

# BC556B, BC557A, B, C, BC558B

## Amplifier Transistors

### PNP Silicon

#### Features

- Pb-Free Packages are Available\*

#### MAXIMUM RATINGS

| Rating   | Symbol            | Value             | Unit                       |
|--|-------------------|-------------------|----------------------------|
| Collector - Emitter Voltage<br>BC556<br>BC557<br>BC558                                 | $V_{CEO}$         | -65<br>-45<br>-30 | Vdc                        |
| Collector - Base Voltage<br>BC556<br>BC557<br>BC558                                    | $V_{CBO}$         | -80<br>-50<br>-30 | Vdc                        |
| Emitter - Base Voltage   | $V_{EBO}$         | -5.0              | Vdc                        |
| Collector Current – Continuous<br>– Peak   | $I_C$<br>$I_{CM}$ | -100<br>-200      | mAdc                       |
| Base Current – Peak  | $I_{BM}$          | -200              | mAdc                       |
| Total Device Dissipation @ $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$             | 625<br>5.0        | mW<br>mW/ $^\circ\text{C}$ |
| Total Device Dissipation @ $T_C = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$             | 1.5<br>12         | W<br>mW/ $^\circ\text{C}$  |
| Operating and Storage Junction<br>Temperature Range                                    | $T_J, T_{stg}$    | -55 to +150       | $^\circ\text{C}$           |

#### THERMAL CHARACTERISTICS

| Characteristic                          | Symbol          | Max  | Unit                      |
|---|-----------------|------|---------------------------|
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 200  | $^\circ\text{C}/\text{W}$ |
| Thermal Resistance, Junction-to-Case    | $R_{\theta JC}$ | 83.3 | $^\circ\text{C}/\text{W}$ |

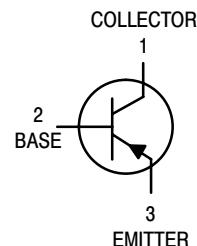
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

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

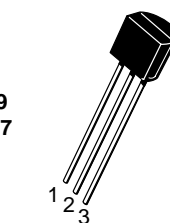


ON Semiconductor®

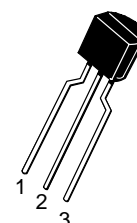
<http://onsemi.com>



TO-92  
CASE 29  
STYLE 17

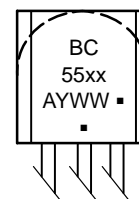


STRAIGHT LEAD  
BULK PACK



BENT LEAD  
TAPE & REEL  
AMMO PACK

#### MARKING DIAGRAM



xx = 6B, 7A, 7B, 7C, or 8B  
A = Assembly Location  
Y = Year  
WW = Work Week  
▪ = Pb-Free Package

(Note: Microdot may be in either location)

#### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 6 of this data sheet.

# BC556B, BC557A, B, C, BC558B

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted)

| Characteristic  | Symbol   | Min                  | Typ                        | Max                                 | Unit   |              |
|---|--|----------------------|----------------------------|-------------------------------------|--|--------------|
| <b>OFF CHARACTERISTICS</b>  |  |                      |                            |                                     |  |              |
| Collector–Emitter Breakdown Voltage<br>(I <sub>C</sub> = –2.0 mAdc, I <sub>B</sub> = 0)   | BC556<br>BC557<br>BC558                            | V <sub>(BR)CEO</sub> | –65<br>–45<br>–30          | –<br>–<br>–                         | –<br>–<br>–                                  | V            |
| Collector–Base Breakdown Voltage<br>(I <sub>C</sub> = –100 µAdc)  | BC556<br>BC557<br>BC558                            | V <sub>(BR)CBO</sub> | –80<br>–50<br>–30          | –<br>–<br>–                         | –<br>–<br>–                                  | V            |
| Emitter–Base Breakdown Voltage<br>(I <sub>E</sub> = –100 µAdc, I <sub>C</sub> = 0)  | BC556<br>BC557<br>BC558                            | V <sub>(BR)EBO</sub> | –5.0<br>–5.0<br>–5.0       | –<br>–<br>–                         | –<br>–<br>–                                  | V            |
| Collector–Emitter Leakage Current<br>(V <sub>CES</sub> = –40 V)<br>(V <sub>CES</sub> = –20 V)<br><br>(V <sub>CES</sub> = –20 V, T <sub>A</sub> = 125°C) | BC556<br>BC557<br>BC558<br>BC556<br>BC557<br>BC558 | I <sub>CES</sub>     | –<br>–<br>–<br>–<br>–<br>– | –2.0<br>–2.0<br>–2.0<br>–<br>–<br>– | –100<br>–100<br>–100<br>–4.0<br>–4.0<br>–4.0 | nA<br><br>µA |

## ON CHARACTERISTICS

|   |  |                      |  |   |  |   |
|---|--|----------------------|--|---|--|---|
| DC Current Gain<br>(I <sub>C</sub> = –10 µAdc, V <sub>CE</sub> = –5.0 V)<br><br>(I <sub>C</sub> = –2.0 mAdc, V <sub>CE</sub> = –5.0 V)<br><br>(I <sub>C</sub> = –100 mAdc, V <sub>CE</sub> = –5.0 V)                    | A Series Device<br>B Series Devices<br>C Series Devices<br>BC557<br>A Series Device<br>B Series Devices<br>C Series Devices<br>A Series Device<br>B Series Devices<br>C Series Devices | h <sub>FE</sub>      | –<br>–<br>–<br>120<br>120<br>180<br>420<br>–<br>–<br>– | 90<br>150<br>270<br>–<br>170<br>290<br>500<br>120<br>180<br>300 | –<br>–<br>–<br>800<br>220<br>460<br>800<br>–<br>–<br>– | – |
| Collector–Emitter Saturation Voltage<br>(I <sub>C</sub> = –10 mAdc, I <sub>B</sub> = –0.5 mAdc)<br>(I <sub>C</sub> = –10 mAdc, I <sub>B</sub> = see Note 1)<br>(I <sub>C</sub> = –100 mAdc, I <sub>B</sub> = –5.0 mAdc) |  | V <sub>CE(sat)</sub> | –<br>–<br>–  | –0.075<br>–0.3<br>–0.25   | –0.3<br>–0.6<br>–0.65                                  | V |
| Base–Emitter Saturation Voltage<br>(I <sub>C</sub> = –10 mAdc, I <sub>B</sub> = –0.5 mAdc)<br>(I <sub>C</sub> = –100 mAdc, I <sub>B</sub> = –5.0 mAdc)  |  | V <sub>BE(sat)</sub> | –<br>–   | –0.7<br>–1.0  | –<br>–   | V |
| Base–Emitter On Voltage<br>(I <sub>C</sub> = –2.0 mAdc, V <sub>CE</sub> = –5.0 Vdc)<br>(I <sub>C</sub> = –10 mAdc, V <sub>CE</sub> = –5.0 Vdc)  |  | V <sub>BE(on)</sub>  | –0.55<br>–   | –0.62<br>–0.7   | –0.7<br>–0.82  | V |

## SMALL–SIGNAL CHARACTERISTICS

|  |  |                 |                          |                   |                          |     |
|--|--|-----------------|--------------------------|-------------------|--------------------------|-----|
| Current–Gain – Bandwidth Product<br>(I <sub>C</sub> = –10 mA, V <sub>CE</sub> = –5.0 V, f = 100 MHz)                         | BC556<br>BC557<br>BC558  | f <sub>T</sub>  | –<br>–<br>–              | 280<br>320<br>360 | –<br>–<br>–              | MHz |
| Output Capacitance<br>(V <sub>CB</sub> = –10 V, I <sub>C</sub> = 0, f = 1.0 MHz)   |  | C <sub>ob</sub> | –                        | 3.0               | 6.0                      | pF  |
| Noise Figure<br>(I <sub>C</sub> = –0.2 mAdc, V <sub>CE</sub> = –5.0 V,<br>R <sub>S</sub> = 2.0 kΩ, f = 1.0 kHz, Δf = 200 Hz) | BC556<br>BC557<br>BC558  | NF              | –<br>–<br>–              | 2.0<br>2.0<br>2.0 | 10<br>10<br>10           | dB  |
| Small–Signal Current Gain<br>(I <sub>C</sub> = –2.0 mAdc, V <sub>CE</sub> = 5.0 V, f = 1.0 kHz)                              | BC557<br>A Series Device<br>B Series Devices<br>C Series Devices | h <sub>fe</sub> | 125<br>125<br>240<br>450 | –<br>–<br>–<br>–  | 900<br>260<br>500<br>900 | –   |

1. I<sub>C</sub> = –10 mAdc on the constant base current characteristics, which yields the point I<sub>C</sub> = –11 mAdc, V<sub>CE</sub> = –1.0 V.

# BC556B, BC557A, B, C, BC558B

## BC557/BC558



Figure 1. Normalized DC Current Gain



Figure 2. "Saturation" and "On" Voltages



Figure 3. Collector Saturation Region



Figure 4. Base-Emitter Temperature Coefficient



Figure 5. Capacitances



Figure 6. Current-Gain - Bandwidth Product

# BC556B, BC557A, B, C, BC558B

## BC556

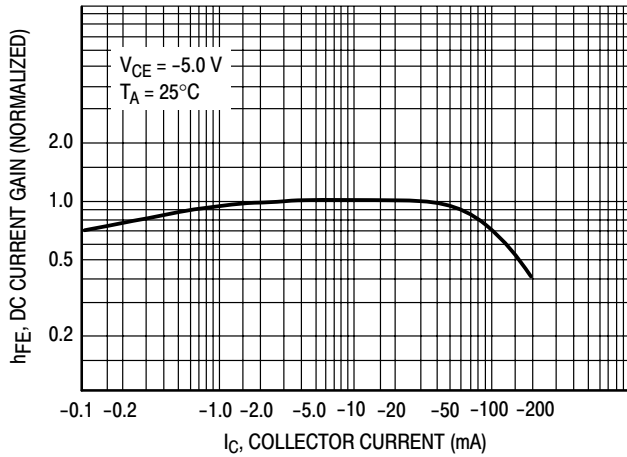


Figure 7. DC Current Gain

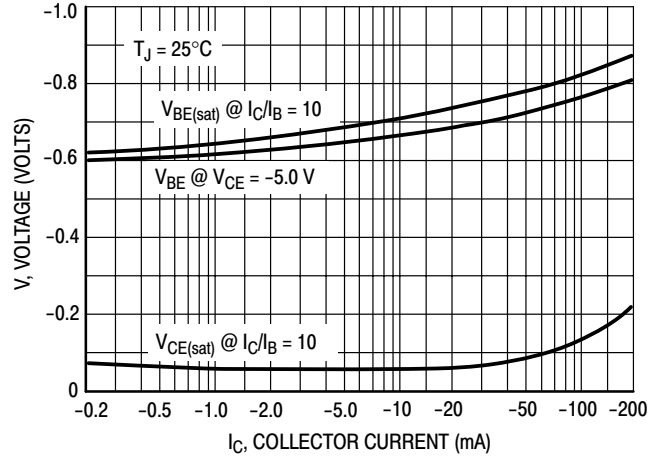


Figure 8. "On" Voltage

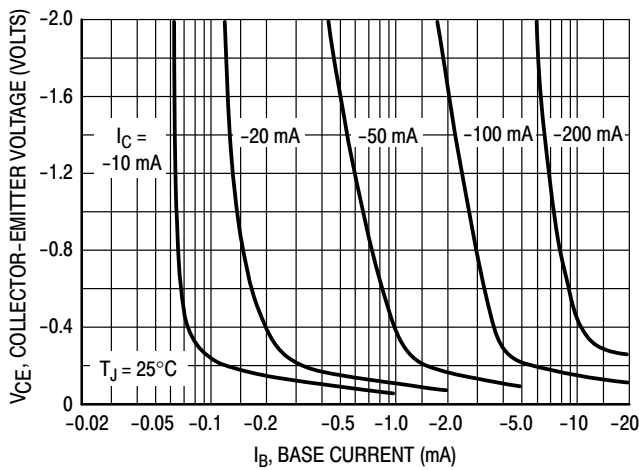


Figure 9. Collector Saturation Region

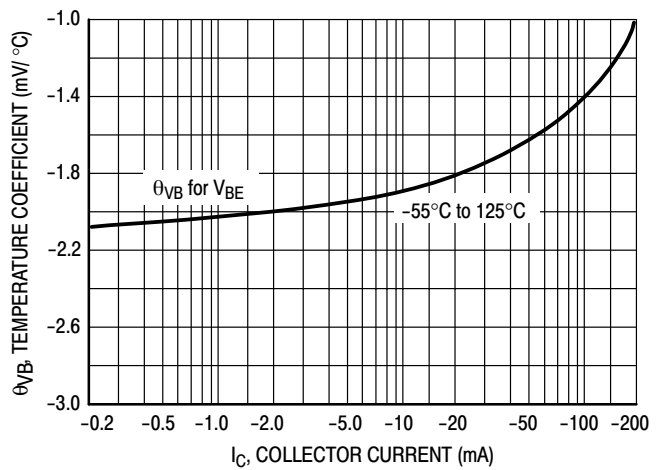


Figure 10. Base-Emitter Temperature Coefficient

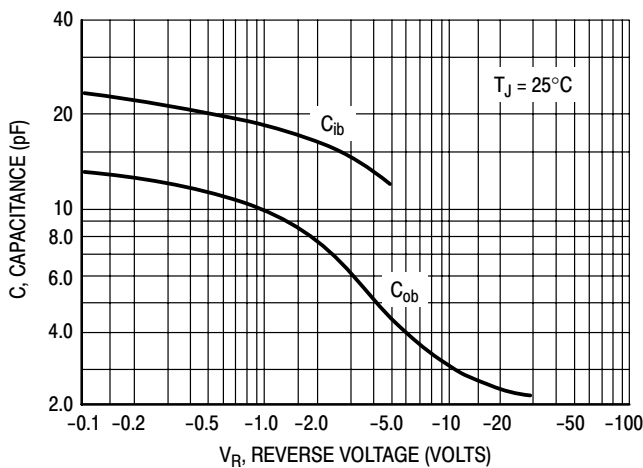


Figure 11. Capacitance

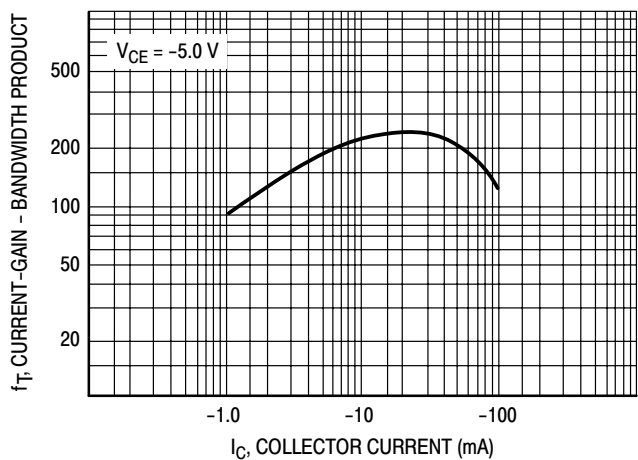


Figure 12. Current-Gain - Bandwidth Product

# BC556B, BC557A, B, C, BC558B

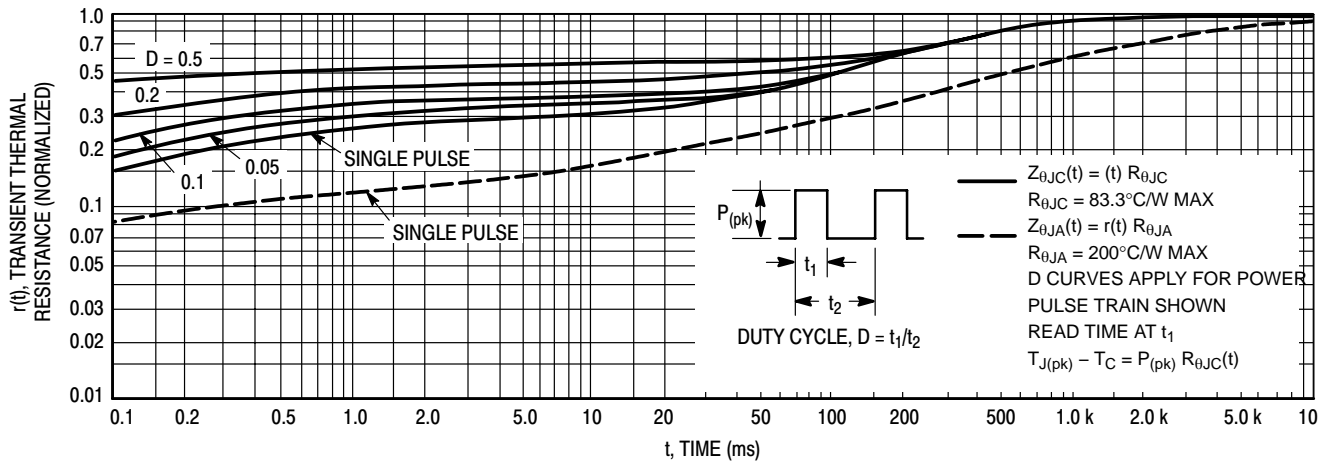


Figure 13. Thermal Response

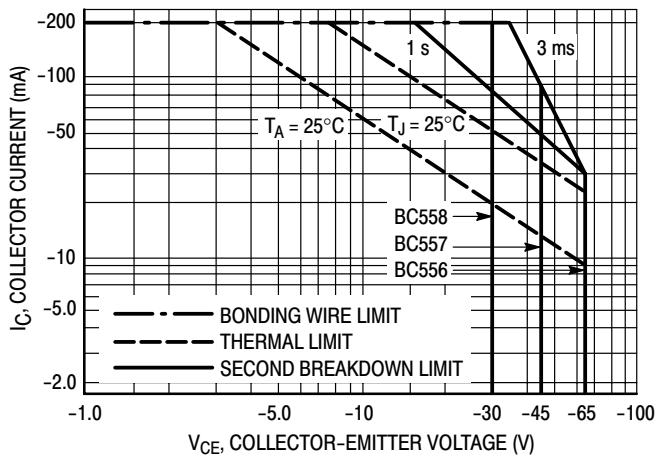


Figure 14. Active Region - Safe Operating Area

The safe operating area curves indicate  $I_C$ - $V_{CE}$  limits of the transistor that must be observed for reliable operation. Collector load lines for specific circuits must fall below the limits indicated by the applicable curve.

The data of Figure 14 is based upon  $T_{J(pk)} = 150^\circ\text{C}$ ;  $T_C$  or  $T_A$  is variable depending upon conditions. Pulse curves are valid for duty cycles to 10% provided  $T_{J(pk)} \leq 150^\circ\text{C}$ .  $T_{J(pk)}$  may be calculated from the data in Figure 13. At high case or ambient temperatures, thermal limitations will reduce the power than can be handled to values less than the limitations imposed by second breakdown.

## BC556B, BC557A, B, C, BC558B

### ORDERING INFORMATION

| Device     | Package            | Shipping†          |
|------------|--------------------|--------------------|
| BC556BG    | TO-92<br>(Pb-Free) | 5000 Units / Bulk  |
| BC556BZL1G | TO-92<br>(Pb-Free) | 2000 / Ammo Box    |
| BC557AZL1G | TO-92<br>(Pb-Free) | 2000 / Ammo Box    |
| BC557BG    | TO-92<br>(Pb-Free) | 5000 Units / Bulk  |
| BC557BRL1  | TO-92              | 2000 / Tape & Reel |
| BC557BRL1G | TO-92<br>(Pb-Free) | 2000 / Tape & Reel |
| BC557BZL1G | TO-92<br>(Pb-Free) | 2000 / Ammo Box    |
| BC557CG    | TO-92<br>(Pb-Free) | 5000 Units / Bulk  |
| BC557CZL1G | TO-92<br>(Pb-Free) | 2000 / Ammo Box    |
| BC558BRLG  | TO-92<br>(Pb-Free) | 2000 / Tape & Reel |
| BC558BRL1G | TO-92<br>(Pb-Free) | 2000 / Tape & Reel |
| BC558BZL1G | TO-92<br>(Pb-Free) | 2000 / Ammo Box    |

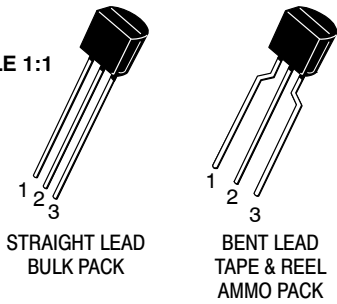
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

# MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS

ON Semiconductor®



SCALE 1:1



TO-92 (TO-226)  
CASE 29-11  
ISSUE AM

DATE 09 MAR 2007



STRAIGHT LEAD  
BULK PACK



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

| DIM | INCHES |       | MILLIMETERS |       |
|-----|--------|-------|-------------|-------|
|     | MIN    | MAX   | MIN         | MAX   |
| A   | 0.175  | 0.205 | 4.45        | 5.20  |
| B   | 0.170  | 0.210 | 4.32        | 5.33  |
| C   | 0.125  | 0.165 | 3.18        | 4.19  |
| D   | 0.016  | 0.021 | 0.407       | 0.533 |
| G   | 0.045  | 0.055 | 1.15        | 1.39  |
| H   | 0.095  | 0.105 | 2.42        | 2.66  |
| J   | 0.015  | 0.020 | 0.39        | 0.50  |
| K   | 0.500  | ---   | 12.70       | ---   |
| L   | 0.250  | ---   | 6.35        | ---   |
| N   | 0.080  | 0.105 | 2.04        | 2.66  |
| P   | ---    | 0.100 | ---         | 2.54  |
| R   | 0.115  | ---   | 2.93        | ---   |
| V   | 0.135  | ---   | 3.43        | ---   |



BENT LEAD  
TAPE & REEL  
AMMO PACK



NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

| DIM | MILLIMETERS |      |
|-----|-------------|------|
|     | MIN         | MAX  |
| A   | 4.45        | 5.20 |
| B   | 4.32        | 5.33 |
| C   | 3.18        | 4.19 |
| D   | 0.40        | 0.54 |
| G   | 2.40        | 2.80 |
| J   | 0.39        | 0.50 |
| K   | 12.70       | ---  |
| N   | 2.04        | 2.66 |
| P   | 1.50        | 4.00 |
| R   | 2.93        | ---  |
| V   | 3.43        | ---  |

STYLES ON PAGE 2

|                  |                           |  |
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| DESCRIPTION:     | TO-92 (TO-226)            | PAGE 1 OF 3  |

**TO-92 (TO-226)**  
**CASE 29-11**  
**ISSUE AM**

DATE 09 MAR 2007

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

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

STYLE 3:  
 PIN 1. ANODE  
 2. ANODE  
 3. CATHODE

STYLE 4:  
 PIN 1. CATHODE  
 2. CATHODE  
 3. ANODE

STYLE 5:  
 PIN 1. DRAIN  
 2. SOURCE  
 3. GATE

STYLE 6:  
 PIN 1. GATE  
 2. SOURCE & SUBSTRATE  
 3. DRAIN

STYLE 7:  
 PIN 1. SOURCE  
 2. DRAIN  
 3. GATE

STYLE 8:  
 PIN 1. DRAIN  
 2. GATE  
 3. SOURCE & SUBSTRATE

STYLE 9:  
 PIN 1. BASE 1  
 2. EMITTER  
 3. BASE 2

STYLE 10:  
 PIN 1. CATHODE  
 2. GATE  
 3. ANODE

STYLE 11:  
 PIN 1. ANODE  
 2. CATHODE & ANODE  
 3. CATHODE

STYLE 12:  
 PIN 1. MAIN TERMINAL 1  
 2. GATE  
 3. MAIN TERMINAL 2

STYLE 13:  
 PIN 1. ANODE 1  
 2. GATE  
 3. CATHODE 2

STYLE 14:  
 PIN 1. EMITTER  
 2. COLLECTOR  
 3. BASE

STYLE 15:  
 PIN 1. ANODE 1  
 2. CATHODE  
 3. ANODE 2

STYLE 16:  
 PIN 1. ANODE  
 2. GATE  
 3. CATHODE

STYLE 17:  
 PIN 1. COLLECTOR  
 2. BASE  
 3. EMITTER

STYLE 18:  
 PIN 1. ANODE  
 2. CATHODE  
 3. NOT CONNECTED

STYLE 19:  
 PIN 1. GATE  
 2. ANODE  
 3. CATHODE

STYLE 20:  
 PIN 1. NOT CONNECTED  
 2. CATHODE  
 3. ANODE

STYLE 21:  
 PIN 1. COLLECTOR  
 2. EMITTER  
 3. BASE

STYLE 22:  
 PIN 1. SOURCE  
 2. GATE  
 3. DRAIN

STYLE 23:  
 PIN 1. GATE  
 2. SOURCE  
 3. DRAIN

STYLE 24:  
 PIN 1. EMITTER  
 2. COLLECTOR/ANODE  
 3. CATHODE

STYLE 25:  
 PIN 1. MT 1  
 2. GATE  
 3. MT 2

STYLE 26:  
 PIN 1. V<sub>CC</sub>  
 2. GROUND 2  
 3. OUTPUT

STYLE 27:  
 PIN 1. MT  
 2. SUBSTRATE  
 3. MT

STYLE 28:  
 PIN 1. CATHODE  
 2. ANODE  
 3. GATE

STYLE 29:  
 PIN 1. NOT CONNECTED  
 2. ANODE  
 3. CATHODE

STYLE 30:  
 PIN 1. DRAIN  
 2. GATE  
 3. SOURCE

STYLE 31:  
 PIN 1. GATE  
 2. DRAIN  
 3. SOURCE

STYLE 32:  
 PIN 1. BASE  
 2. COLLECTOR  
 3. EMITTER

STYLE 33:  
 PIN 1. RETURN  
 2. INPUT  
 3. OUTPUT

STYLE 34:  
 PIN 1. INPUT  
 2. GROUND  
 3. LOGIC

STYLE 35:  
 PIN 1. GATE  
 2. COLLECTOR  
 3. EMITTER

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