硅耐光电
SILICON NICE OPTOELECTRONIC

光电耦合器
OPTOCOUPLER

产品规格书
Product Data Sheet

Si-0630,0631
高速光耦系列
Si-0630,0631 High-speed Series

Si DCC
Release

贵州硅耐光电有限公司
GuiZhou Silicon Nice Optoelectronic Co., Ltd.

描述 Description

Si-0630 和 Si-0631 是双通道器件，每个通道都由一个红外发光二极管和一个具有可触发输出的高速集成光电探测器逻辑门芯片光学耦合。这两款器件均被封在一个符合标准 SO8 封装尺寸的 8 针小外形封装中。

The Si-0630 and Si-0631 are dual channel devices each consists of an infrared emitting diode optically coupled to a high speed integrated photo detector logic gate with a strobable output.The devices are packaged in an 8-pin small outline package which conforms to the standard SO8 footprint.

典型应用 Typical Applications

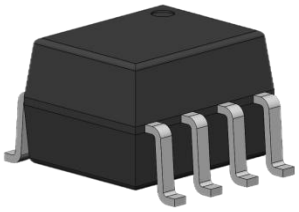
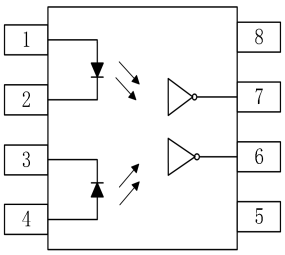
- 高速逻辑系统隔离
  Isolation of high speed logic systems
- 电机驱动中的功率晶体管隔离
  Power transistor isolation in motor drives
- 用于 A/D、D/A 转换时的数字隔离
  Digital isolation for A/D, D/A conversion
- 用于微处理器系统、计算机及其外围设备之间的接口
  Microprocessor system interfaces, computer-peripheral interfaces

特性 Features

- 高速率：10MBd
  High speed: 10 MBd
- 兼容 LVTTL/LVCMOS 电平
  LVTTL/LVCMOS Compatible

发光二极管 LED	输出 Output
ON	H
OFF	L

封装与功能图 Package and Functional Diagram

封装 Package	内部连接图 Internal Connection Diagram	引脚分配 Pin Assignment
 SO8		1: Anode1 2: Cathode1 3: Cathode2 4: Anode2 5:Gnd 6:V_{O2} 7:V_{O1} 8:V_{CC}

安规与绝缘参数 Safety and Insulation Ratings

参数 Parameter		符号 Symbol	数值 Value	单位 Unit
最大额定隔离电压 Maximum Rated Withstanding Isolation Voltage	According to UL1577, t = 1 min	V_{ISO}	3750	V_{RMS}
最大瞬态隔离电压 Maximum Transient Isolation Voltage	According to DIN EN 60747-5-5	V_{IOTM}	5000	V_{peak}
最大峰值重复隔离电压 Maximum Repetitive Peak Isolation Voltage	According to DIN EN 60747-5-5	V_{IORM}	600	V_{peak}
爬电距离 Creepage Distance	/	L	＞4.6	mm

极限参数 Absolute Maximum Ratings (T_{amb}=25℃)

参数 Parameter		符号 Symbol	极限值 Rating	单位 Unit
输入端 Input	正向电流 Forward Current	I_F	50	mA
	反向电压 Reverse Voltage	V_R	6	V
	输入功耗 Input Power Dissipation	P_{IN}	30	mW
输出端 Output	电源电压 Supply Voltage	V_{CC}	7	V
	集电极输出电压 Output Collector Voltage	V_O	7	V
	集电极输出电流 Output Collector Current	I_O	50	mA
	集电极输出功耗 Output Collector Power Dissipation	P_O	60	mW
总功耗 Total Power Dissipation		P_{tot}	100	mW
工作温度 Operating Temperature		T_{amb}	-40~85	°C
存储温度 Storage Temperature		T_{stg}	-55~125	°C
焊接温度 Soldering Temperature		T_{sld}	260	°C

推荐的工作条件 Recommended Operating Conditions

参数 Parameter	符号 Symbol	最小值 Min.	最大值 Max.	单位 Unit
电源电压 Power Supply Voltage	V_{CC}	3.0	5.5	V
低电平输入电流 Low Level Input Current	I_{FL}	0	250	uA
高电平输入电流*High Level Input Current *	I_{FH}	5	15	mA
输出上拉电阻 Output Pull-up Resistor	R_L	330	4k	Ω
扇出系数(每通道负载电阻 1kΩ)Fan out(at R_L=1kΩ per channel)	N	-	8	TTL Loads
工作温度 Operating Temperature	T_A	-40	+85	°C

注 *：初始切换阈值为 5mA 或以下。建议使用 6.3mA 至 10mA 以达到最佳性能

Note *: The initial switching threshold is 5 mA or less. From 6.3 mA to 10 mA is recommended to achieve optimal performance

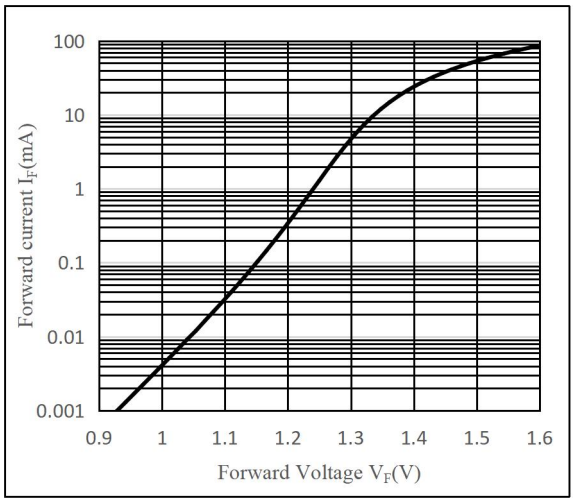
产品特性参数 Electro-optical Characteristics (T_{amb}=25°C)

参数 Parameter		测试条件 Test Conditions	符号 Symbol	最小值 Min.	典型值 Typ.	最大值 Max.	单位 Units
输入端 Input	正向电压 Forward Voltage	I_F=10mA	V_F	-	1.37	1.8	V
	反向电压 Reverse Voltaget	I_R=10uA	B_{VR}	6	-	-	V
	输入电容 Input Capacitance	V_F=0V,f=1MHz	C_{IN}	-	60	-	pF
	正向电压温度系数 Temperature Coefficient of Forward Voltage	I_F=10mA	$\Delta V_F/\Delta T_A$	-	-1.4	-	mV/°C
输出端 Output	高电平电源电流 High Level Supply Current	I_F=0mA V_{CC}=5.5V	I_{CCH}	-	10	15	mA
	低电平电源电流 Low Level Supply Vurrent	I_F=10mA V_{CC}=5.5V	I_{CCL}	-	13	21	mA
传输特性 Transfer Characteristics	输入阈值电流 Input Threshold Current	V_{CC}=5.5V V_O < 0.6V I_O=13mA	I_{FT}	-	2.6	5	mA
	高电平输出电流 High Level Output Current	I_F=250uA V_{CC}=V_O=5.5V	I_{OH}	-	5.5	100	uA
	低电平输出电压 Low Level Output Voltage	I_F=5mA V_{CC}=5.5V $I_{OL(sinking)}$=13mA	V_{OL}	-	0.35	0.6	V
隔离特性 Isolation Characteristics	输入-输出隔离电压 Input-Output Insulation Voltage	R.H＜50%, t = 60 s, I_{I-O} ＜ 50uA , T_A = 25 °C	V_{ISO}	3750	-	-	V
	输入-输出隔离电阻 Input-Output Resistance	V_{I-O}=500V, 40~60%R.H.	R_{I-O}	-	10^{12}	-	Ω
	输入-输出隔离电容 Input-Output Capacitance	f=1MHz,T_A=25°C	C_{I-O}	-	1.0	-	pF

开关特性参数 Switching Characteristics (T_{amb}=25℃)

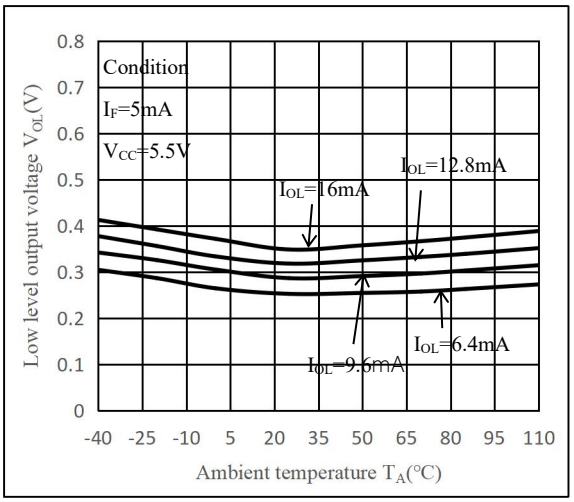
参数 Parameter		测试条件 Test Conditions	符号 Symbol	最小值 Min.	典型值 Typ.	最大值 Max.	单位 Units
输出高电平传输延时 Propagation Delay Time to Output High Level		I_F=7.5mA V_{CC}=5.0V R_L = 350Ω C_L =15pF T_A=25°C	t_{PLH}	-	48	75	ns
输出低电平传输延时 Propagation Delay Time to Output Low Level			t_{PHL}	-	50	75	ns
脉宽失真 Pulse Width Distortion			$\lvert t_{PLH} - t_{PHL} \rvert$	-	3.5	35	ns
输出上升时间 Output Rise Time			t_r	-	25	-	ns
输出下降时间 Output Fall Time			t_f	-	10	-	ns
输出高电平共模抑制因子 Common Mode Transient Immunity at High Output Level	0630	I_F=0mA V_{CC}=5.0V R_L = 350Ω V_O=2.0V（Min） $\lvert V_{CM} \rvert$=1kV T_A=25°C	$\lvert CM_H \rvert$	5	-	-	kV/us
	0631			10	-	-	
输出低电平共模抑制因子 Common Mode Transient Immunity at Low Output Level	0630	I_F=7.5mA V_{CC}=5.0V R_L = 350Ω V_O=0.8V(Max) $\lvert V_{CM} \rvert$=1kV T_A=25°C	$\lvert CM_L \rvert$	5	-	-	kV/us
	0631			10	-	-	

典型特性曲线 Typical Characteristics Curves



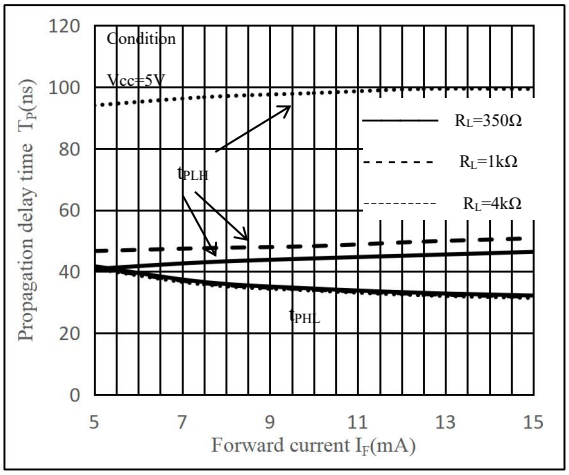
图例 1-正向电流与正向电压曲线图

Fig. 1 - Forward Current vs. Forward Voltage



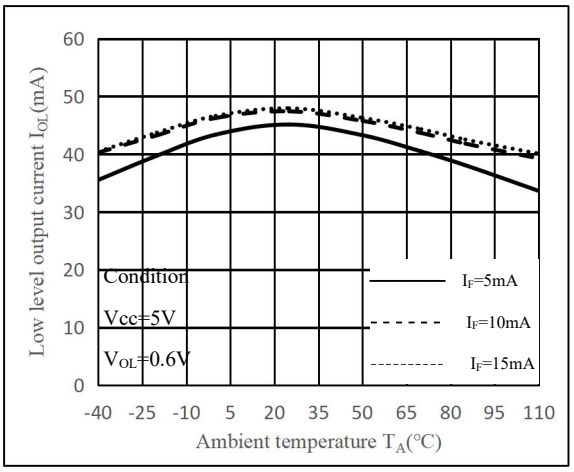
图例 2-低电平输出电压与环境温度曲线图

Fig. 2 - Low-level output voltage vs. Ambient Temperature



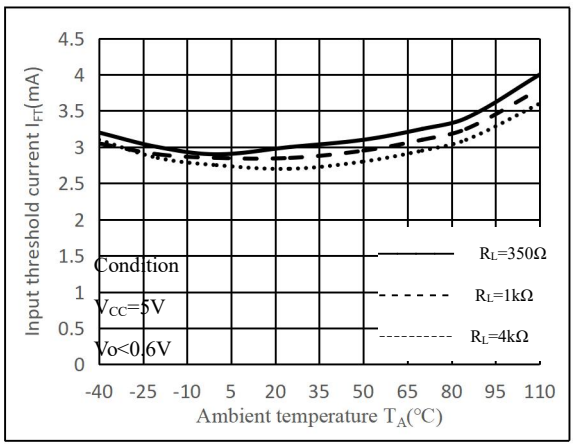
图例 3 -传播延时时间与正向电流曲线图

Fig. 3 - Propagation delay time vs. Forward current



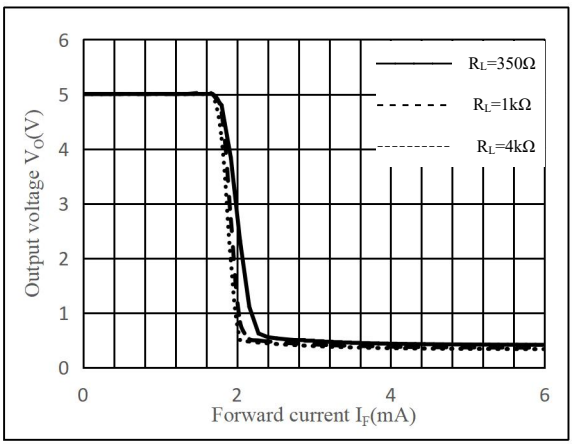
图例 4-低电平输出电流与环境温度曲线图

Fig. 4 Low-level output current vs. Ambient temperature



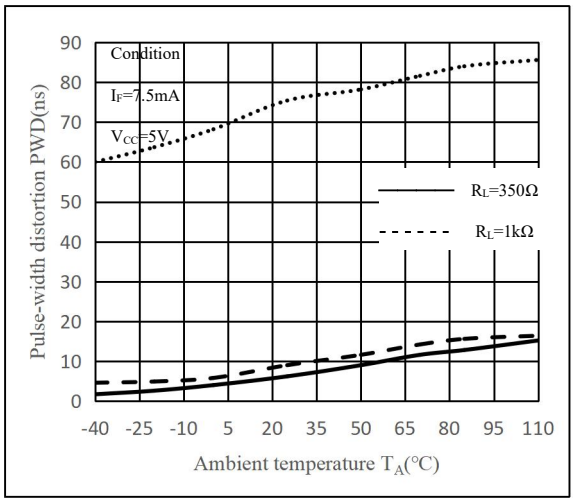
图例 5-输入阈值电流与环境温度曲线图

Fig.5-Input threshold current vs. Ambient temperature



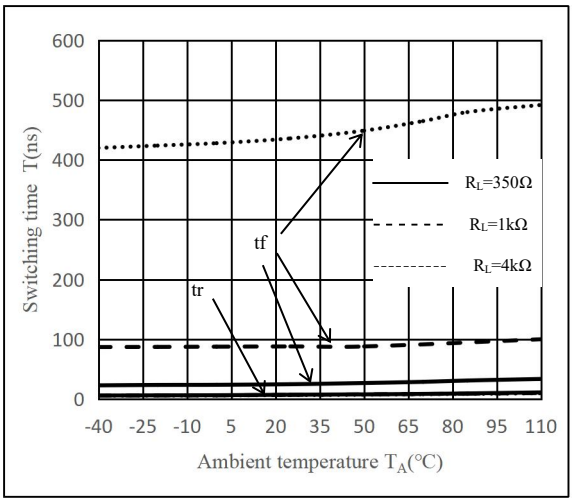
图例 6-输出电压与正向电流曲线图

Fig.6-Output voltage vs. Forward current



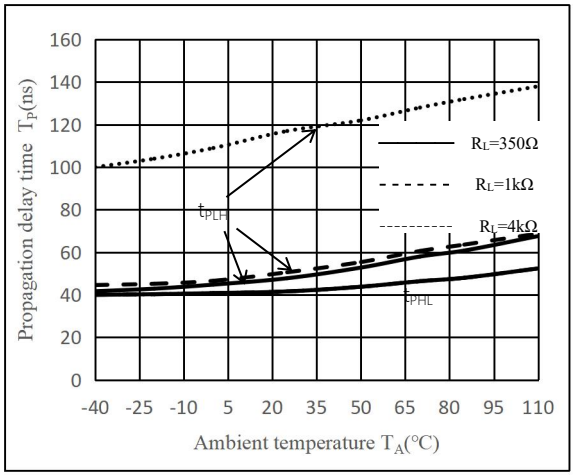
图例 7-低电平输出电压与环境温度曲线图

Fig. 7- Low Level Output Voltage vs. Ambient Temperature



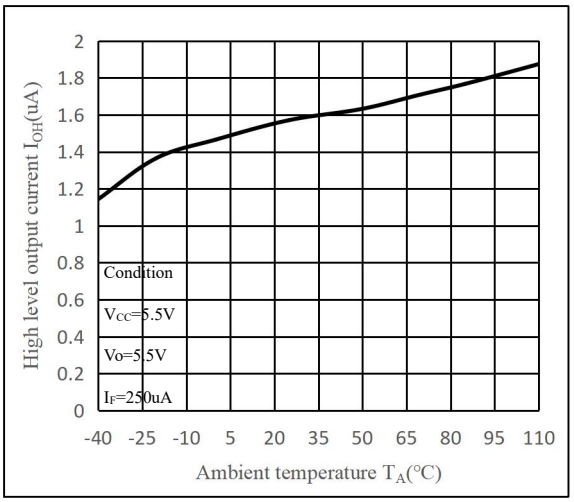
图例 8-开关时间与环境温度曲线图

Fig. 8- Switching time vs. Ambient Temperature



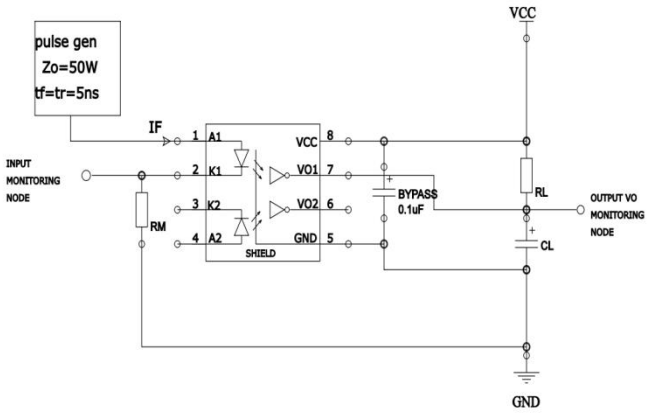
图例 9-传输延时与环境温度曲线图

Fig. 9- Propagation delay time vs. Ambient Temperature



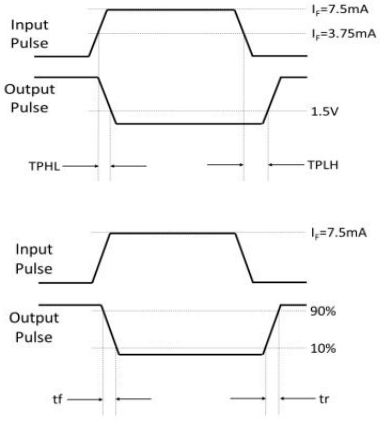
图例 10-高电平输出电流与环境温度曲线图

Fig. 10- High Level Output Current vs. Ambient Temperature



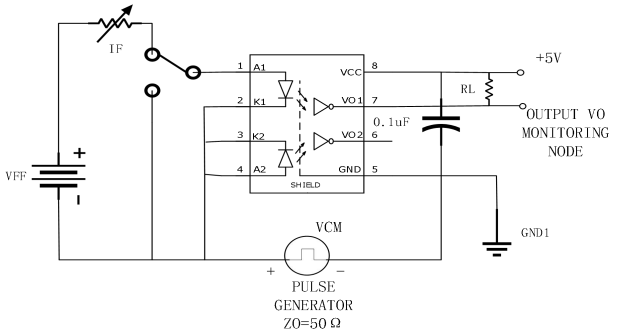
图例 11-传输延迟时间测试电路

Fig11-Test Circuit for Propagation Delay Time



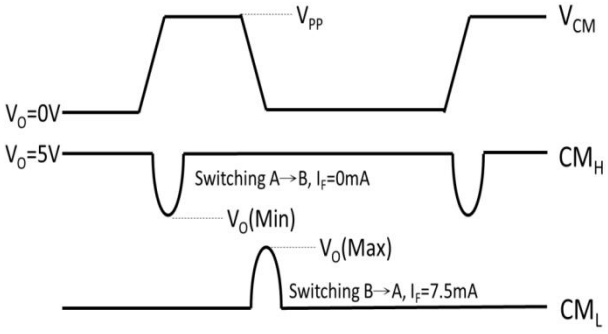
图例 12-时间测试波形图

Fig.12-Waveforms of TPHL, TPLH, tr, tf



图例 13-共模抑制因子测试电路

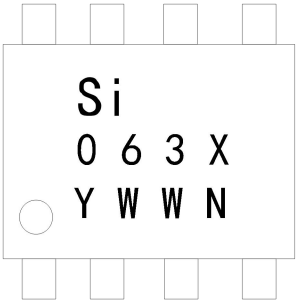
Fig.13 Test Circuit for Common Mode Transient Immunity



图例 14-共模抑制测试波形图

Fig.21 Waveforms of Common Mode Transient Immunity

印字信息 Marking Information



- Si:生产商代码 Manufacturer’s Code Marking
- 063X: 器件型号代码 Device Part Number
- Y: 年份代码 Last Digit of Year (ex: 4=2024, 5=2025)
- WW: 周号代码 Week Code (01 to 53)
- N:特殊代码 Special code or None

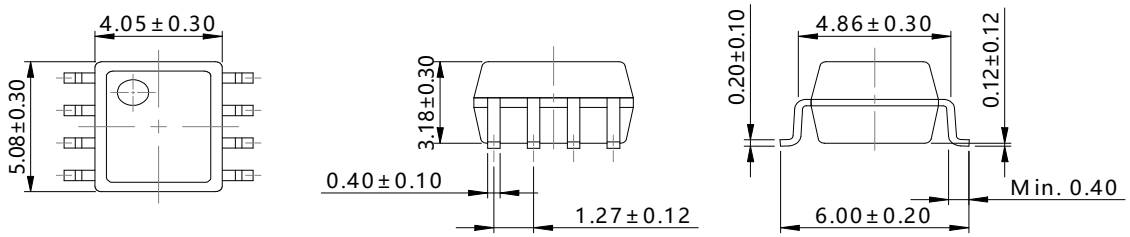
命名规则 Naming Rule

Si-063X-WY-ZTT

- Si: 生产商代码 Manufacturer’s Code Marking
- 063X: 器件型号代码 Device Part Number
- W:框架材质（C=铜）
- Y:G/None（G=环保 ， None =非环保）
- Z:封装形式 (S=SO8)
- TT：补充码 A~Z or 0~9 or None

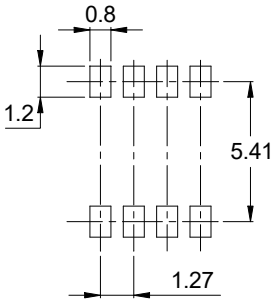
封装外形尺寸 Package Outline Dimensions

SO8



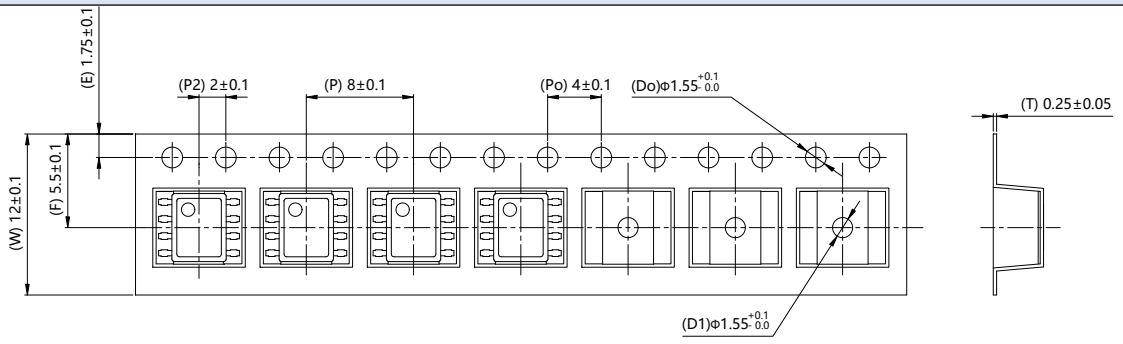
单位 Unit: mm

推荐焊盘尺寸 Recommended Footprint Patterns



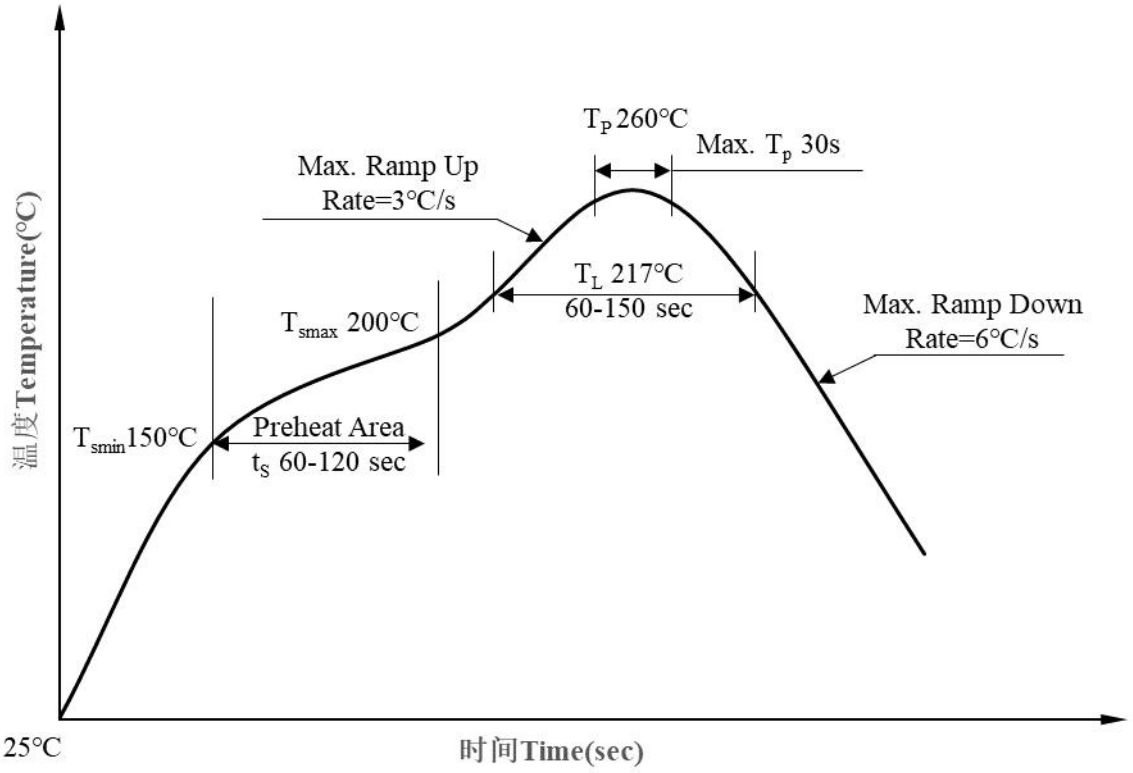
包装载带与卷盘 Packing Tape and Reel

封装类型 Package Type	每盘数量 Quantity per Reel	内盒数量 Quantity per Inner Box	外箱数量 Quantity per Carton	内盒尺寸 Inner Box Dimensions	外箱尺寸 Carton Dimensions
SO8	2000 pcs/reel	4000 pcs/inner box	40,000 pcs/carton	353*340*60mm	650*375*365mm

封装类型 Package Type	载带尺寸 Tape Dimensions
SO8	

单位 Unit: 毫米 mm

回流焊温度曲线 Solder Reflow Temperature Profile



曲线项目 Profile Item		符号 Symbol	数值 Value	单位 Unit
预热区 Preheat Area	最低温度 Temperature Min.	T_{smin}	150	°C
	最高温度 Temperature Max.	T_{smax}	200	°C
	时间 Time (min. to max.)	ts	60~120	sec
焊接区 Soldering Area	温度 Temperature	T_L	217	°C
	时间 Time	t_L	60~150	sec
峰值温度 Peak Temperature		T_P	260	°C
峰值温度 T_P 至 T_P-5℃之间的时间 Time within 5 °C of Peak Temperature: T_P - 5°C		tp	30	sec max.
上升速率 Ramp-up rate		-	3	°C / sec max.
下降速率 Ramp-down rate		-	6	°C / sec max.

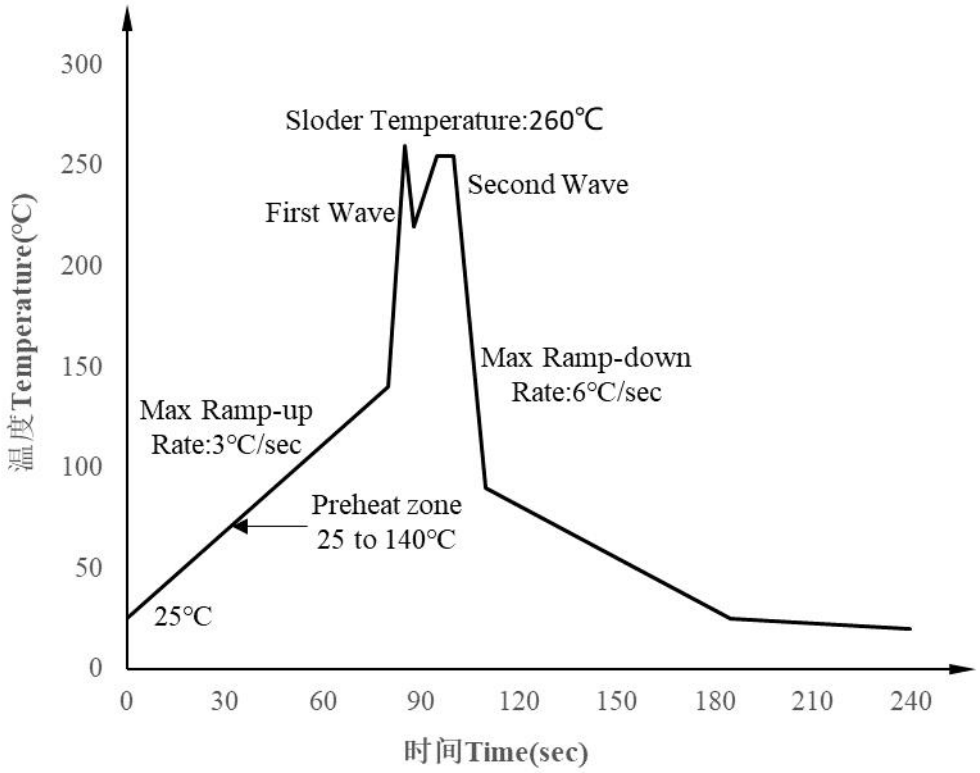
注：参考 IPC/JEDEC J-STD-020D 标准。

Note: Reference: IPC/JEDEC J-STD-020D.

建议在所示的温度和时间条件下进行回流焊，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.

波峰焊温度曲线 Wave soldering Temperature Profile



详情请参考 JEDEC 标准 JESD22-A111

For more details,please refer to the JESD22-A111 of JEDEC standards.

手工烙铁焊接 Hand soldering by soldering iron

(1) 建议一次完成焊接。

One time soldering is recommended.

(2) 温度 360℃ ± 5℃，时间≤3s。

Temperature：360℃ ± 5℃, within 3s.

声明 Disclaimer

1. 为提高产品可靠性、功能或设计或其他方面，硅耐所有产品规格可能会进行更改，恕不另行通知。
Silicon nice all product specifications are subject to change without notice to improve reliability, function or design or otherwise.

2. 使用本产品时请遵守规格书中的说明，硅耐对使用不符合这些规格表中说明的产品造成的损坏不承担任何责任。
When using this product, please observe the instructions in this specifications. Silicon nice assumes no responsibility for any damage resulting from use of the product which does not comply with the instructions included in this specification sheets.

3. 本规格书中所展示的产品为电子应用中的一般用途而设计，如办公自动化设备、通信设备、音频/视频设备、电气应用和仪器仪表等。
The products shown in this specifications are designed for the general use in electronic applications such as office automation equipment, communications devices, audio/visual equipment, electrical application and instrumentation,etc.

4. 对于需要高可靠性或安全性的设备/装置，如太空应用、核电控制设备、医疗设备、任何“特定”应用等，请联系我们的销售代表。
For equipment/devices where high reliability or safety is required, such as space applications, nuclear power control equipment, medical equipment, any ”specific” application,etc, please contact our sales representatives.

5. 如对文件中表述的内容有疑问，欢迎联系我们。
If you have any questions about the contents of the document, please contact us.