

# BD435, BD437, BD439, BD441

## Plastic Medium Power Silicon NPN Transistor

This series of plastic, medium-power silicon NPN transistors can be used for amplifier and switching applications. Complementary types are BD438 and BD442.

### Features

- Pb-Free Packages are Available\*

### MAXIMUM RATINGS

| Rating   | Symbol                           | Value          | Unit                 |           |
|--|----------------------------------|----------------|----------------------|-----------|
| Collector-Emitter Voltage  | BD435<br>BD437<br>BD439<br>BD441 | $V_{CEO}$      | 32<br>45<br>60<br>80 | Vdc       |
| Collector-Base Voltage   | BD435<br>BD437<br>BD439<br>BD441 | $V_{CBO}$      | 32<br>45<br>60<br>80 | Vdc       |
| Emitter-Base Voltage   |                                  | $V_{EBO}$      | 5.0                  | Vdc       |
| Collector Current  |                                  | $I_C$          | 4.0                  | Adc       |
| Base Current   |                                  | $I_B$          | 1.0                  | Adc       |
| Total Device Dissipation @ $T_C = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ |                                  | $P_D$          | 36<br>288            | W<br>W/°C |
| Operating and Storage Junction<br>Temperature Range                                    |                                  | $T_J, T_{stg}$ | -55 to +150          | °C        |

### THERMAL CHARACTERISTICS

| Characteristic                       | Symbol        | Max | Unit |
|--------------------------------------|---------------|-----|------|
| Thermal Resistance, Junction-to-Case | $\theta_{JC}$ | 3.5 | °C/W |

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.

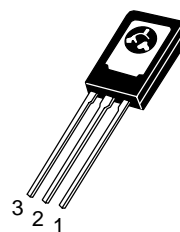
\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



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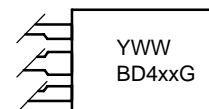
<http://onsemi.com>

## 4.0 AMPERES POWER TRANSISTORS NPN SILICON



TO-225AA  
CASE 77  
STYLE 1

### MARKING DIAGRAM



BD4xx = Device Code  
xx = 35, 37, 37T, 39, 41  
Y = Year  
WW = Work Week  
G = Pb-Free Package

### ORDERING INFORMATION

| Device  | Package               | Shipping      |
|---------|-----------------------|---------------|
| BD435   | TO-225AA              | 500 Units/Box |
| BD435G  | TO-225AA<br>(Pb-Free) | 500 Units/Box |
| BD437   | TO-225AA              | 500 Units/Box |
| BD437G  | TO-225AA<br>(Pb-Free) | 500 Units/Box |
| BD437T  | TO-225AA              | 50 Units/Rail |
| BD437TG | TO-225AA<br>(Pb-Free) | 50 Units/Rail |
| BD439   | TO-225AA              | 500 Units/Box |
| BD439G  | TO-225AA<br>(Pb-Free) | 500 Units/Box |
| BD441   | TO-225AA              | 500 Units/Box |
| BD441G  | TO-225AA<br>(Pb-Free) | 500 Units/Box |

# BD435, BD437, BD439, BD441

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

| Characteristic   |                                  | Symbol        | Min                  | Typ              | Max                      | Unit |
|--|----------------------------------|---------------|----------------------|------------------|--------------------------|------|
| Collector–Emitter Breakdown Voltage<br>( $I_C = 100\text{ mA}$ , $I_B = 0$ )   | BD435<br>BD437<br>BD439<br>BD441 | $V_{(BR)CEO}$ | 32<br>45<br>60<br>80 | –<br>–<br>–<br>– | –<br>–<br>–<br>–         | Vdc  |
| Collector–Base Breakdown Voltage<br>( $I_C = 100\ \mu\text{A}$ , $I_B = 0$ )   | BD435<br>BD437<br>BD439<br>BD441 | $V_{(BR)CBO}$ | 32<br>45<br>60<br>80 | –<br>–<br>–<br>– | –<br>–<br>–<br>–         | Vdc  |
| Emitter–Base Breakdown Voltage<br>( $I_E = 100\ \mu\text{A}$ , $I_C = 0$ )   |                                  | $V_{(BR)EBO}$ | 5.0                  | –                | –                        | Vdc  |
| Collector Cutoff Current<br>( $V_{CB} = 32\text{ V}$ , $I_E = 0$ )<br>( $V_{CB} = 45\text{ V}$ , $I_E = 0$ )<br>( $V_{CB} = 60\text{ V}$ , $I_E = 0$ )<br>( $V_{CB} = 80\text{ V}$ , $I_E = 0$ ) | BD435<br>BD437<br>BD439<br>BD441 | $I_{CBO}$     | –<br>–<br>–<br>–     | –<br>–<br>–<br>– | 0.1<br>0.1<br>0.1<br>0.1 | mAdc |
| Emitter Cutoff Current<br>( $V_{EB} = 5.0\text{ V}$ )  |                                  | $I_{EBO}$     | –                    | –                | 1.0                      | mAdc |
| DC Current Gain<br>( $I_C = 10\text{ mA}$ , $V_{CE} = 5.0\text{ V}$ )  | BD435<br>BD437<br>BD439<br>BD441 | $h_{FE}$      | 40<br>30<br>20<br>15 | –<br>–<br>–<br>– | –<br>–<br>–<br>–         | –    |
| DC Current Gain<br>( $I_C = 500\text{ mA}$ , $V_{CE} = 1.0\text{ V}$ )   | BD435<br>BD437<br>BD439, BD441   | $h_{FE}$      | 85<br>85<br>40       | –<br>–<br>–      | 475<br>375<br>475        | –    |
| DC Current Gain<br>( $I_C = 2.0\text{ A}$ , $V_{CE} = 1.0\text{ V}$ )  | BD435<br>BD437<br>BD439<br>BD441 | $h_{FE}$      | 50<br>40<br>25<br>15 | –<br>–<br>–<br>– | –<br>–<br>–<br>–         | –    |
| Collector Saturation Voltage<br>( $I_C = 2.0\text{ A}$ , $I_B = 0.2\text{ V}$ )<br>( $I_C = 3.0\text{ A}$ , $I_B = 0.3\text{ A}$ )   | BD435<br>BD437, BD439, BD441     | $V_{CE(sat)}$ | –<br>–               | –<br>–           | 0.5<br>0.8               | Vdc  |
| Base–Emitter On Voltage<br>( $I_C = 2.0\text{ A}$ , $V_{CE} = 1.0\text{ V}$ )  |                                  | $V_{BE(on)}$  | –                    | –                | 1.1                      | Vdc  |
| Current–Gain – Bandwidth Product<br>( $V_{CE} = 1.0\text{ V}$ , $I_C = 250\text{ mA}$ , $f = 1.0\text{ MHz}$ )   |                                  | $f_T$         | 3.0                  | –                | –                        | MHz  |

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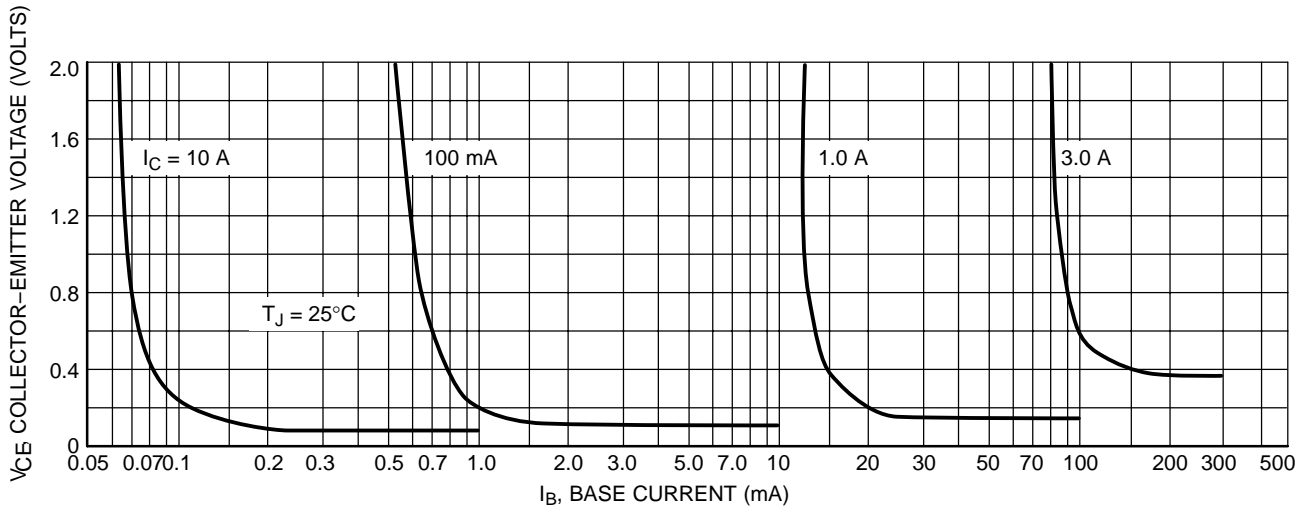


Figure 1. Collector Saturation Region

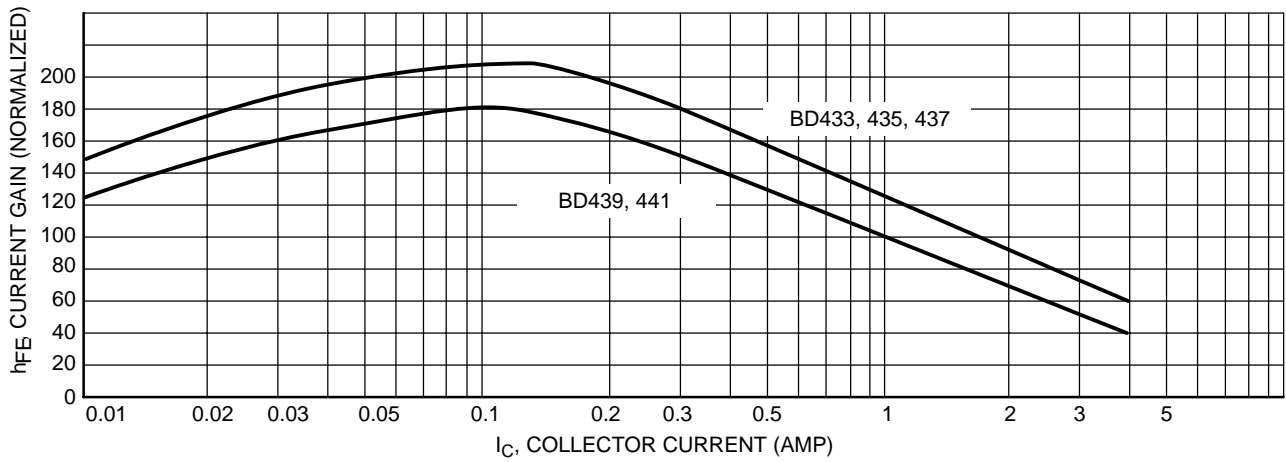


Figure 2. Current Gain

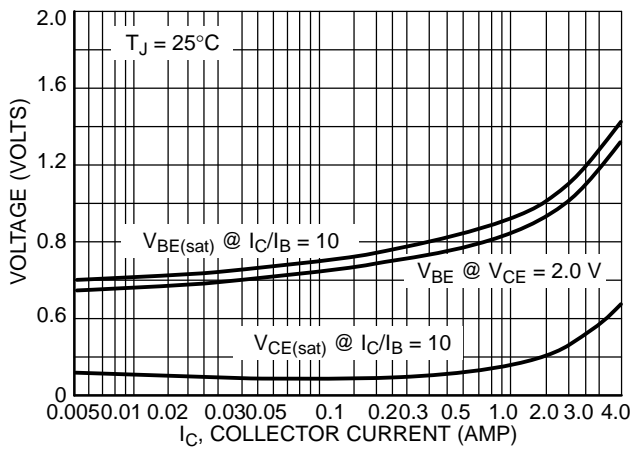


Figure 3. "On" Voltage

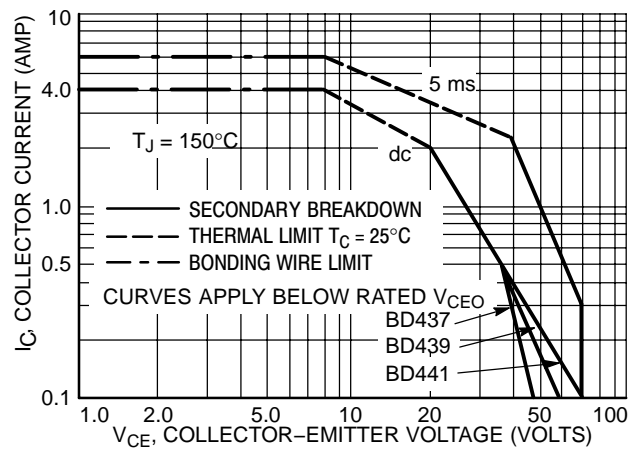
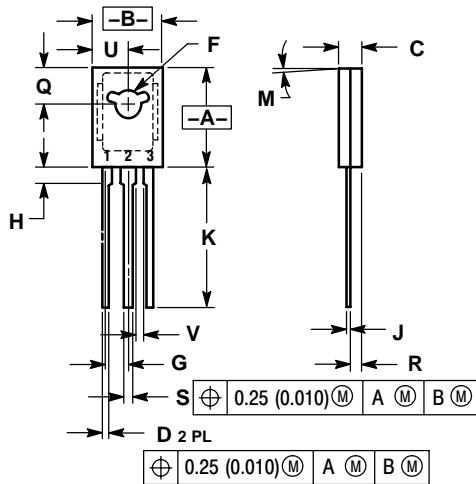


Figure 4. Active Region Safe Operating Area

# BD435, BD437, BD439, BD441

## 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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