



COMPLEMENTARY SILICON POWER TRANSISTORS

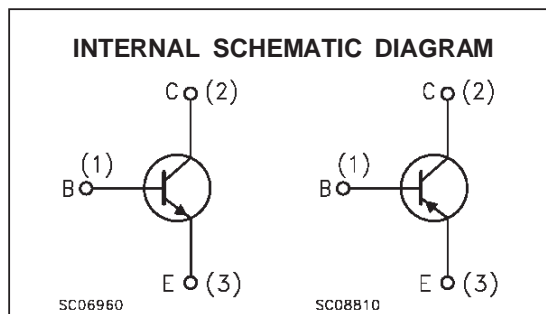
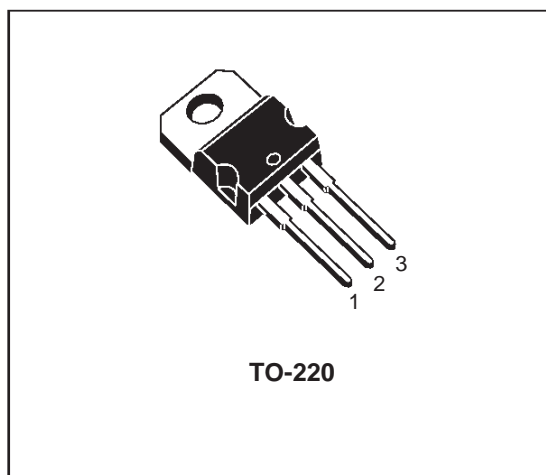
- COMPLEMENTARY PNP - NPN DEVICES

APPLICATION

- LINEAR AND SWITCHING INDUSTRIAL EQUIPMENT

DESCRIPTION

The BD707, BD709 and BD711 are silicon Epitaxial-Base NPN power transistors in Jedec TO-220 plastic package. They are intended for use in power linear and switching applications. The BD707 and BD711 complementary PNP types are BD708 and BD712 respectively.



ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | | | Unit | |
|-----------|--|------------|----------------|-------------------------|------|------------------|
| | | NPN PNP | BD707 BD708 | BD709 BD711 BD712 | | |
| V_{CBO} | Collector-Base Voltage ($I_E = 0$) | | 60 | 80 | 100 | V |
| V_{CER} | Collector-Emitter Voltage ($V_{BE} = 0$) | | 60 | 80 | 100 | V |
| V_{CEO} | Collector-Emitter Voltage ($I_B = 0$) | | 60 | 80 | 100 | V |
| V_{EBO} | Emitter-Base Voltage ($I_C = 0$) | | 5 | | | V |
| I_C | Collector Current | | 12 | | | A |
| I_{CM} | Collector Peak Current | | 18 | | | A |
| I_B | Base Current | | 5 | | | A |
| P_{tot} | Total Dissipation at $T_c \leq 25^\circ\text{C}$ | | 75 | | | 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

THERMAL DATA

| | | | | |
|-----------------------|-------------------------------------|-----|------|------|
| R _{thj-case} | Thermal Resistance Junction-case | Max | 1.67 | °C/W |
| R _{thj-case} | Thermal Resistance Junction-ambient | Max | 70 | °C/W |

ELECTRICAL CHARACTERISTICS (T_{case} = 25 °C unless otherwise specified)

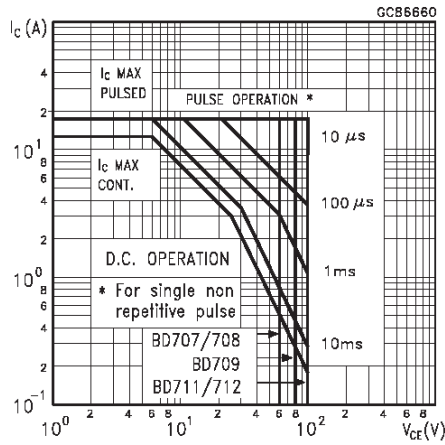
| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|------------------------|---|--|---------------------------|-----------------------------|----------------------------------|----------------------------------|
| I _{CBO} | Collector Cut-off Current (I _E = 0) | for BD707/708 V _{CB} = 60 V for BD709 V _{CB} = 80 V for BD711/712 V _{CB} = 100 V T _{case} = 150 °C for BD707/708 V _{CB} = 60 V for BD709 V _{CB} = 80 V for BD711/712 V _{CB} = 100 V | | | 100 100 100 1 1 1 | μA μA μA mA mA mA |
| I _{CEO} | Collector Cut-off Current (I _B = 0) | for BD707/708 V _{CE} = 30 V for BD709 V _{CE} = 40 V for BD711/712 V _{CE} = 50 V | | | 100 100 100 | mA mA mA |
| I _{EBO} | Emitter Cut-off Current (I _C = 0) | V _{EB} = 5 V | | | 1 | mA |
| V _{CEO(sus)*} | Collector-Emitter Sustaining Voltage (I _B = 0) | I _C = 100 mA for BD707/708 for BD709 for BD711/712 | 60 80 100 | | | V V V |
| V _{CE(sat)*} | Collector-Emitter Saturation Voltage | I _C = 4 A I _B = 0.4 A | | | 1 | V |
| V _{CEK*} | Knee Voltage | I _C = 3 A I _B = ** | | | 0.4 | V |
| V _{BE*} | Base-Emitter Voltage | I _C = 4 A V _{CE} = 4 V | | | 1.5 | V |
| h _{FE*} | DC Current Gain | I _C = 0.5 A V _{CE} = 2 V I _C = 2 A V _{CE} = 2 V for BD707/708 for BD709 I _C = 4 A V _{CE} = 4 V I _C = 10 A V _{CE} = 4 V for BD707/708 for BD709 for BD711/712 | 40 30 30 15 5 | 120 10 8 8 | 400 150 | |
| f _T | Transition frequency | I _C = 300 mA V _{CE} = 3 V | 3 | | | MHz |

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

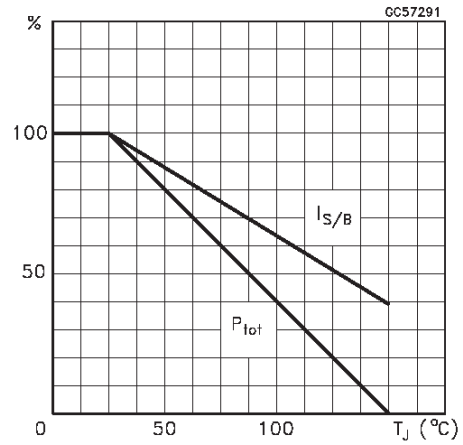
** Value for which I_C = 3.3 A at V_{CE} = 2V.

For PNP types voltage and current values are negative.

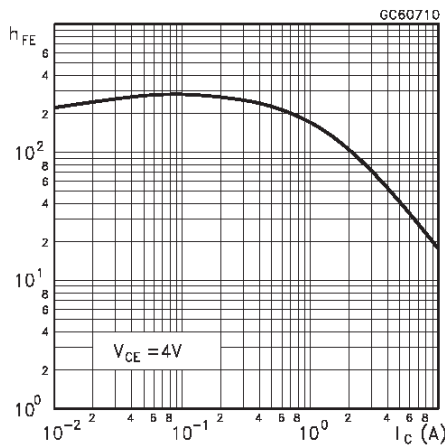
Safe Operating Areas



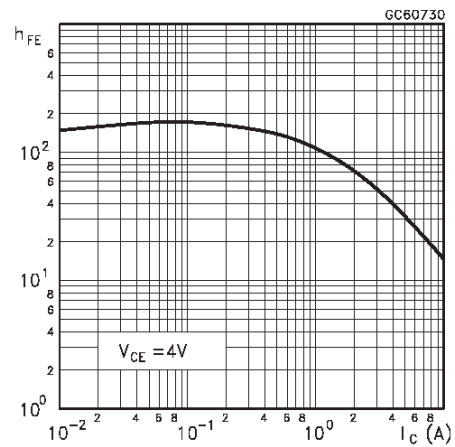
Derating Curve



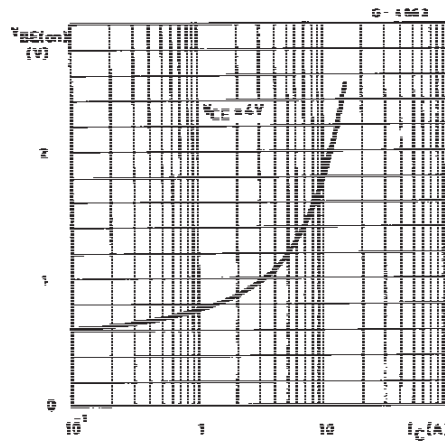
DC Current Gain(NPN type)



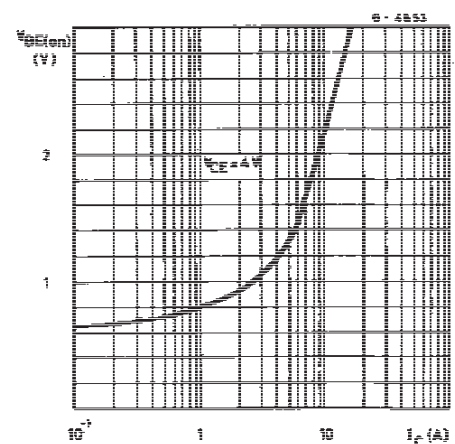
DC Current Gain(PNP type)



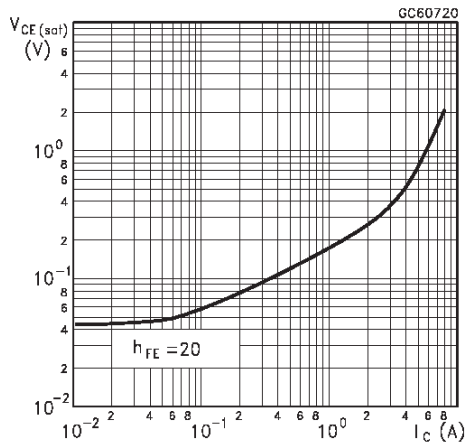
DC Transconductance(NPN type)



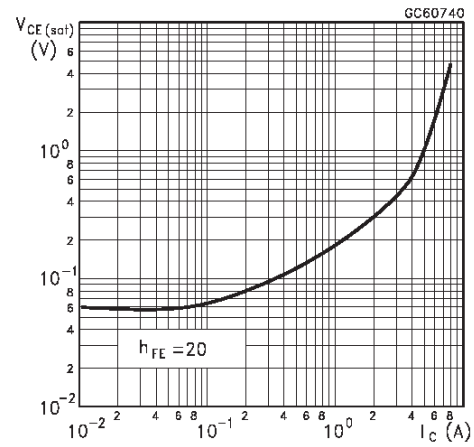
DC Transconductance(PNP type)



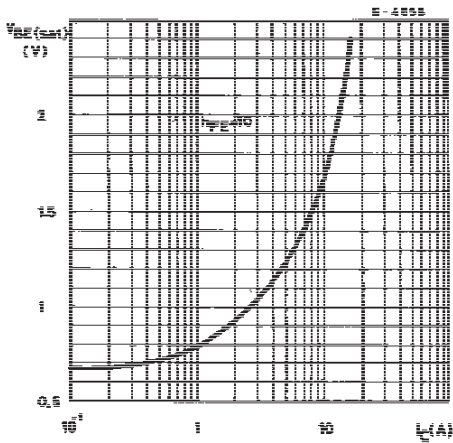
Collector-Emitter Saturation Voltage (NPN type)



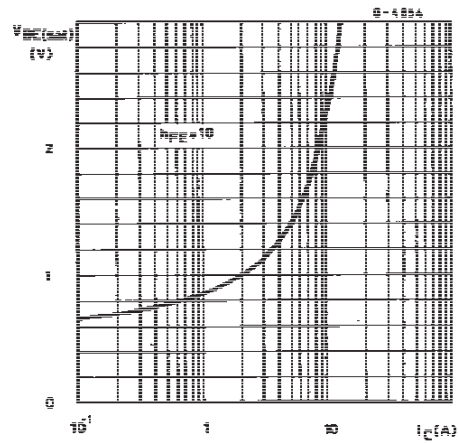
Collector-Emitter Saturation Voltage (PNP type)



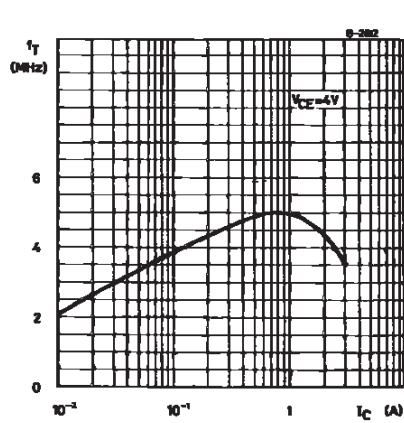
Base-Emitter Saturation Voltage (NPN type)



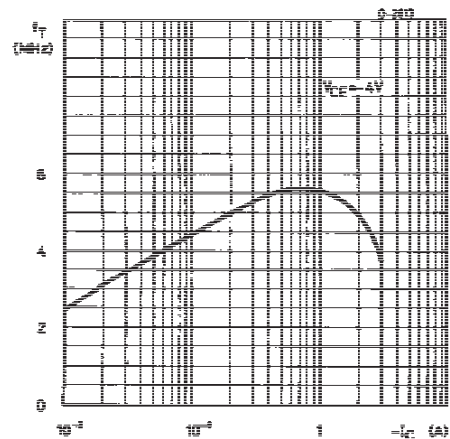
Base-Emitter Saturation Voltage (PNP type)



Transition Frequency (NPN type)

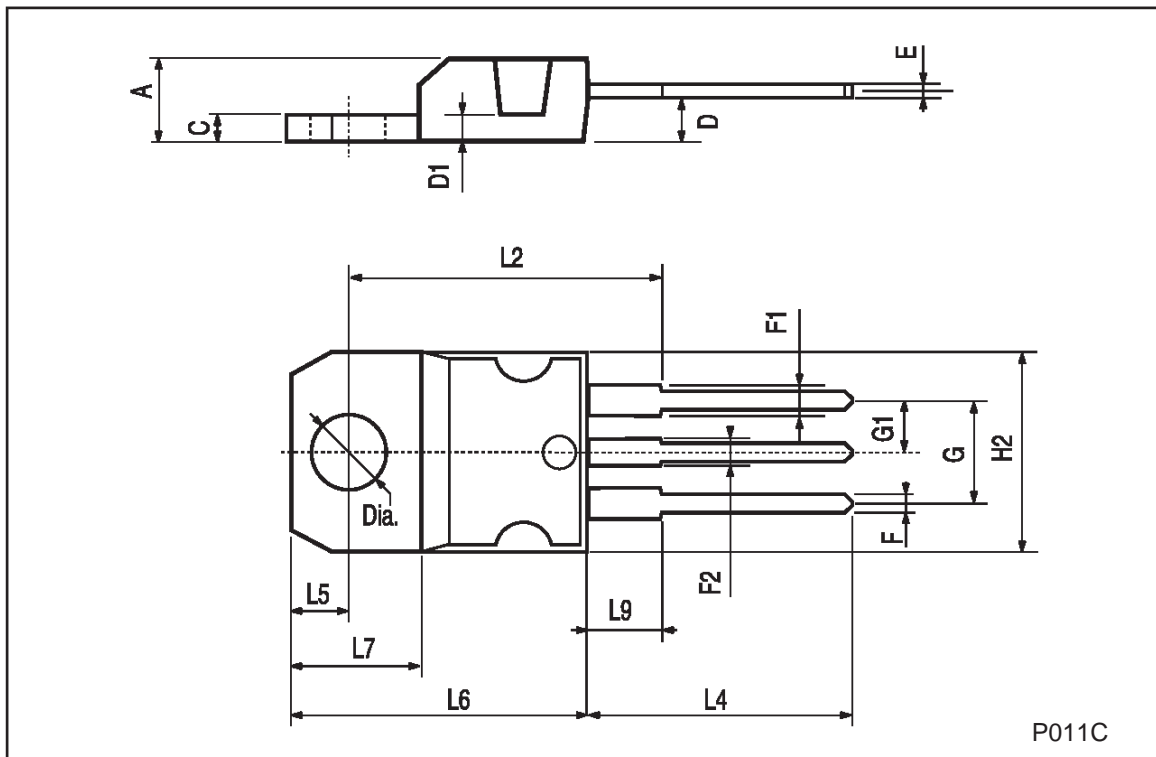


Transition Frequency (PNP type)



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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