ØD	W	B	C	E
4	4.8	4.3	4.3	1.0
5	5.8	5.3	5.3	1.4
6.3	7.1	6.6	6.6	2.2

### DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

µF	WV	6.3	10	16	25	35	50
0.1							4×5.3 1.0
0.22							4×5.3 2.0
0.33							4×5.3 2.8
0.47							4×5.3 4.0
1.0							4×5.3 8.4
2.2						4×5.3 8.4	5×5.3 13
3.3					5×5.3 12	5×5.3 16	5×5.3 17
4.7				4×5.3 12	5×5.3 16	5×5.3 18	6.3×5.3 20
10		4×5.3 17	5×5.3 23	6.3×5.3 27	6.3×5.3 29		
22	5×5.3 28	6.3×5.3 33	6.3×5.3 37				
33	6.3×5.3 37	6.3×5.3 41	6.3×5.3 49				
47	6.3×5.3 45						

Ripple current (mA rms) at 85°C, 120Hz  
Case size ØD × L (mm)

# SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS



Height 5.5mmL, 105°C Non-polarized Series

**NP** Non-polarized **S** Solvent Proof



- Chip type, Non-polarized, Wide temperature 105°C
- Chip type with 5.5mmL height
- Designed for surface mounting on high density PC board
- Applicable to automatic insertion machine using carrier tape
- Complied to the RoHS directive

NC  $\rightarrow$  CN  
Wide temp.

Item	Characteristics						
Operating temperature range	-55 ~ +105°C						
Leakage current max.	I = 0.05CV or 10μA whichever is greater (after 2 minutes)						
Capacitance tolerance	±20% at 120Hz, 20°C						
Dissipation factor max. (at 120Hz, 20°C)	WV	6.3	10	16	25	35	50
	tanδ	0.32	0.26	0.24	0.20	0.18	0.18
Low temperature characteristics (Impedance ratio at 120Hz)	WV	6.3	10	16	25	35	50
	Z-25°C/Z+20°C	4	3	2	2	2	2
	Z-40°C/Z+20°C	8	6	4	4	3	3
Load life (after application of the rated voltage for 1000 hours at 105°C)	Leakage current			Less than specified value			
	Capacitance change			Within ±20% of initial value			
	tanδ			Less than 200% of specified value			
	Test method			Polarity reverse each 250 hours			
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.						
Resistance to soldering heat	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 250°C for 10 seconds.						
	Leakage current			Less than specified value			
	Capacitance change			Within ±10% of initial value			
	tanδ			Less than specified value			

## DRAWING (See page 79)

Unit : mm

-Series code of CN is "C"

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu F$	WV	6.3	10	16	25	35	50
0.1							4×5.3 1.3
0.22							4×5.3 2.3
0.33							4×5.3 2.8
0.47							4×5.3 4.0
1.0							4×5.3 8.4
2.2						4×5.3 8.4	5×5.3 13
3.3					5×5.3 12	5×5.3 16	5×5.3 17
4.7				4×5.3 12	5×5.3 16	5×5.3 18	6.3×5.3 20
10			4×5.3 17	5×5.3 23	6.3×5.3 27	6.3×5.3 29	
22	5×5.3	28	6.3×5.3 33	6.3×5.3 37			
33	6.3×5.3	37	6.3×5.3 41	6.3×5.3 49			
47	6.3×5.3	45					

↑ ↑  
Ripple current (mA rms) at 105°C, 120Hz  
Case size  $\phi D \times L$  (mm)



# 4 MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

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## PART NUMBER SYSTEM

### Part Number System

<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
1	2	3	4	5	6	7	8
Series Name	Rated Voltage	Capacitance	Cap. Tol.	Case Diameter	Case Height	Lead Taping Forming and Cutting	Internal Control Code

1 Series Name  
See page 4~5.

2 Rated Working Voltage

WV	2.5	4	6.3	10	16	20	25
Code	0E	0G	0J	1A	1C	1D	1E

WV	35	40	50	63	80	100	160
Code	1V	1G	1H	1J	1K	2A	2C

WV	200	250	315	350	400	450	500
Code	2D	2E	2F	2V	2G	2W	2H

6 Case Height  
ex) 5mm 005  
11mm 011  
12.5mm 12M  
20mm 020  
31.5mm 31M  
35.5mm 35M

7 Lead Taping, Forming and Cutting  
See pages 84 ~ 86

3 Capacitance

ex) 0.47 $\mu$ F 474  
4.7 $\mu$ F 475  
47 $\mu$ F 476  
470 $\mu$ F 477  
4700 $\mu$ F 478  
47000 $\mu$ F 479

4 Capacitance Tolerance

Tolerance (%)	$\pm 10$	$\pm 20$	-10 +20	-10 +30	-10 +50
Code	K	M	V	Q	T

5 Case Diameter

ex)  $\varnothing 3$  03  $\varnothing 12.5$  12  
 $\varnothing 4$  04  $\varnothing 16$  16  
 $\varnothing 5$  05  $\varnothing 18$  18  
 $\varnothing 6.3$  6L  $\varnothing 22$  22  
 $\varnothing 8$  08  $\varnothing 25.4$  25  
 $\varnothing 10$  10

# 4 MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

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## PART NUMBER SYSTEM

### Part Number System

<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
1	2	3	4	5	6	7	8
Series Name	Rated Voltage	Capacitance	Cap. Tol.	Case Diameter	Case Height	Lead Taping Forming and Cutting	Internal Control Code

1 Series Name  
See page 4~5.

2 Rated Working Voltage

WV	2.5	4	6.3	10	16	20	25
Code	0E	0G	0J	1A	1C	1D	1E
WV	35	40	50	63	80	100	160
Code	1V	1G	1H	1J	1K	2A	2C
WV	200	250	315	350	400	450	500
Code	2D	2E	2F	2V	2G	2W	2H

3 Capacitance

ex) 0.47 $\mu$ F 474  
 4.7 $\mu$ F 475  
 47 $\mu$ F 476  
 470 $\mu$ F 477  
 4700 $\mu$ F 478  
 47000 $\mu$ F 479

4 Capacitance Tolerance

Tolerance (%)	$\pm 10$	$\pm 20$	-10 +20	-10 +30	-10 +50
Code	K	M	V	Q	T

5 Case Diameter

ex)  $\varnothing 3$  03  $\varnothing 12.5$  12  
 $\varnothing 4$  04  $\varnothing 16$  16  
 $\varnothing 5$  05  $\varnothing 18$  18  
 $\varnothing 6.3$  6L  $\varnothing 22$  22  
 $\varnothing 8$  08  $\varnothing 25.4$  25  
 $\varnothing 10$  10

6 Case Height  
 ex) 5mm 005  
 11mm 011  
 12.5mm 12M  
 20mm 020  
 31.5mm 31M  
 35.5mm 35M

7 Lead Taping, Forming and Cutting  
 See pages 84 ~ 86

# PACKING

## ● BULK PACKING QUANTITY(pcs) / BOX

SIZE		BULK (QUANTITY)		
ØD	L (mm)	V-Bag	INNER BOX	MIDDLE BOX
3	5	500	12000	48000
4	5, 7	500	10000	40000
5	5, 7, 9, 11	500	7000	28000
6.3	5, 7, 9, 11	500	6000	24000
8	5	500	5000	20000
	9, 11.5	300	3600	14400
10	9, 12.5	200	2400	9600
	16	200	2000	8000
	20, 25	200	1600	6400
12.5	16	100	1200	4800
	20	100	1000	4000
	25	100	900	3600
16	16	100	800	3200
	20	50	600	2400
	25	50	500	2000
	31.5, 35.5	50	400	1600
18	16	50	600	2400
	20	50	500	2000
	20, 25, 31.5	50	400	1600
	35.5	50	300	1200

## ● CUTTING PACKING QUANTITY(pcs) / BOX

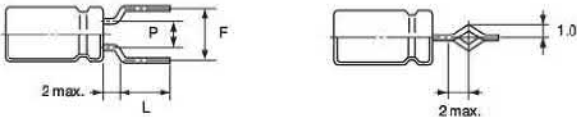
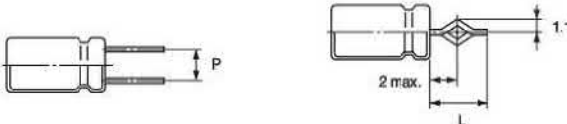
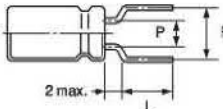
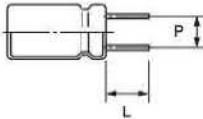
SIZE		CUTTING (QUANTITY)		
ØD	L (mm)	V-Bag	INNER BOX	MIDDLE BOX
4	5, 7	500	9000	36000
5	5, 7, 9, 11	500	7000	28000
6.3	5, 7, 9, 11	500	6000	24000
8	5	500	5000	20000
	9, 11.5	300	3600	14400
10	9		1000	8000(16000)
	12.5		800	6400(12800)
	16		700	5600(11200)
	20		500	4000(8000)
	25		400	3200(6400)
	30		900	2700
	40 ↑		900	1800
12.5	16		400	3200(6400)
	20		300	2400(4800)
	25		250	2000(4000)
	40 ↑		600	1200
16	16		400	1200
	20		400	1200
	25, 31.5		400	1200
	35.5		400	1200
	40 ↑		400	1200
18	16		300	900
	20		300	900
	25		300	900
	31.5, 35.5		300	900
	40 ↑		300	900
20	41		240	720
22	35.5 ↓		200	600
	40 ↑		200	600
25.4	35.5 ↓		100	300
	40 ↑		100	300

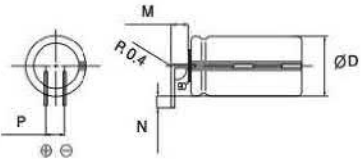
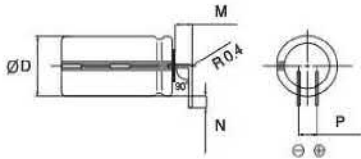
\*( ) is for oversea

# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

## Lead Forming & Cutting

Unit : mm

Configurations	Case dia.	Shape	Code	Drawing	
				L	F
<b>T - Type</b>	$\varnothing D \leq 8$		TS	4.5	5.0
<b>S - Type</b>	$\varnothing D \geq 10$		SS	4.5	-
<b>F - Type</b>	$\varnothing D \leq 8$		FS	5.0	5.0
<b>C - Type</b>	ALL		CS	5.0	-

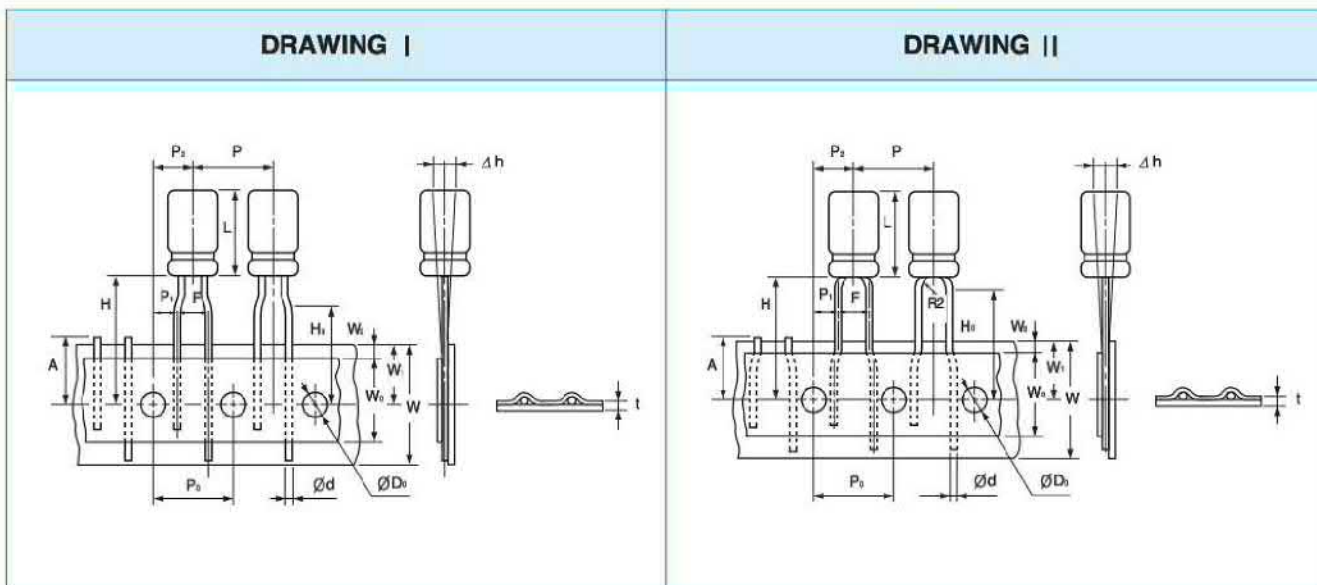
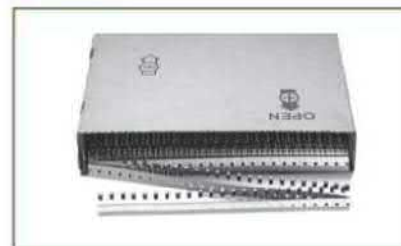
Configurations	Case dia.	Shape		Drawing	
				M	N
	$\varnothing D \geq 8$			M	N
<b>D - Type</b>	Code	DL	DR	3.0	3.2
<b>H - Type</b>		HL	HR	3.0	3.7
<b>M - Type</b>		ML	MR	6.0	2.5
<b>Q - Type</b>		QL	QR	6.0	1.5
<b>J - Type</b>		JL	JR	6.0	0.5



# TAPING

## Lead Taping Capacitors for Automatic Insertion

● Ammo



## DIMENSIONS

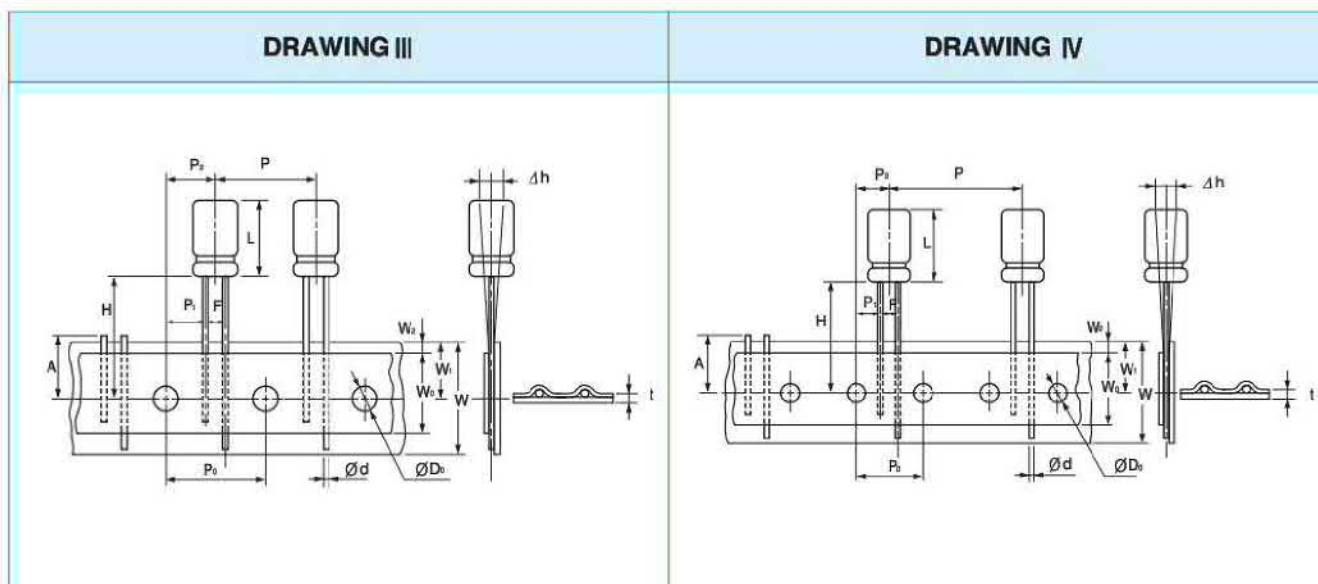
Unit : mm

Applicable Drawing No.			I (II)				III			I					
Description	Symbol	Tolerance	Ø3	Ø4	Ø5		Ø6.3	Ø8		Ø4	Ø5		Ø6.3	Ø8	
Case Height	L	*Note	5	5, 7	5	7~11	5	7~11	5	5, 7	5	7~11	5	7~11	5
Lead Dia.	d	±0.05	0.4	0.45	0.45	0.5	0.45	0.5	0.45	0.45	0.45	0.5	0.45	0.5	0.45
Body Pitch	P	±1.0	12.7				12.7	12.7	12.7	12.7				12.7	12.7
Feeding Hole Pitch	P0	±0.2	12.7				12.7	12.7	12.7	12.7				12.7	12.7
Feeding Hole Alignment	P1	±0.7	5.1				5.1	5.1	5.1	3.85				3.85	3.85
Feeding Hole Alignment	P2	±1.0	6.35				6.35	6.35	6.35	6.35				6.35	6.35
Lead Center Spacing	F	+0.6 -0.2	2.5				2.5	2.5	2.5	5.0				5.0	5.0
Body Inclination	Δh	±2.0	0				0	0	0	0				0	0
Tape Width	W	±0.5	18.0				18.0	18.0	18.0	18.0				18.0	18.0
Adhesive Tape Width	W0	min.	9.5				9.5	9.5	9.5	9.5				9.5	12.5
Feeding Hole Alignment	W1	±0.5	9.0				9.0	9.0	9.0	9.0				9.0	9.0
Adhesive Tape Margin	W2	max.	2.0				2.0	2.0	2.0	2.0				2.0	2.0
Length from Seating Plane	H	±0.5	17.5 (18.0)				17.5	18.5	18.5	18.5 (5, 7mm L = 17.5)				17.5	20.0
Lead Clinch Height	H0	±0.5	16.5 (17.0)				—	—	—	16.5				16.5	16.5
Feeding Hole Dia.	ØD0	±0.2	4.0				4.0	4.0	4.0	4.0				4.0	4.0
Total Tape Thickness	t	±0.2	0.7				0.7	0.7	0.7	0.7				0.7	0.7
Cut Lead Height	A	max.	11.0				11.0	11.0	11.0	11.0				11.0	11.0
Taping Code	Ammo	⊕ leader	PB(PC)				PC	PE	PE	PA				PA	PG

\* Note : Refer to the drawing of each series for tolerance.

## TAPING

### ● Lead Taping Capacitors for Automatic Insertion



### ● DIMENSIONS

Unit : mm

Applicable Drawing No.			III	III	IV	IV	IV
Description	Symbol	Tolerance	Ø10	Ø12.5	Ø16	Ø18	Ø18
Case Height	L	max.	27.0	27.0	37.5	37.5	37.5
Lead Dia.	d	±0.05	0.6	0.6	0.8	0.8	0.8
Body Pitch	P	±1.0	12.7	15.0	25.4	30.0	30.0
Feeding Hole Pitch	P <sub>0</sub>	±0.2	12.7	15.0	12.7	15.0	15.0
Feeding Hole Alignment	P <sub>1</sub>	±0.7	3.85	5.0	3.85	3.75	3.75
Feeding Hole Alignment	P <sub>2</sub>	±1.0	6.35	7.5	6.35	7.5	7.5
Lead Center Spacing	F	+0.6 -0.2	5.0	5.0	7.5	7.5	7.5
Body Inclination	Δh	±2.0	0	0	0	0	0
Tape Width	W	±0.5	18.0	18.0	18.0	18.0	18.0
Adhesive Tape Width	W <sub>0</sub>	min.	12.5	12.5	12.5	12.5	12.5
Feeding Hole Alignment	W <sub>1</sub>	±0.5	9.0	9.0	9.0	9.0	9.0
Adhesive Tape Margin	W <sub>2</sub>	max.	2.0	2.0	2.0	2.0	2.0
Length from Seating Plane	H	±0.5	18.5	18.5	18.5	18.5	18.5
Feeding Hole Dia.	ØD <sub>0</sub>	±0.2	4.0	4.0	4.0	4.0	4.0
Total Tape Thickness	t	±0.2	0.7	0.7	0.7	0.7	0.7
Cut Lead Height	A	max.	11.0	11.0	11.0	11.0	11.0
Taping Code	Ammo	⊕ leader	PA	PH	PL	PA	PA

### ● PACKAGING Q'ty(pcs.)/Box

Unit : mm

Ammo					
Size	Case Height	L	H	W	Q'ty
3	5	332	230	42	3000
4	5, 7				2500
5	5, 7	332	230	49	2000
	9, 11				
6.3	5, 7	332	230	42	1500
	9, 11	332	230	49	
8	5	332	230	42	1000
	9, 11.5	332	230	49	
10	9, 12.5, 16	332	190	51	500
	20, 25	332	190	59	
12.5	16, 20, 25	342	240	62	400
16	16, 20, 25	342	240	62	250
	31.5, 35.5	342	240	74	
18	16, 20, 25	342	240	62	200
	31.5, 35.5	342	240	74	



## Standard, For General Purposes Series

- Standard series for general purposes
- High voltage, high capacitance series
- Voltage range of 6.3~500V
- Complied to the RoHS directive



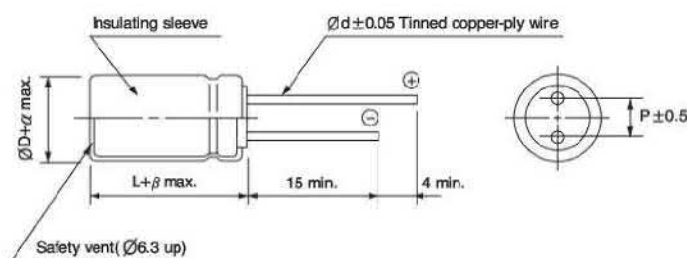
Solvent Proof  
WV ≤ 100V



Item	Characteristics											
Operating temperature range	WV		6.3 ~ 450					500				
	Temperature range		-40 ~ +85°C					-25 ~ +85°C				
Leakage current max.	WV ≤ 100							WV > 100				
	I = 0.01CV or 3μA whichever is greater (after 2 min) I = 0.03CV or 4μA whichever is greater (after 1 min)							I = 0.02CV+15μA (after 5 min)				
Capacitance tolerance	±20% at 120Hz, 20°C											
Dissipation factor max. (at 120Hz, 20°C)	Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value.											
	WV	6.3	10	16	25	35	50	63	100	160 ~ 250	350 ~ 500	
	tanδ	0.28	0.24	0.20	0.16	0.14	0.12	0.10	0.08	0.15	0.20	
Low temperature characteristics (Impedance ratio at 120Hz)	WV		6.3	10	16	25	35	50~100	160	200~350	400~450	500
	Z-25°C/Z+20°C		5	4	3	2	2	2	4	6	10	12
	Z-40°C/Z+20°C		12	10	8	5	4	3	6	8	12	—
Load life (after application of the rated voltage for 2000 hours at 85°C)	Leakage current					Less than specified value						
	Capacitance change					Within ±20% of initial value						
	tanδ					Less than 200% of specified value						
Shelf life (at 85°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.											

## DRAWING

Unit : mm



ØD	5	6.3	8	10	12.5	16	18	22	25.4
P	2.0	2.5	3.5	5.0	5.0	7.5	7.5	10.0	12.5
Ød	0.5	0.5	0.6	0.6	0.6	0.8	0.8	1.0	1.0
α	0.5							1.0	
β	1.5		2.0				3.0		

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

WV	Frequency μF	60Hz	120Hz	1kHz	10kHz	50kHz	100kHz≤
6.3~100	~ 47	0.75	1.00	1.55	2.00	2.00	2.00
	68 ~ 680	0.80	1.00	1.35	1.50	1.62	1.75
	1000 ~	0.85	1.00	1.15	1.15	1.32	1.50
160~500	~ 220	0.80	1.00	1.40	1.60	1.70	1.80
	330 ~	0.90	1.00	1.13	1.15	1.32	1.50



# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

**SD** series

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV μF	6.3	10	16	25	35	50	63	100	160	200	250	350	400	450	500
1.0						5×11 21	5×11 23	5×11 23						8×11.5 26	
1.5						5×11 26	5×11 28	5×11 28						8×11.5 32	
2.2						5×11 32	5×11 34	5×11 34						8×11.5 33	
3.3						5×11 39	5×11 42	5×11 42	6.3×11 45	6.3×11 45	6.3×11 48	8×11.5 53	8×11.5 56	8×11.5 50	
4.7						5×11 46	5×11 50	5×11 50	6.3×11 53	6.3×11 57	6.3×11 57	8×11.5 66	10×12.5 61	10×12.5 72	10×16 69
6.8						5×11 56	5×11 60	5×11 60	8×11.5 76	8×11.5 76	8×11.5 76	10×12.5 88	10×12.5 87	10×16 86	10×16 76
10						5×11 68	5×11 72	5×11 76	8×11.5 96	8×11.5 96	10×12.5 107	10×12.5 107	10×16 115	10×20 115	12.5×25 178
15						5×11 83	5×11 89	6.3×11 89	10×12.5 131	10×16 143	10×16 143	10×20 156	12.5×20 165	12.5×20 164	
22						5×11 101	5×11 108	6.3×11 124	10×12.5 156	10×16 173	10×16 170	12.5×20 222	12.5×20 218	12.5×25 217	16×25 265
33						5×11 123	6.3×11 151	8×11.5 178	10×16 209	10×20 232	10×20 247	16×20 297	12.5×25 296	16×25 294	16×31.5 310
47					5×11 131	*6.3×11 169	6.3×11 181	8×11.5 222	10×20 293	10×20 293	12.5×20 319	16×20 353	16×25 387	16×31.5 384	18×31.5 412
68				5×11 144	*6.3×11 182	6.3×11 203	8×11.5 256	10×12.5 293	12.5×20 391	12.5×25 426	16×20 425	16×25 465	16×31.5 488	16×35.5 503	18×35.5 457
100			5×11 162	* 5×11 181	6.3×11 220	8×11.5 291	8×11.5 311	10×16 388	12.5×25 516	16×25 516	16×25 564	18×31.5 592	18×35.5 667	18×40 546	
150			* 5×11 198	6.3×11 246	8×11.5 318	10×12.5 414	10×12.5 422	10×20 528	16×20 632	16×25 691	16×31.5 726	18×40 845	18×40 863	22×45 1283	
220	5×11 201	* 5×11 218	6.3×11 276	6.3×11 327	8×11.5 386	10×12.5 501	10×16 586	12.5×20 737	16×25 873	18×31.5 962	18×35.5 986	22×41 1112	22×45 1183		
330	*6.3×11 283	6.3×11 307	6.3×11 359	8×11.5 431	10×12.5 549	10×16 672	10×20 784	12.5×25 1002	16×35.5 1152	18×35.5 1206	22×41 1495				
470	6.3×11 338	6.3×11 366	8×11.5 476	10×12.5 550	10×16 740	10×20 875	12.5×20 1098	16×25 1328	18×40 1434	22×41 1495	25.4×41 1612				
680	8×11.5 480	8×11.5 520	8×11.5 600	10×16 754	10×20 947	12.5×20 1235	12.5×25 1440	16×31.5 1643	22×41 1831	25.4×51 1902	25.4×51 2151				
1000	8×11.5 581	10×12.5 659	10×12.5 796	10×16 942	12.5×20 1306	12.5×25 1633	16×25 1937	18×31.5 1965	25.4×51 2105						
2200	10×16 983	10×16 1051	10×20 1331	12.5×20 1542	16×25 2032	16×31.5 2220	18×31.5 2445	25.4×41 2612							
3300	10×20 1286	12.5×20 1545	12.5×20 1686	16×25 2194	16×31.5 2502	18×31.5 2765	18×40 2987								
4700	12.5×20 1736	12.5×25 1903	12.5×25 2129	16×25 2448	16×35.5 2905	18×40 3272	25.4×41 3412								
6800	12.5×25 2129	16×25 2332	16×25 2577	18×31.5 3114	18×40 3408	25.4×41 4251	25.4×51 4351	<div> <div>← Case size ØD × L (mm)</div> <div>← Ripple current (mA rms) at 85°C, 120Hz</div> </div>							
10000	16×25 2629	16×31.5 2830	16×31.5 3176	18×40 3544	25.4×41 3899										
15000	16×35.5 2959	16×35.5 3284	18×35.5 3656	25.4×41 4399											
22000	18×40 3733	18×40 3843	22×41 4012												

Size Ø8×9 is available for capacitors marked "★"

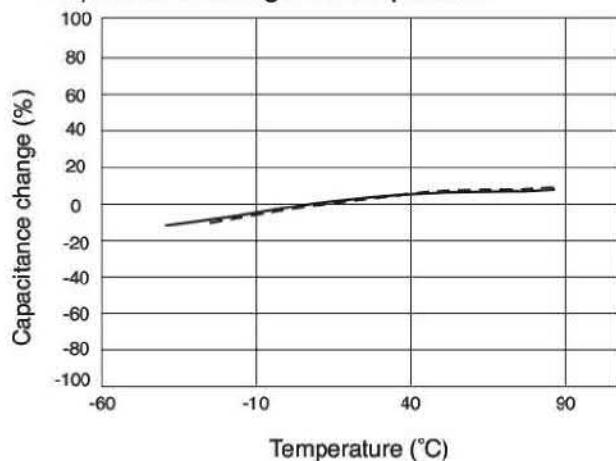
**SD** series

## TYPICAL PERFORMANCE

— 16V 1000 $\mu$ F  
 ..... 400V 10 $\mu$ F

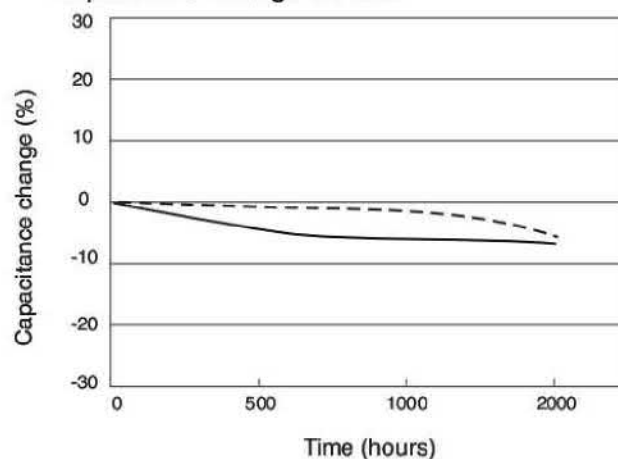
### ● TEMPERATURE CHARACTERISTICS

Capacitance change vs. temperature

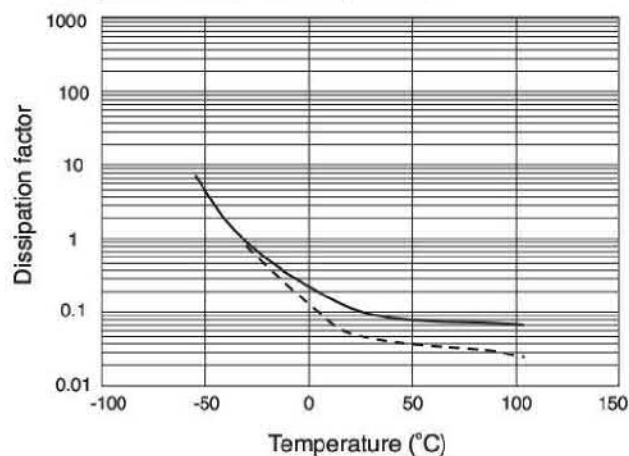


### ● LOAD LIFE (at +85°C)

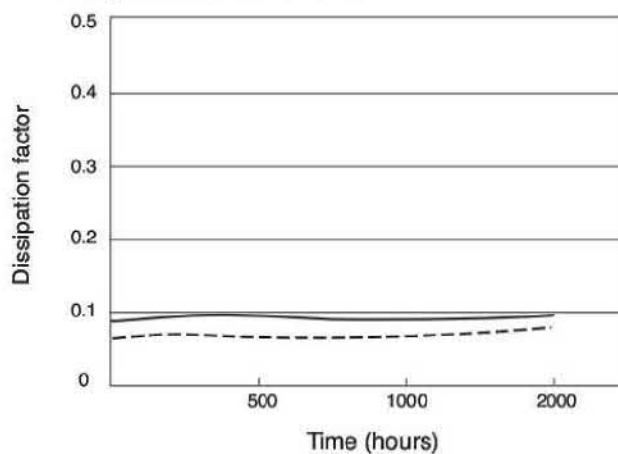
Capacitance change vs. time



Dissipation factor vs. temperature

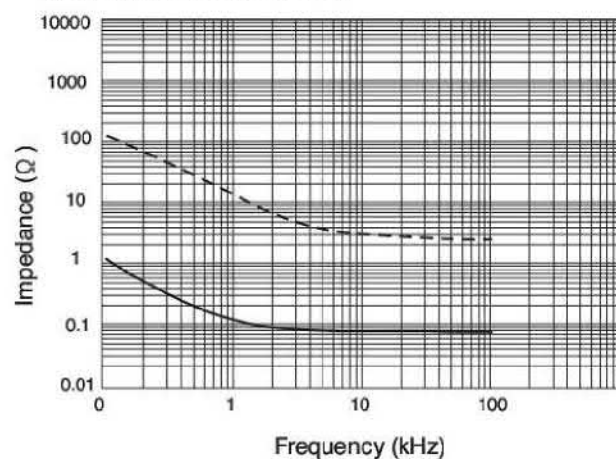


Dissipation factor vs. time

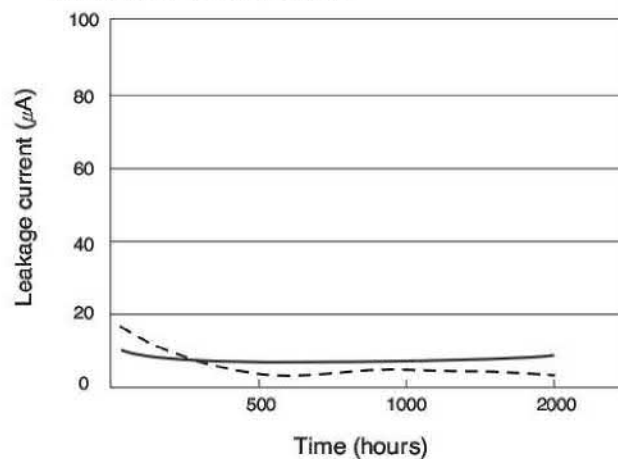


### ● FREQUENCY CHARACTERISTICS

Impedance vs. frequency



Leakage current vs. time

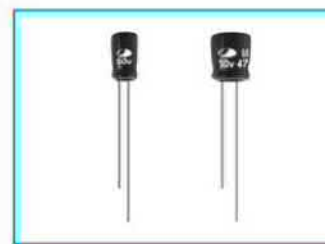
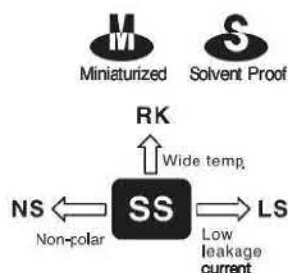


# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS



Standard, Height 7mmL  
Series

- Super miniature series with 7mmL height
- Suited for use in compact audio equipment
- Load life of 2000 hours at 85°C
- Complied to the RoHS directive



Item	Characteristics								
Operating temperature range	-40 ~ +85°C								
Leakage current max.	I = 0.01CV or 4μA whichever is greater (after 1 minute)								
Capacitance tolerance	± 20% at 120Hz, 20°C								
Dissipation factor max. (at 120Hz, 20°C)	WV	4	6.3	10	16	25	35, 40	50	63
	tanδ	0.35	0.24	0.20	0.16	0.14	0.12	0.10	0.10
Low temperature characteristics (Impedance ratio at 120Hz)	WV		4	6.3	10	16, 25		35 ~ 63	
	Z-25°C/Z+20°C		6	4	3	2		2	
	Z-40°C/Z+20°C		12	8	6	4		3	
Load life (after application of the rated voltage for 2000 hours at 85°C)	Leakage current				Less than specified value				
	Capacitance change				Within ±20% of initial value				
	tanδ				Less than 200% of specified value				
Shelf life (at 85°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.								

● DRAWING (See page 97)

Unit : mm

## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

μF \ WV	4	6.3	10	16	25	35	40	50	63
0.1								4×7	4.4
0.15								4×7	5.4
0.22								4×7	6.6
0.33								4×7	8.0
0.47								4×7	10
0.68								4×7	12
1.0								4×7	14
1.5								4×7	17
2.2								4×7	21
3.3								4×7	25
4.7								4×7	30
6.8						4×7	33	4×7	37
10					4×7	37	4×7	40	5×7
15				4×7	43	4×7	46	5×7	57
22			4×7	46	4×7	52	5×7	64	6.3×7
33	4×7	43	4×7	52	4×7	57	5×7	73	5×7
47	4×7	51	4×7	62	5×7	78	5×7	87	6.3×7
68	5×7	71	5×7	86	5×7	94	6.3×7	122	108
100	5×7	86	5×7	104	6.3×7	132	6.3×7	148	
150	6.3×7	122	6.3×7	148	6.3×7	162			
220	6.3×7	148	6.3×7	179					

— Ripple current (mA rms) at 85°C, 120Hz  
— Case size ØD×L (mm)

## ● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

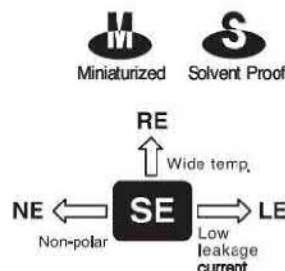
μF \ Frequency	60Hz	120Hz	1kHz	10kHz	50kHz	100kHz ≤
~ 47	0.75	1.00	1.55	2.00	2.00	2.00
68 ~ 680	0.80	1.00	1.35	1.50	1.62	1.75



## SE Series

Standard, Height 5mmL

- Ultra miniature series with 5mmL height
- Suitable to replace tantalum capacitors at low cost
- Load life of 2000 hours at 85°C
- Complied to the RoHS directive



Item	Characteristics									
Operating temperature range	-40 ~ +85°C									
Leakage current max.	I = 0.01CV or 4μA whichever is greater (after 1 minute)									
Capacitance tolerance	±20% at 120Hz, 20°C									
Dissipation factor max. (at 120Hz, 20°C)	WV	4	6.3	10	16	25	35	50	63	
	tanδ	0.35	0.24	0.20	0.16(0.20)	0.13(0.15)	0.12(0.14)	0.09(0.11)	0.09(0.11)	
	Figures in ( ) are for Ø3 products.									
Low temperature characteristics (Impedance ratio at 120Hz)	WV		4		6.3		10		16 ~ 63	
	Z-25°C/Z+20°C		6		4		3		2	
	Z-40°C/Z+20°C		12		8		6		4	
Load life (after application of the rated voltage for 2000 hours at 85°C)	Leakage current				Less than specified value					
	Capacitance change				Within ±20% of initial value					
	tanδ				Less than 200% of specified value					
Shelf life (at 85°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.									

### DRAWING (See page 98)

Unit : mm

### DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu F$	WV	4	6.3	10	16	25	35	50	63
0.1								4×5(3×5)	41(3.1)
0.15								4×5(3×5)	50(3.8)
0.22								4×5(3×5)	61(4.6)
0.33								4×5(3×5)	75(5.7)
0.47								4×5(3×5)	89(6.7)
0.68								4×5(3×5)	11(8.1)
1.0								4×5(3×5)	13(9.8)
1.5								4×5(3×5)	16(12)
2.2							4×5(3×5)	17(13)	4×5
3.3						4×5(3×5)	20(15)	4×5	24
4.7					4×5(3×5)	21(16)	4×5	24	5×5
6.8				4×5(3×5)	23(19)	4×5	25	5×5	33
10	4×5(3×5)	21(17)	4×5(3×5)	25(21)	4×5	28	4×5	31	5×5
15	4×5(3×5)	26(21)	4×5	31	4×5	34	5×5	44	5×5
22	4×5(3×5)	31(26)	4×5	37	5×5	47	5×5	53	6.3×5
33	4×5	38	5×5	53	5×5	58	6.3×5	76	6.3×5
47	4×5	45	5×5	63	6.3×5	81	6.3×5	91	8×5
68	5×5	63	6.3×5	89	6.3×5	98	6.3×5	109	8×5
100	5×5	89	6.3×5	108	8×5	140	8×5	157	8×5
150	6.3×5	109	8×5	157	8×5	172	8×5	192	
220	6.3×5	133	8×5	190	8×5	208			
330	8×5	192							

↑ Ripple current (mA rms) at 85°C, 120Hz  
Case size  $\varnothing D \times L$  (mm)

### FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

$\mu F$	Frequency	60Hz	120Hz	1kHz	10kHz	50kHz	100kHz ≤
~ 47		0.75	1.00	1.55	2.00	2.00	2.00
68 ~		0.80	1.00	1.35	1.50	1.62	1.75

# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS



## Wide Temperature Range Series

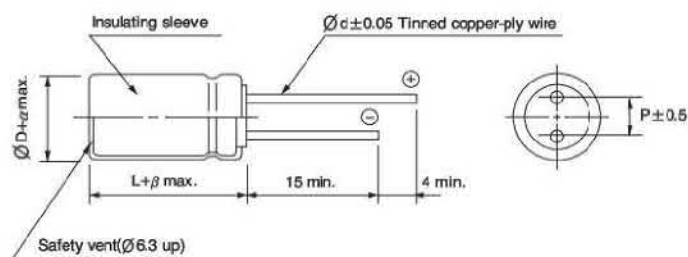
- Standard series for general purpose
- High CV value
- Wide operating temperature range of -55 ~ +105°C
- Complied to the RoHS directive



Item	Characteristics										
Operating temperature range	WV	6.3 ~ 100					160 ~ 450		500		
	Temperature range	-55 ~ +105°C					-40 ~ +105°C		-25 ~ +105°C		
Leakage current max.	WV ≤ 100							WV > 100			
	I = 0.01CV or 3μA whichever is greater (after 2 min) I = 0.03CV or 4μA whichever is greater (after 1 min)							I = 0.02CV+15μA (after 5 min)			
Capacitance tolerance	± 20% at 120Hz, 20°C										
Dissipation factor max. (at 120Hz, 20°C)	Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value.										
	WV	6.3	10	16	25	35	50	63	100	160~250	350~500
	tanδ	0.28	0.24	0.20	0.16	0.14	0.12	0.10	0.08	0.15	0.20
Low temperature characteristics (Impedance ratio at 120Hz)	WV	6.3	10	16	25	35	50~100	160	200~350	400~450	500
	Z-25°C/Z+20°C	5	4	3	2	2	2	4	6	10	12
	Z-40°C/Z+20°C	12	10	8	5	4	3	6	8	12	—
Load life (after application of the rated voltage for 2000 hours at 105°C)	Leakage current					Less than specified value					
	Capacitance change					Within ±20% of initial value					
	tanδ					Less than 200% of specified value					
	ØD				ØD ≤ 8				ØD ≥ 10		
	Life time				1000 hours				2000 hours		
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.										

## DRAWING

Unit : mm



ØD	5	6.3	8	10	12.5	16	18	22
P	2.0	2.5	3.5	5.0	5.0	7.5	7.5	10.0
Ød	0.5	0.5	0.6	0.6	0.6	0.8	0.8	1.0
α	0.5							1.0
β	1.5		2.0			3.0		

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

WV	Frequency	60Hz	120Hz	1kHz	10kHz	50kHz	100kHz ≤
6.3~100	~ 47	0.75	1.00	1.55	2.00	2.00	2.00
	68 ~ 680	0.80	1.00	1.35	1.50	1.62	1.75
	820 ~	0.85	1.00	1.15	1.15	1.32	1.50
160~500	~ 220	0.80	1.00	1.40	1.60	1.70	1.80
	330 ~	0.90	1.00	1.13	1.15	1.32	1.50



### ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV μF	6.3	10	16	25	35	50	63	100	160	200	250	350	400	450	500
2.2						5×11 24	5×11 26	5×11 26	6.3×11 23	6.3×11 23	6.3×11 23	8×11.5 28	8×11.5 28	10×12.5 27	
3.3						5×11 29	5×11 32	5×11 32	6.3×11 29	6.3×11 29	8×11.5 34	8×11.5 34	10×12.5 39	10×16 36	
4.7						5×11 35	5×11 38	5×11 38	6.3×11 34	8×11.5 40	8×11.5 40	10×12.5 47	10×12.5 47	10×16 43	10×16 59
6.8						5×11 42	5×11 46	5×11 46	8×11.5 49	10×12.5 56	10×12.5 56	10×16 62	10×16 62	10×20 56	10×16 72
10						5×11 51	5×11 56	5×11 56	10×12.5 68	10×12.5 68	10×12.5 68	10×16 75	10×20 82	12.5×20 80	12.5×25 88
15						5×11 62	5×11 68	6.3×11 78	10×16 92	10×16 92	10×16 92	10×20 100	12.5×20 118	12.5×25 107	12.5×30 115
22						5×11 75	5×11 83	6.3×11 95	10×16 111	10×16 111	10×20 121	12.5×20 143	12.5×25 155	16×25 144	16×25 159
33						5×11 92	6.3×11 116	8×11.5 137	10×20 149	10×20 149	12.5×20 175	12.5×25 190	16×25 211	16×31.5 193	16×31.5 207
47					★ 5×11 96	★ 6.3×11 127	6.3×11 139	10×12.5 190	12.5×20 208	12.5×20 208	12.5×25 227	16×25 252	16×31.5 276	16×31.5 230	18×31.5 261
68				★ 5×11 103	6.3×11 132	8×11.5 180	8×11.5 197	10×16 251	12.5×25 273	16×20 279	16×25 303	16×31.5 332	18×35.5 373	18×31.5 285	18×35.5 335
82				6.3×11 137	6.3×11 145	8×11.5 198	8×11.5 216	10×20 290	12.5×25 302	16×25 333	16×31.5 364	18×35.5 369	18×40 387	18×31.5 327	18×40 370
100			5×11 119	6.3×11 151	6.3×11 160	8×11.5 218	8×11.5 239	10×20 332	12.5×25 331	16×25 368	16×31.5 402	18×35.5 407	18×40 427	18×40 436	
150		5×11 134	★ 6.3×11 167	6.3×11 185	8×11.5 231	10×12.5 310	10×12.5 340	12.5×20 477	16×25 450	16×35.5 517	18×35.5 554	18×40 523	22×41 596		
220	5×11 146	★ 5×11 182	6.3×11 203	8×11.5 264	8×11.5 280	10×12.5 376	10×16 451	12.5×25 630	16×31.5 596	18×35.5 671	18×40 694	22×41 721			
330	★ 6.3×11 206	6.3×11 228	8×11.5 283	8×11.5 324	10×12.5 399	10×16 504	10×20 603	16×25 856	18×35.5 822	18×40 850	22×41 968				
470	6.3×11 246	6.3×11 272	8×11.5 349	10×12.5 449	10×16 521	10×20 657	12.5×20 844	16×25 1021	18×40 1015	22×41 1155					
680	8×11.5 348	10×12.5 449	10×12.5 488	10×16 591	12.5×16 740	12.5×20 927	12.5×25 1107	16×31.5 1344	22×41 1390						
820	8×11.5 382	10×12.5 493	10×16 587	10×20 703	12.5×20 880	12.5×25 1050	16×25 1300	16×35.5 1627							
1000	8×11.5 422	10×12.5 544	10×16 648	10×20 820	12.5×20 974	12.5×25 1226	16×25 1490	18×40 1925							
1500	10×16 621	10×16 690	12.5×16 862	12.5×20 1017	16×20 1188	16×25 1442	16×35.5 1770								
2200	10×20 778	10×20 844	12.5×20 1055	12.5×20 1100 12.5×25 1235	16×25 1426	16×31.5 1442	16×35.5 1770								
3300	12.5×16 983	12.5×20 1148	12.5×25 1323	16×25 1562	16×35.5 1857	16×35.5 1794	18×40 2688								
4700	12.5×20 1219	12.5×25 1421	16×25 1657	16×31.5 1916	18×35.5 2224	<div>Case size ØD × L (mm)</div> <div>Ripple current (mA rms) at 105°C, 120Hz</div>									
6800	12.5×25 1480	16×25 1737	16×31.5 1982	18×35.5 2335											
10000	16×25 1807	16×35.5 2172	18×35.5 2409												
15000	16×35.5 2233	18×35.5 2482													
22000	18×40 2852														

Size Ø8×9 is available for capacitors marked "★"

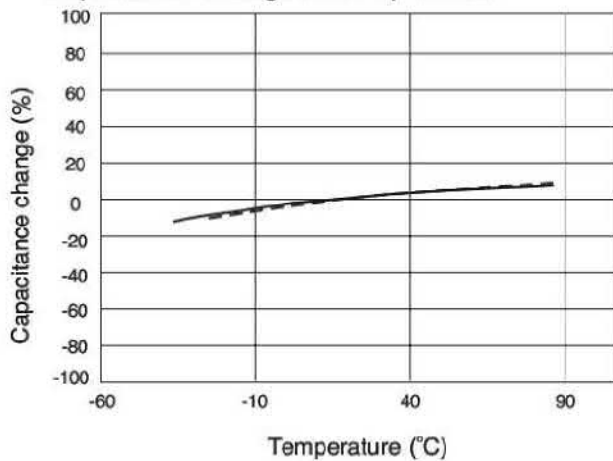


## TYPICAL PERFORMANCE

— 16V 1000 $\mu$ F  
 ..... 400V 10 $\mu$ F

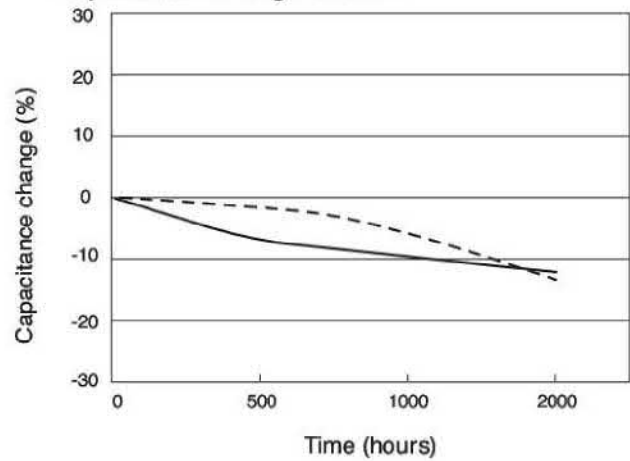
### TEMPERATURE CHARACTERISTICS

Capacitance change vs. temperature

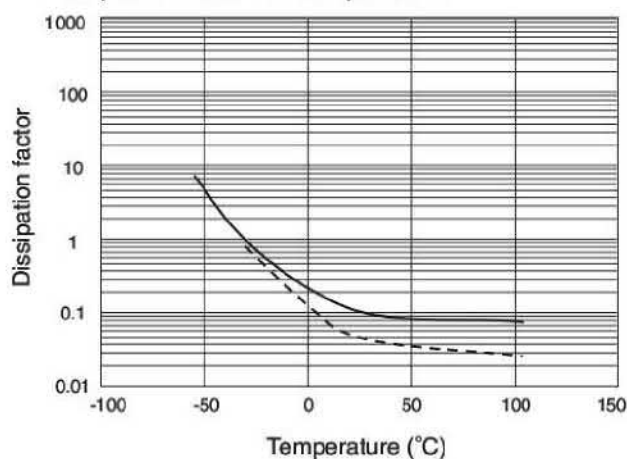


### LOAD LIFE (at +105°C)

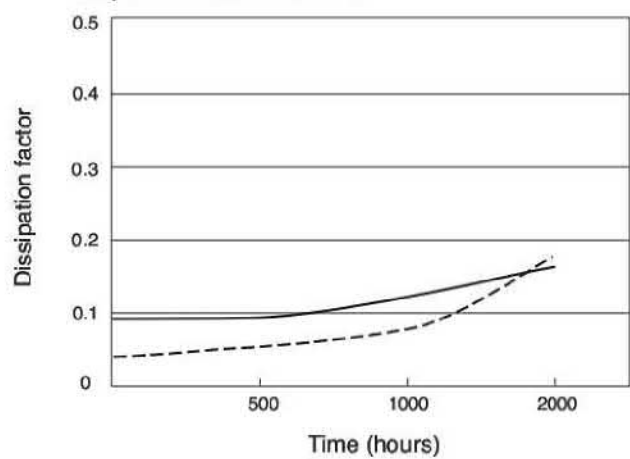
Capacitance change vs. time



Dissipation factor vs. temperature

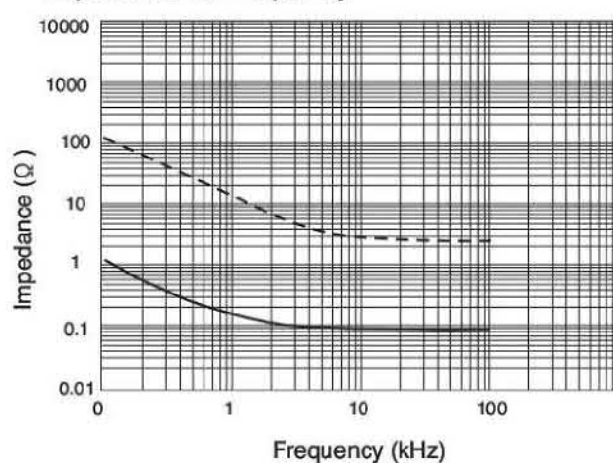


Dissipation factor vs. time

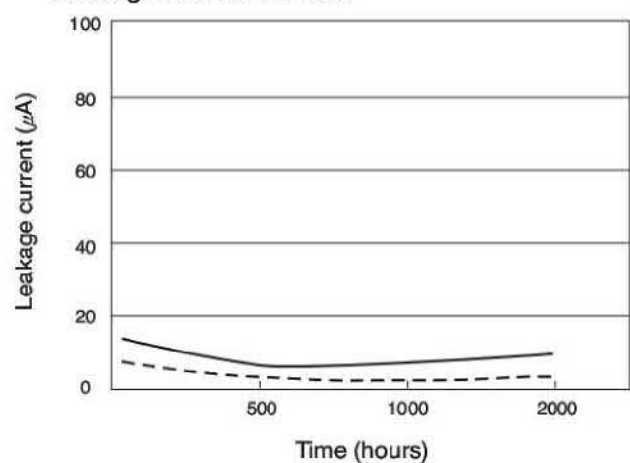


### FREQUENCY CHARACTERISTICS

Impedance vs. frequency



Leakage current vs. time





## Wide Temperature Range, Miniaturized Series

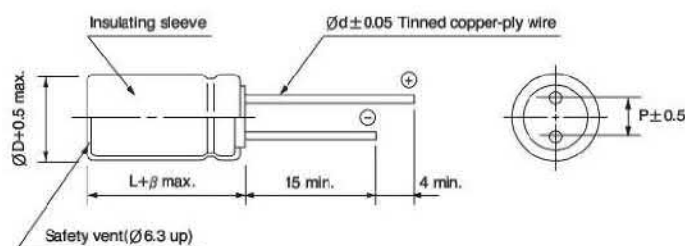
- Miniature size compared with RD series
- High CV value
- Wide operating temperature range of -55 ~ +105°C
- Complied to the RoHS directive



Item	Characteristics										
Operating temperature range	WV		6.3 ~ 100					160 ~ 450			
	Temperature range		-55 ~ +105°C					-40 ~ +105°C			
Leakage current max.	WV ≤ 100							WV > 100			
	I = 0.01CV or 3μA whichever is greater (after 2 min) I = 0.03CV or 4μA whichever is greater (after 1 min)							I = 0.02CV+15μA (after 5 min)			
Capacitance tolerance	± 20% at 120Hz, 20°C										
Dissipation factor max. (at 120Hz, 20°C)	Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value.										
	WV	6.3	10	16	25	35	50	63	100	160~250	350~450
	tanδ	0.28	0.24	0.20	0.16	0.14	0.12	0.10	0.08	0.15	0.20
Low temperature characteristics (Impedance ratio at 120Hz)	WV	6.3	10	16	25	35	50~100	160	200~250	350~400	450
	Z-25°C/Z+20°C	5	4	3	2	2	2	3	4	6	8
	Z-40°C/Z+20°C	10	8	6	4	3	3	4	8	10	12
Load life (after application of the rated voltage for 2000 hours at 105°C)	Leakage current					Less than specified value					
	Capacitance change					Within ±20% of initial value					
	tanδ					Less than 200% of specified value					
	ØD			ØD ≤ 8				ØD ≥ 10			
	Life time			1000 hours				2000 hours			
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.										

### DRAWING

Unit : mm



ØD	6.3	8	10	12.5	16	18
P	2.5	3.5	5.0	5.0	7.5	7.5
Ød	0.5	0.6	0.6	0.6	0.8	0.8
β	1.5	2.0				

### FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

WV	Frequency μF	60Hz	120Hz	1kHz	10kHz	50kHz	100kHz≤
6.3~100	~ 47	0.75	1.00	1.55	2.00	2.30	2.00
	68 ~ 680	0.80	1.00	1.35	1.50	1.62	1.75
	1000 ~	0.85	1.00	1.15	1.15	1.32	1.50
160~500	~ 220	0.80	1.00	1.40	1.60	1.70	1.80
	330 ~	0.90	1.00	1.13	1.15	1.32	1.50

# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

**RM** series

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV μF	6.3	10	16	25	35	50	63	100	160	200	250	350	400	450
1.0														6.3 × 11 13
2.2												6.3 × 11 23	8 × 11.5 28	8 × 11.5 23
3.3											6.3 × 11 30	8 × 11.5 34	8 × 11.5 34	10 × 12.5 33
4.7										6.3 × 11 34	8 × 11.5 40	8 × 11.5 40	10 × 12.5 47	10 × 12.5 39
6.8										8 × 11.5 49	10 × 12.5 56	10 × 12.5 56	10 × 16 62	10 × 16 52
10									8 × 11.5 59	8 × 11.5 59	10 × 12.5 68	10 × 16 75	10 × 16 75	10 × 20 68
15									10 × 12.5 84	10 × 12.5 84	10 × 16 92	10 × 16 92	12.5 × 20 115	12.5 × 20 96
22									10 × 12.5 102	10 × 16 111	10 × 16 111	12.5 × 20 139	12.5 × 20 140	12.5 × 25 127
33								8 × 11.5 139	10 × 16 136	10 × 20 149	10 × 20 149	12.5 × 25 180	16 × 25 211	16 × 25 117
47								10 × 12.5 190	10 × 20 177	12.5 × 20 203	12.5 × 20 203	16 × 25 252	16 × 25 252	16 × 31.5 231
68								10 × 12.5 229	12.5 × 25 267	16 × 20 279	12.5 × 25 267	16 × 31.5 303	16 × 31.5 332	16 × 35.5 291
100						8 × 11.5 218	8 × 11.5 239	10 × 16 304	12.5 × 25 324	16 × 25 368	16 × 25 368	18 × 31.5 432	18 × 35.5 453	18 × 40 397
150						8 × 11.5 267	10 × 12.5 293	10 × 20 372	16 × 25 450	16 × 25 450	16 × 31.5 450	18 × 35.5 554		
220				6.3 × 11 224	8 × 11.5 280	10 × 12.5 376	10 × 16 451	12.5 × 20 564	16 × 31.5 596	18 × 31.5 641	18 × 35.5 671			
330			6.3 × 11 248	8 × 11.5 324	10 × 12.5 400	10 × 16 504	10 × 20 603	16 × 25 856	18 × 31.5 784	18 × 40 863				
470		6.3 × 11 272	8 × 11.5 349	8 × 11.5 386	10 × 12.5 476	10 × 20 657	12.5 × 20 824	16 × 25 1021	18 × 40 1030					
680	6.3 × 11 295	8 × 11.5 386	8 × 11.5 420	10 × 12.5 540	10 × 16 627	12.5 × 20 905	12.5 × 25 1082	16 × 31.5 1344						
1000	8 × 11.5 422	8 × 11.5 469	10 × 12.5 592	10 × 16 717	10 × 20 829	12.5 × 25 1197	16 × 25 1490	18 × 35.5 1835						
1500	10 × 16 621	10 × 16 680	10 × 20 797	12.5 × 20 993	12.5 × 25 1136	16 × 31.5 1578	18 × 31.5 1812							
2200	10 × 16 713	10 × 16 774	10 × 20 898	12.5 × 25 1206	16 × 25 1426	16 × 31.5 1709	18 × 31.5 1935							
3300	10 × 20 909	10 × 20 978	12.5 × 20 1184	16 × 25 1562	16 × 31.5 1769	18 × 35.5 2152								
4700	12.5 × 20 1189	12.5 × 20 1272	12.5 × 25 1459	16 × 25 1752	16 × 35.5 2073									
6800	12.5 × 25 1445	16 × 25 1529	16 × 25 1811	16 × 35.5 2176	18 × 40 2510	<div> <div>← Case size ØD × L (mm)</div> <div>← Ripple current (mA rms) at 105°C, 120Hz</div> </div>								
10000	16 × 25 1807	16 × 25 1892	16 × 31.5 2140	18 × 35.5 2497										
15000	16 × 31.5 2128	16 × 35.5 2313	18 × 35.5 2545											
22000	18 × 31.5 2411	18 × 35.5 2595												





## Wide Temperature Range, Height 7mmL Series

- Super miniature series with 7mmL height
- High performance and excellent temperature characteristics
- Wide operating temperature range of -55 ~ +105°C
- Complied to the RoHS directive



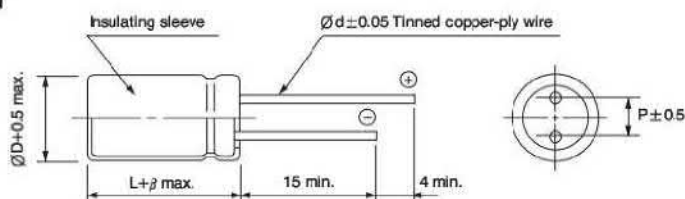
SS  
Wide temp.



Item	Characteristics								
Operating temperature range	-55 ~ +105°C								
Leakage current max.	I = 0.01CV or 3μA whichever is greater (after 1 minute)								
Capacitance tolerance	±20% at 120Hz, 20°C								
Dissipation factor max. (at 120Hz, 20°C)	WV	4	6.3	10	16	25	35	50	63
	tanδ	0.35	0.22	0.19	0.15	0.12	0.12	0.10	0.10
Low temperature characteristics (Impedance ratio at 120Hz)	WV		4	6.3	10	16	25, 35		50, 63
	Z-25°C/Z+20°C		6	4	3	2	2		2
	Z-40°C/Z+20°C		12	10	8	6	4		3
Load life (after application of the rated voltage for 1000 hours at 105°C)	Leakage current				Less than specified value				
	Capacitance change				Within ±20% of initial value				
	tanδ				Less than 200% of specified value				
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.								

### DRAWING

Unit : mm



ØD	4	5	6.3
P	1.5	2.0	2.5
Ød	0.45	0.5	0.5
β	1.0	1.5	

### DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu$ F \ WV	4		6.3		10		16		25		35		50		63	
0.1													4×7	2.9	4×7	2.9
0.22													4×7	4.3	4×7	4.3
0.33													4×7	5.2	4×7	5.2
0.47													4×7	6.2	4×7	6.2
0.68													4×7	7.5	4×7	7.5
1.0													4×7	9.1	4×7	9.1
2.2													4×7	14	5×7	16
3.3											4×7	15	5×7	19	6.3×7	22
4.7									4×7	18	5×7	21	6.3×7	26	6.3×7	26
6.8							4×7	19	5×7	25	5×7	25	6.3×7	32		
10					4×7	21	4×7	24	5×7	30	6.3×7	35				
22			4×7	29	5×7	36	5×7	40	6.3×7	52	↑	↑				
33	4×7	28	5×7	40	6.3×7	51	6.3×7	57								
47	4×7	33	5×7	47	6.3×7	60										
68	5×7	46	6.3×7	67												

↑

↑

Ripple current (mA rms) at 105°C, 120Hz

Case size ØD×L (mm)

↑ Ripple current (mA rms) at 105°C, 120Hz  
↑ Case size ØD×L (mm)

### FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

µF	Frequency	60Hz	120Hz	1kHz	10kHz	50kHz	100kHz ≤
~ 47		0.75	1.00	1.55	2.00	2.00	2.00
68 ~		0.80	1.00	1.35	1.50	1.62	1.75

# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

**RE**

Wide Temperature Range, Height 5mmL Series

- Ultra miniature series with 5mmL height
- Wide operating temperature range of -55 ~ +105°C
- Suitable to replace tantalum capacitors at low cost
- Complied to the RoHS directive

**M** Miniaturized **S** Solvent Proof

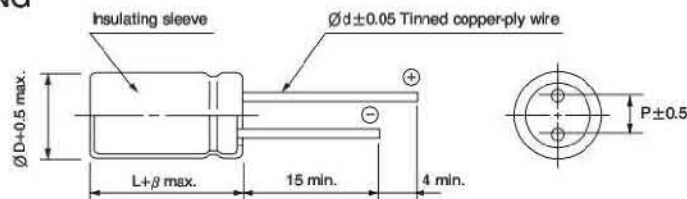
**SE** → **RE**  
Wide temp.



Item	Characteristics							
Operating temperature range	-55 ~ +105°C							
Leakage current max.	I = 0.01CV or 3μA whichever is greater (after 2 minutes)							
Capacitance tolerance	±20% at 120Hz, 20°C							
Dissipation factor max. (at 120Hz, 20°C)	WV	4	6.3	10	16	25	35	50
	tanδ	0.35	0.27	0.23	0.19	0.15	0.13	0.11
Low temperature characteristics (Impedance ratio at 120Hz)	WV		4	6.3	10	16	25~50	
	Z-25°C/Z+20°C		7	3	3	2	2	
	Z-40°C/Z+20°C		12	8	5	4	3	
Load life (after application of the rated voltage for 1000 hours at 105°C)	Leakage current			Less than specified value				
	Capacitance change			Within ±25% of initial value				
	tanδ			Less than 200% of specified value				
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.							

## DRAWING

Unit : mm



ØD	3	4	5	6.3	8
P	1.0	1.5	2.0	2.5	2.5
Ød	0.4	0.45	0.45	0.45	0.45
β	1.0			1.5	

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

µF \ WV	4	6.3	10	16	25	35	50
0.1							4×5(3×5) 2.4(2.0)
0.15							4×5(3×5) 3.0(2.5)
0.22							4×5(3×5) 3.6(3.0)
0.33							4×5(3×5) 4.4(3.7)
0.47							4×5(3×5) 5.2(4.4)
0.68							4×5(3×5) 6.3(5.3)
1.0							4×5(3×5) 7.7(6.4)
1.5							4×5(3×5) 9.4(7.8)
2.2							4×5(3×5) 11(9.5)
3.3						4×5(3×5) 13(11)	4×5 14
4.7					4×5(3×5) 14(12)	4×5 15	5×5 19
6.8					4×5 17	5×5 21	5×5 23
10		4×5(3×5) 15(13)	4×5(3×5) 17(14)	4×5(3×5) 18(15)	5×5 24	5×5 26	6.3×5 33
15	4×5(3×5) 17(14)	4×5 19	4×5 21	5×5 26	5×5 29	6.3×5 37	6.3×5 40
22	4×5 20	4×5 23	5×5 29	5×5 32	6.3×5 42	6.3×5 45	8×5 58
33	4×5 25	5×5 32	5×5 35	6.3×5 45	6.3×5 51	8×5 65	8×5 71
47	4×5 29	5×5 39	6.3×5 49	6.3×5 54	8×5 72	8×5 77	
68	5×5 41	6.3×5 55	6.3×5 59	8×5 77	8×5 87		
100	5×5 50	6.3×5 66	8×5 85	8×5 93			
150	6.3×5 71	8×5 96	8×5 104				
220	8×5 102	8×5 116					

↑ Ripple current (mA rms) at 105°C, 120Hz  
Case size ØD×L (mm)

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

µF \ Frequency	60Hz	120Hz	1kHz	10kHz	50kHz	100kHz ≤
~ 47	0.75	1.00	1.55	2.00	2.00	2.00
68 ~	0.80	1.00	1.35	1.50	1.62	1.75



## ZS High Ripple Current, Height 7mmL Series

**M** Miniaturized **S** Solvent Proof **IZI** Low Impedance

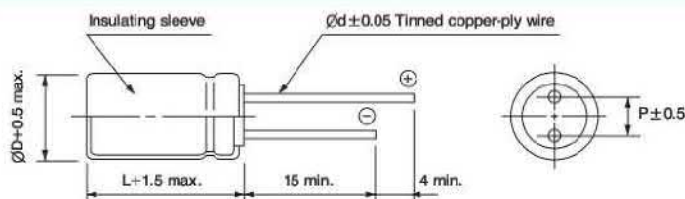
- Super miniature series with 7mmL height
- High ripple current & high temperature with RK series
- Load life of 2000 hours at 105°C
- Complied to the RoHS directive

RK  $\Rightarrow$  **ZS**  
High Ripple



Item	Characteristics						
Operating temperature range	-40 ~ +105°C						
Leakage current	I = 0.01CV or 3μA whichever is greater (after 2 minutes) I = 0.03CV or 4μA whichever is greater (after 1 minute)						
Capacitance tolerance	± 20% at 120Hz, 20°C						
Dissipation factor max. (at 120Hz, 20°C)	WV	6.3	10	16	25	35	50
	tanδ	0.22	0.19	0.16	0.14	0.12	0.10
Low temperature characteristics (Impedance ratio at 120Hz)	WV	6.3	10	16	25	35	50
	Z-25°C / Z+20°C	2	2	2	2	2	2
	Z-40°C / Z+20°C	6	4	3	3	3	3
Load life	After an application of DC bias voltage plus the rated AC ripple current for 2000 hours at 105°C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.						
	Leakage current			Less than specified value			
	Capacitance change			Within ± 25% of the initial value			
	tanδ			Less than 200% of the specified value			
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.						

### DRAWING



Unit : mm

ØD	5	6.3	8
P	2.0	2.5	3.5
Ød	0.5	0.5	0.5

### DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV Item µF	6.3			10			16			25			35			50		
	ØD×L (mm)	Imp.(Ω) max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Imp.(Ω) max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Imp.(Ω) max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Imp.(Ω) max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Imp.(Ω) max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Imp.(Ω) max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz
2.2																5×7	2.00	165
4.7																5×7	2.00	165
10																6.3×7	0.90	235
22													5×7	1.40	165	6.3×7	0.90	260
33	5×7	1.40	165	5×7	1.40	165	5×7	1.40	165	5×7	1.40	165	6.3×7	0.70	235	8×7	0.50	350
47	5×7	1.40	165	5×7	1.40	165	5×7	1.40	165	6.3×7	0.70	235	8×7	0.34	350	8×7	0.50	450
68	6.3×7	0.70	235	6.3×7	0.70	235	6.3×7	0.70	235	6.3×7	0.70	235	8×7	0.34	350			
100	6.3×7	0.70	235	6.3×7	0.70	235	6.3×7	0.70	235	8×7	0.34	350						
150	6.3×7	0.70	235	6.3×7	0.70	235	8×7	0.34	350									
220	8×7	0.34	350	8×7	0.34	350												
330	8×7	0.34	350															

### FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

µF	Frequency	120Hz	1kHz	10kHz	50kHz	100kHz≤
~ 33		0.35	0.55	0.75	0.87	1.00
47 ~ 150		0.40	0.60	0.80	0.90	1.00
220 ~		0.50	0.65	0.85	0.92	1.00



# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

## ZL High Ripple Current, Height 7mmL Series

- Super miniature series with 7mmL height
- Load life of 3000 hours at 105°C
- Complied to the RoHS directive

**M** Miniaturized **S** Solvent Proof **IZI** Low Impedance

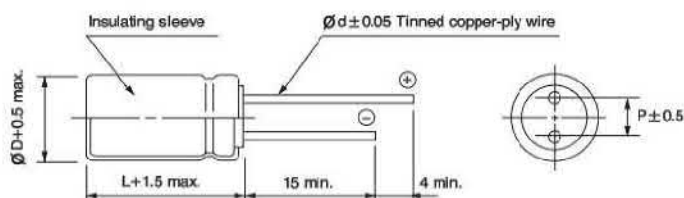
**ZS** → **ZL**  
High Ripple



Item	Characteristics						
Operating temperature range	-40 ~ +105°C						
Leakage current	I = 0.01CV or 3μA whichever is greater (after 2 minutes) I = 0.03CV or 4μA whichever is greater (after 1 minute)						
Capacitance tolerance	± 20% at 120Hz, 20°C						
Dissipation factor max. (at 120Hz, 20°C)	WV	6.3	10	16	25	35	50
	tanδ	0.22	0.19	0.16	0.14	0.12	0.10
Low temperature characteristics (Impedance ratio at 120Hz)	WV	6.3	10	16	25	35	50
	Z-25°C / Z+20°C	2	2	2	2	2	2
	Z-40°C / Z+20°C	6	4	3	3	3	3
Load life	After an application of DC bias voltage plus the rated AC ripple current for 3000 hours at 105°C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.						
	Leakage current		Less than specified value				
	Capacitance change		Within ± 25% of the initial value				
	tanδ		Less than 200% of the specified value				
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.						

## DRAWING

Unit : mm



ØD	5	6.3	8
P	2.0	2.5	3.5
Ød	0.5	0.5	0.5

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV Item μF	6.3				10				16				25				35				50			
	ØD×L (mm)	Imp.(Ω) max. 20°C	Ripple current (mA rms) 105°C 100kHz		ØD×L (mm)	Imp.(Ω) max. 20°C	Ripple current (mA rms) 105°C 100kHz		ØD×L (mm)	Imp.(Ω) max. 20°C	Ripple current (mA rms) 105°C 100kHz		ØD×L (mm)	Imp.(Ω) max. 20°C	Ripple current (mA rms) 105°C 100kHz		ØD×L (mm)	Imp.(Ω) max. 20°C	Ripple current (mA rms) 105°C 100kHz		ØD×L (mm)	Imp.(Ω) max. 20°C	Ripple current (mA rms) 105°C 100kHz	
2.2																					5×7	1.00	165	
10																					6.3×7	0.42	235	
22																	5×7	0.84	165		6.3×7	0.42	235	
33	5×7	0.84	165		5×7	0.84	165		5×7	0.84	165		5×7	0.84	165		6.3×7	0.42	235		8×7	0.20	350	
47	5×7	0.84	165		5×7	0.84	165		5×7	0.84	165		6.3×7	0.42	235		8×7	0.20	350		8×7	0.20	350	
68	6.3×7	0.42	235		6.3×7	0.42	235		6.3×7	0.42	235		6.3×7	0.42	235		8×7	0.20	350					
100	6.3×7	0.42	235		6.3×7	0.42	235		6.3×7	0.42	235		8×7	0.20	350									
150	6.3×7	0.20	235		6.3×7	0.42	235		8×7	0.20	350													
220	8×7	0.20	350		8×7	0.20	350																	
330	8×7	0.20	350																					

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT (See page 101)

## ZE High Ripple Current, Height 5mmL Series

**M** Miniaturized **S** Solvent Proof **IZI** Low Impedance

- Super miniature series with 5mmL height
- High ripple current & high temperature with RE series
- Load life of 2000 hours at 105°C
- Complied to the RoHS directive

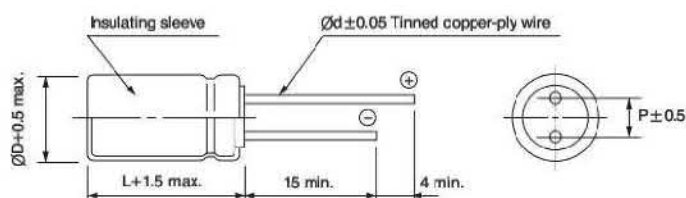
RE  $\Rightarrow$  **ZE**  
High Ripple



Item	Characteristics					
Operating temperature range	-55 ~ +105°C					
Leakage current	I = 0.01CV or 3μA whichever is greater (after 2 minutes) I = 0.03CV or 4μA whichever is greater (after 1 minute)					
Capacitance tolerance	± 20% at 120Hz, 20°C					
Dissipation factor max. (at 120Hz, 20°C)	WV	6.3	10	16	25	35
	tanδ	0.22	0.20	0.18	0.14	0.12
Low temperature characteristics (Impedance ratio at 120Hz)	WV	6.3	10	16	25	35
	Z-25°C / Z+20°C	3	3	2	2	2
	Z-40°C / Z+20°C	9	7	5	3	3
Load life	After an application of DC bias voltage plus the rated AC ripple current for 2000 hours at 105°C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.					
	Leakage current		Less than specified value			
	Capacitance change		Within ±20% of the initial value			
	tanδ		Less than 200% of the specified value			
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.					

## DRAWING

Unit : mm



ØD	5	6.3
P	2.0	2.5
Ød	0.45	0.45

MINIATURE TYPES

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	120Hz	1kHz	10kHz	50kHz	100kHz ≤
~ 33	0.35	0.55	0.75	0.87	1.00
47 ~	0.40	0.60	0.80	0.90	1.00

## MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

**ZE** series

### ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV Item μF	6.3			10			16			25			35		
	ØD × L (mm)	Imp.(Ω) max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD × L (mm)	Imp.(Ω) max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD × L (mm)	Imp.(Ω) max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD × L (mm)	Imp.(Ω) max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD × L (mm)	Imp.(Ω) max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz
1													5×5	2.40	100
1.5													5×5	2.40	100
2.2													5×5	2.40	100
3.3													5×5	2.40	100
4.7													5×5	2.40	100
6.8													5×5	2.40	100
10										5×5	2.40	100	5×5	2.40	100
15							5×5	2.40	100	5×5	2.40	100	5×5	2.40	100
22							5×5	2.40	100	5×5	2.40	100	6.3×5	0.75	140
33	5×5	2.40	100	5×5	2.40	100	5×5	2.40	100	6.3×5	0.75	140	6.3×5	0.75	140
47	5×5	2.40	100	5×5	2.40	100	6.3×5	0.75	140	6.3×5	0.75	140			
68	6.3×5	0.75	140	6.3×5	0.75	140	6.3×5	0.75	140						
100	6.3×5	0.75	140	6.3×5	0.75	140									



## RZ Extremely Low Impedance Series

Long Life   
 Solvent Proof   
 Low Impedance

- Extremely low impedance at high frequency
- High reliability withstanding 5000 hours load life at 105°C (2000/3000 hours for smaller case sizes as specified below)
- Ideally suited for use in switching power supplies
- Complied to the RoHS directive

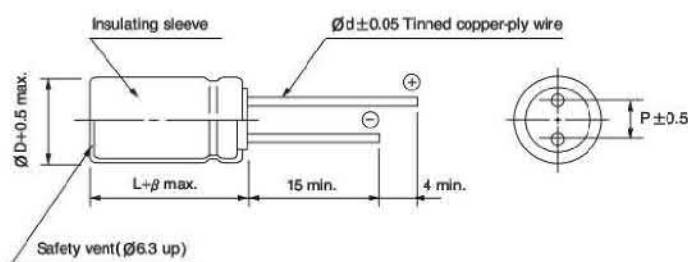
$\Rightarrow$  RP  
Long life



Item	Characteristics							
Operating temperature range	-55 ~ +105°C							
Leakage current max.	I = 0.01CV or 3μA whichever is greater (after 2 minutes) I = 0.03CV or 4μA whichever is greater (after 1 minute)							
Capacitance tolerance	±20% at 120Hz, 20°C							
Dissipation factor max. (at 120Hz, 20°C)	Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value							
	WV	6.3	10	16	25	35	50	63
	tanδ	0.22	0.19	0.16	0.14	0.12	0.10	0.08
Low temperature characteristics (Impedance ratio at 120Hz)	WV	6.3, 10		16 ~ 35		50, 63		
	Z-55°C/Z+20°C	4		3		2		
Load life	After an application of DC bias voltage plus the rated AC ripple current for 5000 hours at 105°C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.							
	Leakage current			Less than specified value				
	Capacitance change			Within ±20% of initial value				
	tanδ			Less than 200% of specified value				
	ØD	Ø8 ≤ 6.3		ØD = 8		ØD ≥ 10		
	Life time	2000 hours		3000 hours		5000 hours		
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.							
	Leakage current			Less than specified value				
	Capacitance change			Within ±20% of initial value				
	tanδ			Less than 150% of specified value				

### DRAWING

Unit : mm



ØD	5	6.3	8	10	12.5	16	18
P	2.0	2.5	3.5	5.0	5.0	7.5	7.5
Ød	0.5	0.5	0.6	0.6	0.6	0.8	0.8
β	1.5		2.0				

### FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

μF	Frequency	120Hz	1kHz	10kHz	50kHz	100kHz ≤
~ 33		0.40	0.65	0.82	0.91	1.00
47 ~ 220		0.50	0.70	0.84	0.92	1.00
330 ~ 680		0.55	0.75	0.86	0.93	1.00
1000 ~ 1500		0.60	0.80	0.88	0.94	1.00
2200 ~		0.70	0.85	0.90	0.95	1.00

# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

**RZ** series

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV Item μF	6.3			10			16			25		
	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz
33										5×11	0.80	155
47							5×11	0.80	155	6.3×11	0.55	210
68				5×11	0.80	155	6.3×11	0.50	220	6.3×11	0.36	260
100	5×11	0.85	150	6.3×11	0.55	210	6.3×11	0.35	265	8×11.5	0.24	383
150	6.3×11	0.49	225	6.3×11	0.35	265	8×11.5	0.23	388	8×11.5	0.16	460
220	6.3×11	0.30	285	8×11.5	0.24	387	8×11.5	0.16	460	10×12.5	0.13	600
330	8×11.5	0.20	292	8×11.5	0.16	480	10×12.5	0.12	625	10×16	0.095	750
470	10×12.5	0.14	575	10×12.5	0.13	600	10×16	0.09	770	10×20	0.065	1020
680	10×16	0.11	700	10×16	0.09	770	10×20	0.065	1020	12.5×20	0.046	1392
1000	10×20	0.075	950	10×20	0.060	1050	12.5×20	0.047	1411	12.5×25	0.036	1660
1500	10×25	0.055	1220	12.5×20	0.045	1417	12.5×25	0.036	1660	16×20	0.034	1770
2200	12.5×20	0.043	1438	12.5×25	0.034	1710	16×20	0.033	1800	16×25	0.028	2051
3300	12.5×25	0.034	1710	16×20	0.031	1850	16×25	0.027	2095	16×35.5	0.020	2680
4700	16×25	0.032	1935	16×31.5	0.023	2420	16×35.5	0.020	2680	18×40	0.018	2960
6800	16×31.5	0.024	2370	16×35.5	0.020	2680	18×35.5	0.018	2900			
10000	16×40	0.020	2750	18×40	0.017	3040						
15000	18×40	0.018	2960									

WV Item μF	35			50			63		
	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz
1.0				5×11	4.0	36			
1.5				5×11	3.8	45			
2.2				5×11	3.5	54			
3.3				5×11	3.0	66			
4.7				5×11	2.2	81			
6.8				5×11	1.8	91			
10				5×11	1.4	115	5×11	1.06	135
15				5×11	0.93	145	6.3×11	0.73	185
22	5×11	0.75	160	6.3×11	0.65	195	6.3×11	0.52	215
33	6.3×11	0.49	225	6.3×11	0.43	240	8×11.5	0.35	320
47	6.3×11	0.34	270	8×11.5	0.30	344	8×11.5	0.25	365
68	8×11.5	0.24	384	8×11.5	0.20	410	10×12.5	0.19	495
100	8×11.5	0.16	460	10×16	0.16	581	10×20	0.12	750
150	10×12.5	0.12	625	10×20	0.10	820	10×25	0.09	950
220	10×16	0.09	770	10×25	0.075	1040	12.5×20	0.065	1140
330	10×20	0.060	1060	12.5×20	0.075	1281	12.5×25	0.049	1420
470	12.5×20	0.046	1401	12.5×25	0.044	1500	16×25	0.042	1700
680	12.5×25	0.036	1660	16×20	0.040	1630	16×31.5	0.032	2050
1000	16×20	0.034	1770	16×31.5	0.030	2120	18×35.5	0.029	2280
1500	16×31.5	0.028	2385	16×40	0.026	2410			
2200	16×35.5	0.020	2680	18×40	0.024	2560			
3300	18×40	0.017	3040						



## WL Extremely Low Impedance Series

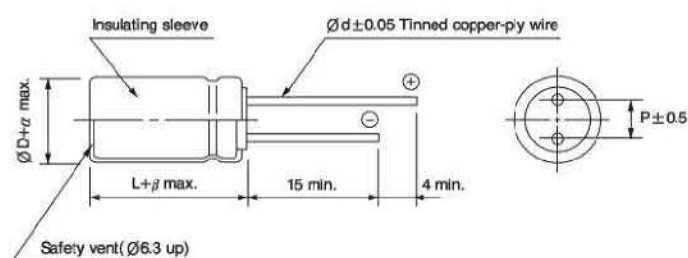
- Wide voltage compared with RZ series
- Operating temperature range of  $-40 \sim +105^{\circ}\text{C}$
- Extremely low impedance at high frequency
- High reliability withstanding 5000 hours load life at  $105^{\circ}\text{C}$  (2000/3000 hours for smaller case size as specified below)
- Complied to the RoHS directive



Item	Characteristics										
Operating temperature range	WV	6.3 ~ 100					160 ~ 450		500		
	Temperature range	-40 ~ +105°C					-40 ~ +105°C		-25 ~ +105°C		
Leakage current max.	WV ≤ 100							WV > 100			
	I = 0.01CV or 3μA whichever is greater (after 2 min.) I = 0.03CV or 4μA whichever is greater (after 1 min.)							I = 0.02CV + 15μA (after 5 min.)			
Capacitance tolerance	± 20% at 120Hz, 20°C										
Dissipation factor max. (at 120Hz, 20°C)	Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value.										
	WV	6.3	10	16	25	35	50	63	100	160~250	350~500
	tanδ	0.22	0.19	0.16	0.14	0.12	0.10	0.09	0.08	0.15	0.20
Low temperature characteristics (Impedance ratio at 120Hz)	WV	6.3	10	16	25 ~ 100		160 ~ 250	350 ~ 450	500		
	Z-25°C/Z+20°C	4	3	2	2		3	6	8		
	Z-40°C/Z+20°C	8	6	4	3		4	10	-		
Load life	After an application of DC bias voltage plus the rated AC ripple current for 5000 hours at 105°C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.										
	Leakage current				Less than specified value						
	Capacitance change				Within ±25% of initial value						
	tanδ				Less than 200% of specified value						
	Life time		ØD = 5, 6.3			ØD = 8			ØD ≥ 10		
	WV ≤ 100		2000 hours			3000 hours			5000 hours		
Shelf life (at 105°C)	WV > 100		2000 hours								
	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.										

## DRAWING

Unit : mm



ØD	5	6.3	8	10	12.5	16	18	20	22
P	2.0	2.5	3.5	5.0	5.0	7.5	7.5	10.0	10.0
Ød	0.5	0.5	0.6	0.6	0.6	0.8	0.8	0.8	1.0
α	0.5							1.0	
β	1.5			2.0				3.0	

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

µF	Frequency	120Hz	1kHz	10kHz	50kHz	100kHz ≤
~ 33		0.40	0.65	0.82	0.91	1.00
33 ~ 270		0.50	0.70	0.84	0.92	1.00
330 ~ 680		0.55	0.75	0.86	0.93	1.00
820 ~ 1800		0.60	0.80	0.88	0.94	1.00
2200 ~		0.70	0.85	0.90	0.95	1.00



# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

**WL** series

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV Item $\mu\text{F}$	6.3			10			16			25		
	$\varnothing D \times L$ (mm)	Impedance ( $\Omega$ )max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	$\varnothing D \times L$ (mm)	Impedance ( $\Omega$ )max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	$\varnothing D \times L$ (mm)	Impedance ( $\Omega$ )max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	$\varnothing D \times L$ (mm)	Impedance ( $\Omega$ )max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz
4.7										5 × 11	0.70	180
10							5 × 11	0.70	180	5 × 11	0.70	180
22	5 × 11	0.70	180	5 × 11	0.70	180	5 × 11	0.70	180	5 × 11	0.70	180
33	5 × 11	0.70	180	5 × 11	0.70	180	5 × 11	0.70	180	5 × 11	0.70	180
47	5 × 11	0.65	180	5 × 11	0.65	180	5 × 11	0.65	180	5 × 11	0.65	180
100	5 × 11	0.65	180	5 × 11	0.65	180	6.3 × 11	0.30	280	6.3 × 11	0.30	280
150	6.3 × 11	0.30	280	6.3 × 11	0.30	280	6.3 × 11	0.30	280	8 × 11.5	0.14	450
220	6.3 × 11	0.30	280	6.3 × 11	0.30	280	8 × 11.5	0.14	450	8 × 11.5	0.14	450
330	6.3 × 11	0.30	280	8 × 11.5	0.14	450	8 × 11.5	0.14	450	10 × 12.5	0.10	660
470	8 × 11.5	0.14	450	8 × 11.5	0.14	450	10 × 12.5	0.10	660	10 × 16	0.080	850
680	10 × 12.5	0.10	660	10 × 12.5	0.10	660	10 × 16	0.080	850	10 × 20	0.054	1100
1000	10 × 12.5	0.10	660	10 × 16	0.080	850	10 × 20	0.054	1100	12.5 × 20	0.050	1400
1500	10 × 20	0.054	1100	10 × 20	0.054	1100	12.5 × 20	0.050	1400	16 × 20	0.030	2100
2200	12.5 × 20	0.050	1400	12.5 × 20	0.050	1400	12.5 × 25	0.038	1700	16 × 25	0.030	2100
3300	12.5 × 20	0.050	1400	12.5 × 25	0.038	1700	16 × 25	0.030	2100	16 × 31.5	0.025	2600
4700	16 × 25	0.030	2100	16 × 25	0.030	2100	16 × 31.5	0.025	2600	18 × 35.5	0.022	3000
6800	16 × 25	0.030	2100	16 × 31.5	0.025	2600	18 × 35.5	0.022	3000			
10000	16 × 31.5	0.025	2600	18 × 35.5	0.022	3000						
15000	18 × 35.5	0.022	3000									

WV Item $\mu\text{F}$	35			50			63			100		
	$\varnothing D \times L$ (mm)	Impedance ( $\Omega$ )max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	$\varnothing D \times L$ (mm)	Impedance ( $\Omega$ )max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	$\varnothing D \times L$ (mm)	Impedance ( $\Omega$ )max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	$\varnothing D \times L$ (mm)	Impedance ( $\Omega$ )max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz
0.22				5 × 11	8.0	18						
0.47				5 × 11	5.0	25						
1.0				5 × 11	3.5	40						
2.2				5 × 11	3.0	55				5 × 11	2.5	52
3.3				5 × 11	2.6	65	5 × 11	2.0	64	5 × 11	2.5	64
4.7	5 × 11	0.70	180	5 × 11	2.3	90	5 × 11	2.0	76	5 × 11	2.5	76
10	5 × 11	0.70	180	5 × 11	1.4	120	5 × 11	2.0	111	6.3 × 11	1.0	128
22	5 × 11	0.70	180	5 × 11	1.2	150	6.3 × 11	0.60	190	8 × 11.5	0.60	224
33	5 × 11	0.65	180	6.3 × 11	0.60	200	6.3 × 11	0.60	233	10 × 12.5	0.40	319
47	6.3 × 11	0.30	280	6.3 × 11	0.43	250	8 × 11.5	0.50	338	10 × 16	0.30	417
100	8 × 11.5	0.20	450	8 × 11.5	0.24	340	10 × 16	0.12	456	12.5 × 20	0.15	570
150	8 × 11.5	0.14	450	10 × 12.5	0.17	490	10 × 20	0.10	610	12.5 × 25	0.12	762
220	10 × 12.5	0.10	660	10 × 16	0.12	650	10 × 25	0.090	809	16 × 25	0.070	1250
330	10 × 16	0.080	850	10 × 20	0.10	810	12.5 × 20	0.085	1036	16 × 31.5	0.050	1404
470	10 × 20	0.054	1100	12.5 × 20	0.085	1100	16 × 20	0.050	1411	18 × 40	0.030	1980
680	12.5 × 20	0.050	1400	12.5 × 25	0.065	1200	16 × 25	0.043	1843	18 × 40	0.030	2050
820	12.5 × 25	0.045	1500	16 × 25	0.055	1300	18 × 25	0.035	1900	18 × 40	0.030	2215
1000	12.5 × 25	0.038	1700	16 × 25	0.043	1600	16 × 35.5	0.025	1967			
1500	16 × 25	0.030	2100	16 × 31.5	0.038	2000						
2200	16 × 31.5	0.025	2600	18 × 35.5	0.034	2300						
3300	18 × 35.5	0.022	3000									

**WL** series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV Item μF	160			200			250		
	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C
1	6.3 × 11	3.5	45						
10	10 × 16	3	230				10 × 20	3.5	300
22	10 × 20	1.3	440	10 × 20	1.5	440	12.5 × 20	2.3	480
33	10 × 20	1.3	560	12.5 × 20	0.91	590	12.5 × 25	1.7	630
47	12.5 × 20	0.91	725	12.5 × 20	0.91	780	12.5 × 25	1.7	630
68	12.5 × 25	0.63	950	12.5 × 25	0.63	950	16 × 25	1.0	1000
82							16 × 25	1.0	1100
100	16 × 25	0.45	1280	16 × 25	0.45	1280	16 × 31.5	0.63	1400
150	16 × 31.5	0.35	1300	16 × 25	0.35	1500	18 × 25	0.42	1450
							18 × 31.5		
220	16 × 31.5	0.30	1300	18 × 31.5	0.30	1700	18 × 35.5	0.39	1485
							18 × 40	0.35	
330	18 × 31.5	0.25	1700	18 × 35.5	0.21	1900			

WV Item μF	350			400			450		
	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C
3.3							10 × 20	6.5	150
4.7							12.5 × 20	3.6	200
10	10 × 20	2.9	180	10 × 16	3.5	176	12.5 × 25	2.5	315
				10 × 20	2.9	180			
22	12.5 × 20	2.1	270	12.5 × 25	1.3	300	12.5 × 25	2.0	525
33	16 × 20	0.91	600	16 × 20	0.91	600	16 × 25	1.7	570
47	16 × 25	0.73	700	16 × 25	0.73	700	16 × 25	1.7	660
							16 × 31.5	1.6	720
56							18 × 25	1.5	720
68	16 × 31.5	0.49	1100	16 × 31.5	0.49	1100	18 × 25	1.5	800
							16 × 35.5	1.3	900
82	16 × 35.5	0.45	1130	16 × 35.5	0.42	1150	18 × 31.5	0.93	900
							16 × 40	0.93	1000
100	18 × 31.5	0.40	1170	18 × 35.5	0.34	1200	18 × 31.5	0.83	1000
							18 × 35.5	0.75	1200
120	18 × 35.5	0.37	1200	18 × 40	0.34	1270	16 × 40	0.93	1100
150	18 × 40	0.35	1250	20 × 41	0.33	1380	18 × 35.5	0.71	1200
							18 × 40	0.50	1500
							20 × 41	0.32	1600

WV Item μF	500		
	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C
10	12.5 × 25	3.0	260
22	12.5 × 30	2.3	420
	16 × 25	2.2	470
33	18 × 31.5	1.8	560
47	16 × 35.5	1.7	650
	18 × 35.5	1.5	700
56	16 × 40	1.3	740
68	16 × 45	1.2	820
	18 × 40	1.1	900
82	16 × 50	1.1	940
	18 × 40	1.0	1000
100	18 × 45	1.0	1200
	20 × 41	0.8	1250
120	22 × 45	0.8	1370



# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS



Extremely Low Impedance Series



Low Impedance



Long Life



Solvent Proof



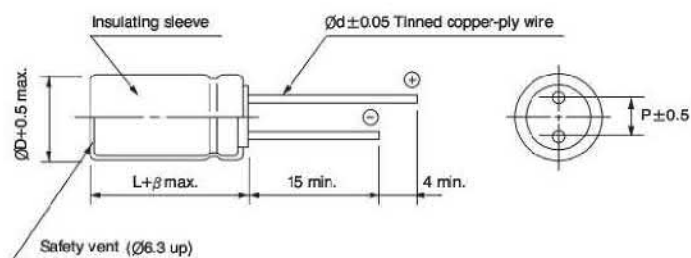
- High reliability long life(10000 hours)
- Operating temperature  $-55 \sim +105^{\circ}\text{C}$
- Enabled high ripple current by a reduction of impedance at high frequency
- Ideally suited for use in switching power supply, main board
- Complied to the RoHS directive



Item	Characteristics						
Operating temperature range	-55 ~ +105°C						
Leakage current max.	I = 0.01CV or 3μA whichever is greater (after 2 minutes)						
Capacitance tolerance	±20% at 120Hz, 20°C						
Dissipation factor max. (at 120Hz, 20°C)	Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value.						
	WV	6.3	10	16	25	35	50
	tanδ	0.22	0.19	0.16	0.14	0.12	0.10
Low temperature characteristics (Impedance ratio at 120Hz)	WV		6.3	10	16 ~ 25		35 ~ 50
	Z-55°C/Z+20°C		3	3	3		3
Load life	After an application of DC bias voltage plus the rated AC ripple current for 10000 hours at 105°C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.						
	Leakage current			Less than specified value			
	Capacitance change			Within ±20% of initial value			
	tanδ			Less than 200% of specified value			
	ØD	ØD = 5, 6.3		ØD = 8	ØD = 10	ØD ≥ 12.5	
	Life time		4000 hours	6000 hours	7000 hours	10000 hours	
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.						

## DRAWING

Unit : mm



$\phi\text{D}$	5	6.3	8	10	12.5	16	18
P	2.0	2.5	3.5	5.0	5.0	7.5	7.5
$\phi\text{d}$	0.5	0.5	0.6	0.6	0.6	0.8	0.8
$\beta$	1.5			2.0			

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

$\mu\text{F}$ \ Frequency	120Hz	1kHz	10kHz	50kHz	100kHz $\leq$
~ 33	0.40	0.65	0.82	0.91	1.00
39 ~ 270	0.50	0.70	0.84	0.92	1.00
330 ~ 680	0.55	0.75	0.86	0.93	1.00
820 ~ 1800	0.60	0.80	0.88	0.94	1.00
2200 ~	0.70	0.85	0.90	0.95	1.00



**RP** series

## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV Item μF	6.3			10			16		
	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz
47							5 × 11	0.65	180
68				5 × 11	0.65	180	6.3 × 11	0.30	280
100	5 × 11	0.65	180	5 × 11	0.65	180	6.3 × 11	0.30	280
150	5 × 11	0.65	280	6.3 × 11	0.30	280	6.3 × 11	0.30	280
220	6.3 × 11	0.30	280	6.3 × 11	0.30	280	8 × 11.5	0.14	450
330	6.3 × 11	0.30	280	8 × 11.5	0.14	450	8 × 11.5	0.14	450
470	8 × 11.5	0.14	450	8 × 11.5	0.14	450	10 × 12.5	0.10	660
680	10 × 12.5	0.10	660	10 × 12.5	0.10	660	10 × 16	0.08	850
1000	10 × 12.5	0.10	660	10 × 16	0.08	850	10 × 20	0.054	1100
1500	10 × 20	0.054	1100	10 × 20	0.054	1100	12.5 × 20	0.050	1400
2200	12.5 × 20	0.050	1400	12.5 × 20	0.050	1400	12.5 × 25	0.038	1700
3300	12.5 × 20	0.050	1400	12.5 × 25	0.038	1700	16 × 25	0.030	2100
4700	16 × 25	0.030	2100	16 × 31.5	0.030	2100	16 × 25	0.025	2600
6800	16 × 25	0.030	2100	16 × 31.5	0.025	2600	16 × 35.5	0.022	3000
10000	16 × 31.5	0.025	2600	18 × 35.5	0.022	3000			
15000	18 × 35.5	0.022	3000						

WV Item μF	25			35			50		
	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz
1.0							5 × 11	3.5	40
2.2							5 × 11	3.0	55
3.3							5 × 11	2.6	65
4.7							5 × 11	2.3	90
6.8							5 × 11	1.4	120
10							5 × 11	1.4	120
22				5 × 11	0.70	180	5 × 11	1.2	150
33	5 × 11	0.70	180	5 × 11	0.65	180	6.3 × 11	0.60	200
47	5 × 11	0.65	180	6.3 × 11	0.30	280	6.3 × 11	0.43	250
68	6.3 × 11	0.30	280	8 × 11.5	0.14	450	8 × 11.5	0.24	340
100	6.3 × 11	0.30	280	8 × 11.5	0.14	450	8 × 11.5	0.24	340
150	8 × 11.5	0.14	450	8 × 11.5	0.14	450	10 × 12.5	0.17	490
220	8 × 11.5	0.14	450	10 × 12.5	0.10	660	10 × 16	0.12	650
330	10 × 12.5	0.10	660	10 × 16	0.080	850	10 × 20	0.10	810
470	10 × 16	0.080	850	10 × 20	0.054	1100	12.5 × 20	0.085	1100
680	10 × 20	0.054	1100	12.5 × 20	0.050	1400	12.5 × 25	0.065	1200
1000	12.5 × 20	0.050	1400	12.5 × 25	0.038	1700	16 × 31.5	0.043	1600
1500	16 × 25	0.030	1400	16 × 31.5	0.030	2100	16 × 31.5	0.038	2000
2200	16 × 25	0.030	2100	16 × 31.5	0.025	2600	18 × 35.5	0.034	2300
3300	16 × 31.5	0.025	2600	18 × 35.5	0.022	3000			
4700	18 × 35.5	0.022	3000						

# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS



High ripple current,  
Extremely Low Impedance Series



Low Impedance



Long Life



Solvent Proof



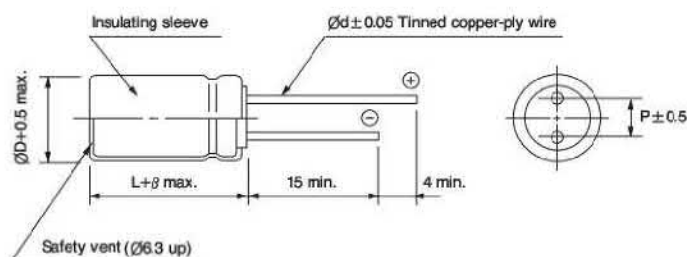
- Operating temperature range of  $-40 \sim +105^{\circ}\text{C}$
- Extremely low impedance at high frequency
- High reliability withstanding 10000 hours load life at  $105^{\circ}\text{C}$   
(5000 / 7000 hours for smaller case size as specified below)
- Complied to the RoHS directive



Item	Characteristics								
Operating temperature range	-40 ~ +105°C								
Leakage current max.	I = 0.03CV or 3μA whichever is greater (after 2 minutes)								
Capacitance tolerance	±20% at 120Hz, 20°C								
Dissipation factor max. (at 120Hz, 20°C)	Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value.								
	WV	6.3	10	16	25	35	50	63	100
	tanδ	0.22	0.19	0.16	0.14	0.12	0.10	0.09	0.08
Low temperature characteristics (Impedance ratio at 120Hz)	WV		6.3		10		16		25 ~ 100
	Z-40°C/Z+20°C		8		6		4		3
Load life	After an application of DC bias voltage plus the rated AC ripple current for 10000 hours at 105°C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.								
	Leakage current				Less than specified value				
	Capacitance change				Within ± 25% of initial value				
	tanδ				Less than 200% of specified value				
	ØD		ØD = 5, 6.3		ØD = 8, 10		ØD ≥ 12.5		
	Life time		5000 hours		7000 hours		10000 hours		
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.								

## DRAWING

Unit : mm



$\phi D$	5	6.3	8	10	12.5	16	18
P	2.0	2.5	3.5	5.0	5.0	7.5	7.5
$\phi d$	0.5	0.5	0.6	0.6	0.6	0.8	0.8
$\beta$	1.5			2.0			

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

$\mu\text{F}$ \ Frequency	120Hz	1kHz	10kHz	50kHz	100kHz $\leq$
~ 33	0.40	0.65	0.82	0.91	1.00
39 ~ 270	0.50	0.70	0.84	0.92	1.00
330 ~ 680	0.55	0.75	0.86	0.93	1.00
820 ~ 1800	0.60	0.80	0.88	0.94	1.00
2200 ~	0.70	0.85	0.90	0.95	1.00



## WF series

### ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV Item μF	6.3			10			16			25		
	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz
33										5×11	0.90	150
47							5×11	0.90	150	5×11	0.90	150
100	5×11	0.90	150	5×11	0.90	150	6.3×11	0.40	250	6.3×11	0.40	250
220	6.3×11	0.40	250	6.3×11	0.40	250	8×11.5	0.25	400	8×11.5	0.25	400
330	6.3×11	0.40	250	8×11.5	0.25	400	8×11.5	0.25	400	10×12.5	0.16	580
470	8×11.5	0.25	400	8×11.5	0.25	400	10×12.5	0.16	580	10×16	0.120	770
1000	10×12.5	0.16	580	10×16	0.120	770	10×20	0.078	1050	12.5×20	0.062	1300
2200	12.5×20	0.062	1300	12.5×20	0.062	1300	12.5×25	0.048	1650	16×25	0.034	1850
3300	12.5×20	0.062	1300	12.5×25	0.048	1650	16×25	0.034	1850	16×31.5	0.029	2000
4700	16×25	0.034	1850	16×25	0.034	1850	16×31.5	0.029	2000	18×35.5	0.025	2200
6800	16×25	0.034	1850	16×31.5	0.029	2000	18×35.5	0.025	2200			
10000	16×31.5	0.029	2000	18×35.5	0.025	2200						
15000	18×35.5	0.025	2200									

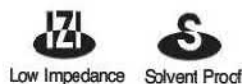
WV Item μF	35			50			63			100		
	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz
0.47				5×11	5.5	30				5×11	6.0	15
1.0				5×11	4.0	50				5×11	4.5	20
2.2				5×11	2.5	55				5×11	3.0	30
3.3				5×11	2.2	65				5×11	2.7	40
4.7				5×11	1.9	88				5×11	2.5	65
10				5×11	1.5	100	5×11	23	87	6.3×11	1.2	140
22				5×11	0.9	150	6.3×11	1.30	140	8×11.5	0.83	160
33	5×11	0.90	150	6.3×11	0.40	250	6.3×11	1.20	140	10×12.5	0.43	230
47	6.3×11	0.4	250	6.3×11	0.4	400	8×11.5	0.63	210	10×12.5	0.43	230
										10×16	0.31	290
100	8×11.5	0.25	400	8×11.5	0.25	500	10×12.5	0.43	300	12.5×16	0.23	750
										12.5×20	0.16	
220	10×12.5	0.16	580	10×16	0.12	770	10×25	0.210	520	16×25	0.073	900
330	10×16	0.120	770	10×20	0.08	1050	12.5×20	0.160	660	16×25	0.073	900
390	10×20	0.095	900	10×20	0.075	1170	12.5×25	0.140	700	12.5×34.5	0.073	1650
470	10×20	0.078	1050	12.5×20	0.062	1300	12.5×25	0.120	750			
1000	12.5×25	0.048	1650	16×25	0.034	1850	16×31.5	0.054	1390			
2200	16×31.5	0.029	2000	18×35.5	0.025	2200						
3300	18×35.5	0.025	2200									



# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS



High Ripple Current Series



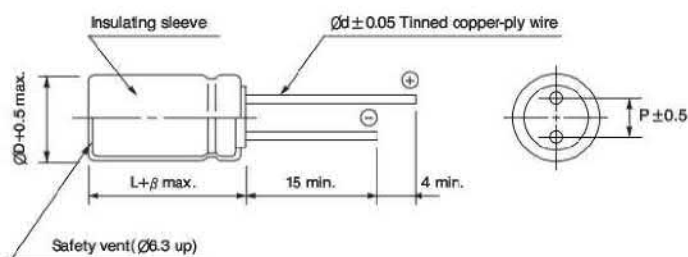
- Enabled high ripple current by a reduction of impedance at high frequency
- High reliability withstanding 5000 hours load life at 105°C (2000 ~ 4000 hours for smaller case sizes as specified below)
- Complied to the RoHS directive



Item	Characteristics								
Operating temperature range	-55 ~ +105°C								
Leakage current max.	I = 0.01CV or 3μA whichever is greater (after 2 minutes) I = 0.03CV or 4μA whichever is greater (after 1 minute)								
Capacitance tolerance	± 20% at 120Hz, 20°C								
Dissipation factor max. (at 120Hz, 20°C)	Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value.								
	WV	6.3	10	16	25	35	50	63	100
	tanδ	0.22	0.19	0.16	0.14	0.12	0.10	0.09	0.08
Low temperature characteristics (Impedance ratio at 120Hz)	Z-55°C / Z+20°C					Z-25°C / Z+20°C			
	3					2			
Load life	After an application of DC bias voltage plus the rated AC ripple current for 5000 hours at 105°C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.								
	Leakage current				Less than specified value				
	Capacitance change				Within ± 25% of the initial value				
	tanδ				Less than 200% of the specified value				
	ØD		ØD = 5, 6.3		ØD = 8		ØD = 10		ØD ≥ 12.5
Life time		2000 hours		3000 hours		4000 hours		5000 hours	
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.								

## DRAWING

Unit : mm



ØD	5	6.3	8	10	12.5	16	18
P	2.0	2.5	3.5	5.0	5.0	7.5	7.5
Ød	0.5	0.5	0.6	0.6	0.6	0.8	0.8
β	1.5			2.0			

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	120Hz	1kHz	10kHz	50kHz	100kHz ≤
~ 33	0.32	0.60	0.80	0.90	1.00
39 ~ 270	0.40	0.63	0.82	0.91	1.00
330 ~ 680	0.45	0.67	0.84	0.92	1.00
820 ~ 1800	0.50	0.70	0.86	0.93	1.00
2200 ~	0.60	0.75	0.88	0.94	1.00

**LK** series

## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV Item μF	6.3			10			16			25		
	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz
33										5×11	0.800	200
47							5×11	0.800	200	5×11	0.550	200
100	5×11	0.850	200	5×11	0.600	200	8×11.5	0.350	550	8×11.5	0.240	550
150	8×11.5	0.490	550	8×11.5	0.350	550	8×11.5	0.240	550	10×12.5	0.160	927
220	8×11.5	0.300	550	8×11.5	0.240	550	10×12.5	0.160	927	10×12.5	0.130	927
330	8×11.5	0.240	550	10×12.5	0.160	927	10×12.5	0.130	927	10×16	0.095	1100
470	10×12.5	0.140	927	10×12.5	0.130	927	10×16	0.095	1100	10×20	0.075	1280
680	10×16	0.110	1100	10×16	0.095	1100	10×20	0.075	1280	10×25	0.055	1495
1000	10×20	0.075	1280	10×20	0.075	1280	10×25	0.055	1495	12.5×25	0.043	2100
1500	10×25	0.055	1495	10×25	0.055	1495	12.5×25	0.043	2100	16×25	0.034	2607
2200	12.5×25	0.043	2100	12.5×25	0.043	2100	12.5×30	0.034	2480	16×31.5	0.032	2840
3300	12.5×30	0.034	2480	16×25	0.034	2607	16×31.5	0.032	2840	16×35.5	0.029	3017
4700	16×31.5	0.032	2840	16×31.5	0.032	2840	16×35.5	0.029	3017	18×40	0.027	3379
6800	16×35.5	0.029	3017	16×35.5	0.029	3017	18×40	0.027	3379			

WV Item μF	35			50			63			100		
	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz
1.0				5×11	4.00	36						
2.2				5×11	3.50	54				5×11	5.00	38
3.3				5×11	3.00	66				5×11	5.00	44
4.7				5×11	2.20	74				5×11	5.00	53
10				5×11	2.000	115	5×11	1.06	135	6.3×11	2.00	89
22	5×11	2.000	200	5×11	1.800	160	6.3×11	0.520	215	8×11.5	1.200	159
33	5×11	1.500	200	6.3×11	1.200	285	8×11.5	0.350	320	10×12.5	0.800	221
47	8×11.5	0.700	550	8×11.5	0.700	550	8×11.5	0.250	365	10×16	0.600	350
100	10×12.5	0.200	927	10×12.5	0.200	927	10×20	0.120	750	12.5×20	0.300	405
150	10×12.5	0.160	927	10×16	0.120	1100	10×25	0.090	950	12.5×25	0.250	541
220	10×16	0.120	1100	10×20	0.095	1280	12.5×20	0.065	1140	16×25	0.150	885
330	10×20	0.095	1280	10×25	0.075	1495	12.5×25	0.049	1420	16×31.5	0.100	991
470	10×25	0.075	1495	12.5×25	0.055	2100	16×25	0.042	1700	18×40	0.068	1401
680	12.5×25	0.055	2100	16×25	0.043	2770	16×31.5	0.032	2050			
1000	12.5×30	0.043	2480	16×31.5	0.034	2840	18×35.5	0.029	2280			
1500	16×31.5	0.034	2840	16×35.5	0.032	3017						
2200	16×35.5	0.032	3017	18×40	0.029	3379						
3300	18×40	0.029	3379									



# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS



High Ripple Current  
Series



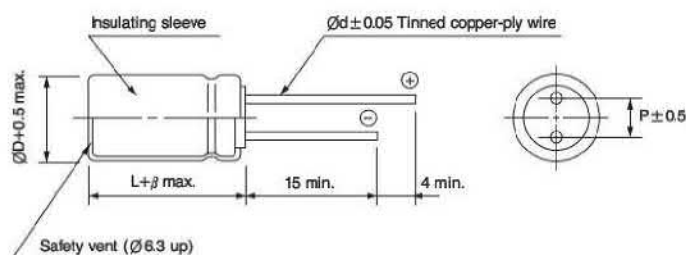
- Ripple current compared with LK series
- Enabled high ripple current by a reduction of impedance at high frequency
- High reliability withstanding 5000 hours load life at 105°C  
(2000 ~ 3000 hours for smaller case sizes as specified below)
- Complied to the RoHS directive



Item	Characteristics									
Operating temperature range	-40 ~ +105°C									
Leakage current max.	I = 0.01CV or 3μA whichever is greater (after 2 minutes) I = 0.03CV or 4μA whichever is greater (after 1 minute)									
Capacitance tolerance	±20% at 120Hz, 20°C									
Dissipation factor max. (at 120Hz, 20°C)	Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value.									
	WV	6.3	10	16	25	35	50	63	100	
	tanδ	0.22	0.19	0.16	0.14	0.12	0.10	0.08	0.08	
Low temperature characteristics (Impedance ratio at 120Hz)	Z-40°C / Z+20°C					Z-25°C / Z+20°C				
	3					2				
Load life	After an application of DC bias voltage plus the rated AC ripple current for 5000 hours at 105°C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.									
	Leakage current				Less than specified value					
	Capacitance change				Within ±25% of the initial value					
	tanδ				Less than 200% of the specified value					
	∅D				∅D = 5, 6.3		∅D = 8		∅D ≥ 10	
	Life time				2000 hours		3000 hours		5000 hours	
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.									

## DRAWING

Unit : mm



∅D	5	6.3	8	10	12.5	16	18
P	2.0	2.5	3.5	5.0	5.0	7.5	7.5
∅d	0.5	0.5	0.6	0.6	0.6	0.8	0.8
β	1.5			2.0			

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency μF	120Hz	1kHz	10kHz	50kHz	100kHz≤
~ 33	0.40	0.65	0.82	0.94	1.00
39 ~ 270	0.50	0.70	0.84	0.96	1.00
330 ~ 680	0.55	0.75	0.86	0.96	1.00
820 ~ 1800	0.60	0.80	0.88	0.97	1.00
2200 ~	0.70	0.85	0.90	0.97	1.00



**MK** series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV Item μF	6.3			10			16			25		
	ØD × L (mm)	Impedance (Ω) max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD × L (mm)	Impedance (Ω) max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD × L (mm)	Impedance (Ω) max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD × L (mm)	Impedance (Ω) max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz
10							5 × 11	1.000	250	5 × 11	1.000	250
22	5 × 11	0.525	250	5 × 11	0.525	250	5 × 11	1.000	250	5 × 11	0.525	250
33	5 × 11	0.525	250	5 × 11	0.525	250	5 × 11	0.525	250	5 × 11	0.525	250
47	5 × 11	0.450	250	5 × 11	0.450	250	5 × 11	0.450	250	5 × 11	0.450	250
100	5 × 11	0.450	250	5 × 11	0.450	250	5 × 11	0.450	250	5 × 11	0.450	250
150	6.3 × 11	0.300	405	6.3 × 11	0.300	405	6.3 × 11	0.300	405	6.3 × 11	0.300	405
220	6.3 × 11	0.225	405	6.3 × 11	0.225	405	6.3 × 11	0.225	405	6.3 × 11	0.225	405
330	6.3 × 11	0.225	405	8 × 11.5	0.175	760	8 × 11.5	0.108	760	8 × 11.5	0.108	760
390	8 × 11.5	0.108	550	8 × 11.5	0.108	760	8 × 11.5	0.108	760	8 × 11.5	0.108	760
470	8 × 11.5	0.108	760	8 × 11.5	0.108	760	8 × 11.5	0.108	760	8 × 11.5	0.108	760
560	8 × 15	0.098	880	8 × 15	0.098	880	8 × 15	0.098	880	8 × 15	0.098	880
680	10 × 12.5	0.088	1030	10 × 12.5	0.088	1030	10 × 12.5	0.088	1030	10 × 12.5	0.088	1030
820	10 × 16	0.075	1030	10 × 16	0.075	1030	10 × 16	0.075	1030	10 × 16	0.075	1030
1000	10 × 16	0.065	1430	10 × 16	0.065	1430	10 × 16	0.065	1430	10 × 16	0.065	1430
1200												
1500	10 × 20	0.050	1820	10 × 20	0.050	1820	10 × 20	0.050	1820	10 × 20	0.050	1820
1800	10 × 20	0.050	1820	10 × 20	0.050	1820	10 × 20	0.050	1820	10 × 20	0.050	1820
2200	12.5 × 20	0.043	2360	12.5 × 20	0.043	2360	12.5 × 20	0.043	2360	12.5 × 20	0.043	2360
3300	12.5 × 20	0.040	2360	12.5 × 20	0.040	2360	12.5 × 20	0.040	2360	12.5 × 20	0.040	2360
4700	16 × 25	0.024	3114	16 × 25	0.024	3114	16 × 25	0.024	3114	16 × 25	0.024	3114
6800	16 × 25	0.024	3114	16 × 25	0.024	3114	16 × 25	0.024	3114	16 × 25	0.024	3114
10000	16 × 31.5	0.024	3312	16 × 31.5	0.024	3312	16 × 31.5	0.024	3312	16 × 31.5	0.024	3312
15000	18 × 35.5	0.022	3420	18 × 35.5	0.022	3420	18 × 35.5	0.022	3420	18 × 35.5	0.022	3420

WV Item μF	35			50			63			100		
	ØD × L (mm)	Impedance (Ω) max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD × L (mm)	Impedance (Ω) max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD × L (mm)	Impedance (Ω) max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD × L (mm)	Impedance (Ω) max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz
0.22				5 × 11	5.00	250						
0.47				5 × 11	4.00	250						
1.0				5 × 11	3.00	250						
2.2				5 × 11	3.00	250						
3.3				5 × 11	1.50	250						
4.7	5 × 11	0.525	250	5 × 11	1.50	250	5 × 11	2.000	165	5 × 11	3.000	125
10	5 × 11	0.525	250	5 × 11	1.000	250	5 × 11	2.000	165	5 × 11	2.000	125
22	5 × 11	0.525	250	5 × 11	0.500	250	5 × 11	0.500	165	6.3 × 11	0.500	205
33	5 × 11	0.450	250	6.3 × 11	0.300	405	6.3 × 11	0.300	265	8 × 11.5	0.300	355
47	6.3 × 11	0.300	405	6.3 × 11	0.300	405	6.3 × 11	0.300	265	10 × 12.5	0.250	450
56	6.3 × 11	0.300	405	6.3 × 11	0.300	405	8 × 11.5	0.200	500	8 × 15	0.200	500
100	8 × 11.5	0.160	760	8 × 11.5	0.160	580	10 × 12.5	0.160	680	10 × 16	0.160	750
150	8 × 11.5	0.108	760	8 × 15	0.108	770	10 × 16	0.100	945	10 × 20	0.150	800
220	8 × 15	0.098	1030	10 × 12.5	0.088	1030	10 × 20	0.080	1100	12.5 × 20	0.100	1045
330	10 × 16	0.065	1430	10 × 16	0.065	1430	10 × 25	0.070	1300	12.5 × 25	0.070	1195
390	8 × 20	0.088	1430	10 × 20	0.050	1820	12.5 × 20	0.040	1495	16 × 25	0.060	1600
470	8 × 20	0.088	1430	10 × 20	0.050	1820	12.5 × 25	0.038	1600	16 × 31.5	0.040	1750
680	10 × 20	0.050	1820	12.5 × 20	0.043	2360	16 × 20	0.035	1990	16 × 31.5	0.040	1750
1000	12.5 × 20	0.043	2360	12.5 × 25	0.029	2770	16 × 25	0.030	2780	18 × 40	0.030	2060
1500	12.5 × 25	0.029	2770	16 × 25	0.027	3114	16 × 35.5	0.020	2835			
2200	16 × 20	0.027	2880	16 × 31.5	0.024	3312						
3300	18 × 35.5	0.022	3420									

# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS



High Ripple Current Series



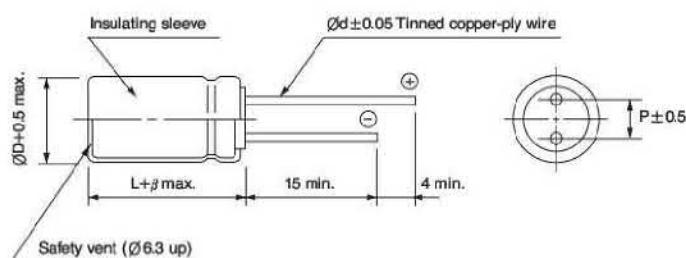
- High Ripple current with MK series
- Enabled high ripple current by a reduction of impedance at high frequency
- High reliability withstanding 5000 hours load life at 105°C (2000 ~ 4000 hours for smaller case sizes as specified below)
- Complied to the RoHS directive



Item	Characteristics									
Operating temperature range	-40 ~ +105°C									
Leakage current max.	I = 0.01CV or 3μA whichever is greater (after 2 minutes) I = 0.03CV or 4μA whichever is greater (after 1 minute)									
Capacitance tolerance	±20% at 120Hz, 20°C									
Dissipation factor max. (at 120Hz, 20°C)	Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value.									
	WV	6.3	10	16	25	35	50			
	tanδ	0.22	0.19	0.16	0.14	0.12	0.1			
Low temperature characteristics (Impedance ratio at 120Hz)	Z-40°C / Z+20°C			Z-25°C / Z+20°C						
	3			2						
Load life	After an application of DC bias voltage plus the rated AC ripple current for 5000 hours at 105°C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.									
	Leakage current			Less than specified value						
	Capacitance change			Within ±25% of the initial value						
	tanδ			Less than 200% of the specified value						
	ØD			ØD = 5, 6.3		ØD = 8		ØD = 10		ØD ≥ 12.5
Life time			2000 hours		3000 hours		4000 hours		5000 hours	
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.									

## DRAWING

Unit : mm



ØD	5	6.3	8	10	12.5	16
P	2.0	2.5	3.5	5.0	5.0	7.5
Ød	0.5	0.5	0.6	0.6	0.6	0.8
β	1.5		2.0			

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	120Hz	1kHz	10kHz	50kHz	100kHz≤
~ 33	0.40	0.65	0.82	0.94	1.00
47 ~ 270	0.50	0.70	0.84	0.96	1.00
330 ~ 680	0.55	0.75	0.86	0.96	1.00
820 ~ 1800	0.60	0.80	0.88	0.97	1.00
2200 ~	0.70	0.85	0.90	0.97	1.00



## MQ series

### ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV Item μF	6.3			10			16		
	ØD × L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD × L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD × L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz
10							5 × 11	0.525	250
22	5 × 11	0.525	250	5 × 11	0.525	250	5 × 11	0.525	270
33	5 × 11	0.525	270	5 × 11	0.525	270	5 × 11	0.525	290
47	5 × 11	0.450	290	5 × 11	0.450	290	5 × 11	0.450	310
100	5 × 11	0.450	310	5 × 11	0.450	310	6.3 × 11	0.225	405
150	6.3 × 11	0.225	405	6.3 × 11	0.225	405	6.3 × 11	0.225	460
220	6.3 × 11	0.225	460	6.3 × 11	0.225	460	8 × 11.5	0.108	760
330	6.3 × 11	0.225	505	8 × 11.5	0.108	760	8 × 11.5	0.108	950
470	8 × 11.5	0.108	950	8 × 11.5	0.108	950	10 × 12.5	0.088	1280
680	10 × 12.5	0.088	1280	10 × 12.5	0.088	1280	10 × 16	0.065	1785
1000	10 × 16	0.065	1785	10 × 16	0.065	1785	10 × 20	0.050	2270
1200				10 × 16	0.60	2200			
1500	10 × 20	0.050	2270	10 × 20	0.050	2270	12.5 × 20	0.043	2950
2200	12.5 × 20	0.043	2950	12.5 × 20	0.043	2950	12.5 × 25	0.029	3460

WV Item μF	25			35			50		
	ØD × L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD × L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD × L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz
4.7	5 × 11	0.525	250	5 × 11	0.525	250	5 × 11	1.50	270
10	5 × 11	0.525	250	5 × 11	0.525	270	5 × 11	0.750	290
22	5 × 11	0.525	270	5 × 11	0.525	290	5 × 11	0.390	310
33	5 × 11	0.525	290	5 × 11	0.450	310	6.3 × 11	0.255	405
47	5 × 11	0.450	310	6.3 × 11	0.225	460	6.3 × 11	0.210	460
100	6.3 × 11	0.225	460	8 × 11.5	0.108	760	8 × 11.5	0.108	950
150	8 × 11.5	0.108	760	8 × 11.5	0.108	950	10 × 12.5	0.088	1280
220	8 × 11.5	0.108	950	10 × 12.5	0.088	1280	10 × 16	0.065	1785
330	10 × 12.5	0.088	1280	10 × 16	0.065	1785	10 × 20	0.050	2270
470	10 × 16	0.065	1785	10 × 20	0.050	2270	12.5 × 20	0.043	2950
680	10 × 20	0.060	2270	12.5 × 20	0.043	2950	12.5 × 25	0.029	3460
1000	12.5 × 20	0.060	2950	12.5 × 25	0.029	3460	16 × 25	0.027	3890
1200	12.5 × 20	0.043	3100						
1500	16 × 20	0.024	3600	16 × 25	0.024	3890			
2200	16 × 25	0.024	3890						



# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS



Ultra Low Impedance Series



Low Impedance



Miniaturized



Solvent Proof



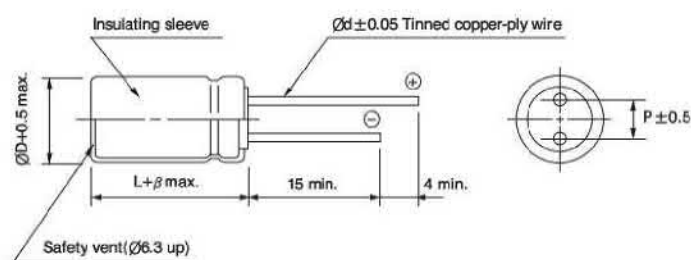
- Low impedance compared with WL series
- Enabled high ripple current by a reduction of impedance at high frequency
- High reliability withstanding 5000 hours load life at 105°C  
(2000~3000 hours for smaller case sizes as specified below)
- Complied to the RoHS directive

MK → MZ  
Low Imp.

Item	Characteristics								
Operating temperature range	-40 ~ +105°C								
Leakage current max.	I = 0.01CV or 3μA whichever is greater (after 2 minutes) I = 0.03CV or 4μA whichever is greater (after 1 minute)								
Capacitance tolerance	±20% at 120Hz, 20°C								
Dissipation factor max. (at 120Hz, 20°C)	Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value.								
	WV	6.3	10	16	25	35	50	63	100
	tanδ	0.22	0.19	0.16	0.14	0.12	0.10	0.09	0.08
Low temperature characteristics (Impedance ratio at 120Hz)	Z-40°C / Z+20°C					Z-25°C / Z+20°C			
	3					2			
Load life	After an application of DC bias voltage plus the rated AC ripple current for 5000 hours at 105°C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.								
	Leakage current				Less than specified value				
	Capacitance change				Within ±25% of initial value				
	tanδ				Less than 200% of specified value				
	ØD		ØD = 5, 6.3		ØD = 8		ØD ≥ 10		
Life time		2000 hours		3000 hours		5000 hours			
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.								

## DRAWING

Unit : mm



ØD	5	6.3	8	10	12.5	16	18
P	2.0	2.5	3.5	5.0	5.0	7.5	7.5
Ød	0.5	0.5	0.6	0.6	0.6	0.8	0.8
β	1.5			2.0			

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	120Hz	1kHz	10kHz	50kHz	100kHz≤
~ 33	0.42	0.70	0.90	0.95	1.00
47 ~ 270	0.50	0.73	0.92	0.96	1.00
330 ~ 680	0.55	0.77	0.94	0.97	1.00
1000 ~ 1500	0.60	0.80	0.96	0.98	1.00
2200 ~	0.70	0.85	0.98	0.99	1.00

**MZ** series

## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV Item μF	6.3			10			16			25		
	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz
4.7										5×11	0.35	250
10							5×11	0.35	250	5×11	0.35	250
22	5×11	0.35	250	5×11	0.35	250	5×11	0.35	250	5×11	0.35	250
33	5×11	0.35	250	5×11	0.35	250	5×11	0.35	250	5×11	0.35	250
47	5×11	0.30	250	5×11	0.30	250	5×11	0.30	250	5×11	0.30	250
100	5×11	0.30	250	5×11	0.30	250	6.3×11	0.15	405	6.3×11	0.15	405
150	6.3×11	0.15	405	6.3×11	0.15	405	6.3×11	0.15	405	8×11.5	0.1	760
220	6.3×11	0.15	405	6.3×11	0.15	405	8×11.5	0.072	760	8×11.5	0.09	760
330	6.3×11	0.15	405	8×11.5	0.012	760	8×11.5	0.072	760	10×12.5	0.08	1030
470	8×11.5	0.072	760	8×11.5	0.010	760	10×12.5	0.053	1030	10×16	0.038	1430
680	10×12.5	0.053	1030	10×12.5	0.053	1030	10×16	0.038	1430	10×20	0.027	1820
1000	10×12.5	0.053	1030	10×16	0.038	1430	10×20	0.027	1820	12.5×20	0.025	2360
1500	10×20	0.027	1820	10×20	0.027	1820	12.5×20	0.025	2360	16×20	0.020	3460
2200	12.5×20	0.025	2360	12.5×20	0.025	2360	12.5×25	0.018	2770	16×25	0.015	3460
3300	12.5×20	0.025	2360	12.5×25	0.024	2770	16×25	0.015	3460	16×31.5	0.015	3680
4700	16×25	0.015	3460	16×25	0.015	3460	16×31.5	0.015	3680	18×35.5	0.014	3800
6800	16×25	0.015	3460	16×31.5	0.015	3680	18×35.5	0.014	3800			
10000	16×31.5	0.015	3680	18×35.5	0.014	3800						
15000	18×35.5	0.014	3800									

WV Item μF	35			50			63			100		
	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz
0.47				5×11	2.0	250						
1.0				5×11	2.0	250						
2.2				5×11	2.0	250				5×11	2.0	125
3.3				5×11	1.0	250	5×11	2.0	165	5×11	2.0	125
4.7	5×11	0.35	250	5×11	1.0	250	5×11	2.0	165	5×11	2.0	125
10	5×11	0.35	250	5×11	0.50	250	5×11	0.45	165	6.3×11	0.50	205
22	5×11	0.35	250	5×11	0.4	250	6.3×11	0.30	265	8×11.5	0.30	355
33	5×11	0.30	250	6.3×11	0.17	405	6.3×11	0.30	265	10×12.5	0.25	450
47	6.3×11	0.15	405	6.3×11	0.14	405	8×11.5	0.20	500	10×16	0.20	580
100	8×11.5	0.072	760	8×11.5	0.105	760	10×16	0.10	945	12.5×20	0.10	1045
150	8×11.5	0.072	760	10×12.5	0.061	1030	10×20	0.08	1100	12.5×25	0.070	1195
220	10×12.5	0.053	1030	10×16	0.038	1430	10×25	0.07	1300	16×25	0.060	1600
330	10×16	0.038	1430	10×20	0.032	1820	12.5×20	0.04	1495	16×31.5	0.040	1750
470	10×20	0.027	1820	12.5×20	0.025	2360	16×20	0.035	1990	18×40	0.030	2060
680	12.5×20	0.025	2360	12.5×25	0.020	2770	16×25	0.030	2780			
1000	12.5×25	0.019	2770	16×25	0.018	3460	16×35.5	0.020	2835			
1500	16×25	0.015	3460	16×31.5	0.015	3680						
2200	16×31.5	0.015	3680	18×35.5	0.014	3800						
3300	18×35.5	0.014	3800									



# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS



Low Impedance, Long Life  
Series



Low Impedance



Long Life



Solvent Proof



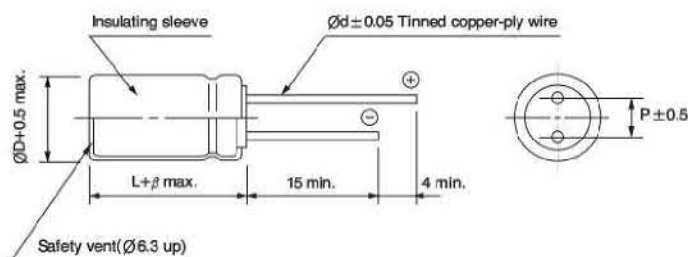
- Operating temperature range of  $-40 \sim +105^{\circ}\text{C}$
- Enabled high ripple current by a reduction of impedance at high frequency range
- High reliability withstanding 10000 hours load life at  $105^{\circ}\text{C}$   
(6000/8000 hours for as specified below)
- Complied to the RoHS directive



Item	Characteristics						
Operating temperature range	-40 ~ +105°C						
Leakage current max.	I = 0.01CV or 3μA whichever is greater (after 2 minutes) I = 0.03CV or 4μA whichever is greater (after 1 minute)						
Capacitance tolerance	± 20% at 120Hz, 20°C						
Dissipation factor max. (at 120Hz, 20°C)	Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value.						
	Rated Voltage(V)	6.3	10	16	25	35	50
	tanδ	0.22	0.19	0.16	0.14	0.12	0.10
Low temperature characteristics (Impedance ratio at 120Hz)	Z-40°C / Z+20°C			Z-25°C / Z+20°C			
	3			2			
Load life	After an application of DC bias voltage plus the rated AC ripple current for 10000 hours at 105°C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.						
	Leakage current		Less than specified value				
	Capacitance change		Within ± 25% of initial value				
	tanδ		Less than 200% of specified value				
	ØD		ØD = 5, 6.3		ØD = 8		ØD ≥ 10
	Life time		6000 hours		8000 hours		10000 hours
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.						

## DRAWING

Unit : mm



$\phi D$	5	6.3	8	10	12.5	16	18
P	2.0	2.5	3.5	5.0	5.0	7.5	7.5
$\phi d$	0.5	0.5	0.6	0.6	0.6	0.8	0.8
$\beta$	1.5		2.0				

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

$\mu\text{F}$ \ Frequency	120Hz	1kHz	10kHz	50kHz	100kHz
$\sim 33$	0.32	0.60	0.80	0.90	1.00
39 $\sim$ 270	0.40	0.63	0.82	0.91	1.00
330 $\sim$ 680	0.45	0.67	0.84	0.92	1.00
820 $\sim$ 1800	0.50	0.70	0.86	0.93	1.00
2200 $\sim$	0.60	0.75	0.88	0.94	1.00



### ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV Item μF	6.3			10			16		
	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz
47	5 × 11	0.600	300	5 × 11	0.600	300	5 × 11	0.600	300
100	5 × 11	0.600	345	5 × 11	0.600	345	6.3 × 11	0.300	345
150	6.3 × 11	0.300	345	6.3 × 11	0.300	345	6.3 × 11	0.300	540
220	6.3 × 11	0.300	345	6.3 × 11	0.300	345	8 × 11.5	0.200	540
330	6.3 × 11	0.300	540	8 × 11.5	0.200	608	8 × 11.5	0.140	945
470	8 × 11.5	0.140	540	8 × 11.5	0.140	630	10 × 12.5	0.105	945
680	10 × 12.5	0.105	945	10 × 12.5	0.105	945	8 × 20	0.105	945
820	10 × 12.5	0.105	945	10 × 16	0.075	945	10 × 16	0.075	1250
1000	10 × 16	0.075	1250	8 × 20	0.105	945	10 × 20	0.054	1760
				10 × 12.5	0.105	945	8 × 20	0.075	1250
				10 × 16	0.075	1250	10 × 20	0.054	1760
				10 × 20	0.054	1650			
1200	10 × 16	0.075	1500	10 × 16	0.075	1760	10 × 20	0.054	1960
1500	10 × 20	0.054	1760	10 × 20	0.054	1760	12.5 × 20	0.050	1960
1800	10 × 20	0.054	1760	10 × 20	0.054	1760	12.5 × 20	0.050	2250
2200	12.5 × 20	0.050	1960	12.5 × 20	0.050	1960	12.5 × 25	0.040	2480
2700	12.5 × 20	0.050	2250	12.5 × 25	0.040	2250	12.5 × 25	0.040	2900
3300	12.5 × 20	0.050	2480	12.5 × 25	0.040	2480	16 × 25	0.030	3250
3900	12.5 × 25	0.040	2480	16 × 25	0.030	2480	16 × 25	0.030	3570
4700	16 × 25	0.030	3250	16 × 25	0.030	3250	16 × 31.5	0.027	3630
5600	16 × 25	0.030	3570	16 × 25	0.030	3570			
6800	16 × 25	0.030	3630	16 × 31.5	0.027	3630			
8200	16 × 31.5	0.027	3700	18 × 35.5	0.025	3700			

WV Item μF	25			35			50		
	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz
10							5×11	3.000	160
22							5×11	1.800	240
33							5×11	1.800	292
47				6.3×11	0.300	345	6.3×11	1.000	450
56				6.3×11	0.300	345	6.3×11	0.700	450
68	6.3×11	0.300	345	6.3×11	0.300	345	8×11.5	0.500	490
100	6.3×11	0.300	345	6.3×11	0.300	500	8×11.5	0.300	724
				8×11.5	0.250	540			
120	6.3×11	0.300	345	8×11.5	0.200	540	8×11.5	0.200	950
150	8×11.5	0.250	345	8×11.5	0.160	945	10×12.5	0.120	979
180	8×11.5	0.200	345	8×11.5	0.140	945	8×20	0.120	1200
							10×12.5	0.120	1190
220	8×11.5	0.160	345	8×11.5	0.140	945	8×20	0.120	1370
				10×12.5	0.105	945	10×16	0.075	1370
270	10×12.5	0.105	945	8×15	0.120	945	10×20	0.064	1580
				10×16	0.075	1250			
330	10×12.5	0.105	945	10×16	0.075	1330	10×20	0.064	1870
390	8×15	0.105	1250	10×20	0.054	1500	10×20	0.064	2050
	10×12.5	0.105	1250						
470	10×16	0.075	1330	8×20	0.085	1430	12.5×20	0.050	2050
				10×16	0.075	1600			
				10×20	0.054	1760			
560	8×20	0.054	1700	12.5×20	0.050	1960	12.5×25	0.040	2410
	10×20	0.054							
680	10×16	0.075	1760	10×20	0.054	1850	12.5×25	0.040	2410
	10×20	0.054		12.5×20	0.050	2250			
				10×25					
820	10×20	0.054	2300	12.5×25	0.040	2350	16×20	0.040	2730
	12.5×20	0.050							
1000	12.5×20	0.050	2350	12.5×25	0.040	2480	16×25	0.036	3010
1200	12.5×20	0.050	2480	16×20	0.040	2900			
1500	16×20	0.040	2480	16×25	0.030	3250			
1800	16×20	0.040	2900	16×25	0.030	3570			
2200	12.5×30	0.040	2900	16×31.5	0.027	3630			
	16×25	0.030	3250						
2700	16×25	0.030	3570						
3300	16×31.5	0.027	3630						

# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS



Ultra Low Impedance, Long Life Series



Low Impedance



Miniaturized



Solvent Proof



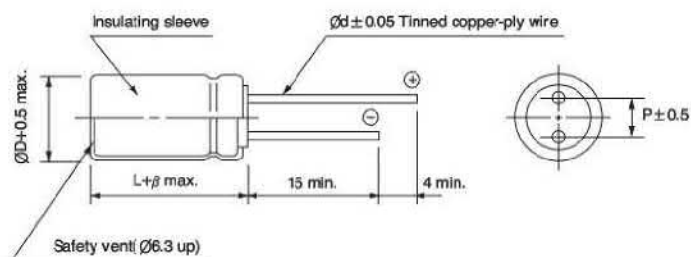
- Long Life compared with MZ series
- Enabled high ripple current by a reduction of impedance at high frequency
- High reliability withstanding 10000 hours load life at 105°C (6000/8000 hours for as specified below)
- Complied to the RoHS directive



Item	Characteristics									
Operating temperature range	-40 ~ +105°C									
Leakage current max.	I = 0.01CV or 3μA whichever is greater (after 2 minutes) I = 0.03CV or 4μA whichever is greater (after 1 minute)									
Capacitance tolerance	± 20% at 120Hz, 20°C									
Dissipation factor max. (at 120Hz, 20°C)	Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value.									
	WV	6.3	10	16	25	35	50	63	100	
	tanδ	0.22	0.19	0.16	0.14	0.12	0.10	0.09	0.08	
Low temperature characteristics (Impedance ratio at 120Hz)	Z-40°C / Z+20°C					Z-25°C / Z+20°C				
	3					2				
Load life	After an application of DC bias voltage plus the rated AC ripple current for 10000 hours at 105°C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.									
	Leakage current				Less than specified value					
	Capacitance change				Within ± 25% of initial value					
	tanδ				Less than 200% of specified value					
	ØD				ØD = 5, 6.3		ØD = 8		ØD ≥ 10	
	Life time				6000 hours		8000 hours		10000 hours	
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.									

## DRAWING

Unit : mm



ØD	5	6.3	8	10	12.5	16	18
P	2.0	2.5	3.5	5.0	5.0	7.5	7.5
Ød	0.5	0.5	0.6	0.6	0.6	0.8	0.8
β	1.5			2.0			

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	120Hz	1kHz	10kHz	50kHz	100kHz≤
~ 33	0.42	0.70	0.90	0.95	1.00
39 ~ 270	0.50	0.73	0.92	0.96	1.00
330 ~ 680	0.55	0.77	0.94	0.97	1.00
820 ~ 1800	0.60	0.80	0.96	0.98	1.00
2200 ~	0.70	0.85	0.98	0.99	1.00



## ML series

### ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV Item μF	6.3			10			16			25		
	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz
10							5×11	0.35	250	5×11	0.35	250
22	5×11	0.35	250	5×11	0.35	250	5×11	0.35	250	5×11	0.35	250
33	5×11	0.35	250	5×11	0.35	250	5×11	0.35	250	5×11	0.35	250
47	5×11	0.30	250	5×11	0.30	250	5×11	0.30	250	5×11	0.30	250
100	5×11	0.30	250	5×11	0.30	250	6.3×11	0.15	405	6.3×11	0.15	405
150	6.3×11	0.15	405	6.3×11	0.15	405	6.3×11	0.15	405	8×11.5	0.072	760
220	6.3×11	0.15	405	6.3×11	0.15	405	8×11.5	0.072	760	8×11.5	0.072	760
330	6.3×11	0.15	405	8×11.5	0.08	760	8×11.5	0.072	760	10×12.5	0.053	1030
390	6.3×11	0.15	405	8×11.5	0.072	760	8×11.5	0.072	760	8×15	0.072	1250
470	8×11.5	0.072	760	8×11.5	0.072	760	10×12.5	0.053	1030	10×16	0.038	1430
560	8×11.5	0.072	630	10×12.5	0.053	650	10×12.5	0.053	1100	8×20	0.072	1800
680	10×12.5	0.053	1030	10×12.5	0.053	1030	10×16	0.038	1430	10×20	0.027	1820
1000	10×12.5	0.053	1030	10×16	0.038	1430	10×20	0.027	1820	12.5×20	0.025	2360
1500	10×20	0.027	1820	10×20	0.027	1820	12.5×20	0.025	2360	16×20	0.015	3460
2200	12.5×20	0.025	2360	12.5×20	0.025	2360	12.5×25	0.018	2770	16×25	0.015	3460
3300	12.5×20	0.025	2360	12.5×25	0.018	2770	16×25	0.015	3460	16×31.5	0.015	3680
4700	16×25	0.015	3460	16×25	0.015	3460	16×31.5	0.015	3680			
6800	16×25	0.015	3460	16×31.5	0.015	3680						
10000	16×31.5	0.015	3680	18×35.5	0.014	3800						

WV Item μF	35			50			63			100		
	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz
10	5×11	0.35	250	5×11	0.50	250	5×11	0.45	165	6.3×11	0.50	205
22	5×11	0.35	250	5×11	0.34	250	6.3×11	0.30	265	8×11.5	0.30	355
33	5×11	0.30	250	6.3×11	0.17	405	6.3×11	0.30	265	10×12.5	0.25	450
47	6.3×11	0.15	405	6.3×11	0.14	405	8×11.5	0.20	500	10×16	0.20	580
56	6.3×11	0.15	405	6.3×11	0.14	405	8×11.5	0.17	540	10×16	0.20	630
68	8×11.5	0.10	540	8×11.5	0.10	540	10×12.5	0.15	760	8×20	0.25	700
100	8×11.5	0.072	760	8×11.5	0.072	760	10×16	0.10	945	10×20	0.18	800
										12.5×20	0.10	1045
150	8×11.5	0.072	760	10×12.5	0.061	1030	8×20	0.120	1200	12.5×25	0.080	1195
							10×20	0.080				
220	10×12.5	0.053	1030	10×16	0.038	1430	10×25	0.070	1300	16×25	0.060	1600
330	10×16	0.038	1430	10×20	0.032	1820	12.5×20	0.040	1495	16×31.5	0.040	1750
470	8×20	0.038	1600	12.5×20	0.025	2360	16×20	0.037	1990	18×40	0.030	2060
	10×20	0.027	1820									
680	12.5×20	0.025	2360	12.5×25	0.020	2770	16×25	0.030	2780			
1000	12.5×25	0.022	2770	16×25	0.018	3460	16×35.5	0.020	2835			
1500	16×25	0.018	3460	16×31.5	0.015	3680						
2200	16×31.5	0.015	3680				18×40	0.02	3500			



# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

## MN High Ripple Current, Ultra Low Impedance Series

- Low impedance compared with series
- Enabled ripple current with extremely low impedance at high frequency range
- High reliability withstanding 5000 hours load life at 105°C
- Complied to the RoHS directive



Item	Characteristics				
Operating temperature range	-40 ~ +105°C				
Leakage current max.	I = 0.01CV or 3μA whichever is greater (after 2 minutes) I = 0.03CV or 4 μA whichever is greater (after 1 minute)				
Capacitance tolerance	±20% at 120Hz, 20°C				
Dissipation factor max. (at 120Hz, 20°C)	Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value.				
	WV	6.3	10	16	25
	tanδ	0.22	0.19	0.16	0.14
Low temperature characteristics (Impedance ratio at 120Hz)	WV	6.3	10	16	25
	Z-40°C / Z+20°C	3	3	3	3
Load life	After an application of DC bias voltage plus the rated AC ripple current for 5000 hours at 105°C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.				
	Leakage current	Less than specified value			
	Capacitance change	Within ±25% of initial value			
	tanδ	Less than 200% of specified value			
		ØD	ØD ≤ 8		ØD ≥ 10
	Life time	3000 hours		5000 hours	
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.				

● DRAWING (See page 120)

Unit : mm

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV Item μF	6.3			10			16			25		
	ØD × L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD × L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD × L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	ØD × L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz
220										8 × 11.5	0.036	1140
390										8 × 15	0.028	1490
470							8 × 11.5	0.036	1140	10 × 12.5	0.026	1540
560										8 × 20	0.019	1870
680				8 × 11.5	0.036	1140	8 × 15	0.028	1490	10 × 16	0.019	2000
820	8 × 11.5	0.036	1140				10 × 12.5	0.026	1540			
1000				8 × 15	0.028	1490	8 × 20	0.021	1870	10 × 20	0.013	2550
				10 × 12.5	0.026	1540	10 × 16	0.019	2000	10 × 25	0.012	2800
1200	8 × 15	0.028	1490									
1500	8 × 20	0.016	1950	8 × 20	0.021	1870	10 × 20	0.013	2550			
	10 × 12.5	0.026	1540	10 × 16	0.019	2000						
1800	8 × 20	0.021	1870	10 × 20	0.013	2550	10 × 25	0.012	2800			
	10 × 16	0.019	2000									
2200	10 × 20	0.013	2550	10 × 25	0.012	2800						
3300	10 × 25	0.012	2800									

● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

μF	Frequency	120Hz	1kHz	10kHz	50kHz	100kHz ≤
~ 220		0.50	0.73	0.92	0.96	1.00
390 ~ 680		0.55	0.77	0.94	0.97	1.00
820 ~ 1800		0.60	0.80	0.96	0.98	1.00
2200 ~		0.70	0.85	0.98	0.99	1.00

## MD High Ripple Current, Ultra Low Impedance Series

- Low impedance compared with series
- Enabled ripple current with extremely low impedance at high frequency range
- High reliability withstanding 2000 hours load life at 105°C
- Complied to the RoHS directive

**IZI** Low Impedance **S** Solvent Proof

MZ  $\Rightarrow$  MD  
High Ripple



Item	Characteristics			
Operating temperature range	-40 ~ +105°C			
Leakage current max.	I = 0.01CV or 3μA whichever is greater (after 2 minutes) I = 0.03CV or 4μA whichever is greater (after 1 minute)			
Capacitance tolerance	± 20% at 120Hz, 20°C			
Dissipation factor max. (at 120Hz, 20°C)	Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value.			
	WV	6.3	10	16
	tanδ	0.22	0.19	0.16
Low temperature characteristics (Impedance ratio at 120Hz)	WV	6.3	10	16
	Z-40°C / Z+20°C	3	3	3
Load life	After an application of DC bias voltage plus the rated AC ripple current for 2000 hours at 105°C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.			
	Leakage current	Less than specified value		
	Capacitance change	Within ± 25% of initial value		
	tanδ	Less than 200% of specified value		
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.			

● DRAWING (See page 120)

Unit : mm

## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

Item μF	6.3			10			16		
	WV	Impedance (Ω) max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	WV	Impedance (Ω) max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	WV	Impedance (Ω) max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz
470							8 × 11.5	0.021	1340
680				8 × 11.5	0.021	1340	8 × 15	0.020	1850
820	8 × 11.5	0.021	1340				10 × 12.5	0.016	1960
1000				8 × 15	0.020	1850	8 × 20	0.013	2350
1200	8 × 15	0.020	1850	10 × 12.5	0.016	1960	10 × 16	0.013	2460
1500	10 × 12.5	0.016	1960	8 × 20	0.013	2350	10 × 20	0.011	2770
1800	8 × 20	0.013	2460	10 × 16	0.013	2460			
2200	10 × 20	0.011	2770	10 × 20	0.011	2770	10 × 25	0.009	3230
3300	10 × 25	0.009	3230	10 × 25	0.009	3230			

## ● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency μF	120Hz	1kHz	10kHz	50kHz	100kHz≤
~ 820	0.55	0.77	0.94	0.97	1.00
1000 ~ 1800	0.60	0.80	0.96	0.98	1.00
2200 ~	0.70	0.85	0.98	0.99	1.00



# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS



For PSU, Long Life Series



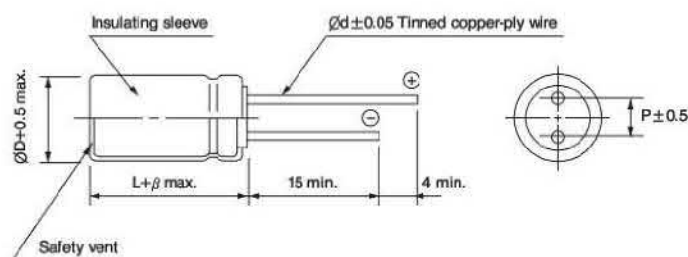
- High reliability withstanding 8000 hours load life at 105°C
- Suitable for CFL, adapter and power supply
- Complied to the RoHS directive



Item	Characteristics		
Operating temperature range	-25 ~ +85°C		
Leakage current max.	I = 0.02CV+25μA (after 5 minutes)		
Capacitance tolerance	± 20% at 120Hz, 20°C		
Dissipation factor max. (at 120Hz, 20°C)	Rated Voltage(V)	450	500
	tanδ	0.20	0.20
Low temperature characteristics (Impedance ratio at 120Hz)	WV	450	500
	Z(-25°C) / Z(+20°C)	6	6
Load life (after application of the rated voltage for 8000 hours at 85°C)	Leakage current	Less than specified value	
	Capacitance change	Within ±20% of initial value	
	tanδ	Less than 200% of specified value	
Shelf life (at 85°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.		

## DRAWING

Unit : mm



ØD	16	18
P	7.5	7.5
Ød	0.8	0.8
β	L≤40mm	2.0
	L>40mm	3.0

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV	450	500
47		16 × 35.5
56		16 × 40
68	16 × 35.5	16 × 45
	18 × 31.5	18 × 40
82	16 × 40	16 × 50
	18 × 31.5	
100	16 × 40	
	18 × 35.5	
120	16 × 50	
150	16 × 50	

Ripple current (mA rms) at 85°C, 120Hz  
Case size ØD×L (mm)

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

WV	Frequency	120Hz	1kHz	10kHz	50kHz	100kHz≤
450V		1.00	1.40	1.50	1.75	2.00
500V		1.00	1.35	1.45	1.69	1.80



# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS



## Miniature, Long Life, For LED Lighting Series

- Miniature, long life
- For LED Lighting
- High reliability withstanding 10000 hours load life at 105°C
- Complied to the RoHS directive



Long Life



Solvent Proof



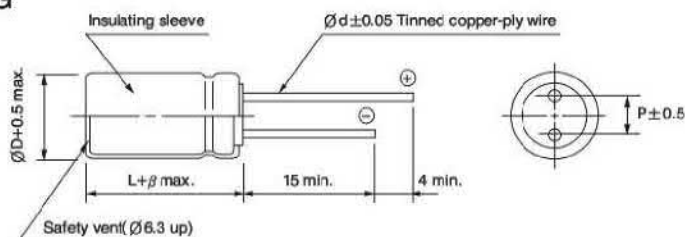
Long life



Item	Characteristics					
Operating temperature range	-25 ~ +105°C					
Leakage current max.	I = 0.01CV or 3μA whichever is greater (after 2 minutes) I = 0.03CV or 4μA whichever is greater (after 1 minute)					
Capacitance tolerance	±20% at 120Hz, 20°C					
Dissipation factor max. (at 120Hz, 20°C)	WV	10	16	25	35	50
	tanδ	0.45	0.35	0.30	0.22	0.19
Low temperature characteristics (Impedance ratio at 120Hz)	WV	10	16	25	35	50
	Z-25°C/Z+20°C	8	6	4	4	3
Load life (after application of the rated voltage for 10000 hours at 105°C)	Leakage current		Less than specified value			
	Capacitance change		Within ±25% of the initial value			
	tanδ		Less than 200% of the specified value			
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.					

### DRAWING

Unit : mm



ØD	5	6.3	8
P	2.0	2.5	3.5
Ød	0.5	0.5	0.6
β	1.5		

### DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV Item μF	10		16		25		35		50	
	ØD×L (mm)	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Ripple current (mA rms) 105°C 100kHz	ØD×L (mm)	Ripple current (mA rms) 105°C 100kHz
1									5×11	32
2.2									5×11	42
3.3									5×11	84
4.7									5×11	96
10									5×11	108
22									5×11	132
33					5×11	156	5×11	175	6.3×11	228
47			5×11	175	5×11	175	6.3×11	252	6.3×11	228
100	5×11	175	6.3×11	252	6.3×11.5	252	8×11.5	396	8×11.5	324
220	6.3×11	252	8×11.5	396	8×11.5	396	8×15	430		
330	8×11.5	396	8×11.5	396						

### FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency μF	120Hz	1kHz	10kHz	50kHz	100kHz ≤
~ 33	0.42	0.70	0.90	0.95	1.00
47 ~	0.55	0.73	0.92	0.96	1.00



## Low Imp., High Ripple Current Series

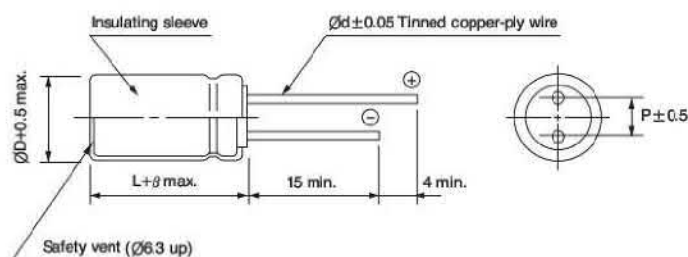


- For LED Lighting
- High reliability withstanding 10000 hours load life at 105°C (6000 ~ 9000 hours for smaller case sizes as specified below)
- Complied to the RoHS directive, Halogen-Free

Item	Characteristics									
Operating temperature range	-40 ~ +105°C									
Leakage current max.	I = 0.01CV or 3μA whichever is greater (after 2 minutes)									
Capacitance tolerance	±20% at 120Hz, 20°C									
Dissipation factor max. (at 120Hz, 20°C)	Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value.									
	WV	6.3	10	16	25	35	50	63	80	100
	tanδ	0.22	0.19	0.16	0.14	0.12	0.10	0.09	0.08	0.08
Low temperature characteristics (Impedance ratio at 120Hz)	Z-25°C / Z+20°C						2			
	Z-40°C / Z+20°C						3			
Load life	After an application of DC bias voltage plus the rated AC ripple current for 10000 hours at 105°C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.									
	Rated voltage (Vdc)		6.3 ~ 10				16 ~ 100			
	Capacitance change		Within ±30% of initial value				Within ±25% of initial value			
	tanδ		Less than 200% of specified value							
	Leakage current		Less than specified value							
	ØD		Life time (hrs)							
			6.3Vdc		10~50Vdc		63~100Vdc			
	Ø5 ~ Ø6.3		6000		7000		6000			
	Ø8 × 11.5L		8000		9000		8000			
	Ø8 × 15L ~ 20L		9000		10000		9000			
Ø10 × 12.5L		9000								
Ø10 × 16L ~ 25L		10000								
Ø12.5 ~										
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6305 clause 5.4.									

## DRAWING

Unit : mm



$\phi D$	5	6.3	8	10	12.5	16	18
P	2.0	2.5	3.5	5.0	5.0	7.5	7.5
$\phi d$	0.5	0.5	0.6	0.6	0.6	0.8	0.8
$\beta$	1.5			2.0			

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	120Hz	1kHz	10kHz	50kHz	100kHz $\leq$
$\mu F$					
~ 33	0.42	0.70	0.90	0.95	1.00
47 ~ 270	0.50	0.73	0.92	0.96	1.00
330 ~ 680	0.55	0.77	0.94	0.97	1.00
820 ~ 1800	0.60	0.80	0.96	0.98	1.00
2200 ~	0.70	0.85	0.98	0.99	1.00



## LQ series

### DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV Item $\mu F$	6.3			10			16			25			35		
	$\varnothing D \times L$ (mm)	IMP. ( $\Omega$ ) max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	$\varnothing D \times L$ (mm)	IMP. ( $\Omega$ ) max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	$\varnothing D \times L$ (mm)	IMP. ( $\Omega$ ) max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	$\varnothing D \times L$ (mm)	IMP. ( $\Omega$ ) max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	$\varnothing D \times L$ (mm)	IMP. ( $\Omega$ ) max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz
47													5 × 11	0.400	450
68										5 × 11	0.400	450			
100							5 × 11	0.400	450				6.3 × 11	0.170	700
120															
150				5 × 11	0.400	450				6.3 × 11	0.170	700			
180													8 × 11.5	0.075	1200
220	5 × 11	0.400	345										8 × 15	0.059	1600
270							6.3 × 11	0.170	700				10 × 12.5	0.053	1700
330				5 × 11	0.170	700				8 × 11.5	0.075	1200	8 × 20	0.041	1960
390										8 × 15	0.059	1600	10 × 16	0.038	2000
470	6.3 × 11	0.170	540				8 × 11.5	0.075	1200	10 × 12.5	0.053	1700	10 × 16	0.038	2100
560				6.3 × 11.5	0.075	1200	8 × 15	0.059	1600	8 × 20	0.041	1960	10 × 20	0.028	2500
680				8 × 15	0.059	1600	10 × 12.5	0.053	1700	10 × 16	0.036	2000	10 × 25	0.024	2900
820	8 × 11.5	0.075	945	10 × 12.5	0.053	1700	8 × 20	0.041	1960				12.5 × 20	0.025	2600
1000	8 × 15	0.059	1250	10 × 16	0.041	1960	10 × 16	0.036	2000	10 × 20	0.027	2500	12.5 × 20	0.025	2800
1200	10 × 12.5	0.053	1500	10 × 16	0.036	2000				10 × 25	0.023	2900	12.5 × 25	0.019	3200
1500	8 × 20	0.041	1500				10 × 20	0.027	2500	12.5 × 20	0.024	2600	12.5 × 30	0.018	3660
1800	10 × 16	0.036	1760	10 × 20	0.027	2500	10 × 25	0.023	2900	12.5 × 25	0.018	3200	16 × 20	0.021	3330
2200				10 × 25	0.023	2900	12.5 × 20	0.024	2600	12.5 × 30	0.017	3660	12.5 × 34.5	0.016	4120
2700	10 × 20	0.027	1960	10 × 20	0.024	2600	12.5 × 25	0.018	3200	16 × 20	0.020	3330	16 × 25	0.017	3810
3300	10 × 25	0.023	2250	12.5 × 25	0.018	3200	12.5 × 30	0.017	3660	16 × 25	0.016	3810			
3900	12.5 × 20	0.024	2480				16 × 20	0.020	3300						
4700	12.5 × 25	0.018	2900	12.5 × 20	0.018	3660	12.5 × 34.5	0.015	4120						
5600	12.5 × 30	0.017	3450	16 × 25	0.016	3300	16 × 25	0.016	3810						
6800	12.5 × 34.5	0.015	3570	16 × 25	0.021	4120									
8200	16 × 20	0.020	3250	16 × 25	0.017	3810									

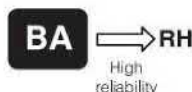
WV Item $\mu F$	50			63			80			100		
	$\varnothing D \times L$ (mm)	IMP. ( $\Omega$ ) max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	$\varnothing D \times L$ (mm)	IMP. ( $\Omega$ ) max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	$\varnothing D \times L$ (mm)	IMP. ( $\Omega$ ) max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz	$\varnothing D \times L$ (mm)	IMP. ( $\Omega$ ) max. 20°C 100kHz	Ripple current (mA rms) 105°C 100kHz
8.2										5 × 11	1.200	220
12							5 × 11	1.200	220			
18				5 × 11	0.710	240				6.3 × 11	0.460	370
27	5 × 11	0.480	310				6.3 × 11	0.460	370			
33										8 × 11.5	0.290	620
47	6.3 × 11	0.380	400	6.3 × 11	0.280	420	8 × 11.5	0.290	620	8 × 15	0.200	780
56	6.3 × 11	0.220	500				8 × 15	0.200	780	10 × 12.5	0.170	780
68							10 × 12.5	0.170	780	8 × 20	0.160	1040
82				8 × 11.5	0.180	720	8 × 20	0.160	1040	10 × 16	0.105	1040
100	8 × 11.5	0.120	950	8 × 15	0.130	990	10 × 16	0.110	1040	10 × 16	0.105	1140
120	8 × 15	0.082	1230	10 × 12.5	0.110	990				10 × 20	0.080	1430
150	10 × 12.5	0.073	1280	8 × 20	0.096	1200	10 × 20	0.084	1430	12.5 × 16	0.105	1430
180	8 × 20	0.058	1580	10 × 16	0.076	1200	12.5 × 16	0.110	1430	10 × 25	0.066	1620
220	10 × 16	0.050	1650				10 × 25	0.062	1750	12.5 × 20	0.059	1750
270				10 × 20	0.056	1570	12.5 × 25	0.047	2210	12.5 × 25	0.045	2210
330	10 × 20	0.036	2060	10 × 25	0.046	1990	12.5 × 30	0.042	2400	12.5 × 30	0.040	2400
390	10 × 25	0.030	2240	12.5 × 20	0.041	1990	16 × 20	0.048	1950	16 × 20	0.046	1950
470	12.5 × 20	0.030	2300	12.5 × 25	0.031	2460	12.5 × 34.5	0.036	2600	12.5 × 34.5	0.034	2600
560				12.5 × 30	0.028	2760	16 × 25	0.038	2430	12.5 × 40	0.030	2860
680	12.5 × 25	0.024	2800	16 × 20	0.032	2380	18 × 20	0.045	2270	16 × 25	0.036	2430
820	12.5 × 30	0.022	3370	16 × 25	0.025	2890	16 × 31.5	0.032	2640	18 × 20	0.045	2270
1000	12.5 × 34.5	0.020	3810	16 × 31.5	0.023	2950	16 × 35.5	0.029	2860	16 × 31.5	0.030	2640
1200	16 × 25	0.021	3510				18 × 25	0.036	2500	16 × 40	0.026	3510
2200				18 × 40	0.02	3200	18 × 35.5	0.027	3510	18 × 35.5	0.026	3510



# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

## BA For PSU, Smaller Case Size Series

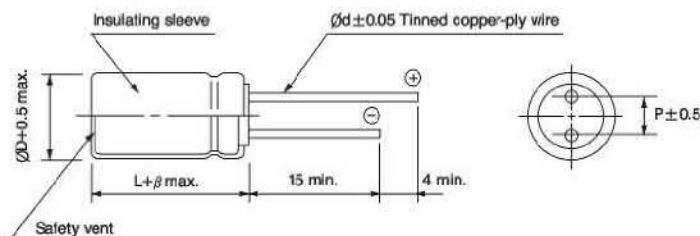
- 105°C 2000 hours
- Smaller case size for energy saving lamp & ballast
- Complied to the RoHS directive



Item	Characteristics						
Operating temperature range	-40 ~ +105°C						
Leakage current max.	I = 0.03CV + 15μA (CV ≤ 1000) I = 0.02CV + 25μA (after 5 minutes)						
Capacitance tolerance	±20% at 120Hz, 20°C						
Dissipation factor max. (at 120Hz, 20°C)	WV	160	200	250	350	400	450
	tanδ	0.10	0.10	0.10	0.15	0.15	0.15
Low temperature characteristics (Impedance ratio at 120Hz)	WV	160	200	250	350	400	450
	Z-25°C/Z+20°C	3	3	3	4	6	6
	Z-40°C/Z+20°C	4	4	4	-	-	-
Load life	After an application of DC bias voltage plus the rated AC ripple current for 2000 hours at 105°C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.						
	Leakage current		Less than specified value				
	Capacitance change		Within ±20% of initial value				
	tanδ		Less than 200% of specified value				
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.						

## DRAWING

Unit : mm



ØD	8	10	12.5	16	18
P	3.5	5.0	5.0	7.5	7.5
Ød	0.6	0.6	0.6	0.8	0.8
β	1.5	2.0			

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

µF \ WV	160	200	250	350	400	450
1.0					8 × 11.5	10 × 12.5
2.2				10 × 12.5	10 × 12.5	10 × 12.5
3.3			10 × 12.5	10 × 12.5	10 × 16	10 × 16
4.7		8 × 11.5	10 × 12.5	10 × 16	10 × 16	10 × 20
10	10 × 12.5	10 × 12.5	10 × 16	10 × 20	10 × 20	12.5 × 20
22	10 × 16	10 × 16	10 × 20	12.5 × 20	12.5 × 25	16 × 25
33	10 × 20	10 × 20	12.5 × 20	16 × 20	16 × 25	18 × 25
47	10 × 20	12.5 × 20	12.5 × 25	16 × 25	18 × 25	
100	12.5 × 25	16 × 25	18 × 25			
220	18 × 25					

← Ripple current (mA rms) at 105°C, 120Hz  
 ← Case size ØD × L (mm)

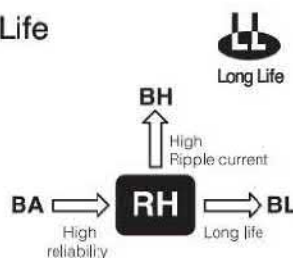
## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

µF \ Frequency	60Hz	120Hz	1kHz	10kHz	50kHz	100kHz ≤
~ 47	0.75	1.00	1.55	2.00	2.00	2.00
100 ~	0.80	1.00	1.34	2.00	2.00	2.00

## RH

For PSU High Ripple Current, Long Life Series

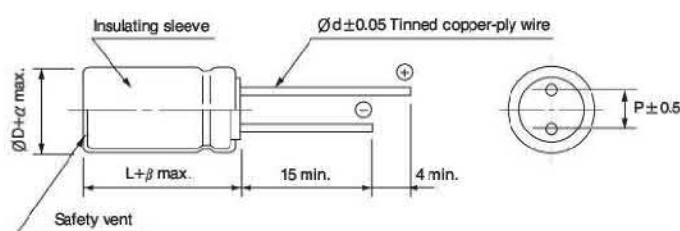
- High ripple current
- High reliability withstanding 5000 hours load life at 105°C
- Suited for ballast application
- Complied to the RoHS directive



Item	Characteristics							
Operating temperature range	WV	160 ~ 250		350 ~ 450		500		
	Temperature range	-40 ~ +105°C		-40 ~ +105°C		-25 ~ 105°C		
Leakage current max.	I = 0.02CV + 15μA (after 5 minutes)							
Capacitance tolerance	± 20% at 120Hz, 20°C							
Dissipation factor max. (at 120Hz, 20°C)	WV	160	200	250	350	400	450	500
	tanδ	0.15	0.15	0.15	0.20	0.24	0.24	0.24
Low temperature characteristics (Impedance ratio at 120Hz)	WV	160	200	250	350	400	450	500
	Z-25°C/Z+20°C	3	3	3	4	6	6	6
	Z-40°C/Z+20°C	4	4	4	8	10	10	-
Load life	After an application of DC bias voltage plus the rated AC ripple current for 5000 hours at 105°C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.							
	Leakage current			Less than specified value				
	Capacitance change			Within ± 20% of initial value				
	tanδ			Less than 200% of specified value				
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.							

## DRAWING

Unit : mm



ØD	10	12.5	16	18	20	22
P	5.0	5.0	7.5	7.5	10.0	10.0
Ød	0.6	0.6	0.8	0.8	0.8	1.0
β	2.0				3.0	
α	0.5				1.0	

MINIATURE TYPES

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

µF	Frequency	60Hz	120Hz	1kHz	10kHz	50kHz	100kHz≤
~ 4.7		0.25	0.30	0.60	0.80	0.90	1.00
6.8 ~ 10		0.30	0.40	0.70	0.90	0.95	1.00
22 ~		0.40	0.50	0.80	0.90	0.95	1.00

# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

**RH** series

## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu\text{F}$ \ WV	160		200		250		350	
1.0							10 × 12.5	80
2.2							10 × 12.5	90
3.3							10 × 12.5	100
							10 × 16	130
4.7							10 × 16	200
6.8			10 × 12.5	120	10 × 12.5	120	10 × 16	200
10	10 × 16	250	10 × 16	300	10 × 20	300	10 × 16	280
22	10 × 16	360	10 × 16	360	12.5 × 20	600	12.5 × 20	350
	10 × 20	500	10 × 20	500				
33	10 × 20	500	10 × 20	500	12.5 × 20	600	16 × 20	500
			12.5 × 20	600				
47	12.5 × 20	600	12.5 × 20	660	12.5 × 25	720	16 × 25	660
68	12.5 × 25	600	12.5 × 25	760	16 × 25	920	16 × 31.5	800
82	16 × 20	760	16 × 20	880	16 × 25	1120	18 × 31.5	920
100	16 × 25	1100	16 × 25	1120	16 × 31.5	1200	18 × 31.5	1020
120	16 × 25	1180	16 × 31.5	1200	18 × 25	1200	18 × 31.5	1150
150	16 × 31.5	1300	16 × 31.5	1300	18 × 25	1250	18 × 40	1250
					18 × 31.5	1250		
220					18 × 35.5	1600		

$\mu\text{F}$ \ WV	400		450		500	
1.0	10 × 12.5	90				
2.2	10 × 12.5	100	10 × 16	120		
	10 × 16	120				
3.3	10 × 16	140	10 × 16	140		
4.7	10 × 16	180	10 × 20	180		
6.8	10 × 16	200	10 × 20	200		
10	10 × 20	280	12.5 × 20	300	12.5 × 20	300
15	12.5 × 16	280				
22	12.5 × 25	430	16 × 25	550	16 × 25	420
33	16 × 25	640	16 × 31.5	700	16 × 31.5	560
47	16 × 31.5	750	16 × 31.5	700	18 × 35.5	700
56			18 × 25	750	18 × 35.5	740
68	16 × 31.5	880	18 × 25	900	18 × 35.5	900
			18 × 31.5	1000		
82	16 × 35.5	1000	18 × 31.5	1035	18 × 40	1030
			18 × 35.5	1100		
100	18 × 35.5	1120	18 × 35.5	1296	18 × 45	1100
					20 × 41	1200
120	18 × 40	1250	18 × 40	1400		
150	20 × 41	1380	20 × 41	1796		
180	20 × 41	1450	22 × 45	1800		

↑  
Ripple current (mA rms) at 105°C, 100kHz  
Case size  $\varnothing D \times L$  (mm)



## RU For PSU, High Ripple Current Series

- High ripple current compared with RH series
- High reliability withstanding 5000 hours load life at 105°C
- Suited for ballast application
- Complied to the RoHS directive

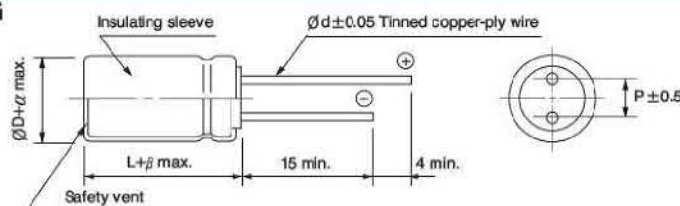
RH  $\Rightarrow$  RU  
High Ripple



Item	Characteristics							
Operating temperature range	WV	160 ~ 450				500		
	Temperature range	-40 ~ +105°C				-25 ~ 105°C		
Leakage current max.	I = 0.02CV + 25μA (after 5 minutes)							
Capacitance tolerance	±20% at 120Hz, 20°C							
Dissipation factor max. (at 120Hz, 20°C)	WV	160	200	250	350	400	450	500
	tanδ	0.15	0.15	0.15	0.20	0.20	0.20	0.24
Low temperature characteristics (Impedance ratio at 120Hz)	WV	160	200	250	350	400	450	500
	Z-25°C/Z+20°C	3	3	3	4	6	6	6
	Z-40°C/Z+20°C	4	4	4	8	10	10	-
Load life	After an application of DC bias voltage plus the rated AC ripple current for 5000 hours at 105°C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.							
	Leakage current			Less than specified value				
	Capacitance change			Within ±20% of initial value				
	tanδ			Less than 200% of specified value				
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.							

### DRAWING

Unit : mm



$\phi D$	10	12.5	16	18	20	22
P	5.0	5.0	7.5	7.5	10.0	12.5
$\phi d$	0.6	0.6	0.8	0.8	0.8	1.0
$\beta$	2.0				3.0	
$\alpha$	0.5				1.0	

### DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu F$	WV	160		200		250		350		400		450		500	
3.3												10 × 12.5	180		
10	10 × 16	290	10 × 16	350	10 × 16	350	10 × 20	325	10 × 16	310	12.5 × 20	345	12.5 × 20	345	
15	10 × 16	340	10 × 16	430	10 × 16	430	10 × 20	360	10 × 20	400	16 × 20	530	16 × 25	490	
22	10 × 16	415	10 × 20	525	12.5 × 20	525	12.5 × 20	405	12.5 × 20	475	16 × 20	635	16 × 25	485	
33	10 × 20	580	12.5 × 20	695	12.5 × 20	695	16 × 20	580	16 × 25	740	16 × 25	810	16 × 31.5	650	
47	12.5 × 20	635	12.5 × 20	765	12.5 × 25	835	16 × 25	765	18 × 25	870	18 × 25	900	18 × 35.5	810	
68	12.5 × 25	695	12.5 × 25	880	16 × 20	1000	18 × 25	925	18 × 31.5	1020	18 × 31.5	1160	18 × 35.5	1040	
82	12.5 × 25	880	16 × 25	1100	16 × 25	1275	18 × 25	985	18 × 31.5	1160	18 × 31.5	1250	18 × 40	1100	
100	16 × 20	1200	16 × 25	1275	18 × 25	1330	18 × 31.5	1180	18 × 35.5	1300	18 × 35.5	1450	20 × 41	1275	
120	16 × 25	1330	18 × 25	1390	18 × 25	1450	18 × 31.5	1330	18 × 40	1450	18 × 40	1620	22 × 45	1800	
150	16 × 25	1450	18 × 25	1500	18 × 25	1550	18 × 40	1450	18 × 45	1500	18 × 45	1700			
									20 × 41	1600	20 × 41	1800			

↑  
 Ripple current (mA rms) at 105°C, 100kHz  
 Case size  $\phi D \times L$  (mm)

### FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

$\mu F$	Frequency	120Hz	1kHz	10kHz	50kHz	100kHz $\leq$
~ 47		0.35	0.60	0.80	0.90	1.00
68 ~		0.40	0.65	0.85	0.92	1.00

# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS



For PSU, High Ripple Current Series



- Higher ripple current compared with RH series
- Operating temperature range of -25~105°C
- High reliability withstanding 5000 hours load life at 105°C
- Complied to the RoHS directive

RH → BH  
High Ripple

Item	Characteristics				
Operating temperature range	-25 ~ +105°C				
Leakage current max.	I = 0.04CV + 100μA (after 1 minute) I = 0.02CV + 25μA (after 5 minutes)				
Capacitance tolerance	±20% at 120Hz, 20°C				
Dissipation factor max. (at 120Hz, 20°C)	WV	200	250	350	400
	tanδ	0.15	0.15	0.20	0.24
Low temperature characteristics (Impedance ratio at 120Hz)	WV	200	250	350	400
	Z-25°C/Z+20°C	3	3	6	6
Load life	After an application of DC bias voltage plus the rated AC ripple current for 5000 hours at 105°C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.				
	Leakage current		Less than specified value		
	Capacitance change		Within ±20% of initial value		
	tanδ		Less than 200% of specified value		
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.				

● DRAWING (See page 130)

Unit : mm

## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

μF \ WV	200		250		350		400	
2.2							10 × 16	160
3.3					10 × 16	190	10 × 16	180
4.7					10 × 16	220	10 × 16	220
6.8					10 × 16	280	10 × 16	280
8.2					8 × 20	300	8 × 20	400
					10 × 16	300	10 × 20	400
10	10 × 16	320	10 × 16	320	8 × 20	300	8 × 23	400
					10 × 20	400	10 × 20	400
	8 × 20	300	8 × 23	350	10 × 30	500	12.5 × 20	700
22	10 × 20	550	10 × 20	550	12.5 × 20	650	12.5 × 25	780
					12.5 × 25	680		
33	12.5 × 20	700	12.5 × 20	800	16 × 25	910	16 × 25	920
47	12.5 × 20	980	12.5 × 25	1040	18 × 20	1150		
68	12.5 × 20	1100	16 × 25	1350	16 × 31.5	1300		
	12.5 × 25	1300						
82	16 × 20	1450	12.5 × 30	1450				
100	12.5 × 30	1550	↑ ← Ripple current (mA rms) at 105°C, 100kHz Case size ØD×L (mm)					
	16 × 25	1630						

## ● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

μF \ Frequency	60Hz	120Hz	1kHz	10kHz	50kHz	100kHz ≤
~ 4.7	0.30	0.40	0.60	0.80	0.90	1.00
6.8 ~ 10	0.35	0.40	0.70	0.90	0.95	1.00
22 ~	0.40	0.50	0.80	0.90	0.95	1.00



New  
**PQ**

For PSU, High Ripple Current, Long Life Series

- High reliability withstanding 5000 hours load life at 105°C
- Suitable for CFL, adapter and power supply
- Complied to the RoHS directive

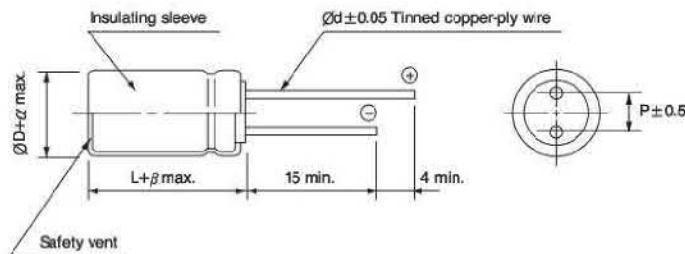
RU  $\Rightarrow$  **PQ**  
High Ripple



Item	Characteristics		
Operating temperature range	-25 ~ +105°C		
Leakage current max.	I = 0.02CV+25μA (after 5 minutes)		
Capacitance tolerance	± 20% at 120Hz, 20°C		
Dissipation factor max. (at 120Hz, 20°C)	Rated Voltage(V)	400	450
	tanδ	0.20	0.20
Low temperature characteristics (Impedance ratio at 120Hz)	WV	400	450
	Z(-25°C) / Z(+20°C)	6	6
Load life	After an application of DC bias voltage plus the rated AC ripple current for 5000 hours at 105°C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.		
	Leakage current	Less than specified value	
	Capacitance change	Within ±20% of initial value	
	tanδ	Less than 200% of specified value	
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.		

## DRAWING

Unit : mm



$\phi D$	12.5	16	18	20
P	5.0	7.5	7.5	10.0
$\phi d$	0.6	0.8	0.8	0.8
$\beta$		2.0		3.0
$\alpha$		0.5		1.0

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu F$	WV	400		450	
22		12.5 × 25	215	16 × 25	175
33		16 × 25	320	16 × 31.5	350
47		16 × 31.5	375	16 × 31.5	350
68		16 × 31.5	435	18 × 25	520
82		18 × 31.5	500	18 × 31.5	600
100		18 × 35.5	560	18 × 35.5	750
120		18 × 40	625	18 × 40	850
150		20 × 41	690	20 × 41	930

Ripple current (mA rms) at 105°C, 120Hz  
Case size  $\phi D \times L$  (mm)

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

$\mu F$	Frequency	60Hz	120Hz	1kHz	10kHz	50kHz	100kHz $\leq$
~ 68		0.80	1.00	1.60	1.80	1.90	2.00
82 ~		0.50	1.00	1.08	1.33	1.50	1.67



# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS



For PSU, High Ripple Current, Long Life Series



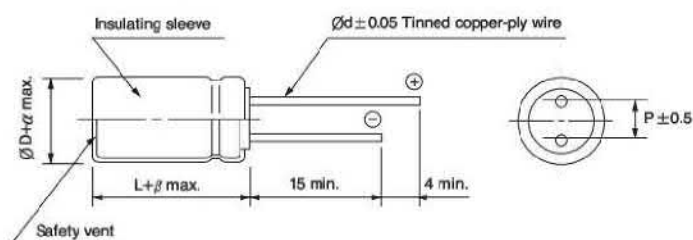
- High ripple current
- Operating temperature range of -25 ~ 105°C
- For power supply and adapter
- Complied to the RoHS directive



Item	Characteristics							
Operating temperature range	-25 ~ +105°C							
Leakage current max.	I = 0.02CV + 25μA (after 5 minutes)							
Capacitance tolerance	± 20% at 120Hz, 20°C							
Dissipation factor max. (at 120Hz, 20°C)	WV	160	200	250	350	400	450	500
	tanδ	0.15	0.15	0.15	0.20	0.20	0.20	0.24
Low temperature characteristics (Impedance ratio at 120Hz)	WV	160	200	250	350	400	450	500
	Z-25°C/Z+20°C	3	3	3	4	6	6	6
Load life	After an application of DC bias voltage plus the rated AC ripple current for 10000 hours at 105°C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.							
	Leakage current			Less than specified value				
	Capacitance change			Within ± 20% of initial value				
	tanδ			Less than 200% of specified value				
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.							

## DRAWING

Unit : mm



$\phi D$	10	12.5	16	18	20
P	5.0	5.0	7.5	7.5	10.0
$\phi d$	0.6	0.6	0.8	0.8	0.8
$\beta$	2.0				3.0
$\alpha$	0.5				1.0

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu F$ WV	160		200		250		350		400		450		500	
4.7									10 × 12.5	190	10 × 16	220		
6.8					10 × 12.5	190	10 × 16	220	10 × 16	220	10 × 16	220		
10	10 × 16	250	10 × 16	250	10 × 20	280	10 × 20	280	10 × 20	280	12.5 × 20	320	12.5 × 25	320
22	10 × 20	500	10 × 20	500	12.5 × 20	600	12.5 × 20	350	12.5 × 25	430	12.5 × 25	350	16 × 25	560
33	10 × 20	500	12.5 × 20	600	12.5 × 20	600	16 × 20	500	16 × 25	640	18 × 25	700	18 × 35.5	720
47	12.5 × 20	660	12.5 × 20	660	12.5 × 25	720	16 × 25	660	18 × 25	840	18 × 31.5	880	18 × 40	1000
68	12.5 × 25	760	12.5 × 25	760	16 × 25	920	18 × 25	840	18 × 31.5	870	18 × 25	1000	18 × 35.5	1000
82	12.5 × 25	830	16 × 25	955	16 × 25	1010	18 × 31.5	900	18 × 35.5	950	18 × 35.5	1050		
100	16 × 25	1120	18 × 25	1120	18 × 25	1200			18 × 40	1000	18 × 35.5	1100		
120											18 × 40	1200		
150	18 × 25	1360	18 × 25	1360							20 × 41	1300		

↑ ↑ Ripple current (mA rms) at 105°C, 100kHz  
Case size  $\phi D \times L$  (mm)

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	60Hz	120Hz	1kHz	10kHz	50kHz	100kHz ≤
Coefficient	0.35	0.50	0.80	0.90	0.95	1.00

# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS



For PSU, Long Life Series

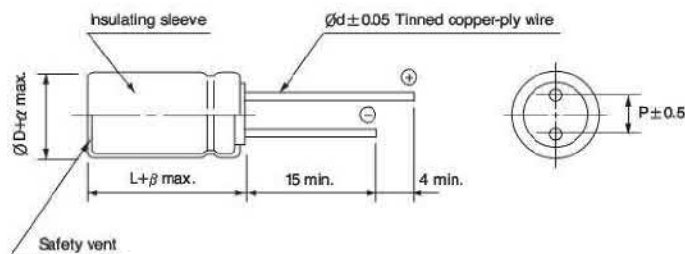
- High reliability withstanding 10000 hours load life at 105°C
- For power supply and adapter
- Complied to the RoHS directive



Item	Characteristics		
Operating temperature range	-25 ~ +105°C		
Leakage current max.	I = 0.02CV+15μA (after 5 minutes)		
Capacitance tolerance	± 20% at 120Hz, 20°C		
Dissipation factor max. (at 120Hz, 20°C)	Rated Voltage(V)	400	450
	tanδ	0.20	0.20
Low temperature characteristics (Impedance ratio at 120Hz)	WV	400	450
	Z(-25°C) / Z(+20°C)	6	6
Load life	After an application of DC bias voltage plus the rated AC ripple current for 10000 hours at 105°C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.		
	Leakage current	Less than specified value	
	Capacitance change	Within ±20% of initial value	
	tanδ	Less than 200% of specified value	
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.		

## DRAWING

Unit : mm



ØD	12.5	16	18	20
P	5.0	7.5	7.5	10.0
Ød	0.6	0.8	0.8	0.8
β		2.0		3.0
α		0.5		1.0

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

µF \ WV	400		450	
22	12.5 × 25	430	12.5 × 25	350
33	16 × 20	640	16 × 25	650
47	18 × 20	840	18 × 20	880
68	18 × 25	870	18 × 25	1000
82	18 × 31.5	950	18 × 31.5	1050
100	18 × 31.5	1000	18 × 35.5	1100
120	18 × 40	1160	18 × 40	1300
150	20 × 41	1280	20 × 41	1440

Ripple current (mA rms) at 105°C, 100kHz  
Case size ØD×L (mm)

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

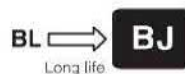
Frequency	120Hz	1kHz	10kHz	50kHz	100kHz≤
Coefficient	0.50	0.80	0.90	0.95	1.00

# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS



For PSU, High Ripple, Long Life  
Series

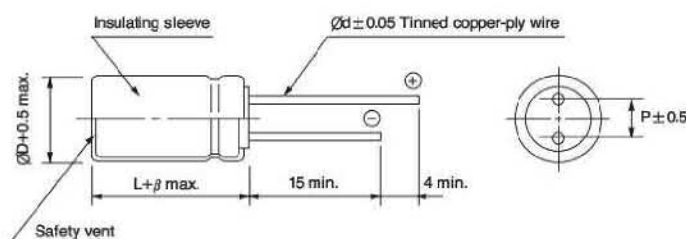
- High reliability withstanding 12000 hours load life at 105°C
- Suitable for CFL, adapter and power supply
- Complied to the RoHS directive



Item	Characteristics							
Operating temperature range	-40 ~ +105°C (160 ~ 250WV), -25 ~ +105°C (350 ~ 500WV)							
Leakage current max.	CV ≤ 1000 : I = 0.01CV + 40μA (after 1 minutes), I = 0.03CV + 15μA (after 5 minutes) CV > 1000 : I = 0.04CV + 100μA (after 1 minutes), I = 0.02CV + 25μA (after 5 minutes)							
Capacitance tolerance	± 20% at 120Hz, 20°C							
Dissipation factor max. (at 120Hz, 20°C)	WV	160	200	250	350	400	450	500
	tanδ	0.15	0.15	0.15	0.20	0.20	0.20	0.24
Low temperature characteristics (Impedance ratio at 120Hz)	WV	160	200	250	350	400	450	500
	Z-25°C/Z+20°C	3	3	3	6	6	6	6
	Z-40°C/Z+20°C	4	4	4	-	-	-	-
Load life	After an application of DC bias voltage plus the rated AC ripple current for 12000 hours at 105°C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.							
	Leakage current			Less than specified value				
	Capacitance change			Within ±20% of initial value				
	tanδ			Less than 200% of specified value				
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.							

## DRAWING

Unit : mm



ØD	10	12.5	16	18
P	5.0	5.0	7.5	7.5
Ød	0.6	0.6	0.8	0.8
β	2.0			

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

WV	Frequency μF	120Hz	1kHz	10kHz	50kHz	100kHz≤
160~450	4.7 ~ 15	0.30	0.60	0.90	0.95	1.00
	22 ~ 47	0.40	0.70	0.90	0.95	1.00
	68 ~ 220	0.50	0.80	0.90	0.95	1.00
500	10 ~ 33	0.40	0.70	0.90	0.95	1.00
	47 ~ 68	0.50	0.80	0.90	0.95	1.00



**BJ** series

## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu F$ \ WV	160		200		250		350	
4.7							10 × 12.5	150
6.8					10 × 12.5	250	10 × 16	230
10	10 × 16	280	10 × 16	320	10 × 16	320	10 × 20	350
22	10 × 16	450	10 × 20	500	10 × 20	500	12.5 × 20	530
33	10 × 16	600	10 × 20	650	12.5 × 20	670	16 × 20	710
47	10 × 20	680	12.5 × 20	780	12.5 × 20	780	16 × 25	935
68	12.5 × 20	760	12.5 × 25 16 × 20	820	16 × 20	920	18 × 25	1010
82	12.5 × 25	820	16 × 25	900	16 × 20	1070	18 × 25	1140
100	12.5 × 25 16 × 20	1050	16 × 25	1120	16 × 25 18 × 20	1200	18 × 31.5	1220
120	16 × 25	1150	16 × 25	1200	18 × 25	1300		
150	16 × 25	1300	18 × 25	1360	18 × 25	1500		
220	16 × 25	1750	18 × 31.5	1800				

$\mu F$ \ WV	400		450		500	
4.7	10 × 16	180	10 × 16	180		
6.8	10 × 16	230	10 × 16 10 × 20	230 280		
10	10 × 20	330	10 × 20 12.5 × 20	330 400	12.5 × 20	300
15	12.5 × 20	400	12.5 × 20 12.5 × 25	400 500	12.5 × 25	440
22	12.5 × 25	530	12.5 × 25 16 × 20	570 600	16 × 25	560
33	16 × 20	650	16 × 25 18 × 20	700	16 × 31.5 18 × 25	675
47	16 × 25 18 × 20	840	18 × 25	900	18 × 31.5	720
68	16 × 31.5	920	18 × 31.5	1000	18 × 40	1000
82	18 × 31.5	1040	18 × 35.5	1100	18 × 40	1050
100	18 × 35.5	1260	18 × 40	1300	20 × 41	1150

↑  
Ripple current (mA rms) at 105°C, 100kHz  
Case size  $\varnothing D \times L$  (mm)

# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS



## High Ripple, Long Life Series

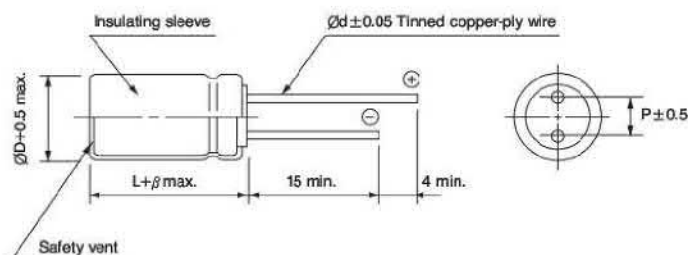
- High reliability withstanding 12000 hours load life at 105°C
- For power supply and adapter
- Complied to the RoHS directive



Item	Characteristics		
Operating temperature range	-25 ~ +105°C		
Leakage current max.	I = 0.02CV+15μA (after 5 minutes)		
Capacitance tolerance	± 20% at 120Hz, 20°C		
Dissipation factor max. (at 120Hz, 20°C)	Rated Voltage(V)	400	450
	tanδ	0.20	0.20
Low temperature characteristics (Impedance ratio at 120Hz)	WV	400	450
	Z(-25°C) / Z(+20°C)	6	6
Load life	After an application of DC bias voltage plus the rated AC ripple current for 12000 hours at 105°C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.		
	Leakage current	Less than specified value	
	Capacitance change	Within ±20% of initial value	
	tanδ	Less than 200% of specified value	
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.		

## DRAWING

Unit : mm



ØD	12.5	16	18
P	5.0	7.5	7.5
Ød	0.6	0.8	0.8
β	2.0		

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

µF \ WV	400		450	
22	12.5 × 25	600	12.5 × 25	740
33	16 × 20	800	16 × 25	910
47	16 × 25	900	16 × 31.5 18 × 20	1050
68	16 × 31.5	1080	18 × 31.5	1170
82	18 × 31.5	1350	18 × 35.5	1430
100	18 × 35.5	1640	18 × 40	1690

Ripple current (mA rms) at 105°C, 100kHz  
Case size ØD×L (mm)

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

µF \ Frequency	120Hz	300Hz	1kHz	10kHz	100kHz≤
22 ~ 47	0.40	0.50	0.70	0.90	1.00
68 ~	0.50	0.60	0.80	0.90	1.00

## BK For PSU, High Temperature Series

- High reliability withstanding 5000 Hours load life at 125°C
- Suitable for compact energy saving lamp
- Complied to the RoHS directive

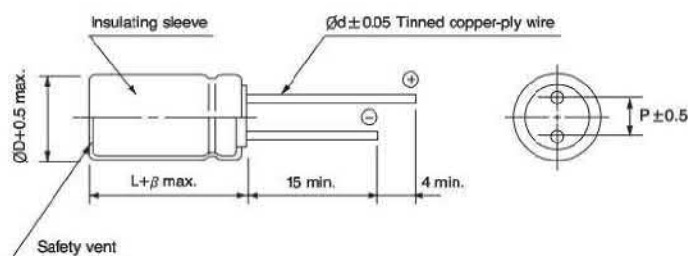
RH  $\Rightarrow$  BK  
High Temp



Item	Characteristics						
Operating temperature range	-25 ~ +125°C						
Leakage current max.	I = 0.03CV+15μA (CV≤ 1000), I = 0.02CV+25μA (CV >1000) (after 5 minutes)						
Capacitance tolerance	±20% at 120Hz, 20°C						
Dissipation factor max. (at 120Hz, 20°C)	Rated Voltage(V)	160	200	250	350	400	450
	tanδ	0.15	0.15	0.15	0.20	0.24	0.24
Low temperature characteristics (Impedance ratio at 120Hz)	WV	160	200	250	350 ~ 450		
	Z-25°C/Z+20°C	3	3	3	6		
Load life	After an application of DC bias voltage plus the rated AC ripple current for 5000 hours at 125°C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.						
	Leakage current		Less than specified value				
	Capacitance change		Within ±20% of initial value				
	tanδ		Less than 200% of specified value				
	450WV products are for 2000 hours.						
Shelf life (at 125°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.						

### DRAWING

Unit : mm



ØD	10	12.5	16
P	5.0	5.0	7.5
Ød	0.6	0.6	0.8
β	2.0		

### DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu\text{F}$ \ WV	160		200		250		350		400		450		
2.2							$10 \times 12.5$	90	$10 \times 12.5$	90			
3.3					$10 \times 12.5$	90	$10 \times 16$	120	$10 \times 16$	100			
4.7	$10 \times 12.5$	90	$10 \times 12.5$	100	$10 \times 12.5$	100	$10 \times 16$	130	$10 \times 20$	170	$10 \times 25$	104	
					$10 \times 16$	120	$10 \times 20$	170					
10	$10 \times 12.5$	110	$10 \times 12.5$	130	$10 \times 16$	140	$12.5 \times 20$	250	$12.5 \times 20$	250	$12.5 \times 20$	155	
	$10 \times 16$	140	$10 \times 16$	160	$10 \times 20$	170							
22	$10 \times 20$	280	$10 \times 20$	280	$12.5 \times 20$	300	<div><div></div><div>Ripple current (mA rms) at 125°C, 100kHz</div><div></div><div>Case size <math>\varnothing D \times L</math> (mm)</div></div>					$16 \times 25$	277
33	$12.5 \times 20$	400	$12.5 \times 20$	400	$12.5 \times 25$	450						$16 \times 31.5$	365
47	$12.5 \times 25$	520	$12.5 \times 25$	520									

### FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	60Hz	120Hz	1kHz	10kHz	50kHz	100kHz ≤
Coefficient	0.30	0.40	0.70	0.90	0.95	1.00

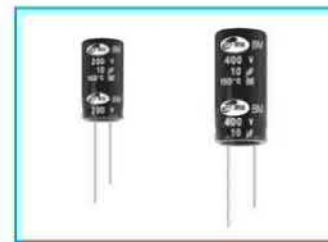


## MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS



For PSU, 2000 hours at 150°C  
Series

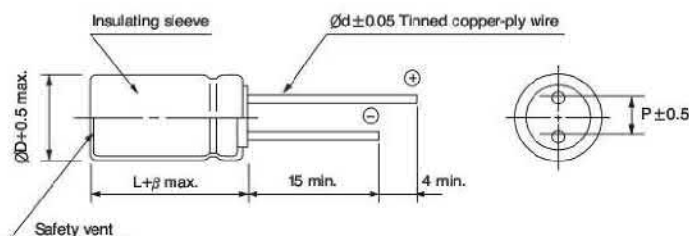
- High reliability withstanding 2000 hours load life at 150°C
- Suitable for compact energy saving lamp
- Complied to the RoHS directive



Item	Characteristics				
Operating temperature range	-25 ~ +150°C				
Leakage current max.	I = 0.03CV or 4μA (after 5 minutes)				
Capacitance tolerance	± 20% at 120Hz, 20°C				
Dissipation factor max. (at 120Hz, 20°C)	Rated Voltage(V)	160	200	350	400
	tanδ	0.20	0.20	0.24	0.24
Low temperature characteristics (Impedance ratio at 120Hz)	WV	160	200	350	400
	Z-25°C/Z+20°C	3	3	6	6
Load life	After an application of DC bias voltage plus the rated AC ripple current for 2000 hours at 150°C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.				
	Leakage current		Less than specified value		
	Capacitance change		Within ±20% of initial value		
	tanδ		Less than 200% of specified value		
Shelf life (at 150°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.				

### DRAWING

Unit : mm



ØD	10	12.5
P	5.0	5.0
Ød	0.6	0.6
β	2.0	

### DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

µF \ WV	160		200		350		400	
2.2					10 × 12.5	36	10 × 16	42
3.3					10 × 12.5	48	10 × 16	50
4.7					10 × 16	77	10 × 20	83
5.6					10 × 20	100	12.5 × 20	97
10	10 × 12.5	110	10 × 16	83	12.5 × 25	120	12.5 × 25	105
22	10 × 20	160	10 × 20	170	<div> </div>			
33	12.5 × 20	230	12.5 × 20	210				
47	12.5 × 25	250	12.5 × 25	240				

### FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	60Hz	120Hz	1kHz	10kHz	50kHz	100kHz ≤
Coefficient	0.75	1.00	1.50	1.75	1.77	1.80

## LU

For Slim PSU, 2000 hours at 105°C  
Series

- High reliability withstanding 2000 hours load life at 105°C
- Suitable for Slim application
- Complied to the RoHS directive

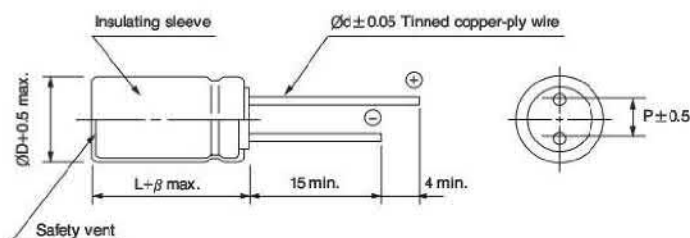
LU → LB  
Long Life



Item	Characteristics				
Operating temperature range	-40 ~ +105°C(250V), -25 ~ +105°C(350~)				
Leakage current max.	I = 0.02CV +15μA (after 5 minutes)				
Capacitance tolerance	±20% at 120Hz, 20°C				
Dissipation factor max. (at 120Hz, 20°C)	Rated Voltage(V)	200 ~ 250	350	450	500
	tanδ	0.15	0.20	0.20	0.20
Low temperature characteristics (Impedance ratio at 120Hz)	WV	200 ~ 250	350	450	500
	Z(-25°C)/Z(+20°C)	3	8	8	8
	Z(-40°C)/Z(+20°C)	4	-	-	-
Load life	After an application of DC bias voltage plus the rated AC ripple current for 2000 hours at 105°C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.				
	Leakage current		Less than specified value		
	Capacitance change		Within ±20% of initial value		
	tanδ		Less than 200% of specified value		
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.				

## DRAWING

Unit : mm



ØD	8	10	12.5
P	3.5	5.0	5.0
Ød	0.6	0.6	0.6
β	1.5	2.0	

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

µF \ WV	200	250	350	450	500
16			8 × 40 145	8 × 40 165	10 × 50 155
22(21)		8 × 40 150	8 × 45 210	8 × 50 210 10 × 30 250	10 × 50 230
39		8 × 45 215	10 × 45 350	10 × 50 375	12.5 × 50 360
47		8 × 50 250	10 × 45 380	10 × 50 410	12.5 × 50 390
53		10 × 40 375	10 × 50 395	10 × 50 520	12.5 × 60 430
56		10 × 40 395	10 × 50 405	12.5 × 40 520	12.5 × 60 460
60					12.5 × 60 470
68		10 × 40 435	12.5 × 40 495	12.5 × 50 635	
82		10 × 45 505	12.5 × 45 570	12.5 × 50 700	
100	12.5 × 30 530	10 × 50 585	12.5 × 50 660	12.5 × 60 720	
150		12.5 × 50 765			

Ripple current (mA rms) at 105°C, 120Hz  
Case size ØD × L (mm)

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	60Hz	120Hz	1kHz	10kHz	50kHz	100kHz ≤
Coefficient	0.75	1.00	1.35	1.50	1.75	2.00



# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS



For Slim PSU, 10000 hours at 105°C Series



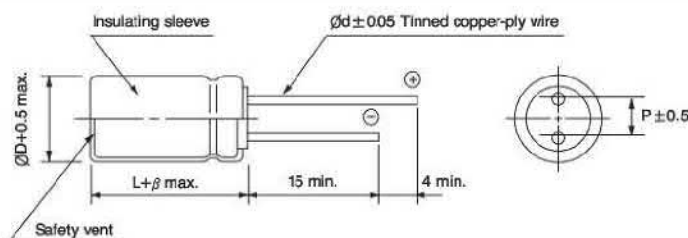
- High reliability withstanding 10000 hours load life at 105°C (WV ≥ 350V : reliability withstanding 5000 hours load life at 105°C)
- Suitable for slim application
- Complied to the RoHS directive



Item	Characteristics				
Operating temperature range	-40 ~ +105°C(250V), -25 ~ +105°C(350V ~ 500V)				
Leakage current max.	I = 0.02CV + 15μA (after 5 minutes)				
Capacitance tolerance	± 20% at 120Hz, 20°C				
Dissipation factor max. (at 120Hz, 20°C)	Rated Voltage(V)	250	350	450	500
	tanδ	0.15	0.20	0.20	0.20
Low temperature characteristics (Impedance ratio at 120Hz)	WV	250	350	450	500
	Z-25°C/Z+20°C	3	8	8	8
	Z-40°C/Z+20°C	4	-	-	-
Load life	After an application of DC bias voltage plus the rated AC ripple current for 10000 hours at 105°C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.				
	Leakage current		Less than specified value		
	Capacitance change		Within ±20% of initial value		
	tanδ		Less than 200% of specified value		
	Life time		ØD = 8		ØD ≥ 10
	WV = 250		5000 hours		10000 hours
Shelf life (at 105°C)	WV ≥ 350		5000 hours		
	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.				

## DRAWING

Unit : mm



ØD	8	10	12.5
P	3.5	5.0	5.0
Ød	0.6	0.6	0.6
β	1.5	2.0	

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

μF \ WV	250		350		450		500		
16			8 × 40	145	8 × 40	165	10 × 50	155	
21	8 × 40	150	8 × 45	180	8 × 50	240	10 × 50	230	
22							12.5 × 30	250	
27	8 × 45	175	10 × 40	220	10 × 50	280	10 × 50	260	
39(40)	8 × 45	215	10 × 40	350	10 × 50	375	12.5 × 50	360	
47	8 × 50	375	10 × 45	380	10 × 50	410	12.5 × 50	390	
56	10 × 30	380	10 × 50	405	12.5 × 40	520	12.5 × 60	460	
	10 × 40	395							
60							12.5 × 60	470	
68	10 × 40	550	12.5 × 40	560	12.5 × 45	560	12.5 × 60	470	
					12.5 × 50	635			
82	10 × 45	560	12.5 × 45	570	12.5 × 50	700			
100	10 × 50	585	12.5 × 50	660	12.5 × 60	720			
150	12.5 × 50	765	<div><div></div><div></div><div></div></div> <div>Ripple current (mA rms) at 105°C, 120Hz</div> <div>Case size ØD×L (mm)</div>						
180	12.5 × 50	800							

Ripple current (mA rms) at 105°C, 120Hz  
Case size ØD × L (mm)

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency(Hz)	60Hz	120Hz	1kHz	10kHz	50kHz	100kHz ≤
Coefficient	0.75	1.00	1.35	1.50	1.75	2.00



# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS



High Ripple Current, High Reliability Series

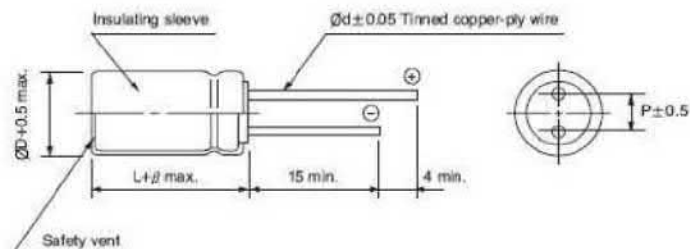


- High ripple current for diplay module
- High reliability withstanding 10000 hours load life at 105°C
- Suited for ballast application
- Complied to the RoHS directive

Item	Characteristics				
Operating temperature range	-40 ~ +105°C				
Leakage current max.	$I = 0.02CV + 15\mu A$ (after 5 minutes)				
Capacitance tolerance	± 20% at 120Hz, 20°C				
Dissipation factor max. (at 120Hz, 20°C)	WV	160	200	250	275
	tanδ	0.15	0.15	0.15	0.20
Low temperature characteristics (Impedance ratio at 120Hz)	WV	160	200	250	275
	Z-40°C/Z+20°C	4	4	4	4
Load life	After an application of DC bias voltage plus the rated AC ripple current for 10000 hours at 105°C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.				
	Leakage current		Less than specified value		
	Capacitance change		Within ± 20% of initial value		
	tanδ		Less than 200% of specified value		
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.				

## DRAWING

Unit: mm



ØD	10	12.5	16	18
P	5.0	5.0	7.5	7.5
Ød	0.6	0.6	0.8	0.8
β	2.0			

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

µF \ WV	160	200	250	275
10	10 × 16	10 × 16	10 × 16	
22	10 × 16	10 × 16	10 × 20	10 × 20
33	10 × 20	10 × 20	12.5 × 20	12.5 × 20
47	10 × 20	12.5 × 20	12.5 × 20	12.5 × 25
68	12.5 × 20	12.5 × 25	16 × 20	16 × 25
82	12.5 × 25	16 × 20	16 × 20	18 × 25
100	12.5 × 25	16 × 20	16 × 25	18 × 25
120	16 × 20	16 × 20	18 × 25	18 × 31.5
150	16 × 25	18 × 25	18 × 25	18 × 35.5

Ripple current (mA rms) at 105°C, 100kHz  
Case size ØD×L (mm)

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency(Hz)	50(60)Hz	120Hz	300Hz	1kHz	10kHz	100kHz≤
Coefficient	0.30	0.40	0.50	0.70	0.90	1.00

## MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

### CS,CH For Charger and Adapter Series

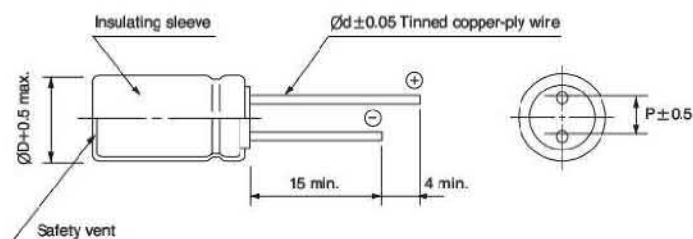
- Load life of 2000 hours at 85°C / 105°C
- Voltage range 400 ~ 450V
- Complied to the RoHS directive



Item	Characteristics	
Operating temperature range	-25 ~ +85°C (CH)	-25 ~ +105°C (CS)
Leakage current max.	$I = 0.02CV + 15\mu A$ (after 5 minutes)	
Capacitance tolerance	±20% at 120Hz, 20°C	
Dissipation factor max.	0.2max. at 120Hz, 20°C	
Surge test (1.5kVDC: 5th interval 5 sec)	Appearance	Normal
	Leakage current	Less than specified value
	Capacitance change	Within initial value
	tanδ	Less than specified value
Load life (after application of the rated voltage for 2000 hours at 85°C/105°C)	Leakage current	Less than specified value
	Capacitance change	Within ±20% of initial value
	tanδ	Less than 200% of specified value
Shelf life (at 85°C/105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.	

### DRAWING

Unit : mm



ØD	8	10	12.5	16	18
P	3.5	5.0	5.0	7.5	7.5
Ød	0.6	0.6	0.8	0.8	0.8
β	1.5	2.0	2.0	2.0	2.0

\* Note : Other case sizes, rated voltage or capacitance are available upon request.  
Please check with us about individual size and dimensions.

## RB

High Temperature, For 125°C Use Series

- Load life of 2000 hours at 125°C
- For Electronic Control unit and other high temperature applications
- Complied to the RoHS directive

**S**  
Solvent Proof  
WV ≤ 100V

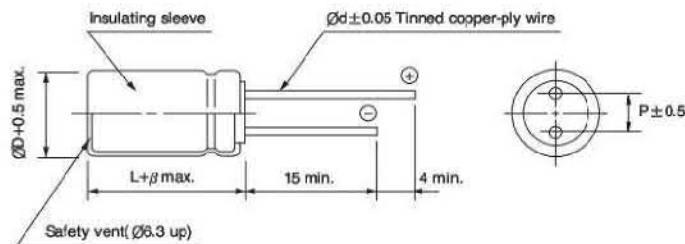
**RB** → **VA**  
High Temp.



Item	Characteristics								
Operating temperature range	WV ≤ 50: -55 ~ +125°C, WV ≥ 63: -40 ~ 125°C								
Leakage current max.	WV ≤ 50: I = 0.01CV or 3μA whichever is greater (after 2 minutes) WV ≥ 63: 0.03CV +10μA(after 5 min.)								
Capacitance tolerance	± 20% at 120Hz, 20°C								
Dissipation factor max. (at 120Hz, 20°C)	Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value.								
	Rated Voltage(V)	6.3	10	16	25	35	50	63 ~ 100	160 ~ 250
	tanδ	0.22	0.19	0.16	0.14	0.12	0.10	0.08	0.15
Low temperature characteristics (Impedance ratio at 120Hz)	WV		6.3 ~10			16 ~ 250			
	Z-25°C/Z+20°C		3			2			
	Z-40°C/Z+20°C		5			4			
Load life (after application of the rated voltage for 2000 hours at 125°C)	Leakage current			Less than specified value					
	Capacitance change			Within ±20% of initial value					
	tanδ			Less than 300% of specified value					
	Ø5, 6.3 and WV ≥ 100 products are for 1000 hours								
Shelf life (at 125°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.								

## DRAWING

Unit : mm



ØD	5	6.3	8	10	12.5	16	18
P	2.0	2.5	3.5	5.0	5.0	7.5	7.5
Ød	0.5	0.5	0.6	0.6	0.6	0.8	0.8
β	1.5			2.0			

MINIATURE TYPES

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

WV	Frequency	60Hz	120Hz	1kHz	10kHz	50kHz	100kHz ≤
6.3~100	~ 47	0.38	0.50	0.78	1.00	1.00	1.00
	68 ~ 680	0.46	0.57	0.77	0.86	0.93	1.00
	1000 ~	0.57	0.67	0.77	0.77	0.88	1.00
160~250	0.47 ~ 220	0.44	0.56	0.78	0.89	0.94	1.00
	330 ~	0.60	0.67	0.75	0.77	0.88	1.00



# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

**RB** series

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV Item μF	6.3		10		16	
	ØD × L (mm)	Ripple current (mA rms) 125°C 100kHz	ØD × L (mm)	Ripple current (mA rms) 125°C 100kHz	ØD × L (mm)	Ripple current (mA rms) 125°C 100kHz
33						
47					5 × 11	124
68			5 × 11	124	6.3 × 11	176
100	5 × 11	120	6.3 × 11	168	6.3 × 11	212
150	6.3 × 11	180	6.3 × 11	212	8 × 11.5	310
220	6.3 × 11	228	8 × 11.5	310	8 × 11.5	368
330	8 × 11.5	234	8 × 11.5	368	10 × 12.5	500
470	10 × 12.5	460	10 × 12.5	480	10 × 16	616
680	10 × 16	560	10 × 16	616	10 × 20	816
1000	10 × 20	760	10 × 20	848	12.5 × 20	1129
1500	10 × 25	976	12.5 × 20	1134	12.5 × 25	1328
2200	12.5 × 20	1150	12.5 × 25	1368	16 × 20	1440
3300	12.5 × 25	1368	16 × 20	1480	16 × 25	1676
4700	16 × 25	1548	16 × 31.5	1936	16 × 35.5	2144
6800	16 × 31.5	1896	16 × 35.5	2144	18 × 35.5	2320
10000	16 × 40	2200	18 × 40	2432		
15000	18 × 40	2368				

WV Item μF	25		35		50	
	ØD × L (mm)	Ripple current (mA rms) 125°C 100kHz	ØD × L (mm)	Ripple current (mA rms) 125°C 100kHz	ØD × L (mm)	Ripple current (mA rms) 125°C 100kHz
1.0					5 × 11	29
1.5					5 × 11	36
2.2					5 × 11	43
3.3					5 × 11	53
4.7					5 × 11	65
6.8					5 × 11	73
10					5 × 11	92
15					5 × 11	116
22			5 × 11	128	6.3 × 11	156
33	5 × 11	124	6.3 × 11	180	6.3 × 11	192
47	6.3 × 11	168	6.3 × 11	216	8 × 11.5	275
68	6.3 × 11	208	8 × 11.5	307	8 × 11.5	328
100	8 × 11.5	306	8 × 11.5	368	10 × 16	465
150	8 × 11.5	368	10 × 12.5	500	10 × 20	656
220	10 × 12.5	480	10 × 16	616	10 × 25	832
330	10 × 16	600	10 × 20	848	12.5 × 20	1025
470	10 × 20	816	12.5 × 20	1121	12.5 × 25	1200
680	12.5 × 20	1114	12.5 × 25	1328	16 × 20	1304
1000	12.5 × 25	1328	16 × 20	1416	16 × 31.5	1696
1500	16 × 20	1416	16 × 31.5	1908	16 × 40	1928
2200	16 × 25	1641	16 × 35.5	2144	18 × 40	2048
3300	16 × 35.5	2144	18 × 40	2432		
4700	18 × 40	2368				

**RB** series

## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV Item μF	63		100		160	
	ØD×L (mm)	Ripple current (mA rms) 125°C 100kHz	ØD×L (mm)	Ripple current (mA rms) 125°C 100kHz	ØD×L (mm)	Ripple current (mA rms) 125°C 100kHz
0.47	8×11.5	13	8×11.5	13	10×12.5	10
1.0	8×11.5	19	8×11.5	19	10×12.5	15
2.0	8×11.5	28	10×12.5	33	10×16	24
3.3	8×11.5	34	10×16	44	10×16	32
4.7	8×11.5	41	10×16	52	10×20	38
10	8×11.5	60	10×20	83	12.5×20	66
22	10×16	113	12.5×25	157	16×25	118
33	10×20	151	16×25	214	16×31.5	158
47	12.5×20	211	16×31.5	279		
100	12.5×25	336				

WV Item μF	200		250	
	ØD×L (mm)	Ripple current (mA rms) 125°C 100kHz	ØD×L (mm)	Ripple current (mA rms) 125°C 100kHz
0.47	10×12.5	10	10×12.5	10
1.0	10×12.5	15	10×12.5	14
2.0	10×16	24	10×16	24
3.3	10×20	32	10×20	32
4.7	10×20	38	12.5×20	45
10	12.5×20	72	16×25	79
22	16×31.5	129		

# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS



High Temperature, For 125°C Use  
Long Life Series



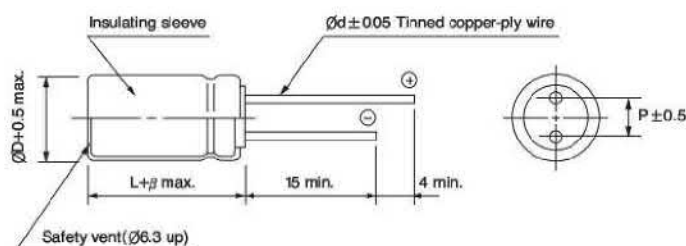
- Load life of 5000 hours at 125°C
- Low impedance at high frequency
- For electronic control unit and other high temperature applications
- Complied to the RoHS directive



Item	Characteristics								
Operating temperature range	-40 ~ +125°C								
Leakage Current max.	I = 0.03CV or 3μA whichever is greater (after 2 minutes)								
Capacitance Tolerance	±20% at 120Hz, 20°C								
Dissipation Factor max. (at 120Hz, 20°C )	Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value.								
	WV	6.3	10	16	25	35	50	63	100
	tanδ	0.22	0.20	0.16	0.14	0.12	0.10	0.10	0.08
Low temperature characteristics (Impedance ratio at 120Hz)	WV	6.3	10	16	25	35	50	63	100
	Z-25°C/Z+20°C	3	3	3	2	2	2	2	2
	Z-40°C/Z+20°C	6	6	4	3	3	3	3	3
Load life (after application of the rated voltage for 5000 hours at 125°C)	Capacitance change		Within ±30% of initial value						
	tanδ		Less than 300% of the specified value						
	Leakage current		Less than specified value						
	ØD	ØD = 6.3	ØD = 8		ØD = 10		ØD ≥ 12.5		
	Life time	1000 hours	2000 hours		3000 hours		5000 hours		
Shelf life (at 125°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.								

## DRAWING

Unit : mm



$\phi D$	5	6.3	8	10	12.5	16
P	2.0	2.5	3.5	5.0	5.0	7.5
$\phi d$	0.5	0.5	0.6	0.6	0.6	0.8
$\beta$	1.5		2.0			

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	120Hz	1kHz	10kHz	50kHz	100kHz $\leq$
$\mu F$					
~ 33	0.20	0.50	0.80	0.90	1.00
47 ~ 100	0.25	0.60	0.90	0.95	1.00
150 ~ 220	0.35	0.70	0.92	0.96	1.00
330 ~ 680	0.45	0.75	0.95	0.97	1.00
1000 ~ 1500	0.50	0.80	0.96	0.98	1.00
2200 ~	0.55	0.85	0.98	0.99	1.00



**WT** series

## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV Item μF	6.3			10			16			25		
	ØD × L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 125°C 100kHz	ØD × L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 125°C 100kHz	ØD × L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 125°C 100kHz	ØD × L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 125°C 100kHz
47										5 × 11	0.80	250
68				5 × 11	0.80	250	5 × 11	0.80	250	6.3 × 11	0.34	405
100	5 × 11	0.80	250	6.3 × 11	0.34	405	6.3 × 11	0.34	405	6.3 × 11	0.34	405
150	6.3 × 11	0.34	405	6.3 × 11	0.34	405	6.3 × 11	0.34	405	8 × 11.5	0.28	760
220	6.3 × 11	0.34	405	8 × 11.5	0.30	760	8 × 11.5	0.28	760	10 × 12.5	0.14	1030
330	8 × 11.5	0.28	760	8 × 11.5	0.28	760	10 × 12.5	0.14	1030	10 × 16	0.10	1430
470	10 × 12.5	0.14	1030	10 × 12.5	0.14	1030	10 × 16	0.10	1430	10 × 20	0.08	1500
680	10 × 16	0.10	1430	10 × 16	0.10	1430	10 × 20	0.06	1500	12.5 × 20	0.06	1720
1000	10 × 20	0.06	1500	10 × 20	0.06	1500	12.5 × 20	0.06	1720	12.5 × 25	0.05	1900
1500	10 × 25	0.06	1620	12.5 × 20	0.06	1720	12.5 × 25	0.05	1900			
2200	12.5 × 20	0.06	1720	12.5 × 25	0.05	1900						
3300	12.5 × 25	0.05	1900									

WV Item μF	35			50			63			100		
	ØD × L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 125°C 100kHz	ØD × L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 125°C 100kHz	ØD × L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 125°C 100kHz	ØD × L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 125°C 100kHz
10												
22	5 × 11	0.80	250							10 × 12.5	0.80	480
33	6.3 × 11	0.34	405	8 × 11.5	0.45	300	8 × 11.5	1.50	150	10 × 12.5	0.80	480
47	6.3 × 11	0.34	405	8 × 11.5	0.35	440	10 × 12.5	0.59	530	10 × 16	0.55	630
68	8 × 11.5	0.19	760									
100	8 × 11.5	0.28	760	10 × 12.5	0.18	555	10 × 16	0.41	690	12.5 × 20	0.25	990
150	10 × 12.5	0.14	1030									
220	10 × 16	0.10	1430	10 × 20	0.10	930	12.5 × 20	0.16	1050	16 × 25	0.11	1500
330	10 × 25	0.06	1620	12.5 × 20	0.07	1330	12.5 × 25	0.12	1290	16 × 31.5	0.08	1790
470	12.5 × 20	0.06	1720	12.5 × 25	0.06	1650	12.5 × 31.5	0.10	1460			
680	12.5 × 25	0.05	1900	16 × 31.5	0.03	2430						

## MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS



130°C, Long Life, Low Impedance Series



Low Impedance

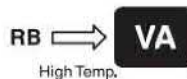


Long Life



Solvent Proof

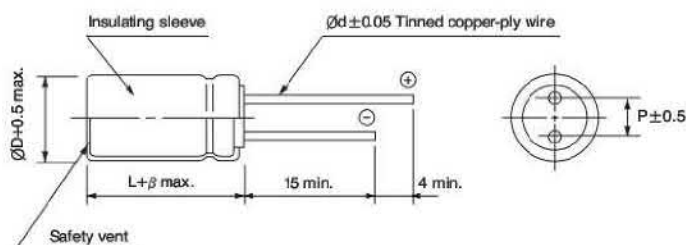
- Load life of 4000 hours at 130°C
- Low impedance at high frequency
- For Electronic Control Unit and other high temperature applications
- Complied to the RoHS directive



Item	Characteristics				
Operating temperature range	-40 ~ +130°C				
Leakage current max.	I = 0.01CV or 3μA whichever is greater (after 2 minutes)				
Capacitance tolerance	±20% at 120Hz, 20°C				
Dissipation factor max. (at 120Hz, 20°C)	Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value.				
	Rated Voltage(V)	10	16	25	35
	tanδ	0.20	0.16	0.14	0.12
Low temperature characteristics (Impedance ratio at 120Hz)	WV	10	16	25	35
	Z-25°C/Z+20°C	3	2	2	2
	Z-40°C/Z+20°C	6	4	3	3
Load life (after application of the rated voltage for 4000 hours at 130°C)	Leakage current		Less than specified value		
	Capacitance change		Within ±30% of initial value		
	tanδ		Less than 300% of specified value		
	ØD		ØD ≤ 10		ØD ≥ 12.5
	Life time		2000 hours		4000 hours
Shelf life (at 130°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.				

### DRAWING

Unit : mm



$\varnothing D$	8	10	12.5	16	18
P	3.5	5.0	5.0	7.5	7.5
$\varnothing d$	0.6	0.6	0.6	0.8	0.8
$\beta$	1.5	2.0			

### FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

$\mu F$ \ Frequency	60Hz	120Hz	1kHz	10kHz	50kHz	100kHz $\leq$
~ 330	0.60	0.70	0.85	0.95	0.97	1.00
470 ~ 1500	0.65	0.75	0.90	0.98	0.99	1.00
2200 ~	0.75	0.80	0.95	1.00	1.00	1.00

## VA series

### ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV Item μF	10			16		
	ØD × L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 130°C 100kHz	ØD × L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 130°C 100kHz
220						
330	8 × 11.5	0.22	360	8 × 11.5	0.22	360
470	10 × 12.5	0.15	620	10 × 12.5	0.15	620
1000	10 × 20	0.073	960	10 × 20	0.073	960
2200	12.5 × 25	0.040	1430	12.5 × 25	0.040	1430
3300	16 × 25	0.038	1900	16 × 31.5	0.034	2300
4700	16 × 31.5	0.034	2300	16 × 35.5	0.031	2550

WV Item μF	25			35		
	ØD × L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 130°C 100kHz	ØD × L (mm)	Impedance (Ω)max. 20°C 100kHz	Ripple current (mA rms) 130°C 100kHz
220	8 × 11.5	0.22	360	10 × 12.5	0.15	500
330	10 × 12.5	0.15	620	10 × 16	0.10	700
470	10 × 20	0.10	800	10 × 20	0.073	800
1000	12.5 × 25	0.055	1100	12.5 × 25	0.040	1100
2200	16 × 31.5	0.034	2300	16 × 35.5	0.031	2550
3300	16 × 35.5	0.031	2550	18 × 35.5	0.028	2800



## MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS



155°C, High Temp, High Reliability  
Series

- Load life of 1000 hours at 155°C use
- For Electronic Control Unit and other high temperature applications
- Complied to the RoHS directive



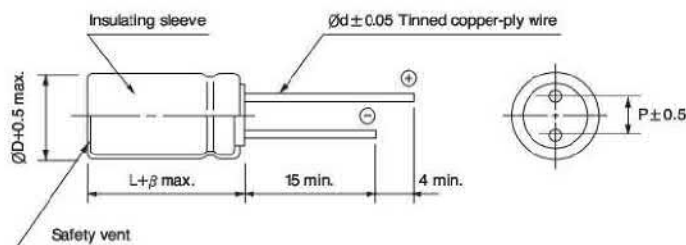
VA  $\Rightarrow$  VB  
High Temp.



Item	Characteristics								
Operating temperature range	-40 ~ +155°C								
Leakage current max.	I = 0.03CV or 4μA whichever is greater (after 1 minute)								
Capacitance tolerance	±20% at 120Hz, 20°C								
Dissipation factor max. (at 120Hz, 20°C)	Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value.								
	Rated Voltage(V)	10	16	25	35	50	63	80	100
	tanδ	0.20	0.16	0.14	0.12	0.10	0.10	0.08	0.08
Low temperature characteristics (Impedance ratio at 120Hz)									
	WV	10	16	25	35	50	63	80	100
	Z-25°C/Z+20°C	3	2	2	2	2	2	2	2
	Z-40°C/Z+20°C	4	4	4	4	4	4	4	4
Load life (after application of the rated voltage for 1000 hours at 155°C)	Leakage current		Less than specified value						
	Capacitance change		Within ±30% of initial value						
	tanδ		Less than 300% of specified value						
Shelf life (at 155°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.								

### DRAWING

Unit : mm



ØD	10	12.5	16	18
P	5	5	7.5	7.5
Ød	0.6	0.6	0.8	0.8
β	2.0			

### FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

CV	Frequency	120Hz	1kHz	50kHz	100kHz ≤
1000 ≤ CV		0.67	0.91	0.95	1.00
1000 > CV		0.50	0.83	0.91	1.00

**VB** series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV Item $\mu F$	10		16		25		35	
	$\varnothing D \times L (mm)$	Ripple current (mA rms) 155°C, 100kHz	$\varnothing D \times L (mm)$	Ripple current (mA rms) 155°C, 100kHz	$\varnothing D \times L (mm)$	Ripple current (mA rms) 155°C, 100kHz	$\varnothing D \times L (mm)$	Ripple current (mA rms) 155°C, 100kHz
1.0							10 × 12.5	35
2.2							10 × 12.5	50
3.3							10 × 12.5	60
4.7							10 × 12.5	85
10							10 × 12.5	175
22							10 × 12.5	200
33							10 × 12.5	225
47							10 × 12.5	250
100					10 × 12.5	250	10 × 20	400
220			10 × 16	300	12.5 × 20	500	12.5 × 25	600
330	10 × 16	300	10 × 20	400	12.5 × 25	600	16 × 25	800
470	10 × 20	400	12.5 × 20	600	16 × 25	800	16 × 31.5	1000
1000	12.5 × 25	600	16 × 25	800	16 × 31.5	1000	18 × 40	1300
2200	16 × 31.5	1000	18 × 35.5	1200				
3300	18 × 35.5	1200	18 × 40	1300				
4700	18 × 40	1300						

WV Item $\mu F$	50		63		80		100	
	$\varnothing D \times L (mm)$	Ripple current (mA rms) 155°C, 100kHz	$\varnothing D \times L (mm)$	Ripple current (mA rms) 155°C, 100kHz	$\varnothing D \times L (mm)$	Ripple current (mA rms) 155°C, 100kHz	$\varnothing D \times L (mm)$	Ripple current (mA rms) 155°C, 100kHz
22							10 × 12.5	390
33					10 × 12.5	420	10 × 16	510
47					10 × 16	550	10 × 20	640
56			10 × 12.5	430	10 × 20	690	10 × 20	640
68			10 × 16	560	10 × 20	690	12.5 × 20	760
100	10 × 16	380	10 × 20	710	12.5 × 20	820	12.5 × 25	950
220	12.5 × 20	640	12.5 × 25	1040	16 × 25	1250	16 × 31.5	1380
330	16 × 20	770	16 × 20	1080	16 × 31.5	1480	18 × 31.5	1430
470	16 × 25	960	16 × 25	1280	18 × 31.5	1530		
560	16 × 31.5	1080	16 × 31.5	1520				
680	18 × 25	1190	16 × 35.5	1520				
1000	18 × 31.5	1420						

# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS



## For Flame Retardancy Series

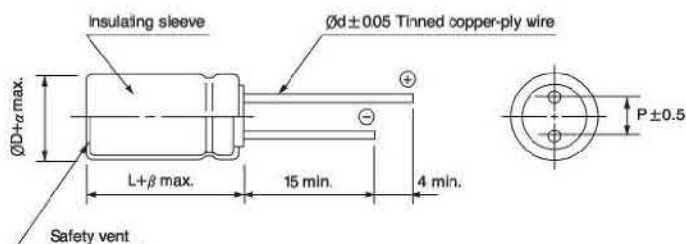
- Flame retardancy series for general purposes
- Load life of 2000 hours at 105°C
- Complied to the RoHS directive



Item	Characteristics		
Operating temperature range	-25 ~ +105°C		
Leakage current max.	I = 0.02CV +15μA (after 5 minutes)		
Capacitance tolerance	± 20% at 120Hz, 20°C		
Dissipation factor max. (at 120Hz, 20° C)	Rated Voltage (V)	400	450
	tanδ	0.20	0.20
Low temperature characteristics (Impedance ratio at 120Hz)	WV	400	450
	Z-25°C/Z+20°C	6	6
Load life (after application of the rated voltage for 2000 hours at 105°C)	Leakage current	Less than specified value	
	Capacitance change	Within ± 25% of initial value	
	tanδ	Less than 200% of specified value	
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.		

## DRAWING

Unit : mm



ØD	10	12.5	16	18	20
P	5.0	5.0	7.5	7.5	10.0
Ød	0.6	0.6	0.8	0.8	0.8
β	2.0				3.0
α	0.5				1.0

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV	400		450	
2.2			10 × 12.5	47
2.7			10 × 12.5	52
4.7			10 × 16	125
6.8			10 × 16	161
10	10 × 20	131	10 × 20	197
22	12.5 × 25	225	16 × 25	371
33	16 × 20	397	16 × 31.5	422
47	16 × 25	476	18 × 31.5	598
68	16 × 31.5	615	18 × 31.5	663
100	18 × 40	727	18 × 35.5	718
120			18 × 40	745
150			20 × 41	798

↑ Ripple current (mA rms) at 105°C, 120Hz  
 ↑ Case size ØD × L (mm)

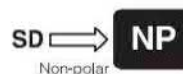
## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	1kHz	50kHz	100kHz ≤
Coefficient	0.80	1.00	1.10	1.30	1.40



## NP Non-Polarized Series

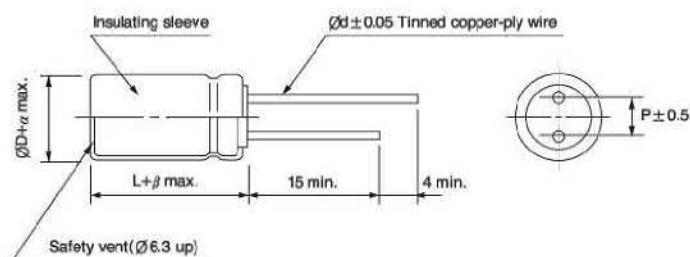
- Standard non-polarized series
- Designed for use in circuits with reversing polarity
- Higher voltage ratings available up to 250V
- Load life of 2000 hours at 85°C
- Complied to the RoHS directive



Item	Characteristics											
Operating temperature range	-40 ~ +85°C											
Leakage current max.	I = 0.03CV or 3μA whichever is greater (after 5 minutes)											
Capacitance tolerance	±20% at 120Hz, 20°C											
Dissipation factor max. (at 120Hz, 20°C)	Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value.											
	WV	6.3	10	16	25	35	50	63	80	100	160	200,250
	tanδ	0.25	0.23	0.20	0.15	0.15	0.12	0.12	0.12	0.12	0.15	0.20
Low temperature characteristics (Impedance ratio at 120Hz)	WV		6.3		10		16		25~100		160~250	
	Z-25°C/Z+20°C		4		3		2		2		3	
	Z-40°C/Z+20°C		10		8		6		4		5	
Load life (after application of the rated voltage for 2000 hours at 85°C)	Leakage current						Less than specified value					
	Capacitance change						Within ±20% of initial value					
	tanδ						Less than 200% of specified value					
	Test method						Polarity reverse each 250 hours					
Shelf life (at 85°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.											

## DRAWING

Unit : mm



ØD	5	6.3	8	10	12.5	16	18	22	25.4
P	2.0	2.5	3.5	5.0	5.0	7.5	7.5	10.0	12.5
Ød	0.5	0.5	0.6	0.6	0.6	0.8	0.8	1.0	1.0
β	1.5			2.0				3.0	
α	0.5							1.0	

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

µF \ Frequency	50Hz	120Hz	1kHz	10kHz ≤
~ 47	0.75	1.00	1.55	2.00
68 ~ 680	0.80	1.00	1.34	1.50
1000 ~	0.85	1.00	1.13	1.15

# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

**NP** series

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV μF	6.3	10	16	25	35	50	63	80	100	160	200	250
0.47						5 × 11 12	5 × 11 12	5 × 11 12	5 × 11 12			
0.68						5 × 11 14	5 × 11 14	5 × 11 14	5 × 11 14			
1.0						5 × 11 18	5 × 11 18	5 × 11 18	5 × 11 18			
1.5						5 × 11 21	5 × 11 21	5 × 11 21	5 × 11 21			
2.2						5 × 11 26	5 × 11 26	5 × 11 26	5 × 11 26			
3.3						5 × 11 32	5 × 11 32	5 × 11 32	5 × 11 32	10 × 16 49	10 × 16 42	10 × 20 46
4.7						5 × 11 38	5 × 11 38	5 × 11 38	6.3 × 11 44	10 × 16 59	10 × 20 55	12.5 × 20 63
6.8						5 × 11 46	5 × 11 46	6.3 × 11 52	8 × 11.5 62	10 × 20 77	12.5 × 20 78	12.5 × 20 78
10						5 × 11 55	6.3 × 11 64	6.3 × 11 64	8 × 11.5 75	12.5 × 20 109	12.5 × 20 95	12.5 × 25 103
15					5 × 11 61	6.3 × 11 78	6.3 × 11 78	8 × 11.5 92	10 × 12.5 107	12.5 × 20 134	12.5 × 25 127	16 × 25 140
22				5 × 11 73	6.3 × 11 84	6.3 × 11 94	8 × 11.5 111	10 × 12.5 129	10 × 16 142	12.5 × 25 177	16 × 25 170	16 × 31.5 186
33			5 × 11 78	6.3 × 11 103	6.3 × 11 103	8 × 11.5 136	10 × 12.5 158	10 × 16 173	10 × 20 189	16 × 25 240	16 × 35.5 239	18 × 35.5 256
47		5 × 11 87	6.3 × 11 107	6.3 × 11 123	8 × 11.5 145	10 × 12.5 189	10 × 16 207	10 × 20 226	12.5 × 20 265	16 × 35.5 329	18 × 40 321	
68	5 × 11 100	6.3 × 11 120	6.3 × 11 129	8 × 11.5 175	10 × 12.5 203	10 × 16 249	10 × 20 272	12.5 × 20 319	12.5 × 25 348	18 × 35.5 425		
100	6.3 × 11 139	6.3 × 11 145	8 × 11.5 184	10 × 12.5 247	10 × 16 270	10 × 20 329	10 × 20 329	12.5 × 20 387	16 × 25 468			
150	6.3 × 11 171	8 × 11.5 210	10 × 12.5 262	10 × 16 331	10 × 20 361	10 × 20 404	12.5 × 20 474	12.5 × 25 516	16 × 25 573			
220	8 × 11.5 244	10 × 12.5 295	10 × 16 347	10 × 20 437	10 × 20 437	12.5 × 20 574	12.5 × 25 625	16 × 25 694	16 × 35.5 797			
330	10 × 12.5 347	10 × 16 396	10 × 20 464	10 × 20 535	12.5 × 20 628	16 × 25 850	16 × 25 850	16 × 35.5 976	18 × 40 1098			
470	10 × 16 454	10 × 20 516	10 × 20 553	12.5 × 20 750	12.5 × 25 818	16 × 31.5 1110	16 × 35.5 1164	18 × 40 1311	22 × 41 1443			
680	10 × 20 595	12.5 × 20 729	12.5 × 20 781	12.5 × 25 984	16 × 25 1091	18 × 35.5 1503	18 × 40 1577	22 × 41 1736	25.4 × 41 1896			
1000	12.5 × 20 847	12.5 × 20 883	12.5 × 25 1033	16 × 25 1323	16 × 35.5 1519	18 × 40 1912	22 × 41 2105	25.4 × 41 2299				
1500	12.5 × 20 999	12.5 × 25 1132	16 × 25 1338	16 × 35.5 1748	18 × 40 1968	22 × 41 2386	25.4 × 41 2607					
2200	12.5 × 25 1272	16 × 25 1463	16 × 35.5 1781	18 × 40 2254	22 × 41 2481	25.4 × 51 3221						
3300	16 × 25 1672	16 × 35.5 1985	18 × 40 2360	22 × 41 2890	25.4 × 41 3157							
4700	16 × 35.5 2221	18 × 40 2579	22 × 41 2987	25.4 × 51 3927	<div> <div>← Case size ØD × L (mm)</div> <div>← Ripple current (mA rms) at 85°C, 120Hz</div> </div>							
6800	18 × 41 2840	22 × 41 3214	25.4 × 51 4004									
10000	22 × 41 3516	25.4 × 51 4290										

## NS Non-Polarized, Height 7mmL Series

- Non-polarized series with 7mmL height
- Load life of 2000 hours at 85°C
- Complied to the RoHS directive

NP Non-polarized S Solvent Proof

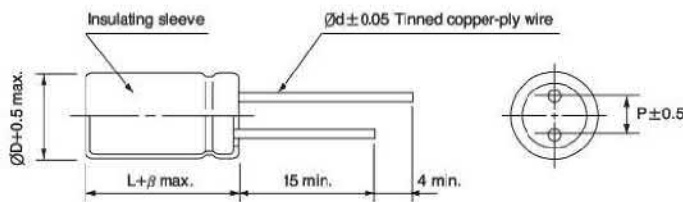
SS Non-polar NS



Item	Characteristics									
Operating temperature range	-40 ~ +85°C									
Leakage current max.	I = 0.05CV or 10μA whichever is greater (after 2 minutes)									
Capacitance tolerance	± 20% at 120Hz, 20°C									
Dissipation factor max. (at 120Hz, 20°C)	WV	6.3	10	16	25	35	40	50	63	
	tanδ	0.24	0.20	0.17	0.16	0.15	0.14	0.12	0.10	
Low temperature characteristics (Impedance ratio at 120Hz)	WV		6.3		10		16~25		35~63	
	Z-25°C/Z+20°C		4		3		2		2	
	Z-40°C/Z+20°C		8		6		4		4	
Load life (after application of the rated voltage for 2000 hours at 85°C)	Leakage current				Less than specified value					
	Capacitance change				Within ± 20% of initial value					
	tanδ				Less than 200% of specified value					
	Test method				Polarity reverse each 250 hours					
Shelf life (at 85°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.									

### DRAWING

Unit : mm



ØD	4	5	6.3
P	1.5	2.0	2.5
Ød	0.45	0.5	0.5
β	1.0	1.5	

### DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

µF \ WV	6.3	10	16	25	35	40	50	63
0.1							4×7 4.0	4×7 4.4
0.15							4×7 5.0	4×7 5.4
0.22							4×7 6.0	4×7 6.6
0.33							4×7 7.3	4×7 8.0
0.47							4×7 8.8	4×7 9.6
0.68							4×7 11	4×7 12
1.0							4×7 13	4×7 14
1.5							4×7 16	4×7 17
2.2						4×7 18	4×7 19	5×7 24
3.3				4×7 20	4×7 21	5×7 25	5×7 27	6.3×7 34
4.7			4×7 23	4×7 24	5×7 29	5×7 29	6.3×7 37	6.3×7 40
6.8		4×7 26	5×7 32	5×7 33	6.3×7 39	6.3×7 41		
10		4×7 31	5×7 39	6.3×7 47	6.3×7 48			
15	4×7 35	5×7 44	6.3×7 55					
22	5×7 49	6.3×7 62	6.3×7 67					
33	6.3×7 69	6.3×7 76						
47	6.3×7 83							

↑ Ripple current (mA rms) at 85°C, 120Hz  
↑ Case size ØD×L (mm)

### FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	1kHz	10kHz≤
Coefficient	0.75	1.00	1.55	2.00



# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS



Non-Polarized, Height 5mmL  
Series



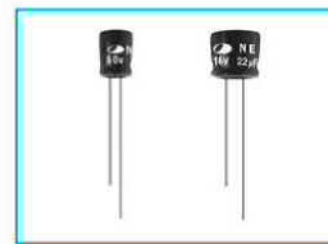
Miniaturized



Non-polarized



Solvent Proof



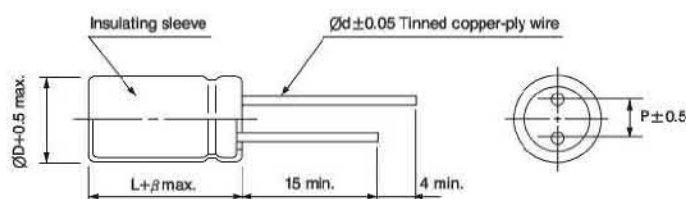
- Non-polarized and low profile series with 5mmL height
- Uniquely designed for use in lightweight and portable equipment
- Complied to the RoHS directive

SE → NE  
Non-polar

Item	Characteristics						
Operating temperature range	-40 ~ +85°C						
Leakage current max.	I = 0.05CV or 10 $\mu$ A whichever is greater (after 2 minutes)						
Capacitance tolerance	$\pm$ 20% at 120Hz, 20°C						
Dissipation factor max. (at 120Hz, 20°C)	WV	6.3	10	16	25	35	50
	$\tan\delta$	0.24	0.20	0.17	0.17	0.15	0.15
Low temperature characteristics (Impedance ratio at 120Hz)	WV	6.3	10	16, 25	35, 50		
	Z-25°C/Z+20°C	4	3	2	2		
	Z-40°C/Z+20°C	8	6	4	3		
Load life (after application of the rated voltage for 1000 hours at 85°C)	Leakage current		Less than specified value				
	Capacitance change		Within $\pm$ 20% of initial value				
	$\tan\delta$		Less than 200% of specified value				
	Test method		Polarity reverse each 250 hours				
Shelf life (at 85°C)	After 1000 hours no load test, leakage current, capacitance and $\tan\delta$ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.						

## DRAWING

Unit : mm



ØD	4	5	6.3
P	1.5	2.0	2.5
Ød	0.45	0.45	0.45
β	1.0	1.5	

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

μF \ WV	6.3	10	16	25	35	50
0.1						4×5 3.2
0.15						4×5 3.9
0.22						4×5 4.7
0.33						4×5 5.8
0.47						4×5 6.9
0.68						4×5 8.3
1.0						4×5 10
1.5						4×5 12
2.2				4×5 14	4×5 15	5×5 17
3.3				5×5 20	5×5 21	5×5 21
4.7			4×5 21	5×5 24	5×5 25	6.3×5 30
6.8			5×5 29	6.3×5 33	6.3×5 36	6.3×5 36
10		4×5 28	5×5 35	6.3×5 41	6.3×5 43	
15	4×5 31	5×5 39	6.3×5 50			
22	5×5 43	6.3×5 55	6.3×5 60			
33	6.3×5 62	6.3×5 68				
47	6.3×5 74					

Ripple current (mA rms) at 85°C, 120Hz  
Case size ØD×L (mm)

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	1kHz	10kHz ≤
Coefficient	0.75	1.00	1.55	2.00

## BP For Speaker Networks Series

NP Non-polarized S Solvent Proof

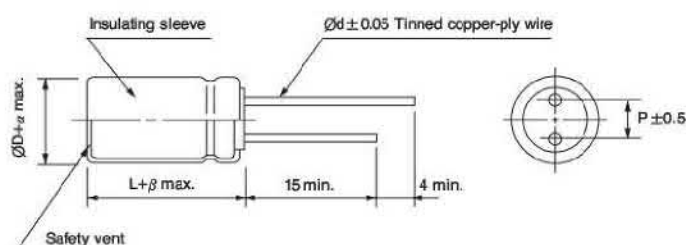


- Non-polarized series for crossover networks in Hi-Fi sound systems
- Excellent frequency characteristics
- Close capacitance tolerance
- Extended voltage range of 25V, 50V, 100V, 200V
- Complied to the RoHS directive

Item	Characteristics		
Operating temperature range	-40 ~ +85°C		
Leakage current max.	I = 0.03CV or 3μA whichever is greater (after 5 minutes)		
Capacitance tolerance	±20% at 120Hz, 20°C		
Dissipation factor max. (at 120Hz, 20°C)	<div>Frequency \ Series</div>	BP	
		25WV, 50WV, 100WV	200WV
		0.10	0.12
		0.15	0.30
Load life (after application of the rated voltage for 2000 hours at 85°C)	Leakage current		Less than specified value
	Capacitance change		Within ±15% of initial value
	tanδ		Less than 200% of specified value
	Test method		Polarity reverse each 250 hours
Shelf life (at 85°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.		

## DRAWING

Unit : mm



ØD	8	10	12.5	16	18	22	25.4
P	3.5	5	5	7.5	7.5	10	12.5
Ød	0.6	0.6	0.6	0.8	0.8	1.0	1.0
β	1.5	2.0				3.0	
α	0.5				1.0		

MINIATURE TYPES

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu F$	1.0	1.5	2.2	3.3	4.7	6.8	10	15	22	33	47	68	100
25	8×11.5 67	8×11.5 82	10×12.5 114	10×12.5 139	10×12.5 166	10×16 222	10×20 297	10×20 364	10×20 440	12.5×20 678	12.5×25 890		
50	8×11.5 67	8×11.5 82	10×12.5 114	10×12.5 139	10×12.5 166	10×16 222	10×20 297	10×20 364	10×20 440	12.5×20 678	12.5×25 890	16×31.5 950	16×35.5 1170
100	10×16 100	10×16 125	10×16 150	10×16 185	10×16 225	10×20 275	12.5×20 340	12.5×20 420	12.5×25 543	16×25 737	16×31.5 790	16×35.5 983	16×40 1253
200							16×25 403	16×31.5 540	16×35.5 687	16×40 884	18×40 920	22×40 1218	25.4×40 1614

Case size  $\varnothing D \times L$  (mm)  
 Ripple current (mA rms) at 85°C, 1kHz

## MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

# RN

Non-Polarized, Wide Temperature Range Series

**NP** Non-polarized  
**S** Solvent Proof



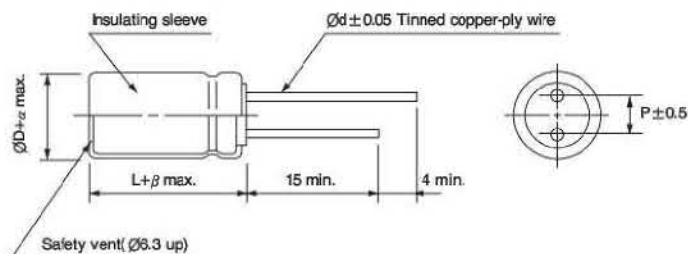
- Wide operating temperature range of -40 ~ +105°C
- Designed for use in circuits with reversing polarity
- Complied to the RoHS directive

**RD** → **RN**  
Non-polar

Item	Characteristics									
Operating temperature range	-40 ~ +105°C									
Leakage current max.	I = 0.03CV or 3μA whichever is greater (after 5 minutes)									
Capacitance tolerance	±20% at 120Hz, 20°C									
Dissipation factor max. (at 120Hz, 20°C)	Capacitance > 1000μF: tanδ increases by 0.02 for each 1000μF from below value.									
	WV	6.3	10	16	25	35	50	63	80	100
	tanδ	0.24	0.20	0.16	0.16	0.14	0.12	0.12	0.12	0.12
Low temperature characteristics (Impedance ratio at 120Hz)	WV		6.3		10		16		25 ~ 100	
	Z-25°C/Z+20°C		4		3		2		2	
	Z-40°C/Z+20°C		8		6		4		3	
Load life (after application of the rated voltage for 1000 hours at 105°C)	Leakage current				Less than specified value					
	Capacitance change				Within ±20% of initial value					
	tanδ				Less than 200% of specified value					
	Test method				Polarity reverse each 250 hours					
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.									

### DRAWING

Unit : mm



ØD	5	6.3	8	10	12.5	16	18	22	25.4
P	2.0	2.5	3.5	5.0	5.0	7.5	7.5	10.0	12.5
Ød	0.5	0.5	0.6	0.6	0.6	0.8	0.8	1.0	1.0
β	1.5			2.0				3.0	
α	0.5							1.0	

### FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	1kHz	10kHz≤
~ 47	0.75	1.00	1.55	2.00
68 ~ 680	0.80	1.00	1.34	1.50
1000 ~	0.85	1.00	1.13	1.15



**RN** series

## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV μF	6.3	10	16	25	35	50	63	80	100
0.1						5 × 11 3.6	5 × 11 3.9	5 × 11 3.9	5 × 11 4.2
0.15						5 × 11 4.4	5 × 11 4.8	5 × 11 4.8	5 × 11 5.1
0.22						5 × 11 5.3	5 × 11 5.8	5 × 11 5.8	5 × 11 6.2
0.33						5 × 11 6.5	5 × 11 7.2	5 × 11 7.2	5 × 11 7.5
0.47						5 × 11 7.8	5 × 11 8.5	5 × 11 8.5	5 × 11 9.2
0.68						5 × 11 9.4	5 × 11 10	5 × 11 10	5 × 11 11
1.0						5 × 11 11	5 × 11 12	5 × 11 12	5 × 11 13
1.5						5 × 11 14	5 × 11 15	5 × 11 15	5 × 11 16
2.2						5 × 11 17	5 × 11 18	5 × 11 18	5 × 11 19
3.3						5 × 11 21	5 × 11 23	6.3 × 11 26	6.3 × 11 27
4.7					5 × 11 23	5 × 11 25	6.3 × 11 31	6.3 × 11 31	8 × 11.5 39
6.8				5 × 11 26	5 × 11 27	6.3 × 11 34	6.3 × 11 37	8 × 11.5 44	10 × 12.5 54
10			5 × 11 31	5 × 11 31	6.3 × 11 38	6.3 × 11 41	8 × 11.5 53	10 × 12.5 62	10 × 12.5 65
15		5 × 11 34	5 × 11 38	6.3 × 11 44	8 × 11.5 55	8 × 11.5 60	10 × 12.5 76	10 × 12.5 76	10 × 16 88
22	5 × 11 38	5 × 11 41	6.3 × 11 53	8 × 11.5 63	8 × 11.5 67	10 × 12.5 84	10 × 16 101	10 × 16 101	
33	5 × 11 46	6.3 × 11 58	8 × 11.5 77	8 × 11.5 77	10 × 12.5 95	10 × 16 113	10 × 16 124	10 × 20 135	
47	6.3 × 11 63	6.3 × 11 69	8 × 11.5 92	10 × 12.5 106	10 × 16 125	10 × 20 147	10 × 20 161	12.5 × 20 189	
68	6.3 × 11 76	8 × 11.5 98	10 × 12.5 128	10 × 16 140	10 × 20 164	10 × 20 177	12.5 × 20 227	12.5 × 25 248	
100	8 × 11.5 109	10 × 12.5 139	10 × 16 170	10 × 20 185	10 × 20 198	12.5 × 20 251	12.5 × 25 300	16 × 25 333	
150	10 × 12.5 155	10 × 16 186	10 × 20 227	12.5 × 20 267	12.5 × 20 285	12.5 × 25 336	16 × 25 408	16 × 35.5 488	
220	10 × 12.5 188	10 × 20 246	12.5 × 20 323	12.5 × 20 323	12.5 × 25 376	16 × 25 451	16 × 35.5 567	18 × 35.5 609	
330	10 × 16 252	12.5 × 20 354	12.5 × 20 396	12.5 × 25 431	16 × 25 511	16 × 35.5 634	18 × 35.5 745	18 × 40 782	
470	10 × 20 328	12.5 × 20 422	12.5 × 25 515	16 × 25 571	16 × 35.5 701	18 × 35.5 812	18 × 40 933	22 × 41 1027	
680	12.5 × 20 464	12.5 × 25 554	16 × 25 687	16 × 35.5 788	18 × 35.5 904	18 × 40 1025	22 × 41 1236	25.4 × 41 1350	
1000	12.5 × 25 613	16 × 25 745	16 × 35.5 956	18 × 35.5 1026	18 × 40 1151	22 × 41 1368	25.4 × 41 1637		
1500	16 × 25 800	16 × 35.5 999	18 × 35.5 1184	18 × 40 1243	22 × 41 1451	25.4 × 41 1694			
2200	16 × 35.5 1072	18 × 35.5 1242	18 × 40 1428	22 × 41 1572	25.4 × 51 1974				
3300	18 × 35.5 1361	18 × 40 1534	22 × 41 1835	25.4 × 41 2005	Case size $\varnothing D \times L$ (mm) Ripple current (mA rms) at 105°C, 120Hz				
4700	18 × 40 1650	22 × 41 1942	25.4 × 51 2498						
6800	22 × 41 2060	25.4 × 51 2603							
10000	25.4 × 51 2755								

## MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS



For Speaker Networks  
Series

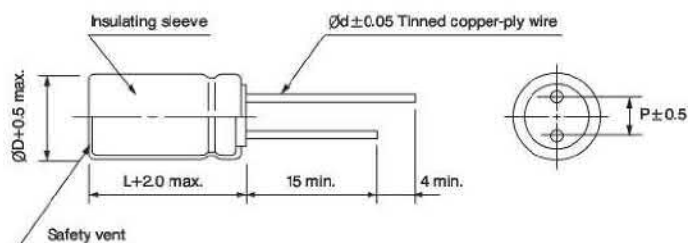
- Non-polarized series for crossover networks in Hi-Fi sound systems
- Excellent frequency characteristics
- Close capacitance tolerance
- Complied to the RoHS directive



Item	Characteristics									
Operating temperature range	-40 ~ +105°C									
Leakage current max.	I = 0.03CV or 3μA whichever is greater (after 5 minutes)									
Capacitance tolerance	±20% at 120Hz, 20°C									
Dissipation factor max. (at 120Hz, 20°C)	<table><tr><th>Series</th><th>BR</th></tr><tr><th>Frequency</th><td>200WV</td></tr><tr><td>1kHz</td><td>0.12</td></tr><tr><td>5kHz</td><td>0.30</td></tr></table>	Series	BR	Frequency	200WV	1kHz	0.12	5kHz	0.30	
Series	BR									
Frequency	200WV									
1kHz	0.12									
5kHz	0.30									
Load life (after application of the rated voltage for 2000 hours at 105°C)	Leakage current	Less than specified value								
	Capacitance change	Within ±15% of initial value								
	tanδ	Less than 200% of specified value								
	Test method	Polarity reverse each 250 hours								
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.									

### DRAWING

Unit : mm



ØD	10	12.5	16	18
P	5.0	5.0	7.5	7.5
Ød	0.6	0.6	0.8	0.8

### DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV	3.3	4.7	6.8	10	15	22	33	47	68	100
200	10×16 185	10×20 250	12.5×20 300	12.5×20 340	12.5×25 420	16×25 650	18×25 730	18×40 920	18×40 935	18×40 950

Case size ØD×L (mm)  
Ripple current (mA rms) at 105°C, 1kHz



## For Horizontal Deflection Current Correction Series



Non-polarized



Solvent Proof

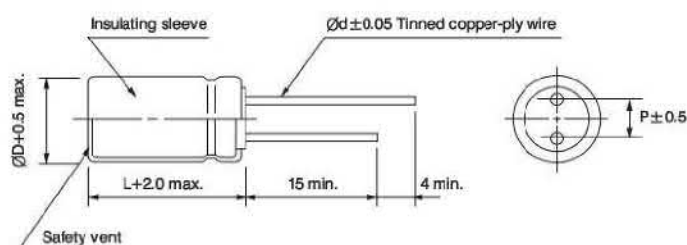
- Designed for horizontal deflection current correction in TV, monitor or computer
- Stable characteristics at high frequency and high ripple current
- Complied to the RoHS directive



Item	Characteristics	
Operating temperature range	-40 ~ +85°C	
Leakage current max.	$I = 0.03CV + 50\mu A$ (after 5 minutes)	
Capacitance tolerance	$\pm 10, \pm 20\%$ at 120Hz, 20°C	
Dissipation factor max.	0.04 max. at 120Hz, 20°C	
Low temperature characteristics (Impedance ratio at 120Hz)	Z-25°C/Z+20°C	1.5
	Z-40°C/Z+20°C	3.0
Load life (after application of DC 12V superimposed with specified ripple current)	Leakage current	Less than specified value
	Capacitance change	Within $\pm 15\%$ of initial value
	$\tan\delta$	Less than 200% of specified value
	Test method	Polarity reverse each 250 hours
	NF series are for 2000 hours at 85°C	
Shelf life (at 85°C)	After 1000 hours no load test, leakage current, capacitance and $\tan\delta$ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.	

### DRAWING

Unit : mm



ØD	10	12.5	16	18
P	5.0	5.0	7.5	7.5
Ød	0.6	0.6	0.8	0.8

MINIATURE TYPES

### DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV \ µF	1.0	1.5	2.2	3.3	4.7	6.8	8.2	10
25, 50	10 × 20 1.8	12.5 × 20 2.4	12.5 × 25 3.3	16 × 25 4.5	16 × 31.5 6.0	16 × 35.5 8.0	16 × 40 9.0	18 × 40 10.0

Case size ØD × L (mm)  
Ripple current (A<sub>p-p</sub>) at 85°C, 15.75kHz



## MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS



For Horizontal Deflection Current Correction Series

**NP** Non-polarized **S** Solvent Proof



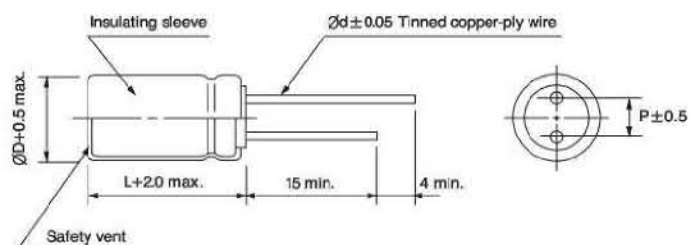
- Designed for horizontal deflection current correction in TV, monitor or computer
- Stable characteristics at high frequency and high ripple current
- Complied to the RoHS directive

**NF**  $\Rightarrow$  **NH**  
High Temp.

Item	Characteristics	
Operating temperature range	-40 ~ +105°C	
Leakage current max.	$I = 0.03CV + 50\mu A$ (after 5 minutes)	
Capacitance tolerance	$\pm 10, \pm 20\%$ at 120Hz, 20°C	
Dissipation factor max.	0.04 max. at 120Hz, 20°C	
Low temperature characteristics (Impedance ratio at 120Hz)	Z-25°C/Z+20°C	1.5
	Z-40°C/Z+20°C	3.0
Load life (after application of DC 12V superimposed with specified ripple current)	Leakage current	Less than specified value
	Capacitance change	Within $\pm 15\%$ of initial value
	$\tan\delta$	Less than 200% of specified value
	Test method	Polarity reverse each 250 hours
	NH series are for 2000 hours at 105°C	
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and $\tan\delta$ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.	

### DRAWING

Unit : mm



ØD	10	12.5	16	18
P	5.0	5.0	7.5	7.5
Ød	0.6	0.6	0.8	0.8

### DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV	µF	1.0	1.5	2.2	3.3	4.7	6.8	8.2	10
25, 50		10 × 20 2.3	12.5 × 20 3.1	12.5 × 25 4.8	16 × 25 6.5	16 × 31.5 8.6	16 × 35.5 10.6	16 × 40 10.4	18 × 40 10.7

Case size ØD × L (mm)  
Ripple current (Ap-p) at 85°C, 15.75kHz



## Low Leakage Current Series

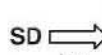
- Standard low leakage current series
- Suited for high gain audio coupling applications
- Stable leakage current characteristics for a long period of use
- Voltage range of 10 ~ 100V
- Complied to the RoHS directive



Low Leakage Current



Solvent Proof



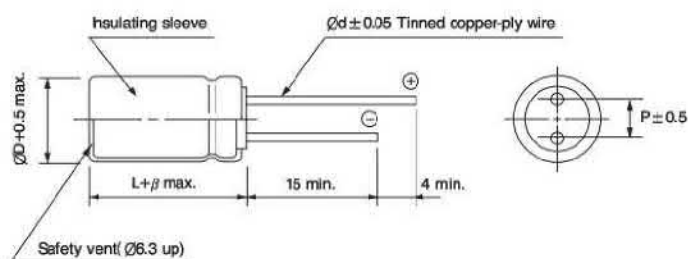
Low leakage current



Item	Characteristics								
Operating temperature range	-40 ~ +85℃								
Leakage current max.	I = 0.002CV or 0.4μA whichever is greater (after 2 minutes)								
Capacitance tolerance	±20% at 120Hz, 20℃								
Dissipation factor max. (at 120Hz, 20℃)	Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value.								
	WV	10	16	25	35	40	50	63	100
	tanδ	0.17	0.15	0.12	0.12	0.12	0.10	0.09	0.09
Low temperature characteristics (Impedance ratio at 120Hz)	WV	10~25	35	40	50	63	100		
	Z-25℃/Z+20℃	2	1.75	1.75	1.5	1.5	1.5		
	Z-40℃/Z+20℃	4	4	4	2	2	2		
Load life (after application of the rated voltage for 2000 hours at 85℃)	Leakage current		Less than specified value						
	Capacitance change			WV≤16		WV>16			
		ØD≤6.3		±20%		±20%			
		ØD>6.3		±20%		±15%			
	tanδ		Less than 150% of specified value						
Shelf life (at 85℃)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20℃ by the KS C 6035 clause 5.4.								

## DRAWING

Unit : mm



ØD	5	6.3	8	10	12.5	16	18
P	2.0	2.5	3.5	5.0	5.0	7.5	7.5
Ød	0.5	0.5	0.6	0.6	0.6	0.8	0.8
β	1.5			2.0			

MINIATURE TYPES

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

µF	Frequency	50Hz	120Hz	1kHz	10kHz ≤
~ 47		0.75	1.00	1.55	2.00
68 ~ 680		0.80	1.00	1.35	1.50
1000 ~		0.85	1.00	1.15	1.15

# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

LL series

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu F$	WV	10		16		25		35	
1.0									
1.5									
2.2									
3.3									
4.7									
6.8								5 × 11	46
10						5 × 11	55	5 × 11	55
15				5 × 11	61	5 × 11	68	5 × 11	68
22			69	5 × 11	73	5 × 11	82	6.3 × 11	94
33		5 × 11	84	5 × 11	90	6.3 × 11	116	6.3 × 11	116
47		5 × 11	101	6.3 × 11	123	8 × 11.5	163	8 × 11.5	163
68		6.3 × 11	139	6.3 × 11	148	8 × 11.5	196	10 × 12.5	227
100		6.3 × 11	169	8 × 11.5	212	10 × 12.5	276	10 × 16	302
150		8 × 11.5	244	10 × 12.5	302	10 × 16	370	10 × 20	404
220		10 × 12.5	344	10 × 16	401	10 × 20	489	12.5 × 20	574
330		10 × 16	461	10 × 20	535	12.5 × 20	703	12.5 × 25	766
470		10 × 20	600	12.5 × 20	750	12.5 × 25	914	12.5 × 25	914
680		12.5 × 20	847	12.5 × 20	902	12.5 × 25	1100	16 × 25	1220
1000		12.5 × 20	1028	12.5 × 25	1193	16 × 25	1480	16 × 31.5	1619
1500		12.5 × 25	1298	16 × 25	1522	16 × 31.5	1835	18 × 35.5	2066
2200		16 × 25	1659	16 × 31.5	1908	18 × 35.5	2341		
3300		16 × 31.5	2124	18 × 35.5	2502				
4700		18 × 35.5	2737						

Case size  $\varnothing D \times L$  (mm)  
Ripple current (mA rms) at 85°C, 120Hz

$\mu F$	WV	40		50		63		100	
1.0						5 × 11	20	5 × 11	18
1.5						5 × 11	25	5 × 11	22
2.2						5 × 11	30	5 × 11	26
3.3				5 × 11	35	5 × 11	37	5 × 11	32
4.7		5 × 11	38	5 × 11	42	5 × 11	44	5 × 11	38
6.8		5 × 11	46	5 × 11	50	5 × 11	53	6.3 × 11	53
10		5 × 11	55	6.3 × 11	70	6.3 × 11	73	8 × 11.5	76
15		6.3 × 11	78	6.3 × 11	85	8 × 11.5	106	8 × 11.5	93
22		6.3 × 11	94	8 × 11.5	122	8 × 11.5	129	10 × 12.5	130
33		8 × 11.5	136	8 × 11.5	149	10 × 12.5	183	10 × 16	175
47		8 × 11.5	163	10 × 12.5	207	10 × 16	239	10 × 20	227
68		10 × 12.5	227	10 × 16	273	10 × 20	314	12.5 × 20	313
100		10 × 16	302	10 × 20	361	12.5 × 20	447	12.5 × 25	380
150		10 × 20	404	12.5 × 20	519	12.5 × 25	596	16 × 25	508
220		12.5 × 20	475	12.5 × 25	685	16 × 25	801	16 × 31.5	699
330		12.5 × 25	766	16 × 25	931	16 × 31.5	1074	16 × 35.5	983
470		16 × 25	1014	16 × 31.5	1216	16 × 35.5	1345	18 × 40	1320
680		16 × 25	1220	18 × 35.5	1534	18 × 40	1821		
1000		16 × 31.5	1699	18 × 40	2095				
1500		18 × 40	2168						

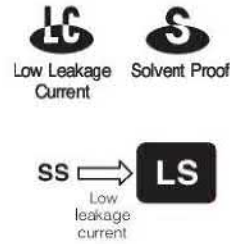
Case size  $\varnothing D \times L$  (mm)  
Ripple current (mA rms) at 85°C, 120Hz



## LS

Low Leakage Current, Height 7mmL  
Series

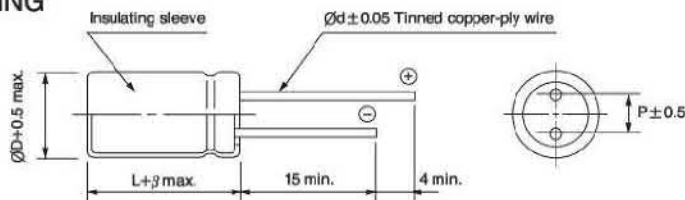
- Low leakage current series with 7mmL height
- Load life of 2000 hours at 85°C
- Complied to the RoHS directive



Item	Characteristics								
Operating temperature range	-40 ~ +85°C								
Leakage current max.	I = 0.002CV or 0.4μA whichever is greater (after 2 minutes)								
Capacitance tolerance	± 20% at 120Hz, 20°C								
Dissipation factor max. (at 120Hz, 20°C)	WV	6.3	10	16	25	35	40	50	63
	tanδ	0.24	0.20	0.16	0.14	0.12	0.12	0.10	0.10
Low temperature characteristics (Impedance ratio at 120Hz)	WV		6.3	10		16, 25		35 ~ 63	
	Z-25°C/Z+20°C		4	3		2		2	
	Z-40°C/Z+20°C		8	6		4		3	
Load life (after application of the rated voltage for 2000 hours at 85°C)	Leakage current				Less than specified value				
	Capacitance change				Within ± 20% of initial value				
	tanδ				Less than 200% of specified value				
Shelf life (at 85°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.								

## DRAWING

Unit : mm



ØD	4	5	6.3
P	1.5	2.0	2.5
Ød	0.45	0.5	0.5
β	1.0	1.5	

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

µF	WV	6.3	10	16	25	35	40	50	63
0.1								4×7	4.4
0.15								4×7	5.4
0.22								4×7	6.6
0.33								4×7	8.0
0.47								4×7	9.6
0.68								4×7	12
1.0								4×7	14
1.5								4×7	17
2.2								4×7	21
3.3								4×7	25
4.7						4×7	28	5×7	35
6.8					4×7	31	5×7	38	42
10				4×7	35	5×7	43	5×7	46
15			4×7	38	5×7	49	5×7	53	6.3×7
22	4×7	43	5×7	53	5×7	60	6.3×7	74	6.3×7
33	5×7	60	5×7	65	6.3×7	85	6.3×7	91	
47	5×7	71	6.3×7	90	6.3×7	101			
68	6.3×7	99	6.3×7	109					
100	6.3×7	120							

Ripple current (mA rms) at 85°C, 120Hz  
Case size ØD×L (mm)

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

µF	Frequency	50Hz	120Hz	1kHz	10kHz ≤
~ 47		0.75	1.00	1.55	2.00
68 ~		0.80	1.00	1.35	1.50

# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS



Low Leakage Current, Height 5mmL Series



Low Leakage Current



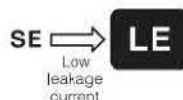
Miniaturized



Solvent Proof



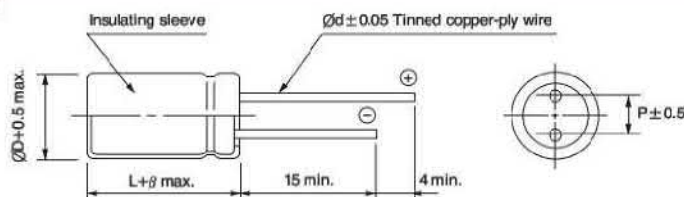
- Low leakage current series with 5mmL height
- Designed for use in lightweight and portable equipment
- Complied to the RoHS directive



Item	Characteristics							
Operating temperature range	-40 ~ +85°C							
Leakage current max.	I = 0.002CV or 0.4μA whichever is greater (after 2 minutes)							
Capacitance tolerance	± 20% at 120Hz, 20°C							
Dissipation factor max. (at 120Hz, 20°C)	WV	4	6.3	10	16	25	35	50
	tanδ	0.35	0.24	0.20	0.16	0.14	0.12	0.10
Low temperature characteristics (Impedance ratio at 120Hz)	WV	4	6.3	10	16	25	35, 50	
	Z-25°C/Z+20°C	7	4	3	2	2	2	
	Z-40°C/Z+20°C	15	10	8	6	4	3	
Load life (after application of the rated voltage for 1000 hours at 85°C)	Leakage current			Less than specified value				
	Capacitance change			Within ±20% of initial value				
	tanδ			Less than 200% of specified value				
Shelf life (at 85°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.							

## DRAWING

Unit : mm



ØD	4	5	6.3
P	1.5	2.0	2.5
Ød	0.45	0.45	0.45
β	1.0	1.5	

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV	4	6.3	10	16	25	35	50
0.1							4×5 3.9
0.15							4×5 4.8
0.22							4×5 5.8
0.33							4×5 7.1
0.47							4×5 8.5
0.68							4×5 10
1.0							4×5 12
1.5							4×5 15
2.2							4×5 18
3.3							4×5 22
4.7						4×5 25	5×5 31
6.8					4×5 27	5×5 34	6.3×5 44
10				4×5 31	5×5 38	5×5 42	6.3×5 53
15			4×5 34	5×5 44	6.3×5 55	6.3×5 59	
22		4×5 37	5×5 47	6.3×5 62	6.3×5 66		
33	5×5 44	5×5 53	6.3×5 68	6.3×5 76			
47	5×5 52	6.3×5 74	6.3×5 81				
68	6.3×5 74	6.3×5 89					
100	6.3×5 89						

Ripple current (mA rms) at 85°C, 120Hz  
Case size ØD×L (mm)

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	1kHz	10kHz≤
~ 47	0.75	1.00	1.55	2.00
68 ~	0.80	1.00	1.35	1.50



## RL

Low Leakage Current, Wide Temperature Range Series

**LC**  
Low Leakage Current

**S**  
Solvent Proof

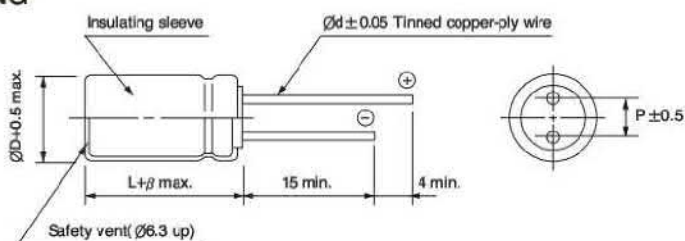


- Low leakage current series
- Wide operating temperature range of -55 ~ +105°C
- For Hi-Fi sound audio systems
- Complied to the RoHS directive

Item	Characteristics						
Operating temperature range	-55 ~ +105°C						
Leakage current max.	I = 0.002CV or 0.4μA whichever is greater (after 2 minutes)						
Capacitance tolerance	± 20% at 120Hz, 20°C						
Dissipation factor max. (at 120Hz, 20°C)	WV	10	16	25	35	40	50
	tanδ	0.15	0.12	0.08	0.08	0.08	0.08
Low temperature characteristics (Impedance ratio at 120Hz)	WV	10	16	25~50			
	Z-25°C/Z+20°C	2	2	1.5			
	Z-40°C/Z+20°C	4	3	2			
Load life (after application of the rated voltage for 1000 hours at 105° C)	Leakage current			Less than specified value			
	Capacitance change			Within ± 15% of initial value			
	tanδ			Less than 150% of specified value			
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.						

## DRAWING

Unit : mm



$\varnothing D$	5	6.3	8	10
P	2.0	2.5	3.5	5.0
$\varnothing d$	0.5	0.5	0.6	0.6
$\beta$		1.5		2.0

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu F$	WV	10	16	25	35	40	50
0.1							5×11 4.4
0.15							5×11 5.4
0.22							5×11 6.5
0.33							5×11 8.0
0.47							5×11 9.6
0.68							5×11 11
1.0							5×11 14
1.5							5×11 17
2.2							5×11 21
3.3							5×11 25
4.7							5×11 30
6.8							5×11 36
10						5×11	44
15					5×11	54	63×11 62
22				5×11	65	63×11	75 63×11 75
33			5×11	65	63×11	92	8×11.5 109 8×11.5 109
47	5×11	70	63×11	90	63×11	110	8×11.5 129 8×11.5 129
68	63×11	96	63×11	108	8×11.5	156	8×11.5 156 10×12.5 181 10×12.5 181
100	63×11	117	8×11.5	154	8×11.5	189	10×12.5 219
150	8×11.5	169	8×11.5	189	10×12.5	269	
220	8×11.5	205	10×12.5	266			
330	10×12.5	291					

Ripple current (mA rms) at 105°C, 120Hz  
 Case size  $\varnothing D \times L$  (mm)

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

$\mu F$	Frequency	50Hz	120Hz	1kHz	10kHz $\leq$
~ 47		0.75	1.00	1.55	2.00
68 ~		0.80	1.00	1.35	1.50



# 5 LARGE ALUMINUM ELECTROLYTIC CAPACITORS

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## PART NUMBER SYSTEM

### Part Number System

<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
1	2	3	4	5	6	7	8
Series Name	Rated Voltage	Capacitance	Cap. Tol.	Case Diameter	Case Height	Terminal Configurations	Internal Control Code

#### 1 Series Name

See page 5.

#### 2 Rated Working Voltage

WV	6.3	10	16	25	35
Code	0J	1A	1C	1E	1V
WV	40	50	63	80	100
Code	1G	1H	1J	1K	2A
WV	160	200	220	250	315
Code	2C	2D	7D	2E	2F
WV	330	350	360	375	400
Code	2L	2V	2Z	7S	2G
WV	450	475	500	550	600
Code	2W	7W	2H	7H	2X

#### 3 Capacitance

ex) 47 $\mu$ F 476  
 470 $\mu$ F 477  
 4700 $\mu$ F 478  
 47000 $\mu$ F 479

#### 4 Capacitance Tolerance

Tolerance (%)	$\pm 10$	$\pm 20$	0 +20	-10 +20	-10 +30	-10 +50
Code	K	M	W	V	Q	T

#### 5 Case Diameter

ex)  $\varnothing 22$  22  
 $\varnothing 25.4$  25  
 $\varnothing 30$  30  
 $\varnothing 35$  35  
 $\varnothing 40$  40  
 $\varnothing 51$  51  
 $\varnothing 63.5$  64  
 $\varnothing 76.2$  76  
 $\varnothing 89$  89

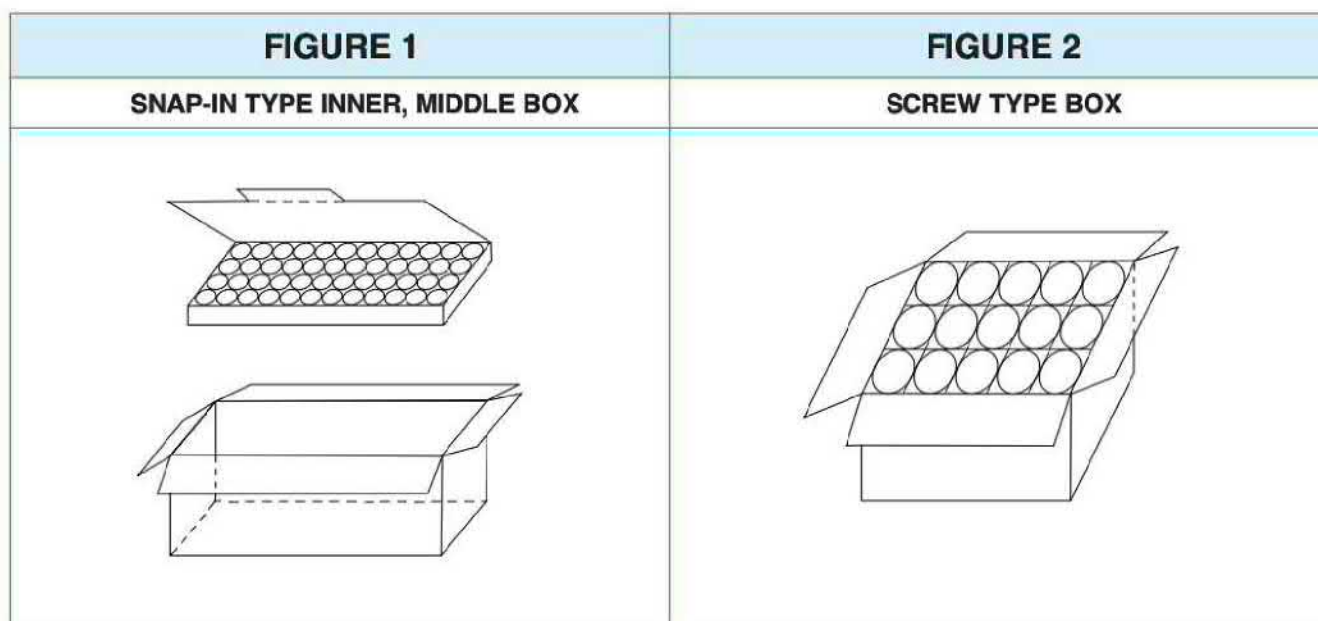
#### 6 Case Height

ex) 30mm 030  
 105mm 105

#### 7 Terminal Configurations

Terminal Configurations		Code
Snap-in Terminal for PC board mounting	Terminal Length 6mm	HA
	Terminal Length 4mm	HC
Lug Terminal for Soldering	$\varnothing D \leq 35$	LC
	$\varnothing D = 40$	LA
	$\varnothing D = 51$	LD
	$\varnothing D \geq 63.5$	LE
Photo Flash	$\varnothing D \leq 20$	PJ
	$\varnothing D = 22$	PK
	$\varnothing D = 25.4, 30$	LC
	$\varnothing D = 35$	LF
Screw Terminal Type		SB
Screw Terminal Type (Stud Type)		TB
Screw Terminal Type (M6)		S6
Screw Terminal Type (Stud Type, M6)		T6

# PACKING



● SNAP-IN TYPE PACKAGING Quantity(pcs) / BOX(FIGURE 1)

SIZE		SNAP-IN(QUANTITY)	
ØD	L	INNER BOX	MIDDLE BOX
20, 22	20 ~ 40	200	600
	45 ~ 50		
25	20 ~ 40	150	450
	45 ~ 50		
	60		
30	20 ~ 40	100	300
	45 ~ 55		
	60 ~ 80		
35	20 ~ 40	50	200
	45 ~ 55		150
	60 ~ 80		
	100 ~ 120		
40	30 ~ 40	50	150
	50		
	60 ~ 80		
	90 ~ 110		

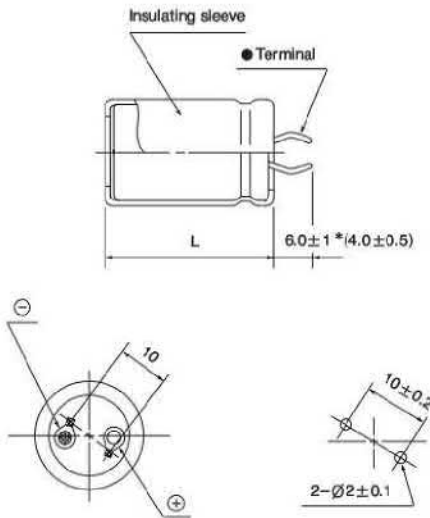
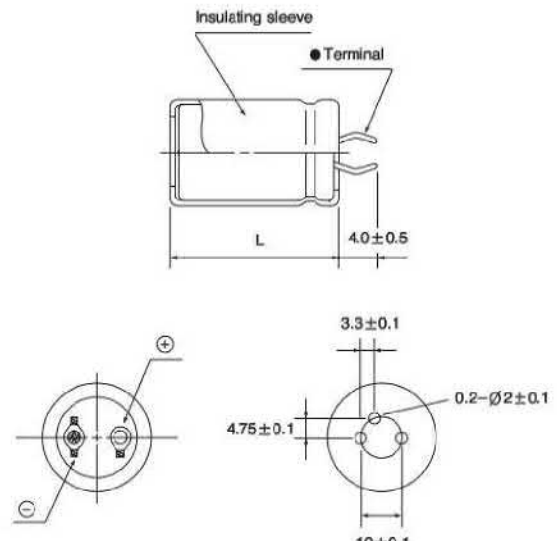
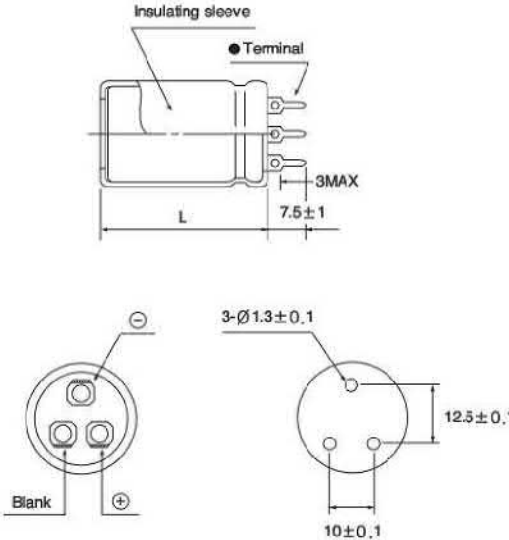
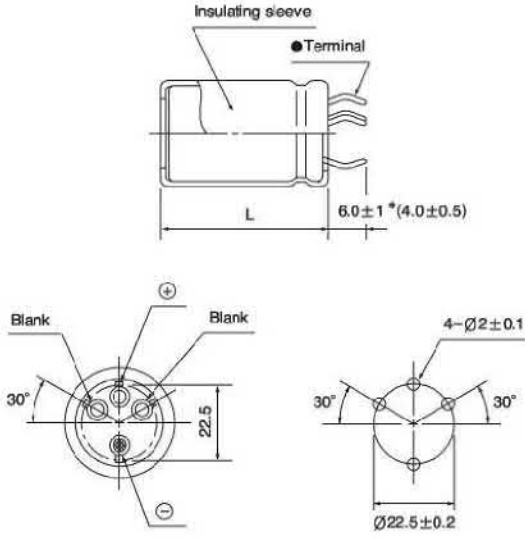
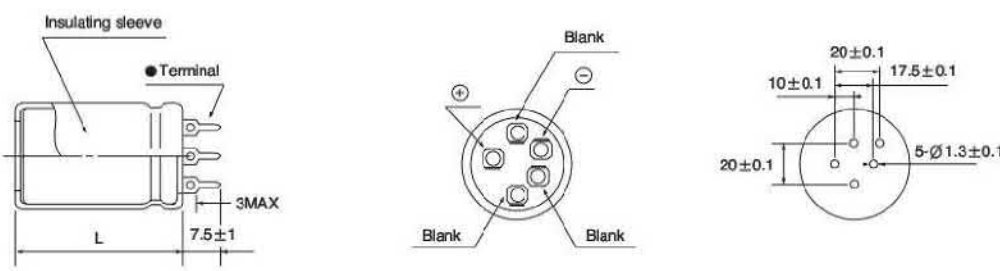
● SCREW TYPE PACKAGING Quantity(pcs) / BOX & BOX SIZE(FIGURE 2)

SIZE		SCREW
ØD	L	QUANTITY
35	50 ~ 100	49
	105 ~ 120	49
51	50 ~ 100	25
	105 ~ 125	25
	130 ~ 140	25
64	60 ~ 100	16
	105 ~ 125	16
	130 ~ 160	16
76	80 ~ 100	16
	105 ~ 125	16
	130 ~ 170	16
89	100 ~ 190	9



# LARGE ALUMINUM ELECTROLYTIC CAPACITORS

## ● SNAP-IN DRAWING

STANDARD 2 PIN (Ø22~Ø40)	2 PIN - 1 (Ø25, Ø30, Ø35)
	
3 PIN - 1 (ONLY Ø25)	4 PIN (Ø35, Ø40)
	
5 PIN (ONLY Ø40)	
	

## SCREW CASE DRAWING

STANDARD	STUD TYPE
	<p>(ONLY <math>\varnothing 51, 64, 76</math>)</p>

## T-BOARD DRAWING

STANDARD	(+) 3mm Up	WILD TYPE (M6 BOLT)
	<p>(ONLY <math>\varnothing 76</math>)</p>	<p>(ONLY <math>\varnothing 76</math>)</p>

## STUD TYPE DRAWING

NON-INSULATED VERSION	INSULATED VERSION		
		Stud Type Washer	
		Stud Type Bolt	
		Insulation Cap	

# LARGE ALUMINUM ELECTROLYTIC CAPACITORS

Upgrade

## HC

Snap-in Terminal Type, Standard Series

- Standard snap-in terminal type
- Including 550WV products
- Complied to the RoHS directive



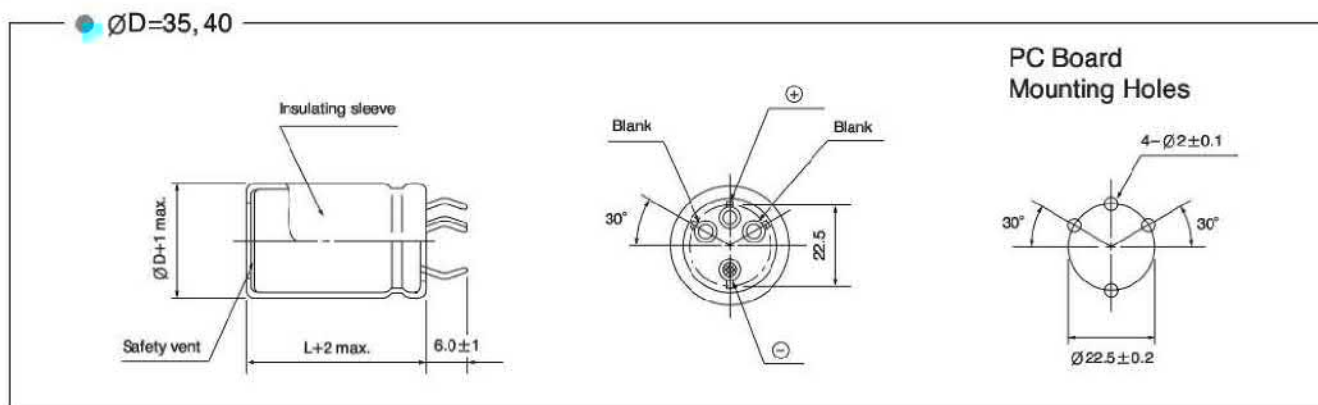
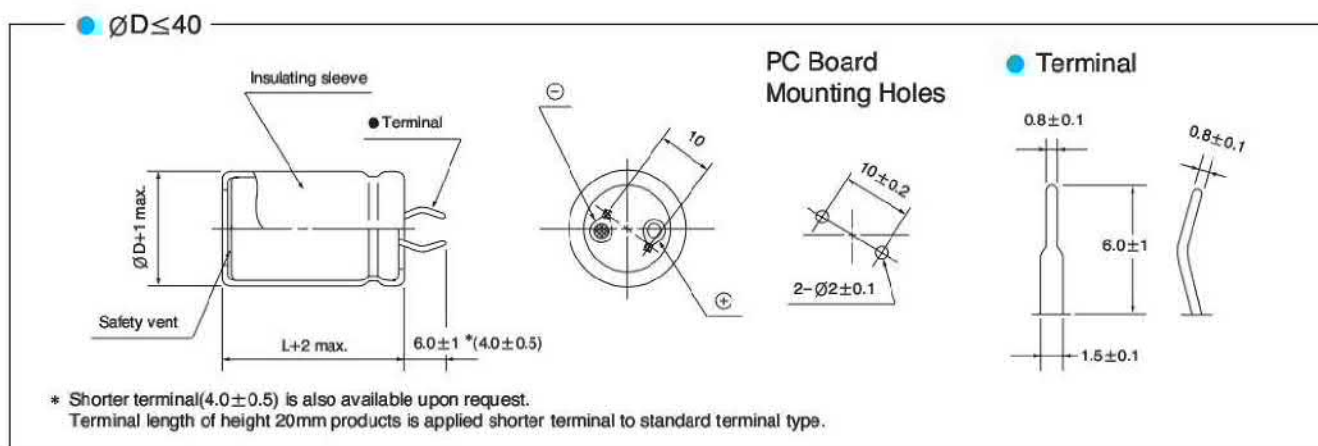
Solvent Proof  
WV ≤ 100V



Item	Characteristics								
Operating temperature range	WV< 350 : -40 ~ +85℃, WV≥ 350 : -25 ~ +85℃								
Capacitance tolerance	±20% at 120Hz, 20℃								
Leakage current max.	I=3 √CV (μA) (after 5 minutes)								
Dissipation factor max. (at 120Hz, 20℃)	Capacitance > 1000μF : tanδ increases by 0.01 for each 1000μF from below value.								
	WV	6.3	10	16, 25	35	50, 63	80, 100	160 ~ 400	450~550
	tanδ	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.20
Load life (after application of the rated voltage for 2000 hours at 85℃)	Leakage current				Less than specified value				
	Capacitance change				Within ±20% of initial value				
	tanδ				Less than 200% of specified value				
Shelf life (at 85℃)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20℃ by the KS C 6035 clause 5.4.								

## DRAWING

Unit : mm



## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

WV	Frequency	50Hz	120Hz	300Hz	1kHz	10kHz ≤
~ 100		0.85	1.00	1.05	1.15	1.20
160 ~ 250		0.85	1.00	1.20	1.25	1.45
300 ~		0.85	1.00	1.15	1.20	1.40



## HC series

### DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV μF ØD	6.3					10					16				
	22	25.4	30	35	40	22	25.4	30	35	40	22	25.4	30	35	40
10000											22×25 3.32				
12000						22×25 3.31					22×30 3.55	25.4×25 3.89			
15000	22×25 3.39					22×30 3.82	25.4×25 3.39				22×35 4.29	25.4×30 4.45	30×25 4.56		
18000	22×30 3.85	25.4×25 3.96				22×35 4.28	25.4×25 4.17				22×40 4.77	25.4×35 4.96	30×30 5.10		
22000	22×35 4.34	25.4×25 4.22				22×40 4.79	25.4×30 4.71	30×25 4.83			22×50 5.51	25.4×40 5.51	30×30 5.39		
27000	22×40 4.85	25.4×30 4.77	30×25 4.89			22×45 5.30	25.4×35 5.26	30×30 5.41				25.4×45 6.06	30×35 5.98	35×25 5.80	
33000	22×45 5.36	25.4×35 5.32	30×30 5.47			22×50 5.82	25.4×40 5.81	30×30 5.69	35×25 5.81				30×40 6.56	35×30 6.41	
39000	22×50 5.83	25.4×40 5.82	30×30 5.70	35×25 5.82			25.4×45 6.31	30×35 6.22	35×30 6.38				30×45 7.08	35×35 6.96	
47000		25.4×45 6.35	30×35 6.26	35×30 6.41			25.4×50 6.83	30×40 6.78	35×30 6.62				30×50 7.62	35×40 7.54	
56000		25.4×50 6.85	30×40 6.80	35×30 6.64				30×45 7.31	35×35 7.18					35×45 8.08	40×40 8.23
68000			30×45 7.35	35×35 7.23					35×40 7.76					35×50 8.63	40×50 9.13
100000				35×45 8.34	40×40 8.49					40×50 9.35					40×60 10.2

WV μF ØD	25					35					50				
	22	25.4	30	35	40	22	25.4	30	35	40	22	25.4	30	35	40
3300											22×30 2.97	25.4×25 3.06			
4700						22×30 3.06	25.4×25 2.98				22×40 3.83	25.4×35 3.98	30×25 3.86	35×25 4.19	
5600	22×25 2.65					22×35 3.28	25.4×30 3.39				22×45 4.26	25.4×40 4.44	30×30 4.35	35×25 4.44	
6800	22×30 3.06	25.4×25 3.15				22×40 3.73	25.4×30 3.67	30×25 3.76			22×50 4.77	25.4×40 4.76	30×35 4.92	35×30 5.04	
8200	22×35 3.45	25.4×30 3.57				22×45 4.13	25.4×35 4.10	30×30 4.22				25.4×50 5.43	30×40 5.38	35×30 5.26	
10000	22×40 3.95	25.4×30 3.89	30×25 3.99			22×50 4.68	25.4×40 4.68	30×30 4.58					30×45 6.07	35×35 5.97	
12000	22×45 4.41	25.4×35 4.37	30×30 4.50				25.4×45 5.18	30×35 5.11	35×30 5.24				30×50 6.62	35×40 6.55	
15000	22×50 4.94	25.4×40 4.94	30×35 5.10					30×40 5.72	35×35 5.88					35×45 7.20	
18000		25.4×45 5.45	30×35 5.38	35×30 5.51				30×45 6.28	35×40 6.46					35×50 7.74	40×40 7.62
22000			30×45 6.22	35×35 6.12					35×45 7.07	40×40 7.20					40×50 8.54
27000			30×50 6.82	35×40 6.74						40×50 8.14					40×60 9.45
33000				35×45 7.35	40×40 7.48					40×50 8.46					

WV μF ØD	63					80					100				
	22	25.4	30	35	40	22	25.4	30	35	40	22	25.4	30	35	40
1200						22×25 2.24					22×30 2.39	25.4×25 2.46			
1500						22×30 2.67					22×35 2.83	25.4×30 2.93	30×25 3.00		
1800	22×25 2.20					22×30 2.92	25.4×25 3.01				22×40 3.26	25.4×35 3.39	30×30 3.49		
2200	22×30 2.50	25.4×25 2.58				22×35 3.25	25.4×30 3.36	30×25 3.45			22×45 3.58	25.4×40 3.74	30×30 3.66		
2700	22×35 2.94	25.4×30 3.04				22×40 3.79	25.4×35 3.94	30×30 4.05				25.4×45 4.33	30×35 4.27	35×30 4.37	
3300	22×40 3.14	25.4×35 3.26	30×25 3.34			22×45 4.18	25.4×40 4.36	30×30 4.27				25.4×50 4.76	30×40 4.72	35×35 4.85	
3900	22×40 3.60	25.4×35 3.74	30×30 3.85			22×50 4.75	25.4×45 4.96	30×35 4.89					30×45 5.36	35×35 5.27	
4700	22×50 4.19	25.4×40 4.19	30×35 4.10	35×30 4.19			25.4×50 5.44	30×40 5.39	35×30 5.27				30×50 5.86	35×40 5.80	
5600		25.4×45 4.65	30×35 4.58	35×30 4.70				30×45 5.91	35×35 5.81					35×45 6.34	40×40 6.45
6800		25.4×50 5.20	30×40 5.16	35×30 5.04					35×40 6.45						40×50 7.40
8200			30×45 5.62	35×35 5.53					35×45 6.91	40×40 7.04					40×50 7.60
10000			30×50 6.32	35×40 6.25						40×50 8.14	← Case size ØD×L (mm) ← Ripple current (Arms) at 85°C, 120Hz				
12000				35×45 6.83	40×40 6.95										

# LARGE ALUMINUM ELECTROLYTIC CAPACITORS

**HC** series

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV μF	160					200					250				
	22	25.4	30	35	40	22	25.4	30	35	40	22	25.4	30	35	40
150											22×25 0.90	25.4×20 0.92			
180						22×20 0.91					22×25 0.90	25.4×20 1.01			
220	22×20 1.01					22×25 1.09	25.4×20 1.11				22×25 1.09	25.4×25 1.19	30×20 1.22		
270	22×25 1.20	25.4×20 1.32				22×25 1.20	25.4×25 1.32	30×20 1.35			22×30 1.23	25.4×25 1.32	30×20 1.35		
330	22×25 1.33	25.4×20 1.36				22×30 1.42	25.4×25 1.46	30×20 1.49			22×30 1.42	25.4×30 1.58	30×20 1.49	35×20 1.62	
390	22×25 1.45	25.4×25 1.59	30×20 1.62			22×30 1.54	25.4×25 1.59	30×25 1.74	35×20 1.77		22×35 1.63	25.4×30 1.69	30×25 1.73	35×20 1.77	
470	22×30 1.69	25.4×25 1.75	30×20 1.78			22×35 1.79	25.4×30 1.86	30×25 1.90	35×20 1.94		22×40 1.89	25.4×30 1.84	30×25 1.90	35×25 2.06	
560	22×35 1.96	25.4×30 2.03	30×25 2.08	35×20 2.12		22×40 2.06	25.4×35 2.14	30×25 2.08	35×25 2.25		22×50 2.26	25.4×40 2.25	30×30 2.20	35×25 2.25	
680	22×40 2.27	25.4×30 2.23	30×25 2.29	35×20 2.33		22×45 2.38	25.4×40 2.48	30×30 2.43	35×25 2.48			25.4×45 2.60	30×35 2.56	35×30 2.62	
820	22×45 2.61	25.4×35 2.59	30×30 2.67	35×25 2.73		22×50 2.73	25.4×45 2.85	30×35 2.81	35×30 2.88			25.4×45 2.82	30×40 2.95	35×30 2.88	
1000	22×50 3.01	25.4×40 3.01	30×30 3.05	35×25 3.01				30×40 3.26	35×30 3.18				30×45 3.40	35×35 3.35	
1200		25.4×45 3.23	30×35 3.18	35×30 3.26				30×45 3.49	35×35 3.43					35×40 3.59	40×40 3.81
1500			30×40 3.73	35×35 3.83				30×50 4.06	35×40 4.01					35×50 4.35	40×50 4.60
1800				35×40 4.39	40×40 4.66				35×45 4.58	40×40 4.66					40×60 5.39

WV μF	315					350					400				
	22	25.4	30	35	40	22	25.4	30	35	40	22	25.4	30	35	40
68											22×20 0.58	25.4×20 0.61			
82						22×20 0.62					22×25 0.66	25.4×20 0.68			
100	22×20 0.68					22×25 0.73	25.4×20 0.75				22×25 0.74	25.4×25 0.81	30×20 0.82		
120	22×25 0.80	25.4×20 0.82				22×25 0.81	25.4×25 0.88	30×20 0.90			22×30 0.86	25.4×25 0.88	30×20 0.90		
150	22×25 0.89	25.4×25 0.99	30×20 1.01			22×30 0.96	25.4×25 0.97	30×20 1.01			22×30 0.96	25.4×30 1.05	30×25 1.08	35×20 1.09	
180	22×30 1.05	25.4×25 1.07	30×20 1.10	35×20 1.20		22×35 1.12	25.4×30 1.14	30×25 1.18	35×20 1.20		22×40 1.17	25.4×35 1.21	30×25 1.18	35×25 1.28	
220	22×35 1.23	25.4×30 1.27	30×25 1.30	35×20 1.33		22×40 1.29	25.4×30 1.26	30×25 1.30	35×25 1.41		22×45 1.35	25.4×40 1.41	30×30 1.38	35×25 1.41	
270	22×40 1.43	25.4×30 1.40	30×25 1.44	35×25 1.56			25.4×35 1.47	30×30 1.53	35×25 1.65			25.4×40 1.55	30×30 1.55	35×25 1.56	
330	22×50 1.73	25.4×35 1.63	30×30 1.69	35×25 1.73			25.4×40 1.71	30×35 1.78	35×30 1.83			25.4×45 1.80	30×35 1.78	35×30 1.83	
390		25.4×40 1.86	30×35 1.94	35×30 1.99				30×40 2.03	35×30 1.98				30×40 2.03	35×30 1.98	
470			30×35 2.13	35×30 2.18				30×40 2.23	35×35 2.30				30×45 2.30	35×35 2.30	
560			30×40 2.44	35×35 2.50				30×45 2.55	35×40 2.62					35×40 2.62	40×40 2.78
680			30×45 2.80	35×40 2.88				30×50 2.92	35×45 3.01	40×40 3.06				35×50 3.13	40×50 3.31
820			30×50 3.21	35×50 3.44	40×40 3.37				35×50 3.44	40×50 3.63					40×60 3.89

WV μF	450					500					550				
	22	25.4	30	35	40	22	25.4	30	35	40	22	25.4	30	35	40
47											22×30 0.41	25.4×25 0.42	30×20 0.43		
56	22×20 0.51										22×30 0.45	25.4×30 0.49	30×25 0.50	35×20 0.51	
68	22×25 0.60	25.4×20 0.61				22×25 0.46					22×35 0.52	25.4×30 0.53	30×25 0.55	35×20 0.56	
82	22×30 0.71	25.4×25 0.72	30×20 0.74			22×30 0.54	25.4×25 0.55				22×40 0.60	25.4×35 0.62	30×30 0.64	35×25 0.66	
100	22×30 0.78	25.4×30 0.85	30×25 0.88	35×20 0.89		22×40 0.66	25.4×30 0.66	30×25 0.67			22×45 0.70	25.4×40 0.72	30×30 0.71	35×25 0.73	
120	22×35 0.91	25.4×30 0.93	30×25 0.96	35×20 0.98			25.4×40 0.78	30×30 0.78				25.4×45 0.83	30×35 0.82	35×30 0.84	
150	22×40 1.07	25.4×35 1.10	30×30 1.14	35×25 1.16				30×35 0.92				25.4×50 0.96	30×40 0.96	35×35 0.99	
180		25.4×35 1.20	30×30 1.25	35×25 1.28				30×40 1.05					30×45 1.10	35×35 1.08	
220		25.4×40 1.40	30×35 1.45	35×30 1.49				30×45 1.22	35×40 1.25					35×45 1.31	40×40 1.33
270			30×40 1.62	35×30 1.65					35×45 1.44					35×50 1.51	40×50 1.59
330			30×45 1.94	35×35 1.94					35×45 1.62						40×50 1.76
390			30×50 2.21	35×35 2.09					35×50 1.80						40×60 2.05
470			30×50 2.42	35×40 2.42	40×40 2.55					40×50 2.10					40×60 2.25
560				35×50 2.84	40×50 3.00					40×60 2.45					
680					40×60 3.54					40×60 2.70					

← Case size ØD×L (mm)  
 ← Ripple current (Arms) at 85°C, 120Hz





## Snap-in Terminal Type, Miniaturized Series

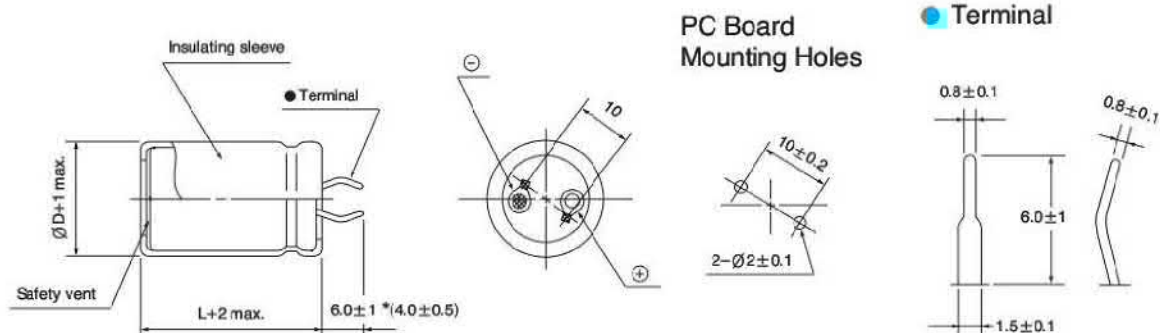
- Smaller case sizes than HC series
- High voltage, high capacitance series
- Load life of 3000 hours at 85°C
- Addition of 10 ~ 100V rated voltage
- Complied to the RoHS directive



Item	Characteristics							
Operating temperature range	WV<350 : -40 ~ +85°C, WV ≥350 : -25 ~ +85°C							
Capacitance tolerance	± 20% at 120Hz, 20°C							
Leakage current max.	I=3√CV (μA) (after 5 minutes)							
Dissipation factor max. (at 120Hz, 20°C)	Capacitance > 1000μF : tanδ increases by 0.01 for each 1000μF from below value.							
	WV	10	16, 25	35	50, 63	80, 100	160 ~ 400	450
	tanδ	0.40	0.35	0.30	0.25	0.20	0.15	0.20
Load life (after application of the rated voltage for 3000 hours at 85°C)	Leakage current			Less than specified value				
	Capacitance change			Within ±20% of initial value				
	tanδ			Less than 200% of specified value				
Shelf life (at 85°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.							

### DRAWING

Unit : mm



- \* Shorter terminal( $4.0 \pm 0.5$ ) is also available upon request.  
Terminal length of height 20mm products is applied shorter terminal to standard terminal type.

### FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

WV	Frequency	60Hz	120Hz	300Hz	1kHz	10kHz ≤
~ 100		0.85	1.00	1.06	1.15	1.20
160 ~ 250		0.85	1.00	1.20	1.25	1.45
350 ~		0.85	1.00	1.15	1.20	1.40



# LARGE ALUMINUM ELECTROLYTIC CAPACITORS

**HJ** series

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV μF ØD	10				16				25			
	22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
6800									22×25 2.24			
8200									22×30 2.61			
10000					22×30 2.68				22×35 3.24	25.4×30 3.14	30×25 3.25	
12000	22×25 2.39				22×35 3.12	25.4×25 3.00			22×40 3.70	25.4×35 3.63	30×25 3.56	
15000	22×30 2.86				22×40 3.67	25.4×30 3.58	30×25 3.70			25.4×40 4.09	30×30 4.00	35×25 4.07
18000	22×35 3.21	25.4×25 3.05			22×45 4.15	25.4×35 4.13	30×25 3.93			25.4×45 4.62	30×35 4.60	35×30 4.64
22000	22×40 3.74	25.4×30 3.64				25.4×40 4.44	30×30 4.38			25.4×50 5.14	30×40 5.17	35×30 5.05
27000	22×45 4.06	25.4×35 3.98	30×25 3.57			25.4×45 4.89	30×35 4.84	35×25 4.71			30×45 5.98	35×35 5.88
33000		25.4×40 4.50	30×30 3.99	35×25 4.57			30×40 5.50	35×30 5.41				35×40 6.59
39000		25.4×45 5.17	30×30 4.55	35×30 5.18			30×45 6.19	35×35 6.09				
47000			30×35 5.15	35×35 5.76			30×50 6.80	35×40 6.75				
56000			30×40 5.61	35×40 6.45								

WV μF ØD	35				50				63			
	22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
2200									22×30 2.15			
2700					22×25 1.95				22×30 2.38	25.4×25 2.42		
3300					22×30 2.40	25.4×25 2.35			22×35 2.72	25.4×30 2.74		
3900	22×25 1.89				22×30 2.50	25.4×25 2.50			22×40 3.07	25.4×35 3.16	30×25 3.00	
4700	22×30 2.29	25.4×25 2.26			22×35 2.91	25.4×30 2.98	30×25 3.01		22×45 3.44	25.4×40 3.55	30×30 3.51	
5600	22×30 2.42	25.4×25 2.42			22×40 3.31	25.4×35 3.44	30×30 3.42		22×50 3.92	25.4×45 4.01	30×35 3.98	35×30 3.93
6800	22×35 2.82	25.4×30 2.89	30×25 2.89		22×45 3.70	25.4×40 3.81	30×35 3.93	35×25 3.80		25.4×50 4.47	30×40 4.48	35×30 4.38
8200	22×40 3.26	25.4×35 3.30	30×25 3.19			25.4×45 4.32	30×40 4.51	35×30 4.41			30×45 5.07	35×35 4.99
10000	22×45 3.57	25.4×40 3.65	30×30 3.60	35×25 3.60		25.4×50 4.83	30×45 5.04	35×35 4.88			30×50 5.75	35×40 5.68
12000		25.4×45 4.15	30×35 4.13	35×30 4.23			30×45 5.44	35×40 5.60				35×45 6.47
15000		25.4×50 4.76	30×40 4.76	35×35 4.90				35×45 6.53				
18000			30×45 5.22	35×40 5.44				35×45 7.04				
22000				35×45 6.28								
27000				35×50 6.90								

WV μF ØD	80				100			
	22	25.4	30	35	22	25.4	30	35
1200	22×25 1.77				22×30 2.02	25.4×25 2.06		
1500	22×30 2.00	25.4×25 2.02			22×35 2.40	25.4×30 2.45		
1800	22×35 2.35	25.4×30 2.35			22×40 2.76	25.4×35 2.81	30×30 2.84	
2200	22×40 2.86	25.4×30 2.79	30×25 2.85		22×45 3.00	25.4×40 3.10	30×30 3.06	35×25 3.13
2700	22×45 3.23	25.4×35 3.05	30×30 3.17			25.4×45 3.59	30×35 3.57	35×30 3.66
3300	22×50 3.18	25.4×40 3.28	30×30 3.24				30×40 4.15	35×35 4.18
3900		25.4×45 3.62	30×35 3.60				30×45 4.58	35×35 4.51
4700		25.4×50 4.22	30×40 4.23	35×30 4.12				35×40 5.18
5600			30×45 4.66	35×35 4.59				35×50 5.91
6800				35×40 5.20				
8200				35×45 5.86				
10000				35×50 6.61				

Case size ØD×L (mm)

Ripple current (A rms) at 85°C, 120Hz

## HJ series

### DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV μF	160				200				250			
	22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
150									22 × 20 0.83			
180					22 × 20 0.91				22 × 20 0.91			
220					22 × 20 1.01				22 × 25 1.09	25.4 × 20 1.11		
270	22 × 20 1.12				22 × 25 1.20	25.4 × 20 1.23			22 × 25 1.20	25.4 × 25 1.32		
330	22 × 25 1.33	25.4 × 20 1.36			22 × 25 1.33	25.4 × 20 1.36			22 × 30 1.42	25.4 × 25 1.46	30 × 20 1.49	
390	22 × 25 1.45	25.4 × 20 1.48			22 × 25 1.45	25.4 × 25 1.59	30 × 20 1.62		22 × 35 1.63	25.4 × 30 1.69	30 × 25 1.73	35 × 20 1.77
470	22 × 30 1.69	25.4 × 25 1.75			22 × 30 1.69	25.4 × 25 1.75	30 × 20 1.78		22 × 35 1.79	25.4 × 35 1.96	30 × 25 1.90	35 × 20 1.94
560	22 × 30 1.85	25.4 × 25 1.91	30 × 20 1.94		22 × 35 1.96	25.4 × 30 2.03	30 × 25 2.08	35 × 20 2.12	22 × 40 2.06	25.4 × 35 2.14	30 × 25 2.08	35 × 25 2.25
680	22 × 35 2.16	25.4 × 30 2.23	30 × 25 2.29	35 × 20 2.33	22 × 40 2.27	25.4 × 30 2.23	30 × 25 2.29	35 × 25 2.33	22 × 50 2.49	25.4 × 40 2.48	30 × 30 2.43	35 × 25 2.48
820	22 × 40 2.50	25.4 × 30 2.45	30 × 25 2.52	35 × 20 2.56	22 × 45 2.61	25.4 × 35 2.59	30 × 30 2.67	35 × 25 2.73		25.4 × 45 2.85	30 × 35 2.81	35 × 30 2.88
1000	22 × 45 2.89	25.4 × 35 2.86	30 × 30 2.95	35 × 25 3.01	22 × 50 3.01	25.4 × 40 3.01	30 × 35 3.11	35 × 30 3.18			30 × 40 3.26	35 × 35 3.35
1200	22 × 50 3.09	25.4 × 40 3.08	30 × 30 3.02	35 × 25 3.08		25.4 × 45 3.23	30 × 35 3.18	35 × 30 3.26			30 × 45 3.49	35 × 35 3.43
1500		25.4 × 45 3.61	30 × 35 3.56	35 × 30 3.65			30 × 45 3.90	35 × 35 3.83				35 × 40 4.01
1800			30 × 40 4.09	35 × 35 4.20			30 × 50 4.44	35 × 40 4.39				35 × 50 4.76
2200			30 × 50 4.63	35 × 40 4.58				35 × 45 4.77				
2700				35 × 45 5.29								
3300				35 × 50 5.77								

WV μF	350				400				450			
	22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
56									22 × 20 0.51			
68					22 × 20 0.56				22 × 20 0.56			
82					22 × 20 0.62				22 × 25 0.66	25.4 × 20 0.68		
100	22 × 20 0.68				22 × 25 0.73	25.4 × 20 0.75			22 × 25 0.73	25.4 × 25 0.81		
120	22 × 25 0.80	25.4 × 20 0.82			22 × 25 0.80	25.4 × 20 0.82			22 × 30 0.86	25.4 × 25 0.88	30 × 20 0.90	
150	22 × 25 0.90	25.4 × 25 0.92			22 × 30 0.90	25.4 × 25 0.99	30 × 20 1.01		22 × 35 1.01	25.4 × 30 1.05	30 × 25 1.08	35 × 20 1.10
180	22 × 30 1.05	25.4 × 25 1.08			22 × 30 1.05	25.4 × 25 1.08	30 × 25 1.10		22 × 35 1.11	25.4 × 35 1.21	30 × 25 1.18	35 × 20 1.20
220	22 × 30 1.16	25.4 × 30 1.19	30 × 25 1.22		22 × 35 1.23	25.4 × 30 1.27	30 × 25 1.30	35 × 20 1.33	22 × 40 1.29	25.4 × 35 1.34	30 × 25 1.30	35 × 25 1.41
270	22 × 35 1.36	25.4 × 30 1.41	30 × 25 1.44	35 × 20 1.47	22 × 40 1.43	25.4 × 35 1.49	30 × 30 1.44	35 × 25 1.47	22 × 50 1.57	25.4 × 40 1.56	30 × 30 1.53	35 × 25 1.56
330	22 × 45 1.58	25.4 × 35 1.56	30 × 30 1.60	35 × 25 1.62	22 × 50 1.66	25.4 × 40 1.64	30 × 30 1.69	35 × 25 1.73		25.4 × 45 1.81	30 × 35 1.78	35 × 30 1.83
390	22 × 50 1.80	25.4 × 40 1.79	30 × 30 1.84	35 × 25 1.88		25.4 × 45 1.88	30 × 35 1.94	35 × 30 1.99			30 × 40 2.03	35 × 35 2.09
470		25.4 × 45 2.06	30 × 35 2.02	35 × 30 2.06		25.4 × 50 2.16	30 × 40 2.23	35 × 30 2.18			30 × 45 2.33	35 × 35 2.29
560		25.4 × 50 2.46	30 × 40 2.32	35 × 35 2.38			30 × 45 2.55	35 × 35 2.50				35 × 40 2.62
680			30 × 45 2.69	35 × 35 2.76			30 × 50 2.92	35 × 40 2.89				35 × 50 3.13
820				35 × 40 3.17				35 × 50 3.31	Case size (D × L) (mm) Ripple current (Arms) at 85°C, 120Hz			
1000				35 × 45 3.65								



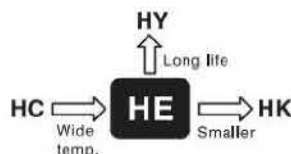
# LARGE ALUMINUM ELECTROLYTIC CAPACITORS

# HE

## Wide Temperature Range, Standard Series

- Wide temperature range of -40(-25) ~ +105°C
- Standard snap-in terminal type
- Complied to the RoHS directive

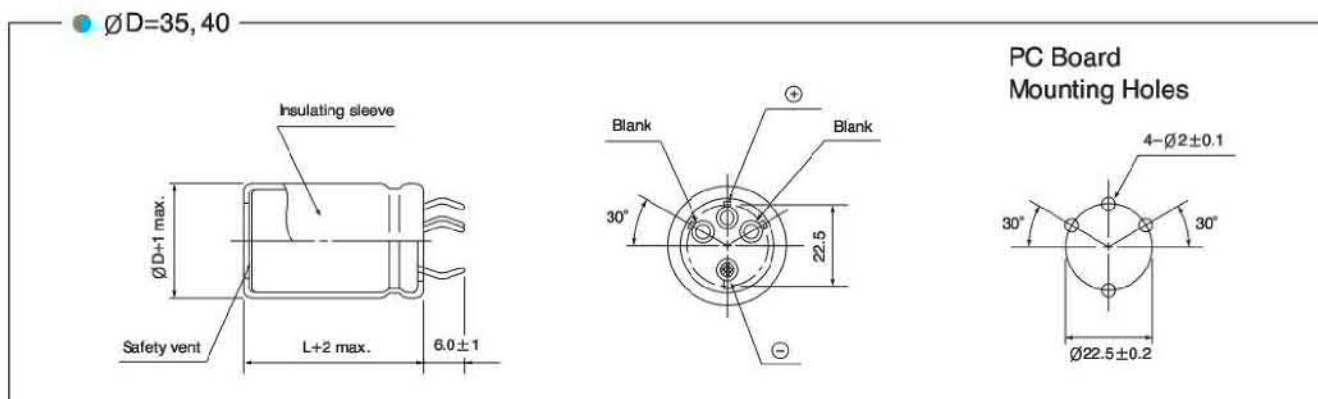
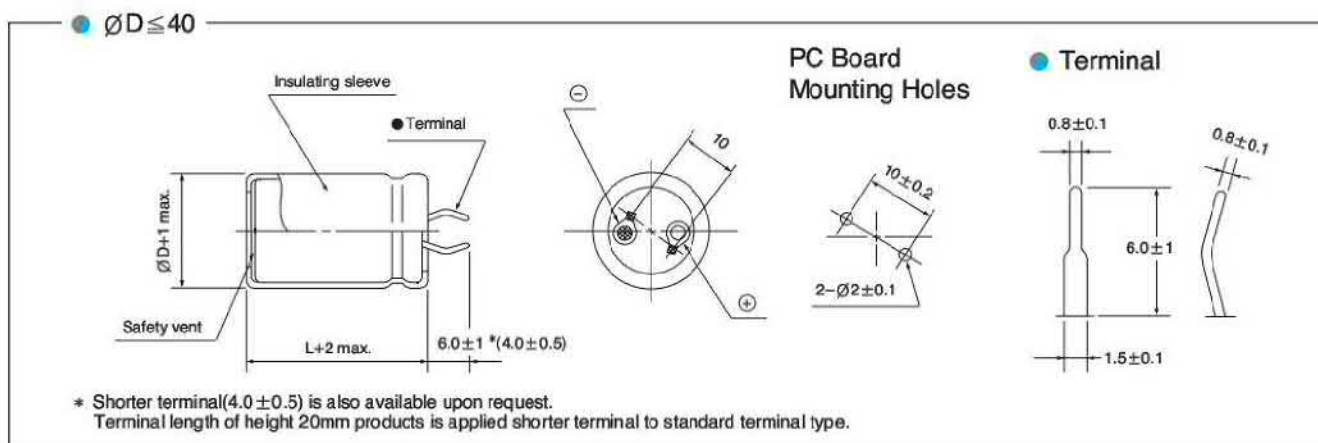
  
Solvent Proof  
WV ≤ 100V



Item	Characteristics							
Operating temperature range	WV<350 : -40 ~ +105°C, WV ≥ 350 : -25 ~ +105°C							
Capacitance tolerance	±20% at 120Hz, 20°C							
Leakage current max.	I=3√CV (μA) (after 5 minutes)							
Dissipation factor max. (at 120Hz, 20°C)	Capacitance > 1000μF : tanδ increases by 0.01 for each 1000μF from below value.							
	WV	6.3, 10	16	25, 35	50, 63	80, 100	160~400	450, 500
	tanδ	0.50	0.40	0.35	0.25	0.20	0.15	0.20
Load life (after application of the rated voltage for 2000 hours at 105°C)	Leakage current				Less than specified value			
	Capacitance change				Within ±20% of initial value			
	tanδ				Less than 200% of specified value			
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.							

## DRAWING

Unit : mm



## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

WV	Frequency(Hz)	50Hz	120Hz	300Hz	1kHz	10kHz ≤
~ 100		0.85	1.00	1.06	1.15	1.20
160 ~ 250		0.85	1.00	1.20	1.25	1.45
315 ~		0.85	1.00	1.15	1.20	1.40



## HE series

### DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV μF ØD	6.3					10					16				
	22	25.4	30	35	40	22	25.4	30	35	40	22	25.4	30	35	40
8200											22×25 2.14				
10000						22×25 2.17					22×30 2.48	25.4×25 2.56			
12000	22×25 2.19					22×30 2.48					22×35 2.80	25.4×30 2.90	30×25 2.97		
15000	22×30 2.53					22×35 2.83	25.4×25 2.75				22×40 3.17	25.4×35 3.29	30×30 3.38		
18000	22×35 2.85	25.4×25 2.77				22×35 3.00	25.4×30 3.11				22×45 3.50	25.4×40 3.65	30×30 3.57		
22000	22×35 3.04	25.4×30 3.15				22×40 3.35	25.4×35 3.48	30×25 3.38				25.4×45 4.03	30×35 3.98		
27000	22×40 3.40	25.4×35 3.53	30×25 3.42			22×50 3.88	25.4×40 3.87	30×30 3.79				25.4×50 4.42	30×40 4.39	35×30 4.29	
33000	22×50 3.92	25.4×40 3.91	30×30 3.83				25.4×45 4.26	30×35 4.20					30×45 4.79	35×35 4.71	
39000		25.4×45 4.26	30×35 4.20				25.4×50 4.60	30×40 4.57	35×30 4.46				30×50 5.16	35×40 5.10	
47000		25.4×50 4.63	30×40 4.60	35×30 4.50				30×45 4.95	35×35 4.87					35×45 5.50	40×40 5.60
56000			30×50 5.17	35×40 5.12					35×45 5.49	40×40 5.59					40×50 6.22
68000				35×45 5.52	40×40 5.62					40×50 6.22					40×60 6.83

WV μF ØD	25					35					50				
	22	25.4	30	35	40	22	25.4	30	35	40	22	25.4	30	35	40
2700											22×30 1.94				
3300						22×25 1.62					22×35 2.20				
3900						22×30 1.88					22×40 2.52	25.4×35 2.62	30×25 2.54		
4700	22×25 1.73					22×35 2.14	25.4×25 2.09				22×45 2.81	25.4×40 2.93	30×30 2.87		
5600	22×30 1.98					22×35 2.29	25.4×30 2.37	30×25 2.43			22×50 3.11	25.4×40 3.11	30×35 3.21		
6800	22×30 2.14					22×40 2.61	25.4×35 2.71	30×30 2.79				25.4×50 3.64	30×40 3.61	35×30 3.53	
8200	22×35 2.42	25.4×30 2.50				22×50 3.02	25.4×40 3.02	30×30 2.95					30×45 3.94	35×35 3.87	
10000	22×40 2.77	25.4×35 2.88					25.4×45 3.43	30×35 3.38					30×50 4.42	35×40 4.37	
12000	22×45 3.09	25.4×40 3.22	30×30 3.15				25.4×50 3.78	30×40 3.75	35×30 3.67					35×45 4.78	
15000		25.4×45 3.62	30×35 3.57	35×30 3.65				30×45 4.19	35×35 4.12					35×50 5.24	40×40 5.13
18000		25.4×50 3.98	30×40 3.95	35×35 4.06					35×40 4.52						40×50 5.76
22000			30×45 4.36	35×35 4.28					35×45 4.95	40×40 5.04					40×50 5.98
27000				35×45 4.92	40×40 5.01					40×50 5.92					40×60 6.61

WV μF ØD	63					80					100				
	22	25.4	30	35	40	22	25.4	30	35	40	22	25.4	30	35	40
820						22×25 1.37					22×30 1.46	25.4×25 1.51			
1000						22×30 1.62	25.4×25 1.67				22×35 1.71	25.4×30 1.77			
1200	22×25 1.37					22×30 1.67	25.4×25 1.72				22×40 1.86	25.4×35 1.94	30×25 1.88		
1500	22×30 1.50	25.4×25 1.54				22×35 1.98	25.4×30 2.05				22×45 2.18	25.4×40 2.28	30×30 2.23		
1800	22×30 1.64	25.4×25 1.69				22×40 2.28	25.4×35 2.37	30×25 2.30				25.4×45 2.61	30×35 2.57		
2200	22×35 1.86	25.4×30 1.92				22×45 2.51	25.4×35 2.49	30×30 2.56				25.4×50 2.85	30×40 2.83	35×30 2.76	
2700	22×40 2.17	25.4×30 2.13	30×25 2.18				25.4×45 3.03	30×35 2.99					30×45 3.27	35×35 3.22	
3300	22×50 2.53	25.4×40 2.53	30×30 2.48				25.4×50 3.33	30×40 3.30	35×30 3.23				30×50 3.59	35×40 3.55	
3900		25.4×45 2.88	30×35 2.84					30×45 3.75	35×35 3.69					35×45 4.03	
4700		25.4×50 3.20	30×40 3.17	35×30 3.10				30×50 4.10	35×40 4.06					35×50 4.40	40×40 4.31
5600			30×45 3.51	35×35 3.46					35×45 4.44						40×50 4.88
6800			30×50 3.92	35×40 3.88					35×50 4.90	40×40 4.80					40×50 5.18
8200				35×45 4.22						40×50 5.32	← Case size (ØD×L) (mm)				
10000				35×50 4.74	40×40 4.64						← Ripple current (Arms) at 105°C, 120Hz				

# LARGE ALUMINUM ELECTROLYTIC CAPACITORS

**HE** series

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV μF	160					200					250				
	22	25.4	30	35	40	22	25.4	30	35	40	22	25.4	30	35	40
150						22×20 0.63					22×20 0.68	25.4×20 0.69			
180	22×20 0.69					22×20 0.69					22×25 0.74	25.4×20 0.76	30×20 0.83		
220	22×20 0.76					22×25 0.82	25.4×20 0.84				22×25 0.88	25.4×25 0.90	30×20 0.92		
270	22×25 0.91	25.4×20 0.93				22×30 0.91	25.4×25 1.00	30×20 1.02			22×30 1.03	25.4×30 1.06	30×25 1.09	35×20 1.11	
330	22×25 1.01	25.4×25 1.10	30×20 1.13			22×30 1.07	25.4×25 1.11	30×20 1.13			22×40 1.20	25.4×30 1.18	30×25 1.21	35×20 1.23	
390	22×30 1.17	25.4×25 1.20	30×20 1.23			22×35 1.24	25.4×30 1.28	30×25 1.31	35×20 1.34		22×45 1.36	25.4×40 1.42	30×30 1.39	35×25 1.42	
470	22×35 1.36	25.4×25 1.32	30×25 1.44	35×20 1.47		22×40 1.43	25.4×35 1.40	30×25 1.44	35×25 1.56		22×50 1.56	25.4×40 1.56	30×30 1.53	35×25 1.56	
560	22×40 1.56	25.4×30 1.53	30×25 1.57	35×25 1.70		22×45 1.63	25.4×40 1.62	30×30 1.67	35×25 1.70			25.4×50 1.86	30×35 1.76	35×30 1.80	
680	22×45 1.80	25.4×35 1.79	30×25 1.73	35×25 1.88		22×50 1.88	25.4×45 1.96	30×30 1.84	35×25 1.88				30×35 2.12	35×35 2.09	
820	22×50 2.06	25.4×40 2.06	30×30 2.02	35×25 2.06			25.4×50 2.25	30×35 2.13	35×30 2.18				30×40 2.23	35×35 2.40	
1000		25.4×45 2.38	30×35 2.35	35×30 2.41				30×45 2.57	35×35 2.53					35×45 2.76	40×40 2.81
1200		25.4×50 2.52	30×40 2.50	35×30 2.44				30×50 2.72	35×35 2.57	40×40 2.85				35×50 2.91	40×50 3.08
1500				35×40 3.00	40×40 3.19				35×45 3.13	40×50 3.44					40×60 3.68

WV μF	315					350					400				
	22	25.4	30	35	40	22	25.4	30	35	40	22	25.4	30	35	40
56											22×20 0.37				
68						22×20 0.41					22×25 0.44	25.4×20 0.45			
82	22×20 0.45					22×25 0.48	25.4×20 0.49				22×25 0.48	25.4×25 0.53	30×20 0.54		
100	22×25 0.53	25.4×20 0.55				22×25 0.53	25.4×25 0.59	30×20 0.60			22×30 0.56	25.4×25 0.58	30×20 0.60		
120	22×30 0.62	25.4×25 0.64	30×20 0.65			22×30 0.62	25.4×25 0.64	30×20 0.65			22×35 0.66	25.4×30 0.68	30×25 0.70	35×20 0.71	
150	22×35 0.74	25.4×30 0.76	30×20 0.73			22×40 0.78	25.4×30 0.76	30×25 0.78	35×20 0.80		22×40 0.77	25.4×30 0.75	30×25 0.78	35×20 0.80	
180	22×40 0.85	25.4×35 0.88	30×25 0.86	35×20 0.87		22×45 0.89	25.4×35 0.88	30×30 0.91	35×20 0.87		22×45 0.89	25.4×40 0.93	30×30 0.91	35×25 0.93	
220	22×45 0.98	25.4×35 0.98	30×25 0.98	35×20 0.96		22×50 1.03	25.4×40 1.03	30×30 1.00	35×25 1.03		22×50 1.02	25.4×40 1.01	30×30 1.00	35×30 1.08	
270		25.4×40 1.19	30×30 1.12	35×25 1.14			25.4×45 1.19	30×35 1.17	35×30 1.20			25.4×45 1.17	30×35 1.17	35×30 1.20	
330		25.4×40 1.24	30×40 1.36	35×30 1.33			25.4×50 1.35	30×40 1.36	35×30 1.36			25.4×50 1.35	30×40 1.36	35×35 1.40	
390			30×40 1.47	35×35 1.52			25.4×50 1.47	30×45 1.54	35×35 1.54				30×50 1.61	35×40 1.59	
470			30×45 1.70	35×40 1.74					35×40 1.74				30×50 1.76	35×45 1.82	40×40 1.85
560			30×50 1.90	35×40 1.90					35×50 2.06	40×40 2.02				35×50 2.06	40×50 2.18
680			30×50 2.12	35×45 2.18	40×40 2.23					40×50 2.40				35×50 2.27	40×60 2.57

WV μF	450					500				
	22	25.4	30	35	40	22	25.4	30	35	40
47	22×20 0.34					22×25 0.27	25.4×20 0.27			
56	22×25 0.40	25.4×20 0.41				22×30 0.31	25.4×25 0.32	30×20 0.33		
68	22×25 0.44	25.4×25 0.48	30×20 0.49			22×30 0.34	25.4×25 0.35	30×25 0.39	35×20 0.39	
82	22×30 0.51	25.4×25 0.52	30×20 0.54			22×35 0.40	25.4×30 0.41	30×25 0.43	35×20 0.43	
100	22×30 0.56	25.4×25 0.58	30×25 0.64	35×20 0.65		22×40 0.46	25.4×35 0.48	30×25 0.47	35×25 0.51	
120	22×35 0.66	25.4×30 0.67	30×25 0.70	35×25 0.76		22×45 0.53	25.4×40 0.55	30×30 0.55	35×30 0.59	
150	22×45 0.80	25.4×30 0.77	30×25 0.83	35×25 0.85			25.4×45 0.65	30×35 0.64	35×30 0.66	
180		25.4×35 0.93	30×30 0.90	35×30 0.98			25.4×45 0.70	30×40 0.74	35×35 0.76	
220		25.4×45 1.08	30×35 1.06	35×30 1.08				30×45 0.85	35×40 0.88	40×40 0.93
270			30×40 1.23	35×35 1.26				30×50 0.98	35×45 1.01	40×40 1.03
330			30×45 1.42	35×40 1.46					35×50 1.17	40×50 1.23
390			30×50 1.60	35×45 1.66					35×50 1.27	40×50 1.34
470				35×45 1.81	40×40 1.85					40×60 1.57
560				35×50 2.06	40×50 2.18					

Case size ØD×L (mm)  
Ripple current (Arms) at 105°C, 120Hz



## Upgrade HK Miniaturized Series

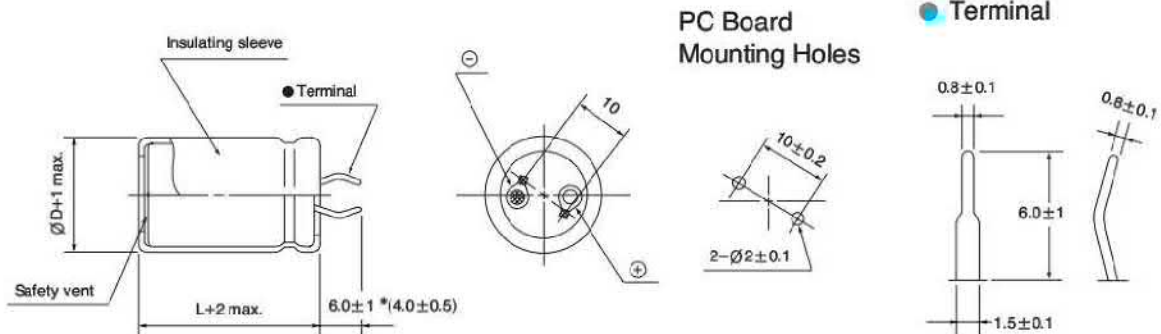
- Smaller case sizes than HE series
- Load life of 3000 hours at 105°C
- Addition of 6.3 ~ 100V, 500V rated voltage
- Complied to the RoHS directive



Item	Characteristics							
Operating temperature range	WV<350 : -40 ~ +105°C, WV ≥350 : -25 ~ +105°C							
Capacitance tolerance	±20% at 120Hz, 20°C							
Leakage current max.	I=3 √ CV (μA) (after 5 minutes)							
Dissipation factor max. (at 120Hz, 20°C)	Capacitance > 1000μF : tanδ increases by 0.01 for each 1000μF from below value.							
	WV	6.3, 10	16	25, 35	50, 63	80, 100	160~400	450, 500
	tanδ	0.50	0.40	0.35	0.25	0.20	0.15	0.20
Load life (after application of the rated voltage for 3000 hours at 105°C)	Leakage current				Less than specified value			
	Capacitance change				Within ±20% of initial value			
	tanδ				Less than 200% of specified value			
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.							

### DRAWING

Unit : mm



- \* Shorter terminal(4.0±0.5) is also available upon request.  
Terminal length of height 20mm products is applied shorter terminal to standard terminal type.

### FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

WV	Frequency	50Hz	120Hz	300Hz	1kHz	10kHz ≤
~ 100		0.85	1.00	1.06	1.15	1.20
160 ~ 250		0.85	1.00	1.20	1.25	1.45
350 ~		0.85	1.00	1.15	1.20	1.40



# LARGE ALUMINUM ELECTROLYTIC CAPACITORS

**HK** series

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV μF ØD	6.3					10					16				
	22	25.4	30	35	40	22	25.4	30	35	40	22	25.4	30	35	40
8200											22×25 2.14				
10000						22×25 2.17					22×30 2.48	25.4×25 2.55			
12000	22×25 2.19					22×30 2.48					22×35 2.80	25.4×30 2.90	30×25 2.97		
15000	22×30 2.53					22×35 2.83	25.4×25 2.75				22×40 3.17	25.4×35 3.29	30×30 3.38		
18000	22×35 2.85	25.4×25 2.77				22×35 3.00	25.4×30 3.11				22×45 3.50	25.4×40 3.65	30×30 3.57		
22000	22×35 3.04	25.4×30 3.15				22×40 3.35	25.4×35 3.48	30×25 3.38				25.4×45 4.03	30×35 3.98		
27000	22×40 3.40	25.4×35 3.53	30×25 3.42			22×50 3.88	25.4×40 3.87	30×30 3.79				25.4×50 4.42	30×40 4.39	35×30 4.29	
33000	22×50 3.92	25.4×40 3.91	30×30 3.83				25.4×45 4.26	30×35 4.20					30×45 4.79	35×35 4.71	
39000		25.4×45 4.26	30×35 4.20				25.4×50 4.60	30×40 4.57	35×30 4.46				30×50 5.16	35×40 5.10	
47000		25.4×50 4.63	30×40 4.60	35×30 4.50				30×45 4.95	35×35 4.87					35×45 5.50	40×40 5.60
56000			30×50 5.17	35×40 5.12					35×45 5.49	40×40 5.59					40×50 6.22
68000				35×45 5.52	40×40 5.62					40×50 6.22					40×60 6.83

WV μF ØD	25					35					50				
	22	25.4	30	35	40	22	25.4	30	35	40	22	25.4	30	35	40
2700											22×30 1.94				
3300						22×25 1.62					22×35 2.20				
3900						22×30 1.88					22×40 2.52	25.4×35 2.62	30×25 2.64		
4700	22×25 1.73					22×35 2.14	25.4×25 2.09				22×45 2.81	25.4×40 2.93	30×30 2.87		
5600	22×30 1.98					22×35 2.29	25.4×30 2.37	30×25 2.43			22×50 3.11	25.4×40 3.11	30×35 3.21		
6800	22×30 2.14					22×40 2.61	25.4×35 2.71	30×30 2.79				25.4×50 3.64	30×40 3.61	35×30 3.53	
8200	22×35 2.42	25.4×30 2.50				22×50 3.02	25.4×40 3.02	30×30 2.95					30×45 3.94	35×35 3.87	
10000	22×40 2.77	25.4×35 2.88					25.4×45 3.43	30×35 3.38					30×50 4.42	35×40 4.37	
12000	22×45 3.09	25.4×40 3.22	30×30 3.15				25.4×50 3.78	30×40 3.75	35×30 3.67					35×45 4.78	
15000		25.4×45 3.62	30×35 3.57	35×30 3.65				30×45 4.19	35×35 4.12					35×50 5.24	40×40 5.13
18000		25.4×50 3.98	30×40 3.95	35×35 4.06					35×40 4.52						40×50 5.76
22000			30×45 4.36	35×35 4.28					35×45 4.95	40×40 5.04					40×50 5.98
27000				35×45 4.92	40×40 5.01					40×50 5.92					40×60 6.61

WV μF ØD	63					80					100				
	22	25.4	30	35	40	22	25.4	30	35	40	22	25.4	30	35	40
820						22×25 1.37					22×30 1.46	25.4×25 1.51			
1000						22×30 1.62	25.4×25 1.67				22×35 1.71	25.4×30 1.77			
1200	22×25 1.37					22×30 1.67	25.4×25 1.72				22×40 1.86	25.4×35 1.94	30×25 1.88		
1500	22×30 1.50	25.4×25 1.54				22×35 1.98	25.4×30 2.05				22×45 2.18	25.4×40 2.28	30×30 2.23		
1800	22×30 1.64	25.4×25 1.69				22×40 2.28	25.4×35 2.37	30×25 2.30				25.4×45 2.61	30×35 2.57		
2200	22×35 1.86	25.4×30 1.92				22×45 2.51	25.4×35 2.49	30×30 2.56				25.4×50 2.85	30×40 2.83	35×30 2.76	
2700	22×40 2.17	25.4×30 2.13	30×25 2.18				25.4×45 3.03	30×35 2.99					30×45 3.27	35×35 3.22	
3300	22×50 2.53	25.4×40 2.53	30×30 2.48				25.4×50 3.33	30×40 3.30	35×30 3.23				30×50 3.59	35×40 3.55	
3900		25.4×45 2.88	30×35 2.84					30×45 3.75	35×35 3.69					35×45 4.03	
4700		25.4×50 3.20	30×40 3.17	35×30 3.10				30×50 4.10	35×40 4.06					35×50 4.40	40×40 4.31
5600			30×45 3.51	35×35 3.46					35×45 4.44						40×50 4.88
6800			30×50 3.92	35×40 3.88					35×50 4.90	40×40 4.80					40×50 5.18
8200				35×45 4.22						40×50 5.32	← Case size (ØD × L) (mm) ← Ripple current (Arms) at 105°C, 120Hz				
10000				35×50 4.74	40×40 4.64										

## HK series

### DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV μF ∅D	160				200				250			
	22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
120									22 × 20 0.56			
150					22 × 20 0.63				22 × 25 0.68	25.4 × 20 0.69		
180					22 × 20 0.69	25.4 × 20 0.76			22 × 25 0.74	25.4 × 20 0.78		
220	22 × 20 0.76				22 × 25 0.82	25.4 × 20 0.84			22 × 25 0.82	25.4 × 25 0.90	30 × 20 0.92	
270	22 × 25 0.91	25.4 × 20 0.93			22 × 25 0.91	25.4 × 25 1.00	30 × 20 1.02		22 × 30 0.97	25.4 × 25 1.00	30 × 20 1.02	
330	22 × 25 1.01	25.4 × 20 1.03			22 × 30 1.07	25.4 × 25 1.11	30 × 20 1.13		22 × 35 1.14	25.4 × 30 1.18	30 × 25 1.21	35 × 20 1.23
390	22 × 25 1.09	25.4 × 25 1.20	30 × 20 1.23		22 × 30 1.17	25.4 × 25 1.20	30 × 25 1.31	35 × 20 1.34	22 × 40 1.30	25.4 × 35 1.35	30 × 25 1.31	35 × 25 1.42
470	22 × 30 1.28	25.4 × 25 1.32	30 × 20 1.35		22 × 35 1.36	25.4 × 30 1.40	30 × 25 1.44	35 × 20 1.47	22 × 45 1.50	25.4 × 35 1.48	30 × 30 1.53	35 × 25 1.56
560	22 × 35 1.48	25.4 × 30 1.53	30 × 25 1.57	35 × 20 1.60	22 × 40 1.56	25.4 × 30 1.53	30 × 25 1.57	35 × 25 1.70	22 × 50 1.71	25.4 × 40 1.70	30 × 30 1.67	35 × 25 1.70
680	22 × 40 1.72	25.4 × 30 1.69	30 × 25 1.73	35 × 20 1.76	22 × 45 1.80	25.4 × 35 1.79	30 × 30 1.84	35 × 25 1.88		25.4 × 50 2.05	30 × 35 1.94	35 × 30 1.98
820	22 × 45 1.96	25.4 × 35 1.96	30 × 30 2.02	35 × 25 2.06		25.4 × 45 2.16	30 × 30 2.02	35 × 25 2.06			30 × 40 2.23	35 × 35 2.29
1000	22 × 50 2.28	25.4 × 40 2.28	30 × 30 2.23	35 × 25 2.28		25.4 × 50 2.48	30 × 35 2.35	35 × 30 2.41			30 × 50 2.68	35 × 40 2.65
1200		25.4 × 45 2.41	30 × 35 2.38	35 × 30 2.44			30 × 40 2.50	35 × 35 2.57			30 × 60 2.92	35 × 45 2.80
1500		25.4 × 50 2.81	30 × 40 2.79	35 × 30 2.73			30 × 50 3.04	35 × 40 3.00				35 × 50 3.25
1800			30 × 45 3.19	35 × 35 3.14				35 × 45 3.43				
2200			30 × 50 3.44	35 × 45 3.55				35 × 50 3.68				
2700				35 × 50 4.08								

WV μF ∅D	350				400				450			
	22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
47					22 × 20 0.34							
56	22 × 20 0.37				22 × 20 0.37	25.4 × 20 0.41			22 × 25 0.40			
68	22 × 20 0.41	25.4 × 20 0.45			22 × 25 0.44	25.4 × 20 0.45			22 × 30 0.47	25.4 × 25 0.48		
82	22 × 25 0.48	25.4 × 20 0.49			22 × 25 0.48	25.4 × 25 0.53	30 × 20 0.54		22 × 30 0.51	25.4 × 25 0.53		
100	22 × 25 0.53	25.4 × 25 0.58	30 × 20 0.60		22 × 30 0.57	25.4 × 25 0.58	30 × 20 0.60		22 × 35 0.60	25.4 × 30 0.62	30 × 25 0.64	
120	22 × 30 0.62	25.4 × 25 0.64	30 × 20 0.65		22 × 35 0.66	25.4 × 25 0.64	30 × 25 0.70	35 × 20 0.71	22 × 40 0.69	25.4 × 30 0.68	30 × 25 0.70	35 × 25 0.76
150	22 × 35 0.74	25.4 × 30 0.76	30 × 25 0.78	35 × 20 0.80	22 × 40 0.78	25.4 × 30 0.76	30 × 25 0.78	35 × 20 0.80	22 × 45 0.81	25.4 × 40 0.85	30 × 30 0.83	35 × 25 0.85
180	22 × 40 0.85	25.4 × 30 0.83	30 × 25 0.86	35 × 20 0.87	22 × 45 0.89	25.4 × 35 0.88	30 × 30 0.91	35 × 25 0.93	22 × 50 0.93	25.4 × 40 0.93	30 × 30 0.91	35 × 25 0.93
220	22 × 45 0.96	25.4 × 35 0.98	30 × 30 1.00	35 × 25 1.03	22 × 50 1.03	25.4 × 40 1.03	30 × 30 1.00	35 × 25 1.03		25.4 × 45 1.07	30 × 35 1.06	35 × 25 1.03
270	22 × 50 1.14	25.4 × 40 1.14	30 × 30 1.11	35 × 25 1.14		25.4 × 45 1.19	30 × 35 1.17	35 × 30 1.20			30 × 40 1.23	35 × 30 1.20
330		25.4 × 45 1.31	30 × 35 1.30	35 × 30 1.33		25.4 × 50 1.37	30 × 40 1.36	35 × 30 1.33			30 × 45 1.42	35 × 35 1.40
390		25.4 × 50 1.49	30 × 40 1.48	35 × 35 1.52			30 × 45 1.54	35 × 35 1.52			30 × 50 1.61	35 × 40 1.59
470			30 × 45 1.69	35 × 35 1.67			30 × 50 1.76	35 × 40 1.74				35 × 45 1.82
560			30 × 50 1.92	35 × 40 1.90				35 × 45 1.98				35 × 50 2.06
680				35 × 50 2.27				35 × 50 2.27				

WV μF ∅D	500				
	22	25.4	30	35	40
82	22 × 40 0.42	25.4 × 35 0.43	30 × 20 0.40		
100	22 × 45 0.49	25.4 × 35 0.48	30 × 30 0.50		
120	22 × 50 0.51	25.4 × 40 0.50	30 × 30 0.50	35 × 25 0.51	
150		25.4 × 45 0.53	30 × 35 0.53	35 × 30 0.54	
180		25.4 × 50 0.55	30 × 40 0.55	35 × 35 0.57	
220			30 × 50 0.89	35 × 35 0.84	
270			30 × 55 1.02	35 × 40 0.97	
330			30 × 60 1.17	35 × 50 1.17	
390				35 × 60 1.36	
470					40 × 60 1.57
560					40 × 70 1.82

← Case size ∅D × L (mm)  
← Ripple current (Arms) at 105°C, 120Hz



# LARGE ALUMINUM ELECTROLYTIC CAPACITORS

## HV Miniaturized Series

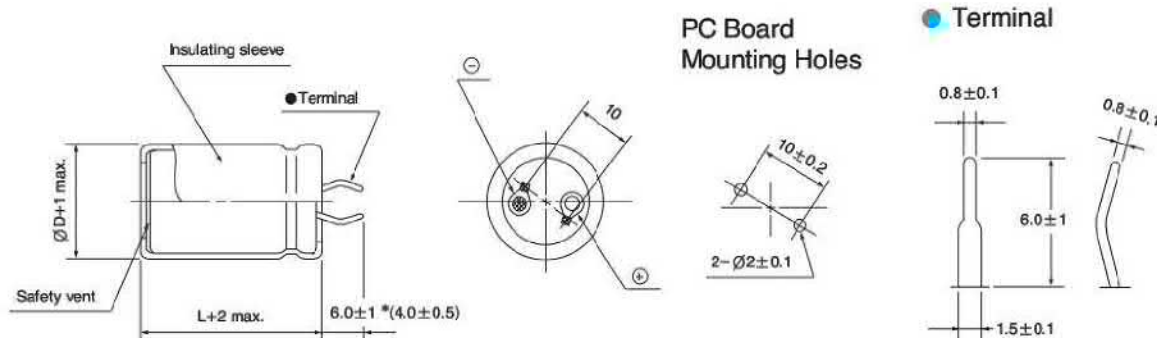
- Smaller case sizes than HK series
- Load life of 3000 hours at 105°C
- Complied to the RoHS directive



Item	Characteristics				
Operating temperature range	WV<350 : -40 ~ +105°C, WV ≥ 350 : -25 ~ +105°C				
Capacitance tolerance	± 20% at 120Hz, 20°C				
Leakage current max.	$I=3\sqrt{CV}$ (μA) (after 5 minutes)				
Dissipation factor max. (at 120Hz, 20°C)	Capacitance > 1000μF : tanδ increases by 0.01 for each 1000μF from below value.				
	WV	250	350	400	450
	tanδ	0.15	0.15	0.15	0.20
Load life (after application of the rated voltage for 3000 hours at 105°C)	Leakage current		Less than specified value		
	Capacitance change		Within ±20% of initial value		
	tanδ		Less than 200% of specified value		
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.				

## DRAWING

Unit : mm



- \* Shorter terminal(4.0±0.5) is also available upon request.  
Terminal length of height 20mm products is applied shorter terminal to standard terminal type.

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

WV \ Frequency	60Hz	120Hz	1kHz	10kHz≤
~ 250	0.85	1.00	1.25	1.45
350 ~	0.85	1.00	1.20	1.40



## HV series

### DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV μF	250				350				400			
	22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
47									22×20 0.34			
56					22×20 0.37				22×20 0.37	25×20 0.41		
68					22×20 0.41	25×20 0.45			22×20 0.44	25×20 0.45		
82					22×20 0.48	25×20 0.49			22×20 0.48	25×20 0.53	30×20 0.54	
100					22×20 0.53	25×20 0.58	30×20 0.60		22×25 0.57	25×20 0.58	30×20 0.60	
120	22×20 0.56				22×25 0.62	25×20 0.64	30×20 0.65		22×30 0.66	25×25 0.64	30×20 0.70	35×20 0.71
150	22×20 0.68	25×20 0.69			22×30 0.74	25×25 0.76	30×20 0.78	35×20 0.80	22×35 0.78	25×25 0.76	30×20 0.78	35×20 0.80
180	22×25 0.74	25×20 0.76			22×35 0.85	25×25 0.83	30×20 0.86	35×20 0.87	22×40 0.89	25×30 0.88	30×25 0.91	35×20 0.93
220	22×25 0.82	25×20 0.90	30×20 0.92		22×40 0.98	25×30 0.98	30×25 1.00	35×20 1.03	22×45 1.03	25×35 1.03	30×25 1.00	35×25 1.03
270	22×30 0.97	25×25 1.00	30×20 1.02		22×45 1.14	25×35 1.14	30×25 1.11	35×20 1.14		25×40 1.19	30×30 1.17	35×25 1.20
330	22×30 1.14	25×25 1.18	30×25 1.21	35×20 1.23		25×40 1.31	30×30 1.30	35×25 1.33		25×45 1.37	30×35 1.36	35×30 1.33
390	22×35 1.30	25×30 1.35	30×25 1.31	35×20 1.42		25×45 1.49	30×35 1.48	35×30 1.52			30×40 1.54	35×30 1.52
470	22×40 1.50	25×35 1.48	30×25 1.53	35×25 1.56			30×40 1.69	35×30 1.67			30×45 1.76	35×35 1.74
560	22×45 1.71	25×35 1.70	30×30 1.67	35×25 1.70			30×45 1.92	35×35 1.90				35×40 1.98
680		25×45 2.05	30×35 1.94	35×30 1.98				35×45 2.27				35×45 2.27
820			30×40 2.23	35×30 2.29								
1000			30×45 2.68	35×35 2.65								
1200			30×55 2.92	35×40 2.80								
1500				35×45 3.25								

WV μF	450			
	22	25.4	30	35
47				
56	22×20 0.40			
68	22×25 0.47	25×20 0.48		
82	22×25 0.51	25×25 0.53		
100	22×30 0.60	25×25 0.62	30×20 0.64	
120	22×35 0.69	25×25 0.68	30×25 0.70	35×20 0.76
150	22×40 0.81	25×35 0.85	30×25 0.83	35×20 0.85
180	22×45 0.93	25×35 0.93	30×30 0.91	35×25 0.93
220		25×40 1.07	30×30 1.06	35×25 1.03
270			30×35 1.23	35×30 1.20
330			30×40 1.42	35×35 1.40
390			30×45 1.61	35×35 1.59
470				35×40 1.82
560				35×45 2.06
680				35×50 2.40

← Case size ØD×L (mm)

← Ripple current (Arms) at 105°C, 120Hz

# LARGE ALUMINUM ELECTROLYTIC CAPACITORS



## High Ripple Series

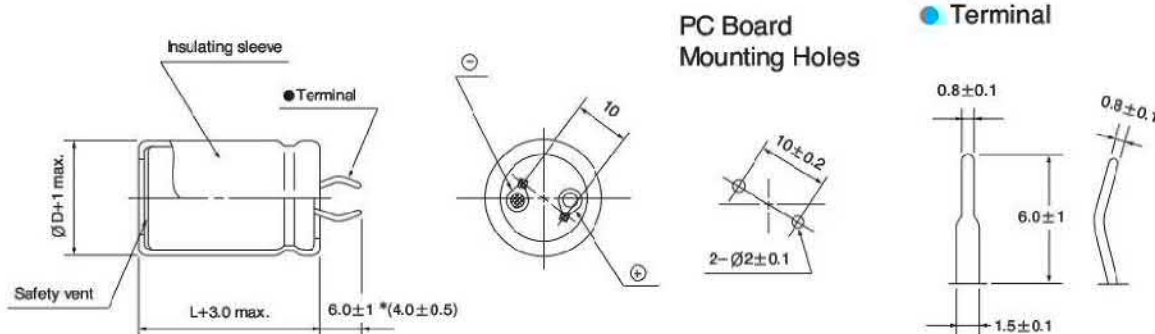
- High ripple current compared with HV series
- Load life of 3000 hours at 105°C
- Complied to the RoHS directive



Item	Characteristics			
Operating temperature range	WV<350 : -40 ~ +105℃, WV ≥ 350 : -25 ~ +105℃			
Capacitance tolerance	± 20% at 120Hz, 20℃			
Leakage current max.	$I=3\sqrt{CV}$ (μA) (after 5 minutes)			
Dissipation factor max. (at 120Hz, 20℃)	Capacitance > 1000μF : tanδ increases by 0.01 for each 1000μF from below value.			
	WV	250	400	450
	tanδ	0.15	0.15	0.20
Load life (after application of the rated voltage for 3000 hours at 105℃)	Leakage current		Less than specified value	
	Capacitance change		Within ± 20% of initial value	
	tanδ		Less than 200% of specified value	
Shelf life (at 105℃)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20℃ by the KS C 6035 clause 5.4.			

### DRAWING

Unit : mm



- \* Shorter terminal(4.0±0.5) is also available upon request.  
Terminal length of height 20mm products is applied shorter terminal to standard terminal type.

### DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV µF	250				400				450			
	22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
180	22×20 0.80	25×20 0.81			22×35 1.15	25×25 1.14	30×20 1.18		22×40 1.20	25×35 1.20	30×25 1.18	35×30 1.2
220	22×25 0.85	25×20 0.97			22×40 1.33	25×30 1.34	30×25 1.30			25×35 1.39	30×30 1.37	35×30 1.33
330	22×30 1.29	25×25 1.27	30×20 1.30			25×40 1.78	30×30 1.76	35×25 1.72			30×35 1.85	35×30 1.82
470	22×40 1.62	25×30 1.59	30×25 1.64	35×20 1.68			30×40 2.28	35×30 2.26				35×35 2.36
560	22×45 1.84	25×35 1.87	30×25 1.87	35×25 1.83				35×35 2.57				35×40 2.67
680		25×40 2.21	30×30 2.09	35×25 2.19	Case size ØD×L (mm)							35×45 2.95

↑ Ripple current (Arms) at 105°C, 120Hz

### FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

WV	Frequency	60Hz	120Hz	300Hz	1kHz	10kHz ≤
250		0.85	1.00	1.20	1.25	1.45
400, 450		0.85	1.00	1.15	1.20	1.40

# LARGE ALUMINUM ELECTROLYTIC CAPACITORS



Upgrade



Long Life  
Series

- Long life than HK series
- Load life of 5000 hours at 105°C
- Addition of 10 ~ 100V rated voltage
- Complied to the RoHS directive



Solvent Proof  
WV ≤ 100V



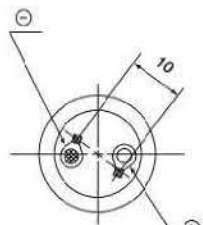
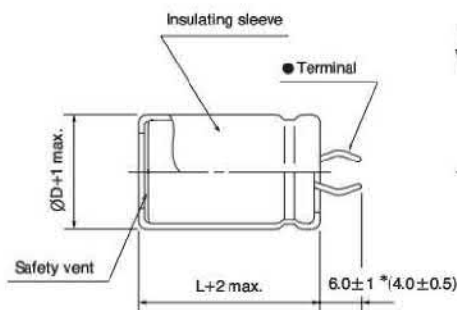
Long Life



Item	Characteristics							
Operating temperature range	WV<350 : -40 ~ +105°C, WV ≥350 : -25 ~ +105°C							
Capacitance tolerance	±20% at 120Hz, 20°C							
Leakage current max.	I=3 √ CV (μA) (after 5 minutes)							
Dissipation factor max. (at 120Hz, 20°C)	Capacitance > 1000μF : tanδ increases by 0.01 for each 1000μF from below value.							
	WV	10	16	25, 35	50, 63	80, 100	160 ~ 400	450
	tanδ	0.50	0.40	0.35	0.25	0.20	0.15	0.20
Load life (after application of the rated voltage for 5000 hours at 105°C)	Leakage current				Less than specified value			
	Capacitance change				Within ±20% of initial value			
	tanδ				Less than 200% of specified value			
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.							

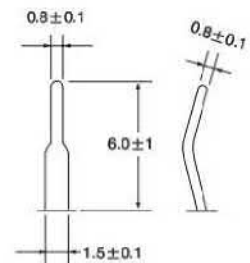
## DRAWING

Unit : mm



## PC Board Mounting Holes

## Terminal



- \* Shorter terminal(4.0±0.5) is also available upon request.  
Terminal length of height 20mm products is applied shorter terminal to standard terminal type.

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

WV	Frequency(Hz)	60Hz	120Hz	300Hz	1kHz	10kHz≤
~ 100		0.85	1.00	1.06	1.15	1.20
160 ~ 250		0.85	1.00	1.20	1.25	1.45
350 ~		0.85	1.00	1.15	1.20	1.40



# LARGE ALUMINUM ELECTROLYTIC CAPACITORS

**HL** series

## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV μF ØD	10				16				25			
	22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
5600									22 × 25 1.50			
6800									22 × 30 1.90	25.4 × 25 1.90		
8200					22 × 25 1.80				22 × 35 2.10	25.4 × 30 2.10	30 × 25 2.10	
10000					22 × 30 2.20	25.4 × 25 2.20			22 × 40 2.30	25.4 × 35 2.30	30 × 25 2.20	
12000	22 × 30 2.10				22 × 35 2.40	25.4 × 30 2.40			22 × 40 2.50	25.4 × 35 2.50	30 × 30 2.60	
15000	22 × 30 2.30	25.4 × 25 2.30			22 × 40 2.70	25.4 × 35 2.70	30 × 30 2.70			25.4 × 40 2.80	30 × 35 2.90	35 × 30 2.90
18000	22 × 35 2.70	25.4 × 30 2.70			22 × 45 2.80	25.4 × 40 3.00	30 × 30 3.00	35 × 25 3.00		25.4 × 50 3.10	30 × 40 3.10	35 × 30 3.10
22000	22 × 40 2.90	25.4 × 35 2.90	30 × 30 2.90			25.4 × 40 3.10	30 × 35 3.30	35 × 30 3.30			30 × 45 3.50	35 × 35 3.50
27000	22 × 45 3.30	25.4 × 40 3.30	30 × 30 3.30	35 × 25 3.30			30 × 40 3.60	35 × 30 3.60			30 × 50 3.80	35 × 40 3.70
33000		25.4 × 45 3.50	30 × 35 3.50	35 × 30 3.50			30 × 45 4.00	35 × 35 4.00				35 × 45 4.10
39000			30 × 40 3.80	35 × 30 3.70			30 × 50 4.30	35 × 40 4.30				35 × 50 4.40
47000			30 × 45 4.00	35 × 35 3.90				35 × 45 4.60				
56000				35 × 40 4.50								

WV μF ØD	35				50				63			
	22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
1200									22 × 25 1.30			
1500									22 × 30 1.50	25.4 × 25 1.50		
1800					22 × 25 1.30				22 × 35 1.60	25.4 × 30 1.60	30 × 25 1.60	
2200					22 × 30 1.40				22 × 40 1.80	25.4 × 30 1.80	30 × 30 1.80	
2700					22 × 30 1.60	25.4 × 25 1.60			22 × 45 2.00	25.4 × 35 2.00	30 × 30 2.00	
3300	22 × 25 1.50				22 × 35 1.80	25.4 × 30 1.80			22 × 50 2.20	25.4 × 40 2.20	30 × 35 2.20	35 × 25 2.20
3900	22 × 30 1.60				22 × 40 1.90	25.4 × 30 1.90	30 × 25 1.90			25.4 × 45 2.40	30 × 35 2.40	35 × 30 2.40
4700	22 × 35 1.80	25.4 × 25 1.80			22 × 40 2.00	25.4 × 35 2.10	30 × 30 2.10	35 × 25 2.10		25.4 × 50 2.60	30 × 40 2.60	35 × 35 2.60
5600	22 × 35 2.00	25.4 × 30 2.00			22 × 45 2.20	25.4 × 40 2.30	30 × 35 2.30	35 × 25 2.30			30 × 45 2.80	35 × 35 2.80
6800	22 × 40 2.20	25.4 × 35 2.20	30 × 25 2.20		22 × 50 2.40	25.4 × 45 2.50	30 × 35 2.50	35 × 30 2.50				35 × 40 3.10
8200	22 × 45 2.30	25.4 × 35 2.30	30 × 30 2.40	35 × 25 2.40			30 × 40 2.80	35 × 30 2.70				35 × 45 3.40
10000		25.4 × 40 2.50	30 × 35 2.60	35 × 25 2.50			30 × 45 3.00	35 × 35 3.00				35 × 50 3.80
12000		25.4 × 45 2.80	30 × 35 2.80	35 × 30 2.90				35 × 40 3.30				
15000			30 × 40 3.10	35 × 35 3.20				35 × 45 3.70				
18000			30 × 45 3.30	35 × 40 3.50								
22000				35 × 45 3.70								

WV μF ØD	80				100			
	22	25.4	30	35	22	25.4	30	35
680					22 × 25 1.10			
820	22 × 25 1.20				22 × 30 1.30	25.4 × 25 1.30		
1000	22 × 30 1.30	25.4 × 25 1.30			22 × 35 1.50	25.4 × 30 1.50		
1200	22 × 35 1.50	25.4 × 25 1.50			22 × 40 1.60	25.4 × 35 1.60	30 × 25 1.60	
1500	22 × 40 1.60	25.4 × 30 1.60	30 × 25 1.60		22 × 45 1.80	25.4 × 40 1.80	30 × 30 1.80	
1800	22 × 45 1.80	25.4 × 35 1.80	30 × 30 1.80			25.4 × 45 2.00	30 × 35 2.00	35 × 25 2.00
2200	22 × 50 2.00	25.4 × 40 2.00	30 × 30 2.00	35 × 25 2.00		25.4 × 50 2.20	30 × 40 2.20	35 × 30 2.20
2700		25.4 × 45 2.20	30 × 35 2.20	35 × 30 2.20			30 × 45 2.40	35 × 35 2.40
3300			30 × 40 2.40	35 × 35 2.40				35 × 40 2.70
3900			30 × 45 2.60	35 × 40 2.60				35 × 45 2.90
4700				35 × 45 3.00				
5600				35 × 50 3.30				

← Case size ØD × L (mm)  
 ← Ripple current (Arms) at 105°C, 120Hz

## HL series

### DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV μF ØD	160				200				250			
	22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
120									22×20 0.56			
150					22×20 0.63				22×25 0.68	25.4×20 0.69		
180					22×20 0.69	25.4×20 0.76			22×25 0.74	25.4×20 0.76		
220	22×20 0.76				22×25 0.82	25.4×20 0.84			22×25 0.82	25.4×25 0.90	30×20 0.92	
270	22×25 0.91	25.4×20 0.93			22×25 0.91	25.4×25 1.00	30×20 1.02		22×30 0.97	25.4×25 1.00	30×20 1.02	
330	22×25 1.01	25.4×20 1.03			22×30 1.07	25.4×25 1.11	30×20 1.13		22×35 1.14	25.4×30 1.18	30×25 1.21	35×20 1.23
390	22×25 1.09	25.4×25 1.20	30×20 1.23		22×30 1.17	25.4×25 1.20	30×25 1.31	35×20 1.34	22×40 1.30	25.4×35 1.35	30×25 1.31	35×25 1.42
470	22×30 1.28	25.4×25 1.32	30×20 1.35		22×35 1.36	25.4×30 1.40	30×25 1.44	35×20 1.47	22×45 1.50	25.4×35 1.48	30×30 1.53	35×25 1.56
560	22×35 1.48	25.4×30 1.53	30×25 1.57	35×20 1.60	22×40 1.56	25.4×30 1.53	30×25 1.57	35×25 1.70	22×50 1.71	25.4×40 1.70	30×30 1.67	35×25 1.70
680	22×40 1.72	25.4×30 1.69	30×25 1.73	35×20 1.76	22×45 1.80	25.4×35 1.79	30×30 1.84	35×25 1.88		25.4×50 2.05	30×35 1.94	35×30 1.98
820	22×45 1.98	25.4×35 1.96	30×30 2.02	35×25 2.06		25.4×45 2.16	30×30 2.02	35×25 2.06			30×40 2.23	35×35 2.29
1000	22×50 2.28	25.4×40 2.28	30×30 2.23	35×25 2.28		25.4×50 2.48	30×35 2.35	35×30 2.41			30×50 2.68	35×40 2.65
1200		25.4×45 2.41	30×35 2.38	35×30 2.44			30×40 2.50	35×35 2.57				35×45 2.80
1500		25.4×50 2.81	30×40 2.79	35×35 2.73			30×50 3.04	35×40 3.00				35×50 3.25

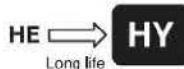
WV μF ØD	350				400				450			
	22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
47					22×20 0.34							
56	22×20 0.37				22×20 0.37	25.4×20 0.41			22×25 0.40			
68	22×20 0.41	25.4×20 0.45			22×25 0.44	25.4×20 0.45			22×30 0.47	25.4×25 0.48		
82	22×25 0.48	25.4×20 0.49			22×25 0.48	25.4×25 0.53	30×20 0.54		22×30 0.51	25.4×25 0.53		
100	22×25 0.53	25.4×25 0.58	30×20 0.60		22×30 0.57	25.4×25 0.58	30×20 0.60		22×35 0.60	25.4×30 0.62	30×25 0.64	
120	22×30 0.62	25.4×25 0.64	30×20 0.65		22×35 0.66	25.4×25 0.64	30×25 0.70	35×20 0.71	22×40 0.69	25.4×30 0.68	30×25 0.70	35×25 0.76
150	22×35 0.74	25.4×30 0.76	30×25 0.78	35×20 0.80	22×40 0.78	25.4×30 0.76	30×25 0.78	35×20 0.80	22×45 0.81	25.4×40 0.85	30×30 0.83	35×25 0.85
180	22×40 0.85	25.4×30 0.83	30×25 0.86	35×20 0.87	22×45 0.89	25.4×35 0.88	30×30 0.91	35×25 0.93	22×50 0.93	25.4×40 0.93	30×30 0.91	35×25 0.93
220	22×45 0.98	25.4×35 0.98	30×30 1.00	35×25 1.03	22×50 1.03	25.4×40 1.03	30×30 1.00	35×25 1.03		25.4×45 1.07	30×35 1.06	35×25 1.03
270	22×50 1.14	25.4×40 1.14	30×30 1.11	35×25 1.14		25.4×45 1.19	30×35 1.17	35×30 1.20			30×40 1.23	35×30 1.20
330		25.4×45 1.31	30×35 1.30	35×30 1.33		25.4×50 1.37	30×40 1.36	35×30 1.33			30×45 1.42	35×35 1.40
390		25.4×50 1.49	30×40 1.48	35×35 1.52			30×45 1.54	35×35 1.52			30×50 1.61	35×40 1.59
470			30×45 1.69	35×35 1.67			30×50 1.76	35×40 1.74	← Case size ØD×L (mm)			
560			30×50 1.92	35×40 1.90					↑ Ripple current (Arms) at 105°C, 120Hz			



# LARGE ALUMINUM ELECTROLYTIC CAPACITORS

## HY Snap-in Terminal Type, Long Life Series

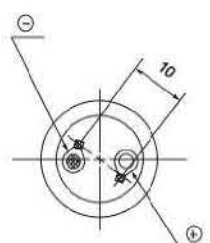
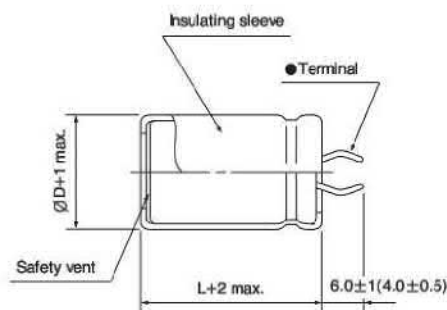
- Load life of 7000 hours at 105°C
- Voltage range of 160 ~ 450V
- Suited for use in industrial power supplies where high reliability
- Complied to the RoHS directive



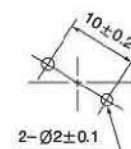
Item	Characteristics						
Operating temperature range	WV<350: -40 ~ +105°C, WV ≥350: -25 ~ +105°C						
Capacitance tolerance	± 20% at 120Hz, 20°C						
Leakage current max.	I=3 √ CV (μA) (after 5 minutes)						
Dissipation factor max. (at 120Hz, 20°C)	Capacitance > 1000μF : tanδ increases by 0.01 for each 1000μF from below value.						
	WV	160	200	250	350	400	450
	tanδ	0.15	0.15	0.15	0.15	0.15	0.20
Load life (after application of the rated voltage for 7000 hours at 105°C)	Leakage current		Less than specified value				
	Capacitance change		Within ±25% of initial value				
	tanδ		Less than 250% of specified value				
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.						

## DRAWING

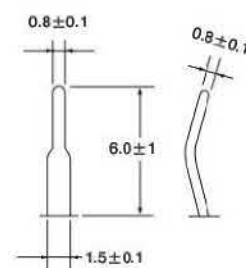
Unit : mm



## PC Board Mounting Holes



## Terminal



- \* Shorter terminal(4.0±0.5) is also available upon request.  
Terminal length of height 20mm products is applied shorter terminal to standard terminal type.

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

WV \ Frequency	50Hz	120Hz	300Hz	1kHz	10kHz ≤
160 ~ 250	0.85	1.00	1.20	1.25	1.45
350 ~	0.85	1.00	1.15	1.20	1.40



## HY series

### DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV μF	160				200				250			
	22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
270	22×25 0.91				22×30 0.97	25.4×25 1.00			22×35 1.02	25.4×30 1.06	30×25 1.09	
330	22×30 1.07				22×30 1.07	25.4×25 1.10			22×40 1.19	25.4×35 1.24	30×25 1.20	
390	22×30 1.23	25.4×25 1.35			22×35 1.23	25.4×30 1.27	30×25 1.31		22×45 1.36	25.4×35 1.35	30×30 1.39	
470	22×35 1.35	25.4×30 1.40			22×40 1.42	25.4×35 1.48	30×30 1.52			25.4×45 1.63	30×35 1.61	35×30 1.64
560	22×40 1.55	25.4×30 1.53	30×25 1.57		22×45 1.63	25.4×35 1.62	30×30 1.67			25.4×50 1.85	30×35 1.75	35×30 1.80
680	22×45 1.80	25.4×35 1.78	30×30 1.93			25.4×40 1.87	30×35 1.93				30×45 2.12	35×35 2.08
820		25.4×40 2.06	30×30 2.01			25.4×50 2.24	30×40 2.23	35×30 2.17			30×50 2.42	35×40 2.39
1000		25.4×45 2.38	30×35 2.34				30×45 2.57	35×35 2.52				35×45 2.76
1200		25.4×50 2.51	30×40 2.49	35×35 2.56			30×50 2.71	35×40 2.68				35×50 2.90
1500			30×45 2.91	35×35 2.86				35×50 3.25				
1800			30×50 3.32	35×40 3.28								

WV μF	350				400				450			
	22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
47									22×30 0.38			
56					22×25 0.39				22×35 0.45	25.4×25 0.43		
68					22×30 0.46	25.4×25 0.48			22×35 0.52	25.4×30 0.51		
82	22×25 0.48				22×35 0.54	25.4×25 0.53			22×45 0.60	25.4×35 0.59	30×25 0.57	
100	22×30 0.56	25.4×25 0.58			22×35 0.60	25.4×30 0.62			22×50 0.69	25.4×40 0.69	30×30 0.67	
120	22×35 0.65	25.4×30 0.68			22×40 0.69	25.4×35 0.72	30×25 0.69			25.4×45 0.79	30×30 0.74	
150	22×40 0.77	25.4×30 0.76			22×50 0.84	25.4×40 0.84	30×30 0.82			25.4×50 0.92	30×40 0.91	35×30 0.89
180	22×45 0.89	25.4×35 0.88				25.4×45 0.97	30×35 0.95	35×25 0.92			30×45 1.04	35×35 1.03
220	22×50 1.02	25.4×40 1.02	30×30 1.00			25.4×50 1.11	30×40 1.11	35×30 1.08			30×50 1.20	35×40 1.19
270		25.4×50 1.23	30×35 1.17	35×30 1.20			30×45 1.28	35×35 1.26				35×45 1.37
330			30×45 1.42	35×35 1.37			30×50 1.47	35×40 1.46				35×50 1.58
390			30×50 1.60	35×40 1.58				35×45 1.65	← Case size ØD × L (mm) ← Ripple current (A rms) at 105°C, 120Hz			
470				35×40 1.74				35×50 1.88				
560				35×50 2.06								

# LARGE ALUMINUM ELECTROLYTIC CAPACITORS



High Temperature Range, For 125°C Use Series

- Wide operating temperature range of -40 ~ +125°C
- With a guaranteed useful life of 10 years at 60°C
- Ideal for industrial applications requiring continuous operation
- Complied to the RoHS directive



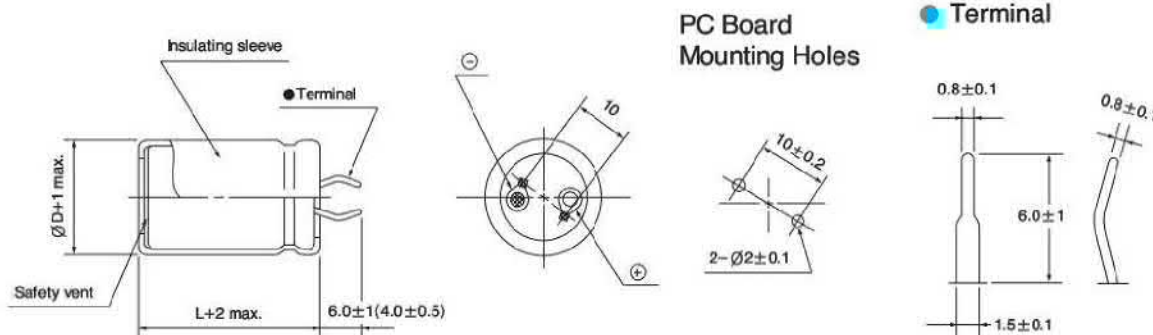
HE → HB  
High temp.



Item	Characteristics							
Operating temperature range	-40 ~ +125°C							
Capacitance tolerance	±20% at 120Hz, 20°C							
Leakage current max.	$I=3\sqrt{CV}$ (μA) (after 5 minutes)							
Dissipation factor max. (at 120Hz, 20°C)	Capacitance > 1000μF : tanδ increases by 0.01 for each 1000μF from below value.							
	WV	10	16	25	35	50, 63	80 ~ 160	200, 250
	tanδ	0.50	0.40	0.30	0.25	0.20	0.17	0.15
Load life (after application of the rated voltage for 1000 hours at 125°C)	Leakage current			Less than specified value				
	Capacitance change			Within ±15% of initial value				
	tanδ			Less than 150% of specified value				
Shelf life (at 125°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.							

## DRAWING

Unit : mm



- \* Shorter terminal(4.0±0.5) is also available upon request.  
Terminal length of height 20mm products is applied shorter terminal to standard terminal type.

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

WV \ Frequency	50Hz	120Hz	300Hz	1kHz	10kHz ≤
~ 100	0.85	1.00	1.06	1.15	1.20
160 ~	0.85	1.00	1.20	1.25	1.45

## HB series

### DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV μF ØD	10				16				25			
	22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
1500									22×30 0.95			
2200					22×30 1.00				22×40 1.28	25.4×30 1.26		
3300	22×30 1.09				22×40 1.36	25.4×35 1.41			22×50 1.72	25.4×40 1.72	30×30 1.68	
4700	22×40 1.45	25.4×35 1.51			22×50 1.78	25.4×40 1.77	30×30 1.74			25.4×50 2.23	30×40 2.22	35×30 2.17
6800	22×50 1.91	25.4×40 1.91	30×35 1.97				30×40 2.31	35×30 2.26			30×50 2.90	35×40 2.87
10000			30×45 2.62	35×35 2.57				35×45 3.14				
15000				35×45 3.44								

WV μF ØD	35				50				63			
	22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
470									22×35 0.69	25.4×30 0.71		
680					22×30 0.78				22×40 0.87	25.4×35 0.91	30×30 0.93	
1000	22×30 0.85				22×40 1.06	25.4×30 1.04				25.4×45 1.21	30×35 1.19	35×30 1.22
1500	22×40 1.16	25.4×30 1.14			22×50 1.42	25.4×40 1.42	30×30 1.39				30×45 1.60	35×40 1.65
2200	22×50 1.54	25.4×40 1.54	30×30 1.50				30×40 1.86	35×35 1.91				35×50 2.16
3300			30×40 2.04	35×35 2.09				35×40 2.45				
4700				35×40 2.61								

WV μF ØD	80				100				160			
	22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
150									22×30 0.37			
220					22×30 0.48				22×40 0.50	25.4×30 0.49		
330	22×30 0.59				22×40 0.66	25.4×30 0.65			22×50 0.67	25.4×40 0.67	30×30 0.65	
470	22×40 0.79	25.4×35 0.82			22×50 0.86	25.4×40 0.86	30×35 0.89			25.4×50 0.87	30×40 0.86	35×30 0.84
680		25.4×40 1.04	30×35 1.07				30×40 1.12	35×30 1.09			30×50 1.12	35×40 1.11
1000			30×45 1.42	35×35 1.40				35×40 1.46				35×50 1.46
1500				35×45 1.86								

WV μF ØD	200				250			
	22	25.4	30	35	22	25.4	30	35
100					22×30 0.32			
150	22×35 0.42				22×40 0.44	25.4×30 0.43		
220	22×45 0.56	25.4×40 0.58	30×30 0.57		22×50 0.58	25.4×40 0.58	30×35 0.60	35×30 0.61
330		25.4×50 0.77	30×40 0.77	35×30 0.75			30×45 0.80	35×35 0.79
470			30×50 0.99	35×40 0.98				35×45 1.03
680				35×50 1.28				

← Case size ØD×L (mm)

← Ripple current (A rms) at 125°C, 120Hz



# LARGE ALUMINUM ELECTROLYTIC CAPACITORS



## Lug Terminal Type Series

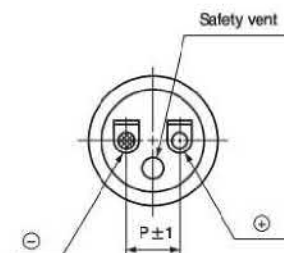
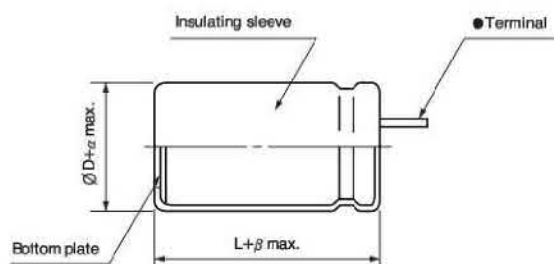
- Lug terminal series
- Suited for use in power supplies and industrial controls
- Complied to the RoHS directive



Item	Characteristics					
Operating temperature range	WV<350 : -40 ~ +85°C, WV ≥ 350 : -25 ~ +85°C					
Capacitance tolerance	±20% at 120Hz, 20°C					
Leakage current max.	I=3 √CV (μA) (after 5 minutes)					
Dissipation factor max. (at 120Hz, 20°C)	Capacitance > 1000μF : tanδ increases by 0.01 for each 1000μF from below value.					
	WV	16	25	35~63	80~350	400~450
	tanδ	0.35	0.30	0.25	0.20	0.25
Load life (after application of the rated voltage for 2000 hours at 85°C)	Leakage current			Less than specified value		
	Capacitance change			Within ±20% of initial value		
	tanδ			Less than 200% of specified value		
Shelf life (at 85°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.					

## DRAWING

Unit : mm



## TERMINAL

For solder tag

ØD	≤ 35	40	51
Dimensions			
Code	LC	LA	LD

ØD	25.4	30	35	40	51
P	10	10	14	18	18
α	1				2
β	2				3

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

WV \ Frequency	50Hz	120Hz	300Hz	1kHz	10kHz ≤
~ 100	0.85	1.00	1.06	1.15	1.20
160 ~ 250	0.85	1.00	1.20	1.25	1.45
315 ~	0.85	1.00	1.15	1.20	1.40

## LM series

### DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV μF	16		25		35		40		50	
3300							25.4×30	2.46	25.4×30	2.46
4700					25.4×30	2.89	25.4×40	3.21	25.4×40	3.21
6800			25.4×30	3.12	25.4×40	3.73	25.4×50	4.07	25.4×50	4.07
10000	25.4×30	3.42	25.4×40	4.03	25.4×50	4.71	25.4×60	5.07	30×50	5.08
15000	25.4×40	4.41	25.4×50	5.07	30×50	5.81	30×60	6.24	35×60	6.67
22000	25.4×50	5.44	30×50	6.15	35×60	7.44	35×60	7.44	35×80	8.34
33000	30×50	6.57	35×60	7.85	35×80	9.18	35×80	9.18	40×100	10.6
47000	35×60	8.19	35×80	9.49	40×100	11.3	51×105	12.5	51×105	12.5
68000	35×80	9.85	40×100	11.6	51×105	13.2				
100000	40×100	12.0	51×105	13.5						
150000	51×105	13.9								

WV μF	63		80		100		160		200	
330							25.4×30	0.92	25.4×30	0.92
470							25.4×40	1.22	25.4×40	1.22
680							25.4×50	1.60	25.4×50	1.60
1000					25.4×30	1.60	25.4×60	2.09	30×50	2.09
1500			25.4×30	1.92	25.4×40	2.13	30×60	2.69	35×60	2.87
2200	25.4×30	2.05	25.4×40	2.52	25.4×50	2.75	35×60	3.40	35×80	3.81
3300	25.4×40	2.73	25.4×50	3.29	30×50	3.55	35×100	5.02	40×100	5.27
4700	25.4×50	3.50	25.4×60	4.14	35×60	4.76	40×100	6.15	51×105	6.80
6800	25.4×60	4.38	30×60	5.15	35×80	6.17	51×105	7.86		
10000	30×60	5.46	35×80	7.08	40×100	8.16				
15000	35×80	7.48	40×80	8.43	51×105	10.2				
22000	35×100	9.16	51×105	11.3						
33000	51×105	11.7								

WV μF	250		315		350		400		450	
68									25.4×30	0.37
100					25.4×30	0.51	25.4×30	0.45	25.4×40	0.50
150			25.4×30	0.62	25.4×40	0.69	25.4×40	0.62	25.4×50	0.67
220	25.4×30	0.75	25.4×40	0.84	25.4×50	0.91	25.4×50	0.81	30×50	0.88
330	25.4×40	1.02	25.4×50	1.12	25.4×60	1.20	30×60	1.16	35×60	1.24
470	25.4×50	1.33	25.4×60	1.43	30×60	1.54	35×60	1.47	35×80	1.65
680	30×50	1.73	30×60	1.86	35×60	1.98	35×80	1.99	35×100	2.18
1000	30×60	2.25	35×70	2.56	35×100	2.96	40×100	2.78	51×80	2.77
1500	35×80	3.22	35×100	3.54	40×100	3.72	51×105	3.69		
2200	35×100	4.19	40×100	4.40	51×105	4.86	← Ripple current (A rms) at 85°C, 120Hz — Case size ØD×L (mm)			
3300	51×80	5.24	51×105	5.82						

# LARGE ALUMINUM ELECTROLYTIC CAPACITORS

## GT Screw Terminal Type, Standard Series

- Ideally suited for use as input and output filter capacitors in power supplies
- Suited for smoothing circuits for general purpose inverters and control circuits for F.A. machines
- Designed for use as input filter capacitor for current U.P.S.
- Complied to the RoHS directive

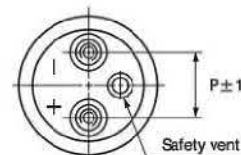
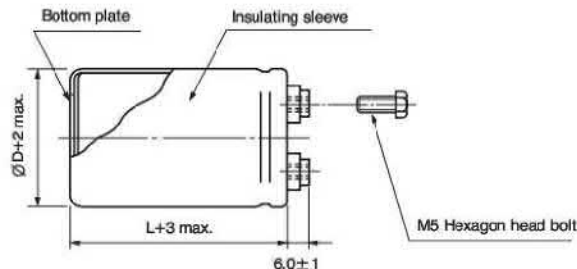
GT  $\Rightarrow$  CU  
Wide Temp.



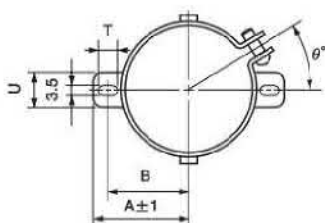
Item	Characteristics									
Operating temperature range	WV<350 : -40 ~ 85°C, WV ≥ 350 : -25 ~ +85°C									
Capacitance tolerance	±20% at 120Hz, 20°C									
Leakage current max.	I=3√CV (μA) (after 5 minutes)									
Dissipation factor max. (at 120Hz, 20°C)	∅D \ WV	16	25	35	50	63	80	100	160~250	350~500
	35	0.70	0.45	0.45	0.30	0.25	0.25	0.20	0.15	0.25
	51	1.00	0.60	0.60	0.45	0.35	0.30	0.20	0.15	0.25
	63.5	1.30	0.80	0.70	0.50	0.40	0.35	0.25	0.20	0.25
	76.2	2.00	1.20	0.90	0.70	0.50	0.45	0.35	0.25	0.25
	89	2.50	1.40	1.00	0.80	0.60	0.50	0.40	0.30	0.25
Load life (after application of the rated voltage for 2000 hours at 85°C)	Leakage current			Less than specified value						
	Capacitance change			WV ≤ 250 : Within ± 15% of the initial value WV ≥ 350 : Within ± 20% of the initial value						
	tanδ			WV ≤ 250 : Less than 175% of the specified value WV ≥ 350 : Less than 300% of the specified value						
Shelf life (at 85°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.									

## DRAWING

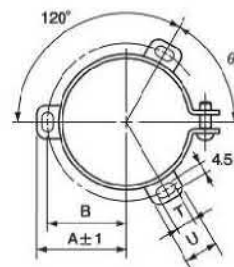
Unit : mm



### TWO LEGS ANGLE



### THREE LEGS ANGLE



### TWO LEGS ANGLE SIZE TABLE

ØD	B	A	T	U	θ°	P
35	24	29	7	10	30	12.7
51	33.6	39.9	6	14	30	22
63.5	40.8	46.8	6	14	30	28.6

### THREE LEGS ANGLE SIZE TABLE

ØD	B	A	T	U	θ°	P
51	32.9	38.9	7	12	60	22
63.5	38.4	45.3	7	14	60	28.6
76.2	44.5	51.5	8	16	60	31.8
89	50.8	61	8	16	60	31.8



## GT series

### DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu F$ \ WV	16		25		35		50	
10000							35×60	6.2
15000					35×50	5.8	35×80	8.5
22000			35×60	7.5	35×68	7.9	35×100	11.3
33000	35×60	7.4	35×80	10.3	35×100	11.3	35×120	15.0
47000	35×80	9.9	35×100	13.5	35×120	14.6	51×100	15.2
68000	35×100	13.1	51×80	14.5	51×100	15.9	51×120	19.7
100000	51×80	13.7	51×100	19.2	51×120	20.7	63.5×120	24.2
150000	51×100	18.3	51×140	27.1	63.5×120	25.1	76.2×120	25.9
220000	51×140	25.4	63.5×120	28.4	76.2×120	27.7	76.2×160	35.1
330000	63.5×120	27.3	76.2×120	29.3	76.2×160	37.9		
470000	76.2×120	27.1	76.2×160	39.2				
680000	76.2×160	36.5						

$\mu F$ \ WV	63		80		100		160	
1500							35×60	3.4
2200							35×80	4.6
3300							35×100	6.2
4700					35×60	5.2	51×80	7.7
6800	35×50	5.2	35×60	5.6	35×80	7.0	51×100	10.0
10000	35×60	6.8	35×80	7.6	35×100	9.4	51×140	14.1
15000	35×80	9.3	35×120	11.1	51×80	11.8	63.5×140	16.5
22000	35×120	13.4	51×80	11.7	51×100	15.6	76.2×140	17.6
33000	51×100	14.5	51×120	16.8	51×140	22.0		
47000	51×120	18.6	63.5×100	18.5	63.5×140	25.0		
68000	63.5×100	20.8	63.5×140	25.4	76.2×140	26.2		
100000	76.2×120	25.0	76.2×140	29.7				
150000	76.2×140	32.5						

$\mu F$ \ WV	200		250	
330				
470				
680			35×50	2.1
1000	35×60	2.8	35×68	2.9
1500	35×68	3.6	35×80	3.8
2200	35×100	5.1	35×120	5.5
3300	35×120	6.7	51×100	7.0
4700	51×100	8.3	51×140	9.6
6800	51×140	11.5	63.5×120	10.0
10000	63.5×120	12.1	76.2×120	11.2
15000	76.2×120	13.7	76.2×160	15.3
22000	76.2×160	18.6		

← Ripple current (A rms) at 85°C, 120Hz  
 ← Case size  $\varnothing D \times L$  (mm)

# LARGE ALUMINUM ELECTROLYTIC CAPACITORS

**GT** series

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV Item μF	350			400			450		
	ØD×L (mm)	Ripple current (A rms)		ØD×L (mm)	Ripple current (A rms)		ØD×L (mm)	Ripple current (A rms)	
		40°C 120Hz	85°C 120Hz		40°C 120Hz	85°C 120Hz		40°C 120Hz	85°C 120Hz
180							35×60	2.9	1.0
220				35×50	3.0	1.1	35×60	3.2	1.1
270	35×50	3.3	1.2	35×50	3.3	1.2	35×60	3.6	1.2
330	35×50	3.7	1.3	35×60	3.9	1.4	35×80	4.4	1.5
390	35×60	4.3	1.5	35×60	4.3	1.5	35×80	4.8	1.7
470	35×60	4.7	1.6	35×80	5.3	1.8	35×100	5.8	2.0
560	35×80	5.8	2.0	35×100	6.3	2.2	35×100	6.3	2.2
680	35×80	6.4	2.2	35×100	7.0	2.4	35×120	7.5	2.6
820	35×100	7.7	2.7	35×120	8.3	2.9	51×80	8.0	2.8
1000	35×120	9.2	3.2	51×80	8.8	3.1	51×100	9.6	3.4
1200	51×80	9.7	3.4	51×80	9.7	3.4	51×100	10.6	3.7
1500	51×80	10.8	3.8	51×100	11.8	4.1	51×120	12.7	4.4
1800	51×100	12.9	4.5	51×120	13.9	4.9	63.5×100	13.8	4.8
2200	51×120	15.4	5.4	51×140	16.4	5.7	63.5×120	16.3	5.7
2700	51×140	18.2	6.4	63.5×120	18.1	6.3	63.5×140	19.2	6.7
3300	63.5×120	20.0	7.0	63.5×140	21.3	7.4	76.2×120	20.6	7.2
3900	63.5×140	23.1	8.1	63.5×160	24.4	8.6	76.2×140	23.7	8.3
4700	63.5×160	26.8	9.4	76.2×140	26.0	9.1	76.2×160	27.5	9.6
5600	76.2×140	28.4	10.0	76.2×160	30.0	10.5	89×140	31.3	10.9
6800	76.2×160	33.0	11.6	89×140	34.5	12.1	89×160	36.3	12.7
8200	89×140	37.8	13.2	89×160	39.8	13.9			
10000	89×160	44.0	15.4	89×160	44.0	15.4			

WV Item μF	500		
	ØD×L (mm)	Ripple current (A rms)	
		40°C 120Hz	85°C 120Hz
1000	51×120	12.2	4.2
1200	63.5×100	13.1	4.5
1500	63.5×100	14.8	5.1
1800	63.5×120	17.4	6.0
2200	63.5×140	20.3	7.0
2700	76.2×120	22.3	7.5
3300	76.2×140	26.1	8.8

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

WV Frequency	50Hz	120Hz	300Hz	1kHz	10kHz≤
~ 100	0.8	1.0	1.1	1.15	1.2
160 ~ 250	0.8	1.0	1.1	1.15	1.3
350 ~	0.8	1.0	1.2	1.35	1.4

## GK Screw Terminal Type, High Ripple Series

- Ideally suited for use as input and output filter capacitors in power supplies
- High ripple current capability
- Suited for smoothing circuits for general purpose inverters and control circuits for F.A. machines
- Designed for use as input filter capacitor for current U.P.S.
- Complied to the RoHS directive

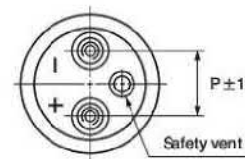
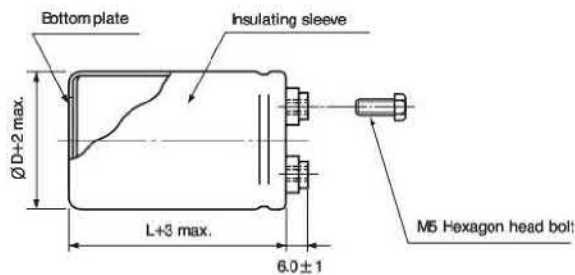
GT → GK  
High Ripple



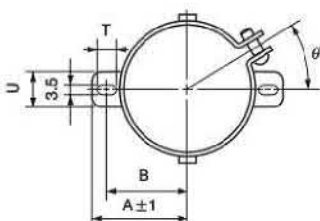
Item	Characteristics	
Operating temperature range	-25 ~ +85°C	
Capacitance tolerance	±20% at 120Hz, 20°C	
Leakage current max.	$I = 3 \sqrt{CV}$ (μA) (after 5 minutes)	
Dissipation factor max. (at 120Hz, 20°C)	0.25 max. at 120Hz, 20°C	
Load life (after application of the rated voltage for 2000 hours at 85°C)	Leakage current	Less than specified value
	Capacitance change	Within ±20% of initial value
	tanδ	Less than 300% of specified value
Shelf life (at 85°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.	

### DRAWING

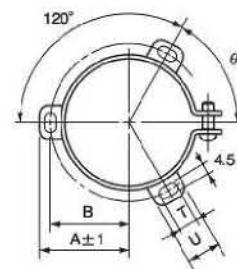
Unit : mm



### TWO LEGS ANGLE



### THREE LEGS ANGLE



### TWO LEGS ANGLE SIZE TABLE

ØD	B	A	T	U	θ°	P
35	24	29	7	10	30	12.7
51	33.6	39.9	6	14	30	22
63.5	40.8	46.8	6	14	30	28.6

### THREE LEGS ANGLE SIZE TABLE

ØD	B	A	T	U	θ°	P
51	32.9	38.9	7	12	60	22
63.5	38.4	45.3	7	14	60	28.6
76.2	44.5	51.5	8	16	60	31.8
89	50.8	61	8	16	60	31.8



## LARGE ALUMINUM ELECTROLYTIC CAPACITORS

**GK** series

### ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV Item μF	350		400		450	
	ØD×L (mm)	Ripple current (A rms) 85°C 120Hz	ØD×L (mm)	Ripple current (A rms) 85°C 120Hz	ØD×L (mm)	Ripple current (A rms) 85°C 120Hz
180					35 × 60	1.5
220			35 × 50	1.7	35 × 60	1.7
270	35 × 50	1.8	35 × 50	1.8	35 × 60	1.8
330	35 × 50	2.0	35 × 60	2.1	35 × 80	2.3
390	35 × 60	2.3	35 × 60	2.3	35 × 80	2.6
470	35 × 60	2.4	35 × 80	2.7	35 × 100	3.0
560	35 × 80	3.0	35 × 100	3.3	35 × 100	3.3
680	35 × 80	3.3	35 × 100	3.6	35 × 120	3.9
820	35 × 100	4.1	35 × 120	4.4	51 × 80	4.2
1000	35 × 120	4.8	51 × 80	4.7	51 × 100	5.1
1200	51 × 80	5.1	51 × 80	5.1	51 × 100	5.6
1500	51 × 80	5.7	51 × 100	6.2	51 × 120	6.6
1800	51 × 100	6.8	51 × 120	7.4	63.5 × 100	7.2
2200	51 × 120	8.1	51 × 140	8.6	63.5 × 120	8.6
2700	51 × 140	9.6	63.5 × 120	9.5	63.5 × 140	10.1
3300	63.5 × 120	10.5	63.5 × 140	11.1	76.2 × 120	10.8
3900	63.5 × 140	12.2	63.5 × 160	12.9	76.2 × 140	12.5
4700	63.5 × 160	14.1	76.2 × 140	13.7	76.2 × 160	14.4
5600	76.2 × 140	15.0	76.2 × 160	15.8	89 × 140	16.4
6800	76.2 × 160	17.4	89 × 140	18.2	89 × 160	19.1
8200	89 × 140	19.8	89 × 160	20.9		
10000	89 × 160	23.1	89 × 160	23.1		

### ● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	300Hz	1kHz	3kHz
Coefficient	0.8	1.0	1.1	1.3	1.4

## GM Screw Terminal Type, High Ripple Series

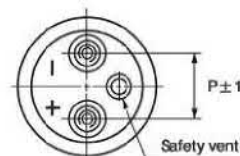
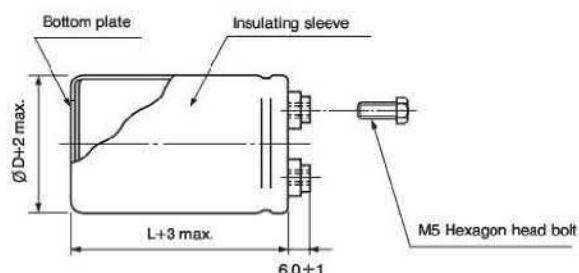
- Ideally suited for use as input and output filter capacitors in power supplies
- High ripple current compared with GK series
- Suited for smoothing circuits for general purpose inverters and control circuits for F.A. machines
- Designed for use as input filter capacitor for current U.P.S.
- Complied to the RoHS directive



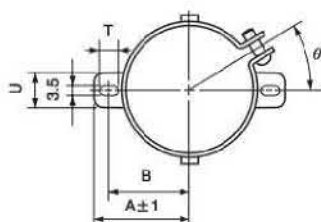
Item	Characteristics	
Operating temperature range	-25 ~ +85°C	
Capacitance tolerance	±20% at 120Hz, 20°C	
Leakage current max.	$I \leq 3 \sqrt{CV}$ ( $\mu A$ ) (after 5 minutes)	
Dissipation factor max.	0.25 max. at 120Hz, 20°C	
Load life (after application of the rated voltage for 2000 hours at 85°C)	Leakage current	Less than specified value
	Capacitance change	Within ±20% of initial value
	$\tan \delta$	Less than 300% of specified value
Shelf life (at 85°C)	After 1000 hours no load test, leakage current, capacitance and $\tan \delta$ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.	

### DRAWING

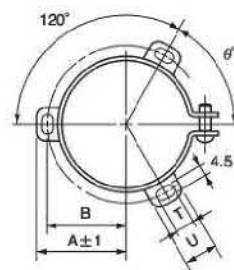
Unit : mm



### TWO LEGS ANGLE



### THREE LEGS ANGLE



### TWO LEGS ANGLE SIZE TABLE

ØD	B	A	T	U	θ°	P
51	33.6	39.9	6	14	30	22
63.5	40.8	46.8	6	14	30	28.6

### THREE LEGS ANGLE SIZE TABLE

ØD	B	A	T	U	θ°	P
51	32.9	38.9	7	12	60	22
63.5	38.4	45.3	7	14	60	29
76.2	44.5	51.5	8	16	60	32
89	50.8	61	8	16	60	31.8

## LARGE ALUMINUM ELECTROLYTIC CAPACITORS

**GM** series

### ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

<div> <div>WV</div> <div>Item</div> <div> <div>μF</div> <div></div> </div> </div>	350		400		450	
	ØD×L (mm)	Ripple current (A rms) 85°C 120Hz	ØD×L (mm)	Ripple current (A rms) 85°C 120Hz	ØD×L (mm)	Ripple current (A rms) 85°C 120Hz
820					51 × 80	4.8
1000			51 × 80	5.3	51 × 100	5.8
1200	51 × 80	5.8	51 × 80	5.8	51 × 100	6.3
1500	51 × 80	6.5	51 × 100	7.0	51 × 120	7.5
1800	51 × 100	7.7	51 × 120	8.3	51 × 140	8.2
2200	51 × 120	9.2	51 × 140	9.7	63.5 × 100	8.9
2700	51 × 140	10.9	63.5 × 100	10.0	63.5 × 120	10.4
3300	63.5 × 100	11.0	63.5 × 120	11.6	63.5 × 130	11.7
3900	63.5 × 120	13.0	63.5 × 130	13.2	76.2 × 120	13.4
4700	63.5 × 130	14.5	76.2 × 120	14.7	76.2 × 130	15.5
5600	76.2 × 120	15.5	76.2 × 130	16.1	76.2 × 160	17.2
6800	76.2 × 130	17.8	76.2 × 160	19.0	76.2 × 170	19.4
8200	76.2 × 160	21.1	76.2 × 170	21.4		
10000	76.2 × 170	23.8	89 × 160	25.0		

### ● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	1kHz	3kHz
Coefficient	0.8	1.0	1.3	1.4



## CU Screw Terminal Type, Wide Temperature Range Series

- Screw terminal series for high temperature up to 105°C
- High ripple current capability
- Ideally suited for use as input and output filter capacitors in power supplies
- Complied to the RoHS directive

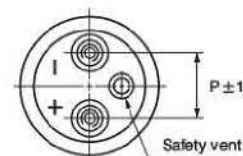
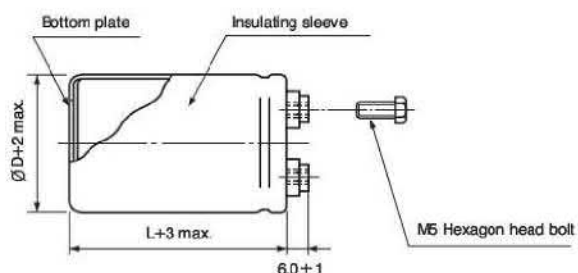
GT  $\Rightarrow$  **CU**  
Wide Temp.



Item	Characteristics										
Operating temperature range	WV<350 : -40 ~ +105°C, WV ≥350 : -25 ~ +105°C										
Capacitance tolerance	± 20% at 120Hz, 20°C										
Leakage current max.	≦3 √ CV (μA) (after 5 minutes)										
Dissipation factor max. (at 120Hz, 20°C)	<div>WV ∅D</div>	16	25	35	50	63	80	100	160	200,250	350~450
	35	0.45	0.45	0.40	0.30	0.25	0.25	0.20	0.15	0.15	0.25
	51	0.60	0.60	0.45	0.45	0.35	0.30	0.20	0.15	0.15	0.25
	63.5	0.80	0.70	0.50	0.50	0.40	0.35	0.25	0.20	0.20	0.25
	76.2	1.20	0.90	0.70	0.70	0.70	0.50	0.40	0.35	0.25	0.25
Load life (after application of the rated voltage for 2000 hours at 105°C)	Leakage current					Less than specified value					
	Capacitance change					Within ±20% of initial value					
	tanδ					Less than 300% of specified value					
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.										

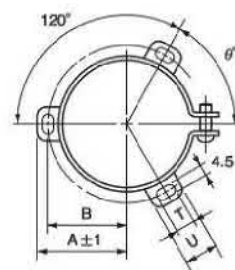
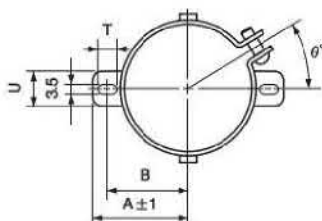
### DRAWING

Unit : mm



### TWO LEGS ANGLE

### THREE LEGS ANGLE



### TWO LEGS ANGLE SIZE TABLE

ØD	B	A	T	U	θ°	P
35	24	29	7	10	30	12.7
51	33.6	39.9	6	14	30	22
63.5	40.8	46.8	6	14	30	28.6

### THREE LEGS ANGLE SIZE TABLE

ØD	B	A	T	U	θ°	P
51	32.9	38.9	7	12	60	22
63.5	38.4	45.3	7	14	60	28.6
76.2	44.5	51.5	8	16	60	31.8

# LARGE ALUMINUM ELECTROLYTIC CAPACITORS

**CU** series

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu\text{F}$ \diagdown WV	16		25		35		50	
6800							35×50	3.1
10000					35×60	3.5	35×60	4.0
15000			35×50	3.8	35×80	4.8	35×80	5.5
22000	35×60	4.9	35×68	5.1	35×100	6.4	35×120	8.0
33000	35×80	6.7	35×100	7.4	35×120	8.5	51×100	8.3
47000	35×100	8.8	35×120	9.5	51×100	9.9	51×120	10.7
68000	51×80	9.5	51×100	10.3	51×120	12.8	63.5×100	12.6
100000	51×100	12.5	51×120	13.5	63.5×120	16.4	76.2×120	13.7
150000	51×140	17.6	63.5×120	16.9	76.2×120	16.8	76.2×140	17.9
220000	63.5×120	18.4	76.2×120	18.0	76.2×160	22.8		
330000	76.2×120	19.1	76.2×160	24.6				
470000	76.2×160	25.5						

$\mu\text{F}$ \diagdown WV	63		80		100		160	
1000							35×60	1.7
1500					35×60	1.9	35×68	2.1
2200					35×80	2.6	35×100	3.0
3300					35×100	3.5	35×120	4.0
4700			35×60	3.0	51×80	4.3	51×100	5.0
6800	35×60	3.7	35×80	4.1	51×100	5.7	51×140	7.0
10000	35×80	5.0	35×100	5.4	51×140	7.9	63.5×120	7.3
15000	35×120	7.2	51×80	6.3	63.5×140	9.2	76.2×120	7.0
22000	51×80	7.0	51×100	8.3	76.2×140	9.1	76.2×160	9.4
33000	51×120	10.1	51×140	11.7				
47000	63.5×100	11.7	63.5×140	14.3				
68000	63.5×140	16.0	76.2×140	14.2				
100000	76.2×140	14.6						

$\mu\text{F}$ \diagdown WV	200		250		350		400	
220							35×50	1.1
330					35×60	1.4	35×60	1.5
470			35×60	1.1	35×80	2.0	35×80	2.0
680	35×50	1.3	35×80	1.5	35×100	2.6	35×100	2.6
1000	35×68	1.8	35×100	2.1	35×120	3.4	51×80	3.2
1500	35×80	2.3	51×80	2.6	51×100	4.4	51×100	4.8
2200	35×120	3.3	51×100	3.4	51×120	5.7	63.5×100	6.4
3300	51×100	4.2	51×140	4.8	63.5×120	7.8	76.2×120	10.5
4700	51×140	5.8	63.5×120	5.2	76.2×120	9.0	76.2×140	12.5
6800	63.5×120	6.2	76.2×120	5.5	76.2×140	12.4	76.2×160	15.1
10000	76.2×120	6.7	76.2×160	7.5				
15000	76.2×160	9.2						

Ripple current (A rms) at 105°C, 120Hz  
Case size  $\varnothing D \times L$  (mm)

$\mu\text{F}$ \diagdown WV	450	
2200	63.5×110	6.7
2700	63.5×130	7.9
3300	76.2×120	9.4
3900	76.2×130	10.5
4700	76.2×140	11.9
5600	76.2×150	13.3
6800	89×150	14.9

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

WV \ Frequency	50Hz	120Hz	300Hz	1kHz	10kHz≤
~ 100	0.8	1.0	1.1	1.15	1.2
160 ~ 250	0.8	1.0	1.1	1.15	1.3
315 ~	0.8	1.0	1.2	1.35	1.4

## GF For Inverter Circuits Series

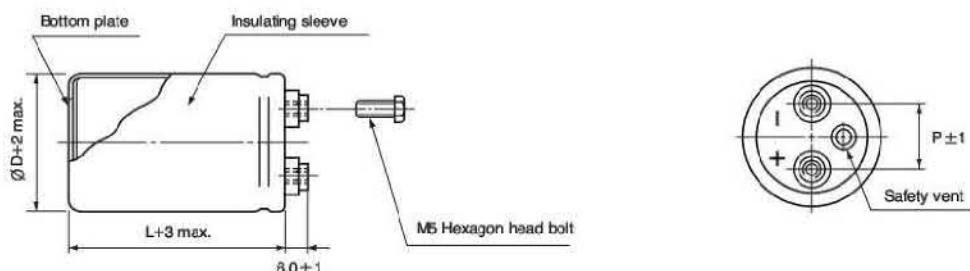
- Screw terminal series in compact case sizes
- High reliability, long life guaranteed for 5000 hours load life at 85°C (500 ~ 600WV is assured 2000 hours at 85°C)
- Suited for use in industrial power supplies for inverters
- Complied to the RoHS directive



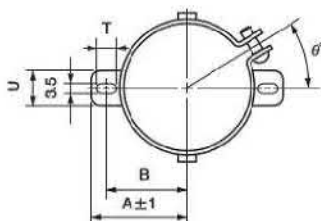
Item	Characteristics	
Operating temperature range	-25 ~ +85°C	
Capacitance tolerance	±20% at 120Hz, 20°C	
Leakage current max.	$I=3\sqrt{CV}$ (μA) (after 5 minutes)	
Dissipation factor max.	0.25 max. at 120Hz, 20°C	
Load life (after application of the rated voltage for 5000 hours at 85°C)	Leakage current	Less than specified value
	Capacitance change	Within ±20% of initial value
	tanδ	Less than 300% of specified value
	500~600WV products are for 2000 hours.	
Shelf life (at 85°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.	

### DRAWING

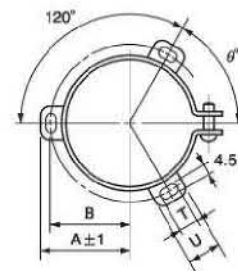
Unit : mm



### TWO LEGS ANGLE



### THREE LEGS ANGLE



### TWO LEGS ANGLE SIZE TABLE

$\phi D$	B	A	T	U	$\theta^\circ$	P
51	33.6	39.9	6	14	30	22
63.5	40.8	46.8	6	14	30	28.6

### THREE LEGS ANGLE SIZE TABLE

$\phi D$	B	A	T	U	$\theta^\circ$	P
51	32.9	38.9	7	12	60	22
63.5	38.4	45.3	7	14	60	28.6
76.2	44.5	51.5	8	16	60	31.8
89	50.8	61	8	16	60	31.8



# LARGE ALUMINUM ELECTROLYTIC CAPACITORS

**GF** series

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV Item μF	350			400			450		
	ØD×L (mm)	Ripple current (A rms)		ØD×L (mm)	Ripple current (A rms)		ØD×L (mm)	Ripple current (A rms)	
		40°C 120Hz	85°C 120Hz		40°C 120Hz	85°C 120Hz		40°C 120Hz	85°C 120Hz
2200	51 × 110	16.0	6.0	51 × 130	17.1	6.4	63.5 × 110	17.0	6.4
2700	51 × 130	18.9	7.1	63.5 × 110	18.9	7.1	63.5 × 130	20.0	7.5
3300	63.5 × 100	20.5	7.5	63.5 × 130	22.2	8.3	76.2 × 110	21.4	8.0
3900	63.5 × 100	23.2	8.2	76.2 × 100	24.2	8.4	76.2 × 130	24.7	8.3
4700	76.2 × 100	26.9	9.5	76.2 × 130	27.1	10.2	76.2 × 150	28.7	10.8
5600	76.2 × 110	28.9	10.5	76.2 × 150	31.3	11.8	76.2 × 160	32.5	12.1
6800	76.2 × 130	33.7	12.3	76.2 × 160	35.8	13.4	89 × 150	37.9	14.3
8200	76.2 × 160	38.3	14.7	89 × 150	41.6	15.7	89 × 160	42.6	16.1
10000	89 × 150	45.9	17.3	89 × 160	46.4	17.8			
12000	89 × 160	51.7	19.5						

WV Item μF	500			550			600		
	ØD×L (mm)	Ripple current (A rms)		ØD×L (mm)	Ripple current (A rms)		ØD×L (mm)	Ripple current (A rms)	
		40°C 120Hz	85°C 120Hz		40°C 120Hz	85°C 120Hz		40°C 120Hz	85°C 120Hz
1000	51 × 120	12.2	4.2	51 × 130	12.2	4.2	63.5 × 130	17.1	5.9
1200	63.5 × 100	13.1	4.5	63.5 × 110	14.5	5.0	76.2 × 120	19.4	6.7
1500	63.5 × 100	14.8	5.1	63.5 × 130	17.4	6.0	76.2 × 140	23.4	8.1
1800	63.5 × 120	17.4	6.0	76.2 × 110	19.4	6.7	76.2 × 160	27.8	9.6
2200	63.5 × 140	20.3	7.0	76.2 × 130	23.2	8.0	76.2 × 160	31.0	10.7
2700	76.2 × 120	22.3	7.5	76.2 × 150	27.2	9.4	89 × 160	36.5	12.6
3300	76.2 × 140	26.1	8.8	76.2 × 160	31.9	11.0			
3900				89 × 160	36.2	12.5			

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	300Hz	1kHz	3kHz
Coefficient	0.8	1.0	1.1	1.3	1.4

## GH For inverter Circuits Series

**M** Miniaturized **LL** Long Life

- Screw terminal series in compact case sizes
- Miniature size, High ripple current compared with GF series
- High reliability, long life guaranteed for 5000 hours load life at 85°C (500WV is assured 2000 hours at 85°C)
- Suited for use in industrial power supplies for inverters
- Complied to the RoHS directive

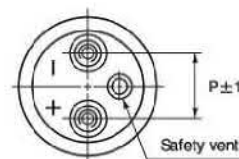
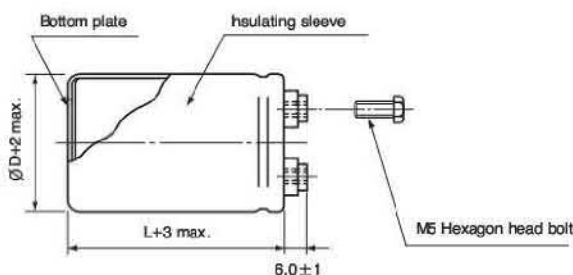
GF → **GH**  
Miniature  
High ripple



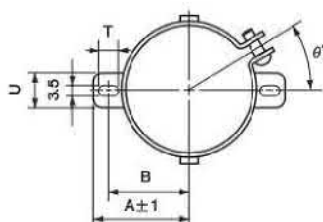
Item	Characteristics	
Operating temperature range	-25 ~ +85°C	
Capacitance tolerance	±20% at 120Hz, 20°C	
Leakage current max.	$I = 3 \sqrt{CV} (\mu A)$ (after 5 minutes)	
Dissipation factor max.	0.25 max. at 120Hz, 20°C	
Load life (after application of the rated voltage for 5000 hours at 85°C)	Leakage current	Less than the specified value
	Capacitance change	Within ±20% of the initial value
	tanδ	Less than 300% of specified value
	500WV products are for 2000 hours	
Shelf life (at 85°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.	

### DRAWING

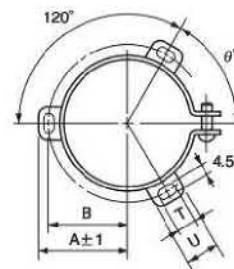
Unit : mm



### TWO LEGS ANGLE



### THREE LEGS ANGLE



### TWO LEGS ANGLE SIZE TABLE

ØD	B	A	T	U	θ°	P
51	33.6	39.9	6	14	30	22
63.5	40.8	46.8	6	14	30	28.6

### THREE LEGS ANGLE SIZE TABLE

ØD	B	A	T	U	θ°	P
51	32.9	38.9	7	12	60	22
63.5	38.4	45.3	7	14	60	28.6
76.2	44.5	51.5	8	16	60	31.8
89	50.8	61	8	16	60	31.8

## LARGE ALUMINUM ELECTROLYTIC CAPACITORS

**GH** series

### DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu\text{F}$ \ WV	400		450		500	
1800					63.5 × 110	6.5
2200	51 × 100	8.4	51 × 130	8.6	63.5 × 130	7.7
2700	51 × 130	10.5	63.5 × 110	10.5	76.2 × 110	8.8
3300	63.5 × 100	11.6	63.5 × 120	11.9	76.2 × 130	10.4
3900	63.5 × 110	12.3	76.2 × 110	13.9	76.2 × 150	12.1
4700	63.5 × 130	14.5	76.2 × 120	15.5	89 × 130	13.7
5600	76.2 × 120	16.5	76.2 × 140	15.9	89 × 150	17.8
6800	76.2 × 130	17.5	76.2 × 160	18.4		
8200	76.2 × 150	18.7	89 × 150	19.7		
10000	89 × 150	20.5				
12000	89 × 160	21.0				

↑  
Ripple current (A rms) at 85°C, 120Hz  
↑  
Case size  $\varnothing D \times L$  (mm)

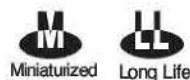
### FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	300Hz	1kHz	3kHz
Coefficient	0.8	1.0	1.1	1.3	1.4



## GN For Inverter, Miniature, High Ripple Series

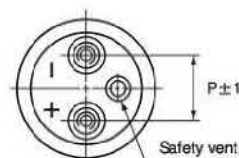
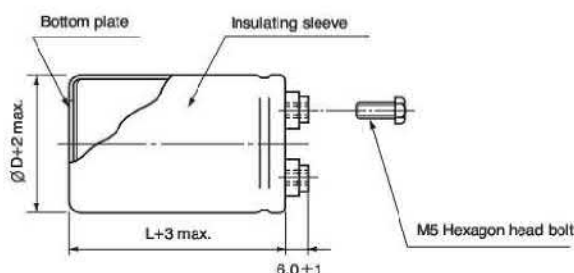
- Miniature size, High ripple current compared with GH series
- High reliability, long life guaranteed for 5000 hours load life at 85°C
- Suited for use in industrial power supplies for inverters
- Complied to the RoHS directive



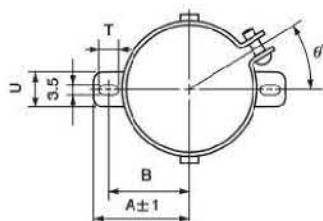
Item	Characteristics	
Operating temperature range	-25 ~ +85°C	
Capacitance tolerance	±20% at 120Hz, 20°C	
Leakage current max.	$I = 3 \sqrt{CV}$ (μA) (after 5 minutes)	
Dissipation factor max.	0.25 max. at 120Hz, 20°C	
Load life (after application of the rated voltage for 5000 hours at 85°C)	Leakage current	Less than specified value
	Capacitance change	Within ±20% of the initial value
	tanδ	Less than 300% of specified value
	500WV products are for 2000 hours.	
Shelf life (at 85°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.	

### DRAWING

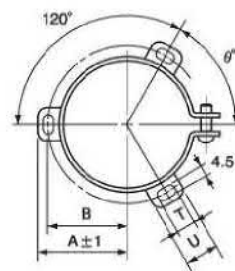
Unit : mm



### TWO LEGS ANGLE



### THREE LEGS ANGLE



### TWO LEGS ANGLE SIZE TABLE

ØD	B	A	T	U	θ°	P
51	33.6	39.9	6	14	30	22
63.5	40.8	46.8	6	14	30	28.6

### THREE LEGS ANGLE SIZE TABLE

ØD	B	A	T	U	θ°	P
51	32.9	38.9	7	12	60	22
63.5	38.4	45.3	7	14	60	28.6
76.2	44.5	51.5	8	16	60	31.8
89	50.8	61	8	16	60	31.8

## LARGE ALUMINUM ELECTROLYTIC CAPACITORS

**GN** series

### ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu\text{F}$ \ WV	400		450		500	
1800					63.5 × 100	6.5
2200	51 × 100	8.4	51 × 120	8.6	63.5 × 120	7.7
2700	51 × 110	10.0	63.5 × 100	10.5	76.2 × 100	8.8
3300	63.5 × 100	11.6	63.5 × 110	11.9	76.2 × 120	10.4
3900	63.5 × 100	12.3	76.2 × 100	13.9	76.2 × 140	12.1
4700	63.5 × 120	14.5	76.2 × 110	15.5	89 × 120	13.7
5600	76.2 × 110	16.5	76.2 × 130	15.9	89 × 140	17.8
6800	76.2 × 120	17.5	76.2 × 150	18.4		
8200	76.2 × 140	18.7	89 × 140	19.7		
10000	89 × 140	20.5				
12000	89 × 150	21.0				

↑  
Ripple current (A rms) at 85°C, 120Hz

↑  
Case size ØD × L (mm)

### ● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	300Hz	1kHz	3kHz
Coefficient	0.8	1.0	1.1	1.3	1.4

**NEW**  
**GQ**

For Inverter, High Ripple  
Series

**LL**  
Long Life



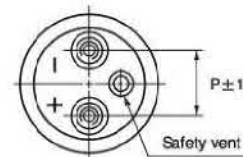
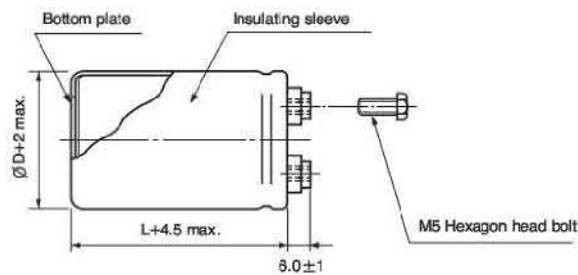
- High ripple current compared with GN series
- High reliability, long life guaranteed for 5000 hours load life at 85°C
- Suited for use in industrial power supplies for inverters
- Complied to the RoHS directive

GN  $\Rightarrow$  **GQ**  
High  
Ripple

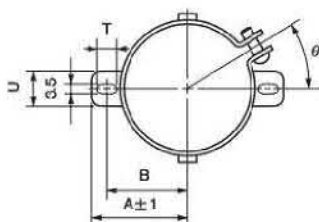
Item	Characteristics	
Operating temperature range	-25 ~ +85°C	
Capacitance tolerance	$\pm 20\%$ at 120Hz, 20°C	
Leakage current max.	$I = 3 \sqrt{CV} (\mu A)$ (after 5 minutes)	
Dissipation factor max.	0.25 max. at 120Hz, 20°C	
Load life (after application of the rated voltage for 5000 hours at 85°C)	Leakage current	Less than specified value
	Capacitance change	Within $\pm 20\%$ of the initial value
	$\tan \delta$	Less than 300% of specified value
	After 1000 hours no load test, leakage current, capacitance and $\tan \delta$ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.	
Shelf life (at 85°C)		

## DRAWING

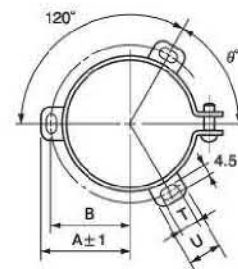
Unit : mm



## TWO LEGS ANGLE



## THREE LEGS ANGLE



## TWO LEGS ANGLE SIZE TABLE

ØD	B	A	T	U	θ°	P
51	33.6	39.9	6	14	30	22
63.5	40.8	46.8	6	14	30	28.6

## THREE LEGS ANGLE SIZE TABLE

ØD	B	A	T	U	θ°	P
51	32.9	38.9	7	12	60	22
63.5	38.4	45.3	7	14	60	28.6
76.2	44.5	51.5	8	16	60	31.8
89	50.8	61	8	16	60	31.8



## LARGE ALUMINUM ELECTROLYTIC CAPACITORS

**GQ** series

### ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu F$ \ WV	400		450	
1800				
2200	51 × 100	10.9	51 × 120	7.3
2700	51 × 110	13.0	63.5 × 100	13.7
3300	63.5 × 100	15.1	63.5 × 110	15.5
3900	63.5 × 110	16.0	76.2 × 100	18.1
4700	63.5 × 130	18.9	76.2 × 110	20.2
5600	76.2 × 110	21.5	76.2 × 130	20.7
6800	76.2 × 130	22.8	76.2 × 150	23.9
8200	76.2 × 150	24.3	89 × 140	25.6
10000	89 × 140	26.7		
12000	89 × 150	27.3		

↑ Ripple current (A rms) at 85°C, 120Hz

↑ Case size  $\varnothing D \times L$  (mm)

### ● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	60Hz	120Hz	300Hz	1kHz	3kHz
Coefficient	0.8	1.0	1.1	1.3	1.4



## Screw Terminal Type, Long Life Series

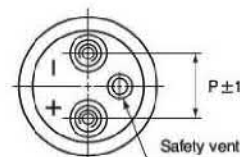
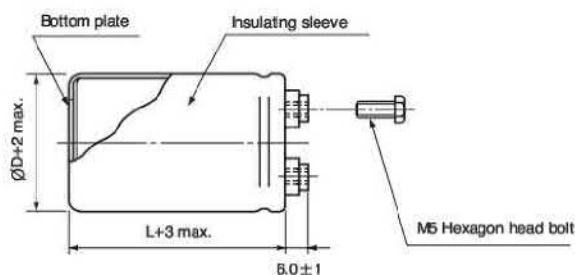
- Screw terminal series in compact case sizes
- High reliability, long life guaranteed for 20000 hours load life at 85°C
- Suited for use in industrial power supplies for inverters
- Complied to the RoHS directive



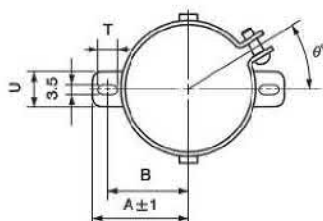
Item	Characteristics	
Operating temperature range	-25 ~ +85°C	
Capacitance tolerance	±20% at 120Hz, 20°C	
Leakage current max.	$I = 3 \sqrt{CV} (\mu A)$ (after 5 minutes)	
Dissipation factor max.	0.25 max. at 120Hz, 20°C	
Load life (after application of the rated voltage for 20000 hours at 85°C)	Leakage current	Less than specified value
	Capacitance change	Within ±20% of initial value
	tanδ	Less than 300% of specified value
Shelf life (at 85°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.	

### DRAWING

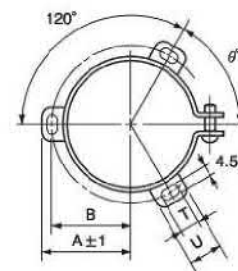
Unit : mm



### TWO LEGS ANGLE



### THREE LEGS ANGLE



### TWO LEGS ANGLE SIZE TABLE

ØD	B	A	T	U	θ°	P
51	33.6	39.9	6	14	30	22
63.5	40.8	46.8	6	14	30	28.6

### THREE LEGS ANGLE SIZE TABLE

ØD	B	A	T	U	θ°	P
51	32.9	38.9	7	12	60	22
63.5	38.4	45.3	7	14	60	28.6
76.2	44.5	51.5	8	16	60	31.8
89	50.8	61	8	16	60	31.8

## LARGE ALUMINUM ELECTROLYTIC CAPACITORS

GL series

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

$\mu\text{F}$	WV	350		400		450	
	Item	$\varnothing D \times L$ (mm)	Ripple current (A rms) 85°C 120Hz	$\varnothing D \times L$ (mm)	Ripple current (A rms) 85°C 120Hz	$\varnothing D \times L$ (mm)	Ripple current (A rms) 85°C 120Hz
1500						51 × 110	6.1
1800				51 × 110	6.6	51 × 130	7.1
2200		51 × 110	7.3	51 × 130	7.9	63.5 × 110	7.8
2700		51 × 130	8.7	63.5 × 110	8.7	63.5 × 130	9.2
3300		63.5 × 100	9.2	63.5 × 130	10.2	76.2 × 110	9.9
3900		63.5 × 110	10.4	76.2 × 100	10.3	76.2 × 130	11.4
4700		76.2 × 100	11.4	76.2 × 130	12.5	76.2 × 150	13.2
5600		76.2 × 110	12.8	76.2 × 150	14.5	76.2 × 160	14.8
6800		76.2 × 130	15.1	76.2 × 160	16.4	89 × 150	17.5
8200		76.2 × 150	18.0	89 × 150	19.2	89 × 160	19.7
10000		89 × 150	21.2	89 × 160	21.8		
12000		89 × 160	23.9				

● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	300Hz	1kHz	3kHz
Coefficient	0.8	1.0	1.1	1.3	1.4





## High ripple Current, High Reliability Series

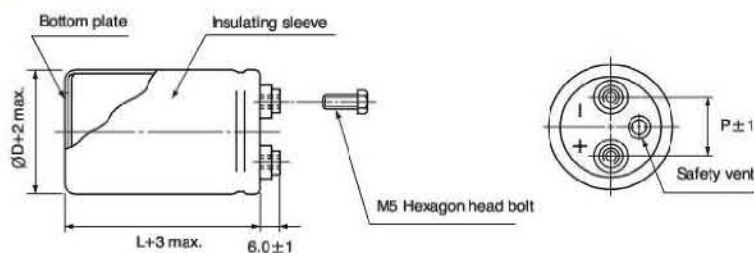
- High ripple current compared with CU series
- Long life guaranteed for 5000 hours load life at 105°C
- Suited for the general-purpose inverter
- Complied to the RoHS directive



Item	Characteristics	
Operating temperature range	-25 ~ +105°C	
Capacitance tolerance	±20% at 120Hz, 20°C	
Leakage current max.	$I = 3\sqrt{CV}$ (μA) (after 5 minutes)	
Dissipation factor max.	0.20 max. at 120Hz, 20°C	
Load life (after application of the rated voltage for 5000 hours at 105°C)	Leakage current	Less than specified value
	Capacitance change	Within ±20% of initial value
	tanδ	Less than 200% of specified value
	500WV products are for 2000hours	
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.	

### DRAWING

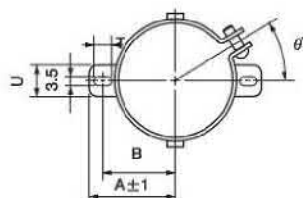
Unit : mm



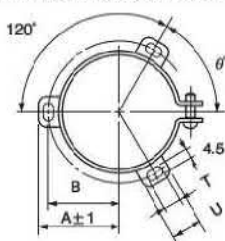
### TWO LEGS ANGLE SIZE TABLE

ØD	B	A	T	U	θ°	P
51	33.6	39.9	6	14	30	22
63.5	40.8	46.8	6	14	30	28.6

### TWO LEGS ANGLE



### THREE LEGS ANGLE



### THREE LEGS ANGLE SIZE TABLE

ØD	B	A	T	U	θ°	P
51	32.9	38.9	7	12	60	22
63.5	38.4	45.3	7	14	60	28.6
76.2	44.5	51.5	8	16	60	31.8
89	50.8	61	8	16	60	31.8

### DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV Item μF	400		450		500	
	ØD×L (mm)	Ripple Current (A rms) 105°C 120Hz	ØD×L (mm)	Ripple Current (A rms) 105°C 120Hz	ØD×L (mm)	Ripple Current (A rms) 105°C 120Hz
1000					51 × 130	6.3
1500					63.5 × 110	7.5
2200	63.5 × 110	11.6	63.5 × 115	12.1	76.2 × 130	10.1
2700	63.5 × 115	13.7	63.5 × 130	14.3	76.2 × 140	12.3
3300	63.5 × 130	16.1	76.2 × 130	16.9	76.2 × 150	13.0
3900	63.5 × 140	18.1	76.2 × 140	20.5	89 × 160	15.0
4700	76.2 × 130	21.2	76.2 × 150	22.6	89 × 160	16.5
5600	76.2 × 150	24.3	76.2 × 160	25.2		
6800	89 × 150	27.1	89 × 150	26.0		

### FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	300Hz	1kHz	3kHz
Coefficient	0.8	1.0	1.1	1.3	1.4

## LARGE ALUMINUM ELECTROLYTIC CAPACITORS



### High Ripple, High Reliability Long Life Series

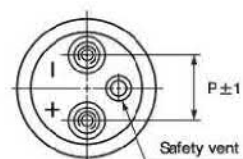
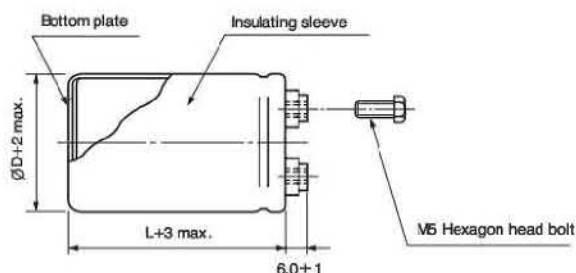
- High ripple current compared with EV Series
- High reliability, long life guaranteed for 7000 hours load life at 105°C
- Suited for use in industrial power supplies for inverter
- Complied to the RoHS directive



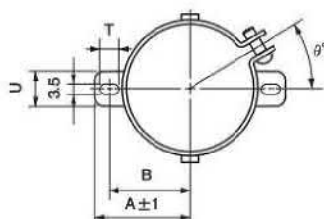
Item	Characteristics	
Operating temperature range	-25 ~ +105°C	
Capacitance tolerance	±20% at 120Hz, 20°C	
Leakage current max.	$I = 3 \sqrt{CV}$ (μA) (after 5 minutes)	
Dissipation factor max.	0.20 max. at 120Hz, 20°C	
Load life (after application of the rated voltage for 7000 hours at 105°C)	Leakage current	Less than specified value
	Capacitance change	Within ±20% of initial value
	tanδ	Less than 300% of specified value
Shelf life (at 105°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.	

### DRAWING

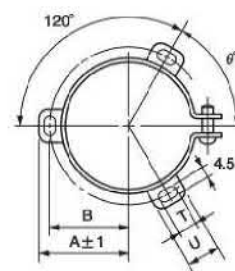
Unit : mm



### TWO LEGS ANGLE



### THREE LEGS ANGLE



### TWO LEGS ANGLE SIZE TABLE

ØD	B	A	T	U	θ°	P
51	33.6	39.9	6	14	30	22
63.5	40.8	46.8	6	14	30	28.6

### THREE LEGS ANGLE SIZE TABLE

ØD	B	A	T	U	θ°	P
51	32.9	38.9	7	12	60	22
63.5	38.4	45.3	7	14	60	28.6
76.2	44.5	51.5	8	16	60	31.8
89	50.8	61	8	16	60	31.8

## EY series

### ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV Item μF	350		400		450	
	ØD×L (mm)	Ripple current (A rms) 105°C 120Hz	ØD×L (mm)	Ripple current (A rms) 105°C 120Hz	ØD×L (mm)	Ripple current (A rms) 105°C 120Hz
1500					51 × 110	6.1
1800			51 × 110	7.4	51 × 130	7.1
2200	51 × 110	8.2	51 × 130	8.8	63.5 × 110	7.8
2700	51 × 130	9.8	63.5 × 110	9.7	63.5 × 130	9.2
3300	63.5 × 100	10.3	63.5 × 130	11.4	76.2 × 110	9.9
3900	63.5 × 110	11.6	76.2 × 100	11.6	76.2 × 130	11.4
4700	76.2 × 100	12.7	76.2 × 130	14.0	76.2 × 150	13.2
5600	76.2 × 110	14.3	76.2 × 150	16.2	76.2 × 160	14.8
6800	76.2 × 130	16.8	76.2 × 160	18.3	89 × 150	17.5
8200	76.2 × 150	20.1	89 × 150	21.5	89 × 160	19.7
10000	89 × 150	23.7	89 × 160	24.3		
12000	89 × 160	26.7				

### ● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Frequency	50Hz	120Hz	300Hz	1kHz	3kHz
Coefficient	0.8	1.0	1.1	1.3	1.4



# LARGE ALUMINUM ELECTROLYTIC CAPACITORS

## LW,SW

For Welding Machine  
Series

- For welding machine applications
- Charge and discharge characteristic : 100000 cycles at 5 ~ 35°C
- LW series with lug terminal type, SW series with screw terminal type
- Complied to the RoHS directive

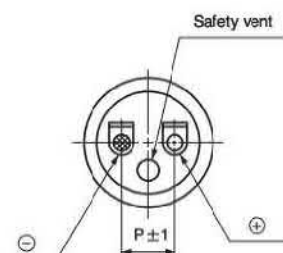
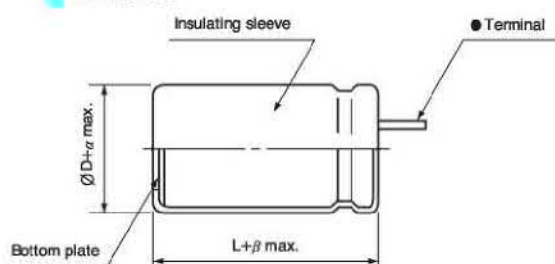


Item	Characteristics
Operating temperature range	-25 ~ +85°C
Capacitance tolerance	-10 ~ +50% at 120Hz, 20°C (Capacitance Tolerance "T")
Leakage current max.	$I=3\sqrt{CV}$ (μA) (after 5 minutes)
Dissipation factor max.	0.20 max.at 120Hz, 20°C
Charge and discharge characteristics	After charge and discharge for 100000 cycles at 5~35°C with application of the rate voltage, the capacitors shall be satisfied the following specifications.
	Leakage current
	Capacitance change
	tanδ
	Less than 150% of specified value Within ± 15% of initial value Less than 150% of specified value
Conditions	
Charge resistance : 4Ω Charge time : 1 sec	
Discharge resistance : 0.12Ω Discharge time : 0.5sec	

## DRAWING

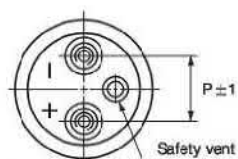
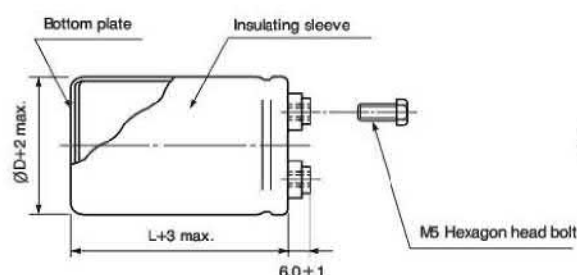
Unit : mm

### LW series



ØD	35	51
P	14	18
α	1	2
β	2	3

### SW series



ØD	35	51	63.5	76.2
P	12.7	22	28.6	31.8

## DIMENSIONS

ØD×L (mm)

WV SERIES μF	315		475	
	LW	SW	LW	SW
225			51×100	51×100
330	35×100			
470	51×100			76.2×120
1000		63.5×140		76.2×160
1500		76.2×120		
2200		76.2×160		

## AM For Hi-Fi Component System Series

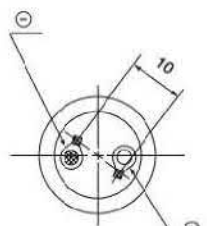
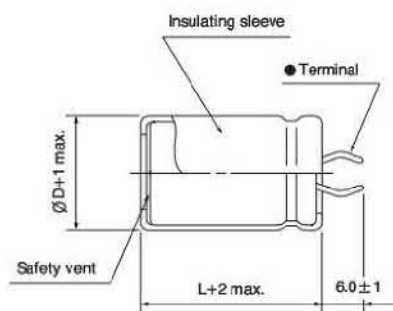


- For high grade audio equipment
- High resonance frequency, low ESR and low impedance
- Ideally suited for Hi-Fi VTR and CD players
- Snap-in terminal type
- Voltage range of 16~100V
- Complied to the RoHS directive

Item	Characteristics				
Operating temperature range	-40 ~ +85°C				
Capacitance tolerance	± 20% at 120Hz, 20°C				
Leakage current max.	$I = 3\sqrt{CV}$ (μA) (after 5 minutes)				
Dissipation factor max. (at 120Hz, 20°C)	WV	16	25 ~ 35	50 ~ 71	80 ~ 100
	tanδ	0.25	0.22	0.20	0.15
Charge and discharge characteristics	After charge and discharge for 5000 cycles at 70°C with application of the rated voltage, the capacitors shall be satisfied the following specifications.				
	Appearance		No visible damage and no leakage electrolyte		
	Leakage current		Less than specified value		
	Capacitance change		Within ± 15% of initial value		
	tanδ		Less than 150% of specified value		
	Conditions				
	Charge resistance : 4Ω		Applied current : 1A		
Load life (after application of the rated voltage for 2000 hours at 85°C)	Discharge resistance : 100Ω		Charge and discharge time : 60sec. (each)		
	Leakage current		Less than specified value		
	Capacitance change		Within ± 20% of initial value		
	tanδ		Less than 200% of specified value		
Shelf life (at 85°C)	After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.				

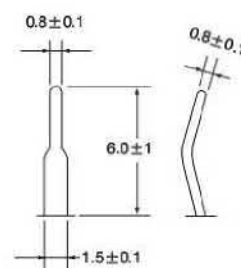
### DRAWING

Unit : mm



### PC Board Mounting Holes

### Terminal



## LARGE ALUMINUM ELECTROLYTIC CAPACITORS

**AM** series

### DIMENSIONS

ØD×L(mm)

μF \ WV	16	25	35	50	63	80	100
470							22×40
680						22×40	25.4×40
1000					22×40	25.4×40	25.4×50
1500				22×40	25.4×40	25.4×50	30×50
2200			22×40	25.4×40	25.4×50	30×50	35×50
3300		22×40	25.4×40	25.4×50	30×50	30×60	35×60
4700		25.4×40	25.4×50	30×50	30×60	35×60	
6800	22×40	25.4×50	30×50	30×60	35×60		
8200	25.4×40	30×50	35×50	35×60	35×60		
10000	25.4×50	35×50	35×60	35×60			
12000	30×50	35×50	35×60				
15000	35×50	35×60					
22000	35×60						
33000	35×60						



## DF For Photo Flash Series

- For photo flash applications with lug terminal
- Low dissipation factor, low leakage current and high stability during the repetition of charge and discharge
- Complied to the RoHS directive

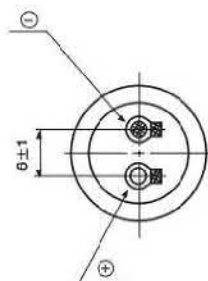
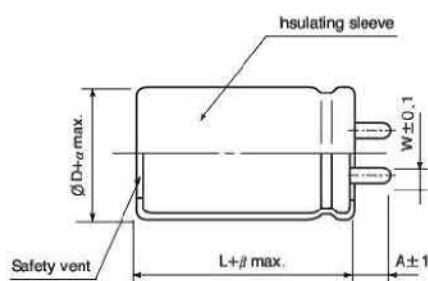


Item	Characteristics		
Operating temperature range	-20 ~ +55℃		
Capacitance tolerance	-10 ~ +20% at 120Hz, 20℃		
Leakage current max.	$I=1 \times C$ (μA) (after 5 minutes), where C=Nominal capacitance (μF)		
Dissipation factor max. (at 120Hz, 20℃)	Capacitance range(μF)	150 ~ 600	700 ~ 1500
	$\tan\delta$	0.10	0.15
Charge and discharge characteristics	Charge and discharge at rated voltage at 5~35℃ with a switch sequence of 30 seconds for 5000 times via xenon flash tube with discharge resistance of 0.7~1.0Ω		
	Leakage current	Less than 150% of specified value	
	Capacitance change	Within ± 10% of initial value	
	$\tan\delta$	Less than 150% of specified value	
Shelf life	After leaving capacitors under no load at 55℃ for 1000 hours. The measurement shall be performed at 20℃ by the KS C 6035 clause 5.4.		
	Leakage current	Less than 300% of specified value	
	Capacitance change	Within ± 10% of initial value	
	$\tan\delta$	Less than 150% of specified value	

## DRAWING

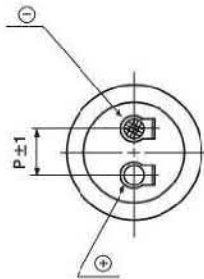
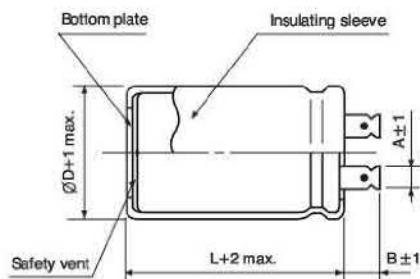
Unit : mm

•  $\varnothing D \leq 20$



	$\varnothing D=20$
W	2.5
$\alpha$	1.0
$\beta$	2.0
A	4.0

•  $\varnothing D \geq 22$



	$\varnothing D=22$	$\varnothing D \geq 25.4$	$\varnothing D=40^*$
A	3.5	4.5	4.5
B	6.0	8.0	11.0
P	8.0	10.0	18.0

\* Note :  $\varnothing 40$  is available upon request. Please check with us individual size and dimensions.

# LARGE ALUMINUM ELECTROLYTIC CAPACITORS

**DF** series

## DIMENSIONS

ØD×L(mm)

WV (SV)	µF \ ØD	20	22	25.4	30	35
<b>330 (350)</b>	200	20×27				
	250	20×30	22×27			
	300	20×36	22×30			
	350	20×39	22×33			
	400	20×44	22×36	25.4×30		
	450		22×42	25.4×33		
	500		22×44	25.4×37		
	600			25.4×42	30×33	
	700			25.4×47	30×38	
	800			25.4×54	30×42	
	900			25.4×57	30×45	
	1000				30×48	35×40
	1200				30×58	35×45
	1300				30×63	35×50
	1500				30×70	35×55
<b>360 (390)</b>	200	20×30	22×27			
	250	20×36	22×30			
	300	20×39	22×36	25.4×30		
	350	20×44	22×40	25.4×33		
	400		22×42	25.4×35		
	450		22×48	25.4×40		
	500			25.4×44	30×35	
	600			25.4×54	30×38	
	700			25.4×57	30×45	
	800				30×50	35×40
	900				30×55	35×45
	1000				30×58	35×55
	1200				30×70	35×55
	1300					35×60
	1500					35×70

## AR, AH For Inverter Air-conditionings

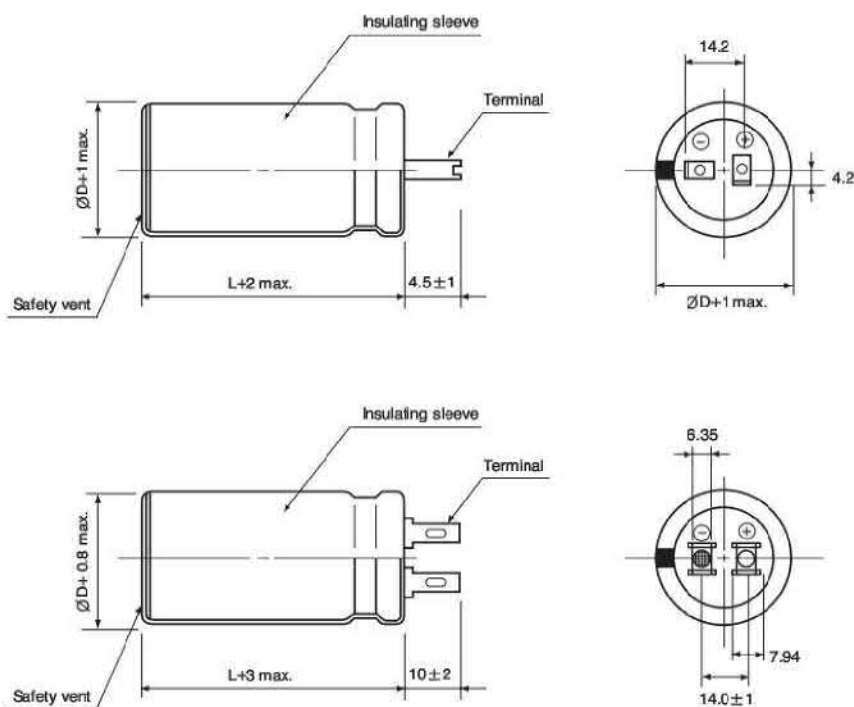
- For high ripple current application such as air conditioning system
- AR series is load life of 3000 hours at 85°C
- AH series is load life of 3000 hours at 105°C



Item	Characteristics			
Operating temperature range	-25 ~ +85°C (AR)		-25 ~ +105°C (AH)	
Capacitance tolerance	±10% at 120Hz, 20°C			
Leakage current max.	I=3 √CV (μA) (after 5 minutes)			
Dissipation factor (120Hz, 20°C )	WV	350	400	450
	tanδ	0.15	0.15	0.20
Low temperature characteristics (120Hz)	Z-25°C/ Z+20°C ≤ 4			
Load life	The following specifications shall be satisfied when the capacitors are restored to 20°C after subjected to DC voltage with the rated ripple current is applied for 3000 hours at (85°C/105°C)			
	Leakage current	Less than specified value		
	Capacitance change	Within ±20% of initial value		
	tanδ	Less than 200% of specified value		
Shelf life	After leaving capacitors under no load at 85°C/105°C for 1000 hours. The measurement shall be performed at 20°C by the KS C 6035 clause 5.4.			
	Leakage current	Less than specified value		
	Capacitance change	Within ±15% of initial value		
	tanδ	Less than 150% of specified value		

### DRAWING

Unit : mm



\* Note : If you want to use the 'AR, AH' series in your circuit, Please consult our technical department.



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