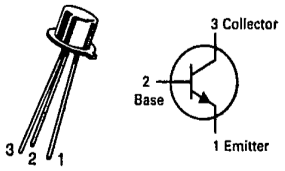
2N2501

CASE 22-03, STYLE 1
TO-18 (TO-206AA)



SWITCHING TRANSISTOR

NPN SILICON

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MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	20	Vdc
Collector-Base Voltage	V_{CBO}	40	Vdc
Emitter-Base Voltage	V_{EBO}	6.0	Vdc
Total Device Dissipation @ T_A = 25°C Derate above 25°C	P_D	0.36 2.1	Watt mW/°C
Total Device Dissipation @ T_C = 25°C Derate above 25°C	P_D	1.2 6.9	Watts mW/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	−65 to +200	°C

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted.)

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage (I_C = 30 mAdc, I_B = 0, Pulsed)	$V_{(BR)CEO}$	20	—	Vdc
Collector-Base Breakdown Voltage (I_C = 10 μAdc, I_E = 0)	$V_{(BR)CBO}$	40	—	Vdc
Emitter-Base Breakdown Voltage (I_E = 10 μAdc, I_C = 0)	$V_{(BR)EBO}$	6.0	—	Vdc
Collector Cutoff Current (V_{CE} = 20 Vdc, V_{BE} = 3.0 Vdc)	I_{CEX}	—	25	nAdc
Base Cutoff Current (V_{CE} = 20 Vdc, V_{BE} = 3.0 Vdc) (V_{CE} = 20 Vdc, V_{BE} = 3.0 Vdc, T_A = 150°C)	I_{BL}	 — —	 0.025 50	nAdc
ON CHARACTERISTICS				
DC Current Gain (I_C = 100 μAdc, V_{CE} = 1.0 Vdc) (I_C = 1.0 mAdc, V_{CE} = 1.0 Vdc) (I_C = 10 mAdc, V_{CE} = 1.0 Vdc) (I_C = 10 mAdc, V_{CE} = 1.0 Vdc, T_A = −55°C) (I_C = 50 mAdc, V_{CE} = 1.0 Vdc) (I_C = 100 mAdc, V_{CE} = 1.0 Vdc) (I_C = 500 mAdc, V_{CE} = 5.0 Vdc)	h_{FE}	 20 30 50 20 40 30 10	 — — 150 — — — —	—
Collector-Emitter Saturation Voltage(1) (I_C = 10 mAdc, I_B = 1.0 mAdc) (I_C = 50 mAdc, I_B = 5.0 mAdc) (I_C = 100 mAdc, I_B = 10 mAdc)	$V_{CE(sat)}$	 — — —	 0.2 0.3 0.4	Vdc
Base-Emitter Saturation Voltage (I_C = 10 mAdc, I_B = 1.0 mAdc) (I_C = 50 mAdc, I_B = 5.0 mAdc) (I_C = 100 mAdc, I_B = 10 mAdc)	$V_{BE(sat)}$	 — — —	 0.85 1.0 1.2	Vdc
SMALL-SIGNAL CHARACTERISTICS				
Current-Gain — Bandwidth Product (V_{CE} = 20 Vdc, I_C = 10 mAdc, f = 100 MHz)	f_T	350	—	MHz
Output Capacitance (V_{CB} = 10 Vdc, I_E = 0, f = 100 kHz)	C_{obo}	—	4.0	pF
Input Capacitance (V_{EB} = 0.5 Vdc, I_C = 0, f = 100 kHz)	C_{ibo}	—	7.0	pF
Small-Signal Current Gain (V_{CE} = 20 Vdc, I_C = 10 mAdc, f = 100 MHz)	h_{fe}	3.5	—	—

ELECTRICAL CHARACTERISTICS (continued) (T_A = 25°C unless otherwise noted.)

Characteristic	Symbol	Min	Max	Unit
SWITCHING CHARACTERISTICS				
Charge Storage Time Constant ($I_C = I_{B1} = I_{B2}$ = 10 mAdc)	τ_S	—	15	ns
Total Control Charge (I_C = 10 mAdc, I_B = 1.0 mAdc)	Q_T	—	60	pC
Active Region Time Constant (I_C = 10 mAdc)	τ_A	—	2.5	ns

(1) Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.

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FIGURE 1 — COLLECTOR-EMITTER SATURATION VOLTAGES versus BASE CURRENT

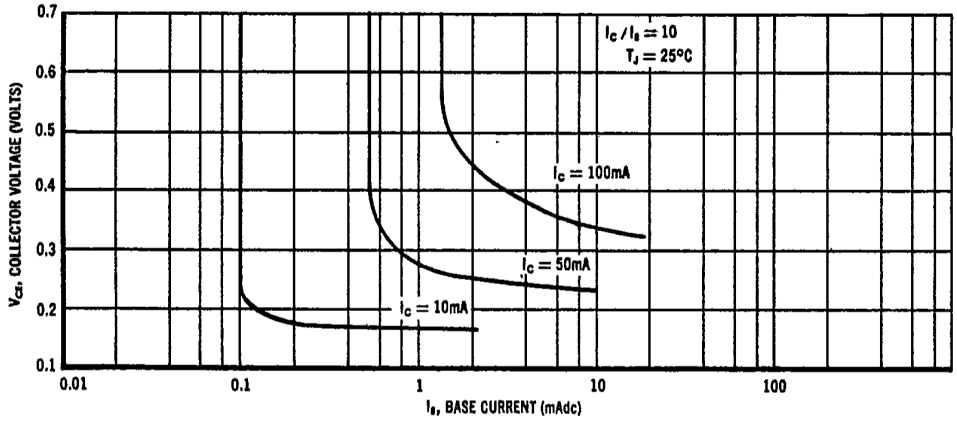

FIGURE 2 — BASE-EMITTER VOLTAGE versus COLLECTOR CURRENT

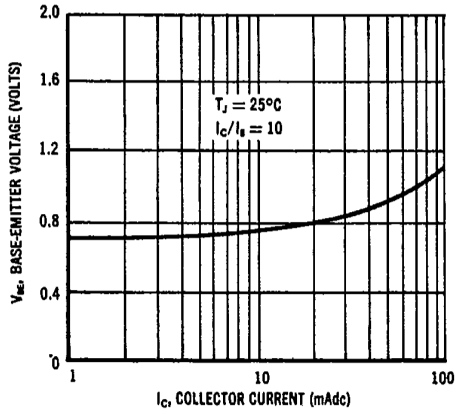

FIGURE 3 — TEMPERATURE COEFFICIENTS

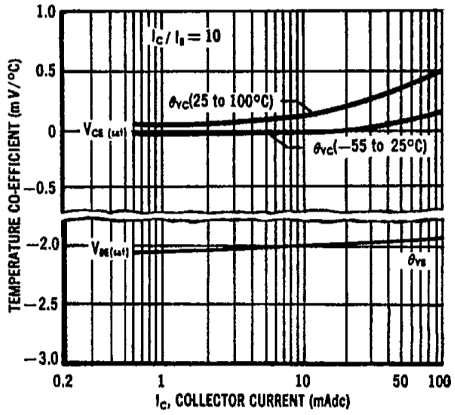

FIGURE 4 — ACTIVE REGION TIME CONSTANT

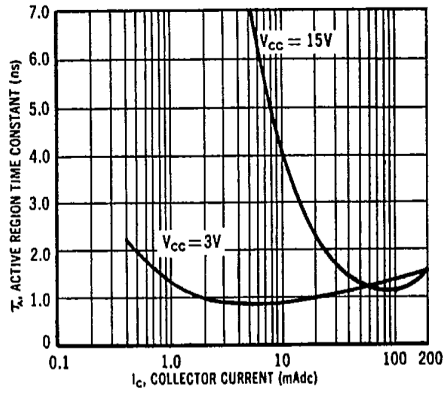

FIGURE 5 — COMMON EMITTER DC LEAKAGE CHARACTERISTICS

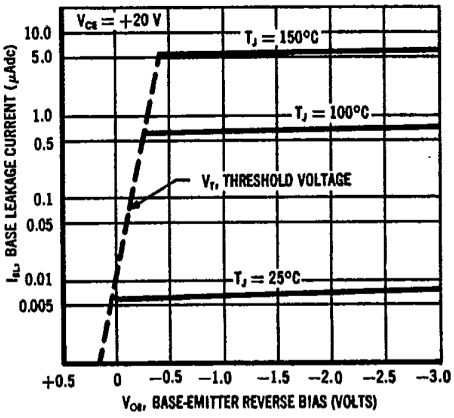

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FIGURE 6 — RISE TIME FACTOR

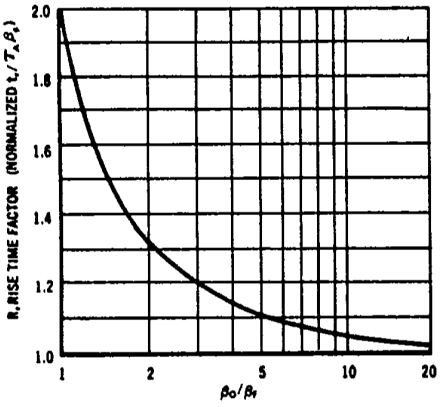

FIGURE 7 — FALL TIME FACTOR