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# BD135 / 137 / 139

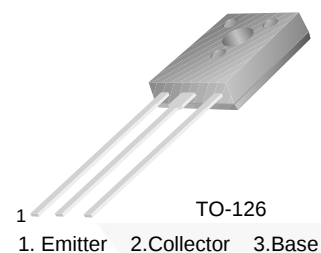
## NPN Epitaxial Silicon Transistor

### Features

- Complement to BD136, BD138 and BD140 respectively

### Applications

- Medium Power Linear and Switching



### Ordering Information

| Part Number | Marking  | Package   | Packing Method |
|-------------|----------|-----------|----------------|
| BD13516S    | BD135-16 | TO-126 3L | Bulk           |
| BD1356STU   | BD135-6  |           | Rail           |
| BD13510STU  | BD135-10 |           |                |
| BD13516STU  | BD135-16 |           |                |
| BD13716STU  | BD137-16 |           |                |
| BD13710STU  | BD137-10 |           | Bulk           |
| BD13716S    | BD137-16 |           | Rail           |
| BD13916STU  | BD139-16 |           | Bulk           |
| BD13910S    | BD139-10 |           | Rail           |
| BD13916S    | BD139-16 |           |                |
| BD1396STU   | BD139-6  |           |                |
| BD13910STU  | BD139-10 |           |                |

## Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only. Values are at  $T_C = 25^\circ\text{C}$  unless otherwise noted.

| Symbol    | Parameter                 |                          | Value        | Units            |
|-----------|---------------------------|--------------------------|--------------|------------------|
| $V_{CBO}$ | Collector-Base Voltage    | BD135                    | 45           | V                |
|           |                           | BD137                    | 60           |                  |
|           |                           | BD139                    | 80           |                  |
| $V_{CEO}$ | Collector-Emitter Voltage | BD135                    | 45           | V                |
|           |                           | BD137                    | 60           |                  |
|           |                           | BD139                    | 80           |                  |
| $V_{EBO}$ | Emitter-Base Voltage      |                          | 5            | V                |
| $I_C$     | Collector Current (DC)    |                          | 1.5          | A                |
| $I_{CP}$  | Collector Current (Pulse) |                          | 3.0          | A                |
| $I_B$     | Base Current              |                          | 0.5          | A                |
| $P_C$     | Device Dissipation        | $T_C = 25^\circ\text{C}$ | 12.5         | W                |
|           |                           | $T_A = 25^\circ\text{C}$ | 1.25         | W                |
| $T_J$     | Junction Temperature      |                          | 150          | $^\circ\text{C}$ |
| $T_{STG}$ | Storage Temperature       |                          | - 55 to +150 | $^\circ\text{C}$ |

## Electrical Characteristics

Values are at  $T_C = 25^\circ\text{C}$  unless otherwise noted.

| Symbol         | Parameter                            |       | Test Condition                             | Min. | Typ. | Max. | Units         |
|----------------|--------------------------------------|-------|--------------------------------------------|------|------|------|---------------|
| $V_{CEO(SUS)}$ | Collector-Emitter Sustaining Voltage | BD135 | $I_C = 30\text{ mA}, I_B = 0$              | 45   |      |      | V             |
|                |                                      | BD137 |                                            | 60   |      |      |               |
|                |                                      | BD139 |                                            | 80   |      |      |               |
| $I_{CBO}$      | Collector Cut-off Current            |       | $V_{CB} = 30\text{ V}, I_E = 0$            |      |      | 0.1  | $\mu\text{A}$ |
| $I_{EBO}$      | Emitter Cut-off Current              |       | $V_{EB} = 5\text{ V}, I_C = 0$             |      |      | 10   | $\mu\text{A}$ |
| $h_{FE1}$      | DC Current Gain                      |       | $V_{CE} = 2\text{ V}, I_C = 5\text{ mA}$   | 25   |      |      |               |
| $h_{FE2}$      |                                      |       | $V_{CE} = 2\text{ V}, I_C = 0.5\text{ A}$  | 25   |      |      |               |
| $h_{FE3}$      |                                      |       | $V_{CE} = 2\text{ V}, I_C = 150\text{ mA}$ | 40   |      | 250  |               |
| $V_{CE(sat)}$  | Collector-Emitter Saturation Voltage |       | $I_C = 500\text{ mA}, I_B = 50\text{ mA}$  |      |      | 0.5  | V             |
| $V_{BE(on)}$   | Base-Emitter On Voltage              |       | $V_{CE} = 2\text{ V}, I_C = 0.5\text{ A}$  |      |      | 1    | V             |

## $h_{FE}$ Classification

| Classification | 6        | 10       | 16        |
|----------------|----------|----------|-----------|
| $h_{FE3}$      | 40 ~ 100 | 63 ~ 160 | 100 ~ 250 |

## Typical Performance Characteristics

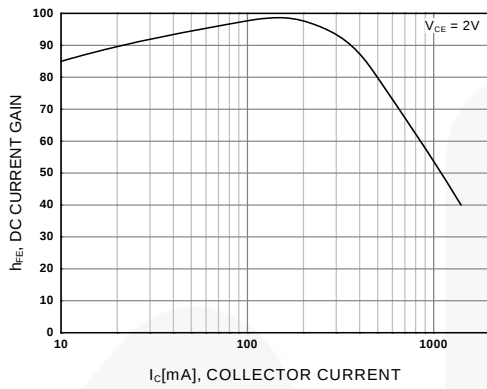


Figure 1. DC current Gain

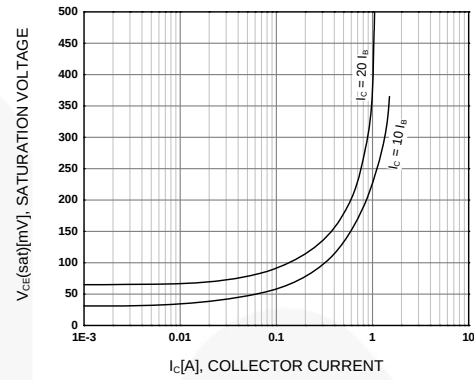


Figure 2. Collector-Emitter Saturation Voltage

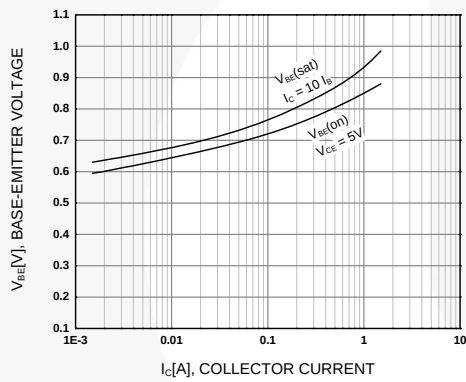


Figure 3. Base-Emitter Voltage

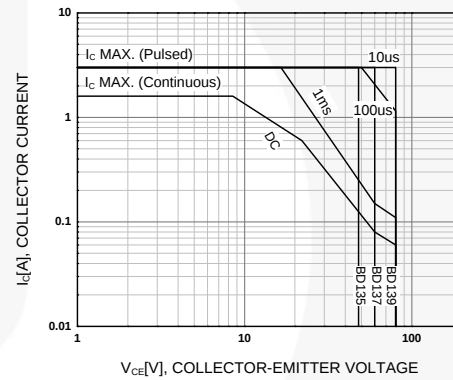


Figure 4. Safe Operating Area

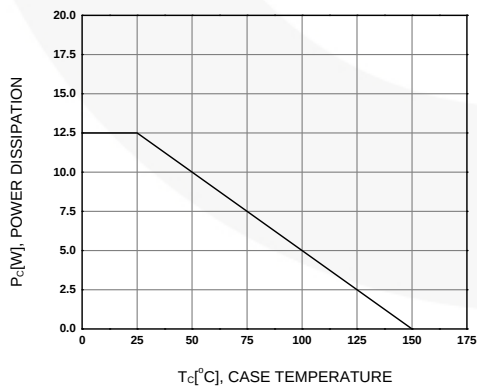


Figure 5. Power Derating

Technical drawing of a TSSTU terminal showing three views: front view, side view, and end view.

**Front View Dimensions:**

- Overall width: 8.30 / 7.70
- Top section width: 3.80 - 4.00
- Central hole diameter:  $\phi 3.20$
- Maximum height: 14.20 MAX
- Bottom section width: 1.50 - 1.70
- Bottom section depth: 0.65 - 0.85
- Bottom section length: 2.29
- Bottom section tolerance:  $\pm .254(M)$
- Bottom section angle:  $3^\circ$

**Side View Dimensions:**

- Top section width: 3.05 - 3.45
- Top section height: 10.80 - 11.20
- Bottom section width: 1.55 - 1.95
- Bottom section height: 15.9 - 16.30
- Bottom section length: 0.45 - 0.60
- Bottom section tolerance:  $3X$

| PRODUCTION CODE | TERMINAL LENGTH "D" |
|-----------------|---------------------|
| TSSTU           | 3.45-4.05           |

A) THIS PACKAGE DOES NOT COMPLY TO ANY  
CURRENT PACKAGING STANDARD.

B) ALL DIMENSIONS ARE IN MILLIMETERS.

C) DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH,  
AND TIE BAR EXTRUSIONS.

D) FOR TERMINAL LENGTH SEE TABLE

E) DRAWING FILE NAME AND REVISION : MKT-TO126Arev1

| PRODUCTION CODE   | TERMINAL LENGTH "D" |
|-------------------|---------------------|
| TSSTU             | 3.45-4.05           |
| TSTU              | 2.36-2.96           |
| NONE (STD LENGTH) | 12.76-13.36         |

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| EcoSPARK®                                                                           | MegaBuck™                                      | SmartMax™                                                                           | TRUECURRENT®*                                                                                       |
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