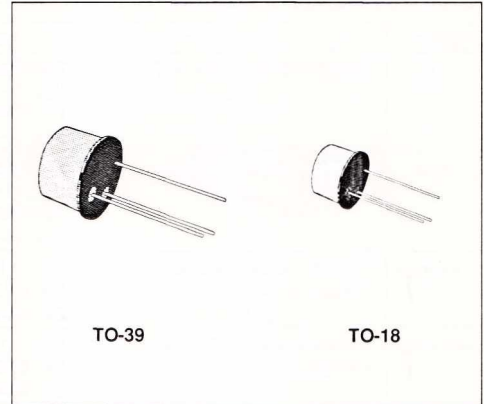


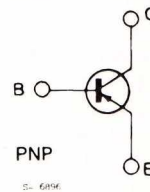
GENERAL PURPOSE AMPLIFIERS AND SWITCHES

DESCRIPTION

The 2N3502, 2N3503, 2N3504 and 2N3505 are silicon planar epitaxial PNP transistors in Jedec TO-39 (2N3502, 2N3503) and in Jedec TO-18 (2N3504, 2N3505) metal cases. They are designed for high-speed saturated switching and general purpose applications.



INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | | Unit |
|----------------|--|------------------|------------------|------------------|
| | | 2N3502 2N3504 | 2N3503 2N3505 | |
| V_{CBO} | Collector-base Voltage ($I_E = 0$) | - 45 | - 60 | V |
| V_{CEO} | Collector-emitter Voltage ($I_B = 0$) | - 45 | - 60 | V |
| V_{EBO} | Emitter-base Voltage ($I_C = 0$) | 5 | | V |
| I_C | Collector Current | 600 | | mA |
| P_{tot} | Total power Dissipation at $T_{amb} \leq 25^\circ\text{C}$ | | | |
| | For 2N3504, 2N3505 | 0.4 | | W |
| | For 2N3502, 2N3503 | 0.7 | | W |
| | at $T_{case} \leq 25^\circ\text{C}$ | | | |
| | For 2N3504, 2N3505 | 1.3 | | W |
| | For 2N3502, 2N3503 | 3 | | W |
| T_{stg}, T_J | Storage and Junction Temperature | - 65 to 200 | | $^\circ\text{C}$ |

THERMAL DATA

| | | 2N3502 2N3503 | 2N3504 2N3505 |
|------------------|-------------------------------------|------------------|------------------|
| $R_{th\ j-case}$ | Thermal Resistance Junction-case | Max 132 °C/W | 58.3 °C/W |
| $R_{th\ j-amb}$ | Thermal Resistance Junction-ambient | Max 437 °C/W | 250 °C/W |

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

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|-----------------|---|---|--|------|--------------------------|-------------|
| I_{CES} | Collector Cutoff Current ($V_{BE} = 0$) | For 2N3503 and 2N3505 $V_{CE} = -50\text{ V}$ For 2N3502 and 2N3504 $V_{CE} = -30\text{ V}$ | | | - 10 - 10 | nA nA |
| I_{CBO} | Collector Cutoff Current ($I_E = 0$) | For 2N3503 and 2N3505 $V_{CE} = -50\text{ V}$ $T_{amb} = 150\text{ °C}$ For 2N3502 and 2N3504 $V_{CE} = -30\text{ V}$ $T_{amb} = 150\text{ °C}$ | | | - 10 - 10 | nA nA |
| $V_{(BR)CBO}$ | Collector-base Breakdown Voltage ($I_E = 0$) | $I_C = -10\text{ }\mu\text{A}$ For 2N3503 and 2N3505 For 2N3502 and 2N3504 | - 60 - 45 | | | V V |
| $V_{(BR)CEO}$ * | Collector-emitter Breakdown Voltage ($I_B = 0$) | $I_C = -10\text{ mA}$ For 2N3503 and 2N3505 For 2N3502 and 2N3504 | - 60 - 45 | | | V V |
| $V_{(BR)EBO}$ | Emitter-base Breakdown Voltage ($I_C = 0$) | $I_E = -10\text{ }\mu\text{A}$ | - 5 | | | V |
| $V_{CE(sat)}$ * | Collector-emitter Saturation Voltage | $I_C = -50\text{ mA}$ $I_B = -2.5\text{ mA}$ $I_C = -150\text{ mA}$ $I_B = -15\text{ mA}$ $I_C = -500\text{ mA}$ $I_B = -50\text{ mA}$ | | | - 0.25 - 0.4 - 1.6 | V V V |
| $V_{BE(sat)}$ * | Base-emitter Saturation Voltage | $I_C = -50\text{ mA}$ $I_B = -2.5\text{ mA}$ $I_C = -150\text{ mA}$ $I_B = -15\text{ mA}$ $I_C = -500\text{ mA}$ $I_B = -50\text{ mA}$ | | | - 1 - 1.3 - 2 | V V V |
| h_{FE} * | DC Current Gain | $I_C = -0.01\text{ mA}$ $V_{CE} = -10\text{ V}$ $I_C = -0.1\text{ mA}$ $V_{CE} = -10\text{ V}$ $I_C = -1\text{ mA}$ $V_{CE} = -10\text{ V}$ $I_C = -10\text{ mA}$ $V_{CE} = -10\text{ V}$ $I_C = -150\text{ mA}$ $V_{CE} = -10\text{ V}$ $I_C = -500\text{ mA}$ $V_{CE} = -10\text{ V}$ $T_{amb} = -55\text{ °C}$ $I_C = 50\text{ mA}$ $V_{CE} = -10\text{ V}$ | 80 120 135 140 100 50 50 | | 300 | |
| f_T | Transition Frequency | $I_C = -50\text{ mA}$ $V_{CE} = -20\text{ V}$ $f = 100\text{ MHz}$ | 200 | | | MHz |
| C_{EBO} | Emitter-base Capacitance | $I_C = 0$ $V_{EB} = -0.5\text{ V}$ $f = 100\text{ kHz}$ | | | 30 | pF |
| C_{CBO} | Collector-base Capacitance | $I_E = 0$ $V_{CB} = -10\text{ V}$ $f = 1\text{ MHz}$ | | | 8 | pF |
| NF | Noise Figure | $I_C = -30\text{ }\mu\text{A}$ $V_{CE} = -5\text{ V}$ $f = 1\text{ MHz}$ $R_G = 10\text{ K}\Omega$ | | | 4 | dB |
| t_{on} | Turn-on Time | $I_C = -300\text{ mA}$ $V_{CC} = -30\text{ V}$ $I_{B1} = -30\text{ mA}$ | | | 40 | ns |
| t_{off} | Turn-off Time | $I_C = -300\text{ mA}$ $V_{CC} = -30\text{ V}$ $I_{B1} = -I_{B2} = -30\text{ mA}$ | | | 100 | ns |

* Pulsed : pulse duration = 300 μs , duty cycle = 1.5%.