深圳市蓝宝安科电子有限公司
Shenzhen LanbaoAnke Electronics Co.,Ltd.

承　认　书

APPROVAL SHEET

编号 NO.	LB-DPG-03
版次 Ver.	A/2

客户 Customer	

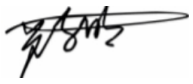
品名 Product	三端保险丝
系列 Series	DPGxx60 Series

料号Part No.		规格描述Specification	备注Remark
蓝宝 LB fuse			
客　户 Customer			

供应商-蓝宝 Supplier-LB fuse		零件承认章 Approval Signet	客户 Customer	零件承认章 Approval Signet
制作 Make				
审查 Check				
批准 Approval				

联络Contact			
业务Sales	电话Telephone	手机Cellphone	邮箱E-mail
			lanbaofuse@163.com
零件承认后敬请回签一份给我司留存。			

History of Change变更记录

NO.	日期 Date	描述 Description	版次 Edition	修改 modified by	审核 Checked by
1	2020.05.20	新制订	A/1		
2	2023.04.03	更改为新封面	A/2		
3					
4					
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10					
11					

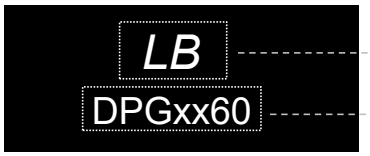
DPG Specification For Resistor Embedded Protector

1. SCOPE

DPG Series Resistor Embedded Protector， Protect Li-ion battery from the overcurrent and the overcharge

2. Part Numbering Marking

「example」：



Company logo

Model Mark
DPG:G Series/（9.5*5.0*2.0mm）

3. ELECTRICAL CHARACTERISTICS

Part Number	I_{rated} (A)	Cells in series	V_{max} (V_{DC})	I_{brek} (A)	V_{op} (V)	R_{fuse} (mΩ)	Agency Approval
							cULus
DPG1260	60	3	120	160	9.6~ 13.2	0.5～1.5	E213695
DPG1460	60	4	120	160	13.0~18.4		
DPG2060	60	5	120	160	16.7~23.5		
DPG3060	60	6~7	120	160	22.3~31.5		
DPG4060	60	9~ 10	120	160	33.0~46.9		
DPG5060	60	12~ 14	120	160	43.7~62.0		
DPG5060K	60	15~ 16	120	160	56.0~72.0		
DPG5060K1	60	17	120	160	59.5~76.0		
DPG5060K2	60	20	120	160	62.0~90.0		
DPG5060-2P	60	15LFP	120	160	37.5~54.0		
DPG5060-3P	60	16LFP	120	160	40.0~58.4		
DPG5060-4P	60	17LFP	120	160	44.2~62.9		
DPG5060-7P	60	20LFP	120	160	50.0~74.0		
DPG5060-10P	60	23LFP	120	160	60.0~90.0		
DPG5060-11P	60	24LFP	120	160	60.0~85.0		
DPG5060-23P	60	36LFP	120	160	90.0~133.2		

Annotation：

I_{rated}：Current carrying capacity that is measured at 40℃ thermal equilibrium condition

I_{brek}：The current that the fuse element able to interrupt

V_{max}：the maxmum Voltage that can be cut off by fuse

V_{op}：Range of operation voltage

R_{fuse}：The resistance of the fuse element

Cells in series：Number of battery cells connected in series in the circuit for ITV device to protect

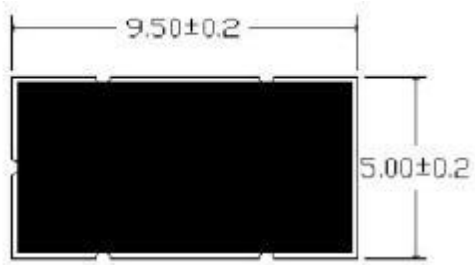
Thermal Derating Characteristics

Ambient Operating Temperature		25℃	40℃	60℃
Recommend Rated Current（A）	DPGXX60A	67.0	60.0	49.0

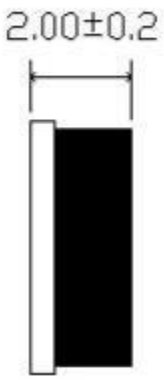
4. OUTLINE DRAWING&TEST SUBSTRATE SIZE

4-1 Outline Drawing (Unit: mm)

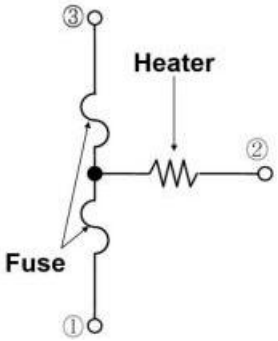
Top view



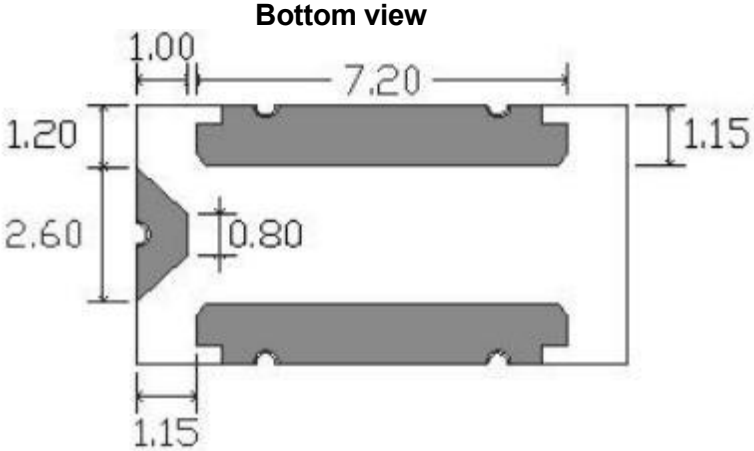
Side view



Equivalent Circuit



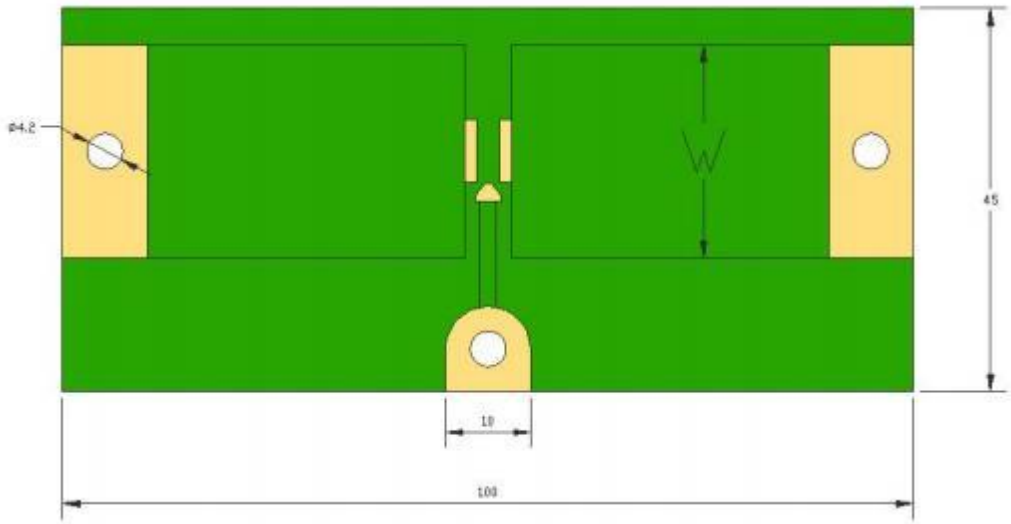
Bottom view



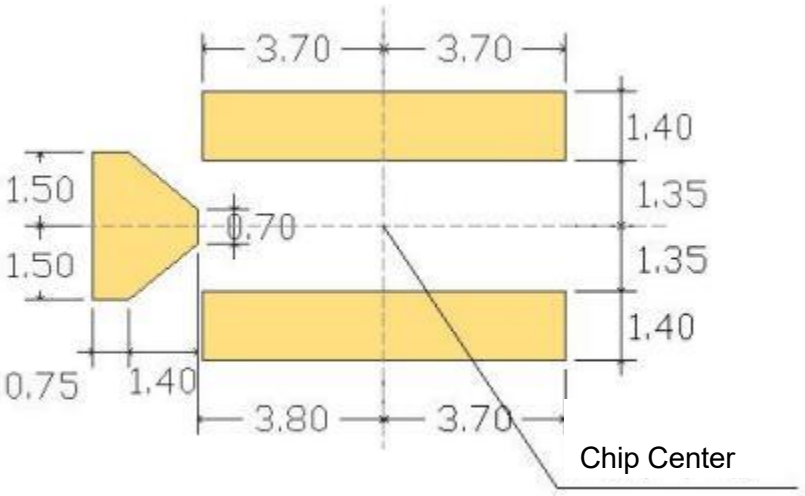
The surface shell is made of LCP material, and the bottom substrate is made of alumina ceramics

Tolerances Unless Otherwise Specified：±0.2mm.

4-2 Test substrate size (Unit: mm)



Fuse links are soldered to the prescribed circuit board (Fig 1) with Pb-free solder (Sn96.5/Ag3/Cu0.5 [%]). Covered wires(L=15cm) that provides to Table.1 are soldered to the board's Terminal①,③ by the solder above.

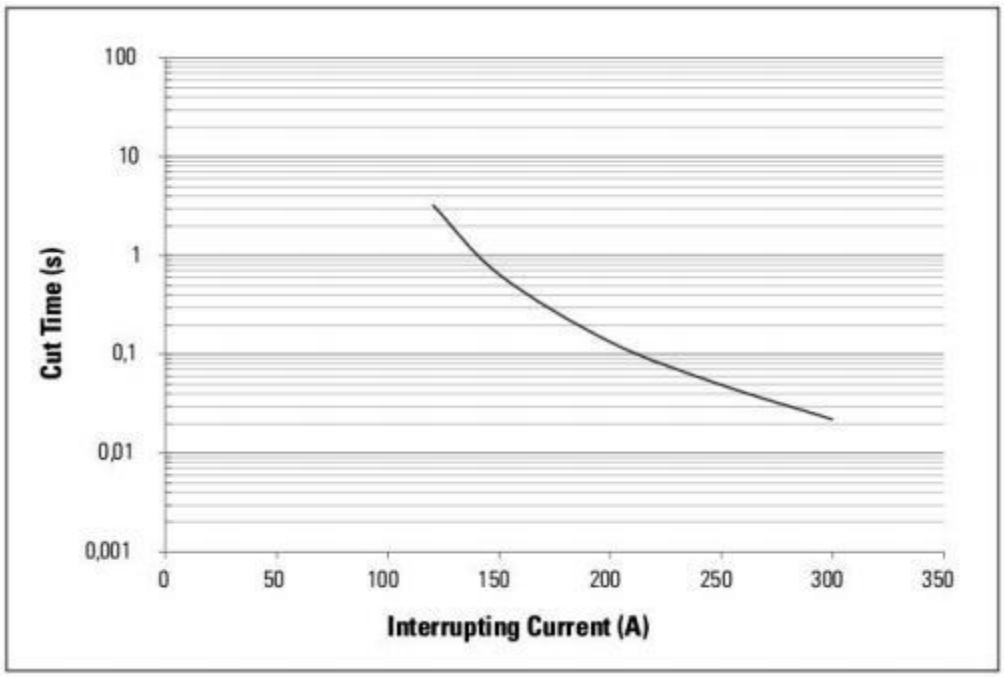


This is only the recommended size and does not guarantee the mounting quality. Please verify it in combination with your company's design guidelines.

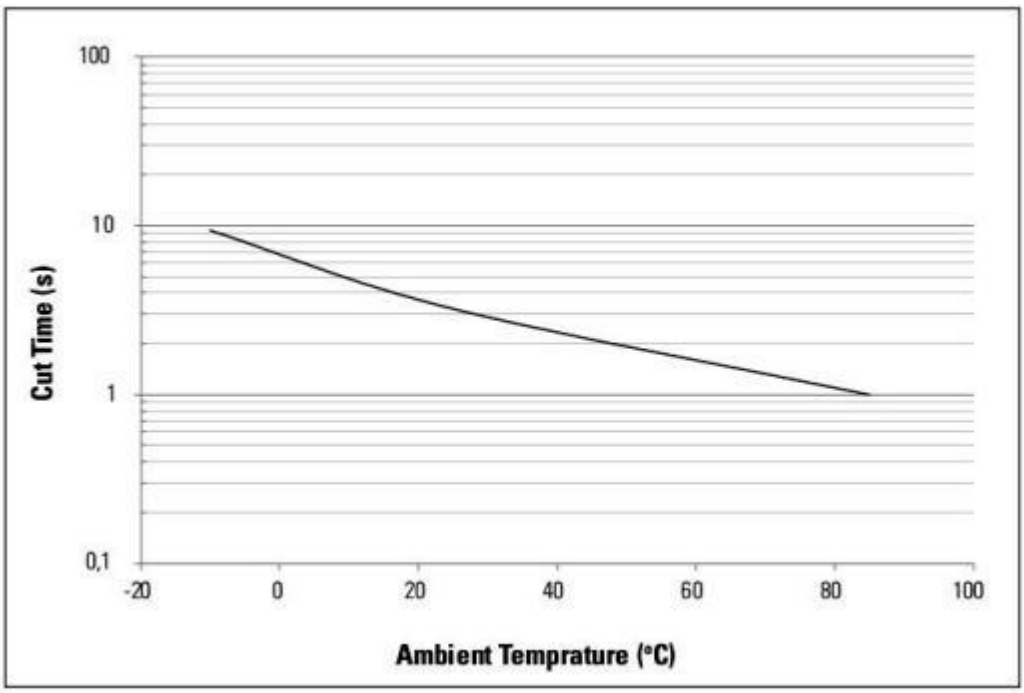
Rated Current	Materials	Base thickness	Copper width W	Copper thickness	Covered wires
60A	Glass Epoxy PWBs.	0.6-0.66mm	25mm	3.0OZ	AWG6

5. PRODUCT PERFORMANCE CURVE

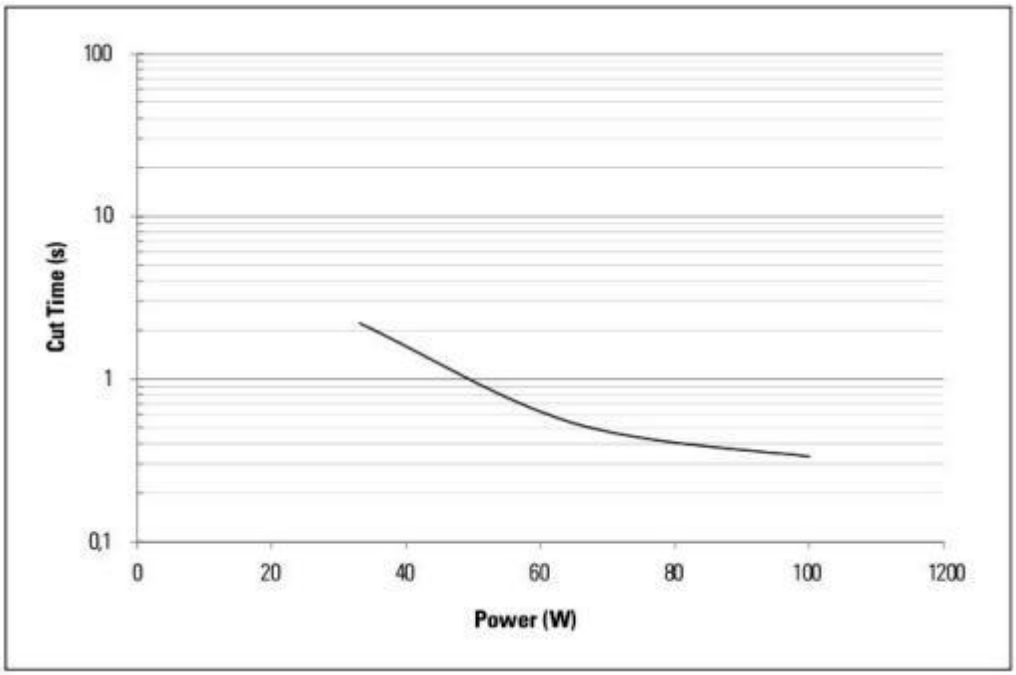
5-1 CHARACTERISTICS DIAGRAM(I-t)



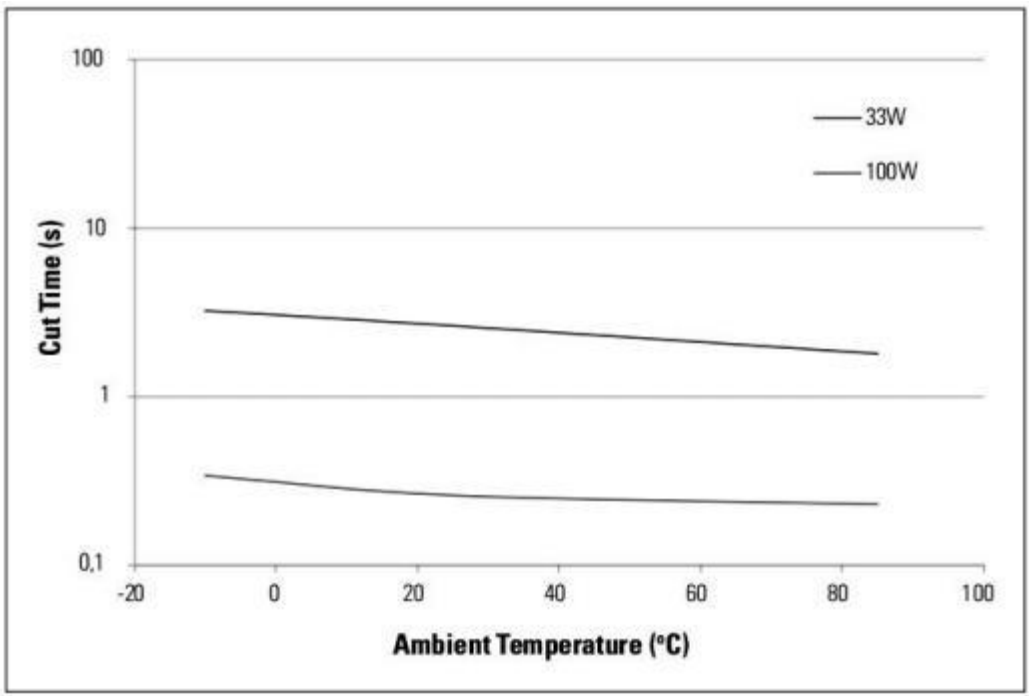
5-2 CHARACTERISTICS DIAGRAM(2*I-t)



5-3 CURVE OF HEATING ELEMENT POWER AND FUSING TIME

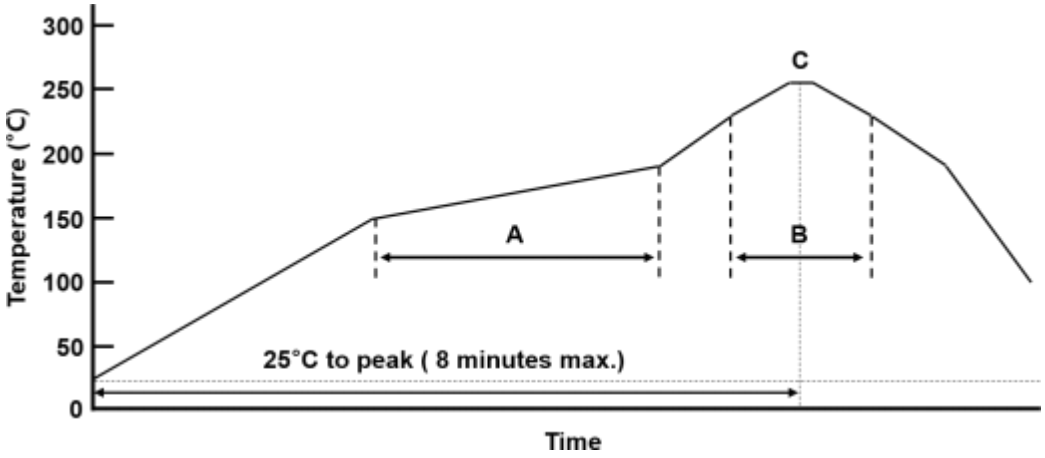


5-4 FUSING TIME CURVE UNDER DIFFERENT POWER / AMBIENT TEMPERATURE



6. RECOMMENDED CUSTOMER SOLDERING PARAMETERS

6-1 REFLOW



	A(Pre-Heating)	B	C(Peak)
Temperature[℃]	150~190℃	Over 230℃	255 ± 5℃
Time [sec]	90 ± 30sec	25 ± 5sec	Max. 5sec

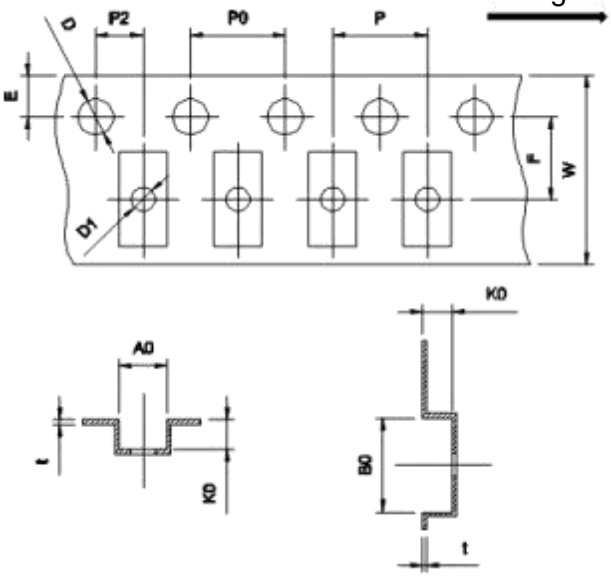
7. PACKING INFORMATION

7-1 QUANTITY & WEIGHT

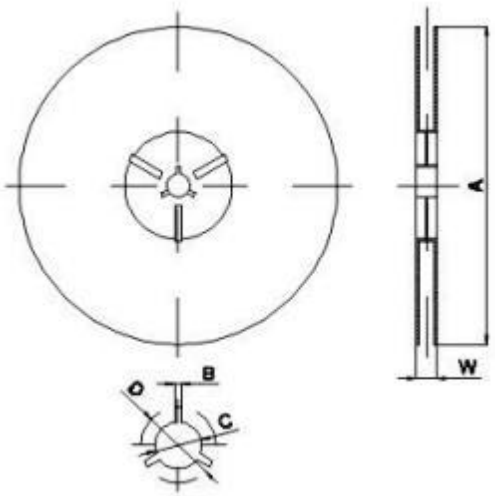
Type Number	Quantity(pcs)
LB-DPG5060	2,000

7-2 Reel & Tape specifications

Braiding direction



Code	(mm)
E	1.75±0.10
F	7.50±0.10
P2	2.00±0.1
D	1.50±0.1
D1	1.50±0.1
P0	4.00±0.10
10P0	40.0±0.20
W	16.00±0.30
P	8.00±0.10
A0	5.40±0.10
B0	9.85±0.10
K0	2.48±0.10
t	0.30±0.05



Code	(mm)
A	330±1.0
B	2+0.5/-0
C	13±0.2
D	21±0.2
W	22.7±0.5

8. ENVIRONMENTAL RELIABILITY

8.1 Characteristics

8.1.1 General Conditions of Measurement 。

In the absence of additional test environmental standards, the test environmental standards are as follows;

Ambient temperature: 5 to 35℃.

Relative humidity: 45 to 85%RH.

Air pressure: 86 to 106kPa

If you have any questions about the test results, please follow the following environmental standards.

Ambient temperature: 20±2℃.

Relative humidity: 60 to 70%RH.

Air pressure: 86 to 106kPa

8.2 Electrical Characteristics

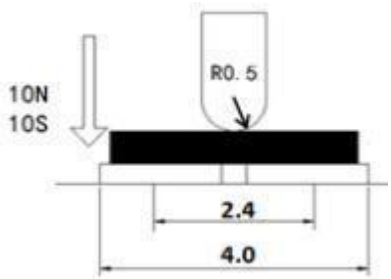
No.	Items	Conditions	Specifications
1	Clearing time	Apply the operating voltage to the heater. For other procedures, refer to《Voltage action characteristic test method》.	The fuse shall be melt Within 1 min.
		Energize both ends of the fuse with twice the rated current. For other procedures, refer to《Current action characteristic test method》.	
2	Current carrying capacity	Energize the rated current at both ends of the fuse. For other procedures, refer to《Temperature Rise characteristic test method》.	No melting within 1 hour

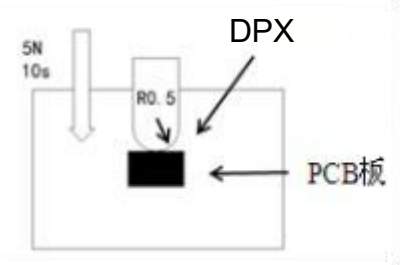
annotate:

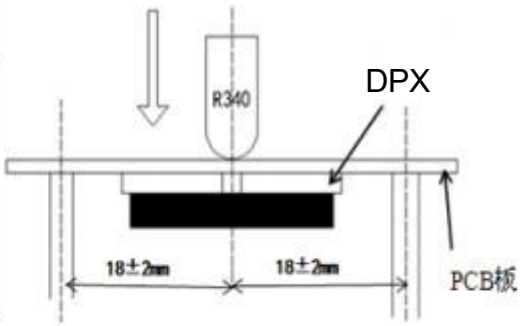
Electrical Characteristics is influenced by thermal capacity of PCB, parts, pattern width, and so on. Therefore you should check it on your PCB.

8.3 Mechanical Characteristics

No.	Items	Conditions	Specifications
1	Tensile Strength between base and cap.	The fuse shall be sustained, and the cap is vertically thrust.	Destruction strength shall be 3N or more.
2	Core body strength	A static load of 10N using a R0.5 pressure rod shall be applied to the center in the direction of the arrow and held for 10s.	Without mechanical damage such as breaks. Electrical characteristics shall be satisfied.
3	Adhesion	A static load of 5N using a R0.5 pressure rod shall be applied on the core of the component and in the direction of the arrow and held for 10s.For making the sample, refer to 《Temperature Rise characteristic test method》	Without electrode peeling. Electrical characteristics shall be satisfied.
4	Board bending test	Apply pressure in the direction of the arrow until bent width reaches 0.5mm and hold for 30s.For making the sample, refer to《Current carrying capacity characteristic test method》.	Without mechanical damage such as breaks.Electrical characteristics shall be satisfied.



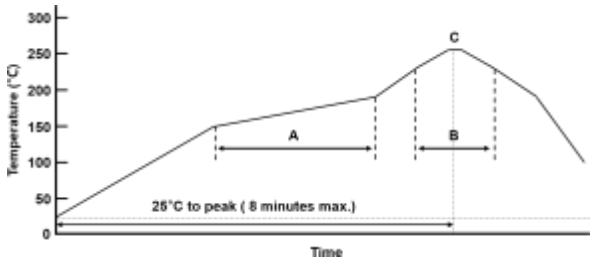




8.4 Endurance Characteristics

No.	Items	Conditions	Specifications
1	Dry heat	The fuse shall be stored at a temperature of 100 ± 5 ℃ for 6h. And then it shall be subjected to standard atmospheric conditions for 1h, after which its measurement shall be made.	Without deformation of case or excessive looseness of caps. Electrical characteristics shall be satisfied.
2	Cold	The fuse shall be stored at a temperature of-20±3℃ for 500h. And then it shall be subjected to standard atmospheric conditions for 1h, after which its measurement shall be made.	
3	Damp heat	The fuse shall be stored at a temperature of 40±2℃ with relative humidity of 90 to 95%RH for 250h. And then it shall be subjected to standard atmospheric conditions for 1h, after which its measurement shall be made.	
4	Endurance test	Energize the product with 150A current for 5ms, disconnect 995ms as a cycle, and cycle 10000 cycles together.	Without damage such as deformation or disconnection of fuse element.

8.5 Mounting Characteristics

No.	Items	Conditions	Specifications
1	Resistance to soldering heat	 Reflow soldering method Peak temp ：255℃±5℃5s, 230℃±5℃30s. The specimen shall be passed through the reflow furnace for 2times. The specimen shall be stored at standard atmospheric conditions for 24h after which the measurement shall be made.	Without deformation of case or excessive looseness of caps. Electrical characteristics shall be satisfied.。
2	Solder ability	Solder ：Pb-free (Sn96.5Ag3Cu0.5%) Flux ：25wt％Rosin Ethanol solution Dipping depth ：2～2.5mm Temperature ：235±5℃ Dipping time ：2±0.5S Dipping and drawing speed ：25±2.5mm/S	A new uniform coating of solder shall cover a minimum of 95% of the surface being immersed.

Ver	Make	Confirm	Examination
Version 1	Qiulian.lai 2022/05/20	Terry.xie 2022/05/20	Shijun.xiong 2022/05/20

Handling Instructions for Double protection Fuse

- Please confirm the latest product information before a design.

- Storage Condition
  - This products should be stored in a cool (Room temperature under 40°C) and dry condition less than 60% relative humidity and kept out of solvent fumes circumstances.
  - Under stable storage conditions the preservation period is 3 months after shipping.

  Double protection Fuse complies with environmental regulation.
  - ROHS/Double protection Fuse complies with RoHS
  - Double protection Fuse complies with general requirement for Halogen Free.

- Performance data is typical value.
  - These data is not a guaranteed value.
  - These data is measured with our company's standard PCB.
  - The characteristics are influenced by thermal capacity of PCB.
  - Generally, when thermal capacity of PCB increases, current-carrying capacity will be increase and fusing time will be long.

- Precautions regarding handling
  - Make sure that the terminals of this product are connected on the lands of the circuit board referring to section "Measurement (pp. 3)".
  - Ultrasonic-cleaning of immersion-cleaning and so on must not be done to Double protection Fuse before and after mounted. When cleaning is done, flux on element would flow, and it would not be satisfied its specification. Moreover, a similar influence happens when the product comes in contact with cleaning-solution. These products after cleaning will not be guaranteed.
  - Prevent corrosive gas (Cl_2, NH_3, SO_X, NO_X, etc.) from contacting the products.
  - Please do not re-use of the Double protection Fuse removed by solder correction
  - Excessive stress or shock may make products broken or cracked due to the nature of ceramics structure

- SMD Re-work
  - Please, Do Not Reuse the Double protection Fuse removed or detached by PCB re-work
  - After PCB Re-work, Re-mounting of NEW Double protection Fuse should be done as follow step.

  → Hot Plate: Temperature of 220 ± 5°C for 3sec.

  → Iron: Temperature of 300 ± 5°C for 3sec.