
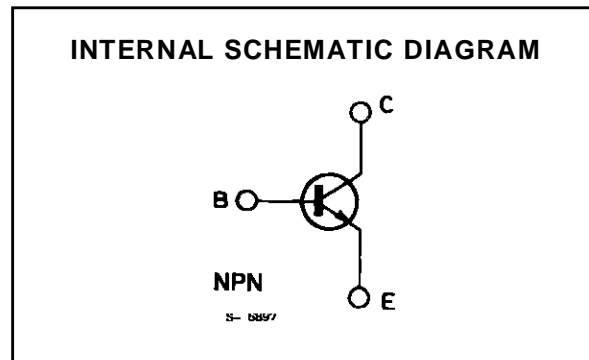
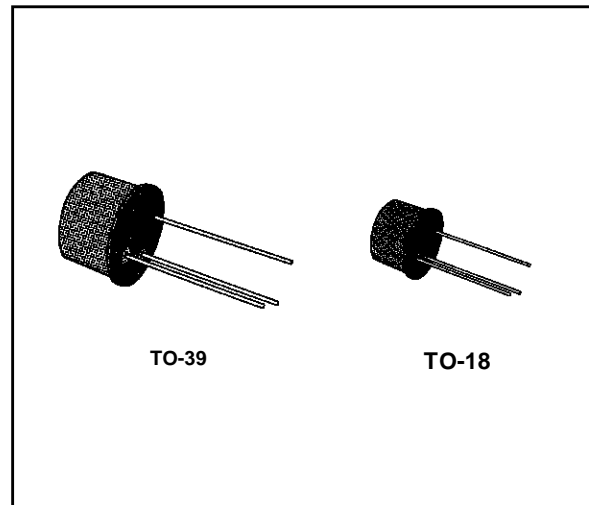


**HIGH-SPEED SWITCHES**

**DESCRIPTION**

The 2N2218, 2N2219, 2N2221 and 2N2222 are silicon planar epitaxial NPN transistors in Jedec TO-39 (for 2N2218 and 2N2219) and in Jedec TO-18 (for 2N2221 and 2N2222) metal cases. They are designed for high-speed switching applications at collector currents up to 500 mA, and feature useful current gain over a wide range of collector current, low leakage currents and low saturation voltages.

 2N2218/2N2219 approved to CECC 50002-100, 2N2221/2N2222 approved to CECC 50002-101 available on request.



**ABSOLUTE MAXIMUM RATINGS**

| Symbol    | Parameter   | Value       | Unit             |
|-----------|---|-------------|------------------|
| $V_{CBO}$ | Collector-base Voltage ( $I_E = 0$ )  | 60          | V                |
| $V_{CEO}$ | Collector-emitter Voltage ( $I_B = 0$ )   | 30          | V                |
| $V_{EBO}$ | Emitter-base Voltage ( $I_C = 0$ )  | 5           | V                |
| $I_C$     | Collector Current   | 0.8         | A                |
| $P_{tot}$ | Total Power Dissipation at $T_{amb} \leq 25\text{ }^\circ\text{C}$<br>for <b>2N2218</b> and <b>2N2219</b><br>for <b>2N2221</b> and <b>2N2222</b><br>at $T_{case} \leq 25\text{ }^\circ\text{C}$<br>for <b>2N2218</b> and <b>2N2219</b><br>for <b>2N2221</b> and <b>2N2222</b> | 0.8         | W                |
|           |   | 0.5         | W                |
|           |   | 3           | W                |
|           |   | 1.8         | W                |
| $T_{stg}$ | Storage Temperature   | - 65 to 200 | $^\circ\text{C}$ |
| $T_j$     | Junction Temperature  | 175         | $^\circ\text{C}$ |

## 2N2218-2N2219-2N2221-2N2222

### THERMAL DATA

|                        |                                     |     | 2N2218<br>2N2219 | 2N2221<br>2N2222 |
|------------------------|-------------------------------------|-----|------------------|------------------|
| R <sub>th j-case</sub> | Thermal Resistance Junction-case    | Max | 50 °C/W          | 83.3 °C/W        |
| R <sub>th j-amb</sub>  | Thermal Resistance Junction-ambient | Max | 187.5 °C/W       | 300 °C/W         |

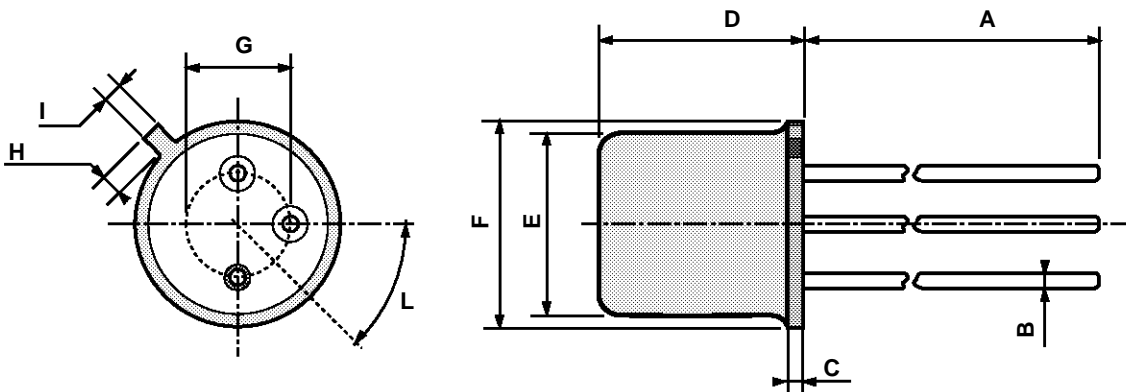
### ELECTRICAL CHARACTERISTICS (T<sub>amb</sub> = 25 °C unless otherwise specified)

| Symbol                  | Parameter   | Test Conditions  | Min.                             | Typ. | Max.       | Unit     |
|-------------------------|---|--|----------------------------------|------|------------|----------|
| I <sub>CBO</sub>        | Collector Cutoff Current<br>(I <sub>E</sub> = 0)            | V <sub>CB</sub> = 50 V<br>V <sub>CB</sub> = 50 V    T <sub>amb</sub> = 150 °C  |                                  |      | 10<br>10   | nA<br>μA |
| I <sub>EBO</sub>        | Emitter Cutoff Current<br>(I <sub>C</sub> = 0)              | V <sub>EB</sub> = 3 V  |                                  |      | 10         | nA       |
| V <sub>(BR) CBO</sub>   | Collector-base Breakdown<br>Voltage (I <sub>E</sub> = 0)    | I <sub>C</sub> = 10 μA   | 60                               |      |            | V        |
| V <sub>(BR) CEO</sub> * | Collector-emitter Breakdown<br>Voltage (I <sub>B</sub> = 0) | I <sub>C</sub> = 10 mA   | 30                               |      |            | V        |
| V <sub>(BR) EBO</sub>   | Emitter-base Breakdown<br>Voltage (I <sub>C</sub> = 0)      | I <sub>E</sub> = 10 μA   | 5                                |      |            | V        |
| V <sub>CE (sat)</sub> * | Collector-emitter Saturation<br>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   |                                  |      | 0.4<br>1.6 | V<br>V   |
| V <sub>BE (sat)</sub> * | Base-emitter Saturation<br>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   |                                  |      | 1.3<br>2.6 | V<br>V   |
| h <sub>FE</sub> *       | DC Current Gain   | for <b>2N2218</b> and <b>2N2221</b><br>I <sub>C</sub> = 0.1 mA    V <sub>CE</sub> = 10 V<br>I <sub>C</sub> = 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> = 150 mA     V <sub>CE</sub> = 1 V<br>for <b>2N2219</b> and <b>2N2222</b><br>I <sub>C</sub> = 0.1 mA    V <sub>CE</sub> = 10 V<br>I <sub>C</sub> = 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> = 150 mA     V <sub>CE</sub> = 1 V | 20<br>25<br>35<br>40<br>20<br>20 |      | 120        |          |
| f <sub>T</sub>          | Transition Frequency  | I <sub>C</sub> = 20 mA    V <sub>CE</sub> = 20 V<br>f = 100 MHz  | 250                              |      |            | MHz      |
| C <sub>CBO</sub>        | Collector-base Capacitance                                  | I <sub>E</sub> = 0<br>f = 100 kHz    V <sub>CB</sub> = 10 V  |                                  |      | 8          | pF       |
| R <sub>e(hie)</sub>     | Real Part of Input<br>Impedance                             | I <sub>C</sub> = 20 mA    V <sub>CE</sub> = 20 V<br>f = 300 MHz  |                                  |      | 60         | Ω        |

\* Pulsed : pulse duration = 300 μs, duty cycle = 1 %.

TO-18 MECHANICAL DATA

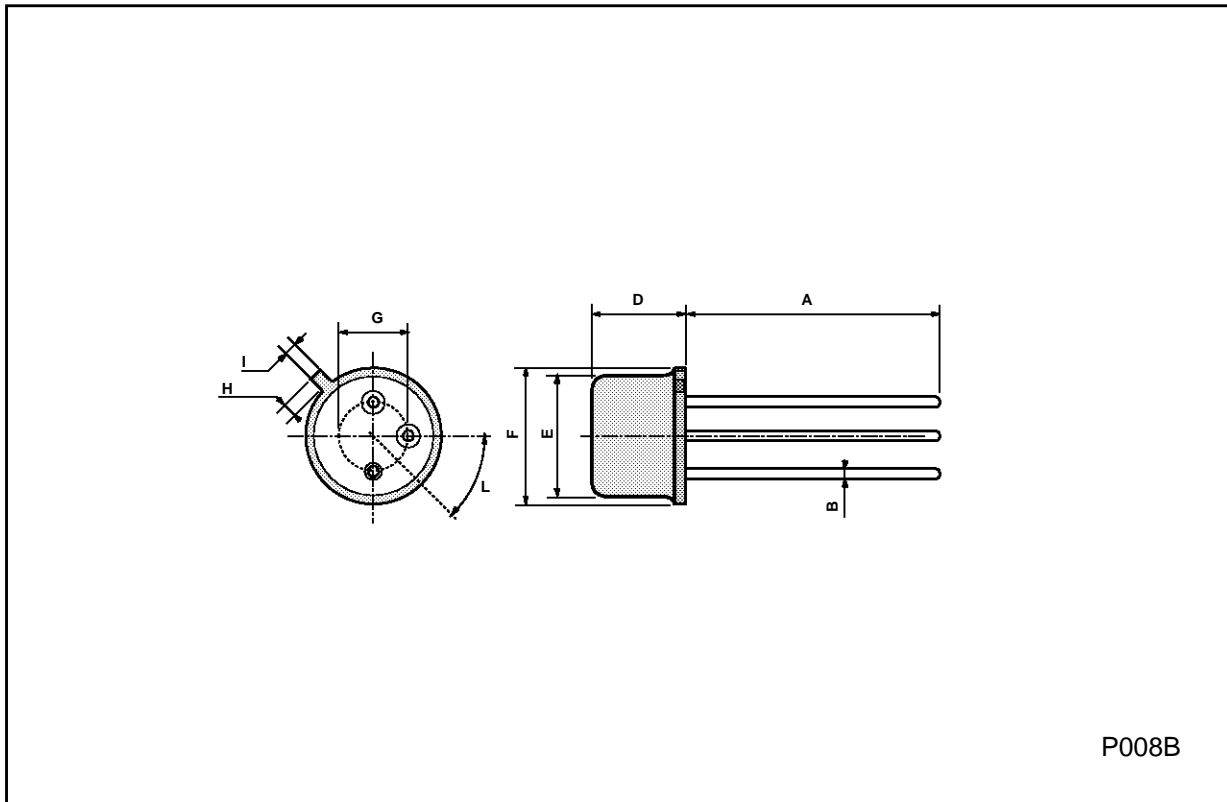
| DIM. | mm   |      |      | inch  |       |       |
|------|------|------|------|-------|-------|-------|
|      | MIN. | TYP. | MAX. | MIN.  | TYP.  | MAX.  |
| A    |      | 12.7 |      |       | 0.500 |       |
| B    |      |      | 0.49 |       |       | 0.019 |
| D    |      |      | 5.3  |       |       | 0.208 |
| E    |      |      | 4.9  |       |       | 0.193 |
| F    |      |      | 5.8  |       |       | 0.228 |
| G    | 2.54 |      |      | 0.100 |       |       |
| H    |      |      | 1.2  |       |       | 0.047 |
| I    |      |      | 1.16 |       |       | 0.045 |
| L    | 45°  |      |      | 45°   |       |       |



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**TO39 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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