

### MAXIMUM RATINGS

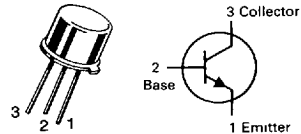
Rating	Symbol	Value	Unit
Collector-Emitter Voltage	$V_{CE0}$	65	Vdc
Collector-Emitter Voltage, $R_{BE} \leq 10$ Ohms	$V_{CER}$	80	Vdc
Collector-Base Voltage	$V_{CBO}$	120	Vdc
Emitter-Base Voltage	$V_{EBO}$	7.0	Vdc
Collector Current — Continuous	$I_C$	1.0	Adc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	1.0 5.71	Watt mW/ $^\circ\text{C}$
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	5.0 28.6	Watts mW/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	-65 to +200	$^\circ\text{C}$

### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Ambient	$R_{\theta JA}(1)$	175	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction to Case	$R_{\theta JC}$	35	$^\circ\text{C}/\text{W}$

## 2N2102

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



AMPLIFIER TRANSISTOR

NPN SILICON

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)(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 ( $I_C = 100$ $\mu$ Adc, $V_{EB} = 1.5$ Vdc)	$V_{(BR)CEX}$	120	—	—	Vdc
Collector-Base Breakdown Voltage ( $I_C = 100$ $\mu$ Adc, $I_E = 0$ )	$V_{(BR)CBO}$	120	—	—	Vdc
Emitter-Base Breakdown Voltage ( $I_E = 100$ $\mu$ Adc, $I_C = 0$ )	$V_{(BR)EBO}$	7.0	—	—	Vdc
Collector Cutoff Current ( $V_{CB} = 60$ Vdc, $I_E = 0$ )	$I_{CBO}$	—	—	2.0	nAdc
( $V_{CB} = 60$ Vdc, $I_E = 0$ , $T_A = 150^\circ\text{C}$ )		—	—	2.0	$\mu$ Adc
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)	$h_{FE}$	20	—	—	—
( $I_C = 10$ mAdc, $V_{CE} = 10$ Vdc)(2)		35	—	—	—
( $I_C = 10$ mAdc, $V_{CE} = 10$ Vdc, $T_A = -55^\circ\text{C}$ )(2)		20	—	—	—
( $I_C = 150$ mAdc, $V_{CE} = 10$ Vdc)(2)		40	—	120	—
( $I_C = 500$ mAdc, $V_{CE} = 10$ Vdc)(2)		25	—	—	—
( $I_C = 1.0$ Adc, $V_{CE} = 10$ Vdc)(2)		10	—	—	—
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)	$C_{ob0}$	—	6.0	15	pF
Input Capacitance ( $V_{EB} = 0.5$ Vdc, $I_C = 0$ , $f = 1.0$ MHz)	$C_{ib0}$	—	50	80	pF
Input Impedance ( $I_C = 1.0$ mAdc, $V_{CE} = 5.0$ Vdc, $f = 1.0$ kHz)	$h_{ib}$	24	—	34	Ohms
( $I_C = 5.0$ mAdc, $V_{CE} = 10$ Vdc, $f = 1.0$ kHz)		4.0	—	8.0	
Voltage Feedback Ratio ( $I_C = 1.0$ mAdc, $V_{CE} = 5.0$ Vdc, $f = 1.0$ kHz)	$h_{rb}$	—	—	3.0	$\times 10^{-4}$
( $I_C = 5.0$ mAdc, $V_{CE} = 10$ Vdc, $f = 1.0$ kHz)		—	—	3.0	
Small-Signal Current Gain ( $I_C = 1.0$ mAdc, $V_{CE} = 5.0$ Vdc, $f = 1.0$ kHz)	$h_{fe}$	30	—	100	—
( $I_C = 5.0$ mAdc, $V_{CE} = 10$ Vdc, $f = 1.0$ kHz)		35	—	150	
Output Admittance ( $I_C = 1.0$ mAdc, $V_{CE} = 5.0$ Vdc, $f = 1.0$ kHz)	$h_{ob}$	0.01	—	0.5	$\mu$ mho
( $I_C = 5.0$ mAdc, $V_{CE} = 10$ Vdc, $f = 1.0$ kHz)		0.01	—	1.0	
Noise Figure ( $I_C = 300$ $\mu$ 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  $\leq 300$   $\mu$ s, Duty Cycle  $\leq 20\%$ .