



富捷科技

Product Datasheet

产品规格说明书

FAR Series Automotive Anti-sulfured Array Thick Film Chip Resistor

抗硫化汽车级排阻厚膜片式电阻器

安徽省富捷电子科技有限公司

ANHUI FOJAN ELECTRONICS TECHNOLOGY CO., LTD

安徽省马鞍山市郑蒲港新区金蒲电子产业园

JINPU ELECTRONIC INDUSTRIAL PARK, ZHENGPU PORT NEW
DISTRICT, MAANSHAN CITY, ANHUI PROVINCE

zoey@fosan.net.cn www.fosan.vip

抗硫化汽车级排阻厚膜片式电阻器 Automotive Anti-sulfured Array Thick Film Array Chip Resistor FAR Series



■ 特点 (Features)

- 电性能稳定, 可靠度高 - Stable electrical capability and high Reliability
- 符合 RoHS 指令&无卤素要求 - Compliant with RoHS directive , Halogen free requirement
- 在拾取与放置应用中更高效 - More efficient in pick & place application
- 符合汽车标准相关条款 - Compliant with AEC-Q200 standard

■ 应用 (Application)

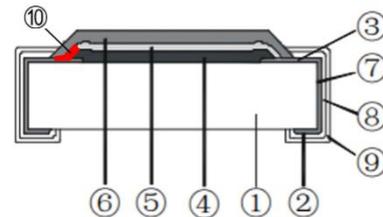
- 广泛应用于 SDRAM 和 DDRAM 的端子、计算机、PDA、工业自动化及消费类电子产品等领域。
- Terminal for SDRAM and DDRAM, Computer, PDA, industrial automation and consumer electronics etc.

■ 产品料号 (Parts Number Explanation) 示例: FAR064RJ151 TS

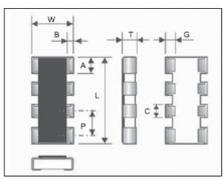
F 公司	AR 产品别	064R 尺寸	J 公差	151 字码	T 包装别	T 电极类型	特殊码
FOJAN	AR: Automotive Anti-sulfured Array Others series refer to Catalogue	022R	F:±1%	3-digits+blank	T: 7 inch reel	T:Convex	Blank
		042R	J:±5%	102=1KΩ	Q:10 inch reel	A:Concave	
		062R	P: Jumper	1R0=1Ω	R:13 inch reel	F: Flat	
		024R			B:Bulk		
		044R					
		064R					
Company	Product Type	Size	Tolerance	Resistance	Packaging	Termination	Special Case

■ 电阻结构 (Construction)

NO.	结构 Construction	材料 Material
1	陶瓷基板 Ceramic substrate	三氧化二铝 Al ₂ O ₃
2	银电极 Conductive layer(Back)	银 Ag
3	银电极 Conductive layer(Top)	银 Ag/pd
4	阻体层 Resistive layer	氧化钌 RuO ₂
5	内保护层 Inner protective layer	玻璃 Glass
6	外保护层 Outer Protective layer	环氧树脂 Epoxy
7	侧电极 Side conductive layer	镍铬合金 NiCr
8	镍电极 Ni plating layer	镍 Ni
9	锡电极 Sn Conductive layer	锡 Sn
10	抗硫化层 Anti-sulfured layer	低温银 Ag



■ 尺寸 (Dimension):

尺寸 Dimension					
	单位 (unit) : mm				
型别 (Type)	L	W	H	T1	T2
022R	0.80±0.10	0.60±0.10	0.25±0.10	0.35±0.10	0.15±0.10
042R	1.00±0.10	1.00±0.10	0.30±0.05	0.30±0.10	0.25±0.10
062R	1.60±0.10	1.60±0.15	0.30±0.10	0.40±0.10	0.30±0.10
024R	1.40±0.10	0.60±0.10	0.20±0.10	0.35±0.10	0.15±0.10
044R	2.00±0.10	1.00±0.10	0.40±0.05	0.45±0.10	0.30±0.15
064R	3.20±0.15	1.60±0.15	0.65±0.05	0.60±0.10	0.30±0.15

■ 电气特性 (Electrical characteristics)

型别 Type	70°C 下额定功率 Rated Power at 70°C	最大工作电压 Max Working Voltage	最大过负荷电压 Max Overload Voltage	绝缘耐压 DWV
022R	1/20W	15V	30V	30V
042R	1/16W	50V	100V	100V
062R	1/10W	50V	100V	100V
024R	1/20W	12.5V	25V	25V
044R	1/16W	25V	50V	100V
064R	1/10W	50V	100V	100V

型别 Type	零欧姆阻值 Value of Jumper		零欧姆额定电流 Rated Current of Jumper	零欧姆最大电流 Max Current of Jumper	阻值范围 Resistance Range	
	±1%	±5%			1%、2%	5%
022R	-	<50mΩ	0.5A	1A	10Ω-1MΩ	10Ω-1MΩ
042R	<30mΩ	<50mΩ	1A	2.5A	10Ω-1MΩ	10Ω-1MΩ
062R	<30mΩ	<50mΩ	1A	2.5A	10Ω-1MΩ	10Ω-1MΩ
024R	-	<50mΩ	0.5A	1A	10Ω-1MΩ	10Ω-1MΩ
044R	<30mΩ	<50mΩ	1A	2.5A	10Ω-1MΩ	10Ω-1MΩ
064R	<30mΩ	<50mΩ	1A	2.5A	10Ω-1MΩ	10Ω-1MΩ

备注 (Remark) : 额定电压计算公式 (The rated voltage is calculated by the following formula) :

$$E = \sqrt{RP}$$

E: 额定电压 (Rated Voltage) (V)

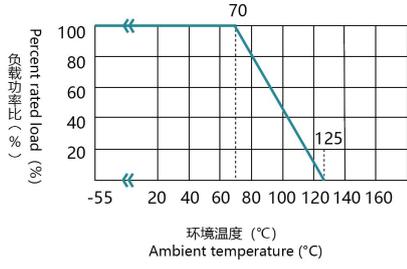
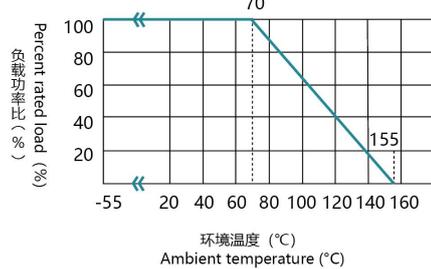
P: 额定功率 (Rated Power) (W)

R: 电阻阻值 (Resistance) (ohm)

如果计算出的电压超过此型别的最大工作电压, 则此型别的最大工作电压为此电阻的额定电压。

In case the value calculated by the formula exceed the maximum working voltage as above table 8, the maximum working voltage shall be regarded as rated voltage.

功率衰减曲线 (Derating Curve)

使用温度范围 Temperature usage range	-55°C~+125°C (0201)	-55°C~+155°C (其他)
说明 Describe	周围温度若超过 70°C 至 125°C 之间,功率可照下图曲线予以修订 If the ambient temperature exceeds 70°C to 125°C, the power can be revised according to the curve in the following figure	周围温度若超过 70°C 至 155°C 之间,功率可照下图曲线予以修订 If the ambient temperature exceeds 70°C to 155°C, the power can be revised according to the curve in the following figure
功率衰减曲线图 Power Attenuation Curve		

温度系数 (Temperature Coefficient)

型别 Type	阻值范围 Resistance Range	产品精度和温漂系数 (ppm/°C) Resistance Tolerance and TCR (ppm/°C)		
		±1%	±2%	±5%
022R/024R/044R/ 064R/042R/068R	10Ω-1MΩ	±200	±200	±200

性能 (Performance)

内容 Item	测试方法 Test Methods	测试条件 Test Conditions	规格 Specification
温度系数 Temperature Coefficient	JIS C 5201 4.8 IEC60115-1-4.8	$TCR = (R - R_0) / (t - t_0) R_0 \times 10^6$ (ppm) R0: 电阻在室温下的阻值(resistance at room temperature) R: 电阻在 125°C 或 -55°C 下的阻值(resistance at 125°C or -55°C) t0: 室温(room temperature) t: 测试温度 (test temperature 125°C or -55°C)	As SEPC
短时间过负荷 Short-time overload	JIS C 5201 4.13 IEC60115-1-4.13	加载 2.5 倍的额定电压, 时间 5 秒后测量试验前后的阻值变化率。 Applied 2.5 times of rated voltage for 5 second. Measure the variation of resistance.	1%: ±(1.0%+0.05Ω) 5%: ±(2.0%+0.05Ω)
高温储存 High Temperature Exposure (Storage)	AEC-Q200TEST3 MIL-STD-202 METHOD108	125°C 下放置 1000h, 不加载功率, 试验结束 24 ± 4 小时后进行测试。 1000hrs.@T=155.Unpowered.Measurement at 24±4hours°C after test conclusion	±(1.00%+0.05Ω)

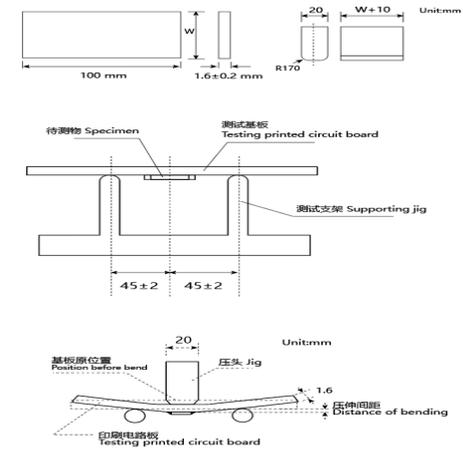
FAR-Series Automotive Anti-sulfured
Array Thick Film Chip Resistor Product Specifications
FAR 系列汽车级抗硫化排阻厚膜片式电阻器规格书



内容 Item	测试方法 Test Methods	测试条件 Test Conditions	规格 Specification
温度循环 Temperature Cycling	AEC-Q200TEST 4 JESD22 METHOD JA-104	-55~+155, °C循环 1000 次, 在每一个极 限温度持续时间不超过 30 分钟, 且温度转换时间不超 过 1 分钟, 试验 结束 24±4 小时 后进行测试。 1000 Cycles(-55to+155)Measurement at 24±4 hours°CAfter test conclusion.30min maximum dwell time at each temperature extreme.1min.maximum transition time.	±(2.00%+0.05Ω)
焊锡性 Solderability	AEC-Q200TEST18 J-STD-002	用于引脚型和表面贴装型元件, 不需要电气测试。放大 倍数 50 倍。测试条件: 表面贴装型: a)方法 B,干热@155°C,4 小时, @235°C,3±0.5 秒 b) 方法 B,蒸煮 8 小时, @235°C,3±0.5 秒 For pin and surface-mount components, no electrical testing required. Magnification 50 times. Test conditions: Surface mount type: a)Method B:dry heat@155°C,4hours,@235°C,3 ±0.5seconds b)Method B:cook for 8 hours at @ 235°C,3±0.5 seconds	> 95%面积上锡 (> 95% coverage)
抗焊锡热 Resist to soldering heat	AEC-Q200TEST15 MIL-STD-202 METHOD210	沾助焊剂后浸入锡炉, 锡炉温度 260±5°C, 时间 10±0.5 秒, 测量试验前后的阻值变化率。 Dip the terminal in a flux and then dip into a soldering bath at 260±5°C for 10±0.5sec. Measure the variation of resistance.	±(1.00% +0.05Ω)
绝缘电阻 Insulation resistance	JIS C 5201 4.6 IEC60115-1-4.6	电阻本体上加载绝缘耐压 60±5 秒后, 测量绝缘阻抗。 Applied the dielectric withstanding voltage on the center of body for 60±5seconds. Then measure insulation resistance.	> 10GΩ
绝缘耐压 Dielectric withstanding voltage	JIS C 5201 4.7 IEC60115-1-4.7	电阻本体上加载绝缘耐压 60±5 秒。 Applied the dielectric withstanding voltage on the center of body for60±5seconds.	无击穿飞弧可见机械损伤 No evidence of flash over, mechanical damage arcing or insulation breakdown
温度快速变化 Rapid temperature changes	JIS C 5201 4.19	电阻放入温度循环机中, T1 温度: -55±3°C; T2 温度: 155 ±3°C./125±3°C, 放置 30 分钟, 共 300 个循环。量测试验前后阻值变化率。 Put specimen in a chamber which temperature can be T1: -55±3°C; T2: 155±3°C/125±3°C, 30min, repeated 300 cycles. Measure the variation of resistance.	0.5%/1%:±(1.0%+0.05Ω) 5%: ±(2.0%+0.05Ω)
温湿循环 Moisture resistance	MIL-STD-202 METHOD 106	25°C~65°C,90~100%RH, 2.5 小时; 65°C 90~100%RH, 3 小时; 65°C~25°C,80~100%RH,2.5 小时,10 个循环,试验结束 24±4 小时后进行测试。 25°C~65°C,90~100%RH, 2.5H; 65°C 90~100%RH, 3H; 65°C~25°C 80~100%RH, 2.5H, 10 cycles, Measurement at 24± 4 hours after test conclusion.	1%:±(1.0%+0.05Ω) 5%: ±(2.0%+0.05Ω)

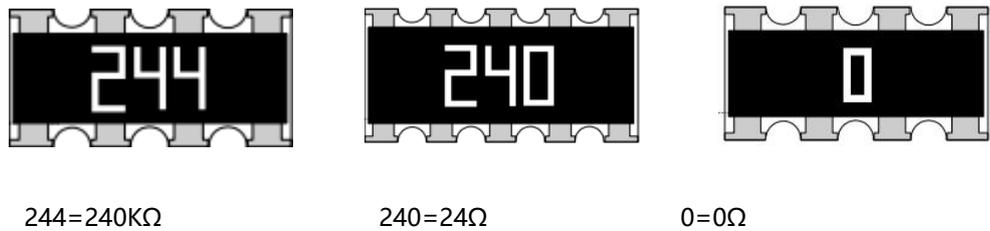
FAR-Series Automotive Anti-sulfured
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内容 Item	测试方法 Test Methods	测试条件 Test Conditions	规格 Specification
端子强度 Terminal Strength	AEC-Q200TEST11 MIL-STD 202 METHOD211	04020.5kgf; 0603:1.0kgf; 其他规格: 2.0kgf 施加 推力, 维持 60±1 秒 0402:0.5kgf,0603:1.0kgf;Other:2.0kgf ;60±1 seconds;	无破损 No Broken
端子弯曲 Terminal bending	AEC-Q200TEST21 AEC-Q200-005	电阻焊接在测试板上进行弯折,弯折保持时间 20±1 秒, 1206(含) 以下的尺寸弯曲 5+0.2/0 mm; 1206 以上的尺寸弯曲 2+0.2/0 mm; 量测试验前后阻值变化率 Specimen shall be mounted on test board, then bend the board and maintained for 20±1s. the distance of bending is 5+0.2/0 mm for resistors which size no larger than 1206 or 2+0.2/0 mm which size larger than 1206. Measure the variation of resistance. 测试板 (test board) 压头 (jig) 	±(1.00% + 0.05Ω)
耐湿特性 Humidity	MIL-STD-202 METHOD103 AEC-Q200TEST7	电阻放入恒温恒湿箱, 加载 10%额定功率, 85°C /85%RH,持续通电 1000+24/-0H, 试验结束 24±4 小时后进行测试 PutthespecimeninachamberLoad10%of operating power,1000hours85°C/85%RH. Measurementat24±4hoursaftertestconclusion.	1%: ±(1.0%+0.05Ω) 5%: ±(2.0%+0.05Ω)
负荷寿命 Load life	MIL-STD-202 METHOD108 AEC-Q200TEST8	电阻放入恒温箱中, 温度 125±2°C, ON TIME:1.5H, OFF TIME:0.5H, 通电额定电压 1000 ⁺²⁴ / ₋₀ 小时, 量测试验前后阻值变化率。 Put the specimen in a chamber at 125±2°C,temperature, ON TIME:1.5H, OFF TIME:0.5H, and applied rated voltage for 1000 ⁺²⁴ / ₋₀ H. Measure the variation of resistance.	1%: ±(1.0%+0.05Ω) 5%: ±(2.0%+0.05Ω)
抗硫化实验 Sulfuration test	ASTM-B-809-95	方法一: 温度 105°C,湿热蒸硫粉试验 (加饱和硝酸钾) 1000hrs Method1:steam sulfur powder test (with saturated potassium nitrate) at 60 °C with humidity and heat (1000hrs)	±(3.0%+0.05Ω)Max

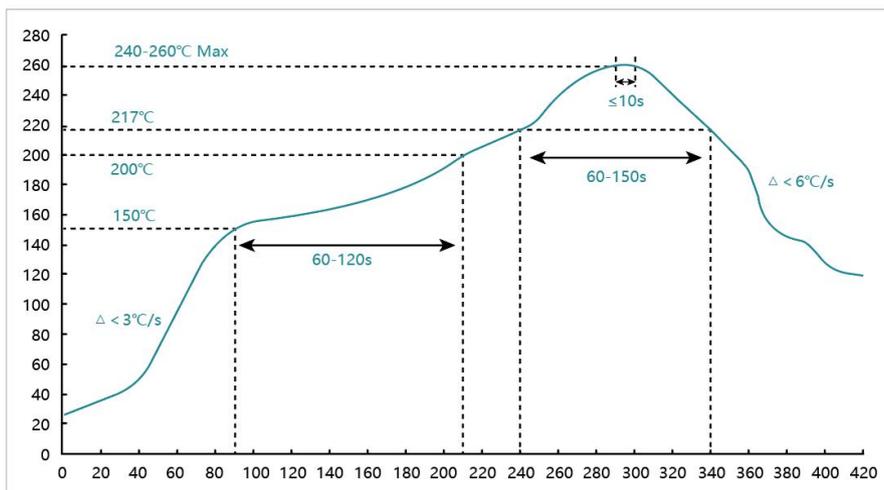
■ 本体标识 (Marking on the Resistor's Body)

- 022R/024R/042R: 无字码
- 044R/064R/062R: E24 系列 3 digits, the first 2 digits are significant figures of resistance value and the 3rd one denotes the power number of 10, (10X)

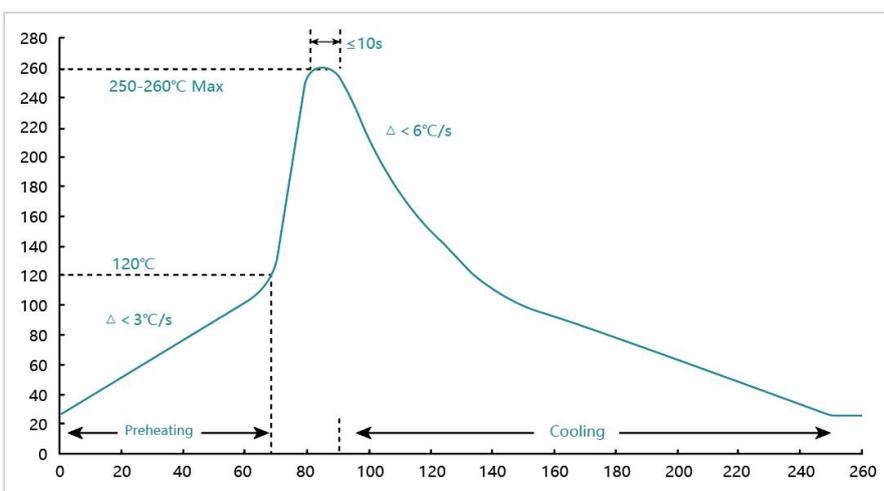


▪ **焊接 (soldering)**

- **建议回流焊曲线 (Recommend reflow soldering profile)**



- **建议波峰焊曲线 (Recommend wave soldering profile)**



- **手工焊温度 (hand soldering temperature)**

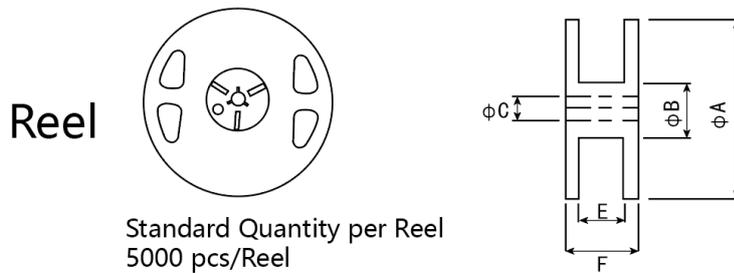
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烙铁温度 350±10°C 3 秒之内，避免烙铁接触电阻本体

The iron temperature is 350±10°C, hand soldering time less than 3S. Avoid solder iron tip direct touch the components body

■ **包装规格 (Tapping Specification)**

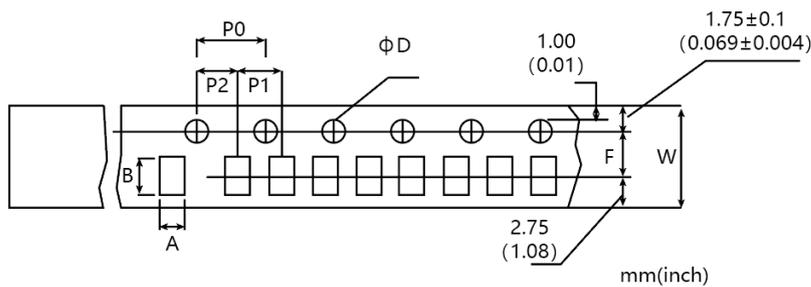


-卷盘尺寸 (Reel dimension)

Type	Size	Unit	A	B	C	F	W
022R/024R	7"	15K /Reel	mm 178±2.0	60.0±1.0	13.5±0.5	11.4±0.1	9.00±0.3
042R/044R	7"	10K /Reel	mm 178±2.0	60.0±1.0	13.5±0.5	11.4±0.1	9.00±0.3
062R/064R	7"	5K/Reel	mm 178±2.0	60.0±1.0	13.5±0.5	11.4±0.1	9.00±0.3

-包装尺寸 (packing dimension)

纸带编带 Paper Taping



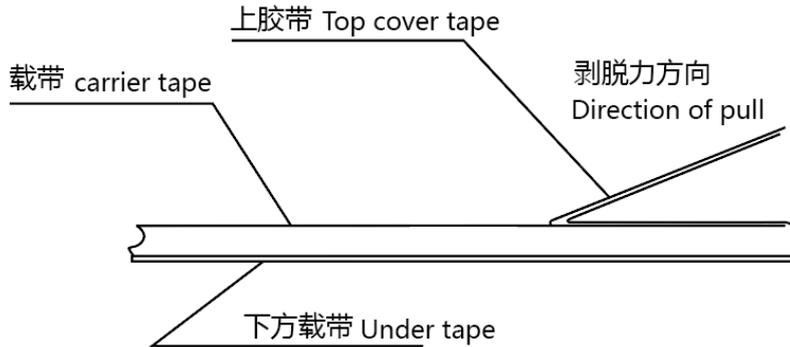
Unit: mm

Dim	A	B	D	F	P0	P1	P2	W	T
022R	0.79±0.01	1.00±0.01	1.50±0.1	3.50±0.05	4.00±0.1	2.00±0.1	2.00±0.05	8.00±0.20	0.50±0.03
024R	0.90±0.01	1.70±0.01	1.50±0.1	3.50±0.05	4.00±0.1	2.00±0.1	2.00±0.05	8.00±0.20	0.50±0.03
042R	1.20±0.20	1.20±0.20	1.50±0.1	3.50±0.05	4.00±0.1	2.00±0.1	2.00±0.05	8.00±0.20	0.45±0.03
044R	1.20±0.20	2.20±0.20	1.50±0.1	3.50±0.05	4.00±0.1	2.00±0.1	2.00±0.05	8.00±0.20	0.70±0.03
062R	1.90±0.01	1.90±0.01	1.50±0.1	3.50±0.05	4.00±0.1	4.00±0.1	2.00±0.05	8.00±0.20	0.83±0.03
064R	2.00±0.20	3.60±0.20	1.50±0.1	3.50±0.05	4.00±0.1	4.00±0.1	2.00±0.05	8.00±0.20	0.83±0.05

■ 上胶带剥离力测试 (Peel force of top cover tape)

上胶带以 200mm/分钟的速度，沿 165~180 度角的方向进行剥离，如下图所示。纸带的剥离力范为 10g~70g；载带的剥离力范围 30~100g。

The top cover tape is pulled at a speed of 200 mm/min with the angle between the tape during peel and the direction of unreeling maintained at 165 to 180 degree as following picture. The peel force of paper carrier tape shall be 0.1N to 0.7N(10 to 70 g), the peel force of plastic carrier tape shall be 0.3N to 1N (30 to 100 g)



■ 厚膜排阻器使用说明 (Chip Resistor Instructions for use)

本产品以下特殊环境下应用，性能可能会受到影响：

(Application of the products in a special environment can deteriorate product performance) :

1. 高温；
High temperature
2. 有海风或腐蚀性气体，包括氯气，硫化氢，氨气，二氧化硫，二氧化氮等；
Near the sea ,or corrosive gas, such as Cl₂,H₂S,NH₃,SO₂,and NO₂,etc;
3. 各种类型的液体，包括水，油，化学品，有机溶剂的使用；
Unverified liquids, such as water,oil,chenical or organic solvent;
4. 在用树脂或其他涂层材料密封产品的情况下使用；
Unverified resin or paint to cover products;
5. 焊接后使用不洁焊剂或使用水或水溶性清洁剂清洗产品
Products should be washed with soluble cheaner even if non cleaning flux.

- 储存 / 搬运条件 (Storage / Carry conditions)

1. 储存温度 25±5°C Temperature: 25±5°C
2. 湿度 30~70%RH Humidity: 30~70%RH
3. 储存期限: 先进先出, 2 年 Storage life: 2years FIFO
4. 存放和搬运时，请保持盒子的正确方向。严禁跌落在箱体上，否则可能损坏产品电极或本体
Please hold box correct orientation when storing and carrying.It is strictly prohibited to fall on the box.
otherwise the product electrode or body may be damaged.

