ORIENT

Photo coupler

Product Data Sheet

Part Number: OR-M6XX-(HB)

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) Compliance Halogens Free (Br < 900ppm, Cl < 900ppm, Br+Cl <1500ppm)

(2) 3.3V / 5V supply voltage

(3) Low power consumption

(4) High speed: 10MBd

(5) - 40 ℃ to 105 ℃ temperature of AC and DC performance

(6) Safety approval

UL approved(No.E323844)

VDE approved(No.40029733)

CQC approved (No.CQC19001231256)

(7) In compliance with RoHS, REACH standards

(8) MSL Class I

2. Instructions

OR-M6XX is made up of an efficient AlGaAs light-emitting diode and high-speed optical detector. This design provides good ac and dc isolation between the input and output ends of the photoelectric coupler. The output characteristic of the photodetector is a collector open circuit schottky clamp transistor. The photoelectric coupler operating temperature range: - 40 ℃ to 105 ℃.

3. Application Range

(1)Ground loop elimination

(2)LSTTL to TTL, LSTTL or 5 volt CMOS

(3)Line receiver, data transmission

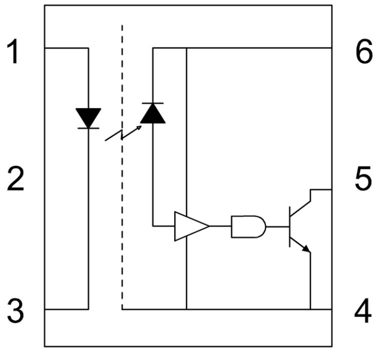
(4)Data multiplexing

(5)Switching power supplies

(6)Pulse transformer replacement

(7)Computer peripheral interface

4. Functional Diagram



1.Anode
2.NC
3.Cathode
4.GND
5.Output
6.Vcc

Truth table

Input（LED）	Output
ON	L
OFF	H

0.1 uF capacitor bypass capacitance needs to be connected between Pin4 and Pin6.

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

Parameter		**Symbol**	**Ratings**	**Unit**
Input	Average Forward Input Current	I_F	20	mA
	Reverse Input Voltage	V_R	5	V
	Power Dissipation	P_I	40	mW
Output	Supply Voltage	V_{CC}	7	V
	Output Voltage	V_O	7	V
	Output Current	I_O	50	mA
	Power Dissipation	P_O	85	mW
Insulation Voltage*1		V_{iso}	3750	Vrms
Operating Temperature		T_{Opr}	–40 to +105	°C
Storage Temperature		T_{stg}	–55 to +125	°C
Soldering Temperature*2		T_{Sol}	260	°C

Notes:
*1 AC for 1 minute, R.H.= 40 ~ 60% R.H. In this test, pins 1, 2, 3 are shorted together, and pins 4, 5, 6 are shorted together.
*2 Soldering time is For 10 seconds.

6. Recommended Operating Conditions

Parameter	**Symbol**	**Min**	**Max**	**Unit**
Operating Temperature	T_A	-40	105	°C
Supply Voltage	V_{CC}	2.7	3.6	V
		4.5	5.5	
Low Level Input Current	I_{FL}	0	250	µA
High Level Input Current	I_{FH}	5	15	mA
Fan Out (at RL=1kΩ per channel)	N	—	5	TTL Loads

7. Opto-Electronic Characteristics

Parameter		Symbol	Min	Typ	Max	Unit	Condition
Input	Forward Voltage	V_F	—	1.39	1.8	V	I_F= 10mA T_A=25°C
	Temperature Coefficient OF Forward Voltage	$\Delta V_F / \Delta T$	—	-0.9	—	mV/°C	I_F= 10mA
	Reverse Voltage	BV_R	5	—	—	V	I_R = 10μA
	Input Threshold Current	I_{TH}	—	1.6	5	mA	V_{CC}=3.3V, V_O=0.6V, I_{OL} (sinking) =13mA
	Input Capacitance	C_{IN}	—	34	—	pF	f = 1MHz, VF = 0V
Detector	High Level Supply Current	I_{CCH}	—	4.3	7	mA	V_{CC}=3.3V,I_F=0mA
	Low Level Supply Current	I_{CCL}	—	6.4	10	mA	V_{CC}= 3.3V,I_F=10mA
	High Level Output Current	I_{OH}	—	9	100	μA	V_{CC}=3.3V, V_O=3.2V,I_F=250μA
	Low Level Output Voltage	V_{OL}	—	0.4	0.6	V	V_{CC}=3.3V, I_F=5mA, I_{OL} (sinking)=13mA

Recommended temperature range (TA= -40°C to 125°C,2.7V≤VCC≤3.6 V), IF= 7.5mA Unless otherwise stated. Typical valuesTA =25°C.

Parameter		Symbol	Min	Typ	Max	Unit	Condition
Input	Forward Voltage	V_F	—	1.38	1.8	V	I_F= 10mA T_A=25°C
	Temperature Coefficient OF Forward Voltage	$\Delta V_F / \Delta T$	—	-0.9	—	mV/°C	I_F= 10mA
	Reverse Voltage	BV_R	5	—	—	V	I_R = 10μA
	Input Threshold Current	I_{TH}	—	1.8	5	mA	V_{CC}=5.5V,V_O=0.6V I_{OL}>13mA
	Input Capacitance	C_{IN}	—	34	—	pF	f = 1MHz, V_F = 0V
Detector	High Level Supply Current	I_{CCH}	—	7.2	10	mA	V_{CC}=5.5V,I_F=0mA
	Low Level Supply Current	I_{CCL}	—	9.8	13	mA	V_{CC}= 5.5V,I_F=10mA
	High Level Output Current	I_{OH}	—	5	100	μA	V_{CC}=5.5V, V_O=5.5V,I_F=250μA
	Low Level Output Voltage	V_{OL}	—	0.4	0.6	V	V_{CC}=5.5V, I_F=5mA, I_{OL} (sinking) = 13mA

Recommended temperature range(TA= -40°C to 125°C,4.5V≤VCC≤5.5V), IF= 7.5mA Unless otherwise stated. Typical values TA =25°C.

8. Switching Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Condition
Propagation delay time to output High level	t_{PLH}	—	56	90	ns	R_L=350Ω C_L=15pF
Propagation delay time to output Low level	t_{PHL}	—	39	75	ns	
Pulse Width Distortion	$\|t_{PLH}-t_{PHL}\|$	—	—	45	ns	
Output Rise Time (10 to 90%)	t_r	—	20	—	ns	
Output Fall Time (90 to 10%)	t_f	—	6.6	—	ns	
Propagation Delay Skew	t_{PSK}	—	—	40	ns	

Recommended temperature range (TA= -40°C to 125°C, 2.7V≤VCC≤3.6 V), IF= 7.5mA Unless otherwise stated. Typical values TA =25°C,VCC = 3.3 V。

Parameter	Symbol	Min	Typ	Max	Unit	Condition
Propagation delay time to output High level	t_{PLH}	—	40	75	ns	R_L=350Ω, C_L=15pF,
Propagation delay time to output Low level	t_{PHL}	—	38	75	ns	
Pulse Width Distortion	$\|t_{PLH}-t_{PHL}\|$	—	—	35	ns	
Output Rise Time (10 to 90%)	tr	—	22	—	ns	
Output Fall Time (90 to 10%)	t_f	—	6.9	—	ns	
Propagation Delay Skew	t_{PSK}	—	—	40	ns	

Recommended temperature range (TA= -40°C to 125°C, 4.5V≤VCC≤5.5V), IF= 7.5mA Unless otherwise stated. Typical values TA =25°C,VCC = 5.0 V。

Parameter	Symbol	Min	Typ	Max	Unit	Condition
Input-Output Insulation Leakage Current	II-O	—	—	1	μA	45% RH, t=5s VI-O = 3kV DC,TA =25 C
Withstand Insulation Test Voltage	VISO	3750	—	—	VRMS	RH ≤ 50%, t =1min,TA=25°C
Input-Output Resistance	RI-O	—	10^{12}	—	Ω	VI-O = 500V DC
Input-Output Capacitance	CI-O	—	1	—	p	f = 1MHz, TA = 25 C

Recommended temperature range (TA= -40°C to 125°C) Unless otherwise stated. Typical values TA =25°C.

9. Order Information

Part Number

OR-M6XX-W-Y-Z-(HB)

Note

XX = Type code. (‘00’, ‘01’, ‘11’)

W = Tape and reel option. (TP or TP1).

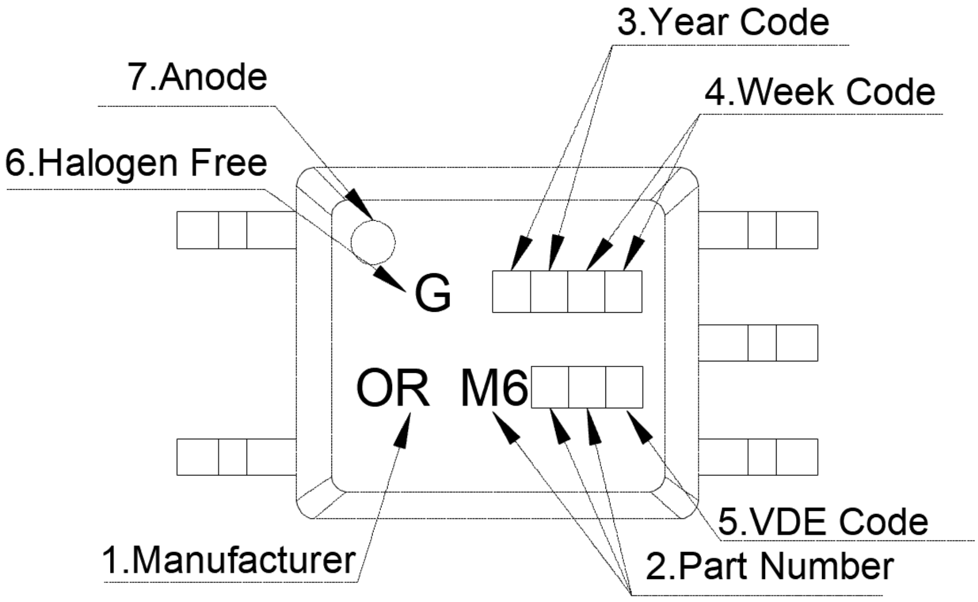
Y = ‘V’ code for VDE safety (This options is not necessary).

Z = ‘G’ code for Halogen free.

* VDE Code can be selected.

Option	Description	Packing quantity
TP	Surface mount lead form (low profile) + TP tape & reel option	3000 units per reel
TP1	Surface mount lead form (low profile) + TP1 tape & reel option	3000 units per reel

10. Naming Rule



1. Manufacturer : ORIENT.

2. Part Number : M600, M601 or M611.

3. Year Code ☐☐ : '21' means '2021' and so on.

4. Week Code ☐☐ : 01 means the first week, 02 means the second week and so on.

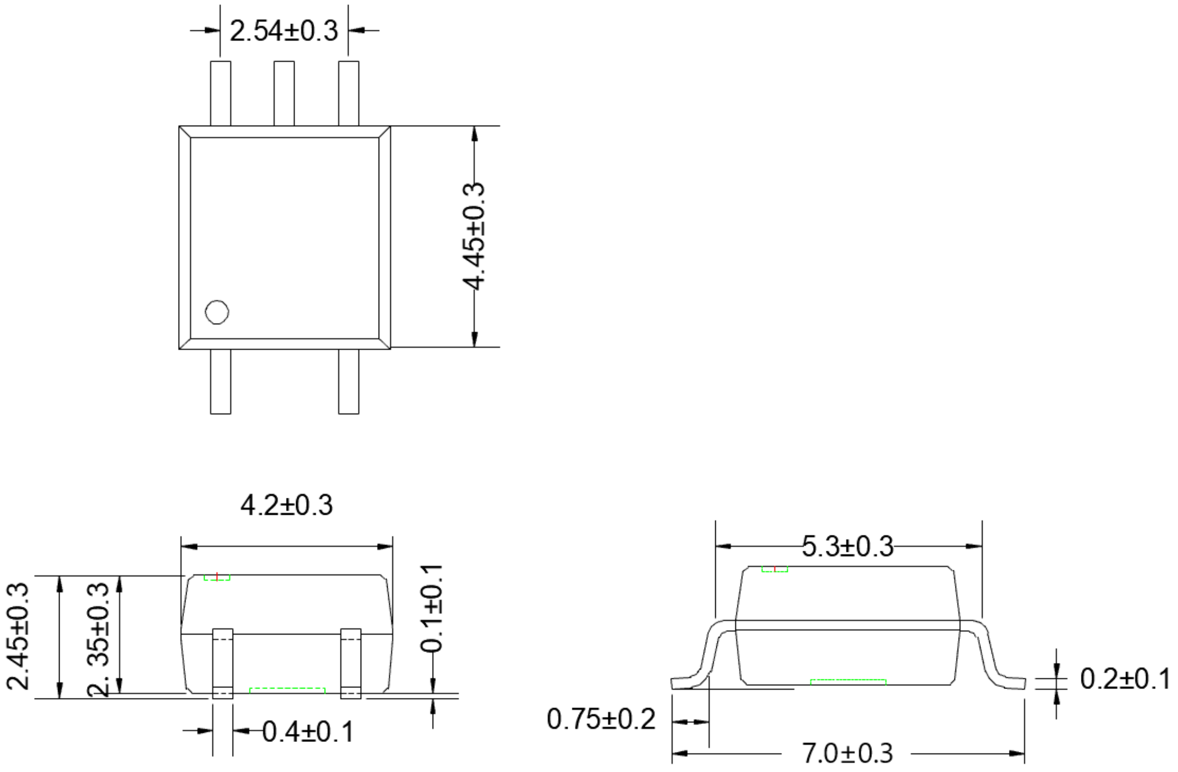
5. VDE Code ⬚ . (Optional)

6. HF Code ‘G’: Halogen Free.

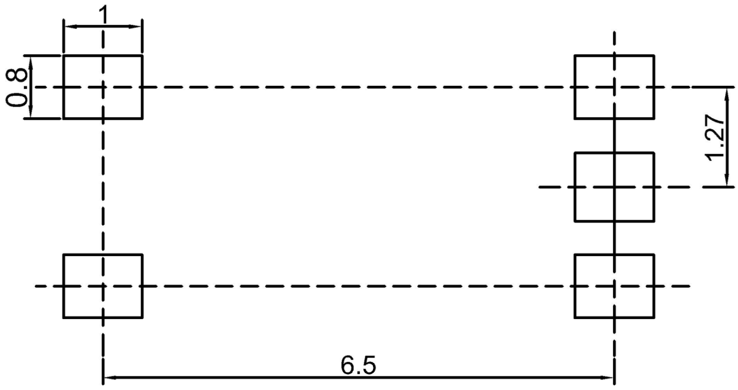
7. Anode.

* VDE Code can be selected.

11. Outer Dimension



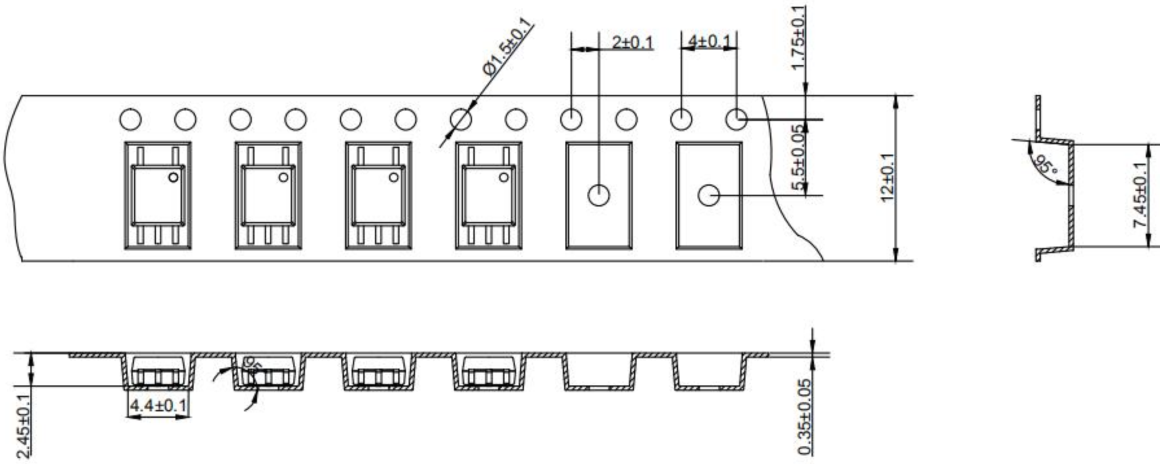
12. Recommended Foot Print Patterns (Mount Pad)



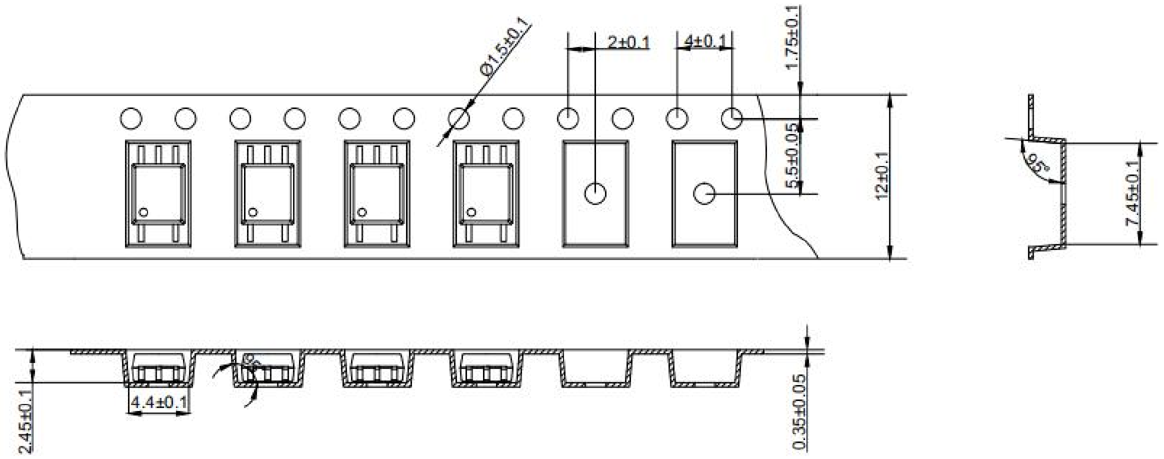
unit : mm

13. Taping Dimensions

(1)OR-M6XX-TP



(2)OR-M6XX-TP1



Description	**Symbol**	**Dimension in mm(inch)**
Tape wide	W	12±0.3(0.472)
Pitch of sprocket holes	P0	4±0.1(0.157)
Distance of compartment	F	5.5±0.1(0.217)
	P2	2±0.1(0.079)
Distance of compartment to compartment	P1	8±0.1(0.315)

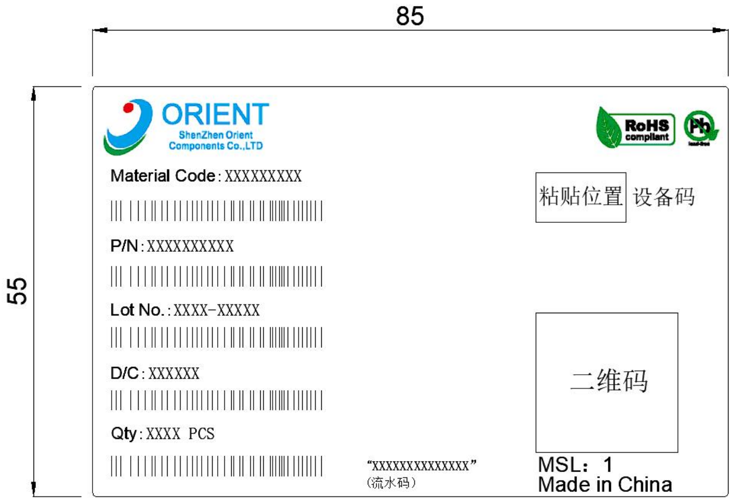
Encapsulation type	**TP/TP1**
amount (pcs)	3000

14. Package Dimension

(1) package dimension

Packing Information	
Packing type	Reel type
Tape Width	12mm
Qty per Reel	3,000pcs
Small box (inner) Dimension	345*345*45mm
Large box (Outer) Dimension	480x360x360mm
Max qty per small box	6,000pcs
Max qty per large box	60,000pcs

(2)Packing Label Sample



Note：

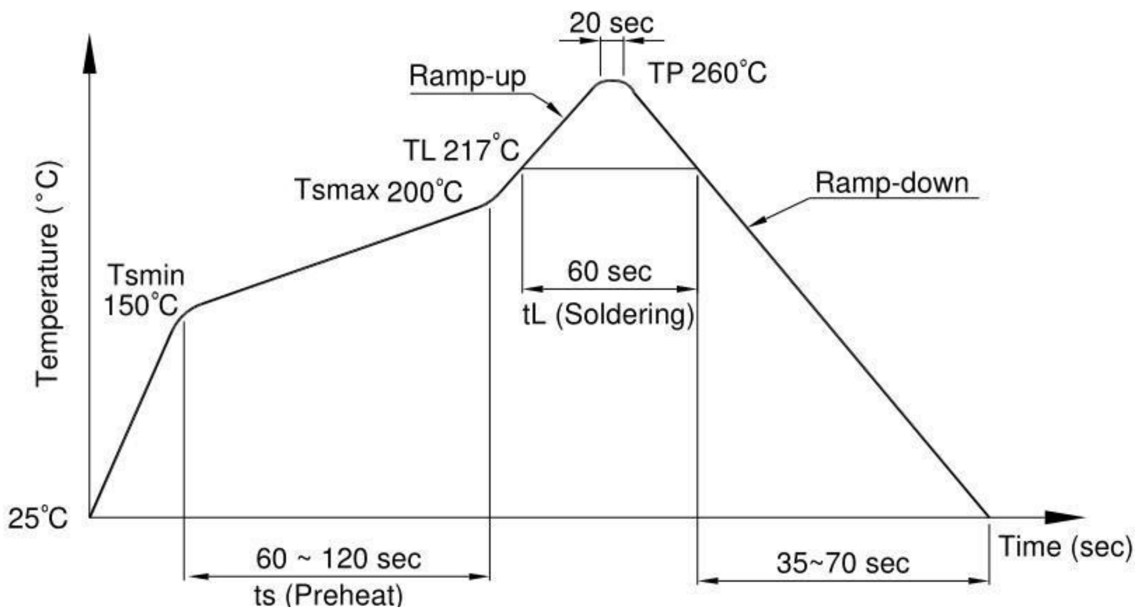
1. Material Code :Product ID.
2. P/N :Contents with "Order Information" in the specification.
3. Lot No. :Product weeks.
4. D/C :Product data.
5. Quantity :Packaging quantity.

15. 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.

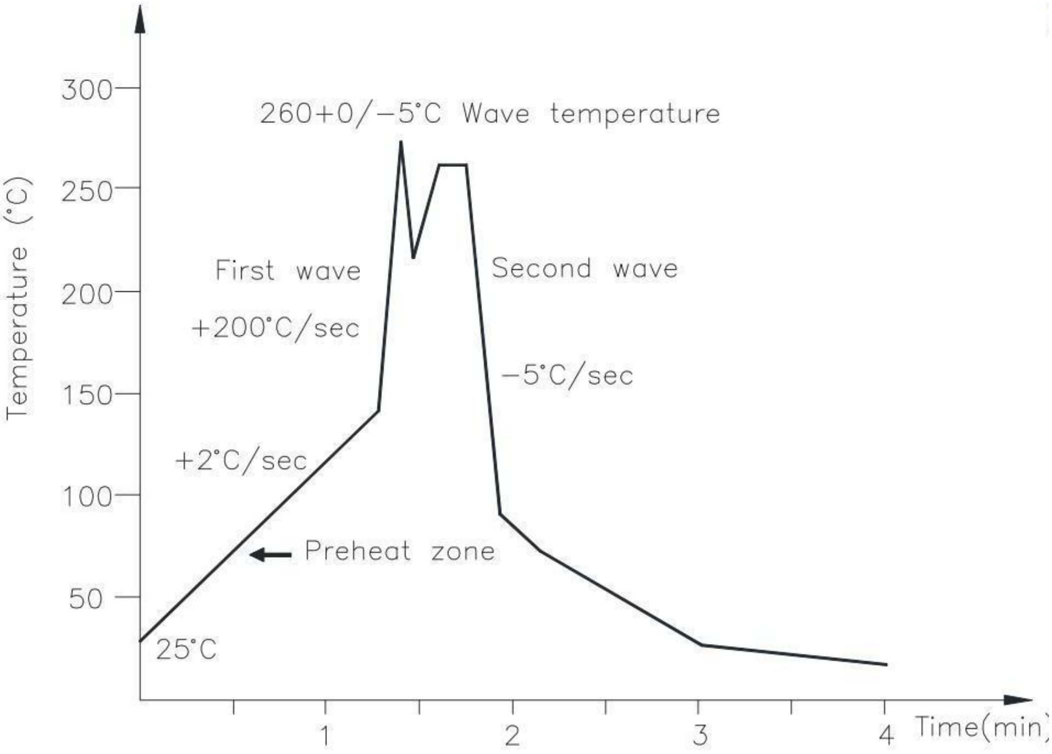
Profile item	Conditions
Preheat - Temperature Min (T Smin) - Temperature Max (T Smax) - Time (min to max) (ts)	 150˚C 200˚C 90±30 sec
Soldering zone - Temperature (TL) - Time (t L)	 217˚C 60 sec
Peak Temperature	260˚C
Peak Temperature time	20 sec
Ramp-up rate	3˚C / sec max.
Ramp-down rate from peak temperature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

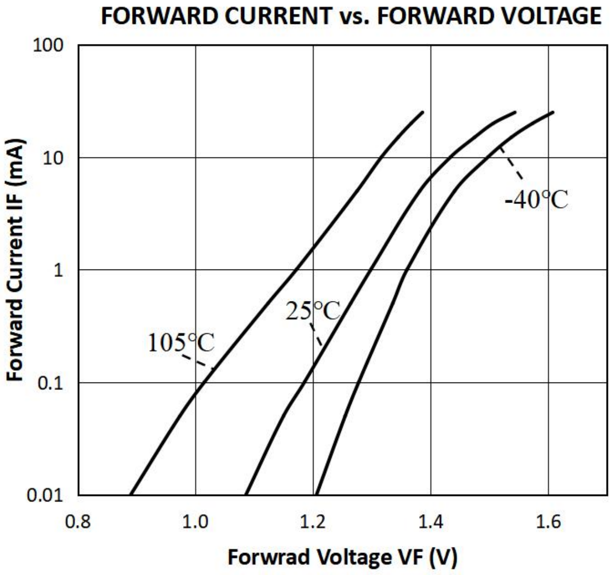


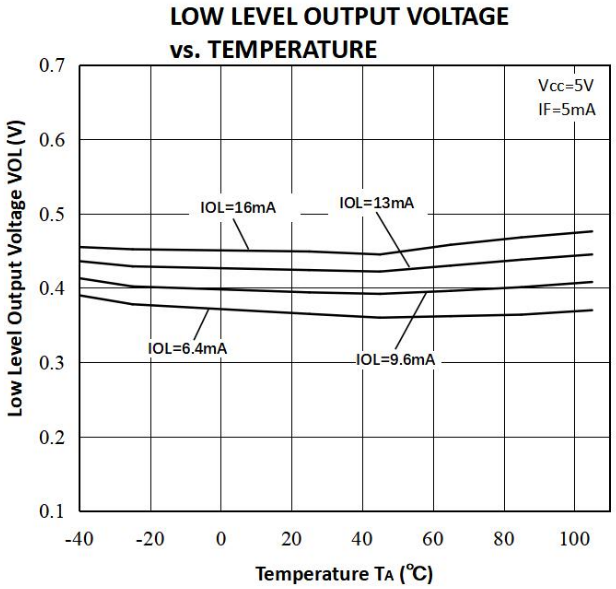
3. Hand soldering by soldering iron

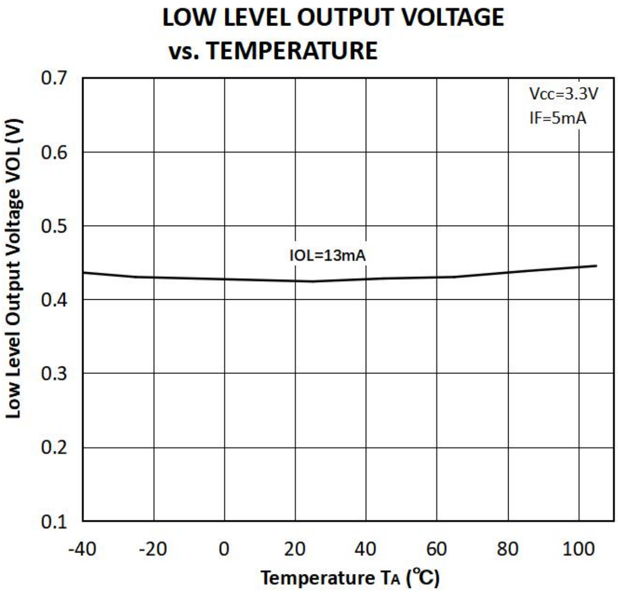
Allow single lead soldering in every single process. One time soldering is recommended.

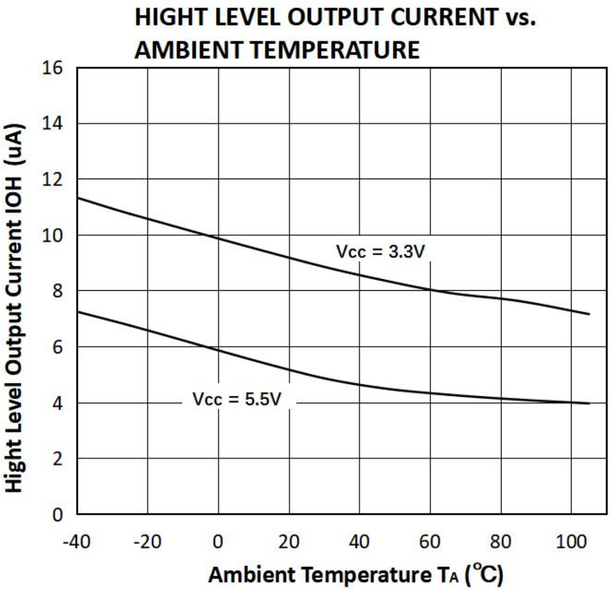
Temperature	380+0/-5˚C
Time	3 sec max

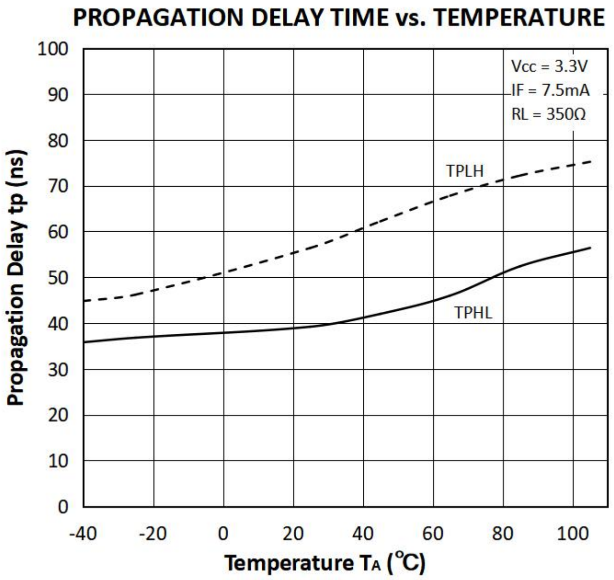
16. Characteristics Curve

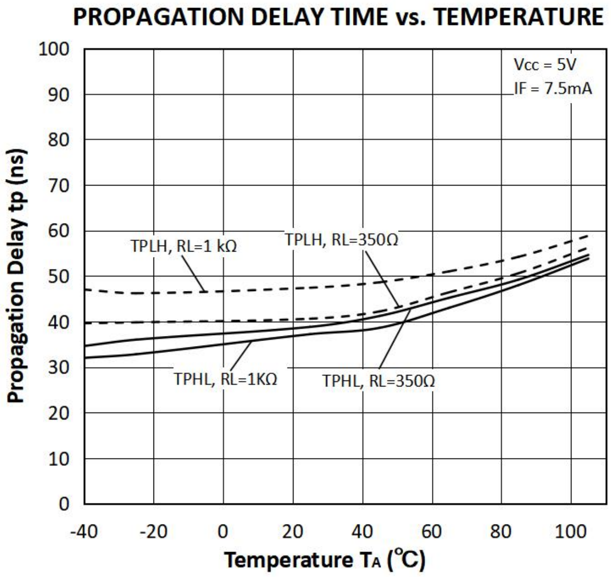












17. Switching time test circuit

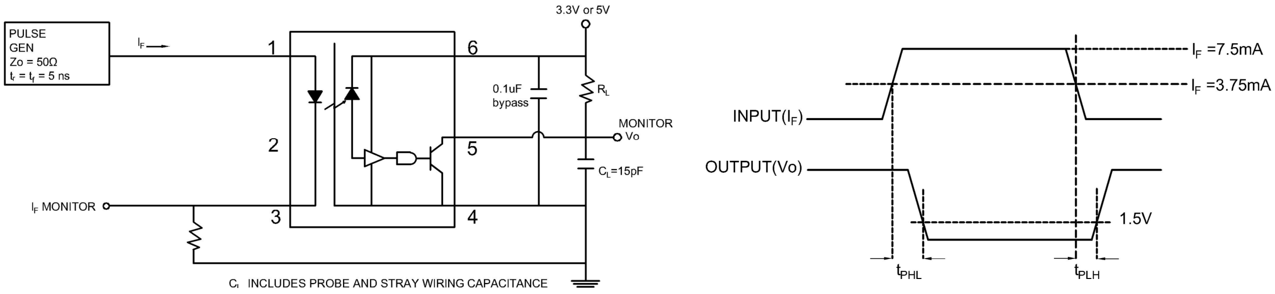


Figure 18.1： Test Circuit for T_{PHL} and T_{PLH}

18. NOTES

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

(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.

(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.

(4) When requiring a device for any “specific” application, please contact our sales in advice.

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

(6) The contents described herein are subject to change without prior notice.

(7) Immerge unit’s body in solder paste is not recommended.