



承认书

APPROVAL SHEET

客户名称:

Customer

/

产品名称:

Part Name

片式压敏电阻器

Chip Varistor

产品规格:

Specification

FPV453215E Series

版本号:

Version No.

21.01

日期:

DATE

2021-3-22

Manufacturer			Customer		
拟制	审核	确认	检验	审核	批准
Draft by	Checked by	Approve by	Check by	Checked by	Approval by
林晓华	徐雪枫	岑权进			



履历表 Resume

版本 Version No.	修改明细 Modify Details	日期 Date
18.01	首次发行 Initial issue	2018-5-21
20.01	修改了可靠性试验项目抗弯强度试验方法及要求 Modified the bending strength test method and requirements of reliability test items.	2020-5-28
21.01	修改了温度循环为温度冲击，修改了回流焊曲线。 Modified the temperature shocking instead of temperature cycling, and the reflow soldering profile.	2021-3-22



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8	贮存方法 Storage Methods
9	使用注意事项 Precautions For Use



1. 外形尺寸与内部结构 Dimension & Inner-configuration:



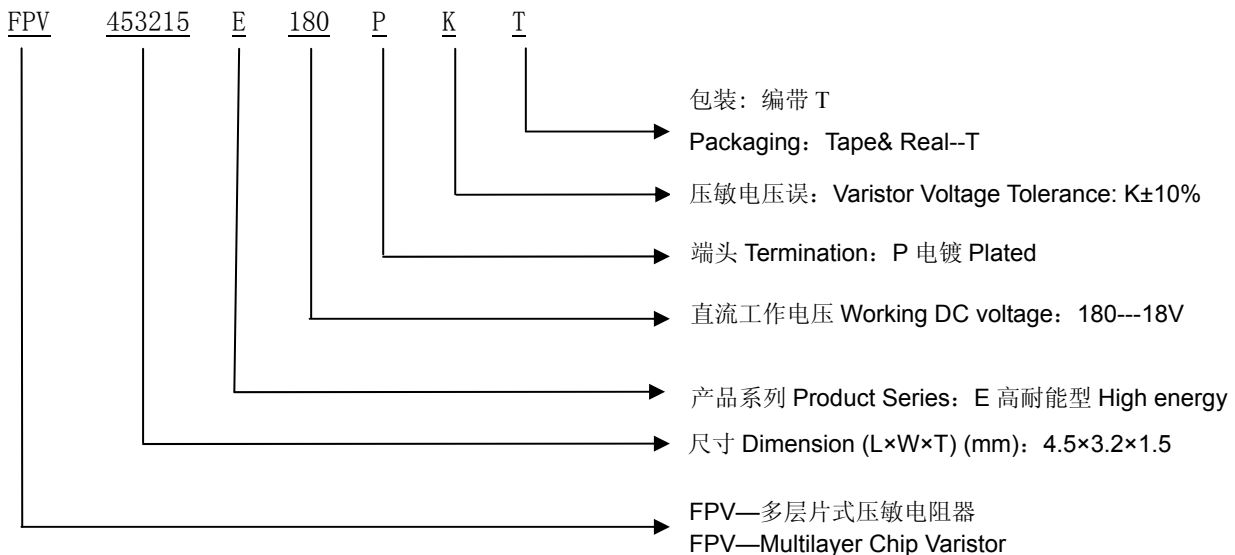
- a. 银层 Ag layer
- b. Ni/Sn 镀层 Ni/Sn plating
- c. 内电极 Inner electrode
- d. 瓷体 Body
- e. 端电极 Terminal electrode
- f. 玻璃层 Gass layer

序号 No.	部位 Component		材料 Material
1	瓷体Body		氧化锌ZnO
2	玻璃层Gass layer		硅铋系Si-Bi
3	内电极Inner electrode		钯/银Pd/Ag
4	端电极 Terminal electrode	银层 Ag layer	银Ag
		Ni/Sn镀层Ni/Sn plating	镍层-锡层Ni-Sn

单位Unit: mm(inch)

型号 Size	L	W	T	D
453215	4.5±0.20 (0.180±0.008)	3.2±0.20 (0.126±0.008)	1.5±0.20 (0.060±0.008)	0.5±0.3(0.020±0.012)

2. 产品品名构成 Product Spec. Model





3. 电性能参数表 Electrical Characteristics List

规格型号 Part Number	客户 物料号 Customers P/N	工作电压 Working Voltage		压敏电压 Varistor Voltage @ 1mA DC		最大限制电压 Maximum Clamping Voltage 8/20 μ s	能量耐量 Energy Absorption	峰值 电流 Peak Current	标准 电容量 (参考值) Typical Capacitance (Reference Value) @ 1MHz
		直流 DC	交流 AC	V_B					
		伏特 Volts	伏特 Volts	伏特 Volts	ΔV_B		伏特 Volts	焦耳 Joules	
高耐能系列 High energy absorb series									
FPV453215E110PLT		11	7.8	16	$\pm 15\%$	33@5A	2.5	500	2400
FPV453215E120PLT		12	8.5	18	$\pm 15\%$	34@5A	2.5	500	2300
FPV453215E140PKT		14	10	20	$\pm 10\%$	35@5A	2.5	500	2200
FPV453215E160PKT		16	11.3	22	$\pm 10\%$	39@5A	2.5	500	1900
FPV453215E180PKT		18	12.7	25	$\pm 10\%$	44@5A	2.5	500	1800
FPV453215E220PKT		22	15.6	30	$\pm 10\%$	53@5A	2.5	500	1600
FPV453215E240PKT		24	17	33	$\pm 10\%$	58@5A	2.5	500	1500
FPV453215E260PKT		26	18.4	36	$\pm 10\%$	63@5A	2.5	500	1300
FPV453215E300PKT		30	21.2	42	$\pm 10\%$	74@5A	2.5	500	1200
FPV453215E330PKT		33	23.3	45	$\pm 10\%$	79@5A	2.5	500	1100
FPV453215E380PKT		38	27	51	$\pm 10\%$	90@5A	2.5	500	1050
FPV453215E420PKT		42	30	56	$\pm 10\%$	99@5A	2.5	500	1000
FPV453215E480PKT		48	34	62	$\pm 10\%$	110@5A	2.5	500	900
FPV453215E560PKT		56	40	72	$\pm 10\%$	127@5A	2.5	500	800
FPV453215E600PKT		60	45	76	$\pm 10\%$	134@5A	2.5	500	650
FPV453215E680PKT		68	48	86	$\pm 10\%$	151@5A	2.5	500	550
FPV453215E850PKT		85	60	100	$\pm 10\%$	190@5A	2.5	500	450

备注：电容量为参考值不作产品合格与否判定。The capacitance is only the reference value, not the standard to judge the product is qualified or not.



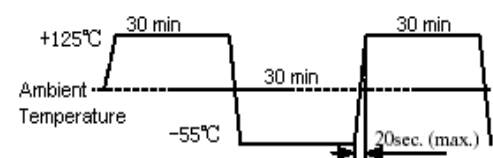
4. 可靠性试验项目 Reliability Testing Items

序号 No.	项目 Items	要求 Requirements	试验方法及备注 Test Methods and Remarks
1	工作温度范围 Operating Temperature Range	-55℃~+125℃	
2	可焊 Solder ability	至少 90%端电极表面被焊锡覆盖。 At least 90% of terminal electrode should be covered with solder	预热温度:120℃~150℃ 预热时间: 60s 焊料: (96.5%Sn/3.0%Ag/0.5%Cu) 焊锡 焊锡温度: 245℃±5℃ 浸锡深度:10mm 浸锡时间 : 5±1s 浸渍到助焊剂约:3~5 s Preheating temperature:120℃ to 150℃ Preheating time: 60s Solder 96.5%Sn/3.0%Ag/0.5%Cu of the Sn solder. Solder temperature: 245±5℃ Immersion tin depth:10mm Duration : 5±1s Dip performance to a flux of about:3~5 s
3	耐焊接热 Resistance to Soldering	无可见机械损伤; 压敏电压变化率为±10%。 No mechanical damage; Varistor voltage change within±10%。。	预热温度: 120℃~150℃ 预热时间: 60s 焊料: (96.5%Sn/3.0%Ag/0.5%Cu) 焊锡 浸锡温度: 260℃±5℃ 浸锡深度:10mm 浸锡时间 : 10±1s 浸渍到助焊剂约:3 ~ 5 s Preheating temperature: 120℃ to 150℃ Preheating time: 60s Solder 96.5%Sn/3.0%Ag/0.5%Cu of the Sn solder. Solder temperature: 260℃±5℃ Immersion tin depth:10mm Duration : 10±1s Dip performance to a flux of about:3 ~ 5 s



序号 No.	项目 Items	要求 Requirements	试验方法及备注 Test Methods and Remarks						
4	端电极强度 Adhesion of electrode	端电极与瓷体不应受损, 无可见机械损伤。 The termination and body should be no damage.	<table border="1"> <thead> <tr> <th>规格型号 Part Number</th> <th>施加力 Applied force</th> <th>保持时间 Keep time</th> </tr> </thead> <tbody> <tr> <td>4532</td> <td>10N</td> <td>10±1S</td> </tr> </tbody> </table> <p>Chip Glass Epoxy Board Mounting Pad F</p>	规格型号 Part Number	施加力 Applied force	保持时间 Keep time	4532	10N	10±1S
规格型号 Part Number	施加力 Applied force	保持时间 Keep time							
4532	10N	10±1S							
5	耐低温 Low temperature resistance	无可见机械损伤; 压敏电压变化率为±10%。 No mechanical damage; Varistor voltage change within±10%。	测试温度: $-55 \pm 2^{\circ}\text{C}$ $+24$ 测试时间: $1000 - 0$ h Temperature: $-55 \pm 2^{\circ}\text{C}$ $+24$ Testing time: $1000 - 0$ h						
6	抗弯强度 Bending strength	无可见机械损伤, No mechanical damage	条件: 测试基板(PCB) 施压速度: 0.5mm/s 弯度: 2mm, 保持时间≥30s Condition: print circuit board. Pressing speed: 0.5 mm/s curvature: 2mm, hold time 30 s						
			<p>厚度 thickness $1.6\text{mm} \pm 0.20\text{mm}$ 或者 or $0.8\text{mm} \pm 0.10\text{mm}$ 基板 substrate 产品 Chip 20mm R5 弯曲工具 Bending tool 焊接 solder 弯曲度 Camber 支座 support radius: 2.5mm $45\text{mm} \pm 2\text{mm}$ $45\text{mm} \pm 2\text{mm}$</p>						
7	振动 Vibration	无可见机械损伤; 压敏电压变化率为±5%。 No mechanical damage; Varistor voltage change within ±5%。	振幅: 1.5mm 测试时间: 沿三个垂直方向各做 2 小时 频率范围: 10Hz~55Hz~10Hz (1 分钟) Amplitude modulation: 1.5mm Test time: A period of 2h in each of 3 mutually perpendicular directions. Frequency range: 10Hz to 55Hz to 10Hz for 1min.						



序号 No.	项目 Items	要求 Requirements	试验方法及备注 Test Methods and Remarks
8	耐高温 High temperature resistance	无可见机械损伤; 压敏电压变化率为±10%。 No mechanical damage; Varistor voltage change within±10%。	测试时间: 1000^{+24}_{-0} h 测试温度: $125\pm 2^{\circ}\text{C}$ Testing time: 1000^{+24}_{-0} h Temperature: $125\pm 2^{\circ}\text{C}$
9	高温负载 High temperature load	无可见机械损伤; 压敏电压变化率为±10%。 No mechanical damage; Varistor voltage change within±10%。	施加电压: 工作电压 测试时间: 1000^{+24}_{-0} h 测试温度: $85^{\circ}\text{C}\pm 2^{\circ}\text{C}$ Applied voltage: Working voltage Testing time: 1000^{+24}_{-0} h Temperature: $85\pm 2^{\circ}\text{C}$
10	恒定湿热 Static Humidity	无可见机械损伤; 压敏电压变化率为±10%。 No mechanical damage; Varistor voltage change within±10%。	湿度: 90%~95% RH; 温度: $60^{\circ}\text{C}\pm 2^{\circ}\text{C}$; 测试时间: 1000^{+24}_{-0} h。 Humidity: 90% to 95% RH; Temperature: $60^{\circ}\text{C}\pm 2^{\circ}\text{C}$; Testing time: 1000^{+24}_{-0} h。
11	温度冲击 Temperature Shock	无可见机械损伤; 压敏电压变化率为±10%。 No mechanical damage; Varistor voltage change within±10%。	温度: -55°C , 30±3 分钟 $+125^{\circ}\text{C}$, 30±3 分钟 循环次数: 32 Temperature: -55°C for 30±3min $+125^{\circ}\text{C}$ for 30±3min Number of cycles: 32 

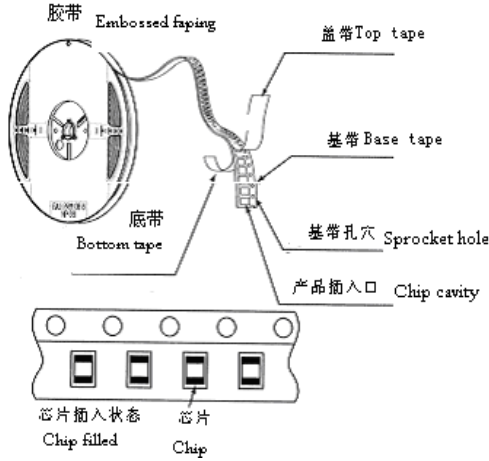
注: 以上要求测试电性能的项目, 应试验后在标准条件下放置 24 小时后测试。

Note: When there are questions concerning, measurement shall be made after 24 ± 2 hrs of recovery under the standard condition.



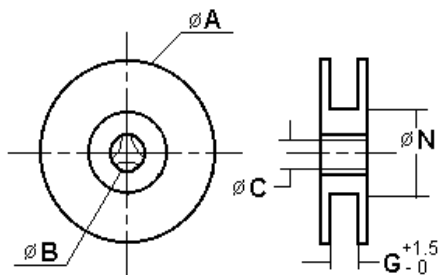
5. 产品包装 Packaging

1) 编带图 Taping drawings

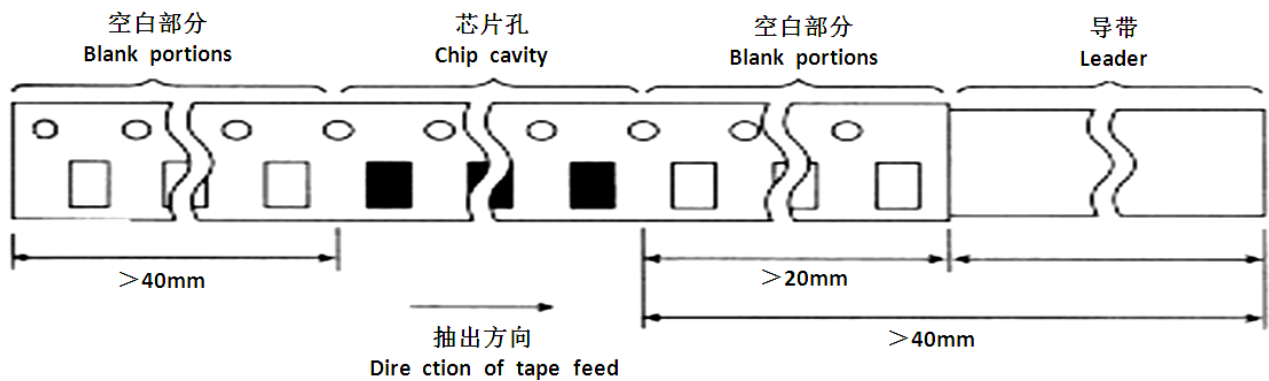


2) 卷盘尺寸 Reel dimensions (Unit: mm)

型号 Size	卷盘型号 Reel type	A	B	C	N	G
4532	CF-12	330±2.0	22.0±2.0	12.5±1.5	98±2.0	12



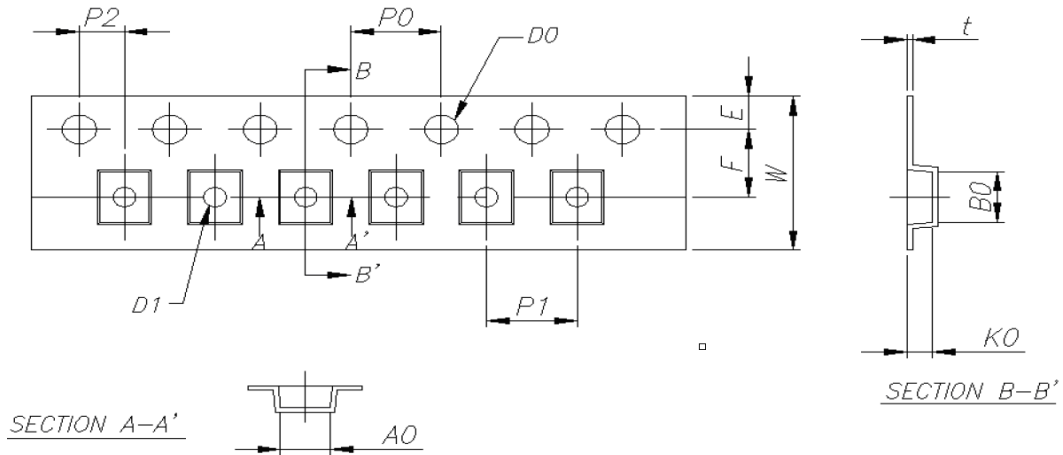
3) 导带及空格部分 Leader and blank portion



4) 编带尺寸 Taping dimensions (Unit: mm)

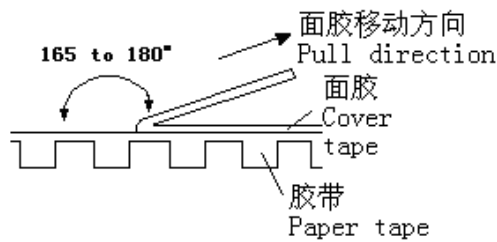


●塑料胶带 Embossed tape



型号 Size	W	A0	B0	D0	D1	E	F	K0	P0	P2	P1	T
4532	12±0.3	3.4±0.1	4.85±0.1	1.5+0.1/-0.0	1.0±0.05	1.75±0.1	5.5±0.1	3.0±0.1	4.0±0.1	2.0±0.1	8.0±0.1	0.30±0.05

5) 剥离力检验 Peeling off force



- ① 盖带的剥离力：沿面胶移动方向拉时要求剥离力为 0.1N~0.7N。
Peeling force should be 0.1~0.7N pulling in the direction of arrow.
- ② 剥离速度：300mm/min
Speed of peeling off: 300mm/min.
- ③ 在胶带剥落时，面胶不能有破损，不能粘纸带。
The cover bond should not be damaged and bond the tape when it peeled off.

6) 包装数量（单位：粒） Packaging number (Unit: Pcs)

型号 Size	453215
每卷数量 REEL	3000
每盒数量 BOX	12000
每箱数量 CASE	36000



7) 标签粘贴位置 Label stick station

卷盘标签 Reel label	纸盒标签 Carton label	外箱标签 Outer box label
		

6. 环保情况说明 Environmental Protection Statement

RoHS 指令： 公司产品符合 RoHS 指令。

Response to RoHS directive: Our products are RoHS compliance.

7. 推荐焊接条件 Recommend Soldering Conditions

1) 焊接条件 Soldering Conditions

产品适用于回流焊 Products can be applied to reflow soldering.

① 焊接要求 Soldering conditions

- 预热时，产品表温与焊料温度的温差最大不允许超出 150℃，焊接完冷却时，产品表温与溶剂温度之间的温差最大不超过 100℃。预热不足有可能引发产品表面裂纹，从而导致产品品质下降。

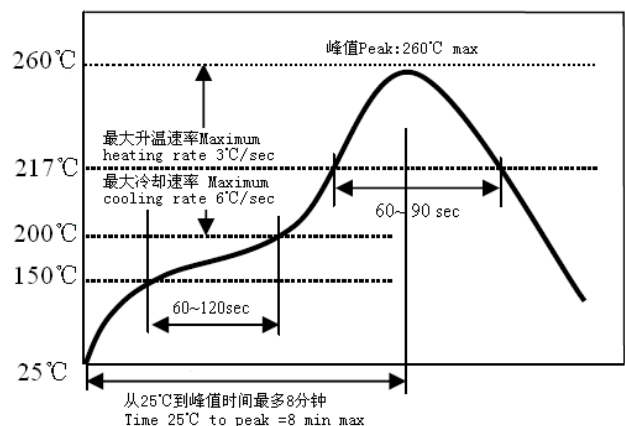
Pre-heating should be in such a way that the temperature difference between solder and ferrite surface is limited to 150℃ max. Also cooling into solvent after soldering should be in such way that the temperature difference is limited to 100℃ max. Un-enough pre-heating may cause cracks on the ferrite, resulting in the deterioration of product quality.

- 产品要在以下画出的曲线允许的范围进行焊接。其它焊接条件可能引起产品电极的腐蚀。当焊接重复时，允许的时间为第一次做的累计时间。

Products should be soldered within the following allowable range indicated by the slanted line. The excessive soldering conditions may cause the corrosion of the electrode. When soldering is repeated, allowable time is the accumulated time.

2) 回流焊曲线 Reflow soldering profile

- 预热条件: 150 ~ 200℃ / 60 ~ 120秒
Preheat condition: 150 ~ 200℃ / 60 ~ 120sec
- 允许大于217℃时间: 60—90秒
Allowed time above 217℃: 60~90sec
- 最大温度: 260 °C
max temp: 260 °C
- 最高温的最大时间: 10秒
max time at max temp: 10 sec
- 焊膏: Sn/3.0Ag/0.5Cu





Solder paste: Sn/3.0Ag/0.5Cu

- 回流焊次数：最多2次

Allowed Reflow time: 2x max

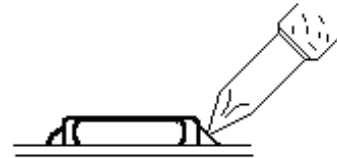
3) 手工焊接 Iron soldering

使用烙铁进行返修时要求在 150℃ 下预热至少 1 分钟，不能直接用焊头接触磁体，返修焊接条件如下：

- ①烙铁头温度：350℃；②烙铁输出功率：≤30W；③烙铁头直径：≤1.0mm；④焊接时间：<3秒；⑤手工焊接次数：最多2次

Reworking with Soldering Iron must preheating at 150℃ for 1 minute is required, and do not directly touch the core with the tip of the soldering iron. The reworking soldering conditions are as follows:

- ① Temperature of soldering iron tip: 350℃;
- ② Soldering iron power output: 30W max.
- ③ Diameter of soldering iron end: 1.0mm max.
- ④ Soldering time: within 3 sec.
- ⑤ Max.2 times for iron soldering



4) 清洗条件 Cleaning Conditions

对本产品进行清洗操作前，需确认以下条件：

- (1) 清洗温度：≤60℃（酒精清洗剂≤40℃）
- (2) 超声波清洗

输出：≤20 W/L 持续时间：≤5 分钟 频率：28~40kHz

▲清洗时要避免 PCB 板和安装产品的共振。

The following conditions should be observed when cleaning the products:

- (1) Cleaning Temperature: 60℃ max. (40℃ max. for alcohol cleaning agents)
- (2) Ultrasonic

Output: 20 W/L max.

Duration: 5 min max.

Frequency: 28 to 40kHz

Care should be taken not to cause resonance of the PCB and mounted products.

8. 存储要求 Storage Requirements

1) 存储期限 Storage period

距电感公司出厂检验时间 6 个月内，产品可以使用，检验时间可以通过包装外侧标记的检验号确认。若时间超过 6 个月，应检查焊接性能后方可使用。

Products which inspected in inductor company over 6 months ago should be examined and used, which can be Confirmed with inspection No. marked on the container. Solder ability should be checked if this period is exceeded.

2) 存储条件 Storage conditions

- (1) 存放货物的库房应满足以下条件：温度：-10~+40℃，相对湿度：30~70% RH。



Products should be storage in the warehouse on the following conditions:

Temperature : -10~+40℃ Humidity: 30~70% RH relative humidity

(2) 禁止将产品保管在腐蚀性物质中，如硫磺、氯气或酸，否则将引起端头氧化，导致降低焊接性。

Don't keep products in corrosive gases such as sulfur, chlorine gas or acid , or it may case oxidization of Electrodes resulting in poor solder ability.

(3) 为了避免受潮气、灰尘等物质的影响，产品应保管于货架上。

Products should be stored on the palette for the prevention of the influence from humidity, dust and so on.

(4) 产品保管在库房中，应避免热冲击、振动以及直接光照等等。

Products should be stored in the warehouse without heat shock, vibration, direct sunlight and so on.

(5) 产品应密封包装。

Products should be stored under the airtight packaged condition.

9. 注意事项 Notes

(1) 若本次承认的为“整体无铅”产品，则表明该产品符合RoHS指令的要求。

If the parcel label on product is "Unitary lead free" that indicate the products in accord with ROHS appointed requests.

(2) 本承认书保证我司产品作为一个单体时的质量情况，当我司产品被安装到贵公司产品上时请保证贵司的产品已根据贵司的规范进行了有效评价和确认。

This product specification guarantees the quality of our product as a single unit, Please make sure that your product has been evaluated and confirmed against your specifications when our product is mounted to your product.

(3) 如果贵司对我司产品的试用已超过了本测试规范所界定的产品功能，对于此所引发的失效我司将不予保证。

We can't warrant against failure caused by any use of our product that deviates from the intended use as described in this product specification.