Continental Device India Pvt. Limited

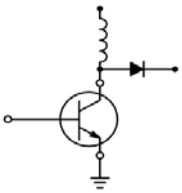
An IATF 16949, ISO9001 and ISO 14001 Certified Company

# Switchmode Serier NPN Silicon Power Transistor

15 AMPERES, 300 and 400 VOLTS,175 WATTS

**2N6546**
**2N6547**

TO-3



**TO-3**
**Metal Can Package**
**RoHS compliant**

## FEATURES:

The 2N6547 transistor is designed for high–voltage, high–speed, power switching in inductive circuits where fall time is critical. They are particularly suited for 115 and 220 volt line operated switch–mode applications

Specification Features —

High Temperature Performance Specified for:

Reversed Biased SOA with Inductive Loads

Switching Times with Inductive Loads

Saturation Voltages

Leakage Currents

## APPLICATIONS:

1. Switching Regulators
2. PWM Inverters and Motor Controls
3. Solenoid and Relay Drivers
4. Deflection Circuits

## ABSOLUTE MAXIMUM RATINGS ($T_a$ = 25 ºC)

| Rating | Symbol | Value | Unit |
|---|---|---|---|
| Collector–Emitter Voltage | $V_{CEO(sus)}$ | 400 | Vdc |
| Collector–Emitter Voltage | $V_{CEX(sus)}$ | 450 | Vdc |
| Collector–Emitter Voltage | $V_{CEV}$ | 850 | Vdc |
| Emitter Base Voltage | $V_{EB}$ | 9.0 | Vdc |
| Collector Current — Continuous<br>— Peak (2) | $I_C$<br>$I_{CM}$ | 15<br>30 | Adc |
| Base Current — Continuous<br>— Peak (2) | $I_B$<br>$I_{BM}$ | 10<br>20 | Adc |
| Emitter Current — Continuous<br>— Peak (2) | $I_E$<br>$I_{EM}$ | 25<br>35 | Adc |
| Total Power Dissipation<br>@ $T_C$ = 25°C<br>@ $T_C$ = 100°C<br>Derate above 25°C | $P_D$ | <br>175<br>100<br>1.0 | Watts<br><br><br>W/°C |
| Operating and Storage Junction Temperature Range | $T_J$, $T_{stg}$ | –65 to +200 | °C |

### THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|---|---|---|---|
| Thermal Resistance, Junction to Case | $R_{JC}$ | 1.0 | °C/W |
| Maximum Lead Temperature for Soldering Purposes: 1/8 from Case for 5 Seconds | $T_L$ | 275 | °C |

## ELECTRICAL CHARACTERISTICS ($T_A$=25 ° C unless otherwise specified)

| Characteristic | | Symbol | Min | Max | Unit |
|---|---|---|---|---|---|
| **OFF CHARACTERISTICS (1)** | | | | | |
| Collector–Emitter Sustaining Voltage ($I_C$ = 100 mA, $I_B$ = 0) | 2N6546<br>2N6547 | $V_{CEO(sus)}$ | <br>300<br>400 | <br>—<br>— | Vdc |
| Collector–Emitter Sustaining Voltage ($I_C$ = 8.0 A, $V_{clamp}$ = Rated $V_{CEX}$, $T_C$ = 100°C)<br>($I_C$ = 15 A, $V_{clamp}$ = Rated $V_{CEO}$ = 100 V, $T_C$ = 100°C) | 2N6546<br>2N6547<br>2N6546<br>2N6547 | $V_{CEX(sus)}$ | <br>350<br>450<br>200<br>300 | <br>—<br>—<br>—<br>— | Vdc |
| Collector Cutoff Current ($V_{CEV}$ = Rated Value, $V_{BE(off)}$ = 1.5 Vdc)<br>($V_{CEV}$ = Rated Value, $V_{BE(off)}$ = 1.5 Vdc, $T_C$ = 100°C) | | $I_{CEV}$ | <br>—<br>— | <br>1.0<br>4.0 | mAdc |
| Collector Cutoff Current ($V_{CE}$ = Rated $V_{CEV}$, $R_{BE}$ = 50 , $T_C$ = 100°C) | | $I_{CER}$ | — | 5.0 | mAdc |
| Emitter Cutoff Current ($V_{EB}$ = 9.0 Vdc, $I_C$ = 0) | | $I_{EBO}$ | — | 1.0 | mAdc |
| **SECOND BREAKDOWN** | | | | | |
| Second Breakdown Collector Current with base forward biased t = 1.0 s (non–repetitive) ($V_{CE}$ = 100 Vdc) | | $I_{S/b}$ | 0.2 | — | Adc |
| **ON CHARACTERISTICS (1)** | | | | | |
| DC Current Gain ($I_C$ = 5.0 Adc, $V_{CE}$ = 2.0 Vdc)<br>($I_C$ = 10 Adc, $V_{CE}$ = 2.0 Vdc) | | $h_{FE}$ | <br>1 2<br>6.0 | <br>60<br>30 | — |
| Collector–Emitter Saturation Voltage ($I_C$ = 10 Adc, $I_B$ = 2.0 Adc)<br>($I_C$ = 15 Adc, $I_B$ = 3.0 Adc)<br>($I_C$ = 10 Adc, $I_B$ = 2.0 Adc, $T_C$ = 100°C) | | $V_{CE(sat)}$ | <br>—<br>—<br>— | <br>1.5<br>5.0<br>2.5 | Vdc |
| Base–Emitter Saturation Voltage ($I_C$ = 10 Adc, $I_B$ = 2.0 Adc)<br>($I_C$ = 10 Adc, $I_B$ = 2.0 Adc, $T_C$ = 100°C | | $V_{BE(sat)}$ | <br>—<br>— | <br>1.6<br>1.6 | Vdc |
| **DYNAMIC CHARACTERISTICS** | | | | | |
| Current–Gain — Bandwidth Product ($I_C$ = 500 mAdc, $V_{CE}$ = 10 Vdc, $f_{test}$ = 1.0 MHz) | | $f_T$ | 6.0 | 28 | MHz |
| Output Capacitance ($V_{CB}$ = 10 Vdc, $I_E$ = 0, $f_{test}$ = 1.0 MHz) | | $C_{ob}$ | 125 | 500 | pF |
| **SWITCHING CHARACTERISTICS** | | | | | |
| Resistive Load | | | | | |
| Delay Time | ($V_{CC}$ = 250 V, $I_C$ = 10 A, $I_{B1}$ = $I_{B2}$ = 2.0 A, $t_p$ = 100 s, Duty Cycle ≤ 2.0%) | $t_d$ | — | 0.05 | u s |
| Rise Time | | $t_r$ | — | 1.0 | u s |
| Storage Time | | $t_s$ | — | 4.0 | u s |
| Fall Time | | $t_f$ | — | 0.7 | u s |
| Inductive Load, Clamped | | | | | |
| Storage Time | ($I_C$ = 10 A(pk), $V_{clamp}$ = Rated $V_{CEX}$, $I_{B1}$ = 2.0 A, $V_{BE(off)}$ = 5.0 Vdc, $T_C$ = 100°C) | $t_s$ | — | 5.0 | u s |
| Fall Time | | $t_f$ | — | 1.5 | u s |
| | | | **Typical** | | |
| Storage Time | ($I_C$ = 10 A(pk), $V_{clamp}$ = Rated $V_{CEX}$, $I_{B1}$ = 2.0 A, $V_{BE(off)}$ = 5.0 Vdc, $T_C$ = 25°C) | $t_s$ | 2.0 | | u s |
| Fall Time | | $t_f$ | 0.09 | | u s |

(1) Pulse Test: Pulse Width = 300 s, Duty Cycle = 2%.

## TYPICAL CHARACTERISTICS CURVES

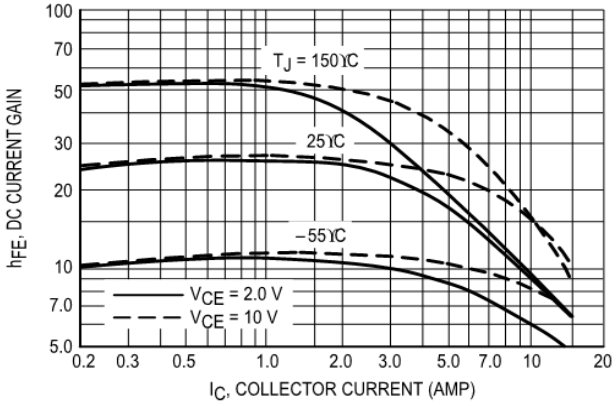



**Figure 1. DC Current Gain**

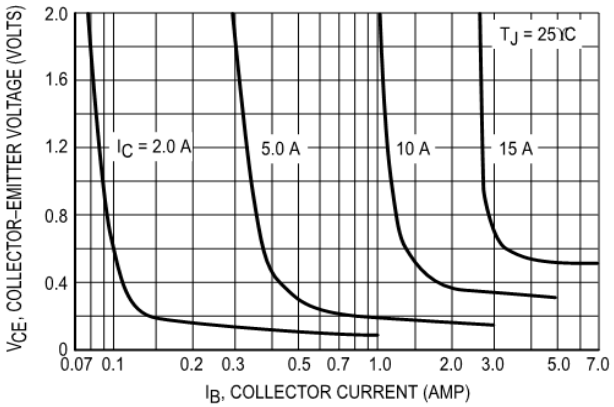



**Figure 2. Collector Saturation Region**

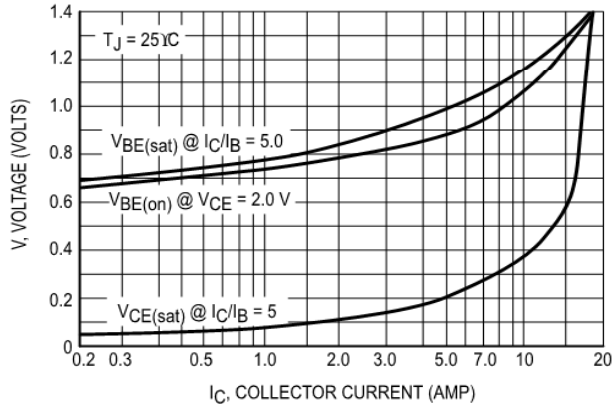



**Figure 3. "On" Voltages**

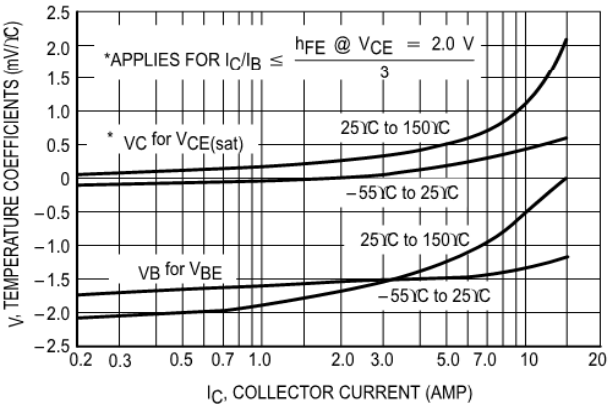



**Figure 4. Temperature Coefficients**

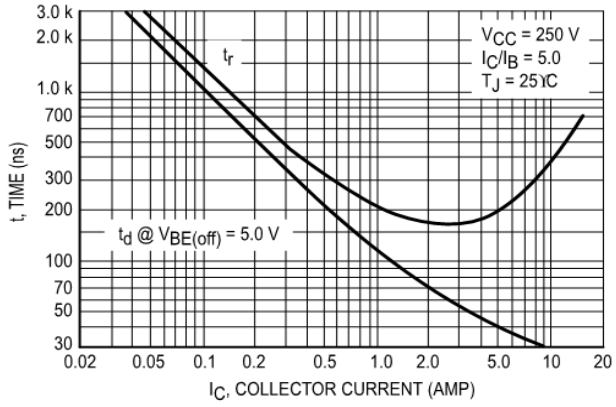



**Figure 5. Turn–On Time**

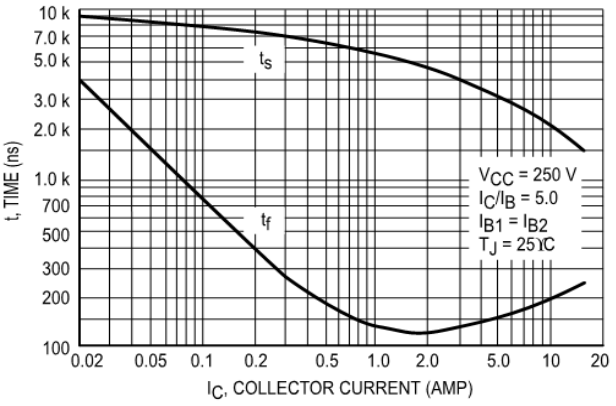



**Figure 6. Turn–Off Time**

## TYPICAL CHARACTERISTICS CURVES

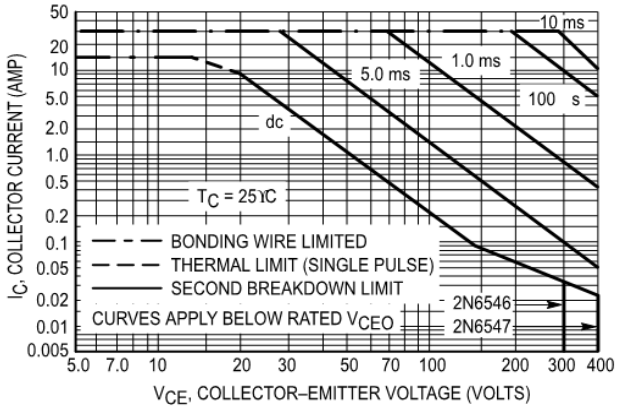



**Figure 7. Forward Bias Safe Operating Area**

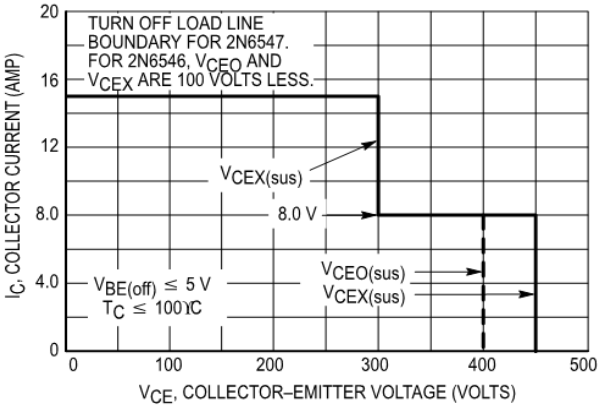



**Figure 8. Reverse Bias Safe Operating Area**

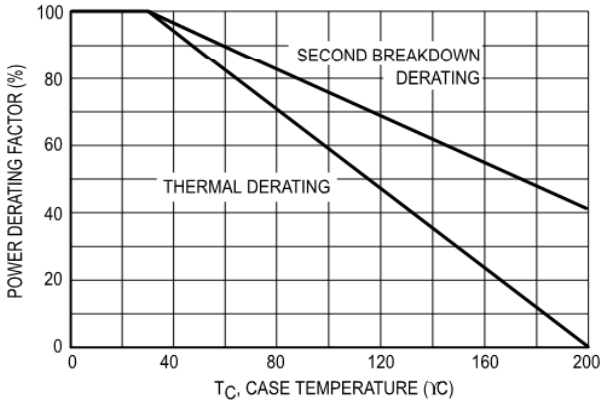



**Figure 9. Power Derating**

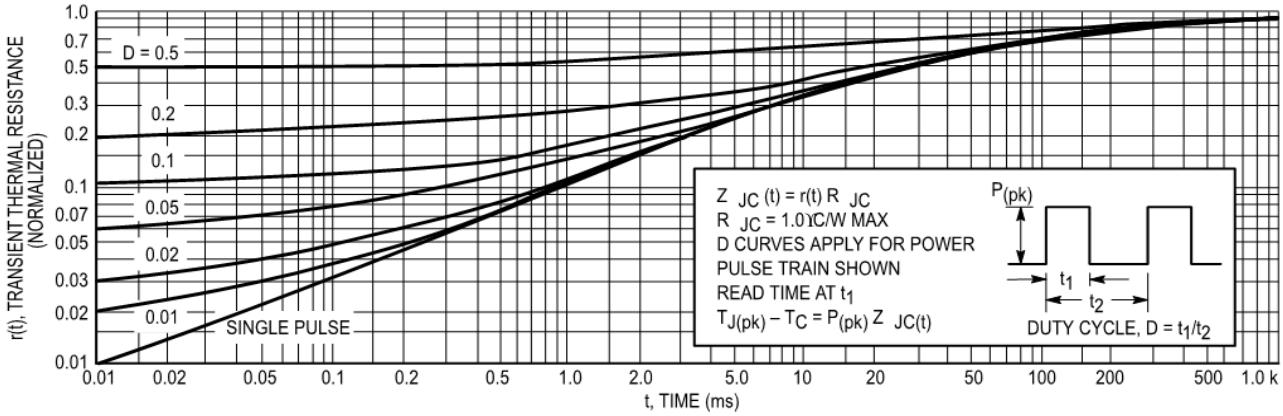
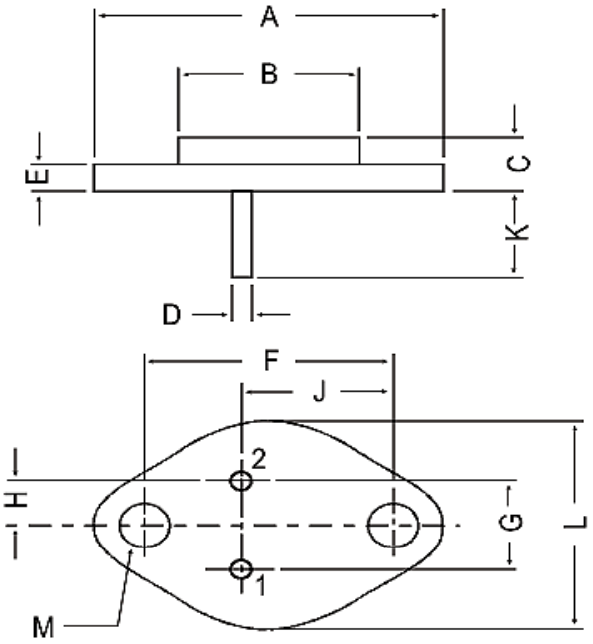


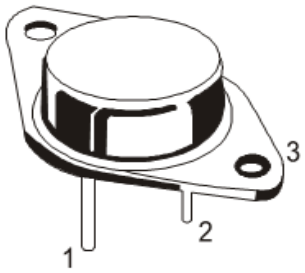

**Figure 10. Thermal Response**

## Package Details




All dimensions in mm.

| DIM | MIN. | MAX. |
|---|---|---|
| A | — | 39.37 |
| B | — | 22.22 |
| C | 6.35 | 8.50 |
| D | 0.96 | 1.09 |
| E | — | 1.77 |
| F | 29.90 | 30.40 |
| G | 10.69 | 11.18 |
| H | 5.20 | 5.72 |
| J | 16.64 | 17.15 |
| K | 11.15 | 12.25 |
| L | — | 26.67 |
| M | 3.84 | 4.19 |




PIN CONFIGURATION
1. BASE
2. EMITTER
3. COLLECTOR

## Packing Detail

| PACKAGE | STANDARD PACK | | INNER CARTON BOX | | OUTER CARTON BOX | | |
|---|---|---|---|---|---|---|---|
| | Details | Net Weight/Qty | Size | Qty | Size | Qty | Gr Wt |
| TO-3 | 100 pcs/pkt | 1.3 kg/100 pcs | 12.5" x 8" x 1.8" | 0.1K | 17" x 11.5" x 21" | 2K | 27.5 kgs |

# Recommended Product Storage Environment for Discrete Semiconductor Devices

This storage environment assumes that the Diodes and transistors are packed properly inside the original packing supplied by CDIL.

- Temperature 5 °C to 30 °C
- Humidity between 40 to 70 %RH
- Air should be clean.
- Avoid harmful gas or dust.
- Avoid outdoor exposure or storage in areas subject to rain or water spraying .
- Avoid storage in areas subject to corrosive gas or dust. Product shall not be stored in areas exposed to direct sunlight.
- Avoid rapid change of temperature.
- Avoid condensation.
- Mechanical stress such as vibration and impact shall be avoided.
- The product shall not be placed directly on the floor.
- The product shall be stored on a plane area. They should not be turned upside down. They should not be placed against the wall.

## Shelf Life of CDIL Products

The shelf life of products is the period from product manufacture to shipment to customers. The product can be unconditionally shipped within this period. The period is defined as 2 years.
If products are stored longer than the shelf life of 2 years the products shall be subjected to quality check as per CDIL quality procedure.
The products are further warranted for another one year after the date of shipment subject to the above conditions in CDIL original packing.

## Floor Life of CDIL Products and MSL Level

When the products are opened from the original packing, the floor life will start.
For this, the following JEDEC table may be referred:

| JEDEC MSL Level | | |
|---|---|---|
| **Level** | **Time** | **Condition** |
| 1 | Unlimited | ≤30 °C / 85% RH |
| 2 | 1 Year | ≤30 °C / 60% RH |
| 2a | 4 Weeks | ≤30 °C / 60% RH |
| 3 | 168 Hours | ≤30 °C / 60% RH |
| 4 | 72 Hours | ≤30 °C / 60% RH |
| 5 | 48 Hours | ≤30 °C / 60% RH |
| 5a | 24 Hours | ≤30 °C / 60% RH |
| 6 | Time on Label(TOL) | ≤30 °C / 60% RH |

## Customer Notes

**Component Disposal Instructions**

1. CDIL Semiconductor Devices are RoHS compliant, customers are requested to please dispose as per prevailing Environmental Legislation of their Country.
2. In Europe, please dispose as per EU Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE).

## Disclaimer

The product information and the selection guides facilitate selection of the CDIL's Semiconductor Device(s) best suited for application in your product(s) as per your requirement. It is recommended that you completely review our Data Sheet(s) so as to confirm that the Device(s) meet functionality parameters for your application. The information furnished in the Data Sheet and on the CDIL Web Site/CD are believed to be accurate and reliable. CDIL however, does not assume responsibility for inaccuracies or incomplete information. Furthermore, CDIL does not assume liability whatsoever, arising out of the application or use of any CDIL product; neither does it convey any license under its patent rights nor rights of others. These products are not designed for use in life saving/support appliances or systems. CDIL customers selling these products (either as individual Semiconductor Devices or incorporated in their end products), in any life saving/support appliances or systems or applications do so at their own risk and CDIL will not be responsible for any damages resulting from such sale(s).
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