

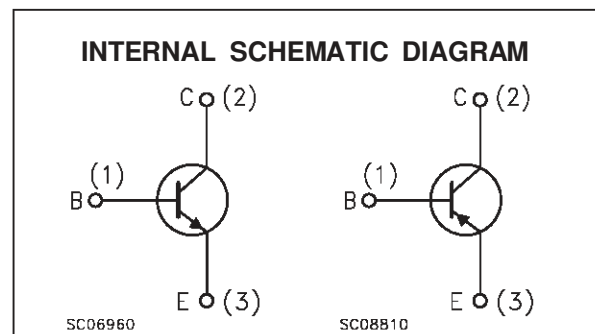
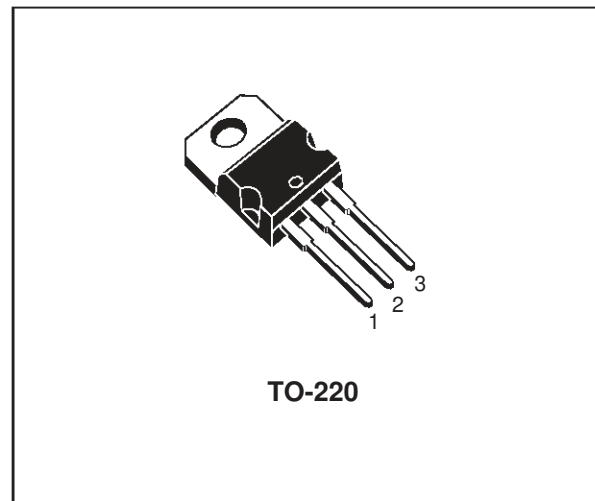
## COMPLEMENTARY SILICON POWER TRANSISTORS

- STMicroelectronics PREFERRED SALESTYPES

### DESCRIPTION

The BD909 and BD911 are silicon Epitaxial-Base NPN power transistors mounted in Jedec TO-220 plastic package. They are intended for use in power linear and switching applications.

The complementary PNP types are BD910 and BD912 respectively.



### ABSOLUTE MAXIMUM RATINGS

| Symbol     | Parameter  | Value |            | Unit |                  |
|------------|--|-------|------------|------|------------------|
|            |  | NPN   | BD909      |      | BD911            |
|            |  | PNP   | BD910      |      | BD912            |
| $V_{CBO}$  | Collector-Base Voltage ( $I_E = 0$ )             |       | 80         | 100  | V                |
| $V_{CEO}$  | Collector-Emitter Voltage ( $I_B = 0$ )          |       | 80         | 100  | V                |
| $V_{EBO}$  | Emitter-Base Voltage ( $I_C = 0$ )               |       | 5          |      | V                |
| $I_E, I_C$ | Collector Current                                |       | 15         |      | A                |
| $I_B$      | Base Current                                     |       | 5          |      | A                |
| $P_{tot}$  | Total Dissipation at $T_c \leq 25^\circ\text{C}$ |       | 90         |      | W                |
| $T_{stg}$  | Storage Temperature                              |       | -65 to 150 |      | $^\circ\text{C}$ |
| $T_j$      | Max. Operating Junction Temperature              |       | 150        |      | $^\circ\text{C}$ |

For PNP types voltage and current values are negative.

# BD909 / BD910 / BD911 / BD912

## THERMAL DATA

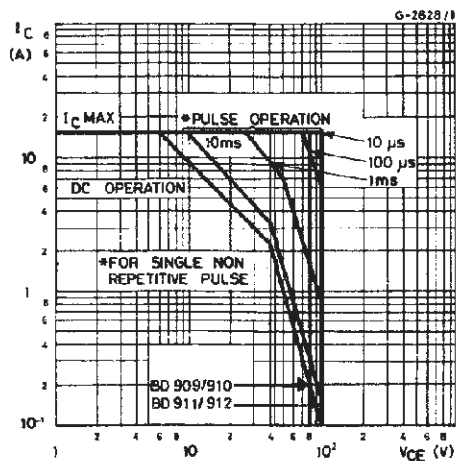
|                |                                  |     |     |               |
|----------------|----------------------------------|-----|-----|---------------|
| $R_{thj-case}$ | Thermal Resistance Junction-case | Max | 1.4 | $^{\circ}C/W$ |
|----------------|----------------------------------|-----|-----|---------------|

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

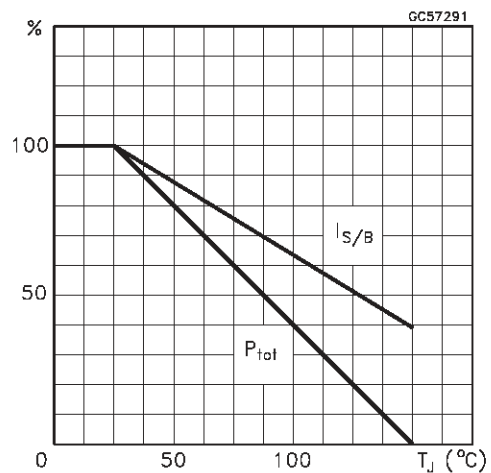
| Symbol          | Parameter  | Test Conditions   | Min.          | Typ. | Max.                 | Unit                           |
|-----------------|--|---|---------------|------|----------------------|--------------------------------|
| $I_{CBO}$       | Collector Cut-off Current ( $I_E = 0$ )            | for <b>BD909/910</b> $V_{CB} = 80 V$<br>for <b>BD911/912</b> $V_{CB} = 100 V$<br>$T_{case} = 150^{\circ}C$<br>for <b>BD909/910</b> $V_{CB} = 80 V$<br>for <b>BD911/912</b> $V_{CB} = 100 V$ |               |      | 500<br>500<br>5<br>5 | $\mu A$<br>$\mu A$<br>mA<br>mA |
| $I_{CEO}$       | Collector Cut-off Current ( $I_B = 0$ )            | for <b>BD909/910</b> $V_{CE} = 40 V$<br>for <b>BD911/912</b> $V_{CE} = 50 V$  |               |      | 1<br>1               | mA<br>mA                       |
| $I_{EBO}$       | Emitter Cut-off Current ( $I_C = 0$ )              | $V_{EB} = 5 V$  |               |      | 1                    | mA                             |
| $V_{CE(sus)}^*$ | Collector-Emitter Sustaining Voltage ( $I_B = 0$ ) | $I_C = 100 mA$ for <b>BD909/910</b><br>for <b>BD911/912</b>   | 80<br>100     |      |                      | V<br>V                         |
| $V_{CE(sat)}^*$ | Collector-Emitter Saturation Voltage               | $I_C = 5 A$ $I_B = 0.5 A$<br>$I_C = 10 A$ $I_B = 2.5 A$   |               |      | 1<br>3               | V<br>V                         |
| $V_{BE(sat)}^*$ | Base-Emitter Saturation Voltage                    | $I_C = 10 A$ $I_B = 2.5 A$  |               |      | 2.5                  | V                              |
| $V_{BE}^*$      | Base-Emitter Voltage                               | $I_C = 5 A$ $V_{CE} = 4 V$  |               |      | 1.5                  | V                              |
| $h_{FE}^*$      | DC Current Gain                                    | $I_C = 0.5 A$ $V_{CE} = 4 V$<br>$I_C = 5 A$ $V_{CE} = 4 V$<br>$I_C = 10 A$ $V_{CE} = 4 V$   | 40<br>15<br>5 |      | 250<br>150           |                                |
| $f_T$           | Transition frequency                               | $I_C = 0.5 A$ $V_{CE} = 4 V$  | 3             |      |                      | MHz                            |

\* Pulsed: Pulse duration = 300  $\mu s$ , duty cycle 1.5 %  
For PNP types voltage and current values are negative.

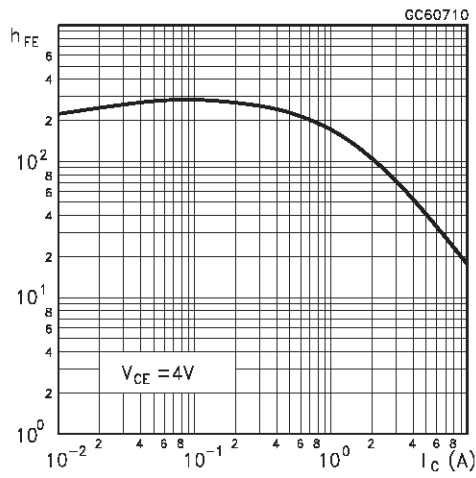
## Safe Operating Area



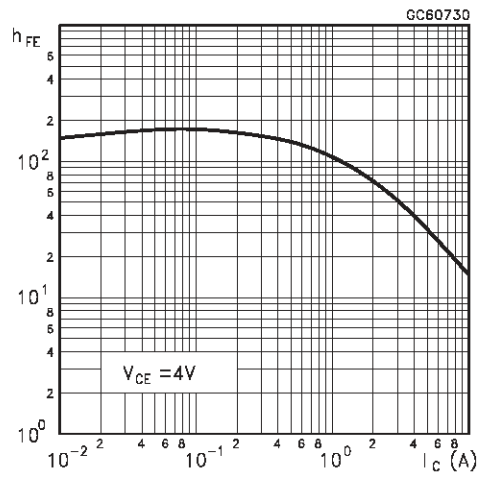
## Derating Curves



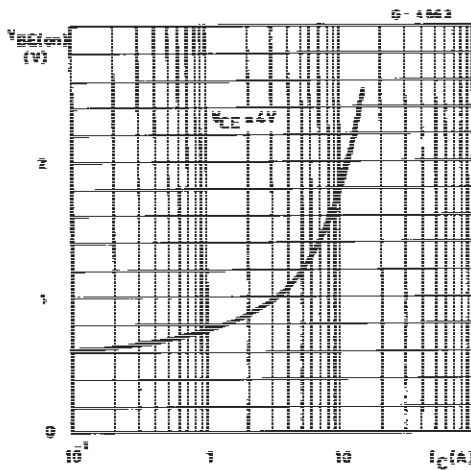
DC Current Gain (NPN type)



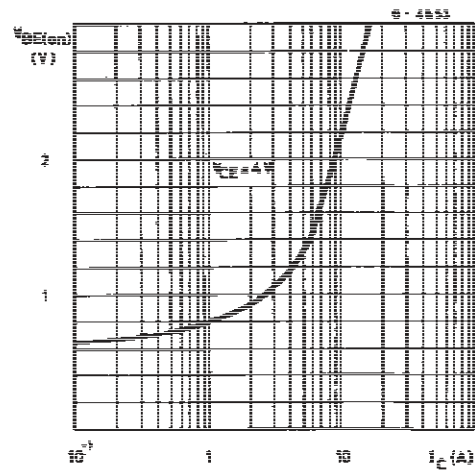
DC Current Gain (PNP type)



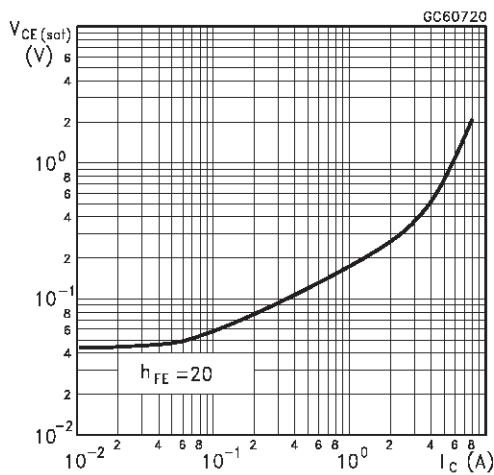
DC Transconductance (NPN type)



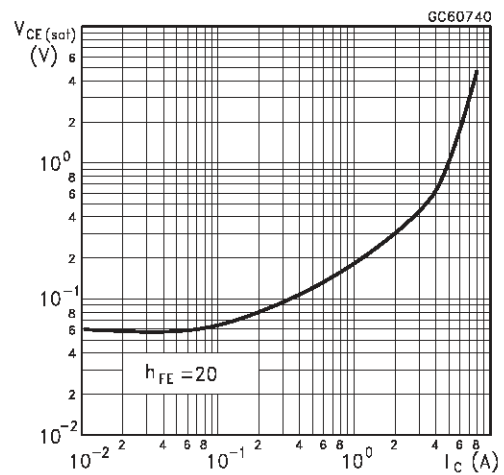
DC Transconductance (PNP type)



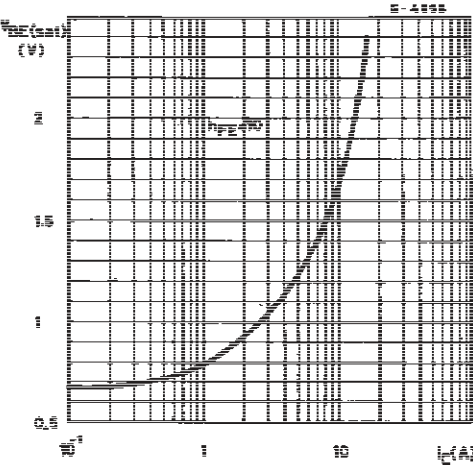
Collector-Emitter Saturation Voltage (NPN type)



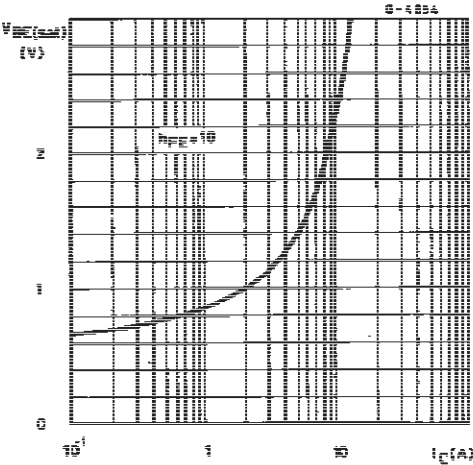
Collector-Emitter Saturation Voltage (PNP type)



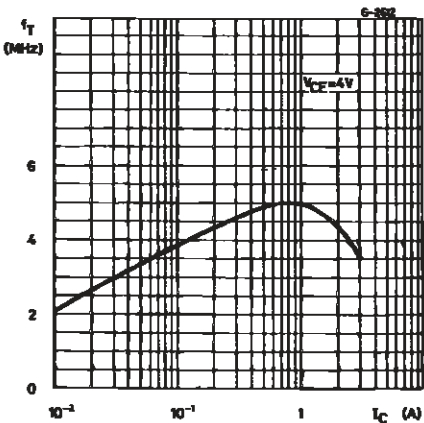
Base-Emitter Saturation Voltage (NPN type)



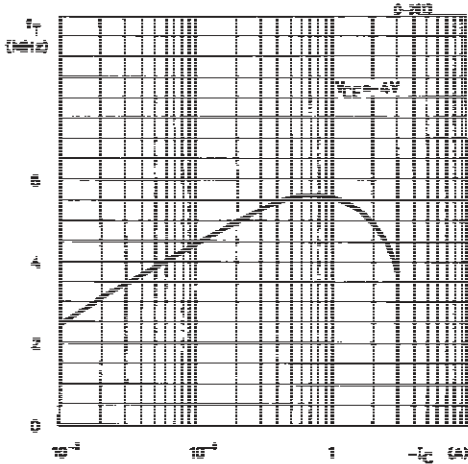
Base-Emitter Saturation Voltage (PNP type)



Transition Frequency (NPN type)

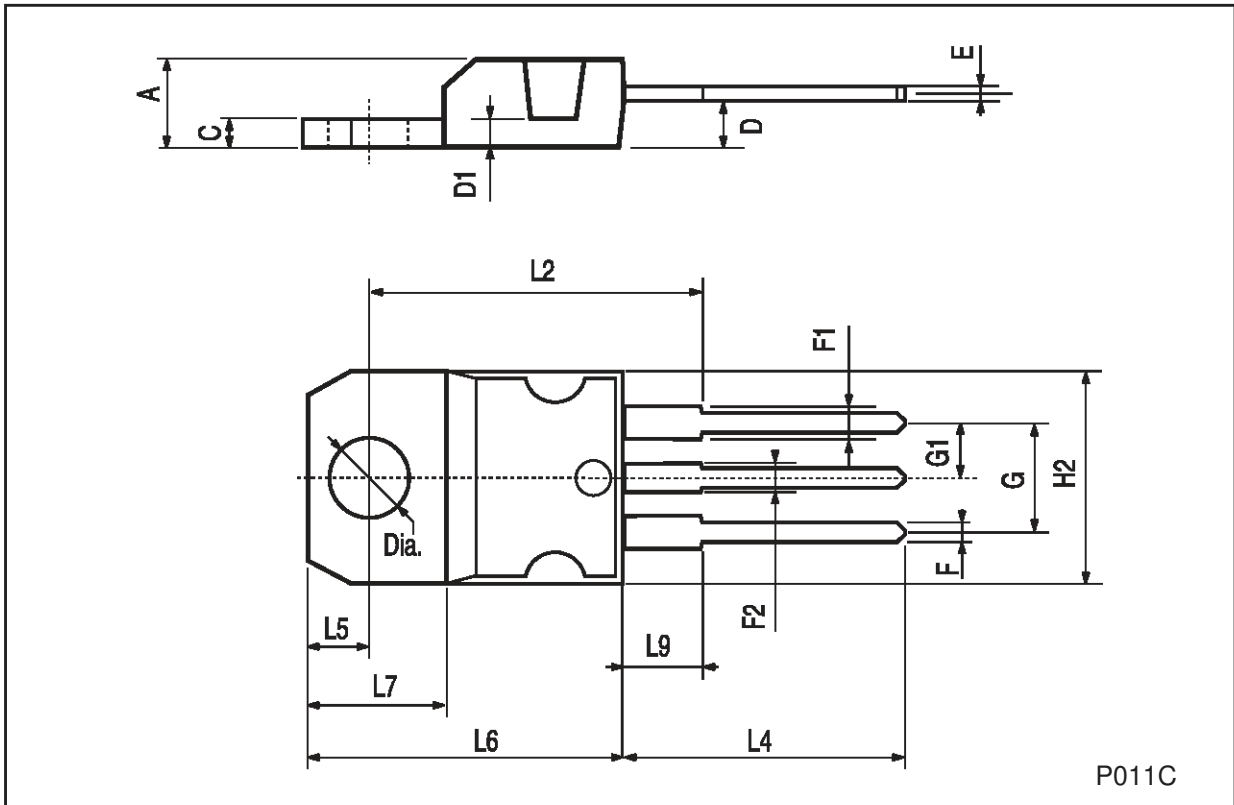


Transition Frequency (PNP type)



**TO-220 MECHANICAL DATA**

| DIM. | mm    |      |       | inch  |       |       |
|------|-------|------|-------|-------|-------|-------|
|      | MIN.  | TYP. | MAX.  | MIN.  | TYP.  | MAX.  |
| A    | 4.40  |      | 4.60  | 0.173 |       | 0.181 |
| C    | 1.23  |      | 1.32  | 0.048 |       | 0.051 |
| D    | 2.40  |      | 2.72  | 0.094 |       | 0.107 |
| D1   |       | 1.27 |       |       | 0.050 |       |
| E    | 0.49  |      | 0.70  | 0.019 |       | 0.027 |
| F    | 0.61  |      | 0.88  | 0.024 |       | 0.034 |
| F1   | 1.14  |      | 1.70  | 0.044 |       | 0.067 |
| F2   | 1.14  |      | 1.70  | 0.044 |       | 0.067 |
| G    | 4.95  |      | 5.15  | 0.194 |       | 0.203 |
| G1   | 2.4   |      | 2.7   | 0.094 |       | 0.106 |
| H2   | 10.0  |      | 10.40 | 0.393 |       | 0.409 |
| L2   |       | 16.4 |       |       | 0.645 |       |
| L4   | 13.0  |      | 14.0  | 0.511 |       | 0.551 |
| L5   | 2.65  |      | 2.95  | 0.104 |       | 0.116 |
| L6   | 15.25 |      | 15.75 | 0.600 |       | 0.620 |
| L7   | 6.2   |      | 6.6   | 0.244 |       | 0.260 |
| L9   | 3.5   |      | 3.93  | 0.137 |       | 0.154 |
| DIA. | 3.75  |      | 3.85  | 0.147 |       | 0.151 |



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