PRODUCT SPECIFICATION

PRODUCT: CERAMIC DISC CAPACITOR

TYPE : CERAMIC DISC CAPACITOR (Surface Layer Type)

CUSTOMER: _____

DOC. NO.: POE-D09-00-E-13

Ver.: 13

APPROVED BY CUSTOMER

VENDOR：

☐ **WALSIN TECHNOLOGY CORPORATION**
566-1, KAO SHI ROAD,YANG-MEI
TAO-YUAN, TAIWAN

☐ **PAN OVERSEAS (GUANGZHOU) ELECTRONIC CO.,LTD.**
NO.277,HONG MING ROAD,EASTERN SECTION,
HUANGPU DISTRICT ,GUANG ZHOU,CHINA

MAKER：PAN OVERSEAS (GUANGZHOU) ELECTRONIC CO.,LTD.
NO.277,HONG MING ROAD,EASTERN SECTION,
HUANGPU DISTRICT ,GUANG ZHOU,CHINA

Record of change

Date	Version	Description	page
2008.6.3	1	1. D16-00-E-09(before) → POE-D09-00-E-01(1st edition)	
2008.8.22	2	1. Complete lead code Add last SAP code " H" for halogen and Pb free , epoxy resin.	14-14 9
2008.12.12	3	1.Complete the 13th to 17th codes of SAP P/N. 2.Page layout adjustment.	4-6
2009.8.21	4	1. Change PSA & POE logo to Walsin & POE logo.	
2011/3/8	5	Review the capacitance range, delete the part of 223/333/473/683.	
2013/5/8	6	1. Review the Lead diameter φ from 0.60 +/-0.06mm to 0.55+/-0.05mm 2. Review the "shall be omitted when DΦ<6.0 mm & shall be omitted when DΦ<8.0 mm." to "shall be omitted when DΦ<060 &shall be omitted when DΦ<080 . " 3. Review the Solderability temperature from 255(+5/-0)℃ to 245± 5℃.,Solderability time from 2±0.5s to 5±0.5s,	6,8 7 10
2016/3/3	7	1. Review the Available lead code of Lead Configuration. 2. Delete the definition about "Old Part No." 3. Review the Specification and test method.	5 5-6 10-12
2017/10/31	8	1. Review the Available lead code of Lead Configuration.	5
2019/7/26	9	1. Review the Hole-down tape width (W0) from 11.0mm min. to 8.0mm min.	7
2021/9/9	10	1. Delete Walsin & POE logo.	1
2022/1/8	11	1. Add "Soldering Recommendation"	15
2022/4/21	12	1. Add 8.5.3 List of substances that affect the insulation strength of coating	14
2025/7/6	13	1. Review the Drawing of Internal Structure and material list	16

Table of Contents

1. Part number for SAP system(total eighteen code)：

FY	500	104	Z	060	B	20	C	5	P
❶	❷	❸	❹	❺	❻	❼	❽	❾	❿

❶ Temperature characteristic：

Code	FY(Y5V)
Operating temperature	-25℃ to +85℃
Cap. change	-82%~+22%

❷ Rated voltage (Vdc)：

Voltage	16V	25V	50V
Code	160	250	500

❸Capacitance(pF)：

Capacitors (pF)	100000
Code	104

❹Capacitance tolerance： Z=+80%-20%

❺ Nominal body diameter dimension (Ref. to page.7 Dφ Code spec.) .

❻ Code of lead type：Please refer to Item “2.Mechanical”.

❼Packing mode and lead’s length (identified by 2-figure code)

Taping Code	Description
AN	Ammo / Pitch of component:12.7 mm

Bulk Code	Description
3E	Lead’s length L：3.5mm
04	Lead’s length L：4mm
4E	Lead’s length L：4.5mm
20	Lead’s length L：20mm

❽Length tolerance

Code	Description	
A	±0.5 mm(Only for short kink lead code “D / X / H”)	Short lead
B	±1.0 mm	Short lead
C	Min.	Long lead
D	Taping special purpose	Taping

❾Pitch

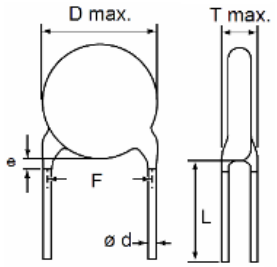
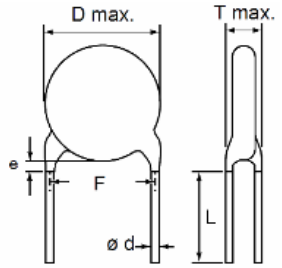
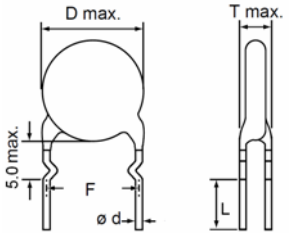
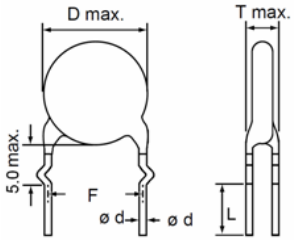
Code	Description
5	5.0±0.8mm (For Bulk)
5	5.0+0.8mm-0.2mm (For Taping)

❿Coating code

Code	Description
P	Halogen free and Pb free, phenolic resin,
A	

2. Mechanical:

Available lead code (Phenolic resin coating)**:** (unit: mm)

Lead type	SAP P/N (13-17) digits	Pitch (F)	Lead length (L)	Packing	Lead configuration
Lead style：B Straight long lead	B20C5	5.0 ± 0.8	20 MIN.	Bulk	
	BAND5	$5.0^{+0.8}_{-0.2}$	Taping Spec. (Ref.to page.8)	Tap. Ammo	
Lead style：L Straight short lead	L4EB5	5.0 ± 0.8	4.5 ± 1.0	Bulk	
	L05B5	5.0 ± 0.8	5.0 ± 1.0		
	L05B0	10 ± 1.0	5.0 ± 1.0		
Lead style：H Inside kink lead	H3EA5	5.0 ± 0.8	3.5 ± 0.5	Bulk	
	H04A5	5.0 ± 0.8	4.0 ± 0.5		
	H4EB5	5.0 ± 0.8	4.5 ± 1.0		
	H05B5	5.0 ± 0.8	5.0 ±1.0		
	H20C5	5.0 ± 0.8	20 MIN.		
	HAND5	$5.0^{+0.8}_{-0.2}$	Taping SPEC. (Ref.to page.8)	Tap. Ammo	
Lead style：X Outside kink lead	X3EA5	5.0±0.8	3.5 ± 0.5	Bulk	
	X04A5	5.0±0.8	4.0 ± 0.5		
	X05B5	5.0±0.8	5.0 ± 1.0		

※ Lead diameter φ= 0.55 +/-0.05mm

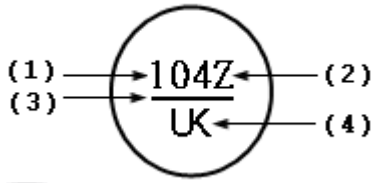
※ **e** (Coating **extension** on leads):
For straight lead style: 1.5mmMax;
For kink lead style: not exceed the kink.

※When Dφ≥11mm, only for bulk, but Dφ≤10mm can do Bulk or Taping.

3. Capacitance value vs. rated voltage, product diameter:

Manufacturing capacity list						
T.C.	FY (Y5V) CLASS III					
Rate voltage	16V		25V		50V	
Dφ	**050**	**060**	**050**	**060**	**050**	**060**
D max. (mm)	6.0	7.0	6.0	7.0	6.0	7.0
T max. (mm)	3.5	3.5	3.5	3.5	3.5	3.5
100000		104		104		104

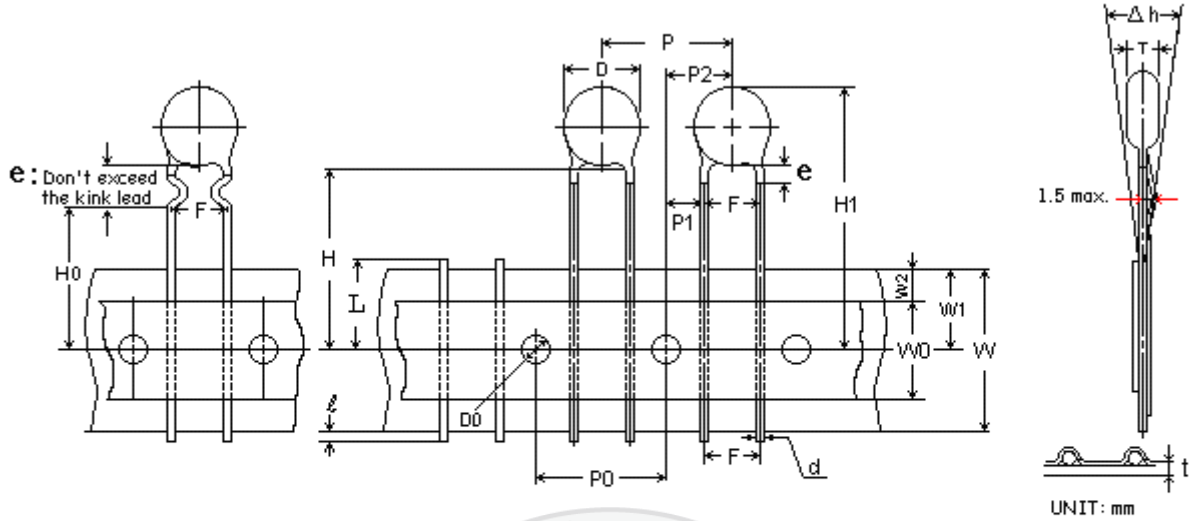
4. Marking:

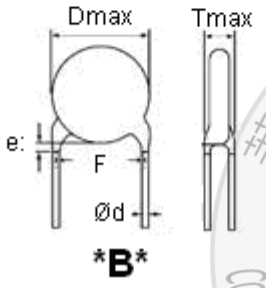
Marking / Remarks		
		
Temp. char.	Y5V：Shall be omitted	
(1). Rated capacitance	Identified by 3-Figure Code. Ex. 100000pF→"104"，	
(2). Capacitance tolerance	Z=+80%-20%	
(3). Rated voltage	16V&25V	Marked with code: 16V→"16V"，25V→"25V"
	50V	Shall be marked "_" under the rated capacitance.
(4). Manufacturer's identification	50V: Shall be marked as "UK", but shall be omitted when DΦ<060. 16V&25V: Shall be marked as "UK", but shall be omitted when DΦ<080.	

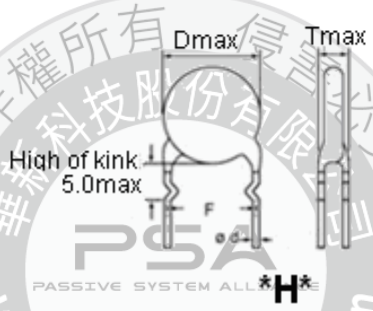
5. Taping specifications:

* Lead spacing: **F**=5.0 $^{+0.8}_{-0.2}$ **(mm)**

- **12.7mm pitch/lead spacing 5.0mm taping**
  Lead code: *BAND5 & *DAND5 & *HAND5



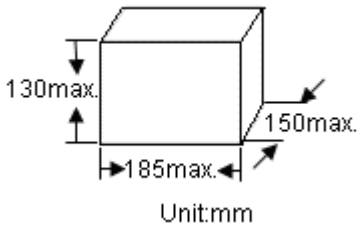
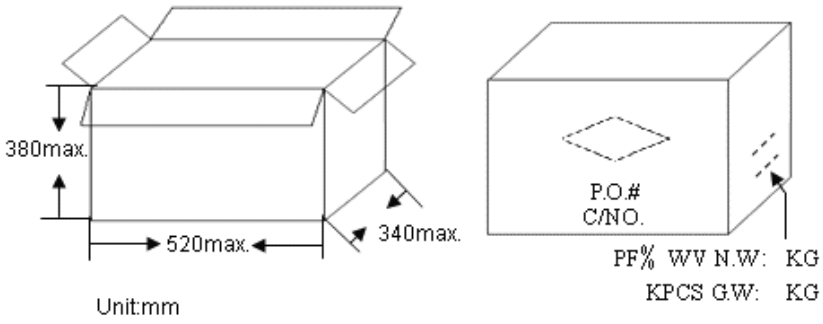
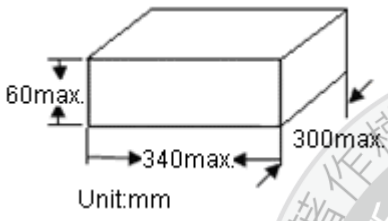
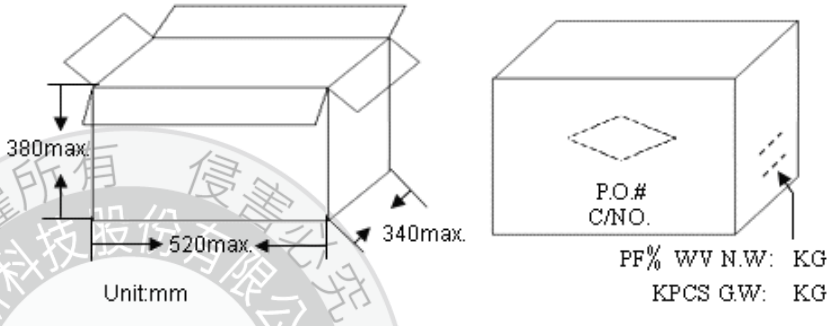




Item		Symbol	Specification		Remarks
			Value	Tolerance	
Body diameter		D	*	max.	See Section“3. Capacitance value vs. rated voltage, product diameter”.
Body thickness		T	*	max.	
Lead-wire diameter		d	0.55	±0.05	
Pitch of component		P	12.7	±1.0	
Feed hole pitch		P0	12.7	±0.3	Cumulative pitch erroe:1.0mm/20 pitch
Feed hole center to lead		P1	3.85	±0.7	To be measured at bottom of clinch
Hole center to component center		P2	6.35	±1.3	
Lead-to-lead distance		F	5.0	+0.8,-0.2	
Component alignment, F-R		Δ h	0	±2.0	
Tape width		W	18.0	+1.0,-0.5	
Hole-down tape width		W0	8.0	min.	
Hole position		W1	9.0	+0.75,-0.5	
Hole-down tape position		W2	3.0	max.	
Height of component form tape center	For straight lead type	H	20.0	+1.0 -0.5	
	For kinked lead type	H0	16.0	±0.5	
Component height		H1	32.25	max.	
Lead-wire protrusion		ℓ	2.0	max.	Or the end of lead wire may be inside the tape.
Food hole diameter		D0	4.0	±0.2	
Total tape thickness		t	0.7	±0.2	Ground paper:0.5±0.1mm
Length of sniped lead		L	11.0	max.	
Coating rundown on leads		e	Please refer to page 6 “e(Coating extension on leads)”.		

6. Packing Baggage：

6.1 Packing size:

Type	Box	Carton
Bulk		
Ammo taping		

6.2.Pakaging Styles

Bulk：1000pcs/bag

Taping：2000pcs/box for Ammo

7. Specification and test method:

7.1 SCOPE: THIS SPECIFICATION APPLIES TO SEMI-CONDUCTIVE CERAMIC TYPE CAPACITOR.

7.2 TEST CONDITIONS :

UNLESS OTHERWISE SPECIFIED, ALL TESTS SHALL BE OPERATED AT THE STANDARD TEST CONDITIONS OF TEMPERATURE 5℃ TO 35℃ AND RELATIVE HUMIDITY 45% TO 85% . WHEN FAILS A TEST, RETEST BE OPERATED AT THE CONDITIONS OF TEMPERATURE 25℃±2℃, RELATIVE HUMIDITY OF 60% TO70% AND BAROMETRIC PRESSURE 860 TO 1060 MBAR..

7.3 HANDLE PROCEDURE :

TO AVOID UNEXPECTED TESTING RESULTS FROM OCCURRING, THE TESTED CAPACITOR MUST BE KEPT AT ROOM TEMPERATURE FOR AT LEAST 30 MINUTES AND COMPLETELY DISCHARGED.

7.4 TEST ITEMS :

ITEM	POST-TEST REQUIREMENTS	TESTING PROCEDURE
TEMPERATURE RANGE	Y5V：-25℃～+85℃	
APPEARANCE STRUCTURE SIZE	NO ABNORMALITIES	AS STATED IN SECTION 3.
MARKING		AS STATED IN SECTION 4
WITHSTAND VOLTAGE	NO ABNORMALITIES	200% RATED VOLTAGE WITH 10mA MAX. CHARGING CURRENT FOR 1～5 SEC. Pre-treatment: Capacitor shall be stored at125±3℃ for 1hour.then placed at※[1]room condition for 24±2hours
INSULATION RESISTANCE	RATED VOLTAGE: 12～16VDC LESSER OF 100MΩ OR 10 MΩ · μF RATED VOLTAGE: 25～50VDC LESSER OF 1000MΩ OR 20 MΩ · μF	INSULATION RESISTANCE SHALL BE MEASURED AT 60±5 SECONDS , 10±1 VDC Pre-treatment: Capacitor shall be stored at125±3℃ for 1hour.then placed at※[1]room condition for 24±2hours
CAPACITANCE	TOLERANCE : M : ±20% Z : +80-20%	TESTING FREQUENCY : 1 KHZ ± 20 % TESTING VOLTAGE : 0.1 VRMS MAX. Pre-treatment: Capacitor shall be stored at125±3℃ for 1hour.then placed at※[1]room condition for 24±2hours
DISSIPATION FACTOR (D.F.)	12～16VDC：BELOW 7.5% 25～50VDC：BELOW 5.0%	
TEMPERATURE RANGE	Y5V：-25℃～+85℃	
TEMPERATURE CHARACTERISTIC	CAP. CHANGE : Y5V：WITHIN +22% ～-82%	CAPACITANCE SHALL BE MEASURED AT 25℃. AND CLASSIFIED AS CAP. CHANGE : -25℃ ～85℃ Pre-treatment: Capacitor shall be stored at125±3℃ for 1hour.then placed at※[1]room condition for 24±2hours
TERMINAL STRENGTH	TENSILE STRENGTH : NO BREAKDOWN	WIRE DIA.0.5 M/M, LOADING WEIGHT 0.5KGS FOR 10±1 SECONDS WIRE DIA.0.6 M/M, LOADING WEIGHT 1.0KGS FOR 10±1 SECONDS
	BENDING STRENGTH : NO BREAKDOWN	WIRE DIA.0.5 M/M, LOADING WEIGHT 0.25 KGS WIRE DIA.0.6 M/M, LOADING WEIGHT 0.5 KGS (BENDING BACK AND FORTH 90 DEGREE TWICE)
SOLDERBILITY	LEAD WIRE SHALL BE SOLDERED OVER 3/4 OF THE CIRCUMFERENTIAL DIRECTION.	TO COMPLY WITH JIS-C-5102 8.4 SOLDER TEMPERATURE245±5℃ AND DIPPING TIME 5±0.5 SECONDS. FLUX : WEIGHT RATIO OF RESIN 25%.

※[1]"room condition" Temperature:15~35, Relative humidity: 45~75%, Atmospheric pressure:86~106kPa

ITEM	POST-TEST REQUIREMENTS	TESTING PROCEDURE
SOLDERING HEAT RESISTANCE	APPEARANCE : NO ABNORMALITIES CAP. CHANGE : Y5V： ± 30% WITHSTAND VOLTAGE : (BETWEEN TERMINALS) NO ABNORMALITIES	LEAD WIRE OR TERMINALS SHALL BE IMMERSED UP TO 2.0 M/M FORM BODY. (A) BODY DIA.≦5.0mm: INTO THE MOLTEN SOLDER OF WHICH TEMPERATURE: 260(+5/-0)℃ FOR 3.0±0.5 SECONDS. (B) BODY DIA.＞5.0mm: INTO THE MOLTEN SOLDER OF WHICH TEMPERATURE 260(+5/-0)℃ FOR 5~10 SECONDS. THEN LEAVE AT STANDARD TEST CONDITIONS FOR 1~2 HOURS, THEN MEASURED. ※WHEN SOLDERING CAPACITOR WITH A SOLDERING IRON, IT SHOULD BE PERFORMED IN FOLLOWING CONDITIONS. TEMPERATURE OF IRON-TIP: 350~400 ℃ SOLDERING IRON WATTAGE : 50W MAX. SOLDERING TIME : 3.5 SEC. MAX.
HUMIDITY CHARACTERISTIC (STABLE SITUATION)	APPEARANCE : NO ABNORMALITIES CAP. CHANGE : Y5V： ± 30% D.F.：12～16VDC： 10 % MAX. 25～50VDC： 7.5% MAX. INSULATION RESISTANCE: 12～16VDC: LESSER OF 50 MΩ OR 5 MΩ・μF 25～50VDC: LESSER OF 500MΩ OR 20 MΩ・MF	CAPACITORS SHALL BE SUBJECTED TO A RELATIVE HUMIDITY OF 90～95% AT 40±2℃FOR 500(+24/-0) HOURS. THEN DRIED FOR24±2 HOURS AND MEASURED. Pre-treatment: Capacitor shall be stored at125±3℃ for 1hour.then placed at※[1]room condition for 24±2hours Post-treatment: Capacitor should be stored for 24±2 hrs. at *[1]room condition
HUMIDITY LOADING	APPEARANCE : NO ABNORMALITIES CAP. CHANGE : Y5V： ± 30% D.F.：12～16VDC： 10 % MAX. 25～50VDC： 7.5% MAX. INSULATION RESISTANCE : 12～16VDC：LESSER OF 50 MΩ OR 5 MΩ・μF 25～50VDC：LESSER OF 500MΩ OR 20 MΩ・μF	CAPACITORS SHALL BE SUBJECTED TO A RELATIVE HUMIDITY OF 90 ～ 95 % AT 40 ± 2℃ FOR 500(+24/-0) HOURS WITH RATED VOLTAGE APPLIED WITH 10MA MAX. THEN DRIED FOR 24±2 HOURS AND MEASURED. Pre-treatment: Capacitor shall be stored at125±3℃ for 1hour.then placed at※[1]room condition for 24±2hours Post-treatment: Capacitor should be stored for 24±2 hrs. at *[1]room condition

※[1]"room condition" Temperature:15~35, Relative humidity: 45~75%, Atmospheric pressure:86~106kPa

ITEM	POST-TEST REQUIREMENTS	TESTING PROCEDURE
HIGH TEMPERATURE LOADING	APPEARANCE : NO ABNORMALITIES CAP. CHANGE : Y5V： ± 30% D.F.：12～16VDC： 10 % MAX. 25～50VDC： 7.5% MAX. INSULATION RESISTANCE : 12～16VDC：LESSER OF 50 MΩ OR 5 MΩ・μF 25～50VDC：LESSER OF 500MΩ OR 20 MΩ・μF	CAPACITORS SHALL BE SUBJECTED TO A TEST OF 150% RATED VOLTAGE WITH 10MA MAX. FOR HIGH 1000(+48/-0) HOURS AT 85±2℃ AND THEN DRIED FOR 24±2 HOURS AND MEASURED Pre-treatment: Capacitor shall be stored at125±3℃ for 1hour.then placed at※[1]room condition for 24±2hours Post-treatment: Capacitor should be stored for 24±2 hrs. at *[1]room condition
TEMPERATURE CYCLING	APPEARANCE : NO ABNORMALITIES CAP. CHANGE : Y5V : ±30% MAX D.F. ≦16VDC: 10% MAX 25VDC~50VDC: 7.5%MAX INSULATION RESISTANCE : INSULATION RESISTANCE: ≦16VDC: LESSER OF 50 MΩ OR 5 MΩ*uF 25VDC~50VDC: LESSER OF 50 MΩ OR 5 MΩ*uF	CAPACITORS SHALL BE SUBJECTED TO: -25±3℃(30±3min) → 25℃(3min) → 85±3℃(30±3min) → 25℃(3min) FOR 5 CYCLE. Pre-treatment: Capacitor shall be stored at125±3℃ for 1hour.then placed at※[1]room condition for 24±2hours Post-treatment: Capacitor should be stored for 24±2 hrs. at *[1]room condition

※[1]"room condition" Temperature:15~35, Relative humidity: 45~75%, Atmospheric pressure:86~106kPa

8. Cautions & notices:

※**Application:** DC or Low frequency High Voltage circuits.

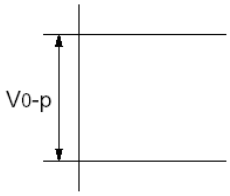
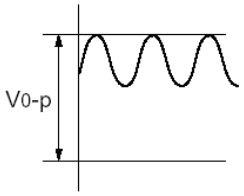
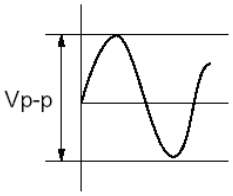
As coupling and decoupling capacitors for such application where higher losses and a reduced capacitance stability are required.

8.1. Caution (Rating)

I. Operating Voltage

When DC-rated capacitors are to be used in AC or ripple current circuits, be sure to maintain the Vp-p value of the applied voltage or the Vo-p which contains DC bias within the rated voltage range.

When the voltage is applied to the circuit, starting or stopping may generate irregular voltage for a transit period because of resonance or switching. Be sure to use a capacitor with a rated voltage range that includes these irregular voltages.

Voltage	DC Voltage	DC+AC Voltage	AC Voltage
Positional measurement			

II. Operating Temperature and Self-generated Heat

Keep the surface temperature of a capacitor below the upper limit of its rated operating temperature range. Be sure to take into account the heat generated by the capacitor itself. When the capacitor is used in a high frequency current, pulse current or similar current, it may self-generate heat due to dielectric loss. The frequency of the applied sine wave voltage should be less than 10kHz. The applied voltage load (*) should be such that the capacitor's self-generated heat is within 20℃ at an atmosphere temperature of 25℃. When measuring, use a thermocouple of small thermal capacity-K of ø0.1mm in conditions where the capacitor is not affected by radiant heat from other components or surrounding ambient fluctuations.

Excessive heat may lead to deterioration of the capacitor's characteristics and reliability. (Never attempt to perform measurement with the cooling fan running. Otherwise, accurate measurement cannot be ensured.)

III. Fail-Safe

When capacitor is broken, failure may result in a short circuit. Be sure to provide an appropriate fail-safe function like a fuse on your product if failure would follow an electric shock, fire or fume.

8.2. Caution (Storage and operating condition)

I. Operating and storage environment

The insulating coating of capacitors does not form a perfect seal; therefore, do not use or store capacitors in a corrosive atmosphere, especially where chloride gas, sulfide gas, acid, alkali, salt or the like are present. And avoid exposure to moisture. Before cleaning, bonding or molding this product, verify that these processes do not affect product quality by testing the performance of a cleaned, bonded or molded product in the intended equipment. Store the capacitors where the temperature and relative humidity do not exceed –10 to 40 degrees centigrade and 15 to 85 % for 6 months maximum and use within the period after receiving the capacitors.

FAILURE TO FOLLOW THE ABOVE CAUTIONS MAY RESULT, WORST CASE, IN A SHORT CIRCUIT AND CAUSE FUMING OR PARTIAL DISPERSION WHEN THE PRODUCT IS USED.

8.3.Caution (Soldering and Mounting)

I. Vibration and impact

Do not expose a capacitor or its leads to excessive shock or vibration during use.

II. Soldering

When soldering this product to a PCB/PWB, do not exceed the solder heat resistance specification of the capacitor. Subjecting this product to excessive heating could melt the internal junction solder and may result in thermal shocks that can crack the ceramic element. When soldering capacitor with a soldering iron, it should be performed in following conditions.

Temperature of iron-tip: 400 degrees C. max.

Soldering iron wattage : 50W max.

Soldering time : 3.5 sec. max.

FAILURE TO FOLLOW THE ABOVE CAUTIONS MAY RESULT, WORST CASE, IN A SHORT CIRCUIT AND CAUSE FUMING OR PARTIAL DISPERSION WHEN THE PRODUCT IS USED.

8.4. Caution (Handling)

Vibration and impact

Do not expose a capacitor or its leads to excessive shock or vibration during use.

FAILURE TO FOLLOW THE ABOVE CAUTIONS MAY RESULT, WORST CASE, IN A SHORT CIRCUIT AND CAUSE FUMING OR PARTIAL DISPERSION WHEN THE PRDUCT IS USED.

8.5. Notice

8.5.1. Notice (Soldering and Mounting)

Cleaning (ultrasonic cleaning)

To perform ultrasonic cleaning, observe the following conditions.

Rinse bath capacity : Output of 20 watts per liter or less.

Rinsing time : 5 min. maximum.

Do not vibrate the PCB/PWB directly.

Excessive ultrasonic cleaning may lead to fatigue destruction of the lead wires.

8.5.2. Notice (Rating)

Capacitance change of capacitor

Class 3 series:

Capacitors have an aging characteristic, whereby the capacitor continually decreases its capacitance slightly if the capacitor is left on for a long time. Moreover, capacitance might change greatly depending on the surrounding temperature or an applied voltage. So, it is not likely to be suitable for use in a time constant circuit.

Please contact us if you need detailed information.

8.5.3 List of substances that affect the insulation strength of coating：

Resin solvent

Category	Model		
Ketone	Acetone	Butanone	Cyclohexanone
Esters	Ethyl acetate	Dibutyl phthalate	
Chlorinated hydrocarbons	Dichloromethane		

Resin thinner

Category		Model	
Reactive diluentactivated thinner	Simple function group	HK-66 (Alkyl glycidyl ether)	
		501 (Butyl glycidyl ether)	
		690 (Phenyl Glycidyl Ether)	
		AGE (C12-14Aliphatic Polyalcohol Glycidyl Ether)	
		692 (Benzyl Glycidyl Ether)	
	Two functional groups	D-678（Neopentyl glycol diglycidyl ether）	
		622 (1,4-Butanediol diglycidyl ether)	
		669 (Ethylene glycol diglycidyl ether)	
		X-632 (Polypropylene glycol diglycidyl ether)	
		X-652 (1,6-Hexadiol diglycidyl ether)	
		D-691Epoxypropane o-methylphenyl ether	
Non-activated thinner		Anhydrous ethanol	Toluene
		Ethyl acetate	Dimethylbenzene
		Dimethyl formamide	Butyl acetate
		Acetone	Styrene
		Polyol	Benzyl alcohol

Note: The above substances should not contact the coating of the product body, otherwise it will affect the insulation strength of the product

9. Soldering Recommendation:

9.1 Wave Soldering Profile:

- Temperature conditions of the flow is recommended as shown in the chart
- Must implement the pre-heat
- Maximum peak flow temperature is recommended 265℃
- Time “T” implement in the chart recommended within 20 sec. it temperature exceed 200℃
- Take care with the flow solder not to touch the capacitor body directly at mounting

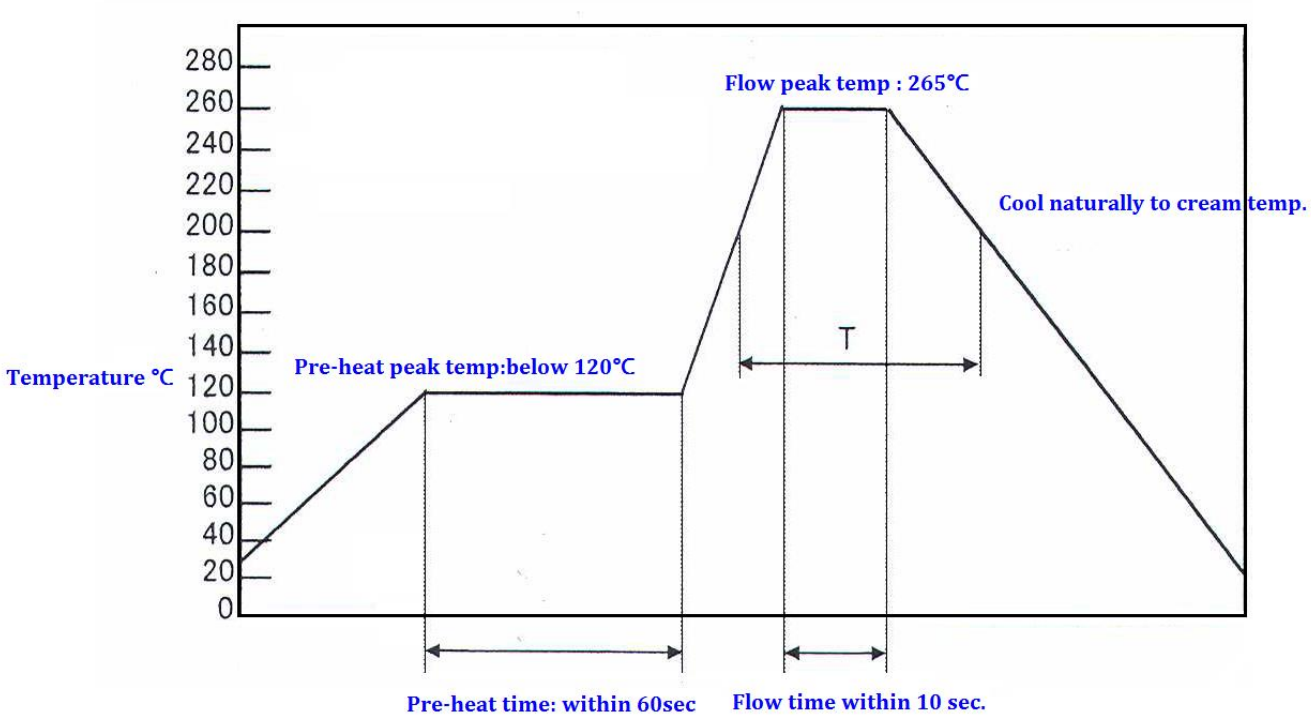


Chart to show flow recommended temp

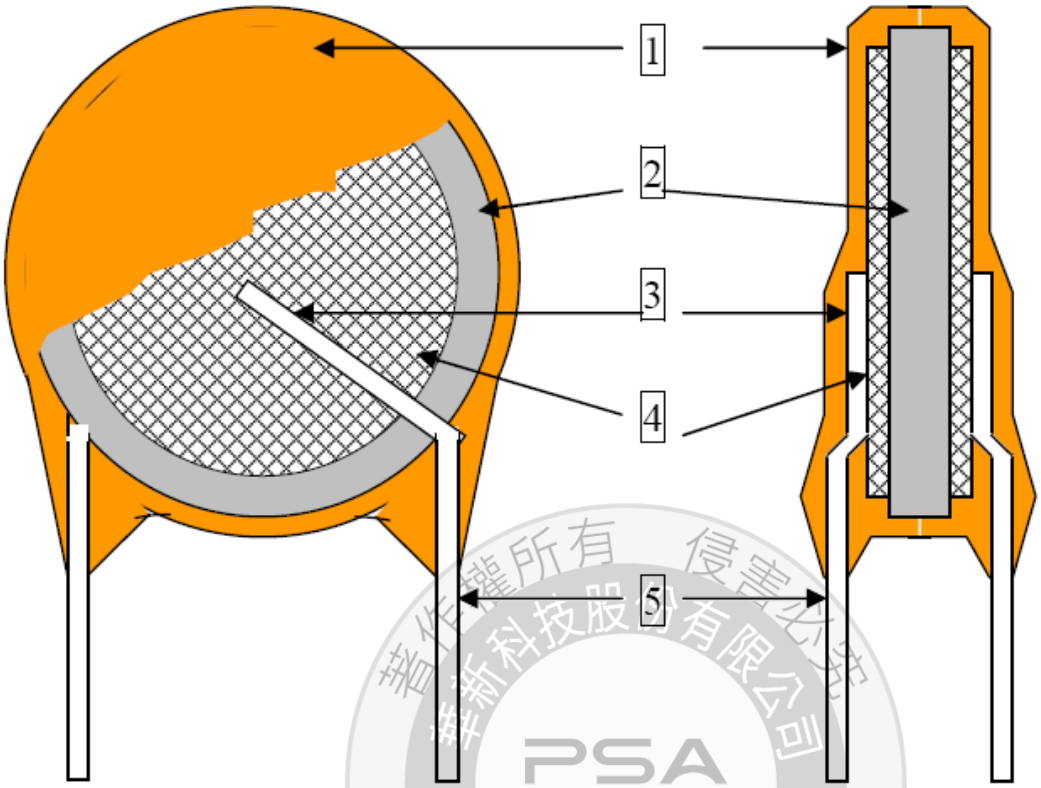
9.2 Recommended Reworking Conditions with Soldering Iron：

- Temperature of iron-tip: 400 degrees C. max.
- Soldering iron wattage: 50W max.
- Soldering time: 3.5 sec. max.
- Distance from coating body: 2 mm (min.)

9.3 Reflow-Soldering：Lead Ceramic Cap. should not be soldered by reflow-soldering.

10. **Drawing of internal structure and material list**：

產 品 結 構 圖



Remarks：

No.	Material	Description
1	Insulation Coating	Phenolic resins
2	Dielectric Element	Ceramic
3	Solder	Tin-Silver alloy
4	Electrodes	Silver [Ag]
5	Leads wire	Solder coated CP wire (Solder : Tin-Silver alloy)