

承 認 書

APPROVAL SHEET FOR AL. ELECTROLYTIC CAPACITORS

承 認
APPROVED BY

料号 (Customer)	料号 (CapXon)	规格 Description Dφ*L		加工 形式(mm)
	DV470M050E077ETR	47uF/50V	6.3X7.7	T/R

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CAPXON ELECTRONIC (SHEN ZHEN) CO., LTD

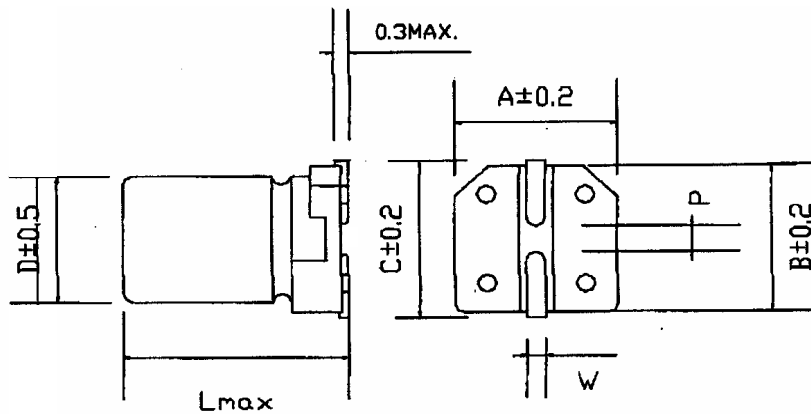
FOR APPROVAL

Aluminum Electrolytic Capacitors DV Type

1. Electric Characteristics

CAPXON P/N	Cap. (μF)	Cap Tol. (%)	Rated W.V (VDC)	Surge Volt (VDC)	Max.D.F (%)	Ripple Current 100KHz105°C (mA)	Max.IM 100KHz (Ω)	Max.LC (μA)	Oper. Temp. (°C)	Case Size DΦ*L (mm)	USER P/N
DV470M050E077ETR	47	±20	50	58	17	230	0.7	23.5	-55~+105	6.3X7.7	

2. Diagram of Dimensions (Unit=mm)



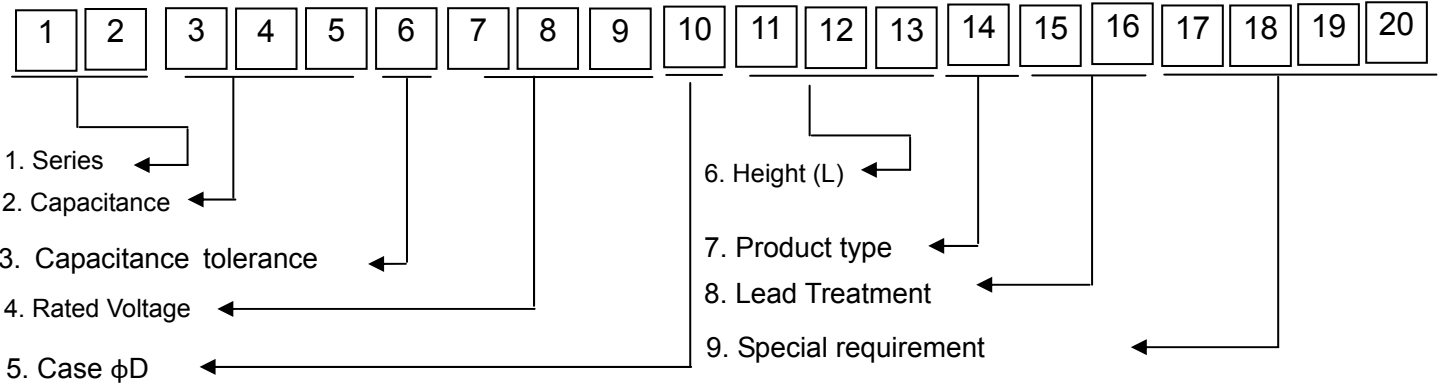
D	L	A	B	C	W	P±0.2
6.3	7.7	6.6	6.6	7.2	0.5~0.8	2.2

3. Remarks:

- 3.1 Leakage Current Test: $I \leq 0.01CV$ or 3 (uA) , After 2 minutes whichever is greater measured with rated working voltage applied.
- 3.2 Operating temperature: for -55°C ~ +105°C
- 3.3 Cap and Dissipation factor (D.F) Test: At +20°C ,120Hz
- 3.4 Load Life Test: At +105°C for 2000Hrs.
- 3.5 Shelf Life Test: At +105°C for 1000Hrs.
- 3.6 Such spec. capacitors are just fit for this electric model , if you have some other application, please contact with us in advance.

Part Number System

When placing an order for Aluminum Electrolytic Capacitors, please observe the following Catalog Part Number format that describes.



(1). Series

The series name.

(2). Capacitance

Capacitance is shown in microfarad (μ F)

Capacitance (μ F)	0.1	0.47	1	4.7	10	100	1000	10000
Code	0R1	R47	010	4R7	100	101	102	103

(3). Capacitance tolerance

Tolerance%	± 5	± 10	± 20	± 30	-10to+30	-10to+50	-10to+20	-10to100	0to+20	-30to+0	± 15
Code	H	K	M	N	Q	T	V	W	Z	U	S
Tolerance%	0to+30	0to+40	0to+50	-5to+20	-8to+5	+5to+20	0to-20	-15to+20	-25to+20	-50to+0	-5to+30
Code	Y	X	A	J	E	I	B	P	L	O	C

For tolerance other than these and specified capacitance tolerance, please specify the value on the order sheet.

(4). Voltage (W.V)

Voltage (W.V)	6.3	10	16	25	35	50	63	80	100	160	200	220	250	350	400	420	450	500
Code	6R3	010	016	025	035	050	063	080	100	160	200	220	250	350	400	420	450	500

(5). Case (ϕ D: mm)

Diameter	3	4	5	6.3	7.3	8	10	12	13	16	18	20	22	25	30	35	40	42	45	51	63.5	76.2	89	14.5	12.5
Code	A	B	C	E	7	F	G	H	I	J	K	L	M	N	O	P	Q	U	V	R	S	T	X	Y	Z

(6). Height (L: mm)

Description	5	5.5	7	7.7	8	11	11.5	12	12.5	14	16	20	21	25	25.5	31.5	35	35.5	41	47	52	83	98	118	141	151
Code	050	055	070	077	080	110	115	120	125	140	160	200	210	250	255	315	350	355	410	470	520	830	980	A18	A41	A51

(7). Product type

Type	Without Lead Treatment	With Lead Treatment
Code	A	E

(8). Lead Treatment (Radial type)

Description	Taping (Ammo Package)	Taping (Reel Package)	Lead Cutting	Lead Forming Cutting	Lead Forming only	Lead Crimping & Forming	Lead Cutting & Kink	Kink	Bending & Cutting	Forming & Kink
Code	TA, TB, TC, TD, TE, TF, ETC.	RA, RB, RC, RD, RE, Etc.	CA	CF	FA	KF	CK	KA	CR, CL	EF

Remarks: The product of V- chip sticks a dish to process form is "TR".

(9) Special & appearance requirement (the 17th, 18th, 19th, 20th code)

Code	Special	Code	Special	Code	request characteristic	Code	Special
A	Terminals of Snap-in	H	Height requirement	R	Ripple current	U	Package & label
B	Rubber	I	L.C.	S	countermeasure		
C	Lead wire	K	Vent line	T	Temperature characteristic		
D	D.F.	L	Life	V	Vt, Electrolyte paper		
E	Electrolyte	N	Nude	M	Solder, technics, form, Case with pillar,		
F	Pitch	P	Sleeve, tray, print, PVC sleeve	Y	clip loop		
G	Fill glue	Q	Capacitance, CV, Break	Z	Impedance & ESR		

Remarks:

1. If it's without lead treatment & special requirement, the 15th code is blank.
2. If it's with lead treatment & without require special requirement, the 17th, 18th, 19th, 20th code is blank.
3. If it's without lead treatment, but with special requirement, the 15th, 16th code filled with 0.
4. If it's without lead treatment, but with special requirement, also exceeds 4 kinds, keystone characteristic is 4 codes.
5. If it's with lead treatment, but with 1 special requirement, only remark 17th code, latter three codes is blank.
6. If it's with lead treatment, but with 1 special requirement, and it is different from former data, the 17th is 0, the 18th code is characteristic.

Information
1. Maximum ripple current

1.1 Maximum RMS ripple current at +105°C, 100KHz.

1.2 When capacitors are operated at temperatures other than +105°C, and frequency other than 100KHz, the maximum RMS ripple currents must be multiplied by the factors shown in below table.

Multiplier for Ripple Current vs. Frequency:

CAP (uF) \ Frequency(Hz)	60(50)	120	400	1K	10K	50K~100K
CAP ≤ 10	0.47	0.59	0.76	0.85	0.97	1.0
10 < CAP	0.52	0.65	0.80	0.89	0.97	1.0

1.3 When frequency is different from specified condition shown as above, do not exceed the value obtained by multiplying the permissible maximum ripple current by the multiplier above. The ripple current verify methods according to JIS-C-5101-1(2010) No.: 4.23

☆ Note: 1) Ripple current corrected with working frequency

2) Check the generated heat of capacitor when ripple current is hard to measure in the circuit.

Promoted temperature by self-generating heat should be within 5°C.

2. Working Voltage (WV)

Make sure that no excess voltage (that is, higher than the rated voltage) is applied to capacitor. Please pay attention so that the peak voltage, which is DC voltage, overlapped by ripple current, will not exceed the rated voltage.

3. Insulating

General types of aluminum electrolytic capacitors are covered with a vinyl sleeve or the like. And this Sleeve is used for marking. When the internal element or the container is needed to be insulated, capacitors specially designed for insulation requirement are recommended to be used.

4. Soldering

4.1 When soldering a PC board with various components, too high soldering temperature or too long dipping time may cause secondary shrinking of the sleeve and then the container unnecessarily exposed.

The soldering must be done on the reverse of PC board.

4.2 Soldering may melt or break the sleeve when the sleeve is contacted with circuit boards. So the capacitors are recommended to be slightly apart from the circuit boards.

5. Vent

The capacitor ($\Phi \geq 10\text{mm}$) is provided with a safety vent on the bottom of the container. The vent would rupture in the event of the unsafe usage or misuse and relieve the internal higher pressure.

6. High Altitude

The capacitors can withstand those transportation conditions that temperature may range from -55 to +105°C, and the altitude may reach 200,000 feet.

7. Cleaning agents:

If the capacitor is cleaned in halogenated agents for organic removing solder flux solvent, the agents may penetrate into the inside of capacitor, and may generate corrosion.

8. Environment-friendly policy

In the entire process of capacitor's production, including manufacture, packaging, storage and transportation, our company always comply with the related Environmental Protection Laws and Regulations of RoHS.

9. Mounting and installation design according to EIAJ RCR-2367 standards.

1. Performance

Test environment:

Methods	Temperature (°C)	Relative humidity (RH)	Atomospheric (Kpa)
①	15~35	25~75%	86~106
②	25±10	40~60%	86~106
③	20±1	63~67%	86~106

Remark:

- ①: Normal testing & the test results without doubt.
- ②: Normal testing & the test results with doubt.
- ③: Testing it in standard laboratory & the test results still with judgement.

1-1.Leakage current (L.C.)

(Conditions)

Rated voltage shall be applied to capacitors in series with a resistor of 1000±10Ω. Then leakage current shall be measured at the end of a specified period after the capacitors reached the rated voltage across the terminals.

(Criteria)

$I \leq 0.01CV$ or $3(\mu A)$ {I: Leakage Current (μA); C: Capacitance (μF); V: Rated voltage (V)}
After 2 minute whichever is greater measured with rated working voltage applied.

1-2.Capacitance (Cap.)

(Conditions)

Measuring frequency : 120Hz±20%
Measuring voltage : 0.5Vrms max. +1.5 to 2.0VDC
Measuring circuit : Series equivalent circuit

(Criteria)

Shall be within the specified capacitance tolerance.

1-3.Dissipation factor(tanδ)

(Conditions)

Measuring frequency : 120Hz±20%
Measuring voltage : 0.5Vrms max. +1.5 to 2.0VDC
Measuring circuit : Series equivalent circuit

(Criteria)

W.V.(V)	6.3	10	16	25~35	50	63	100
D.F.(%)max.	24	19	16	14	12	9	8

For capacitance value > 1000μF, add 2% oer another 1000μF.

1-4.Terminal strength

(1) Pull strength

(Conditions)

The capacitor body shall be held. A force shall be gradually applied to the lead wire in the direction of the axis of the lead wire up to the specified pull force, and retained for 10±1 seconds.

Diameter of terminal (mm)	Pull force (N±10%)
0.35 < d ≤ 0.5	5(0.51Kg)
0.5 < d ≤ 0.8	10(1.02Kg)
0.8 < d ≤ 1.25	20(2.04Kg)
SNAP-IN type terminal	40(4.08Kg)

(Criteria)

The lead wire shall neither loosen nor break away.

(2) Lead bending strength

(Conditions)

The capacitor shall be held so that the normal axis of the lead wire can be in a vertical position. A weight equivalent to the specified load shall be hung on the end of the lead wire. The capacitor body shall be inclined through 90° and returned to its normal position within 2 to 3 seconds. The consecutive bend shall then be in the opposite direction in the same manner.

Diameter of terminal (mm)	Pull force (N±10%)	Bends
0.35 < d ≤ 0.5	2.5N(0.26 Kg)	2
0.5 < d ≤ 0.8	5 N(0.51 Kg)	2
0.8 < d ≤ 1.25	10N(1.02 Kg)	2
LUG type terminal	20N(2.04Kg)	2

SNAP-IN type terminals do not bending experiments, LUG terminal bending test, bending angle of 45 degree centigrade.

(Criteria)

The lead wire shall neither loosen nor break away.

1-5.Soldering Heat Resistance Test

(Conditions)

Return to normal temperature and measure it after reflow in the condition of No.8

(Criteria)

- Capacitance change : Within ±10% of initial value.
- Tan δ : Not more than the specified value
- Leakage current : Not more than the specified value
- Swelling of the case : Less than 6.3φ - 0.2mm or less
More than 8φ - 0.3mm or less
- Appearance : No abnormality

1-6. Solderability Test

(Conditions)

- Type of solder : Sn-3Ag-0.5Cu
- Flux : Ethanol solution (25 wt.% rosin)
- Solder temperature : 245±5 °C
- Depth of immersion : Up to 1.5-2.0mm from the root of the lead wire covered with a thermal shield plate
- Dipping time : 2±0.5 seconds

(Criteria)

At least 95% of circumferential surface of the dipped portion of terminal shall be covered with new solder.

1-7. Temperature cycles

(Conditions)

Referring to JIS-C- 5101-1 (2010) No:1-10, the capacitor shall be subjected in turn to the procedures specified below:

Step	Temperature	Time (min.)	Cycles
1	Rated low working temperature (-55±3°C)	30±3	1 to 4 = 1 cycle, total 10 cycles.
2	25±5°C	3	
3	Rated high working temperature (105±2°C)	30±3	
4	25±5°C	3	

Remark: If the highest working temp. over than 125°C, the using temp. tolerance is ±5°C.

(Criteria)

Capacitance change	: Within ±5% of initial value.
Tan δ	: Not more than the specified value
Leakage current	: Not more than the specified value
Appearance	: No leakage and damaged.

1-8. Vibration

(Conditions)

Vibration frequency range	: 2 to 3000Hz
Amplitude or Acceleration	: 0.75 mm (Half amplitude) or 98m/s ² (Whichever is less severe)
The vibration amplitude of P-P value	: 0mm~25mm
Sweep rate	: 10-55-10Hz (Approximately 1 minute)
Direction and period of motion	: 3 orthogonal directions mutually each for 2h.(Total 6hrs)

(Criteria)

Capacitance change	: Within ±5% of initial value
Tan δ	: Not more than the specified value
Leakage current	: Not more than the specified value
Appearance	: No leakage and damaged.

1-9. Damp Heat Steady State Test

(Conditions)

Test temperature	: +40±2°C
Relative humidity	: 90 to 95%RH
Test time	: 250 hours (Endurance time ≤2000H) : 500 hours (Endurance time >2000H)

After completion of test, the capacitors shall expose in the atmospheric condition for 16 hours, and then measurements shall be taken.

(Criteria)

Capacitance change	: Within ±20% of initial value. (Endurance time ≤2000H) : Within ±10% of initial value. (Endurance time >2000H)
Tan δ	: Not more than 120% of the specified value
Leakage current	: Not more than the specified value
Appearance	: No leakage and damaged.

1-10.Endurance

(Conditions)

Capacitors shall be placed in an oven with application of the rated D.C voltage.

Ambient temperature : 105±2℃

Specified test time : 2000 hours

(Criteria)

Capacitance change : Within ±30% of initial value.

Tan δ : Not more than 300% of the specified value

Leakage current : Not more than the specified value

Appearance : No leakage and damaged.

1-11.Surge voltage test

(Conditions)

Test temperature : +15 to +35℃

Series protective resistor : 1000±10Ω

Charge and discharge time : Charge period is 30s,
followed by a discharge period of 5.5 min

Test cycle : 1000 cycles.

Rated voltage ≤ 315V : Surge voltage shall be 1.15 times the rated voltage

Rated voltage > 315V : Surge voltage shall be 1.1 times the rated voltage

(Criteria)

Capacitance change : Within ±15% of initial value.

Tan δ : Not more than the specified value

Leakage current : Not more than the specified value

Appearance : No leakage and damaged.

1-12.Pressure relief vent

(Conditions)

Apply a reverse voltage with the DC current of 1 amp.(DC reverse voltage test)

When the pressure relief vent operated, the capacitor shall not flame although emission of gas or a part of the inside element is allowable.

If the vent does not operate with the voltage applied for 30 minutes, the test is considered to be passed.

(Criteria)

No sparking; No shorting.

No breaking out of electrolyte paper;

Vent opening, no flowing down of electrolyte.

1-13.High Temperature Storage

(Conditions)

The following specifications shall be satisfied when the capacitors are restored to 20℃ after exposing them for 1000 hours at 105±2℃ without an applied voltage. Before the measurements, the capacitor shall be preconditioned by applying voltage according to Item 4.1 of JIS C 5101-4.

(Criteria)

Capacitance change : Within ±30% of initial value.

Tan δ : Not more than 300% of the specified value

Leakage current : Not more than the specified value

Appearance : No leakage and damaged.

1-14.High and Low Temperature characteristics

(Conditions)

Step	Temperature [°C]	Time
1	+20±2	/
2	-55±3	2h
3	+20±2	15±2 min.
4	+105±2	2h
5	+20±2	15±2 min.

(Criteria)

Step 2: Impedance ratio shall not exceed the values shown in Table attached.

[120Hz]

Rated Voltage(V)	6.3	10	16	25	35	50	63~100
Z-25°C/Z+20°C	2	2	2	2	2	2	1.5
Z-55°C/Z+20°C	8	6	4	4	3	3	2

Step 4. Capacitance change

: Within ±30% of initial value.

Tan δ

: Not more than the specified value.

Leakage current

: Shall not more than 800% of initial specified value

2. Reference standard

DV series is applicable to general-purpose grade capacitors of JIS-C-5101-1(2010)

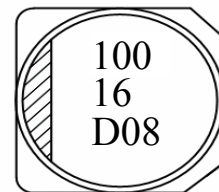
The othes test conditions shall comply with JIS-C-5101-4(2010).

3. Marking

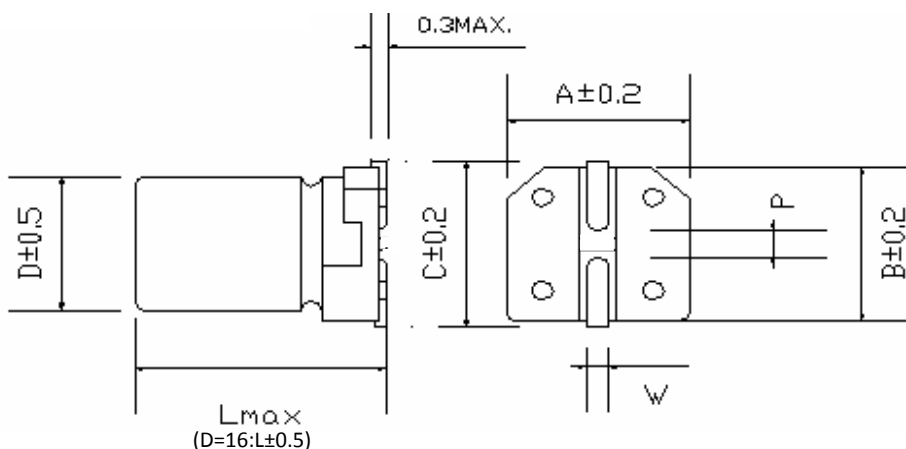
The following items shall be marked on each capacitor. All marking shall be legible and permanent.

(Example)

- (1) 16V: Rated voltage
- (2) 100: Nominal capacitance(μF)
- (3) Shadow part: (-)Polarity (Cathode indicate)
- (4) D08: Production date code
(D: DV Series; 0: year 2010; 8: the 8 Months)



4. Diagram of dimension (Unit: mm)

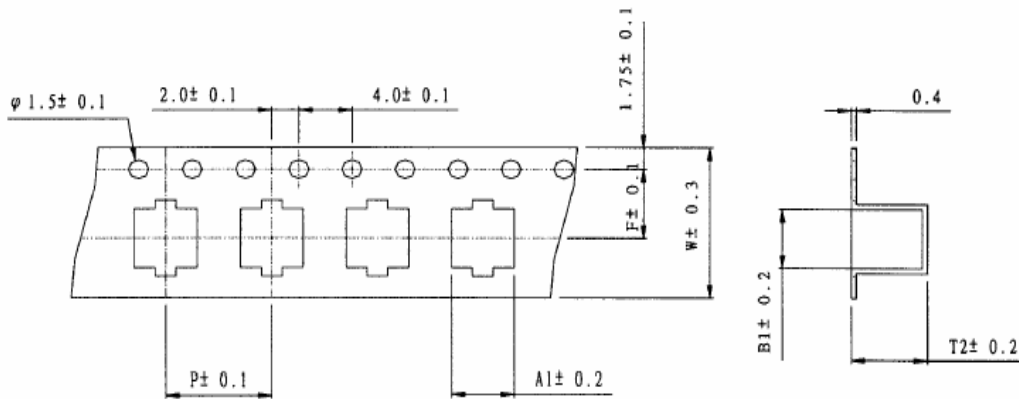


D	L	A	B	C	W	P±0.2
4	5.5	4.3	4.3	4.9	0.5~0.8	1
5	5.5	5.3	5.3	5.9	0.5~0.8	1.4
6.3	5.5	6.6	6.6	7.2	0.5~0.8	2.2
6.3	7.7	6.6	6.6	7.2	0.5~0.8	2.2
8	6.5	8.3	8.3	9	0.5~0.8	2.3
8	10.5	8.3	8.3	9	0.7~1.1	3.1
10	10.5	10.3	10.3	11	0.7~1.1	4.5
12.5	14	13.0	13.0	13.9	1.0~1.4	4.5
16	17	17.1	17.1	18	1.0~1.4	7

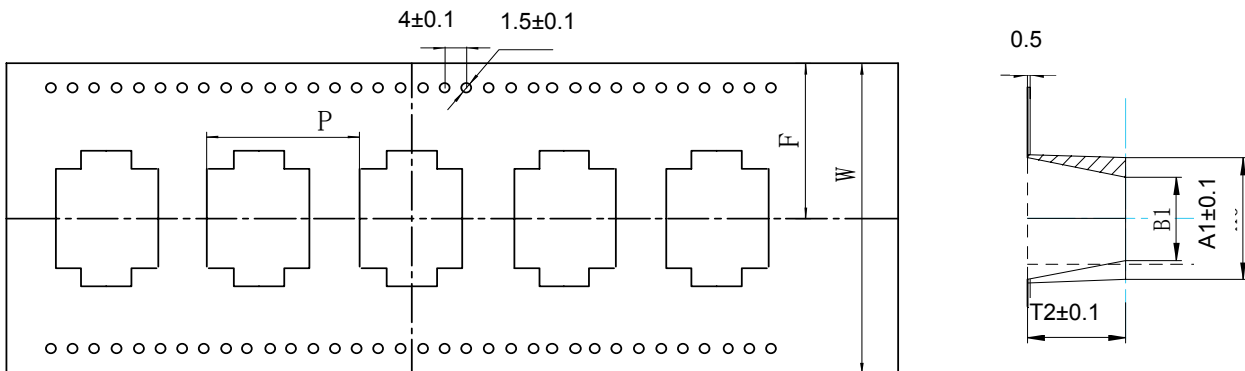
5. Taping

5.1 Carrier tape

4Φ~10Φ:

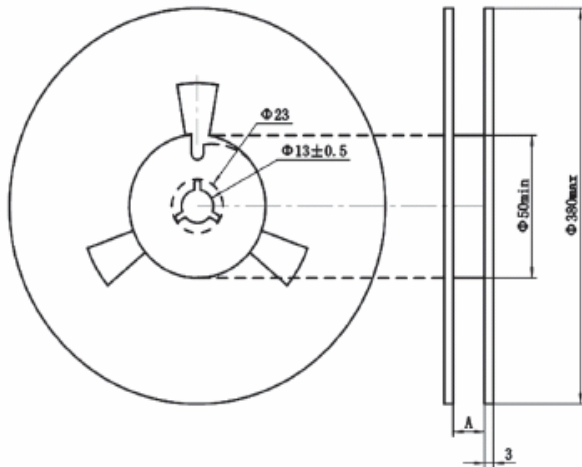


12.5Φ~16Φ:



DΦxL	4x5.5	5x5.5	6.3x5.5	6.3x7.7	8x6.5	8x10.5	10x10.5	12.5x14	16x17
W	12	12	16	16	16	24	24	32	44
P	8	12	12	12	12	16	16	24	28
F	5.5	5.5	7.5	7.5	7.5	11.5	11.5	16	21.95
A ₁	4.7	5.7	7	7	8.7	8.7	10.7	13.9	19.5
B ₁	4.7	5.7	7	7	8.7	8.7	10.7	13.9	17.5
T ₂	5.7	5.7	5.7	8	7	11	11	14.5	17.3

6. Reel:



Quantity	
DΦxL	Q'ty / Reel
4x5.5	2000pcs
5x5.5	1000pcs
6.3x5.5	1000pcs
6.3x7.7	900 pcs
8x6.5	1000pcs
8x10.5	500pcs
10x10.5	500pcs
12.5X14	200pcs
16X17	125pcs

DΦ	4	5	6.3, 8	8, 10	12.5	16
A	14	14	18	26	34	46

7. Packing

7.1 Capacitors on tape are reeled as shown in unreeling tape direction with the cathode side adjacent to the sprocket hole in the carrier tape as shown in Fig-1

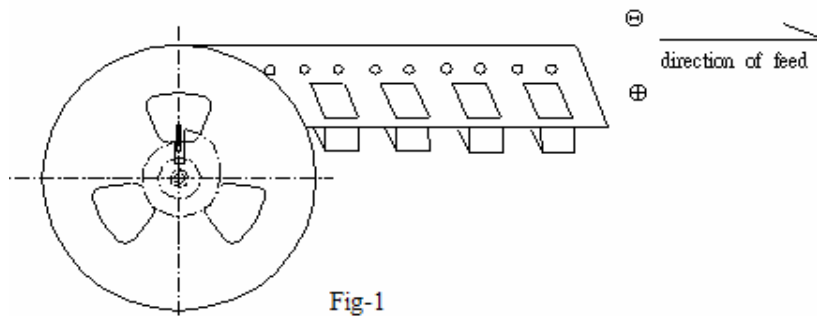


Fig-1

7.2 The cover tape width will extend the edge of the carrier tape less than 0.5mm as shown in Fig-2. the cover tape will cover the sprocket holes on the carrier tape less than 0.75mm as shown in Fig-3.

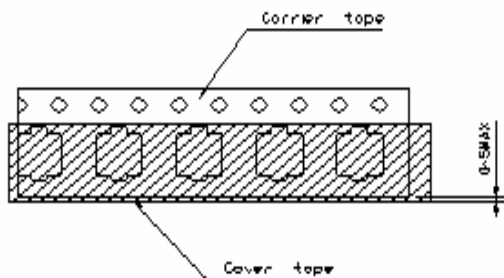


Fig-2

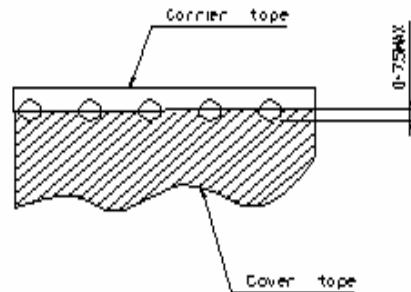


Fig-3

7.3 The cover tape will have a peel back force of 20 to 100 grams measured at angle of 165° to 180° with respect to the carrier tape as shown in Fig-4. The peeling speed will be 300 mm/min.

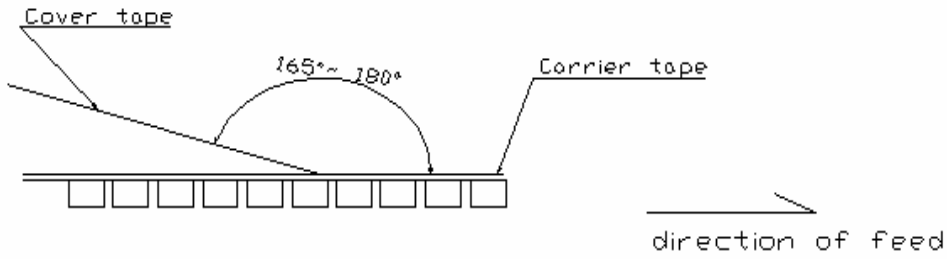


Fig-4

8. Temperature profile

