



# ORIENT

## Photo coupler

### Product Data Sheet

Part Number: OR-3H5

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

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

**SHENZHEN ORIENT COMPONENTS CO., LTD**

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### 1. Features

1. Current transfer ratio (CTR) : 600% Min. at  $I_F = 1\text{mA}$ ,  $V_{CE} = 2\text{V}$
2. High input-output isolation voltage. ( $V_{ISO}=3,750\text{Vrms}$ )
3. Employs double transfer mold technology
4. Operating temperature:  $-55^\circ\text{C}$  to  $100^\circ\text{C}$
5. In compliance with RoHS, REACH standards



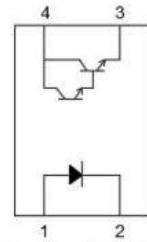
### 2. Instructions

The OR-3H5 series device contains an infrared emitting diodes, optically to a photo Darlington detector.

They are encapsulated in a 4-pin SSOP, free of halogens and Sb2O3

### 3. Application Range

- (1). Hybrid substrates that require high density mounting
- (2). Programmable controller



1 Anode 2 Cathode  
3 Emitter 4 Collector

### 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( $t=10\mu\text{s}$ ) | $I_{FM}$  | 1           | A                |
|                          | Reverse Voltage                           | $V_R$     | 6           | V                |
|                          | Power Dissipation                         | P         | 100         | mW               |
|                          | Junction Temperature                      | $T_J$     | 125         | $^\circ\text{C}$ |
| Output                   | Collector and emitter Voltage             | $V_{CEO}$ | 40          | V                |
|                          | Emitter and collector Voltage             | $V_{ECO}$ | 7           |                  |
|                          | Collector Current                         | $I_C$     | 90          | mA               |
|                          | Power Dissipation                         | $P_C$     | 150         | mW               |
|                          | Junction Temperature                      | $T_J$     | 125         | $^\circ\text{C}$ |
| *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        | Condition                                    | Min                | Typ.*              | Max  | Unit     |
|------------------------------|--------------------------------------|---------------|--|--------------------|--------------------|------|----------|
| Input                        | Forward Current                      | $V_F$         | $I_F=5mA$                                    | ---                | 1.1                | 1.4  | V        |
|                              | Reverse Current                      | $I_R$         | $V_R=5V$                                     | ---                | ---                | 5    | $\mu A$  |
|                              | Terminal Capacitance                 | $C_t$         | $V=0, f=1KHz$                                | ---                | 30                 | 250  | pF       |
| Output                       | Collector Dark Current               | $I_{CEO}$     | $V_{CE}=40V, I_F=0$                          | ---                | ---                | 400  | nA       |
|                              | Collector-Emitter Breakdown Voltage  | $BV_{CEO}$    | $I_C=0.1mA$<br>$I_F=0$                       | 40                 | ---                | ---  | V        |
|                              | Emitter-Collector Breakdown Voltage  | $BV_{ECO}$    | $I_E=0.1mA$<br>$I_F=0$                       | 7                  | ---                | ---  | V        |
| Transforming Characteristics | 1.Current Transfer Ratio             | CTR           | $I_F=1mA$<br>$V_{CE}=2V$                     | 600                | ---                | 7500 | %        |
|                              | Collector Current                    | $I_C$         |  | 6                  | ---                | 75   | mA       |
|                              | Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_F=1mA$<br>$I_C=2mA$                       | ---                | ---                | 1    | V        |
|                              | Insulation Impedance                 | $R_{iso}$     | DC500V<br>40~60%R.H.                         | $5 \times 10^{10}$ | $1 \times 10^{11}$ | ---  | $\Omega$ |
|                              | Floating Capacitance                 | $C_f$         | $V=0, f=1MHz$                                | ---                | 0.6                | 1    | pF       |
|                              | Response Time(Rise)                  | $t_r$         | $V_{CC}=5V,$<br>$I_C=2mA$<br>$R_L=100\Omega$ | ---                | 200                | ---  | $\mu s$  |
|                              | Descend Time(fall)                   | $t_f$         |  | ---                | 200                | ---  | $\mu s$  |

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

## 6. Rank table of current transfer ratio CTR

| MODEL NO. | CTR Rank | Min. | Max. | Unit | Condition                            |
|-----------|----------|------|------|------|--------------------------------------|
| OR-3H5    | NO mark  | 600  | ---  | %    | IF=1mA, V <sub>CE</sub> =2V, Ta=25°C |

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

## 7. Order Information

Part Number

**OR-3H5-X-Y-Z**

**Note**

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

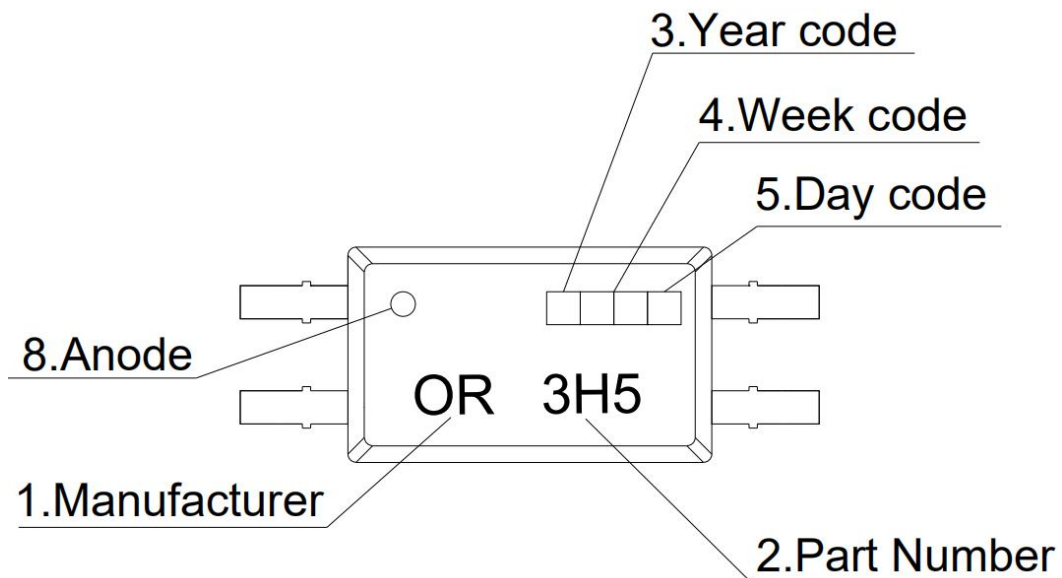
Y = 'V' code for VDE safety (This options is not necessary).

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 |

## 7. Naming Rule

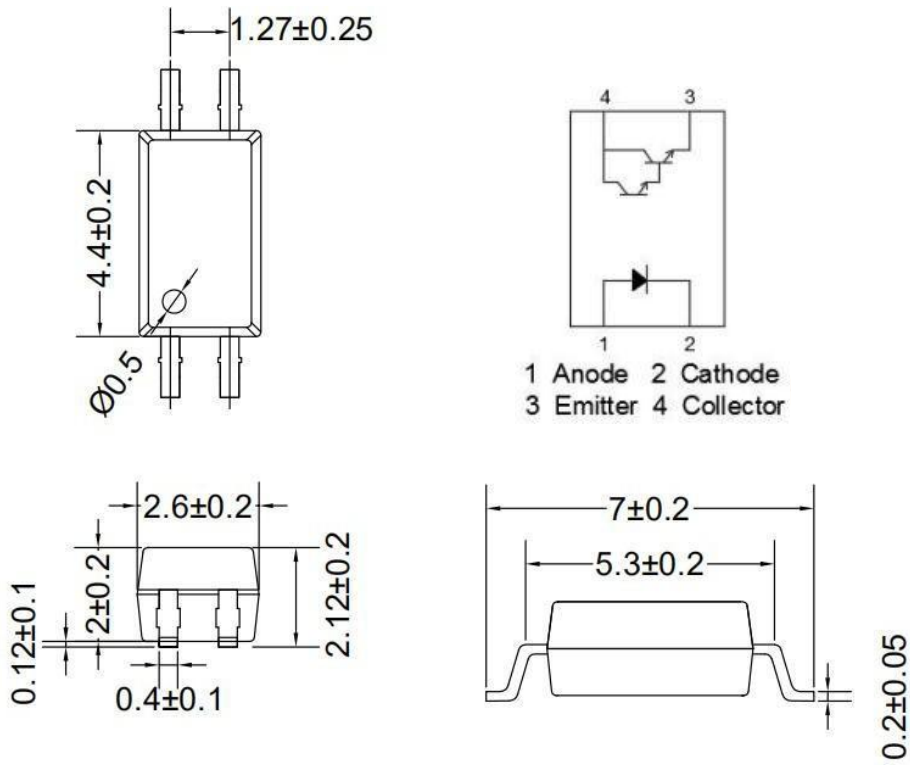


1. ORIENT
2. '3H5' denotes device type code.
3. Year Code: '9' means '2019' and so on.
4. Week Code: 01 represents the first week, 02 represents the second week, and so on.
5. Day Code: 'A to F' means 'Monday to Sunday'.
6. Anode.

\* Halogen Free Mark can be selected.

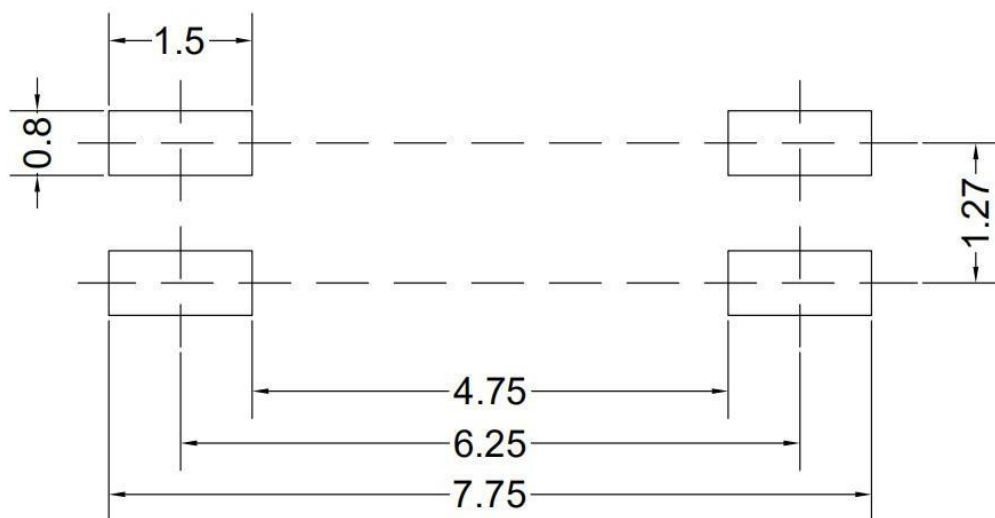
\* VDE Mark can be selected.

### 8. Outer Dimension



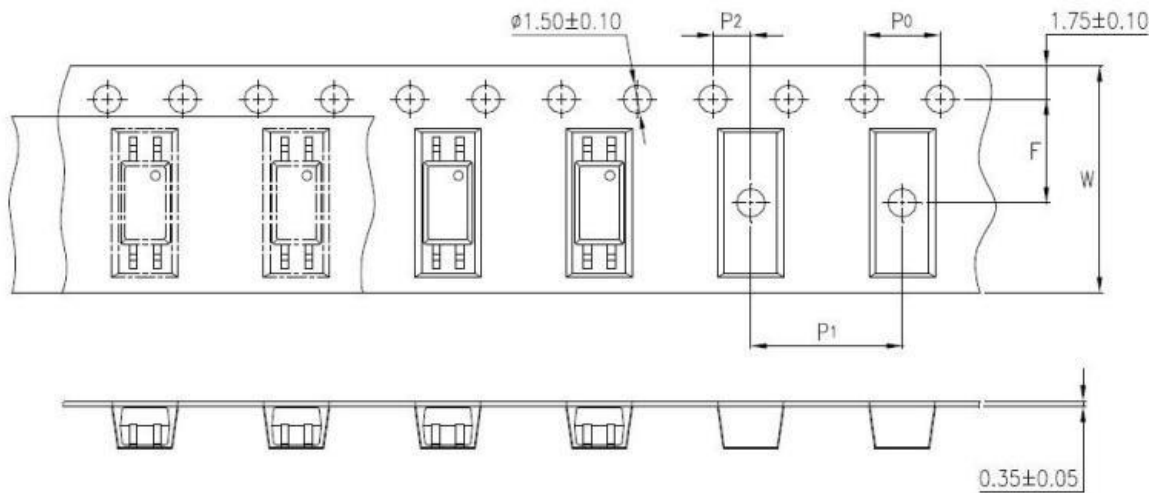
### 9. Recommended Foot Print Patterns (Mount Pad)

(unit : mm)

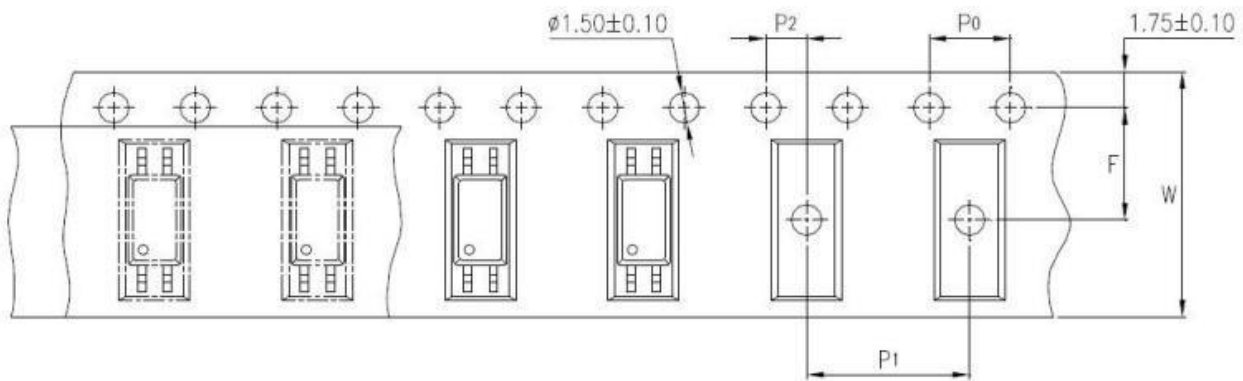


## 10. Taping Dimensions

### ( 1 ) OR-3H5-TP



### ( 2 ) OR-3H5-TP1



| type      | Symbol | Dimensions: mm (in.) |
|-----------|--------|----------------------|
| bandwidth | W      | 12±0.3 (0.47)        |
| pitch     | P0     | 4±0.1 (0.15)         |
| pitch     | F      | 5.5±0.1 (0.217)      |
|           | P2     | 2±0.1 (0.079)        |
| interval  | P1     | 8±0.1 (0.315)        |

|                    |        |
|--------------------|--------|
| Encapsulation type | TP/TP1 |
| Quantity (pieces)  | 3000   |

## 11. Package Dimension

### (1) package dimension

Packing Information

| Packing Information         |               |
|-----------------------------|---------------|
| Packing type                | Reel type     |
| Tape Width                  | 12mm          |
| Qty per Reel                | 3,000         |
| Small box (inner) Dimenaion | 345*345*45mm  |
| Max qty per small box       | 6,000         |
| Large box (Outer) Dimenaion | 480x360x360mm |
| Max qty per large box       | 60,000        |

### (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.



## 12. Reliability Test

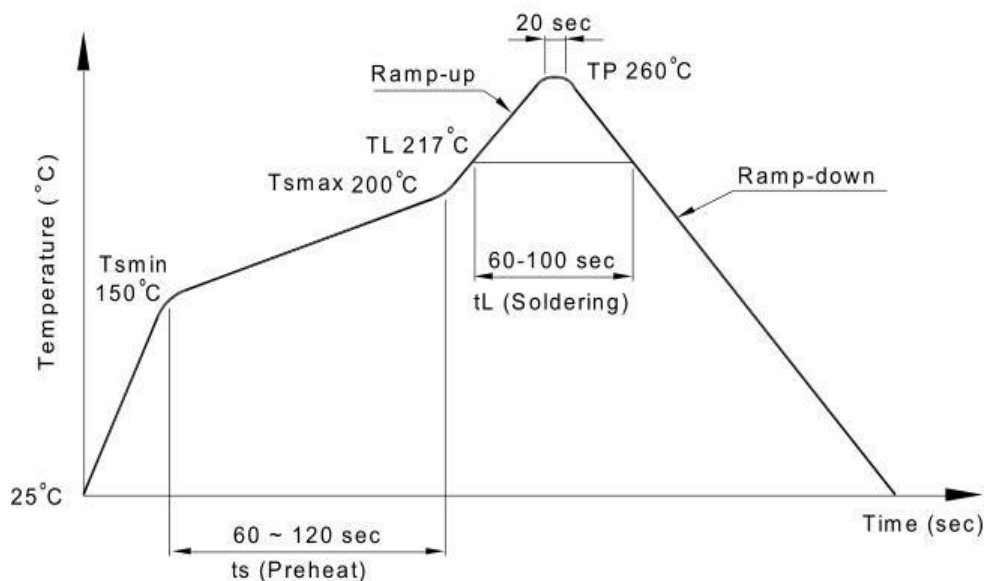
| NO. | Item                                   | Condition                                  | Quantity | Cycle     | Reference Standards        |
|-----|--|--|----------|-----------|----------------------------|
| 1   | RSH,<br>Resistance to Solder Heat      | 260±5°C,20s/cycle                          | 22       | 3 cycles  | JESC22A-106                |
| 2   | SD,<br>Solderability                   | 260±5°C,<br>10s/cycle                      | 22       | 1 cycle   | JESD22-B102                |
| 3   | TC,<br>Temperature Cycle               | H: 125°C 15min<br>∫ 5min<br>L: -55°C 15min | 77       | 300cycles | JESC22A-104                |
| 4   | TS,<br>Thermal Shock                   | H:100°C 5min<br>∫ 15s<br>L:-10°C 5min      | 77       | 300cysles | JESC22A-106                |
| 5   | LTSL,<br>Low Temperature Storage       | T:-55°C                                    | 77       | 1000h     | JESD22-A119                |
| 6   | HTSL,<br>High Temperature Storage      | T:125°C                                    | 77       | 1000h     | JESC22A-103                |
| 7   | THB,<br>High Temperature High Humidity | T:85°C<br>RH: 85%                          | 77       | 1000h     | JESC22A-101                |
| 8   | HTOL<br>DC Operating Life              | T: 110°C<br>IF=10mA<br>VCC=5V              | 77       | 1000h     | MIL-STD-750<br>Method 1037 |
| 9   | ESD-HBM<br>Human Body Model<br>ESD     | Ta=25° C,<br>Reference<br>JESD22-A114      | 6        | 1 cycle   | JESD22-A114                |

### 13. Temperature Profile Of Soldering

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

Note: one solder backflow is recommended under the conditions described below in the temperature and time profile. Do not weld more than three times.

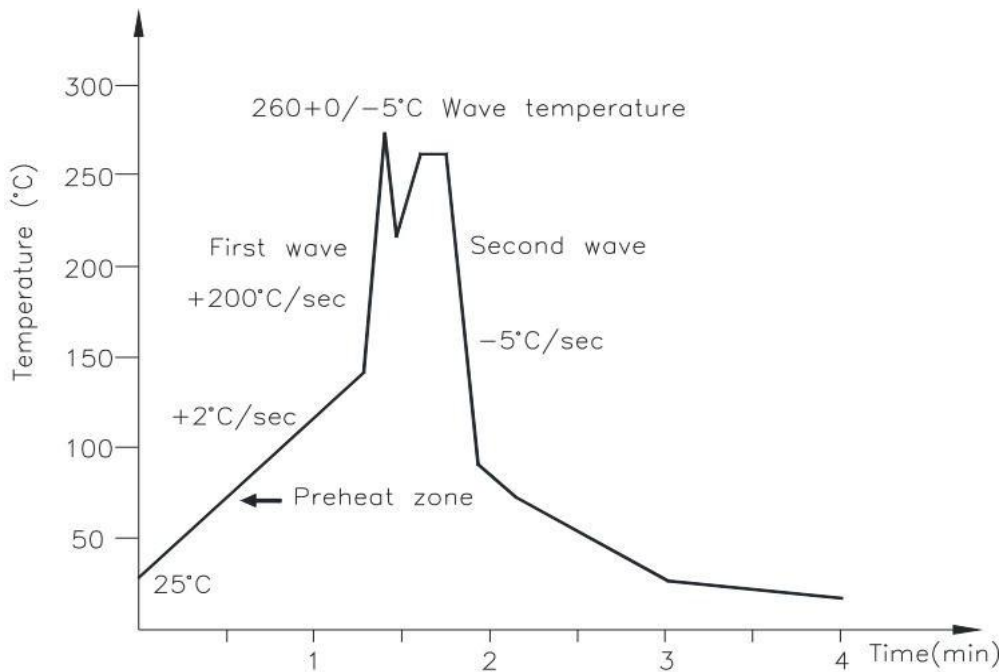
| Profile item                         | Conditions     |
|--------------------------------------|----------------|
| Preheat                              |                |
| - Temperature Min (T Smin)           | 150°C          |
| - Temperature Max (T Smax)           | 200°C          |
| - Time (min 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 welding is recommended under the temperature condition.

|                     |             |
|---------------------|-------------|
| Temperature         | 260+0/-5°C  |
| Time                | 10 sec      |
| Preheat temperature | 5 to 140°C  |
| Preheat time        | 30 to 80sec |



(3) Hand soldering by soldering iron

Single lead welding is allowed in each process and one-time welding is recommended.

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

## 14. Characteristics Curve

Figure 1. Diode Power Dissipation vs. Ambient Temperature

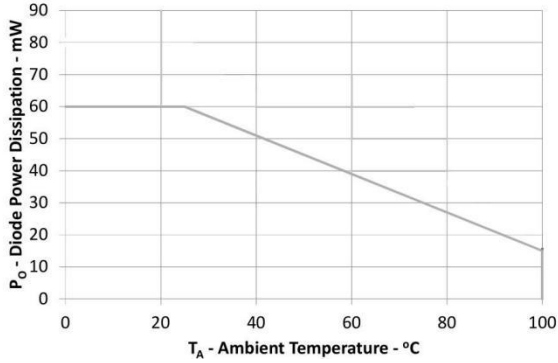


Figure 2. Transistor Power Dissipation vs. Ambient Temperature

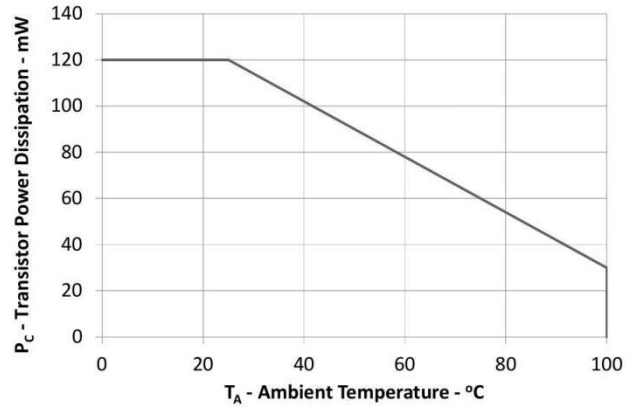


Figure 3. Forward Current vs. Forward Voltage

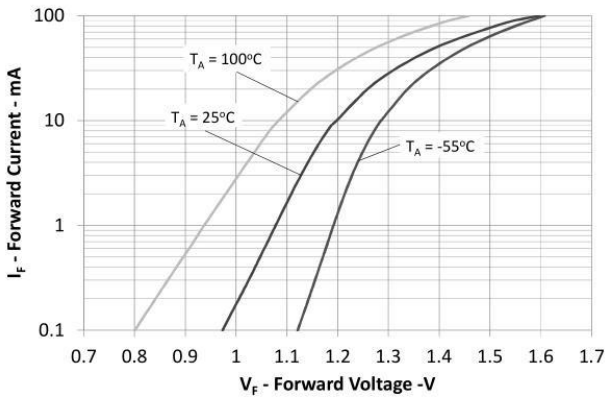


Figure 4. Collector Current vs. Non-Saturated Collector to Emitter Voltage

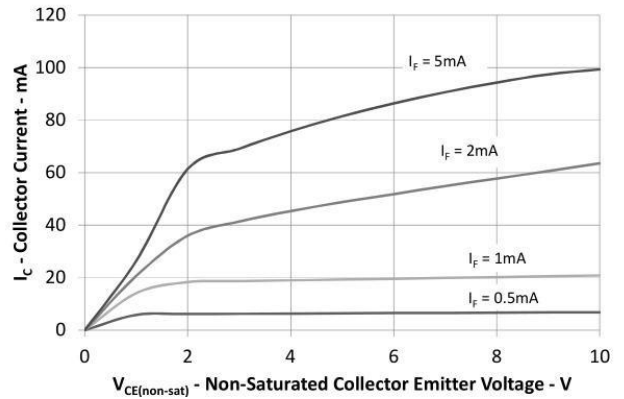


Figure 5. Collector to Emitter Dark Current vs. Ambient Temperature

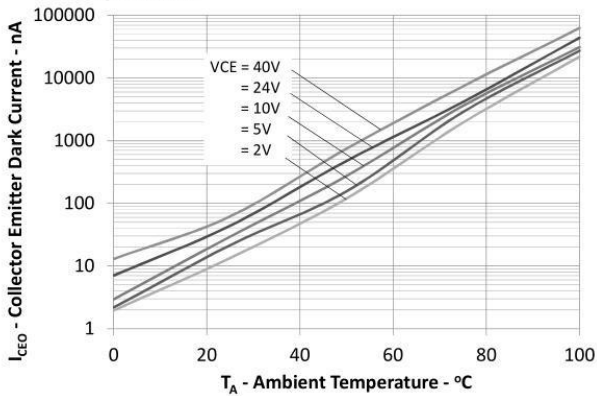


Figure 6. Collector Current vs. Saturated Collector to Emitter Voltage

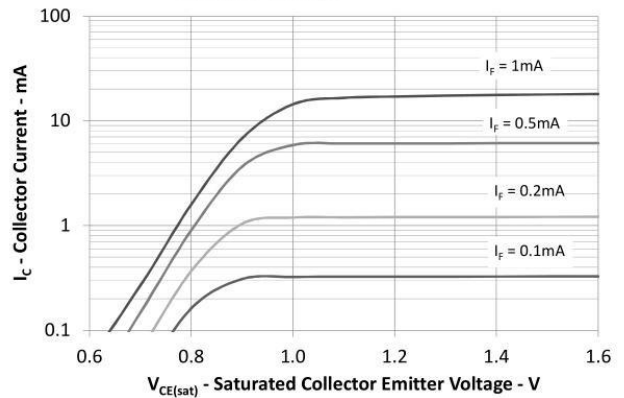


Figure 7. Normalized Current Transfer Ratio vs. Ambient Temperature

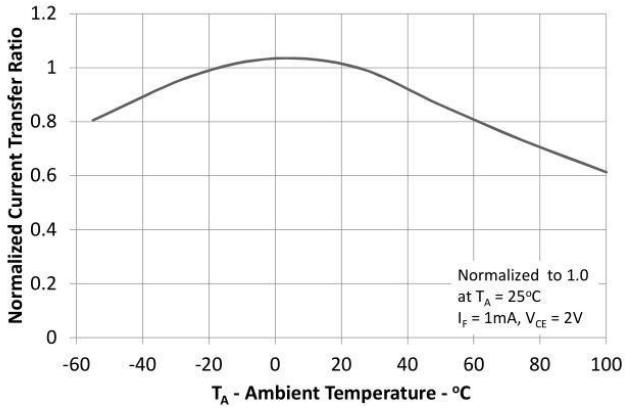


Figure 8. Current Transfer Ratio vs. Forward Current

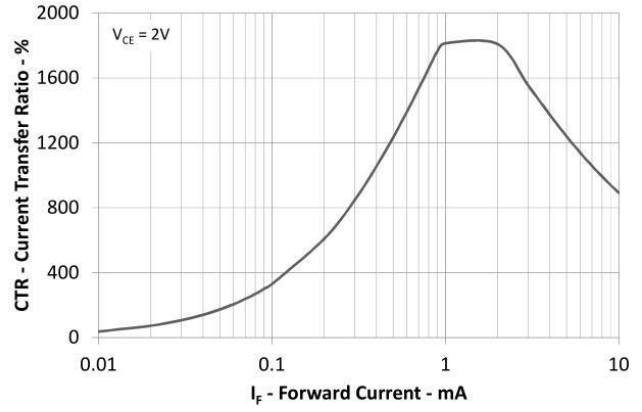


Figure 9. Switching Time vs. Load Resistance

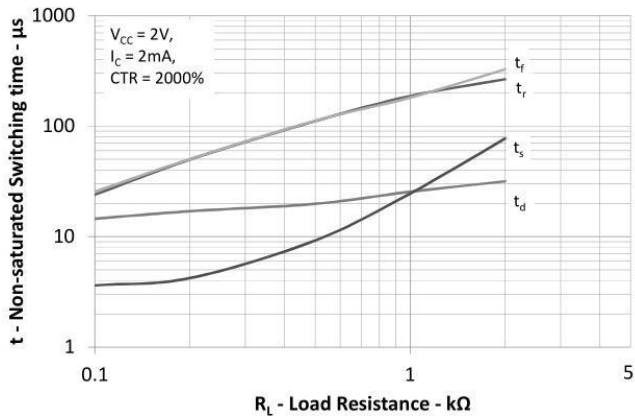


Figure 10. Switching Time vs. Load Resistance

