



# ORIENT

## Photo coupler

### Product Data Sheet

Part Number: OR-60L

Customer: \_\_\_\_\_

Date: \_\_\_\_\_

**SHENZHEN ORIENT COMPONENTS CO., LTD**

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### 1. Features

- (1) Dual Voltage Operation (3.3V/5V)
- (2) Package creepage at 8mm
- (3) High speed: 15 MBd typical
- (4) Guaranteed performance over temperature -40°C~105°C
- (5) High isolation voltage ( $V_{ISO} = 5000 V_{rms}$ .)
- (6) Safety approval
  - UL approved(No.E323844)
  - VDE approved(No.40029733)
  - CQC approved (No.CQC19001231480 )
- (7) In compliance with RoHS, REACH standards
- (8) MSL Level 1



### 2. Description

The 60L serie devices are consists of an infrared emitting diode optically coupled to a high speed integrated photo detector logic gate with a storable output. The devices in a 6-pin small DIP package.

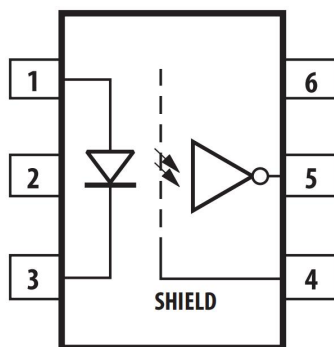
The OR-60L has 8 mm creepage distance and is half size of 8-pin DIP.

The OR-60LW is lead bending type for long creepage distance (Gull-wing) for surface mount.

### 3. Application Range

- (1) Ground loop elimination
- (2) LSTTL to TTL, LSTTL or 5 volt CMOS
- (3) Line receiver, data transmission
- (4) Data multiplexing
- (5) Switching power supplies
- (6) Pulse transformer replacement
- (7) Computer peripheral interface

### 4. Functional Diagram



#### Pin Configuration

- 1: Anode
- 2: No Connection
- 3: Cathode
- 4: GND
- 5:  $V_{out}$
- 6:  $V_{CC}$

#### Truth Table (Positive Logic)

Input	Output
H	L
L	H

**5. Absolute Maximum Ratings (Ta=25°C)**

Parameter		Symbol	Ratings	Unit
Diode	Forward Current <sup>*1</sup>	I <sub>F</sub>	20	mA
	Reverse Voltage	V <sub>R</sub>	5	V
Detector	Supply Voltage	V <sub>CC</sub>	7	V
	Output Voltage	V <sub>O</sub>	7	V
	Output Current	I <sub>O</sub>	50	mA
	Power Dissipation <sup>*2</sup>	P <sub>O</sub>	100	mW
Insulation Voltage		V <sub>iso</sub>	5000	V <sub>rms</sub>
Operating Ambient Temperature		T <sub>opr</sub>	-40 to +105	°C
Storage Temperature		T <sub>stg</sub>	-55 to +125	°C
Soldering temperature		T <sub>sol</sub>	260	°C

Notes:

\*1 AC for 1 minute, R.H.= 40 ~ 60% R.H. In this test, pins 1, 2, 3 & 4 are shorted together, and pins 5, 6, 7 & 8 are shorted together.

\*2 For 10 seconds.

## 6. Electrical Optical Characteristics at Ta=25°C

Over Recommended Operating Conditions (TA = -40°C to +85°C, 2.7V ≤ VCC ≤ 3.6V) unless otherwise specified.  
All Typicals at VCC = 3.3 V, TA = 25°C.

Parameter		Symbol	MIN.	TYP.	MAX.	Unit	Conditions
I N P U T	Forward Voltage	V <sub>F</sub>	---	1.2	1.8	V	I <sub>F</sub> = 10mA
	Reverse Current	I <sub>R</sub>	---	---	10	μA	V <sub>R</sub> = 5V
	Forward Voltage Temperature Coefficient	ΔV <sub>F</sub> /ΔT <sub>A</sub>	---	-1.6	---	mV/C	I <sub>F</sub> = 10mA
	Input Capacitance	C <sub>IN</sub>	---	60	---	pF	V = 0 V, f = 1 MHz
O U T P U T	High Level Output Current	I <sub>OH</sub>	---	2	100	μA	VCC = 3.3 V, VO = 3.3 V, IFL = 250μA
	Low Level Output Voltage	V <sub>OL</sub>	---	0.4	0.6	V	VCC = 3.3 V, IF = 5 mA, IOL(Sinking) = 13 mA
	High Level Supply Current	I <sub>CCH</sub>	---	6.5	10	mA	VCC = 3.3 V, IF = 0 mA
	Low Level Supply Current	I <sub>CCL</sub>	---	8.5	13		VCC = 3.3 V, IF = 10 mA
	Input Threshold Current	IFT	---	---	5	mA	VCC = 3.3V, VO = 0.6V, IOL = 13mA
C O U P L E D	Propagation delay time to output High level	t <sub>PHL</sub>	---	---	90	ns	RL = 350Ω CL = 15pF
	Propagation delay time to output Low level	t <sub>PLH</sub>	---	---	75	ns	
	Pulse width distortion	t <sub>PHL</sub> - t <sub>PLH</sub>	---	---	50	ns	
	Output rise time	t <sub>r</sub>	---	50	---	ns	
	Output fall time	t <sub>f</sub>	---	20	---	ns	

Over recommended operating conditions (TA=-40°C to +85°C, 4.5V ≤ VDD ≤ 5.5V) unless otherwise specified.  
All typicals at VCC = 5 V, TA = 25 °C.

Parameter		Symbol	MIN.	TYP.	MAX.	Unit	Conditions
INPUT	Forward Voltage	V <sub>F</sub>	---	1.2	1.8	V	I <sub>F</sub> = 10mA
	Reverse Current	I <sub>R</sub>	---	---	10	μA	V <sub>R</sub> = 5V
	Forward Voltage Temperature Coefficient	ΔV <sub>F</sub> /ΔT <sub>A</sub>	---	-1.6	---	mV/C	I <sub>F</sub> = 10mA
	Input Capacitance	C <sub>IN</sub>	---	60	---	pF	V = 0 V, f = 1 MHz
OUTPUT	High Level Output Current	I <sub>OH</sub>	---	2	100	μA	VCC = 5.5 V, VO = 5.5 V, IFL = 250μA
	Low Level Output Voltage	V <sub>OL</sub>	---	0.4	0.6	V	VCC = 5.5 V, IF = 5 mA, IOL(Sinking) = 13 mA
	High Level Supply Current	I <sub>CCH</sub>	---	6.5	10	mA	VCC = 5.5 V, IF = 0 mA
	Low Level Supply Current	I <sub>CCL</sub>	---	8.5	13		VCC = 5.5 V, IF = 10 mA
	Input Threshold Current	IFT	---	---	5	mA	VCC= 5.5V, VO=0.6V, IOL=13mA
CHARACTERISTICS	Propagation delay time to output High level	t <sub>PHL</sub>	---	---	90	ns	RL=350Ω CL=15pF
	Propagation delay time to output Low level	t <sub>PLH</sub>	---	---	75	ns	
	Pulse width distortion	t <sub>PHL</sub> - t <sub>PLH</sub>	---	---	30	ns	
	Output rise time	t <sub>r</sub>	---	50	---	ns	
	Output fall time	t <sub>f</sub>	---	20	---	ns	

Parameter	Symbol	MIN.	TYP.	MAX.	Unit	Conditions
Common Mode Transient Immunity at Logic High *4	CMH	5	---	---	KV/μS	IF = 0mA, VOH=2.0V, RL=350Ω, TA=25°C, VCM=1000Vp-p
Common Mode Transient Immunity at Logic Low *5	CML	5	---	---	KV/μS	IF = 7.5mA, VOL=0.8V, RL=350Ω, TA=25°C, VCM=1000Vp-p

- (1) Typical values at T<sub>A</sub> = 25°C
- (2) Test circuit for propagation delay time(Figure on Page 17)
- (3) Test circuit for common mode transient immunity(Figure on Page 17)



## 7. Order Information

**Part Number**

**OR-60LY-Z-X**

**Note**

60L = Part Number.

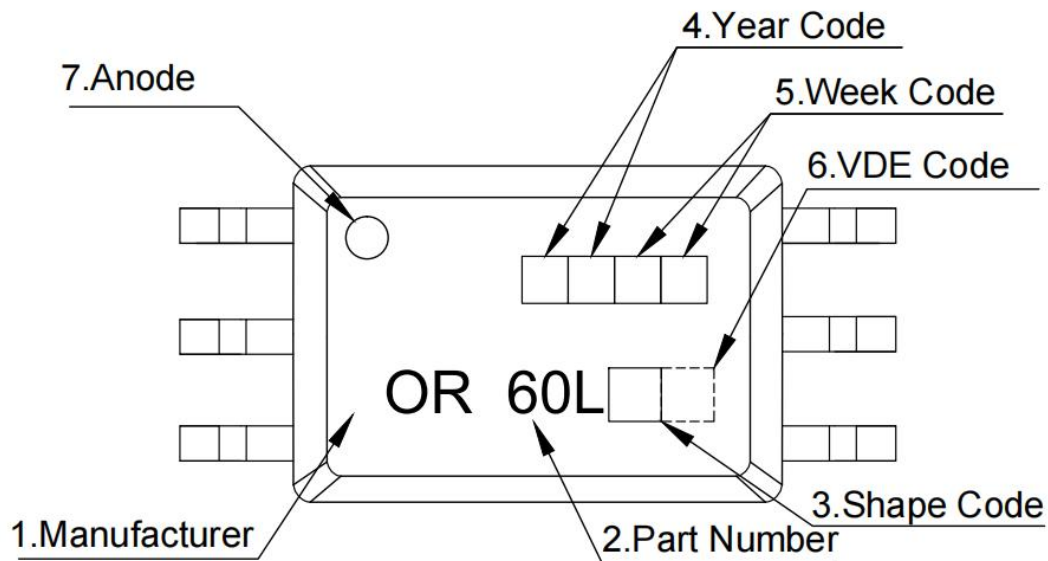
Y = Lead form option (W)

Z = Tape and reel option (TA,TA1 or none).

X = VDE Code. (Optional)

<b>Option</b>	<b>Description</b>	<b>Packing quantity</b>
S(TA)	Surface mount lead form (low profile) + TA tape & reel option	1000 units per reel
S(TA1)	Surface mount lead form (low profile) + TA1 tape & reel option	1000 units per reel

## 8. Naming Rule

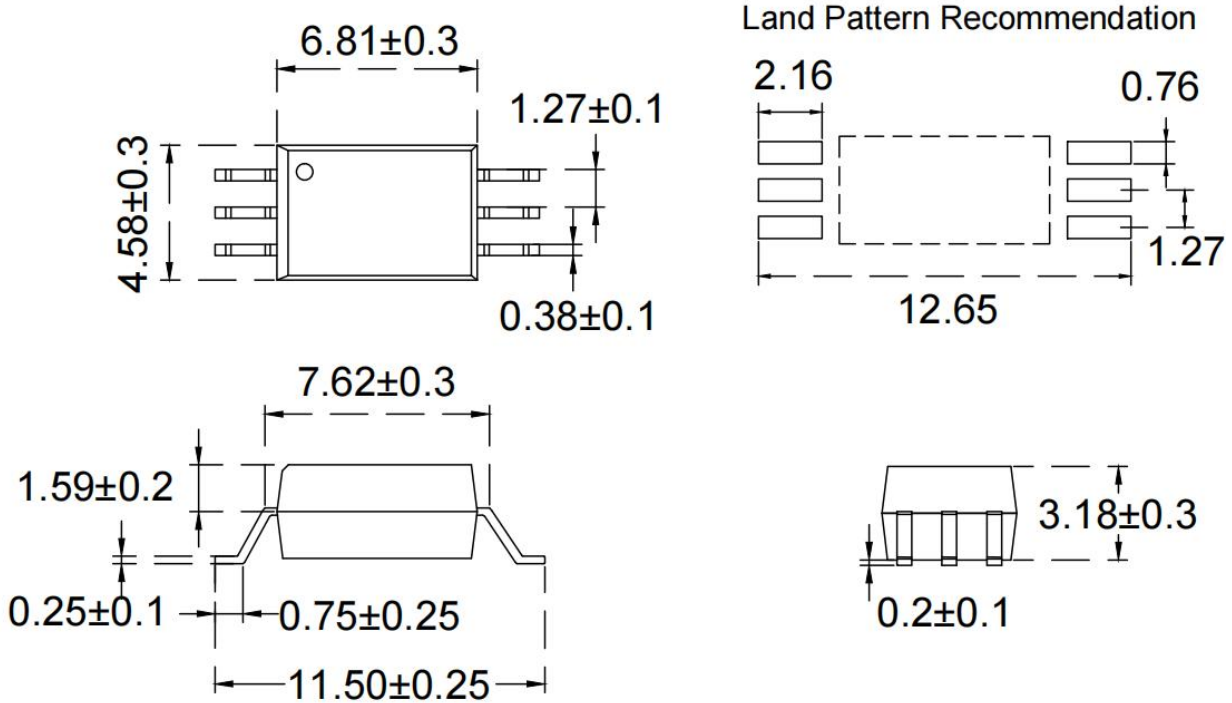


1. Manufacturer : ORIENT.
2. Part Number : 60L .
3. Shape Code  : Lead form option ,W
4. Year Code  : '21' means '2021' and so on.
5. Week Code : 01 means the first week, 02 means the second week and so on.
6. VDE Code .
7. Anode.

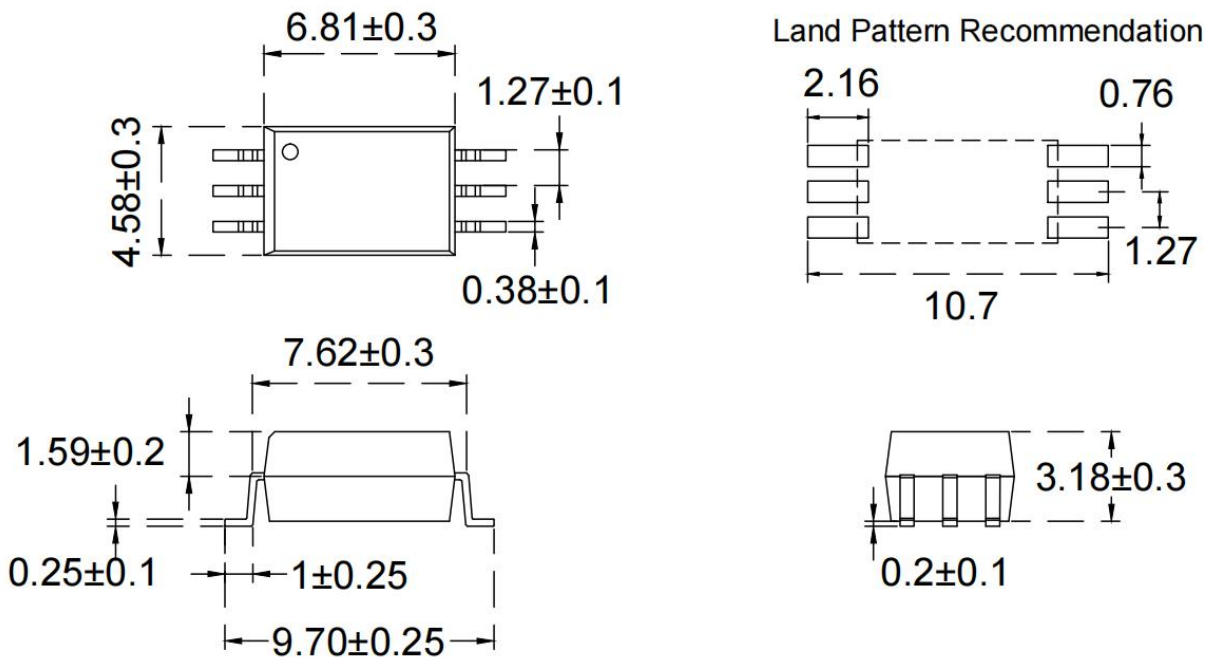
\* VDE Code (Optional)

9. Package Dimension

(1).OR-60LW



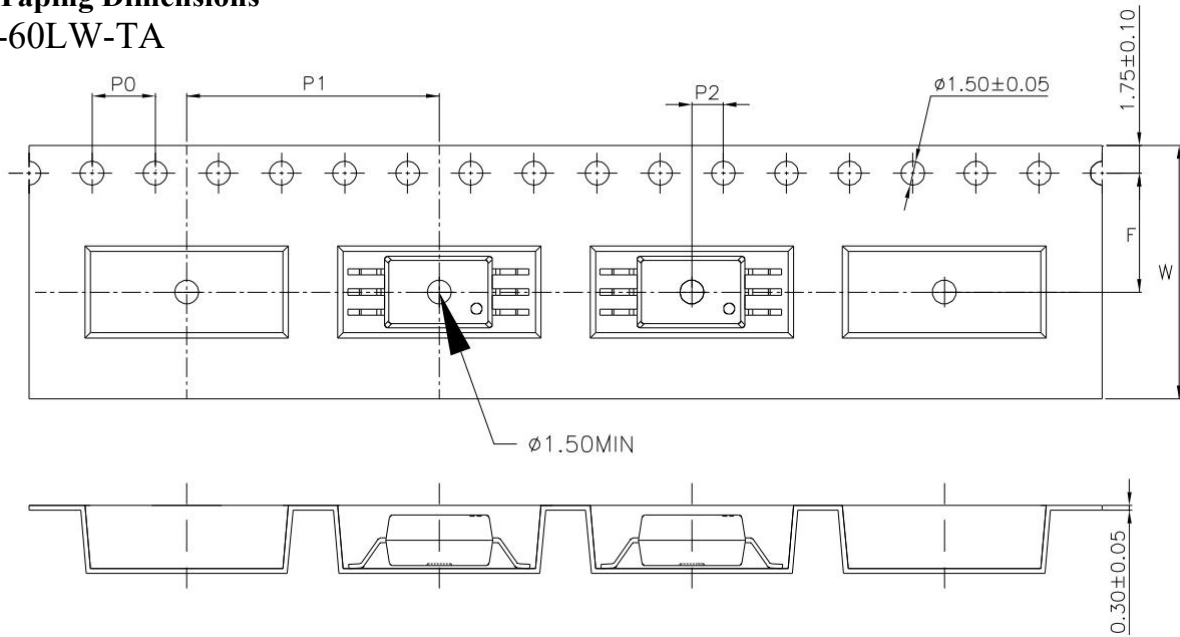
(2).OR-60LW1



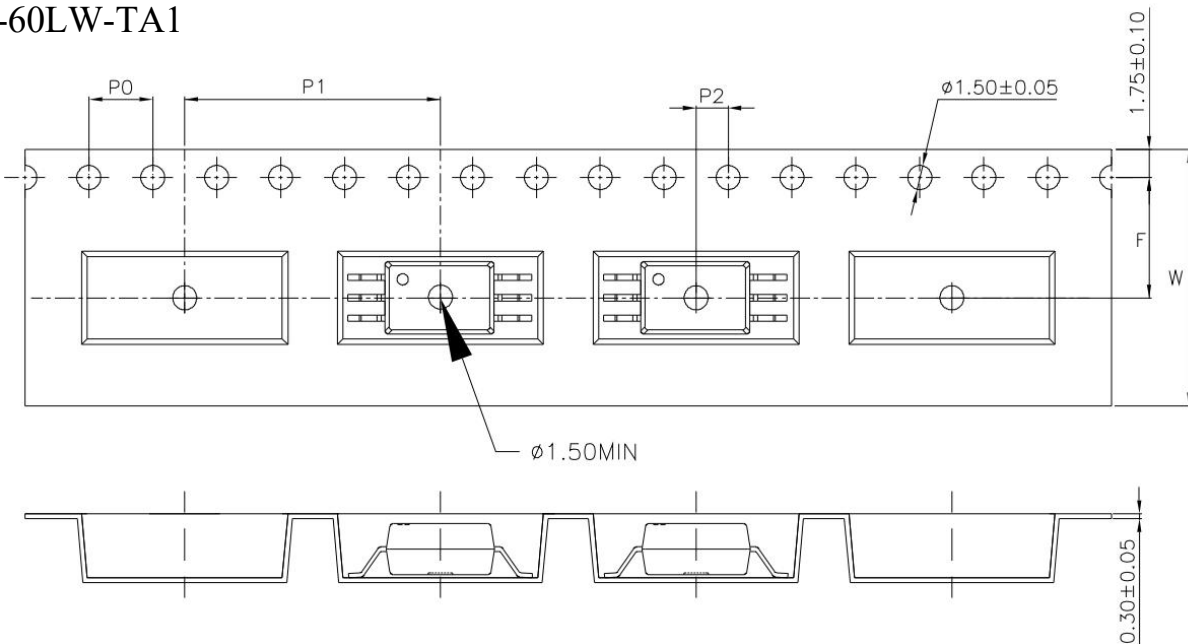


**10. Taping Dimensions**

**(1)OR-60LW-TA**



**(2)OR-60LW-TA1**



Type	symbol	Dimension in mm (inch)	
		For W type	For W1 type
bandwidth	W	$16 \pm 0.3$ (0.63)	$16 \pm 0.3$ (0.63)
pitch	P0	$4 \pm 0.1$ (0.16)	$4 \pm 0.1$ (0.16)
pitch	F	$7.5 \pm 0.1$ (0.3)	$7.5 \pm 0.1$ (0.3)
	P2	$2 \pm 0.1$ (0.079)	$2 \pm 0.1$ (0.079)
interval	P1	$16 \pm 0.1$ (0.63)	$12 \pm 0.1$ (0.47)

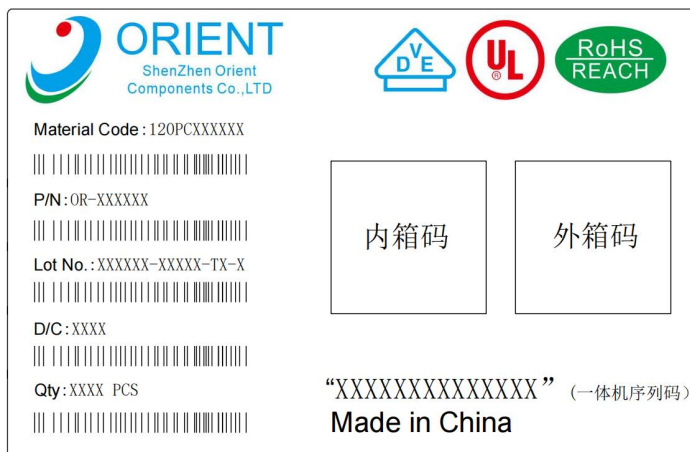
Encapsulation type	TA/TA1
amount ( pcs )	1000

## 11. Package Dimension

### (1) package dimension

Packing Information	
Packing type	Reel type
Tape Width	16mm
Qty per Reel	1,000pcs
Small box (inner) Dimension	345*345*58.5mm
Large box (Outer) Dimension	620x360x360mm
Max qty per small box	2,000pcs
Max qty per large box	20,000pcs

### (2)Packing Label Sample



The label sample includes the following elements:

- Logos:** ORIENT (ShenZhen Orient Components Co.,LTD), VDE, UL, and RoHS REACH.
- Material Code:** 120PCXXXXXX
- P/N:** OR-XXXXXX
- Lot No.:** XXXXXX-XXXXX-TX-X
- D/C:** XXXX
- Qty:** XXXX PCS
- Inner Box Code:** 内箱码
- Outer Box Code:** 外箱码
- Serial Number:** "XXXXXXXXXXXXXXXX" (一体机序列码)
- Origin:** Made in China

#### Note:

1. Material Code :Product ID.
2. P/N :Contents with "Order Information" in the specification.
3. Lot No. :Product data.
4. D/C :Product weeks.
5. Quantity :Packaging quantity.

**12. Reliability Test**

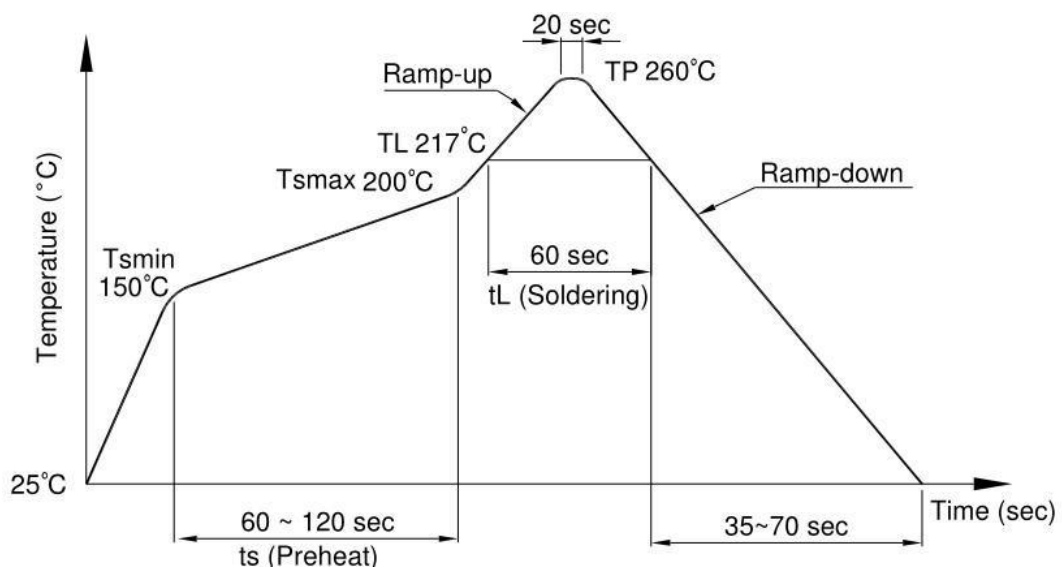
NO.	ITEMS	Reliability Testing				
		QTY. (Pcs)	Condition	Process	Device	Standard
1	RSH 耐焊接热	22	260±5°C	5s/3 次	锡炉	JESD22-A106
2	HTSL 高温存储	77	125°C	168 hrs	高温烤箱 测试仪	JESD22-A103
				500 hrs		
				1000 hrs		
3	LTSL 低温存储	77	-40°C	168 hrs	低温箱 测试仪	JESD22-A119
				500 hrs		
				1000 hrs		
4	TC 温度循环	77	H:125°C 15min ↓5min L:-55°C 15min	300 cycle	冷热冲击 机	JESD22-A104
5	TS 温度冲击	77	H:100°C 5min ↓15s L:-40°C 5min	300 cycle	冷热冲击 机	JESD22-A106
6	HTOL 高温操作	77	100°C IF=10mA Vcc=5V	168 hrs	高温烤箱 测试仪、 老化电路 板	JESD22-A108
				500 hrs		
				1000 hrs		
7	ESD- HBM 人体模式	22	≥8KV 1Cycle	1次	ESD静电 测试仪	JESD22-A114
8	SD 可焊性	22	Pb-free 245±5°C	5s/1次	锡炉	JESD22-B102
9	HTHB 温湿寿命 试验	77	85°C,85%RH IF=10mA,Vcc=5V	168 hrs	恒温恒湿 机, 测试 仪	JESD22-A101
				500 hrs		
				1000 hrs		
10	Autoclave 压力锅	77	Ta=121 °C,100%RH,2atm	96hrs	压力锅	JESD22-A102

### 13. Temperature Profile Of Soldering

(1).IR Reflow soldering (JEDEC-STD-020C compliant)

One time soldering reflow is recommended within the condition of temperature and time profile shown below. Do not solder more than three times.

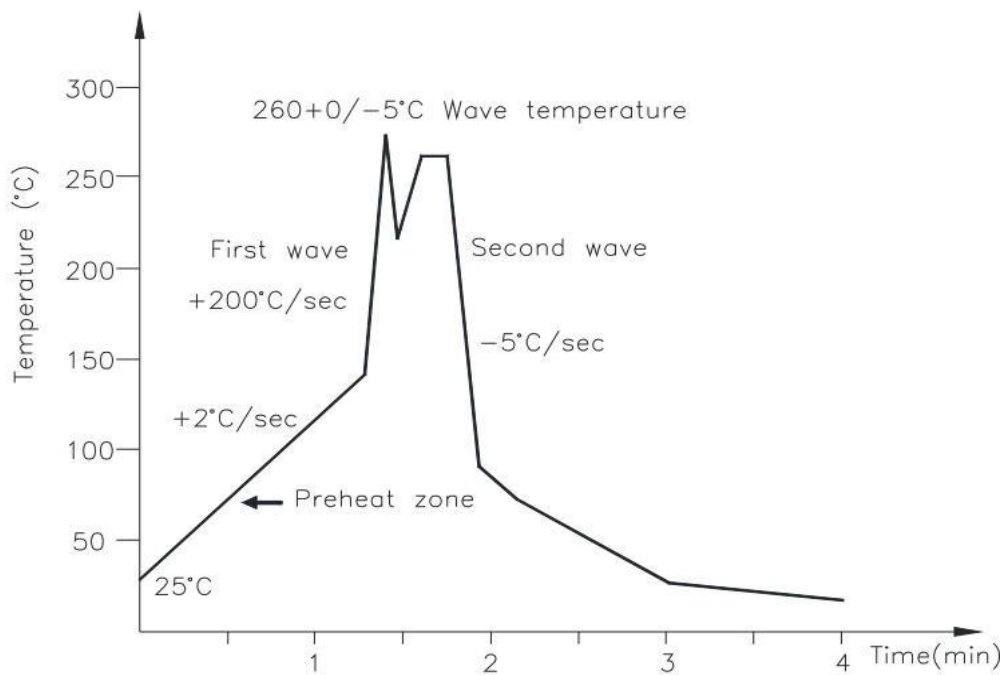
Profile item	Conditions
Preheat - Temperature Min (T Smin ) - Temperature Max (T Smax ) - Time (min to max) (ts)	150°C 200°C 90±30 sec
Soldering zone - Temperature (TL ) - Time (t L )	217°C 60 sec
Peak Temperature	260°C
Peak Temperature time	20 sec
Ramp-up rate	3°C / sec max.
Ramp-down rate from peak temperature	3~6°C / sec
Reflow times	≤3



**(3) .Wave soldering (JEDEC22A111 compliant)**

One time soldering is recommended within the condition of temperature.

Temperature	260+0/-5°C
Time	10 sec
Preheat temperature	5 to 140°C
Preheat time	30 to 80 sec



**(3).Hand soldering by soldering iron**

Allow single lead soldering in every single process. One time soldering is recommended.

Temperature	380+0/-5°C
Time	3 sec max

14. CHARACTERISTICS CURVES (TYPICAL PERFORMANCE)

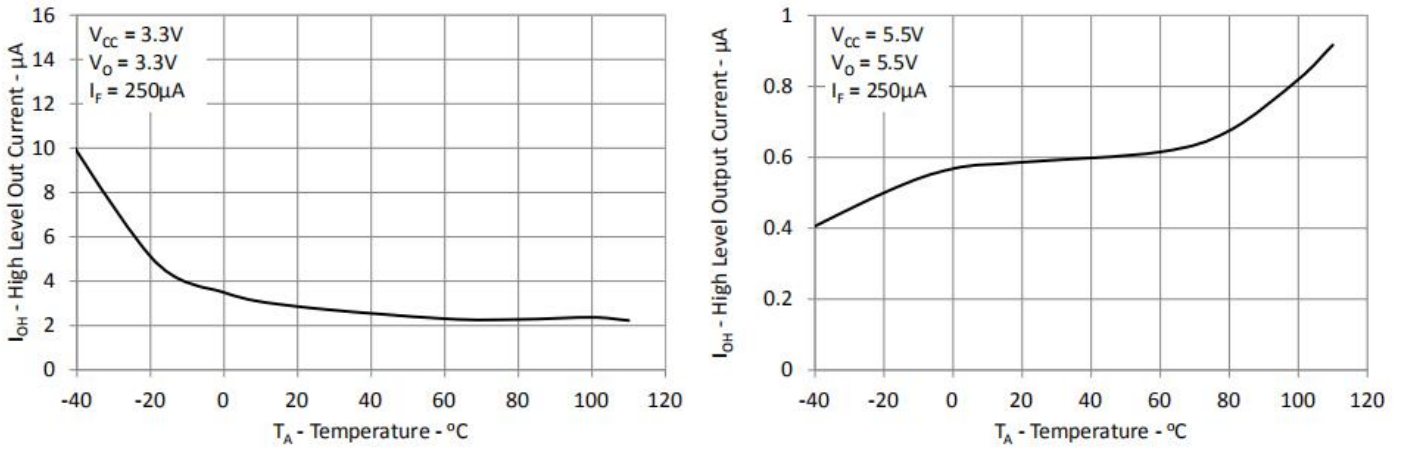


Figure 1. Typical high level output current vs. temperature.

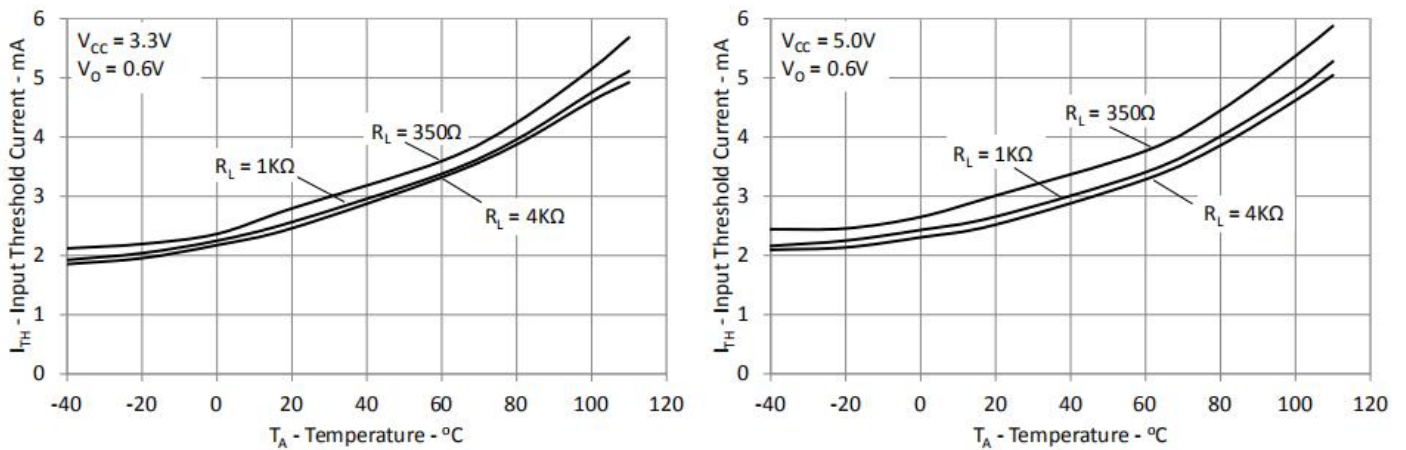


Figure 2. Typical input threshold current vs. temperature.

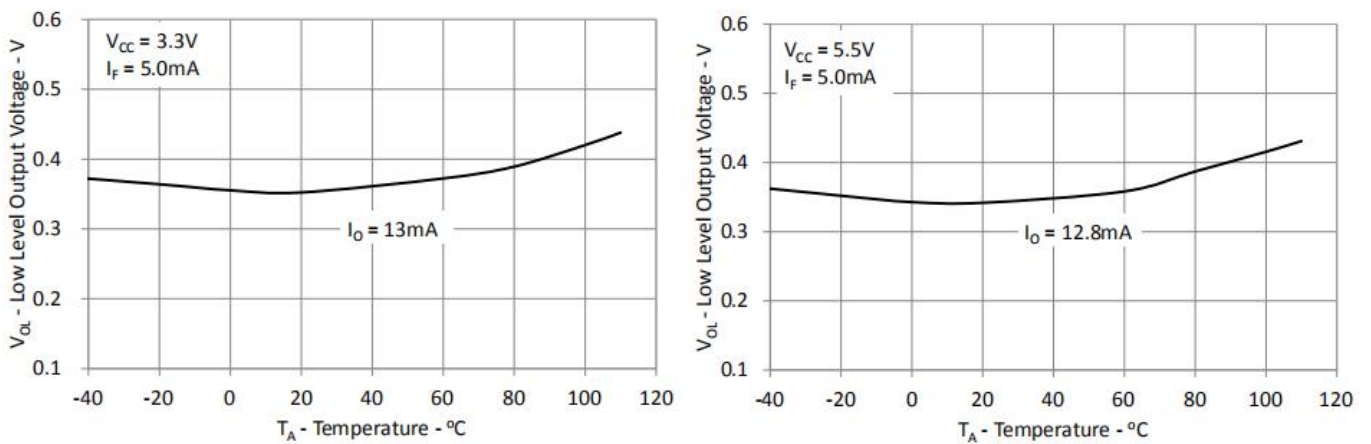


Figure 3. Typical low level output voltage vs. temperature.

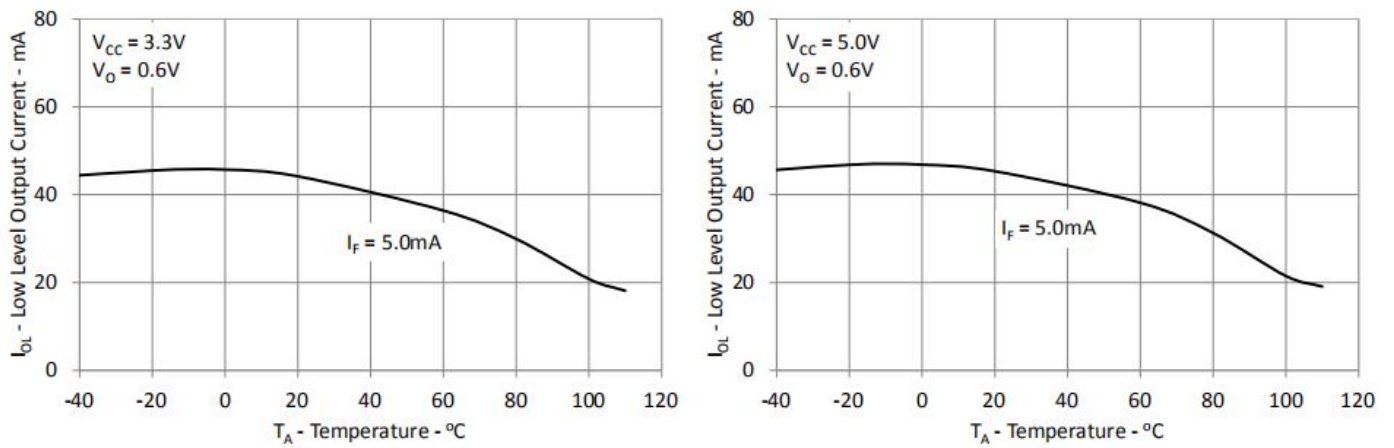


Figure 4. Typical low level output current vs. temperature.

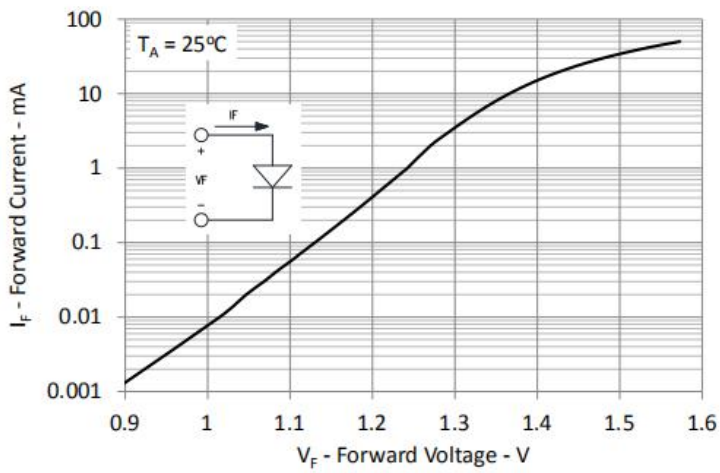


Figure 5. Typical input diode forward characteristic.

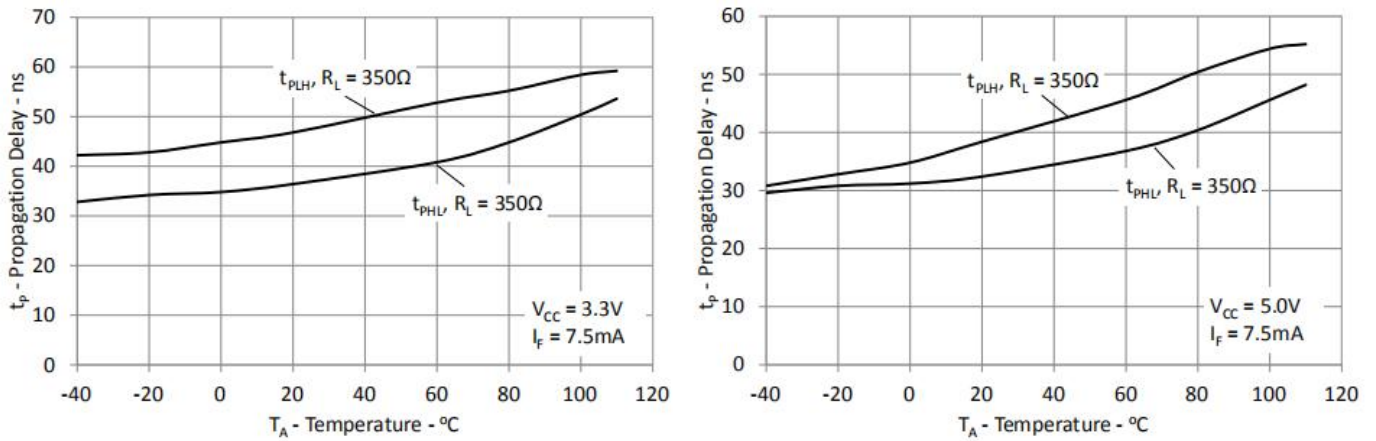


Figure 6. Typical propagation delay vs. temperature.

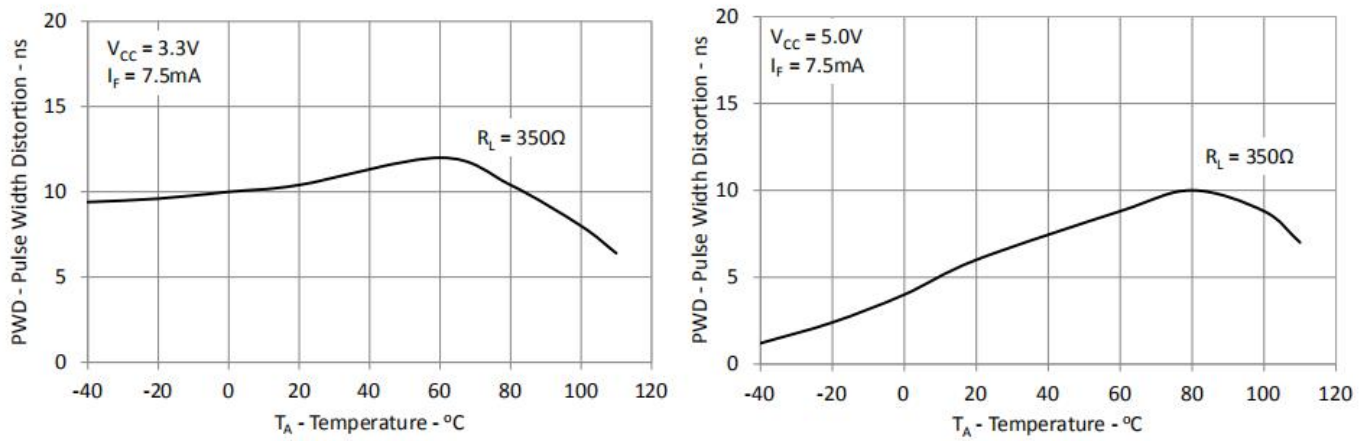


Figure 7. Typical pulse width distortion vs. temperature.



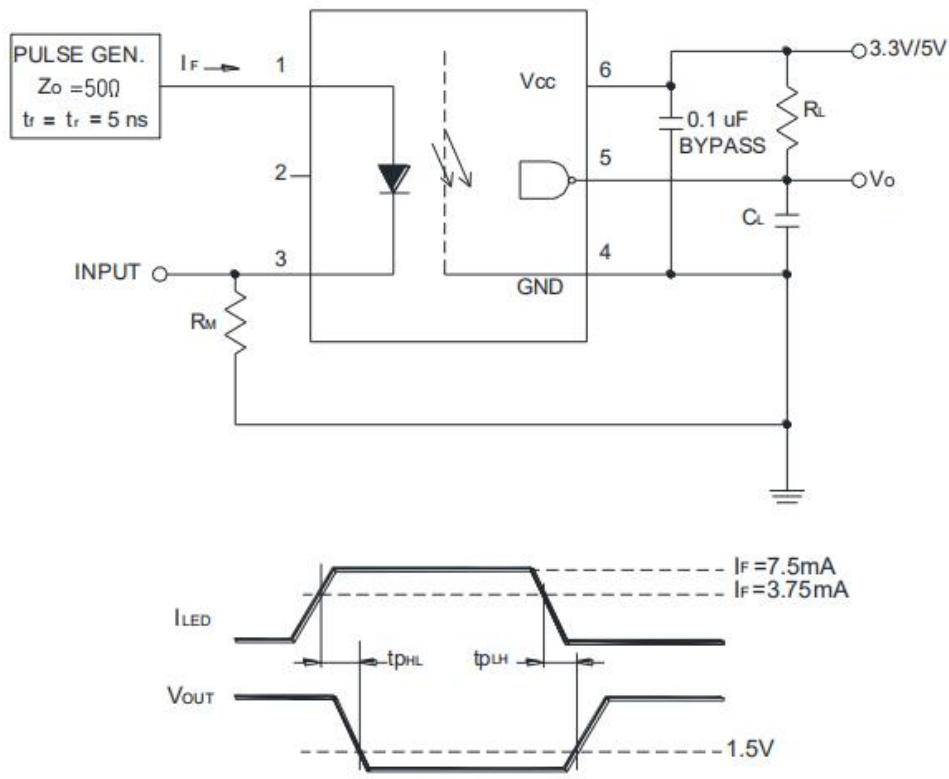


Figure 8. Test Circuit for  $t_{PHL}$  and  $t_{PLH}$

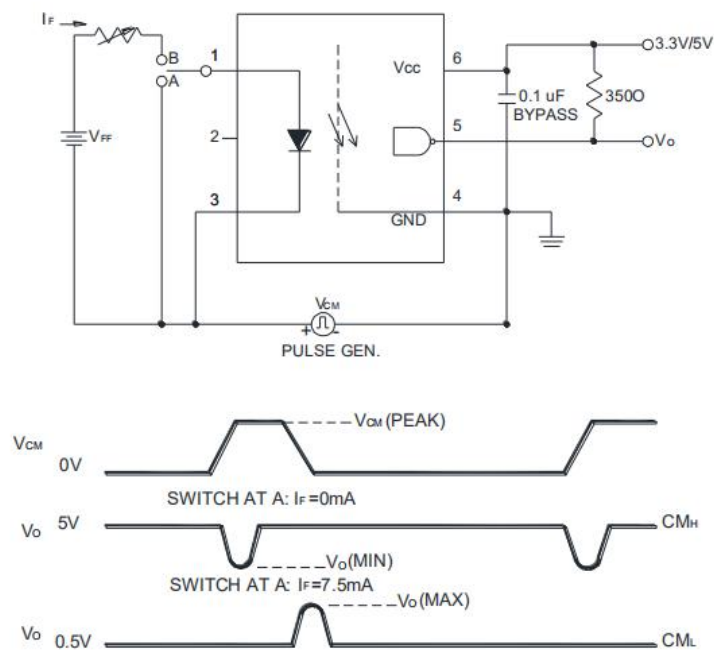


Figure 9. Test Circuit for Common Mode Transient Immunity and typical waveforms