



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: HPL6N137-×

PART NO.: HPL6N137-×

拟制 Prepared	审核 Verified	批准 Approved

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1 概述 General

光耦产品 HPL6N137-× 由 850nm 砷化铝镓红外发光二极管同超高速逻辑门光敏芯片耦合封装构成。产品输出端为集电极开路输出，从而允许线或输出。输入端提供最大 5mA 的电流，输出端即可吸收最小 13mA 的电流。产品具有很强的共模抑制能力。

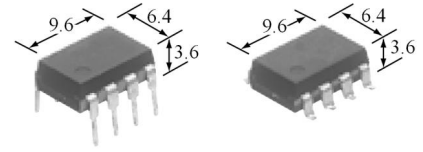


图 1 产品 Figure 1-Product

The HPL6N137-× optocouplers consist of a 850 nm AlGaAS LED, optically coupled to a very high speed integrated photo-detector logic gate with a strobable output. This output features an open collector, thereby permitting wired OR outputs. A maximum input of 5mA will provide a minimum output sink current of 13mA. Products have strong common mode rejection capability.

2 特点 Features

- 数据传输速率快。High speed:10 Mbit/s .
- 逻辑门输出。Logic gate output.
- 输入、输出间绝缘电压高。The isolation voltage between input and output is high: VISO \geq 5000Vrms.
- 双列直插式/贴片式 8L 塑料封装。8L DIP/SOP 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.
- TTL/LSTTL 兼容。TTL/LSTTL Compatible:5V supply.

3 应用 Applications

- 线接收器。Line receivers.
- 数据传输。Data transmission.
- 计算机外围接口。Computer-peripheral interface.
- 替代脉冲变压器。Pulse transformer replacement.
- 开关电源。Switching power supply.

4 真值表及电原理图 Truth Table and Schematic

表 1 真值表 Table 1-Truth Table

输入端 INPUT	使能端 ENABLE	输出端 OUTPUT
H	H	L
L	H	H
H	L	H
L	L	H
H	NC	L
L	NC	H

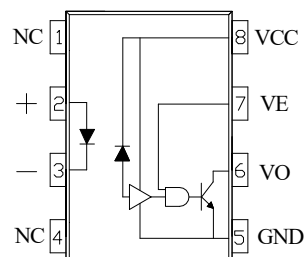


图 2 电原理图 Figure 2-Schematic

5 极限参数 Absolute Maximum Ratings

表 2 极限参数

Table 2-Absolute Maximum Ratings (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 (t=1ms, 50% duty cycle)	I _{FP}	40 mA
	反向电压 Reverse Voltage	V _R	5 V
输出端 output	输出电流 Output Current	I _O	50 mA
	电源电压 Supply Voltage	V _{CC}	7 V
	输出电压 Output Voltage	V _O	7 V
	使能端电压 Enable Input Voltage (勿超出 Vcc 500mV 以上 Not to exceed Vcc by more than 500mV)	V _{EH}	5.5 V
	输出端功耗 Output Power Dissipation	P _c	85 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 _{slid}	360
	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 推荐工作条件 Recommended Operating Conditions

表 3 推荐工作条件

Table 3-Recommended Operating Conditions

参数名称 Characteristic	符号 Symbol	最小值 Min.	最大值 Max.	单位 Unit.
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}	7	20	mA
高电平使能端电压 High Level Enable Voltage	V _{EH}	2.0	V _{CC}	V
低电平使能端电压 Low Level Enable Voltage(Output High)	V _{EL}	0	0.8	V
输出端电源电压 Supply Voltage, Output	V _{CC}	4.5	5.5	V
		2.7	3.6	V
扇出数 Fan Out (TTL Load)	N		8	

7 光电参数 Opto-Electrical Characteristics

表 4 光电参数

Table 4-Opto-Electrical Characteristics

T_a=25°C

参数 Parameters		符号 Symb.	测试条件 Test Conditions	最小值 Min.	特征值 Typ.	最大值 Max.	单位 Unit
输入端 Input	正向电压 Forward Voltage	V _F	I _F =10mA		1.35	1.7	V
	输入端反向击穿电压 Input Reverse Breakdown Voltage	BV _R	I _R =10μA	5			V
输出端 Output	高电平电源电流 High Level Supply Current	I _{CCH}	V _E =0.5V, V _{CC} =5.5V, I _F =0 mA		7	10	mA
	低电平电源电流 Low Level Supply Current	I _{CCL}	V _E =0.5V, V _{CC} =5.5V, I _F =10 mA		9	13	mA
	高电平使能端电流 High Level Enable Current	I _{EH}	V _E =2.0V, V _{CC} =5.5V		-1.0		mA
	低电平使能端电流 Low Level Enable Current	I _{EL}	V _E =0.5V, V _{CC} =5.5V		-1.6	-2.0	mA
	高电平使能端电压 High Level Enable Voltage	V _{EH}	V _{CC} =5.5V, I _F =0 mA	2.0			V
	低电平使能端电压 Low Level Enable Voltage	V _{EL}	V _{CC} =5.5V, I _F =10 mA			0.8	V
耦合 Coupler	高电平输出电流 High Level Output Current	I _{OH}	I _F =0.25mA, V _{CC} =5.5V, V _O =5.5V, V _E =2V			100	μA
	低电平输出电压 Low Level Output Voltage	V _{OL}	I _F =5mA, V _{CC} =5.5V, I _{OL} =13mA, V _E =2V		0.35	0.6	V
	触发电流 Input Threshold Current	I _{FT}	I _{OL} =13mA, V _{CC} =5.5V, V _O =0.6V, V _E =2V		3	5	mA
开关 Switching	输出端逻辑由低到高的传输延迟时间 Propagation Delay Time to Logic Low at Output	t _{pHL} ^a	R _L =350Ω, C _L =15pF, I _F =7.5mA		60	75	ns
	输出端逻辑由高到低的传输延迟时间 Propagation Delay Time to Logic High at Output	t _{pLH} ^b	R _L =350Ω, C _L =15pF, I _F =7.5mA		60	75	ns
	输出端为高电平时的共模抑制能力 Common Mode Transient Immunity at Logic High Level Output	CM _H	R _L =350Ω, I _F =0mA, V _{O(min)} =2.0, V _{CM} =10V _{P-P}	1000			V/μs
	输出端为低电平时的共模抑制能力 Common Mode Transient Immunity at Logic High Level Output	CM _L	R _L =350Ω, I _F =7.5mA, V _{O(max)} =0.8, V _{CM} =10V _{P-P}	1000			V/μs
	输出端上升时间 Output Rise Time(10%~90%)	t _r ^c	R _L =350Ω, C _L =15pF, I _F =7.5mA		30		ns
	输出端下降时间 Output Fall Time(90%~10%)	t _f ^d			30		
	输出端逻辑由低到高的使能延迟时间 Propagation Delay Time of Enable	t _{ELH} ^e	R _L =350Ω, C _L =15pF, I _F =7.5mA, V _{EH} =3.0V, V _{EL} =0.5V		25		ns
	输出端逻辑由高到低的使能延迟时间 Propagation Delay Time of Enable	t _{EHL} ^f	R _L =350Ω, C _L =15pF, I _F =7.5mA, V _{EH} =3.0V, V _{EL} =0.5V		25		ns

隔离 Isolation	绝缘电压 Isolation voltage	V_{ISO}	$I_{off} \leq 0.3mA$, AC, 60s	5000		V
	输入-输出电容 Capacitance (Input to Output)	C_{I-O}^g	$f = 1MHz$		0.4	pF

^{a b c d} $t_{pHL}, t_{pLH}, t_r, t_f$ 测试方法见图 3。The test method of $t_{pHL}, t_{pLH}, t_r, t_f$ is shown in figure 3.
^{e f} t_{ELH}, t_{EHL} 测试方法见图 4。The test method of t_{ELH}, t_{EHL} is shown in figure 4.
^g C_{I-O} 测试是将 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.

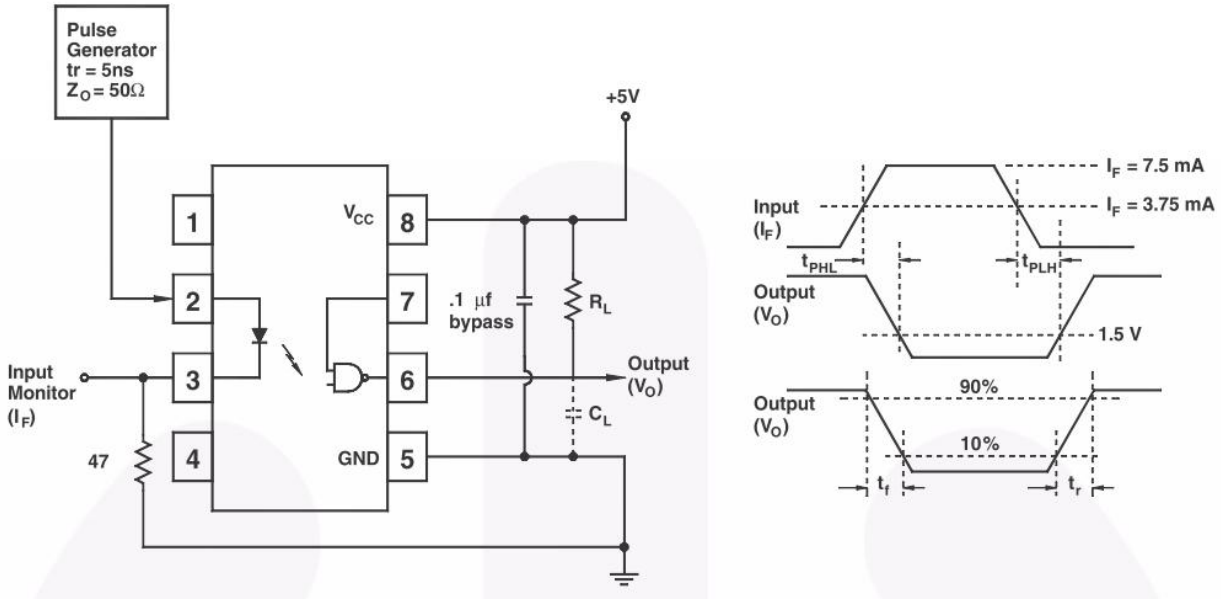


图 3 $t_{pHL}, t_{pLH}, t_r, t_f$ 测试方法

Figure 3- The test method of $t_{pHL}, t_{pLH}, t_r, t_f$

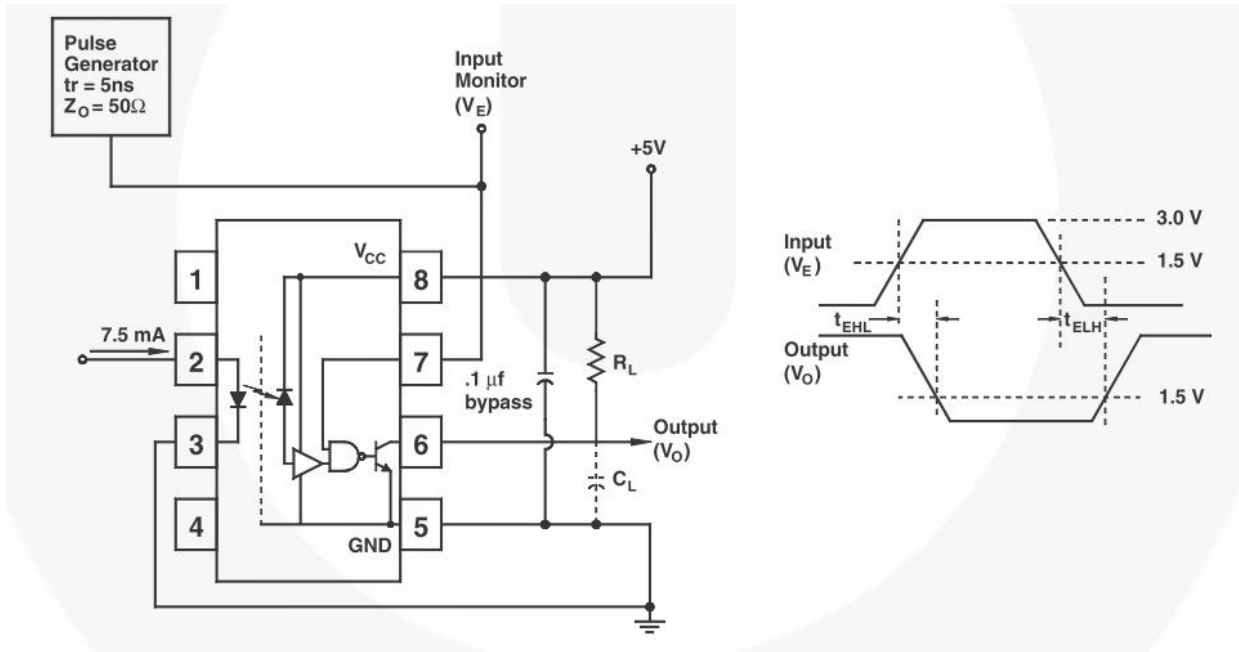


图 4 t_{ELH}, t_{EHL} 测试方法

Figure 4- The test method of t_{ELH}, t_{EHL}

8 外形尺寸 Dimensions

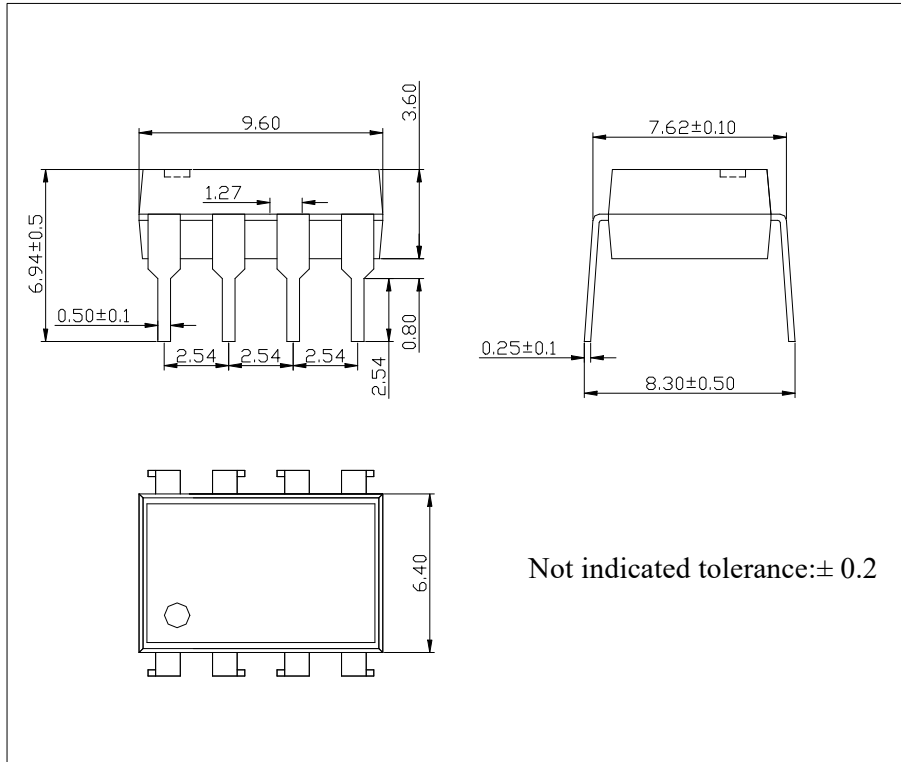


图 5 HPL6N137-D8 外形尺寸

Figure 5- The dimensions of HPL6N137-D8

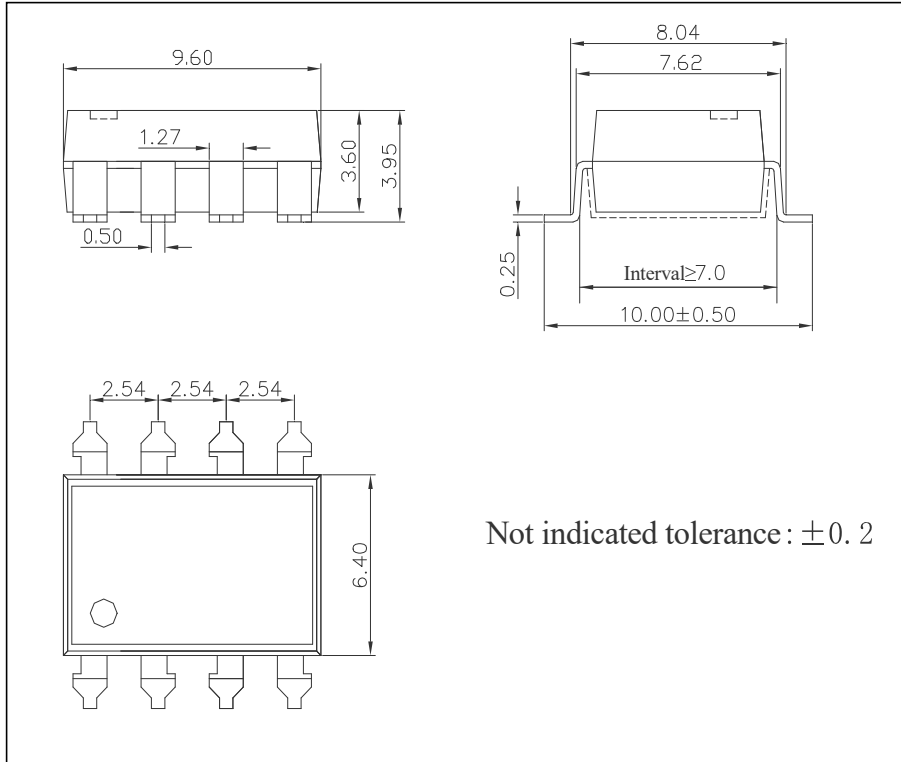


图 6 HPL6N137-S8 外形尺寸

Figure 6- The dimensions of HPL6N137-S8

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：**HPL6N137-×**产品印章如图7。

Print type characters ,trade mark and Lot.No.on the Photo Coupler.For example the marking of product

HPL6N137-× is shown as figure 7.

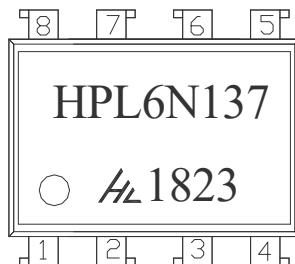


图7 产品印章

Figure 7- Marking

10 包装方式 Packing

10.1 条管包装 (Tube): 适用于 For HPL6N137-D8.

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, 一端贴合格证 (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):

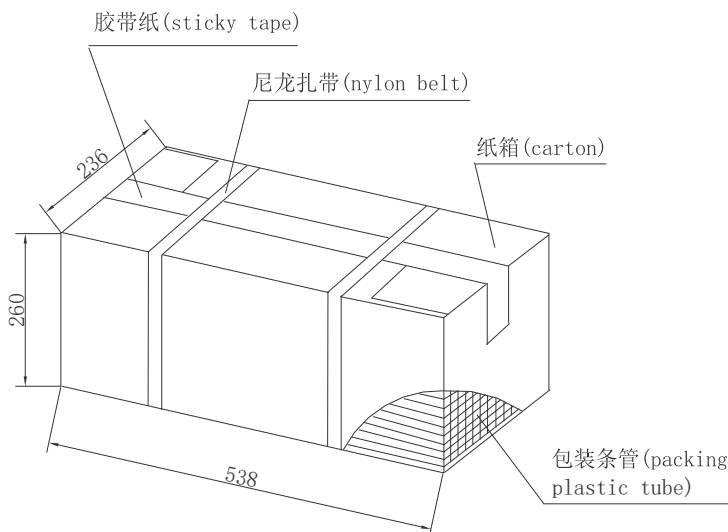


图8 条管外包装

Figure 8- Outer packing for Tube

10.2 编带包装 (Tape and reel): 适用于 For HPL6N137-S8

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

10.2.2 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)

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):

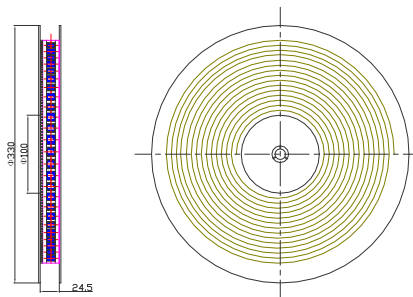
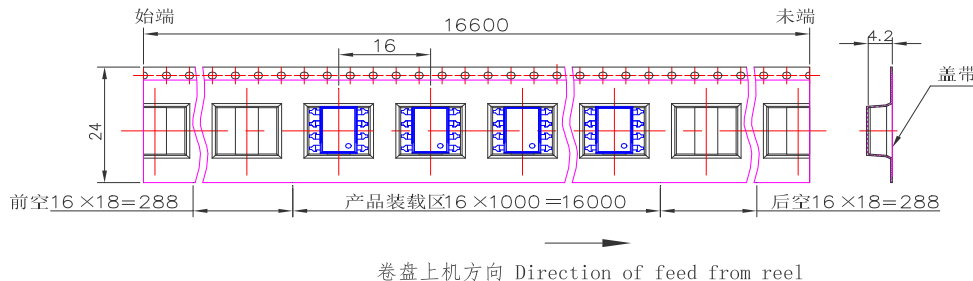


图 9 编带包装示意图

Figure 9- Taping Packing Schematic

10.3 注意事项 Note

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

推荐贮存湿度 Recommend storage humidity: <70%;

10.3.2 湿气敏感度等级 3 级。MSL level: MSL 3.

10.4 引脚镀锡厚度：大于等于 5μm，平均 8μm~10μm。

Thickness of Sn which plated on lead frame: $\geq 5 \mu\text{m}$, average $8 \mu\text{m} \sim 10 \mu\text{m}$.

10.5 推荐焊接条件 Recommended Soldering Conditions

10.5.1 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.

10.5.2 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.

10.5.3 回流焊 Reflow soldering

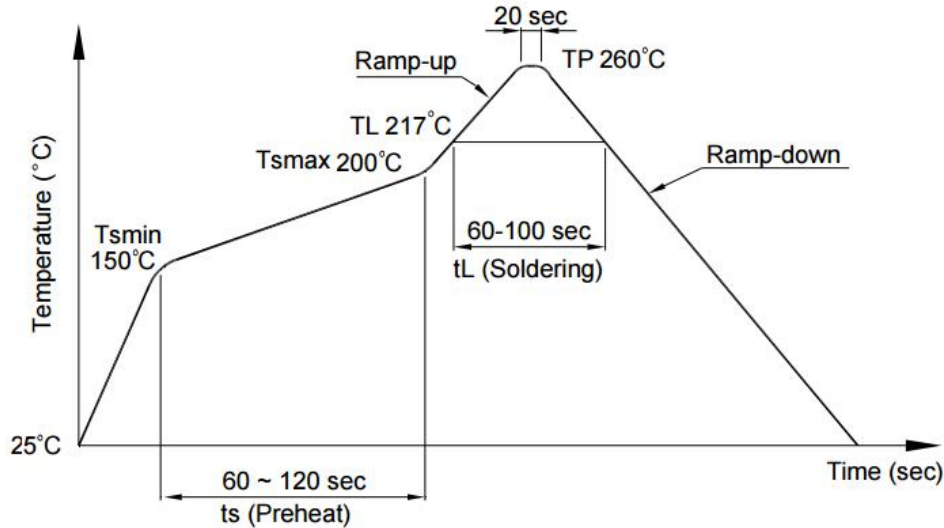
1) 推荐锡膏规格 Recommend tin glue specifications:

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 10 回流焊参数

Figure 10-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.

10.5.4 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.

10.6 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.

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
1.0	2018-07-03	新版发行 New edition	黄发宝	兰玉平
1.1	2018-12-14	1.增加 HPL6N137-S8 产品	黄发宝	段果
1.2	2020-09-28	1.工作温度上限由 85℃调整至 105℃；	黄发宝	段果
1.3	2021-09-15	1.高电平输出电流上限由 0.1 μ A 调整为 100 μ A； 2.低电平输出电压上限由 0.4V 调整为 0.6V。	黄发宝	段果
1.4	2022-05-09	1.表 3 的输出端电源电压 V _{CC} 新增工作条件 2.7V~3.6V； 2.表 1 手工焊接的温度由 350℃提高至 360℃，焊接温度由 5s 调整为 3s；回流焊的时间由 10S 调整为 5s。 3.更新第 10 点使用注意事项；	黄发宝	段果
1.5	2022-12-29	1. 工厂地址变更、删除邮编； 2. 工作温度上限由 105℃调整为 110℃； 3. 删除 10.3 标识 Label。	张强龙	黄发宝
1.6	2023-11-02	1、公司名称变更	姚彭彭	黄发宝