Miniature Aluminum Electrolytic Capacitors

Classification	Series	Configuration	Applications	Category Temperature Range (°C)	Features: Standard type	Features: Smaller-sized & low profile	Features: Low impedance	Features: Long life	Features: Anti-cleaning solvent	Rated Voltage Range (V.D.C)	Rated Capacitance Range (μF)	Tolerance on Rated Capacitance (%)	Page
Ultra-Miniature type	MA	04	5mmL, Standard, For General Purposes	−40 to +85	●				●	4 to 50	0.1 to 470	±20	109
	MP	04	5mmL, Bi-Polarized	−40 to +85	●				●	6.3 to 50	0.1 to 47	±20	110
	MT	04	5mmL, Wide Temperature Range	−55 to +105	●				●	4 to 50	0.1 to 100	±20	111
	MF	04	5mmL, Low Impedance	−55 to +105			●		●	6.3 to 35	1 to 100	±20	112
	MV	04	5mmL, Long Life Assurance	−40 to +105				●		4 to 50	0.1 to 100	±20	113
	SA	04	7mmL, For General Purposes	−40 to +85	●				●	6.3 to 50	0.1 to 220	±20	114
	SR	04	7mmL, High C / V	−40 to +85		●			●	4 to 50	0.1 to 470	±20	114
	SP	04	7mmL, Bi-Polarized	−40 to +85	●				●	6.3 to 50	0.1 to 220	±20	115
	ST	04	7mmL, Wide Temperature Range	−55 to +105	●				●	6.3 to 50	0.1 to 220	±20	116
	SV	04	7mmL, Long Life Assurance	−40 to +105				●		6.3 to 50	0.1 to 220	±20	117
	SF	04	7mmL, Low Impedance	−55 to +105			●		●	6.3 to 35	6.8 to 220	±20	118
Standard type	VK	04	Miniature Sized, Standard	−40 (−25) to +85		●			▲	6.3 to 450	0.1 to 68000	±20	120
	VR	04	Standard	−40 (−25) to +85	●				▲	6.3 to 450	0.1 to 33000	±20	122
	VX	02	Standard, For General Purposes	−40 (−25) to +85	●				▲	6.3 to 450	0.47 to 10000	±20	124
	VY	04	Miniature Sized, Wide Temperature Range	−55 (−40, −25) to +105		●			▲	6.3 to 450	0.1 to 68000	±20	126
	VZ	04	Wide Temperature Range	−55 (−40, −25) to +105	●				▲	6.3 to 450	0.1 to 33000	±20	128
	RS	04	Compact & Standard For General Purposes	−40 to +85		●			▲	6.3 to 400	0.1 to 10000	±20	130
	RZ	04	Low-Profile Sized, Wide Temperature Range	−55 (−40) to +105		●			▲	6.3 to 400	0.1 to 10000	±20	132
	RU	04	12.5mmL	−40 (−25) to +85		●			▲	6.3 to 450	6.8 to 6800	±20	134
	RY	04	12.5mmL Wide Temperature Range	−55 (−40, −25) to +105		●			▲	6.3 to 450	6.8 to 4700	±20	136
	VP	04	Bi-Polarized	−40 to +85	●				●	6.3 to 100	0.47 to 6800	±20	138
	EP	04	Bi-Polarized, Wide Temperature Range	−55 to +105	●				●	6.3 to 100	0.47 to 6800	±20	119
High Reliability type	PM	04	Extremely Low Impedance, High Reliability	−55 (−40, −25) to +105			●	●	▲	6.3 to 450	0.47 to 15000	±20	140
	PW	04	Miniature Sized, Low Impedance, High Reliability	−55 (−40, −25) to +105		●	●	●	▲	6.3 to 450	0.47 to 15000	±20	147
	TT	04	Miniature Sized, Low Impedance, High Reliability	−40 to +105		●	●	●	●	6.3 to 50	1 to 470	±20	152
	PA	04	Miniature Sized, Low Impedance, High Reliability	−55 to +105		●	●	●	●	6.3 to 35	180 to 10000	±20	154
	HV	04	Extremely Low Impedance, High Reliability	−40 to +105		●	●	●	●	6.3 to 35	47 to 8200	±20	156
	HD	04	Extremely Low Impedance, High Reliability	−40 to +105		●	●		●	6.3 to 50	22 to 6800	±20	160
	HC	04	Extremely Low Impedance, High Reliability	−40 to +105		●	●		●	6.3 to 35	4.7 to 1000	±20	158
	HE	04	Extremely Low Impedance, High Reliability	−40 to +105		●	●	●	●	6.3 to 100	0.47 to 18000	±20	163
	HM	04	Extremely Low Impedance, High Reliability, For PC motherboard	−40 to +105		●	●		●	6.3 to 16	330 to 12000	±20	168
	HN	04	Extremely Low Impedance, High Reliability, For PC motherboard	−25 to +105		●	●		●	6.3 to 16	330 to 8200	±20	169
	HZ	04	Extremely Low Impedance, For PC motherboard	−25 to +105		●	●		●	6.3 to 16	470 to 3300	±20	170
	PJ	04	Low Impedance, For Switching Power Supplies	−55 (−40, −25) to +105	●		●	●	▲	6.3 to 450	0.47 to 15000	±20	171
	PS	04	Miniature Sized, Low Impedance, For Switching Power Supplies	−55 (−40, −25) to +105		●	●		▲	6.3 to 450	0.47 to 15000	±20	178
	TS	04	Miniature Sized, For Switching Power Supplies	−40 to +105		●		●	●	6.3 to 50	0.1 to 470	±20	180
	PV	04	Miniature Sized, Low Impedance, High Reliability	−55 to +105			●	●	●	6.3 to 50	0.47 to 390	±20	182
	PT	04	Miniature Sized, High Ripple Current, Long Life	−25 to +105		●		●		200 to 450	15 to 820	±20	184
	PZ	04	High voltage, Smaller-Sized	−25 to +105		●				200 to 450	18 to 470	±20	186
	PB	04	Miniature Sized, High Ripple Current, High Reliability	−40 (−25) to +105		●		●	▲	10 to 450	0.47 to 3300	±20	188
	CA	04	Miniature Sized, High Ripple Current, Long Life	−25 to +105		●		●		160 to 450	6.8 to 220	±20	190
	CS	04	Miniature Sized, High Ripple Current, High Reliability	−40 (−25) to +105		●		●		160 to 450	6.8 to 330	±20	192
	CY	04	Miniature Sized, High Ripple Current, High Reliability	−40 to +105		●		●		160 to 400	6.8 to 560	±20	194
	PX	04	Long Life Assurance, High Reliability	−55 to +105			●	●	●	10 to 35	1 to 4700	±20	196
	BT	04	High Temperature Range, For Industrial equipment (125°C)	−40 (−25) to +125				●	▲	10 to 450	1 to 4700	±20	198
	BW	04	High Temperature Range, For Industrial equipment (135°C)	−55 to +135				●	●	10 to 100	1 to 4700	±20	200
	BX	04	High Temperature Range, For Automobile equipment (150°C)	−55 (−40, −25) to +150				●	●	10 to 400	1 to 4700	±20	202

Above description is a feature against AK-225AES.
▲ : Applicable up to 100V ratings or less.

Miniature Aluminum Electrolytic Capacitors

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Special equipment	KL	04	Low Leakage Current	−40 to +85	●				●	6.3 to 100	0.1 to 10000	±20, ±10	204
	TM	04	Timer Circuit Use	−40 to +85	●				●	10 to 50	1 to 470	±20, ±10	206
	JB	04	Memory Back-Up Use	−25 to +85	●				●	5.5	2.2mF to 47mF	−10 to +50	207
	AQ	04	For Permissible Abnormal Voltage	−40 to +105						200・400	10 to 220	±20	208
	AS	04	Miniature Type,For Permissible Abnormal Voltage	−40 to +105		●				200	33 to 330	±20	209
For audio equipment	KZ	04	Premium Grade Type, For Audio Equipment	−40 to +85					●	25 to 100	10 to 1000	±20	210
	FG	04	High Grade Type, For Audio Equipment	−40 to +85	●				●	6.3 to 100	0.1 to 10000	±20	212
	KW	04	Standard, For Audio Equipment	−40 to +85	●				●	6.3 to 100	0.1 to 33000	±20	211
	FW	04	Standard, For Audio Equipment	−40 to +85		●			●	6.3 to 100	0.1 to 33000	±20	214
	SW	04	7mmL, For Audio Equipment	−40 to +85	●				●	6.3 to 50	0.1 to 220	±20	216
	MW	04	5mmL, For General Audio Equipment	−40 to +85	●				●	4 to 50	0.1 to 470	±20	217
	UQ	32	105°C Chip Type, For Audio Equipment	−40 to +105					●	6.3 to 50	0.1 to 1000	±20	218
	ES	04	Bi-Polarized, For Audio Equipment	−40 to +85	●				●	6.3 to 50	0.47 to 1000	±20	220
	DB, GB	04	Bi-Polarized, For Speaker Network	−40 to +85	●				●	50	1 to 68	±20, ±10	221
	Upgrade KT	04	105°C Standard, For Audio Equipment	−55 to +105	●				●	6.3 to 50	0.1 to 33000	±20	222

Above description is a feature against AK-225AES.
▲ : Applicable up to 100V ratings or less.Please refer to page 19 for details of cleaning.

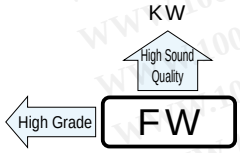
ALUMINUM ELECTROLYTIC CAPACITORS

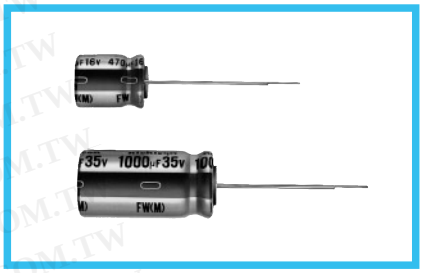
nichicon

FW series

Standard, For Audio Equipment

● Compliant to the RoHS directive (2002/95/EC).





■Specifications

Item	Performance Characteristics
Category Temperature Range	−40 to +85°C
Rated Voltage Range	6.3 to 100V
Rated Capacitance Range	0.1 to 33000μF
Capacitance Tolerance	±20% at 120Hz, 20°C
Leakage Current	After 1 minute's application of rated voltage, leakage current is not more than 0.03 CV or 4 (μA) , whichever is greater. After 2 minutes' application of rated voltage, leakage current is not more than 0.01 CV or 3 (μA) , whichever is greater.
Tangent of loss angle (tan δ)	Measurement frequency : 120Hz, Temperature : 20°C

Rated voltage (V)	6.3	10	16	25	35	50	63	100
tan δ (MAX.)	0.28	0.24	0.20	0.16	0.14	0.12	0.10	0.08

For capacitance of more than 1000μF, add 0.02 for every increase of 1000μF.

Stability at Low Temperature — Measurement frequency : 120Hz

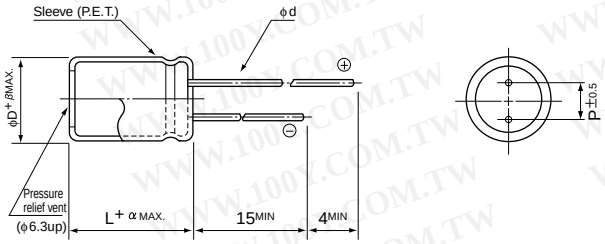
Rated voltage (V)		6.3	10	16	25	35	50	63	100
Impedance ratio ZT / Z20 (MAX.)	Z−25°C / Z+20°C	5	4	3	2	2	2	2	2
	Z−40°C / Z+20°C	12	10	8	5	4	3	3	3

Endurance — The specifications listed at right shall be met when the capacitors are restored to 20°C after the rated voltage is applied for 2000 hours at 85°C.

Capacitance change	Within ±20% of the initial capacitance value
tan δ	200% or less than the initial specified value
Leakage current	Less than or equal to the initial specified value

Item	Performance Characteristics
Shelf Life	After sroring the capacitors under no load at 85°C for 1000 hours and then performing voltage treatment based on JIS C 5101-4 clause 4.1 at 20°C, they shall meet the specified values for the endurance characteristics listed above.
Marking	Printed with black color letter on Gold sleeve.

■Radial Lead Type

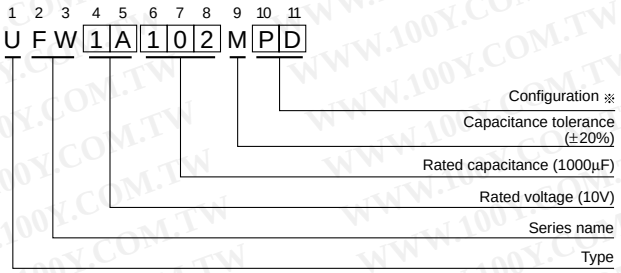


(mm)

φD	5	6.3	8	10	12.5	16	18	20	22	25
P	2.0	2.5	3.5	5.0	5.0	7.5	7.5	10	10	12.5
φd	0.5	0.5	0.6	0.6	0.6	0.8	0.8	1.0	1.0	1.0
β	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1.0	1.0

α	
	(φD < 20) 1.5
	(φD ≧ 20) 2.0

Type numbering system (Example : 10V 1000μF)



※ Configuration

φ D	Pb-free leadwire Pb-free PET sleeve
5	DD
6.3	ED
8 ·10	PD
12.5 to 18	HD
20 to 25	RD

• Please refer to page 20 about the end seal configulation.

Please refer to page 20, 21, 22 about the formed or taped product spec.
Please refer to page 4 for the minimum order quantity.

● Dimension table in next page.

FW series

■Dimensions

Cap.(μF) \ V	6.3		10		16		25		35		50		63		100	
Code	0J		1A		1C		1E		1V		1H		1J		2A	
0.1	0R1										5×11	1.1			5×11	2.1
0.22	R22										5×11	2.4			5×11	4.7
0.33	R33										5×11	3.5			5×11	7.0
0.47	R47										5×11	5.0			5×11	10
1	010										5×11	10			5×11	21
2.2	2R2										5×11	23			5×11	30
3.3	3R3										5×11	35			5×11	40
4.7	4R7										5×11	40			5×11	45
10	100										5×11	65	5×11	70	6.3×11	75
22	220										5×11	95	5×11	100	6.3×11	120
33	330								5×11	105	5×11	120	6.3×11	140	8×11.5	160
47	470						5×11	115	5×11	120	6.3×11	150	6.3×11	165	10×12.5	210
100	101			5×11	145	5×11	155	6.3×11	185	6.3×11	200	8×11.5	250	10×12.5	300	10×20	350
220	221			6.3×11	230	6.3×11	250	8×11.5	320	10×12.5	370	10×12.5	410	10×16	470	12.5×25	600
330	331	6.3×11	265	6.3×11	270	8×11.5	360	10×12.5	420	10×12.5	470	10×16	570	10×20	650	12.5×25	750
470	471	6.3×11	310	6.3×11	330	8×11.5	420	10×12.5	530	10×16	630	12.5×20	760	12.5×20	880	16×25	1000
1000	102	8×11.5	530	10×12.5	630	10×16	770	10×20	950	12.5×20	1100	12.5×25	1300	16×25	1300	18×40	1370
2200	222	10×20	980	10×20	1050	12.5×20	1250	12.5×25	1550	16×25	1800	16×35.5	2090	18×35.5	2200	22×50	2400
3300	332	10×20	1170	12.5×20	1420	12.5×25	1700	16×25	1950	16×35.5	2220	18×35.5	2360	20×40	2700	25×50	2900
4700	472	12.5×20	1350	12.5×25	1800	16×25	2100	16×31.5	2360	18×35.5	2490	20×40	2900	22×50	3400		
6800	682	12.5×25	1600	16×25	2150	16×35.5	2500	18×35.5	2590	20×40	3000	22×50	3500	25×50	3500		
10000	103	16×25	2000	16×35.5	2500	18×35.5	2640	20×40	3000	22×50	3700	25×50	4000				
15000	153	16×35.5	2550	18×35.5	2720	20×40	3400	22×50	3800	25×50	4300						
22000	223	18×40	3200	20×40	3700	22×50	4200	25×50	4500								
33000	333	22×50	3900	22×50	4500	25×50	4800									Case size φD×L (mm)	Rated ripple

Rated ripple current (mArms) at 85°C 120Hz

●Frequency coefficient of rated ripple current

Cap.(μF) \ Frequency	50Hz	120Hz	300Hz	1kHz	10kHz or more
Less than 47	0.75	1.00	1.35	1.57	2.00
100 to 470	0.80	1.00	1.23	1.34	1.50
1000 to 33000	0.85	1.00	1.10	1.13	1.15