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-S1A02L-2

PART NO.：HSSR-S1A02L-2

拟制 Prepared	审核 Verified	批准 Approved

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1 概述 General

产品 HSSR-S1A02L-2 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级管可确保继电器动作。当加在输入级红外发光二级管的正向压降为 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-S1A02L-2 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 shown in Figure 1.

2 特点 Features

- 微型光 MOS 固态继电器。Micro Photo MOSFET Solid State Relay.
- 单通道常开型单刀单掷继电器。Single Channel Normally On Single-Pole-Single-Throw (SPST) Relay.
- 400V 输出耐压产品。400V Output Withstand Voltage.
- 180mA 额定电流产品。180mA Current Rating.
- 低输入电流，CMOS 兼容。Low Input Current: CMOS Compatibility.
- 非常快的开关速度：典型值 0.2ms (Ton), 0.1ms (Toff)。
  High Speed Switching: 0.2ms (Ton), 0.1ms (Toff) Typical
- 高输入输出绝缘耐压：3750 Vrms for 1 min。
  High Input-to-Output Insulation Voltage: 3750 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

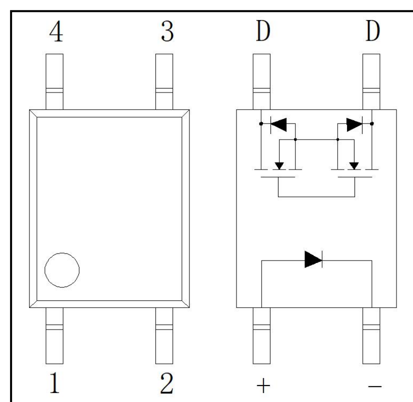


图 2 电原理图 Figure 2-Schematic

5 极限参数 Absolute Maximum Ratings

表 2 极限参数

Table 2-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	25	mA
	反向电压 Reverse Voltage	V_R	5	V
	峰值正向电流 Peak Forward Current (f = 100 Hz, Duty factor = 0.1%)	I_{FP}	1	A
	耗散功率 Power Dissipation	P_M	50	mW
输出端 output	开关电压 Switching Voltage	$V_{O(MAX)}$	0 to±400	V (DC or AC peak)
	连续通态电流 Continuous load current	$I_{O(MAX)}$	180	mA
	峰值通态电流 Peak load current （100ms， Duty factor = 10%, VL = DC）	Ipeak	300	mA
	耗散功率 Power dissipation	P_C	300	mW
工作温度 Operating temp.		T_{aop}	-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	
绝缘电压 Isolation voltage （RH≤60％,交流 1 分钟）(RH≤60%, AC 1min.)		V_{ISO}	3750	V_{rms}

6 光电参数 Opto-Electrical Characteristics

表 3 光电参数

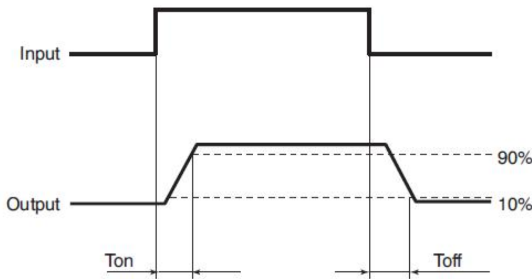
Table 3-Opto-Electrical Characteristics **T_a=25℃**

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
输入端 Input	正向电压 Forward voltage	V_F	I_F=10mA		1.2	1.5	V
	反向电流 Reverse current	I_R	V_R=5V			10	uA
	动作电流 Action Current	$I_{F(ON)}$ [a]	I_O= 180mA		1	3	mA
	复位电流 Reset Current	$I_{F(OFF)}$	I_O= 180mA	0.1	0.5		mA

输出端 Output	断态漏电流 OFF-State Leakage Current	I_{OFF}	V_O= 400V			1	uA
	导通电阻 ON Resistance	R_{ON}	I_O=180mA，I_F=5mA			10	Ω
	输出电容 Output Capacitance	C_O	V_{OFF}=0V, f_O = 1MHz		50		pF
传输 Xfer	动作时间 * Action Time	T_{ON}	I_F=10mA, I_O= 180mA		0.2	0.5	ms
	复位时间 * Reset Time	T_{OFF}	I_F=10mA, I_O= 180mA		0.1	0.5	ms
	耦合电容 Coupled Capacitance	$C_{I/O}$	Vs=0, f= 1MHz		0.5		pF
隔离 Isolation	绝缘电压 Isolation voltage	V_{ISO}	I_{off}≤0.3mA, AC, 60s	3750			V

[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 $I_{F(ON)}$.

*动作时间 Action Time/复位时间 Reset Time



7 特性曲线 Performance Curves

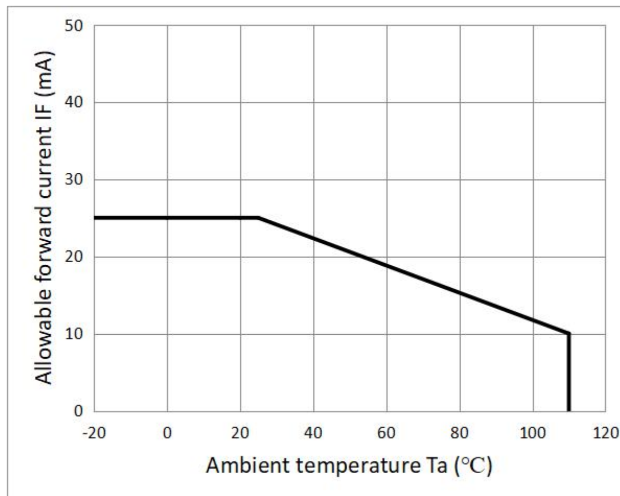


图 4 IF-Ta 特性曲线

Figure 4-Forward current VS. Temperature

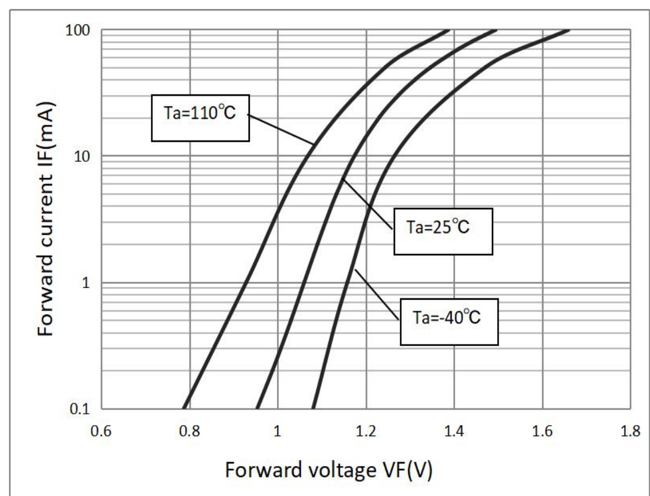
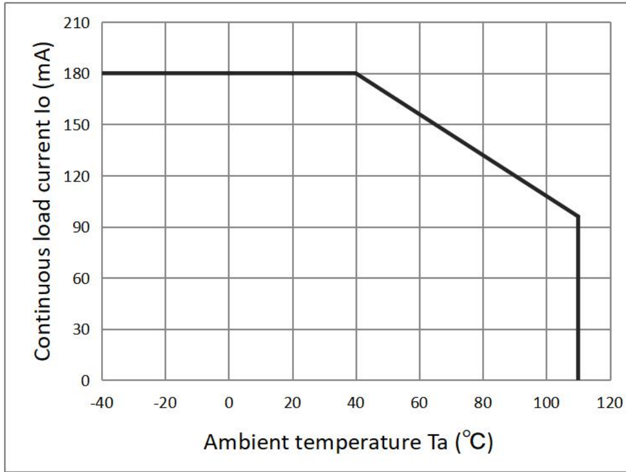


图 5 IF-VF 特性曲线

Figure 5-Forward current VS. Forward voltage



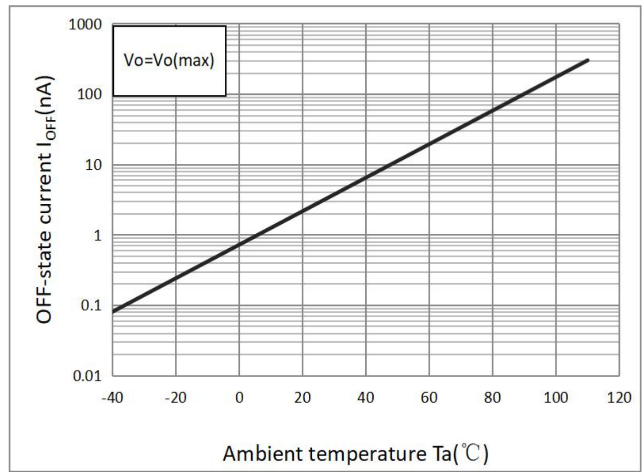
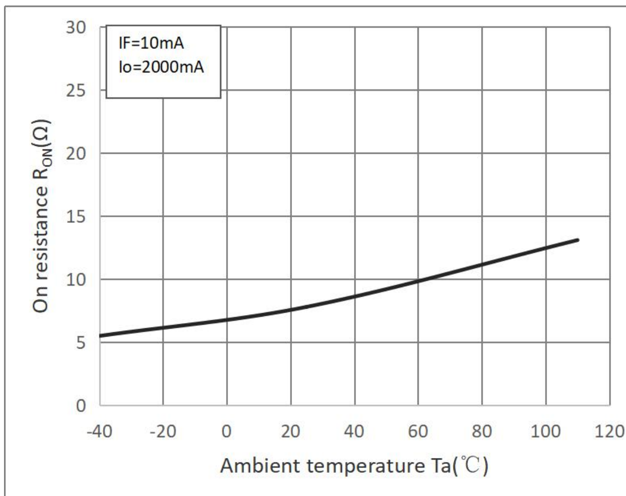


图 5 Io-Ta 特性曲线

Figure 6-Load current VS. Temperature

图 6 I_{OFF}-Ta 特性曲线

Figure 7-OFF-state current VS. Temperature



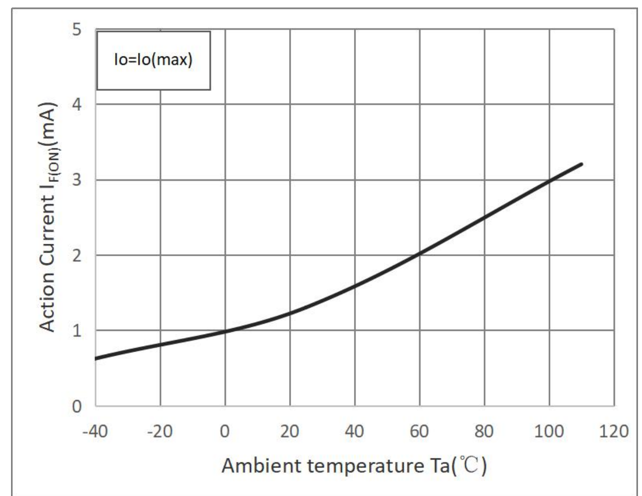
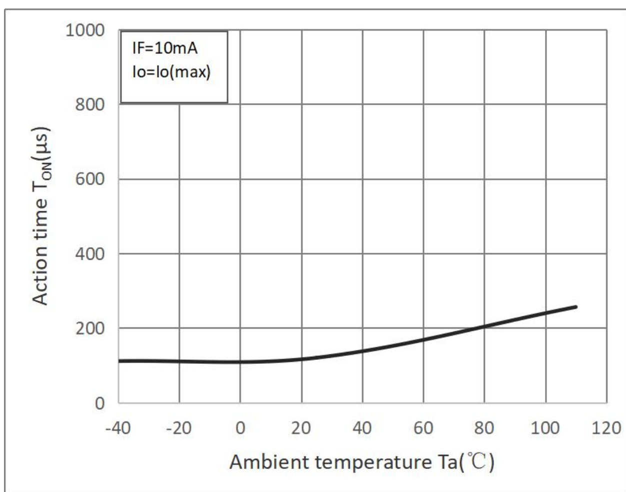


图 7 Ron-Ta 特性曲线

Figure 8-On resistance VS. Temperature

图 8 $I_{F(ON)}$-Ta 特性曲线

Figure 9-Action current VS. Temperature



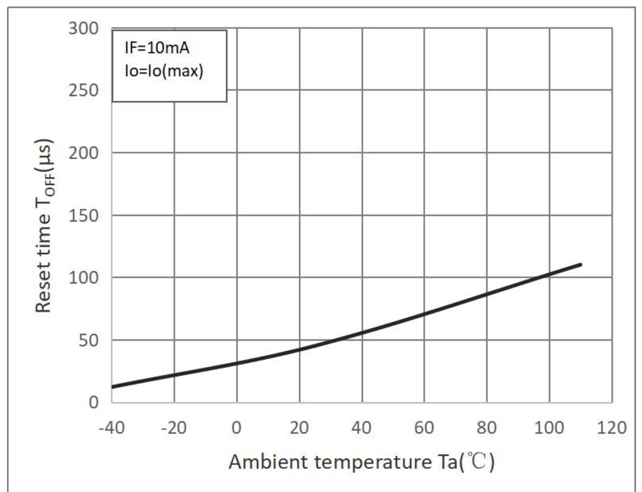


图 9 T_{ON}-Ta 特性曲线

Figure 10-Action time VS. Temperature

图 10 T_{OFF}-Ta 特性曲线

Figure 11-Reset time VS. Temperature

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8 外形尺寸及电原理图 Dimensions and Circuit Diagram

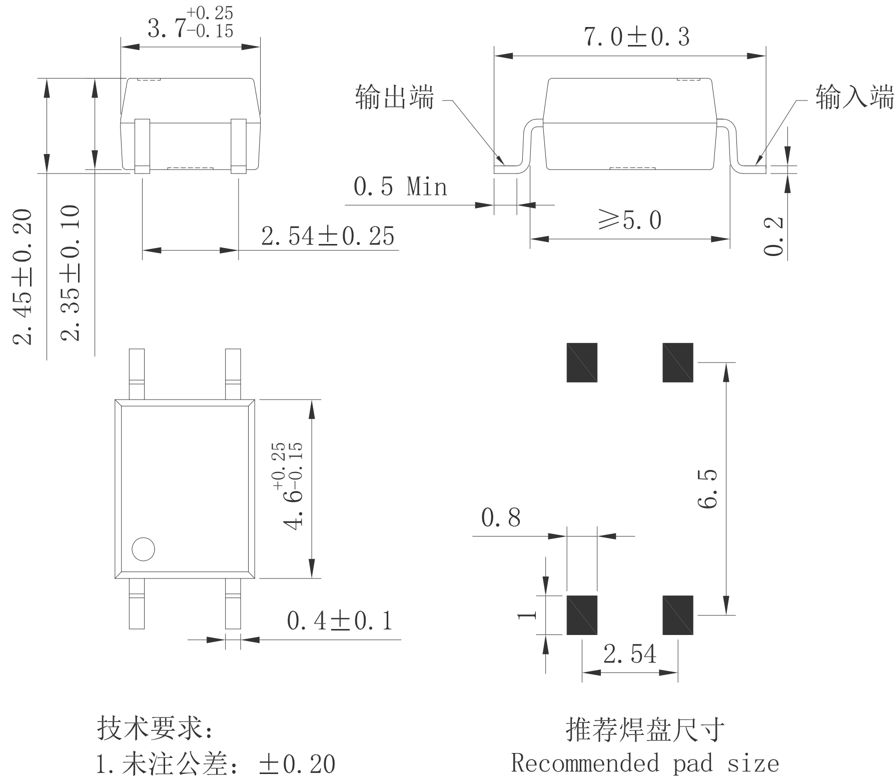


图 11 HSSR-S1A02L-2 外形尺寸

Figure 12- The dimensions of HSSR-S1A02L-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-S1A02L-2 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-S1A02L-2 is shown as figure 13.

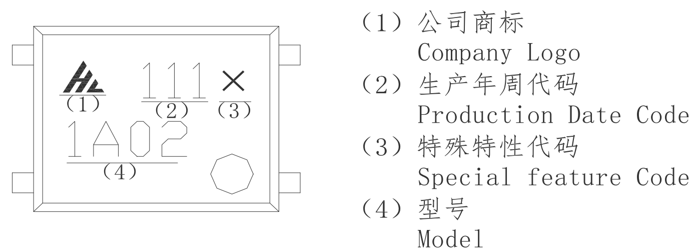


图 12 产品印章

Figure 13- Marking

10 包装方式 Packing

10.1 编带包装（Tape and reel）：适用于 For HSSR-S1A02L-2

10.1.1 每卷数量（Qty/reel）：3000 只（pcs）。每箱数量（Qty/ctn）：60000 只（pcs）。

10.1.2 内包装（Inner packing）：

每卷盘 3000 只，贴合格证（型号、生产日期代号、检验员代号）。

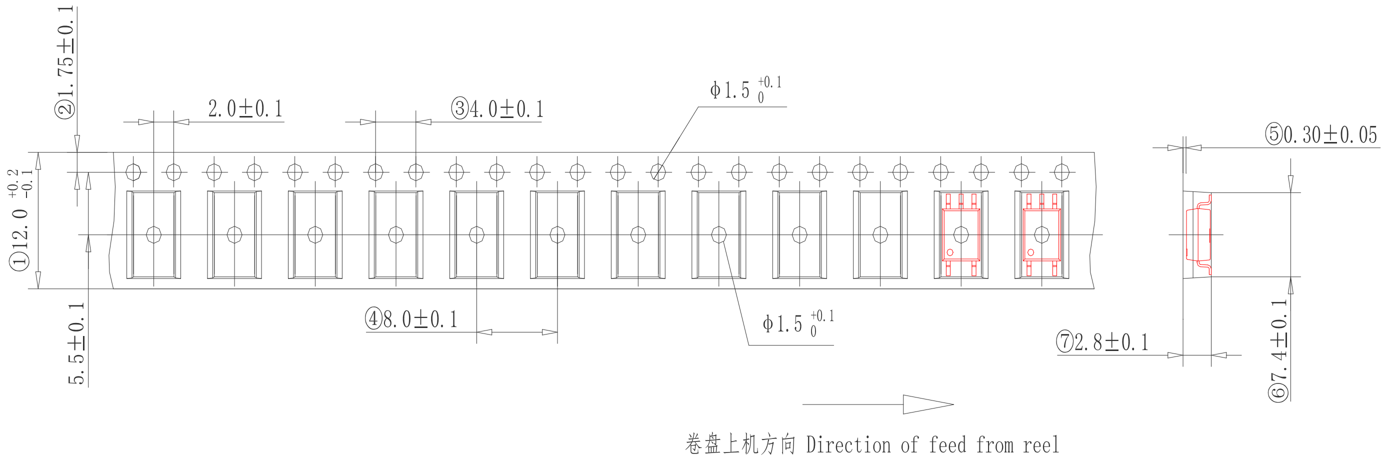
3000pcs/reel，certificate on reel（model，code of product date，Inspector’s code）

10.1.3 外包装(Outter 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）：



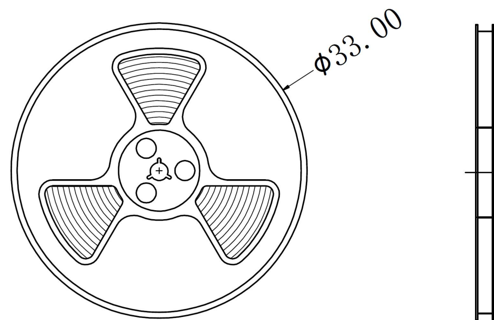


图 13 编带包装示意图

Figure 14-Taping Packing Schematic

10.2 注意事项 Note

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

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

10.2.2 湿气敏感度等级 1 级。MSL level: MSL 1.

10.3 引脚镀锡厚度：大于等于 3μm。

Thickness of Sn which plated on lead frame: ≥3 μm.

10.4 推荐焊接条件　Recommended soldering conditions

10.4.1 施加在环氧树脂上的温度不要超过最高贮存温度。

Not to apply high temperature exceeding the maximum storage temperature to the epoxy resin.

10.4.2 在高温下不要对环氧树脂施加压力。

Not to apply any force to the epoxy resin at high temperature.

10.4.3 焊接过程 Soldering process

1、在焊接过程中不要对器件施加任何压力。

Not to apply any stress to the component during the soldering process.

2、回流焊 Reflow soldering

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

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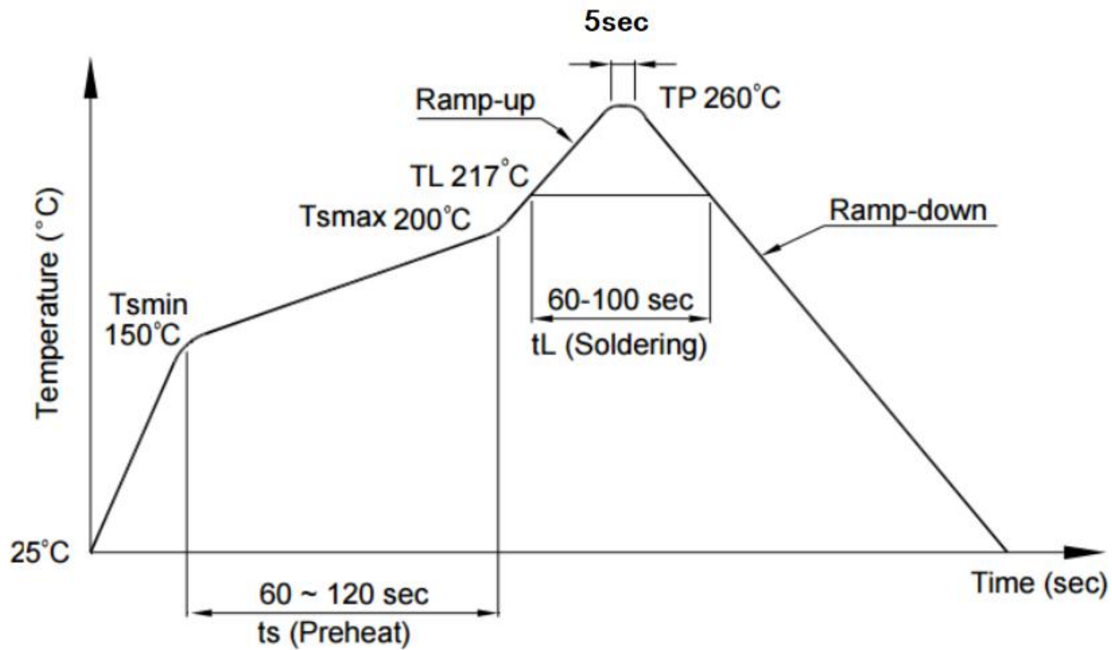
a) 熔点 Melting temperature:217℃

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 14 回流焊参数

Figure 15-Recommended reflow soldering profile

11 产地 Production Place

11.1 产地 Production Place：中国厦门 Xiamen China；

11.2 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.;

11.3 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
1.5	2023-11-07	公司名称变更	姚彭彭	黄发宝
1.4	2023-07-20	1.删除 5.结构与材料； 2.工作温度上限：85℃改为 110℃； 3.增加手工焊温度； 4.更新推荐回流焊接参数； 5.更新特性曲线图 3-图 10。	姚彭彭	黄发宝
1.3	2023-01-15	修改厂区地址	郑清清	黄发宝
1.2	2022-10-19	删除 10.2 标识 Label	张强龙	段果
1.1	2022-10-09	外形图新增未注尺寸公差	郑清清	段果
1.0	2021-05-23	新版发行 New edition	黄发宝	段果

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