



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-01
版次 Ver.	A/3

<b>客户</b> Customer	
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<b>品名</b> Product	三端保险丝
<b>系列</b> Series	DPGxx45 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	牛文博			
审查 Check				
批准 Approval	汪君球			

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	2022.05.20	新制订	A/1	牛文博	<del>牛文博</del>
2	2023.04.03	更改为新封面	A/2	牛文博	<del>牛文博</del>
3	2025.05.07	新增发热体电阻值、单颗重量、注解、 注意事项、产品型号编码规则	A/3	牛文博	<del>牛文博</del>
4					
5					
6					
7					
8					
9					
10					
11					

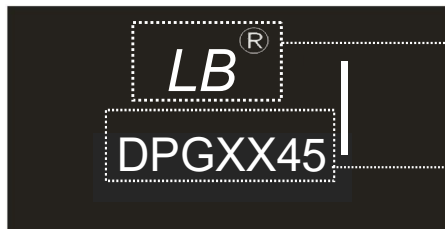
# DPG Specification For Resistor Embedded Protector

## 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 (XX represents different voltage platforms, 45 represents rated current 45A)

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

## 3. ELECTRICAL CHARACTERISTICS

Part Number	I <sub>rated</sub> (A)	Cells in series	V <sub>max</sub> (V <sub>oc</sub> )	I <sub>brek</sub> (A)	V <sub>op</sub> (V)	Heater DCR (Ω)	R <sub>fuse</sub> (mΩ)	Agency Approval
DPG0845	45	2	120	120	7.0~9.2	0.85~1.48	0.7~1.5	UL: E213695 TUV: J50654650
DPG1245	45	3	120	120	9.8~13.5	1.9~2.9	0.7~1.5	
DPG1445	45	4	120	120	13.0~18.4	3.4~5.1	0.7~1.5	
DPG2045	45	5	120	120	16.7~23.5	5.6~8.4	0.7~1.5	
DPG3045	45	6~7	120	120	22.3~31.5	10.0~15.0	0.7~1.5	
DPG3545	45	8	120	120	18.0~32.0	14.4~21.5	0.7~1.5	
DPG4045	45	9~10	120	120	33.0~46.9	22.0~33.0	0.7~1.5	
DPG5045	45	12~14	120	120	43.7~62	40.0~62.0	0.7~1.5	
DPG5045-15	45	15	120	120	52.5~67.5	70.0~150.0	0.7~1.5	
DPG5045-16	45	16	120	120	56~70.4	55.0~95.0	0.7~1.5	
DPG5045-17	45	17	120	120	59.5~76.0	64.0~104.0	0.5~1.5	
DPG5045-20	45	20	120	120	60.0~90.0	72.0~145.0	0.5~1.5	
DPG5045-24	45	24	120	120	84.0~108.0	230.0~380.0	0.5~1.5	
DPG5045-26	45	26	120	120	72.0~120.0	170.0~260.0	0.5~1.5	
DPG5045-2P	45	15LFP	120	120	40.0~54.0	29.2~48.4	0.5~1.5	
DPG5045-3P	45	16LFP	120	120	35.0~62.0	46.8~78.0	0.5~1.5	
DPG5045-10P	45	22-24LFP	120	120	44.8~87.6	105.0~175.0	0.5~1.5	
DPG5045-11P	45	24LFP	120	120	72.0~92.0	85.0~156.5	0.5~1.5	
DPG5045-1S	45	17~22 SI 20LFP	120	120	50.0~74.0	55.0~75.5	0.5~1.5	

### Annotation:

I<sub>rated</sub>: Current carrying capacity that is measured at 40°C thermal equilibrium condition

I<sub>brek</sub>: The current that the fuse element able to interrupt

V<sub>max</sub>: the maximum Voltage that can be cut off by fuse

V<sub>op</sub>: Range of operation voltage

R<sub>fuse</sub>: The resistance of the fuse element

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

1S: S stands for the acronym of Sodium io sodium, 1 represents 17-22 series sodium ion batteries,

LFP represents lithium iron phosphate batteries, with P as the abbreviation

### Thermal Derating Characteristics

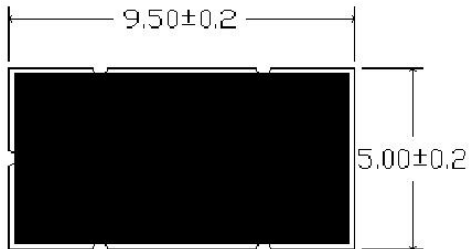
Ambient Operating Temperature		25°C	40°C	60°C
Recommend Rated Current (A)	DPGXX45A	49.0	44.5	37.0

# DPG Specification For Resistor Embedded Protector

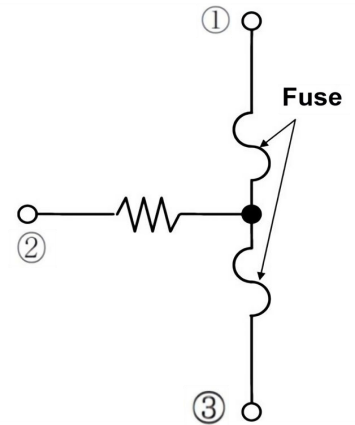
## 4. OUTLINE DRAWING&TEST SUBSTRATE SIZE

### 4-1 Outline Drawing (Unit: mm)

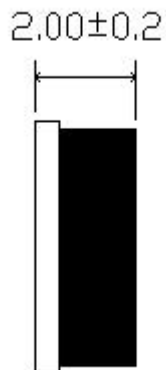
Top view



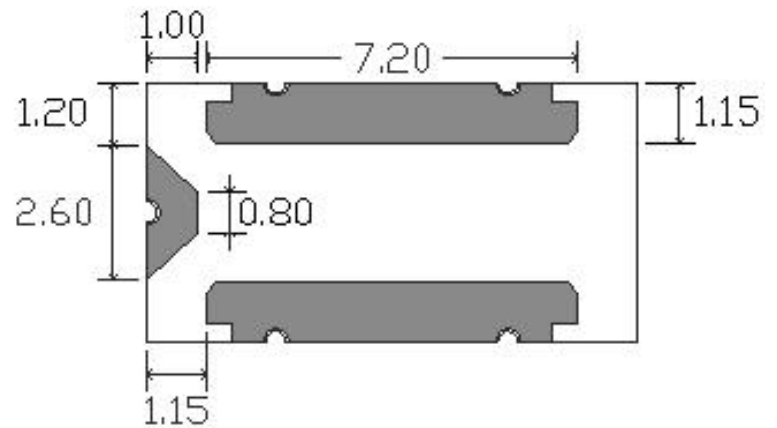
Equivalent Circuit



Side view



Bottom view

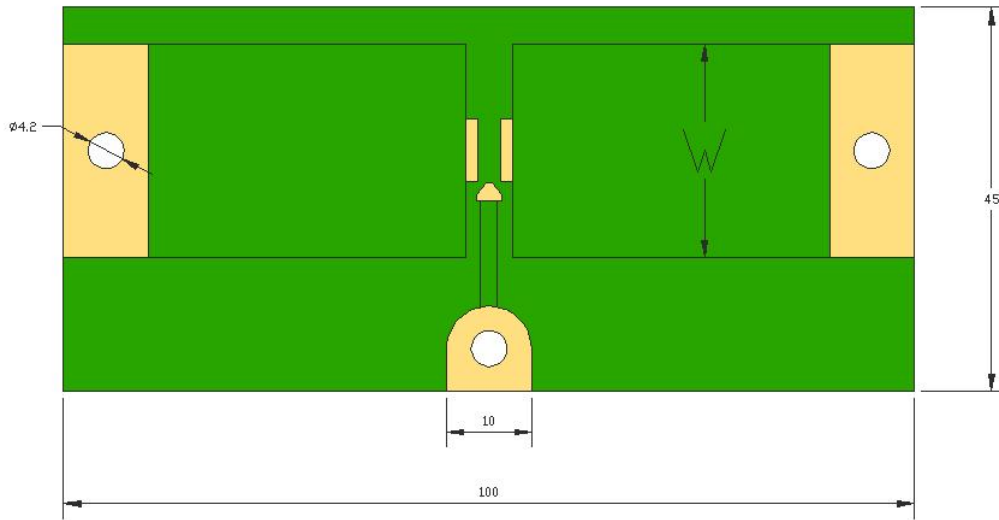


The surface shell is made of LCP material, and the bottom substrate is made of alumina ceramics

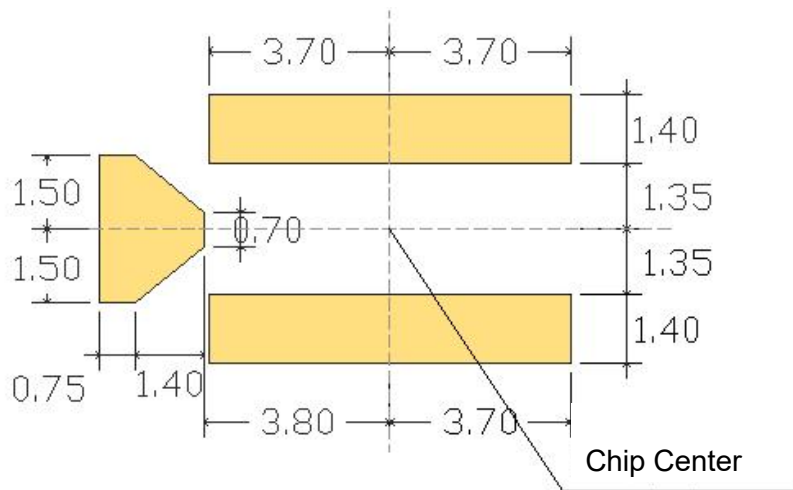
Tolerances Unless Otherwise Specified: ±0.2mm.

# DPG Specification For Resistor Embedded Protector

## 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 Terminal ①, ③ by the solder above.



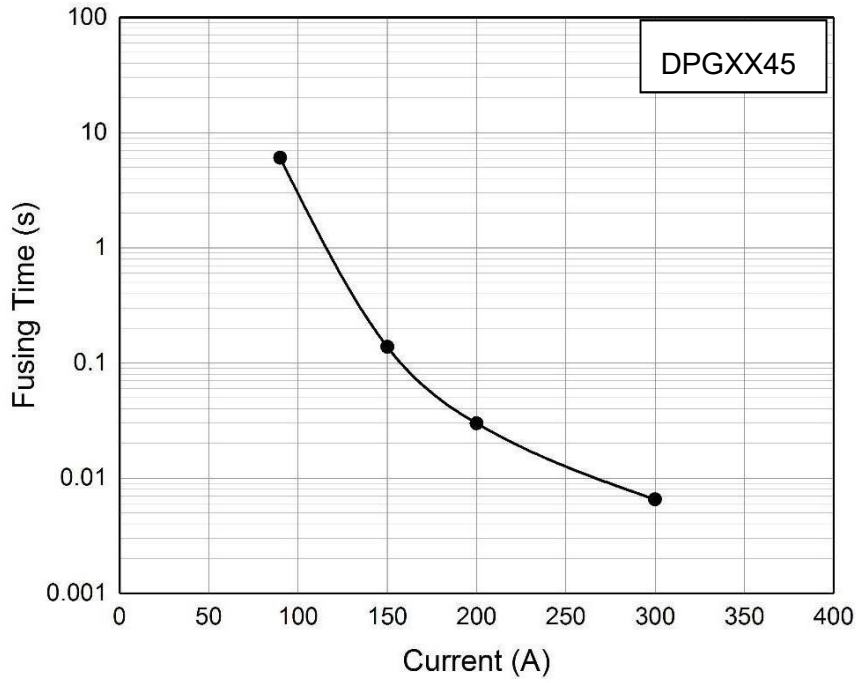
This is only the recommended size and does not guarantee the mounting quality. Please verify it in combination with your company's design guidelines.

Rated Current	Materials	Base thickness	Copper width W	Copper thickness	Covered wires
45A	Glass Epoxy PWBs.	0.6-0.66mm	25mm	2.0OZ	AWG8

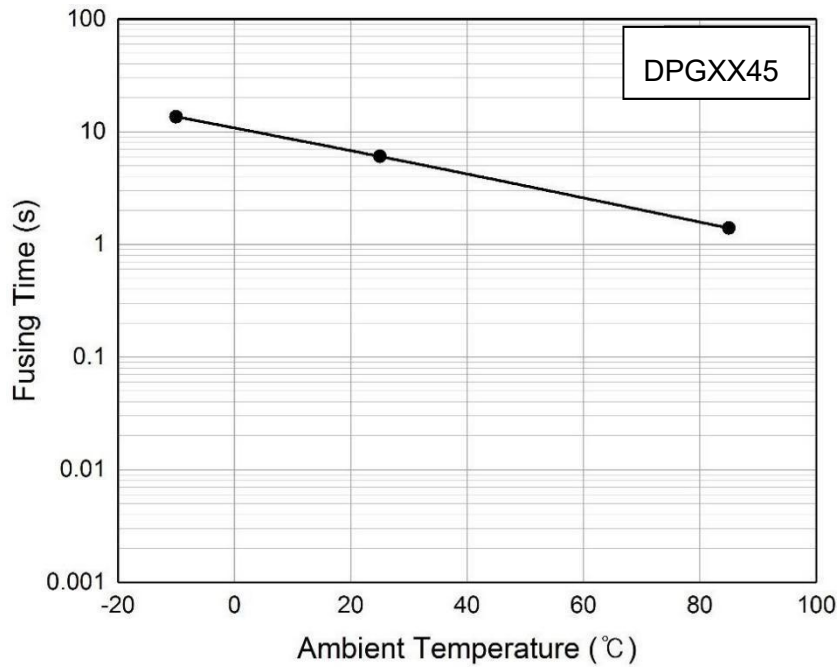
# DPG Specification For Resistor Embedded Protector

## 5. PRODUCT PERFORMANCE CURVE

### 5-1 CHARACTERISTICS DIAGRAM(I-t)

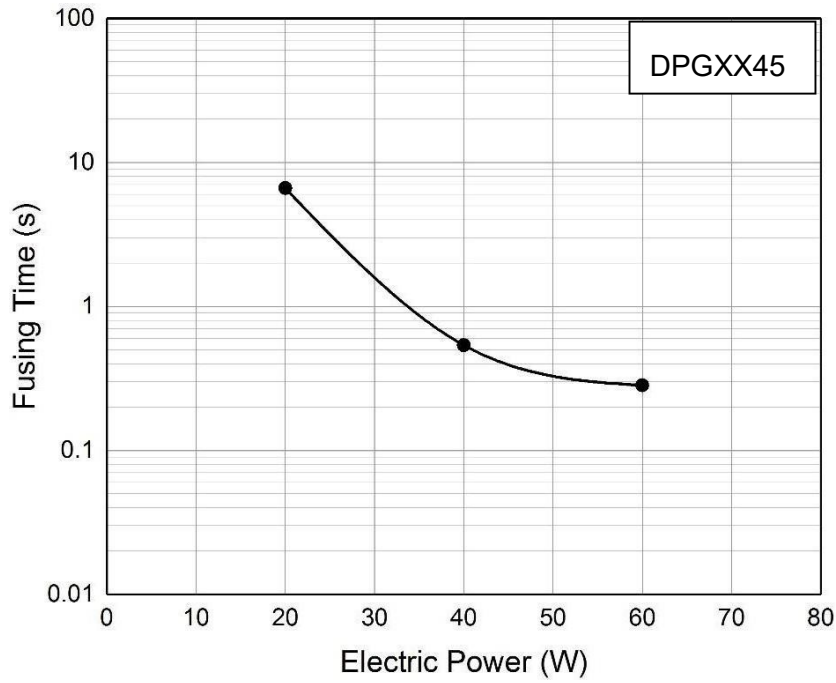


### 5-2 CHARACTERISTICS DIAGRAM(2\*I-t)

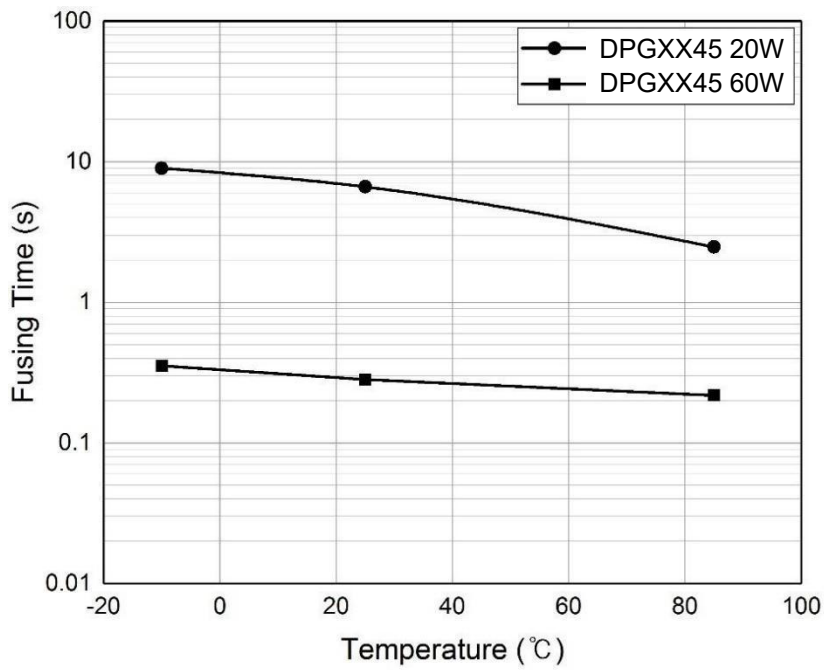


# DPG Specification For Resistor Embedded Protector

5-3 CURVE OF HEATING ELEMENT POWER AND FUSING TIME

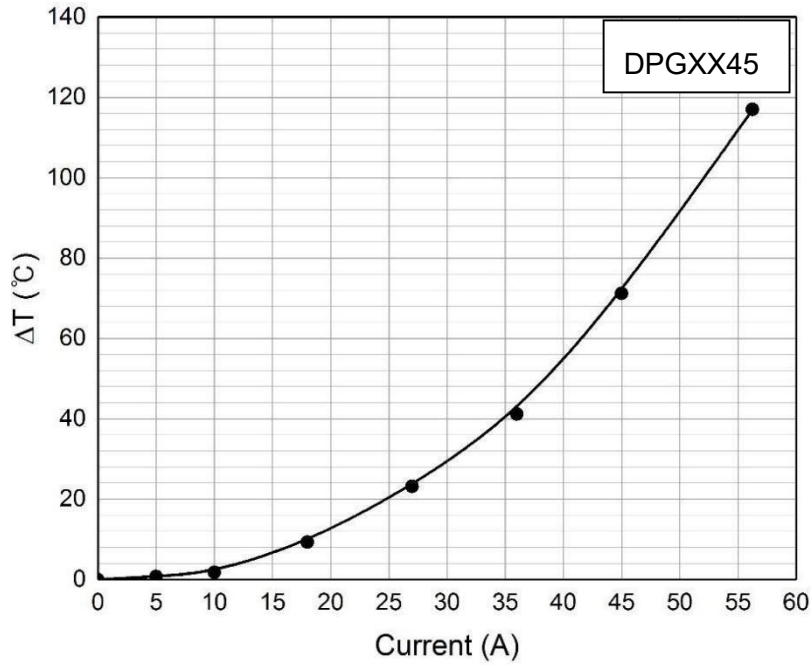


5-4 FUSING TIME CURVE UNDER DIFFERENT POWER / AMBIENT TEMPERATURE



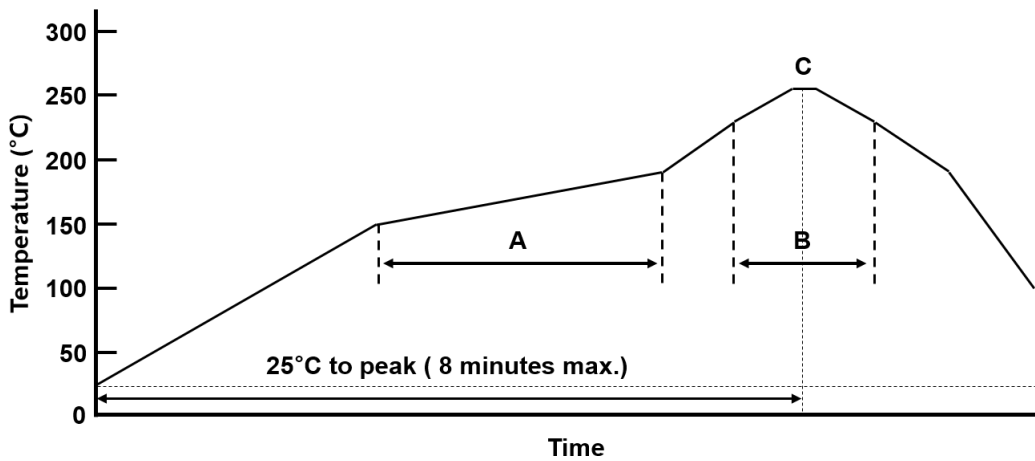
# DPG Specification For Resistor Embedded Protector

## 5-5 CURRENT AND AMBIENT TEMPERATURE CURVE



## 6. RECOMMENDED CUSTOMER SOLDERING PARAMETERS

### 6-1 REFLOW



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

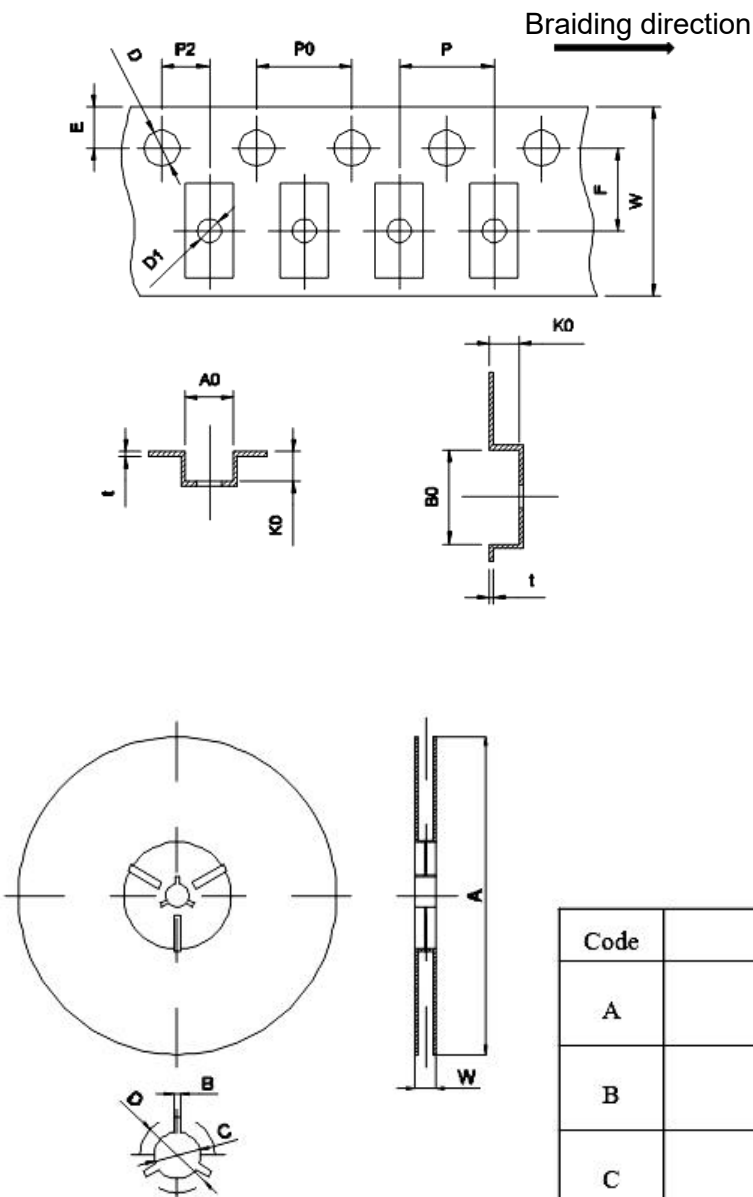
# DPG Specification For Resistor Embedded Protector

## 7. PACKING INFORMATION

### 7-1 QUANTITY & WEIGHT

Type Number	Quantity(PCS)	Single Weight(mg)
DPGXX45	2000	174 ± 30

### 7-2 Reel & Tape specifications



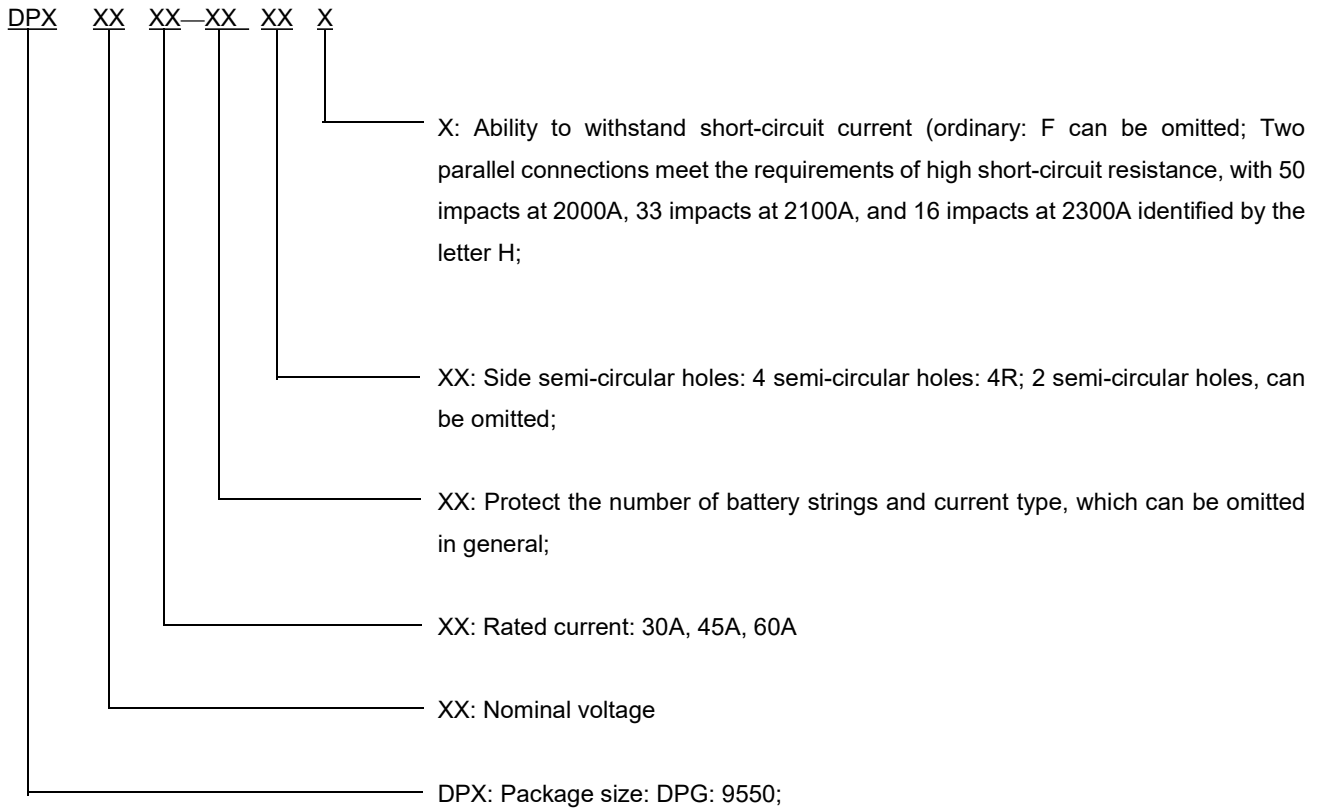
Code	(mm)
E	1.75±0.10
F	7.50±0.10
P2	2.00±0.1
D	1.50±0.1
D1	1.50±0.1
P0	4.00±0.10
10P0	40.0±0.20
W	16.00±0.30
P	8.00±0.10
A0	5.40±0.10
B0	9.85±0.10
K0	2.48±0.10
t	0.30±0.05

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

# DPG Specification For Resistor Embedded Protector

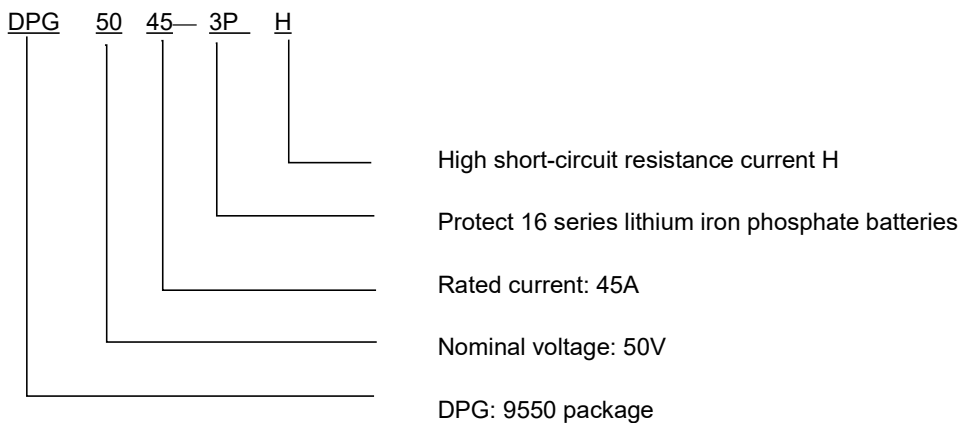
## 7-3 Product Coding Rules

### Product Coding Rules



Illustrate with examples:

DPG5045-3P H is connected in parallel with two devices that can withstand 2000A short-circuit current of 500us for 50 impacts, 2100A short-circuit current of 500us for 33 impacts, and 2300A short-circuit current of 500us for 16 impacts



## 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°C.

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°C.

Relative humidity: 60 to 70%RH.

Air pressure: 86 to 106kPa

# DPG Specification For Resistor Embedded Protector

## 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

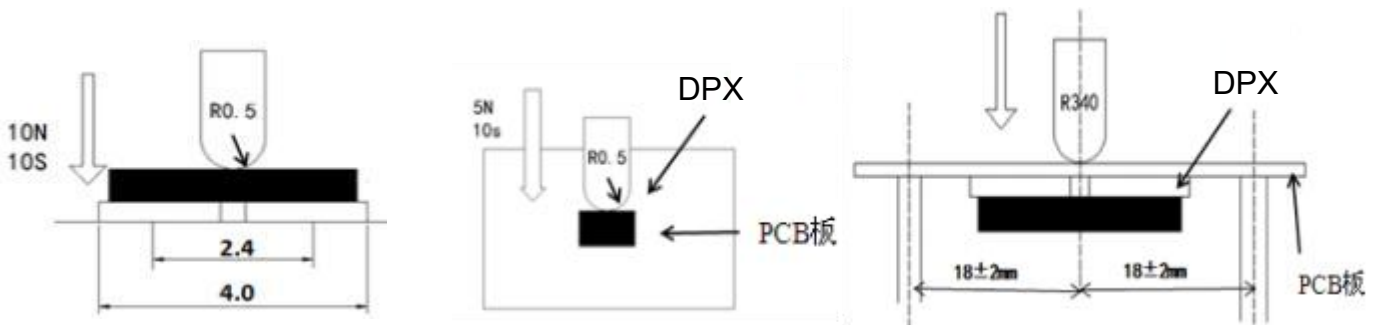
annotate:

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

# DPG Specification For Resistor Embedded Protector

## 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.



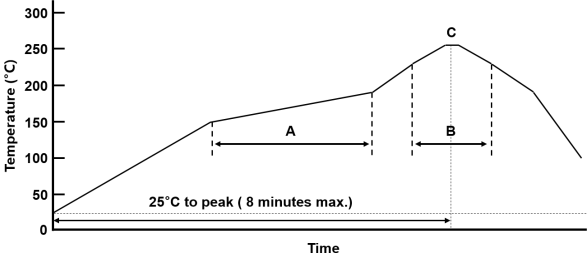
## DPG Specification For Resistor Embedded Protector

### 8.4 Endurance Characteristics

No.	Items	Conditions	Specifications
1	Dry heat	The fuse shall be stored at a temperature of $100 \pm 5$ °C 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 $-20 \pm 3$ °C 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 $40 \pm 2$ °C 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.

# DPG Specification For Resistor Embedded Protector

## 8.5 Mounting Characteristics

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

## 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.
  - After removing the sealed packaging, the shelf life is 3 months

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

- Please do not use sealant to completely seal the product, as complete sealing will affect the product's melting performance.
  
- 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  $220 \pm 5^{\circ}\text{C}$  for 3sec.
  
    - Iron: Temperature of  $300 \pm 5^{\circ}\text{C}$  for 3sec.

# Model DPG, followed by 04, 06, 08, 12, 14, 18, 20, 24, 28, 30, 32, 35, 40 or 50, followed by xx.

File Number: E213695

## COMPANY

### ZHONG SHAN LANBAO ELECTRICAL APPLIANCES CO LTD

West Xing Pu Rd

Huang Pu

Zhongshan, Guangdong 528429 China

## MODEL INFO

DPG, followed by 04, 06, 08, 12, 14, 18, 20, 24, 28, 30, 32, 35, 40 or 50, followed by xx. xx can be any two numbers 01 to 60, indicated rated current.

Supplemental micro fuses: surface mount

SUPPLEMENTAL FUSES	额定值
Micro Fuse	Yes
Pigtail Leads	No
Surface Mount	Yes
Cartridge Enclosed	No
Time Delay	No
Paper Tube	No
Filled Tube	No
OD - Length	9.5 mm
Length - Width	5 mm
Height	2 mm

RATING TABLE				
Amps Minimum (A)	Amps Maximum (A)	Voltage (V)	Voltage Source	Interrupting Rating (A)
1	60	80	dc	120
1	60	100	dc	120

**RATING TABLE**

<b>Amps Minimum (A)</b>	<b>Amps Maximum (A)</b>	<b>Voltage (V)</b>	<b>Voltage Source</b>	<b>Interrupting Rating (A)</b>
1	60	120	dc	120

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No.102 Xingpu Road, Huangpu Town  
Zhongshan  
528429 Guangdong  
P.R. China

**Fertigungsstätte *Manufacturing Plant***

Zhongshan Lanbao Electrical  
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EN 60127-1:2006+A1+A2

EN 60127-7:2016

(Except for cl.8.1)

**Zertifiziertes Produkt (Geräteidentifikation)**

*Certified Product (Product Identification)*

**Lizenzentgelte - Einheit**

*License Fee - Unit*

(Miniature Fuse-links)

Type Designation : DPGxy  
x = 12, 14, 20, 30, 32, 35, 40  
or 50  
y = 30, 45 or 60  
Trademark : LB  
Rated Voltage : DC 80V/100V/120V  
Rated Current (In) : 30A, 45A, 60A  
T/I Characteristic :  $2.0I_n \leq 60s$ ,  $10I_n \leq 1s$   
Rated Breaking Capacity : 120A  
Dimension : 9.5mm x 5.0mm x 2.0mm

8

Remark: Product also passed tests of cl.8.3, cl.8.6 and  
cl.8.7 according to EN 60127-4:2005+A1+A2.

8

ANLAGE (Appendix): 1

Dem Zertifikat liegt unsere Prüf- und Zertifizierungsordnung zugrunde.  
Das Produkt entspricht den o.g. Anforderungen, die Herstellung wird überwacht.  
This certificate is based on our Testing and Certification Regulation. The product  
fulfills above mentioned requirements, the production is subject to surveillance.

**Zertifizierungsstelle**

**TÜV Rheinland LGA Products GmbH, Tillystraße 2, 90431 Nürnberg**

<http://www.tuv.com/safety> E-mail: markcheck@tuv.com

Fax: +49 221 806-3935

**Audrey Wang**