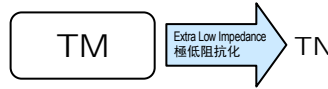


# TM Series

## LOW IMPEDANCE

### 低阻抗品

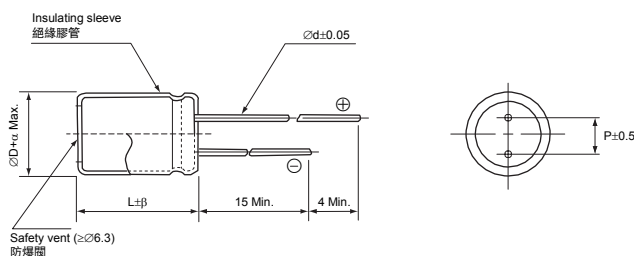
- Low impedance at high frequency  
高頻低阻抗
- Ideally suited for use of switching power supplies  
適用於開關電源
- Load life of 2000~3000 hours at 105°C  
在 105°C 環境中負荷壽命 2000~3000 小時
- Comply with the RoHS & REACH  
符合 RoHS 與 REACH



### □ SPECIFICATIONS 特性表

Items 項目	Characteristics 主要特性	
Operation Temperature Range 使用溫度範圍	-40 ~ +105°C	-25 ~ +105°C
Voltage Range 額定工作電壓範圍	6.3 ~ 100V	160 ~ 450V
Capacitance Range 靜電容量範圍	1 ~ 15000µF	22 ~ 330µF
Capacitance Tolerance 靜電容量允許偏差	±20% at 120Hz, 20°C	
Leakage Current 漏電流	Leakage current ≤0.01CV or 3µA, whichever is greater (after 2 minutes application of rated voltage at 20°C) 漏電流 ≤0.01CV or 3µA 取較大值(在 20°C 環境中施加額定工作電壓 2 分鐘後)	Leakage current ≤0.02CV + 15µA (after 5 minutes application of rated voltage at 20°C) 漏電流 ≤0.02CV + 15µA(在 20°C 環境中施加額定工作電壓 5 分鐘後)
Dissipation Factor (tan δ) 損耗角正切	C: Nominal capacitance (µF) 標稱靜電容量, V: Rated voltage (V) 額定電壓	
	When nominal capacitance is over 1000µF, tan δ shall be added 0.02 to the listed value with increase of every 1000µF. 當標稱靜電容量大於 1000µF, 其標稱靜電容量每增加 1000µF, 損耗角正切增加 0.02. Measurement frequency 測試頻率: 120Hz, Temperature 溫度: 20°C	
	Rated Voltage (V) 額定工作電壓	6.3    10    16~35    50, 63    100    160~250    350~450
Stability at Low Temperature 低溫特性	Measurement frequency 測試頻率: 120Hz	
	Rated Voltage (V) 額定工作電壓	6.3~16    25~100    160~250    350~450
	Impedance Ratio 阻抗比	Z(-25°C) / Z(20°C)    2    2    3    8 Z(-40°C) / Z(20°C)    4    3    —    —
Load Life 高溫負荷特性	After 3000 hours (∅5~∅8 products are for 2000 hours) application of the rated voltage at 105°C, they meet the characteristics listed below. 在 105°C 環境中施加額定工作電壓 3000 小時 (∅5~∅8 產品為 2000 小時) 後, 電容器的特性符合下表的要求。	
	Capacitance Change 靜電容量變化率	Within ±20% of initial measured value 初始值的±20%以內
	Dissipation Factor 損耗角正切	≤200% of initial specified value 不大於規範值的 200%
Shelf Life 高溫貯存特性	After leaving capacitors under no load at 105°C for 1000 hours, they meet the specified value for load life characteristics listed above. 在 105°C 環境中無負荷放置 1000 小時後, 電容器的特性符合高溫負荷特性中所列的規定值。	
	Marking 標識 Printed with white colour on black sleeve (PVC) or printed with white colour on green sleeve (PET). 黑色膠管白字印刷 (PVC) 或綠色膠管白字印刷 (PET).	

### □ DRAWING 外形圖 (Unit: mm)



∅D	5	6.3	8 (L≤11.5)	8 (L≥16)	10	13	16	18	22
P	2.0	2.5	3.5		5.0	7.5		10.0	
∅d	0.5			0.6			0.8		
β	1.5					2.0			
α	0.5								1.0

### □ FREQUENCY COEFFICIENT OF ALLOWABLE RIPPLE CURRENT 紋波電流頻率補償係數

Frequency 頻率		50Hz	120Hz	300Hz	1KHz	10KHz~
Coefficient 係數	1 ~ 47µF	0.75	1.00	1.35	1.55	2.0
	68 ~ 680µF	0.80	1.00	1.25	1.34	1.5
	1000 ~ 15000µF	0.85	1.00	1.10	1.13	1.15

The endurance of capacitors is reduced with internal heating produced by ripple current at the rate of halving the lifetime with every 5~10°C rise. When long life performance is required in actual use, the rms ripple current has to be reduced. 鋁電解電容器在疊加紋波電流後會引起發熱, 溫度每上升 5~10°C 壽命會減半。若要保持長壽命性能, 請在使用過程中適當降低紋波電流。

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## TM Series

## DIMENSIONS &amp; MAXIMUM PERMISSIBLE RIPPLE CURRENT &amp; IMPEDANCE 規格尺寸及最大允許紋波電流及阻抗值

WV Parameter 參數 μF		6.3 (0J)				10 (1A)			
		Case size ∅D×L (mm) 尺寸	Impedance (Ω) max. 20°C, 100KHz 阻抗值	Ripple current (mA rms) 紋波電流		Case size ∅D×L (mm) 尺寸	Impedance (Ω) max. 20°C, 100KHz 阻抗值	Ripple current (mA rms) 紋波電流	
				105°C, 120Hz	105°C, 100KHz			105°C, 120Hz	105°C, 100KHz
33	330					5 × 11	2.10	74	111
47	470	5 × 11	2.10	56	117	5 × 11	1.90	88	132
68	680	5 × 11	1.90	74	140	5 × 11	1.74	106	156
100	101	5 × 11	1.70	113	170	5 × 11	1.30	147	221
220	221	6.3 × 11.5	0.92	158	260	6.3 × 11.5	0.59	185	280
330	331	6.3 × 11.5	0.83	195	300	6.3 × 11.5	0.33	215	410
470	471	8 × 11.5	0.62	385	578	8 × 11.5 (10 × 12)	0.29 (0.25)	443 (465)	563 (630)
680	681	8 × 11.5	0.44	483	627	8 × 11.5	0.13	482	697
1000	102	8 × 11.5	0.36	505	645	8 × 16 (10 × 12)	0.10 (0.098)	816 (820)	928 (935)
1200	122	8 × 16	0.18	525	685	10 × 16	0.095	835	969
1500	152	10 × 12 (10 × 16)	0.16 (0.16)	787 (787)	964 (964)	10 × 16 (10 × 20)	0.094 (0.092)	905 (1029)	1050 (1208)
2200	222	10 × 20	0.095	1002	1195	10 × 20 (13 × 21)	0.08 (0.08)	1006 (1103)	1200 (1315)
3300	332	10 × 20 (13 × 21)	0.093 (0.087)	1100 (1189)	1225 (1391)	13 × 25 (16 × 20)	0.065 (0.063)	1573 (1425)	1812 (1645)
4700	472	13 × 25	0.068	1608	1875	16 × 25	0.060	1971	2262
6800	682	13 × 25 (16 × 25)	0.067 (0.065)	1680 (1776)	1905 (2076)	16 × 31	0.048	2390	2650
10000	103	16 × 31	0.050	2169	2404	18 × 31	0.035	2590	2730
15000	153	18 × 31	0.040	2380	2850				

WV Parameter 參數 μF		16 (1C)				25 (1E)			
		Case size ∅D×L (mm) 尺寸	Impedance (Ω) max. 20°C, 100KHz 阻抗值	Ripple current (mA rms) 紋波電流		Case size ∅D×L (mm) 尺寸	Impedance (Ω) max. 20°C, 100KHz 阻抗值	Ripple current (mA rms) 紋波電流	
				105°C, 120Hz	105°C, 100KHz			105°C, 120Hz	105°C, 100KHz
22	220	5 × 11	2	66	132	5 × 11	1.90	65	130
33	330	5 × 11	1.8	81	163	5 × 11	1.60	78	156
47	470	5 × 11	1.4	97	194	5 × 11	1.30	106	198
68	580	5 × 11	0.93	134	201	6.3 × 11.5	0.82	152	228
100	101	6.3 × 11.5	0.85	163	244	6.3 × 11.5	0.71	198	265
220	221	6.3 × 11.5 (8 × 11.5)	0.50 (0.45)	320 (358)	400 (430)	6.3 × 11.5 (8 × 11.5)	0.46 (0.38)	305 (356)	440 (480)
330	331	8 × 11.5	0.41	425	565	8 × 11.5 (10 × 12)	0.36 (0.25)	434 (645)	656 (840)
470	471	6.3 × 15 (8 × 11.5) (10 × 12)	0.38 (0.35) (0.30)	465 (503) (600)	660 (707) (845)	8 × 16 (10 × 12)	0.23 (0.20)	600 (700)	949 (970)
680	681	8 × 16 (10 × 12)	0.26 (0.24)	768 (815)	1024 (1038)	10 × 16	0.10	924	1387
1000	102	10 × 16 (10 × 20)	0.12 (0.14)	982 (1000)	1126 (1207)	10 × 16 (10 × 20)	0.09 (0.068)	1179 (1179)	1386 (1386)
1200	122	10 × 20	0.15	1035	1268	13 × 21	0.065	1280	1515
1500	152	10 × 20 (13 × 21)	0.096 (0.072)	1100 (1182)	1270 (1355)	13 × 25	0.062	1403	1621
2200	222	13 × 25	0.063	1453	1674	13 × 25 (16 × 25)	0.063 (0.055)	1500 (1567)	1774 (1839)
3300	332	13 × 30	0.056	1619	1816	16 × 31 (18 × 25)	0.050 (0.052)	2003 (1745)	2391 (1992)
4700	472	16 × 25	0.050	2173	2403	16 × 35	0.040	2420	2840
6800	682	16 × 35	0.040	2440	2797	18 × 35	0.035	2840	3250
10000	103	18 × 35	0.038	2850	3230				

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## TM Series

## □ DIMENSIONS &amp; MAXIMUM PERMISSIBLE RIPPLE CURRENT &amp; IMPEDANCE 規格尺寸及最大允許紋波電流及阻抗值

WV		35 (1V)				50 (1H)			
Parameter 參數 μF	Case size ∅D×L (mm) 尺寸	Impedance (Ω) max. 20°C, 100KHz 阻抗值	Ripple current (mA rms) 紋波電流		Case size ∅D×L (mm) 尺寸	Impedance (Ω) max. 20°C, 100KHz 阻抗值	Ripple current (mA rms) 紋波電流		
			105°C, 120Hz	105°C, 100KHz			105°C, 120Hz	105°C, 100KHz	
1	010				5 × 11	4.2	16	32	
2.2	2R2				5 × 11	4.0	18	36	
3.3	3R3				5 × 11	3.8	20	40	
4.7	4R7				5 × 11	2.5	29	58	
6.8	6R8				5 × 11	2.2	38	76	
10	100	5 × 11	1.80	55	100	5 × 11	2.0	52	104
22	220	5 × 11 (6.3 × 11.5)	1.50 (1.40)	67 (75)	134 (145)	5 × 11 (6.3 × 11.5)	1.6 (1.0)	68 (76)	136 (150)
33	330	5 × 11	1.20	81	163	6.3 × 11.5	0.8	85	175
47	470	6.3 × 11.5	1.10	114	229	6.3 × 11.5	0.71	125	225
68	680	6.3 × 11.5	0.85	137	273	8 × 11.5	0.65	215	385
100	101	6.3 × 11.5 (8 × 11.5)	0.68 (0.50)	205 (273)	340 (409)	8 × 11.5	0.4	380	480
220	221	8 × 11.5 (8 × 16)	0.27 (0.25)	484 (510)	725 (750)	8 × 16 (10 × 12)	0.25 (0.20)	580 (600)	760 (805)
330	331	8 × 16 (10 × 16)	0.16 (0.14)	540 (610)	795 (900)	10 × 20	0.10	900	1045
470	470	10 × 16 (10 × 20)	0.12 (0.10)	810 (960)	1020 (1095)	10 × 20 (13 × 21)	0.09 (0.088)	1000 (1085)	1120 (1260)
680	681	10 × 20 (10 × 25)	0.085 (0.072)	1015 (1089)	1160 (1433)	13 × 25	0.078	1275	1464
1000	102	13 × 21	0.065	1350	1490	13 × 25 (16 × 25)	0.075 (0.065)	1305 (1460)	1500 (1700)
1500	152	13 × 25	0.060	1580	1715	16 × 31	0.050	1710	1990
2200	222	16 × 25	0.055	1759	2069	16 × 35 (18 × 31)	0.045 (0.045)	2076 (2076)	2326 (2326)
3300	332	16 × 35 (18 × 25)	0.045 (0.050)	2300 (2165)	2520 (2420)	18 × 35	0.04	2500	2700
4700	472	18 × 35	0.038	2450	2875				

WV		63 (1J)				100 (2A)			
Parameter 參數 μF	Case size ∅D×L (mm) 尺寸	Impedance (Ω) max. 20°C, 100KHz 阻抗值	Ripple current (mA rms) 紋波電流		Case size ∅D×L (mm) 尺寸	Impedance (Ω) max. 20°C, 100KHz 阻抗值	Ripple current (mA rms) 紋波電流		
			105°C, 120Hz	105°C, 100KHz			105°C, 120Hz	105°C, 100KHz	
1	010				5 × 11	7	47	66	
2.2	2R2				5 × 11	6	66	72	
3.3	3R3				5 × 11	5	68	78	
4.7	4R7	5 × 11	2.5	45	71	5 × 11	4	72	88
10	100	5 × 11	1.5	50	81	6.3 × 11.5	1.2	100	180
22	220	5 × 11	1.2	110	165	8 × 11.5	0.66	196	282
33	330	6.3 × 11.5	0.85	135	210	8 × 11.5	0.5	310	380
47	470	8 × 11.5	0.56	210	330	8 × 16 (10 × 12)	0.32 (0.25)	405 (460)	500 (630)
68	680	8 × 11.5	0.56	210	330	10 × 16	0.25	515	780
100	101	8 × 16 (10 × 12)	0.50 (0.40)	370 (380)	581 (600)	10 × 16 (10 × 20)	0.22 (0.16)	600 (650)	820 (890)
220	221	10 × 16 (10 × 20)	0.35 (0.27)	540 (710)	850 (1000)	13 × 25	0.13	920	1280
330	331	10 × 20 (13 × 21)	0.20 (0.16)	860 (950)	1100 (1200)	16 × 25	0.09	1200	1440
470	471	13 × 25	0.14	1100	1300	16 × 31	0.06	1560	1790
680	681	16 × 25	0.08	1215	1450	18 × 35	0.055	1650	1850
1000	102	16 × 25 (16 × 31)	0.06 (0.06)	1295 (1350)	1525 (1600)	18 × 40	0.051	1700	2040
2200	222	18 × 40	0.045	1500	1800				

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## TM Series

## DIMENSIONS &amp; MAXIMUM PERMISSIBLE RIPPLE CURRENT &amp; IMPEDANCE 規格尺寸及最大允許紋波電流及阻抗值

WV		160 (2C)				200 (2D)			
Parameter 參數 μF		Case size ØD×L (mm) 尺寸	Impedance (Ω) max. 20°C, 100KHz 阻抗值	Ripple current (mA rms) 紋波電流		Case size ØD×L (mm) 尺寸	Impedance (Ω) max. 20°C, 100KHz 阻抗值	Ripple current (mA rms) 紋波電流	
				105°C, 120Hz	105°C, 100KHz			105°C, 120Hz	105°C, 100KHz
10	100					8 × 11.5 (10 × 12)	7.80 (6.20)	225 (240)	295 (320)
22	220	10 × 20	1.30	315	440	10 × 16 (10 × 20)	4.30 (4.20)	285 (300)	365 (380)
33	330	10 × 20	1.30	405	565	13 × 21	3.0	425	560
47	470	10 × 20 (13 × 21)	1.12 (0.91)	495 (525)	685 (725)	13 × 21	2.6	510	785
68	680	13 × 25	0.63	680	950	13 × 25	1.4	645	875
100	101	16 × 25 (16 × 31)	0.27 (0.25)	920 (925)	1280 (1290)	13 × 25	0.95	715	980
150	151	16 × 31	0.22	930	1300	16 × 31 (18 × 25)	0.80 (0.72)	745 (730)	995 (985)
220	221	16 × 31	0.22	930	1300	18 × 31	0.45	750	1000
330	331	16 × 35 (18 × 31)	0.22	1580	1700	18 × 35 (22 × 35)	0.38 (0.28)	760 (795)	1050 (1135)

WV		250 (2E)				350 (2V)			
Parameter 參數 μF		Case size ØD×L (mm) 尺寸	Impedance (Ω) max. 20°C, 100KHz 阻抗值	Ripple current (mA rms) 紋波電流		Case size ØD×L (mm) 尺寸	Impedance (Ω) max. 20°C, 100KHz 阻抗值	Ripple current (mA rms) 紋波電流	
				105°C, 120Hz	105°C, 100KHz			105°C, 120Hz	105°C, 100KHz
4.7	4R7	8 × 11.5	7.00	90	145	8 × 11.5 (10 × 12)	6.5 (6.2)	115 (140)	460 (195)
6.8	6R8	10 × 12	5.80	115	180	10 × 12 (10 × 16)	5.4 (5.0)	145 (150)	210 (220)
10	100	10 × 16	4.50	150	245	10 × 16 (10 × 20)	4.5 (4.2)	160 (175)	230 (275)
22	220	10 × 20	3.20	265	360	13 × 21 (13 × 25)	3.9 (2.5)	295 (300)	400 (455)
33	330	13 × 21	2.50	310	495	13 × 25 (16 × 20)	3.4 (3.0)	405 (465)	525 (645)
47	470	13 × 25	1.90	425	570	16 × 25	2.8	550	705
68	680	16 × 25	1.20	480	655	16 × 31	2.0	625	825
100	101	16 × 31 (18 × 31)	0.65 (0.40)	505 (550)	690 (750)	16 × 35 (18 × 31)	1.2 (0.7)	700 (705)	905 (960)
150	151	18 × 35 (22 × 35)	0.30 (0.24)	600 (630)	845 (900)	18 × 35	0.6	1020	1050
220	221	22 × 35	0.25	750	1000				

WV		400 (2G)				450 (2W)			
Parameter 參數 μF		Case size ØD×L (mm) 尺寸	Impedance (Ω) max. 20°C, 100KHz 阻抗值	Ripple current (mA rms) 紋波電流		Case size ØD×L (mm) 尺寸	Impedance (Ω) max. 20°C, 100KHz 阻抗值	Ripple current (mA rms) 紋波電流	
				105°C, 120Hz	105°C, 100KHz			105°C, 120Hz	105°C, 100KHz
2.2	2R2	6.3 × 11.5 (8 × 11.5)	8.8 (8.0)	80 (95)	110 (130)	8 × 11.5	7.0	95	138
3.3	3R3	8 × 11.5	8.0	105	140	8 × 11.5	6.0	105	140
4.7	4R7	8 × 11.5 (10 × 12)	8.0 (6.0)	130 (135)	175 (210)	10 × 12	5.6	150	200
6.8	6R8	10 × 12 (10 × 16)	5.0 (4.5)	150 (160)	220 (230)	10 × 16	6.5	205	265
10	100	10 × 16 (10 × 20)	3.6 (3.6)	195 (205)	265 (285)	10 × 20	9.0	235	320
22	220	13 × 21	3.8	310	420	13 × 35	6.0	415	570
33	330	16 × 20 (16 × 25)	3.4 (3.0)	405 (465)	525 (645)	16 × 31	2.4	385	710
47	470	16 × 25 (16 × 31)	2.8 (2.6)	550 (585)	705 (775)	16 × 35 (18 × 26)	1.8 (1.2)	515 (585)	755 (800)
68	680	16 × 31	2.0	625	825	18 × 31	1.0	620	845
100	101	18 × 31 (18 × 35)	1.2 (0.7)	700 (705)	905 (960)	18 × 35	0.64	380	520
150	151	18 × 40	0.6	1020	1050				

- Please refer to page 19 "Taping Specifications" & page 21 "Lead Forming & Cutting" about the taped or formed product spec. 編帶與引線成型標準請查閱第 19 頁“編帶標準”及第 21 頁“引線成型與剪腳”。
- Please refer to page 20 "Packaging Specifications" for the minimum package quantity. 最小包裝數量請查閱第 20 頁“包裝標準”。
- Please refer to page 16 for the Part Number System. 產品編碼規則請查閱第 16 頁。

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