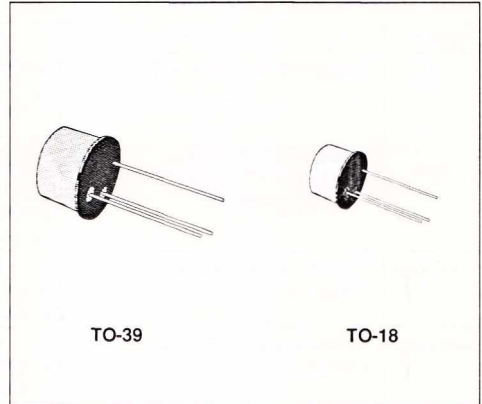


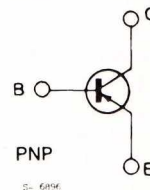
## GENERAL PURPOSE AMPLIFIERS AND SWITCHES

### 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 <b>2N3503</b> and <b>2N3505</b> $V_{CE} = -50\text{ V}$ For <b>2N3502</b> and <b>2N3504</b> $V_{CE} = -30\text{ V}$			- 10 - 10	nA nA
$I_{CBO}$	Collector Cutoff Current ( $I_E = 0$ )	For <b>2N3503</b> and <b>2N3505</b> $V_{CE} = -50\text{ V}$ $T_{amb} = 150\text{ °C}$ For <b>2N3502</b> and <b>2N3504</b> $V_{CE} = -30\text{ V}$ $T_{amb} = 150\text{ °C}$			- 10 - 10	nA nA
$V_{(BR)CBO}$	Collector-base Breakdown Voltage ( $I_E = 0$ )	$I_C = -10\text{ }\mu\text{A}$ For <b>2N3503</b> and <b>2N3505</b> For <b>2N3502</b> and <b>2N3504</b>	- 60 - 45			V V
$V_{(BR)CEO}$ *	Collector-emitter Breakdown Voltage ( $I_B = 0$ )	$I_C = -10\text{ mA}$ For <b>2N3503</b> and <b>2N3505</b> For <b>2N3502</b> and <b>2N3504</b>	- 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  $\mu\text{s}$ , duty cycle = 1.5%.