规 格书
SPECIFICATION

Customer name ：

BERYL SERIES ： SS **TYPE ： SMD**

DESCRIPTION ：SS016M220TR5*5.4

Apply date ： 2025-09-04

BERYL			CUSTOMER		
P/N:SS016M220TR5*5.4			P/N:		
PREPARED	CHECKED	APPROVED	PREPARED	CHECKED	APPROVED
董桂茹	廖梅君	成 旭			

After approved, please sign back 1 Approval Sheet before order. If not, we will treat it as tacitly acknowledged and accepted our relative standard and technical index.

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Revise record

NO.	Date	Revise reason	Revise content	Prepared
01	2025.09.04	First issue	First issue	董桂茹

1 、 Application

This specification applies to Aluminum electrolytic capacitor (foil type) used in electronic equipment. Designed capacitor's quality meets IEC 60384.

2 、 Table of specification and ch aract eri stics

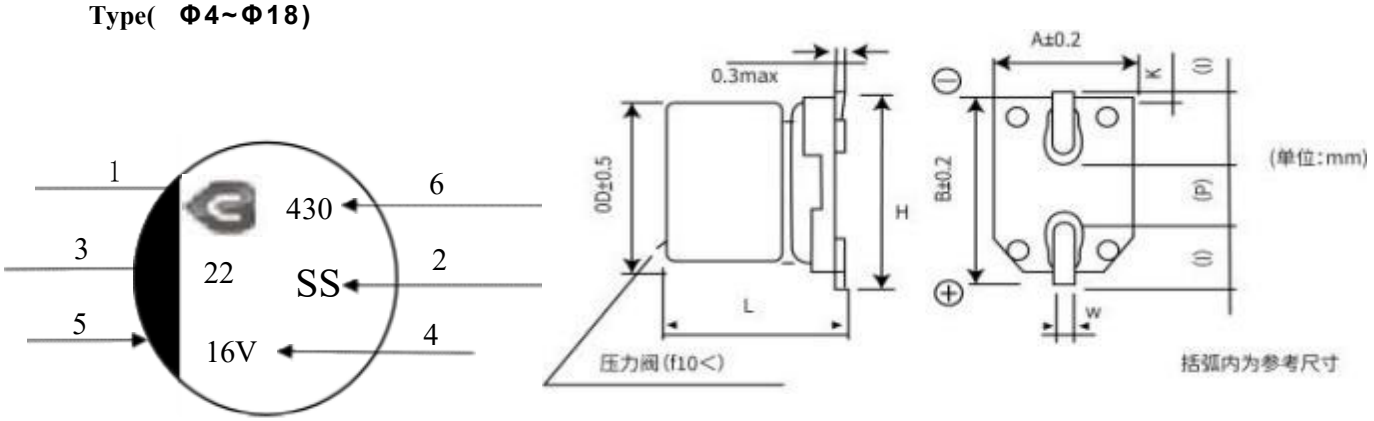
Series	Cap(uF) 120Hz/20℃	WV(V)	Size (mm)		Temperature (℃)	Capacitance Tolerance	Life(hours) @105(℃)
			D	L			
SS	22	16	5	5.4	-40~+ 105	±20%	2000

DF (%)(MAX) 120Hz/20℃	LC(μA)(MAX) 2min/20℃	ESR(Ω)(MAX) 100KHz/25℃	RC (mA rms) (MAX)105℃/120Hz	Surge voltage(V)
≤20	≤4	-	28	18

Other： /

3 、 Prod uct Di mensi ons

Type(Φ4~Φ18)



Dimensions Unit： mm

ΦD	L	A/B	H	I	W	P	K
4/D	5.4±0.5	4.3	5.5	1.8	0.5~0.8	1.0	0.35+0. 15/-0.20
5/E		5.3	6.5	2.1		1.3	
6.3/F		6.6	7.8	2.4		2.2	
	7.7±0.5						
8/H	10.5±0.5	8.3	10	3.4	0.8~ 1. 1	3.1	0.70±0.20
	12.5±0.5						
10/J	10.5±0.5	10.3	12	3.5		4.5	
	12.5±0.5						

4、 Part Numb er

SS	016	M	220	TR	5*5.4

Size: 5*5.4

PACKAGE TYPE： Reel

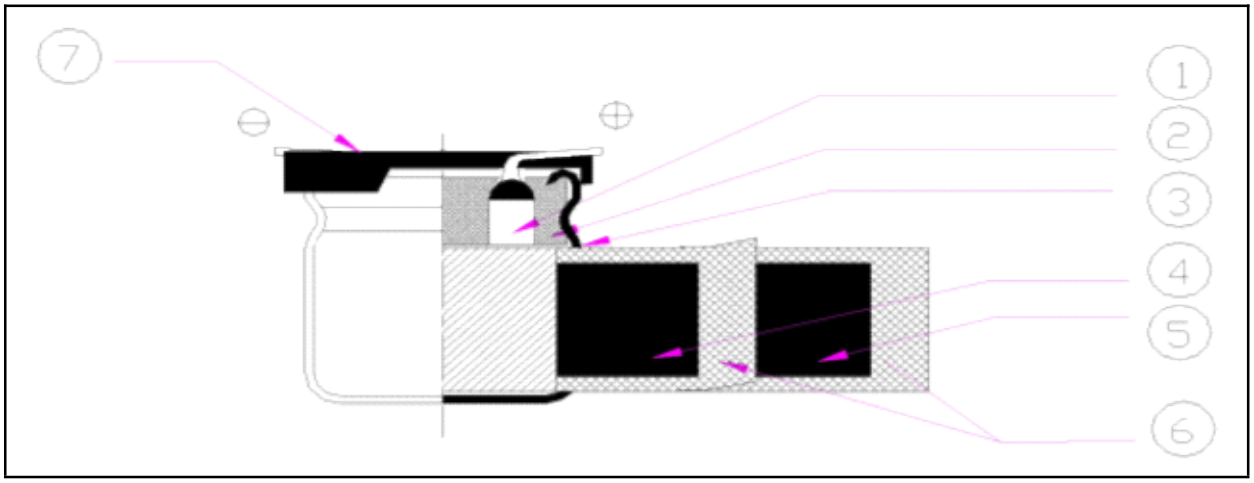
RATED CAPACITANCE: 220=22uF

CAPACITANCE TOLERANCE: M=±20%

RATED VOLTAGE: 016=16V

SERIES NAME

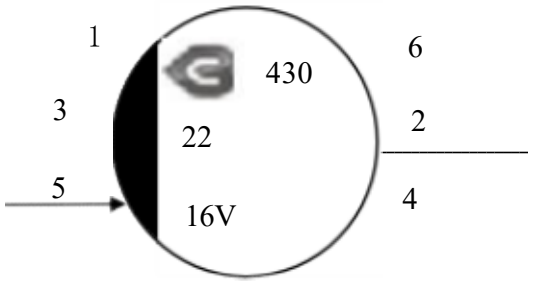
5、 Frame drawi ng and mat eri al s



No	Parts	Material	Main supply Factory
1	Lead wire	Aluminum- wire LG3+Tin- plating of copper cover steel	NANTONG GENENIC ELECTRONIC INDUSTRY CO., LTD
2	Rubber bung	IIR rubber	Tiantai Pengyu Rubber Co., Ltd. Zhejiang Tiantai Xianghe Industrial Co., Ltd
3	CASE	Aluminum -99.5%	Shenzhen Xiesheng Precision Products Co., Ltd. Hangzhou Lin'an Yipeng Electronic Technology Co., Ltd
4	Anode foil(+)	Formed Aluminum 99.98% or 99.98%	Dongguang Sunshine Foil Co., Ltd. Lidon Electronic Technology Co., Ltd.
5	Cathode foil(-)	Etched Aluminum 99.7%	AFT ELECTRONIC CO. LTD. BOLUO
6	Separator paper	Electrolytic Capacitor paper	NKK NIPPON KODOSHI CORPORATION. Zhejiang Kane Special Paper CO.,Ltd.
7	BASE	PPA	Hongxinde Electronic Technology Co.Ltd.

6、 Product Marking

Marking Sample:



Marking Details:

Capacitor shall be marked the following items:

1) Trademark (BERYL)
2) Series symbol
3) Nominal capacitance(22uF)
4) working voltage(16V)
5) Cathode marked
6) Date code (430)

7、 Ch aract eri stics

Standard atmospheric conditions

Unless other specified, the standard range of atmospheric conditions for making measurements and tests is as follows:

Ambient temperature : 15oC to 35oC
Relative humidity : 45% to 85%
Air pressure : 86kPa to 106kPa

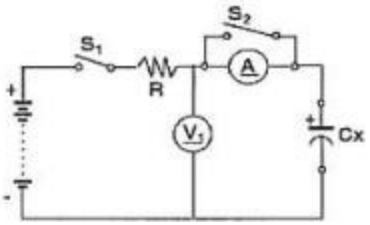
If there is any doubt about the results, measurement shall be made within the following conditions:

Ambient temperature : 20oC ± 2oC
Relative humidity : 60% to 70%
Air pressure : 86kPa to 106kPa

Operating temperature range

The ambient temperature range at which the capacitor can be operated continuously at rated voltage is (4~ 120WV) -40oC to + 105oC .

Table

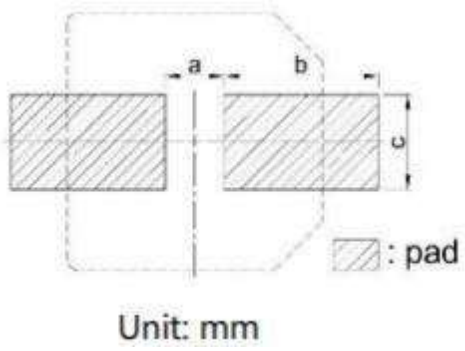
ITEM		PERFORMANCE
1	**Nominal capacitance (Tolerance)**	**< Condition>** Measuring Frequency: 1 2 0 Hz± 1 2 Hz Measuring circuit: Series equivalent circuit Measuring Voltage: Not more than 0 . 5 Vrms + 1 . 5 ~ 2 . 0 V. DC Measuring Temperature: 2 0 ± 2 ℃ **< Criteria>** Shall be within the specified capacitance tolerance.
2	**Leakage current**	**<Condition>** Connecting the capacitor with a protective resistor (1kΩ± 10Ω) in series for 2 minutes, and then, measure leakage current. **<Criteria>** I: Leakage current (μA) I (μA) ≤0.01CVor 3 (μA) whichever is greater, measurement circuit refer to right drawing. C: Capacitance (μF) V: Rated DC working voltage (V) 
3	**Dissipation factor**	**< Condition>** Nominal capacitance, for measuring frequency, voltage and temperature. **< Criteria>** Must be within the parameters (See page 3)

<table>
<tr><th colspan="2">ITEM</th><th>PERFORMANCE</th></tr>
<tr><td>4</td><td>Impedance</td><td>< Condition>
Measuring frequency: 1 0 0 kHz; Measuring temperature: 2 0 ± 2 ℃
Measuring point : 2 mm max. from the surface of a sealing rubber on the lead wire.
< Criteria>
(2 5 ℃) Must be within the parameters (See page 3)</td></tr>
<tr><td>5</td><td>Load life test</td><td>< Condition>
According to IEC6 0 3 8 4 - 4 No. 4 . 1 3 methods, the capacitor is stored at a temperature of Maximum operating temperature ± 2 ° C with DC bias voltage plus the rated ripple current for Rated life +4 8 / 0 hours. (The sum of DC and ripple peak voltage shall not exceed the rated working voltage) Then the product should be tested after 1 6 hours recovering time at atmospheric conditions. The result should meet the following table:
< Criteria>
The characteristic shall meet the following requirements.
<table>
<tr><td>Leakage current</td><td>Not more than the specified value.</td></tr>
<tr><td>Capacitance Change</td><td>Within ±20% of initial value.</td></tr>
<tr><td>Dissipation Factor</td><td>Not more than 200% of the specified value.</td></tr>
<tr><td>Appearance</td><td>There shall be no leakage of electrolyte.</td></tr>
</table></td></tr>
<tr><td>6</td><td>Shelf life test</td><td>< Condition>
The capacitors are then stored with no voltage applied at a temperature of Maximum operating temperature±2℃ for1000+48/0 hours. Following this period, the capacitors shall be removed from the test chamber and be allowed to stabilized at room temperature for16 hours. measure leakage current
< Criteria>
The characteristic shall meet the following requirements.
<table>
<tr><td>Leakage current</td><td>Not more than the specified value.</td></tr>
<tr><td>Capacitance Change</td><td>Within ± 2 0 % of initial value</td></tr>
<tr><td>Dissipation Factor</td><td>Not more than 200% of the specified value.</td></tr>
<tr><td>Appearance</td><td>There shall be no leakage of electrolyte.</td></tr>
</table></td></tr>
<tr><td>7</td><td>Maximum permissible (ripple current, temperature coefficient)</td><td>< Condition>
The maximum permissible ripple current is the maximum A. C current at 1 2 0 Hz and can be applied at maximum operating temperature
Table- 3
The combined value of D. C voltage and the peak A. C voltage shall not exceed the rated voltage and shall not reverse voltage .
Frequency Multipliers:
<table>
<tr><td>Freq (Hz)</td><td>50</td><td>120</td><td>300</td><td>1K</td><td>10K~ 100K</td></tr>
<tr><td>Correction Factor</td><td>0.70</td><td>1.00</td><td>1. 17</td><td>1.36</td><td>1.50</td></tr>
</table></td></tr>
</table>

<table>
<tr><th colspan="2">ITEM</th><th>PERFORMANCE</th></tr>
<tr><td>8</td><td>Terminal strength</td><td>
< Condition>
Tensile strength of terminals
Fixed the capacitor, applied force to the terminal in lead out direction for30+5-0 seconds. Bending strength of terminals.
Fixed the capacitor, applied force to bent the terminal (1~4 mm from the rubber) for 90° within 2~3 seconds, and then bent it for 90° to its original position within 2~3 seconds.
<table>
<tr><th>Diameter of lead wire</th><th>Tensile force N (kgf)</th><th>Bending force N (kgf)</th></tr>
<tr><td>0.5mm and less</td><td>5 (0.51)</td><td>2.5 (0.25)</td></tr>
<tr><td>0.6~0.8 mm</td><td>10 (1.02)</td><td>5 (0.51)</td></tr>
</table>
< Criteria>
No noticeable changes shall be found, no breakage or looseness at the terminal.
</td></tr>
<tr><td>9</td><td>Temperature characteristics</td><td>
< Condition>
<table>
<tr><th>STEP</th><th>Testing temperature (℃)</th><th>Time</th></tr>
<tr><td>1</td><td>20±2</td><td>Time to reach thermal equilibrium</td></tr>
<tr><td>2</td><td>-40 -25±3</td><td>Time to reach thermal equilibrium</td></tr>
<tr><td>3</td><td>20±2</td><td>Time to reach thermal equilibrium</td></tr>
<tr><td>4</td><td>105±2</td><td>Time to reach thermal equilibrium</td></tr>
<tr><td>5</td><td>20±2</td><td>Time to reach thermal equilibrium</td></tr>
</table>
Capacitance, DF, and impedance shall be measured at 120 Hz.
< Criteria>
a. At +105℃, capacitance measured at +20℃ shall be within ±25% of its original value.
Dissipation factor shall be within the limit of Item 7 . 3
The leakage current measured shall not more than 10 times of its specified value.
b. In step 5, capacitance measured at +20℃ shall be within ± 10% of its original value.
Dissipation factor shall be within the limit of Item 7 . 3
The leakage current shall not more than the specified value.
c. At- 40℃, Impedance (Z) ratio shall not exceed the value of the following table.
<table>
<tr><td>Voltage (V)</td><td>4</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td><td>63</td><td>80</td><td>100</td><td>120</td></tr>
<tr><td>Z-25℃/Z+20℃</td><td>7</td><td>4</td><td>3</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td></tr>
<tr><td>Z-40℃/Z+20℃</td><td>15</td><td>8</td><td>6</td><td>4</td><td>4</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>4</td></tr>
</table>
</td></tr>
<tr><td>10</td><td>Surge test</td><td>
< Condition>
Applied a surge voltage to the capacitor connected with a (100 ±50)/CR (kΩ) resistor in series for 30±5 seconds in every 5±0.5 minutes at 15~35℃ .Procedure shall be repeated 1000 times. Then the capacitors shall be left under normal humidity for 1-2 hours before measurement
CR : Nominal Capacitance (μF)
< Criteria>
<table>
<tr><td>Leakage current</td><td>Not more than the specified value.</td></tr>
<tr><td>Capacitance Change</td><td>Within ± 15% of initial value</td></tr>
<tr><td>Dissipation Factor</td><td>Not more than the specified value.</td></tr>
<tr><td>Appearance</td><td>There shall be no leakage of electrolyte</td></tr>
</table>
Attention:
This test simulates over voltage at abnormal situation only. It is not applicable to such over voltage as often applied.
</td></tr>
</table>

<table>
<tr><th colspan="2">ITEM</th><th>PERFORMANCE</th></tr>
<tr><td>11</td><td>Change of temperature test</td><td>
< Condition>
Temperature cycle:
According to IEC6 0 3 8 4 - 4 No. 4 . 7 methods, capacitor shall be placed in an oven, the condition according as below:
<table>
<tr><td>Temperature</td><td>Time</td></tr>
<tr><td>(1) +20℃</td><td>3 Minutes</td></tr>
<tr><td>(2) Rated low temperature (- 40℃)(-25℃)</td><td>30±2 Minutes</td></tr>
<tr><td>(3) Rated high temperature (+105℃)</td><td>30±2 Minutes</td></tr>
<tr><td colspan="2">(1) to (3) = 1 cycle, total 5 cycle</td></tr>
</table>
< Criteria>
The characteristic shall meet the following requirement.
<table>
<tr><td>Leakage current</td><td>Not more than the specified value.</td></tr>
<tr><td>Dissipation Factor</td><td>Not more than the specified value.</td></tr>
<tr><td>Appearance</td><td>There shall be no leakage of electrolyte.</td></tr>
</table>
</td></tr>
<tr><td>12</td><td>Damp heat test</td><td>
< Condition>
Humidity test :
According to IEC60384-4 No.4. 12 methods, capacitor shall be exposed for 500± 8 hours in an atmosphere of 90~95%R H .at 40±2℃ , the characteristic change shall meet the following requirement.
< Criteria>
<table>
<tr><td>Leakage current</td><td>Not more than the specified value.</td></tr>
<tr><td>Capacitance Change</td><td>Within ± 10% of initial value.</td></tr>
<tr><td>Dissipation Factor</td><td>Not more than 120% of the specified value.</td></tr>
<tr><td>Appearance</td><td>There shall be no leakage of electrolyte.</td></tr>
</table>
</td></tr>
<tr><td>13</td><td>Solderability test</td><td>
< Condition>
The capacitor shall be tested under the following conditions:
Soldering temperature : 245 ± 5oC
Dipping depth : 2mm
Dipping speed : 25±2.5mm/s
Dipping time : 3± 0.5s
<Criteria>
<table>
<tr><td>Soldering wetting time</td><td>Less than 3s</td></tr>
<tr><td>Coating quality</td><td>A minimum of 95% of the surface being immersed</td></tr>
</table>
</td></tr>
</table>

ITEM		PERFORMANCE
14	Reflow Conditions for SMD type	**Recommended pad pattern and size**

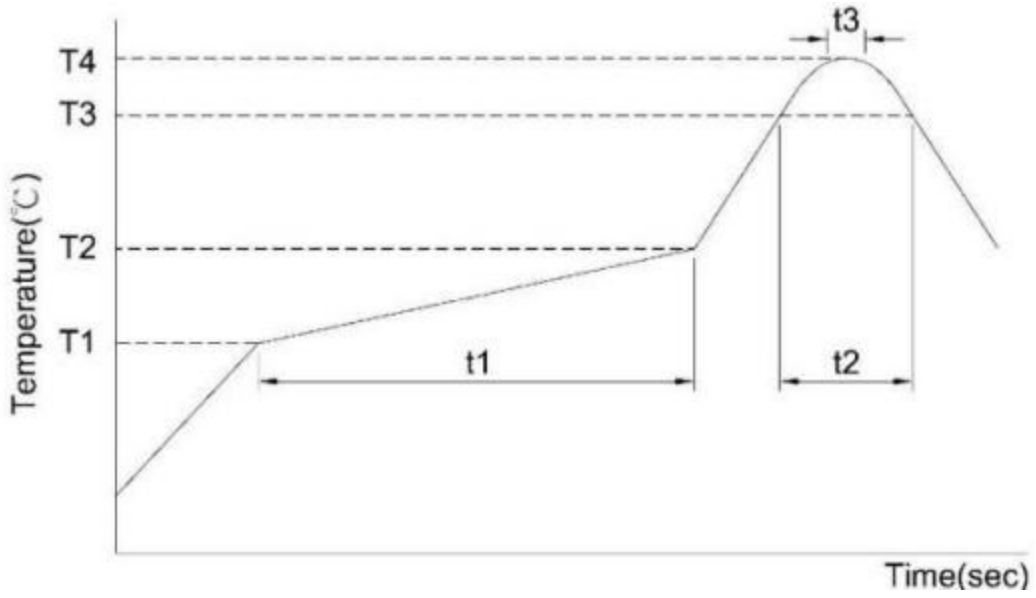


产品尺寸	焊盘尺寸		
	a	b	c
4Φ	1.0	2.6	1.6
5Φ	1.4	3.0	1.6
6.3Φ	1.9	3.5	1.6
8Φ	3.0	4.5	2.5
10Φ	4.0	4.0	2.5
12.5Φ	4.0	6.0	3.2
16Φ	6.0	7.0	3.2
18Φ	6.0	8.0	3.2

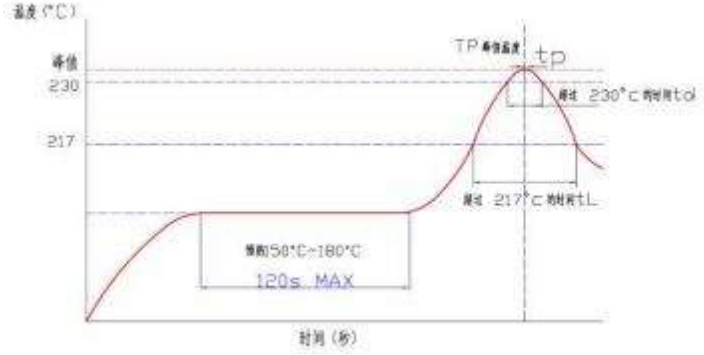
Recommended Soldering Methods

2. 1 Solder iron method: Bit temperature:350 ± 5℃ ， Application time of soldering Iron: 3 + 1/-0 sec

2.2 Reflow Soldering （Pb-free ）：



<table>
<tr><th colspan="2">ITEM</th><th>PERFORMANCE</th></tr>
<tr><td>15</td><td>Vibration test</td><td>
< Condition>
The following conditions shall be applied for 2 hours in each 3 mutually perpendicular directions. Vibration frequency range : 10Hz ~ 55Hz
each to peak amplitude : 1.5mm
Sweep rate : 10Hz ~ 55Hz ~ 10Hz in about 1 minute
Mounting method: The capacitor with diameter greater than 12.5mm or longer than 25mm must be fixed in place with a bracket.

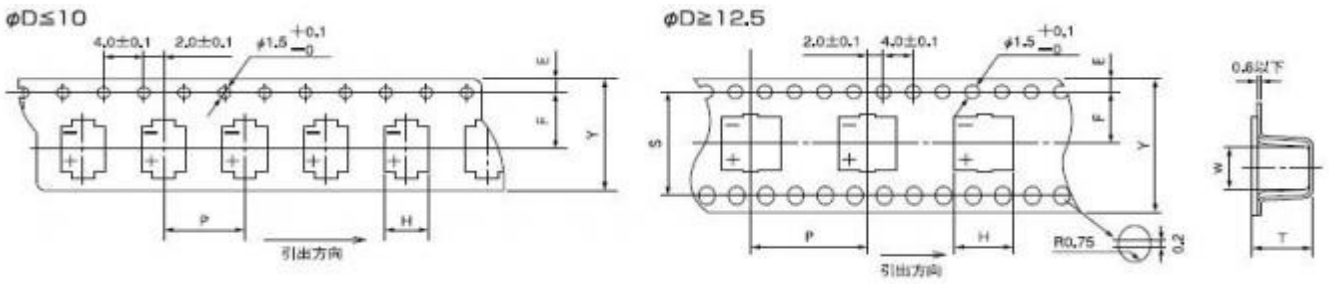
< Criteria>
After the test, the following items shall be tested :
<table>
<tr><td>Inner construction</td><td>No intermittent contacts, open or short circuiting.
No damage of tab terminals or electrodes</td></tr>
<tr><td>Appearance</td><td>No mechanical damage in terminal. No leakage of electrolyte or swelling of the case. The markings shall be legible</td></tr>
</table>
</td></tr>
<tr><td>16</td><td>Resistance to solder heat test</td><td>
<Condition>
The capacitors are kept on a hot plate for 30 seconds, which is maintained at 250 ° C. The capacitors shall meet the characteristic requirements listed at right when they are removed from the plate and restored to 20°C.
<Criteria>
<table>
<tr><td>Leakage current</td><td>Not more than the specified value.</td></tr>
<tr><td>Capacitance Change</td><td>Within ± 10% of initial value.</td></tr>
<tr><td>Dissipation Factor</td><td>Not more than the specified value</td></tr>
<tr><td>Appearance</td><td>There shall be no leakage of electrolyte.</td></tr>
</table>
Recommendable reflow condition


<table>
<tr><th>Size</th><th>Thickness (mm)</th><th>Tp(° C)</th><th>tL (second)</th><th>td (second)</th><th>tp (second)</th></tr>
<tr><td>Ø4~Ø6.3*7.7L</td><td>≥2.5</td><td>250±0</td><td>≤60</td><td>≤20</td><td>≤5</td></tr>
<tr><td>Ø8*6.5L</td><td>≥2.5</td><td>240±0</td><td>≤30</td><td>≤10</td><td>≤5</td></tr>
<tr><td>Ø8/10*13.5L</td><td>≥2.5</td><td>235±0</td><td>≤40</td><td>≤10</td><td>≤5</td></tr>
<tr><td>Ø12.5~Ø16</td><td>≥3.0</td><td>230±0</td><td>≤20</td><td>--</td><td>≤3</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th colspan="2">ITEM</th><th>PERFORMANCE</th></tr>
<tr><td>17</td><td>Vent test</td><td>
< Condition>
The following test only apply to those products with vent products at diameter > Φ6.3 with vent.
D. C. test
The capacitor is connected with its polarity reversed to a DC power source. Then a current selected from Table 2 is applied.
< Table 2 >
<table>
<tr><th>Diameter (mm)</th><th>DC Current (A)</th></tr>
<tr><td>22.4 or less</td><td>1</td></tr>
</table>
<Criteria>
The vent shall operate with no dangerous conditions such as flames or dispersion of pieces of the capacitor and/or case.
</td></tr>
</table>

8、 V- Chip Type Aluminum Electrolytic Capacitors

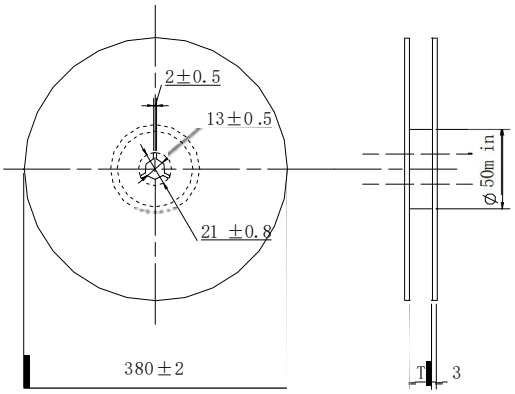
Carrier tape



(mm)

ΦD*L	Y(±0.3)	P(±0. 1)	F(±0. 1)	H(±0.2)	T(±0. 1)	E(±0. 15)
4*3.95	12	8	5.5	4.5	4.4	1.75
4*4.5					5	
4*5.4/5.7					5.9	
4*5.8					6.4	
4*7					7.2	
4*10.5					11	
5*3.95		12		5.5	4.4	
5*4.5					5	
5*5.4/5.7					5.9	
5*5.8					6.4	
5*7					7.6	
5*10.5	16	12	7.5		11	
6.3*3.95				6.8	4.4	
6.3*4.5					5	
6.3*5.4/5.7					6.1	
6.3*5.8					6.4	
6.3*7.7					8.3	
6.3*8.7					9.3	
6.3*10.5					11	
8*6.2				8.7	7	
8*6.5					7.3	
8*10.5	24	16	11.5		11	
8*12.5					13. 1	
10*7.7				10.7	8.7	
10*10.5					11	
10*12.5					13.0	
10*16						
12.5*13.5	32	24	14.2	13.4	14.5	
12.5*16.5					17.0	
16*16.5	44	28	20.2	17.5		
16*21.5					23.0	
18*16.5		32		19.5	17.5	
18*21.5					23.0	

Reel



(mm)

ΦD	4	5	6.3 (8*6.2)	8	10	12.5	16	18
W	12	12	16	24	24	32	44	44
T	14	14	18	26	26	34	46	46

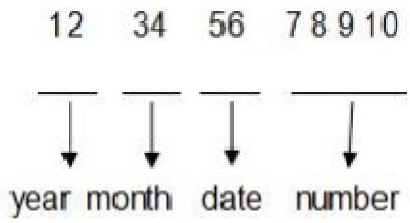
Package quantity

ΦD×L	Quantity / Reel 数量 / 每盘	pcs/ Small packing box 数量/小包装箱	pcs/Large packing box 数量/大包装箱
4*3.95、4*4.5、4*5.4、4*5.7、4*5.8	2000pcs	24000pcs	48000pcs
5*3.95、5*4.5、5*5.4、5*5.7、5*5.8、5*7	1000pcs	12000pcs	24000pcs
6.3*3.95、6.3*4.5、6.3×5.4、6.3*5.7、6 3*5 8 、6 3*7 7、8*6 2 、8*6 5	1000pcs	10000pcs	20000pcs
6.3*8.7	900pcs	9000pcs	18000pcs
4*10.5、5*10.5、6.3*10.5	700pcs	7000pcs	14000pcs
8*10.5、10*7.7、10*10.5	500pcs	3500pcs	7000pcs
8*12.5	400pcs	2800pcs	5600pcs
10*12.5	400pcs	2800pcs	5600pcs
10*16	350pcs	2450pcs	4900pcs
12.5*13.5	200pcs	1200pcs	2400pcs
12.5*16.5	150pcs	900pcs	1800pcs
16*16.5	125pcs	625pcs	1250pcs
16*21.5	75pcs	375pcs	750pcs
18*16.5	125pcs	625pcs	1250pcs
18*21.5	75pcs	375pcs	750pcs

9、 Packing Information

Packing Label Marked (the following items shall be marked on the label)
(Inside box or bag)
(1) Clint order number (2) Client part number (3) Beryl part number (4) Capacitance (5) Voltage (6) Dimension (7) Packaging quantity (8) Capacitance tolerance (9) QC Marking (10) Lot number (11) Series

LOT Number：



1） Outer box

外箱

2） Outer box label：

BERYL Zhao Qing Beryl Electronic Technology Co., Ltd.	
C.S.R:	RoHS HF
C.S.R P/O:	
C.S.R P/N:	
S.P.R P/N:	QC
SPEC:	
Q'TY: PCS	TOL: %
L/N:	S.P.R:

10、Prohibition to Use Environment- related Substances

We are hereby to certify the followings:

Our company hereby warrants and guarantees that all or part of products, including, but not limited to, the peripherals, accessories or package, delivered to your company (including your subsidiaries and affiliated companies) directly or indirectly by our company are free from any of the substances listed below.

The latest version of <Substances Prohibited as per RoHS or <Sony-SS-00259>

Accord with heavy metal	Cadmium and cadmium compounds
	Lead and lead compounds
	Mercury and mercury compounds
	Hexavalent chromium compounds
Organic chlorin compounds	Polychlorinated biphenyls (PCB)
	Polychlorinated naphthalenes (PCN)
	Polychlorinated terphenyls (PCT)
	Chlorinated paraffins (CP)
	Other chlorinated organic compounds
Organic bromine compounds	Polybrominated biphenyls (PBB)
	Polybrominated diphenylethers (PBDE)
	Other brominated organic compounds
Tributyltin compounds Triphenyltin compounds	
Asbestos	
Specific azo compounds	
Formaldehyde	
Polyvinyl chloride (PVC) and PVC blends	
F、Cl、Br、I	
REACH	