



ORIENT

Photo coupler

Product Data Sheet

Part Number: OR-357-(GK)

Customer: _____

Date: _____

一级代理商：

深圳市弗瑞鑫电子有限公司

地址：深圳市宝安区西乡大道302号金源商务大厦B座三楼

TEL: 0755-29563634

FAX: 0755-27447020

www.frxelec.com

1. Features

- (1) Current transfer ratio(CTR : MIN. 50% at $I_F = 5\text{mA}$, $V_{CE} = 5\text{V}$, $T_a = 25^\circ\text{C}$)
- (2) High input -output isolation voltage ($V_{ISO} = 3,750\text{V}_{rms}$)
- (3) High collector-emitter voltage ($V_{CEO} = 80\text{V}$)
- (4) SOP-4 package
- (5) Operating Temperature -55°C to 125°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



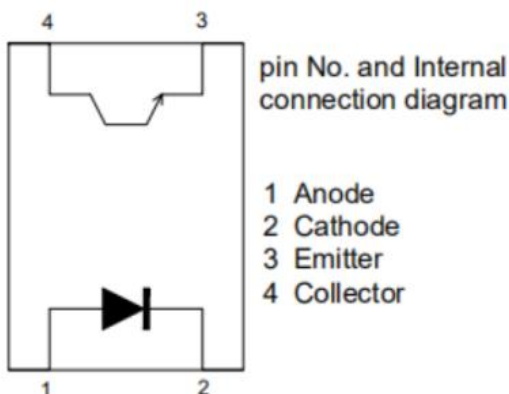
2. Instructions

- The OR-357-(GK) series device consists of an infrared led, photo transistor detector. They are encapsulated in a 4 pin SOP encapsulation.
- Pin pitch of OR-357-(GK) 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 | 50 | mA |
| | Junction Temperature | T_J | 125 | °C |
| | 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} | 3750 | Vrms |
| Working Temperature | | T_{opr} | -55 to + 125 | °C |
| Deposit 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 Voltage | V_F | --- | 1.2 | 1.4 | V | $I_F=20\text{mA}$ |
| | Reverse Current | I_R | --- | --- | 5 | μA | $V_R=5\text{V}$ |
| | 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 conversion ratio | CTR | 50 | --- | 600 | % | $I_F=5\text{mA}, V_{CE}=5\text{V}$ |
| | Collector Current | I_C | 2.5 | --- | 30 | mA | |
| | Collector and Emitter Saturation Voltage | $V_{CE(sat)}$ | --- | --- | 0.2 | V | $I_F=20\text{mA}, I_C=1\text{mA}$ |
| | Insulation Impedance | R_{iso} | 5×10^{10} | 1×10^{11} | --- | Ω | DC500V 40~60%R.H. |
| | Floating Capacitance | C_f | --- | 0.6 | 1 | pF | $V=0, f=1\text{MHz}$ |
| | Response Time | t_r | --- | 2.9 | 10 | μs | $V_{CC}=2\text{V}, I_C=2\text{mA}, R_L=100\Omega$ |
| | Descend Time | t_f | --- | 4.5 | 10 | μs | |

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

7. Rank table of current transfer ratio CTR (tolerance:±3%)

| CTR Rank | Min. | Max. | Condition |
|----------|------|------|---------------------------------------|
| A | 80 | 160 | $I_F=5mA, V_{CE}=5V, T_a=25^{\circ}C$ |
| B | 130 | 260 | |
| C | 200 | 400 | |
| D | 300 | 600 | |
| No mark | 50 | 600 | |

8. Order Information

Part Number

OR-357X-W-Y-Z-(GK)

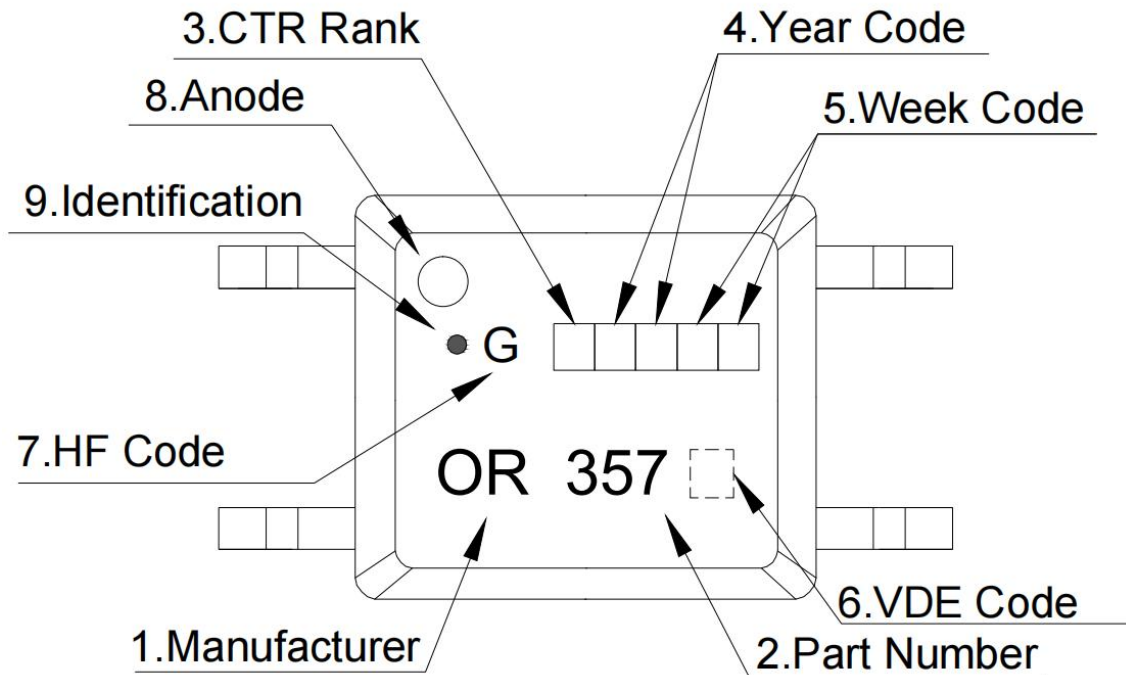
Note

X = CTR Rank (A, B, C, D 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 .
GK = 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 |

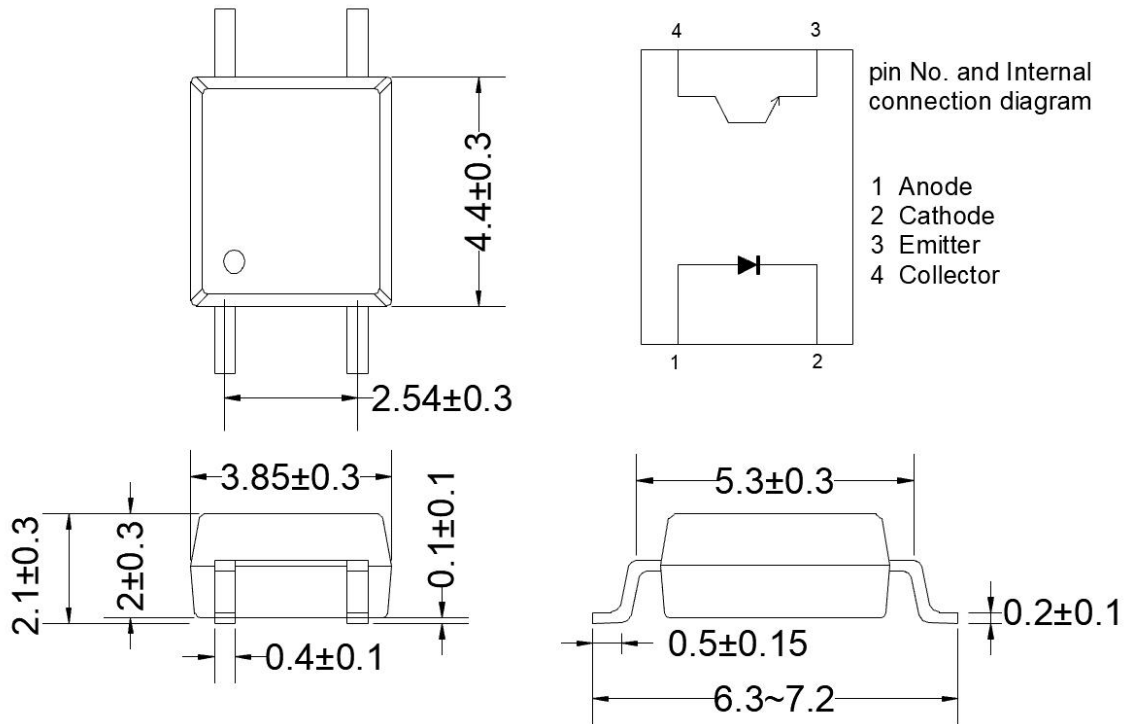
9. Naming Rule



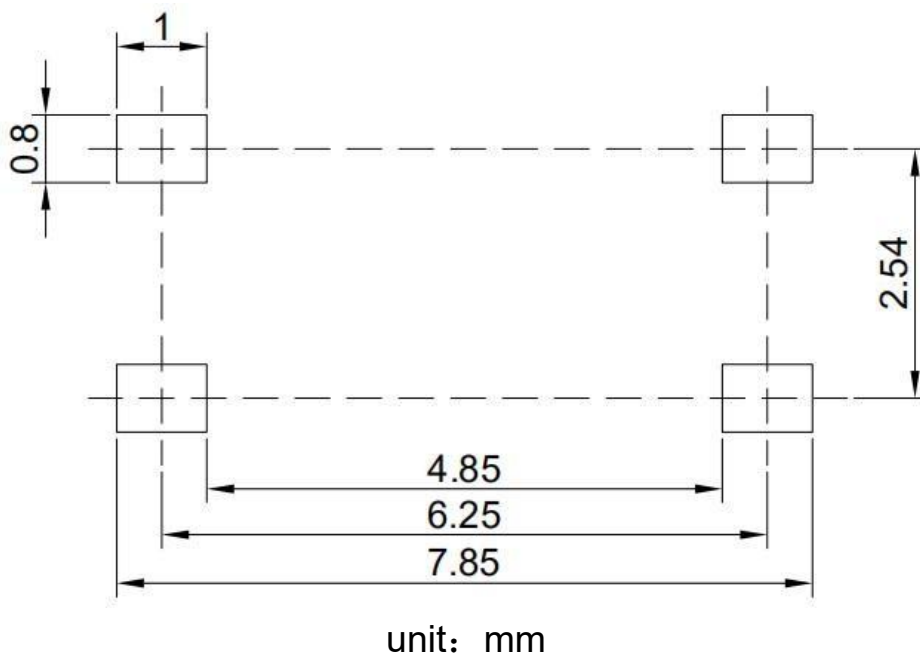
1. Manufacturer : ORIENT.
2. Part Number : 357.
3. Rank Code : CTR Rank
4. Year Code : '0' means '2020' and so on.
5. Week Code : 01 means the first week, 02 means the second week and so on.
6. VDE Code . (Optional)
7. HF Code 'G': Halogen Free.
8. Anode.
9. Identification.

* VDE Code can be selected.

10. Outer Dimension

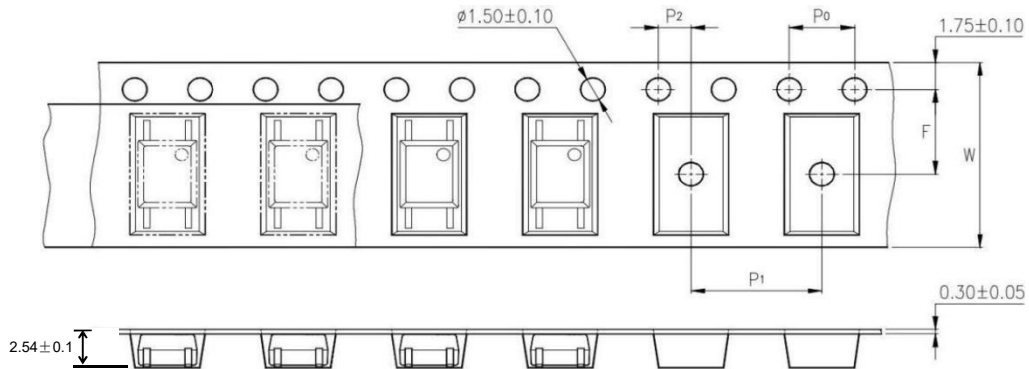


11. Recommended Foot Print Patterns (Mount Pad)

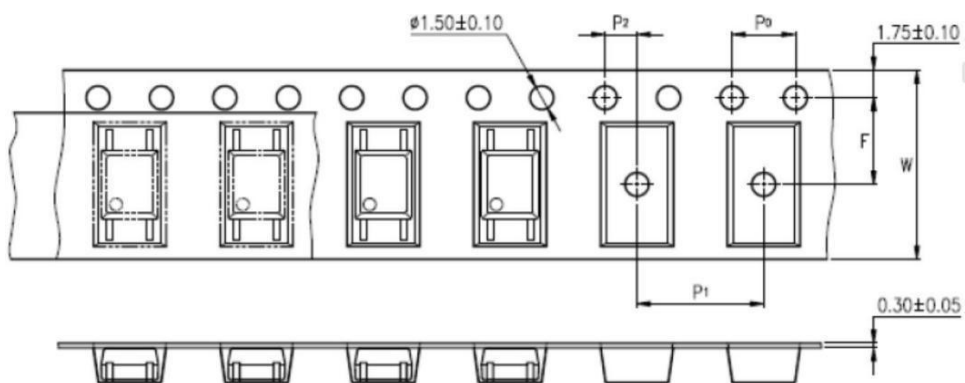


12. Taping Dimensions

(1) OR-357-TP



(2) OR-357-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) |

| | |
|-----------------|--------|
| 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



Material Code : 120PCXXXXXX

P/N : OR-XXXXXX

Lot No. : XXXXXX-XXXX-TX-X

D/C : XXXX

Qty : XXXX PCS


内箱码

外箱码

“XXXXXXXXXXXXXXXX” (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

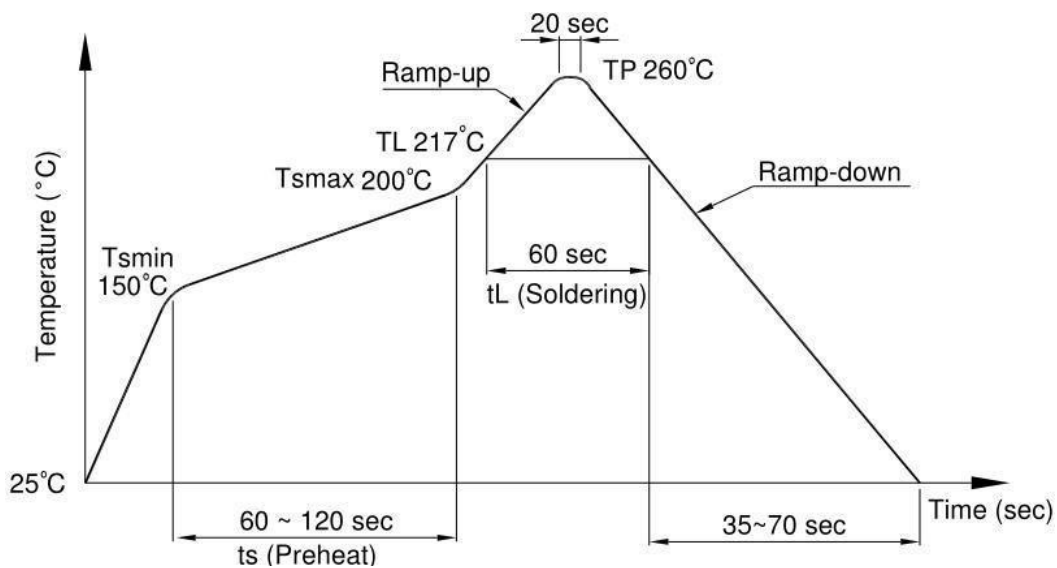
| NO. | ITEMS | Reliability Testing | | | | |
|-----|----------------------------|---------------------|--|--------------|-----------------------|-------------|
| | | QTY. (Pcs) | Condition | Process | Device | Standard |
| 1 | RSH 耐焊接热 | 22 | 260±5℃ | 10s/3 次 | 锡炉 | JESD22-A106 |
| 2 | HTSL 高温存储 | 77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

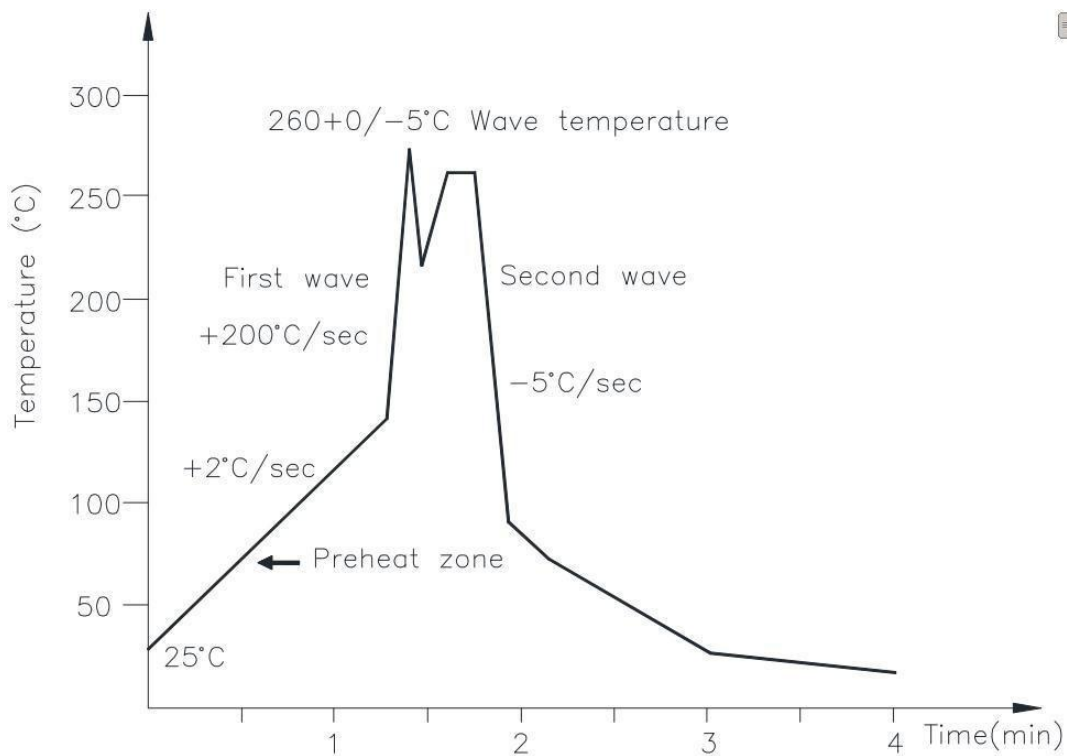
| Profile item | Conditions |
|--------------------------------------|----------------|
| Preheat | |
| - Temperature Min (T Smin) | 150°C |
| - Temperature Max (T Smax) | 200°C |
| - Time (min to max) (ts) | 90±30 sec |
| Soldering zone | |
| - Temperature (TL) | 217°C |
| - Time (t L) | 60 sec |
| 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

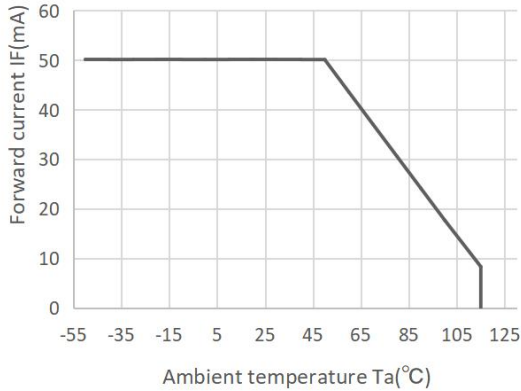


Fig.2 Collector Power Dissipation vs. Ambient temperature

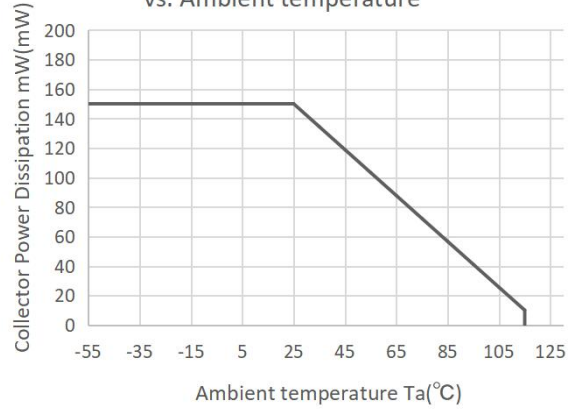


Fig.3 Collector-emitter Saturation Voltage vs. Forward Current

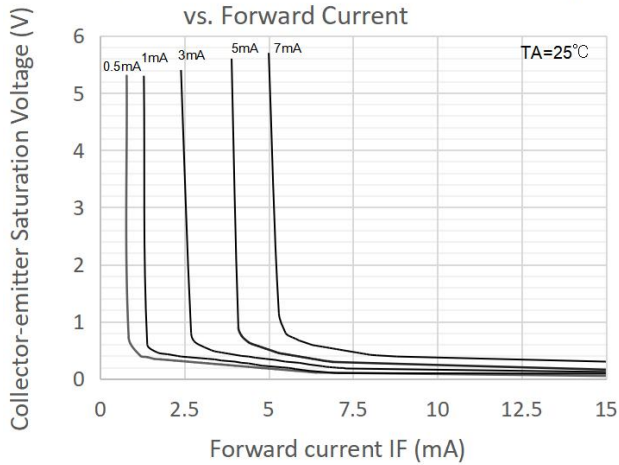


Fig.4 Forward Current vs. Forward Voltage

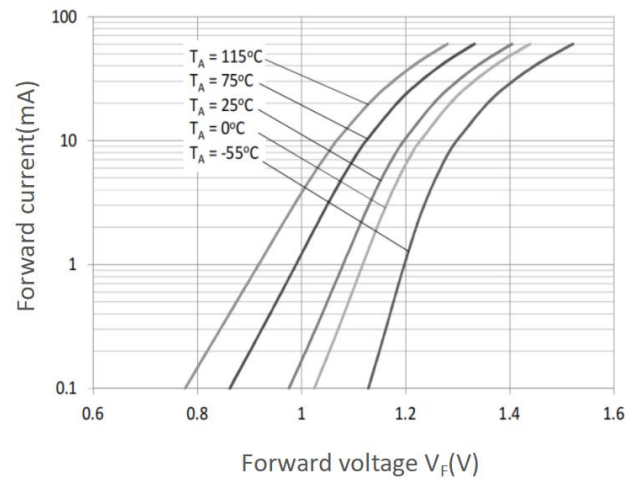


Fig.5 Forward Current vs. Current Transfer Ratio

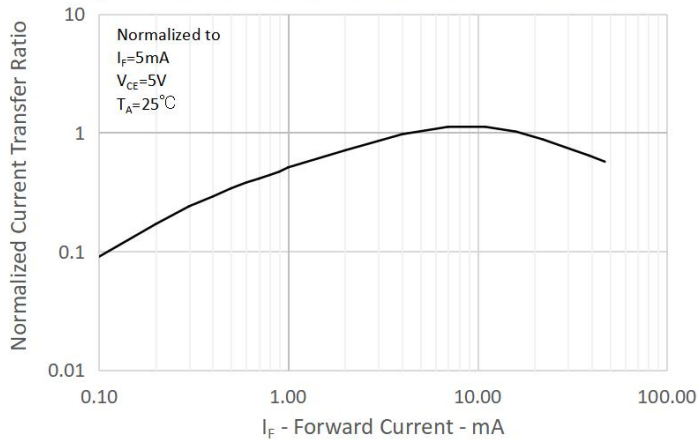


Fig.6 Collector Current vs. Collector-emitter Voltage

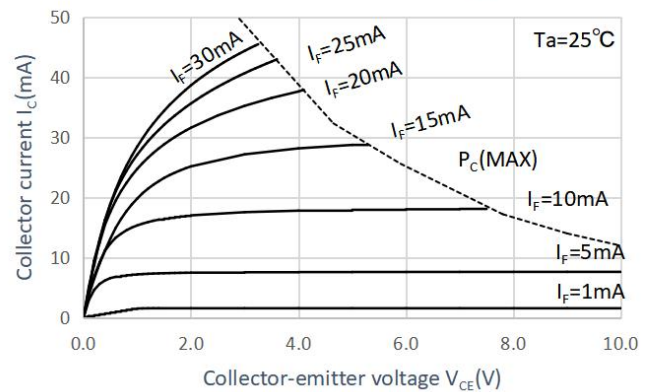


Fig.7 Relative Current Transfer Ratio vs. Ambient Temperature

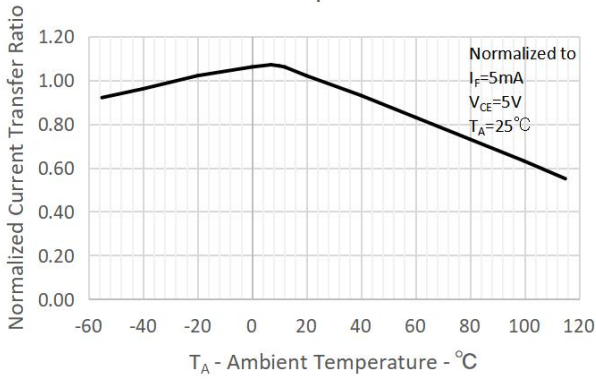


Fig.8 Collector-emitter Saturation Voltage vs. Ambient Temperature

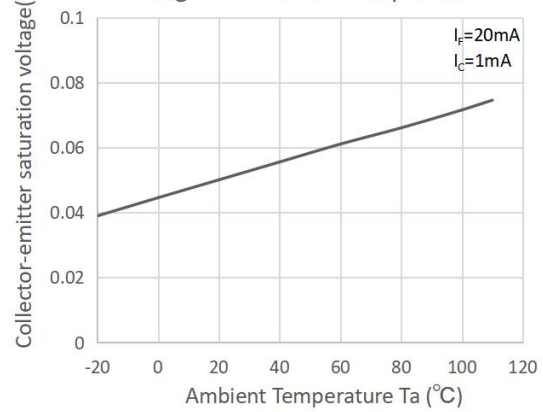


Fig.9 Collector Dark Current vs. Ambient Temperature

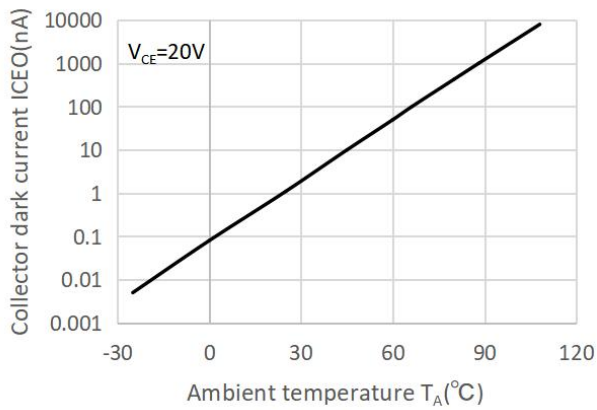


Fig.10 Respinse Time vs. Load Resistance

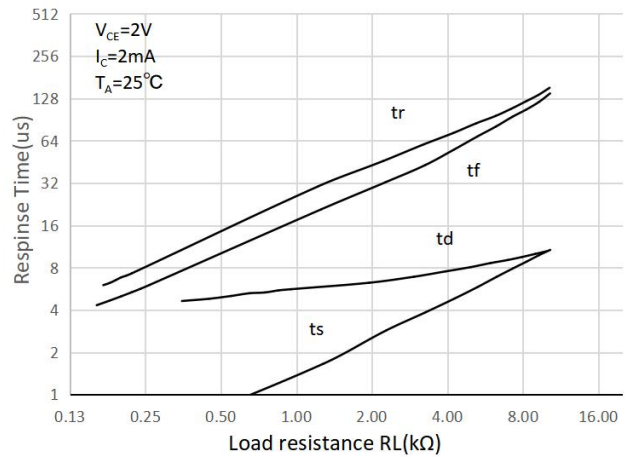
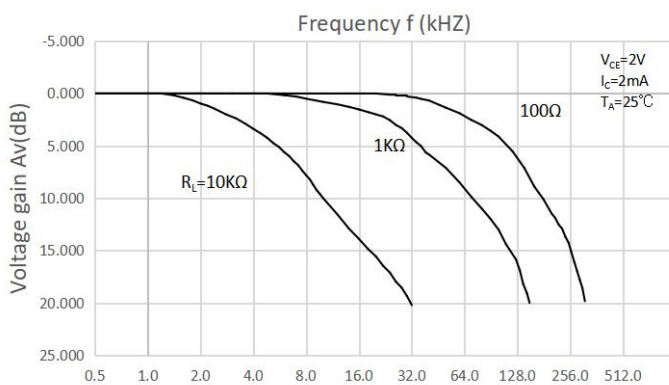
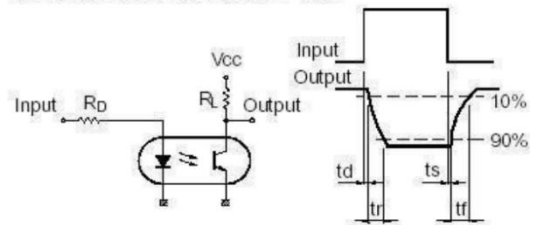


Fig.11 Frequency Response



Test Circuit for Response Time



Test Circuit for Frequency Response

