ORIENT

Photo coupler

Product Data Sheet

Part Number: OR-3120(B)_OR-3150(B)

Customer: _____

Date: _____

SHENZHEN ORIENT COMPONENTS CO ., LTD

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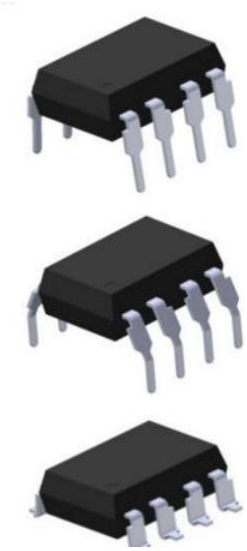
Preliminary

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

1. Features



(1) 1.5A maximum peak output current for OR-3150(B),
3.0A maximum peak output current for OR-3120(B).
(2) 35-kV/μs minimum Common Mode Rejection (CMR) at V_{CM} = 1500V
(3) 0.25V maximum low level output voltage (V_{OL}) eliminates need for negative gate drive
(4) I_{CC} = 3 mA maximum supply current
(5) Under voltage lock-out protection (UVLO) with hysteresis
(6) Wide operating V_{CC} range: 15V to 30V
(7) 0.2μs maximum propagation delay
(8) ±0.1μs maximum delay between devices/channels
(9) Industrial temperature range: –40°C to 110°C
(10) Safety approval

UL approved(No.E323844)

VDE approved(No.40029733)

CQC approved (No.CQC19001231254)

(11) In compliance with RoHS, REACH standards
(12) MSL Class I

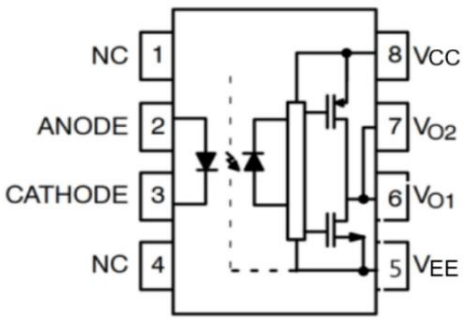
2. Instructions

The OR-3120(B)/OR-3150(B) consists of an LED optically coupled to an integrated circuit with a power output stage. This optocoupler is 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 IGBTs with ratings up to 1200V/50A.

3. Application Range

(1) IGBT/MOSFET gate drive
(2) AC/Brushless DC motor drives
(3) Industrial inverters
(4) Switch mode power supplies

4. Functional Diagram



Truth Table				
LED	VCC – VEE "POSITIVE GOING" (TURN-ON)		VCC – VEE "NEGATIVE GOING" (TURN-OFF)	
	VCC – VEE	VO	VCC – VEE	VO
OFF	0 – 30 V	LOW	30 – 0 V	LOW
ON	0 – 11.0 V	LOW	30 – 12.0 V	HIGH
ON	11.0 – 13.5 V	TRANSITION	12.0 – 9.5 V	TRANSITION
ON	13.5 – 30 V	HIGH	9.5 – 0 V	LOW

Note 1: A 0.1 μF bypass capacitor must be connected between pins 5 and 8.
Note 2: Pin 1 and Pin 4 are suspension pins. 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
	Reverse Input Voltage		V_R	5	V
Output	"High" Peak Output Current	OR-3120(B)	$I_{OH(PEAK)}$	3.0	A
		OR-3150(B)		1.5	
	"Low" Peak Output Current	OR-3120(B)	$I_{OL(PEAK)}$	3.0	A
		OR-3150(B)		1.5	
	Output Power Dissipation		P_O	250	mW
Total Power Dissipation			P_T	295	mW
Total Output Supply Voltage			V_{CC} - V_{EE}	35	V
Total Output Supply Voltage (90℃)			V_{CC} - V_{EE}	30	V
Insulation Voltage			V_{iso}	5000	Vrms
Maximum Working Insulation Voltage			V_{IORM}	850	Vpeak
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	℃
Power Supply	V_{CC}	15	30	V
Input Current	$I_{F(ON)}$	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° C, V_{CC} - V_{EE} = 30 V, V_{EE} = Ground; all minimum and maximum specifi cations are at recommended operating conditions (T_A = -40 to 110° C, $I_{F(ON)}$ = 7 to 16 mA, $V_{F(OFF)}$ = 0 to 0.8 V, V_{EE} = Ground, V_{CC} = 15 to 30 V).

Parameter		Symbol	Min.	Typ.	Max.	Units	Test Conditions
High Level Output Current	OR-3120(B)	I_{OH}	—	-2.3	-1.0	A	$V_O = (V_{CC} – 3V)$
			—	—	-2.0		$V_O = (V_{CC} – 6V)$
	OR-3150(B)		—	—	-0.2		$V_O = (V_{CC} – 0.75V)$
			—	—	-1.0		$V_O = (V_{CC} – 4V)$
Low Level Output Current	OR-3120(B)	I_{OL}	1.0	2.5	—	A	$V_O = (V_{EE} + 3V)$
			2.0	—	—		$V_O = (V_{EE} + 6V)$
	OR-3150(B)		0.2	—	—		$V_O = (V_{EE} + 0.75V)$
			1.0	—	—		$V_O = (V_{EE} + 4V)$
High Level Output Voltage		V_{OH}	(VCC – 0.3)	(VCC– 0.1)	—	V	I_O = –100 mA
Low Level Output Voltage		V_{OL}	—	0.06	0.25	V	I_O = 100 mA
High Level Supply Current		I_{CCH}	—	1.5	3.0	mA	Output Open, I_F = 7 to 16 mA
Low Level Supply Current		I_{CCL}	—	1.6	3.0	mA	Output Open,V_F = 0 to +0.8V
Threshold Input Current Low to High		I_{FLH}	—	2.0	5.0	mA	I_O = 0 mA,V_O > 5V
Threshold Input Voltage High to Low		V_{FHL}	0.8	—	—	V	I_O = 0 mA,V_O < 5V
Input Forward Voltage		V_F	1.2	1.4	1.8	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		BV_R	5	—	—	V	I_R = 10 μA
Input Capacitance		C_{IN}	—	70	—	pF	f = 1 MHz, V_F = 0V
UVLO Threshold		V_{UVLO+}	11.0	12.7	13.5	V	V_O > 5 V,I_F = 10 mA
		V_{UVLO-}	9.5	11.2	12.0	V	V_O < 5 V,I_F = 10 mA
UVLO Hysteresis		$UVLO_{HYS}$	—	1.5	—	V	—
Insulation Impedance		R_{iso}	5×10^{10}	1×10^{12}	—	Ω	DC500V, 40~60%R.H.

1.All typical values at TA = 25°C and VCC – VEE = 30V, unless otherwise noted.
2.Maximum pulse width = 10 μs, 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 μs, 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° C, V_{CC} - V_{EE} = 30 V, V_{EE} = Ground; all minimum and maximum specifi cations are at recommended operating conditions (T_A = -40 to 110° C, $I_{F(ON)}$ = 7 to 16 mA, $V_{F(OFF)}$ = 0 to 0.8 V, V_{EE} = Ground, V_{CC} = 15 to 30 V).

Parameter	Symbol	Min.	Typ	Max.	Units	Test Conditions
Propagation Delay Time to High Output Level	t_{PLH}	0.05	0.15	0.20	μs	**OR-3120(B):** Rg=10Ω,Cg=10nF, f=10kHz, Duty Cycle=50% **OR-3150(B):** Rg=47Ω,Cg=3nF, f=10kHz, Duty Cycle = 50%
Propagation Delay Time to Low Output Level	t_{PHL}	0.05	0.15	0.20	μs	
Pulse Width Distortion	PWD	—	0.005	0.06	μs	
Propagation Delay Difference Between Any Two Parts	PDD	–0.1	—	0.1	μs	
Rise Time	Tr	—	0.05	—	μs	
Fall Time	Tf	—	0.05	—	μs	
UVLO Turn On Delay	$t_{UVLO\ ON}$	—	0.9	—	μs	V_O>5V,I_F=10mA
UVLO Turn Off Delay	$t_{UVLO\ OFF}$	—	0.8	—		V_O<5V,I_F=10mA
Output High Level Common Mode Transient Immunity	$\|CM_H\|$	35	50	—	kV/μs	T_A=25°C, V_{CM}=1500V, I_F=10 to 16mA, V_{CC}=30V
Output Low Level Common Mode Transient Immunity	$\|CM_L\|$	35	50	—	kV/μs	T_A=25°C, V_{CM}= 1500V, V_F=0V,V_{CC}=30V

1.All typical values at TA = 25 °C and VCC – VEE = 30 V, unless otherwise noted.
2.Pulse Width Distortion (PWD) is defined as |tPHL-tPLH| for any given device.
3.The difference between tPHL and tPLH between any two parts under the same test condition.
4.Common mode transient immunity in the high state is the maximum tolerable dVCM/dt of the common mode pulse, VCM, to assure that the output will remain in the high state (i.e., VO>15.0V).
5.Common mode transient immunity in a low state is the maximum tolerable dVCM/dt of the common mode pulse, VCM, to assure that the output will remain in a low state (i.e., VO<1.0V).

9. Order Information

Part Number

OR-3120(B)U-Y-Z
Or OR-3150(B)U-Y-Z

Note

3120(B) / 3150(B) = Part Number.

U = Lead form option (S, M or none)

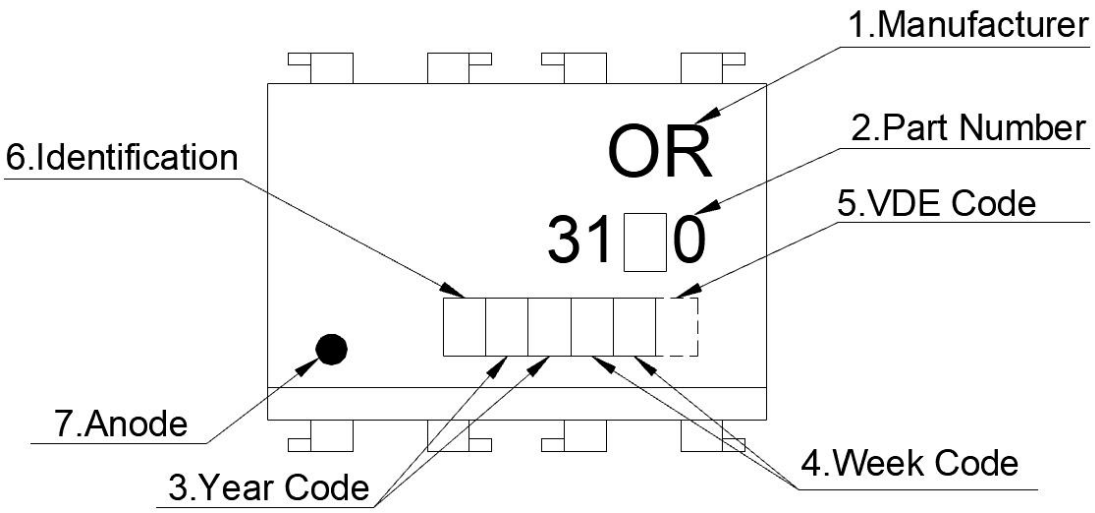
Y = Tape and reel option (TA,TA1 or none).

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

* VDE Code can be selected.

Option	Description	Packing quantity
None	Standard DIP Option	45 units per tube
M	Wide lead bend (0.4 inch spacing)	45 units per tube
TA	Surface mount lead form (low profile) + TA tape & reel option	1000 units per reel
TA1	Surface mount lead form (low profile) + TA1 tape & reel option	1000 units per reel

10. Naming Rule

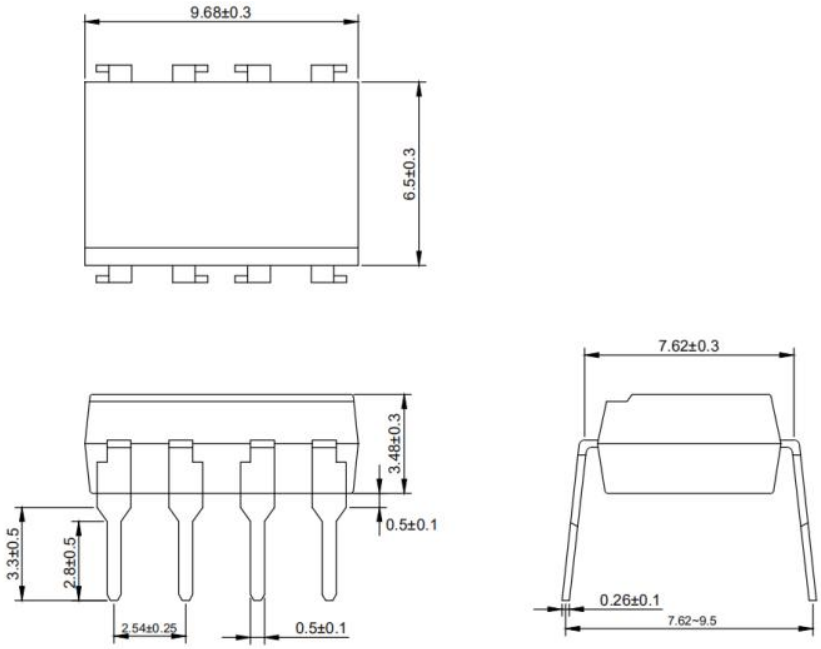


1. Manufacturer : ORIENT.
2. Part Number : 3120 or 3150.
3. Year Code □□： '21' means '2021' and so on.
4. Week Code □□： 01 represents the first week, 02 represents the second week, and so on.
5. VDE Code ⬚. (Optional)
6. Identification “B”.
7. Anode.

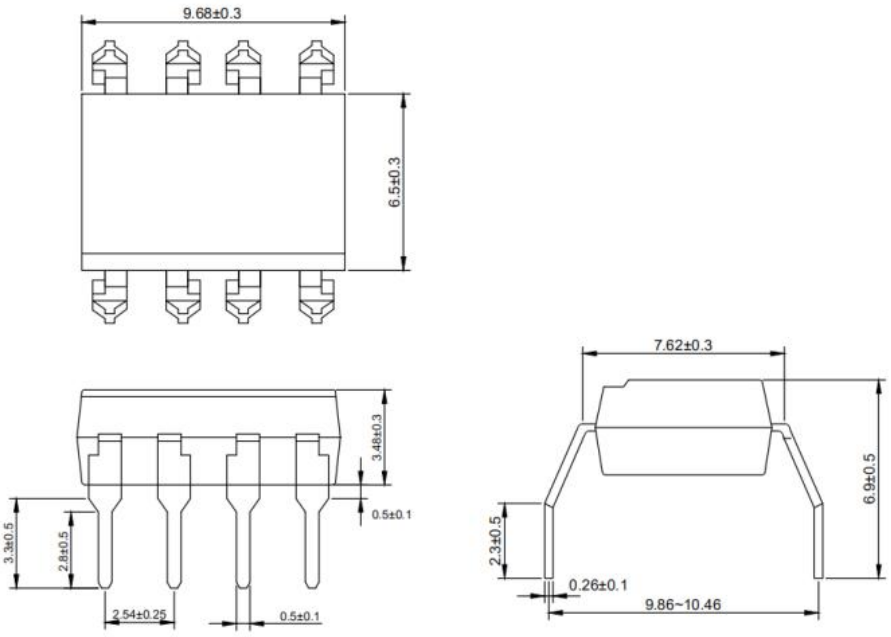
* VDE Mark can be selected.

11. Outer Dimension

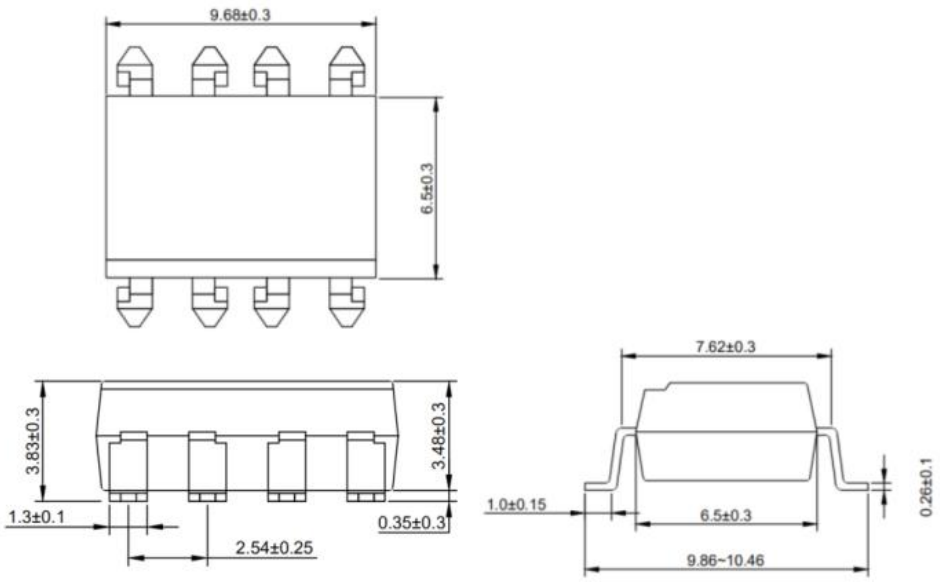
(1) OR-3120(B)_OR-3150(B)



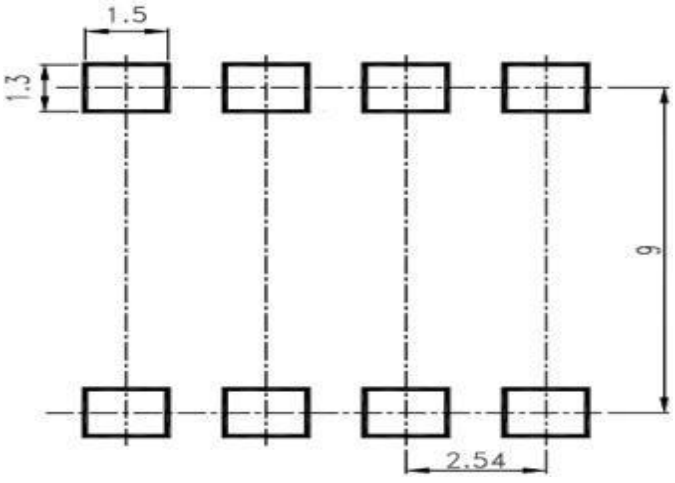
(2) OR-3120(B)M_OR-3150(B)M



(3) OR-3120(B)S_OR-3150(B)S



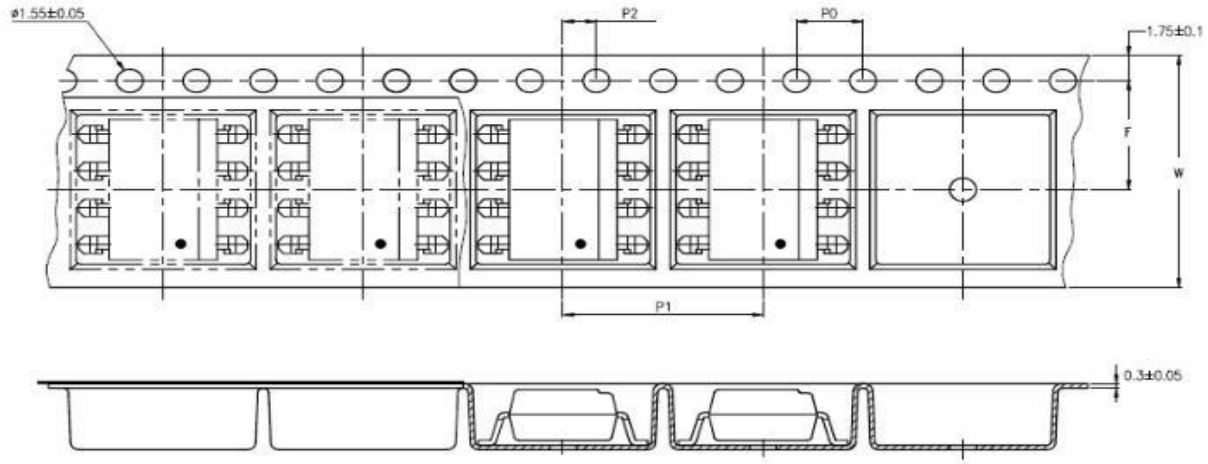
12. Recommended Foot Print Patterns (Mount Pad)



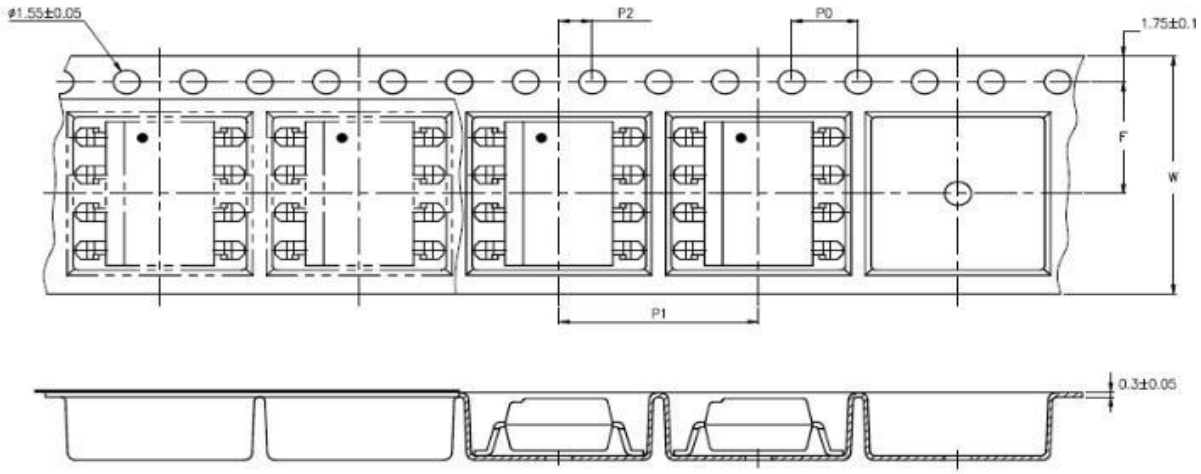
unit：mm

13. Taping Dimensions

(1) OR-3120(B)S-TA_OR-3150(B)S-TA



(2) OR-3120(B)S-TA1_OR-3150(B)S-TA1



type	symbol	Size: mm （inches）
bandwidth	W	16±0.3（0.63）
pitch	P0	4±0.1（0.15）
pitch	F	7.5±0.1（0.295）
	P2	2±0.1（0.079）
interval	P1	12±0.1（0.472）

Encapsulation type	TA/TA1
amount （pcs）	1000

14. Package Dimension

(1) package dimension

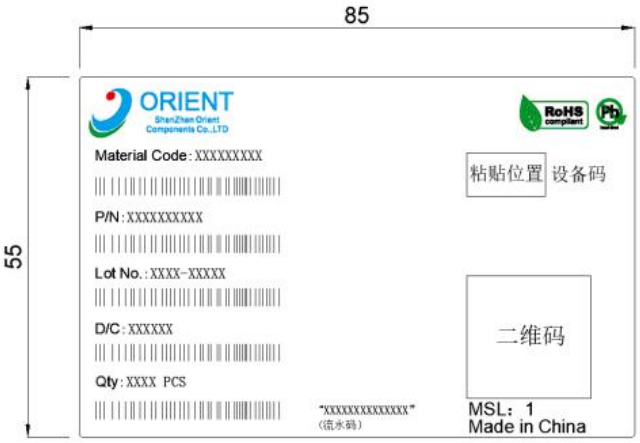
DIP Type

Packing Information	
Packing type	Tube
Qty per Tube	45pcs
Small box (Inner) Dimension	525*128*60mm
Large box (Outer) Dimension	545*290*335mm
The Amount per Inner Box	2,250pcs
The Amount per Outer Box	22,500pcs

SOP Type

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:

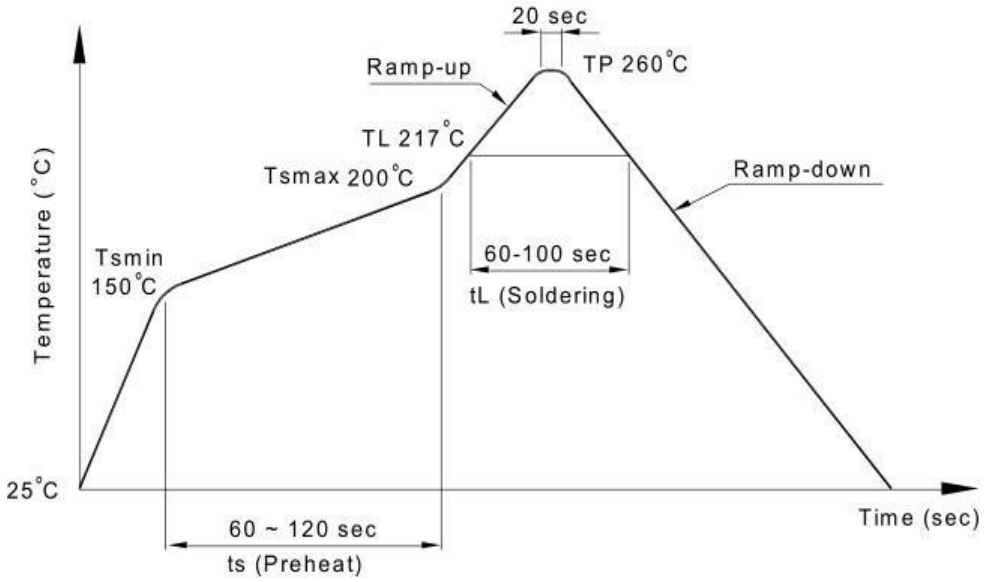
1. Material Code :Product ID.
2. P/N :Contents with "Order Information" in the specification.
3. Lot No. :Product data.
4. D/C :Product weeks.
5. Quantity :Packaging quantity.

15. Temperature Profile Of Soldering

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

Note: one solder backflow is recommended under the conditions described below in the temperature and time profile. Do not weld more than three times.

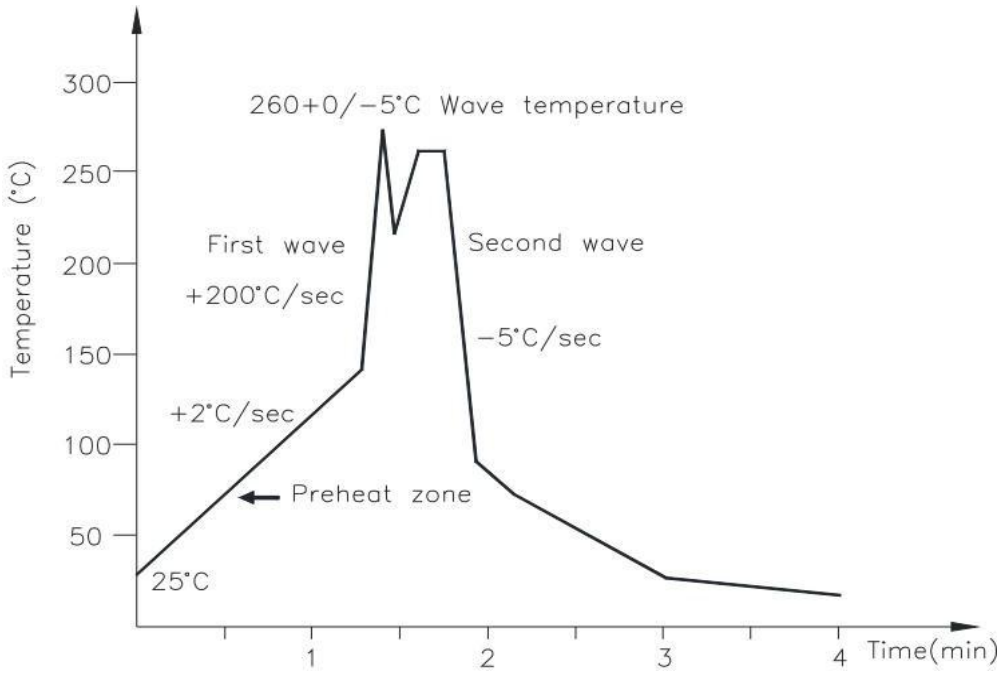
Profile item	Conditions
Preheat - Temperature Min (T Smin) - Temperature Max (T Smax) - Time (min to max) (ts)	 150˚C 200˚C 90±30 sec
Soldering zone - Temperature (TL) - Time (t L)	 217˚C 60 sec
Peak Temperature	260˚C
Peak Temperature time	20 sec
Ramp-up rate	3˚C / sec max.
Ramp-down rate from peak temperature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



(2) .Wave soldering (JEDEC22A111 compliant)

One-time welding is recommended under the temperature condition.

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



(3).Hand soldering by soldering iron

Single lead welding is allowed in each process and one-time welding is recommended.

Temperature Time	380+0/-5˚C 3 sec max

16. Characteristics Curves & Test Circuits

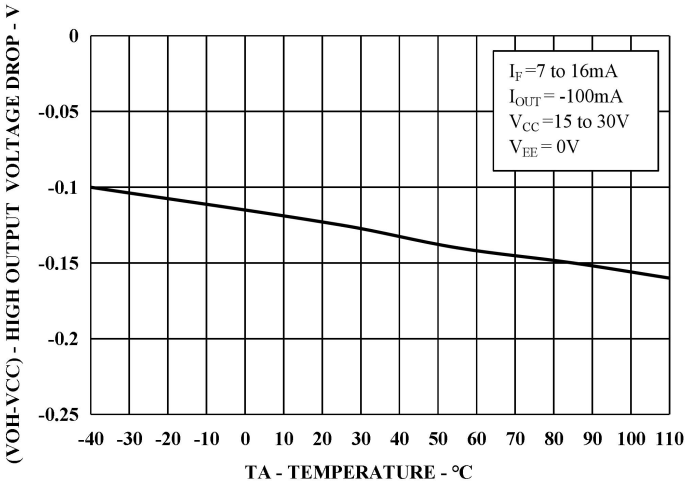


Figure 1: V_{OH} vs. Temperature

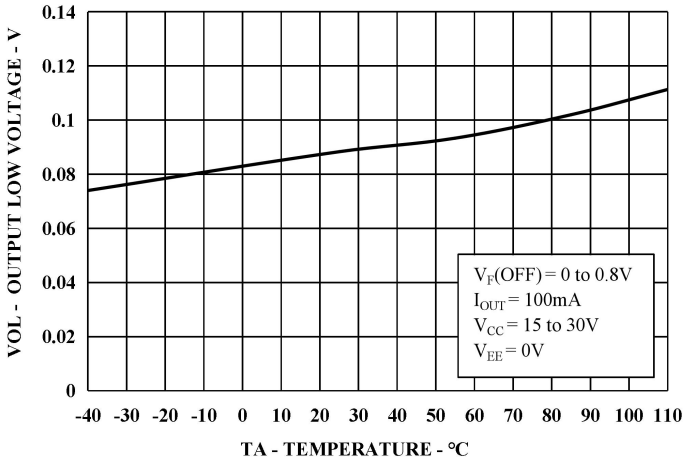


Figure 2: V_{OL} vs. Temperature

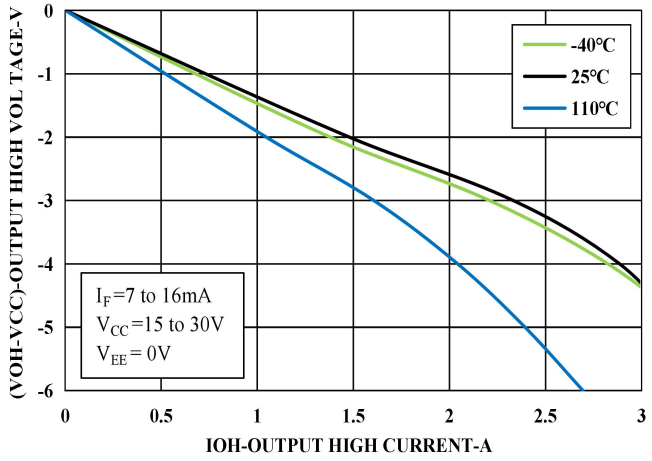


Figure 3: V_{OH} vs. I_{OH}

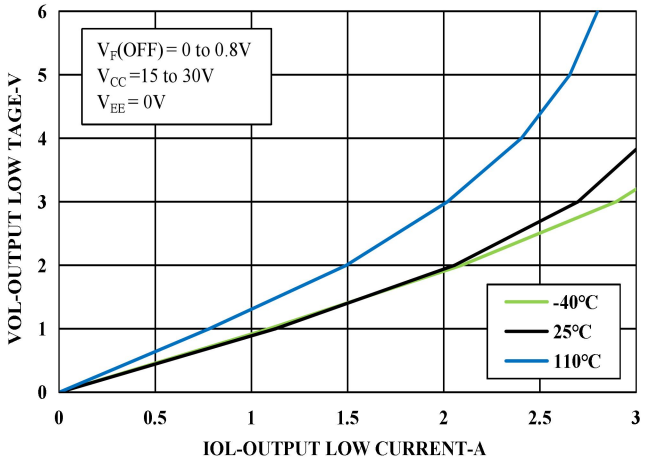


Figure 4: V_{OL} vs. I_{OL}

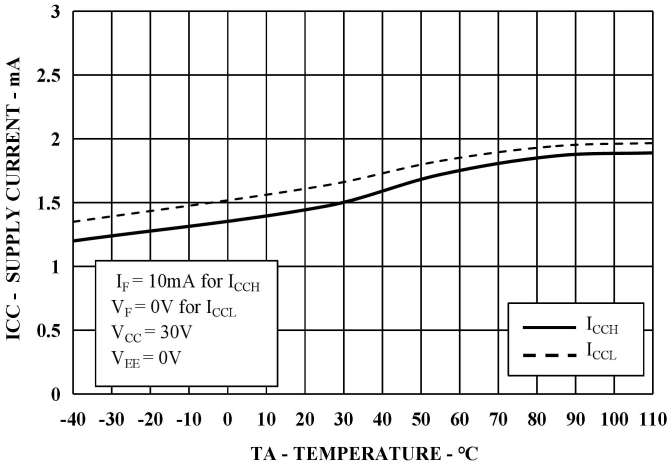


Figure 5: I_{CC} vs. Temperature

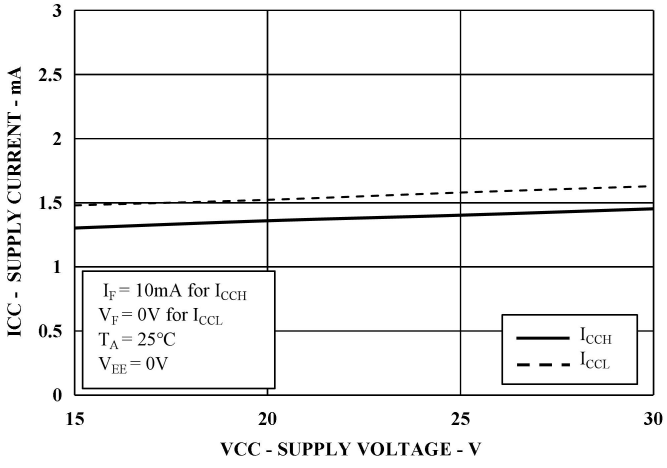


Figure 6: I_{CC} vs. V_{CC}

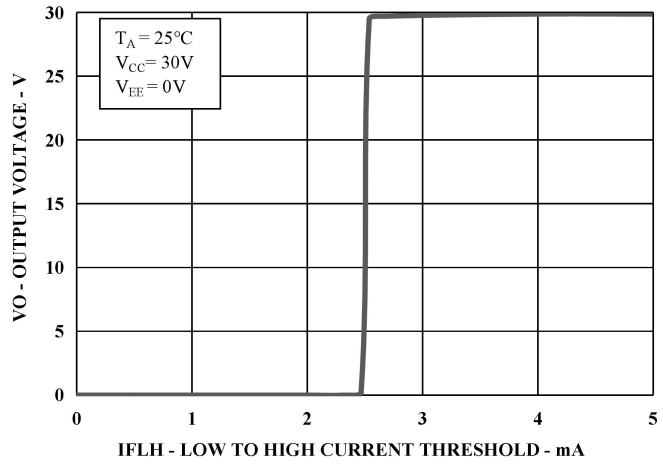


Figure 7: Transfer Characteristics

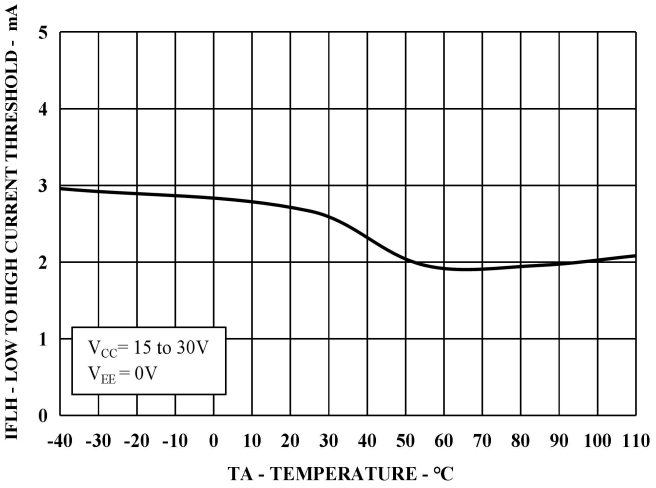


Figure 8: I_{FLH} vs. Temperature

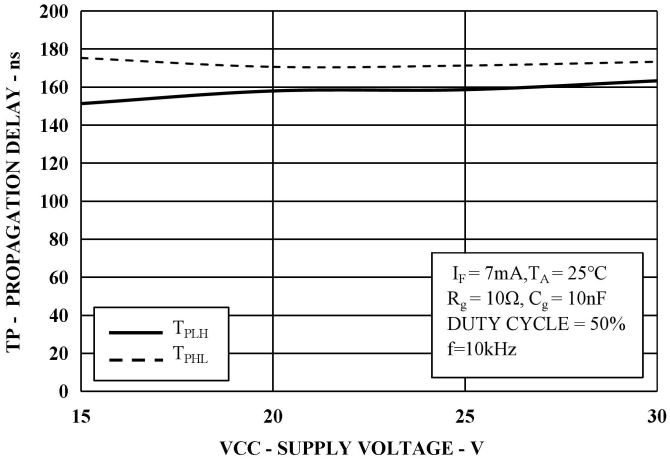


Figure 9: Propagation Delay vs. V_{CC}

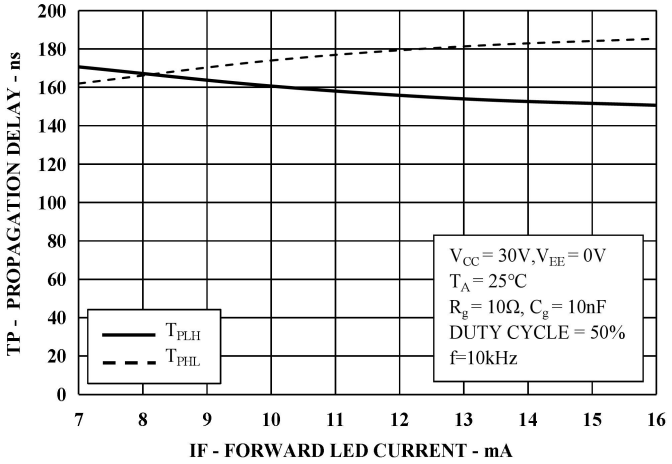


Figure 10: Propagation Delay vs. I_F

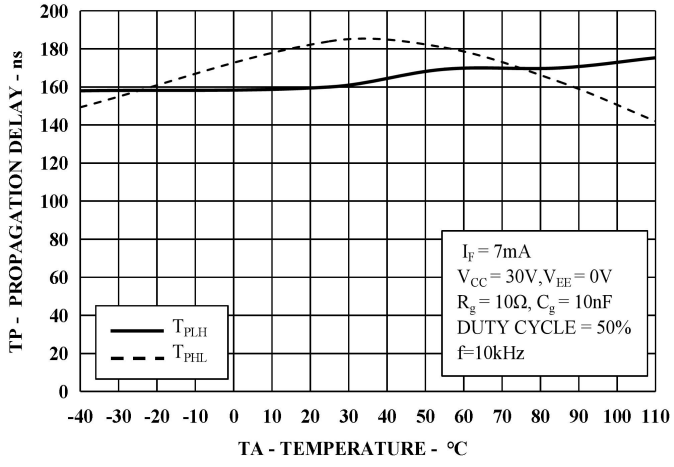


Figure 11: Propagation Delay vs. Temperature

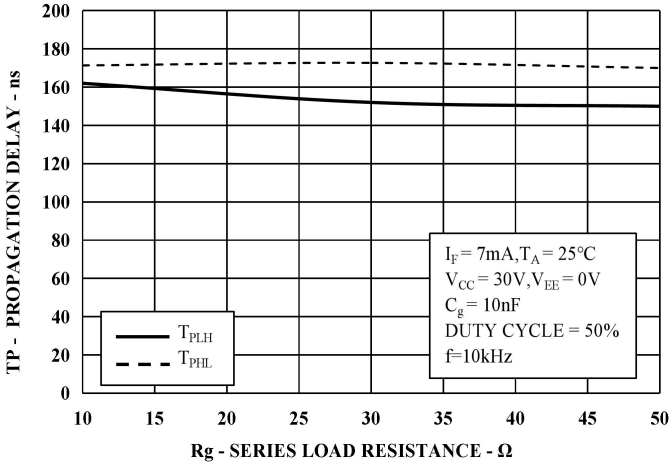


Figure 12: Propagation Delay vs. Rg

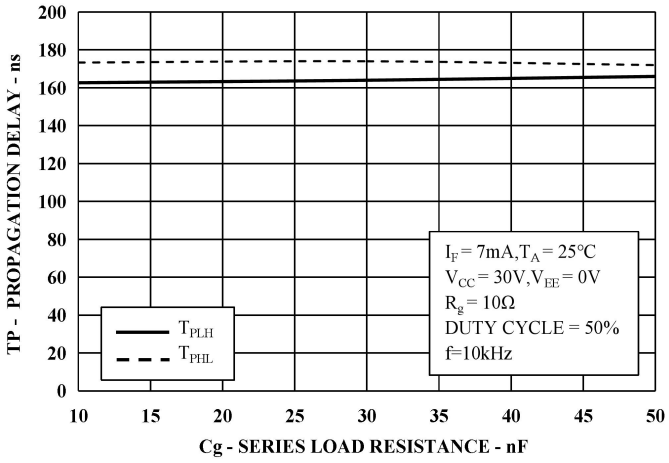


Figure 13: Propagation Delay vs. Cg

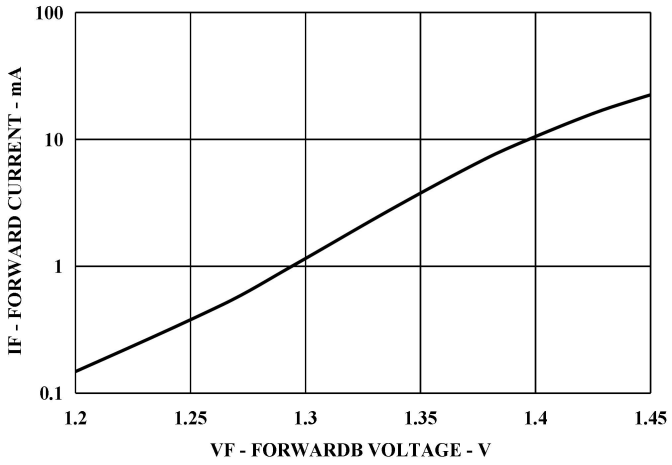


Figure 14: Input Current vs Forward Voltage

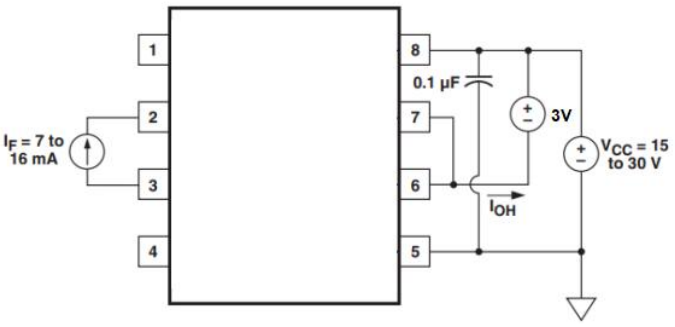


Figure 15: I_{OH} Test Circuit

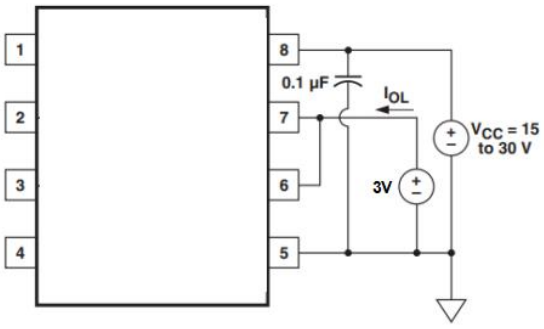


Figure 16: I_{OL} Test Circuit

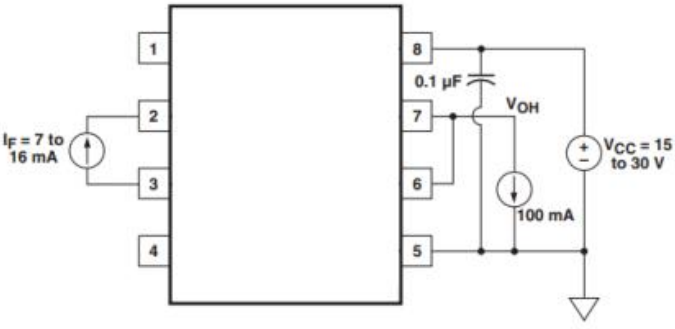


Figure 17: V_{OH} Test Circuit

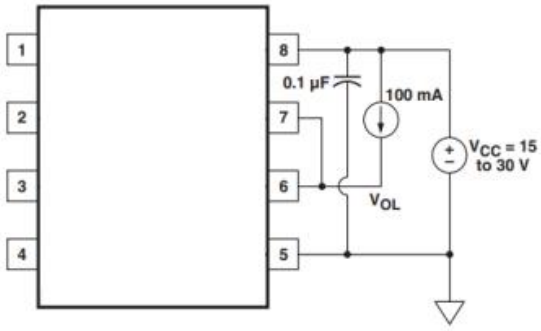


Figure 18: V_{OL} Test Circuit

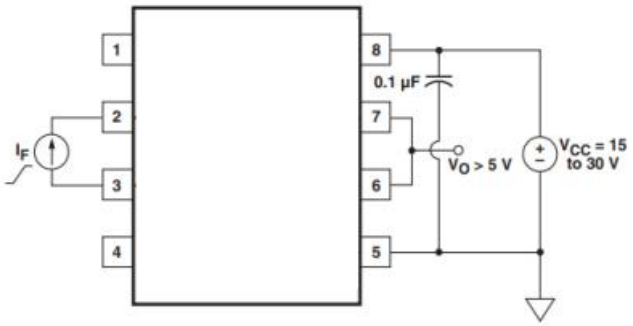


Figure 19: I_{FLH} Test Circuit

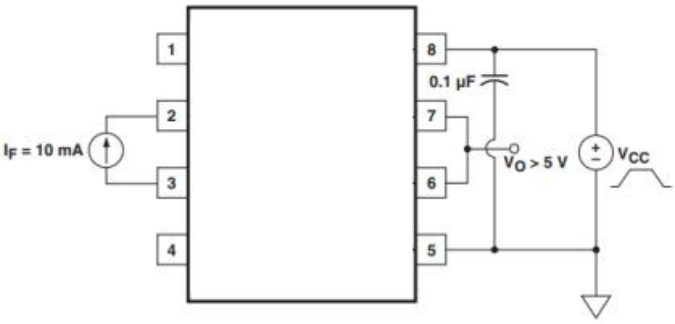
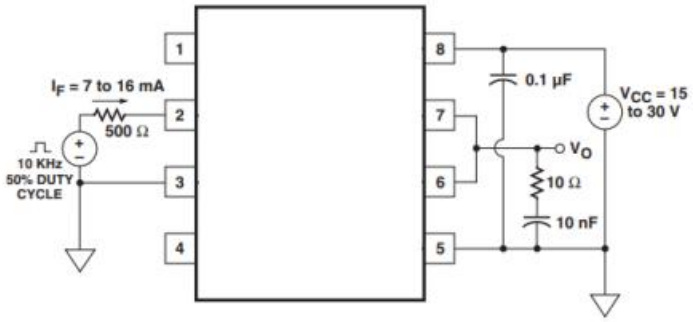


Figure 20: UVLO Test Circuit



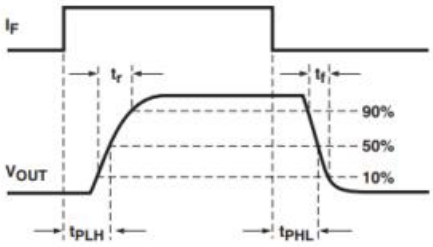
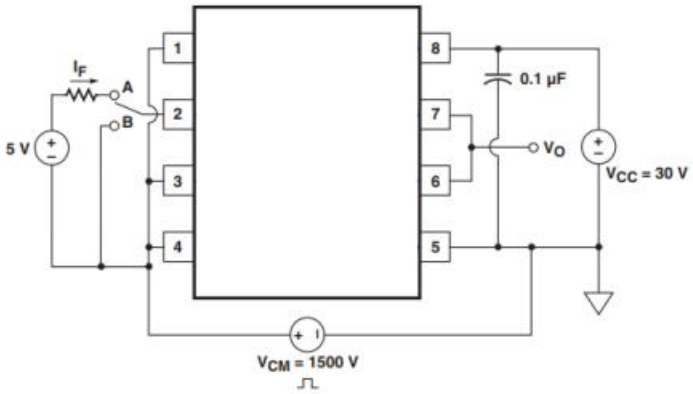


Figure 21: tPLH, tPHL, tr, and tf Test Circuit Waveforms



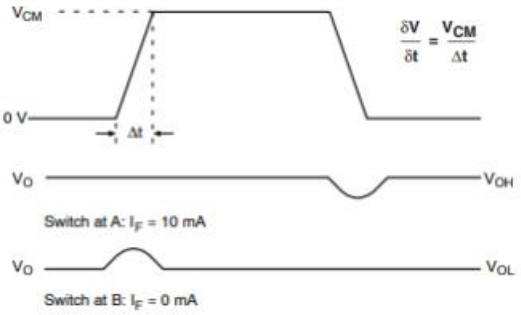


Figure 22: CMR Test Circuit and Waveforms

17. Notes

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

17.2 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.

17.3 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.

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

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

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

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