



# ORIENT

## Photo coupler

### Product Data Sheet

Part Number: ORPC-817

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

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

**SHENZHEN ORIENT COMPONENTS CO ., LTD**

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[www.orient-opto.com](http://www.orient-opto.com)

### 1. Features

- (1) Current transfer ratio ( CTR : MIN. 50% at  $I_F = 5\text{mA}$ ,  $V_{CE} = 5\text{V}$  )
- (2) High input-output isolation voltage (  $V_{iso} = 5,000\text{Vrms}$  )
- (3) Response time (  $t_r$  : TYP.  $4\mu\text{s}$  at  $V_{CE} = 2\text{V}$ ,  $I_C = 2\text{mA}$ ,  $R_L = 100\Omega$  )
- (4) ESD pass HBM 8000V/MM 2000V
- (5) Safety approval

- UL approved (No.E323844)
- VDE approved(No.40029733)
- CQC approved (No.CQC09001029446)
- CE approved (No.AC/0431008)
- State Grid approved (No.SGCM013420170152 )

- (6) In compliance with RoHS, REACH standards
- (7) MSL Class I



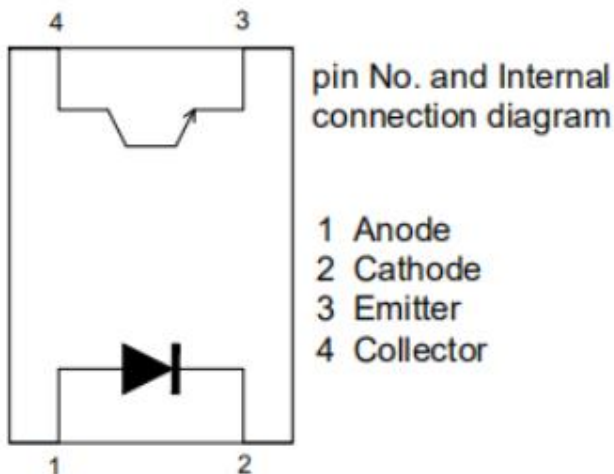
### 2. Description

- (1) ORPC-817 photo coupler consist of one piece of GaAs emitter and one piece of NPN transistor.
- (2) Packaged in a 4-pin DIP package and available in wide-lead spacing and SMD option.

### 3. Applications

- (1) Switching power supply
- (2) Ammeter
- (3) Computer
- (4) Instrumental application, measurement machine
- (5) Signal transforming systems
- (6) Imbursement equipments, duplicating machine, automat
- (7) Family-use electric equipments, such as fans

### 4. Functional Diagram



5. Absolute Maximum Ratings at Ta=25°C

| Parameter                                    |  | Symbol     | Rated Value  | Unit |
|--|--|------------|--------------|------|
| Input  | Forward Current  | $I_F$      | 60           | mA   |
|  | Peak forward Current<br>(100µs pulse, 100Hz frequency) | $I_{FP}$   | 1            | A    |
|  | Reverse Voltage  | $V_R$      | 6            | V    |
|  | 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   |
| Total Consume Power                          |  | $P_{tot}$  | 200          | mW   |
| *1 Insulation Voltage                        |  | $V_{iso}$  | 5,000        | Vrms |
| Max Insulation Voltage (Insulating oil test) |  | $V_{IOTM}$ | 10,000       | V    |
| Rated Impulse Insulation Voltage             |  | $V_{IORM}$ | 630          | V    |
| Working Temperature                          |  | $T_{opr}$  | -55 to + 110 | °C   |
| Deposit Temperature                          |  | $T_{stg}$  | -55 to + 125 |      |
| *2 Soldering Temperature                     |  | $T_{sol}$  | 260          |      |

\*1.AC For 1 Minute, R.H. = 40 ~ 60%

Isolation voltage shall be measured using the following method.

- (1) Short between anode and cathode on the primary side and between collector and emitter on the secondary side.
- (2) The isolation voltage tester with zero-cross circuit shall be used.
- (3) The waveform of applied voltage shall be a sine wave.

\*2. Soldering time is 10 seconds

**6. Electro-Optical Characteristics (Ta=25°C unless specified otherwise)**

| Parameter                           |   | Symbol        | Min                | Typ.*              | Max | Unit          | Condition   |
|-------------------------------------|---|---------------|--------------------|--------------------|-----|---------------|---|
| <b>Input</b>                        | Forward Voltage                           | $V_F$         | ---                | 1.2                | 1.4 | V             | $I_F=20\text{mA}$   |
|                                     | Reverse Current                           | $I_R$         | ---                | ---                | 5   | $\mu\text{A}$ | $V_R=5\text{V}$   |
|                                     | Collector Capacitance                     | $C_t$         | ---                | 30                 | 250 | pF            | $V=0, f=1\text{KHz}$  |
| <b>Output</b>                       | 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             | $I_C=0.1\text{mA}$<br>$I_F=0\text{mA}$                                  |
|                                     | Emitter and Collector attenuation Voltage | $BV_{ECO}$    | 7                  | ---                | --- | V             | $I_E=0.1\text{mA}$<br>$I_F=0\text{mA}$                                  |
| <b>Transforming Characteristics</b> | *1 Current conversion ratio               | CTR           | 50                 | ---                | 600 | %             | $I_F=5\text{mA}$<br>$V_{CE}=5\text{V}$                                  |
|                                     | Collector Current                         | $I_C$         | 2.5                | ---                | 30  | mA            |   |
|                                     | Collector and Emitter Saturation Voltage  | $V_{CE(sat)}$ | ---                | 0.1                | 0.2 | V             | $I_F=20\text{mA}$<br>$I_C=1\text{mA}$                                   |
|                                     | Insulation Impedance                      | $R_{iso}$     | $5 \times 10^{10}$ | $1 \times 10^{12}$ | --- | $\Omega$      | DC500V<br>40~60%R.H.  |
|                                     | Floating Capacitance                      | $C_f$         | ---                | 0.6                | 1.0 | pF            | $V=0, f=1\text{MHz}$  |
|                                     | Cut-off Frequency                         | $f_c$         | ---                | 80                 | --- | kHz           | $V_{CE}=5\text{V},$<br>$I_C=2\text{mA}$<br>$R_L=100\Omega, -3\text{dB}$ |
|                                     | Rise Time                                 | $t_r$         | ---                | 4                  | 18  | $\mu\text{s}$ | $V_{CE}=2\text{V},$<br>$I_C=2\text{mA}$                                 |
|                                     | Descend Time                              | $t_f$         | ---                | 3                  | 18  | $\mu\text{s}$ | $R_L=100\Omega$   |

\*1 Current Conversion Ratio =  $I_C / I_F \times 100\%$  , CTR Tolerance:  $\pm 3\%$ .



## 7. Rank Table of Current Transfer Ratio

### (1) ORPC-817

| Grade Sign | Min (%) | Max (%) |
|------------|---------|---------|
| ORPC-817L  | 50      | 100     |
| ORPC-817A  | 80      | 160     |
| ORPC-817B  | 130     | 260     |
| ORPC-817C  | 200     | 400     |
| ORPC-817D  | 300     | 600     |

Note: Working condition:  $I_F=5\text{mA}$ ,  $V_{CE}=5\text{V}$ ,  $T_a=25^\circ\text{C}$ .

### (2) ORPC-817M

| Grade Sign | Min (%) | Max (%) |
|------------|---------|---------|
| ORPC-817ML | 50      | 100     |
| ORPC-817MA | 80      | 160     |
| ORPC-817MB | 130     | 260     |
| ORPC-817MC | 200     | 400     |
| ORPC-817MD | 300     | 600     |

Note: Working condition:  $I_F=5\text{mA}$ ,  $V_{CE}=5\text{V}$ ,  $T_a=25^\circ\text{C}$ .

### (3) ORPC-817S

| Grade Sign | Min (%) | Max (%) |
|------------|---------|---------|
| ORPC-817SL | 50      | 100     |
| ORPC-817SA | 80      | 160     |
| ORPC-817SB | 130     | 260     |
| ORPC-817SC | 200     | 400     |
| ORPC-817SD | 300     | 600     |

Note: Working condition:  $I_F=5\text{mA}$ ,  $V_{CE}=5\text{V}$ ,  $T_a=25^\circ\text{C}$ .



## 8. Order Information

### Part Number

# ORPC-817XT-V-W-Z

### Note

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

T = CTR Rank (L, A, B, C, D or none)

V = Tape and reel option (TP, TP1 or none).

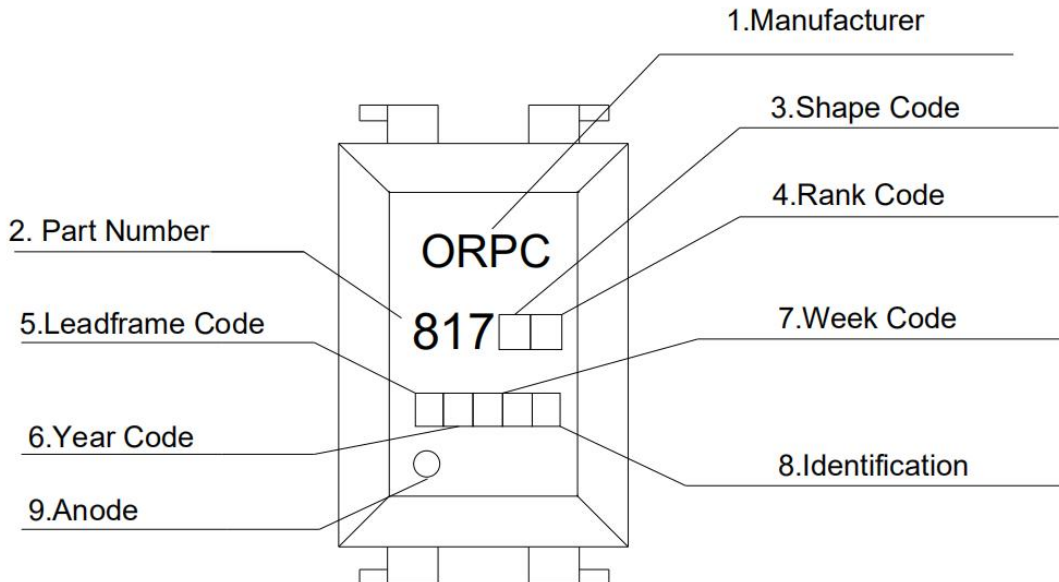
W = Lead frame option (F: Iron, C:copper)

Z = 'G' code for Halogen free (This options is not necessary).

\* Halogen Free can be selected.

| Option | Description  | Packing quantity    |
|--------|--|---------------------|
| None   | Standard DIP-4   | 100 units per tube  |
| M      | Wide lead bend (0.4 inch spacing)                              | 100 units per tube  |
| S(TP)  | Surface mount lead form (low profile) + TP tape & reel option  | 2000 units per reel |
| S(TP1) | Surface mount lead form (low profile) + TP1 tape & reel option | 2000 units per reel |

9. Naming Rule

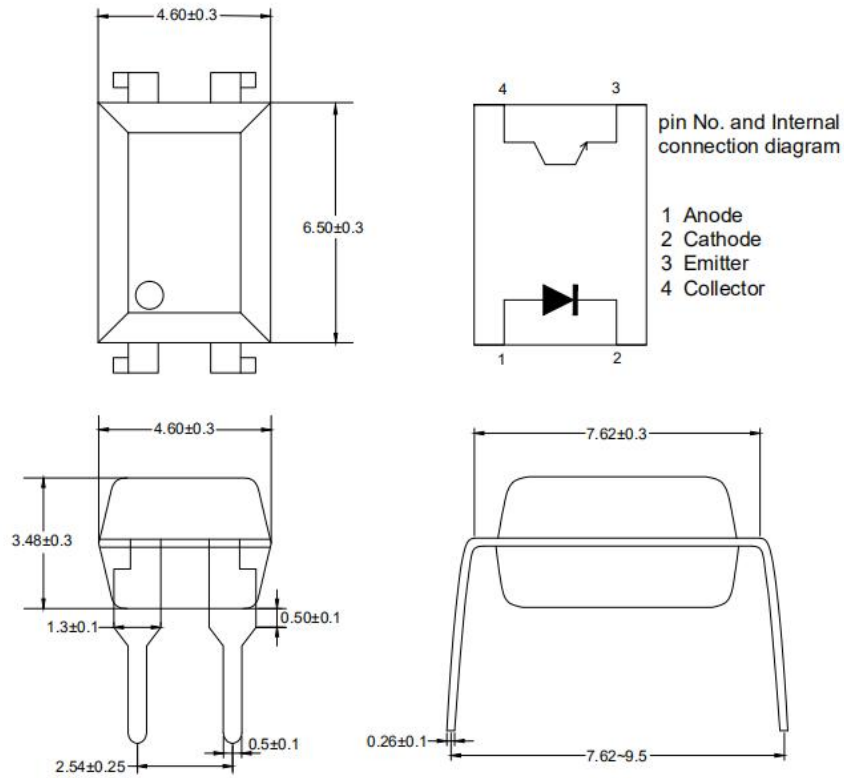


1. Manufacturer : ORIENT.
2. Part Number : 817.
3. Shape Code .
4. Rank Code : CTR Rank
5. Lead frame Code : 'F' means Iron, 'C' means Copper.
6. Year Code  : '1' means '2021' and so on.
7. Week Code : 01 means the first week, 02 means the second week and so on.
8. Identification .
9. Anode.

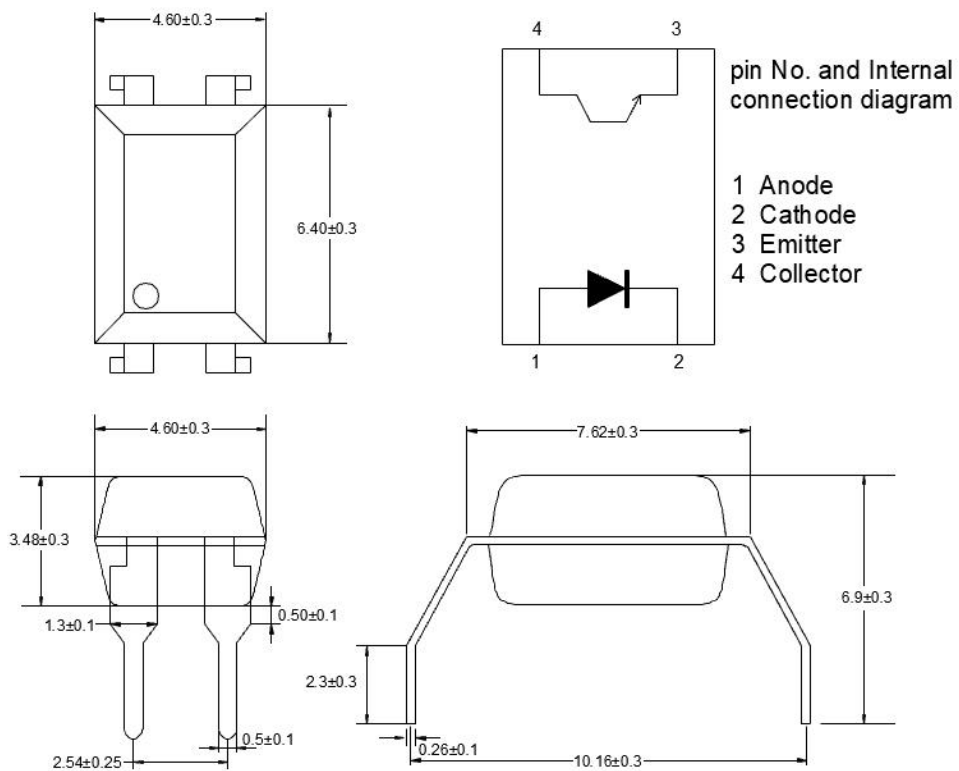
\* Halogen Free Mark can be selected.

10. Package Dimension (Unit: mm)

(1) ORPC-817

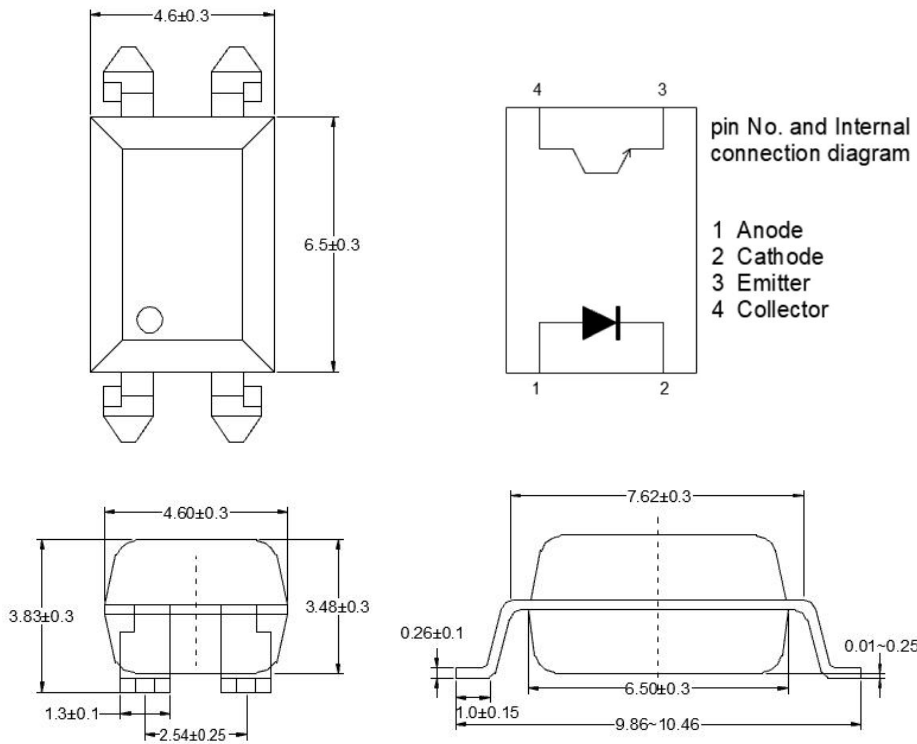


(2) ORPC-817M



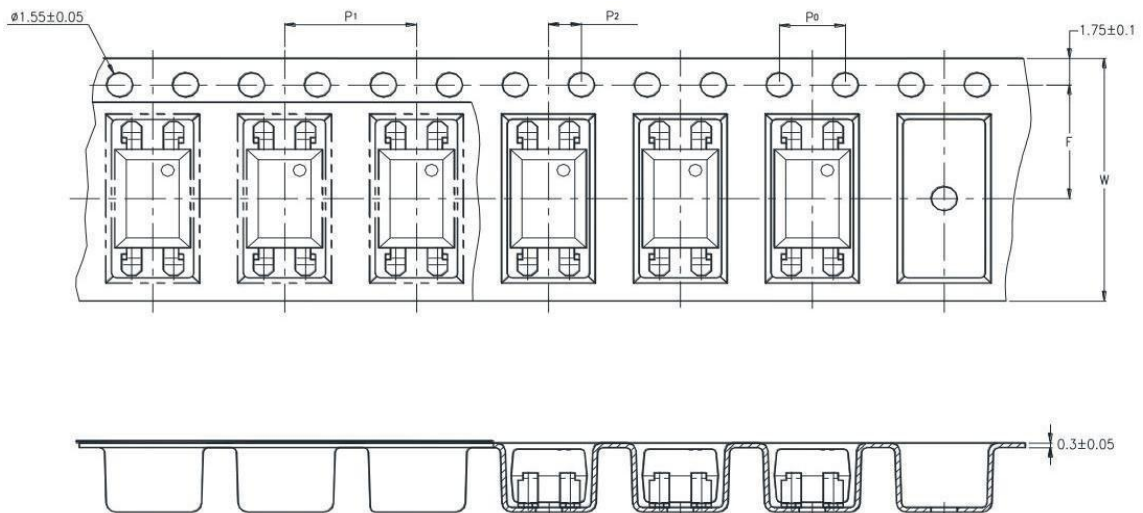


(3) ORPC-817S

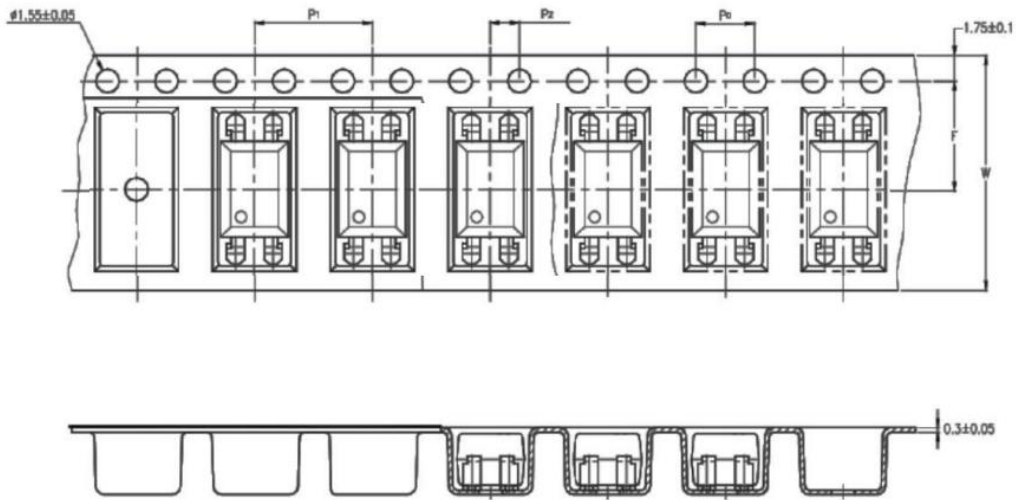


11. Taping Dimensions

(1)ORPC-817S-TP



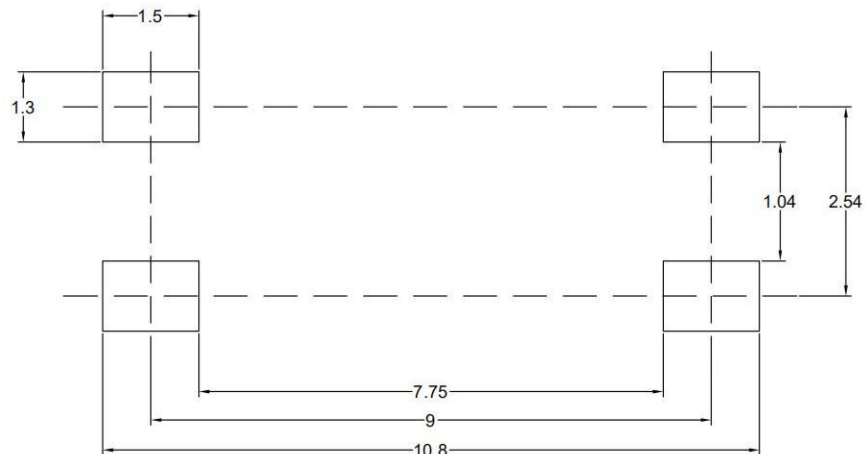
(2)ORPC-817S-TP1



| Description                            | Symbol         | Dimension in mm (inch) |
|--|----------------|------------------------|
| Tape wide                              | W              | 16±0.3 (.63)           |
| Pitch of sprocket holes                | P <sub>0</sub> | 4±0.1 (.15)            |
| Distance of compartment                | F              | 7.5±0.1 (.295)         |
|  | P <sub>2</sub> | 2±0.1 (.0079)          |
| Distance of compartment to compartment | P <sub>1</sub> | 8±0.1 (.472)           |

|                 |        |
|-----------------|--------|
| Package Type    | TP/TP1 |
| Quantities(pcs) | 2000   |

12. Recommended Foot Print Patterns (Mount Pad) (Unit: mm)



### 13. Package Dimension

#### (1) package dimension


DIP Type

| Packing Information         |               |
|-----------------------------|---------------|
| Packing type                | Tube          |
| Qty per Tube                | 100pcs        |
| Small box (Inner) Dimension | 525*128*60mm  |
| Large box (Outer) Dimension | 545*290*335mm |
| The Amount per Inner Box    | 5,000pcs      |
| The Amount per Outer Box    | 50,000pcs     |



SOP Type

| Packing Information         |                |
|-----------------------------|----------------|
| Packing type                | Reel type      |
| Tape Width                  | 16mm           |
| Qty per Reel                | 2,000pcs       |
| Small box (inner) Dimension | 345*345*58.5mm |
| Large box (Outer) Dimension | 620x360x360mm  |
| Max qty per small box       | 4,000pcs       |
| Max qty per large box       | 40,000pcs      |

#### (2)Packing Label Sample



Material Code : 120PCXXXXXX  
|||||  
P/N: OR-XXXXXX  
|||||  
Lot No. : XXXXXX-XXXXX-TX-X  
|||||  
D/C: XXXX  
|||||  
Qty: XXXX PCS  
|||||


内箱码

外箱码

“XXXXXXXXXXXXXXXXXX” (一体机序列码)  
**Made in China**

**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.

## 14. Reliability Test

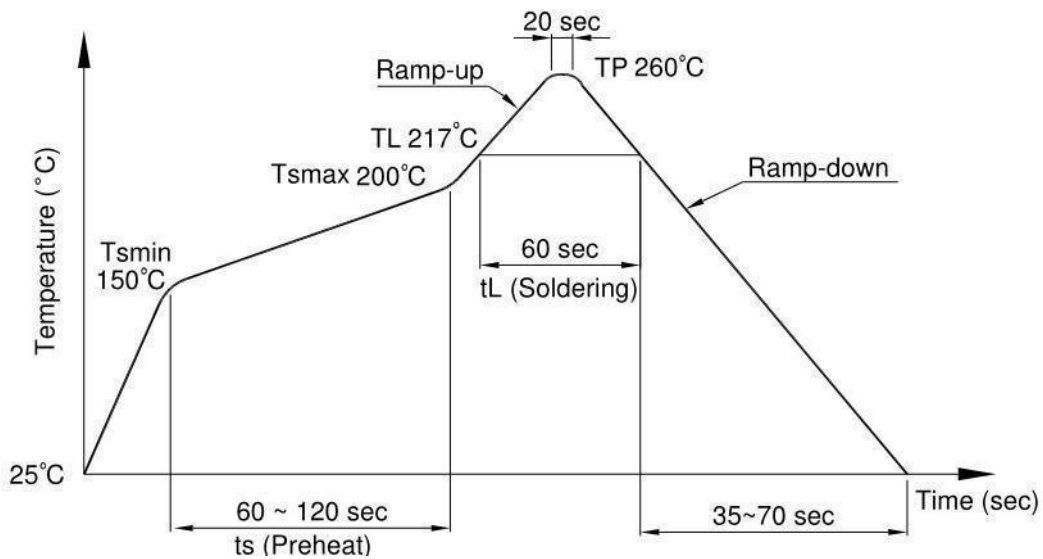
| NO. | ITEMS                      | Reliability Testing |  |              |                       |             |
|-----|----------------------------|---------------------|--|--------------|-----------------------|-------------|
|     |                            | QTY.<br>(Pcs)       | Condition                              | Process      | Device                | Standard    |
| 1   | RSH<br>耐焊接热                | 22                  | 260±5℃                                 | 10s/3 次      | 锡炉                    | JESD22-A106 |
| 2   | HTSL<br>高温存储               | 77                  | 125℃                                   | 168 hrs      | 高温烤箱<br>测试仪           | JESD22-A103 |
|     |                            |                     |  | 500 hrs      |                       |             |
|     |                            |                     |  | 1000 hrs     |                       |             |
| 3   | LTSL<br>低温存储               | 77                  | -55℃                                   | 168 hrs      | 低温箱<br>测试仪            | JESD22-A119 |
|     |                            |                     |  | 500 hrs      |                       |             |
|     |                            |                     |  | 1000 hrs     |                       |             |
| 4   | TC<br>温度循环                 | 77                  | H:125℃ 15min<br>∫ 5min<br>L:-55℃ 15min | 300<br>cycle | 冷热冲击机                 | JESD22-A104 |
| 5   | TS<br>温度冲击                 | 77                  | H:100℃ 5min<br>∫ 15s<br>L:-40℃ 5min    | 300<br>cycle | 冷热冲击机                 | JESD22-A106 |
| 6   | HTOL<br>高温操作               | 77                  | 110℃<br>IF=10mA<br>Vce=5V              | 168 hrs      | 高温烤箱<br>测试仪、老<br>化电路板 | JESD22-A108 |
|     |                            |                     |  | 500 hrs      |                       |             |
|     |                            |                     |  | 1000 hrs     |                       |             |
| 7   | ESD-HBM<br>人体模式            | 22                  | ≥8KV 1Cycle                            | 1次           | ESD静电测<br>试仪          | JESD22-A114 |
| 8   | SD<br>可焊性                  | 22                  | Pb-free<br>245±5℃                      | 5S/1次        | 锡炉                    | JESD22-B102 |
| 9   | HTRB<br>高温反向偏压             | 77                  | HTRB<br>@125℃<br>Vce=80v               | 168 hrs      | 高温烤箱<br>, 测试仪         | JESD22-A103 |
|     |                            |                     |  | 500 hrs      |                       |             |
|     |                            |                     |  | 1000 hrs     |                       |             |
| 10  | H3TRB<br>温湿度反向偏<br>压, 寿命试验 | 77                  | H3TRB<br>85℃,85%RH<br>Vce=80v          | 168 hrs      | 恒温恒湿<br>机, 测试仪        | JESD22-A101 |
|     |                            |                     |  | 500 hrs      |                       |             |
|     |                            |                     |  | 1000 hrs     |                       |             |
| 11  | Autoclave<br>压力锅           | 77                  | Ta=121<br>℃,100%RH,2atm                | 96hrs        | 压力锅                   | JESD22-A102 |

**15. Temperature Profile Of Soldering**

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

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

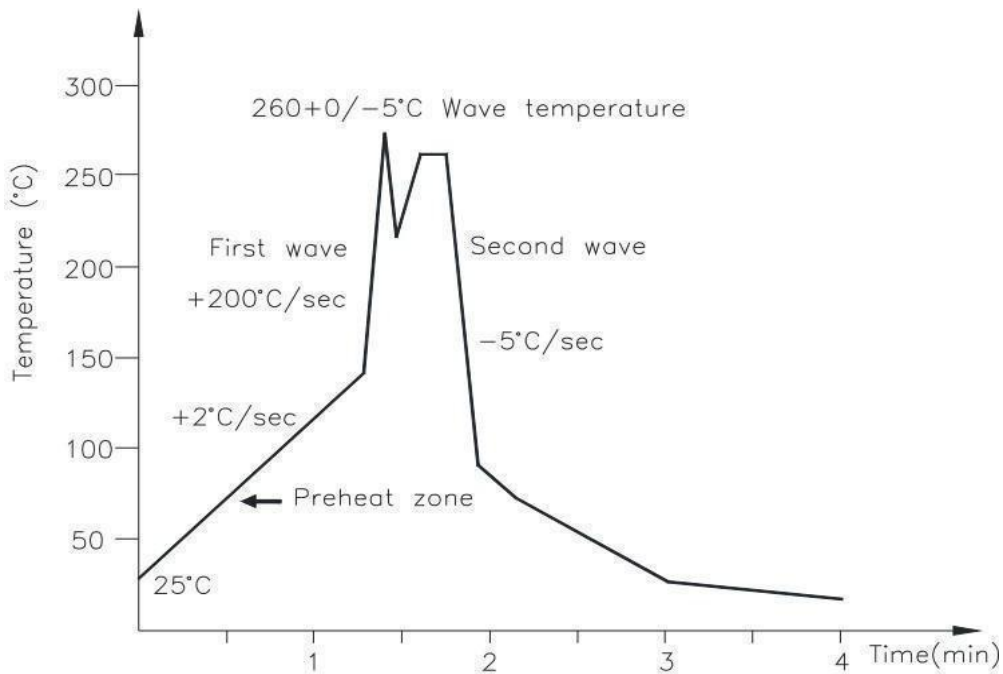
| Profile item                         | Conditions     |
|--------------------------------------|----------------|
| Preheat                              |                |
| - Temperature Min (T Smin )          | 150°C          |
| - Temperature Max (T Smax )          | 200°C          |
| - Time (min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

16. Characteristics Curves

Fig.1 Forward current vs Ambient temperature

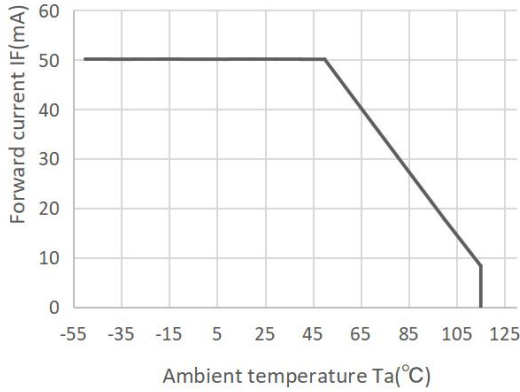


Fig.2 Collector Power Dissipation vs. Ambient temperature

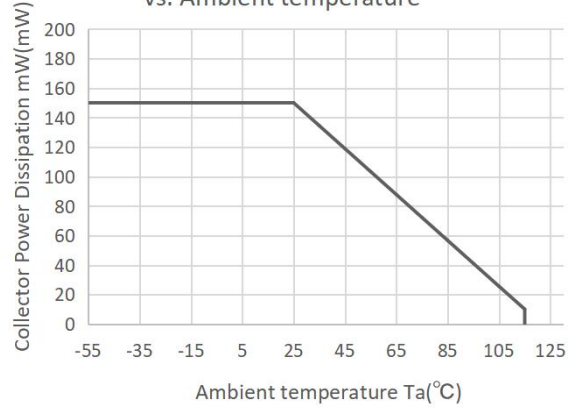


Fig.3 Collector-emitter Saturation Voltage vs. Forward Current

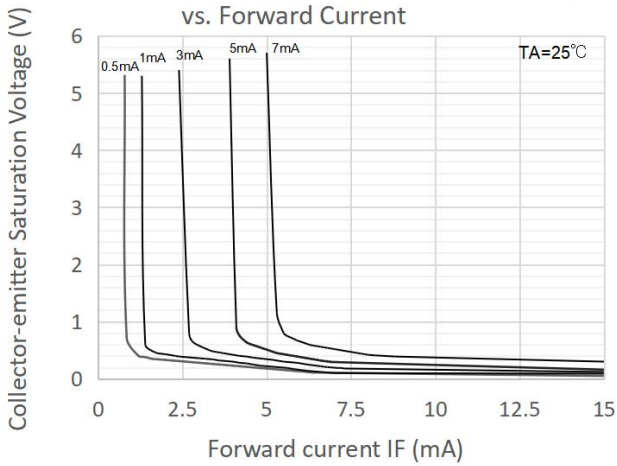


Fig.4 Forward Current vs. Forward Voltage

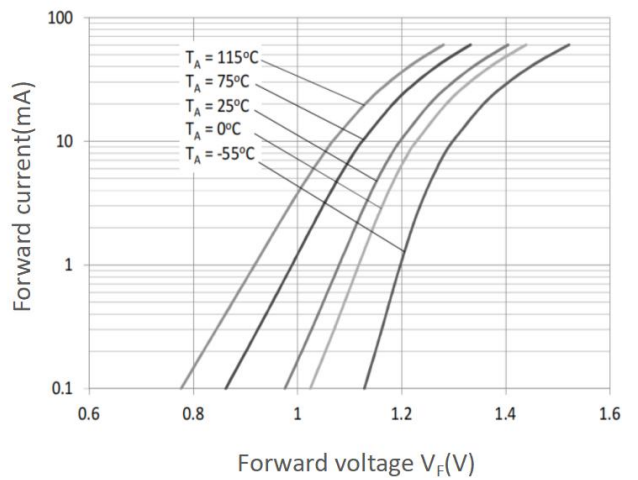


Fig.5 Forward Current vs. Current Transfer Ratio

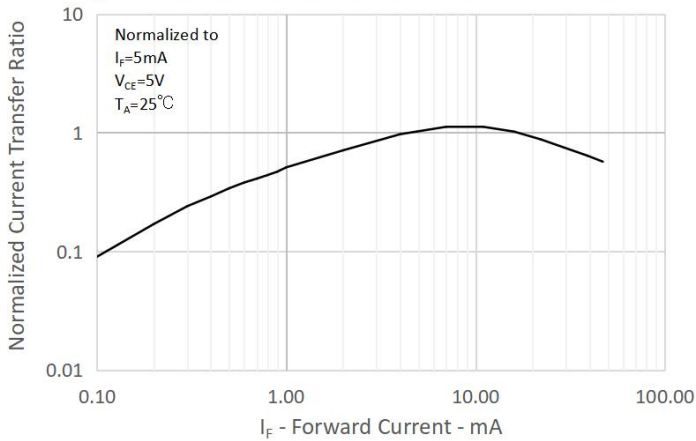


Fig.6 Collector Current vs. Collector-emitter Voltage

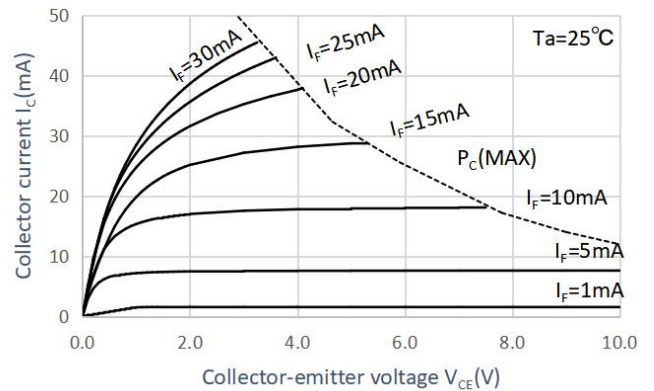


Fig.7 Relative Current Transfer Ratio vs. Ambient Temperature

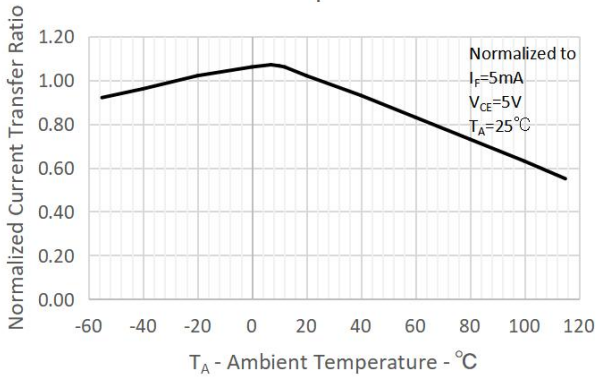


Fig.8 Collector-emitter Saturation Voltage vs. Ambient Temperature

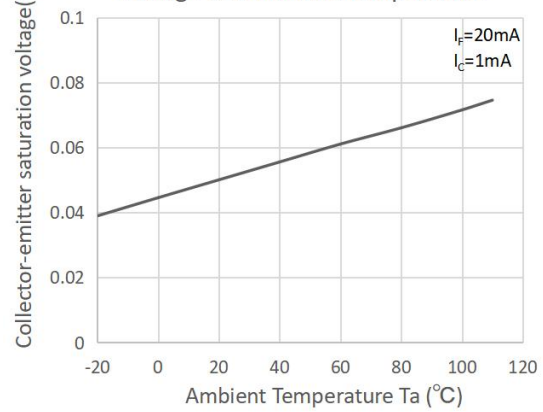


Fig.9 Collector Dark Current vs. Ambient Temperature

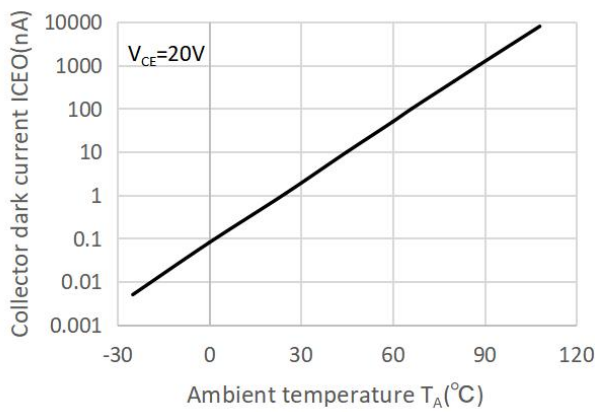


Fig.10 Respinse Time vs. Load Resistance

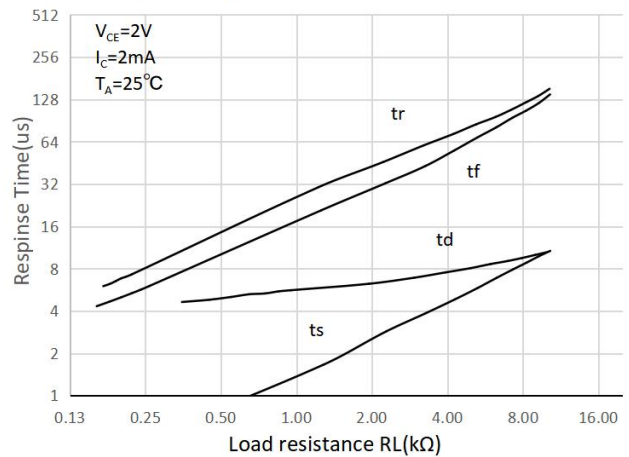
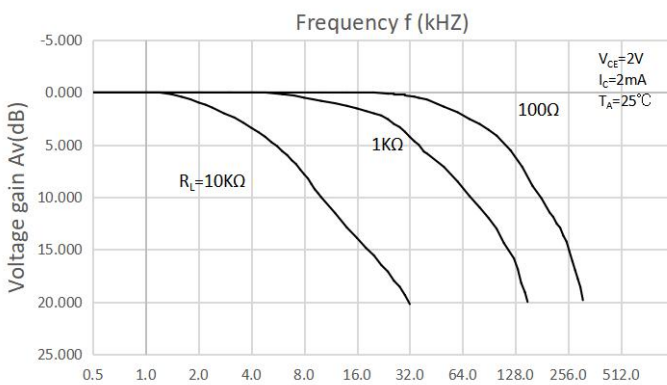
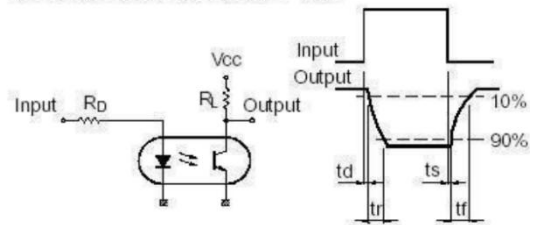


Fig.11 Frequency Response



Test Circuit for Response Time



Test Circuit for Frequency Response

