



ORIENT

Photo coupler

Product Data Sheet

Part Number: OR-3H4-4

Customer: _____

Date: _____

SHENZHEN ORIENT COMPONENTS CO.,LTD.

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1. Features

- 1.Current transfer ratio(CTR) : MIN. 20% at $I_F = \pm 1\text{mA}$, $V_{CE} = 5\text{V}$, $T_a=25\text{ }^\circ\text{C}$
- 2.High input-output isolation voltage.($V_{ISO}=3,750\text{Vrms}$)
3. $BV_{CEO} = 80\text{V(MIN)}$
- 4.Operating temperature:-55 $^\circ\text{C}$ to 125 $^\circ\text{C}$
- 5.In compliance with RoHS, REACH standards
- 6.MSL Class I

2. Instructions

The OR-3H4-4 series is consist of four channel device each pair contains two infrared led and a photo transistor detector.

They are encapsulated in a 16-pin SOP, free of halogens and Sb2O3

3. Application Range

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

4. Max Absolute rated Value (Normal Temperature=25 $^\circ\text{C}$)

| Parameter | | Symbol | Rated Value | Unit |
|--------------------------|-------------------------------|-----------|-------------|------------------|
| Input | Forward Current | I_F | 50 | mA |
| | Peak forward current(t=10us) | I_{FM} | 1 | A |
| | Reverse Voltage | V_R | 6 | V |
| | Power Dissipation | P | 65 | mW |
| | Junction Temperature | T_j | 125 | $^\circ\text{C}$ |
| Output | Collector and emitter Voltage | V_{CEO} | 80 | V |
| | Emitter and collector Voltage | V_{ECO} | 7 | |
| | Collector Current | I_C | 50 | mA |
| | Power Dissipation | P_C | 150 | mW |
| | Junction Temperature | T_j | 125 | $^\circ\text{C}$ |
| Total Power Dissipation | | P_{tot} | 200 | mW |
| *1 Insulation Voltage | | V_{iso} | 3750 | Vrms |
| Operating Temperature | | T_{opr} | -55 to +125 | $^\circ\text{C}$ |
| Storage Temperature | | T_{stg} | -55 to +150 | |
| *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.

5. Opto-electronic Characteristics(Normal Temperature=25°C)

| Parameter | | Symbol | Min | Typ.* | Max | Unit | Condition |
|------------------------------|--------------------------------------|---------------|--------------------|--------------------|-----|---------------|---|
| Input | Forward Voltage | V_F | --- | 1.2 | 1.4 | V | $I_F=\pm 20\text{mA}$ |
| | Terminal Capacitance | C_t | --- | 60 | --- | pF | $V=0, f=1\text{KHz}$ |
| Output | Collector Dark Current | I_{CEO} | --- | --- | 100 | nA | $V_{CE}=20\text{V}, I_F=0\text{mA}$ |
| | Collector-Emitter Breakdown Voltage | BV_{CEO} | 80 | --- | --- | V | $I_C=0.1\text{mA}, I_F=0\text{mA}$ |
| | Emitter-Collector Breakdown Voltage | BV_{ECO} | 7 | --- | --- | V | $I_E=0.1\text{mA}, I_F=0\text{mA}$ |
| | *1 Current Transfer Ratio | CTR | 20 | --- | 400 | % | $I_F=\pm 1\text{mA}$ $V_{CE}=5\text{V}$ |
| | Collector Current | I_C | 2 | --- | 40 | mA | |
| Transforming Characteristics | Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | --- | --- | 0.4 | V | $I_F=\pm 8\text{mA}$ $I_C=2.4\text{mA}$ |
| | Insulation Impedance | R_{iso} | 5×10^{10} | 1×10^{11} | --- | Ω | DC 500V 40~60%R.H. |
| | Floating Capacitance | C_f | --- | 0.8 | 1 | pF | $V=0, f=1\text{MHz}$ |
| | Response Time | t_r | --- | 3 | 18 | μs | $V_{CE}=10\text{V},$ $I_C=2\text{mA},$ $R_L=100\Omega,$ $f=100\text{Hz}$ |
| | Descend Time | t_f | --- | 4 | 18 | μs | |

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

6. Rank table of current transfer ratio CTR

| MODEL NO. | CTR Rank | Min. | Max. | Condition | Unit |
|-----------|----------|------|------|---------------------------------------|------|
| OR-3H4-4 | NO mark | 20 | 400 | IF=±1mA, V _{CE} =5V, Ta=25°C | % |
| | A2 | 100 | 300 | | |
| | GB | 100 | 400 | | |

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

7. Order Information

Part Number

OR-3H4-4W-X-Y-Z

Note

W = CTR Rank (A2 , GB or none)

X = Tape and reel option (TA or TA1).

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

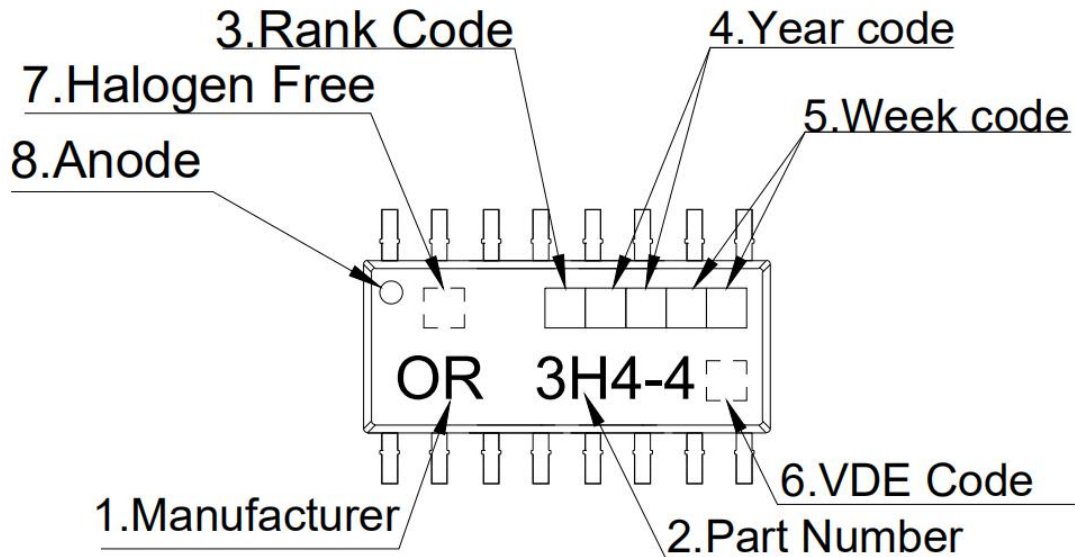
Z = 'G' code for Halogen free (This options is not necessary).

* VDE Code can be selected.

* Halogen Free Code can be selected.

| Option | Description | Packing quantity |
|--------|--|---------------------|
| TA | Surface mount lead form (low profile) + TA tape & reel option | 2000 units per reel |
| TA1 | Surface mount lead form (low profile) + TA1 tape & reel option | 2000 units per reel |

8. Naming Rule

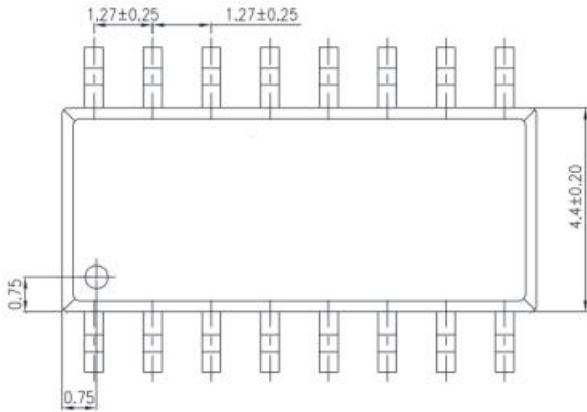


1. Manufacturer : ORIENT.
2. Part Number : 3H4-4.
3. Rank Code : CTR Rank
4. Year Code : '21' means '2021' and so on.
5. Week Code : 01 means the first week, 02 means the second week and so on.
6. VDE Code .
7. HF Code : Halogen Free.
8. Anode.

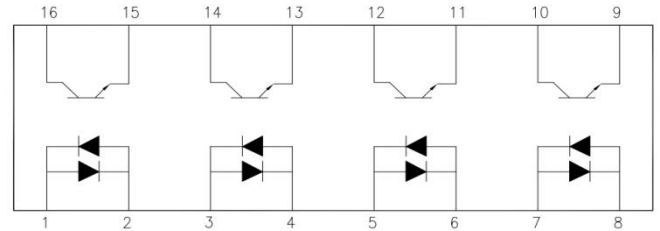
* Halogen Free Mark can be selected.

* VDE Mark can be selected.

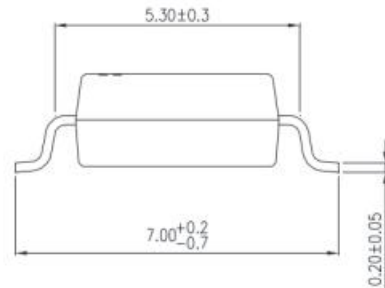
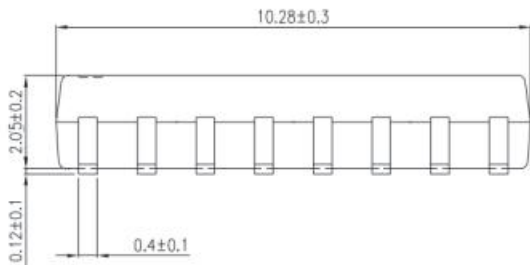
9. Outer Dimension



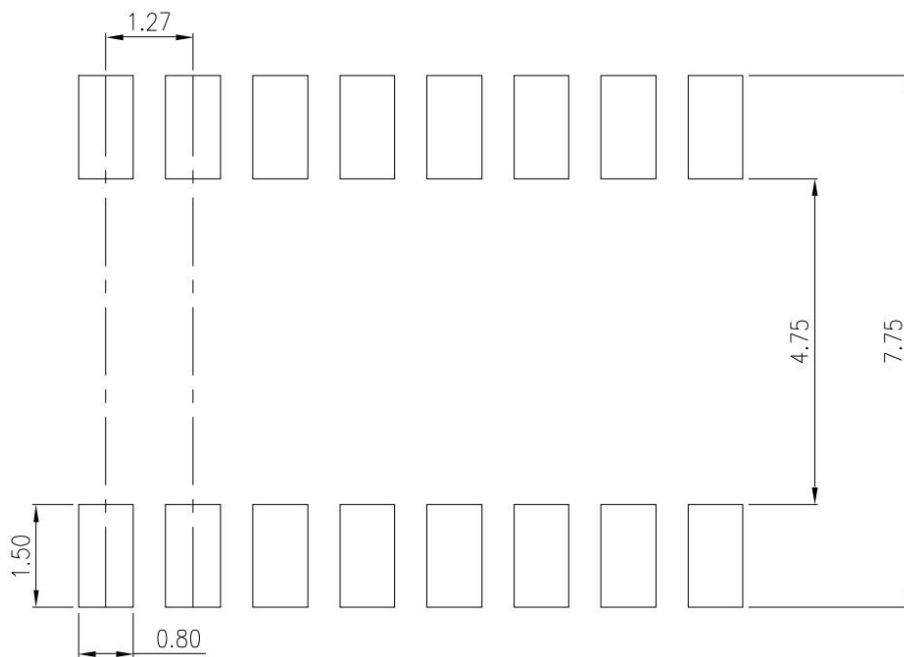
PIN NO. AND INTERNAL CONNECTION DIAGRAM



1,3,5,7. Anode,Cathode 9,11,13,15. Emitter
 2,4,6,8. Cathode,Anode 10,12,14,16. Collector

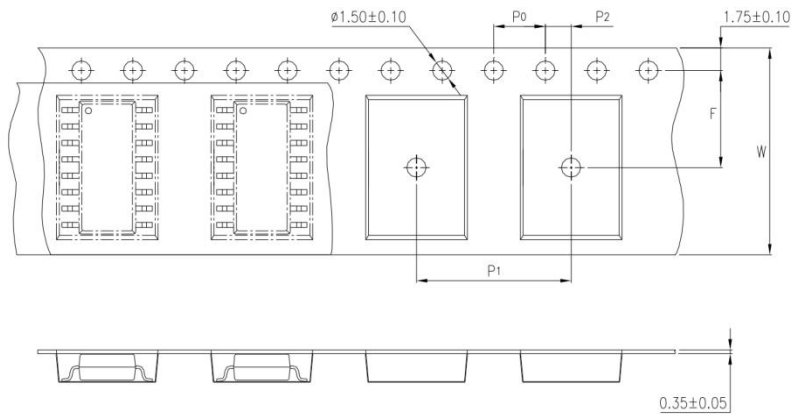


10. Recommended Foot Print Patterns (Mount Pad) (Unit:mm)

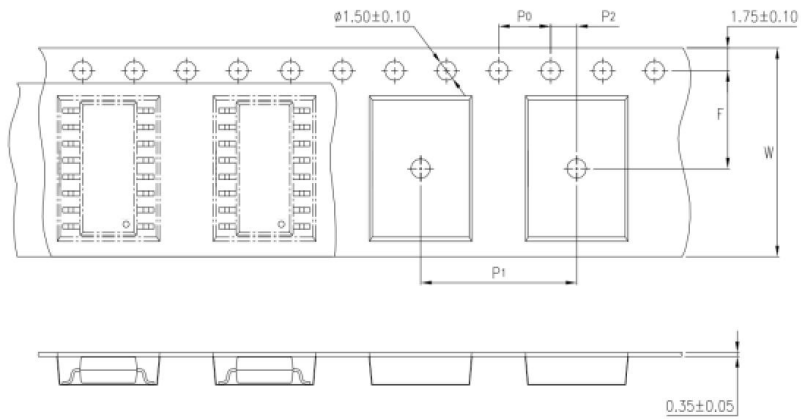


11. Taping Dimensions

(1)OR-3H4-4-TA1



(2)OR-3H4-4-TA



| type | Symbol | Dimensions: mm (in.) |
|----------------|--------|-------------------------|
| bandwidth h | W | 16 ± 0.3 (0.47) |
| pitch | P_0 | 4 ± 0.1 (0.15) |
| pitch | F | 7.5 ± 0.1 (0.217) |
| | P_2 | 2 ± 0.1 (0.079) |
| interval | P_1 | 12 ± 0.1 (0.315) |

| | |
|-----------------------|--------|
| Encapsulation type | TA1/TA |
| Quantity (pieces) | 2000 |

12. Package Dimension

(1) package dimension

| Packing Information | |
|-----------------------------|---------------|
| Packing type | Reel type |
| Tape Width | 16mm |
| Qty per Reel | 2000 |
| Small box (inner) Dimension | 345*345*60mm |
| Max qty per small box | 4000 |
| Large box (Outer) Dimension | 620x360x360mm |
| Max qty per large box | 40000 |

(2) Packing Label Sample



1. MTL NO: Contents with "Order Information" in the specification.
2. LOT NO: The production cycle of the product.
3. BATCH: The CTR RANK of the product.
4. Quantity: Product packaging quantity.
5. Product Data: The data when product be made.

13. Reliability Test

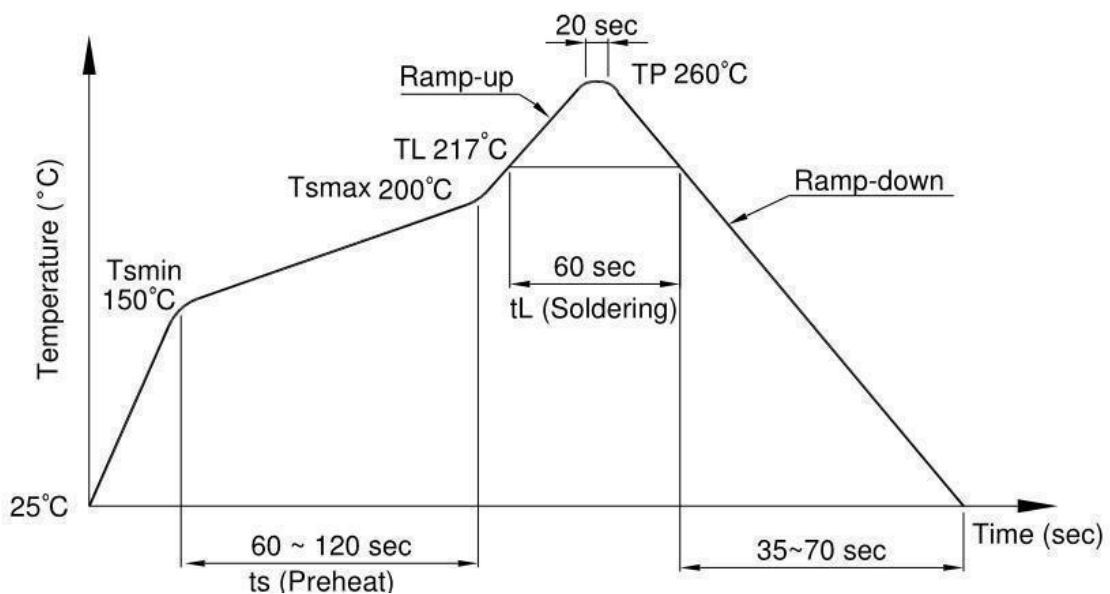
| NO. | Reliability Testing | | | | |
|-----|---------------------|---------------|--|-------------|-------------|
| | ITEMS | QTY. (Pcs) | Condition | Process | Standard |
| 1 | RSH | 22 | 260±5°C | 10s/3 times | JESD22-A106 |
| 2 | HTSL | 77 | 125°C | 168 hrs | JESD22-A103 |
| | | | | 500 hrs | |
| | | | | 1000 hrs | |
| 3 | LTSL | 77 | -55°C | 168 hrs | JESD22-A119 |
| | | | | 500 hrs | |
| | | | | 1000 hrs | |
| 4 | TC | 77 | H:125°C 15min ∫ 5min L:-55°C 15min | 300 cycle | JESD22-A104 |
| 5 | TS | 77 | H:100°C 5min ∫ 15s L:-40°C 5min | 300 cycle | JESD22-A106 |
| 6 | HTOL | 77 | 110°C IF=10mA Vce=5V | 168 hrs | JESD22-A108 |
| | | | | 500 hrs | |
| | | | | 1000 hrs | |
| 7 | ESD-HBM | 22 | ≥8KV 1Cycle | 1 time | JESD22-A114 |
| 8 | SD | 22 | Pb-free 260±5°C | 5S/1 time | JESD22-B102 |
| 9 | HTRB | 77 | @125°C Vce=80v | 168 hrs | JESD22-A103 |
| | | | | 500 hrs | |
| | | | | 1000 hrs | |
| 10 | H3TRB | 77 | 85°C,85%RH Vce=80v | 168 hrs | JESD22-A101 |
| | | | | 500 hrs | |
| | | | | 1000 hrs | |
| 11 | Autoclave | 77 | Ta=121 °C,100%RH,2atm | 168h | JESD22-A102 |

14. 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.

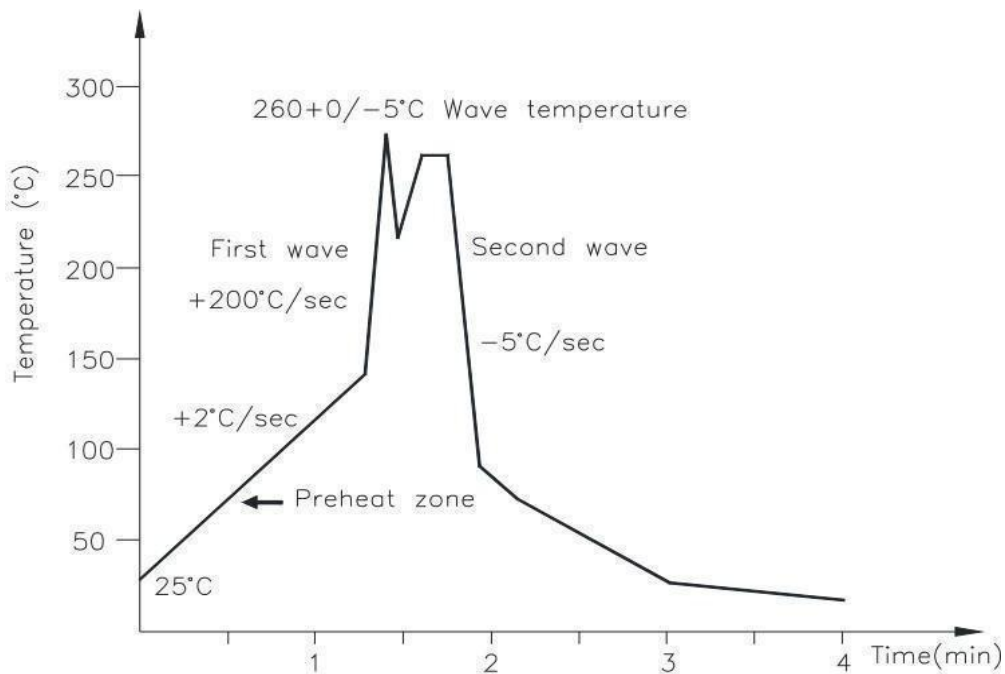
| Profile item | Conditions |
|--------------------------------------|----------------|
| Preheat | |
| - Temperature Min (T Smin) | 150°C |
| - Temperature Max (T Smax) | 200°C |
| - Time (min to max) (ts) | 90±30 sec |
| Soldering zone | |
| - Temperature (TL) | 217°C |
| - Time (t L) | 60 sec |
|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

15. Characteristics Curve

Figure 1. Collector Power Dissipation vs. Ambient Temperature

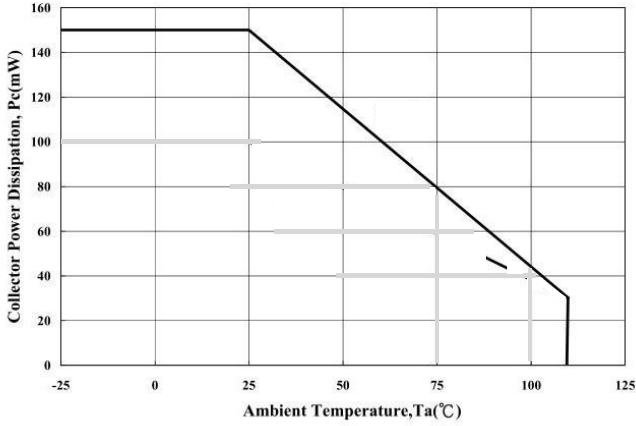


Figure 2. Forward Current vs. Ambient Temperature

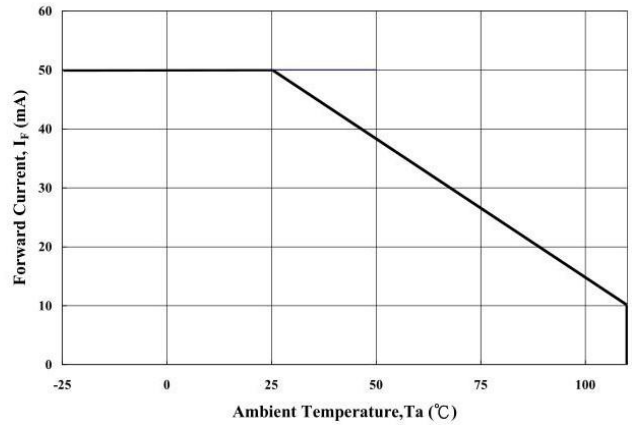


Figure 3. Forward Current vs. Forward Voltage

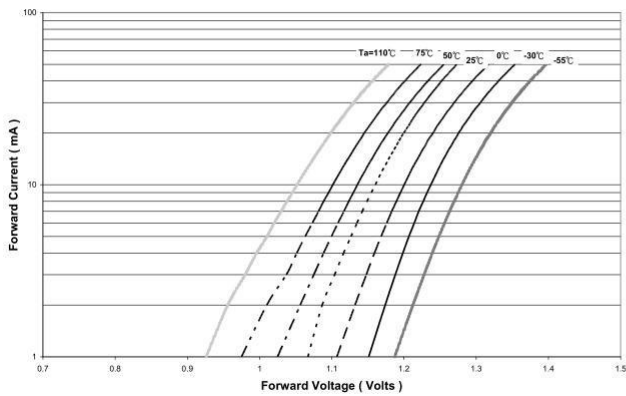


Figure 4. Forward Voltage Temperature Coefficient vs. Forward Current

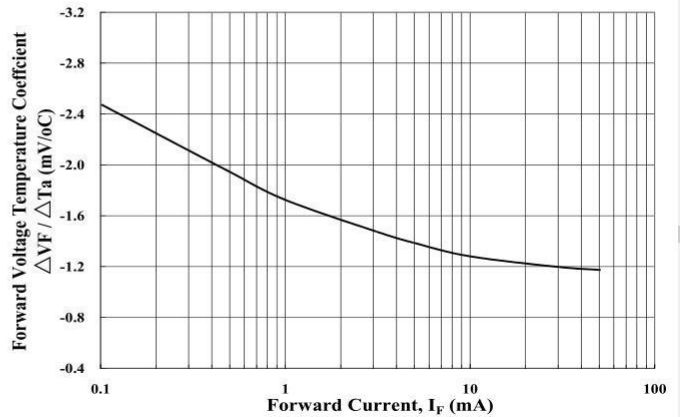


Figure 5. Pulse Forward Current vs. Duty Cycle Ratio

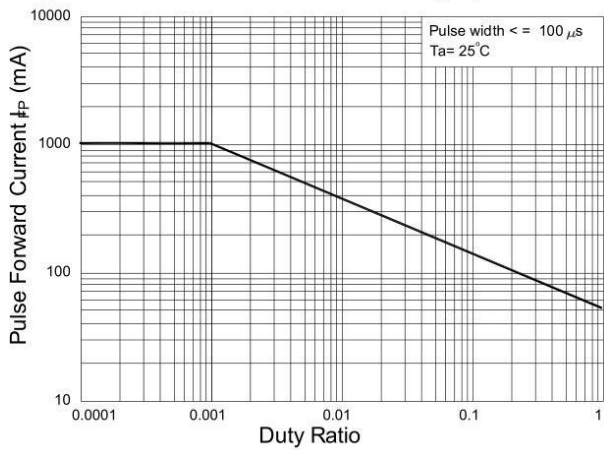


Figure 6. Pulse Forward Current vs. Pulse Forward Voltage

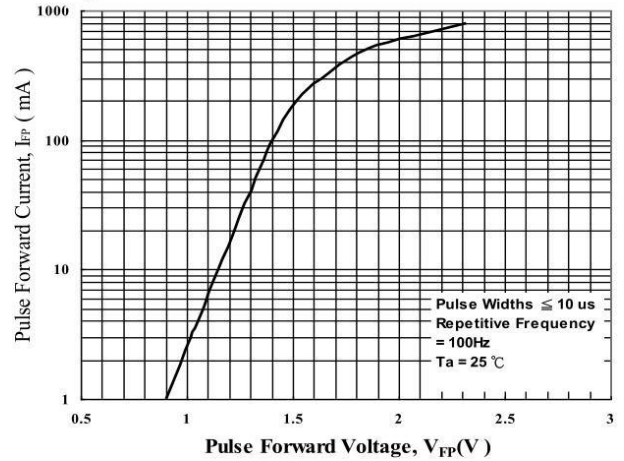


Figure 7. Collector-Emitter Saturation Voltage vs. Forward

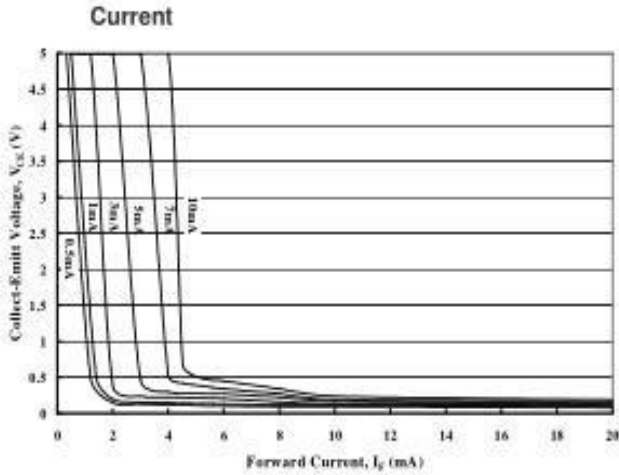


Figure 8. Collector Current vs. Collector-Emitter

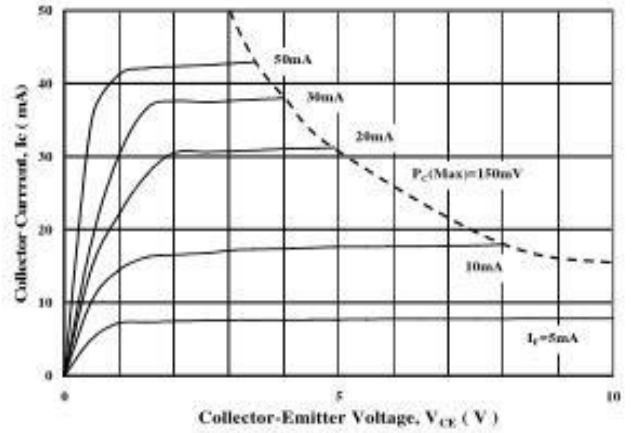


Figure 9. Collector Current vs. Small Collector-Emitter

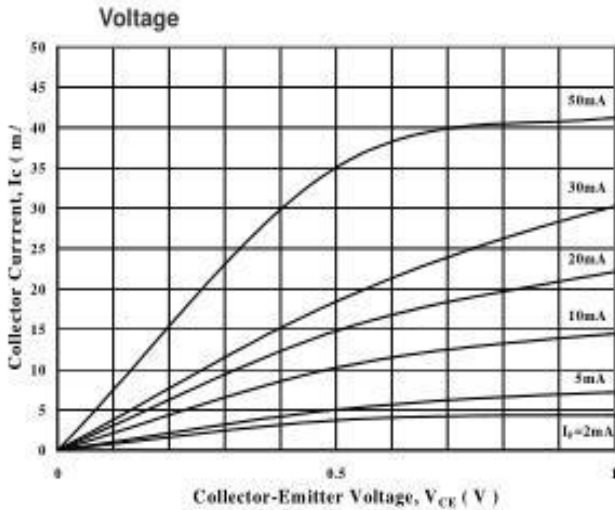


Figure 10. Normalized CTR vs. Forward Current

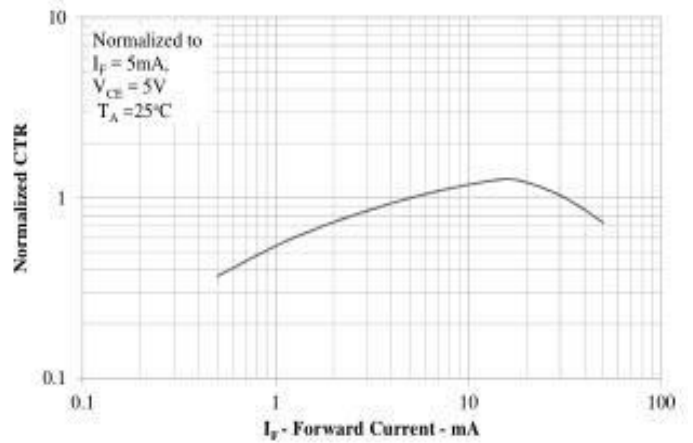


Figure 11. Collector Dark Current vs. Ambient Temperature

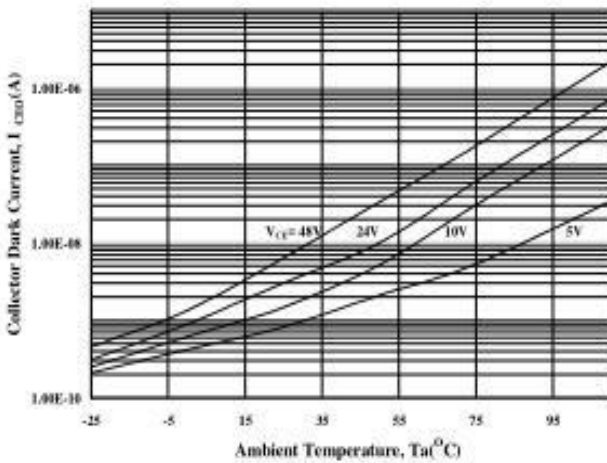


Figure 12. Current Transfer Ratio vs. Forward

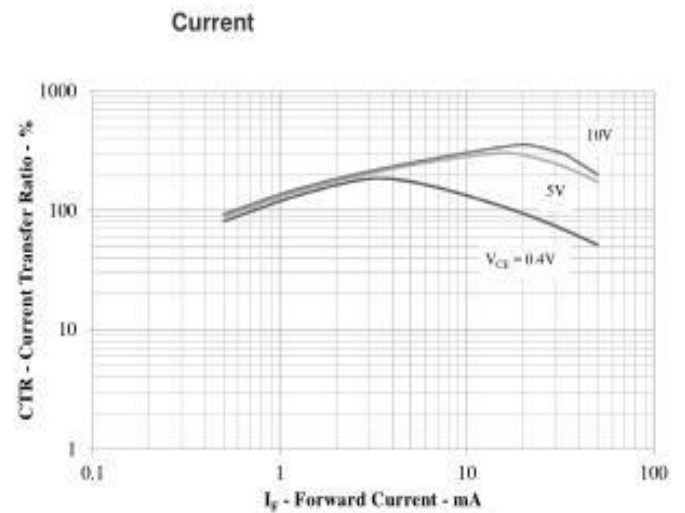


Figure 13. Normalized CTR vs. Ambient Temperature

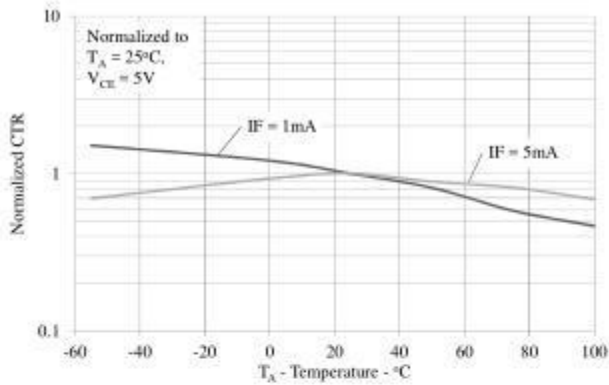


Figure 14. Collector-Emitter Saturation Voltage vs. Ambient Temperature

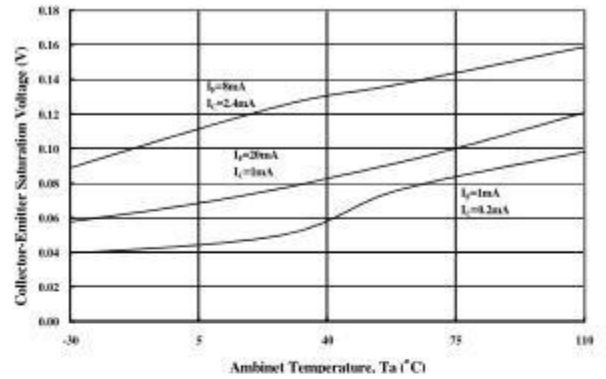


Figure 15. Collector Current vs. Ambient Temperature

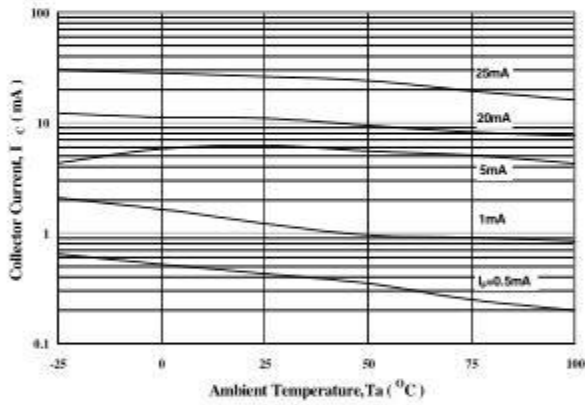


Figure 16. Switching Time vs. Load Resistance

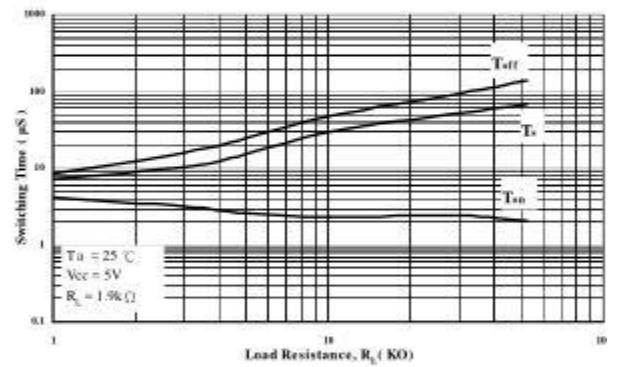


Figure 17. Switching Time vs. Ambient Temperature

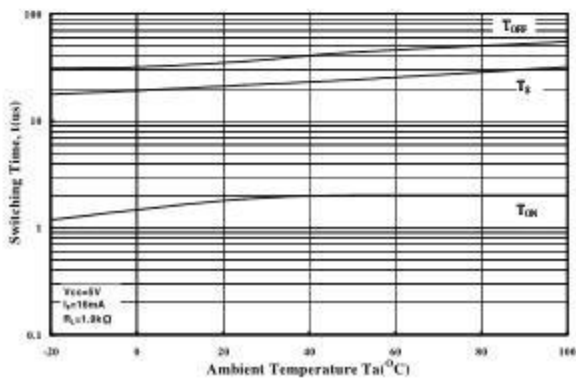
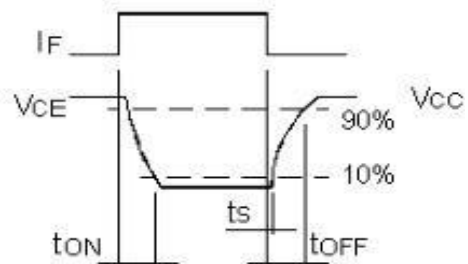
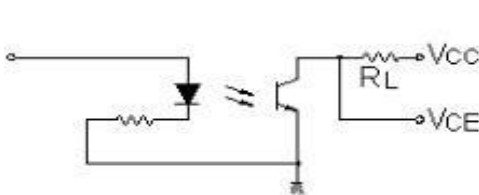
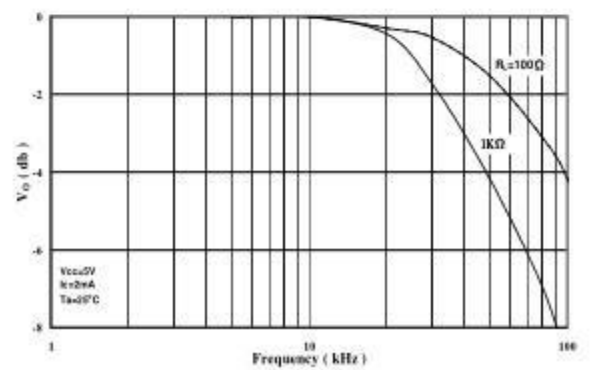


Figure 18. Frequency Response



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