NIPPON CHEMI-CON

SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

CAT. No. E1001I (Ver.2)

INDEX		
PRODUCT SEARCH	SERIES TABLE	→
	GROUP CHART	→
PRODUCTION GUIDE	PRECAUTIONS AND GUIDELINES (Aluminum Electrolytic Capacitor)	→
	PART NUMBERING SYSTEM	→
	ENVIRONMENTAL CONSIDERATION	→
	PACKAGING	→
	TAPING SPECIFICATIONS	→
	RECOMMENDED REFLOW CONDITION	→
	STANDARDIZATION	→
	WORLD-WIDE MANUFACTURING LOCATIONS	→
PRODUCT SPECIFICATIONS	CHIP TYPE	→
RELIABILITY DATA		→
APPENDIX (GLOBAL CODE)		→

CAPACITOR SERIES TABLE, CONTENTS

Next page

Series			Features	Endurance (+R=With ripple)	Standard type	Low impedance	Solvent resistant	Terminal type	Rated voltage range (Vdc)	Capacitance range (μF)
Conductive Polymer Electrolyte Type		PXS (NEW!)	Chip type, super low ESR, long life	105℃ 5,000 hours		●	●	SMD	4 to 16	22 to 560
		PXF	Chip type, super low ESR	105℃ 2,000 hours		●	●	SMD	2.5 to 6.3	220 to 1,000
		PXE (Upgrade!)	Chip type, super low ESR	105℃ 2,000 hours		●	●	SMD	2.5 to 16	33 to 2,700
		PXA	Chip type, super low ESR	105℃ 1,000 to 2,000 hours	●	●	●	SMD	2.5 to 25	3.3 to 1,500
		PXH	125℃ Vertical type	125℃ 1,000 hours		●	●	SMD	2.5 to 20	22 to 1,000
		PSF (NEW!)	Radial type, super low ESR, long life	105℃ 5,000 hours		●	●	Radial	2.5 to 16	100 to 560
		PSE (NEW!)	Radial type, super low ESR, long life	105℃ 5,000 hours		●	●	Radial	2.5 to 6.3	470 to 820
		PSC	Radial lead type, super low ESR, high ripple current	105℃ 2,000 hours		●	●	Radial	2.5 to 16	270 to 2,700
		PSA	Super low ESR, high ripple current	105℃ 2,000 hours		●	●	Radial	2.5 to 16	47 to 1,500
		PS	Radial lead type, super low ESR	105℃ 2,000 hours	●	●	●	Radial	2.5 to 35	18 to 1,500
		PSL (NEW!)	Low ESL (Ask Engineering Bulletin No791 in detail)	105℃ 2,000 hours		●	●	Radial	2.5	330 & 560
Miniature Surface Mount	Vertical Type	MVS	4.5mm height	85℃ 2,000 hours	●		●	SMD	4 to 50	0.1 to 220
		MVA	5.5 to 22.0mm max. height, downsized	85℃ 2,000 hours			▲	SMD	4 to 450	0.1 to 10,000
		MV	5.5 to 10.5mm max. height	85℃ 1,000 to 2,000 hours	●		●	SMD	4 to 63	0.1 to 1,000
		MVE	5.5 to 22.0mm max. height, downsized	105℃ 1,000 to 2,000 hours			▲	SMD	6.3 to 450	0.47 to 6,800
		MVK	5.5 to 10.5mm max. height	105℃ 1,000 to 2,000 hours	●		●	SMD	6.3 to 50	0.1 to 1,000
		MZA	6.1 to 10.5mm max. height, very low impedance	105℃ 2,000 hours		●	●	SMD	6.3 to 80	3.3 to 1,500
		MVY	5.5 to 22.0mm max. height	105℃ 1,000 to 5,000 hours		●	▲	SMD	6.3 to 100	1.0 to 8,200
		MZF (NEW!)	105℃10,000 hours, Low impedance, Long life (Ask Engineering Bulletin No794 in detail)	105℃ 10,000 hours		●	●	SMD	6.3 to 50	10 to 470
		MZE	105℃7,000/8,000 hours, low impedance, long life	105℃ 7,000 to 8,000 hours		●	●	SMD	6.3 to 50	10 to 470
		MZD	105℃5,000 hours, low impedance, long life (Ask Engineering Bulletin No758 in detail)	105℃ 5,000 hours		●	●	SMD	6.3 to 50	10 to 470
		MLA	Low impedance, long life	105℃ 3,000 hours		●	●	SMD	6.3 to 50	10 to 1,000
		MVJ	6.0mm max. height	105℃ 2,000 hours			●	SMD	6.3 to 50	0.1 to 100
		MLF (NEW!)	105℃10,000 hours, Long life (Ask Engineering Bulletin No793 in detail)	105℃ 10,000 hours			●	SMD	6.3 to 50	0.1 to 1,000
		MLE	105℃7,000/8,000 hours, long life	105℃ 7,000 to 8,000 hours			●	SMD	6.3 to 50	0.1 to 1,000
		MLD	105℃5,000 hours, long life (Ask Engineering Bulletin No759 in detail)	105℃ 5,000 hours			●	SMD	6.3 to 50	0.1 to 1,000
		MVL	6.0 to 10.5mm max. height	105℃ 3,000 to 5,000 hours			●	SMD	6.3 to 50	0.1 to 1,000
		MVH	6.0 to 22.0mm max. height	125℃ 1,000 to 5,000 hours			▲	SMD	10 to 450	3.3 to 4,700
		MHB	10.5mm max. height	125℃ 2,000 hours			●	SMD	10 to 35	47 to 470
		MKB	10.5mm max. height	105℃ 3,000 hours				SMD	400	2.2 to 4.7
		MV-BP	5.5mm max. height, bi-polar	85℃ 2,000 hours			●	SMD	4 to 50	0.1 to 47
		MVK-BP	6.0mm max. height, bi-polar	105℃ 1,000 hours			●	SMD	6.3 to 50	0.1 to 47
Miniature	Low Profile	SRM	5mm height, downsized	85℃ 1,000 hours			●	Radial	4 to 50	0.1 to 330
		SRE	5mm height	85℃ 1,000 hours	●			Radial	4 to 50	0.1 to 100
		KRE	5mm height	105℃ 1,000 hours	●		●	Radial	6.3 to 50	0.1 to 100
		SRA	7mm height	85℃ 1,000 hours	●			Radial	4 to 63	0.1 to 470
		KMA	7mm height	105℃ 1,000 hours	●		●	Radial	4 to 63	0.1 to 220
		SRG	φ4×7 to φ18×25mm, low profile	85℃ 1,000 to 2,000 hours			●	Radial	4 to 50	0.1 to 10,000
		KRG	φ4×7 to φ18×25mm, low profile	105℃ 1,000 hours			●	Radial	6.3 to 50	0.1 to 10,000
	General Purpose	SMQ	Downsized	85℃ 2,000 hours	●			Radial	6.3 to 450	0.1 to 47,000
		KMQ	Downsized	105℃ 1,000 to 2,000 hours +R	●		▲	Radial	6.3 to 450	0.1 to 47,000
		SMG	General, downsized	85℃ 2,000 hours	●		▲	Radial	6.3 to 450	0.1 to 39,000
		KMG	General, downsized	105℃ 1,000 to 2,000 hours +R	●		▲	Radial	6.3 to 450	0.1 to 22,000
		SME-BP	Bi-polar, general	85℃ 2,000 hours	●		●	Radial	6.3 to 100	0.47 to 6,800
		KME-BP	Bi-polar, general	105℃ 1,000 hours	●		●	Radial	6.3 to 100	0.47 to 6,800
	High Frequency Use	KZM	Lowest impedance, long life	105℃ 6,000 to 10,000 hours +R		●		Radial	6.3 to 50	27 to 10,000
		KZH	Lowest impedance, long life	105℃ 5,000 to 6,000 hours +R		●		Radial	6.3 to 35	47 to 8,200
		KZE	Lowest impedance, long life	105℃ 1,000 to 5,000 hours +R		●		Radial	6.3 to 100	6.8 to 6,800
		KY	Low impedance, long life	105℃ 4,000 to 10,000 hours +R		●		Radial	6.3 to 100	0.47 to 18,000
		LXZ	Low impedance, downsized	105℃ 2,000 to 8,000 hours +R		●	●	Radial	6.3 to 63	12 to 18,000
		LXY	Low impedance, high reliability	105℃ 2,000 to 8,000 hours +R	●	●	●	Radial	10 to 63	10 to 8,200
		LXV	Low impedance	105℃ 2,000 to 5,000 hours +R		●	●	Radial	6.3 to 100	5.6 to 15,000

: Promotional products

▲ : Some of range are solvent resistant.

NIPPON CHEMI-CON

CAPACITOR SERIES TABLE, CONTENTS

Previous page

Series			Features	Endurance (+R=With ripple)	Standard type	Low impedance	Solvent resistant	Terminal type	Rated voltage range (V_{DC})	Capacitance range (μF)
Miniature	High Reliability	KXJ	Downsized, long life, for input filtering	105℃ 10,000 to 12,000 hours +R		●		Radial	160 to 450	6.8 to 680
		KXG	Downsized, long life, for input filtering	105℃ 8,000 to 10,000 hours +R		●		Radial	160 to 450	6.8 to 330
		SMH	φ20×20 to φ22×50mm	85℃ 2,000 hours +R	●			Radial	160 to 450	33 to 470
		KMH	φ20×20 to φ22×50mm	105℃ 2,000 hours +R	●			Radial	160 to 450	33 to 470
		PAG	Low profile, for input filtering	105℃ 2,000 hours +R				Radial	200 to 450	18 to 560
		KLJ	Downsized, no sparks with DC overvoltage	105℃ 2,000 hours +R				Radial	200 & 400	4.7 to 330
		KLG	No sparks with DC overvoltage	105℃ 2,000 hours +R				Radial	200 & 400	22 to 330
		FL	Long life	105℃ 3,000 hours +R			●	Radial	6.3 to 50	0.47 to 270
		GPA	125℃, downsized, low impedance	125℃ 3,000 to 5,000 hours +R		●	●	Radial	25 to 50	470 to 6,800
		GXE	125℃, downsize, low impedance	125℃ 2,000 to 5,000 hours +R		●	▲	Radial	10 to 450	4.7 to 4,700
		GXL	125℃ Long life	125℃ 5,000 hours +R			●	Radial	10 to 50	100 to 1,000
	Special Application	LBG	For airbag	105℃ 5,000 hours +R		●	●	Radial	25 & 35	1,000 to 11,000
		KZG	For PC motherboard (Ask Engineering Bulletin No705 in detail)	105℃ 2,000 hours +R		●		Radial	6.3 to 16	470 to 3,300
		LLA	Low DC leakage, general	85℃ 1,000 hours			●	Radial	6.3 to 50	0.1 to 15,000
		PH	For photo flash	55℃ 5,000 times charging				Radial	300 & 330	—
Snap-in	General Purpose	KMR	105℃, Snap-in terminal, super downsized	105℃ 2,000 hours +R	●			Pin	160 to 450	100 to 3,300
		SMQ	Snap-in terminal, more downsized	85℃ 2,000 hours +R	●			Pin	160 to 450	82 to 3,900
		KMQ	Snap-in terminal, more downsized	105℃ 2,000 hours +R	●			Pin	35, 50, 160 to 450	68 to 33,000
		SMM	Snap-in terminal, downsized	85℃ 3,000 hours +R	●			Pin	160 to 450	47 to 3,300
		KMS	Snap-in terminal, downsized	105℃ 3,000 hours +R	●			Pin	160 to 450	82 to 3,300
		KMM	Snap-in terminal, downsized	105℃ 2,000 to 3,000 hours +R	●			Pin	160 to 450	39 to 3,300
		SMH	Snap-in terminal, general (Ask Engineering Bulletin No585 for 160 to 450V)	85℃ 2,000 hours +R	●			Pin	6.3 to 100	820 to 100,000
		KMH	Snap-in terminal, general (Ask Engineering Bulletin No584 for 160 to 450V)	105℃ 2,000 hours +R	●			Pin	6.3 to 100	560 to 82,000
	Low Profile	SLM	15mm height	85℃ 2,000 hours +R				Pin	160 to 400	47 to 560
		KLM	15mm height	105℃ 2,000 hours +R				Pin	160 to 400	39 to 390
	High Reliability	LXM	Long life	105℃ 7,000 hours +R				Pin	160 to 450	47 to 2,200
		LXS	Snap-in terminal downsized	105℃ 5,000 hours +R	●			Pin	160 to 450	82 to 3,300
		LXQ	Long life, downsized	105℃ 5,000 hours +R				Pin	160 to 450	82 to 2,700
		LXG	Long life	105℃ 5,000 hours +R				Pin	10 to 100	390 to 47,000
		CHA	No sparks with DC overvoltage, downsized	105℃ 2,000 hours +R				Pin	200 to 450	56 to 1,200
		LXH	No sparks with DC overvoltage	105℃ 3,000/5,000 hours +R				Pin	200 & 400	68 to 1,500
		KMV (NEW!)	For charge and discharge application (Ask Engineering Bulletin No781 in detail)	105℃ 3,000 hours +R				Pin	350 to 450	82 to 1,200
Screw-mount	General Purpose	SME	Screw terminal, general	85℃ 2,000 hours +R	●			Screw	10 to 250	560 to 680,000
		KMH	Screw terminal, general	105℃ 2,000 hours +R	●			Screw	10 to 400	180 to 680,000
	For Inverter	RWG	85℃, high ripple, downsized, long life	85℃ 5,000 hours +R				Screw	350 to 450	1,500 to 18,000
		RWF	High ripple, long life	85℃ 5,000 hours +R				Screw	350 to 450	820 to 22,000
		RWQ (NEW!)	High ripple, downsized	85℃ 2,000 hours +R	●			Screw	350 to 550	390 to 15,000
		RWE	High ripple	85℃ 2,000 hours +R	●			Screw	350 to 550	100 to 12,000
		RWY	High ripple, long life, low cost	85℃ 5,000 hours +R				Screw	350 to 450	500 to 14,000
		RWL	High ripple, long life	85℃ 20,000 hours +R				Screw	350 to 450	2,200 to 12,000
		FTP	Ellips can shape, high ripple	85℃ 5,000 hours +R				Screw	63 to 450	270 to 21,000
		LXA	Long life	105℃ 2,000/5,000 hours +R				Screw	10 to 525	330 to 390,000
		LXR	High ripple, long life	105℃ 5,000 hours +R				Screw	350 to 450	2,200 to 15,000
		RWV (NEW!)	For charge and discharge application (Ask Engineering Bulletin No782 in detail)	85℃ 5,000 hours +R				Screw	350 to 450	820 to 18,000

: Promotional products

▲ : Some of range are solvent resistant.

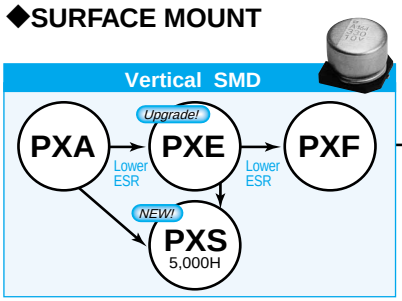
CAT. No. E1001I

GROUP CHART

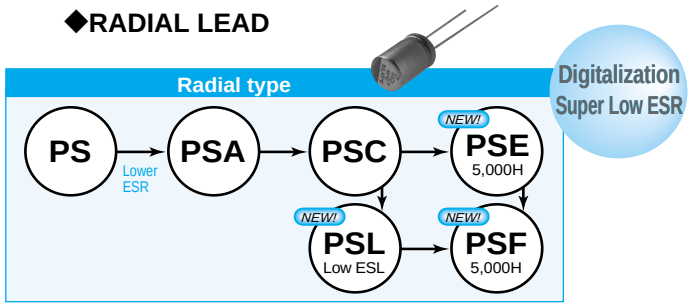
Next page

CONDUCTIVE POLYMER ALUMINUM SOLID CAPACITORS

◆SURFACE MOUNT

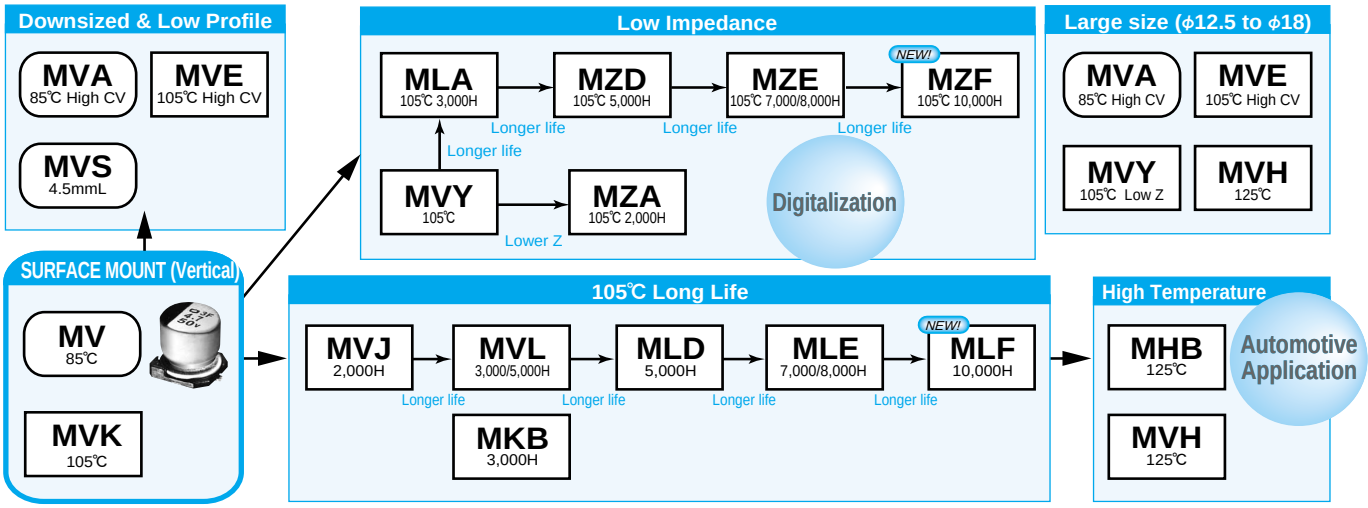


◆RADIAL LEAD

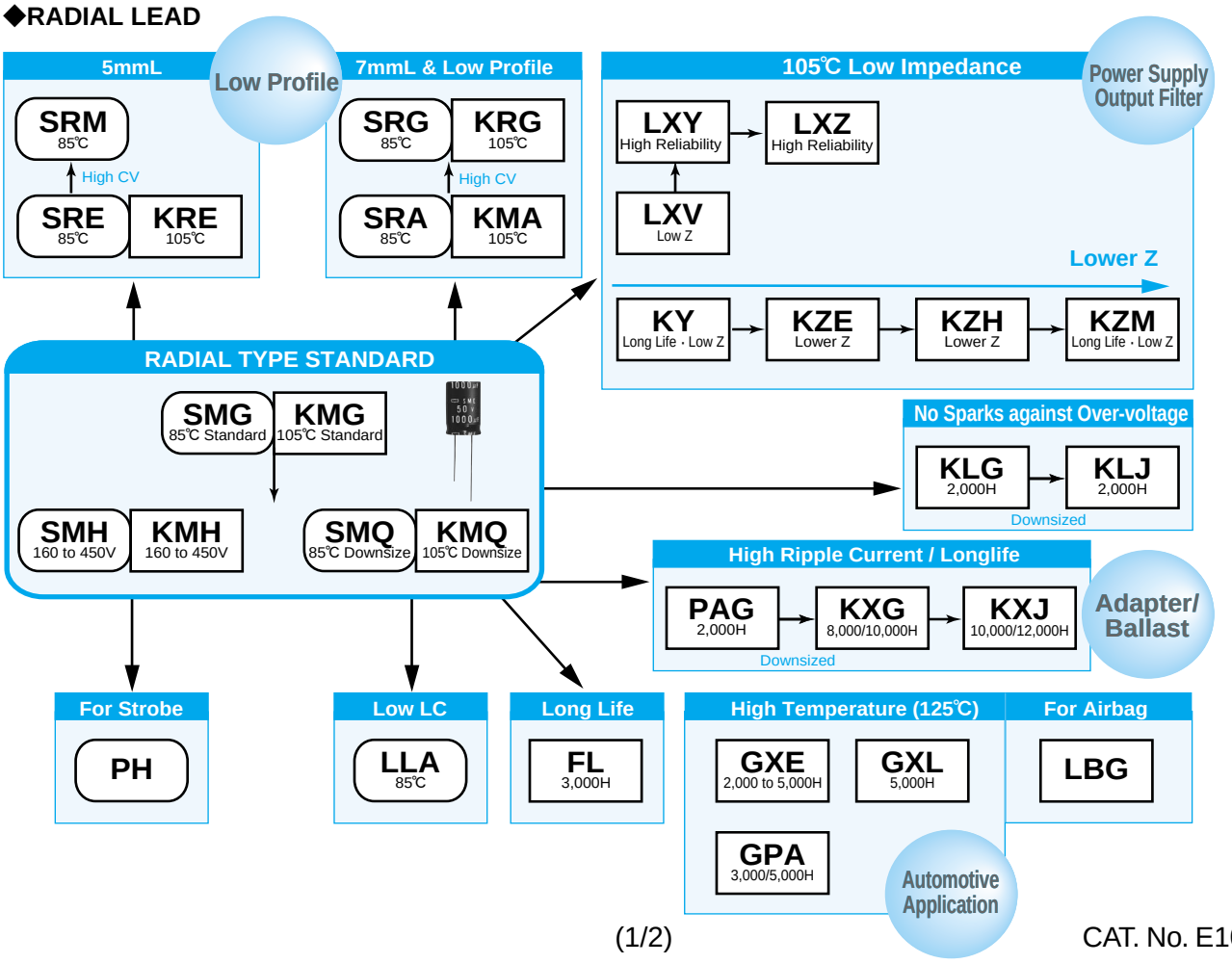


ALUMINUM ELECTROLYTIC CAPACITORS

◆SURFACE MOUNT



◆RADIAL LEAD



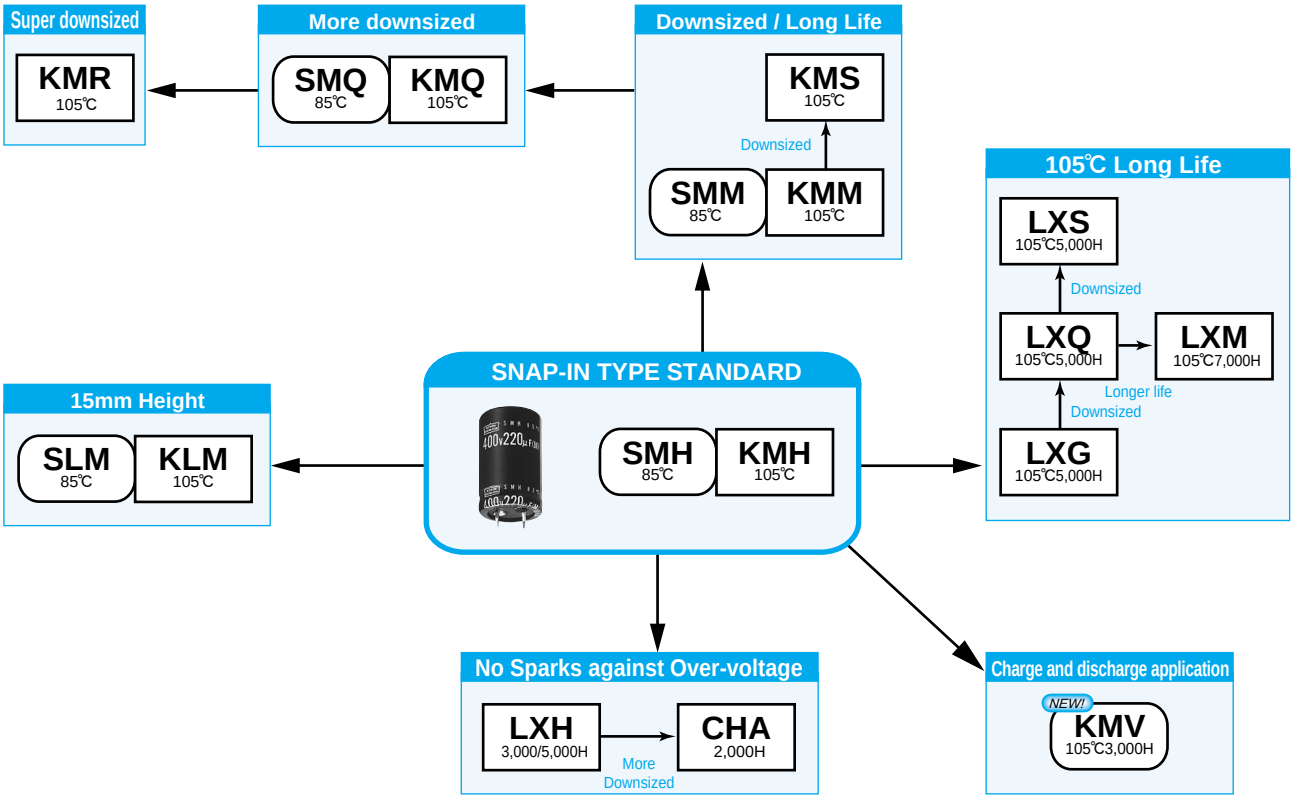
CAT. No. E1001I

GROUP CHART

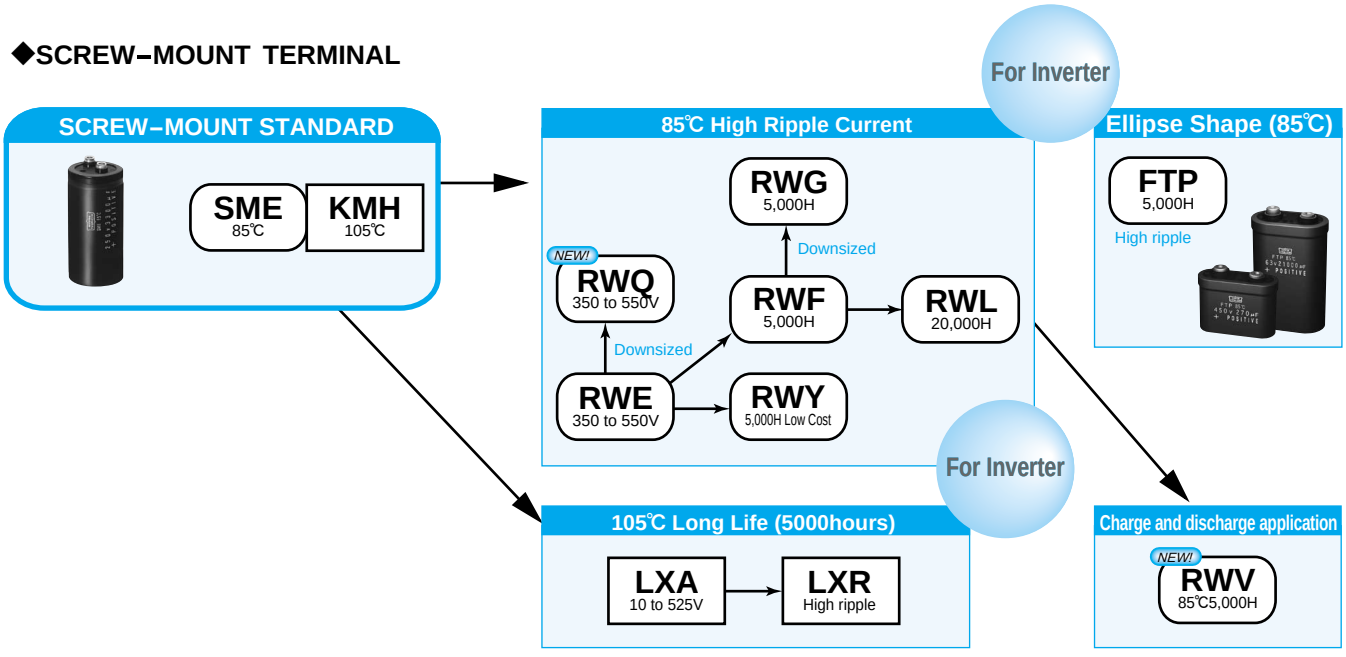
Previous page

ALUMINUM ELECTROLYTIC CAPACITORS

◆SNAP-IN



◆SCREW–MOUNT TERMINAL

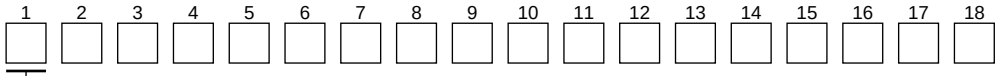


PART NUMBERING SYSTEM

Part numbering system

Our part numbering system is common to all of Nippon Chemi-Con's subsidiaries worldwide, and has been switching the conventional part numbering system. The part number uses 18-digit codes to express information of principal product specifications such as product category, series name, rated voltage, capacitance, case size and RoHS compliance.

●Categories



Code	Details
A	Conductive Polymer Aluminum Solid Capacitors (Polar)
E	Aluminum Electrolytic Capacitors (Polar)
B	Aluminum Electrolytic Capacitors (Bi-polar)
K	Multilayer Ceramic Capacitors
F,W	Film Capacitors
D	Electric Double Layer Capacitors
T	Metal Oxide Varistors
L	Amorphous Choke Coils

* For digits 2 to 18, please see "Product code guide".

●Example

Product type	Part number (Example)	Conventional part number (Ref.)
Surface mount type	EMV-160ADA100MD55G	MV16VC10MD55E0
Radial lead type	ESMG6R3ETC102MHB5D	TC04RSMG6. 3VB1000MF50E0
Snap-in type	ESMQ201VSN471MP30S	SMQ200VSSN470M22BE0
Screw mount terminal type	ERWE551LGC821MCD0M	RWE550LGSN820MCC13EA

ENVIRONMENTAL CONSIDERATION

Environment friendly capacitors

Nippon Chemi-Con always considers the environment in product materials, designs and manufacturing. In fact, our factories already have received ISO 14000 certificate. Cadmium, Mercury, Hexavalent Chromium, PBB and PBDE have never been used in our products. Furthermore, lead-containing materials have been eliminated from all our aluminum electrolytic capacitors including Conductive Polymer Aluminum Solid Capacitors to comply with RoHS. If you need "Halogen-Free" products, please consult with us.

◆Lead free and Non-PVC Products

1. Lead wire (Plating)

Category		Plating material on lead wires	
		Original type	Lead-free type
Chip	case code : B55 to JA0	Sn-Pb	Sn-Bi
	case code : KE0 to MN0		Sn100%
Radial	case dia : ～φ8		Sn-Bi
	case dia : φ10～		Sn100%
Snap-in			Sn100%
Screw-Mount		Originally lead free	Originally lead free

*Please consult with us when you need "Lead-free parts" other than the above mentioned terminal plating materials.
(Note) **Pb** : lead, **Sn** : Tin, **Bi** : Bismuth

2. Sleeve

Category		Sleeve material	
		Original type	Lead-free type
Chip		Sleeveless(Resin case)	Sleeveless(Resin case)
Radial	φ8×5L	Sleeveless(Coating case)	Sleeveless(Coating case)
	except φ8×5L	PVC	PET
Snap-in		PVC	PET
Screw-Mount		PVC	PVC(Lead-free)

* Please consult with us when you need "Non-PVC parts" other than the above mentioned outer sleeve materials.

The colors of a PET sleeve are "Black", "Brown", and "Dark blue".
Standard designs of "lead-free" Snap-in type are not equipped with a plastic disc.
Please consult with us when you need nonflammable grade for outer sleeve material.

Identification of friendly parts is given by a supplement code (18th digit) of the part number.
For details, please refer to "Product code guide" for each type.

◆Regarding compliance for European REACH Regulation

According to the content of RIP3.8TGD (Technical Guidance Document) which is published on 26 May 2008, our electronic components are "articles without any intended release". Therefore they are not applicable for "Registration" for European REACH Regulation Article 7 (1).

Reference: Electrolytic Condenser Investigation Society
"Study of REACH Regulation in EU about Electrolytic Capacitor" (publicized on 13 March 2008)

CAT. No. E1001I

PACKAGING

TAPING SPECIFICATIONS

SURFACE MOUNT TYPE (TAPING)

◆CARRIER TAPE [mm]

Fig.1

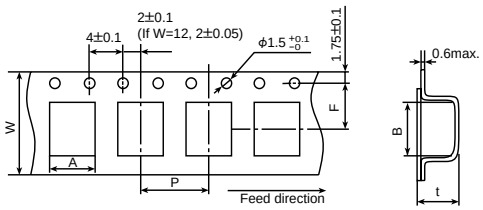


Fig.3

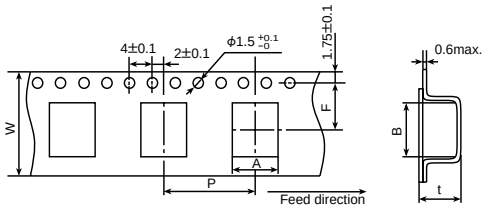


Fig.2

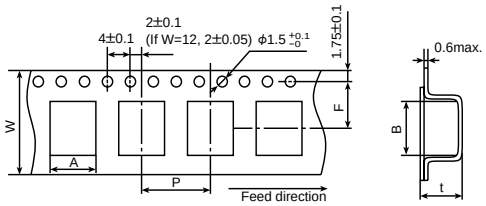
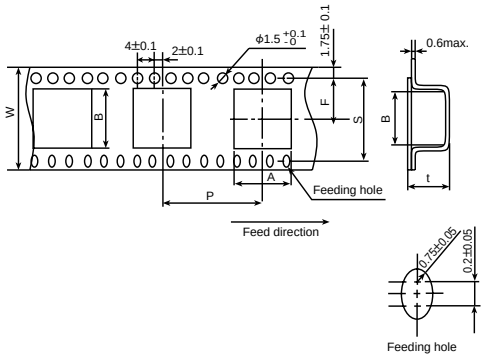


Fig.4



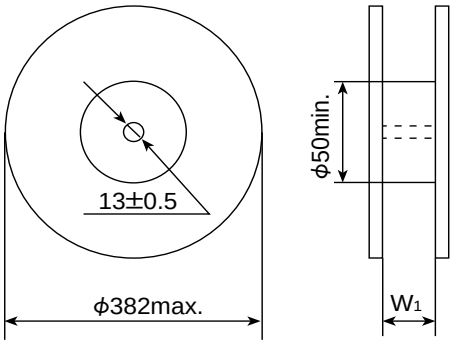
[mm]

Series \ Items		W	A	B	F	P	t	S	Fig.
		±0.3	±0.2	±0.2	±0.1	±0.1	±0.2	±0.1	
	B55	12.0	3.5	3.5	5.5	8.0	5.9	—	1
	D46	12.0	4.7	4.7	5.5	8.0	4.9	—	1
	D55	12.0	4.7	4.7	5.5	8.0	5.7	—	1
	D60,D61	12.0	4.7	4.7	5.5	8.0	6.3	—	1
	D73	12.0	4.7	4.7	5.5	8.0	7.5	—	1
	E46	12.0	5.7	5.7	5.5	12.0	4.9	—	2
	E55	12.0	5.7	5.7	5.5	12.0	5.7	—	2
	E60,E61	12.0	5.7	5.7	5.5	12.0	6.3	—	2
AlchipTM MVS/MVA MV/MVE MVK/MZA MVY/MZF MZE/MZD MLA/MVJ MLF/MLE MLD/MVL MVH/MHB MKB/MV-BP MVK-BP	E73	16.0	5.7	5.7	7.5	12.0	7.5	—	2
	F45	16.0	7.0	7.0	7.5	12.0	4.8	—	2
	F46	16.0	7.0	7.0	7.5	12.0	4.9	—	2
	F55	16.0	7.0	7.0	7.5	12.0	5.7	—	2
	F60,F61	16.0	7.0	7.0	7.5	12.0	6.3	—	2
	F73	16.0	7.0	7.0	7.5	12.0	7.5	—	2
	F80	16.0	7.0	7.0	7.5	12.0	8.2	—	2
	F90	16.0	7.0	7.0	7.5	12.0	9.2	—	2
	H63	16.0	8.7	8.7	7.5	12.0	6.8	—	2
	H70	24.0	8.7	8.7	11.5	12.0	7.3	—	2
	H80	24.0	8.7	8.7	11.5	12.0	8.3	—	2
NPCAPTM PXS/PXF PXE/PXA PXH	HA0	24.0	8.7	8.7	11.5	16.0	11.0	—	3
	HC0	24.0	8.7	8.7	11.5	16.0	12.7	—	3
	J80	24.0	10.7	10.7	11.5	16.0	8.3	—	3
	JA0	24.0	10.7	10.7	11.5	16.0	11.0	—	3
	JC0	24.0	10.7	10.7	11.5	16.0	12.8	—	3
	KE0	32.0	13.4	13.4	14.2	24.0	14.0	28.4	4
	KG5	32.0	13.4	13.4	14.2	24.0	16.5	28.4	4
	LH0	44.0	17.5	17.5	20.2	28.0	16.8	40.4	4
	LN0	44.0	17.5	17.5	20.2	28.0	22.1	40.4	4
	MH0	44.0	19.5	19.5	20.2	32.0	17.1	40.4	4
	MN0	44.0	19.5	19.5	20.2	32.0	22.1	40.4	4

* Regarding to taping for LH0/LN0/MH0/MN0, please consult with us.

PACKAGING

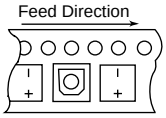
◆REEL DIMENSIONS [mm]



◆POLARITY

Alchip™- MVS/MVA/MV
MVE/MVK/MZA
MVY/MZF/MZE
MZD/MLA/MVJ
MLF/MLE/MLD
MVL/MVH/MHB
MKB/MV-BP
MVK-BP

NP CAP™ PXS/PXF/PXE
PXA/PXH

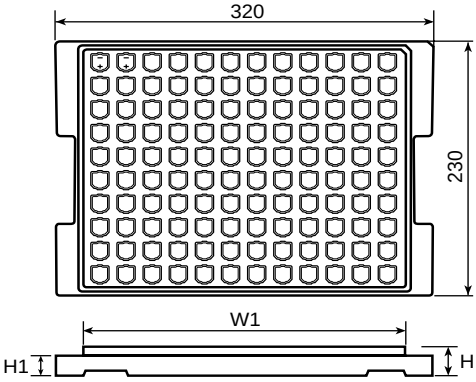


◆QUANTITY PER REEL/BOX

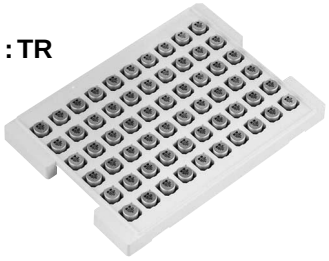
Series	Size code	Quantity (pcs/reel)	Quantity (pcs/box)	W1 (mm)
Alchip™ MVS/MVA MV/MVE MVK/MZA MVY/MZF MZE/MZD MLA/MVJ MLF/MLE MLD/MVL MVH/MHB MKB/MV-BP MVK-BP	B55	2,000	10,000	14
	D46,D55,D60,D61	2,000	10,000	14
	D73	1,500	7,500	14
	E46,E55,E60,E61	1,000	5,000	14
	E73	1,000	5,000	18
	F46,F55,F60,F61,F73	1,000	5,000	18
	F80	900	4,500	18
	F90	800	4,000	18
	H63	1,000	5,000	18
	HA0	500	1,500	26
	JA0	500	1,500	26
	KE0	200	600	34
	KG5	150	450	34
	LH0	125	250	46
	LN0	75	150	46
	MH0	125	250	46
	MN0	75	150	46
NPCAP™ PXS/PXF PXE/PXA PXH	D55	2,000	20,000	14
	E60,E61	1,000	10,000	14
	F45,F55,F60,F61	1,000	7,000	18
	F80	900	6,300	18
	H70	1,000	6,000	26
	H80	900	5,400	26
	HA0	500	3,000	26
	HC0	400	1,200	26
	J80	500	3,000	26
	JA0	500	3,000	26
	JC0	400	1,200	26

SURFACE MOUNT TYPE (TRAY)

◆DIMENSIONS [mm]



●TRAY CODE : TR



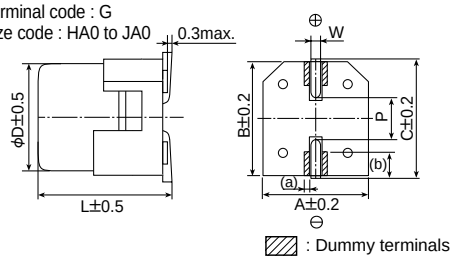
Size code	H [mm]	W1 [mm]	H1 [mm]	Quantity [pcs/tray]	Quantity [pcs/box]
KE0 & KG5	21.0	284	18.5	120	600
LH0 & LN0	28.0	284	24.0	80	400
MH0 & MN0	28.0	284	24.0	60	300

VIBRATION RESISTANT STRUCTURE (Terminal code : G)

◆DIMENSIONS [mm]

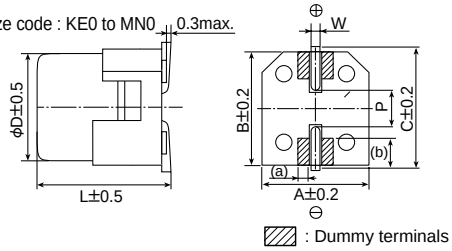
●Terminal code : G

●Size code : HA0 to JA0



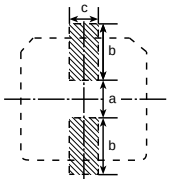
: Dummy terminals

●Size code : KE0 to MN0



: Dummy terminals

◆RECOMMENDED SOLDER LAND



Solder land on PC board

Size code	Dimensions of products (mm)									Solder land (mm)		
	D	L	A	B	C	W	P	(a)	(b)	a	b	c
HA0	8.0	10.0	8.3	8.3	9.0	0.7 to 1.1	3.1	(0.5)	(1.8)	3.1	4.2	3.5
JA0	10.0	10.0	10.3	10.3	11.0	0.7 to 1.1	4.5	(0.5)	(2.1)	4.5	4.4	3.5
KE0	12.5	13.5	13.0	13.0	13.7	1.0 to 1.3	4.2	(1.3)	(3.0)	3.4	6.3	9.3
KG5	12.5	16.0	13.0	13.0	13.7	1.0 to 1.3	4.2	(1.3)	(3.0)	3.4	6.3	9.3
LH0	16.0	16.5	17.0	17.0	18.0	1.0 to 1.3	6.5	(2.0)	(3.0)	4.7	7.8	9.6
LN0	16.0	21.5	17.0	17.0	18.0	1.0 to 1.3	6.5	(2.0)	(3.0)	4.7	7.8	9.6
MH0	18.0	16.5	19.0	19.0	20.0	1.0 to 1.3	6.5	(2.0)	(4.0)	4.7	8.8	9.6
MN0	18.0	21.5	19.0	19.0	20.0	1.0 to 1.3	6.5	(2.0)	(4.0)	4.7	8.8	9.6

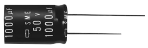
( ); Ref.

NIPPON CHEMI-CON

PACKAGING

TAPING SPECIFICATIONS

RADIAL LEAD TYPE (TAPING)



◆DIMENSION [mm]

Fig.1
Taping Code : TA, TC
ϕD=ϕ4 to 8

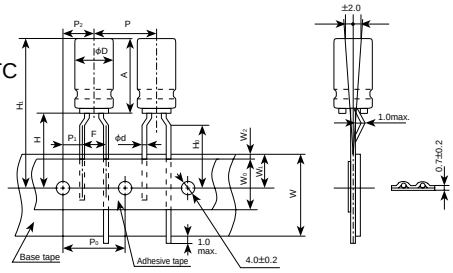


Fig.2
Taping Code : TD
ϕD=ϕ5
ϕD×L=ϕ4×7

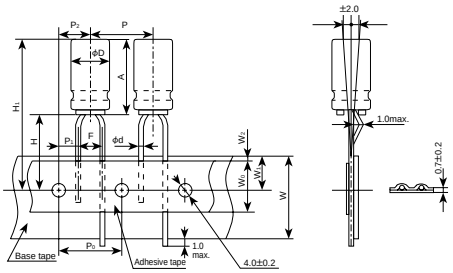


Fig.3
Taping Code : TD
ϕD=ϕ6.3 to 12.5

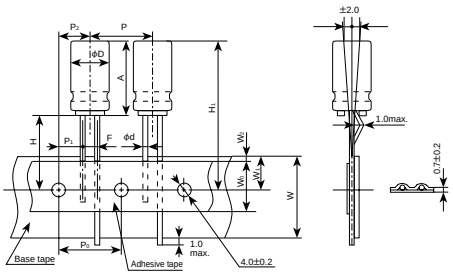
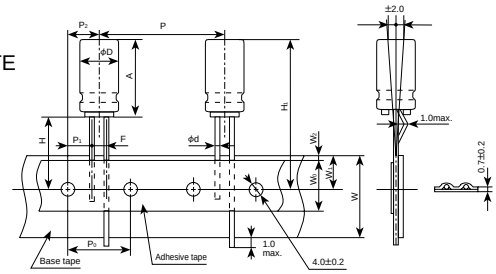


Fig.4
Taping Code : TE
ϕD=ϕ12.5



Code	Taping Code	Case size ϕD	Case size A	ϕd	P	P0	P1	P2	F	W	W0	W1	W2	H	H0	H1	Fig.
tol.		—	—	±0.05	±1.0	±0.2	±0.7	±1.0	+0.8 −0.2	±0.5	min.	±0.5	max.	±0.75	±0.5		
Nominal	TA	4	5	0.45	12.7	12.7	5.1	6.35	2.5	18.0	6.0	9.0	1.5	18.5	16.0	H1=H+A Check insertion machine specs.	1
	TC						3.85		5					17.5			
	TD		7	0.45	12.7	12.7	5.1	6.35	2.5	18.0	6.0	9.0	1.5	18.5 *1	16.0		2
	TC						3.85		5					17.5			1
	TD		11.5	0.45	12.7	12.7	5.1	6.35	2.5	18.0	10.0	9.0	1.5	17.5	16.0		1
	TC						3.85		5								
	TD	5	5 to 7	0.45	12.7	12.7	5.1	6.35	2.5	18.0	6.0	9.0	1.5	18.5	—		2
	TC						3.85		5					17.5	16.0		1
	TD		9 to 15	0.5	12.7	12.7	5.1	6.35	2.5	18.0	10.0	9.0	1.5	18.5	—		2
	TC						3.85		5						16.0		1
	TD	6.3	5 to 7	0.45	12.7	12.7	5.1	6.35	2.5	18.0	6.0	9.0	1.5	18.5	—		3
	TC						3.85		5					17.5	16.0		1
	TD		9 to 15	0.5	12.7	12.7	5.1	6.35	2.5	18.0	10.0	9.0	1.5	18.5	—		3
	TC						3.85		5						16.0		1
	TD	8	5	0.45	12.7	12.7	5.1	6.35	2.5	18.0	6.0	9.0	1.5	18.5	—		3
	TC						3.85		5					17.5	16.0		1
	TC		7	0.45	12.7	12.7	3.85	6.35	5	18.0	6.0	9.0	1.5	17.5	16.0		1
	TD		9 to 20	0.6	12.7	12.7	3.85	6.35	3.5	18.0	10.0	9.0	1.5	20.0	—		1
	TC								5						16.0		
tol.		±0.5	max.	±0.05	±1.0	±0.3	±0.7	±1.3	+0.8 −0.2	±0.5	min.	±0.5	max.	+2.0 −0	—		
Nominal	TD	10	21	0.6	12.7	12.7	3.85	6.35	5	18.0	12.5	9.0	1.5	18.0	—		3
	TD	12.5	26	0.6	*2 15	15	5.0	7.5	5	18.0	12.5	9.0	1.5	18.0	—		3
	TE			0.6	25.4	12.7	3.85	6.35	5	18.0	12.5	9.0	1.5	18.0	—		4

* 1 : For ϕ4×7 (A=7, F=25), shall be $18.5^{-0.5/+0.75}$ (Taping code : TD) at Fig.2.

* 2 : P=15 taping is not standard. Use P=25.4 taping.

TAPING CODE

Example

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
E	S	M	G	5	0	0	E	T	C	1	0	0	M	E	1	1	D

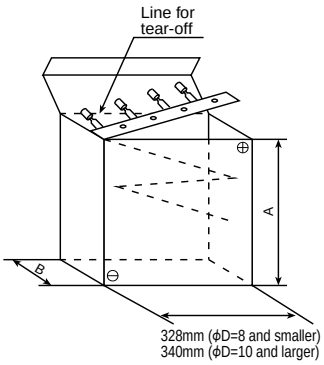
- 18: Supplement code
- 15 to 17: Size code
- 14: Capacitance tolerance code
- 11 to 13: Nominal capacitance code
- 9 to 10: Lead forming code (Radial lead type)

Type	Contents	Code 9th	Code 10th
Taping (Radial lead)	Straight	T	D
	Sloping clinch		
	Straight(Skip a hole)	T	E
	Clinch(F=2.5mm)	T	A
	Clinch(F=3.5mm)	T	B
	Clinch(F=5.0mm)	T	C

- 8: Terminal code
- 5 to 7: Rated voltage code
- 4: Series code
- 1 to 3: Category

QUANTITY PER AMMO PACK

Ammo pack box



Typical example

Case size ϕD ×L(mm)		A (mm)	B (mm)	Quantity (pcs.)
ϕ4	L=5 & 7mm	183	42	2,000
	L=11.5mm	183	51	
ϕ5	L=5 & 7mm	232	42	2,000
	L=9 to 15mm	232	51	
	L=17mm	235	60	
ϕ6.3	L=5 & 7mm	282	42	2,000
	L=9 to 15mm	284	51	
	L=17mm	284	55	
ϕ8	L=5 & 7mm	232	42	1,000
	L=9 to 15mm	232	51	
	L=17 & 20mm	235	60	
ϕ10	L=≦16mm	308	56	800(500)*
	L=17 to 20mm	308	62	800
	L=21 to 25mm	308	67	800
	L=26 to 30mm	308	71	500
ϕ12.5	L=≦16mm	308	62	500
	L=17 to 25mm	308	67	500

*Minimum order quantity for PSF/PSE/PSC/PSA/PS series

CAT. No. E1001I

PACKAGING

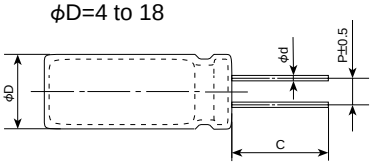
RADIAL LEAD TYPE (CUT/FORMED LEAD)

The following lead configurations are available. When ordering, please indicate the type of lead configurations by using the appropriate supplement code, such as C5, FC, MC or RC in the product part number.

[mm]

●Lead code : C5

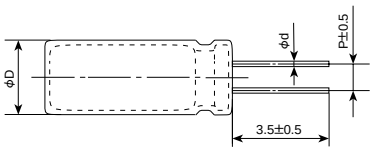
ϕD=4 to 18



Case diameter	C:Lead length
ϕD=4 to 8	: 5.0±0.5
ϕD=10 to 18	: $5.0^{+1.0}_{-0}$

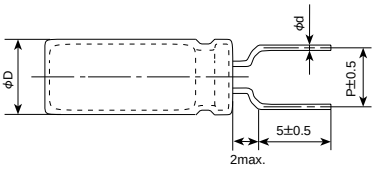
●Lead code : C3

ϕD=4 to 18



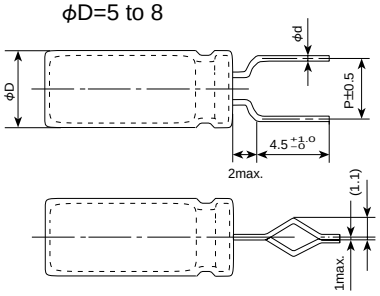
●Lead code : FC

ϕD=5 to 8



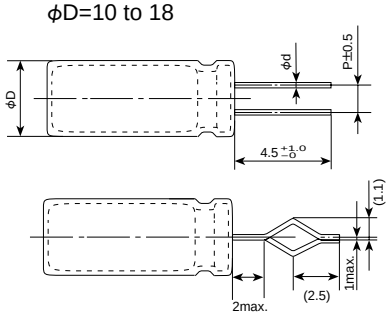
●Lead code : FM

ϕD=5 to 8



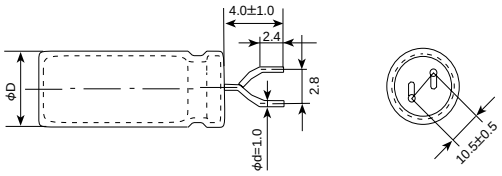
●Lead code : MC

ϕD=10 to 18



●Lead code : RC

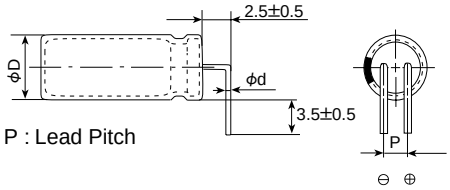
ϕD=20 & 22



●Lead code : BC

ϕD=10, 12.5 : P=5.0±0.5

ϕD=14.5, 16, 18 : P=7.5±0.5



P : Lead Pitch

PACKAGING

MINIMUM ORDER QUANTITY

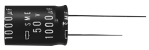
Please order by minimum order quantity.

◆SURFACE MOUNT

●Vertical

Series	Size code	Quantity (pcs)	
		Taping	Tray (pcs/box)
Alchip™ MVS/MVA/MV MVE/MVK/MZA MVY/MZF/MZE MZD/MLA/MVJ MLF/MLE/MLD MVL/MVH/MHB MKB/MV-BP MVK-BP	B55	2,000	—
	D46, D55, D60, D61	2,000	—
	D73	1,500	—
	E46, E55, E60, E61, E73	1,000	—
	F45, F46, F55, F60, F61, F73	1,000	—
	F80, H80	900	—
	F90	800	—
	H63, H70	1,000	—
	HA0	500	—
	HC0	400	—
	J80, JA0	500	—
	JC0	400	—
NPCAP™ PXS/PXF/PXE PXA/PXH	KE0	200	600
	KG5	150	600
	LH0	125	400
	LN0	75	400
	MH0	125	300
	MN0	75	300

◆RADIAL



Size		Quantity (pcs)	
		Bagged*1	Taping
ϕ4		200	2,000
ϕ5		200	2,000
ϕ6.3		200 (200)*2	2,000 (2,000)*2
ϕ8		200 (100)*2	1,000 (1,000)*2
ϕ10	**Height≦25mm**	200 (100)*2	800 (500)*2
	Height≧30mm	200	500
ϕ12.5		100	500
ϕ14.5		50	250
ϕ16		50	250
ϕ18		50	250

*1 Standard bagged quantity.
*2 Minimum order quantity for PSF/PSE/PSC/PSA/ PS series.

◆SNAP-IN

200 pieces

NIPPON CHEMI-CON

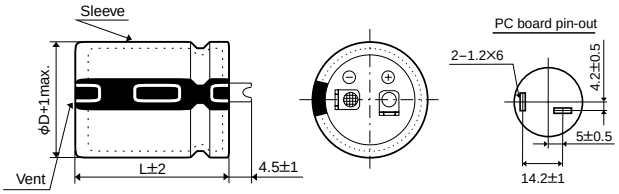
ALUMINUM ELECTROLYTIC CAPACITORS

AVAILABLE TERMINAL FOR SNAP-IN TYPE

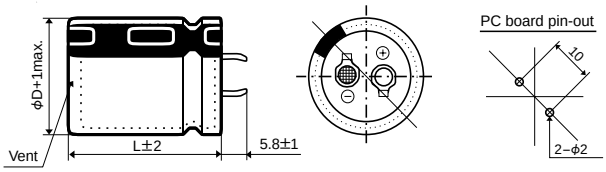
AVAILABLE TERMINALS FOR SNAP-IN TYPE [mm]

The following terminal options can be selected.
Please consult with us before purchase.

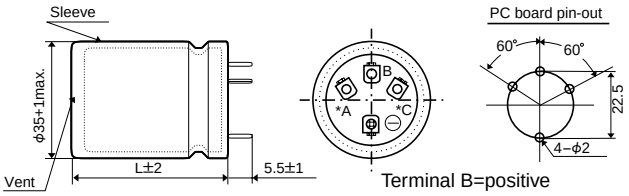
D=ϕ30 to ϕ40mm　Terminal Code : LIN



D=ϕ22 to ϕ35mm　Terminal Code·Dummy Terminal Code : VNN

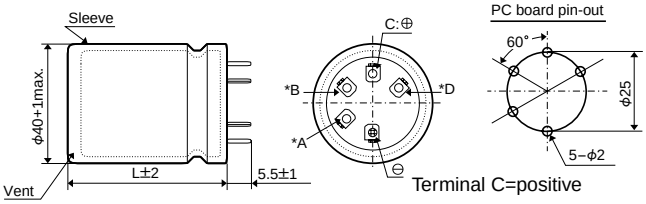


D=ϕ35 & ϕ40mm　Terminal Code·Dummy Terminal Code : VRD

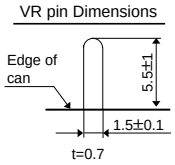


Terminal B=positive
Terminal A & C=blank

D=ϕ40mm　Terminal Code·Dummy Terminal Code : VRT



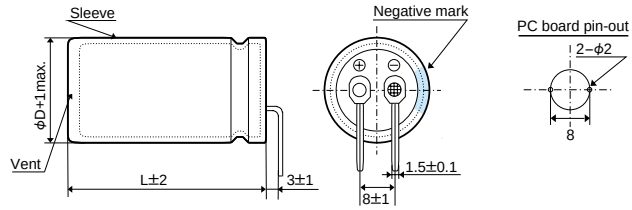
Terminal C=positive
Terminal A, B & D=blank



CAUTION

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

D=ϕ20X30 to ϕ50 ℓ mm, ϕ22X30 to ϕ50 ℓ mm　Terminal Code·Dummy Terminal Code : LCN



NIPPON CHEMI-CON

CONDUCTIVE POLYMER ALUMINUM SOLID CAPACITORS

Surface Mount

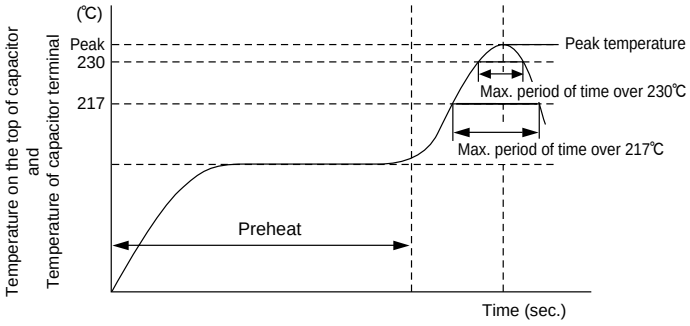
RECOMMENDED REFLOW SOLDERING CONDITIONS

NPCAP™-PXS/PXF/PXE/PXA/PXH Series

The following conditions are recommended for air or infrared reflow soldering PXS/PXF/PXE/PXA/PXH series onto a glass epoxy circuit board of 90×50×0.8mm (with resist) by cream solder. The temperatures shown are the surface temperature values on the top of the can and temperature of capacitor terminal.

Reflow should be performed twice or less.

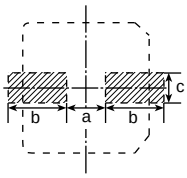
Please ensure that the capacitor became cold enough to the room temperature (5 to 35℃) before the second reflow.



Voltage range (Vdc)	Preheat	Time maintained above 217℃	Time maintained above 230℃	Peak temp.	Reflow number
2.5 to 16V	150 to 180℃ 120 sec.max.	50 sec.max.	40 sec.max.	260℃max.	1-cycle only
				250℃max.	2-cycle allowed
20 to 25V		50 sec.max. (40 sec.max.)	40 sec.max. (30 sec.max.)	250℃max. (240℃max.)	1-cycle only
		40 sec.max.	30 sec.max.		2-cycle allowed

( ) : Applies for 20V 82μF(J80) and 25V 39μF(J80)

●Recommended Solder Land on PC Board



Solder land on PC board

Size code	a	b	c
D55	1.0	2.6	1.6
E60,E61	1.4	3.0	1.6
F45, F55, F60 F61, F80	1.9	3.5	1.6
H70, H80, HA0, HC0	3.1	4.2	2.2
J80, JA0, JC0	4.5	4.4	2.2

◆PRECAUTIONS FOR USERS

Soldering method
The capacitors of NPCAP™-PXS/PXF/PXE/PXA/PXH series have no capability to withstand such dip or wave soldering as totally immersing components into a solder bath.

Reflow soldering
Reflow the capacitors within Recommended Reflow Soldering Conditions. Verify there is no temperature stress to the capacitors because the following differences might degrade capacitors electrically and mechanically. Please consult with us if other reflow conditions are employed.

1.Location of components : Temperature increases at the edge of PC board more than the center.
2.Population of PC board : The lower the component population is, the more temperature rises.
3.Material of PC board : A ceramic-made board needs more heat than a glass epoxy-made board. The heat increase may cause damage to the capacitors.
4.Thickness of PC board : A thicker board needs more heat than a thinner board. The heat may damage the capacitors.
5.Size of PC board : A larger board needs more heat than a smaller board. The heat may damage the capacitors.
6.Solder thickness
If very thin cream solder paste is to be used for SMD types, please consult with us.
7.Location of infrared ray lamps : IR reflow as well as hot plate reflow heats only on the reverse side of the PC board to lessen heat stress to the capacitors.
8.Case leakage current will increase (~mA) after the reflow process, the leakage current which rose gradually decreases when voltage is applied.

Rework of soldering
Use a soldering iron for rework. Do not exceed an iron tip temperature of 380±10℃ and an exposure time of 3±0.5 seconds.

Mechanical stress
Do not grab the capacitors to lift the PC board and give stress to the capacitor. Avoid bending the PC board. This may damage the capacitors.

Cleaning assembly board
Immediately after solvent cleaning, remove residual solvent with an air knife for at least 10 minutes. If the solvent is insufficiently dry, the capacitors may corrode.

Coating on assembly board
1.Before curing coating material, remove the cleaning solvents from the assembly board.
2.Before conformal coating, a chloride free pre-coat material is recommended to decrease the stress on the capacitors.

Molding with resin
Internal chemical reaction gradually produces gas in the capacitor; increasing internal pressure. If the end seal of the capacitor is completely coverd by resin the gas will be unable to escape causing a potentially dangerous situation. The chlorine in resin will penetrate the end seal, reach the element, and damage of the capacitor.

Glue
The followings are requirements for glue.
1.A low curing temperature over a short period of time
2.Strong adhension and heat resistance after curing
3.Long shelf life
4.No corrosion

Others
Refer to Precautions for Users of Aluminum Electrolytic Capacitors.

CAT. No. E1001I

NIPPON CHEMI-CON

SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

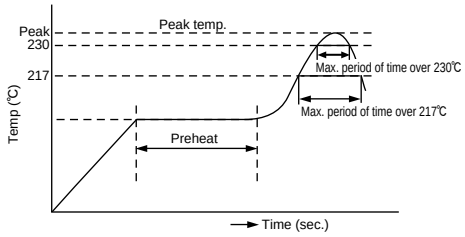
Surface Mount

RECOMMENDED REFLOW SOLDERING CONDITIONS

Alchip™-MVS/MVA/MV/MVE/MVK/MZA/MVY/MZF/MZE/MZD/MLA/MVJ/MLF/MLE/MLD/MVL/MVH/MHB/MKB/MV-BP/MVK-BP

The following conditions are recommended for air convection and infrared reflow soldering on the SMD products on to a glass epoxy circuit boards by cream solder. The dimensions of the glass epoxy boards with resist are 90×50×0.8mm for B55 to KG5 case code SMD capacitors and 180×90×0.8mm for LH0 to MN0 case codes SMD capacitors.
The temperatures shown are the surface temperature values on the top of the can and on the capacitor terminals.
Reflow should be performed twice or less.
Please ensure that the capacitor became cold enough to the room temperature (5 to 35℃) before the second reflow.
Consult with us when performing reflow profile in IPC / JEDEC (J-STD-020)

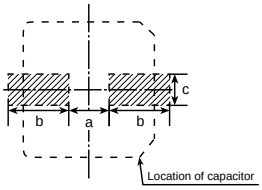
●Recommended soldering heat conditions (Except for Conductive Polymer Aluminum Solid Capacitors)



Contents			Lead-free type (high heat durability design)					Original type		
SMD type	Case code	Voltage range (Vdc)	Use Supplement Code "G" for case code B55 to JA0, and "S" for case code KE0 to MN0					Supplement Code "N"		
			Preheat	Time maintained above 217℃	Time maintained above 230℃	Peak temp.	Reflow number	Preheat	Time maintained above 200℃	Peak temp.
Vertical	B55 to F90	4 to 50V	150 to 180℃ 120sec. max.	90sec. max	60sec. max.	260℃max.	2 times or less	150℃max. 120sec. max.	20sec. max.	240℃max.
		63 to 80V		60sec. max.	40sec. max.	250℃max.	2 times or less			—
	H63 to JA0	4 to 50V		60sec. max.	30sec. max.	245℃max.	2 times or less			230℃max.
		63 to 100, 400V		30sec. max.	20sec. max.	240℃max.	2 times or less			230/ 240℃max.
	KE0 to MN0	6.3 to 50V		30sec. max.	20sec. max.	240℃max.	2 times or less			230℃max.
		63 to 450V		20sec.	—	230℃max.	2 times or less			
	D46, E46, F46	4 to 50V		40sec. max.	30sec. max.	250℃max.	2 times or less			—

●Recommended Solder Land on PC Board

Series : MVS/MVA/MV/MVE/MVK/MZA/MVY/MZF/MZE/MZD/MLA
MVJ/MLF/MLE/MLD/MVL/MVH/MHB/MKB/MV-BP/MVK-BP



: Solder land on PC board

Case code	Terminal code : A			Terminal code : G		
	a	b	c	a	b	c
B55	0.8	2.2	1.6			
D46, D55, D60, D61, D73	1.0	2.6	1.6			
E46, E55, E60, E61, E73	1.4	3.0	1.6			
F46, F55, F60, F61, F73, F80, F90	1.9	3.5	1.6			
H63	2.3	4.5	1.6			
HA0	3.1	4.2	2.2	3.1	4.2	3.5
JA0	4.5	4.4	2.2	4.5	4.4	3.5
KE0, KG5	4.0	5.7	2.5	3.4	6.3	9.3
LH0, LN0	6.0	6.9	2.5	4.7	7.8	9.6
MH0, MN0	6.0	7.9	2.5	4.7	8.8	9.6

◆PRECAUTIONS FOR USERS

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

Reflow soldering
Reflow the capacitors within recommended reflow soldering conditions. Verify there is no temperature stress to the capacitors because the following differences might degrade capacitors electrically and mechanically. Please consult us if other reflow conditions are employed.
1.Location of components : Temperature increases at the edge of PC board more than the center.
2.Population of PC board : The lower the component population is, the more temperature rises.
3.Material of PC board : A ceramic made board needs more heat than a glass epoxy made board. The heat increase may cause damage to the capacitors.
4.Thickness of PC board : A thicker board needs more heat than a thinner board. The heat increase may damage the capacitors.
5.Size of PC board : A larger board needs more heat than a smaller board. The heat increase may damage the capacitors.
6.Solder thickness
If very thin cream solder paste is to be used for SMD types, please consult with us.
7.Location of infrared ray lamps : IR reflow as well as hot plate reflow heats only on the reverse side of the PC board to lessen heat stress to the capacitors.

Rework of soldering
Use a soldering iron for rework. Do not exceed an iron tip temperature of 380±10℃ and an exposure time of 3±0.5 seconds.

Mechanical stress
Do not use the capacitors for lifting the PC board and give stress to the capacitor. Avoid bending the PC board. This may damage the capacitors.

Cleaning assembly board
Immediately after solvent cleaning, remove residual solvent with an air knife for at least 10 minutes. If the solvent is insufficiently dry, the capacitors may corrode.

Coating on assembly board
1.Before curing coating material, remove the cleaning solvents from the assembly board.
2.Before conformal coating, a chloride free pre-coat material is recommended to decrease the stress on the capacitors.

Molding with resin
Internal chemical reaction gradually produces gas in the capacitor; then, increasing internal pressure. If the end seal of the capacitor is completely coverd by resin the gas will be unable to escape causing a potentially dangerous situation. The chlorine contained resin will penetrate into the end seal, reach the inside element, and cause damage of the capacitor.

Others
Refer to Precautions for Users of Aluminum Electrolytic Capacitors.

CAT. No. E1001I

STANDARDIZATION

The following series are discontinued. Please use the replacements in the table.

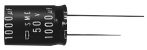
◆CONDUCTIVE POLYMER REPLACEMENT(CHIP TYPE)

Discontinued series	Characteristics	Replacements
PX	105℃ Super low ESR	PXA

◆CHIP TYPE REPLACEMENTS

Discontinued series	Characteristics	Replacements
MKA	105℃ Standard	MVK

◆LEAD TYPE REPLACEMENTS



Discontinued series	Characteristics	Replacements
SL	85℃ standard	SMG
SM		
SMC		
SME		
KM	105℃ standard	KMG
KMC		
KME		
USM		LXY
BSM		
SHA	95℃ L=7mm	LXY/LXZ
SM-BP	85℃ bi-polar	SME-BP
KM-BP	105℃ bi-polar	KME-BP
SR	85℃ low profile	SRG
SRC		
SRJ		
SX	Low impedance	KY/LXV
SXA		
SXC		
RX		
RXC		
LXE		
LXJ		
SXE		
KMF(6.3 to 100Vdc)		
SXF	Low impedance Long life	LXY
LXF		
TXF		
LXA	Long life	KY/ LXY
LX(10 to 63Vdc)		*

Discontinued series	Characteristics	Replacements
KX	High heat resistance	GXE
KXC		
GX		
EX		
GXC		
GXD		
EU	High temperature performance	LXY
GHA	150℃ high heat resistance	*
LL	Low leakage current	LLA/KY
LR		LLA
KHA	High ripple current	KXG
KXB		
KMF(160 to 450Vdc)		
BX	JIS B-X characteristics	KMG
SM(VP-type)	85℃ large radial	SMG/SMH
SRF		
GX-VH	High operating temperature	*
SD	2 volt	
SB	For memory backup	
KRL	105℃ low leakage current	
KSA	Bi-polar high ripple	
SRE(5.2L)	L=5.2mm	
FTK	Appropriate shape	

◆SNAP-IN REPLACEMENTS

Discontinued series	Characteristics	Replacements
SM	85℃ standard	SMH/SMM
SME		
SMG		
KM	105℃ standard	KMH/KMM
KME		
KMG		
NM	Long case size	SMH
NMA		
BK	Long height	
NM-HR	High ripple current	KMH/KMM
BX	JIS B-X characteristics	
LX	Long life	LXG/LXQ
LXA		
KLG	Overvoltage resistant design	CHA
KLH		
RZ	Low impedance	*
GX	High heat resistance	
VD	voltage doubler rectifier circuit	

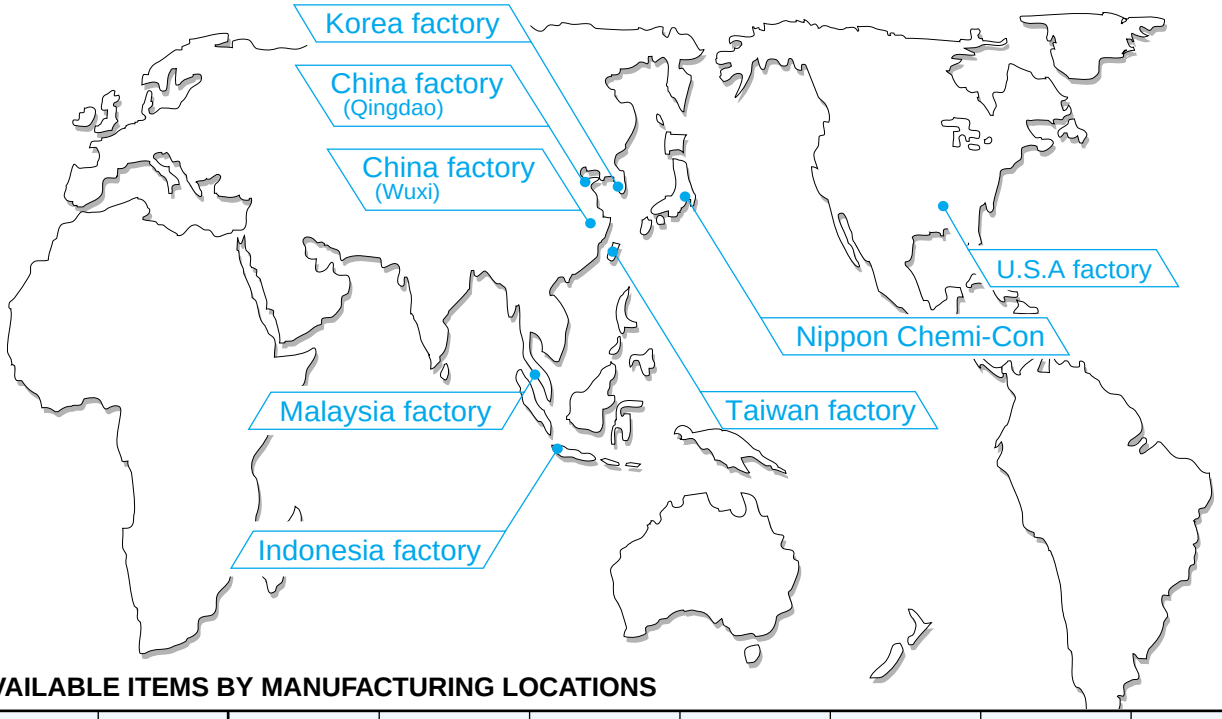
◆SCREW-MOUNT TERMINAL REPLACEMENTS

Discontinued series	Characteristics	Replacements
EW	85℃ standard	SME
PW		
MW		
GW		
SW	100℃	KMH
RW	For inverters	RWE/RWF
RWA		
KM	High reliability	KMH
KME		
LX	105℃ Long life	LXA/LXR
LWY		
KW	Low impedance, Long life	*
FW	Low impedance	

* Please contact us.

CAT. No. E1001I

WORLD-WIDE MANUFACTURING LOCATIONS



◆AVAILABLE ITEMS BY MANUFACTURING LOCATIONS

Classification	Series	Korea factory	China factory (Qingdao)	China factory (Wuxi)	Indonesia factory	Taiwan factory	Malaysia factory	U.S.A. factory
SMD	MV	●		●	●			
	MVK	●		●	●			
Low Profile	SRE				●			
	SRA		●		●			
	KMA		●		●			
	SRG		●		●			
General purpose	SMG	●	●	●	●	●		
	KMG	●	●	●	●	●		
	SMQ			●	●			
	KMQ			●	●			
Bi-polar	SME-BP	●	●		●	●		
	KME-BP	●	●		●	●		
Low impedance, High ripple	LXV			●	●	●		
	LXY			●	●			
	KY	●	●	●	●	●		
	KZE	●	●	●	●	●		
	KXG			●				
Snap-in	SMQ			●			●	
	KMQ			●			●	
	SMH			●			●	●
	KMH			●			●	●
	SMM			●			●	●
	KMM			●			●	●
Screw-mount Terminal	KMH							●
	RWE							●
	RWF							●
	RWL							●
	LXA							●

Please be sure to contact us before ordering as our product range is continuously improved and the product you require may have been superseded.

CAT. No. E1001I

PRECAUTIONS AND GUIDELINES

For conductive polymer aluminum electrolytic solid capacitors, please refer to PRECAUTIONS AND GUIDELINES (Conductive Polymer)

Designing Device Circuits

1 Select the capacitors to suit installation and operating conditions, and use the capacitors to meet the performance limits prescribed in this catalog or the product specifications.

2 Polarity

Aluminum Electrolytic Capacitors are polarized.
Apply neither reverse voltage nor AC voltage to polarized capacitors. Using reversed polarity causes a short circuit or venting. Before use, refer to the catalog, product specifications or capacitor body to identify the polarity marking. (The shape of rubber seal does not represent the directional rule for polarity.)
Use a bi-polar type of non-solid aluminum electrolytic capacitor for a circuit where the polarity is occasionally reversed.
However, note that even a bi-polar aluminum electrolytic capacitor must not be used for AC voltage applications.

3 Operating voltage

Do not apply a DC voltage which exceeds the full rated voltage. The peak voltage of a superimposed AC voltage (ripple voltage) on the DC voltage must not exceed the full rated voltage.
A surge voltage value, which exceeds the full rated voltage, is prescribed in the catalogs, but it is a restricted condition, for especially short periods of time.

4 Ripple current

The rated ripple current has been specified at a certain ripple frequency. The rated ripple current at several frequencies must be calculated by multiplying the rated ripple current at the original frequency using the frequency multipliers for each product series. For more details, refer to the paragraph on Aluminum Electrolytic Capacitor Life.

5 Category temperature

The use of a capacitor outside the maximum rated category temperature will considerably shorten the life or cause the capacitor to vent.
The relation between the lifetime of aluminum electrolytic capacitors and ambient temperature follows Arrhenius' rule that the lifetime is approximately halved with each 10℃ rise in ambient temperature.

6 Life expectancy

Select the capacitors to meet the service life of a device.

7 Charge and discharge

Do not use capacitors in circuits where heavy charge and discharge cycles are frequently repeated. Frequent and sharp heavy discharging cycles will result in decreasing capacitance and damage to the capacitors due to generated heat. Specified capacitors can be designed to meet the requirements of charging-discharging cycles, frequency, operating temperature, etc.

8 Failure mode of capacitors

Non-solid aluminum electrolytic capacitors, in general, have a lifetime which ends in an open circuit, but depending on conditions of usage or products type, failure mode of capacitors will be venting.
Please contact a representative of Nippon Chemi-Con.

9 Insulating

a) Electrically isolate the following parts of a capacitor from the negative terminal, the positive terminal and the circuit traces.
- The outer can case of a non-solid aluminum capacitor.
- The dummy terminal of a non-solid aluminum capacitor, which is designed for mounting stability.

b) The outer sleeve of a capacitor is not assured as an insulator (Except for screw type).

10 Condition

Do not use/expose capacitors to the following conditions.
a) Oil, water, salty water storage in damp locations.
b) Direct sunlight
c) Toxic gases such as hydrogen sulfide, sulfurous acid, nitrous acid, chlorine or its compounds, and ammonium
d) Ozone, ultraviolet rays or radiation
e) Severe vibration or mechanical shock conditions beyond the limits prescribed in the catalogs or the product specification.

11 Mounting

a) The paper separators and the electrolytic-conductive electrolytes in a non-solid aluminum electrolytic capacitor are flammable.
Leaking electrolyte on a printed circuit board can gradually erode the copper traces, possibly causing smoke or burning by short-circuiting the copper traces.
Verify the following points when designing a PC board.
- Provide the appropriate hole spacing on the PC board to match the terminal spacing of the capacitor.
- Make the following open space over the vent so that the vent can operate correctly.

Case diameter	Clearance
φ6.3 to φ16mm	2mm minimum
φ18 to φ35mm	3mm minimum
φ40mm and up	5mm minimum

- Do not place any wires or copper traces over the vent of the capacitor.
- Installing a capacitor with the vent facing the PC board needs an appropriate ventilation hole in PC board.
- Do not pass any copper traces beneath the seal side of a capacitor. The trace must pass 1 or 2mm to the side of the capacitor.
- Avoid placing any heat-generating objects adjacent to a capacitor or even on the reverse side of the PC board.
- Do not pass any via holes underneath a capacitor.
- In designing double-sided PC boards, do not locate any copper trace under the seal side of a capacitor.

b) Do not mount the terminal side of a screw mount capacitor downwards. If a screw terminal capacitor is mounted on its side, make sure the positive terminal is higher than the negative terminal.
Do not tighten the screws of the terminals and the mounting clamps over the specified torque prescribed in the catalog or the production specification.
c) For a surface mount capacitor, design the copper pads of the PC board in accordance with the catalog or the product specifications.

12 Others

a) The electrical characteristics of capacitors vary in respect to temperature, frequency and service life. Design the device circuits by taking these changes into account.
b) Capacitors mounted in parallel need the current to flow equally through the individual capacitors.
c) Capacitors mounted in series require resistors in parallel with the individual capacitors to balance the voltage.
d) Using capacitor for applications which always consider safety. Consult with our factory before use in applications which can affect human life.(space equipment, aerial equipment, nuclear equipment, medical equipment, vehicle control equipment, etc) Please note that the product, which is designed only for specific usage can not be used in other usages.(ex. Photo flash type, etc.)

CAT. No. E1001I

PRECAUTIONS AND GUIDELINES

Installing Capacitors

1 Installing

a) Used capacitors are not reusable, except in the case that the capacitors are detached from a device for periodic inspection to measure their electrical characteristics.
b) If the capacitors have self charged, discharge in the capacitors through a resistor of approximately 1kΩ before use.
c) If capacitors are stored at a temperature of 35℃ or more and more than 75%RH, the leakage current may increase. In this case, they can be reformed by applying the rated voltage through a resistor of approximately 1kΩ.
d) Verify the rated capacitance and voltages of the capacitors when installing.
e) Verify the polarity of the capacitors.
f) Do not use the capacitors if they have been dropped on the floor.
g) Do not deform the cases of capacitors.
h) Verify that the lead spacing of the capacitor fits the hole spacing in the PC board before installing the capacitors. Some standard pre-formed leads are available.
i) For pin terminals or snap-in terminals, insert the terminals into PC board and press the capacitor downward until the bottom of the capacitor body reaches PC board surface.
j) Do not apply any mechanical force in excess of the limits prescribed in the catalogs or the product specifications of the capacitors.
Also, note the capacitors may be damaged by mechanical shocks caused by the vacuum/insertion head, component checker or centering operation of an automatic mounting or insertion machine.

2 Soldering and Solderability

a) When soldering with a soldering iron
- Soldering conditions (temperature and time) should be within the limits prescribed in the catalogs or the product specifications.
- If the terminal spacing of a capacitor does not fit the terminal hole spacing of the PC board, reform the terminals in a manner to minimize a mechanical stress into the body of the capacitor.
- Remove the capacitors from the PC board, after the solder is completely melted, reworking by using a soldering iron minimizes the mechanical stress to the capacitors.
- Do not touch the capacitor body with the hot tip of the soldering iron.

b) Flow soldering
- Do not dip the body of a capacitor into the solder bath only dip the terminals in. The soldering must be done on the reverse side of PC board.
- Soldering conditions (preheat, solder temperature and dipping time) should be within the limits prescribed in the catalogs or the product specifications.
- Do not apply flux to any part of capacitors other than their terminals.
- Make sure the capacitors do not come into contact with any other components while soldering.

c) Reflow soldering
- Soldering conditions (preheat, solder temperature and dipping time) should be within the limits prescribed in the catalogs or the product specifications.
- When setting the temperature infrared heaters, consider that the infrared absorption causes material to be discolored and change in appearance.
- Do not solder capacitors more than once using reflow. If you need to twice, be sure to consult with us.
- Make sure capacitors do not come into contact with copper traces.

d) Do not re-use surface mount capacitors which have already been soldered.
In addition, when installing a new capacitor onto the assembly board to rework, remove old residual flux from the surface of the PC board, and then use a soldering iron within the prescribed conditions.
e) Confirm before running into soldering that the capacitors are for reflow soldering.

3 Handling after soldering

Do not apply any mechanical stress to the capacitor after soldering onto the PC board.
a) Do not lean or twist the body of the capacitor after soldering the capacitors onto the PC board.
b) Do not use the capacitors for lifting or carrying the assembly board.
c) Do not hit or poke the capacitor after soldering to PC board.
When stacking the assembly board, be careful that other components do not touch the aluminum electrolytic capacitors.
d) Do not drop the assembly board.

4 Cleaning PC boards

a) Do not wash capacitors by using the following cleaning agents.
- Halogenated solvents; cause capacitors to fail due to corrosion.
- Alkali system solvents; corrode (dissolve) an aluminum case.
- Petroleum and terpene system solvents; cause the rubber seal material to deteriorate.
- Xylene; causes the rubber seal material to deteriorate.
- Acetone; erases the marking.

Solvent resistant capacitors are only suitable for washing using the cleaning conditions prescribed in the catalogs or the product specifications. In particular, ultrasonic cleaning will accelerate damaging capacitors.
b) Verify the following points when washing capacitors.
- Monitor conductivity, pH, specific gravity, and the water content of cleaning agents. Contamination adversely affects these characteristics.
- Be sure not to expose the capacitors under solvent rich conditions or keep capacitors inside a closed container. In addition, please dry the solvent sufficiently on the PC board and the capacitor with an air knife (temperature should be less than the maximum rated category temperature of the capacitor) over 10 minutes.
Aluminum electrolytic capacitors can be characteristically and catastrophically damaged by halogen ions, particularly by chlorine ions, though the degree of the damage mainly depends upon the characteristics of the electrolyte and rubber seal material. When halogen ions come into contact with the capacitors, the foil corrodes when voltages applied. This corrsion causes ; extremely high leakage current, which causes in line with, venting, and an open circuit.
Global environmental warnings (Greenhouse effects and other environmental destruction by depletion of the ozone layer), new types of cleaning agents have been developed and commercialized as substitutes for CFC-113,1,1,2-trichloroethlene and 1,1,1-trichloroethylene. The following are recommended as cleaning conditions for some of new cleaning agents.

–Higher alcohol system cleaning agents
Recommended cleaning agents:
Pine Alpha ST-100S (Arakawa Chemical)
Clean Through 750H, 750K, 750L, and 710M (Kao)
Technocare FRW-14,15,16,17 (Momentive performance materials)
Cleaning conditions:
Using these cleaning agents capacitors are capable of withstanding immersion or ultrasonic cleaning for 10 minutes at a maximum liquid temperature of 60℃. Find optimum condition for washing, rinsing, and drying. Be sure not to rub the

PRECAUTIONS AND GUIDELINES

marking off the capacitor by contacting any other components or the PC board. Note that shower cleaning adversely affects the markings on the sleeve.

–Non-Halogenated Solvent Cleaning
AK225AES (Asahi Glass)
Cleaning conditions:
Solvent resistant capacitors are capable of withstanding any one of immersion, ultrasonic or vapor cleaning for 5 minutes; ex-ception is 2 minutes max. for KRE, and KRE-BP series capacitors and 3 minutes for SRM series capacitors. However, from a view of the global environmental problems, these types of solvent will be banned in near future. We would recommended not using them as much as possible.

Isopropyl alcohol cleaning agents
IPA (Isopropyl Alcohol) is one of the most acceptable cleaning agents; it is necessary to maintain a flux content in the cleaning liquid at a maximum limit of 2 Wt.%.

5 Precautions for using adhesives and coating materials

a) Do not use any adhesive and coating materials containing halogenated solvent.
b) Verify the following before using adhesive and coating material.
- Remove flux and dust leftover between the rubber seal and the PC board before applying adhesive or coating materials to the capacitor.
- Dry and remove any residual cleaning agents before applying adhesive and coating materials to the capacitors. Do not cover over the whole surface of the rubber seal with the adhesive or coating materials.
- For permissible heat conditions for curing adhesives or coating materials, follow the instructions in the catalogs or the product specifications of the capacitors.
- Covering over the whole surface of the capacitor rubber seal with resin may result in a hazardous condition because the inside pressure cannot release completely. Also, a large amount of halogen ions in resins will cause the capacitors to fail because the halogen ions penetrate into the rubber seal and the inside of the capacitor.

c) Some of coating material cannot be curred over the capacitor. Please note that loose luster and whitening on the surface of the outer sleeve might be caused according to the kind of solvents used for mounting adhesives and coating agents.

6 Fumigation

In many cases when exporting or importing electronic devices, such as capacitors, wooden packaging is used. In order to control insects, many times, it becomes necessary to fumigate the shipments. Precautions during “Fumigation” using halogenated chemical such as Methyl Bromide must be taken. Halogen gas can penetrate packaging materials used, such as, cardboard boxes and vinyl bags. Penetration of the halogenide gas can cause corrosion of Electrolytic capacitors.

The Operation of Devices

a) Do not touch a capacitor directly with bare hands.
b) Do not short-circuit the terminal of a capacitor by letting it come into contact with any conductive object.
Also, do not spill electric-conductive liquid such as acid or alkaline solution over the capacitor.
c) Do not use capacitors in circumstance where they would be subject to exposure to the following materials exist or expose.
- Oil, water, salty water or damp location.
- Direct sunlight.
- Toxic gases such as hydrogen sulfide, sulfurous acid, nitrous acid, chlorine or its compounds, and ammonium.
- Ozone, ultraviolet rays or radiation.
- Severe vibration or mechanical shock conditions beyond the limits prescribed in the catalogs or product specification.

Maintenance Inspection

a) Make periodic inspections of capacitors that have been used in industrial applications. Before inspection, turn off the power supply and carefully discharge the electricity in the capacitors. Verify the polarity when measuring the capacitors with a volt-ohm meter. Also, do not apply any mechanical stress to the terminals of the capacitors.
b) The following items should be checked during the periodic inspections.
- Significant damage in appearance : venting and electrolyte leakage.
- Electrical characteristics: leakage current, capacitance, tanδ and other characteristics prescribed in the catalogs or product specifications.
We recommend replacing the capacitors if the parts are out of specification.

In Case of Venting

a) If a non-solid aluminum electrolytic capacitor expells gas when venting, it will discharge odors or smoke, or burn in the case of a short-circuit failure. Immediately turn off or unplug the main power supply of the device.
b) When venting, a non-solid aluminum electrolytic capacitor blows out gas with a temperature of over 100℃. (A solid aluminum electrolytic capacitor discharges decomposition gas or burning gas while the outer resin case is burning.) Never expose the face close to a venting capacitor. If your eyes should inadvertently become exposed to the spouting gas or you inhale it, immediately flush the open eyes with large amounts of water and gargle with water respectively. If electrolyte is on the skin, wash the electrolyte away from the skin with soap and plenty of water. Do not lick the electrolyte of non-solid aluminum electrolytic capacitors.

Storage

We recommend the following conditions for storage.
a) Do not store capacitors at a high temperature or in high humidity. Store the capacitors indoors at a temperature of 5 to 35℃ and a humidity of less than 75%RH.
b) Store the capacitors in places free from water, oil or salt water.
c) Store the capacitors in places free from toxic gasses (hydrogen sulfide, sulfurous acid, chlorine, ammonium, etc.)
d) Store the capacitors in places free from ozone, ultraviolet rays or radiation.
e) Keep capacitors in the original package.
f) It is not applied to a regulation of JEDEC J-STD-020(Rev.C).

Disposal

Please consult with a local industrial waste disposal specialist when disposing of aluminum electrolytic capacitors.

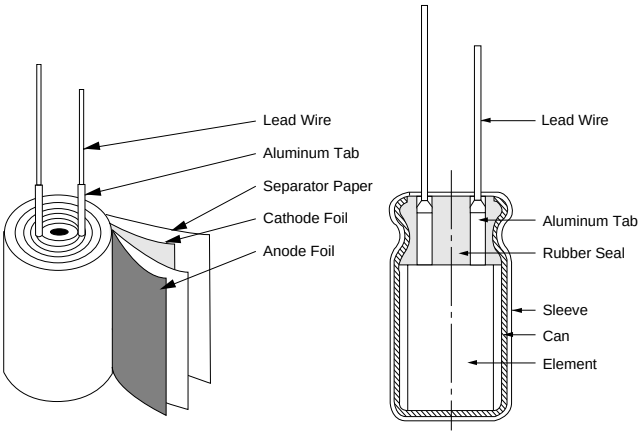
Catalogs

Specifications in catalogs may be subject to change without notice. For more details of precautions and guidelines for aluminum electrolytic capacitors, please refer to Engineering Bulletin No. 634A.

PRECAUTIONS AND GUIDELINES

Structure of Aluminum Electrolytic Capacitors

The aluminum electrolytic capacitor contains an internal element of an anode foil, a cathode foil and paper separator rolled together, impregnated with an electrolyte, then attached to external terminals connecting the tabs with the anode or the cathode foils, and sealed in a can case.



Among various types of capacitors, an aluminum electrolytic capacitor offers large CV to volume and features low cost. The capacitance (C) of aluminum electrolytic capacitors, as well as other capacitors, is expressed by the following equation:

$$C=8.854\times10^{-12}\times\frac{\varepsilon S}{d}\ (F)$$

Where : ε=Dielectric constant
S=Surface area of dielectric (m^2)
d=Thickness of dielectric (m)

This equation shows that the capacitance increases in proportion as the dielectric constant becomes high, its surface area becomes large and the thickness of dielectric becomes thin. In aluminum electrolytic capacitors the dielectric constant of an aluminum oxide (Al_2O_3) layer is 8 to 10, which is not as high as compared with the other types of capacitors. However, the dielectric layer of the aluminum oxide is extremely thin (about 15Å per volt) and the surface area is very large. An electrochemical formed electrode foil makes the dielectric on the etched surface of aluminum electrode foil. Electrochemical etching creates 20 to 100 times more surface area as plain foil. Therefore, an aluminum electrolytic capacitor can offer a large capacitance compared with other types.

Primary of Composition Material

Anode aluminum foil:
First, the etching process is carried out electromechanically with a chloride solution which dissolves metal and increases the surface area of the foil; forming a dense network like innumerable microscopic channels. Secondly, the formation process is carried out with a solution such as ammonium borate which forms the aluminum oxide layer (Al_2O_3) as a dielectric at a thickness of about 1.1 to 1.5nm / volt. The process needs to charge more the rated voltage into the foil.

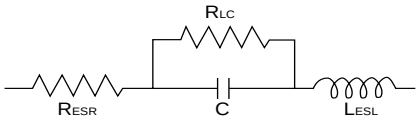
Cathode aluminum foil:
As in the first manufacturing process of the positive foil, the cathode foil requires etching process. Generally, it does not require the formation process; therefore, the natural oxide layer of Al_2O_3, which gives a characteristic dielectric voltage of 1.0 volts, is formed.

Electrolyte and separator:
In a non-solid aluminum electrolytic capacitor, the electrolyte, an electrically conductive liquid, functions as a true cathode by contacting the dielectric oxide layer. Accordingly, the "cathode foil" serves as an electrical connection between the electrolyte and terminal.
The separator functions to retain the electrolyte and prevent the anode and cathode foils from short-circuiting.

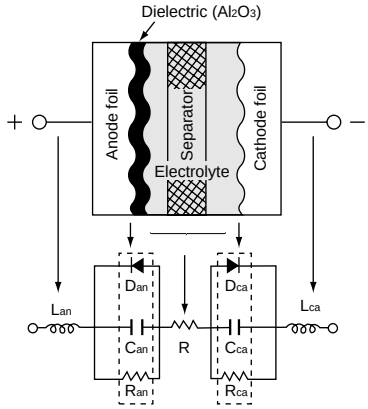
Can case and sealing materials:
The foils and separator are wound into a cylinder to make an internal element, which is impregnated with the electrolyte, inserted into an aluminum can case and sealed. During the service life of a capacitor, electrolyte slowly and naturally vaporizes by electrochemical reaction on the boundary of the aluminum foils. The gas will increase the pressure inside the case and finally cause the pressure relief vent to open or the sealing materials to bulge. The sealing material functions not only to prevent electrolyte from drying out but also to allow the gas to escape out of the can case in a controlled manner.

The Equivalent Circuit

As the equivalent circuit of an aluminum electrolytic capacitor is shown below, it forms a capacitance, a series resistance, an inductance, and a parallel resistance.



R_{ESR}=Equivalent series resistance (ESR)
R_{LC} =Resistance due to leakage current
C =Capacitance
L_{ESL} =Equivalent series inductance



From a composition material point wise, the equivalent circuit is subdivided as follows.

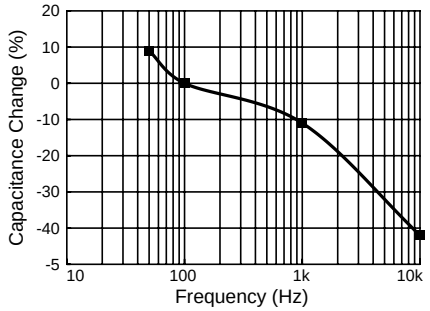
C_{an}, C_{Ca}=Capacitance due to anode and cathodes foils
R =Resistance of electrolyte and separator
R_{an}, R_{Ca}=Internal resistance of oxide layer on anode and cathode foils
D_{an}, D_{Ca}=Diode effects due to oxide layer on anode and cathode foils
L_{an}, L_{Ca} =Inductance due to anode and cathode terminals

Basic Electrical Characteristics

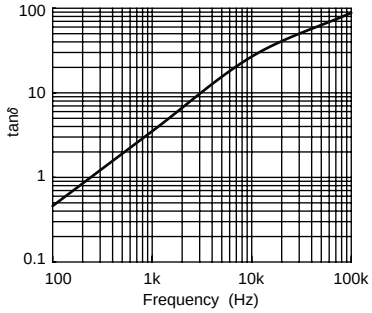
Capacitance:
The capacitance of capacitor is expressed as AC capacitance

PRECAUTIONS AND GUIDELINES

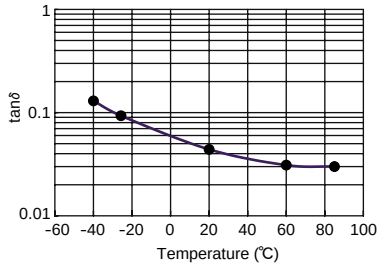
by measuring impedance and separating factors. Also, the AC capacitance depends upon frequency, voltage and other measuring methods. In fact, JIS C 5101 prescribes that the series capacitive factor of an equivalent series( ) circuit shall be the capacitance measured at a frequency of 120Hz and applying a maximum AC voltage of 0.5V rms with a DC bias voltage of 1.5 or 2.0V to aluminum electrolytic capacitors. The capacitance of an aluminum electrolytic capacitor becomes smaller with increasing frequency. See the typical behavior shown below.



Capacitance VS. Frequency

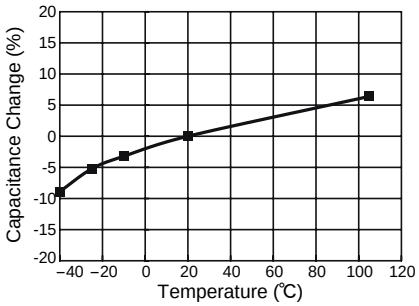


tanδ VS. Frequency



Temperature Characteristics of tanδ

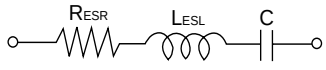
The capacitance value is highly dependent upon temperature and frequency. As the temperature decreases, the capacitance becomes smaller. See the typical behavior shown below.

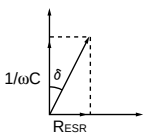


Temperature Characteristics of Capacitance

On the other hand, DC capacitance, which can be measured by applying a DC voltage, shows a slightly larger value than the AC capacitance at a normal temperature and has the flatter characteristic over the temperature range.

tanδ(tangent of loss angle or dissipation factor):
The tanδ is expressed as the ratio of the resistive component (R_{ESR}) to the capacitive reactance ($1/\omega C$) in the equivalent series circuit. Its measuring conditions are the same as the capacitance.





$\tan\delta = R_{ESR} / (1/\omega C) = \omega C R_{ESR}$

Where : R_{ESR}=ESR at 120Hz
ω =2πf
f =120Hz

The tanδ shows higher values as the measured frequency increases and the measured temperature decreases.

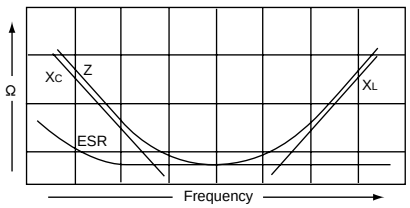
Equivalent series resistance (ESR):
The ESR is the series resistance consisting of the aluminum oxide layer, electrolyte/separator combination, and other resistance related factors, foil length, foil surface area and others.
The ESR value depends upon the temperature. Decreasing the temperature makes the resistivity of the electrolyte increase and leads to increasing ESR.
As the measuring frequency increases, the ESR decreases and reaches an almost constant value that mainly dominates the frequency-independent resistance relating electrolyte/separator combination.

Impedance (Z):
The impedance is the resistance of the alternating current at a specific frequency. It is related to capacitance (C) and inductance (L) in terms of capacitive and inductive reactance, and also related to the ESR. It is expressed as follows:

$$Z = \sqrt{ESR^2 + (X_L - X_C)^2}$$

Where : $X_C = 1/\omega C = 1/2\pi fC$
$X_L = \omega L = 2\pi fL$

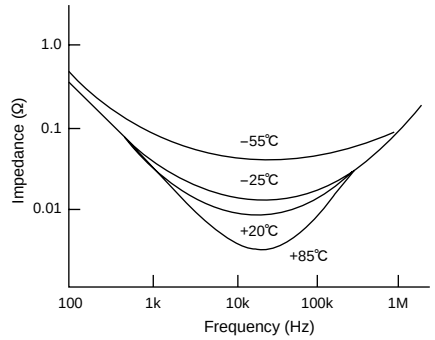
As shown below, the capacitive reactance (Xc) dominates at the range of low frequencies, and the impedance decreases with increasing frequency until it reaches the ESR in the middle frequency range. At the range of the higher frequencies the inductive reactance (XL) comes to dominate, so that the impedance increases when increasing the measuring frequency.



Impedance VS.Frequency

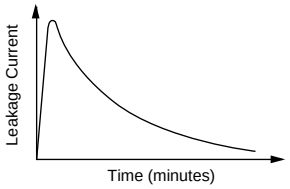
As shown at the next page, the impedance value varies with temperature because the resistance of the electrolyte is strongly affected by temperature.

PRECAUTIONS AND GUIDELINES



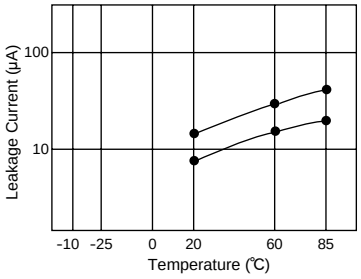
Temperature Characteristics of Impedance

Leakage current:
The dielectric of a capacitor has a very high resistance that does not allow DC current to flow. However, due to the characteristics of the aluminum oxide layer that functions as a dielectric in contact with electrolyte, a small amount of current, called leakage current, will flow to reform and repair the oxide layer when a voltage is being applied. As shown below, a high leakage current flows to charge voltage to the capacitor for the first seconds, and then the leakage current will decrease and reach an almost steady-state value with time.



Leakage Current VS. Time

Measuring temperature and voltage influences the leakage current. The leakage current shows higher values as the temperature and voltage increase.

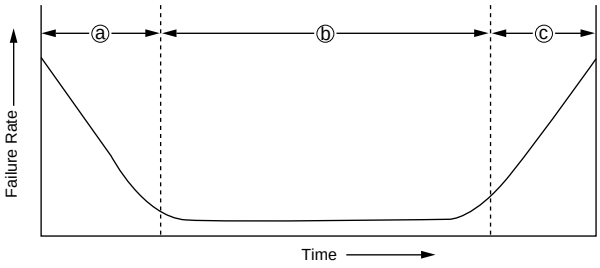


Typical Temperature Characteristics

In general, the leakage current is measured at 20℃ by applying the rated voltage to capacitor through a resistor of 1000Ω in series. The leakage current is the value several minutes later after the capacitor has reached the rated voltage. The catalog prescribes the measuring temperature and time.

Reliability

The bathtub curve:
Aluminum electrolytic capacitors feature failure rates shown by the following bathtub curve.



a) Infant failure period
This initial period accounts for the failures caused by deficiencies in design, structure, the manufacturing process or severe misapplications. In other words the initial failures occur as soon as the components are installed in a circuit. In the case of aluminum electrolytic capacitors, these failures do not occur at customers' field because aging process reforms an incomplete oxide layer, or eliminate the defective parts at the aging process and the sorting process.
Misapplication of the capacitor such as inappropriate ambient conditions, over-voltage, reverse voltage, or excessive ripple current should be avoided for proper use of the capacitor in a circuit.

b) Useful life period
This random failure period exhibits an extremely low failure rate. These failures are not related to operating time but to application conditions. During this period, non-solid aluminum electrolytic capacitors lose a small amount of electrolyte. The electrolyte loss shows as a slow decrease in capacitance and a slow increase in tanδ and ESR. Non-solid aluminum electrolytic capacitors still exhibit lower catastrophic failures than semiconductors and solid tantalum capacitors.

c) Wear-out failure period
This period reflects a deterioration in the component properties of the capacitor ; the failure rate increases with time. Non-solid aluminum electrolytic capacitors end their useful life during this period.

Failure types:
The two types of failures are classified as catastrophic failures and wear-out failures as follows.

1) Catastrophic failures
This is a failure mode that destroys the function of the capacitor like a short circuit or open circuit failure.

2) Wear-out failures
This is a failure mode where gradually deteriorates; the electrical parameters of the capacitor. The criteria of judging the failures, vary with application and design factors. Capacitance decreases and tanδ increases are caused by the loss of electrolyte in the wear-out failure period. This is primary due to loss of electrolyte by diffusion (as vapor) through the sealing material. Gas molecules can diffuse out through the material of the end seal. High temperature increase the electrolyte vapor pressure within the capacitor and the diffusion rate is therefore increased. This increases internal pressure may cause the seal to bulge caused by elevated temperatures. This bulging may accelerate diffusion and mechanically degrade the seal. Factors that can increase the capacitor temperature, such as ambient temperature and ripple current, can accelerate the wear-out phase of a capacitor.

Failure modes:
Aluminum electrolytic capacitors show various failure modes in different applications. (See Table 1.)

PRECAUTIONS AND GUIDELINES

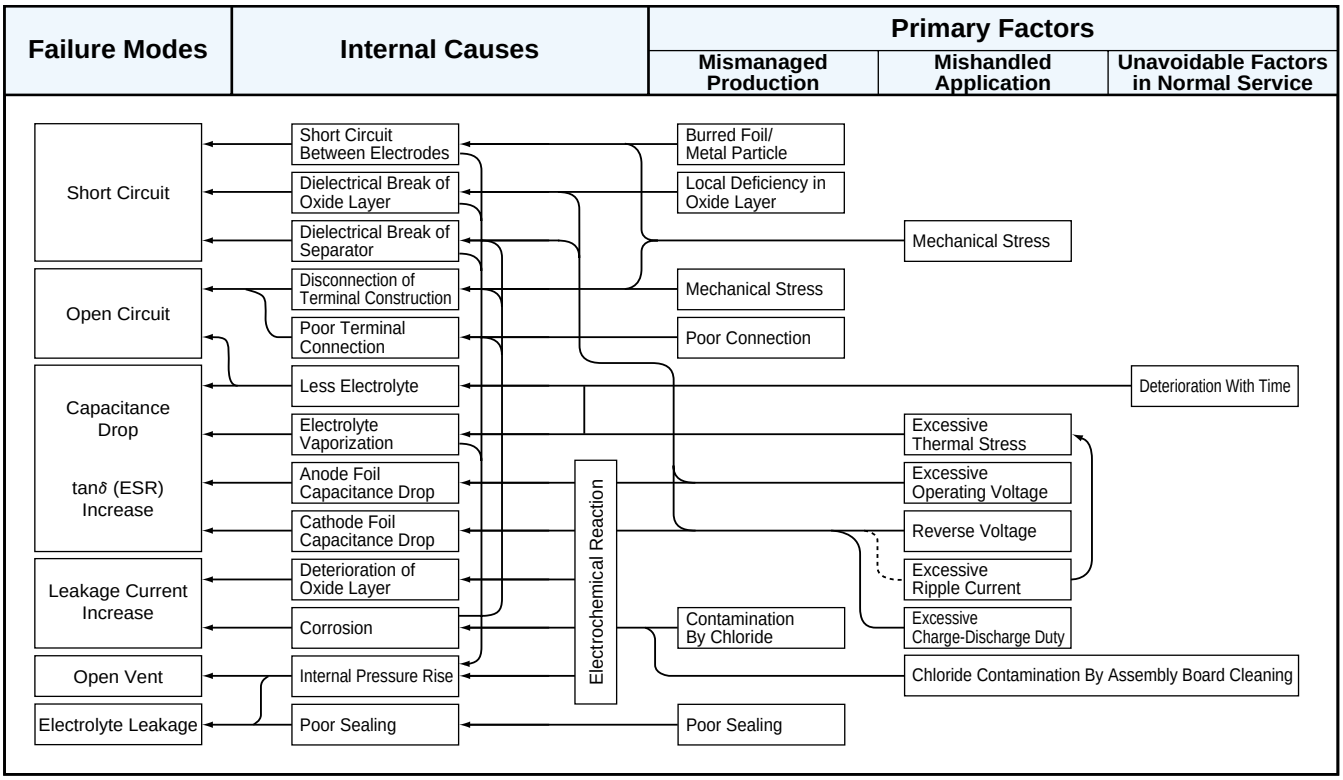


Table1

Life of Aluminum Electrolytic Capacitors

The life of aluminum electrolytic capacitors is largely dependent on environmental and electrical factors. Environmental factors include temperature, humidity, atmospheric pressure and vibration. Electrical factors include operating voltage, ripple current and charge-discharge duty cycles. The factor of temperature (ambient temperature and internal heating due to ripple current) is the most critical to the life of aluminum electrolytic capacitors.

General formula to estimate lifetime:
The lifetime of non-solid aluminum electrolytic capacitors is generally expressed by using three elements representing the effects of ambient temperature, applying voltage and ripple current, which is shown by the following equation:

$$L_X = L \cdot K_{Temp} \cdot K_{Voltage} \cdot K_{Ripple}$$

Where : L_X =Lifetime of capacitor to be estimated
L_o =Base lifetime of capacitor
K_{Temp} =Ambient temperature accelation term
$K_{Voltage}$=Voltage accelation term
K_{Ripple} =Ripple current accelation term

K_{Temp} (Effects of ambient temperature on life):
Because an aluminum electrolytic capacitor is essentially an electrochemical component, increased temperatures accelerate the chemical reaction producing gas within the capacitor which is diffused through the end seal, and consequently accelerates a gradual decrease in capacitance and a gradual increase in tanδ and ESR. The following equation has been experimentally found to express the relationship between the temperature acceleration factor and the deterioration of the capacitor.

$$L_X = L_O \cdot K_{Temp} = L_O \cdot B^{(T_O - T_X)/10}$$
$$K_{Temp} = B^{(T_O - T_X)/10}$$

Where : L_X =Lifetime (hour) of capacitor to be estimated
L_o =Base lifetime (hour) of capacitor
T_o =Maximum rated category temperature (℃) of capacitor shown in catalog
T_X =Actual ambient temperature (℃) of capacitor
B =Temperature accelation factor (≃2)

Factor B will vary depending on range of ambient temperature or products type.

This equation is similar to Arrhenius' equation that expresses a relationship between chemical reaction rates and temperature, and called Arrhenius' rule of aluminum electrolytic capacitors. The temperature acceleration factor (B) is approximately 2 over an ambient temperature range (Tx) from 40℃ to the maximum rated category temperature of each capacitor. It means that the lifetime is approximately halved with every 10℃ rise in ambient temperature and can be extended by using the capacitors at low temperatures. For an ambient temperature range (Tx) of 20℃ to 40℃, the factor B will be close to 2, and the lifetime will actually be extended. However, operating and surrounding conditions, especially the operating conditions influence ambient temperatures mutually. The ambient temperature in this range will be very changeable; therefore, lifetime estimation under 40℃ should use 40 as Tx.

$K_{voltage}$ (Effects of applying voltage to life):
Miniature and large sized aluminum electrolytic capacitors for popular applications, such as surface mount types, radial lead types, snap-in types and block types, have little voltage effect on their life. Other factors like temperature and ripple current determine the life in comparison with voltage, as long as the capacitors are used at voltages and temperatures within the specifications prescribed in the catalog. Consequently, $K_{voltage}$=1 is used for these capacitors. 350V and higher screw-mount terminal types of capacitors for customer-use power electronics applications allow the life time to extend by applying low voltage, relating to the characteristics of their aluminum oxide layer. RWG, RWF, RWE, RWY, RWL and LXA series are applicable to the method. For $K_{voltage}$ values of these products, please contact a representative of Nippon Chemi-Con.

K_{ripple} (Effects of ripple current to life):
Aluminum electrolytic capacitors have higher tanδ than any other types of capacitors; therefore, the ripple current gives aluminum electrolytic capacitors higher internal heat. Be sure to check the rated ripple current which is specified in the catalog for assuring the life.

PRECAUTIONS AND GUIDELINES

The ripple current through the capacitor produces heat by dissipating power from the capacitor. This leads to temperature increase. Internal heating produced by ripple currents can be expressed by:

$$W=(I_{Ripple})^2 \cdot R_{ESR}+V \cdot I_{Leakage}$$

Where : W = Internal power loss
I_{Ripple} = R.M.S. ripple current
R_{ESR} = Internal resistance (ESR) at ripple frequency
V = Applied voltage
$I_{Leakage}$ = Leakage current

Leakage current may be 5 to 10 times higher than the values measured at 20℃, but compared with Iripple , the leakage current value is very small and negligible.
Thus, the above equation can be simplified:

$$W=(I_{Ripple})^2 \cdot R_{ESR}$$

The following equation gives the internal heat rise; it is heat rise to stable condition. (It is necessary to input several factors.):

$$(I_{Ripple})^2 \cdot R_{ESR}= \beta \cdot A \cdot \Delta T$$

Where : β = Heat transfer constant
A = Surface area of can case
$A=(\pi/4) \cdot D \cdot (D+4L)$
Where : D=Can diameter
L=Can length
ΔT=An increase in core temperature by internal heating due to ripple current
(ΔT=Core temperature−Ambient temperature)

From the above equation, internal temperature rise (ΔT) produced by ripple current is given by:

$$\Delta T=(I_{Ripple})^2 \cdot R_{ESR} / (\beta \cdot A)$$

When the ripple frequency is 120Hz, R_{ESR} at 120Hz is expressed by

$$R_{ESR}=\tan\delta / (\omega \cdot C)$$

$$\Delta T=(I_{Ripple})^2 \cdot \tan\delta / (\beta \cdot A \cdot \omega \cdot C)$$

Where : tanδ=120Hz value
ω = $2\pi \cdot f = 2\pi \cdot 120$Hz
C = 120Hz capacitance value

As above equation, ΔT varies with frequency of ripple, frequency and temperature dependent ESR, and application dependent β (even ripple current is constant). We really recommend that customers measure ΔT with a thermocouple at the actual operating conditions of the application in lieu of using the above equation. (Another approximation of ΔT will be stated later.)
As mentioned in the paragraph of K_{Temp}, aluminum electrolytic capacitors will slowly increase in tanδ and ESR during their service life. The application without ripple current has no influence on the life of the capacitor even though the ESR will increase during life. In other words, the application with ripple current makes ΔT increase; furthermore, a ΔT increase results in ESR increase. The ESR increase then makes ΔT increase. It is a chain reaction. Theoretically, the ripple current acceleration term (K_{Ripple}) cannot be simply expressed like the ambient temperature acceleration term (K_{Temp}). Practically, the ripple current acceleration term (K_{Ripple}) can be approximately expressed by an equation using a ΔT initially measured. The following table shows the ripple current acceleration term (K_{Ripple}) for each capacitor design group.

K_{Ripple}		Products Type	Products Series
$2^{(-\Delta T/5)}$		Surface Mount	MVS MVA MV MVE MVK MZA MVY MZF MZE MZD MLA MVJ MLF MLE MLD MVL MVH MHB MKB MV-BP MVK-BP
		Radial	SRM SRE KRE SRA KMA SRG KRG SMQ SMG SME-BP KME-BP LLA
$2^{(\Delta To-\Delta T)/5}$	ΔTo=3 to 5 deg Contact us for details	Radial	KMQ KMG KZM KZH KZE KY LXZ LXY LXV KXJ KXG KMH PAG KLJ KLG FL GPA GXE GXL LBG
		Snap-in	KMR KMQ KMS KMM KMH KLM LXM LXS LXQ LXG CHA LXH
		Screw-Mount (Less than 350Vdc)	KMH LXA
	ΔTo=5 to 10 deg Contact us for details	Radial	SMH
		Snap-in	SMQ SMM SMH SLM
		Screw-Mount	SME
$2^{(-2+(25-\Delta T)/b)}$		Screw-Mount (350Vdc and higher)	RWG RWF RWE RWY RWL LXA

Note : ΔT = An increase (deg) in core temperature produced by internal heating due to actual operating ripple current. The ΔT is the difference between the core temperature and ambient temperature measured at the actual operating conditions.
ΔTo = An increase (deg) in core temperature by internal heating due to rated ripple current.
b = Factor b varies from 5 to 10 by the conditions of ripple frequency and ΔT. Please contact a representative of Nippon Chemi-Con for the details

Note that a ΔT over a certain maximum limit may over-heat the capacitors, though the lifetime estimation will not give you practical lifetime. For instance, the following shows a guide limit of ΔT at each ambient temperature for 105℃ maximum rated products.

Ambient temperature Tx (℃)	85	105
Guide limit of ΔT (deg)	15	5
Core temperature (=Tx+ΔT)	100	110

Approximation of ΔT

Estimation of the lifetime requires two temperature measurements; first obtain ΔT by actually measuring the core temperature, inserting the thermocouple inside the operating capacitor and secondary, the ambient temperature. A more convenient way to get the ΔT is to convert the surface temperature of the capacitor case and the ambient temperature by using a coefficient specified for each case diameter as follows:

$$\Delta T=Kc \cdot (Ts-Tx)$$

Where : Kc=Coefficient from table below
Ts=Surface temperature (deg) of capacitor can case
Tx=Ambient temperature (deg)

No air flow conditions.

Diameter (mm)	φ5 to φ8		φ10	φ12.5	φ16	φ18	φ22	φ25
Kc	1.10		1.15	1.20	1.25	1.30	1.35	1.40
Diameter (mm)	φ30	φ35	φ40	φ50	φ63.5	φ76	φ89	φ100
Kc	1.50	1.65	1.75	1.90	2.20	2.50	2.80	3.10

Also, you can roughly estimate a ΔT by using the following equation without need to measure.

PRECAUTIONS AND GUIDELINES

$$\Delta T=\Delta T_0\cdot(Ix/Io)^2$$

Where : ΔT_0=5 deg for 105℃ maximum rated capacitors.
Io =Rated ripple current (A_{RMS}) : if its frequency is different from operating ripple current Ix, it needs converting by using a frequency multiplier prescribed in the catalog.
Ix =Operating ripple current (A_{RMS}) actually flowing into a capacitor

Like switching power supplies, if the operating ripple current consists of commercial frequency element and switching frequency element(s), an internal power loss is expressed by the following equation.

$$W=(If_1)^2\cdot ESR_{f1}+(If_2)^2\cdot ESR_{f2}+\cdots+(If_n)^2\cdot ESR_{fn}$$

Where : W =Internal power loss
$I_{f1}\cdots I_{fn}$ =Ripple currents at every frequencies f1···fn
$ESR_{f1}\cdots ESR_{fn}$=ESR's at every frequencies f 1···fn

The above equation can be transformed into another equation to get a ripple current value in accordance with the frequency of the rated ripple current, each of $ESR_{f1},\cdots ESR_{fn}$ is approximately equal to ESR_{f0} divided by square value of the frequency multiplier ($F_{f1}\cdots F_{fn}$). Here ESR^{f0} is the value at the frequency of the rated ripple current and $F_{f1}\cdots F_{fn}$ is a conversion coefficient from one frequency to another in accordance with the frequency f1···fn.

$$ESR_{f1}=ESR_{f0}/(Ff_1)^2$$
$$\vdots \qquad \vdots$$
$$ESR_{fn}=ESR_{f0}/(Ff_n)^2$$

Relationship of $w=(L_{Ripple})^2\cdot R_{ESR}$ leads Ix as follows:

$$Ix=\sqrt{W/ESR_{f0}}$$

The above is rewritten in the following equation:

$$Ix=\sqrt{(I_{f1}/F_{f1})^2+(I_{f2}/F_{f2})^2+\cdots\cdots(I_{fn}/F_{fn})^2}$$

Where : Ix =Ripple current in accordance with the frequency of the rated ripple current
$I_{f1}\cdots\cdots I_{fn}$ =Operating ripple currents at every frequencyf1···fn
$F_{f1}\cdots\cdots F_{fn}$=Frequency multipliers for every frequencyf1···fn prescribed in the catalog, based on the fact that the internal resistance of a capacitor varies with frequency.

The result calculated by the estimated life expectancy formula, it is not guaranteed lifetime.
When designer calculate the lifetime of apparatus, please include an extra margin in consideration of the estimated lifetime of a capacitor. When the result calculated by the estimated life expectancy formula exceeds 15 years, please consider 15 years to be a maximum.

Cleaning Agents

a. Cleaning agents penetrate into a capacitor.
Solvent contacts the rubber seal of a capacitor. Some percentage of solvent does not penetrate but a percentage suceeds in entering and defusing inside the capacitor.

b. Cleaning agents decompose and release halogen ions.
In the electrolyte of the inside element, the halides in the cleaning agents become hydrolyzed and release halogen ions as follows,

$$RX+H_2O\rightarrow ROH+H^++X^-$$

RX : Halide
X^- : Halogen ion

c. Corrosion
The halogen ions attack the aluminum foil by the following anodic half-cell reaction:

$$Al+3X^-\rightarrow AlX_3+3e$$

The AlX3 further becomes hydrolyzed and release the halogen ion again:

$$AlX_3+3H_2O\rightarrow Al(OH)^3+3H^++3X^-$$

The halogen ions release by this hydrolysis reaction further attacks the aluminum according to the previous reaction formula, and these reactions are repeated and accelerated when voltage and temperature is applied. Also, the hydrogen ions increase the local acidity which causes the oxide dielectric to dissolve. Thus, localized corrosion accelerates to corrode both the aluminum metal and the dielectric. In addition, a terpene or petroleum system cleaning solvent will be absorbed into the rubber seal of the capacitor. The rubber seal finally weakens. An alkaline saponification detergent will damage the aluminum metal and marking. In summary, recommended cleaning agents are halogen free. Terpene, petroleum, alkali detergent and any solvent making the rubber seal material deteriorate are not recommended.

Compatible cleaning agents:
In line with recent global environmental warnings (Greenhouse effect and other environmental destruction by depletion of the ozone layer), new types of cleaning agents have been commercialized and substituted as CFC-113,1,1,2-trichloroethlene and 1,1,1-trichloroethylene. The following are recommended cleaning conditions for some of new cleaning agents.

Higher alcohol system cleaning agents
Recommended cleaning agents:
Pine Alpha ST-100S (Arakawa Chemical)
Clean Through 750H, 750K, 750L, and 710M (Kao)
Technocare FRW-14 through 17 (GE Toshiba Silicones)
Cleaning conditions:
1) Capacitors are capable of withstanding immersion or ultrasonic cleaning for 10 minutes at a maximum liquid temperature of 60℃ using the above cleaning agents. Find the optimum conditions for washing, rinsing, and drying. Be sure not to rub the marking off the capacitor by contact with any other components on the PC board. Note that shower cleaning adversely affects the marking.
2) To rinse by water, control the conditions such as temperature and water pressure to avoid sleeve shrinking or swelling.
3) Clean Through 750H and similar are weak-alkaline solvents. Do not leave the alkaline on the capacitor after cleaning process.

CFCs substitute solvents (HCFC system)
Asahi Glass AK225AES solvent is usable only with solvent resistant type capacitors, which are designed with reinforced seal constructions and modified electrolyte. This product does not penetrate the capacitor and deactivate halogen ions. However, AK225AES is one of the solvents which will have a restricted usage in future from the environmental point of view.

PRECAUTIONS AND GUIDELINES

Non-Halogenated Solvent Cleaning

HCFC solvents: AK225AES (Asahi Glass)
Cleaning conditions:
Solvent resistant type capacitors are capable of withstanding immersion, ultrasonic or vapor cleaning for 5 minutes; exception is 2 minutes max. for KRE and KRE-BP series capacitors for 3 minutes and SRM series capacitors.
Applicable series (only for solvent resistant products):

Surface mount :	PXS, PXF, PXE, PXH, MVS, MVA(4 to 63Vdc), MV, MVE(6.3 to 63Vdc), MVK, MZA, MVY(6.3 to 63Vdc), MZF, MZE, MZD, MLA, MVJ, MLF, MLE, MLD, MVL, MVH(10 to 50Vdc), MHB, MV-BP, MVK-BP
Radial lead :	PSF, PSE, PSC, PSA, PS, SRM, KRE, KMA, SRG, KRG, KMQ(6.3 to 100Vdc), SMG(6.3 to 250Vdc), KMG(6.3 to 250Vdc), SME-BP, KME-BP, LXZ, LXY, LXV, GPA, GXE(10 to 50Vdc), GXL, LLA

Isopropyl alcohol cleaning agents
IPA (Isopropyl Alcohol) is one of the most acceptable cleaning agents; it is necessary to maintain a flux content in the cleaning liquid at a maximum limit of 2 Wt. %, because chlorides in flux dissolves in the cleaning liquid during the cleaning process.
Xylene -additive IPA may make the rubber seal deteriorate.

Non-clean flux
Both ionic halogen and non-ionic halogens damage the capacitor when they penetrate in through the rubber seal. Note that some of the fluxes called non-halogenated flux contains less ionic halogen activator but actually a large amount of non-ionic halogen.
Per our analysis, AHQ3100K(Asahi) and POZ6(Senjyu) minimize ionic and non-ionic halogens.

Other Precautions to wash capacitors
a) Monitor conductivity, pH, specific gravity and water content of cleaning agents. Contamination adversely affects the characteristics.
b) The solvent may stay between the end seal and the PC board if the capacitor is mounted directly onto the PCB without a small gap. The residual solvent can cause defects. Also, washing for more than the specified time causes solvent residual. Therefore, wash the assembly board for at least 10 minutes at the recommended temperature. Be sure not to expose the capacitors under solvent rich conditions or keep capacitors inside a closed container.
c) Reforming the leads of the capacitor to fit lead spacing on the PC board causes cleaning agents to get into the inside capacitor. This may result in corrosion to the foil. Therefore, use the capacitors, which fit the hole spacing on the PC board or reform the lead wires in a manner which will not cause mechanical stress to the capacitor body.

CAT. No. E1001I

NIPPON CHEMI-CON

PART NUMBERING SYSTEM

Product code guide (Surface mount type)

(Example : MVA series, 25V-47μF, ϕ6.3×5.2L)

Please refer to the following table

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
E	M	V	A	2	5	0	A	D	A	4	7	0	M	F	5	5	G

- 18 Supplement code⑨
- 15 16 17 Size code⑧
- 14 Capacitance tolerance⑦
- 11 12 13 Capacitance code⑥
- 9 10 Taping /Tray code⑤
- 8 Terminal code④
- 5 6 7 Voltage code③
- 4 Series code②
- 1 Category①

①Category

Contents	Code
	1st
Polar	E
Bi-polar	B

②Series code

Series name	Code		
	2nd	3rd	4th
MVA	M	V	A
MV	M	V	—
No series name	C	S	T

③Voltage code

Voltage (V)	Code		
	5th	6th	7th
4	4	R	0
6.3	6	R	3
10	1	0	0
16	1	6	0
25	2	5	0
35	3	5	0
50	5	0	0
63	6	3	0
80	8	0	0
100	1	0	1
160	1	6	1
200	2	0	1
250	2	5	1
400	4	0	1
450	4	5	1

④Terminal code

Type	Code
	8th
No dummy terminal	A
With dummy terminal	G

⑤Taping / Tray code

Taping type	Reel dia. ϕ(mm)	Code		Application size ϕD (mm)
		9th	10th	
Reel (Cardboard)	380	D	A	ϕD=3 to 18 (not ϕD=12.5)
Reel (Cardboard)	330	D	B	ϕD=3 to 18
Reel (Plastic)	380	P	A	ϕD=3 to 10
Reel for reuse	380	R	A	ϕD=3 to 12.5

Package	Code		Application size ϕD(mm)
	9th	10th	
Tray	T	R	ϕD=12.5 to 18

Refer to product guide for taping and tray specifications.

⑥Capacitance code

Cap. (μF)	Code		
	11th	12th	13th
0.1	R	1	0
0.15	R	1	5
0.22	R	2	2
0.33	R	3	3
0.47	R	4	7
0.68	R	6	8
1.0	1	R	0
1.5	1	R	5
2.2	2	R	2
3.3	3	R	3
4.7	4	R	7
6.8	6	R	8
10	1	0	0
15	1	5	0
22	2	2	0
33	3	3	0
47	4	7	0
56	5	6	0
68	6	8	0
100	1	0	1
150	1	5	1
180	1	8	1
220	2	2	1
330	3	3	1
470	4	7	1
680	6	8	1
820	8	2	1
1,000	1	0	2
1,500	1	5	2
2,200	2	2	2
3,300	3	3	2
4,700	4	7	2
6,800	6	8	2
8,200	8	2	2
10,000	1	0	3

⑦Capacitance tolerance

Tol. (%)	Code
	14th
±20	M

⑧Size code (Vertical)

ϕD (mm)	Code
	15th
3	B
4	D
5	E
6.3	F
8	H
10	J
12.5	K
16	L
18	M

L (mm)	Code	
	16th	17th
4.5	4	6
5.2	5	5
5.7	6	0
5.8	6	1
6.3	6	3
7.0	7	3
7.7	8	0
8.7	9	0
10	A	0
13.5	E	0
16	G	5
16.5	H	0
21.5	N	0

⑨Supplement code

Terminal plating material	Code
	18th
Sn-Bi	G
Sn100%	S

* Refer to the appendix (Part number) for codes not listed here.

NIPPON CHEMI-CON

SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

4.5mm height, 85℃

Alchip™-MVS Series

- 4.5mm height
- Endurance : 2,000 hours at 85℃
- Solvent resistant type (see PRECAUTIONS AND GUIDELINES)
- **RoHS Compliant**

MVS
Low profile
MV

◆SPECIFICATIONS

Items	Characteristics								
Category Temperature Range	−40 to +85℃								
Rated Voltage Range	4 to 50Vdc								
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)								(at 20℃ after 2 minutes)
Dissipation Factor (tanδ)	Rated voltage (Vdc)	4V	6.3V	10V	16V	25V	35V	50V	
	tanδ (Max.)	0.50	0.30	0.24	0.19	0.16	0.14	0.14	(at 20℃, 120Hz)
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (Vdc)	4V	6.3V	10V	16V	25V	35V	50V	
	Z(−25℃)/Z(+20℃)	7	4	3	2	2	2	2	
	Z(−40℃)/Z(+20℃)	15	8	8	4	4	3	3	(at 120Hz)

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 85℃.

Rated voltage	4 & 6.3Vdc	10 to 50Vdc
Capacitance change	≦±30% of the initial value	≦±25% of the initial value
DF (tanδ)	≦300% of the initial specified value	≦300% of the initial specified value
Leakage current	≦The initial specified value	≦The initial specified value

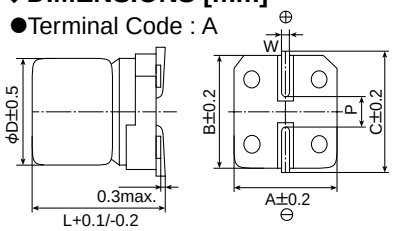
Shelf Life

The following specifications shall be satisfied when the capacitors are restored to 20℃ after exposing them for 1,000 hours at 85℃ without voltage applied. Before the measurement, the capacitor shall be preconditioned by applying voltage according to Item 4.1 of JIS C 5101-4.

Rated voltage	4 & 6.3Vdc	10 to 50Vdc
Capacitance change	≦±30% of the initial value	≦±25% of the initial value
DF (tanδ)	≦300% of the initial specified value	≦300% of the initial specified value
Leakage current	≦The initial specified value	≦The initial specified value

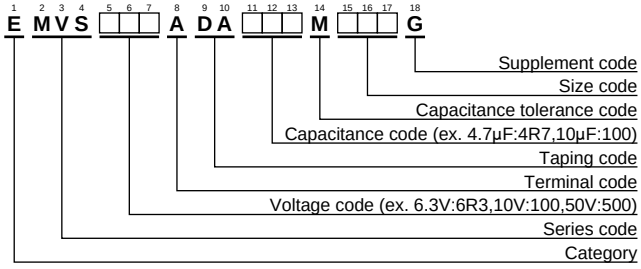
◆DIMENSIONS [mm]

●Terminal Code : A



Size code	D	L	A	B	C	W	P
D46	4	4.5	4.3	4.3	5.1	0.5 to 0.8	1.0
E46	5	4.5	5.3	5.3	5.9	0.5 to 0.8	1.4
F46	6.3	4.5	6.6	6.6	7.2	0.5 to 0.8	1.9

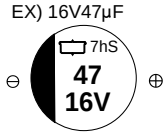
◆PART NUMBERING SYSTEM



Please refer to "Product code guide (surface mount type)"

◆MARKING

EX) 16V47μF



◆STANDARD RATINGS

WV (Vdc)	Cap (μF)	Size code	tanδ	Rated ripple current (mArms/ 85℃,120Hz)	Part No.
4	33	D46	0.50	28	EMVS4R0ADA330MD46G
	47	D46	0.50	33	EMVS4R0ADA470MD46G
	100	E46	0.50	56	EMVS4R0ADA101ME46G
	220	F46	0.50	96	EMVS4R0ADA221MF46G
6.3	22	D46	0.30	28	EMVS6R3ADA220MD46G
	47	E46	0.30	45	EMVS6R3ADA470ME46G
	100	F46	0.30	70	EMVS6R3ADA101MF46G
10	33	E46	0.24	41	EMVS100ADA330ME46G
16	10	D46	0.19	23	EMVS160ADA100MD46G
	22	E46	0.19	37	EMVS160ADA220ME46G
	47	F46	0.19	58	EMVS160ADA470MF46G
25	33	F46	0.16	52	EMVS250ADA330MF46G

WV (Vdc)	Cap (μF)	Size code	tanδ	Rated ripple current (mArms/ 85℃,120Hz)	Part No.
35	4.7	D46	0.14	18	EMVS350ADA4R7MD46G
	10	E46	0.14	29	EMVS350ADA100ME46G
	22	F46	0.14	46	EMVS350ADA220MF46G
50	0.10	D46	0.14	1.0	EMVS500ADAR10MD46G
	0.22	D46	0.14	2.0	EMVS500ADAR22MD46G
	0.33	D46	0.14	2.8	EMVS500ADAR33MD46G
	0.47	D46	0.14	4.0	EMVS500ADAR47MD46G
	1.0	D46	0.14	8.4	EMVS500ADA1R0MD46G
	2.2	D46	0.14	13	EMVS500ADA2R2MD46G
	3.3	D46	0.14	17	EMVS500ADA3R3MD46G
	4.7	E46	0.14	20	EMVS500ADA4R7ME46G
	10	F46	0.14	33	EMVS500ADA100MF46G

CAT. No. E1001I

NIPPON CHEMI-CON

SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

Downsized, 85℃

Alchip™-MVA Series

- ϕ4 through ϕ18 case sizes are fully lined up
- Endurance : 2,000 hours at 85℃
- Suitable to fit for downsized equipment
- Solvent resistant type except 100 to 450Vdc (see PRECAUTIONS AND GUIDELINES)
- **RoHS Compliant**

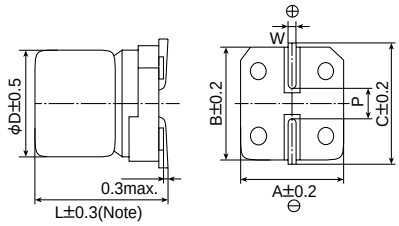
MVA
↑
Downsized
Expanded case sizes
MV

◆SPECIFICATIONS

Items	Characteristics												
Category Temperature Range	−40 to +85℃												
Rated Voltage Range	4 to 450Vdc												
Capacitance Tolerance	±20% (M)												(at 20℃, 120Hz)
Leakage Current	Rated voltage (Vdc)	4 to 100V						160 to 450V					
	D55 to JA0	I=0.01CV or 3μA, whichever is greater.(after 2 minutes)						—					
	KE0 to MN0	I=0.03CV or 4μA, whichever is greater.(after 1 minute)						I=0.04CV+100μA max.(after 1 minute)					
	Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V)												(at 20℃)
Dissipation Factor (tanδ)	Rated voltage (Vdc)		4V	6.3V	10V	16V	25V	35V	50V	63V	100V	160 to 250V	400 & 450V
	tanδ (Max.)	D55 to JA0	0.42	0.35	0.30	0.26	0.16	0.14	0.12	0.12	0.12	—	—
		KE0 to MN0	—	0.38	0.34	0.30	0.26	0.22	0.18	0.14	0.10	0.20	0.25
	When nominal capacitance exceeds 1,000μF, add 0.02 to the value above for each 1,000μF increase.												(at 20℃, 120Hz)
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (Vdc)		4V	6.3V	10V	16V	25V	35V	50V	63V	100V	160 to 250V	400 & 450V
	D55 to JA0	Z(−25℃)/Z(+20℃)	7	4	3	2	2	2	2	2	3	—	—
		Z(−40℃)/Z(+20℃)	17	10	8	6	4	3	3	3	4	—	—
	KE0 to MN0	Z(−25℃)/Z(+20℃)	—	5	4	3	2	2	2	2	2	3	6
		Z(−40℃)/Z(+20℃)	—	12	10	8	5	4	3	3	3	6	10
													(at 120Hz)
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 85℃.												
	Size code	D55 to JA0						D55 to JA0			KE0 to MN0		
	Rated voltage (Vdc)	4V & 6.3V						10 to 100V			6.3 to 450V		
	Capacitance change	≦±30% of the initial value						≦±20% of the initial value					
	DF (tanδ)	≦200% of the initial specified value						≦200% 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 1,000 hours at 85℃ without voltage applied. Before the measurement, the capacitor shall be preconditioned by applying voltage according to Item 4.1 of JIS C 5101-4.												
	Size code	D55 to JA0						D55 to JA0			KE0 to MN0		
	Rated voltage	4V & 6.3V						10 to 100V			6.3 to 450V		
	Capacitance change	≦±30% of the initial value						≦±20% of the initial value					
	DF (tanδ)	≦200% of the initial specified value						≦200% of the initial specified value					
	Leakage current	≦The initial specified value						≦The initial specified value					

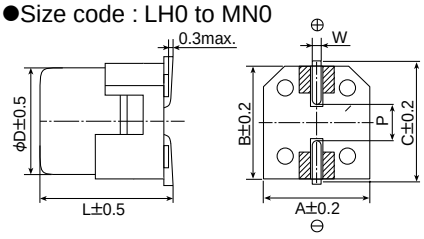
◆DIMENSIONS [mm]

●Terminal Code : A
●Size code : D55 to MN0



Note : L±0.5 for HA0 to MN0

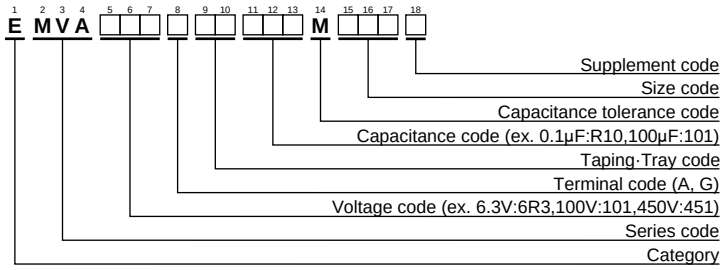
●Terminal Code : G
●Size code : LH0 to MN0



: Dummy terminals

Size code	D	L	A	B	C	W	P
D55	4	5.2	4.3	4.3	5.1	0.5 to 0.8	1.0
E55	5	5.2	5.3	5.3	5.9	0.5 to 0.8	1.4
F55	6.3	5.2	6.6	6.6	7.2	0.5 to 0.8	1.9
F60	6.3	5.7	6.6	6.6	7.2	0.5 to 0.8	1.9
F80	6.3	7.7	6.6	6.6	7.2	0.5 to 0.8	1.9
HA0	8	10.0	8.3	8.3	9.0	0.7 to 1.1	3.1
JA0	10	10.0	10.3	10.3	11.0	0.7 to 1.1	4.5
KE0	12.5	13.5	13.0	13.0	13.7	1.0 to 1.3	4.2
KG5	12.5	16.0	13.0	13.0	13.7	1.0 to 1.3	4.2
LH0	16	16.5	17.0	17.0	18.0	1.0 to 1.3	6.5
LN0	16	21.5	17.0	17.0	18.0	1.0 to 1.3	6.5
MH0	18	16.5	19.0	19.0	20.0	1.0 to 1.3	6.5
MN0	18	21.5	19.0	19.0	20.0	1.0 to 1.3	6.5

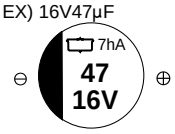
◆PART NUMBERING SYSTEM



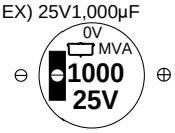
Please refer to "Product code guide (surface mount type)"

◆MARKING

D55 to JA0
EX) 16V47μF



KE0 to HN0
EX) 25V1,000μF



CAT. No. E1001I

NIPPON CHEMI-CON

SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

Downsized, 85℃

Alchip™-MVA Series

◆STANDARD RATINGS

is not solvent resistant.

WV (Vdc)	Cap (μF)	Size code	tanδ	Rated ripple current (mArms/ 85℃,120Hz)	Part No.
4	33	D55	0.42	25	EMVA4R0ADA330MD55G
	47	D55	0.42	30	EMVA4R0ADA470MD55G
	100	E55	0.42	50	EMVA4R0ADA101ME55G
	220	F55	0.42	80	EMVA4R0ADA221MF55G
	330	F80	0.42	135	EMVA4R0ADA331MF80G
	470	F80	0.42	150	EMVA4R0ADA471MF80G
	1,000	HA0	0.42	320	EMVA4R0ADA102MHA0G
6.3	33	D55	0.35	30	EMVA6R3ADA330MD55G
	47	D55	0.35	33	EMVA6R3ADA470MD55G
	100	E55	0.35	55	EMVA6R3ADA101ME55G
	220	F55	0.35	88	EMVA6R3ADA221MF55G
	330	F80	0.35	135	EMVA6R3ADA331MF80G
	470	HA0	0.35	280	EMVA6R3ADA471MHA0G
	680	HA0	0.35	290	EMVA6R3ADA681MHA0G
	820	HA0	0.35	320	EMVA6R3ADA821MHA0G
	1,000	JA0	0.35	430	EMVA6R3ADA102MJA0G
	1,500	JA0	0.35	480	EMVA6R3ADA152MJA0G
	2,200	KE0	0.40	890	EMVA6R3ARA222MKE0S
	3,300	KG5	0.42	1,000	EMVA6R3ARA332MKG5S
	3,300	LH0	0.42	1,200	EMVA6R3□DA332MLH0S
	4,700	LH0	0.44	1,400	EMVA6R3□DA472MLH0S
	6,800	LN0	0.48	1,750	EMVA6R3□DA682MLN0S
	6,800	MH0	0.48	1,700	EMVA6R3□DA682MMH0S
	10,000	MN0	0.56	2,000	EMVA6R3□DA103MMN0S
10	22	D55	0.30	26	EMVA100ADA220MD55G
	33	D55	0.30	30	EMVA100ADA330MD55G
	47	E55	0.30	44	EMVA100ADA470ME55G
	100	F55	0.30	70	EMVA100ADA101MF55G
	150	F55	0.30	79	EMVA100ADA151MF55G
	220	F80	0.30	130	EMVA100ADA221MF80G
	330	HA0	0.30	270	EMVA100ADA331MHA0G
	470	HA0	0.30	280	EMVA100ADA471MHA0G
	1,000	JA0	0.30	430	EMVA100ADA102MJA0G
	2,200	KE0	0.36	960	EMVA100ARA222MKE0S
	3,300	LH0	0.38	1,300	EMVA100□DA332MLH0S
	4,700	LN0	0.40	1,550	EMVA100□DA472MLN0S
	4,700	MH0	0.40	1,600	EMVA100□DA472MMH0S
	6,800	MN0	0.44	1,850	EMVA100□DA682MMN0S
16	22	D55	0.26	26	EMVA160ADA220MD55G
	33	E55	0.26	37	EMVA160ADA330ME55G
	47	E55	0.26	44	EMVA160ADA470ME55G
	100	F55	0.26	70	EMVA160ADA101MF55G
	150	F80	0.26	110	EMVA160ADA151MF80G
	220	F80	0.26	130	EMVA160ADA221MF80G
	330	HA0	0.26	270	EMVA160ADA331MHA0G
	470	HA0	0.26	280	EMVA160ADA471MHA0G
	680	JA0	0.26	380	EMVA160ADA681MJA0G
	1,000	KE0	0.30	710	EMVA160ARA102MKE0S
	2,200	LH0	0.32	1,150	EMVA160□DA222MLH0S
	3,300	LN0	0.34	1,450	EMVA160□DA332MLN0S
	3,300	MH0	0.34	1,450	EMVA160□DA332MMH0S
	4,700	MN0	0.36	1,750	EMVA160□DA472MMN0S
25	10	D55	0.16	24	EMVA250ADA100MD55G
	22	E55	0.16	41	EMVA250ADA220ME55G
	33	E55	0.16	47	EMVA250ADA330ME55G
	47	F55	0.16	60	EMVA250ADA470MF55G
	56	F55	0.16	66	EMVA250ADA560MF55G
	100	F80	0.16	120	EMVA250ADA101MF80G
	150	HA0	0.16	210	EMVA250ADA151MHA0G
	220	HA0	0.16	260	EMVA250ADA221MHA0G
	330	HA0	0.16	300	EMVA250ADA331MHA0G
	470	JA0	0.16	400	EMVA250ADA471MJA0G
	1,000	KE0	0.26	820	EMVA250ARA102MKE0S
	2,200	LN0	0.28	1,450	EMVA250□DA222MLN0S
	2,200	MH0	0.28	1,400	EMVA250□DA222MMH0S
	3,300	MN0	0.30	1,800	EMVA250□DA332MMN0S
35	4.7	D55	0.14	18	EMVA350ADA4R7MD55G
	10	D55	0.14	24	EMVA350ADA100MD55G
	22	E55	0.14	41	EMVA350ADA220ME55G
	33	F55	0.14	54	EMVA350ADA330MF55G
	47	F60	0.14	64	EMVA350ADA470MF60G
	100	F80	0.14	120	EMVA350ADA101MF80G

WV (Vdc)	Cap (μF)	Size code	tanδ	Rated ripple current (mArms/ 85℃,120Hz)	Part No.
35	150	HA0	0.14	210	EMVA350ADA151MHA0G
	220	HA0	0.14	260	EMVA350ADA221MHA0G
	330	JA0	0.14	360	EMVA350ADA331MJA0G
	470	KE0	0.22	600	EMVA350ARA471MKE0S
	1,000	LH0	0.22	1,100	EMVA350□DA102MLH0S
	2,200	MN0	0.24	1,700	EMVA350□DA222MMN0S
50	3.3	D55	0.12	15	EMVA500ADA3R3MD55G
	4.7	D55	0.12	18	EMVA500ADA4R7MD55G
	10	E55	0.12	30	EMVA500ADA100ME55G
	22	F55	0.12	47	EMVA500ADA220MF55G
	33	F80	0.12	70	EMVA500ADA330MF80G
	47	F80	0.12	85	EMVA500ADA470MF80G
	100	HA0	0.12	190	EMVA500ADA101MHA0G
	220	JA0	0.12	320	EMVA500ADA221MJA0G
	330	KE0	0.18	600	EMVA500ARA331MKE0S
	470	KG5	0.18	740	EMVA500ARA471MKG5S
	470	LH0	0.18	850	EMVA500□DA471MLH0S
	1,000	LN0	0.18	1,300	EMVA500□DA102MLN0S
	1,000	MN0	0.18	1,400	EMVA500□DA102MMN0S
63	0.10	D55	0.12	1.3	EMVA630ADAR10MD55G
	0.22	D55	0.12	3.0	EMVA630ADAR22MD55G
	0.33	D55	0.12	4.0	EMVA630ADAR33MD55G
	0.47	D55	0.12	5.0	EMVA630ADAR47MD55G
	1.0	D55	0.12	8.0	EMVA630ADA1R0MD55G
	2.2	D55	0.12	12	EMVA630ADA2R2MD55G
	3.3	E55	0.12	17	EMVA630ADA3R3ME55G
	4.7	E55	0.12	20	EMVA630ADA4R7ME55G
	10	F55	0.12	32	EMVA630ADA100MF55G
	22	F80	0.12	60	EMVA630ADA220MF80G
	33	HA0	0.12	110	EMVA630ADA330MHA0G
	47	HA0	0.12	130	EMVA630ADA470MHA0G
	56	JA0	0.12	160	EMVA630ADA560MJA0G
	68	JA0	0.12	170	EMVA630ADA680MJA0G
	100	KE0	0.14	380	EMVA630ARA101MKE0S
	220	KE0	0.14	580	EMVA630ARA221MKE0S
	330	KG5	0.14	720	EMVA630ARA331MKG5S
	330	LH0	0.14	820	EMVA630□DA331MLH0S
	470	LH0	0.14	950	EMVA630□DA471MLH0S
	470	MH0	0.14	1,000	EMVA630□DA471MMH0S
100	22	HA0	0.12	90	EMVA101ADA220MHA0G
	33	JA0	0.12	120	EMVA101ADA330MJA0G
	68	KE0	0.10	380	EMVA101ARA680MKE0S
	100	KE0	0.10	440	EMVA101ARA101MKE0S
	220	LN0	0.10	850	EMVA101□DA221MLN0S
	220	MH0	0.10	800	EMVA101□DA221MMH0S
	330	MN0	0.10	1,000	EMVA101□DA331MMN0S
160	47	KG5	0.20	370	EMVA161ARA470MKG5S
	68	LH0	0.20	500	EMVA161□DA680MLH0S
	100	LN0	0.20	590	EMVA161□DA101MLN0S
	100	MH0	0.20	590	EMVA161□DA101MMH0S
200	22	KE0	0.20	240	EMVA201ARA220MKE0S
	33	KG5	0.20	310	EMVA201ARA330MKG5S
	47	LH0	0.20	420	EMVA201□DA470MLH0S
	68	LN0	0.20	510	EMVA201□DA680MLN0S
	68	MH0	0.20	510	EMVA201□DA680MMH0S
	100	MN0	0.20	590	EMVA201□DA101MMN0S
250	10	KE0	0.20	150	EMVA251ARA100MKE0S
	22	KG5	0.20	240	EMVA251ARA220MKG5S
	33	LH0	0.20	340	EMVA251□DA330MLH0S
	47	LN0	0.20	420	EMVA251□DA470MLN0S
	47	MH0	0.20	420	EMVA251□DA470MMH0S
	68	MN0	0.20	490	EMVA251□DA680MMN0S
400	4.7	KE0	0.25	120	EMVA401ARA4R7MKE0S
	10	LH0	0.25	140	EMVA401□DA100MLH0S
	22	LN0	0.25	280	EMVA401□DA220MLN0S
	22	MH0	0.25	280	EMVA401□DA220MMH0S
	33	MN0	0.25	350	EMVA401□DA330MMN0S
450	4.7	KE0	0.25	120	EMVA451ARA4R7MKE0S
	10	LH0	0.25	140	EMVA451□DA100MLH0S
	22	LN0	0.25	280	EMVA451□DA220MLN0S
	33	MN0	0.25	350	EMVA451□DA330MMN0S

□ : Enter the appropriate terminal code.

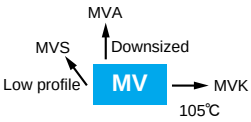
NIPPON CHEMI-CON

SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

Standard, 85℃

Alchip™-MV Series

- Height 5.2 to 10.0mm
- Suitable to fit for downsized equipment
- Solvent resistant type (see PRECAUTIONS AND GUIDELINES)
- **RoHS Compliant**

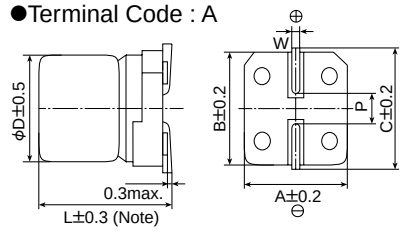


◆SPECIFICATIONS

Items	Characteristics									
Category Temperature Range	−40 to +85℃									
Rated Voltage Range	4 to 63Vdc									
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)									(at 20℃ after 2 minutes)
Dissipation Factor (tanδ)	Rated voltage (Vdc)		4V	6.3V	10V	16V	25V	35V	50V	63V
	tanδ (Max.)	B55	0.42	0.27	0.23	0.19	0.16	0.14	0.12	—
		D55 to F60	0.42	0.24	0.20	0.16	0.14	0.12	0.10	0.12
		H63 to JA0	—	0.40	0.30	0.26	0.16	0.14	0.12	0.12
										(at 20℃,120Hz)
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (Vdc)		4V	6.3V	10V	16V	25V	35V	50V	63V
	Z(−25℃)/Z(+20℃)		7	4	3	2	2	2	2	2
	Z(−40℃)/Z(+20℃)	B55	17	10	8	6	4	3	3	—
		D55 to F60	15	10	8	6	4	3	3	3
		H63 to JA0	—	10	8	6	4	3	3	3
										(at 120Hz)
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated voltage is applied for 2,000 hours (B55 size 1,000 hours) at 85℃.									
	Capacitance change	≦±20% of the initial value								
	D.F. (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 500 hours at 85℃ without voltage applied. Before the measurement, the capacitor shall be preconditioned by applying voltage according to Item 4.1 of JIS C 5101-4.									
	Case code	B55	D55 to JA0							
	Capacitance change	≦±20% of the initial value	≦±15% of the initial value							
	D.F. (tanδ)	≦200% of the initial specified value	≦150% of the initial specified value							
	Leakage current	≦The initial specified value	≦The initial specified value							

◆DIMENSIONS [mm]

●Terminal Code : A

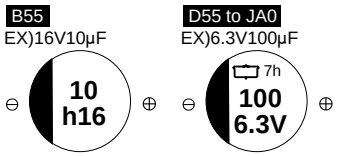


Note : L±0.5 for H63 to JA0

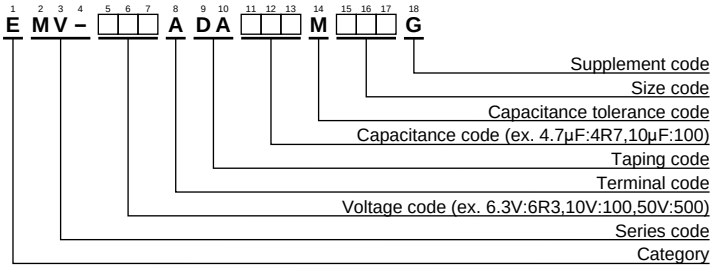
Size code	D	L	A	B	C	W	P
B55	3	5.2	3.3	3.3	3.7	0.45 to 0.75	0.8
D55 & D60	4	*5.2	4.3	4.3	5.1	0.5 to 0.8	1.0
E55 & E60	5	*5.2	5.3	5.3	5.9	0.5 to 0.8	1.4
F55 & F60	6.3	*5.2	6.6	6.6	7.2	0.5 to 0.8	1.9
H63	8	6.3	8.3	8.3	9.0	0.5 to 0.8	2.3
HA0	8	10.0	8.3	8.3	9.0	0.7 to 1.1	3.1
JA0	10	10.0	10.3	10.3	11.0	0.7 to 1.1	4.5

* : L=5.7 for D60, E60 and F60.

◆MARKING



◆PART NUMBERING SYSTEM



Please refer to "Product code guide (surface mount type)"

CAT. No. E1001I

NIPPON CHEMI-CON

SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

Standard, 85℃

Alchip™-MV Series

◆STANDARD RATINGS

WV (Vdc)	Cap (μF)	Size code	tanδ	Rated ripple current (mArms/ 85℃,120Hz)	Part No.
4	(22)	(B55)	(0.42)	(14)	EMV-4R0ADA220MB55G
	33	D55	0.42	23	EMV-4R0ADA330MD55G
	47	D55	0.42	27	EMV-4R0ADA470MD55G
	(68)	(E55)	(0.42)	(38)	EMV-4R0ADA680ME55G
	100	E55	0.42	46	EMV-4R0ADA101ME55G
	220	F55	0.42	74	EMV-4R0ADA221MF55G
6.3	(15)	(B55)	(0.27)	(14.5)	EMV-6R3ADA150MB55G
	(22)	(B55)	(0.27)	(17.5)	EMV-6R3ADA220MB55G
	22	D55	0.24	23	EMV-6R3ADA220MD55G
	47	E55	0.24	38	EMV-6R3ADA470ME55G
	100	F55	0.24	60	EMV-6R3ADA101MF55G
	330	H63	0.40	190	EMV-6R3ADA331MH63G
	470	HA0	0.40	265	EMV-6R3ADA471MHA0G
	1,000	JA0	0.40	400	EMV-6R3ADA102MJA0G
10	(10)	(B55)	(0.23)	(12.8)	EMV-100ADA100MB55G
	(15)	(D55)	(0.20)	(20)	EMV-100ADA150MD55G
	33	E55	0.20	35	EMV-100ADA330ME55G
	(68)	(F55)	(0.20)	(54)	EMV-100ADA680MF55G
	100	F60	0.20	70	EMV-100ADA101MF60G
	220	H63	0.30	175	EMV-100ADA221MH63G
16	(6.8)	(B55)	(0.19)	(11.6)	EMV-160ADA6R8MB55G
	(10)	(B55)	(0.19)	(14)	EMV-160ADA100MB55G
	10	D55	0.16	17	EMV-160ADA100MD55G
	(15)	(E55)	(0.16)	(26)	EMV-160ADA150ME55G
	22	E55	0.16	32	EMV-160ADA220ME55G
	47	F55	0.16	50	EMV-160ADA470MF55G
	(68)	(F60)	(0.16)	(78)	EMV-160ADA680MF60G
	220	HA0	0.26	215	EMV-160ADA221MHA0G
	330	HA0	0.26	270	EMV-160ADA331MHA0G
	470	JA0	0.26	330	EMV-160ADA471MJA0G
25	(4.7)	(B55)	(0.16)	(10.5)	EMV-250ADA4R7MB55G
	(6.8)	(D55)	(0.14)	(16)	EMV-250ADA6R8MD55G
	33	F55	0.14	45	EMV-250ADA330MF55G
	47	F60	0.14	65	EMV-250ADA470MF60G
	(68)	(H63)	(0.16)	(115)	EMV-250ADA680MH63G
	100	H63	0.16	145	EMV-250ADA101MH63G
	330	JA0	0.16	305	EMV-250ADA331MJA0G
35	(2.2)	(B55)	(0.14)	(7.7)	EMV-350ADA2R2MB55G
	(3.3)	(B55)	(0.14)	(9.4)	EMV-350ADA3R3MB55G
	4.7	D55	0.12	15	EMV-350ADA4R7MD55G
	(6.8)	(E55)	(0.12)	(20)	EMV-350ADA6R8ME55G
	10	E55	0.12	25	EMV-350ADA100ME55G
	(15)	(F55)	(0.12)	(33)	EMV-350ADA150MF55G
	22	F55	0.12	40	EMV-350ADA220MF55G
	33	F60	0.12	55	EMV-350ADA330MF60G
	47	H63	0.14	105	EMV-350ADA470MH63G
	(68)	(HA0)	(0.14)	(157)	EMV-350ADA680MHA0G
	100	HA0	0.14	175	EMV-350ADA101MHA0G
	220	JA0	0.14	265	EMV-350ADA221MJA0G

WV (Vdc)	Cap (μF)	Size code	tanδ	Rated ripple current (mArms/ 85℃,120Hz)	Part No.
50	(0.10)	(B55)	(0.12)	(1.0)	EMV-500ADAR10MB55G
	0.10	D55	0.10	1.3	EMV-500ADAR10MD55G
	(0.15)	(B55)	(0.12)	(2.0)	EMV-500ADAR15MB55G
	(0.15)	(D55)	(0.10)	(2.0)	EMV-500ADAR15MD55G
	(0.22)	(B55)	(0.12)	(2.0)	EMV-500ADAR22MB55G
	0.22	D55	0.10	2.9	EMV-500ADAR22MD55G
	(0.33)	(B55)	(0.12)	(3.0)	EMV-500ADAR33MB55G
	0.33	D55	0.10	3.5	EMV-500ADAR33MD55G
	(0.47)	(B55)	(0.12)	(3.8)	EMV-500ADAR47MB55G
	0.47	D55	0.10	4.2	EMV-500ADAR47MD55G
	(0.68)	(B55)	(0.12)	(4.6)	EMV-500ADAR68MB55G
	(0.68)	(D55)	(0.10)	(5.1)	EMV-500ADAR68MD55G
	(1.0)	(B55)	(0.12)	(5.6)	EMV-500ADA1R0MB55G
	1.0	D55	0.10	6.2	EMV-500ADA1R0MD55G
	(1.5)	(B55)	(0.12)	(6.9)	EMV-500ADA1R5MB55G
	(1.5)	(D55)	(0.10)	(7.5)	EMV-500ADA1R5MD55G
	(2.2)	(B55)	(0.12)	(8.3)	EMV-500ADA2R2MB55G
	2.2	D55	0.10	10	EMV-500ADA2R2MD55G
	3.3	D55	0.10	14	EMV-500ADA3R3MD55G
	4.7	E55	0.10	19	EMV-500ADA4R7ME55G
	(6.8)	(F55)	(0.10)	(24)	EMV-500ADA6R8MF55G
	10	F55	0.10	29	EMV-500ADA100MF55G
	(15)	(F60)	(0.10)	(32)	EMV-500ADA150MF60G
	22	F60	0.10	45	EMV-500ADA220MF60G
	33	H63	0.12	95	EMV-500ADA330MH63G
	47	HA0	0.12	140	EMV-500ADA470MHA0G
	(68)	(JA0)	(0.12)	(170)	EMV-500ADA680MJA0G
	100	JA0	0.12	195	EMV-500ADA101MJA0G
63	0.10	D55	0.12	1.3	EMV-630ADAR10MD55G
	(0.15)	(D55)	(0.12)	(2.0)	EMV-630ADAR15MD55G
	0.22	D55	0.12	2.9	EMV-630ADAR22MD55G
	0.33	D55	0.12	3.5	EMV-630ADAR33MD55G
	0.47	D55	0.12	4.2	EMV-630ADAR47MD55G
	(0.68)	(D55)	(0.12)	(5.1)	EMV-630ADAR68MD55G
	1.0	D60	0.12	7.0	EMV-630ADA1R0MD60G
	(1.5)	(D60)	(0.12)	(8.4)	EMV-630ADA1R5MD60G
	2.2	D60	0.12	10	EMV-630ADA2R2MD60G
	3.3	E60	0.12	13	EMV-630ADA3R3ME60G
	4.7	F60	0.12	18.5	EMV-630ADA4R7MF60G
	(6.8)	(F60)	(0.12)	(21)	EMV-630ADA6R8MF60G
	10	HA0	0.12	46	EMV-630ADA100MHA0G
	(15)	(HA0)	(0.12)	(52)	EMV-630ADA150MHA0G
	22	HA0	0.12	69	EMV-630ADA220MHA0G
	33	HA0	0.12	85	EMV-630ADA330MHA0G
	47	HA0	0.12	101	EMV-630ADA470MHA0G
	(68)	(JA0)	(0.12)	(125)	EMV-630ADA680MJA0G

( ) : Second standard

NIPPON CHEMI-CON

SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

Downsized, 105℃

Alchip™-MVE Series

- Rated voltage range : 6.3 to 450V, capacitance range : 0.47 to 6,800μF
- Endurance : 1,000 to 2,000 hours at 105℃
- Case size range : φ4×5.2L to φ18×21.5L
- Solvent resistant type except 100 to 450Vdc (see PRECAUTIONS AND GUIDELINES)
- **RoHS Compliant**

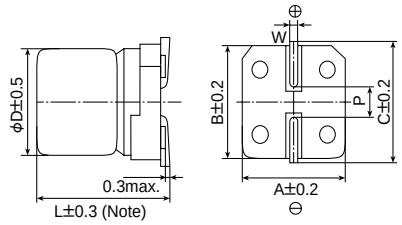
MVE
↑ Downsized, Expanded case sizes
MVK

◆SPECIFICATIONS

Items	Characteristics											
Category Temperature Range	-40 to +105℃											
Rated Voltage Range	6.3 to 450Vdc											
Capacitance Tolerance	±20%(M)											(20℃, 120Hz)
Leakage Current	Rated voltage(Vdc)	6.3 to 100V								160 to 450V		
	D55 to JA0	I=0.01CV or 3μA, whichever is greater (2 minutes)								—		
	KE0 to MN0	I=0.03CV or 4μA, whichever is greater (1 minute)								I=0.04CV+100μA (1minute)		
	Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V)											(20℃)
Dissipation Factor (tanδ)	See STANDARD RATINGS											(20℃, 120Hz)
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (Vdc)		6.3V	10V	16V	25V	35V	50V	63V	100V	160 to 250V	400 to 450V
	D55 to JA0	Z(-25℃)/Z(+20℃)	4	3	2	2	2	2	2	3	—	—
		Z(-40℃)/Z(+20℃)	12	8	6	4	3	3	3	4	—	—
	KE0 to MN0	Z(-25℃)/Z(+20℃)	5	4	3	2	2	2	2	2	3	6
		Z(-40℃)/Z(+20℃)	10	8	6	4	3	3	3	3	6	10 (120Hz)
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated voltage is applied for the specified period of time at 105℃.											
	Size code	D55 to F80	HA0 to MN0									
	Time	1,000 hours	2,000 hours									
	Capacitance change	≦±30% of the initial value	≦±20% of the initial value									
	D.F. (tanδ)	≦300% of the initial specified value	≦200% 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 1,000 hours (500 hours for B55 to F80 size) at 105℃ without voltage applied. Before the measurement, the capacitor shall be preconditioned by applying voltage according to Item 4.1 of JIS C 5101-4.											
	Size code	D55 to F80	HA0 to MN0									
	Capacitance change	≦±25% of the initial value	≦±20% of the initial value									
	D.F. (tanδ)	≦200% of the initial specified value	≦200% of the initial specified value									
	Leakage current	≦The initial specified value	≦The initial specified value									

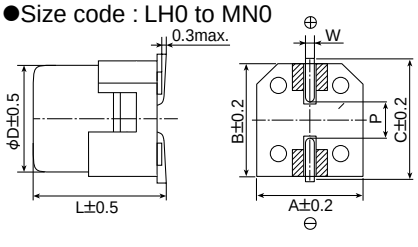
◆DIMENSIONS [mm]

- Terminal Code : A
- Size code : D55 to MN0



Note : L±0.5 for HA0 to MN0

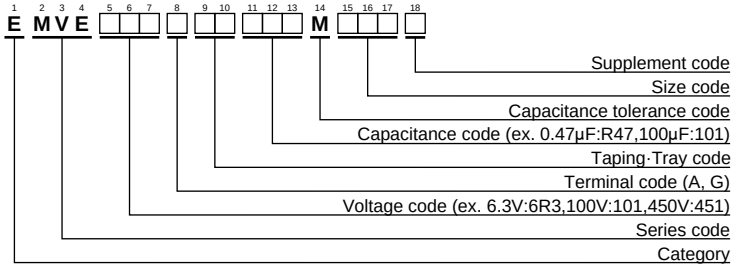
- Terminal Code : G
- Size code : LH0 to MN0



▨ : Dummy terminals

Size code	D	L	A	B	C	W	P
D55	4	5.2	4.3	4.3	5.1	0.5 to 0.8	1.0
E55	5	5.2	5.3	5.3	5.9	0.5 to 0.8	1.4
F55	6.3	5.2	6.6	6.6	7.2	0.5 to 0.8	1.9
F60	6.3	5.7	6.6	6.6	7.2	0.5 to 0.8	1.9
F80	6.3	7.7	6.6	6.6	7.2	0.5 to 0.8	1.9
HA0	8	10.0	8.3	8.3	9.0	0.7 to 1.1	3.1
JA0	10	10.0	10.3	10.3	11.0	0.7 to 1.1	4.5
KE0	12.5	13.5	13.0	13.0	13.7	1.0 to 1.3	4.2
KG5	12.5	16.0	13.0	13.0	13.7	1.0 to 1.3	4.2
LH0	16	16.5	17.0	17.0	18.0	1.0 to 1.3	6.5
LN0	16	21.5	17.0	17.0	18.0	1.0 to 1.3	6.5
MH0	18	16.5	19.0	19.0	20.0	1.0 to 1.3	6.5
MN0	18	21.5	19.0	19.0	20.0	1.0 to 1.3	6.5

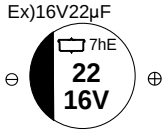
◆PART NUMBERING SYSTEM



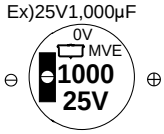
Please refer to "Product code guide (surface mount type)"

◆MARKING

D55 to JA0
Ex)16V22μF



KE0 to MN0
Ex)25V1,000μF



CAT. No. E1001I

NIPPON CHEMI-CON

SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

Downsized, 105℃

Alchip™-MVE Series

◆STANDARD RATINGS

is not solvent resistant.

WV (Vdc)	Cap (μF)	Size code	tanδ	Rated ripple current (mArms/ 105℃,120Hz)	Part No.
6.3	22	D55	0.30	22	EMVE6R3ADA220MD55G
	33	E55	0.30	34	EMVE6R3ADA330ME55G
	47	E55	0.30	38	EMVE6R3ADA470ME55G
	100	F55	0.30	69	EMVE6R3ADA101MF55G
	220	F80	0.45	120	EMVE6R3ADA221MF80G
	330	HA0	0.40	290	EMVE6R3ADA331MHA0G
	470	HA0	0.45	320	EMVE6R3ADA471MHA0G
	680	HA0	0.45	340	EMVE6R3ADA681MHA0G
	1,000	JA0	0.40	410	EMVE6R3ADA102MJA0G
	1,500	JA0	0.45	550	EMVE6R3ADA152MJA0G
	2,200	KE0	0.40	680	EMVE6R3ARA222MKE0S
	2,200	LH0	0.40	840	EMVE6R3□DA222MLH0S
	3,300	KG5	0.42	850	EMVE6R3ARA332MKG5S
	3,300	MH0	0.42	1,000	EMVE6R3□DA332MMH0S
	4,700	LN0	0.44	1,200	EMVE6R3□DA472MLN0S
	4,700	MH0	0.44	1,200	EMVE6R3□DA472MMH0S
	6,800	LN0	0.48	1,200	EMVE6R3□DA682MLN0S
	6,800	MN0	0.48	1,350	EMVE6R3□DA682MMN0S
10	22	E55	0.24	30	EMVE100ADA220ME55G
	33	E55	0.24	34	EMVE100ADA330ME55G
	47	F55	0.24	48	EMVE100ADA470MF55G
	100	F55	0.30	69	EMVE100ADA101MF55G
	150	F80	0.35	100	EMVE100ADA151MF80G
	220	F80	0.35	120	EMVE100ADA221MF80G
	330	HA0	0.35	290	EMVE100ADA331MHA0G
	470	HA0	0.35	320	EMVE100ADA471MHA0G
	1,000	JA0	0.35	410	EMVE100ADA102MJA0G
	2,200	KG5	0.36	750	EMVE100ARA222MKG5S
	2,200	LH0	0.36	850	EMVE100□DA222MLH0S
	3,300	LH0	0.38	1,000	EMVE100□DA332MLH0S
	3,300	MH0	0.38	1,100	EMVE100□DA332MMH0S
	4,700	LN0	0.40	1,300	EMVE100□DA472MLN0S
	4,700	MN0	0.40	1,350	EMVE100□DA472MMN0S
16	10	D55	0.20	17	EMVE160ADA100MD55G
	22	E55	0.20	30	EMVE160ADA220ME55G
	33	F55	0.20	45	EMVE160ADA330MF55G
	47	F55	0.20	48	EMVE160ADA470MF55G
	100	F55	0.26	69	EMVE160ADA101MF55G
	150	F80	0.28	100	EMVE160ADA151MF80G
	220	F80	0.28	120	EMVE160ADA221MF80G
	330	HA0	0.28	290	EMVE160ADA331MHA0G
	470	HA0	0.28	320	EMVE160ADA471MHA0G
	680	JA0	0.28	470	EMVE160ADA681MJA0G
	1,000	KE0	0.30	550	EMVE160ARA102MKE0S
	1,000	LH0	0.30	650	EMVE160□DA102MLH0S
	2,200	LH0	0.32	950	EMVE160□DA222MLH0S
	2,200	MH0	0.32	1,000	EMVE160□DA222MMH0S
	3,300	LN0	0.34	1,200	EMVE160□DA332MLN0S
	3,300	MH0	0.34	1,200	EMVE160□DA332MMH0S
25	10	E55	0.16	27	EMVE250ADA100ME55G
	22	F55	0.16	44	EMVE250ADA220MF55G
	33	F55	0.16	50	EMVE250ADA330MF55G
	47	F55	0.16	60	EMVE250ADA470MF55G
	100	F80	0.18	100	EMVE250ADA101MF80G
	150	HA0	0.18	240	EMVE250ADA151MHA0G
	220	HA0	0.18	320	EMVE250ADA221MHA0G
	330	JA0	0.16	450	EMVE250ADA331MJA0G
	470	JA0	0.18	490	EMVE250ADA471MJA0G
	1,000	LH0	0.26	820	EMVE250□DA102MLH0S
	1,000	MH0	0.26	880	EMVE250□DA102MMH0S
	2,200	LN0	0.28	1,250	EMVE250□DA222MLN0S
	2,200	MN0	0.28	1,300	EMVE250□DA222MMN0S
35	4.7	D55	0.14	16	EMVE350ADA4R7MD55G
	10	E55	0.14	27	EMVE350ADA100ME55G
	22	F55	0.14	44	EMVE350ADA220MF55G
	33	F60	0.14	54	EMVE350ADA330MF60G
	47	F80	0.16	80	EMVE350ADA470MF80G
	100	F80	0.16	100	EMVE350ADA101MF80G
	150	HA0	0.16	260	EMVE350ADA151MHA0G
	220	JA0	0.16	375	EMVE350ADA221MJA0G
	330	JA0	0.16	450	EMVE350ADA331MJA0G

WV (Vdc)	Cap (μF)	Size code	tanδ	Rated ripple current (mArms/ 105℃,120Hz)	Part No.
35	470	KE0	0.22	520	EMVE350ARA471MKE0S
	470	LH0	0.22	650	EMVE350□DA471MLH0S
	1,000	LH0	0.22	750	EMVE350□DA102MLH0S
	1,000	MH0	0.22	1,000	EMVE350□DA102MMH0S
	2,200	MN0	0.24	1,450	EMVE350□DA222MMN0S
50	0.47	D55	0.12	5.0	EMVE500ADAR47MD55G
	1.0	D55	0.12	8.0	EMVE500ADA1R0MD55G
	2.2	D55	0.12	12	EMVE500ADA2R2MD55G
	3.3	D55	0.12	15	EMVE500ADA3R3MD55G
	4.7	E55	0.12	20	EMVE500ADA4R7ME55G
	10	F55	0.12	32	EMVE500ADA100MF55G
	22	F60	0.12	47	EMVE500ADA220MF60G
	33	F80	0.14	65	EMVE500ADA330MF80G
	47	F80	0.14	80	EMVE500ADA470MF80G
	100	HA0	0.14	230	EMVE500ADA101MHA0G
	220	JA0	0.14	375	EMVE500ADA221MJA0G
	330	KE0	0.18	500	EMVE500ARA331MKE0S
	330	LH0	0.18	600	EMVE500□DA331MLH0S
	470	LH0	0.18	700	EMVE500□DA471MLH0S
	470	MH0	0.18	750	EMVE500□DA471MMH0S
	1,000	MN0	0.18	1,200	EMVE500□DA102MMN0S
63	0.47	D55	0.12	5.0	EMVE630ADAR47MD55G
	1.0	D55	0.12	8.0	EMVE630ADA1R0MD55G
	2.2	D55	0.12	12	EMVE630ADA2R2MD55G
	3.3	E55	0.12	17	EMVE630ADA3R3ME55G
	4.7	F55	0.12	22	EMVE630ADA4R7MF55G
	10	F55	0.12	32	EMVE630ADA100MF55G
	22	F80	0.12	58	EMVE630ADA220MF80G
	33	HA0	0.12	140	EMVE630ADA330MHA0G
	47	HA0	0.12	170	EMVE630ADA470MHA0G
	100	JA0	0.12	310	EMVE630ADA101MJA0G
	220	KE0	0.14	470	EMVE630ARA221MKE0S
	220	LH0	0.14	560	EMVE630□DA221MLH0S
	330	LH0	0.14	700	EMVE630□DA331MLH0S
	330	MH0	0.14	750	EMVE630□DA331MMH0S
	470	LN0	0.14	900	EMVE630□DA471MLN0S
	470	MH0	0.14	900	EMVE630□DA471MMH0S
100	22	HA0	0.12	100	EMVE101ADA220MHA0G
	33	JA0	0.12	150	EMVE101ADA330MJA0G
	47	KE0	0.10	250	EMVE101ARA470MKE0S
	68	KE0	0.10	300	EMVE101ARA680MKE0S
	100	KE0	0.10	380	EMVE101ARA101MKE0S
	100	LH0	0.10	450	EMVE101□DA101MLH0S
	220	LN0	0.10	750	EMVE101□DA221MLN0S
	220	MH0	0.10	750	EMVE101□DA221MMH0S
	330	MN0	0.10	980	EMVE101□DA331MMN0S
160	33	KE0	0.15	95	EMVE161ARA330MKE0S
	47	LH0	0.15	260	EMVE161□DA470MLH0S
	68	LN0	0.15	320	EMVE161□DA680MLN0S
	68	MH0	0.15	320	EMVE161□DA680MMH0S
	100	LN0	0.15	380	EMVE161□DA101MLN0S
200	10	KE0	0.15	80	EMVE201ARA100MKE0S
	22	KG5	0.15	110	EMVE201ARA220MKG5S
	33	LH0	0.15	220	EMVE201□DA330MLH0S
	47	LN0	0.15	270	EMVE201□DA470MLN0S
	47	MH0	0.15	270	EMVE201□DA470MMH0S
	68	MN0	0.15	330	EMVE201□DA680MMN0S
250	4.7	KE0	0.15	65	EMVE251ARA4R7MKE0S
	10	KG5	0.15	105	EMVE251ARA100MKG5S
	22	LH0	0.15	180	EMVE251□DA220MLH0S
	33	LN0	0.15	230	EMVE251□DA330MLN0S
	33	MH0	0.15	230	EMVE251□DA330MMH0S
	47	MN0	0.15	280	EMVE251□DA470MMN0S
400	4.7	KG5	0.20	50	EMVE401ARA4R7MKG5S
	10	LH0	0.20	85	EMVE401□DA100MLH0S
	22	MN0	0.20	130	EMVE401□DA220MMN0S
450	3.3	KE0	0.20	40	EMVE451ARA3R3MKE0S
	4.7	KG5	0.20	50	EMVE451ARA4R7MKG5S
	10	LH0	0.20	85	EMVE451□DA100MLH0S
	22	MN0	0.20	130	EMVE451□DA220MMN0S

□ : Enter the appropriate terminal code.

CAT. No. E1001I

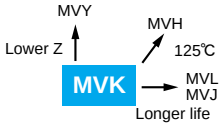
NIPPON CHEMI-CON

SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

Standard, 105℃

Alchip™-MVK Series

- Endurance : 1,000 to 2,000 hours at 105℃
- Suitable to fit for downsized equipment
- Solvent resistant type (see PRECAUTIONS AND GUIDELINES)
- **RoHS Compliant**

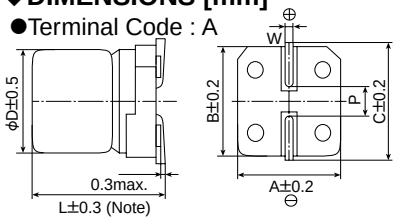


◆SPECIFICATIONS

Items	Characteristics							
Category Temperature Range	−40 to +105℃							
Rated Voltage Range	6.3 to 50Vdc							
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)							(at 20℃ after 2 minutes)
Dissipation Factor (tanδ)	Rated voltage (Vdc)		6.3V	10V	16V	25V	35V	50V
	tanδ (Max.)	D55 to F55	0.30	0.24	0.20	0.16	0.14	0.12
		H63 to JA0	0.40	0.30	0.26	0.16	0.14	0.12
								(at 20℃,120Hz)
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (Vdc)		6.3V	10V	16V	25V	35V	50V
	Z(−25℃)/Z(+20℃)		4	3	2	2	2	2
	Z(−40℃)/Z(+20℃)		10	8	6	4	3	3
								(at 120Hz)
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated voltage is applied for the specified period of time at 105℃.							
	Case code		D55 to F55		H63 to JA0			
	Time		1,000hours		2,000hours			
	Capacitance change		≦±30% of the initial value		≦±20% of the initial value			
	D.F. (tanδ)		≦300% of the initial specified value		≦200% 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 the specified time at 105℃ without voltage applied. Before the measurement, the capacitor shall be preconditioned by applying voltage according to Item 4.1 of JIS C 5101-4.							
	Case code		D55 to F55		H63 to JA0			
	Time		500hours		1,000hours			
	Capacitance change		≦±25% of the initial value		≦±20% of the initial value			
	D.F. (tanδ)		≦200% of the initial specified value		≦200% of the initial specified value			
	Leakage current		≦The initial specified value		≦The initial specified value			

◆DIMENSIONS [mm]

●Terminal Code : A

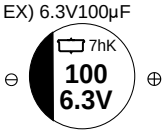


Note : L±0.5 for H63 to JA0

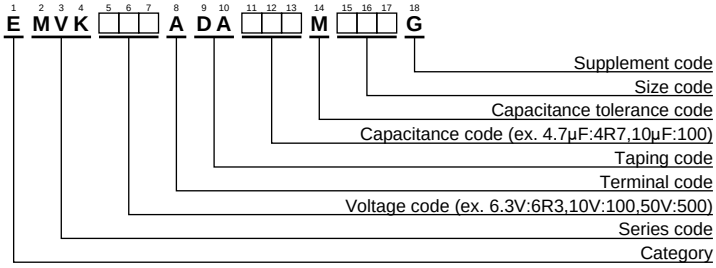
Size code	D	L	A	B	C	W	P
D55	4	5.2	4.3	4.3	5.1	0.5 to 0.8	1.0
E55	5	5.2	5.3	5.3	5.9	0.5 to 0.8	1.4
F55	6.3	5.2	6.6	6.6	7.2	0.5 to 0.8	1.9
H63	8	6.3	8.3	8.3	9.0	0.5 to 0.8	2.3
HA0	8	10.0	8.3	8.3	9.0	0.7 to 1.1	3.1
JA0	10	10.0	10.3	10.3	11.0	0.7 to 1.1	4.5

◆MARKING

EX) 6.3V100μF



◆PART NUMBERING SYSTEM



Please refer to "Product code guide (surface mount type)"

CAT. No. E1001I

NIPPON CHEMI-CON

SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

Standard, 105℃

Alchip™-MVK Series

◆STANDARD RATINGS

WV (Vdc)	Cap (μF)	Case code	tanδ	Rated ripple current (mArms/ 105℃,120Hz)	Part No.
6.3	22	D55	0.30	21	EMVK6R3ADA220MD55G
	47	E55	0.30	36	EMVK6R3ADA470ME55G
	100	F55	0.30	56	EMVK6R3ADA101MF55G
	330	HA0	0.40	290	EMVK6R3ADA331MHA0G
	1,000	JA0	0.40	410	EMVK6R3ADA102MJA0G
10	33	E55	0.24	34	EMVK100ADA330ME55G
	100	H63	0.30	90	EMVK100ADA101MH63G
	220	HA0	0.30	180	EMVK100ADA221MHA0G
16	10	D55	0.20	16	EMVK160ADA100MD55G
	22	E55	0.20	30	EMVK160ADA220ME55G
	47	F55	0.20	48	EMVK160ADA470MF55G
	470	JA0	0.26	460	EMVK160ADA471MJA0G
25	33	F55	0.16	45	EMVK250ADA330MF55G
	47	H63	0.16	80	EMVK250ADA470MH63G
	100	HA0	0.16	180	EMVK250ADA101MHA0G
	330	JA0	0.16	450	EMVK250ADA331MJA0G
35	4.7	D55	0.14	15	EMVK350ADA4R7MD55G
35	10	E55	0.14	25	EMVK350ADA100ME55G
	22	F55	0.14	40	EMVK350ADA220MF55G
	33	H63	0.14	80	EMVK350ADA330MH63G
	220	JA0	0.14	375	EMVK350ADA221MJA0G
50	0.10	D55	0.12	1.3	EMVK500ADAR10MD55G
	0.22	D55	0.12	2.6	EMVK500ADAR22MD55G
	0.33	D55	0.12	3.2	EMVK500ADAR33MD55G
	0.47	D55	0.12	3.8	EMVK500ADAR47MD55G
	1.0	D55	0.12	5.6	EMVK500ADA1R0MD55G
	2.2	D55	0.12	10	EMVK500ADA2R2MD55G
	3.3	D55	0.12	14	EMVK500ADA3R3MD55G
	4.7	E55	0.12	19	EMVK500ADA4R7ME55G
	10	F55	0.12	29	EMVK500ADA100MF55G
	22	H63	0.12	70	EMVK500ADA220MH63G
	33	HA0	0.12	140	EMVK500ADA330MHA0G
	47	HA0	0.12	170	EMVK500ADA470MHA0G
	100	JA0	0.12	310	EMVK500ADA101MJA0G

NIPPON CHEMI-CON

SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

Lower impedance, 105℃

Alchip™-MZA Series

- Lowest impedance, 2,000 hours at 105℃
- Solvent resistant type
- **RoHS Compliant**

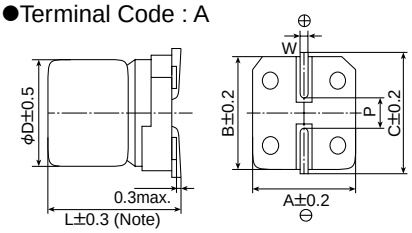
MZA
↑ Lower Z
MVY

◆SPECIFICATIONS

Items	Characteristics									
Category Temperature Range	-55 to +105℃									
Rated Voltage Range	6.3 to 80Vdc									
Capacitance Tolerance	±20%(M)									(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)									(at 20℃ after 2 minutes)
Dissipation Factor (tanδ)	Rated voltage(Vdc)	6.3V	10V	16V	25V	35V	50V	63V	80V	
	tanδ (Max.)	0.26	0.19	0.16	0.14	0.12	0.10	0.08	0.08	(20℃, 120Hz)
Low Temperature Characteristics (Max. impedance Ratio)	Rated voltage(Vdc)	6.3V	10V	16V	25V	35V	50V	63V	80V	
	Z(-25℃)/Z(+20℃)	2	2	2	2	2	2	2	2	
	Z(-40℃)/Z(+20℃)	3	3	3	3	3	3	3	3	
	Z(-55℃)/Z(+20℃)	4	4	4	3	3	3	3	3	(120Hz)
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	≦±30% of the initial value								
	D.F. (tanδ)	≦200% of the initial specified value								
	Leakage current	≦The initial specified value								

◆DIMENSIONS [mm]

●Terminal Code : A

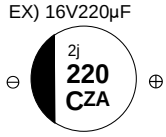


Note : L±0.5 for HA0 and JA0

Size code	D	L	A	B	C	W	P
D61	4	5.8	4.3	4.3	5.1	0.5 to 0.8	1.0
E61	5	5.8	5.3	5.3	5.9	0.5 to 0.8	1.4
F61	6.3	5.8	6.6	6.6	7.2	0.5 to 0.8	1.9
F80	6.3	7.7	6.6	6.6	7.2	0.5 to 0.8	1.9
HA0	8	10.0	8.3	8.3	9.0	0.7 to 1.1	3.1
JA0	10	10.0	10.3	10.3	11.0	0.7 to 1.1	4.5

◆MARKING

EX) 16V220μF



●Rated voltage symbol

Rated voltage (Vdc)	Symbol
6.3	j
10	A
16	C
25	E
35	V
50	H
63	J
80	K

◆PART NUMBERING SYSTEM

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
E	M	Z	A				A	D	A				M				G

Supplement code
Size code
Capacitance tolerance code
Capacitance code (ex. 4.7μF:4R7,10μF:100)
Taping code
Terminal code
Voltage code (ex. 6.3V:6R3,10V:100,50V:500)
Series code
Category

Please refer to "Product code guide (surface mount type)"

CAT. No. E1001I

NIPPON CHEMI-CON

SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

Lower impedance, 105℃

Alchip™-MZA Series

◆STANDARD RATINGS

WV(Vdc)	Cap(μF)	Case code	tanδ	Impedance (Ωmax/20℃, 100kHz)	Rated ripple current (mArms/105℃, 100kHz)	Part No.
6.3	22	D61	0.26	1.35	90	EMZA6R3ADA220MD61G
	47	D61	0.26	1.35	90	EMZA6R3ADA470MD61G
	47	E61	0.26	0.70	160	EMZA6R3ADA470ME61G
	100	E61	0.26	0.70	160	EMZA6R3ADA101ME61G
	100	F61	0.26	0.36	240	EMZA6R3ADA101MF61G
	220	F61	0.26	0.36	240	EMZA6R3ADA221MF61G
	330	F80	0.26	0.34	280	EMZA6R3ADA331MF80G
	470	HA0	0.26	0.16	600	EMZA6R3ADA471MHA0G
	1,000	HA0	0.26	0.16	600	EMZA6R3ADA102MHA0G
	1,500	JA0	0.26	0.08	850	EMZA6R3ADA152MJA0G
10	22	D61	0.19	1.35	90	EMZA100ADA220MD61G
	33	D61	0.19	1.35	90	EMZA100ADA330MD61G
	33	E61	0.19	0.70	160	EMZA100ADA330ME61G
	220	F80	0.19	0.34	280	EMZA100ADA221MF80G
	330	HA0	0.19	0.16	600	EMZA100ADA331MHA0G
	470	HA0	0.19	0.16	600	EMZA100ADA471MHA0G
	680	HA0	0.19	0.16	600	EMZA100ADA681MHA0G
	1,000	JA0	0.19	0.08	850	EMZA100ADA102MJA0G
16	10	D61	0.16	1.35	90	EMZA160ADA100MD61G
	22	D61	0.16	1.35	90	EMZA160ADA220MD61G
	22	E61	0.16	0.70	160	EMZA160ADA220ME61G
	47	E61	0.16	0.70	160	EMZA160ADA470ME61G
	47	F61	0.16	0.36	240	EMZA160ADA470MF61G
	100	F61	0.16	0.36	240	EMZA160ADA101MF61G
	220	F80	0.16	0.34	280	EMZA160ADA221MF80G
	330	HA0	0.16	0.16	600	EMZA160ADA331MHA0G
	470	HA0	0.16	0.16	600	EMZA160ADA471MHA0G
	680	JA0	0.16	0.08	850	EMZA160ADA681MJA0G
25	10	D61	0.14	1.35	90	EMZA250ADA100MD61G
	22	E61	0.14	0.70	160	EMZA250ADA220ME61G
	33	E61	0.14	0.70	160	EMZA250ADA330ME61G
	33	F61	0.14	0.36	240	EMZA250ADA330MF61G
	47	F61	0.14	0.36	240	EMZA250ADA470MF61G
	100	F80	0.14	0.34	280	EMZA250ADA101MF80G
	220	HA0	0.14	0.16	600	EMZA250ADA221MHA0G
	330	HA0	0.14	0.16	600	EMZA250ADA331MHA0G
	470	JA0	0.14	0.08	850	EMZA250ADA471MJA0G
35	4.7	D61	0.12	1.35	90	EMZA350ADA4R7MD61G
	10	D61	0.12	1.35	90	EMZA350ADA100MD61G
	10	E61	0.12	0.70	160	EMZA350ADA100ME61G
	22	E61	0.12	0.70	160	EMZA350ADA220ME61G
	33	F61	0.12	0.36	240	EMZA350ADA330MF61G
	47	F61	0.12	0.36	240	EMZA350ADA470MF61G
	100	F80	0.12	0.34	280	EMZA350ADA101MF80G
	100	HA0	0.12	0.16	600	EMZA350ADA101MHA0G
	220	HA0	0.12	0.16	600	EMZA350ADA221MHA0G
	330	JA0	0.12	0.08	850	EMZA350ADA331MJA0G
50	4.7	D61	0.10	2.90	60	EMZA500ADA4R7MD61G
	10	E61	0.10	1.52	85	EMZA500ADA100ME61G
	10	F61	0.10	0.88	165	EMZA500ADA100MF61G
	22	F61	0.10	0.88	165	EMZA500ADA220MF61G
	33	F80	0.10	0.68	195	EMZA500ADA330MF80G
	47	F80	0.10	0.68	195	EMZA500ADA470MF80G
	100	HA0	0.10	0.34	350	EMZA500ADA101MHA0G
	220	JA0	0.10	0.18	670	EMZA500ADA221MJA0G
63	4.7	E61	0.08	4.8	50	EMZA630ADA4R7ME61G
	10	F61	0.08	2.2	80	EMZA630ADA100MF61G
	22	F80	0.08	2.1	120	EMZA630ADA220MF80G
	33	HA0	0.08	0.70	250	EMZA630ADA330MHA0G
	47	HA0	0.08	0.70	250	EMZA630ADA470MHA0G
	68	HA0	0.08	0.70	250	EMZA630ADA680MHA0G
	100	JA0	0.08	0.45	400	EMZA630ADA101MJA0G
80	3.3	E61	0.08	5.0	25	EMZA800ADA3R3ME61G
	4.7	F61	0.08	3.0	40	EMZA800ADA4R7MF61G
	10	F80	0.08	2.4	60	EMZA800ADA100MF80G
	22	HA0	0.08	1.3	130	EMZA800ADA220MHA0G
	33	HA0	0.08	1.3	130	EMZA800ADA330MHA0G
	47	JA0	0.08	0.70	200	EMZA800ADA470MJA0G

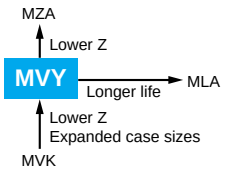
NIPPON CHEMI-CON

SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

Low impedance, 105℃

Alchip™-MVY Series

- Endurance : 1,000 to 5,000 hours at 105℃
- Low impedance
- For digital equipment, especially DC-DC converters
- Solvent resistant type except 80 & 100Vdc (see PRECAUTIONS AND GUIDELINES)
- **RoHS Compliant**

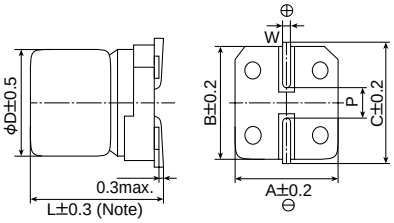


◆SPECIFICATIONS

Items	Characteristics											
Category Temperature Range	−55 to +105℃ (6.3 to 63Vdc) -40 to +105℃ (80 & 100Vdc)											
Rated Voltage Range	6.3 to 100Vdc											
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)											(at 20℃ after 2 minutes)
Dissipation Factor (tanδ)	Rated voltage (Vdc)		6.3V	10V	16V	25V	35V	50V	63V	80V	100V	When nominal capacitance exceeds 1,000μF, add 0.02 to the value above for each 1,000μF increase. (at 20℃, 120Hz)
	tanδ (Max.)	D55 to F80	0.24	0.20	0.16	0.14	0.12	0.12	—	—	—	
		HA0 & JA0	0.28	0.24	0.20	0.16	0.14	0.12	—	—	—	
		KE0 to MN0	0.26	0.22	0.18	0.16	0.14	0.12	0.14	0.10	0.10	
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (Vdc)		6.3V	10V	16V	25V	35V	50V	63V	80V	100V	
	Z(−40℃)/Z(+20℃)	D55 to JA0	3	2	2	2	2	2	—	—	—	
		KE0 to MN0	10	8	6	4	3	3	3	3	3	(at 120Hz)
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated voltage is applied for specified time at 105℃.											
	Time	D55 to F80 : 1,000 hours HA0 & JA0 : 2,000 hours KE0 to MN0 : 5,000 hours										
	Rated voltage	6.3Vdc (D55 to JA0)	6.3 to 100Vdc									
	Capacitance change	≦±30% of the initial value	≦±20% of the initial value									
	D.F. (tanδ)	≦300% of the initial specified value	≦200% 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 1,000 hours at 105℃ without voltage applied. Before the measurement, the capacitor shall be preconditioned by applying voltage according to Item 4.1 of JIS C 5101-4.											
	Rated voltage	6.3Vdc (D55 to JA0)	6.3 to 100Vdc									
	Capacitance change	≦±30% of the initial value	≦±20% of the initial value									
	D.F. (tanδ)	≦300% of the initial specified value	≦200% of the initial specified value									
	Leakage current	≦The initial specified value	≦The initial specified value									

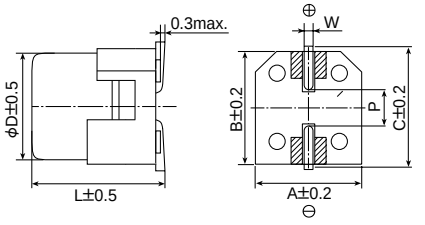
◆DIMENSIONS [mm]

- Terminal Code : A
- Size code : D55 to MN0



Note : L±0.5 for HA0 to MN0

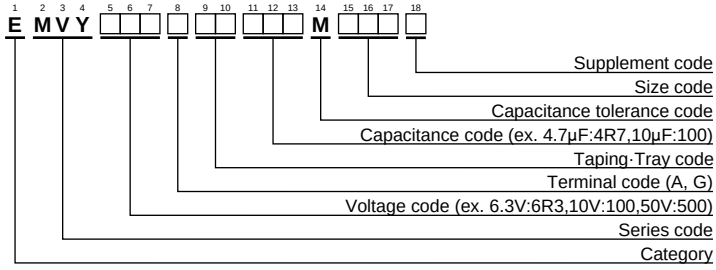
- Terminal Code : G
- Size code : LH0 to MN0



: Dummy terminals

Size code	ΦD	L	A	B	C	W	P
D55	4	5.2	4.3	4.3	5.1	0.5 to 0.8	1.0
E55	5	5.2	5.3	5.3	5.9	0.5 to 0.8	1.4
F55	6.3	5.2	6.6	6.6	7.2	0.5 to 0.8	1.9
F61	6.3	5.8	6.6	6.6	7.2	0.5 to 0.8	1.9
F80	6.3	7.7	6.6	6.6	7.2	0.5 to 0.8	1.9
HA0	8	10.0	8.3	8.3	9.0	0.7 to 1.1	3.1
JA0	10	10.0	10.3	10.3	11.0	0.7 to 1.1	4.5
KE0	12.5	13.5	13.0	13.0	13.7	1.0 to 1.3	4.2
KG5	12.5	16.0	13.0	13.0	13.7	1.0 to 1.3	4.2
LH0	16	16.5	17.0	17.0	18.0	1.0 to 1.3	6.5
LN0	16	21.5	17.0	17.0	18.0	1.0 to 1.3	6.5
MH0	18	16.5	19.0	19.0	20.0	1.0 to 1.3	6.5
MN0	18	21.5	19.0	19.0	20.0	1.0 to 1.3	6.5

◆PART NUMBERING SYSTEM

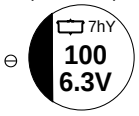


Please refer to "Product code guide (surface mount type)"

◆MARKING

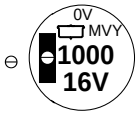
D55 to JA0

EX) 6.3V100μF



KE0 to MN0

EX) 16V1,000μF



CAT. No. E1001I

NIPPON CHEMI-CON

SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

Low impedance, 105℃

Alchip™-MVY Series

◆STANDARD RATINGS

is not solvent resistant (80/100Vdc).

WV (Vdc)	Cap (μF)	Size code	Impedance (Ωmax/20℃, 100kHz)	Rated ripple current (mArms/105℃, 100kHz)	Part No.
6.3	22	D55	3.0	60	EMVY6R3ADA220MD55G
	33	E55	1.8	95	EMVY6R3ADA330ME55G
	47	E55	1.8	95	EMVY6R3ADA470ME55G
	100	F55	1.0	140	EMVY6R3ADA101MF55G
	220	F55	1.0	140	EMVY6R3ADA221MF55G
	330	F80	0.34	280	EMVY6R3ADA331MF80G
	470	HA0	0.30	450	EMVY6R3ADA471MHA0G
	680	HA0	0.30	450	EMVY6R3ADA681MHA0G
	1,000	HA0	0.30	450	EMVY6R3ADA102MHA0G
	1,500	JA0	0.15	670	EMVY6R3ADA152MJA0G
	2,200	KE0	0.070	820	EMVY6R3ARA222MKE0S
	2,200	LH0	0.054	1,260	EMVY6R3□DA222MLH0S
	3,300	KG5	0.060	950	EMVY6R3ARA332MKG5S
	3,300	MH0	0.054	1,350	EMVY6R3□DA332MMH0S
	4,700	LN0	0.038	1,630	EMVY6R3□DA472MLN0S
	4,700	MH0	0.054	1,350	EMVY6R3□DA472MMH0S
	6,800	LN0	0.038	1,630	EMVY6R3□DA682MLN0S
	6,800	MN0	0.038	1,750	EMVY6R3□DA682MMN0S
	8,200	MN0	0.038	1,750	EMVY6R3□DA822MMN0S
10	22	E55	1.8	95	EMVY100ADA220ME55G
	33	E55	1.8	95	EMVY100ADA330ME55G
	47	F55	1.0	140	EMVY100ADA470MF55G
	100	F55	1.0	140	EMVY100ADA101MF55G
	220	F80	0.34	280	EMVY100ADA221MF80G
	330	HA0	0.30	450	EMVY100ADA331MHA0G
	470	HA0	0.30	450	EMVY100ADA471MHA0G
	680	JA0	0.15	670	EMVY100ADA681MJA0G
	1,000	JA0	0.15	670	EMVY100ADA102MJA0G
	2,200	KG5	0.060	950	EMVY100ARA222MKG5S
	2,200	LH0	0.054	1,260	EMVY100□DA222MLH0S
	3,300	LH0	0.054	1,260	EMVY100□DA332MLH0S
	3,300	MH0	0.054	1,350	EMVY100□DA332MMH0S
	4,700	LN0	0.038	1,630	EMVY100□DA472MLN0S
	4,700	MN0	0.038	1,750	EMVY100□DA472MMN0S
	6,800	MN0	0.038	1,750	EMVY100□DA682MMN0S
16	10	D55	3.0	60	EMVY160ADA100MD55G
	22	E55	1.8	95	EMVY160ADA220ME55G
	33	F55	1.0	140	EMVY160ADA330MF55G
	47	F55	1.0	140	EMVY160ADA470MF55G
	100	F55	1.0	140	EMVY160ADA101MF55G
	220	F80	0.34	280	EMVY160ADA221MF80G
	330	HA0	0.30	450	EMVY160ADA331MHA0G
	470	HA0	0.30	450	EMVY160ADA471MHA0G
	680	JA0	0.15	670	EMVY160ADA681MJA0G
	1,000	KE0	0.070	820	EMVY160ARA102MKE0S
	1,000	LH0	0.054	1,260	EMVY160□DA102MLH0S
	2,200	LH0	0.054	1,260	EMVY160□DA222MLH0S
	2,200	MH0	0.054	1,350	EMVY160□DA222MMH0S
	3,300	LN0	0.038	1,630	EMVY160□DA332MLN0S
	3,300	MH0	0.054	1,350	EMVY160□DA332MMH0S
	4,700	MN0	0.038	1,750	EMVY160□DA472MMN0S
25	10	E55	1.8	95	EMVY250ADA100ME55G
	22	F55	1.0	140	EMVY250ADA220MF55G
	33	F55	1.0	140	EMVY250ADA330MF55G
	47	F55	1.0	140	EMVY250ADA470MF55G
	100	F80	0.34	280	EMVY250ADA101MF80G
	220	HA0	0.30	450	EMVY250ADA221MHA0G
25	330	HA0	0.30	450	EMVY250ADA331MHA0G
	470	JA0	0.15	670	EMVY250ADA471MJA0G
	1,000	LH0	0.054	1,260	EMVY250□DA102MLH0S
	1,000	MH0	0.054	1,350	EMVY250□DA102MMH0S
	2,200	LN0	0.038	1,630	EMVY250□DA222MLN0S
	2,200	MN0	0.038	1,750	EMVY250□DA222MMN0S
	3,300	MN0	0.038	1,750	EMVY250□DA332MMN0S
35	4.7	D55	3.0	60	EMVY350ADA4R7MD55G
	10	E55	1.8	95	EMVY350ADA100ME55G
	22	F55	1.0	140	EMVY350ADA220MF55G
	33	F55	1.0	140	EMVY350ADA330MF55G
	47	F55	1.0	140	EMVY350ADA470MF55G
	47	F61	1.0	140	EMVY350ADA470MF61G
	68	F80	0.34	280	EMVY350ADA680MF80G
	100	HA0	0.30	450	EMVY350ADA101MHA0G
	220	HA0	0.30	450	EMVY350ADA221MHA0G
	330	JA0	0.15	670	EMVY350ADA331MJA0G
	470	KE0	0.070	820	EMVY350ARA471MKE0S
	470	LH0	0.054	1,260	EMVY350□DA471MLH0S
	1,000	LH0	0.054	1,260	EMVY350□DA102MLH0S
	1,000	MH0	0.054	1,350	EMVY350□DA102MMH0S
	2,200	MN0	0.038	1,750	EMVY350□DA222MMN0S
50	1.0	D55	5.0	30	EMVY500ADA1R0MD55G
	2.2	D55	5.0	30	EMVY500ADA2R2MD55G
	3.3	D55	5.0	30	EMVY500ADA3R3MD55G
	4.7	E55	3.0	50	EMVY500ADA4R7ME55G
	10	F55	2.0	70	EMVY500ADA100MF55G
	22	F55	2.0	70	EMVY500ADA220MF55G
	33	F80	0.60	170	EMVY500ADA330MF80G
	47	F80	0.60	170	EMVY500ADA470MF80G
	68	HA0	0.60	300	EMVY500ADA680MHA0G
	100	HA0	0.60	300	EMVY500ADA101MHA0G
	220	JA0	0.30	500	EMVY500ADA221MJA0G
	330	KE0	0.11	650	EMVY500ARA331MKE0S
	330	LH0	0.087	900	EMVY500□DA331MLH0S
	470	LH0	0.087	900	EMVY500□DA471MLH0S
	470	MH0	0.087	1,060	EMVY500□DA471MMH0S
	1,000	MN0	0.050	1,520	EMVY500□DA102MMN0S
63	68	KE0	0.19	500	EMVY630ARA680MKE0S
	100	KE0	0.19	500	EMVY630ARA101MKE0S
	220	KE0	0.19	500	EMVY630ARA221MKE0S
	220	LH0	0.12	845	EMVY630□DA221MLH0S
	330	LH0	0.12	845	EMVY630□DA331MLH0S
	330	MH0	0.12	905	EMVY630□DA331MMH0S
	470	LN0	0.085	1,100	EMVY630□DA471MLN0S
	470	MH0	0.12	905	EMVY630□DA471MMH0S
80	100	KE0	0.33	450	EMVY800ARA101MKE0S
	220	KG5	0.26	550	EMVY800ARA221MKG5S
	330	LN0	0.16	900	EMVY800□DA331MLN0S
	330	MH0	0.24	700	EMVY800□DA331MMH0S
	470	MN0	0.16	950	EMVY800□DA471MMN0S
100	47	KE0	0.33	450	EMVY101ARA470MKE0S
	68	KE0	0.33	450	EMVY101ARA680MKE0S
	100	KE0	0.33	450	EMVY101ARA101MKE0S
	100	LH0	0.24	650	EMVY101□DA101MLH0S
	220	LN0	0.16	900	EMVY101□DA221MLN0S
	220	MH0	0.24	700	EMVY101□DA221MMH0S
	330	MN0	0.16	950	EMVY101□DA331MMN0S

□ : Enter the appropriate terminal code.

NIPPON CHEMI-CON

SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS Low impedance, 7000 to 8000-hours-life, 105℃

Alchip™-MZE Series

- Endurance : 7,000 to 8,000 hours at 105℃
- Low impedance
- Rated voltage range : 6.3 to 50V
- Nominal capacitance range : 10 to 470μF
- Suitable for high reliability products
- **RoHS Compliant**

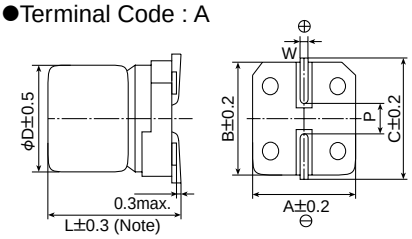
MVY —Longer life→ MZD —Longer life→ **MZE**

◆SPECIFICATIONS

Items	Characteristics							
Category Temperature Range	-25 to +105℃							
Rated Voltage Range	6.3 to 50Vdc							
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)							(at 20℃, after 2 minutes)
Dissipation Factor (tanδ)	Rated voltage (Vdc)	6.3V	10V	16V	25V	35V	50V	
	tanδ (Max.)	0.32	0.28	0.26	0.16	0.14	0.14	(at 20℃,120Hz)
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage(Vdc)	6.3V	10V	16V	25V	35V	50V	
	Z(-10℃)/Z(+20℃)	4	3	2	2	2	2	(at 120Hz)
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated voltage is applied for specified time at 105℃.							
	Time	E73 & F73 : 7,000 hours F90 to JA0 : 8,000 hours						
	Capacitance change	≦±30% of the initial value						
	D.F. (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. Before the measurement, the capacitor shall be preconditioned by applying voltage according to Item 4.1 of JIS C 5101-4.							
	Capacitance change	≦±30% of the initial value						
	D.F. (tanδ)	≦300% of the initial specified value						
	Leakage current	≦The initial specified value						

◆DIMENSIONS [mm]

●Terminal Code : A



Note : L±0.5 for HA0 and JA0

Size code	D	L	A	B	C	W	P
E73	5	7.0	5.3	5.3	5.9	0.5 to 0.8	1.4
F73	6.3	7.0	6.6	6.6	7.2	0.5 to 0.8	1.9
F90	6.3	8.7	6.6	6.6	7.2	0.5 to 0.8	1.9
HA0	8	10.0	8.3	8.3	9.0	0.7 to 1.1	3.1
JA0	10	10.0	10.3	10.3	11.0	0.7 to 1.1	4.5

◆PART NUMBERING SYSTEM

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
E	M	Z	E				A	D	A				M				G

- Supplement code
- Size code
- Capacitance tolerance code
- Capacitance code (ex. 47μF:470,100μF:101)
- Taping code
- Terminal code
- Voltage code (ex. 6.3V:6R3,10V:100,25V:250)
- Series code
- Category

◆MARKING

EX) 16V47μF

●Rated voltage symbol

Rated voltage (Vdc)	6.3	10	16	25	35	50
Symbol	j	A	C	E	V	H

◆STANDARD RATINGS

WV (Vdc)	Cap (μF)	Size code	Impedance (Ωmax/20℃, 100kHz)	Rated ripple current (mArms/105℃, 100kHz)	Part No.
6.3	47	E73	2.2	95	EMZE6R3ADA470ME73G
	100	F73	1.1	140	EMZE6R3ADA101MF73G
	220	F90	1.0	230	EMZE6R3ADA221MF90G
	330	F90	1.0	230	EMZE6R3ADA331MF90G
	470	HA0	0.22	600	EMZE6R3ADA471MHA0G
10	33	E73	2.2	95	EMZE100ADA330ME73G
	150	F73	1.1	140	EMZE100ADA151MF73G
16	22	E73	2.2	95	EMZE160ADA220ME73G
	47	F73	1.1	140	EMZE160ADA470MF73G
	100	F73	1.1	140	EMZE160ADA101MF73G
	150	F90	1.0	230	EMZE160ADA151MF90G
	220	F90	1.0	230	EMZE160ADA221MF90G
	330	HA0	0.22	600	EMZE160ADA331MHA0G
	470	JA0	0.16	850	EMZE160ADA471MJA0G
25	22	E73	2.2	95	EMZE250ADA220ME73G

WV (Vdc)	Cap (μF)	Size code	Impedance (Ωmax/20℃, 100kHz)	Rated ripple current (mArms/105℃, 100kHz)	Part No.
25	33	F73	1.1	140	EMZE250ADA330MF73G
	47	F73	1.1	140	EMZE250ADA470MF73G
	100	F90	1.0	230	EMZE250ADA101MF90G
	220	HA0	0.22	600	EMZE250ADA221MHA0G
	330	JA0	0.16	850	EMZE250ADA331MJA0G
35	10	E73	2.2	95	EMZE350ADA100ME73G
	10	F73	1.1	140	EMZE350ADA100MF73G
	22	E73	2.2	95	EMZE350ADA220ME73G
	22	F73	1.1	140	EMZE350ADA220MF73G
	33	F90	1.0	230	EMZE350ADA330MF90G
	47	F90	1.0	230	EMZE350ADA470MF90G
	100	HA0	0.22	600	EMZE350ADA101MHA0G
	220	JA0	0.16	850	EMZE350ADA221MJA0G
50	47	HA0	0.53	350	EMZE500ADA470MHA0G
	100	JA0	0.35	670	EMZE500ADA101MJA0G

CAT. No. E1001I

NIPPON CHEMI-CON

SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

Low impedance, 105℃

Alchip™-MLA Series

- Low impedance, long life
- Rated voltage 6.3 to 50V, Capacitance 10 to 1,000μF
- Case size φ5×5.8L to φ10×10L
- Suitable for applications requiring long life and low impedance such as equipment in continuous operation, industrial applications, etc.
- **RoHS Compliant**

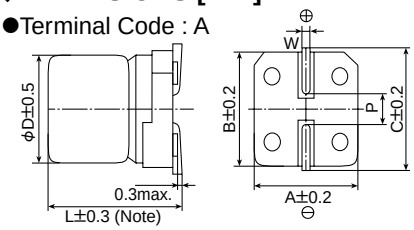
MVY → Longer life → **MLA**
MVK ↑ Lower Z

◆SPECIFICATIONS

Items	Characteristics							
Category Temperature Range	-40 to +105℃							
Rated Voltage Range	6.3 to 50Vdc							
Capacitance Tolerance	±20%(M)							(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)							(at 20℃ after 2 minutes)
Dissipation Factor (tanδ)	Rated voltage(Vdc)		6.3V	10V	16V	25V	35V	50V
	tanδ (Max.)	E61 to F61	0.28	0.24	0.22	0.16	0.13	0.12
		F80	0.32	0.27	0.24	0.16	0.13	0.12
		HA0 to JA0	0.28	0.24	0.22	0.16	0.13	0.12
								(20℃, 120Hz)
Low Temperature Characteristics (Max. impedance Ratio)	Rated voltage(Vdc)		6.3V	10V	16V	25V	35V	50V
	Z(-25℃)/Z(+20℃)		4	3	2	2	2	2
	Z(-40℃)/Z(+20℃)		10	7	5	3	3	3
								(120Hz)
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated voltage is applied for 3,000 hours at 105℃.							
	Capacitance change	≦±30% of the initial value						
	D.F. (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. Before the measurement, the capacitor shall be preconditioned by applying voltage according to Item 4.1 of JIS C 5101-4.							
	Capacitance change	≦±30% of the initial value						
	D.F. (tanδ)	≦300% of the initial specified value						
	Leakage current	≦The initial specified value						

◆DIMENSIONS [mm]

●Terminal Code : A



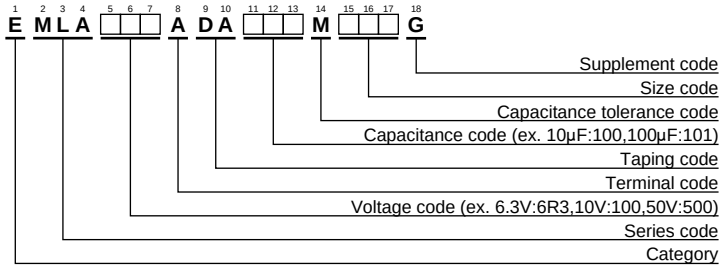
Note : L±0.5 for HA0 and JA0

Size code	D	L	A	B	C	W	P
E61	5	5.8	5.3	5.3	5.9	0.5 to 0.8	1.4
F61	6.3	5.8	6.6	6.6	7.2	0.5 to 0.8	1.9
F80	6.3	7.7	6.6	6.6	7.2	0.5 to 0.8	1.9
HA0	8	10.0	8.3	8.3	9.0	0.7 to 1.1	3.1
JA0	10	10.0	10.3	10.3	11.0	0.7 to 1.1	4.5

◆MARKING

EX) 16V100μF

◆PART NUMBERING SYSTEM



Please refer to "Product code guide (surface mount type)"

●Rated voltage symbol

Rated voltage (Vdc)	Symbol
6.3	j
10	A
16	C
25	E
35	V
50	H

CAT. No. E1001I

NIPPON CHEMI-CON

SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

Low impedance, 105℃

Alchip™-MLA Series

◆STANDARD RATINGS

WV (Vdc)	Cap (μF)	Size code	tanδ	Impedance (Ωmax/20℃, 100kHz)	Rated ripple current (mArms/105℃, 100kHz)	Part No.
6.3	47	E61	0.28	1.30	95	EMLA6R3ADA470ME61G
	100	F61	0.28	0.70	140	EMLA6R3ADA101MF61G
	150	F61	0.28	0.70	140	EMLA6R3ADA151MF61G
	220	F80	0.32	0.70	230	EMLA6R3ADA221MF80G
	330	F80	0.32	0.70	230	EMLA6R3ADA331MF80G
	330	HA0	0.28	0.16	600	EMLA6R3ADA331MHA0G
	470	HA0	0.28	0.16	600	EMLA6R3ADA471MHA0G
	1,000	JA0	0.28	0.08	850	EMLA6R3ADA102MJA0G
10	33	E61	0.24	1.30	95	EMLA100ADA330ME61G
	47	F61	0.24	0.70	140	EMLA100ADA470MF61G
	100	F61	0.24	0.70	140	EMLA100ADA101MF61G
	150	F61	0.24	0.70	140	EMLA100ADA151MF61G
	220	F80	0.27	0.70	230	EMLA100ADA221MF80G
	220	HA0	0.24	0.16	600	EMLA100ADA221MHA0G
	330	HA0	0.24	0.16	600	EMLA100ADA331MHA0G
	470	HA0	0.24	0.16	600	EMLA100ADA471MHA0G
16	22	E61	0.22	1.30	95	EMLA160ADA220ME61G
	33	F61	0.22	0.70	140	EMLA160ADA330MF61G
	47	F61	0.22	0.70	140	EMLA160ADA470MF61G
	100	F61	0.22	0.70	140	EMLA160ADA101MF61G
	100	F80	0.24	0.70	230	EMLA160ADA101MF80G
	150	F80	0.24	0.70	230	EMLA160ADA151MF80G
	220	F80	0.24	0.70	230	EMLA160ADA221MF80G
	220	HA0	0.22	0.16	600	EMLA160ADA221MHA0G
	330	HA0	0.22	0.16	600	EMLA160ADA331MHA0G
	470	HA0	0.22	0.16	600	EMLA160ADA471MHA0G
	470	JA0	0.22	0.08	850	EMLA160ADA471MJA0G
25	10	E61	0.16	1.30	95	EMLA250ADA100ME61G
	22	E61	0.16	1.30	95	EMLA250ADA220ME61G
	22	F61	0.16	0.70	140	EMLA250ADA220MF61G

WV (Vdc)	Cap (μF)	Size code	tanδ	Impedance (Ωmax/20℃, 100kHz)	Rated ripple current (mArms/105℃, 100kHz)	Part No.
25	33	F61	0.16	0.70	140	EMLA250ADA330MF61G
	47	F61	0.16	0.70	140	EMLA250ADA470MF61G
	47	F80	0.16	0.70	230	EMLA250ADA470MF80G
	100	F80	0.16	0.70	230	EMLA250ADA101MF80G
	100	HA0	0.16	0.16	600	EMLA250ADA101MHA0G
	150	HA0	0.16	0.16	600	EMLA250ADA151MHA0G
	220	HA0	0.16	0.16	600	EMLA250ADA221MHA0G
	330	HA0	0.16	0.16	600	EMLA250ADA331MHA0G
	330	JA0	0.16	0.08	850	EMLA250ADA331MJA0G
	470	JA0	0.16	0.08	850	EMLA250ADA471MJA0G
35	10	E61	0.13	1.30	95	EMLA350ADA100ME61G
	22	F61	0.13	0.70	140	EMLA350ADA220MF61G
	33	F61	0.13	0.70	140	EMLA350ADA330MF61G
	33	F80	0.13	0.70	230	EMLA350ADA330MF80G
	47	F80	0.13	0.70	230	EMLA350ADA470MF80G
	100	F80	0.13	0.70	230	EMLA350ADA101MF80G
	100	HA0	0.13	0.16	600	EMLA350ADA101MHA0G
	150	HA0	0.13	0.16	600	EMLA350ADA151MHA0G
	220	HA0	0.13	0.16	600	EMLA350ADA221MHA0G
	220	JA0	0.13	0.08	850	EMLA350ADA221MJA0G
	330	JA0	0.13	0.08	850	EMLA350ADA331MJA0G
50	10	F61	0.12	2.00	70	EMLA500ADA100MF61G
	22	F61	0.12	2.00	70	EMLA500ADA220MF61G
	33	F80	0.12	1.60	100	EMLA500ADA330MF80G
	47	F80	0.12	1.60	100	EMLA500ADA470MF80G
	47	HA0	0.12	0.34	350	EMLA500ADA470MHA0G
	100	HA0	0.12	0.34	350	EMLA500ADA101MHA0G
	100	JA0	0.12	0.18	670	EMLA500ADA101MJA0G
	150	JA0	0.12	0.18	670	EMLA500ADA151MJA0G
	220	JA0	0.12	0.18	670	EMLA500ADA221MJA0G

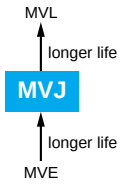
NIPPON CHEMI-CON

SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

2000-hours-life, 105℃

Alchip™-MVJ Series

- Endurance : 2,000 hours at 105℃
- Solvent resistant type
- **RoHS Compliant**



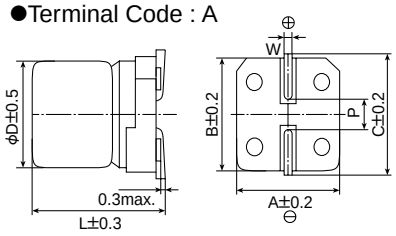
◆SPECIFICATIONS

Items	Characteristics							
Category Temperature Range	−40 to +105℃							
Rated Voltage Range	6.3 to 50Vdc							
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)							(at 20℃ after 2 minutes)
Dissipation Factor (tanδ)	Rated voltage (Vdc)	6.3V	10V	16V	25V	35V	50V	
	tanδ (Max.)	0.30	0.24	0.20	0.16	0.14	0.12	(at 20℃, 120Hz)
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (Vdc)	6.3V	10V	16V	25V	35V	50V	
	Z(−25℃)/Z(+20℃)	4	3	2	2	2	2	
	Z(−40℃)/Z(+20℃)	12	8	6	4	3	3	(at 120Hz)

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℃.			
	Rated voltage	6.3Vdc	10 & 16Vdc	25 to 50Vdc
	Capacitance change	≦±30% of the initial value	≦±25% of the initial value	≦±20% of the initial value
	D.F. (tanδ)	≦300% of the initial specified value	≦300% of the initial specified value	≦200% of the initial specified value
	Leakage current	The initial specified value	≦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 1,000 hours at 105℃ without voltage applied. Before the measurement, the capacitor shall be preconditioned by applying voltage according to Item 4.1 of JIS C 5101-4.			
	Rated voltage	6.3Vdc	10 & 16Vdc	25 to 50Vdc
	Capacitance change	≦±30% of the initial value	≦±25% of the initial value	≦±20% of the initial value
	D.F. (tanδ)	≦300% of the initial specified value	≦300% of the initial specified value	≦200% of the initial specified value
	Leakage current	≦The initial specified value	≦The initial specified value	≦The initial specified value

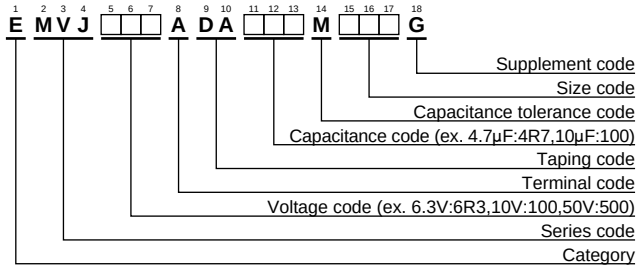
◆DIMENSIONS [mm]

●Terminal Code : A



Size code	D	L	A	B	C	W	P
D60	4	5.7	4.3	4.3	5.1	0.5 to 0.8	1.0
E60	5	5.7	5.3	5.3	5.9	0.5 to 0.8	1.4
F60	6.3	5.7	6.6	6.6	7.2	0.5 to 0.8	1.9

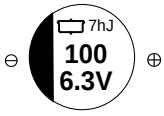
◆PART NUMBERING SYSTEM



Please refer to "Product code guide (surface mount type)"

◆MARKING

EX) 6.3V100μF



◆STANDARD RATINGS

WV (Vdc)	Cap (μF)	Size code	tanδ	Rated ripple current (mArms/105℃,120Hz)	Part No.
6.3	22	D60	0.30	21	EMVJ6R3ADA220MD60G
	47	E60	0.30	36	EMVJ6R3ADA470ME60G
	100	F60	0.30	56	EMVJ6R3ADA101MF60G
10	33	E60	0.24	34	EMVJ100ADA330ME60G
16	10	D60	0.20	16	EMVJ160ADA100MD60G
	22	E60	0.20	30	EMVJ160ADA220ME60G
	47	F60	0.20	48	EMVJ160ADA470MF60G
25	33	F60	0.16	45	EMVJ250ADA330MF60G
35	4.7	D60	0.14	15	EMVJ350ADA4R7MD60G
	10	E60	0.14	25	EMVJ350ADA100ME60G

WV (Vdc)	Cap (μF)	Size code	tanδ	Rated ripple current (mArms/105℃,120Hz)	Part No.
35	22	F60	0.14	40	EMVJ350ADA220MF60G
50	0.10	D60	0.12	1.3	EMVJ500ADAR10MD60G
	0.22	D60	0.12	2.6	EMVJ500ADAR22MD60G
	0.33	D60	0.12	3.2	EMVJ500ADAR33MD60G
	0.47	D60	0.12	3.8	EMVJ500ADAR47MD60G
	1.0	D60	0.12	5.6	EMVJ500ADA1R0MD60G
	2.2	D60	0.12	10	EMVJ500ADA2R2MD60G
	3.3	D60	0.12	14	EMVJ500ADA3R3MD60G
	4.7	E60	0.12	19	EMVJ500ADA4R7ME60G
	10	F60	0.12	29	EMVJ500ADA100MF60G

CAT. No. E1001I

NIPPON CHEMI-CON

SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

7000 to 8000-hours-life, 105℃

Alchip™-MLE Series

- Endurance : 7,000 to 8,000 hours at 105℃
- Rated voltage range : 6.3 to 50V
- Nominal capacitance range : 0.1 to 1,000μF
- Suitable for high reliability products
- **RoHS Compliant**

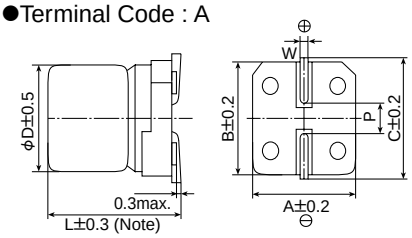
MVL → (Longer life) MLD → (Longer life) **MLE**

◆SPECIFICATIONS

Items	Characteristics							
Category Temperature Range	-25 to +105℃							
Rated Voltage Range	6.3 to 50Vdc							
Capacitance Tolerance	±20%(M)							(at 20℃,120Hz)
Leakage Current	I=0.03CV or 4μA, whichever is greater Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V)							(at 20℃, after 2 minutes)
Dissipation Factor (tanδ)	Rated voltage (Vdc)	6.3V	10V	16V	25V	35V	50V	
	tanδ (Max.)	0.32	0.28	0.26	0.16	0.14	0.14	(at 20℃,120Hz)
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage(Vdc)	6.3V	10V	16V	25V	35V	50V	
	Z(-10℃)/Z(+20℃)	4	3	2	2	2	2	(at 120Hz)
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated voltage is applied for specified time at 105℃.							
	Time	D73 to F73 : 7,000 hours F90 to JA0 : 8,000 hours						
	Capacitance change	≦±30% of the initial value						
	D.F. (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. Before the measurement, the capacitor shall be preconditioned by applying voltage according to Item 4.1 of JIS C 5101-4.							
	Capacitance change	≦±30% of the initial value						
	D.F. (tanδ)	≦300% of the initial specified value						
	Leakage current	≦The initial specified value						

◆DIMENSIONS [mm]

●Terminal Code : A



Note : L±0.5 for HA0 and JA0

Size code	D	L	A	B	C	W	P
D73	4	7.0	4.3	4.3	5.1	0.5 to 0.8	1.0
E73	5	7.0	5.3	5.3	5.9	0.5 to 0.8	1.4
F73	6.3	7.0	6.6	6.6	7.2	0.5 to 0.8	1.9
F90	6.3	8.7	6.6	6.6	7.2	0.5 to 0.8	1.9
HA0	8	10.0	8.3	8.3	9.0	0.7 to 1.1	3.1
JA0	10	10.0	10.3	10.3	11.0	0.7 to 1.1	4.5

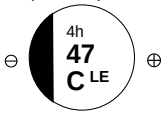
◆PART NUMBERING SYSTEM

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
E	M	L	E				A	D	A				M				G

- 18 : Supplement code
- 15–17 : Size code
- 14 : Capacitance tolerance code
- 11–13 : Capacitance code (ex. 47μF:470,100μF:101)
- 9–10 : Taping code
- 8 : Terminal code
- 5–7 : Voltage code (ex. 6.3V:6R3,10V:100,25V:250)
- 4 : Series code
- 1–3 : Category

◆MARKING

EX) 16V47μF



●Rated voltage symbol

Rated voltage (Vdc)	6.3	10	16	25	35	50
Symbol	j	A	C	E	V	H

◆STANDARD RATINGS

WV (Vdc)	Cap (μF)	Size code	Rated ripple current (mArms/105℃, 120Hz)	Part No.
6.3	22	D73	22	EMLE6R3ADA220MD73G
	47	E73	36	EMLE6R3ADA470ME73G
	100	F73	60	EMLE6R3ADA101MF73G
	220	F90	101	EMLE6R3ADA221MF90G
	330	HA0	160	EMLE6R3ADA331MHA0G
	1,000	JA0	313	EMLE6R3ADA102MJA0G
10	33	E73	35	EMLE100ADA330ME73G
	220	HA0	141	EMLE100ADA221MHA0G
16	10	D73	18	EMLE160ADA100MD73G
	22	E73	30	EMLE160ADA220ME73G
	47	F73	50	EMLE160ADA470MF73G
	100	F90	81	EMLE160ADA101MF90G
	470	JA0	254	EMLE160ADA471MJA0G
25	33	F73	48	EMLE250ADA330MF73G
	47	F90	63	EMLE250ADA470MF90G
	100	HA0	116	EMLE250ADA101MHA0G
35	0.10	D73	1.0	EMLE350ADAR10MD73G

WV (Vdc)	Cap (μF)	Size code	Rated ripple current (mArms/105℃, 120Hz)	Part No.
35	0.22	D73	2.6	EMLE350ADAR22MD73G
	0.33	D73	3.2	EMLE350ADAR33MD73G
	0.47	D73	3.8	EMLE350ADAR47MD73G
	1.0	D73	6.2	EMLE350ADA1R0MD73G
	2.2	D73	11	EMLE350ADA2R2MD73G
	3.3	D73	14	EMLE350ADA3R3MD73G
	4.7	D73	15	EMLE350ADA4R7MD73G
	4.7	E73	19	EMLE350ADA4R7ME73G
	10	E73	25	EMLE350ADA100ME73G
	10	F73	30	EMLE350ADA100MF73G
	22	F73	42	EMLE350ADA220MF73G
	22	F90	49	EMLE350ADA220MF90G
	33	F90	57	EMLE350ADA330MF90G
	220	JA0	216	EMLE350ADA221MJA0G
50	33	HA0	77	EMLE500ADA330MHA0G
	47	HA0	92	EMLE500ADA470MHA0G
	100	JA0	151	EMLE500ADA101MJA0G

CAT. No. E1001I

NIPPON CHEMI-CON

SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

3000 to 5000-hours-life, 105℃

Alchip™-MVL Series

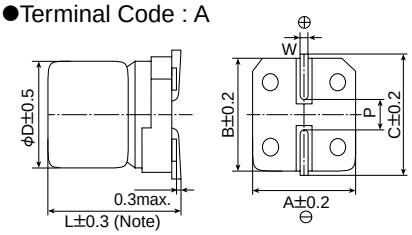
- Endurance : 3,000 to 5,000 hours at 105℃
- Suitable for applications requiring long life such as continuously operating equipment, industrial applications, etc
- Solvent resistant type (see PRECAUTIONS AND GUIDELINES)
- **RoHS Compliant**

◆SPECIFICATIONS

Items	Characteristics							
Category Temperature Range	-40 to +105℃							
Rated Voltage Range	6.3 to 50Vdc							
Capacitance Tolerance	±20%(M)							(at 20℃,120Hz)
Leakage Current	I=0.03CV or 4μA, whichever is greater Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V)							(at 20℃, after 2 minutes)
Dissipation Factor (tanδ)	Rated voltage (Vdc)	6.3V	10V	16V	25V	35V	50V	
	Max. tanδ	0.28	0.24	0.20	0.16	0.13	0.12	(at 20℃,120Hz)
Low Temperature Characteristics (Max. impedance Ratio)	Rated voltage(Vdc)	6.3V	10V	16V	25V	35V	50V	
	Z(-25℃)/Z(+20℃)	4	3	2	2	2	2	
	Z(-40℃)/Z(+20℃)	10	7	5	3	3	3	(120Hz)
Endurance	After the capacitors are subjected to the rated DC voltage for 3,000 hours (HA0 & JA0 sizes 5,000 hours) at 105℃, the following specifications shall be satisfied when the capacitors are restored to 20℃.							
	Capacitance change	≦±30% of the initial value						
	D.F. (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. Before the measurement, the capacitor shall be preconditioned by applying voltage according to Item 4.1 of JIS C 5101-4.							
	Capacitance change	≦±30% of the initial value						
	D.F. (tanδ)	≦300% of the initial specified value						
	Leakage current	≦The initial specified value						

◆DIMENSIONS [mm]

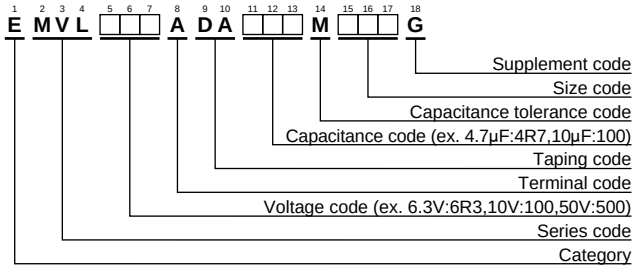
●Terminal Code : A



Note : L±0.5 for HA0 and JA0

Size code	D	L	A	B	C	W	P
D60	4	5.7	4.3	4.3	5.1	0.5 to 0.8	1.0
E60	5	5.7	5.3	5.3	5.9	0.5 to 0.8	1.4
F60	6.3	5.7	6.6	6.6	7.2	0.5 to 0.8	1.9
F80	6.3	7.7	6.6	6.6	7.2	0.5 to 0.8	1.9
HA0	8	10.0	8.3	8.3	9.0	0.7 to 1.1	3.1
JA0	10	10.0	10.3	10.3	11.0	0.7 to 1.1	4.5

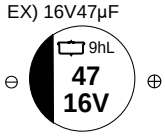
◆PART NUMBERING SYSTEM



Please refer to "Product code guide (surface mount type)"

◆MARKING

EX) 16V47μF



◆STANDARD RATINGS

WV (Vdc)	Cap (μF)	Size code	tanδ	Rated ripple current (mArms/ 105℃,120Hz)	Part No.
6.3	22	D60	0.28	22	EMVL6R3ADA220MD60G
	47	E60	0.28	36	EMVL6R3ADA470ME60G
	100	F60	0.28	60	EMVL6R3ADA101MF60G
	220	F80	0.28	101	EMVL6R3ADA221MF80G
	330	HA0	0.28	160	EMVL6R3ADA331MHA0G
	1,000	JA0	0.28	313	EMVL6R3ADA102MJA0G
10	33	E60	0.24	35	EMVL100ADA330ME60G
	220	HA0	0.24	141	EMVL100ADA221MHA0G
16	10	D60	0.20	18	EMVL160ADA100MD60G
	22	E60	0.20	30	EMVL160ADA220ME60G
	47	F60	0.20	50	EMVL160ADA470MF60G
	100	F80	0.20	81	EMVL160ADA101MF80G
	470	JA0	0.20	254	EMVL160ADA471MJA0G
25	33	F60	0.16	48	EMVL250ADA330MF60G
	47	F80	0.16	63	EMVL250ADA470MF80G
	100	HA0	0.16	116	EMVL250ADA101MHA0G
	330	JA0	0.16	238	EMVL250ADA331MJA0G

WV (Vdc)	Cap (μF)	Size code	tanδ	Rated ripple current (mArms/ 105℃,120Hz)	Part No.
35	4.7	D60	0.13	15	EMVL350ADA4R7MD60G
	10	E60	0.13	25	EMVL350ADA100ME60G
	22	F60	0.13	42	EMVL350ADA220MF60G
	33	F80	0.13	57	EMVL350ADA330MF80G
	220	JA0	0.13	216	EMVL350ADA221MJA0G
50	0.10	D60	0.12	1.0	EMVL500ADAR10MD60G
	0.22	D60	0.12	2.6	EMVL500ADAR22MD60G
	0.33	D60	0.12	3.2	EMVL500ADAR33MD60G
	0.47	D60	0.12	3.8	EMVL500ADAR47MD60G
	1.0	D60	0.12	6.2	EMVL500ADA1R0MD60G
	2.2	D60	0.12	11	EMVL500ADA2R2MD60G
	3.3	D60	0.12	14	EMVL500ADA3R3MD60G
	4.7	E60	0.12	19	EMVL500ADA4R7ME60G
	10	F60	0.12	30	EMVL500ADA100MF60G
	22	F80	0.12	49	EMVL500ADA220MF80G
	33	HA0	0.12	77	EMVL500ADA330MHA0G
	47	HA0	0.12	92	EMVL500ADA470MHA0G
	100	JA0	0.12	151	EMVL500ADA101MJA0G

CAT. No. E1001I

NIPPON CHEMI-CON

SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

High heat resistance, 125℃

Alchip™-MVH Series

- Lower ESR, Higher ripple current
- Endurance : 1,000 to 5,000 hours at 125℃
- Suitable to fit for automotive equipment
- Solvent resistant type (10 to 50V)
- **RoHS Compliant**

MVH
125℃
Expanded case sizes
MVK

◆SPECIFICATIONS

Items	Characteristics
Category Temperature Range	-40 to +125℃
Rated Voltage Range	10 to 450Vdc
Capacitance Tolerance	±20% (M) (at 20℃, 120Hz)
Leakage Current	Rated voltage (Vdc): 10 to 100Vdc / 160 to 450Vdc F60 to JA0: I=0.01CV or 3μA, whichever is greater. / I=0.04CV+100 KE0 to MN0: I=0.03CV or 4μA, whichever is greater. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20℃ after 2 minutes)

Dissipation Factor (tanδ)

Rated voltage (Vdc)		10V	16V	25V	35V	50V	63V	80V	100V	160 to 250V	400 & 450V
tanδ (Max.)	F60 to JA0	0.24	0.20	0.16	0.14	0.14	0.12	0.12	0.10	—	—
	KE0 to MN0	0.22	0.18	0.16	0.14	0.12	0.14	—	0.10	0.20	0.24

When nominal capacitance exceeds 1,000μF, add 0.02 to the value above for each 1,000μF increase. (at 20℃, 120Hz)

Low Temperature Characteristics (Max. Impedance Ratio)

Rated voltage (Vdc)		10V	16V	25V	35V	50V	63V	80V	100V	160 to 250V	400 & 450V
F60 to JA0	Z(−25℃)/Z(+20℃)	3	2	2	2	2	2	2	2	—	—
	Z(−40℃)/Z(+20℃)	6	4	4	3	3	3	3	3	—	—
KE0 to MN0	Z(−25℃)/Z(+20℃)	4	3	2	2	2	2	—	2	3	6
	Z(−40℃)/Z(+20℃)	8	6	4	3	3	3	—	3	6	10

(at 120Hz)

Endurance

The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated voltage is applied for the specified time at 125℃.

Time	F60 to H63 (10 to 100Vdc) : 1,000hours HA0 to JA0 (10 to 100Vdc) : 2,000hours KE0 to MN0 (10 to 100Vdc) : 5,000hours KE0 to MN0 (160 to 450Vdc) : 2,000hours
Capacitance change	≦±30% of the initial value
D.F. (tanδ)	≦300% of the initial specified value
Leakage current	≦The initial specified value

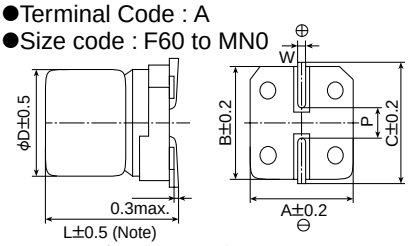
Shelf Life

The following specifications shall be satisfied when the capacitors are restored to 20℃ after exposing them for 1,000 hours (500 hours for 400 to 450Vdc) at 125℃ without voltage applied. Before the measurement, the capacitor shall be preconditioned by applying voltage according to Item 4.1 of JIS C 5101-4.

Rated voltage(Vdc)	10 to 50Vdc	63 to 450Vdc
Capacitance change	≦±30% of the initial value	≦±30% of the initial value
D.F. (tanδ)	≦300% of the initial specified value	≦300% of the initial specified value
Leakage current	≦The initial specified value	≦500% of the initial specified value

◆DIMENSIONS [mm]

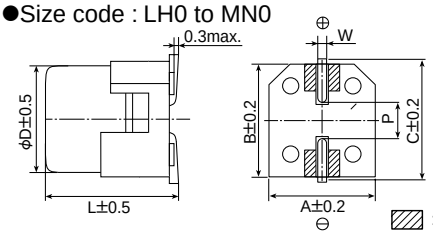
- Terminal Code : A
- Size code : F60 to MN0



Note : L±0.3 for F60 and F80

Size code	D	L	A	B	C	W	P
F60	6.3	5.7	6.6	6.6	7.2	0.5 to 0.8	1.9
F80	6.3	7.7	6.6	6.6	7.2	0.5 to 0.8	1.9
H63	8	6.3	8.3	8.3	9.0	0.5 to 0.8	2.3
HA0	8	10.0	8.3	8.3	9.0	0.7 to 1.1	3.1
JA0	10	10.0	10.3	10.3	11.0	0.7 to 1.1	4.5
KE0	12.5	13.5	13.0	13.0	13.7	1.0 to 1.3	4.2
KG5	12.5	16.0	13.0	13.0	13.7	1.0 to 1.3	4.2
LH0	16	16.5	17.0	17.0	18.0	1.0 to 1.3	6.5
LN0	16	21.5	17.0	17.0	18.0	1.0 to 1.3	6.5
MH0	18	16.5	19.0	19.0	20.0	1.0 to 1.3	6.5
MN0	18	21.5	19.0	19.0	20.0	1.0 to 1.3	6.5

- Terminal Code : G
- Size code : LH0 to MN0



: Dummy terminals

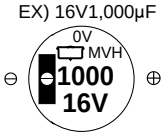
◆MARKING

F60 to JA0

EX) 35V47μF

KE0 to MN0

EX) 16V1,000μF



CAT. No. E1001I

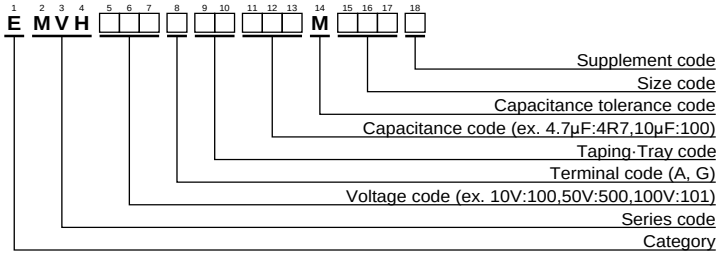
NIPPON CHEMI-CON

SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

High heat resistance, 125℃

Alchip™-MVH Series

◆PART NUMBERING SYSTEM



Please refer to "Product code guide (surface mount type)"

◆STANDARD RATINGS

is not solvent resistant (63 to 450Vdc).

WV (Vdc)	Cap (μF)	Size code	ESR (Ωmax/ 100kHz)		Rated ripple current (mArms/125℃)		Part No.
			20℃	-40℃	100kHz	120Hz	
10	100	F80	0.90	14.0	110	—	EMVH100ADA101MF80G
	100	H63	0.90	14.0	110	—	EMVH100ADA101MH63G
	220	F80	0.90	14.0	110	—	EMVH100ADA221MF80G
	220	H63	0.90	14.0	110	—	EMVH100ADA221MH63G
	220	HA0	0.40	6.0	220	—	EMVH100ADA221MHA0G
	330	HA0	0.40	6.0	220	—	EMVH100ADA331MHA0G
	330	JA0	0.30	4.5	296	—	EMVH100ADA331MJA0G
	470	JA0	0.30	4.5	296	—	EMVH100ADA471MJA0G
	1,000	KE0	0.14	2.1	750	—	EMVH100ARA102MKE0S
	2,200	LH0	0.10	1.5	1,000	—	EMVH100□DA222MLH0S
	2,200	MH0	0.10	1.5	1,200	—	EMVH100□DA222MMH0S
	3,300	MH0	0.10	1.5	1,200	—	EMVH100□DA332MMH0S
	4,700	MN0	0.058	0.87	1,550	—	EMVH100□DA472MMN0S
16	47	F60	1.6	24.0	69	—	EMVH160ADA470MF60G
	100	HA0	0.40	6.0	220	—	EMVH160ADA101MHA0G
	220	HA0	0.40	6.0	220	—	EMVH160ADA221MHA0G
	220	JA0	0.30	4.5	296	—	EMVH160ADA221MJA0G
	330	JA0	0.30	4.5	296	—	EMVH160ADA331MJA0G
	470	KE0	0.14	2.1	750	—	EMVH160ARA471MKE0S
	680	KE0	0.14	2.1	750	—	EMVH160ARA681MKE0S
	680	LH0	0.10	1.5	1,000	—	EMVH160□DA681MLH0S
	1,000	MH0	0.10	1.5	1,200	—	EMVH160□DA102MMH0S
	2,200	MH0	0.10	1.5	1,200	—	EMVH160□DA222MMH0S
25	33	F60	1.6	24.0	69	—	EMVH250ADA330MF60G
	47	F80	0.90	14.0	110	—	EMVH250ADA470MF80G
	47	H63	0.90	14.0	110	—	EMVH250ADA470MH63G
	100	F80	0.90	14.0	110	—	EMVH250ADA101MF80G
	100	H63	0.90	14.0	110	—	EMVH250ADA101MH63G
	100	HA0	0.40	6.0	220	—	EMVH250ADA101MHA0G
	220	HA0	0.40	6.0	220	—	EMVH250ADA221MHA0G
	220	JA0	0.30	4.5	296	—	EMVH250ADA221MJA0G
	330	JA0	0.30	4.5	296	—	EMVH250ADA331MJA0G
	330	KE0	0.14	2.1	750	—	EMVH250ARA331MKE0S
	470	KE0	0.14	2.1	750	—	EMVH250ARA471MKE0S
	470	LH0	0.10	1.5	1,000	—	EMVH250□DA471MLH0S
	680	LH0	0.10	1.5	1,000	—	EMVH250□DA681MLH0S
	680	MH0	0.10	1.5	1,200	—	EMVH250□DA681MMH0S
	1,000	MN0	0.058	0.87	1,550	—	EMVH250□DA102MMN0S
35	10	F60	1.6	24.0	69	—	EMVH350ADA100MF60G
	22	F60	1.6	24.0	69	—	EMVH350ADA220MF60G
	33	F80	0.90	14.0	110	—	EMVH350ADA330MF80G
	33	H63	0.90	14.0	110	—	EMVH350ADA330MH63G
	47	F80	0.90	14.0	110	—	EMVH350ADA470MF80G
	47	H63	0.90	14.0	110	—	EMVH350ADA470MH63G
	47	HA0	0.40	6.0	220	—	EMVH350ADA470MHA0G
	100	HA0	0.40	6.0	220	—	EMVH350ADA101MHA0G
	100	JA0	0.30	4.5	296	—	EMVH350ADA101MJA0G
	220	JA0	0.30	4.5	296	—	EMVH350ADA221MJA0G
	330	KE0	0.14	2.1	750	—	EMVH350ARA331MKE0S
	330	LH0	0.10	1.5	1,000	—	EMVH350□DA331MLH0S
	470	KG5	0.11	1.5	900	—	EMVH350ARA471MKG5S
	470	LH0	0.10	1.5	1,000	—	EMVH350□DA471MLH0S
	680	MH0	0.10	1.5	1,200	—	EMVH350□DA681MMH0S
50	10	F60	2.8	42.0	51	—	EMVH500ADA100MF60G
	10	H63	1.6	30.0	83	—	EMVH500ADA100MH63G
	22	F80	2.0	30.0	83	—	EMVH500ADA220MF80G
	22	H63	1.6	30.0	83	—	EMVH500ADA220MH63G
50	33	F80	2.0	30.0	83	—	EMVH500ADA330MF80G
	33	H63	1.6	30.0	83	—	EMVH500ADA330MH63G
	33	HA0	0.70	11.0	160	—	EMVH500ADA330MHA0G
	47	HA0	0.70	11.0	160	—	EMVH500ADA470MHA0G
	47	JA0	0.50	7.5	247	—	EMVH500ADA470MJA0G
	100	JA0	0.50	7.5	247	—	EMVH500ADA101MJA0G
	100	KE0	0.23	3.5	550	—	EMVH500ARA101MKE0S
	220	KE0	0.23	3.5	550	—	EMVH500ARA221MKE0S
	220	LH0	0.15	2.3	850	—	EMVH500□DA221MLH0S
	330	KG5	0.18	2.7	700	—	EMVH500ARA331MKG5S
	330	LH0	0.15	2.3	850	—	EMVH500□DA331MLH0S
	470	MH0	0.15	2.3	920	—	EMVH500□DA471MMH0S
63	10	F80	2.0	100	60	—	EMVH630ADA100MF80G
	10	H63	2.0	110	60	—	EMVH630ADA100MH63G
	22	HA0	0.70	35.0	100	—	EMVH630ADA220MHA0G
	33	HA0	0.70	35.0	100	—	EMVH630ADA330MHA0G
	33	JA0	0.50	25.0	170	—	EMVH630ADA330MJA0G
	47	HA0	0.70	35.0	100	—	EMVH630ADA470MHA0G
	47	JA0	0.50	25.0	170	—	EMVH630ADA470MJA0G
	100	KE0	0.25	12.5	500	—	EMVH630ARA101MKE0S
	220	KG5	0.20	10.0	600	—	EMVH630ARA221MKG5S
	330	LH0	0.18	9.0	820	—	EMVH630□DA331MLH0S
	470	LN0	0.11	5.5	1,100	—	EMVH630□DA471MLN0S
80	10	HA0	0.75	50.0	70	—	EMVH800ADA100MHA0G
	22	HA0	0.75	50.0	70	—	EMVH800ADA220MHA0G
	22	JA0	0.55	35.0	115	—	EMVH800ADA220MJA0G
	33	HA0	0.75	50.0	70	—	EMVH800ADA330MHA0G
	33	JA0	0.55	35.0	115	—	EMVH800ADA330MJA0G
	47	JA0	0.55	35.0	115	—	EMVH800ADA470MJA0G
100	10	HA0	0.75	50.0	70	—	EMVH101ADA100MHA0G
	22	HA0	0.75	50.0	70	—	EMVH101ADA220MHA0G
	22	JA0	0.55	35.0	115	—	EMVH101ADA220MJA0G
	33	JA0	0.55	35.0	115	—	EMVH101ADA330MJA0G
	47	KE0	0.33	16.5	450	—	EMVH101ARA470MKE0S
	68	KG5	0.26	13.0	550	—	EMVH101ARA680MKG5S
	100	LH0	0.24	12.0	650	—	EMVH101□DA101MLH0S
	220	MN0	0.16	8.0	950	—	EMVH101□DA221MMN0S
160	10	KE0	—	—	—	100	EMVH161ARA100MKE0S
	22	LH0	—	—	—	180	EMVH161□DA220MLH0S
	33	MH0	—	—	—	245	EMVH161□DA330MMH0S
	68	MN0	—	—	—	380	EMVH161□DA680MMN0S
200	10	KE0	—	—	—	100	EMVH201ARA100MKE0S
	22	LH0	—	—	—	180	EMVH201□DA220MLH0S
	33	LN0	—	—	—	250	EMVH201□DA330MLN0S
	33	MH0	—	—	—	245	EMVH201□DA330MMH0S
	47	MN0	—	—	—	315	EMVH201□DA470MMN0S
250	10	KG5	—	—	—	110	EMVH251ARA100MKG5S
	22	LN0	—	—	—	200	EMVH251□DA220MLN0S
	22	MH0	—	—	—	205	EMVH251□DA220MMH0S
	33	MN0	—	—	—	260	EMVH251□DA330MMN0S
400	4.7	KE0	—	—	—	70	EMVH401ARA4R7MKE0S
	6.8	LH0	—	—	—	100	EMVH401□DA6R8MLH0S
	10	LN0	—	—	—	140	EMVH401□DA100MLN0S
	10	MH0	—	—	—	135	EMVH401□DA100MMH0S
450	3.3	KG5	—	—	—	65	EMVH451ARA3R3MKG5S
	4.7	LH0	—	—	—	85	EMVH451□DA4R7MLH0S
	10	MN0	—	—	—	145	EMVH451□DA100MMN0S

□ : Enter the appropriate terminal code.

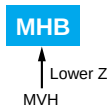
NIPPON CHEMI-CON

SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

High heat resistance, 125℃

Alchip™-MHB Series

- ESR : Less than MVH
- Endurance : 2,000 hours at 125℃
- Rated Voltage Range : 10 to 35V
- Nominal capacitance range : 47 to 330μF
- Solvent resistant type
- **RoHS Compliant**

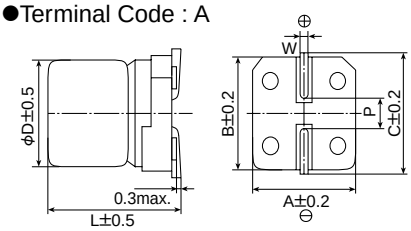


◆SPECIFICATIONS

Items	Characteristics					
Category Temperature Range	-40 to +125℃					
Rated Voltage Range	10 to 35Vdc					
Capacitance Tolerance	±20%(M)					(20℃, 120Hz)
Leakage Current	I≦0.01CV Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V)					(at 20℃ after 2 minutes)
Dissipation Factor (tanδ)	Rated voltage(Vdc)	10V	16V	25V	35V	
	tanδ (Max.)	0.24	0.20	0.16	0.14	(20℃, 120Hz)
Low Temperature Characteristics (Max. impedance Ratio)	Rated voltage(Vdc)	10V	16V	25V	35V	
	Z(-25℃)/Z(+20℃)	3	2	2	2	
	Z(-40℃)/Z(+20℃)	4	3	3	3	(120Hz)
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	≦±30% of the initial value				
	D.F. (tanδ)	≦300% of the initial specified value				
	Leakage current	≦The initial specified value				
	ESR(-40℃, 400kHz)	HA0 : ≦6Ω				
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. Before the measurement, the capacitor shall be preconditioned by applying voltage according to Item 4.1 of JIS C 5101-4.					
	Capacitance change	≦±30% of the initial value				
	D.F. (tanδ)	≦300% of the initial specified value				
	Leakage current	≦The initial specified value				

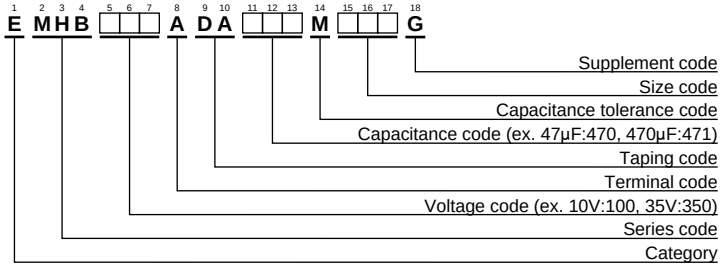
◆DIMENSIONS [mm]

●Terminal Code : A



Size code	D	L	A	B	C	W	P
HA0	8	10.0	8.3	8.3	9.0	0.7 to 1.1	3.1

◆PART NUMBERING SYSTEM



◆MARKING

EX) 16V220μF

●Rated voltage symbol

Rated voltage (Vdc)	Symbol
10	A
16	C
25	E
35	V

◆STANDARD RATINGS

WV(Vdc)	Cap(μF)	Size code	ESR (Ωmax/100k to 400kHz)		Rated ripple current (mArms/125℃, 100k to 400kHz)	Part No.
			20℃	-40℃		
10	330	HA0	0.3	3.0	240	EMHB100ADA331MHA0G
16	100	HA0	0.3	3.0	240	EMHB160ADA101MHA0G
	220	HA0	0.3	3.0	240	EMHB160ADA221MHA0G
25	100	HA0	0.3	3.0	240	EMHB250ADA101MHA0G
	220	HA0	0.3	3.0	240	EMHB250ADA221MHA0G
35	47	HA0	0.3	3.0	240	EMHB350ADA470MHA0G
	100	HA0	0.3	3.0	240	EMHB350ADA101MHA0G

CAT. No. E1001I

NIPPON CHEMI-CON

SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

Low ESR, 105℃

Alchip™-MKB Series

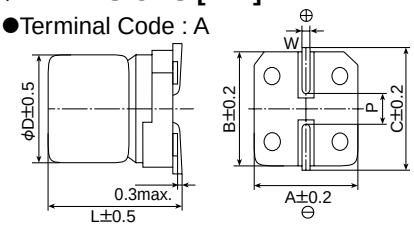
- Low ESR
- Endurance : 3,000 hours at 105℃
- Rated voltage 400V, Capacitance 2.2 to 4.7μF
- **RoHS Compliant**

◆SPECIFICATIONS

Items	Characteristics		
Category Temperature Range	-40 to +105℃		
Rated Voltage Range	400Vdc		
Capacitance Tolerance	±20%(M)		(20℃, 120Hz)
Leakage Current	I=0.04CV+100(max.) Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V)		(at 20℃ after 1 minute)
Dissipation Factor (tanδ)	Rated voltage(Vdc)	400V	
	tanδ (Max.)	0.25	(20℃, 120Hz)
Low Temperature Characteristics (Max. impedance Ratio)	Rated voltage(Vdc)	400V	
	Z(-25℃)/Z(+20℃)	6	
	Z(-40℃)/Z(+20℃)	10	(120Hz)
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated voltage is applied for 3,000 hours at 105℃.		
	Capacitance change	≦±20% of the initial value	
	D.F. (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 500 hours at 105℃ without voltage applied. Before the measurement, the capacitor shall be preconditioned by applying voltage according to Item 4.1 of JIS C 5101-4.		
	Capacitance change	≦±20% of the initial value	
	D.F. (tanδ)	≦200% of the initial specified value	
	Leakage current	≦The initial specified value	

◆DIMENSIONS [mm]

●Terminal Code : A



Size code	D	L	A	B	C	W	P
HA0	8	10.0	8.3	8.3	9.0	0.7 to 1.1	3.1
JA0	10	10.0	10.3	10.3	11.0	0.7 to 1.1	4.5

◆MARKING

EX) 400V3.9μF

●Rated voltage symbol

Rated voltage (Vdc)	Symbol
400	2G

◆PART NUMBERING SYSTEM

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
E	M	K	B	4	0	1	A	D	A				M				G

- 18 Supplement code
- 15 16 17 Size code
- 14 Capacitance tolerance code
- 11 12 13 Capacitance code (ex. 2.2μF:2R2)
- 9 10 Taping code
- 8 Terminal code
- 5 6 7 Voltage code
- 2 3 4 Series code
- 1 Category

Please refer to "Product code guide (surface mount type)"

◆STANDARD RATINGS

WV (Vdc)	Cap (μF)	Size code	ESR (Ωmax/120Hz)		Rated ripple current (mArms/105℃,120Hz)	Part No.
			20℃	-40℃		
400	2.2	HA0	20	1,000	26	EMKB401ADA2R2MHA0G
	3.3	JA0	10	500	37	EMKB401ADA3R3MJA0G
	3.9	JA0	10	500	38	EMKB401ADA3R9MJA0G
	4.7	JA0	10	500	39	EMKB401ADA4R7MJA0G

CAT. No. E1001I

NIPPON CHEMI-CON

SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

Bi-polar, 85℃

Alchip™-MV-BP Series

- Bi-polar chip type for the circuit, of which polarity is frequently reversed
- Solvent resistant type (see PRECAUTIONS AND GUIDELINES)
- **RoHS Compliant**

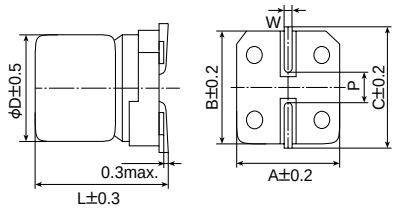
MV-BP
Bi-polar
MV

◆SPECIFICATIONS

Items	Characteristics								
Category Temperature Range	−40 to +85℃								
Rated Voltage Range	4 to 50Vdc								
Capacitance Tolerance	±20% (M)								(at 20℃, 120Hz)
Leakage Current	I=0.05CV or 10μA, whichever is greater. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V)								(at 20℃ after 2 minutes)
Dissipation Factor (tanδ)	Rated voltage (Vdc)	4V	6.3V	10V	16V	25V	35V	50V	
	tanδ (Max.)	0.45	0.32	0.26	0.24	0.22	0.20	0.20	(at 20℃, 120Hz)
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (Vdc)	4V	6.3V	10V	16V	25V	35V	50V	
	Z(−25℃)/Z(+20℃)	7	4	3	2	2	2	2	
	Z(−40℃)/Z(+20℃)	15	10	8	6	4	3	3	(at 120Hz)
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 85℃, however the polarization shall be reversed every 250 hours.								
	Capacitance change	≦±20% of the initial value							
	D.F. (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 500 hours at 85℃ without voltage applied. Before the measurement, the capacitor shall be preconditioned by applying voltage according to Item 4.1 of JIS C 5101-4.								
	Capacitance change	≦±15% of the initial value							
	D.F. (tanδ)	≦150% of the initial specified value							
	Leakage current	≦The initial specified value							

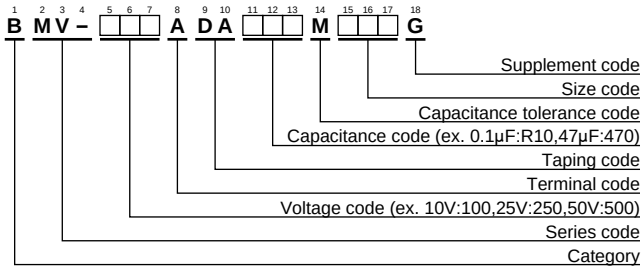
◆DIMENSIONS [mm]

●Terminal Code : A



Size code	D	L	A	B	C	W	P
D55	4	5.2	4.3	4.3	5.1	0.5 to 0.8	1.0
E55	5	5.2	5.3	5.3	5.9	0.5 to 0.8	1.4
F55	6.3	5.2	6.6	6.6	7.2	0.5 to 0.8	1.9

◆PART NUMBERING SYSTEM



Please refer to "Product code guide (surface mount type)"

◆MARKING

EX) 35V4.7μF

◆STANDARD RATINGS

WV (Vdc)	Cap (μF)	Size code	tanδ	Rated ripple current (mArms/ 85℃,120Hz)	Part No.
4	(15)	(D55)	(0.45)	(14)	BMV-4R0ADA150MD55G
6.3	10	D55	0.32	13	BMV-6R3ADA100MD55G
	22	E55	0.32	23	BMV-6R3ADA220ME55G
	47	F55	0.32	36	BMV-6R3ADA470MF55G
10	(6.8)	(D55)	(0.26)	(12)	BMV-100ADA6R8MD55G
	(15)	(E55)	(0.26)	(21)	BMV-100ADA150ME55G
	33	F55	0.26	33	BMV-100ADA330MF55G
16	4.7	D55	0.24	11	BMV-160ADA4R7MD55G
	10	E55	0.24	18	BMV-160ADA100ME55G
	22	F55	0.24	28	BMV-160ADA220MF55G
25	3.3	D55	0.22	9.0	BMV-250ADA3R3MD55G
	(6.8)	(E55)	(0.22)	(15)	BMV-250ADA6R8ME55G
	(15)	(F55)	(0.22)	(24)	BMV-250ADA150MF55G
35	2.2	D55	0.20	8.0	BMV-350ADA2R2MD55G
35	4.7	E55	0.20	13	BMV-350ADA4R7ME55G
	(6.8)	(F55)	(0.20)	(17)	BMV-350ADA6R8MF55G
	10	F55	0.20	21	BMV-350ADA100MF55G
50	0.10	D55	0.20	1.3	BMV-500ADAR10MD55G
	(0.15)	(D55)	(0.20)	(1.9)	BMV-500ADAR15MD55G
	0.22	D55	0.20	2.3	BMV-500ADAR22MD55G
	0.33	D55	0.20	2.8	BMV-500ADAR33MD55G
	0.47	D55	0.20	3.4	BMV-500ADAR47MD55G
	(0.68)	(D55)	(0.20)	(4.1)	BMV-500ADAR68MD55G
	1.0	D55	0.20	5.5	BMV-500ADA1R0MD55G
	(1.5)	(D55)	(0.20)	(6.5)	BMV-500ADA1R5MD55G
	2.2	E55	0.20	9.0	BMV-500ADA2R2ME55G
	3.3	E55	0.20	11	BMV-500ADA3R3ME55G
	4.7	F55	0.20	14	BMV-500ADA4R7MF55G

( ) : Second standard

CAT. No. E1001I

NIPPON CHEMI-CON

SURFACE MOUNT ALUMINUM ELECTROLYTIC CAPACITORS

Bi-polar, 105℃

Alchip™-MVK-BP Series

- Bi-polar chip type for the circuit, of which polarity is frequently reversed
- Solvent resistant type (see PRECAUTIONS AND GUIDELINES)
- **RoHS Compliant**

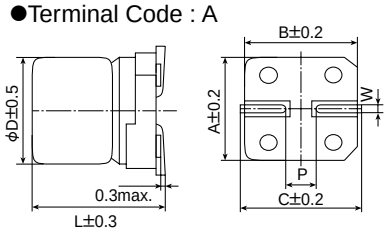
MVK-BP
Bi-polar
MVK

◆SPECIFICATIONS

Items	Characteristics							
Category Temperature Range	−40 to +105℃							
Rated Voltage Range	6.3 to 50Vdc							
Capacitance Tolerance	±20% (M)							(at 20℃, 120Hz)
Leakage Current	I=0.05CV or 10μA, whichever is greater. Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V)							(at 20℃ after 2 minutes)
Dissipation Factor (tanδ)	Rated voltage (Vdc)	6.3V	10V	16V	25V	35V	50V	
	tanδ (Max.)	0.35	0.26	0.24	0.20	0.18	0.18	(at 20℃, 120Hz)
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (Vdc)	6.3V	10V	16V	25V	35V	50V	
	Z(−25℃)/Z(+20℃)	4	3	2	2	2	2	
	Z(−40℃)/Z(+20℃)	10	8	6	4	3	3	(at 120Hz)
Endurance	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℃, however the polarization shall be reversed every 250 hours.							
	Capacitance change	≦±30% of the initial value						
	D.F. (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 500 hours at 105℃ without voltage applied. Before the measurement, the capacitor shall be preconditioned by applying voltage according to Item 4.1 of JIS C 5101-4.							
	Capacitance change	≦±25% of the initial value						
	D.F. (tanδ)	≦200% of the initial specified value						
	Leakage current	≦The initial specified value						

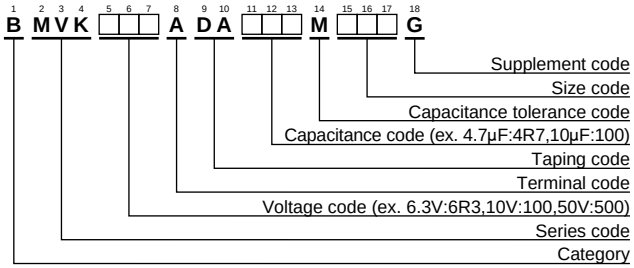
◆DIMENSIONS [mm]

●Terminal Code : A



Size code	D	L	A	B	C	W	P
D60	4	5.7	4.3	4.3	5.1	0.5 to 0.8	1.0
E60	5	5.7	5.3	5.3	5.9	0.5 to 0.8	1.4
F60	6.3	5.7	6.6	6.6	7.2	0.5 to 0.8	1.9

◆PART NUMBERING SYSTEM



Please refer to "Product code guide (surface mount type)"

◆MARKING

EX) 35V4.7μF

◆STANDARD RATINGS

WV (Vdc)	Cap (μF)	Size code	tanδ	Rated ripple current (mArms/ 105℃,120Hz)	Part No.
6.3	10	D60	0.35	14	BMVK6R3ADA100MD60G
	22	E60	0.35	25	BMVK6R3ADA220ME60G
	47	F60	0.35	39	BMVK6R3ADA470MF60G
10	(6.8)	(D60)	(0.26)	(13)	BMVK100ADA6R8MD60G
	(15)	(E60)	(0.26)	(22)	BMVK100ADA150ME60G
	33	F60	0.26	35	BMVK100ADA330MF60G
16	4.7	D60	0.24	12	BMVK160ADA4R7MD60G
	10	E60	0.24	20	BMVK160ADA100ME60G
	22	F60	0.24	32	BMVK160ADA220MF60G
25	3.3	D60	0.20	10	BMVK250ADA3R3MD60G
	(6.8)	(E60)	(0.20)	(17)	BMVK250ADA6R8ME60G
	(15)	(F60)	(0.20)	(28)	BMVK250ADA150MF60G
35	2.2	D60	0.18	8.8	BMVK350ADA2R2MD60G
	4.7	E60	0.18	15	BMVK350ADA4R7ME60G
	10	F60	0.18	23	BMVK350ADA100MF60G

WV (Vdc)	Cap (μF)	Size code	tanδ	Rated ripple current (mArms/ 105℃,120Hz)	Part No.
50	0.10	D60	0.18	1.3	BMVK500ADAR10MD60G
	(0.15)	(D60)	(0.18)	(1.9)	BMVK500ADAR15MD60G
	0.22	D60	0.18	2.3	BMVK500ADAR22MD60G
	0.33	D60	0.18	2.8	BMVK500ADAR33MD60G
	0.47	D60	0.18	3.4	BMVK500ADAR47MD60G
	(0.68)	(D60)	(0.18)	(4.1)	BMVK500ADAR68MD60G
	1.0	D60	0.18	5.5	BMVK500ADA1R0MD60G
	(1.5)	(D60)	(0.18)	(7.5)	BMVK500ADA1R5MD60G
	2.2	E60	0.18	10	BMVK500ADA2R2ME60G
	3.3	E60	0.18	13	BMVK500ADA3R3ME60G
	4.7	F60	0.18	16	BMVK500ADA4R7MF60G
	(6.8)	(F60)	(0.18)	(20)	BMVK500ADA6R8MF60G

( ) : Second standard

CAT. No. E1001I

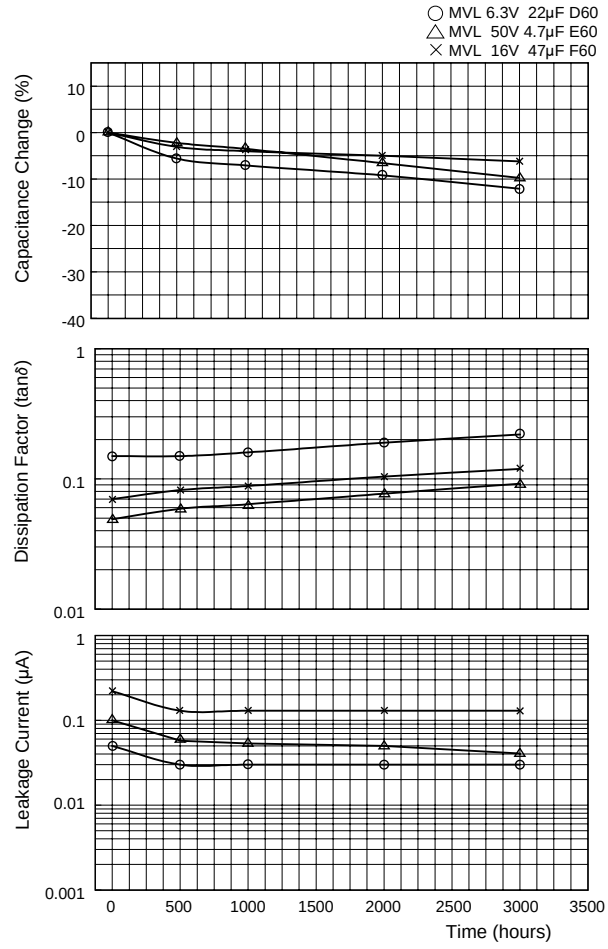
NIPPON CHEMI-CON

RELIABILITY DATA

Surface Mount

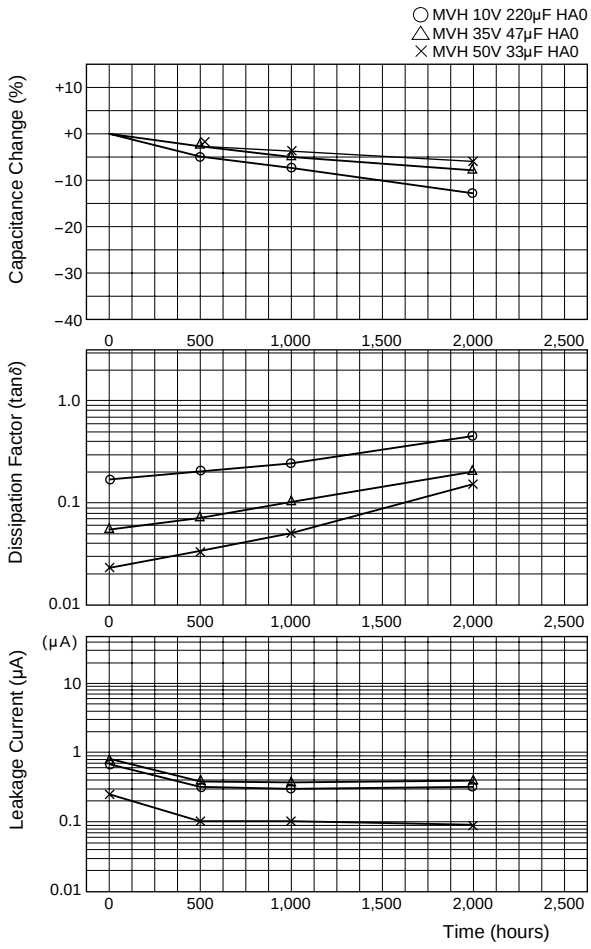
MVL Series

●105℃ Endurance



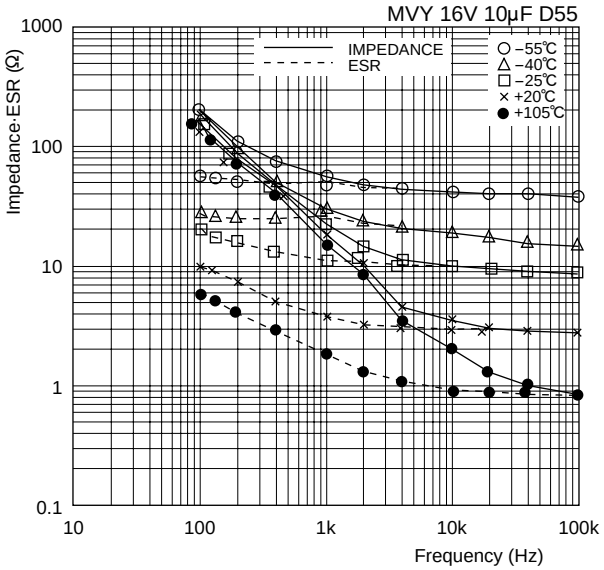
MVH Series

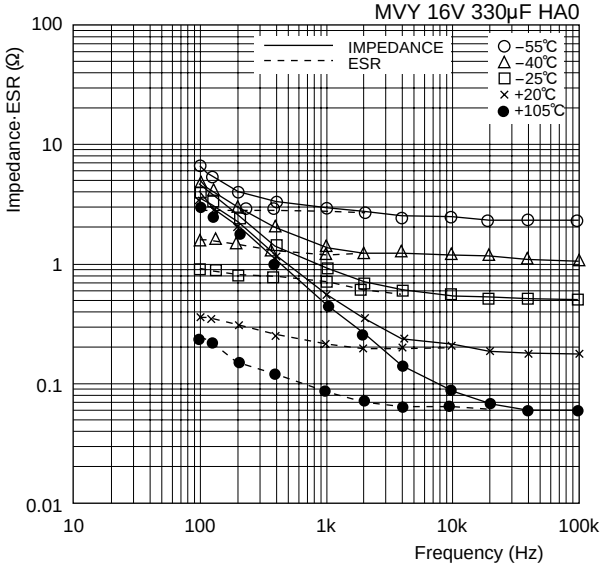
●125℃ Endurance



MVY Series

●Impedance/ESR vs Frequency





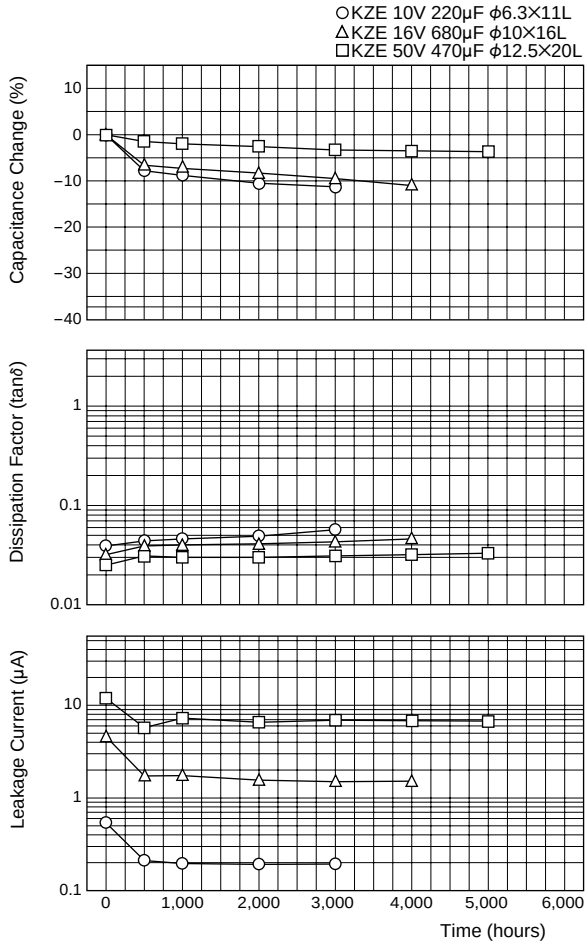
NIPPON CHEMI-CON

RELIABILITY DATA

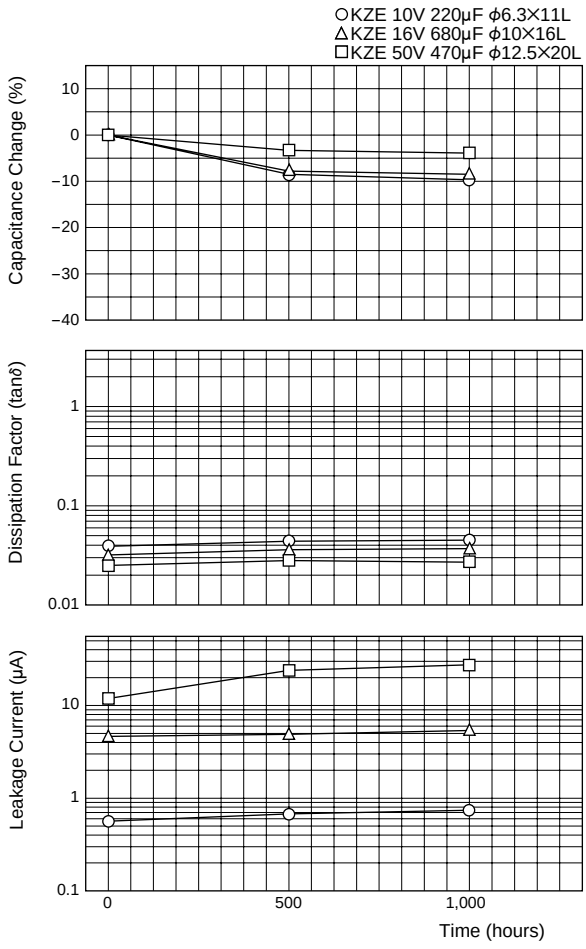
Radial

KZE Series

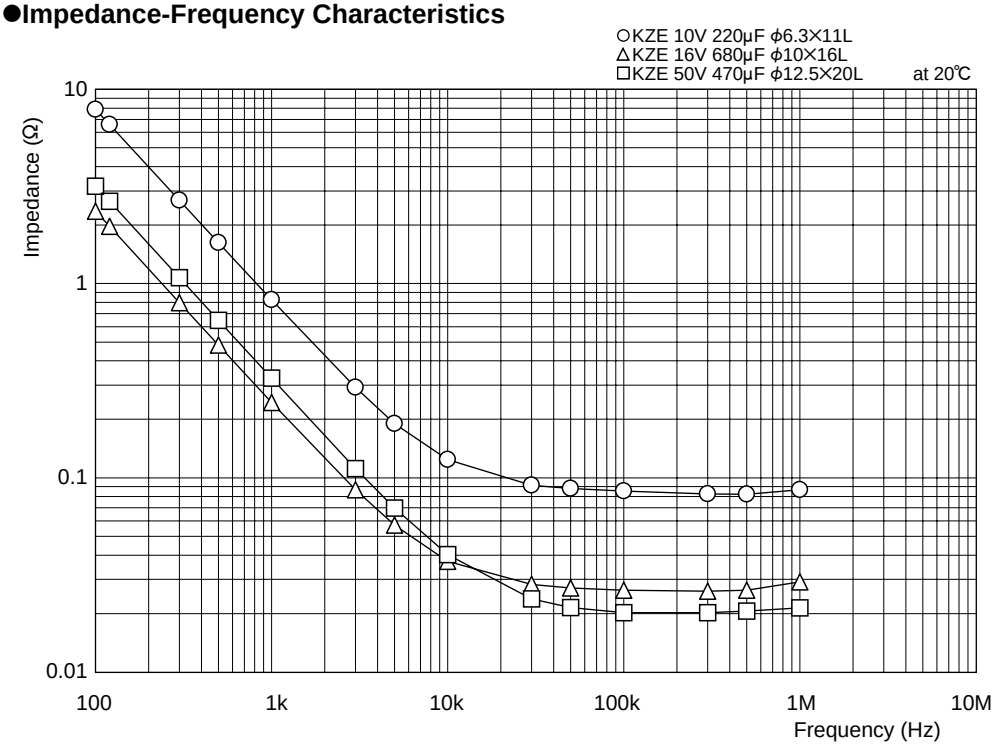
●105℃ Endurance with Rated Ripple Current



●105℃ Shelf Life



●Impedance-Frequency Characteristics



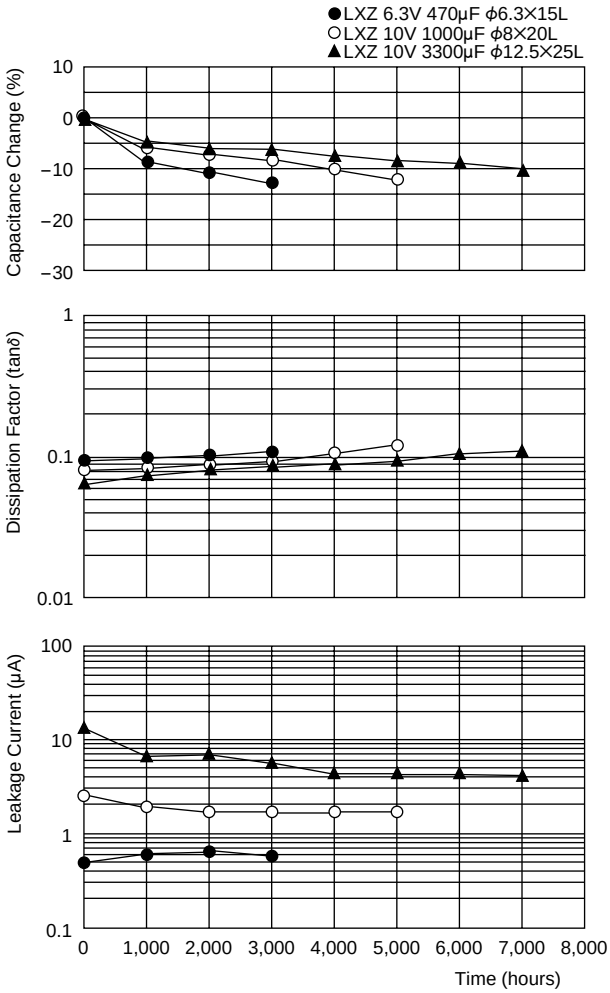
NIPPON CHEMI-CON

RELIABILITY DATA

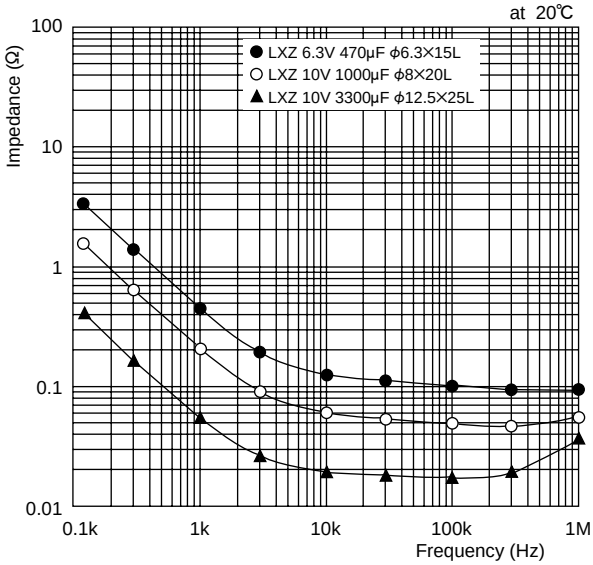
Low Impedance Radial

LXZ Series

●105℃ Endurance with Rated Ripple Current

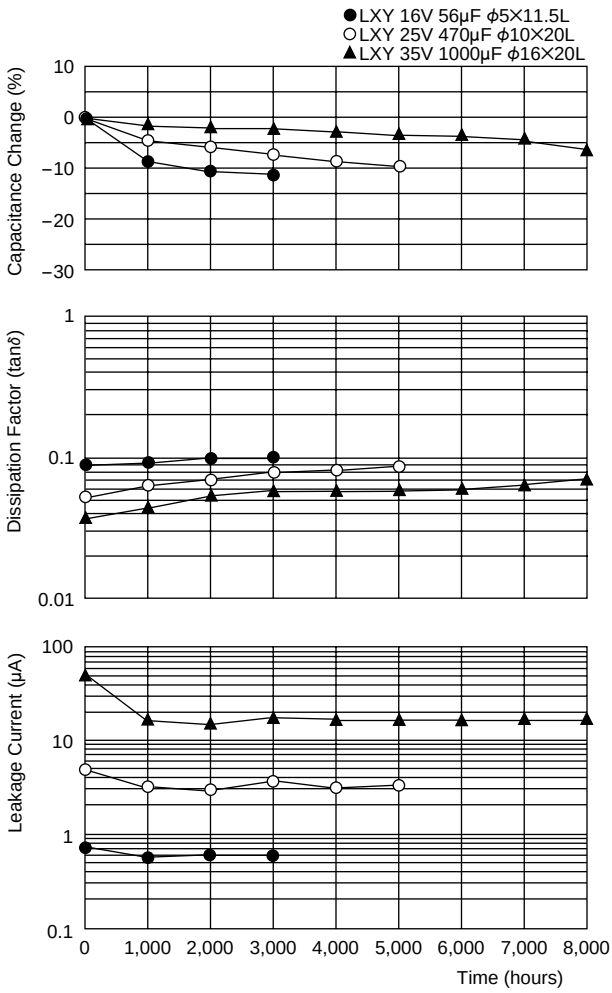


●Impedance-Frequency Characteristics

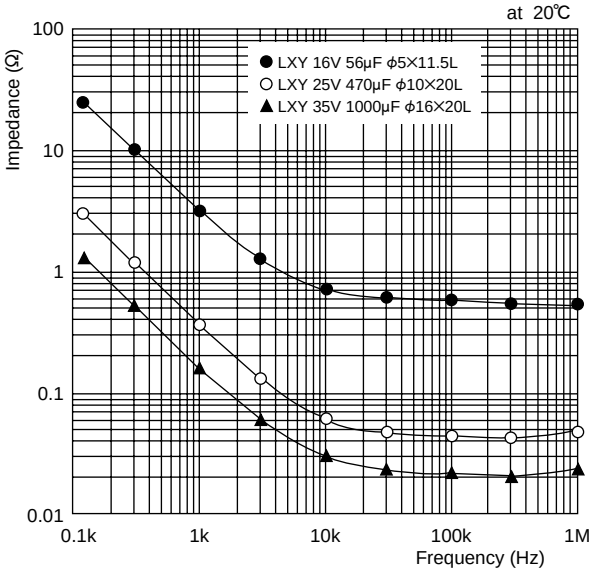


LXY Series

●105℃ Endurance with Rated Ripple Current



●Impedance-Frequency Characteristics



NIPPON CHEMI-CON

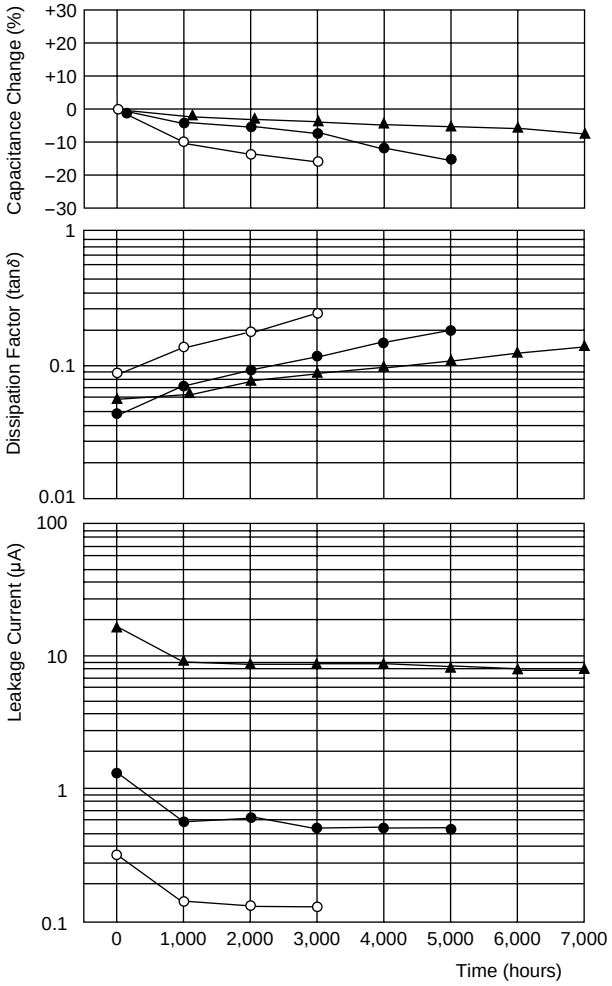
RELIABILITY DATA

Low Impedance Radial

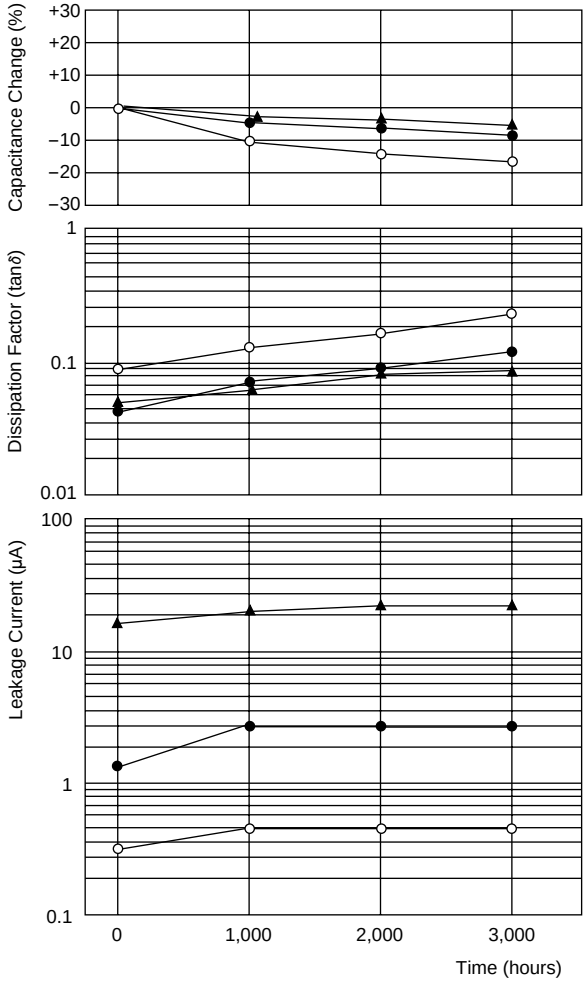
LXV Series

○ LXV 10V 820μF φ5×11.5L
● LXV 25V 220μF φ8×15L
▲ LXV 35V 560μF φ12.5×20L

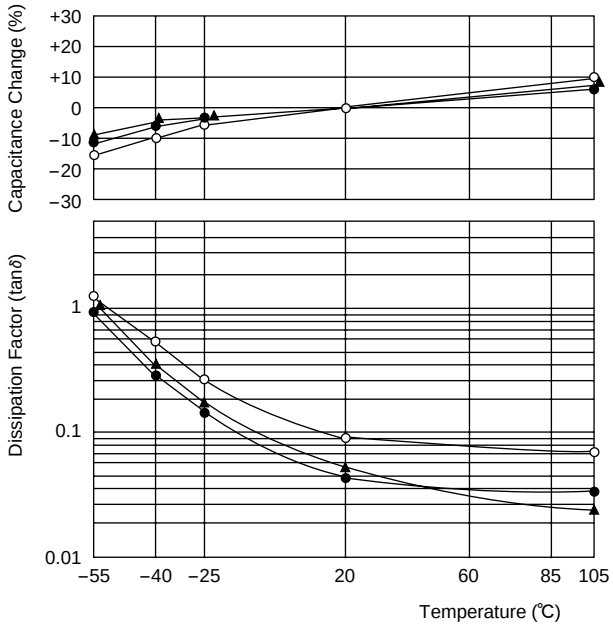
●105℃ Endurance with Rated Ripple Current



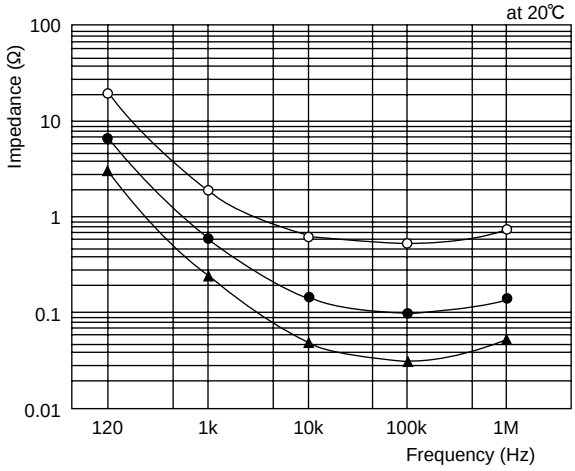
●105℃ Shelf Life test



●Temperature Characteristics



●Impedance-Frequency Characteristics



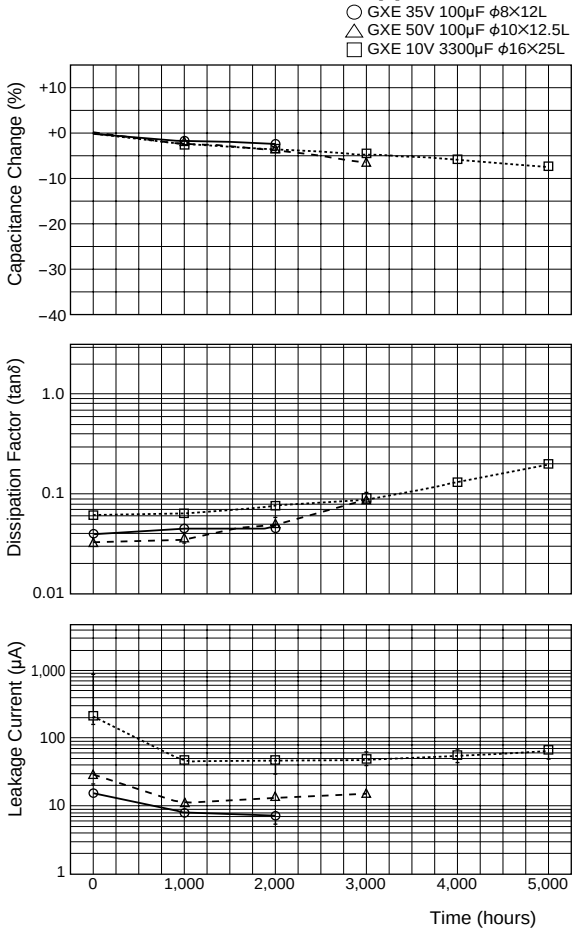
NIPPON CHEMI-CON

RELIABILITY DATA

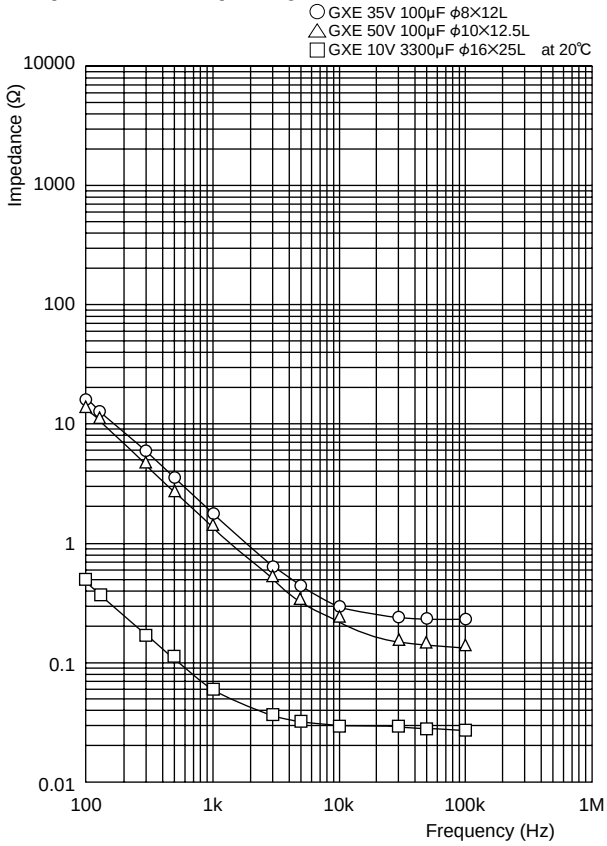
Radial

GXE Series

●125℃ Endurance with Rated Ripple Current



●Impedance-Frequency Characteristics

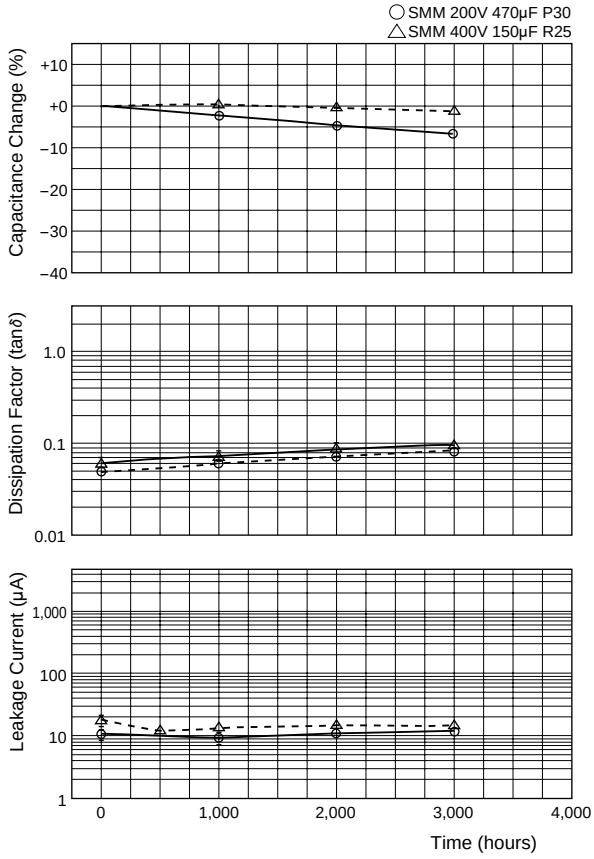


NIPPON CHEMI-CON

RELIABILITY DATA

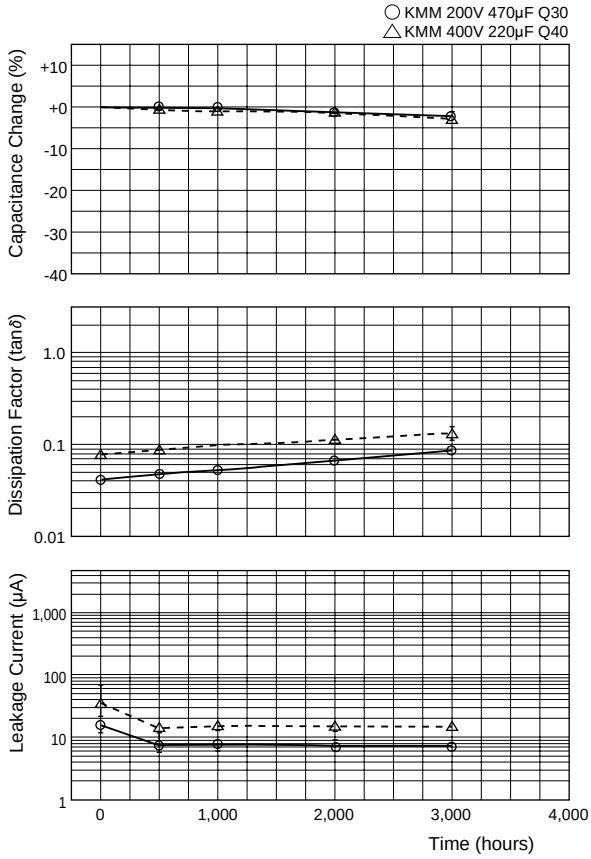
SMM Series

●85℃ Endurance with Rated Ripple Current



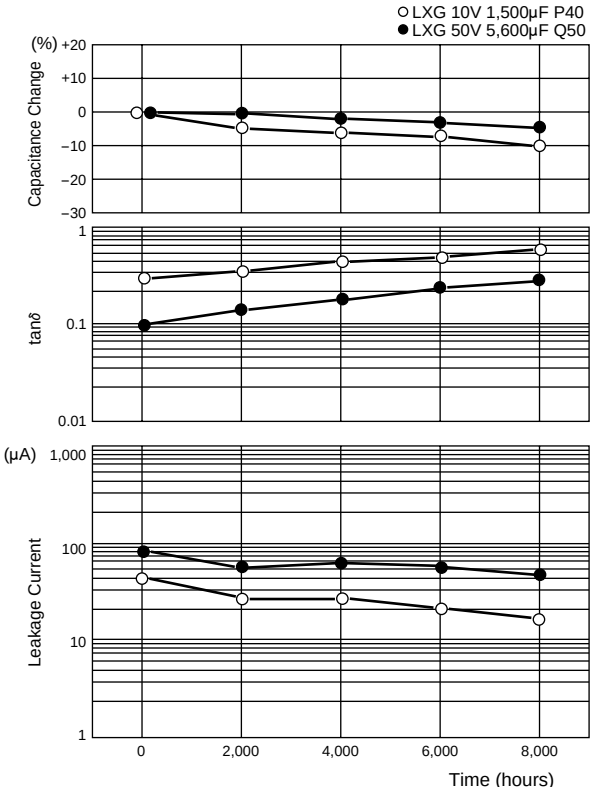
KMM Series

●105℃ Endurance with Rated Ripple Current



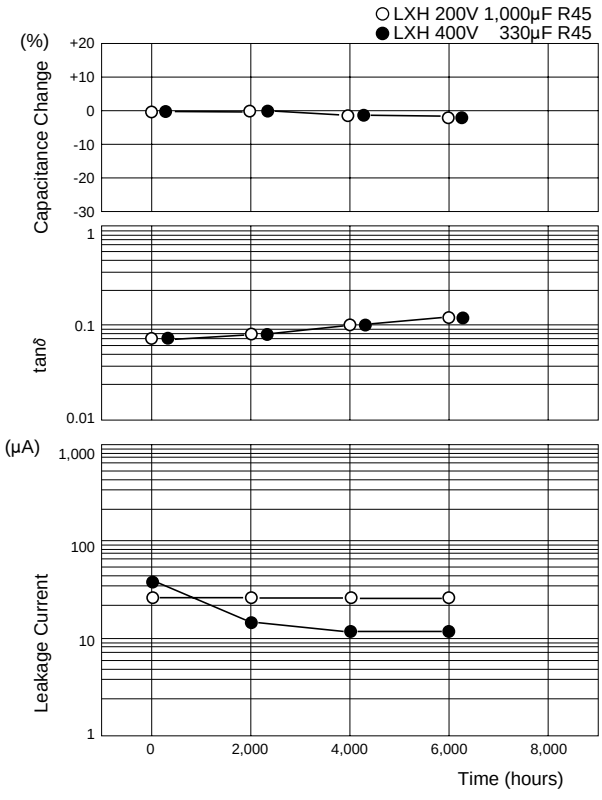
LXG Series

●105℃ Endurance with Rated Ripple Current



LXH Series

●105℃ Endurance with Rated Ripple Current



NIPPON CHEMI-CON

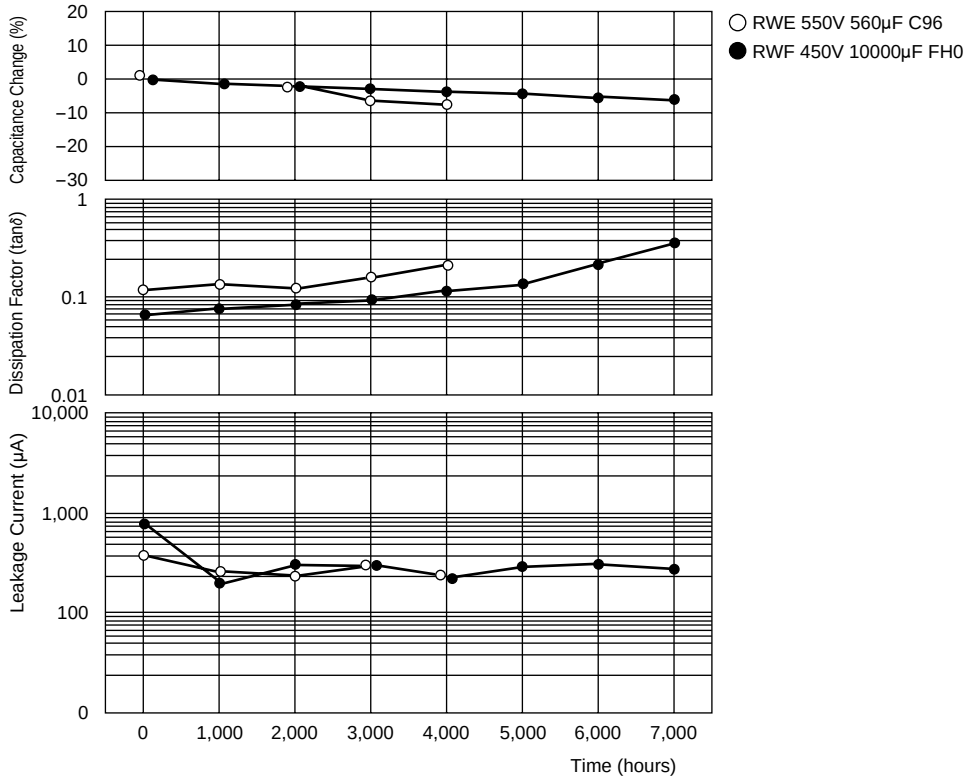
RELIABILITY DATA

Screw-Mount

RWE/RWF/RWL Series

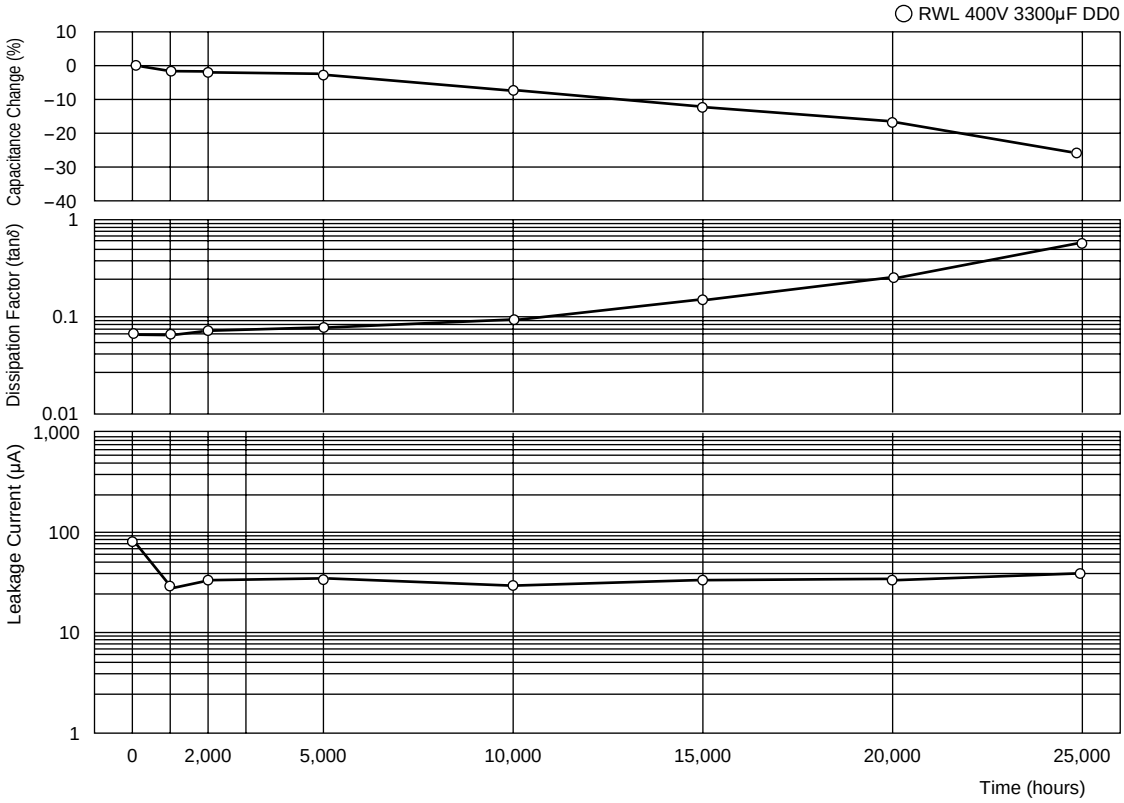
RWE/RWF series

●85℃ Endurance with Rated Ripple Current



RWL series

●85℃ Endurance with Rated Ripple Current



NIPPON CHEMI-CON

PART NUMBERING SYSTEM

Appendix (Part number)

◆Capacitance code

* How to use the table

	1st
2nd	Cap. Value

For less than 10μF, a decimal point position is displayed with R.
For 10μF or more, capacitance code is set to the first 2 digits and index (1digit).
Treatment of fraction (Refer to the table)

Capacitance value part

2nd	1st								
	1	2	3	4	5	6	7	8	9
0	10.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0
A	10.5	20.5	30.5	40.5	50.5	60.5	70.5	80.5	90.5
1	11.0	21.0	31.0	41.0	51.0	61.0	71.0	81.0	91.0
B	11.5	21.5	31.5	41.5	51.5	61.5	71.5	81.5	91.5
2	12.0	22.0	32.0	42.0	52.0	62.0	72.0	82.0	92.0
C	12.5	22.5	32.5	42.5	52.5	62.5	72.5	82.5	92.5
3	13.0	23.0	33.0	43.0	53.0	63.0	73.0	83.0	93.0
D	13.5	23.5	33.5	43.5	53.5	63.5	73.5	83.5	93.5
4	14.0	24.0	34.0	44.0	54.0	64.0	74.0	84.0	94.0
E	14.5	24.5	34.5	44.5	54.5	64.5	74.5	84.5	94.5
5	15.0	25.0	35.0	45.0	55.0	65.0	75.0	85.0	95.0
F	15.5	25.5	35.5	45.5	55.5	65.5	75.5	85.5	95.5
6	16.0	26.0	36.0	46.0	56.0	66.0	76.0	86.0	96.0
G	16.5	26.5	36.5	46.5	56.5	66.5	76.5	86.5	96.5
7	17.0	27.0	37.0	47.0	57.0	67.0	77.0	87.0	97.0
H	17.5	27.5	37.5	47.5	57.5	67.5	77.5	87.5	97.5
8	18.0	28.0	38.0	48.0	58.0	68.0	78.0	88.0	98.0
J	18.5	28.5	38.5	48.5	58.5	68.5	78.5	88.5	98.5
9	19.0	29.0	39.0	49.0	59.0	69.0	79.0	89.0	99.0
K	19.5	29.5	39.5	49.5	59.5	69.5	79.5	89.5	99.5

Example of conversion

Real cap.	The first 2 digits	Treatment of fraction	Code 11th	Code 12th	Code 13th
10.0μF →	10.0 →	10.0 →	1	0	0
10.1μF →	10.1 →	10.0 →	1	0	0
10.2μF →	10.2 →	10.0 →	1	0	0
10.3μF →	10.3 →	10.5 →	1	A	0
10.4μF →	10.4 →	10.5 →	1	A	0
10.5μF →	10.5 →	10.5 →	1	A	0
10.6μF →	10.6 →	10.5 →	1	A	0
10.7μF →	10.7 →	10.5 →	1	A	0
10.8μF →	10.8 →	11.0 →	1	1	0
10.9μF →	10.9 →	11.0 →	1	1	0
11.0μF →	11.0 →	11.0 →	1	1	0
132μF →	13.2 →	13.0 →	1	3	1
133μF →	13.3 →	13.5 →	1	D	1
167μF →	16.7 →	16.5 →	1	G	1
168μF →	16.8 →	17.0 →	1	7	1
1110μF →	11.1 →	11.0 →	1	1	2
1340μF →	13.4 →	13.5 →	1	D	2
13200μF →	13.2 →	13.0 →	1	3	3
13600μF →	13.6 →	13.5 →	1	D	3
270000μF →	27.0 →	27.0 →	2	7	4

◆Case length (Radial lead type)

Case length [mm]	16th	17th
0.0	—	—
0.1	0	B
0.2	0	C
0.3	0	D
0.4	0	E
0.5	0	F
0.6	0	G
0.7	0	H
0.8	0	J
0.9	0	K

Case length [mm]	16th	17th
1.0	0	1
1.1	1	B
1.2	1	C
1.3	1	D
1.4	1	E
1.5	1	F
1.6	1	G
1.7	1	H
1.8	1	J
1.9	1	K

Case length [mm]	16th	17th
2.0	0	2
2.1	2	B
2.2	2	C
2.3	2	D
2.4	2	E
2.5	2	F
2.6	2	G
2.7	2	H
2.8	2	J
2.9	2	K

Case length [mm]	16th	17th
3.0	0	3
3.1	3	B
3.2	3	C
3.3	3	D
3.4	3	E
3.5	3	F
3.6	3	G
3.7	3	H
3.8	3	J
3.9	3	K

Case length [mm]	16th	17th
4.0	0	4
4.1	4	B
4.2	4	C
4.3	4	D
4.4	4	E
4.5	4	F
4.6	4	G
4.7	4	H
4.8	4	J
4.9	4	K

Case length [mm]	16th	17th
5.0	0	5
5.1	5	B
5.2	5	C
5.3	5	D
5.4	5	E
5.5	5	F
5.6	5	G
5.7	5	H
5.8	5	J
5.9	5	K

Case length [mm]	16th	17th
6.0	0	6
6.1	6	B
6.2	6	C
6.3	6	D
6.4	6	E
6.5	6	F
6.6	6	G
6.7	6	H
6.8	6	J
6.9	6	K

Case length [mm]	16th	17th
7.0	0	7
7.1	7	B
7.2	7	C
7.3	7	D
7.4	7	E
7.5	7	F
7.6	7	G
7.7	7	H
7.8	7	J
7.9	7	K

Case length [mm]	16th	17th
8.0	0	8
8.1	8	B
8.2	8	C
8.3	8	D
8.4	8	E
8.5	8	F
8.6	8	G
8.7	8	H
8.8	8	J
8.9	8	K

Case length [mm]	16th	17th
9.0	0	9
9.1	9	B
9.2	9	C
9.3	9	D
9.4	9	E
9.5	9	F
9.6	9	G
9.7	9	H
9.8	9	J
9.9	9	K

Case length [mm]	16th	17th
10.0	1	0
10.1	A	1
10.2	A	2
10.3	A	3
10.4	A	4
10.5	A	5
10.6	A	6
10.7	A	7
10.8	A	8
10.9	A	9

Case length [mm]	16th	17th
11.0	1	1
11.1	B	1
11.2	B	2
11.3	B	3
11.4	B	4
11.5	B	5
11.6	B	6
11.7	B	7
11.8	B	8
11.9	B	9

Case length [mm]	16th	17th
12.0	1	2
12.1	C	1
12.2	C	2
12.3	C	3
12.4	C	4
12.5	C	5
12.6	C	6
12.7	C	7
12.8	C	8
12.9	C	9

Case length [mm]	16th	17th
13.0	1	3
13.1	D	1
13.2	D	2
13.3	D	3
13.4	D	4
13.5	D	5
13.6	D	6
13.7	D	7
13.8	D	8
13.9	D	9

Case length [mm]	16th	17th
14.0	1	4
14.1	E	1
14.2	E	2
14.3	E	3
14.4	E	4
14.5	E	5
14.6	E	6
14.7	E	7
14.8	E	8
14.9	E	9

PART NUMBERING SYSTEM

Case length [mm]	16th	17th
15.0	1	5
15.1	F	1
15.2	F	2
15.3	F	3
15.4	F	4
15.5	F	5
15.6	F	6
15.7	F	7
15.8	F	8
15.9	F	9

Case length [mm]	16th	17th
16.0	1	6
16.1	G	1
16.2	G	2
16.3	G	3
16.4	G	4
16.5	G	5
16.6	G	6
16.7	G	7
16.8	G	8
16.9	G	9

Case length [mm]	16th	17th
17.0	1	7
17.1	H	1
17.2	H	2
17.3	H	3
17.4	H	4
17.5	H	5
17.6	H	6
17.7	H	7
17.8	H	8
17.9	H	9

Case length [mm]	16th	17th
18.0	1	8
18.1	J	1
18.2	J	2
18.3	J	3
18.4	J	4
18.5	J	5
18.6	J	6
18.7	J	7
18.8	J	8
18.9	J	9

Case length [mm]	16th	17th
19.0	1	9
19.1	K	1
19.2	K	2
19.3	K	3
19.4	K	4
19.5	K	5
19.6	K	6
19.7	K	7
19.8	K	8
19.9	K	9

Case length [mm]	16th	17th
20.0	2	0
20.5	L	1
21.0	2	1
21.5	L	3
22.0	2	2
22.5	L	5
23.0	2	3
23.5	L	7
24.0	2	4
24.5	L	9
25.0	2	5
25.5	M	1
26.0	2	6
26.5	M	3
27.0	2	7
27.5	M	5
28.0	2	8
28.5	M	7
29.0	2	9
29.5	M	9

Case length [mm]	16th	17th
30.0	3	0
30.5	N	1
31.0	3	1
31.5	N	3
32.0	3	2
32.5	N	5
33.0	3	3
33.5	N	7
34.0	3	4
34.5	N	9
35.0	3	5
35.5	P	1
36.0	3	6
36.5	P	3
37.0	3	7
37.5	P	5
38.0	3	8
38.5	P	7
39.0	3	9
39.5	P	9

Case length [mm]	16th	17th
40.0	4	0
40.5	Q	1
41.0	4	1
41.5	Q	3
42.0	4	2
42.5	Q	5
43.0	4	3
43.5	Q	7
44.0	4	4
44.5	Q	9
45.0	4	5
45.5	R	1
46.0	4	6
46.5	R	3
47.0	4	7
47.5	R	5
48.0	4	8
48.5	R	7
49.0	4	9
49.5	R	9

Case length [mm]	16th	17th
50.0	5	0
50.5	S	1
51.0	5	1
51.5	S	3
52.0	5	2
52.5	S	5
53.0	5	3
53.5	S	7
54.0	5	4
54.5	S	9
55.0	5	5
55.5	T	1
56.0	5	6
56.5	T	3
57.0	5	7
57.5	T	5
58.0	5	8
58.5	T	7
59.0	5	9
59.5	T	9

Case length [mm]	16th	17th
60.0	6	0
60.5	U	1
61.0	6	1
61.5	U	3
62.0	6	2
62.5	U	5
63.0	6	3
63.5	U	7
64.0	6	4
64.5	U	9
65.0	6	5
65.5	V	1
66.0	6	6
66.5	V	3
67.0	6	7
67.5	V	5
68.0	6	8
68.5	V	7
69.0	6	9
69.5	V	9

Case length [mm]	16th	17th
70.0	7	0
70.5	W	1
71.0	7	1
71.5	W	3
72.0	7	2
72.5	W	5
73.0	7	3
73.5	W	7
74.0	7	4
74.5	W	9
75.0	7	5
75.5	X	1
76.0	7	6
76.5	X	3
77.0	7	7
77.5	X	5
78.0	7	8
78.5	X	7
79.0	7	9
79.5	X	9

Case length [mm]	16th	17th
80.0	8	0
80.5	Y	1
81.0	8	1
81.5	Y	3
82.0	8	2
82.5	Y	5
83.0	8	3
83.5	Y	7
84.0	8	4
84.5	Y	9
85.0	8	5
85.5	Z	1
86.0	8	6
86.5	Z	3
87.0	8	7
87.5	Z	5
88.0	8	8
88.5	Z	7
89.0	8	9
89.5	Z	9

PART NUMBERING SYSTEM

◆Case length (Snap-in type / Screw mount terminal type)

Case length [mm]	16th	17th
20	2	0
21	2	1
22	2	2
23	2	3
24	2	4
25	2	5
26	2	6
27	2	7
28	2	8
29	2	9

Case length [mm]	16th	17th
30	3	0
31	3	1
32	3	2
33	3	3
34	3	4
35	3	5
36	3	6
37	3	7
38	3	8
39	3	9

Case length [mm]	16th	17th
40	4	0
41	4	1
42	4	2
43	4	3
44	4	4
45	4	5
46	4	6
47	4	7
48	4	8
49	4	9

Case length [mm]	16th	17th
50	5	0
51	5	1
52	5	2
53	5	3
54	5	4
55	5	5
56	5	6
57	5	7
58	5	8
59	5	9

Case length [mm]	16th	17th
60	6	0
61	6	1
62	6	2
63	6	3
64	6	4
65	6	5
66	6	6
67	6	7
68	6	8
69	6	9

Case length [mm]	16th	17th
70	7	0
71	7	1
72	7	2
73	7	3
74	7	4
75	7	5
76	7	6
77	7	7
78	7	8
79	7	9

Case length [mm]	16th	17th
80	8	0
81	8	1
82	8	2
83	8	3
84	8	4
85	8	5
86	8	6
87	8	7
88	8	8
89	8	9

Case length [mm]	16th	17th
90	9	0
91	9	1
92	9	2
93	9	3
94	9	4
95	9	5
96	9	6
97	9	7
98	9	8
99	9	9

Case length [mm]	16th	17th
100	A	0
101	A	1
102	A	2
103	A	3
104	A	4
105	A	5
106	A	6
107	A	7
108	A	8
109	A	9

Case length [mm]	16th	17th
110	B	0
111	B	1
112	B	2
113	B	3
114	B	4
115	B	5
116	B	6
117	B	7
118	B	8
119	B	9

Case length [mm]	16th	17th
120	C	0
121	C	1
122	C	2
123	C	3
124	C	4
125	C	5
126	C	6
127	C	7
128	C	8
129	C	9

Case length [mm]	16th	17th
130	D	0
131	D	1
132	D	2
133	D	3
134	D	4
135	D	5
136	D	6
137	D	7
138	D	8
139	D	9

Case length [mm]	16th	17th
140	E	0
141	E	1
142	E	2
143	E	3
144	E	4
145	E	5
146	E	6
147	E	7
148	E	8
149	E	9

Case length [mm]	16th	17th
150	F	0
151	F	1
152	F	2
153	F	3
154	F	4
155	F	5
156	F	6
157	F	7
158	F	8
159	F	9

Case length [mm]	16th	17th
160	G	0
161	G	1
162	G	2
163	G	3
164	G	4
165	G	5
166	G	6
167	G	7
168	G	8
169	G	9

Case length [mm]	16th	17th
170	H	0
171	H	1
172	H	2
173	H	3
174	H	4
175	H	5
176	H	6
177	H	7
178	H	8
179	H	9

Case length [mm]	16th	17th
180	J	0
181	J	1
182	J	2
183	J	3
184	J	4
185	J	5
186	J	6
187	J	7
188	J	8
189	J	9

Case length [mm]	16th	17th
190	K	0
191	K	1
192	K	2
193	K	3
194	K	4
195	K	5
196	K	6
197	K	7
198	K	8
199	K	9

Case length [mm]	16th	17th
200	L	0
201	L	1
202	L	2
203	L	3
204	L	4
205	L	5
206	L	6
207	L	7
208	L	8
209	L	9

Case length [mm]	16th	17th
210	M	0
211	M	1
212	M	2
213	M	3
214	M	4
215	M	5
216	M	6
217	M	7
218	M	8
219	M	9

Case length [mm]	16th	17th
220	N	0
221	N	1
222	N	2
223	N	3
224	N	4
225	N	5
226	N	6
227	N	7
228	N	8
229	N	9

Case length [mm]	16th	17th
230	P	0
231	P	1
232	P	2
233	P	3
234	P	4
235	P	5
236	P	6
237	P	7
238	P	8
239	P	9

Case length [mm]	16th	17th
240	Q	0
241	Q	1
242	Q	2
243	Q	3
244	Q	4
245	Q	5
246	Q	6
247	Q	7
248	Q	8
249	Q	9

Case length [mm]	16th	17th
250	R	0
251	R	1
252	R	2
253	R	3
254	R	4
255	R	5
256	R	6
257	R	7
258	R	8
259	R	9

PART NUMBERING SYSTEM

◆Supplement code

Surface mount type / Conductive polymer (Include Radial lead type)

	Terminal plating material (Radial lead type)		
	Sn100%	Sn-Bi	Sn-Pb
Coating case	S	G	N

Radial lead type / Snap-in type

		Terminal plating material (Radial lead type)		
		Sn100%	Sn-Bi	Sn-Pb
Outer sleeve	PET	S	D	C
	Coating case	H	G	F
	Polyolefin	L	—	—
	Pb-free PVC	M	—	N
	PVC	B	A	N

* Pb-free snap-in type does not have a plastic disk.
We also produce Pb-free snap-in type with "Plastic disk, Pb-free PVC sleeve and Sn100% terminal plating".
In this case, supplement code (the 18th digit) is "T".

Screw mount terminal type

	Screw terminal
Pb-free PVC	M
Polyolefin	S
PET	C
PVC	N