

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 @ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	1.0 5.71	Watt mW/°C
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ 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	$R_{\theta JA}(1)$	175	°C/W

2N2102

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

AMPLIFIER TRANSISTOR

NPN SILICON

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Refer to 2N3019 for graphs.

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Collector-Emitter Breakdown Voltage ($I_C = 100$ mAdc, $R_{BE} \leq 10$ ohms)	$V_{CER(sus)}$	80	—	—	Vdc
Collector-Emitter Sustaining Voltage(2) ($I_C = 100$ mAdc, $I_B = 0$)	$V_{CEO(sus)}$	65	—	—	Vdc
Collector-Emitter Breakdown Voltage ($I_C = 100$ μ Adc, $V_{EB} = 1.5$ Vdc)	$V_{(BR)CEX}$	120	—	—	Vdc
Collector-Base Breakdown Voltage ($I_C = 100$ μ Adc, $I_E = 0$)	$V_{(BR)CBO}$	120	—	—	Vdc
Emitter-Base Breakdown Voltage ($I_E = 100$ μ Adc, $I_C = 0$)	$V_{(BR)EBO}$	7.0	—	—	Vdc
Collector Cutoff Current ($V_{CB} = 60$ Vdc, $I_E = 0$) ($V_{CB} = 60$ Vdc, $I_E = 0$, $T_A = 150^\circ\text{C}$)	I_{CBO}	—	—	2.0 2.0	nAdc μ Adc
Emitter Cutoff Current ($V_{BE} = 5.0$ 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) ($I_C = 10$ mAdc, $V_{CE} = 10$ Vdc, $T_A = -55^\circ\text{C}$) ($I_C = 150$ 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)	hFE	20 35 20 40 25 10	— — — — — —	— — — 120 — —	—
Collector-Emitter Saturation Voltage ($I_C = 150$ mAdc, $I_B = 15$ mAdc)	$V_{CE(sat)}$	—	0.15	0.5	Vdc
Base-Emitter Saturation Voltage ($I_C = 150$ mAdc, $I_B = 15$ mAdc)	$V_{BE(sat)}$	—	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, $I_E = 0$, $f = 100$ kHz)	C_{obo}	—	6.0	15	pF
Input Capacitance ($V_{BE} = 0.5$ Vdc, $I_C = 0$, $f = 100$ kHz)	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	$\times 10^{-4}$
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	μ mho
Noise Figure ($I_C = 300$ μ Adc, $V_{CE} = 10$ 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
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(1) $R_{\theta JA}$ is measured with the device soldered into a typical printed circuit board. (2) Pulse Test: Pulse Width ≤ 300 μ s, Duty Cycle $\leq 2.0\%$.