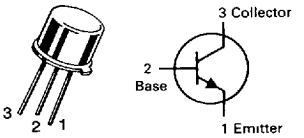
2N2102

CASE 79-04, STYLE 1
TO-39 (TO-205AD)



AMPLIFIER TRANSISTOR

NPN SILICON

Refer to 2N3019 for graphs.

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	65	Vdc
Collector-Emitter Voltage, $R_{BE} \leq 10$ Ohms	V_{CER}	80	Vdc
Collector-Base Voltage	V_{CBO}	120	Vdc
Emitter-Base Voltage	V_{EBO}	7.0	Vdc
Collector Current — Continuous	I_C	1.0	Adc
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 Ambient	$R_{\theta JA}$(1)	175	°C/W
Thermal Resistance, Junction to Case	$R_{\theta JC}$	35	°C/W

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage (I_C = 100 mAdc, $R_{BE} \leq$ 10 ohms)(2)	$V_{CER(sus)}$	80	—	—	Vdc
Collector-Emitter Sustaining Voltage(2) (I_C = 100 mAdc, I_B = 0)(2)	$V_{CEO(sus)}$	65	—	—	Vdc
Collector-Emitter Breakdown Voltage (I_C = 100 μAdc, V_{EB} = 1.5 Vdc)	$V_{(BR)CEX}$	120	—	—	Vdc
Collector-Base Breakdown Voltage (I_C = 100 μAdc, I_E = 0)	$V_{(BR)CBO}$	120	—	—	Vdc
Emitter-Base Breakdown Voltage (I_E = 100 μAdc, I_C = 0)	$V_{(BR)EBO}$	7.0	—	—	Vdc
Collector Cutoff Current (V_{CB} = 60 Vdc, I_E = 0) (V_{CB} = 60 Vdc, I_E = 0, T_A = 150°C)	I_{CBO}	— —	— —	2.0 2.0	nAdc μAdc
Emitter Cutoff Current (V_{EB} = 5.0 Vdc, I_C = 0)	I_{EBO}	—	—	2.0	nAdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 0.1 mAdc, V_{CE} = 10 Vdc) (I_C = 10 mAdc, V_{CE} = 10 Vdc)(2) (I_C = 10 mAdc, V_{CE} = 10 Vdc, T_A = −55°C)(2) (I_C = 150 mAdc, V_{CE} = 10 Vdc)(2) (I_C = 500 mAdc, V_{CE} = 10 Vdc)(2) (I_C = 1.0 Adc, V_{CE} = 10 Vdc)(2)	h_{FE}	20 35 20 40 25 10	— — — — — —	— — — 120 — —	—
Collector-Emitter Saturation Voltage (I_C = 150 mAdc, I_B = 15 mAdc)(2)	$V_{CE(sat)}$	—	0.15	0.5	Vdc
Base-Emitter Saturation Voltage (I_C = 150 mAdc, I_B = 15 mAdc)(2)	$V_{BE(sat)}$	—	0.88	1.1	Vdc
SMALL-SIGNAL CHARACTERISTICS					
Current-Gain — Bandwidth Product (I_C = 50 mAdc, V_{CE} = 10 Vdc, f = 20 MHz)	f_T	60	—	—	MHz
Output Capacitance (V_{CB} = 10 Vdc, I_E = 0, f = 1.0 MHz)	C_{obo}	—	6.0	15	pF
Input Capacitance (V_{EB} = 0.5 Vdc, I_C = 0, f = 1.0 MHz)	C_{ibo}	—	50	80	pF
Input Impedance (I_C = 1.0 mAdc, V_{CE} = 5.0 Vdc, f = 1.0 kHz) (I_C = 5.0 mAdc, V_{CE} = 10 Vdc, f = 1.0 kHz)	h_{ib}	24 4.0	— —	34 8.0	Ohms
Voltage Feedback Ratio (I_C = 1.0 mAdc, V_{CE} = 5.0 Vdc, f = 1.0 kHz) (I_C = 5.0 mAdc, V_{CE} = 10 Vdc, f = 1.0 kHz)	h_{rb}	— —	— —	3.0 3.0	X 10^{-4}
Small-Signal Current Gain (I_C = 1.0 mAdc, V_{CE} = 5.0 Vdc, f = 1.0 kHz) (I_C = 5.0 mAdc, V_{CE} = 10 Vdc, f = 1.0 kHz)	h_{fe}	30 35	— —	100 150	—
Output Admittance (I_C = 1.0 mAdc, V_{CE} = 5.0 Vdc, f = 1.0 kHz) (I_C = 5.0 mAdc, V_{CE} = 10 Vdc, f = 1.0 kHz)	h_{ob}	0.01 0.01	— —	0.5 1.0	μmho
Noise Figure (I_C = 300 μAdc, V_{CE} = 10 Vdc, R_S = 1.0 k Ohm, f = 1.0 kHz, Bandwidth = 1.0 Hz)	NF	—	4.0	6.0	dB
SWITCHING CHARACTERISTICS					
Switching Time	$t_d + t_r + t_f$	—	—	30	ns

(1) $R_{\theta JA}$ is measured with the device soldered into a typical printed circuit board. (2) Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.