



# ORIENT

## Photo coupler

### Product Data Sheet

Part Number: OR-M302X(L)/M305X(L)/M307X(L)

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)

## 1. Features

- (1) High isolation voltage between input and output (Viso:3750 V rms)
- (2) 4pin non zero-cross optoisolators triac driver output
- (3) High repetitive peak off-state voltage VDRM :  
M302X: Min. 400V, M305X: Min. 600V, M307X: Min. 800V
- (4) High critical rate of rise of off-state voltage  $dv/dt$  : MIN. 1000 V /  $\mu$ sTape and reel packaging.
- (5) Operating temperature -40 °C to +110 °C
- (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



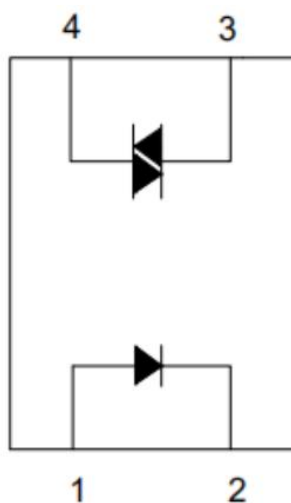
## 2. Description

The OR-M302X(L)/M305X(L)/M307X(L) consists of a non zero crossing photo triac, optically coupled to a gallium arsenide infrared emitting diode. They are housed in the SOP-4 package and guarantees insulation thickness. Therefore, they meet the reinforced insulation class requirements of international safety standards.

## 3. Application Range

- AC Motor Drives
- AC Motor Starters
- Static power switch
- Lighting Controls
- Solenoid/Valve Controls
- Solid State Relays
- Temperature Controls

## 4. Functional Diagram



- 1. Anode
- 2. Cathode
- 3. Main terminal
- 4. Main terminal

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

| Parameter                |                                                 | Symbol       | Rated Value | Unit             |
|--------------------------|-------------------------------------------------|--------------|-------------|------------------|
| Input                    | Forward Current                                 | $I_F$        | 50          | mA               |
|                          | Reverse Voltage                                 | $V_R$        | 6           | V                |
|                          | Power Dissipation                               | P            | 100         | mW               |
| Output                   | Off-State Output Terminal Voltage               | OR-M302X     | 400         | V                |
|                          |                                                 | OR-M305X     | 600         |                  |
|                          |                                                 | OR-M307X     | 800         |                  |
|                          | On state RMS current                            | $I_{T(RMS)}$ | 100         | mA(RMS)          |
|                          | Peak Repetitive Surge Current (PW=1ms, 120 pps) | $I_{TSM}$    | 1           | A                |
|                          | Power Dissipation                               | P            | 300         | mW               |
| Total Power Dissipation  |                                                 | $P_{tot}$    | 400         | mW               |
| *1 Insulation Voltage    |                                                 | $V_{iso}$    | 3750        | V <sub>rms</sub> |
| Working Temperature      |                                                 | $T_{opr}$    | -40 ~ + 110 | °C               |
| Deposit Temperature      |                                                 | $T_{stg}$    | -55 ~ + 125 |                  |
| *2 Soldering Temperature |                                                 | $T_{sol}$    | 260         |                  |

Notes:

\*1 AC for 1 minute, R.H.= 40 ~ 60% R.H. In this test, pins 1, 2 are shorted together, and pins 3, 4 are shorted together.

\* 2 For 10 seconds

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

| Parameter                |                                                                           |                                  | Symbol           | Min | Typ.* | Max  | Unit | Condition                                    |
|--------------------------|---------------------------------------------------------------------------|----------------------------------|------------------|-----|-------|------|------|----------------------------------------------|
| Input                    | Forward Voltage                                                           |                                  | V <sub>F</sub>   | --- | 1.2   | 1.6  | V    | I <sub>F</sub> =10mA                         |
|                          | Reverse Current                                                           |                                  | I <sub>R</sub>   | --- | ---   | 5    | μA   | V <sub>R</sub> =6V                           |
| Output                   | *1.Peak Blocking Current, Either Direction                                | OR-M302X<br>OR-M305X             | I <sub>DRM</sub> | --- | 10    | 100  | nA   | V <sub>DRM</sub> =<br>Rated V <sub>DRM</sub> |
|                          |                                                                           | OR-M307X                         |                  | --- | ---   | 500  |      |                                              |
|                          | Peak On-State Voltage, Either Direction                                   |                                  | V <sub>TM</sub>  | --- | ---   | 2.5  | V    | ITM=100mA<br>Peak                            |
|                          | *2.Critical rate of Rise of Off-State Voltage                             | OR-M302X                         | dv/dt            | --- | 100   | ---  | V/μs | Vin=240Vrms                                  |
| OR-M305X<br>OR-M307X     |                                                                           | 1000                             |                  | --- | ---   |      |      |                                              |
| Transfer Characteristics | *3.Led Trigger Current,Current Required to Latch Output, Either Direction | OR-M3020<br>OR-M3050<br>OR-M3070 | I <sub>FT</sub>  | --- | ---   | 30   | mA   | Main Terminal Voltage = 3V                   |
|                          |                                                                           | OR-M3021<br>OR-M3051<br>OR-M3071 |                  | --- | ---   | 15   |      |                                              |
|                          |                                                                           | OR-M3022<br>OR-M3052<br>OR-M3072 |                  | --- | ---   | 10   |      |                                              |
|                          |                                                                           | OR-M3023<br>OR-M3053<br>OR-M3073 |                  | --- | ---   | 5    |      |                                              |
|                          |                                                                           | OR-M3024<br>OR-M3054<br>OR-M3074 |                  | --- | ---   | 3    |      |                                              |
|                          | Holding Current, Either Direction                                         |                                  | I <sub>H</sub>   | 0.2 | 0.25  | ---- | mA   |                                              |

\*1. Test voltage must be applied within dv/dt rating.

\*2. This is static dv/dt. Commutating dv/dt is a function of the load-driving thyristor(s) only.

\*3. All devices are guaranteed to trigger at an  $I_F$  value less than or equal to max  $I_{\text{FT}}$ . Therefore, recommended operating  $I_F$  lies between max  $I_{\text{FT}}$ , 30 mA for OR-M3020 and OR-M3050, 15 mA for OR-M3021 and OR-M3051, 10 mA for OR-M3022 and OR-M3052, 5 mA for OR-M3023 and OR-M3053, 3 mA for OR-M3024 and OR-M3054, and absolute max  $I_F$  (50mA).



## 7. Order Information

### Part Number

**OR-M302X(L)-W-Y-Z**

**OR-M305X(L)-W-Y-Z**

**or OR-M307X(L)-W-Y-Z**

### Note

M302X/M305X/M307X= Part Number(X = 0,1,2,3 or 4)

(L)= Dedicated line code.

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

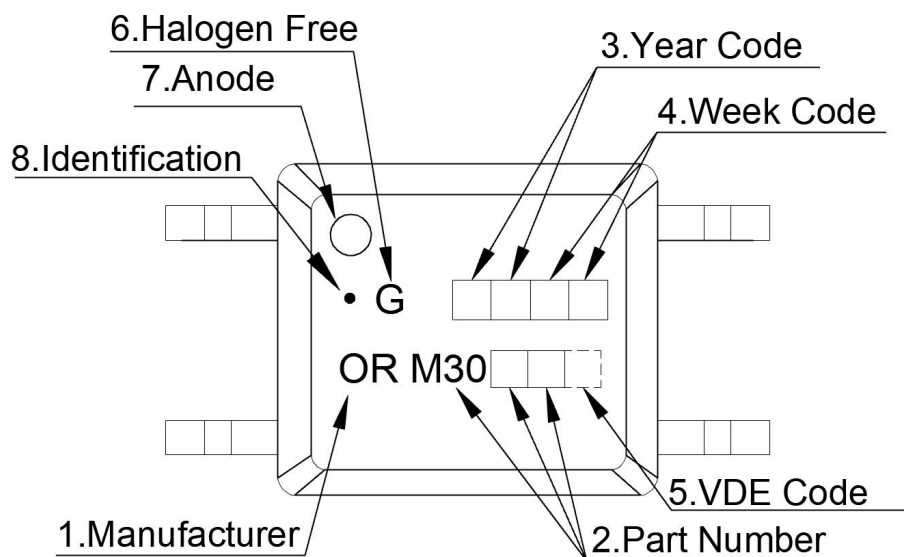
Y = 'V' code for VDE safety (This options is not necessary).

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 |

## 8. Naming Rule

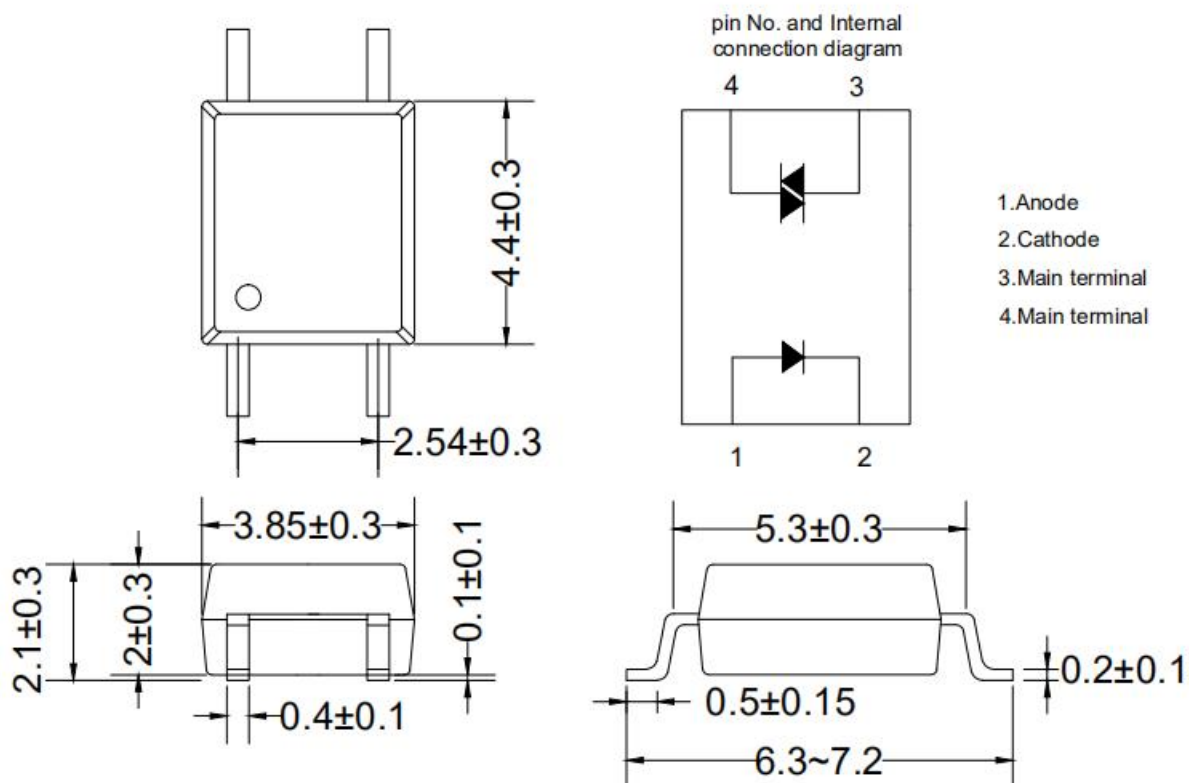


1. Manufacturer : ORIENT.
2. Part Number : M30□□.
3. Year Code □□ : '21' means '2021' and so on.
4. Week Code □□: 01 means the first week, 02 means the second week and so on.
5. VDE Code □□□. (Optional)
6. HF Code 'G': Halogen Free.
7. Anode.
8. Identification “ • ” : Dedicated line code (L) .

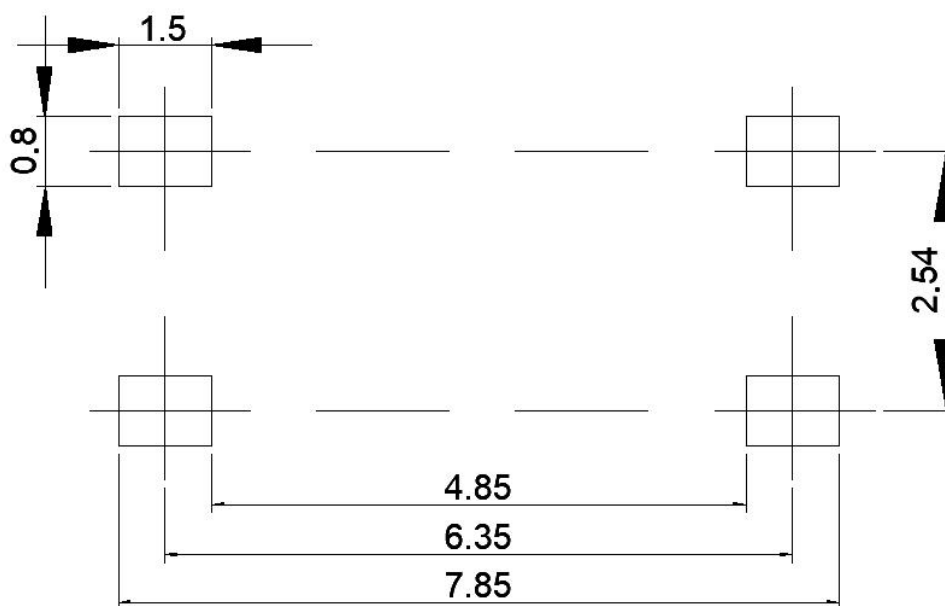
\* VDE Code can be selected.

## 9. Package Dimension

OR-M30XX



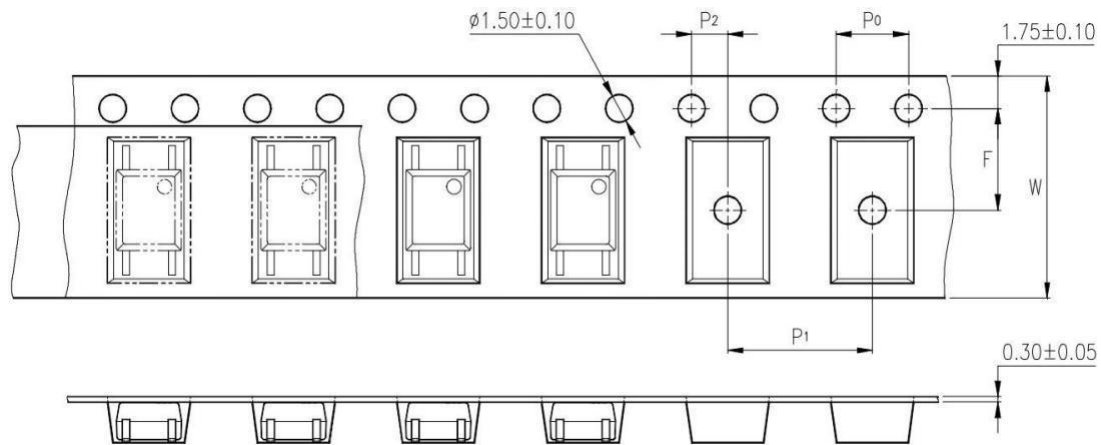
## 10. Recommended Foot Print Patterns (Mount Pad)



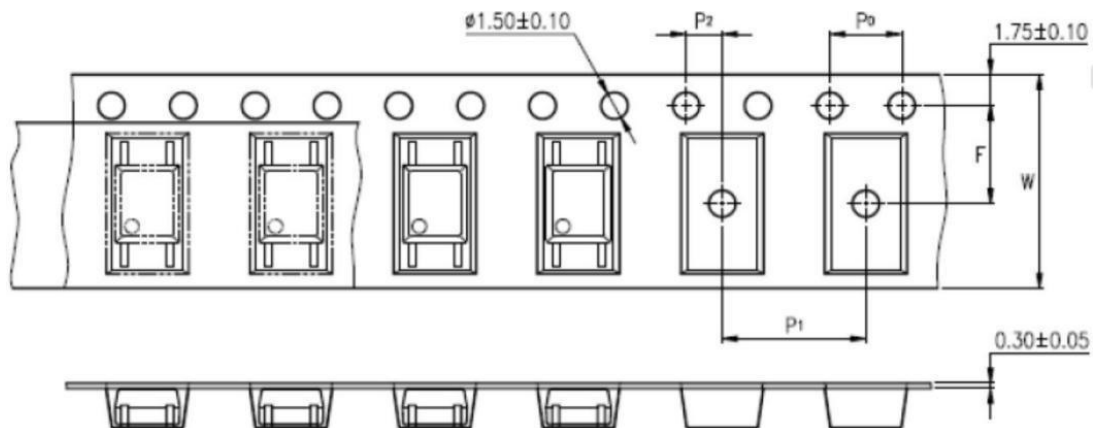
unit: mm

## 11. Taping Dimensions

### (1)TP Type



### (2)TP1 Type



| 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)          |

|                 |        |
|-----------------|--------|
| Package Type    | TP/TP1 |
| Quantities(pcs) | 3000   |



## 12. 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



Material Code: 120PCXXXXXX

P/N: XXXXXXXXXX

Lot No.: XXXX-XXXXX

D/C: XXXXXX

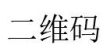
Qty: XXXX PCS



MSL: 1  
Made in China

XXXXXXXXXXXXXXXXXXXX

(流水码)



二维码

粘贴位置 设备码

#### Note:

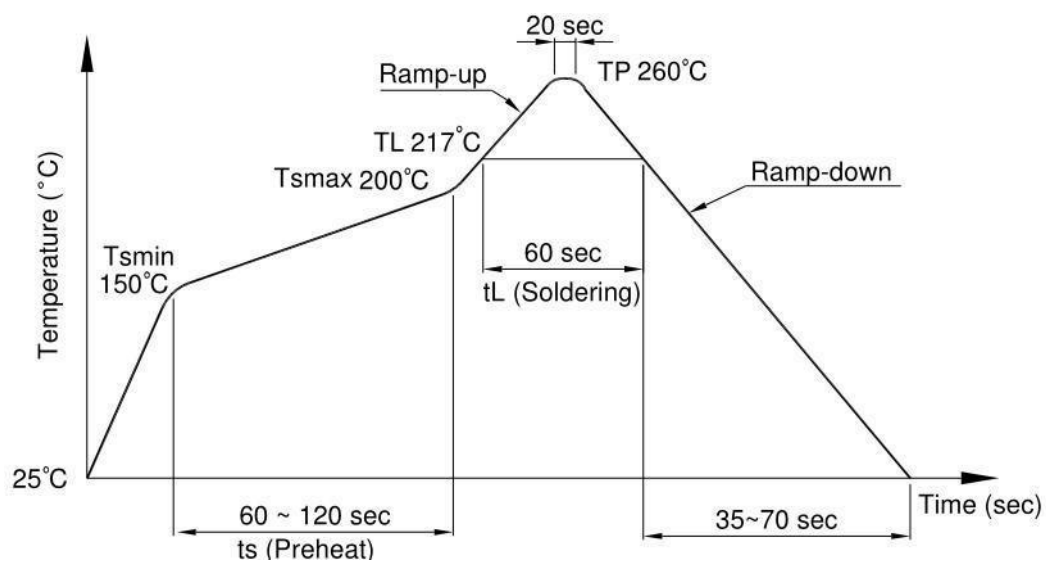
1. Material Code :Product ID.
2. P/N :Contents with "Order Information" in the specification.
3. Lot No. :Product data.
4. D/C :Product weeks.
5. Quantity :Packaging quantity.

### 13. Temperature Profile Of Soldering

#### (1) IR Reflow soldering

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

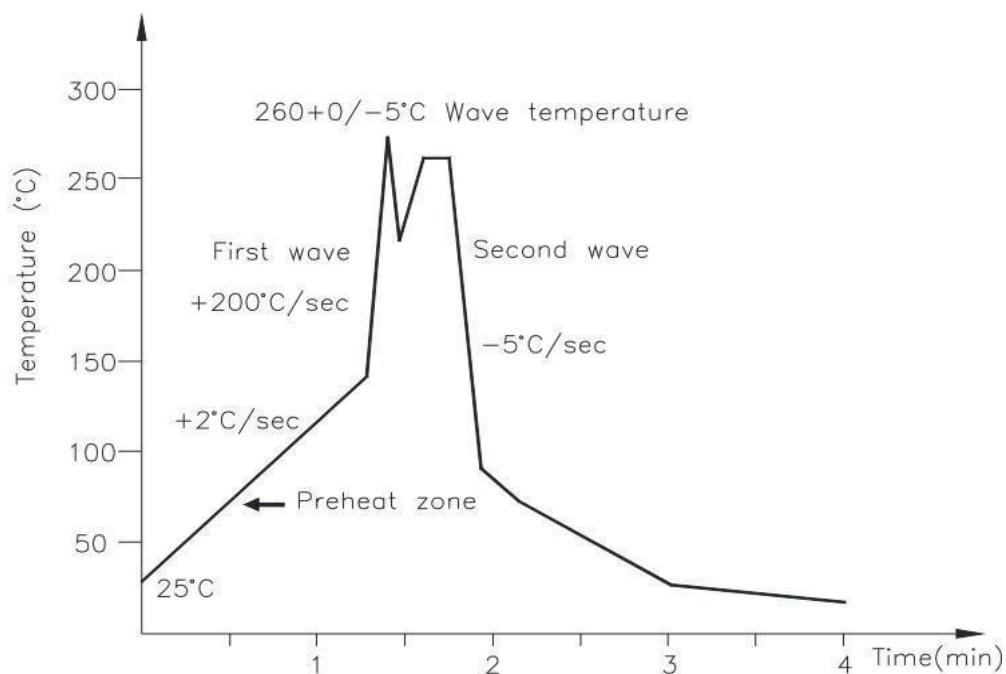
| Profile item                         | Conditions     |
|--------------------------------------|----------------|
| Preheat                              |                |
| - Temperature Min (T Smin )          | 150°C          |
| - Temperature Max (T Smax )          | 200°C          |
| - Time (min 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

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 |



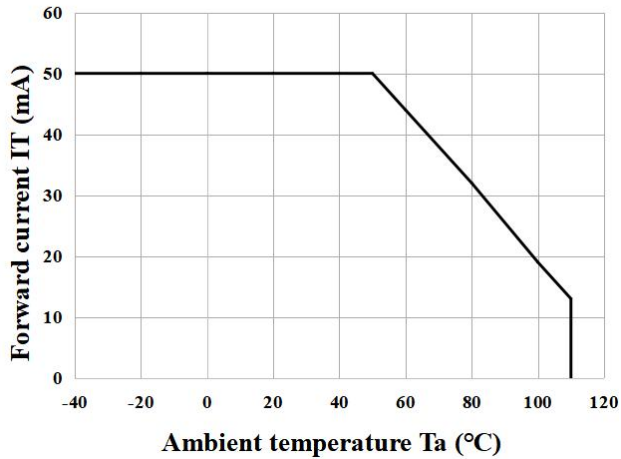
## (3) Hand soldering by soldering iron

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

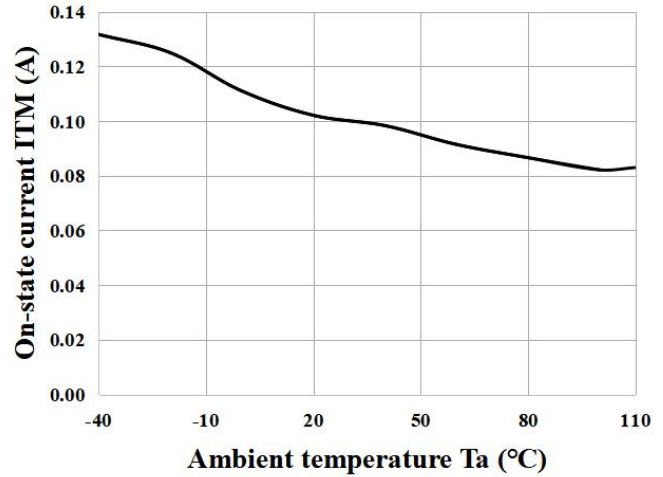
|             |            |
|-------------|------------|
| Temperature | 380+0/-5°C |
| Time        | 3 sec max  |

## 14. CHARACTERISTICS CURVES (TYPICAL PERFORMANCE)

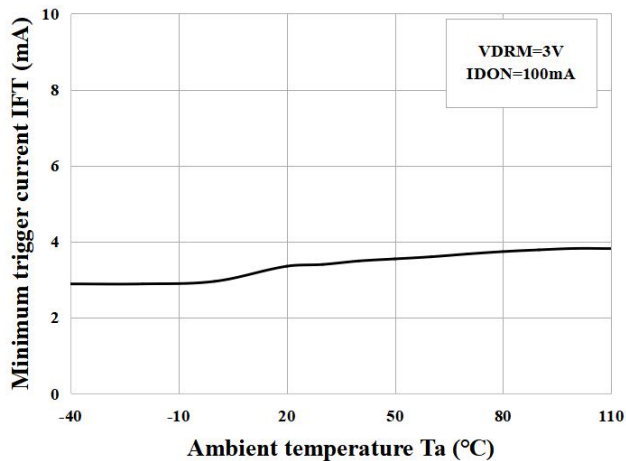
**Fig.1 Forward current vs. Ambient temperature**



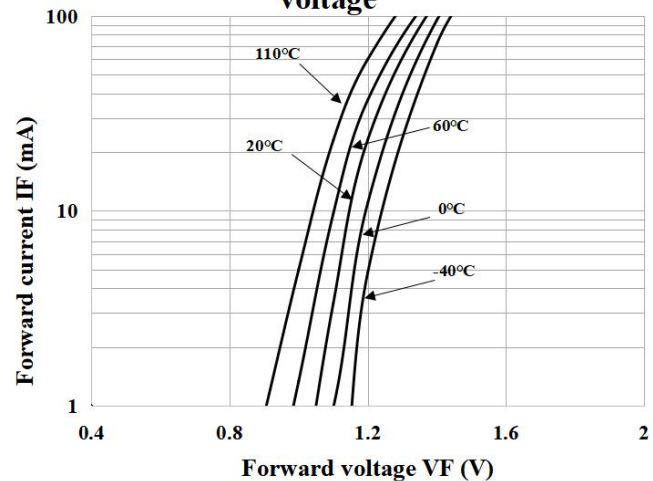
**Fig.2 On-state current ITM (A) vs. Ambient temperature**



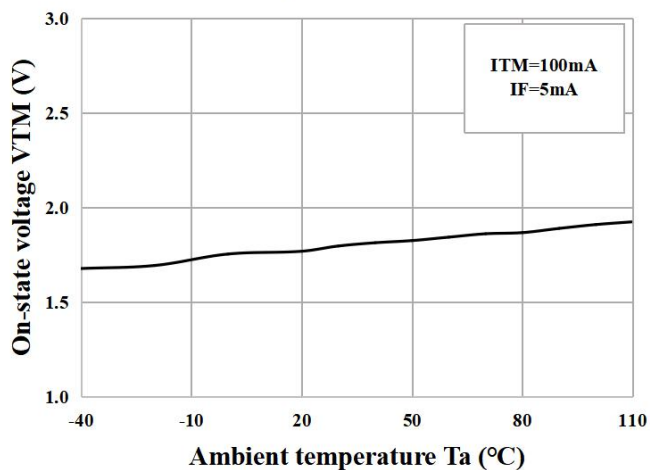
**Fig.3 Minimum trigger current IFT (mA) vs. Ambient temperature**



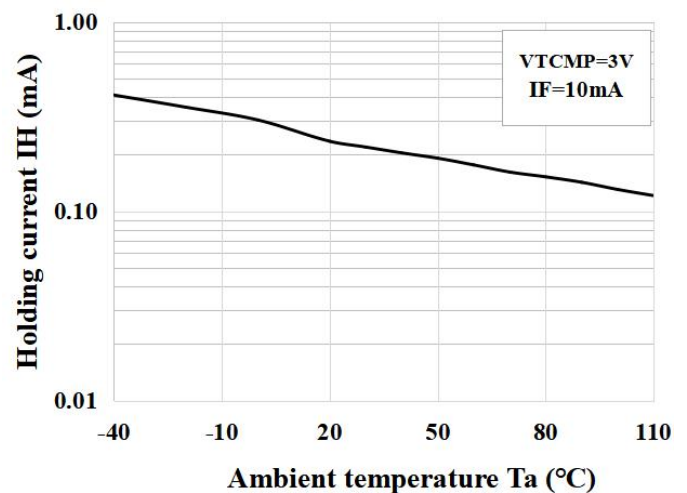
**Fig.4 Forward current vs. Forward voltage**



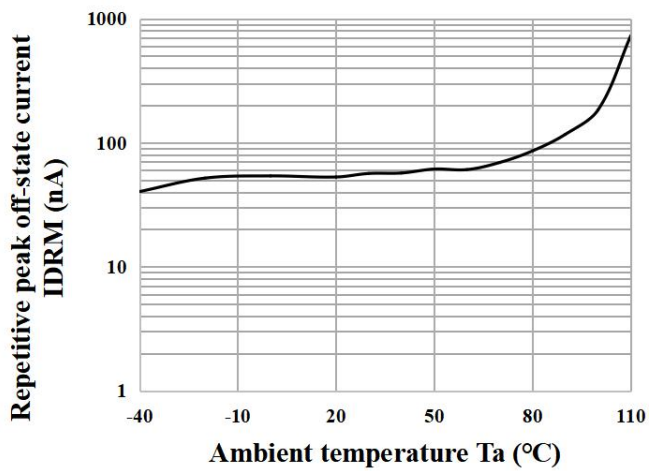
**Fig.5 On-state voltage VTM (V) vs. Ambient temperature**



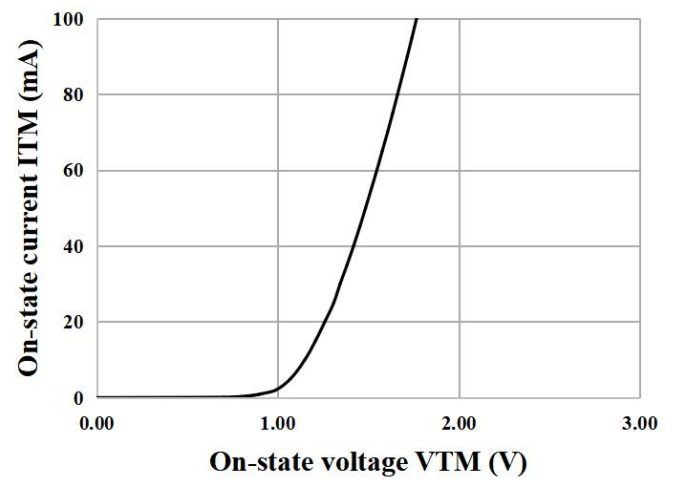
**Fig.6 Holding current IH (mA) vs. Ambient temperature**



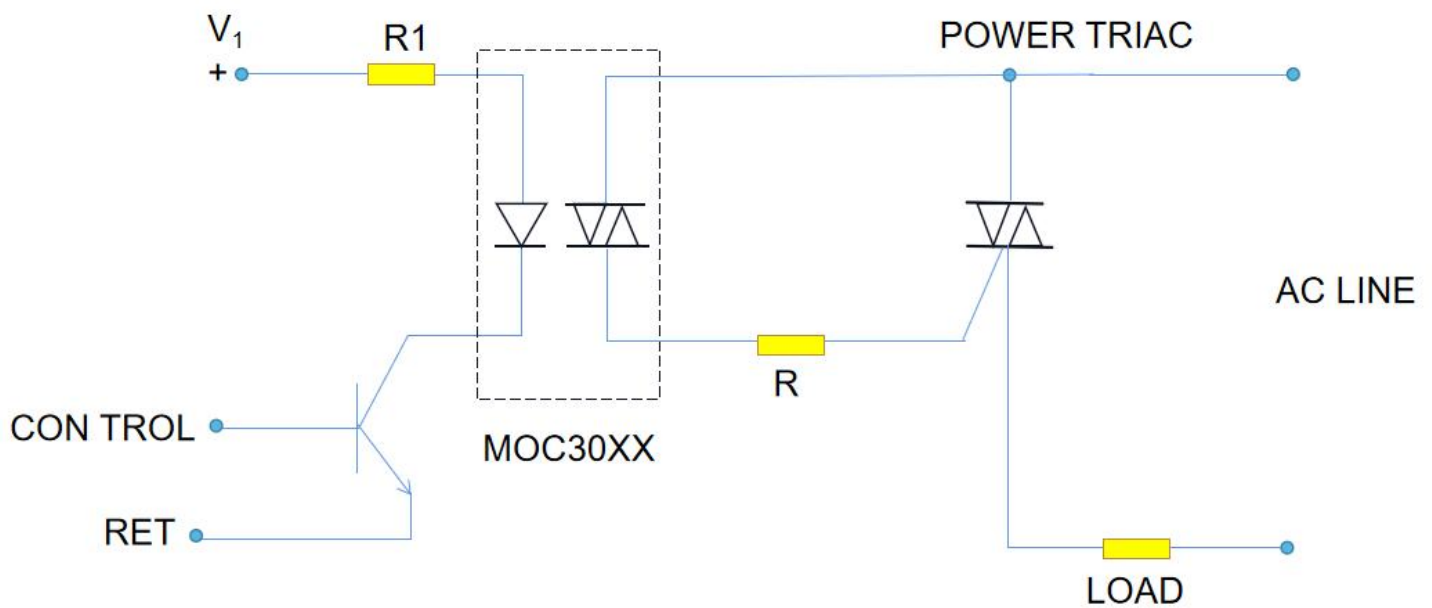
**Fig.7 Repetitive peak off-state current vs. Ambient temperature**



**Fig.8 On-state current vs. On-state voltage**



### Basic driver Circuit





## 15.NOTES

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

**15.2** 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.

**15.3** 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.

**15.4** 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.

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

**15.7** Immerge unit’s body in solder paste is not recommended.