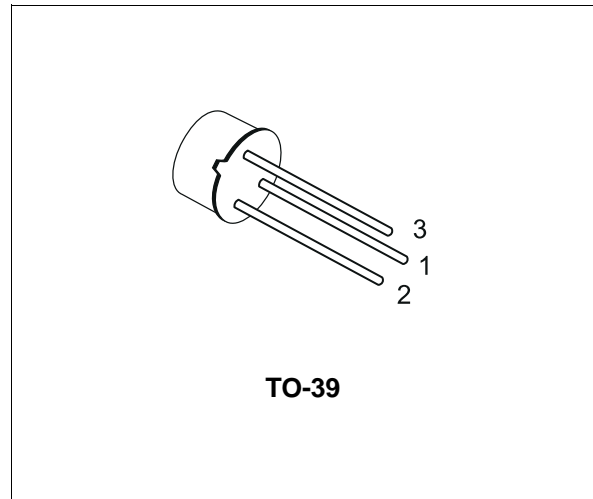


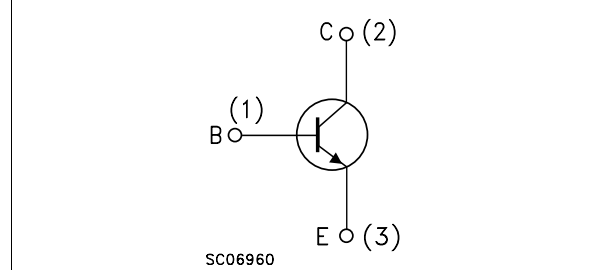
## SMALL SIGNAL NPN TRANSISTOR

### DESCRIPTION

The 2N3019 is a silicon Planar Epitaxial NPN transistor in Jedec TO-39 metal case, designed for high-current, high frequency amplifier application. It features high gain and low saturation voltage.



### INTERNAL SCHEMATIC DIAGRAM



### ABSOLUTE MAXIMUM RATINGS

| Symbol    | Parameter  | Value      | Unit             |
|-----------|--|------------|------------------|
| $V_{CBO}$ | Collector-Base Voltage ( $I_E = 0$ )   | 140        | V                |
| $V_{CEO}$ | Collector-Emitter Voltage ( $I_B = 0$ )  | 80         | V                |
| $V_{EBO}$ | Emitter-Base Voltage ( $I_C = 0$ )   | 7          | V                |
| $I_C$     | Collector Current  | 1          | A                |
| $P_{tot}$ | Total Dissipation at $T_{amb} \leq 25\text{ }^\circ\text{C}$<br>at $T_C \leq 25\text{ }^\circ\text{C}$ | 0.8        | W                |
|           |  | 5          | W                |
| $T_{stg}$ | Storage Temperature  | -65 to 175 | $^\circ\text{C}$ |
| $T_j$     | Max. Operating Junction Temperature  | 175        | $^\circ\text{C}$ |

## THERMAL DATA

|                       |                                     |     |       |      |
|-----------------------|-------------------------------------|-----|-------|------|
| R <sub>thj-case</sub> | Thermal Resistance Junction-Case    | Max | 30    | °C/W |
| R <sub>thj-amb</sub>  | Thermal Resistance Junction-Ambient | Max | 187.5 | °C/W |

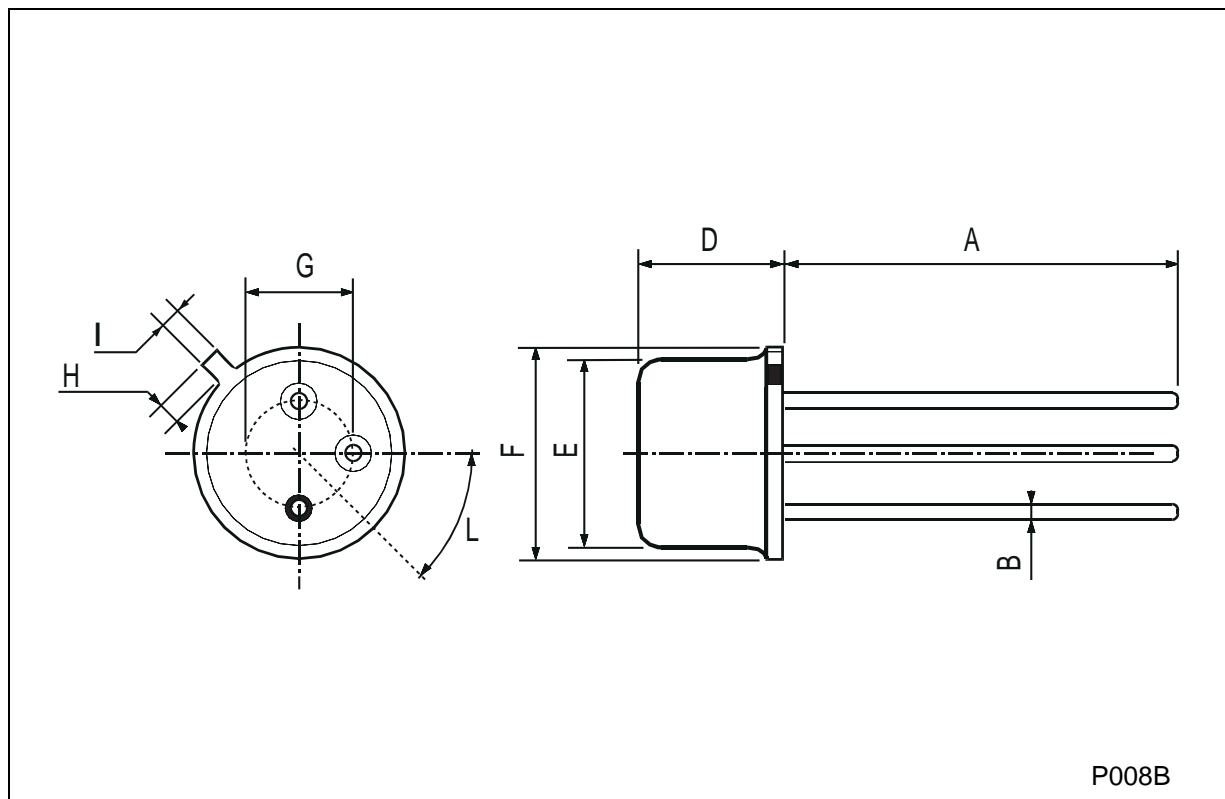
ELECTRICAL CHARACTERISTICS (T<sub>case</sub> = 25 °C unless otherwise specified)

| Symbol                            | Parameter  | Test Conditions  | Min.                              | Typ. | Max.       | Unit     |
|-----------------------------------|--|--|-----------------------------------|------|------------|----------|
| I <sub>CBO</sub>                  | Collector Cut-off Current (I <sub>E</sub> = 0)           | V <sub>CB</sub> = 90 V<br>V <sub>CB</sub> = 90 V T <sub>C</sub> = 150 °C   |                                   |      | 10<br>10   | nA<br>μA |
| I <sub>EBO</sub>                  | Emitter Cut-off Current (I <sub>C</sub> = 0)             | V <sub>EB</sub> = 5 V  |                                   |      | 10         | nA       |
| V <sub>(BR)CBO</sub>              | Collector-Base Breakdown Voltage (I <sub>E</sub> = 0)    | I <sub>C</sub> = 100 μA  | 140                               |      |            | V        |
| V <sub>(BR)CEO*</sub>             | Collector-Emitter Breakdown Voltage (I <sub>B</sub> = 0) | I <sub>C</sub> = 10 mA   | 80                                |      |            | V        |
| V <sub>(BR)EBO</sub>              | Emitter-Base Breakdown Voltage (I <sub>C</sub> = 0)      | I <sub>E</sub> = 100 μA  | 7                                 |      |            | V        |
| V <sub>CE(sat)*</sub>             | Collector-Emitter Saturation Voltage                     | I <sub>C</sub> = 150 mA I <sub>B</sub> = 15 mA<br>I <sub>C</sub> = 500 mA I <sub>B</sub> = 50 mA   |                                   |      | 0.2<br>0.5 | V<br>V   |
| V <sub>BE(sat)*</sub>             | Base-Emitter Saturation Voltage                          | I <sub>C</sub> = 150 mA I <sub>B</sub> = 15 mA   |                                   |      | 1.1        | V        |
| h <sub>FE*</sub>                  | DC Current Gain  | I <sub>C</sub> = 0.1 mA V <sub>CE</sub> = 10 V<br>I <sub>C</sub> = 10 mA V <sub>CE</sub> = 10 V<br>I <sub>C</sub> = 150 mA V <sub>CE</sub> = 10 V<br>I <sub>C</sub> = 500 mA V <sub>CE</sub> = 10 V<br>I <sub>C</sub> = 1A V <sub>CE</sub> = 10 V<br>I <sub>C</sub> = 150 mA V <sub>CE</sub> = 10 V<br>T <sub>amb</sub> = -55 °C | 50<br>90<br>100<br>50<br>15<br>40 |      | 300        |          |
| h <sub>fe*</sub>                  | Small Signal Current Gain                                | I <sub>C</sub> = 1 mA V <sub>CE</sub> = 5 V f = 1KHz   | 80                                |      | 400        |          |
| f <sub>T</sub>                    | Transition Frequency                                     | I <sub>C</sub> = 50 mA V <sub>CE</sub> = 10 V f = 20MHz  | 100                               |      |            | MHz      |
| C <sub>CBO</sub>                  | Collector-Base Capacitance                               | I <sub>E</sub> = 0 V <sub>CB</sub> = 10 V f = 1MHz   |                                   |      | 12         | pF       |
| C <sub>EBO</sub>                  | Emitter-Base Capacitance                                 | I <sub>C</sub> = 0 V <sub>EB</sub> = 0.5 V f = 1MHz  |                                   |      | 60         | pF       |
| NF                                | Noise Figure   | I <sub>C</sub> = 0.1 mA V <sub>CE</sub> = 10 V<br>f = 1KHz R <sub>g</sub> = 1KΩ  |                                   |      | 4          | dB       |
| r <sub>bb'</sub> C <sub>b'c</sub> | Feedback Time Constant                                   | I <sub>C</sub> = 10 mA V <sub>CE</sub> = 10 V f = 4MHz   |                                   |      | 400        | ps       |

\* Pulsed: Pulse duration = 300 μs, duty cycle ≤ 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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