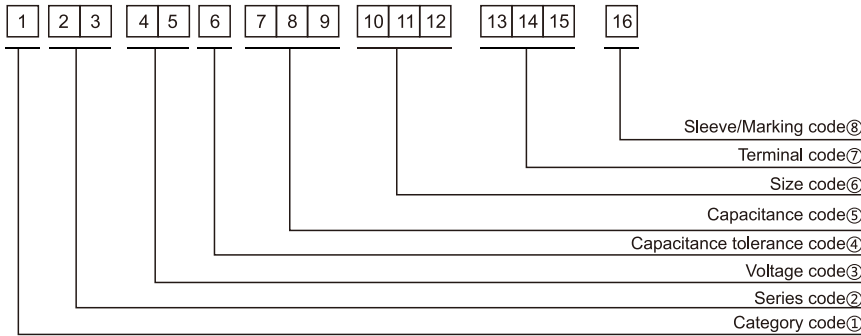


Part Numbering System



① Category code

Type	Code
	1
Electrolytic Capacitor	E
Conductive Polymer	S

② Series code

Series name	Code	
	2	3
WH	W	H
CD11GE	G	E
CD11GES	G	X
CD11GAS	G	W
CD11GHS	G	S
NR	N	R
PZ	P	Z

③ Voltage code

WV (V _{dc})	Code	
	4	5
2.5	0	E
3	0	D
4	0	G
6.3	0	J
6.8	0	C
7	0	Q
7.5	0	A
10	1	A
12	1	T
16	1	C
25	1	E
35	1	V
40	1	G
50	1	H
63	1	J
80	1	B
100	1	K
120	2	B
160	2	C
180	2	L
200	2	D
220	2	N
250	2	E
315	2	F
350	2	V
380	2	P
400	2	G
420	2	T
450	2	W
500	2	H
550	2	J
600	2	K

④ Capacitance tolerance code

Tol. (%)	Code
	6
-10~+10	K
-20~+20	M
-10~+30	Q
-10~+20	V
0~+20	A
-5~+20	C
-10~-20	B
-5~+5	D
0~+10	E
-5~-20	F
-15~+5	N

⑤ Capacitance code

Cap (μF)	Code		
	7	8	9
0.10	R	1	0
0.22	R	2	2
0.33	R	3	3
0.47	R	4	7
0.68	R	6	8
1	0	1	0
2.2	2	R	2
3.3	3	R	3
4.7	4	R	7
6.8	6	R	8
10	1	0	0
22	2	2	0
33	3	3	0
47	4	7	0
68	6	8	0
100	1	0	1
220	2	2	1
330	3	3	1
470	4	7	1
680	6	8	1
1000	1	0	2
2200	2	2	2
3300	3	3	2
4700	4	7	2
6800	6	8	2
10000	1	0	3
22000	2	2	3
33000	3	3	3
68000	6	8	3

⑥ Size code

ΦD (mm)	Code
10	
4	C
5	D
6.3	E
8	F
10	G
11	H
12	J
12.5	W
13	K
14	X
16	L
18	M
19	Z
20	N
22	O
25	P
30	Q
35	R
40	Y
51.6	S
64.3	T
76.9	U
91	V
100	A

L (mm)	Code	
	11	12
5	0	5
7	0	7
11	1	1
12	1	2
16	1	6
20	2	0
25	2	5
30	3	0
35	3	5
40	4	0
46	4	6
50	5	0
60	6	0
80	8	0
100	A	0
115	B	5
120	C	0
130	D	0
140	E	0
160	G	0
200	K	0
220	M	0
236	N	6
250	P	0

⑦ Terminal code

Specification	Code	Size	
	13	14	15
Bulk packing	O	-	-
Taping (SMD Type)	D	0	0
Φ4~8 Taping F=5.0mm	P	5	0
Φ10~12.5 Taping F=5.0mm	B	5	0
Lead Cut L=3.5mm	C	3	5
Lead Cut L=11.0mm	C	B	0
Lead Forming & Cut L=4.5mm	F	-	-
Kink & Cut L=4.5mm	J	-	-
Snap-in type Terminal 4.0mm in length	K	-	-
Three Terminals	T	-	-
Ring clip mounting standard design	A	0	0
Ring clip mounting special design	S	-	-

⑧ Sleeve/Marking code

Sleeve/Marking	Code
	16
PVC	C
PET	T
Dark blue	B
Bright red	R
Sky-blue	S
Light blue	T
Pink	Z
Black	H
Purple-blue	V
Red	O

Lead Forming
Taping Specifications

Fig.1 code: X



Fig.2 code: B



Fig.3 code: B



Fig.4 code: P



Lead Forming

Specification Fig.1 & Fig.2 & Fig.3

Items	Symbol	Case size										Tolerance		
		4*5 4*7		5*5 5*7		5*11		6.3*5	6.3*7 6.3*9	6.3*11 6.3*12	8*5/7 8*9/11 8*11.5 8*12		8*16 8*20	10*9/12 10*12.5 10*13/16 10*20/25
Pin Code		X	B	X	B	X	B	B	B	B	B	B	B	
Lead wire diameter	Φd	0.45		0.45		0.5		0.45	0.5	0.5	0.45/0.5	0.6	0.6	±0.05
Pitch of body	P	12.7		12.7		12.7		12.7	12.7	12.7	12.7	12.7	12.7	±1.0
Feed hole pitch	P0	12.7		12.7		12.7		12.7	12.7	12.7	12.7	12.7	12.7	±0.2
Distance from hole center to lead	P1	5.1	5.6	5.1	5.35	5.1	5.35	5.1	5.1	5.1	4.6	4.6	3.85	±0.7
Distance from feed hole center to body center	P2	6.35		6.35		6.35		6.35	6.35	6.35	6.35	6.35	6.35	±1.0
Lead-to-lead distance	F	2.5	1.5	2.5	2.0	2.5	2.0	2.5	2.5	2.5	3.5	3.5	5.0	±0.5
Height of body from tape center	H	18.5		18.5		18.5		18.5	18.5	18.5	18.5	18.5	18.5	±0.75
Base tape width	W	18.0		18.0		18.0		18.0	18.0	18.0	18.0	18.0	18.0	±0.5
Adhesive tape width	W0	6.0		6.0		6.0		6.0	6.0	8.0	8.0	8.0	11.0	min
Hole position	W1	9.0		9.0		9.0		9.0	9.0	9.0	9.0	9.0	9.0	+0.75 -0.5
Hole down tape position	W2	3.0		3.0		3.0		3.0	3.0	3.0	3.0	3.0	3.0	max

Specification Fig.4

Items	Symbol	Case size									Tolerance
		4*5 4*7	5*5	5*7	5*11	6.3*5	6.3*7 6.3*9	6.3*11 6.3*12	8*5/7 8*9/11 8*11.5/12	8*16 8*20	
Pin Code		P	P	P	P	P	P	P	P	P	
Lead wire diameter	Φd	0.45	0.45	0.45	0.5	0.45	0.5	0.5	0.45/0.5	0.6	±0.05
Pitch of body	P	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	±1.0
Feed hole pitch	P0	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	±0.2
Distance from hole center to lead	P1	3.85	3.85	3.85	3.85	3.85	3.85	3.85	3.85	3.85	±0.7
Distance from feed hole center to body center	P2	6.35	6.35	6.35	6.35	6.35	6.35	6.35	6.35	6.35	±1.0
Lead-to-lead distance	F	1.5	2.0	2.0	2.0	2.5	2.5	2.5	3.5	3.5	±0.5
Lead to lead distance	F1	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	+0.8 -0.2
Height of body from tape center	H	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	±0.75
Lead wire clinch height	H0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	±0.5
Base tape width	W	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	±0.5
Adhesive tape width	W0	6.0	6.0	6.0	6.0	6.0	6.0	8.0	8.0	8.0	min
Hole position	W1	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	+0.75 -0.5
Hole down tape position	W2	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	max

Lead Forming

Lead Forming & Cut

Code:C
RANGE: $\Phi 4\sim\Phi 18$



Code:F
RANGE: $\Phi 4\sim\Phi 8$



ΦD	F	L	ΦD	F	L
4	1.5	3.0~12.0	4	5.0	3.5, 4.5, 5.0, 7.0
5	2.0	3.0~12.0	5	5.0	3.5, 4.5, 5.0, 7.0
6.3	2.5	3.0~12.0	6.3	5.0	3.5, 4.5, 5.0, 7.0
8	3.5	3.0~12.0	8	5.0	3.5, 4.5, 5.0, 7.0
10	5.0	3.0~12.0	-	-	-
12.5	5.0	3.0~12.0	-	-	-
16	7.5	3.0~12.0	-	-	-
18	7.5	3.0~12.0	-	-	-

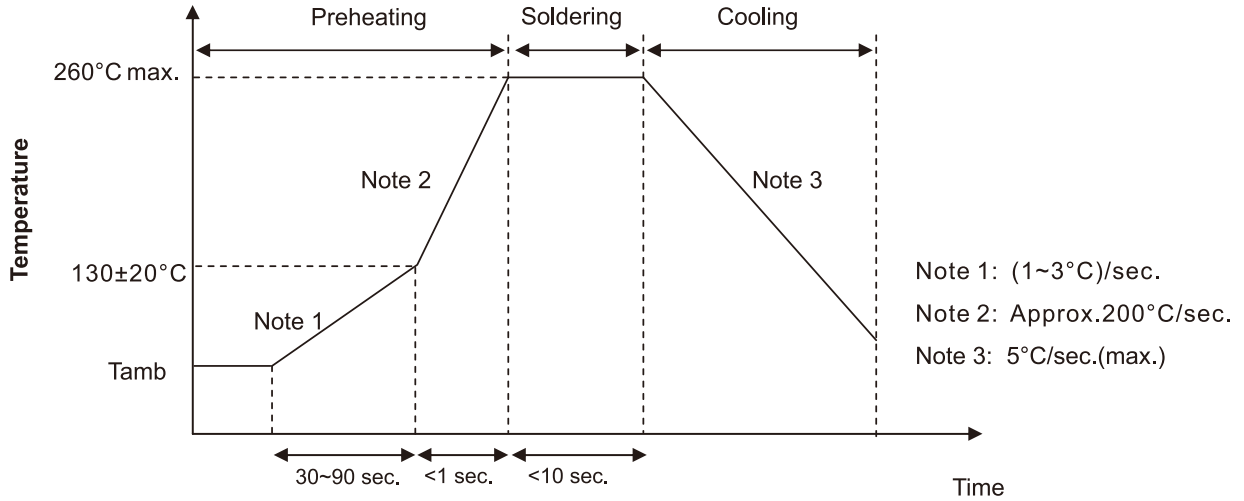
Code:J
RANGE: $\Phi 10\sim\Phi 18$



ΦD	F	L
10	5.0	4.0, 4.5, 5.0
12.5	5.0	4.0, 4.5, 5.0
16	7.5	4.0, 4.5, 5.0
18	7.5	4.0, 4.5, 5.0

Solering Recommendation

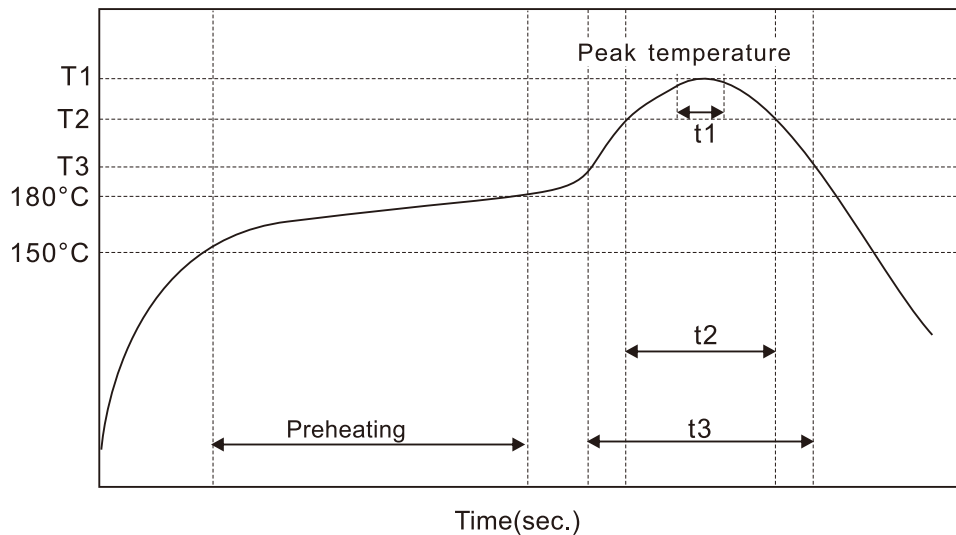
■ Flow Soldering(Radial Lead Type)



■ Reflow Soldering

- (For Polymer SMD Type)

Recommended Reflow Profile

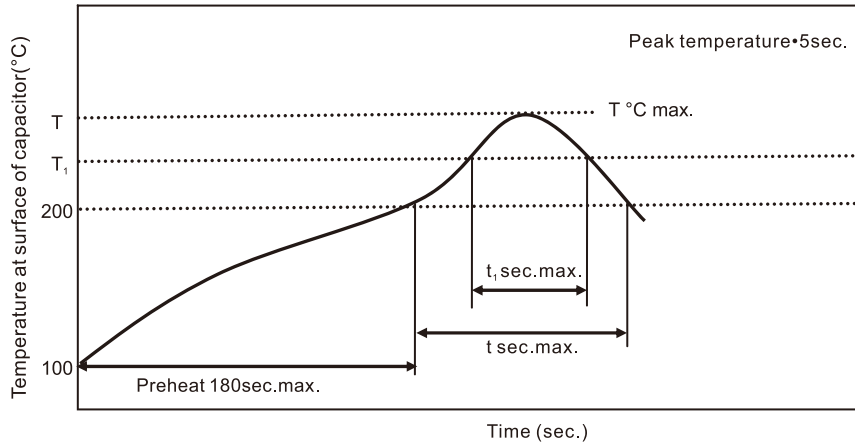


Item	Preheating	T1(°C)	T2(°C)	T3(°C)	t1(sec.)	t2(sec.)	t3(sec.)	Reflow cycle
Condition 1	150°C to 180°C Within 90sec.	≤260	230	200	≤10	≤40	≤60	1
Condition 2		≤250	230	200	≤10	≤40	≤60	2

● (For Liquid SMD Type)

Case size: $\Phi 6.3$ – $\Phi 10$ mm:

- Temperature at surface of capacitor shall not exceed $T^{\circ}\text{C}$.
- The duration for over 200°C temperature and $T_1^{\circ}\text{C}$ at surface of capacitor shall not exceed t and t_1 seconds, respectively.
- Preheat shall be done at 100°C to 200°C and for Maximum 180 seconds.

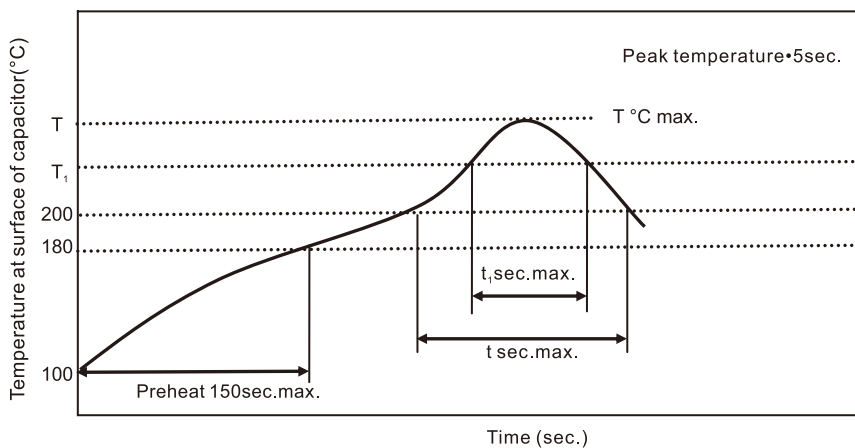


Case size (mm)	$T(^{\circ}\text{C})$ ①	$T_1(^{\circ}\text{C})$	$t(\text{sec.})$ ②	$t_1(\text{sec.})$ ③	Reflow cycle
$\Phi 6.3$	250	230	90	40	1
$\Phi 8$	240	230	90	30	1
$\Phi 10$	235	230	60	30	1

- ① Peak temperature
- ② The duration over 200°C (max.)
- ③ The duration over $T_1^{\circ}\text{C}$
- Please contact us if capacitors are subject to the conditions other than the allowable range of reflow.

Case size: $\Phi 12.5$ – $\Phi 18$ mm:

- Temperature at surface of capacitor shall not exceed $T^{\circ}\text{C}$.
- The duration for over 200°C temperature and $T_1^{\circ}\text{C}$ at surface of capacitor shall not exceed t and t_1 seconds, respectively.
- Preheat shall be done at 100°C to 180°C and for Maximum 150 seconds.

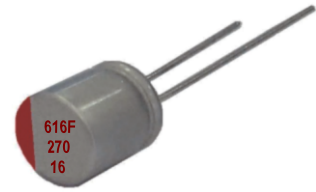


Case size (mm)	$T(^{\circ}\text{C})$ ①	$T_1(^{\circ}\text{C})$	$t(\text{sec.})$ ②	$t_1(\text{sec.})$ ③	Reflow cycle
$\Phi 12.5$ – $\Phi 18$	240	230	60	30	1

- ① Peak temperature
- ② The duration over 200°C (max.)
- ③ The duration over $T_1^{\circ}\text{C}$
- Please contact us if capacitors are subject to the conditions other than the allowable range of reflow.

PF series

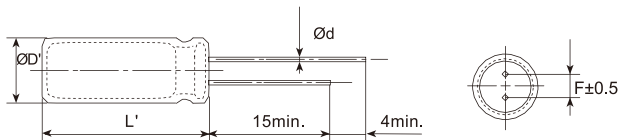
- Endurance: +105°C 3,000~5,000 hours
- Long life time
- Recommended Applications: System Board, Display Card, Small Charger and intelligent TV
- RoHS Compliant and lead-free



SPECIFICATIONS

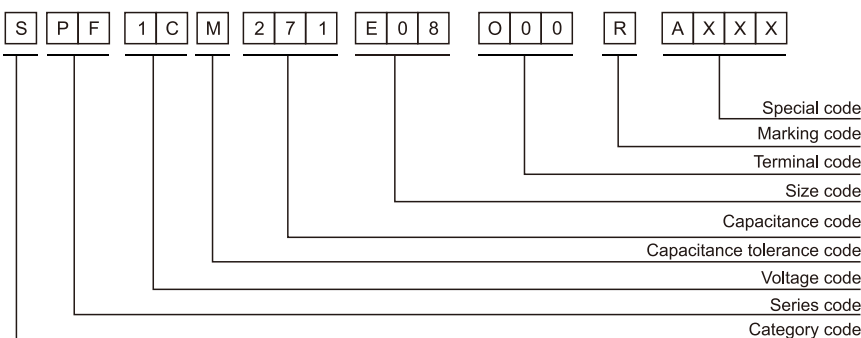
Items	Characteristics	
Category Temperature Range	-55~+105°C	
Rated Working Voltage Range	6.3~100 V _{dc}	
Nominal Capacitance Range	4.7~5600μF	
Capacitance Tolerance	±20%(M) (at 20°C, 120Hz)	
DC Leakage Current	I≤0.2CV or 500μA, whichever is greater. Where, I:Max.leakage current (μA),C:Nominal capacitance (μF),V: Rated voltage (V) (at 20°C after 2 minutes)	
DissipationFactor (tanδ)	Rated Voltage(V _{dc})	6.3 6.8 7.5 10 16 63 80 100 (at 20°C, 120Hz)
	tanδ (max.)	0.08 0.12 0.15
ESR(100k~300kHz,20°C)	Value in characteristics table	
Temperature Characteristic (Impedance Ratio at 100kHz)	Z(+105°C)/Z(+20°C)≤1.25 Z(-55°C)/Z(+20°C)≤1.25	
Endurance	After applying rated voltage for 3,000 to 5,000 hours at 105°C, the capacitors shall meet the following requirements.	
	Appearance	No significant damage
	Capacitance Change	≤±20% of the initial value
	D.F. (tanδ)	≤150% of the initial specified value
	ESR	≤150% of the initial specified value
Leakage Current	≤The initial specified value	
Humidity Test	After subjected to 90~95%RH for 2,000 hours at 60°C without voltage applied, the capacitors shall meet the specified values for the Endurance characteristics listed above.	
Surge Test	After subjected to 1,000 cycles each consisting of charge with the surge voltage specified at normal temperature for 30 seconds through a protective resistor and discharge for 5 minutes 30 seconds, the capacitors shall meet the following requirements.	
	Appearance	No significant damage
	Capacitance Change	≤±20% of the initial value
	D.F. (tanδ)	≤150% of the initial specified value
	ESR	≤150% of the initial specified value
Leakage Current	≤The initial specified value	

DIMENSIONS[mm]



ØD	5	5.5	6.3	6.8	8	10	13
Ød	0.5	0.5	0.5	0.5	0.6	0.6	0.6
F	2.0	2.5	2.5	2.5	3.5	5.0	5.0
ØD'	ØD+0.5max.						
L'	L+1.0max.			L-0.5~+1		L-0.5~+2	

PART NUMBERING SYSTEM



PF series

■ STANDARD RATINGS

VDC (SV)	Cap (μF)	Size ΦDxL(mm)	ESR (mΩ,20°C,100kHz)(max.)	Rated ripple current (mArms/105°C,100kHz)	Leakage Current (μA)(max.)
6.3 (7.2)	100	4*7	33	1350	500
	150	4*7	33	1890	500
		5*7	33	2340	500
	220	5*7	22	3150	500
		6.3*7	22	3195	500
	270	6.3*8	17	3240	500
		5*7	22	3420	500
	330	5*8	22	3600	500
		6.3*5	28	2844	500
	390	6.3*8	22	3800	500
		5*9	22	3690	500
	470	5*10	22	3870	592
		5.5*9	22	3690	592
	560	6.3*7	22	3510	592
		6.3*8	17	3960	592
	680	6.3*7	22	3780	706
		6.3*8	22	4320	706
	820	5.5*9	22	3870	706
		6.3*9	22	4572	857
	1000	5.5*9	22	4320	857
		8*9	22	4140	857
	1200	6.3*9	22	4572	1033
		6.3*10	18	4600	1033
	1500	8*9	17	4230	1033
		6.3*10	11	4635	1260
	1800	8*9	13	4320	1260
		8*11	11	4680	1260
	2200	6.3*11	11	4680	1512
8*11		11	4770	1512	
3300	8*11	11	4860	1890	
	10*12	11	4950	1890	
4700	10*10	11	5004	2268	
	8*14	11	5130	2772	
5600	10*12	11	5220	2772	
	10*14	11	5310	4158	
6.8 (7.8)	220	10*17	11	5490	5000
	5600	10*18	11	5670	5000
7 (8)	220	5*7	22	2970	500
	270	5*7	22	3240	500
	330	5*8	22	3420	500
	390	5*9	22	3510	530
	470	5*9	22	3690	639
	560	6.3*7	22	3330	639
	680	6.3*8	22	4050	762
	820	6.3*9	22	4320	925
	1000	6.3*9	22	4410	1115
	1000	6.3*11	13	4590	1360
7.5 (8.6)	220	8*11	11	4635	1360
	220	5*7	22	2880	500
	270	5*8	22	3060	500
	330	5*9	22	3240	500
	470	6.3*8	22	3420	658
	560	5.5*9	22	3240	658
	680	6.3*8	22	3600	784
	820	6.3*9	13	3780	952
10 (11.5)	220	6.3*10	13	4050	1148
	270	8*9	13	4140	1148
	330	5*7	22	2790	500
	270	5*8	22	2970	500
	330	5*9	22	3150	500
	470	6.3*7	28	2880	705
	500	5.5*9	22	3195	705
	560	5.5*9	22	3240	750
	680	6.3*8	22	3510	840
	820	6.3*9	13	3690	1020
10 (11.5)	820	6.3*10	13	3960	1230
	1200	8*9	13	4095	1230
	1200	8*11	13	4320	1800
	47	5*7	39	1980	500
	56	5*7	39	2025	500
	68	5*7	39	2070	500
	82	5*7	39	2115	500
100	5*7	39	2160	500	
120	5*5	39	1800	500	
120	5*7	22	2205	500	

Conductive Polymer Radial Type

PF series

■ STANDARD RATINGS

VDC (SV)	Cap (μF)	Size ΦDxL(mm)	ESR (mΩ,20°C,100kHz)(max.)	Rated ripple current (mArms/105°C,100kHz)	Leakage Current (μA)(max.)
10 (11.5)	150	5*7	22	2250	500
		5*8	22	2430	500
	220	5*9	22	2538	500
		6.3*8	17	2844	500
	270	6.3*8	22	2790	540
	330	6.3*8	22	2970	660
		8*9	17	3060	660
	390	6.3*8	22	3060	780
		5.5*9	22	3060	940
	470	6.3*8	22	3150	940
		8*9	17	3195	940
		8*11	15	3300	940
	560	6.3*10	14	3240	1120
		8*9	17	3240	1120
	680	6.3*11	17	3420	1360
		8*11	13	3510	1360
	820	8*11	13	3600	1640
		8*11	13	3780	2000
	1000	10*12	11	4770	2000
		8*12	11	4050	2400
1200	10*12	11	4905	2400	
	10*12	11	4950	3000	
1500	10*13	11	5220	3600	
	10*15	11	5490	4400	
1800	10*18	11	5580	5000	
	10*18	11	5580	5000	
12 (13.8)	330	5.5*9	22	2790	792
		5.5*9	22	2880	1128
	470	6.3*9	22	3105	1128
		6.3*10	17	3060	1128
	680	6.3*11	17	3240	1632
		8*10	17	3330	1632
	820	8*11	13	3420	1968
	1000	8*12	13	3600	2400
	1200	8*14	13	3960	2880
1500	8*16	13	4320	3600	
16 (18.4)	47	5*7	22	1845	500
	56	5*7	22	1890	500
	68	5*7	22	1935	500
	82	5*7	22	1980	500
	100	5*8	22	2025	500
		6.3*5	28	1890	500
	120	5*8	22	2115	500
	150	5*8	22	2160	500
	180	5*8	22	2205	576
		6.3*7	18	2250	576
	220	5*10	22	2340	704
		6.3*8	22	2430	704
	270	6.3*10	17	2610	704
		5.5*9	22	2475	864
	330	6.3*8	22	2520	864
		8*9	22	2610	864
	470	5.5*9	22	2610	1056
		6.3*9	22	2610	1056
	560	6.3*10	17	2790	1056
		5.5*11	22	2700	1504
	680	6.3*11	17	2790	1504
		8*11	12	4140	1504
	820	10*12	12	4800	1504
		8*11	12	2880	1792
	1000	8*13	12	2970	1792
		8*11	12	3060	2176
	1200	10*12	12	3240	2176
		8*13	12	3150	2624
	1500	10*12	12	3420	2624
		10*13	12	3600	3200
	1800	8*14	12	3240	3200
		10*15	12	3870	3840
	2200	10*12	12	3800	3840
10*14		12	4320	4800	
3300	10*18	12	4950	4800	
	10*15	12	4860	5000	
3300	10*18	12	5220	5000	
	10*15	12	5000	5000	
3300	13*18	12	5490	5000	

PF series

■ STANDARD RATINGS

VDC (SV)	Cap (μF)	Size ΦDxL(mm)	ESR (mΩ,20°C,100kHz)(max.)	Rated ripple current (mA rms/105°C,100kHz)	Leakage Current (μA)(max.)
20 (23)	33	5*8	44	1710	500
	39	5*8	44	1755	500
	47	5*8	44	1980	500
	56	5*9	44	1890	500
	68	6.3*8	33	1890	500
	82	6.3*8	33	1935	500
	100	6.3*8	33	1980	500
	120	6.3*8	33	2070	500
	150	6.3*10	22	2115	600
	220	8*9	33	2205	880
	270	8*11	22	2295	880
	330	8*11	22	2430	1080
	470	10*12	22	2520	1320
	680	10*13	22	2610	1880
	820	10*15	22	2790	2720
	1000	10*12	22	2700	2720
	1000	10*18	22	3060	3280
1000	10*18	22	3510	4000	
25 (29)	33	5*8	44	1665	500
	39	5*8	44	1710	500
	47	5*9	44	1755	500
	56	5*9	44	1845	500
	68	6.3*8	33	1890	500
	82	6.3*8	33	1935	500
	100	6.3*8	33	1980	500
	100	6.3*10	22	2070	500
	120	8*11	22	2205	500
	150	6.3*8	33	2070	600
	150	6.3*10	22	2115	750
	180	8*9	33	2205	900
	220	8*11	22	2295	1100
	270	8*11	22	2430	1350
	330	8*11	22	2520	1650
	470	10*12	22	2790	1650
	470	10*12	22	2520	2350
680	8*11	22	2070	2350	
680	10*12	22	2700	2350	
820	10*15	22	2880	3400	
820	10*18	22	2970	4100	
1000	8*16	22	2300	4100	
1000	10*18	22	3420	5000	
35 (41)	4.7	5*8	66	1530	500
	10	5*8	66	1620	500
	15	5*8	66	1665	500
	22	5*9	110	1755	500
	33	5*9	55	1800	500
	39	5*9	55	1845	500
	47	6.3*7	55	1890	500
	56	6.3*7	55	1935	500
	68	6.3*7	55	1980	500
	82	6.3*7	55	2025	574
	100	6.3*8	55	2115	700
	100	6.3*10	44	2160	700
	120	8*11	44	2340	700
	120	6.3*10	44	2250	840
	150	6.3*10	44	2295	1050
	180	6.3*11	44	2340	1260
	220	8*11	44	2520	1540
270	10*12	33	2610	1540	
270	10*12	33	2700	1890	
330	10*12	33	2790	2310	
470	10*13	22	2880	3290	
680	10*16	22	3060	4760	
820	10*18	22	3150	5000	
1000	10*18	22	3330	5000	
50 (58)	4.7	5*8	66	1440	500
	10	6.3*7	39	1665	500
	15	5*8	77	1467	500
	22	5*8	77	1494	500
	22	6.3*7	39	1710	500
	33	6.3*7	39	1800	500
	56	6.3*8	39	1890	500
56	6.3*8	39	1908	560	

Conductive Polymer Radial Type

PF series

■ STANDARD RATINGS

VDC (SV)	Cap (μF)	Size ΦDxL(mm)	ESR (mΩ,20°C,100kHz)(max.)	Rated ripple current (mA rms/105°C,100kHz)	Leakage Current (μA)(max.)
50 (58)	68	6.3*10	33	1935	680
	100	8*11	33	2070	1000
	120	8*11	33	2160	1200
	150	10*12	33	2250	1500
	220	10*12	33	2430	2200
	270	10*13	22	2610	2700
	330	10*15	22	2700	3300
	440	10*18	22	2790	4400
	470	10*18	22	2835	4700
	680	13*18	22	2970	5000
63 (73)	4.7	6.3*8	66	1440	500
	6.8	6.3*8	66	1485	500
	10	6.3*5	66	1440	500
	22	6.3*8	33	1400	500
	33	6.3*8	33	1530	500
	39	6.3*8	33	1575	500
	47	6.3*9	33	1710	592
	56	8*9	33	1620	706
	68	8*11	33	1800	857
	82	8*11	33	1890	1033
	100	10*12	33	1980	1260
	150	10*12	33	2250	1890
	220	10*15	22	2385	2772
	270	10*17	22	2565	3402
330	10*18	22	2655	4158	
470	13*18	22	2790	5000	
80 (92)	4.7	6.3*8	66	1350	500
	6.8	6.3*8	66	1395	500
	22	6.3*10	66	1485	500
	33	8*11	39	1530	528
	47	10*12	39	1665	752
	68	10*12	39	1710	1088
	100	10*14	39	1890	1600
100 (115)	4.7	6.3*8	66	1260	500
	6.8	6.3*8	66	1305	500
	10	6.3*10	55	1350	500
		8*11	55	1395	500
	15	8*11	55	1395	500
	22	10*12	39	1440	500
	33	10*14	39	1485	660
	47	10*16	39	1620	940

※ Specifications subject to change without notice.