



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：高速逻辑门输出型光耦合器

DESCRIPTION: High Speed Logic Gate Opto-coupler

产品型号：HPL6W136

PART NO.: HPL6W136

拟制 Prepared	审核 Verified	批准 Approved

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1 概述 General

光耦产品 HPL6W136 由砷化铝镓红外发光二极管与高速逻辑门光敏芯片耦合封装构成。正常工作温度可达 $-40^{\circ}\text{C}\sim+110^{\circ}\text{C}$ 。采用 WSOP8 封装，爬电距离 $\geq 15\text{mm}$ ，具有高压绝缘能力，适用于 690VAC 驱动器、可再生逆变器和医疗设备等高压电力系统中的隔离式通信逻辑接口和控制。



图 1 产品 Figure 1-Product

The HPL6W136 optocouplers consist of an AlGaAs LED, optically coupled to a very high speed integrated photo-detector logic gate with a strobable output. The coupled parameters are guaranteed over the temperature range of -40°C to $+110^{\circ}\text{C}$. Adopt WSOP8 package, creepage distance $\geq 15\text{mm}$, with high-voltage insulation capability, suitable for isolated communication logic interface and control in high-voltage power systems such as 690VAC drives, regenerative inverters and medical equipment.

2 特点 Features

- 数据传输速率快。High speed:1 Mbit/s .
- 集电极开路输出。Open-Collector Output。
- TTL/LSTTL 兼容。TTL/LSTTL Compatible:5V supply
- 输入、输出间绝缘电压高。The isolation voltage between input and output is high: VISO $\geq 7500\text{Vrms}$.
- $V_{\text{CM}} = 1000\text{V}$ 时共模抑制比 $\geq 10\text{ kV} / \mu\text{s}$ 。10 kV/ μs minimum Common Mode Rejection (CMR) at $V_{\text{CM}} = 1000\text{V}$.
- 双列贴片宽体式 8L 塑料封装。WSOP8 plastic package.
- 符合 RoHS 指令最新要求及 REACH 法规最新要求。Compliance with the latest requirements of the RoHS Directive and the latest REACH requirements.
- 产品符合 UL/cUL、VDE 安规认证。The products comply with UL/cUL, VDE safety certification.
UL/cUL 证书编号: E178703; VDE 证书编号: 40004708
UL/cUL Certificate No. E178703; VDE Certificate No. 40004708

3 应用 Applications

- 数字隔离用于 A/D, D/A 转换。Digital isolation for A/D, D/A conversion digital field.
- 高压电力系统（即 690VAC 驱动器）High voltage power systems, e.g., 690VAC drives.
- 通讯接口。Communications interface.
- 可再生能源逆变器。Renewable energy inverters.
- 开关电源中的反馈元件。Feedback elements in switching power supplies.

4 真值表及电原理图 Truth Table and Schematic

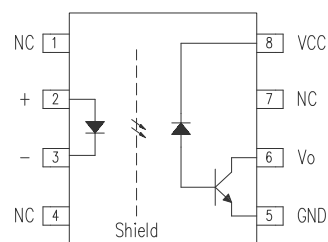


图 2 电原理图
Figure 2-Schematic

表 1 真值表

Table 1-Truth Table

LED	OUTPUT Vo
ON	L
OFF	H

5 绝缘特性 IEC/EN/DIN EN 60747-5-5 Insulation Characteristics*

表 2 绝缘特性

Table 2-Insulation Characteristics

Description	Symbol	Value	Unit
Installation classification per DIN VDE 0110, Table 1			
for rated mains voltage ≤ 150 Vrms		I – IV	
for rated mains voltage ≤ 300 Vrms		I – IV	
for rated mains voltage ≤ 300 Vrms		I – IV	
for rated mains voltage ≤ 600 Vrms		I – IV	
for rated mains voltage ≤ 1000 Vrms		I – III	
Climatic Classification		40/105/21	
Pollution Degree (DIN VDE 0110/39)		2	
Maximum Working Insulation Voltage	V_{IORM}	2262	Vpeak
Input to Output Test Voltage, Method b* $V_{IORM} \times 1.875 = V_{PR}$, 100% Production Test with $t_m=1$ sec, Partial discharge < 5 pC	V_{PR}	4241	Vpeak
Input to Output Test Voltage, Method a* $V_{IORM} \times 1.6 = V_{PR}$, Type and Sample Test, $t_m=10$ sec, Partial discharge < 5 pC	V_{PR}	3619	Vpeak
Highest Allowable Overvoltage (Transient Overvoltage $t_{ini} = 60$ sec)	V_{IOTM}	12000	Vpeak
Case Temperature	T_S	150	°C
Input Current	I_S , INPUT	400	mA
Output Power	P_S , OUTPUT	1000	mW
Insulation Resistance at T_S , $V_{IO} = 500$ V	R_S	$\geq 10^9$	Ω
Tracking Resistance (Comparative Tracking Index)	CTI	>175	V

*请参阅当前目录中 IEC/EN/DIN EN 60747-5-5 《产品安全条例》 章节的光耦合器部分前面的详细描述。

*Refer to the front of the optocoupler section of the current catalog, under Product Safety Regulations section IEC/EN/DIN EN 60747-5-5, for a detailed description.

注:隔离特性只保证在安全最大额定值内, 应用中的保护电路必须保证安全最大额定值。

Note: Isolation characteristics are guaranteed only within the safety maximum ratings which must be ensured by protective circuits in application.

6 极限参数 Absolute Maximum Ratings

表 3 极限参数

Table 3-Absolute Maximum Ratings (Ta=25°C, RH=30~75%)

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	20	mA
	正向脉冲电流 Pulse Forward Current (<1μs Pulse Width, <10% Duty Cycle)	I _{FP}	80	mA
	反向电压 Reverse Voltage	V _R	5	V
	输入端功耗 Input Power Dissipation	P _I	35	mW
输出端 output	输出电流 Output Current	I _O	8	mA
	电源电压 Supply Voltage (1min Max)	V _{CC}	-0.5~30	V
	输出电压 Output Voltage	V _O	-0.5~20	V
	输出端功耗 Output Power Dissipation	P _O	100	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	
输入-输出间绝缘电压* Isolation voltage (RH≤60%,交流 1 分钟) (RH≤60%, AC 1min.)		V _{ISO}	7500	V _{rms}

*交流 60 秒, R.H. = 40 ~ 60% 隔离电压应采用以下方法测量。(1)初级侧的阳极和阴极之间以及次级侧的集电极和发射极之间的距离短。(2)带过零电路应使用的隔离电压测试仪。(3)外加电压的波形应为正弦波。

*AC For 60 Seconds, R.H. = 40 ~ 60% Isolation voltage shall be measured using the following method. (1) Short between anode and cathode on the primary side and between collector and emitter on the secondary side. (2) The isolation voltage tester with zero-cross circuit shall be used. (3) The waveform of applied voltage shall be a sine wave.

7 推荐工作条件 Recommended Operating Conditions

表 4 推荐工作条件

Table 4-Recommended Operating Conditions

参数名称 Characteristic	符号 Symbol	最小值 Min.	最大值 Max.	单位 Unit.
工作温度 Operating temp.	T _{aop}	-40	+105	°C
低电平输入电流 Input Current,Low Level	I _{FL}	0	250	μA
高电平输入电流 Input Current,High Level	I _{FH}	8	16	mA
输出端电源电压 Power Supply Voltage	V _{CC}	3	20	V
正向电压 Forward Voltage	V _{F(OFF)}	-	0.8	V

8 光电参数 Opto-Electrical Characteristics

表 5 光电参数

Table 5-Opto-Electrical Characteristics

T_a=25°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
输入端 Input	正向电压 Forward Voltage	V _F	I _F =16mA	1.1	1.5	1.7	V
	反向输入压降 Input Reverse Breakdown Voltage	BV _R	I _R =10μA	5	-	-	V
输出端 Output	高电平输出电流 Logic High Output Current	I _{OH}	V _O =V _{CC} =5.5V I _F =0 mA	-	3	500	nA
			V _O =V _{CC} =20V I _F =0 mA	-	0.1	1	μA
	低电平供给电流 Logic Low Supply Current	I _{CCL}	V _O =Open V _{CC} =20V I _F =16 mA	-	120	200	μA
	高电平供给电流 Logic High Supply Current	I _{CCH}	V _O =Open V _{CC} =20V I _F =0mA	-	0.01	2	μA
耦合 Coupler	电流传输比 Current Transfer Ratio	CTR	I _F =16mA V _{CC} =4.5V V _O =0.4V	19	-	-	%
	低电平输出电流 Logic Low Output Voltage	V _{OL}	I _F =16mA V _{CC} =4.5V I _O =1.1mA	-	0.25	0.4	V
开关 Switching	输出端逻辑由高到低的传输延迟 Propagation Delay Time to Logic Low at Output	t _{pHL}	R _L =1.9kΩ I _F =16mA CL=15pF	-	0.2	1.5	μs
	输出端逻辑由低到高的传输延迟 Propagation Delay Time to Logic High at Output	t _{pLH}	R _L =1.9kΩ I _F =16mA CL=15pF	-	0.5	1.5	μs
	输出端为高电平时的共模抑制比 Common Mode Transient Immunity at Logic High Level Output	CM _H	R _L =1.9kΩ I _F =0mA V _{CM} =1000V _{P-P}	10000	-	-	V/μs
	输出端为低电平时的共模抑制比 Common Mode Transient Immunity at Logic High Level Output	CM _L	R _L =1.9kΩ I _F =16mA V _{CM} =1000V _{P-P}	-10000	-	-	V/μs
	带宽 Bandwidth	BW	R _L =100Ω	-	2	-	MHz
隔离 Isolation	绝缘电压 Isolation voltage	V _{ISO} ^a	I _{off} ≤0.45mA, AC, 60s	7500	-	-	V
	常温绝缘电阻 Isolation Resistance between Input and Output	R _{I-O} ^a	V _{I-O} =500V DC	10 ¹²	-	-	Ω

输入-输出电容 Capacitance (Input to Output)	C_{1-o}^a	$f = 1\text{MHz}$	-	0.6	-	pF
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a. 测试时是将 PIN1,2,3,4 短接在一起, PIN5,6,7,8 短接在一起。Device considered a two-terminal device: Pins 1, 2, 3 and 4 shorted together, and Pins 5, 6, 7 and 8 shorted together.

9 特性曲线图 Characteristic Curve

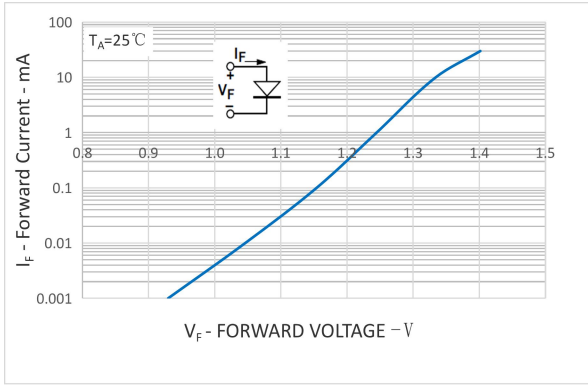


图 3 V_F - I_F 特性曲线

Figure 3-Typical input diode forward characteristic

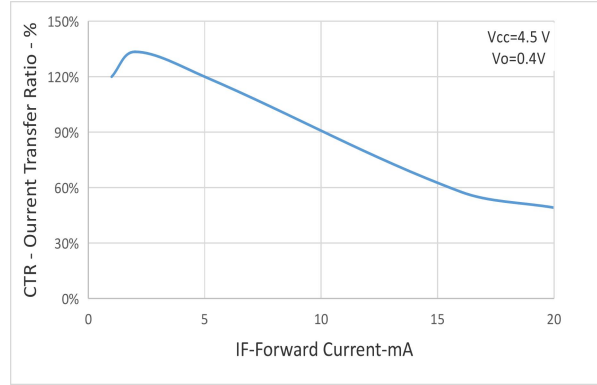


图 4 CTR- I_F 特性曲线

Figure 4-Current Transfer Ratio vs. Forward Current

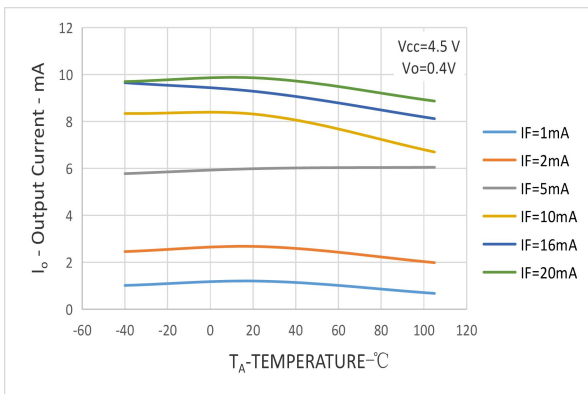


图 5 I_o - T_A 特性曲线

Figure 5-Output Current vs. Temperature

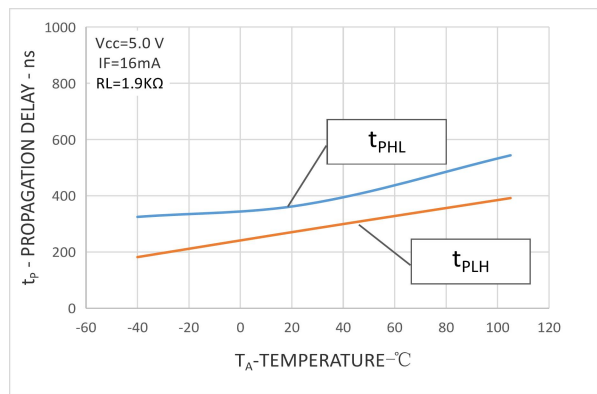


图 6 t_p - T_A 特性曲线

Figure 6-Propagation Delay vs. Temperature

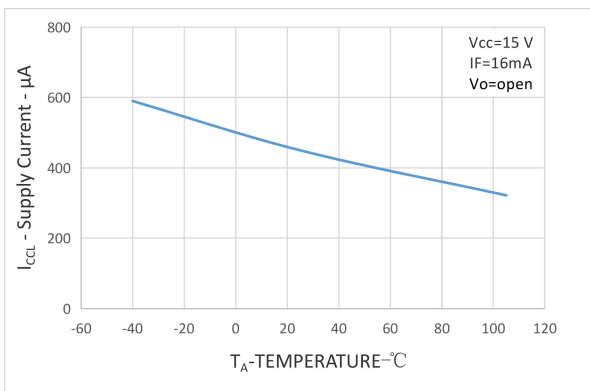


图 7 I_{CCL} - T_A 特性曲线

Figure 7-Supply Current vs. Temperature

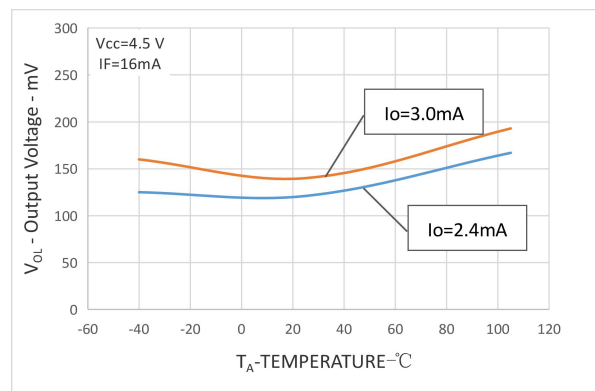


图 8 V_{OL} - T_A 特性曲线

Figure 8-Logic Low Output Voltage vs. Temperature

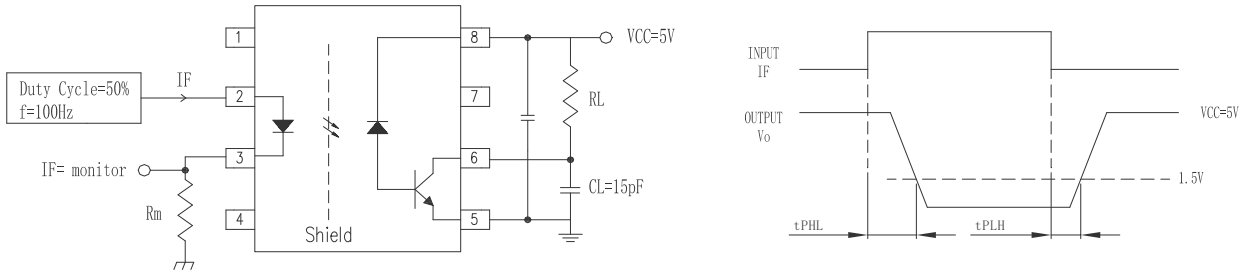


图 9 t_{PHL} 、 t_{PLH} 测试电路
Figure 9- The test method of t_{PHL} 、 t_{PLH}

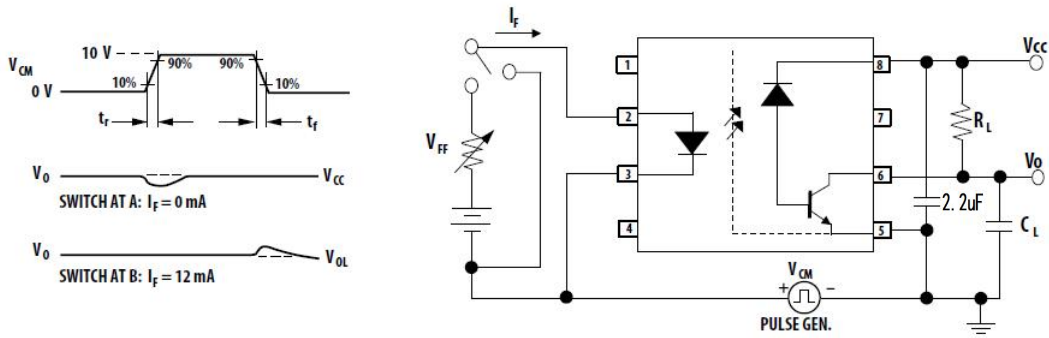
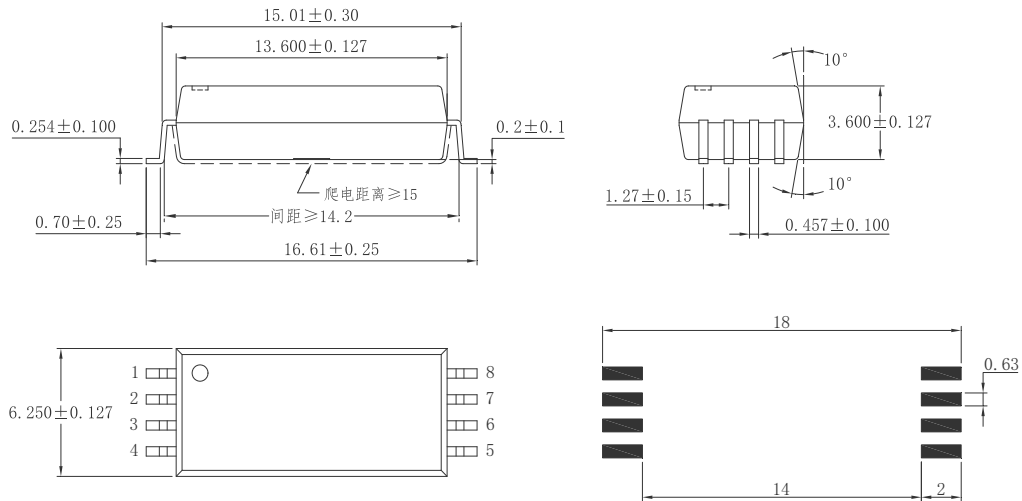


图 10 CMR 测试电路
Figure 10- Test Circuit for Transient Immunity and Typical Waveforms

10 外形尺寸 Dimensions



管脚定义 PIN Definition:
1: 空位 None; 2: 正极 Anode;
3: 负极 Cathode; 4: 空位 None;
5: GND ; 6: Vo;
7: 空位 None; 8: VCC

推荐焊盘尺寸
Recommended Pad Size

图 11 HPL6W136 外形尺寸
Figure 11- The dimensions of HPL6W136

11 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：**HPL6W136** 产品印章如图 12。

Print type characters ,trade mark and Lot.No.on the Photo Coupler.For example the marking of product **HPL6W136** is shown as Figure 12.

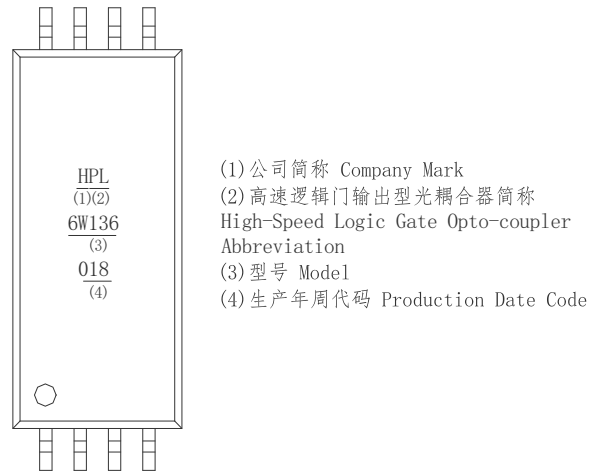


图 12 产品印章
Figure 12- Marking

12 包装方式 Packing

12.1 编带包装 (Tape and reel) : 适用于 For HPL6W136

12.1.1 每卷数量 (Qty/reel) : 1000 只 (pcs)。每箱数量 (Qty/ctn) : 10000 只 (pcs)。

12.1.2 内包装 (Inner packing) :

每卷盘 1000 只, 贴合格证 (型号、生产日期代号、检验员代号)。

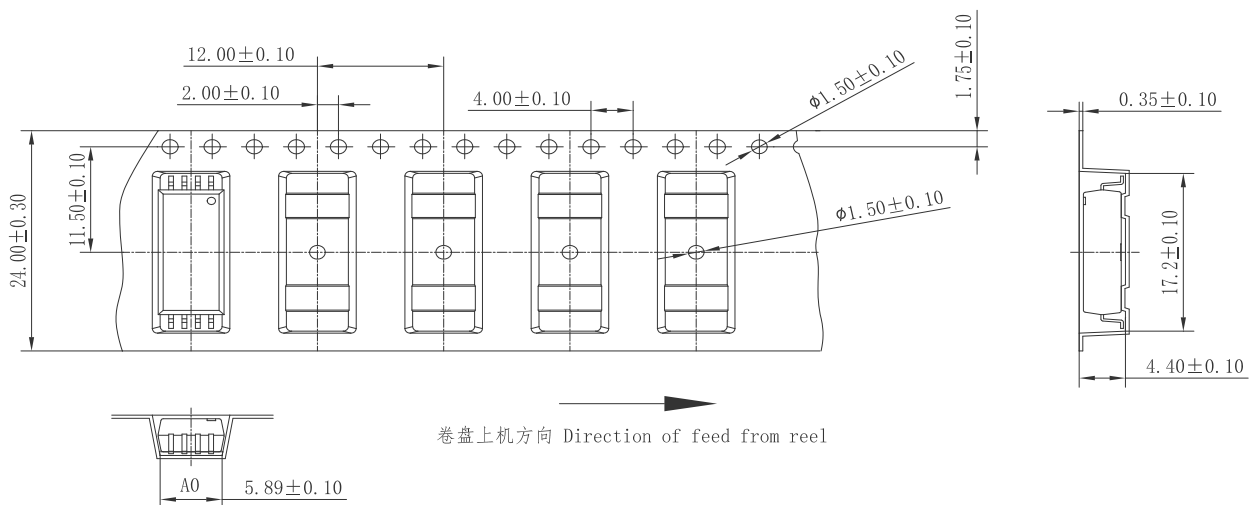
1000pcs/reel, certificate on reel (model, code of product date, Inspector's code)

12.1.3 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.

12.1.4 示意图 (Schematic) :



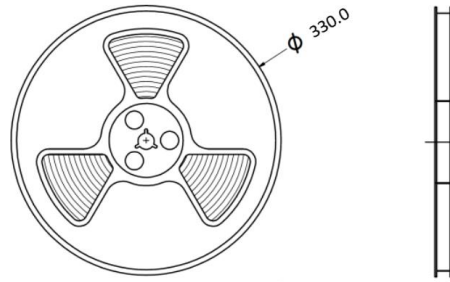


图 13 编带包装示意图

Figure 13- Taping Packing Schematic

13 使用注意事项 Note

13.1 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.

13.2 引脚镀锡厚度: 大于等于 3 μ m。

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

13.3 推荐焊接条件 Recommended Soldering Conditions

13.3.1 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.

13.3.2 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.

13.3.3 回流焊 Reflow soldering

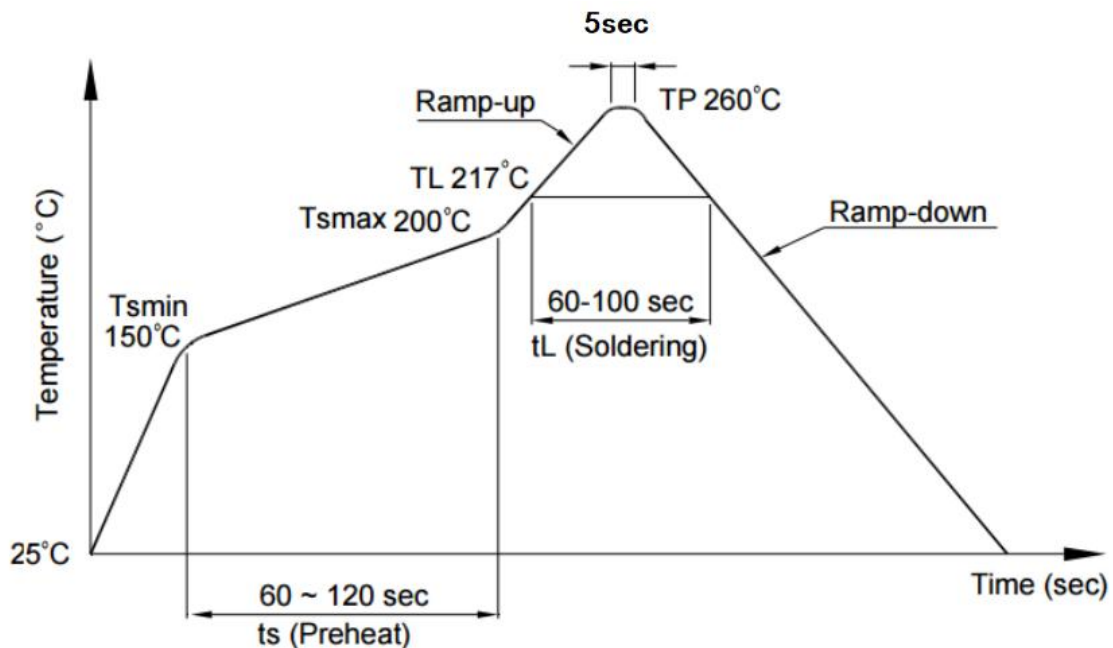
1) 推荐锡膏规格 Recommend tin glue specifications:

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 14 回流焊参数

Figure 14-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.

13.3.4 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.

13.4 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.

14 产地 Production Place

14.1 产地 Production Place: 中国厦门 Xiamen China;

14.2 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.;

14.3 工厂地址 Production Add.: 厦门市翔安区舩阳南路 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
1.0	2020-08-08	新版发行 New edition	黄发宝	段果
1.1	2022-02-21	1. 更新产品概述与应用； 2. 更新合格证标签模板。	黄发宝	段果
1.2	2023-03-25	1. 工厂地址变更； 2. 工作温度上限由105℃调整为110℃； 3. 删除12.2标识Label； 4. 删除13.2静电防护等级； 5. 更新图14回流焊参数曲线。	张强龙	黄发宝
1.3	2023-11-07	1、公司名称变更为华联半导体科技有限公司； 2、新增安规认证说明以及证书编号；	张强龙	黄发宝