

Amplifier Transistors

NPN Silicon

BC546B, BC547A, B, C, BC548B, C

Features

- Pb-Free Packages are Available*

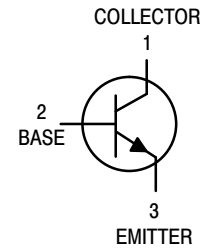
MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|--|----------------|----------------|----------------------------|
| Collector - Emitter Voltage BC546 BC547 BC548 | V_{CEO} | 65 45 30 | Vdc |
| Collector - Base Voltage BC546 BC547 BC548 | V_{CBO} | 80 50 30 | Vdc |
| Emitter - Base Voltage | V_{EBO} | 6.0 | Vdc |
| Collector Current - Continuous | I_C | 100 | mA dc |
| Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C | P_D | 625 5.0 | mW mW/ $^\circ\text{C}$ |
| Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C | P_D | 1.5 12 | W mW/ $^\circ\text{C}$ |
| Operating and Storage Junction Temperature Range | T_J, T_{stg} | -55 to +150 | $^\circ\text{C}$ |

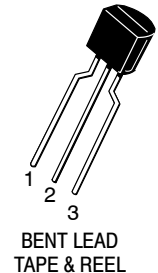
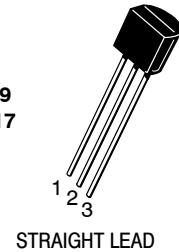
THERMAL CHARACTERISTICS

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

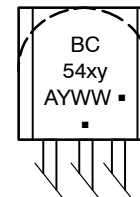
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.



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.

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

BC546B, BC547A, B, C, BC548B, C

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|----------------------|---------------------------------|-----------------------------|---------------------------------|------------------|
| OFF CHARACTERISTICS | | | | | |
| Collector – Emitter Breakdown Voltage (I _C = 1.0 mA, I _B = 0) | V _{(BR)CEO} | 65 45 30 | – – – | – – – | V |
| Collector – Base Breakdown Voltage (I _C = 100 µA) | V _{(BR)CBO} | 80 50 30 | – – – | – – – | V |
| Emitter – Base Breakdown Voltage (I _E = 10 µA, I _C = 0) | V _{(BR)EBO} | 6.0 6.0 6.0 | – – – | – – – | V |
| Collector Cutoff Current (V _{CE} = 70 V, V _{BE} = 0) (V _{CE} = 50 V, V _{BE} = 0) (V _{CE} = 35 V, V _{BE} = 0) (V _{CE} = 30 V, T _A = 125°C) | I _{CES} | – – – – | 0.2 0.2 0.2 – | 15 15 15 4.0 | nA µA |
| ON CHARACTERISTICS | | | | | |
| DC Current Gain (I _C = 10 µA, V _{CE} = 5.0 V) | h _{FE} | – – – | 90 150 270 | – – – | – |
| (I _C = 2.0 mA, V _{CE} = 5.0 V) | | 110 110 110 110 | – – – 180 | 450 800 800 220 | |
| (I _C = 100 mA, V _{CE} = 5.0 V) | | 200 420 | 290 520 | 450 800 | |
| Collector – Emitter Saturation Voltage (I _C = 10 mA, I _B = 0.5 mA) (I _C = 100 mA, I _B = 5.0 mA) (I _C = 10 mA, I _B = See Note 1) | V _{CE(sat)} | – – – | 0.09 0.2 0.3 | 0.25 0.6 0.6 | V |
| Base – Emitter Saturation Voltage (I _C = 10 mA, I _B = 0.5 mA) | V _{BE(sat)} | – | 0.7 | – | V |
| Base – Emitter On Voltage (I _C = 2.0 mA, V _{CE} = 5.0 V) (I _C = 10 mA, V _{CE} = 5.0 V) | V _{BE(on)} | 0.55 – | – – | 0.7 0.77 | V |
| SMALL-SIGNAL CHARACTERISTICS | | | | | |
| Current – Gain – Bandwidth Product (I _C = 10 mA, V _{CE} = 5.0 V, f = 100 MHz) | f _T | 150 150 150 | 300 300 300 | – – – | MHz |
| Output Capacitance (V _{CB} = 10 V, I _C = 0, f = 1.0 MHz) | C _{obo} | – | 1.7 | 4.5 | pF |
| Input Capacitance (V _{EB} = 0.5 V, I _C = 0, f = 1.0 MHz) | C _{ibo} | – | 10 | – | pF |
| Small – Signal Current Gain (I _C = 2.0 mA, V _{CE} = 5.0 V, f = 1.0 kHz) | h _{fe} | 125 125 125 240 450 | – – 220 330 600 | 500 900 260 500 900 | – |
| Noise Figure (I _C = 0.2 mA, V _{CE} = 5.0 V, R _S = 2 kΩ, f = 1.0 kHz, Δf = 200 Hz) | NF | – – – | 2.0 2.0 2.0 | 10 10 10 | dB |

1. I_B is value for which I_C = 11 mA at V_{CE} = 1.0 V.

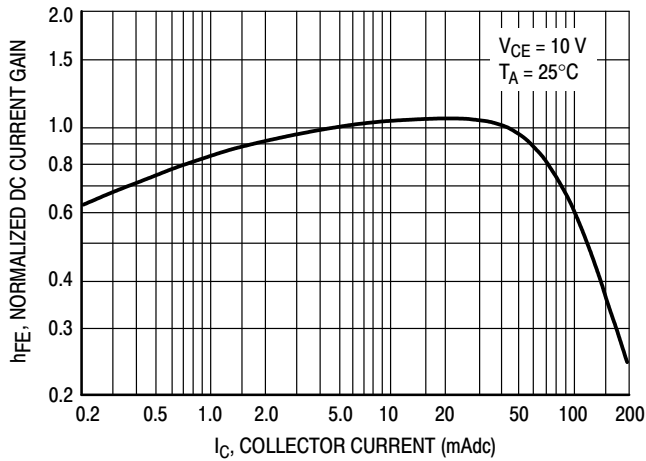


Figure 1. Normalized DC Current Gain

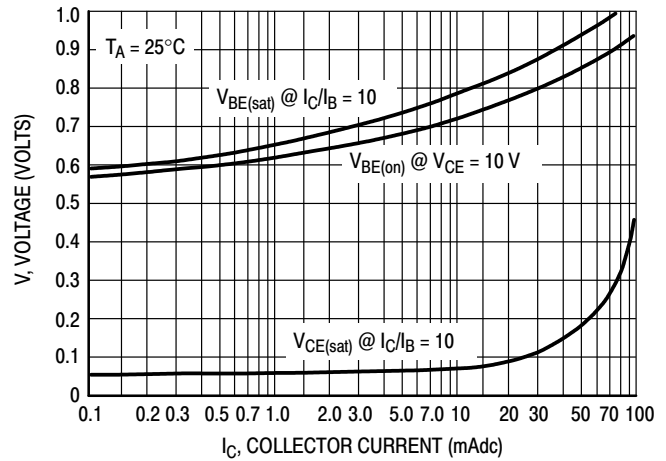


Figure 2. "Saturation" and "On" Voltages

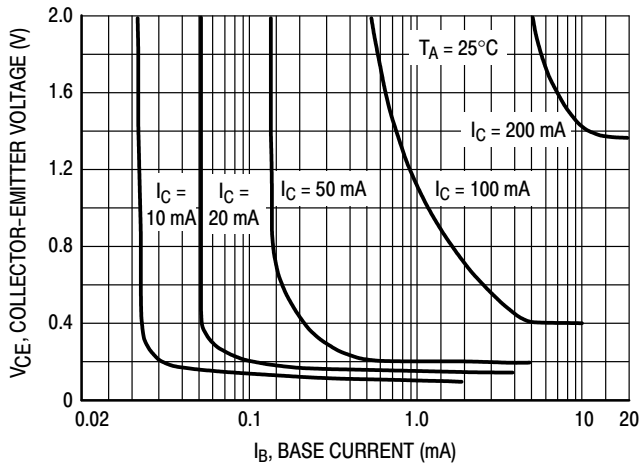


Figure 3. Collector Saturation Region

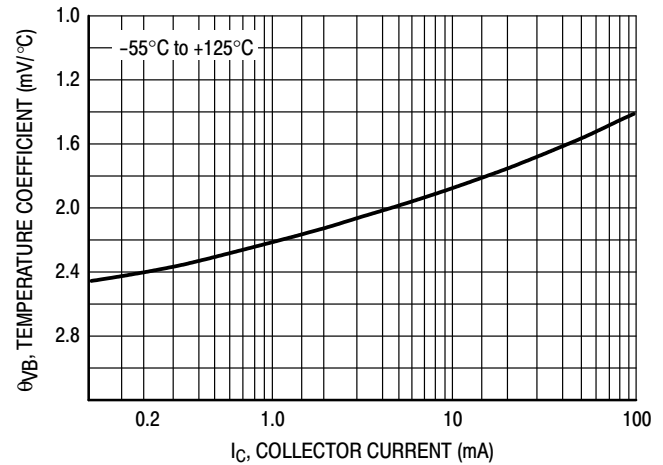


Figure 4. Base-Emitter Temperature Coefficient

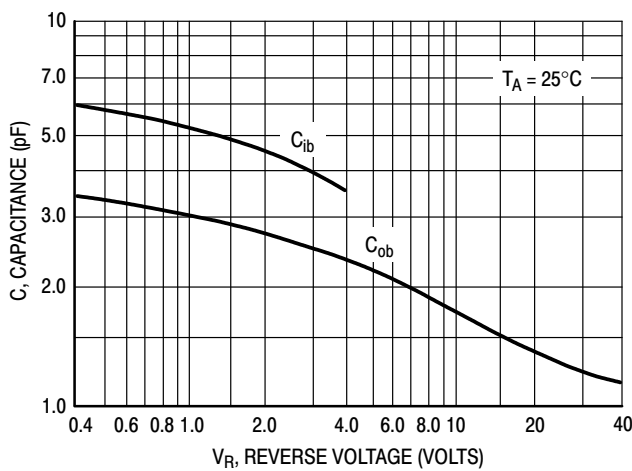


Figure 5. Capacitances

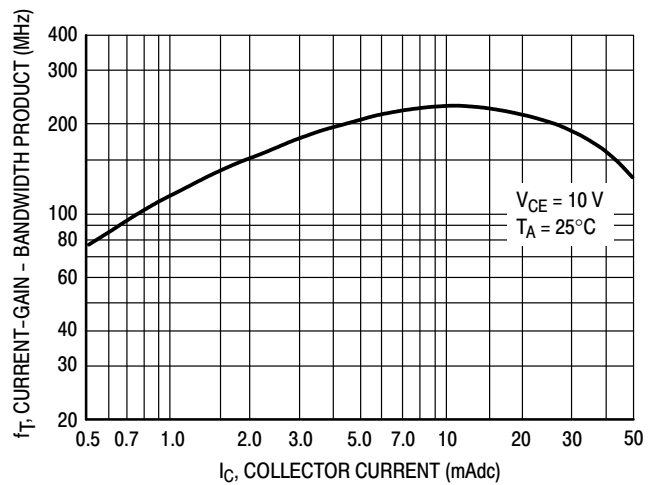


Figure 6. Current-Gain - Bandwidth Product

BC546B, BC547A, B, C, BC548B, C

BC546

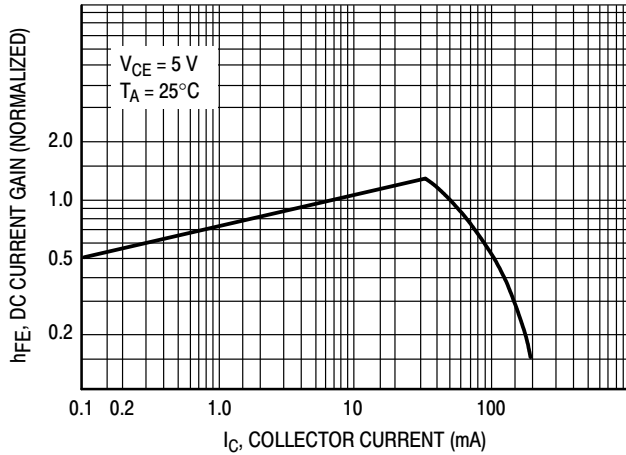


Figure 7. DC Current Gain

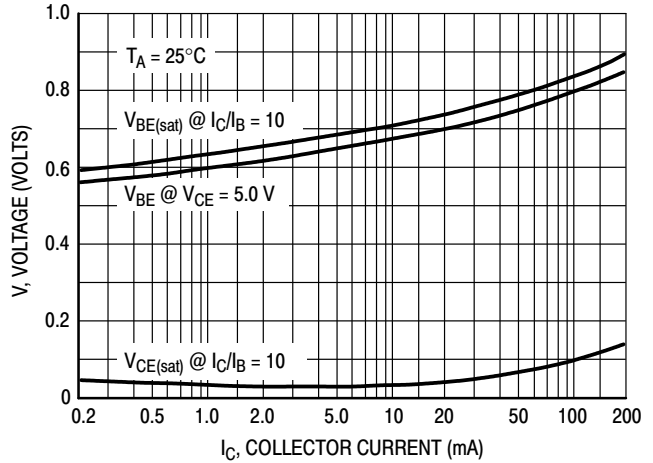


Figure 8. "On" Voltage

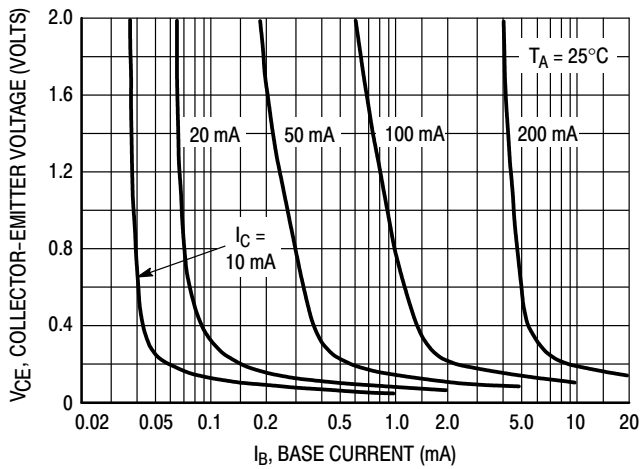


Figure 9. Collector Saturation Region

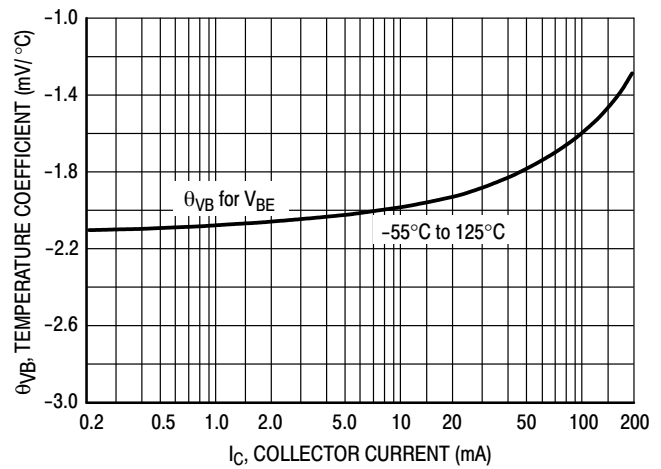


Figure 10. Base-Emitter Temperature Coefficient

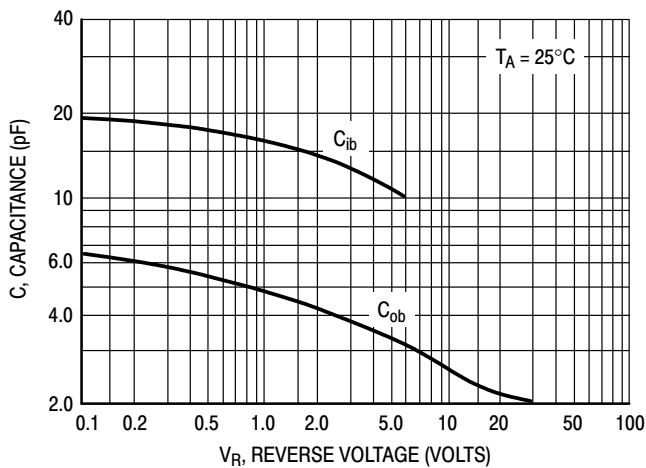


Figure 11. Capacitance

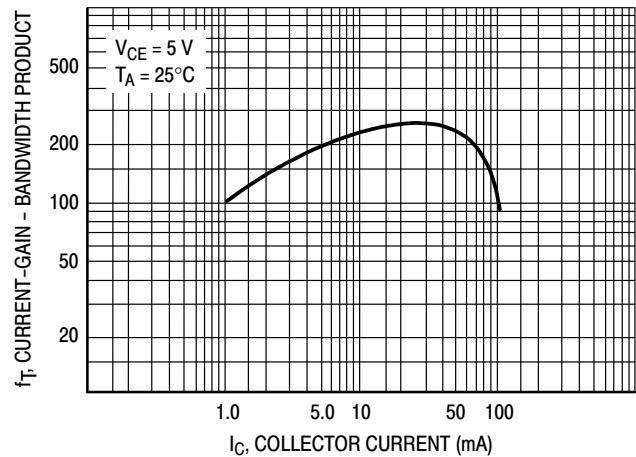


Figure 12. Current-Gain - Bandwidth Product

BC546B, BC547A, B, C, BC548B, C

ORDERING INFORMATION

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

ON

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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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_{CC} 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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