承認書

SPECIFICATION

Customer： 深圳市立創電子商務有限公司

Part Name: E-CAP

SPEC： RD Series

Part NO.： ALL

Date： 2018-6-22

CUSTOMER SIGN		

TOPAZCON	
DRAWING	RATIFY
黃峰	陳慶

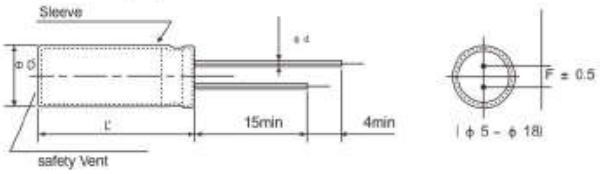
RD Series

- Standard series for general purpose
- Endurance:+85 ℃ 2,000 hours
- RoHS Compliant

SPECIFICATIONS

Items	Characteristics														
Category Temperature Range	-40 to +85 ℃ (6.3 to 100V) -25 to +85 ℃ (160 to 450 Vdc)														
Rated Voltage Range	6.3 to 450Vdc														
Capacitance Tolerance	± 20%(M) (at20 ℃ ,120Hz)														
Leakage Current	6.3 to100Vdc	160to450Vdc	Where, I:Max.leakage current(μA), C:Nominal capacitance (F), V:Rated voltage(V)												
	I ≤ 0.01CV or 3 μ A,whichever is greater	I ≤ 0.03CV+10 μ A	(at 20 ℃ after 2minutes)												
Dissipation Factor (tanδ)	Rated voltage(Vdc)	6.3	10	16	25	35	50	63	100	160	200	250	350	400	450
	Tanδ (Max)	0.24	0.20	0.16	0.14	0.12	0.10	0.09	0.08	0.20	0.20	0.20	0.24	0.24	0.24
	When nominal capacitance exceeds 1,000 μ F, add 0.02 to the value above for each 1,000 μ F increase (at 20 ℃ , 120Hz)														
Low Temperature Characteristics (Max.Impedance Ratio)	Rated voltage(Vdc)	6.3	10	16	25	35	50	63	100	160~250		350~400		450	
	Z(-25 ℃)/Z(+20 ℃)	5	4	3	2					3		6		6	(at 120Hz)
	Z(-40 ℃)/Z(+20 ℃)	12	10	8	5	4	3			-		-		-	
Endurance	The following specification shall be satisfied when the capacitors are restored to 20 ℃ after the rated voltage applied for 2,000 hours at 85 ℃														
	Capacitance change	≤ ± 20% of the initial value													
	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 ℃ after exposing them for 1000 hours at 85 ℃ ,without voltage applied														
	Capacitance change	≤ ± 20% of the initial value													
	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	16	18
Φ d	0.5	0.5	0.5	0.6	0.6	0.6	0.8	0.8
F	2.0	2.5	3.5		5.0	5.0	7.5	7.5
Φ D'	Φ D+0.5max							
L'	L+2max							

RATED RIPPLE CURRENT MULTIPLIERS

Frequency correction factor for ripple current φ 5 to φ 18

Freq(Hz) / Cap(μF)	60	120	300	1k	10k	100k
Cap < 10	0.65	1.00	1.35	1.75	2.30	2.50
10 ≤ Cap < 100	0.75	1.00	1.25	1.50	1.75	1.80
100 ≤ Cap ≤ 1000	0.80	1.00	1.15	1.30	1.40	1.50
Cap > 1000	0.85	1.00	1.03	1.05	1.08	1.08

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

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WV (Vdc)	Cap (μ F)	Case size Φ D × L(mm)	Tanδ	Ripple current (mArms/85 ℃ ,120Hz)
6.3(0J)	33	5 × 11	0.24	65
	47	5 × 11	0.24	80
	100	5 × 11	0.24	135
	220	5 × 12	0.24	220
	330	6.3 × 11	0.24	280
	470	6.3 × 12	0.24	360
	1000	8 × 12	0.24	590
	2200	10 × 20	0.26	1000
	3300	10 × 25	0.28	1200
	4700	13 × 20	0.30	1550
	6800	13 × 25	0.34	1920
	10000	16 × 25	0.42	2370
	15000	16 × 35	0.52	2880
	22000	18 × 40	0.66	3350
10(1A)	22	5 × 11	0.20	60
	33	5 × 11	0.20	75
	47	5 × 11	0.20	95
	100	5 × 11	0.20	140
	220	5 × 12	0.20	240
	330	6.3 × 11	0.20	310
	470	6.3 × 12	0.20	400
	1000	10 × 13	0.20	660
	2200	10 × 20	0.22	1090
	3300	13 × 20	0.24	1450
	4700	13 × 25	0.26	1800
	6800	16 × 25	0.30	2250
	10000	16 × 35	0.38	2710
	15000	18 × 35	0.48	3120
16(1C)	10	5 × 11	0.16	50
	22	5 × 11	0.16	65
	33	5 × 11	0.16	80
	47	5 × 11	0.16	115
	100	5 × 11	0.16	175
	220	6.3 × 11	0.16	280
	330	8 × 11	0.16	380
	470	8 × 11	0.16	460
	1000	10 × 16	0.16	800
	2200	13 × 20	0.18	1320
	3300	13 × 25	0.20	1670
	4700	16 × 25	0.22	2120
	6800	16 × 30	0.26	2550
25(1E)	4.7	5 × 11	0.14	30
	10	5 × 11	0.14	45
	22	5 × 11	0.14	70
	33	5 × 11	0.14	98
	47	5 × 11	0.14	120
	100	6.3 × 11	0.14	190
	220	8 × 11	0.14	330
	330	8 × 12	0.14	440
	470	10 × 13	0.14	550
	1000	10 × 20	0.14	970
	2200	13 × 25	0.16	1570
	3300	16 × 25	0.18	2000
	4700	16 × 30	0.20	2450

WV (Vdc)	Cap (μ F)	Case size Φ D × L(mm)	Tanδ	Ripple current (mArms/85 ℃ ,120Hz)
35(1V)	4.7	5 × 11	0.12	40
	10	5 × 11	0.12	55
	22	5 × 11	0.12	90
	33	5 × 11	0.12	110
	47	5 × 11	0.12	135
	100	6.3 × 11	0.12	215
	220	8 × 12	0.12	335
	330	10 × 13	0.12	500
	470	10 × 16	0.12	680
	1000	13 × 20	0.12	1180
	2200	16 × 25	0.14	1810
	3300	16 × 35	0.16	2300
	4700	18 × 35	0.18	2750
50(1A)	0.1	5 × 11	0.10	1.3
	0.22	5 × 11	0.10	2.9
	0.33	5 × 11	0.10	4.3
	0.47	5 × 11	0.10	7.0
	1	5 × 11	0.10	17
	2.2	5 × 11	0.10	28
	3.3	5 × 11	0.10	35
	4.7	5 × 11	0.10	41
	10	5 × 11	0.10	60
	22	5 × 11	0.10	95
	33	6.3 × 11	0.10	130
	47	6.3 × 11	0.10	160
	100	8 × 11	0.10	270
	220	10 × 16	0.10	435
	330	10 × 20	0.10	590
	470	10 × 20	0.10	760
	1000	13 × 25	0.10	1350
	2200	16 × 35	0.12	2110
	3300	18 × 35	0.14	2550
63(1J)	4.7	5 × 11	0.09	45
	10	5 × 11	0.09	70
	22	6.3 × 11	0.09	110
	33	6.3 × 11	0.09	140
	47	6.3 × 12	0.09	190
	100	10 × 13	0.09	300
	220	10 × 16	0.09	490
	330	10 × 20	0.09	710
	470	13 × 20	0.09	900
	1000	16 × 25	0.09	1350
	2200	18 × 35	0.11	2330
100(2A)	0.1	5 × 11	0.08	2.1
	0.22	5 × 11	0.08	4.7
	0.33	5 × 11	0.08	7.0
	0.47	5 × 11	0.08	10
	1	5 × 11	0.08	21
	2.2	5 × 11	0.08	35
	3.3	5 × 11	0.08	45
	4.7	5 × 11	0.08	50
	10	6.3 × 11	0.08	75
	22	8 × 11	0.08	135
	33	8 × 12	0.08	185

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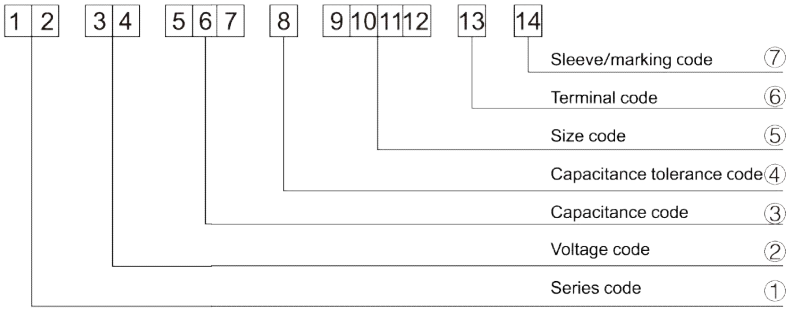
WV (Vdc)	Cap (μ F)	Case size Φ D × L(mm)	Tanδ	Ripple current (mArms/85 ℃ ,120Hz)
100(2A)	47	10 × 13	0.08	235
	100	10 × 20	0.08	380
	220	13 × 25	0.08	630
	330	13 × 30	0.08	760
	470	16 × 30	0.08	1000
	1000	18 × 40	0.08	1350
160(2C)	0.47	6.3 × 11	0.20	10
	1	6.3 × 11	0.20	15
	2.2	6.3 × 11	0.20	30
	3.3	6.3 × 11	0.20	40
	4.7	6.3 × 11	0.20	48
	10	8 × 12	0.20	80
	10	10 × 12	0.20	94
	22	10 × 12	0.20	130
	22	10 × 16	0.20	150
	22	10 × 20	0.20	170
	33	10 × 16	0.20	180
	33	10 × 20	0.20	210
	47	10 × 20	0.20	240
	47	12.5 × 20	0.20	280
	68	12.5 × 20	0.20	360
	100	12.5 × 25	0.20	470
	150	16 × 20	0.20	520
	180	16 × 25	0.20	600
	220	16 × 30	0.20	780
	270	18 × 30	0.20	860
	330	18 × 35	0.20	1000
	390	18 × 35	0.20	1020
	470	18 × 40	0.20	1220
200(2D)	0.47	6.3 × 11	0.20	10
	1	6.3 × 11	0.20	15
	2.2	6.3 × 11	0.20	34
	3.3	6.3 × 11	0.20	45
	4.7	6.3 × 11	0.20	5
	4.7	8 × 12	0.20	60
	10	10 × 12	0.20	100
	22	10 × 20	0.20	170
	33	10 × 20	0.20	205
	47	12.5 × 20	0.20	270
	68	12.5 × 25	0.20	370
	100	16 × 25	0.20	475
	150	16 × 25	0.20	550
	180	18 × 25	0.20	620
	220	18 × 35	0.20	810
	270	18 × 35	0.20	870
	330	18 × 35	0.20	1000
	330	18 × 40	0.20	1020
250(2E)	0.47	6.3 × 11	0.2	10
	1	6.3 × 11	0.20	16
	2.2	6.3 × 11	0.20	34
	3.3	6.3 × 11	0.20	42
	3.3	8 × 12	0.20	46
	4.7	6.3 × 11	0.20	50
	4.7	8 × 12	0.20	55
	10	10 × 12	0.20	100
	10	10 × 16	0.20	105
	22	10 × 20	0.20	170

WV (Vdc)	cap (μ F)	Case size Φ D × L(mm)	Tanδ	Ripple current (mArms/85 ℃ ,120Hz)
250(2E)	33	10 × 20	0.20	200
	33	12.5 × 20	0.20	230
	47	12.5 × 20	0.20	270
	47	12.5 × 25	0.20	295
	68	16 × 25	0.20	382
	100	16 × 25	0.20	450
	100	16 × 30	0.20	515
	120	16 × 30	0.20	530
	150	16 × 30	0.20	570
	180	18 × 30	0.20	620
350(2V)	0.47	6.3 × 11	0.24	15
	1	6.3 × 11	0.24	22
	2.2	8 × 12	0.24	38
	3.3	8 × 12	0.24	46
	4.7	10 × 12	0.24	65
	10	10 × 12	0.24	90
	10	10 × 16	0.24	100
	10	10 × 20	0.24	120
	2	12.5 × 20	0.24	185
	3	16 × 25	0.24	275
	47	16 × 25	0.24	325
	68	16 × 25	0.24	405
	100	18 × 30	0.24	530
400(2G)	1	6.3 × 11	0.24	22
	2.2	8 × 12	0.24	38
	3.3	10 × 12	0.24	54
	4.7	10 × 12	0.24	60
	4.7	10 × 16	0.24	75
	10	10 × 16	0.24	100
	10	10 × 20	0.24	120
	22	12.5 × 25	0.24	205
	33	16 × 25	0.24	275
	47	16 × 25	0.24	325
	47	16 × 30	0.24	350
	56	16 × 30	0.24	385
	68	18 × 25	0.24	420
	82	18 × 30	0.24	475
	100	18 × 35	0.24	545
450(2W)	1	8 × 12	0.24	16
	2.2	8 × 12	0.24	32
	2.2	10 × 12	0.24	35
	3.3	10 × 12	0.24	40
	3.3	10 × 16	0.24	44
	4.7	10 × 12	0.24	50
	4.7	10 × 16	0.24	58
	4.7	10 × 20	0.24	65
	10	10 × 20	0.24	80
	10	12.5 × 20	0.24	92
	22	12.5 × 25	0.24	150
	22	16 × 25	0.24	165
	33	16 × 30	0.24	215
	47	16 × 30	0.24	260
	47	16 × 35	0.24	280
	68	18 × 30	0.24	370
	82	18 × 35	0.24	390
	100	18 × 40	0.24	420

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 (Vdc)	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
Lesd Cut	F
	C
	R
	L
	M
	S
	B
	K

Lead Forming

Taping Specifications

Fig.1 Code:T1

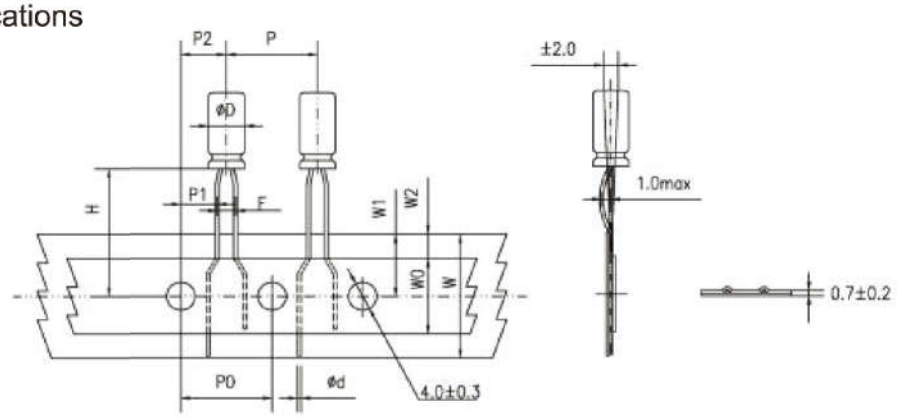


Fig.2Code:T2

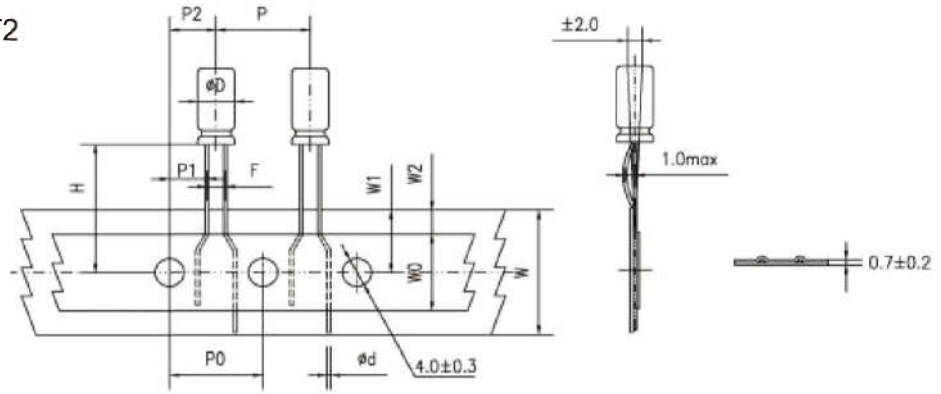


Fig.3 Code:T2

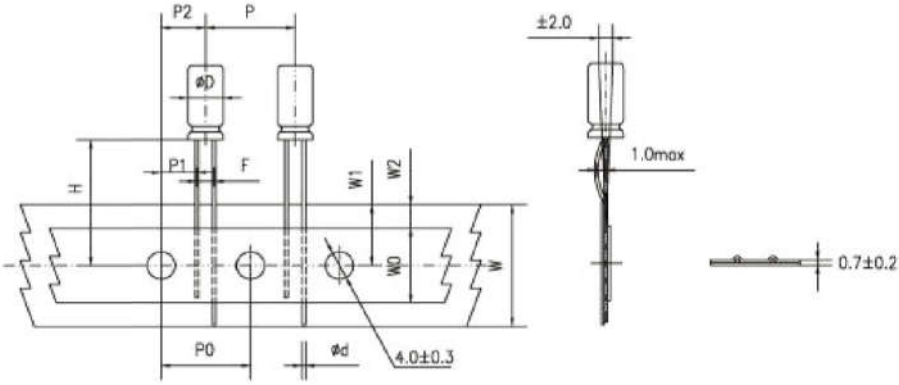
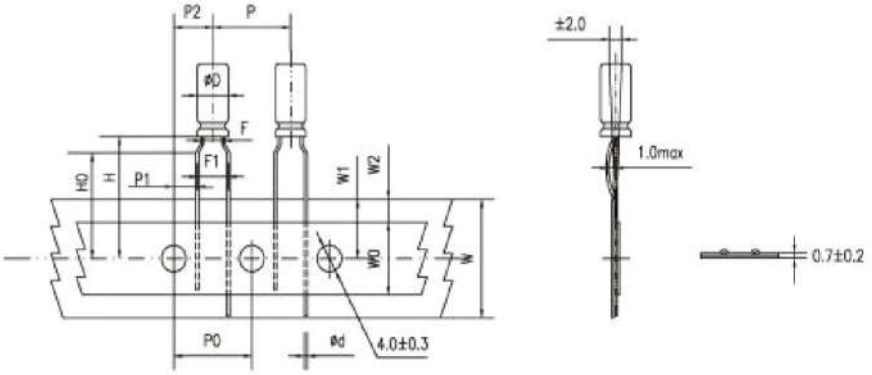


Fig.4 Code:T3



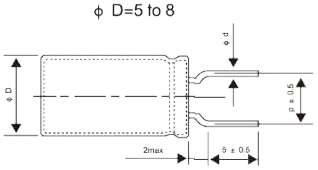
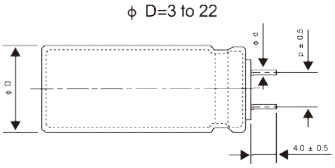
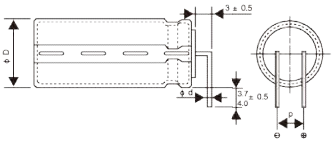
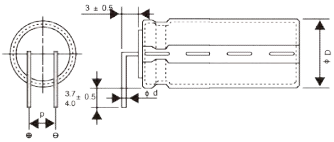
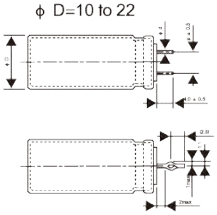
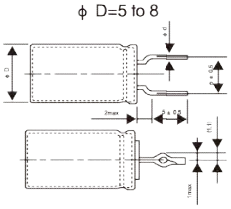
Specification Fig.1 & Fig.2 & Fig.3

Iterms	Symbol	CASE SIZE										Tolerance
		4 × 5 4 × 7		5 × 5 5 × 7		5x11	6.3x5	6.3x7 6.3x9	6.3x11 6.3x12	8x5/7 8x9/11 8x11.5 8x12	8x16 8x20	10x9/12 10x12.5 10x13/16 10x20/25	
Pin Code		T1	T2	T1	T2	T1	T2	T2	T2	T2	T2	T2	
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	PO	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	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	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

Iterms	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		T3	T3	T3	T3	T3	T3	T3	T3	T3	
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	PO	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	± 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	± 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	HO	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	WO	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	+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 & Cut:

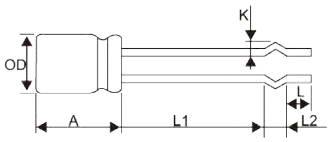
Lead comfiguration:F	Lead comfiguration:C
ϕ D=5 to 8 	ϕ D=3 to 22 
Lead comfiguration:R	**Lead comfiguration:L**
ϕ D=10 to 22 	ϕ D=10 to 22 
Lead comfiguration:M	**Lead comfiguration:S**
ϕ D=10 to 22 	ϕ D=5 to 8 

LEAD SPACING&RECOMMENDED PCB DIMENSIONS

(mm)

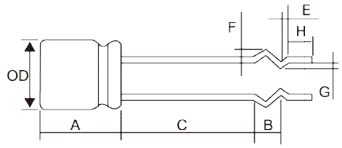
ϕD / Dimension	ϕd	p	PC Board		Lead Configuration
			Hole diame ter	Thickness	
5	0.5	5.0	0.8	1.6	F C S
6.3	0.5	5.0	0.8		
8	0.5/0.6	5.0	1.0		
10	0.6	5.0	1.0	1.6	C M R L
12.5	0.6	5.0	1.0		
16	0.8	7.5	1.2		
18	0.8	7.5	1.2		
20	0.8	7.5	1.2		
22	0.8	10.0	1.2		

Lead comfiguration:B



ØD	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 comfiguration:K



ØD	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

鋁電解電容器的使用注意事項

Guidelines For Using Aluminum Electrolytic Capacitor

爲使客戶獲得電解電容器的最佳性能和延長電解電容器的使用壽命，在使用電解電容器前，請務必閱讀本注意事項。

Upon using Aluminum Electrolytic Capacitors, please proper handling and observing to following important points will insure optimum capacitor performance and long life.

1、直流電解電容器是有極性的　DC electrolytic capacitors are polarized.

確定極性，極性標誌在電容器的基體上。以免因極性反可能引起電路短路或電容器損壞，當極性不固定或不確定的，使用雙極性電容器。注意直流電解電容器不能使用於交流。

Make sure of the polarity .The polarity is marked on the body of the capacitor .Application of the reversed voltage may cause a short circuit or damage to the capacitor. Use bipolar capacitors when the polarity is not determined or unknown. Note that DC electrolytic capacitors can not be used for AC application.

2、雙極性電容器

Bipolar capacitors

只適用於脈動電路和極性反轉電路中，不適用於純交流和高紋波電路中。

They are used only in pulse circuits as well as polarity reverse circuits. but not applicable in pure AC or high ripple current.

3、使用電壓不要大於額定電壓　DO not apply voltage greater than rated voltage .

使用電壓大於額定電壓，漏電流會增大，可能損壞電容器。建議工作電壓爲額定電壓的百分之七十～八十，電容器在建議的工作電壓下使用可延長電容器的壽命。

If a voltage exceeding the rated voltage is applied , the leakage current will increase ,which damage the capacitor. Recommended working voltage is 70 to 80 percent of rated voltage. Using capacitors at recommended working voltage prolongs capacitor life.

4、不要使過量的紋波電流通過電容器

Do not allow excessive ripple current through the capacitor.

流過電容器的紋波電流超過許可值，將會引起電容器發熱，電容量減少，損害電容器。通過電容器的紋波電流不要大於允許值，一般不超過額定值的 80%。

The flow of ripple current over permissible ripple current will cause heat of the capacitor, which may decrease the capacitance and damage the capacitor. ripple current on the capacitor must be at or bellow allowable level, generally not more than 80% of the rated current.

5、快速的充放電電路中，使用專門設計的電容器

Use specially designed capacitors for the circuits where charge and discharge are frequency repeated.

在經受快速的週期性充放電電路中，電容器可能受損害，它的壽命因容量下降、溫升等原因而縮短，在這種電路中，一定要使用專門設計的電容器。

In the circuit subjected to rapid charge and discharge cycles, capacitors may be damaged, its life may be shortened by capacitance decrease, heat rise, ect. Be sure and use special capacitors in these applications.

6、工作溫度範圍　Operating temperature range.

電容器的特性隨工作溫度而變化，在溫度較高的情況下，容量、漏電流增大，tgδ減少；在低溫情況下，容量和漏電流下降，tgδ增大。電容器在較低的溫度下使用會確保延長壽命。

The characteristics of capacitors change with the operating temperature. The capacitance and leakage current increase and tgδ decrease at higher temperatures. The capacitance and leakage current decrease and tgδ increase at lower temperature. Usage at lower temperature will ensure longer life.

7、核對工作頻率　Check operating frequency.

電解電容器的電容量通常是在 100Hz 或 120Hz 下測得的。然而要記住容量隨頻率的升高而下降，tgδ隨頻率的升高而增大，並使周圍溫度升高。

The capacitance of electrolytic capacitors is usually measured at 100Hz or 120Hz. However , remember that capacitance decrease and tgδ increase as the applied frequency becomes higher whereas the ambient temperature becomes higher.

8、長時間存放的電容器，在使用前加額定直流電壓處理　Apply rated DC voltage treatment to the capacitors which have been stored for a long time.

長時間的存放，實際對電容器的容量和 tgδ沒有多大的影響，然而往往會使漏電流增大，耐壓降低。

長時間存放後的電容器處理，首先逐漸施加直流電壓至額定電壓，然後再使用。

Long periods of storage have virtually no effect no a capacitor’s capacitance and tgδ. Such periods tend, however, to increase leakage current and decrease withstand voltage.

After removing capacitors from long-duration storage, First apply a gradually increasing DC voltage to rated voltage and then use them.

9、電容器外殼與陰極端是不絕緣的　The capacitor case is not insulated from the cathode terminal.

電容器的外殼與陰極端是通過電解液連接的，如果電容器的外殼必須與線路絕緣，則電容器的安裝位置處，一定要採取絕緣措施。

The capacitor’s case and cathode terminal connect through the electrolyte. If the case is to be completely insulated, that insulation must be at the capacitor’s mounting point.

10、電容器的端子或引線不要施加過大的力

Do not apply excessive force to the terminals and leads.

過大的力施加到端子或引線上，可能引起引線的斷裂或端子分裂，轉而會引起內部連接的破壞。

The excessive strong force applied to the terminals and lead wires may cause leads to break or terminals to separate and, in turn, cause the internal contact to fail.

11、如電容器需彎腳成臥式狀態。彎腳處應與電容器成體保持 2mm 的安全間距，否則可能造成電容器內部結構損傷。

Such as capacitor to bend feet into horizontal state. Bending feet should maintain with capacitor adult 2mm safe spacing, otherwise may cause the internal of capacitor structural damage

12、浸焊料後，線路板的清洗　Cleaning of the circuit board after solder dipping.

清洗線路板以去除焊劑或其它附著物。爲了保護塑膠套管，印刷標誌以及封口材料不被破壞，電容器不能用鹵化物或類似溶劑作爲電容器清洗用，如三氯乙烯，二甲苯或酮類等。建議使用的清洗溶劑爲：甲醇，異丙醇，乙醇，異丁醇，石油醚，丙醇和一般的洗滌劑。

Cleaning circuit boards to remove flux or other extraneous matter. To ensure protection for sleeve, marking and sealing materials on capacitor body, capacitor should never be washed or cleaned by halogens agents or solvents such as trichlorethylene, xylem or acetone etc. Recommended cleaning solvents. Methanol, isopropanol ethanol, isobutanol, petroleumethe, propane and/or commercial detergents.

13、焊接時注意溫度和持續的時間　Be cautious of the temperature and duration when soldering.

烙鐵應與電容器的塑膠絕緣套管保持一定的距離。當電容器浸于焊料槽時，建議溫度在 260℃以內，時間不要超過 10 秒鐘，以避免電容器元件受損。

Soldering irons should be kept away from the vinyl insulated sleeves of capacitor. When the capacitor dipped in solder bath, recommendable within 260℃and 10 seconds to avoid damage of capacitor unit.

14、印刷線路板上孔的佈局

Hole positions on the circuit board.

設計印刷線路板時，安裝孔距應等於引線間距，當孔距大於或小於引線間距時，安裝電容器時，將有應力作用到引線上，可能引起短路，電路損壞，漏電流增大。

另外，焊料可能通過所打的孔及後加工零件的引線孔濺落到塑膠套管上，造成損傷，所以要認真考慮孔的佈局。

When designing a circuit board, space the position holes equally to the space between lead wires. When the spacing is either greater than or less than the capacitor’s leads, mounting the capacitor will apply to the leads, causing short circuits, broken circuits, and increased current.

Otherwise, through-holes on the circuit board as well as lead holes of post-process parts can result in solder splashing onto the vinyl sleeve , causing damage. Consider hole positions carefully.