

# BD139

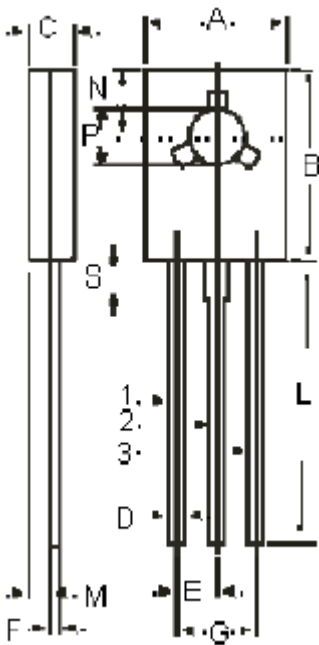
## TO-126 NPN Transistors



### Features:

- NPN Plastic Power Transistors.
- Medium Power Linear and Switching Applications.

### TO-126 Plastic Package

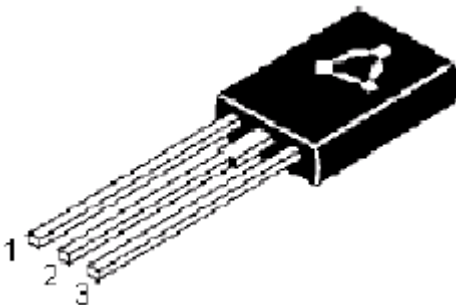


| Dimensions | Minimum        | Maximum |
|------------|----------------|---------|
| A          | 7.4            | 7.8     |
| B          | 10.5           | 10.8    |
| C          | 2.4            | 2.7     |
| D          | 0.7            | 0.9     |
| E          | 2.25 (Typical) |         |
| F          | 0.49           | 0.75    |
| G          | 4.5 (Typical)  |         |
| L          | 15.7 (Typical) |         |
| M          | 1.27 (Typical) |         |
| N          | 3.75 (Typical) |         |
| P          | 3.0            | 3.2     |
| S          | 2.5 (Typical)  |         |

Dimensions : Millimetres

### Pin Configuration:

1. Emitter
2. Collector
3. Base



### Absolute Maximum Ratings

| -  | Symbol         | -                  | BD139     | Unit             |
|--|----------------|--------------------|-----------|------------------|
| Collector-Base Voltage (Open Emitter)  | $V_{CBO}$      | Maximum            | 100       | V                |
| Collector-Emitter Voltage (Open Base)  | $V_{CEO}$      |                    | 80        |                  |
| Collector Current  | $I_C$          |                    | 1.5       | A                |
| Total Power Dissipation upto $T_C = 25^\circ\text{C}$                              | $P_{tot}$      |                    | 12.5      | W                |
| Junction Temperature   | $T_j$          |                    | 150       | $^\circ\text{C}$ |
| Collector-Emitter Saturation Voltage<br>$I_C = 0.5\text{A}$ , $I_B = 0.05\text{A}$ | $V_{CE (Sat)}$ |                    | 0.5       | V                |
| DC Current Gain<br>$I_C = 0.15\text{A}$ ; $V_{CE} = 2\text{V}$                     | $h_{FE}$       | Minimum<br>Maximum | 40<br>250 | -                |

### Ratings (at $T_a = 25^\circ\text{C}$ unless otherwise specified)

| -   | Symbol         | -           | BD139       | Unit               |
|---|----------------|-------------|-------------|--------------------|
| Collector-Base Voltage (Open Emitter)   | $V_{CBO}$      | Maximum     | 100         | V                  |
| Collector-Emitter Voltage (Open Base)   | $V_{CEO}$      |             | 80          |                    |
| Emitter-Base Voltage (Open Collector)   | $V_{EBO}$      |             | 5.0         |                    |
| Collector Current   | $I_C$          |             | 1.5         | A                  |
| Base Current  | $I_B$          |             | 0.5         |                    |
| Total Power Dissipation up to $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_{tot}$      |             |             | 1.25<br>10         |
| Total Power Dissipation up to $T_C = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ |                | 12.5<br>100 |             |                    |
| Junction Temperature  | $T_j$          |             | 150         | $^\circ\text{C}$   |
| Storage Temperature   | $T_{stg}$      | -           | -65 to +150 |                    |
| <b>Thermal Resistance</b>   |                |             |             |                    |
| From Junction to Case   | $R_{th (j-c)}$ | -           | 10          | $^\circ\text{C/W}$ |
| From Junction to Ambient  | $R_{th (j-a)}$ | -           | 100         |                    |

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## TO-126 NPN Transistors



### Characteristics ( $T_{amb} = 25^{\circ}\text{C}$ unless otherwise specified)

| -  | Symbol                                      | -       | BD139            | Unit          |
|--|---|---------|------------------|---------------|
| Collector Cut off Current<br>$I_E = 0; V_{CB} = 30\text{V}$<br>$I_E = 0; V_{CB} = 30\text{V}; T_C = 125^{\circ}\text{C}$   | $I_{CBO}$                                   | Maximum | 0.1<br>10        | $\mu\text{A}$ |
| Emitter Cut off Current<br>$I_C = 0; V_{EB} = 5\text{V}$   | $I_{EBO}$                                   |         | 10               |               |
| Breakdown Voltages<br>$I_C = 0.03\text{A}; I_B = 0$<br>$I_C = 1\text{mA}; I_E = 0$<br>$I_E = 1\text{mA}; I_C = 0$  | $V_{CEO (Sus)}^*$<br>$V_{CBO}$<br>$V_{EBO}$ | Minimum | 40<br>100<br>5.0 | V             |
| Saturation Voltage<br>$I_C = 0.5\text{A}; I_B = 0.05\text{A}$  | $V_{CE (sat)}^*$                            |         | Maximum          |               |
| Base-Emitter On Voltage<br>$I_C = 0.5\text{A}; V_{CE} = 2\text{V}$   | $V_{BE (on)}^*$                             |         |                  | 1.0           |
| DC Current Gain<br>$I_C = 0.15\text{A}; V_{CE} = 2\text{V}^*$<br><br>$I_C = 0.15\text{A}; V_{CE} = 2\text{V}^{**}$<br><br>$I_C = 0.15\text{A}; V_{CE} = 2\text{V}^*$ | $h_{FE}^*$                                  | Minimum | 25               | -             |
|  |   | Minimum | 40               |               |
|  |   | Maximum | 250              |               |
|  |   | Minimum | 25               |               |

### \*\* $h_{FE}$ Classification:

|     |         |     |
|-----|---------|-----|
| -6  | Minimum | 40  |
|     | Maximum | 100 |
| -10 | Minimum | 63  |
|     | Maximum | 160 |
| -16 | Minimum | 100 |
|     | Maximum | 250 |
| -25 | Minimum | 160 |
|     | Maximum | 400 |

\* Pulse Test: Pulse Width =  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$ .

### Specifications

| $I_C (av)$<br>Maximum<br>(A) | $V_{CEO}$<br>Maximum<br>(V) | $h_{FE}$<br>Minimum<br>at $I_C = 0.15\text{mA}$ | $P_{tot}$<br>at $25^{\circ}\text{C}$<br>(mW) | Plastic<br>Package | Type | Part Number |
|------------------------------|-----------------------------|---|--|--------------------|------|-------------|
| 1.5                          | 80                          | 40  | 12.5   | TO-126             | NPN  | BD139       |



### Notes:

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