



产品规格书

Specification Sheet

品 名(P/N): 光电耦合器 Photocoupler

客户名称(Customer): _____

本厂型号(Mfg P/N): ORPC-6N137

日 期(Date): _____

深圳市奥伦德科技股份有限公司
SHENZHEN ORIENT TECHNOLOGY CO.,LTD.

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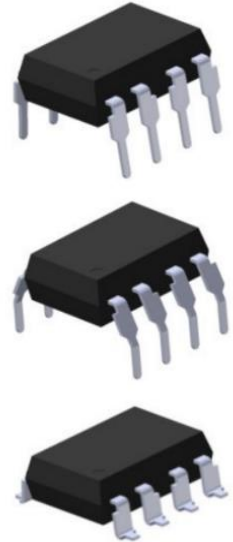
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www.orient-opto.com

1、特点(Features)

- (1) 3.3 v / 5V 供给电压
- (2) 低功耗
- (3) 高速: 15MBd(典型)
- (4) $V_{CM}=1000V$, 共模抑制(CMR)最低为 $10\text{ kv} / \mu\text{s}$
- (5) 温度在 $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$ 时保证交流和直流性能。



2、说明(Instructions)

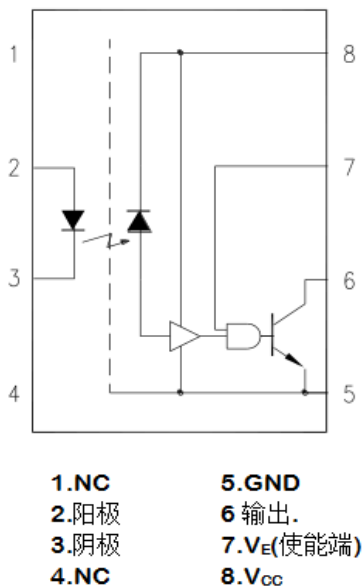
6N137 是由一个高效的 AlGaAs 发光二极管和高速光学检测器组成。本设计在光电耦合器的输入和输出端之间提供良好的交流和直流隔离。光检测器的输出特性是一个集电极开路肖特基钳位晶体管。保证共模瞬态免疫在 3.3 v 时达到 $10\text{ kv} / \mu\text{s}$ 。

光电耦合器的工作温度范围: $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$ 。

3、应用范围 (Application Range)

- 线路接收器隔离
- A/ D, D/A 转换的数字信号隔离
- 消除接地回路的噪声
- 开关电源
- 替代脉冲变压器
- 马达控制系统
- 微处理器系统、计算机及其外围设备的接口

4、原理图(Functional Diagram)



真值表

输入 (LED)	使能	输出
ON	H	L
OFF	H	H
ON	L	H
OFF	L	H
ON	NC	L
OFF	NC	H

A Pin8 与 Pin5 之间需连接 0.1μF 旁路电容

5、最大绝对额定值(常温 T=25°C)*1 (Absolute Maximum Ratings (Ta=25°C))

参数 Parameter		符号 Symbol	额定值 Rated Value	单位 Unit
输入 (Input)	平均正向输入电流 (Average Forward Input Current)	I _F	20	mA
	反向输入电压 (Reverse Input Voltage)	V _R	5	V
	功耗 (Power Dissipation)	P _I	40	mV
	使能端输入电压 (Enable Input Voltage)	V _E	VCC+0.5	V
	使能端输入电流 (Enable Input current)	I _E	5	mA
输出 (Output)	输出集电极电流 (Output Collector Current)	I _O	50	mA
	输出集电极电压 (Output Collector Voltage)	V _O	7	V
	集电极功耗 (Output Collector Power Dissipation)	P _O	85	mW
供给电压 (Supply Voltage)		V _{CC}	7	V
绝缘电压 (Insulation Voltage)		V _{iso}	5000	V _{rms}
工作温度 (Working Temperature)		T _{opr}	-40 ~ +85	°C
存贮温度 (Storage Temperature)		T _{stg}	-55 ~ +125	
*2 焊锡温度 (Soldering Temperature)		T _{sol}	260	

*1. 室温= 25°C。超过最大绝对额定值会对器件造成永久性损坏。长时间工作在最大绝对额定值会影响可靠性。

*2. 锡焊时间为 10 秒 soldering time is 10 seconds



6、推荐工作条件 (Recommended Operating Conditions)

参数 Parameter	符号 Symbol	最小 Min	最大 Max	单位 Unit
工作温度 (Operating Temperature)	T_A	-40	85	°C
供给电压 (Supply Voltage)	V_{CC}	2.7 4.5	3.6 5.5	V
低电平输入电流 (Low Level Input Current)	I_{FL}	0	250	μA
高电平输入电流 (High Level Input Current)	I_{FH}	5	15	mA
低电平使能电压 (Low Level Enable Voltage)	V_{EL}	0	0.8	V
高电平使能电压 (High Level Enable Voltage)	V_{EH}	2	V_{CC}	V
输出上拉电阻 (Output Pull-up Resistor)	R_L	330	4k	Ω
扇出系数 Fan Out (at $R_L=1k\Omega$ per channel)	N	—	5	TTL 负载 (Loads)



7、光电特性(常温 T=25°C) (Opto-electronic Characteristics)

参数 Parameter	符号 Symbol	条件 Condition	最小 Min	典型值 Typ	最大 Max	单位 Unit
输入(Input)						
正向电压 (Forward voltage)	V_F	$I_F = 10\text{mA}$	—	1.38	1.7	V
正向电压温度系数 (Temperature Coefficient OF Forward Voltage)	$\Delta V_F / \Delta T$	$I_F = 10\text{mA}$	—	-1.5	—	mV/°C
反向电压 (Reverse Voltage)	BV_R	$I_R = 10\mu\text{A}$	5	—	—	V
输入阈值电流 (Input Threshold Current)	I_{TH}	$V_E = 2\text{V}, V_{CC} = 3.3\text{V}$ $V_O = 0.6\text{V}$ $I_{OL} (\text{sinking}) = 13\text{mA}$	—	1.5	5	mA
输入电容 (Input Capacitance)	C_{IN}	$f = 1\text{MHz}, V_F = 0\text{V}$	—	34	—	pF
接收端 (Detector)						
高电平供给电流 (High Level Supply Current)	I_{CCH}	$V_E = 0.5\text{V}, V_{CC} = 3.3\text{V}, I_F = 0\text{mA}$	—	3.8	10	μA
低电平供给电流 (Low Level Supply Current)	I_{CCL}	$V_E = 0.5\text{V}, V_{CC} = 3.3\text{V}, I_F = 10\text{mA}$	—	5.8	13	mA
高电平使能电流 (High Level Enable Current)	I_{EH}	$V_{CC} = 3.3\text{V}, V_E = 2\text{V}$	—	-0.19	-1.6	mA
低电平使能电流 (Low Level Enable Current)	I_{EL}	$V_{CC} = 3.3\text{V}, V_E = 0.5\text{V}$	—	-0.41	-1.6	mA
高电平使能电压 (High Level Enable Voltage)	V_{EH}		2	—	—	V
低电平使能电压 (Low Level Enable Voltage)	V_{EL}			—	0.8	V
高电平输出电流 (High Level Output Current)	I_{OH}	$V_E = 2\text{V}, V_{CC} = 3.3\text{V}, V_O = 3.2\text{V}, I_F = 250\mu\text{A}$	—	5	100	μA
低电平输出电流 (Low Level Output Voltage)	V_{OL}	$V_E = 2\text{V}, V_{CC} = 3.3\text{V}, I_F = 5\text{mA}, I_{OL} (\text{sinking}) = 13\text{mA}$	—	0.3	0.6	V

推荐温度范围($T_A = -40^\circ\text{C} \sim +85^\circ\text{C}, 2.7\text{V} \leq V_{CC} \leq 3.6\text{V}$), $I_F = 7.5\text{mA}$ 除非另有说明。典型值 $T_A = 25^\circ\text{C}, V_{CC} = 3.3\text{V}$ 。



推荐温度范围($T_A = -40^{\circ}\text{C} \sim +85^{\circ}\text{C}$, $4.5\text{V} \leq V_{CC} \leq 5.5\text{V}$), $I_F = 7.5\text{mA}$ 除非另有说明。典型值 $T_A = 25^{\circ}\text{C}$, $V_{CC} = 5.0\text{V}$ 。

参数 Parameter	符号 Symbol	条件 Condition	最小 Min	典型值 Typ	最大 Max	单位 Unit
输入(Input)						
正向电压 (Forward voltage)	V_F	$I_F = 10\text{mA}$	—	1.38	1.7	V
正向电压温度系数 (Temperature Coefficient OF Forward Voltage)	$\Delta V_F / \Delta T$	$I_F = 10\text{mA}$	—	-1.5	—	mV/ $^{\circ}\text{C}$
反向电压 (Reverse Voltage)	BV_R	$I_R = 10\mu\text{A}$	5	—	—	V
输入阈值电流 (Input Threshold Current)	I_{TH}	$V_{CC} = 5.5\text{V}, V_O = 0.6\text{V}$ $I_{OL} > 13\text{mA}$	—	1.35	5	mA
输入电容 (Input Capacitance)	C_{IN}	$f = 1\text{MHz}, V_F = 0\text{V}$	—	34	—	pF
接收端 (Detector)						
高电平供给电流 (High Level Supply Current)	I_{CCH}	$V_E = 0.5\text{V},$ $V_{CC} = 5.5\text{V}, I_F = 0\text{mA}$	—	6.1	10	μA
高电平供给电流 (Low Level Supply Current)	I_{CCL}	$V_E = 0.5\text{V},$ $V_{CC} = 5.5\text{V}, I_F = 10\text{mA}$	—	8.3	13	mA
高电平使能电流 (High Level Enable Current)	I_{EH}	$V_{CC} = 5.5\text{V}, V_E = 2\text{V}$	—	-0.6	-1.6	mA
低电平使能电流 (Low Level Enable Current)	I_{EL}	$V_{CC} = 5.5\text{V}, V_E = 0.5\text{V}$	—	-0.9	-1.6	mA
高电平使能电压 (High Level Enable Voltage)	V_{EH}		2	—	—	V
低电平使能电压 (Low Level Enable Voltage)	V_{EL}		—	—	0.8	V
高电平输出电流 (High Level Output Current)	I_{OH}	$V_E = 2\text{V}, V_{CC} = 5.5\text{V},$ $V_O = 5.5\text{V}, I_F = 250\mu\text{A}$	—	0.9	100	μA
低电平输出电流 (Low Level Output Voltage)	V_{OL}	$V_E = 2\text{V}, V_{CC} = 5.5\text{V},$ $I_F = 5\text{mA},$ $I_{OL} (\text{sinking}) = 13\text{mA}$	—	0.3	0.6	V

8、开关特性 (Switching Characteristics)

参数 Parameter	符号 Symbol	条件 Condition	最小 Min	典型值 Typ	最大 Max	单位 Unit
到高电平输出的传输延时 (Propagation delay time to output High level)	t_{PLH}	$R_L=350\Omega$ $C_L=15pF$	25	48	90	ns
到高电平输出的传输延时 (Propagation delay time to output Low level)	t_{PHL}		25	35	75	ns
脉宽失真 (Pulse Width Distortion)	$ t_{PLH}-t_{PHL} $		—	13	—	ns
输出上升时间 (Output Rise Time (10 to 90%))	t_r		—	21	—	ns
输出下降时间 (Output Fall Time (90 to 10%))	t_f		—	6.6	—	ns
使能电压从高电平到低电平的传输延时 (Propagation Delay Time of Enable from V_{EH} to V_{EL})	t_{ELH}	$R_L=350\Omega$ $C_L=15pF$ $V_{EL}=0V$ $V_{EH}=3V$	—	27	—	ns
使能电压从低电平到高电平的传输延时 (Propagation Delay Time of Enable from V_{EL} to V_{EH})	t_{EHL}		—	9	—	ns

推荐温度范围($T_A = -40^\circ C \sim +85^\circ C, 2.7V \leq V_{CC} \leq 3.6V$), $I_F = 7.5mA$ 除非另有说明。典型值 $T_A = 25^\circ C, V_{CC} = 3.3V$ 。

参数 Parameter	符号 Symbol	条件 Condition	最小 Min	典型值 Typ	最大 Max	单位 Unit
到高电平输出的传输延时 (Propagation delay time to output High level)	t_{PLH}	$T_A=25^\circ C$ $R_L=350\Omega$ $C_L=15pF$	25	40	75	ns
			—	—	100	
到高电平输出的传输延时 (Propagation delay time to output Low level)	t_{PHL}		25	32	75	ns
			—	—	100	
脉宽失真 (Pulse Width Distortion)	$ t_{PLH}-t_{PHL} $	$R_L=350\Omega$ $C_L=15pF$	—	8	—	ns
输出上升时间 Output Rise Time (10 to 90%)	t_r		—	22	—	ns



输出下降时间 Output Fall Time (90 to 10%)	t_f		—	6.9	—	ns
使能电压从高电平到低电平的传输延时 (Propagation Delay Time of Enable from V_{EH} to V_{EL})	t_{ELH}	$R_L=350\Omega$ $C_L=15pF$ $V_{EL}=0V$ $V_{EH}=3V$	—	28	—	ns
使能电压从低电平到高电平的传输延时 (Propagation Delay Time of Enable from V_{EL} to V_{EH})	t_{EHL}		—	12	—	ns

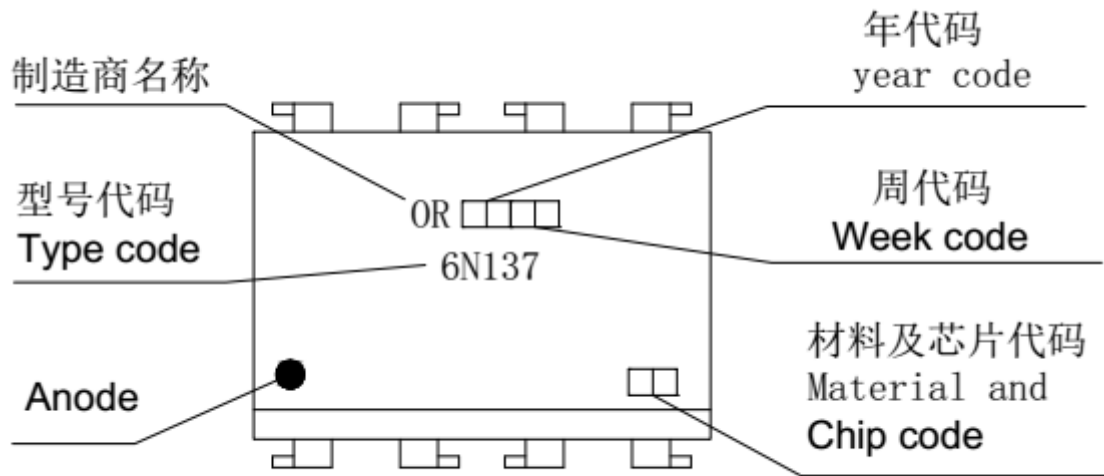
推荐温度范围($T_A = -40^\circ C \sim +85^\circ C, 4.5V \leq V_{CC} \leq 5.5V$), $I_F = 7.5mA$ 除非另有说明。典型值 $T_A = 25^\circ C, V_{CC} = 5.0V$ 。

参数 Parameter	符号 Symbol	条件 Condition	最小 Min	典型值 Typ	最大 Max	单位 Unit
逻辑高共模瞬态抑制比 (Logic High Common Mode Transient Immunity)	CM_H	$V_{CC}=3.3V, V_{CM}=1000V, R_L=350\Omega$ $I_F=0mA, T_A=25^\circ C$	10	15	—	kV/ μs
		$V_{CC}=5V, V_{CM}=1000V, R_L=350\Omega$ $I_F=0mA, T_A=25^\circ C$	10	15	—	
逻辑低共模瞬态抑制比 (Logic Low Common Mode Transient Immunity)	CM_L	$V_{CC}=3.3V, V_{CM}=1000V, R_L=350\Omega$ $I_F=10mA, T_A=25^\circ C$	10	15	—	kV/ μs
		$V_{CC}=5V, V_{CM}=1000V, R_L=350\Omega$ $I_F=10mA, T_A=25^\circ C$	10	15	—	

参数 Parameter	符号 Symbol	条件 Condition	最小 Min	典型值 Typ	最大 Max	单位 Unit
输入-输出绝缘漏电流 (Input-Output Insulation Leakage Current)	I_{I-O}	45% RH, $t=5s$, $V_{I-O} = 3kV DC, T_A = 25^\circ C$	—	—	1	μA
绝缘测试耐压 (Withstand Insulation Test Voltage)	V_{ISO}	$RH \leq 50\%, t = 1min, T_A = 25^\circ C$	5000	—	—	V_{RMS}
输入-输出电阻 (Input-Output Resistance)	R_{I-O}	$V_{I-O} = 500V DC$	—	10^{12}	—	Ω
输入-输出电容 (Input-Output Capacitance)	C_{I-O}	$f = 1MHz, T_A = 25^\circ C$	—	1	—	p

推荐温度范围($T_A = 40^\circ C \sim 85^\circ C$)除非另有说明。典型值 $T_A = 25^\circ C$ 。

9、命名规则(Naming Rule)



注:

(1) 年代码 year Code: 08 代表 2008 年、09 代表 2009

年、依此类推。

(2) 周代码 Week Code: 01 代表第一周、02 代表第二周、

依此类推。

(3) OR: 制造商名称, 代表制造商 Shenzhen Orient Components Co., Ltd.

(4) 型号代码 Type code: 代表型号 6N137。

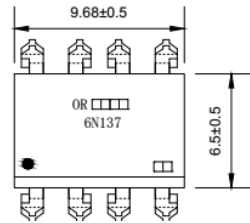
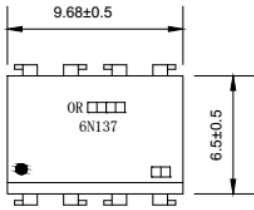
(5) 材料及芯片代码 Material and Chip code: 例如: FG (FC) 或 CG

(CC), 其中 F 表铁支架/C 表铜支架,G/C 代表芯片代码。

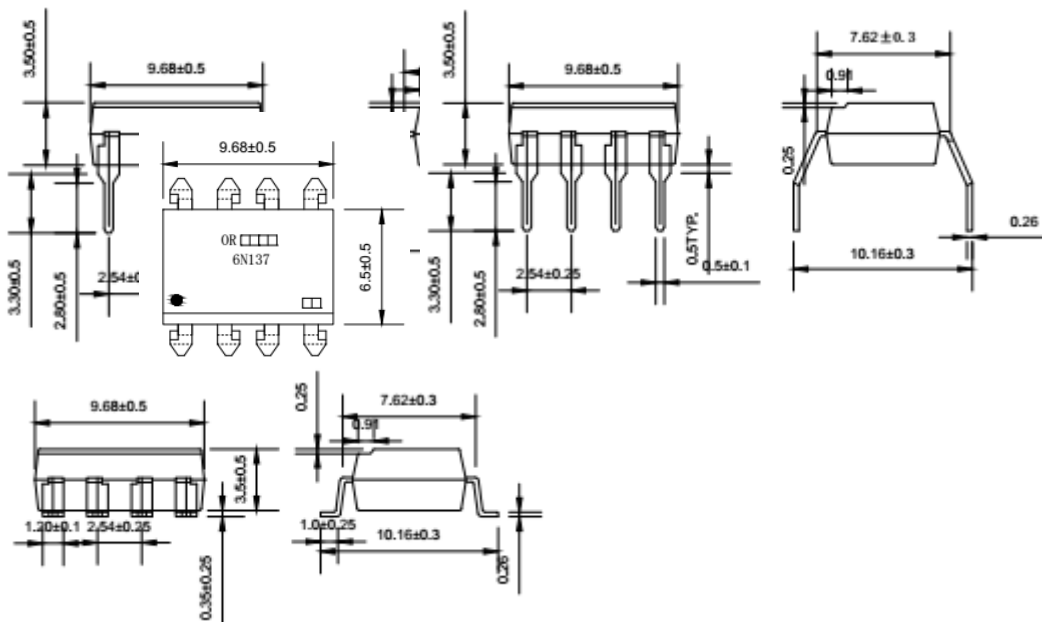
(6) Anode: 阳极

10、外形尺寸 (Outer Dimension)

(1) OR-6N137



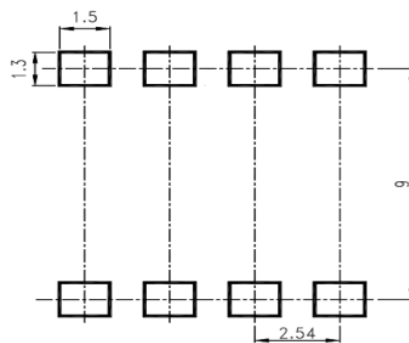
(2) OR-6N137M



(3) OR-6N137S

11、推荐的焊盘尺寸 (Recommended Foot Print Patterns (Mount Pad))

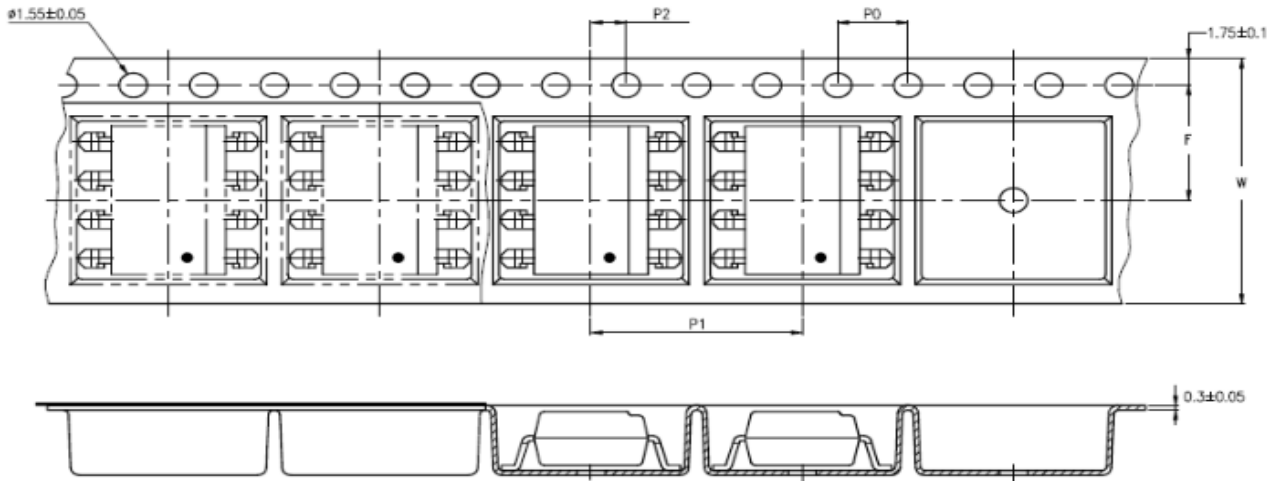
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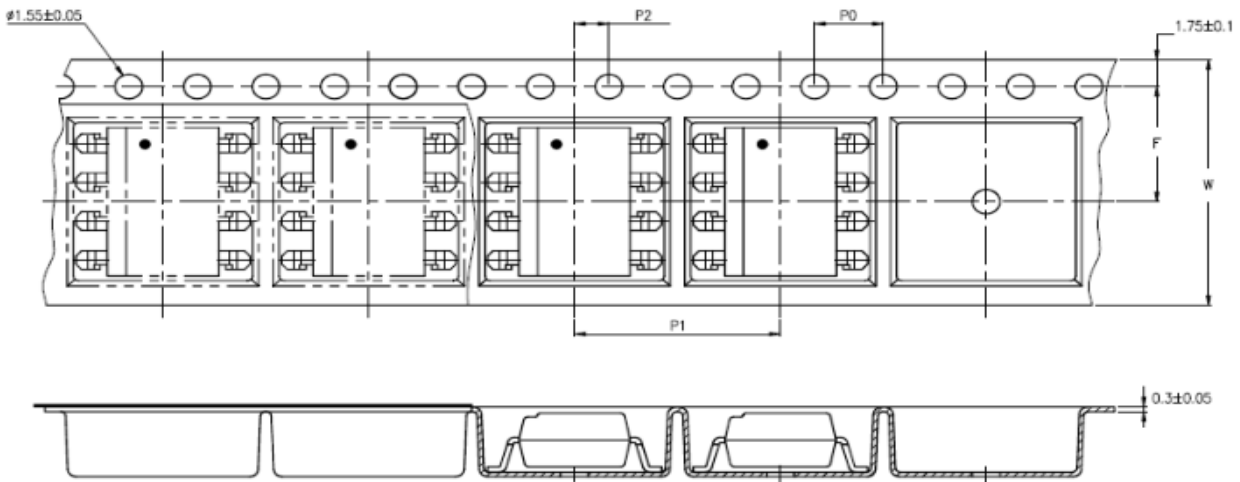
12、编带尺寸

(Taping Dimensions)

(1) OR-6N137-TA



(2) OR-6N137-TA1



类型	符号	尺寸：毫米（英寸）
带宽	W	16±0.3（0.63）
孔距	P0	4±0.1（0.15）
孔距	F	7.5±0.1（0.295）
	P2	2±0.1（0.079）
间隔	P1	12±0.1（0.472）

13、焊接温度
(Temperature Profile)

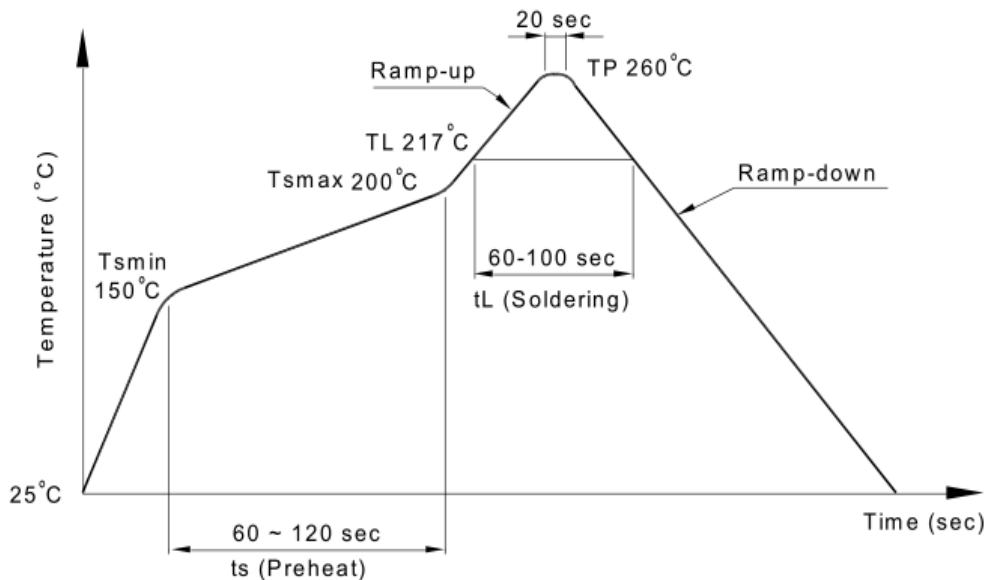
封装类型	TA/TA1
数量（个）	1000

曲线图
(Of Soldering)

(1) 红外回流焊 (jedec-std-020c 兼容) (IR Reflow soldering (JEDEC-STD-020C compliant))

注意：一次焊接回流建议在温度和时间配置文件如下所示的条件下。不要焊接超过三次。

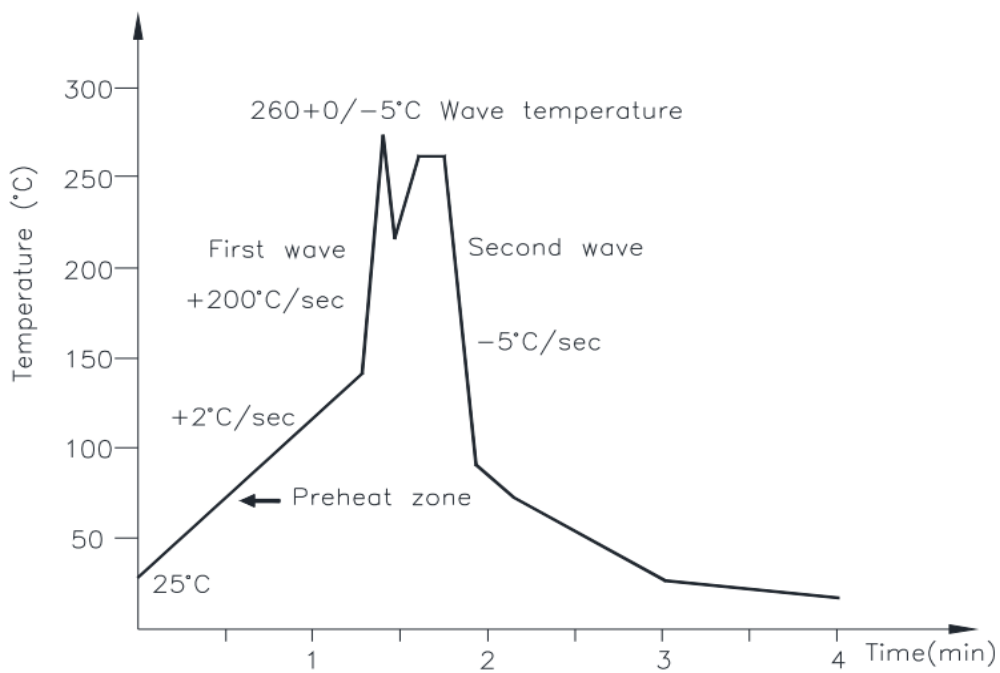
配置项	条件
预热 (Preheat)	
-最低温度 (TSmin)	150°C
-最高温度 (TSmax)	200°C
-时间 (最小到最大 (TS))	90±30 sec
焊接区 (Soldering zone)	
-温度 (TL)	217°C
-时间 (tL)	60~100 sec
峰值温度 (Peak Temperature)	260°C
爬升率 (Ramp-up rate)	3°C / sec max.
下降率 (3°C / sec max.)	3~6°C / sec



(2) 超声波焊接 (jedec22a111 兼容) (Wave soldering (JEDEC22A111 compliant))

建议在温度条件下一致性焊接。

温度 (Temperature)	260+0/-5°C
时间 (Time)	10 sec
预热温度 (Preheat temperature)	5 to 140°C
预热时间 (Preheat time)	30 to 80 sec



(3) 电烙铁手工焊接 (Hand soldering by soldering iron)

允许单铅焊接在每一个过程中,建议一次性焊接。

温度 (Temperature)	380+0/-5°C
时间 (Time)	3 sec max

14、开关时间测试电路 (Switching time test circuit)

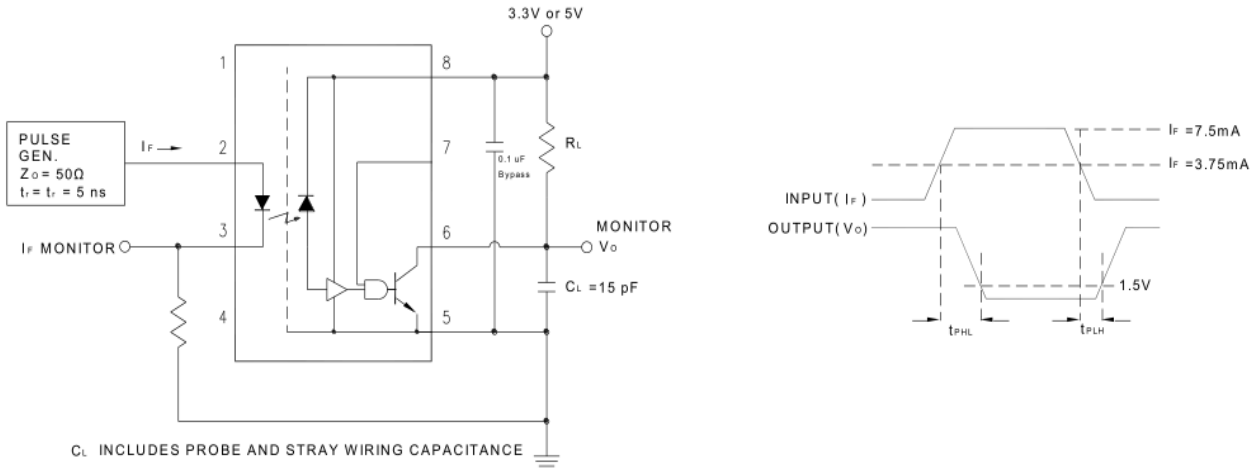


Figure 1: Test Circuit for t_{PHL} and t_{PLH}

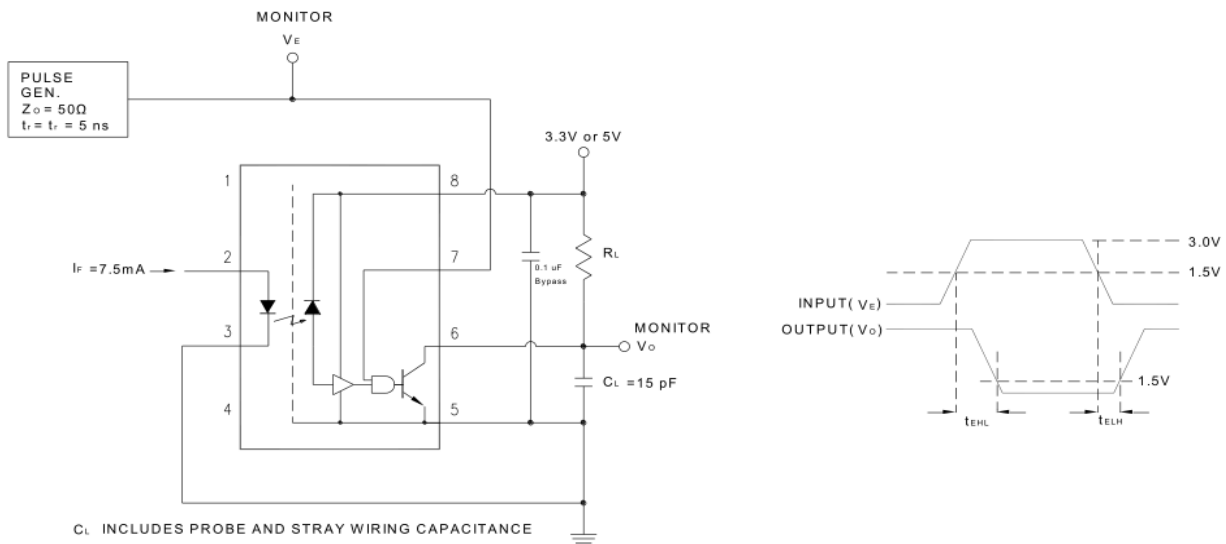


Figure 2: Single Channel Test Circuit for Common Mode Transient Immunity

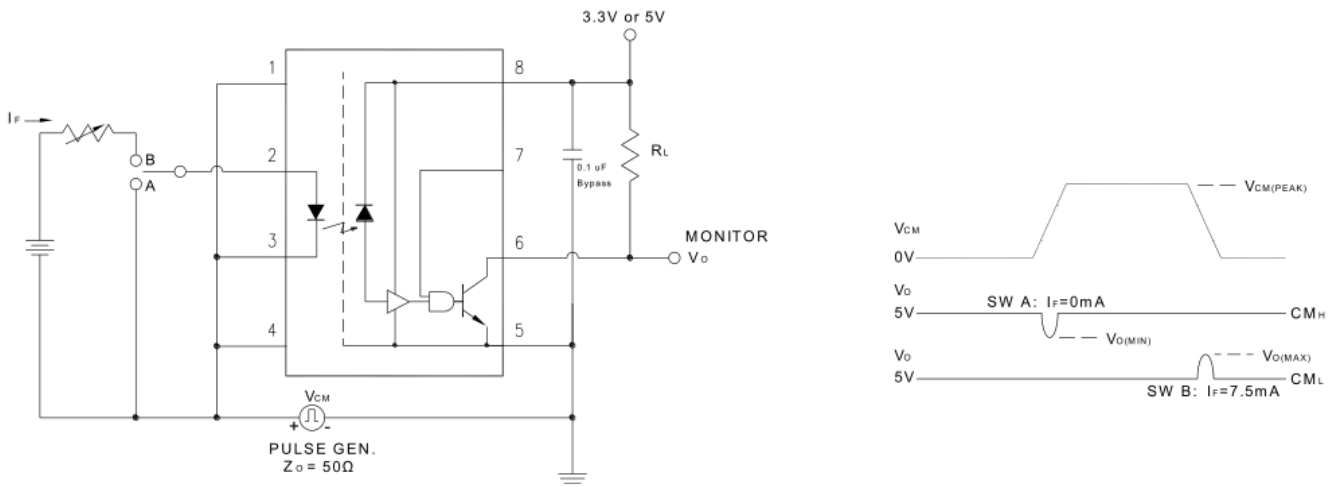


Figure 3: Single Channel Test Circuit for Common Mode Transient Immunity

15、特性曲线 (Characteristics Curve)

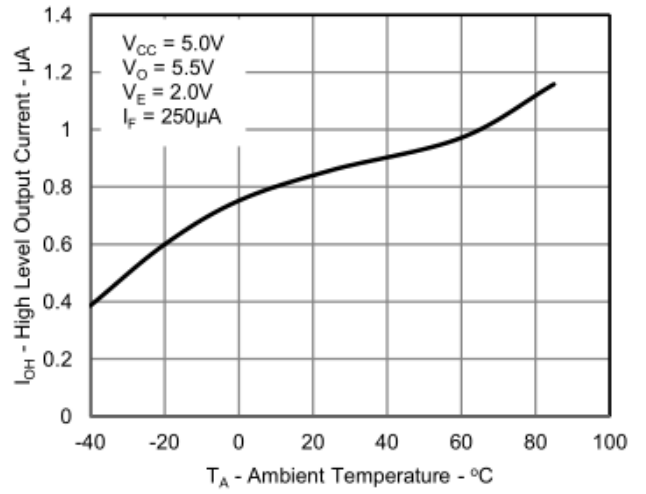
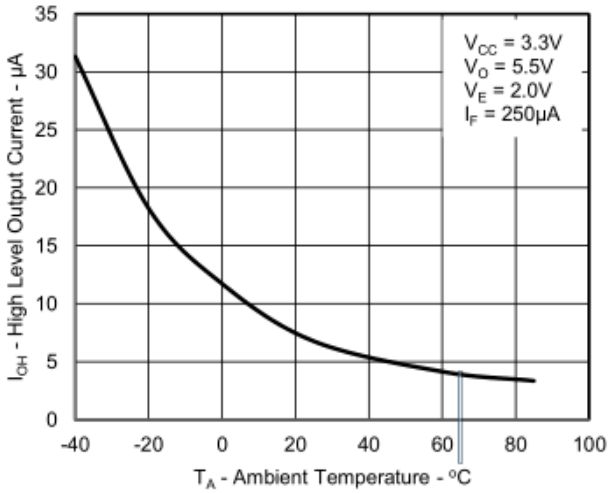


Figure 4: Typical High Level Output Current vs. Ambient Temperature

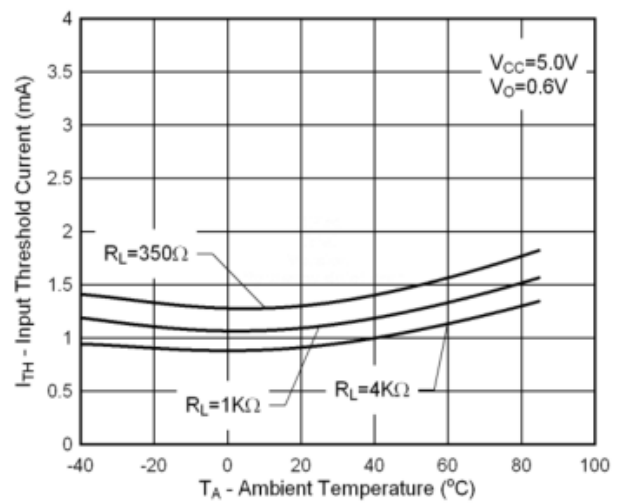
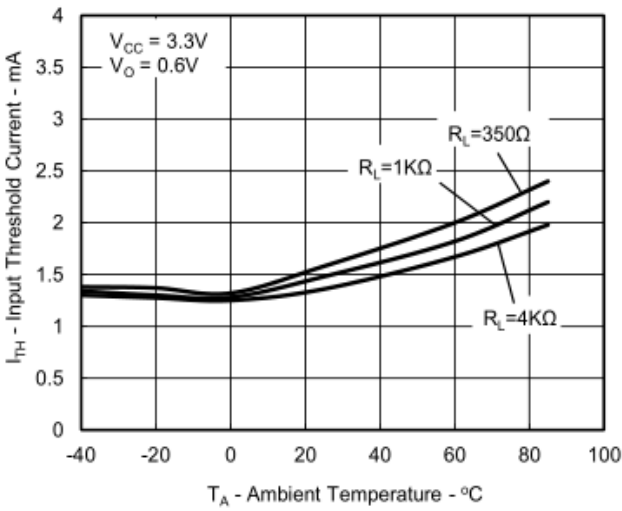


Figure 5: Typical Input Diode Threshold Current vs. Ambient Temperature

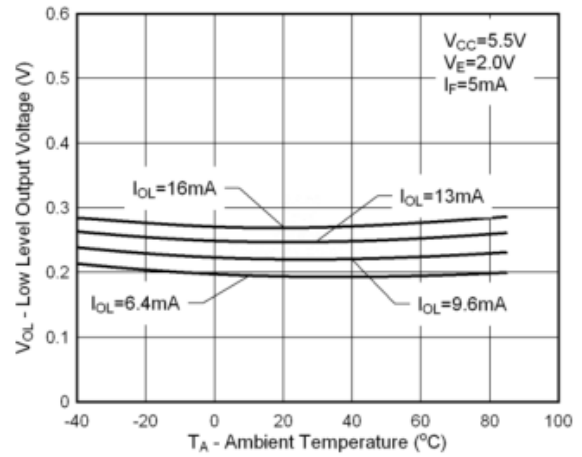
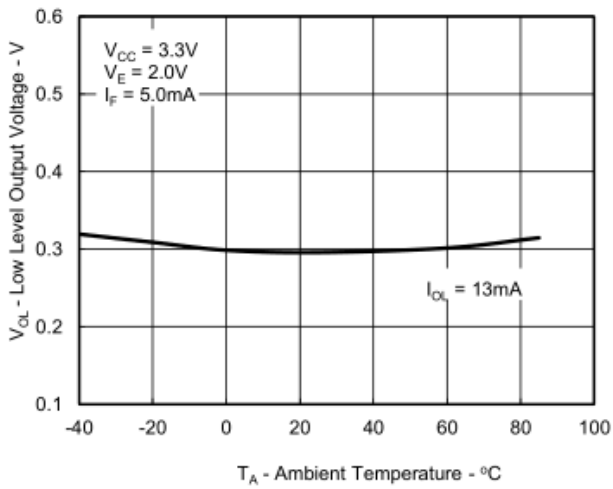


Figure 6: Typical Low Level Output Voltage vs. Ambient Temperature

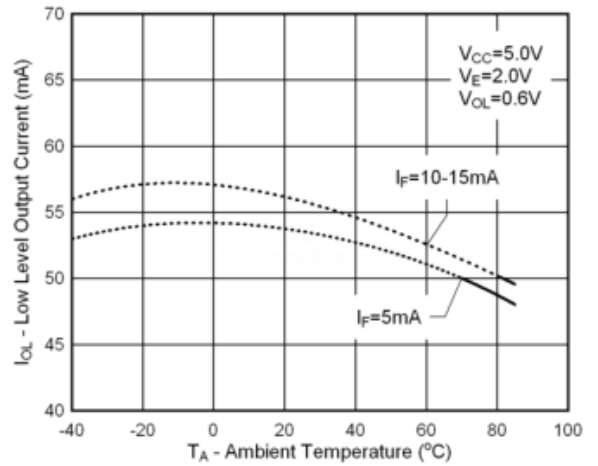
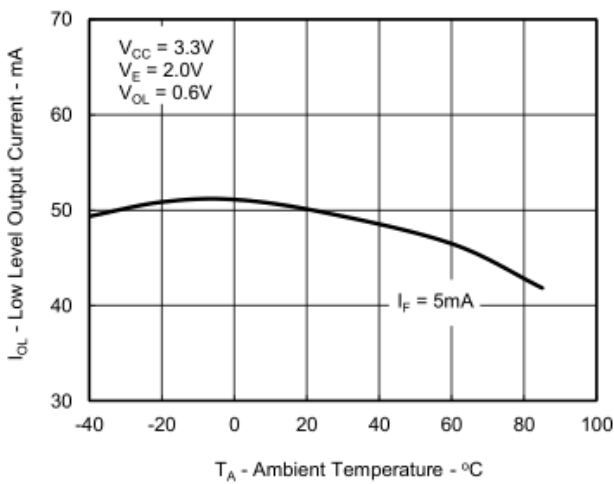


Figure 7: Typical Low Level Output Current vs. temperature

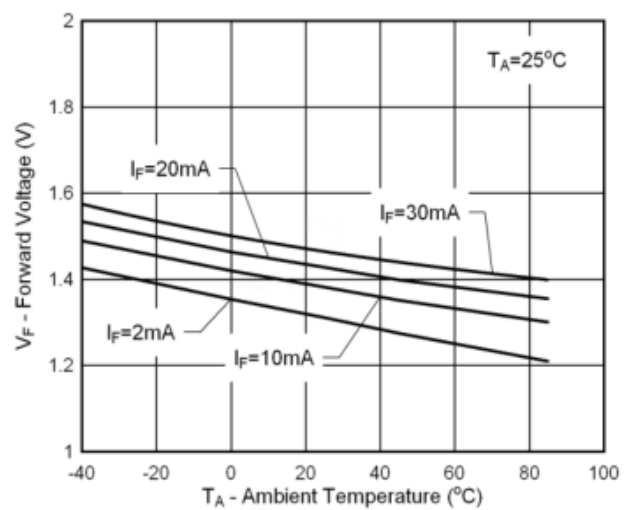
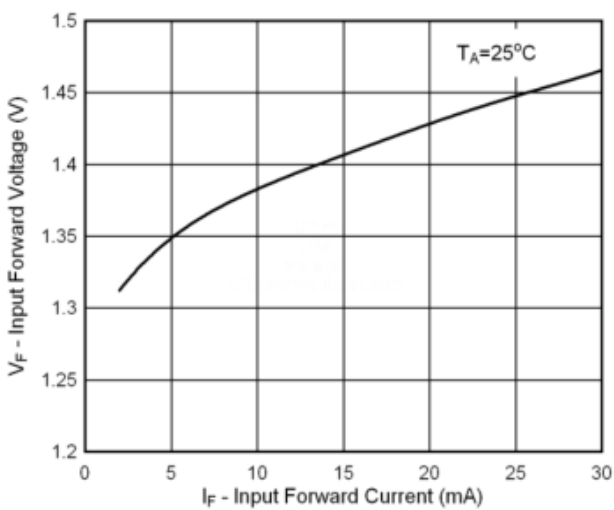


Figure 8: Typical Input Diode Forward Characteristic

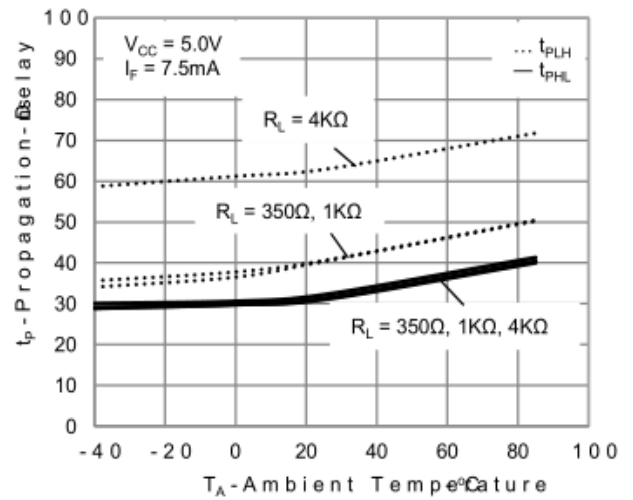
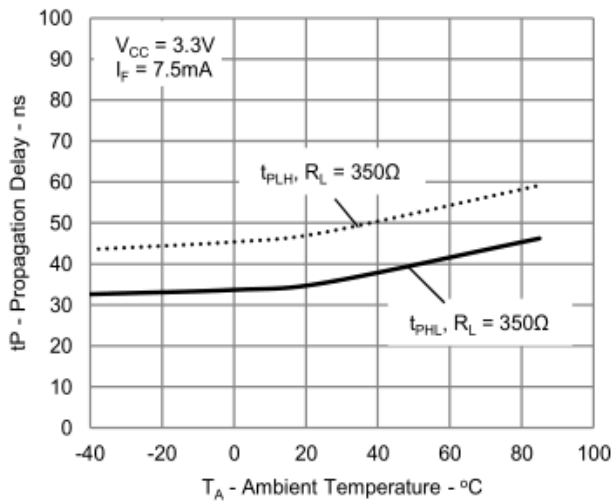


Figure 9: Typical Propagation Delay vs. Ambient Temperature

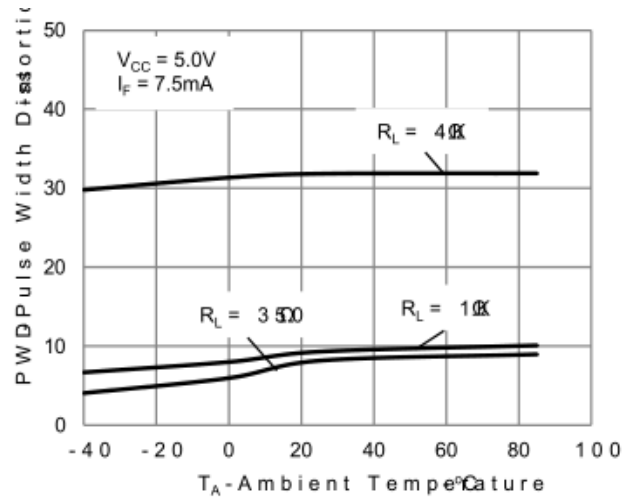
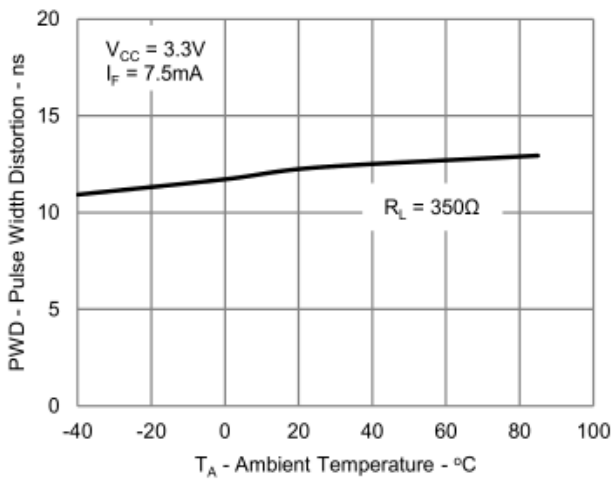


Figure 10: Typical Pulse Width Distortion vs. Ambient Temperature