

规格書

SPECIFICATION

Customer : _____

Part Name: _____ **E-CAP** _____

SPEC : _____ **LL Series** _____

Part NO. : _____ **ALL** _____

Date : _____ **2017-11-22** _____

CUSTOMER SIGN		

TOPAZCON	
DRAWING	RATIFY
黃峰	陳慶

LL Series

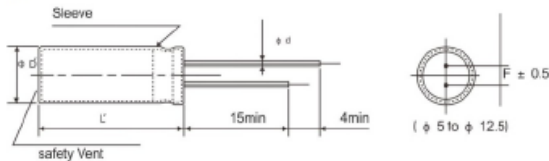


- Extremely low and stable leakage current characteristics
- Endurance: +105 °C 2,000 hours
- Wide temperature range of -40 °C +105 °C
- RoHS Compliant

● SPECIFICATIONS

Items	Characteristics	
Category	-40 to +105 °C	
Temperature Range	-40 to +105 °C	
Rated Voltage Range	6.3 to 100Vdc	
Capacitance Tolerance	± 20%(W) (at 20 °C, 120Hz)	
Leakage Current	I ≤ 0.002CV or 0.4 μA whichever is greater Where, I:Max. leakage current(μ A), C:Nominal capacitance(μ F), V:Rated voltage(V) (at 20 °C after 2 minutes)	
Dissipation Factor (tanδ)	Rated voltage	6.3 10 16 25 35 50 63 100
	Tanδ (max)	0.22 0.19 0.16 0.14 0.12 0.10 0.10 0.10
Low Temperature Characteristics (Max. Impedance Ratio)	When nominal capacitance exceeds 1,000 μ F, and 0.02 to the value above for each 1,000 μ F increase (at 20 °C, 120Hz)	
	Rated voltage(MxI)	6.3 10 16 25 35 50 63 100
Endurance	Z(-25 °C / Z(+20 °C))	4 3 3 3 2 2 2 2
	Z(-40 °C / Z(+20 °C))	6 6 6 4 4 3 3 3
Shelf Life	The following specification shall be satisfied when the capacitors are restored to 20 °C after subjected to DC voltage with the rated ripple current is applied for 2,000 hours at 105 °C	
	Capacitance change	≤ ± 20% of the initial value
Shelf Life	DF (tanδ)	≤ 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 500 hours at 105 °C, without voltage applied	
	Capacitance change	≤ ± 20% of the initial value
Shelf Life	DF (tanδ)	≤ 200% of the initial specified value
	Leakage current	≤ 200% The initial specified value

● DIMENSIONS[MM]



Φ D	5	6.3	8	10	12.5
Φ d	0.5	0.5	0.5	0.6	0.6
F	2.0	2.5	3.5	5.0	5.0
Φ D	Φ D+0.5max				
L'	L+2max				

● RATED RIPPLE CURRENT MULTIPLIERS

Frequency correction factor for ripple current

Cap(μF)	50/60I	120	1k	10k	100k
Cap < 100	0.60	1.00	1.45	1.65	1.70
100 ≤ Cap < 1000	0.80	1.00	1.36	1.48	1.53
Cap ≥ 1000	0.85	1.00	1.25	1.35	1.33

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

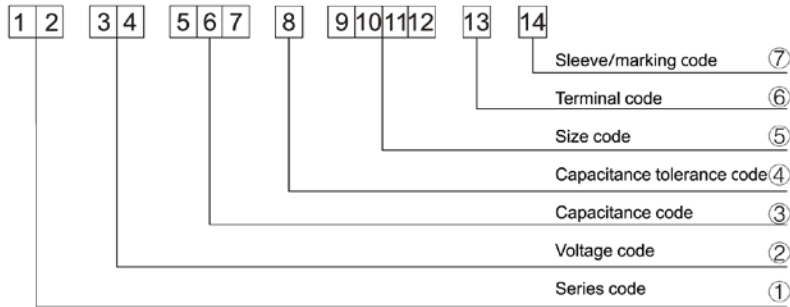
LL Series

● STANDARD RATINGS

WV (Vdc)	cap (μF)	CaSe size Φ D × L(mm)	Tanδ	Ripple current (mA _{rms} /105 °C, 120Hz)
6.3(0J)	22	5 × 11	0.22	36
	33	5 × 11	0.22	44
	47	5 × 11	0.22	53
	100	5 × 11	0.22	74
	220	6.3 × 11	0.22	131
	330	6.3 × 11	0.22	161
	470	8 × 11	0.22	242
	1000	10 × 12	0.22	390
	2200	12.5 × 20	0.24	665
10(1A)	22	5 × 11	0.19	50
	33	5 × 11	0.19	66
	47	5 × 11	0.19	75
	100	5 × 11	0.19	104
	220	8 × 11	0.19	193
	330	8 × 11	0.19	256
	470	8 × 11	0.19	319
	1000	10 × 16	0.19	605
16(1C)	2200	12.5 × 20	0.21	860
	10	5 × 11	0.16	39
	22	5 × 11	0.16	62
	33	5 × 11	0.16	68
	47	5 × 11	0.16	105
	100	6.3 × 11	0.16	138
	220	8 × 11	0.16	220
	330	8 × 11	0.16	268
	470	10 × 12	0.16	407
1000	10 × 20	0.16	704	
25(1E)	2200	12.5 × 25	0.18	890
	4.7	5 × 11	0.14	32
	10	5 × 11	0.14	43
	22	5 × 11	0.14	65
	33	5 × 11	0.14	76
	47	6.3 × 11	0.14	116
	100	8 × 11	0.14	149
	220	10 × 12	0.14	246
	330	10 × 12	0.14	352
	470	10 × 16	0.14	484
1000	12.5 × 20	0.14	847	
35(1V)	4.7	5 × 11	0.12	33
	10	5 × 11	0.12	48
	22	6.3 × 11	0.12	71
	33	6.3 × 11	0.12	83
	47	6.3 × 11	0.12	125
	100	8 × 11	0.12	187
	220	10 × 12	0.12	330
	330	10 × 16	0.12	440
	470	12.5 × 20	0.12	590
1000	12.5 × 25	0.12	1012	

WV (Vdc)	cap (μF)	CaSe size Φ D × L(mm)	Tanδ	Ripple current (mA _{rms} /105 °C, 120Hz)
50(1H)	0.47	5 × 11	0.10	12
	1	5 × 11	0.10	17
	2.2	5 × 11	0.10	24
	3.3	5 × 11	0.10	29
	4.7	5 × 11	0.10	36
	10	5 × 11	0.10	52
	22	6.3 × 11	0.10	77
	33	6.3 × 11	0.10	99
	47	8 × 11	0.10	138
	100	10 × 12	0.10	217
	220	10 × 20	0.10	380
63(1J)	330	12.5 × 20	0.10	506
	470	12.5 × 25	0.10	705
	0.47	5 × 11	0.10	12
	1	5 × 11	0.10	17
	2.2	5 × 11	0.10	24
	3.3	5 × 11	0.10	32
	4.7	5 × 11	0.10	39
	10	6.3 × 11	0.10	58
	22	6.3 × 11	0.10	94
	33	8 × 11	0.10	110
100(2A)	47	8 × 11	0.10	152
	100	10 × 16	0.10	260
	220	10 × 20	0.10	440
	330	12.5 × 20	0.10	594
	0.47	5 × 11	0.10	12
	1	5 × 11	0.10	17
	2.2	5 × 11	0.10	24
	3.3	5 × 11	0.10	32
	4.7	6.3 × 11	0.10	39
	10	8 × 11	0.10	61
100(2A)	22	8 × 11	0.10	106
	33	10 × 12	0.10	142
	47	10 × 16	0.10	184
	100	12.5 × 20	0.10	300
	220	12.5 × 30	0.10	533

Part Number System



① Series code

Series name	Code	
	1	2
SM	S	M
SS	S	S
SH	S	H
SP	S	P
NP	N	P
LL	L	L
RD	R	D
RE	R	E
RT	R	T
RF	R	F
RG	R	G
RJ	R	J
RR	R	R
LF	L	F
LJ	L	J
LR	L	R
LG	L	G

② Voltage code

WV (V _{dc})	Code	
	3	4
4	0	G
6.3	0	J
10	1	A
16	1	C
25	1	E
35	1	V
50	1	H
63	1	J
80	1	K
100	2	A
160	2	C
200	2	D
250	2	E
350	2	V
400	2	G
450	2	W
500	2	H

③ Capacitance code

Cap (uF)	Code		
	5	6	7
0.1	R	1	0
0.22	R	2	2
0.33	R	3	3
0.47	R	4	7
1	1	R	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
100	1	0	1
220	2	2	1
330	3	3	1
470	4	7	1
560	5	6	1
1000	1	0	2
1500	1	5	2
2200	2	2	2
3300	3	3	2
4700	4	7	2
6800	6	8	2
10000	1	0	3
15000	1	5	3

④ Capacitance tolerance code

Tol. (%)	Code
	8
-5 ~ +5	J
-10 ~ +10	K
-20 ~ +20	M

⑤ Size code

ΦD × L (mm)	Code			
	9	10	11	12
3 × 5	0	3	0	5
4 × 5	0	4	0	5
5 × 5	0	5	0	5
6.3 × 5	0	6	0	5
4 × 7	0	4	0	7
5 × 7	0	5	0	7
6.3 × 7	0	6	0	7
8 × 7	0	8	0	7
5 × 11	0	5	1	1
6.3 × 11	0	6	1	1
8 × 12	0	8	1	2
8 × 16	0	8	1	6
10 × 12	1	0	1	2
10 × 16	1	0	1	6
8 × 20	0	8	2	0
10 × 20	1	0	2	0
13 × 20	1	3	2	0
13 × 25	1	3	2	5
16 × 25	1	6	2	5
16 × 32	1	6	3	2
16 × 36	1	6	3	6
18 × 32	1	8	3	2
18 × 36	1	8	3	6
18 × 40	1	8	4	0

⑦ Sleeve/Marking code

Sleeve/Marking	Code 14
PET	T
Black	B
Yellow	Y
Ink Green	I
Pea Green	P
Orange	O

⑥ Terminal code

Specification	Code 13
Bulk packing	0
Φ4-8Taping	T1
	T2
	T2
Φ10-18Taping	T3
	T3
Lead Cut	F
	C
	R
	L
	M
	S
	B
	K
	K

Lead Forming

Taping Specifications

Fig.1 Code:T1

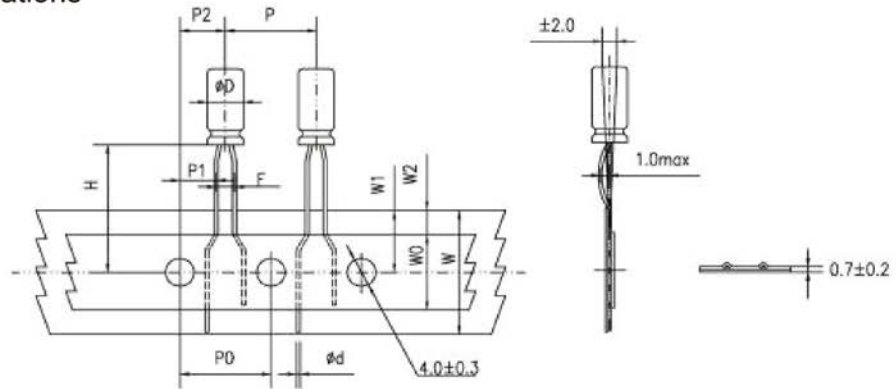


Fig.2 Code:T2

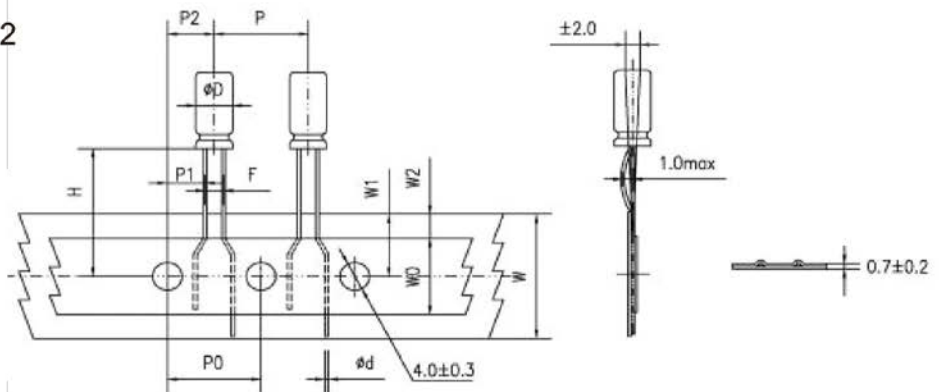


Fig.3 Code:T2

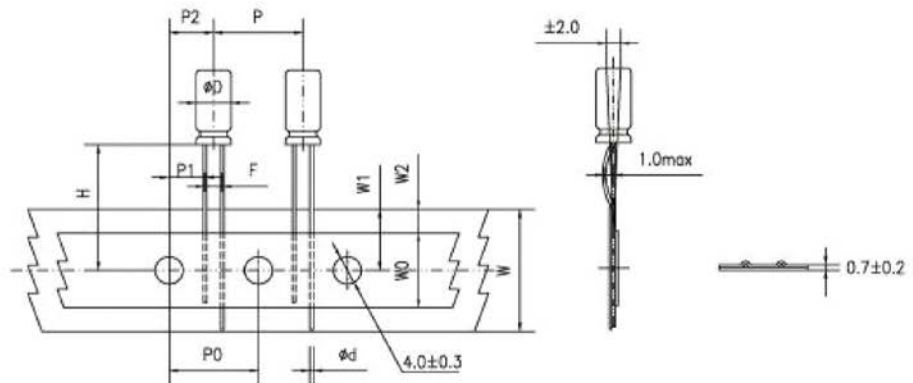
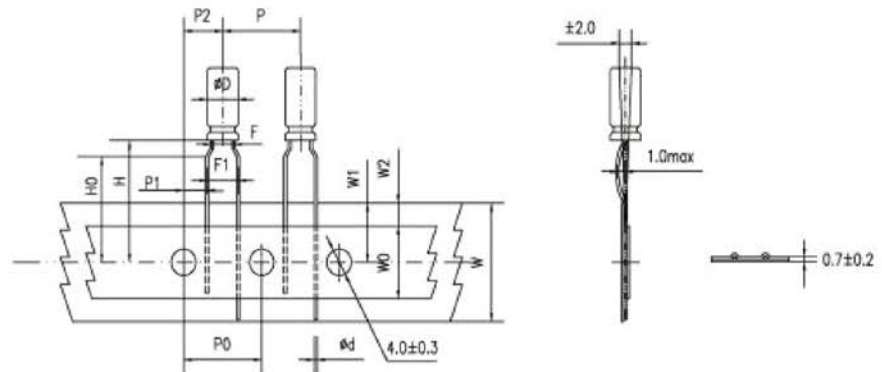


Fig.4 Code:T3



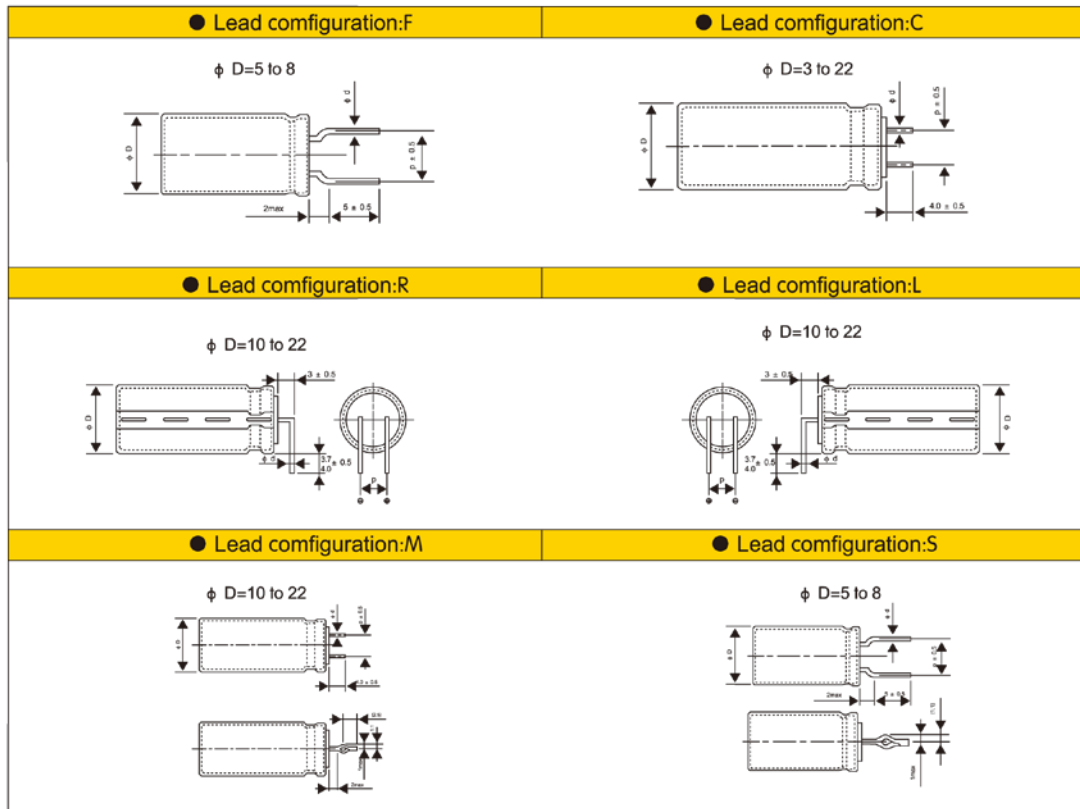
Specification Fig.1 & Fig.2 & Fig.3

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
Pin Code		T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	T ₂	T ₂	T ₂	T ₂	T ₂	T ₂	T ₂			
Lead wire diameter	φd	0.45		0.45		0.5		0.45	0.5	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	12.7	± 1.0	
Feed hole pitch	PO	12.7		12.7		12.7		12.7	12.7	12.7	12.7	12.7		12.7	12.7	± 0.2	
Hole center to lead distance	P1	5.1	5.6	5.1	5.35	5.1	5.35	5.1	5.1	5.1	5.1	4.6	4.6	3.85	± 0.7		
Feed hole center to body center distance	P2	6.35		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	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	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	18.0	± 0.5	
Adhesive tape width	WO	11.0		11.0		11.0		11.0	11.0	11.0	11.0	11.0		11.0	11.0	min	
Hole positron	W1	9.0		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	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	
Pin Code		T ₃	T ₃	T ₃	T ₃	T ₃	T ₃	T ₃	T ₃	T ₃	T ₃	T ₃	T ₃	T ₃	T ₃		
Lead wire diameter	φd	0.45		0.45		0.45		0.5	0.45	0.5	0.5	0.45/0.5		0.6	0.6	± 0.05	
Pitch of body	P	12.7		12.7		12.7		12.7	12.7	12.7	12.7	12.7		12.7	12.7	± 1.0	
Feed hole pitch	PO	12.7		12.7		12.7		12.7	12.7	12.7	12.7	12.7		12.7	12.7	± 0.2	
Hole center to lead distance	P1	3.85		3.85		3.85		3.85	3.85	3.85	3.85	3.85		3.85	3.85	± 0.7	
Feed hole center to body center distance	P2	6.35		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	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	18.5	± 0.75	
Lead wire clinch height	HO	16.0		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	18.0	± 0.5	
Adhesive tape width	WO	11.0		11.0		11.0		11.0	11.0	11.0	11.0	11.0		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	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	3.0	max	

● Lead Forming & Cut:

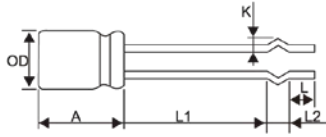


● LEAD SPACING&RECOMMENDED PCB DIMENSIONS

(mm)

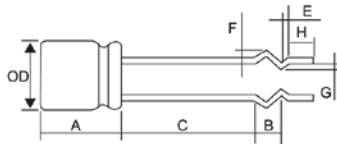
Dimension	φD	φd	p	PC Board		Lead Configuration
				Hole diameter	Thickness	
5	5	0.5	5.0	0.8	1.6	F C S
6.3	6.3	0.5	5.0	0.8		
8	8	0.5/0.6	5.0	1.0		
10	10	0.6	5.0	1.0	1.6	C M R L
12.5	12.5	0.6	5.0	1.0		
16	16	0.8	7.5	1.2		
18	18	0.8	7.5	1.2		
20	20	0.8	7.5	1.2		
22	22	0.8	10.0	1.2		

● Lead configuration: B



φD	L1	L2	K	A	L	
5	17.5-19.5	2.6	1.9	10.0-15.0	3.0-5.0	
6.3	17.5-19.5	2.6	1.9	10.0-16.0		
8	12.0-14.0	2.5	1.3	10.0-20.0		
8	13.5-15.5	2.5	1.5			
8	13.0-15.0	3.0	1.5			
8	19.5-21.5	3.0	1.5			
8	21.0-23.0	3.0	1.5			
10	7.5-9.5	2.5	1.7	10.0-25.0		
10	17.0-19.0	2.5	1.7			
10	10.5-12.5	2.5	1.5			
10	10.0-12.0	3.0	1.5			
10	13.0-15.0	3.0	1.5			
10	18.0-20.0	3.0	1.5			
10	21.0-23.0	3.0	1.5			
	± 1.0	± 0.5	0.3	± 1.0		± 1.0

● Lead configuration: K



φD	C	B	E	F	G	A	H
8	13.5-15.5	3	1.2	1.8	0.8	10-20	3.0-5.0
10	18.5-20.5	3	1.2	1.8	1	10-25	
10	19.0-21.0	3	1.5	1.4	0.5		
	± 1.0	± 0.5	± 0.3	± 0.3	± 0.3	± 1.0	± 1.0