

TM SERIES – *LOW ESR, FOR SWITCHING POWER SUPPLIES SERIES*

- ◆ Applicable Standard
Characteristic W of JIS C 5141

- ◆ Operating Temperature Range
-40°C ~ +105°C

- ◆ Rated Working Voltage
6.3~50 V.DC

- ◆ Rated Voltage and Surge Voltage

Rated Voltage (V)	6.3	10	16	25	35	50
Surge Voltage (V)	8	13	20	32	44	63

- ◆ DC Leakage Current

Applying the rated DC voltage to the capacitor. The leakage current is measured at 2 minutes after the DC voltage across the capacitor reached the rated voltage. The leakage current shall not exceed the value below. (at 25°C)

$$I \leq 0.01 CV \text{ or } 3 \mu A, \text{ whichever is greater after 2 minutes.}$$

Where, I: Leakage Current (μA) C: Nominal Capacitance (μF)

V: Rated Voltage (V)

- ◆ Capacitance Tolerance

The capacitance shall be within the following tolerance to the nominal capacitance.
-20% ~ +20% (at 25°C, 120Hz)

- ◆ Tangent of Loss Angle ($\tan \delta$)

$\tan \delta$ shall not exceed the value below. (at 25°C, 120Hz)

When nominal capacitance is over 1000 μF . $\tan \delta$ shall be added 0.02 to the listed value with increase of every 1000 μF .

Rated Voltage (V)	6.3	10	16	25	35	50
$\tan \delta$	0.22	0.19	0.16	0.14	0.12	0.10

- ◆ Temperature Characteristics

Impedance ratio of the -25°C or -40°C value to the 25°C value shall not exceed the value below. (at 120Hz)

Rated Voltage (V)	6.3	10	16	25	35	50
$Z(-55^\circ C)/Z(25^\circ C)$	4	4	3			

◆ Load Life

Test in accordance with JIS C5141No.19.

The following specifications shall be satisfied when the capacitors are restored to 25°C.

after the rated voltage is applied for(5 ϕ ~8 ϕ) 1000 hours or (10 ϕ ~25 ϕ) 2000 hours at 105°C.

Capacitance Change	$\pm 20\%$ of the initial measured value.
Tan δ	$\leq 200\%$ of the initial specified value.
Leakage Current	\leq The initial specified value.

◆ Shelf Life

The following specifications shall be satisfied when the capacitors are restored to 25°C after exposing them for 500 hours at 105°C without voltage applied. The capacitors shall be subjected to voltage treatment specified in item 4.4 of JIS C 5102, before the measurements.

Capacitance Change	$\pm 20\%$ of the initial measured value.
Tan δ	$\leq 200\%$ of the initial specified value.
Leakage Current	\leq The initial specified value.

◆ Solder ability

The lead wires shall be dipped into Methanol (JIS K 1501) or Isopropyl Alcohol (JIS K 1522 or JIS K 8839) solution of 10 $\pm 20\%$ Rosin (JIS K 5902) for 2 ± 0.5 seconds, and then dipped into solder H63A (JIS Z 3282) at 235 $\pm 5^\circ\text{C}$ for 2 ± 0.5 seconds. The depth of immersion shall be 2 to 2.5 mm of the capacitor body.

After immersion, the solder shall cover at least 3/4 of the lead wire surface immersed.

◆ Lead Strength

Pull Strength

The lead wire shall not get loose or cut off, while a parallel force is gradually applied to the lead wire up to 10N and retained for 10 second.

Bending Strength

Apply the 0.5Kg weight to the end of the lead wire, and lean the capacitors body 90° and return to the original position within approximately 5 seconds. Then, repeat this cycle in the posited direction at the same speed.

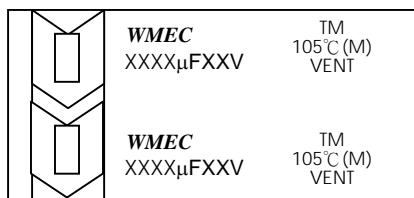
After that, the lead wire shall not loose or cut off.

◆ Marking

Color Style: golden marking on black sleeve.

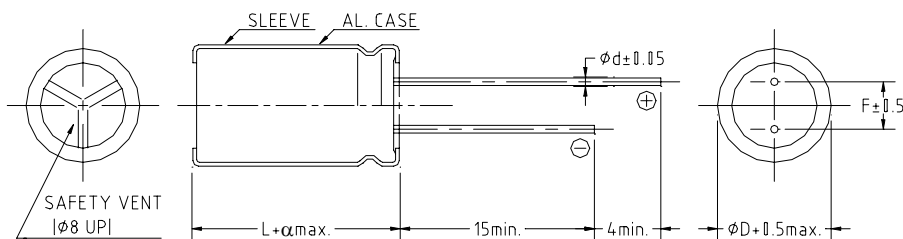
The following items shall be marked on each capacitor.

Example:



- (1) Series Name
- (2) Maximum Operating Temperature
- (3) Capacitance Tolerance
- (4) Safety Device Marking
(Safety vent more than 8mm Diameter product)
- (5) Polarity
- (6) Wanming Electronics Co., Ltd. Marking
- (7) Nominal Capacitance
- (8) Rated Voltage

◆ Dimensions (mm)



ϕD	5	6.3	8	10	13	16	18
F	2.0	2.5	3.5	5.0		7.5	
ϕd	0.5		0.5or0.6	0.6	0.6or0.8		0.8
α	1.0			1.5			

◆ Ripple Current Coefficients

Frequency Multipliers

Freq.(Hz) Cap.(μF)	60(50)	120	1K	10K	100K \leq
1.0 ~ 47	0.45	0.55	0.75	0.90	1.00
68 ~ 330	0.60	0.70	0.85	0.95	1.00
390 ~ 1000	0.65	0.75	0.90	0.98	1.00
1200 ~ 6800	0.75	0.80	0.95	1.00	1.00

Temperature Multipliers

Temp. (°C)	40	60	70	85	105
Coefficient	2.4	2.1	1.78	1.65	1.00

◆ Case Size & Permissible Max. Ripple Current

Case Size : ϕ D×L (mm)
 Max. Ripple Current : mA (rms) (105°C, 120Hz)

WV Item μ F	6.3				10			
	SIZE	Impedance (Ω) max. 25°C 100k Hz	R.C. (mA rms)		SIZE	Impedance (Ω) max. 25°C 100k Hz	R.C. (mA rms)	
			105°C 120Hz	105°C 100kHz			105°C 120Hz	105°C 100kHz
470	8x12	0.31	383	578	8x14	0.26	463	704
680	8x12	0.21	460	690	10x16	0.16	620	880
1000	8x16	0.16	670	772	8x14	0.11	810	940
1200	10x17	0.14	775	846	10x20	0.10	835	969
1500	10x20	0.13	845	976	13x21	0.080	995	1123
1800	10x20	0.16	948	1089	13x21	0.075	1029	1208
2200	13x21	0.092	1002	1195	13x25	0.070	1202	1414
3300	13x25	0.070	1302	1504	13x30	0.062	1573	1812
4700	13x25	0.062	1608	1857	13x36	0.052	1947	2238
6800	16x36	0.048	1980	2280	16x35	0.044	2390	2705

WV Item μ F	16				25			
	SIZE	Impedance (Ω) max. 25°C 100k Hz	R.C. (mA rms)		SIZE	Impedance (Ω) max. 25°C 100k Hz	R.C. (mA rms)	
			105°C 120Hz	105°C 100kHz			105°C 120Hz	105°C 100kHz
330	8x12	0.27	381	586				
470	10x10	0.22	570	853	13x21	0.19	705	994
680	10x20	0.16	710	1065	13x21	0.12	906	1359
1000	10x17	0.13	982	1126	13x25	0.083	1179	1386
1200	13x21	0.134	1036	1268	13x25	0.086	1256	1360
1500	13x25	0.076	1182	1355	16x26	0.072	1403	1621
1800	13x25	0.073	1366	1565	16x26	0.069	1495	1680
2200	10x30	0.068	1443	1664	10x35	0.062	1720	1992
3300	16x31	0.06	1820	2017	16x40	0.054	2126	2514
4700	16x40	0.055	2320	2645				

WV Item μ F	35				50			
	SIZE	Impedance (Ω) max. 25°C 100k Hz	R.C. (mA rms)		SIZE	Impedance (Ω) max. 25°C 100k Hz	R.C. (mA rms)	
			105°C 120Hz	105°C 100kHz			105°C 120Hz	105°C 100kHz
1.0					5x11	4.9	35	70
2.2					5x11	4.2	53	106
3.3					5x11	3.9	65	130
4.7					5x11	3.6	82	164
6.8					5x11	3.2	91	182
10	5x11	1.9	105	210	5x11	2.7	100	200
22	5x11	1.5	120	240	5x11	1.9	125	250
33	5x11	1.2	130	260	6.3x11	1.1	195	390
47	6.3x11	0.58	220	440	6.3x11	0.9	245	490
68	6.3x11	0.47	280	460	8x12	0.7	310	540
100	6.3x11	0.39	315	472	8x12	0.5	385	577
220	8x20	0.23	500	750	10x17	0.27	505	757
330	10x17	0.18	615	922	10x20	0.18	675	1012
470	8x20	0.12	825	1237	13x21	0.12	895	1342
680	13x21	0.09	1050	1410	13x25	0.09	1125	1687
1000	13x21	0.068	1300	1495	13x26	0.076	1495	1719
2200	16x26	0.045	2110	2426	18x35	0.050	2190	2518

◆ Packaging Specification

Case size ϕ D×L (mm)	Plastic Bag Capacity	Small Box Capacity		Carton Box Capacity		Small Box Size			Carton Box Size		
	pcs. / per bag	Bag / per small box	pcs. / per small box	small box / per carton box	pcs. / per carton box	L (mm)	H (mm)	W (mm)	L (mm)	H (mm)	W (mm)
4×5	500	50	25,000	2	50,000	300	295	225	470	310	310
5×5	500	50	25,000	2	50,000	300	295	225	470	310	310
6.3×5	500	50	25,000	2	50,000	300	295	225	470	310	310
4×7	500	50	25,000	2	50,000	300	295	225	470	310	310
5×7	500	50	25,000	2	50,000	300	295	225	470	310	310
6.3×7	500	40	25,000	2	50,000	300	295	225	470	310	310
5×11	500	40	20,000	2	40,000	300	295	225	470	310	310
6.3×11	500	30	15,000	2	30,000	300	295	225	470	310	310
8×11	250	40	10,000	2	20,000	300	295	225	470	310	310
8×14	250	30	7,500	2	15,000	300	295	225	470	310	310
8×20	200	25	5,000	2	10,000	300	295	225	470	310	310
10×10(17)	200	25	5,000	2	10,000	300	295	225	470	310	310
10×20	200	25	5,000	2	10,000	300	295	225	470	310	310
10×24	200	25	5,000	2	10,000	300	295	225	470	310	310
10X30/35	100	25	2,500	2	5,000	300	295	225	470	310	310
13×21	100	25	2,500	2	5,000	300	295	225	470	310	310
13×25	100	25	2,500	2	5,000	300	295	225	470	310	310
13×30	100	25	2,500	2	5,000	300	295	225	470	310	310
16×26	100	6	600	4	2,400	300	145	225	470	310	310
16×31	50	10	500	4	2,000	300	145	225	470	310	310
16×36	50	8	400	4	1,600	300	145	225	470	310	310
18×31	50	6	300	4	1,200	300	145	225	470	310	310
18×40	50	6	300	4	1,200	300	145	225	470	310	310
22×40	50	4	200	4	800	300	145	225	470	310	310
25×40	25	8	200	4	800	300	145	225	470	310	310

The following items shall be marked on the box.

WMEC [®]		Customer	
WMEC P/N		PO. No.	
Lot No.		Customer P/N	
Final Date		Description	
Inspection		Quantity	PCS.

◆ Other

For other specifications, Characteristic W of JIS C 5141 shall be satisfied.

Aluminum Electrolytic Capacitors may be damaged by corrosion, which is caused by and halogenated hydrocarbon solvents.

Please let us know in advance the solvent name and conditions for your P.C.B. cleaning.

We guarantee our products without any prohibited substance about environment