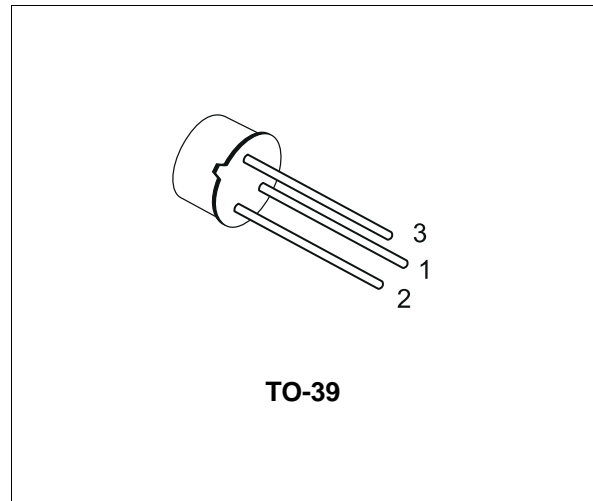


## EPITAXIAL PLANAR NPN

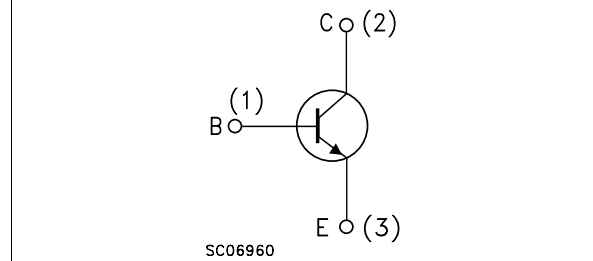
### DESCRIPTION

The 2N1711 is a silicon Planar Epitaxial NPN transistor in Jedec TO-39 metal case. It is intended for use in high performance amplifier, oscillator and switching circuits.

The 2N1711 is also used to advantage in amplifiers where low noise is an important factor.



### INTERNAL SCHEMATIC DIAGRAM



### ABSOLUTE MAXIMUM RATINGS

| Symbol    | Parameter  | Value      | Unit             |
|-----------|--|------------|------------------|
| $V_{CBO}$ | Collector-Base Voltage ( $I_E = 0$ )                         | 75         | V                |
| $V_{CER}$ | Collector-Emitter Voltage ( $R_{BE} \leq 10\Omega$ )         | 50         | V                |
| $V_{EBO}$ | Emitter-Base Voltage ( $I_C = 0$ )                           | 7          | V                |
| $I_C$     | Collector Current  | 500        | mA               |
| $P_{tot}$ | Total Dissipation at $T_{amb} \leq 25\text{ }^\circ\text{C}$ | 0.8        | W                |
|           | at $T_C \leq 25\text{ }^\circ\text{C}$                       | 3          | W                |
|           | at $T_C \leq 100\text{ }^\circ\text{C}$                      | 1.7        | W                |
| $T_{stg}$ | Storage Temperature  | -65 to 175 | $^\circ\text{C}$ |
| $T_j$     | Max. Operating Junction Temperature                          | 175        | $^\circ\text{C}$ |

## THERMAL DATA

|                |                                     |     |       |               |
|----------------|-------------------------------------|-----|-------|---------------|
| $R_{thj-case}$ | Thermal Resistance Junction-Case    | Max | 50    | $^{\circ}C/W$ |
| $R_{thj-amb}$  | Thermal Resistance Junction-Ambient | Max | 187.5 | $^{\circ}C/W$ |

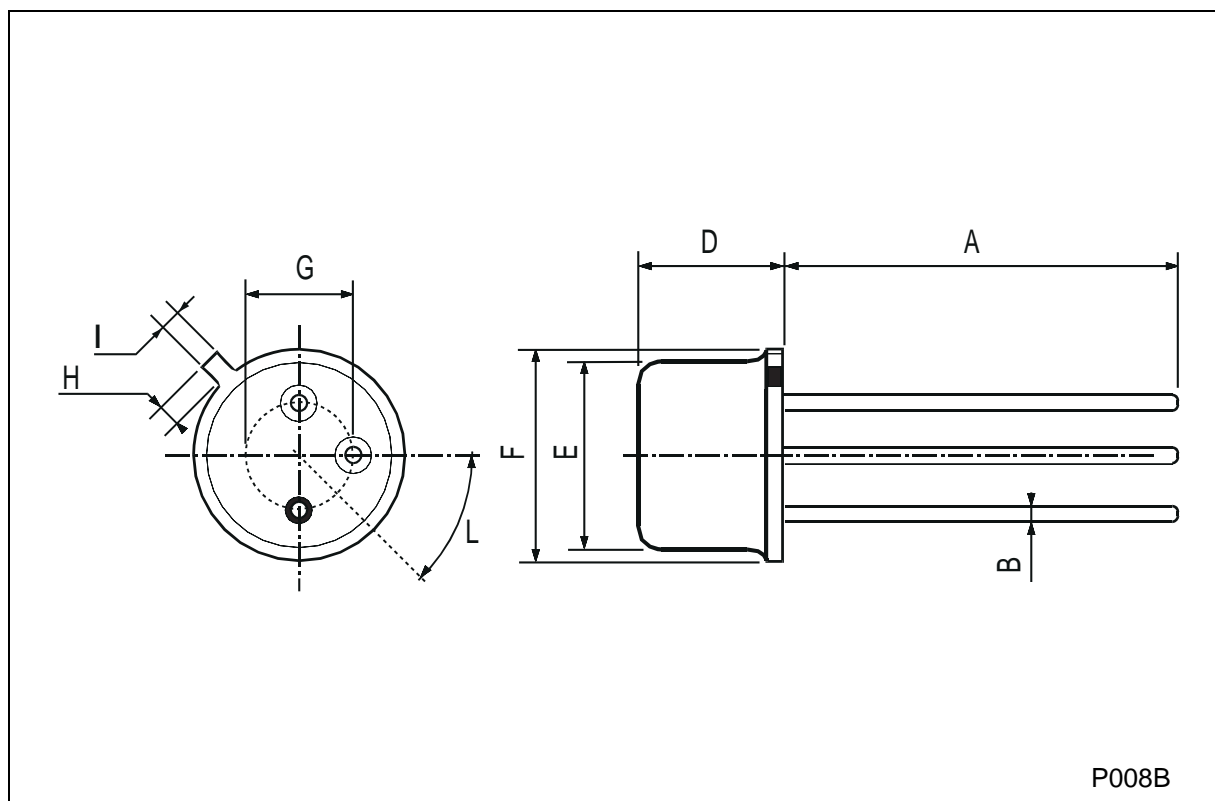
ELECTRICAL CHARACTERISTICS ( $T_{case} = 25^{\circ}C$  unless otherwise specified)

| Symbol          | Parameter  | Test Conditions  | Min.                              | Typ.                               | Max.     | Unit          |
|-----------------|--|--|-----------------------------------|------------------------------------|----------|---------------|
| $I_{CBO}$       | Collector Cut-off Current ( $I_E = 0$ )                        | $V_{CB} = 60 V$<br>$V_{CB} = 60 V \quad T_C = 150^{\circ}C$  |                                   |                                    | 10<br>10 | nA<br>$\mu A$ |
| $I_{EBO}$       | Emitter Cut-off Current ( $I_C = 0$ )                          | $V_{EB} = 5 V$   |                                   |                                    | 5        | nA            |
| $V_{(BR)CBO}$   | Collector-Base Breakdown Voltage ( $I_E = 0$ )                 | $I_C = 100 \mu A$  | 75                                |                                    |          | V             |
| $V_{(BR)CER}^*$ | Collector-Emitter Breakdown Voltage ( $R_{BE} \leq 10\Omega$ ) | $I_C = 10 mA$  | 50                                |                                    |          | V             |
| $V_{(BR)EBO}$   | Emitter-Base Breakdown Voltage ( $I_C = 0$ )                   | $I_E = 100 \mu A$  | 7                                 |                                    |          | V             |
| $V_{CE(sat)}^*$ | Collector-Emitter Saturation Voltage                           | $I_C = 150 mA \quad I_B = 15 mA$   |                                   | 0.5                                | 1.5      | V             |
| $V_{BE(sat)}^*$ | Base-Emitter Saturation Voltage                                | $I_C = 150 mA \quad I_B = 15 mA$   |                                   | 0.95                               | 1.3      | V             |
| $h_{FE}^*$      | DC Current Gain  | $I_C = 10 \mu A \quad V_{CE} = 10 V$<br>$I_C = 0.1 mA \quad V_{CE} = 10 V$<br>$I_C = 10 mA \quad V_{CE} = 10 V$<br>$I_C = 150 mA \quad V_{CE} = 10 V$<br>$I_C = 500 mA \quad V_{CE} = 10 V$<br>$I_C = 10 mA \quad V_{CE} = 10 V$<br>$T_C = -55^{\circ}C$ | 20<br>35<br>75<br>100<br>40<br>35 | 60<br>80<br>130<br>130<br>75<br>65 | 300      |               |
| $h_{fe}$        | Small Signal Current Gain                                      | $I_C = 1 mA \quad V_{CE} = 10 V \quad f = 1 KHz$   | 70                                | 135                                | 300      |               |
| $f_T$           | Transition Frequency   | $I_C = 50 mA \quad V_{CE} = 10 V \quad f = 20 MHz$   | 70                                | 100                                |          | MHz           |
| $C_{EBO}$       | Emitter-Base Capacitance                                       | $I_C = 0 \quad V_{EB} = 0.5 V \quad f = 1 MHz$   |                                   | 50                                 | 80       | pF            |
| $C_{CBO}$       | Collector-Base Capacitance                                     | $I_E = 0 \quad V_{CB} = 10 V \quad f = 1 MHz$  |                                   | 18                                 | 25       | pF            |
| NF              | Noise Figure   | $I_C = 0.3 mA \quad V_{CE} = 10 V$<br>$R_g = 510 \Omega \quad f = 1 KHz$   |                                   | 3.5                                | 8        | dB            |
| $h_{ie}$        | Input Impedance  | $I_C = 1 mA \quad V_{CE} = 5 V \quad f = 1 KHz$  |                                   | 4.4                                |          | K $\Omega$    |
| $h_{re}$        | Reverse Voltage Ratio  | $I_C = 1 mA \quad V_{CE} = 5 V \quad f = 1 KHz$  |                                   | $7.3 \times 10^{-4}$               |          |               |
| $h_{oe}$        | Output Admittance  | $I_C = 1 mA \quad V_{CE} = 5 V \quad f = 1 KHz$  |                                   | 23.8                               |          | $\mu S$       |

\* Pulsed: Pulse duration = 300  $\mu s$ , duty cycle  $\leq 1\%$

## TO-39 MECHANICAL DATA

| DIM. | mm         |      |      | inch  |      |       |
|------|------------|------|------|-------|------|-------|
|      | MIN.       | TYP. | MAX. | MIN.  | TYP. | MAX.  |
| A    | 12.7       |      |      | 0.500 |      |       |
| B    |            |      | 0.49 |       |      | 0.019 |
| D    |            |      | 6.6  |       |      | 0.260 |
| E    |            |      | 8.5  |       |      | 0.334 |
| F    |            |      | 9.4  |       |      | 0.370 |
| G    | 5.08       |      |      | 0.200 |      |       |
| H    |            |      | 1.2  |       |      | 0.047 |
| I    |            |      | 0.9  |       |      | 0.035 |
| L    | 45° (typ.) |      |      |       |      |       |



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