

# BD135, BD137, BD139

## Plastic Medium Power Silicon NPN Transistors

This series of plastic, medium-power silicon NPN transistors are designed for use as audio amplifiers and drivers utilizing complementary or quasi complementary circuits.

### Features

- DC Current Gain –  $h_{FE} = 40$  (Min) @  $I_C = 0.15$  Adc
- BD 135, 137, 139 are complementary with BD 136, 138, 140
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant\*

### MAXIMUM RATINGS

| Rating   | Symbol                  | Value                        | Unit                          |
|--|-------------------------|------------------------------|-------------------------------|
| Collector-Emitter Voltage  | BD135<br>BD137<br>BD139 | $V_{CEO}$<br>45<br>60<br>80  | Vdc                           |
| Collector-Base Voltage   | BD135<br>BD137<br>BD139 | $V_{CBO}$<br>45<br>60<br>100 | Vdc                           |
| Emitter-Base Voltage   | $V_{EBO}$               | 5.0                          | Vdc                           |
| Collector Current  | $I_C$                   | 1.5                          | Adc                           |
| Base Current   | $I_B$                   | 0.5                          | Adc                           |
| Total Device Dissipation @ $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$                   | 1.25<br>10                   | Watts<br>mW/ $^\circ\text{C}$ |
| Total Device Dissipation @ $T_C = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$                   | 12.5<br>100                  | Watts<br>mW/ $^\circ\text{C}$ |
| Operating and Storage Junction Temperature Range                                       | $T_J, T_{stg}$          | -55 to<br>+150               | $^\circ\text{C}$              |

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.

### THERMAL CHARACTERISTICS

| Characteristic                          | Symbol        | Max | Unit                      |
|---|---------------|-----|---------------------------|
| Thermal Resistance, Junction-to-Case    | $\theta_{JC}$ | 10  | $^\circ\text{C}/\text{W}$ |
| Thermal Resistance, Junction-to-Ambient | $\theta_{JA}$ | 100 | $^\circ\text{C}/\text{W}$ |

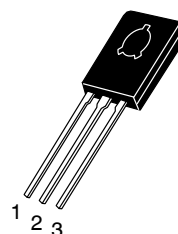
\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



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## 1.5 A POWER TRANSISTORS NPN SILICON 45, 60, 80 V, 12.5 W



TO-225  
CASE 77  
STYLE 1

### MARKING DIAGRAM



Y = Year  
WW = Work Week  
xx = 35, 37, 39  
G = Pb-Free Package

### ORDERING INFORMATION

| Device  | Package               | Shipping†       |
|---------|-----------------------|-----------------|
| BD135G  | TO-225AA<br>(Pb-Free) | 500 Units / Box |
| BD135TG | TO-225AA<br>(Pb-Free) | 50 Units / Rail |
| BD137G  | TO-225AA<br>(Pb-Free) | 500 Units / Box |
| BD139G  | TO-225AA<br>(Pb-Free) | 500 Units / 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.

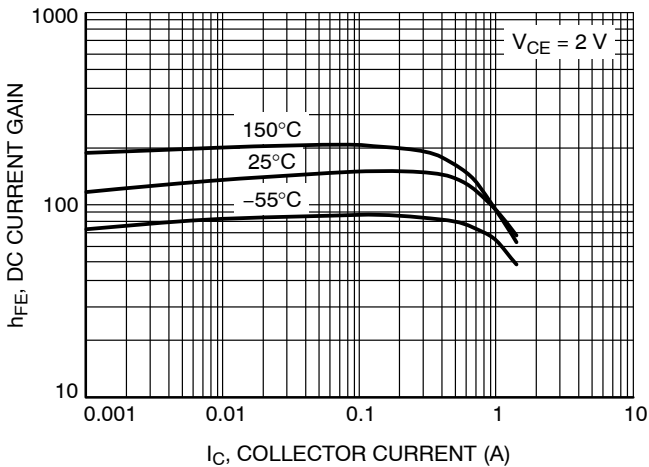
# BD135, BD137, BD139

## ELECTRICAL CHARACTERISTICS ( $T_C = 25^\circ\text{C}$ unless otherwise noted)

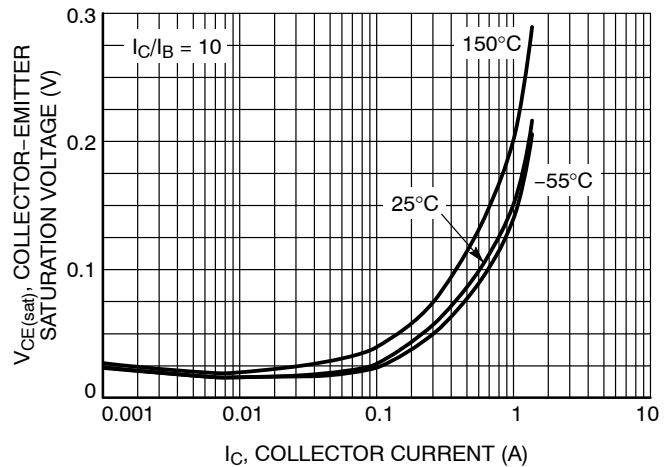
| Characteristic   | Symbol          | Type                    | Min            | Max           | Unit             |
|--|-----------------|-------------------------|----------------|---------------|------------------|
| Collector–Emitter Sustaining Voltage*<br>( $I_C = 0.03\text{ A dc}$ , $I_B = 0$ )  | $BV_{CE0}^*$    | BD135<br>BD137<br>BD139 | 45<br>60<br>80 | –<br>–<br>–   | Vdc              |
| Collector Cutoff Current<br>( $V_{CB} = 30\text{ Vdc}$ , $I_E = 0$ )<br>( $V_{CB} = 30\text{ Vdc}$ , $I_E = 0$ , $T_C = 125^\circ\text{C}$ )                                   | $I_{CBO}$       |                         | –<br>–         | 0.1<br>10     | $\mu\text{A dc}$ |
| Emitter Cutoff Current<br>( $V_{BE} = 5.0\text{ Vdc}$ , $I_C = 0$ )  | $I_{EBO}$       |                         | –              | 10            | $\mu\text{A dc}$ |
| DC Current Gain<br>( $I_C = 0.005\text{ A}$ , $V_{CE} = 2\text{ V}$ )<br>( $I_C = 0.15\text{ A}$ , $V_{CE} = 2\text{ V}$ )<br>( $I_C = 0.5\text{ A}$ , $V_{CE} = 2\text{ V}$ ) | $h_{FE}^*$      |                         | 25<br>40<br>25 | –<br>250<br>– | –                |
| Collector–Emitter Saturation Voltage*<br>( $I_C = 0.5\text{ A dc}$ , $I_B = 0.05\text{ A dc}$ )  | $V_{CE(sat)}^*$ |                         | –              | 0.5           | Vdc              |
| Base–Emitter On Voltage*<br>( $I_C = 0.5\text{ A dc}$ , $V_{CE} = 2.0\text{ Vdc}$ )  | $V_{BE(on)}^*$  |                         | –              | 1             | Vdc              |

\*Pulse Test: Pulse Width  $\leq 300\ \mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .

## TYPICAL CHARACTERISTICS



**Figure 1. DC Current Gain**



**Figure 2. Collector–Emitter Saturation Voltage**

# BD135, BD137, BD139

## TYPICAL CHARACTERISTICS

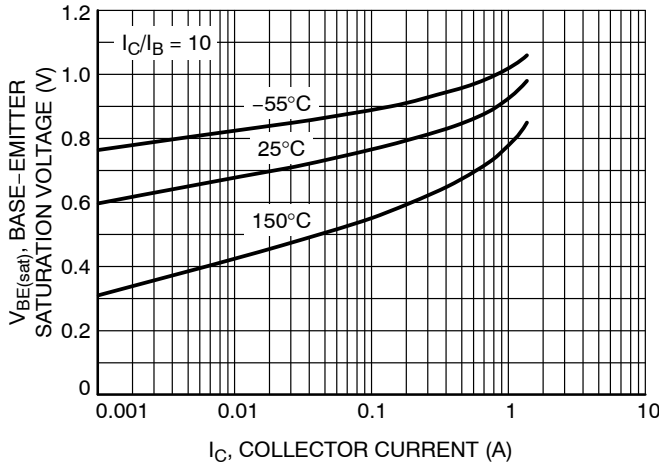


Figure 3. Base-Emitter Saturation Voltage

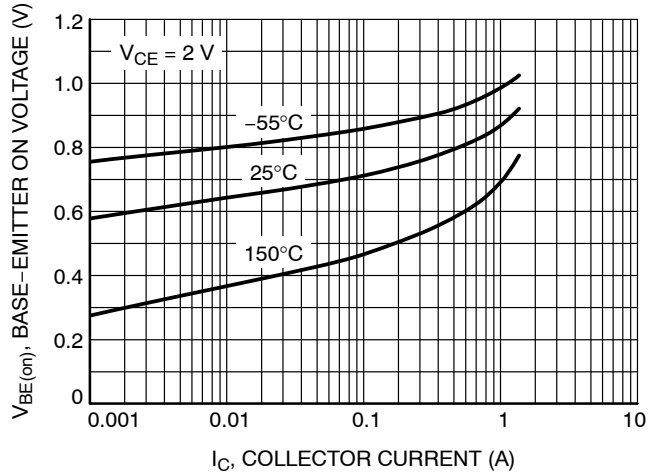


Figure 4. Base-Emitter On Voltage

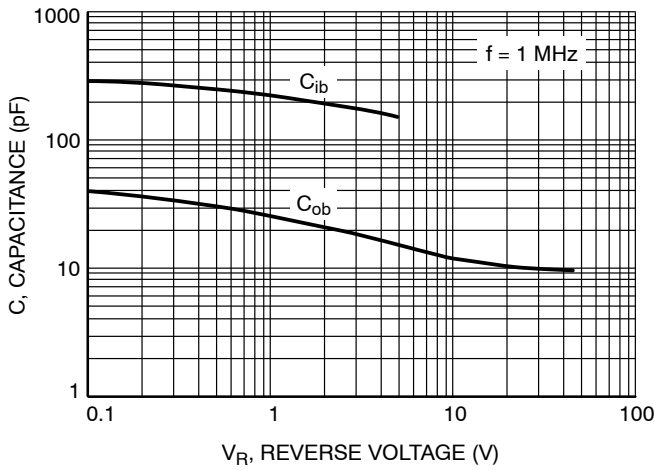


Figure 5. Capacitance

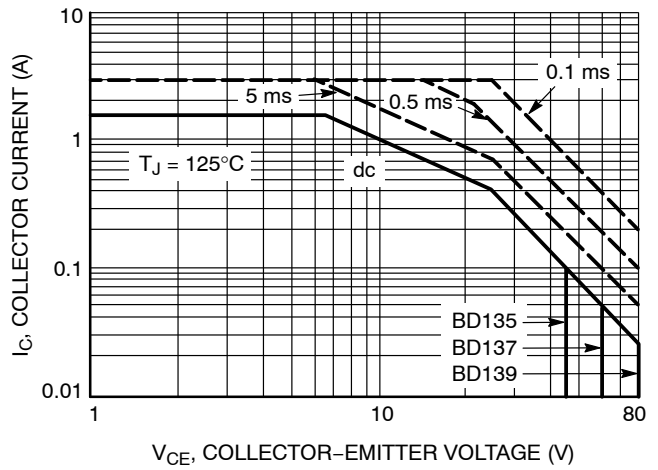


Figure 6. Active-Region Safe Operating Area

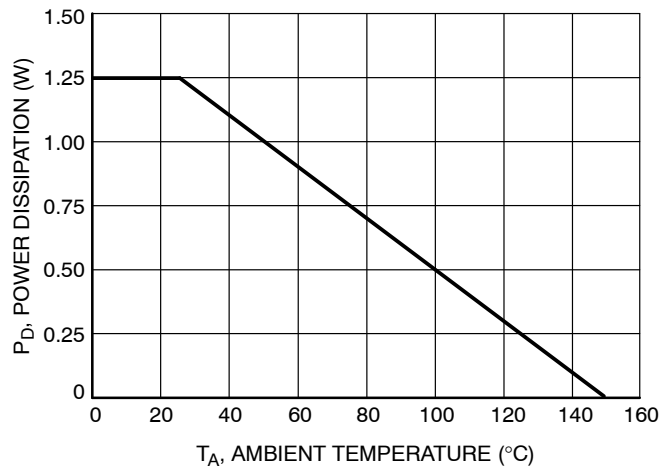
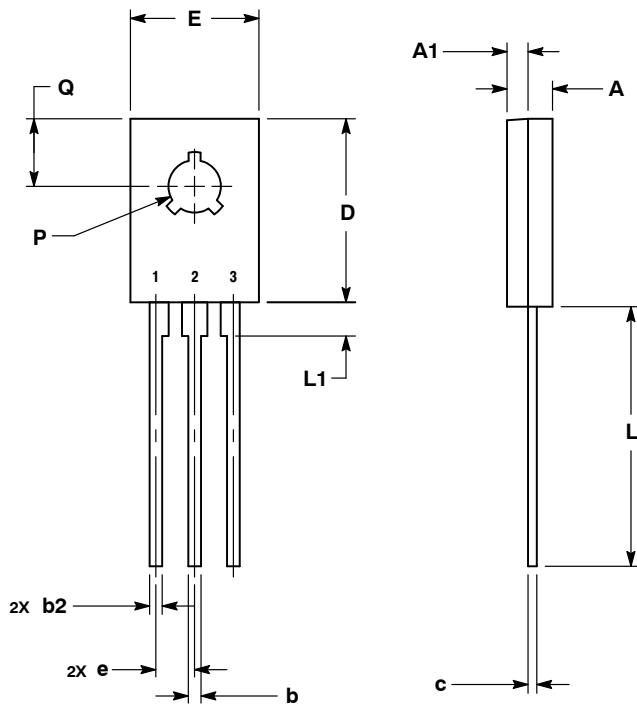


Figure 7. Power Derating

# BD135, BD137, BD139

## PACKAGE DIMENSIONS

TO-225  
CASE 77-09  
ISSUE AA



**NOTES:**

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. NUMBER AND SHAPE OF LUGS OPTIONAL.

| DIM | MILLIMETERS |       |
|-----|-------------|-------|
|     | MIN         | MAX   |
| A   | 2.40        | 3.00  |
| A1  | 1.00        | 1.50  |
| b   | 0.60        | 0.90  |
| b2  | 0.51        | 0.88  |
| c   | 0.39        | 0.63  |
| D   | 10.60       | 11.10 |
| E   | 7.40        | 7.80  |
| e   | 2.04        | 2.54  |
| L   | 14.50       | 16.63 |
| L1  | 1.27        | 2.54  |
| P   | 2.90        | 3.30  |
| Q   | 3.80        | 4.20  |

**STYLE 1:**

- PIN 1. EMITTER
- COLLECTOR
- BASE

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