

MAXIMUM RATINGS

Rating	Symbol	BC 559	BC 560	Unit
Collector-Emitter Voltage	V_{CE0}	30	45	Vdc
Collector-Base Voltage	V_{CB0}	30	50	Vdc
Emitter-Base Voltage	V_{EB0}	5.0		Vdc
Collector Current – Continuous	I_C	100		mAdc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	625	5.0	mW mW/ $^\circ\text{C}$
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	1.5	12	Watt mW/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-55 to +150		$^\circ\text{C}$

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	83.3	$^\circ\text{C/W}$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	200	$^\circ\text{C/W}$

BC559

BC560

CASE 29-02, STYLE 17
TO-92 (TO-226AA)

LOW NOISE TRANSISTORS

PNP SILICON

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

Characteristic	Symbol	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage ($I_C = 10\text{ mAdc}, I_B = 0$) BC559 BC560	$V_{(BR)CEO}$	30 45			Vdc
Collector-Base Breakdown Voltage ($I_C = 10\ \mu\text{Adc}, I_E = 0$) BC559 BC560	$V_{(BR)CBO}$	30 50			Vdc
Emitter-Base Breakdown Voltage ($I_E = 10\ \mu\text{Adc}, I_C = 0$)	$V_{(BR)EBO}$	5			Vdc
Collector Cutoff Current ($V_{CB} = 30\text{ Vdc}, I_E = 0$) ($V_{CB} = 30\text{ Vdc}, I_E = 0, T_A = +125^\circ\text{C}$)	I_{CBO}			15 5	nAdc μAdc
Emitter Cutoff Current ($V_{EB} = 4\text{ Vdc}, I_C = 0$)	I_{EBO}			15	nAdc
ON CHARACTERISTICS					
DC Current Gain ($I_C = 10\ \mu\text{Adc}, V_{CE} = 5\text{ Vdc}$) BC559B/560B BC559C/560C ($I_C = 2\text{ mAdc}, V_{CE} = 5\text{ Vdc}$) BC559B/560B BC559C/560C BC559/560	h_{FE}	100 100 180 380 120	150 270 290 500	460 800 800	
Collector-Emitter Saturation Voltage ($I_C = 10\text{ mAdc}, I_B = 0.5\text{ mAdc}$) ($I_C = 10\text{ mAdc}, I_B = \text{see note 1}$) ($I_C = 100\text{ mAdc}, I_B = 5\text{ mAdc}$, see note 2)	$V_{CE(sat)}$		0.075 0.3 0.25	0.25 0.6	Vdc
Base-Emitter Saturation Voltage ($I_C = 100\text{ mAdc}, I_B = 5\text{ mAdc}$)	$V_{BE(sat)}$		1.1		Vdc
Base-Emitter On Voltage ($I_C = 10\ \mu\text{Adc}, V_{CE} = 5\text{ Vdc}$) ($I_C = 100\ \mu\text{Adc}, V_{CE} = 5\text{ Vdc}$) ($I_C = 2\text{ mAdc}, V_{CE} = 5\text{ Vdc}$)	$V_{BE(on)}$	0.55	0.52 0.55 0.62	0.75	Vdc
SMALL SIGNAL CHARACTERISTICS					
Current-Gain-Bandwidth Product ($I_C = 10\text{ mAdc}, V_{CE} = 5\text{ Vdc}, f = 100\text{ MHz}$)	f_T		250		MHz
Collector-Base Capacitance ($V_{CE} = 10\text{ Vdc}, I_E = 0, f = 1\text{ MHz}$)	C_{cbo}		2.5		pF

Note 1: I_B is value for which $I_C = 11\text{ mA}$ at $V_{CE} = 1\text{ V}$

Note 2: Pulse test = $300\ \mu\text{s}$ – Duty cycle = 2%

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

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Input Impedance ($I_C = 2\text{ mAdc}$, $V_{CE} = 5\text{ V}$, $f = 1\text{ KHz}$) BC559B/BC560B BC559C/BC560C	h_{ie}	3.2 5.0	6.0 8.0	8.5 14.0	$\text{K}\Omega$
Voltage Feedback Ratio ($I_C = 2\text{ mAdc}$, $V_{CE} = 5\text{ V}$, $f = 1\text{ KHz}$) BC559B/BC560B BC559C/BC560C	h_{re}		3.5 4.0		10^{-4}
Small Signal Current Gain ($I_C = 2\text{ mAdc}$, $V_{CE} = 5\text{ V}$, $f = 1\text{ KHz}$) BC559B/BC560B BC559C/BC560C	h_{fe}	240 450	330 600	500 900	
Output Admittance ($I_C = 2\text{ mAdc}$, $V_{CE} = 5\text{ V}$, $f = 1\text{ KHz}$) BC559B/BC560B BC559C/BC560C	h_{oe}		10 12	60 110	μmhos
Noise Figure ($I_C = 200\ \mu\text{Adc}$, $V_{CE} = 5\text{ Vdc}$, $R_S = 2\ \text{K}\Omega$, $f = 30\ \text{Hz} - 15\ \text{KHz}$)	NF		0.5	2.0	dB
Equivalent Input Noise Voltage ($I_C = 200\ \mu\text{Adc}$, $V_{CE} = 5\text{ V}$, $R_S = 2\ \text{k}\Omega$, $f = 120\ \text{Hz}$) See Application note, Section I	V_T		8.0	10	$\text{nV}/\sqrt{\text{Hz}}$
Equivalent Input Noise Voltage ($I_C = 200\ \mu\text{Adc}$, $V_{CE} = 5\text{ V}$, $R_S = 2\ \text{K}\Omega$, $f = 10\ \text{Hz} - 50\ \text{Hz}$) See Application note, Section II	V_T		74	110	$\text{nV}/\sqrt{\text{Hz}}$

FIGURE 1 – NOISE VOLTAGE V_S FREQUENCY

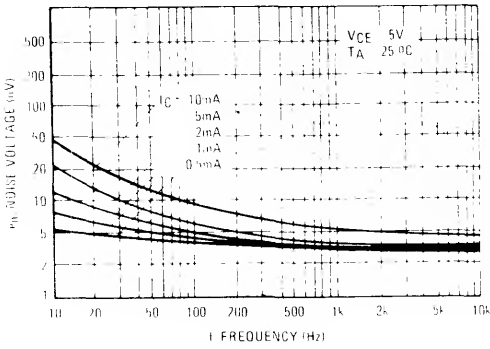


FIGURE 2 – NOISE VOLTAGE V_S COLLECTOR CURRENT

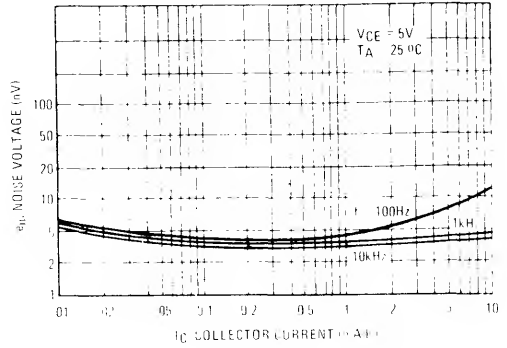


FIGURE 3 – NOISE CURRENT

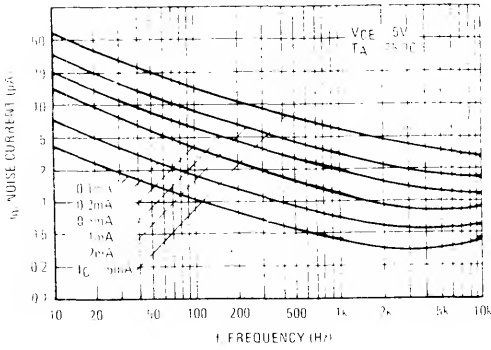


FIGURE 4 – WIDEBAND NOISE FIGURE

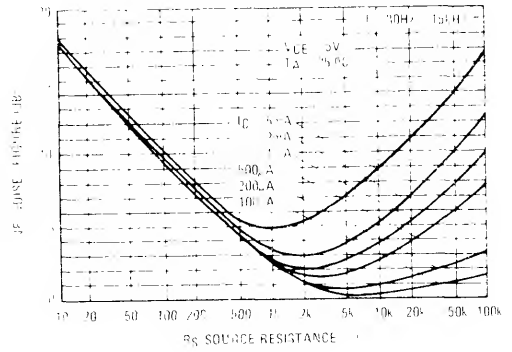


FIGURE 5 – TOTAL NOISE VOLTAGE (120 Hz)

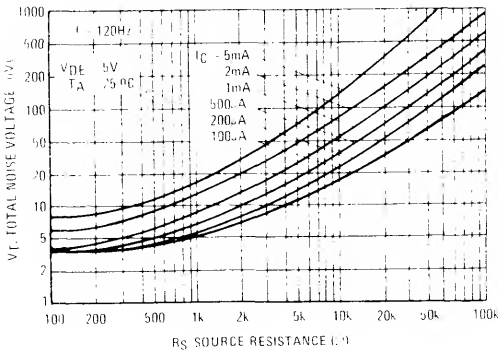
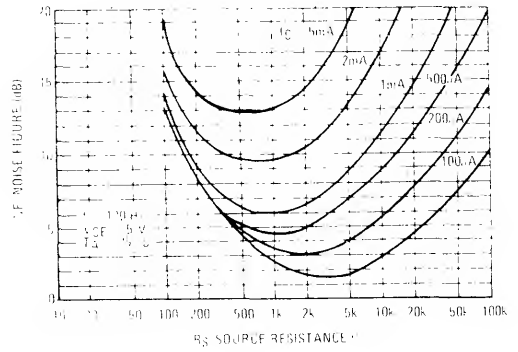


FIGURE 6 – NOISE FIGURE (120 Hz)



BC559, BC560

FIGURE 7 – NORMALIZED DC CURRENT GAIN

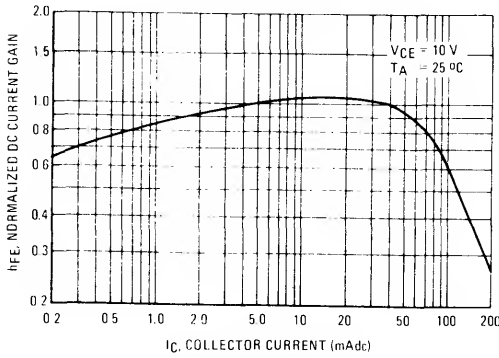


FIGURE 8 – "SATURATION" AND "ON" VOLTAGES

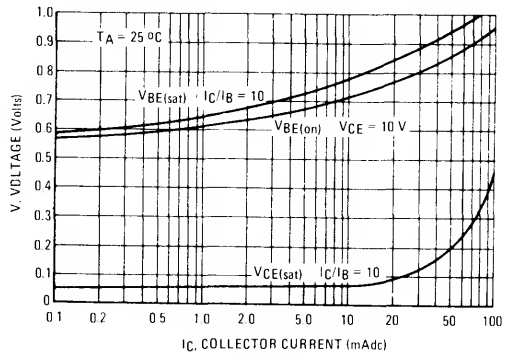


FIGURE 9 – CURRENT GAIN-BANDWIDTH PRODUCT

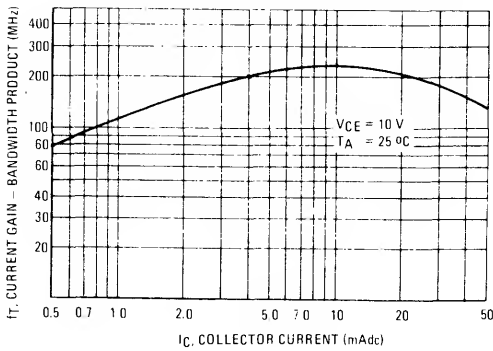


FIGURE 10 – CAPACITANCE

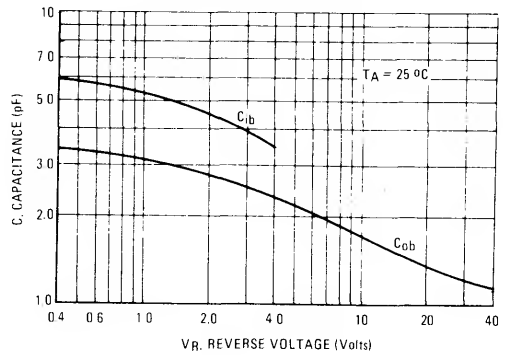


FIGURE 11 – OUTPUT ADMITTANCE

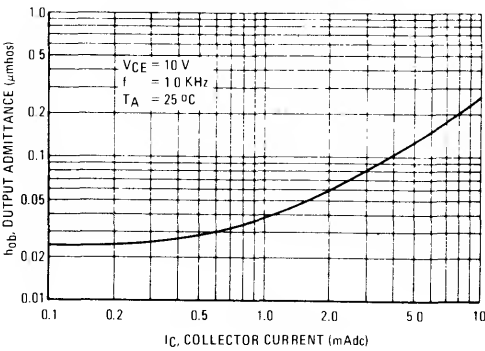
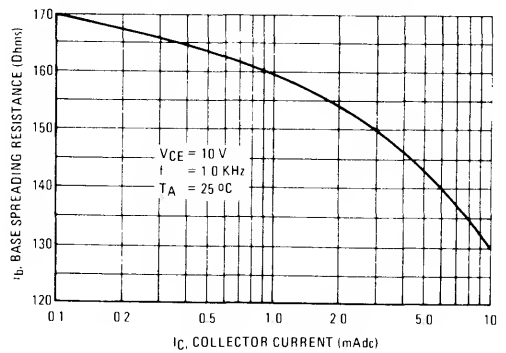


FIGURE 12 – BASE SPREADING RESISTANCE



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