SGS-THOMSON MICROELECTRONICS

# BD235/BD236 BD237/BD238

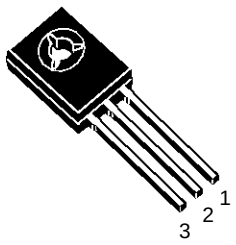
## COMPLEMENTARY SILICON POWER TRANSISTORS

- SGS-THOMSON PREFERRED SALESTYPES

**DESCRIPTION**

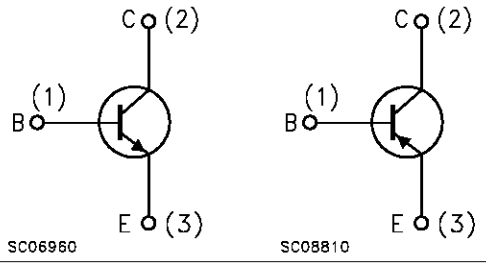
The BD235 and BD237 are silicon epitaxial-base NPN power transistors in Jedec SOT-32 plastic package inteded for use in medium power linear and switching applications.

The complementary PNP types are BD236 and BD238 respectively.




**SOT-32**

**INTERNAL SCHEMATIC DIAGRAM**




**ABSOLUTE MAXIMUM RATINGS**

| Symbol | Parameter | | Value | | Unit |
|---|---|---|---|---|---|
| | | NPN | BD235 | BD237 | |
| | | PNP | BD236 | BD238 | |
| $V_{CBO}$ | Collector-Base Voltage ($I_E$ = 0) | | 60 | 100 | V |
| $V_{CER}$ | Collector-Base Voltage ($R_{BE}$ = 1KΩ) | | 60 | 100 | V |
| $V_{CEO}$ | Collector-Emitter Voltage ($I_B$ = 0) | | 60 | 80 | V |
| $V_{EBO}$ | Emitter-Base Voltage ($I_C$ = 0) | | 5 | | V |
| $I_C$ | Collector Current | | 2 | | A |
| $I_{CM}$ | Collector Peak Current | | 6 | | A |
| $P_{tot}$ | Total Dissipation at $T_c$ = 25 °C | | 25 | | W |
| $T_{stg}$ | Storage Temperature | | -65 to 150 | | °C |
| $T_j$ | Max. Operating Junction Temperature | | 150 | | °C |

For PNP types voltage and current values are negative.

## THERMAL DATA

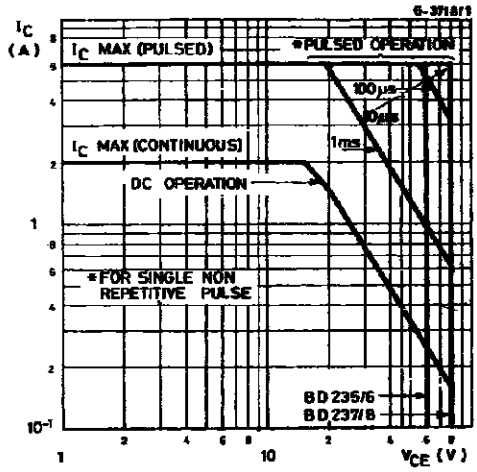
| | | | | |
|---|---|---|---|---|
| $R_{thj\text{-}case}$ | Thermal Resistance Junction-case | Max | 5 | $^oC/W$ |

## ELECTRICAL CHARACTERISTICS ($T_{case}$ = 25 $^oC$ unless otherwise specified)

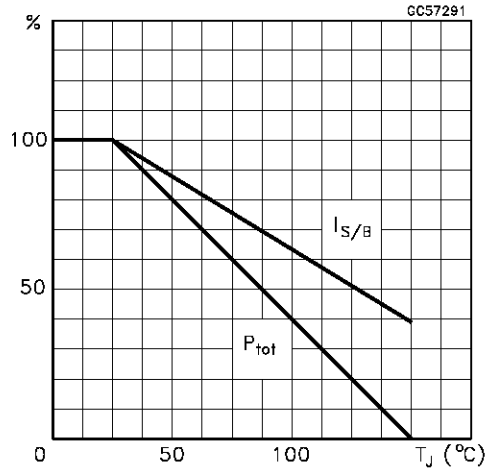
| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $I_{CBO}$ | Collector Cut-off Current ($I_E$ = 0) | $V_{CE}$ = rated $V_{CEO}$<br>$V_{CE}$ = rated $V_{CEO}$ $T_c$ = 150 $^oC$ | | | 0.1<br>2 | mA<br>mA |
| $I_{EBO}$ | Emitter Cut-off Current ($I_C$ = 0) | $V_{EB}$ = 5 V | | | 1 | mA |
| $V_{CEO(sus)}$* | Collector-Emitter Sustaining Voltage | $I_C$ = 100 mA<br>for **BD235/BD236**<br>for **BD237/BD238** | <br>60<br>80 | | | <br>V<br>V |
| $V_{CE(sat)}$* | Collector-Emitter Saturation Voltage | $I_C$ = 1 A $I_B$ = 0.1 A | | | 0.6 | V |
| $V_{BE}$* | Base-Emitter Voltage | $I_C$ = 1 A $V_{CE}$ = 2 V | | | 1.3 | V |
| $h_{FE}$* | DC Current Gain | $I_C$ = 150 mA $V_{CE}$ = 2 V<br>$I_C$ = 1 A $V_{CE}$ = 2 V | 40<br>25 | | | |
| $f_T$ | Transition frequency | $I_C$ = 250 mA $V_{CE}$ = 10 V | 3 | | | MHz |
| $h_{FE1}/h_{FE2}$* | Matched Pairs | $I_C$ = 150 mA $V_{CE}$ = 2 V | | 1.6 | | |

* Pulsed: Pulse duration = 300 µs, duty cycle 1.5 %

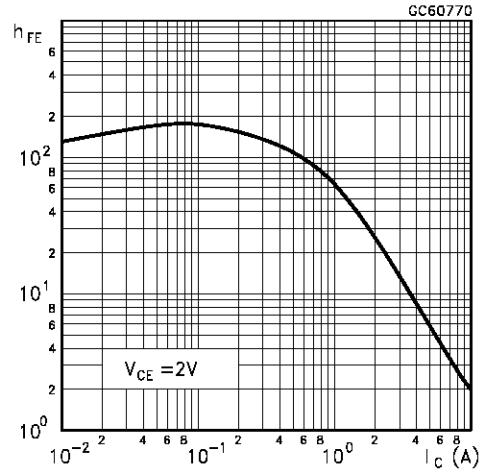
Safe Operating Area



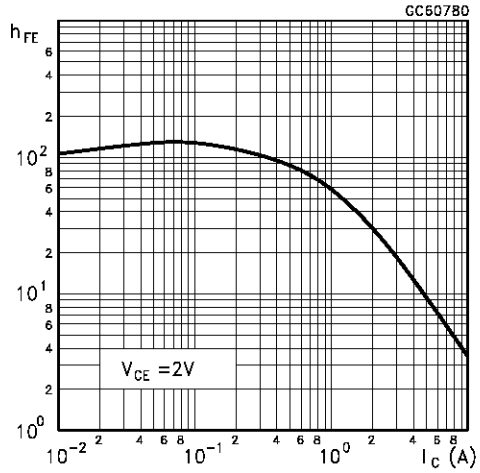

Derating Curves



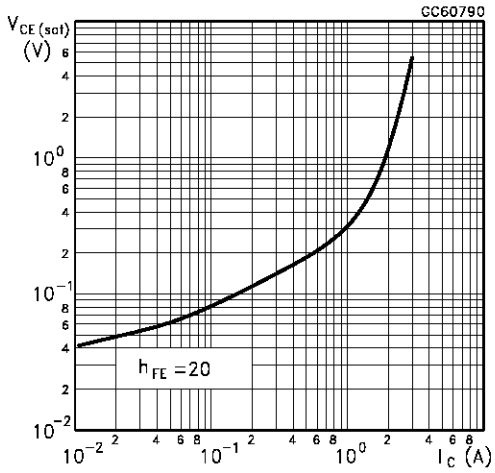
DC Current Gain (NPN type)



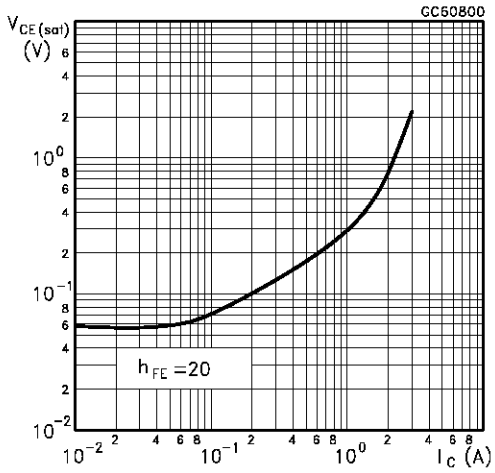

DC Current Gain (PNP type)



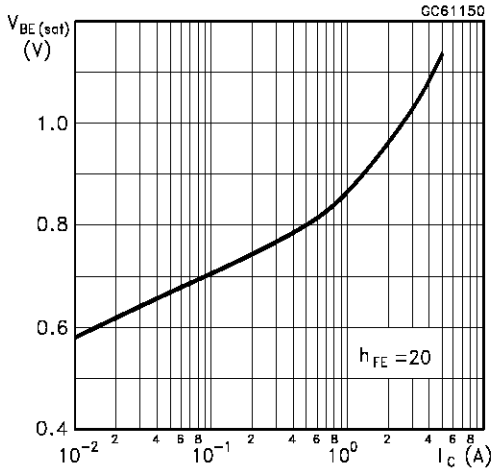

Collector-Emitter Saturation Voltage (NPN type)



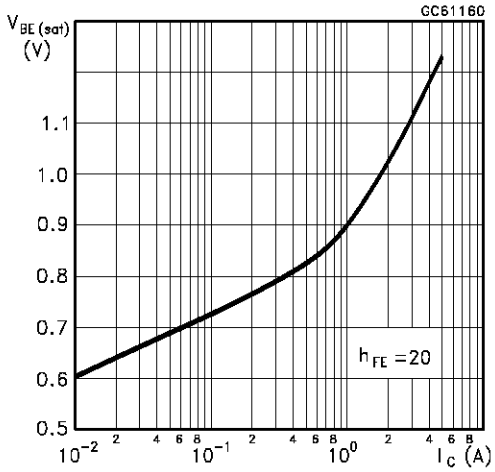

Collector-Emitter Saturation Voltage (PNP type)




Base-Emitter Saturation Voltage (NPN type)

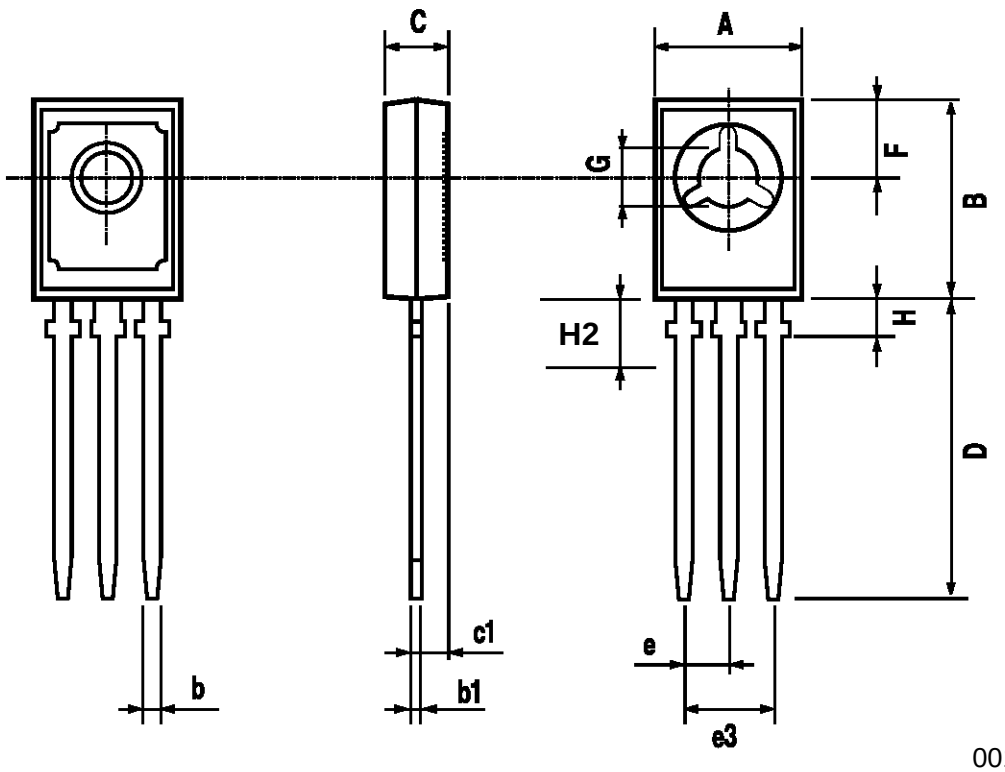



Collector-Base Capacitance (PNP type)



## SOT-32 (TO-126) MECHANICAL DATA

| DIM. | mm | | | inch | | |
|---|---|---|---|---|---|---|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | 7.4 | | 7.8 | 0.291 | | 0.307 |
| B | 10.5 | | 10.8 | 0.413 | | 0.445 |
| b | 0.7 | | 0.9 | 0.028 | | 0.035 |
| b1 | 0.49 | | 0.75 | 0.019 | | 0.030 |
| C | 2.4 | | 2.7 | 0.040 | | 0.106 |
| c1 | 1.0 | | 1.3 | 0.039 | | 0.050 |
| D | 15.4 | | 16.0 | 0.606 | | 0.629 |
| e | | 2.2 | | | 0.087 | |
| e3 | 4.15 | | 4.65 | 0.163 | | 0.183 |
| F | | 3.8 | | | 0.150 | |
| G | 3 | | 3.2 | 0.118 | | 0.126 |
| H | | | 2.54 | | | 0.100 |
| H2 | | 2.15 | | | 0.084 | |

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