



# ORIENT

## Photo coupler

### Product Data Sheet

Part Number: OR-60L

Customer: \_\_\_\_\_

Date: \_\_\_\_\_

**SHENZHEN ORIENT COMPONENTS CO., LTD**

Block A 3rd Floor No.4 Building, Tian'an Cyber Park, Huangge Rd, LongGang Dist, Shenzhen, GD

TEL: 0755-29681816  
FAX: 0755-29681200  
[www.orient-opto.com](http://www.orient-opto.com)

**Preliminary**

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

## 1. Features

- (1) Dual Voltage Operation (3.3V/5V)
- (2) Package creepage at 8mm
- (3) High speed: 10 MBd
- (4) Guaranteed performance over temperature -40°C to 105°C
- (5) High isolation voltage ( $V_{ISO} = 5000 \text{ Vrms.}$ )
- (6) Safety approval
  - UL approved(No.E323844)
  - VDE approved(No.40029733)
  - CQC approved (No.CQC19001231480 )
- (7) In compliance with RoHS, REACH standards
- (8) MSL Level 1



## 2. Description

The 60L series devices are consists of an infrared emitting diode optically coupled to a high speed integrated photo detector logic gate with a storable output.

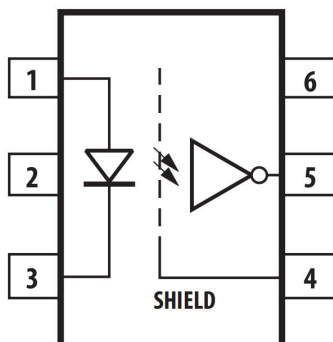
The OR-60LW is lead bending type for long creepage distance (Gull-wing) for surface mount.

The OR-60LW1 is lead bending type (Gull-wing) for surface mounting.

## 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



### Pin Configuration

- 1: Anode
- 2: No Connection
- 3: Cathode
- 4: GND
- 5:  $V_{out}$
- 6:  $V_{CC}$

### Truth Table (Positive Logic)

| Input | Output |
|-------|--------|
| H     | L      |
| L     | H      |

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

| Parameter               |                   | Symbol           | Ratings     | Unit             |
|-------------------------|-------------------|------------------|-------------|------------------|
| Input                   | Forward Current   | I <sub>F</sub>   | 20          | mA               |
|                         | Reverse Voltage   | V <sub>R</sub>   | 5           | V                |
| Output                  | Supply Voltage    | V <sub>CC</sub>  | 7           | V                |
|                         | Output Voltage    | V <sub>O</sub>   | 7           | V                |
|                         | Output Current    | I <sub>O</sub>   | 50          | mA               |
|                         | Power Dissipation | P <sub>O</sub>   | 100         | mW               |
| Insulation Voltage*1    |                   | V <sub>iso</sub> | 5000        | V <sub>rms</sub> |
| Operating Temperature   |                   | T <sub>opr</sub> | -40 to +105 | °C               |
| Storage Temperature     |                   | T <sub>stg</sub> | -55 to +125 | °C               |
| Soldering Temperature*2 |                   | T <sub>sol</sub> | 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 <sub>A</sub>  | -40 | 105 | °C   |
| Supply Voltage           | V <sub>cc</sub> | 2.7 | 3.6 | V    |
|                          |                 | 4.5 | 5.5 |      |
| Low Level Input Current  | I <sub>FL</sub> | 0   | 250 | μA   |
| High Level Input Current | I <sub>FH</sub> | 5   | 15  | mA   |

## 7. Electrical Optical Characteristics at Ta=25°C

| Parameter |                                             | Symbol                    | Min. | Typ. | Max. | Unit          | Conditions                                                                     |
|-----------|---------------------------------------------|---------------------------|------|------|------|---------------|--------------------------------------------------------------------------------|
| Input     | Forward Voltage                             | $V_F$                     | ---  | 1.39 | 1.8  | V             | $I_F = 10\text{mA}$                                                            |
|           | Reverse Current                             | $I_R$                     | ---  | ---  | 10   | $\mu\text{A}$ | $V_R = 5\text{V}$                                                              |
|           | Forward Voltage Temperature Coefficient     | $\Delta V_F / \Delta T_A$ | ---  | -0.9 | ---  | mV/C          | $I_F = 10\text{mA}$                                                            |
|           | Input Capacitance                           | $C_{IN}$                  | ---  | 30   | ---  | pF            | $V = 0\text{V}, f = 1\text{MHz}$                                               |
| Output    | High Level Output Current                   | $I_{OH}$                  | ---  | 8.5  | 100  | $\mu\text{A}$ | $V_{CC} = 3.3\text{V}, V_O = 3.3\text{V}, I_{FL} = 250\mu\text{A}$             |
|           | Low Level Output Voltage                    | $V_{OL}$                  | ---  | 0.4  | 0.6  | V             | $V_{CC} = 3.3\text{V}, I_F = 5\text{mA}, I_{OL}(\text{Sinking}) = 13\text{mA}$ |
|           | High Level Supply Current                   | $I_{CCH}$                 | ---  | 5.5  | 10   | mA            | $V_{CC} = 3.3\text{V}, I_F = 0\text{mA}$                                       |
|           | Low Level Supply Current                    | $I_{CCL}$                 | ---  | 7.5  | 13   |               | $V_{CC} = 3.3\text{V}, I_F = 10\text{mA}$                                      |
|           | Input Threshold Current                     | $I_{TH}$                  | ---  | 2.1  | 5    | mA            | $V_{CC} = 3.3\text{V}, V_O = 0.6\text{V}, I_{OL} = 13\text{mA}$                |
| Coupled   | Propagation delay time to output High level | $t_{PHL}$                 | ---  | ---  | 90   | ns            | $R_L = 350\Omega$<br>$C_L = 15\text{pF}$                                       |
|           | Propagation delay time to output Low level  | $t_{PLH}$                 | ---  | ---  | 75   | ns            |                                                                                |
|           | Pulse width distortion                      | $ t_{PHL} - t_{PLH} $     | ---  | ---  | 50   | ns            |                                                                                |
|           | Output rise time                            | $t_r$                     | ---  | 50   | ---  | ns            |                                                                                |
|           | Output fall time                            | $t_f$                     | ---  | 20   | ---  | ns            |                                                                                |

Over Recommended Operating Conditions ( $T_A = -40^\circ\text{C}$  to  $105^\circ\text{C}$ ,  $2.7\text{V} \leq V_{CC} \leq 3.6\text{V}$ ) unless otherwise specified.  
All Typicals at  $V_{CC} = 3.3\text{V}$ ,  $T_A = 25^\circ\text{C}$ .

| Parameter |                                             | Symbol                    | Min. | Typ. | Max. | Unit          | Conditions                                                                     |
|-----------|---------------------------------------------|---------------------------|------|------|------|---------------|--------------------------------------------------------------------------------|
| Input     | Forward Voltage                             | $V_F$                     | ---  | 1.39 | 1.8  | V             | $I_F = 10\text{mA}$                                                            |
|           | Reverse Current                             | $I_R$                     | ---  | ---  | 10   | $\mu\text{A}$ | $V_R = 5\text{V}$                                                              |
|           | Forward Voltage Temperature Coefficient     | $\Delta V_F / \Delta T_A$ | ---  | -0.9 | ---  | mV/C          | $I_F = 10\text{mA}$                                                            |
|           | Input Capacitance                           | $C_{IN}$                  | ---  | 30   | ---  | pF            | $V = 0\text{V}, f = 1\text{MHz}$                                               |
| Output    | High Level Output Current                   | $I_{OH}$                  | ---  | 4.5  | 100  | $\mu\text{A}$ | $V_{CC} = 5.5\text{V}, V_O = 5.5\text{V}, I_{FL} = 250\mu\text{A}$             |
|           | Low Level Output Voltage                    | $V_{OL}$                  | ---  | 0.4  | 0.6  | V             | $V_{CC} = 5.5\text{V}, I_F = 5\text{mA}, I_{OL}(\text{Sinking}) = 13\text{mA}$ |
|           | High Level Supply Current                   | $I_{CCH}$                 | ---  | 7.6  | 10   | mA            | $V_{CC} = 5.5\text{V}, I_F = 0\text{mA}$                                       |
|           | Low Level Supply Current                    | $I_{CCL}$                 | ---  | 9.8  | 13   |               | $V_{CC} = 5.5\text{V}, I_F = 10\text{mA}$                                      |
|           | Input Threshold Current                     | $I_{FT}$                  | ---  | 2.2  | 5    | mA            | $V_{CC} = 5.5\text{V}, V_O = 0.6\text{V}, I_{OL} = 13\text{mA}$                |
| Coupled   | Propagation delay time to output High level | $t_{PHL}$                 | ---  | ---  | 90   | ns            | $R_L = 350\Omega$<br>$C_L = 15\text{pF}$                                       |
|           | Propagation delay time to output Low level  | $t_{PLH}$                 | ---  | ---  | 75   | ns            |                                                                                |
|           | Pulse width distortion                      | $ t_{PHL} - t_{PLH} $     | ---  | ---  | 30   | ns            |                                                                                |
|           | Output rise time                            | $t_r$                     | ---  | 50   | ---  | ns            |                                                                                |
|           | Output fall time                            | $t_f$                     | ---  | 20   | ---  | ns            |                                                                                |

Over recommended operating conditions ( $T_A = -40^\circ\text{C}$  to  $+105^\circ\text{C}$ ,  $4.5\text{V} \leq V_{CC} \leq 5.5\text{V}$ ) unless otherwise specified.

All typicals at  $V_{CC} = 5.5\text{V}$ ,  $T_A = 25^\circ\text{C}$ .



## 8. Order Information

Part Number

**OR-60LY-Z-X**

### Note

60L = Part Number.

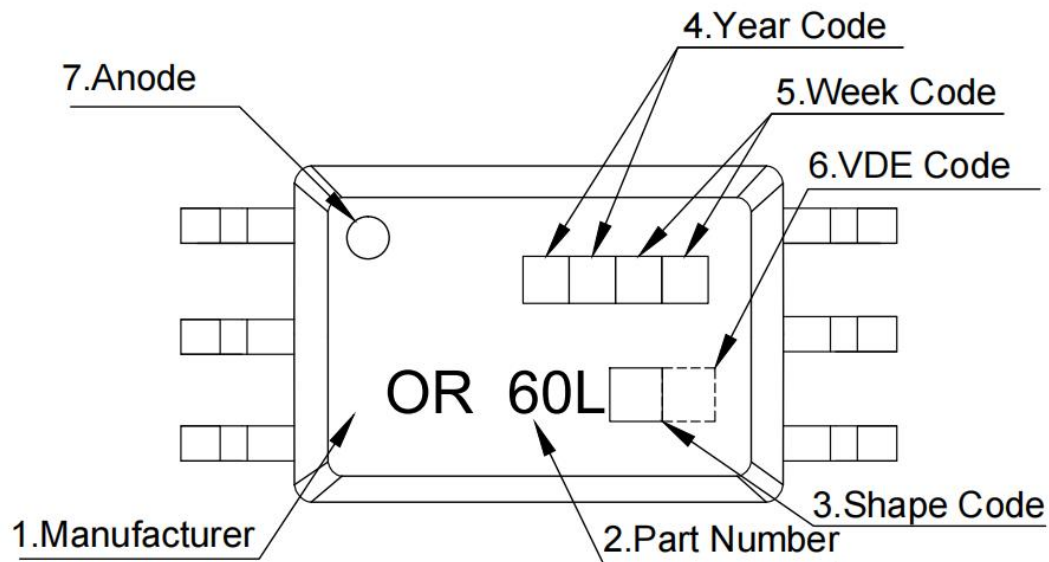
Y = Lead form option (W or W1)

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

X = VDE Code. (Optional)

| 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 |

## 9. Naming Rule



1. Manufacturer : ORIENT.

2. Part Number : 60L .

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.

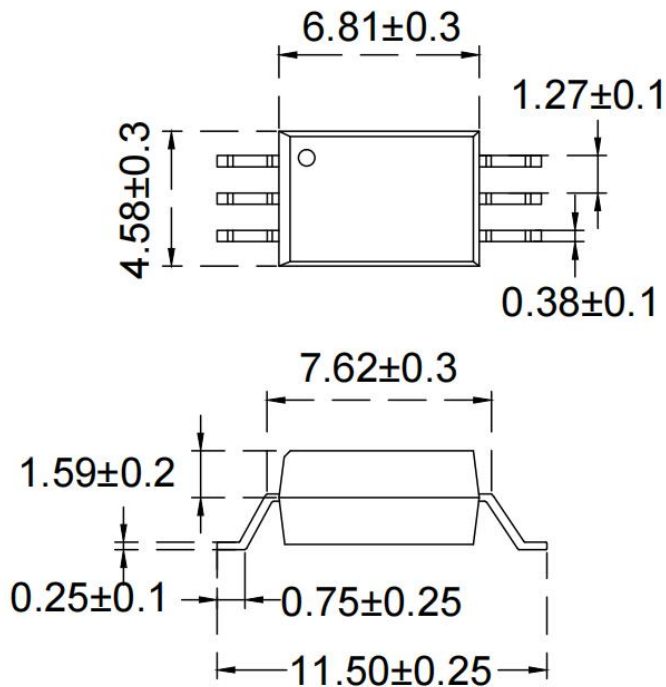
6. VDE Code  :V

7. Anode.

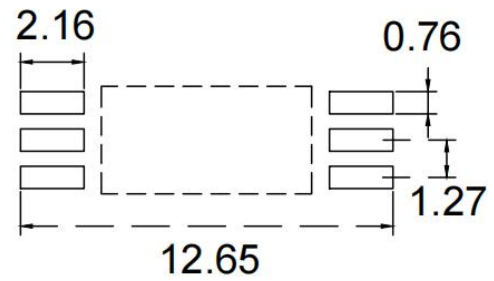
\* VDE Code (Optional)

## 10. Package Dimension

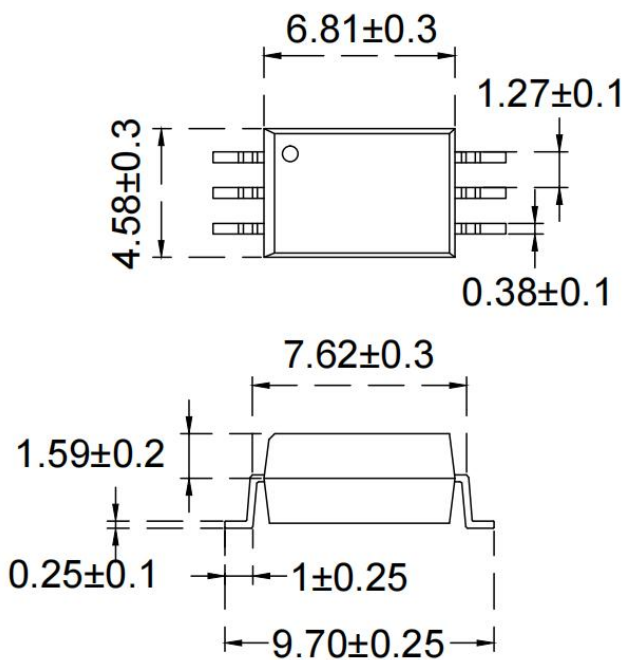
### (1).OR-60LW



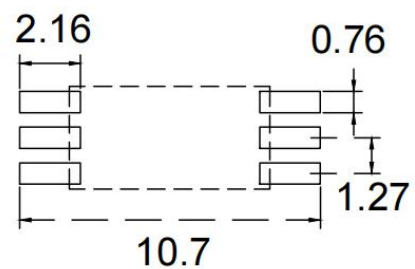
### Land Pattern Recommendation



### (2).OR-60LW1

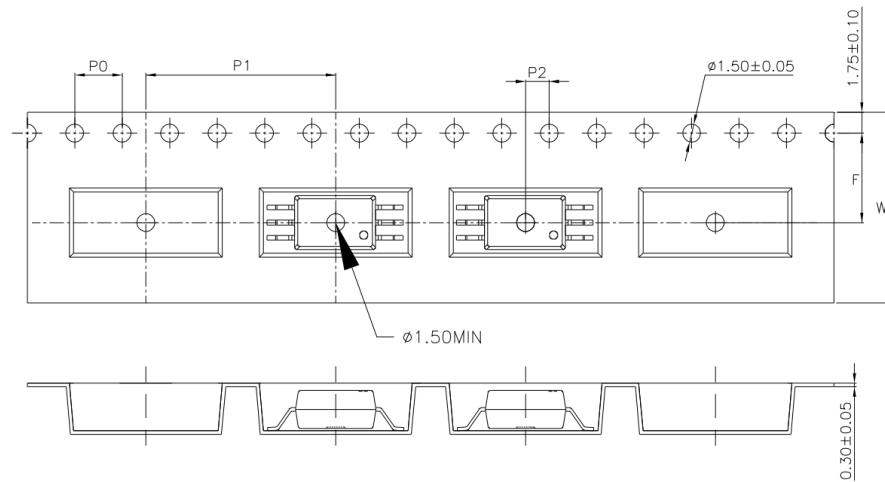


### Land Pattern Recommendation

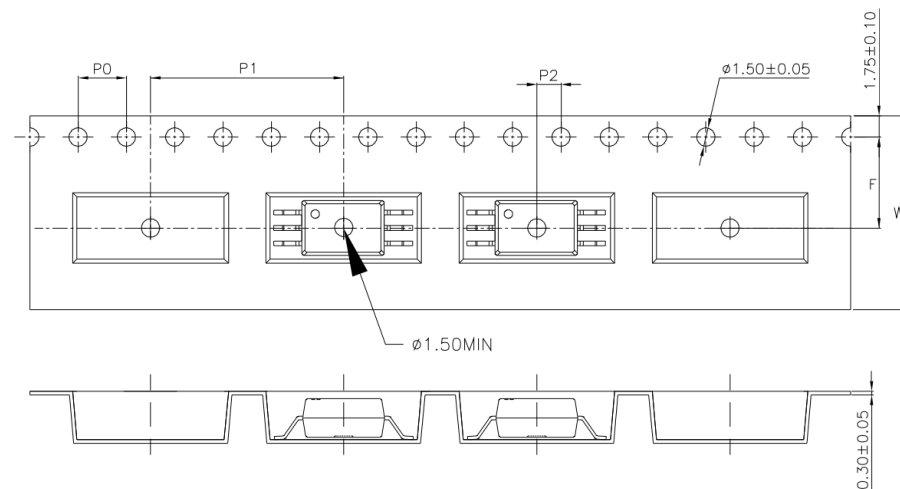


## 11. Taping Dimensions

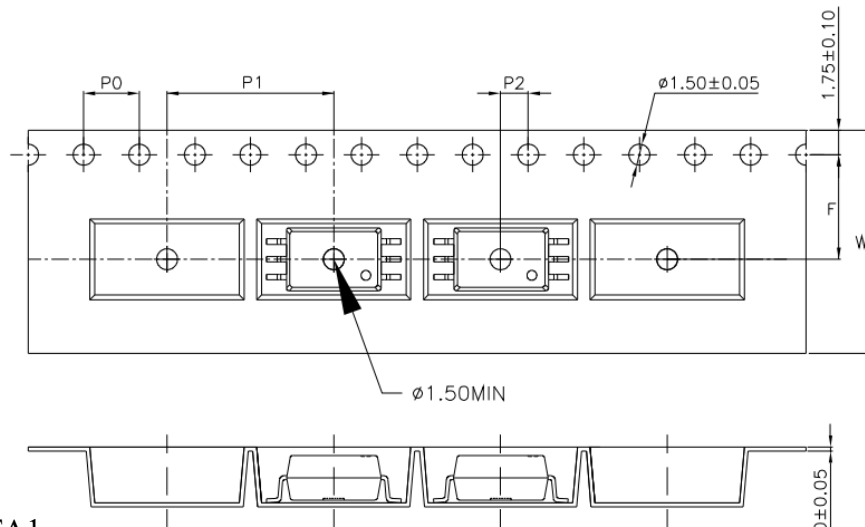
### (1)OR-60LW-TA



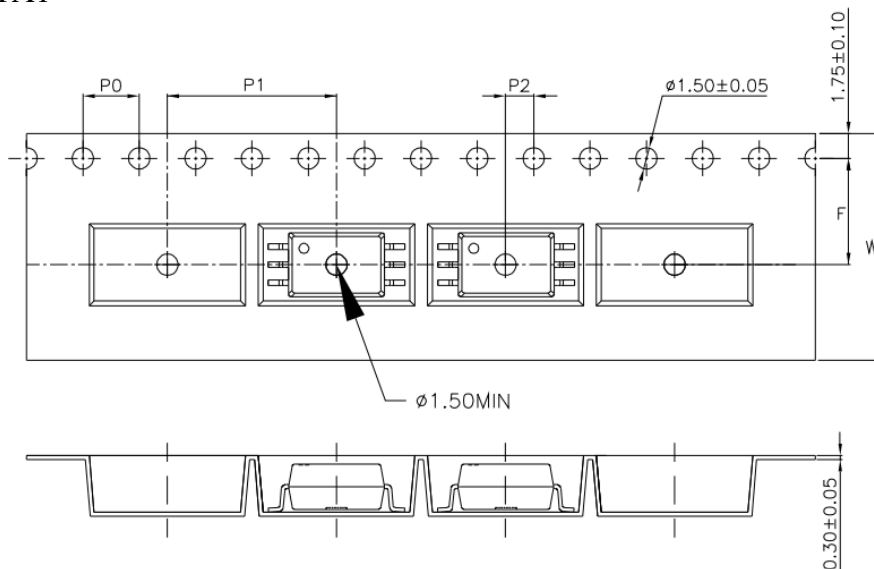
### (2)OR-60LW-TA1



## (1)OR-60LW1-TA



## (2)OR-60LW1-TA1



| Type      | symbol | Dimension in mm (inch)<br>For W type | Dimension in mm (inch)<br>For W1 type |
|-----------|--------|--------------------------------------|---------------------------------------|
| bandwidth | W      | $16 \pm 0.3$ (0.63)                  | $16 \pm 0.3$ (0.63)                   |
| pitch     | P0     | $4 \pm 0.1$ (0.16)                   | $4 \pm 0.1$ (0.16)                    |
| pitch     | F      | $7.5 \pm 0.1$ (0.3)                  | $7.5 \pm 0.1$ (0.3)                   |
|           | P2     | $2 \pm 0.1$ (0.079)                  | $2 \pm 0.1$ (0.079)                   |
| interval  | P1     | $16 \pm 0.1$ (0.63)                  | $12 \pm 0.1$ (0.47)                   |

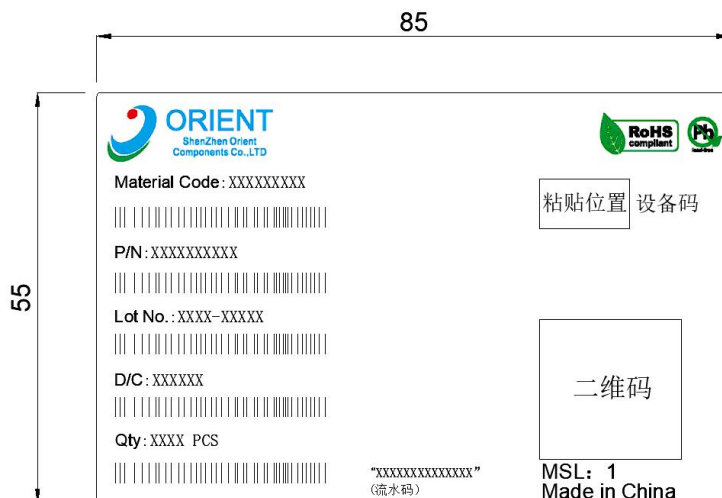
|                    |        |
|--------------------|--------|
| Encapsulation type | TA/TA1 |
| amount (pcs)       | 1000   |

## 12. 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:

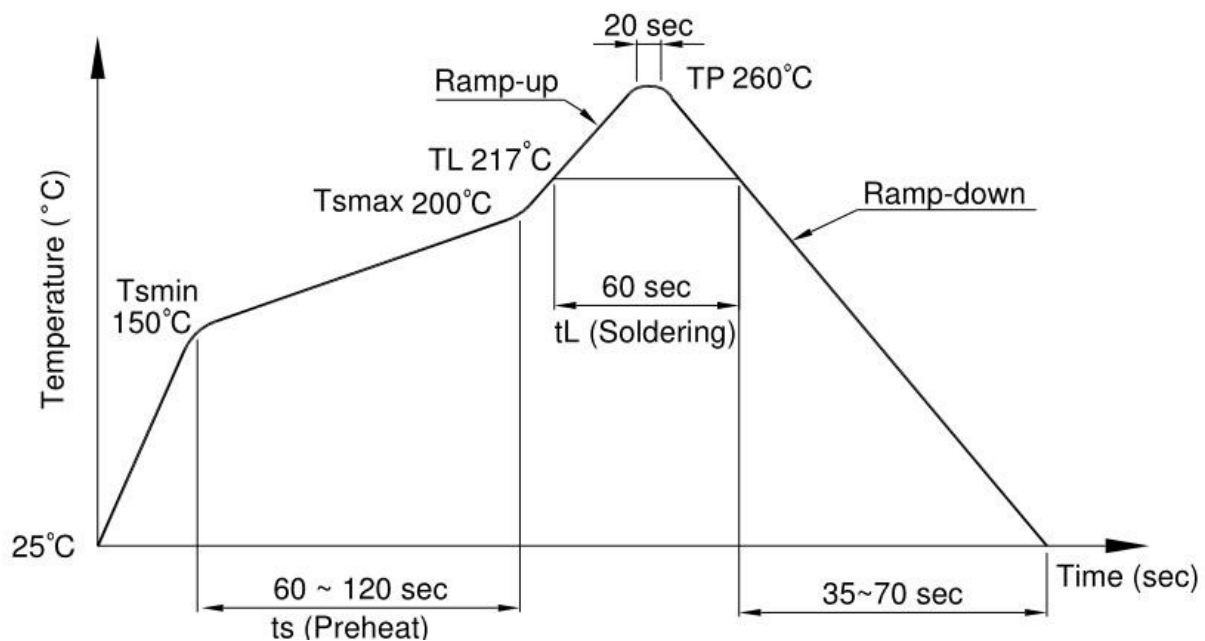
1. Material Code :Product ID.
2. P/N :Contents with "Order Information" in the specification.
3. Lot No. :Product weeks.
4. D/C :Product data.
5. Quantity :Packaging quantity.

### 13. 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.

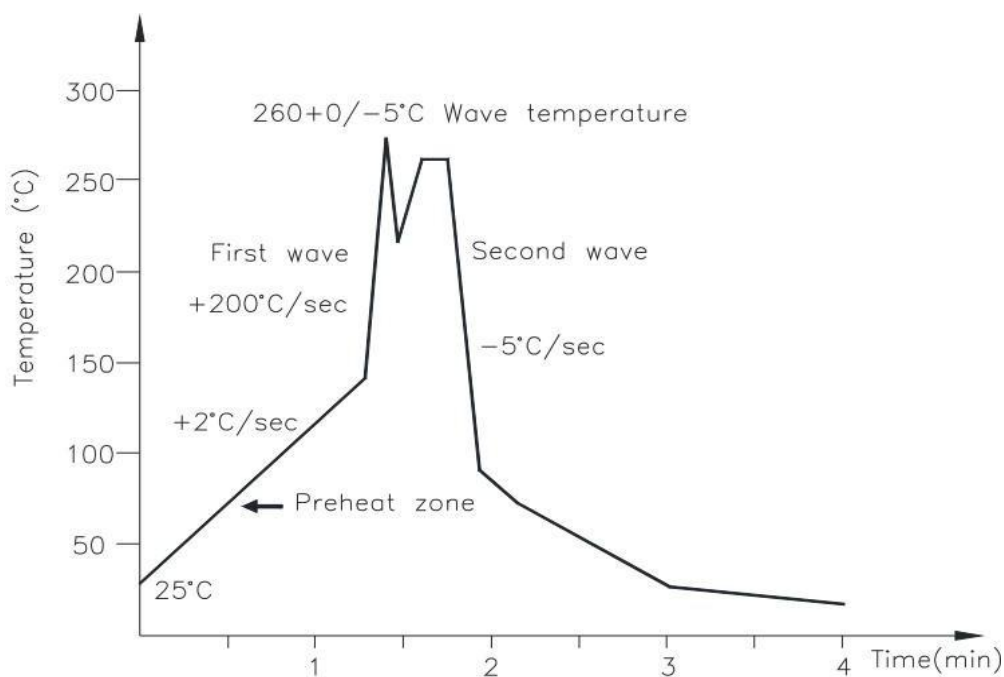
| Profile item                         | Conditions     |
|--------------------------------------|----------------|
| Preheat                              |                |
| - Temperature Min (T Smin )          | 150°C          |
| - Temperature Max (T Smax )          | 200°C          |
| - Time (min to max) (ts)             | 90±30 sec      |
| Soldering zone                       |                |
| - Temperature (TL )                  | 217°C          |
| - Time (t L )                        | 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 |



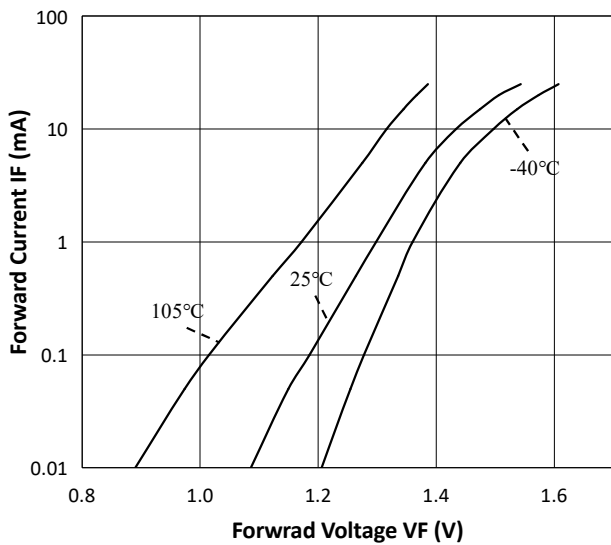
## (3).Hand soldering by soldering iron

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

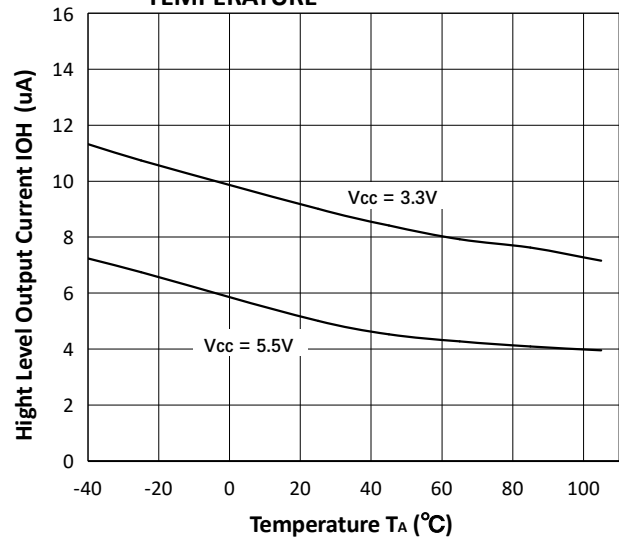
|             |            |
|-------------|------------|
| Temperature | 380+0/-5°C |
| Time        | 3 sec max  |

## 14. Characteristics Curves

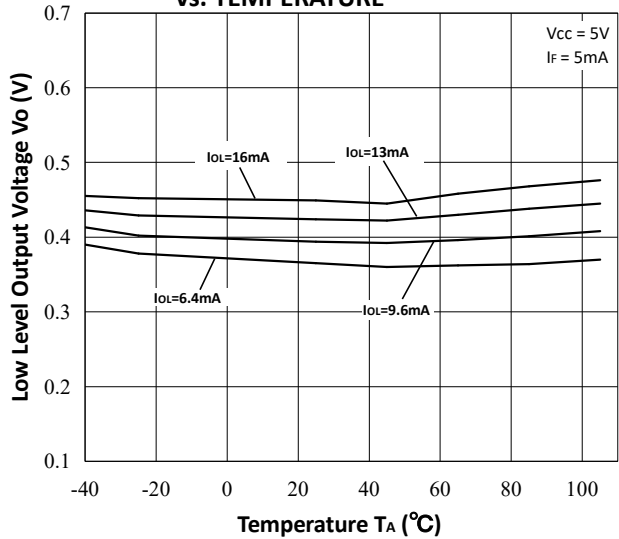
FORWARD CURRENT vs. FORWARD VOLTAGE



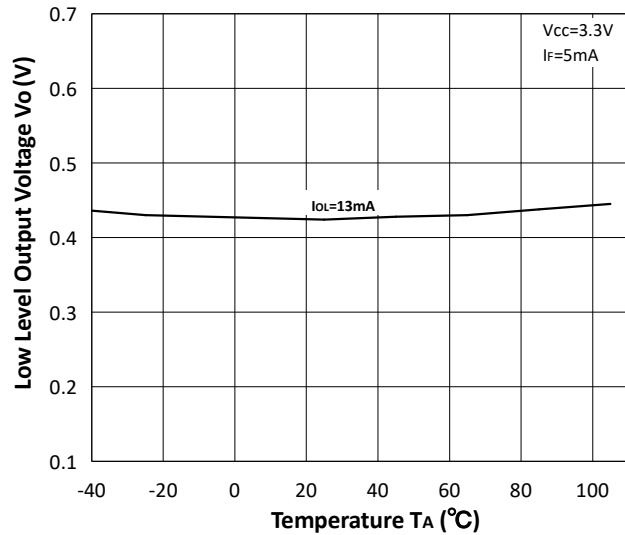
HIGHT LEVEL OUTPUT CURRENT vs. TEMPERATURE



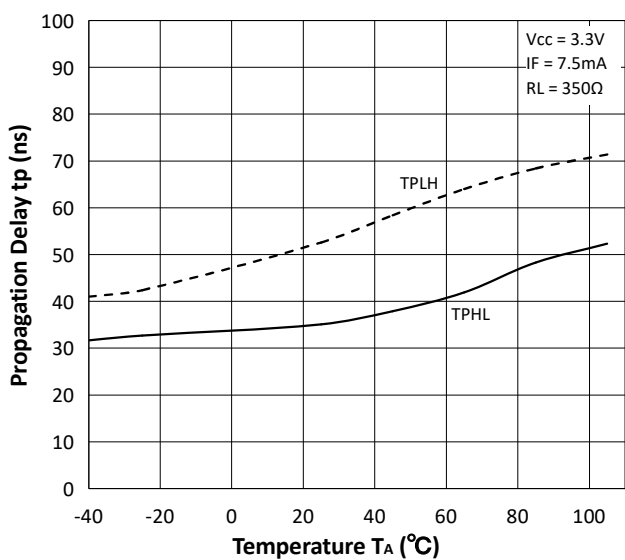
LOW LEVEL OUTPUT VOLTAGE vs. TEMPERATURE



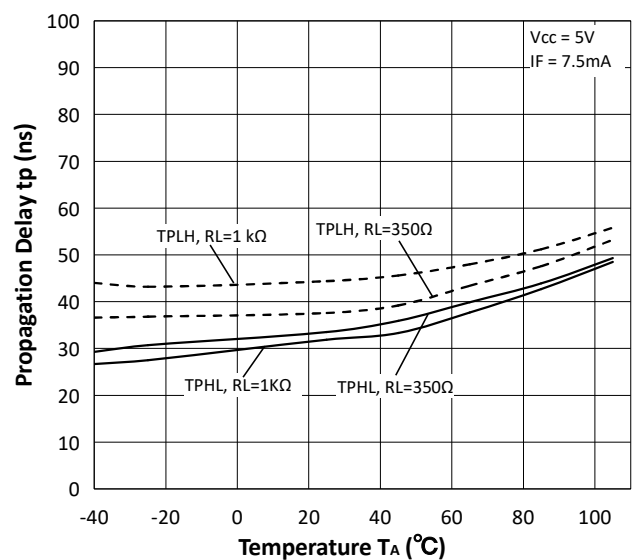
LOW LEVEL OUTPUT VOLTAGE vs. TEMPERATURE

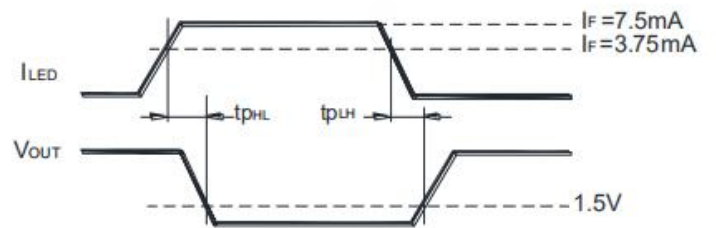
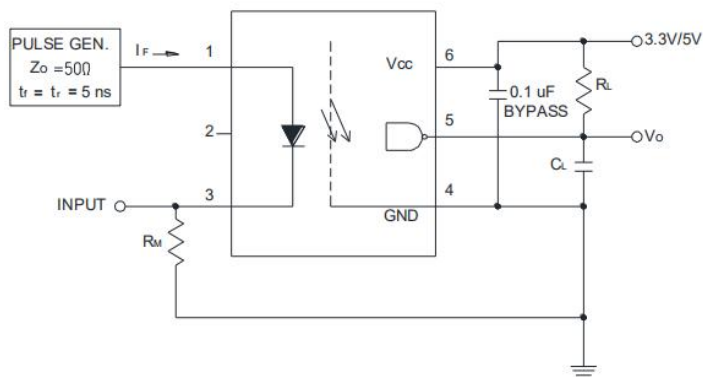


PROPAGATION DELAY TIME vs. TEMPERATURE



PROPAGATION DELAY TIME vs. TEMPERATURE





Test Circuit for  $t_{PHL}$  and  $t_{PLH}$



## 15. 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.