NQUNXIN®
群芯微电子

中国芯 光电梦

高速光耦

High Speed Photo Coupler

QXH511

宁波群芯微电子股份有限公司
NINGBO QUNXIN MICROELECTRONICS CO., LTD.

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68 Yuhaidong Road, Hangzhou Bay New District, Ningbo, Zhejiang, China

概述 Description

QXH511 是一种用于单通道的高速光耦合器，由一个 850nm 的 AlGaAs LED 光学耦合到一个高速光电检测器组成。光电二极管偏极和输出晶体管集电极的单独连接，可以通过降低基极集电极电容，使速度比传统光电晶体管耦合器提高 100 倍。

The QXH511 optocoupler consists of a 850 nm AlGaAS LED,optically coupled to a high speed photodetector transistor. A separate connection for the bias of the photodiode improves the speed by several orders of magnitude over conventional phototransistor optocouplers by reducing the base-collector capacitance of the input transistor.

特性 Features

- 高比特率：1MBit/s
  High speed – 1 MBit/s
- 输入和输出之间的高隔离电压(Viso=7500 Vrms)
  High isolation voltage between input and output（Viso=7500 Vrms)
- 工作温度范围：-40℃ to +125℃
  Operating temperature range: -40℃~ +125℃
- 集电极开路输出
  Open-Collector Output

应用 Applications

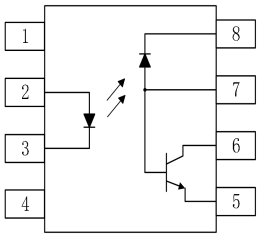
- CMOS-LSTTL-TTL 的输出接口
  Output interface to CMOS-LSTTL-TTL
- 通信设备
  Telecommunication equipment
- 电机驱动中的功率晶体管隔离
  Power transistor isolation in motor drives
- 替代低速光电晶体管光电耦合器
  Replacement for low speed phototransistor photocouplers

真值表 Truth table

LED	VO
OFF	H
ON	L

封装和原理图 Package and Schematic Diagram

LSOP8



Pin Configuration

1. NC	8.VCC
2. Anode	7.VB
3. Cathode	6.VO
4. NC	5.GND

注：在引脚 5 和 8 之间必须连接一个 0.1uF 的旁路电容器。
Note: 0.1uF bypass capacitor must be connected between pins 5 and 8.

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产品型号命名规则 Order Code

QX H511 - UN Y - W (V) (ZZ)

① ② ③ ④ ⑤ ⑥ ⑦

① 公司代码 Company Code（QX: 群芯 Qunxin）
② 产品系列 Product Series（H511）
③框架类型 Lead Frame（Cu: 铜框架 Copper）
④ 树脂类型 Epoxy Type（H: 无卤 Halogen-free）
⑤ 封装形式 Package（L: LSOP）
⑥ 器件工作温度范围 Device Operating Temperature Range（特殊范围需填或者空白 Special Range need to be filled in or left blank）
⑦ 内部补充代码 Internal Supplementary Code（数字或者空白 Number or None）

印字信息 Marking Information

- 印字中“Q”为群芯品牌 LOGO
  “Q”denotes LOGO
- 印字中“Y”代表年份；A(2018),B(2019),C(2020)……
  “Y”denotes YEAR：A(2018), B(2019), C(2020)……
- 印字中“WW”代表周号
  “WW”denotes week’s number
- 印字中“N”代表星期几
  “N”denotes day of the week
- 印字中的“H”代表无卤
  “H”denotes Halogen-free
- 印字中的“V”代表产品特殊标识：A~Z 或空白
  “V”denotes Product special code： A~Z or None

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绝缘和安规信息 Insulation and Safety related specifications

项目 Item	符号 Symbol	数值 Value	单位 Unit	备注 Note
爬电距离 Creepage Distance	L	>15	mm	从输入端到输出端，沿本体最短距离路径 Measured from input terminals to output terminals, shortest distance path along body.
电气间隙 Clearance Distance	L	>15	mm	从输入端到输出端，通过空气的最短距离 Measured from input terminals to output terminals, shortest distance through air.
绝缘距离 Insulation Thickness	DTI	>0.5	mm	发射器和探测器之间的绝缘厚度 Insulation thickness between emitter and detector.
电痕指数 Comparative Tracking Index	CTI	≥600	V	IEC60112
峰值隔离电压 Peak Isolation Voltage	V_{IORM}	2262	V_{peak}	DIN/EN/IEC EN60747-5-5.
瞬态隔离电压 Transient Isolation Voltage	V_{IOTM}	12000	V_{peak}	DIN/EN/IEC EN60747-5-5.
隔离电压 Isolation Voltage	V_{ISO}	>7500	V_{rms}	For 1 min

极限参数 Absolute Maximum Ratings (T_A=25℃)

参数 Parameter		符号 Symbol	额定值 Rating	单位 Unit
发射端 Input	正向电流 Forward Current	I_F	50	mA
	反向电压 Reverse Input Voltage	V_R	5.0	V
	正向瞬态峰值电流（≤1μs p.w，300pps） Peak transient input current (≤1μs p.w., 300 pps)	$I_{F\ (trans)}$	1	A
	输入功耗 Input Power Dissipation	P_I	45	mW
接收端 Output	电源电压 Supply Voltage	V_{CC}	-0.5 ~ 30	V
	输出电流 Output Current	I_O	8	mA
	输出电流峰值 Peak output current	$I_{O\ (pk)}$	16	mA
	输出集电极功耗 Output Collector power dissipation	P_O	100	mW
	输出电压 Output Voltage	V_O	-0.5 to 20	V
工作温度 Operating Temperature		T_{opr}	-40~+125	℃
存储温度 Storage Temperature		T_{stg}	-55~+125	℃
焊接温度 Soldering Temperature		T_{sol}	260	℃

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产品特性参数 Electro-optical Characteristics (T_A=25℃)

参数 Parameter		符号 Symbol	条件 Condition	最小 Min.	典型 Typ.	最大 Max.	单位 Unit
发射端 Input	正向电压 Forward Voltage	V_F	I_F=16mA	-	1.36	1.7	V
	反向击穿电压 Reverse Breakdown Voltage	B_{VR}	I_R=10μA	5	50	-	V
	正向电压温度系数 Diode Temperature Coefficient	$\Delta V_F/\Delta T_A$	I_F=10mA	-	-1.6	-	mV/°C
接收端 Output	高电平电源电流 High Level Supply Current	I_{CCH}	V_{CC}=15V I_F=0mA V_O=Open	-	-	1	μA
	低电平电源电流 Low Level Supply Current	I_{CCL}	V_{CC}=15V I_F=16mA V_O=Open	-	600	-	μA
传输特性 Transfer Characteristics	高电平输出电流 HIGH Level Output Current	I_{OH}	I_F=0mA V_O=V_{CC}=5.5V	-	0.001	0.5	μA
			I_F=0mA V_O=V_{CC}=15V	-	0.005	1	
	低电平输出电压 LOW Level Output Voltage	V_{OL}	I_F=16mA V_{CC}=4.5V I_O=3.0mA	-	0.13	0.4	V
			I_F=16mA V_{CC}=4.5V I_O=2.4mA	-	0.15	0.5	V
	电流传输比 Current Transfer Ratio	CTR	I_F=16mA V_{CC}=4.5V V_O=0.4V	19	65	-	%
隔离电压 Isolation Voltage		V_{ISO}	RH<50% T_A=25℃ I_{I-O}≤50μA	7500	-	-	V_{RMS}
隔离电阻 Isolation Resistance		R_{I-O}	V_{I-O}=500V	-	10^{12}	-	Ω
隔离电容 Isolation Capacitance		C_{I-O}	f=1MHz	-	1.08	-	pF

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开关特性 Switching Specification

参数 Parameter	符号 Symbol	条件 Condition	最小 Min.	典型 Typ.	最大 Max.	单位 Unit
输出高电平传播延迟时间 Propagation Delay Time to Output HIGH Level	T_{PLH}	I_F=16mA R_L=1.9kΩ T_A=25°C	-	240	800	ns
输出低电平传播延迟时间 Propagation Delay Time to Output Low Level	T_{PHL}	I_F=16mA R_L=1.9kΩ T_A=25°C	-	100	800	ns
逻辑高电平共模瞬态抗扰度 Common Mode Transient Immunity(at Logic High)	$\|CM_H\|$	I_F=0mA, V_{CC}=5V $\|V_{CM}\|$=1500V(Peak) C_L=15pF, R_L=1.9kΩ	15	-	-	kV/μs
逻辑低电平共模瞬态抗扰度 Common Mode Transient Immunity (at Logic Low)	$\|CM_L\|$	I_F=16mA, V_{CC}=5V $\|V_{CM}\|$=1500V(Peak) C_L=15pF, R_L=1.9kΩ	15	-	-	kV/μs

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

Fig.1 Normalized CTR vs. Forward current

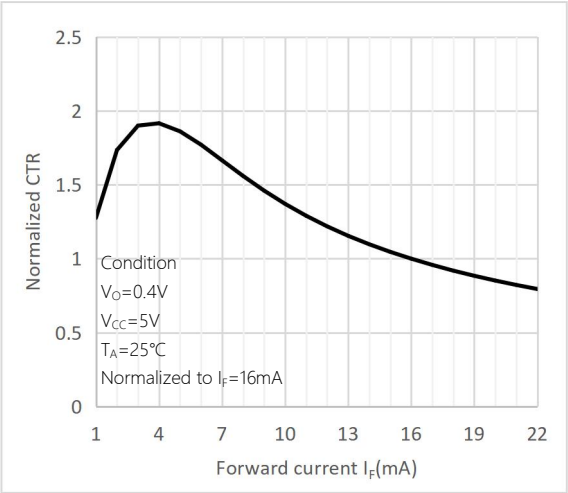


Fig.2 Normalized CTR vs. Ambient temperature

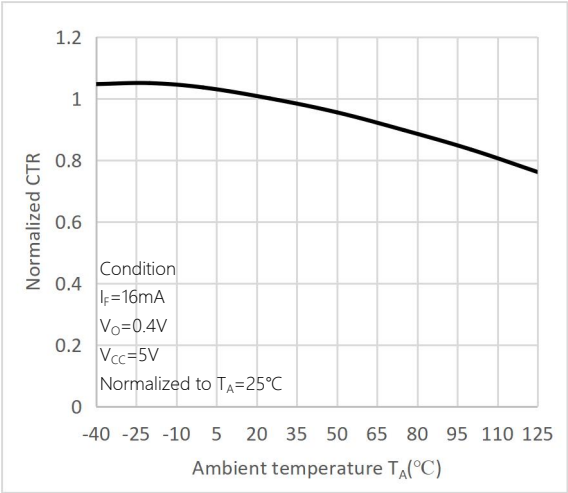


Fig.3 Output current vs. Output voltage

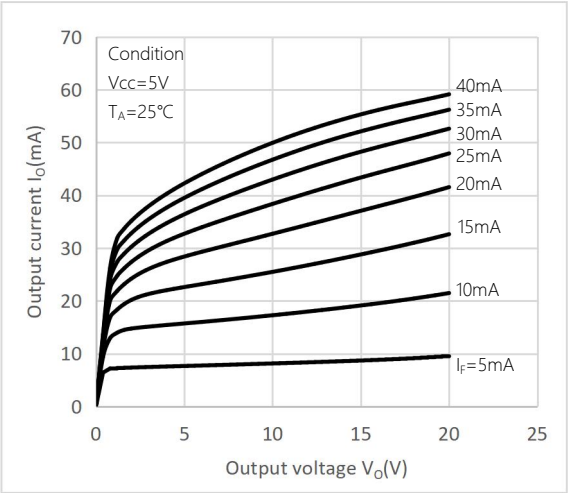


Fig.4 High level output current vs. Ambient temperature

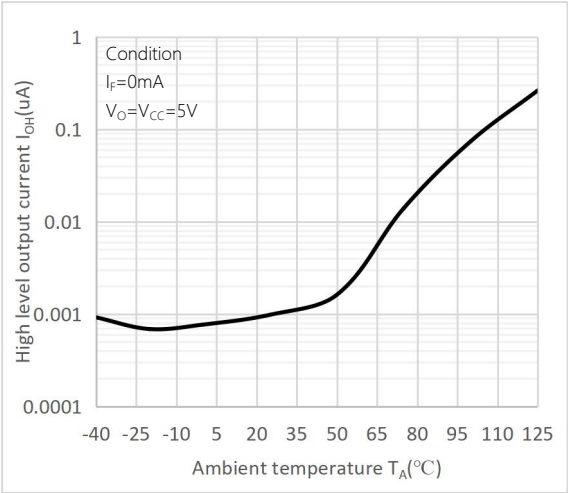


Fig.5 Propagation delay time vs. Ambient temperature

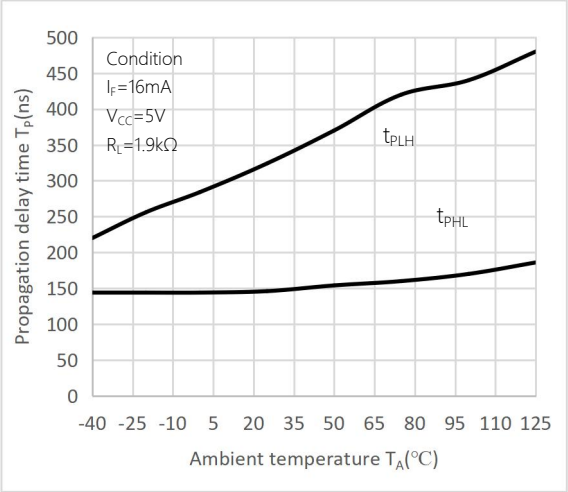
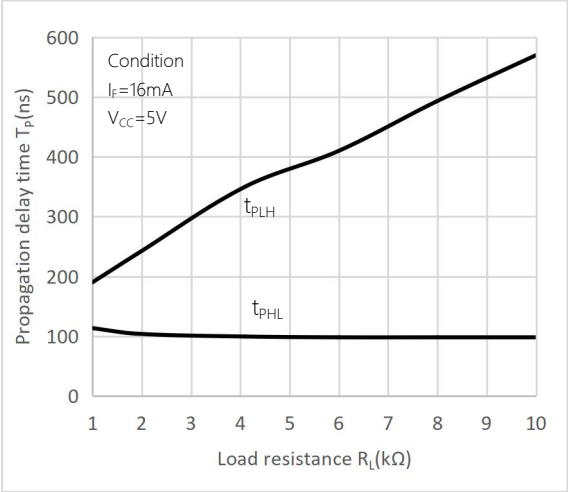


Fig.6 Propagation delay time vs. Load resistance



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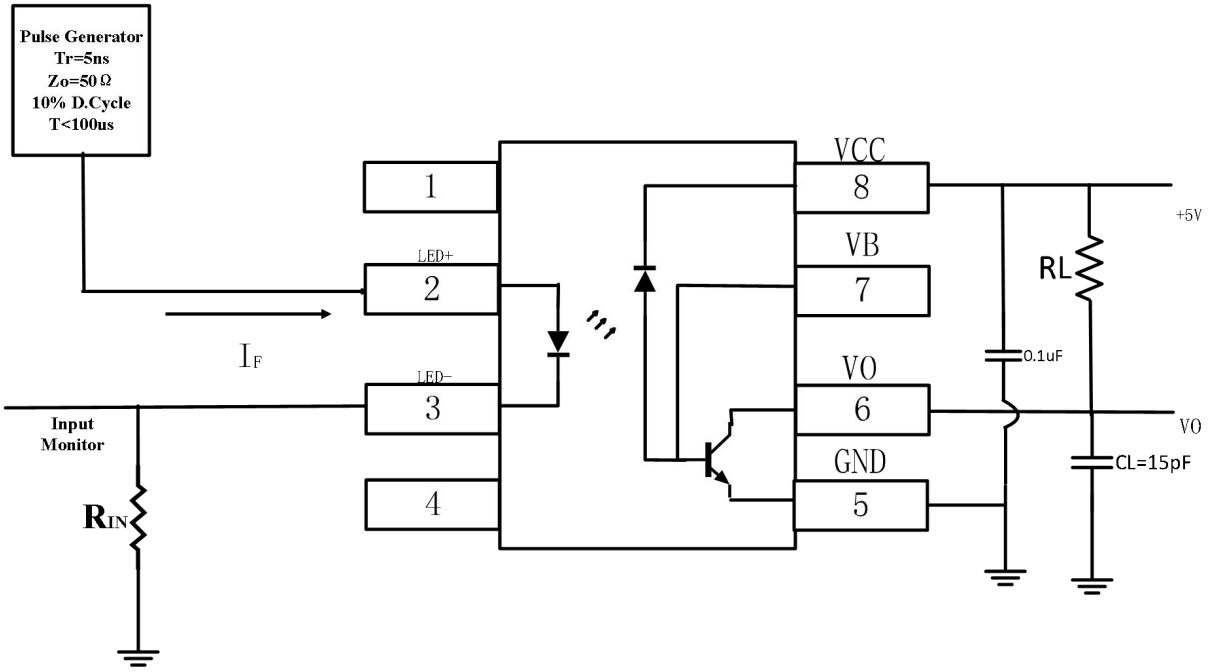
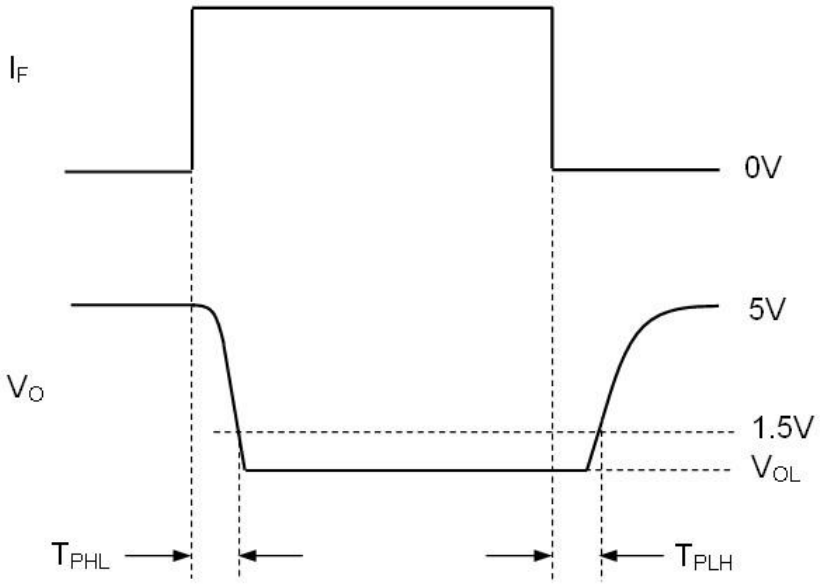
延迟时间测试电路 Test Circuit for Propagation Delay Time





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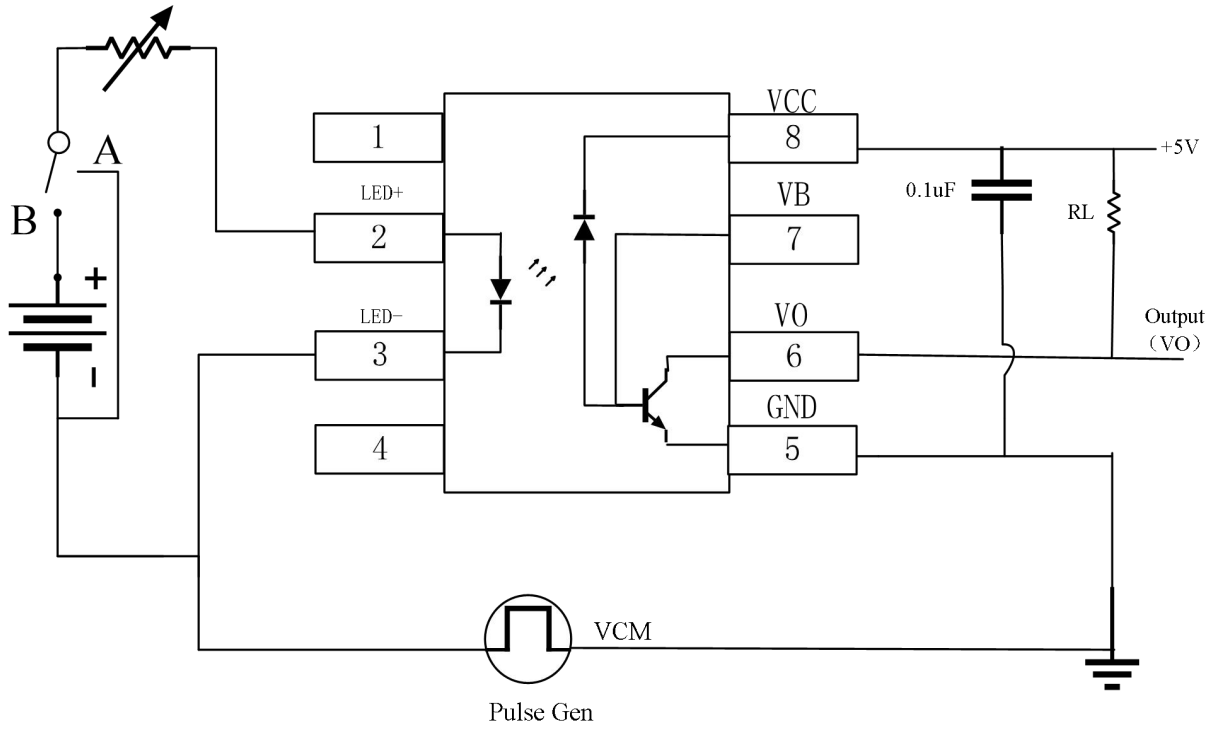
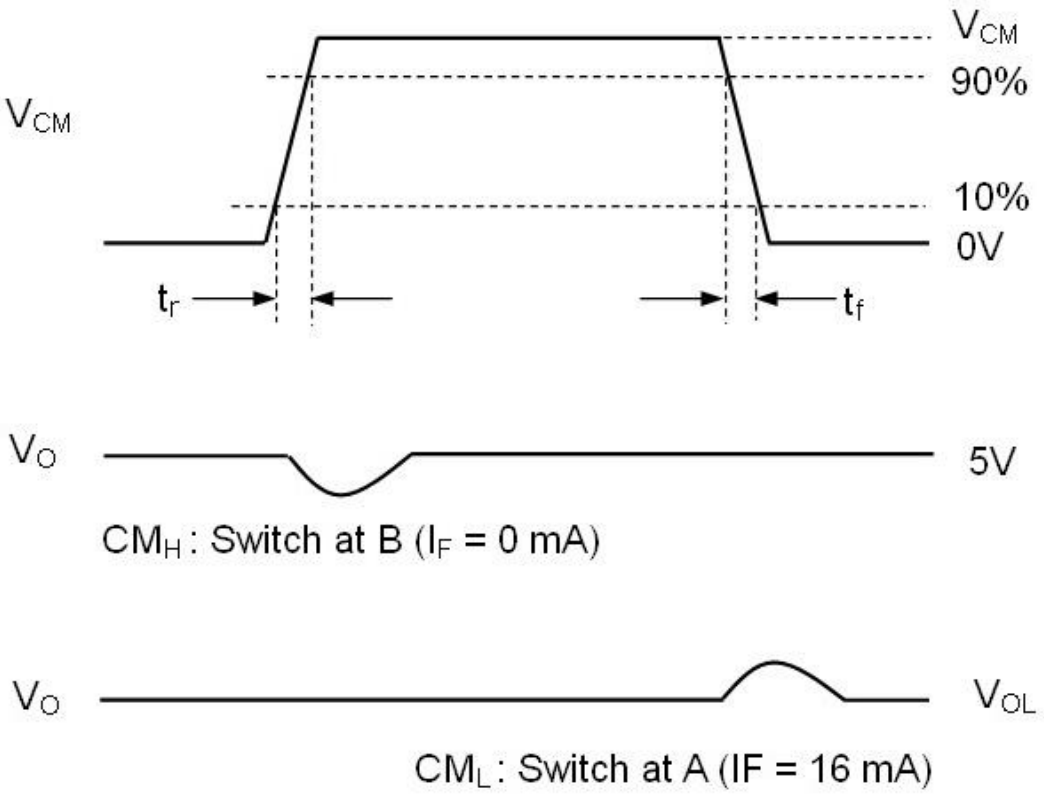
CMR 测试电路 Test Circuit for Common Mode Transient Immunity





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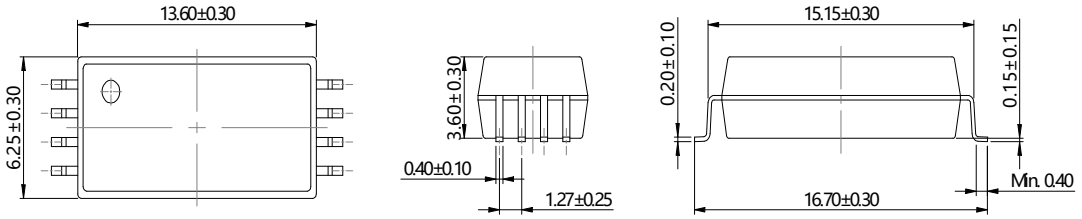
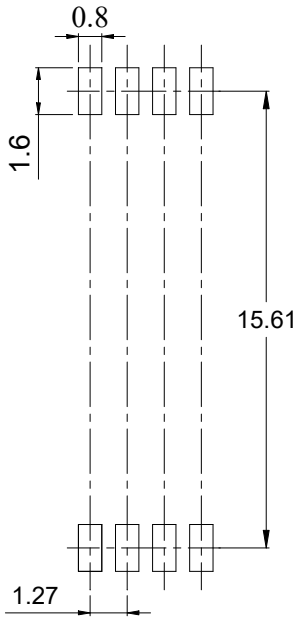
外形尺寸 Outline Dimensions

LSOP8



单位 Unit: mm

建议焊盘布局 Recommended Pad Layout



单位 Unit: mm

注：上图为产品正视图。
Note：The picture above is the front view of the product.

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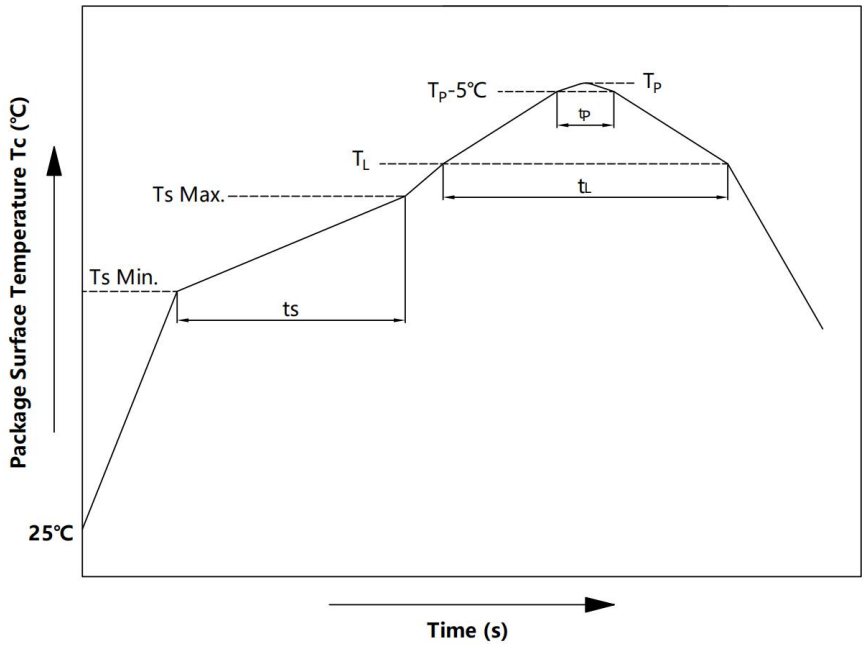
回流焊温度曲线图 Solder Reflow Profile



项目 Item	符号 Symbol	最小值 Min.	最大值 Max.	单位 Unit
预热温度 Preheat Temperature	Ts	150	200	℃
预热时间 Preheat Time	ts	60	120	s
升温速率 Ramp-Up Rate (T_L to T_P)	-	-	3	℃/s
液相线温度 Liquidus Temperature	T_L	217		℃
时间高于 T_L Time Above T_L	t_L	60	150	s
峰值温度 Peak Temperature	T_P	-	260	℃
Tc 在(T_P-5)和 T_P 之间的时间 Time During Which Tc Is Between (T_P-5) and T_P	t_p	-	30	s
降温速率 Ramp-down Rate(T_P to T_L)	-	-	6	℃/s

注 Note：

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；

Reflow soldering is recommended at the temperatures and times shown, no more than three times;

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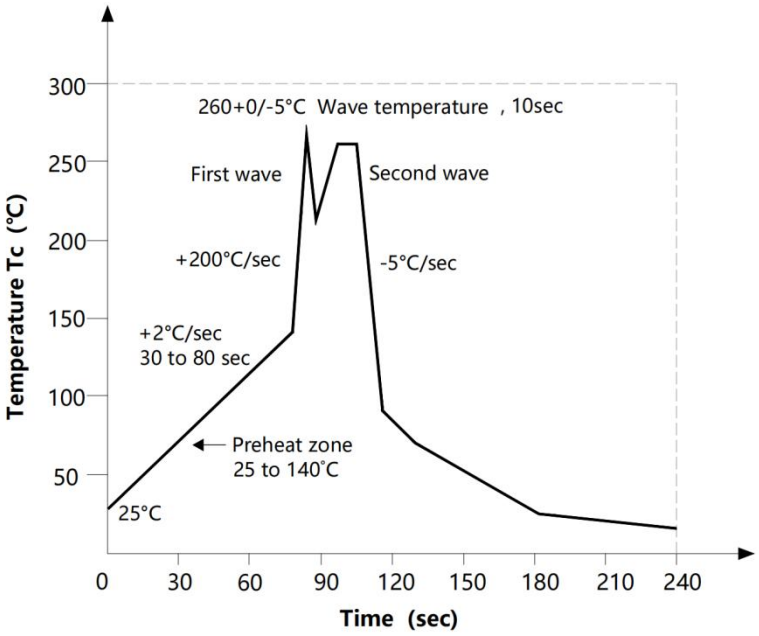
波峰焊温度曲线图 Wave Soldering Profile



手工烙铁焊接 Soldering with hand soldering iron

A. 手工烙铁焊仅用于产品返修或样品测试；
Hand soldering iron is only used for product rework or sample testing;

B. 手工烙铁焊要求：温度 360℃ ± 5℃，时间≤3s。
Hand soldering iron requirements：Temperature：360℃ ± 5℃, within 3s.

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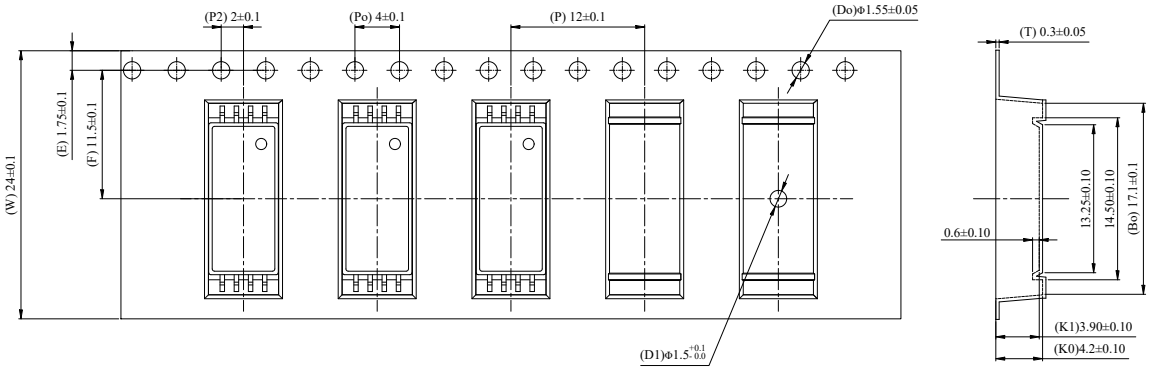
包装 Packing

■ 汇总表 Summary table

封装形式	包装方式	盘数量	盒数量	箱数量	静电袋规格	盒规格	箱(双瓦楞)规格	备注
LSOP8	卷盘 (ϕ330mm 蓝盘)	800 只/盘	2 盘/盒	8 盒/箱	450*390*0.1mm	353*340*75mm	650*375*365mm	首端各空 50 个空格，末端空 100
Package Type	Packing Form	Quantity per Reel	Quantity per Box	Quantity per Carton	Antistatic Bag Specification	Box Specification	Carton Specification	Note
LSOP8	Tube (ϕ330mm Blue)	800 pcs/reel	2 reels /box	8 boxes /ctn	450*390*0.1mm	353*340*75mm	650*375*365mm	Leave 50 spaces at the beginning and 100 spaces at the end

■ 编带包装 Tape & Reel

1) 每卷数量：800 只。
   Qty/reel：800pcs.
2) 每箱数量：12800 只。
   Qty/ctn： 12800pcs.
3) 内包装：每盒 2 盘。
   Inner packing：2 reels/box.
4) 示意图 Schematic：



单位 Unit：mm

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