ORIENT

Photo coupler

Product Data Sheet

Part Number: OR-480

Customer: _____

Date: _____

SHENZHEN ORIENT COMPONENTS CO ., LTD

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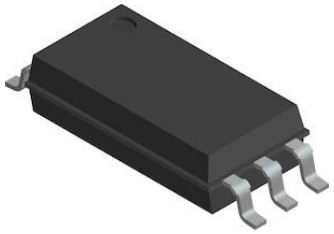
1. Features



(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

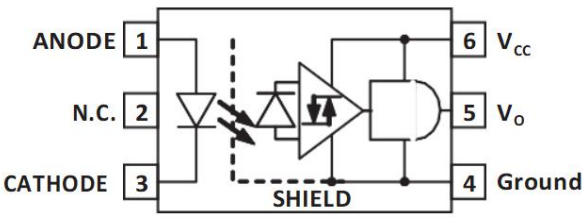
2. Description

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℃)

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	℃
Storage Temperature		T_{stg}	-55～ + 125	
*2 Soldering Temperature		T_{sol}	260	

*1. Room temperature = 25 ℃. 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	℃

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

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/μs	|VCM| = 1000 V, IF = 6.0 mA, VCC = 5 V, TA = 25°C
Output Low Level Common Mode Transient Immunity	$\|CM_L\|$	20	—	—		|VCM| = 1000 V, VF = 0 V, VCC = 5 V, TA = 25°C

9. Order Information

Part Number

OR-480U-Y-Z

Note

480= Part Number .

U = Lead form option ,W or W1 .

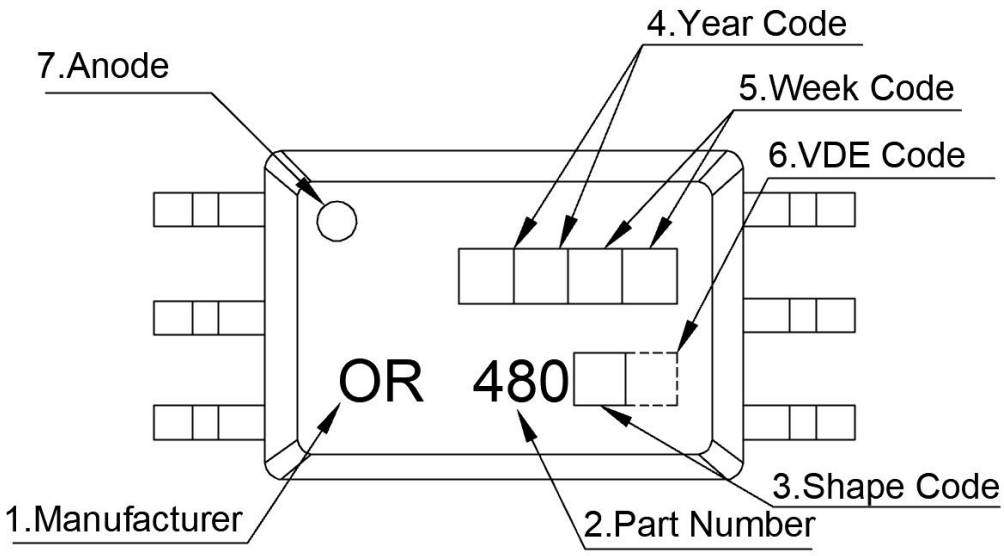
Y = Tape and reel option (TA,TA1 or none) .

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

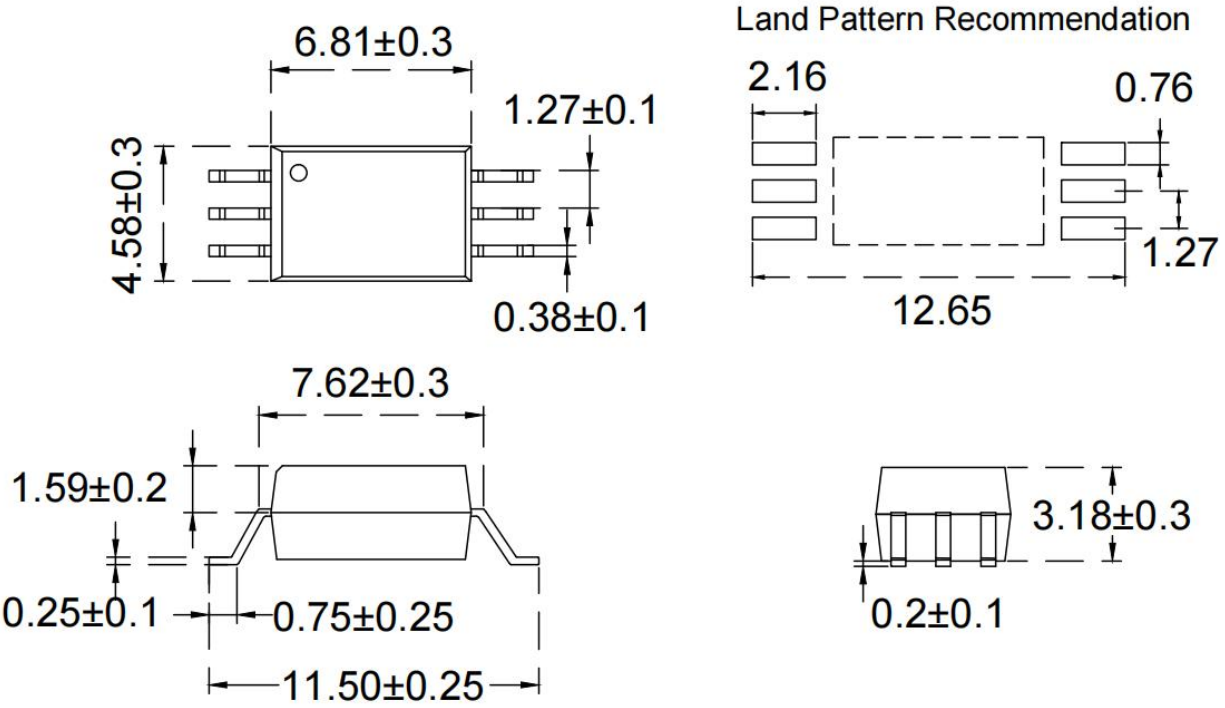


1. Manufacturer : ORIENT.
2. Part Number : 480.
3. Shape Code □ : Lead form option ,W or W1 .
4. Year Code □□ ： '21' means '2021' and so on.
5. Week Code □□ ： 01 means the first week, 02 means the second week and so on.
6. VDE Code ⬚. (Optional)
7. Anode.

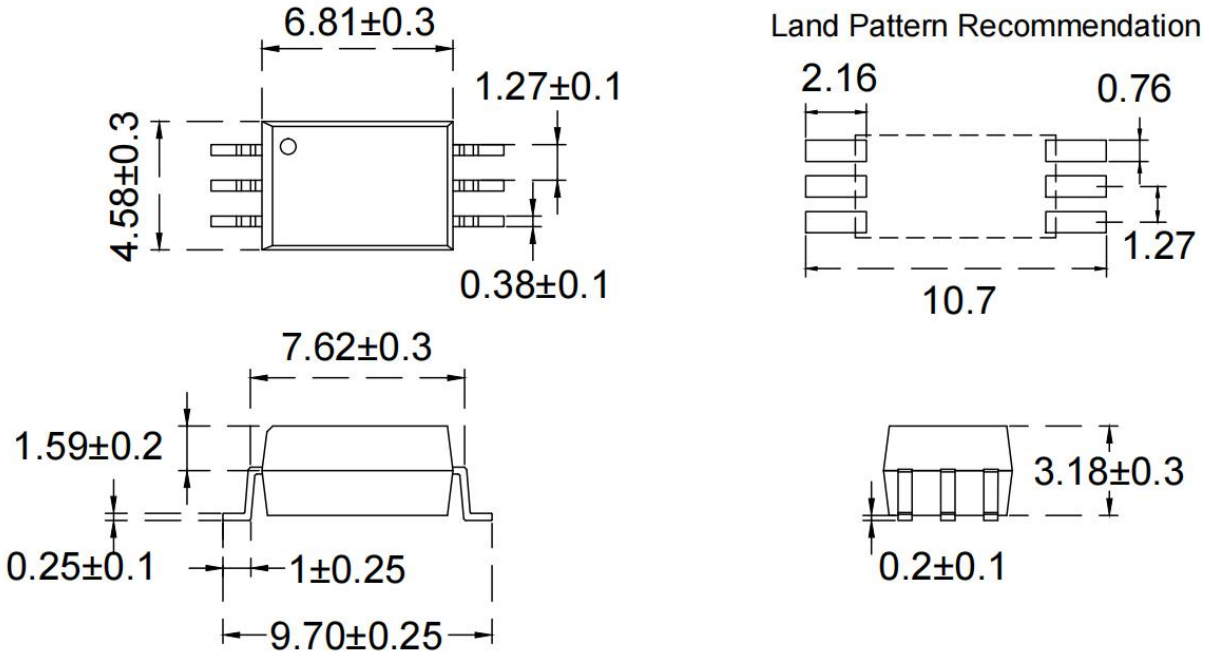
* VDE Mark can be selected.

11. Package Dimension

(1).OR-480W

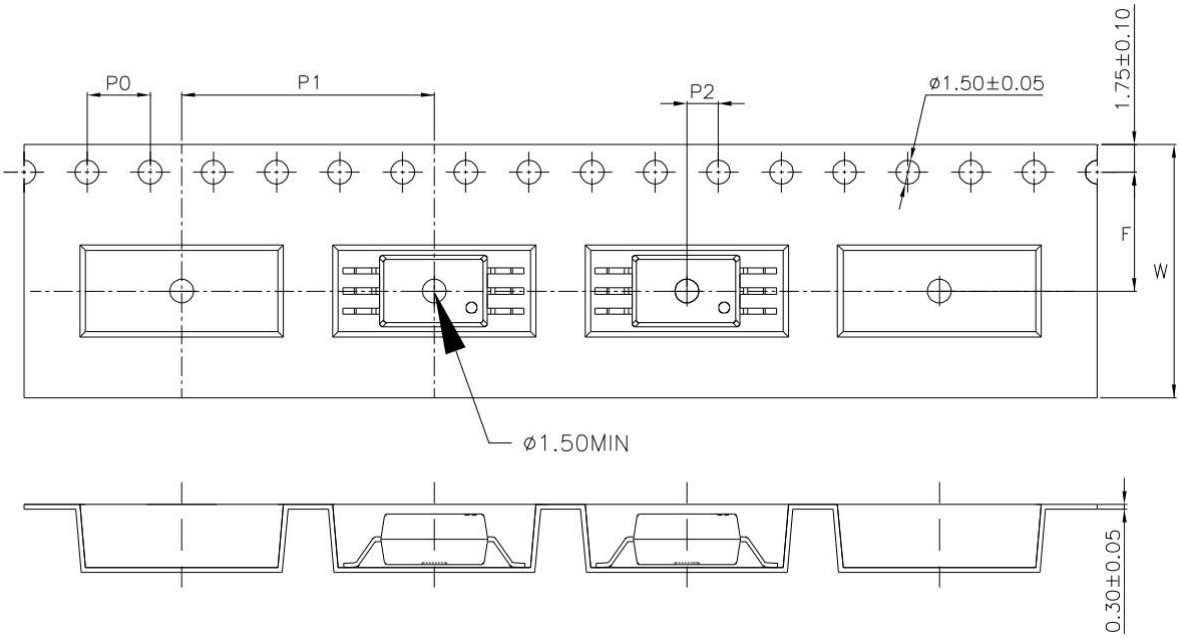


(2).OR-480W1

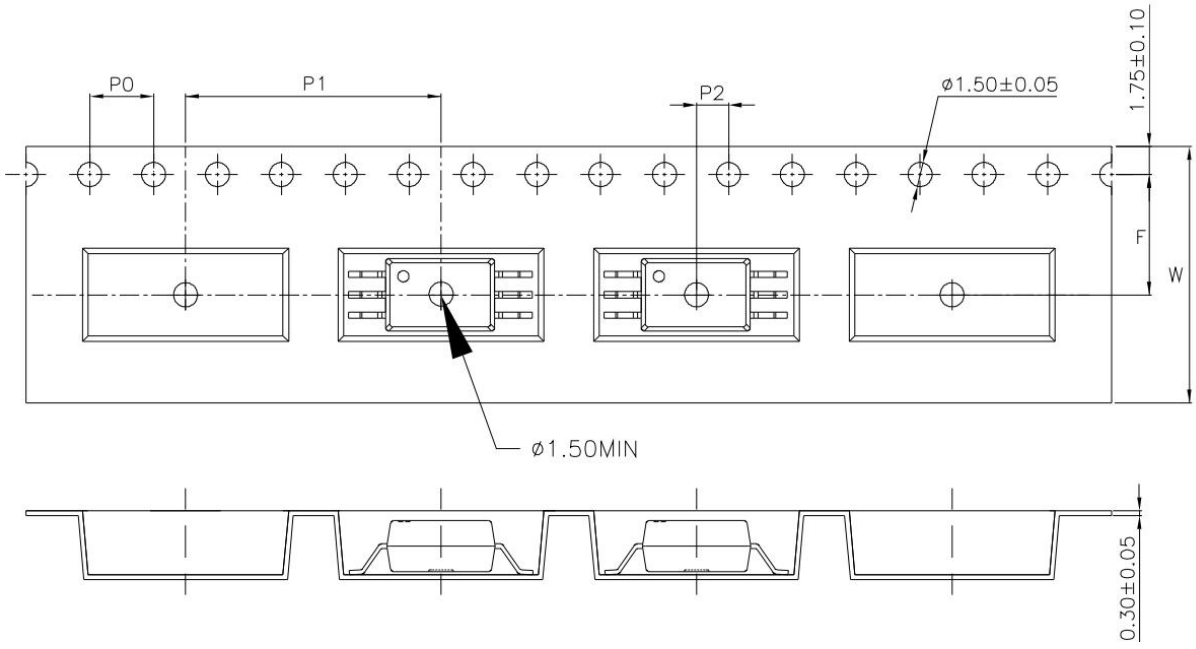


12. Taping Dimensions

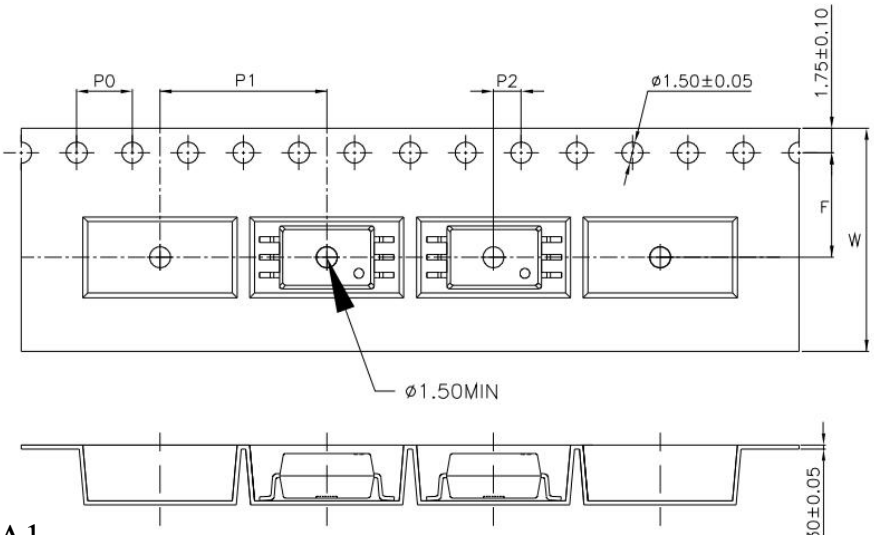
(1)OR-480W-TA



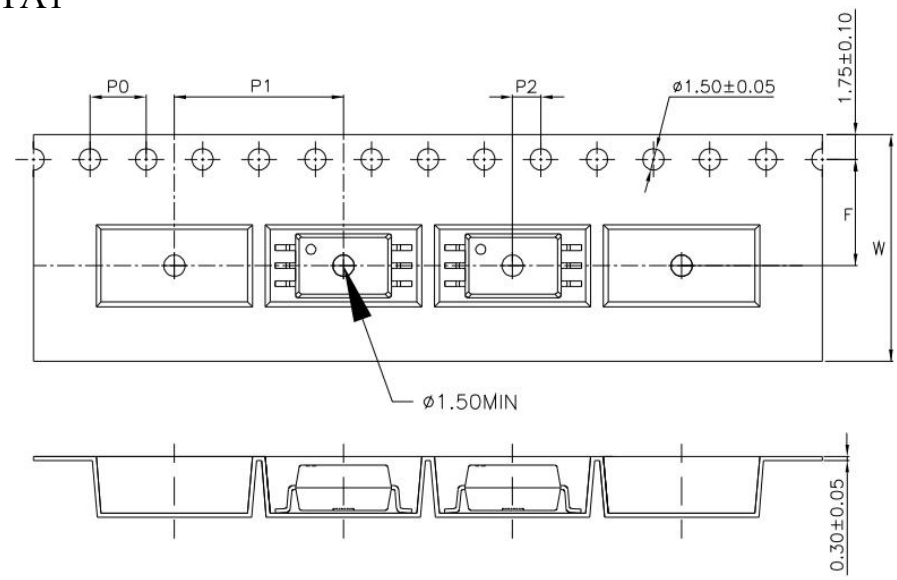
(2)OR-480W-TA1



(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±0.3 (0.63)	16±0.3 (0.63)
pitch	P0	4±0.1 (0.16)	4±0.1 (0.16)
pitch	F	7.5±0.1 (0.3)	7.5±0.1 (0.3)
	P2	2±0.1 (0.079)	2±0.1 (0.079)
interval	P1	16±0.1 (0.63)	12±0.1 (0.47)

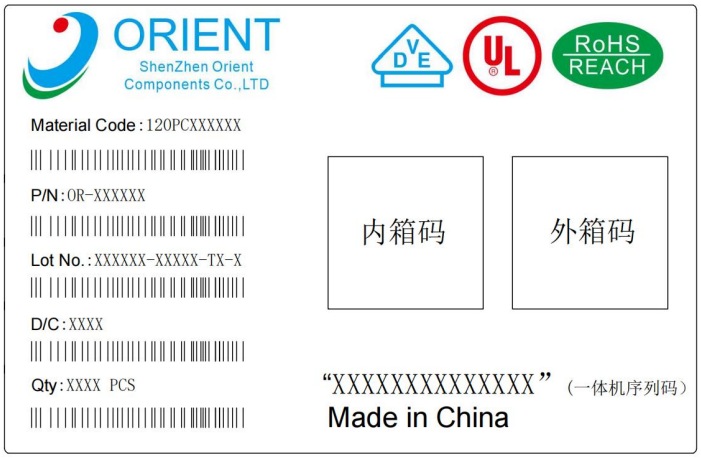
Encapsulation type	TA/TA1
amount （pcs）	1000

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:

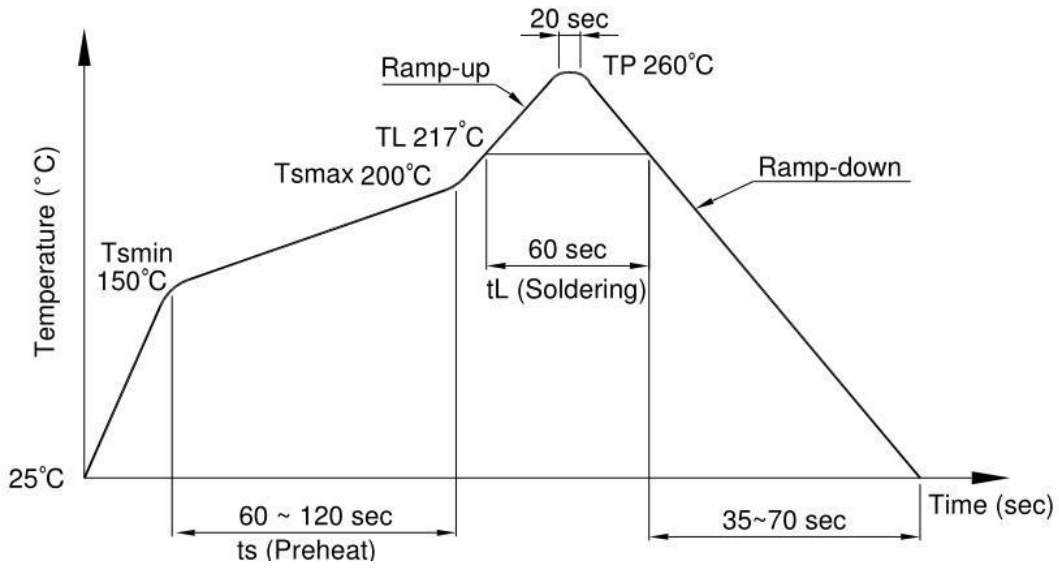
1. Material Code :Product ID.
2. P/N :Contents with "Order Information" in the specification.
3. Lot No. :Product data.
4. D/C :Product weeks.
5. Quantity :Packaging quantity.

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.

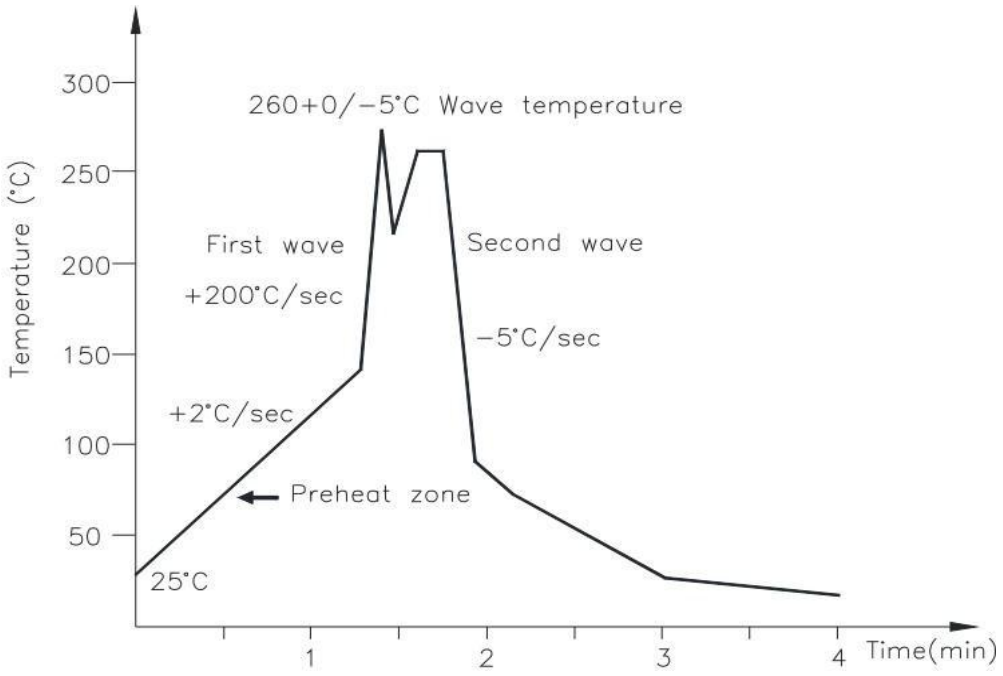
Profile item	Conditions
Preheat - Temperature Min (T Smin) - Temperature Max (T Smax) - Time (min to max) (ts)	 150˚C 200˚C 90±30 sec
Soldering zone - Temperature (TL) - Time (t L)	 217˚C 60 sec
Peak Temperature	260˚C
Peak Temperature time	20 sec
Ramp-up rate	3˚C / sec max.
Ramp-down rate from peak temperature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



(3) .Wave soldering (JEDEC22A111 compliant)

One time soldering is recommended within the condition of temperature.

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



(3).Hand soldering by soldering iron

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

Temperature Time	380+0/-5˚C 3 sec max

15. CHARACTERISTICS CURVES (TYPICAL PERFORMANCE)

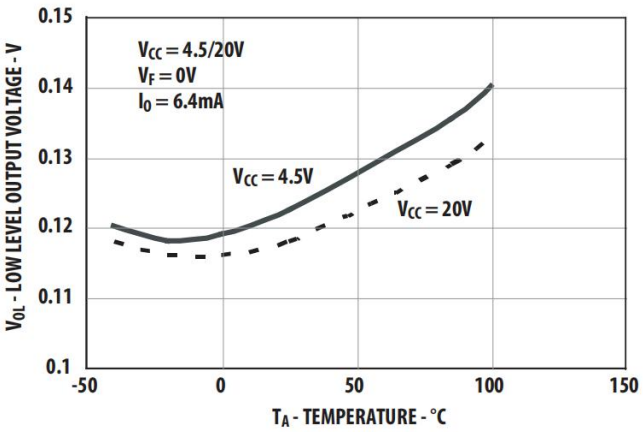


Figure 1. Typical Logic Low Output Voltage vs. Temperature

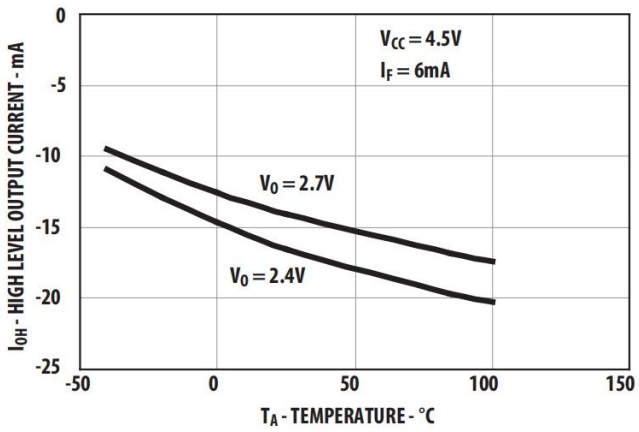


Figure 2. Typical Logic High Output Current vs. Temperature

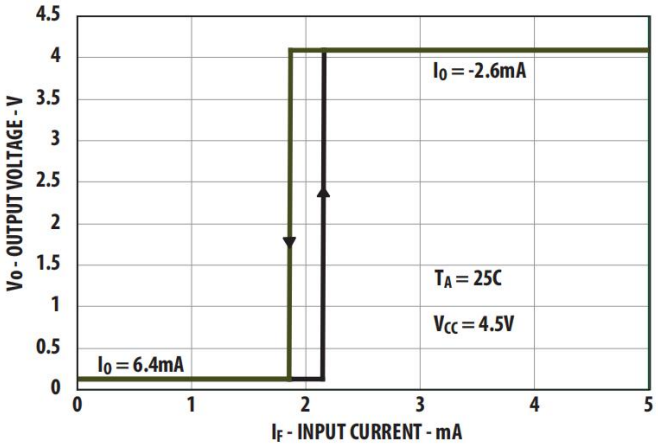


Figure 3. Typical Output Voltage vs. Forward Input Current

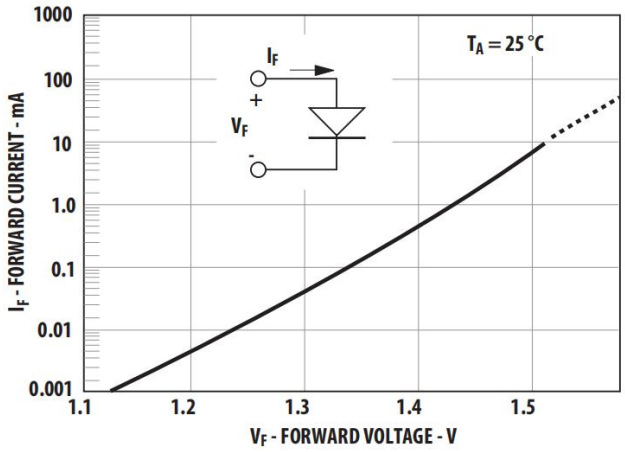
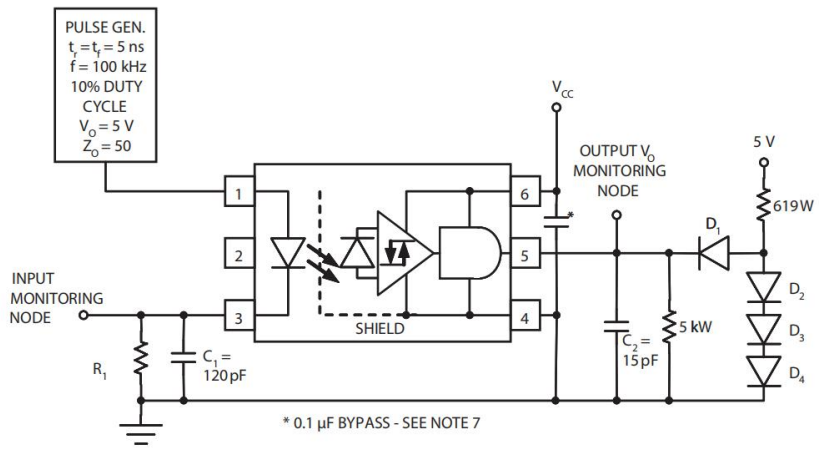


Figure 4. Typical Input Diode Forward Characteristic



THE PROBE AND JIG CAPACITANCES ARE INCLUDED IN C_1 AND C_2.

R_1	580 W	330 W
$I_{F(ON)}$	6 mA	10 mA

ALL DIODES ARE 1N916 OR 1N3064.

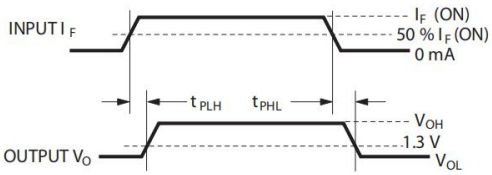


Figure 5. Circuit for t_{PLH}, t_{PHL}, t_r, t_f

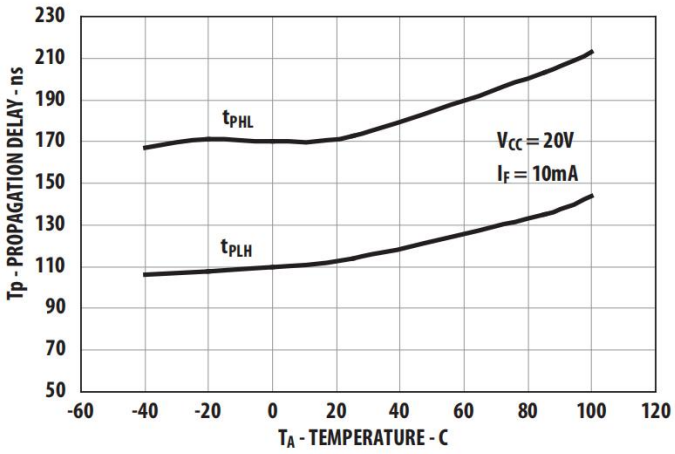


Figure 6. Typical Propagation Delays vs. Temperature.

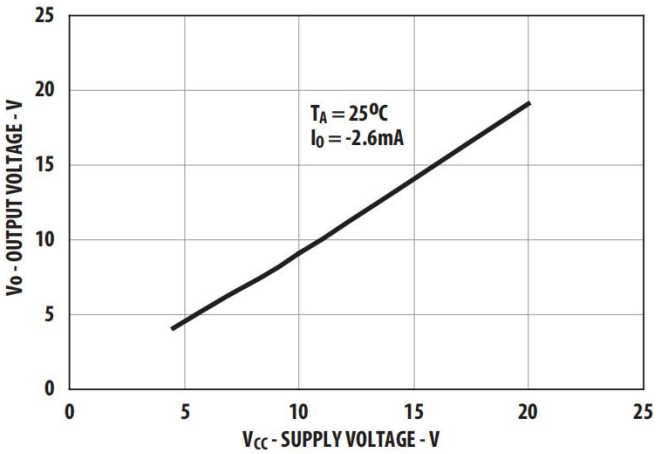


Figure 7. Typical Logic High Output Voltage vs. Supply Voltage

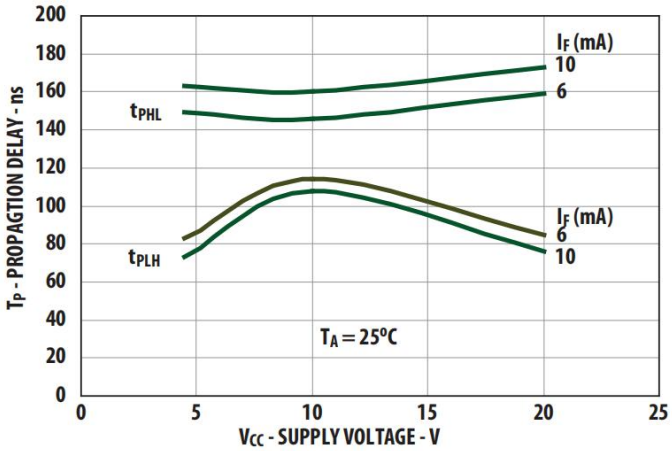


Figure 8. Typical Propagation Delay vs. Supply Voltage

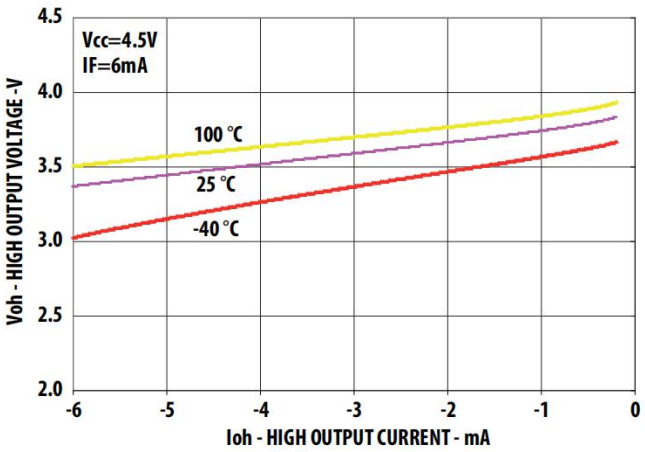


Figure 9. Voh vs Ioh Across Temperatures

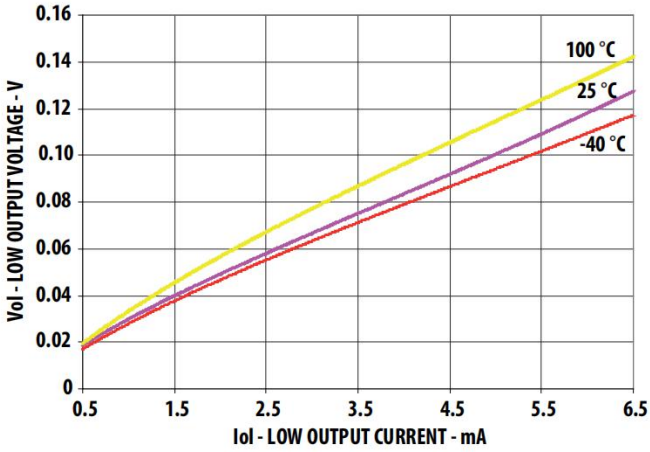


Figure 10. Vol vs Iol Across Temperatures

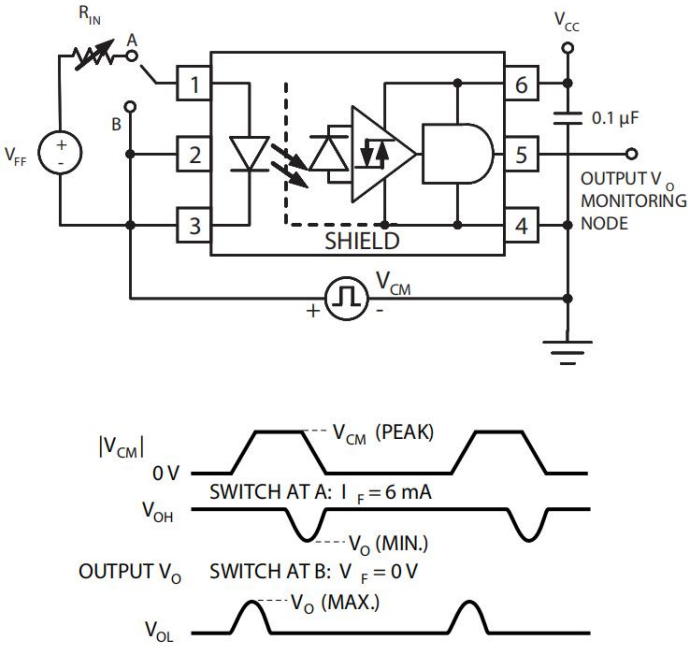


Figure 11. Test Circuit for Common Mode Transient Immunity and Typical Waveforms