ORIENT

Photo coupler

Product Data Sheet

Part Number: OR-480

Customer: _____

Date: _____

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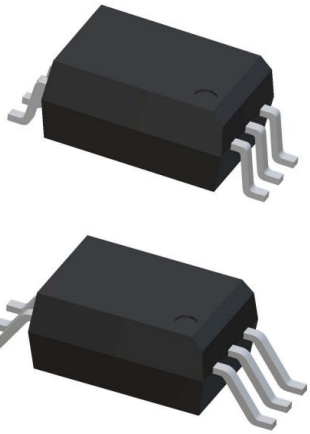
Preliminary

This datasheet is a preliminary design specification, and the formal specifications are subject to the recognition letter with jointly signed

1. Features



(1) Performance Specified for Common IPM Applications Over Industrial Temperature Range
(2) Totem Pole Output (No Pull-up Resistor Required)
(3) Maximum propagation delay tPHL/tPLH = 350 ns
(4) Maximum pulse width distortion (PWD) = 250 ns
(5) Propagation delay difference:Min. –100 ns , Max. +250 ns
(6) Wide operating V_{CC} range: 4.5V to 20V
(7) 20 kV/μs minimum common mode rejection (CMR) at V_{CM} = 1000V
(8) Available in Stretched SO-6 package
(9) Industrial temperature range: -40° C to 110° C
(10) Safety approval
UL approved(No.E323844)
VDE approved(No.40029733)
CQC approved (No.CQC19001231480)
(11) In compliance with RoHS, REACH standard
(12) MSL Level 1

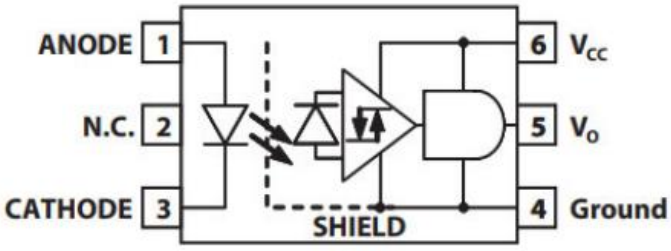
2. Description

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	V_O
ON	HIGH
OFF	LOW

Note 1: A 0. 1 μF bypass capacitor must be connected between pins 4 and 6.
Note 2: Pin 2 is a suspension pin. Please do not connect to external circuits.

5. Absolute Maximum Ratings (Ta=25℃)*1

Parameter		Symbol	Rated Value	Unit
Input	Average Forward Input Current	I_F	25	mA
	Peak Transient Input 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
Total Power Dissipation		P_T	210	mW
Insulation Voltage		V_{iso}	5000	Vrms
Operating Temperature		T_{opr}	-40 ～+ 110	℃
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.	Unit
Operating Temperature	T_A	-40	110	℃
Supply voltage	V_{CC}	4.5	20	V
Input Current (ON)	$I_{F(ON)}$	6	10	mA
Input Voltage (OFF)	$V_{F(OFF)}$	0	0.8	V

7. Electrical Optical Characteristics

Unless otherwise noted, all typical values are at T_A = 25°C. All minimum and maximum specifications are at recommended operating conditions: T_A = –40°C to +110°C, V_{CC} = +4.5V to 20V, $I_{F(ON)}$ = 6 mA to 10 mA, $V_{F(OFF)}$ = 0V to 0.8V.

Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
Logic Low Output Voltage	V_{OL}	—	0.05	0.3	V	I_{OL} = 3.5 mA
		—	0.08	0.5	V	I_{OL} = 6.5 mA
Logic High Output Voltage	V_{OH}	V_{CC} – 0.3	V_{CC} – 0.1	—	V	I_{OH} = -3.5 mA
		V_{CC} – 0.5	V_{CC} – 0.15	—		I_{OH} = -6.5 mA
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
High Level Supply Current	I_{CCH}	—	0.9	2.5	mA	V_{CC} = 5.5 V, I_F = 10 mA, I_O = Open
		—	1.2	2.5	mA	V_{CC} = 20 V, I_F = 10 mA, I_O = Open
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=10mA, V_O=GND
		—	-185	-50	mA	V_{CC} = 20 V, I_F=10mA, V_O=GND
Threshold Input Current High to Low	I_{FLH}	—	2.3	5.5	mA	V_O > (V_{CC} – 0.5V)
Threshold Input Voltage Low to High	V_{FHL}	0.8	—	—	mA	V_O < 0.5 V
Input Forward Voltage	V_F	1.2	1.4	1.7	V	I_F = 10 mA
Temperature Coefficient of Forward Voltage	$\Delta V_F/\Delta T_A$	—	–1.6	—	mV/°C	I_F = 10 mA
Input Reverse Breakdown Voltage	B_{VR}	5	—	—	V	I_R = 10 μA
Input Capacitance	C_{IN}	—	70	—	pF	f = 1 MHz, V_F = 0V

8. Switching Characteristics

Unless otherwise noted, all typical values are at T_A = 25°C. All minimum and maximum specifications are at recommended operating conditions: T_A = –40°C to +110°C, V_{CC} = +4.5V to 20V, $I_{F(ON)}$ = 6 mA to 10 mA, $V_{F(OFF)}$ = 0V to 0.8V.

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	PWD	—	10	250	ns	
Propagation Delay Difference Between Any Two Parts	PDD	-100	—	250	ns	
Rise Time	Tr	—	18	—	ns	
Fall Time	Tf	—	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

1.The tPLH propagation delay is measured from the 50% point on the leading edge of the input pulse to the 1.3V point on the leading edge of the output pulse. The tPHL propagation delay is measured from the 50% point on the trailing edge of the input pulse to the 1.3V point on the trailing edge of the output pulse.

2.Pulse Width Distortion (PWD) is defined as |tPHL – tPLH | for any given device.

3. The difference between tPLH and tPHL between any two devices under the same test condition.

4.CMH is the maximum slew rate of the common mode voltage that can be sustained with the output voltage in the logic high state, VO > 2.0V. CML is the maximum slew rate of the common mode voltage that can be sustained with the output voltage in the logic low state, VO < 0.8V.

9. Order Information

Part Number

OR-480U-Y-Z

Note

480= Part Number .

U = Lead form option ,W or W1 .

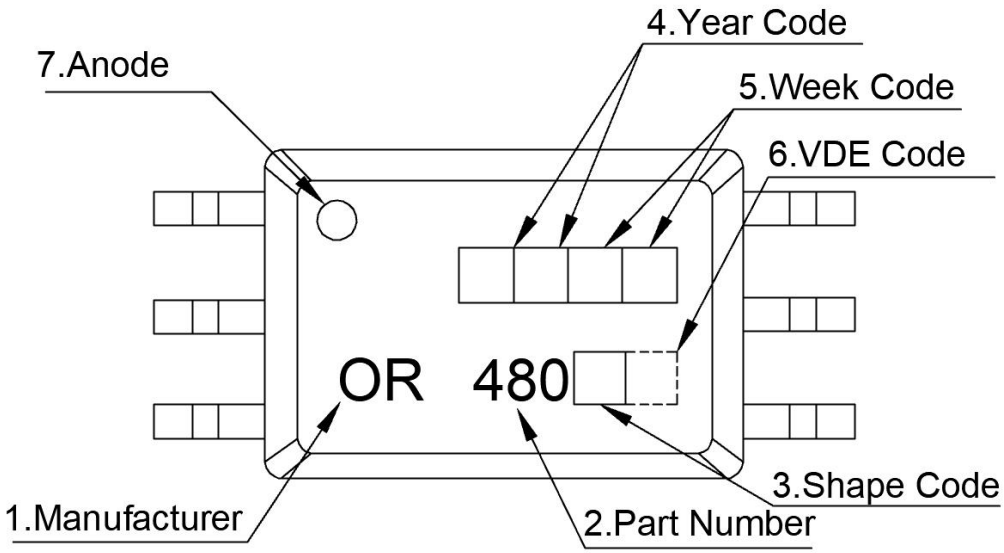
Y = Tape and reel option (TA,TA1 or none) .

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

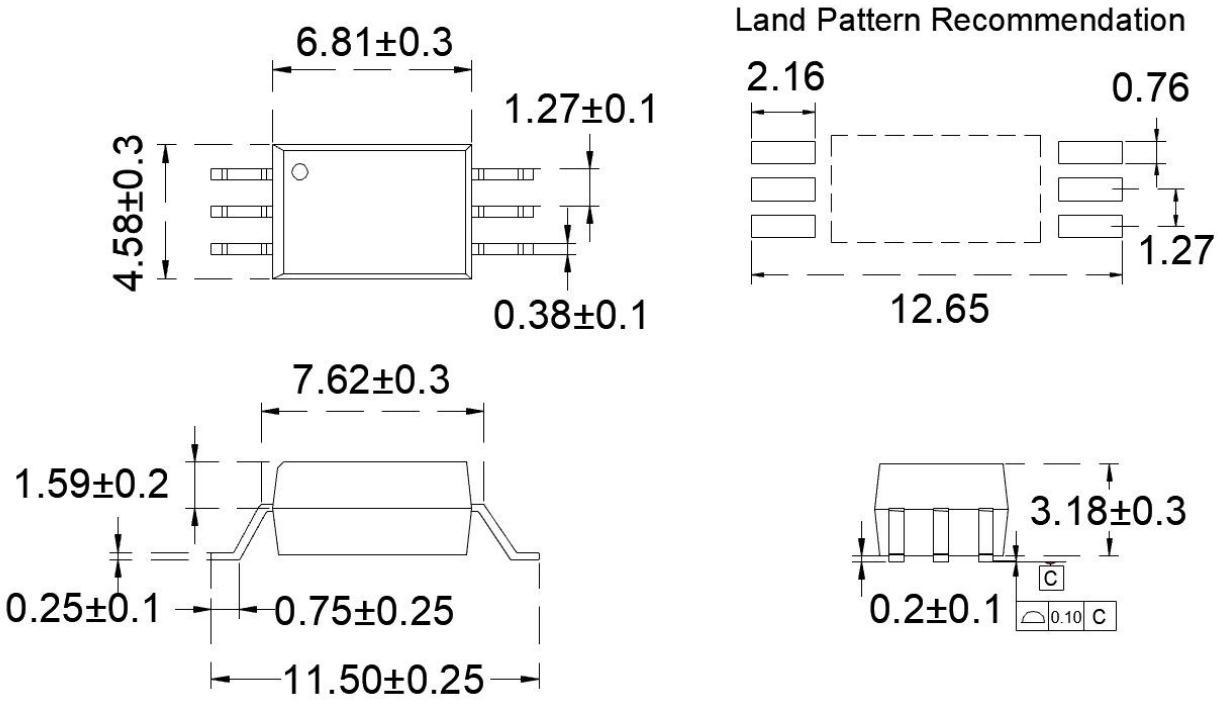


1. Manufacturer : ORIENT.
2. Part Number : 480.
3. Shape Code □ : Lead form option ,W or W1 .
4. Year Code □□ ： '21' means '2021' and so on.
5. Week Code □□： 01 means the first week, 02 means the second week and so on.
6. VDE Code ⬚. (Optional)
7. Anode.

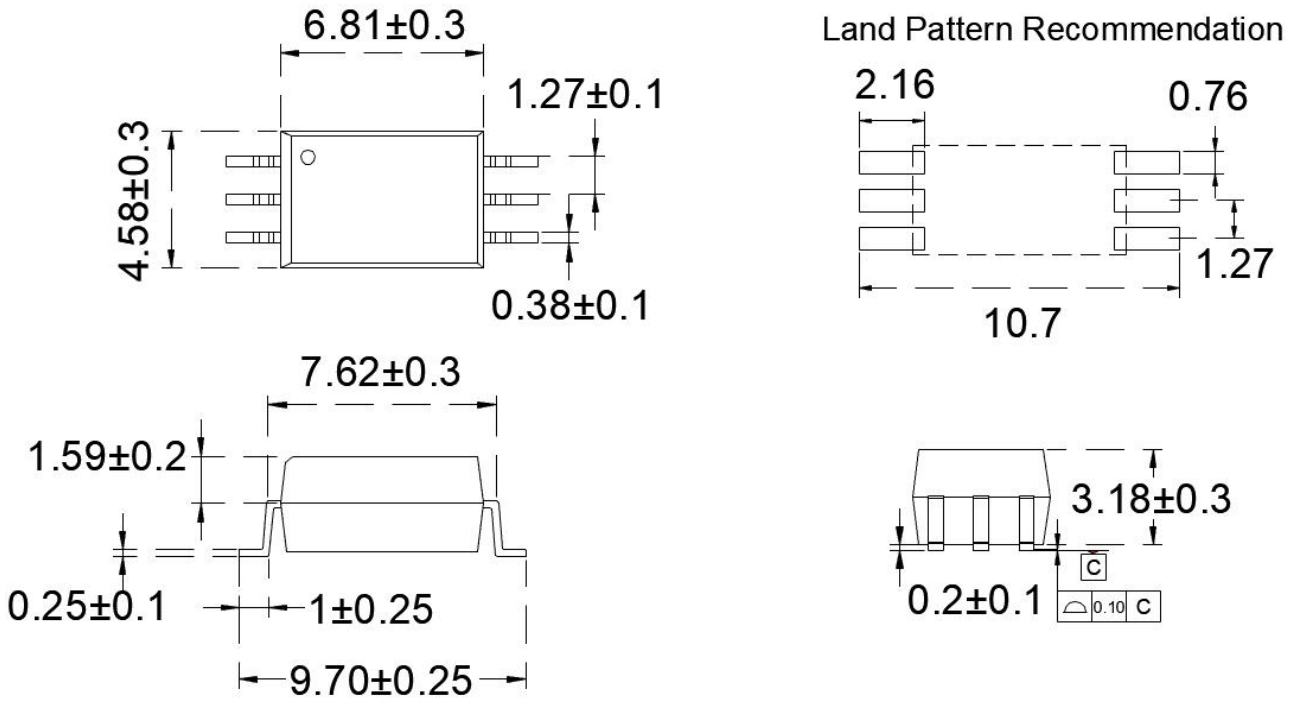
* VDE Mark can be selected.

11. Package Dimension

（1）OR-480W

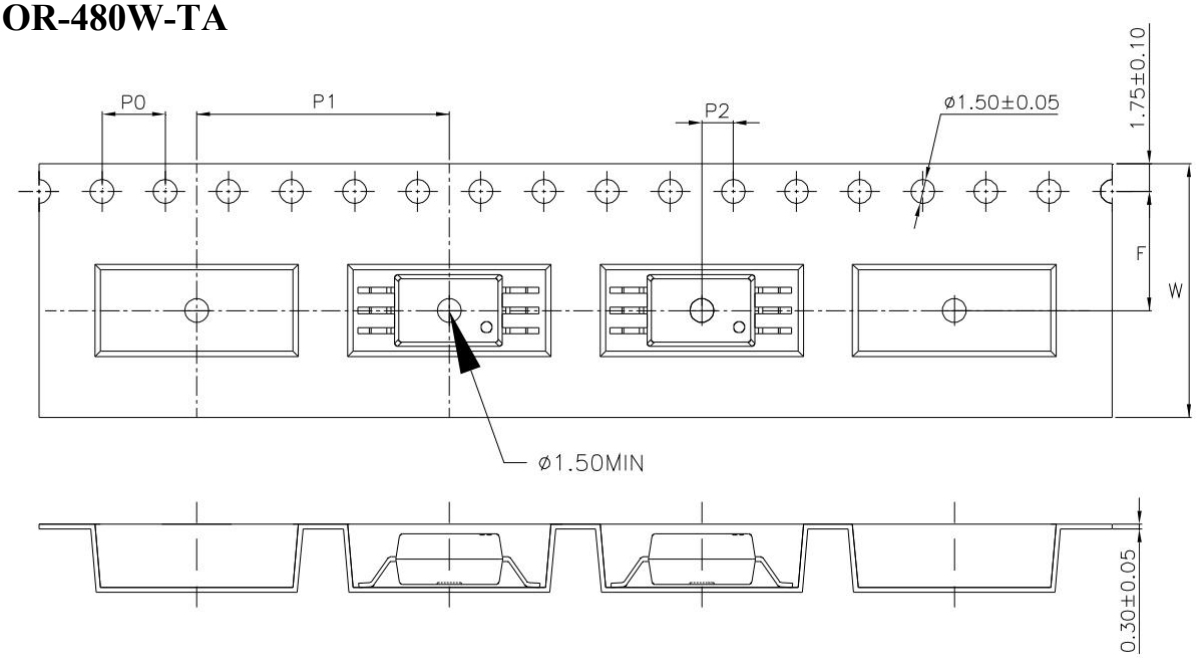


（2）OR-480W1

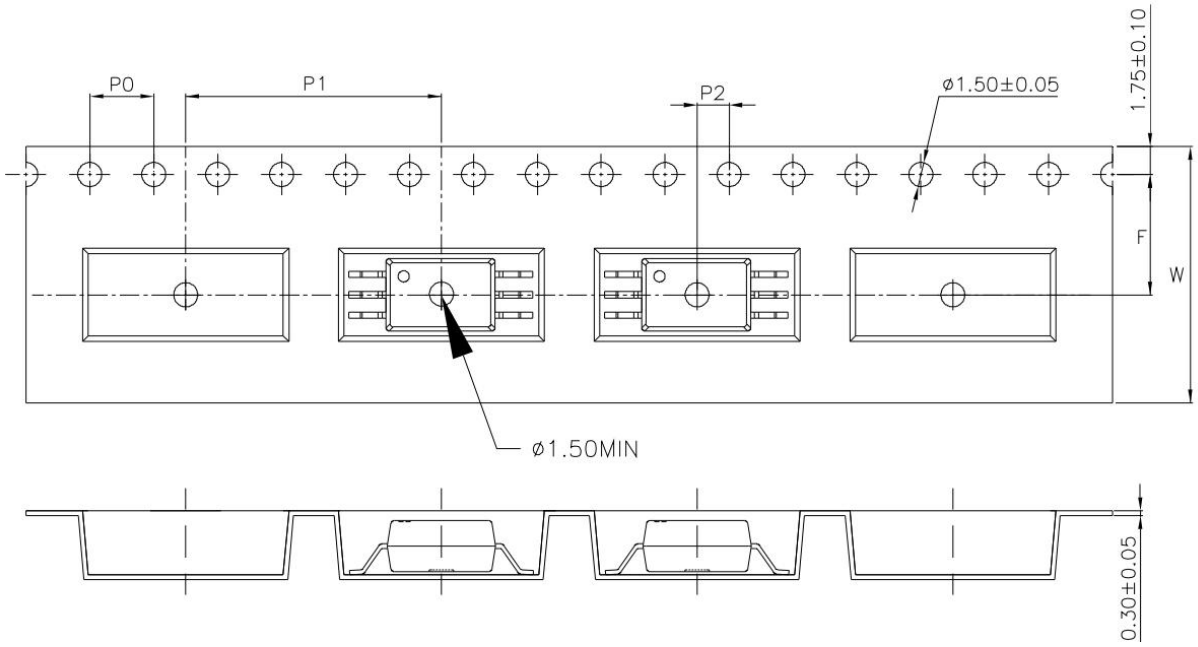


12. Taping Dimensions

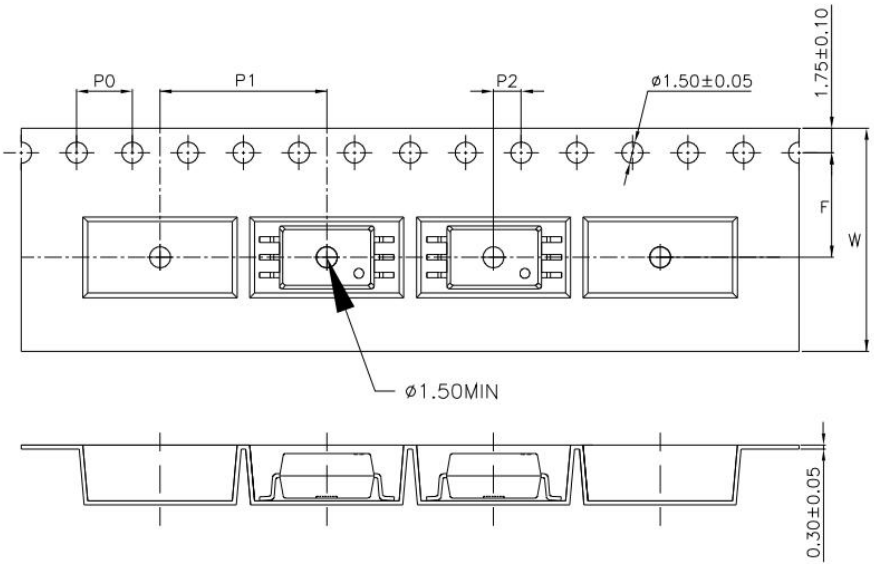
（1）OR-480W-TA



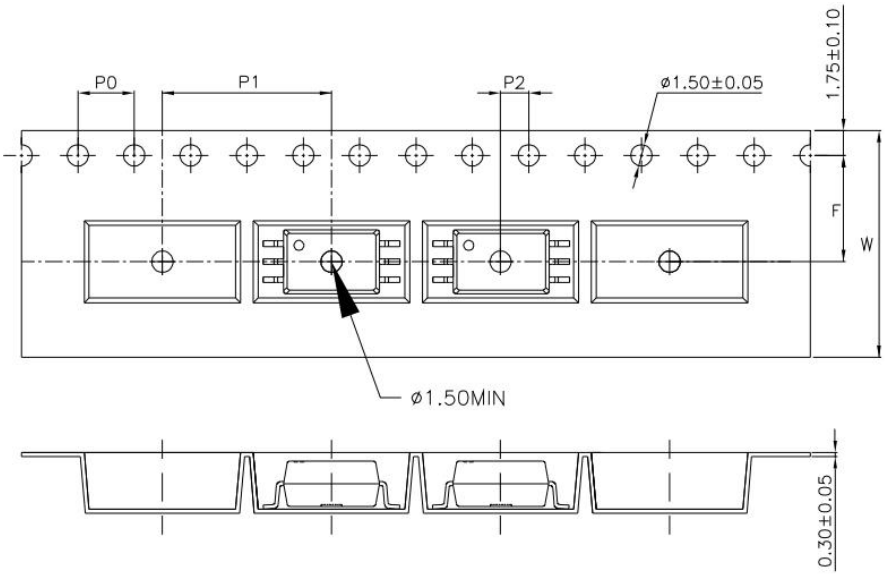
（2）OR-480W-TA1



（3）OR-480W1-TA



（4）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)

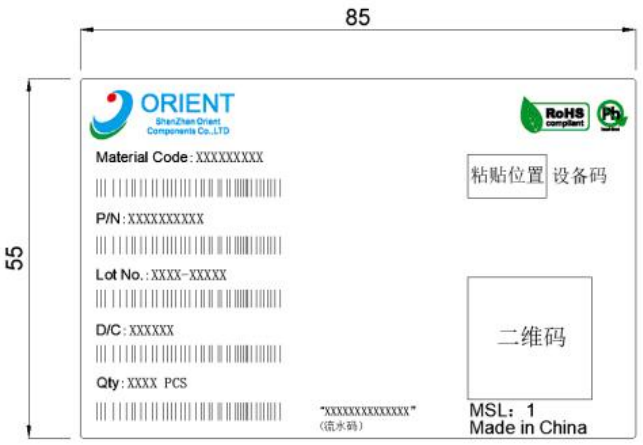
Encapsulation type	TA/TA1
amount （pcs）	1000

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:

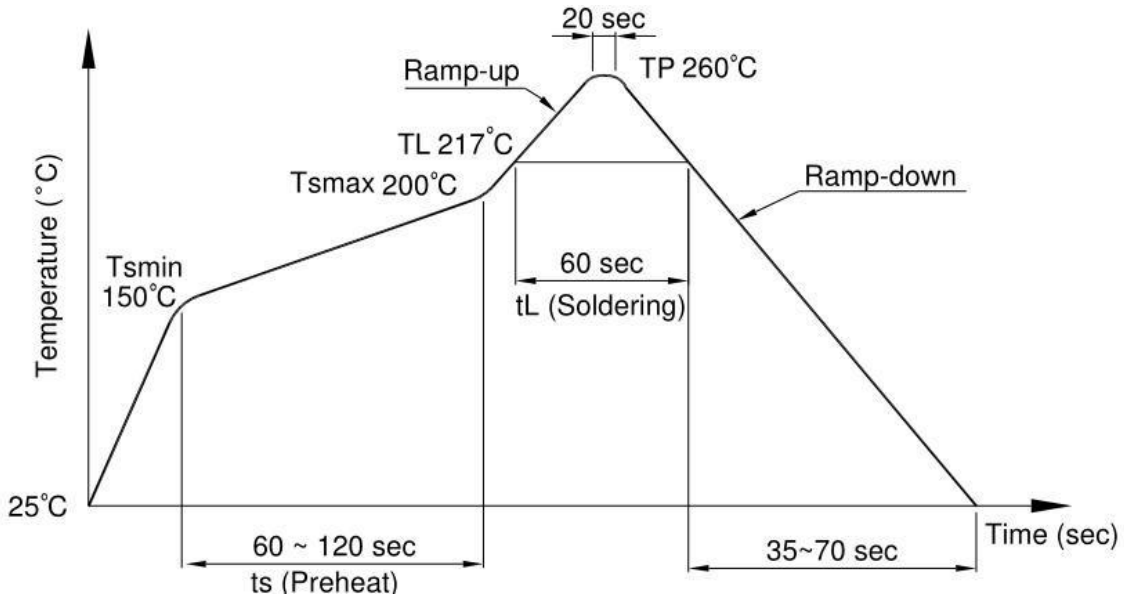
1. Material Code :Product ID.
2. P/N :Contents with "Order Information" in the specification.
3. Lot No. :Product data.
4. D/C :Product weeks.
5. Quantity :Packaging quantity.

14. Temperature Profile Of Soldering

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

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

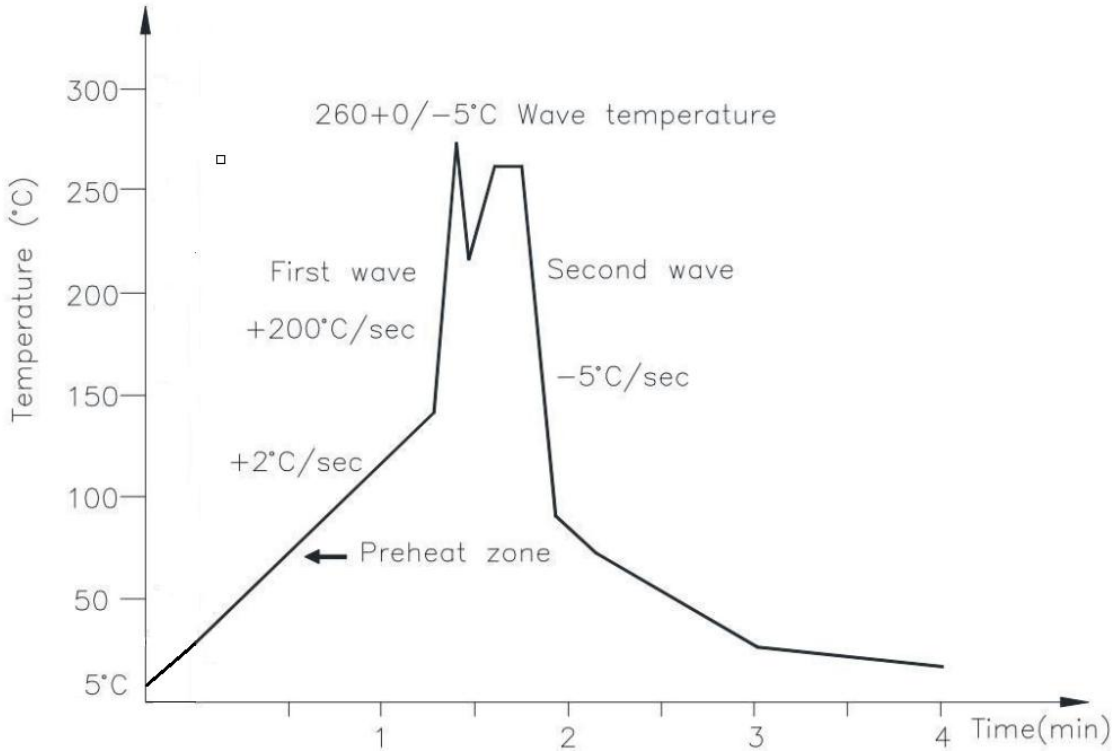
Profile item	Conditions
Preheat - Temperature Min (T Smin) - Temperature Max (T Smax) - Time (min to max) (ts)	 150˚C 200˚C 90±30 sec
Soldering zone - Temperature (TL) - Time (t L)	 217˚C 60 sec
Peak Temperature	260˚C
Peak Temperature time	20 sec
Ramp-up rate	3˚C / sec max.
Ramp-down rate from peak temperature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



(2) 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 & Test Circuits

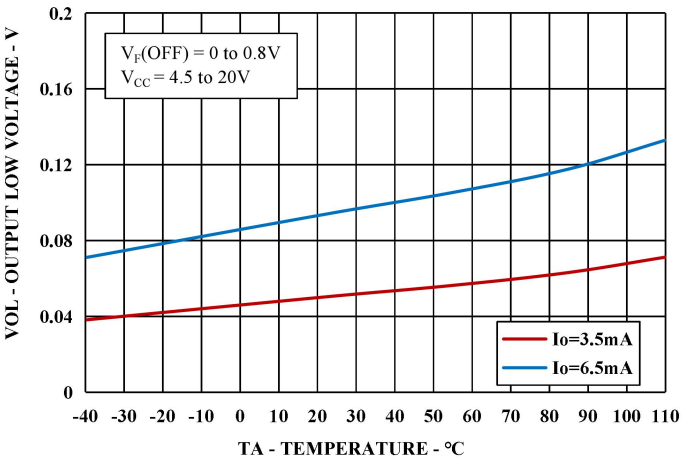


Figure 1: V_{OL} vs. Temperature

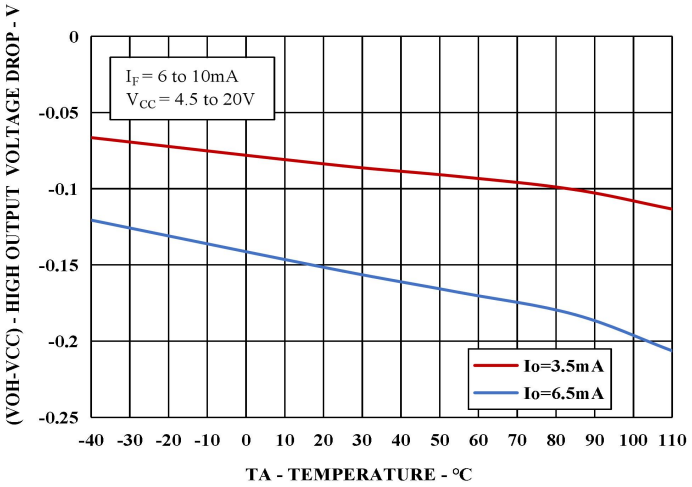


Figure 2: V_{OH}-V_{CC} vs. Temperature

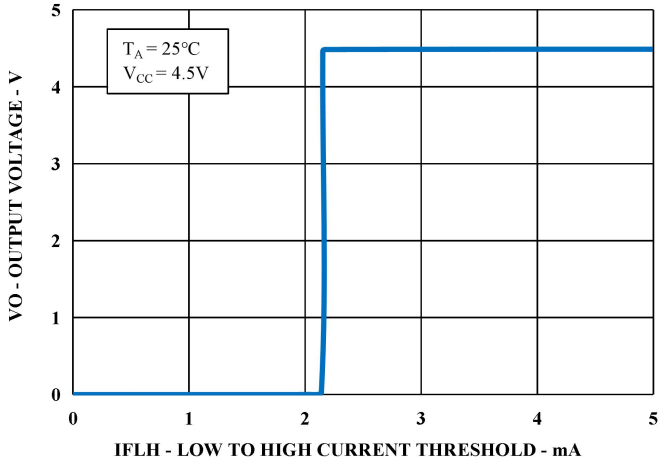


Figure 3: Transfer Characteristics

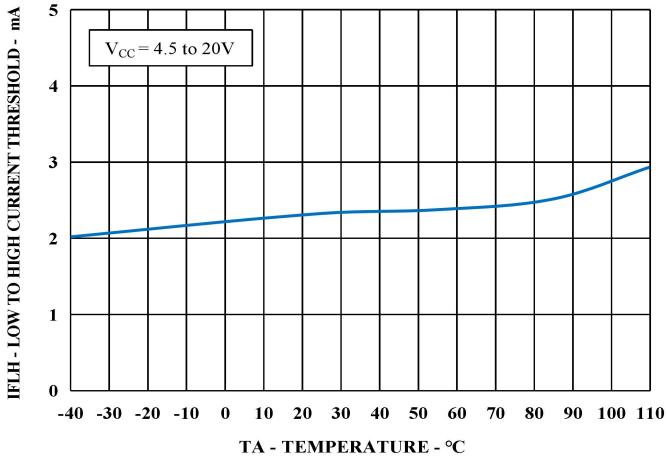


Figure 4: I_{FLH} vs. Temperature

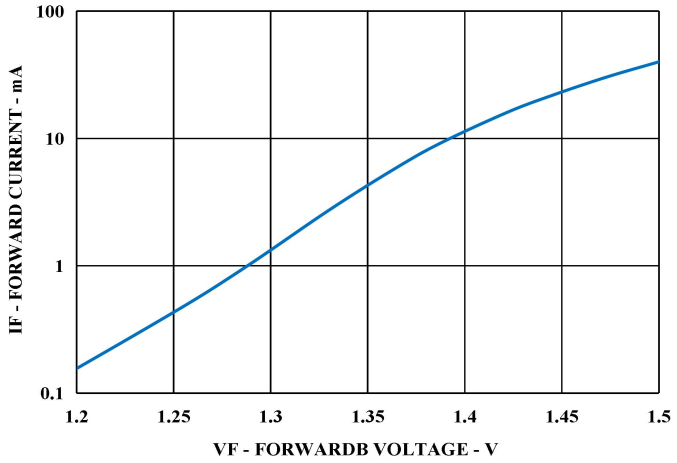


Figure 5: Input Current vs Forward Voltage

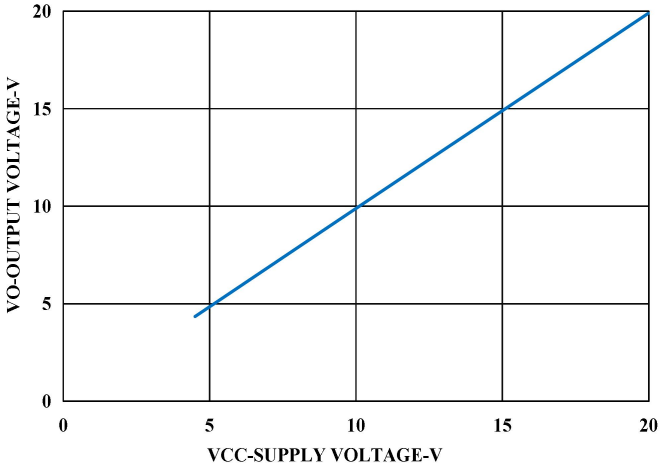


Figure 6: Output Voltage vs. Supply Voltage

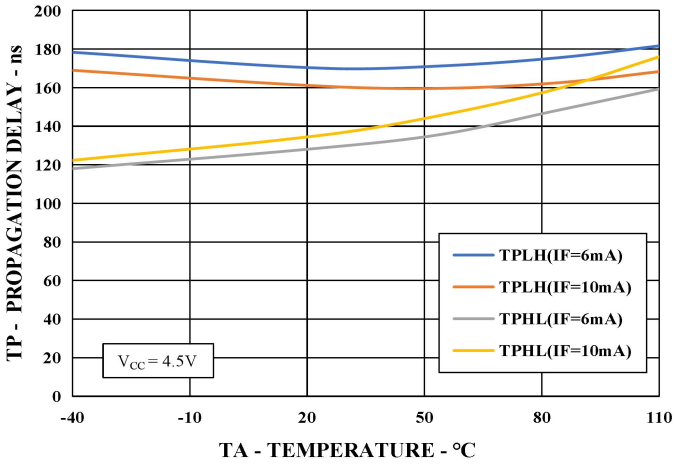


Figure 7: Propagation Delay vs. Temperature

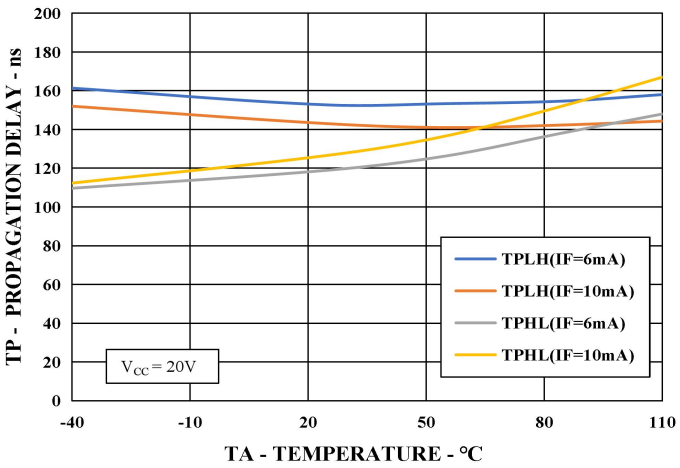


Figure 8: Propagation Delay vs. Temperature

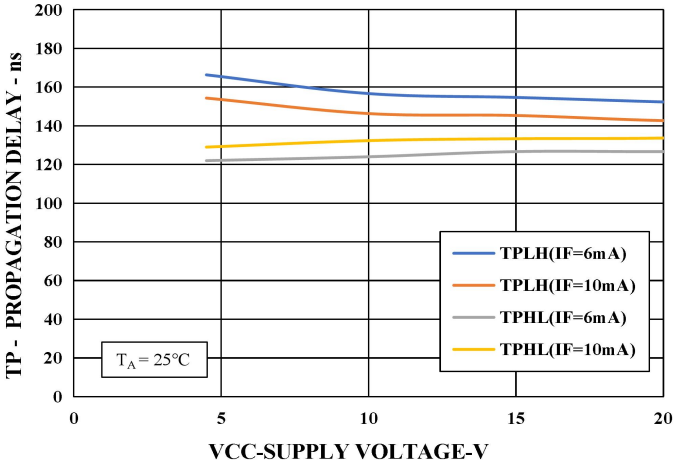


Figure 9: Propagation Delay vs. V_{CC}

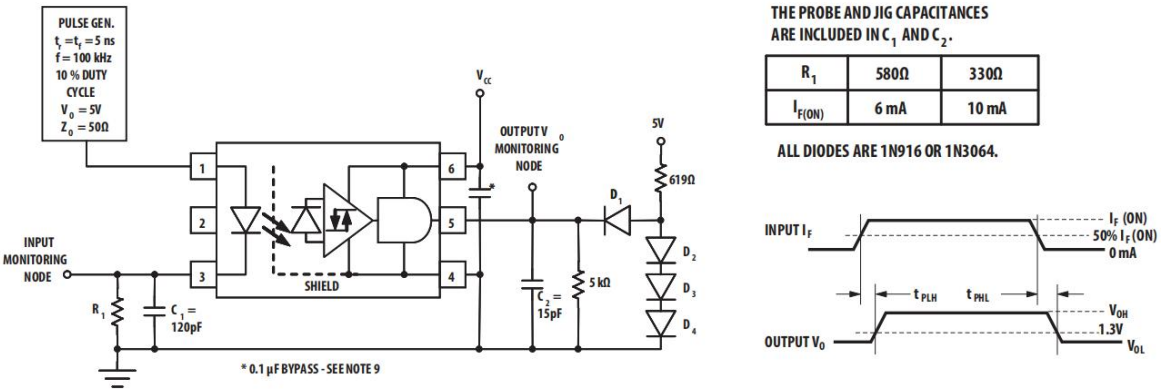


Figure 10: Test Circuit for t_{PLH}, t_{PHL}, t_r, and t_f

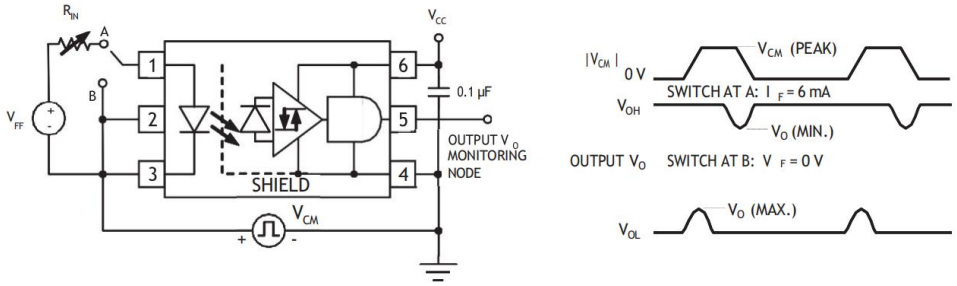


Figure 11: Test Circuit for Common Mode Transient Immunity and Typical Waveforms

16. Notes

16.1 Orient is continually improving the quality, reliability, function or design and Orient reserves the right to make changes without further notices.

16.2 The products shown in this publication are designed for the general use in electronic applications such as office automation equipment, communications devices, audio/visual equipment, electrical application and instrumentation.

16.3 For equipment/devices where high reliability or safety is required, such as space applications, nuclear power control equipment, medical equipment, etc, please contact our sales representatives.

16.4 When requiring a device for any "specific" application, please contact our sales in advice.

15.5 If there are any questions about the contents of this publication, please contact us at your convenience.

16.6 The contents described herein are subject to change without prior notice.

16.7 Immerge unit's body in solder paste is not recommended.