NQUNXIN®
群芯微电子

中国芯 光电梦

高速光耦

High Speed Photo Coupler

QXN137

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

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QXN137

High Speed 10MBit/s Logic Gate

概述 Description

QXN137 光耦合器由一个 850nm 的 AlGaAS LED 组成，其光学耦合到一个非常高速的集成光电探测器逻辑门，可快速输出。

The QXN137 optocoupler consists of a 850 nm AlGaAS LED, optically coupled to a very high speed integrated photo-detector logic gate withastrobable output.

特性 Features

- 高比特率：10MBit/s
  High bit rate：10MBit/s
- 工作温度范围： -40°C ~125°C
  Fan-out of 8 over -40°C to +125°C
- 逻辑门输出
  Logic gate output
- 频闪输出
  Strobable output
- 输入-输出隔离电压 (V_{ISO}=5000 Vrms)
  High isolation voltage between input and output(V_{ISO}=5000 Vrms)
- 符合加强绝缘标准
  Meet reinforced insulation standards

应用 Applications

- 接地回路消除
  Ground loop elimination
- LSTTL 转 TTL, LSTTL 或 5V CMOS
  LSTTL to TTL, LSTTL or 5-volt CMOS
- 线路接收器，数据传输
  Line receiver, data transmission
- 开关电源
  Switching power supplies
- 计算机外围接口
  Computer-peripheral interface

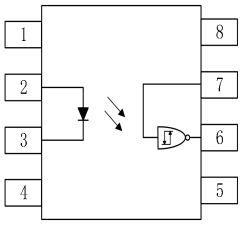
真值表 Truth table

LED	ENABLE	OUT
ON	H	L
OFF	H	H
ON	L	H
OFF	L	H
ON	NC	L
OFF	NC	H

封装和原理图 Package and Schematic Diagram

WDIP8

WSMD8



Pin Configuration

1.NC	8.VCC
2. Anode	7.VE
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

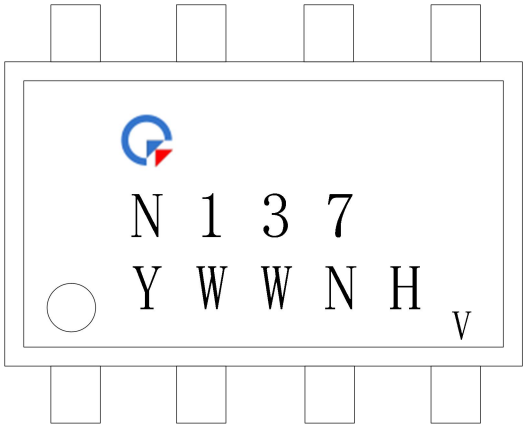
QX N137 - UN Y - W (V) (ZZ)

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（N137）
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（D:WDIP ; S: WSMD）
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“ ”为群芯品牌 LOGO
  “ ”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



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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	>10	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	>10	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	>0.4	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}	1500	V_{peak}	DIN/EN/IEC EN60747-5-5.
瞬态隔离电压 Transient Isolation Voltage	V_{IOTM}	8000	V_{peak}	DIN/EN/IEC EN60747-5-5.
隔离电压 Isolation Voltage	V_{ISO}	>5000	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
	使能输入电压不超过 V_{CC} 500mV Enable Input Voltage Not to Exceed V_{CC} by more than 500mV	V_E	5.5	V
	反向电压 Reverse Voltage	V_R	5	V
	输入功耗 Input Power Dissipation	P_I	100	mW
接收端 output	电源电压 Supply Voltage	V_{CC}	7	V
	输出电流 Output Current	I_O	50	mA
	输出电压 Output Voltage	V_O	7	V
	输出集电极功耗 Output Collector Power Dissipation	P_O	85	mW
工作温度 Operating Temperature		T_{opr}	-40 to +125	℃
存储温度 Storage Temperature		T_{stg}	-55 to +125	℃
焊接温度 Soldering Temperature		T_{sol}	260 for 10 sec	℃

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推荐操作条件 Recommended Operating Conditions

参数 Parameter	符号 Symbol	最小值 Min	最大值 Max.	单位 Unit
输入电流 Input Current	I_F	6	15	mA
电源电压 Supply Voltage	V_{CC}	2.7	5.5	V
低电平使能电压 Low Level Enable Voltage	V_{EL}	0	0.8	V
高电平使能电压 Low Level Enable Voltage	V_{EH}	2.0	V_{CC}	V
工作温度 Operating Temperature	T_A	-40	+125	℃
输出上拉电阻 Output Pull-up Resistor	R_L	330	4k	Ω

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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 Input Forward Voltage	V_F	I_F=10mA	-	1.38	1.75	V
	反向击穿电压 Input Reverse Breakdown Voltage	B_{VR}	I_R=10μA	5	50	-	V
	输入电容 Input Capacitance	C_{IN}	V=0, f=1MHz	-	70	-	pF
	正向电压的温度系数 Input Diode Temperature Coefficient	$\Delta V_F/\Delta T_A$	I_F=10mA	-	-1.4	-	mV/°C
接收端 Output	高电平电源电流 High Level Supply Current	I_{CCH}	I_F=0mA V_{CC}=5.5V V_E=0.5V	-	6.5	10	mA
	低电平电源电流 Low Level Supply Current	I_{CCL}	I_F=10mA V_{CC}=5.5V	-	9	13	mA
传输特性 Transfer Characteristics	低电平使能电流 Low Level Enable Current	I_{EL}	V_{CC}=5.5V V_E=0.5V		-0.8	-1.6	mA
	高电平使能电流 High Level Enable Current	I_{EH}	V_{CC}=5.5V V_E=2.0V		-0.6	-1.6	mA
	高电平使能电压 High Level Enable Voltage	V_{EH}	I_F=10mA V_{CC}=5.5V	2.0	-	-	V
	低电平使能电压 Low Level Enable Voltage	V_{EL}	I_F=10mA V_{CC}=5.5V	-	-	0.8	V
	高电平输出电流 High Level Output Current	I_{OH}	I_F=250μA V_{CC}=V_O=5.5V V_E=2V	-	-	100	μA
	低电平输出电压 Low Level Output Voltage	V_{OL}	I_F=5mA V_{CC}=5.5V I_{OL}=13mA V_E=2V	-	0.3	0.6	V
	输入阈值电流 Input Threshold Current	I_{FT}	V_{CC}=5.5V I_{OL}=13mA V_O<0.6V V_E=2V	-	1.5	5	mA
隔离电阻 Isolation Resistance		R_{I-O}	V_{I-O}=500V	-	10^{12}	-	Ω
隔离电容 Isolation Resistance		C_{I-O}	f=1MHz	-	0.6	-	pF

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开关特性 Switching Specification (T_A=25℃)

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 Propagation Delay Time to Output High Level	T_{PLH}	I_F=7.5mA V_{CC}=5.0V C_L=15pF R_L=350Ω	-	43	100	ns
输出低电平传播延迟 Propagation Delay Time to Output Low Level	T_{PHL}		-	30	100	ns
脉宽失真 ($\|T_{PHL}–T_{PLH}\|$) Pulse Width Distortion ($\|T_{PHL}–T_{PLH}\|$)	PWD		-	9	35	ns
输出上升时间(10% – 90%) Output Rise Time (10–90%)	tr		-	40	-	ns
输出下降时间(90% - 10%) Output Rise Time (90–10%)	tf		-	8	-	ns
输出高电平使能传播延迟 Enable Propagation Delay Time to Output HIGH Level	t_{ELH}	I_F=7.5mA V_{CC}=5.0V V_{EH}=3.5V C_L=15pF R_L=350Ω	-	30	-	ns
输出低电平使能传播延迟 Enable Propagation Delay Time to Output LOW Level	t_{EHL}		-	12	-	ns
输出高电平共模瞬态抑制 Common Mode Transient Immunity (at Output High Level)	$\|CM_H\|$	I_F=0mA, V_{CC}=5V $\|V_{CM}\|$=50V(Peak) $V_{O(MIN)}$=2.0V, R_L=350Ω	5	10	-	kV/μs
输出低电平共模瞬态抑制 Common Mode Transient Immunity (at Output Low Level)	$\|CM_L\|$	I_F=10mA, V_{CC}=5V $\|V_{CM}\|$=50V(Peak) $V_{O(MAX)}$=0.8V, R_L=350Ω	5	10	-	kV/μs

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

Fig.1 Low-level output voltage vs. Ambient temperature

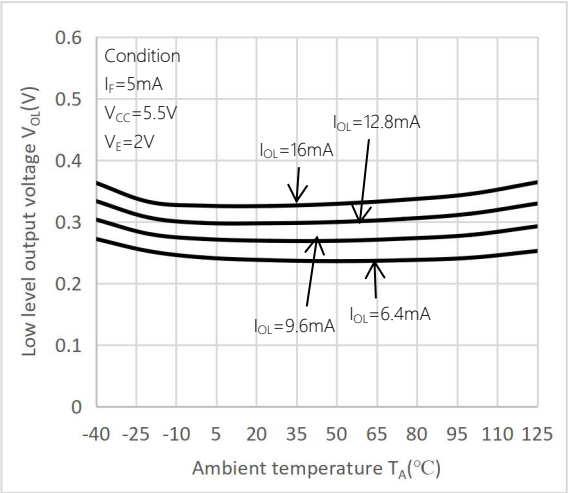

Fig.2 Forward current vs. Forward voltage

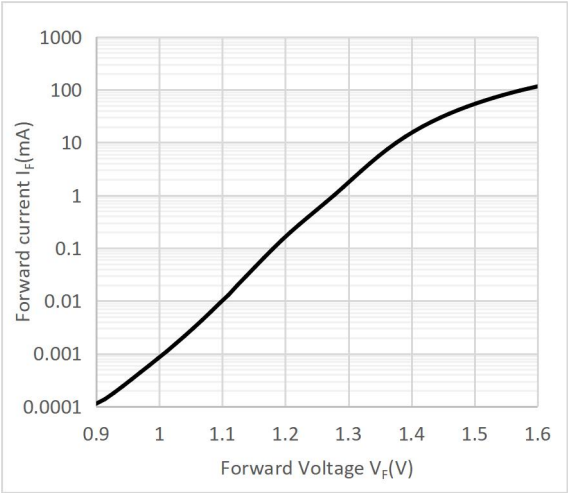

Fig.3 Propagation delay time vs. Forward current

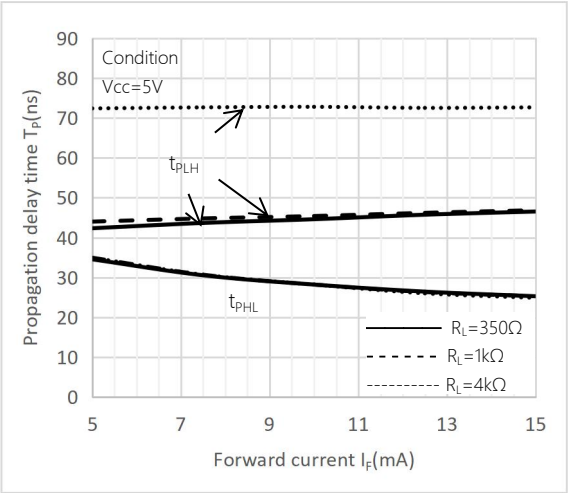

Fig.4 Low-level output current vs. Ambient temperature

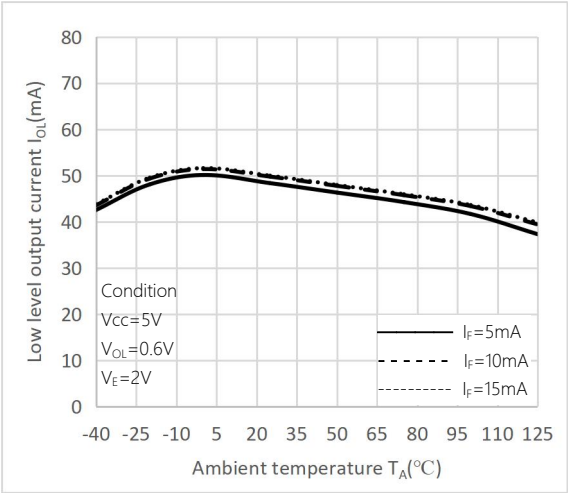

Fig.5 Input threshold current vs. Ambient temperature

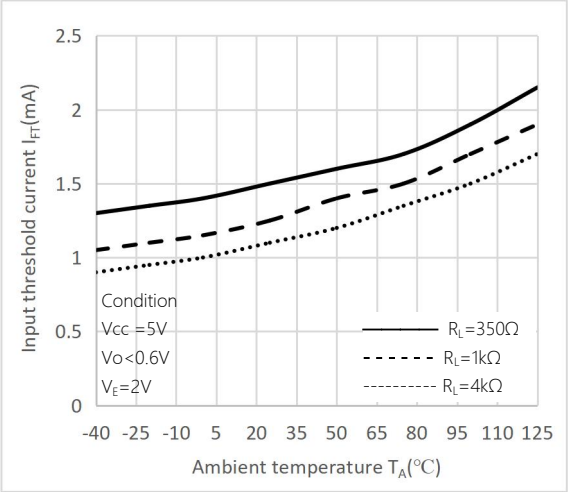

Fig.6 Output voltage vs. Forward current

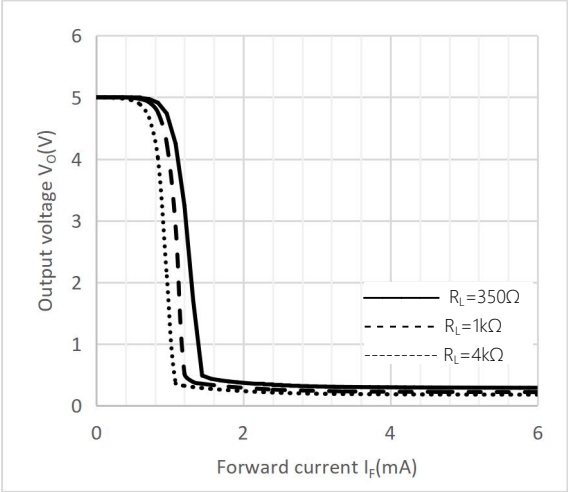

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Fig.7 Pulse-width distortion vs. Ambient temperature

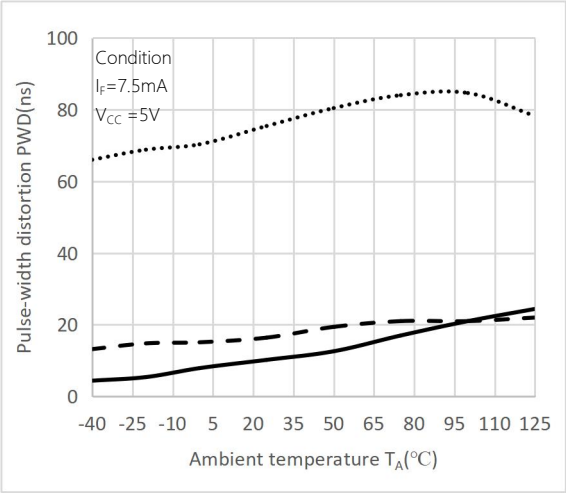


Fig.8 Switching time vs. Ambient temperature

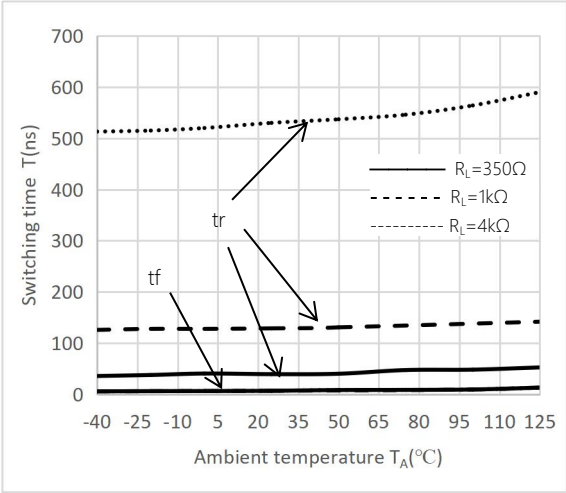


Fig.9 Propagation delay time vs. Ambient temperature

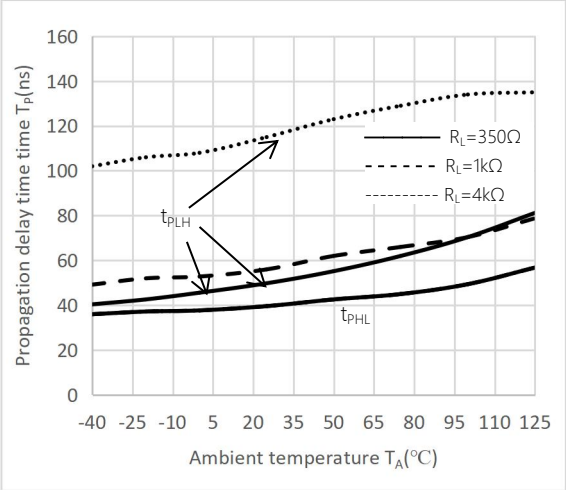


Fig.10 Enable propagation delay time vs. Ambient temperature

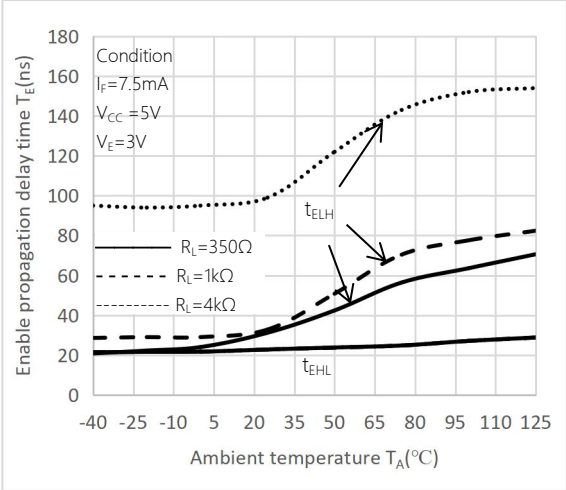
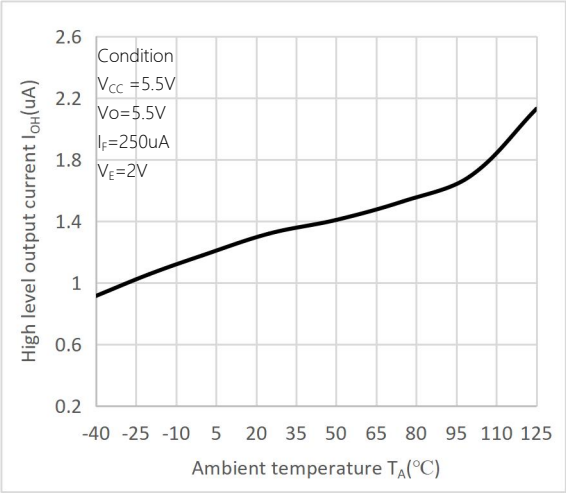


Fig.11 High-level output current vs. Ambient temperature



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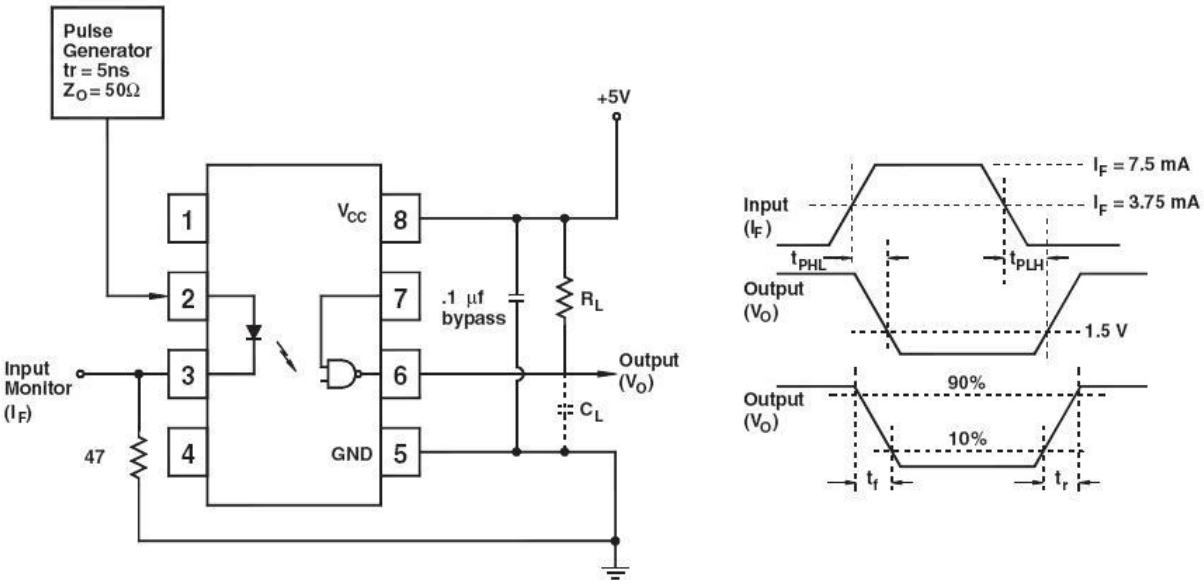
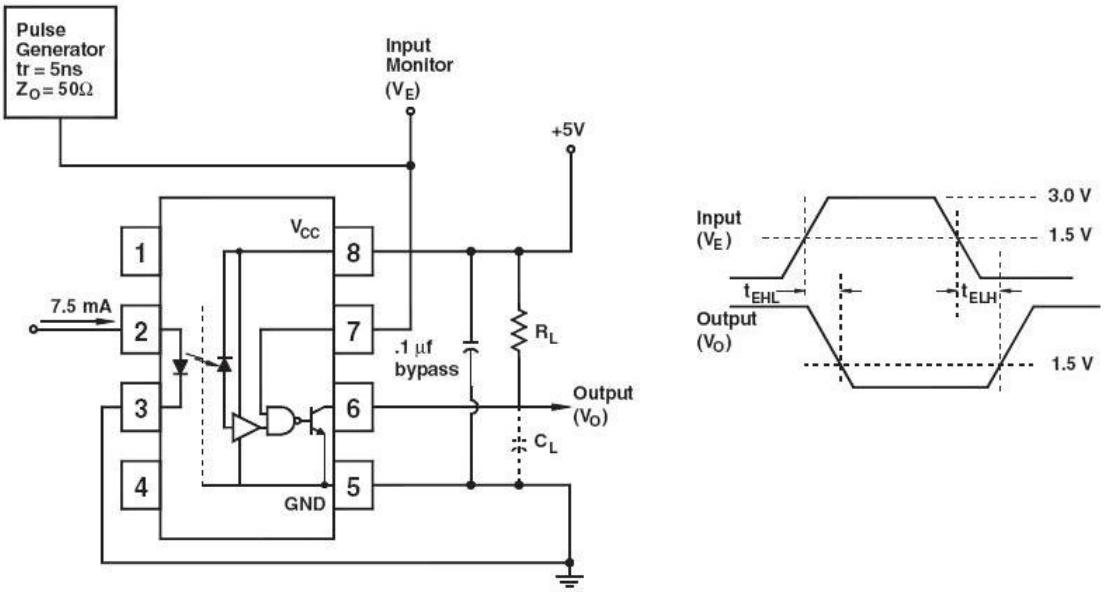
传输延迟时间测试电路 Test Circuit for Propagation Delay Time





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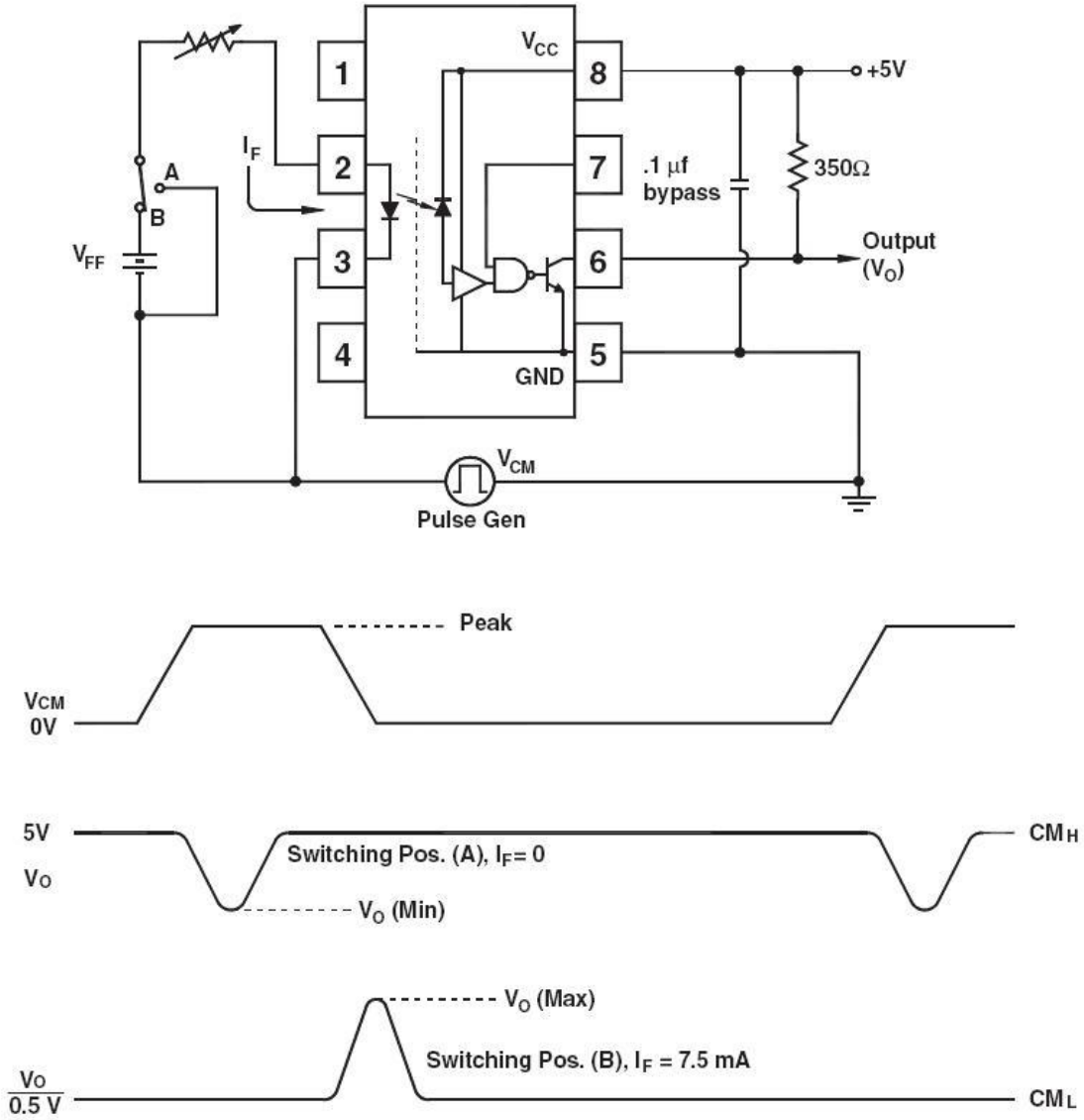
CMR 测试电路 Test Circuit for Common Mode Transient Immunity



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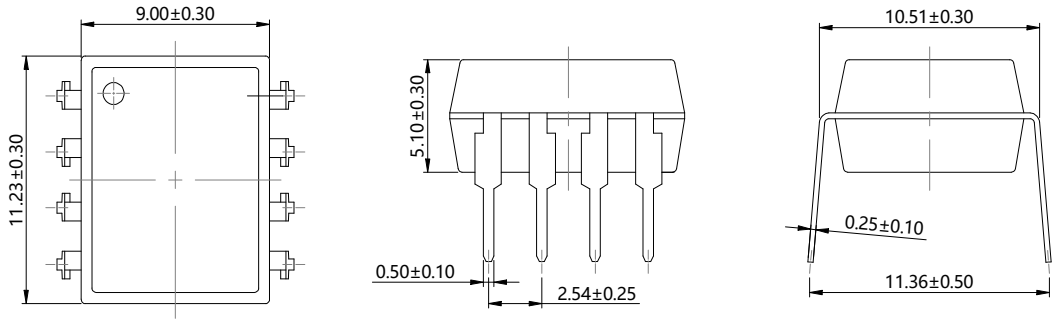
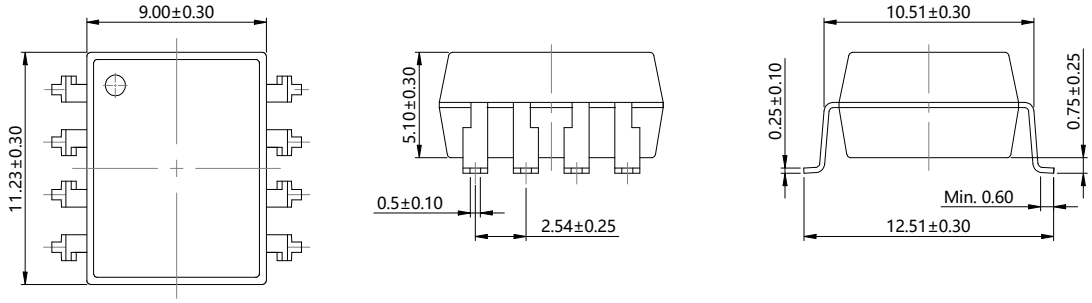
外形尺寸 Outline Dimensions

WDIP8

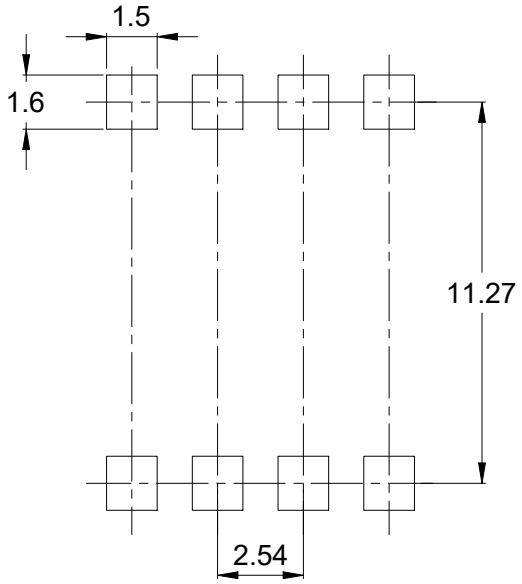


WSMD8



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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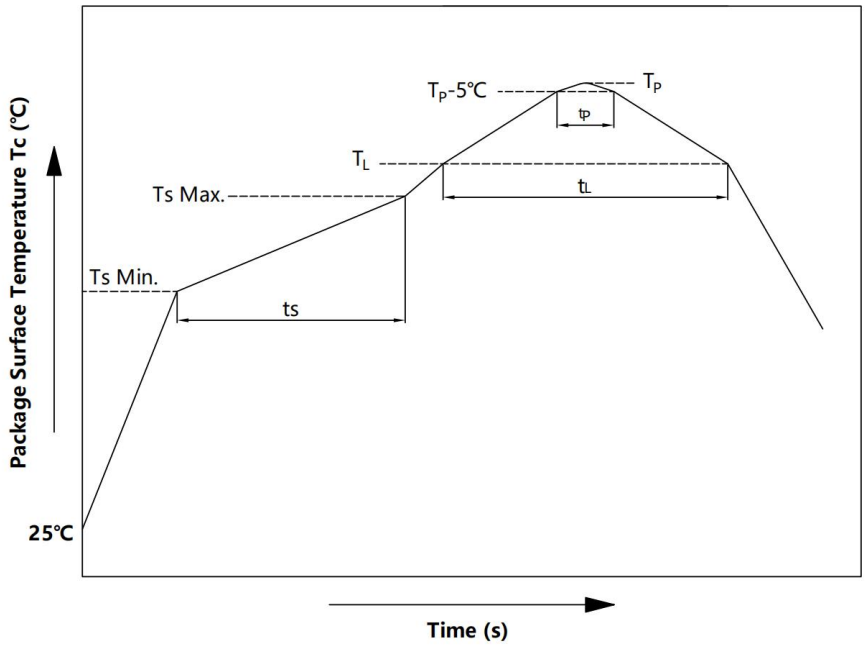
回流焊温度曲线图 Solder Reflow Profile



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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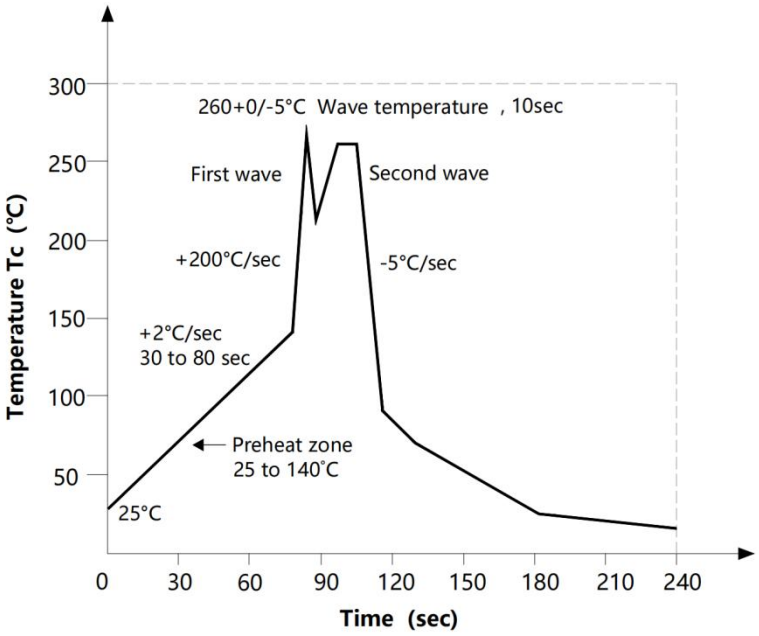
波峰焊温度曲线图 Wave Soldering Profile



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
WDIP8	管装 (500*16*13mm)	40 只/管	21 管/盒	10 盒/箱	不适用	525*130*57mm	550*280*320mm	每管使用蓝白胶塞，方向须一致
WSMD8	盘装 (ϕ330mm 蓝盘)	500 个/卷	2 盘/盒	8 盒/箱	450*390*0.1mm	340*75*340mm	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
WDIP8	Tube (500*16*13mm)	40pcs /Tube	27 Tubes /box	10 boxes /ctn	NA	525*130*57mm	550*280*320mm	Endplug (blue) and Endplug (white) keep the direction
WSMD8	Reel (ϕ330mm Blue)	500 pcs/reel	2 reels/box	8 boxes/ctn	450*390*0.1mm	340*75*340mm	650*375*365mm	Leave 50 spaces at the beginning and 100 spaces at the end

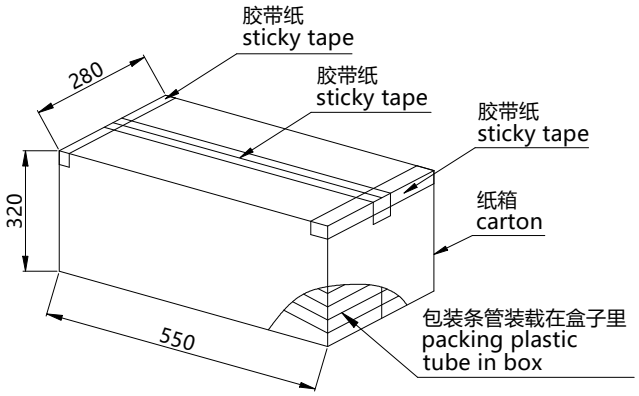
■ 管条包装 Tape & Tube

1）每管数量：40 只。
Qty/Tube：40pcs.

2）每箱数量：8400 只。
Qty/ctn：8400 pcs.

3）内包装：每盒 27 管。
Inner packing：27 Tube/box.

4）示意图 Schematic：



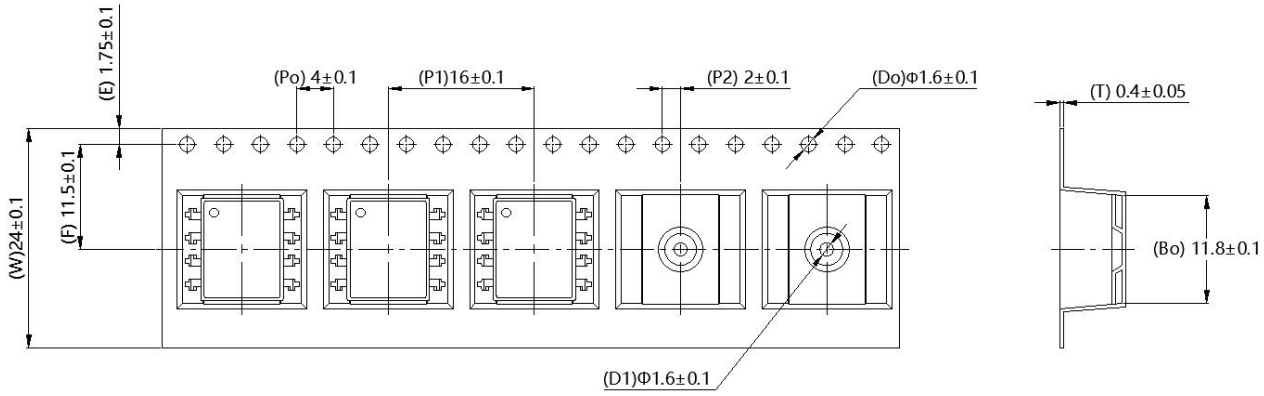
■ 编带包装 Tape & Reel

1）每卷数量：500 只。
Qty/reel：500 pcs.

2）每箱数量：8000 只。
Qty/ctn：8000 pcs.

3）内包装：每盒 2 盘。
Inner packing：2 reels/box.

4）示意图 Schematic：



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