

XL-ALS-PDIC2016C

技术数据表 Technical Data Sheet

彩色光传感器

特点 (Characteristic) :

* 色温及环境光传感

Color Temperature and Ambient Light Sensing.

* 低功率运行

Low Power Management .

* 16 位分辨率

16 Bit resolution

* 可编程的增益和集成时间.

Programmable Gain & Integration Time.

* 湿气敏感性等级 (MSL) :4-5级

Moisture sensitivity level (MSL) : 4-5 levels



应用领域 (Product application) :

* 亮度传感器

Brightness Sensing

* 彩色温度传感器

Color Temperature Sensing

* 小笔记本

Notebook

* 穿戴设备

Handheld device

* 扫描仪

Scanner



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光电参数（温度=25℃）:Electro-Optical Charasteristics (Temperature=25° C):

1、绝对最大额定参数 Absolute Maximum Ratings.

SYMBOL	PARAMETER	MIN	MAX	Unit
VDD	供电电源 Power Supply Voltage.	-0.5	3.6	V
Vin	输入电压 Input Voltage.	-0.5	VDD	V
Vout	输出电压 Output Voltage.	-	VDD	V
Tj	结区温度 Junction Temperature.	-	80	°C

*超出“绝对最大额定参数”所列的应力可能会对设备造成永久性损坏。 仅此为应力等级，并不暗示设备在这些或任何其他条件想的功能操作，超出了在推进操作条件下指示的功能操作。长时间暴露于绝对最大额定条件下可能会影响设备的可靠性

*Stresses beyond those listed under“absolute maximum ratings”may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability

2、ESD 等级 ESD Ratings.

SYMBOL	MET	VALUE	Unit
VESD	人体形态 Human-Body Model (HBM)	+/- 2000	V
	机器形态 Machine Model (MM).	+/- 800	V

3、建议使用条件 Recommended Operating Conditions.

SYMBOL	PARAMETER	MIN	TYP	MAX	Unit
VDD	供电电源 Power Supply Voltage	2.6	3.3	3.6	V
Vin	输入电压 Input Voltage.	0	--	VDD	V
Vout	输出电压 Output Voltage.	0	--	VDD	V
TA	运行温度 Operating ambient temperature.	-30	--	70	°C

电气特性(VDD=3V, Ta=25℃) Electrical Characteristics (VDD = 3V, Ta = 25℃).

SYMBOL	PARAMETER	MIN	TYP	MAX	Unit
电源电压 Supply Current.	运行 Active.	--	300	350	uA
	睡眠 Sleep (@ADDR high).	--	1	10	
	睡眠 Sleep (@ADDR low).	--	16	25	
SDA 输出低电平 SDA output Low voltage.	3mA 反向电流 13mA sink current.	0	--	0.4	V
	6mA 反向电流 6mA sink current.	--	--	0.6	
低电平输出电压 Low Level Input Voltage.	--	--	--	VDD*0.3	V
高电平输出电压 High Level Input Voltage.	--	VDD*0.7	--	--	V

数据传输的时间要求 Data Transmission Timing Requirements.

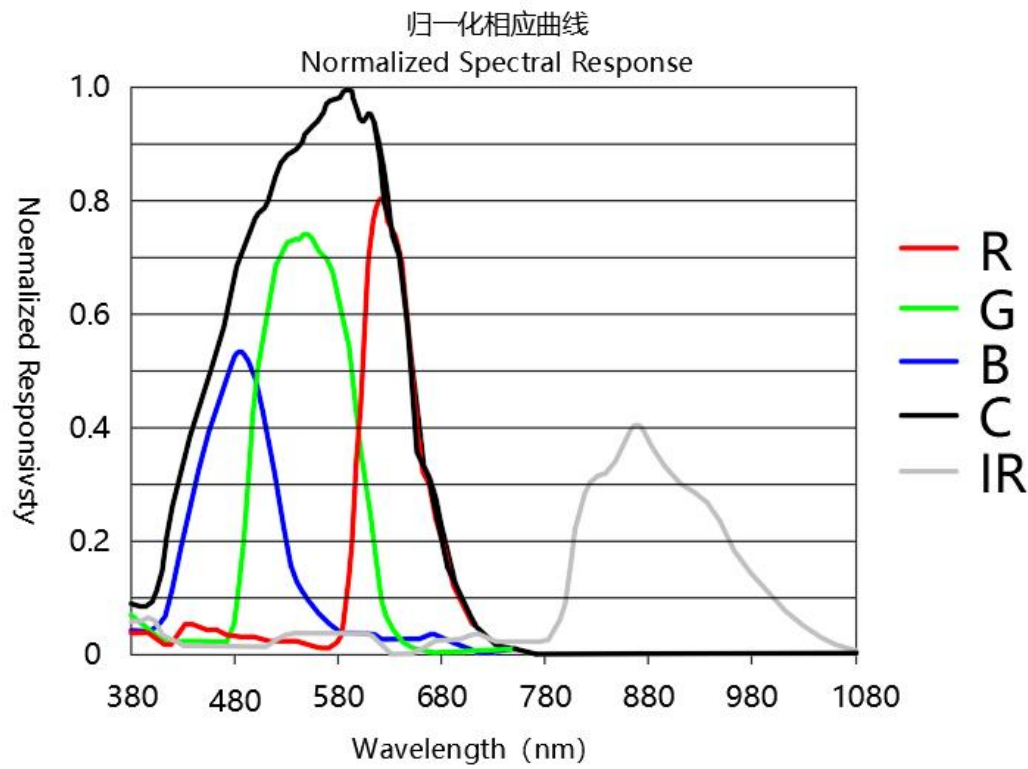
PARAMETER	CONDITIONS	MIN	MAX	Unit
输出低电平(SDA) Output Low Level (SDA)	IOL=4mA.	--	0.5	V
SCL 工作频率 SCL Operating Frequency	--	--	400	KHz
停止和启动条件 Stop and Start Condition	--	1.3	--	us
重复启动后的保持时间 Hold Time After Repeated Start Conditions	--	0.6	--	us
SCL 时钟低周期 SCL Clock Low Period	--	1.3	--	us
SCL 时钟高周期 SCL Clock High Period.	--	0.6	--	us
重复启动条件设置时间 Repeated Start Condition Setup Time.	--	0.6	--	us
计数保持时间 Data Hold Time.	--	0	0.9	us
计数设置时间 Data Setup Time.	--	100	--	ns
时钟/计数下降时间 Clock/Data Fall Time.	--	--	300	ns
时钟/计数上升时间 Clock/Data Rise Time.	--	--	300	ns
停止条件设置时间 Stop Condition Setup Time.	--	0.6	--	ns

光学特性 (VDD=3V, Ta=25℃) Optical Characteristics (VDD = 3V, Ta = 25℃).

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	Unit
ADC 峰值波长灵敏度 Peak_Sensitivity Wavelength of ADC.	R	--	--	630	--	nm
	G	--	--	550	--	nm
	B	--	--	480	--	nm
	C	--	--	590	--	nm
	IR	--	--	870	--	nm
ADC 的计数值 Counter Value of ADC.	R	5700K WLED , 1000Lux, 集成时间 10ms , 再次=1.	--	3730	--	counts
	G		--	8635	--	counts
	B	5700K WLED, 1000Lux, Integration Time 10ms, AGAIN=1.	--	7545	--	counts
	C		--	15830	--	counts
	IR		--	50	--	counts
暗计数值 Dark Count Value.		黑暗, 集成时间 100ms , 再次=1 Dark, Integration Time 100ms, AGAIN=1.	0	1	3	counts
ADC 计数范围 ADC count Range.		--	0	--	65.535	counts
增益缩放 Gain scaling.		AGAIN = 0	--	1	--	x
		AGAIN = 1	--	1.5	--	
		AGAIN = 2	--	2	--	
		AGAIN = 3	--	2.5	--	

典型特性曲线

Typical Characteristics Curves



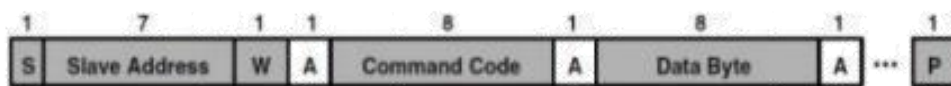
使用说明 Detailed Description.

I2C Protocol

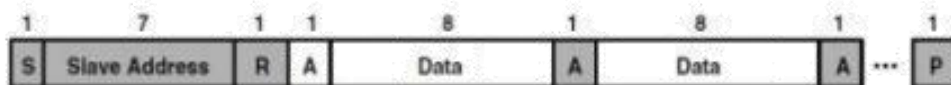
XL-ALS-PDIC2016C 的接口和控制是通过 I2C 串行兼容接口（标准或快速模式）到一组寄存器完成的，这些寄存器提供对设备控制功能和输出数据的访问。该设备支持使用 7 位寻址协议在 b1000_011 和 b1000_010 之间选择一个可选择的 I2C 地址。I2C 标准提供了三种类型的总线事务：读、写和组合协议。在写入操作中，写入的第一个字节是一个命令字节，后面是数据。在组合协议中，写入的第一个字节是命令字节，然后读取一系列字节。如果发出了读取命令，则先前命令中的寄存器地址将用于数据访问。

Interface and control of the ZCS-2016C-08D-Z4 is accomplished through an I2C serial compatible interface (standard or fast mode) to a set of registers that provide access to device control functions and output data. The device supports a select able I2C address between b1000_011 and b1000_010 using 7-bit addressing protocol. The I2C standard provides for three types of bus transaction: read, write, and a combined protocol. During a write operation, the first byte written is a command byte followed by data. In a combined protocol, the first byte written is the command byte followed by reading a series of bytes. If a read command is issued, the register address from the previous command will be used for data access.

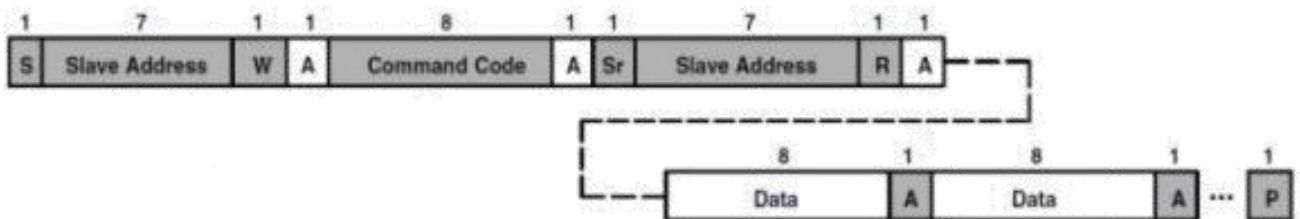
- A Acknowledge (0)
- N Not Acknowledged (1)
- P Stop Condition
- R Read (1)
- S Start Condition
- Sr Repeated Start Condition
- W Write (0)
- ... Continuation of protocol
- Master-to-Slave
- Slave-to-Master



I²C Write Protocol



I²C Read Protocol



< I2C Protocol >

寄存器图 Register Maps.

ADDR	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0	DEF
0x80	RESERVED			DARK_EN	RESERVED	W_EN	RGB_EN	PON	0x00
0x81	IRGAIN		IRGAIN AGAIN		W_TIME	RGB_TIME			0x00
0x82	DEVICE ID								0x24
0x83	REVISION ID								0x00
0xA0	ADC_R[7:0]								0x00
0xA1	ADC_R[15:8]								0x00
0xA2	ADC_G[7:0]								0x00
0xA3	ADC_G[15:8]								0x00
0xA4	ADC_B[7:0]								0x00
0xA5	ADC_B[15:8]								0x00
0xA6	ADC_C[7:0]								0x00
0xA7	ADC_C[15:8]								0x00
0xA8	ADC_IR[7:0]								0x00
0xA9	ADC_IR[15: 8]								0x00

启用注册 Enable Register

ADDR	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0	DEF
0x80	RESERVED			DARK_EN	RESERVED	W_EN	RGB_EN	PON	0x00

FIELD	BITS	DESCRIPTION
DARK_EN	4	暗偏移应用取消 Dark Offset cancellation Enable.
W_EN	2	等待状态启用 Wait State Enable.
RGB_EN	1	RGB , 清除和红外控制器启用 RGB, Clear and IR controller Enable.
PON	0	电源打开 Power ON. 该位激活内部模拟电路,以允许计时器和ADC 通道工作。写入一个1 将激活模拟电路。写入0 将禁用模拟电路。在对I²C 接口的读写期间, 这个位被暂时覆盖, 模拟电路被启用, 独立于PON 的状态。 This bit activates the internal analog circuit to permit the timers and ADC channels to operate. Writing a 1 activates analog circuit. Writing a 0 disables analog circuit. During reads and writes over the I²C interface, this bit is temporarily overridden and analog circuit is enabled, independent of the state of PON.

增益和时间控制注册 Gain & Time control Register.

ADDR	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0	DEF
0x81	IRGAIN		AGAIN		W_TIME	RGB_TIME			0x00

FIELD	BITS	DESCRIPTION
IRGAIN	[7:6]	IR Gain 0 : 1x, 1: 0.5x, 2: 0.25x, 3:
AGAIN	[5:4]	Analog Gain 0 : 1x, 1: 1.5x, 2: 2x, 3: 2.5x
W_TIME	3	WAIT Time 0 : 10ms, 1: 100ms
RGB_TIME	[2:0]	Optical Integration Time 0: 10ms, 1: 20ms, 2: 40ms, 3: 80ms 4: 100ms, 5: 200ms, 6: 400ms, 7: 800ms

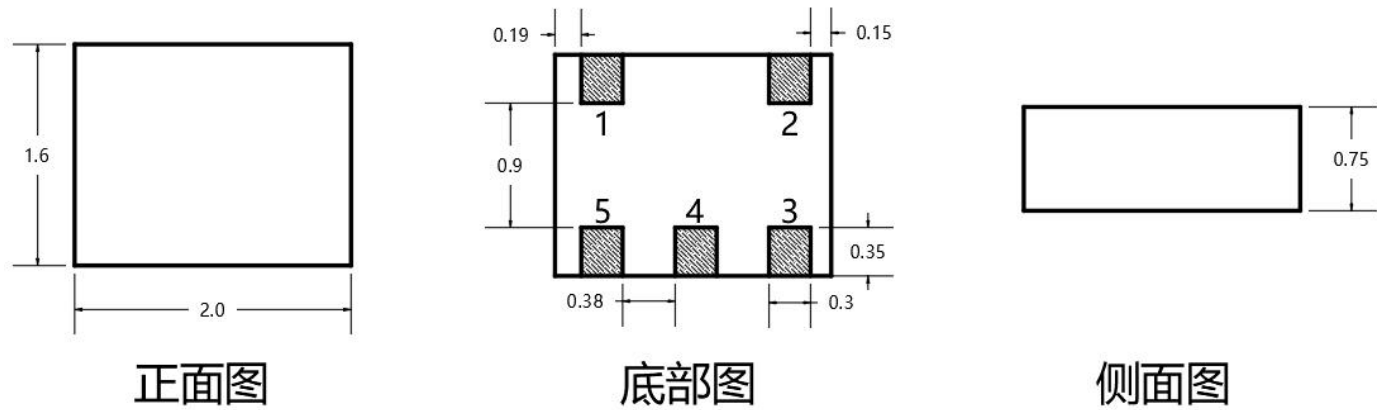
ADC数据 ADC Data

ADDR	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0	DEF
0x82	DEVICE ID								0x24
0x83	REVISION ID								0x00
0xA0	ADC_R[7:0]								0x00
0xA1	ADC_R[15:8]								0x00
0xA2	ADC_G[7:0]								0x00
0xA3	ADC_G[15:8]								0x00
0xA4	ADC_B[7:0]								0x00
0xA5	ADC_B[15:8]								0x00
0xA6	ADC_C[7:0]								0x00
0xA7	ADC_C[15:8]								0x00
0xA8	ADC_IR[7:0]								0x00
0xA9	ADC_IR[15: 8]								0x00

FIELD	DESCRIPTION
DEV_ID	Device ID (0x24)
REV_ID	Revision ID (0x0)
ADC_R	RED data
ADC_G	GREEN data
ADC_B	BLUE data
ADC_C	Clear data
ADC_IR	IR data

外形尺寸

Outline Dimension



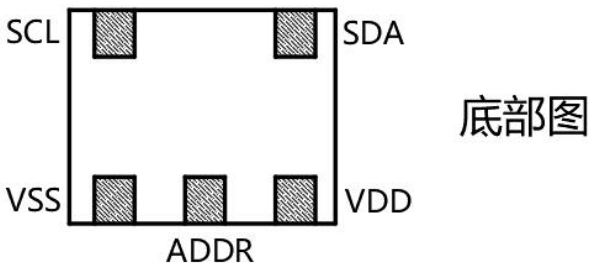
备注:

1.单位: 毫米 (mm)

Remarks: 1 Unit: mm

2.公差: 无特别标注则为±0.3mm

2. Tolerance: ± 0.3mm unless otherwise specified



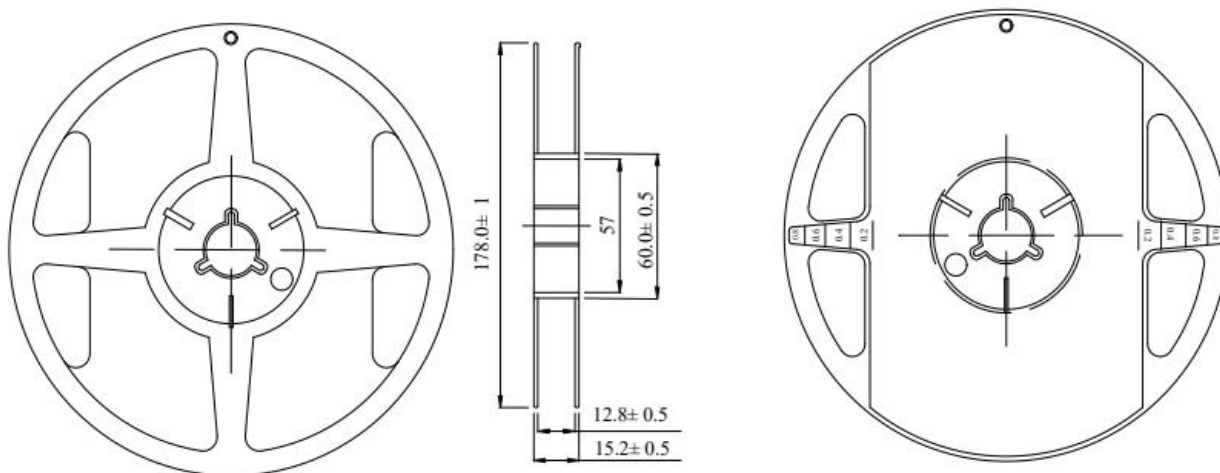
管脚配置和功能 Pin Configuration and Functions

#.	PIN.	I/O/P/G	DESCRIPTION
1	SCL	I	I2C 串行时钟输入终端 I2C serial clock input terminal.
2	SDA	I/O	I2C 串行数据输入/输出终端 I2C serial data input/output terminal.
3	VDD	P	电源电压 Supply voltage.
4	ADDR	O	I2C 设备地址输入端子 (内部上拉) -高或浮动: 7'b1000_011-低: 7'b1000_010. I2C device address input terminal (internal pull-up) - High l t ng : 7'b1000_011 - Low : 7'b1000_010.
5	VSS	G	接地端 Supply Ground.

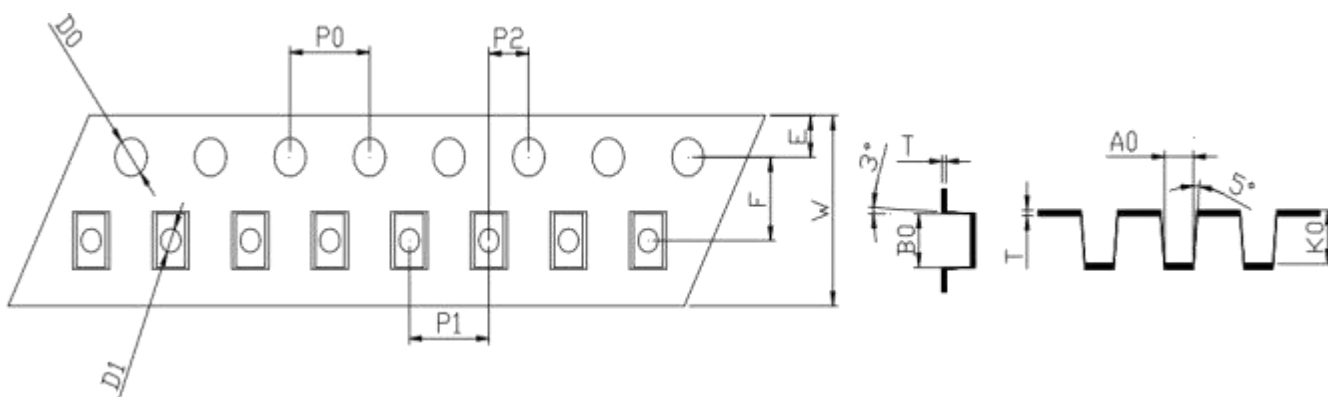
包装

Packaging

●Dimensions for Reel (Unit: mm)



●Dimensions of Tape (Unit: mm)



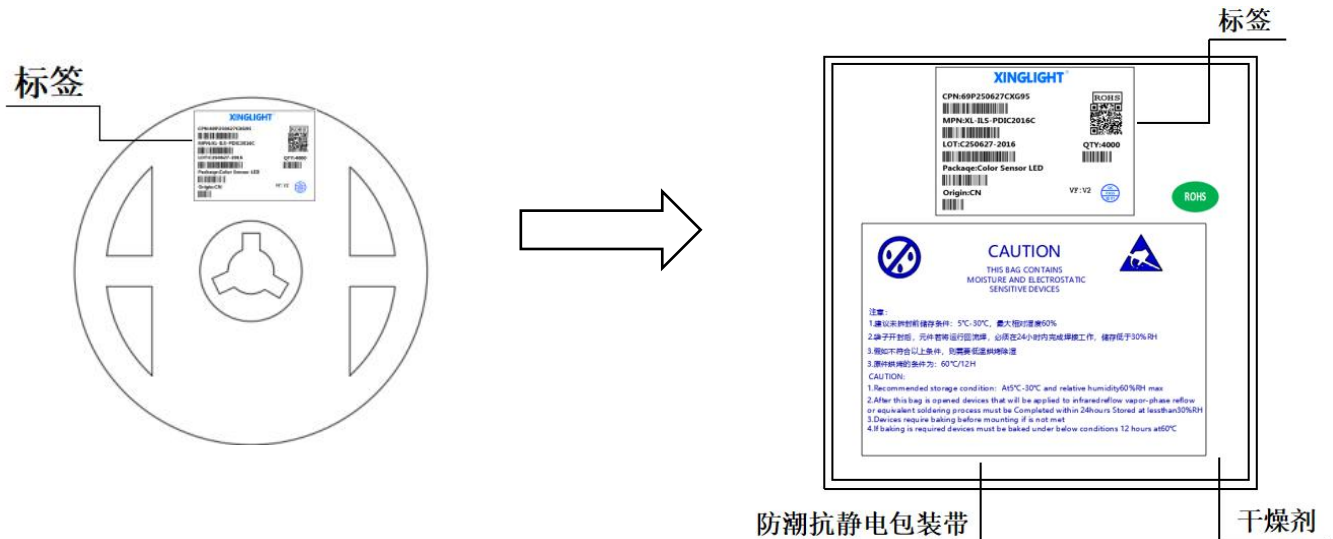
注:

1. 尺寸单位为毫米(mm)。
1. Size unit is mm (mm).
2. 尺寸公差是±0.1mm。
2. The dimensional tolerance is ± 0.1 mm.

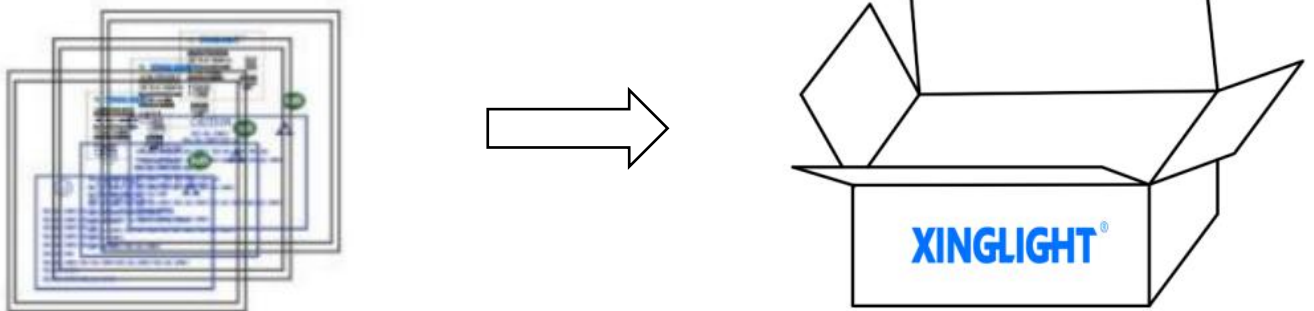
包装

Packaging

◇ 防潮抗静电包装 Moisture Proof and Antti-Electrostatic Foil Bag



◇ 外包装箱 Cardboard Box



◇ 标签说明 Label Expantion

CPN: 批号/档位

MPN: 型号

LOT: 日期

QTY: 数量

ORIGIN: 产地

VF: 电压

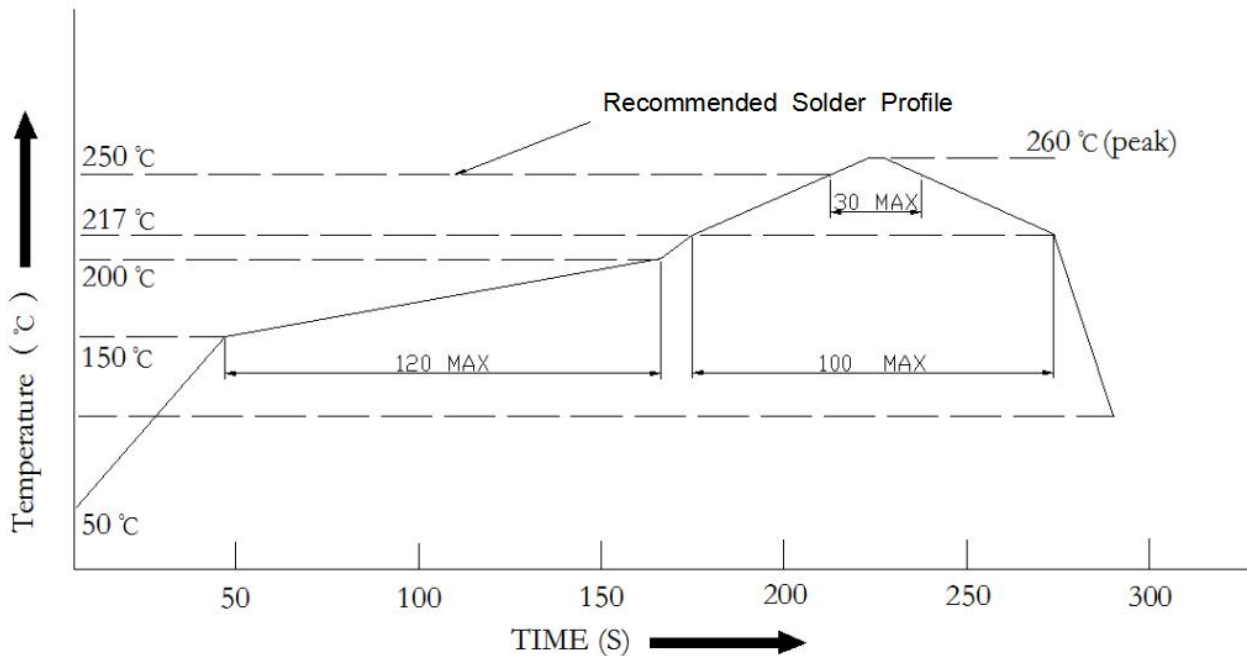
PACKAQUE: 封装



焊接指导

Guideline for Soldering

推荐焊接温度曲线 The wave peak welding curve is recommended :



注意: Note

1、铅焊料温度剖面

Lead solder temperature profile

2、回流焊焊接次数建议一遍

It is recommended to perform reflow soldering once

3、焊接时，不要在加热过程中对 LED 施加压力

When soldering, do not put stress on the LED during heating

4、焊接后，不要使电路板翘曲

After soldering, do not warp the circuit board

5、产品最佳的最高焊接温度建议控制在240°C/10S

The recommended maximum welding temperature for the product is 240 °C/10s

使用注意事项

Precautions

烙铁条件 Soldering Iron

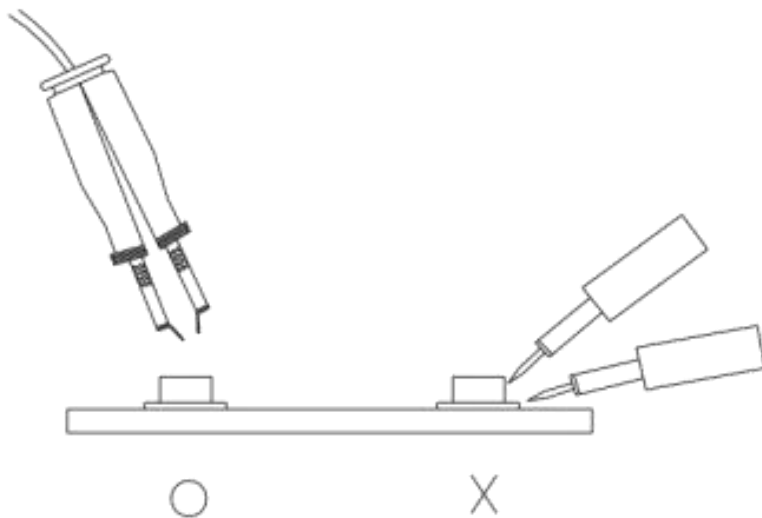
每个端子都要去烙铁尖端温度低于 300°C为 3 秒内一次少于烙铁容量 25W 。 离开两秒钟然后更多的间隔，并做焊接每个终端。手工焊料通常在开始的时候容易损坏产品。

Each terminal is to go to the tip of soldering iron temperature less than 300°C for 3 seconds within once in less than the soldering iron capacity 25W. Leave two seconds and more intervals, and do soldering of each terminal. Be careful because the damage of the product is often started at the time of the hand solder.

*手工补数 Repairing

修理不应在 LED 焊接后进行。当修理是不可避免的是，应该使用双头烙铁 (如下图所示)。应该是事先确认 LED 的特性是否会或不会损坏通过修理。

Repair should not be done after the LED have been soldered. When repairing is unavoidable, a double-head soldering iron should be used (as below figure). It should be confirmed beforehand whether the characteristics of the LED will or will not be damaged by repairing.



贮存:**Storage**

- 本产品使用密封防潮抗静电袋包装，并附有干燥剂，未开封的产品有一年的保存时间。

Moisture proof and anti-electrostatic package with moisture absorbent material is used, to keep moisture to a minimum.

- 开封前，产品须存放在温度不高于 30℃，湿度不高于 60%RH 的环境中。

Before opening the package, the product should be kept at 30℃ or less and humidity less than 60% RH, and be used within a year.

- 开封后，产品须存放在温度不高于 30℃，湿度不高于 40%RH 的环境中，且应该在 168 小时（7 天）内使用完。建议工作环境为温度不高于 30℃，湿度不高于 60%RH。

After opening the package, the product should be stored at 30℃ or less and humidity less than 40%RH, and be soldered within 168 hours (7 days). It is recommended that the product be operated at the workshop condition of 30℃ or less and humidity less than 60%RH.

- 对于尚未焊接的 LED，如果吸湿剂或包装失效，或者产品没有符合以上有效存储条件，烘焙可以起到一定的性能恢复效果。烘焙条件：60±5℃，持续24 小时。

If the moisture absorbent material has fade away or the LEDs have exceeded the storage time, baking treatment should be performed based on the following condition: (60±5)℃ for 24 hours.

静电:**Static Electricity**

静电和电涌会导致产品特性发生改变，例如正向电压降低等，如果情况严重甚至会损毁产品。所以在使用时必须采取有效的防静电措施。所有相关的设备和机器都应该正确接地，同时必须采取其他防止静电和电涌的措施。使用防静电手环，防静电垫子，防静电工作服、工作鞋、手套，防静电容器，都是有效的防止静电和电涌的措施。

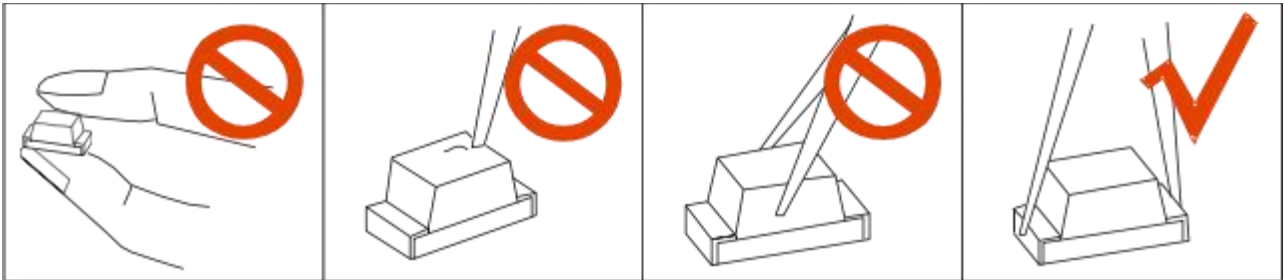
Static electricity or surge voltage damages the LEDs. Damaged LEDs will show some unusual characteristic such as the forward voltage becomes lower, or the LEDs do not light at the low current. even not light.

All devices, equipment and machinery must be properly grounded. At the same time, it is recommended that wrist bands or anti-electrostatic gloves, anti-electrostatic containers be used when dealing with the LEDs.

其他事项:**Others**

直接用手拿取产品不但会污染封装树脂表面,也可能由于静电等因素导致产品性能的改变。过度的压力也可能直接影响封装内部的管芯和金线,因此请勿对产品施加过度压力,特别当产品处于高温状态下,例如在回流焊接过程中。

When handling the product, touching the encapsulant with bare hands will not only contaminate its surface, but also affect on its optical characteristics. Excessive force to the encapsulant might result in catastrophic failure of the LEDs due to die breakage or wire deformation. For this reason, please do not put excessive stress on LEDs, especially when the LEDs are heated such as during Reflow Soldering.



LED 的环氧树脂封装部分相当脆弱,请勿用坚硬、尖锐的物体刮、擦封装树脂部分。在用镊子夹取的时候也应当小心注意。

The epoxy resin of encapsulant is fragile, so please avoid scratch or friction over the epoxy resin surface.

While handling the product with tweezers, do not hold by the epoxy resin, be careful.

5. 眼睛保护忠告:**Safety Advice For Human Eyes**

LED 发光时,请勿直视发光光源,特别是对于一些光强较高的 LED,强光可能伤害你的眼睛。

Viewing direct to the light emitting center of the LEDs, especially those of great Luminous Intensity, will cause great hazard to human eyes. Please be careful.