

# BD136, BD138, BD140

## Plastic Medium Power Silicon PNP Transistor

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

### Features

- Pb-Free Packages are Available\*
- DC Current Gain –  $h_{FE} = 40$  (Min) @  $I_C = 0.15$  Adc
- BD 136, 138, 140 are complementary with BD 135, 137, 139

### MAXIMUM RATINGS

| Rating   | Symbol                  | Value                            | Unit                          |
|--|-------------------------|----------------------------------|-------------------------------|
| Collector-Emitter Voltage  | BD136<br>BD138<br>BD140 | $V_{CEO}$<br>45<br>60<br>80      | Vdc                           |
| Collector-Base Voltage   | BD136<br>BD138<br>BD140 | $V_{CBO}$<br>45<br>60<br>100     | Vdc                           |
| Emitter-Base Voltage   |                         | $V_{EBO}$<br>5.0                 | Vdc                           |
| Collector Current  |                         | $I_C$<br>1.5                     | Adc                           |
| Base Current   |                         | $I_B$<br>0.5                     | Adc                           |
| Total Device Dissipation @ $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ |                         | $P_D$<br>1.25<br>10              | Watts<br>mW/ $^\circ\text{C}$ |
| Total Device Dissipation @ $T_C = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ |                         | $P_D$<br>12.5<br>100             | Watts<br>mW/ $^\circ\text{C}$ |
| Operating and Storage Junction Temperature Range                                       |                         | $T_J, T_{stg}$<br>-55 to<br>+150 | $^\circ\text{C}$              |

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

### 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 | $^\circ\text{C}/\text{W}$ |

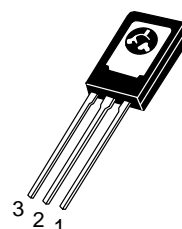
\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



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



TO-225AA  
CASE 77  
STYLE 1

### MARKING DIAGRAM



xx = 36, 38, 40  
Y = Year  
WW = Work Week

### ORDERING INFORMATION

| Device | Package               | Shipping†     |
|--------|-----------------------|---------------|
| BD136  | TO-225AA              | 500 Units/Box |
| BD136G | TO-225AA<br>(Pb-Free) | 500 Units/Box |
| BD138  | TO-225AA              | 500 Units/Box |
| BD138G | TO-225AA<br>(Pb-Free) | 500 Units/Box |
| BD140  | TO-225AA              | 500 Units/Box |
| BD140G | TO-225AA<br>(Pb-Free) | 500 Units/Box |

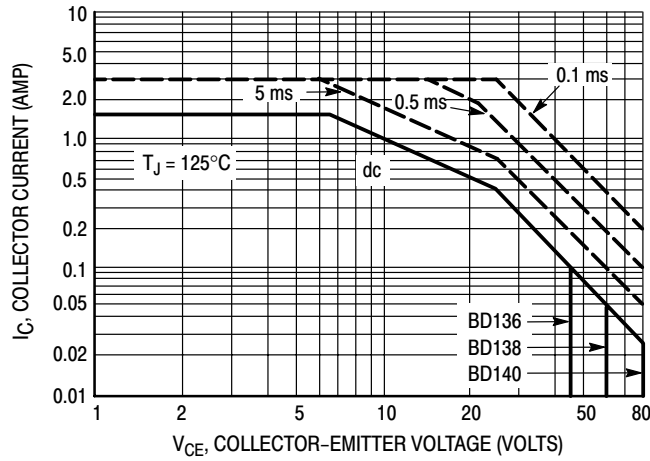
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

# BD136, BD138, BD140

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

| Characteristic   | Symbol          | Type                       | Min            | Max           | Unit             |
|--|-----------------|----------------------------|----------------|---------------|------------------|
| Collector–Emitter Sustaining Voltage*<br>( $I_C = 0.03 \text{ A dc}$ , $I_B = 0$ )   | $BV_{CEO}$      | BD 136<br>BD 138<br>BD 140 | 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  $\leq 2.0\%$ .

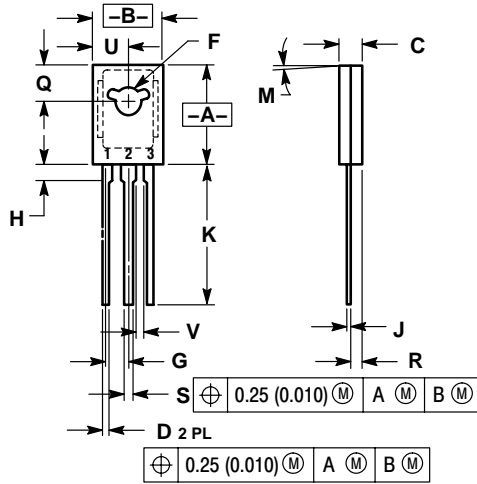


**Figure 1. Active–Region Safe Operating Area**

# BD136, BD138, BD140

## PACKAGE DIMENSIONS

TO-225AA  
CASE 77-09  
ISSUE Z



### NOTES:


1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 077-01 THRU -08 OBSOLETE, NEW STANDARD 077-09.

| DIM | INCHES    |       | MILLIMETERS |       |
|-----|-----------|-------|-------------|-------|
|     | MIN       | MAX   | MIN         | MAX   |
| A   | 0.425     | 0.435 | 10.80       | 11.04 |
| B   | 0.295     | 0.305 | 7.50        | 7.74  |
| C   | 0.095     | 0.105 | 2.42        | 2.66  |
| D   | 0.020     | 0.026 | 0.51        | 0.66  |
| F   | 0.115     | 0.130 | 2.93        | 3.30  |
| G   | 0.094 BSC |       | 2.39 BSC    |       |
| H   | 0.050     | 0.095 | 1.27        | 2.41  |
| J   | 0.015     | 0.025 | 0.39        | 0.63  |
| K   | 0.575     | 0.655 | 14.61       | 16.63 |
| M   | 5° TYP    |       | 5° TYP      |       |
| Q   | 0.148     | 0.158 | 3.76        | 4.01  |
| R   | 0.045     | 0.065 | 1.15        | 1.65  |
| S   | 0.025     | 0.035 | 0.64        | 0.88  |
| U   | 0.145     | 0.155 | 3.69        | 3.93  |
| V   | 0.040     | ---   | 1.02        | ---   |

### STYLE 1:

- PIN 1. EMITTER
- COLLECTOR
- BASE

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