

深圳市瑞隆源电子有限公司 Shenzhen RUILONGYUAN Electronics Co.,Ltd.

产品名称 Product name	板载电涌保护器 Power Surge Protective Device Installed on pcb	产品型号 Product Type	CMOV20G320P2VA
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# CMOV20G320P2VA

## 板载电涌保护器 技术规格书

Power Surge Protective Device Installed on pcb Technical Specification

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深圳市瑞隆源电子有限公司

Shenzhen RUILONGYUAN Electronics Co.,Ltd.

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## 修订记录 Revision History

版本 Revision Version	描述 Description	页码 Page	日期 Date
X0	参考阶段 Reference	14	2022.9.27
A0	正式承认 Qualified	14	2022.12.27
A1	增加耐压参数 5000VDC Increase withstand voltage parameter to 5000 VDC	14	2025.04.09
A2	增加 UL 认证标识 Add UL certification mark.	14	2026.04.03

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## 1. 适用范围 Scope

板载电涌保护器是采用多级 GDT 方案，具有续流遮断能力。小体积，适用多种安装环境。常用于光伏逆变器，太阳能，通信设备，机房电源等对可靠性和耐候性要求高的场所。

Power Surge Protective Device Installed on pcb is a multi-level GDT solution with freewheeling interruption capability. Small size, suitable for a variety of installation environments. Commonly used in places with high reliability and weather resistance requirements such as photovoltaic inverters, solar energy, communication equipment, computer room power supplies, etc.

## 2. 术语 Glossary

### 2.1 浪涌 Surge

电路中电流、电势或能量的瞬态波。基于本标准，浪涌不包括在几个周期内因升高的工频电压所产生的瞬态过电压 (TOV)。

A transient wave of current, potential or power in an electric circuit. For the purposes of this standard, surges do not include temporary over voltages (TOV) consisting of an increase in the power frequency voltage for several cycles.

### 2.2 电涌保护器 Surge Protective Device (SPD)

至少包含一个非线性元件，通过转移或抑制冲击电流来限制冲击电压的设备，且可以重复使用。

A device composed of at least one non-linear component and intended for limiting surge voltages on equipment by diverting or limiting surge current and is capable of repeating these functions as specified.

### 2.3 一端口 SPD one-port SPD

在端子之间没有特定的串联阻抗的 SPD

SPD having no intended series impedance

### 2.4 电压开关型 SPD voltage switching type SPD

没有电涌时具有高阻抗，当对电涌电压响应时能突变成低阻抗的 SPD

SPD that has a high impedance when no surge is present, but can have a sudden change in impedance to a low value in response to a voltage surge

### 2.5 电压限制型 SPD voltage limiting type SPD

没有电涌时具有高阻抗，但是随着电涌电流和电压的上升，其阻抗将持续地减小的 SPD

SPD that has a high impedance when no surge is present, but will reduce it continuously with increased surge current and voltage

### 2.6 1.2/50 $\mu$ s 电压波形 1.2/50 $\mu$ s Voltage Wave

在开路情况下，视在波前时间为 1.2  $\mu$ s，且半峰值时间为 50  $\mu$ s 的冲击电压。

Voltage surge with a virtual front time of 1.2  $\mu$ s and a time to half-value of 50  $\mu$ s delivered across an open circuit.

### 2.7 8/20 $\mu$ s 电流波形 8/20 $\mu$ s Current Wave

短路情况下，视在波前时间为 8  $\mu$ s 且半峰值时间为 20  $\mu$ s 的冲击电流。

Current surge with a virtual front time of 8  $\mu$ s and a time to half-value of 20  $\mu$ s delivered into a short circuit.

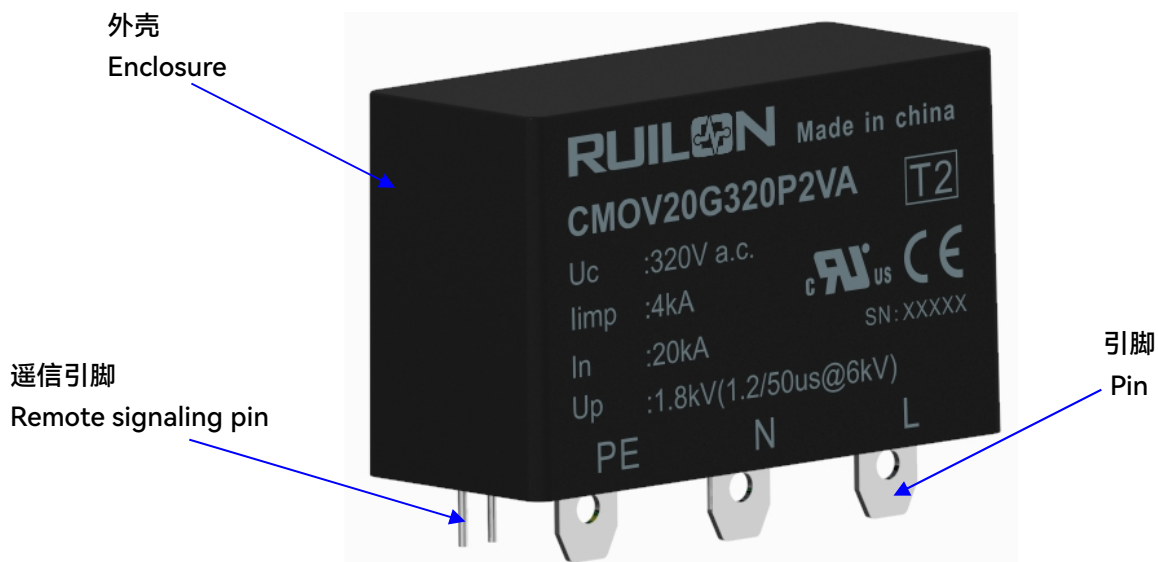
- 2.8 最大持续工作电压 Maximum Continuous Operating Voltage (MCOV)  
可连续地施加在 SPD 上的最大交流电压有效值或直流电压。  
Maximum r.m.s. voltage, which may be continuously applied to the SPD's mode of protection.
- 2.9 电压保护水平 Voltage Protection Level (Up)  
由于施加规定陡度的冲击电压和规定幅值及波形的冲击电流而在 SPD 两端之间预期出现的最大电压。  
Maximum voltage to be expected at the SPD terminals due to an impulse stress with defined voltage steepness and an impulse stress with a discharge current with given amplitude and wave shape.
- 2.10 标称放电电流 Nominal Discharge Current (In)  
由厂家给出的, SPD 在经过 15 次 8/20  $\mu$ s 电流波形浪涌冲击后无损坏的电流峰值。  
Peak value of the current, selected by the manufacturer, through the SPD having a current wave shape of 8/20  $\mu$ s where the SPD remains functional after 15 surges.
- 2.11 第 I 类试验用冲击电流 impulse current for class I test, Iimp  
用于划分进行第 II 类试验的 SPD 的等级。其波形一般由电流峰值和电荷量来确定。它用于第 I 类试验的动作负载试验。  
本标准中为明确起见, Iimp 通过 10/350 $\mu$ s 电流波形和峰值 Ipeak 来表征。  
Tests carried out with the impulse discharge current Iimp, with an 8/20 current impulse with a crest value equal to the crest value of Iimp, and with a 1,2/50 voltage impulse.
- 2.12 保护模式 Modes of Protection  
在端子间保护保护元器件的电流路径, 例如相对相、相对地、相对中线、中线对地。  
An intended current path, between terminals that contains protective components, e.g. line-to-line, line-to-earth, line-to-neutral, neutral-to-earth.
- 2.13 额定断开续流值 Follow current interrupt rating  
SPD 本身能断开的预期短路电流。  
Prospective short-circuit current that an SPD is able to interrupt without operation of a disconnector
- 2.14 外壳防护等级 (IP 代码) Degrees of Protection Provided by Enclosure (IP code)  
外壳提供的防止触及危险的部件、防止外界固体异物进入和/或防止水的进入壳内的防护程度。  
Classification preceded by the symbol IP indicating the extent of protection provided by an enclosure against access to hazardous parts, against ingress of solid foreign objects and possibly harmful ingress of water.

### 3. 结构尺寸 Structure and Dimensions

#### 3.1 结构图 Structure

产品结构：由三个多级 GDT 组成,采用 Y 型模式，具有续流遮断能力。

It is composed of three multi-stage GDTs, adopts Y-shaped mode, with freewheeling interruption capability and freewheeling interruption capability.

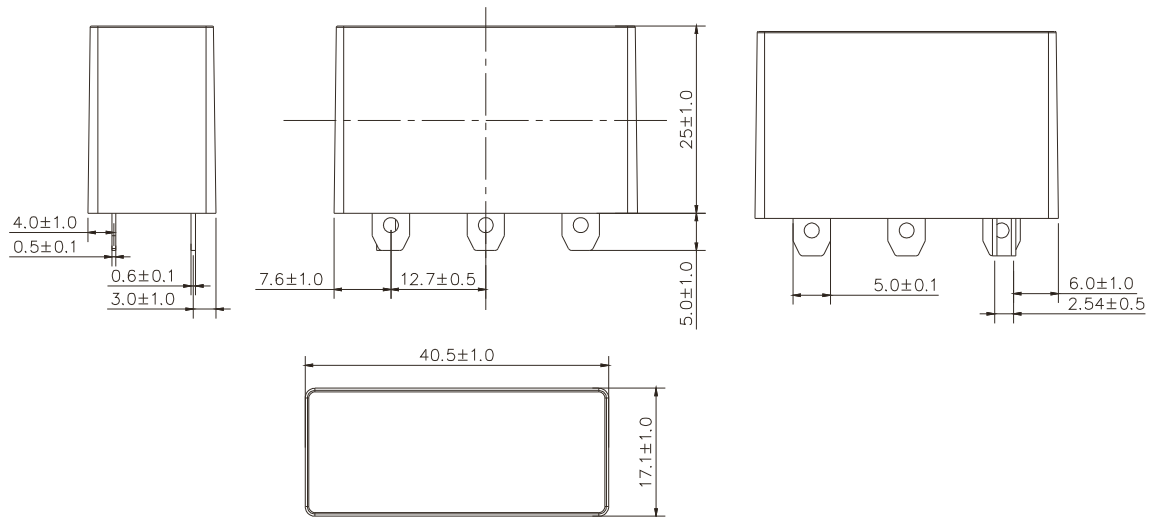


#### 3.2 主要原材料明细 Main Material List

编号 NO.	零件名 Part Name	材质 Materials
1	外壳 Enclosure	塑料 Plastic
2	温度保险丝 Thermal fuse	塑料、铜、环氧树脂 Plastic、Cu、Epoxy
3	气体放电管 GDT	陶瓷、铜 Ceramics、Cu
4	引脚 Pin	铜 Cu
5	填充料 Filling material	环氧树脂 Epoxy

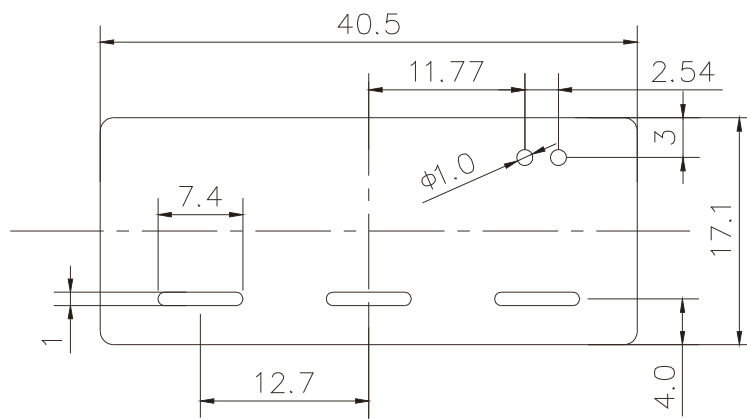
### 3.3 产品尺寸 Product Dimensions

单位 Unit: mm

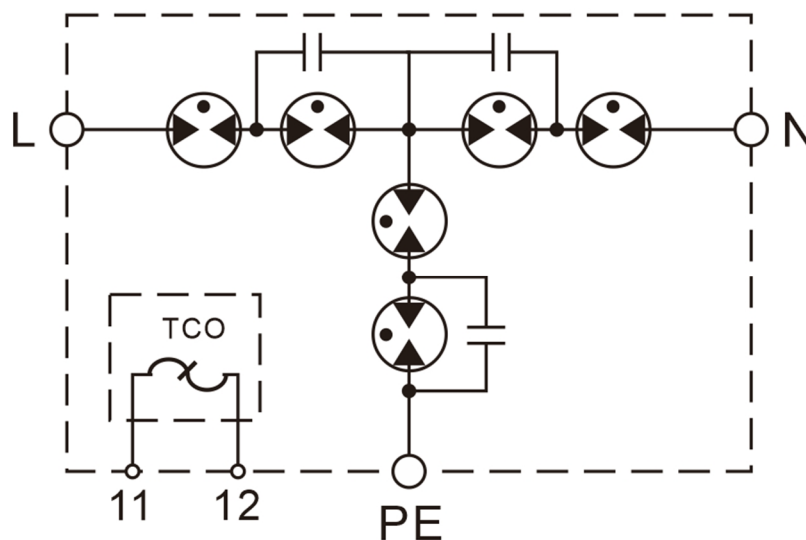


### 3.4 推荐焊盘开孔尺寸 Recommended pad cut-out size


单位 Unit: mm



### 3.4 电路图 Circuit Diagram



#### 4. 安规认证 Agency Approvals

认证标志 Agency	标准 Standards	认证号 File No.	类别 Category
	UL1449	E508408	Type 5

#### 5. 环保 Environment

环保 Environment	指令号 Order No.	指令 Order
RoHS2.0	2015/863/EU	满足 RoHS 指令 Meet the RoHS

#### 6. 技术参数 Specifications

技术特性 Technical Feature	技术参数 Technical Parameters	执行标准 Reference Standards
最大持续运行电压 U <sub>c</sub> Maximum Continuous Operating Voltage (U <sub>c</sub> )	320VAC	IEC61643-11
标称放电电流 Nominal Discharge Current (8/20 μs) (I <sub>n</sub> )	20kA	IEC61643-11
冲击放电电流 Impulse discharge current (10/350us)(I <sub>imp</sub> )	4kA	IEC61643-11
电压保护水平 Voltage Protection Rating (1.2/50μs-8/20μs@6kV) (U <sub>p</sub> )	1.8 kV	IEC61643-11
续流遮断能力 Follow current interrupt rating (I <sub>fi</sub> )	0.5kA@320VAC	IEC61643-11
保护模式 Modes of protection	L-N,L-PE,N-PE	IEC61643-11
外壳防护等级 Degrees of Protection of enclosure	IP20	IEC60529
海拔 Altitude	0 ~ 2000m	IEC61643-11
工作温度 Operational Temperature Range	(-40 to 85) °C	IEC61643-11
绝缘电压 insulation voltage	L/N/PE-11/12 5000VDC	/

## 7. 检验方法和标准 Inspection Method & Standards

### 7.1 常规检验项目 General Test Items

序号 No.	项目 Items	检验工具 Inspection Tools	检验要求 Inspection Requirement	参考标准 Reference Standards
1	外观 Appearance	目视 Visual check	外壳无穿孔、无飞边、标示清晰。 The case without perforation and fins, the mark is clear.	企业标准 Enterprise Standard
2	尺寸 Dimension	游标卡尺 vernier caliper	用游标卡尺测量产品尺寸，尺寸范围参 3.3。 Use the Vernier caliper to measure the product size, and the size range please reference to the table 3.3.	企业标准 Enterprise Standard

### 7.2 电压保护等级测试 Voltage Protect Rating Test

参考标准: IEC61643-11-2011 章节 8.3.3.3

Reference Standard: IEC61643.11-2011 Section 8.3.3.3

测试方法:

使用复合波进行本试验(Test:L-N,L-PE,N-PE)

- 1) 每次冲击的间隔时间应足以使试品冷却到环境温度。
- 2) 设定复合波发生器的电压，使输出的开路电压未制造商对 SPD 规定  $U_{oc}$  的 0.1,0.2,0.5 和 1.0 倍。
- 3) 用上述这些发生器的整定值，每种幅值对 SPD 施加 4 次冲击，正负极性各 2 次。
- 4) 每次冲击时，应用示波器记录从发生器流入 SPD 的电流和在 SPD 输出端口的电压。
- 5) 测得的限制电压和  $U_{max}$  是在整体试验程序中记录的最大放电电压。

Test Method:

To perform this test a combination wave generator is used.

- 1) The interval between the individual impulses shall be long enough for the sample to cool down to ambient temperature.
- 2) The voltage of the combination wave generator is set to provide an open-circuit voltage of 0,1; 0,2; 0,5; 1,0 times the  $U_{OC}$  as declared by the manufacturer for the SPD.
- 3) With these generator settings four surges will be applied to the SPD at each amplitude: two with positive and two with negative polarity.
- 4) An oscillographic record shall be made of the current delivered by the generator into the SPD and the voltage at the output port of the SPD for each impulse.
- 5) The value for determining the measured limiting voltage and  $U_{max}$  is the maximum voltage recorded during this test.

判定标准:

试验中，电压和电流波形图及目测检查试品没有击穿或闪络的迹象。

对于二类试验，测试样品的限制电压即为  $U_{max}(8/20\mu s)$  和  $U_{max}$ (波前放电电压)的最大值；对于三类试验，测试样品的限制电压即为  $U_{max}$ (混合波)。上述测试的限制电压值小于等于标注的电压保护水平。

Pass criteria:

During the test, there was no evidence of breakdown or flashover on the voltage and current waveforms and visual inspection of the samples.

For the second type test, the limiting voltage of the test sample is the maximum value of  $U_{max}(8/20\mu s)$  and  $U_{max}$  (wavefront discharge voltage); for the third type test, the limiting voltage of the test sample is  $U_{max}$  (mixed wave). The limit voltage value of the above test is less than or equal to the marked voltage protection level.

## 7.3

## 标称放电电流试验 Nominal Discharge Current Test

参考标准: IEC61643-11-2011 章节 8.3.4.3

Reference Standard: IEC61643.11-2011 Section 8.3.4.3

测试方法:

- 1) 对试品 L-N 施加 15 次 8/20 正极性的冲击电流, 分成 3 组, 每组 5 次冲击。每次冲击与电源频率同步, 同步角以  $30^{\circ}\pm 5^{\circ}$  的间隔逐级增加, 每次冲击记录电流波形;
- 2) 每次冲击的同时施加  $U_c$ , 两次冲击之间的间隔时间为 50-60s;
- 3) 两组之间的间隔时间为 30min-35min;
- 4) 15 次冲击结束后, 保持  $U_c$  时间不少于 15 分钟;
- 5) 重复上述步骤 1)~ 4) 重复 3 次
- 6) L-PE、N-PE 重复上述步骤。

Test Method:

- 1) Apply an impulse current of 8/20 positive polarity to the test samples L-N 15 times, and divide them into 3 groups with 5 impulses in each group. Each shock is synchronized with the power frequency, the synchronization angle increases step by step at intervals of  $30^{\circ}\pm 5^{\circ}$ , and the current waveform is recorded for each shock;
- 2) Apply  $U_c$  at the same time as each impact, The interval between two shocks is 50-60s;
- 3) The interval between two groups is 30min-35min;
- 4) Impact 15 shocks, keep  $U_c$  for no less than 15 minutes;
- 5) Steps 1) and 4), above, shall be repeated for a total of 3 cycles;
- 6) Repeat the above test at L-PE, N-PE.

判定标准:

- 1) 产品应达到热稳定。在施加  $U_c$  电压的最后 15min, 如果电流  $I_c$  的阻性分量峰值或功耗呈现出下降的趋势或没有升高, 则认为 SPD 是热稳定的。如果试验本身是加电  $U_c$  进行的, 则不间断地继续保持加电 15min, 或在 30s 内重新加电;
- 2) 电压和电流波形图及目测检查应没有击穿或闪络的迹象;
- 3) 试验过程中无发生可见的损坏;
- 4) 试验后所测量的限制电压应小于或等于  $U_p$ ;
- 5) 试验后, 不得有过高的泄漏电流。SPD 根据制造商的说明书按正常使用连接到参考试验电压  $U_{REF}$  的电源, 测量流过每个端子的电流, 电流的阻性分量不得超过 1mA, 或者电流增加不得超过在相关试验初始时测量结果的 20%;
- 6) 试验时, 制造商规定的外部脱离器不得动作, 试验后, 该脱离器处在正常工作状态;
- 7) 试验时, 制造商规定的内部脱离器不得动作, 试验后, 该脱离器处于正常工作状态;
- 8) 不得有对人员或者设备产生的爆炸或其他危险。

Pass Criteria:

- 1) Thermal stability shall be achieved. The SPD is considered to be thermally stable if the crest of the resistive component of the current flowing into the SPD or the power dissipation shows either a decreasing tendency or does not increase during 15 min of  $U_c$  voltage application immediately after the application of  $U_c$ . If the test itself is performed with the SPD energized at  $U_c$ , then  $U_c$  either remains applied for these 15 min without interruption or is reapplied within less than 30 s;
- 2) Voltage and current records and visual inspection shall show no indication of puncture or flashover;
- 3) No visible damage shall occur during the test;

- 4) Values for measured limiting voltage after the test shall be below or equal to UP;
- 5) No excessive leakage currents shall occur after the test; The SPD shall be connected as for normal use according to the manufacturer's instructions to a power supply at the reference test voltage ( $U_{REF}$ ). The current that flows through each terminal is measured. Its resistive component (measured at the crest of the sine wave) shall not exceed a value of 1 mA, or the current shall not have changed by more than 20 % compared to the initial value determined at the beginning of the relevant test sequence;
- 6) External disconnectors as specified by the manufacturer shall not operate during the test and shall be in working order after the test;
- 7) Internal disconnectors as specified by the manufacturer shall not operate during the test and shall be in working order after the test;
- 8) There shall be no explosion or other hazard to either personnel or the facility.

## 8. 注意事项 Attention

### 8.1 安装前阅读并理解所有说明。

Read and understand all instructions before installation.

### 8.2 持续施加在产品上的电压不应超过其最大连续工作电压 $U_c$ 。

The voltage continuously applied to the product should not exceed its maximum continuous working voltage  $U_c$

### 8.3 装配时不要用丙酮等溶剂清洗本产品，以免破坏本产品的封装层。

Avoiding to destroy enclosure, solvent such as acetone is forbidden for cleaning products when assembly.

### 8.4 装配时应避免出现如敲击等作业方式，避免造成本产品出现机械损伤。

Avoiding making mechanical damage on products, improper operation such as knocking when assembly is not allowed.

### 8.5 应用本产品的设备必须有可靠的接地线与大地相连，地线长度应小于 0.5 米。

Equipment on the use of the products must have reliable grounding to the earth, the length of the grounding wire less than 0.5 m.

### 8.6 未遵守操作说明可能导致电气系统或相关设备损坏。

If you do not obey the instructions, the electric system or associated equipment may be breakdown.

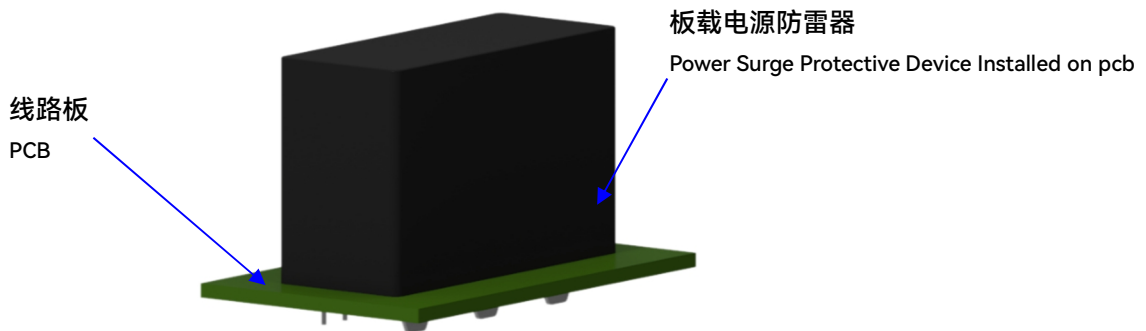
### 8.7 安装位置：室内。

Installation location: Indoors.

### 8.8 系统电压波动范围小于 10%。

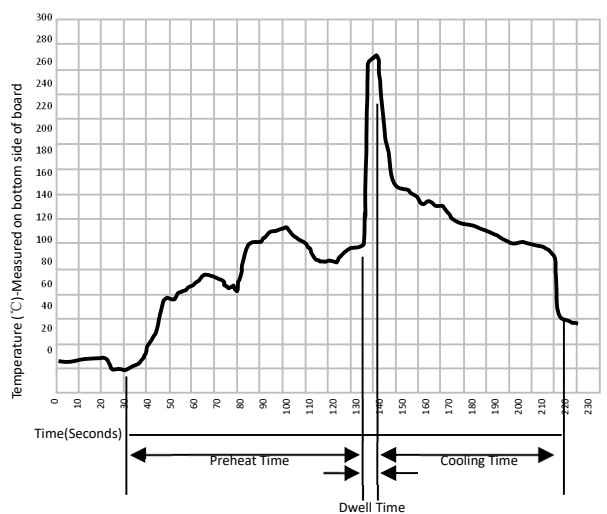
Fluctuation range of system voltage shall be less than 10%.

- 8.9 如果热保护装置断开，指示窗口将由白色转换为黑色。  
If the Thermal-Links break, the Indication window will be converted from white to black.
- 8.10 安装方式 Mounting Method  
PCB 板安装 PCB board installation



### 9. 波峰焊温度曲线 Wave Soldering profile

波峰焊条件 Wave Soldering Condition		无铅焊接 Pb-Free assembly
预热 Pre Heat	最低温度 Temperature Min	100°C
	最高温度 Temperature Max	150°C
	时间 Time (从小到大 min to max)	60 – 180 secs
锡炉温度 Solder Pot Temperature		270°C Max
焊接停留时间 Solder Dwell Time		2-5 seconds



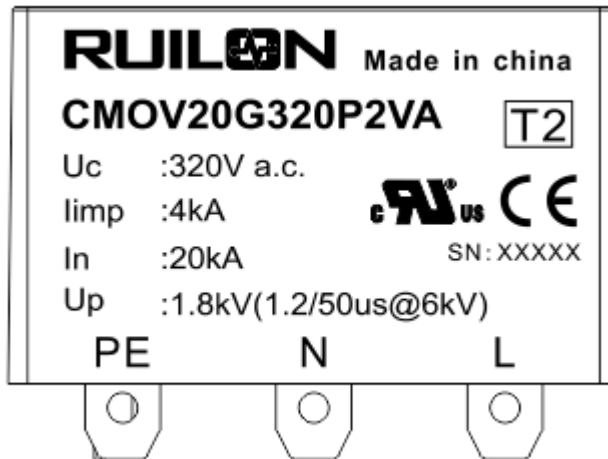
**备注 Remark:**

**本产品不支持回流焊**

This product does not support reflux welding

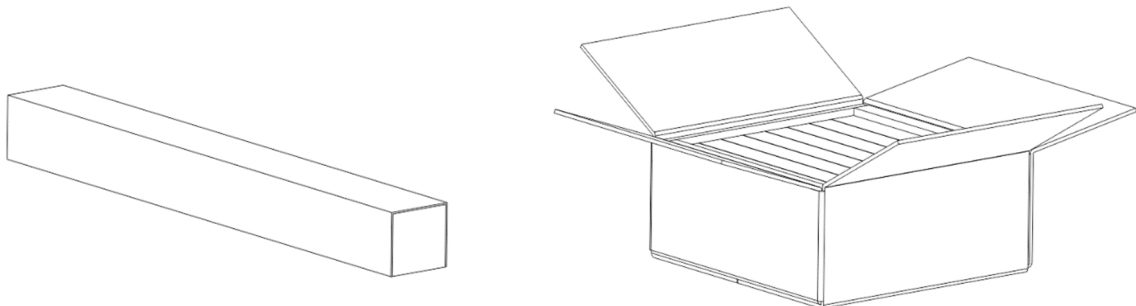
## 10. 标示及包装 Marks and Package

### 10.1 产品本体标识 Marking on Product



### 10.2 包装 Packaging

包装方式与要求 Packaging Method and Requirement		
包装尺寸(mm) Dimensions	包装管 (Packaging tube)	外箱 Carton
	300*42.5*33.6	355*355*166
数量 (PCS) Quantity	15	315
净重(kg) Net Weight	≈0.569	≈11.939
毛重(kg) Gross Weight	≈0.652	≈14.282
备注: Remark:		



**11. 产品批号&追溯号识别 Lot No. & Tracking No. System**

产品追溯号识别 Tracking No. System

大包装追溯号:

Tracking No. on the Outer Package:

Product code(产品代码)	10.20.28.3206.0000
Lot No(批次)	生产批次 Production batch
Product number(产品型号)	CMOV20G320P2VA
Quantity (数量)	315



**12. 储存条件和有效日期 Storage Conditions and Effective Date**

- a) 推荐长期存储条件: 存储温度: (-10 - 40) °C, 存储湿度: ≤75%RH。  
Recommend Long-term Storage Condition: Storage Temperature: (-10 - 40) °C, Storage Humidity ≤75%RH.
- b) 不要将本产品存放在有腐蚀性气体或阳光直接照射的环境中。  
Do not store the products in the environment that with corrosive gas or under direct sunlight.
- c) 存储期限: 2 年。  
Storage Period: 2 years.

**13. 有效性 Validity**

**13.1 修订协议 Agreement of Revision**

本规格书的内容若有不充分或需要修订时, 得由两公司协议后再行修订。

If the content of the specifications is inadequate or need revising, it will be revised after agreement by both parties.

**13.2 有效性 Validity**

本规格书提出后, 于贵公司承认期间, 可暂时使用, 若经过 1 个月后贵公司无异议或未签回规格书时, 则视同有效文件运用。

The specifications can be used temporarily during the period of approval. If you have no any objection or not return one hardcopy to us within 1 month, the specifications will be operated as a valid document.

-以下无正文 END-