



Miniature Sized, Low Impedance,
High Reliability For Switching Power Supplies
series



Smaller



Low Impedance



Long Life



Anti-Solvent
Feature
(Through
100V only)

- Smaller case size and lower impedance than PM series.
- Low impedance and high reliability withstanding 2000 hours to 8000 hours.
- Capacitance ranges available based on the numerical values in E12 series under JIS.
- Compliant to the RoHS directive (2011/65/EU).



Specifications

Item	Performance Characteristics																							
Category Temperature Range	-55 to +105°C (6.3 to 100V), -40 to + 105°C (160 to 400V), -25 to +105°C (450V)																							
Rated Voltage Range	6.3 to 450V																							
Rated Capacitance Range	0.47 to 15000µF																							
Capacitance Tolerance	±20% at 120Hz, 20°C																							
Leakage Current	Rated voltage (V)	6.3 to 100						160 to 450																
	Leakage current	After 1 minute's application of rated voltage at 20°C, leakage current is not more than 0.03CV or 4 (µA), whichever is greater.						CV ≤ 1000: I = 0.1CV+40 (µA) max. CV > 1000: I = 0.04CV+100 (µA) max.																
Tangent of loss angle (tan δ)	For capacitance of more than 1000µF, add 0.02 for every increase of 1000µF. Measurement frequency : 120Hz at 20°C																							
	Rated voltage (V)	6.3	10	16	25	35	50	63	100	160 to 250	315 · 350	400 · 450												
	tan δ (MAX.)	0.22	0.19	0.16	0.14	0.12	0.10	0.09	0.08	0.15	0.20	0.25												
Stability at Low Temperature	120Hz																							
	Rated voltage (V)		6.3 · 10	16 · 25	35 · 50	63 · 100	160 · 200	250	315 · 350	400	450													
	Impedance ratio (MAX.)	Z-25°C / Z+20°C	—	—	—	—	3	3	4	6	15													
		Z-40°C / Z+20°C	—	—	—	—	4	6	8	10	—													
Z-55°C / Z+20°C		3	3	3	3	—	—	—	—	—														
Endurance	The specifications listed at right shall be met when the capacitors are restored to 20°C after D.C. bias plus rated ripple current is applied for 8000 hours (2000 hours for φD=4, 5 and 6.3, 3000 hours for φD=8, 5000 hours for φD=10, 7000 hours for φD=12.5) at 105°C, the peak voltage shall not exceed the rated voltage.																							
													Capacitance change		Within ±20% of the initial capacitance value									
													tan δ		200% or less than the initial specified value									
Shelf Life	After storing the capacitors under no load at 105°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.																							
													Leakage current		Less than or equal to the initial specified value									
Marking	Printed with white color letter on dark brown sleeve.																							

Radial Lead Type

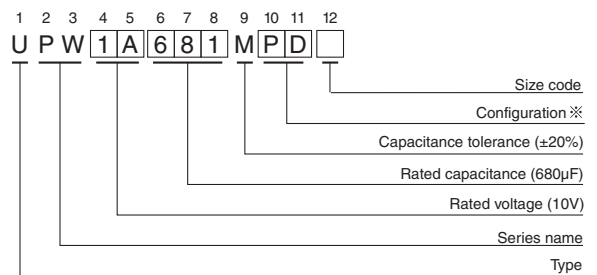


α	(L = 7) 1.0
	(L < 20) 1.5
	(L ≥ 20) 2.0

φD	4	5	6.3	8	10	12.5	16	18	20	22	25
P	1.5	2.0	2.5	3.5	5.0	5.0	7.5	7.5	10.0	10.0	12.5
φd	0.45	0.5	0.5	0.6	0.6	0.6	0.8	0.8	1.0	1.0	1.0
		(0.45)	(0.45)			※0.8					
β	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1.0	1.0	1.0

※: Applied to L>25 products
(): Applied to 7mmL products

Type numbering system (Example : 10V 680µF)



※ Configuration

φ D	Pb-free leadwire Pb-free PET sleeve
4 · 5	DD
6.3	ED (7mm L : DD)
8 · 10	PD
12.5 to 18	HD
20 to 25	RD

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

Frequency coefficient of rated ripple current

V	Cap. (µF)	Frequency	50Hz	120Hz	300Hz	1kHz	10kHz or more
6.3 to 100	0.47 to 56		0.20	0.30	0.50	0.80	1.00
			0.55	0.65	0.75	0.85	1.00
			0.70	0.75	0.80	0.90	1.00
			0.80	0.85	0.90	0.95	1.00
160 to 450	0.47 to 220		0.80	1.00	1.25	1.40	1.60
			0.90	1.00	1.10	1.13	1.15

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.

■ Standard Ratings

V (Code) Item Cap.(μF) Code		6.3 (0J)				10 (1A)			
		Case size φD × L (mm)	Impedance (Ω) MAX.		Rated ripple (mAmps) 105°C / 100kHz	Case size φD × L (mm)	Impedance (Ω) MAX.		Rated ripple (mAmps) 105°C / 100kHz
			20°C / 100kHz	−10°C / 100kHz			20°C / 100kHz	−10°C / 100kHz	
22	220	5 × 11	0.60	1.20	180	5 × 11 ▲ 4 × 7	0.60 2.00	1.20 5.00	180 65
27	270	4 × 7	2.00	5.00	65				
33	330	5 × 11 ▲ 5 × 7	0.60 0.95	1.20 2.40	180 120	5 × 11 ▲ 5 × 7	0.60 0.95	1.20 2.40	180 120
39	390					5 × 7	0.95	2.40	120
47	470	5 × 11 ▲ 5 × 7	0.60 0.95	1.20 2.40	180 120	5 × 11 ▲ 4 × 11	0.60 1.30	1.20 2.60	180 120
56	560	5 × 7	0.95	2.40	120				
68	680	4 × 11	1.30	2.60	120				
82	820					5 × 11 ▲ 6.3 × 7	0.60 0.45	1.20 1.20	180 200
100	101	5 × 11	0.60	1.20	180	5 × 11 ▲ 5 × 15	0.60 0.50	1.20 1.00	180 235
120	121	6.3 × 7	0.45	1.20	200				
150	151	6.3 × 11 ▲ 5 × 15	0.25 0.50	0.50 1.00	290 235	6.3 × 11	0.25	0.50	290
180	181					6.3 × 11	0.25	0.50	290
220	221	6.3 × 11	0.25	0.50	290	6.3 × 11 ▲ 6.3 × 15	0.25 0.23	0.50 0.46	290 430
330	331	6.3 × 11 ▲ 6.3 × 15	0.25 0.23	0.50 0.46	290 430	8 × 11.5	0.117	0.234	555
470	471	8 × 11.5	0.117	0.234	555	8 × 11.5	0.117	0.234	555
560	561	8 × 11.5	0.117	0.234	555				
680	681	10 × 12.5	0.090	0.180	755	10 × 12.5 ▲ 8 × 15	0.090 0.085	0.180 0.170	760 730
820	821	8 × 15 ▲ 10 × 12.5	0.085 0.090	0.170 0.180	730 755				
1000	102	10 × 12.5	0.090	0.180	755	10 × 16 ▲ 8 × 20	0.068 0.065	0.136 0.130	1050 995
1200	122	8 × 20 ▲ 10 × 16	0.065 0.068	0.130 0.136	995 1050	10 × 20	0.052	0.104	1220
1500	152	10 × 20	0.052	0.104	1220	10 × 20 ▲ 10 × 25	0.052 0.045	0.104 0.090	1220 1440
2200	222	12.5 × 20 ▲ 10 × 25	0.038 0.045	0.076 0.090	1655 1440	12.5 × 20 ▲ 10 × 31.5	0.038 0.035	0.076 0.070	1655 1815
2700	272	10 × 31.5	0.035	0.070	1815	12.5 × 25	0.030	0.060	1945
3300	332	12.5 × 20	0.038	0.076	1655	12.5 × 25 ▲ 12.5 × 31.5	0.030 0.025	0.060 0.050	1950 2310
3900	392	12.5 × 25	0.030	0.060	1945	12.5 × 35.5 ▲ 16 × 20	0.022 0.029	0.044 0.058	2510 2210
4700	472	16 × 25 ▲ 12.5 × 31.5	0.022 0.025	0.044 0.050	2555 2310	16 × 25	0.022	0.044	2555
5600	562	12.5 × 35.5 ▲ 16 × 20	0.022 0.029	0.044 0.058	2510 2210	16 × 25 ▲ 18 × 20	0.022 0.028	0.044 0.056	2560 2490
6800	682	16 × 25 ▲ 18 × 20	0.022 0.028	0.044 0.056	2560 2490	16 × 31.5 ▲ 18 × 25	0.018 0.020	0.036 0.040	3010 2740
8200	822	16 × 31.5	0.018	0.036	3010	16 × 35.5 ▲ 18 × 31.5	0.016 0.016	0.032 0.032	3150 3635
10000	103	16 × 31.5 ▲ 18 × 25	0.016 0.020	0.032 0.040	3150 2740	18 × 35.5	0.015	0.030	3680
12000	123	18 × 31.5	0.016	0.032	3635				
15000	153	18 × 35.5	0.015	0.030	3680	18 × 40	0.014	0.028	3800

▲ : In this case, [6] will be put at 12th digit of type numbering system.

■ Standard Ratings

Cap. (μF)	V(Code)	Item Code	16 (1C)			25 (1E)			
			Case size φD × L (mm)	Impedance (Ω) MAX.		Case size φD × L (mm)	Impedance (Ω) MAX.		Rated ripple (mArms) 105°C / 100kHz
				20°C / 100kHz	−10°C / 100kHz		20°C / 100kHz	−10°C / 100kHz	
4.7	4R7					5 × 11	0.60	1.20	180
10	100		5 × 11	0.60	1.20	5 × 11	0.60	1.20	180
						▲4 × 7	2.00	5.00	65
15	150		4 × 7	2.00	5.00				
22	220		5 × 11	0.60	1.20	5 × 11	0.60	1.20	180
			▲5 × 7	0.95	2.40	▲5 × 7	0.95	2.40	120
27	270		5 × 7	0.95	2.40	4 × 11	1.30	2.60	120
33	330		5 × 11	0.60	1.20	5 × 11	0.60	1.20	180
			▲6.3 × 7	0.45	1.20				
39	390		4 × 11	1.30	2.60	5 × 11	0.60	1.20	180
						▲6.3 × 7	0.45	1.20	200
47	470		5 × 11	0.60	1.20	5 × 11	0.60	1.20	180
56	560		5 × 11	0.60	1.20	5 × 15	0.50	1.00	235
			▲6.3 × 7	0.45	1.20				
82	820		5 × 15	0.50	1.00	6.3 × 11	0.25	0.50	290
100	101		6.3 × 11	0.25	0.50	6.3 × 11	0.25	0.50	290
120	121		6.3 × 11	0.25	0.50	6.3 × 15	0.23	0.46	430
150	151		6.3 × 11	0.25	0.50	8 × 11.5	0.117	0.234	555
180	181		6.3 × 15	0.23	0.46				
220	221		8 × 11.5	0.117	0.234	8 × 11.5	0.117	0.234	555
330	331		8 × 11.5	0.117	0.234	10 × 12.5	0.090	0.180	760
						▲8 × 15	0.085	0.170	730
470	471		10 × 12.5	0.090	0.180	10 × 16	0.068	0.136	1050
			▲8 × 15	0.085	0.170	▲8 × 20	0.065	0.130	995
560	561					10 × 20	0.052	0.104	1220
680	681		10 × 16	0.068	0.136	10 × 20	0.052	0.104	1220
			▲8 × 20	0.065	0.130				
820	821		10 × 20	0.052	0.104	10 × 25	0.045	0.090	1440
1000	102		10 × 20	0.052	0.104	12.5 × 20	0.038	0.076	1660
						▲10 × 31.5	0.035	0.070	1815
1200	122		10 × 25	0.045	0.090				
1500	152		12.5 × 20	0.038	0.076	16 × 25	0.022	0.044	2555
			▲10 × 31.5	0.035	0.070	▲12.5 × 25	0.030	0.060	1950
1800	182					12.5 × 31.5	0.025	0.050	2310
						▲16 × 20	0.029	0.058	2210
2200	222		12.5 × 25	0.030	0.060	16 × 25	0.022	0.044	2555
						▲18 × 20	0.028	0.056	2490
						※12.5 × 35.5	0.022	0.044	2510
2700	272		12.5 × 31.5	0.025	0.050	16 × 25	0.022	0.044	2555
			▲16 × 20	0.029	0.058				
3300	332		16 × 25	0.022	0.044	16 × 31.5	0.018	0.036	3010
			▲12.5 × 35.5	0.022	0.044	▲18 × 25	0.020	0.040	2740
3900	392		16 × 25	0.022	0.044	16 × 35.5	0.016	0.032	3150
			▲18 × 20	0.028	0.056	▲18 × 31.5	0.016	0.032	3635
4700	472		16 × 31.5	0.018	0.036	18 × 35.5	0.015	0.030	3680
			▲18 × 25	0.020	0.040				
5600	562		16 × 35.5	0.016	0.032				
			▲18 × 31.5	0.016	0.032				
6800	682		18 × 35.5	0.015	0.030	18 × 40	0.014	0.028	3800
8200	822		18 × 35.5	0.015	0.030				
10000	103		18 × 40	0.014	0.028				

▲ : In this case, [6] will be put at 12th digit of type numbering system.

※ : In this case, [3] will be put at 12th digit of type numbering system.

■ Standard Ratings

Cap.(μF)	V(Code)	Item Code	35 (1V)				50 (1H)			
			Case size φD × L (mm)	Impedance (Ω) MAX.		Rated ripple (mArms) 105°C / 100kHz	Case size φD × L (mm)	Impedance (Ω) MAX.		Rated ripple (mArms) 105°C / 100kHz
				20°C / 100kHz	-10°C / 100kHz			20°C / 100kHz	-10°C / 100kHz	
0.47	R47						5 × 11	5.00	10.0	25
1	010						5 × 11	3.50	7.00	40
2.2	2R2						5 × 11	3.00	6.00	55
3.3	3R3						5 × 11	2.60	5.20	65
4.7	4R7		5 × 11	0.60	1.20	180	5 × 11	2.30	4.60	90
6.8	6R8		4 × 7	2.00	5.00	65				
10	100		5 × 11	0.60	1.20	180	5 × 11	1.40	2.80	120
			▲ 5 × 7	0.95	2.40	120	▲ 4 × 11	2.50	5.00	90
12	120		5 × 7	0.95	2.40	120				
18	180		4 × 11	1.30	2.60	120	5 × 11	1.30	2.60	155
22	220		5 × 11	0.60	1.20	180	5 × 11	1.20	2.40	170
27	270		5 × 11	0.60	1.20	180	5 × 15	0.90	1.80	215
			▲ 6.3 × 7	0.45	1.20	200				
33	330		5 × 11	0.60	1.20	180	6.3 × 11	0.43	0.86	300
39	390		5 × 15	0.50	1.00	235				
47	470		6.3 × 11	0.25	0.50	290	6.3 × 11	0.43	0.86	300
56	560		6.3 × 11	0.25	0.50	290	6.3 × 15	0.40	0.80	360
82	820		6.3 × 15	0.23	0.46	430	8 × 11.5	0.234	0.468	485
100	101		8 × 11.5	0.117	0.234	555	8 × 11.5	0.234	0.468	485
120	121						8 × 15	0.155	0.310	635
							▲ 10 × 12.5	0.162	0.324	620
150	151		8 × 11.5	0.117	0.234	555	10 × 12.5	0.162	0.324	615
180	181						8 × 20	0.120	0.240	860
							▲ 10 × 16	0.119	0.238	850
220	221		10 × 12.5	0.090	0.180	760	10 × 16	0.119	0.238	850
			▲ 8 × 15	0.085	0.170	730	▲ 10 × 20	0.090	0.180	1030
270	271						10 × 25	0.082	0.164	1200
330	331		10 × 16	0.068	0.136	1050	10 × 20	0.090	0.180	1030
			▲ 8 × 20	0.065	0.130	995	▲ 10 × 31.5	0.060	0.120	1610
390	391		10 × 20	0.052	0.104	1220	12.5 × 20	0.063	0.126	1480
470	471		10 × 20	0.052	0.104	1220	12.5 × 20	0.060	0.120	1500
560	561		10 × 25	0.045	0.090	1440	12.5 × 25	0.050	0.100	1832
680	681		12.5 × 20	0.038	0.076	1660	12.5 × 25	0.050	0.100	1840
			▲ 10 × 31.5	0.035	0.070	1815	▲ 16 × 20	0.048	0.096	1840
820	821						12.5 × 35.5	0.034	0.068	2290
							▲ 18 × 20	0.042	0.084	2420
1000	102		12.5 × 25	0.030	0.060	1950	16 × 25	0.034	0.068	2235
1200	122		12.5 × 31.5	0.025	0.050	2310	16 × 31.5	0.028	0.056	2700
			▲ 16 × 20	0.029	0.058	2210	▲ 18 × 25	0.029	0.058	2610
1500	152		16 × 25	0.022	0.044	2555	16 × 31.5	0.028	0.056	2700
			▲ 12.5 × 35.5	0.022	0.044	2510	▲ 16 × 35.5	0.025	0.050	2790
1800	182		16 × 25	0.022	0.044	2555	18 × 31.5	0.025	0.050	3000
			▲ 18 × 20	0.028	0.056	2490				
2200	222		16 × 31.5	0.018	0.036	3010	18 × 35.5	0.023	0.046	3100
			▲ 18 × 25	0.020	0.040	2740				
2700	272		16 × 35.5	0.016	0.032	3150				
			▲ 18 × 31.5	0.016	0.032	3635				
3300	332		18 × 35.5	0.015	0.030	3680				
4700	472		18 × 40	0.014	0.028	3800				

▲ : In this case, [6] will be put at 12th digit of type numbering system.

■ Standard Ratings

V(Code)		63 (1J)				100 (2A)				
Cap(μF)	Code	Item	Case size φD × L (mm)	Impedance (Ω) MAX.		Rated ripple (mAmps) 105°C / 100kHz	Case size φD × L (mm)	Impedance (Ω) MAX.		Rated ripple (mAmps) 105°C / 100kHz
				20°C / 100kHz	−10°C / 100kHz			20°C / 100kHz	−10°C / 100kHz	
0.47	R47						5 × 11	43.0	86.0	20
1	010						5 × 11	20.0	40.0	30
2.2	2R2						5 × 11	9.80	19.6	44
3.3	3R3						5 × 11	6.60	13.2	58
4.7	4R7		5 × 11	4.70	9.40	68	5 × 11	4.60	9.20	74
6.8	6R8		5 × 11	2.50	5.00	95	5 × 11	3.50	7.00	95
		▲ 4 × 11	3.50	7.00	80					
10	100		5 × 11	2.10	4.20	110	6.3 × 11	1.80	3.60	130
12	120		5 × 11	2.00	4.00	145				
15	150		6.3 × 11	1.20	2.40	160	8 × 11.5	0.83	1.66	180
18	180		5 × 15	1.30	2.60	200	6.3 × 15	0.80	1.60	200
22	220		6.3 × 11	0.71	1.42	250	8 × 11.5	0.68	1.36	230
33	330		6.3 × 11	0.71	1.42	250	10 × 12.5	0.46	0.92	320
		▲ 8 × 15				0.45	0.90	360		
39	390		6.3 × 15	0.70	1.40	330				
47	470		8 × 11.5	0.342	0.684	405	10 × 16	0.37	0.74	420
							▲ 8 × 20	0.37	0.74	420
68	680		8 × 11.5	0.342	0.684	405	10 × 20	0.30	0.60	490
82	820						10 × 25	0.25	0.50	540
100	101		10 × 12.5	0.256	0.512	540	12.5 × 20	0.18	0.36	580
		▲ 8 × 15	0.230	0.460	535					
120	121		10 × 16	0.194	0.388	600				
150	151		10 × 16	0.194	0.388	660	12.5 × 25	0.13	0.26	710
180	181		10 × 20	0.147	0.294	890	12.5 × 31.5	0.12	0.24	790
		▲ 12.5 × 15	0.150	0.300	1020	▲ 16 × 20	0.13	0.26	750	
220	221		10 × 20	0.147	0.294	885	16 × 25	0.10	0.20	890
		▲ 10 × 25	0.130	0.260	1050	▲ 18 × 20	0.11	0.22	850	
270	271		16 × 15	0.090	0.180	1410				
330	331		12.5 × 20	0.085	0.170	1290	16 × 25	0.090	0.18	1080
390	391		12.5 × 25	0.070	0.140	1720	18 × 25	0.083	0.166	1260
		▲ 18 × 15	0.086	0.172	1690					
470	471		12.5 × 25	0.070	0.140	1720	16 × 31.5	0.076	0.152	1310
		▲ 12.5 × 31.5	0.055	0.110	2090					
		※ 16 × 20	0.059	0.118	1770					
560	561						18 × 31.5	0.068	0.136	1370
680	681		16 × 25	0.050	0.100	2160	16 × 35.5	0.064	0.128	1410
		▲ 12.5 × 35.5	0.047	0.094	2270					
		※ 18 × 20	0.055	0.110	2290					
820	821		16 × 31.5	0.043	0.086	2670				
		▲ 18 × 25	0.043	0.086	2590					
1000	102		16 × 31.5	0.043	0.086	2770	18 × 40	0.047	0.094	1520
		▲ 16 × 35.5	0.036	0.072	2770					
1200	122		18 × 31.5	0.032	0.064	2950				
1500	152		18 × 35.5	0.030	0.060	3100				
2200	222		18 × 40	0.028	0.056	3200				

▲ : In this case, [6] will be put at 12th digit of type numbering system.

※ : In this case, [3] will be put at 12th digit of type numbering system.

V(Code)		160		200		250		315		350		400		450	
Cap. (μF)	Code	2C		2D		2E		2F		2V		2G		2W	
0.47	R47	6.3 × 11	12	6.3 × 11	12	6.3 × 11	12	8 × 11.5	11	8 × 11.5	11				
1	010	6.3 × 11	17	6.3 × 11	17	6.3 × 11	17	8 × 11.5	16	10 × 12.5	17	10 × 12.5	16	10 × 12.5	18
2.2	2R2	6.3 × 11	25	6.3 × 11	25	8 × 11.5	29	10 × 12.5	28	10 × 16	31	10 × 16	27	10 × 20	29
3.3	3R3	8 × 11.5	36	8 × 11.5	36	10 × 12.5	42	10 × 12.5	34	10 × 16	38	10 × 20	36	12.5 × 20	41
4.7	4R7	8 × 11.5	43	10 × 12.5	50	10 × 12.5	50	10 × 16	45	10 × 20	49	10 × 20	43	12.5 × 20	49
10	100	10 × 12.5	70	10 × 16	80	10 × 20	88	10 × 20	72	12.5 × 20	82	12.5 × 25	72	16 × 25	75
22	220	10 × 20	130	10 × 20	140	12.5 × 25	155	12.5 × 25	120	16 × 25	130	16 × 25	110	16 × 31.5	115
33	330	12.5 × 20	180	12.5 × 25	190	12.5 × 25	190	16 × 25	155	16 × 31.5	160	16 × 31.5	140	● 18 × 35.5	145
47	470	12.5 × 25	220	12.5 × 25	220	16 × 25	230	16 × 35.5	190	● 18 × 35.5	200	● 18 × 35.5	170	20 × 40	175
100	101	16 × 25	330	16 × 31.5	335	● 18 × 35.5	340	Δ 18 × 40	285	20 × 40	290	22 × 50	350	25 × 50	350
220	221	● 18 × 35.5	500	Δ 18 × 40	515	20 × 40	525	22 × 50	540	25 × 50	550				
330	331	20 × 40	900	22 × 40	1100	22 × 50	1150								
470	471	22 × 50	1200	22 × 50	1310	25 × 50	1350								

※ Rated ripple current (mAmps) at 105°C 120Hz

Size φ20 × 31 is available for capacitors marked " ● "

Size φ20 × 35 is available for capacitors marked " Δ "

In this case, [6] will be put at 12th digit of type numbering system.