# 2N6287G Datasheet



| | |
|---|---|
| DiGi Electronics Part Number | 2N6287G-DG |
| Manufacturer | onsemi |
| Manufacturer Product Number | 2N6287G |
| Description | TRANS PNP DARL 100V 20A TO204 |
| Detailed Description | Bipolar (BJT) Transistor PNP - Darlington 100 V 20 A 160 W Through Hole TO-204 (TO-3) |



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## Purchase and inquiry

| Manufacturer Product Number: | Manufacturer: |
| --- | --- |
| 2N6287G | onsemi |
| Series: | Product Status: |
| - | Obsolete |
| Transistor Type: | Current - Collector (Ic) (Max): |
| PNP - Darlington | 20 A |
| Voltage - Collector Emitter Breakdown (Max): | Vce Saturation (Max) @ Ib, Ic: |
| 100 V | 3V @ 200mA, 20A |
| Current - Collector Cutoff (Max): | DC Current Gain (hFE) (Min) @ Ic, Vce: |
| 1mA | 750 @ 10A, 3V |
| Power - Max: | Frequency - Transition: |
| 160 W | - |
| Operating Temperature: | Mounting Type: |
| -65°C ~ 200°C (TJ) | Through Hole |
| Package / Case: | Supplier Device Package: |
| TO-204AA, TO-3 | TO-204 (TO-3) |
| Base Product Number: | |
| 2N6287 | |

## Environmental & Export classification

| RoHS Status: | Moisture Sensitivity Level (MSL): |
| --- | --- |
| ROHS3 Compliant | 1 (Unlimited) |
| REACH Status: | ECCN: |
| REACH Unaffected | EAR99 |
| HTSUS: | |
| 8541.29.0095 | |

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**DATA SHEET**
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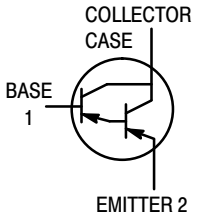
# Darlington Complementary Silicon Power Transistors

# 2N6284 (NPN); 2N6286, 2N6287 (PNP)

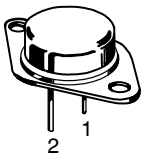
**20 AMPERE COMPLEMENTARY SILICON POWER TRANSISTORS 100 VOLTS, 160 WATTS**

These packages are designed for general−purpose amplifier and low−frequency switching applications.




### Features

- High DC Current Gain @ $I_C$ = 10 Adc −
  $h_{FE}$ = 2400 (Typ) − 2N6284
  = 4000 (Typ) − 2N6287
- Collector−Emitter Sustaining Voltage −
  $V_{CEO(sus)}$ = 100 Vdc (Min)
- Monolithic Construction with Built−In Base−Emitter Shunt Resistors
- Pb−Free Packages are Available*




**TO−204AA (TO−3)**
**CASE 1−07**
**STYLE 1**

**MARKING DIAGRAM**


2N628x = Device Code
x = 4, 6 or 7
G = Pb−Free Package
A = Location Code
YY = Year
WW = Work Week
MEX = Country of Orgin

### MAXIMUM RATINGS (Note 1)

| Rating | Symbol | Value | Unit |
|---|---|---|---|
| Collector−Emitter Voltage<br>2N6286<br>2N6284/87 | $V_{CEO}$ | <br>80<br>100 | Vdc |
| Collector−Base Voltage<br>2N6286<br>2N6284/87 | $V_{CB}$ | <br>80<br>100 | Vdc |
| Emitter−Base Voltage | $V_{EB}$ | 5.0 | Vdc |
| Collector Current − Continuous<br>Peak | $I_C$ | 20<br>40 | Adc |
| Base Current | $I_B$ | 0.5 | Adc |
| Total Power Dissipation @ $T_C$ = 25°C<br>Derate above 25°C | $P_D$ | 160<br>0.915 | W<br>W/°C |
| Operating and Storage Temperature Range | $T_J$, $T_{stg}$ | −65 to +200 | °C |

### THERMAL CHARACTERISTICS (Note 1)

| Characteristic | Symbol | Max | Unit |
|---|---|---|---|
| Thermal Resistance, Junction−to−Case | $R_{\theta JC}$ | 1.09 | °C/W |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.
1. Indicates JEDEC Registered Data.

### ORDERING INFORMATION

| Device | Package | Shipping |
|---|---|---|
| 2N6284 | TO−3 | 100 Units/Tray |
| 2N6284G | TO−3<br>(Pb−Free) | 100 Units/Tray |
| 2N6286 | TO−3 | 100 Units/Tray |
| 2N6286G | TO−3<br>(Pb−Free) | 100 Units/Tray |
| 2N6287 | TO−3 | 100 Units/Tray |
| 2N6287G | TO−3<br>(Pb−Free) | 100 Units/Tray |

*For additional information on our Pb−Free strategy and soldering details, please download the **onsemi** Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

# 2N6284 (NPN); 2N6286, 2N6287 (PNP)

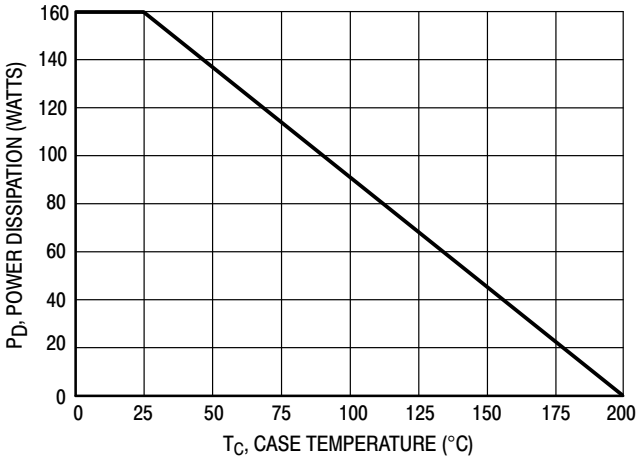



**Figure 1. Power Derating**

**ELECTRICAL CHARACTERISTICS** ($T_C$ = 25°C unless otherwise noted) (Note 2)

| Characteristic | | Symbol | Min | Max | Unit |
|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | |
| Collector−Emitter Sustaining Voltage ($I_C$ = 0.1 Adc, $I_B$ = 0) | 2N6286<br>2N6284, 2N6287 | $V_{CEO(sus)}$ | 80<br>100 | –<br>– | Vdc |
| Collector Cutoff Current ($V_{CE}$ = 40 Vdc, $I_B$ = 0)<br>($V_{CE}$ = 50 Vdc, $I_B$ = 0) | | $I_{CEO}$ | –<br>– | 1.0<br>1.0 | mAdc |
| Collector Cutoff Current ($V_{CE}$ = Rated $V_{CB}$, $V_{BE(off)}$ = 1.5 Vdc)<br>($V_{CE}$ = Rated $V_{CB}$, $V_{BE(off)}$ = 1.5 Vdc, $T_C$ = 150°C) | | $I_{CEX}$ | –<br>– | 0.5<br>5.0 | mAdc |
| Emitter Cutoff Current ($V_{BE}$ = 5.0 Vdc, $I_C$ = 0) | | $I_{EBO}$ | – | 2.0 | mAdc |
| **ON CHARACTERISTICS** (Note 3) | | | | | |
| DC Current Gain ($I_C$ = 10 Adc, $V_{CE}$ = 3.0 Vdc)<br>($I_C$ = 20 Adc, $V_{CE}$ = 3.0 Vdc) | | $h_{FE}$ | 750<br>100 | 18,000<br>– | – |
| Collector−Emitter Saturation Voltage ($I_C$ = 10 Adc, $I_B$ = 40 mAdc)<br>($I_C$ = 20 Adc, $I_B$ = 200 mAdc) | | $V_{CE(sat)}$ | –<br>– | 2.0<br>3.0 | Vdc |
| Base−Emitter On Voltage ($I_C$ = 10 Adc, $V_{CE}$ = 3.0 Vdc) | | $V_{BE(on)}$ | – | 2.8 | Vdc |
| Base−Emitter Saturation Voltage ($I_C$ = 20 Adc, $I_B$ = 200 mAdc) | | $V_{BE(sat)}$ | – | 4.0 | Vdc |
| **DYNAMIC CHARACTERISTICS** | | | | | |
| Magnitude of Common Emitter Small−Signal Short−Circuit Forward Current Transfer Ratio ($I_C$ = 10 Adc, $V_{CE}$ = 3.0 Vdc, f = 1.0 MHz) | | $\|h_{fe}\|$ | 4.0 | – | MHz |
| Output Capacitance ($V_{CB}$ = 10 Vdc, $I_E$ = 0, f = 0.1 MHz) | 2N6284<br>2N6286, 2N6287 | $C_{ob}$ | –<br>– | 400<br>600 | pF |
| Small−Signal Current Gain ($I_C$ = 10 Adc, $V_{CE}$ = 3.0 Vdc, f = 1.0 kHz) | | $h_{fe}$ | 300 | – | – |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

2. Indicates JEDEC Registered Data.
3. Pulse test: Pulse Width = 300 μs, Duty Cycle = 2%

# 2N6284 (NPN); 2N6286, 2N6287 (PNP)

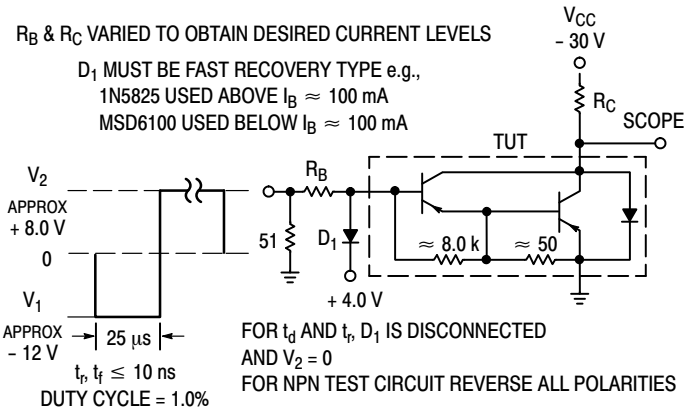



**Figure 2. Switching Times Test Circuit**

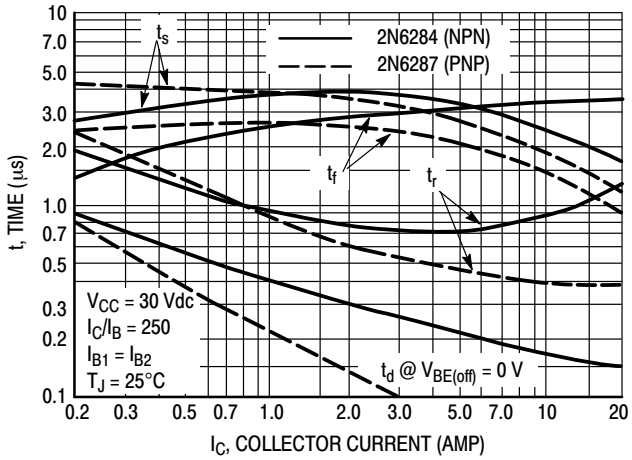



**Figure 3. Switching Times**

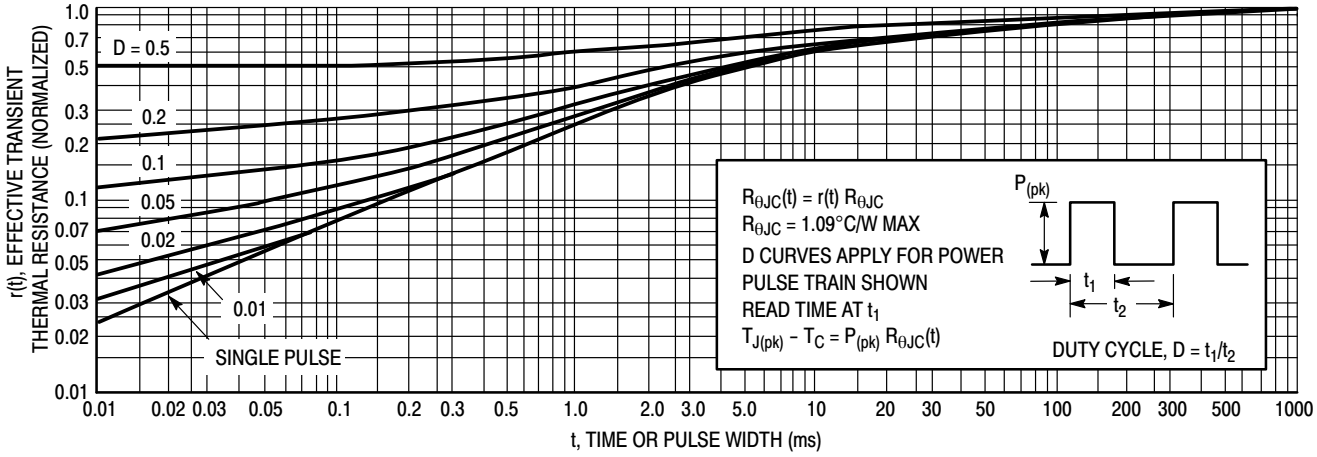



**Figure 4. Thermal Response**

## ACTIVE−REGION SAFE OPERATING AREA

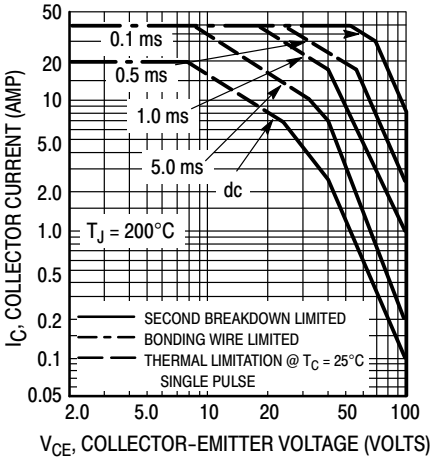



**Figure 5. 2N6284, 2N6287**

There are two limitations on the power handling ability of a transistor: average junction temperature and second breakdown. Safe operating area curves indicate $I_C - V_{CE}$ limits of the transistor that must be observed for reliable operation; i.e. the transistor must not be subjected to greater dissipation than the curves indicate.

The data of Figure 5 is based on $T_{J(pk)}$ = 200°C; $T_C$ is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided $T_{J(pk)} < 200°C$. $T_{J(pk)}$ may be calculated from the data in Figure 4. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

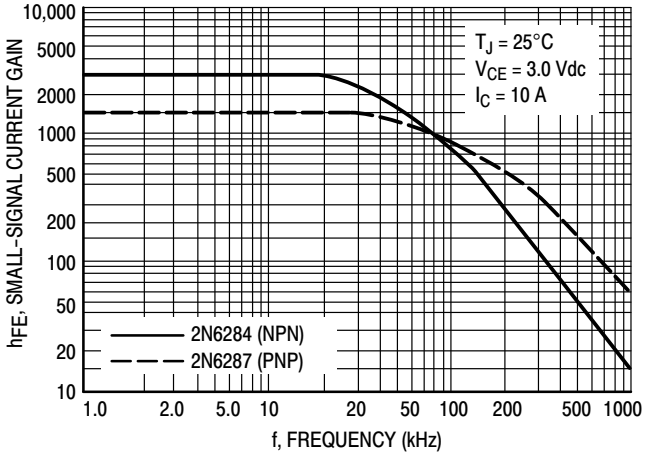



**Figure 6. Small−Signal Current Gain**

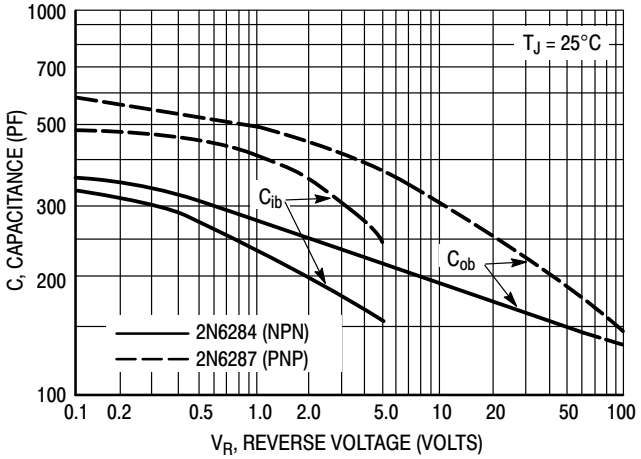
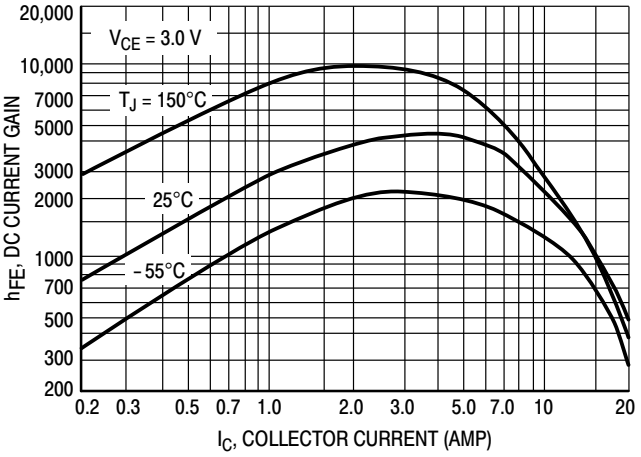



**Figure 7. Capacitance**

## 2N6284 (NPN); 2N6286, 2N6287 (PNP)

**NPN**
**2N6284**




**PNP**
**2N6287**

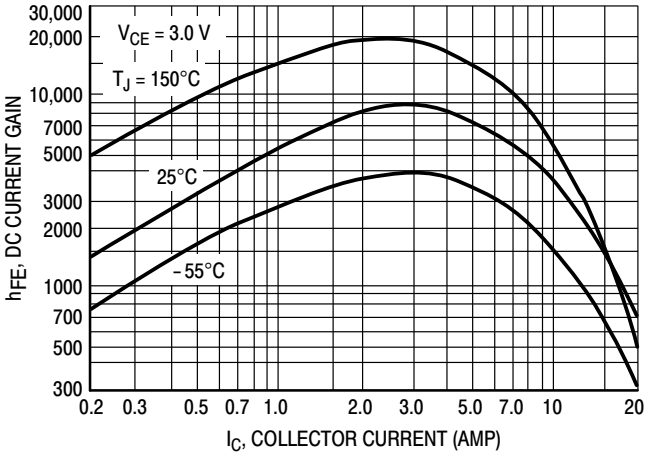
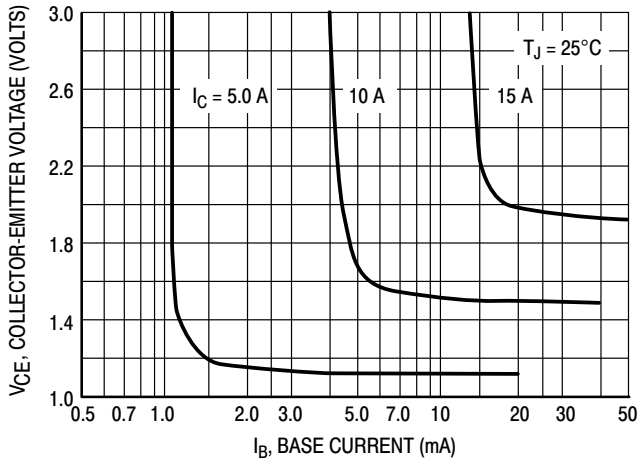



**Figure 8. DC Current Gain**



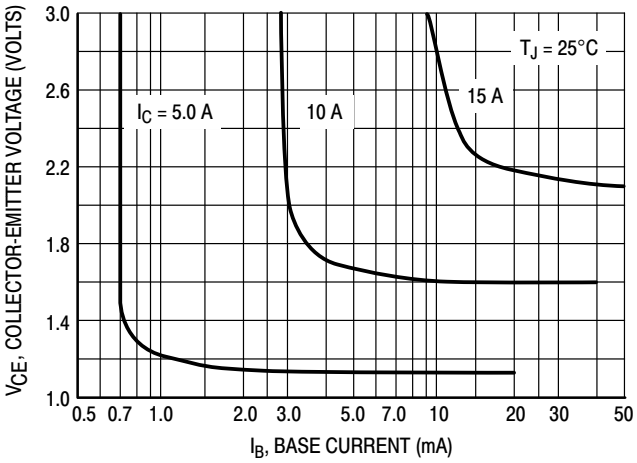
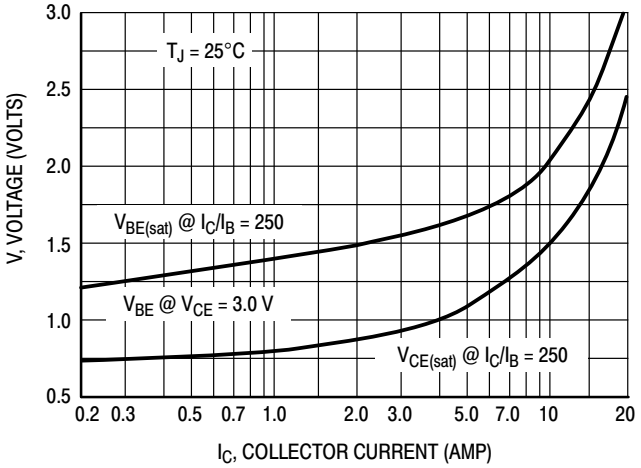




**Figure 9. Collector Saturation Region**



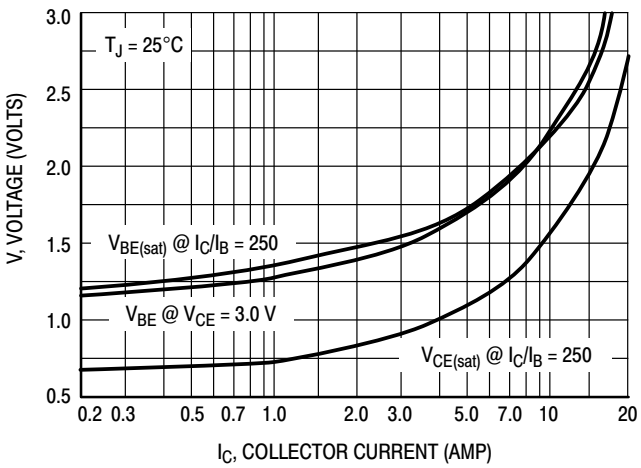
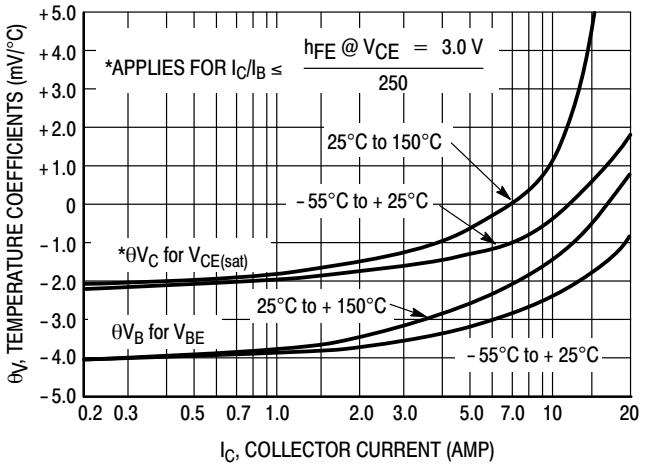




**Figure 10. “On” Voltages**

## 2N6284 (NPN); 2N6286, 2N6287 (PNP)

**NPN**
**2N6284**




**PNP**
**2N6287**

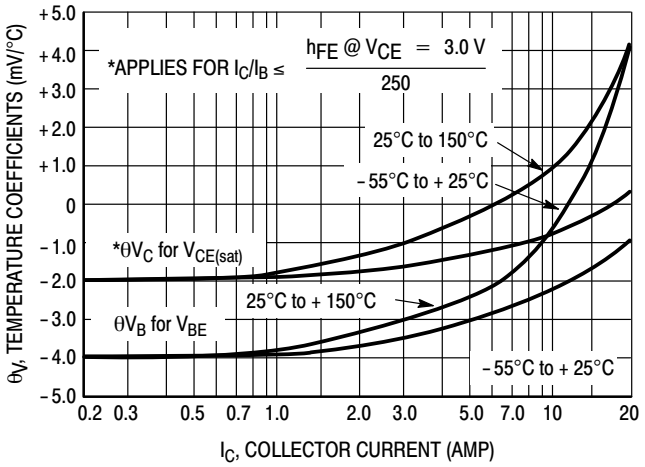
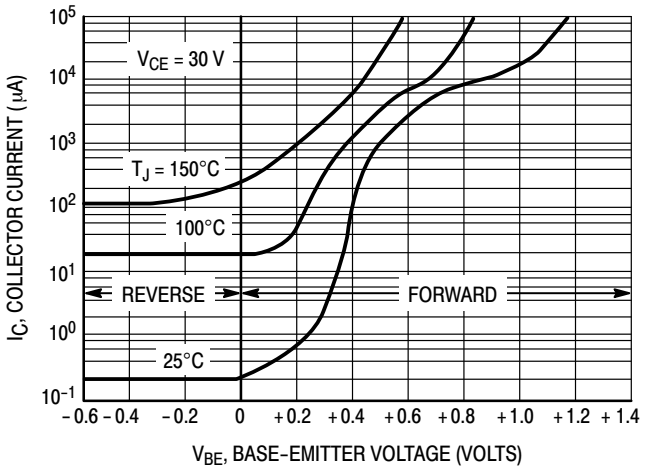



**Figure 11. Temperature Coefficients**



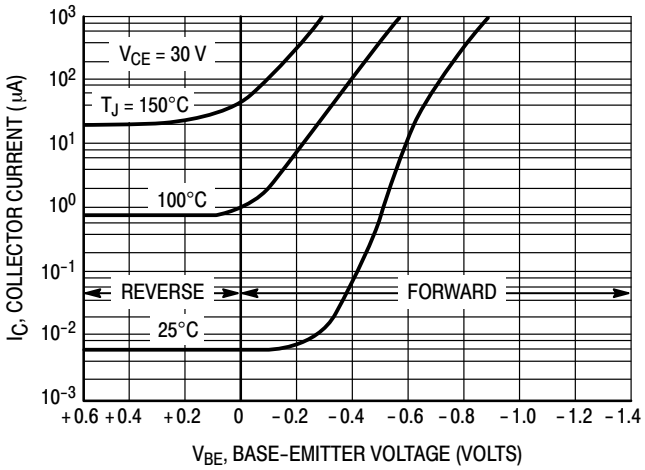




**Figure 12. Collector Cut−Off Region**

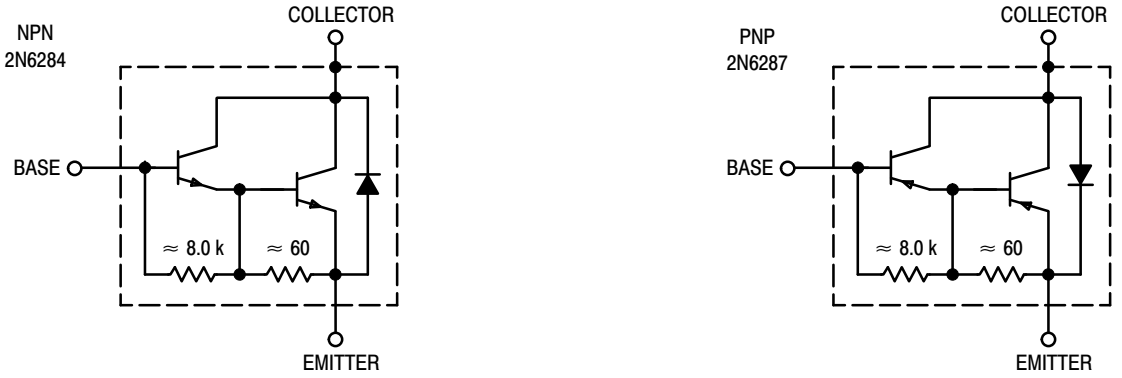
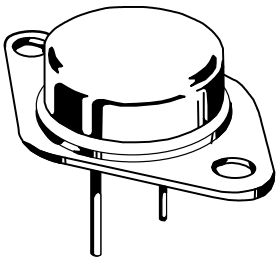



**Figure 13. Darlington Schematic**

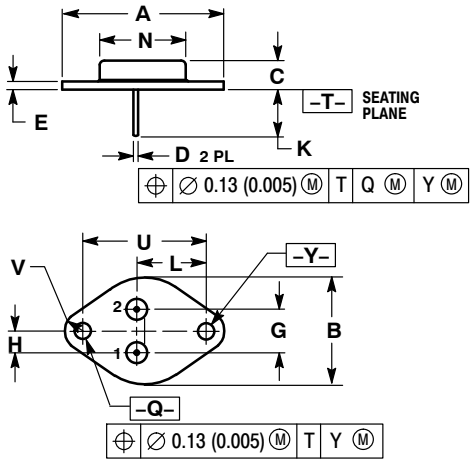
# MECHANICAL CASE OUTLINE
## PACKAGE DIMENSIONS



**TO−204 (TO−3)**
CASE 1−07
ISSUE Z

DATE 10 MAR 2000

**SCALE 1:1**




NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. ALL RULES AND NOTES ASSOCIATED WITH REFERENCED TO−204AA OUTLINE SHALL APPLY.

| | INCHES | | MILLIMETERS | |
|---|---|---|---|---|
| DIM | MIN | MAX | MIN | MAX |
| A | 1.550 REF | | 39.37 REF | |
| B | --- | 1.050 | --- | 26.67 |
| C | 0.250 | 0.335 | 6.35 | 8.51 |
| D | 0.038 | 0.043 | 0.97 | 1.09 |
| E | 0.055 | 0.070 | 1.40 | 1.77 |
| G | 0.430 BSC | | 10.92 BSC | |
| H | 0.215 BSC | | 5.46 BSC | |
| K | 0.440 | 0.480 | 11.18 | 12.19 |
| L | 0.665 BSC | | 16.89 BSC | |
| N | --- | 0.830 | --- | 21.08 |
| Q | 0.151 | 0.165 | 3.84 | 4.19 |
| U | 1.187 BSC | | 30.15 BSC | |
| V | 0.131 | 0.188 | 3.33 | 4.77 |

STYLE 1:
PIN 1. BASE
2. EMITTER
CASE: COLLECTOR

STYLE 2:
PIN 1. BASE
2. COLLECTOR
CASE: EMITTER

STYLE 3:
PIN 1. GATE
2. SOURCE
CASE: DRAIN

STYLE 4:
PIN 1. GROUND
2. INPUT
CASE: OUTPUT

STYLE 5:
PIN 1. CATHODE
2. EXTERNAL TRIP/DELAY
CASE: ANODE

STYLE 6:
PIN 1. GATE
2. EMITTER
CASE: COLLECTOR

STYLE 7:
PIN 1. ANODE
2. OPEN
CASE: CATHODE

STYLE 8:
PIN 1. CATHODE #1
2. CATHODE #2
CASE: ANODE

STYLE 9:
PIN 1. ANODE #1
2. ANODE #2
CASE: CATHODE

| | | | |
|---|---|---|---|
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| **DESCRIPTION:** | **TO−204 (TO−3)** | | **PAGE 1 OF 1** |

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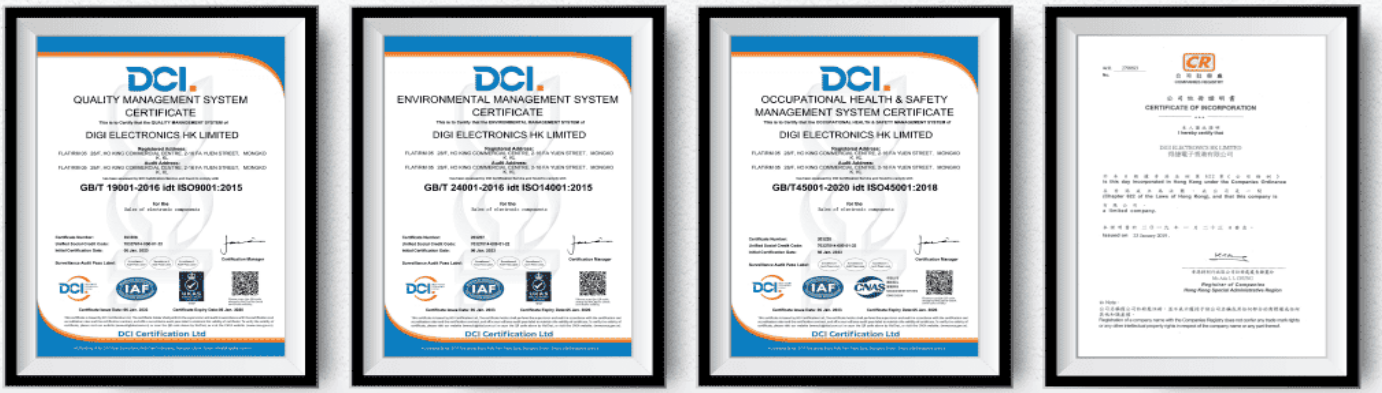



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