# BD241C (NPN), BD242B (PNP), BD242C (PNP)

# Complementary Silicon Plastic Power Transistors

Designed for use in general purpose amplifier and switching applications.

### Features

- High Current Gain − Bandwidth Product
- Compact TO−220 AB Package
- Epoxy Meets UL94 V−0 @ 0.125 in
- These Devices are Pb−Free and are RoHS Compliant*

### MAXIMUM RATINGS

| Rating | Symbol | BD242B | BD241C BD242C | Unit |
|---|---|---|---|---|
| Collector−Emitter Voltage | $V_{CEO}$ | 80 | 100 | Vdc |
| Collector−Emitter Voltage | $V_{CES}$ | 90 | 115 | Vdc |
| Emitter−Base Voltage | $V_{EB}$ | 5.0 | | Vdc |
| Collector Current −Continuous | $I_C$ | 3.0 | | Adc |
| Collector Current − Peak | $I_{CM}$ | 5.0 | | Adc |
| Base Current | $I_B$ | 1.0 | | Adc |
| Total Device Dissipation @ $T_C$ = 25°C<br>Derate above 25°C | $P_D$ | 40<br>0.32 | | W<br>W/°C |
| Operating and Storage Junction Temperature Range | $T_J$, $T_{stg}$ | −65 to +150 | | °C |
| ESD − Human Body Model | HBM | 3B | | V |
| ESD − Machine Model | MM | C | | V |

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.

### THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|---|---|---|---|
| Thermal Resistance, Junction−to−Ambient | $R_{\theta JA}$ | 62.5 | °C/W |
| Thermal Resistance, Junction−to−Case | $R_{\theta JC}$ | 3.125 | °C/W |

*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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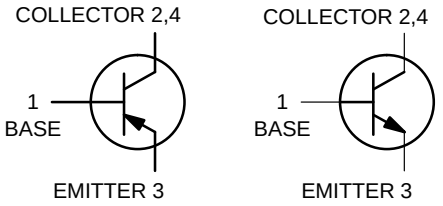
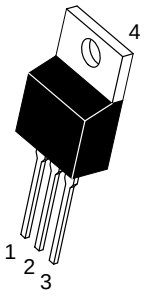
**POWER TRANSISTORS**
**COMPLEMENTARY**
**SILICON**
**3 AMP**
**80−100 VOLTS**
**40 WATTS**

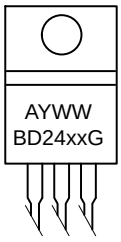
**COMPLEMENTARY**




**TO−220**
**CASE 221A**
**STYLE 1**

**MARKING DIAGRAM**




BD24xx = Device Code
xx = 1C, 2B, or 2C
A = Assembly Location
Y = Year
WW = Work Week
G = Pb−Free Package

### ORDERING INFORMATION

| Device | Package | Shipping† |
|---|---|---|
| BD241CG | TO−220 (Pb−Free) | 50 Units/Rail |
| BD242BG | TO−220 (Pb−Free) | 50 Units/Rail |
| BD242CG | TO−220 (Pb−Free) | 50 Units/Rail |

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

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

| Characteristic | | Symbol | Min | Max | Unit |
|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | |
| Collector−Emitter Sustaining Voltage (Note 1)<br>($I_C$ = 30 mAdc, $I_B$ = 0) | BD242B<br>BD241C, BD242C | $V_{CEO}$ | <br>80<br>100 | | Vdc |
| Collector Cutoff Current<br>($V_{CE}$ = 50 Vdc, $I_B$ = 0)<br>($V_{CE}$ = 60 Vdc, $I_B$ = 0) | <br>BD242B<br>BD241C, BD242C | $I_{CEO}$ | | <br>0.3 | mAdc |
| Collector Cutoff Current<br>($V_{CE}$ = 80 Vdc, $V_{EB}$ = 0)<br>($V_{CE}$ = 100 Vdc, $V_{EB}$ = 0) | <br>BD242B<br>BD241C, BD242C | $I_{CES}$ | | <br>200 | μAdc |
| Emitter Cutoff Current<br>($V_{BE}$ = 5.0 Vdc, $I_C$ = 0) | | $I_{EBO}$ | | <br>1.0 | mAdc |
| **ON CHARACTERISTICS** (Note 1) | | | | | |
| DC Current Gain<br>($I_C$ = 1.0 Adc, $V_{CE}$ = 4.0 Vdc)<br>($I_C$ = 3.0 Adc, $V_{CE}$ = 4.0 Vdc) | | $h_{FE}$ | <br>25<br>10 | | |
| Collector−Emitter Saturation Voltage<br>($I_C$ = 3.0 Adc, $I_B$ = 0.6 Adc) | | $V_{CE(sat)}$ | | <br>1.2 | Vdc |
| Base−Emitter On Voltage<br>($I_C$ = 3.0 Adc, $V_{CE}$ = 4.0 Vdc) | | $V_{BE(on)}$ | | <br>1.8 | Vdc |
| **DYNAMIC CHARACTERISTICS** | | | | | |
| Current Gain − Bandwidth Product (Note 2)<br>($I_C$ = 500 mAdc, $V_{CE}$ = 10 Vdc, $f_{test}$ = 1.0 MHz) | | $f_T$ | <br>3.0 | | MHz |
| Small−Signal Current Gain<br>($I_C$ = 0.5 Adc, $V_{CE}$ = 10 Vdc, f = 1.0 kHz) | | $h_{fe}$ | <br>20 | | |

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.

1. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.
2. $f_T = |h_{fe}| \bullet f_{test}$.

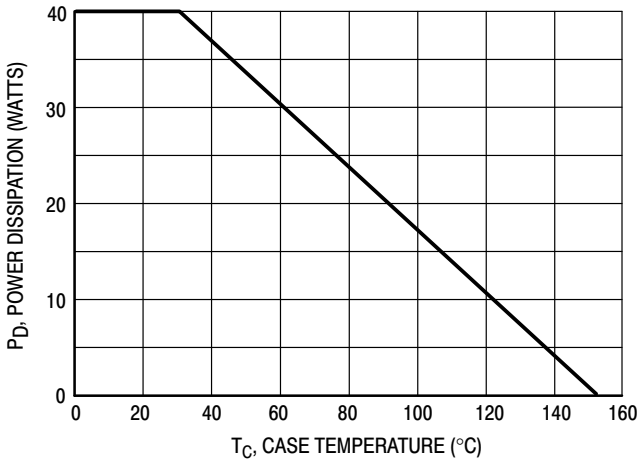



**Figure 1. Power Derating**

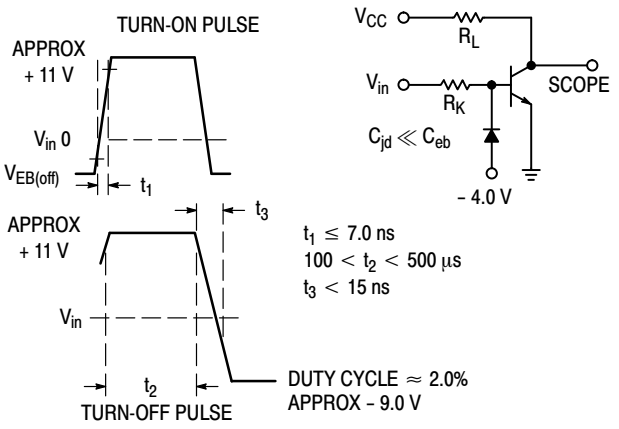



**Figure 2. Switching Time Equivalent Circuit**

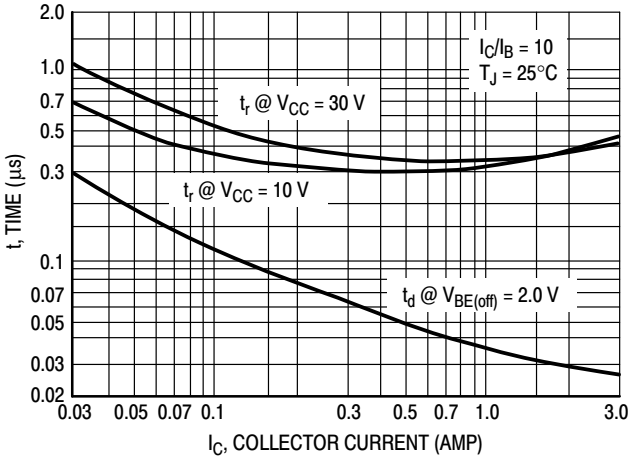



**Figure 3. Turn−On Time**

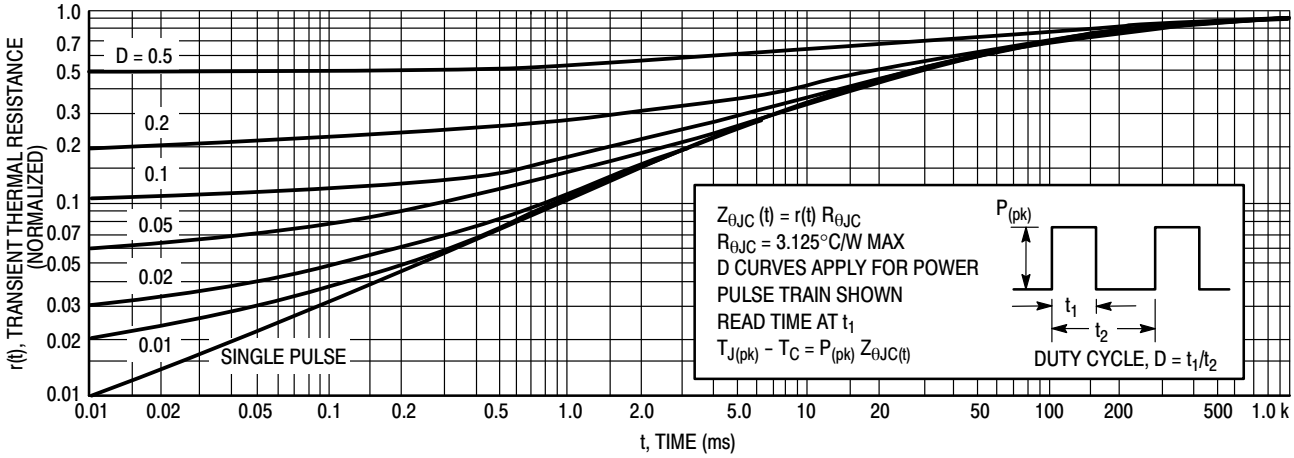



**Figure 4. Thermal Response**

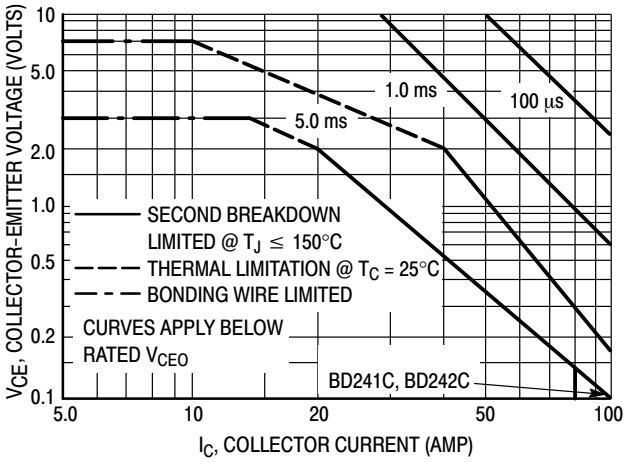



**Figure 5. Active Region Safe Operating Area**

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 $T_{J(pk)} = 150°C$; $T_C$ is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided $T_{J(pk)} \leq 150°C$, $T_{J(pk)}$ 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.

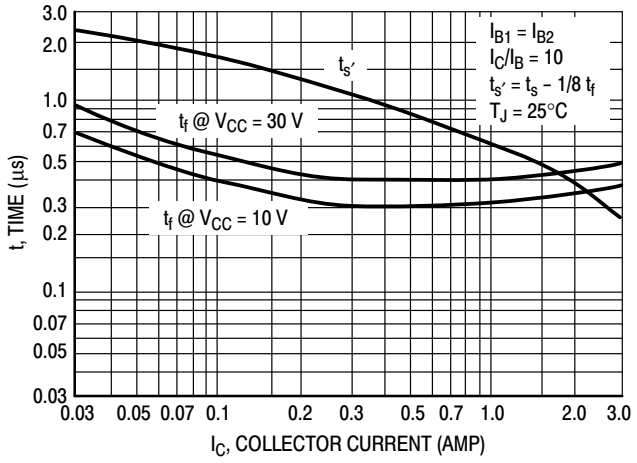



**Figure 6. Turn−Off Time**

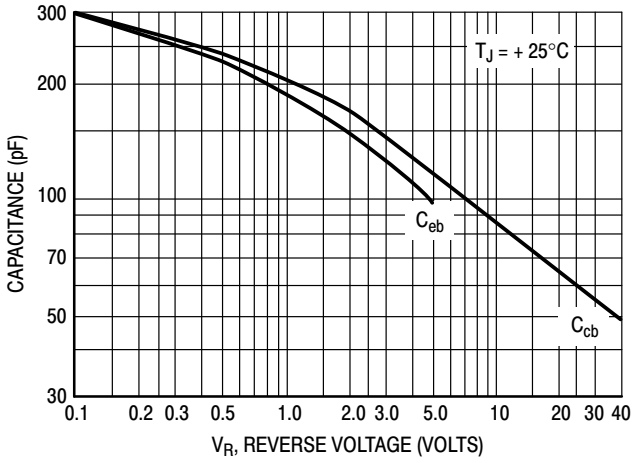



**Figure 7. Capacitance**

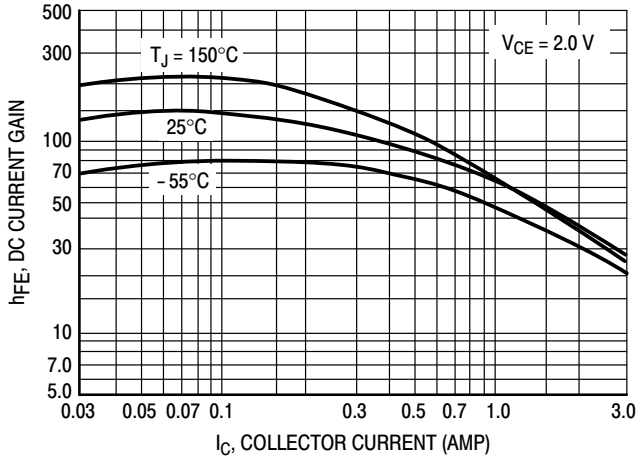



**Figure 8. DC Current Gain**

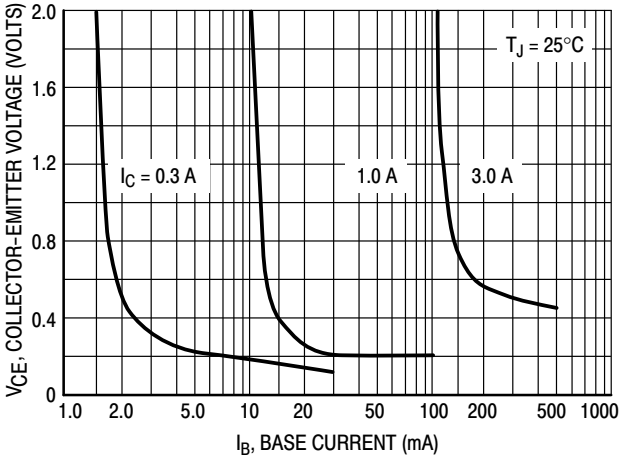



**Figure 9. Collector Saturation Region**

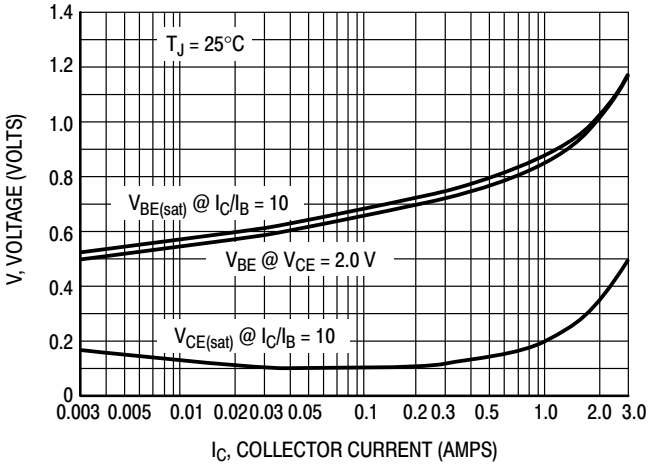



**Figure 10. “On” Voltages**

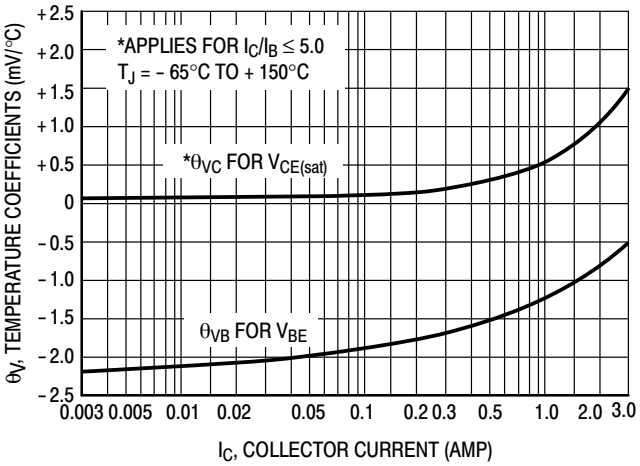



**Figure 11. Temperature Coefficients**

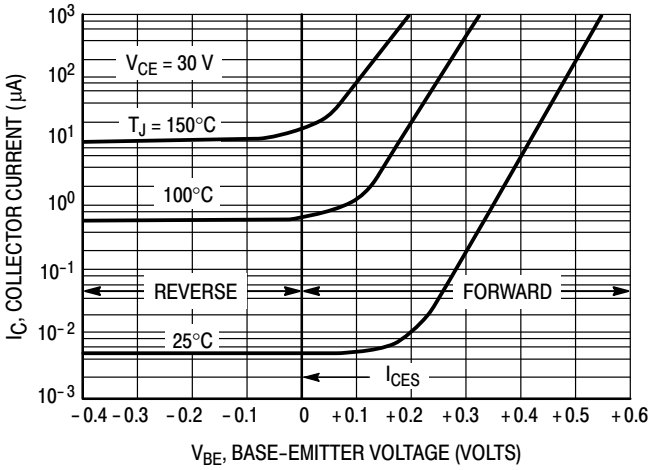



**Figure 12. Collector Cut−Off Region**

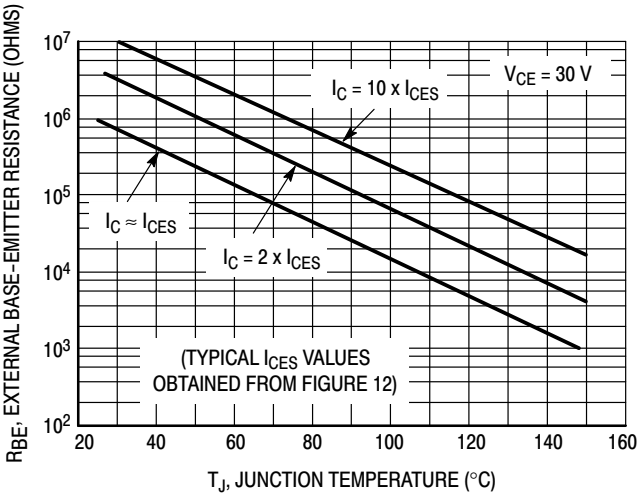


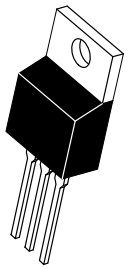

**Figure 13. Effects of Base−Emitter Resistance**

# MECHANICAL CASE OUTLINE
## PACKAGE DIMENSIONS

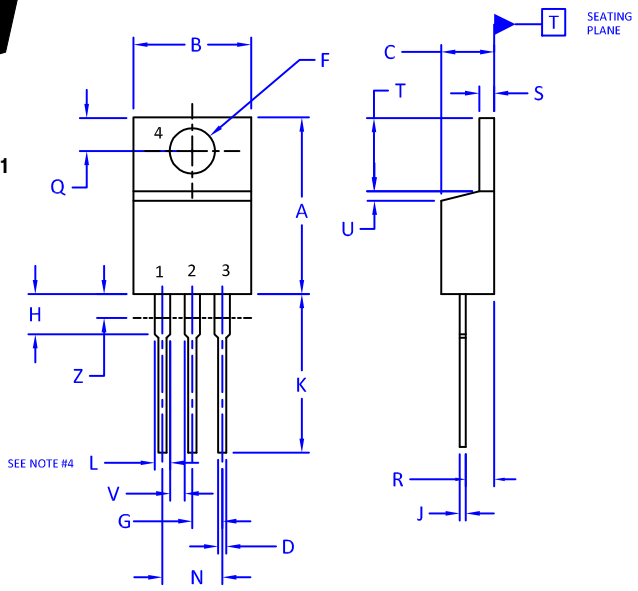
ON Semiconductor®

**TO−220**
CASE 221A−09
ISSUE AJ

DATE 05 NOV 2019



SCALE 1:1




NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 2009.
2. CONTROLLING DIMENSION: INCHES
3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.
4. MAX WIDTH FOR F102 DEVICE = 1.35MM

| | INCHES | | MILLIMETERS | |
|---|---|---|---|---|
| DIM | MIN. | MAX. | MIN. | MAX. |
| A | 0.570 | 0.620 | 14.48 | 15.75 |
| B | 0.380 | 0.415 | 9.66 | 10.53 |
| C | 0.160 | 0.190 | 4.07 | 4.83 |
| D | 0.025 | 0.038 | 0.64 | 0.96 |
| F | 0.142 | 0.161 | 3.60 | 4.09 |
| G | 0.095 | 0.105 | 2.42 | 2.66 |
| H | 0.110 | 0.161 | 2.80 | 4.10 |
| J | 0.014 | 0.024 | 0.36 | 0.61 |
| K | 0.500 | 0.562 | 12.70 | 14.27 |
| L | 0.045 | 0.060 | 1.15 | 1.52 |
| N | 0.190 | 0.210 | 4.83 | 5.33 |
| Q | 0.100 | 0.120 | 2.54 | 3.04 |
| R | 0.080 | 0.110 | 2.04 | 2.79 |
| S | 0.045 | 0.055 | 1.15 | 1.41 |
| T | 0.235 | 0.255 | 5.97 | 6.47 |
| U | 0.000 | 0.050 | 0.00 | 1.27 |
| V | 0.045 | ---- | 1.15 | --- |
| Z | ---- | 0.080 | --- | 2.04 |

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

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

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

STYLE 4:
PIN 1. MAIN TERMINAL 1
2. MAIN TERMINAL 2
3. GATE
4. MAIN TERMINAL 2

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

STYLE 6:
PIN 1. ANODE
2. CATHODE
3. ANODE
4. CATHODE

STYLE 7:
PIN 1. CATHODE
2. ANODE
3. CATHODE
4. ANODE

STYLE 8:
PIN 1. CATHODE
2. ANODE
3. EXTERNAL TRIP/DELAY
4. ANODE

STYLE 9:
PIN 1. GATE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

STYLE 10:
PIN 1. GATE
2. SOURCE
3. DRAIN
4. SOURCE

STYLE 11:
PIN 1. DRAIN
2. SOURCE
3. GATE
4. SOURCE

STYLE 12:
PIN 1. MAIN TERMINAL 1
2. MAIN TERMINAL 2
3. GATE
4. NOT CONNECTED

| | | |
|---|---|---|
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