



ORIENT

Photo coupler

Product Data Sheet

Part Number: OR-314(B)

Customer: _____

Date: _____

SHENZHEN ORIENT COMPONENTS CO., LTD

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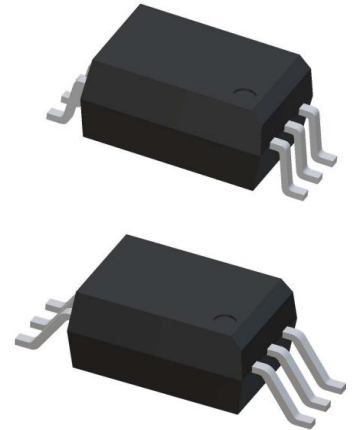
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Preliminary

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

1. Features

- (1) High speed response.
- (2) Ultra high CMR.
- (3) Bootstrappable supply current.
- (4) $I_{OH(PEAK)}$ MAX: 1.5A
- (5) $I_{OL(PEAK)}$ MAX: 1.5A
- (6) 200ns maximum propagation delay over temperature range
- (7) $I_{CC(max)}$ = 3mA maximum supply current
- (8) 25 kV/ μ s minimum common mode rejection (CMR) at V_{CM} = 1500V
- (9) Wide VCC operating range: 10V to 30V over temperature range
- (10) Available in Stretched SO-6 package
- (11) Industrial temperature range: -40° C to 105° C
- (12) Safety approval
 - UL approved(No.E323844)
 - VDE approved(No.40029733)
 - CQC approved (No.CQC19001231480)
- (13) In compliance with RoHS, REACH standard
- (14) MSL Level 1



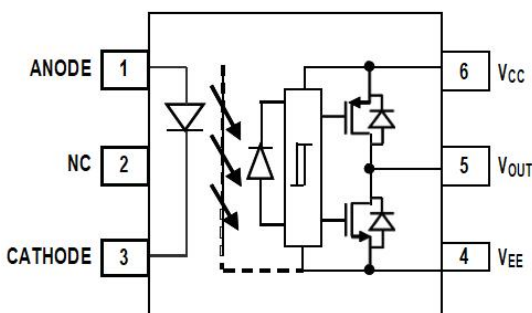
2. Description

The OR-314(B) consists of a GaAsP LED optically coupled to an integrated circuit with a power output stage. These optocouplers are ideally suited for driving power IGBTs and MOSFETs used in motor control inverter applications. The high operating voltage range of the output stage provides the drive voltages required by gate controlled devices. The voltage and current supplied by this optocoupler makes it ideally suited for directly driving small or medium power IGBTs.

3. Application Range

- | | |
|---|--------------------------------------|
| (1) Isolated IGBT/Power MOSFET gate drive | (2) AC and Brushless DC motor drives |
| (3) Industrial inverters | (4) Inverter for home appliances |
| (5) Switching power supplies | (6) Induction cooker |

4. Functional Diagram



Truth Table			
LED	VCC – VEE “POSITIVE GOING” (TURN-ON)	VCC – VEE “NEGATIVE GOING” (TURN-OFF)	VO
OFF	0 – 30 V	0 – 30 V	LOW
ON	0 – 6.9V	0 – 5.9 V	LOW
ON	6.9 – 8.7 V	5.9 – 7.5 V	TRANSITION
ON	8.7 – 30 V	7.5 – 30 V	HIGH

Note 1: A 0.1 μ F bypass capacitor must be connected between pins VCC and VEE.

Note 2: Pin 2 is a suspension pin. Please do not connect to external circuits.

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

Parameter		Symbol	Rated Value	Unit
Input	Average Forward Input Current	I_F	25	mA
	Reverse Input Voltage	V_R	5	V
Output	“High” Peak Output Current	$I_{OH(PEAK)}$	1.5	A
	“Low” Peak Output Current	$I_{OL(PEAK)}$	1.5	A
	Output Power Dissipation	P_O	250	mW
Total Output Supply Voltage		$V_{CC} - V_{EE}$	35	V
Output Voltage		$V_{O(PEAK)}$	V_{CC}	V
Input Current (Rise/Fall Time)		$t_{r(IN)} / t_{f(IN)}$	500	ns
Insulation Voltage		V_{iso}	5000	Vrms
Operating Temperature		T_{opr}	-40 ~ + 105	°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.	Unit
Operating Temperature	T_A	-40	105	°C
Supplier Voltage	V_{CC}	10	30	V
Input Current (ON)	$I_{F(ON)}$	7	16	mA
Input Voltage (OFF)	$V_{F(OFF)}$	0	0.8	V

7. Electrical Optical Characteristics

Unless otherwise noted, all typical values are at $T_A = 25^\circ\text{C}$, $V_{CC} - V_{EE} = 30\text{ V}$, $V_{EE} = \text{Ground}$; all minimum and maximum specifications are at recommended operating conditions ($T_A = -40$ to 105°C , $I_{F(ON)} = 7$ to 16 mA , $V_{F(OFF)} = 0$ to 0.8 V , $V_{EE} = \text{Ground}$, $V_{CC} = 10$ to 30 V).

Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
High Level Output Current	I_{OH}	—	-0.7	-0.4	A	$V_O = (V_{CC} - 4V)$
		—	—	-1.5		$V_O = (V_{CC} - 6V)$
Low Level Output Current	I_{OL}	0.4	0.9	—	A	$V_O = (V_{EE} + 2.5V)$
		1.5	—	—		$V_O = (V_{EE} + 6V)$
High Level Output Voltage	V_{OH}	$(V_{CC} - 0.6)$	$(V_{CC} - 0.3)$	—	V	$I_F = 10\text{ mA}$, $I_O = -100\text{ mA}$
Low Level Output Voltage	V_{OL}	—	$(V_{EE} + 0.14)$	$(V_{EE} + 0.4)$	V	$I_F = 0\text{ mA}$, $I_O = 100\text{ mA}$
High Level Supply Current	I_{CCH}	—	1.8	3.0	mA	Output Open, $I_F = 7$ to 16 mA
Low Level Supply Current	I_{CCL}	—	2.2	3.0	mA	Output Open, $V_F = 0$ to $+0.8\text{ V}$
Threshold Input Current Low to High	I_{FLH}	—	2.4	5.0	mA	$I_O = 0\text{ mA}$, $V_O > 5V$
Threshold Input Voltage High to Low	V_{FHL}	0.8	—	—	V	$I_O = 0\text{ mA}$, $V_O < 5V$
Input Forward Voltage	V_F	1.2	1.4	1.8	V	$I_F = 10\text{ mA}$
Temperature Coefficient of Forward Voltage	$\Delta V_F / \Delta T_A$	—	-1.6	—	mV/ $^\circ\text{C}$	$I_F = 10\text{ mA}$
Input Reverse Breakdown Voltage	B_{VR}	5	—	—	V	$I_R = 10\text{ }\mu\text{A}$
Input Capacitance	C_{IN}	—	70	—	pF	$f = 1\text{ MHz}$, $V_F = 0V$
UVLO Threshold	V_{UVLO+}	6.9	7.9	8.7	V	$V_O > 5V$, $I_F = 10\text{ mA}$
	V_{UVLO-}	5.9	6.8	7.5	V	$V_O < 5V$, $I_F = 10\text{ mA}$
UVLO Hysteresis	$UVLO_{HYS}$	—	1.0	—	V	—

1.All typical values at $T_A = 25^\circ\text{C}$ and $V_{CC} - V_{EE} = 30V$, unless otherwise noted.

2.Maximum pulse width = $10\text{ }\mu\text{s}$, maximum duty cycle = 0.2%. This value is intended to allow for component tolerances for designs with IO peak minimum = 0.5 A. See Applications section for additional details on limiting IOH peak.

3.Maximum pulse width = $50\text{ }\mu\text{s}$, maximum duty cycle = 0.5%.

4.In this test, VOH is measured with a dc load current. When driving capacitive loads VOH will approach VCC as IOH approaches zero amps.

5.Maximum pulse width = 1 ms, maximum duty cycle = 20%.

8. Switching Characteristics

Unless otherwise noted, all typical values are at $T_A = 25^\circ\text{C}$, $V_{CC} - V_{EE} = 30\text{ V}$, $V_{EE} = \text{Ground}$; all minimum and maximum specifications are at recommended operating conditions ($T_A = -40$ to 105°C , $I_{F(\text{ON})} = 7$ to 16 mA , $V_{F(\text{OFF})} = 0$ to 0.8 V , $V_{EE} = \text{Ground}$, $V_{CC} = 10$ to 30 V).

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Propagation Delay Time to High Output Level	t_{PLH}	50	120	200	ns	$R_g = 47\Omega$, $C_g = 3\text{ nF}$, $f = 10\text{ kHz}$, Duty Cycle = 50% $I_F = 7$ to 16 mA , $V_{CC} = 10$ to 30 V
Propagation Delay Time to Low Output Level	t_{PHL}	50	130	200		
Pulse Width Distortion	PWD	—	15	70		
Propagation Delay Difference Between Any Two Parts	PDD	-100	—	100		
Rise Time	T_r	—	35	—		
Fall Time	T_f	—	35	—		
Output High Level Common Mode Transient Immunity	$ CM_H $	25	—	—	kV/ μs	$T_A = 25^\circ\text{C}$, $V_{CM} = 1500\text{ V}$, $I_F = 10$ to 16 mA , $V_{CC} = 30\text{ V}$
Output Low Level Common Mode Transient Immunity	$ CM_L $	25	—	—	kV/ μs	$T_A = 25^\circ\text{C}$, $V_{CM} = 1500\text{ V}$, $V_F = 0\text{ V}$, $V_{CC} = 30\text{ V}$

1. All typical values at $T_A = 25^\circ\text{C}$ and $V_{CC} - V_{EE} = 30\text{ V}$, unless otherwise noted.
2. Pulse Width Distortion (PWD) is defined as $|t_{PHL} - t_{PLH}|$ for any given device.
3. The difference between t_{PHL} and t_{PLH} between any two parts under the same test condition.
4. Common mode transient immunity in the high state is the maximum tolerable dV_{CM}/dt of the common mode pulse, V_{CM} , to assure that the output will remain in the high state (i.e., $V_O > 15.0\text{ V}$).
5. Common mode transient immunity in a low state is the maximum tolerable dV_{CM}/dt of the common mode pulse, V_{CM} , to assure that the output will remain in a low state (i.e., $V_O < 1.0\text{ V}$).



9. Order Information

Part Number

OR-314(B)U-Y-Z

Note

314= Part Number .

(B)= Identification.

U = Lead form option ,W or W1 .

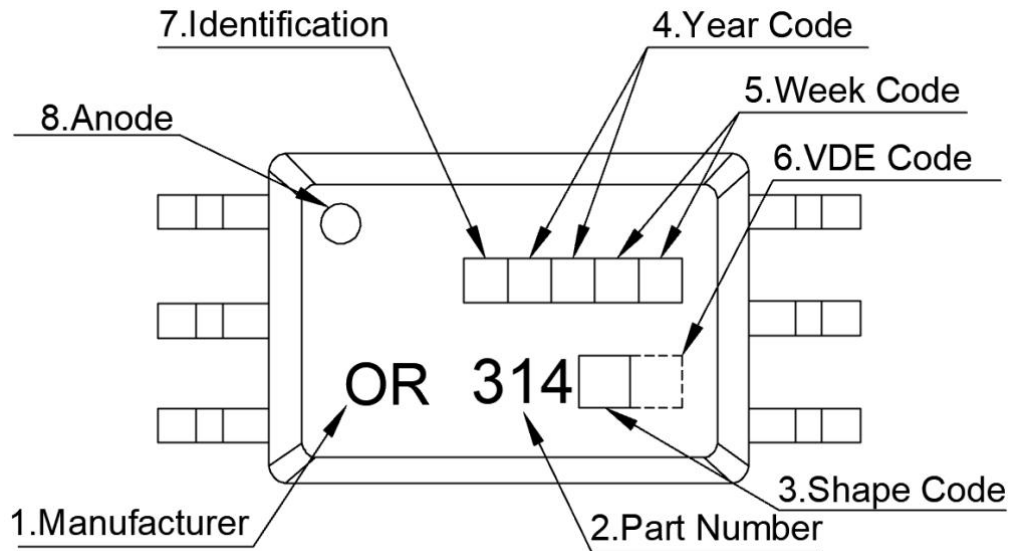
Y = Tape and reel option (TA,TA1 or none) .

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

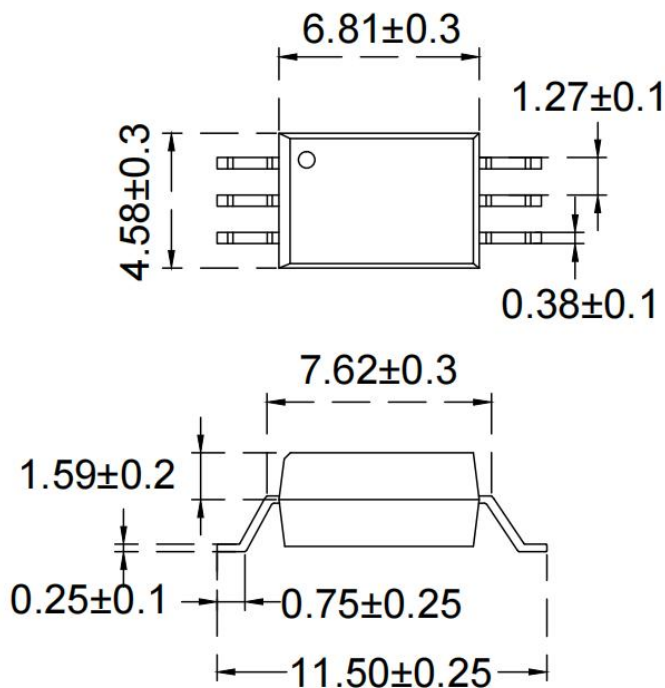


1. Manufacturer : ORIENT.
2. Part Number : 314.
3. Shape Code : Lead form option ,W or W1 .
4. Year Code : '21' means '2021' and so on.
5. Week Code : 01 means the first week, 02 means the second week and so on.
6. VDE Code . (Optional)
7. Identification.
8. Anode.

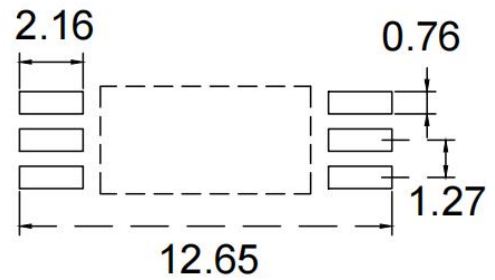
* VDE Mark can be selected.

11. Package Dimension

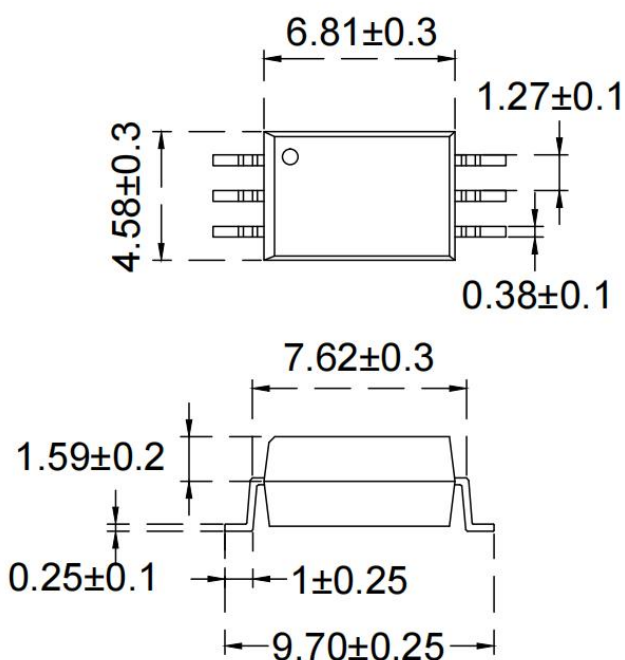
(1) OR-314(B)W



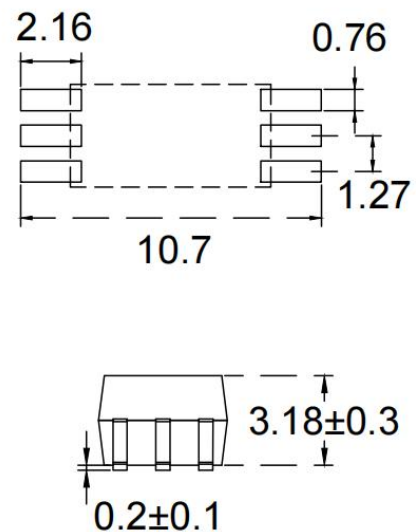
Land Pattern Recommendation



(2) OR-314(B)W1

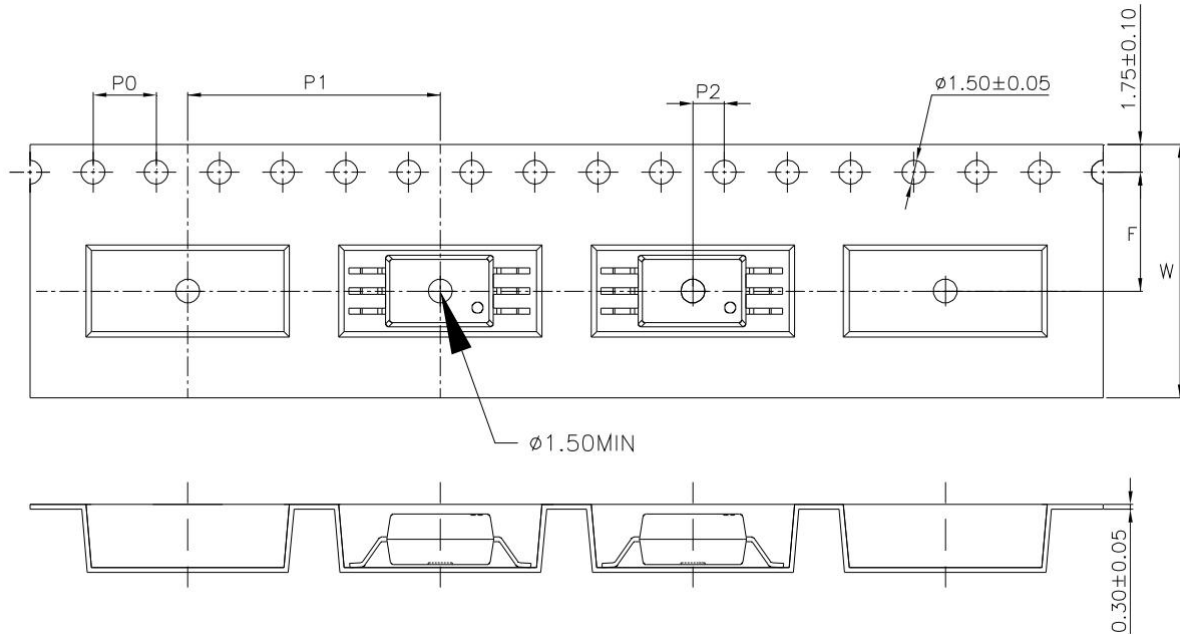


Land Pattern Recommendation

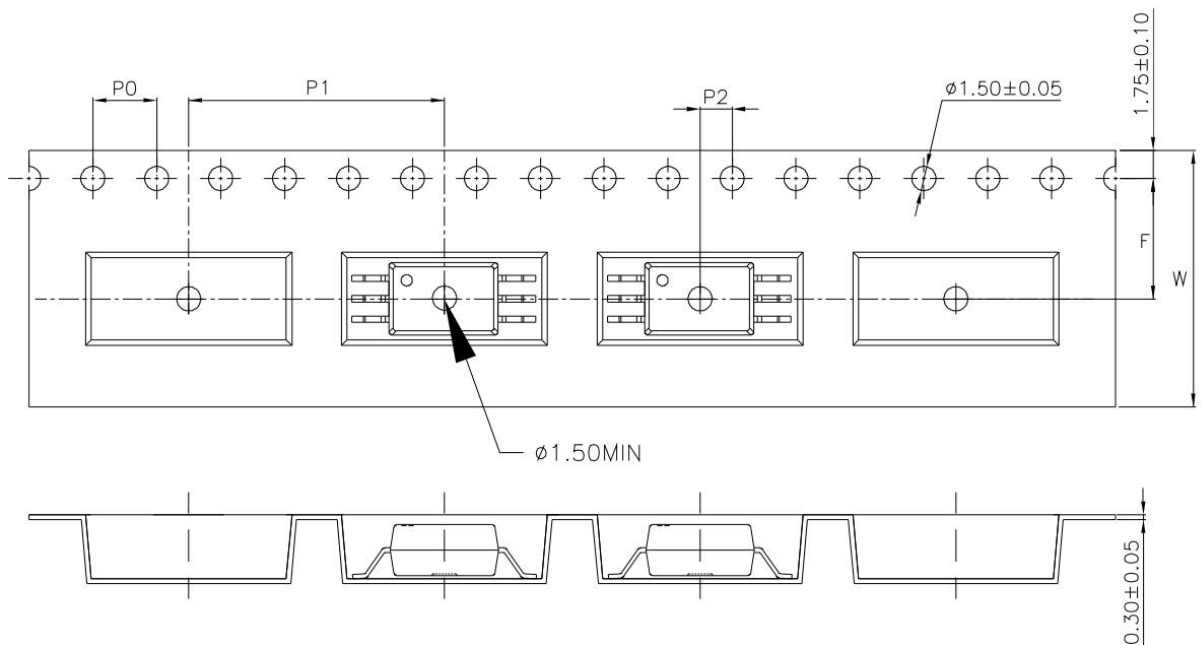


12. Taping Dimensions

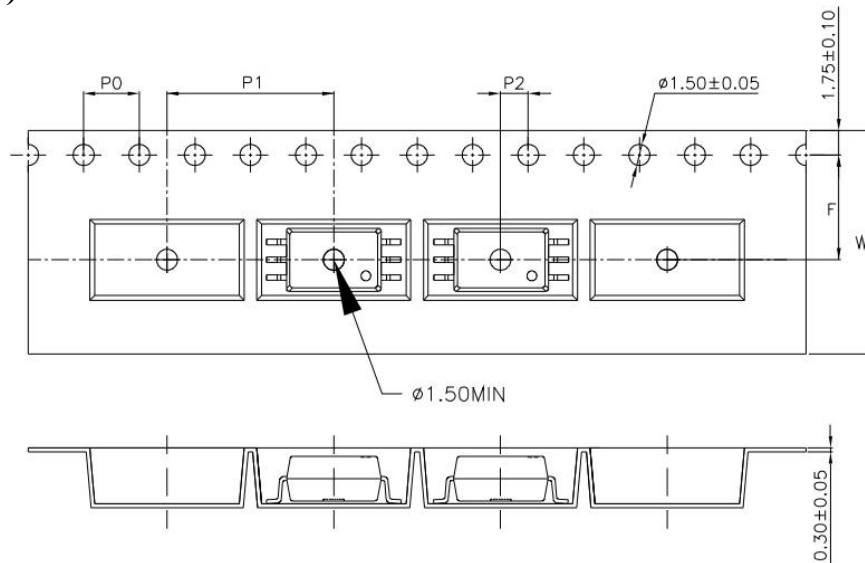
(1) OR-314(B)W-TA



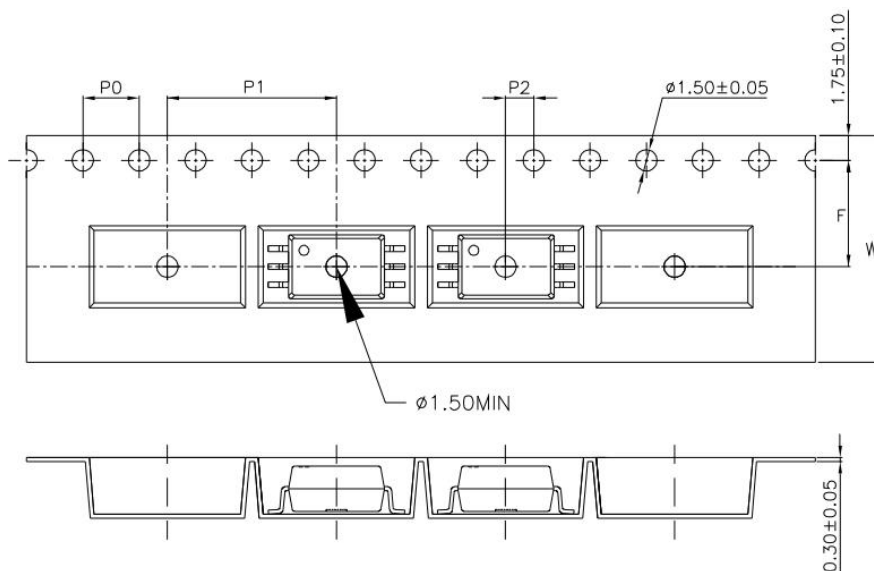
(2) OR-314(B)W-TA1



(3) OR-314(B)W1-TA



(4) OR-314(B)W1-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)

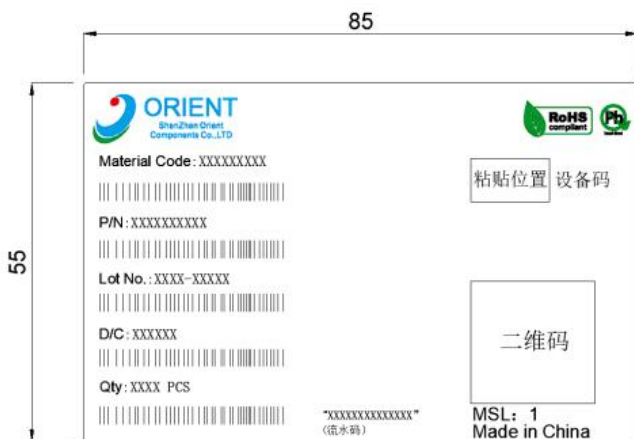
Encapsulation type	TA/TA1
amount (pcs)	1000

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:

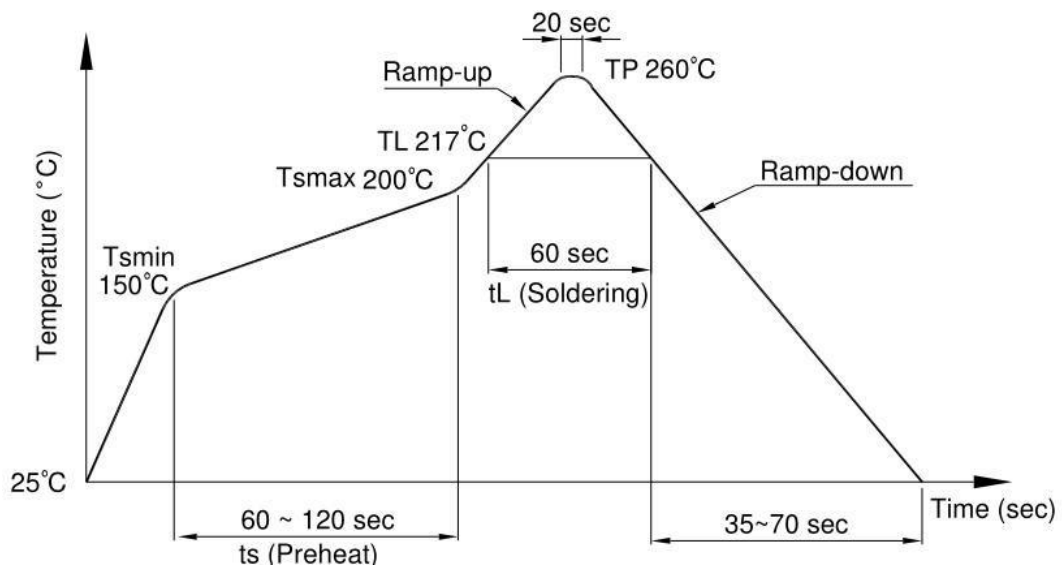
1. Material Code :Product ID.
2. P/N :Contents with "Order Information" in the specification.
3. Lot No. :Product data.
4. D/C :Product weeks.
5. Quantity :Packaging quantity.

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.

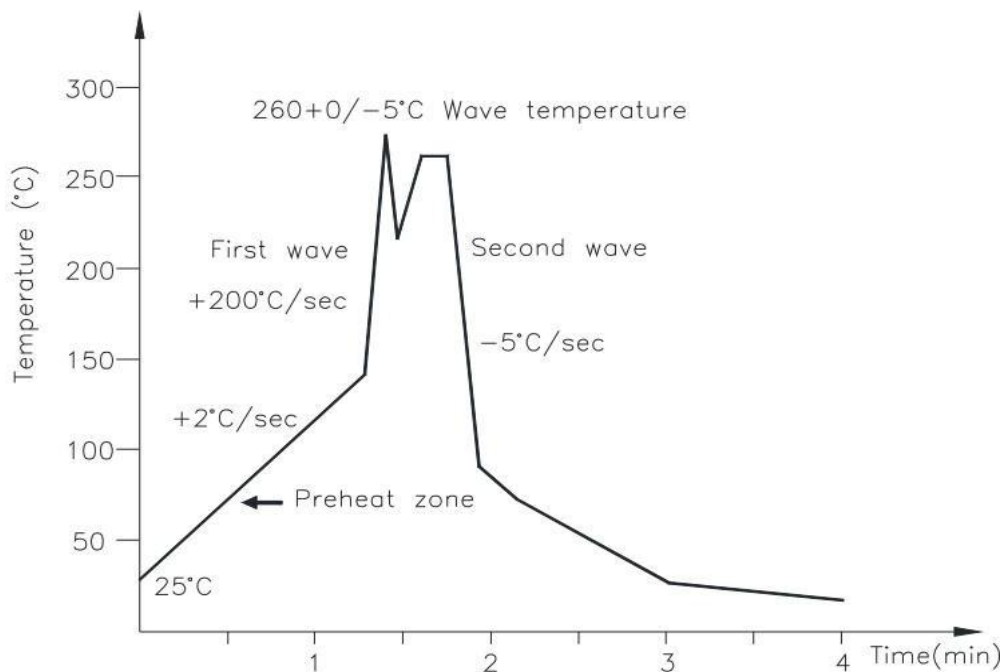
Profile item	Conditions
Preheat - Temperature Min (T Smin) - Temperature Max (T Smax) - Time (min to max) (ts)	150°C 200°C 90±30 sec
Soldering zone - Temperature (TL) - Time (t L)	217°C 60 sec
Peak Temperature	260°C
Peak Temperature time	20 sec
Ramp-up rate	3°C / sec max.
Ramp-down rate from peak temperature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



(2).Wave soldering (JEDEC22A111 compliant)

One time soldering is recommended within the condition of temperature.

Temperature	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 & Test Circuits

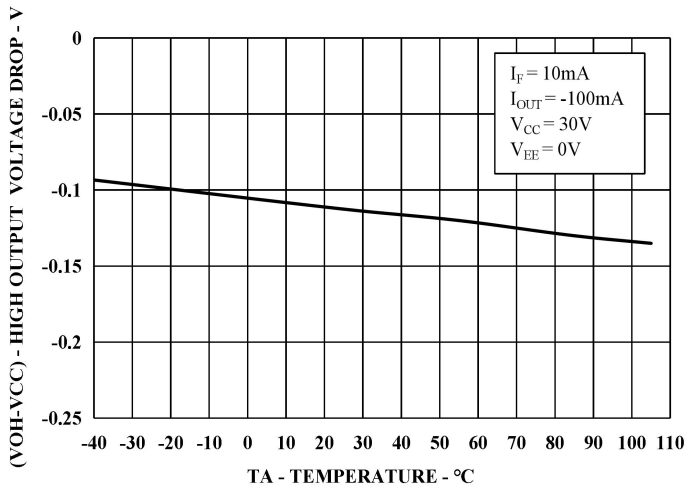


Figure 1: V_{OH} vs. Temperature

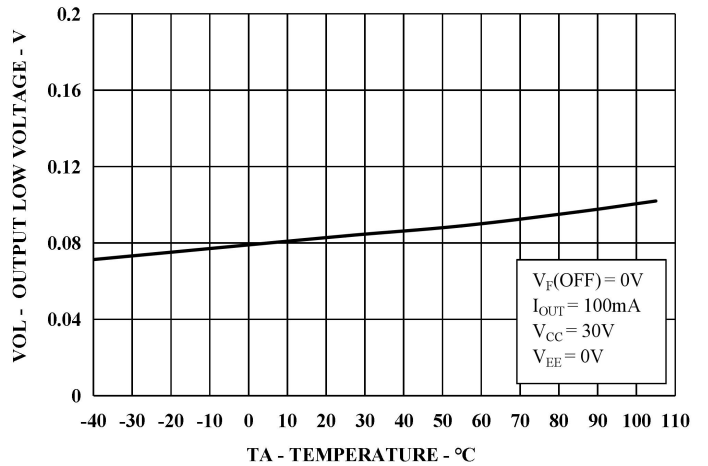


Figure 2: V_{OL} vs. Temperature

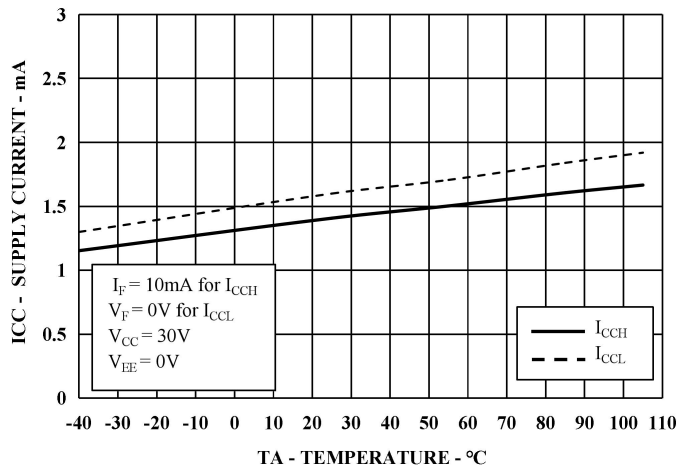


Figure 3: I_{CC} vs. Temperature

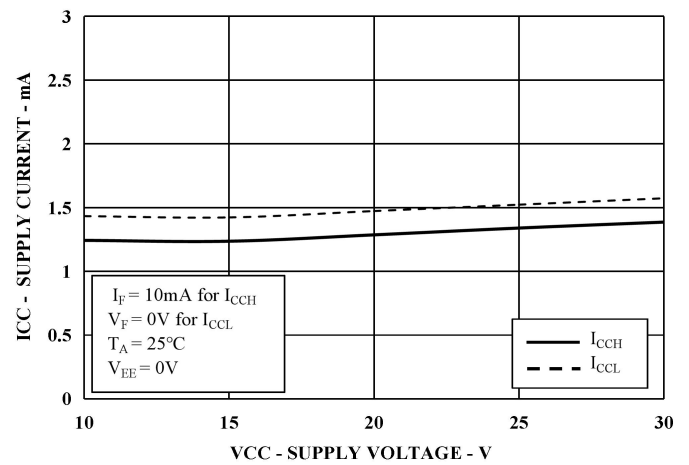


Figure 4: I_{CC} vs. V_{CC}

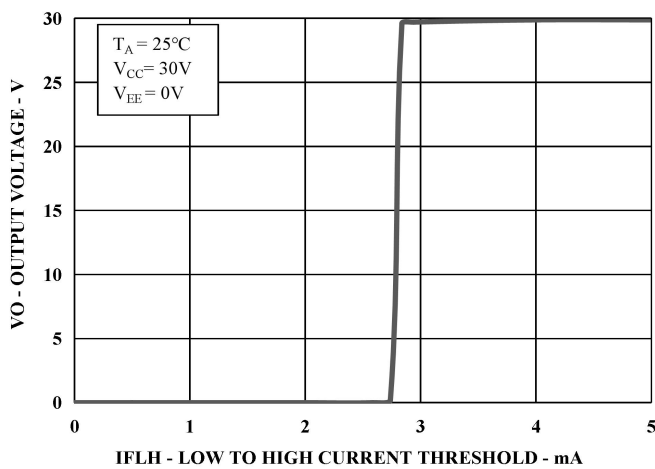


Figure 5: Transfer Characteristics

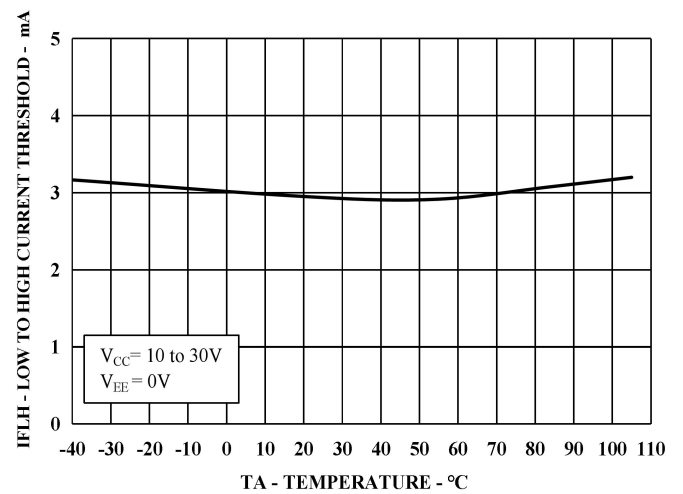


Figure 6: I_{FLH} vs. Temperature

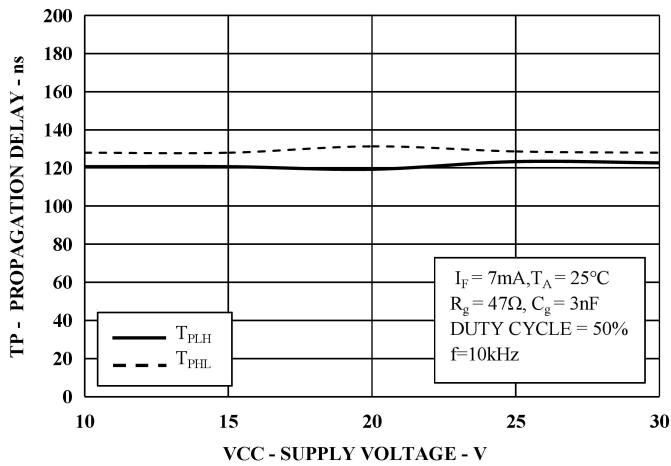
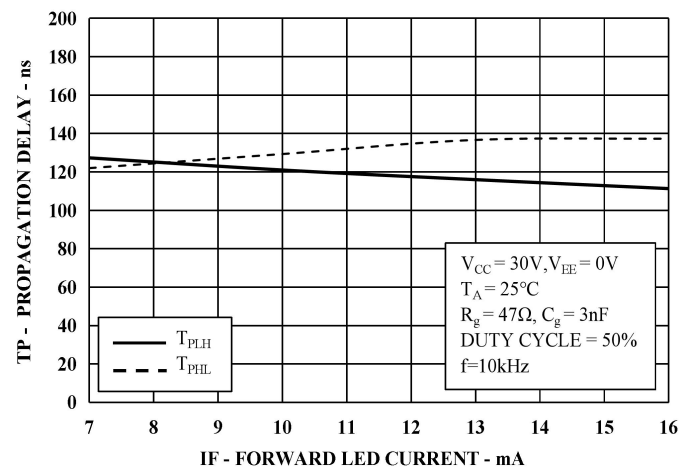
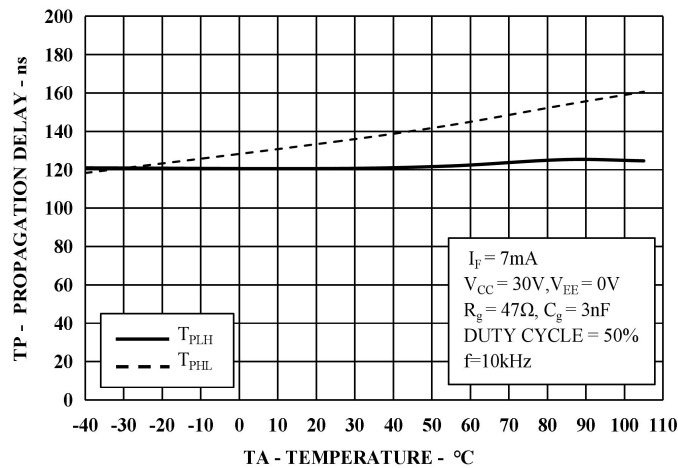

Figure 7: Propagation Delay vs. V_{CC}

Figure 8: Propagation Delay vs. I_F


Figure 9: Propagation Delay vs. Temperature

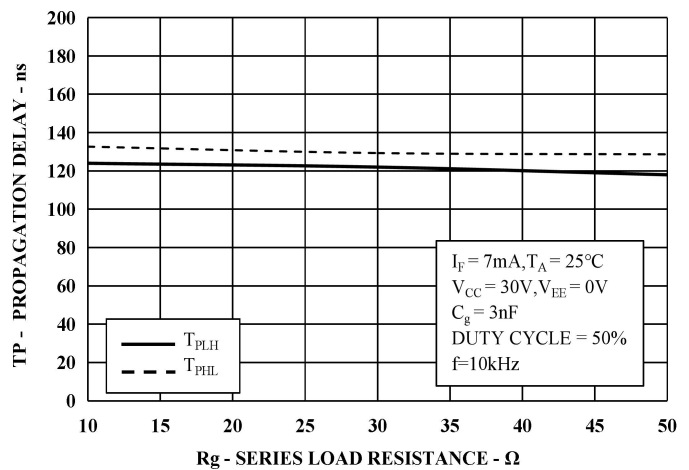
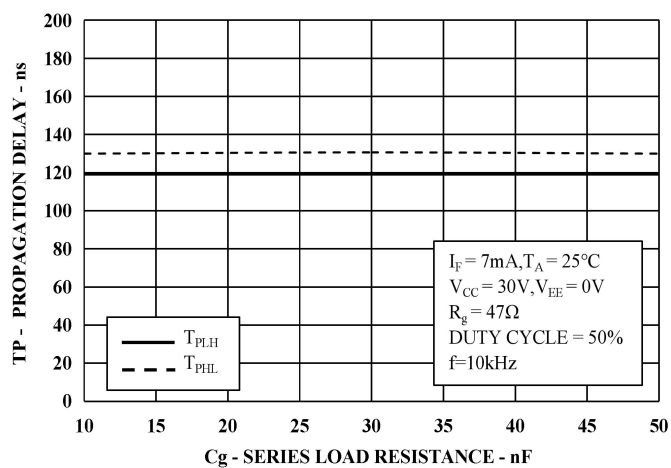
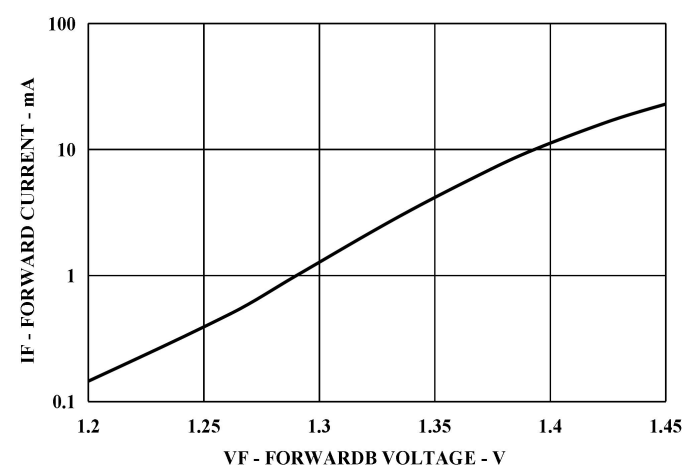

Figure 10: Propagation Delay vs. R_g

Figure 11: Propagation Delay vs. C_g


Figure 12: Input Current vs Forward Voltage

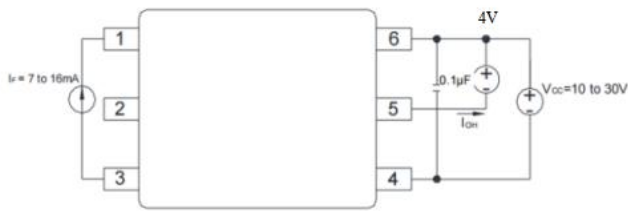
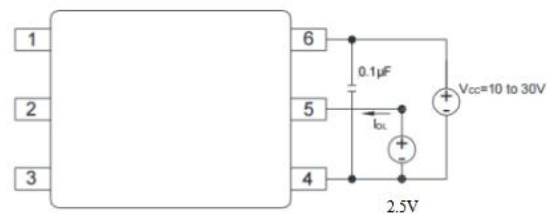
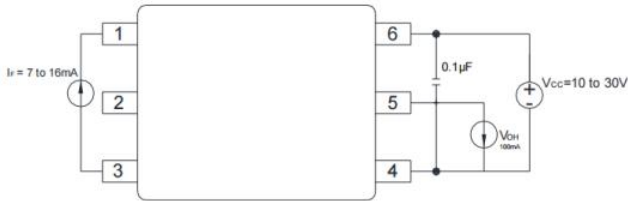
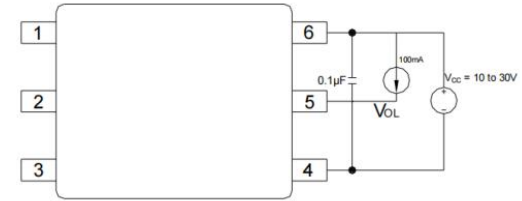
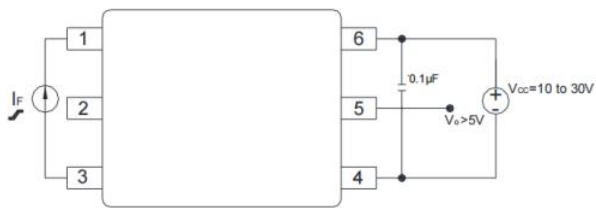
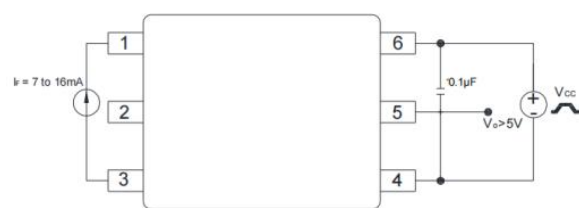

Figure 13: I_{OH} Test Circuit

Figure 14: I_{OL} Test Circuit

Figure 15: V_{OH} Test Circuit

Figure 16: V_{OL} Test Circuit

Figure 17: I_{FLH} Test Circuit


Figure 18: UVLO Test Circuit

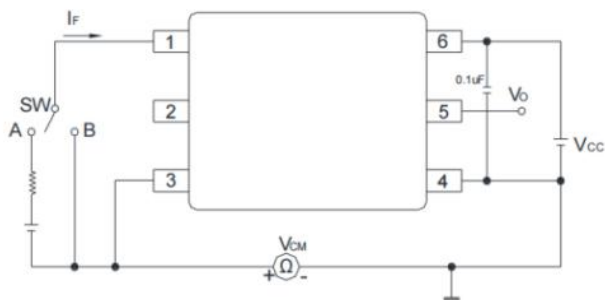
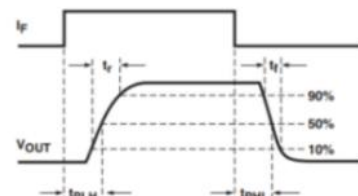
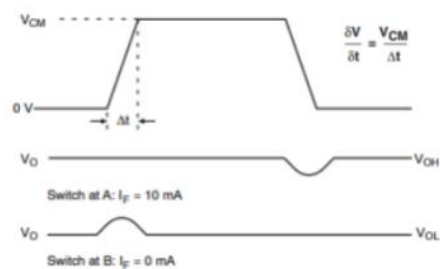

Figure 19: t_{PLH} , t_{PHL} , t_r , and t_f Test Circuit Waveforms


Figure 20: CMR Test Circuit and 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.

16.5 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.