

Boca Semiconductor Corp.

MAXIMUM RATINGS

Rating	Symbol	2N3019 2N3020	2N3700	Unit
Collector-Emitter Voltage	V_{CEO}	80	80	Vdc
Collector-Base Voltage	V_{CBO}	140	140	Vdc
Emitter-Base Voltage	V_{EBO}	7.0	7.0	Vdc
Collector Current — Continuous	I_C	1.0	1.0	Adc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	0.8 4.6	0.5 2.85	Watts $\text{mW}/^\circ\text{C}$
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	5.0 28.6	1.8 10.6	Watts $\text{mW}/^\circ\text{C}$
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-65 to +200		$^\circ\text{C}$

THERMAL CHARACTERISTICS

Characteristic	Symbol	2N3019 2N3020	2N3700	Unit
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	217	350	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction to Case	$R_{\theta JC}$	35	97	$^\circ\text{C}/\text{W}$

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage(1) ($I_C = 30 \text{ mAdc}, I_B = 0$)	$V_{(BR)CEO}$	80	—	Vdc
Collector-Base Breakdown Voltage ($I_C = 100 \mu\text{Adc}, I_E = 0$)	$V_{(BR)CBO}$	140	—	Vdc
Emitter-Base Breakdown Voltage ($I_E = 100 \mu\text{Adc}, I_C = 0$)	$V_{(BR)EBO}$	7.0	—	Vdc
Collector Cutoff Current ($V_{CB} = 90 \text{ Vdc}, I_E = 0$) ($V_{CB} = 90 \text{ Vdc}, I_E = 0, T_A = +150^\circ\text{C}$)	I_{CBO}	— —	0.01 10	μAdc
Emitter Cutoff Current ($V_{EB} = 5.0 \text{ Vdc}, I_C = 0$)	I_{EBO}	—	0.010	μAdc

ON CHARACTERISTICS

DC Current Gain ($I_C = 0.1 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}$)		2N3700, 2N3019 2N3020	h_{FE}	50 30	— 100	—
($I_C = 10 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}$)(1)		2N3700, 2N3019 2N3020		90 40	— 120	
($I_C = 150 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}$)(1)		2N3700, 2N3019 2N3020		100 40	300 120	
($I_C = 150 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}, T_C = -55^\circ\text{C}$)(1)		2N3700, 2N3019		40	—	
($I_C = 500 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}$)(1)		2N3700, 2N3019 2N3020		50 30	— 100	
($I_C = 1.0 \text{ Adc}, V_{CE} = 10 \text{ Vdc}$)(1)		All Types		15	—	
Collector-Emitter Saturation Voltage(1) ($I_C = 150 \text{ mAdc}, I_B = 15 \text{ mAdc}$) ($I_C = 500 \text{ mAdc}, I_B = 50 \text{ mAdc}$)	$V_{CE(sat)}$			— —	0.2 0.5	Vdc
Base-Emitter Saturation Voltage(1) ($I_C = 150 \text{ mAdc}, I_B = 15 \text{ mAdc}$)	$V_{BE(sat)}$			—	1.1	Vdc

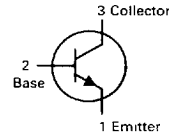
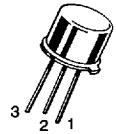
SMALL-SIGNAL CHARACTERISTICS

Current-Gain — Bandwidth Product ($I_C = 50 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}, f = 20 \text{ MHz}$)	f_T	2N3020 2N3019, 2N3700		80 100	— 400	MHz
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2N3019★

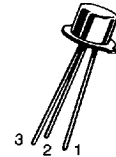
2N3020

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



2N3700★

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



GENERAL TRANSISTORS

NPN SILICON

★2N3019 and 2N3700
are Motorola designated
preferred devices.

2N3019 2N3020 2N3700

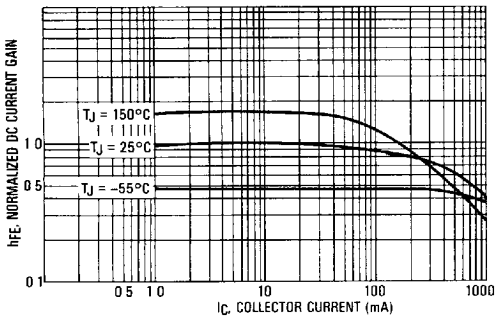
ELECTRICAL CHARACTERISTICS (continued) ($T_A = 25^\circ\text{C}$ unless otherwise noted.)

Characteristic	Symbol	Min	Max	Unit
Output Capacitance ($V_{CB} = 10\text{ Vdc}$, $I_E = 0$, $f = 1.0\text{ MHz}$)	C_{obo}	—	12	pF
Input Capacitance ($V_{EB} = 0.5\text{ Vdc}$, $I_C = 0$, $f = 1.0\text{ MHz}$)	C_{ibo}	—	60	pF
Small-Signal Current Gain ($I_C = 1.0\text{ mA}$, $V_{CE} = 5.0\text{ Vdc}$, $f = 1.0\text{ kHz}$)	h_{fe}	80 30	400 200	—
Collector Base Time Constant ($I_E = 10\text{ mA}$, $V_{CB} = 10\text{ Vdc}$, $f = 79.8\text{ MHz}$)	$r_b' C_c$	— 15	400 400	ps
Noise Figure ($I_C = 100\ \mu\text{Adc}$, $V_{CE} = 10\text{ Vdc}$, $R_S = 1.0\text{ k ohms}$, $f = 1.0\text{ kHz}$)	NF	—	4	dB

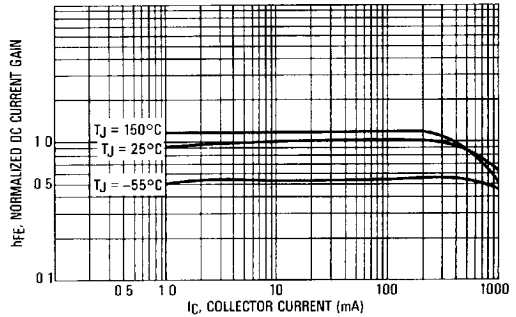
(1) Pulse Test: Pulse Width $\leq 300\ \mu\text{s}$, Duty Cycle $\leq 1.0\%$.

<http://www.bocasemi.com>

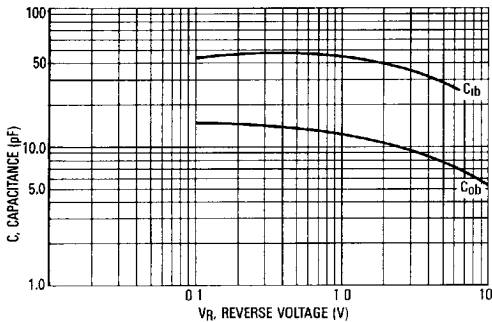
DC CURRENT GAIN
2N3019, 2N3700



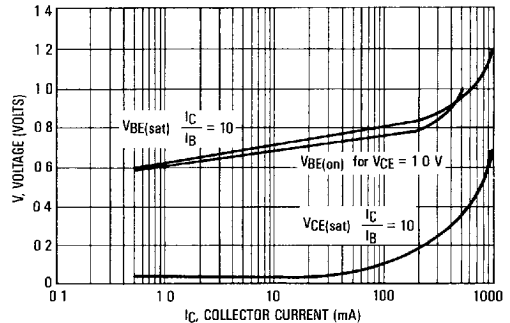
DC CURRENT GAIN
2N3020



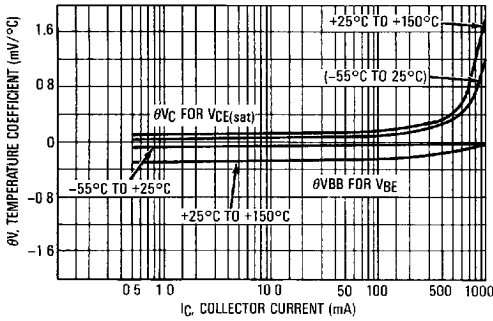
CAPACITANCE



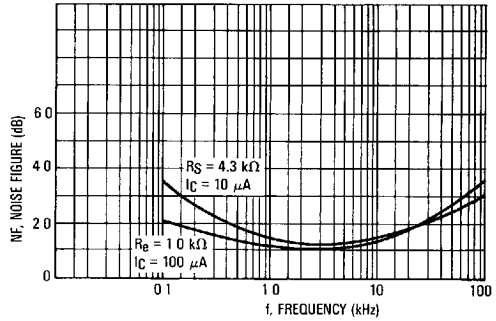
"ON" VOLTAGES



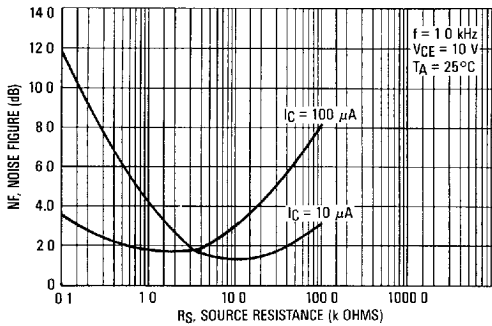
TEMPERATURE COEFFICIENTS



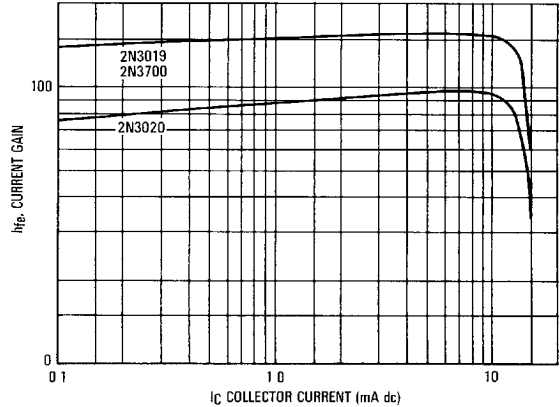
FREQUENCY EFFECTS



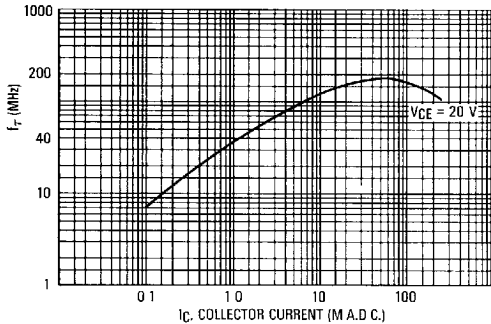
SOURCE RESISTANCE EFFECTS



CURRENT GAIN BANDWIDTH PRODUCT versus COLLECTOR CURRENT — 1 kHz h_{fe}



CURRENT GAIN — BANDWIDTH PRODUCT



ACTIVE REGION SAFE OPERATING AREA

