

# Boca Semiconductor Corp. (BSC)

## MAXIMUM RATINGS

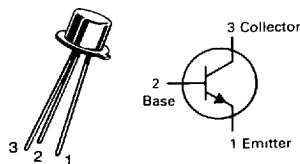
Rating	Symbol	2N930	2N930A	Unit
Collector-Emitter Voltage	$V_{CEO}$	45	45	Vdc
Collector-Base Voltage	$V_{CBO}$	45	60	Vdc
Emitter-Base Voltage	$V_{EBO}$	5.0	6.0	Vdc
Collector Current	$I_C$	30		mAdc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	0.5	3.33	W mW/ $^\circ\text{C}$
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	1.2	6.9	Watt mW/ $^\circ\text{C}$
Operating and Storage Temperature Temperature Range	$T_J, T_{stg}$	-65 to +175		$^\circ\text{C}$

## THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	350	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case	$R_{\theta JC}$	146	$^\circ\text{C/W}$

## 2N930, A

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



## AMPLIFIER TRANSISTORS

NPN SILICON

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

Characteristic	Symbol	Min	Max	Unit
<b>OFF CHARACTERISTICS</b>				
Collector-Emitter Breakdown Voltage(1) ( $I_C = 10 \text{ mAdc}, I_B = 0$ )	$V_{(BR)CEO}$	45	—	Vdc
Collector-Base Breakdown Voltage ( $I_C = 10 \mu\text{Adc}, I_E = 0$ )	$V_{(BR)CBO}$	45 60	—	Vdc
Emitter-Base Breakdown Voltage ( $I_E = 10 \mu\text{Adc}, I_C = 0$ )	$V_{(BR)EBO}$	5.0 6.0	—	Vdc
Collector Cutoff Current ( $V_{CE} = 5.0 \text{ Vdc}, I_B = 0$ )	$I_{CEO}$	—	2.0	nAdc
Collector Cutoff Current ( $V_{CB} = 45 \text{ Vdc}, I_E = 0$ )	$I_{CBO}$	— —	10 2.0	nAdc
Collector Cutoff Current ( $V_{CB} = 45 \text{ Vdc}, V_{BE} = 0$ )	$I_{CES}$	— —	10 2.0	nAdc $\mu\text{Adc}$
Collector Cutoff Current ( $V_{CE} = 45 \text{ Vdc}, V_{BE} = 0, T_A = 170^\circ\text{C}$ )		— —	10 2.0	$\mu\text{Adc}$
Emitter Cutoff Current ( $V_{EB} = 5.0 \text{ Vdc}, I_C = 0$ )	$I_{EBO}$	— —	10 2.0	nAdc

## ON CHARACTERISTICS

Characteristic	Symbol	Min	Max	Unit
DC Current Gain ( $I_C = 1.0 \mu\text{Adc}, V_{CE} = 5.0 \text{ Vdc}$ )	$h_{FE}$	60	—	—
( $I_C = 1.0 \mu\text{Adc}, V_{CE} = 5.0 \text{ Vdc}$ )		100	300	
( $I_C = 10 \mu\text{Adc}, V_{CE} = 5.0 \text{ Vdc}, T_A = -55^\circ\text{C}$ )		20 30	— —	
( $I_C = 500 \mu\text{Adc}, V_{CE} = 5.0 \text{ Vdc}$ )		150	—	
( $I_C = 10 \text{ mAdc}, V_{CE} = 5.0 \text{ Vdc}$ )(1)		— —	600 600	

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**2N930, A**

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

Characteristic		Symbol	Min	Max	Unit
Collector-Emitter Saturation Voltage (1) ( $I_C = 10\text{ mAdc}$ , $I_B = 0.5\text{ mAdc}$ )	2N930 2N930A	$V_{CE(sat)}$	— —	1.0 0.5	Vdc
Base-Emitter Saturation Voltage (1) ( $I_C = 10\text{ mAdc}$ , $I_B = 0.5\text{ mAdc}$ )	2N930 2N930A	$V_{BE(sat)}$	0.6 0.7	1.0 0.9	Vdc

**SMALL-SIGNAL CHARACTERISTICS**

Current-Gain — Bandwidth Product ( $I_C = 500\ \mu\text{A}$ dc, $V_{CE} = 5.0\text{ Vdc}$ , $f = 30\text{ MHz}$ )	2N930 2N930A	$f_T$	30 45	— —	MHz
Output Capacitance ( $V_{CB} = 5.0\text{ Vdc}$ , $I_E = 0$ , $f = 1.0\text{ MHz}$ )	2N930 2N930A	$C_{obo}$	— —	8.0 6.0	pF
Input Impedance ( $I_E = 1.0\text{ mA}$ dc, $V_{CB} = 5.0\text{ Vdc}$ , $f = 1.0\text{ kHz}$ )		$h_{ib}$	25	32	ohms
Voltage Feedback Ratio ( $I_E = 1.0\text{ mA}$ dc, $V_{CB} = 5.0\text{ Vdc}$ , $f = 1.0\text{ kHz}$ )		$h_{rb}$	—	600	$\times 10^{-6}$
Small Signal Current Gain ( $I_C = 1.0\text{ mA}$ dc, $V_{CE} = 5.0\text{ Vdc}$ , $f = 1.0\text{ kHz}$ )		$h_{fe}$	150	600	—
Output Admittance ( $I_E = 1.0\text{ mA}$ dc, $V_{CB} = 5.0\text{ Vdc}$ , $f = 1.0\text{ kHz}$ )		$h_{ob}$	—	1.0	$\mu\text{mhos}$
Noise Figure ( $I_C = 10\ \mu\text{A}$ dc, $V_{CE} = 5.0\text{ Vdc}$ $R_S = 10\text{ k ohms}$ , $f = 1.0\text{ kHz}$ )		NF	—	3.0	dB

(1) Pulse Test: Pulse Width  $\leq 300\ \mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .

**FIGURE 1 — COLLECTOR SATURATION VOLTAGE CHARACTERISTICS**

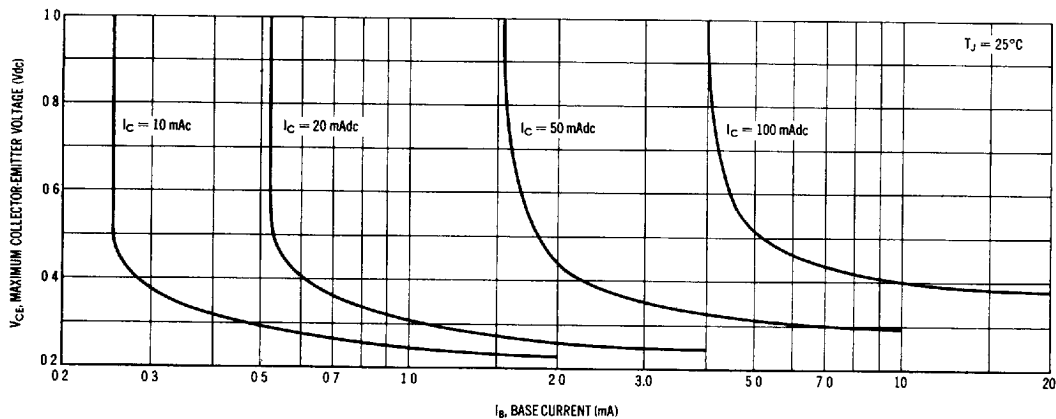


FIGURE 2 — MINIMUM CURRENT GAIN CHARACTERISTICS

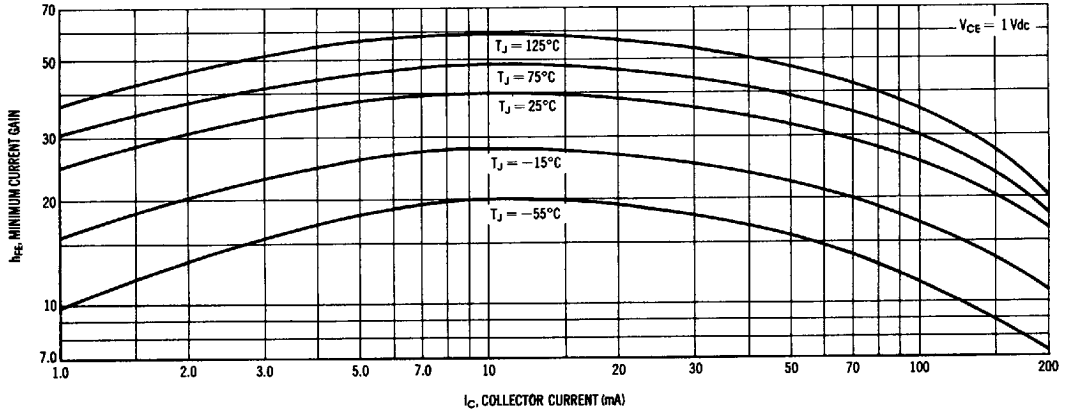


FIGURE 3 — LIMITS OF SATURATION VOLTAGES

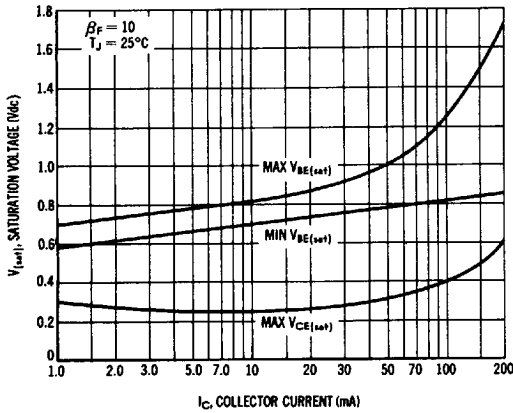
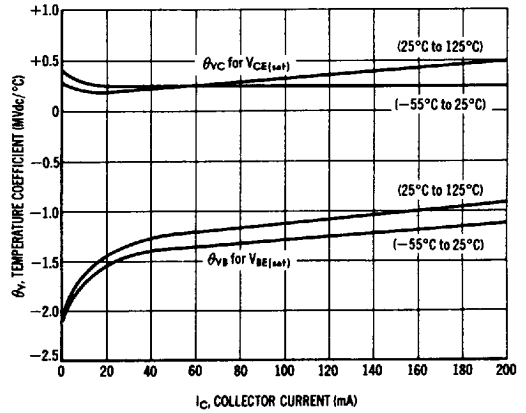


FIGURE 4 — TYPICAL TEMPERATURE COEFFICIENTS



TYPICAL SWITCHING CHARACTERISTICS

FIGURE 5 — TURN-ON TIME VARIATIONS WITH VOLTAGE

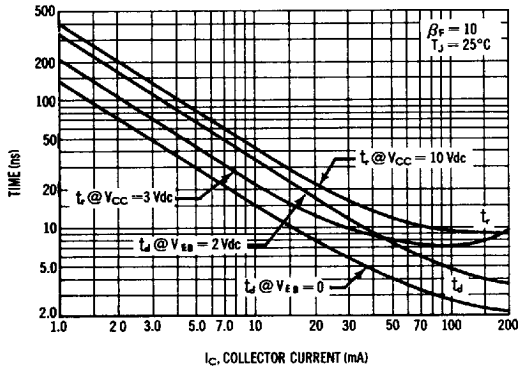


FIGURE 6 — RISE TIME BEHAVIOR

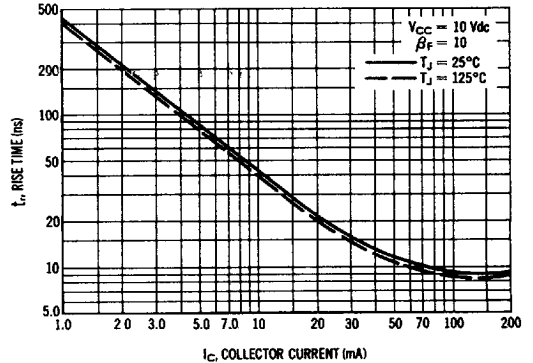


FIGURE 7 — STORAGE TIME BEHAVIOR

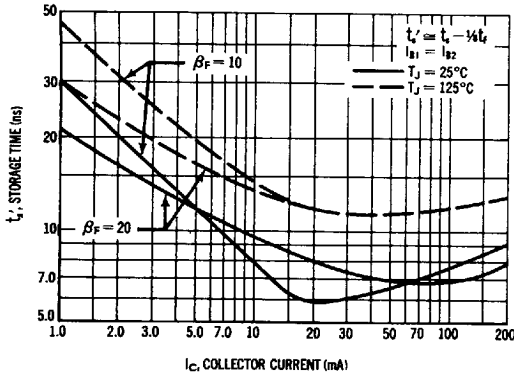


FIGURE 8 — FALL TIME BEHAVIOR

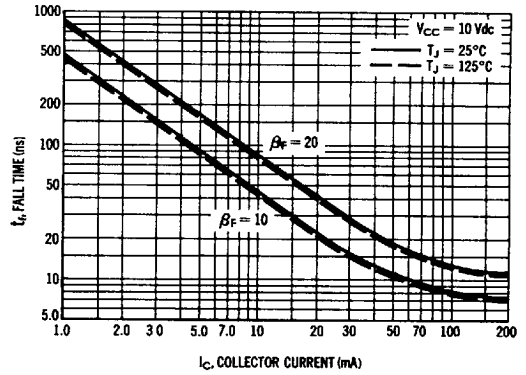


FIGURE 9 — JUNCTION CAPACITANCE VARIATIONS

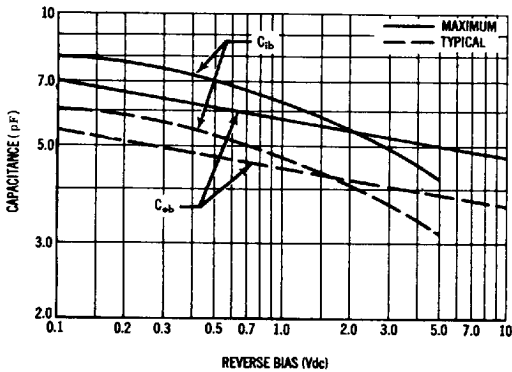


FIGURE 10 — MAXIMUM CHARGE DATA

