2N3742

CASE 79-02, STYLE 1
TO-39 (TO-205AD)

AMPLIFIER TRANSISTOR

NPN SILICON

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MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	300	Vdc
Collector-Base Voltage	V_{CBO}	300	Vdc
Emitter-Base Voltage	V_{EBO}	7.0	Vdc
Collector Current — Continuous	I_C	50	mAdc
Total Device Dissipation @ T_A = 25°C Derate above 25°C	P_D	1.0 5.71	Watt mW/°C
Total Device Dissipation @ T_C = 25°C Derate above 25°C	P_D	5.0 28.6	Watts mW/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	−65 to +200	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	35	°C/W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	175	°C/W

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage(1) (I_C = 10 mAdc, I_B = 0)	$V_{(BR)CEO}$	300	—	Vdc
Collector-Base Breakdown Voltage (I_C = 100 μAdc, I_E = 0)	$V_{(BR)CBO}$	300	—	Vdc
Emitter-Base Breakdown Voltage (I_E = 100 μAdc, I_C = 0)	$V_{(BR)EBO}$	7.0	—	Vdc
Collector Cutoff Current (V_{CB} = 200 Vdc, I_E = 0) (V_{CB} = 200 Vdc, I_E = 0, T_A = 100°C)	I_{CBO}	— —	0.2 20	μAdc
Emitter Cutoff Current (V_{EB} = 6.0 Vdc, I_C = 0)	I_{EBO}	—	0.2	μAdc
ON CHARACTERISTICS(2)				
DC Current Gain (I_C = 3.0 mAdc, V_{CE} = 10 Vdc) (I_C = 10 mAdc, V_{CE} = 10 Vdc) (I_C = 30 mAdc, V_{CE} = 10 Vdc) (I_C = 50 mAdc, V_{CE} = 20 Vdc)	h_{FE}	 10 15 20 20	 — — 200 —	—
Collector-Emitter Saturation Voltage (I_C = 10 mAdc, I_B = 1.0 mAdc) (I_C = 30 mAdc, I_B = 3.0 mAdc)	$V_{CE(sat)}$	 — —	 0.75 1.0	Vdc
Base-Emitter Saturation Voltage (I_C = 10 mAdc, I_B = 1.0 mAdc) (I_C = 30 mAdc, I_B = 3.0 mAdc)	$V_{BE(sat)}$	 — —	 1.0 1.2	Vdc
SMALL-SIGNAL CHARACTERISTICS				
Current-Gain — Bandwidth Product(3) (I_C = 10 mAdc, V_{CE} = 20 Vdc, f = 20 MHz)	f_T	30	—	MHz
Output Capacitance (V_{CB} = 10 Vdc, I_E = 0, f = 100 kHz)	C_{obo}	—	6.0	pF
Input Capacitance (V_{EB} = 0.5 Vdc, I_C = 0, f = 100 kHz)	C_{ibo}	—	80	pF
Input Impedance (I_C = 10 mAdc, V_{CE} = 10 Vdc, f = 1.0 kHz)	h_{ie}	—	2.0	k ohms
Voltage Feedback Ratio (I_C = 10 mAdc, V_{CE} = 10 Vdc, f = 1.0 kHz)	h_{re}	—	2.0	$X10^{-4}$
Small-Signal Current Gain (I_C = 10 mAdc, V_{CE} = 10 Vdc, f = 10 kHz)	h_{fe}	20	200	—

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

Characteristic	Symbol	Min	Max	Unit
Output Admittance (I_C = 10 mAdc, V_{CE} = 10 Vdc, f = 1.0 kHz)	h_{oe}	—	50	mhos
Real Part of Input Impedance (I_C = 10 mAdc, V_{CE} = 10 Vdc, f = 5.0 MHz)	$Re(h_{ie})$	—	200	Ohms

(1) Pulse Test: Pulse Width ≤ 30 μs, Duty Cycle ≤ 1.0%.
(2) Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.
(3) f_T is defined as the frequency at which $|h_{fe}|$ extrapolates to unity.

FIGURE 1 – DC CURRENT GAIN

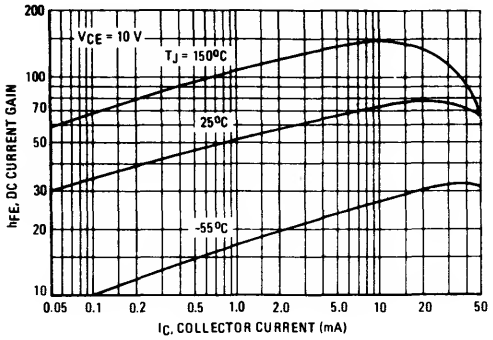

FIGURE 2 – DC SAFE OPERATING AREA

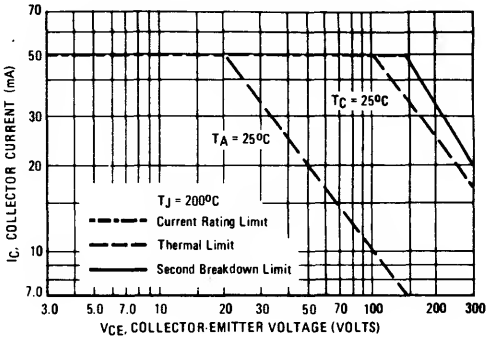

FIGURE 3 – "ON" VOLTAGES

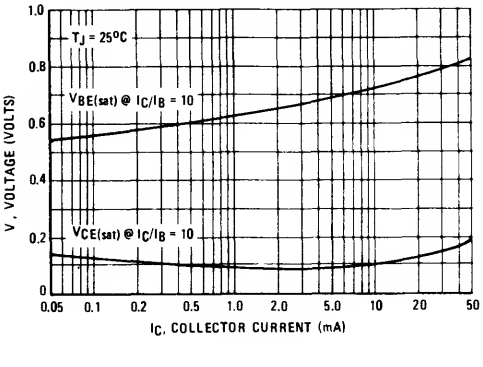

FIGURE 4 – TEMPERATURE COEFFICIENTS

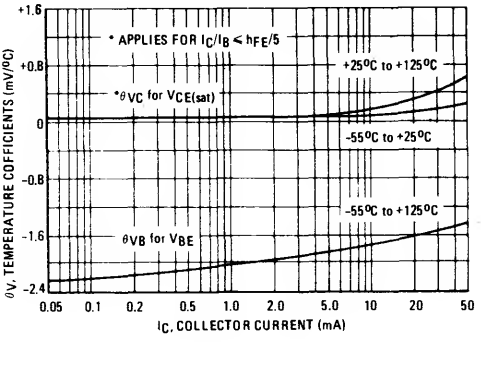

FIGURE 5 – CURRENT-GAIN-BANDWIDTH PRODUCT

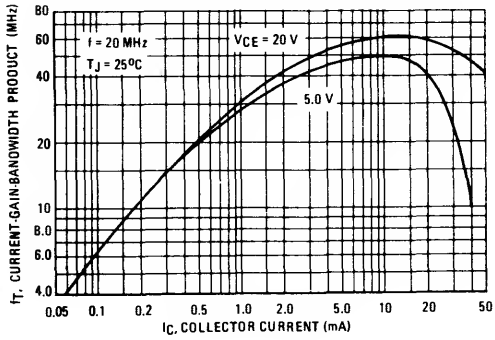

FIGURE 6 – CAPACITANCE