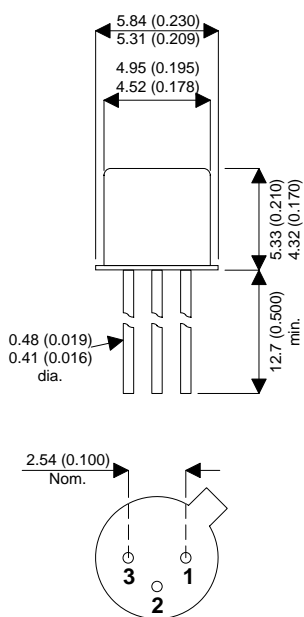


MECHANICAL DATA
Dimensions in mm (inches)



TO-18 METAL PACKAGE

PIN 1 – Emitter PIN 2 – Base PIN 3 – Collector

**GENERAL PURPOSE
NPN TRANSISTOR
FOR HIGH RELIABILITY
APPLICATIONS**

FEATURES

- SILICON PLANAR EPITAXIAL NPN TRANSISTOR
- CECC SCREENING OPTIONS
- HIGH SPEED SATURATED SWITCHING

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ unless otherwise stated)

| | | |
|-----------------|---|-------------------------------|
| V_{CBO} | Collector – Base Voltage | 60V |
| V_{CEO} | Collector – Emitter Voltage | 40V |
| V_{EBO} | Emitter – Base Voltage | 6V |
| I_C | Collector Current | 200mA |
| P_D | Total Device Dissipation @ $T_A = 25^\circ\text{C}$ | 350mW |
| | Derate above 25°C | 3.33mW / $^\circ\text{C}$ |
| $R_{\theta JA}$ | Thermal Resistance Junction – Ambient | 300 $^\circ\text{C}/\text{W}$ |
| T_{STG}, T_J | Operating and Storage Temperature Range | -55 to +175 $^\circ\text{C}$ |

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise stated)

| Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|--|----------------------|------|------|------|
| $V_{(BR)CEO}^*$ Collector – Emitter Breakdown Voltage | $I_C = 1\text{mA}$ $I_B = 0$ | 40 | | | V |
| $V_{(BR)CBO}$ Collector – Base Breakdown Voltage | $I_C = 10\mu\text{A}$ $I_E = 0$ | 60 | | | |
| $V_{(BR)EBO}$ Emitter – Base Breakdown Voltage | $I_E = 10\mu\text{A}$ $I_C = 0$ | 6 | | | |
| I_{BL} Base Cut-off Current | $V_{CE} = 30\text{V}$ | | | 50 | nA |
| I_{CEX} Collector – Emitter Cut-off Current | $V_{EB} = 3\text{V}$ | | | 50 | |
| $V_{CE(sat)}$ Collector – Emitter Saturation Voltage | $I_C = 10\text{mA}$ $I_B = 1\text{mA}$ | | | 0.2 | V |
| | $I_C = 50\text{mA}$ $I_B = 5\text{mA}$ | | | 0.3 | |
| $V_{BE(sat)}^*$ Base – Emitter Saturation Voltage | $I_C = 10\text{mA}$ $I_B = 1\text{mA}$ | 0.65 | | 0.85 | V |
| | $I_C = 50\text{mA}$ $I_B = 5\text{mA}$ | | | 0.95 | |
| h_{FE}^* DC Current Gain | $V_{CE} = 1\text{V}$ | $I_C = 0.1\text{mA}$ | 40 | | — |
| | | $I_C = 1\text{mA}$ | 70 | | |
| | | $I_C = 10\text{mA}$ | 100 | 300 | |
| | | $I_C = 50\text{mA}$ | 60 | | |
| | | $I_C = 100\text{mA}$ | 30 | | |

* Pulse Test: $t_p \leq 300\mu\text{s}$, $\delta \leq 2\%$.

SMALL SIGNAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise stated)

| Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|--------------------------------------|--|--|------|------|------------------|
| f_t Current Gain Bandwidth Product | $V_{CE} = 20\text{V}$ $I_C = 10\text{mA}$ $f = 100\text{MHz}$ | 300 | | | MHz |
| C_{ob} Output Capacitance | $V_{CB} = 5\text{V}$ $I_E = 0$ $f = 1\text{MHz}$ | | | 4 | pF |
| C_{ib} Input Capacitance | $V_{BE} = 0.5\text{V}$ $I_C = 0$ $f = 1\text{MHz}$ | | | 8 | pF |
| h_{ie} Input Impedance | $V_{CE} = 10\text{V}$ $I_C = 1\text{mA}$ $f = 1\text{kHz}$ | 1 | | 10 | k Ω |
| h_{oe} Output Admittance | | 1 | | 40 | μhmos |
| h_{re} Voltage Feedback Ratio | | 0.5 | | 8 | $\times 10^{-4}$ |
| h_{fe} Small Signal Current Gain | | 100 | | 400 | — |
| N_F Noise Figure | | $V_{CE} = 5\text{V}$ $I_C = 100\mu\text{A}$ $f = 1\text{kHz}$ $R_S = 1\text{k}\Omega$ | | | 5 |

SWITCHING CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise stated)

| Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|--------------------|---|------|------|------|------|
| t_d Delay Time | $V_{CC} = 3\text{V}$ $V_{BE} = 0.5\text{V}$ | | | 35 | ns |
| t_r Rise Time | $I_C = 10\text{mA}$ $I_{B1} = 1\text{mA}$ | | | 35 | |
| t_s Storage Time | $V_{CC} = 3\text{V}$ $V_{BE} = 0.5\text{V}$ | | | 200 | |
| t_f Fall Time | $I_{B1} = I_{B2} = 1\text{mA}$ | | | 50 | |

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