

概述 Description

CYM305X 系列产品由一颗 GaAs 红外二极管和一颗光电 TRIAC 组成光电耦合器件。元件设计为电子及功率双向可控硅控制单元，可应用于交流负载及电感负载等电路之间的信号传输，使输入端与负载完全隔离，目的在于增加安全性，减小电路干扰，减化电路设计。

The CYM305X series products consist of a GaAs infrared diode and a photoelectric TRIAC, forming a photoelectric coupling device. The components are designed as electronic and power bidirectional triode thyristor control units, suitable for signal transmission between AC loads and inductive loads in circuits. They achieve complete isolation between the input and load, aiming to enhance safety, reduce circuit interference, and simplify circuit design.

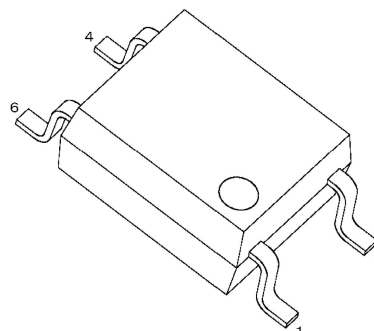
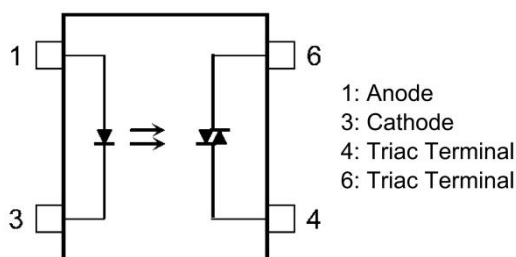
特性 Features

- 峰值击穿电压
Peak breakdown voltage
- 600V: CYM305X
- 输入输出之间高隔离电压($V_{iso}=3750V\ rms$)
High isolation voltage between input and output($V_{iso}=3750\ Vrms$)
- 无铅和符合 EU REACH 和 RoHS
Compliance with EU REACH and RoHS
- UL 认证、CQC 认证
UL certification, CQC certification

电性应用 Applications

- 工业控制; Industrial control
- 红绿灯; Traffic lights
- 自动售货机; Vending machines
- 固态继电器; Solid state relays
- 镇流器; amperite
- 电磁阀/阀控制; Electromagnetic valve/valve control
- 静态 AC 电源开关; Static AC power switch
- 白炽灯调光器; Incandescent dimmer
- 电机控制器。motor controller

结构图和封装 Block Diagram and Package



产品型号命名规则Order Code

CY M305X W (V) (ZZ)

① ② ③ ④ ⑤

1. 公司代码：CY代表公司简称

Company code: CY stands for Company Abbreviation

2. 产品系列：M305X

Product series: M305X

3. 封装形式：W代表封装形式,空代表DIP,S代表SMD

Packaging form: Empty represents DIP, S represents SMD

4. 包装形式：V代表包装形式，如TP为卷盘包装，空为管装

Packaging form: V represents packaging form, such as TP for reel packaging and empty for tube packaging

5. 内部补充代码：ZZ代表内部补充代码，数字或者空白

Internal supplementary code: ZZ represents internal supplementary code, numerical or blank

印丝Marking Information



●印字中“OCIC”表示为品牌LOGO

In the printing, "OCIC" represents the brand logo

●印字中“M305X”表示为产品系列

In the printing, "M305X" represents the product series

●印字中“X”代表：0,1,2,3;

The "X" in the printing represents: 0,1, 2, 3;

●印字中“YY”代表年份：21(2021),22(2022),23(2023)...

In the printing, "Y" represents the year: 21 (2021),22 (2022), 23 (2023)

●印字中“WW”代表周期：01 (第一周),02(第二周)....

In the printing, "WW" represents the cycle: 01 (first week), 02 (second week)

极限参数(Ta=25°C)Absolute Maximum Ratings (Ta=25°C)

参数 Parameter		符号 Symbol	额定值 Rated	单位 Unit
输入 Input	正向电流 Forward Current	I_F	60	mA
	反向电压 Backward Voltage	V_R	6	V
	功耗 Power Dissipation	P_D	100	mW
	额定值降低因子(Ta=85°C以上) Power dissipation Derating factor (above Ta = 85° C)		3.8	mW/°C
输出 output	输出端电压 Off-state output terminal voltage	CYM305X V_{DRM}	600	V
	峰值重复浪涌(pw=100μs, 120pps) Peak repetitive surge current (pw=100 μ s, 120pps)	I_{TSM}	1	A
	工作RMS电流 On-state current (root mean square value)	$I_{T(RMS)}$	100	mA
	整体功耗在环境温度为25°C时 Power Dissipation	P_C	300	mW
	额定值降低因子(Ta=85°C以上) Power dissipation Derating factor (above Ta = 85° C)		7.6	mW/°C
整体功耗在环境温度为25°C时 Total Power Dissipation		P_{tot}	330	mW
隔离电压* Isolation Voltage		V_{iso}	3750	Vrms
工作温度 Operating Temperature		T_{opr}	-40~+85	°C
储存温度 Storage Temperature		T_{stg}	-55~+125	°C
焊接温度 (10s) Soldering Temperature (10s)		T_{sol}	260	°C

*在相对湿度40~60%下的进行交流电测试，此时1、2和3脚短接，4、5和6脚短接。

* Conduct AC test at 40%~60% relative humidity. At this time, pins 1, 2 and 3 are short-circuited, and pins 4, 5 and 6 are short-circuited.

光电特性 (Ta =25°C)Electro-optical Characteristics (Ta=25°C)

参数 Parameter			符号 Symbol	条件 Condition	最小值 Min.	典型 Typ.	最大值 Max.	单位 Unit
输入 Input	正向电压 Forward Voltage		V_F	$I_F=30\text{mA}$			1.4	V
	反向电流 Back current		I_R	$V_R=6\text{V}$			10	μA
输出 Output	断态峰值电流 Off-state peak current	CYM305X	I_{DRM}	$V_{\text{DRM}}=\text{Rated } V_{\text{DRM}},$ $I_F=0\text{mA}$			500	nA
	通态峰值电压 On-state peak voltage		V_{TM}	$I_{\text{TM}}=100\text{mA peak},$ $I_F=\text{Rated } I_{\text{FT}}$			3	V
	断态电压临界 上升率 Critical rise rate of off-state voltage	CYM305X	dv/dt	$V_{\text{PEAK}}=400\text{V},$ $I_F=0$	1000			V/ μs
传输特性 Transfer Characteri stics	LED 触发电流 LED trigger current	CYM3051	I_{FT}	Main terminal Voltage=3V		15		mA
		CYM3052				10		
		CYM3053				5		
	维持电流 Maintain current		I_H			250		μA

典型光电特性曲线 Typical Electro-Optical Characteristics Curves

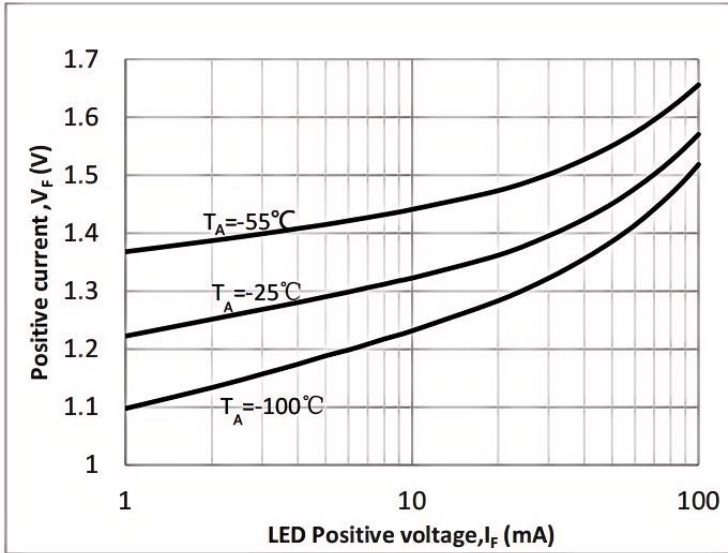


Fig.1 LED Positive voltage vs Positive current

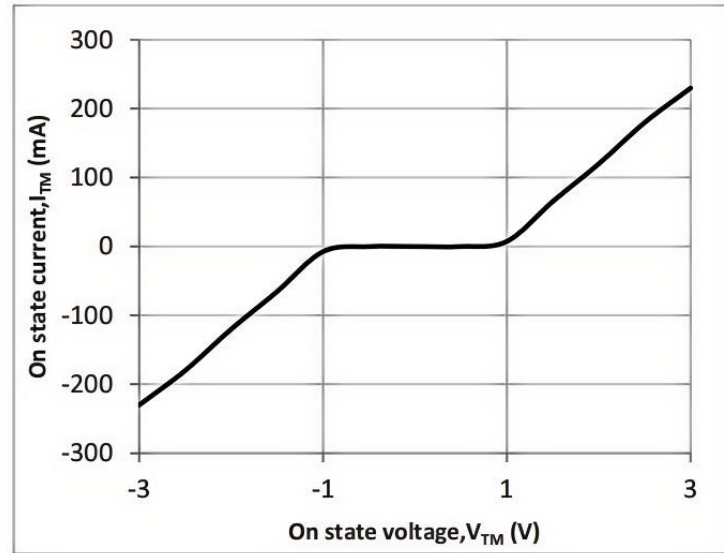


Fig.2 On-state characteristic

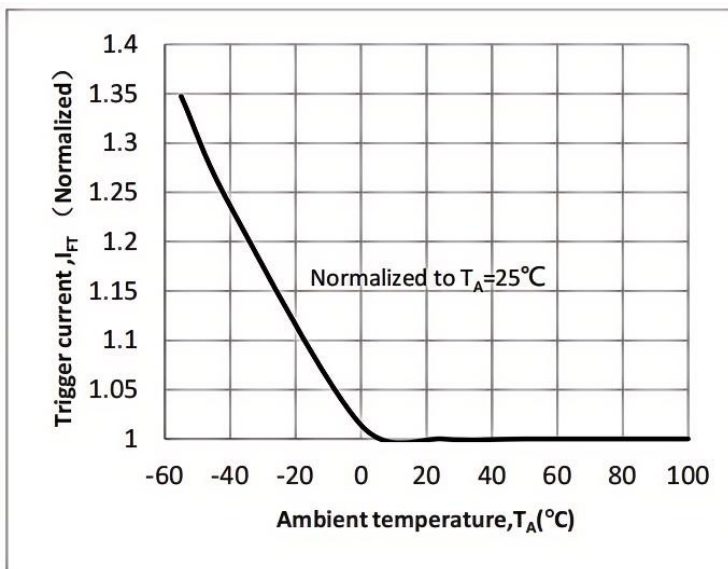


Fig.3 Trigger current vs Ambient temperature

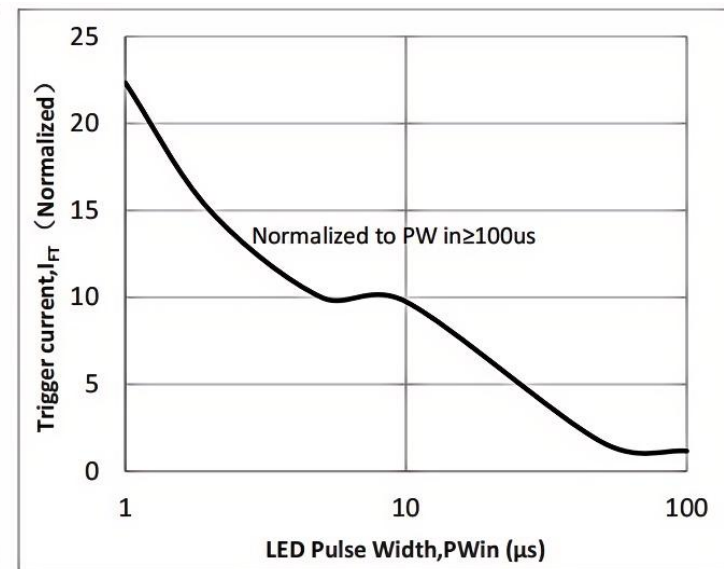


Fig.4 LED Trigger current vs LED Pulse Width

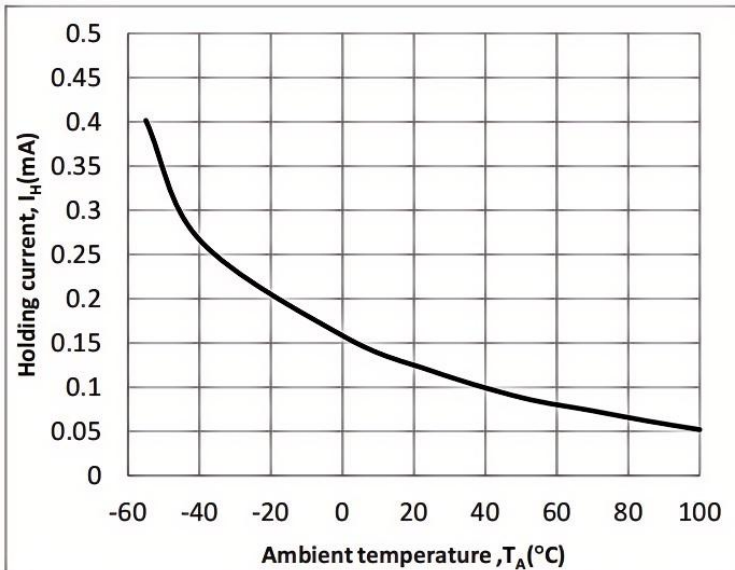


Fig.5 Holding current vs Temperature

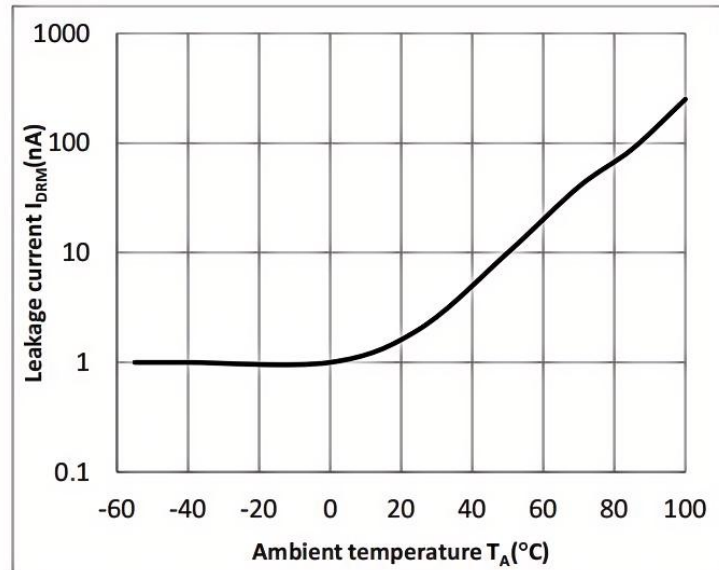


Fig.6 Leakage current vs Temperature

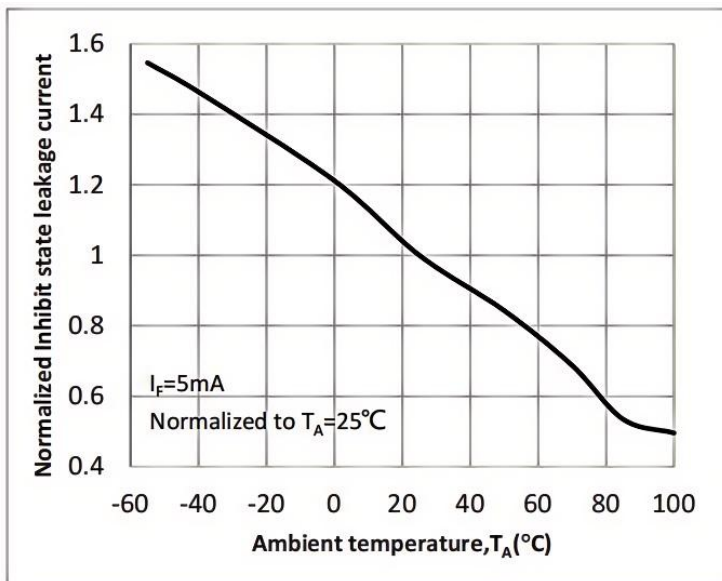


Fig.7 Inhibit state leakage current vs Ambient temperature

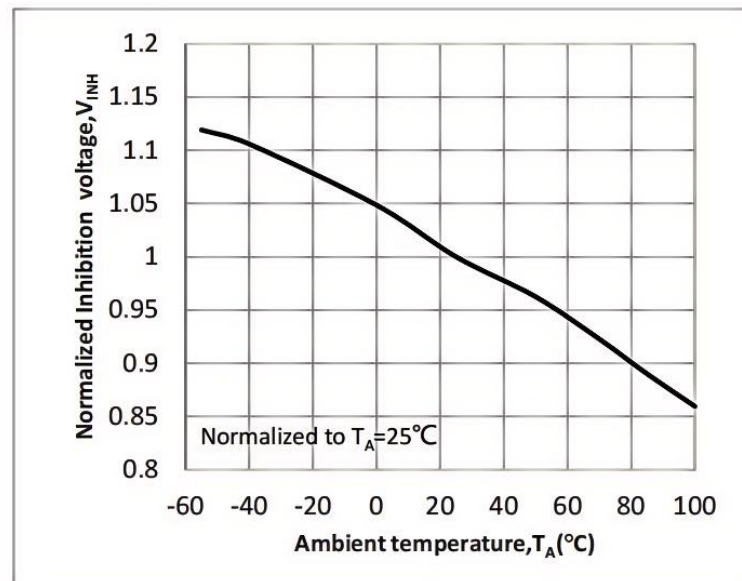
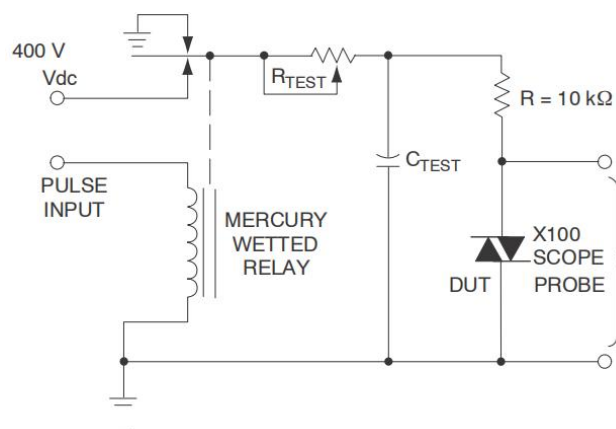


Fig.8 Inhibition voltage vs Ambient temperature

测试电路 Test Circuit



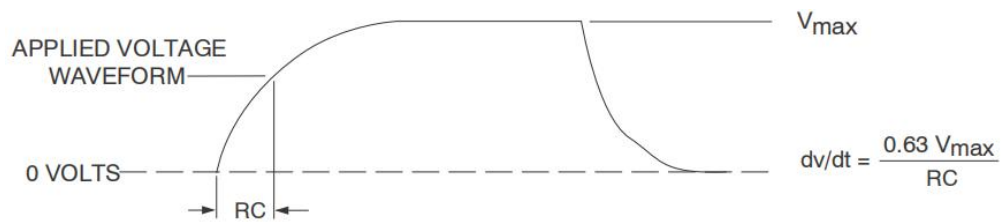


图9: dv/dt 测试电路 & 波形.

通过RC电路施加于被测器件的输出端的高电压脉冲设置到所需的VPEAK值上。LED电流无需加上。波形VT使用 X100探头监测。通过调节RTEST值，dv/dt（斜度）增加，直到被测器件观察到被触发（波形崩溃）。dv/dt然后下降，直到被测器件停止被触发。此时，记录 τ_{RC} 值并可计算dv/dt了。

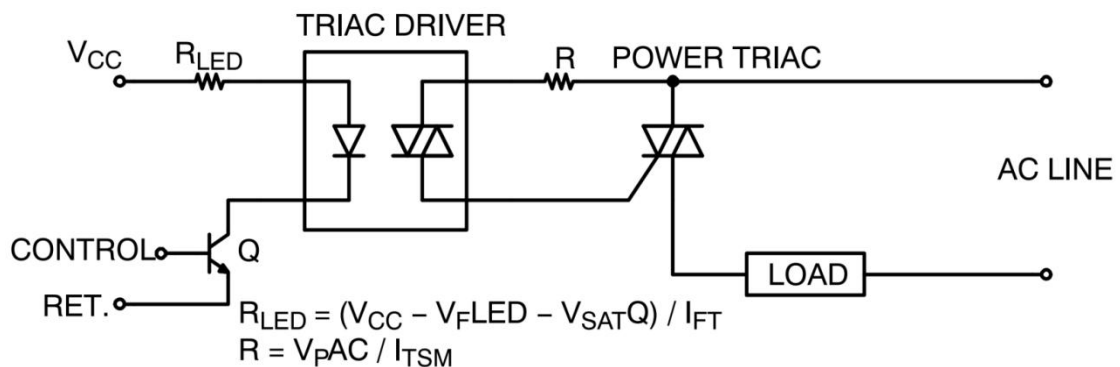
The high-voltage pulse applied to the output terminals of the device under test via the RC circuit is set to the desired VPEAK value. No LED current needs to be applied. The VT waveform is monitored using an X100 probe. By adjusting the RTEST value, dv/dt (slope) increases until the device under test is observed to trigger (waveform collapse). dv/dt then decreases until the device under test stops triggering. At this point, the τ_{RC} value is recorded, and dv/dt can be calculated.

$$dv/dt = \frac{0.632 \times V_{PEAK}}{\tau_{RC}}$$

例如: $V_{PEAK} = 600V$ 的 CYM305X 系列. dv/dt 值计算如下:

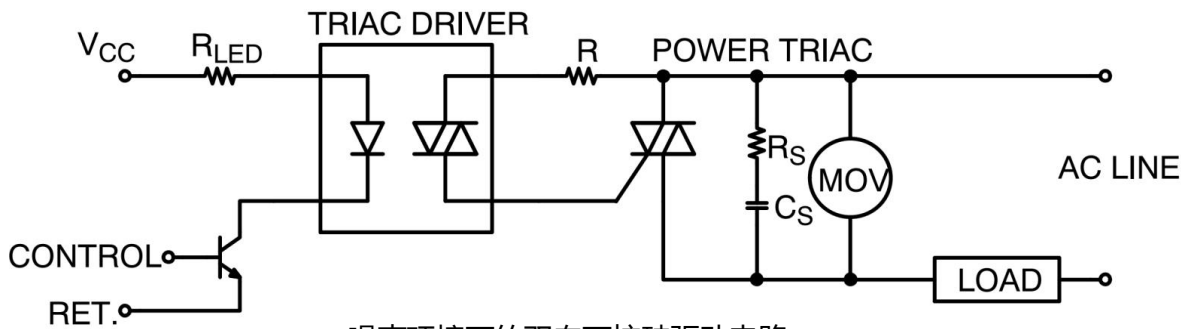
For example: the CYM305X series with $V_{PEAK} = 600 V$. The dv/dt value is calculated as follows:

$$dv/dt = \frac{0.632 \times 600}{\tau_{RC}} = \frac{252}{\tau_{RC}}$$



基本驱动电路

Basic driving circuit



噪声环境下的双向可控硅驱动电路

Bidirectional thyristor drive circuit in noisy environment

典型值 $R_S=33$, $C_S=0.01$ (Typical values $R_S=33$, $C_S=0.01$ F)

MOV (金属氧化物压敏电阻) 保护双向可控硅(MOV (metal oxide varistor) protects bidirectional thyristors)

瞬态过电压>VDRM最大值的驱动器(Drivers with transient overvoltage>VDRM maximum value)

回流焊温度曲线图Solder Reflow Profile

1. 焊接注意事项

不管是使用烙铁还是回流焊，焊接温度应尽可能接近下面所示的条件。

• 回流焊时

回流焊不超过 260°C 时须在10秒内完成焊接，焊接温度曲线是基于塑封体表面温度（见下图，以塑封体表面温度为基准）

回流焊只限过一至两次。

拆开包装后必须在2周内使用完。

Welding precautions

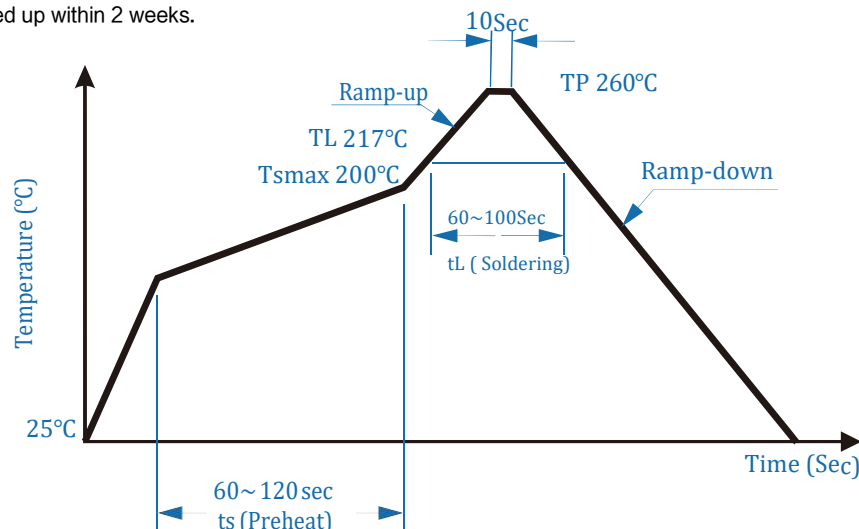
Whether using a soldering iron or reflow soldering, the soldering temperature should be as close as possible to the conditions shown below.

During reflow soldering

When reflow soldering does not exceed 260°C , the soldering must be completed within 10 seconds. The soldering temperature curve is based on the surface temperature of the plastic enclosure (see the figure below, with the surface temperature of the plastic enclosure as the reference)

Reflow soldering is only allowed once or twice.

After unpacking, it must be used up within 2 weeks.



• 波峰焊

建议在温度条件下进行一次性焊接。

温度: $260 \pm 0/-5^{\circ}\text{C}$

时间: 10秒。

预热温度: 25至 140°C ,

预热时间: 30至80秒。

• Wave soldering

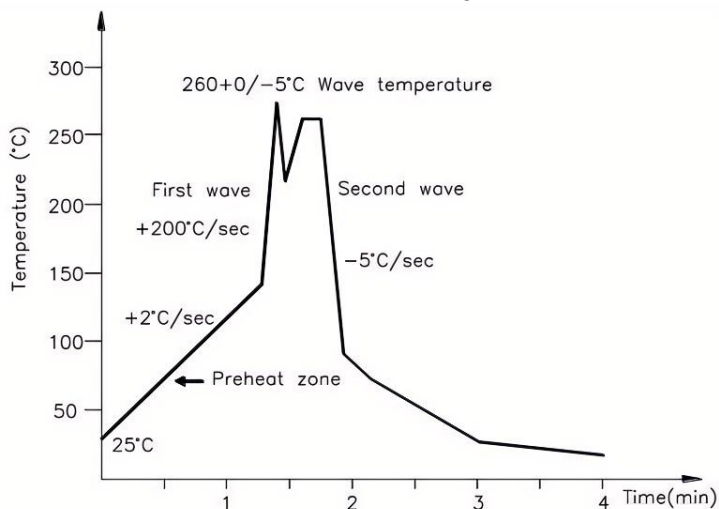
It is recommended to perform one-time welding under temperature conditions.

Temperature: $260 \pm 0/-5^{\circ}\text{C}$

Time: 10 seconds.

Preheating temperature: 25 to 140°C ,

Preheating time: 30 to 80 seconds.



• 使用烙铁焊接

建议在温度条件下进行一次性焊接。

温度: $260 \pm 0/-5^{\circ}\text{C}$; 时间: 10秒。

预热温度: 25至 140°C , 预热时间: 30至80秒。

• Use a soldering iron to weld

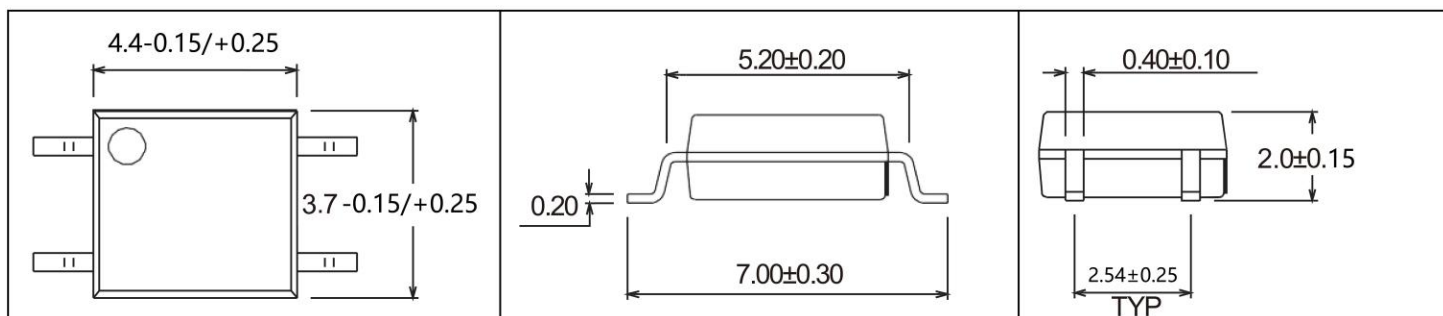
It is recommended to perform one-time welding under temperature conditions.

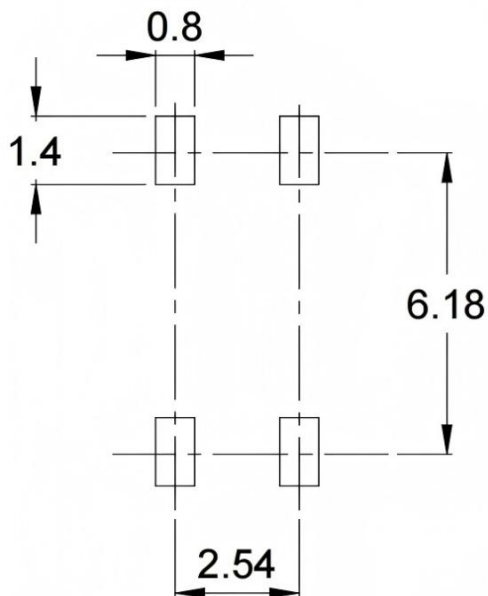
Temperature: $260 \pm 0/-5^{\circ}\text{C}$; Time: 10 seconds.

Preheating temperature: 25 to 140°C , preheating time: 30 to 80 seconds.

封装尺寸(单位:mm)Outline Dimension (Unit:mm)

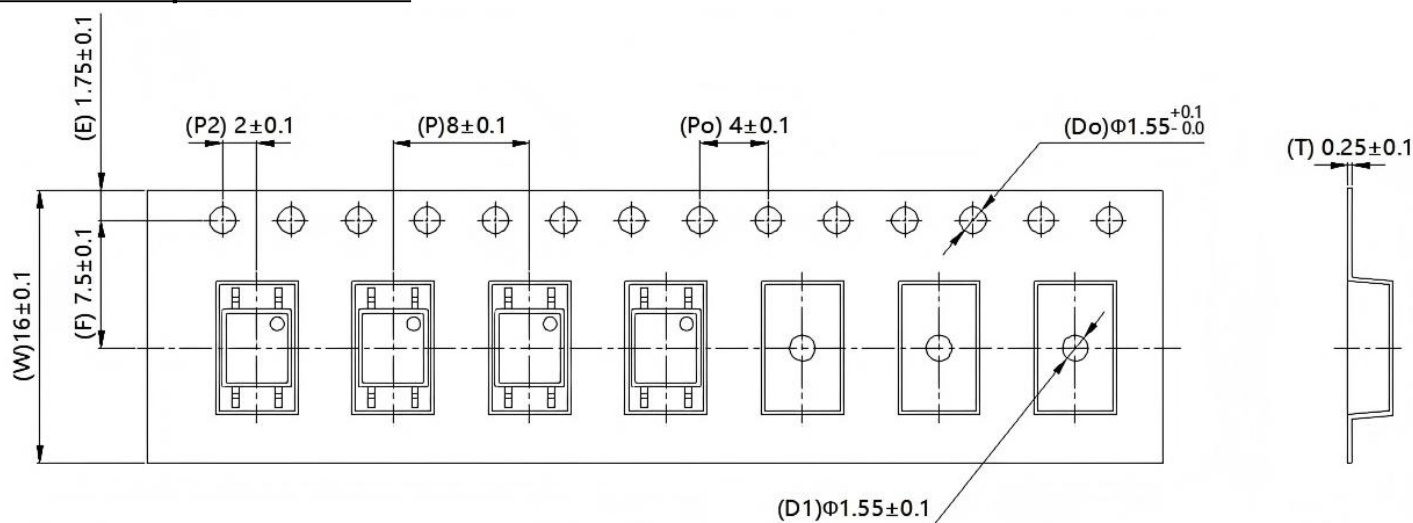
SOP-4



建议焊盘布局 (单位: mm) Recommended pad layout (Unit: mm)

包装Packing

封装形式 Package Type	包装方式 Packing Form	盘数量 Quantity per Reel	盒数量 Quantity per Box	箱数量 Quantity per Carton	静电袋 Antistatic Bag Specification	盒规格 Box Specification	箱规格 Carton Specification
SOP4	卷盘Reel ($\phi 330$ mm)	3000 PCS/盘 (reel)	15000 PCS/盒 (box)	60000 PCS/箱 (ctn)	-	355*90*337mm	377*347*355mm

编带尺寸 Tape dimensions



注意: Attention:

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