

HF series

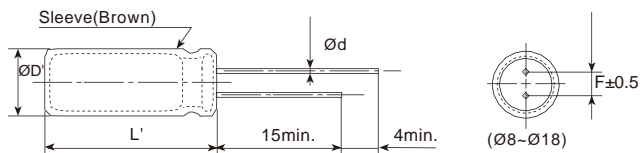
- Long life, high ripple current; For power supply applications
- Endurance: +105°C 5,000~10,000 hours
- RoHS Compliant



SPECIFICATIONS

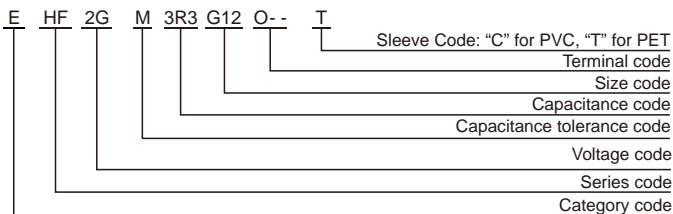
Items	Characteristics							
Category Temperature Range	-40~+105°C(160~400V _{dc})			-25~+105°C(450V _{dc})				
Rated Voltage Range	160~450 V _{dc}							
Capacitance Tolerance	±20%(M) (at 20°C, 120Hz)							
Leakage Current		After 1 minute	After 5 minutes				Where, I: Max. leakage current (μA), C: Nominal capacitance (μF), V: Rated voltage (V) (at 20°C)	
	CV 1000	I 0.1CV+40μA	I 0.03CV+15μA					
	CV>1000	I 0.04CV+100μA	I 0.02CV+25μA					
Dissipation Factor (tan δ)	Rated Voltage(V _{dc})	160	200	250	350	400	450	
	tan δ (max.)	0.15	0.15	0.15	0.20	0.20	0.20	
Low Temperature Characteristics (Max. Impedance Ratio)	Rated Voltage(V _{dc})	160	200	250	350	400	450	
	Z(-25°C)/Z(+20°C)	3	3	3	6	6	6	
	Z(-40°C)/Z(+20°C)	8	8	8	10	10	-	
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after DC voltage plus the rated ripple current is applied for a specified period of time at 105°C.							
	Capacitance Change	±20% of the initial value					Case Dia.(mm)	Load life (hours)
	D.F. (tan δ)	200% of the initial specified value					ØD = 8	5,000
	Leakage Current	The initial specified value					ØD = 10	8,000
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					ØD = 12.5	10,000
	D.F. (tan δ)	200% of the initial specified value						
	Leakage Current	200% of the initial specified value						

DIMENSIONS[mm]



ØD	8	10	12.5	16	18
Ød	0.5	0.6	0.6	0.8	0.8
F	3.5	5.0	5.0	7.5	7.5
ØD'	ØD+0.5max.				
L'	L+2max.				

PART NUMBERING SYSTEM



RATED RIPPLE CURRENT MULTIPLIERS

Frequency correction factor for ripple current

Freq.(Hz)	120	1k	10k	100k
Cap.(μF)				
<100	1.0	1.75	2.25	2.50
100	1.0	1.67	2.05	2.25

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.

HF series

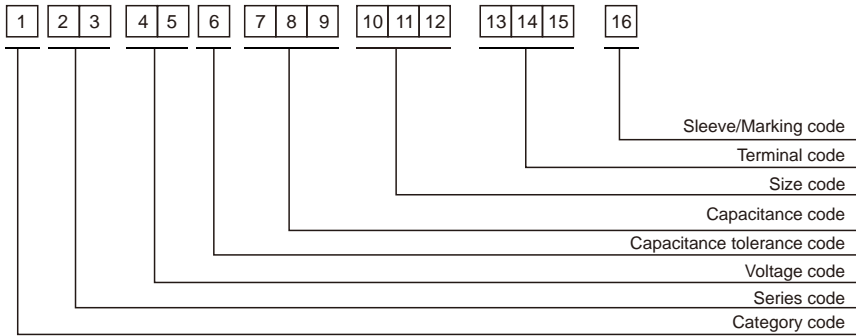
■ STANDARD RATINGS

WV (Vdc)	Cap (μF)	Size DxDL(mm)	tan	Rated ripple current (mArms/105°C, 120Hz)	Part Number
160(2C)	10	10x16	0.15	128	EHF2CM100G16OT
	12	10x16	0.15	145	EHF2CM120G16OT
	15	10x20	0.15	175	EHF2CM150G20OT
	22	10x20	0.15	205	EHF2CM220G20OT
	33	10x20	0.15	250	EHF2CM330G20OT
	39	10x20	0.15	275	EHF2CM390G20OT
	47	10x20	0.15	300	EHF2CM470G20OT
		12.5x20	0.15	310	EHF2CM470W20OT
	56	12.5x20	0.15	350	EHF2CM560W20OT
	68	12.5x20	0.15	478	EHF2CM680W20OT
	82	12.5x20	0.15	510	EHF2CM820W20OT
		16x20	0.15	525	EHF2CM820L20OT
	100	12.5x25	0.15	630	EHF2CM101W25OT
		16x20	0.15	635	EHF2CM101L20OT
	150	16x20	0.15	770	EHF2CM151L20OT
		16x25	0.15	790	EHF2CM151L25OT
220	16x25	0.15	1020	EHF2CM221L25OT	
	18x25	0.15	1045	EHF2CM221M25OT	
330	18x30	0.15	1402	EHF2CM331M30OT	
200(2D)	10	10x16	0.15	126	EHF2DM100G16OT
	12	10x16	0.15	140	EHF2DM120G16OT
	15	10x20	0.15	170	EHF2DM150G20OT
	22	10x20	0.15	205	EHF2DM220G20OT
	33	10x20	0.15	255	EHF2DM330G20OT
		12.5x20	0.15	265	EHF2DM330W20OT
	39	12.5x20	0.15	310	EHF2DM390W20OT
	47	12.5x20	0.15	392	EHF2DM470W20OT
	68	12.5x20	0.15	470	EHF2DM680W20OT
		12.5x25	0.15	485	EHF2DM680W25OT
	82	16x20	0.15	554	EHF2DM820L20OT
	100	16x20	0.15	632	EHF2DM101L20OT
		16x25	0.15	655	EHF2DM101L25OT
	150	16x25	0.15	840	EHF2DM151L25OT
		16x30	0.15	865	EHF2DM151L30OT
	220	18x25	0.15	870	EHF2DM151M25OT
18x25		0.15	1050	EHF2DM221M25OT	
330	18x30	0.15	1080	EHF2DM221M30OT	
	18x35	0.15	1430	EHF2DM331M35OT	
470	18x40	0.15	1460	EHF2DM331M40OT	
250(2E)	4.7	8x12	0.15	70	EHF2EM4R7F12OT
	5.6	10x12	0.15	85	EHF2EM5R6G12OT
	6.8	10x12	0.15	110	EHF2EM6R8G12OT
	10	10x20	0.15	140	EHF2EM100G20OT
	22	10x20	0.15	205	EHF2EM220G20OT
	33	12.5x20	0.15	325	EHF2EM330W20OT
	39	12.5x20	0.15	345	EHF2EM390W20OT
	47	12.5x20	0.15	390	EHF2EM470W20OT
		12.5x25	0.15	405	EHF2EM470W25OT
	68	16x20	0.15	528	EHF2EM680L20OT
		16x20	0.15	550	EHF2EM820L20OT
	82	16x30	0.15	570	EHF2EM820L30OT
		16x25	0.15	680	EHF2EM101L25OT
	100	18x25	0.15	700	EHF2EM101M25OT
		18x25	0.15	866	EHF2EM151M25OT
	220	18x31	0.15	1130	EHF2EM221M31OT
18x40		0.15	1160	EHF2EM221M40OT	

WV (Vdc)	Cap (μF)	Size DxDL(mm)	tan	Rated ripple current (mArms/105°C, 120Hz)	Part Number
350(2V)	4.7	10x12	0.20	70	EHF2VM4R7G12OT
	5.6	10x12	0.20	90	EHF2VM5R6G12OT
	6.8	10x16	0.20	112	EHF2VM6R8G16OT
	10	10x20	0.20	140	EHF2VM100G20OT
	22	12.5x20	0.20	265	EHF2VM220W20OT
	33	16x20	0.20	364	EHF2VM330L20OT
	39	16x20	0.20	385	EHF2VM390L20OT
		16x20	0.20	430	EHF2VM470L20OT
	47	16x25	0.20	445	EHF2VM470L25OT
		16x25	0.20	560	EHF2VM680L25OT
	68	18x20	0.20	550	EHF2VM680M20OT
		18x25	0.20	570	EHF2VM680M25OT
	82	18x25	0.20	618	EHF2VM820M25OT
	100	18x25	0.20	700	EHF2VM101M25OT
		18x30	0.20	725	EHF2VM101M30OT
	120	18x30	0.20	836	EHF2VM121M30OT
150	18x35	0.20	970	EHF2VM151M35OT	
400(2G)	1	8x12	0.20	30	EHF2GM010F12OT
	2.2	8x12	0.20	45	EHF2GM2R2F12OT
	3.3	10x12	0.20	80	EHF2GM3R3G12OT
	4.7	10x16	0.20	100	EHF2GM4R7G16OT
	6.8	10x16	0.20	112	EHF2GM6R8G16OT
	10	10x20	0.20	144	EHF2GM100G20OT
	15	12.5x20	0.20	222	EHF2GM150W20OT
	22	12.5x20	0.20	260	EHF2GM220W20OT
		12.5x25	0.20	275	EHF2GM220W25OT
	33	16x20	0.20	368	EHF2GM330L20OT
	39	16x25	0.20	410	EHF2GM390L25OT
		16x25	0.20	470	EHF2GM470L25OT
	47	18x20	0.20	455	EHF2GM470M20OT
		16x30	0.20	480	EHF2GM470L30OT
	56	10x50	0.20	520	EHF2GM560G50OT
		12.5x40	0.20	600	EHF2GM680W40OT
68	18x25	0.20	590	EHF2GM680M25OT	
	12.5x45	0.20	625	EHF2GM820W45OT	
82	18x25	0.20	610	EHF2GM820M25OT	
	18x30	0.20	630	EHF2GM820M30OT	
100	12.5x50	0.20	790	EHF2GM101W50OT	
	18x31	0.20	765	EHF2GM101M31OT	
120	18x35	0.20	785	EHF2GM101M35OT	
	18x35	0.20	870	EHF2GM121M35OT	
150	18x40	0.20	985	EHF2GM151M40OT	
450(2W)	6.8	10x20	0.20	112	EHF2WM6R8G20OT
	10	12.5x20	0.20	185	EHF2WM100W20OT
	15	12.5x25	0.20	248	EHF2WM150W25OT
	22	16x20	0.20	295	EHF2WM220L20OT
		10x40	0.20	405	EHF2WM330G40OT
	33	16x25	0.20	398	EHF2WM330L25OT
		18x20	0.20	385	EHF2WM330M20OT
	39	10x45	0.20	425	EHF2WM390G45OT
		18x25	0.20	415	EHF2WM390M25OT
	47	12.5x40	0.20	505	EHF2WM470W40OT
		18x25	0.20	496	EHF2WM470M25OT
	56	12.5x40	0.20	550	EHF2WM560W40OT
	68	18x30	0.20	640	EHF2WM680M30OT
	82	12.5x50	0.20	730	EHF2WM820W50OT
		18x35	0.20	720	EHF2WM820M35OT
	100	18x40	0.20	808	EHF2WM101M40OT

Radial Type

Part Numbering System



Category code

Type	Code
	1
Aluminum electrolytic capacitor	E

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

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

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

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

Size code

D (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

Terminal code

Specification	Code	Size	
	13	14	15
Bulk packing	O	-	-
Taping (SMD Type)	D	0	0
4~8 Taping F=5.0mm	P	5	0
10~12.5 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	-	-

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 (Unit: mm)

Fig.1 code: X

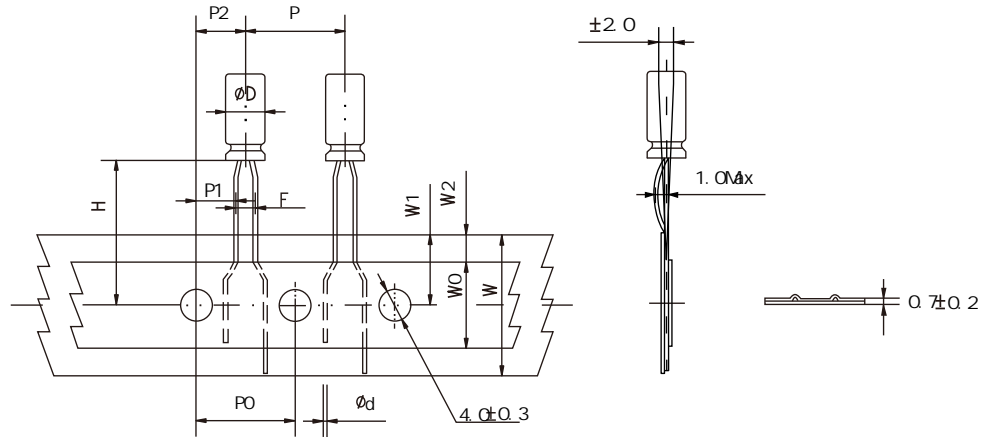


Fig.2 code: B

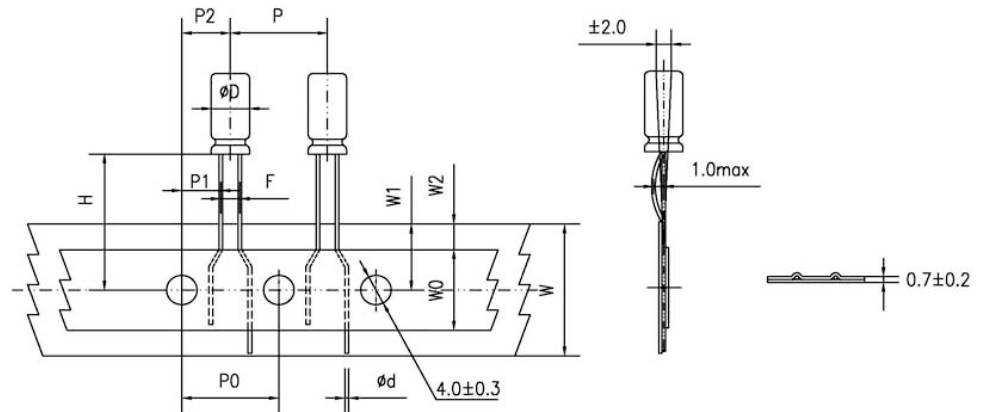


Fig.3 code: B

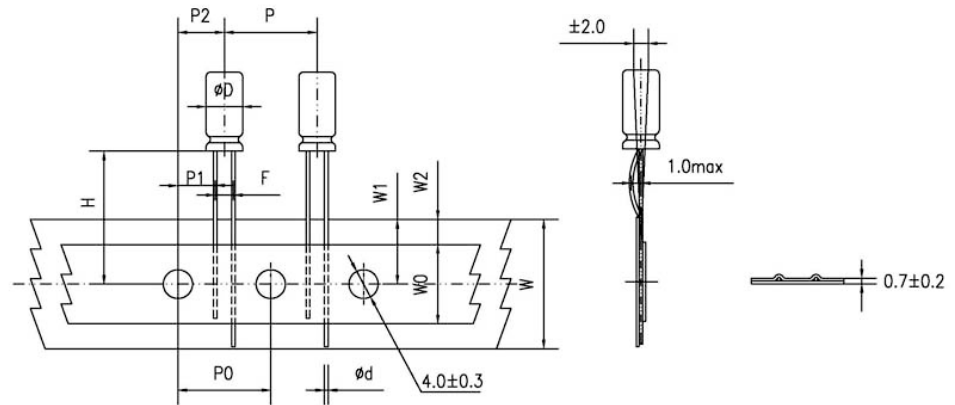
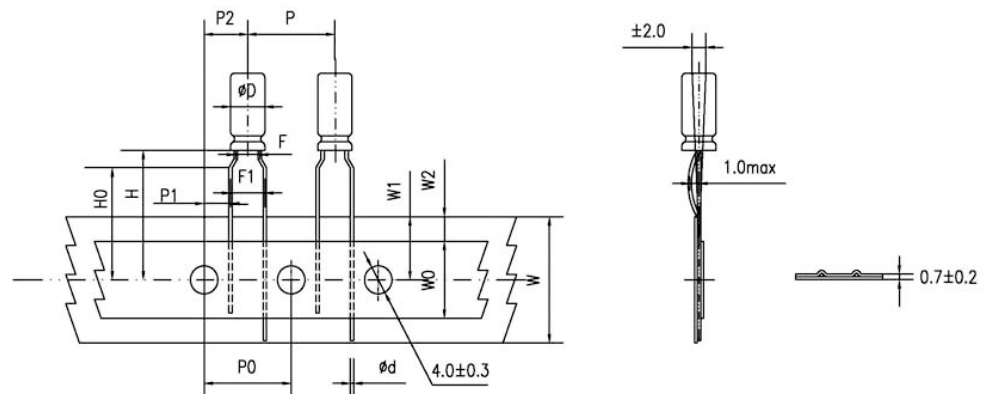


Fig.4 code: P



Lead Forming

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

(mm)

Items	Symbol	Case size										Tolerance		
		4x5 4x7		5x5 5x7		5x11		6.3x5	6.3x7 6.3x9 6.3x11 6.3x12	8x5/7 8x9/11 8x11.5 8x12	8x16 8x20		10x9 10x12 10x13/16 10x20/25	12.5x16 12.5x20 13x20
Pin Code		X	B	X	B	X	B	B	B	B	B	B	B	
Lead wire diameter	d	0.45		0.45		0.5		0.45	0.5	0.45/0.5	0.6	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	15	±1.0
Feed hole pitch	P0	12.7		12.7		12.7		12.7	12.7	12.7	12.7	12.7	15	±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	4.6	4.6	3.85	5.0	±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	7.5	±1.0
Lead-to-lead distance	F	2.5	1.5	2.5	2.0	2.5	2.0	2.5	2.5	3.5	3.5	5.0	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	8.0	8.0	8.0	11.0	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	1.5		1.5		1.5		1.5	1.5	1.5	1.5	1.5	1.5	max

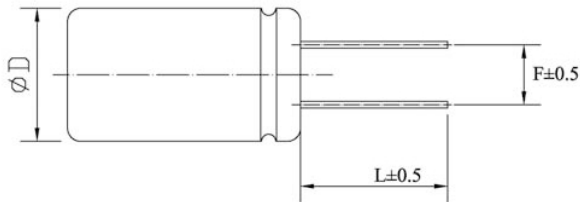
Specification Fig.4

(mm)

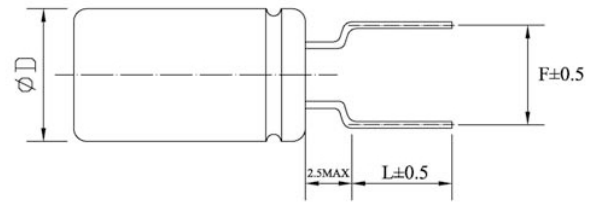
Items	Symbol	Case size									Tolerance
		4x5 4x7	5x5	5x7	5x11	6.3x5	6.3x7 6.3x9	6.3x11 6.3x12	8x5/7 8x9/11 8x11.5/12	8x16 8x20	
Pin Code		P	P	P	P	P	P	P	P	P	
Lead wire diameter	d	0.45	0.45	0.45	0.5	0.45	0.5	0.5	0.45/0.5	0.6	±0.05
Pitch of body	P	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	±1.0
Feed 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	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	max

Lead Forming
Lead Forming & Cut

Code:C
RANGE: 4~ 18



Code:F
RANGE: 4~ 8

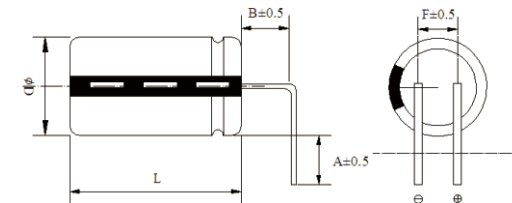


(mm)

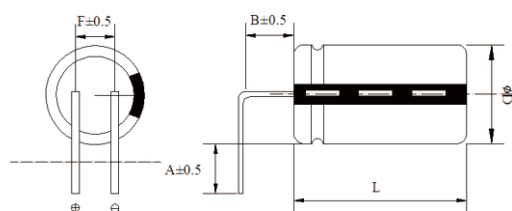
D	F	L	D	F	L
4	1.5	3.0~12.0	4	5.0	3.5, 4.5, 5.0, 7.0
5	2.0	3.0~12.0	5	5.0	3.5, 4.5, 5.0, 7.0
6.3	2.5	3.0~12.0	6.3	5.0	3.5, 4.5, 5.0, 7.0
8	3.5	3.0~12.0	8	5.0	3.5, 4.5, 5.0, 7.0
10	5.0	3.0~12.0	-	-	-
12.5	5.0	3.0~12.0	-	-	-
16	7.5	3.0~12.0	-	-	-
18	7.5	3.0~12.0	-	-	-

Code:R/L
RANGE: 10~ 18

Right horizontal forming



Left horizontal forming



(mm)

D	F	A	B
10~12.5	5.0	2.5, 3.0, 3.5, 4.0, 4.5, 5.0	1.5, 2.5
16~18	7.5	2.5, 3.0, 3.5, 4.0, 4.5, 5.0	1.5, 2.5