

# BC546B, BC547A, B, C, BC548B, C

## Amplifier Transistors

### NPN Silicon

#### Features

- Pb-Free Packages are Available\*

#### MAXIMUM RATINGS

| Rating   | Symbol         | Value       | Unit                 |
|--|----------------|-------------|----------------------|
| Collector - Emitter Voltage  | BC546          | 65          | Vdc                  |
|  | BC547          | 45          |                      |
|  | BC548          | 30          |                      |
| Collector - Base Voltage   | BC546          | 80          | Vdc                  |
|  | BC547          | 50          |                      |
|  | BC548          | 30          |                      |
| Emitter - Base Voltage   | $V_{EBO}$      | 6.0         | Vdc                  |
| Collector Current - Continuous   | $I_C$          | 100         | mAdc                 |
| Total Device Dissipation @ $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$          | 625         | mW                   |
|  |                | 5.0         | mW/ $^\circ\text{C}$ |
| Total Device Dissipation @ $T_C = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$          | 1.5         | W                    |
|  |                | 12          | 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 | $^\circ\text{C}/\text{W}$ |

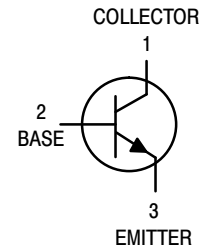
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

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

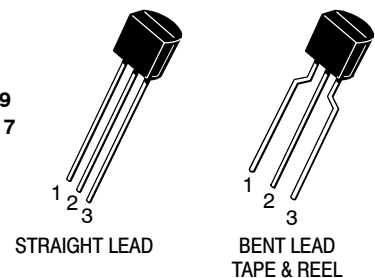


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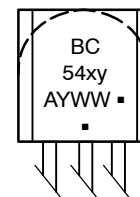
<http://onsemi.com>



TO-92  
CASE 29  
STYLE 17



#### MARKING DIAGRAM



- x = 6, 7, or 8
- y = A, B or C
- 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 5 of this data sheet.

# BC546B, BC547A, B, C, BC548B, C

## 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> = 1.0 mA, I <sub>B</sub> = 0)  | 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 μA)   | V <sub>(BR)CBO</sub> | 80<br>50<br>30                         | –<br>–<br>–                      | –<br>–<br>–                            | V                |
| Emitter – Base Breakdown Voltage<br>(I <sub>E</sub> = 10 μA, I <sub>C</sub> = 0)  | V <sub>(BR)EBO</sub> | 6.0<br>6.0<br>6.0                      | –<br>–<br>–                      | –<br>–<br>–                            | V                |
| Collector Cutoff Current<br>(V <sub>CE</sub> = 70 V, V <sub>BE</sub> = 0)<br>(V <sub>CE</sub> = 50 V, V <sub>BE</sub> = 0)<br>(V <sub>CE</sub> = 35 V, V <sub>BE</sub> = 0)<br>(V <sub>CE</sub> = 30 V, T <sub>A</sub> = 125°C) | I <sub>CES</sub>     | –<br>–<br>–<br>–                       | 0.2<br>0.2<br>0.2<br>–           | 15<br>15<br>15<br>4.0                  | nA<br><br><br>μA |
| <b>ON CHARACTERISTICS</b>   |                      |  |                                  |  |                  |
| DC Current Gain<br>(I <sub>C</sub> = 10 μA, V <sub>CE</sub> = 5.0 V)  | h <sub>FE</sub>      | –<br>–<br>–                            | 90<br>150<br>270                 | –<br>–<br>–                            | –                |
| (I <sub>C</sub> = 2.0 mA, V <sub>CE</sub> = 5.0 V)  |                      | 110<br>110<br>110<br>110<br>200<br>420 | –<br>–<br>–<br>180<br>290<br>520 | 450<br>800<br>800<br>220<br>450<br>800 |                  |
| (I <sub>C</sub> = 100 mA, V <sub>CE</sub> = 5.0 V)  |                      | –<br>–<br>–                            | 120<br>180<br>300                | –<br>–<br>–                            |                  |
| Collector – Emitter Saturation Voltage<br>(I <sub>C</sub> = 10 mA, I <sub>B</sub> = 0.5 mA)<br>(I <sub>C</sub> = 100 mA, I <sub>B</sub> = 5.0 mA)<br>(I <sub>C</sub> = 10 mA, I <sub>B</sub> = See Note 1)                      | V <sub>CE(sat)</sub> | –<br>–<br>–                            | 0.09<br>0.2<br>0.3               | 0.25<br>0.6<br>0.6                     | V                |
| Base – Emitter Saturation Voltage<br>(I <sub>C</sub> = 10 mA, I <sub>B</sub> = 0.5 mA)  | V <sub>BE(sat)</sub> | –                                      | 0.7                              | –                                      | V                |
| Base – Emitter On Voltage<br>(I <sub>C</sub> = 2.0 mA, V <sub>CE</sub> = 5.0 V)<br>(I <sub>C</sub> = 10 mA, V <sub>CE</sub> = 5.0 V)  | V <sub>BE(on)</sub>  | 0.55<br>–                              | –<br>–                           | 0.7<br>0.77                            | V                |
| <b>SMALL-SIGNAL CHARACTERISTICS</b>   |                      |  |                                  |  |                  |
| Current – Gain – Bandwidth Product<br>(I <sub>C</sub> = 10 mA, V <sub>CE</sub> = 5.0 V, f = 100 MHz)  | f <sub>T</sub>       | 150<br>150<br>150                      | 300<br>300<br>300                | –<br>–<br>–                            | MHz              |
| Output Capacitance<br>(V <sub>CB</sub> = 10 V, I <sub>C</sub> = 0, f = 1.0 MHz)   | C <sub>obo</sub>     | –                                      | 1.7                              | 4.5                                    | pF               |
| Input Capacitance<br>(V <sub>EB</sub> = 0.5 V, I <sub>C</sub> = 0, f = 1.0 MHz)   | C <sub>ibo</sub>     | –                                      | 10                               | –                                      | pF               |
| Small – Signal Current Gain<br>(I <sub>C</sub> = 2.0 mA, V <sub>CE</sub> = 5.0 V, f = 1.0 kHz)  | h <sub>fe</sub>      | 125<br>125<br>125<br>240<br>450        | –<br>–<br>220<br>330<br>600      | 500<br>900<br>260<br>500<br>900        | –                |
| Noise Figure (I <sub>C</sub> = 0.2 mA, V <sub>CE</sub> = 5.0 V, R <sub>S</sub> = 2 kΩ, f = 1.0 kHz, Δf = 200 Hz)  | NF                   | –<br>–<br>–                            | 2.0<br>2.0<br>2.0                | 10<br>10<br>10                         | dB               |

1. I<sub>B</sub> is value for which I<sub>C</sub> = 11 mA at V<sub>CE</sub> = 1.0 V.

BC547/BC548

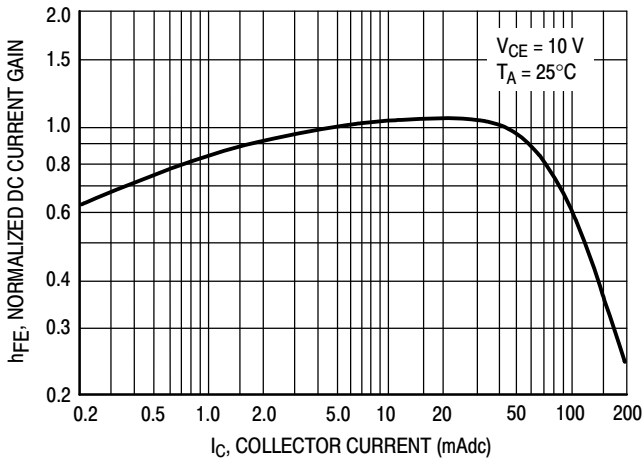


Figure 1. Normalized DC Current Gain

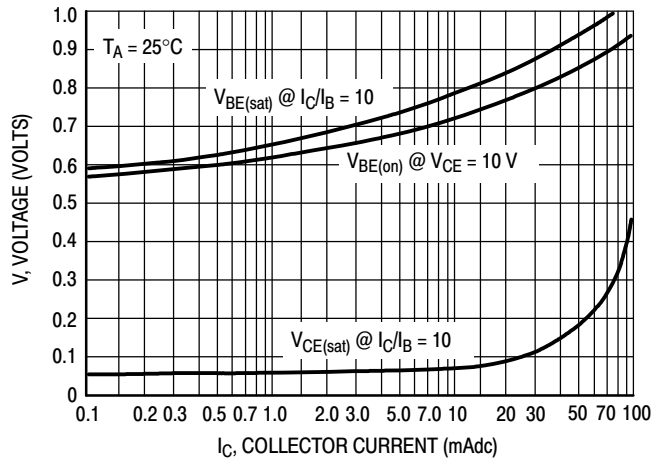


Figure 2. "Saturation" and "On" Voltages

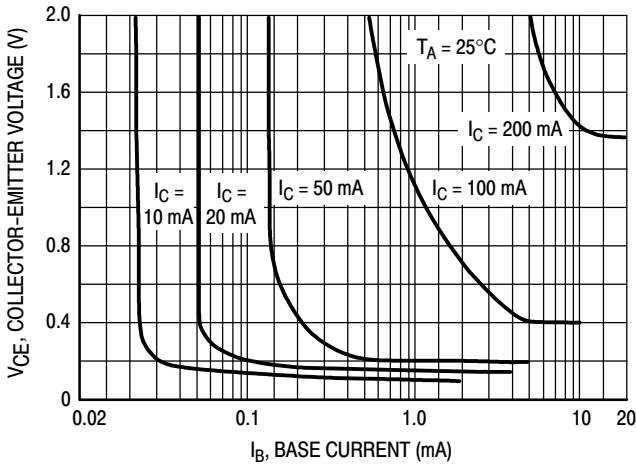


Figure 3. Collector Saturation Region

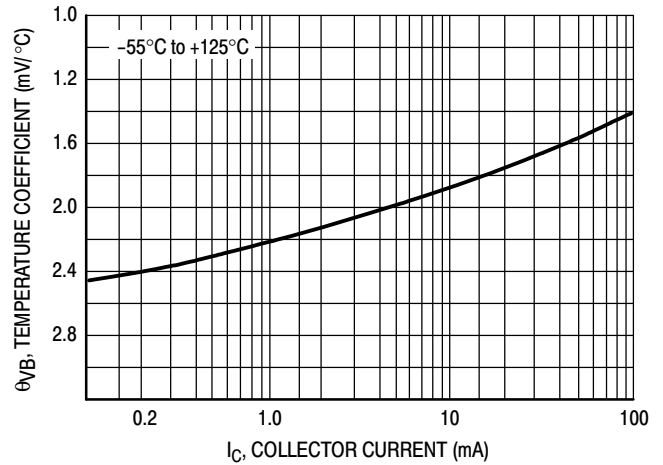


Figure 4. Base-Emitter Temperature Coefficient

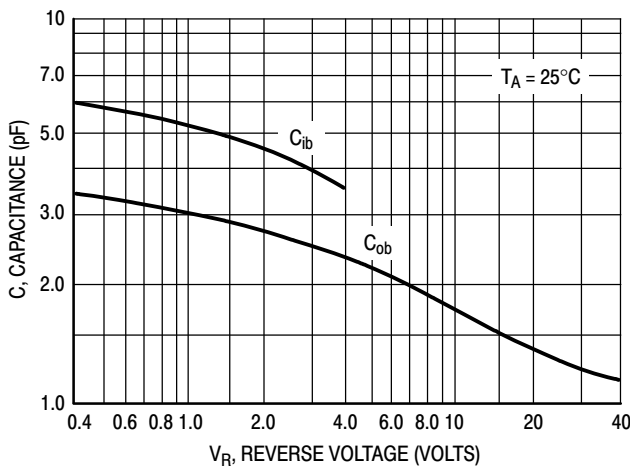


Figure 5. Capacitances

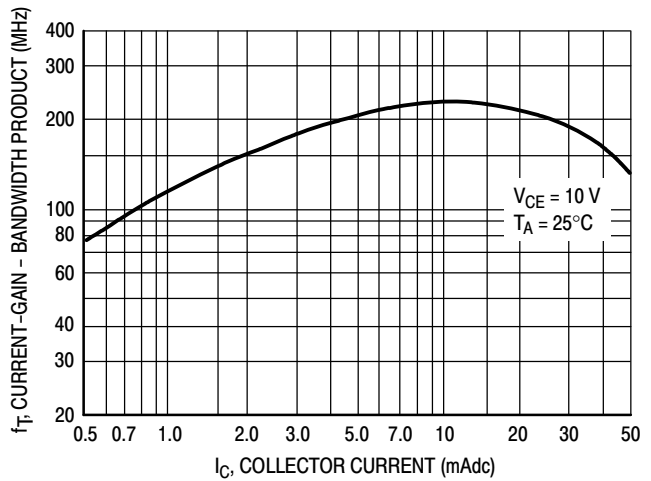


Figure 6. Current-Gain - Bandwidth Product

BC546



Figure 7. DC Current Gain



Figure 8. "On" Voltage



Figure 9. Collector Saturation Region



Figure 10. Base-Emitter Temperature Coefficient



Figure 11. Capacitance

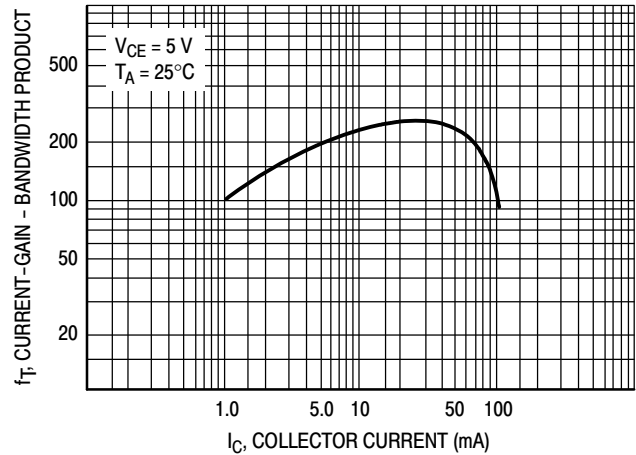


Figure 12. Current-Gain - Bandwidth Product

## BC546B, BC547A, B, C, BC548B, C

### ORDERING INFORMATION

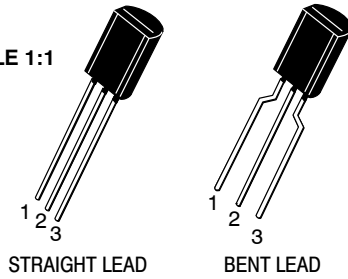
| Device     | Package            | Shipping†          |
|------------|--------------------|--------------------|
| BC546B     | TO-92              | 5000 Units / Bulk  |
| BC546BG    | TO-92<br>(Pb-Free) | 5000 Units / Bulk  |
| BC546BRL1  | TO-92              | 2000 / Tape & Reel |
| BC546BRL1G | TO-92<br>(Pb-Free) | 2000 / Tape & Reel |
| BC546BZL1G | TO-92<br>(Pb-Free) | 2000 / Ammo Box    |
| BC547ARL   | TO-92              | 2000 / Tape & Reel |
| BC547ARLG  | TO-92<br>(Pb-Free) | 2000 / Tape & Reel |
| BC547AZL1G | TO-92<br>(Pb-Free) | 2000 / Ammo Box    |
| BC547BG    | TO-92<br>(Pb-Free) | 5000 Units / Bulk  |
| BC547BRL1G | TO-92<br>(Pb-Free) | 2000 / Tape & Reel |
| BC547BZL1G | TO-92<br>(Pb-Free) | 2000 / Ammo Box    |
| BC547CG    | TO-92<br>(Pb-Free) | 5000 Units / Bulk  |
| BC547CZL1G | TO-92<br>(Pb-Free) | 2000 / Ammo Box    |
| BC548BG    | TO-92<br>(Pb-Free) | 5000 Units / Bulk  |
| BC548BRL1G | TO-92<br>(Pb-Free) | 2000 / Tape & Reel |
| BC548BZL1G | TO-92<br>(Pb-Free) | 2000 / Ammo Box    |
| BC548CG    | TO-92<br>(Pb-Free) | 5000 Units / Bulk  |
| BC548CZL1G | 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

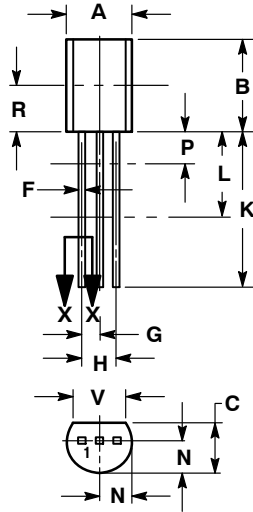


SCALE 1:1

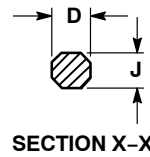


## TO-92 (TO-226) 1 WATT CASE 29-10 ISSUE A

DATE 08 MAY 2012



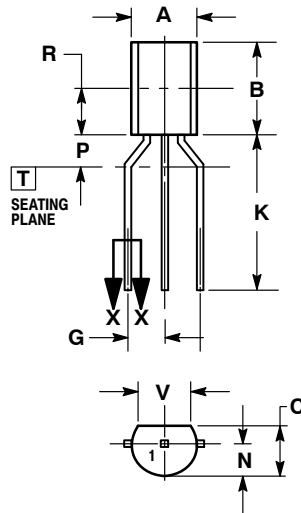
STRAIGHT LEAD



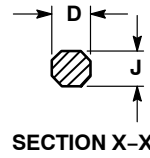
SECTION X-X

- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1994.
  2. CONTROLLING DIMENSION: INCHES.
  3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
  4. DIMENSION F APPLIES BETWEEN DIMENSIONS P AND L. DIMENSIONS D AND J APPLY BETWEEN DIMENSIONS L AND K MINIMUM. THE LEAD DIMENSIONS ARE UNCONTROLLED IN DIMENSION P AND BEYOND DIMENSION K MINIMUM.

| DIM | INCHES |       | MILLIMETERS |      |
|-----|--------|-------|-------------|------|
|     | MIN    | MAX   | MIN         | MAX  |
| A   | 0.175  | 0.205 | 4.44        | 5.21 |
| B   | 0.290  | 0.310 | 7.37        | 7.87 |
| C   | 0.125  | 0.165 | 3.18        | 4.19 |
| D   | 0.018  | 0.021 | 0.46        | 0.53 |
| F   | 0.016  | 0.019 | 0.41        | 0.48 |
| G   | 0.045  | 0.055 | 1.15        | 1.39 |
| H   | 0.095  | 0.105 | 2.42        | 2.66 |
| J   | 0.018  | 0.024 | 0.46        | 0.61 |
| 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   | 0.135  | ---   | 3.43        | ---  |
| V   | 0.135  | ---   | 3.43        | ---  |



BENT LEAD



SECTION X-X

- NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
  2. CONTROLLING DIMENSION: INCHES.
  3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
  4. DIMENSION F APPLIES BETWEEN DIMENSIONS P AND L. DIMENSIONS D AND J APPLY BETWEEN DIMENSIONS L AND K MINIMUM. THE LEAD DIMENSIONS ARE UNCONTROLLED IN DIMENSION P AND BEYOND DIMENSION K MINIMUM.

| DIM | INCHES |       | MILLIMETERS |      |
|-----|--------|-------|-------------|------|
|     | MIN    | MAX   | MIN         | MAX  |
| A   | 0.175  | 0.205 | 4.44        | 5.21 |
| B   | 0.290  | 0.310 | 7.37        | 7.87 |
| C   | 0.125  | 0.165 | 3.18        | 4.19 |
| D   | 0.018  | 0.021 | 0.46        | 0.53 |
| G   | 0.094  | 0.102 | 2.40        | 2.80 |
| J   | 0.018  | 0.024 | 0.46        | 0.61 |
| K   | 0.500  | ---   | 12.70       | ---  |
| N   | 0.080  | 0.105 | 2.04        | 2.66 |
| P   | ---    | 0.100 | ---         | 2.54 |
| R   | 0.135  | ---   | 3.43        | ---  |
| V   | 0.135  | ---   | 3.43        | ---  |

### STYLES ON PAGE 2

|                         |                              |  |
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**TO-92 (TO-226) 1 WATT  
CASE 29-10  
ISSUE A**

DATE 08 MAY 2012

- |   |  |  |   |   |
|---|--|--|---|---|
| <p>STYLE 1:<br/>PIN 1. EMITTER<br/>2. BASE<br/>3. COLLECTOR</p>             | <p>STYLE 2:<br/>PIN 1. BASE<br/>2. EMITTER<br/>3. COLLECTOR</p>                | <p>STYLE 3:<br/>PIN 1. ANODE<br/>2. ANODE<br/>3. CATHODE</p>               | <p>STYLE 4:<br/>PIN 1. CATHODE<br/>2. CATHODE<br/>3. ANODE</p>            | <p>STYLE 5:<br/>PIN 1. DRAIN<br/>2. SOURCE<br/>3. GATE</p>            |
| <p>STYLE 6:<br/>PIN 1. GATE<br/>2. SOURCE &amp; SUBSTRATE<br/>3. DRAIN</p>  | <p>STYLE 7:<br/>PIN 1. SOURCE<br/>2. DRAIN<br/>3. GATE</p>                     | <p>STYLE 8:<br/>PIN 1. DRAIN<br/>2. GATE<br/>3. SOURCE &amp; SUBSTRATE</p> | <p>STYLE 9:<br/>PIN 1. BASE 1<br/>2. EMITTER<br/>3. BASE 2</p>            | <p>STYLE 10:<br/>PIN 1. CATHODE<br/>2. GATE<br/>3. ANODE</p>          |
| <p>STYLE 11:<br/>PIN 1. ANODE<br/>2. CATHODE &amp; ANODE<br/>3. CATHODE</p> | <p>STYLE 12:<br/>PIN 1. MAIN TERMINAL 1<br/>2. GATE<br/>3. MAIN TERMINAL 2</p> | <p>STYLE 13:<br/>PIN 1. ANODE 1<br/>2. GATE<br/>3. CATHODE 2</p>           | <p>STYLE 14:<br/>PIN 1. EMITTER<br/>2. COLLECTOR<br/>3. BASE</p>          | <p>STYLE 15:<br/>PIN 1. ANODE 1<br/>2. CATHODE<br/>3. ANODE 2</p>     |
| <p>STYLE 16:<br/>PIN 1. ANODE<br/>2. GATE<br/>3. CATHODE</p>                | <p>STYLE 17:<br/>PIN 1. COLLECTOR<br/>2. BASE<br/>3. EMITTER</p>               | <p>STYLE 18:<br/>PIN 1. ANODE<br/>2. CATHODE<br/>3. NOT CONNECTED</p>      | <p>STYLE 19:<br/>PIN 1. GATE<br/>2. ANODE<br/>3. CATHODE</p>              | <p>STYLE 20:<br/>PIN 1. NOT CONNECTED<br/>2. CATHODE<br/>3. ANODE</p> |
| <p>STYLE 21:<br/>PIN 1. COLLECTOR<br/>2. EMITTER<br/>3. BASE</p>            | <p>STYLE 22:<br/>PIN 1. SOURCE<br/>2. GATE<br/>3. DRAIN</p>                    | <p>STYLE 23:<br/>PIN 1. GATE<br/>2. SOURCE<br/>3. DRAIN</p>                | <p>STYLE 24:<br/>PIN 1. EMITTER<br/>2. COLLECTOR/ANODE<br/>3. CATHODE</p> | <p>STYLE 25:<br/>PIN 1. MT 1<br/>2. GATE<br/>3. MT 2</p>              |
| <p>STYLE 26:<br/>PIN 1. V<sub>CC</sub><br/>2. GROUND 2<br/>3. OUTPUT</p>    | <p>STYLE 27:<br/>PIN 1. MT<br/>2. SUBSTRATE<br/>3. MT</p>                      | <p>STYLE 28:<br/>PIN 1. CATHODE<br/>2. ANODE<br/>3. GATE</p>               | <p>STYLE 29:<br/>PIN 1. NOT CONNECTED<br/>2. ANODE<br/>3. CATHODE</p>     | <p>STYLE 30:<br/>PIN 1. DRAIN<br/>2. GATE<br/>3. SOURCE</p>           |
| <p>STYLE 31:<br/>PIN 1. GATE<br/>2. DRAIN<br/>3. SOURCE</p>                 | <p>STYLE 32:<br/>PIN 1. BASE<br/>2. COLLECTOR<br/>3. EMITTER</p>               | <p>STYLE 33:<br/>PIN 1. RETURN<br/>2. INPUT<br/>3. OUTPUT</p>              | <p>STYLE 34:<br/>PIN 1. INPUT<br/>2. GROUND<br/>3. LOGIC</p>              | <p>STYLE 35:<br/>PIN 1. GATE<br/>2. COLLECTOR<br/>3. EMITTER</p>      |

|                         |                              |   |
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