



# ORIENT

## Photo coupler

### Product Data Sheet

Part Number: OR-480

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

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

#### 一级代理商：

深圳市弗瑞鑫电子有限公司

地址：深圳市宝安区西乡大道302号金源商务大厦B座三楼

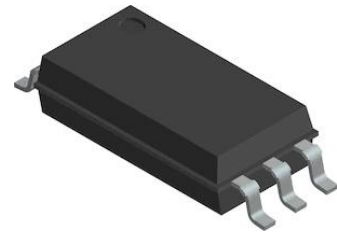
TEL：0755-29563634

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[www.frxelec.com](http://www.frxelec.com)

**1. Features**

- (1) Performance Specified for Common IPM Applications Over Industrial Temperature Range.
- (2) Short Maximum Propagation Delays
- (3) Minimized Pulse Width Distortion (PWD)
- (4) Very High Common Mode Rejection (CMR)
- (5) Hysteresis
- (6) Totem Pole Output (No Pull-up Resistor Required)
- (7) Available in Stretched SO-6 package.
- (8) Industrial temperature range: -40° C to 105° C
- (9) Safety approval
  - UL approved(No.E323844)
  - VDE approved(No.40029733)
  - CQC approved (No.CQC19001231480 )
- (10) In compliance with RoHS, REACH standard
- (11) MSL Level 1



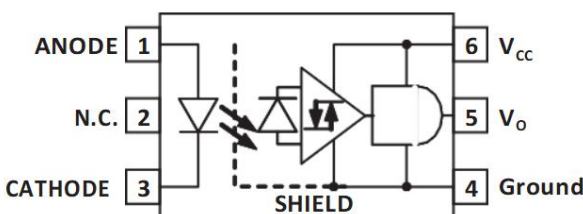
**2. Description**

The OR-480 fast speed optocou- plers contain a GaAsP LED and photo detector with built-in Schmitt trigger to provide logic-compatible waveforms, eliminating the need for additional wave shaping. The totem pole output eliminates the need for a pull up resistor and allows for direct drive Intelligent Power Module or gate drive. Minimized propagation delay difference between devices make these optocou- plers excellent solutions for improving inverter efficiency through reduced switching dead time.

**3. Application Range**

- (1)IPM Interface Isolation
- (2)Isolated IGBT/MOSFET Gate Drive
- (3)AC and Brushless DC Motor Drives
- (4)Industrial Inverters
- (5)General Digital Isolation

**4. Functional Diagram**



Truth Table	
LED	VO
OFF	LOW
ON	HIGH

Note: A 0.1 μF bypass capacitor must be connected between pins 4 and 6

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

Parameter		Symbol	Rated Value	Unit
Input	Average Forward Input Current	$I_F$	50	mA
	Peak transient input forward current	$I_{FPT}$	1	A
	Reverse Input Voltage	$V_R$	5	V
Output	Average Output Current	$I_O$	25	mA
	Supply Voltage	$V_{CC}$	25	V
	Output Voltage	$V_O$	25	V
	Output Collector Power Dissipation	$P_O$	210	mW
Insulation Voltage		$V_{iso}$	5000	Vrms
Working Temperature		$T_{opr}$	-40 ~ + 100	°C
Storage Temperature		$T_{stg}$	-55 ~ + 125	
*2 Soldering Temperature		$T_{sol}$	260	

\*1. Room temperature = 25 °C. Exceeding the maximum absolute rating can permanently damage the device. Working long hours at the maximum absolute rating can affect reliability.

\*2. soldering time is 10 seconds.

## 6. Recommended Operating Conditions

Parameter	Symbol	Min.	Max.	Units
Power Supply Voltage	$V_{CC}$	4.5	20	V
Forward Input Current (ON)	$I_{F(ON)}$	6	10	mA
Forward Input Voltage (OFF)	$V_{F(OFF)}$	-	0.8	V
Operating Temperature	$T_A$	-40	100	°C

**7. Electrical Optical Characteristics at Ta=25°C**

Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
Logic Low Output Voltage	$V_{OL}$	—	0.08	0.5	V	$I_{OL} = 6.4 \text{ mA}$
Logic High Output Voltage	$V_{OH}$	2.4	4.9	—	V	$I_{OH} = -2.6 \text{ mA}$
		2.7	5			$I_{OH} = -0.4 \text{ mA}$
		2.7				$I_{OH} = -1.6 \text{ mA}$
Output Leakage Current ( $V_O = V_{CC} + 0.5V$ )	$I_{OHH}$	—	—	100	$\mu\text{A}$	$V_{CC} = 5 \text{ V}, I_F = 10 \text{ mA}$
		—	—	500	$\mu\text{A}$	$V_{CC} = 20 \text{ V}, I_F = 10 \text{ mA}$
High Level Supply Current	$I_{CCH}$	—	0.9	2.5	mA	$V_{CC} = 5.5 \text{ V}, I_F = 10 \text{ mA}, I_O = \text{Open}$
		—	1.1	2.5	mA	$V_{CC} = 20 \text{ V}, I_F = 10 \text{ mA}, I_O = \text{Open}$
Low Level Supply Current	$I_{CCL}$	—	0.9	3.0	mA	$V_{CC} = 5.5 \text{ V}, V_F = 0 \text{ V}, I_O = \text{Open}$
		—	1.2	3.0	mA	$V_{CC} = 20 \text{ V}, V_F = 0 \text{ V}, I_O = \text{Open}$
Threshold Input Current Low to High	$I_{FLH}$	—	2.3	5.5	mA	$C_g = 25 \text{ nF}, V_O > 5 \text{ V}$
Logic Low Short Circuit Output Current	$I_{OSL}$	25	185	—	mA	$V_O = V_{CC} = 5.5 \text{ V}, V_F = 0 \text{ V}$
		50	175	—	mA	$V_O = V_{CC} = 20 \text{ V}, V_F = 0 \text{ V}$
Logic High Short Circuit Output Current	$I_{OSH}$	—	-162	-25	mA	$V_{CC} = 5.5 \text{ V}, I_F = 6 \text{ mA}, V_O = \text{GND}$
		—	-185	-50	mA	$V_{CC} = 20 \text{ V}, I_F = 6 \text{ mA}, V_O = \text{GND}$
Input Forward Voltage	$V_F$	1.2	1.55	1.95	V	$I_F = 10 \text{ mA}$
Temperature Coefficient of Forward Voltage	$\Delta V_F / \Delta T$	—	-1.7	—	mV/°C	$I_F = 10 \text{ mA}$
Input Reverse Breakdown Voltage	$B_{VR}$	5	—	—	V	$I_R = 100 \mu\text{A}$
Input Capacitance	$C_{IN}$	—	70	—	pF	$f = 1 \text{ MHz}, V_F = 0 \text{ V}$

**8. Switching Characteristics**

Parameter	Symbol	Min.	Typ	Max.	Units	Test Conditions
Propagation Delay Time to High Output Level	$t_{PLH}$	—	155	350	ns	With Peaking Capacitor
Propagation Delay Time to Low Output Level	$t_{PHL}$	—	145	350	ns	With Peaking Capacitor
Pulse Width Distortion	$ t_{PHL} - t_{PLH}  = P_{WD}$	—	6.2	250	ns	
Propagation Delay Difference Between Any Two Parts	$P_{DD}$	-100	—	250	ns	
Rise Time	$t_r$	—	18	—	ns	
Fall Time	$t_f$	—	15	—	ns	
Output High Level Common Mode Transient Immunity	$ CM_H $	20	—	—	kV/ $\mu\text{s}$	$ V_{CM}  = 1000 \text{ V}, I_F = 6.0 \text{ mA}, V_{CC} = 5 \text{ V}, T_A = 25^\circ\text{C}$
Output Low Level Common Mode Transient Immunity	$ CM_L $	20	—	—		$ V_{CM}  = 1000 \text{ V}, V_F = 0 \text{ V}, V_{CC} = 5 \text{ V}, T_A = 25^\circ\text{C}$



## 9. Order Information

### Part Number

# OR-480U-Y-Z

### Note

480= Part Number .

U = Lead form option ,W or W1 .

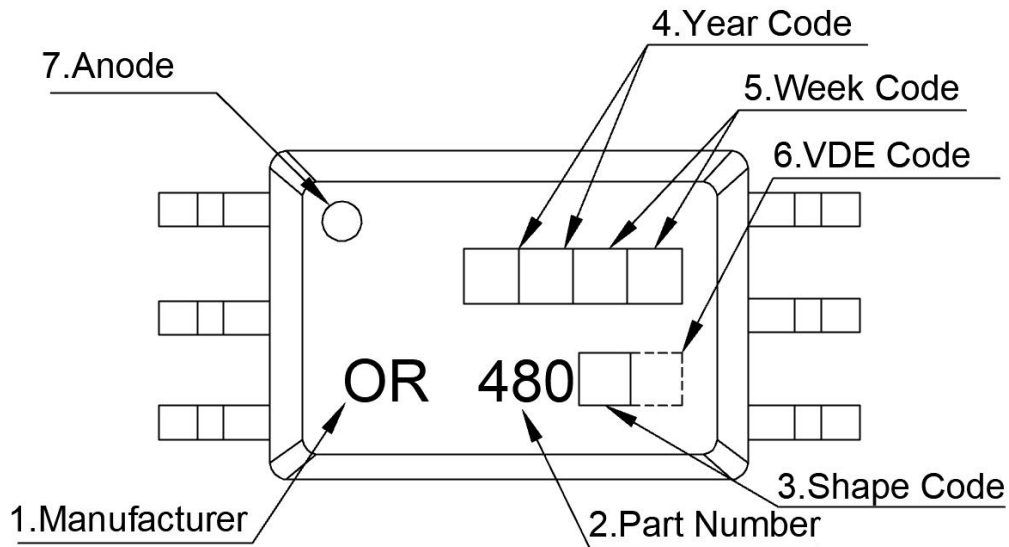
Y = Tape and reel option (TA,TA1 or none) .

Z = ‘V’ code for VDE safety (This options is not necessary).

\* VDE Code can be selected.

Option	Description	Packing quantity
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

## 10. Naming Rule

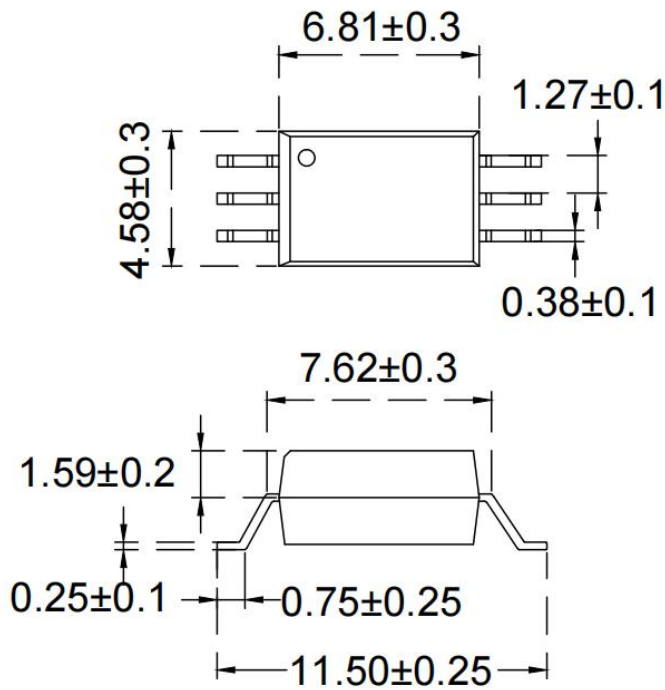


1. Manufacturer : ORIENT.
2. Part Number : 480.
3. Shape Code  : Lead form option ,W or W1 .
4. Year Code  : '21' means '2021' and so on.
5. Week Code : 01 means the first week, 02 means the second week and so on.
6. VDE Code . (Optional)
7. Anode.

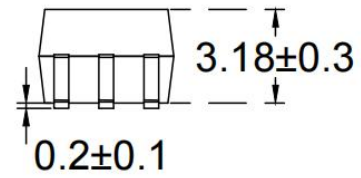
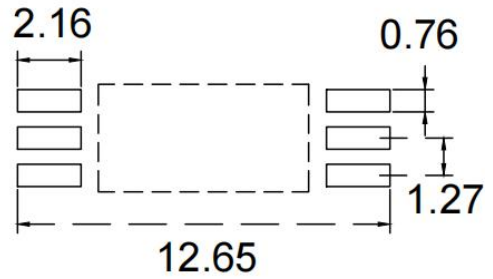
\* VDE Mark can be selected.

**11. Package Dimension**

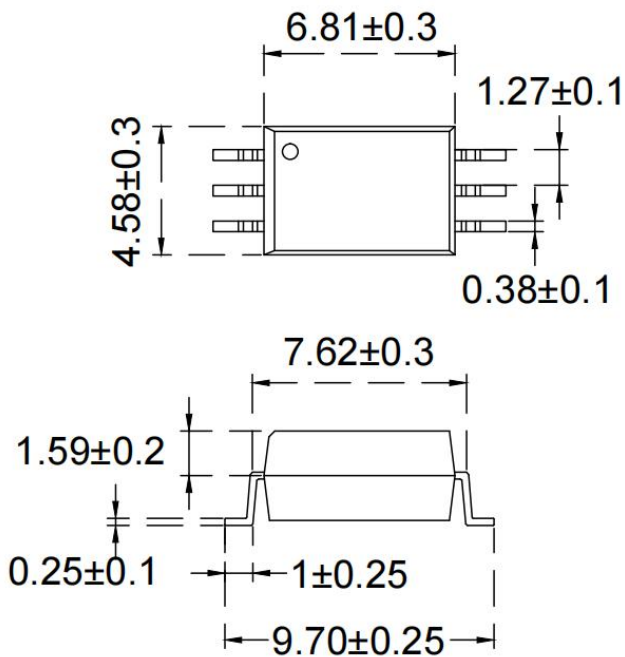
(1).OR-480W



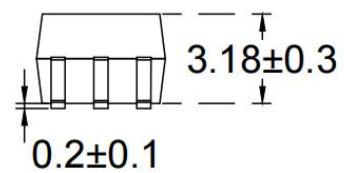
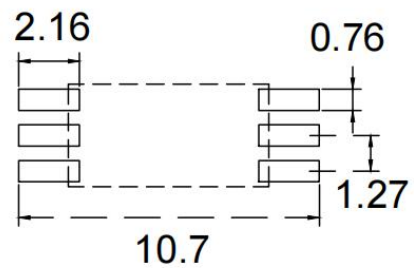
Land Pattern Recommendation



(2).OR-480W1

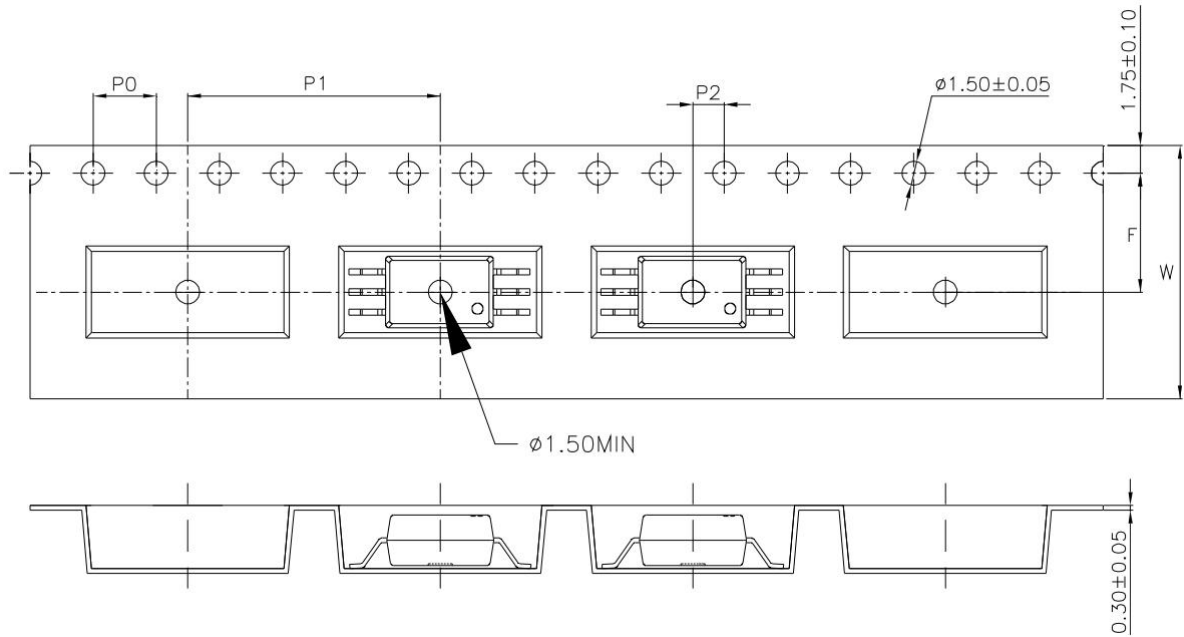


Land Pattern Recommendation

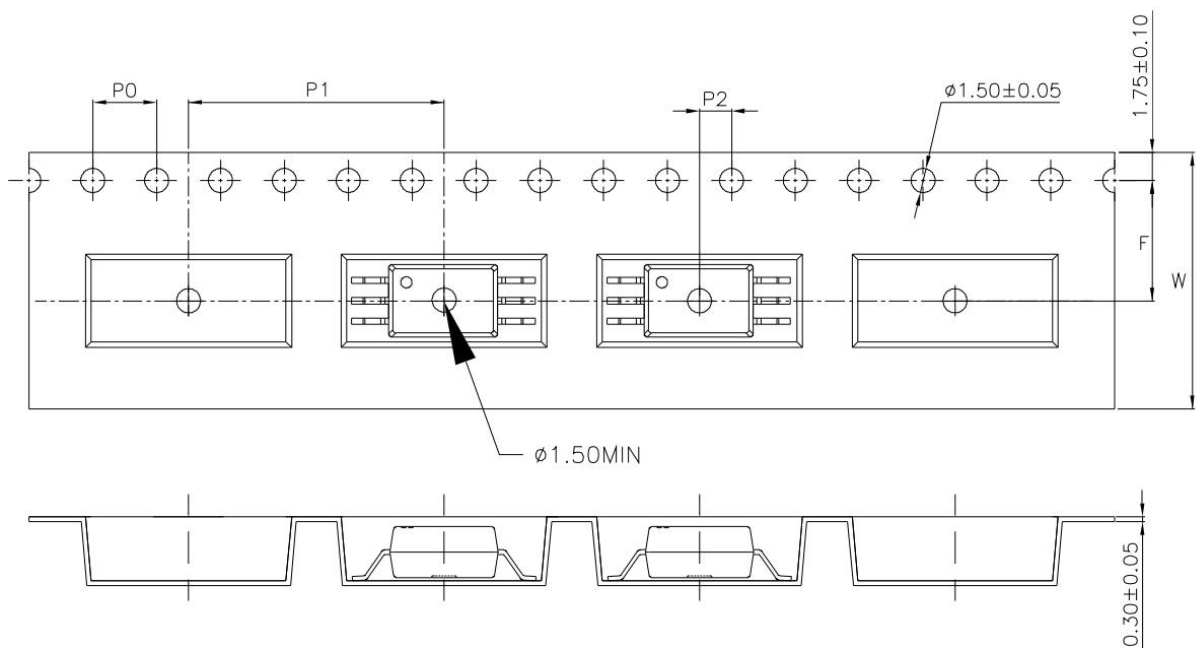


## 12. Taping Dimensions

### (1)OR-480W-TA

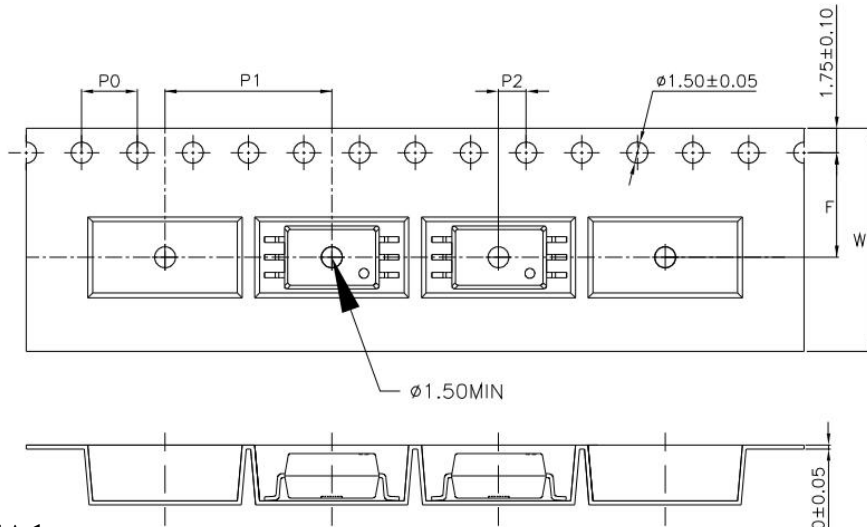


### (2)OR-480W-TA1

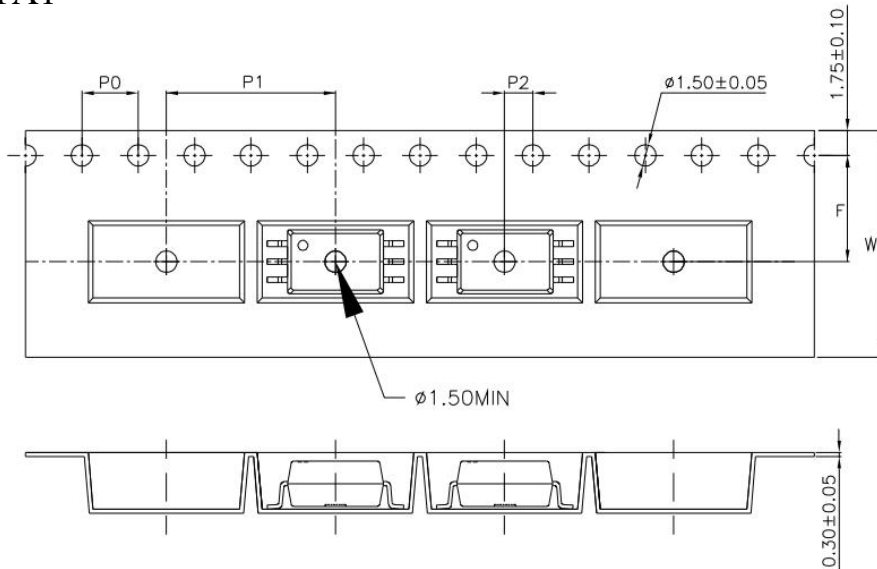




(1)OR-480W1-TA



(2)OR-480W1-TA1



Type	symbol	Dimension in mm (inch) For W type	Dimension in mm (inch) 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)

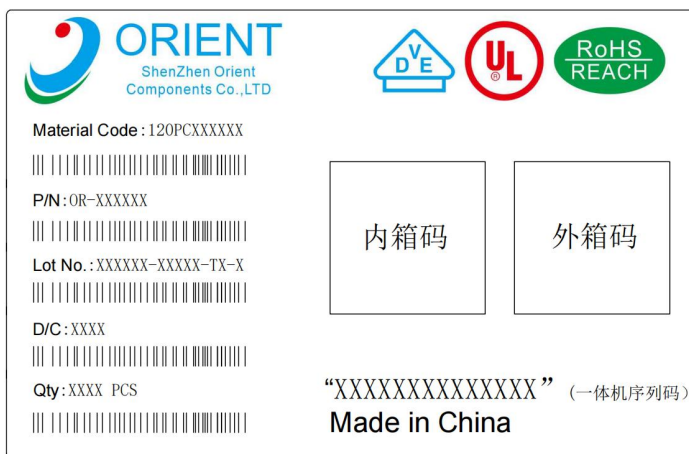
Encapsulation type	TA/TA1
amount ( pcs )	1000

### 13. 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



**Note:**

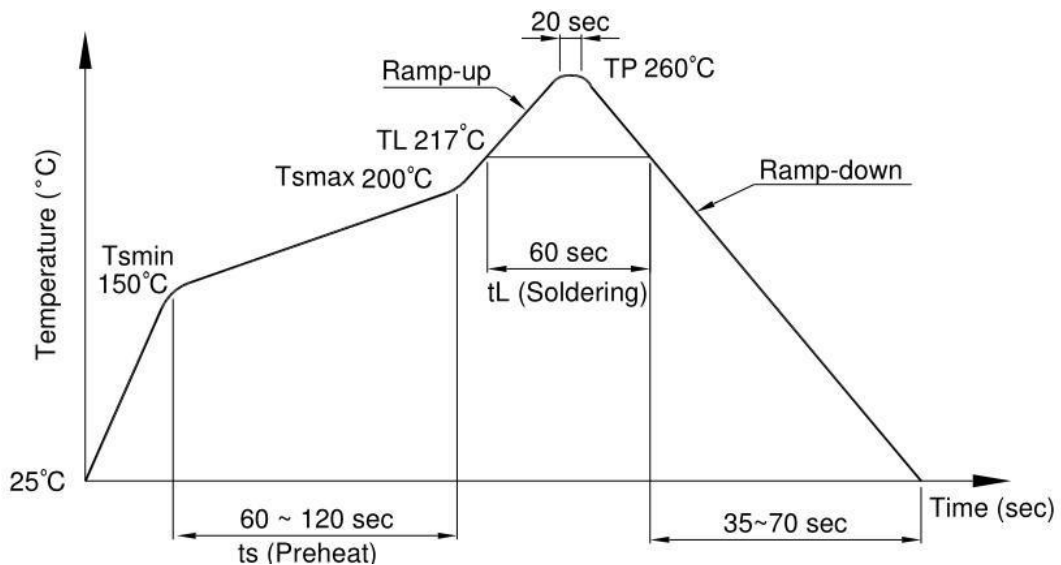
1. Material Code :Product ID.
2. P/N :Contents with "Order Information" in the specification.
3. Lot No. :Product data.
4. D/C :Product weeks.
5. Quantity :Packaging quantity.

### 14. 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.

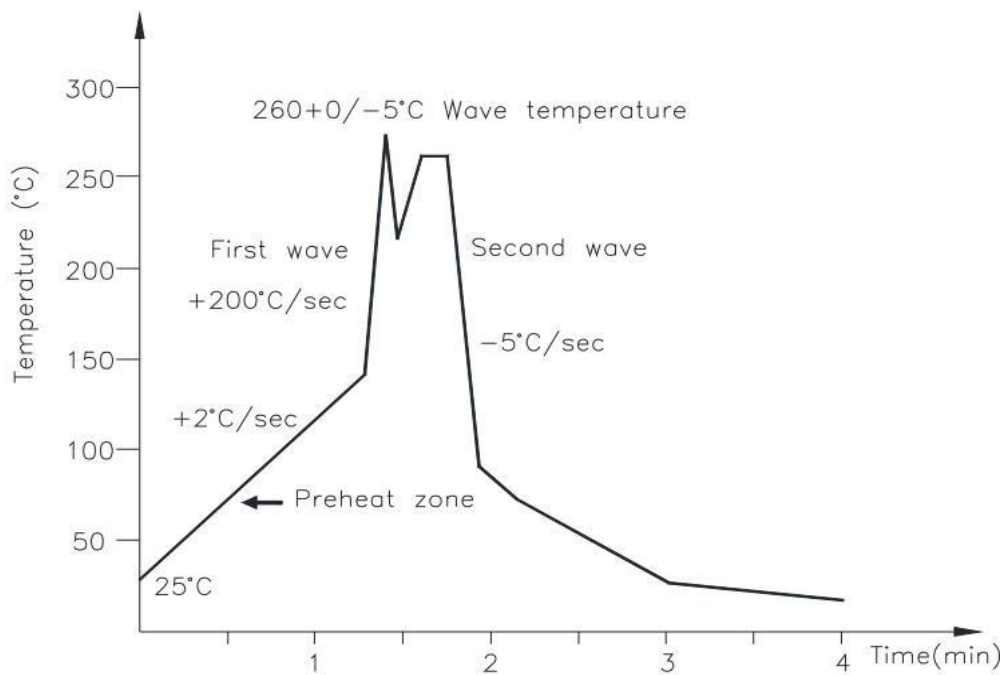
Profile item	Conditions
Preheat - Temperature Min (T Smin ) - Temperature Max (T Smax ) - Time (min to max) (ts)	150°C 200°C 90±30 sec
Soldering zone - Temperature (TL ) - Time (t L )	217°C 60 sec
Peak Temperature	260°C
Peak Temperature time	20 sec
Ramp-up rate	3°C / sec max.
Ramp-down rate from peak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

### 15. CHARACTERISTICS CURVES (TYPICAL PERFORMANCE)

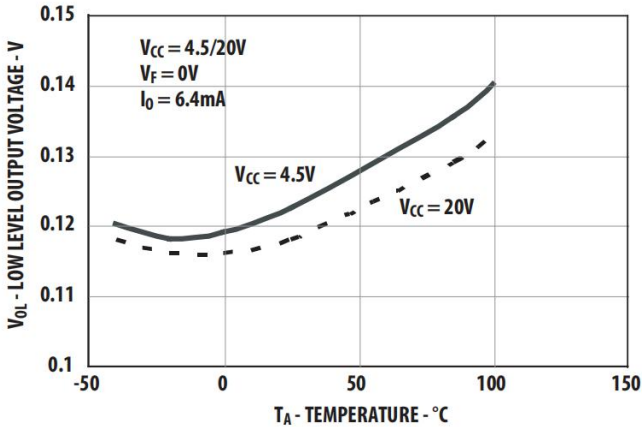


Figure 1. Typical Logic Low Output Voltage vs. Temperature

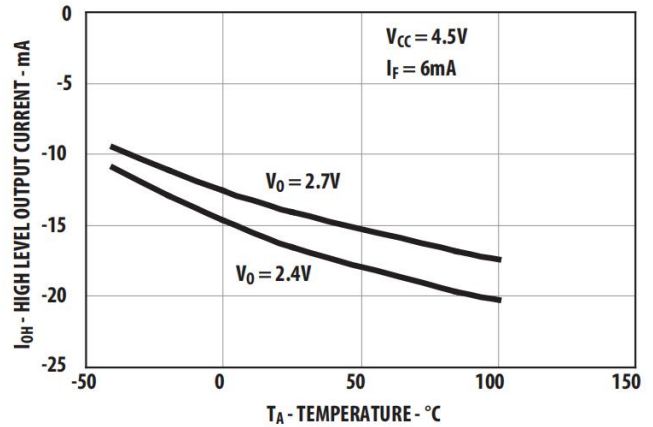


Figure 2. Typical Logic High Output Current vs. Temperature

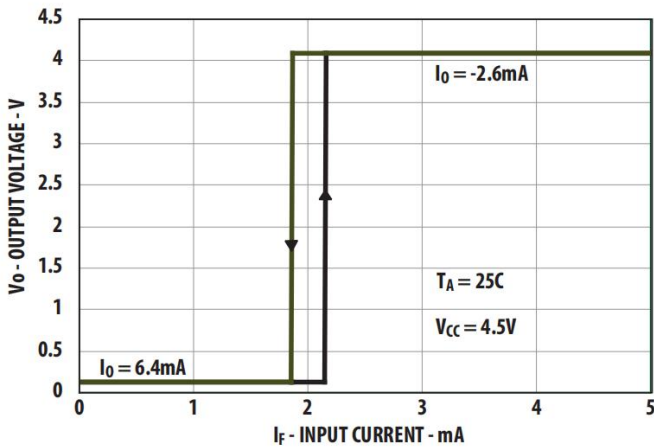


Figure 3. Typical Output Voltage vs. Forward Input Current

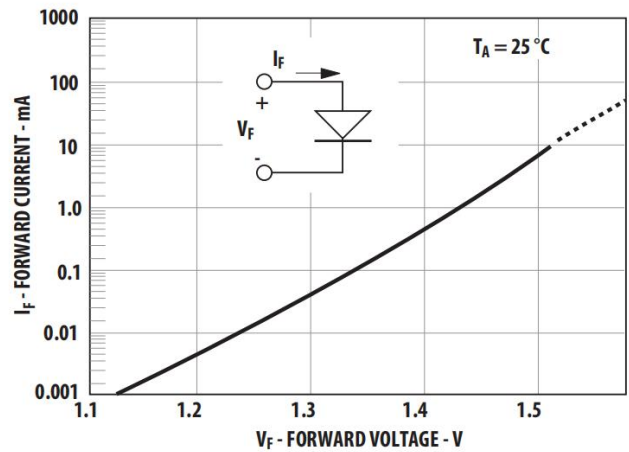
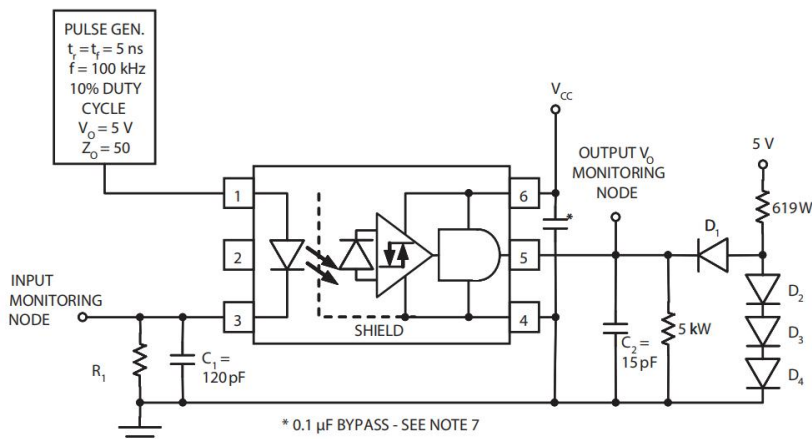


Figure 4. Typical Input Diode Forward Characteristic



THE PROBE AND JIG CAPACITANCES ARE INCLUDED IN C<sub>1</sub> AND C<sub>2</sub>.

R <sub>1</sub>	580 W	330 W
I <sub>F(ON)</sub>	6 mA	10 mA

ALL DIODES ARE 1N916 OR 1N3064.

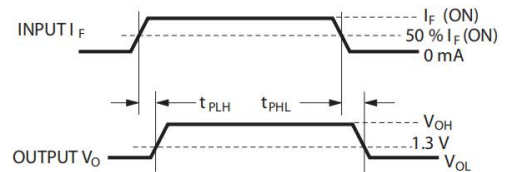


Figure 5. Circuit for t<sub>PLH</sub>, t<sub>PHL</sub>, t<sub>r</sub>, t<sub>f</sub>

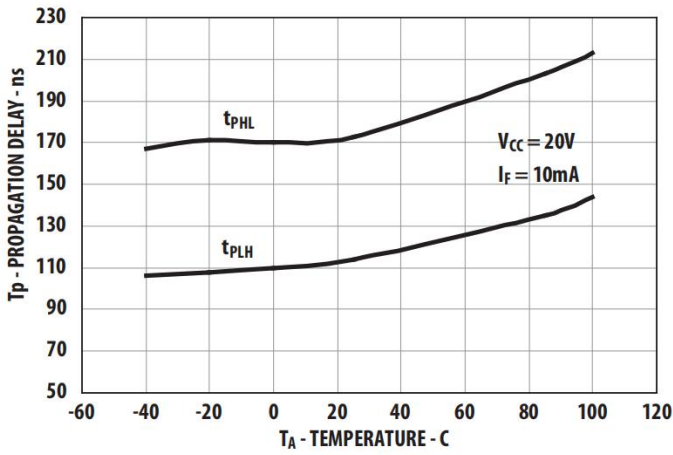


Figure 6. Typical Propagation Delays vs. Temperature.

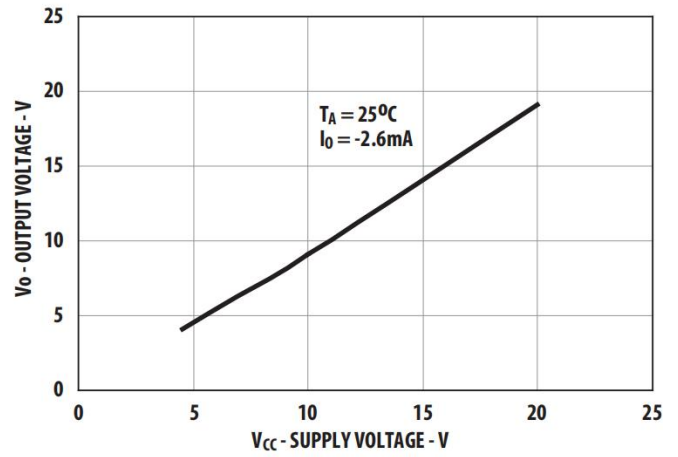


Figure 7. Typical Logic High Output Voltage vs. Supply Voltage

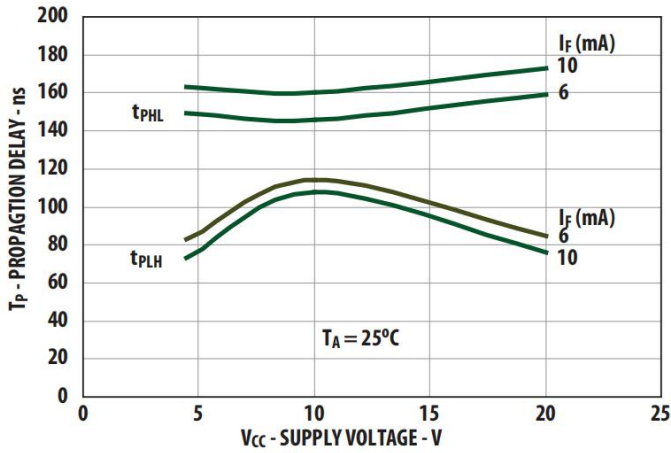


Figure 8. Typical Propagation Delay vs. Supply Voltage

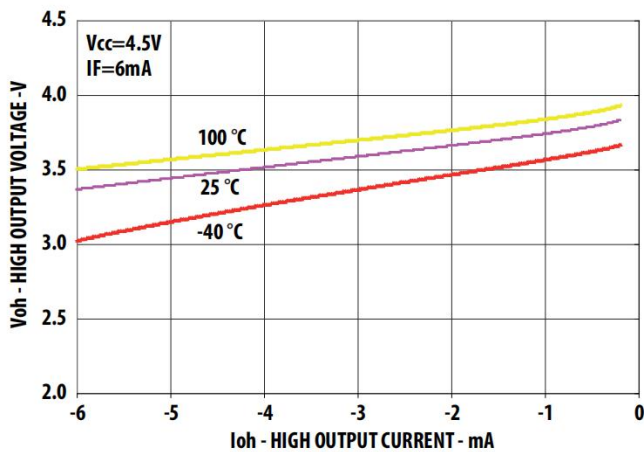


Figure 9. Voh vs Ioh Across Temperatures

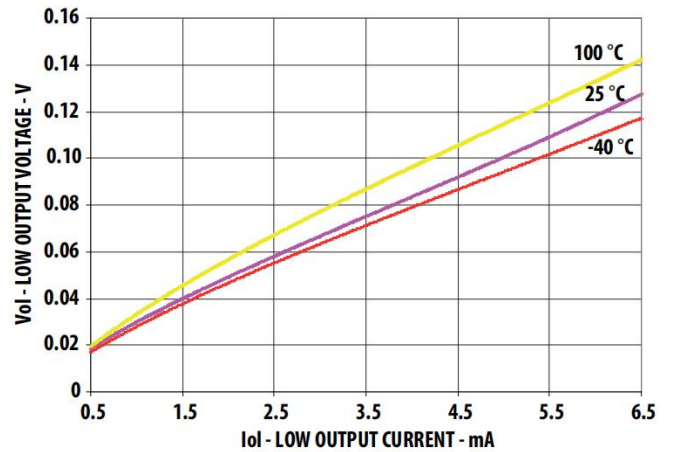


Figure 10. Vol vs Iol Across Temperatures

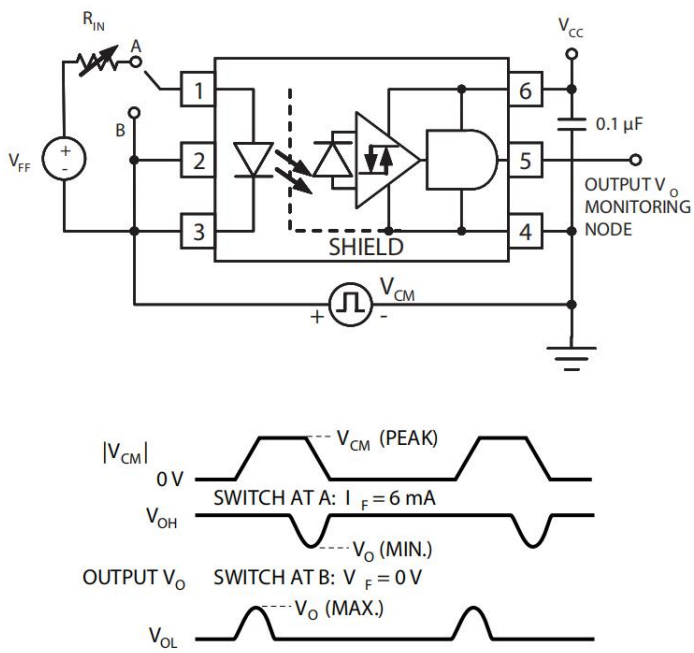


Figure 11. Test Circuit for Common Mode Transient Immunity and Typical Waveforms