



厦门华联电子股份有限公司

Xiamen Hualian Electronics Corp., Ltd.

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# 产品规格书

## SPECIFICATION

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产品名称：光敏双向晶闸管输出型光耦合器  
DESCRIPTION: Photo-triac Output Opto-coupler  
产品型号：HPC3053-×  
PART NO.: HPC3053-×

拟制 Prepared	审核 Verified	批准 Approved

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## 1 概述 General

产品 HPC3053-× 由砷化铝镓红外发光二极管同非零交叉光敏双向晶闸管芯片耦合封装构成。产品可实现低压电路同高压线路间的逻辑隔离，可为大电流晶闸管提供随机相位控制。产品具有很高的静态  $dV/dT$ ，以确保感性负载下仍有可靠的开关性能。产品图见图 1。

The HPC3053-× consist of a AlGaAs infrared emitting diode optically coupled to a non-zero-crossing silicon bilateral AC switch (triac). These devices isolate low voltage logic from high voltage AC lines to provide random phase control of high current triacs or thyristors. These devices feature greatly enhanced static  $dv/dt$  capability to ensure stable switching performance of inductive loads. Products shown in Figure 1.



图1 产品 Figure 1-Product

## 2 特点 Features

- 输出端为非过零双向晶闸管输出。Random Phase Triac Output.
- 输入、输出间绝缘电压高。The isolation voltage between input and output is high:  $V_{ISO} \geq 5000V_{rms}$ .
- 双列直插式 6L 塑料封装。6L DIP plastic package.
- 安规认证：UL 安全认证文件号(UL File No.): E178703  
VDE 安全认证文件号(VDE Licence No.):40004708

- 符合 RoHS 指令最新要求及 REACH 法规最新要求。

Comply with the latest requirements of the RoHS directive and the latest requirements of REACH regulations.

## 3 应用 Applications

- 螺线管/阀门控制 Solenoid/valve controls
- 灯整流器 Lamp ballasts
- 静态交流电源开关 Static AC power switch
- 微处理器同 115Vac、240Vac 接口 Interfacing microprocessors to 115 and 240 Vac peripherals
- 白炽灯调光器 Incandescent lamp dimmers
- 温度控制 Temperature controls
- 马达控制 Motor controls

## 4 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	$I_F$	60	mA
	反向电压 Reverse Voltage	$V_R$	6	V
	耗散功率 Power Dissipation	$P_M$	100	mW
输出端 output	断态重复峰值电压 Off-state repetitive peak voltage	$V_{DRM}$	600	V
	通态电流 On-state current	$I_{T(RMS)}$	100	mA
	峰值浪涌电流 Peak repetitive surge current	$I_{TSM}$	1	A
	耗散功率 Power dissipation	$P_C$	300	mW

工作温度 Operating temp.	$T_{aop}$	-40 ~ +100	°C
贮存温度 Storage temp.	$T_{stg}$	-55 ~ +125	°C
焊接温度 (10 秒) Soldering Temperature (10 Sec.)	$T_{sol}$	260	°C
总耗散功率 Total power dissipation	$P_T$	400	mW
绝缘电压 Isolation voltage (RH≤60%,交流 1 分钟) (RH≤60%, AC 1min.)	$V_{ISO}$	5000	$V_{rms}$

## 5 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	$V_F$	$I_F=10\text{mA}$	-	1.24	1.4	V
反向电流 Reverse current	$I_R$	$V_R=6\text{V}$	-	-	10	uA
断态重复峰值电流 Off-state repeated peak current	$I_{DRM}$	$V_{DRM}=600\text{V}^a$	-	-	100	nA
断态电压临界上升率 Off-state voltage critical rise	$dv/dt^b$	$V_{DRM}=600\text{V}_{AC}$ $dv/dt=0.63V_{DRM}/\tau$	1000	-	-	V/us
LED 触发电流 LED triggering current	$I_{FT}^c$	$V_T=3\text{V}$	-	-	5	mA
维持电流 Holding current	$I_H$		-	257	-	uA
峰值通态电压 On-state peak voltage	$V_{TM}$	$I_{TM}=100\text{mA}$	-	1.58	2.5	V
绝缘电压 Isolation voltage	$V_{ISO}$	$I_{off}\leq 0.3\text{mA}$ , AC, 60s	5000	-	-	V

<sup>a</sup>外加测试电压须在  $dv/dt$  额定值内。The additional test voltage should be within  $dv/dt$  rated value.

<sup>b</sup>这是静态  $dv/dt$ , 转换  $dv/dt$  只随负载驱动闸流管变化。This is static  $dv/dt$ ,  $dv/dt$  is converted with changes of loading for the driven thyristor.

<sup>c</sup>保证所有器件在  $I_F$  值小于或等于最大的  $I_{FT}$  时触发。It is guaranteed that all devices trigger when  $I_F$  value is less than or equal to the maximum value of  $I_{FT}$ .

## 6 特性曲线 Performance Curves

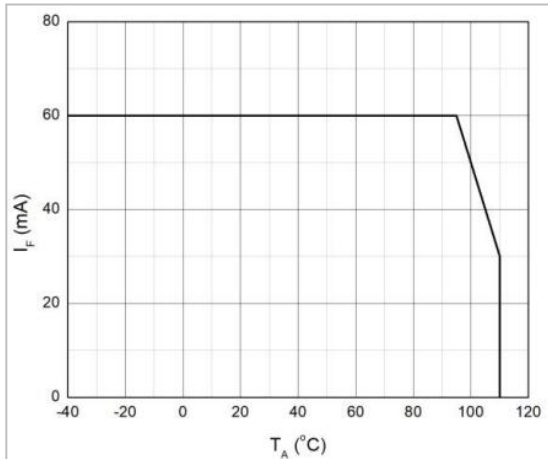


图 2  $T_A$ - $I_F$  特性曲线

Figure 2- Forward Current vs. Ambient Temperature

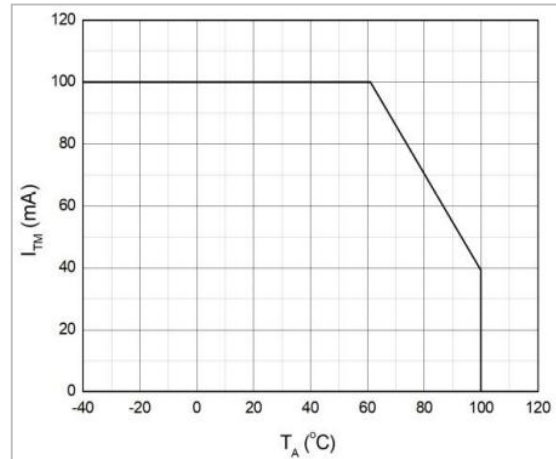


图 3  $T_A$ - $I_{TM}$  特性曲线

Figure 3- On-state Terminal Current vs. Ambient Temperature

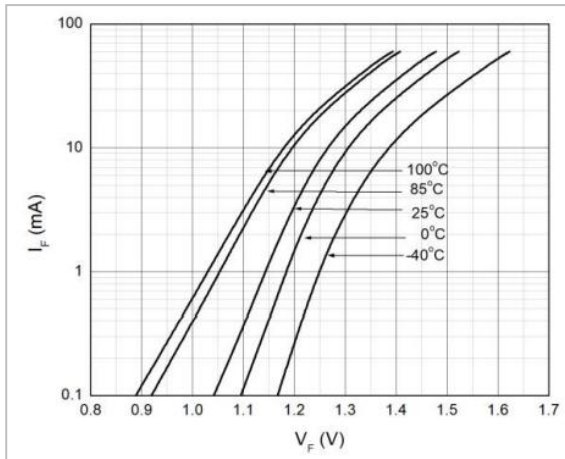


图 4  $V_F$ - $I_F$  特性曲线

Figure 4- Forward Current vs. Forward Voltage

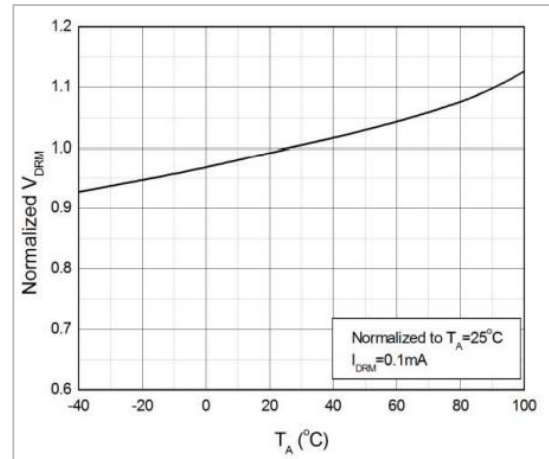


图 5  $T_A$ -Normalized  $V_{DRM}$  特性曲线

Figure 5- Normalized Off-state Voltage vs. Ambient Temperature

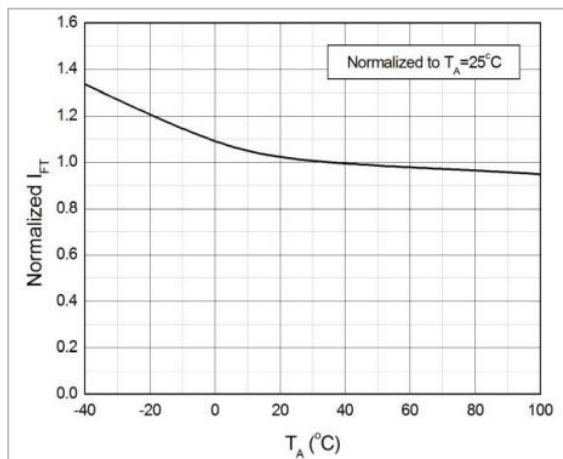


图 6  $T_A$ -Normalized  $I_{FT}$  特性曲线

Figure 6- Normalized Trigger Current vs. Ambient Temperature

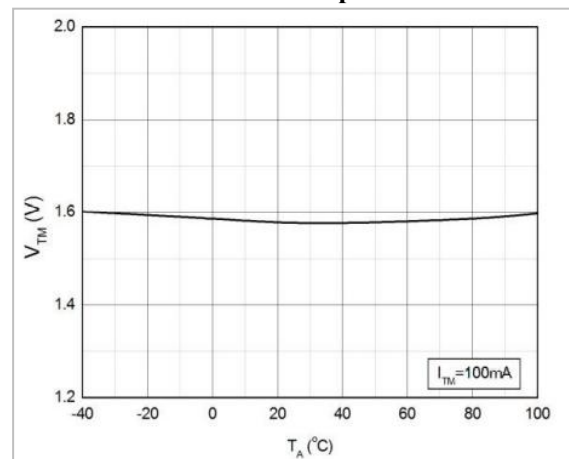


图 7  $T_A$ - $V_{TM}$  特性曲线

Figure 7- On-state Terminal Voltage vs. Ambient Temperature

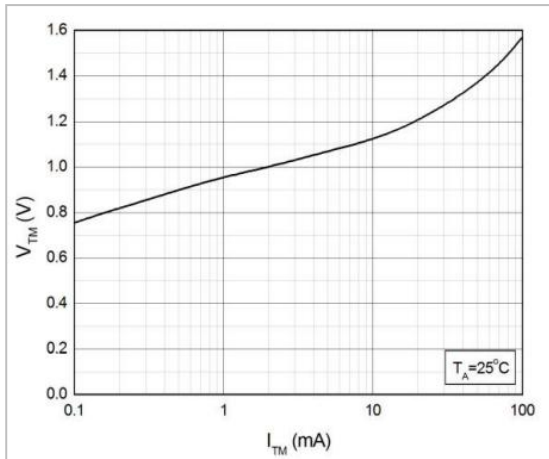


图 8  $I_{TM}$ - $V_{TM}$  特性曲线

Figure 8- On-state Terminal Voltage vs. On-state Terminal Current

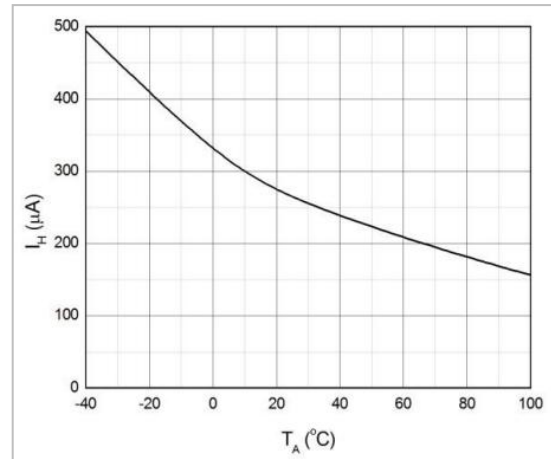


图 9  $T_A$ - $I_H$  特性曲线

Figure 9- Holding Current vs. Ambient Temperature

## 7 电原理图 Schematic Diagram

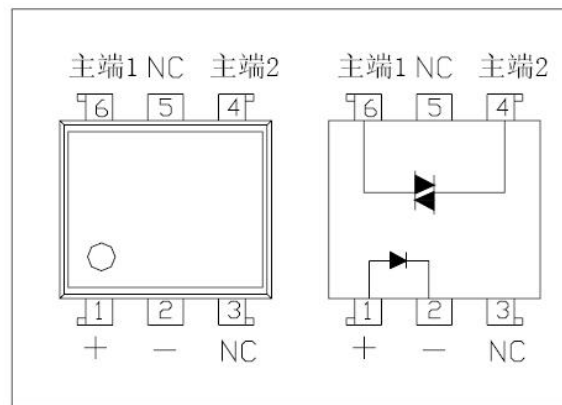


图 10 电原理图

Figure 10- Circuit Diagram

## 8 外形尺寸图 Dimensions Diagram

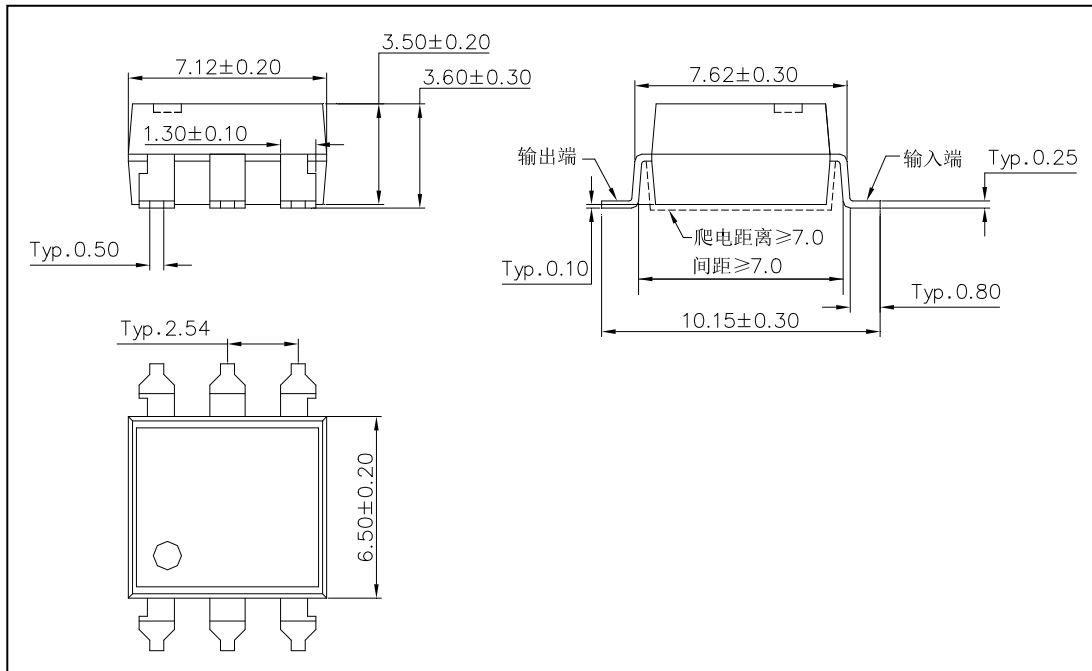


图 11 HPC3053-2 外形尺寸  
Figure 11- The dimension of HPC3053-2

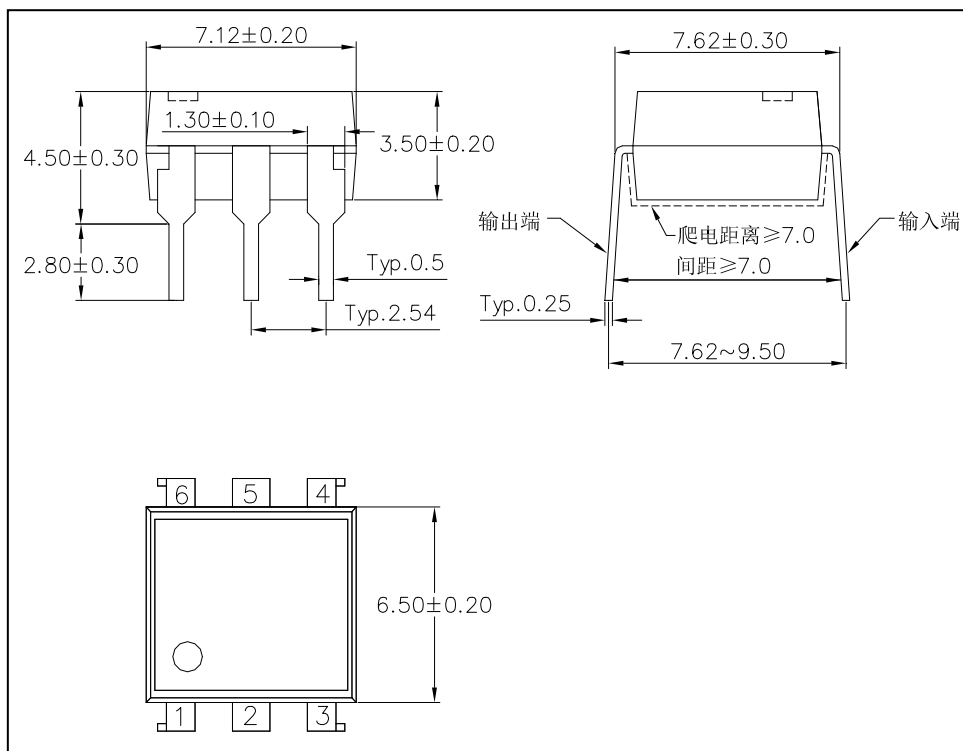


图 12 HPC3053-3 外形尺寸  
Figure 12- The dimension of HPC3053-3

## 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：HPC3053-×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 HPC3053-× is shown as figure 13.



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 HPC3053-3.

10.1.1 每箱数量 (Qty/ctn) : 16000 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 1600 只, 贴合格证 (型号、生产日期代号、检验员代号) 。

1600pcs/bundle, certificate on one end (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) :

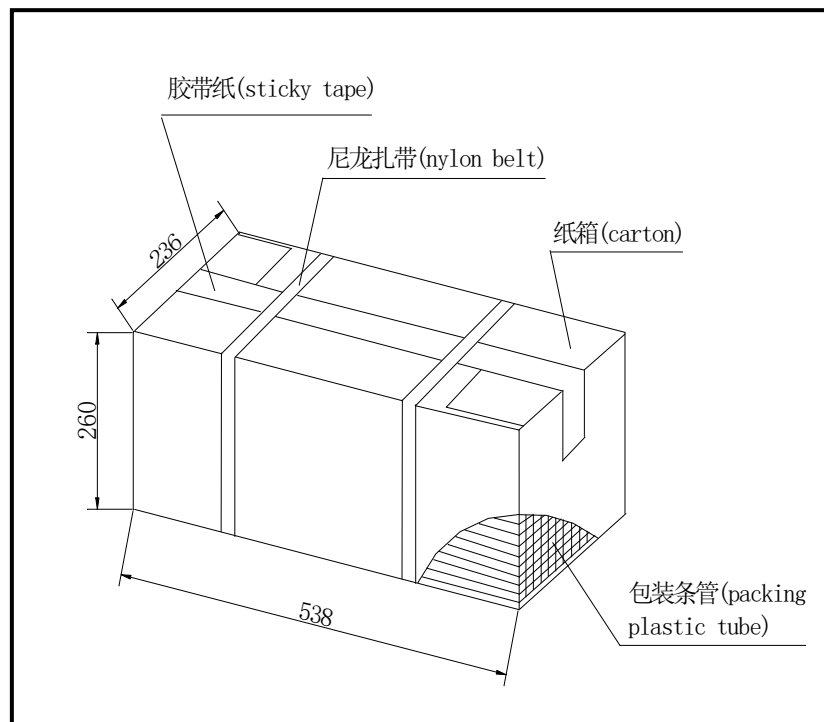


图14 条管外包装

Figure 14- Outter packing for Tube

**10.2 编带包装 (Tape and reel) : 适用于 For HPC3053-2。**

**10.2.1** 每卷数量 (Qty/reel) : 1000 只 (pcs)。每箱数量 (Qty/ctn) : 15000 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) :**

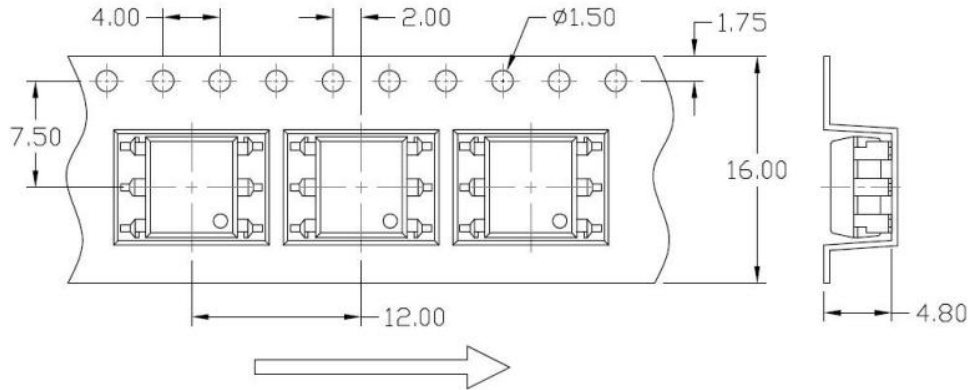


图 15 编带包装示意图

Figure 15- Taping Packing Schematic

**11 注意事项 Note**

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

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

贮存有效期半年 Storage life: Half of a year.

**11.1.2** 湿气敏感度等级 1 级。MSL level: MSL 1.

**11.2** 引脚镀锡厚度: 大于等于 3μm。

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

**11.3** 推荐焊接条件 Recommended soldering conditions

**11.4** 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.

**11.5** 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.

**11.6** 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:

a) 熔点 Melting temperature: 217°C

b) 组分 Contains: SnAg3Cu0.5

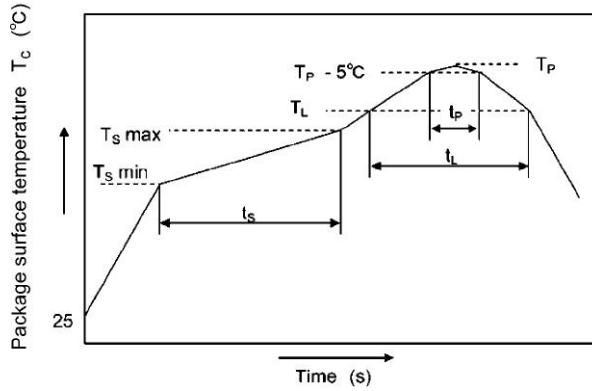
2) 回流焊工序必须在器件冷却至室温后进行。

Never take next process until the component is cooled down to room temperature after reflow.



3) 推荐无铅回流焊接参数，如下图所示：

The recommended Lead-free reflow soldering profile is following:



	Symbol	Min	Max	Unit
Preheat temperature	$T_s$	150	200	°C
Preheat time	$t_s$	60	120	s
Ramp-up rate ( $T_L$ to $T_P$ )			3	°C/s
Liquidus temperature	$T_L$	217		°C
Time above $T_L$	$t_L$	60	150	s
Peak temperature	$T_P$		260	°C
Time during which $T_c$ is between ( $T_P - 5$ ) and $T_P$	$t_p$		30	s
Ramp-down rate ( $T_P$ to $T_L$ )			6	°C/s

图 16 回流焊参数

Figure 16-Recommended reflow soldering profile