

CD11GA SERIES

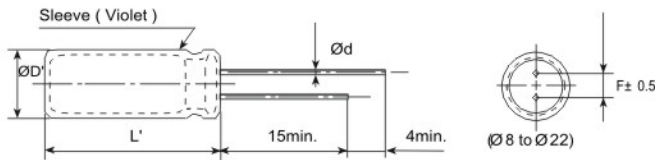
- Longer life+105°C8,000 hours,+130°C 2,000hours
- Especially designed for electronic ballast
- Withstand high temperature+130°C and high ripple current
- RoHS Compliant



◆ SPECIFICATIONS

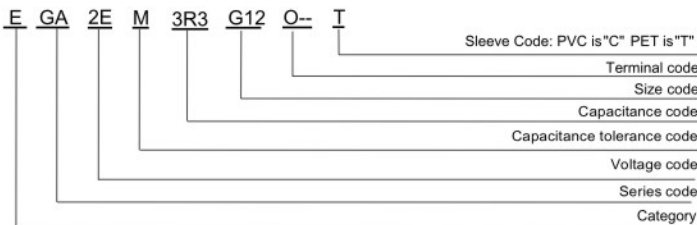
Items	Characteristics						
Category	-40 to +130°C(160 to 400V _{dc}) - 25 to +130°C(450V _{dc})						
Temperature Range							
Rated Voltage Range	160 to 450V _{dc}						
Capacitance Tolerance	±20%(M) (at 20°C, 120Hz)						
Leakage Current	160 to 400V _{dc}	450V _{dc}		Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V)			
	$I \leq 0.02CV + 10 \mu A$	$I \leq 0.03CV + 10 \mu A$					(at 20°C after 2 minutes)
Dissipation Factor (tan δ)	Rated voltage (V _{dc})	160V	200V	250V	350V	400V	450V
	tan δ (Max.)	0.08					0.12
Low Temperature Characteristics (Max. Impedance Ratio)	Rated voltage (V _{dc})	160V	200V	250V	350V	400V	450V
	Z(-25°C)/Z(+20°C)	3	3	3	5	5	6
	Z(-40°C)/Z(+20°C)	6	6	6	6	6	--
Endurance	After application of the rated DC voltage at 130 °C 2,000hours or application of DC voltage with rated ripple current at 105 °C 8,000 hours, the capacitors shall meet the requirements as below.						
	Capacitance change	≤ ±20% of the initial value					
	D.F. (tan δ)	≤ 200% of the initial specified value					
	Leakage current	≤ The initial specified value					
Shelf Life	The following specification shall be satisfied when the capacitors are restored to 20°C after exposing them for 1,000hours at 105 °C without voltage applied.						
	Capacitance change	≤ ±20% of the initial value					
	D.F. (tan δ)	≤ 200% of the initial specified value					
	Leakage current	≤ 200%The initial specified value					

◆ DIMENSIONS [mm]



Ø D	8	10	12.5	16	18	22
Ø d	0.6	0.6	0.6	0.8	0.8	0.8
F	3.5	5.0	5.0	7.5	7.5	10.5
Ø D'	Ø D+0.5max.					
L'	L+2max.					

◆ PART NUMBERING SYSTEM



※ Sleeve Code and Terminal Code should follow the part number system

◆ RATED RIPPLE CURRENT MULTIPLIERS

Frequency correction factor for ripple current (Hz)

Freq.(Hz)	120	1K	10K	100K
WV(V _{dc})				
160~250	0.55	0.85	0.90	1.00
350~450	0.50	0.80	0.90	1.00

The endurance of capacitors is shorted 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.

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◆ STANDARD RATINGS

Rated Voltage		160V(2C)									
μF	Φ D	Φ 8		Φ 10		Φ 12.5		Φ 16		Φ 18	
	3.3		8x12	80							
4.7		8x16	86	10x12	86						
5.6		8x16	92								
6.8		8x16	100								
8.2				10x16	160						
10				10x16	225						
15				10x16	288						
22				10x20	450						
33						12.5x20	540				
47						12.5x25	594				
68								16x25	770		
100								16x25	1008		
150										18x30	1224
220										18x35	1260

Rated Voltage		200V(2D)											
μF	Φ D	Φ 8		Φ 10		Φ 12.5		Φ 16		Φ 18		Φ 22	
	2.8		8x12	72									
3.3		8x12	81										
4.7				10x12	90								
5.6		8x16	97										
6.8		8x16	106										
8.2				10x16	160								
10				10x16	225								
15				10x20	378								
22						12.5x20	450						
33						12.5x20	540						
47						12.5x25	594						
68								16x25	770				
100								16x30	1008				
150										18x35	1224		
220												22x35	1530

Rated Voltage		250V(2E)											
μF	Φ D	Φ 8		Φ 10		Φ 12.5		Φ 16		Φ 18			
	2.2		8x12	72									
2.8				10x12	81								
3.3				10x12	90								
4.7				10x12	99								
5.6				10x16	126								
6.8				10x16	140								
8.2				10x16	160								
10				10x16	252								
				10x20									
15						12.5x20	405						
22						12.5x20	500						
33						12.5x25	590						
47								16x25	648				
68								16x30	828				
100										18x30	1080		
150										18x35	1350		
220													

▲ Case Size (Φ D x L)

▲ Ripple Current(mArms/105°C,100KHz)

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◆ **STANDARD RATINGS**

Rated Voltage		350V(2V)									
μ F	Φ D	Φ 8		Φ 10		Φ 12.5		Φ 16		Φ 18	
		1.0		8x12	58						
1.5				10x12	63						
1.8				10x12	70						
2.2				10x12	80						
2.8				10x12	86						
3.3				10x12	95						
4.7				10x16	119						
5.6				10x20	162						
6.8				10x20	198						
8.2						12.5x20	216				
10						12.5x20	252				
15						12.5x20	360				
22						12.5x25	450	16x25	500		
33								16x30	590		
47										18x25	700
68										18x30	850

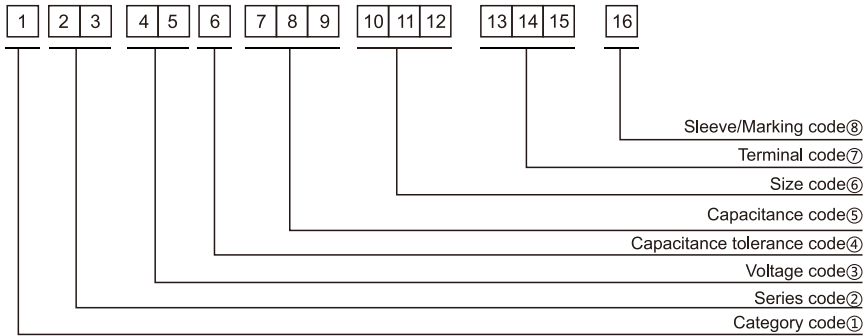
Rated Voltage		400V(2G)									
μ F	Φ D	Φ 8		Φ 10		Φ 12.5		Φ 16		Φ 18	
		1.0				10x12	65				
1.5				10x12	76						
1.8				10x12	81						
2.2				10x16	83						
2.8				10x16	90						
3.3				10x16	99						
4.7				10x20	119						
5.6						12.5x20	162				
6.8						12.5x20	198				
8.2						12.5x20	234				
10						12.5x20	252				
15						12.5x25	380				
22								16x25	500		
33								16x30	590		
47										18x30	756
68										18x40	900

Rated Voltage		450V(2W)									
μ F	Φ D	Φ 8		Φ 10		Φ 12.5		Φ 16		Φ 18	
		1.0		8x16	72						
1.5				10x12	79						
1.8				10x12	83						
2.2				10x16	86						
2.8				10x16	90						
3.3				10x16	99						
4.7				10x20	119						
5.6						12.5x20	162				
6.8						12.5x20	198				
8.2						12.5x20	252				
10						12.5x20	288				
15						12.5x25	378				
22								16x25	504		
33								16x30	630		
47										18x30	792

▲ Case Size (Φ DxL)

▲ Ripple current(mArms/105°C,100KHz)

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

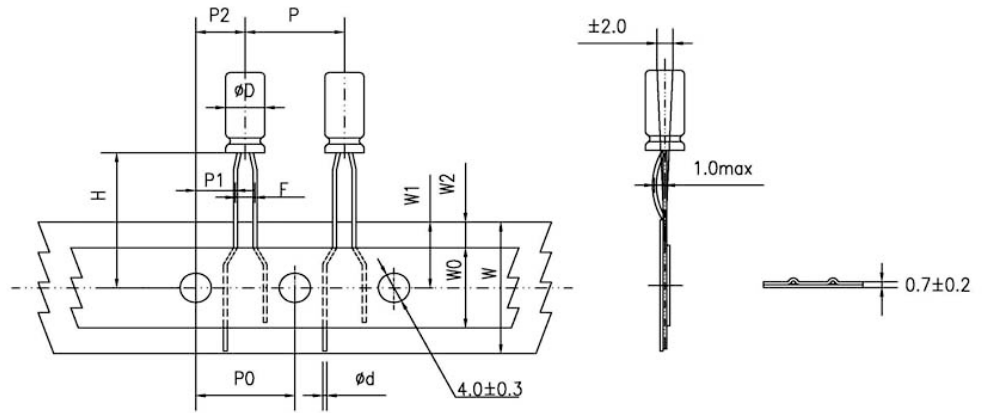


Fig.2 code: B

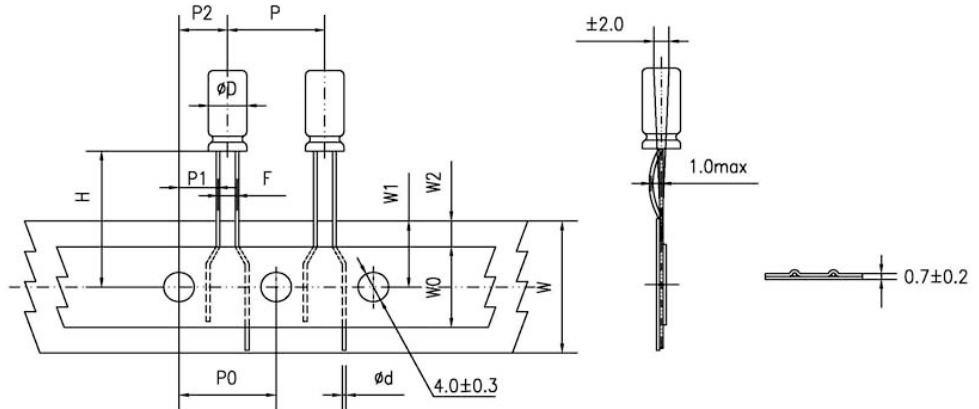


Fig.3 code: B

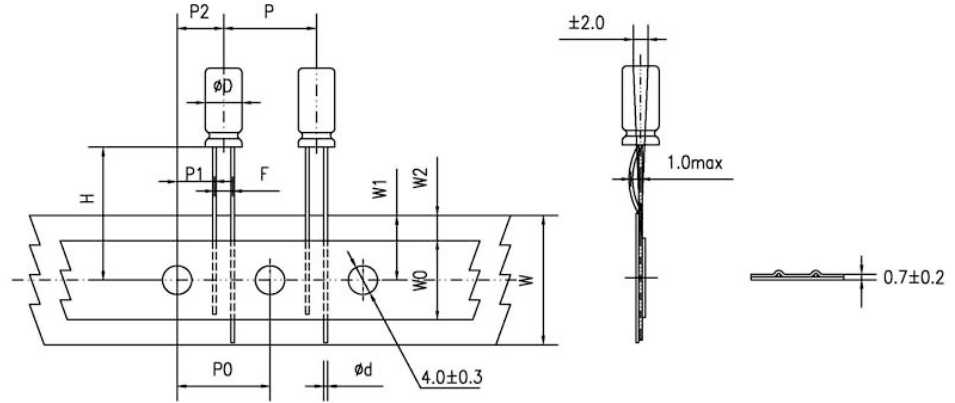
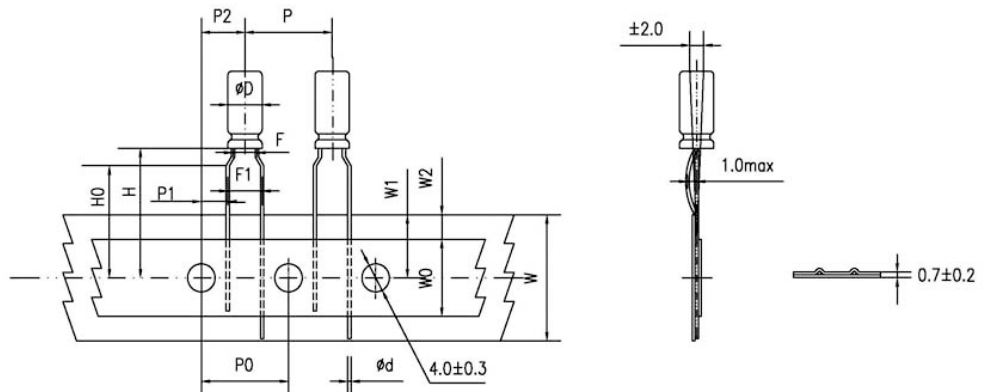


Fig.4 code: P



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

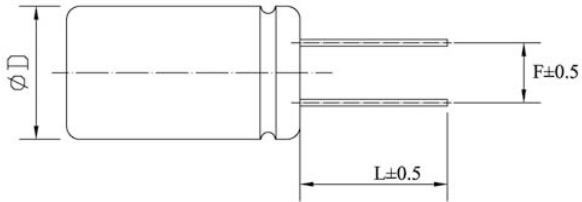
Specification Fig.4

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

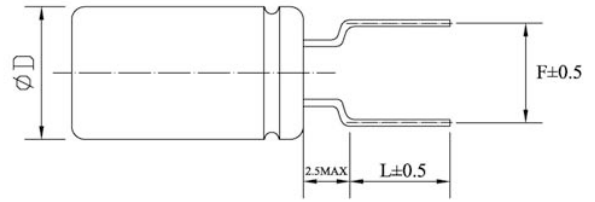
Lead Forming

Lead Forming & Cut

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

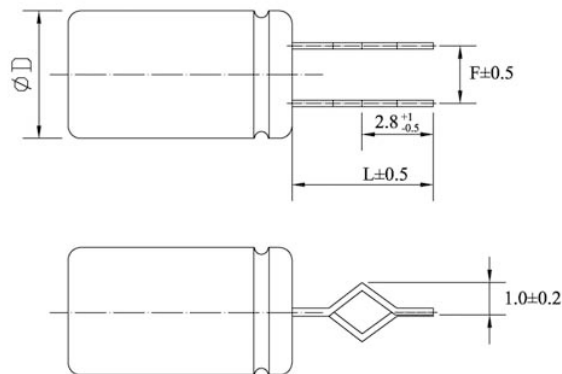


Code:F
RANGE: $\Phi 4\sim\Phi 8$



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	-	-	-

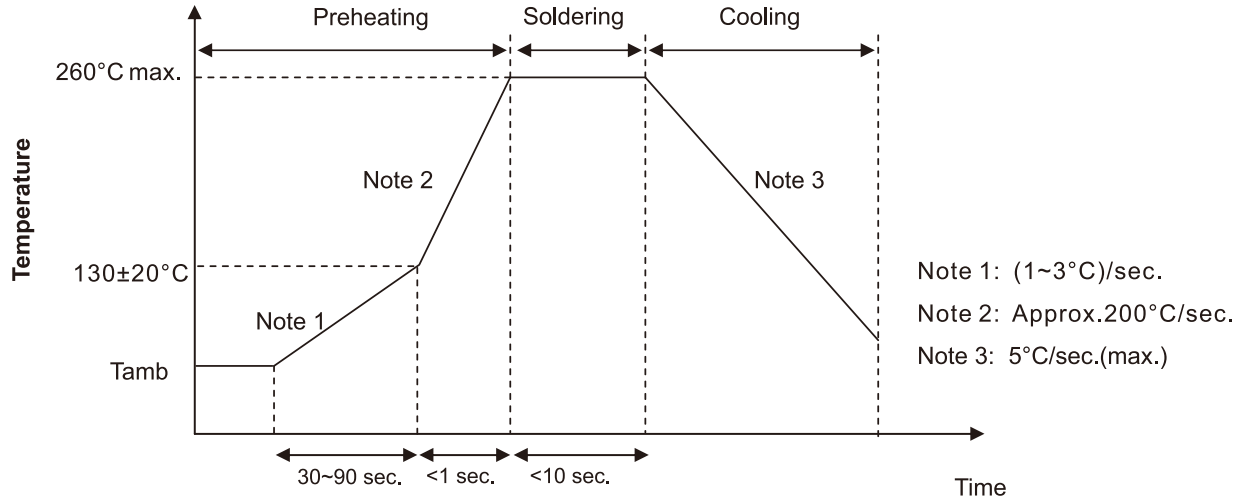
Code:J
RANGE: $\Phi 10\sim\Phi 18$



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

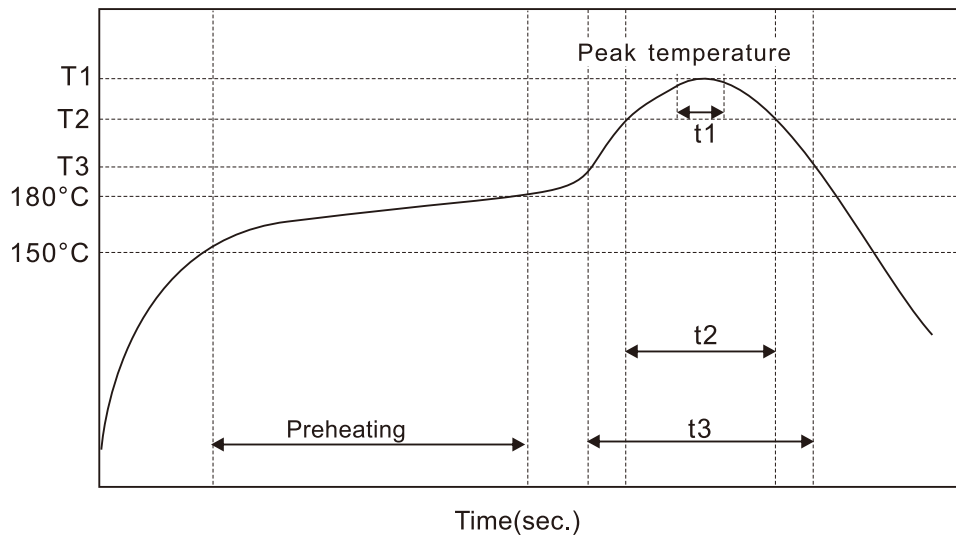
■ Flow Soldering(Radial Lead Type)



■ Reflow Soldering

- (For Polymer SMD Type)

Recommended Reflow Profile

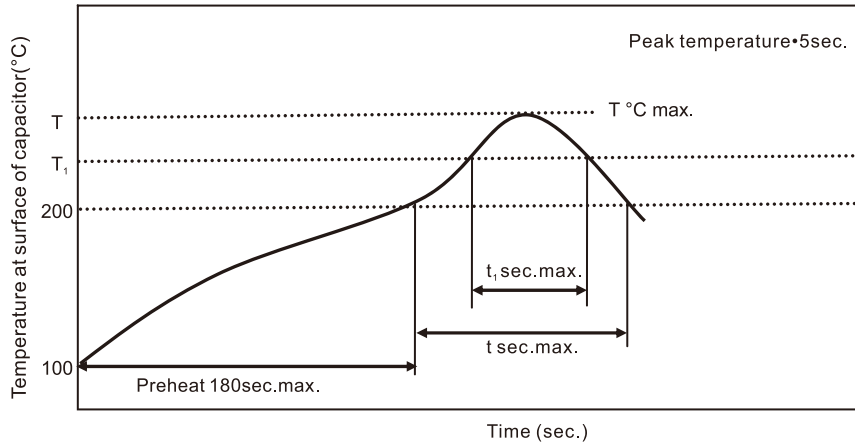


Item	Preheating	T1(°C)	T2(°C)	T3(°C)	t1(sec.)	t2(sec.)	t3(sec.)	Reflow cycle
Condition 1	150°C to 180°C Within 90sec.	≤260	230	200	≤10	≤40	≤60	1
Condition 2		≤250	230	200	≤10	≤40	≤60	2

● (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.

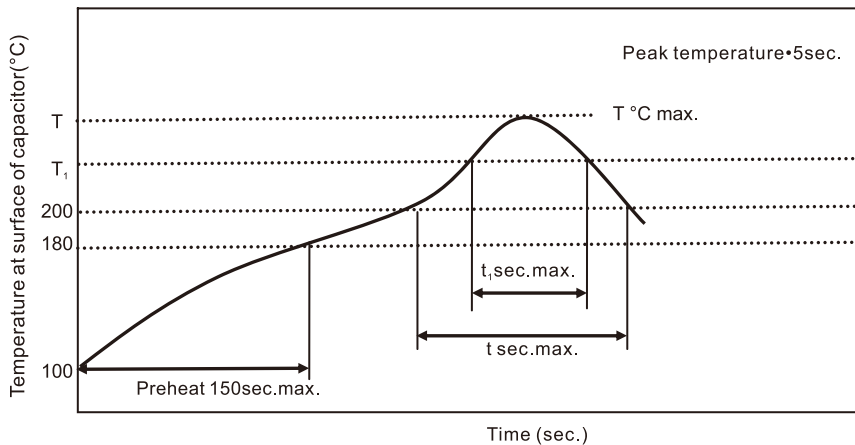


Case size (mm)	$T(^{\circ}\text{C})$ ①	$T_1(^{\circ}\text{C})$	$t(\text{sec.})$ ②	$t_1(\text{sec.})$ ③	Reflow cycle
$\Phi 6.3$	250	230	90	40	1
$\Phi 8$	240	230	90	30	1
$\Phi 10$	235	230	60	30	1

- 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.