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LIST OF PRODUCTS

CONDUCTIVE POLYMER ALUMINUM SOLID CAPACITORS

Series			Applications	Load life Time (Hrs)	Miniature	Standard type	Low impedance	Long life	Solvent-proof	Terminal type	Rated voltage range (V _{DC})	Capacitance range (μF)	Page
Conductive Polymer Aluminum Solid Capacitors (ellcap™)	Surface mount	APV	Vertical type, 125°C, Low ESR	125°C 2,000hrs			●		●	SMD	10~35	8.2~82	17
		ARV	Vertical type, Stable Leakage Current at SV(after Reflow)	105°C 2,000hrs			●		●	SMD	16~20	22~330	19
		AXV	Vertical type, 105°C, Super Low ESR	105°C 2,000hrs			●		●	SMD	2.5~16	68~2,700	21
		ASV 	Vertical type, 105°C, Low ESR	105°C 2,000hrs			●		●	SMD	2.5~25	6.8~1,500	23
	Radial	AXA 	Radial type, 105°C, Super Low ESR	105°C 2,000hrs			●		●	Radial	2.5~16	68~2,700	25
		ASA 	Radial type, 105°C, Low ESR	105°C 2,000hrs			●		●	Radial	2.5~35	6.8~1,500	27

SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

Series			Applications	Load life Time (Hrs)	Miniature	Standard type	Low impedance	Long life	Solvent-proof	Terminal type	Rated voltage range (V _{DC})	Capacitance range (μF)	Page
Surface mount	General Purpose	MVG	5.5~22.0mm max. height, downsized	85°C 1,000~2,000hrs	●				●	SMD	4~450	0.1~10,000	43
		BDS(MVK)	5.5~22.0mm max. height	105°C 1,000~2,000hrs	●				●	SMD	6.3~450	0.1~6,800	45
		BXA	5.6~10.5mm max. height, Low Imp	105°C 1,000~2,000hrs			●		●	SMD	6.3~50	2.2~1,500	47
		BXE	5.6~10.5mm max. height, Ultra Low Imp	105°C 1,000~2,000hrs			●		●	SMD	6.3~35	4.7~1,500	49
		BJX	5.6~10.5mm max. height, Low Imp, Long Life	105°C 2,000~5,000hrs			●	●	●	SMD	6.3~35	4.7~1,500	51
		BDA	5.5~6.0mm max. height, Long life	105°C 2,000hrs				●	●	SMD	4~50	0.1~100	53
		BLA	5.5~10.5mm max. height, Long life	105°C 5,000hrs				●	●	SMD	4~50	0.1~470	55
		BLH	10.5mm max. height, Long life	105°C 10,000hrs				●	●	SMD	10~50	33~470	57
		CLZ 	5.5~22.0mm max. height, Wide temp. Low ESR	125°C 1,000~5,000hrs			●	●	●	SMD	10~400	10~4,700	59
		CLX	10.5~14.0mm max. height, Wide temp. Ultra low ESR	125°C 2,000~4,000hrs			●	●	●	SMD	10~50	33~1,000	61
		VDA	10.5~14.0mm max. height, Wide temp.	150°C 1,000hrs				●	●	SMD	10~50	47~1,000	63
	Bi-Polar	MVG(MV)-BP	5.5mm max. height, Bi-polar	85°C 2,000hrs					●	SMD	4~50	0.1~47	65
		BDS(MK)-BP	5.5mm max. height, Bi-polar	105°C 1,000hrs					●	SMD	6.3~50	0.1~47	65

MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

Series			Applications	Load life Time (Hrs)	Miniature	Standard type	Low impedance	Long life	Solvent-proof	Terminal type	Rated voltage range (V _{DC})	Capacitance range (μF)	Page
Miniature	Low Profile	DSA / DZA	5mm height, Downsized / Reflow Application	85°C 2,000hrs		●				Radial	4~50	0.1~330	68
		GSA / GZA	7mm height, Downsized / Reflow Application	85°C 2,000hrs	●					Radial	6.3~63	0.1~470	70
		EMA	5mm height, Wide temp. Long Life	105°C 2,000hrs				●		Radial	4~50	0.1~100	72
		HMA	7mm height, Wide temp. Long Life	105°C 2,000hrs				●		Radial	6.3~50	0.1~150	73
	General Purpose	MHA	High capacitance, Downsized	85°C 2,000hrs	●					Radial	4~500	0.1~15,000	74
		NHA	High capacitance, Downsized	105°C 1,000~2,000hrs	●					Radial	6.3~500	0.1~15,000	76
	Low Leakage	GSA(SRA)-LL/LL	Height 7mm / General	85°C 2,000hrs		●				Radial	6.3~100	0.1~4,700	78
	Bi-polar	DSA(SRE)-BP	5mm height	85°C 1,000hrs		●				Radial	4~50	0.1~47	80
		GSA-BP	7mm height	85°C 2,000hrs		●				Radial	6.3~50	0.1~47	81
		MHA-BP	General	85°C 2,000hrs		●				Radial	6.3~250	3.3~6,800	82
		NHA-BP	General, Wide temp.	105°C 1,000hrs		●			●	Radial	6.3~250	3.3~6,800	84
		SSP	Speaker network	85°C 2,000hrs		●				Radial	25~63	1~100	86
		KSA	Horizontal deflection, Wide temp	105°C 1,000hrs		●			●	Radial	25, 50	2.2~10	88

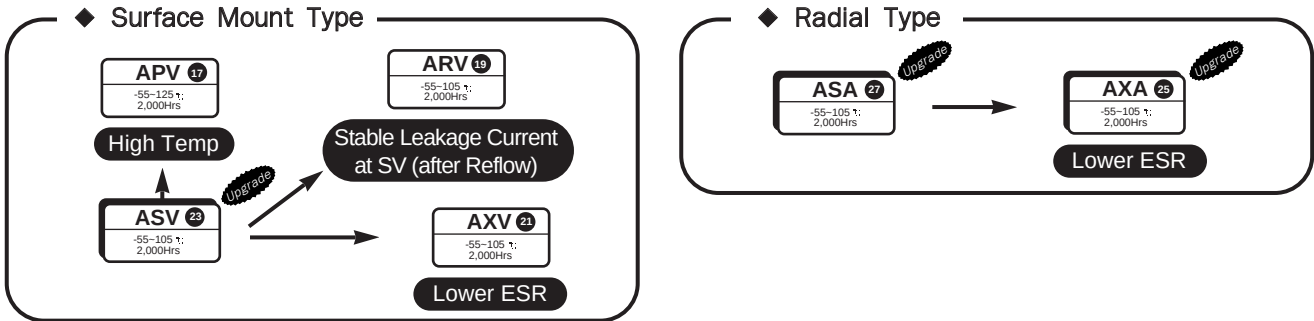
PRODUCTION GUIDE

Series			Applications	Load life Time (Hrs)	Miniature	Standard type	Low Impedance	Long life	Solvent-proof	Terminal type	Rated voltage range (Vdc)	Capacitance range (μF)	Page
Miniature	ESR, Low Imp.	EXB	Height 5mm Ultra Low Imp.	105°C 2,000hrs			●	●	●	Radial	6.3~35	1~100	89
		HXB	Height 7mm Ultra Low Imp.	105°C 2,000hrs			●	●		Radial	6.3~50	10~330	90
		HXL	Height 7mm Ultra Low Imp. Long life	105°C 3,000hrs			●	●		Radial	6.3~50	10~330	91
		NXL(LXV)	Low Imp., Long life	105°C 2,000~5,000hrs			●	●	●	Radial	6.3~100	0.47~15,000	92
		NXP(LXZ)	Low Imp., Long life, Downsized	105°C 2,000~5,000hrs			●	●	●	Radial	6.3~35	33~18,000	95
		NXA	Low Imp., Long life	105°C 4,000~10,000hrs			●	●		Radial	6.3~100	6.8~18,000	97
		NXB	Low Imp., Long life	105°C 2,000~5,000hrs			●	●		Radial	6.3~100	3.3~8,200	100
		NXH	Low Imp., Long life	105°C 6,000~10,000hrs			●	●		Radial	6.3~50	27~8,200	103
		NXK	Low Imp., Long life, High ripple	105°C 4,000~5,000hrs			●	●		Radial	10~50	100~2,700	105
	High Reliability	NXF	Ultra Low ESR	150°C 2,000 hrs			●			Radial	6.3~16	470~3,300	107
		NXE	Ultra Low ESR, Long life	105°C 3,000~4,000hrs			●	●		Radial	6.3~35	150~3,300	109
		NZE	High ripple, Downsized	105°C 2,000hrs			●			Radial	160~450	8.2~390	111
		NFC	Long life, High ripple	105°C 2,000~5,000hrs			●	●		Radial	160~500	1~470	113
		NFA	Long life, High ripple	105°C 8,000~10,000hrs			●	●		Radial	160~450	3.3~330	116
		NFL	Long life, High ripple	105°C 10,000~12,000hrs			●	●		Radial	160~500	3.3~470	118
		NLA	Long life	105°C 4,000~10,000hrs			●	●		Radial	6.3~50	10~18,000	121
		NLC	Long life	105°C 10,000hrs			●	●		Radial	6.3~50	10~680	123
		PXB	Wide temp., Imp. Long life	125°C 2,000~5,000hrs			●	●	●	Radial	10~450	4.7~4,700	125
		PXD	Wide temp., Ultra Low Imp. Long life	125°C 2,000~4,000hrs			●	●	●	Radial	10~50	10~4,700	127
	Special Application	PHA	Wide temp.	150°C 1,000hrs				●	●	Radial	10~50	100~3,300	129
		AHS	Audio grade, Downsized	85°C 2,000hrs	●					Radial	10~100	0.1~10,000	131
		PHL	For photo flash	5~35°C 5,000Times						Radial	300~330	5~160	133
		NZD	Air bag	105°C 5,000hrs				●	●	Radial	16~35	820~5,600	134

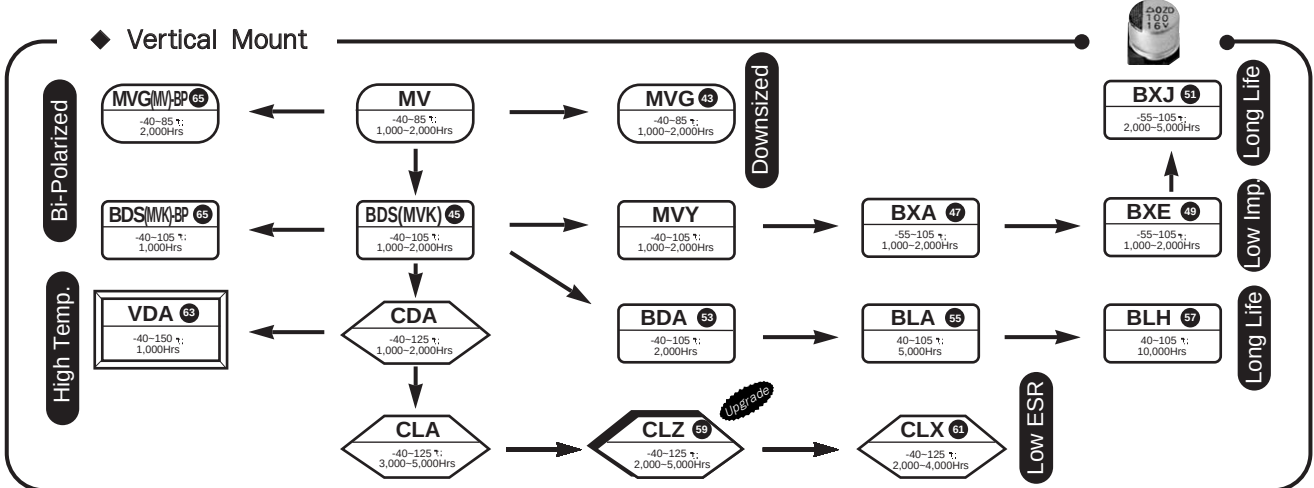
Series			Applications	Load life Time (Hrs)	Miniature	Standard type	Low Impedance	Long life	Solvent-proof	Terminal type	Rated voltage range (V _{DC})	Capacitance range (μ F)	Page
PCB Terminal Type	General Purpose	RDC	More Downsized	85°C 2,000hrs	●					Pin	16~500	68~56,000	136
		TDA	Miniature	105°C 2,000hrs	●					Pin	16~500	47~47,000	140
		TDC	More Downsized	105°C 2,000hrs	●					Pin	160~450	68~1,200	144
		TEA	15mm height	105°C 2,000hrs	●					Pin	160~400	39~390	147
	High Reliability	TLA	Downsized, Long life, Wide temp.	105°C 3,000hrs				●		Pin	160~500	56~2,200	149
		TLS	Downsized, Long life, Wide temp. High ripple	105°C 3,000hrs				●		Pin	160~450	100~3,300	152
		UDA	Wide Temp.	125°C 1,000hrs				●		Pin	16~250	100~10,000	154
		TLC(LXG)	Miniature, Long life	105°C 5,000hrs				●		Pin	10~500	47~47,000	157
		TLB	Miniature, Long life	105°C 7,000hrs	●			●		Pin	160~450	47~2,200	161
	Special Application	RVA	No spark with DC overvoltage	85°C 2,000hrs						Pin	200~450	68~2,200	163
		TVA	No spark with DC overvoltage	105°C 2,000hrs						Pin	200~450	68~2,200	165
		DL	General Audio	85°C 2,000hrs		●				Pin	50~100	3,300~22,000	167
		AHS	Hi-Fi Audio Miniature	85°C 2,000hrs	●					Pin	50~100	3,300~22,000	168
Screw-Bot Terminal Type	General Purpose	TGA(KMH)	General, Wide temp.	105°C 2,000hrs		●				Screw	10~400	180~680,000	170
		RFC(RWF)	High ripple, Long life	85°C 5,000hrs				●		Screw	350~450	2,700~15,000	173
	For Inverter	RGA	High ripple, High voltage	85°C 2,000hrs						Screw	500~600	100~3,900	175
		RFA	High ripple, Long life	85°C 20,000hrs				●		Screw	350~500	2,200~12,000	177
		TFA	High ripple, Long life	105°C 5,000hrs				●		Screw	350~450	2,200~10,000	179
	Special Application	PH	For photo flash	5~35°C 5,000Times						Pin/ Screw	330	165~2,000	181
		DH	For Welding	40°C 1,000,000Times							315, 475	100~330	182

SERIES GROUP CHART

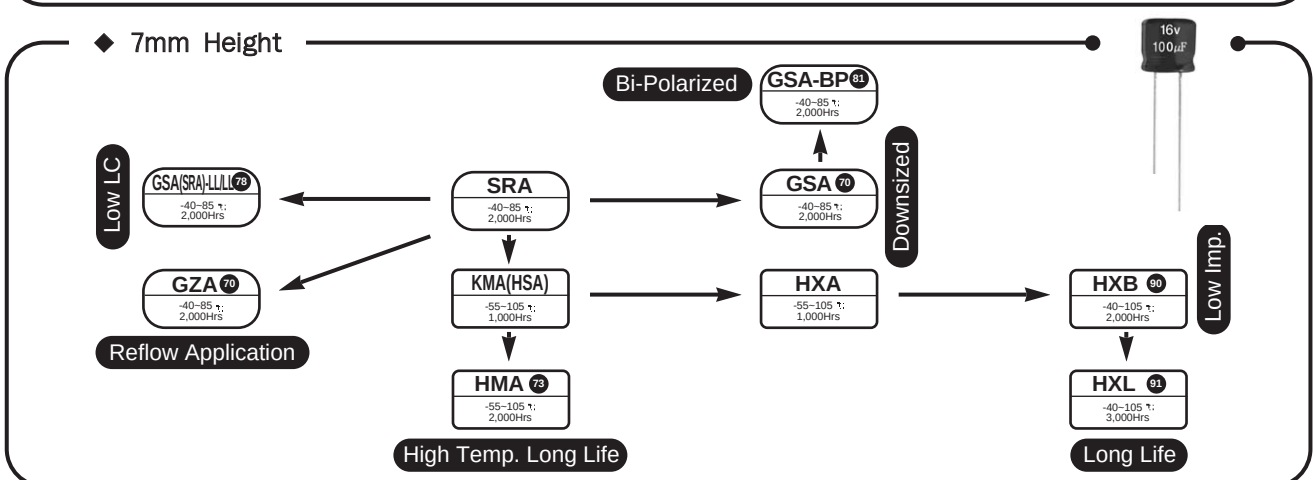
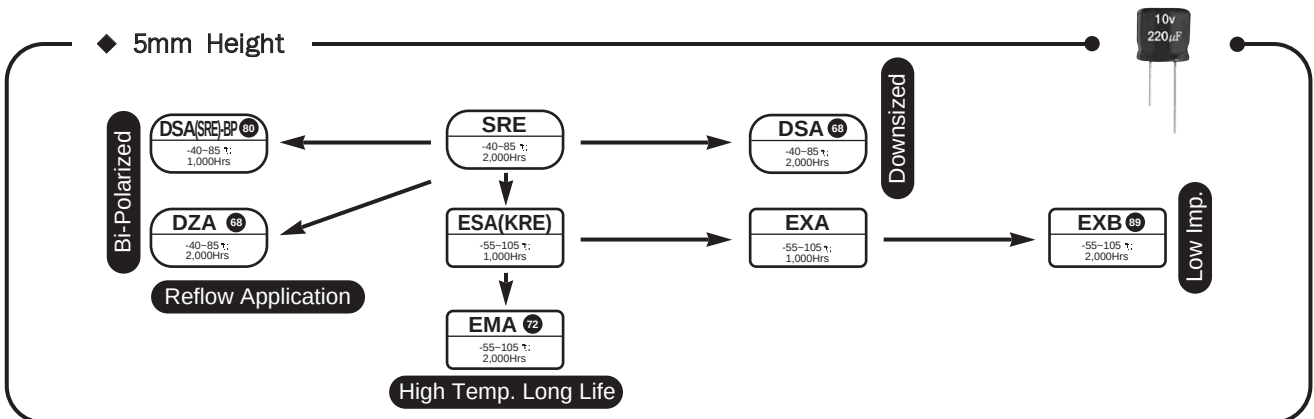
● Conductive Polymer Aluminum Solid Capacitors (reALcap™)



● SURFACE MOUNT TYPES

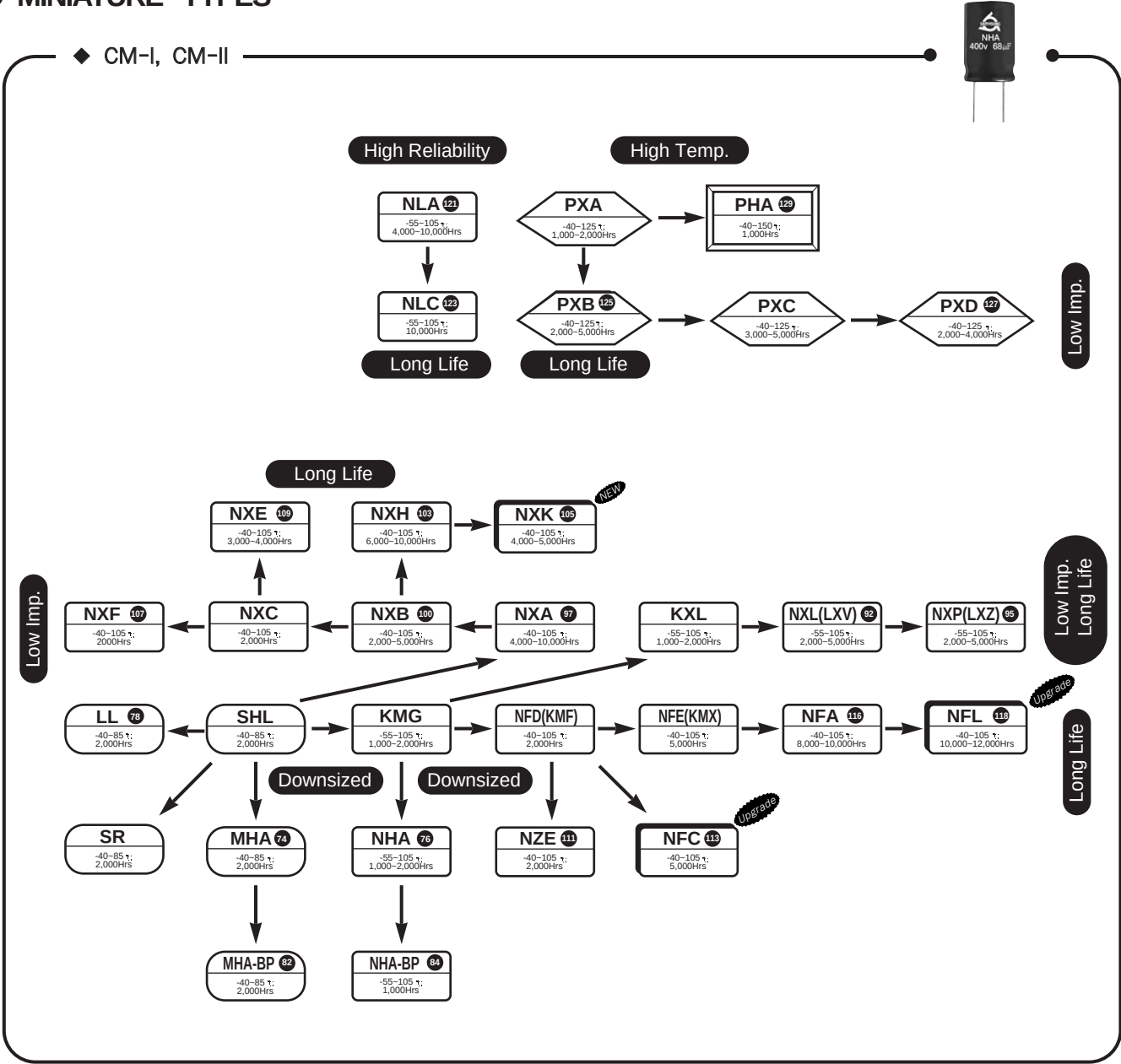


● MINIATURE TYPES

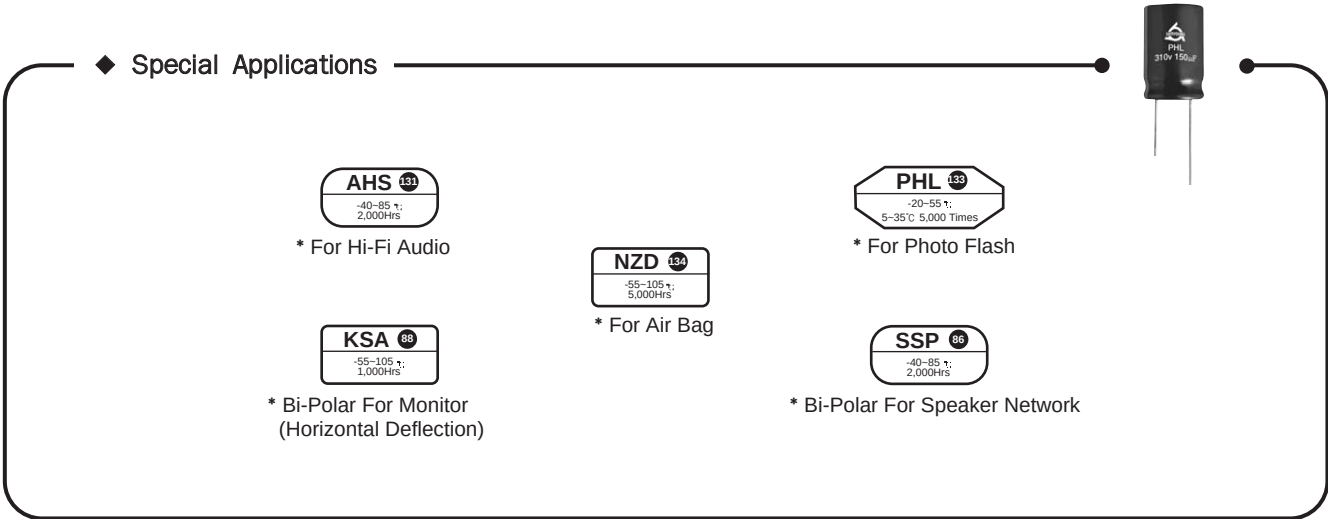




MINIATURE TYPES

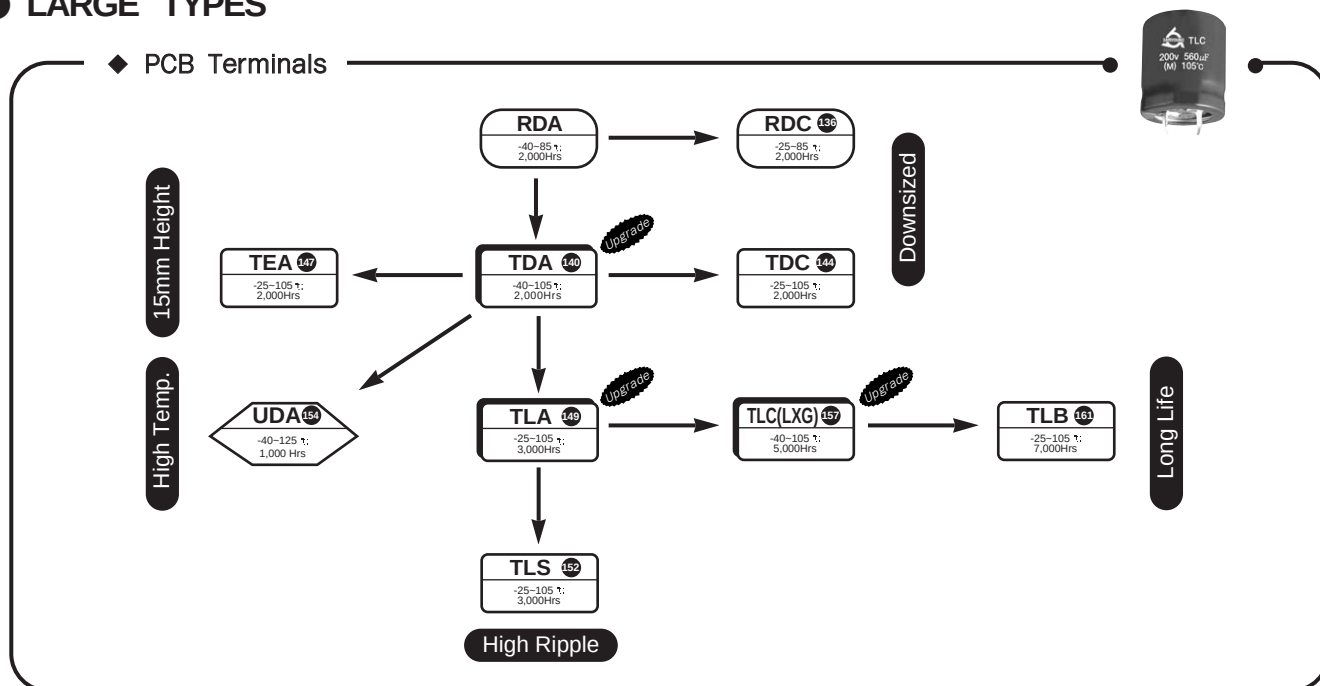


Special Applications

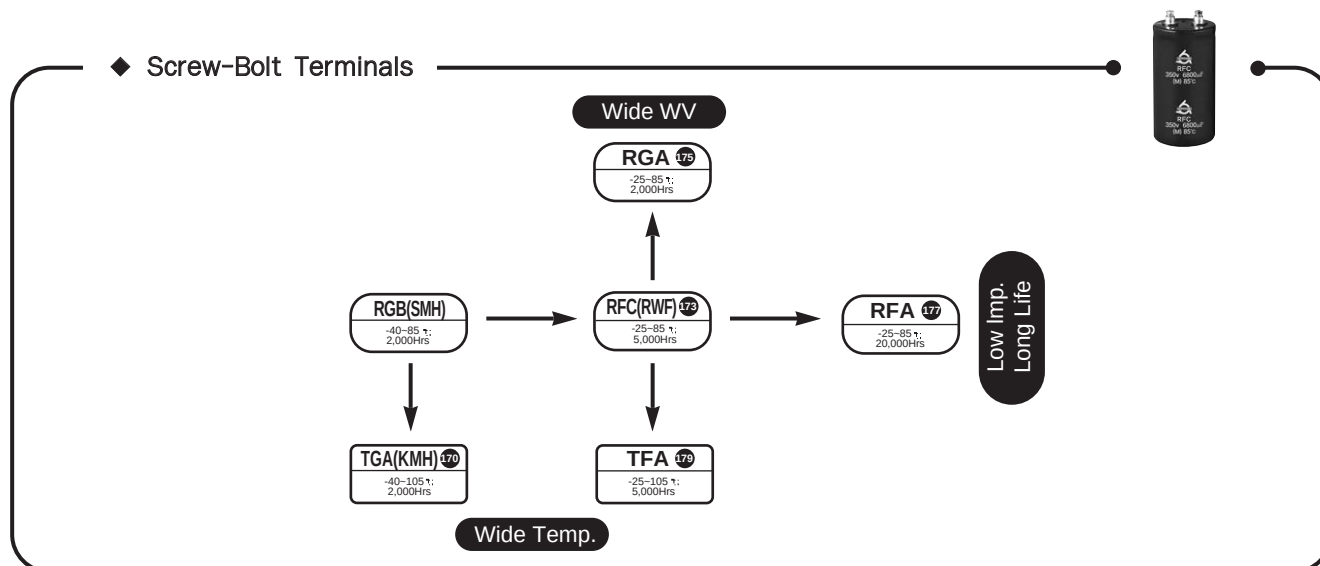


● LARGE TYPES

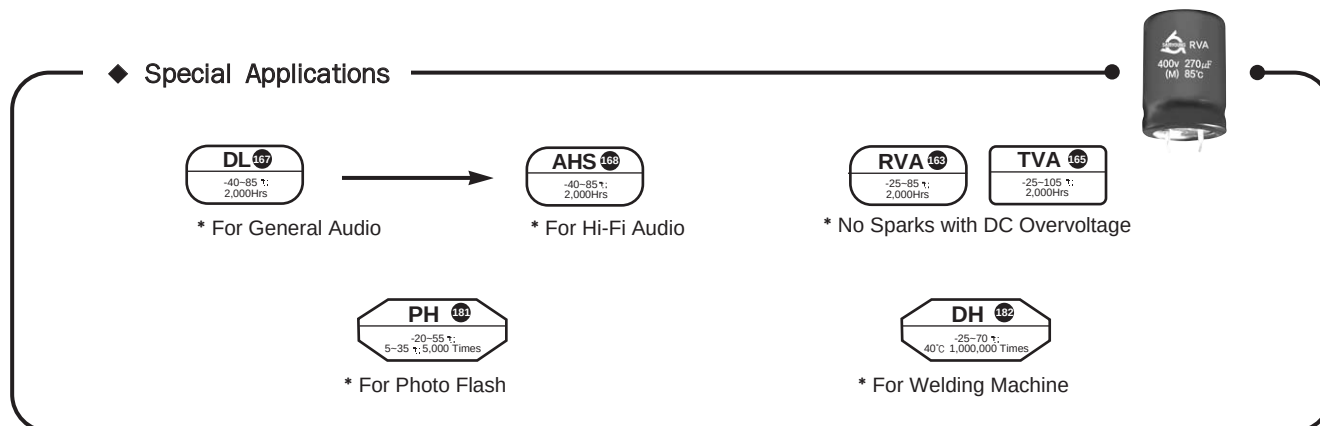
◆ PCB Terminals



◆ Screw-Bolt Terminals



◆ Special Applications



DETAIL SPECIFICATIONS OF TAPING METHOD

■ SURFACE MOUNT TYPE
TAPING DIMENSIONS

Fig.1

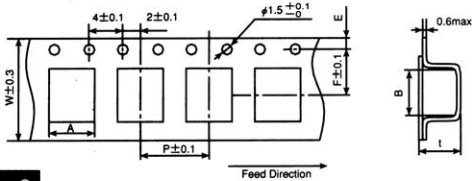


Fig.2

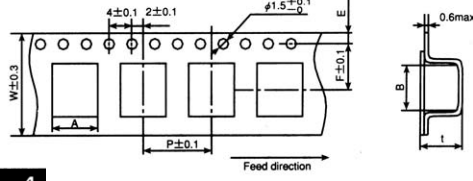


Fig.3

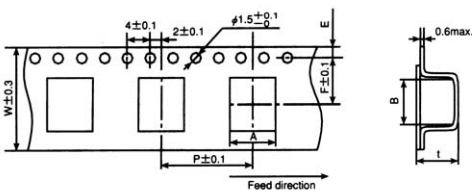
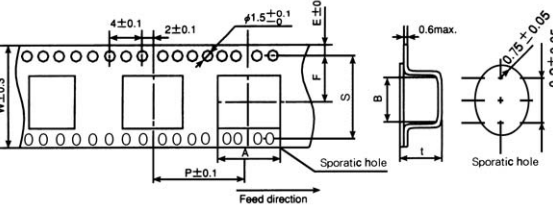


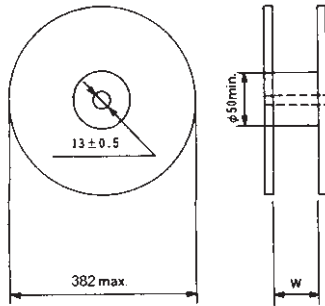
Fig.4



(mm)

Series	Case Code	Fig	W	A	B	F	E	P	t	S
AL CHIP reALcap™	φ 3(B55)	1	12	3.5±0.2	3.5±0.2	5.5	1.75±0.1	8	5.9±0.2	-
	φ4(D55,D56,D60)	1	12	4.7±0.2	4.7±0.2	5.5	1.75±0.1	8	5.7±0.2(D55,D56) 6.3±0.2(D60)	-
	φ 5(E55,E56,E60)	2	12	5.7±0.2	5.7±0.2	5.5	1.75±0.1	12	5.7±0.2(E55,E56) 6.3±0.2(E60)	-
	φ 6.3(F55,F56,F60)	2	16	7.0±0.2	7.0±0.2	7.5	1.75±0.1	12	5.7±0.2(F55,F56) 6.3±0.3(F60)	-
	φ 6.3×8L(F80)	2	16	7.0±0.2	7.0±0.2	7.5	1.75±0.1	12	8.2±0.2	-
	φ 8×6L(H63)	2	16	8.7±0.2	8.7±0.2	7.5	1.75±0.1	12	6.8±0.2	-
	φ 8×6.7L(H70)	2	24	8.7±0.2	8.7±0.2	11.5	1.75±0.1	12	7.3±0.2	-
	φ 8×10L(H10)	3	24	8.7±0.2	8.7±0.2	11.5	1.75±0.1	16	11.0±0.2	-
	φ 8×11.5L(H12)	3	24	8.7±0.2	8.7±0.2	11.5	1.75±0.1	16	12.3±0.2	-
	φ 10×10L(J10)	3	24	10.7±0.2	10.7±0.2	11.5	1.75±0.1	16	11.0±0.2	-
	φ 10×12.2L(J12)	3	24	10.7±0.2	10.7±0.2	11.5	1.75±0.1	16	13.0±0.2	-
	φ 12.5×13.5L(K14)	4	32	13.4±0.2	13.4±0.2	14.2	1.75±0.1	24	14.0±0.2	28.4±0.1

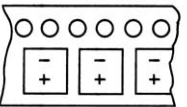
REEL



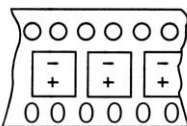
ORIENTATION OF POLARITY

- AL CHIP
- reALcap™

Feed Direction →



Feed Direction →



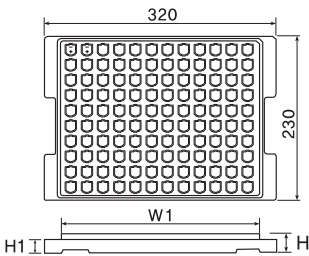
< φ 12.5 >

QUANTITY PER REEL

Series	Case Code	W(mm)	Q'ty(pcs/reel)	Q'ty(pcs/box)
AL CHIP reALcap™	φ 3(B55)	14	2,000	20,000
	φ 4(D55,D56,D60)	14	2,000	20,000
	φ 5(E55,E56,E60)	14	1,000	10,000
	φ 6.3(F55,F56,F60)	18	1,000	10,000
	φ 6.3×8L(F80)	18	900	9,000
	φ 8×6L(H63)	18	1,000	10,000
	φ 8×6.7L(H70)	26	1,000	6,000
	φ 8×10L(H10)	26	500	3,000
	φ 8×11.5L(H12)	26	400	2,400
	φ 10×10L(J10)	26	500	3,000
	φ 10×12.2L(J12)	26	400	2,400
	φ 12.5×13.5L(K14)	34	200	1,000

■ SURFACE MOUNT TYPE(TRAY)

DIMENSIONS(mm)

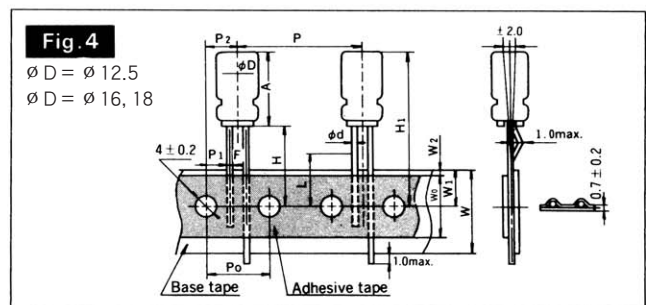
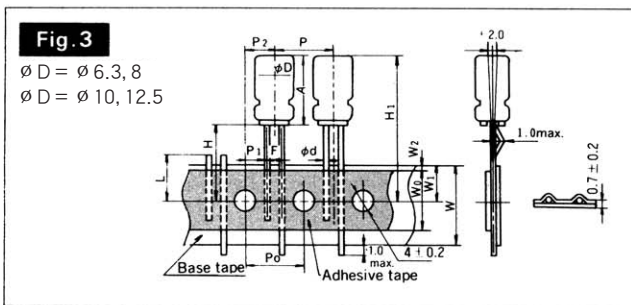
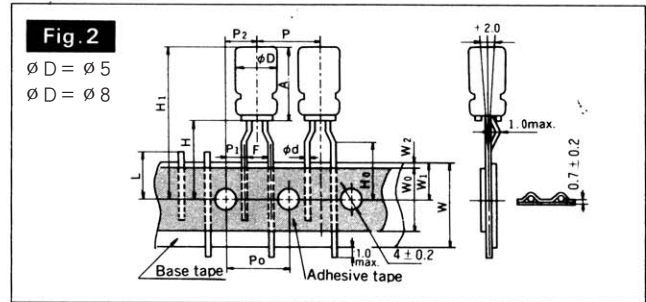
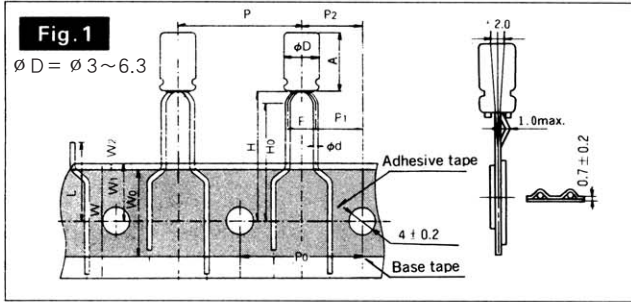


QUANTITY PER TRAY/BOX

Case Code	H (mm)	W1 (mm)	H1 (mm)	Q' ty (pcs/tray)	Q' ty (pcs/box)
L17~L22	28.0	284	24.0	80	160,400
M17~M22	28.0	284	24.0	60	120,300

MINIATURE TYPE

Unit(mm)



Code	Case size ϕD	A	ϕd	P	P0	P1	P2	F	W	W0	W1	W2	H	H0	H1	L	Fig
Tol.	±0.5	※1)	±0.05	±1.0	±0.2	±0.7	±1.0	+0.8 -0.2	±0.5	min.	±0.5	max.	±0.75	±0.5	-	max.	
Nominal	3	5	0.4	12.7	12.7	5.1 3.85	6.35	2.5 5	18.0	6	9.0	1.5	18.2 17.5	- 16.0		11.0	1 2
	3.5	5	0.4	12.7	12.7	5.1 3.85	6.35	2.5 5	18.0	6	9.0	1.5	18.2 17.5	- 16.0		11.0	1 2
	4	5~7	0.45	12.7	12.7	5.1 3.85	6.35	2.5 5	18.0	6	9.0	1.5	18.2 17.5	- 16.0		11.0	1 2
	5	5~7	0.45	12.7	12.7	5.1 3.85	6.35	2.5 5	18.0	6	9.0	1.5	18.2 17.5	- 16.0		11.0	1 2
		11~15	0.5	12.7	12.7	5.1 3.85	6.35	2.5 5	18.0	10	9.0	1.5	18.5	16.0		11.0	2
	6.3	5~7	0.45	12.7	12.7	5.1 3.85	6.35	2.5 5	18.0	6	9.0	1.5	18.2 17.5	- 16.0		11.0	3 2
		9~15	0.5	12.7	12.7	5.1 3.85	6.35	2.5 5	18.0	10	9.0	1.5	18.5	- 16.0		11.0	3 2
	8	※2) 5	0.45	12.7	12.7	5.1 3.85	6.35	2.5 5	18.0	6	9.0	1.5	18.2 17.5	- 16.0		11.0	3 2
		7	0.45	12.7	12.7	5.1 3.85	6.35	3.5 5	18.0	10	9.0	1.5	20 18.5	- 16.0		11.0	3 1
		9~20	0.6	12.7	12.7	5.1 3.85	6.35	3.5 5	18.0	10	9.0	1.5	20	- 16.0		11.0	3 2
Tol.	±0.5	max.	±0.05	±1.0	±0.3	±0.7	±1.3		±0.5	min.	±0.5	max.	±0.75	-		max.	
Nominal	10	27	0.6	12.7	12.7	3.85	6.35	5	18.0	12.5	9.0	1.5	18.5	-		11.0	3
	12.5	27	0.6	15	15	5.0	7.5	5	18.0	12.5	9.0	1.5	18.5	-		11.0	3
			• 0.6	25.4	12.7	3.85	6.35	5	18.0	12.5	9.0	1.5	18.5	-		11.0	4
	16	37.5	0.8	30	15	3.75	7.5	7.5	18.0	12.5	9.0	3.0	18~20	-		11.0	4
	18	37.5	0.8	30	15	3.75	7.5	7.5	18.0	12.5	9.0	3.0	18~20	-		11.0	4

H1 = H + A
 Check insertion machine specs.

● P=25.4 taping is not standard. Use P=15 taping.

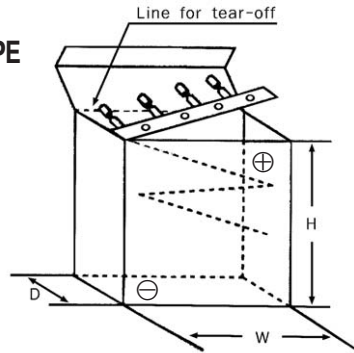
※1) Refer to the drawing of each series for tolerance.

※1) $\phi 8 \times 5L$ (Height) is 6.5mm max.

PACKING QUANTITY

MINIATURE TYPE

TAPING



Packing quantity ($\phi 3 \sim \phi 18$) is changable.

Item		Inner Box (PCS)	Out Box (PCS)	Box Dimension D × W × H (mm)
RMV $\phi 6.3$		1,500	9,000	41 × 330 × 232
RMV $\phi 8$	7~9L	1,000	6,000	41 × 330 × 232
	11.5L	1,000	5,000	51 × 330 × 230
RMV $\phi 10$		500	2,500	53 × 330 × 190
SRE $\phi 3, 3.5$		3,000	18,000	41 × 330 × 232
SRE, A $\phi 4$		2,500	15,000	41 × 330 × 232
SRE, A $\phi 5$		2,000	12,000	41 × 330 × 232
SRE, A $\phi 6.3$		1,500	9,000	41 × 330 × 232
SRE, A $\phi 8$		1,000	6,000	41 × 330 × 232
$\phi 5$		2,000	10,000	51 × 330 × 230
$\phi 6.3$		1,500	7,500	48 × 330 × 211
$\phi 8$	11.5L	1,000	5,000	51 × 330 × 230
	15L	1,000	5,000	51 × 330 × 230
	20L	800	4,000	62 × 330 × 198
$\phi 10$	16L max.	500	2,500	53 × 330 × 190
	25L max.			62 × 330 × 190
	33L max.			68 × 330 × 190
$\phi 12.5$	25L max.	400	2,000	61 × 324 × 235
$\phi 16$	25L max.	250	1,250	62 × 342 × 245
	35.5L max.		1,000	73 × 342 × 245
$\phi 18$	25L max.	200	1,000	62 × 342 × 245
	35.5L max.		800	73 × 342 × 245

LONG AND FORMING CUT

Item	ϕ D × L (mm)	Terminal Conf.	Vinyl Bag (PCS)	Inner Box (PCS)	Out Box (PCS)
RMV	$\phi 6.3$	Long	500	2,000	24,000
	$\phi 8$	Long	200	1,000	12,000
	$\phi 10$	Long	100	2,000	8,000
SRE	$\phi 3 \sim \phi 4$	Long/Forming	500	4,000	48,000
	$\phi 5$	Long/Forming	500	3,000	36,000
	$\phi 6.3$	Long/Forming	500	3,000	30,000
SRA	$\phi 8$	Long/Forming	200	1,000	12,000
	$\phi 4 \sim \phi 5$	Long/Forming	500	3,000	36,000
	$\phi 6.3$	Long/Forming	500	2,000	24,000
SR	$\phi 8$	Long/Forming	200	1,000	12,000
	$\phi 6 \times 9L$	Long/Forming	500	2,000	24,000
	$\phi 8 \sim 9L$	Long	200	1,000	12,000
CM-I	$\phi 5$	Forming		2,000	24,000
		Long	200	2,000	20,000
	$\phi 6.3$	Forming			
		Long			
	$\phi 8 \times 11.5L$	Long/Forming	200	1,000	12,000
	$\phi 8 \times 15L$	Long	100	500	6,000
CM-II	$\phi 8 \times 20L$	Long	100	500	6,000

Item	ϕ D × L (mm)	Terminal Conf.	Vinyl Bag (PCS)	Inner Box (PCS)	Out Box (PCS)
CM-II	$\phi 10 \times 12.5L$	Forming	100	2,500	10,000
		Long	100	2,000	8,000
	$\phi 10 \times 15 \sim 16L$	Forming	100	2,000	8,000
		Long	100	1,500	6,000
	$\phi 10 \times 20L \sim$	Forming	100	1,600	6,400
		Long	100	1,200	4,800
	$\phi 10 \times 25 \sim 50L$	Forming	100	1,200	4,800
		Long	100	1,000	4,000
	$\phi 12.5 \times 13L$	Forming/Long	100	1,500	6,000
	$\phi 12.5 \times 15 \sim 25L$	Forming	100	1,000	4,000
	$\phi 12.5 \times 15 \sim 16L$	Long	100	1,000	4,000
	$\phi 12.5 \times 20 \sim 25L$	Long	100	800	3,200
	$\phi 12.5 \times 30 \sim 35L$	Forming/Long	50	600/500	2,400/2,000
	$\phi 12.5 \times 42.5 \sim 50L$	Forming	50	500	2,000
		Long		400	1,600
	$\phi 16 \times 15L$	Forming	50	600	2,400
		Long			
	$\phi 16 \times 20 \sim 25L$	Forming/Long	50	600/500	2,400/2,000
	$\phi 16 \times 31.5 \sim 40L$	Forming/Long	50	400	1,600
	$\phi 18 \times 20 \sim 25L$	Forming/Long	50	400	1,600
	$\phi 18 \times 30 \sim 40L$	Forming	25	300	1,200
		Long		250	1,000
CM-III	$\phi 20 \times 40L$	Forming	-	150	600
		Long	20	160	640
	$\phi 22 \times 20 \sim 30L$	Long	20	200	800
	$\phi 22 \times 35L \sim$	Long	20	160	640
	$\phi 25.4 \times 25L$				
	$\phi 22 \times 50L \sim$	Long	15	120	480
	$\phi 25.4 \times 50L$				
	$\phi 22 \times 20L \sim$	Forming	-	100	400
	$\phi 25.4 \times 40L$				
	$\phi 22 \times 45L$	Forming	-	100	300
	$\phi 25.4 \times 45 \sim 50L$				



GENERAL PACKAGE

Size		Terminal Config.	Product Q'ty Per Inner Box(pcs)	Product Q'ty Per Out Box(pcs)
ø D(mm)	L(mm)			
14.5	35	LA	320	1,280
16	25 ~ 45		250	1,000
	50		250	750
20	25 ~ 45	LA, VN, VS	150	600
	50		150	450
22 ~ 30	15 ~ 45		100	400
	50 ~ 60		100	300
35 ~ 40	15 ~ 45	VN, VS, VR, LA, LR, LI	50	200
	50 ~ 60		50	150
35	70 ~ 80		80	160
40	70 ~ 80		50	100
35	-	LA, LG, LR	-	50
50	-		-	32
63.5 ~ 89	-		-	10

Conductive Polymer Aluminum Solid Capacitors

PRECAUTIONS AND GUIDELINES (CONDUCTIVE POLYMER SOLID CAPACITORS)

DESIGNING DEVICE CIRCUITS

1. Types of circuits where reALcap capacitors are not to be used

The leakage current may increase due to soldering and other processes. Since large leakage current can bring problems, avoid the use of conductive polymer solid capacitors(hereafter called solid capacitors) in the following circuits.

- 1) High impedance circuits
- 2) Time constant circuits
The capacitance can be varied depending the operating conditions. The change of capacitance affects the time constant circuit.
- 3) Coupling circuits
- 4) Other circuits where circuits are affected by leakage current.

2. Polarity

Solid Capacitors are polarized. Do not apply either reverse voltage or AC voltage to the solid capacitor. Reverse voltage may cause a short circuit.

3. Rated voltage

Do not apply voltage exceeding rated voltage. Overvoltage may cause a short circuit.

4. Operating Temperature

Do not use the solid capacitor at temperature which exceeds the specified range. High temperature may cause decrease the life of the solid capacitor.

5. Ripple current

Do not apply the exceeding current which value exceeds the rated ripple current. The over ripple current cause decrease the life of the solid capacitor.

6. Charge and discharge

Do not use the solid capacitor in circuits for rapid charge and discharge repetitively. Repetitively charge and discharge of capacitors may reduce the capacitance.

회로 설계시 주의 사항

1. 고체콘덴서 사용을 피해야 하는 회로

누설전류는 납땜이나 다른 이유로 인해 증가할 수 있습니다. 누설전류는 문제를 야기할 수 있기 때문에 아래의 회로에는 고체콘덴서 사용을 피하여 주십시오. (전도성 고분자 고체 콘덴서를 축약하여 고체 콘덴서로 표기함.)

- 1) 큰 인피던스를 갖는 회로
- 2) 시정수용 회로
고체콘덴서는 작동 조건에 따라 용량이 변할 수 있습니다. 용량의 변화는 시정수 회로에 영향을 줍니다.
- 3) 커플링 회로
- 4) 누설전류에 의해 영향을 받는 회로들

2. 극성

고체콘덴서는 극성을 갖고 있습니다. 역전압이나 교류전압을 고체콘덴서에 인가하지 마십시오. 역전압은 고체콘덴서를 쇼트 시킬 수 있습니다.

3. 정격전압

정격전압을 초과하는 전압을 인가하지 마십시오. 과전압은 고체콘덴서를 쇼트 시킬 수 있습니다.

4. 사용 온도

보증 온도를 초과하는 온도에서 고체콘덴서를 사용하지 마십시오. 높은 온도는 고체콘덴서의 수명을 줄어뜨리게 합니다.

5. 리플 전류

정격 리플전류를 초과하는 전류를 인가하지 마십시오. 과도한 리플전류는 고체콘덴서의 수명을 줄어뜨리게 합니다.

6. 충전과 방전

고체콘덴서를 빠르게 충전과 방전을 반복하는 회로에 사용하지 마십시오. 반복적인 충전과 방전은 용량을 줄어뜨리게 합니다.

7. Insulation

Aluminum case, cathode lead wire, anode lead wire and circuit pattern should be electrically isolated.

8. Solid Capacitor Usage Environment

The following environment should be avoided.

- 1) Damp conditions such as water, saltwater spray, or oil spray or fumes.
High humidity or humidity condensation situations.
- 2) Hazardous gas/fumes such as hydrogen sulfide, sulfurous acid gas, nitrous acid, chlorine gas or ammonia.
- 3) Ozone, ultraviolet rays or radiation.
- 4) Severe vibration or mechanical shock.

9. Capacitor Mounting

- 1) Surface Mount Type
Land pattern on PCB board should comply with the specification.
- 2) Radial Type
Interval of terminal holes on the PCB is in accordance with the specification.

7. 절연

알루미늄 케이스, 음극 단자선, 양극 단자선 그리고 회로 패턴은 전기적으로 절연상태에 있어야 합니다.

8. 고체콘덴서 사용 환경

아래의 환경은 피해 주십시오.

- 1) 습한 환경
(물, 소금물, 기름이 있는 환경)
- 2) 유해한 가스
(황화 수소, 아황산 가스, 아질산, 염소, 암모니아)가 있는 환경
- 3) 오존, 자외선이 있는 환경
- 4) 진동과 기계적 충격이 있는 환경

9. 고체콘덴서의 장착

- 1) SMD 타입 제품
PCB의 패턴은 규정과 일치해야 합니다.
- 2) RADIAL 타입 제품
PCB의 홀 간격은 규정과 일치해야 합니다.

INSTALLING CAPACITORS

1. Installing

- 1) Do not reuse capacitors which already assembled.
- 2) The capacitor may have self-charge during storage time. In this case, discharge the capacitor through about 1k Ω resistor before use.
- 3) Leakage current of capacitors may be increased during storage. In this case, the capacitors can be reformed by the voltage treatment through about 1k Ω resistor.

<Voltage Treatment>

Applying rated voltage for 120 minutes at maximum operating temperature range.

- 4) Do not apply severe vibration or mechanical shock.

콘덴서 설치

1. 설치

- 1) 장착되었던 콘덴서를 다시 사용하지 마십시오.
- 2) 고체콘덴서는 보관 중에 충전될 수 있습니다. 이 경우에는, 사용 전에 약 1k Ω 저항을 통하여 방전하십시오.
- 3) 누설전류는 보관 중에 증가할 수 있습니다. 이 경우에, 고체 콘덴서는 1k Ω 저항을 통하여 전압처리를 한 후에 사용하십시오.

<전압처리>

최고사용온도에서 120분 동안 정격 전압 인가.

- 4) 진동이나 기계적 충격을 주지 마십시오.

2. Soldering

The leakage current may increase due to thermal stress that occur during soldering. Ensure the soldering conditions meet the specifications.

2-1. Soldering with a soldering iron

- 1) Ensure the lead spacing of the solid capacitor meets the hole spacing on the PCB board.
- 2) Ensure the soldering conditions meets the approval sheet.
- 3) Soldering iron should not touch the solid capacitor's body.

2-2. Reflow soldering

- 1) Reflow soldering must not be used for radial type solid capacitors.
- 2) Soldering conditions(preheat, solder temperature and reflow time) should be within the limits prescribed in the catalogs or product specifications.
- 3) For setting a degree of heating infrared heaters, consider that the infrared absorption may vary in the color and materials of a solid capacitor.
- 4) Do not solder solid capacitors more than once by reflow.

3. Handling after soldering

- 1) Do not lean or twist the solid capacitor's body after soldering on PCB.
- 2) Do not pick-up or move PCB by holding the soldered solid capacitors.

4. Cleaning PCB boards

4-1. Agents must be avoided

- 1) Do not wash boards by using the following agents.
 - Halogenated solvents
 - Alkali system solvents
 - Petroleum system solvents
 - Xylene, Acetone
- 2) Monitor conductivity, pH, specific gravity and the water content before cleaning boards.

2. 납땜

누설전류는 납땜 중에 발생하는 열 충격에 의하여 증가할 수 있습니다. 납땜조건이 규정을 만족하는지 확인하십시오.

2-1. 인두를 사용한 납땜

- 1) 고체콘덴서의 단자간격이 PCB 기판의 홀 간격과 일치하는지 확인하십시오.
- 2) 납땜 조건이 승인원을 만족하는지 확인하십시오.
- 3) 납땜 인두로 고체콘덴서 몸체를 접촉하지 마십시오.

2-2. 리플로 납땜

- 1) 리플로 솔더링은 RADIAL 타입 고체콘덴서에 적용하지 마십시오.
- 2) 솔더링 조건(온도 및 시간)은 카탈로그나 제품승인원에서 규정한 제한치 이내이어야 합니다.
- 3) 적외선 히터 사용시, 고체콘덴서 색상과 재질에 따라 적외선 흡수율이 상이함을 고려하십시오.
- 4) 고체콘덴서를 2회 이상 리플로를 통과시키지 마십시오.

3. 납땜 후 관리

- 1) 납땜 후 고체콘덴서의 몸체를 기울이거나 비틀지 마십시오.
- 2) 납땜되어진 고체콘덴서를 잡고 PCB 기판을 들어올리거나 움직이지 마십시오.

4. PCB 기판 세척

4-1. 피해야 할 세척제

- 1) 아래의 약품으로 세척하지 마십시오.
 - Halogenated solvents
 - Alkali system solvents
 - Petroleum system solvents
 - Xylene, Acetone
- 2) 기판 세척 전에, 세척제의 전도도, pH, 비중과 수분함유량을 확인하십시오.

3) Influence of cleaning agents

(Halogenated solvents)

Solid capacitors are easily affected by halogen ions, particularly by chloride ions. When halogen ions enter the inside of the solid capacitor, the capacitor may be failed due to corrosion of capacitor's foil.

3) 할로겐계 세척제의 문제점

고체콘덴서는 할로겐 이온(특히 염소 이온)에 의해 쉽게 영향을 받습니다. 할로겐 이온들이 고체콘덴서 내부에 침투하게 되면, 콘덴서 박의 부식에 의해 고장날 수 있습니다.

4-2. Recommended Agents

1) Higher alcohol cleaning agents

Solid capacitors may withstand immersion or ultrasonic cleaning for 10 minutes at a maximum liquid temperature of 60°C

2) IPA(Isopropyl Alcohol)

Solid capacitors are capable of withstanding any one of immersion, ultrasonic or vapor cleaning for 5 minutes.

4-2. 권장 세척제

1) Higher alcohol cleaning agents

고체콘덴서는 침적 혹은 초음파 세척을 최대 60°C에서 10분 동안 견딜 수 있습니다.

2) IPA(Isopropyl Alcohol)

고체콘덴서는 침적이나 초음파 혹은 증기 세척을 5분 동안 견딜 수 있습니다.

5. Using adhesives and coating materials

1) Do not use halogenated adhesives and coating materials.

2) Flux and cleaning agents should be removed before using adhesives or coating materials.

3) Do not cover up the whole surface of the solid capacitor. Make coverage only partial.
(The sealing area 30%)

5. 제품의 고정제와 코팅제

1) 할로겐계의 고정제와 코팅제를 사용하지 마십시오.

2) 고정제와 코팅제를 사용하기 전에, 플럭스와 세척제를 제거하십시오.

3) 고체콘덴서 봉구부 전체를 밀봉시키지 마십시오.
(봉구부의 30% 이하)

THE OPERATION OF DEVICES

- Do not directly touch the solid capacitor terminals.
- Do not connect with conductors between the terminals.
- The following environment should be avoided when using solid capacitors.

- Damp conditions such as water, saltwater spray, or oil spray or fumes, High humidity or humidity condensation situations.

- Hazardous gas/fumes such as hydrogen sulfide, sulfurous acid gas, nitrous acid,

기기 작동 중 주의사항

- 콘덴서 단자를 직접적으로 만지지 마십시오.
- 단자 사이를 도전체로 연결하지 마십시오.
- 아래의 환경에서는 고체콘덴서 사용을 피하여 주십시오.

- 습한 환경 (물, 소금물, 기름이 있는 환경)

- 유해 가스 (황화 수소, 아황산 가스, 아질산, 염소, 암모니아 등) 에 노출된 환경



chlorine gas or ammonia.

- Exposure to ozone, ultraviolet rays or radiation.

- 오존, 자외선에 노출된 환경

EMERGENCY ACTION

- If a short circuit occurs and odorous gas is released, immediately turn off the main power switch or pull out the plug from the power outlet.
- If the gas comes in contact with eyes or skin, rinse immediately. If the gas is inhaled, gargle immediately.

응급 조치

- 콘덴서가 쇼트 되거나 냄새가 나는 가스를 배출하면, 즉시 전원을 끄십시오.
- 배출된 가스가 눈이나 피부에 닿게되면, 즉시 세척하십시오. 가스 흡입 시 입안을 닦아 주십시오.

CONDITIONS OF STORAGE

- Do not store solid capacitors at a high temperature and high humidity. Store the solid capacitors indoors at a temperature 5~35°C and a humidity of less than 75%RH.
- Store solid capacitors in places free from water, oil or salt water.
- Store solid capacitors in places free from toxic gases(hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, ammonium, etc.)
- Store solid capacitors in places out of ozone, ultraviolet rays or radiation.
- Keep solid capacitors in the package.

보관 조건

- 고체콘덴서를 고온/다습한 환경에서 보관하지 마십시오. 온도가 5~35°C, 습도가 75%RH 이하인 실내에서 보관하여 주십시오.
- 물이나 소금물, 기름이 없는 장소에 보관하십시오.
- 유해 가스(황화 수소, 아황산 가스, 아질산, 염소, 암모니아 등)가 없는 환경에서 보관하십시오.
- 오존, 자외선이 없는 곳에서 보관하십시오.
- 고체콘덴서를 포장된 상태에서 보관하십시오.

OTHERS

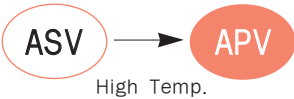
- Case sizes and other product standards specified in this catalog may be changed or modified without notice for improvement of quality.

기타

- 카탈로그에 규정된 케이스 사이즈나 다른 제품 기준은 품질 개선을 위하여 귀사에 통지 없이 변경될 수 있습니다.

reALcap™ APV Series

- Higher heat resistance (125°C)
- High Ripple Current
- Endurance 125°C, 2,000hrs

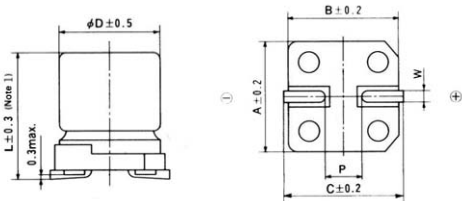


SPECIFICATIONS

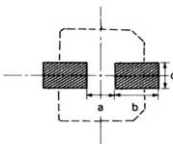
Item	Characteristics				
Category temperature range	-55 to +125℃				
Rated voltage range	10 to 35V _{DC}				
Surge voltage	Rated Voltage(WV)	10	16	25	35
	Surge Voltage(SV)	11.5	18.4	29	40
Capacitance tolerance	±20%(M) (at 20℃, 120Hz)				
Tangent of loss angle	Shall not exceed the value in Ratings of APV series. (at 20℃, 120Hz)				
Leakage Current ※ 1	Shall not exceed the value in Ratings of APV series. (at 20℃, 2minutes)				
ESR	Shall not exceed the value in Ratings of APV series. (at 20℃, 100kHz)				
Impedance Ratio (Characteristics at low temp.)	Impedance	Ratio		(at 100kHz)	
	Z(-55℃)/Z(+20℃)	≤ 1.25			
	Z(+125℃)/Z(+20℃)	≤ 1.25			
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated voltage is applied for 2,000 hours at 125℃. Capacitance change ≤ ±20% of the initial value Tan δ ≤ 200% of the initial specified value ESR ≤ 200% of the initial specified value Leakage current ≤ The initial specified value				
Bias Humidity	The following specifications shall be satisfied when the capacitors are restored to 20℃ after subjecting them to the DC rated voltage at 60℃, 90~95%RH for 500 hours. Capacitance change ≤ ±20% of the initial value Tan δ ≤ 200% of the initial specified value ESR ≤ 200% of the initial specified value Leakage current ≤ The initial specified value				
Surge voltage	The following specifications shall be satisfied when the capacitors are restored to +20℃ after the surge voltage is at a cycle of 360seconds which consist charge for 30 seconds and discharge for 330 seconds, for 1000 cycles at 125℃. Capacitance change ≤ ±20% of the initial value Tan δ ≤ 150% of the initial specified value ESR ≤ 150% of the initial specified value Leakage current ≤ The initial specified value				

※ 1: If any doubt arises, remeasure the leakage current after following voltage treatment.(Voltage treatment:Applying rated voltage for 120minutes at 125°C)

DIMENSIONS

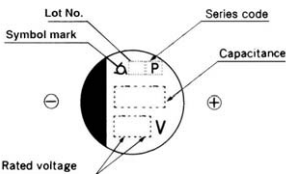


Recommended solder land on PC board



■ : Solder land on PC board

MARKING



Note 1 : L±0.5 for 8×11.5(H12) ~ 10×12.2(J12)

Unit(mm)

Case code	Ø D	L	A	B	C	W	P	a	b	c
F60	6.3	5.7	6.6	6.6	7.2	0.5~0.8	1.9	1.9	3.5	1.6
H70	8.0	6.7	8.3	8.3	9.0	0.5~0.8	3.1	3.1	4.2	1.6
H12	8.0	11.5	8.3	8.3	9.0	0.7~1.1	3.1	3.1	4.2	2.2
J12	10.0	12.2	10.3	10.3	11.0	0.7~1.1	4.5	4.5	4.4	2.2

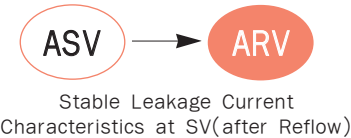


RATINGS OF APV Series

Case Code	Rated Voltage (V)	Rated Capacitance (μF)	ESR(mΩ) (at 100kHz)	Rated Ripple Current (mA rms) at 100kHz		Tangent of loss angle	Leakage Current (μA)
				105℃ <Temp. ≤ 125℃	Temp. ≤ 105℃		
F60	25	10	65	474	1,500	0.10	50
	10	56	45	538	1,700	0.12	112
H70	35	8.2	70	400	1,300	0.10	57
	25	22	48	580	1,835	0.10	110
	16	82	40	670	2,120	0.12	262
H12	35	22	50	700	2,300	0.12	154
	25	47	30	943	2,980	0.12	235
J12	35	47	30	1,150	3,650	0.12	329
	25	82	28	1,202	3,800	0.12	410

reALcap™ ARV Series

- Stable Leakage Current Characteristics at SV (after Reflow)
- Low ESR (at 100kHz~300kHz)
- Endurance 105°C, 2,000hrs

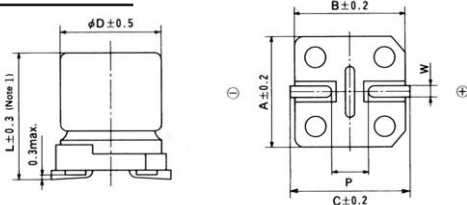


SPECIFICATIONS

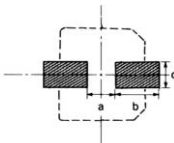
Item	Characteristics		
Category temperature range	-55 to +105℃		
Rated voltage range	16 to 20V _{DC}		
Surge voltage	Rated Voltage(WV)	16	20
	Surge Voltage(SV)	18.4	23.0
Capacitance tolerance	±20%(M) (at 20℃, 120Hz)		
Tangent of loss angle	Shall not exceed the value in Ratings of ARV series. (at 20℃, 120Hz)		
Leakage Current ※ 1	Shall not exceed the value in Ratings of ARV series. (at 20℃, 2 minutes)		
ESR	Shall not exceed the value in Ratings of ARV series. (at 20℃, 100kHz)		
Impedance Ratio (Characteristics at low temp.)	Impedance	Ratio	(at 100kHz)
	Z(-25℃)/Z(+20℃)	≦ 1.25	
	Z(+125℃)/Z(+20℃)	≦ 1.25	
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated voltage is applied for 2,000 hours at 105℃. Capacitance change ≦ ±20% of the initial value Tan δ ≦ 150% of the initial specified value ESR ≦ 150% of the initial specified value Leakage current ≦ The initial specified value		
Bias Humidity	The following specifications shall be satisfied when the capacitors are restored to 20℃ after subjecting them to the DC rated voltage at 60℃, 90~95%RH for 1,000 hours. Capacitance change ≦ ±20% of the initial value Tan δ ≦ 150% of the initial specified value ESR ≦ 150% of the initial specified value Leakage current ≦ The initial specified value		
Surge voltage	The following specifications shall be satisfied when the capacitors are restored to +20℃ after the surge voltage is at a cycle of 360seconds which consist charge for 30 seconds and discharge for 330 seconds, for 1000 cycles at 105℃. Capacitance change ≦ ±20% of the initial value Tan δ ≦ 150% of the initial specified value ESR ≦ 150% of the initial specified value Leakage current ≦ The initial specified value		
Resistance to Reflow heat (Refer to 67page)	The following specifications shall be satisfied when the capacitors are restored to +20℃ after Reflow Soldering at 250℃ (within 10seconds). Capacitance change ≦ ±15% of the initial value Tan δ ≦ The initial specified value ESR ≦ The initial specified value Leakage current ≦ The initial specified value (at WV or SV)		

※ 1: If any doubt arises, remeasure the leakage current after following voltage treatment.(Voltage treatment: Applying rated voltage for 120minutes at 105°C)

DIMENSIONS

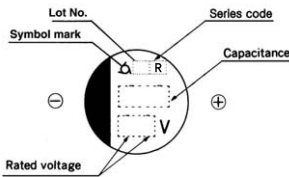


Recommended solder land on PC board



■ : Solder land on PC board

MARKING



Note 1 : L±0.5 for 8×11.5(H12)~10×12.2(J12) Unit(mm)

Case code	Ø D	L	A	B	C	W	P	a	b	c
F60	6.3	5.7	6.6	6.6	7.2	0.5~0.8	1.9	1.9	3.5	1.6
H70	8.0	6.7	8.3	8.3	9.0	0.5~0.8	3.1	3.1	4.2	1.6
H12	8.0	11.5	8.3	8.3	9.0	0.7~1.1	3.1	3.1	4.2	2.2
J12	10.0	12.2	10.3	10.3	11.0	0.7~1.1	4.5	4.5	4.4	2.2



RATINGS OF ARV Series

Case Code	Rated Voltage (V)	Rated Capacitance (μF)	ESR(mΩ) (at 100kHz)	Rated Ripple Current(mArms) at 100kHz	Tangent of loss angle	Leakage Current (μA)
F60	20	22	40	1,950	0.10	88
	16	39	35	2,080	0.10	125
H70	20	33	45	1,890	0.12	132
	16	82	40	2,120	0.12	262
H12	20	100	24	3,320	0.15	400
	16	180	20	3,640	0.15	576
J12	20	150	20	4,320	0.15	600
	16	330	16	4,720	0.15	792

reALcap™ AXV Series

- Super Low ESR, Large Capacitance
- High Ripple Current
- -55°C ~ +105°C
- Endurance 105°C, 2,000hrs

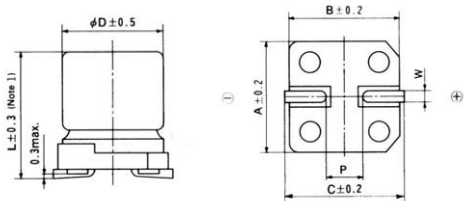


SPECIFICATIONS

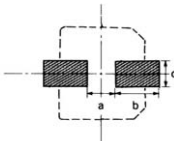
Item	Characteristics					
Category temperature range	-55 to +105℃					
Rated voltage range	2.5 to 16V _{dc}					
Surge voltage	Rated Voltage(WV)	2.5	4	6.3	10	16
	Surge Voltage(SV)	3.3	5.2	8.2	11.5	18.4
Capacitance tolerance	±20%(M) (at 20℃, 120Hz)					
Tangent of loss angle	Shall not exceed the value in Ratings of AXV series. (at 20℃, 120Hz)					
Leakage Current ※ 1	Shall not exceed the value in Ratings of AXV series. (at 20℃, 2 minutes)					
ESR	Shall not exceed the value in Ratings of AXV series. (at 20℃, 100kHz)					
Impedance Ratio (Characteristics at low temp.)	Impedance	Ratio		(at 100kHz)		
	Z(-25℃)/Z(+20℃)	≦ 1.25				
	Z(+105℃)/Z(+20℃)	≦ 1.25				
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated voltage is applied for 2,000 hours at 105℃. Capacitance change ≦ ±20% of the initial value Tan δ ≦ 150% of the initial specified value ESR ≦ 150% of the initial specified value Leakage current ≦ The initial specified value					
Bias Humidity	The following specifications shall be satisfied when the capacitors are restored to 20℃ after subjecting them to the DC rated voltage at 60℃, 90~95%RH for 1,000 hours. Capacitance change ≦ ±20% of the initial value Tan δ ≦ 150% of the initial specified value ESR ≦ 150% of the initial specified value Leakage current ≦ The initial specified value					
Surge voltage	The following specifications shall be satisfied when the capacitors are restored to +20℃ after the surge voltage is at a cycle of 360seconds which consist charge for 30 seconds and discharge for 330 seconds, for 1000 cycles at 105℃. Capacitance change ≦ ±20% of the initial value Tan δ ≦ 150% of the initial specified value ESR ≦ 150% of the initial specified value Leakage current ≦ The initial specified value					

※ 1: If any doubt arises, remeasure the leakage current after following voltage treatment.(Voltage treatment: Applying rated voltage for 120minutes at 105°C)

DIMENSIONS

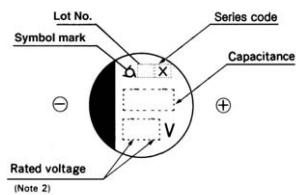


Recommended solder land on PC board



■ : Solder land on PC board

MARKING



Note 1 : L±0.5 for 8×11.5(H12)~10×12.2(J12)
Note 2 : 6.3WV is marked by 6V

Unit(mm)

Case code	Ø D	L	A	B	C	W	P	a	b	c
F60	6.3	5.7	6.6	6.6	7.2	0.5~0.8	1.9	1.9	3.5	1.6
H70	8.0	7.0	8.3	8.3	9.0	0.5~0.8	3.1	3.1	4.2	1.6
H10	8.0	10.0	8.3	8.3	9.0	0.7~1.1	3.1	3.1	4.2	2.2
H12	8.0	11.5	8.3	8.3	9.0	0.7~1.1	3.1	3.1	4.2	2.2
J12	10.0	12.2	10.3	10.3	11.0	0.7~1.1	4.5	4.5	4.4	2.2



CONDUCTIVE POLYMER ALUMINUM SOLID CAPACITORS

RATINGS OF AXV Series

Case Code	Rated Voltage (V)	Rated Capacitance(μ F)	ESR(m Ω) (at 100kHz)	Rated Ripple Current(mArms) at 100kHz	Tangent of loss angle	Leakage Current (μ A)
F60	16	68	30	2,200	0.12	300
	10	120	27	2,320	0.12	300
	6.3	220	27	2,320	0.12	300
	6.3	330	17	3,390	0.12	415
	4	330	27	2,320	0.12	300
	2.5	390	25	2,410	0.12	300
	2.5	390	15	3,160	0.12	300
H70	16	120	27	2,900	0.12	500
	16	150	22	3,220	0.12	500
	10	270	22	3,220	0.12	500
	6.3	390	22	3,220	0.12	491
	4	560	22	3,220	0.12	500
	2.5	680	20	3,370	0.12	500
H10	16	220	12	5,060	0.12	704
H12	6.3	820	12	4,700	0.15	1,033
	4	560	9	5,380	0.15	500
	4	1,200	12	4,700	0.15	960
	2.5	1,500	10	5,150	0.15	750
J12	2.5	2,700	12	5,080	0.15	1,350

reALcap™ ASV Series

- Low ESR (at 100kHz~300kHz)
- High Ripple Current
- -55°C ~ +105°C
- Endurance 105°C, 2,000hrs

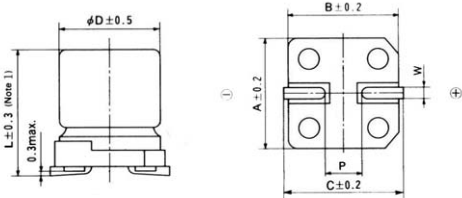


SPECIFICATIONS

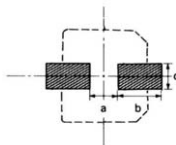
Item	Characteristics							
Category temperature range	-55 to +105℃							
Rated voltage range	2.5 to 25V _{DC}							
Surge voltage	Rated Voltage(WV)	2.5	4	6.3	10	16	20	25
	Surge Voltage(SV)	3.3	5.2	8.2	11.5	18.4	23.0	25.0
Capacitance tolerance	±20%(M) (at 20℃, 120Hz)							
Tangent of loss angle	Shall not exceed the value in Ratings of ASV series. (at 20℃, 120Hz)							
Leakage Current ※ 1	Shall not exceed the value in Ratings of ASV series. (at 20℃, 2 minutes)							
ESR	Shall not exceed the value in Ratings of ASV series. (at 20℃, 100kHz)							
Impedance Ratio (Characteristics at low temp.)	Impedance	Ratio						
	Z(-25℃)/Z(+20℃)	≤ 1.25						
	Z(+105℃)/Z(+20℃)	≤ 1.25 (at 100kHz)						
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated voltage is applied for 2,000 hours at 105℃. Capacitance change ≤ ±20% of the initial value Tan δ ≤ 150% of the initial specified value ESR ≤ 150% of the initial specified value Leakage current ≤ The initial specified value							
Bias Humidity	The following specifications shall be satisfied when the capacitors are restored to 20℃ after subjecting them to the DC rated voltage at 60℃, 90~95%RH for 1,000 hours. Capacitance change ≤ ±20% of the initial value Tan δ ≤ 150% of the initial specified value ESR ≤ 150% of the initial specified value Leakage current ≤ The initial specified value							
Surge voltage	The following specifications shall be satisfied when the capacitors are restored to +20℃ after the surge voltage is at a cycle of 360seconds which consist charge for 30 seconds and discharge for 330 seconds, for 1000 cycles at 105℃. Capacitance change ≤ ±20% of the initial value Tan δ ≤ 150% of the initial specified value ESR ≤ 150% of the initial specified value Leakage current ≤ The initial specified value							

※ 1: If any doubt arises, remeasure the leakage current after following voltage treatment.(Voltage treatment:Applying rated voltage for 120minutes at 105°C)

DIMENSIONS

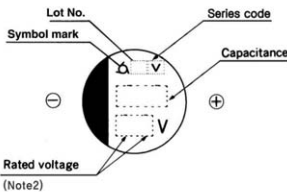


Recommended solder land on PC board



■ : Solder land on PC board

MARKING



Note 1 : L±0.5 for 8×10.0(H10)~10×12.2(J12)
Note 2 : 6.3WV is marked by 6V

Unit(mm)

Case code	Ø D	L	A	B	C	W	P	a	b	c
F60	6.3	5.7	6.6	6.6	7.2	0.5~0.8	1.9	1.9	3.5	1.6
H70	8.0	6.7	8.3	8.3	9.0	0.5~0.8	3.1	3.1	4.2	1.6
H10	8.0	10.0	8.3	8.3	9.0	0.7~1.1	3.1	3.1	4.2	2.2
H12	8.0	11.5	8.3	8.3	9.0	0.7~1.1	3.1	3.1	4.2	2.2
J10	10.0	10.0	10.3	10.3	11.0	0.7~1.1	4.5	4.5	4.4	2.2
J12	10.0	12.2	10.3	10.3	11.0	0.7~1.1	4.5	4.5	4.4	2.2



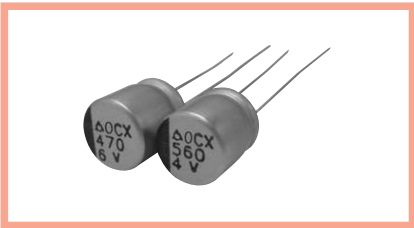
CONDUCTIVE POLYMER ALUMINUM SOLID CAPACITORS

RATINGS OF ASV Series

Case Code	Rated Voltage (V)	Rated Capacitance(μ F)	ESR($m\Omega$) (at 100kHz)	Rated Ripple Current(mArms) at 100kHz	Tangent of loss angle	Leakage Current (μ A)
F60	25	10	45	1,840	0.10	125
	25	6.8	45	1,840	0.10	85
	20	22	40	1,950	0.10	88
	20	27	40	1,950	0.10	108
	16	39	35	2,080	0.10	125
	16	47	35	2,080	0.10	150
	10	47	30	2,250	0.12	94
	10	56	30	2,250	0.12	112
	6.3	82	30	2,250	0.12	103
	6.3	100	30	2,250	0.12	126
	6.3	120	30	2,250	0.12	151
	4	150	30	2,250	0.12	120
H70	20	33	45	1,890	0.12	132
	20	47	45	1,890	0.12	188
	16	56	45	1,890	0.12	179
	16	82	40	2,120	0.12	262
	10	120	35	2,560	0.12	240
	10	150	35	2,560	0.12	300
	6.3	220	35	2,560	0.12	277
	4	150	35	2,560	0.12	120
	4	330	35	2,560	0.12	264
H10	25	47	30	2,640	0.12	588
	20	68	25	2,890	0.12	272
	16	180	20	3,240	0.12	576
	10	220	17	3,510	0.12	440
	6.3	270	17	3,510	0.12	340
	4	330	17	3,510	0.12	264
H12	25	33	30	2,980	0.12	413
	20	100	24	3,320	0.15	400
	16	180	20	3,640	0.15	576
	10	330	17	3,950	0.15	660
	6.3	470	15	4,210	0.15	592
	4	560	13	4,520	0.15	448
	4	680	13	4,520	0.15	544
	2.5	680	13	4,520	0.15	340
J10	25	56	25	3,430	0.12	1,250
	20	150	20	3,830	0.12	600
	16	330	16	4,280	0.12	1,056
	10	470	14	4,570	0.12	940
	6.3	560	13	4,750	0.12	706
	4	680	13	4,750	0.12	544
	4	1,200	13	4,750	0.12	960
	2.5	1,500	13	4,750	0.12	750
J12	25	56	28	3,800	0.12	700
	20	150	20	4,320	0.15	600
	16	330	16	4,720	0.15	792
	10	560	13	5,230	0.15	840
	6.3	820	12	5,440	0.15	775
	4	1,200	12	5,440	0.18	960
	2.5	1,500	12	5,440	0.18	750

reAlcap™ AXA Series

- Super Low ESR, Large Capacitance
- High Ripple Current
- -55°C ~ +105°C
- Endurance 105°C, 2,000hrs



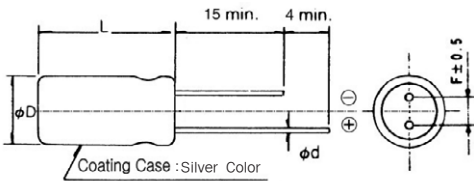
SPECIFICATIONS

Item	Characteristics					
Category temperature range	-55 to +105℃					
Rated voltage range	2.5 to 16V _{bcc}					
Surge voltage	Rated Voltage(WV)	2.5	4	6.3	10	16
	Surge Voltage(SV)	3.3	5.2	8.2	11.5	18.4
Capacitance tolerance	±20%(M) (at 20℃, 120Hz)					
Tangent of loss angle	Shall not exceed the value in Ratings of AXA series. (at 20℃, 120Hz)					
Leakage Current ※ 1	Shall not exceed the value in Ratings of AXA series. (at 20℃, 2 minutes)					
ESR	Shall not exceed the value in Ratings of AXA series. (at 20℃, 100kHz)					
Impedance Ratio (Characteristics at low temp.)	Impedance	Ratio				
	Z(-25℃)/Z(+20℃)	≤ 1.25				
	Z(+105℃)/Z(+20℃)	≤ 1.25		(at 100kHz)		
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated voltage is applied for 2,000 hours at 105℃. Capacitance change ≤ ±20% of the initial value Tan δ ≤ 150% of the initial specified value ESR ≤ 150% of the initial specified value Leakage current ≤ The initial specified value					
Bias Humidity	The following specifications shall be satisfied when the capacitors are restored to 20℃ after subjecting them to the DC rated voltage at 60℃, 90~95%RH for 1,000 hours. Capacitance change ≤ ±20% of the initial value Tan δ ≤ 150% of the initial specified value ESR ≤ 150% of the initial specified value Leakage current ≤ The initial specified value					
Surge voltage	The following specifications shall be satisfied when the capacitors are restored to +20℃ after the surge voltage is at a cycle of 360seconds which consist charge for 30 seconds and discharge for 330 seconds, for 1000 cycles at 105℃. Capacitance change ≤ ±20% of the initial value Tan δ ≤ 150% of the initial specified value ESR ≤ 150% of the initial specified value Leakage current ≤ The initial specified value					

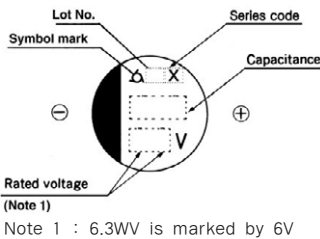
※ 1 : If any doubt arises, remeasure the leakage current after following voltage treatment.(Voltage treatment: Applying rated voltage for 120minutes at 105°C)

DIMENSIONS

Coating Case Type



MARKING



Unit(mm)

øD(+0.5max.)	8.0	8.0	8.0	8.0	10.0
L	7.0	8.0	10.0	11.5	12.5
Lmax.	7.0max.	9.0max.	10.0max.	11.5max.	12.5max.
ø d(±0.05)	0.45	0.6	0.6	0.6	0.6
F(±0.5)	3.5	3.5	3.5	3.5	5.0



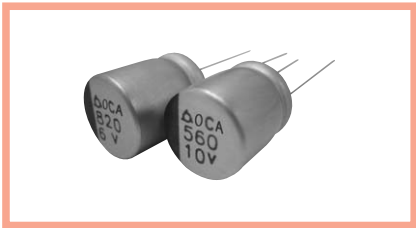
CONDUCTIVE POLYMER ALUMINUM SOLID CAPACITORS

RATINGS OF AXA Series

Case Size ($\varnothing$ D $\times$ L) (mm)	Rated Voltage (V)	Rated Capacitance(μ F)	ESR(m Ω) (at 100kHz)	Rated Ripple Current(mArms) at 100kHz	Tangent of loss angle	Leakage Current (μ A)
6.3 $\times$ 6	16	150	30	2,490	0.12	480
	16	100	30	2,200	0.12	320
	16	68	30	2,200	0.12	300
	10	120	27	2,320	0.12	300
	10	150	27	2,320	0.12	300
	6.3	270	27	2,320	0.12	340
	6.3	220	18	3,160	0.12	300
	4	330	27	2,410	0.12	300
8 $\times$ 7	16	120	27	2,900	0.12	500
	16	150	22	3,220	0.12	500
	10	270	22	3,220	0.12	500
	6.3	390	22	3,220	0.12	491
	4	560	22	3,220	0.12	500
	2.5	680	20	3,370	0.12	500
8 $\times$ 8	6.3	470	8	5,700	0.10	592
	4	560	7	6,100	0.10	500
	2.5	560	8	5,700	0.10	500
	2.5	820	7	6,100	0.10	500
8 $\times$ 10	6.3	620	15	3,760	0.10	1,033
8 $\times$ 11.5	16	180	16	3,640	0.10	576
	6.3	470	8	5,700	0.10	592
	4	560	7	6,100	0.10	500
	2.5	820	7	6,100	0.10	500
10 $\times$ 12.5	16	470	10	6,100	0.10	1,504
	6.3	1,500	10	5,560	0.10	1,890
	2.5	2,700	10	5,560	0.10	1,350

reALcap™ ASA Series

- Low ESR (at 100kHz~300kHz)
- High Ripple Current
- -55°C ~ +105°C
- Endurance 105°C, 2,000hrs



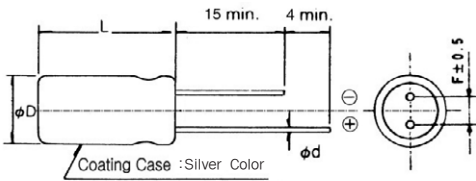
SPECIFICATIONS

Item	Characteristics									
Category temperature range	-55 to +105℃									
Rated voltage range	2.5 to 35V _{dc}									
Surge voltage	Rated Voltage(WV)	2.5	4	6.3	10	16	20	25	32	35
	Surge Voltage(SV)	3.3	5.2	8.2	11.5	18.4	23.0	25.0	32.0	35.0
Capacitance tolerance	±20%(M) (at 20℃, 120Hz)									
Tangent of loss angle	Shall not exceed the value in Ratings of ASA series. (at 20℃, 120Hz)									
Leakage Current ※ 1	Shall not exceed the value in Ratings of ASA series. (at 20℃, 2 minutes)									
ESR	Shall not exceed the value in Ratings of ASA series. (at 20℃, 100kHz)									
Impedance Ratio (Characteristics at low temp.)	Impedance		Ratio		(at 100kHz)					
	Z(-25℃) / Z(+20℃)		≦ 1.25							
	Z(+105℃) / Z(+20℃)		≦ 1.25							
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated voltage is applied for 2,000 hours at 105℃. Capacitance change ≦ ±20% of the initial value Tan δ ≦ 150% of the initial specified value ESR ≦ 150% of the initial specified value Leakage current ≦ The initial specified value									
Bias Humidity	The following specifications shall be satisfied when the capacitors are restored to 20℃ after subjecting them to the DC rated voltage at 60℃, 90~95%RH for 1,000 hours. Capacitance change ≦ ±20% of the initial value Tan δ ≦ 150% of the initial specified value ESR ≦ 150% of the initial specified value Leakage current ≦ The initial specified value									
Surge voltage	The following specifications shall be satisfied when the capacitors are restored to +20℃ after the surge voltage is at a cycle of 360seconds which consist charge for 30 seconds and discharge for 330 seconds, for 1000 cycles at 105℃. Capacitance change ≦ ±20% of the initial value Tan δ ≦ 150% of the initial specified value ESR ≦ 150% of the initial specified value Leakage current ≦ The initial specified value									

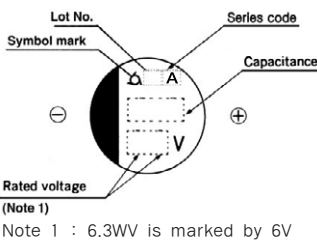
※ 1: If any doubt arises, remeasure the leakage current after following voltage treatment.(Voltage treatment: Applying rated voltage for 120minutes at 105°C)

DIMENSIONS

Coating Case Type



MARKING



Unit(mm)

φD(+0.5max.)	6.3	8.0	8.0	8.0	8.0	10.0	10.0
L	6.0	7.0	8.0	10.0	11.5	10.0	12.5
Lmax.	6.0max.	7.0max.	8.0max.	10.0max.	11.5max.	10.0max.	12.5max.
φd(±0.05)	0.45	0.45	0.5	0.6	0.6	0.6	0.6
F(±0.5)	2.5	3.5	3.5	3.5	3.5	5.0	5.0



CONDUCTIVE POLYMER ALUMINUM SOLID CAPACITORS

RATINGS OF ASA Series

Case Size ($\varnothing$ D $\times$ L) (mm)	Rated Voltage (V)	Rated Capacitance(μ F)	ESR(m Ω) (at 100kHz)	Rated Ripple Current(mArms) at 100kHz	Tangent of loss angle	Leakage Current (μ A)
6.3 $\times$ 5.5	35	10	80	1,380	0.12	70
	32	22	35	2,300	0.12	140
	25	33	45	1,840	0.10	413
	25	10	45	1,840	0.10	125
	25	6.8	45	1,840	0.10	85
	20	22	40	1,950	0.10	220
	16	39	35	2,080	0.10	312
	10	56	30	2,250	0.12	280
	10	68	30	2,250	0.12	340
	6.3	82	30	2,250	0.12	258
	4	100	30	2,250	0.12	200
	4	150	30	2,250	0.12	300
8 $\times$ 7	35	8.2	70	1,300	0.10	57
	25	22	60	1,630	0.10	275
	20	33	45	1,890	0.12	132
	20	47	45	1,890	0.12	188
	16	56	45	1,890	0.12	179
	16	82	40	2,120	0.12	262
	10	120	35	2,560	0.12	240
	10	150	35	2,560	0.12	300
	6.3	220	35	2,560	0.12	277
	4	150	35	2,560	0.12	120
	4	330	35	2,560	0.12	264
8 $\times$ 8	20	120	45	1,890	0.12	480
	32	68	70	1,500	0.10	435
8 $\times$ 10	25	47	30	2,640	0.12	588
	20	150	25	2,890	0.12	600
	20	68	25	2,890	0.12	272
	16	180	20	3,240	0.12	576
	10	220	17	3,510	0.12	440
	6.3	270	17	3,510	0.12	340
	4	330	17	3,510	0.12	264
8 $\times$ 11.5	35	22	50	2,300	0.12	154
	25	47	30	2,980	0.15	588
	20	100	24	3,320	0.15	400
	16	180	20	3,640	0.15	576
	10	330	17	3,950	0.15	660
	6.3	470	15	4,210	0.15	592
	4	560	13	4,520	0.15	448
	2.5	680	13	4,520	0.15	340
10 $\times$ 10	25	56	25	3,430	0.12	700
	20	150	20	3,830	0.12	600
	16	330	16	4,280	0.12	1,056
	10	470	13	4,750	0.12	940
	6.3	560	13	4,750	0.12	706
	4	680	13	4,750	0.12	544
10 $\times$ 12.5	25	56	28	3,800	0.12	700
	20	150	20	4,320	0.15	600
	16	330	16	4,720	0.15	792
	10	560	13	5,230	0.15	840
	6.3	820	12	5,440	0.15	775
	4	1,200	12	5,440	0.18	960
	2.5	1,500	12	5,440	0.18	750

Aluminum Electrolytic Capacitors



LIST OF SUBSTITUTE FOR DISCONTINUED SERIES

The following series are discontinued.

Please use the recommended replacements in the table.

◆LIST OF SMD REPLACEMENTS

Characteristics	Discontinued Series	Substitute Series
85°C standard	MV	MVG
Low Impedance	MVY	BXA
High Temperature	CDA, CLA	CLZ

◆LIST OF RADIAL REPLACEMENTS

Characteristics	Discontinued Series	Substitute Series
85°C standard	SL,SM,SMS,SRF,SHL,SR	MHA
105°C standard	KM,KMC,KME,KRF,KMG	NHA
85°C Bi-polarized	SRE-BP,SRA-BP	DSA-BP,GSA-BP
85°C Bi-polarized	SM-BP(D), SMS-BP,SH-BP	MHA-BP
105°C Bi-polarized	KM-BP(D),KME-BP,KMG-BP	NHA-BP
85°C Bi-polarized	SM-BP(P)	SSP
85°C Bi-polarized	SM-BP(S),SSA	KSA
105°C Bi-polarized	KM-BP(S)	KSA
Low Impedance	LXF	NXL(LXV),NXP(LXZ)
Low Impedance	RX,RZ,SXA,SXC,SXE,LXJ,KXL	NXL(LXV)
Ultra Low ESR	NXC	NXE
High Ripple	KHR,NFD(KMF),NFE(KMX)	NZE
High Reliability	KU,KUX	NXL(LXV)
High Temperature	KXC,PXA	PXB
High Temperature, Low Impedance	PXC	PXD
7L Standard	SRA	GSA
Solvent - proof (5L, 7L)	SRM,SRJ,KRE(ESA),KMA(HAS)	EMA,HMA
5L Standard	SRE	DSA
5L Low Impedance	EXA	EXB
7L Low Impedance	HXA	HXB

◆LIST OF SNAP-IN REPLACEMENTS

Characteristics	Discontinued Series	Substitute Series
85°C standard	SM,NM,SMS,SHL,SMK,SMG,SMH, SLT,RDA	RDC
105°C standard	KM,KME,KMG,KMH,KLT	TDA
Protecting Overvoltage	KLG	RVA,TVA

◆LIST OF SCREW-BOLT REPLACEMENTS

Characteristics	Discontinued Series	Substitute Series
85°C standard	RGB(SMH)	TGA(KMH)
105°C standard	KME	TGA(KMH)
For Inverter	GW,RWA	RFC(RWF)

PRECAUTIONS AND GUIDELINES TO USERS

PRECAUTION FOR USE OF ALUMINUM ELECTROLYTIC CAPACITORS

Select the capacitors suited to their installation and operating environment, and use them within the performance limits prescribed in their catalog or product specifications, please pay attention to the points listed below.

- Allowable operating temperature range is exceed
- PCB board cleaning conditions
- Reverse voltage
- Voltage exceeds rated working voltage
- Rapid charging and discharging
- Severe vibration or mechanical shock

Please pay attention to right circuit pattern design. When you fail to follow above precautions, you can expect the leakage of electrolyte or opening of the vent in a capacitor because of sudden heating and increased internal pressure.

CAUTION DURING CIRCUIT DESIGN

1. Rated voltage

If a voltage exceeding the capacitor's rated voltage is applied, the capacitor may be damaged as leakage current increases. When using the capacitor with AC voltage superimposed on DC voltage, care must be exercised that the peak value of AC voltage does not exceed the rated voltage.

2. Operating Temperature

Do not use Aluminum Electrolytic Capacitors at temperature which exceeds the specified operating temperature range. Applying capacitors surpassing guaranteed conditions may cause destruction due to rapid characteristic deterioration. Where, temperature of a capacitor includes radiation heat of Power transistor, IC, Resistor, etc. and self heat by ripple current as well as ambient temperature of a set.

3. Ripple Current

Do not apply excessive current to the capacitors, which exceeds the specified maximum permissible ripple current. If you apply over-rated ripple current, you can expect initial failure in your set. When the

알루미늄 전해 콘덴서의 사용상의 주의점

콘덴서를 사용하고자 할때 카다로그나 승인원에 제시된 범위 내에서 설치 및 사용 환경에 맞게 선정하고 검토시 아래 사항에 대해 유의하시길 바랍니다.

- 허용 사용온도 범위 초과
- 기판 세척 조건
- 역전압
- 정격 전압을 초과하는 과전압
- 급격한 충전 방전
- 가혹한 진동과 기계적 쇼크

상기와 같은 경우, 급격한 발열 및 내압 상승으로 인한 전해액 누설 또는 방폭변 동작으로 발열, 발화되는 경우가 있으므로 회로 패턴 설계시 주의하여 주시기 바랍니다.

회로 설계시 주의 사항

1. 정격 전압

정격전압 이상의 전압을 인가하면 콘덴서의 누설전류가 증대되어 파손되어 버립니다. 또 DC에 AC를 중첩하여 사용할 때에는 AC전압의 Peak치가 정격전압 이하가 되도록 주의하여 주십시오.

2. 사용 온도

규정되어 있는 사용온도 범위를 초과하여 사용하지말아 주십시오. 보증범위를 초과하는 조건에서의 사용은 급격한 특성 열화가 발생되어 파손되는 경우가 있습니다. 온도는 Set의 주위 온도 뿐만 아니라 Set내의 발열체(Power TR, IC, 저항 등)의 방사열, 리플 전류에 따른 자기발열 등이 모두 포함된 콘덴서의 실제온도를 확인하여 주십시오.

3. 리플 전류

과전류(허용 리플을 초과하는 전류)를 흘리지 말아주십시오. 정격치 이상의 리플전류가 흐르게 되면 초기고장이 발생할 수 있습니다. 허용 리플치 이하에서 사용하더라도 직류 Bias 전압이

value of direct bias voltage is small, even though you apply permissible ripple current, reversed voltage can be occurred. Please take deep attention to possible reversed voltage.

4. Charge and discharge

General Aluminum Electrolytic Capacitors are not suitable for rapid charge and discharge applications. Consult with samyoung about specially designed capacitors for rapid charge and discharge.

5. Polarization

Aluminum Electrolytic Capacitors are normally polarized. Reverse voltage or AC voltage should not be applied. When polarity of applied voltage is uncertain or when the polarity may flip over, non-polar type capacitors should be used. But the non-polar type cannot be used for AC circuit. Please confirm the polarity to avoid applying any reverse voltage or ac voltage to the capacitors. Polarity is indicated as below:

- Negative polarity is indicated on the side of body by means of a stripe or an arrow.
- On radial leaded Aluminum Electrolytic Capacitors, the shorter lead is the negative terminal.
- On Snap-In and Lug Terminal type capacitors, the knurled rivets ( , ) indicates the negative terminal.
- On Surface Mount Capacitors, the mark () indicates the direction of Negative Polarity.

6. INSULATION

- Aluminum case, cathode lead wire, anode lead wire and circuit pattern should be electrically isolated.
- The blank terminals must not be connected to a solder trace on the pc board, but be electrically isolated from negative or positive terminal.
- The PVC sleeve of Aluminum Electrolytic Capacitors is not recognized as an insulator, and therefore, the standard capacitor should not be used in a place where insulation function is needed. Please consult with Samyoung should your require a higher grade of insulating sleeve.

작을 때는 역전압이 인가되는 경우가 있습니다. 역전압이 인가되지 않는 범위에서 사용하여 주십시오.

4. 충 · 방전

일반적인 시전해 콘덴서는 급격한 충방전이 이루어지는 회로에 사용하지 말아 주십시오.

충방전 목적의 회로에 적용할 경우에는 폐사에 연락 바랍니다.

5. 극성

Al 전해 콘덴서는 극성이 있습니다. 역전압 또는 교류 전압을 인가하지 말아 주십시오. 극성이 불확실하거나 극성이 반전하는 회로에는 무극성 콘덴서를 사용하십시오. 그러나 무극성 콘덴서라 하더라도 교류 회로에는 사용하지 할 수가 없습니다. 역전압 혹은 교류전압이 인가되어지지 않을 경우에도 확인 후 사용해 주십시오. 극성은 아래와 같이 표시되어 집니다.

- 음극은 제품 옆면에 띠 또는 실선 인쇄로 표시되어 집니다.
- 리드선 단자 동일 방향 콘덴서는 리드선이 짧은 쪽이 음극을 표시합니다.
- 기판 자립형(pcb terminal)인 LUG 단자의 콘덴서는 ( , )로 음극을 표시합니다.
- SMD Type은 () 로 음극을 표시합니다.

6. 절연

- Al 케이스와 음극 리드선, 양극 리드선을 회로적으로 완전히 격리시켜 주십시오.
- BLANK 단자는 PCB 회로에서 음극 또는 양극 단자와 연결납땜하지 말아 주십시오.
- 콘덴서의 외장 PVC Sleeve는 절연이 보장되어 있지 않습니다. 절연기능이 필요한 경우에는 사용하지 말아 주십시오. Sleeve의 절연 기능이 필요한 경우에는 폐사에 연락바랍니다.

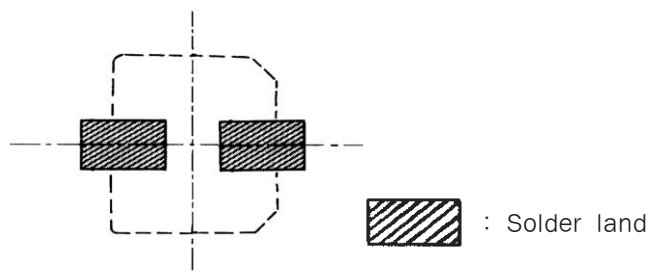
7. Surge Voltage

The surge voltage rating is the maximum DC overvoltage to which the capacitor may be subjected for short periods not exceeding approximately 30 seconds at infrequent intervals of not more than six minutes. According to KS C IEC 60384-4, the test shall be continued 1000 cycles at room temperature for the capacitors of characteristic KS C IEC 60384-4 or at the maximum operating temperature for the capacitors of characteristics B and C of KS C IEC 60384-4 with voltage applied through a series resistance of 1000 ohms without discharge, the electrical characteristics of the capacitor after the test are specified in KS C IEC 60384-4 unless otherwise specified, the surge voltages are as follows:.

Rated Voltage (WV)	4	6.3	10	16	25	35	50	63	80	100	160	200	250	315	350	400	420	450	500	550	600
Surge Voltage (SV)	5	8	13	20	32	44	63	79	100	125	200	250	300	365	400	450	470	500	550	600	650

CONSIDERATION TO ASSEMBLY CONDITION

- Design the appropriate hole spacing to match the lead pitch of capacitors.
- Do not locate any wiring and circuit patterns directly above the capacitor's vent.
- The sealing side of the screw terminal type should not face down in the application. When the capacitors are mounted horizontally, the anode screw terminals must be positioned at the upper side.
- Parts which radiate heat should not be placed Capacitors on the PCB board.
- Land pattern of Surface Mount Capacitors should comply with the specification which is mentioned in the catalog or specification sheets. (Refer to SMD Type)
- Torque of tightening screw terminals should not exceed the specified maximum value which is described in the catalog or specification sheets.



7. 보호전압

보호 전압이란 DC 최대 과전압으로 6분의 주기로 약 30초간 견딜수 있는 전압을 말합니다.

(30초 충전, 5분 30초 방전)

KS C IEC 60384-4 규격에 의하면, 직렬저항 1000Ω을 통하여 충전하여 방전없이 시험하되 특성 W 제품은 상온에서, 특성 B와 특성 C 제품은 최고사용온도에서 1000회 실시하게 되어 있습니다.

시험 후의 전기적 특성은 KS C IEC 60384-4 규격을 참조바랍니다. 특별한 언급이 없을 경우 보호전압은 아래의 표와 같습니다.

취급 환경 설계

- 콘덴서 단자 간격에 맞게 PCB 구멍을 설계해 주십시오.
- 콘덴서 안전장치(방폭변)부분 위에 배선 및 PCB 회로패턴이 닿지 않게 설계해 주십시오.
- Screw 단자형 콘덴서의 봉구부를 밑으로 향하게 하지 말아주십시오. 만약 제품을 옆으로 눕힐 경우에는 양극 단자를 위로 향하게 하여 주십시오.
- 콘덴서의 주변 및 PCB 의 반대쪽(제품 밑)에 발열 부품의 배치를 피해주십시오.
- SMD Type형 콘덴서의 PCB 패턴의 납땜 Land는 Catalog 또는 승인원에 규정된 범위내에서 연결하여 주시길 바랍니다. (SMD Type 참조)
- Screw 단자에 회로를 연결하실 때의 토크는 Catalog 또는 승인원에 규정된 범위내에서 연결하여 주시기 바랍니다.

- Consider current balance when 2 or more Aluminum Electrolytic Capacitors are connected in parallel.
- Use bleeder resistors when 2 or more Aluminum Electrolytic Capacitors are connected in series. In this case, the resistors should be connected parallel to the capacitors.
- Aluminum Electrolytic Capacitors may accumulate charge naturally during storage. In this case, discharge through about 1k Ω resistor before use.
- Leakage current of Aluminum Electrolytic Capacitors may be increased during long storage time. In this case, the capacitors should be subject to voltage treatment through about 1k Ω resistor before use.

1. Soldering

- Kindly follow the soldering conditions (temperature and time) defined on your approval sheet, otherwise less 10 seconds at 260°C.
- In case lead wire reforming is needed due to inappropriate pitch between capacitor and holes on PCB stress to the capacitor should be avoided.
- In case soldered capacitor has to be withdrawn from the PCB by soldering irons, the capacitor should be removed after solder has melted sufficiently in order to avoid stress to the capacitor or lead wires.
- Soldering iron should never touch the capacitor's body.

2. Flow soldering

- Do not dip capacitor's body into melted solder.
- Soldering conditions (preheat, solder temperature and dipping time) should be within the limits prescribed in the catalogs of product specifications.
- Do not put flux on any part of capacitors others than their terminals.
- Do not let other components lean against the capacitors while soldering.

- 콘덴서를 2개이상 병렬로 연결할 때는 전류 Balance를 고려해 주시길 바랍니다.
- 콘덴서 2개이상을 직렬로 연결하실때는 전압 Balance를 고려해서 콘덴서에 병렬로 분압 저항기를 삽입하여 주십시오.
- 전해 콘덴서는 재기 전압이 발생할 경우가 있습니다. 이런 경우에는 사용하기 전에 약 1k Ω 의 저항을 통해 방전 처리 후 사용하여 주십시오.
- 전해 콘덴서의 누설전류는 장기간 사용치 않고 보관시 증가 됩니다. 이런 경우에는 약1k Ω 의 저항을 통해 전압처리후 사용하여 주시길 바랍니다.

1. 납땜

- 납땜 조건(온도, 시간)은 승인원에 규정된 범위내 또는 260°C, 10초 이하의 조건에서 사용하여 주십시오.
- 리드선 간격과 PCB기판 구멍이 틀려 리드선의 가공이 필요한 경우 납땜하기전 콘덴서 본체에 스트레스가 가해지지 않도록 주의 바랍니다.
- 납땜된 콘덴서를 떼어내어 다시 사용코자할 때에는 납땜전에 콘덴서의 단자에 스트레스가 가지않도록 납을 충분히 묻혀 주십시오.
- 납땜 인두가 콘덴서 본체에 닿지 않도록 하여주십시오.

2. Flow 납땜

- 콘덴서의 본체를 납 용융되는 곳에 넣지 말아 주십시오.
- 납땜 조건(예비가열, 납땜온도, 침적시간)은 카다로그 또는 승인원에 규정된 범위내에서 하여 주십시오.
- 단자부 이외 부분에 플럭스가 부착되지 않도록 해주십시오.
- 납땜중에 콘덴서에 다른 부품들이 닿지 않도록 하여주십시오.

3. Reflow soldering (Refer to page 67)

- Soldering conditions (preheat, solder temperature and reflow time) should be within the limits prescribed in the catalogs or product specifications.
- For setting a degree of heating infrared heater consider that the color and material of a capacitor vary their infrared absorption.
- Do not solder capacitors more than once by reflow.

4. Handling after soldering

- Do not bend or twist the capacitor's body after soldering on PCB.
- Do not pick-up or move PCB by holding the soldered capacitors.
- Do not hit the capacitors and isolate capacitor from the PCB of their device when stacking PCB store.

5. Mounting Capacitors with pressure Relief Vent

- Make the following open space over the pressure relief vent of the capacitor so that the vent can operate.

∅ D(mm)	6.3~16	18~35	40~
space	2mm min.	3mm min.	5mm min.

- Do not locate any wire or copper trace over the vent of the capacitor
- If the capacitor is mounted with its vent faced down on the PCB, make a ventilation hole in the PCB in place.
- In designing double-sided PCB, do not locate any copper trace under the seal side of a capacitor.
If it is absolutely unavoidable, these traces must be sufficiently spaced at least 1 or 2 mm apart..

6. Protecting Vibration

- Radial lead type : Applicable to items with over 10g in weight, diameter of 18mm or longer than 30mm in length
- PCB terminal type : Applicable to items with diameter of 22mm and longer than 40mm in length.

3. Reflow 납땜 (67page 참조)

- 납땜 조건(예비가열, 납땜온도, Reflow시간)은 카다로그 또는 승인원에 규정된 범위내에서 하여 주십시오.
- 적외선 히터를 사용할때에는 콘덴서의 색깔이나 재질에 따라 적외선 흡수율이 다르기 때문에 가열 온도를 맞추어 주십시오.
- 한번 Reflow를 통과한 것에 대해서 다시 하지 말아주십시오.

4. 납땜후 제품 취급 요령

- PCB에 콘덴서를 납땜한 후 제품을 비틀지 말아 주십시오.
- 납땜 되어진 콘덴서를 잡고 PCB를 올리거나 이동시키지 말아 주십시오.
- PCB에 콘덴서가 장착된 상태로 PCB를 쌓을 경우 PCB나 기타 제품이 닿지 않게 하여 주십시오.

5. 안전변이 있는 제품의 장착

- 콘덴서 안전변이 동작할 수 있는 공간이 있어야 합니다.

- 콘덴서의 안전변 위에 배선이나 회로 패턴이 없도록 하여 주십시오.
- 만약 콘덴서의 안전변이 PCB쪽으로 향할경우 PCB에 구멍을 설치하여야 합니다.
- 양면 PCB를 사용한 경우 콘덴서 밑으로 회로를 설계 하지 말고 만약 불가피할 경우 최소한 콘덴서로부터 1mm ~ 2mm 정도 떨어지게 설계해 주십시오.

6. 진동대비

- 리드 동일방향형 : 질량 10g, ∅ 18 이상 또는 L치수 30이상 제품
- PCB Terminal Type : ∅ 22, L치수 40이상 제품

In order to prevent possible damage by vibration on the PCB, kindly bond our capacitors on the PCB or use any fastening devices.

7. Adhesive and Coating Materials

- Do not use halogenated adhesives and coating materials to fix Aluminum Electrolytic Capacitors.
- Flux between the surface of capacitors should be cleaned before using adhesives or coating materials.
- Solvents should be dried up before using adhesives or coating materials.
- Do not cover up all the sealing area of capacitor with adhesives or coating materials. Make coverage only partial. (The sealing area 30%)

8. Influence of cleaning solvent for aluminum electrolytic capacitors

- Aluminum electrolytic capacitors are easily affected by halogen ions, particularly by chloride ions. Excessive amounts of halogen ions, if happened to enter the inside of the capacitors, will give corrosion accidents-rapid capacitance drop and vent open. The extent of corrosion accidents varies with kinds of electrolytes and seal-materials.
- Therefore, the prevention of halogen ion contamination is the most important check point for quality lines. At present, halogenated hydrocarbon-contained organic solvents contained organic solvents such as Trichloroethylene, 1-1-1 Trichloroethane, and Freon are used to remove flux from circuit boards. However, if general types of aluminum electrolytic capacitors, whose seal constructions are not solvent-proof, are cleaned with such solvents, the solvents may gradually penetrate the seal portion and erode.
- The inside of the capacitors, the mechanism of corrosion of aluminum electrolytic capacitors by halogen ions can be explained as follows:
Halides(RX) are absorbed and diffused into the seal portion. The halides then enter the inside of the capacitors and contact with the electrolyte of the capacitors, where by halogen ions are made free by a hydrolysis with water in the electrolyte:



진동으로 문제시되는 PCB에 상기 제품을 장착하는 경우에는 반드시 PCB와 제품 바닥면을 Bonding하여 사용하거나 별도 지그를 부착하여 사용하십시오.

7. 제품 고정제와 코팅

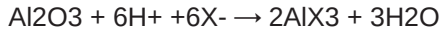
- 할로겐계 용제를 포함하는 고정제, 코팅제는 사용하지 않아 주십시오.
- 고정제, 코팅제를 사용하기 전에 기판과 콘덴서 봉구부 부분에 플럭스가 남거나 오염된 채로 놓아두지 않아 주십시오.
- 기판 세척제는 고정제, 코팅제를 사용하기 전에 완전히 건조시켜 주십시오.
- 고정제, 코팅제를 사용할 때 콘덴서 봉구부 전체를 밀봉시키지 않아 주십시오.(봉구부의 30% 이하)

8. 알루미늄 전해 콘덴서 세척용 용매의 영향

- 알루미늄 전해 콘덴서는 할로겐계 이온, 특히 염소 이온에 쉽게 영향을 받습니다. 할로겐계 이온이 콘덴서 내부로 침투하게 되면 부식활동에 의해 급속한 용량감소 및 방폭변이 개변등의 현상이 일어납니다. 부식활동의 정도는 전해액 및 봉합물질의 종류에 따라 달라지게 됩니다.
- 따라서 폐사의 생산 라인에서는 할로겐계 이온의 침투 방지를 품질관리의 최고 중점관리 사항으로 관리하고 있습니다. 현재 Trichloroethylene, 1-1-1 Trichloroethane 및 Freon과 같은 탄화수소 화합물이 들어있는 유기용제들이 회로기판의 플럭스를 제거하기 위해 사용됩니다. 그러나 봉구 구조가 내세척용이 아닌 일반 전해콘덴서에 그와같은 용매로 세척할 경우 점차적으로 봉입부분으로 흘러들어가 콘덴서 내부의 부식이 발생합니다.
- 할로겐이온에 의한 부식의 진행은 다음과 같이 설명되어 집니다. 할로겐화물이 수분과 반응하여 다음식과 같이 해리된 다음 봉입부분으로 확산되어 집니다.



The halogen ions(X-) react with the dielectric substance (Al₂O₃) of aluminum electrolytic capacitors:



AlX₃ is dissociated with water:

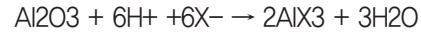


- Aluminum electrolytic capacitors have been exposed to halogenated hydrocarbon cleaning and defluxing solvents are susceptible to attack by these solvents. this exposure can result in solvent penetration into the capacitors, leading to internal corrosion and potential failure.
- Common type of halogenated cleaning agent are listed below.

Chemical Name	Structural Formula	Representative Brand Name
Trichlorotrifluoroethane	C ₂ Cl ₃ F ₃	Freon TF , Daiflon S-3
Fluorotrichloromethane	CCl ₃ F	Freon-11 , Daiflon S-1
1,1,1-Trichloroethane	F ₂ H ₃ Cl ₃	Chloethane
Trichloroethylene	C ₂ HCl ₃	Trichene
Methyl Chloride	CH ₃ Cl	MC

- We would like to recommend you the below cleaning materials for your stable cleaning condition taking place of previous materials.
 - Isopropyl Alcohol(IPA) or water
Cleaning method: One of immersion, ultrasonic or vapor cleaning Maximum cleaning time: 5minutes
 - * Do not use AK225AES
 - Standard Aluminum Electrolytic Capacitors should be free from halogenated solvents during PCB cleaning after soldering, Use solvent-proof capacitor and follow the specified cleaning condition when halogenated solvents are used.
 - Solvent-proof capacitors in the catalogue is mark with the solvent-proof.
- 
- Solvents should have well controlled conductivity ph, specific gravity and water contents during the cleaning of solvent-proof capacitors. Chlorine levels can rise with contamination and adversely affect the performance of the capacitor.

할로겐 이온(X-)은 알루미늄 전해콘덴서의 유전체(Al₂O₃)와 반응합니다.



AlX₃ 는 물과 반응하면 할로겐 이온을 해리시키면서 알루미늄 하이드록사이드로 됩니다.



- 세척 및 플럭스 제거용으로 사용된 할로겐계 탄화수소 용매에 접한 알루미늄 콘덴서는 이러한 용매들에 의해 손상을 받을 우려가 있습니다. 콘덴서 내부로 용매가 침투하면서 내부부식으로 인한 불량률 유발할 수 있습니다.
- 할로겐계의 세척제의 일반적인 유형은 아래 표와 같습니다.

화학명	구조식	대표 상품명
Trichlorotrifluoroethane	C ₂ Cl ₃ F ₃	Freon TF , Daiflon S-3
Fluorotrichloromethane	CCl ₃ F	Freon-11 , Daiflon S-1
1,1,1-Trichloroethane	F ₂ H ₃ Cl ₃	Chloethane
Trichloroethylene	C ₂ HCl ₃	Trichene
Methyl Chloride	CH ₃ Cl	MC

- 폐사에서는 안정적인 세척을 위해서 다음의 세척제를 권장합니다.
 - Isopropyl Alcohol(이소프로필 알코올)또는 물 세척방법 : 침척, 증기세척
최대 세척시간: 5분
 - * AK225AES는 사용하지 마십시오.
 - 콘덴서는 할로겐용제등으로 세척할 수 없습니다. 다만 세척이 필요한 경우에는 내세척용 콘덴서를 사용하고 카다로그 또는 승인원에 규정된 범위 내에서 사용하시기 바랍니다.
 - 카다로그 내에서 내세척용 콘덴서는
- 
- 로 표시합니다.
- 내세척용 콘덴서를 세척할 때 세척제의 오염관리 (도전도, pH, 비중, 수분량 등)를 하여 주십시오. 세척제가 오염되었을 때에는 염소농도가 높게되어 콘덴서 내부가 부식되는 경우가 있습니다.

EMERGENCY ACTION

- When the vent is open and some gas blows out from the capacitor, please turn the main switch of the equipment off or pull out the plug from the power outlet immediately.
- During vent operation, extremely hot gas(over 100°C) may blow out from the capacitors. Do not stand close to the capacitors. In case of eye contact, flush the open eye(s) with large amount of clean water immediately, do not swallow. Do not touch electrolyte but wash skin with soap and water in case of skin contact.

CONDITION OF STORAGE/USE

If electrolytic capacitors temperatures caused by such things as direct sunlight, the life of the capacitor may be adversely affected. Storage in a high humidity atmosphere may affect the solderability of lead wires and terminals.

1. STORAGE AREA

- Do not store capacitors at a high temperature and high humidity. Store the capacitors indoors at a temperature of 5 to 35°C and a humidity of less than 75%RH.
- Store the capacitors in places free from water, oil or salt water.
- Store the capacitors in places free from toxic gasses (hydrogen sulfide, sulfuric acid, nitrous acid, chlorine, ammonium, etc.)
- Store the capacitors in places out of ozone, ultraviolet rays or radiation.
- Keep capacitors in the package.

2. CONDITIONS OF USE

The following environment should be avoided when using aluminum electrolytic capacitors.

- Damp conditions such as water, saltwater spray, or oil spray or fumes, High humidity or humidity condensation situations.
- Hazardous gas/fumes such as hydrogen sulfide, sulfuric acid gas, nitrous acid, chlorine gas or ammonia.
- Exposure to ozone, ultraviolet rays or radiation.

만일의 경우

- 사용중 콘덴서가 개변되어 Gas가 분출될 경우 Set의 주 전원 장치의 스위치를 끄거나 플러그를 뽑아 주십시오.
- 콘덴서의 안전변 동작시 +100°C를 초과하는 고온Gas가 분출하기 때문에 얼굴을 가까이 대지 말아주십시오. 분출한 Gas가 눈에 들어 가거나 흡입한 경우에는 즉시 물로 눈을 씻거나 삼키지 말고 입안을 닦아주시기 바랍니다. 전해액은 만지지 말고 만약 피부에 묻었을 경우 물이나 비누로 닦아 주시길 바랍니다.

보관/사용 조건

전해 콘덴서를 직사광을 받는 장소, 고온장소에 보관하게 되면 제품 수명에 악영향을 초래하며 또 다습한 장소에 보관 하게 되면 리드선과 단자의 납땜성이 나빠질 우려가 있습니다.

1. 보관 장소

- 콘덴서를 고온 다습 조건에 보관하지 말아 주십시오. 실내 온도가 5~35°C, 습도는 75%RH 이하 조건에서 보관하시길 바랍니다.
- 콘덴서를 물, 기름 또는 소금물에 오염되지 않도록 해주십시오.
- 콘덴서를 유해 Gas(유화 수소, 아황산, 아질산, 염소, 암모늄 등)에 노출된 환경에서 보관하지 말아주십시오.
- 콘덴서를 오존, 자외선 및 방사선에 노출되는 환경에서 보관하지 말아 주십시오.
- 포장 상태에서 보관하여 주십시오.

2. 사용 조건

다음의 환경에서는 전해 콘덴서를 사용하지 말아 주십시오.

- 직접수, 염수, 기름이 근접해 있거나 다습 또는 결로 상태가 되는 환경
- 유해 Gas(유화수소, 아황산, 아질산, 염소, 암모니아 등)가 가득한 환경
- 오존, 자외선 또는 방사선에 노출된 환경

3. VOLTAGE TREATMENT

If the electrolytic capacitor is allowed to stand for a long time, its withstand voltage is liable to drop, resulting in increased leakage current. If the rated voltage is applied to such a product, a large leakage current occurs and this generates internal heat, which damaged the capacitor. Of the electrolytic capacitor is allowed to stand for a long time, therefore, use it after giving voltage treatment. Voltage treatment shall be performed by increasing voltage up to the capacitor's voltage rating gradually while lowering the leakage current. In this case, the leakage current of the electrolytic capacitor is less than specified value.

Meanwhile, the voltage treatment time may be effectively shortened if the ambient temperature is increased (within the maximum operating temperature range).

DESTRUCTING CAPACITORS

In case of destructing our capacitors, kindly take following instructions.

- Burn capacitors up after making holes on them or scrapping. When you try to destroy them by fire, you may expect explosion in the capacitors.
- In order to prevent hazardous gas like chlorine gas, burn our capacitors on high temperature range. Burning sleeve on low temperature may cause producing chlorine gas.
- When you do not have burning facilities, please contact special industrial wastes processing companies.

OTHERS

- Since it has possibilities for electric shock or burns, kindly discharge it at the level of $1k\Omega$ in advance.(sufficient and safe resistance values should be considered before applying)
- Capacitor case sizes and other product standards specified in this catalog may be changed or modified without notice for improvement of quality.
- For methods of testing, refer to KS C IEC 60384-4 (JIS C 5101-1, JIS C 5101-4)

3. 전압 처리

전해 콘덴서는 장시간 방치하게 되면 내압이 떨어져 누설전류가 증가하는 경향이 있습니다. 이러한 제품에 전압을 인가하면 과대한 누설전류로 인한 내부 발열로 파손되는 일이 있습니다. 장기간 방치된 제품에 대해서는 전압처리후 사용하여 주십시오.

전압처리란 인가전압을 누설 전류가 낮아질때까지 서서히 정격전압까지 인가함을 말하며, 이 때의 누설전류치는 규격보다 작아야 합니다. 만일 주위온도가 상승되어 지면 전압 처리 시간이 단축되어 질수 있습니다.(최고 사용온도 이내)

폐기에 대하여

콘덴서를 폐기할 경우에는 다음의 방법대로 하여주십시오.

- 콘덴서에 구멍을 내거나 충분히 부순 후에 소각하여 주십시오. 소각시 콘덴서가 폭발하는 경우가 있습니다.
- 콘덴서는 외장슬리브(폴리염화비닐)가 씌워져 있기 때문에 고온 소각을 하여 주십시오. 저온 소각을 하면 염소 Gas등의 유해 Gas가 발생되는 원인이 됩니다.
- 콘덴서를 소각하지 않는 경우는 전문 산업폐기물 처리업체에 의뢰하여 주십시오.

기타

- 감전 및 화상의 우려가 있으므로 사용전에 $1k\Omega$ (전압, 용량에 따라 충분히 여유를 고려한 저항 선택)의 저항을 통해서 방전처리해 주십시오.
- 카다로그에 규정된 제품 케이스 사이즈 및 기타 제품기준은 품질 개선의 필요성으로 인하여 귀사에 통지없이 변경될 수 있습니다.
- 기타 시험규격에 대해서는 KS C IEC 60384-4 (JIS C 5101-1, JIS C 5101-4)을 참조 바랍니다.

LEAD CUTTING/FORMING SPECIFICATIONS

(mm)

● Lead configuration : CC $\varnothing D = 3$ to 25.4	● Lead configuration : FC $\varnothing D = 5$ to 8
● Lead configuration : FM $\varnothing D = 5$ to 8	● Lead configuration : MC $\varnothing D = 10$ to 25.4
● Lead configuration : LF $\varnothing D = 10$ to 16	● Lead configuration : DC $\varnothing D = 22$ to 25.4
● Lead configuration : RB $\varnothing D = 10$ to 22	● Lead configuration : LB $\varnothing D = 10$ to 22

LEAD SPACING & RECOMMENDED PCB DIMENSIONS

(mm)

Dimensions $\varnothing D$	$\varnothing d$	P	PC Board		Lead Configuration
			Hole diameter	Thickness	
5	0.5	5.0	0.8	1.6	CC
6.3	0.5	5.0	0.8		FC
8	0.6	5.0	1.0		FM
10	0.6	5.0	1.0	1.6	CC MC
12.5	0.6	5.0	1.0		
16	0.8	7.5	1.2		
18	0.8	7.5	1.2		
20	0.8	7.5	1.2		
22	0.8	10	1.2		
25.4	1.0	10	1.4		
	1.0	12.5	1.4		
	1.0	10	2.0	1.6	DC

※ Note : Other case sizes are available upon request.
Please check with us about individual size and dimensions.

PART NUMBER INDICATION CHART

1. CATALOG NUMBERING SYSTEM

Capacitance tolerance	Symbol	Capacitance tolerance	Symbol
-10% ~ +10%	K	-20% ~ +20%	M
0% ~ +100%	P	-30% ~ +30%	N
-10% ~ +50%	T	-10% ~ +30%	Q
-10% ~ +100%	W	-10% ~ +20%	V
0% ~ +20%	R	0% ~ +30%	S

Nominal values are used.
10V → 10
100V → 100
450V → 450

Miniature	Large Sized					
VB	VN	VR	LA	LI	LG	VL

MHA
Series

6.3
Rated voltage

VB
Lead type

1000
Capacitance

M
Cap. tolerance

Supplement

Capacitance(μF)	Code
0.1	R1
1	1
4.7	4R7
10	10
100	100

Taping Clinch	Code
2.5mm	2.5TP
3.5mm	3.5TP
5.0mm	5.0TP
7.5mm	7.5TP

	Code
Bi-Polar	BP
Lead Cut, Formed Type	CC, MC, LF, FM, FC, DC, RB, LB



ALUMINUM ELECTROLYTIC CAPACITORS

2. SUBSTANCE

Terminal Type

Symbol	Configuration	Type
VB		CE04 (SINGLE ENDED) TYPE ($\varnothing 3 \sim \varnothing 25.4$)
VN/VS		PCB TERMINAL TYPE ($\varnothing 20 \sim \varnothing 40$: 2 TERMINALS)
LG		SCREW-BOLT TERMINALS TYPE ($\varnothing 35 \sim \varnothing 89$)
LR		PCB TERMINAL TYPE ($\varnothing 35 \sim \varnothing 63.5$: 2 TERMINALS)
VR		PCB TERMINAL TYPE ($\varnothing 35 \sim \varnothing 50$: 4 TERMINALS)
LA		CE62 TYPE ($\varnothing 14.5 \sim \varnothing 50$: 2 TERMINALS)
LI		PCB TERMINAL TYPE ($\varnothing 30 \sim \varnothing 35$: 2 TERMINALS)

STANDARD FREQUENCY MULTIPLYING FACTOR

μF	Frequency(Hz)	60	120	300	1k	10k	100k
0.1 ~ 3.3		0.65	1	1.35	1.75	2.30	2.50
4.7 ~ 33		0.75	1	1.25	1.50	1.75	1.80
47 ~ 1,000		0.80	1	1.15	1.30	1.40	1.50
2,200 ~		0.85	1	1.03	1.05	1.08	1.08



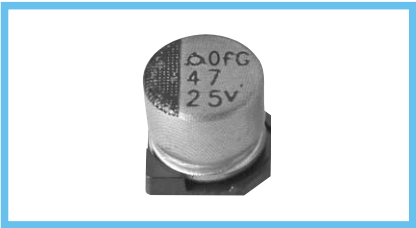
MVG Series

• 85°C 1,000~2,000Hrs assured.

Solvent-proof

$WV \leq 63V_{DC}$

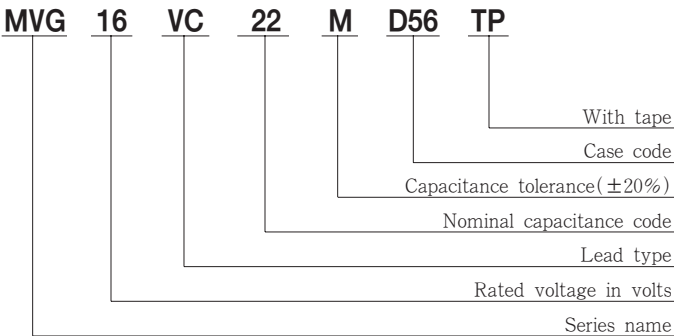
- Vertical SMD Type.
- Downsized of MV Series.
- For CD/DVD-ROM, Navigation, LCD MT/TV
- RoHS compliant.
- Halogen-free capacitors are also available.



SPECIFICATIONS

Item	Characteristics									
Rated Voltage Range	4 ~ 450 V _{DC}									
Opertating Temperature Range	-40 ~ +85°C									
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)									
Leakage Current	Rated Volatag(V _{DC})	4~100					160~450			
	Max. leakage current(μA)	0.01CV (μA) or 3μA, whichever is greater. (at 20°C, 2 minutes)					0.04CV + 100(μA) (at 20°C, 1 minute)			
	Where, C:Nominal capacitance(μF), V:Rated voltage(V _{DC})									
Dissipation Factor Tanδ(Max.)	Rated Voltage(V _{DC})	4	6.3	10	16	25~50	63~100	160~250	400~450	
	Tanδ(Max.)	0.42	0.40	0.30	0.20	0.15	0.12	0.20	0.25	
(at 20°C, 120Hz)										
Temperature Characteristics (Max. Impedance ratio)	Rated Voltage(V _{DC})	4	6.3	10	16	25	35~50	63~100	160~250	400~450
	Z(-25°C)/Z(+20°C)	7	4	3	2	2	2	3	3	6
	Z(-40°C)/Z(+20°C)	15	10	8	6	4	3	4	6	10
(at 120Hz)										
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 2,000 hours at 85°C. (where, 1,000 hours for ø 3)									
	Rated Voltage(V _{DC})	4 ~ 6.3			10 ~ 100			160~450		
	Capacitance change	≤ ±30% of the initial value			≤ ±25% of the initial value			≤ ±20% of the initial value		
	Tanδ	≤ 300% of the initial specified value						≤ 200% of the initial specified value		
	Leakage Current	≤ The initial specified value								
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1,000 hours at 85°C without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. (where, 500 hours for ø 3)									
	Rated Voltage(V _{DC})	4 ~ 6.3			10 ~ 100			160~450		
	Capacitance change	≤ ±30% of the initial value			≤ ±25% of the initial value			≤ ±20% of the initial value		
	Tanδ	≤ 300% of the initial specified value						≤ 200% of the initial specified value		
	Leakage Current	≤ The initial specified value								
Others	Satisfied characteristics KS C IEC 60384-4									

PART NUMBERING SYSTEM



Capacitance	Code
0.1μF	R1
0.47μF	R47
1.0μF	1
4.7μF	4R7
10μF	10
100μF	100



SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

DIMENSIONS OF MVG Series(Type:VC)

Unit(mm)

DIMENSIONS

● Vibration Resistance

<Size code: B55~M22> <Size code: L17~M22>

■ : Dummy terminals

Recommended Solder land on PC board

■ : Solder land on PC board

MARKING

<B55 ~ J10> <K14~M22>

Note 1 : L±0.5 for 8×6.3(H63) ~ 18×21.5(M22)
Note 2 : 3×5.2(B55), 4×5.3(D56), 5×5.3(E56) is excluded symbol mark
Note 3 : 6.3WV is marked by 6V

Case code	∅D	L	A	B	C	W	P	a	b	c	a	b	c
B55	3	5.2	3.3	3.3	3.7	0.45-0.75	0.8	0.8	2.2	1.6			
D56	4	5.3	4.3	4.3	5.1	0.5-0.8	1.0	1.0	2.6	1.6			
E56	5	5.3	5.3	5.3	5.9	0.5-0.8	1.4	1.4	3.0	1.6			
F56	6.3	5.3	6.6	6.6	7.2	0.5-0.8	1.9	1.9	3.5	1.6			
F60	6.3	5.7	6.6	6.6	7.2	0.5-0.8	1.9	1.9	3.5	1.6			
F80	6.3	7.7	6.6	6.6	7.2	0.5-0.8	1.9	1.9	3.5	1.6			
H63	8	6.3	8.3	8.3	9.0	0.5-0.8	2.3	2.3	4.5	1.6			
H10	8	10	8.3	8.3	9.0	0.7-1.1	3.1	3.1	4.2	2.2			
J10	10	10	10.3	10.3	11.0	0.7-1.1	4.5	4.5	4.4	2.2			
K14	12.5	13.5	13.0	13.0	13.7	1.0-1.3	4.2	4.0	5.7	2.5			
L17	16	16.5	17.0	17.0	18.0	1.0-1.3	6.5	6.0	6.9	2.5	4.7	7.8	9.6
L22	16	21.5	17.0	17.0	18.0	1.0-1.3	6.5	6.0	6.9	2.5			
M17	18	16.5	19.0	19.0	20.0	1.0-1.3	6.5	6.0	7.9	2.5	4.7	8.8	9.6
M22	18	21.5	19.0	19.0	20.0	1.0-1.3	6.5	6.0	7.9	2.5			

● Vibration Resistance

RATINGS OF MVG Series

Vdc μF	4	6.3	10	16	25	35	50	63	100
0.1							B55 D56	1.1 1.3	D56 1.3
0.22							B55 D56	2.0 2.9	D56 3.0
0.33							B55 D56	3.0 3.5	D56 4.0
0.47							B55 D56	3.8 4.2	D56 5.0
1							B55 D56	5.6 6.2	D56 8.0
2.2						B55 D56	7.7	B55 D56	8.3 10
3.3						B55 D56	9.4	D56	14
4.7					B55 D56	10.5	D56	15	E56 17
10					B55 D56	14	D56	19	E56 20
22	B55 D56	14	B55 D56	23	D56	27	E56	28	F56 33
33	D56	23	D56	30	D56	30	F56	40	F80 40
47	D56	27	D56	33	E56	45	F56	40	F80 55
68	E56	38	E56	49	F56	54	F56	78	H63 157
100	E56	46	E56	55	F56	65	F60	85	H10 175
220	F56	74	F60	75	F80 H63	130	F80	130	H10 260
330			F80 H63	135	H10	270	H10	270	H10 300
470			H10	280	H10	280	H10	280	J10 400
1,000			J10	430	J10	430	K14	710	K14 820
1,500			J10	480	K14	850			
2,200			K14	890	K14	960	L17	1150	M17 1400
3,300			L17	1200	L17	1300	M17	1450	M22 1800
4,700			L17	1400	M17	1600	M22	1750	
6,800			M17	1700	M22	1850			
10,000			M22	2000					

Vdc μF	160	200	250	400	450
4.7				K14 120	K14 120
10	J10 55	K14 150	K14 150	L17 140	L17 140
22	K14 240	K14 240	L17 300	M17 280	L22 280
33	K14 260	L17 350	L17 340	M22 350	M22 350
47	L17 400	L17 420	M17 420		
68	L17 500	M17 510	M22 490		
100	M17 590	M22 590			

Rated Ripple Current(mArms/85°C, 120Hz)
Case code

* Height 4.6mm max. is available request.
Please check with us about individual size and dimensions.



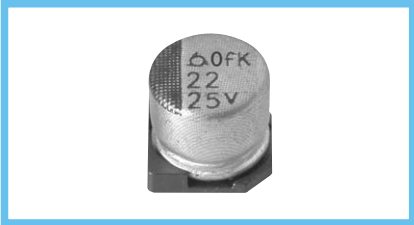
BDS(MVK) Series

• 105°C 1,000~2,000Hrs assured.

- Vertical SMD type.
- Wide Temperature range.
- For CD/DVD-ROM, Navigation, LCD MT/TV
- RoHS compliant.
- Halogen-free capacitors are also available.

Solvent-proof

WV ≤ 63V_{DC}

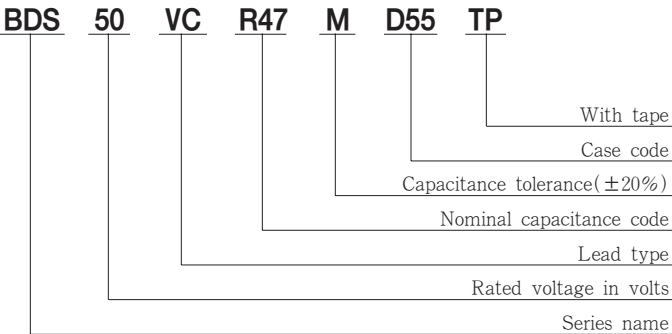


SPECIFICATIONS

Wide Temp.

Item	Characteristics								
Rated Voltage Range	6.3 ~ 450 V _{DC}								
Opertating Temperature Range	-40 ~ +105°C								
Capacitance Tolerance	±20%(M) (at 20°C, 120Hz)								
Leakage Current	Rated Voltage(V _{DC})	6.3~100						160~450	
	Max. Leakage current(μA)	0.01CV (μA) or 3μA , whichever is greater. (at 20°C, 2 minutes)						0.04CV + 100(μA) (at 20°C, 1 minute)	
	Where, C:Nominal capacitance(μF), V:Rated voltage(V _{DC})								
Dissipation Factor Tanδ(Max.)	Rated voltage(V _{DC})	6.3	10	16	25	35	50~100	160~250	400~450
	ø 4~ø 6.3	0.30	0.24	0.20	0.16	0.14	0.12	-	-
	ø 8~ø 18	0.40	0.30	0.26	0.16	0.14	0.12	0.15	0.20
(at 20°C, at 120Hz)									
Temperature Characteristics (Max. Impedance ratio)	Rated voltage(V _{DC})	6.3	10	16	25	35	50~100	160~250	400~450
	Z(-25°C)/Z(+20°C)	4	3	2	2	2	3	3	6
	Z(-40°C)/Z(+20°C)	10	8	6	4	3	4	6	10
(at 120Hz)									
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied with the following conditions.								
	ø 4~ø 6.3:105°C, 1,000 hours, ø 8~ø 18:105°C, 2,000 hours. Capacitance change ø 4~ø 6.3 ≤ ±30% of the initial value ø 8~ø 18 ≤ ±20% of the initial value Tanδ ø 4~ø 6.3 ≤ 300% of the initial specified value ø 8~ø 18 ≤ 200% of the initial specified value Leakage current ≤ The initial specified value								
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for the specified time at 105°C without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements.								
	ø 4~ø 6.3:105°C, 500 hours, ø 8~ø 18:105°C, 1,000 hours. Capacitance change ø 4~ø 6.3 ≤ ±25% of the initial value ø 8~ø 18 ≤ ±20% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value								
Others	Satisfied characteristics KS C IEC 60384-4								

PART NUMBERING SYSTEM



Capacitance	Code
0.1μF	R1
0.47μF	R47
1.0μF	1
4.7μF	4R7
10μF	10
100μF	100

DIMENSIONS OF BDS(MVK) Series(Type:VC)

Unit(mm)

DIMENSIONS

● Vibration Resistance

<Size code:D55~M22> <Size code:L17~M22>

■ : Dummy terminals

Recommended Solder land on PC board

■ : Solder land on PC board

MARKING

<D55 ~ J10> <K14 ~ M22>

Note 1 : L±0.5 for 8×6.3(H63) ~ 18×21.5(M22)
 Note 2 : 4×5.2(D55), 5×5.2(E55) is excluded symbol mark
 Note 3 : 6.3WV is marked by 6V

Case code	∅D	L	A	B	C	W	P	a	b	c	a	b	c
D55	4	5.2	4.3	4.3	5.1	0.5-0.8	1.0	1.0	2.6	1.6			
E55	5	5.2	5.3	5.3	5.9	0.5-0.8	1.4	1.4	3.0	1.6			
F55	6.3	5.2	6.6	6.6	7.2	0.5-0.8	1.9	1.9	3.5	1.6			
F60	6.3	5.7	6.6	6.6	7.2	0.5-0.8	1.9	1.9	3.5	1.6			
F80	6.3	7.7	6.6	6.6	7.2	0.5-0.8	1.9	1.9	3.5	1.6			
H63	8	6.3	8.3	8.3	9.0	0.5-0.8	2.3	2.3	4.5	1.6			
H10	8	10	8.3	8.3	9.0	0.7-1.1	3.1	3.1	4.2	2.2			
J10	10	10	10.3	10.3	11.0	0.7-1.1	4.5	4.5	4.4	2.2			
K14	12.5	13.5	13.0	13.0	13.7	1.0-1.3	4.2	4.0	5.7	2.5			
L17	16	16.5	17.0	17.0	18.0	1.0-1.3	6.5	6.0	6.9	2.5	4.7	7.8	9.6
L22	16	21.5	17.0	17.0	18.0	1.0-1.3	6.5	6.0	6.9	2.5			
M17	18	16.5	19.0	19.0	20.0	1.0-1.3	6.5	6.0	7.9	2.5	4.7	8.8	9.6
M22	18	21.5	19.0	19.0	20.0	1.0-1.3	6.5	6.0	7.9	2.5			

● Vibration Resistance

RATINGS OF BDS(MVK) Series

μF \ Vdc	6.3	10	16	25	35	50	63	100
0.1						D55 1.3	D55 1.3	
0.22						D55 2.6	D55 3.0	
0.33						D55 3.2	D55 4.0	
0.47						D55 3.8	D55 5.0	
1						D55 5.6	D55 8.0	
2.2						D55 10	D55 12	
3.3						D55 14	E55 17	
4.7					D55 15	E55 19	E55 20	
10			D55 16	E55 25	E55 25	F55 29	F60 32	
22	D55 21	E55 30	E55 30	F55 40	F55 40	H63 70	H10 80	H10 90
33	E55 34	E55 34	F55 45	F55 45	H63 80	H10 140	H10 145	J10 150
47	E55 36	F55 48	F55 48	F60/H63 52	H63 140	H10 170	H10 180	K14 250
100	F55/F60 56	F60/H63 90	F60/H10 110	F80/H63 135	H10 250	J10 310	K14 380	K14 380
220	H63 150	F80/H63 150	F80/H10 150	H10 275	J10 375	K14 420	K14 470	M17 750
330	F80/H10 127	J10 450	J10 450	J10 450	K14 480	K14 500	L17 700	M22 980
470	J10 460	J10 460	J10 460	J10 460	K14 520	L17 700	M17 900	
1,000	J10 520	J10 540	K14 550	K14 550	L17 750	M22 1200		
1,500	J10 550	K14 620						
2,200	K14 680	L17 850	M17 1000	M22 1300	M22 1450			
3,300	M17 1000	M17 1100	M17 1200					
4,700	L22 1200	M22 1350						
6,800	M22 1350							

μF \ Vdc	160	200	250	400	450
3.3				K14 30	K14 40
4.7			K14 65	L17 60	L17 60
10	J10 45	K14 80	L17 100	L17 85	L17 85
22	K14 85	K14 85	L17 180	M22 130	M22 130
33	K14 95	L17 220	M17 230		
47	L17 260	M17 270	M22 280		
68	M17 320	M22 330			
100	L22 380				

Rated Ripple Current(mArms/105°C, 120Hz)
Case code

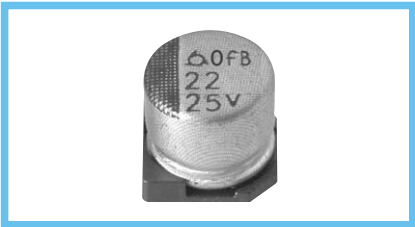
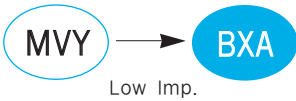


BXA Series

• 105°C 1,000~2,000Hrs assured.

Solvent-proof

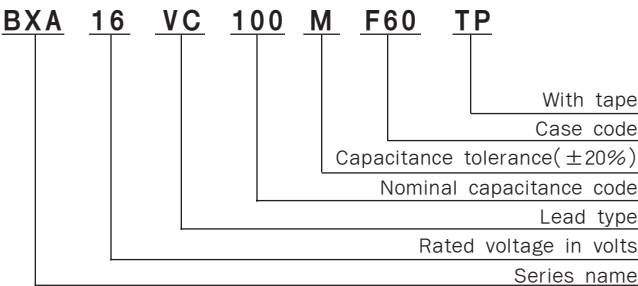
- Vertical SMD type.
- Low impedance.
- For STB, Satellite Radio, Computer Server
- RoHS compliant.
- Halogen-free capacitors are also available.



SPECIFICATIONS

Item	Characteristics								
Rated Voltage Range	6.3 ~ 50 V _{DC}								
Opertating Temperature Range	-55 ~ +105℃								
Capacitance Tolerance	±20%(M) (at 20℃, 120Hz)								
Leakage Current	I=0.01CV or 3μA, whichever is greater. Where, I:Max. Leakage current(μA), C:Nominal capacitance(μF), V:Rated voltage(V _{DC}) (at 20℃, 2 minutes)								
Dissipation Factor Tanδ(Max.)	Rated Voltage(V _{DC}) SIZE		6.3	10	16	25	35	50	(at 20℃, 120Hz)
	D56~H63		0.24	0.20	0.16	0.14	0.12	0.12	
	H10~J10		0.28	0.24	0.20	0.16	0.14	0.12	
Temperature Characteristics (Max. Impedance ratio)	Rated voltage(V _{DC})		6.3	10	16	25	35	50	(at 120Hz)
	Z(-25℃)/Z(20℃)		3	2	2	2	2	2	
	Z(-55℃)/Z(20℃)		5	4	4	3	3	3	
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated voltage is applied with the following conditions. ø4~ø6.3 : 105℃, 1,000 hours, ø8 & ø10 : 105℃, 2,000 hours. Capacitance change ≤ ±25% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value								
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after exposing them for 1000 hours at 105℃ without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≤ ±25% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value								
Others	Satisfied characteristics KS C IEC 60384-4								

PART NUMBERING SYSTEM



Capacitance	Code
0.1μF	R1
0.47μF	R47
1.0μF	1
4.7μF	4R7
10μF	10
100μF	100

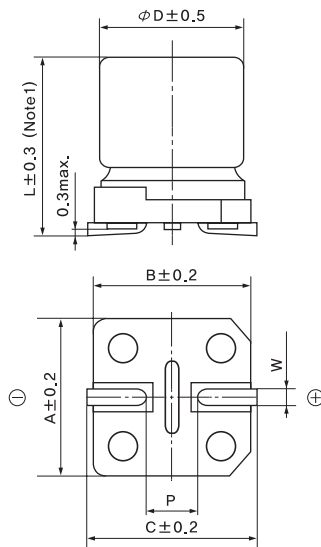


SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

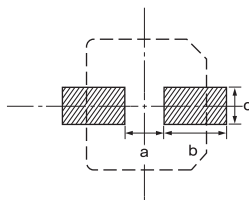
DIMENSIONS OF BXA Series(Type : VC)

Unit(mm)

DIMENSIONS

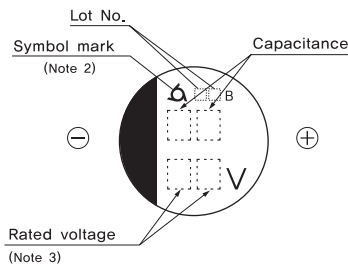


Recommended solder land on PC board



: Solder land on PC board

MARKING



Note 1 : $L \pm 0.5$ for 8×10 (H10), 10×10 (J10).

Note 2 : 4×5.3 (D56), 5×5.3 (E56) is excluded symbol mark.

Note 3 : 6.3WV is marked by 6V.

Case code	ϕD	L	A	B	C	W	P	a	b	c
D56	4	5.3	4.3	4.3	5.1	0.5-0.8	1.0	1.0	2.6	1.6
E56	5	5.3	5.3	5.3	5.9	0.5-0.8	1.4	1.4	3.0	1.6
F60	6.3	5.7	6.6	6.6	7.2	0.5-0.8	1.9	1.9	3.5	1.6
F80	6.3	7.7	6.6	6.6	7.2	0.5-0.8	1.9	1.9	3.5	1.6
H63	8	6.3	8.3	8.3	9.0	0.5-0.8	2.3	2.3	4.5	1.6
H10	8	10	8.3	8.3	9.0	0.7-1.1	3.1	3.1	4.2	2.2
J10	10	10	10.3	10.3	11.0	0.7-1.1	4.5	4.5	4.4	2.2

RATINGS OF BXA Series

$\mu F \backslash V_{DC}$	6.3			10			16			25			35			50			
2.2																D56	4.8	30	
4.7													D56	2.1	80	E56	3.0	50	
10										D56	2.1	80	E56	0.90	150	F60	2.0	70	
22				D56	2.1	80	E56	0.90	150	E56	0.90	150	E56	0.90	150	F60	1.2	120	
33	D56	2.1	80	E56	0.90	150	F60	0.44	230	F60	0.44	230	F60	0.44	230	F80	1.0	170	
47	E56	0.90	150	F60	0.44	230	F60	0.44	230	F60	0.44	230	F60	0.44	230	H63	0.9	150	
68	F60	0.44	230	F60	0.44	230	F60	0.44	230	F60	0.44	230	F80	0.34	280	H10	0.44	230	
100	F60	0.44	230	F60	0.44	230	F60	0.44	230	F80	H63	0.34	280	H10	0.17	450	H10	0.44	230
220	F60	0.44	230	F80	0.34	280	F80	0.34	280	H10	0.17	450	H10	0.17	450	J10	0.30	350	
330	F80	0.34	280	H10	0.17	450	H10	0.17	450	H10	0.17	450	J10	0.09	670				
470	H10	0.17	450	H10	0.17	450	H10	0.17	450	J10	0.09	670							
1,000	H10	0.17	450	J10	0.09	670													
1,500	J10	0.09	670	▲	▲	▲													

Rated Ripple Current (mA rms/ 105°C, 100kHz)

Impedance (Ω max./ 20°C, 100kHz)

Case code

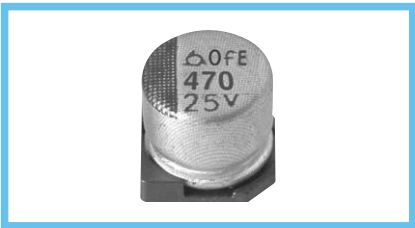
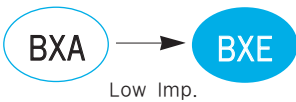


BXE Series

• 105°C 1,000~2,000Hrs assured.

Solvent-proof

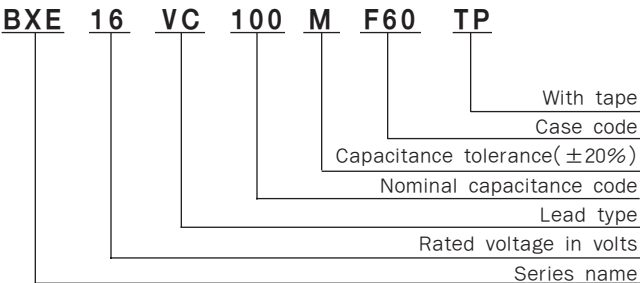
- Vertical SMD type.
- Very low impedance.
- For STB, Satellite Radio, Computer Server
- RoHS compliant.
- Halogen-free capacitors are also available.



SPECIFICATIONS

Item	Characteristics					
Rated Voltage Range	6.3 ~ 35 V _{DC}					
Opertating Temperature Range	-55 ~ +105°C					
Capacitance Tolerance	±20%(M) (at 20°C, 120Hz)					
Leakage Current	I=0.01CV(μA) or 3μA, whichever is greater. Where, I:Max. Leakage current(μA), C:Nominal capacitance(μF), V:Rated voltage(V _{DC}) (at 20°C, 2 minutes)					
Dissipation Factor (Tanδ)	Rated Voltage(V _{DC})	6.3	10	16	25	35
	Tan δ (Max.)	0.26	0.19	0.16	0.14	0.12
(at 20°C, 120Hz)						
Temperature Characteristics (Max. Impedance ratio)	Rated voltage(V _{DC})	6.3	10	16	25	35
	Z(-25°C)/Z(20°C)	3	2	2	2	2
	Z(-55°C)/Z(20°C)	5	4	4	3	3
(at 120Hz)						
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied with the following conditions. ø4~ø6.3 : 105°C, 1,000 hours, ø8 & ø10 : 105°C, 2,000 hours. Capacitance change ≤ ±30% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value					
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1,000 hours at 105°C without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≤ ±30% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value					
Others	Satisfied characteristics KS C IEC 60384-4					

PART NUMBERING SYSTEM



Capacitance	Code
0.1μF	R1
0.47μF	R47
1.0μF	1
4.7μF	4R7
10μF	10
100μF	100

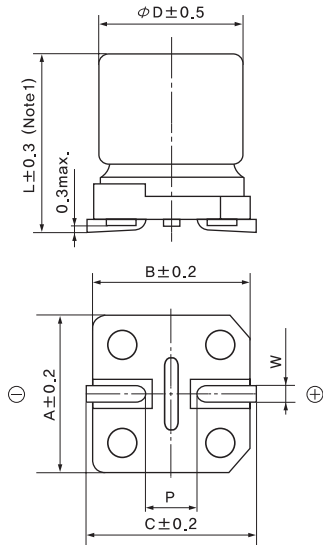


SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

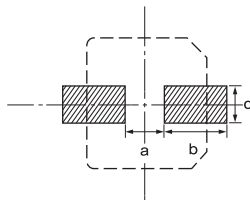
DIMENSIONS OF BXE Series(Type : VC)

Unit(mm)

DIMENSIONS

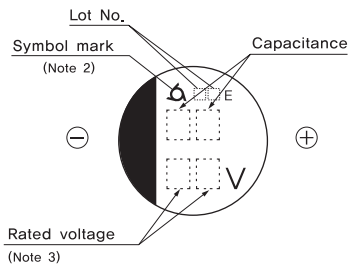


Recommended solder land on PC board



■ : Solder land on PC board

MARKING



Note 1 : $L \pm 0.5$ for 8×10 (H10), 10×10 (J10).

Note 2 : 4×5.3 (D56), 5×5.3 (E56) is excluded symbol mark.

Note 3 : 6.3WV is marked by 6V.

Case code	ϕD	L	A	B	C	W	P	a	b	c
D56	4	5.3	4.3	4.3	5.1	0.5-0.8	1.0	1.0	2.6	1.6
E56	5	5.3	5.3	5.3	5.9	0.5-0.8	1.4	1.4	3.0	1.6
F60	6.3	5.7	6.6	6.6	7.2	0.5-0.8	1.9	1.9	3.5	1.6
F80	6.3	7.7	6.6	6.6	7.2	0.5-0.8	1.9	1.9	3.5	1.6
H10	8	10	8.3	8.3	9.0	0.7-1.1	3.1	3.1	4.2	2.2
J10	10	10	10.3	10.3	11.0	0.7-1.1	4.5	4.5	4.4	2.2

RATINGS OF BXE Series

μF \ V_{DC}	6.3			10			16			25			35		
4.7													D56	1.8	85
10										D56	1.8	85	E56	0.8	155
22				D56	1.8	85	E56	0.8	155	E56	0.8	155	E56	0.8	155
33	D56	1.8	85	E56	0.8	155	F60	0.36	240	F60	0.36	240	F60	0.36	240
47	E56	0.8	155	F60	0.36	240	F60	0.36	240	F60	0.36	240	F60	0.36	240
68	F60	0.36	240	F60	0.36	240	F60	0.36	240	F60	0.36	240	F80	0.34	280
100	F60	0.36	240	F60	0.36	240	F60	0.36	240	F80	0.34	280	H10	0.16	600
220	F60	0.36	240	F80	0.34	280	F80	0.34	280	H10	0.16	600	H10	0.16	600
330	F80	0.34	280	H10	0.16	600	H10	0.16	600	H10	0.16	600	J10	0.08	850
470	H10	0.16	600	H10	0.16	600	H10	0.16	600	J10	0.08	850			
1,000	H10	0.16	600	J10	0.08	850									
1,500	J10	0.08	850	▲	▲	▲									

Rated Ripple Current (mA rms/ 105°C, 100kHz)

Impedance (Ω max./ 20°C, 100kHz)

Case code

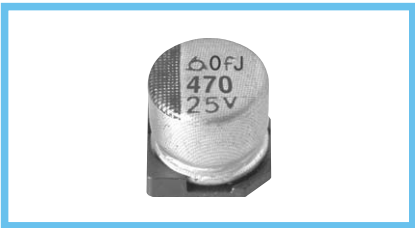


BXJ Series

• 105°C 2,000~5,000Hrs assured.

Solvent-proof

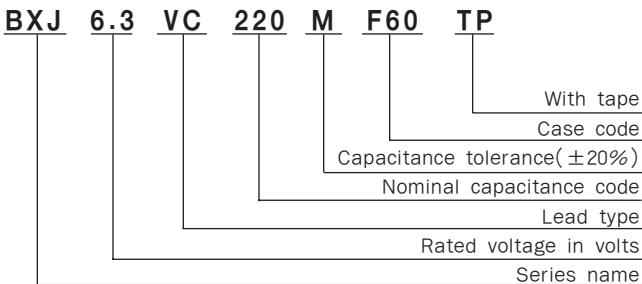
- Vertical SMD type.
- Very low impedance, Long Life.
- For STB, Tuner
- RoHS compliant.
- Halogen-free capacitors are also available.



SPECIFICATIONS

Item	Characteristics					
Rated Voltage Range	6.3 ~ 35 V _{DC}					
Opertating Temperature Range	-55 ~ +105℃					
Capacitance Tolerance	±20%(M) (at 20℃, 120Hz)					
Leakage Current	I=0.01CV(μA) or 3μA, whichever is greater. Where, I:Max. Leakage current(μA), C:Nominal capacitance(μF), V:Rated voltage(V _{DC}) (at 20℃, 2 minutes)					
Dissipation Factor (Tanδ)	Rated Voltage(V _{DC})	6.3	10	16	25	35
	Tan δ (Max.)	0.26	0.19	0.16	0.14	0.12
(at 20℃, 120Hz)						
Temperature Characteristics (Max. Impedance ratio)	Rated voltage(V _{DC})	6.3	10	16	25	35
	Z(-25℃)/Z(+20℃)	3	2	2	2	2
	Z(-55℃)/Z(+20℃)	5	4	4	3	3
(at 120Hz)						
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated voltage is applied with the following conditions. D56~H63 : 105℃, 2,000 hours, H10 & J10 : 105℃, 5,000 hours. Capacitance change D56~H63 ≤ ±30% of the initial value H10, J10 ≤ ±35% of the initial value Tanδ ≤ 300% of the initial specified value Leakage current ≤ The initial specified value					
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after exposing them for 1,000 hours at 105℃ without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change D56~H63 ≤ ±30% of the initial value H10, J10 ≤ ±35% of the initial value Tanδ ≤ 300% of the initial specified value Leakage current ≤ The initial specified value					
Others	Satisfied characteristics KS C IEC 60384-4					

PART NUMBERING SYSTEM



Capacitance	Code
0.1μF	R1
0.47μF	R47
1.0μF	1
4.7μF	4R7
10μF	10
100μF	100

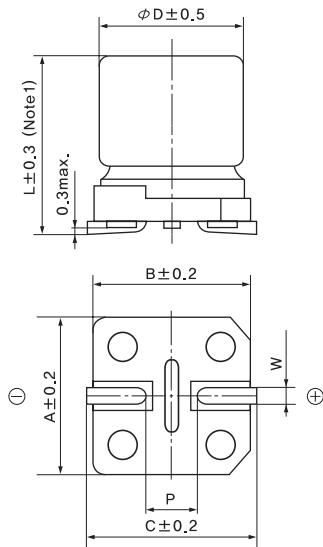


SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

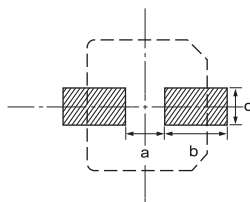
DIMENSIONS OF BXJ Series(Type : VC)

Unit(mm)

DIMENSIONS

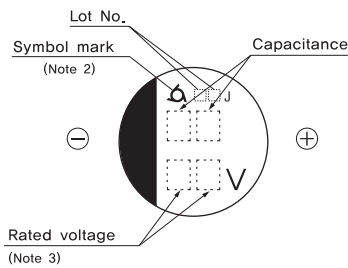


Recommended solder land on PC board



▨ : Solder land on PC board

MARKING



Note 1 : $L \pm 0.5$ for 8×6.3(H63)~10×10(J10).

Note 2 : 4×5.3(D56), 5×5.3(E56) is excluded symbol mark.

Note 3 : 6.3WV is marked by 6V.

Case code	ϕD	L	A	B	C	W	P	a	b	c
D56	4	5.3	4.3	4.3	5.1	0.5-0.8	1.0	1.0	2.6	1.6
E56	5	5.3	5.3	5.3	5.9	0.5-0.8	1.4	1.4	3.0	1.6
F55	6.3	5.2	6.6	6.6	7.2	0.5-0.8	1.9	1.9	3.5	1.6
F60	6.3	5.7	6.6	6.6	7.2	0.5-0.8	1.9	1.9	3.5	1.6
F80	6.3	7.7	6.6	6.6	7.2	0.5-0.8	1.9	1.9	3.5	1.6
H63	8	6.3	8.3	8.3	9.0	0.5-0.8	2.3	2.3	4.5	1.6
H10	8	10	8.3	8.3	9.0	0.7-1.1	3.1	3.1	4.2	2.2
J10	10	10	10.3	10.3	11.0	0.7-1.1	4.5	4.5	4.4	2.2

RATINGS OF BXJ Series

μF \ V_{DC}	6.3			10			16			25			35		
4.7													D56	1.8	85
10										D56	1.8	85	E56	0.8	155
22				D56	1.8	85	E56	0.8	155	E56	0.8	155	F55	0.55	220
33	D56	1.8	85	E56	0.8	155	F60	0.36	240	F60	0.36	240	F60	0.36	240
47	E56	0.8	155	F60	0.36	240	F60	0.36	240	F60	0.36	240	F60	0.36	240
68	F60	0.36	240	F60	0.36	240	F60	0.36	240	F60	0.36	240	F80	0.34	280
													H63	0.26	300
100	F60	0.36	240	F60	0.36	240	F60	0.36	240	F80	0.34	280	H10	0.16	600
										H63	0.26	300	J10	0.08	850
220	F60	0.36	240	F80	0.34	280	F80	0.34	280	H10	0.16	600	H10	0.16	600
330	F80	0.34	280	H10	0.16	600	H10	0.16	600	H10	0.16	600	J10	0.08	850
470	H10	0.16	600	H10	0.16	600	H10	0.16	600	J10	0.08	850			
1,000	H10	0.16	600	J10	0.08	850									
1,500	J10	0.08	850												

Rated Ripple Current (mA_{rms}/ 105°C, 100kHz)

Impedance (Z_{max} / 20°C, 100kHz)

Case code

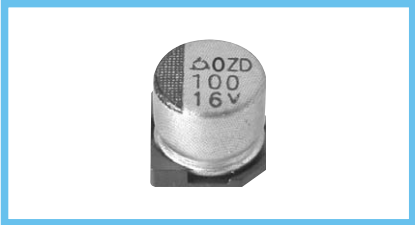


BDA Series

• 105°C 2,000Hrs assured.

Solvent-proof

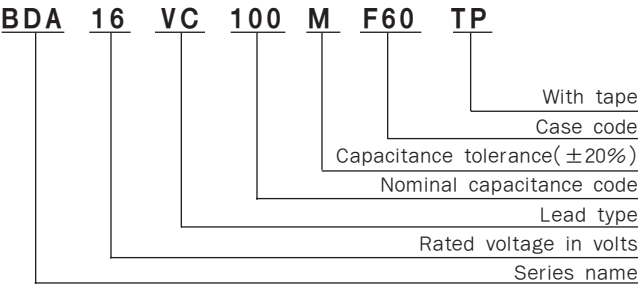
- Vertical SMD type.
- Long life of BDS(MVK) Series.
- For LCD MT/TV, Copying Machine
- RoHS compliant.
- Halogen-free capacitors are also available.



SPECIFICATIONS

Item	Characteristics							
Rated Voltage Range	4 ~ 50 V _{DC}							
Opertating Temperature Range	-40 ~ +105°C							
Capacitance Tolerance	±20%(M) (at 20°C, 120Hz)							
Leakage Current	I=0.01CV(μA) or 3μA, whichever is greater. Where, I:Max. Leakage current(μA), C:Nominal capacitance(μF), V:Rated voltage(V _{DC}) (at 20°C, 2 minutes)							
Dissipation Factor Tanδ(Max.)	Rated voltage(V _{DC})	4	6.3	10	16	25	35	50
	Tanδ(Max.)	0.37	0.28	0.24	0.20	0.16	0.13	0.12
(at 20°C, 120Hz)								
Temperature Characteristics (Max. Impedance ratio)	Rated voltage(V _{DC})	4	6.3	10	16	25~50		
	Z(-25°C)/Z(20°C)	6	3	3	2	2		
	Z(-40°C)/Z(20°C)	12	8	5	4	3		
(at 120Hz)								
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage applied for 2,000 hours at 105°C.							
	Rated voltage(V _{DC})	4 ~ 16V _{DC}			25 ~ 50V _{DC}			
	Capacitance change	≤ ±25% of the initial value			≤ ±20% of the initial value			
	Tanδ	≤ 200% of the initial specified value						
Shelf Life	Leakage current	≤ The initial specified value						
	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1,000 hours at 105°C without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements.							
	Rated voltage(V _{DC})	4 ~ 16V _{DC}			25 ~ 50V _{DC}			
	Capacitance change	≤ ±25% of the initial value			≤ ±20% of the initial value			
Others	Tanδ	≤ 200% of the initial specified value						
	Leakage current	≤ The initial specified value						
Others	Satisfied characteristics KS C IEC 60384-4							

PART NUMBERING SYSTEM



Capacitance	Code
0.1μF	R1
0.47μF	R47
1.0μF	1
4.7μF	4R7
10μF	10
100μF	100

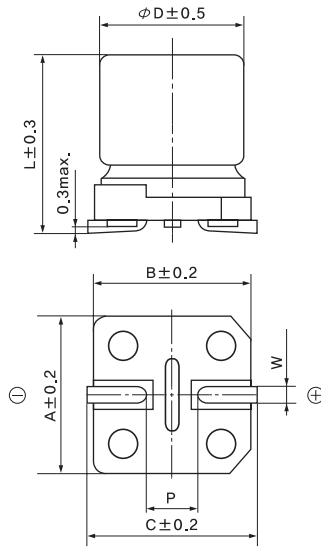


SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

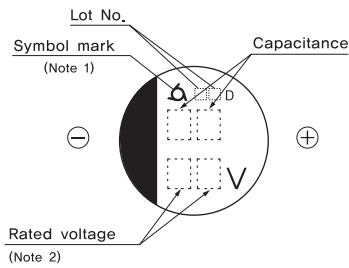
DIMENSIONS OF BDA Series (Type : VC)

Unit(mm)

DIMENSIONS



MARKING

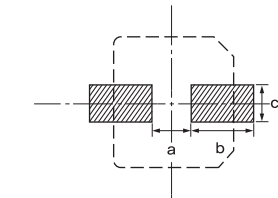


Note 1 : 4×5.2(D55), 5×5.2(E55) is excluded symbol mark

Note 2 : 6.3WV is marked by 6V

Case code	∅ D	L	A	B	C	W	P	a	b	c
D55	4	5.2	4.3	4.3	5.1	0.5-0.8	1.0	1.0	2.6	1.6
E55	5	5.2	5.3	5.3	5.9	0.5-0.8	1.4	1.4	3.0	1.6
F55	6.3	5.2	6.6	6.6	7.2	0.5-0.8	1.9	1.9	3.5	1.6
F60	6.3	5.7	6.6	6.6	7.2	0.5-0.8	1.9	1.9	3.5	1.6

Recommended solder land on PC board



▨ : Solder land on PC board

RATINGS OF BDA Series

Vdc μF	4		6.3		10		16		25		35		50	
0.1													D55	1.3
0.22													D55	2.6
0.33													D55	3.2
0.47													D55	3.8
1													D55	5.6
2.2													D55	10
3.3													D55	14
4.7									D55	13	D55	15	E55	19
10							D55	16	E55	25	E55	25	F55	29
22	D55	19	D55	21	E55	30	E55	30	F55	40	F55	40		
33	E55	30	E55	34	E55	34	F55	45	F55	45				
47	E55	34	E55	36	F55	48	F55	48	F60	52				
100	E55	45	F60	56	F60	90	F60	110						

Rated Ripple Current (mA rms/105°C, 120Hz)

Case code

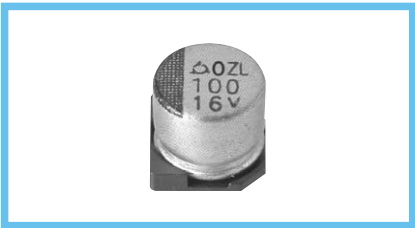
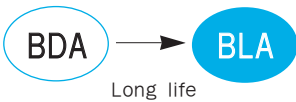


BLA Series

• 105°C 5,000Hrs assured.

Solvent-proof

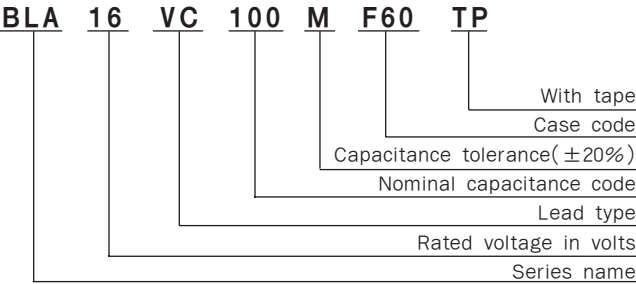
- Vertical SMD type.
- Long life of BDA Series
- For LCD MT, AVN
- RoHS compliant.
- Halogen-free capacitors are also available.



SPECIFICATIONS

Item	Characteristics																															
Rated Voltage Range	4 ~ 50 V _{DC}																															
Operating Temperature Range	-40 ~ +105°C																															
Capacitance Tolerance	±20%(M) (at 20°C, 120Hz)																															
Leakage Current	I=0.01CV(μA) or 3μA, whichever is greater. Where, I:Max. Leakage current(μA), C:Nominal capacitance(μF), V:Rated voltage(V _{DC}) (at 20°C, 2 minutes)																															
Dissipation Factor Tanδ(Max.)	<table><tr><td>Rated voltage(V_{DC})</td><td>4</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td></tr><tr><td>Tanδ(Max.)</td><td>0.37</td><td>0.28</td><td>0.24</td><td>0.20</td><td>0.16</td><td>0.13</td><td>0.12</td></tr></table>								Rated voltage(V _{DC})	4	6.3	10	16	25	35	50	Tanδ(Max.)	0.37	0.28	0.24	0.20	0.16	0.13	0.12								
	Rated voltage(V _{DC})	4	6.3	10	16	25	35	50																								
Tanδ(Max.)	0.37	0.28	0.24	0.20	0.16	0.13	0.12																									
(at 20°C, 120Hz)																																
Temperature Characteristics (Max. Impedance ratio)	<table><tr><td>Rated voltage(V_{DC})</td><td>4</td><td>6.3</td><td>10</td><td>16</td><td colspan="3">25~50</td></tr><tr><td>Z(-25°C)/Z(+20°C)</td><td>8</td><td>4</td><td>3</td><td>2</td><td colspan="3">2</td></tr><tr><td>Z(-40°C)/Z(+20°C)</td><td>14</td><td>10</td><td>7</td><td>5</td><td colspan="3">3</td></tr></table>								Rated voltage(V _{DC})	4	6.3	10	16	25~50			Z(-25°C)/Z(+20°C)	8	4	3	2	2			Z(-40°C)/Z(+20°C)	14	10	7	5	3		
	Rated voltage(V _{DC})	4	6.3	10	16	25~50																										
	Z(-25°C)/Z(+20°C)	8	4	3	2	2																										
Z(-40°C)/Z(+20°C)	14	10	7	5	3																											
(at 120Hz)																																
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 5,000 hours at 105°C. Capacitance change ≤ ±30% of the initial value Tanδ ≤ 300% of the initial specified value Leakage current ≤ The initial specified value																															
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1,000 hours at 105°C without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≤ ±30% of the initial value Tanδ ≤ 300% of the initial specified value Leakage current ≤ The initial specified value																															
Others	Satisfied characteristics KS C IEC 60384-4																															

PART NUMBERING SYSTEM



Capacitance	Code
0.1μF	R1
0.47μF	R47
1.0μF	1
4.7μF	4R7
10μF	10
100μF	100

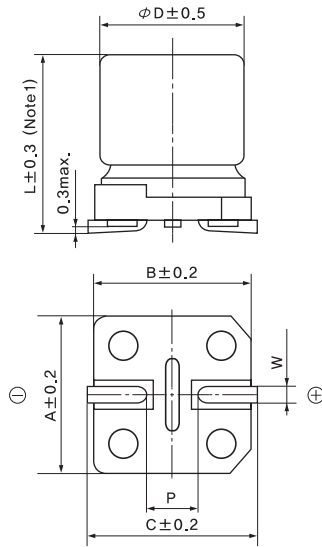


SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

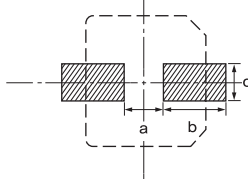
DIMENSIONS OF BLA Series (Type : VC)

Unit(mm)

DIMENSIONS

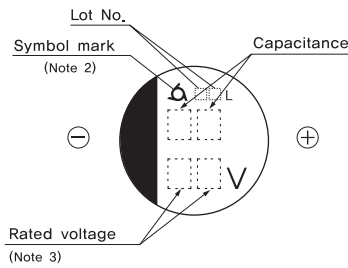


Recommended solder land on PC board



 : Solder land on PC board

MARKING



Note 1 : $L \pm 0.5$ for 8×10 (H10), 10×10 (J10)

Note 2 : 4×5.2 (D55), 5×5.2 (E55) is excluded symbol mark

Note 3 : 6.3WV is marked by 6V

Case code	ϕD	L	A	B	C	W	P	a	b	c
D55	4	5.2	4.3	4.3	5.1	0.5-0.8	1.0	1.0	2.6	1.6
E55	5	5.2	5.3	5.3	5.9	0.5-0.8	1.4	1.4	3.0	1.6
F55	6.3	5.2	6.6	6.6	7.2	0.5-0.8	1.9	1.9	3.5	1.6
F60	6.3	5.7	6.6	6.6	7.2	0.5-0.8	1.9	1.9	3.5	1.6
F80	6.3	7.7	6.6	6.6	7.2	0.5-0.8	1.9	1.9	3.5	1.6
H10	8	10	8.3	8.3	9	0.7-1.1	3.1	3.1	4.2	2.2
J10	10	10	10.3	10.3	11	0.7-1.1	4.5	4.5	4.4	2.2

RATINGS OF BLA Series

V _{DC} μF	4		6.3		10		16		25		35		50	
0.1													D55	1.3
0.22													D55	2.6
0.33													D55	3.2
0.47													D55	3.8
1													D55	5.6
2.2													D55	10
3.3													D55	14
4.7									D55	13	D55	15	E55	19
10							D55	16	E55	25	E55	25	F55	29
22	D55	19	D55	21	E55	30	E55	30	F55	40	F55	40	F60	43
33	E55	30	E55	34	E55	34	F55	45	F55	45	F80	57	H10	77
47	E55	34	E55	36	F55	48	F55	48	F60	52	H10	92	H10	92
100	E55	45	F60	56	F60	90	F60	110	H10	116	J10	151	J10	151
220					F80	120	H10	140	J10	216	J10	216		
330					H10	170	J10	238	J10	238				
470					J10	254	J10	254						

Rated Ripple Current (mA_{rms}/105°C, 120Hz)

Case code

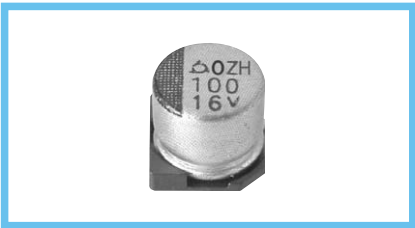
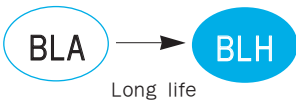


BLH Series

• 105°C 10,000Hrs assured.

Solvent-proof

- Vertical SMD type.
- Long life of BLA Series
- For LCD MT/TV, AVN
- RoHS compliant.
- Halogen-free capacitors are also available.

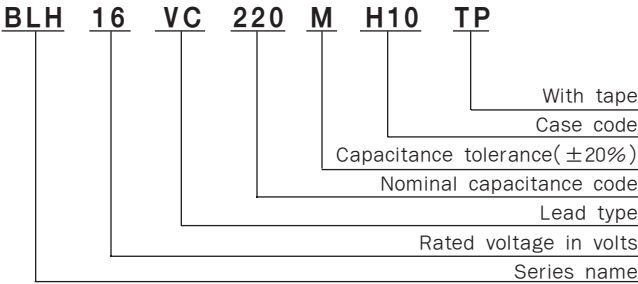


SPECIFICATIONS

Item	Characteristics																							
Rated Voltage Range	10 ~ 50 V _{DC}																							
Operating Temperature Range	-40 ~ +105°C																							
Capacitance Tolerance	±20%(M) (at 20°C, 120Hz)																							
Leakage Current	I=0.01CV(μA) or 3μA, whichever is greater. Where, I:Max. Leakage current(μA), C:Nominal capacitance(μF), V:Rated voltage(V _{DC}) (at 20°C, 2 minutes)																							
Dissipation Factor (Tanδ)	<table><tr><td>Rated voltage(V_{DC})</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td></tr><tr><td>Tanδ(Max.)</td><td>0.24</td><td>0.20</td><td>0.16</td><td>0.13</td><td>0.12</td></tr></table> (at 20°C, 120Hz)						Rated voltage(V _{DC})	10	16	25	35	50	Tanδ(Max.)	0.24	0.20	0.16	0.13	0.12						
Rated voltage(V _{DC})	10	16	25	35	50																			
Tanδ(Max.)	0.24	0.20	0.16	0.13	0.12																			
Temperature Characteristics (Max. Impedance ratio)	<table><tr><td>Rated voltage(V_{DC})</td><td>10</td><td>16</td><td colspan="3">25~50</td></tr><tr><td>Z(-25°C)/Z(+20°C)</td><td>3</td><td>2</td><td colspan="3">2</td></tr><tr><td>Z(-40°C)/Z(+20°C)</td><td>7</td><td>5</td><td colspan="3">3</td></tr></table> (at 120Hz)						Rated voltage(V _{DC})	10	16	25~50			Z(-25°C)/Z(+20°C)	3	2	2			Z(-40°C)/Z(+20°C)	7	5	3		
Rated voltage(V _{DC})	10	16	25~50																					
Z(-25°C)/Z(+20°C)	3	2	2																					
Z(-40°C)/Z(+20°C)	7	5	3																					
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 10,000 hours at 105°C Capacitance change ≤ ±30% of the initial value Tanδ ≤ 300% of the initial specified value Leakage current ≤ The initial specified value																							
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1,000 hours at 105°C without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≤ ±30% of the initial value Tanδ ≤ 300% of the initial specified value Leakage current ≤ The initial specified value																							
Others	Satisfied characteristics KS C IEC 60384-4																							

BLH Series

PART NUMBERING SYSTEM



Capacitance	Code
0.1μF	R1
0.47μF	R47
1.0μF	1
4.7μF	4R7
10μF	10
100μF	100

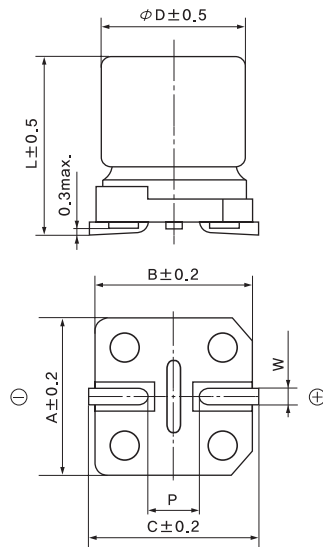


SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

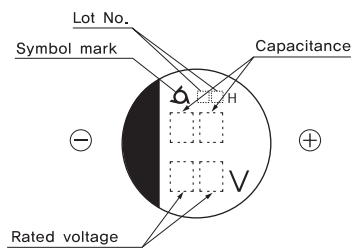
DIMENSIONS OF BLH Series (Type : VC)

Unit(mm)

DIMENSIONS

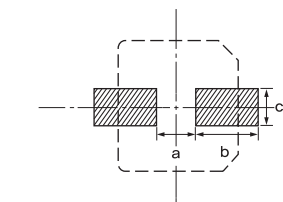


MARKING



Case code	ϕD	L	A	B	C	W	P	a	b	c
H10	8	10	8.3	8.3	9	0.7-1.1	3.1	3.1	4.2	2.2
J10	10	10	10.3	10.3	11	0.7-1.1	4.5	4.5	4.4	2.2

Recommended solder land on PC board



▨ : Solder land on PC board

RATINGS OF BLH Series

V _{DC} μF	10		16		25		35		50	
33									H10	77
47							H10	92	H10	92
100					H10	116	J10	151	J10	151
220			H10	140	J10	218	J10	216		
330	H10	170	J10	238	J10	238				
470	J10	254	J10	254						

Rated Ripple Current (mArms/105°C, 120Hz)

Case code



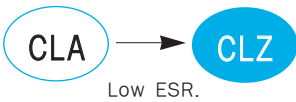
CLZ Series

• 125°C 1,000~5,000Hrs assured.

- Vertical SMD type.
- LOW ESR of CLA Series
- For ECU, ESA
- RoHS compliant.
- Halogen-free capacitors are also available.

Solvent-proof

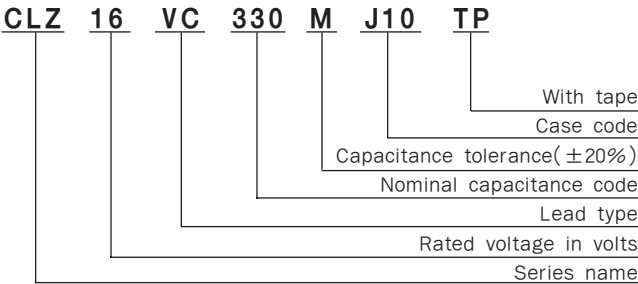
WV ≤ 80V_{DC}



SPECIFICATIONS

Item	Characteristics	
Rated Voltage Range	10 ~ 400 V _{DC}	
Operating Temperature Range	-40 ~ +125°C	
Capacitance Tolerance	±20%(M)	
Leakage Current	Rated voltage(V _{DC})	10~80 160~400
	Max. Leakage current (μA)	I=0.01CV(μA) or 3μA, whichever is greater. (at 20°C, 2 minutes) 0.04CV + 100(μA) (at 20°C, 2 minutes)
	Where, C : Nominal capacitance(μF), V : Rated voltage(V _{DC})	
Dissipation Factor (Tanδ)	Rated voltage(V _{DC})	10 16 25 35 50~80 100 160~250 400
	Tanδ(Max.)	0.22 0.19 0.16 0.14 0.12 0.10 0.20 0.24 (at 20°C, 120Hz)
Temperature Characteristics (Max. Impedance ratio)	Rated voltage(V _{DC})	10 16 25 35~100 160~250 400
	Z(-25°C)/Z(+20°C)	4 3 2 2 3 6
	Z(-40°C)/Z(+20°C)	8 6 4 3 6 10 (at 120Hz)
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for the specified time at 125°C	
	Capacitance change	≤ ±30% of the initial value
	Tanδ	≤ 300% of the initial specified value
Shelf Life	Leakage current	≤ The initial specified value
	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1,000 hours at 125°C without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. (Where, D55 ~ F60 is 500 hours)	
	Capacitance change	≤ ±30% of the initial value
Others	Tanδ	≤ 300% of the initial specified value
	Leakage current	≤ 500% of the initial specified value
	Satisfied characteristics KS C IEC 60384-4	

PART NUMBERING SYSTEM



Capacitance	Code
0.1μF	R1
0.47μF	R47
1.0μF	1
4.7μF	4R7
10μF	10
100μF	100



SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

DIMENSIONS OF CLZ Series (Type : VC)

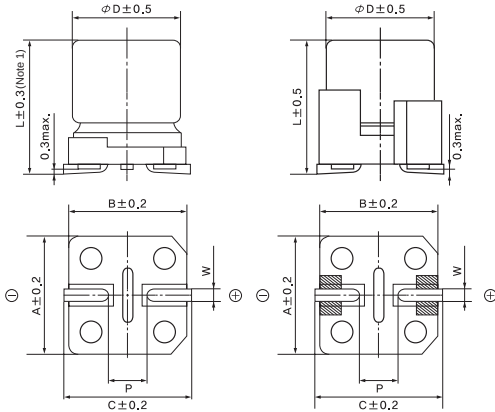
Unit(mm)

DIMENSIONS

● Vibration Resistance

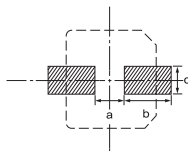
〈Size code:H63~M22〉

〈Size code:L17~M22〉



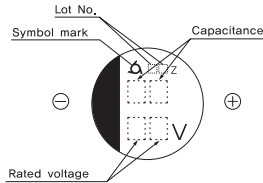
■ : Dummy terminals

Recommended solder land on PC board

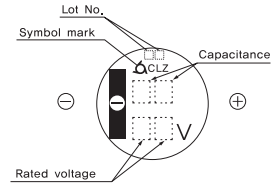


■ : Solder pad on PC board

MARKING



〈D55~J10〉



〈K14~M22〉

Note 1 : L±0.5 for 8×6.3(H63)~18×21.5(M22)

Note 2 : 4×5.2(D55), 5×5.2(E55) is excluded symbol mark

Case code	ØD	L	A	B	C	W	P	a	b	c	a	b	c
D55	4	5.2	4.3	4.3	5.1	0.5~0.8	1.0	1.0	2.6	1.6			
E55	5	5.2	5.3	5.3	5.9	0.5~0.8	1.4	1.4	3.0	1.6			
F55	6.3	5.2	6.6	6.6	7.2	0.5~0.8	1.9	1.9	3.5	1.6			
F60	6.3	5.7	6.6	6.6	7.2	0.5~0.8	1.9	1.9	3.5	1.6			
H63	8	6.3	8.3	8.3	9.0	0.5~0.8	2.3	2.3	4.5	1.6			
H10	8	10	8.3	8.3	9.0	0.7~1.1	3.1	3.1	4.2	2.2			
J10	10	10	10.3	10.3	11.0	0.7~1.1	4.5	4.5	4.4	2.2			
K14	12.5	13.5	13.0	13.0	13.7	1.0~1.3	4.2	4.0	5.7	2.5			
L17	16	16.5	17.0	17.0	18.0	1.0~1.3	6.5	6.0	6.9	2.5	4.7	7.8	9.6
L22	16	21.5	17.0	17.0	18.0	1.0~1.3	6.5	6.0	6.9	2.5			
M17	18	16.5	19.0	19.0	20.0	1.0~1.3	6.5	6.0	7.9	2.5			
M22	18	21.5	19.0	19.0	20.0	1.0~1.3	6.5	6.0	7.9	2.5	4.7	8.8	9.6

● Vibration Resistance

RATINGS OF CLZ Series

V _{DC}	10	16	25	35	50	63	80	100
10	D55 7.00 12	E55 3.30 23	F55 2.00 40	F60 1.60 69	F60 1.60 69	H63 1.60 83	H10 1.00 70	H10 1.60 70
22	E55 3.30 23	E55 3.30 23	F55 2.00 40	F60 1.60 69	H63 1.60 83	H10 1.00 70	J10 0.55 115	H10 1.60 70
33	E55 3.30 23	F55 2.00 40	F60 1.60 69	H63 0.90 110	H10 0.70 160	J10 0.55 115	J10 0.55 115	J10 0.80 115
47	F55 2.00 40	F60 1.60 69	H63 0.90 110	H10 0.40 220	J10 0.50 247	J10 0.55 115	K14 0.33 450	K14 0.33 450
100	H63 0.90 110	H63 0.90 110	H10 0.40 220	H10 0.40 220	J10 0.50 247	K14 0.33 450	L17 0.24 650	K14 0.33 450
220	H10 0.40 220	H10 0.40 220	J10 0.30 296	J10 0.30 296	K14 0.23 550	L17 0.24 650	M17 0.16 950	
330	J10 0.30 296	J10 0.30 296	K14 0.14 750	K14 0.14 750	L17 0.15 850	L17 0.24 650		
470	J10 0.30 296	K14 0.14 750	L17 0.10 1000	M17 0.10 1000	M17 0.15 920	L22 0.16 950		
1,000	K14 0.14 750	M17 0.10 1200	M22 0.058 1550					
2,200	L17 0.10 1000							
3,300	M17 0.10 1200							
4,700	M22 0.058 1550							

Rated Ripple Current (mA_{rms}/125°C, 100kHz)
ESR (Ω max./ 20°C, 100kHz)
Case code

V _{DC}	160	200	250	400
1				J10 18
2.2				J10 26
3.3				J10 37
4.7				K14 70
10	K14 100	K14 100	L17 120	L22 140
22	L17 180	L17 180	M17 205	
33	M17 245	M17 245	M22 260	
47	M22 315	M22 315		
68	M22 380			

Rated Ripple Current (mA_{rms}/125°C, 120Hz)
Case code

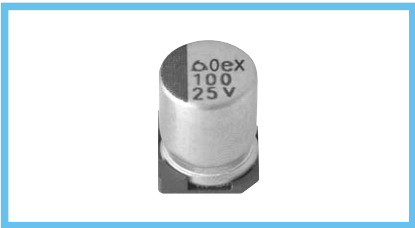
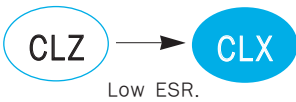


CLX Series

• 125°C 2,000~4000Hrs assured.

Solvent-proof

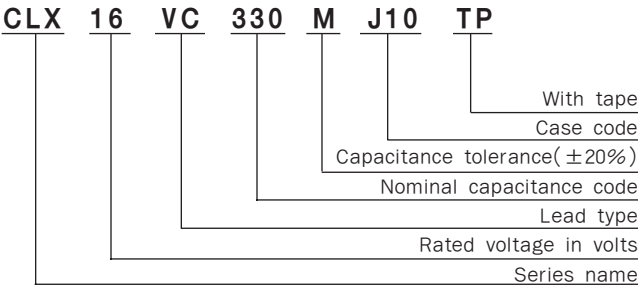
- Vertical SMD type.
- Low ESR of CLZ Series.
- For ECU, ESA
- RoHS compliant.
- Halogen-free capacitors are also available.



SPECIFICATIONS

Item	Characteristics																							
Rated Voltage Range	10 ~ 50 V _{DC}																							
Operating Temperature Range	-40 ~ +125 °C																							
Capacitance Tolerance	±20%(M)																							
Leakage Current	I=0.01CV(μA) or 3μA, whichever is greater. Where, I:Max. Leakage current(μA),C:Nominal capacitance(μF),V:Rated voltage(V _{DC}) (at 20°C, 2 minutes)																							
Dissipation Factor Tanδ(Max.)	<table><tr><td>Rated voltage(V_{DC})</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td></tr><tr><td>Tanδ(Max.)</td><td>0.24</td><td>0.20</td><td>0.16</td><td>0.14</td><td>0.16</td></tr></table> (at 20°C, 120Hz)						Rated voltage(V _{DC})	10	16	25	35	50	Tanδ(Max.)	0.24	0.20	0.16	0.14	0.16						
Rated voltage(V _{DC})	10	16	25	35	50																			
Tanδ(Max.)	0.24	0.20	0.16	0.14	0.16																			
Temperature Characteristics (Max. Impedance ratio)	<table><tr><td>Rated voltage(V_{DC})</td><td>10</td><td>16</td><td>25</td><td colspan="2">35, 50</td></tr><tr><td>Z(-25°C)/Z(+20°C)</td><td>4</td><td>3</td><td>2</td><td colspan="2">2</td></tr><tr><td>Z(-40°C)/Z(+20°C)</td><td>10</td><td>8</td><td>6</td><td colspan="2">4</td></tr></table> (at 120Hz)						Rated voltage(V _{DC})	10	16	25	35, 50		Z(-25°C)/Z(+20°C)	4	3	2	2		Z(-40°C)/Z(+20°C)	10	8	6	4	
Rated voltage(V _{DC})	10	16	25	35, 50																				
Z(-25°C)/Z(+20°C)	4	3	2	2																				
Z(-40°C)/Z(+20°C)	10	8	6	4																				
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied with the following conditions. H10:125°C, 2,000hours, J10:125°C, 3,000hours, K14:125°C, 4,000hours. Capacitance change ≤ ±30% of the initial value Tanδ ≤ 300% of the initial specified value Leakage current ≤ The initial specified value																							
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1,000 hours at 125°C without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≤ ±30% of the initial value Tanδ ≤ 300% of the initial specified value Leakage current ≤ The initial specified value																							
Others	Satisfied characteristics KS C IEC 60384-4																							

PART NUMBERING SYSTEM



Capacitance	Code
0.1μF	R1
0.47μF	R47
1.0μF	1
4.7μF	4R7
10μF	10
100μF	100

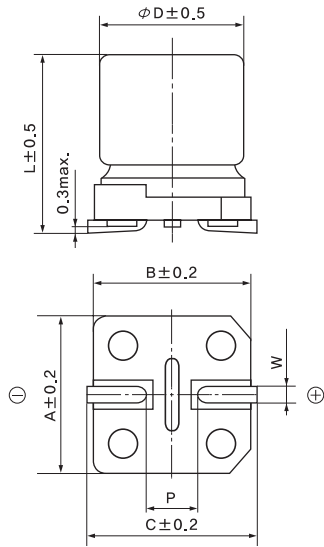


SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

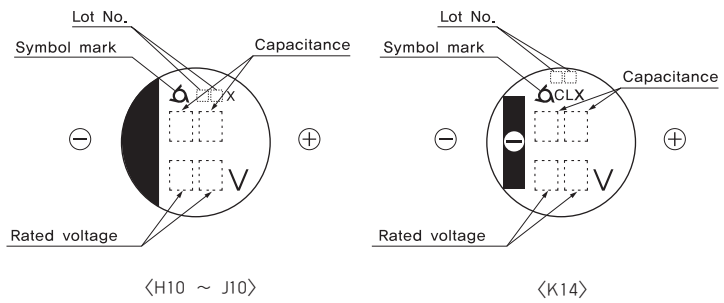
DIMENSIONS OF CLX Series(Type : VC)

Unit(mm)

DIMENSIONS

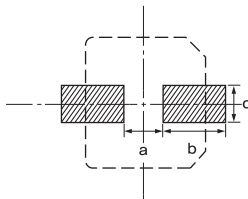


MARKING



Case code	Ø D	L	A	B	C	W	P	a	b	c
H10	8	10	8.3	8.3	9.0	0.7~1.1	3.1	3.1	4.2	2.2
J10	10	10	10.3	10.3	11.0	0.7~1.1	4.5	4.5	4.4	2.2
K14	12.5	13.5	13.0	13.0	13.7	1.0~1.3	4.2	4.0	5.7	2.5

Recommended solder land on PC board



■ : Solder land on PC board

RATINGS OF CLX Series

V _{dc} µF	10			16			25			35			50		
33													H10	0.53	192
47										H10	0.30	264	J10	0.38	296
100							H10	0.30	264	H10	0.23	264	J10	0.38	296
220	H10	0.30	264	H10	0.30	264	J10	0.23	355	J10	0.23	355	K14	0.18	650
330	J10	0.23	355	J10	0.23	355	K14	0.11	950	K14	0.11	950			
470	J10	0.23	355	K14	0.11	950									
1000	K14	0.11	950												

↑ Rated Ripple Current (mA rms/125°C, 100kHz)
↑ ESR (Ω max./ 20°C, 100kHz)
↑ Case code

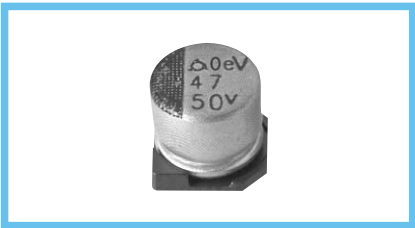
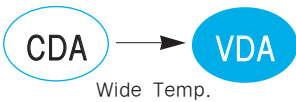


VDA Series

• 150°C 1,000Hrs assured.

- Vertical SMD type.
- Wide Temperature range.
- For ECU, ESA
- Ecological capacitors are also available.
- Halogen-free capacitors are also available.

Solvent-proof

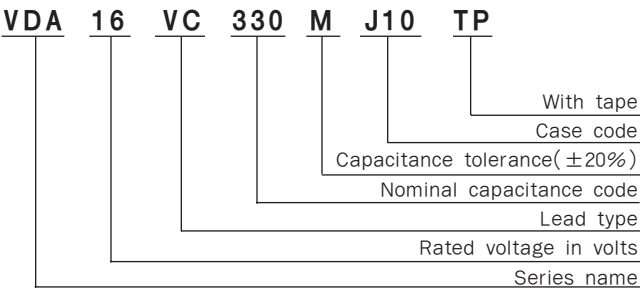


SPECIFICATIONS

Item	Characteristics																							
Rated Voltage Range	10 ~ 50 V _{DC}																							
Operating Temperature Range	-40 ~ +150 °C																							
Capacitance Tolerance	±20%(M) (at 20°C, 120Hz)																							
Leakage Current	I=0.01CV(μA) or 3μA, whichever is greater. Where, I:Max. Leakage current(μA) C:Nominal capacitance(μF) V:Rated voltage(V _{DC}) (at 20°C, 2 minutes)																							
Dissipation Factor Tanδ(Max.)	<table><tr><td>Rated voltage(V_{DC})</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td></tr><tr><td>Tanδ(Max.)</td><td>0.24</td><td>0.20</td><td>0.16</td><td>0.14</td><td>0.14</td></tr></table> (at 20°C, 120Hz)						Rated voltage(V _{DC})	10	16	25	35	50	Tanδ(Max.)	0.24	0.20	0.16	0.14	0.14						
Rated voltage(V _{DC})	10	16	25	35	50																			
Tanδ(Max.)	0.24	0.20	0.16	0.14	0.14																			
Temperature Characteristics (Max. Impedance ratio)	<table><tr><td>Rated voltage(V_{DC})</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td></tr><tr><td>Z(-25°C)/Z(+20°C)</td><td>6</td><td>4</td><td>3</td><td>2</td><td>2</td></tr><tr><td>Z(-40°C)/Z(+20°C)</td><td>12</td><td>10</td><td>8</td><td>6</td><td>6</td></tr></table> (at 120Hz)						Rated voltage(V _{DC})	10	16	25	35	50	Z(-25°C)/Z(+20°C)	6	4	3	2	2	Z(-40°C)/Z(+20°C)	12	10	8	6	6
Rated voltage(V _{DC})	10	16	25	35	50																			
Z(-25°C)/Z(+20°C)	6	4	3	2	2																			
Z(-40°C)/Z(+20°C)	12	10	8	6	6																			
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 1,000 hours at 150°C Capacitance change ≤ ±30% of the initial value Tanδ ≤ 300% of the initial specified value Leakage current ≤ The initial specified value																							
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1,000 hours at 150°C without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≤ ±30% of the initial value Tanδ ≤ 300% of the initial specified value Leakage current ≤ The initial specified value																							
Others	Satisfied characteristics KS C IEC 60384-4																							

VDA Series

PART NUMBERING SYSTEM



Capacitance	Code
0.1μF	R1
0.47μF	R47
1.0μF	1
4.7μF	4R7
10μF	10
100μF	100

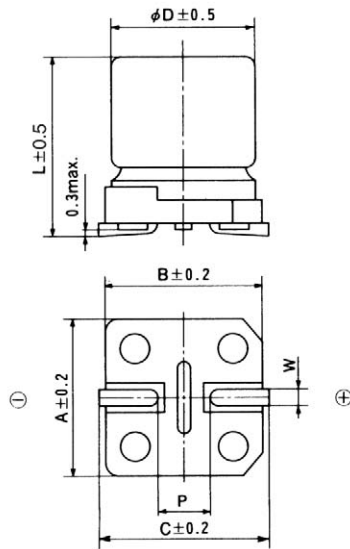


SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

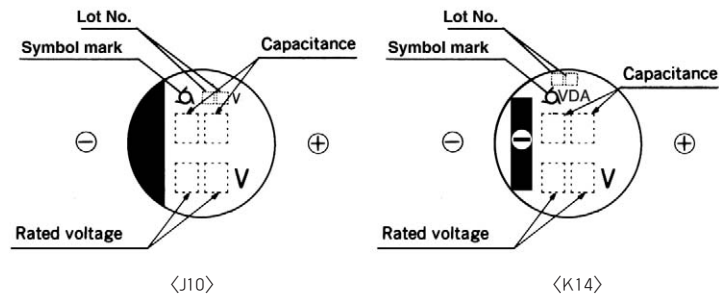
DIMENSIONS OF VDA Series(Type : VC)

Unit(mm)

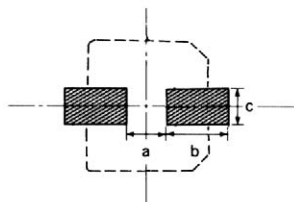
DIMENSIONS



MARKING



Recommended solder land on PC board



▨ : Solder land on PC board

Case code	ϕD	L	A	B	C	W	P	a	b	c
J10	10	10	10.3	10.3	11.0	0.7~1.1	4.5	4.5	4.4	2.2
K14	12.5	13.5	13.0	13.0	13.7	1.0~1.3	4.2	4.0	5.7	2.5

RATINGS OF VDA Series

V_{DC} μF	10	16	25	35	50
47				J10 90	J10 90
100			J10 123	J10 132	K14 167
220		J10 163	J10 183	K14 249	
330	J10 183	J10 200	K14 285		
470	J10 218	K14 304			
1,000	K14 405				

Rated ripple current (mA_{rms}/ 150°C, 120Hz)

Case code



MVG(MV)-BP Series

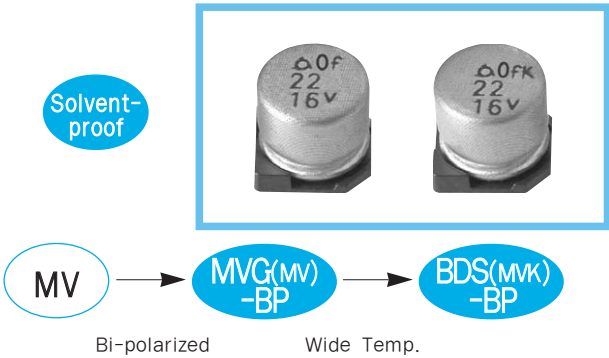
• 85°C 2,000Hrs assured.

- Vertical SMD type.
- Bi-polarized.
- For LCD MT / TV
- RoHS compliant.
- Halogen-free capacitors are also available.

BDS(MVK)-BP Series

• 105°C 1,000Hrs assured.

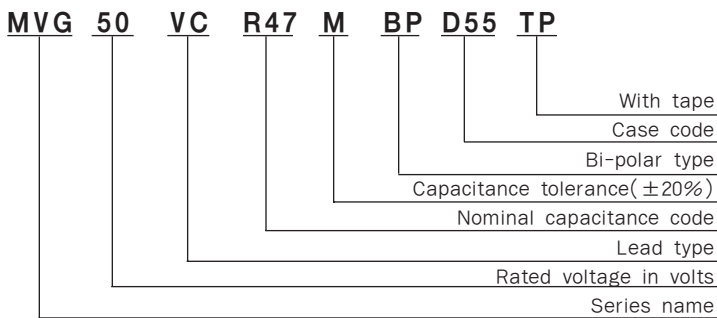
- Vertical SMD type.
- Bi-polarized.
- Wide temperature range.
- For LCD MT / TV
- RoHS compliant.
- Halogen-free capacitors are also available.



SPECIFICATIONS

Item	Characteristics						
Series Name	MVG(MV)-BP				BDS(MVK)-BP		
Rated Voltage Range	4 ~ 50 V _{DC}				6.3 ~ 50 V _{DC}		
Operating Temperature Range	-40 ~ +85℃				-40 ~ +105℃		
Capacitance Tolerance	±20%(M) (at 20℃, 120Hz)						
Leakage Current (In both directions)	I=0.05CV or 10μA, whichever is greater. Where, I:Max. Leakage current(μA), C:Nominal capacitance(μF), V:Rated voltage(V _{DC}) (at 20℃, after 2 minutes)						
Dissipation Factor Tanδ(Max.)	Rated Voltage(V _{DC})	4	6.3	10	16	25	35~50
	MV-BP	0.45	0.32	0.26	0.24	0.22	0.20
	MVK-BP	-	0.35	0.26	0.24	0.20	0.18
(at 20℃, 120Hz)							
Temperature Characteristics (Max. Impedance ratio)	Rated Voltage(V _{DC})	4	6.3	10	16	25	35~50
	Z (-25℃)/Z(20℃)	7	4	3	2	2	2
	Z (-40℃)/Z(20℃)	15	10	8	6	4	3
(at 120Hz)							
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated voltage is applied with the following conditions with its polarization reversed every 250 hours.						
	Series Name	MVG(MV)-BP			BDS(MVK)-BP		
	Test time & temperature	2,000 hours at 85℃			1,000 hours at 105℃		
	Capacitance change	≤ ±20% of the initial value			≤ ±30% of the initial value		
	Tanδ	≤200% of the initial specified value			≤300% of the initial specified value		
	Leakage current	≤The initial specified value			≤The initial specified value		
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after exposing them for 500 hours at 85℃(MVG(MV)-BP) or 105℃(BDS(MVK)-BP) without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements.						
	Series Name	MVG(MV)-BP			BDS(MVK)-BP		
	Capacitance change	≤ ±15% of the initial value			≤ ±25% of the initial value		
	Tanδ	≤150% of the initial specified value			≤200% of the initial specified value		
	Leakage current	≤The initial specified value			≤The initial specified value		
Others	Satisfied characteristics KS C IEC 60384-4						

PART NUMBERING SYSTEM



Capacitance	Code
0.1μF	R1
0.47μF	R47
1.0μF	1
4.7μF	4R7
10μF	10
100μF	100

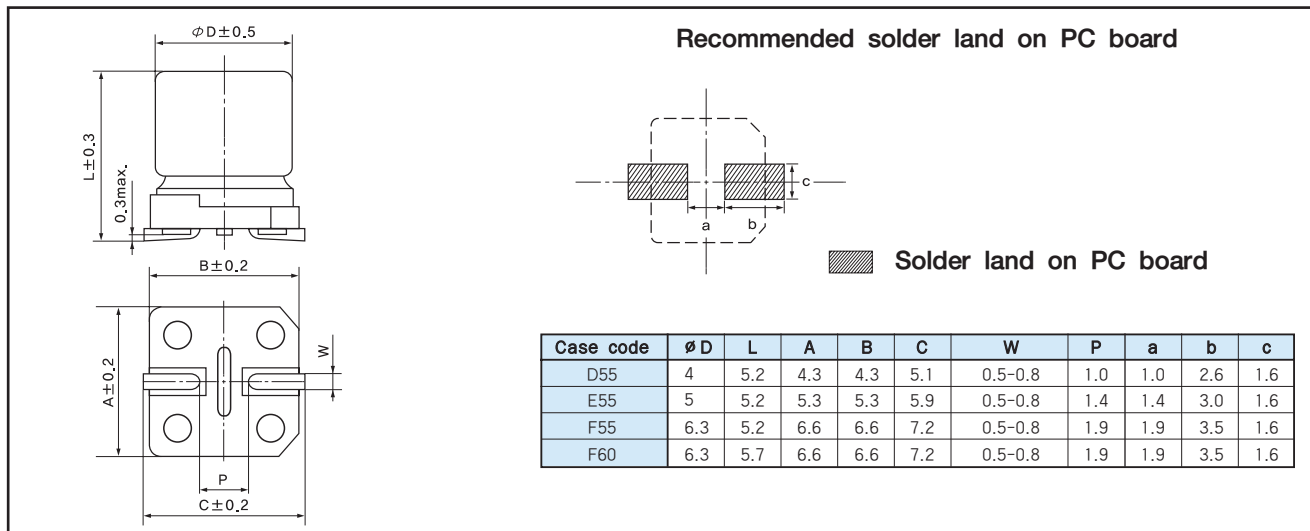
MVG(MV)-BP/
BDS(MVK)-BP Series



SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

DIMENSIONS OF MVG(MV)-BP, BDS(MVK)-BP Series(Type :VC)

Unit(mm)



RATINGS OF MVG(MV)-BP, BDS(MVK)-BP Series

MVG(MV)-BP

μF \ V _{DC}	4		6.3		10		16		25		35		50	
0.10													D55	1.3
(0.15)													D55	1.9
0.22													D55	2.3
0.33													D55	2.8
0.47													D55	3.4
(0.68)													D55	4.1
1.0													D55	5.5
(1.5)													D55	6.5
2.2											D55	8	E55	9
3.3									D55	9			E55	11
4.7							D55	11			E55	13	F55	14
(6.8)					D55	12			E55	15	F55	17		
10			D55	13			E55	18			F55	21		
(15)	D55	14			E55	21			F55	24				
22			E55	23			F55	28						
33					F55	33								
47			F55	36										

Rated Ripple Current(mA rms/ 85°C, 120Hz)
Case code

BDS(MVK)-BP

μF \ V _{DC}	6.3		10		16		25		35		50	
0.10											D55	1.2
(0.15)											D55	1.7
0.22											D55	2.2
0.33											D55	2.7
0.47											D55	3.2
(0.68)											D55	4.0
1.0											D55	5.3
(1.5)											D55	7.2
2.2									D55	7	E55	9.0
3.3							D55	8			E55	12
4.7					D55	10			E55	14	F60	16
(6.8)			D55	11			E55	16			F60	20
10	D55	12			E55	18			F60	23		
(15)			E55	20			F60	28				
22	E55	23			F60	32						
33			F60	35								
47	F60	39										

Rated Ripple Current (mA rms/ 105°C, 120Hz)
Case code

Note : → Use next higher voltage part.
Parenthesized capacitance is not standard part.

PRECAUTIONS TO USERS

Soldering method
The capacitors of Alchip have no capability to withstand such dip or wave soldering as totally immerses a components into a solder bath.

Reflow soldering
Use the capacitors within the Recommended Reflow Soldering Conditions, and also make sure to check the temperature stress to the capacitors because the following makes a difference in the stress to the capacitors. If any other reflow soldering conditions are applied, please consult us.

- ① Location of components. (The edge sides of a PC board increases its temperature more than the center does.)
- ② Population of components. The less the component population is the more the temperature is increased.
- ③ Material of printed circuit board. As a ceramic board needs heating up more than a glass epoxy board to reach the same board temperature, the capacitors may be damaged.
- ④ Thickness of PC board. A thick PC board needs heating up more than a thin board. It may damage the capacitors.
- ⑤ Size of PC board. A large PC board needs heating up more than a small board, and it may damage the capacitors.
- ⑥ Location of infrared ray lamps. On IR reflow as well as hot plate reflow, heating only the reverse side of the PC board will reduce stress to the capacitors.

Rework of soldering
Avoid soldering more than once by reflow. Use a soldering iron for rework of solder, and do not exceed an iron tip tempereure of 300°C and a max. exposure time of 5 seconds.

Mechanical stress
Do not lift up or push the capacitor after soldering. Avoid curvature of the PC board. These may damage the capacitor.

Cleaning of assembly board
For the cleaning conditions, see page 32~33.
Immediately after solvent cleaning, evaporate a residual solvent for at least 10 minutes with a hot forced air. If the assembly board is inadequately dried after a washing process, the capacitors will keep suffering from a residual solvent for long periods of time, and will be corrosion while in service.

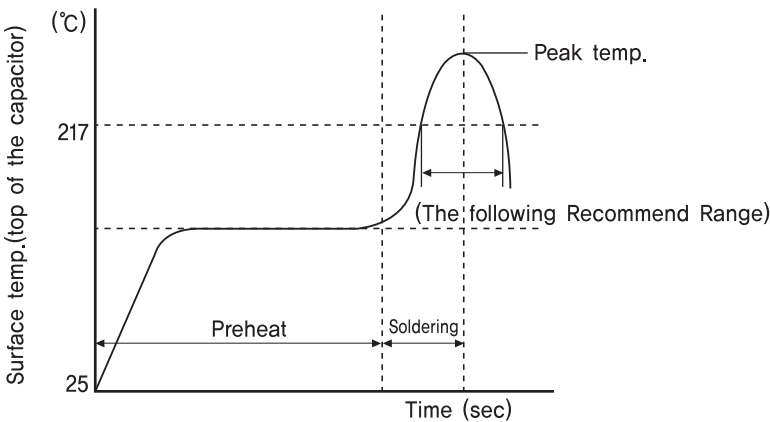
Coating on assembly board
① Before coating, evaporate cleaning solvents from the assembly board.
② Before the conformal coating, using a buffer pre-coat which does not contain chloride is recommended to reduce stress to the capacitors.

Molding by resin
Inner pressure of a capacitor slowly increases over the service life of the capacitor with gas being produced by internal chemical reaction. If the end seal of the capacitor is completely be in danger. Also if the resin contains a large amount of chlorine ion, it will penetrate into the end seal, get into the inside element of the capacitor, and damage the capacitor while in service.

Others
The Precautions to Users for Aluminum Electrolytic Capacitors shall be applied. (page 31)

RECOMMENDED PB-FREE REFLOW SOLDERING CONDITIONS

The following conditions are recomended for air or infrared reflow soldering of the surface mount capacitors onto a glass epoxy circuit board of 90 ×50 ×0.8mm (with resist) by cream solder (eutectic solder) . The temperatures shown are the surface temperature values of the top of the capacitor.



TEMPERATURE PROFILE

CASE CODE	Time of Preheat temp. (from 150°C to 200°C)	Time to be Maintained Above 217°C	Time to be Maintained Above 230°C	Peak Temp.	Reflow Cycle
B55, D55, D56 E55, F55, F60, F80 H63, H10, J10, K14	60 ~ 100 Sec	60 ~ 70 Sec	20 ~ 30 Sec	250 (10 Sec ↓)	1 TIME
L17, L22 M17, M22	60 ~ 100 Sec	50 ~ 60 Sec	-	230 (10 Sec ↓)	1 TIME

DSA Series

- Non-solvent proof.
- Height 5mm.
- For CAR-Audio, Tuner

- 85°C 2,000Hrs assured.

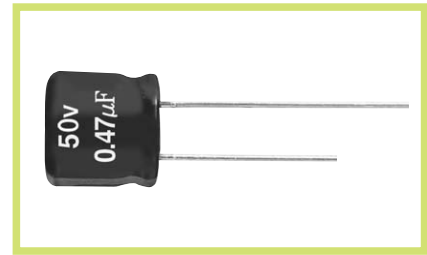
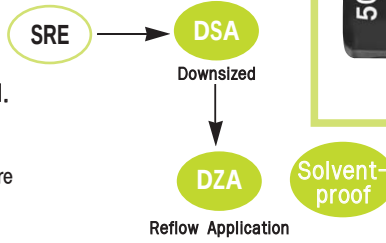
- RoHS compliant.
- Halogen-free capacitors are also available.

DZA Series

- Solvent proof.
- Height 5mm.
- Reflow Application.
- For CAR-Audio, Tuner

- 85°C 2,000Hrs assured.

- RoHS compliant.
- Halogen-free capacitors are also available.

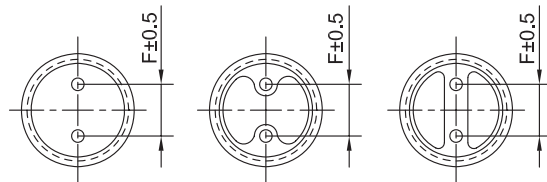
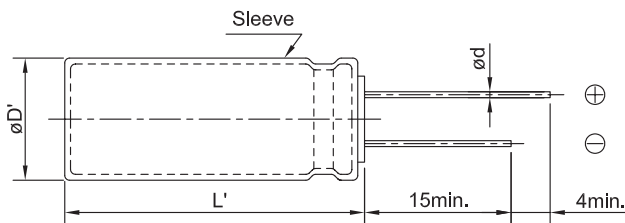


SPECIFICATIONS

Item	Characteristics							
Rated Voltage Range	4 ~ 50 V _{DC}							
Operating Temperature Range	- 40 ~ +85℃							
Capacitance Tolerance	±20% (M) (at 20℃, 120Hz)							
Leakage Current	I=0.01CV(μA)or 3μA, whichever is greater. Where, I:Max. Leakage current(μA), C:Nominal capacitance(μF), V:Rated voltage(V _{DC}) (at 20℃, 2 minutes)							
Dissipation Factor(Tanδ)	Rated Voltage(V _{DC})	4	6.3	10	16	25	35	50
	Tanδ(Max.)	0.38	0.35	0.32	0.30	0.18	0.14	0.12
Temperature Characteristics (Max. Impedance ratio)	(at 20℃, 120Hz)							
	Rated Voltage(V _{DC})	4	6.3	10	16	25	35~50	
	Z(-25℃)/Z(20℃)	7	4	3	2	2	2	
	Z(-40℃)/Z(20℃)	15	10	8	5	4	3	
	(at 120Hz)							
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated voltage is applied for 2,000 hours at 85℃. Capacitance change ≤ ±20% of the initial value Tan δ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value							
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after exposing them for 1,000 hours at 85℃ without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≤ ±20% of the initial value Tan δ ≤ 200% of the initial specified value Leakage current ≤ 200% of the initial specified value							
Others	Satisfied characteristics KS C IEC 60384-4							

DIMENSIONS OF DSA/DZA

Unit(mm)



Marking- DSA : BLACK SLEEVE, WHITE INK
 DZA : GREEN SLEEVE, BLACK INK

ø D	3	3.5	4	5	6.3	8
ø d	0.4	0.4	0.45	0.45	0.45	0.45
F	1.0	1.0	1.5	2.0	2.5	2.5
ø D'	ø D + 0.5 max.					
L'	L + 1.0 max.					L + 1.5 max.

RATINGS OF DSA/DZA Series

μF \ V _{DC}	4	6.3	10	16	25	35	50
0.1							3×5 1.3
0.15							3×5 2.0
0.22							3×5 2.9
0.33							3×5 3.5
0.47							3×5 4.2
0.68							3×5 5.1
1							3×5 6.2
1.5							3×5 7.3
2.2						3×5 8.3	3×5 9.0
3.3					3×5 9.5	3×5 10	3.5×5 12
4.7				3×5 10	3×5 11	3.5×5 13	4×5 17
6.8			3×5 11	3×5 12	3.5×5 14	4×5 18	5×5 22
10		3×5 12	3×5 13	3×5 15	4×5 21	5×5 25	5×5 27
15	3×5 10	3×5 15	3.5×5 18	4×5 24	5×5 28	5×5 31	6.3×5 36
22	3.5×5 15	3.5×5 21	4×5 27	5×5 32	5×5 35	6.3×5 40	6.3×5 45
33	3.5×5 20	4×5 30	5×5 35	5×5 40	6.3×5 45	6.3×5 50	8×5 61
47	4×5 28	4×5 36	5×5 43	6.3×5 50	6.3×5 59	8×5 65	
68	5×5 33	5×5 48	6.3×5 54	6.3×5 60	8×5 74		
100	5×5 48	6.3×5 60	6.3×5 72	6.3×5 77	8×5 90		
150	6.3×5 70	6.3×5 72	8×5 88				
220	6.3×5 79	8×5 93	8×5 98				
330	8×5 95	8×5 141	← Case Size $\varnothing D \times L$ (mm)				
			← Rated Ripple Current (mA _{rms} / 85°C, 120Hz)				

RECOMMENDED REFLOW SOLDERING CONDITIONS(For DZA Series)

The graph plots Surface temp. (top of the capacitor) in °C on the y-axis against Time (sec) on the x-axis. The y-axis has markers at 25 and 217. The x-axis has two labeled regions: 'Preheat' and 'Soldering'. The temperature curve starts at 25°C, rises during the 'Preheat' phase, plateaus, then rises again during the 'Soldering' phase to a 'Peak temp.' before cooling. A horizontal dashed line at 217°C intersects the curve. A double-headed arrow indicates the duration of the 'Soldering' phase, with the text '(The following Recommend Range)' below it.

TEMPERATURE PROFILE

Time of Preheat temp. (from 150°C to 200°C)	Time to be Maintained Above 217°C	Time to be Maintained Above 230°C	Peak Temp.	Reflow Cycle
60 ~ 100 Sec	60 ~ 70 Sec	20 ~ 30 Sec	250 (10 Sec ↓)	1 TIME

GSA Series

- Non-solvent proof.
- Height 7mm.
- For CAR-Audio, Tuner

- 85°C 2,000Hrs assured.

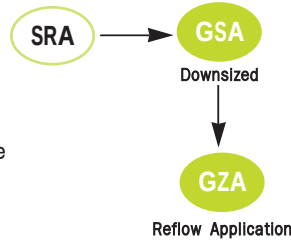
- RoHS compliant.
- Halogen-free capacitors are also available.

GZA Series

- Solvent proof.
- Height 7mm.
- For CAR-Audio, Tuner

- 85°C 2,000Hrs assured.

- RoHS compliant.
- Halogen-free capacitors are also available.



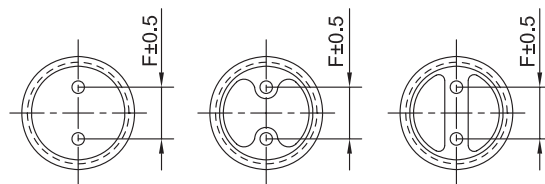
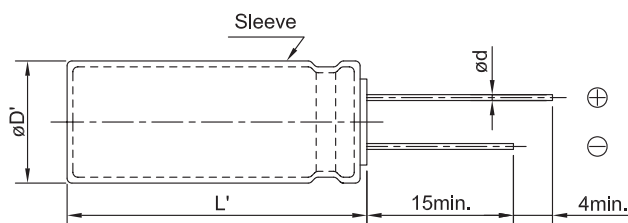
Solvent-proof

SPECIFICATIONS

Item	Characteristics							
Rated Voltage Range	6.3 ~ 63 V _{DC}							
Operating Temperature Range	-40 ~ +85°C							
Capacitance Tolerance	±20%(M) (at 20°C, 120Hz)							
Leakage Current	I=0.01CV(μA)or 3μA, whichever is greater. where, I:Max. Leakage current(μA) C:Nominal capacitance(μF), V:Rated voltage(V _{DC}) (at 20°C, 2 minutes)							
Dissipation Factor(Tanδ)	Rated Voltage(V _{DC})	6.3	10	16	25	35	50	63
	Tanδ(Max.)	0.24	0.20	0.16	0.14	0.12	0.11	0.08
	※ 6.3 VB 220(0.27) , 16 VB 100(0.19) (at 20°C, 120Hz)							
Temperature Characteristics (Max. Impedance ratio)	Rated Voltage(V _{DC})	6.3	10	16	25	35	50~63	
	Z(-25°C)/Z(+20°C)	4	3	2	2	2	2	
	Z(-40°C)/Z(+20°C)	8	6	4	3	3	4 (at 120Hz)	
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 2,000 hours at 85°C. Capacitance change ≤ ±25% of the initial value (where, ±20% for GZA Series) Tanδ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value							
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1,000 hours at 85°C without voltage applied.The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≤ ±20% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ 200% of initial specified value							
Others	Satisfied characteristics KS C IEC 60384-4							

DIMENSIONS OF GSA/GZA Series

Unit(mm)



Marking- GSA : BLACK SLEEVE, WHITE INK
GZA : GREEN SLEEVE, BLACK INK

ø D	4	5	6.3	8
ø d	0.45			
F	1.5	2.0	2.5	3.5
ø D'	ø D + 0.5 max.			
L'	L + 1.0 max.			

RATINGS OF GSA / GZA Series

μF \ V _{DC}	6.3	10	16	25	35	50	63
0.1						4 × 7 1.3	4 × 7 1.3
0.15						4 × 7 2.0	4 × 7 2.0
0.22						4 × 7 2.9	4 × 7 3.0
0.33						4 × 7 3.5	4 × 7 3.7
0.47						4 × 7 5.0	4 × 7 5.4
0.68						4 × 7 7.1	4 × 7 7.6
1						4 × 7 10	4 × 7 11
1.5						4 × 7 12	4 × 7 13
2.2						4 × 7 15	4 × 7 17
3.3					4 × 7 17	4 × 7 18	4 × 7 20
4.7				4 × 7 19	4 × 7 20	4 × 7 22	4 × 7 25
6.8				4 × 7 20	4 × 7 23	5 × 7 25	5 × 7 28
10			4 × 7 25	4 × 7 26	4 × 7 27	5 × 7 31	6.3 × 7 38
15			4 × 7 28	4 × 7 30	5 × 7 36	6.3 × 7 48	6.3 × 7 51
22	4 × 7 31	4 × 7 32	4 × 7 34	5 × 7 41	5 × 7 44	6.3 × 7 58	6.3 × 7 62
33	4 × 7 35	4 × 7 38	5 × 7 45	5 × 7 50	6.3 × 7 64	6.3 × 7 68	8 × 7 72
47	4 × 7 42	5 × 7 50	5 × 7 55	6.3 × 7 65	6.3 × 7 70	8 × 7 84	
68	4 × 7 56	5 × 7 60	6.3 × 7 83	6.3 × 7 85	8 × 7 91		
100	5 × 7 68	6.3 × 7 80	6.3 × 7 95	6.3 × 7 101			
150	6.3 × 7 90	6.3 × 7 95	8 × 7 199	8 × 7 127			
220	6.3 × 7 120	6.3 × 7 122	8 × 7 140				
330	6.3 × 7 141	8 × 7 152	← Case Size $\varnothing D \times L$ (mm) ← Rated Ripple Current (mA _{rms} /85°C, 120Hz)				
470	8 × 7 168						

RECOMMENDED REFLOW SOLDERING CONDITIONS(For GZA Series)

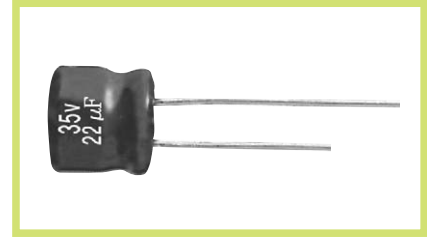
TEMPERATURE PROFILE	Time of Preheat temp. (from 150°C to 200°C)	Time to be Maintained Above 217°C	Time to be Maintained Above 230°C	Peak Temp.	Reflow Cycle
	60 ~ 100 Sec	60 ~ 70 Sec	20 ~ 30 Sec	250 (10 Sec ↓)	1 TIME

EMA Series

• 105°C 2,000Hrs assured.

- Height 5mm.
- Wide Temperature range.
- Long Life of KRE Series
- For CAR-Audio, Tuner
- RoHS compliant.
- Halogen-free capacitors are also available.

Solvent-proof



KRE

EMA

Long life.

SPECIFICATIONS

Item	Characteristics																															
Rated Voltage Range	4 ~ 50 V _{DC}																															
Operating Temperature Range	-55 ~ +105℃																															
Capacitance Tolerance	±20%(M) (at 20℃, 120Hz)																															
Leakage Current	I=0.01CV(μA)or 3μA, whichever is greater. Where, I:Max. Leakage current(μA), C:Nominal capacitance(μF), V:Rated voltage(V _{DC}) (at 20℃, 2 minutes)																															
Dissipation Factor(Tanδ)	<table><tr><td>Rated Voltage(V_{DC})</td><td>4</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td></tr><tr><td>Tanδ(Max.)</td><td>0.30</td><td>0.27</td><td>0.23</td><td>0.19</td><td>0.15</td><td>0.13</td><td>0.11</td></tr></table>								Rated Voltage(V _{DC})	4	6.3	10	16	25	35	50	Tanδ(Max.)	0.30	0.27	0.23	0.19	0.15	0.13	0.11								
	Rated Voltage(V _{DC})	4	6.3	10	16	25	35	50																								
	Tanδ(Max.)	0.30	0.27	0.23	0.19	0.15	0.13	0.11																								
※For φ3×5L EMA, 0.02 shall be added to the above value. (at 20℃, 120Hz)																																
Temperature Characteristics (Max.Impedance ratio)	<table><tr><td>W.V</td><td>4</td><td>6.3</td><td>10</td><td>16</td><td colspan="3">25~50</td></tr><tr><td>Z(-25℃)/Z(20℃)</td><td>6</td><td>3</td><td>3</td><td>2</td><td colspan="3">2</td></tr><tr><td>Z(-40℃)/Z(20℃)</td><td>12</td><td>9</td><td>7</td><td>5</td><td colspan="3">3</td></tr></table>								W.V	4	6.3	10	16	25~50			Z(-25℃)/Z(20℃)	6	3	3	2	2			Z(-40℃)/Z(20℃)	12	9	7	5	3		
	W.V	4	6.3	10	16	25~50																										
	Z(-25℃)/Z(20℃)	6	3	3	2	2																										
Z(-40℃)/Z(20℃)	12	9	7	5	3																											
(at 120Hz)																																
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated voltage is applied for 2,000 hours at 105℃. Capacitance change ≤ ±25% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value																															
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the exposing them for 1,000 hours at 105℃ without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30minutes, at least 24hours and not more than 48 hours before the measurements. Capacitance change ≤ ±25% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value																															
Others	Satisfied characteristics KS C IEC 60384-4																															

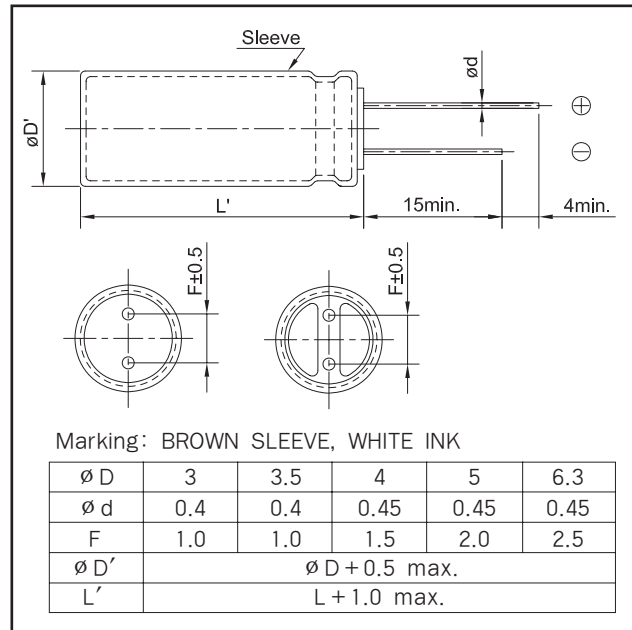
RATINGS OF EMA Series

V _{DC} µF	4	6.3	10	16	25	35	50
0.1							3×5 1.3
0.15							3×5 2.0
0.22							3×5 2.6
0.33							3×5 3.2
0.47							3×5 3.8
0.68							3×5 4.6
1							3×5 5.6
1.5							3×5 6.9
2.2						3×5 7.7	3.5×5 10
3.3					3×5 8.8	3.5×5 11	4×5 14
4.7				3×5 9.4	3.5×5 11	4×5 15	5×5 19
6.8			3×5 11	3.5×5 13	4×5 16	5×5 20	6.3×5 24
10		3×5 12	3.5×5 14	3.5×5 16	5×5 23	5×5 25	6.3×5 29
15	3.5×5 15	3.5×5 16	4×5 20	5×5 25	6.3×5 30	6.3×5 33	
22	4×5 21	4×5 21	5×5 27	5×5 30	6.3×5 37	6.3×5 40	
33	4×5 29	5×5 30	5×5 34	6.3×5 40	6.3×5 45		
47	4×5 36	5×5 36	6.3×5 43	6.3×5 48			
68	5×5 45	6.3×5 46	6.3×5 52				
100	5×5 55	6.3×5 56					

Rated Ripple Current (mA rms/105°C, 120Hz)
Case Size ØD×L(mm)

DIMENSIONS OF EMA Series

Unit(mm)



HMA Series

• 105°C 2,000Hrs assured.

- Height 7mm.
- Wide Temperature range.
- Long Life of KMA Series.
- For CAR-Audio, Tuner
- RoHS compliant.
- Halogen-free capacitors are also available.

Solvent-proof



SPECIFICATIONS

Item	Characteristics							
Rated Voltage Range	6.3 ~ 50 V _{DC}							
Operating Temperature Range	-55 ~ +105°C							
Capacitance Tolerance	±20%(M) (at 20°C, 120Hz)							
Leakage Current	I=0.01CV(μA)or 3μA, whichever is greater. Where, I:Max. Leakage current(μA), C:Nominal capacitance(μF), V:Rated voltage(V _{DC}) (at 20°C, 2 minutes)							
Dissipation Factor(Tanδ)								
	Rated Voltage(V _{DC})	6.3	10	16	25	35	50	
	Tanδ(Max.)	0.22	0.19	0.16	0.14	0.12	0.10	
Temperature Characteristics (Max. Impedance ratio)								
	Rated Voltage(V _{DC})	6.3		10		16		25~50
	Z(-25°C)/Z(+20°C)	4		3		2		2
	Z(-40°C)/Z(+20°C)	8		6		6		3
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 2,000 hours at 105°C. Capacitance change ≤ ±20% of the initial value(when, ±25% for 6.3 V _{DC} ~16 V _{DC}) Tan δ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value							
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1,000 hours at 105°C without voltage applied.The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≤ ±20% of initial value(when, ±25% for 6.3 V _{DC} ~16 V _{DC}) Tan δ ≤ 200% of initial specified value Leakage current ≤ 200% of initial specified value							
Others	Satisfied characteristics KS C IEC 60384-4							

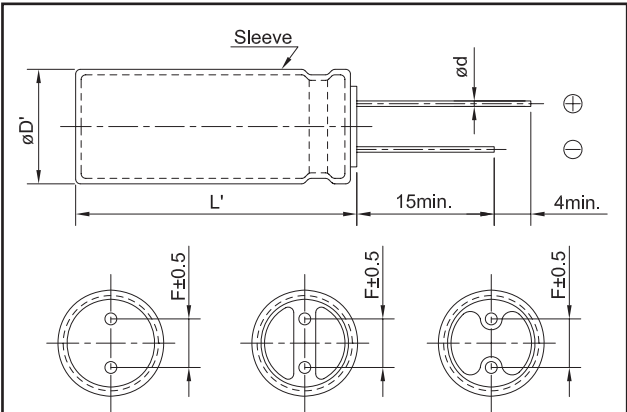
RATINGS OF HMA Series

V _{DC} µF	6.3	10	16	25	35	50
0.1						4×7 1.3
0.15						4×7 2.0
0.22						4×7 2.9
0.33						4×7 3.5
0.47						4×7 5.0
0.68						4×7 7.1
1						4×7 10
1.5						4×7 12
2.2						4×7 15
3.3					4×7 17	4×7 18
4.7				4×7 19	4×7 20	5×7 23
6.8			4×7 20	5×7 23	5×7 24	6.3×7 28
10			4×7 25	5×7 28	5×7 30	6.3×7 34
15		4×7 28	5×7 31	6.3×7 35	6.3×7 37	6.3×7 41
22	4×7 31	5×7 35	5×7 39	6.3×7 43	6.3×7 47	6.3×7 52
33	5×7 39	5×7 43	6.3×7 49	6.3×7 53	8×7 62	8×7 68
47	5×7 47	6.3×7 53	6.3×7 59	8×7 68		
68	6.3×7 57	6.3×7 63	8×7 76			
100	6.3×7 71	6.3×7 80				
150	8×7 94	8×7 94				

Rated Ripple Current (mA rms/105°C, 120Hz)
Case Size ØD×L(mm)

DIMENSIONS OF HMA Series

Unit(mm)



Marking: BROWN SLEEVE, WHITE INK

Ø D	4	5	6.3	8
Ø d	0.45			
F	1.5	2.0	2.5	3.5
Ø D'	Ø D + 0.5 max.			
L'	L + 1.0 max.			



MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

MHA Series

• 85°C 2,000Hrs assured

- Non-solvent proof.
- Downsized of SHL series.
- For Digital Household Appliance
- RoHS compliant.
- Halogen-free capacitors are also available.

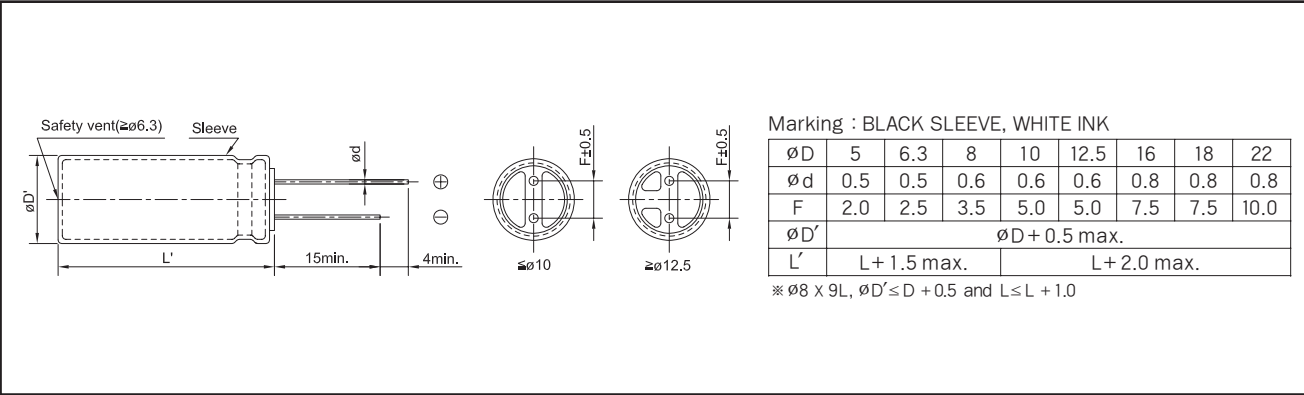


SPECIFICATIONS

Item	Characteristics																																										
Rated Voltage Range	6.3 ~ 100 V _{DC}						160 ~ 500 V _{DC}																																				
Operating Temperature Range	-40 ~ +85°C						-25 ~ +85°C																																				
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)																																										
Leakage Current	After 1 minute:0.03 CV(μA) or 4 μA, whichever is greater After 2 minutes:0.01 CV(μA) or 3 μA, whichever is greater						After 1 minute		After 5 minutes																																		
							CV≤1,000	CV>1,000	CV≤1,000	CV>1,000																																	
							0.1CV+40	0.04CV+100	0.03CV+15	0.02CV+25																																	
	Where, C=Nominal capacitance(μF) V=Rated Voltage(V _{DC}) (at 20°C)																																										
Dissipation Factor (Tanδ)	<table><tr><td>Rated Voltage(V_{DC})</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td><td>63</td><td>100</td><td>160~250</td><td>350~500</td></tr><tr><td>Tanδ(Max.)</td><td>0.34</td><td>0.24</td><td>0.20</td><td>0.16</td><td>0.14</td><td>0.12</td><td>0.10</td><td>0.09</td><td>0.20</td><td>0.24</td></tr></table>										Rated Voltage(V _{DC})	6.3	10	16	25	35	50	63	100	160~250	350~500	Tanδ(Max.)	0.34	0.24	0.20	0.16	0.14	0.12	0.10	0.09	0.20	0.24											
	Rated Voltage(V _{DC})	6.3	10	16	25	35	50	63	100	160~250	350~500																																
Tanδ(Max.)	0.34	0.24	0.20	0.16	0.14	0.12	0.10	0.09	0.20	0.24																																	
When the capacitance exceeds 1,000μF, 0.02 shall be added every 1,000μF increase. (at 20°C, 120Hz)																																											
Temperature Characteristics (Max. Impedance ratio)	<table><tr><td>Rated Voltage(V_{DC})</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td><td>63~100</td><td>160</td><td>200~250</td><td>350~500</td></tr><tr><td>Z(-25°C)/Z(20°C)</td><td>5</td><td>4</td><td>3</td><td>2</td><td>2</td><td>2</td><td>3</td><td>4</td><td>8</td><td>16</td></tr><tr><td>Z(-40°C)/Z(20°C)</td><td>12</td><td>10</td><td>8</td><td>5</td><td>4</td><td>3</td><td>4</td><td>-</td><td>-</td><td>-</td></tr></table>										Rated Voltage(V _{DC})	6.3	10	16	25	35	50	63~100	160	200~250	350~500	Z(-25°C)/Z(20°C)	5	4	3	2	2	2	3	4	8	16	Z(-40°C)/Z(20°C)	12	10	8	5	4	3	4	-	-	-
	Rated Voltage(V _{DC})	6.3	10	16	25	35	50	63~100	160	200~250	350~500																																
	Z(-25°C)/Z(20°C)	5	4	3	2	2	2	3	4	8	16																																
Z(-40°C)/Z(20°C)	12	10	8	5	4	3	4	-	-	-																																	
(at 120Hz)																																											
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 2,000 hours at 85°C.																																										
	Capacitance change ≤ ±20% of the initial value																																										
	Tanδ ≤ 200% of the initial specified value																																										
Shelf Life	Leakage current ≤ The initial specified value																																										
	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1,000 hours at 85°C without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements.																																										
	Capacitance change ≤ ±20% of the initial value																																										
Others	Tanδ ≤ 200% of the initial specified value																																										
	Leakage current ≤ The initial specified value (where, 200% for ≥ WV 160 V _{DC})																																										
	Satisfied characteristics KS C IEC 60384-4																																										

DIMENSIONS OF MHA Series

Unit(mm)



RATINGS OF MHA Series

μF \ Vdc	6.3	10	16	25	35	50	63	100	160	200	250	350	400	450	500
0.1						5×11 5.5	5×11 6.2	5×11 6.5							
0.22						5×11 8	5×11 9	5×11 11							
0.33						5×11 10	5×11 11	5×11 13							
0.47						5×11 15	5×11 16	5×11 17	6.3×11 18	6.3×11 18	6.3×11 19	6.3×11 20	6.3×11 20		
0.68						5×11 18	5×11 19	5×11 19	6.3×11 21	6.3×11 21	6.3×11 22	6.3×11 23	6.3×11 23		
1						5×11 22	5×11 24	5×11 24	6.3×11 23	6.3×11 23	6.3×11 27	6.3×11 28	6.3×11 29	6.3×11 24	6.3×11 20
2.2						5×11 34	5×11 35	5×11 37	6.3×11 33	6.3×11 39	6.3×11 41	6.3×11 43	6.3×11 44	8×11.5 40	8×11.5 34
3.3						5×11 41	5×11 43	5×11 44	6.3×11 46	6.3×11 47	6.3×11 48	8×11.5 56	8×11.5 59	10×12.5 54	10×12.5 50
4.7					5×11 35	5×11 48	5×11 53	5×11 55	6.3×11 56	6.3×11 55	8×11.5 66	8×11.5 68	10×12.5 73	10×16 72	10×16 68
6.8					5×11 46	5×11 59	5×11 63	5×11 64	8×11.5 78	8×11.5 80	8×11.5 82	10×12.5 92	10×16 100	10×20 90	10×20 85
10			5×11 39	5×11 49	5×11 53	5×11 71	5×11 76	5×11 76	8×11.5 82	8×11.5 96	10×12.5 113	10×16 118	10×20 134	12.5×20 120	12.5×20 110
22		5×11 52	5×11 68	5×11 73	5×11 80	5×11 106	5×11 113	6.3×11 130	10×16 150	10×16 168	10×20 198	10×20 233	12.5×20 229	16×20 216	16×20 140
33	5×11 41	5×11 70	5×11 76	5×11 83	5×11 100	5×11 129 8×9 98	6.3×11 159	8×11.5 187	10×20 243	10×20 245	12.5×20 286	12.5×25 300	12.5×25 321	16×20 297	16×31.5 220
47	5×11 59	5×11 88	5×11 98	5×11 126	5×11 138 8×9 98	6.3×11 177 8×9 110	6.3×11 190	8×15 246	10×20 301	12.5×20 343	12.5×25 371	16×20 395	16×25 437	16×31.5 397	18×31.5 247
68	5×11 90	5×11 110	5×11 130	5×11 151	6.3×11 191	6.3×11 213	8×11.5 269	10×12.5 311	12.5×20 410	12.5×25 480	16×20 490	16×25 500	16×31.5 563	16×35.5 555	18×35.5 278
100	5×11 135	5×11 150	5×11 170	5×11 184 8×9 115	6.3×11 231	8×11.5 306	8×11.5 321	10×16 416	12.5×25 541	16×20 543	16×25 572	16×35.5 688	18×35.5 720	18×40 630	
220	5×11 211	5×11 229 8×9 150	6.3×11 290 8×9 290	6.3×11 318	8×11.5 405	10×12.5 506	10×16 615	12.5×20 742	16×25 906	16×31.5 1,029	18×35.5 1,061	22×40 1,100	22×45 1,150		
330	6.3×11 297 8×9 170	6.3×11 322	6.3×11 360	8×11.5 453	8×15 547	10×16 706	10×20 823	12.5×25 987	18×31.5 1,304	18×35.5 1,324	22×40 1,366				
470	6.3×11 355 8×9 241	6.3×11 384	8×11.5 499	8×15 597	10×16 753	10×20 918	10×20 1,039	16×25 1,394	22×35 1,457	22×40 1,494					
680	8×11.5 503	8×11.5 546	8×15 655	10×16 826	10×20 988	12.5×20 1,296	12.5×25 1,512	16×35.5 1,620	22×40 1,680						
1,000	8×11.5 610	8×15 751	10×16 928	10×20 1,094	10×20 1,163	12.5×25 1,715	16×25 1,850	18×35.5 1,995							
2,200	10×16 1,059	10×20 1,226	10×20 1,340	12.5×25 1,800	12.5×35 2,055	16×31.5 2,320	18×35.5 2,740								
3,300	10×20 1,350	10×25 1,657	10×30 1,804	12.5×30 2,159	16×31.5 2,498	18×35.5 3,218									
4,700	12.5×20 1,822	12.5×25 2,103	16×20 2,200	16×25 2,464	16×35.5 3,061	Case Size $\varnothing D \times L$ (mm) Rated Ripple Current (mA rms / 85°C, 120Hz)									
6,800	12.5×20 2,235	12.5×35 2,706	16×25 2,690	16×31.5 2,992											
10,000	16×25 2,760	16×31.5 2,960	16×35.5 3,490												
15,000	16×31.5 3,453	18×35.5 3,826													

RATED RIPPLE CURRENT MULTIPLIERS

Frequency Multipliers

Cap. (μF) \ Freq. (Hz)	60	120	300	1k	10k ~
~6.8	0.65	1.00	1.35	1.75	2.30
10 ~ 68	0.75	1.00	1.25	1.50	1.75
100 ~ 1,000	0.80	1.00	1.15	1.30	1.40
2,200 ~ 15,000	0.85	1.00	1.03	1.05	1.08



MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

NHA Series

• 105°C 1,000~2,000Hrs assured

Solvent-proof

WV ≤ 100V_{DC}

- Downsized of KMG series.
- For Digital Household Appliance
- RoHS compliant.
- Halogen-free capacitors are also available.



SPECIFICATIONS

Item	Characteristics										
Rated Voltage Range	6.3 ~ 100 V _{DC}						160 ~ 400 V _{DC}		450 ~ 500 V _{DC}		
Operating Temperature Range	-55 ~ +105°C						-40 ~ +105°C		-25 ~ +105°C		
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)										
Leakage Current	After 1 minute:0.03 CV(μA) or 4 μA, whichever is greater After 2 minutes:0.01 CV(μA) or 3 μA, whichever is greater						After 1 minute		After 5 minutes		
							CV≤1,000	CV>1,000	CV≤1,000	CV>1,000	
							0.1CV+40	0.04CV+100	0.03CV+15	0.02CV+25	
	Where, C=Nominal capacitance(μF) V=Rated Voltage(V _{DC}) (at 20°C)										
Dissipation Factor (Tanδ)	Rated Voltage(V _{DC})	6.3	10	16	25	35	50	63	100	160~250	350~500
	Tanδ(Max.)	0.34	0.24	0.20	0.16	0.14	0.12	0.10	0.09	0.20	0.24
When the capacitance exceeds 1,000μF, 0.02 shall be added every 1,000μF increase. (at 20°C, 120Hz)											
Temperature Characteristics (Max. Impedance ratio)	Rated Voltage(V _{DC})	6.3	10	16	25	35	50	63~100	160	200~250	350~500
	Z(-25°C)/Z(20°C)	5	4	3	2	2	2	3	4	8	16
	Z(-40°C)/Z(20°C)	12	10	8	5	4	3	4	-	-	-
(at 120Hz)											
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 2,000 hours at 105°C.(where, 1,000 hours ≤ ∅ 8) Capacitance change ≤ ±20% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value										
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1,000 hours at 105°C without voltage applied.(where, 500 hours ≤ ∅ 8) The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≤ ±20% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value (where, 200% for ≥ WV 160 V _{DC})										
Others	Satisfied characteristics KS C IEC 60384-4										

DIMENSIONS OF NHA Series

Unit(mm)

Safety vent(±∅6.3) Sleeve ∅D' L' 15min. 4min. ∅D ∅d F±0.5 F±0.5 ∅10 ∅12.5		Marking : BROWN SLEEVE, WHITE INK							
∅D	5	6.3	8	10	12.5	16	18	22	
∅d	0.5	0.5	0.6	0.6	0.6	0.8	0.8	0.8	
F	2.0	2.5	3.5	5.0	5.0	7.5	7.5	10.0	
∅D'	∅D + 0.5 max.								
L'	L + 1.5 max.				L + 2.0 max.				

RATINGS OF NHA Series

μF \ Vdc	6.3	10	16	25	35	50	63	100	160	200	250	350	400	450	500
0.1						5×11 2.1	5×11 3.2	5×11 3.6							
0.22						5×11 3.2	5×11 4.3	5×11 4.8							
0.33						5×11 6.3	5×11 7.2	5×11 7.8							
0.47						5×11 10	5×11 11	5×11 12	6.3×11 12	6.3×11 12	6.3×11 12	6.3×11 12			
0.68						5×11 12	5×11 13	5×11 14	6.3×11 14	6.3×11 15	6.3×11 15	6.3×11 15			
1						5×11 13	5×11 15	5×11 16	6.3×11 14	6.3×11 15	6.3×11 17	6.3×11 18	6.3×11 19	6.3×11 14	6.3×11 13
2.2						5×11 18	5×11 19	5×11 21	6.3×11 20	6.3×11 24	6.3×11 27	8×11.5 29	8×11.5 30	8×11.5 25	8×11.5 22
3.3						5×11 30	5×11 33	5×11 34	6.3×11 35	6.3×11 36	6.3×11 37	8×11.5 38	10×12.5 41	10×12.5 35	10×16 32
4.7				5×11 25	5×11 27	5×11 37	5×11 39	5×11 40	6.3×11 41	6.3×11 43	8×11.5 45	8×11.5 45	10×12.5 46	10×16 42	10×16 40
6.8				5×11 31	5×11 33	5×11 44	5×11 48	5×11 49	8×11.5 52	8×11.5 54	8×11.5 56	10×16 62	10×16 65	10×20 59	10×20 55
10			5×11 35	5×11 37	5×11 40	5×11 54	5×11 59	5×11 59	8×11.5 60	8×11.5 62	10×16 74	10×20 79	10×20 86	10×20 76	12.5×20 72
22		5×11 48	5×11 53	5×11 56	5×11 67	5×11 79	5×11 87	6.3×11 100	10×16 111	10×16 113	10×20 127	12.5×20 150	10×25 157	12.5×25 136	16×25 132
33	5×11 52	5×11 56	5×11 60	5×11 75	5×11 80	5×11 97	6.3×11 122	8×11.5 144	10×20 156	10×20 158	12.5×20 184	12.5×25 189	16×20 210	12.5×30 189	16×31.5 178
47	5×11 61	5×11 66	5×11 77	5×11 80	5×11 101	6.3×11 133	6.3×11 146	8×15 189	10×20 202	12.5×20 220	12.5×25 238	16×20 246	16×25 280	16×31.5 240	18×31.5 200
68	5×11 69	5×11 83	5×11 92	5×11 113	6.3×11 138	6.3×11 156	8×11.5 207	10×16 264	12.5×20 274	12.5×25 288	16×20 300	16×31.5 348	16×35.5 384	18×35.5 349	
100	5×11 90	5×11 100	5×11 125	6.3×11 159	6.3×11 168	8×11.5 229	10×12.5 251	10×20 349	12.5×25 360	16×20 366	16×25 405	16×35.5 447	18×40 461	22×35 425	
220	5×11 153	5×11 170	6.3×11 213	6.3×11 238	8×11.5 294	10×12.5 395	10×16 474	12.5×20 572	16×25 656	16×31.5 684	18×40 730	22×45 780			
330	6.3×11 216	6.3×11 239	6.3×11 265	8×11.5 340	8×15 398	10×16 529	10×20 633	16×20 810	18×31.5 848	18×40 880	22×40 900				
470	6.3×11 258	6.3×11 286	8×11.5 366	8×15 447	10×16 547	10×20 690	12.5×20 886	16×25 1,072	22×35 1,130	22×40 1,156					
680	8×11.5 365	8×11.5 405	8×15 455	10×16 620	12.5×16 777	12.5×20 973	12.5×25 1,160	16×31.5 1,364	22×45 1,463						
1,000	8×11.5 443	8×15 542	10×16 680	10×20 821	12.5×20 1,023	12.5×25 1,287	16×25 1,565	18×40 2,020							
2,200	10×16 772	10×20 886	12.5×20 1,108	12.5×25 1,297	16×25 1,497	16×31.5 1,724	18×35.5 1,938								
3,300	10×20 1,032	12.5×20 1,205	12.5×25 1,389	16×25 1,646	16×31.5 1,808	18×35.5 2,260	Case Size $\varnothing D \times L$ (mm) Rated Ripple Current(mArms/105°C, 120Hz)								
4,700	12.5×20 1,280	12.5×25 1,492	16×20 1,610	16×31.5 2,012	18×35.5 2,335										
6,800	12.5×25 1,554	16×25 1,824	16×31.5 2,081	18×35.5 2,452	18×40 2,642										
10,000	16×25 1,897	16×31.5 2,082	18×31.5 2,365	18×40 2,692											
15,000	16×35.5 2,344														

RATED RIPPLE CURRENT MULTIPLIERS

Frequency Multipliers

Cap.(μF) \ Freq.(Hz)	60	120	300	1k	10k~
~6.8	0.65	1.00	1.35	1.75	2.30
10~68	0.75	1.00	1.25	1.50	1.75
100~1,000	0.80	1.00	1.15	1.30	1.40
2,200~15,000	0.85	1.00	1.03	1.05	1.08

*SMT Products are available upon request.
Please check with us about individual characteristics.

GSA(SRA)-LL Series

- Non-solvent proof.
- Height 7mm.
- Low leakage current.
- For CAR-Audio

• 85°C 2,000Hrs assured.

- RoHS compliant.
- Halogen-free capacitors are also available.

GSA

GSA(SRA)
-LL

Low Leakage current



LL Series

- Non-solvent proof.
- Very low leakage current.
- For CAR-Audio

• 85°C 2,000Hrs assured.

- RoHS compliant.
- Halogen-free capacitors are also available.

SHL

LL

Low Leakage current

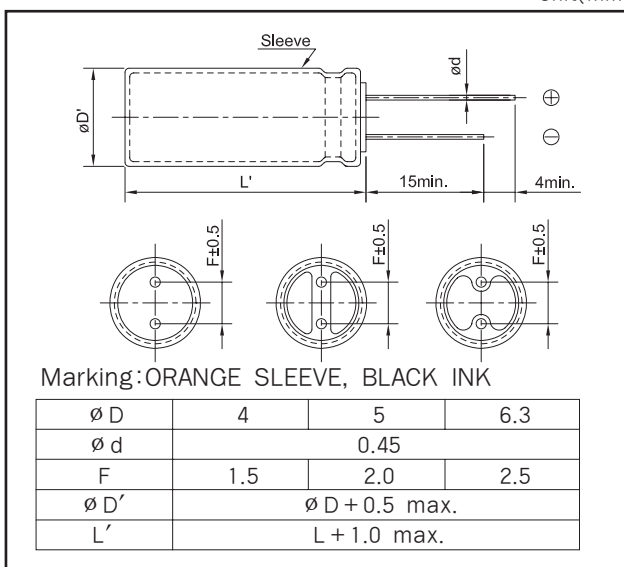


SPECIFICATIONS

Item	Characteristics																																			
Rated Voltage Range	6.3 ~ 100 V _{DC}																																			
Operating Temperature Range	-40 ~ +85°C																																			
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)																																			
Leakage Current(Max.)	GSA(SRA)-LL Series : I=0.004V(μA) or 0.4μA, whichever is greater. LL Series : I=0.002CV(μA) or 0.2μA, whichever is greater. Where, I:Max. leakage current(μA), C:Nominal capacitance(μF), V:Rated voltage(V _{DC}) (at 20°C, 2 minutes)																																			
Dissipation Factor(Tanδ)	<table><tr><td>Rated Voltage(V_{DC})</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50~63</td><td>100</td></tr><tr><td>Tan δ(Max.)</td><td>0.24</td><td>0.20</td><td>0.16</td><td>0.14</td><td>0.12</td><td>0.10</td><td>0.07</td></tr></table> (at 20°C, 120Hz)								Rated Voltage(V _{DC})	6.3	10	16	25	35	50~63	100	Tan δ(Max.)	0.24	0.20	0.16	0.14	0.12	0.10	0.07												
Rated Voltage(V _{DC})	6.3	10	16	25	35	50~63	100																													
Tan δ(Max.)	0.24	0.20	0.16	0.14	0.12	0.10	0.07																													
Temperature Characteristics (Max. Impedance ratio)	<table><tr><td rowspan="4">Rated Voltage(V_{DC})</td><td colspan="2">GSA(SRA)-LL Series</td><td colspan="4">LL Series</td></tr><tr><td colspan="2">—</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td>35~100</td></tr><tr><td colspan="2">Z(-25°C)/Z(+20°C)</td><td>4</td><td>4</td><td>3</td><td>2</td><td>2</td></tr><tr><td colspan="2">Z(-40°C)/Z(+20°C)</td><td>8</td><td>8</td><td>6</td><td>4</td><td>3</td></tr></table> (at 120Hz)								Rated Voltage(V _{DC})	GSA(SRA)-LL Series		LL Series				—		6.3	10	16	25	35~100	Z(-25°C)/Z(+20°C)		4	4	3	2	2	Z(-40°C)/Z(+20°C)		8	8	6	4	3
Rated Voltage(V _{DC})	GSA(SRA)-LL Series		LL Series																																	
	—		6.3	10	16	25	35~100																													
	Z(-25°C)/Z(+20°C)		4	4	3	2	2																													
	Z(-40°C)/Z(+20°C)		8	8	6	4	3																													
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 2,000 hours at 85°C. Capacitance change ≤ ±20% of the initial value Tan δ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value																																			
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 500 hours at 85°C without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≤ ±20% of the initial value Tan δ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value																																			
Others	Satisfied characteristics KS C IEC 60384-4																																			

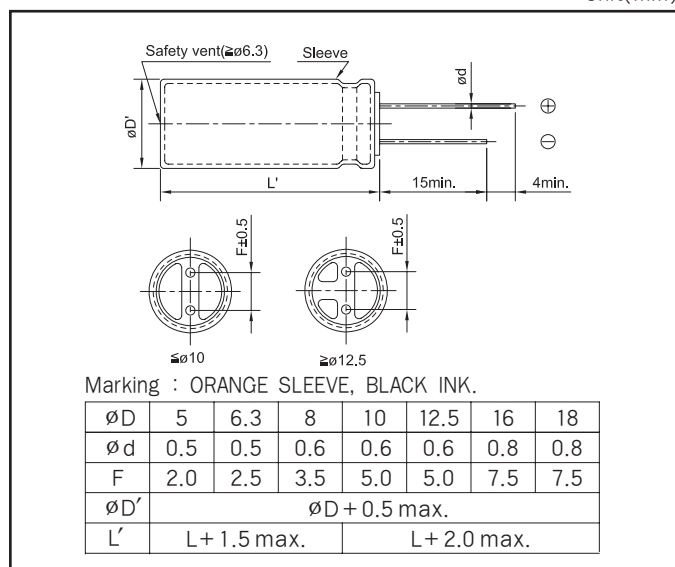
DIMENSIONS OF GSA(SRA)-LL Series

Unit(mm)



DIMENSIONS OF LL Series

Unit(mm)



RATINGS OF GSA(SRA)-LL Series

μF \ V _{DC}	6.3		10		16		25		35		50	
0.1					4×7	1.0					4×7	1.5
0.15					4×7	1.5					4×7	2.0
0.22					4×7	2.0					4×7	3.1
0.33					4×7	3.1					4×7	3.7
0.47					4×7	4.2					4×7	5.2
0.68					4×7	6.8					4×7	7.3
1					4×7	9.2					4×7	12
1.5					4×7	11					4×7	14
2.2					4×7	12					4×7	17
3.3					4×7	15	4×7	17	4×7	18	5×7	21
4.7					4×7	20	4×7	21	5×7	22	6.3×7	25
6.8					5×7	23	5×7	25	6.3×7	28	6.3×7	31
10			4×7	25	5×7	27	5×7	30	6.3×7	33	6.3×7	40
15	4×7	28	5×7	30	6.3×7	33	6.3×7	37	6.3×7	39		
22	5×7	33	5×7	37	6.3×7	42	6.3×7	45	6.3×7	49		
33	5×7	41	6.3×7	45	6.3×7	52	6.3×7	55				
47	6.3×7	49	6.3×7	55	6.3×7	62						
68	6.3×7	59	6.3×7	65								
100	6.3×7	73										

↑
↑
Rated Ripple Current (mA_{rms}/85°C,120Hz)
Case Size $\varnothing D \times L$ (mm)

RATINGS OF LL Series

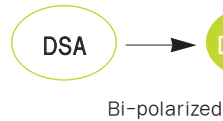
μF \ V _{DC}	6.3		10		16		25		35		50		63		100	
0.1											5×11	5			5×11	6
0.22											5×11	7			5×11	9
0.33											5×11	9			5×11	11
0.47											5×11	11			5×11	13
1											5×11	16			5×11	19
2.2											5×11	23			6.3×11	31
3.3											5×11	28			8×11.5	44
4.7							5×11	28	5×11	31	6.3×11	38			8×11.5	52
10					5×11	39	6.3×11	47	6.3×11	51	8×11.5	64	8×11.5	64	10×16	100
22			5×11	51	6.3×11	66	8×11.5	80	8×11.5	87	10×12.5	112	10×16	124	10×20	160
33			6.3×11	72	6.3×11	80	8×11.5	98	10×12.5	125	10×16	151	10×16	151	12.5×20	217
47			6.3×11	86	8×11.5	110	10×12.5	138	10×12.5	149	10×16	181	10×20	196	12.5×25	282
100			8×11.5	143	10×12.5	189	10×16	223	10×20	260	12.5×20	316	12.5×25	344	16×25	455
220	10×12.5	229	10×16	276	10×20	335	12.5×20	397	12.5×25	466	16×25	564	16×31.5	607	18×35.5	775
330	10×16	309	10×20	367	12.5×20	454	12.5×25	528	12.5×25	631	16×31.5	744	16×35.5	761	18×40	964
470	10×20	399	12.5×20	485	12.5×20	542	16×25	697	16×25	753	16×35.5	908	18×35.5	948		
1,000	12.5×25	702	12.5×25	769	16×25	951	18×35.5	1,120	16×25	1,262	18×40	1,404				
2,200	16×25	1,107	16×31.5	1,295	18×35.5	1,529	18×40	1,647								
3,300	16×35.5	1,438	16×35.5	1,554	18×40	1,804										
4,700	18×35.5	1,676	18×40	1,820												

↑
↑
Rated Ripple Current (mA_{rms}/85°C, 120Hz)
Case Size $\varnothing D \times L$ (mm)

DSA(SRE)-BP Series

• 85°C 1,000Hrs assured.

- Non-solvent proof.
- Height 5mm.
- Bi-polarized
- For CAR-Audio
- RoHS compliant.
- Halogen-free capacitors are also available.



SPECIFICATIONS

Item	Characteristics					
Rated Voltage Range	4 ~ 50 V _{DC}					
Operating Temperature Range	-40 ~ +85°C					
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)					
Leakage Current (In both directions)	I=0.06CV or 10μA, whichever is greater Where, I:Max.Leakage current(μA), C:Nominal capacitance(μF), V:rated voltage(V _{DC}) (at 20°C, 1 minute)					
Dissipation Factor(Tanδ)	Rated Voltage(V _{DC})	4	6.3	10	16	25 35~50
	Tanδ(Max.)	0.35	0.24	0.20	0.17	0.17 0.15 (at 20°C, 120Hz)
Temperature Characteristics (Max. Impedance ratio)	Rated Voltage(V _{DC})	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 (at 120Hz)
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 1,000 hours at 85°C. During this test, the rated voltage shall be reversed on the capacitor every 250 hours. Capacitance change ≤ ±20% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value					
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 500 hours at 85°C, without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24hours and not more than 48 hours before the measurements. Capacitance change ≤ ±20% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value					
Others	Satisfied characteristics KS C IEC 60384-4					

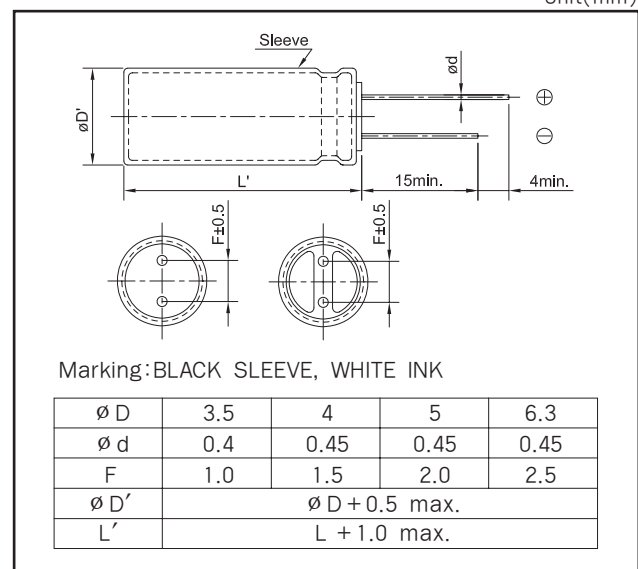
RATINGS OF DSA(SRE)-BP Series

V _{DC} μF	4	6.3	10	16	25	35	50
0.1							3.5×5 1.3
0.15							3.5×5 1.9
0.22							3.5×5 2.3
0.33							3.5×5 2.8
0.47							3.5×5 3.4
0.68							3.5×5 4.1
1						3.5×5 5.0	3.5×5 5.5
1.5					3.5×5 5.7	3.5×5 6.7	4×5 7.5
2.2				3.5×5 7.0	3.5×5 8.0	4×5 9.1	5×5 10
3.3			3.5×5 7.8	3.5×5 9.0	4×5 10	5×5 12	5×5 13
4.7		3.5×5 8.6	3.5×5 10	4×5 12	5×5 14	5×5 15	6.3×5 16
6.8	3.5×5 8.5	3.5×5 11	4×5 14	5×5 17	5×5 18	6.3×5 20	6.3×5 20
10	3.5×5 11	4×5 15	4×5 19	5×5 21	6.3×5 22	6.3×5 24	
15	4×5 15	5×5 22	5×5 23	6.3×5 27	6.3×5 28		
22	5×5 22	5×5 26	5×5 31	6.3×5 33			
33	6.3×5 28	6.3×5 36	6.3×5 38				
47	6.3×5 34	6.3×5 41					

↑ Rated Ripple Current (mArms/85°C,120Hz)
↑ Case Size Ø D×L(mm)

DIMENSIONS OF DSA(SRE)-BP Series

Unit(mm)



GSA-BP Series

• 85°C 2,000Hrs assured.

- Non-solvent proof.
- Height 7mm.
- Bi-polarized
- Downsized of SRA-BP series.
- For CAR-Audio, VCR
- RoHS compliant.
- Halogen-free capacitors are also available.

SRA-BP

Downsized

GSA-BP



SPECIFICATIONS

Item	Characteristics																											
Rated Voltage Range	6.3 ~ 50 V _{DC}																											
Operating Temperature Range	-40 ~ +85℃																											
Capacitance Tolerance	±20%(M) (at 20℃, 120Hz)																											
Leakage Current (In both directions)	I=0.06CV(μA) or 10μA, whichever is greater. Where, I:Max. Leakage current(μA), C:Nominal capacitance(μF), V:Rated voltage(V _{DC}) (at 20℃, 1 minute)																											
Dissipation Factor(Tanδ)	<table><tr><td>Rated voltage(V_{DC})</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td></tr><tr><td>Tanδ(Max.)</td><td>0.24</td><td>0.20</td><td>0.17</td><td>0.16</td><td>0.15</td><td>0.14</td></tr></table> (at 20℃, 120Hz)							Rated voltage(V _{DC})	6.3	10	16	25	35	50	Tanδ(Max.)	0.24	0.20	0.17	0.16	0.15	0.14							
Rated voltage(V _{DC})	6.3	10	16	25	35	50																						
Tanδ(Max.)	0.24	0.20	0.17	0.16	0.15	0.14																						
Temperature Characteristics (Max. Impedance ratio)	<table><tr><td>Rated voltage(V_{DC})</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td colspan="2">35~50</td></tr><tr><td>Z(-25℃)/Z(20℃)</td><td>4</td><td>3</td><td>2</td><td>2</td><td colspan="2">2</td></tr><tr><td>Z(-40℃)/Z(20℃)</td><td>10</td><td>8</td><td>6</td><td>4</td><td colspan="2">3</td></tr></table> (at 120Hz)							Rated voltage(V _{DC})	6.3	10	16	25	35~50		Z(-25℃)/Z(20℃)	4	3	2	2	2		Z(-40℃)/Z(20℃)	10	8	6	4	3	
Rated voltage(V _{DC})	6.3	10	16	25	35~50																							
Z(-25℃)/Z(20℃)	4	3	2	2	2																							
Z(-40℃)/Z(20℃)	10	8	6	4	3																							
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated is voltage for 2,000 hours at 85℃. During the test, the rated voltage shall be reversed on the capacitor every 250 hours. Capacitance change ≤ ±20% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value																											
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after exposing them for 1,000 hours at 85℃ without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≤ ±20% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value																											
Others	Satisfied characteristics KS C IEC 60384-4																											

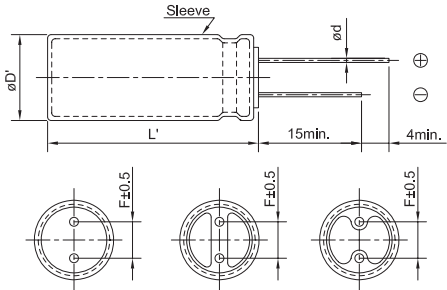
RATINGS OF GSA-BP Series

μF \ V _{DC}	6.3	10	16	25	35	50
0.1						4×7 2.1
0.22						4×7 4.5
0.33						4×7 5.6
0.47						4×7 6.6
1						4×7 9.7
2.2					4×7 13	4×7 14
3.3				4×7 15	4×7 15	4×7 17
4.7			4×7 18	4×7 18	5×7 20	5×7 21
10		4×7 23	4×7 25	5×7 27	6.3×7 33	6.3×7 35
22	4×7 31	4×7 35	5×7 39	6.3×7 44		
33	5×7 40	5×7 48	6.3×7 49			
47	6.3×7 49	6.3×7 53				

Rated Ripple Current(mArms/85°C, 120Hz)
Case Size ØD×L(mm)

DIMENSIONS OF GSA-BP Series

Unit(mm)



Marking : BLACK SLEEVE, WHITE INK

ø D	4	5	6.3
ø d	0.45		
F	1.5	2.0	2.5
ø D'	ø D + 0.5max.		
L'	L + 1.0max.		



MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

MHA-BP Series

• 85°C 2,000Hrs assured

- Non-solvent proof.
- Bi-polarized
- Downsized of SHL-BP series.
- For Digital Household Appliances
- RoHS compliant.
- Halogen-free capacitors are also available.

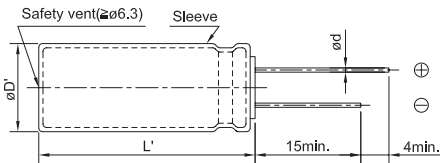


SPECIFICATIONS

Item	Characteristics								
Rated Voltage Range	6.3 ~ 100 V _{DC}					160 ~ 250 V _{DC}			
Operating Temperature Range	-40 ~ +85°C					-25 ~ +85°C			
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)								
Leakage Current (In both directions)	I=0.03CV(μA) or 3μA, whichever is greater. Where, I:Max. Leakage current(μA), C:Nominal capacitance(μF), V:Rated voltage(V _{DC}) (at 20°C, 5 minutes)								
Dissipation Factor (Tanδ)	Rated Voltage(V _{DC})	6.3	10	16~25	35	50	63~100	160	200~250
	Tanδ(Max.)	0.25	0.24	0.20	0.16	0.14	0.12	0.15	0.20
	When the capacitance exceeds 1,000μF, 0.02 shall be added every 1,000μF increase. (at 20°C, 120Hz)								
Temperature Characteristics (Max. Impedance ratio)	Rated Voltage(V _{DC})	6.3	10	16	25~100	160	160~250		
	Z(-25°C)/Z(20°C)	4	3	2	2	4	6		
	Z(-40°C)/Z(20°C)	10	8	6	4	-	-		
	(at 120Hz)								
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 2,000 hours at 85°C. During this test, the rated voltage shall be reversed on the capacitor every 250 hours.								
	Capacitance change ≤ ±20% of the initial value (where, ±25% for ≤ 16 V _{DC}) Tanδ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value								
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1,000 hours at 85°C without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements.								
	Capacitance change ≤ ±20% of the initial value (where, ±25% for ≤ 16 V _{DC}) Tanδ ≤ 200% of the initial specified value Leakage current ≤ 200% of the initial specified value								
Others	Satisfied characteristics KS C IEC 60384-4								

DIMENSIONS OF MHA-BP Series

Unit(mm)



Marking : BLACK SLEEVE, WHITE INK

øD	5	6.3	8	10	12.5	16	18	22
ød	0.5	0.5	0.6	0.6	0.6	0.8	0.8	0.8
F	2.0	2.5	3.5	5.0	5.0	7.5	7.5	10.0
øD'	øD + 0.5 max.							
L'	L + 1.5 max.				L + 2.0 max.			

RATINGS OF MHA-BP Series

μF \ V_{DC}	6.3		10		16		25		35		50	
10									5 × 11	50	5 × 11	52
22							5 × 11	66	6.3 × 11	71	6.3 × 11	89
33							6.3 × 11	90	6.3 × 11	104	8 × 11.5	124
47			5 × 11	86	5 × 11	89	6.3 × 11	107	8 × 11.5	142	10 × 12.5	174
100	5 × 11	126	6.3 × 11	144	6.3 × 11	148	8 × 11.5	179	10 × 12.5	244	10 × 16	284
220	6.3 × 11	213	8 × 11.5	244	10 × 12.5	295	10 × 16	345	10 × 20	432	12.5 × 20	500
330	8 × 11.5	298	10 × 12.5	352	10 × 16	399	10 × 20	458	12.5 × 20	543	16 × 20	666
470	10 × 12.5	420	10 × 16	463	10 × 20	515	12.5 × 20	606	12.5 × 25	704	16 × 25	877
1,000	10 × 20	732	12.5 × 20	791	12.5 × 25	882	16 × 20	961	16 × 31.5	1,223	18 × 35.5	1,409
2,200	12.5 × 25	1,291	16 × 20	1,275	16 × 31.5	1,557	18 × 31.5	1,699	18 × 40	1,838		
3,300	16 × 20	1,581	16 × 31.5	1,859	18 × 35.5	2,034	18 × 40	2,122				
4,700	16 × 31.5	2,219	18 × 31.5	2,290								
6,800	18 × 31.5	2,754	18 × 40	2,890								

μF \ V_{DC}	63		100		160		200		250	
3.3			5 × 11	35					10 × 12.5	48
4.7	5 × 11	40	6.3 × 11	48			10 × 12.5	58	10 × 16	65
10	6.3 × 11	63	8 × 11.5	80	10 × 16	104	10 × 20	96	12.5 × 20	107
22	8 × 11.5	106	10 × 12.5	140	12.5 × 20	185	12.5 × 25	180	16 × 20	190
33	8 × 11.5	137	10 × 16	189	12.5 × 25	247	16 × 20	239	16 × 25	257
47	10 × 12.5	183	10 × 20	244	16 × 25	325	16 × 25	325	18 × 31.5	324
100	10 × 20	327	12.5 × 25	430	18 × 31.5	450	18 × 40	496		
220	12.5 × 25	585	16 × 31.5	759						
330	16 × 25	791	18 × 35.5	934						
470	16 × 31.5	992								
1,000	18 × 40	1,431								

Rated Ripple Current(mArms/ 85°C, 120Hz)

Case Size $\varnothing$ D × L(mm)



MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

NHA-BP Series

• 105°C 1,000Hrs assured

Solvent-proof

WV ≤ 100V_{DC}

KMG-BP

Downsized

NHA-BP



- Bi-polarized
- Downsized of KMG-BP series.
- For Digital Household Appliances
- RoHS compliant.
- Halogen-free capacitors are also available.

SPECIFICATIONS

Item	Characteristics																									
Rated Voltage Range	6.3 ~ 100 V _{DC}					160 ~ 250 V _{DC}																				
Operating Temperature Range	-55 ~ +105℃					-40 ~ +105℃																				
Capacitance Tolerance	±20% (M) (at 20℃, 120Hz)																									
Leakage Current (In both directions)	I=0.03CV(μA) or 3μA, whichever is greater. Where, I:Max. Leakage current(μA), C:Nominal capacitance(μF), V:Rated voltage(V _{DC}) (at 20℃, 5 minutes)																									
Disipation Factor (Tanδ)	<table><tr><td>Rated Voltage(V_{DC})</td><td>6.3</td><td>10</td><td>16~25</td><td>35</td><td>50</td><td>63~100</td><td>160</td><td>200~250</td></tr><tr><td>Tanδ(Max.)</td><td>0.25</td><td>0.24</td><td>0.20</td><td>0.16</td><td>0.14</td><td>0.12</td><td>0.15</td><td>0.20</td></tr></table> When the capacitance exceeds 1,000μF, 0.02 shall be added every 1,000μF increase. (at 20℃, 120Hz)								Rated Voltage(V _{DC})	6.3	10	16~25	35	50	63~100	160	200~250	Tanδ(Max.)	0.25	0.24	0.20	0.16	0.14	0.12	0.15	0.20
Rated Voltage(V _{DC})	6.3	10	16~25	35	50	63~100	160	200~250																		
Tanδ(Max.)	0.25	0.24	0.20	0.16	0.14	0.12	0.15	0.20																		
Temperature Characteristics (Max. Impedance ratio)	<table><tr><td>Rated Voltage(V_{DC})</td><td>6.3</td><td>10</td><td>16</td><td>25~100</td><td>160~250</td></tr><tr><td>Z(-25℃)/Z(20℃)</td><td>4</td><td>3</td><td>2</td><td>2</td><td>3</td></tr><tr><td>Z(-40℃)/Z(20℃)</td><td>8</td><td>6</td><td>4</td><td>3</td><td>4</td></tr></table> (at 120Hz)								Rated Voltage(V _{DC})	6.3	10	16	25~100	160~250	Z(-25℃)/Z(20℃)	4	3	2	2	3	Z(-40℃)/Z(20℃)	8	6	4	3	4
Rated Voltage(V _{DC})	6.3	10	16	25~100	160~250																					
Z(-25℃)/Z(20℃)	4	3	2	2	3																					
Z(-40℃)/Z(20℃)	8	6	4	3	4																					
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated voltage is applied for 1,000 hours at 105℃. During this test, the rated voltage shall be reversed on the capacitor every 250 hours. Capacitance change ≤ ±20% of the initial value (where, ±25% for ≤ 16 V _{DC}) Tanδ ≤ 150% of the initial specified value Leakage current ≤ The initial specified value																									
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after exposing them for 500 hours at 105℃ without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≤ ±20% of the initial value (where, ±25% for ≤ 16 V _{DC}) Tanδ ≤ 150% of the initial specified value Leakage current ≤ 150% of the initial specified value																									
Others	Satisfied characteristics KS C IEC 60384-4																									

DIMENSIONS OF NHA-BP Series

Unit(mm)

Technical drawing of a capacitor showing side and end views with dimensions.

Side View:

- Overall length: L'
- Distance from end to terminal: 15min.
- Terminal length: 4min.
- Terminal diameter: ϕd
- Overall diameter: $\phi D'$
- Labels: Safety vent ($\approx \phi 6.3$), Sleeve

End View:

- Overall diameter: $\phi 10$
- Distance from end to terminal: $F \pm 0.5$

End View:

- Overall diameter: $\approx \phi 12.5$
- Distance from end to terminal: $F \pm 0.5$

Marking : BROWN SLEEVE, WHITE INK

ϕD	5	6.3	8	10	12.5	16	18	22
ϕd	0.5	0.5	0.6	0.6	0.6	0.8	0.8	0.8
F	2.0	2.5	3.5	5.0	5.0	7.5	7.5	10.0
$\phi D'$	$\phi D + 0.5 \text{ max.}$							
L'	$L + 1.5 \text{ max.}$			$L + 2.0 \text{ max.}$				

RATINGS OF NHA-BP Series

μF \ V_{DC}	6.3		10		16		25		35		50	
10									5×11	33	5×11	37
22							5×11	47	6.3×11	55	6.3×11	63
33							6.3×11	66	6.3×11	68	8×11.5	88
47			5×11	57	5×11	64	6.3×11	78	8×11.5	93	10×12.5	123
100	5×11	79	6.3×11	94	6.3×11	107	8×11.5	131	10×12.5	159	10×16	198
220	6.3×11	134	8×11.5	160	10×12.5	215	10×16	252	10×20	283	12.5×20	354
330	8×11.5	188	10×12.5	231	10×16	290	10×20	335	12.5×20	371	16×20	471
470	10×12.5	264	10×16	304	10×20	375	12.5×20	429	12.5×25	481	16×25	620
1,000	10×20	460	12.5×20	533	12.5×25	623	16×20	679	16×31.5	836	18×35.5	996
2,200	12.5×25	823	16×20	859	16×31.5	1,101	18×31.5	1,238	18×40	1,342		
3,300	16×20	1,008	16×31.5	1,253	18×35.5	1,438	18×40	1,592				
4,700	16×31.5	1,432	18×31.5	1,544								
6,800	18×31.5	1,778	18×40	1,949								

μF \ V_{DC}	63		100		160		200		250	
3.3			5×11	25					10×12.5	34
4.7	5×11	28	6.3×11	34			10×12.5	41	10×16	45
10	6.3×11	47	8×11.5	57	10×16	66	10×20	71	12.5×20	79
22	8×11.5	79	10×12.5	99	12.5×20	117	12.5×25	125	16×20	127
33	8×11.5	97	10×16	134	12.5×25	154	16×20	156	16×25	172
47	10×12.5	136	10×20	173	16×25	206	16×25	206	18×31.5	229
100	10×20	238	12.5×25	304	18×31.5	334	18×40	350		
220	12.5×25	403	16×31.5	537						
330	16×25	545	18×35.5	661						
470	16×31.5	702								
1,000	18×40	1,108								

Rated Ripple Current(mArms/ 105°C, 120Hz)

Case Size $\varnothing D \times L$ (mm)



MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

SSP Series

• 85°C 2,000Hrs assured.

- Non-solvent proof.
- Bi-polarized.
- For Speaker Cross-Over Network.
- RoHS compliant.
- Halogen-free capacitors are also available.

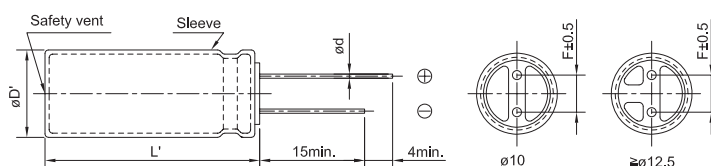


SPECIFICATIONS

Item	Characteristics												
Rated Voltage Range	25 ~ 63 V _{DC}												
Operating Temperature Range	-40 ~ +85℃												
Capacitance Tolerance	±20% (M) (at 1kHz, 20℃)												
Leakage Current (In both directions)	After 1 minute: I=0.06CV(μA) or 10 μA, whichever is greater After 5 minutes: I=0.03CV(μA) or 3 μA, whichever is greater Where, I:MAX.Leakage current(μA), C:Nominal capacitance(μF), V:Rated voltage(V _{DC}) (at 20℃)												
Dissipation Factor(Tanδ)	<table><tr><td>Rated Voltage(V_{DC})</td><td>25</td><td>50</td><td>63</td></tr><tr><td>Tanδ(Max.)</td><td>0.12</td><td>0.10</td><td>0.09</td></tr></table> 0.20 at 10kHz (Applicable to the capacitances of 10 μF or less) (at 1kHz, 20℃)	Rated Voltage(V _{DC})	25	50	63	Tanδ(Max.)	0.12	0.10	0.09				
Rated Voltage(V _{DC})	25	50	63										
Tanδ(Max.)	0.12	0.10	0.09										
Temperature Characteristics (Max. Impedance ratio)	<table><tr><td>Rated Voltage(V_{DC})</td><td>25</td><td>50</td><td>63</td></tr><tr><td>Z(-25℃)/Z(20℃)</td><td>2</td><td>2</td><td>2</td></tr><tr><td>Z(-40℃)/Z(20℃)</td><td>4</td><td>3</td><td>3</td></tr></table> (at 120Hz)	Rated Voltage(V _{DC})	25	50	63	Z(-25℃)/Z(20℃)	2	2	2	Z(-40℃)/Z(20℃)	4	3	3
Rated Voltage(V _{DC})	25	50	63										
Z(-25℃)/Z(20℃)	2	2	2										
Z(-40℃)/Z(20℃)	4	3	3										
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after rated DC voltage is applied for 2,000 hours at 85℃. During this test, the rated DC voltage shall be reversed on the capacitor every 250 hours. Capacitance change ≤ ±15% of the initial value Tanδ ≤ 150% of the initial specified value Leakage current ≤ The initial specified value												
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after exposing them at 85℃ for 1,000 hours without voltage applied. Capacitance change ≤ ±20% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ 200% The of initial specified value												
Others	Satisfied characteristics KS C IEC 60384-4												

DIMENSIONS OF SSP Series

Unit(mm)



Marking : BLACK SLEEVE, WHITE INK

øD	10	12.5	16
ød	0.6	0.6	0.8
F	5.0	5.0	7.5
øD'	øD + 0.5 max.		
L'	L + 2.0 max.		

RATINGS OF SSP Series

μF \ V _{DC}	25	50	63
1			10×12.5
1.5			10×12.5
2.2			10×12.5
3.3			10×12.5
4.7		10×12.5	10×16
6.8	10×12.5	10×16	10×20
10	10×16	10×16	12.5×20
15	10×16	10×20	12.5×20
22	10×20	10×20	12.5×25
33	10×20	12.5×20	16×25
47	10×20	12.5×20	16×25
68	12.5×20	12.5×25	16×31.5
100	12.5×25	16×25	16×35.5

↑ Case Size $\varnothing D \times L(\text{mm})$



MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

KSA Series

• 105°C 1,000Hrs assured.

- Bi-polarized.
- High ripple capability.
- For Horizontal Deflection Circuit, CRT TV/MT
- RoHS compliant.
- Halogen-free capacitors are also available.

Solvent-proof



SSA

KSA

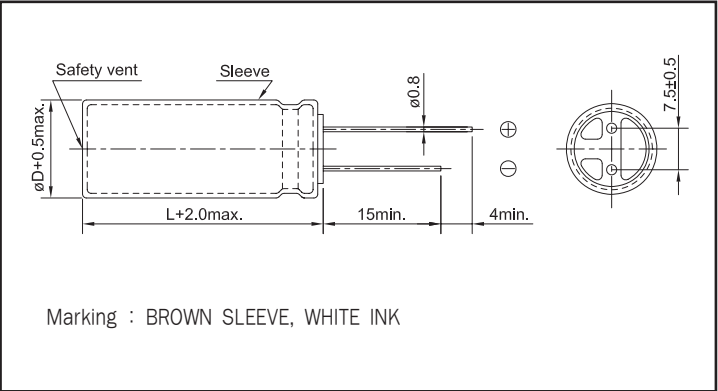
Wide temp.

SPECIFICATIONS

Item	Characteristics														
Rated Voltage Range	25, 50 V _{DC}														
Operating Temperature Range	-55 ~ +105℃														
Nominal Capacitance	2.2(μF)	3.3(μF)	4.7(μF)	6.8(μF)	8.2(μF)	10(μF)									
Case size Ø D×L (mm)	16×25	16×31.5	16×35.5	16×35.5	16×35.5	16×35.5									
Permissible Ripple Current(A _{p-p})	3.4	4.1	4.5	4.6	4.9	5.4									
	(at max. operating temprature, 15.75kHz)														
Capacitance Tolerance	±20% (M) (at 20℃, 120Hz)														
Leakage Current(In both directions)	100μA max. (at 20℃, 3 minutes)														
Dissipation Factor(Tanδ)	0.05 max. (at 20℃, 120Hz)														
Temperature Characteristics (Max. Impedance ratio)	<table><tr><td>Rated Voltage(V_{DC})</td><td>25</td><td>50</td></tr><tr><td>Z(-25℃)/Z(20℃)</td><td>2</td><td>2</td></tr><tr><td>Z(-40℃)/Z(20℃)</td><td>4</td><td>3</td></tr></table> (at 120Hz)						Rated Voltage(V _{DC})	25	50	Z(-25℃)/Z(20℃)	2	2	Z(-40℃)/Z(20℃)	4	3
							Rated Voltage(V _{DC})	25	50						
							Z(-25℃)/Z(20℃)	2	2						
Z(-40℃)/Z(20℃)	4	3													
Load Life															
	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the specified ripple current (AC _{pp} Voltage+applied DC voltage≤WV) applied for 1,000 hours at 105℃.														
	Capacitance change ≤ ±15% of the initial value														
	Tan δ ≤ 200% of the initial specified value														
Shelf Life															
	Leakage current ≤ The initial specified value														
	The following specifications shall be satisfied when the capacitors are restored to 20℃ after exposing them for 500 hours. at 105℃ without voltage and ripple current applied.														
	Capacitance change ≤ ±15% of the initial value														
Others															
	Tan δ ≤ 200% of the initial specified value														
	Leakage current ≤ 200% of the initial specified value														
	Satisfied characteristics KS C IEC 60384-4														

DIMENSIONS OF KSA Series

Unit(mm)



$$\ast I_r(\text{rms}) = \frac{I_r(\text{p-p})}{2\sqrt{3}}$$

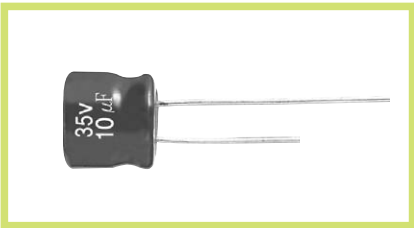
I_r(p-p) is peak-to-peak value at specifications.
I_r(rms) is effective current value.

EXB Series

• 105°C 2,000Hrs assured.

- Ultra Low Impedance, Long Life
- Height 5mm.
- For LCD/PDP TV PSU, DVD Driver
- RoHS compliant.
- Halogen-free capacitors are also available.

Solvent-proof

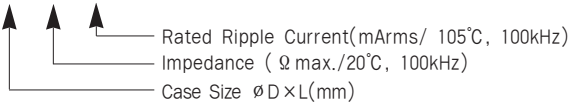


SPECIFICATIONS

Item	Characteristics																							
Rated Voltage Range	6.3 ~ 35 V _{DC}																							
Operating Temperature Range	-55 ~ +105℃																							
Capacitance Tolerance	±20%(M) (at 20℃, 120Hz)																							
Leakage Current	I=0.01CV or 3μA, whichever is greater. Where, I:Max. Leakage current(μA), C:Nominal capacitance(μF), V:Rated voltage(V _{DC}) (at 20℃, 2 minutes)																							
Dissipation Factor(Tanδ)	<table border="1"><tr><td>Rated voltage(V_{DC})</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td></tr><tr><td>Tanδ(Max.)</td><td>0.22</td><td>0.20</td><td>0.18</td><td>0.14</td><td>0.12</td></tr></table> (at 20℃, 120Hz)						Rated voltage(V _{DC})	6.3	10	16	25	35	Tanδ(Max.)	0.22	0.20	0.18	0.14	0.12						
Rated voltage(V _{DC})	6.3	10	16	25	35																			
Tanδ(Max.)	0.22	0.20	0.18	0.14	0.12																			
Temperature Characteristics (Max. Impedance ratio)	<table border="1"><tr><td>Rated voltage(V_{DC})</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td></tr><tr><td>Z(-25℃)/Z(20℃)</td><td>3</td><td>3</td><td>2</td><td>2</td><td>2</td></tr><tr><td>Z(-40℃)/Z(20℃)</td><td>9</td><td>7</td><td>5</td><td>3</td><td>3</td></tr></table> (at 120Hz)						Rated voltage(V _{DC})	6.3	10	16	25	35	Z(-25℃)/Z(20℃)	3	3	2	2	2	Z(-40℃)/Z(20℃)	9	7	5	3	3
Rated voltage(V _{DC})	6.3	10	16	25	35																			
Z(-25℃)/Z(20℃)	3	3	2	2	2																			
Z(-40℃)/Z(20℃)	9	7	5	3	3																			
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated voltage is applied for 2,000 hours at 105℃. Capacitance change ≤ ±20% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value																							
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after exposing them for 1,000 hours at 105℃ without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≤ ±20% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value																							
Others	Satisfied characteristics KS C IEC 60384-4																							

RATINGS OF EXB Series

µF \ V _{DC}	6.3			10			16			25			35		
1													5×5	3.0	80
1.5													5×5	3.0	80
2.2													5×5	3.0	80
3.3													5×5	3.0	80
4.7													5×5	3.0	80
6.8													5×5	3.0	80
10										5×5	1.6	100	5×5	1.6	100
15							5×5	1.6	100	5×5	1.6	100	5×5	1.6	100
22							5×5	1.6	100	5×5	1.6	100	6.3×5	0.8	140
33	5×5	1.6	100	5×5	1.6	100	5×5	1.6	100	6.3×5	0.8	140	6.3×5	0.8	140
47	5×5	1.6	100	5×5	1.6	100	6.3×5	0.8	140	6.3×5	0.8	140			
68	6.3×5	0.8	140	6.3×5	0.8	140	6.3×5	0.8	140						
100	6.3×5	0.8	140	6.3×5	0.8	140									

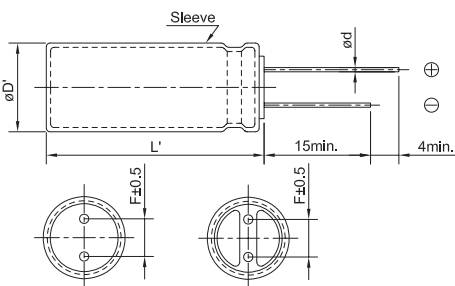


RATED RIPPLE CURRENT MULTIPLIERS

Frequency Multipliers		120	1k	10k	100k
Cap.(µF) \ Freq.(Hz)					
1 ~ 100		0.40	0.75	0.90	1.00

DIMENSIONS OF EXB Series

Unit(mm)



Marking : DARK BROWN SLEEVE, SILVER INK

øD	5	6.3
ød	0.45	
F	2.0	2.5
øD'	øD+0.5max	
L'	L+1.0max	

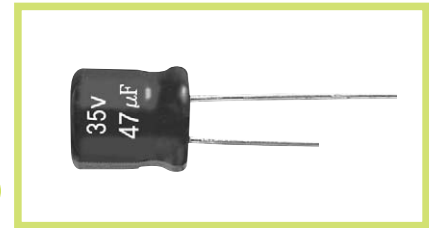


MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

HXB Series

• 105°C 2,000Hrs assured.

- Non-solvent proof.
- Ultra Low Impedance, Long Life
- Height 7mm.
- For LCD/PDP TV PSU, DVD Driver
- RoHS compliant.
- Halogen-free capacitors are also available.



SPECIFICATIONS

Item	Characteristics																					
Rated Voltage Range	6.3 ~ 50 V _{DC}																					
Operating Temperature Range	-40 ~ +105°C																					
Capacitance Tolerance	±20%(M) (at 20°C, 120Hz)																					
Leakage Current	I=0.01CV(μA) or 3μA, whichever is greater. Where, I:Max. Leakage current(μA), C:Nominal capacitance(μF), V:Rated voltage(V _{DC}) (at 20°C, 2 minutes)																					
Dissipation Factor(Tanδ)	<table><tr><td>Rated voltage(V_{DC})</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td></tr><tr><td>Tanδ(Max.)</td><td>0.22</td><td>0.19</td><td>0.16</td><td>0.14</td><td>0.12</td><td>0.10</td></tr></table> (at 20°C, 120Hz)							Rated voltage(V _{DC})	6.3	10	16	25	35	50	Tanδ(Max.)	0.22	0.19	0.16	0.14	0.12	0.10	
Rated voltage(V _{DC})	6.3	10	16	25	35	50																
Tanδ(Max.)	0.22	0.19	0.16	0.14	0.12	0.10																
Temperature Characteristics (Max. Impedance ratio)	<table><tr><td>Rated voltage(V_{DC})</td><td>6.3</td><td>10</td><td>16</td><td>25~50</td></tr><tr><td>Z(-25°C)/Z(20°C)</td><td>2</td><td>2</td><td>2</td><td>2</td></tr><tr><td>Z(-40°C)/Z(20°C)</td><td>6</td><td>4</td><td>3</td><td>3</td></tr></table> (at 120Hz)							Rated voltage(V _{DC})	6.3	10	16	25~50	Z(-25°C)/Z(20°C)	2	2	2	2	Z(-40°C)/Z(20°C)	6	4	3	3
Rated voltage(V _{DC})	6.3	10	16	25~50																		
Z(-25°C)/Z(20°C)	2	2	2	2																		
Z(-40°C)/Z(20°C)	6	4	3	3																		
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 2,000 hours at 105°C. Capacitance change ≤ ±25% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value																					
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1,000 hours at 105°C without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≤ ±25% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value																					
Others	Satisfied characteristics KS C IEC 60384-4																					

RATINGS OF HXB Series

V _{DC}	6.3	10	16	25	35	50
µF						
2.2						5X7 1.15 120
10						6.3X7 0.35 235
22					5X7 0.70 165	6.3X7 0.35 235
33	5X7 0.70 165	5X7 0.70 165	5X7 0.70 165	5X7 0.70 165	6.3X7 0.35 235	8X7 0.17 350
47	5X7 0.70 165	5X7 0.70 165	5X7 0.70 165	6.3X7 0.35 235	8X7 0.17 350	8X7 0.17 350
68	6.3X7 0.35 235	6.3X7 0.35 235	6.3X7 0.35 235	6.3X7 0.35 235	8X7 0.17 350	
100	6.3X7 0.35 235	6.3X7 0.35 235	6.3X7 0.35 235	8X7 0.17 350		
150	6.3X7 0.35 235	6.3X7 0.35 235	8X7 0.17 350			
220	8X7 0.17 350	8X7 0.17 350				
330	8X7 0.17 350					

↑ Rated Ripple Current (mA rms/ 105°C, 100kHz)
↑ Impedance (Ω max./ 20°C, 100kHz)
↑ Case Size ØD × L (mm)

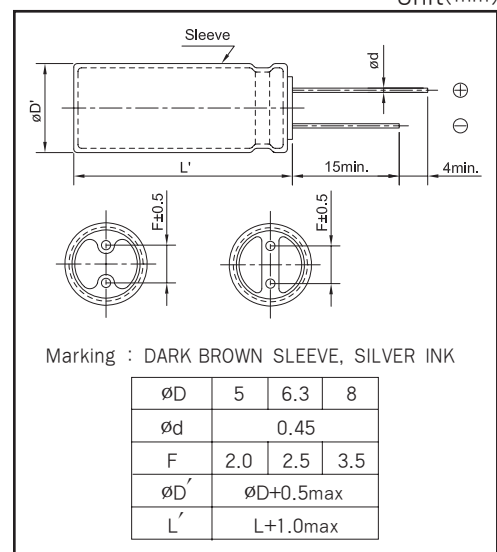
RATED RIPPLE CURRENT MULTIPLIERS

Frequency Multipliers

Cap.(µF) \ Freq.(Hz)	120	1k	10k	100k
2.2~180	0.40	0.75	0.90	1.00
220~330	0.50	0.85	0.94	1.00

DIMENSIONS OF HXB Series

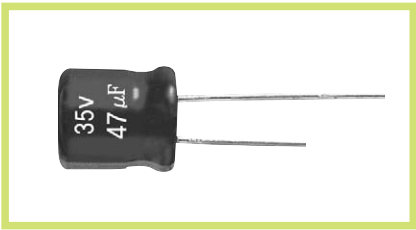
Unit(mm)



HXL Series

• 105°C 3,000Hrs assured.

- Non-solvent proof.
- Ultra Low Impedance, Long Life
- Height 7mm.
- For LCD/PDP TV PSU, DVD Driver
- RoHS compliant.
- Halogen-free capacitors are also available.

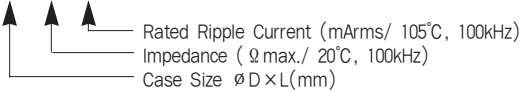


SPECIFICATIONS

Item	Characteristics																					
Rated Voltage Range	6.3 ~ 50 V _{DC}																					
Operating Temperature Range	-40 ~ +105°C																					
Capacitance Tolerance	±20%(M) (at 20°C, 120Hz)																					
Leakage Current	I=0.01CV(μA) or 3μA, whichever is greater. Where, I:Max. Leakage current(μA), C:Nominal capacitance(μF), V:Rated voltage(V _{DC}) (at 20°C, 2 minutes)																					
Dissipation Factor(Tanδ)	<table><tr><td>Rated voltage(V_{DC})</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td></tr><tr><td>Tanδ(Max.)</td><td>0.22</td><td>0.19</td><td>0.16</td><td>0.14</td><td>0.12</td><td>0.10</td></tr></table> (at 20°C, 120Hz)							Rated voltage(V _{DC})	6.3	10	16	25	35	50	Tanδ(Max.)	0.22	0.19	0.16	0.14	0.12	0.10	
Rated voltage(V _{DC})	6.3	10	16	25	35	50																
Tanδ(Max.)	0.22	0.19	0.16	0.14	0.12	0.10																
Temperature Characteristics (Max. Impedance ratio)	<table><tr><td>Rated voltage(V_{DC})</td><td>6.3</td><td>10</td><td>16</td><td>25~50</td></tr><tr><td>Z(-25°C)/Z(20°C)</td><td>2</td><td>2</td><td>2</td><td>2</td></tr><tr><td>Z(-40°C)/Z(20°C)</td><td>6</td><td>4</td><td>3</td><td>3</td></tr></table> (at 120Hz)							Rated voltage(V _{DC})	6.3	10	16	25~50	Z(-25°C)/Z(20°C)	2	2	2	2	Z(-40°C)/Z(20°C)	6	4	3	3
Rated voltage(V _{DC})	6.3	10	16	25~50																		
Z(-25°C)/Z(20°C)	2	2	2	2																		
Z(-40°C)/Z(20°C)	6	4	3	3																		
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 3,000 hours at 105°C. Capacitance change ≤ ±25% of the initial value Tanδ ≤ ±200% of the initial specified value Leakage current ≤ The initial specified value																					
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1,000 hours at 105°C without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≤ ±25% of the initial value Tanδ ≤ ±200% of the initial specified value Leakage current ≤ The of the initial specified value																					
Others	Satisfied characteristics KS C IFC 60384-4																					

RATINGS OF HXL Series

V _{DC}	6.3	10	16	25	35	50
2.2						5X7 1.15 120
10						6.3X7 0.35 235
22					5X7 0.70 165	6.3X7 0.35 235
33	5X7 0.70 165	5X7 0.70 165	5X7 0.70 165	5X7 0.70 165	6.3X7 0.35 235	8X7 0.17 350
47	5X7 0.70 165	5X7 0.70 165	5X7 0.70 165	6.3X7 0.35 235	8X7 0.17 350	8X7 0.17 350
68	6.3X7 0.35 235	6.3X7 0.35 235	6.3X7 0.35 235	6.3X7 0.35 235	8X7 0.17 350	
100	6.3X7 0.35 235	6.3X7 0.35 235	6.3X7 0.35 235	8X7 0.17 350		
150	6.3X7 0.35 235	6.3X7 0.35 235	8X7 0.17 350			
220	8X7 0.17 350	8X7 0.17 350				
330	8X7 0.17 350					



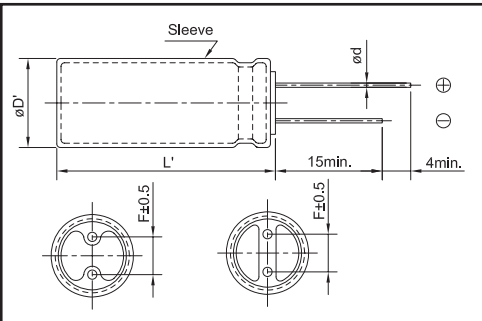
Rated Ripple Current (mA_{rms}/ 105°C, 100kHz)
Impedance (Ω max./ 20°C, 100kHz)
Case Size ØD×L(mm)

RATED RIPPLE CURRENT MULTIPLIERS

Frequency Multipliers

Cap.(µF)	120	1k	10k	100k
2.2~180	0.40	0.75	0.90	1.00
220~330	0.50	0.85	0.94	1.00

DIMENSIONS OF HXL Series Unit(mm)



Marking : DARK BROWN SLEEVE, SILVER INK

ØD	5	6.3	8
Ød	0.45		
F	2.0	2.5	3.5
ØD'	ØD+0.5max		
L'	L+1.0max		



MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

NXL(LXV) Series

• 105°C 2,000~5,000Hrs assured.

Solvent-proof

- Low impedance.
- For SMPS, IP-Board, Adaptor
- RoHS compliant.
- Halogen-free capacitors are also available.



Low Imp. Long life

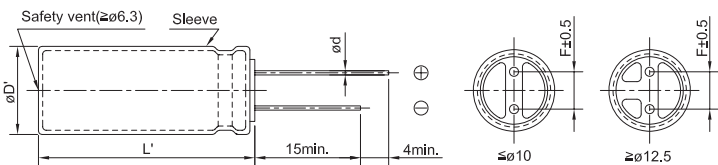


SPECIFICATIONS

Item	Characteristics																		
Rated Voltage Range	6.3 ~ 100 V _{DC}																		
Operating Temperature Range	-55 ~ +105°C																		
Capacitance Tolerance	±20%(M) (at 20°C, 120Hz)																		
Leakage Current	I=0.01CV or 3μA, whichever is greater. Where, I: Max.Leakage current(μA) C: Nominal capacitance (μF) V: Rated voltage (V _{DC}) (at 20°C, 2 minutes)																		
Dissipation Factor (Tanδ)	<table><tr><td>Rated Voltage(V_{DC})</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td><td>63</td><td>100</td></tr><tr><td>Tanδ(Max.)</td><td>0.22</td><td>0.19</td><td>0.16</td><td>0.14</td><td>0.12</td><td>0.10</td><td>0.08</td><td>0.07</td></tr></table> When the capacitance exceeds 1,000μF, 0.02 shall be added every 1,000μF increase. (at 20°C, 120Hz)	Rated Voltage(V _{DC})	6.3	10	16	25	35	50	63	100	Tanδ(Max.)	0.22	0.19	0.16	0.14	0.12	0.10	0.08	0.07
Rated Voltage(V _{DC})	6.3	10	16	25	35	50	63	100											
Tanδ(Max.)	0.22	0.19	0.16	0.14	0.12	0.10	0.08	0.07											
Temperature Characteristics (Max. Impedance ratio)	<table><tr><td>Rated voltage(V_{DC})</td><td>6.3</td><td>10~100</td></tr><tr><td>Capacitance change(Max.) : ΔC(-55°C)/C(20°C)</td><td colspan="2">30%</td></tr><tr><td>Impedance ratio(Max.) : Z(-55°C)/Z(20°C)</td><td>4</td><td>3</td></tr></table> (at 120Hz)	Rated voltage(V _{DC})	6.3	10~100	Capacitance change(Max.) : ΔC(-55°C)/C(20°C)	30%		Impedance ratio(Max.) : Z(-55°C)/Z(20°C)	4	3									
Rated voltage(V _{DC})	6.3	10~100																	
Capacitance change(Max.) : ΔC(-55°C)/C(20°C)	30%																		
Impedance ratio(Max.) : Z(-55°C)/Z(20°C)	4	3																	
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied at 105°C for the following test time. <table><tr><td>Capacitance change</td><td>≤ ±20% of the initial value</td><td>∅ D</td><td>Time</td></tr><tr><td>Tanδ</td><td>≤ 200% of the initial specified value</td><td>∅ 5, 6.3</td><td>2,000 hours</td></tr><tr><td>Leakage current</td><td>≤ The initial specified value</td><td>∅ 8, 10</td><td>3,000 hours</td></tr><tr><td></td><td></td><td>∅ 12.5~</td><td>5,000 hours</td></tr></table>	Capacitance change	≤ ±20% of the initial value	∅ D	Time	Tanδ	≤ 200% of the initial specified value	∅ 5, 6.3	2,000 hours	Leakage current	≤ The initial specified value	∅ 8, 10	3,000 hours			∅ 12.5~	5,000 hours		
Capacitance change	≤ ±20% of the initial value	∅ D	Time																
Tanδ	≤ 200% of the initial specified value	∅ 5, 6.3	2,000 hours																
Leakage current	≤ The initial specified value	∅ 8, 10	3,000 hours																
		∅ 12.5~	5,000 hours																
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1,000 hours at 105°C without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≤ ±20% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value																		
Others	Satisfied characteristics KS C IEC 60384-4																		

DIMENSIONS OF NXL(LXV) Series

Unit(mm)



Marking : DARK BROWN SLEEVE, SILVER INK

∅ D	5	6.3	8	10	12.5	16	18
∅ d	0.5	0.5	0.6	0.6	0.6	0.8	0.8
F	2.0	2.5	3.5	5.0	5.0	7.5	7.5
∅ D'	∅ D + 0.5 max.						
L'	L + 1.5 max.			L + 2.0 max.			

RATINGS OF NXL(LXV) Series

V_{DC} Items μF	6.3			V_{DC} Items μF	10			V_{DC} Items μF	16		
	Case size	Impedance (Ω max.)	Rated ripple current (mA _{rms})		Case size	Impedance (Ω max.)	Rated ripple current (mA _{rms})		Case size	Impedance (Ω max.)	Rated ripple current (mA _{rms})
	ø D × L (mm)	(20°C / 100kHz)	(105°C / 100kHz)		ø D × L (mm)	(20°C / 100kHz)	(105°C / 100kHz)		ø D × L (mm)	(20°C / 100kHz)	(105°C / 100kHz)
120	5 × 11	0.72	165	82	5 × 11	0.72	165	56	5 × 11	0.72	165
220	6.3 × 11	0.38	255	180	6.3 × 11	0.38	255	120	6.3 × 11	0.38	255
330	6.3 × 15	0.27	330	270	6.3 × 15	0.27	330	180	6.3 × 15	0.27	330
330	8 × 11.5	0.19	485	270	8 × 11.5	0.19	485	180	8 × 11.5	0.19	485
470	10 × 12.5	0.12	625	390	10 × 12.5	0.12	625	270	10 × 12.5	0.12	625
560	8 × 15	0.16	495	470	8 × 15	0.16	495	330	8 × 15	0.16	495
680	10 × 16	0.084	825	680	8 × 20	0.11	640	470	8 × 20	0.11	640
820	8 × 20	0.110	640	680	10 × 16	0.084	825	470	10 × 16	0.084	825
1,200	10 × 20	0.062	1,040	1,000	10 × 20	0.062	1,040	680	10 × 20	0.062	1,040
1,500	10 × 25	0.052	1,260	1,200	10 × 25	0.052	1,260	820	10 × 25	0.052	1,260
2,200	10 × 30	0.044	1,440	1,500	10 × 30	0.044	1,440	1,200	10 × 30	0.044	1,440
2,200	12.5 × 20	0.046	1,340	1,800	12.5 × 20	0.046	1,340	1,200	12.5 × 20	0.046	1,340
2,700	12.5 × 25	0.034	1,690	2,200	12.5 × 25	0.034	1,690	1,500	12.5 × 25	0.034	1,690
3,900	12.5 × 30	0.030	1,950	2,700	12.5 × 30	0.030	1,950	2,200	12.5 × 30	0.030	1,950
3,900	16 × 20	0.039	1,630	3,300	12.5 × 35	0.027	2,200	2,200	16 × 20	0.039	1,630
4,700	12.5 × 35	0.027	2,200	3,300	16 × 20	0.039	1,630	2,700	12.5 × 35	0.027	2,200
5,600	12.5 × 42.5	0.024	2,390	3,900	12.5 × 42.5	0.024	2,390	2,700	16 × 25	0.029	2,070
5,600	16 × 25	0.029	2,070	3,900	16 × 25	0.029	2,070	3,300	12.5 × 42.5	0.024	2,390
5,600	18 × 20	0.038	1,750	3,900	18 × 20	0.038	1,750	3,300	18 × 20	0.038	1,750
6,800	16 × 31.5	0.026	2,350	5,600	16 × 31.5	0.026	2,350	3,900	16 × 31.5	0.026	2,350
6,800	18 × 25	0.029	2,130	5,600	18 × 25	0.029	2,200	3,900	18 × 25	0.029	2,130
8,200	16 × 35.5	0.023	2,550	6,800	16 × 35.5	0.023	2,550	4,700	16 × 35.5	0.023	2,550
10,000	18 × 31.5	0.026	2,410	6,800	18 × 31.5	0.026	2,410	5,600	18 × 31.5	0.026	2,410
12,000	18 × 35.5	0.023	2,660	8,200	18 × 35.5	0.023	2,660	6,800	18 × 35.5	0.023	2,660
15,000	18 × 40	0.019	3,010	10,000	18 × 40	0.019	3,010	8,200	18 × 40	0.019	3,010

V_{DC} Items μF	25			V_{DC} Items μF	35			V_{DC} Items μF	50		
	Case size	Impedance (Ω max.)	Rated ripple current (mA _{rms})		Case size	Impedance (Ω max.)	Rated ripple current (mA _{rms})		Case size	Impedance (Ω max.)	Rated ripple current (mA _{rms})
	ø D × L (mm)	(20°C / 100kHz)	(105°C / 100kHz)		ø D × L (mm)	(20°C / 100kHz)	(105°C / 100kHz)		ø D × L (mm)	(20°C / 100kHz)	(105°C / 100kHz)
39	5 × 11	0.72	165	27	5 × 11	0.72	165	18	5 × 11	1.1	130
82	6.3 × 11	0.38	255	56	6.3 × 11	0.38	255	39	6.3 × 11	0.56	220
120	6.3 × 15	0.27	330	82	6.3 × 15	0.27	330	56	6.3 × 15	0.41	310
120	8 × 11.5	0.19	485	82	8 × 11.5	0.19	485	56	8 × 11.5	0.33	368
180	10 × 12.5	0.12	625	120	10 × 12.5	0.12	625	82	8 × 15	0.25	470
220	8 × 15	0.16	495	180	8 × 15	0.16	495	82	10 × 12.5	0.16	480
330	8 × 20	0.11	640	220	8 × 20	0.11	640	120	8 × 20	0.18	610
330	10 × 16	0.084	825	220	10 × 16	0.084	825	120	10 × 16	0.12	755
470	10 × 20	0.062	1,040	330	10 × 20	0.062	1,040	180	10 × 20	0.088	945
560	10 × 25	0.052	1,260	390	10 × 25	0.052	1,260	220	10 × 25	0.068	1,150
820	10 × 30	0.044	1,440	560	10 × 30	0.044	1,440	330	10 × 30	0.059	1,260
820	12.5 × 20	0.046	1,340	560	12.5 × 20	0.046	1,340	330	12.5 × 20	0.059	1,190
1,000	12.5 × 25	0.034	1,690	680	12.5 × 25	0.034	1,690	470	12.5 × 25	0.045	1,490
1,500	12.5 × 30	0.027	1,950	1,000	12.5 × 30	0.030	1,950	560	12.5 × 30	0.039	1,720
1,500	16 × 20	0.039	1,630	1,000	16 × 20	0.039	1,630	680	12.5 × 35	0.038	1,890
1,800	12.5 × 35	0.027	2,200	1,200	12.5 × 35	0.027	2,200	680	16 × 20	0.044	1,420
1,800	16 × 25	0.029	2,070	1,200	16 × 25	0.029	2,070	820	12.5 × 42.5	0.029	2,030
2,200	12.5 × 42.5	0.024	2,390	1,500	12.5 × 42.5	0.024	2,390	820	16 × 25	0.034	1,880
2,200	18 × 20	0.038	1,750	1,500	18 × 20	0.038	1,750	820	18 × 20	0.041	1,520
2,700	16 × 31.5	0.026	2,350	1,800	16 × 31.5	0.026	2,350	1,000	16 × 31.5	0.030	2,150
2,700	18 × 25	0.029	2,130	1,800	18 × 25	0.029	2,130	1,000	18 × 25	0.032	1,930
3,300	16 × 35.5	0.023	2,550	2,200	16 × 35.5	0.023	2,550	1,200	16 × 35.5	0.026	2,320
3,300	18 × 31.5	0.026	2,410	2,200	18 × 31.5	0.026	2,410	1,500	18 × 31.5	0.028	2,200
3,900	18 × 35.5	0.023	2,660	2,700	18 × 35.5	0.023	2,660	1,800	18 × 35.5	0.025	2,400
4,700	18 × 40	0.019	3,010	3,300	18 × 40	0.019	3,010	2,200	18 × 40	0.022	2,610



MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

RATINGS OF NXL(LXV) Series

Items μF	63			100		
	Case size	Impedance (Z_{max})	Rated ripple current ($mArms$)	Case size	Impedance (Z_{max})	Rated ripple current ($mArms$)
	$\varnothing D \times L(mm)$	(20°C/100kHz)	(105°C/100kHz)	$\varnothing D \times L(mm)$	(20°C/100kHz)	(105°C/100kHz)
0.47	5 × 11	65.3	38	5 × 11	31.2	38
0.68	5 × 11	47.2	45	5 × 11	22.1	45
1	5 × 11	31.5	53	5 × 11	14.7	53
1.5	5 × 11	22.4	65	5 × 11	9.80	65
2.2	5 × 11	15.2	78	5 × 11	5.40	78
3.3	5 × 11	11.1	98	5 × 11	4.60	98
4.7	5 × 11	10.8	115	5 × 11	3.90	115
6.8	5 × 11	4.30	120	6.3 × 11	3.20	128
10	5 × 11	2.90	134	6.3 × 11	1.70	154
15	6.3 × 11	2.70	188	8 × 11.5	1.20	222
22	6.3 × 11	1.36	228	8 × 11.5	0.82	270
33	8 × 11.5	0.66	330	10 × 12.5	0.41	384
47	10 × 12.5	0.58	327	10 × 16	0.37	400
68	10 × 16	0.36	431	10 × 20	0.27	470
100	10 × 20	0.29	570	12.5 × 20	0.27	670
150	10 × 25	0.20	765	12.5 × 25	0.21	894
220	12.5 × 20	0.16	994	16 × 25	0.17	1,201
330	12.5 × 25	0.10	1,327	16 × 31.5	0.11	1,471
470	16 × 31.5	0.091	1,518	16 × 35.5	0.091	1,681
680	16 × 35	0.065	2,060	18 × 40	0.072	2,122
1,000	16 × 35.5	0.049	2,250	18 × 40	0.051	2,897

RATED RIPPLE CURRENT MULTIPLIERS

Frequency Multipliers

Rated Voltage (V_{dc})	$\varnothing D$ (mm)	Frequency			
		120Hz	1kHz	10kHz	100kHz
6.3~10	$\varnothing 5 \sim \varnothing 8$	0.65	0.83	0.95	1.00
	$\varnothing 10 \sim \varnothing 12.5$	0.70	0.85	0.96	1.00
	$\varnothing 16 \sim \varnothing 18$	0.85	0.92	0.97	1.00
16~25	$\varnothing 5 \sim \varnothing 8$	0.55	0.76	0.91	1.00
	$\varnothing 10 \sim \varnothing 12.5$	0.65	0.83	0.93	1.00
	$\varnothing 16 \sim \varnothing 18$	0.70	0.87	0.96	1.00
35~50	$\varnothing 5 \sim \varnothing 8$	0.40	0.66	0.85	1.00
	$\varnothing 10 \sim \varnothing 12.5$	0.50	0.73	0.89	1.00
	$\varnothing 16 \sim \varnothing 18$	0.60	0.81	0.94	1.00
63~100	$\varnothing 5 \sim \varnothing 8$	0.20	0.55	0.80	1.00
	$\varnothing 10 \sim \varnothing 12.5$	0.35	0.65	0.85	1.00
	$\varnothing 16 \sim \varnothing 18$	0.50	0.75	0.90	1.00



NXP(LXZ) Series

• 105°C 2,000 ~ 5,000Hrs assured.

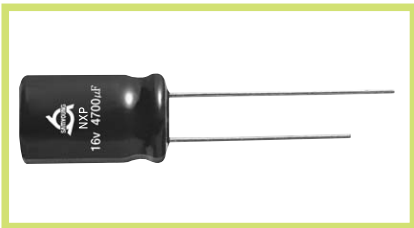
- Low impedance.
- Downsized of LXV series.
- For SMPS, IP-Board, Adaptor
- RoHS compliant.
- Halogen-free capacitors are also available.

Solvent-proof

NXL

NXP(LXZ)

Low Imp.
Downsized



SPECIFICATIONS

Item	Characteristics																	
Rated Voltage Range	6.3 ~ 35 V _{DC}																	
Operating Temperature Range	-55 ~ +105℃																	
Capacitance Tolerance	±20%(M) (at 20℃, 120Hz)																	
Leakage Current	I = 0.01CV (μA) or 3μA, whichever is greater. Where, I:Max. leakage current(μA) C:Nominal capacitance(μF) V:Rated voltage(V _{DC}) (at 20℃, 2 minutes)																	
Dissipation Factor (Tanδ)	<table border="1"><tr><td>Rated Voltage(V_{DC})</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td></tr><tr><td>TANδ(Max.)</td><td>0.22</td><td>0.19</td><td>0.16</td><td>0.14</td><td>0.12</td></tr></table> When the capacitance exceeds 1,000μF, 0.02 shall be added every 1,000μF increase. (at 20℃, 120Hz)						Rated Voltage(V _{DC})	6.3	10	16	25	35	TANδ(Max.)	0.22	0.19	0.16	0.14	0.12
Rated Voltage(V _{DC})	6.3	10	16	25	35													
TANδ(Max.)	0.22	0.19	0.16	0.14	0.12													
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated voltage is applied at 105℃ for the specified period of time. <table><tr><td>Capacitance change ≤ ±20% of the initial value</td><td>ø 5, 6.3</td><td>2,000 hours</td></tr><tr><td>Tanδ ≤ 200% of the initial specified value</td><td>ø 8</td><td>3,000 hours</td></tr><tr><td>Leakage Current ≤ The initial specified value</td><td>ø 10~</td><td>5,000 hours</td></tr></table>						Capacitance change ≤ ±20% of the initial value	ø 5, 6.3	2,000 hours	Tanδ ≤ 200% of the initial specified value	ø 8	3,000 hours	Leakage Current ≤ The initial specified value	ø 10~	5,000 hours			
Capacitance change ≤ ±20% of the initial value	ø 5, 6.3	2,000 hours																
Tanδ ≤ 200% of the initial specified value	ø 8	3,000 hours																
Leakage Current ≤ The initial specified value	ø 10~	5,000 hours																
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after exposing them for 1,000 hours at 105℃ without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≤ ±20% of the initial value Tanδ ≤ 200% of the initial specified value Leakage Current ≤ The initial specified value																	
others	Satisfied characteristics KS C IEC 60384-4																	

DIMENSIONS OF NXP(LXZ) Series

Unit(mm)

Technical drawing of a capacitor showing side and end views with dimensions:

- Side View:**
 - Overall length: L'
 - Lead length: 15min.
 - Lead diameter: ϕd
 - Terminal diameter: $\phi D'$
 - Terminal diameter tolerance: ± 0.3
 - Terminal diameter tolerance: ± 0.5
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 - Terminal diameter tolerance: ± 0.5
 - Terminal

RATED RIPPLE CURRENT MULTIPLIERS

Frequency Multipliers

Cap.(μF) \ Freq.(Hz)	120	1k	10k	100k
33 ~ 180	0.40	0.75	0.90	1.00
220 ~ 560	0.50	0.85	0.94	1.00
680 ~ 1,800	0.60	0.87	0.95	1.00
2,200 ~ 3,900	0.75	0.90	0.95	1.00
4,700 ~ 18,000	0.85	0.95	0.98	1.00



MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

RATINGS OF NXP(LXZ) Series

Vdc ∅ D×L(mm)	6.3			10			16		
	μF	IMP.	Ripple	μF	IMP.	Ripple	μF	IMP.	Ripple
5×11	150	0.50	175	100	0.50	175	47	0.50	175
6.3×11	330	0.25	290	220	0.25	290	100	0.25	290
6.3×15	470	0.18	400	330	0.18	400	220	0.18	400
8×11.5	680	0.12	555	470	0.12	555	330	0.12	555
8×15	1,000	0.090	730	680	0.090	730	470	0.090	730
8×20	1,200	0.080	810	1,000	0.080	810	560	0.080	810
10×12.5	820	0.090	760	680	0.090	760	470	0.090	760
10×16	1,200	0.068	1,050	1,000	0.068	1,050	680	0.068	1,050
10×20	1,500	0.052	1,220	1,200	0.052	1,220	1,000	0.052	1,220
10×25	2,200	0.045	1,440	1,500	0.045	1,440	1,200	0.045	1,440
10×30	2,700	0.037	1,690	1,800	0.037	1,690	1,500	0.037	1,690
12.5×20	3,300	0.038	1,660	2,200	0.038	1,660	1,500	0.038	1,660
12.5×25	3,900	0.030	1,950	3,300	0.030	1,950	2,200	0.030	1,950
12.5×30	4,700	0.025	2,310	3,900	0.025	2,310	2,700	0.025	2,310
12.5×35	5,600	0.022	2,510	4,700	0.022	2,510	3,300	0.022	2,510
12.5×42.5	6,800	0.019	2,870	5,600	0.019	2,870	3,900	0.019	2,870
16×20	5,600	0.031	2,210	3,900	0.031	2,210	2,700	0.031	2,210
16×25	6,800	0.024	2,560	5,600	0.024	2,560	3,900	0.024	2,560
16×31.5	8,200	0.021	3,010	6,800	0.021	3,010	4,700	0.021	3,010
16×35.5	10,000	0.019	3,150	8,200	0.019	3,150	5,600	0.019	3,150
18×20	6,800	0.031	2,490	5,600	0.031	2,490	3,900	0.031	2,490
18×25	10,000	0.023	2,740	6,800	0.023	2,740	4,700	0.023	2,740
18×31.5	12,000	0.021	3,330	8,200	0.021	3,330	5,600	0.021	3,330
18×35.5	15,000	0.019	3,680	10,000	0.019	3,680	8,200	0.019	3,680
18×40	18,000	0.018	3,800	12,000	0.018	3,800	10,000	0.018	3,800

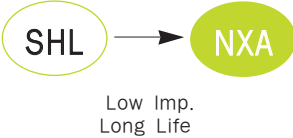
Vdc ∅ D×L(mm)	25			35		
	μF	IMP.	Ripple	μF	IMP.	Ripple
5×11	47	0.50	175	33	0.50	175
6.3×11	100	0.25	290	56	0.25	290
6.3×15	150	0.18	400	100	0.18	400
8×11.5	220	0.12	555	150	0.12	555
8×15	330	0.090	730	220	0.090	730
8×20	390	0.080	810	270	0.080	810
10×12.5	330	0.090	760	220	0.090	760
10×16	470	0.068	1,050	330	0.068	1,050
10×20	680	0.052	1,220	470	0.052	1,220
10×25	820	0.045	1,440	560	0.045	1,440
10×30	1,000	0.037	1,690	680	0.037	1,690
12.5×20	1,000	0.038	1,660	680	0.038	1,660
12.5×25	1,500	0.030	1,950	1,000	0.030	1,950
12.5×30	1,800	0.025	2,310	1,200	0.025	2,310
12.5×35	2,200	0.022	2,510	1,500	0.022	2,510
12.5×42.5	2,700	0.019	2,870	1,800	0.019	2,870
16×20	1,800	0.031	2,210	1,200	0.031	2,210
16×25	2,700	0.024	2,560	1,800	0.024	2,560
16×31.5	3,300	0.021	3,010	2,200	0.021	3,010
16×35.5	3,900	0.019	3,150	2,700	0.019	3,150
18×20	2,200	0.031	2,490	1,800	0.031	2,490
18×25	3,300	0.023	2,740	2,200	0.023	2,740
18×31.5	3,900	0.021	3,330	2,700	0.021	3,330
18×35.5	4,700	0.019	3,680	3,300	0.019	3,680
18×40	5,600	0.018	3,800	3,900	0.018	3,800

↑ Rated Ripple Current (mArms/ 105°C, 100kHz)
↑ Impedance (Ω max./ 20°C, 100kHz)
↑ Nominal Capacitance(μF)

NXA Series

• 105°C 4,000 ~ 10,000Hrs assured.

- Non-solvent proof.
- Low impedance, long life
- For SMPS, IP-Board, Adaptor, Noise Filter, Charger
- RoHS compliant.
- Halogen-free capacitors are also available.

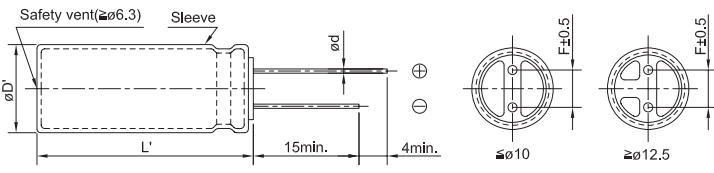


SPECIFICATIONS

Item	Characteristics																														
Rated Voltage Range	6.3 ~ 100 V _{DC}																														
Operating Temperature Range	-40 ~ +105°C																														
Capacitance Tolerance	±20%(M) (at 20°C, 120Hz)																														
Leakage Current	I=0.01CV(μA) or 3μA, whichever is greater. Where, I:Max. Leakage current(μA), C:Nominal capacitance(μF), V:Rated voltage(V _{DC}) (at 20°C, 2 minutes)																														
Dissipation Factor (Tanδ)	<table><tr><td>Rated Voltage(V_{DC})</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td><td>63</td><td>80</td><td>100</td></tr><tr><td>Tanδ(Max.)</td><td>0.22</td><td>0.19</td><td>0.16</td><td>0.14</td><td>0.12</td><td>0.10</td><td>0.09</td><td>0.09</td><td>0.08</td></tr></table> When the capacitance exceeds 1,000μF, 0.02 shall be added every 1,000μF increase. (at 20°C, 120Hz)	Rated Voltage(V _{DC})	6.3	10	16	25	35	50	63	80	100	Tanδ(Max.)	0.22	0.19	0.16	0.14	0.12	0.10	0.09	0.09	0.08										
Rated Voltage(V _{DC})	6.3	10	16	25	35	50	63	80	100																						
Tanδ(Max.)	0.22	0.19	0.16	0.14	0.12	0.10	0.09	0.09	0.08																						
Temperature Characteristics (Max. Impedance ratio)	<table><tr><td>Rated Voltage(V_{DC})</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td><td>63</td><td>80</td><td>100</td></tr><tr><td>Z(-25°C)/Z(+20°C)</td><td>4</td><td>3</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td></tr><tr><td>Z(-40°C)/Z(+20°C)</td><td>8</td><td>6</td><td>4</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td></tr></table> (at 120Hz)	Rated Voltage(V _{DC})	6.3	10	16	25	35	50	63	80	100	Z(-25°C)/Z(+20°C)	4	3	2	2	2	2	2	2	2	Z(-40°C)/Z(+20°C)	8	6	4	3	3	3	3	3	3
Rated Voltage(V _{DC})	6.3	10	16	25	35	50	63	80	100																						
Z(-25°C)/Z(+20°C)	4	3	2	2	2	2	2	2	2																						
Z(-40°C)/Z(+20°C)	8	6	4	3	3	3	3	3	3																						
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied at 105°C for the specified period of time. Capacitance change ≤ ±25% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value <table><tr><td>V_{DC}</td><td>ø5~ø6.3</td><td>ø8~ø10</td><td>ø12.5~ø18</td></tr><tr><td>6.3~10(V)</td><td>4,000 hours</td><td>6,000 hours</td><td>8,000 hours</td></tr><tr><td>16~100(V)</td><td>5,000 hours</td><td>7,000 hours</td><td>10,000 hours</td></tr></table>	V _{DC}	ø5~ø6.3	ø8~ø10	ø12.5~ø18	6.3~10(V)	4,000 hours	6,000 hours	8,000 hours	16~100(V)	5,000 hours	7,000 hours	10,000 hours																		
V _{DC}	ø5~ø6.3	ø8~ø10	ø12.5~ø18																												
6.3~10(V)	4,000 hours	6,000 hours	8,000 hours																												
16~100(V)	5,000 hours	7,000 hours	10,000 hours																												
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 500 hours at 105°C without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≤ ±25% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value																														
Others	Satisfied characteristics KS C IEC 60384-4																														

DIMENSIONS OF NXA Series

Unit(mm)



Marking : DARK BROWN SLEEVE, SILVER INK

øD	5	6.3	8	10	12.5	16	18
ød	0.5	0.5	0.6	0.6	0.6	0.8	0.8
F	2.0	2.5	3.5	5.0	5.0	7.5	7.5
øD'	øD + 0.5 max.						
L'	L + 1.5 max.			L + 2.0 max.			



MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

RATINGS OF NXA Series

Vdc ∅D×L(mm)	6.3			10			16		
	μF	IMP.	Ripple	μF	IMP.	Ripple	μF	IMP.	Ripple
5 × 11	150	0.58	210	100	0.58	210	56	0.58	210
6.3 × 11	330	0.22	340	220	0.22	340	120	0.22	340
8 × 11.5	680	0.13	640	470	0.13	640	330	0.13	640
8 × 15	1,000	0.087	840	680	0.087	840	470	0.087	840
8 × 20	1,200	0.069	1,050	1,000	0.069	1,050	680	0.069	1,050
10 × 12.5	820	0.080	865	680	0.080	865	470	0.080	865
10 × 16	1,200	0.060	1,210	1,000	0.060	1,210	680	0.060	1,210
10 × 20	1,500	0.046	1,400	1,200	0.046	1,400	1,000	0.046	1,400
10 × 25	2,200	0.042	1,650	1,500	0.042	1,650	1,200	0.042	1,650
10 × 30	2,700	0.031	1,910	2,200	0.031	1,910	1,500	0.031	1,910
12.5 × 16	1,800	0.049	1,450	1,500	0.049	1,450	1,000	0.049	1,450
12.5 × 20	3,300	0.035	1,900	2,200	0.035	1,900	1,500	0.035	1,900
12.5 × 25	3,900	0.027	2,230	3,300	0.027	2,230	2,200	0.027	2,230
12.5 × 30	4,700	0.024	2,650	3,900	0.024	2,650	2,700	0.024	2,650
12.5 × 35	5,600	0.020	2,880	4,700	0.020	2,880	3,300	0.020	2,880
16 × 15	2,700	0.042	1,940	2,200	0.042	1,940	1,500	0.042	1,940
16 × 20	5,600	0.027	2,530	3,900	0.027	2,530	2,700	0.027	2,530
16 × 25	6,800	0.021	2,930	5,600	0.021	2,930	3,900	0.021	2,930
16 × 31.5	8,200	0.017	3,450	6,800	0.017	3,450	4,700	0.017	3,450
16 × 35	10,000	0.015	3,610	8,200	0.015	3,610	5,600	0.015	3,610
16 × 40	12,000	0.013	4,080	10,000	0.013	4,080	6,800	0.013	4,080
18 × 15	3,900	0.043	2,210	2,700	0.043	2,210	2,200	0.042	1,940
18 × 20	6,800	0.026	2,860	5,600	0.026	2,860	3,900	0.026	2,860
18 × 25	10,000	0.019	3,140	6,800	0.019	3,140	4,700	0.043	2,210
18 × 31.5	12,000	0.015	4,170	8,200	0.015	4,170	5,600	0.015	4,170
18 × 35.5	15,000	0.014	4,220	10,000	0.014	4,220	8,200	0.015	3,610
18 × 40	18,000	0.012	4,280	12,000	0.012	4,280	10,000	0.012	4,280

Vdc ∅D×L(mm)	25			35			50		
	μF	IMP.	Ripple	μF	IMP.	Ripple	μF	IMP.	Ripple
5 × 11	47	0.58	210	33	0.58	210	10	1.5	100
6.3 × 11	100	0.22	340	56	0.22	340	22	0.3	295
8 × 11.5	220	0.13	640	150	0.13	640	100	0.17	555
8 × 15	330	0.087	840	220	0.087	840	120	0.12	730
8 × 20	470	0.069	1,050	270	0.069	1,050	180	0.09	910
10 × 12.5	330	0.080	865	220	0.080	865	150	0.12	760
10 × 16	470	0.060	1,210	330	0.060	1,210	220	0.084	1,050
10 × 20	680	0.046	1,400	470	0.046	1,400	270	0.060	1,220
10 × 25	820	0.042	1,650	560	0.042	1,650	330	0.055	1,440
10 × 30	1,000	0.031	1,910	680	0.031	1,910	470	0.043	1,690
12.5 × 16	680	0.049	1,450	470	0.049	1,450	270	0.061	1,260
12.5 × 20	1,000	0.035	1,900	680	0.035	1,900	470	0.045	1,660
12.5 × 25	1,500	0.027	2,230	1,000	0.027	2,230	560	0.034	1,950
12.5 × 30	1,800	0.024	2,650	1,200	0.024	2,650	680	0.030	2,310
12.5 × 35	2,200	0.020	2,880	1,500	0.020	2,880	820	0.025	2,510
16 × 15	1,000	0.042	1,940	680	0.042	1,940	470	0.055	1,690
16 × 20	1,800	0.027	2,530	1,200	0.027	2,530	820	0.034	2,210
16 × 25	2,700	0.021	2,930	1,800	0.021	2,930	1,000	0.025	2,555
16 × 31.5	3,300	0.017	3,450	2,200	0.017	3,450	1,200	0.022	3,010
16 × 35	3,900	0.015	3,610	2,700	0.015	3,610	1,500	0.019	3,150
16 × 40	4,700	0.013	4,080	3,300	0.013	4,080	1,800	0.016	3,710
18 × 15	1,200	0.043	2,210	1,000	0.043	2,210	560	0.054	1,930
18 × 20	2,200	0.026	2,860	1,800	0.026	2,860	1,000	0.036	2,490
18 × 25	3,300	0.019	3,140	2,200	0.019	3,140	1,200	0.026	2,740
18 × 31.5	3,900	0.015	4,170	2,700	0.015	4,170	1,800	0.021	3,635
18 × 35.5	4,700	0.014	4,220	3,300	0.014	4,220	2,200	0.017	3,680
18 × 40	5,600	0.012	4,280	3,900	0.012	4,280	2,700	0.014	3,800

↑ Rated Ripple Current (mArms/ 105°C, 100kHz)
↑ Impedance (Ω max./ 20°C, 100kHz)
↑ Nominal Capacitance(μF)

RATINGS OF NXA Series

V _{DC} ∅ D×L(mm)	63			80			100		
	μF	IMP.	Ripple	μF	IMP.	Ripple	μF	IMP.	Ripple
5×11	15	0.88	165				6.8	1.4	125
6.3×11	33	0.35	265				15	0.57	205
8×11.5	56	0.22	500				27	0.36	355
8×15	82	0.16	665				39	0.25	450
8×20	120	0.12	820				56	0.19	565
10×12.5	82	0.11	690	68	0.17	480	47	0.17	480
10×16	120	0.076	950	100	0.11	600	68	0.11	600
10×20	180	0.056	1,150	120	0.084	800	82	0.084	800
10×25	220	0.046	1,350	150	0.069	900	120	0.069	900
12.5×16	180	0.072	1,150	150	0.11	750	100	0.11	750
12.5×20	270	0.041	1,500	220	0.062	1,100	150	0.062	1,100
12.5×25	390	0.031	1,900	330	0.047	1,250	220	0.047	1,250
12.5×30	470	0.028	2,300	390	0.042	1,500	270	0.042	1,500
12.5×35	560	0.024	2,500	470	0.036	1,650	330	0.036	1,650
16×20	470	0.032	2,000	330	0.048	1,350	220	0.048	1,350
16×25	680	0.025	2,600	470	0.038	1,700	330	0.036	1,650
16×31.5	820	0.021	2,850	680	0.032	1,850	470	0.032	1,850
16×35	1,000	0.019	2,900	820	0.029	2,000	560	0.029	2,000
16×40	1,200	0.018	3,400	1,000	0.027	2,200	680	0.027	2,200
18×20	680	0.030	2,500	470	0.038	1,700	330	0.045	1,500
18×25	820	0.024	2,800	680	0.036	1,750	470	0.036	1,750
18×31.5	1,200	0.020	3,300	820	0.030	1,900	560	0.030	1,900
18×35.5	1,500	0.018	3,400	1,000	0.027	2,200	680	0.027	2,200
18×40	1,800	0.017	3,500	1,200	0.026	2,700	820	0.026	2,700

Rated Ripple Current (mArms/ 105°C, 100kHz)

Impedance (Ω max./ 20°C, 100kHz)

Nominal Capacitance(μF)

RATED RIPPLE CURRENT MULTIPLIERS

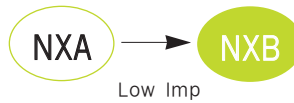
Frequency Multipliers

Frequency(Hz) Capacitance(μF)	120	1k	10k	100k
6.8 ~ 180	0.40	0.75	0.90	1.00
220 ~ 560	0.50	0.85	0.94	1.00
680 ~ 1,800	0.60	0.87	0.95	1.00
2,200 ~ 3,900	0.75	0.90	0.95	1.00
4,700 ~ 18,000	0.85	0.95	0.98	1.00

NXB Series

• 105°C 2,000~5,000Hrs assured.

- Non-solvent proof.
- Very low impedance
- For SMPS, IP-Board, Adaptor, Noise Filter, Charger
- RoHS compliant.
- Halogen-free capacitors are also available.

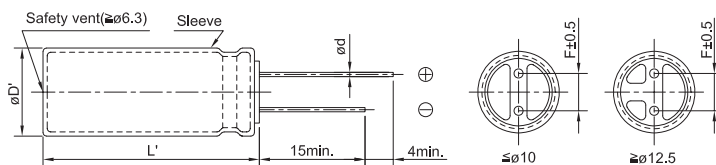


SPECIFICATIONS

Item	Characteristics																		
Rated Voltage Range	6.3 ~ 100 V _{DC}																		
Operating Temperature Range	-40 ~ +105℃																		
Capacitance Tolerance	±20%(M) (at 20℃, 120Hz)																		
Leakage Current	I=0.01CV(μA) or 3μA, whichever is greater. Where, I:Max. Leakage current(μA), C:Nominal capacitance(μF), V:Rated voltage(V _{DC}) (at 20℃, 2 minutes)																		
Dissipation Factor Tanδ	<table><tr><td>Rated voltage(V_{DC})</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td><td>63</td><td>100</td></tr><tr><td>Tanδ(Max)</td><td>0.22</td><td>0.19</td><td>0.16</td><td>0.14</td><td>0.12</td><td>0.10</td><td>0.09</td><td>0.08</td></tr></table> When the capacitance exceeds 1000μF, 0.02 shall be added every 1000μF increase. (at 20℃, 120Hz)	Rated voltage(V _{DC})	6.3	10	16	25	35	50	63	100	Tanδ(Max)	0.22	0.19	0.16	0.14	0.12	0.10	0.09	0.08
Rated voltage(V _{DC})	6.3	10	16	25	35	50	63	100											
Tanδ(Max)	0.22	0.19	0.16	0.14	0.12	0.10	0.09	0.08											
Temperature Characteristics (Max. Impedance ratio)	<table><tr><td>Z(-25℃)/Z(20℃)</td><td>2</td></tr><tr><td>Z(-40℃)/Z(20℃)</td><td>3</td></tr></table> (at 120Hz)	Z(-25℃)/Z(20℃)	2	Z(-40℃)/Z(20℃)	3														
Z(-25℃)/Z(20℃)	2																		
Z(-40℃)/Z(20℃)	3																		
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated voltage is applied at 105℃ for the specified period of time. <table><tr><td>Case Size(∅ D)</td><td>Life Time</td></tr><tr><td>∅ 5, 6.3</td><td>2,000 hours</td></tr><tr><td>∅ 8</td><td>3,000 hours</td></tr><tr><td>∅ 10</td><td>4,000 hours</td></tr><tr><td>∅ 12.5 ~</td><td>5,000 hours</td></tr></table> Capacitance change ≤ ±25% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value	Case Size(∅ D)	Life Time	∅ 5, 6.3	2,000 hours	∅ 8	3,000 hours	∅ 10	4,000 hours	∅ 12.5 ~	5,000 hours								
Case Size(∅ D)	Life Time																		
∅ 5, 6.3	2,000 hours																		
∅ 8	3,000 hours																		
∅ 10	4,000 hours																		
∅ 12.5 ~	5,000 hours																		
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after exposing them for 1,000 hours at 105℃ without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≤ ±25% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value																		
Others	Satisfied characteristics KS C IEC 60384-4																		

DIMENSIONS OF NXB Series

Unit(mm)



Marking : DARK BROWN SLEEVE, SILVER INK

φD	5	6.3	8	10	12.5	16	18
φd	0.5	0.5	0.6	0.6	0.6	0.8	0.8
F	2.0	2.5	3.5	5.0	5.0	7.5	7.5
φD'	φD+0.5 max.						
L'	L+1.5 max.			L+2.0 max.			

RATINGS OF NXB Series

$\frac{V_{DC}}{\varnothing D \times L(mm)}$	6.3			10			16		
	μF	IMP.	Ripple	μF	IMP.	Ripple	μF	IMP.	Ripple
5 × 11	220	0.30	250	150	0.30	250	100	0.30	250
6.3 × 11	470	0.13	405	330	0.13	405	220	0.13	405
6.3 × 15	560	0.10	646	470	0.10	646	330	0.10	646
8 × 11.5	820	0.072	760	680	0.072	760	470	0.072	760
8 × 15	1,200	0.060	818	1,000	0.060	818	680	0.060	818
8 × 20	1,500	0.050	1,260	1,200	0.050	1,260	1,000	0.050	1,260
10 × 12.5	1,200	0.053	1,030	820	0.053	1,030	680	0.053	1,030
10 × 16	1,800	0.038	1,430	1,000	0.038	1,430	1,000	0.038	1,430
10 × 20	2,200	0.023	1,820	1,500	0.023	1,820	1,500	0.023	1,820
10 × 25	3,300	0.022	2,150	2,200	0.022	2,150	1,800	0.022	2,150
12.5 × 16	1,800	0.031	1,452	1,500	0.031	1,452	1,000	0.031	1,452
12.5 × 20	3,900	0.021	2,360	3,300	0.021	2,360	2,200	0.021	2,360
12.5 × 25	4,700	0.020	2,770	3,900	0.020	2,770	2,700	0.020	2,770
12.5 × 30	5,600	0.018	3,290	4,700	0.018	3,290	3,300	0.018	3,290
12.5 × 35	6,800	0.017	3,400	5,600	0.017	3,400	3,900	0.017	3,400
16 × 15	2,700	0.040	1,375	1,800	0.040	1,375	1,200	0.040	1,375
16 × 20	5,600	0.021	3,140	4,700	0.021	3,140	3,300	0.021	3,140
16 × 25	6,800	0.019	3,460	5,600	0.019	3,460	4,700	0.019	3,460
16 × 31.5	8,200	0.013	3,680	6,800	0.013	3,680	5,600	0.013	3,680
18 × 15	3,300	0.043	1,279	2,200	0.043	1,279	1,800	0.043	1,279
18 × 20	5,600	0.023	2,826	4,700	0.023	2,826	3,300	0.023	2,826
18 × 25	8,200	0.018	3,611	5,600	0.018	3,611	3,900	0.018	3,611

$\frac{V_{DC}}{\varnothing D \times L(mm)}$	25			35			50		
	μF	IMP.	Ripple	μF	IMP.	Ripple	μF	IMP.	Ripple
5 × 11	68	0.30	250	47	0.30	250	27	0.30	250
6.3 × 11	150	0.13	405	100	0.13	405	56	0.14	385
6.3 × 15	220	0.10	646	150	0.10	646	100	0.10	646
8 × 11.5	220	0.072	760	150	0.072	760	100	0.072	724
8 × 15	390	0.060	818	270	0.060	818	120	0.060	818
8 × 20	560	0.050	1,260	390	0.050	1,260	180	0.050	1,260
10 × 12.5	470	0.053	1,030	330	0.053	1,030	150	0.061	979
10 × 16	680	0.038	1,430	470	0.038	1,430	220	0.042	1,370
10 × 20	820	0.023	1,820	560	0.023	1,820	330	0.030	1,580
10 × 25	1,000	0.022	2,150	680	0.022	2,150	470	0.028	1,870
12.5 × 16	680	0.031	1,452	470	0.031	1,452	270	0.042	1,071
12.5 × 20	1,500	0.021	2,360	1,000	0.021	2,360	470	0.027	2,050
12.5 × 25	1,800	0.020	2,770	1,200	0.020	2,770	560	0.023	2,410
12.5 × 30	2,200	0.018	3,290	1,500	0.018	3,290	680	0.021	2,860
12.5 × 35	2,700	0.017	3,400	1,800	0.017	3,400	820	0.019	2,960
16 × 15	820	0.040	1,375	560	0.040	1,375	390	0.046	1,196
16 × 20	2,200	0.021	3,140	1,500	0.021	3,140	820	0.023	2,730
16 × 25	3,300	0.019	3,460	1,800	0.019	3,460	1,000	0.021	3,010
16 × 31.5	3,300	0.013	3,680	2,200	0.013	3,680	1,500	0.014	3,201
18 × 15	1,200	0.043	1,279	680	0.043	1,279	470	0.049	1,122
18 × 20	2,200	0.020	3,250	1,500	0.020	3,250	1,000	0.022	2,850
18 × 25	2,700	0.018	3,611	1,800	0.018	3,611	1,200	0.020	3,140

Rated Ripple Current (mA rms/ 105°C, 100kHz)
 Impedance (Ω max./ 20°C, 100kHz)
 Nominal Capacitance(μF)



MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

V _{DC} ∅D×L (mm)	63		
	μF	IMP.	Ripple
5 × 11	10	0.45	165
6.3 × 11	33	0.30	265
6.3 × 15	47	0.25	420
8 × 11.5	47	0.20	500
10 × 12.5	68	0.16	600
10 × 16	100	0.10	945
10 × 20	150	0.080	1,100
10 × 25	220	0.070	1,300
12.5 × 20	330	0.040	1,495
16 × 20	470	0.035	1,990
16 × 25	680	0.030	2,780
16 × 35.5	1,000	0.020	2,835

V _{DC} ∅D×L (mm)	100		
	μF	IMP.	Rilpple
5 × 11	3.3	2.0	125
5 × 11	4.7	2.0	125
6.3 × 11	10	0.50	205
6.3 × 15	22	0.40	300
8 × 11.5	22	0.30	355
10 × 12.5	33	0.25	450
10 × 16	47	0.20	580
12.5 × 20	100	0.10	1,045
12.5 × 25	150	0.070	1,195
16 × 25	220	0.060	1,600
16 × 31.5	330	0.040	1,750
18 × 40	470	0.030	2,060

Rated Ripple Current (mArms/ 105°C, 100kHz)
Impedance (Ω max./ 20°C, 100kHz)
Nominal Capacitance(μF)

RATED RIPPLE CURRENT MULTIPLIERS

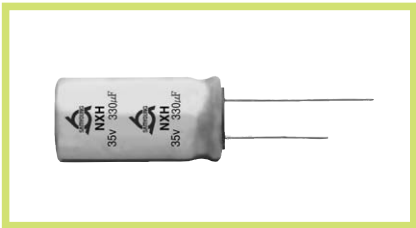
Frequency Multipliers

Freq.(Hz) Cap.(μF)	120	1k	10k	100k
3.3 ~ 180	0.40	0.75	0.90	1.00
220 ~ 560	0.50	0.85	0.94	1.00
680 ~ 1,800	0.60	0.87	0.95	1.00
2,200 ~ 3,900	0.75	0.90	0.95	1.00
4,700 ~ 18,000	0.85	0.95	0.98	1.00

NXH Series

• 105°C 6,000~10,000Hrs assured.

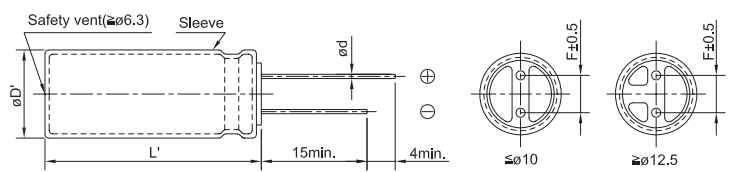
- Non-solvent proof.
- Low impedance
- Long life.
- For LCD TV BLU Inverter, SMPS, IP-Board, Adaptor
- RoHS compliant.
- Halogen-free capacitors are also available.



SPECIFICATIONS

Item	Characteristics																				
Rated Voltage Range	6.3 ~ 50 V _{DC}																				
Operating Temperature Range	-40 ~ +105°C																				
Capacitance Tolerance	±20%(M) (at 20°C, 120Hz)																				
Leakage Current	I=0.01CV(μA) or 3μA, whichever is greater. Where, I:Max. Leakage current(μA), C:Nominal capacitance(μF), V:Rated voltage(V _{DC}) (at 20°C, 2 minutes)																				
Dissipation Factor (Tanδ)	<table><tr><td>Rated voltage(V_{DC})</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td></tr><tr><td>Tanδ (Max.)</td><td>0.22</td><td>0.19</td><td>0.16</td><td>0.14</td><td>0.12</td><td>0.10</td></tr></table> When the capacitance exceeds 1,000μF, 0.02 shall be added every 1,000μF increase (at 20°C, 120Hz)	Rated voltage(V _{DC})	6.3	10	16	25	35	50	Tanδ (Max.)	0.22	0.19	0.16	0.14	0.12	0.10						
Rated voltage(V _{DC})	6.3	10	16	25	35	50															
Tanδ (Max.)	0.22	0.19	0.16	0.14	0.12	0.10															
Temperature Characteristics (Max. Impedance ratio)	<table><tr><td>Z(-25°C)/Z(+20°C)</td><td>2</td></tr><tr><td>Z(-40°C)/Z(+20°C)</td><td>3</td></tr></table> (at 120Hz)	Z(-25°C)/Z(+20°C)	2	Z(-40°C)/Z(+20°C)	3																
Z(-25°C)/Z(+20°C)	2																				
Z(-40°C)/Z(+20°C)	3																				
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage with the rated ripple current is applied for the specified period of time at 105°C. <table><tr><td>Rated voltage(V_{DC})</td><td>6.3~10</td><td>16~50</td><td>øD</td><td>Life Time</td></tr><tr><td>Capacitance change</td><td>≤±30% of the initial value</td><td>≤±25% of the initial value</td><td>ø5~ ø6.3</td><td>6,000 hours</td></tr><tr><td>Tan δ</td><td colspan="2">≤200% of the initial specified value</td><td>ø8</td><td>8,000 hours</td></tr><tr><td>Leakage current</td><td colspan="2">≤The initial specified value</td><td>ø10~</td><td>10,000 hours</td></tr></table>	Rated voltage(V _{DC})	6.3~10	16~50	øD	Life Time	Capacitance change	≤±30% of the initial value	≤±25% of the initial value	ø5~ ø6.3	6,000 hours	Tan δ	≤200% of the initial specified value		ø8	8,000 hours	Leakage current	≤The initial specified value		ø10~	10,000 hours
Rated voltage(V _{DC})	6.3~10	16~50	øD	Life Time																	
Capacitance change	≤±30% of the initial value	≤±25% of the initial value	ø5~ ø6.3	6,000 hours																	
Tan δ	≤200% of the initial specified value		ø8	8,000 hours																	
Leakage current	≤The initial specified value		ø10~	10,000 hours																	
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1,000 hours at 105°C without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. <table><tr><td>Rated voltage(V_{DC})</td><td>6.3~10</td><td>16~50</td></tr><tr><td>Capacitance change</td><td>≤±30% of the initial value</td><td>≤±25% of the initial value</td></tr><tr><td>Tan δ</td><td colspan="2">≤200% of the initial specified value</td></tr><tr><td>Leakage current</td><td colspan="2">≤The initial specified value</td></tr></table>	Rated voltage(V _{DC})	6.3~10	16~50	Capacitance change	≤±30% of the initial value	≤±25% of the initial value	Tan δ	≤200% of the initial specified value		Leakage current	≤The initial specified value									
Rated voltage(V _{DC})	6.3~10	16~50																			
Capacitance change	≤±30% of the initial value	≤±25% of the initial value																			
Tan δ	≤200% of the initial specified value																				
Leakage current	≤The initial specified value																				
Others	Satisfied characteristics KS C IEC 60384-4																				

DIMENSIONS OF NXH Series



Marking : YELLOW SLEEVE, BLACK INK

ØD	5	6.3	8	10	12.5	16	18
Ød	0.5	0.5	0.6	0.6	0.6	0.8	0.8
F	2.0	2.5	3.5	5.0	5.0	7.5	7.5
ØD'	ØD + 0.5 max.						
L'	L + 1.5 max.			L + 2.0 max.			



MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

RATINGS OF NXH Series

V _{DC} ∅D×L(mm)	6.3			10			16		
	μF	IMP.	Ripple	μF	IMP.	Ripple	μF	IMP.	Ripple
5 × 11	220	0.22	345	150	0.22	345	100	0.22	345
5 × 15	470	0.13	480	330	0.13	480	220	0.13	480
6.3 × 11	470	0.094	540	330	0.094	540	220	0.094	540
6.3 × 15	560	0.084	620	470	0.084	620	330	0.084	620
8 × 11.5	820	0.056	945	680	0.056	945	470	0.056	945
8 × 15	1,200	0.045	1,250	1,000	0.045	1,250	680	0.045	1,250
8 × 20	1,500	0.029	1,500	1,500	0.029	1,500	1,000	0.029	1,500
10 × 12.5	1,200	0.039	1,330	1,000	0.039	1,330	680	0.039	1,330
10 × 16	1,800	0.028	1,760	1,500	0.028	1,760	1,000	0.028	1,760
10 × 20	2,200	0.020	1,960	1,800	0.020	1,960	1,500	0.020	1,960
10 × 25	2,700	0.018	2,250	2,200	0.018	2,250	1,800	0.018	2,250
10 × 33	3,300	0.015	2,550	2,700	0.015	2,550	2,200	0.015	2,550
12.5 × 20	3,900	0.017	2,480	3,300	0.017	2,480	2,200	0.017	2,480
12.5 × 25	4,700	0.015	2,900	3,900	0.015	2,900	2,700	0.015	2,900
12.5 × 30	5,600	0.013	3,450	4,700	0.013	3,450	3,300	0.013	3,450
12.5 × 35	6,800	0.012	3,570	5,600	0.012	3,570	3,900	0.012	3,570
16 × 20	6,800	0.015	3,250	4,700	0.015	3,250	3,300	0.015	3,250
16 × 25	8,200	0.013	3,630	6,800	0.013	3,630	4,700	0.013	3,630
18 × 25	10,000	0.012	3,650	8,200	0.012	3,650	5,600	0.012	3,650

V _{DC} ∅D×L(mm)	25			35			50		
	μF	IMP.	Ripple	μF	IMP.	Ripple	μF	IMP.	Ripple
5 × 11	68	0.22	345	47	0.22	345	27	0.34	238
5 × 15	150	0.13	480	100	0.13	480	56	0.16	350
6.3 × 11	150	0.094	540	100	0.094	540	56	0.14	385
6.3 × 15	220	0.084	620	150	0.084	620	100	0.12	586
8 × 11.5	330	0.056	945	220	0.056	945	100	0.074	724
8 × 15	390	0.045	1,250	270	0.045	1,250	120	0.061	950
8 × 20	560	0.029	1,500	390	0.029	1,500	180	0.046	1,190
10 × 12.5	470	0.039	1,330	330	0.039	1,330	150	0.061	979
10 × 16	680	0.028	1,760	470	0.028	1,760	220	0.042	1,370
10 × 20	820	0.020	1,960	560	0.020	1,960	270	0.030	1,580
10 × 25	1,000	0.018	2,250	680	0.018	2,250	330	0.028	1,870
10 × 33	1,200	0.015	2,550	1,000	0.015	2,550	470	0.025	2,110
12.5 × 20	1,500	0.017	2,480	1,000	0.017	2,480	470	0.027	2,050
12.5 × 25	1,800	0.015	2,900	1,200	0.015	2,900	560	0.023	2,410
12.5 × 30	2,200	0.013	3,450	1,500	0.013	3,450	680	0.021	2,860
12.5 × 35	2,700	0.012	3,570	1,800	0.012	3,570	820	0.019	2,960
16 × 20	2,200	0.015	3,250	1,500	0.015	3,250	820	0.023	2,730
16 × 25	3,300	0.013	3,630	2,200	0.013	3,630	1,000	0.021	3,010
18 × 25	3,900	0.012	3,650	2,700	0.012	3,650	1,500	0.019	3,290

↑ Rated ripple Current (mA rms/ 105°C, 100kHz)
↑ Impedance (Ω max./ 20°C, 100kHz)
↑ Nominal Capacitance(μF)

RIPPLE CURRENT MULTIPLIERS

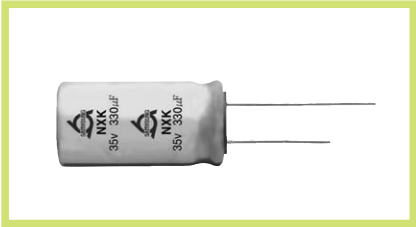
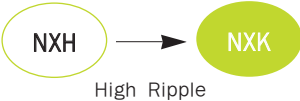
Frequency Multipliers

Cap.(μF)	Freq.(Hz)	120	1k	10k	100k
27 ~ 33		0.42	0.70	0.90	1.00
39 ~ 270		0.50	0.73	0.92	1.00
330 ~ 680		0.55	0.77	0.94	1.00
820 ~ 1,800		0.60	0.80	0.96	1.00
2,200 ~ 10,000		0.70	0.85	0.98	1.00

NXK Series

• 105°C 4,000~5,000Hrs assured

- Non-solvent proof.
- Low impedance.
- High Ripple.
- For LCD TV BLU Inverter, SMPS, IP-Board, Adaptor
- RoHS compliant.
- Halogen-free capacitors are also available.

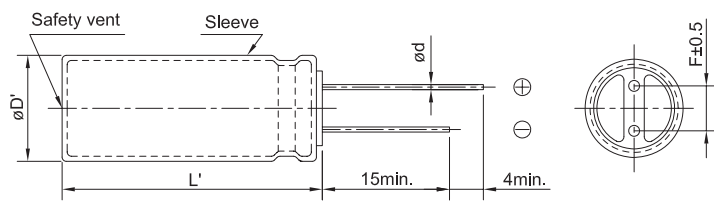


SPECIFICATIONS

Item	Characteristics																								
Rated Voltage Range	10 ~ 50 V _{DC}																								
Operating Temperature Range	-40 ~ + 105°C																								
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)																								
Leakage Current	I=0.01CV(μA) or 3μA, whichever is greater. Where, I:Max. leakage current(μA), C:Nominal capacitance(μF), V:Rated voltage(V _{DC}) (at 20°C, 2 minutes)																								
Dissipation Factor (Tanδ)	<table border="1"><tr><td>Rated Voltage(V_{DC})</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td></tr><tr><td>Tanδ(Max.)</td><td>0.19</td><td>0.16</td><td>0.14</td><td>0.12</td><td>0.10</td></tr></table> When the capacitance exceeds 1,000μF, 0.02 shall be added every 1,000μF increase. (at 20°C, 120Hz)					Rated Voltage(V _{DC})	10	16	25	35	50	Tanδ(Max.)	0.19	0.16	0.14	0.12	0.10								
Rated Voltage(V _{DC})	10	16	25	35	50																				
Tanδ(Max.)	0.19	0.16	0.14	0.12	0.10																				
Temperature Characteristics (Max. Impedance ratio)	<table border="1"><tr><td>Z(-25°C) / Z(+20°C)</td><td>2</td></tr><tr><td>Z(-40°C) / Z(+20°C)</td><td>3</td></tr></table> (at 120Hz)					Z(-25°C) / Z(+20°C)	2	Z(-40°C) / Z(+20°C)	3																
Z(-25°C) / Z(+20°C)	2																								
Z(-40°C) / Z(+20°C)	3																								
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage with the rated ripple current is applied for the specified period of tme at 105°C. <table border="1"><tr><td>Rated voltage(V_{DC})</td><td>10</td><td>16~50</td><td>Case Size(ø D)</td><td>Life Time</td></tr><tr><td>Capacitance change</td><td>≤ ±30% of the initial value</td><td>≤ ±25% of the initial value</td><td>ø 8 ø 10x12.5L</td><td>4,000Hrs</td></tr><tr><td>Tanδ</td><td colspan="2">≤ ±200% of the initial specified value</td><td></td><td></td></tr><tr><td>Leakage current</td><td colspan="2">≤ The initial specified value</td><td>ø 10</td><td>5,000Hrs</td></tr></table>					Rated voltage(V _{DC})	10	16~50	Case Size(ø D)	Life Time	Capacitance change	≤ ±30% of the initial value	≤ ±25% of the initial value	ø 8 ø 10x12.5L	4,000Hrs	Tanδ	≤ ±200% of the initial specified value				Leakage current	≤ The initial specified value		ø 10	5,000Hrs
Rated voltage(V _{DC})	10	16~50	Case Size(ø D)	Life Time																					
Capacitance change	≤ ±30% of the initial value	≤ ±25% of the initial value	ø 8 ø 10x12.5L	4,000Hrs																					
Tanδ	≤ ±200% of the initial specified value																								
Leakage current	≤ The initial specified value		ø 10	5,000Hrs																					
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1,000 hours at 105°C without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. <table border="1"><tr><td>Rated voltage(V_{DC})</td><td>10</td><td>16~50</td></tr><tr><td>Capacitance change</td><td>≤ ±30% of the initial value</td><td>≤ ±25% of the initial value</td></tr><tr><td>Tanδ</td><td colspan="2">≤ ±200% of the initial specified value</td></tr><tr><td>Leakage current</td><td colspan="2">≤ The initial specified value</td></tr></table>					Rated voltage(V _{DC})	10	16~50	Capacitance change	≤ ±30% of the initial value	≤ ±25% of the initial value	Tanδ	≤ ±200% of the initial specified value		Leakage current	≤ The initial specified value									
Rated voltage(V _{DC})	10	16~50																							
Capacitance change	≤ ±30% of the initial value	≤ ±25% of the initial value																							
Tanδ	≤ ±200% of the initial specified value																								
Leakage current	≤ The initial specified value																								
Others	Satisfied characteristics KS C IEC 60384-4																								

DIMENSIONS OF NXK Series

Unit(mm)



Marking : YELLOW SLEEVE, BLACK INK

øD	8	10
ød	0.6	0.6
F	3.5	5.0
øD'	øD + 0.5 max.	
L'	L + 1.5 max. L + 2.0 max.	



MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

RATINGS OF NXX series

Vdc	10		
Capacitance (μF)	$\varnothing D \times L(\text{mm})$	Rated Ripple Current (mA rms/105°C, 100kHz)	IMP. (Ω max./20°C, 100kHz)
680	8 × 11.5	1,417	0.073
1,000	8 × 15	2,050	0.059
1,000	10 × 12.5	2,190	0.053
1,500	8 × 20	2,380	0.041
1,500	10 × 16	2,550	0.038
1,800	10 × 20	2,880	0.028
2,200	10 × 25	3,160	0.024
2,700	10 × 33	3,570	0.020

Vdc	16		
Capacitance (μF)	$\varnothing D \times L(\text{mm})$	Rated Ripple Current (mA rms/105°C, 100kHz)	IMP. (Ω max./20°C, 100kHz)
470	8 × 11.5	1,417	0.073
680	8 × 15	2,050	0.059
680	10 × 12.5	2,190	0.053
1,000	8 × 20	2,380	0.041
1,000	10 × 16	2,550	0.038
1,500	10 × 20	2,880	0.028
1,800	10 × 25	3,160	0.024
2,200	10 × 33	3,570	0.020

Vdc	25		
Capacitance (μF)	$\varnothing D \times L(\text{mm})$	Rated Ripple Current (mA rms/105°C, 100kHz)	IMP. (Ω max./20°C, 100kHz)
330	8 × 11.5	1,417	0.073
390	8 × 15	2,050	0.059
470	10 × 12.5	2,190	0.053
560	8 × 20	2,380	0.041
680	10 × 16	2,550	0.038
820	10 × 20	2,880	0.028
1,000	10 × 25	3,160	0.024
1,200	10 × 33	3,570	0.020

Vdc	35		
Capacitance (μF)	$\varnothing D \times L(\text{mm})$	Rated Ripple Current (mA rms/105°C, 100kHz)	IMP. (Ω max./20°C, 100kHz)
220	8 × 11.5	1,417	0.073
270	8 × 15	2,050	0.059
330	10 × 12.5	2,190	0.053
390	8 × 20	2,380	0.041
470	10 × 16	2,550	0.038
560	10 × 20	2,880	0.028
680	10 × 25	3,160	0.024
1,000	10 × 33	3,570	0.020

Vdc	50		
Capacitance (μF)	$\varnothing D \times L(\text{mm})$	Rated Ripple Current (mA rms/105°C, 100kHz)	IMP. (Ω max./20°C, 100kHz)
100	8 × 11.5	1,086	0.096
120	8 × 15	1,558	0.080
150	10 × 12.5	1,612	0.083
180	8 × 20	1,888	0.065
220	10 × 16	1,985	0.057
270	10 × 20	2,322	0.042
330	10 × 25	2,626	0.037
470	10 × 33	2,954	0.033

RIPPLE CURRENT MULTIPLIERS

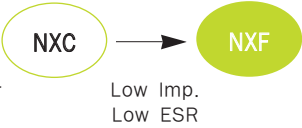
Friquency Multiplires

Cap.(μF) \ Freq.(Hz)	120	1k	10k	100k
100 ~ 270	0.50	0.73	0.92	1.00
330 ~ 680	0.55	0.77	0.94	1.00
820 ~ 1,800	0.60	0.80	0.96	1.00
2,200 ~ 2,700	0.70	0.85	0.98	1.00

NXF Series

• 105°C 2,000Hrs assured.

- Non-solvent proof.
- Ultra low impedance/ESR
- For MAIN-Board, SMPS, Noise Filter, Charger, Adapter
- RoHS compliant.
- Halogen-free capacitors are also available.

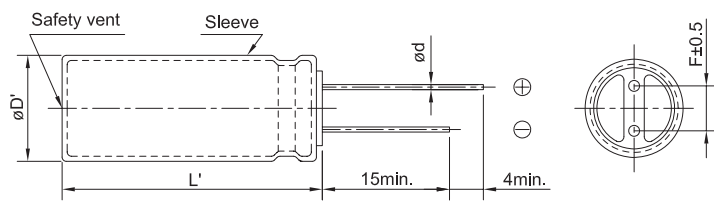


SPECIFICATIONS

Item	Characteristics								
Rated Voltage Range	10 ~ 50 V _{DC}								
Operating Temperature Range	-40 ~ + 105°C								
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)								
Leakage Current	I=0.01CV(μA) or 3μA, whichever is greater. Where, I:Max. leakage current(μA), C:Nominal capacitance(μF), V:Rated voltage(V _{DC}) (at 20°C, 2 minutes)								
Dissipation Factor (Tanδ)	<table border="1"><tr><td>Rated Voltage(V_{DC})</td><td>6.3</td><td>10</td><td>16</td></tr><tr><td>Tanδ(Max.)</td><td>0.22</td><td>0.19</td><td>0.16</td></tr></table> When the capacitance exceeds 1,000μF, 0.02 shall be added every 1,000μF increase. (at 20°C, 120Hz)	Rated Voltage(V _{DC})	6.3	10	16	Tanδ(Max.)	0.22	0.19	0.16
Rated Voltage(V _{DC})	6.3	10	16						
Tanδ(Max.)	0.22	0.19	0.16						
Temperature Characteristics (Max. Impedance ratio)	<table border="1"><tr><td>Z(-25°C) / Z(+20°C)</td><td>2</td></tr><tr><td>Z(-40°C)/ Z(+20°C)</td><td>3</td></tr></table> (at 120Hz)	Z(-25°C) / Z(+20°C)	2	Z(-40°C)/ Z(+20°C)	3				
Z(-25°C) / Z(+20°C)	2								
Z(-40°C)/ Z(+20°C)	3								
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 2,000 hours at 105°C. Capacitance change ≤ ±25% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value								
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1,000 hours at 105°C without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≤ ±25% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value								
Others	Satisfied characteristics KS C IEC 60384-4								

DIMENSIONS OF NXF Series

Unit(mm)



Marking : DARK BROWN SLEEVE, SILVER INK

øD	8	10
ød	0.6	0.6
F	3.5	5.0
øD'	øD + 0.5 max.	
L'	L + 1.5 max.	L + 2.0 max.



MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

RATINGS OF NXF series

V _{DC}	6.3		
Capacitance (μF)	ø D × L (mm)	Rated Ripple Current (mA _{rms} /105°C, 100kHz)	ESR (Ω max./20°C, 100kHz)
820	8 × 11.5	1,311	31
1,200	8 × 15	1,713	24
1,500	10 × 12.5	1,771	22
1,800	8 × 20	2,150	16
1,800	10 × 16	2,300	16
2,200	10 × 20	2,770	11
3,300	10 × 25	3,200	10

V _{DC}	10		
Capacitance (μF)	ø D × L (mm)	Rated Ripple Current (mA _{rms} /105°C, 100kHz)	ESR (Ω max./20°C, 100kHz)
680	8 × 11.5	1,311	31
1,000	8 × 15	1,713	24
1,000	10 × 12.5	1,771	22
1,500	8 × 20	2,150	16
1,500	10 × 16	2,300	16
1,800	10 × 20	2,770	11
2,200	10 × 25	3,200	10

V _{DC}	16		
Capacitance (μF)	ø D × L (mm)	Rated Ripple Current (mA _{rms} /105°C, 100kHz)	ESR (Ω max./20°C, 100kHz)
470	8 × 11.5	1,311	31
680	8 × 15	1,713	24
680	10 × 12.5	1,771	22
1,000	8 × 20	2,150	16
1,000	10 × 16	2,300	16
1,500	10 × 20	2,770	11
1,800	10 × 25	3,200	10

RATED RIPPLE CURRENT MULTIPLIERS

Frequency Multipliers

Cap.(μF) \ Freq.(Hz)	120	1k	10k	100k
470 ~ 560	0.50	0.85	0.94	1.00
680 ~ 1,800	0.60	0.87	0.95	1.00
2,200 ~ 3,300	0.75	0.90	0.95	1.00

NXE Series

• 105°C 3,000~4,000Hrs assured

- Non-solvent proof.
- Ultra low impedance/ESR, Long Life.
- For MAIN-Board, SMPS
- RoHS compliant.
- Halogen-free capacitors are also available.



SPECIFICATIONS

Item	Characteristics												
Rated Voltage Range	6.3 ~ 35 V _{DC}												
Operating Temperature Range	-40 ~ + 105°C												
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)												
Leakage Current	I=0.03CV(μA) or 4μA, whichever is greater. Where, I:Max. leakage current(μA), C:Nominal capacitance(μF), V:Rated voltage(V _{DC}) (at 20°C, 2 minutes)												
Disssipation Factor (Tanδ)	<table><tr><td>Rated Voltage(V_{DC})</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td></tr><tr><td>Tanδ(Max.)</td><td>0.22</td><td>0.19</td><td>0.16</td><td>0.14</td><td>0.12</td></tr></table> (at 20°C, 120Hz)	Rated Voltage(V _{DC})	6.3	10	16	25	35	Tanδ(Max.)	0.22	0.19	0.16	0.14	0.12
Rated Voltage(V _{DC})	6.3	10	16	25	35								
Tanδ(Max.)	0.22	0.19	0.16	0.14	0.12								
Temperature Characteristics (Max. Impedance ratio)	<table><tr><td>Z(-25°C)/ Z(20°C)</td><td>2</td></tr><tr><td>Z(-40°C)/ Z(20°C)</td><td>3</td></tr></table> (at 120Hz)	Z(-25°C)/ Z(20°C)	2	Z(-40°C)/ Z(20°C)	3								
Z(-25°C)/ Z(20°C)	2												
Z(-40°C)/ Z(20°C)	3												
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied at 105°C for the specified period of time. Capacitance change ≤ ±25% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value <table><tr><td>ø D</td><td>Life Time</td></tr><tr><td>ø 8</td><td>3,000 hours</td></tr><tr><td>ø 10</td><td>4,000 hours</td></tr></table>	ø D	Life Time	ø 8	3,000 hours	ø 10	4,000 hours						
ø D	Life Time												
ø 8	3,000 hours												
ø 10	4,000 hours												
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1,000 hours at 105°C without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≤ ±25% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ 200% of the initial specified value												
Others	Satisfied characteristics KS C IEC 60384-4												

DIMENSIONS OF NXE Series

Unit(mm)

Marking : DARK BROWN SLEEVE, SILVER INK

∅D	8	10
∅d	0.6	0.6
F	3.5	5.0
∅D'	∅D + 0.5 max.	
L'	L + 1.5 max.	L + 2.0 max.



MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

RATINGS OF NXE series

Vdc	6.3		
Capacitance (μF)	$\varnothing D \times L(\text{mm})$	Rated Ripple Current (mArms/105°C, 100kHz)	ESR (Ω max./20°C, 100kHz)
820	8 × 11.5	1,140	36
1,200	8 × 15	1,490	28
1,500	10 × 12.5	1,540	26
1,800	8 × 20	1,870	19
1,800	10 × 16	2,000	19
2,200	10 × 20	2,550	13
3,300	10 × 25	2,800	12

Vdc	10		
Capacitance (μF)	$\varnothing D \times L(\text{mm})$	Rated Ripple Current (mArms/105°C, 100kHz)	ESR (Ω max./20°C, 100kHz)
680	8 × 11.5	1,140	36
1,000	8 × 15	1,490	28
1,000	10 × 12.5	1,540	26
1,500	8 × 20	1,870	19
1,500	10 × 16	2,000	19
1,800	10 × 20	2,550	13
2,200	10 × 25	2,800	12

Vdc	16		
Capacitance (μF)	$\varnothing D \times L(\text{mm})$	Rated Ripple Current (mArms/105°C, 100kHz)	ESR (Ω max./20°C, 100kHz)
470	8 × 11.5	1,140	36
680	8 × 15	1,490	28
680	10 × 12.5	1,540	26
1,000	8 × 20	1,870	19
1,000	10 × 16	2,000	19
1,500	10 × 20	2,550	13
1,800	10 × 25	2,800	12

Vdc	25		
Capacitance (μF)	$\varnothing D \times L(\text{mm})$	Rated Ripple Current (mArms/105°C, 100kHz)	ESR (Ω max./20°C, 100kHz)
220	8 × 11.5	1,140	36
390	8 × 15	1,490	28
560	8 × 20	1,870	19
470	10 × 12.5	1,540	26
680	10 × 16	2,000	19
820	10 × 20	2,550	13
1,000	10 × 25	2,800	12

Vdc	35		
Capacitance (μF)	$\varnothing D \times L(\text{mm})$	Rated Ripple Current (mArms/105°C, 100kHz)	ESR (Ω max./20°C, 100kHz)
150	8 × 11.5	1,140	36
270	8 × 15	1,490	28
390	8 × 20	1,870	19
330	10 × 12.5	1,540	26
470	10 × 16	2,000	19
560	10 × 20	2,550	13
680	10 × 25	2,800	12

RATED RIPPLE CURRENT MULTIPLIERS

Frequency Multipliers

Cap.(μF) \ Frequency(Hz)	120	1k	10k	100k
150 ~ 560	0.50	0.85	0.94	1.00
680 ~ 1,800	0.60	0.87	0.95	1.00
2,200 ~ 3,300	0.75	0.90	0.95	1.00

NZE Series

• 105°C 2,000Hrs assured.

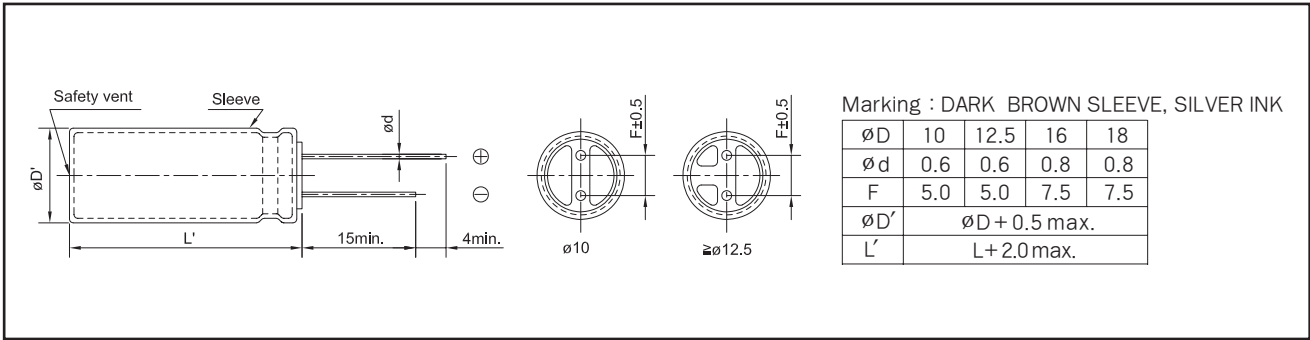
- Non-solvent proof.
- Downsized , High ripple.
- For SMPS, IP-Board, Adaptor
- RoHS compliant.
- Halogen-free capacitors are also available.



SPECIFICATIONS

Item	Characteristics														
Rated Voltage Range	160 ~ 400 V _{DC}		450 V _{DC}												
Operating Temperature Range	-40 ~ + 105°C		-25 ~ + 105°C												
Capacitance Tolerance	±20%(M) (at 20°C, 120Hz)														
Leakage Current	<table><tr><td> C · V \ Time </td><td>After 1 minute</td><td colspan="2">After 5 minutes</td></tr><tr><td>≤ 1000</td><td>I = 0.1CV + 40</td><td colspan="2">I = 0.03CV + 15</td></tr><tr><td>> 1000</td><td>I = 0.04CV + 100</td><td colspan="2">I = 0.02CV + 25</td></tr></table> Where, I:Max. Leakage current(μA) C:Nominal capacitance(μF) V:Rated voltage(V_{DC}) (at 20°C)			C · V \ Time	After 1 minute	After 5 minutes		≤ 1000	I = 0.1CV + 40	I = 0.03CV + 15		> 1000	I = 0.04CV + 100	I = 0.02CV + 25	
C · V \ Time	After 1 minute	After 5 minutes													
≤ 1000	I = 0.1CV + 40	I = 0.03CV + 15													
> 1000	I = 0.04CV + 100	I = 0.02CV + 25													
Dissipation Factor (Tanδ)	<table><tr><td>Rated Voltage(V_{DC})</td><td>160~250</td><td colspan="2">400~450</td></tr><tr><td>Tanδ(Max.)</td><td>0.20</td><td colspan="2">0.24</td></tr></table> (at 20°C, 120Hz)			Rated Voltage(V _{DC})	160~250	400~450		Tanδ(Max.)	0.20	0.24					
Rated Voltage(V _{DC})	160~250	400~450													
Tanδ(Max.)	0.20	0.24													
Temperature Characteristics (Max. Impedance ratio)	<table><tr><td>Rated Voltage(V_{DC})</td><td>160~250</td><td>400</td><td>450</td></tr><tr><td>Z(- 25°C)/Z(+ 20°C)</td><td>3</td><td>5</td><td>6</td></tr><tr><td>Z(- 40°C)/Z(+ 20°C)</td><td>6</td><td>6</td><td>—</td></tr></table> (at 120Hz)			Rated Voltage(V _{DC})	160~250	400	450	Z(- 25°C)/Z(+ 20°C)	3	5	6	Z(- 40°C)/Z(+ 20°C)	6	6	—
Rated Voltage(V _{DC})	160~250	400	450												
Z(- 25°C)/Z(+ 20°C)	3	5	6												
Z(- 40°C)/Z(+ 20°C)	6	6	—												
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied at 105°C for 2,000 hours. Capacitance change ≤ ±20% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value														
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1,000 hours at 105°C without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≤ ±20% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ 500% of the initial specified value														
Others	Satisfied characteristics KS C IEC 60384-4														

DIMENSIONS OF NZE Series





MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

RATINGS OF NZE Series

V _{DC}	160		200		250	
Items μF	ø D×L(mm)	Rated ripple current (mA _{rms} /105°C, 120Hz)	ø D×L(mm)	Rated ripple current (mA _{rms} /105°C, 120Hz)	ø D×L(mm)	Rated ripple current (mA _{rms} /105°C, 120Hz)
22	10×20	192				
33	10×20	236	10×20	236	10×25	258
47	10×25	307	10×25	307	12.5×20	312
68	12.5×20	375	12.5×25	375	12.5×30	444
82	12.5×25	449	12.5×25	449	16×25	496
100	12.5×30	535	12.5×30	535	16×25	548
120	16×20	559	16×25	600	16×25	600
150	16×25	671	16×25	671	16×31.5	724
180	16×25	735	16×31.5	793	16×35.5	810
					18×31.5	819
220	16×31.5	876	16×31.5	876	16×40	924
					18×35.5	936
270	16×35.5	992	16×35.5	992	18×40	1,053
			18×31.5	1,004		
			16×40	1,132		
330	18×31.5	1,110	18×35.5	1,146		
390	18×35.5	1,246	18×40	1,266		

V _{DC}	350		400		450	
Items μF	ø D×L(mm)	Rated ripple current (mA _{rms} /105°C, 120Hz)	ø D×L(mm)	Rated ripple current (mA _{rms} /105°C, 120Hz)	ø D×L(mm)	Rated ripple current (mA _{rms} /105°C, 120Hz)
8.2					10×16	102
10	10×16	116	10×16	116	10×20	122
15	10×20	154	10×20	154	12.5×20	163
22	10×25	207	10×25	207	12.5×25	219
33	12.5×25	276	12.5×25	276	16×25	289
47	16×25	364	16×25	364	16×25	353
56	16×25	397	16×25	397	16×31.5	415
68	16×31.5	472	16×31.5	472	16×35.5	467
	18×25	456				
82	16×35.5	529	16×35.5	529	16×40	530
	18×31.5	536	18×31.5	536	18×31.5	520
100	18×31.5	591	16×40	603	18×35.5	593
			18×35.5	611		
120	18×35.5	669	18×40	680	18×40	659

RATED RIPPLE CURRENT MULTIPLIERS

Frequency Multipliers

Cap.(μF) \ Freq.(Hz)	120	1k	10k	100k
8.2 ~ 100	1.00	1.25	1.50	1.75
120 ~ 390	1.00	1.15	1.30	1.40

NFC Series

• 105°C 5,000Hrs assured.

- Non-solvent proof.
- High ripple , Long Life.
- For SMPS, IP-Board, Adaptor
- RoHS compliant.
- Halogen-free capacitors are also available.

KMF
(KMX)



NFC

Long Life

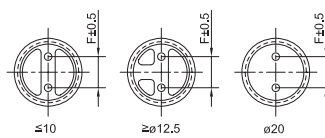
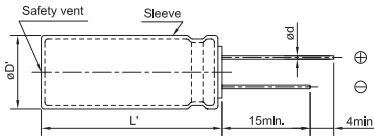


SPECIFICATIONS

Item	Characteristics														
Rated Voltage Range	160 ~ 400 V _{DC}	450 ~ 500 V _{DC}													
Operating Temperature Range	-40 ~ + 105℃	-25 ~ + 105℃													
Capacitance Tolerance	±20%(M) (at 20℃, 120Hz)														
Leakage Current	<table><tr><th> C・V \ Time </th><th>After 1 minute</th><th>After 5 minutes</th></tr><tr><td>≤ 1000</td><td>I = 0.1CV + 40</td><td>I = 0.03CV + 15</td></tr><tr><td>> 1000</td><td>I = 0.04CV + 100</td><td>I = 0.02CV + 25</td></tr></table> Where, I:Max. Leakage current(μA) C:Nominal capacitance (μF) V:Rated voltage (V_{DC})(at 20℃)			C・V \ Time	After 1 minute	After 5 minutes	≤ 1000	I = 0.1CV + 40	I = 0.03CV + 15	> 1000	I = 0.04CV + 100	I = 0.02CV + 25			
C・V \ Time	After 1 minute	After 5 minutes													
≤ 1000	I = 0.1CV + 40	I = 0.03CV + 15													
> 1000	I = 0.04CV + 100	I = 0.02CV + 25													
Dissipation Factor (Tanδ)	<table><tr><th>Rated Voltage(V_{DC})</th><td>160~250</td><td colspan="2">400~500</td></tr><tr><th>Tanδ(Max.)</th><td>0.20</td><td colspan="2">0.24</td></tr></table> (at 20℃, 120Hz)			Rated Voltage(V _{DC})	160~250	400~500		Tanδ(Max.)	0.20	0.24					
Rated Voltage(V _{DC})	160~250	400~500													
Tanδ(Max.)	0.20	0.24													
Temperature Characteristics (Max. Impedance ratio)	<table><tr><th>Rated Voltage(V_{DC})</th><td>160~250</td><td>400</td><td>450~500</td></tr><tr><th>Z(- 25℃)/Z(+ 20℃)</th><td>3</td><td>5</td><td>6</td></tr><tr><th>Z(- 40℃)/Z(+ 20℃)</th><td>6</td><td>6</td><td>—</td></tr></table> (at 120Hz)			Rated Voltage(V _{DC})	160~250	400	450~500	Z(- 25℃)/Z(+ 20℃)	3	5	6	Z(- 40℃)/Z(+ 20℃)	6	6	—
Rated Voltage(V _{DC})	160~250	400	450~500												
Z(- 25℃)/Z(+ 20℃)	3	5	6												
Z(- 40℃)/Z(+ 20℃)	6	6	—												
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated voltage is applied at 105℃ for 5,000 hours. (where, 2,000 hours for Ø6.3) Capacitance change ≤ ±20% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value														
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after exposing them for 1,000 hours at 105℃ without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. (where, 500 hours for Ø6.3) Capacitance change ≤ ±20% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ 500% of the initial specified value														
Others	Satisfied characteristics KS C IEC 60384-4														

DIMENSIONS OF NFC Series

Unit(mm)



Marking : DARK BROWN SLEEVE, SILVER INK

øD	6.3	8	10	12.5	16	18	20	22
ød	0.5	0.6	0.6	0.6	0.8	0.8	0.8	0.8
F	2.5	3.5	5.0	5.0	7.5	7.5	7.5	10.0
øD'	øD + 0.5 max.							
L'	L + 2.0 max.							

※ ø6.3, ø8 x 20L, øD' ≤ øD + 0.5 and L' ≤ L + 1.5



MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

RATINGS OF NFC Series

V _{DC}	160		200	
Items μF	ø D × L (mm)	Rated ripple current (mArms/105°C, 120Hz)	ø D × L (mm)	Rated ripple current (mArms/105°C, 120Hz)
22	8 × 20	135	8 × 20	135
	10 × 20	192	10 × 20	192
33	10 × 20	236	12.5 × 20	262
47	12.5 × 20	312	12.5 × 20	312
68	12.5 × 25	409	12.5 × 25	409
			8 × 50	320
82	8 × 50	360	16 × 20	462
100	16 × 25	548	16 × 25	548
150	16 × 25	701	16 × 25	701
220	16 × 31.5	876	18 × 31.5	906
330	18 × 31.5	1,110		

V _{DC}	250		350	
Items μF	ø D × L (mm)	Rated ripple current (mArms/105°C, 120Hz)	ø D × L (mm)	Rated ripple current (mArms/105°C, 120Hz)
10	8 × 20	95	8 × 20	90
	10 × 20	130	10 × 20	126
22	12.5 × 20	214	12.5 × 20	207
33	12.5 × 25	285	16 × 20	284
			8 × 50	245
47	8 × 50	250	16 × 25	364
	12.5 × 25	340		
68	16 × 25	452	16 × 31.5	472
100	16 × 31.5	591	18 × 31.5	591
150	18 × 31.5	748	18 × 40	760
220	18 × 40	951	22 × 45	970
330	20 × 40	1,196		

V _{DC}	400		450	
Items μF	ø D × L (mm)	Rated ripple current (mArms/105°C, 120Hz)	ø D × L (mm)	Rated ripple current (mArms/105°C, 120Hz)
1	6.3 × 11	19	6.3 × 11	12
1.5			8 × 11.5	23
2.2			8 × 15	38
3.3				
4.7	8 × 11.5	42	8 × 20	62
6.8			10 × 20	100
8.2			10 × 25	121
10				
10	10 × 20	126	12.5 × 20	135
22	12.5 × 25	225	8 × 50	230
27	8 × 50	240	16 × 25	267
33	16 × 20	284	16 × 31.5	319
47	16 × 25	364	10 × 50	334
			18 × 25	368
68	16 × 31.5	472	18 × 31.5	473
82	18 × 31.5	536	12.5 × 50	473
			18 × 35.5	537
100	18 × 35.5	611	12.5 × 60	569
			18 × 40	602
120	18 × 40	680	18 × 40	659
150	18 × 40	760	20 × 40	757
180	20 × 40	855	22 × 50	892
220	22 × 45	996		

RATINGS OF NFC Series

Vdc	500	
Items μF	ø D × L (mm)	Rated ripple current (mArms/105°C,120Hz)
6.8	10 × 20	100
10	12.5 × 20	135
15	12.5 × 25	182
22	16 × 25	241
27	10 × 50	253
33	18 × 25	308
	16 × 31.5	319
39	12.5 × 50	358
47	18 × 31.5	393
60	12.5 × 60	440
68	18 × 35.5	489
82	18 × 40	544
100	20 × 40	618

RATED RIPPLE CURRENT MULTIPLIERS

Frequency Multipliers

Cap.(μF) Freq.(Hz)	120	1k	10k	100k
1 ~ 100	1.00	1.25	1.50	1.75
120 ~ 330	1.00	1.15	1.30	1.40



MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

NFA Series

• 105°C 8,000~10,000Hrs assured.

- Non-solvent proof.
- High ripple and long life.
- For ballasts stabilizer.
- RoHS compliant.
- Halogen-free capacitors are also available.

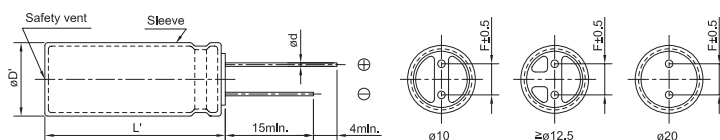


SPECIFICATIONS

Item	Characteristics														
Rated Voltage Range	160~400 V _{DC}		450 V _{DC}												
Operating Temperature Range	-40 ~ +105℃		-25 ~ +105℃												
Capacitance Tolerance	±20%(M) (at 20℃, 120Hz)														
Leakage Current	<table><tr><th> C · V \ Time </th><th>After 1 minute</th><th>After 5 minutes</th></tr><tr><td>≤ 1000</td><td>I = 0.1CV + 40</td><td>I = 0.03CV + 15</td></tr><tr><td>> 1000</td><td>I = 0.04CV + 100</td><td>I = 0.02CV + 25</td></tr></table> Where, I:Max. Leakage current(μA) C:Nominal capacitance(μF) V:Rated voltage(V_{DC}) (at 20℃)			C · V \ Time	After 1 minute	After 5 minutes	≤ 1000	I = 0.1CV + 40	I = 0.03CV + 15	> 1000	I = 0.04CV + 100	I = 0.02CV + 25			
C · V \ Time	After 1 minute	After 5 minutes													
≤ 1000	I = 0.1CV + 40	I = 0.03CV + 15													
> 1000	I = 0.04CV + 100	I = 0.02CV + 25													
Dissipation Factor (Tanδ)	<table><tr><td>Rated Voltage(V_{DC})</td><td>160~250</td><td>350~450</td></tr><tr><td>Tanδ(Max.)</td><td>0.20</td><td>0.24</td></tr></table> (at 20℃, 120Hz)			Rated Voltage(V _{DC})	160~250	350~450	Tanδ(Max.)	0.20	0.24						
Rated Voltage(V _{DC})	160~250	350~450													
Tanδ(Max.)	0.20	0.24													
Temperature Characteristics (Max. Impedance ratio)	<table><tr><td>Rated Voltage(V_{DC})</td><td>160~250</td><td>350~400</td><td>450</td></tr><tr><td>Z(- 25℃)/Z(20℃)</td><td>3</td><td>5</td><td>6</td></tr><tr><td>Z(- 40℃)/Z(20℃)</td><td>6</td><td>6</td><td>-</td></tr></table> (at 120Hz)			Rated Voltage(V _{DC})	160~250	350~400	450	Z(- 25℃)/Z(20℃)	3	5	6	Z(- 40℃)/Z(20℃)	6	6	-
Rated Voltage(V _{DC})	160~250	350~400	450												
Z(- 25℃)/Z(20℃)	3	5	6												
Z(- 40℃)/Z(20℃)	6	6	-												
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated voltage is applied at 105℃ for 10,000 hours.(where, 8,000 hours for Ø10) Capacitance change ≤ ±20% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value														
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after exposing them for 1,000 hours at 105℃ without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≤ ±20% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ 500% of the initial specified value														
Others	Satisfied characteristics KS C IEC 60384-4														

DIMENSIONS OF NFA Series

Unit(mm)



Marking : DARK BROWN SLEEVE, SILVER INK

ØD	10	12.5	16	18	20	22
Ød	0.6	0.6	0.8	0.8	0.8	0.8
F	5.0	5.0	7.5	7.5	7.5	10.0
ØD'	ØD + 0.5 max.					
L'	L + 2.0 max.					

RATINGS OF NFA Series

Vdc	160		200	
Items μF	$\varnothing D \times L(mm)$	Rated ripple current (mArms/105°C,120Hz)	$\varnothing D \times L(mm)$	Rated ripple current (mArms/105°C,120Hz)
22	10×20	192	10×20	192
33	10×20	236	12.5×20	262
47	12.5×20	312	12.5×20	312
68	12.5×25	409	12.5×25	409
100	16×25	548	16×25	548
150	16×31.5	724	16×31.5	701
220	16×31.5	876	18×31.5	906
330	16×35.5	1,110		

Vdc	250		350	
Items μF	$\varnothing D \times L(mm)$	Rated ripple current (mArms/105°C,120Hz)	$\varnothing D \times L(mm)$	Rated ripple current (mArms/105°C,120Hz)
10	10×20	130	10×20	126
22	12.5×20	214	12.5×20	207
33	12.5×25	285	16×20	284
47	12.5×25	340	16×25	364
68	16×25	452	16×31.5	472
100	16×31.5	591	18×31.5	591
150	18×31.5	748	18×40	760
220	18×40	951	22×45	970
330	20×40	1,196		

Vdc	400		450	
Items μF	$\varnothing D \times L(mm)$	Rated ripple current (mArms/105°C,120Hz)	$\varnothing D \times L(mm)$	Rated ripple current (mArms/105°C,120Hz)
3.3			10×20	70
4.7			12.5×20	93
10	10×20	126	12.5×25	147
22	12.5×25	225	16×25	241
33	16×20	284	16×31.5	319
47	16×25	364	18×25	368
68	16×31.5	472	18×31.5	473
82	18×31.5	536	18×35.5	537
100	18×35.5	611	18×40	602
120	18×40	680	18×40	659
150	18×40	760	20×40	757
180	20×40	855	22×50	892
220	22×45	996		

RATED RIPPLE CURRENT MULTIPLIERS

Frequency Multipliers

Cap.(μF)	Freq.(Hz)	120	1k	10k	100k
3.3~100		1.00	1.25	1.50	1.75
	120~330	1.00	1.15	1.30	1.40



MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

NFL Series

• 105°C 10,000~12,000Hrs assured.

- Non-solvent proof.
- High ripple and long life.
- For ballasts stabilizer and other long life required applications.
- RoHS compliant.
- Halogen-free capacitors are also available.

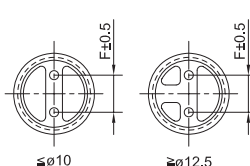
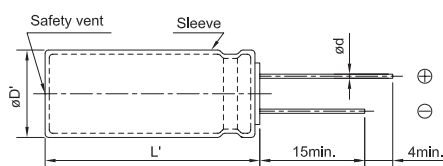


SPECIFICATIONS

Item	Characteristics														
Rated Voltage Range	160~400 V _{DC}		450~500 V _{DC}												
Operating Temperature Range	-40~ +105℃		-25~ +105℃												
Capacitance Tolerance	±20%(M) (at 20℃, 120Hz)														
Leakage Current	<table><tr><td> C · V Time </td><td>After 1 minute</td><td>After 5 minutes</td></tr><tr><td>≤ 1000</td><td>I = 0.1CV + 40</td><td>I = 0.03CV + 15</td></tr><tr><td>> 1000</td><td>I = 0.04CV + 100</td><td>I = 0.02CV + 25</td></tr></table> Where, I:Max. Leakage current(μA) C:Nominal capacitance(μF) V:Rated voltage(V_{DC}) (at 20℃)			C · V Time	After 1 minute	After 5 minutes	≤ 1000	I = 0.1CV + 40	I = 0.03CV + 15	> 1000	I = 0.04CV + 100	I = 0.02CV + 25			
C · V Time	After 1 minute	After 5 minutes													
≤ 1000	I = 0.1CV + 40	I = 0.03CV + 15													
> 1000	I = 0.04CV + 100	I = 0.02CV + 25													
Dissipation Factor (Tanδ)	<table><tr><td>Rated Voltage(V_{DC})</td><td>160~250</td><td>350~500</td></tr><tr><td>Tanδ(Max.)</td><td>0.20</td><td>0.24</td></tr></table> (at 20℃, 120Hz)			Rated Voltage(V _{DC})	160~250	350~500	Tanδ(Max.)	0.20	0.24						
Rated Voltage(V _{DC})	160~250	350~500													
Tanδ(Max.)	0.20	0.24													
Temperature Characteristics (Max. Impedance ratio)	<table><tr><td>Rated Voltage(V_{DC})</td><td>160~250</td><td>350~400</td><td>450~500</td></tr><tr><td>Z(- 25℃)/Z(20℃)</td><td>3</td><td>5</td><td>6</td></tr><tr><td>Z(- 40℃)/Z(20℃)</td><td>6</td><td>6</td><td>-</td></tr></table> (at 120Hz)			Rated Voltage(V _{DC})	160~250	350~400	450~500	Z(- 25℃)/Z(20℃)	3	5	6	Z(- 40℃)/Z(20℃)	6	6	-
Rated Voltage(V _{DC})	160~250	350~400	450~500												
Z(- 25℃)/Z(20℃)	3	5	6												
Z(- 40℃)/Z(20℃)	6	6	-												
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated voltage is applied at 105℃ for 12,000 hours.(where, 10,000 hours for Ø10, Ø8) Capacitance change ≤ ±20% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value														
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after exposing them for 1,000 hours at 105℃ without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measuremensts. Capacitance change ≤ ±20% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ 500% of the initial specified value														
Others	Satisfied characteristics KS C IEC 60384-4														

DIMENSIONS OF NFL Series

Unit(mm)



Marking : DARK BROWN SLEEVE, SILVER INK

ØD	8	10	12.5	16	18
Ød	0.6	0.6	0.6	0.8	0.8
F	3.5	5.0	5.0	7.5	7.5
ØD'	ØD + 0.5 max.				
L'	L + 2.0 max.				

RATINGS OF NFL Series

V _{DC}	160		200	
Items μF	ø D × L (mm)	Rated ripple current (mA _{rms} /105°C, 120Hz)	ø D × L (mm)	Rated ripple current (mA _{rms} /105°C, 120Hz)
27			10 × 16	200
39	10 × 16	237	10 × 20	256
47	10 × 20	280	12.5 × 20	312
56	10 × 25	335	12.5 × 25	371
68	12.5 × 20	375	12.5 × 25	409
100	12.5 × 25	496	16 × 25	550
	10 × 45	562	10 × 50	591
150	16 × 31.5	724	16 × 25	671
			12.5 × 50	786
220	16 × 31.5	876	18 × 31.5	905
	12.5 × 50	952		
270	16 × 35.5	992	18 × 35.5	1,036
330	16 × 40	1,132	18 × 40	1,164
	18 × 31.5	1,109		
390	18 × 35.5	1,246		
470	18 × 40	1,389		

V _{DC}	250		350	
Items μF	ø D × L (mm)	Rated ripple current (mA _{rms} /105°C, 120Hz)	ø D × L (mm)	Rated ripple current (mA _{rms} /105°C, 120Hz)
10	10 × 16	120	10 × 16	110
22	10 × 20	192	12.5 × 20	213
33	10 × 25	257	12.5 × 25	285
47	8 × 50	250	8 × 50	245
	12.5 × 20	312	10 × 50	405
			16 × 25	375
68	12.5 × 30	441	16 × 31.5	503
82	10 × 50	536	12.5 × 45	571
100	16 × 25	548	18 × 31.5	610
150	12.5 × 50	786		
	18 × 25	748		
220	18 × 31.5	905		

V _{DC}	400		450	
Items μF	ø D × L (mm)	Rated ripple current (mA _{rms} /105°C, 120Hz)	ø D × L (mm)	Rated ripple current (mA _{rms} /105°C, 120Hz)
10	10 × 20	110	12.5 × 20	120
22	12.5 × 20	208	16 × 25	228
27	8 × 50	240		
33	16 × 20	261	16 × 31.5	270
39	10 × 45	340	10 × 50	305
47	16 × 25	335	18 × 31.5	360
68	16 × 31.5	460	12.5 × 50	473
	12.5 × 45	482	18 × 35.5	500
82	18 × 31.5	520	18 × 35.5	549
	12.5 × 50	527		
100	18 × 35.5	630	12.5 × 60	626
			18 × 40	670
120	18 × 40	700	20 × 40	720



RATINGS OF NFL Series

Vdc	500	
Items μF	∅ D × L(mm)	Rated ripple current (mArms/105°C,120Hz)
10	12.5 × 20	150
22	16 × 25	228
27	10 × 50	253
33	18 × 25	260
	16 × 31.5	270
39	12.5 × 50	358
47	18 × 31.5	360
60	12.5 × 60	467
68	18 × 35.5	500
82	18 × 40	606
100	20 × 40	657

RATED RIPPLE CURRENT MULTIPLIERS

Frequency Multipliers

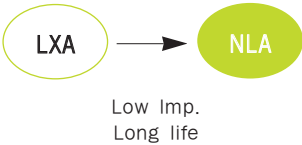
Cap.(μF) \ Freq.(Hz)	120	1k	10k	100k
10 ~ 100	1.00	1.25	1.50	1.75
120 ~ 470	1.00	1.15	1.30	1.40

NLA Series

• 105°C 4,000~10,000Hrs assured.

Solvent-proof

- Low impedance.
- Long Life.
- For SMPS, IP-Board, Adaptor
- RoHS compliant.
- Halogen-free capacitors are also available.



SPECIFICATIONS

Item	Characteristics																					
Rated Voltage Range	6.3 ~ 50 V _{DC}																					
Operating Temperature Range	-55 ~ +105°C																					
Capacitance Tolerance	±20%(M) (at 20°C, 120Hz)																					
Leakage Current	I=0.01CV or 3μA, whichever is greater. Where, I: Max.Leakage current(μA) C: Nominal capacitance (μF) V: Rated voltage (V _{DC}) (at 20°C, 2 minutes)																					
Dissipation Factor (Tanδ)	<table><tr><td>Rated Voltage(V_{DC})</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td></tr><tr><td>Tanδ(Max.)</td><td>0.22</td><td>0.19</td><td>0.16</td><td>0.14</td><td>0.12</td><td>0.10</td></tr></table> (at 20°C, 120Hz) When the capacitance exceeds 1,000μF, 0.02 shall be added every 1,000μF increase.	Rated Voltage(V _{DC})	6.3	10	16	25	35	50	Tanδ(Max.)	0.22	0.19	0.16	0.14	0.12	0.10							
Rated Voltage(V _{DC})	6.3	10	16	25	35	50																
Tanδ(Max.)	0.22	0.19	0.16	0.14	0.12	0.10																
Temperature Characteristics (Max. Impedance ratio)	<table><tr><td>Rated voltage(V_{DC})</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td></tr><tr><td>Z(-25°C)/Z(+20°C)</td><td>4</td><td>3</td><td>2</td><td>2</td><td>2</td><td>2</td></tr><tr><td>Z(-40°C)/Z(+20°C)</td><td>8</td><td>6</td><td>4</td><td>3</td><td>3</td><td>4</td></tr></table> (at 120Hz)	Rated voltage(V _{DC})	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	3	3	4
Rated voltage(V _{DC})	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	3	3	4																
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied at 105°C for the following test time. Capacitance change ≤ ±25% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value <table><tr><td>φ D</td><td>6.3~10V</td><td>16~50V</td></tr><tr><td>φ 5~6.3</td><td>4,000 hours</td><td>5,000 hours</td></tr><tr><td>φ 8~10</td><td>6,000 hours</td><td>7,000 hours</td></tr><tr><td>φ 12.5~</td><td>8,000 hours</td><td>10,000 hours</td></tr></table>	φ D	6.3~10V	16~50V	φ 5~6.3	4,000 hours	5,000 hours	φ 8~10	6,000 hours	7,000 hours	φ 12.5~	8,000 hours	10,000 hours									
φ D	6.3~10V	16~50V																				
φ 5~6.3	4,000 hours	5,000 hours																				
φ 8~10	6,000 hours	7,000 hours																				
φ 12.5~	8,000 hours	10,000 hours																				
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1,000 hours at 105°C without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≤ ±25% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value																					
Others	Satisfied characteristics KS C IEC 60384-4																					

DIMENSIONS OF NLA Series

Unit(mm)

Marking : DARK BROWN SLEEVE, SILVER INK

Ø D	5	6.3	8	10	12.5	16	18
Ø d	0.5	0.5	0.6	0.6	0.6	0.8	0.8
F	2.0	2.5	3.5	5.0	5.0	7.5	7.5
Ø D'	Ø D + 0.5 max.						
L'	L + 1.5 max.			L + 2.0 max.			



MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

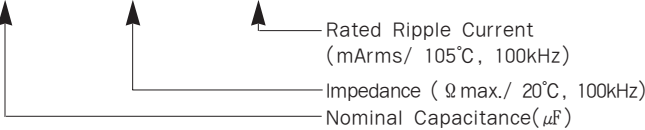
RATINGS OF NLA Series

Vdc ∅D×L(mm)	6.3			10			16		
	μF	IMP.	Ripple	μF	IMP.	Ripple	μF	IMP.	Ripple
5×11	150	0.50	175	100	0.50	175	47	0.50	175
6.3×11	330	0.25	290	220	0.25	290	100	0.25	290
8×11.5	680	0.12	555	470	0.12	555	330	0.12	555
8×15	1,000	0.090	730	680	0.090	730	470	0.090	730
8×20	1,200	0.080	810	1,000	0.080	810	560	0.080	810
10×12.5	820	0.090	760	680	0.090	760	470	0.090	760
10×16	1,200	0.068	1,050	1,000	0.068	1,050	680	0.068	1,050
10×20	1,500	0.052	1,220	1,200	0.052	1,220	1,000	0.052	1,220
10×25	2,200	0.045	1,440	1,500	0.045	1,440	1,200	0.045	1,440
10×30	2,700	0.037	1,690	1,800	0.037	1,690	1,500	0.037	1,690
12.5×16	1,800	0.053	1,270	1,500	0.053	1,270	1,000	0.053	1,270
12.5×20	3,300	0.038	1,660	2,200	0.038	1,660	1,500	0.038	1,660
12.5×25	3,900	0.030	2,310	3,300	0.030	2,310	2,200	0.030	2,310
12.5×30	4,700	0.025	2,510	3,900	0.025	2,510	2,700	0.025	2,510
12.5×35	5,600	0.022	2,870	4,700	0.022	2,870	3,300	0.022	2,870
16×15	2,700	0.048	1,690	2,200	0.048	1,690	1,500	0.048	1,690
16×20	5,600	0.031	2,210	3,900	0.031	2,210	2,700	0.031	2,210
16×25	6,800	0.024	2,560	5,600	0.024	2,560	3,900	0.024	2,560
16×31.5	8,200	0.021	3,010	6,800	0.021	3,010	4,700	0.021	3,010
16×35	10,000	0.019	3,250	8,200	0.019	3,250	5,600	0.019	3,250
16×40	12,000	0.016	3,560	10,000	0.016	3,560	6,800	0.016	3,560
18×15	3,900	0.051	1,920	2,700	0.051	1,920	2,200	0.051	1,920
18×20	6,800	0.031	2,490	5,600	0.031	2,490	3,900	0.031	2,490
18×25	10,000	0.023	2,740	6,800	0.023	2,740	4,700	0.023	2,740
18×31.5	12,000	0.021	3,330	8,200	0.021	3,330	5,600	0.021	3,330
18×35.5	15,000	0.019	3,680	10,000	0.019	3,680	8,200	0.019	3,680
18×40	18,000	0.018	3,800	12,000	0.018	3,800	10,000	0.012	4,280

Vdc ∅D×L(mm)	25			35			50		
	μF	IMP.	Ripple	μF	IMP.	Ripple	μF	IMP.	Ripple
5×11	47	0.50	175	33	0.50	175	10	2.0	100
6.3×11	100	0.25	290	56	0.25	290	22	1.6	150
8×11.5	220	0.12	555	150	0.12	555	47	0.80	180
8×15	330	0.090	730	220	0.090	730	100	0.50	230
8×20	390	0.080	810	270	0.080	810	120	0.30	360
10×12.5	330	0.090	760	220	0.090	760	100	0.28	380
10×16	470	0.068	1,050	330	0.068	1,050	150	0.19	525
10×20	680	0.052	1,220	470	0.052	1,220	220	0.14	610
10×25	820	0.045	1,440	560	0.045	1,440	270	0.11	720
10×30	1,000	0.037	1,690	680	0.037	1,690	330	0.091	845
12.5×16	680	0.053	1,270	470	0.053	1,270	220	0.15	630
12.5×20	1,000	0.038	1,660	680	0.038	1,660	330	0.098	830
12.5×25	1,500	0.030	2,310	1,000	0.030	2,310	470	0.074	975
12.5×30	1,800	0.025	2,510	1,200	0.025	2,510	680	0.062	1,150
12.5×35	2,200	0.022	2,870	1,500	0.022	2,870	820	0.052	1,250
16×15	1,000	0.048	1,690	680	0.048	1,690	390	0.11	845
16×20	1,800	0.031	2,210	1,200	0.031	2,210	680	0.070	1,100
16×25	2,700	0.024	2,560	1,800	0.024	2,560	820	0.052	1,280
16×31.5	3,300	0.021	3,010	2,200	0.021	3,010	1,000	0.045	1,500
16×35	3,900	0.019	3,250	2,700	0.019	3,250	1,200	0.039	1,680
16×40	4,700	0.016	3,560	3,300	0.016	3,560	1,500	0.033	1,850
18×15	1,200	0.051	1,920	1,000	0.051	1,920	390	0.11	965
18×20	2,200	0.031	2,490	1,800	0.031	2,490	680	0.074	1,250
18×25	3,300	0.023	2,740	2,200	0.023	2,740	1,000	0.054	1,370
18×31.5	3,900	0.021	3,330	2,700	0.021	3,330	1,200	0.043	1,810
18×35.5	4,700	0.019	3,680	3,300	0.019	3,680	1,500	0.035	1,850
18×40	5,600	0.012	4,280	3,900	0.012	4,280	1,800	0.029	1,900

RATED RIPPLE CURRENT MULTIPLIERS

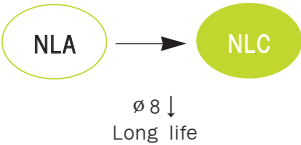
Cap.(μF)	Freq.(Hz)	120	1k	10k	100k
~ 180		0.40	0.75	0.90	1.00
220 ~ 560		0.50	0.85	0.94	1.00
680 ~ 1,800		0.60	0.87	0.95	1.00
2,200 ~ 3,900		0.75	0.90	0.95	1.00
4,700 ~ 18,000		0.85	0.95	0.98	1.00



NLC Series

• 105°C 10,000Hrs assured.

- Low impedance.
- Long Life.
- For SMPS, IP-Board, Adaptor
- RoHS compliant.
- Halogen-free capacitors are also available.



Solvent-proof

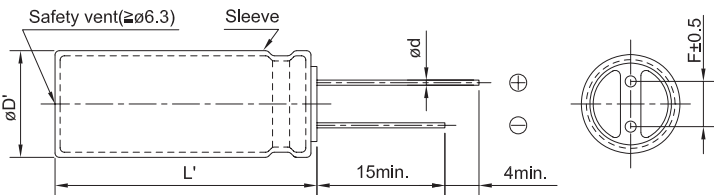


SPECIFICATIONS

Item	Characteristics																		
Rated Voltage Range	6.3 ~ 50 V _{DC}																		
Operating Temperature Range	-55 ~ +105℃																		
Capacitance Tolerance	±20%(M) (at 20℃, 120Hz)																		
Leakage Current	I=0.01CV(μA) or 3μA, whichever is greater. Where, I: Max.Leakage current(μA) C: Nominal capacitance (μF) V: Rated voltage (V _{DC}) (at 20℃, 2 minutes)																		
Dissipation Factor (Tanδ)	<table><tr><td>Rated Voltage(V_{DC})</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td></tr><tr><td>Tanδ(Max.)</td><td>0.22</td><td>0.19</td><td>0.16</td><td>0.14</td><td>0.12</td><td>0.10</td></tr></table> (at 20℃, 120Hz)	Rated Voltage(V _{DC})	6.3	10	16	25	35	50	Tanδ(Max.)	0.22	0.19	0.16	0.14	0.12	0.10				
Rated Voltage(V _{DC})	6.3	10	16	25	35	50													
Tanδ(Max.)	0.22	0.19	0.16	0.14	0.12	0.10													
Temperature Characteristics (Max. Impedance ratio)	<table><tr><td>Rated voltage(V_{DC})</td><td>6.3</td><td>10</td><td>16</td><td>25~35</td><td>50</td></tr><tr><td>Z(-25℃)/Z(+20℃)</td><td>4</td><td>3</td><td>2</td><td>2</td><td>2</td></tr><tr><td>Z(-40℃)/Z(+20℃)</td><td>8</td><td>6</td><td>4</td><td>3</td><td>4</td></tr></table> (at 120Hz)	Rated voltage(V _{DC})	6.3	10	16	25~35	50	Z(-25℃)/Z(+20℃)	4	3	2	2	2	Z(-40℃)/Z(+20℃)	8	6	4	3	4
Rated voltage(V _{DC})	6.3	10	16	25~35	50														
Z(-25℃)/Z(+20℃)	4	3	2	2	2														
Z(-40℃)/Z(+20℃)	8	6	4	3	4														
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated voltage is applied for 10,000 hours at 105℃. Capacitance change ≤ ±25% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value																		
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after exposing them for 1,000 hours at 105℃ without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≤ ±25% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value																		
Others	Satisfied characteristics KS C IEC 60384-4																		

DIMENSIONS OF NLC Series

Unit(mm)



Marking : DARK BROWN SLEEVE, SILVER INK

øD	5	6.3	8
ød	0.5	0.5	0.6
F	2.0	2.5	3.5
øD'	øD + 0.5 max.		
L'	L + 1.5 max.		



MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

RATINGS OF NLC Series

Vdc ∅ D × L (mm)	6.3			10			16		
	μF	IMP.	Ripple	μF	IMP.	Ripple	μF	IMP.	Ripple
5 × 11	150	0.70	140	100	0.70	140	47	0.70	140
6.3 × 11	330	0.50	220	220	0.50	220	100	0.50	220
8 × 11.5	680	0.24	400	470	0.24	400	330	0.24	400

Vdc ∅ D × L (mm)	25			35			50		
	μF	IMP.	Ripple	μF	IMP.	Ripple	μF	IMP.	Ripple
5 × 11	47	0.70	140	33	0.70	140	10	2.0	100
6.3 × 11	100	0.50	220	56	0.50	220	22	1.6	150
8 × 11.5	220	0.24	400	150	0.24	400	47	0.8	180

↑ Rated Ripple Current (mA_{rms}/ 105°C, 100kHz)
↑ Impedance (Ω max./ 20°C, 100kHz)
↑ Nominal Capacitance(μF)

RATED RIPPLE CURRENT MULTIPLIERS

Freq.(Hz) Cap.(μF)	120	1k	10k	100k
~180	0.40	0.75	0.90	1.00
220~560	0.50	0.85	0.94	1.00
~680	0.60	0.87	0.95	1.00

PXB Series

• 125°C 3,000~5,000Hrs assured.

- Low impedance.
- Wide Temperature range.
- Long Life
- For ECU, BLU, Cooling fan
- RoHS compliant.
- Halogen-free capacitors are also available.

Solvent-proof

WV ≤ 80V_{DC}

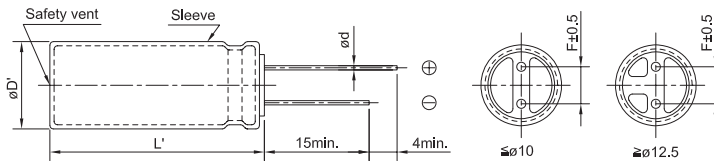


SPECIFICATIONS

Item	Characteristics																												
Rated Voltage Range	10 ~ 80 V _{DC}			160 ~ 400 V _{DC}			450 V _{DC}																						
Operating Temperature Range	-40 ~ +125℃			-40 ~ +125℃			-25 ~ +125℃																						
Capacitance Tolerance	±20% (M) (at 20℃, 120Hz)																												
Leakage Current	I=0.03CV (μA) or 4μA, whichever is greater			CV≤1,000		CV > 1,000																							
				I=0.1CV+40		I=0.1CV+100																							
Where, I : Max. leakage current (μA) C: Nominal capacitance (μF)V: Rated voltage(V _{DC}) (at 20℃, 1 minute)																													
Dissipation Factor (Tan δ)	<table><tr><td>Rated voltage(V_{DC})</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50~63</td><td>80</td><td>160~250</td><td>350~450</td></tr><tr><td>Tanδ(Max.)</td><td>0.20</td><td>0.16</td><td>0.14</td><td>0.12</td><td>0.10</td><td>0.08</td><td>0.20</td><td>0.24</td></tr></table>								Rated voltage(V _{DC})	10	16	25	35	50~63	80	160~250	350~450	Tanδ(Max.)	0.20	0.16	0.14	0.12	0.10	0.08	0.20	0.24			
	Rated voltage(V _{DC})	10	16	25	35	50~63	80	160~250	350~450																				
Tanδ(Max.)	0.20	0.16	0.14	0.12	0.10	0.08	0.20	0.24																					
When the capacitance exceeds 1.000μF, 0.02 shall be added every 1.000μF increase. (at 20℃, 120Hz)																													
Temperature Characteristics (Max. Impedance ratio)	<table><tr><td>Rated Voltage(V_{DC})</td><td>10</td><td>16~35</td><td>50~80</td><td>160~250</td><td>350~400</td><td>450</td></tr><tr><td>Z(-25℃)/Z(+20℃)</td><td>3</td><td>2</td><td>3</td><td>3</td><td>6</td><td>6</td></tr><tr><td>Z(-40℃)/Z(+20℃)</td><td>6</td><td>4</td><td>5</td><td>6</td><td>10</td><td>-</td></tr></table>								Rated Voltage(V _{DC})	10	16~35	50~80	160~250	350~400	450	Z(-25℃)/Z(+20℃)	3	2	3	3	6	6	Z(-40℃)/Z(+20℃)	6	4	5	6	10	-
	Rated Voltage(V _{DC})	10	16~35	50~80	160~250	350~400	450																						
	Z(-25℃)/Z(+20℃)	3	2	3	3	6	6																						
Z(-40℃)/Z(+20℃)	6	4	5	6	10	-																							
(at 120Hz)																													
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated voltage is applied for 5,000 hours at 125℃. (where, 3,000 hours ≤ Ø 8)																												
	Capacitance change ≤ ±30% of the initial value (where, ±20% for ≥ WV 160V _{DC}) Tanδ ≤ 300% of the initial specified value (where, 200% for ≥ WV 160V _{DC}) Leakage current ≤ The initial specified value																												
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after exposing them for 1,000 hours at 125℃ without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements.																												
	Capacitance change ≤ ±30% of the initial value (where, ±20% for ≥ WV 160V _{DC}) Tanδ ≤ 300% of the initial specified value (where, 200% for ≥ WV 160V _{DC}) Leakage current ≤ The initial specified value (where, 500% for ≥ WV 160V _{DC})																												
Others	Satisfied characteristics KS C IEC 60384-4																												

DIMENSIONS OF PXB Series

Unit(mm)



Marking : GREEN SLEEVE, BLACK INK

øD	8	10	12.5	16
ød	0.6	0.6	0.6	0.8
F	3.5	5.0	5.0	7.5
øD'	øD + 0.5 max.			
L'	L+1.5max.	L+2.0max.		



MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

RATINGS OF PXB Series

V _{DC}	10			16			25			35		
Items μF	ø D × L (mm)	Imp. (ℓ max.)	Rated Ripple Current (mArms)	ø D × L (mm)	Imp. (ℓ max.)	Rated Ripple Current (mArms)	ø D × L (mm)	Imp. (ℓ max.)	Rated Ripple Current (mArms)	ø D × L (mm)	Imp. (ℓ max.)	Rated Ripple Current (mArms)
		(20℃, 100kHz)	(125℃, 100kHz)		(20℃, 100kHz)	(125℃, 100kHz)		(20℃, 100kHz)	(125℃, 100kHz)		(20℃, 100kHz)	(125℃, 100kHz)
100				8 × 11.5	0.35	325	8 × 11.5	0.35	325	8 × 11.5	0.35	325
										10 × 12.5	0.25	480
220	8 × 11.5	0.35	325	10 × 12.5	0.25	480	10 × 12.5	0.25	480	10 × 16	0.15	625
330	10 × 12.5	0.25	480	10 × 12.5	0.25	480	10 × 16	0.15	625	10 × 20	0.11	799
470	10 × 12.5	0.25	480	10 × 16	0.15	625	10 × 20	0.11	799	12.5 × 20	0.068	997
1,000	10 × 20	0.11	799	12.5 × 20	0.068	997	12.5 × 25	0.058	1,121	16 × 25	0.040	1,426
2,200	12.5 × 25	0.058	997	16 × 25	0.040	1,426	16 × 31.5	0.034	1,595			
3,300	16 × 25	0.040	1,426	16 × 31.5	0.034	1,595						
4,700	16 × 31.5	0.034	1,595									

V _{DC}	50			63			80		
Items μF	ø D × L (mm)	Imp. (ℓ max.)	Rated Ripple Current (mArms)	ø D × L (mm)	Imp. (ℓ max.)	Rated Ripple Current (mArms)	ø D × L (mm)	Imp. (ℓ max.)	Rated Ripple Current (mArms)
		(20℃, 100kHz)	(125℃, 100kHz)		(20℃, 100kHz)	(125℃, 100kHz)		(20℃, 100kHz)	(125℃, 100kHz)
10	8 × 11.5	0.75	180						
22	8 × 11.5	0.50	250				8 × 11.5	1.5	150
33	8 × 11.5	0.50	280	8 × 11.5	1.5	150	10 × 12.5	0.80	480
47	8 × 11.5	0.50	280	10 × 12.5	0.80	480	10 × 12.5	0.80	480
100	10 × 12.5	0.25	480	10 × 16	0.58	650	10 × 20	0.39	790
220	10 × 20	0.15	625	12.5 × 20	0.27	950	12.5 × 25	0.18	1,240
330	12.5 × 20	0.081	990	12.5 × 25	0.18	1,240	12.5 × 30	0.16	1,390
470	12.5 × 25	0.059	1,150	12.5 × 30	0.16	1,390	16 × 25	0.11	1,500
1,000	16 × 31.5	0.032	1,590	16 × 31.5	0.090	1,650			

V _{DC}	160		200		250		350		400		450(2W)	
Items μF	ø D × L (mm)	Rated Ripple Current (mArms)	ø D × L (mm)	Rated Ripple Current (mArms)	ø D × L (mm)	Rated Ripple Current (mArms)	ø D × L (mm)	Rated Ripple Current (mArms)	ø D × L (mm)	Rated Ripple Current (mArms)	ø D × L (mm)	Rated Ripple Current (mArms)
		(125℃, 120Hz)		(125℃, 120Hz)		(125℃, 120Hz)		(125℃, 120Hz)		(125℃, 120Hz)		(125℃, 120Hz)
4.7							10 × 16	53	10 × 20	53	10 × 25	58
10			10 × 16	78	10 × 20	78	10 × 20	85	12.5 × 20	86	12.5 × 20	86
22	10 × 16	115	10 × 20	126	12.5 × 20	128	12.5 × 25	139	12.5 × 30	142	16 × 25	154
33	10 × 20	154	12.5 × 20	157	12.5 × 25	171	16 × 25	189	16 × 25	189	16 × 31.5	203
47	12.5 × 20	187	12.5 × 25	204	16 × 25	225	16 × 31.5	243	16 × 31.5	243		
68	12.5 × 25	245	16 × 20	250	16 × 31.5	292						
100	16 × 25	329	16 × 25	329								
150	16 × 31.5	434										

RATED RIPPLE CURRENT MULTIPLIERS

(10 ~ 80V_{DC})

Freq.(Hz)	120	1k	10k	100k
Cap.(μF)				
4.7 ~ 100	0.40	0.75	0.90	1.00
220 ~ 470	0.50	0.85	0.94	1.00
1,000	0.60	0.87	0.95	1.00
2,200 ~ 3,300	0.75	0.90	0.95	1.00
~ 4,700	0.85	0.95	0.98	1.00

(160 ~ 450V_{DC})

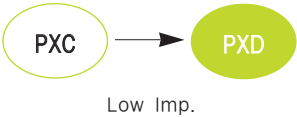
Freq.(Hz)	120	300	1k	10k	100k
Cap.(μF)					
4.7 ~ 33	1.00	1.25	1.50	1.75	1.80
47 ~ 150	1.00	1.15	1.30	1.40	1.50

PXD Series

• 125°C 2,000~4,000Hrs assured.

Solvent-proof

- Ultra low Impedance.
- Wide temperature range.
- Long Life
- For ECU, BLU, Cooling fan
- RoHS compliant.
- Halogen-free capacitors are also available.

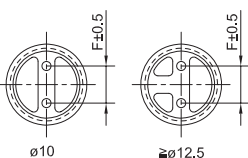
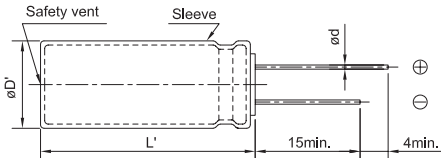


SPECIFICATIONS

Item	Characteristics												
Rated Voltage Range	10 ~ 50 V _{DC}												
Operating Temperature Range	-40 ~ +125℃												
Capacitance Tolerance	±20%(M) (at 20℃,120Hz)												
Leakage Current	I = 0.03CV (μA) or 4μA, whichever is greater. Where, I:Max. leakage current(μA),C:Nominal capacitance(μF),V:Rated voltage(V _{DC}) (at 20℃, 1 minutes)												
Dissipation Factor (Tanδ)	<table><tr><td>Rated Volatag(V_{DC})</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td></tr><tr><td>TANδ(Max.)</td><td>0.20</td><td>0.16</td><td>0.14</td><td>0.12</td><td>0.10</td></tr></table> (at 20℃,120Hz) When the capacitance exceeds 1.000μF, 0.02 shall be added every 1.000μF increase.	Rated Volatag(V _{DC})	10	16	25	35	50	TANδ(Max.)	0.20	0.16	0.14	0.12	0.10
Rated Volatag(V _{DC})	10	16	25	35	50								
TANδ(Max.)	0.20	0.16	0.14	0.12	0.10								
Temperature Characteristics (Max. Impedance ratio)	<table><tr><td>Rated Voltage(V_{DC})</td><td>10</td><td>16 ~ 35</td><td>50</td></tr><tr><td>Z(-25℃)/Z(+20℃)</td><td>3</td><td>2</td><td>3</td></tr><tr><td>Z(-40℃)/Z(+20℃)</td><td>6</td><td>4</td><td>5</td></tr></table> (at 120Hz)	Rated Voltage(V _{DC})	10	16 ~ 35	50	Z(-25℃)/Z(+20℃)	3	2	3	Z(-40℃)/Z(+20℃)	6	4	5
Rated Voltage(V _{DC})	10	16 ~ 35	50										
Z(-25℃)/Z(+20℃)	3	2	3										
Z(-40℃)/Z(+20℃)	6	4	5										
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated voltage is applied for 4,000 hours at 125℃. (where, 2,000 hours ≤ 8φ) Capacitance change ≤ ±30% of the initial value Tanδ ≤ 300% of the initial specified value Leakage Current ≤ The initial specified value												
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after exposing them for 1,000 hours at 125℃ without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≤ ±30% of the initial value Tanδ ≤ 300% of the initial specified value Leakage current ≤ The initial specified value												
Others	Satisfied characteristics KS C IEC 60384-4												

DIMENSIONS OF PXD Series

Unit(mm)



Marking : GREEN SLEEVE, BLACK INK

øD	8	10	12.5	16
ød	0.6	0.6	0.6	0.8
F	3.5	5.0	5.0	7.5
øD'	øD+0.5 max.			
L'	L+1.5max	L+2.0max.		



MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

RATINGS OF PXD Series

V _{DC}		10		16		
Item μF	Ø D×L (mm)	Imp. ($\varnothing$ max.)	Rated Ripple Current (mA _{rms})	Ø D×L (mm)	Imp. ($\varnothing$ max.)	Rated Ripple Current (mA _{rms})
		(20°C, 100kHz)	(125°C, 100kHz)		(20°C, 100kHz)	(125°C, 100kHz)
100				8 × 11.5	0.24	400
220	8 × 11.5	0.24	400	10 × 12.5	0.11	720
330	10 × 12.5	0.11	720	10 × 12.5	0.11	720
470	10 × 12.5	0.11	720	10 × 16	0.071	950
1,000	10 × 20	0.056	1,100	12.5 × 20	0.044	1,250
2,200	12.5 × 25	0.030	1,550	16 × 25	0.023	2,000
3,300	16 × 25	0.023	2,000	16 × 31.5	0.019	2,500
4,700	16 × 31.5	0.019	2,500			

V _{DC}		25		35		
Item μF	Ø D×L (mm)	Imp. ($\varnothing$ max.)	Rated Ripple Current (mA _{rms})	Ø D×L (mm)	Imp. ($\varnothing$ max.)	Rated Ripple Current (mA _{rms})
		(20°C, 100kHz)	(125°C, 100kHz)		(20°C, 100kHz)	(125°C, 100kHz)
100	8 × 11.5	0.24	400	8 × 11.5	0.24	400
				10 × 12.5	0.11	720
220	10 × 12.5	0.11	720	10 × 16	0.071	950
330	10 × 16	0.071	950	10 × 20	0.056	1,100
470	10 × 20	0.056	1,100	12.5 × 20	0.044	1,250
1,000	12.5 × 25	0.030	1,550	16 × 25	0.023	2,000
2,200	16 × 31.5	0.019	2,500			

V _{DC}		50	
Item μF	Ø D×L (mm)	Imp. ($\varnothing$ max.)	Rated Ripple Current (mA _{rms})
		(20°C, 100kHz)	(125°C, 100kHz)
10	8 × 11.5	0.30	230
22	8 × 11.5	0.30	320
33	8 × 11.5	0.30	340
47	8 × 11.5	0.30	340
100	10 × 12.5	0.15	590
220	10 × 20	0.074	950
330	12.5 × 20	0.061	1,150
470	12.5 × 25	0.040	1,400
1,000	16 × 31.5	0.021	2,200

RATED RIPPLE CURRENT MULTIPLIERS

Freq.(Hz) Cap.(μF)	120	1k	10k	100k
10 ~ 100	0.40	0.75	0.90	1.00
220 ~ 470	0.50	0.85	0.94	1.00
1,000	0.60	0.87	0.95	1.00
2,200 ~ 3,300	0.75	0.90	0.95	1.00
~ 4,700	0.85	0.95	0.98	1.00

PHA Series

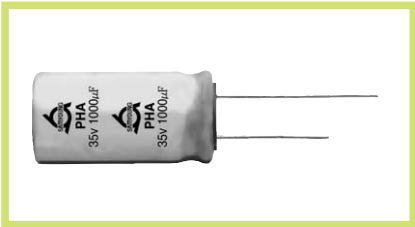
• 150°C 1,000Hrs assured.

Solvent-proof

- Wide Temperature range.
- For ECU, Cooling fan
- RoHS compliant.
- Halogen-free capacitors are also available.



Wide Temp.



SPECIFICATIONS

Item	Characteristics												
Rated Voltage Range	10 ~ 50 V _{DC}												
Operating Temperature Range	-40 ~ +150℃												
Capacitance Tolerance	±20%(M) (at 20℃, 120Hz)												
Leakage Current	I = 0.03CV (μA) or 4μA, whichever is greater. Where, I:Max. leakage current(μA) C:Nominal capacitance(μF) V:Rated voltage(V _{DC}) (at 20℃, 1 minute)												
Dissipation Factor (Tanδ)	<table><tr><td>Rated Voltage(V_{DC})</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td></tr><tr><td>Tanδ(Max.)</td><td>0.24</td><td>0.20</td><td>0.16</td><td>0.14</td><td>0.12</td></tr></table> (at 20℃,120Hz)	Rated Voltage(V _{DC})	10	16	25	35	50	Tanδ(Max.)	0.24	0.20	0.16	0.14	0.12
Rated Voltage(V _{DC})	10	16	25	35	50								
Tanδ(Max.)	0.24	0.20	0.16	0.14	0.12								
Temperature Characteristics (Max. impedance ratio)	<table><tr><td>Rate Voltage(V_{DC})</td><td>10 ~ 50</td></tr><tr><td>Z(-25℃)/Z(+20℃)</td><td>2</td></tr><tr><td>Z(-40℃)/Z(+20℃)</td><td>4</td></tr></table> (at 120Hz)	Rate Voltage(V _{DC})	10 ~ 50	Z(-25℃)/Z(+20℃)	2	Z(-40℃)/Z(+20℃)	4						
Rate Voltage(V _{DC})	10 ~ 50												
Z(-25℃)/Z(+20℃)	2												
Z(-40℃)/Z(+20℃)	4												
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated voltage is applied at 150℃ for 1,000 hours. Capacitance change ≤ ±30% of the initial value Tanδ ≤ 300% of the initial specified value Leakage Current ≤ The initial specified value												
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after exposing them for 1,000 hours at 150℃ without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≤ ±30% of the initial value Tanδ ≤ 300% of the initial specified value Leakage Current ≤ The initial specified value												
others	Satisfied characteristics KS C IEC 60384-4												

DIMENSIONS OF PHA Series

Unit(mm)

Marking : YELLOW SLEEVE, BLACK INK

øD	10	12.5	16
ød	0.6	0.6	0.8
F	5.0	5.0	7.5
øD'	øD + 0.5 max.		
L'	L + 2.0 max.		



MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

RATINGS OF PHA Series

V _{DC}	10		16		25	
Items μF	∅ D×L(mm)	Rated Ripple Current (mA _{rms} /150°C, 120Hz)	∅ D×L(mm)	Rated Ripple Current (mA _{rms} /150°C, 120Hz)	∅ D×L(mm)	Rated Ripple Current (mA _{rms} /150°C, 120Hz)
220					10×16	370
330			10×16	370	12.5×20	600
470	10×16	370	12.5×20	600	16×31.5	1,100
1,000	12.5×20	600	16×31.5	1,100	16×35.5	1,150
2,200	16×31.5	1,100	16×35.5	1,150		
3,300	16×35.5	1,150				

V _{DC}	35		50	
Items μF	∅ D×L(mm)	Rated Ripple Current (mA _{rms} /150°C, 120Hz)	∅ D×L(mm)	Rated Ripple Current (mA _{rms} /150°C, 120Hz)
100	10×16	370	10×20	300
220	10×20	460	12.5×20	400
330	12.5×20	600	12.5×25	500
470	12.5×25	750	16×35.5	700
1,000	16×35.5	1,150		

RATED RIPPLE CURRENT MULTIPLIERS

Freq.(Hz) Cap.(μF)	120	1k	10k	100k
100 ~ 1,000	1.00	1.15	1.30	1.40
2,200 ~ 3,300	1.00	1.03	1.05	1.08

AHS Series

- 85°C 2,000Hrs assured.
- Non-solvent proof.
- Downsized of AH series.
- For Hi-Fi Audio.
- RoHS compliant.
- Halogen-free capacitors are also available.

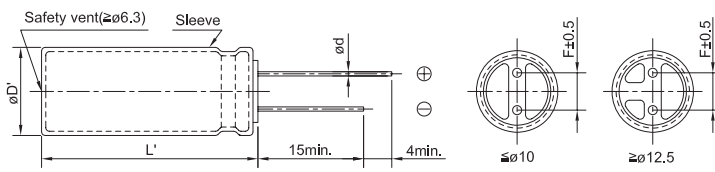


SPECIFICATIONS

Item	Characteristics																
Rated Voltage Range	10 ~ 100 V _{DC}																
Operating Temperature Range	-40 ~ +85℃																
Capacitance Tolerance	±20%(M) (at 20℃, 120Hz)																
Leakage Current	I=0.03CV (μA) or 4μA whichever is greater Where, I: Max. Leakage current(μA) C: Nominal capacitance (μF) V: Rated Voltage (V _{DC}) (at 20℃, 1 minute)																
Dissipation Factor (Tanδ)	<table><tr><td>Rated Voltage(V_{DC})</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td><td>63</td><td>100</td></tr><tr><td>Tanδ(Max.)</td><td>0.19</td><td>0.16</td><td>0.14</td><td>0.12</td><td>0.10</td><td>0.09</td><td>0.08</td></tr></table> When the capacitance exceeds 1,000μF, 0.02 shall be added every 1,000μF increase. (at 20℃, 120Hz)	Rated Voltage(V _{DC})	10	16	25	35	50	63	100	Tanδ(Max.)	0.19	0.16	0.14	0.12	0.10	0.09	0.08
Rated Voltage(V _{DC})	10	16	25	35	50	63	100										
Tanδ(Max.)	0.19	0.16	0.14	0.12	0.10	0.09	0.08										
Temperature Characteristics (Max. Impedance ratio)	<table><tr><td>Rated Voltage(V_{DC})</td><td>10</td><td>16</td><td>25</td><td>35~100</td></tr><tr><td>Z(-25℃)/Z(20℃)</td><td>3</td><td>2</td><td>2</td><td>2</td></tr><tr><td>Z(-40℃)/Z(20℃)</td><td>8</td><td>6</td><td>4</td><td>3</td></tr></table> (at 120Hz)	Rated Voltage(V _{DC})	10	16	25	35~100	Z(-25℃)/Z(20℃)	3	2	2	2	Z(-40℃)/Z(20℃)	8	6	4	3	
Rated Voltage(V _{DC})	10	16	25	35~100													
Z(-25℃)/Z(20℃)	3	2	2	2													
Z(-40℃)/Z(20℃)	8	6	4	3													
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated voltage is applied for 2,000 hours at 85℃. Capacitance change ≤ ±20% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value																
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after exposing them at 85℃. for 1,000 hours without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≤ ±20% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value																
Others	Satisfied characteristics KS C IEC 60384-4																

DIMENSIONS OF AHS Series

Unit(mm)



Marking : DARK BROWN SLEEVE, GOLD INK

ØD	5	6.3	8	10	12.5	16	18
Ød	0.5	0.5	0.6	0.6	0.8	0.8	0.8
F	2.0	2.5	3.5	5.0	5.0	7.5	7.5
ØD'	ØD + 0.5 max.						
L'	L + 1.5 max.			L + 2.0 max.			

※ 10x16 : Ø d = 0.8



MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

RATINGS OF AHS Series

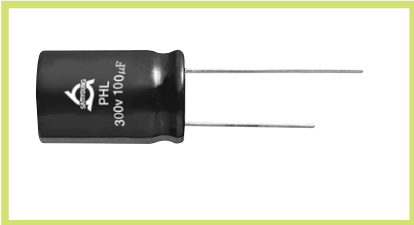
μF \ V _{DC}	10		16		25		35		50	
0.1									5×11	4
0.22									5×11	7
0.33									5×11	8
0.47									5×11	10
1									5×11	14
2.2									5×11	21
3.3									5×11	26
4.7							5×11	28	5×11	31
10					5×11	39	5×11	41	5×11	45
22	5×11	49	5×11	54	5×11	58	5×11	61	5×11	66
33	5×11	59	5×11	66	5×11	70	5×11	75	6.3×11	93
47	5×11	71	5×11	78	5×11	84	6.3×11	103	6.3×11	111
100	5×11	103	6.3×11	132	6.3×11	140	8×11.5	171	8×11.5	185
220	6.3×11	177	8×11.5	224	8×11.5	237	10×12.5	299	10×16	357
330	8×11.5	248	8×11.5	274	10×12.5	343	10×16	404	10×20	473
470	8×11.5	296	10×12.5	386	10×16	451	10×20	523	12.5×20	626
1,000	10×16	538	10×20	638	12.5×20	746	12.5×25	860	16×25	1,017
2,200	12.5×20	920	12.5×25	1,087	16×25	1,262	16×31.5	1,413	18×35.5	1,621
3,300	12.5×25	1,180	16×25	1,411	16×31.5	1,586	18×35.5	1,776		
4,700	16×25	1,458	16×31.5	1,678	18×35.5	2,120				
6,800	16×31.5	1,780	18×35.5	2,016						
10,000	18×35.5	2,134								

Rated Ripple Current (mA_{rms}/85°C, 120Hz)

Case Size $\varnothing D \times L$ (mm)

μF \ V _{DC}	63		100	
0.1			5×11	5
0.22			5×11	7
0.33			5×11	9
0.47			5×11	11
1			5×11	16
2.2			5×11	23
3.3			5×11	28
4.7	5×11	34	5×11	34
10	5×11	49	6.3×11	56
22	6.3×11	83	8×11.5	95
33	6.3×11	102	10×12.5	137
47	8×11.5	136	10×16	181
100	10×12.5	239	12.5×20	316
220	10×20	423	16×25	564
330	12.5×20	575	16×25	691
470	12.5×25	745	16×31.5	891
1,000	16×31.5	1,182		

- PHL Series
- 5~35°C 5,000Times.
 - Non-solvent proof.
 - For Photo Flash.
 - RoHS compliant.
 - Halogen-free capacitors are also available.



SPECIFICATIONS

Item	Characteristics						
Rated Voltage	300 ~ 330 V _{bc}						
Operating Temperature Range	-20 ~ +55℃						
Capacitance Tolerance	-10 ~ +20%(V) (at 20℃, 120Hz)						
Leakage Current	<table><tr><td>ø D(mm)</td><td>ø 5 ~ 8</td><td>ø 10 ~</td></tr><tr><td>LC(Max.)</td><td>I = 2.0 × C</td><td>I = 1.0 × C</td></tr></table> Where, I:Max.Leakage current(μA) C: Nominal capacitance (μF) (at 20℃, 5 minutes)	ø D(mm)	ø 5 ~ 8	ø 10 ~	LC(Max.)	I = 2.0 × C	I = 1.0 × C
ø D(mm)	ø 5 ~ 8	ø 10 ~					
LC(Max.)	I = 2.0 × C	I = 1.0 × C					
Dissipation Factor (Tanδ)	<table><tr><td>ø D(mm)</td><td>ø 5 ~ 8</td><td>ø 10 ~</td></tr><tr><td>Tanδ(Max.)</td><td>0.085</td><td>0.06</td></tr></table> (at 20℃, 120Hz)	ø D(mm)	ø 5 ~ 8	ø 10 ~	Tanδ(Max.)	0.085	0.06
ø D(mm)	ø 5 ~ 8	ø 10 ~					
Tanδ(Max.)	0.085	0.06					
Charge and Discharge Characteristics	The following specifications shall be satisfied when the capacitors are restored to 20℃ after charge and discharge are repeated 5,000 times at room temperature (5 to 35℃) Discharge resistance or Xenon tube: 0.7~1.0 Ω . Capacitance change ≧ ±10% of the initial value Tanδ ≧ 150% of the initial specified value Leakage current ≧ 150% of the initial specified value						
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after exposing them for 1000 hours at 55℃ without voltage applied. Capacitance change ≧ ±10% of the initial value Tanδ ≧ 150% of the initial specified value Leakage current ≧ 150% of the initial specified value						
Others	Satisfied characteristics EIAJ RC - 3801A						

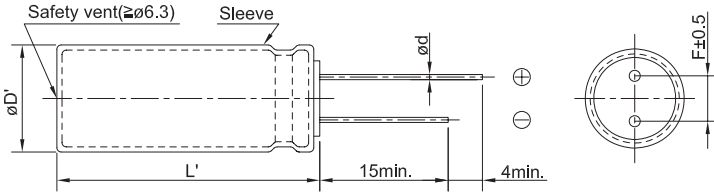
RATINGS OF PHL Series

μF V_{dc}	300			315			330		
5				5×16	6.3×10				
6.8					6.3×11				
10					6.3×15	8×11.5			
12.5					6.3×20	8×15			
15						8×17			
20						8×20			
30						8×23			
60	11.8×22						11.8×24		
80	11.8×27	13×25					11.8×29	13×27	
100	11.8×32	13×29	13.5×26				11.8×35	13×32	13.5×28
120		13×34	13.5×30					13×37	13.5×33
140		13×38	13.5×34					13×42	13.5×37
160		13×43	13.5×38						13.5×41

Note : Other case sizes, rated voltage or capacitance are also available upon request.

Case size ø D×L(mm)

DIMENSIONS OF PHL Series



Marking : BLACK SLEEVE, WHITE INK

øD	5	6.3	8	11.8	13	13.5
ød	0.5	0.5	0.6	0.6	0.6	0.8
F	2.0	2.5	3.5	5.0	5.0	5.0
øD'	øD+0.5 max.					
L'	L+1.0 max.					

Unit(mm)



MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

NZD Series

• 105°C 5,000Hrs assured

Solvent-proof

- For car air bag circuit
- RoHS compliant.
- Halogen-free capacitors are also available.

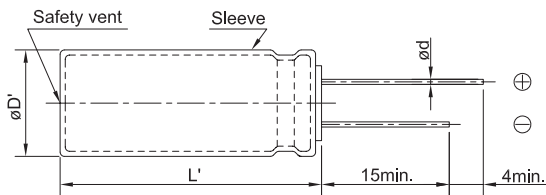


SPECIFICATIONS

Item	Characteristics											
Rated Voltage Range	16 ~ 35 V _{DC}											
Operating Temperature Range	-55 ~ +105℃											
Capacitance Tolerance	0% ~ 30%(S) (at 20℃, 120Hz)											
Leakage Current	I= 0.01CV(μA) Where, I:Max. leakage current(μA), C:Nominal capacitance(μF), V:Rated voltage(V _{DC}) (at 20℃, 2 minutes)											
Dissipation Factor (Tanδ)	<table border="1"><tr><td>Rated Voltage(V_{DC})</td><td>16</td><td>25</td><td>35</td></tr><tr><td>Tanδ(Max.)</td><td>0.16</td><td>0.14</td><td>0.12</td></tr></table> When the capacitance exceeds 1,000μF, 0.02 shall be added every 1,000μF increase. (at 20℃, 120Hz)				Rated Voltage(V _{DC})	16	25	35	Tanδ(Max.)	0.16	0.14	0.12
Rated Voltage(V _{DC})	16	25	35									
Tanδ(Max.)	0.16	0.14	0.12									
Temperature Characteristics (Max. Impedance ratio)	<table border="1"><tr><td>Rated Voltage(V_{DC})</td><td>16</td><td>25</td><td>35</td></tr><tr><td>Z(-55℃)/Z(20℃)</td><td colspan="3">3</td></tr></table> (at 120Hz)				Rated Voltage(V _{DC})	16	25	35	Z(-55℃)/Z(20℃)	3		
Rated Voltage(V _{DC})	16	25	35									
Z(-55℃)/Z(20℃)	3											
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated voltage is applied at 105℃ for 5,000 hours. Capacitance change ≤ ±25% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value											
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after exposing them for 1,000 hours at 105℃ without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≤ ±20% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value											
Others	Satisfied characteristics KS C IEC 60384-4											

DIMENSIONS OF NZD Series

Unit(mm)



Marking : DARK BROWN SLEEVE, SILVER INK

øD	12.5	16	18
ød	0.6	0.8	0.8
F	5.0	7.5	7.5
øD'	øD + 1.0 max.		
L'	L + 2.0 max.		

DIMENSIONS OF NZD Series

Vdc	16		
μF	ø D × L (mm)	Rated Ripple Current (mArms/105°C, 100kHz)	Impedance (m Ω max./20°C, 100kHz)
2,200	12.5 × 20	1,660	38
2,700	12.5 × 25	1,950	30
3,300	16 × 20	2,210	29
4,700	16 × 25	2,560	22
4,700	18 × 20	2,490	28
5,600	18 × 25	2,740	20

Vdc	25		
μF	ø D × L (mm)	Rated Ripple Current (mArms/105°C, 100kHz)	Impedance (m Ω max./20°C, 100kHz)
1,200	12.5 × 20	1,660	38
1,800	12.5 × 25	1,950	30
2,200	16 × 20	2,210	29
3,300	16 × 25	2,560	22
2,700	18 × 20	2,490	28
3,900	18 × 25	2,740	20

Vdc	35		
μF	ø D × L (mm)	Rated Ripple Current (mArms/105°C, 100kHz)	Impedance (m Ω max./20°C, 100kHz)
820	12.5 × 20	1,660	38
1,200	12.5 × 25	1,950	30
1,500	16 × 20	2,210	29
1,800	16 × 25	2,560	22
1,800	18 × 20	2,490	28
2,700	18 × 25	2,740	20



LARGE SIZED ALUMINUM ELECTROLYTIC CAPACITORS

RDC Series

• 85°C 2,000Hrs assured.

- Non-solvent proof.
- Downsized of RDA series.
- For SMPS, Inverter
- RoHS compliant.
- Halogen-free capacitors are also available.



SPECIFICATIONS

Item	Characteristics																																			
Rated Voltage Range	16 ∼ 100 V _{DC}					160 ∼ 500 V _{DC}																														
Operating Temperature Range	-40 ∼ +85°C					-25 ∼ +85°C																														
Capacitance Tolerance	±20% (M) (at 20°C, at 120Hz)																																			
Leakage Current	I=0.02CV(μA) or 3mA, whichever is smaller Where, I:Max. leakage current(μA) C:Nominal capacitance(μF) V:Rated voltage(V _{DC}) (at 20°C, 5 minutes)																																			
※ Dissipation Factor (Tanδ)	<table><tr><td>Rated Voltage(V_{DC})</td><td>16</td><td>25</td><td>35</td><td>50∼63</td><td>100</td><td>160∼250</td><td>315∼400</td><td>450∼500</td></tr><tr><td>Tanδ(Max.)</td><td>0.40</td><td>0.35</td><td>0.30</td><td>0.25</td><td>0.20</td><td>0.15</td><td>0.15</td><td>0.20</td></tr></table> (at 20°C, 120Hz)									Rated Voltage(V _{DC})	16	25	35	50∼63	100	160∼250	315∼400	450∼500	Tanδ(Max.)	0.40	0.35	0.30	0.25	0.20	0.15	0.15	0.20									
Rated Voltage(V _{DC})	16	25	35	50∼63	100	160∼250	315∼400	450∼500																												
Tanδ(Max.)	0.40	0.35	0.30	0.25	0.20	0.15	0.15	0.20																												
Temperature Characteristics (Max.Impedance ratio)	<table><tr><td>Rated Voltage(V_{DC})</td><td>16</td><td>25</td><td>35</td><td>50∼63</td><td>100</td><td>160∼250</td><td>315∼400</td><td>450∼500</td></tr><tr><td>Z(-25°C)/Z(20°C)</td><td>4</td><td>3</td><td>3</td><td>2</td><td>2</td><td>4</td><td>4</td><td>8</td></tr><tr><td>Z(-40°C)/Z(20°C)</td><td>15</td><td>10</td><td>8</td><td>6</td><td>5</td><td>-</td><td>-</td><td>-</td></tr></table> (at 120Hz)									Rated Voltage(V _{DC})	16	25	35	50∼63	100	160∼250	315∼400	450∼500	Z(-25°C)/Z(20°C)	4	3	3	2	2	4	4	8	Z(-40°C)/Z(20°C)	15	10	8	6	5	-	-	-
Rated Voltage(V _{DC})	16	25	35	50∼63	100	160∼250	315∼400	450∼500																												
Z(-25°C)/Z(20°C)	4	3	3	2	2	4	4	8																												
Z(-40°C)/Z(20°C)	15	10	8	6	5	-	-	-																												
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 2,000 hours at 85°C Capacitance change ≤ ±20% of the initial value Tanδ ≤ 200% of the initial specified value Leakage Current ≤ The initial specified value																																			
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 85°C for 1,000 hours without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 25 hours and not more than 48 hours before the measurements. Capacitance change ≤ ±20% of the initial value Tanδ ≤ 200% of the initial specified value Leakage Current ≤ The initial specified value																																			
Others	Satisfied characteristics KS C IEC 60384-4																																			

※ For capacitors with CV products > 100,000 Higher Tanδ value may apply.
When the capacitance exceed 1,000μF, 0.01 shall be added every 1,000μF increase.

RATED RIPPLE CURRENT

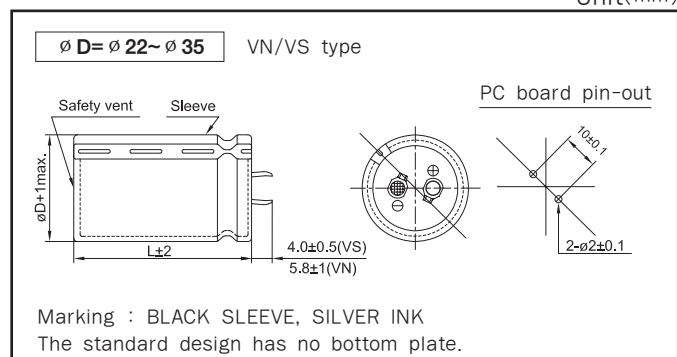
When capacitors are operated in any other condition at 120Hz, the maximum ripple current must be multiplied by the figure shown in the table.

Frequency multiplying factor

Frequency(Hz)	60	120	300	1k	10k~
16~50V _{DC}	0.95	1.00	1.03	1.05	1.08
63~100V _{DC}	0.92	1.00	1.07	1.13	1.19
160~250V _{DC}	0.81	1.00	1.17	1.32	1.45
315~500V _{DC}	0.77	1.00	1.16	1.30	1.41

DIMENSIONS OF RDC Series

Unit(mm)



RATINGS OF RDC Series

μF	V_{DC} $\varnothing D$	16				25				35			
		22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
3,900										22 × 25 2.22			
4,700										22 × 30 2.41	25.4 × 25 2.42		
5,600						22 × 25 2.21				22 × 35 2.75	25.4 × 25 2.64		
6,800						22 × 30 2.40	25.4 × 25 2.56			22 × 40 2.80	25.4 × 30 2.74	30 × 25 2.97	
8,200		22 × 25 2.51				22 × 35 2.72	25.4 × 25 2.80			22 × 45 3.11	25.4 × 35 3.10	30 × 30 3.13	
10,000		22 × 25 2.77				22 × 40 3.09	25.4 × 30 3.12	30 × 25 3.21			25.4 × 40 3.53	30 × 30 3.46	35 × 25 3.20
12,000		22 × 30 2.86	25.4 × 25 2.95			22 × 45 3.48	25.4 × 35 3.43	30 × 30 3.86	35 × 25 3.54		25.4 × 45 3.98	30 × 35 4.01	35 × 30 4.02
15,000		22 × 35 3.29	25.4 × 30 3.46	30 × 25 3.66		22 × 50 4.00	25.4 × 40 3.95	30 × 30 4.00	35 × 25 3.95			30 × 40 4.90	35 × 35 5.01
18,000		22 × 40 3.72	25.4 × 35 3.98	30 × 30 3.98			25.4 × 45 4.45	30 × 35 4.46	35 × 30 4.63			30 × 45 5.43	35 × 40 5.54
22,000		22 × 50 4.37	25.4 × 40 4.26	30 × 30 4.21			25.4 × 50 5.02	30 × 45 5.21	35 × 35 5.16				35 × 45 6.04
27,000			25.4 × 45 4.72	30 × 35 4.82				30 × 50 5.94	35 × 40 5.92				35 × 50 6.89
33,000				30 × 40 5.36	35 × 30 5.15				35 × 45 6.75				
39,000				30 × 45 6.01	35 × 35 5.95				35 × 50 7.56				
47,000				30 × 50 6.79	35 × 40 6.76								
56,000					35 × 45 7.62								

μF	V_{DC} $\varnothing D$	50				63				100			
		22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
820										22 × 25 1.86			
1,000										22 × 30 1.93			
1,200										22 × 30 2.09	25.4 × 25 2.10		
1,500										22 × 35 2.41	25.4 × 30 2.34	30 × 25 2.46	
1,800						22 × 25 1.82				22 × 40 2.71	25.4 × 35 2.75	30 × 25 2.72	
2,200		22 × 25 1.91				22 × 30 2.31	25.4 × 25 2.30			22 × 45 3.08	25.4 × 40 3.13	30 × 30 3.09	35 × 25 3.14
2,700		22 × 30 2.11	25.4 × 25 2.13			22 × 35 2.43	25.4 × 30 2.43				25.4 × 45 3.57	30 × 35 3.55	35 × 30 3.71
3,300		22 × 30 2.37	25.4 × 25 2.38			22 × 35 2.62	25.4 × 30 2.64	30 × 25 2.78			25.4 × 50 4.06	30 × 40 4.05	35 × 30 4.05
3,900		22 × 35 2.65	25.4 × 30 2.68			22 × 40 2.93	25.4 × 35 2.97	30 × 30 3.00				30 × 45 4.54	35 × 35 4.49
4,700		22 × 40 2.99	25.4 × 35 3.03	30 × 25 2.81		22 × 50 3.39	25.4 × 40 3.36	30 × 30 3.32	35 × 25 3.36			30 × 50 5.11	35 × 40 5.11
5,600		22 × 45 3.36	25.4 × 35 3.31	30 × 30 3.37	35 × 25 3.42		25.4 × 45 3.77	30 × 35 3.75	35 × 25 3.76				35 × 45 5.75
6,800		22 × 50 3.81	25.4 × 40 3.81	30 × 35 3.85	35 × 30 3.85		25.4 × 50 4.27	30 × 40 4.27	35 × 30 4.15				
8,200			25.4 × 50 4.37	30 × 40 4.36	35 × 30 4.41			30 × 45 4.83	35 × 35 4.79				
10,000				30 × 45 4.97	35 × 35 4.92			30 × 50 5.49	35 × 40 5.47				
12,000				30 × 50 5.60	35 × 40 5.58				35 × 45 6.19				
15,000					35 × 45 6.44								
18,000					35 × 50 6.71	← Case Size $\varnothing D \times L$(mm) ← Rated Ripple Current(Arms/85°C, 120Hz)							
20,000													



LARGE SIZED ALUMINUM ELECTROLYTIC CAPACITORS

RATINGS OF RDC Series

μF \ V _{DC} Ø D	160				200				250			
	22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
330									22 × 30 1.49	25.4 × 25 1.51	30 × 20 1.48	
390									22 × 35 1.67	25.4 × 30 1.63	30 × 25 1.66	
470					22 × 30 1.78	25.4 × 25 1.80			22 × 40 1.88	25.4 × 30 1.86	30 × 25 1.89	35 × 20 1.89
560	22 × 30 1.95				22 × 35 2.00	25.4 × 30 1.97	30 × 25 2.01		22 × 45 2.13	25.4 × 35 2.09	30 × 30 2.14	35 × 25 2.09
680	22 × 30 2.15				22 × 40 2.27	25.4 × 30 2.24	30 × 25 2.28			25.4 × 50 2.44	30 × 35 2.43	35 × 25 2.46
820	22 × 35 2.42	25.4 × 30 2.45			22 × 45 2.58	25.4 × 35 2.53	30 × 30 2.59				30 × 40 2.75	35 × 30 2.77
1,000	22 × 40 2.75	25.4 × 35 2.79				25.4 × 40 2.88	30 × 35 2.95	35 × 25 2.90			30 × 45 3.31	35 × 35 3.22
1,200		25.4 × 40 3.15	30 × 30 3.13	35 × 25 3.27			30 × 40 3.34	35 × 30 3.31				35 × 40 3.42
1,500		25.4 × 45 3.60	30 × 35 3.63	35 × 30 3.57			30 × 45 3.84	35 × 35 3.82				35 × 45 4.06
1,800			30 × 40 4.09	35 × 30 4.05				35 × 40 4.33				
2,200				35 × 35 4.63				35 × 45 4.92				
2,700				35 × 40 5.30								

μF \ V _{DC} Ø D	315				350				400			
	22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
150	22 × 25 0.98								22 × 30 1.02			
180	22 × 30 1.10				22 × 30 1.11				22 × 35 1.14			
220	22 × 35 1.26	25.4 × 25 1.23	30 × 20 1.25		22 × 35 1.26				22 × 40 1.29	25.4 × 30 1.27	30 × 25 1.30	
270	22 × 40 1.43	25.4 × 30 1.41	30 × 25 1.43	35 × 20 1.45	22 × 40 1.49	25.4 × 30 1.46	30 × 25 1.49		22 × 45 1.48	25.4 × 35 1.45	30 × 30 1.48	
330	22 × 45 1.62	25.4 × 35 1.61	30 × 25 1.62	35 × 20 1.61	22 × 45 1.66	25.4 × 35 1.63	30 × 30 1.67			25.4 × 40 1.65	30 × 30 1.65	35 × 25 1.67
390		25.4 × 40 1.79	30 × 30 1.78	35 × 25 1.86		25.4 × 40 1.88	30 × 30 1.88	35 × 25 1.94		25.4 × 45 1.84	30 × 35 1.85	35 × 30 1.88
470			30 × 35 2.02	35 × 30 2.07		25.4 × 45 2.18	30 × 35 2.20	35 × 30 2.25			30 × 40 2.09	35 × 30 2.07
560			30 × 40 2.28	35 × 35 2.33			30 × 45 2.40	35 × 30 2.37				35 × 35 2.34
680				35 × 40 2.66				35 × 35 2.78				35 × 45 2.74
820				35 × 45 3.00				35 × 40 3.15	← Case Size Ø D × L (mm) ← Rated Ripple Current (Arms/85°C, 120Hz)			



RATINGS OF RDC Series

μF $\swarrow$ V_{DC} $\searrow$ $\varnothing D$	450				500			
	22	25.4	30	35	22	25.4	30	35
68					22 × 30 0.40			
82					22 × 30 0.51	25.4 × 25 0.53		
100						25.4 × 35 0.69		
120	22 × 30 0.91	25.4 × 25 0.91				25.4 × 40 0.86		
150	22 × 35 1.04	25.4 × 30 1.05				25.4 × 45 0.91	30 × 30 0.88	
180	22 × 40 1.18	25.4 × 30 1.15	30 × 25 1.17			25.4 × 50 0.96	30 × 35 0.99	
220	22 × 45 1.33	25.4 × 35 1.31	30 × 30 1.36				30 × 40 1.15	
270		25.4 × 40 1.55	30 × 35 1.60	35 × 25 1.59			30 × 50 1.44	35 × 35 1.36
330			30 × 40 1.90	35 × 30 1.88				35 × 40 1.49
390			30 × 45 2.09	35 × 35 2.08				35 × 45 1.71
470				35 × 40 2.40				35 × 50 2.08
560				35 × 45 2.70	$\longleftarrow$ Case Size $\varnothing D \times L(mm)$ $\longleftarrow$ Rated Ripple Current(Arms/85°C, 120Hz)			



LARGE SIZED ALUMINUM ELECTROLYTIC CAPACITORS

TDA Series

• 105°C 2,000Hrs assured.

- Non-solvent proof.
- Downsized of KMH series.
- For SMPS, Inverter
- RoHS compliant.
- Halogen-free capacitors are also available.



SPECIFICATIONS

Item	Characteristics																														
Rated Voltage Range	16 ∼ 100 V _{DC}				160 ∼ 500 V _{DC}																										
Operating Temperature Range	-40 ∼ +105°C				-25 ∼ +105°C																										
Capacitance Tolerance	±20% (M) (at 20°C, at 120Hz)																														
Leakage Current	I=0.02CV(μA) or 3mA, whichever is smaller Where, I:Max. leakage current(μA) C:Nominal capacitance(μF) V:Rated voltage(V _{DC}) (at 20°C, 5 minutes)																														
※ Dissipation Factor (Tanδ)	<table><tr><td>Rated Voltage(V_{DC})</td><td>16</td><td>25∼35</td><td>50∼63</td><td>100</td><td>160∼400</td><td>420∼500</td></tr><tr><td>Tanδ(Max.)</td><td>0.40</td><td>0.35</td><td>0.25</td><td>0.20</td><td>0.15</td><td>0.20</td></tr></table> (at 20°C, 120Hz)							Rated Voltage(V _{DC})	16	25∼35	50∼63	100	160∼400	420∼500	Tanδ(Max.)	0.40	0.35	0.25	0.20	0.15	0.20										
Rated Voltage(V _{DC})	16	25∼35	50∼63	100	160∼400	420∼500																									
Tanδ(Max.)	0.40	0.35	0.25	0.20	0.15	0.20																									
Temperature Characteristics (Max.Impedance ratio)	<table><tr><td>Rated Voltage(V_{DC})</td><td>16</td><td>25</td><td>35</td><td>50∼63</td><td>100</td><td>160∼400</td><td>420∼500</td></tr><tr><td>Z(-25°C)/Z(20°C)</td><td>4</td><td>3</td><td>3</td><td>2</td><td>2</td><td>4</td><td>8</td></tr><tr><td>Z(-40°C)/Z(20°C)</td><td>15</td><td>10</td><td>8</td><td>6</td><td>5</td><td>-</td><td>-</td></tr></table> (at 120Hz)							Rated Voltage(V _{DC})	16	25	35	50∼63	100	160∼400	420∼500	Z(-25°C)/Z(20°C)	4	3	3	2	2	4	8	Z(-40°C)/Z(20°C)	15	10	8	6	5	-	-
Rated Voltage(V _{DC})	16	25	35	50∼63	100	160∼400	420∼500																								
Z(-25°C)/Z(20°C)	4	3	3	2	2	4	8																								
Z(-40°C)/Z(20°C)	15	10	8	6	5	-	-																								
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 2,000 hours at 105°C Capacitance change ≤ ±20% of the initial value Tanδ ≤ 200% of the initial specified value Leakage Current ≤ The initial specified value																														
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the exposing them at 105°C for 1,000 hours without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≤ ±20% of the initial value Tanδ ≤ 200% of the initial specified value Leakage Current ≤ The initial specified value																														
Others	Satisfied characteristics KS C IEC 60384-4																														

※ For capacitors with CV products > 100,000 Higher Tanδ value may apply.
When the capacitors exceed 1,000μF, 0.01 shall be added every 1,000μF increase.

RATED RIPPLE CURRENT

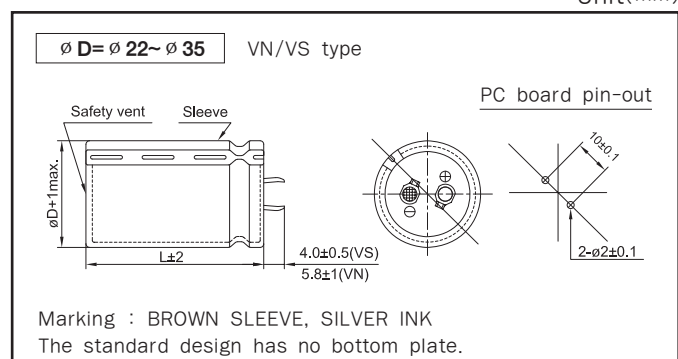
When capacitors are operated in any other condition at 120Hz, the maximum ripple current must be multiplied by the figure shown in the table.

Frequency multiplying factor

Frequency(Hz)	60	120	300	1k	10k~
16~50V _{DC}	0.95	1.00	1.03	1.05	1.08
63~100V _{DC}	0.92	1.00	1.07	1.13	1.19
160~250V _{DC}	0.81	1.00	1.17	1.32	1.45
315~450V _{DC}	0.77	1.00	1.16	1.30	1.41

DIMENSIONS OF TDA Series

Unit(mm)



RATINGS OF TDA Series

μF \ V _{DC} \ $\varnothing D$	16				25				35			
	22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
3,300									22 × 25 1.40			
3,900									22 × 30 1.57			
4,700					22 × 25 1.50				22 × 30 1.72	25.4 × 25 1.80		
5,600					22 × 25 1.63				22 × 35 1.95	25.4 × 30 1.96	30 × 25 1.99	
6,800	22 × 25 1.57				22 × 30 1.86	25.4 × 25 1.87			22 × 40 2.20	25.4 × 35 2.23	30 × 25 2.19	
8,200	22 × 30 1.73				22 × 35 2.11	25.4 × 30 2.12	30 × 25 2.15		22 × 50 2.55	25.4 × 40 2.53	30 × 30 2.53	
10,000	22 × 30 1.97	25.4 × 25 1.97			22 × 40 2.39	25.4 × 35 2.42	30 × 25 2.39			25.4 × 45 2.87	30 × 35 2.90	35 × 30 2.75
12,000	22 × 35 2.22	25.4 × 30 2.24			22 × 45 2.69	25.4 × 40 2.74	30 × 30 2.70	35 × 25 2.74		25.4 × 50 3.24	30 × 40 3.23	35 × 30 3.23
15,000	22 × 40 2.55	25.4 × 35 2.58				25.4 × 45 3.15	30 × 35 3.13	35 × 30 3.27			30 × 45 3.72	35 × 35 3.67
18,000	22 × 45 2.87	25.4 × 40 2.92	30 × 30 2.88			25.4 × 50 3.54	30 × 40 3.54	35 × 30 3.50				35 × 40 4.37
22,000		25.4 × 45 3.32	30 × 35 3.29				30 × 45 4.04	35 × 35 3.97				35 × 50 4.92
27,000		25.4 × 50 3.78	30 × 40 3.77	35 × 30 3.45				35 × 45 4.73				
33,000			30 × 45 4.30	35 × 35 4.26				35 × 50 5.39				
39,000			30 × 50 4.81	35 × 40 4.79								
47,000				35 × 50 5.43								

μF \ V _{DC} \ $\varnothing D$	50				63				100			
	22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
560									22 × 25 1.06			
820									22 × 30 1.32	25.4 × 25 1.33		
1,000									22 × 35 1.50	25.4 × 30 1.51		
1,200					22 × 25 1.19				22 × 40 1.69	25.4 × 35 1.71	30 × 25 1.68	
1,500					22 × 25 1.33				22 × 45 1.94	25.4 × 40 1.98	30 × 30 1.95	
1,800	22 × 25 1.33				22 × 30 1.51	25.4 × 25 1.52				25.4 × 45 2.23	30 × 35 2.26	35 × 25 2.17
2,200	22 × 30 1.50				22 × 35 1.73	25.4 × 30 1.74				25.4 × 50 2.53	30 × 40 2.57	35 × 30 2.50
2,700	22 × 30 1.69	25.4 × 25 1.70			22 × 40 1.97	25.4 × 35 1.99	30 × 25 1.91				30 × 45 2.88	35 × 35 2.86
3,300	22 × 35 1.93	25.4 × 30 1.85			22 × 50 2.29	25.4 × 40 2.27	30 × 30 2.24				30 × 50 3.28	35 × 40 3.27
3,900	22 × 40 2.16	25.4 × 35 2.18	30 × 25 2.15			25.4 × 45 2.54	30 × 35 2.56	35 × 25 2.56				35 × 45 3.67
4,700	22 × 45 2.43	25.4 × 35 2.39	30 × 30 2.35	35 × 25 2.48		25.4 × 50 2.86	30 × 40 2.86	35 × 30 2.79				35 × 50 3.80
5,600	22 × 50 2.75	25.4 × 40 2.70	30 × 35 2.76	35 × 25 2.70			30 × 45 3.22	35 × 35 3.19				
6,800		25.4 × 50 3.30	30 × 40 3.30	35 × 30 3.25			30 × 50 3.66	35 × 40 3.64				
8,200			30 × 45 3.60	35 × 35 3.56				35 × 45 3.90				
10,000			30 × 50 4.04	35 × 40 4.03				35 × 50 4.40				
12,000				35 × 45 4.56	← Case Size $\varnothing D \times L$(mm) ← Rated Ripple Current(Arms/105°C, 120Hz)							



LARGE SIZED ALUMINUM ELECTROLYTIC CAPACITORS

RATINGS OF TDA Series

$\frac{V_{DC}}{\mu F \quad \varnothing D}$	160				200				250			
	22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
100												
120										25.4 × 20 0.48		
150					22 × 20 0.53					25.4 × 20 0.59		
180					22 × 20 0.62	25.4 × 20 0.64			22 × 25 0.78	25.4 × 20 0.75		
220		25.4 × 20 0.66			22 × 25 0.70	25.4 × 20 0.70			22 × 30 0.96	25.4 × 25 0.95	30 × 20 0.93	
270		25.4 × 20 0.80			22 × 25 0.87	25.4 × 20 0.83			22 × 30 1.11	25.4 × 25 1.10	30 × 20 1.10	
330	22 × 25 1.20	25.4 × 20 1.10			22 × 30 1.20	25.4 × 25 1.21	30 × 20 1.20		22 × 35 1.20	25.4 × 30 1.20	30 × 25 1.26	35 × 20 1.17
390	22 × 30 1.30	25.4 × 25 1.29	30 × 20 1.19		22 × 30 1.28	25.4 × 25 1.27	30 × 25 1.25		22 × 40 1.45	25.4 × 35 1.49	30 × 25 1.44	35 × 25 1.49
470	22 × 30 1.36	25.4 × 25 1.39	30 × 20 1.31	35 × 20 1.35	22 × 35 1.41	25.4 × 30 1.41	30 × 25 1.50	35 × 20 1.30	22 × 45 1.53	25.4 × 35 1.50	30 × 30 1.57	35 × 25 1.57
560	22 × 35 1.46	25.4 × 30 1.51	30 × 25 1.54	35 × 20 1.41	22 × 45 1.56	25.4 × 35 1.53	30 × 30 1.57	35 × 25 1.52	22 × 50 1.77	25.4 × 40 1.74	30 × 30 1.73	35 × 25 1.72
680	22 × 40 1.66	25.4 × 30 1.65	30 × 25 1.68	35 × 20 1.69	22 × 45 1.73	25.4 × 35 1.69	30 × 30 1.74	35 × 25 1.72		25.4 × 50 1.84	30 × 35 1.94	35 × 30 1.97
820	22 × 45 1.99	25.4 × 30 1.95	30 × 30 2.00	35 × 25 1.91		25.4 × 45 1.99	30 × 35 2.00	35 × 30 2.04		25.4 × 60 2.20	30 × 40 2.10	35 × 35 1.98
1,000	22 × 50 2.18	25.4 × 40 2.14	30 × 30 2.15	35 × 25 2.17		25.4 × 50 2.21	30 × 40 2.23	35 × 35 2.30			30 × 50 2.31	35 × 40 2.30
1,200		25.4 × 45 2.39	30 × 35 2.37	35 × 30 2.41		25.4 × 60 2.57	30 × 45 2.53	35 × 35 2.57			30 × 60 2.50	35 × 45 2.43
1,500		25.4 × 60 2.87	30 × 40 2.74	35 × 35 2.79			30 × 50 3.01	35 × 40 2.99				35 × 50 2.80
1,800			30 × 45 3.14	35 × 35 3.11			30 × 60 3.47	35 × 45 3.38				
2,200			30 × 60 3.76	35 × 45 3.66				35 × 60 3.60				

$\frac{V_{DC}}{\mu F \quad \varnothing D}$	315				350				400			
	22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
47									22 × 20 0.22			
68									22 × 25 0.51	25.4 × 20 0.46		
82	22 × 25 0.64				22 × 25 0.56				22 × 25 0.55	25.4 × 20 0.53		
100	22 × 30 0.68				22 × 25 0.67				22 × 30 0.67	25.4 × 25 0.67	30 × 20 0.60	
120	22 × 30 0.75	25.4 × 25 0.76			22 × 30 0.73	25.4 × 25 0.73			22 × 35 0.76	25.4 × 30 0.76	30 × 25 0.76	35 × 20 0.70
150	22 × 35 0.82	25.4 × 30 0.83			22 × 35 0.83	25.4 × 30 0.83	30 × 25 0.83		22 × 40 0.82	25.4 × 30 0.80	30 × 25 0.82	35 × 20 0.80
180	22 × 40 0.91	25.4 × 30 0.88	30 × 25 0.85		22 × 40 0.89	25.4 × 30 0.89	30 × 25 0.91		22 × 45 0.88	25.4 × 35 0.88	30 × 30 0.89	35 × 25 0.90
220	22 × 45 0.94	25.4 × 35 0.96	30 × 30 1.00		22 × 45 0.98	25.4 × 35 0.98	30 × 30 0.98	35 × 25 0.96	22 × 50 1.01	25.4 × 40 0.99	30 × 30 0.98	35 × 25 1.02
270		25.4 × 45 1.13	30 × 35 1.12	35 × 25 1.06	22 × 50 1.12	25.4 × 40 1.10	30 × 30 1.08	35 × 25 1.12		25.4 × 45 1.12	30 × 35 1.12	35 × 30 1.16
330		25.4 × 50 1.28	30 × 40 1.28	35 × 30 1.30		25.4 × 45 1.24	30 × 40 1.24	35 × 30 1.29		25.4 × 50 1.27	30 × 40 1.28	35 × 35 1.35
390			30 × 45 1.44	35 × 35 1.42		25.4 × 60 1.47	30 × 40 1.40	35 × 35 1.47		25.4 × 60 1.51	30 × 45 1.49	35 × 35 1.47
470			30 × 50 1.63	35 × 40 1.64		25.4 × 60 1.70	30 × 45 1.67	35 × 35 1.65			30 × 50 1.63	35 × 40 1.62
560				35 × 45 1.87			30 × 50 1.87	35 × 40 1.86			30 × 60 1.88	35 × 50 1.88
680				35 × 50 2.07			30 × 60 2.18	35 × 50 2.18				35 × 60 2.19
820								35 × 60 2.53	← Case Size $\varnothing D \times L$ (mm) ← Rated Ripple Current(Arms/105°C, 120Hz)			

RATINGS OF TDA Series

μF	V _{DC} Ø D	420				450				500			
		22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
56						22 × 25 0.40				22 × 35 0.46	25.4 × 30 0.46	30 × 30 0.48	
68		22 × 25 0.50				22 × 30 0.50	25.4 × 25 0.50			22 × 40 0.45	25.4 × 35 0.53	30 × 30 0.55	
82		22 × 25 0.51	25.4 × 25 0.63			22 × 30 0.55	24.5 × 25 0.54			22 × 45 0.56	25.4 × 35 0.58	30 × 35 0.58	
100		22 × 30 0.58	25.4 × 30 0.69			22 × 35 0.62	25.4 × 30 0.62	30 × 25 0.64			25.4 × 40 0.65	30 × 35 0.66	
120		22 × 35 0.72	25.4 × 30 0.73	30 × 25 0.75		22 × 40 0.70	25.4 × 35 0.71	30 × 30 0.72	35 × 25 0.73		25.4 × 45 0.75	30 × 40 0.76	35 × 30 0.78
150		22 × 45 0.79	25.4 × 35 0.74	30 × 25 0.75	35 × 25 0.81	22 × 45 0.77	25.4 × 40 0.75	30 × 30 0.74	35 × 25 0.75			30 × 45 0.80	35 × 35 0.81
180		22 × 50 0.89	25.4 × 40 0.89	30 × 30 0.88	35 × 25 0.87		25.4 × 45 0.84	30 × 35 0.87	35 × 30 0.88			30 × 50 0.90	35 × 40 0.93
220			25.4 × 45 1.01	30 × 35 1.00	35 × 30 1.05		25.4 × 50 0.98	30 × 40 0.98	35 × 30 1.00			30 × 60 1.10	35 × 45 1.11
270				30 × 45 1.19	35 × 35 1.19		25.4 × 60 1.17	30 × 45 1.15	35 × 35 1.17				35 × 50 1.28
330				30 × 50 1.36	35 × 40 1.39			30 × 50 1.38	35 × 40 1.38				35 × 60 1.50
390					35 × 45 1.57			30 × 60 1.60	35 × 45 1.56				
470					35 × 50 1.73				35 × 50 1.72				
560									35 × 60 1.98	← Case Size Ø D × L (mm) ← Rated Ripple Current (Arms/105°C, 120Hz)			



LARGE SIZED ALUMINUM ELECTROLYTIC CAPACITORS

TDC Series

• 105°C 2,000Hrs assured.

- Non-solvent proof.
- Downsized of TDA series.
- For SMPS, Inverter
- RoHS compliant.
- Halogen-free capacitors are also available.



SPECIFICATIONS

Item	Characteristics								
Rated Voltage Range	160 ～ 450 V _{DC}								
Operating Temperature Range	-25 ～ +105℃								
Capacitance Tolerance	±20% (M) (at 20℃, 120Hz)								
Leakage Current	I=0.02CV or 3mA, whichever is smaller Where, I:Leakage current(μA) C:Nominal capacitance(μF) V:Rated voltage(V _{DC}) (at 20℃, 5 minutes)								
※ Dissipation Factor (Tanδ)	<table><tr><td>Rated Voltage(V_{DC})</td><td>160～400</td><td>420～450</td></tr><tr><td>Tanδ(Max.)</td><td>0.15</td><td>0.20</td></tr></table> (at 20℃, 120Hz)			Rated Voltage(V _{DC})	160～400	420～450	Tanδ(Max.)	0.15	0.20
Rated Voltage(V _{DC})	160～400	420～450							
Tanδ(Max.)	0.15	0.20							
Temperature Characteristics (Max.Impedance ratio)	<table><tr><td>Rated Voltage(V_{DC})</td><td>160～400</td><td>420～450</td></tr><tr><td>Z(-25℃)/Z(20℃)</td><td>4</td><td>8</td></tr></table> (at 120Hz)			Rated Voltage(V _{DC})	160～400	420～450	Z(-25℃)/Z(20℃)	4	8
Rated Voltage(V _{DC})	160～400	420～450							
Z(-25℃)/Z(20℃)	4	8							
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated working voltage is applied for 2,000 hours at 105℃ Capacitance change ≤ ±20% of the initial value Tanδ ≤ 200% of the initial specified value Leakage Current ≤ The initial specified value								
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the exposing them at max. operating temperature for 1,000 hours without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than measurements. Capacitance change ≤ ±20% of the initial value Tanδ ≤ 200% of the initial specified value Leakage Current ≤ The initial specified value								
Others	Satisfied characteristics KS C IEC 60384-4								

※ For capacitors with CV products > 100,000 Higher Tanδ value may apply.
When the capacitance exceeds 1,000μF, 0.01 shall be added every 1,000μF increase.

RATED RIPPLE CURRENT

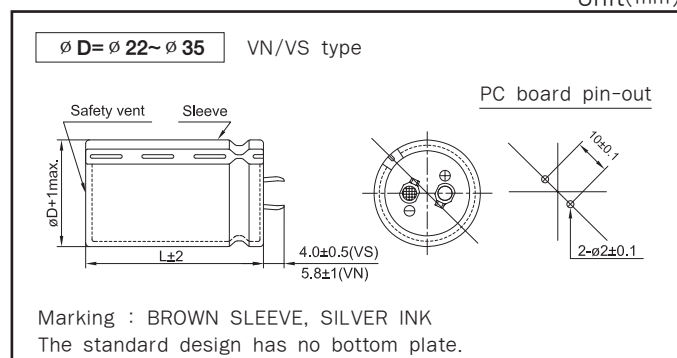
When capacitors are operated in any other condition at 120Hz, the maximum ripple current must be multiplied by the figure shown in the table.

Frequency multiplying factor

Frequency(Hz)	60	120	300	1k	10k~
160~250V _{DC}	0.81	1.00	1.17	1.32	1.45
315~450V _{DC}	0.77	1.00	1.16	1.30	1.41

DIMENSIONS OF TDC Series

Unit(mm)



RATINGS OF TDC Series

μF	V_{DC} $\varnothing D$	160				200				250			
		22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
180										22 × 20 0.78			
220										22 × 25 1.00	25.4 × 20 0.95		
270						22 × 20 1.20					25.4 × 20 1.10		
330		22 × 20 1.20				22 × 25 1.28	25.4 × 20 1.27				25.4 × 25 1.20	30 × 20 1.26	35 × 20 1.17
390		22 × 25 1.32	25.4 × 20 1.39	30 × 20 1.31		22 × 25 1.31	25.4 × 20 1.43	30 × 20 1.43				30 × 20 1.44	35 × 20 1.49
470		22 × 30 1.46	25.4 × 25 1.51	30 × 20 1.54		22 × 30 1.45	25.4 × 25 1.53	30 × 20 1.53				30 × 25 1.57	35 × 20 1.57
560		22 × 30 1.66	25.4 × 25 1.68	30 × 25 1.68		22 × 40 1.67	25.4 × 30 1.67	30 × 25 1.67	35 × 20 1.67			30 × 30 1.80	35 × 25 1.72
680		22 × 35 1.87	25.4 × 30 1.88	30 × 25 1.96		22 × 45 1.75	25.4 × 35 1.75	30 × 25 1.74	35 × 20 1.72			30 × 30 1.94	35 × 30 2.10
820		22 × 40 2.09	25.4 × 30 2.14	30 × 25 2.15	35 × 25 2.04	22 × 50 2.04	25.4 × 40 2.04	30 × 30 2.04	35 × 25 2.04			30 × 35 2.29	35 × 30 2.36
1,000			25.4 × 35 2.38	30 × 30 2.40	35 × 25 2.55			30 × 35 2.30	35 × 30 2.30			30 × 45 2.59	35 × 35 2.63
1,200			25.4 × 40 2.66	30 × 35 2.69	35 × 30 2.86				35 × 30 2.65				

μF	V_{DC} $\varnothing D$	315				350				400			
		22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
82										22 × 20 0.55			
100		22 × 25 0.75								22 × 25 0.66	25.4 × 20 0.67		
120		22 × 25 0.82				22 × 25 0.72					25.4 × 25 0.76		
150		22 × 30 0.91	25.4 × 25 0.94			22 × 30 0.84	25.4 × 25 0.89				25.4 × 25 0.86	30 × 20 0.89	
180			25.4 × 25 1.13			22 × 35 0.98	25.4 × 30 0.94				25.4 × 30 0.97	30 × 25 1.02	35 × 20 1.02
220			25.4 × 30 1.19	30 × 25 1.17		22 × 40 1.04	25.4 × 30 1.07	30 × 25 1.13			25.4 × 35 1.12	30 × 30 1.12	35 × 20 1.11
270			25.4 × 40 1.41	30 × 30 1.28	35 × 20 1.30		25.4 × 35 1.24	30 × 30 1.27			25.4 × 40 1.26	30 × 30 1.27	35 × 25 1.27
330				30 × 35 1.40	35 × 30 1.49		25.4 × 40 1.39	30 × 35 1.43	35 × 25 1.49		25.4 × 45 1.44	30 × 35 1.43	35 × 30 1.44
390				30 × 40 1.44	35 × 30 1.64		25.4 × 50 1.55	30 × 40 1.60	35 × 30 1.66		25.4 × 50 1.51	30 × 40 1.60	35 × 30 1.63
470				30 × 45 1.71	35 × 35 1.82		25.4 × 50 1.72	30 × 45 1.81	35 × 30 1.83			30 × 45 1.81	35 × 35 1.80
560					35 × 40 2.00				35 × 35 2.07	← Case Size $\varnothing D \times L$(mm) ← Rated Ripple Current(Arms/105°C, 120Hz)			



LARGE SIZED ALUMINUM ELECTROLYTIC CAPACITORS

RATINGS OF TDC Series

μF	V _{DC} Ø D	420				450			
		22	25.4	30	35	22	25.4	30	35
68						22 × 20 0.50			
82		22 × 20 0.58				22 × 25 0.59	25.4 × 25 0.62		
100		22 × 25 0.66	25.4 × 25 0.69				25.4 × 25 0.70		
120		22 × 30 0.75	25.4 × 25 0.77	30 × 20 0.75			25.4 × 30 0.75		
150		22 × 40 0.86	25.4 × 30 0.88	30 × 25 0.88			25.4 × 30 0.88	30 × 25 0.87	
180		22 × 45 0.96	25.4 × 35 0.97	30 × 30 1.02	35 × 20 1.05		25.4 × 35 1.01	30 × 25 1.00	
220		22 × 50 1.11	25.4 × 40 1.14	30 × 30 1.14	35 × 20 1.12			30 × 35 1.10	
270			25.4 × 45 1.29	30 × 40 1.30	35 × 30 1.35			30 × 40 1.24	35 × 30 1.25
330				30 × 45 1.48	35 × 35 1.49				35 × 35 1.42
390					35 × 40 1.64				35 × 40 1.63
470					35 × 45 1.79	← Case Size Ø D × L (mm) ← Rated Ripple Current (Arms/105°C, 120Hz)			35 × 45 1.78

TEA Series

- 105°C 2,000Hrs assured.
- Non-solvent proof
- Height 15mm
- For SMPS, Inverter
- RoHS compliant.
- Halogen-free capacitors are also available.



SPECIFICATIONS

Item	Characteristics	
Rated Voltage Range	160 ~ 400 V _{DC}	
Operating Temperature Range	-25 ~ +105°C	
Capacitance Tolerance	±20%(M) (at 20°C, 120Hz)	
Leakage Current	I=0.02CV(μA) or 3mA, whichever is smaller. Where, I: Leakage current(μA), C:Nominal capacitance(μF), V:Rated voltage(V _{DC}) (at 20°C, 5 minutes)	
※ Dissipation Factor(Tanδ)	Rated voltage(V _{DC})	160 ~ 400
	Tanδ(Max.)	0.20 (at 20°C, 120Hz)
Temperature Characteristics (Max. Impedance ratio)	Rated voltage(V _{DC})	160 ~ 400
	Z(-25°C)/Z(20°C)	4 (at 120Hz)
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 2,000 hours at 105°C. Capacitance change ≤ ±20% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value	
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the exposing them at 105°C for 1,000 hours without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≤ ±20% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value	
Others	Satisfied characteristics KS C IEC 60384-4	

※ For capacitors with CV products > 100,000 higher Tanδ value may apply.
When the capacitance exceeds 1,000μF, 0.01 shall be added every 1,000μF increase.

RATED RIPPLE CURRENT

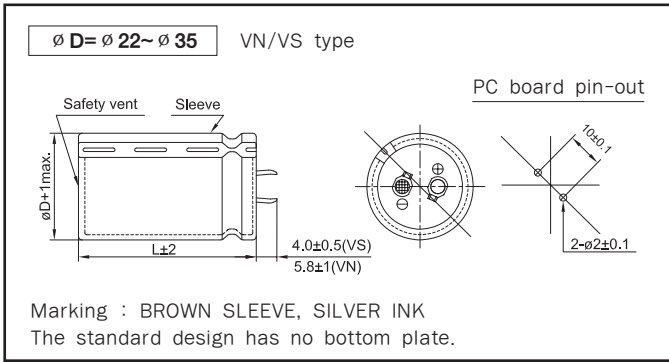
When capacitors are operated in any other conditions at 120Hz the maximum ripple current must be multiplied by the figure shown in the table

Frequency multiplying factor

Frequency(Hz)	60	120	300	1k	10k~
160~250V _{DC}	0.81	1.00	1.17	1.32	1.45
350~450V _{DC}	0.77	1.00	1.16	1.30	1.41

DIMENSIONS OF TEA Series

Unit(mm)





LARGE SIZED ALUMINUM ELECTROLYTIC CAPACITORS

RATINGS OF TEA series

μF $\swarrow$ V_{DC} $\searrow$ $\varnothing D$	160				200			
	22	25.4	30	35	22	25.4	30	35
120					22 × 15 0.61			
150	22 × 15 0.68					25.4 × 15 0.73		
180		25.4 × 15 0.79					30 × 15 0.79	
220		25.4 × 15 0.88					30 × 15 0.90	
270			30 × 15 0.96					35 × 15 1.00
330			30 × 15 1.06					35 × 15 1.07
390				35 × 15 1.20				

μF $\swarrow$ V_{DC} $\searrow$ $\varnothing D$	250				400			
	22	25.4	30	35	22	25.4	30	35
39					22 × 15 0.35			
47						25.4 × 15 0.40		
56						25.4 × 15 0.44		
68							30 × 15 0.46	
82	22 × 15 0.50						30 × 15 0.51	
100		25.4 × 15 0.59						35 × 15 0.56
120		25.4 × 15 0.65						35 × 15 0.62
150			30 × 15 0.71					
180			30 × 15 0.79					
220				35 × 15 0.90	← Case Size $\varnothing D \times L$ (mm) ← Rated Ripple Current(Arms/105°C, 120Hz)			

TLA Series

• 105°C 3,000Hrs assured.

- Non-solvent proof.
- Long Life.
- Equal to TDA case size
- For SMPS, Inverter
- RoHS compliant.
- Halogen-free capacitors are also available.



SPECIFICATIONS

Item	Characteristics								
Rated Voltage Range	160 ~ 500 V _{DC}								
Operating Temperature Range	-25 ~ +105°C								
Capacitance Tolerance	±20%(M) (at 20°C, 120Hz)								
Leakage Current	I=0.02CV or 3mA, whichever is smaller. Where, I:Leakage Current(μA), C:Nominal capacitance(μF), V:Rated voltage(V _{DC}) (at 20°C, 5minutes)								
※ Dissipation Factor(Tanδ)	<table><tr><td>Rated voltage(V_{DC})</td><td colspan="2">160~500</td></tr><tr><td>Tanδ(Max.)</td><td colspan="2">0.20</td></tr></table> (at 20°C, 120Hz)			Rated voltage(V _{DC})	160~500		Tanδ(Max.)	0.20	
Rated voltage(V _{DC})	160~500								
Tanδ(Max.)	0.20								
Temperature Characteristics (Max. Impedance ratio)	<table><tr><td>Rated voltage(V_{DC})</td><td>160~400</td><td>420~500</td></tr><tr><td>Z(-25°C)/Z(20°C)</td><td>4</td><td>8</td></tr></table> (at 120Hz)			Rated voltage(V _{DC})	160~400	420~500	Z(-25°C)/Z(20°C)	4	8
Rated voltage(V _{DC})	160~400	420~500							
Z(-25°C)/Z(20°C)	4	8							
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 3,000 hours at 105°C. Capacitance change ≤ ±20% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value								
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the exposing them at max. operating temperature for 1,000 hours without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≤ ±20% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value								
Others	Satisfied characteristics KS C IEC 60384-4								

※For capacitors with CV products >100,000 higher Tanδ value may apply.
When the capacitance exceeds 1,000μF, 0.01 shall be added every 1,000μF increase.

RATED RIPPLE CURRENT

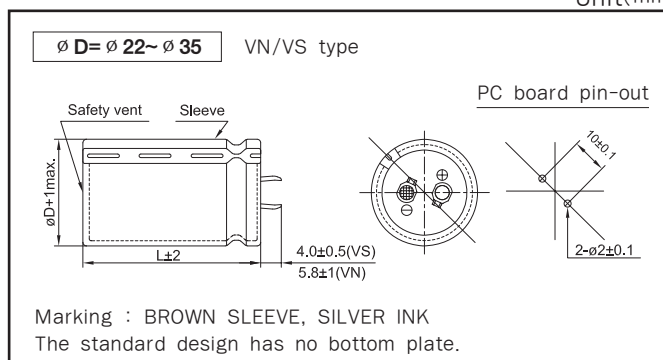
When capacitor are operated in any other condition at 120Hz, the maximum ripple current must be multiplied by the figure shown in the table.

Frequency multiplying factor

Frequency(Hz)	60	120	300	1k	10k~
160~250V _{dc}	0.81	1.00	1.17	1.32	1.45
350~450V _{dc}	0.77	1.00	1.16	1.30	1.41

DIMENSIONS OF TLA Series

Unit(mm)





LARGE SIZED ALUMINUM ELECTROLYTIC CAPACITORS

RATINGS OF TLA Series

μF \ $\varnothing D$	Vdc		160				200				250			
			22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
180											22 × 25 0.78			
220											22 × 25 1.00	25.4 × 25 0.95		
270							22 × 25 1.10				22 × 30 1.18	25.4 × 25 1.18		
330			22 × 25 1.20				22 × 30 1.25	25.4 × 25 1.25			22 × 35 1.30	25.4 × 35 1.30	30 × 25 1.30	
390			22 × 25 1.30	25.4 × 25 1.26			22 × 30 1.35	25.4 × 25 1.35			22 × 40 1.49	25.4 × 35 1.49	30 × 25 1.49	
470			22 × 30 1.55	25.4 × 25 1.55			22 × 40 1.67	25.4 × 30 1.50	30 × 25 1.50		22 × 45 1.65	25.4 × 35 1.65	30 × 30 1.65	35 × 25 1.65
560			22 × 35 1.67	25.4 × 30 1.67	30 × 25 1.67		22 × 45 1.67	25.4 × 30 1.67	30 × 25 1.67		22 × 50 1.67	25.4 × 40 1.80	30 × 30 1.80	35 × 25 1.80
680			22 × 40 1.82	25.4 × 30 1.82	30 × 25 1.82		22 × 45 1.78	25.4 × 35 1.78	30 × 30 1.78	35 × 25 1.78		25.4 × 50 2.00	30 × 35 2.00	35 × 30 2.00
820			22 × 45 2.04	25.4 × 35 2.04	30 × 30 2.04	35 × 25 2.04		25.4 × 45 2.04	30 × 30 2.04	35 × 25 2.04		25.4 × 60 2.20	30 × 40 2.30	35 × 35 2.30
1,000			22 × 50 2.25	25.4 × 40 2.25	30 × 30 2.25	35 × 25 2.25		25.4 × 50 2.30	30 × 35 2.30	35 × 30 2.30			30 × 50 2.47	35 × 40 2.47
1,200				25.4 × 45 2.49	30 × 35 2.49	35 × 30 2.49		25.4 × 60 2.66	30 × 40 2.65	35 × 35 2.65			30 × 60 2.85	35 × 45 2.60
1,500				25.4 × 60 2.97	30 × 40 2.84	35 × 30 2.84			30 × 50 3.08	35 × 40 3.08				35 × 50 3.00
1,800					30 × 45 3.32	35 × 35 3.00			30 × 60 3.49	35 × 45 3.48				35 × 60 3.42
2,200					30 × 60 3.86	35 × 45 3.50				35 × 50 3.78	← Case Size $\varnothing D \times L$ (mm) ← Rated Ripple Current(Arms/105°C, 120Hz)			

μF \ $\varnothing D$	Vdc		350				400			
			22	25.4	30	35	22	25.4	30	35
56										
68							22 × 25 0.55			
82			22 × 25 0.55				22 × 25 0.64			
100			22 × 25 0.69				22 × 30 0.70	25.4 × 25 0.70		
120			22 × 30 0.75	25.4 × 25 0.75			22 × 35 0.75	25.4 × 25 0.75	30 × 25 0.80	
150			22 × 35 0.82	25.4 × 30 0.83	30 × 25 0.82		22 × 40 0.88	25.4 × 30 0.88	30 × 25 0.88	
180			22 × 40 0.92	25.4 × 30 0.92	30 × 25 0.90		22 × 45 0.98	25.4 × 35 0.98	30 × 30 0.98	35 × 25 0.98
220			22 × 45 1.05	25.4 × 35 1.04	30 × 30 1.02	35 × 25 1.04	22 × 50 1.10	25.4 × 40 1.10	30 × 30 1.10	35 × 25 1.0
270			22 × 50 1.16	25.4 × 40 1.18	30 × 30 1.17	35 × 25 1.20		25.4 × 45 1.22	30 × 35 1.22	35 × 30 1.22
330				25.4 × 45 1.29	30 × 35 1.34	35 × 30 1.22		25.4 × 50 1.44	30 × 40 1.44	35 × 30 1.44
390				25.4 × 50 1.51	30 × 40 1.51	35 × 35 1.47		25.4 × 60 1.51	30 × 45 1.60	35 × 35 1.60
470				25.4 × 60 1.66	30 × 45 1.65	35 × 35 1.69			30 × 50 1.90	35 × 40 1.90
560					30 × 50 1.85	35 × 40 1.90			30 × 60 2.10	35 × 45 2.12
680					30 × 60 2.15	35 × 50 1.99				35 × 60 2.27

RATINGS OF TLA Series

μ F V _{DC} ØD	420				450				
	22	25.4	30	35	22	25.4	30	35	
56					22 × 25 0.40				
68	22 × 25 0.50				22 × 30 0.53	25.4 × 25 0.50			
82	22 × 25 0.64	25.4 × 25 0.58			22 × 30 0.64	25.4 × 25 0.64			
100	22 × 30 0.70	25.4 × 25 0.70			22 × 35 0.69	25.4 × 30 0.69	30 × 25 0.64		
120	22 × 35 0.75	25.4 × 30 0.75	30 × 25 0.73		22 × 40 0.80	25.4 × 30 0.80	30 × 25 0.80	35 × 25 0.73	
150	22 × 40 0.88	25.4 × 35 0.88	30 × 25 0.88		22 × 45 0.88	25.4 × 35 0.88	30 × 30 0.88	35 × 25 0.75	
180	22 × 45 0.95	25.4 × 35 0.95	30 × 30 0.95	35 × 25 0.94	22 × 50 1.00	25.4 × 40 1.00	30 × 30 1.00		
220	22 × 50 1.10	25.4 × 45 1.10	30 × 35 1.10	35 × 25 1.10		25.4 × 45 1.12	30 × 35 1.12	35 × 30 1.12	
270		25.4 × 50 1.22	30 × 40 1.22	35 × 30 1.22		25.4 × 50 1.18	30 × 40 1.28	35 × 35 1.28	
330		25.4 × 60 1.41	30 × 45 1.45	35 × 35 1.45			30 × 50 1.45	35 × 40 1.45	
390			30 × 50 1.55	35 × 40 1.55			30 × 60 1.51	35 × 40 1.55	
470			30 × 60 1.79	35 × 45 1.90	⬅ Case Size ØD × L (mm) ⬅ Rated Ripple Current(Arms/105°C, 120Hz)				35 × 50 1.85

V_{DC} μF ∅D	500			
	22	25.4	30	35
47				
56	22 × 35 0.46	25.4 × 30 0.46	30 × 30 0.48	
68	22 × 40 0.45	25.4 × 35 0.53	30 × 30 0.55	
82	22 × 45 0.56	25.4 × 35 0.58	30 × 35 0.58	
100		25.4 × 40 0.65	30 × 35 0.66	
120		25.4 × 45 0.75	30 × 40 0.76	35 × 30 0.78
150			30 × 45 0.80	35 × 35 0.81
180			30 × 50 0.90	35 × 40 0.93
220			30 × 60 1.10	35 × 45 1.11
270				35 × 50 1.28
330				35 × 60 1.50
390				
470				
560				



LARGE SIZED ALUMINUM ELECTROLYTIC CAPACITORS

TLS Series

• 105°C 3,000Hrs assured.

- Non-solvent proof.
- Downsized.
- High ripple capability
- For SMPS, Inverter
- RoHS compliant.
- Halogen-free capacitors are also available.



SPECIFICATIONS

Item	Characteristics								
Rated Voltage Range	160 ~ 450 V _{DC}								
Operating Temperature Range	-25 ~ +105°C								
Capacitance Tolerance	±20%(M) (at 20°C, 120Hz)								
Leakage Current	I=0.02CV or 3mA, whichever is smaller. Where, I:Leakage Current(μA), C:Nominal capacitance(μF), V:Rated voltage(V _{DC}) (at 20°C, 5minutes)								
※ Dissipation Factor(Tanδ)	<table border="1"><tr><td>Rated voltage(V_{DC})</td><td>160~400</td><td>450</td></tr><tr><td>Tanδ(Max.)</td><td>0.15</td><td>0.2</td></tr></table> (at 20°C, 120Hz)			Rated voltage(V _{DC})	160~400	450	Tanδ(Max.)	0.15	0.2
Rated voltage(V _{DC})	160~400	450							
Tanδ(Max.)	0.15	0.2							
Temperature Characteristics (Max. Impedance ratio)	<table border="1"><tr><td>Rated voltage(V_{DC})</td><td>160~400</td><td>450</td></tr><tr><td>Z(-25°C)/Z(20°C)</td><td>4</td><td>8</td></tr></table> (at 120Hz)			Rated voltage(V _{DC})	160~400	450	Z(-25°C)/Z(20°C)	4	8
Rated voltage(V _{DC})	160~400	450							
Z(-25°C)/Z(20°C)	4	8							
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 3,000 hours at 105°C. Capacitance change ≤ ±20% of the initial value Tanδ ≤ ±200% of the initial specified value Leakage current ≤ The initial specified value								
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the exposing them at max. operating temperature for 1,000 hours without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≤ ±20% of the initial value Tanδ ≤ ±200% of the initial specified value Leakage current ≤ The initial specified value								
Others	Satisfied characteristics KS C IEC 60384-4								

※For capacitors with CV products >100,000 higher Tanδ value may apply.
When the capacitance exceeds 1,000μF, 0.01 shall be added every 1,000μF increase.

RATED RIPPLE CURRENT

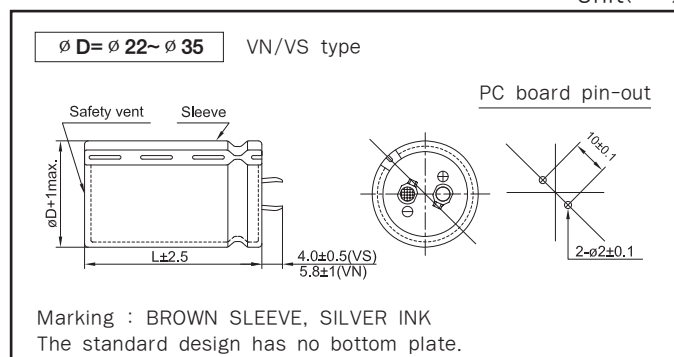
When capacitor are operated in any other condition at 120Hz, the maximum ripple current must be multiplied by the figure shown in the table.

Frequency multiplying factor

Frequency(Hz)	60	120	300	1k	10k~
160~250V _{DC}	0.81	1.00	1.17	1.32	1.45
350~450V _{DC}	0.77	1.00	1.16	1.30	1.41

DIMENSIONS OF TLS Series

Unit(mm)



RATINGS OF TLS Series

μF	V_{DC} $\varnothing D$	160				200				250			
		22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
270										22 × 25 1.11			
330						22 × 25 1.23				22 × 25 1.29			
390						22 × 30 1.40				22 × 35 1.44	25.4 × 25 1.40		
470	22 × 25 1.47					22 × 30 1.54				22 × 40 1.61	25.4 × 30 1.57		
560	22 × 30 1.68					22 × 35 1.72	25.4 × 25 1.67			22 × 45 1.79	25.4 × 35 1.79	30 × 25 1.87	
680	22 × 35 1.86	25.4 × 25 1.84				22 × 40 1.94	25.4 × 30 1.89	30 × 25 2.05		22 × 50 2.02	25.4 × 40 2.02	30 × 30 2.08	35 × 25 2.19
820	22 × 40 2.12	25.4 × 30 2.08				22 × 45 2.17	25.4 × 35 2.17	30 × 30 2.28			25.4 × 45 2.26	30 × 35 2.34	35 × 30 2.44
1,000	22 × 45 2.40	25.4 × 35 2.40	30 × 25 2.50				25.4 × 40 2.45	30 × 30 2.52	35 × 25 2.66		25.4 × 50 2.53	30 × 40 2.66	35 × 30 2.70
1,200	22 × 50 2.69	25.4 × 40 2.68	30 × 30 2.77	35 × 25 2.91			25.4 × 45 2.78	30 × 35 2.83	35 × 30 2.96			30 × 45 2.99	35 × 35 3.00
1,500		25.4 × 45 3.05	30 × 35 3.17	35 × 30 3.30				30 × 40 3.26	35 × 35 3.36				35 × 40 3.48
1,800		25.4 × 50 3.40	30 × 40 3.57	35 × 30 3.62				30 × 50 3.72	35 × 40 3.81				35 × 50 3.98
2,200			30 × 45 4.05	35 × 35 4.07					35 × 45 4.32				
2,700			30 × 50 4.56	35 × 40 4.67					35 × 50 4.88				
3,300				35 × 50 5.40									

μF	V_{DC} $\varnothing D$	315				400				450			
		22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
100										22 × 25 0.70			
120						22 × 25 0.77				22 × 30 0.81			
150						22 × 30 0.90				22 × 35 0.92	25.4 × 25 0.90		
180	22 × 25 0.95					22 × 35 1.02	25.4 × 25 0.99			22 × 40 1.02	25.4 × 35 1.05	30 × 25 1.06	
220	22 × 30 1.10					22 × 40 1.15	25.4 × 30 1.13			22 × 45 1.17	25.4 × 35 1.16	30 × 30 1.18	
270	22 × 35 1.24	25.4 × 25 1.21				22 × 45 1.29	25.4 × 35 1.30	30 × 25 1.29			25.4 × 40 1.32	30 × 30 1.30	35 × 25 1.37
330	22 × 40 1.40	25.4 × 30 1.38	30 × 25 1.43			22 × 50 1.47	25.4 × 40 1.47	30 × 30 1.45			25.4 × 45 1.48	30 × 35 1.51	35 × 30 1.54
390	22 × 45 1.56	25.4 × 35 1.57	30 × 30 1.57				25.4 × 45 1.63	30 × 35 1.61	35 × 25 1.65		25.4 × 50 1.65	30 × 40 1.65	35 × 30 1.67
470	22 × 50 1.70	25.4 × 40 1.76	30 × 30 1.73	35 × 25 1.82			25.4 × 50 1.82	30 × 40 1.82	35 × 30 1.85			30 × 45 1.86	35 × 35 1.87
560		25.4 × 45 1.96	30 × 35 1.93	35 × 30 2.02				30 × 45 2.04	35 × 35 2.05				35 × 40 2.05
680			30 × 40 2.19	35 × 30 2.20				30 × 50 2.30	35 × 40 2.34				35 × 50 2.44
820			30 × 45 2.47	35 × 35 2.48					35 × 45 2.63				
1,000				35 × 40 2.83					35 × 50 2.96				
1,200				35 × 45 3.18	← Case Size $\varnothing D \times L$ (mm) ← Rated Ripple Current (Arms/105°C, 120Hz)								

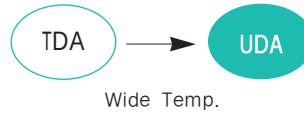


LARGE SIZED ALUMINUM ELECTROLYTIC CAPACITORS

UDA Series

• 125°C 1,000Hrs assured.

- Non-solvent proof.
- Wide Temperature range.
- For automotive and industrial machine.
- RoHS compliant.
- Halogen-free capacitors are also available.



SPECIFICATIONS

Item	Characteristics																							
Rated Voltage Range	16 ∼ 80 V _{DC}			160 ∼ 250 V _{DC}																				
Operating Temperature Range	-40 ∼ +125°C			-25 ∼ +125°C																				
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)																							
Leakage Current	I=0.02CV or 3mA, whichever is smaller Where, I:Leakage current(μA) C:Nominal capacitance(μF) V:Rated voltage(V _{DC}) (at 20°C, 5 minutes)																							
※ Dissipation Factor (Tanδ)	<table><tr><td>Rated Voltage(V_{DC})</td><td>16</td><td>25</td><td>35</td><td>50∼80</td><td>160∼250</td></tr><tr><td>Tanδ(Max.)</td><td>0.45</td><td>0.40</td><td>0.35</td><td>0.30</td><td>0.20</td></tr></table> (at 20°C, 120Hz)						Rated Voltage(V _{DC})	16	25	35	50∼80	160∼250	Tanδ(Max.)	0.45	0.40	0.35	0.30	0.20						
Rated Voltage(V _{DC})	16	25	35	50∼80	160∼250																			
Tanδ(Max.)	0.45	0.40	0.35	0.30	0.20																			
Temperature Characteristics (Max.Impedance ratio)	<table><tr><td>Rated Voltage(V_{DC})</td><td>16</td><td>25</td><td>35</td><td>50∼80</td><td>160∼250</td></tr><tr><td>Z(-25°C)/Z(20°C)</td><td>4</td><td>3</td><td>3</td><td>2</td><td>4</td></tr><tr><td>Z(-40°C)/Z(20°C)</td><td>15</td><td>10</td><td>8</td><td>6</td><td>-</td></tr></table> (120Hz)						Rated Voltage(V _{DC})	16	25	35	50∼80	160∼250	Z(-25°C)/Z(20°C)	4	3	3	2	4	Z(-40°C)/Z(20°C)	15	10	8	6	-
Rated Voltage(V _{DC})	16	25	35	50∼80	160∼250																			
Z(-25°C)/Z(20°C)	4	3	3	2	4																			
Z(-40°C)/Z(20°C)	15	10	8	6	-																			
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated working voltage is applied for 1,000 hours at 125°C Capacitance change ≤ ±20% of the initial value Tanδ ≤ 200% of the initial specified value Leakage Current ≤ The initial specified value																							
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the exposing them at max. operating temperature for 500 hours without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than measurements. Capacitance change ≤ ±20% of the initial value Tanδ ≤ 200% of the initial specified value Leakage Current ≤ The initial specified value																							
Others	Satisfied characteristics KS C IEC 60384-4																							

※ For capacitors with CV products > 100,000 Higher Tanδ value may apply.
When the capacitance exceeds 1,000µF, 0.01 shall be added every 1,000µF increase.

RATED RIPPLE CURRENT

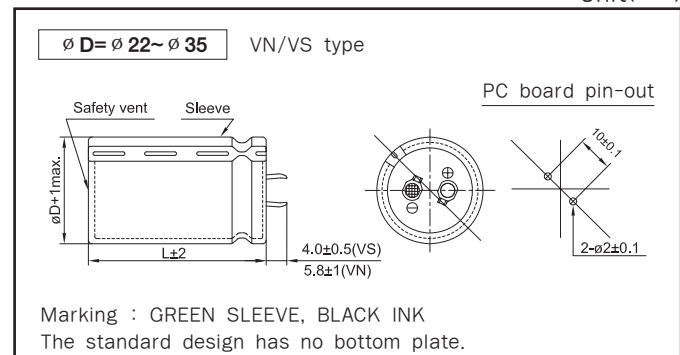
When capacitors are operated in any other condition at 120Hz, the maximum ripple current must be multiplied by the figure shown in the table.

Frequency multiplying factor

Frequency(Hz)	60	120	300	1k	10k~
16~50V _{DC}	0.95	1.00	1.03	1.05	1.08
63~100V _{DC}	0.92	1.00	1.07	1.13	1.19
160~250V _{DC}	0.81	1.00	1.17	1.32	1.45

DIMENSIONS OF UDA Series

Unit(mm)



RATINGS OF UDA Series

μF $\swarrow$ V _{DC} $\searrow$ $\varnothing D$	16				25				35			
	22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
1,000									22 × 30 0.85			
1,500					22 × 30 0.95				22 × 40 1.16	25.4 × 30 1.14		
2,200	22 × 30 1.00				22 × 40 1.28	25.4 × 30 1.41			22 × 50 1.54	25.4 × 40 1.54	30 × 30 1.50	
3,300	22 × 40 1.36	25.4 × 35 1.41			22 × 50 1.72	25.4 × 40 1.72	30 × 30 1.68				30 × 40 2.04	35 × 30 2.09
4,700	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				35 × 40 2.61
6,800			30 × 40 2.31	35 × 30 2.26			30 × 50 2.90	35 × 40 2.87				
10,000				35 × 45 3.14								

μF $\swarrow$ V _{DC} $\searrow$ $\varnothing D$	50				63				80			
	22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
330					22 × 35 0.69	25.4 × 30 0.71			22 × 30 0.59			
470					22 × 40 0.87	25.4 × 35 0.91	30 × 30 0.93		22 × 40 0.79	25.4 × 35 0.82		
680	22 × 30 0.78					25.4 × 45 1.21	30 × 35 1.19	35 × 30 1.22		25.4 × 40 1.04	30 × 35 1.07	
1,000	22 × 40 1.06	25.4 × 30 1.04					30 × 45 1.60	35 × 40 1.65			30 × 45 1.42	35 × 35 1.40
1,500	22 × 50 1.42	25.4 × 40 1.42	30 × 30 1.39					35 × 50 2.16				35 × 45 1.86
2,200			30 × 40 1.86	35 × 35 1.91								
3,300				35 × 40 2.45	← Case Size $\varnothing D \times L$(mm) ← Rated Ripple Current(Arms/125°C, 120Hz)							



LARGE SIZED ALUMINUM ELECTROLYTIC CAPACITORS

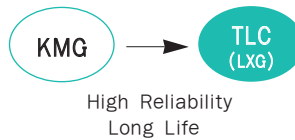
RATINGS OF UDA Series

μF	V_{DC} $\varnothing D$	160				200				250			
		22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
100										22 × 30 0.32			
150		22 × 30 0.37				22 × 35 0.42				22 × 40 0.44	25.4 × 30 0.43		
220		22 × 40 0.50	25.4 × 30 0.49			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		22 × 50 0.67	25.4 × 40 0.67	30 × 30 0.65			25.4 × 50 0.77	30 × 40 0.77	35 × 30 0.75			30 × 45 0.80	35 × 35 0.79
470			25.4 × 50 0.87	30 × 40 0.86	35 × 30 0.84				35 × 40 0.98				35 × 45 1.03
680				30 × 50 1.12	35 × 40 1.11				35 × 50 1.28				35 × 50 1.28
1,000				35 × 50 1.46	← Case Size $\varnothing D \times L$ (mm) ← Rated Ripple Current (Arms/125°C, 120Hz)								

TLC(LXG) Series

• 105°C 5,000Hrs assured.

- Non-solvent proof.
- Long life.
- Almost equal to KMG case sizes.
- For SMPS, Inverter
- RoHS compliant.
- Halogen-free capacitors are also available.



SPECIFICATIONS

Item	Characteristics							
Rated Voltage Range	10 ~ 100 V _{DC}				200 ~ 500 V _{DC}			
Operating Temperature Range	-40 ~ +105°C				-25 ~ +105°C			
Capacitance Tolerance	±20%(M) (at 20°C, 120Hz)							
Leakage Current	I=0.02CV or 3mA, whichever is smaller. Where, I: Leakage current (μA) C: Nominal capacitance (μF) V: Rated voltage (V _{DC}) (at 20°C, 5 minutes)							
※ Dissipation Factor(Tanδ)	Rated Voltage(V _{DC})	10	16	25	35	50	63~400	420~500
	Tanδ(Max.)	0.60	0.45	0.30	0.25	0.20	0.15	0.20
(at 20°C,120Hz)								
Temperature Characteristics (Max.Impedance ratio)	Rated Voltage(V _{DC})	10~16	25	35	50~63	80~100	200~400	420~500
	Z(-25°C)/Z(20°C)	4	3	3	2	2	4	8
	Z(-40°C)/Z(20°C)	15	10	8	6	5	-	-
(at 120Hz)								
Load Life	After the capacitor are subjected to DC voltage and the rated ripple current applied for 5,000 hours at 105°C, the following specifications shall be satisfied when the capacitors are restored to 20°C. The sum of DC voltage and peak AC voltage must not exceed the full rated voltage of the capacitor. Capacitance change ≤ ±25% of the initial value Tanδ ≤ 250% of the initial specified value Leakage current ≤ The initial specified value							
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 105°C for 500 hours without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≤ ±20% of the initial value Tanδ ≤ 150% of the initial specified value Leakage current ≤ The initial specified value							
Others	Satisfied characteristics KS C IEC 60384-4							

※ For capacitors with CV products > 100,000 higher Tanδ value may apply.
When the capacitance exceeds 1,000μF, 0.01 shall be added every 1,000μF increase.

RATED RIPPLE CURRENT

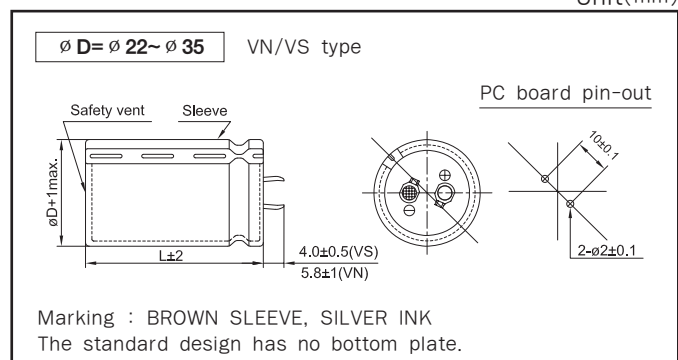
When capacitors are operated in any other conditions at 120Hz the maximum ripple current must be multiplied by the figure shown in the table.

Frequency multiplying factor

Frequency(Hz)	50	120	300	1k	10k~
10~50V _{DC}	0.95	1.00	1.03	1.05	1.08
63~100V _{DC}	0.92	1.00	1.07	1.13	1.19
200, 250V _{DC}	0.81	1.00	1.17	1.32	1.45
350~450V _{DC}	0.77	1.00	1.16	1.30	1.41

DIMENSIONS OF TLC(LXG) Series

Unit(mm)





LARGE SIZED ALUMINUM ELECTROLYTIC CAPACITORS

RATINGS OF TLC(LXG) Series

μF \ V_{DC} \ $\varnothing D$	10				16				25			
	22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
3,900									22 × 25 1.31			
4,700									22 × 30 1.51	25.4 × 25 1.51		
5,600					22 × 25 1.44				22 × 35 1.70			
6,800	22 × 25 1.30				22 × 30 1.66	25.4 × 25 1.66			22 × 40 1.92	25.4 × 30 1.87	30 × 25 1.90	
8,200					22 × 35 1.87					25.4 × 35 2.14	30 × 30 2.15	35 × 25 2.19
10,000	22 × 30 1.65	25.4 × 25 1.64			22 × 40 2.12	25.4 × 30 2.07	30 × 25 2.11		22 × 50 2.45	25.4 × 40 2.43		
12,000	22 × 35 1.85	25.4 × 30 1.85	30 × 25 1.89			25.4 × 35 2.37	30 × 30 2.37	35 × 25 2.42		25.4 × 50 2.78	30 × 35 2.70	35 × 30 2.76
15,000	22 × 40 2.12	25.4 × 35 2.16			22 × 50 2.74	25.4 × 40 2.71					30 × 40 3.13	35 × 35 3.16
18,000	22 × 50 2.45	25.4 × 40 2.43	30 × 30 2.37	35 × 25 2.42		25.4 × 50 3.11	30 × 35 3.02	35 × 30 3.09			30 × 50 3.64	35 × 40 3.61
22,000			30 × 35 2.73	35 × 30 2.79			30 × 40 3.46	35 × 35 3.49				
27,000		25.4 × 50 3.11	30 × 40 3.13				30 × 50 4.07	35 × 40 4.04				35 × 50 4.70
33,000				35 × 35 3.49								
39,000			30 × 50 3.99	35 × 40 3.96				35 × 50 5.16				
47,000				35 × 50 4.62								

μF \ V_{DC} \ $\varnothing D$	35				50				63			
	22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
1,000									22 × 25 1.00			
1,200									22 × 30 1.15	25.4 × 25 1.15		
1,500					22 × 25 1.02				22 × 35 1.32			
1,800					22 × 30 1.17	25.4 × 25 1.17			22 × 40 1.49	25.4 × 30 1.45	30 × 25 1.48	
2,200	22 × 25 1.10				22 × 35 1.33					25.4 × 35 1.67	30 × 30 1.68	35 × 25 1.71
2,700					22 × 40 1.51	25.4 × 30 1.47	30 × 25 1.50		22 × 50 1.92	25.4 × 40 1.90	30 × 35 1.93	
3,300	22 × 30 1.42	25.4 × 25 1.41				25.4 × 35 1.70	30 × 30 1.70	35 × 25 1.74		25.4 × 50 2.20		35 × 30 2.18
3,900	22 × 35 1.58	25.4 × 30 1.58			22 × 50 1.91	25.4 × 40 1.89					30 × 40 2.41	35 × 35 2.43
4,700	22 × 40 1.78		30 × 35 1.77				30 × 35 2.11	35 × 30 2.16			30 × 50 2.80	35 × 40 2.78
5,600		25.4 × 35 1.98	30 × 30 1.98	35 × 25 2.03		25.4 × 50 2.38	30 × 40 2.39	35 × 35 2.41				
6,800	22 × 50 2.26	25.4 × 40 2.24					30 × 50 2.79	35 × 40 2.78				35 × 50 3.55
8,200		25.4 × 50 2.57	30 × 35 2.50	35 × 30 2.55								
10,000			30 × 40 2.86	35 × 35 2.88				35 × 50 3.57				
12,000			30 × 50 3.32	35 × 40 3.30								
18,000				35 × 50 4.29	← Case Size $\varnothing D \times L$ (mm) ← Rated Ripple Current(Arms/105°C, 120Hz)							

RATINGS OF TLC(LXG) Series

V_{DC} μF ∅ D	80				100				200			
	22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
180									22X25 0.63			
270									22X30 0.81	25.4X25 0.81		
330									22X35 0.92	25.4X30 0.92	30X25 0.94	
390					22X25 0.78				22X40 1.02			
470									22X50 1.17	25.4X35 1.15	30X30 1.15	35X25 1.22
560					22X30 0.99	25.4X25 0.98				25.4X40 1.28	30X35 1.30	
680	22X25 0.97				22X35 1.12					25.4X50 1.48	30X40 1.49	35X30 1.47
820	22X30 1.12				22X40 1.26	25.4X30 1.23	30X25 1.25					35X35 1.65
1,000	22X35 1.27	25.4X25 1.23				25.4X35 1.41	30X30 1.42	35X25 1.45			30X50 1.91	35X40 1.90
1,200	22X40 1.42	25.4X30 1.39	30X25 1.41		22X50 1.60	25.4X40 1.59	30X35 1.61					35X50 2.21
1,500		25.4X35 1.62				25.4X50 1.86	30X40 1.87	35X30 1.85				
1,800	22X50 1.84	25.4X40 1.82	30X30 1.78	35X25 1.82				35X35 2.07				
2,200		25.4X50 2.11	30X35 2.05	35X30 2.09			30X50 2.40	35X40 2.39				
2,700			30X40 2.35	35X35 2.37				35X50 2.81				
3,300			30X50 2.75	35X40 2.73								
4,700				35X50 3.46								

V_{DC} μF ∅ D	250				350				400			
	22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
56									22X25 0.34			
68					22X25 0.39				22X30 0.44	25.4X25 0.40		
82					22X30 0.49				22X35 0.50			
100					22X35 0.52	25.4X25 0.51				25.4X30 0.52	30X25 0.52	
120					22X40 0.56	25.4X30 0.55	30X25 0.56		22X40 0.57	25.4X35 0.58		35X25 0.61
150	22X25 0.57					25.4X35 0.60		35X25 0.69	22X50 0.67	25.4X40 0.66	30X30 0.65	
180	22X30 0.66	25.4X25 0.66			22X50 0.73	25.4X40 0.72	30X30 0.71				30X35 0.74	35X30 0.76
220	22X35 0.75					25.4X50 0.93	30X35 0.82	35X30 0.83		25.4X50 0.84	30X40 0.84	35X35 0.94
270	22X40 0.85	25.4X30 0.83	30X25 0.85				30X40 0.94	35X35 1.04			30X50 1.10	35X40 1.09
330		25.4X35 0.96	30X30 0.96	35X25 1.02			30X50 1.19	35X40 1.19				
390	22X50 1.08	25.4X40 1.07										35X50 1.26
470		25.4X50 1.22	30X35 1.19	35X30 1.22				35X50 1.38				
560			30X40 1.35	35X35 1.36								
680			30X50 1.58	35X40 1.57								
1,000				35X50 2.02	◀ Case Size ∅D×L (mm) ◀ Rated Ripple Current (Arms/105°C, 120Hz)							



LARGE SIZED ALUMINUM ELECTROLYTIC CAPACITORS

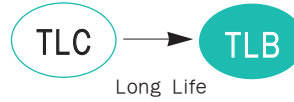
RATINGS OF TLC(LXG) Series

μF	V_{DC} $\varnothing D$	420				450				500			
		22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
47						22 × 25 0.30				22 × 35 0.32			
56						22 × 30 0.36				22 × 35 0.38	25.4 × 30 0.36	30 × 30 0.39	
68		22 × 30 0.44				22 × 35 0.44	25.4 × 30 0.45			22 × 40 0.45	25.4 × 35 0.47	30 × 30 0.44	
82		22 × 30 0.50	25.4 × 30 0.50			22 × 35 0.50	25.4 × 30 0.50			22 × 45 0.54	25.4 × 35 0.54	30 × 35 0.50	
100		22 × 35 0.52	25.4 × 30 0.52			22 × 40 0.53	25.4 × 35 0.52	30 × 30 0.53			25.4 × 40 0.55	30 × 35 0.56	
120		22 × 40 0.56	25.4 × 35 0.56	30 × 30 0.57		22 × 45 0.57	25.4 × 35 0.58	30 × 30 0.58	35 × 30 0.59		25.4 × 45 0.62	30 × 40 0.62	35 × 30 0.63
150		22 × 45 0.67	25.4 × 40 0.67	30 × 30 0.67		22 × 50 0.67	25.4 × 40 0.67	30 × 35 0.67	35 × 30 0.68			30 × 45 0.70	35 × 35 0.71
180		22 × 50	25.4 × 40 0.74	30 × 35 0.75	35 × 30 0.76		25.4 × 45 0.76	30 × 35 0.76				30 × 50 0.85	35 × 40 0.86
220			25.4 × 50 0.84	30 × 40 0.84	35 × 30 0.84		25.4 × 50 0.84	30 × 40 0.84	35 × 35 0.86			30 × 60 1.00	35 × 45 0.95
270				30 × 45 1.10	35 × 35 1.10			30 × 45 1.10	35 × 40 1.11				35 × 50 1.20
330				30 × 50 1.22	35 × 40 1.22			30 × 50 1.22	35 × 45 1.23				35 × 60 1.35
390					35 × 45 1.35				35 × 50 1.35				
470					35 × 50 1.47					← Case Size $\varnothing D \times L$ (mm) ← Rated Ripple Current (Arms/105°C, 120Hz)			

TLB Series

• 105°C 7,000Hrs assured.

- Non-solvent proof
- Long life
- Downsized of LXG series
- For SMPS, Inverter
- RoHS compliant.
- Halogen-free capacitors are also available.



SPECIFICATIONS

Item	Characteristics		
Rated Voltage Range	160 ~ 450 V _{DC}		
Operating Temperature Range	-25 ~ +105°C		
Capacitance Tolerance	±20%(M) (at 20°C, 120Hz)		
Leakage Current	I=0.02CV(μA) or 3mA, whichever is smaller. Where, I: Max. Leakage current(μA), C:Nominal capacitance(μF), V:Rated voltage(V _{DC}) (at 20°C, 5 minutes)		
※ Dissipation Factor(Tanδ)	Rated voltage(V _{DC})	160 ~ 450	
	Tanδ(Max.)	0.20 (at 20°C, 120Hz)	
Temperature Characteristics (Max. Impedance ratio)	Rated voltage(V _{DC})	160 ~ 400	450
	Z(-25°C)/Z(20°C)	4	8 (at 120Hz)
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 7,000 hours at 105°C. Capacitance change ≤ ±25% of the initial value Tanδ ≤ 300% of the initial specified value Leakage current ≤ The initial specified value		
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the exposing them at 105°C for 1,000 hours without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≤ ±20% of the initial value Tanδ ≤ 150% of the initial specified value Leakage current ≤ The initial specified value		
Others	Satisfied characteristics KS C IEC 60384-4		

※ For capacitors with CV products > 100,000 higher Tanδ value may apply.
When the capacitance exceeds 1,000μF, 0.01 shall be added every 1,000μF increase.

RATED RIPPLE CURRENT

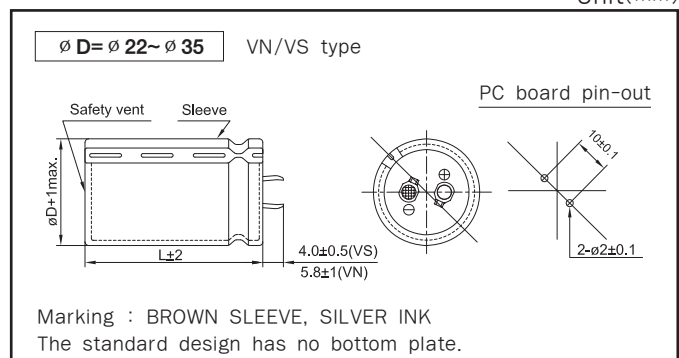
When capacitors are operated in any other conditions at 120Hz the maximum ripple current must be multiplied by the figure shown in the table

Frequency multiplying factor

Frequency(Hz)	60	120	300	1k	10k~
160~250V _{DC}	0.81	1.00	1.17	1.32	1.45
350~450V _{DC}	0.77	1.00	1.16	1.30	1.41

DIMENSIONS OF TLB Series

Unit(mm)





LARGE SIZED ALUMINUM ELECTROLYTIC CAPACITORS

RATINGS OF TLB Series

μF \ V_{DC} $\varnothing D$	160				200				250			
	22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
220					22 × 25 0.90				22 × 30 0.95			
270					22 × 30 1.05				22 × 35 1.08	25.4 × 25 1.05		
330	22 × 25 1.11				22 × 30 1.16	25.4 × 25 1.16			22 × 40 1.22	25.4 × 30 1.19		
390	22 × 30 1.26				22 × 35 1.29	25.4 × 30 1.29			22 × 45 1.36	25.4 × 35 1.35	30 × 25 1.32	
470	22 × 30 1.39	25.4 × 25 1.38			22 × 40 1.46	25.4 × 30 1.42	30 × 25 1.45		22 × 50 1.49	25.4 × 40 1.52	30 × 30 1.49	
560	22 × 35 1.55	25.4 × 30 1.55			22 × 45 1.63	25.4 × 35 1.62	30 × 30 1.62			25.4 × 45 1.70	30 × 35 1.69	
680	22 × 40 1.75	25.4 × 35 1.78	30 × 25 1.74			25.4 × 40 1.83	30 × 30 1.79			25.4 × 50 1.91	30 × 40 1.93	35 × 30 1.90
820	22 × 50 1.97	25.4 × 40 2.01	30 × 30 1.96			25.4 × 45 2.06	30 × 35 2.04				30 × 45 2.19	35 × 35 2.13
1,000		25.4 × 45 2.27	30 × 35 2.26				30 × 45 2.42	35 × 30 2.30				35 × 40 2.46
1,200		25.4 × 50 2.54	30 × 40 2.56	35 × 30 2.52			30 × 50 2.71	35 × 45 2.70				35 × 50 2.86
1,500			30 × 45 2.96	35 × 35 2.89				35 × 45 3.11				
1,800			30 × 50 3.32	35 × 40 3.30				35 × 50 3.50				
2,200				35 × 50 3.87								

μF \ V_{DC} $\varnothing D$	350				400				450			
	22	25.4	30	35	22	25.4	30	35	22	25.4	30	35
47									22 × 25 0.46			
56									22 × 30 0.52			
68					22 × 25 0.55				22 × 30 0.58	25.4 × 25 0.58		
82					22 × 30 0.63				22 × 35 0.65	25.4 × 30 0.65		
100	22 × 25 0.67				22 × 30 0.70	25.4 × 25 0.70			22 × 40 0.74	25.4 × 30 0.72	30 × 25 0.73	
120	22 × 30 0.77	25.4 × 25 0.76			22 × 35 0.79	25.4 × 30 0.79			22 × 45 0.83	25.4 × 35 0.82	30 × 30 0.82	
150	22 × 35 0.88	25.4 × 30 0.88			22 × 40 0.90	25.4 × 30 0.88	30 × 25 0.90			25.4 × 40 0.94	30 × 35 0.96	
180	22 × 40 0.99	25.4 × 30 0.96	30 × 25 0.98		22 × 45 0.99	25.4 × 35 1.01	30 × 30 1.01			25.4 × 45 1.06	30 × 35 1.05	35 × 30 1.07
220	22 × 45 1.12	25.4 × 35 1.11	30 × 30 1.11			25.4 × 40 1.14	30 × 35 1.16				30 × 40 1.20	35 × 35 1.21
270		25.4 × 40 1.26	30 × 35 1.28			25.4 × 50 1.32	30 × 40 1.33	35 × 30 1.31			30 × 50 1.41	35 × 40 1.40
330		25.4 × 45 1.40	30 × 35 1.42	35 × 30 1.45			30 × 45 1.52	35 × 35 1.48				35 × 45 1.60
390			30 × 40 1.60	35 × 35 1.61			30 × 50 1.69	35 × 40 1.68				35 × 50 1.79
470			30 × 50 1.86	35 × 40 1.85				35 × 45 1.91				
560				35 × 40 2.02				35 × 50 2.14				
680				35 × 50 2.36					← Case Size $\varnothing D \times L$ (mm) ← Rated Ripple Current (Arms/105°C, 120Hz)			



RVA Series

• 85°C 2,000Hrs assured.

- Non-solvent proof.
- No sparks with DC overvoltage.
- For SMPS(SET is specified Safety Standard)
- RoHS compliant.
- Halogen-free capacitors are also available.



SPECIFICATIONS

Item	Characteristics								
Rated Voltage Range	200 ~ 450 V _{DC}								
Operating Temperature Range	-25 ~ +85°C								
Capacitance Tolerance	±20%(M) (at 20°C, 120Hz)								
Leakage Current	I=0.02CV or 3mA, whichever is smaller. Where, I:Leakage Current(μA), C:Nominal capacitance(μF), V:Rated voltage(V _{DC}) (at 20°C, 5 minutes)								
※ Dissipation Factor(Tanδ)	<table><tr><td>Rated voltage(V_{DC})</td><td>200~400</td><td>450</td></tr><tr><td>Tanδ(Max.)</td><td>0.15</td><td>0.20</td></tr></table> (at 20°C, 120Hz)			Rated voltage(V _{DC})	200~400	450	Tanδ(Max.)	0.15	0.20
Rated voltage(V _{DC})	200~400	450							
Tanδ(Max.)	0.15	0.20							
Temperature Characteristics (Max. Impedance ratio)	<table><tr><td>Rated voltage(V_{DC})</td><td>200~400</td><td>450</td></tr><tr><td>Z(-25°C)/Z(20°C)</td><td>4</td><td>8</td></tr></table> (at 120Hz)			Rated voltage(V _{DC})	200~400	450	Z(-25°C)/Z(20°C)	4	8
Rated voltage(V _{DC})	200~400	450							
Z(-25°C)/Z(20°C)	4	8							
DC Over Voltage Test	When an excessive DC voltage is applied to the capacitors under the test conditions on next page, the voltage shall operate and than the capacitors shall come to open-circuit without flaming materials.								
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 2,000 hours at 85°C. Capacitance change ≤ ±20% of the initial value Tanδ ≤ ±200% of the initial specified value Leakage current ≤ The initial specified value								
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the exposing them at 85°C for 1,000 hours without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≤ ±20% of the initial value Tanδ ≤ ±200% of the initial specified value Leakage current ≤ The initial specified value								
Others	Satisfied characteristics KS C IEC 60384-4								

※ For capacitors with CV products > 100,000 higher Tanδ value may apply.
When the capacitance exceeds 1,000µF, 0.01 shall be added every 1,000µF increase.

RATED RIPPLE CURRENT

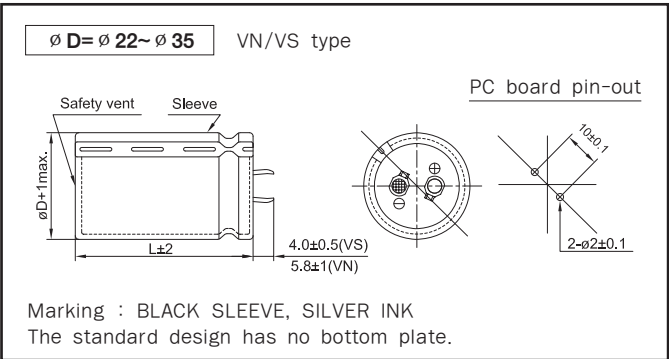
When capacitor are operated in any other condition at 120Hz, the maximum ripple current must be multiplied by the figure shown in the table.

Frequency multiplying factor

Frequency(Hz)	60	120	300	1k	10k~
200~250V _{DC}	0.81	1.00	1.17	1.32	1.45
350~450V _{DC}	0.77	1.00	1.16	1.30	1.41

DIMENSIONS OF RVA Series

Unit(mm)





LARGE SIZED ALUMINUM ELECTROLYTIC CAPACITORS

RATINGS OF RVA Series

μF	V _{DC} Ø D	200				250			
		22	25.4	30	35	22	25.4	30	35
120						22 × 20 0.80			
150		22 × 20 0.88				22 × 25 0.95	25.4 × 20 0.98		
180		22 × 25 1.05				22 × 25 1.12	25.4 × 20 1.13		
220		22 × 25 1.18	25.4 × 20 1.20			22 × 30 1.15	25.4 × 25 1.18	30 × 20 1.20	
270		22 × 30 1.27	25.4 × 25 1.24	30 × 20 1.26		22 × 35 1.31	25.4 × 30 1.32	30 × 20 1.28	
330		22 × 30 1.45	25.4 × 25 1.42	30 × 20 1.44		22 × 40 1.49	25.4 × 30 1.51	30 × 25 1.48	35 × 20 1.51
390		22 × 35 1.59	25.4 × 30 1.58	30 × 20 1.58	35 × 20 1.26	22 × 45 1.67	25.4 × 35 1.63	30 × 30 1.66	35 × 25 1.67
470		22 × 40 1.78	25.4 × 30 1.80	30 × 25 1.80	35 × 20 1.80	22 × 50 1.88	25.4 × 40 1.86	30 × 30 1.89	35 × 25 1.89
560		22 × 45 2.00	25.4 × 35 1.97	30 × 25 2.01	35 × 25 2.03		25.4 × 45 2.09	30 × 35 2.14	35 × 30 2.09
680		22 × 50 2.27	25.4 × 40 2.24	30 × 30 2.28	35 × 25 2.28		25.4 × 50 2.44	30 × 40 2.43	35 × 30 2.46
820			25.4 × 40 2.53	30 × 35 2.59	35 × 30 2.60			30 × 45 2.75	35 × 35 2.77
1,000			25.4 × 45 2.88	30 × 40 2.95	35 × 30 2.90			30 × 50 3.31	35 × 40 3.22
1,200				30 × 45 3.34	35 × 35 3.31				35 × 45 3.42
1,500				30 × 50 3.84	35 × 40 3.82				35 × 50 4.06
1,800					35 × 45 4.33				
2,200					35 × 50 4.92				

μF	V _{DC} Ø D	400				450			
		22	25.4	30	35	22	25.4	30	35
47		22 × 20 0.36							
56		22 × 20 0.40							
68		22 × 25 0.46	25.4 × 20 0.48			22 × 30 0.64			
82		22 × 30 0.71	25.4 × 20 0.72			22 × 30 0.70			
100		22 × 30 0.78	25.4 × 25 0.78	30 × 20 0.79		22 × 35 0.80	25.4 × 30 0.80		
120		22 × 35 0.88	25.4 × 30 0.87	30 × 25 0.90		22 × 40 0.91	25.4 × 30 0.91	30 × 25 0.92	
150		22 × 40 1.02	25.4 × 30 1.02	30 × 25 1.03	35 × 20 1.03	22 × 45 1.04	25.4 × 35 1.05	30 × 30 1.03	
180		22 × 45 1.14	25.4 × 35 1.11	30 × 30 1.13	35 × 25 1.14	22 × 50 1.18	25.4 × 40 1.15	30 × 30 1.17	35 × 25 1.20
220		22 × 50 1.29	25.4 × 40 1.27	30 × 30 1.30	35 × 25 1.27		25.4 × 45 1.31	30 × 35 1.36	35 × 30 1.35
270			25.4 × 45 1.45	30 × 35 1.48	35 × 30 1.49		25.4 × 50 1.55	30 × 40 1.60	35 × 35 1.59
330			22 × 50 1.65	30 × 40 1.65	35 × 30 1.67			30 × 45 1.90	35 × 40 1.88
390				30 × 45 1.85	35 × 35 1.88			30 × 50 2.09	35 × 45 2.08
470				30 × 50 2.09	35 × 40 2.07				35 × 50 2.40
560					35 × 45 2.34				
680					35 × 50 2.74	← Case Size Ø D × L (mm) ← Rated Ripple Current (Arms/85°C, 120Hz)			

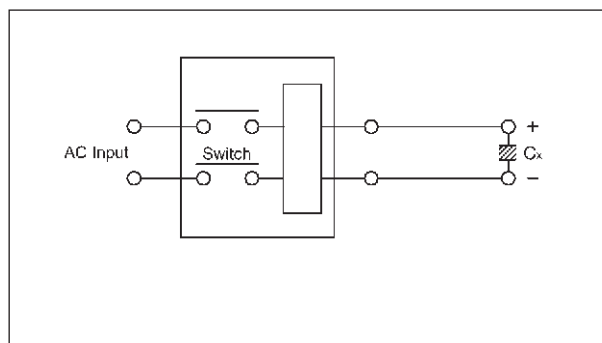
DC OVERVOLTAGE TEST CONDITIONS

The safety vent will operate and the capacitor shall become an open circuit without burning materials when the following excess DC voltage is applied.

● Test DC voltage

Rated voltage	Nominal capacitance	current Limit	Test voltage
200V _{DC}	< 330 μF	4A	300/375V _{DC}
	330 μF ≤ C < 470 μF	5A	
	≥ 470 μF	7A	
250V _{DC}	< 100 μF	4A	350/450V _{DC}
	100 μF ≤ C < 220 μF	5A	
	≥ 220 μF	7A	
400V _{DC}	< 100 μF	4A	500/600V _{DC}
	100 μF ≤ C < 220 μF	5A	
	≥ 220 μF	7A	
450V _{DC}	< 100 μF	4A	550/675V _{DC}
	100 μF ≤ C < 220 μF	5A	
	≥ 220 μF	7A	

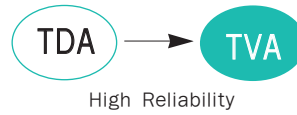
● Test circuit



TVA Series

• 105°C 2,000Hrs assured.

- Non-solvent proof.
- No sparks with DC overvoltage.
- For SMPS(SET is specified Safety Standard)
- RoHS compliant.
- Halogen-free capacitors are also available.



SPECIFICATIONS

Item	Characteristics								
Rated Voltage Range	200 ~ 450 V _{DC}								
Operating Temperature Range	-25 ~ +105℃								
Capacitance Tolerance	±20%(M) (at 20℃, 120Hz)								
Leakage Current	I=0.02CV or 3mA, whichever is smaller. Where, I:Leakage Current(μA), C:Nominal capacitance(μF), V:Rated voltage(V _{DC}) (at 20℃, 5 minutes)								
※ Dissipation Factor(Tanδ)	<table><tr><td>Rated voltage(V_{DC})</td><td>200~400</td><td>450</td></tr><tr><td>Tanδ(Max.)</td><td>0.15</td><td>0.20</td></tr></table> (at 20℃, 120Hz)			Rated voltage(V _{DC})	200~400	450	Tanδ(Max.)	0.15	0.20
Rated voltage(V _{DC})	200~400	450							
Tanδ(Max.)	0.15	0.20							
Temperature Characteristics (Max. Impedance ratio)	<table><tr><td>Rated voltage(V_{DC})</td><td>200~400</td><td>450</td></tr><tr><td>Z(-25℃)/Z(20℃)</td><td>4</td><td>8</td></tr></table> (at 120Hz)			Rated voltage(V _{DC})	200~400	450	Z(-25℃)/Z(20℃)	4	8
Rated voltage(V _{DC})	200~400	450							
Z(-25℃)/Z(20℃)	4	8							
DC Over Voltage Test	When an excessive DC voltage is applied to the capacitors under the test conditions on next page, the voltage shall operate and than the capacitors shall come to open-circuit without flaming materials.								
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated voltage is applied for 2,000 hours at 105℃. Capacitance change ≤ ±20% of the initial value Tanδ ≤ ±200% of the initial specified value Leakage current ≤ The initial specified value								
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the exposing them at 105℃ for 1,000 hours without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≤ ±20% of the initial value Tanδ ≤ ±200% of the initial specified value Leakage current ≤ The initial specified value								
Others	Satisfied characteristics KS C IEC 60384-4								

※ For capacitors with CV products > 100,000 higher Tanδ value may apply.
When the capacitance exceeds 1,000μF, 0.01 shall be added every 1,000μF increase.

RATED RIPPLE CURRENT

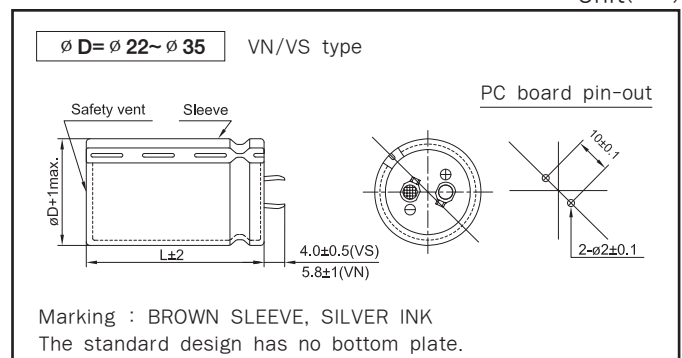
When capacitor are operated in any other condition at 120Hz, the maximum ripple current must be multiplied by the figure shown in the table.

Frequency multiplying factor

Frequency(Hz)	60	120	300	1k	10k~
200~250V _{DC}	0.81	1.00	1.17	1.32	1.45
350~450V _{DC}	0.77	1.00	1.16	1.30	1.41

DIMENSIONS OF TVA Series

Unit(mm)





LARGE SIZED ALUMINUM ELECTROLYTIC CAPACITORS

RATINGS OF TVA Series

μF	V _{DC} Ø D	200				250			
		22	25.4	30	35	22	25.4	30	35
120						22 × 20 0.68			
150						22 × 25 0.77			
180		22 × 25 0.82				22 × 30 0.87	25.4 × 25 0.93		
220		22 × 25 0.92				22 × 30 1.00	25.4 × 25 1.02		
270		22 × 30 1.02				22 × 35 1.14	25.4 × 30 1.13	30 × 25 1.25	
330		22 × 35 1.20	25.4 × 25 1.20			22 × 40 1.28	25.4 × 30 1.29	30 × 25 1.38	
390		22 × 40 1.35	25.4 × 30 1.35			22 × 45 1.42	25.4 × 35 1.46	30 × 30 1.52	35 × 25 1.62
470		22 × 45 1.52	25.4 × 30 1.45	30 × 25 1.47			25.4 × 40 1.64	30 × 30 1.67	35 × 25 1.81
560		22 × 50 1.74	25.4 × 35 1.60	30 × 30 1.60			25.4 × 45 1.82	30 × 35 1.87	35 × 30 1.99
680			25.4 × 40 1.82	30 × 30 1.81	35 × 25 1.86		25.4 × 50 1.96	30 × 40 2.12	35 × 30 2.19
820			25.4 × 50 2.11	30 × 35 2.11	35 × 30 2.11			30 × 45 2.39	35 × 35 2.42
1,000				30 × 40 2.40	35 × 30 2.40			30 × 50 2.52	35 × 40 2.57
1,200				30 × 50 2.65	35 × 35 2.65				35 × 45 2.70
1,500					35 × 45 3.08				35 × 50 3.00
1,800					35 × 50 3.31				

μF	V _{DC} Ø D	400				450			
		22	25.4	30	35	22	25.4	30	35
56		22 × 25 0.45							
68		22 × 30 0.51				22 × 30 0.53			
82		22 × 30 0.58				22 × 35 0.64			
100		22 × 35 0.66	25.4 × 25 0.66			22 × 40 0.69	25.4 × 30 0.69		
120		22 × 40 0.76	25.4 × 30 0.76			22 × 45 0.80	25.4 × 35 0.80		
150		22 × 45 0.85	25.4 × 35 0.85	30 × 30 0.85		22 × 50 0.88	25.4 × 40 0.88	30 × 30 0.88	
180		22 × 50 0.94	25.4 × 40 0.95	30 × 30 0.95			25.4 × 45 1.00	30 × 35 1.00	
220			25.4 × 45 1.24	30 × 35 1.24	35 × 30 1.24		25.4 × 50 1.12	30 × 40 1.12	35 × 30 1.12
270			25.4 × 50 1.30	30 × 40 1.30	35 × 30 1.30			30 × 45 1.28	35 × 35 1.28
330				30 × 45 1.47	35 × 35 1.47			30 × 50 1.45	35 × 40 1.45
390				30 × 50 1.62	35 × 40 1.62				35 × 45 1.55
470					35 × 45 1.90				35 × 50 1.85
560					35 × 50 2.12	← Case Size Ø D × L (mm) ← Rated Ripple Current (Arms/105°C, 120Hz)			

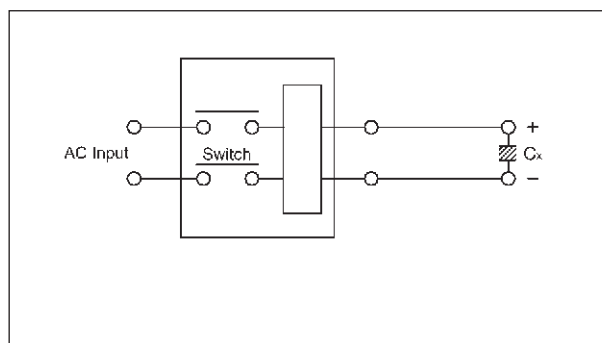
DC OVERVOLTAGE TEST CONDITIONS

The safety vent will operate and the capacitor shall become an open circuit without burning materials when the following excess DC voltage is applied.

● Test DC voltage

Rated voltage	Nominal capacitance	current Limit	Test voltage
200V _{DC}	< 330 μF	4A	300/375V _{DC}
	330 μF ≤ C < 470 μF	5A	
	≥ 470 μF	7A	
250V _{DC}	< 100 μF	4A	350/450V _{DC}
	100 μF ≤ C < 220 μF	5A	
	≥ 220 μF	7A	
400V _{DC}	< 100 μF	4A	500/600V _{DC}
	100 μF ≤ C < 220 μF	5A	
	≥ 220 μF	7A	
450V _{DC}	< 100 μF	4A	550/675V _{DC}
	100 μF ≤ C < 220 μF	5A	
	≥ 220 μF	7A	

● Test circuit



DL Series

• 85°C 2,000Hrs assured.

- Non-solvent proof.
- For AMP, AVR
- General Audio grade
- RoHS compliant..
- Halogen-free capacitors are also available.



SPECIFICATIONS

Item	Characteristics				
Rated Voltage Range	50 ~ 100 V _{DC}				
Operating Temperature Range	-40 ~ +85°C				
Capacitance Tolerance	±20%(M) (at 20°C, 120Hz)				
Leakage Current	I=0.01CV or 2mA, whichever is smaller. Where, I: Leakage current (μA) C: Nominal capacitance (μF) V: Rated voltage (V _{DC}) (at 20°C, 5 minutes)				
Dissipation Factor (Tanδ)	Refer to the below table. (at 20°C, 120Hz)				
Temperature Characteristics (Max. Impedance ratio)	<table border="1"> <tr> <td>Z(-25°C)/Z(20°C)</td><td>4</td></tr> <tr> <td>Z(-40°C)/Z(20°C)</td><td>15</td></tr> </table> (at 120Hz)	Z(-25°C)/Z(20°C)	4	Z(-40°C)/Z(20°C)	15
Z(-25°C)/Z(20°C)	4				
Z(-40°C)/Z(20°C)	15				
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage applied for 2,000 hours at 85°C Capacitance change ≤ ±20% of the initial value. Tanδ ≤ 200% of the initial specified value. Leakage current ≤ The initial specified value				
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at max. operating temperature for ½ assurance load life time without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≤ ±20% of the initial value. Tanδ ≤ 200% of the initial specified value. Leakage current ≤ The initial specified value.				
Charge & Discharge	5,000 times (at 70°C) After this test is completed, the capacitors shall be satisfied the following specifications Capacitance change ≤ ±20% of the initial value. Tanδ ≤ 150% of the initial specified value. Leakage current ≤ The initial specified value. where, Charge resistance : 2.2Ω Charge conditions: rated volt. 1(A) Discharge resistance: 100Ω Charge and discharge time:30 sec(each)				
Others	Satisfied characteristics KS C IEC 60384-4				

RATINGS OF DL Series

μF \ V _{DC}	50			63			80			100		
3,300	25.4 × 30	0.20	1.81	25.4 × 40	0.20	1.96	25.4 × 50	0.20	1.07	30 × 60	0.20	2.32
	30 × 25	0.20	1.86	30 × 30	0.25	1.75	30 × 40	0.20	1.08	35 × 50	0.20	2.32
							35 × 35	0.25	1.86	40 × 40	0.25	2.28
4,700	25.4 × 40	0.25	2.09	25.4 × 50	0.25	2.21	25.4 × 60	0.25	2.33	35 × 60	0.25	2.62
	30 × 30	0.25	2.09	30 × 40	0.25	2.22	30 × 50	0.25	2.35	40 × 50	0.25	2.61
				35 × 30	0.30	2.03	35 × 40	0.30	2.73			
6,800	25.4 × 50	0.25	2.65	30 × 50	0.30	2.58	30 × 60	0.30	2.72	40 × 60	0.25	3.29
	30 × 40	0.25	2.67	35 × 40	0.30	2.57	35 × 50	0.30	2.72			
	35 × 35	0.25	2.67				40 × 40	0.30	2.72			
8,200	30 × 50	0.35	2.63	30 × 60	0.35	2.77	35 × 60	0.30	3.16			
	35 × 40	0.35	2.61	35 × 50	0.35	2.77	40 × 50	0.30	3.15			
				40 × 40	0.35	2.77						
10,000	30 × 50	0.35	2.90	35 × 60	0.35	3.23	40 × 60	0.35	3.37			
	35 × 40	0.35	2.88	40 × 50	0.35	3.22						
12,000	30 × 60	0.35	3.32	35 × 60	0.40	3.31	50 × 50	0.40	3.50			
	35 × 50	0.35	3.34	40 × 50	0.40	3.30						
	40 × 40	0.35	3.35									
15,000	35 × 60	0.35	3.85	40 × 60	0.40	3.86						
	40 × 50	0.35	3.92									
22,000	40 × 60	0.35	5.00									

Rated Ripple Current (Arms/85°C, 120Hz)
 Tanδ(Max.)
 Case Size ØD×L(mm)

DIMENSIONS : Refer to page 168.

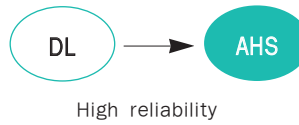


LARGE SIZED ALUMINUM ELECTROLYTIC CAPACITORS

AHS Series

• 85°C 2,000Hrs assured.

- Non-solvent proof.
- Hi-Fi Audio grade.
- For Audio, AMP, AVR
- RoHS compliant.
- Halogen-free capacitors are also available.



SPECIFICATIONS

Item	Characteristics				
Rated Voltage Range	50 ~ 100 V _{DC}				
Operating Temperature Range	-40 ~ +85°C				
Capacitance Tolerance	±20%(M) (at 20°C, 120Hz)				
Leakage Current	I=0.01CV or 2mA, whichever is smaller. Where, I: Leakage current (μA) C: Nominal capacitance (μF) V: Rated voltage (V _{DC}) (at 20°C, 5 minutes)				
Dissipation Factor (Tanδ)	Tanδ shall not exceed the value shown in the table of RATINGS. (at 20°C, 120Hz)				
Temperature Characteristics (Max.Impedance ratio)	<table><tr><td>Z(-25°C)/Z(20°C)</td><td>4</td></tr><tr><td>Z(-40°C)/Z(20°C)</td><td>15</td></tr></table> (at 120Hz)	Z(-25°C)/Z(20°C)	4	Z(-40°C)/Z(20°C)	15
Z(-25°C)/Z(20°C)	4				
Z(-40°C)/Z(20°C)	15				
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage applied for 2,000 hours at 85°C Capacitance change ≤ ±20% of the initial value. Tanδ ≤ 200% of the initial specified value. Leakage current ≤ The initial specified value				
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at max. operating temperature for ½ assurance load life time without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≤ ±20% of the initial value. Tanδ ≤ 200% of the initial specified value. Leakage current ≤ The initial specified value				
Charge & Discharge	5,000 times (at 70°C) After this test is completed, the capacitors shall be satisfied the following specifications. Capacitance change ≤ ±20% of the initial value. Tan δ ≤ 150% of the initial specified value. Leakage current ≤ The initial specified value No visible damage and no leakage electrolyte where, Charge resistance: 2.2 Ω Charge conditions: rated volt. 1(A) Discharge resistance: 100 Ω Charge and discharge time: 30 sec(each)				
Others	Satisfied characteristics KS C IEC 60384-4				

DIMENSIONS OF AHS/DL Series

Unit(mm)

ø D= ø 22~ ø 35 VN/VS type Marking : AHS-DARK BROWN SLEEVE, GOLD INK DL-BLACK SLEEVE, SILVER INK The standard design has no bottom plate.	ø D= ø 35~ ø 40 VR type (4 terminals) B: Positive terminal. A, C: Terminals not connected electrically but used for mechanical support only. (Blank Terminals) Note: Sleeve has an insulating role.
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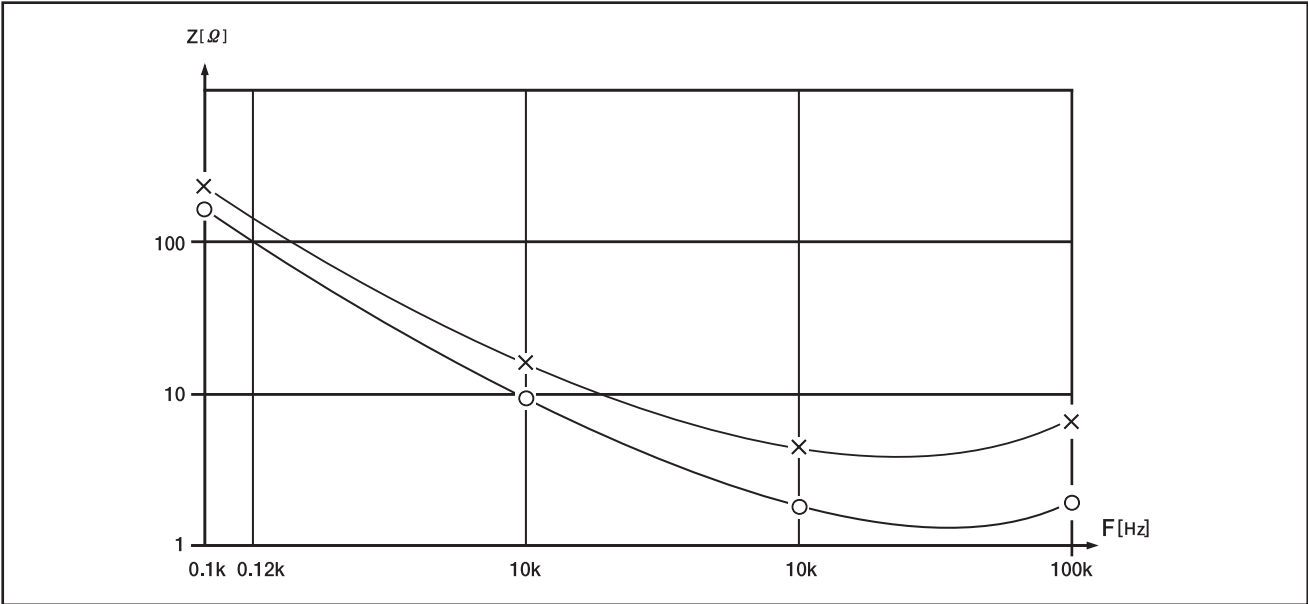
CAUTION:Please use the blank terminals for mechanical support only. The blank terminals must not be connected to a solder trace on the PC board, but be electrically isolated from negative or positive terminal.

RATINGS OF AHS Series

$\mu F \backslash V_{DC}$	50			63			80			100		
3,300	25.4 × 30	0.20	1.84	25.4 × 40	0.20	1.96	25.4 × 50	0.15	2.39	30 × 60	0.15	2.68
	30 × 25	0.20	1.86	30 × 30	0.20	1.96	30 × 40	0.15	2.40	35 × 50	0.15	2.69
							35 × 35	0.15	2.40	40 × 40	0.15	2.68
4,700	25.4 × 40	0.20	2.34	25.4 × 50	0.20	2.47	25.4 × 60	0.15	3.01	35 × 60	0.15	2.98
	30 × 30	0.20	2.36	30 × 40	0.20	2.48	30 × 50	0.15	3.04	40 × 50	0.20	2.92
				35 × 30	0.20	2.48	35 × 40	0.15	3.02			
6,800	25.4 × 50	0.22	2.83	30 × 50	0.22	3.02	30 × 60	0.15	3.35	40 × 60	0.20	3.68
	30 × 40	0.22	2.85	35 × 40	0.22	3.00	35 × 50	0.15	3.35			
	35 × 35	0.25	2.67				40 × 40	0.20	3.34			
8,200	30 × 50	0.25	3.11	30 × 60	0.25	3.27	35 × 60	0.20	3.87			
	35 × 40	0.25	3.09	35 × 50	0.25	3.28	40 × 50	0.20	3.86			
				40 × 40	0.25	3.28						
10,000	30 × 50	0.25	3.43	35 × 60	0.25	3.82	40 × 60	0.20	4.46			
	35 × 40	0.25	3.41	40 × 50	0.25	3.81						
12,000	30 × 60	0.25	3.66	35 × 60	0.25	4.19						
	35 × 50	0.30	3.62	40 × 50	0.25	4.18						
	40 × 40	0.30	3.62									
15,000	35 × 60	0.30	4.27	40 × 60	0.30	4.46						
	40 × 50	0.30	4.26									
22,000	40 × 60	0.30	5.40									

Rated Ripple Current (Arms/85°C, 120Hz)
Tan δ (Max.)
Case Size $\varnothing D \times L$ (mm)

Frequency vs Impedance Graph



○ - ○ AHS 80 VR 8200
x - x DL 80 VR 8200



LARGE SIZED ALUMINUM ELECTROLYTIC CAPACITORS

TGA(KMH) Series

• 105°C 2,000Hrs assured.

- Non-solvent proof.
- Wide temperature range.
- For UPS
- RoHS compliant.
- Halogen-free capacitors are also available.



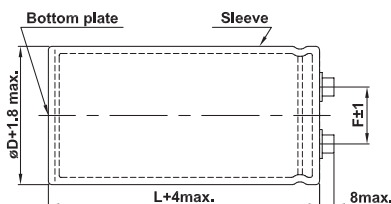
SPECIFICATIONS

Item	Characteristics										
Rated Voltage Range	10 ~ 100 V _{DC}	160 ~ 400 V _{DC}									
Operating Temperature Range	-40 ~ +105°C	-25 ~ +105°C									
Capacitance Tolerance	±20%(M) (at 20°C, 120Hz)										
Leakage Current	I=0.02CV or 5mA, whichever is smaller. Where, I: Leakage current (µA) C: Nominal capacitance (µF) V: Rated voltage (V _{DC}) (at 20°C, 5 minutes)										
Dissipation Factor (tanδ)	Tanδ shall not exceed the values shown in the RATINGS. (at 20°C, 120Hz)										
Temperature Characteristics (Capacitance change ratio)	<table><tr><td>Rated Voltage(V_{DC})</td><td>10~100</td><td>160~400</td></tr><tr><td>C(-25°C)/C(20°C)</td><td>-</td><td>≥0.7</td></tr><tr><td>C(-40°C)/C(20°C)</td><td>≥0.6</td><td>-</td></tr></table> (at 120Hz)		Rated Voltage(V _{DC})	10~100	160~400	C(-25°C)/C(20°C)	-	≥0.7	C(-40°C)/C(20°C)	≥0.6	-
Rated Voltage(V _{DC})	10~100	160~400									
C(-25°C)/C(20°C)	-	≥0.7									
C(-40°C)/C(20°C)	≥0.6	-									
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the ripple duplicated voltage(≤WV) applied for 2,000 hours at 105°C. Capacitance change ≤ ±20% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value										
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 105°C for 500 hours without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≤ ±20% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value										
Others	Satisfied characteristics KS C IEC 60384-4										

DIMENSIONS OF TGA(KMH) Series

Unit(mm)

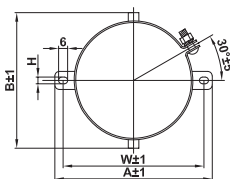
Marking : BROWN SLEEVE, SILVER INK



<Screw specifications>

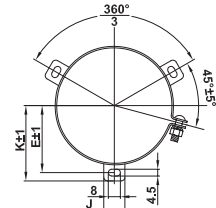
- Plus hexagon-headed screw: M5×0.8×12
- Maximum screw tightening torque:3.23N·m (33kg·cm)

B type mounting clamp



øD	A	B	W	H	F
35	58	44	48	3.5	12.7
50	78	64	68	4.5	22.4
63.5	90	75	80	4.5	28.0
76.5	104.5	90	93.5	4.5	31.5

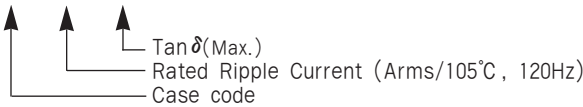
C type mounting clamp



øD	E	K	J	F
50	32.5	37.0	14	22.4
63.5	38.1	43.5	14	28.0
76.5	44.5	50.0	14	31.5
89	50.8	56.5	16	31.5

RATINGS OF TGA(KMH) Series

μF \ VDC	10			16			25			35			50			63			80		
2,200																			A5	2.4	0.15
2,700																A5	2.3	0.20	A5	2.7	0.15
3,300																A5	2.5	0.20	A5	3.0	0.15
3,900													A5	2.8	0.20	A5	2.8	0.20	A6	3.4	0.15
4,700													A5	3.1	0.20	A5	3.1	0.20	A6	3.7	0.15
5,600													A5	3.3	0.20	A6	3.5	0.20	A8	4.5	0.15
6,800													A5	3.5	0.25	A6	3.9	0.20	A8	4.9	0.15
8,200										A5	3.3	0.30	A6	3.8	0.25	A8	4.7	0.20	A10	5.1	0.20
10,000										A5	3.6	0.30	A8	4.6	0.25	A8	4.9	0.25	A12	6.1	0.20
12,000							A5	3.7	0.35	A6	4.2	0.30	A8	5.1	0.25	A10	5.5	0.25	C8	6.7	0.20
15,000							A5	4.1	0.35	A6	4.7	0.30	A8	5.7	0.25	A12	6.6	0.25	C10	8.3	0.20
18,000				A5	4.2	0.45	A6	4.8	0.35	A8	5.7	0.30	A8	6.0	0.25	A12	6.9	0.25	C12	9.9	0.20
22,000	A5	4.9	0.70	A5	4.7	0.45	A6	5.3	0.35	A8	6.8	0.30	A10	6.7	0.25	C8	7.4	0.25	C12	11.0	0.20
27,000	A5	5.1	0.70	A6	5.5	0.45	A8	6.4	0.35	A10	7.5	0.30	C8	9.1	0.25	C12	10.9	0.25	D10	11.4	0.25
33,000	A6	5.9	0.70	A6	5.7	0.45	A8	6.7	0.40	A12	9.0	0.30	C10	11.1	0.25	C12	12.0	0.25	E10	13.9	0.25
39,000	A8	6.3	0.70	A8	6.8	0.45	A10	7.8	0.40	C8	9.2	0.35	C12	13.1	0.25	D10	12.5	0.30	E10	14.5	0.30
47,000	A8	6.9	0.70	A8	7.1	0.50	A12	9.3	0.40	C10	11.2	0.35	C12	13.9	0.30	D12	14.9	0.30	E12	16.5	0.30
56,000	A8	7.4	0.70	A10	8.4	0.50	C8	9.7	0.45	C10	11.4	0.40	D10	14.9	0.35	D12	16.3	0.30	E12	18.1	0.30
68,000	A10	8.5	0.70	A10	8.8	0.55	C10	10.7	0.45	C12	13.6	0.40	D12	16.6	0.35	E12	18.4	0.35	E14	19.7	0.35
82,000	A10	8.9	0.70	C8	10.7	0.55	C10	11.2	0.50	D10	14.8	0.45	E12	18.9	0.40	E14	20.0	0.40	F14	22.1	0.40
100,000	A12	10.7	0.70	C8	10.8	0.65	C12	14.8	0.50	D12	16.5	0.45	E12	19.5	0.45	E14	20.5	0.50			
120,000	C8	11.0	0.75	C10	13.1	0.65	D10	14.9	0.65	D12	17.6	0.55	E12	21.0	0.55	F14	21.8	0.60			
150,000	C10	13.2	0.80	C12	15.3	0.70	D12	17.9	0.65	E12	18.5	0.65	F14	23.9	0.60						
180,000	C12	15.7	0.80	C12	15.7	0.80	D12	18.9	0.80	E12	19.8	0.80	F14	23.9	0.75						
220,000	C12	16.8	0.85	D12	19.2	0.85	E12	21.3	0.85	E14	23.4	0.80									
270,000	D12	19.6	1.00	D12	19.6	1.00	E12	21.7	1.00	F14	25.5	1.00									
330,000	D12	19.7	1.20	E12	21.1	1.30	E14	23.1	1.20												
390,000	E12	21.3	1.50	E12	21.3	1.50	F14	24.9	1.50												
470,000	E12	21.4	1.80	E14	24.2	1.60															
560,000	E14	23.6	2.00	F14	28.1	2.00															
680,000	F14	26.0	2.40	F14	28.5	2.40															



CASE CODE

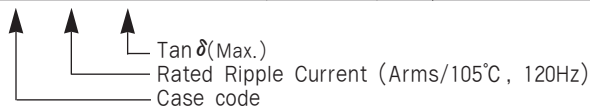
Case Code	∅D (mm)	L (mm)	Case Code	∅D (mm)	L (mm)
A5	35	50	D10	63.5	100
A6	35	60	D12	63.5	120
A8	35	80	E10	76.5	100
A10	35	100	E12	76.5	120
A12	35	120	E13	76.5	130
C8	50	80	E14	76.5	140
C10	50	100	F13	89	130
C12	50	120	F14	89	140



LARGE SIZED ALUMINUM ELECTROLYTIC CAPACITORS

RATINGS OF TGA(KMH) Series

μF	VDC	100			160			200			250			315			350			400		
180														A5	0.8	0.10	A5	0.8	0.10	A5	0.8	0.10
220														A5	0.9	0.10	A5	0.9	0.10	A5	0.9	0.10
270											A5	0.8	0.15	A5	1.0	0.10	A5	1.0	0.10	A5	1.0	0.10
330								A5	0.9	0.15	A5	0.9	0.15	A5	1.1	0.10	A5	1.1	0.10	A6	1.2	0.10
390								A5	1.0	0.15	A5	1.0	0.15	A5	1.2	0.10	A5	1.1	0.10	A6	1.2	0.10
470								A5	1.1	0.15	A5	1.1	0.15	A6	1.4	0.10	A6	1.4	0.10	A8	1.4	0.10
560					A5	1.2	0.15	A5	1.2	0.15	A5	1.2	0.15	A6	1.5	0.10	A8	1.6	0.10	A8	1.4	0.15
680					A5	1.3	0.15	A5	1.3	0.15	A6	1.4	0.15	A8	1.7	0.10	A8	1.6	0.15	A10	1.7	0.15
820					A5	1.4	0.15	A5	1.4	0.15	A8	1.6	0.15	A8	1.7	0.15	A10	1.8	0.15	A12	2.0	0.15
1,000					A5	1.6	0.15	A6	1.7	0.15	A8	1.6	0.20	A10	2.0	0.15	A12	2.2	0.15	C8	2.2	0.15
1,200					A6	1.9	0.15	A6	1.9	0.15	A8	1.8	0.20	A12	2.4	0.15	C8	2.4	0.15	C10	2.7	0.15
1,500					A6	2.1	0.15	A8	2.3	0.15	A10	2.1	0.20	C8	2.7	0.15	C10	3.0	0.15	C12	3.3	0.15
1,800	A5	2.7	0.10		A8	2.5	0.15	A8	2.5	0.15	A12	2.5	0.20	C10	3.3	0.15	C12	3.6	0.15			
2,200	A5	3.0	0.10		A8	2.8	0.15	A10	2.7	0.15	A12	2.8	0.20	C10	4.0	0.15	C12	4.0	0.15	D10	4.2	0.15
2,700	A6	3.5	0.10		A10	3.3	0.15	A12	3.6	0.15	C10	3.5	0.20	C12	4.4	0.15	D10	4.6	0.15			
3,300	A8	4.2	0.10		A12	3.8	0.15	C8	4.1	0.15	C12	4.2	0.20	D10	5.1	0.15				D12	5.5	0.15
3,900	A8	4.5	0.12		C8	3.9	0.20	C10	4.9	0.15	C12	4.6	0.20	D12	6.0	0.15	E12	6.7	0.15			
4,700	A10	5.0	0.12		C10	4.6	0.20	D10	5.3	0.20	D12	5.7	0.20	E10	6.8	0.15				E13	7.6	0.15
5,600	A10	5.4	0.12		C10	5.1	0.20	D10	5.8	0.20	D12	6.3	0.20	E12	8.0	0.15	E13	8.3	0.15	F14	9.4	0.15
6,800	A12	5.8	0.15		C12	6.1	0.20	D12	6.9	0.20	E12	7.7	0.20	F13	9.2	0.15	E14	9.5	0.15	F14	10.4	0.15
8,200	C8	6.4	0.15		D10	7.0	0.20	D12	7.6	0.20	E12	8.4	0.20	F14	11.4	0.15	F14	11.4	0.15			
10,000	C10	7.8	0.15		D12	8.4	0.20	E12	9.3	0.20	E14	10.0	0.20	F14	12.6	0.15						
12,000	C12	9.3	0.15		E10	9.4	0.20	E12	10.2	0.20	F14	11.9	0.20									
15,000	C12	10.4	0.15		E12	11.4	0.20	E12	11.2	0.20	F14	12.2	0.20									
18,000	D10	11.0	0.20		E14	13.4	0.20	F14	13.1	0.25												
22,000	D12	12.5	0.20		F14	14.5	0.25															
27,000	E12	13.7	0.25		F14	16.0	0.25															
33,000	E12	15.2	0.25																			
39,000	E14	16.1	0.30																			
47,000	F14	19.3	0.30																			
56,000	F14	21.1	0.30																			



RATED RIPPLE CURRENT

Frequency Multiplying Factor

Rated voltage (VDC)	øD(mm)	Frequency (Hz)				
		60	120	300	1k	10k~
10~50	ø 35~ø 89	0.95	1.00	1.03	1.05	1.09
63~80	ø 35	0.90	1.00	1.06	1.10	1.08
	ø 50~ø 89	0.95	1.00	1.03	1.05	1.09
100	ø 35	0.82	1.00	1.12	1.22	1.30
	ø 50	0.90	1.00	1.06	1.10	1.18
	ø 63.5~ø 89	0.95	1.00	1.03	1.05	1.09
160~250	ø 35	0.80	1.00	1.19	1.34	1.46
	ø 50~ø 63.5	0.81	1.00	1.14	1.26	1.36
	ø 76.5~ø 89	0.82	1.00	1.12	1.22	1.30
315~400	ø 35~ø 89	0.80	1.00	1.19	1.34	1.46

RFC(RWF) Series

• 85°C 5,000Hrs assured.

- Non-solvent proof.
- High ripple capability.
- Long life.
- For UPS, Industrial Inverter
- RoHS compliant.
- Halogen-free capacitors are also available.



SPECIFICATIONS

Item	Characteristics
Rated Voltage Range	350 ~ 450 V _{DC}
Operating Temperature Range	-25 ~ +85°C
Capacitance Tolerance	±20%(M) (at 20°C, 120Hz)
Leakage Current	I=0.02CV or 5mA, whichever is smaller. Where, I: Leakage current (μA) C: Nominal capacitance (μF) V: Rated voltage (V _{DC}) (at 20°C, 5 minutes)
Dissipation Factor (Tanδ)	0.25max. (at 20°C, 120Hz)
Insulation Withstanding Voltage	When a voltage of 2,000V _{AC} is applied for one minute between the terminals shorted each other and the mounting clamp on the insulating sleeve covering the case, there shall not be electrical damage.
Load Life	After the capacitors are subjected to DC voltage with the rated ripple current applied for 5,000 hours at 85°C, the following specifications shall be satisfied when the capacitors are restored to 20°C. The sum of DC voltage and peak AC voltage must not exceed the full rated voltage of the capacitor. Capacitance change ≤ ±30% of the initial value Tanδ ≤ 300% of the initial specified value Leakage current ≤ The initial specified value
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 85°C for 500 hours without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before measurements. Capacitance change ≤ ±20% of the initial value Tanδ ≤ 300% of the initial specified value Leakage current ≤ The initial specified value
Others	Satisfied characteristics KS C IEC 60384-4

RATED RIPPLE CURRENT MULTIPLIERS

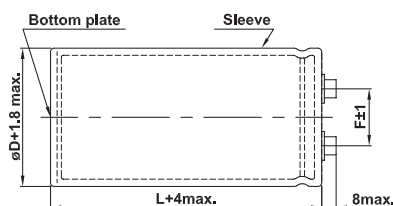
Frequency Multipling Factor

Frequency(Hz)	60	120	300	1k	3k
Factor	0.8	1.0	1.1	1.3	1.4

DIMENSIONS OF RFC(RWF) Series

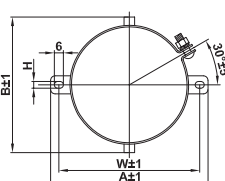
Unit(mm)

Marking : BLACK SLEEVE, GOLD INK



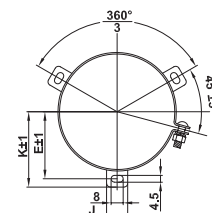
- <Screw specifications>
 øD = ø63.5 ~ ø89
 • Plus hexagon-headed screw:
 M5×0.8×12
 • Maximum screw tightening
 torque: 3.23N·m (33kg·cm)

B type mounting clamp



øD	A	B	W	H	F
63.5	90	75	80	4.5	28.0
76.5	104.5	90	93.5	4.5	31.5

C type mounting clamp



øD	E	K	J	F
63.5	38.1	43.5	14	28.0
76.5	44.5	50.0	14	31.5
89	50.8	56.5	16	31.5



LARGE SIZED ALUMINUM ELECTROLYTIC CAPACITORS

RATINGS OF RFC(RWF) Series

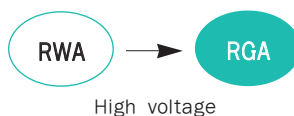
μF $\swarrow$ V _{DC} $\searrow$ $\varnothing D$	350			400			450		
	63.5	76.5	89	63.5	76.5	89	63.5	76.5	89
2,700							63.5 × 120 10.1		
3,300				63.5 × 120 11.1			63.5 × 130 11.7		
3,900	63.5 × 120 12.1			63.5 × 130 12.7			63.5 × 160 13.8	76.5 × 120 13.4	
4,700	63.5 × 130 14.0			63.5 × 160 15.2	76.5 × 120 14.7		63.5 × 190 16.7	76.5 × 130 15.5	
5,600	63.5 × 160 16.6	76.5 × 120 16.1		63.5 × 190 18.2	76.5 × 130 16.9			76.5 × 160 18.3	
6,800	63.5 × 190 20.0	76.5 × 130 18.6			76.5 × 160 20.2			76.5 × 170 20.7	
8,200		76.5 × 160 22.2			76.5 × 170 22.8				89 × 160 24.1
10,000		76.5 × 170 25.2				89 × 160 26.6			89 × 170 27.8
12,000			89 × 160 29.1			89 × 170 30.0			
15,000			89 × 190 35.7	← Case Size $\varnothing D \times L$(mm) ← Rated Ripple Current(Arms/85°C, 120Hz)					

Note: When long life performance is required in actual use, the rms ripple current has to be reduced.

RGA Series

• 85°C 2,000Hrs assured.

- Non-solvent proof.
- For inverter.
- Rated voltage range: 500 to 600V_{DC}
- For UPS, Industrial Inverter.
- RoHS compliant.
- Halogen-free capacitors are also available.



SPECIFICATIONS

Item	Characteristics
Rated Voltage Range	500 ~ 600 V _{DC}
Operating Temperature Range	-25 ~ +85°C
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)
Leakage Current	I = 0.02CV or 5mA, whichever is smaller. Where, I: Max. Leakage current (μA) C: Nominal capacitance (μF) V: Rated voltage (V _{DC}) (at 20°C, 5 minutes)
Dissipation Factor (Tanδ)	0.25max. (at 20°C, 120Hz)
Temperature Characteristics (Capacitance change ratio)	C(-25°C)/C(20°C) ≥ 0.6 (at 120Hz)
Insulation Withstanding Voltage	When a voltage of 2,000V _{AC} is applied for one minute between the terminals shorted each other and the mounting clamp on the insulating sleeve covering the case, there shall not be electrical damage.
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 2,000 hours at 85°C. Capacitance change ≤ ±20% of the initial value Tanδ ≤ 300% of the initial specified value Leakage current ≤ The initial specified value
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 85°C for 500 hours without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≤ ±20% of the initial value Tanδ ≤ 300% of the initial specified value Leakage current ≤ The initial specified value
Others	Satisfied characteristics KS C IEC 60384-4

RATED RIPPLE CURRENT MULTIPLIERS

Frequency Multiplying Factor

Frequency(Hz)	60	120	300	1k	3k
Factor	0.8	1.0	1.1	1.3	1.4

DIMENSIONS OF RGA Series

Unit(mm)

Marking: BLACK SLEEVE, GOLD INK.

<Screw specifications>

- Plus hexagon-headed screw: M5×0.8×12
- Maximum screw tightening torque: 3.23N·m (33kg·cm)

B type mounting clamp

øD	A	B	W	H	F
35	58	44	48	3.5	12.7
50	78	64	68	4.5	22.4
63.5	90	76	80	4.5	28.0
76.5	104.5	90	93.5	4.5	31.5

C type mounting clamp

øD	E	K	J	F
50	32.5	37.0	14	22.4
63.5	38.1	43.5	14	28.0
76.5	44.5	50.0	14	31.5
89	50.8	56.5	16	31.5



LARGE SIZED ALUMINUM ELECTROLYTIC CAPACITORS

RATINGS OF RGA Series

μF	V _{DC} Ø D	500					550				
		35	50	63.5	76.5	89	35	50	63.5	76.5	89
100							35 × 50 0.6				
120	35 × 50 0.7										
180							35 × 80 1.0				
270	35 × 80 1.2						35 × 100 1.3				
330	35 × 100 1.4						35 × 120 1.6				
390	35 × 120 1.7							50 × 75 1.7			
470			50 × 75 1.8								
560								50 × 95 2.1	63.5 × 95 2.5		
680			50 × 90 2.5					50 × 115 2.7	63.5 × 120 3.0		
820			50 × 120 2.9					50 × 130 3.1	63.5 × 130 3.5		
1,000			50 × 130 3.4	63.5 × 95 3.4							
1,200										76.5 × 95 4.2	
1,500				63.5 × 120 4.5	76.5 × 95 4.6					76.5 × 120 5.0	
1,800				63.5 × 130 5.2						76.5 × 130 5.8	
2,200					76.5 × 120 6.1					76.5 × 150 7.0	
2,700					76.5 × 160 7.7						
3,300											89 × 160 9.3
3,900						89 × 160 10.1					

μF	V _{DC} Ø D	600				
		35	50	63.5	76.5	89
180	35 × 100 1.1					
270	35 × 120 1.4					
330			50 × 75 1.7			
390			50 × 95 1.8	63.5 × 95 2.1		
560			50 × 115 2.2	63.5 × 115 2.6		
680			50 × 130 2.9	63.5 × 130 3.2		
820					76.5 × 95 3.3	
1,200					76.5 × 115 4.4	
1,500					76.5 × 130 5.4	
1,800					76.5 × 150 6.5	
2,200						89 × 130 7.8
2,700						89 × 155 8.9

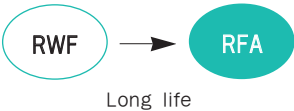
← Case Size Ø D × L (mm)
← Rated Ripple Current (Arms/85°C, 120Hz)

Note: When long life performance is required in actual use, the rms ripple current has to be reduced.

RFA Series

• 85°C 20,000Hrs assured.

- Non-solvent proof.
- High ripple capability.
- Long Life
- For Elevator, Industrial Inverter
- RoHS compliant.
- Halogen-free capacitors are also available.



SPECIFICATIONS

Item	Characteristics
Rated Voltage Range	350 ~ 500 V _{DC}
Operating Temperature Range	-25 ~ +85°C
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)
Leakage Current	I = 0.02CV or 5mA, whichever is smaller. Where, I: Max. Leakage current (µA) C: Nominal capacitance (µF) V: Rated voltage (V _{DC}) (at 20°C, 5 minutes)
Dissipation Factor (Tanδ)	0.25max. (at 20°C, 120Hz)
Temperature Characteristics (Capacitance change ratio)	C(-25°C)/C(20°C) ≥ 0.7 (at 120Hz)
Insulation Withstanding Voltage	When a voltage of 2,000V _{AC} is applied for one minute between the terminals shorted each other and the mounting clamp on the insulating sleeve covering the case, there shall not be electrical damage.
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 20,000 hours at 85°C. Capacitance change ≤ ±30% of the initial value Tanδ ≤ 300% of the initial specified value Leakage current ≤ The initial specified value
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 85°C for 500 hours without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≤ ±20% of the initial value Tanδ ≤ 300% of the initial specified value Leakage current ≤ The initial specified value
Others	Satisfied characteristics KS C IEC 60384-4

RATED RIPPLE CURRENT MULTIPLIERS

Frequency Multiplying Factor

Frequency(Hz)	60	120	300	1k	3k
Factor	0.8	1.0	1.1	1.3	1.4

DIMENSIONS OF RFA Series

Unit(mm)

Marking : BLACK SLEEVE, GOLD INK

Bottom plate
Sleeve

øD*1.8 max.
L*4max.
F±1
8max.

〈Screw specifications〉
øD = ø63.5~ø89
● Plus hexagon-headed screw:
M5×0.8×12
● Maximum screw tightening
torque:3.23N·m (33kg·cm)

B type mounting clamp

B±1
H
6
30±5
W±1
A±1

øD	A	B	W	H	F
63.5	90	75	80	4.5	28.0
76.5	104.5	90	93.5	4.5	31.5

C type mounting clamp

360°
3
45±5°
R±1
E±1
J
8
4.5

øD	E	K	J	F
63.5	38.1	43.5	14	28.0
76.5	44.5	50.0	14	31.5
89	50.8	56.5	16	31.5



LARGE SIZED ALUMINUM ELECTROLYTIC CAPACITORS

RATINGS OF RFA Series

μF \ Vdc $\varnothing D$	350			400			450		
	63.5	76.5	89	63.5	76.5	89	63.5	76.5	89
2,200							63.5 × 120 9.1		
2,700				63.5 × 120 10.1			63.5 × 130 10.6	76.5 × 120 11.2	
3,300	63.5 × 120 11.1			63.5 × 130 11.7			63.5 × 160 12.7	76.5 × 130 13.0	
3,900	63.5 × 130 12.8			63.5 × 160 13.5	76.5 × 120 14.7		63.5 × 170 14.4		
4,700	63.5 × 160 15.2	76.5 × 120 14.7		63.5 × 170 15.8	76.5 × 130 15.5			76.5 × 160 16.7	
5,600	63.5 × 170 17.3	76.5 × 130 16.9		63.5 × 190 18.2	76.5 × 160 18.3			76.5 × 170 21.1	89 × 160 19.9
6,800	63.5 × 190 20.0	76.5 × 160 20.2			76.5 × 170 21.0				89 × 170 23.0
8,200		76.5 × 170 23.1				89 × 160 24.1			89 × 190 26.4
10,000			89 × 160 26.6			89 × 190 29.1			
12,000			89 × 190 32.0	← Case Size $\varnothing D \times L$ (mm) ← Rated Ripple Current(Arms/85°C, 120Hz)					

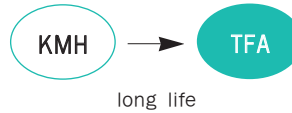
μF \ Vdc $\varnothing D$	500		
	63.5	76.5	89
1,200	63.5 × 90 5.3		
1,500	63.5 × 100 6.3		
1,800	63.5 × 120 7.4		
2,200		76.5 × 110 9.0	
2,700		76.5 × 130 10.3	
3,300		76.5 × 140 11.9	
3,900		76.5 × 150 13.3	
4,700			89 × 150 15.3
5,600			89 × 170 18.2
6,800			89 × 190 21.0

Note: When long life performance is required in actual use, the rms ripple current has to be reduced.

TFA Series

• 105°C 5,000Hrs assured.

- Non-solvent proof.
- High ripple capability.
- Long life
- For Elevator, Industrial Inverter
- RoHS compliant.
- Halogen-free capacitors are also available.



SPECIFICATIONS

Item	Characteristics
Rated Voltage Range	350 ~ 450 V _{DC}
Operating Temperature Range	-25 ~ +105°C
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)
Leakage Current	I = 0.02CV or 5mA, whichever is smaller. Where, I: Max. Leakage current (μA) C: Nominal capacitance (μF) V: Rated voltage (V _{DC}) (at 20°C, 5 minutes)
Dissipation Factor (Tanδ)	0.15max. (at 20°C, 120Hz)
Temperature Characteristics (Capacitance change ratio)	$C(-25^{\circ}\text{C})/C(20^{\circ}\text{C}) \geq 0.7$ (at 120Hz)
Insulation Withstanding Voltage	When a voltage of 2,000V _{AC} is applied for one minute between the terminals shorted each other and the mounting clamp on the insulating sleeve covering the case, there shall not be electrical damage.
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 5,000 hours at 105°C. Capacitance change ≤ ±20% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 105°C for 1,000 hours without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≤ ±20% of the initial value Tanδ ≤ 200% of the initial specified value Leakage current ≤ The initial specified value
Others	Satisfied characteristics KS C IEC 60384-4

RATED RIPPLE CURRENT MULTIPLIERS

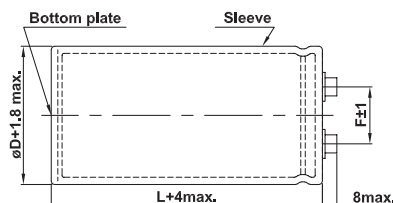
Frequency Multiplying Factor

Frequency(Hz)	120	300	1k	3k
Factor	1.0	1.1	1.3	1.4

DIMENSIONS OF TFA Series

Unit(mm)

Marking : BROWN SLEEVE, SILVER INK

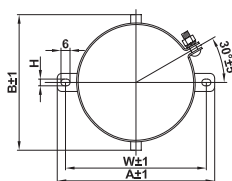


<Screw specifications>

øD = ø63.5 ~ ø89

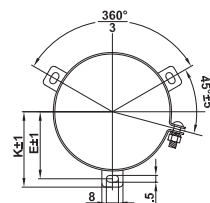
- Plus hexagon-headed screw: M5×0.8×12
- Maximum screw tightening torque: 3.23N·m (33kg·cm)

B type mounting clamp



øD	A	B	W	H	F
63.5	90	75	80	4.5	28.0
76.5	104.5	90	93.5	4.5	31.5

C type mounting clamp



øD	E	K	J	F
63.5	38.1	43.5	14	28.0
76.5	44.5	50.0	14	31.5
89	50.8	56.5	16	31.5



LARGE SIZED ALUMINUM ELECTROLYTIC CAPACITORS

RATINGS OF TFA Series

μF \ Vdc $\varnothing D$	350			400			450		
	63.5	76.5	89	63.5	76.5	89	63.5	76.5	89
2,200							63.5 × 120 11.8		
2,700				63.5 × 120 13.1			63.5 × 130 13.7	76.5 × 120 14.5	
3,300	63.5 × 120 14.4			63.5 × 130 15.2			63.5 × 160 16.5	76.5 × 130 16.9	
3,900	63.5 × 130 16.6			63.5 × 160 17.9	76.5 × 120 18.2		63.5 × 170 18.7		
4,700	63.5 × 160 19.8	76.5 × 120 19.1		63.5 × 170 20.5	76.5 × 130 20.1			76.5 × 160 21.7	
5,600	63.5 × 170 22.5	76.5 × 130 21.9			76.5 × 160 23.8			76.5 × 190 26.1	89 × 160 24.1
6,800		76.5 × 160 26.2			76.5 × 170 27.3	89 × 160 26.6			89 × 170 27.8
8,200		76.5 × 170 30.0	89 × 160 29.2			89 × 170 30.5			89 × 190 32.0
10,000			89 × 170 33.7	← Case Size $\varnothing D \times L$ (mm) ← Rated Ripple Current(Arms/105°C, 120Hz)					

Note:When long life performance is required in actual use, the rms ripple current has to be reduced.

PH Series

• 5~35℃ 5,000Times.

- Non-solvent proof.
- For photo flash.
- RoHS compliant.
- Halogen-free capacitors are also available.



SPECIFICATIONS

Item	Characteristics					
Rated Voltage	330 V _{DC}					
Operating Temperature Range	-20 ~ +55℃					
Capacitance Tolerance	-10 ~ +20%(V) (at 20℃, 120Hz)					
Leakage Current	I=1×C Where, I: Leakage current (μA) C: Nominal capacitance (μF) (at 20℃, 5 minutes)					
Dissipation Factor (Tanδ)	<table><tr><td>Cap. ≤600μF</td><td>0.10</td></tr><tr><td>Cap. >600μF</td><td>0.15</td></tr></table>	Cap. ≤600μF	0.10	Cap. >600μF	0.15	(at 20℃, 120Hz)
Cap. ≤600μF	0.10					
Cap. >600μF	0.15					
Charge and Discharge Characteristics	The following specifications shall be satisfied when the capacitors are restored to 20℃ after charge and discharge are repeated 5,000 times at room temperature. (5 to 35℃) Charge voltage: rated voltage Charge and discharge cycles:30 seconds Discharge resistance or Xenon tube:about 1 Ω Capacitance change ≤ ±10% of the initial value Tanδ ≤ 150% of the initial specified value Leakage current ≤ 150% of the initial specified value					
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after exposing them at 55℃ for 1,000 hours without voltage applied. Capacitance change ≤ ±10% of the initial value Tanδ ≤ 150% of the initial specified value Leakage current ≤ 300% of the initial specified value					
Others	Satisfied EIAJ RC-3801A					

RATINGS OF PH Series

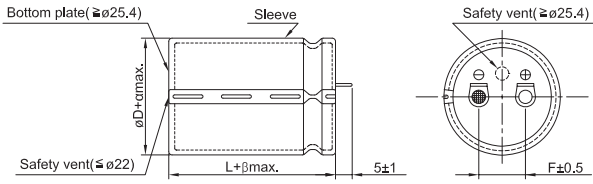
V _{DC} SV μF	330	V _{DC} SV μF	330
	350		350
165	16×27	500	25.4×54
180	14.5×35, 18×29	700	30×54
250	16×39	950	35×50
260	16×45	1,000	35×50
280	20×28	1,500	30×110
320	22×40	2,000	35×80
420	22×50		

↑
Case Size ØD×L(mm)

Note: Case sizes are changable to your requests.

DIMENSIONS

Unit(mm)



Marking : BLACK SLEEVE, SILVER INK

ø D	14.5	16	18	20	22	25.4	30	35
F	5.5	5.5	6	7	7	10	10	14
α	0.5	0.5	0.5	1	1	1	1	1
β	1	1	1	2	2	2	2	2



LARGE SIZED ALUMINUM ELECTROLYTIC CAPACITORS

DH Series

• 40°C 1,000,000Times.

- Non-solvent proof.
- For Welding machine, Warning Light
- RoHS compliant.
- Halogen-free capacitors are also available.



SPECIFICATIONS

Item	Characteristics
Rated Voltage Range	315, 475 V _{DC}
Operating Temperature Range	-25 ~ +70°C
Capacitance Tolerance	-10 ~ +50%(T) (at 20°C, 120Hz)
Leakage Current	$I = 0.06CV$ or 3mA, whichever is smaller. Where, I:Max. leakage current(μA) C:Nominal capacitance(μF) V:Rated voltage(V _{DC}) (at 20°C, 5 minutes)
Disipation Factor (Tanδ)	0.10 Max. (at 20°C, 120Hz)
Temperature Characteristics (Capacitance change ratio)	$C(-10^{\circ}C)/C(20^{\circ}C) \geq 0.8$ (at 120Hz)
Load Life	The following specifications shall be satisfied when the capacitors are restored to 40°C after the rated working voltage applied. And than charge and discharge (charge 0.8sec. discharge 0.2sec) are repeated 1,000,000 times. And than the capacitors are restored to 20°C after the measurements. Capacitance change $\leq \pm 20\%$ of the initial value Tanδ $\leq 200\%$ of the initial specified value Leakage Current $\leq 200\%$ of the initial specified value

RATINGS OF DH Series

V _{DC} μF	315	475
100		35 × 110
150	35 × 100	
225		40 × 110
330	50 × 100	

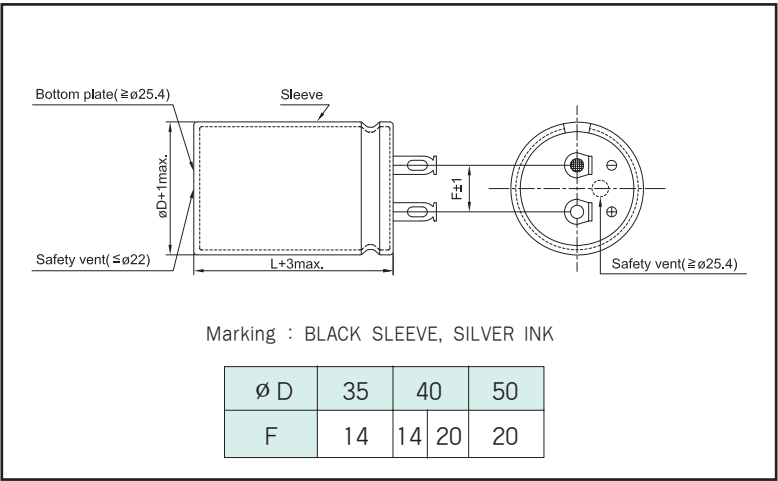
↑
—Case Size ØD×L(mm)

*Case size is available upon request.

Note:When long life performance is required in actual use, the rms ripple current has to be reduced.

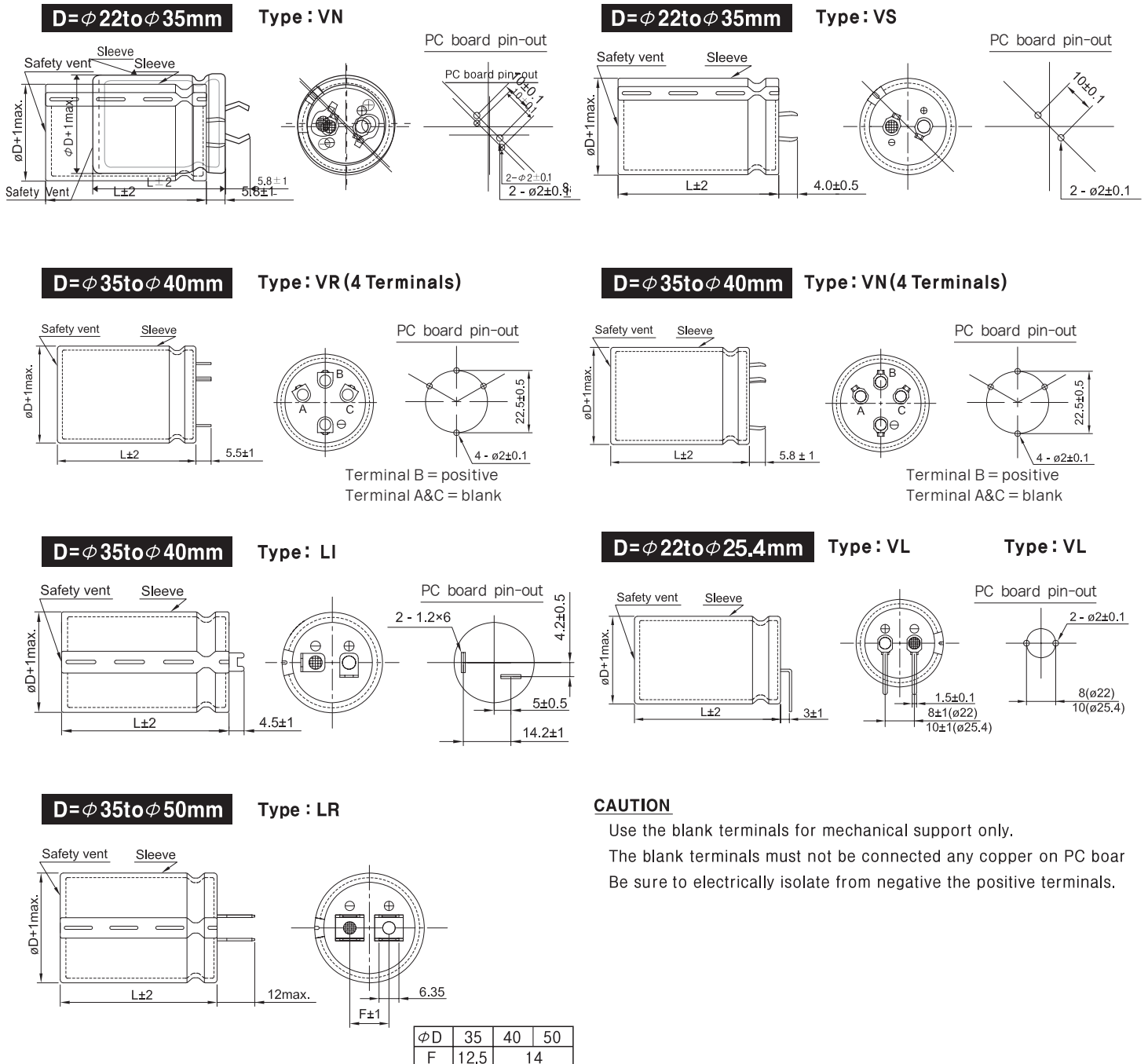
DIMENSIONS

Unit(mm)



AVAILABLE TERMINALS

[mm]



CAUTION

Use the blank terminals for mechanical support only.
The blank terminals must not be connected any copper on PC board.
Be sure to electrically isolate from negative the positive terminals.

ϕ D	35	40	50
F	12.5	14	



ALUMINUM ELECTROLYTIC CAPACITORS

