PRODUCT SPECIFICATION

PRODUCT: CERAMIC DISC CAPACITOR

TYPE: 50V, 100V, 500V, 1KV, 2KV, TEMPERATURE COMPENSATING CAPACITOR

CUSTOMER:

DOC. NO.: POE-D01-00-E-20

Ver.: 20

APPROVED BY CUSTOMER

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VENDOR：

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

1. 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

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Record of change

<table>
<tr><th>Date</th><th>Version</th><th>Description</th><th>page</th></tr>
<tr><td>2008.6.3</td><td>1</td><td>1. D08-00-E-14 (before) → POE-D01-00-E-01 (1st edition)</td><td></td></tr>
<tr><td>2008.8.22</td><td>2</td><td>2. Revised diameter as below :
<table>
<tr><th>Before</th><th>Now</th><th>Before</th><th>Now</th></tr>
<tr><td>CH5000R5X040*</td><td>not available</td><td>SL500181X060*</td><td>SL500181X050*</td></tr>
<tr><td>CH1010R5X040*</td><td>not available</td><td>SL500241X070*</td><td>SL500241X060*</td></tr>
<tr><td>CH501360X050*</td><td>CH501360X060*</td><td>SL500361X080*</td><td>SL500361X070*</td></tr>
<tr><td>CH501620X080*</td><td>CH501620X060*</td><td>SL500391X080*</td><td>SL500391X070*</td></tr>
<tr><td>CH501680X080*</td><td>CH501680X060*</td><td>SL101181X060*</td><td>SL101181X050*</td></tr>
<tr><td>CH501750X080*</td><td>CH501750X060*</td><td>SL101241X070*</td><td>SL101241X060*</td></tr>
<tr><td>CH501820X080*</td><td>CH501820X070*</td><td>SL101361X080*</td><td>SL101361X070*</td></tr>
<tr><td>CH501101X080*</td><td>CH501101X070*</td><td>SL101391X080*</td><td>SL101391X070*</td></tr>
<tr><td>CH102080X060*</td><td>CH102080X050*</td><td>SL102680X060*</td><td>SL102680X050*</td></tr>
<tr><td>CH102100X060*</td><td>CH102100X050*</td><td>SL102121X100*</td><td>SL102121X060*</td></tr>
<tr><td>CH102120X060*</td><td>CH102120X050*</td><td>SL102151X100*</td><td>SL102151X070*</td></tr>
<tr><td>CH102620X080*</td><td>CH102620X070*</td><td>SL102181X100*</td><td>SL102181X070*</td></tr>
<tr><td>CH102820X100*</td><td>CH102820X080*</td><td>SL102201X100*</td><td>SL102201X080*</td></tr>
<tr><td></td><td></td><td>SL102221X100*</td><td>SL102221X080*</td></tr>
</table>
2. Complete lead code
3.Add last SAP code “ H” for halogen and Pb free , epoxy resin..</td><td>8-9
6-7
5</td></tr>
<tr><td>2008.12.12</td><td>3</td><td>3. Complete the 13th to 17th codes of SAP P/N.
2. Page layout adjustment.
3. Added Marking when the coating resin is Halogen and PB free Epoxy.</td><td>5-9</td></tr>
<tr><td>2009.8.19</td><td>4</td><td>1 Change PSA & POE logo to Walsin & POE logo.
2.Operating temperature range change from -25℃ ～ +85℃ to -25℃ ～ +125℃,
and the loading temperature of High Temperature Loading change from +85℃ to +125℃
(but the T.C.C temperature didn’t change).</td><td>13
15</td></tr>
<tr><td>2010.8.24</td><td>5</td><td>1. Change the diameter dimension from 060 to 070 for P/N CH 500V 62Pf&68Pf&75Pf.
2. Add 10Pf~39Pf(Code of diameter dimension is 050) for P/N SL 1KV.</td><td>8
9</td></tr>
<tr><td>2012/5/10</td><td>6</td><td>1). Review the size Dφ of the item CH/500V/121&151 from “100” to be “080”;
2). Review the size Dφ for the item CH/1000V/820 from “080” to be “070”, CH/1000V/101
from “100” to be “070”.</td><td>8
8</td></tr>
<tr><td>2012/12/5</td><td>7</td><td>Add 8.6. Ambient Temp of Allowable Voltage Graph (500Vdc to 2kVdc)</td><td>18-19</td></tr>
<tr><td>2013/5/6</td><td>8</td><td>1. Review the Lead diameter φ from 0.60 +/-0.06mm to 0.55+/-0.05mm
2. Review the “DΦ≤6.0mm shall be omitted.” To “ DΦ≤060 shall be omitted.”
3. Review the Solderability temperature from 255(+5/-0)℃ to 245±5℃，Solderability time
from 2 ±0.5s to 5±0.5s.</td><td>7,10
9
13</td></tr>
<tr><td>2013/10/18</td><td>9</td><td>Review the packing specification</td><td>11</td></tr>
<tr><td>2015/8/31</td><td>10</td><td>Modify the contents of the use of epoxy resin for 1KV products</td><td>8-9</td></tr>
<tr><td>2015/9/23</td><td>11</td><td>1. Modify the contents of the temperature characteristic.
2. Delete the definition about“Old Part No.”.
3. Delete 300 Pf~391 Pf (Code of diameter dimension is 110&120) for P/N CH 50V&100V.
4. Delete 82 Pf &100 Pf (Code of diameter dimension is 070) and 120 Pf &150 Pf (Code of diameter dimension is 080) for P/N CH 500V.
5. Delete 56 Pf &68Pf~100Pf (Code of diameter dimension is 070) for P/N CH 1KV.
6. Delete 4Pf~22Pf (Code of diameter dimension is 060) and 24Pf~47Pf (Code of diameter dimension is 070) for P/N CH 2KV.</td><td>5,
6,7
8
8

8
8</td></tr>
<tr><td>2016/3/2</td><td>12</td><td>1. Review the Available lead code of Lead Configuration.
2. Review 8.6. Ambient Temp of Allowable Voltage Graph (500Vdc to 2kVdc)
3. Review 9. Drawing of internal structure and material list</td><td>6-7
17-18
19</td></tr>
</table>

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<table>
<tr><th>Date</th><th>Version</th><th>Description</th><th>page</th></tr>
<tr><td>2016/5/3</td><td>13</td><td>1. Revised diameter as below :
<table>
<tr><th>Before</th><th>Now</th></tr>
<tr><td>SL202181J100*</td><td>SL202181J080*</td></tr>
<tr><td>SL202201J100*</td><td>SL202201J080*</td></tr>
<tr><td>SL202221J100*</td><td>SL202221J080*</td></tr>
<tr><td>SL202241J100*</td><td>SL202241J080*</td></tr>
<tr><td>SL202271J100*</td><td>SL202271J080*</td></tr>
<tr><td>SL202301J120*</td><td>SL202301J110*</td></tr>
<tr><td>SL202331J120*</td><td>SL202331J110*</td></tr>
</table></td><td>9</td></tr>
<tr><td>2016/11/3</td><td>14</td><td>1. Delete “CH” series.</td><td>5,8,12~13</td></tr>
<tr><td>2016/12/21</td><td>15</td><td>1. Revised the product diameter for SL 50V~500V</td><td>8</td></tr>
<tr><td>2017/9/27</td><td>16</td><td>1. Delete 8Pf~12Pf (Code of diameter dimension is 040) for P/N SL 50V&100V.
2. Delete 8Pf~15Pf (Code of diameter dimension is 050) for P/N SL 500V.
3. Delete 10Pf~12Pf (Code of diameter dimension is 050) for P/N SL 1KV.</td><td>8</td></tr>
<tr><td>2021/9/9</td><td>17</td><td>1. Delete Walsin & POE logo.</td><td>1</td></tr>
<tr><td>2022/1/8</td><td>18</td><td>1. Add “Soldering Recommendation”</td><td>19</td></tr>
<tr><td>2022/4/21</td><td>19</td><td>1. Add 8.5.2 List of substances that affect the insulation strength of coating</td><td>16</td></tr>
<tr><td>2023/6/15</td><td>20</td><td>1. The last code “B” is changed from “Epoxy Resin , Pb free” to “Halogen free and Pb free , epoxy resin ”.</td><td>5,8</td></tr>
</table>

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

SL ❶ 102 ❷ 470 ❸ J ❹ 050 ❺ B ❻ 20 ❼ C ❽ 5 ❾ H ❿

❶ Temperature characteristic：
SL: +350~-1000ppm/℃

❷ Rated voltage (Vdc)：

Voltage	50V	100V	500V	1000V	2000V
Code	500	101	501	102	202

❸Capacitance(pF)：

Capacitors (pF)	47	100	330	470	820
Code	470	101	331	471	821

❹Capacitance tolerance： J: ±5% (For above 10pF), K: ±10%

❺ Nominal body diameter dimension：

Diameter size	4mm	5mm	6mm	7mm	8mm	9mm	10mm	11mm	12mm
Code	040	050	060	070	080	090	100	110	120

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：4.0mm
4E	Lead’s length L：4.5mm
05	Lead’s length L：5.0mm
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	Code	Description
5	5.0±0.8mm (For Bulk)	7	7.5 ±1mm
5	5.0+0.8mm-0.2mm (For Taping)	0	10.0 ±1mm
2	2.5 ±0.8 mm		

❿Coating code

Code	Description
P	Halogen free and Pb free, phenolic resin
A	
B	Halogen free and Pb free , epoxy resin
H	

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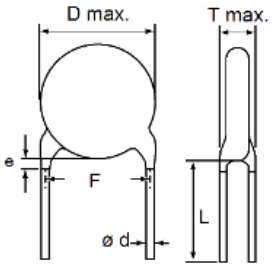
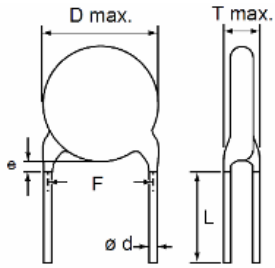
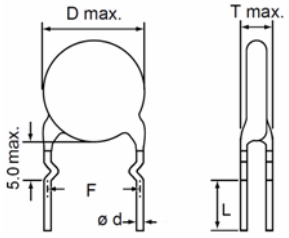
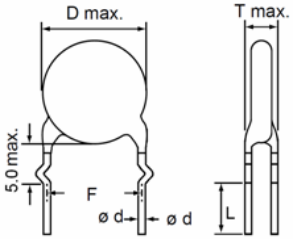
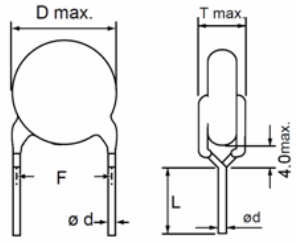
2. Mechanical:

Available lead code: (unit: mm)

Lead type	SAP P/N (13-17) digits	Pitch (F)	Lead length (L)	Available rated voltage	Packing	Lead configuration
Lead style：B Straight long lead	B20C2	2.5 ± 0.8	20 MIN.	50V&100V	Bulk	
	B20C5	5.0 ± 0.8	20 MIN.	50V&100V, 500V, 1KV,2KV		
	B20C6	6.4 ± 1.0	20 MIN.			
	B20C0	10 ± 1.0	20 MIN.			
	B20C7	7.5 ± 1.0	20 MIN.			
	BAND5	5.0 $^{+0.8}_{-0.2}$	Taping Spec. (Ref. to page.10)		Tap. Ammo	
	BAND2	2.5 ± 0.8		50V&100V		
Lead style：L Straight short lead	L05B2	2.5 ± 0.8	5.0 ± 1.0		Bulk	
	L05B5	5.0 ± 0.8	5.0 ± 1.0	50V&100V, 500V, 1KV, 2KV		
	L05B0	10 ± 1.0	5.0 ± 1.0			
	L05B6	6.4 ± 1.0	5.0 ± 1.0			
	L05B7	7.5 ± 1.0	5.0 ± 1.0			
	L4EB5	5.0 ± 0.8	4.5 ± 1.0			
	L4EB7	7.5 ± 1.0	4.5 ± 1.0			
	L4EB0	10 ± 1.0	4.5 ± 1.0			
Lead style：H Inside kink lead	H3EA5	5.0 ± 0.8	3.5 ± 0.5	50V&100V, 500V, 1KV	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.10)		Tap. Ammo	
	H05B7	7.5 ± 1.0	5.0 ±1.0	50V&100V, 500V, 1KV,2KV	Bulk	
	H05B0	10 ± 1.0	5.0 ±1.0			
	H20C0	10 ± 1.0	20 MIN.			
	H04A7	7.5 ± 1.0	4.0 ± 0.5			
	H04A0	10 ± 1.0	4.0 ± 0.5			
	H3EA7	7.5 ± 1.0	3.5 ± 0.5			
	H3EA0	10 ± 1.0	3.5 ± 0.5			
	H4EB7	7.5 ± 1.0	4.5 ± 1.0			
	H4EB0	10 ± 1.0	4.5 ± 1.0			
Lead style：X Outside kink lead	X3EA5	5.0±0.8	3.5 ± 0.5	50V&100V, 500V, 1KV, 2KV	Bulk	
	X3EA7	7.5±1.0				
	X3EA0	10±1.0				
	X04A5	5.0±0.8	4.0 ± 0.5			
	X04A7	7.5±1.0				
	X04A0	10±1.0				
	X05B5	5.0±0.8	5.0 ± 1.0			
	X05B7	7.5±1.0				
	X05B0	10±1.0				
Lead style：D Vertical kink short lead	D04A5	5.0±1.0	4.0 ± 0.5	50V&100V, 500V, 1KV, 2KV	Bulk	
	D04A7	7.5±1.0				
	D04A0	10±1.0				
	D3EA5	5.0±0.8	3.5 ± 0.5			
	D3EA7	7.5±1.0				
	D3EA0	10±1.0				
	DAND5	5.0$^{+0.8}_{-0.2}$	Taping SPEC. (Ref. to page.10)		Tap. Ammo	

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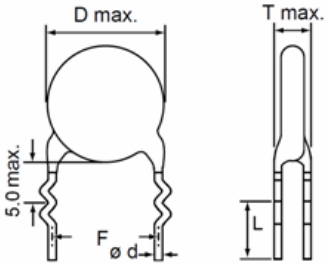
Lead type	SAP P/N (13-17) digits	Lead length (L)	Available rated voltage	Packing	Lead configuration
Lead style：M Double outside kink lead	M05B5	5.0 ± 1.0	50V&100V, 500V, 1KV, 2KV	Bulk	
	M05B7				
	M05B0				
	M04B5	4.0 ± 1.0			
	M04B7				
	M04B0				

※ Lead diameter φ= 0.55 +/-0.05mm

※ Phenolic resin coating for 50V/500V/1KV product; Epoxy resin coating for 1KV or 2KV product.

※ **e** (Coating **extension** on leads):

For straight lead style: 1.5mmMax when the rated voltage is 50Vdc & 100Vdc;
2.0mmMax when the rated voltage is 500Vdc and 1KVdc;
3.0mmMax when the rated voltage is 2KVdc.

For kink lead style: not exceed the kink.

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

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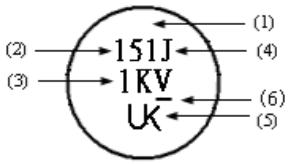
3. Capacitance value vs. rated voltage, product diameter:

T.C	SL																		
Rate voltage	50V/100V							500V					1KV				2KV		
Dφ	040	050	060	070	080	090	100	050	060	070	080	100	050	060	070	080	060	070	080
D max. (mm)	5.0	6.0	7.0	8.0	9.0	10.0	11.0	6.0	7.0	8.0	9.0	11.0	6.0	7.0	8.0	9.0	7.5	8.5	**9.5**
T max. (mm)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	4.0	4.0	4.0	4.0	4.0	4.5	4.5	4.5	4.5	4.5	4.5	**4.5**
10																			
12																			
15	**150**												**150**				**150**		
18	**180**							**180**					**180**				**180**		
20	**200**							**200**					**200**				**200**		
22	**220**							**220**					**220**				**220**		
24	**240**							**240**					**240**				**240**		
27	**270**							**270**					**270**				**270**		
30	**300**							**300**					**300**				**300**		
33	**330**							**330**					**330**				**330**		
36	**360**							**360**					**360**				**360**		
39	**390**							**390**					**390**				**390**		
47	**470**							**470**					**470**				**470**		
51	**510**							**510**					**510**				**510**		
56	**560**							**560**					**560**				**560**		
68	**680**							**680**					**680**				**680**		
75	**750**							**750**						**750**			**750**		
82	**820**							**820**						**820**			**820**		
100	**101**							**101**						**101**				**101**	
120		**121**							**121**					**121**					**121**
150		**151**							**151**						**151**				**151**
180		**181**								**181**					**181**				**181**
200			**201**							**201**						**201**			**201**
220			**221**							**221**						**221**			**221**
240			**241**								**241**								
270				**271**							**271**								
300				**301**							**301**								
330				**331**							**331**								
360				**361**								**361**							
390				**391**								**391**							
470					**471**														
500						**501**													
510						**511**													
560						**561**													
680							**681**												
750							**751**												
820							**821**												
PACKING	**TAPING or BULK**							**TAPING or BULK**					**TAPING or BULK**				**TAPING or BULK**		
COATING	**Phenolic resin**												**Phenolic resin or Epoxy Resin**				**Epoxy Resin**		

4. Marking:

Marking / Remarks	SL
	
(1). Temp. char.	SL：No marking.
(2). Rated capacitance	Identified by 3-Figure Code. Ex. 47pF→"47"，470pF→"471"
(3). Rated voltage	50V&100V: Marked with code "__" under the rated capacitance.
	500V: No any marking under the rated capacitance.
	1000V&2000V: Marked with code: 1000V→"1KV"，2000V→"2KV"
(4). Capacitance tolerance	J: ±5% (For above 10pF), K: ±10%
(5). Manufacturer's identification	Shall be marked as "UK", but DΦ≤060 shall be omitted.
(6). Halogen and Pb free	There is a "__"marking under the code "V" when the coating resin is Halogen free and Pb free Epoxy. (For the last code "H" and "B" of the SAP P/N)

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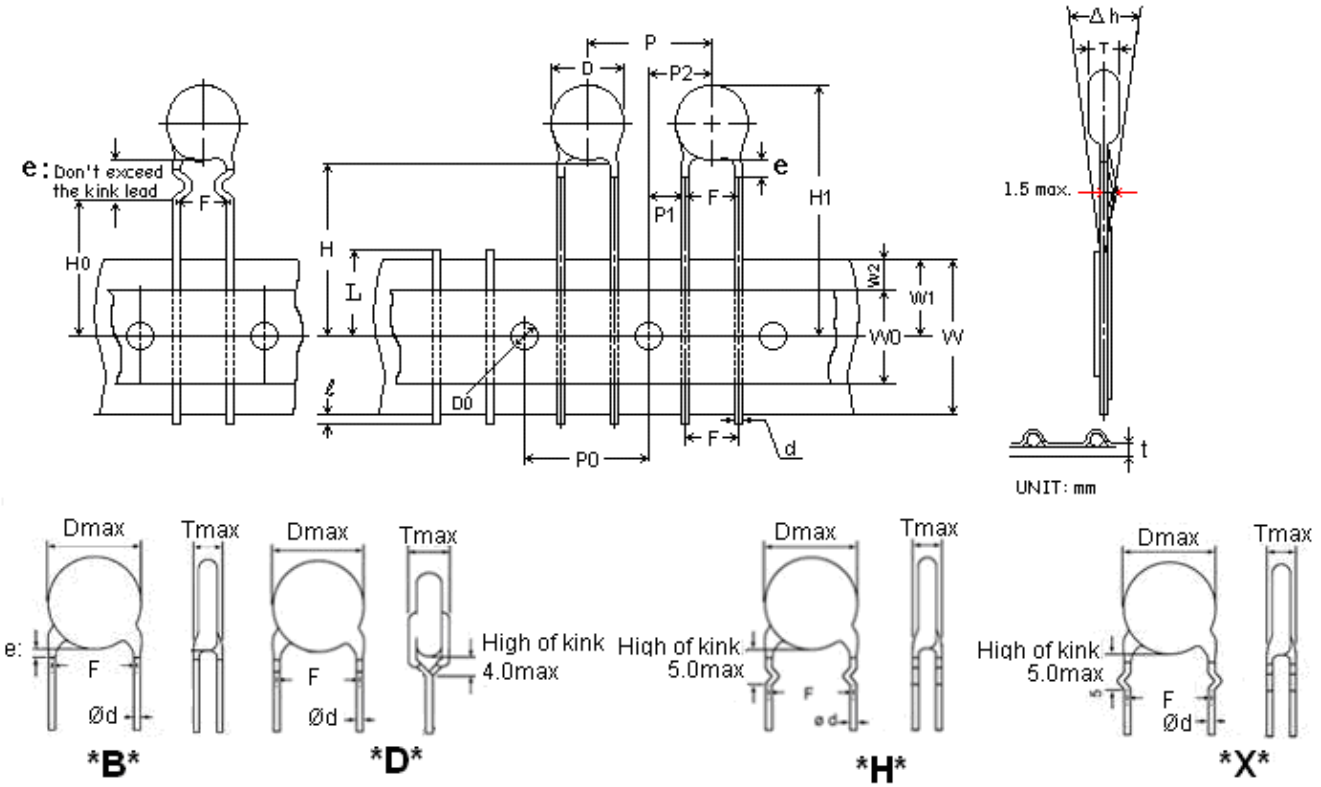
5. Taping specifications:

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

- **12.7mm pitch/lead spacing 5.0mm taping**
  Lead code: *BAND5 & *DAND5 & *HAND5 &*XAND5



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, L-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)".		

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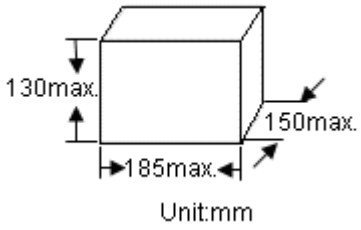
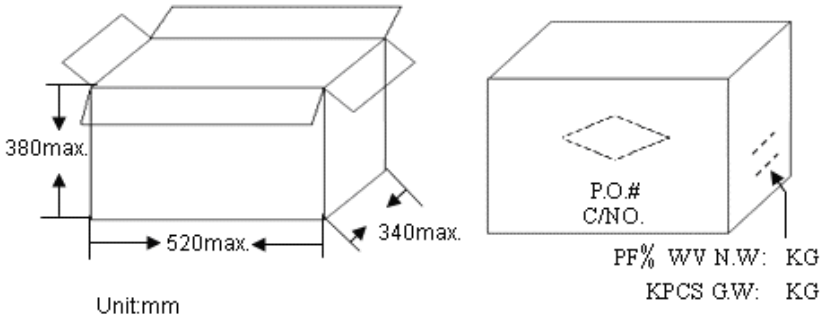
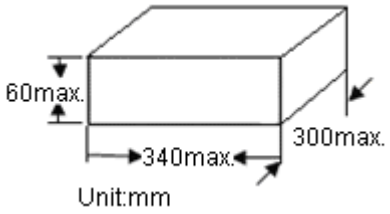
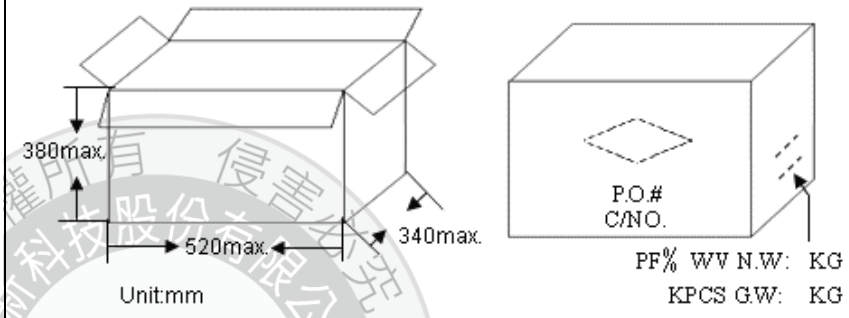
6. Packing Baggage：

6.1 Packing size:

Type	Box	Carton
Bulk		
Ammo taping		

6.2 Packing quantity:

Packing Type	The code of 14th to15th in SAP P/N	MPQ (Kpcs/Box)	Remark
Taping	AN	2	Phenolic resin
	AN	1.5	Epoxy resin

Packing Type	Lead length	Size code of 10th to 12th in SAP P/N	MPQ (Kpcs/Bag)	Kpcs/Box	Remark
Bulk	Long lead (L≧16mm)	040~070	1	3	Phenolic resin
		080~100	1	2	Phenolic resin
		050~100	1	2	Epoxy resin
		110	0.5	1.5	
	Short lead (L＜16mm)	040~060	1	6	
		070~080	1	4	
		090~100	1	3	
		110	1	2	

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7. Specification and test method:

7.1 SCOPE: THIS SPECIFICATION APPLIES TO TEMPERATURE COMPENSATING CERAMIC DISC 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% TO 70% AND BAROMETRIC PRESSURE 860 TO 1060 MBAR.

7.3 HANDLE PROCEDURE : TO AVOID UNEXPECT 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
APPEARANCE STRUCTURE SIZE	NO ABNORMALITIES		AS SECTION 3.
MARKING			AS STATED IN SECTION 4
WITHSTAND VOLTAGE	BETWEEN TERMINALS: NO ABNORMALITIES		A. BELOW 1KV: 300% RATED VOLTAGE WITH 50mA MAX. CHARGING CURRENT FOR 1～5 SEC. B. 1KV & ABOVE: 200% RATED VOLTAGE WITH 50mA MAX. CHARGING CURRENT FOR 1～5 SEC.
	BETWEEN TERMINAL AND ENCLOSURE : NO ABNORMALITIES		SMALL METALLIC BALLS WITH 1mm DIAMETERS SHALL BE PUT ON A VESSEL AND THE TEST CAPACITOR SHALL BE SUBMERGED EXCEPT 2mm FROM THE TOP OF ITS COMPONENT BODY. THE TEST VOLTAGE SHALL BE APPLIED BETWEEN THE SHORT-CIRCUITED TERMINALS AND THE METALLIC BALLS. (APPLY 1.3KV DC OF RATED VOLTAGE BETWEEN TERMINALS AND ENCLOSURE FOR 1～5 SEC)
INSULATION RESISTANCE	10000 MΩ MIN		INSULATION RESISTANCE SHALL BE MEASURED AT 60±5 SECONDS AFTER APPLIED VOLTAGE (RATED) RATED VOLTAGE: 50V=50V, 100V=100V, 500V & ABOVE=500V
CAPACITANCE	TOLERANCE : J : ±5% K : ±10%		TESTING FREQUENCY : 1 MHZ ± 20% TESTING VOLTAGE : 1.0 VRMS
OPERATING TEMPERATURE RANGE	-25℃ ～ +125℃		
Q FACTOR	30 PF & ABOVE	Q ≧1000	AS ABOVE STIPULATION OF CAPACITANCE
	BELOW 30PF	Q ≧ 400+20×C	

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<table>
<tr><th>ITEM</th><th>POST-TEST REQUIREMENTS</th><th>TESTING PROCEDURE</th></tr>
<tr><td rowspan="2">TEMPERATURE CHARACTERISTIC</td><td>TEMPERATURE COEFFICIENT :
SL :+350～-1000 ppm/℃
FOR (+20℃~+85℃)</td><td>ACCORDING TO STEP 1 TO 5 IN ORDER, MEASURED CAPACITANCE WHEN TEMPERATURE REACH BALANCE AND TEMPERATURE COEFFICIENT SHALL BE CALCULATED ON THE FOLLOWING FORMULA :
PPM/℃ =(C2-C1)×10E6/C1(T2-T1)
<table><tr><td>Step</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td>Temp. (℃)</td><td>25±2</td><td>20±3</td><td>25±2</td><td>85±2</td><td>25±2</td></tr></table>
NOTE : C1 = CAPACITANCE AS STEP 3
C2 = CAPACITANCE AS STEP 2 OR 4
T1 = TEMPERATURE AS STEP 3
T2 = TEMPERATURE AS STEP 2 OR 4</td></tr>
<tr><td>CAPACITANCE TOLERANCE :
WITHIN ±0.2% OR ±0.05PF,
WHICHEVER IS LARGE</td><td>ACCORDING TO ABOVE STEP 1,3 & 5, CAPACITANCE TOLERANCE SHALL BE CALCULATED ON THE FOLLOWING FORMULA :
Δ C%=(G - S)/C1
NOTE : G = GREATEST CAPACITANCE AS TESTING RESULT OF STEP 1,3 & 5
S = LEAST CAPACITANCE AS TESTING RESULT OF STEP 1,3 & 5
C1 = CAPACITANCE AS STEP 3</td></tr>
<tr><td rowspan="2">TERMINAL STRENGTH</td><td>TENSIBLE STRENGTH :
NO BREAKDOWN</td><td>WIRE DIA.0.5 M/M. LOADING WEIGHT 0.5 KGS, FOR 10±1 SECONDS.
WIRE DIA.0.6 M/M. LOADING WEIGHT 1.0 KGS, FOR 10±1 SECONDS.</td></tr>
<tr><td>BENDING STRENGTH :
NO BREAKDOWN</td><td>WIRE DIA.0.5 mm, LOADING WEIGHT 0.25 KGS.
WIRE DIA.0.6 mm, LOADING WEIGHT 0.5 KGS.
(BENDING BACK AND FORTH 90 DEGREE TWICE)</td></tr>
<tr><td rowspan="3">SOLDERING HEAT RESISTANCE</td><td>APPEARANCE :
NO ABNORMALITIES</td><td rowspan="3">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.</td></tr>
<tr><td>CAP.CHANGE :
WITHIN ±2.5% OR ±0.25PF,
WHICHEVER IS LARGE.</td></tr>
<tr><td>WITHSTAND VOLTAGE :
(BETWEEN TERMINALS)
NO ABNORMALITIES</td></tr>
<tr><td>SOLDERABILITY</td><td>LEAD WIRE SHALL BE SOLDERED OVER 75% OF THE CIRCUMFERENTIAL DIRECTION.</td><td>TO COMPLY WITH JIS-C-5102 8.4 SOLDER TEMPERATURE245±5℃ AND DIPPING TIME 5±0.5 SECONDS FLUX : WEIGHT RATIO OF ROSIN 25%</td></tr>
</table>

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ITEM	POST-TEST REQUIREMENTS	TESTING PROCEDURE
HUMIDITY CHARACTERISTIC	APPEARANCE : NO ABNORMALITIES	CAPACITORS SHALL BE SUBJECTED TO A RELATIVE HUMIDITY OF 90 ～ 95% AT 40 ± 2℃ FOR 500(+24/-0) HOURS, THEN DRIED FOR 1～2 HOURS AND MEASURED.
	CAP. CHANGE : SL : WITHIN ±5% OR ±0.5PF, WHICHEVER IS LARGE	
	Q FACTOR : SL : LESS THAN 10PF ==> Q ≧ 200 + 10 × C MORE THAN 10PF AND LESS THAN 30PF => Q ≧ 275 + 5 × C / 2 MORE THAN 30PF => Q ≧ 350	
	INSULATION RESISTANCE : 1000MΩ MIN.	
HUMIDITY LOADING	APPEARANCE : NO ABNORMALITIES	CAPACITORS SHALL BE SUBJECTED TO A RELATIVE HUMIDITY OF 90 ～ 95% AT 40±2℃ FOR 500(+24/-0) HOURS WITH RATED VOLTAGE APPLIED (LESS THAN 50mA), THAN DRIED FOR 1～2 HOURS AND MEASURED.
	CAP.CHANGE : SL : WITHIN ±7.5% OR ±0.75PF, WHICHEVER IS LARGE	
	Q FACTOR : SL : LESS THAN 30PF => Q ≧ 100 + 10 × C / 3 MORE THAN 30PF => Q ≧ 200	
	INSULATION RESISTANCE : 500MΩ MIN.	
HIGH TEMPERATURE LOADING	APPEARANCE : NO ABNORMALITIES	CAPACITORS SHALL BE SUBJECTED TO A TEST OF: (A) BELOW 1KV: 200% RATED VOLTAGE WITH 50mA MAX. (B) 1KV & ABOVE: 150% RATED VOLTAGE WITH 50mA MAX. FOR 1000(+48/-0) HOURS AT 125℃ ± 2℃ AND THEN DRIED FOR 1～2 HOURS AND MEASURED.
	CAP. CHANGE : SL : WITHIN ±3% OR ±0.3PF, WHICHEVER IS LARGE	
	Q FACTOR : SL : LESS THAN 10PF => Q ≧ 200 + 10 × C MORE THAN 10PF & LESS THAN 30PF => Q ≧ 275 + 5 × C / 2 MORE THAN 30PF => Q ≧ 350	
	INSULATION RESISTANCE : 1000MΩ MIN.	

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ITEM	POST-TEST REQUIREMENTS	TESTING PROCEDURE
TEMPERATURE CYCLING	APPEARANCE : NO ABNORMALITIES	CAPACITORS SHALL BE SUBJECTED TO: -25±3℃(30±3min) → 25℃(3min) → 125±3℃(30±3min) → 25℃(3min) FOR 5 CYCLE.
	CAP. CHANGE : WITHIN ±5% OR ±0.5PF, WHICHEVER IS LARGE	
	D.F. C < 30pF : Q≧275+(5/2)C C ≧30pF : Q≧350	
	INSULATION RESISTANCE : 1000 MΩ MIN.	

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8. Cautions & notices:

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

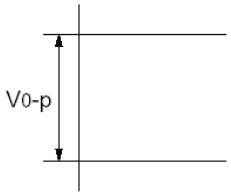
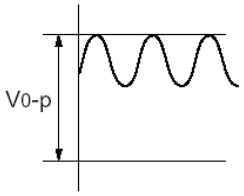
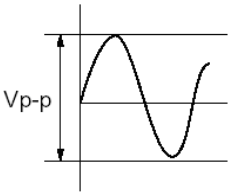
As coupling and decoupling capacitors for such application where higher losses and a reduced capacitance stability are required.

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 100kHz. 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.

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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 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

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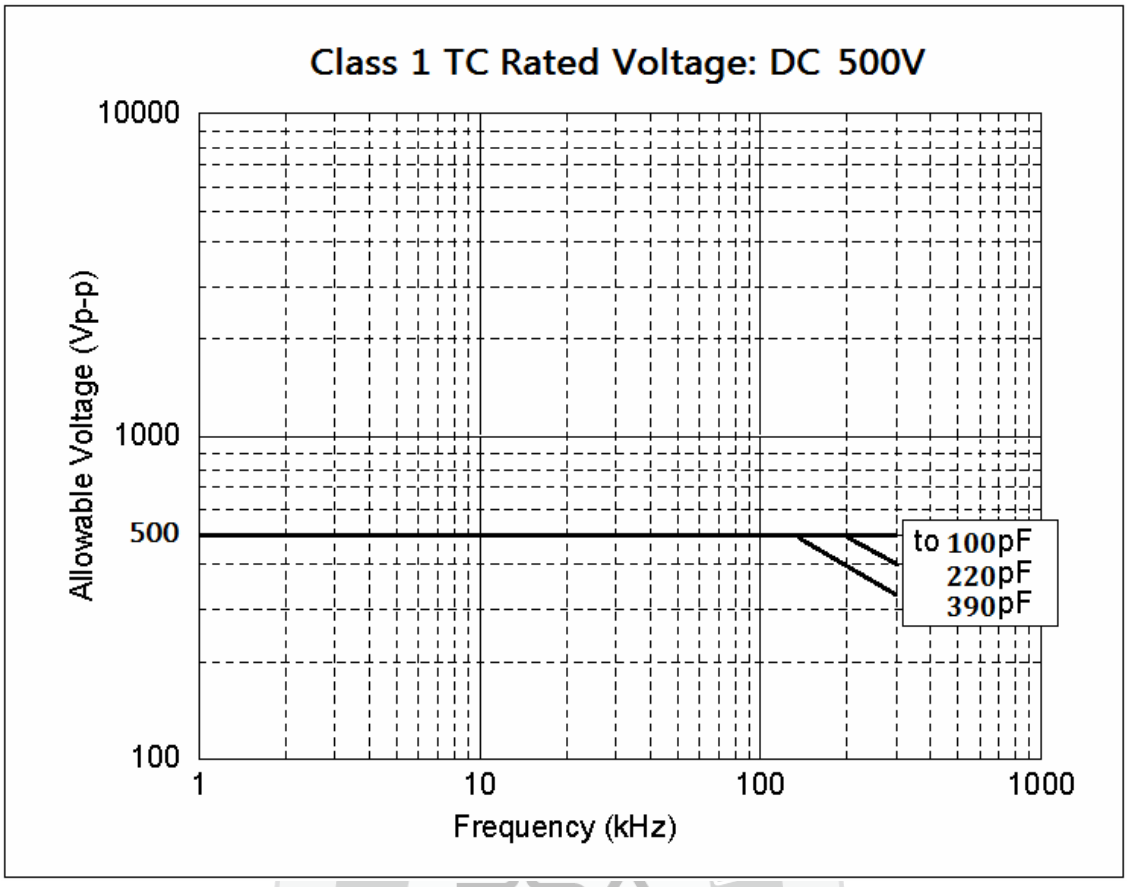
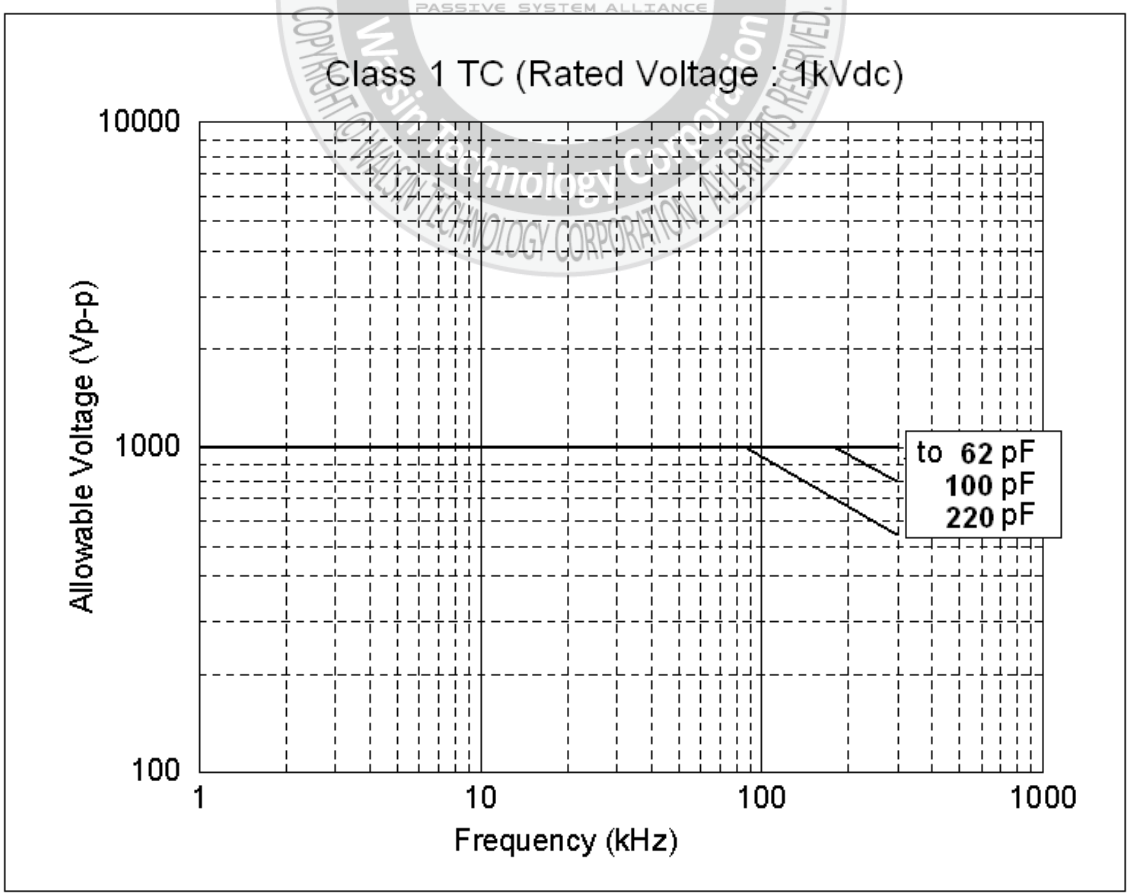
8.6. Ambient Temp of Allowable Voltage Graph (500Vdc to 2kVdc)





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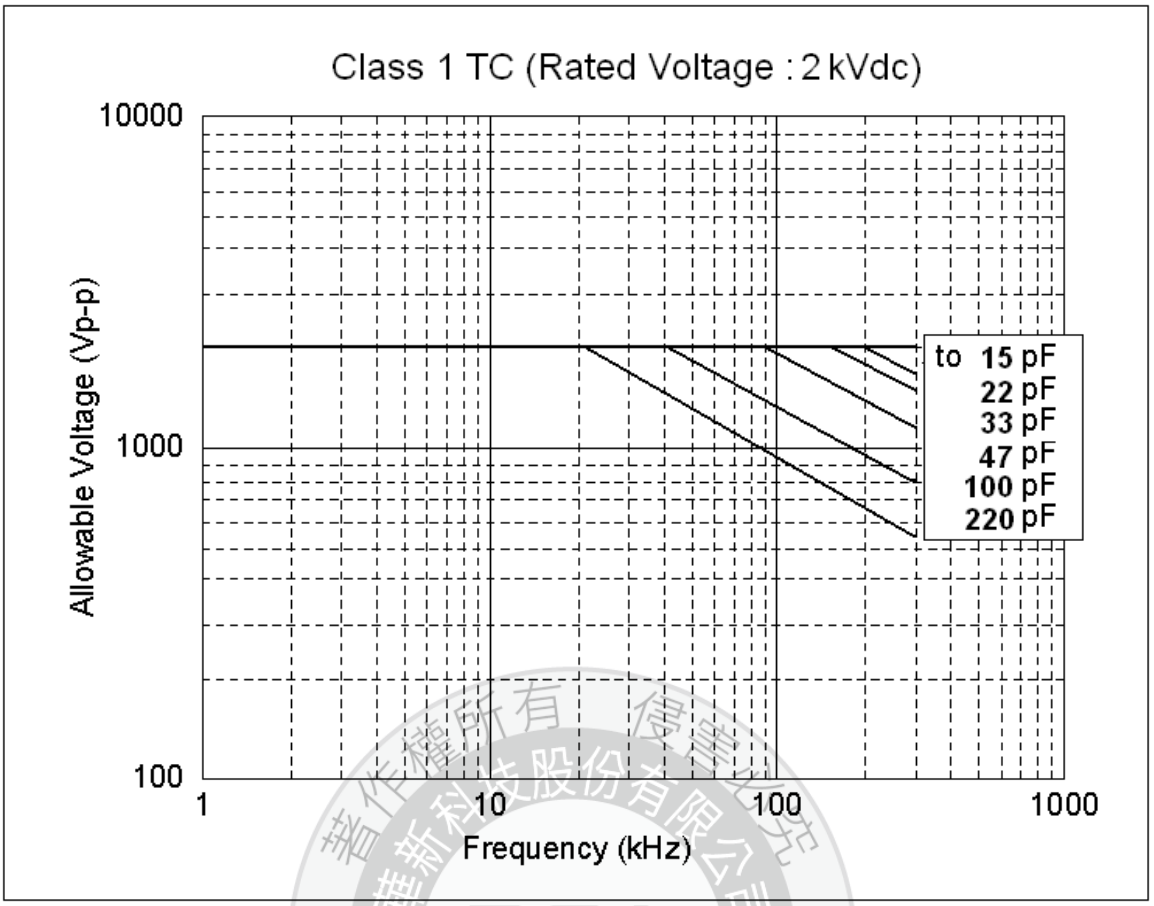

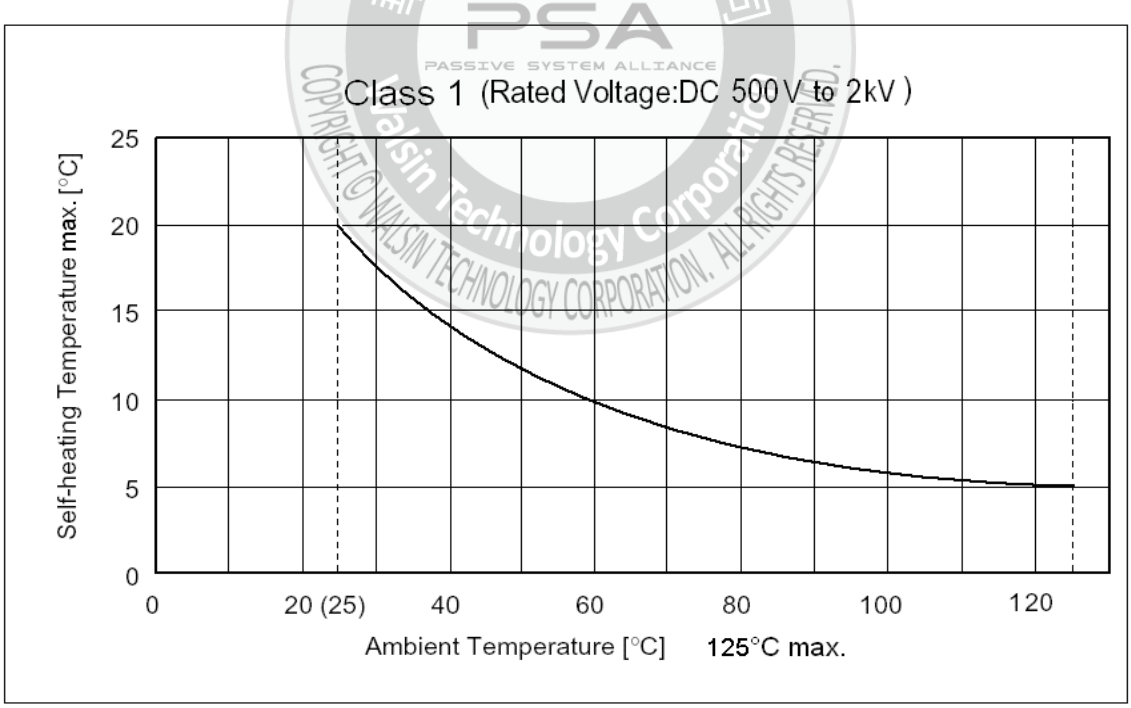

The ambient temperature and the surface temperature of capacitor must be 125℃ or lower. (Including self-heating.)

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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

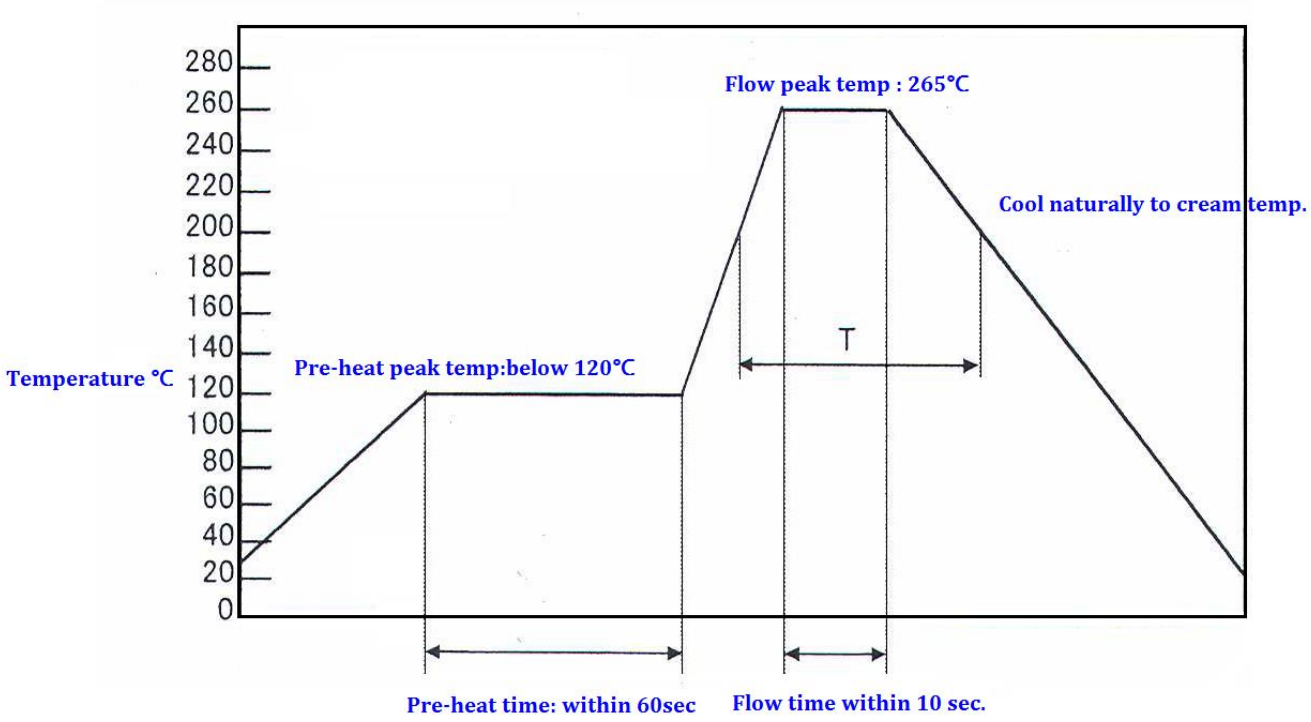

Chart to show flow recommended temp

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.

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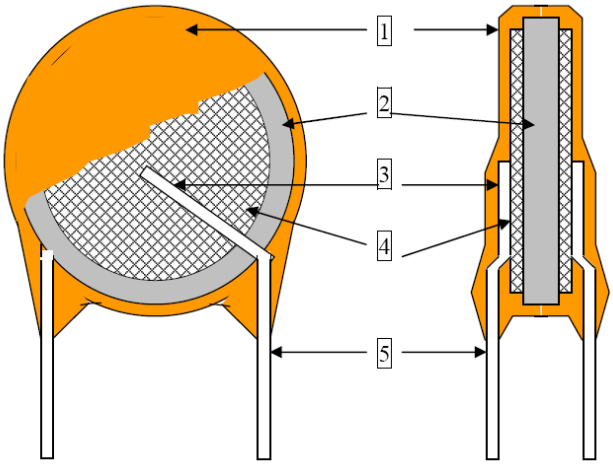
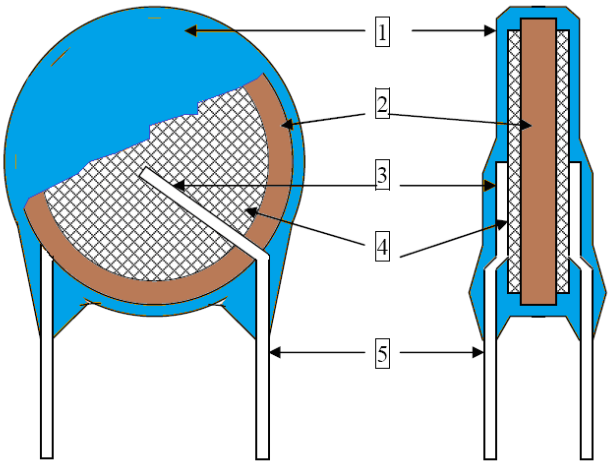
10. Drawing of internal structure and material list:



(phenolic resin)



(epoxy resin)

NO.	部位 Part name	材質 Material	構成部份 Component	供應商 Vendor
1	Insulation Coating	Phenolic resin Epoxy resin	Phenolic resin, Filler, Pigment Epoxy resin, SiO2, TiO2	Namics Kai Hua
2	Dielectric Element	Ceramic	SrCO3, TiO2, Bi2O3, CaCO3	Hua Xing Wang Feng Fenghua
3	Solder	Tin-silver	Sn97.5-Ag2.5	Huajun Haili
4	Electrodes	Ag	Silver,Glass frit	Daejoo Xinguang
5	Leads wire	Tinned copper clad steel wire	Substrate metal:Fe&Cu Surface plating:Sn 100%	Hengtai Wuhu Taililai

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