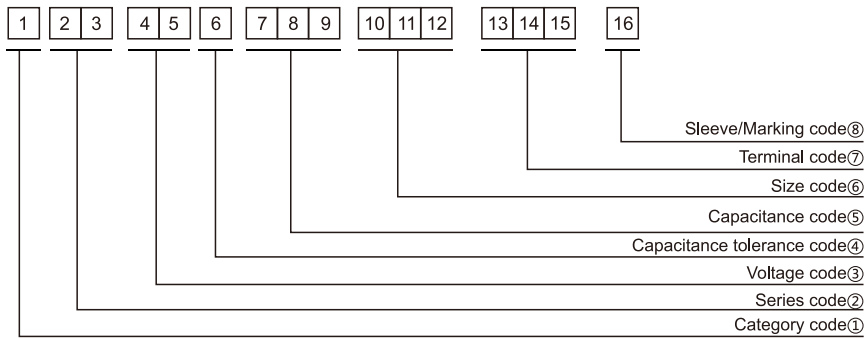


Part Numbering System



① Category code

Type	Code
	1
Electrolytic Capacitor	E
Conductive Polymer	S

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

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

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

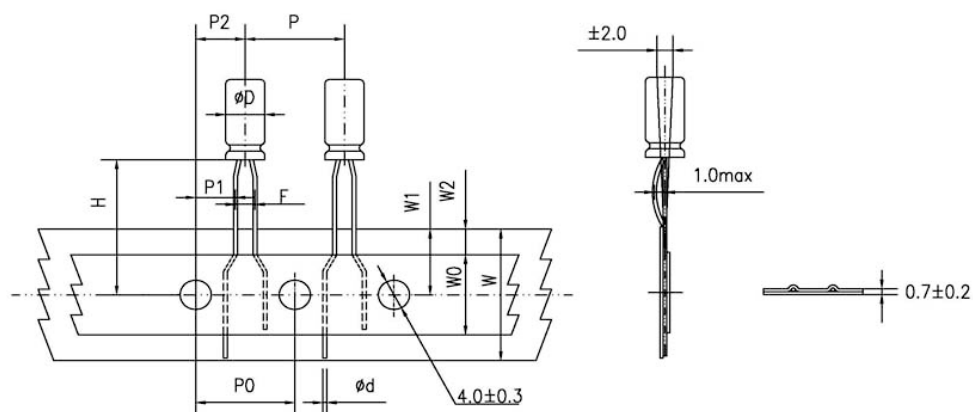


Fig.2 code: B

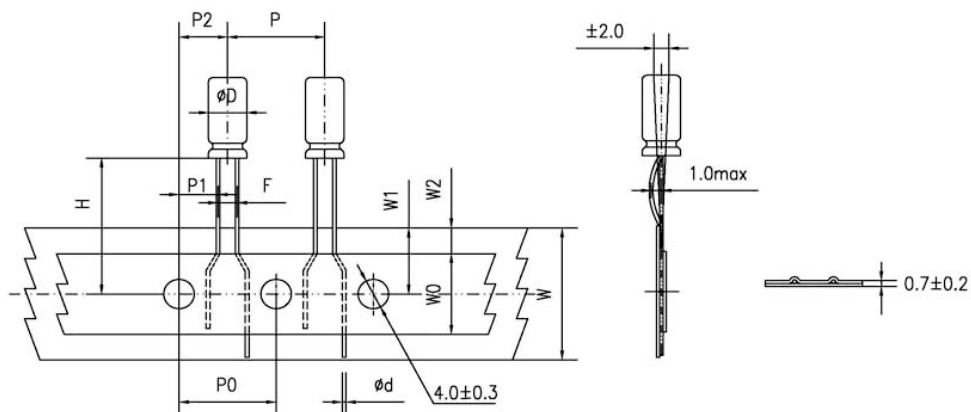


Fig.3 code: B

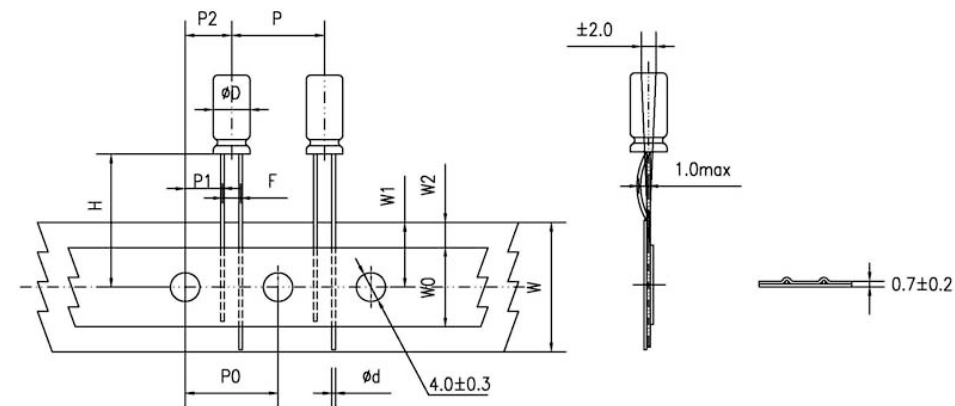
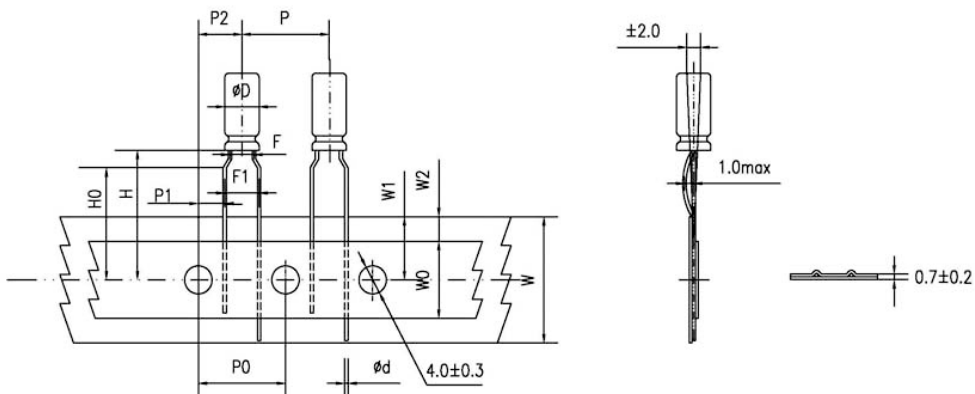


Fig.4 code: P



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

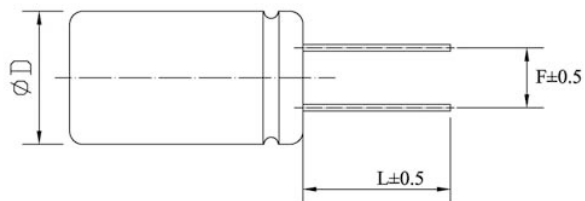
Items	Symbol	Case size									Tolerance
		4*5 4*7	5*5	5*7	5*11	6.3*5	6.3*7 6.3*9	6.3*11 6.3*12	8*5/7 8*9/11 8*11.5/12	8*16 8*20	
Pin Code		P	P	P	P	P	P	P	P	P	
Lead wire diameter	Φd	0.45	0.45	0.45	0.5	0.45	0.5	0.5	0.45/0.5	0.6	±0.05
Pitch of body	P	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	±1.0
Feed 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

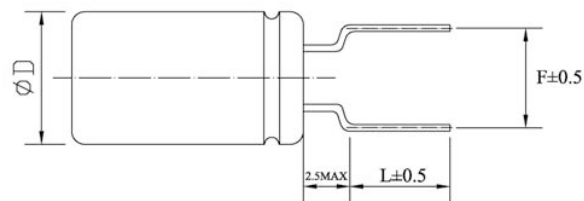
Code:C

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



Code:F

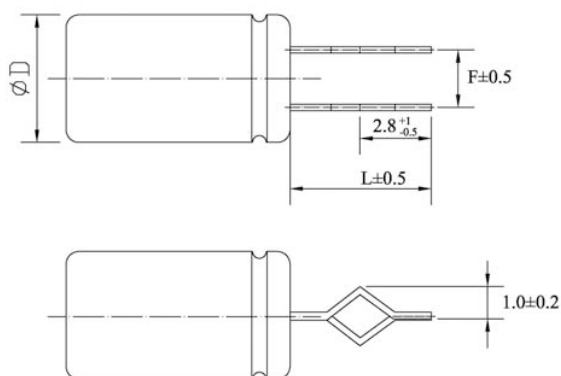
RANGE: $\Phi 4 \sim \Phi 8$



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

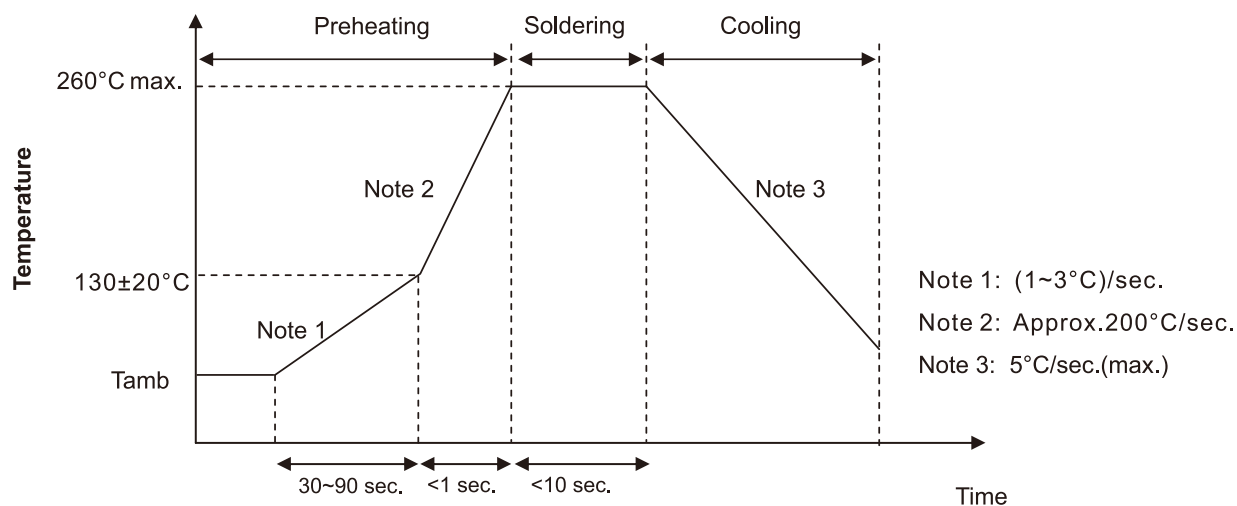
RANGE: $\Phi 10 \sim \Phi 18$



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

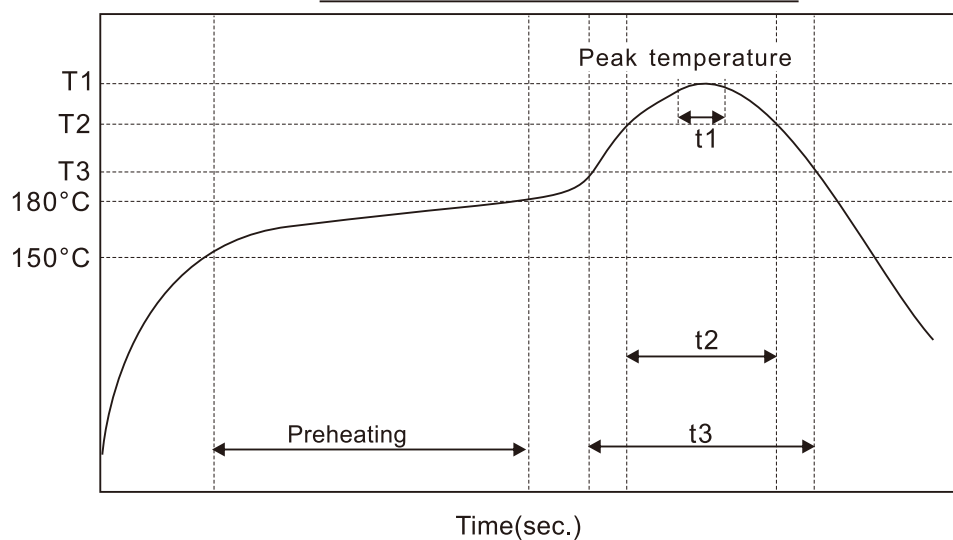
■ Flow Soldering(Radial Lead Type)



■ Reflow Soldering

- (For Polymer SMD Type)

Recommended Reflow Profile

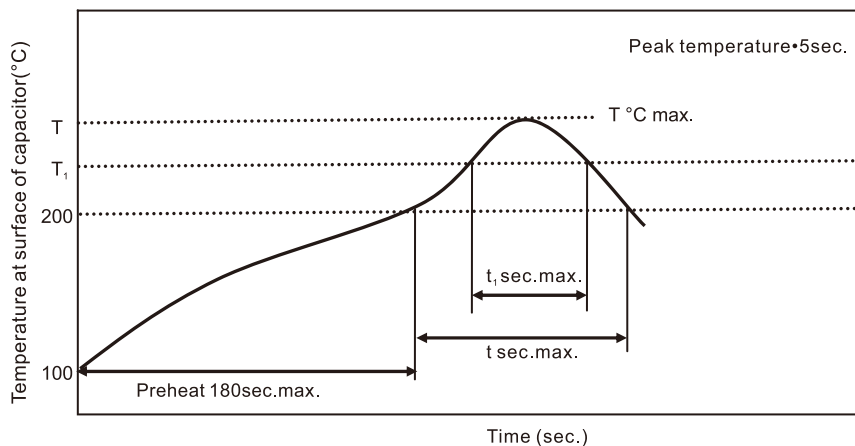


Item	Preheating	T1(°C)	T2(°C)	T3(°C)	t1(sec.)	t2(sec.)	t3(sec.)	Reflow cycle
Condition 1	150°C to 180°C Within 90sec.	≤ 260	230	200	≤ 10	≤ 40	≤ 60	1
Condition 2		≤ 250	230	200	≤ 10	≤ 40	≤ 60	2

• (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.

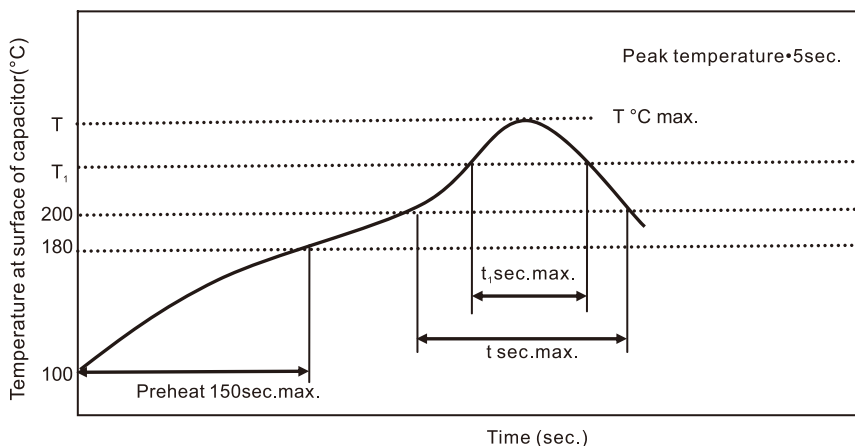


Case size (mm)	$T(^{\circ}\text{C})$ ①	$T_1(^{\circ}\text{C})$	$t(\text{sec.})$ ②	$t_1(\text{sec.})$ ③	Reflow cycle
$\Phi 6.3$	250	230	90	40	1
$\Phi 8$	240	230	90	30	1
$\Phi 10$	235	230	60	30	1

- 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.

BH series

- Endurance: +130°C 3,000 hours
- High reliability, suited for automobile electronics
- Miniaturized, long life, low impedance
- RoHS Compliant

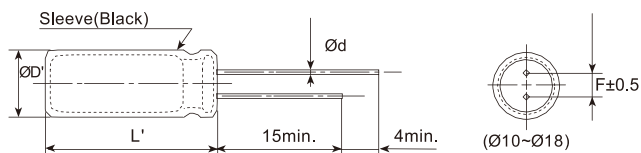
New



SPECIFICATIONS

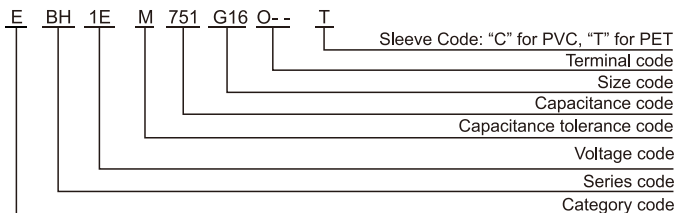
Items	Characteristics							
Category Temperature Range	-40~+130°C							
Rated Voltage Range	25~400 V _{dc}							
Capacitance Tolerance	±20%(M) (at 20°C, 120Hz)							
Leakage Current	25~100 V _{dc}				160~400 V _{dc}			
	I ≤0.03CV or 4μA.(after 2 minutes) whichever is greater.				CV ≤1,000		I ≤0.1CV+40μA. (after 1 minute)	
					CV >1,000		I ≤0.04CV+100μA. (after 1 minute)	
	Where, I: Max.leakage current (μA), C :nominal capacitance (μF), V : Rated voltage (V) (at 20°C)							
Dissipation Factor (tanδ)	Rated Voltage (V _{dc})	25	35	50	63	100	160~250	350~400
	tanδ (max.)	0.14	0.12	0.10	0.09	0.08	0.15	0.20
	When nominal capacitance exceeds 1,000μF, add 0.02 to the value above for each 1,000μF increase. (at 20°C, 120Hz)							
Low Temperature Characteristics (Max. Impedance Ratio)	Rated Voltage (V _{dc})	25	35	50	63	100	160~250	350~400
	Z(-25°C)/Z(+20°C)	2	2	2	2	2	3	6
	Z(-40°C)/Z(+20°C)	4	4	4	4	4	6	12
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after DC voltage plus rated ripple current is applied for 3,000 hours at 130°C.							
	Rated Voltage (V _{dc})	25~100				160~400		
	Capacitance Change	≤±30% of the initial value				≤±20% of the initial value		
	D.F. (tanδ)	≤300% of the initial specified value				≤200% of the initial specified value		
	Leakage Current	≤The initial specified value				≤The initial specified value		
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1,000 hours at 105°C without voltage applied.							
	Capacitance Change	≤±20% of the initial value						
	D.F. (tanδ)	≤200% of the initial specified value						
	Leakage Current	≤200% of the initial specified value						

DIMENSIONS [mm]



ØD	10	12.5	14.5	16	18
Ød	0.6	0.6	0.8	0.8	0.8
F	5.0	5.0	7.5	7.5	7.5
ØD'	ØD+0.5max.				
L'	L+2max.				

PART NUMBERING SYSTEM



RATED RIPPLE CURRENT MULTIPLIERS

Frequency correction factor for ripple current

6.3 to 100 V_{dc}

Cap.(μF)	Freq.(Hz)	120	1k	10k	100k
130 to 240		0.40	0.82	0.93	1.00
270 to 560		0.50	0.85	0.94	1.00
620 to 2000		0.60	0.87	0.95	1.00
2200 to 4300		0.75	0.90	0.95	1.00
4700 to 11000		0.85	0.95	0.98	1.00

160 to 400 V_{dc}

Freq.(Hz)	50	120	300	1k	10k	100k
Cap.(μF)						
12 to 33	0.15	0.30	0.45	0.65	0.95	1.00
36 to 270	0.25	0.35	0.50	0.70	0.96	1.00

The endurance of capacitors is shortened with internal heating produced by ripple current at the rate of halving the lifetime with every 5°C rise. When long life performance is required in actual use, the rms ripple current has to be reduced.

BH series

■ STANDARD RATINGS

WV (V _{dc})	Cap (μF)	Size ΦDxL(mm)	tanδ	Impedance (Ω _{max} /20°C, 100kHz)	Rated ripple current (mA _{rms} /130°C, 100kHz)
25(1E)	510	10*12.5	0.14	0.14	900
	750	10*16	0.14	0.094	1300
	910	12.5*16	0.14	0.082	1220
	1200	10*20	0.14	0.073	1540
		14.5*15	0.14	0.067	1320
	1500	10*25	0.14	0.042	1880
	1600	16*15	0.14	0.063	1430
	1800	12.5*20	0.14	0.038	1590
	2000	10*30	0.16	0.033	2150
	2200	14.5*20	0.16	0.030	1780
	2400	18*15	0.16	0.053	1630
	2700	12.5*25	0.16	0.030	2280
	3000	16*20	0.18	0.029	1890
	3300	12.5*30	0.18	0.025	2760
	3600	14.5*25	0.18	0.025	2760
		12.5*35	0.20	0.022	3120
		16*25	0.20	0.022	3030
	4300	18*20	0.20	0.028	1930
		14.5*30	0.20	0.020	3090
	4700	12.5*40	0.22	0.019	3610
		14.5*35	0.22	0.018	3430
		16*30	0.22	0.018	3330
	5600	18*25	0.24	0.020	3200
		14.5*40	0.24	0.016	3820
	6800	16*35	0.24	0.016	3630
		18*30	0.26	0.016	3480
	8200	16*40	0.28	0.015	3930
	9100	18*35	0.30	0.015	3750
	11000	18*40	0.32	0.014	4040
35(1V)	300	10*12.5	0.12	0.14	900
	510	10*16	0.12	0.094	1300
	560	12.5*16	0.12	0.082	1220
	680	10*20	0.12	0.073	1540
	750	14.5*15	0.12	0.067	1320
	820	10*25	0.12	0.042	1880
	1100	12.5*20	0.12	0.038	1590
		16*15	0.12	0.063	1430
	1200	10*30	0.12	0.033	2150
		12.5*25	0.12	0.030	2280
		14.5*20	0.12	0.030	1780
	1500	18*15	0.12	0.053	1630
		12.5*30	0.14	0.025	2760
		16*20	0.14	0.029	1890
	2000	14.5*25	0.14	0.025	2760
		12.5*35	0.14	0.022	3120
	2400	16*25	0.14	0.022	3030
		18*20	0.14	0.028	1930
		12.5*40	0.14	0.019	3610
	2700	14.5*30	0.14	0.020	3090
		14.5*35	0.16	0.018	3430
	3300	16*30	0.16	0.018	3330
		18*25	0.16	0.020	3200
	3900	14.5*40	0.16	0.016	3820
		16*35	0.18	0.016	3630
	4300	18*30	0.18	0.016	3480
		16*40	0.18	0.015	3930
	5100	18*35	0.20	0.015	3750
	8200	18*40	0.26	0.014	4040

WV (V _{dc})	Cap (μF)	Size ΦDxL(mm)	tanδ	Impedance (Ω _{max} /20°C, 100kHz)	Rated ripple current (mA _{rms} /130°C, 100kHz)
50(1H)	160	10*12.5	0.10	0.24	730
	240	10*16	0.10	0.16	1080
	270	12.5*16	0.10	0.14	1020
	330	10*20	0.10	0.12	1290
	390	14.5*15	0.10	0.12	1090
	430	10*25	0.10	0.055	1740
	510	12.5*20	0.10	0.049	1410
	560	10*30	0.10	0.041	2020
		16*15	0.10	0.11	1190
	680	14.5*20	0.10	0.038	1610
	750	12.5*25	0.10	0.038	2030
		18*15	0.10	0.085	1370
	910	16*20	0.10	0.037	1740
		12.5*30	0.10	0.031	2510
	1000	14.5*25	0.10	0.031	2480
		12.5*35	0.10	0.027	2900
	1200	18*20	0.10	0.036	1830
		14.5*30	0.10	0.026	2870
	1300	16*35	0.10	0.027	2690
		12.5*40	0.10	0.023	3260
	1500	14.5*35	0.10	0.023	3160
		16*30	0.10	0.023	3150
	1600	16*30	0.10	0.023	3150
	1800	18*25	0.10	0.025	2900
	2000	14.5*40	0.12	0.020	3560
		16*35	0.12	0.020	3470
	2200	18*30	0.12	0.021	3330
	2400	16*40	0.12	0.018	3800
	2700	18*35	0.12	0.019	3590
	3300	18*40	0.14	0.017	3850
63(1J)	390	12.5*20	0.10	0.097	1310
	510	12.5*25	0.10	0.072	1880
		14.5*20	0.10	0.072	1510
	620	16*20	0.10	0.062	1630
	680	12.5*30	0.10	0.052	2410
		14.5*25	0.10	0.054	2130
	820	12.5*35	0.10	0.044	2760
		18*20	0.10	0.055	1750
	910	14.5*30	0.10	0.042	2700
		16*25	0.10	0.047	2300
	1000	12.5*40	0.10	0.038	3080
		14.5*35	0.10	0.037	2940
	1100	16*30	0.10	0.037	2940
		18*25	0.10	0.044	2440
	1300	14.5*40	0.10	0.032	3350
		16*35	0.10	0.031	3220
	1500	18*30	0.10	0.037	3100
	1800	16*40	0.10	0.028	3590
	2000	18*35	0.12	0.028	3450
	2400	18*40	0.12	0.023	3690

Radial Type

BH series

STANDARD RATINGS

WV (V _{dc})	Cap (μF)	Size ΦDxL(mm)	tanδ	Impedance (Ω _{max} /20°C, 100kHz)	Rated ripple current (mA _{rms} /130°C, 100kHz)
80(1B)	240	12.5*20	0.08	0.097	1310
	330	12.5*25	0.08	0.072	1880
		14.5*20	0.08	0.072	1510
	390	16*20	0.08	0.062	1630
	430	12.5*30	0.08	0.052	2410
	470	14.5*25	0.08	0.054	2130
		12.5*35	0.08	0.044	2760
		16*25	0.08	0.047	2300
	560	18*20	0.08	0.055	1750
		12.5*40	0.08	0.038	3080
		14.5*30	0.08	0.042	2700
	680	14.5*35	0.08	0.037	2940
		16*30	0.08	0.037	2940
	750	18*25	0.08	0.044	2440
	820	14.5*40	0.08	0.032	3350
	910	16*35	0.08	0.031	3220
		18*30	0.08	0.037	3100
	1100	16*40	0.08	0.028	3590
	1300	18*35	0.08	0.028	3450
	1500	18*40	0.08	0.023	3690
100(1K)	130	12.5*20	0.08	0.12	1210
	180	14.5*20	0.08	0.082	1450
	200	12.5*25	0.08	0.082	1800
	240	12.5*30	0.08	0.062	2290
		16*20	0.08	0.071	1580
	270	14.5*25	0.08	0.064	2050
		12.5*35	0.08	0.051	2680
		16*25	0.08	0.057	2190
	330	18*20	0.08	0.069	1690
		14.5*30	0.08	0.050	2620
		12.5*40	0.08	0.044	2970
	390	14.5*35	0.08	0.044	2850
		16*30	0.08	0.044	2770
		18*25	0.08	0.054	2310
	430	14.5*40	0.08	0.038	3230
		16*35	0.08	0.037	3010
	560	18*30	0.08	0.043	2830
	620	16*40	0.08	0.032	3320
	680	18*35	0.08	0.034	3210
	820	18*40	0.08	0.029	3410

WV (V _{dc})	Cap (μF)	Size ΦDxL(mm)	tanδ	Impedance (Ω _{max} /20°C, 100kHz)	Rated ripple current (mA _{rms} /130°C, 100kHz)
160(2C)	47	12.5*25	0.15	-	590
	68	16*25	0.15	-	750
	82	16*25	0.15	-	825
	100	16*25	0.15	-	960
		18*20	0.15	-	960
	150	18*30	0.15	-	1050
	220	18*35	0.15	-	1500
200(2D)	33	12.5*20	0.15	-	500
	47	12.5*25	0.15	-	650
		16*20	0.15	-	650
	68	16*25	0.15	-	750
	82	16*30	0.15	-	900
		18*25	0.15	-	900
	100	16*30	0.15	-	1100
		18*25	0.15	-	1100
250(2E)	22	12.5*20	0.15	-	430
		12.5*25	0.15	-	530
		16*20	0.15	-	530
	47	16*25	0.15	-	690
		18*20	0.15	-	690
	68	16*30	0.15	-	780
		18*25	0.15	-	780
	82	18*25	0.15	-	900
350(2V)	15	12.5*25	0.20	-	335
		16*20	0.20	-	335
		16*25	0.20	-	450
	22	16*30	0.20	-	535
		16*35	0.20	-	555
	47	18*30	0.20	-	700
		18*35	0.20	-	750
	68	18*40	0.20	-	900
400(2G)	12	12.5*25	0.20	-	280
	15	12.5*25	0.20	-	335
		16*20	0.20	-	335
	22	16*25	0.20	-	480
		16*30	0.20	-	500
	33	18*30	0.20	-	635
		18*35	0.20	-	750
	68	18*40	0.20	-	900