



# BD909/911 BD910/912

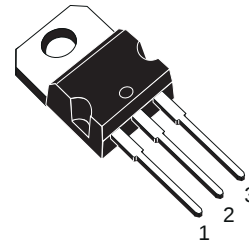
## COMPLEMENTARY SILICON POWER TRANSISTORS

- STMicroelectronics PREFERRED SALESTYPES

### DESCRIPTION

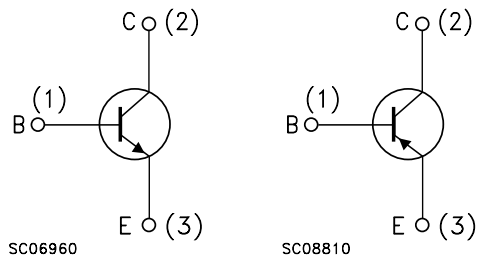
The BD909 and BD911 are silicon Epitaxial-Base NPN power transistors mounted in Jedec TO-220 plastic package. They are intended for use in power linear and switching applications.

The complementary PNP types are BD910 and BD912 respectively.



TO-220

### INTERNAL SCHEMATIC DIAGRAM



### ABSOLUTE MAXIMUM RATINGS

| Symbol                          | Parameter                                      | Value      |       | Unit |       |
|---------------------------------|------------------------------------------------|------------|-------|------|-------|
|                                 |                                                | NPN        | BD909 |      | BD911 |
|                                 |                                                | PNP        | BD910 |      | BD912 |
| V <sub>CBO</sub>                | Collector-Base Voltage (I <sub>E</sub> = 0)    | 80         | 100   | V    |       |
| V <sub>CEO</sub>                | Collector-Emitter Voltage (I <sub>B</sub> = 0) | 80         | 100   | V    |       |
| V <sub>EBO</sub>                | Emitter-Base Voltage (I <sub>C</sub> = 0)      | 5          |       | V    |       |
| I <sub>E</sub> , I <sub>C</sub> | Collector Current                              | 15         |       | A    |       |
| I <sub>B</sub>                  | Base Current                                   | 5          |       | A    |       |
| P <sub>tot</sub>                | Total Dissipation at T <sub>c</sub> ≤ 25 °C    | 90         |       | W    |       |
| T <sub>stg</sub>                | Storage Temperature                            | -65 to 150 |       | °C   |       |
| T <sub>j</sub>                  | Max. Operating Junction Temperature            | 150        |       | °C   |       |

For PNP types voltage and current values are negative.

## BD909 / BD910 / BD911 / BD912

### THERMAL DATA

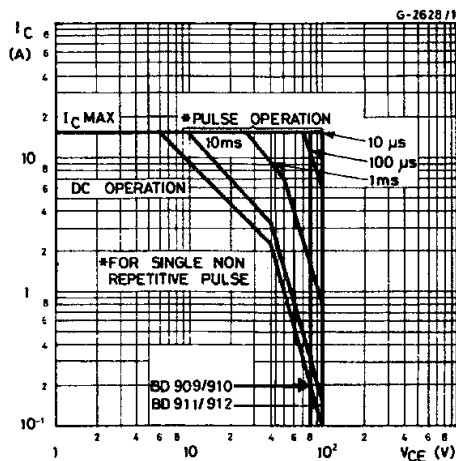
|                       |                                  |     |     |      |
|-----------------------|----------------------------------|-----|-----|------|
| R <sub>thj-case</sub> | Thermal Resistance Junction-case | Max | 1.4 | °C/W |
|-----------------------|----------------------------------|-----|-----|------|

### ELECTRICAL CHARACTERISTICS (T<sub>case</sub> = 25 °C unless otherwise specified)

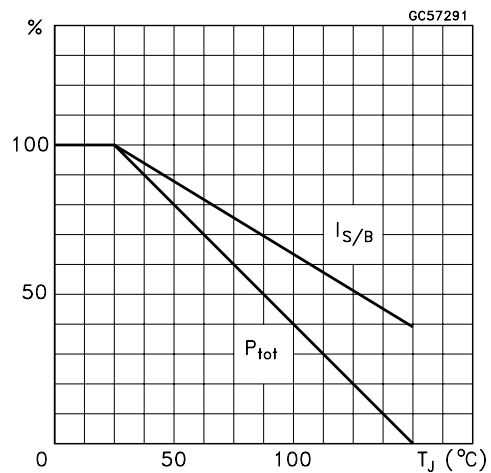
| Symbol                 | Parameter                                                 | Test Conditions                                                                                                                                                                                                          | Min.          | Typ. | Max.                 | Unit                 |
|------------------------|-----------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|------|----------------------|----------------------|
| I <sub>CBO</sub>       | Collector Cut-off Current (I <sub>E</sub> = 0)            | for <b>BD909/910</b> V <sub>CB</sub> = 80 V<br>for <b>BD911/912</b> V <sub>CB</sub> = 100 V<br>T <sub>case</sub> = 150 °C<br>for <b>BD909/910</b> V <sub>CB</sub> = 80 V<br>for <b>BD911/912</b> V <sub>CB</sub> = 100 V |               |      | 500<br>500<br>5<br>5 | μA<br>μA<br>mA<br>mA |
| I <sub>CEO</sub>       | Collector Cut-off Current (I <sub>B</sub> = 0)            | for <b>BD909/910</b> V <sub>CE</sub> = 40 V<br>for <b>BD911/912</b> V <sub>CE</sub> = 50 V                                                                                                                               |               |      | 1<br>1               | mA<br>mA             |
| I <sub>EBO</sub>       | Emitter Cut-off Current (I <sub>C</sub> = 0)              | V <sub>EB</sub> = 5 V                                                                                                                                                                                                    |               |      | 1                    | mA                   |
| V <sub>CEO(sus)*</sub> | Collector-Emitter Sustaining Voltage (I <sub>B</sub> = 0) | I <sub>C</sub> = 100 mA for <b>BD909/910</b><br>for <b>BD911/912</b>                                                                                                                                                     | 80<br>100     |      |                      | V<br>V               |
| V <sub>CE(sat)*</sub>  | Collector-Emitter Saturation Voltage                      | I <sub>C</sub> = 5 A I <sub>B</sub> = 0.5 A<br>I <sub>C</sub> = 10 A I <sub>B</sub> = 2.5 A                                                                                                                              |               |      | 1<br>3               | V<br>V               |
| V <sub>BE(sat)*</sub>  | Base-Emitter Saturation Voltage                           | I <sub>C</sub> = 10 A I <sub>B</sub> = 2.5 A                                                                                                                                                                             |               |      | 2.5                  | V                    |
| V <sub>BE*</sub>       | Base-Emitter Voltage                                      | I <sub>C</sub> = 5 A V <sub>CE</sub> = 4 V                                                                                                                                                                               |               |      | 1.5                  | V                    |
| h <sub>FE*</sub>       | DC Current Gain                                           | I <sub>C</sub> = 0.5 A V <sub>CE</sub> = 4 V<br>I <sub>C</sub> = 5 A V <sub>CE</sub> = 4 V<br>I <sub>C</sub> = 10 A V <sub>CE</sub> = 4 V                                                                                | 40<br>15<br>5 |      | 250<br>150           |                      |
| f <sub>T</sub>         | Transition frequency                                      | I <sub>C</sub> = 0.5 A V <sub>CE</sub> = 4 V                                                                                                                                                                             | 3             |      |                      | MHz                  |

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

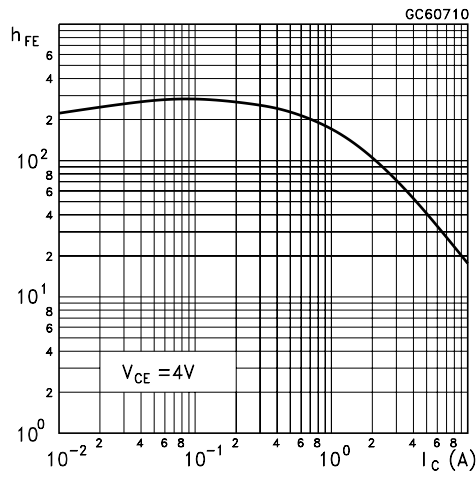
### Safe Operating Area



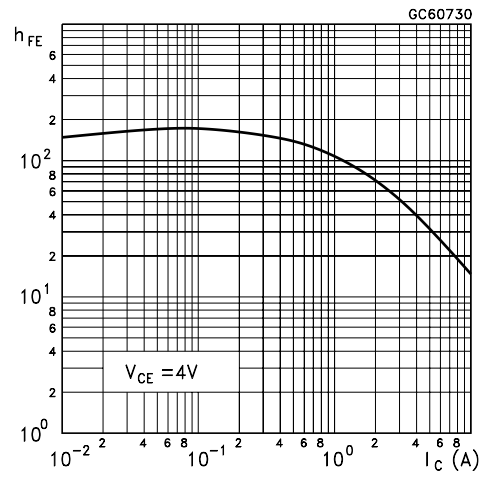
### Derating Curves



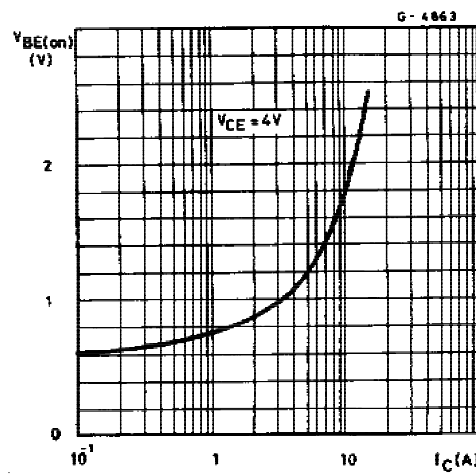
DC Current Gain (NPN type)



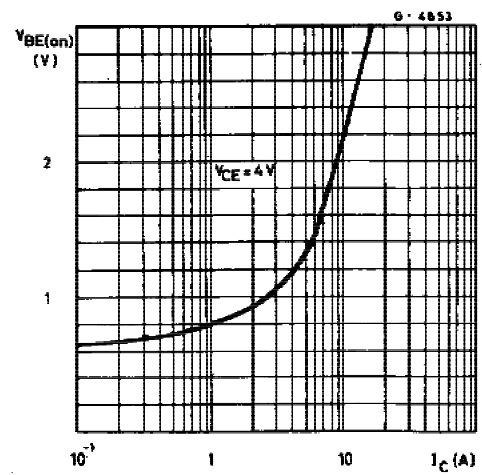
DC Current Gain (PNP type)



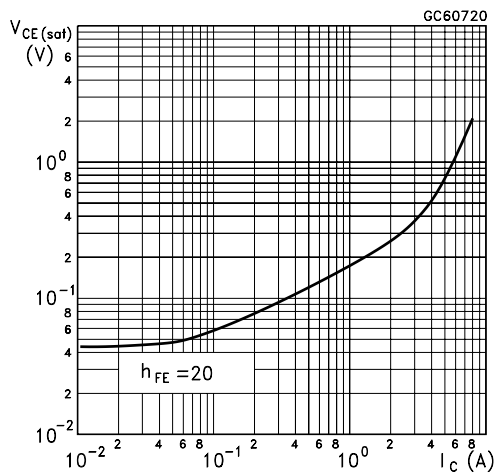
DC Transconductance (NPN type)



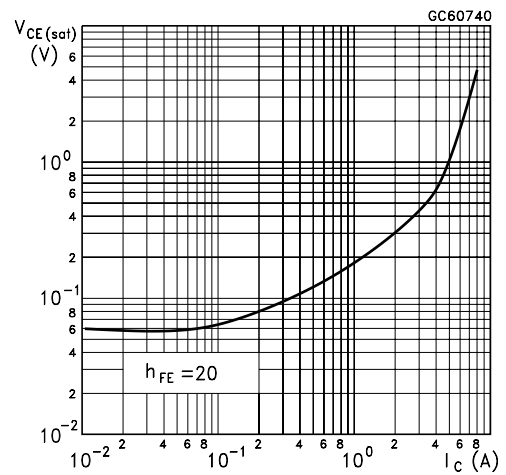
DC Transconductance (PNP type)



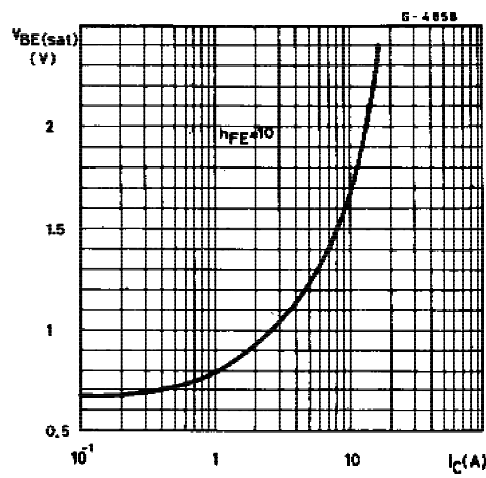
Collector-Emitter Saturation Voltage (NPN type)



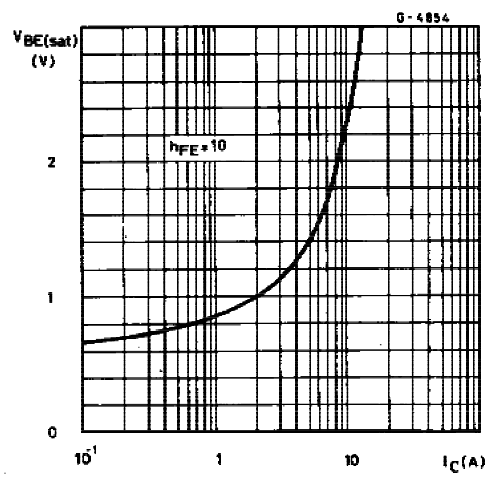
Collector-Emitter Saturation Voltage (PNP type)



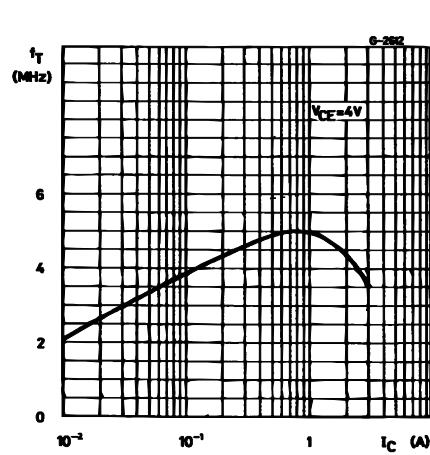
Base-Emitter Saturation Voltage (NPN type)



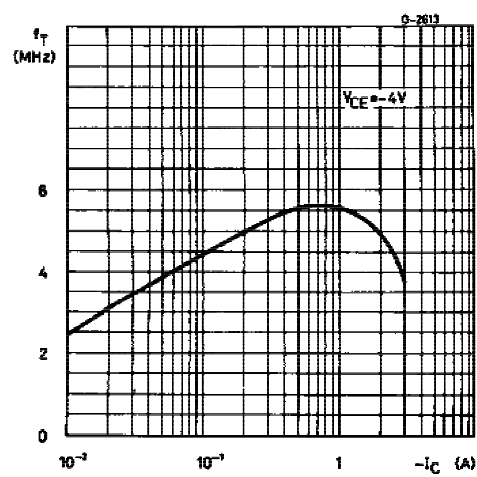
Base-Emitter Saturation Voltage (PNP type)



Transition Frequency (NPN type)

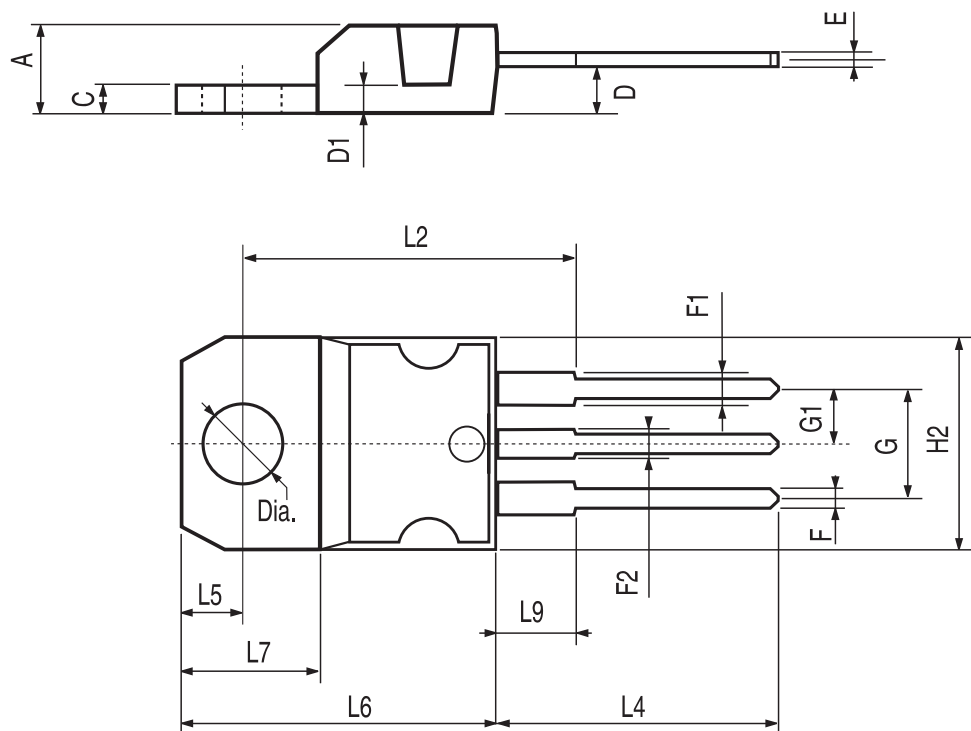


Transition Frequency (PNP type)



## 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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