



Micro Commercial Components



Micro Commercial Components  
130 W Cochran St, Unit B  
Simi Valley, CA 93065  
Tel:818-701-4933

**BD135-6/10/16**  
**BD137-6/10/16**  
**BD139-6/10/16**

## Features

- Halogen free available upon request by adding suffix "-HF"
- Lead Free Finish/RoHS Compliant (Note1) ("P" Suffix designates RoHS Compliant. See ordering information)
- Epoxy meets UL 94 V-0 flammability rating
- Moisture Sensitivity Level 1
- DC Current Gain -  $h_{FE} = 40$  (Min) @  $I_C = 150\text{mA}$
- Complementary with BD136, BD138, BD140

## Maximum Ratings

| Rating                                              | Symbol                  | Value       | Unit                 |
|-----------------------------------------------------|-------------------------|-------------|----------------------|
| Collector-Emitter Voltage                           | BD135<br>BD137<br>BD139 | $V_{CEO}$   | Vdc                  |
| Collector-Base Voltage                              | BD135<br>BD137<br>BD139 | $V_{CBO}$   | Vdc                  |
| Emitter-Base Voltage                                |                         | $V_{EBO}$   | Vdc                  |
| Collector Current                                   |                         | $I_C$       | Adc                  |
| Base Current                                        |                         | $I_B$       | Adc                  |
| Total Device Dissipation @ $T_A = 25^\circ\text{C}$ |                         | $P_D$       | Watt                 |
| Derate above $25^\circ\text{C}$                     |                         |             | mW/ $^\circ\text{C}$ |
| Total Device Dissipation @ $T_C = 25^\circ\text{C}$ |                         | $P_D$       | Watt                 |
| Derate above $25^\circ\text{C}$                     |                         |             | mW/ $^\circ\text{C}$ |
| Operating & Storage Temperature Range               | $T_J, T_{STG}$          | -55 to +150 | $^\circ\text{C}$     |
| Maximum Thermal Resistance Junction to Case         | $R_{\theta JC}$         | 10          | $^\circ\text{C/W}$   |
| Maximum Thermal Resistance Junction to Ambient Air  | $R_{\theta JA}$         | 100         | $^\circ\text{C/W}$   |

## Electrical Characteristics @ $25^\circ\text{C}$ Unless Otherwise Specified

| Symbol                     | Parameter                                                                                                                         | Min                     | Max            | Units           |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-------------------------|----------------|-----------------|
| <b>OFF CHARACTERISTICS</b> |                                                                                                                                   |                         |                |                 |
| $BV_{CEO}$                 | Collector-Emitter Sustaining Voltage*<br>( $I_C = 30\text{mA}, I_B = 0$ )                                                         | BD135<br>BD137<br>BD139 | 45<br>60<br>80 | Vdc             |
| $I_{CBO}$                  | Collector Cutoff Current<br>( $V_{CB} = 30\text{Vdc}, I_E = 0$ )<br>( $V_{CB} = 30\text{Vdc}, I_E = 0, T_C = 125^\circ\text{C}$ ) |                         | 0.1<br>10      | $\mu\text{Adc}$ |
| $I_{EBO}$                  | Emitter Cutoff Current<br>( $V_{BE} = 5.0\text{Vdc}, I_C = 0$ )                                                                   |                         | 10             | $\mu\text{Adc}$ |
| $h_{FE(1)}$                | DC Current Gain*<br>( $I_C = 5\text{mA}, V_{CE} = 2\text{Vdc}$ )                                                                  | 25                      |                |                 |
| $h_{FE(2)}$                | ( $I_C = 0.5\text{Adc}, V_{CE} = 2\text{Vdc}$ )                                                                                   | 25                      |                |                 |
| $h_{FE(3)}$                | ( $I_C = 150\text{mA}, V_{CE} = 2\text{Vdc}$ )                                                                                    | 40                      | 250            |                 |
| $V_{CE(sat)}$              | Collector-Emitter Saturation Voltage<br>( $I_C = 500\text{mA}, I_B = 50\text{mA}$ )                                               |                         | 0.5            | Vdc             |
| $V_{BE(on)}$               | Base-Emitter ON Voltage<br>( $V_{CE} = 2\text{V}, I_C = 0.5\text{A}$ )                                                            |                         | 1              | Vdc             |

## CLASSIFICATION OF $h_{FE(3)}$

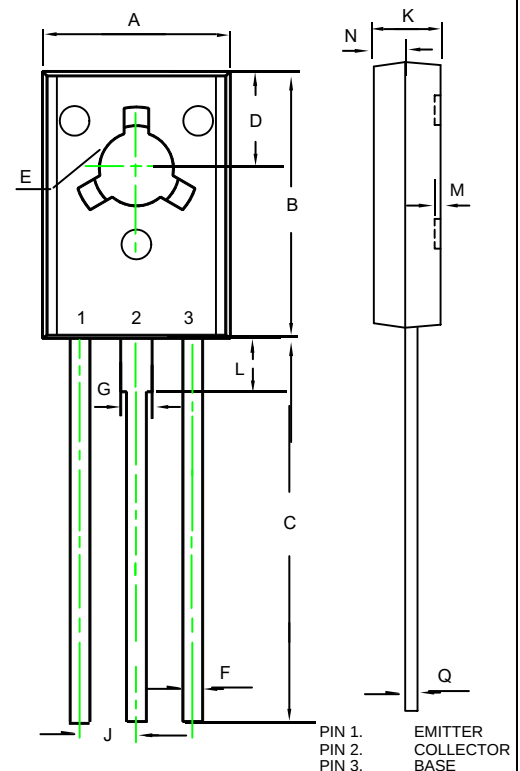
|       |        |        |         |
|-------|--------|--------|---------|
| Rank  | 6      | 10     | 16      |
| Range | 40-100 | 63-160 | 100-250 |

\*Pulse test: Pulse width 300  $\mu\text{sec}$ , Duty cycle 2%

Notes: 1. High Temperature Solder Exemption Applied, see EU Directive Annex Notes 7.

**Power Transistors**  
**NPN Silicon**  
**45,60,80 Volts**

TO-18



| DIMENSIONS |          |       |          |       |      |
|------------|----------|-------|----------|-------|------|
| DIM        | INCHES   |       | MM       |       | NOTE |
|            | MIN      | MAX   | MIN      | MAX   |      |
| A          | 0.291    | 0.307 | 7.40     | 7.80  |      |
| B          | 0.417    | 0.433 | 10.60    | 11.00 |      |
| C          | 0.602    | 0.618 | 15.30    | 15.70 |      |
| D          | 0.154    | 0.161 | 3.90     | 4.10  |      |
| E          | 0.118    | 0.126 | 3.00     | 3.20  |      |
| F          | 0.026    | 0.034 | 0.66     | 0.86  |      |
| G          | 0.046    | 0.054 | 1.17     | 1.37  |      |
| J          | 0.090TYP |       | 2.290TYP |       |      |
| K          | 0.098    | 0.114 | 2.50     | 2.90  |      |
| L          | 0.083    | 0.091 | 2.10     | 2.30  |      |
| M          | 0.000    | 0.012 | 0.00     | 0.30  |      |
| N          | 0.043    | 0.059 | 1.10     | 1.50  |      |
| Q          | 0.018    | 0.024 | 0.45     | 0.60  |      |

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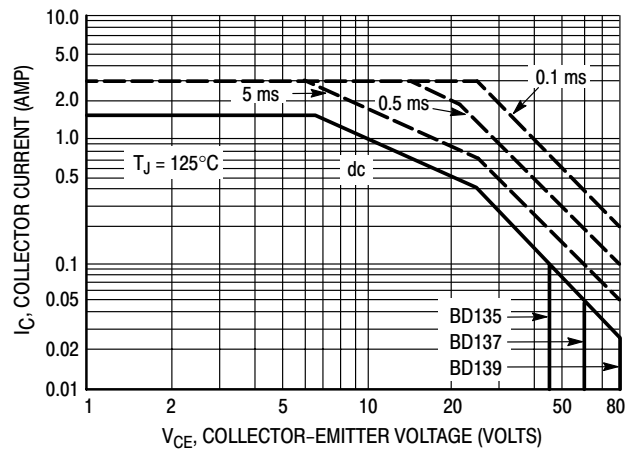


Figure 1. Active-Region Safe Operating Area

## Ordering Information :

| Device         | Packing         |
|----------------|-----------------|
| Part Number-BP | Bulk; 1Kpcs/Box |

Note : Adding "-HF" suffix for halogen free, eg. Part Number-BP-HF

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