



# ORIENT

## Photo coupler

### Product Data Sheet

MPN: OR-354 series of CG

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

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

**SHENZHEN ORIENT COMPONENTS CO.,LTD.**

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**Preliminary**

This is a preliminary  
specification intended for  
design purposes, please take  
the approval sheet as a  
standard with jointly sign

## 1. Features

- (1) Current transfer ratio  
(CTR : MIN. 20% at  $I_F = \pm 1\text{mA}$ ,  $V_{CE} = 5\text{V}$ ,  $T_a = 25^\circ\text{C}$ )
- (2) High input -output isolation voltage (VISO=3,750Vrms)
- (3) High collector-emitter voltage ( $V_{CEO} = 80\text{V}$ )
- (4) SOP-4 package
- (5) Operating Temperature  $-55^\circ\text{C}$  to  $125^\circ\text{C}$
- (6) ESD pass HBM 8000V/MM 2000V
- (7) Safety approval  
UL approved(No.E323844)  
VDE approved(No.40029733)  
CQC approved (No.CQC19001231256)
- (8) In compliance with RoHS, REACH standards
- (9) MSL Class I



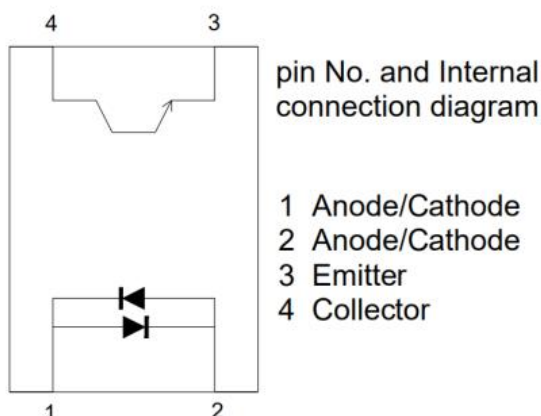
## 2. Instruction

- The OR-354-(CG) series device consists of two infrared emitting diode, connected in inverse parallel, optically coupled to a photo transistor detector. They are encapsulated in a 4 pin SOP encapsulation.
- Pin pitch of OR-354 is 2.54mm

## 3. Application Range

- (1) Hybrid substrates that require high density mounting.
- (2) Programmable controllers
- (3) System appliance, measuring instruments

## 4. Functional Diagram



## 5. Max Absolute rated Value (Normal Temperature=25°C)

| Parameter                |                               | Symbol    | Rated Value  | Unit             |
|--------------------------|-------------------------------|-----------|--------------|------------------|
| Input                    | Forward Current               | $I_F$     | $\pm 50$     | mA               |
|                          | Junction Temperature          | $T_J$     | 125          | °C               |
|                          | Consume Power                 | P         | 70           | mW               |
| Output                   | Collector and emitter Voltage | $V_{CEO}$ | 80           | V                |
|                          | Emitter and collector Voltage | $V_{ECO}$ | 7            |                  |
|                          | Collector Current             | $I_C$     | 50           | mA               |
|                          | Consume Power                 | $P_C$     | 150          | mW               |
|                          | Junction Voltage              | $T_J$     | 125          | °C               |
| Total Consume Power      |                               | $P_{tot}$ | 170          | mW               |
| *1 Insulation Voltage    |                               | $V_{iso}$ | 3750         | V <sub>rms</sub> |
| Operation Temperature    |                               | $T_{opr}$ | -55 to + 125 | °C               |
| Storage Temperature      |                               | $T_{stg}$ | -55 to + 150 |                  |
| *2 Soldering Temperature |                               | $T_{sol}$ | 260          |                  |

- \*1. AC Test, 1 minute, humidity = 40~60%  
Insulation test method as below:  
(1) Short circuit both terminals of photo coupler.  
(2) No Current when testing insulation voltage.  
(3) Adding sine wave voltage when testing.

- \*2. soldering time is 10 seconds.

## 6. Opto-electronic Characteristics

| Parameter                    |                                           | Symbol        | Min                | Typ.*              | Max | Unit          | Condition                                         |
|------------------------------|-------------------------------------------|---------------|--------------------|--------------------|-----|---------------|---------------------------------------------------|
| Input                        | Forward Current                           | $V_F$         | ---                | 1.2                | 1.4 | V             | $I_F=\pm 20\text{mA}$                             |
|                              | Collector capacitance                     | $C_t$         | ---                | 30                 | 250 | pF            | $V=0, f=1\text{KHz}$                              |
| Output                       | Collector to emitter Current              | $I_{CEO}$     | ---                | ---                | 100 | nA            | $V_{CE}=20\text{V}, I_F=0\text{mA}$               |
|                              | Collector and Emitter attenuation Voltage | $BV_{CEO}$    | 80                 | ---                | --- | V             | $I_C=0.1\text{mA}, I_F=0\text{mA}$                |
|                              | Emitter and Collector attenuation Voltage | $BV_{ECO}$    | 7                  | ---                | --- | V             | $I_E=0.1\text{mA}, I_F=0\text{mA}$                |
| Transforming Characteristics | *1 Current Transfer Ratio                 | CTR           | 20                 | ---                | 400 | %             | $I_F=\pm 1\text{mA}$<br>$V_{CE}=5\text{V}$        |
|                              | Collector Current                         | $I_C$         | 0.2                | ---                | 4   | mA            |                                                   |
|                              | Collector and Emitter Saturation Voltage  | $V_{CE(sat)}$ | ---                | ---                | 0.2 | V             | $I_F=\pm 20\text{mA}$<br>$I_C=1\text{mA}$         |
|                              | Insulation Impedance                      | $R_{iso}$     | $5 \times 10^{10}$ | $1 \times 10^{11}$ | --- | $\Omega$      | DC500V<br>40~60%R.H.                              |
|                              | Floating Capacitance                      | $C_f$         | ---                | 0.6                | 1   | pF            | $V=0, f=1\text{MHz}$                              |
|                              | Rise Time                                 | $t_r$         | ---                | 4                  | 18  | $\mu\text{s}$ | $V_{CC}=2\text{V}, I_C=2\text{mA}, R_L=100\Omega$ |
|                              | Fall Time                                 | $t_f$         | ---                | 3                  | 18  | $\mu\text{s}$ |                                                   |

- Current Conversion Ratio =  $I_C / I_F \times 100\%$

## 7. Rank table of current transfer ratio CTR

| CTR Rank | Min. | Max. | Condition                                                                | Unit |
|----------|------|------|--------------------------------------------------------------------------|------|
| A        | 50   | 150  | $I_F = \pm 1\text{mA}$ , $V_{CE} = 5\text{V}$ , $T_a = 25^\circ\text{C}$ | %    |
| B        | 80   | 400  |                                                                          |      |
| B2       | 100  | 400  |                                                                          |      |
| C        | 200  | 400  |                                                                          |      |
| No mark  | 20   | 400  |                                                                          |      |
| GR       | 100  | 300  | $I_F = \pm 5\text{mA}$ , $V_{CE} = 5\text{V}$ , $T_a = 25^\circ\text{C}$ |      |

\*

Current Conversion Ratio =  $I_C / I_F \times 100\%$

## 8. Order Information

### Part Number

**OR-354X-W-Y-Z-(CG)**

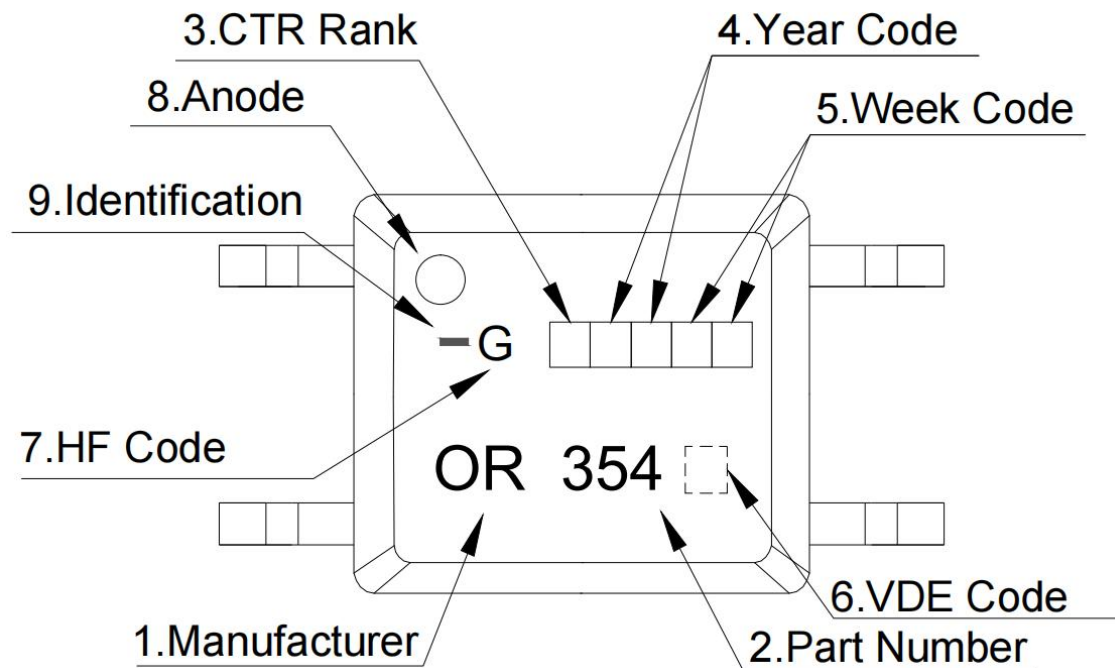
### Note

X = CTR Rank (A, B, B2, C, GR or none)  
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.  
CG = Field Code.

\* 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 |

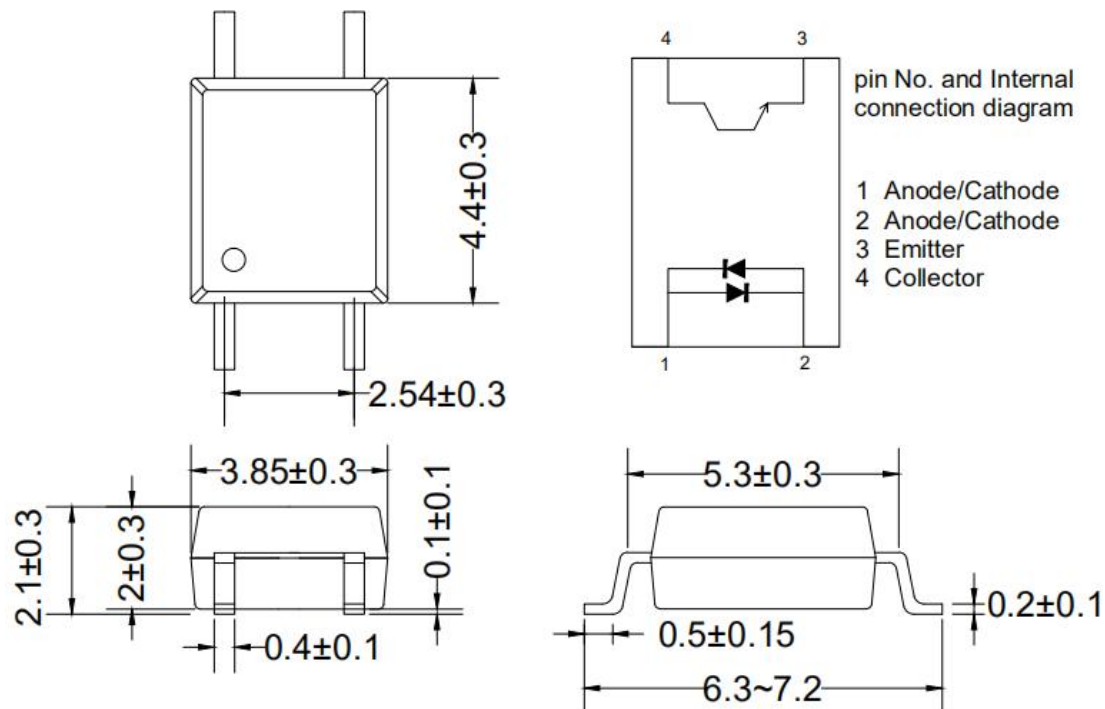
## 9. Naming Rule



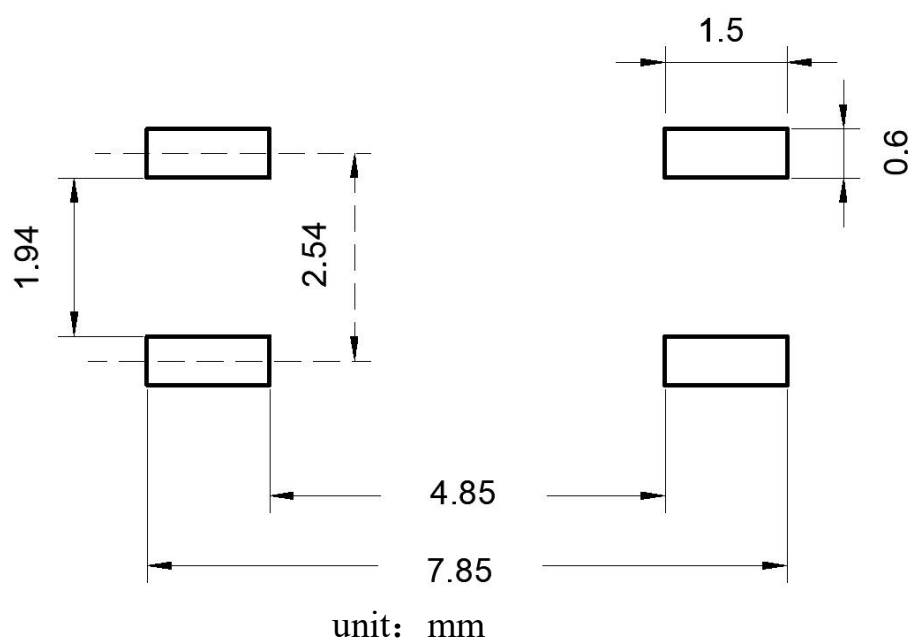
1. Manufacturer : ORIENT.
2. Part Number : 354.
3. Rank Code ☐ : CTR Rank
4. Year Code ☐☐ : '0' means '2020' and so on.
5. Week Code ☐☐ : 01 means the first week, 02 means the second week and so on.
6. VDE Code ☐☐☐☐. (Optional)
7. HF Code 'G': Halogen Free.
8. Anode.
9. Identification.

\* VDE Code can be selected.

## 10. Outer Dimension

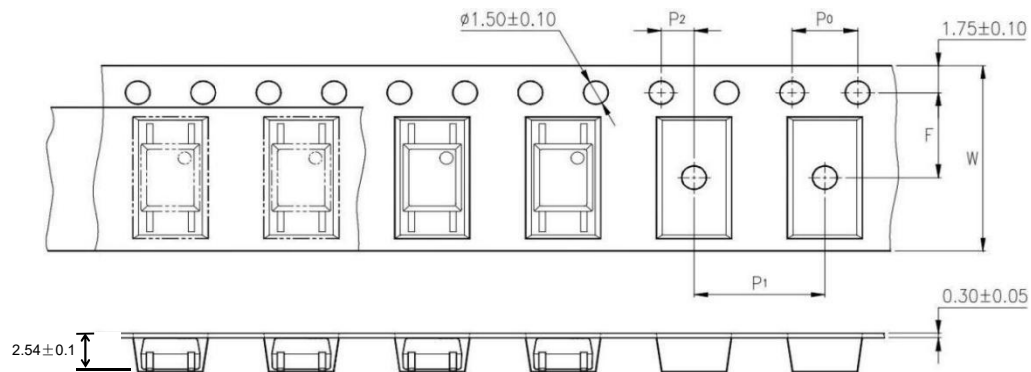


## 11. Recommended Foot Print Patterns (Mount Pad)

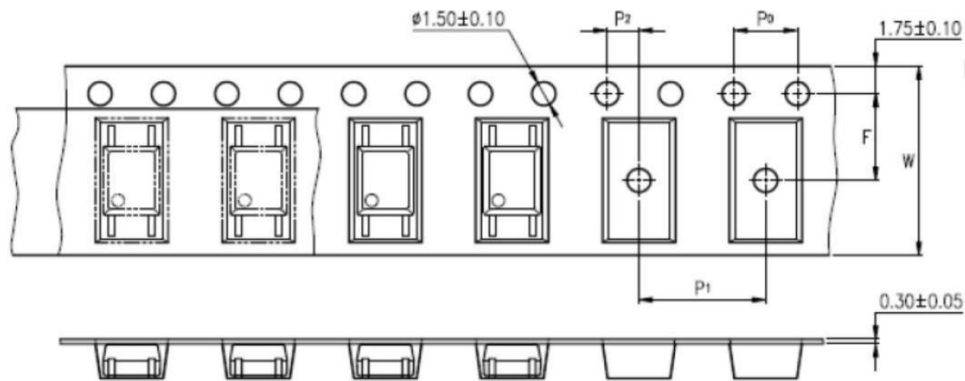


## 12. Taping Dimensions

### (1) OR-354-TP



### (2) OR-354-TP1



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

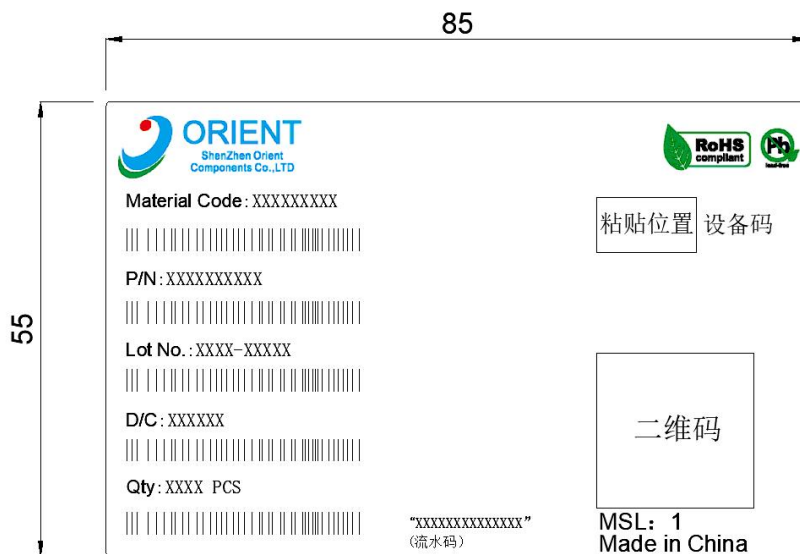
| Package Type    | TP/TP1 |
|-----------------|--------|
| Quantities(pcs) | 3000   |

### 13. 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:

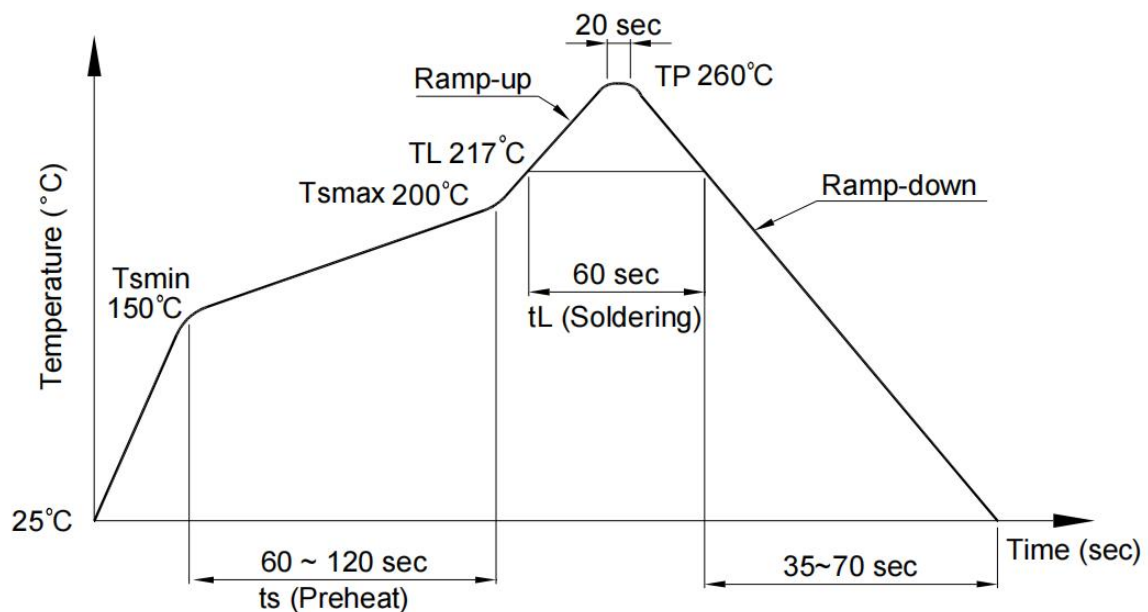
1. Material Code :Product ID.
2. P/N :Contents with "Order Information" in the specification.
3. Lot No. :Product weeks.
4. D/C :Product data.
5. Quantity :Packaging quantity.

## 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.

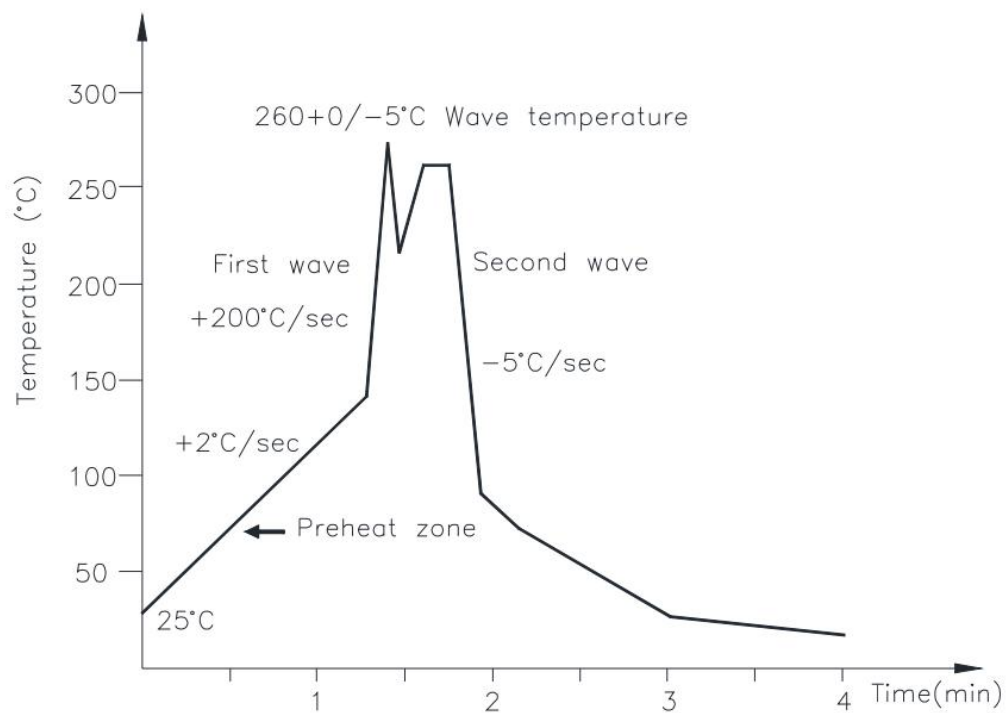
| Profile item                         | Conditions     |
|--------------------------------------|----------------|
| Preheat                              |                |
| - Temperature Min (T Smin )          | 150°C          |
| - Temperature Max (T Smax )          | 200°C          |
| - Time (min 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 (JEDEC22 A111 compliant)

One time soldering is recommended within the condition of temperature.

|                     |              |
|---------------------|--------------|
| Temperature         | 260+0/-5°C   |
| Time                | 10 sec       |
| Preheat temperature | 25 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 Curve

Fig.1 Forward current vs Ambient temperature

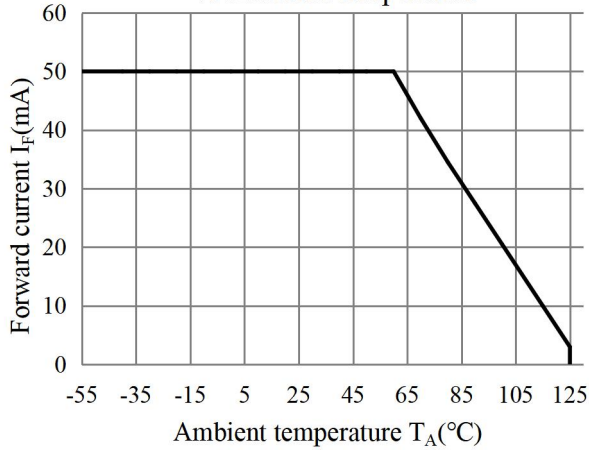


Fig.2 Collector Power Dissipation vs. Ambient temperature

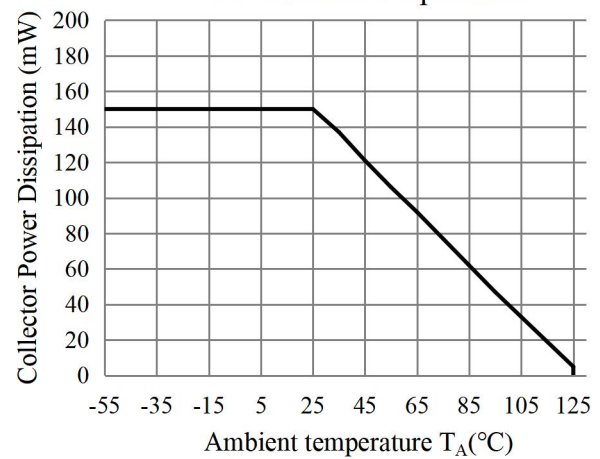


Fig.3 Forward Current vs. Forward Voltage

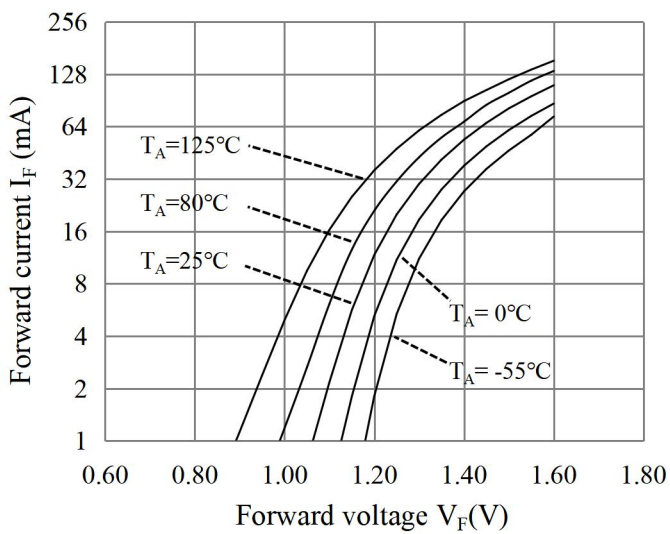


Fig.4 Collector-emitter Saturation Voltage vs. Forward Current

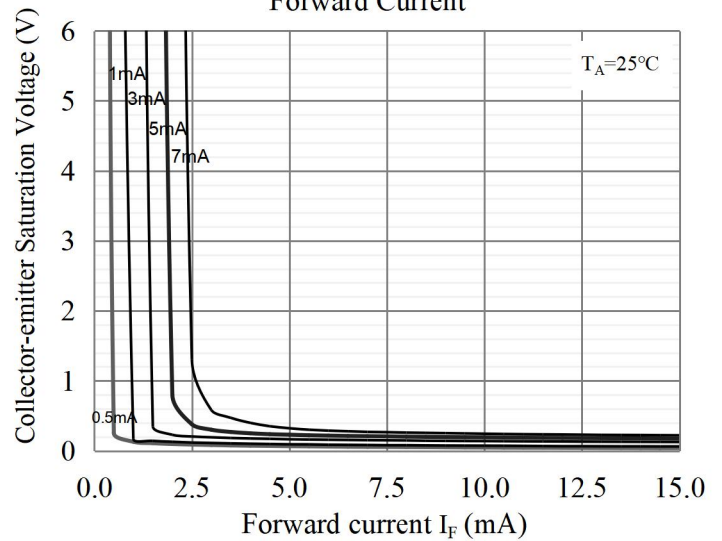


fig.5 Collector Current vs. Non-Saturated Collector Emitter Voltage

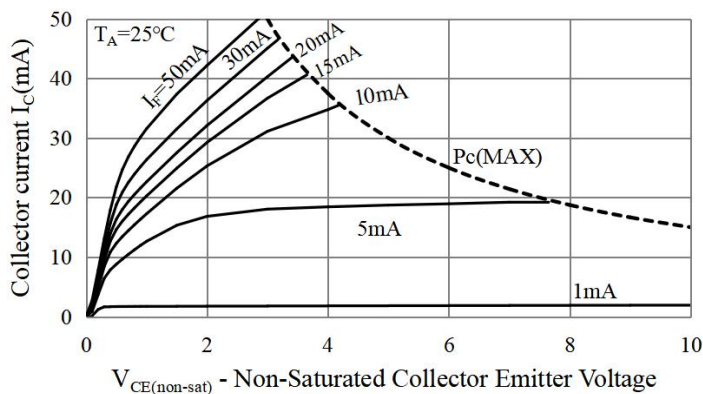


fig.6 Collector Current vs. Non-Saturated Collector Emitter Voltage

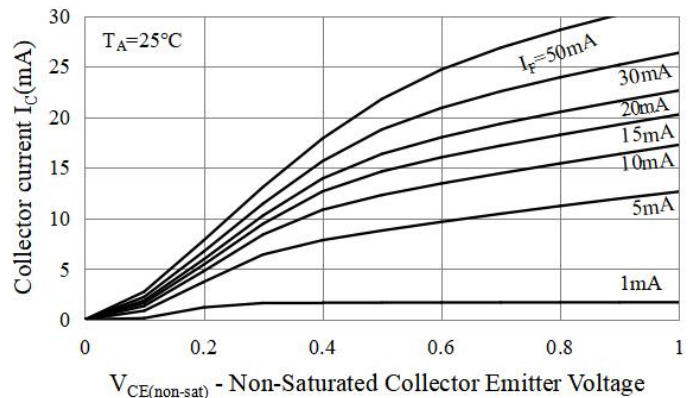


Fig.7 Relative Current Transfer Ratio vs. Ambient Temperature

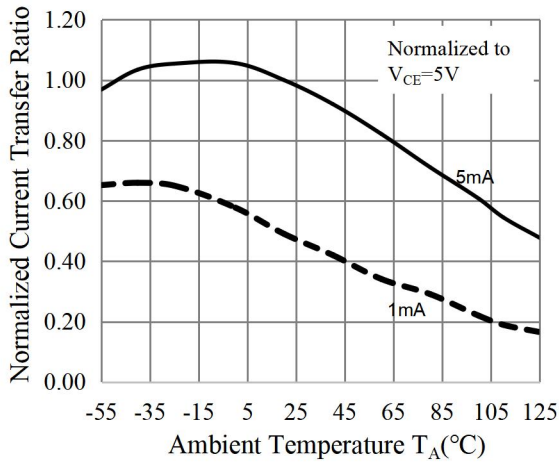


Fig.8 Relative Current Transfer Ratio vs. Ambient Temperature

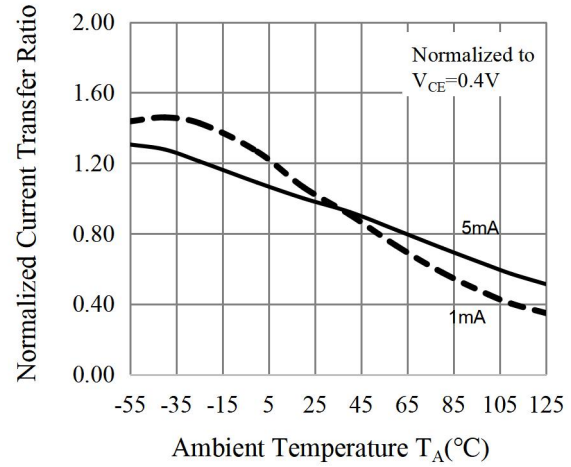


Fig.9 Forward Current vs. Current Transfer Ratio

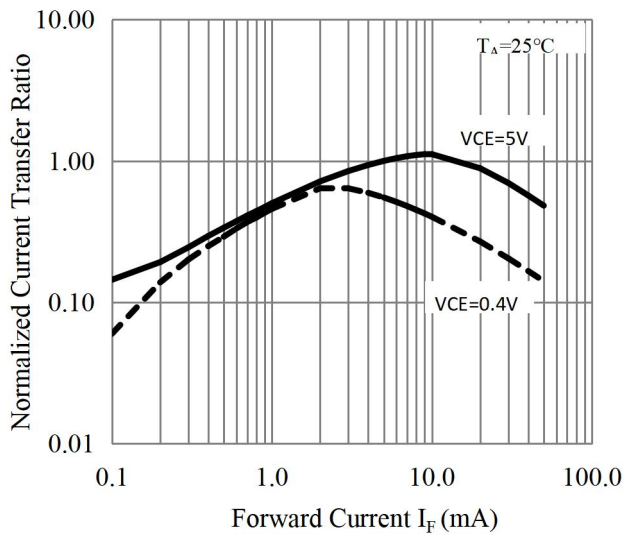


Fig.10 Collector Dark Current vs. Ambient Temperature

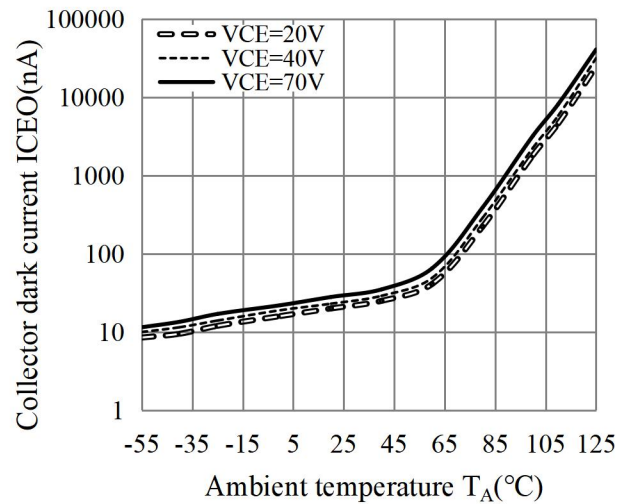


Fig.11 Collector-emitter Saturation Voltage vs. Ambient Temperature

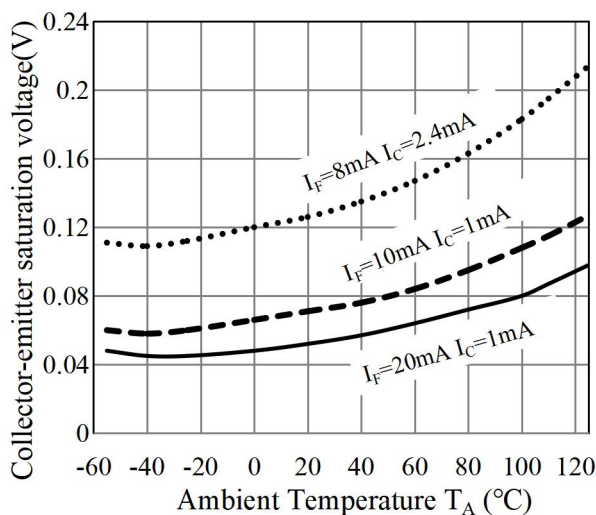


Fig.12 Switching Time vs. Load Resistance

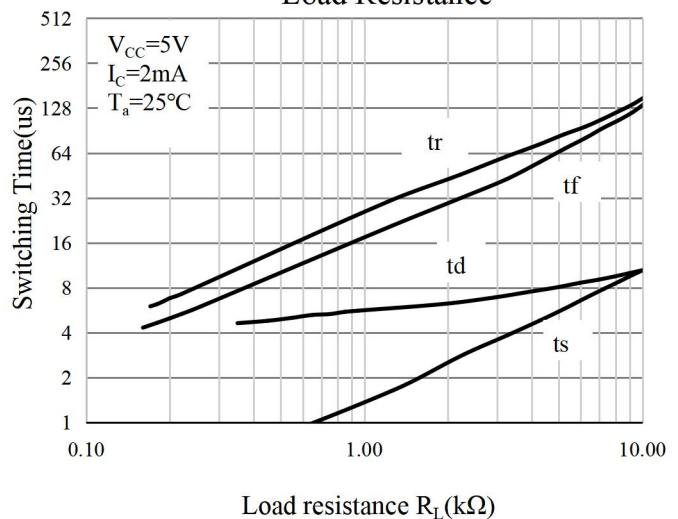


Fig.13 Respinse Time vs. Ambient temperature

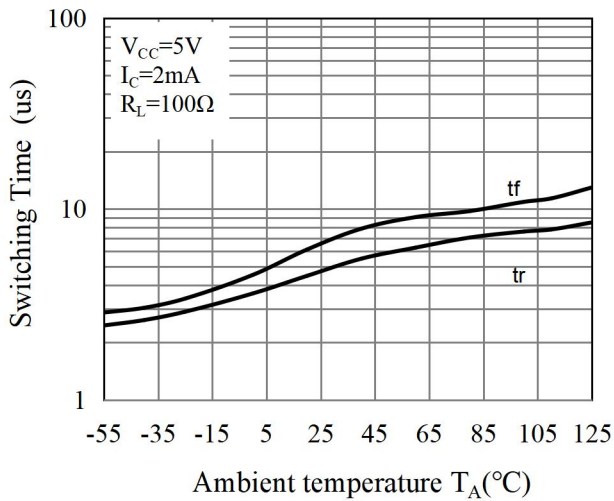
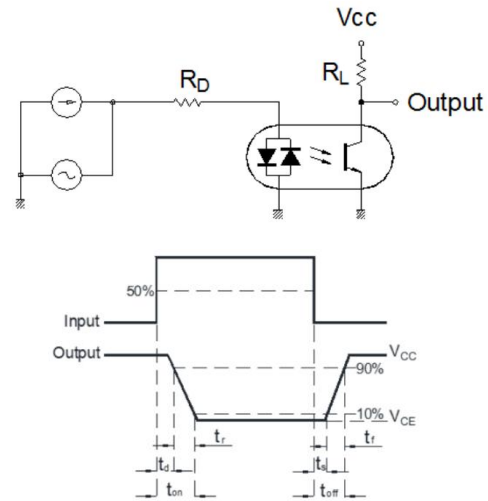


Fig.14 Switching Time Test Circuit & Waveforms



## 16. 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.