



厦门华联半导体科技有限公司

Xiamen Hualian Semiconductor Technology Co., Ltd.

产品规格书

SPECIFICATION

产品名称: 光 MOS 固态继电器

DESCRIPTION: Photo MOSFET Solid State Relay

产品型号: HSSR-DA01-×

PART NO.: HSSR-DA01-×

拟制 Prepared	审核 Verified	批准 Approved

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1 概述 General

产品 HSSR-DA01-×由砷化铝镓红外发光二极管作为输入级耦合到高电压输出光探测电路。光探测电路由高速光电二极管阵列和驱动电路构成，用以开启/关断两个独立的高压金属氧化物半导体场效应管(MOSFET)。一个最小 3mA 的电流流经输入级红外发光二极管可确保继电器动作。当加在输入级红外发光二极管的正向压降为 0.8V 或更小值时，继电器可确保复位。产品见图 1。



图 1 产品 Figure 1-Product

The HSSR-DA01-× consists of a AlGaAs infrared emitting diode input stage optically coupled to a high-voltage output detector circuit. The detector consists of a high-speed photovoltaic diode array and driver circuitry to switch on/off two discrete high voltage MOSFETs. The relay action with a minimum input current of 3mA through the input LED. The relay reset with an input voltage of 0.8V or less. Products (DIP) shown in Figure 1.

2 特点 Features

- 双通道常开型单刀单掷继电器。Dual Channel Normally on Single-Pole-Single-Throw (SPST) Relay.
- 400V 输出耐压产品。400V Output Withstand Voltage.
- 120mA 额定电流产品。120mA Current Rating.
- 低输入电流，CMOS 兼容。Low Input Current: CMOS Compatibility.
- 35 Ω 低通态电阻。35 Ω Low On-Resistance.
- 非常高的断开阻抗：典型值 10 兆欧。
Very High Output Off -state Impedance: 10 Teraohms Typical.
- 非常快的开关速度：典型值 0.5ms (Ton), 0.05ms (Toff)。
High Speed Switching: 0.5ms (Ton), 0.05ms (Toff) Typical
- 高输入输出绝缘耐压：5000 Vrms for 1 min。
High Input-to-Output Insulation Voltage: 5000 Vrms for 1 min.

3 应用 Applications

- 电信切换。Telecommunication Switching.
- 数据通讯。Data Communications.
- 电池管理。Battery management.
- 工业控制。Industrial Controls.
- 医疗设备。Medical equipment.
- EMR/机械继电器替代。EMR / Reed Relay Replacement.

4 电原理图 Schematic Diagram

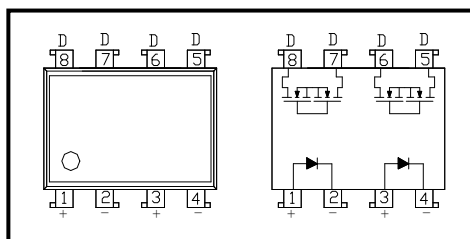


图 2 电原理图 Figure 2-Schematic

5 极限参数 Absolute Maximum Ratings

表 1 极限参数

Table 1-Absolute Maximum Ratings

参数名称 Characteristic		符号 Symbol	额定值 Rating	单位 Unit
输入端 Input	正向电流 Forward Current	I_F	50	mA
	反向电压 Reverse Voltage	V_R	5	V
	峰值正向电流 Peak Forward Current ($f = 100 \text{ Hz}$, Duty factor = 0.1%)	I_{FP}	1	A
	耗散功率 (单个通道) Power Dissipation (Single channel)	P_M	75	mW
输出端 output	开关电压 Switching Voltage	$V_{O(MAX)}$	400	V
	连续通态电流 Continuous load current	$I_{O(MAX)}$	120	mA
	峰值通态电流 Peak load current (100ms, Duty factor = 10%, $V_L = DC$)	I_{peak}	300	mA
	耗散功率 (单个通道) Power dissipation (Single channel)	P_C	360	mW
工作温度 Operating temp.		T_{opr}	-40 ~ +110	°C
贮存温度 Storage temp.		T_{stg}	-55 ~ +125	°C
焊接温度 Soldering Temperature	手工焊 Hand Soldering (3 Sec.)	T_{sld}	360	°C
	回流焊 Reflow Soldering (5 Sec.)		260	
	波峰焊 Wave Soldering (10 Sec.)		270	
绝缘电压 Isolation voltage (RH≤60%, 交流 1 分钟) (RH≤60%, AC 1min.)		V_{ISO}	5000	V_{rms}

6 光电参数 Opto-Electrical Characteristics

表 2 光电参数

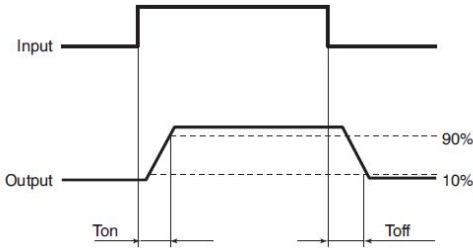
Table 2-Opto-Electrical Characteristics

$T_a = 25^\circ\text{C}$

参数名称 Characteristic	符号 Symbol	测试条件 Test conditions	最小值 Min.	典型值 Typ.	最大值 Max.	单位 Unit
正向电压 Forward voltage	V_F	$I_F = 10\text{mA}$	-	1.35	1.7	V
反向电流 Reverse current	I_R	$V_R = 5\text{V}$	-	-	10	uA
动作电流 Action Current	$I_{F(ON)}^a$	$I_O = 120\text{mA}$	-	1.5	3	mA

	复位电流 Reset Current	$I_{F(OFF)}$	$I_O = 120\text{mA}$	-	0.5	-	mA
输出端 Output	断态漏电流 OFF-State Leakage Current	I_{OFF}	$V_O = 400\text{V}$	-	-	100	nA
	导通电阻 ON Resistance	R_{ON}	$I_O = 120\text{mA}$ $I_F = 10\text{mA}$	-	-	35	Ω
	输出电容 Output Capacitance	C_O	$I_F = 0\text{mA}, V_O = 25\text{V},$ $f_o = 1\text{MHz}$	-	50	-	pF
传输 Xfer	动作时间* Action Time	T_{ON}	$I_F = 5\text{mA}, I_O = 120\text{mA}$	-	0.5	2	ms
	复位时间* Reset Time	T_{OFF}	$I_F = 5\text{mA}, I_O = 120\text{mA}$	-	0.05	1	ms
	耦合电容 Coupled Capacitance	$C_{I/O}$	$F = 1\text{MHz}, V_B = 0\text{V}$	-	2	-	pF
隔离 Isolation	绝缘电压 Isolation voltage	V_{ISO}	$I_{off} \leq 0.3\text{mA},$ AC, 60s	5000	-	-	V
<p>^a 保证所有器件在 I_F 值小于或等于最大的 $I_{F(ON)}$ 时动作。 It is guaranteed that all devices active when I_F value is less than or equal to the maximum value of $I_{F(ON)}$.</p>							

*动作时间 Action Time/复位时间 Reset Time



7 特性曲线 Performance Curves

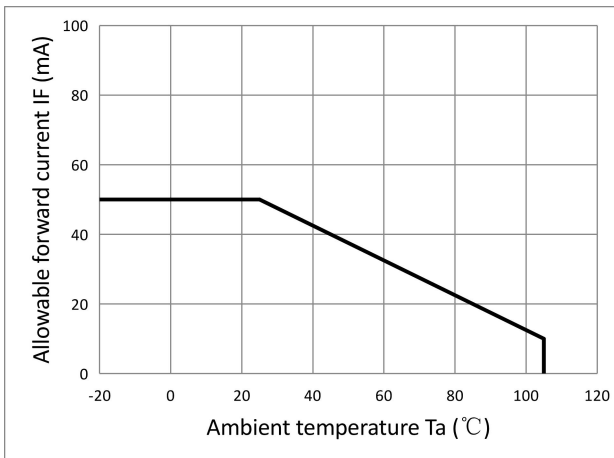


图 3 I_F - T_a 特性曲线

Figure 3-Forward current VS. Temperature

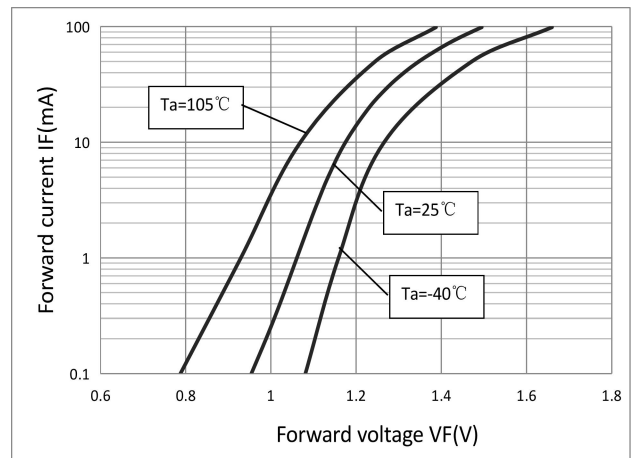


图 4 I_F - V_F 特性曲线

Figure 4-Forward current VS. Forward voltage

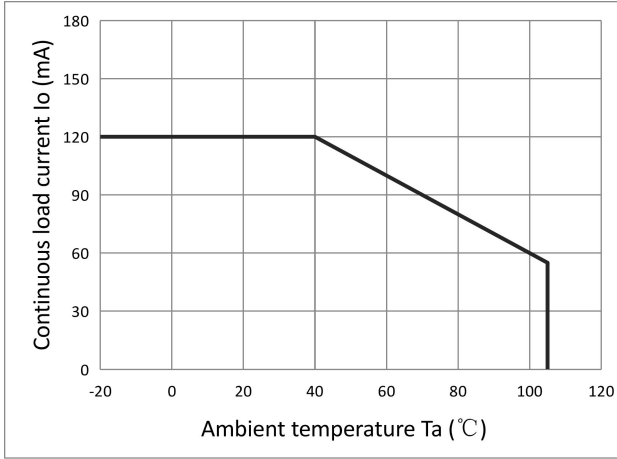


图 5 I_o - T_a 特性曲线

Figure 5-Load current VS. Temperature

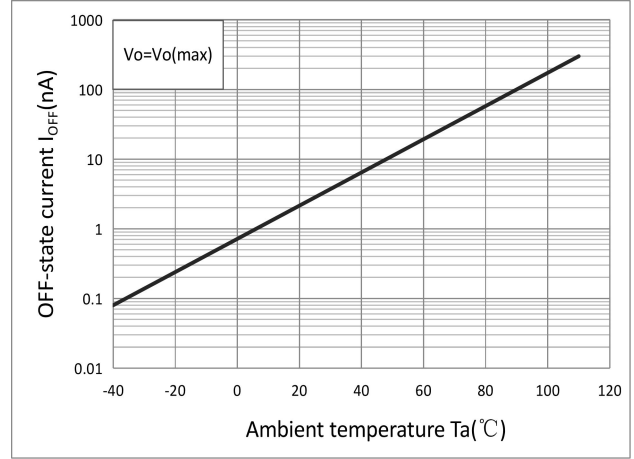


图 6 I_{OFF} - T_a 特性曲线

Figure 6-OFF-state current VS. Temperature

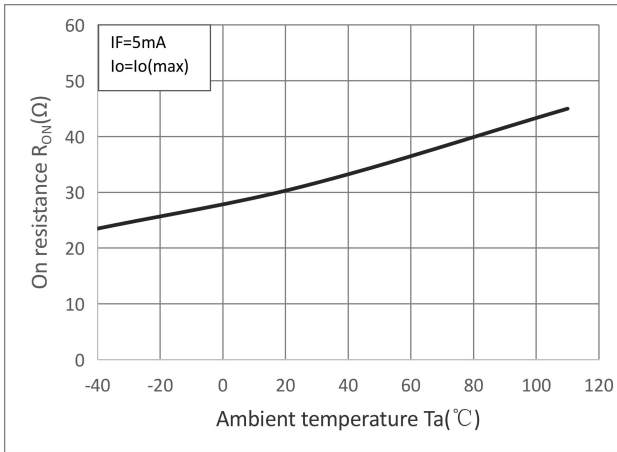


图 7 R_{ON} - T_a 特性曲线

Figure 7-On resistance VS. Temperature

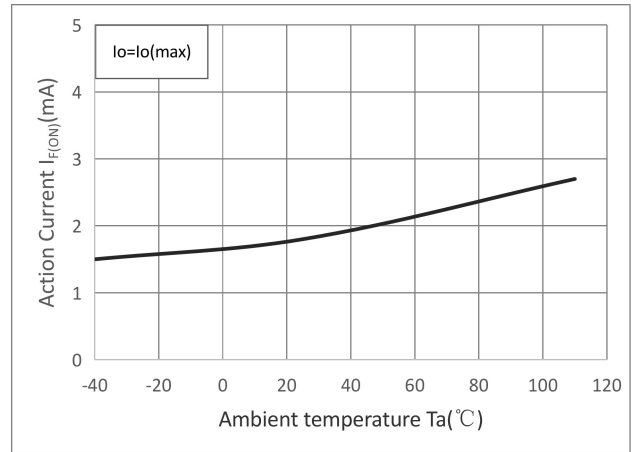


图 8 $I_{F(ON)}$ - T_a 特性曲线

Figure 8-Action current VS. Temperature

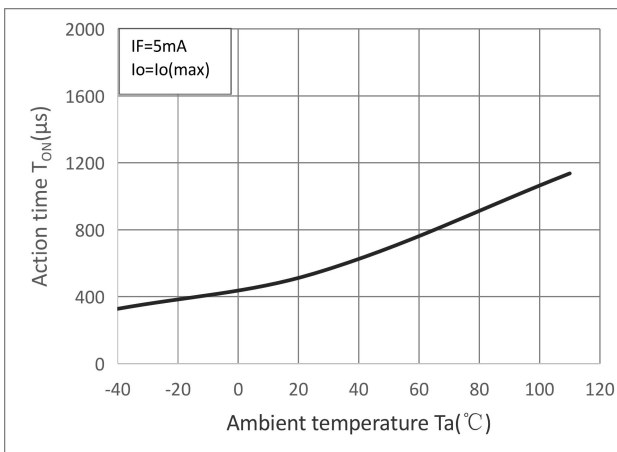


图 9 T_{ON} - T_a 特性曲线

Figure 9-Action time VS. Temperature

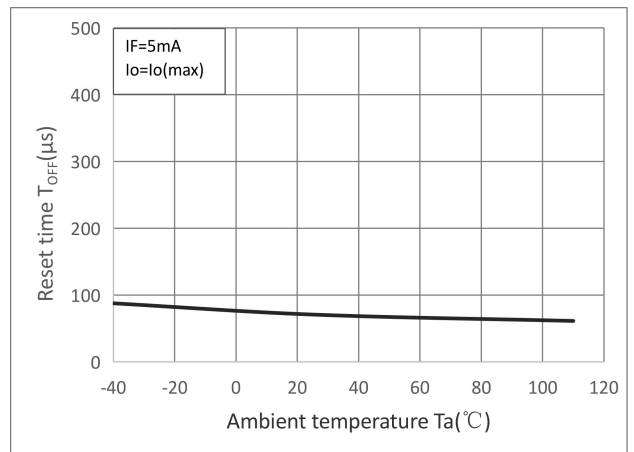


图 10 T_{OFF} - T_a 特性曲线

Figure 10-Reset time VS. Temperature

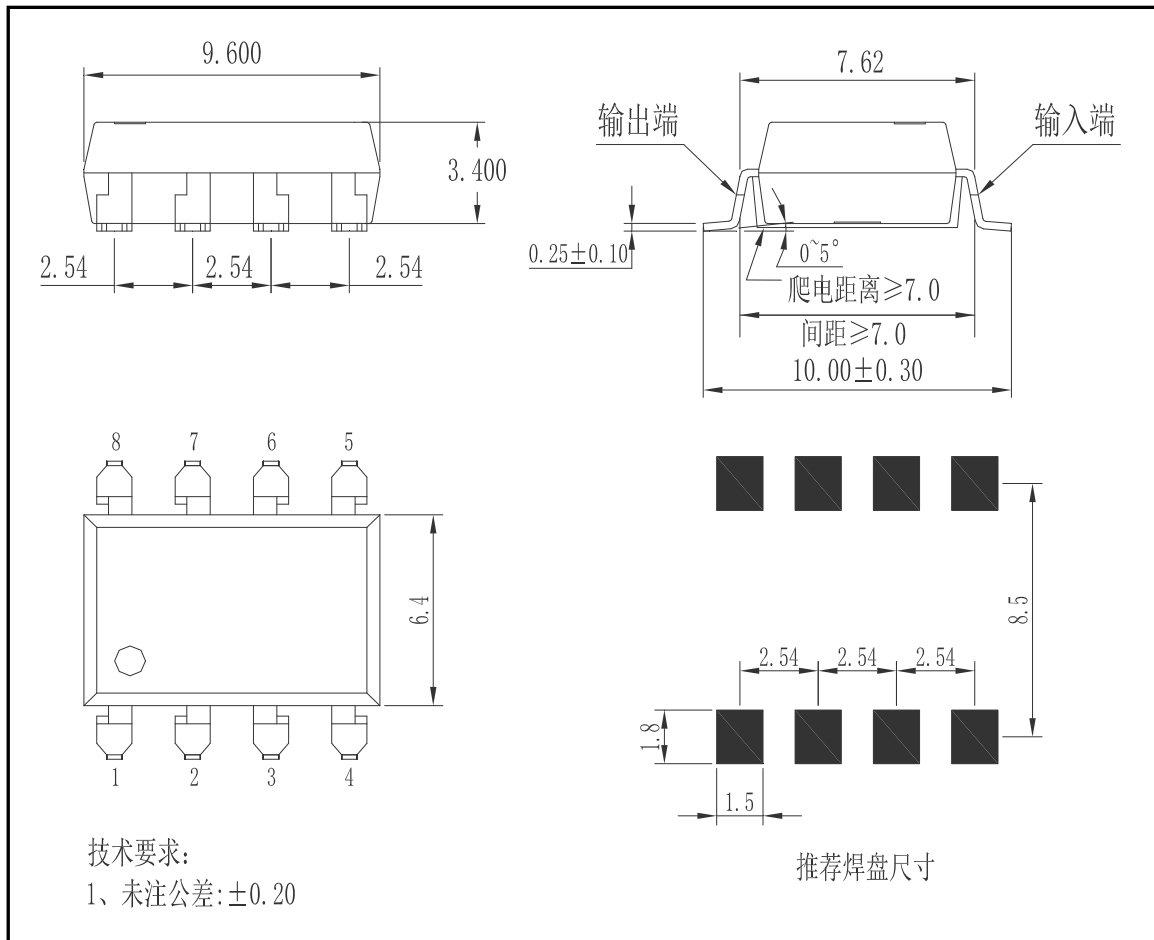


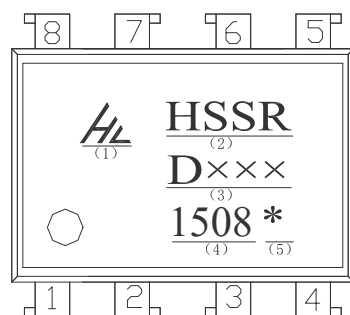
图 12 HSSR-DA01-2 外形尺寸

Figure 12- The dimensions of HSSR-DA01-2

9 标志 Mark

产品上应有型号、公司商标、生产日期代码、引出端识别标记。例如：HSSR-DA01 产品印章如图 13。

Print type characters ,trade mark and Lot.No.on the Photo Coupler.For example the marking of product HSSR-DA01 is shown as figure 13.



- (1) 公司商标 Company Logo
- (2) 光MOS固态继电器简称 Photo Mosfet Solid State Relay Abbreviation
- (3) 型号 Model
- (4) 生产年周代码 Production Date Code
- (5) 特殊特性代码 Special characteristics Code

图 13 产品印章

Figure 13- Marking

10 包装方式 Packing

10.1 条管包装 (Tube): 适用于 For HSSR-DA01。

10.1.1 每箱数量 (Qty/ctn): 20000 只 (pcs)。

10.1.2 内包装 (Inner packing):

每条管 50 只，采用防静电条管，条管上有商标、防静电标志。

50pcs/tube, antistatic tube, indication of trade mark and antistatic.

每纸匣 1000 只，贴合格证（型号、生产日期代号、检验员代号）。

1000pcs/bundle, certificate on one end (model, code of product date, Inspector's code).

10.1.3 外包装(Outer packing):

公司名称、地址、商标、产品型号、数量等标志。

Indication of company name, address, trade mark, model and quantity.

10.1.4 示意图 (Schematic):

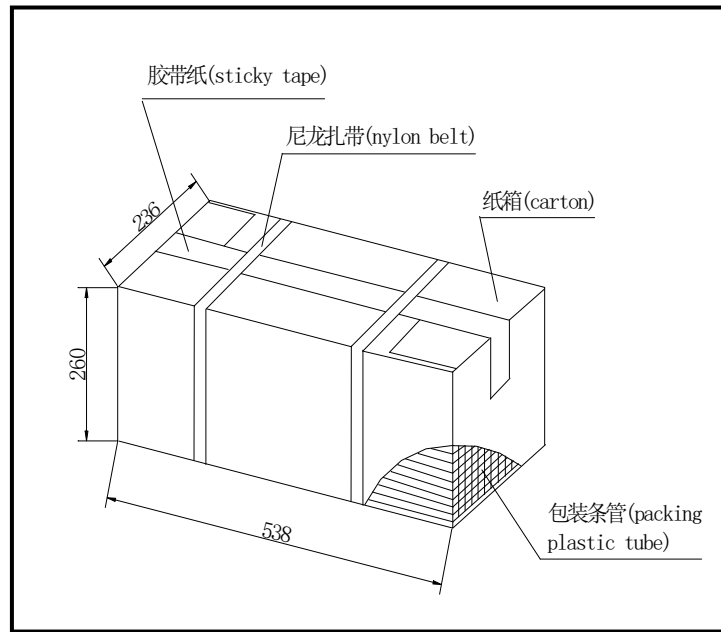


图 14 条管外包装

Figure 14- Outer packing for Tube

10.2 编带包装 (Tape and reel): 适用于 For HSSR-DA01-2。

10.2.1 每卷数量 (Qty/reel): 1200 只 (pcs)。每箱数量 (Qty/ctn): 18000 只 (pcs)。

10.2.2 内包装 (Inner packing):

每卷盘 1200 只，贴合格证（型号、生产日期代号、检验员代号）。

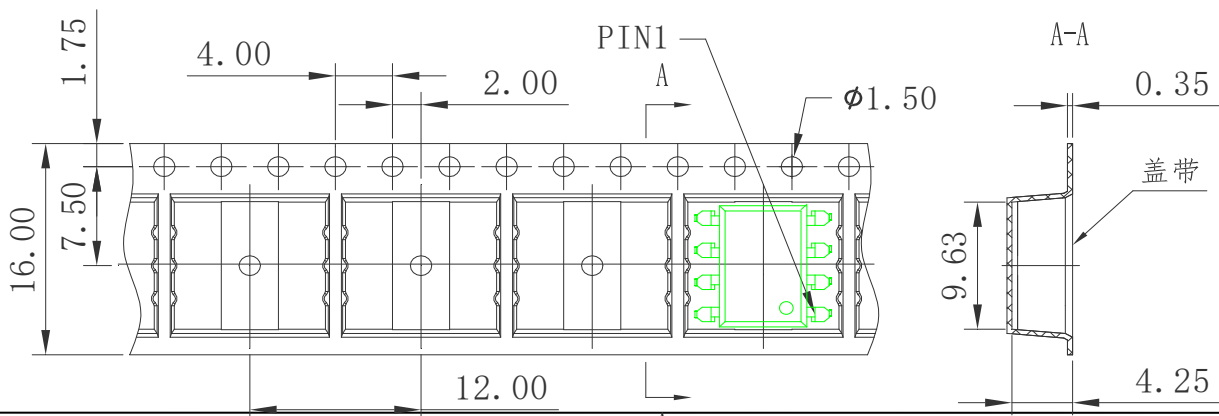
1200pcs/reel, certificate on reel (model, code of product date, Inspector's code)

10.2.3 外包装(Outer packing):

公司名称、地址、商标、产品型号、数量等标志。

Indication of company name, address, trade mark, model and quantity.

10.2.4 示意图 (Schematic):



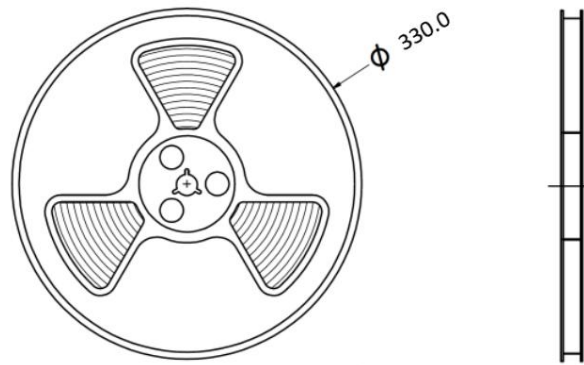


图 15 编带包装示意图
Figure 15- Taping Packing Schematic

11 使用注意事项 Note

11.1 推荐贮存温度 Recommend storage Temp.: 0~40°C;

推荐贮存湿度 Recommend storage humidity: <60%;

湿气敏感度等级 1 级。MSL level: MSL 1.

11.2 静电防护等级（人体模式） ESD(HBM): $\geq 500V$.

11.3 引脚镀锡厚度：大于等于 $3\mu m$ 。

Thickness of Sn which plated on lead frame: $\geq 3\mu m$.

11.4 推荐焊接条件 Recommended Soldering Conditions

11.4.1 请勿使用超过最高贮存温度的物体直接接触环氧本体。

Do not contact the epoxy body directly with objects exceeding the maximum storage temperature.

11.4.2 在高温下不要对环氧本体施加压力，特殊情况下施加的力不应超过 2.5N。

Do not apply pressure to the epoxy at high temperatures, and in special cases do not apply more than 2.5N.

11.4.3 回流焊 Reflow soldering

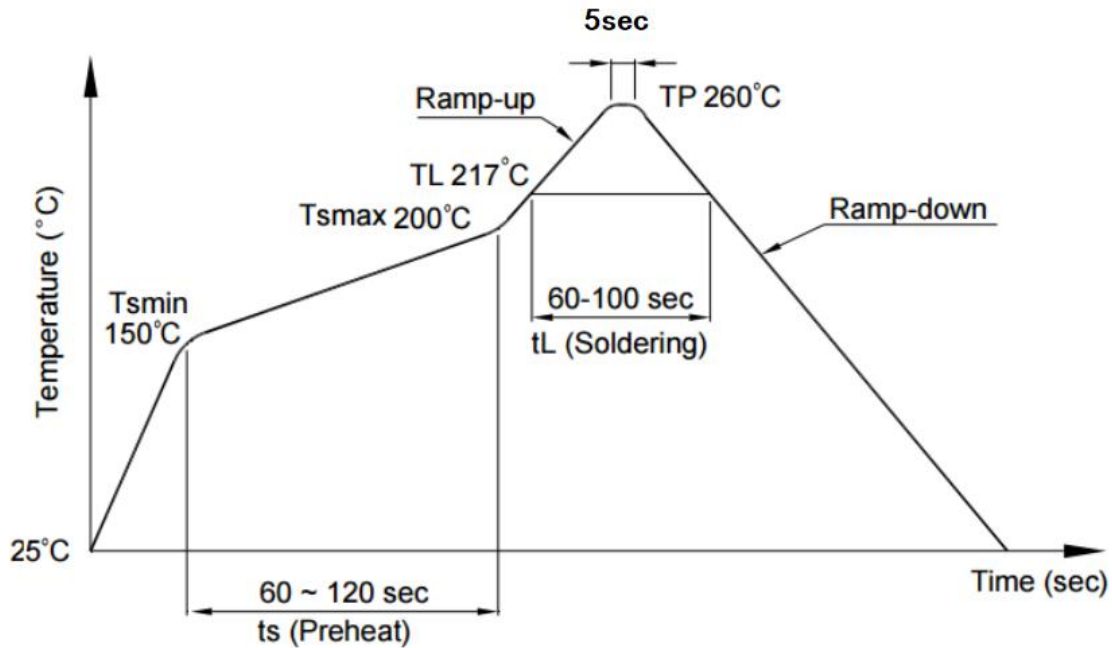
1) 推荐锡膏规格 Recommend tin glue specifications:

a) 熔点 Melting temperature: 217°C

b) 组分 Contains: SnAg3Cu0.5

2) 回流焊工序必须在器件冷却至室温后进行。Never take next process until the component is cooled down to room temperature after reflow.

3) 推荐回流焊接参数，如下图所示： The recommended reflow soldering profile is following:



项目 Items	条件 Conditions	
预热 Preheat	Temperature Min (T_{Smin})	150°C
	Temperature Max (T_{Smax})	200°C
	Time (min to max) (t_s)	90±30 sec
焊接区 Soldering zone	Temperature (T_L)	217°C
	Time (t_L)	60 ~ 100 sec
最高温度 Peak Temperature (T_p)	260°C	
升温速率 Ramp-up rate	3°C / sec max.	
降温速率 Ramp-down rate	3~6°C / sec	

图 16 回流焊参数

Figure 16-Recommended reflow soldering profile

4) 建议在所示的温度和时间条件下进行一次回流焊, 最多不能超过三次。One time soldering reflow is recommended within the condition of temperature and time profile shown below. Do not solder more than three times.

11.4.4 手工烙铁焊 Manual soldering

1) 手工烙铁焊仅用于产品返修或样品测试。Manual soldering is only applicable to product repair.

2) 手工烙铁焊要求: 温度 $360^{\circ}\text{C} \pm 5^{\circ}\text{C}$, 时间 $\leq 3\text{s}$, 返修次数 ≤ 2 次。Manual soldering requirements: temperature $\leq (360^{\circ}\text{C} \pm 5^{\circ}\text{C})$, time $\leq 3\text{s}$, repair times ≤ 2 times.

11.5 本说明书所展示的产品是为一般电子应用而设计的, 如办公自动化设备、通讯设备、视听设备、电气应用和仪器仪表等。对于需要高可靠性或安全性的设备, 如空间应用、核动力控制设备、医疗设备等, 请与我们的销售代表联系。The products shown in this publication are designed for the general use in electronic applications such as office automation equipment, communications devices, audio/visual equipment, electrical application and instrumentation. For equipment/devices where high reliability or safety is required, such as space applications, nuclear power control equipment, medical equipment, etc, please contact our sales representatives.

12 产地 Production Place

12.1 产地 Production Place: 中国厦门 Xiamen China;

12.2 工厂名称 Production NO.: 厦门华联半导体科技有限公司; Xiamen Hualian Semiconductor Technology Co., Ltd.;

12.3 工厂地址 Production Add.: 厦门市翔安区舫阳南路 189 号 No.189, Fangyang South Road, Xiang'an

District, Xiamen China.

更改记录表
Engineering Change Notice-Record

版次 Edition	更改日期 Date	主要更改内容 Main Content	拟制 Prepared	确认 Checked
2.4	2023-11-07	公司名称变更	姚彭彭	黄发宝
2.3	2023-02-09	1. 更新图 1 产品示意图; 2. 表 1 中工作温度上限由 85°C 调整为 110°C; 3. 表 2 的 VF 上限由 1.5V 调整为 1.7V; 4. 更新图 13 印章示意图; 5. 更新图 16 回流焊参数示意图;	郑清清	黄发宝
2.2	2022-12-13	1. 表 2 的 VF 典型值由 1.2V 调整为 1.35V;Ci-o 的典型值由 1pF 调整为 2pF; 2. 产品外形尺寸变更; 3. 湿气敏感度等级由 2a 级改为 1 级; 3.厂址由思明区前埔路改为翔安区舩阳南路。	郑清清	黄发宝
2.1	2022-09-05	1. 表 2 的 VF 上限由 1.3mA 调整为 1.5mA;Co 典型值由 16pF 调整为 50pF;Ci-o 的典型值由 0.35 调整为 1pF. 2. 载带宽度由 24mm 调整为 16mm; 包装数量每卷 1000 只变更为 1200 只, 每箱数量由 10000 只变更为 18000 只。 3. 删除 10.3 的标识。	黄发宝	段果
2.0	2021-12-02	版本升级 Version Upgrade	黄发宝	段果