

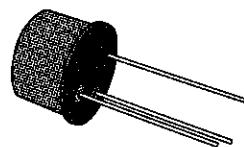
**GENERAL PURPOSE HIGH-VOLTAGE TYPE**

**DESCRIPTION**

The 2N1893 is a silicon planar epitaxial NPN transistor in Jedec TO-39 metal case, designed for use in high-performance amplifier, oscillator and switching circuits.

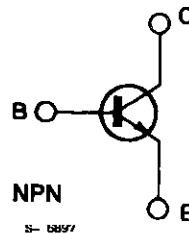
It provides greater voltage swings in oscillator and amplifier circuits and more protection in inductive switching circuits due to its 120 V collector-to-base voltage rating.

 Products approved to CECC 50002-104 available on request.



TO-39

**INTERNAL SCHEMATIC DIAGRAM**



**ABSOLUTE MAXIMUM RATINGS**

| Symbol         | Parameter                                                  | Value       | Unit             |
|----------------|------------------------------------------------------------|-------------|------------------|
| $V_{CBO}$      | Collector-base Voltage ( $I_E = 0$ )                       | 120         | V                |
| $V_{CER}$      | Collector-emitter Voltage ( $R_{BE} \leq 10 \Omega$ )      | 100         | 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                                          | 0.5         | A                |
| $P_{tot}$      | Total Power Dissipation at $T_{amb} \leq 25^\circ\text{C}$ | 0.8         | W                |
|                | at $T_{case} \leq 25^\circ\text{C}$                        | 3           | W                |
|                | at $T_{case} \leq 100^\circ\text{C}$                       | 1.7         | W                |
| $T_{stg}, T_j$ | Storage and Junction Temperature                           | - 65 to 200 | $^\circ\text{C}$ |

## THERMAL DATA

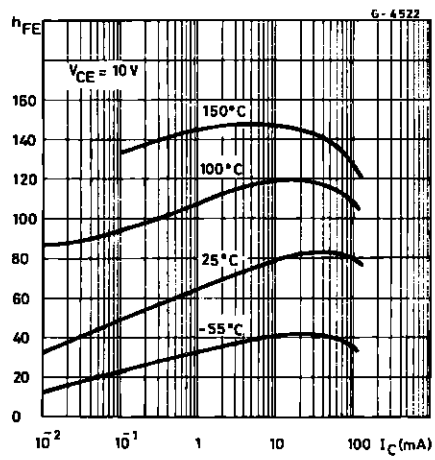
|                  |                                     |     |     |               |
|------------------|-------------------------------------|-----|-----|---------------|
| $R_{th\ j-case}$ | Thermal Resistance Junction-case    | Max | 58  | $^{\circ}C/W$ |
| $R_{th\ j-amb}$  | Thermal Resistance Junction-ambient | Max | 219 | $^{\circ}C/W$ |

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

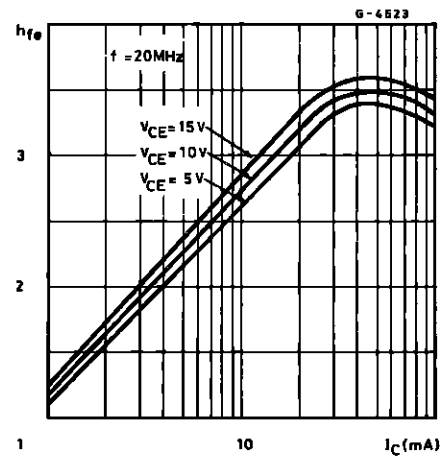
| Symbol          | Parameter                                                        | Test Conditions                                                                                                                                                        | Min.                 | Typ.                 | Max.       | Unit          |
|-----------------|------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------------|------------|---------------|
| $I_{CBO}$       | Collector Cutoff Current<br>( $I_E = 0$ )                        | $V_{CB} = 90\ V$<br>$V_{CB} = 90\ V$ $T_{amb} = 150^{\circ}C$                                                                                                          |                      |                      | 10<br>15   | nA<br>$\mu A$ |
| $I_{EBO}$       | Emitter Cutoff Current<br>( $I_C = 0$ )                          | $V_{EB} = 5\ V$                                                                                                                                                        |                      |                      | 10         | nA            |
| $V_{(BR)\ CBO}$ | Collector-base Breakdown Voltage ( $I_E = 0$ )                   | $I_C = 100\ \mu A$                                                                                                                                                     | 120                  |                      |            | V             |
| $V_{(BR)CER}^*$ | Collector-emitter Breakdown Voltage ( $R_{BE} \leq 10\ \Omega$ ) | $I_C = 10\ mA$                                                                                                                                                         | 100                  |                      |            | V             |
| $V_{(BR)CEO}$   | Collector-emitter Breakdown Voltage ( $I_B = 0$ )                | $I_C = 10\ mA$                                                                                                                                                         | 80                   |                      |            | 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                             | $I_C = 50\ mA$ $I_B = 5\ mA$<br>$I_C = 150\ mA$ $I_B = 15\ mA$                                                                                                         |                      |                      | 1.2<br>5   | V<br>V        |
| $V_{BE(sat)}^*$ | Base-emitter Saturation Voltage                                  | $I_C = 50\ mA$ $I_B = 5\ mA$<br>$I_C = 150\ mA$ $I_B = 15\ mA$                                                                                                         |                      | 0.82<br>0.96         | 0.9<br>1.3 | V<br>V        |
| $h_{FE}^*$      | DC Current Gain                                                  | $I_C = 0.1\ mA$ $V_{CE} = 10\ V$<br>$I_C = 10\ mA$ $V_{CE} = 10\ V$<br>$I_C = 150\ mA$ $V_{CE} = 10\ V$<br>$I_C = 10\ mA$ $V_{CE} = 10\ V$<br>$T_{amb} = -55^{\circ}C$ | 20<br>35<br>40<br>20 | 50<br>80<br>80<br>40 | 120        |               |
| $h_{fe}$        | Small Signal Current Gain                                        | $I_C = 1\ mA$ $V_{CE} = 5\ V$<br>$f = 1\ kHz$<br>$I_C = 5\ mA$ $V_{CE} = 10\ V$<br>$f = 1\ kHz$                                                                        | 30<br>45             | 70<br>85             | 150        |               |
| $f_T$           | Transition Frequency                                             | $I_C = 50\ mA$ $V_{CE} = 10\ V$<br>$f = 20\ MHz$                                                                                                                       | 50                   | 70                   |            | MHz           |
| $C_{EBO}$       | Emitter-base Capacitance                                         | $I_C = 0$ $V_{EB} = 0.5\ V$<br>$f = 1\ MHz$                                                                                                                            |                      | 55                   | 85         | pF            |
| $C_{CBO}$       | Collector-base Capacitance                                       | $I_E = 0$ $V_{CB} = 10\ V$<br>$f = 1\ MHz$                                                                                                                             |                      | 13                   | 15         | pF            |

\* Pulsed : pulse duration = 300  $\mu s$ , duty cycle = 1 %.

DC Current Gain.

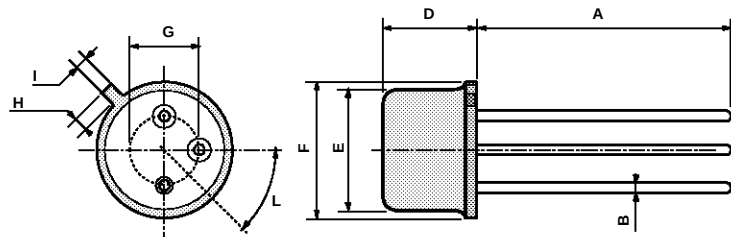


High-frequency Current Gain.



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.) |      |      |       |      |       |



P008B

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