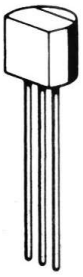
MOTOROLA

2N5088 (SILICON)
2N5089



CASE 29 (1)
(TO-92)

NPN silicon annular transistors designed for low-level, low-noise amplifier applications.

MAXIMUM RATINGS

Rating	Symbol	2N5088	2N5089	Unit
Collector-Emitter Voltage	V_{CEO}	30	25	Vdc
Collector-Base Voltage	V_{CB}	35	30	Vdc
Emitter-Base Voltage	V_{EB}	4.5		Vdc
Collector Current	I_C	50		mAdc
Total Device Dissipation @T_A = 25°C Derate above 25°C	P_D	310 2.81		mW mW/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-55 to +135		°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Ambient	θ_{JA}	0.357	°C/mW

2N5088, 2N5089 (continued)

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Characteristic		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Collector-Emitter Breakdown Voltage (I_C = 1.0 mAdc, I_B = 0)	2N5088	BV_{CEO}	30	-	-	Vdc
	2N5089		25	-	-	
Collector-Base Breakdown Voltage (I_C = 100 μAdc, I_E = 0)	2N5088	BV_{CBO}	35	-	-	Vdc
	2N5089		30	-	-	
Collector Cutoff Current (V_{CB} = 20 Vdc, I_E = 0)	2N5088	I_{CBO}	-	-	50	nAdc
(V_{CB} = 15 Vdc, I_E = 0)	2N5089		-	-	50	
Emitter Cutoff Current ($V_{EB(off)}$ = 3.0 Vdc, I_C = 0)		I_{EBO}	-	-	50	nAdc
($V_{EB(off)}$ = 4.5 Vdc, I_C = 0)			-	-	100	
ON CHARACTERISTICS						
DC Current Gain (I_C = 100 μAdc, V_{CE} = 5.0 Vdc)	2N5088	h_{FE}	300	-	900	
	2N5089		400	-	1200	
(I_C = 1.0 mAdc, V_{CE} = 5.0 Vdc)	2N5088		350	-	-	
	2N5089		450	-	-	
(I_C = 10 mAdc, V_{CE} = 5.0 Vdc)	2N5088		300	-	-	
	2N5089		400	-	-	
Collector-Emitter Saturation Voltage (I_C = 10 mAdc, I_B = 1.0 mAdc)		$V_{CE(sat)}$	-	-	0.5	Vdc
Base-Emitter On Voltage (I_C = 10 mAdc, V_{CE} = 5.0 Vdc)		$V_{BE(on)}$	-	-	0.8	Vdc
DYNAMIC CHARACTERISTICS						
Current-Gain – Bandwidth Product (I_C = 500 μAdc, V_{CE} = 5.0 Vdc, f = 20 MHz		f_T	50	175	-	MHz
Collector-Base Capacitance (V_{CB} = 5.0 Vdc, I_E = 0, f = 100 kHz, emitter guarded)		C_{cb}	-	1.8	4.0	pF
Emitter-Base Capacitance (V_{BE} = 0.5 Vdc, I_C = 0, f = 100 kHz, collector guarded)		C_{eb}	-	4.0	10	pF
Small-Signal Current Gain (I_C = 1.0 mAdc, V_{CE} = 5.0 Vdc, f = 1.0 kHz)	2N5088	h_{fe}	350	-	1400	-
	2N5089		450	-	1800	
Noise Figure (I_C = 100 μAdc, V_{CE} = 5.0 Vdc, R_S = 10 k ohms, f = 10 Hz to 15.7 kHz	2N5088	NF	-	-	3.0	dB
	2N5089		-	-	2.0	

NOISE FIGURE
V_{CE} = 5.0 Vdc, T_A = 25 °C

FIGURE 1 – FREQUENCY EFFECTS

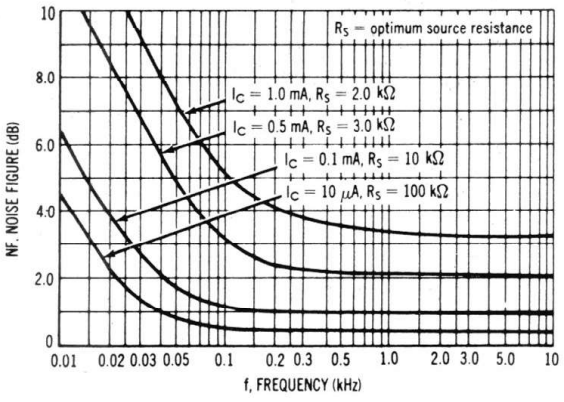
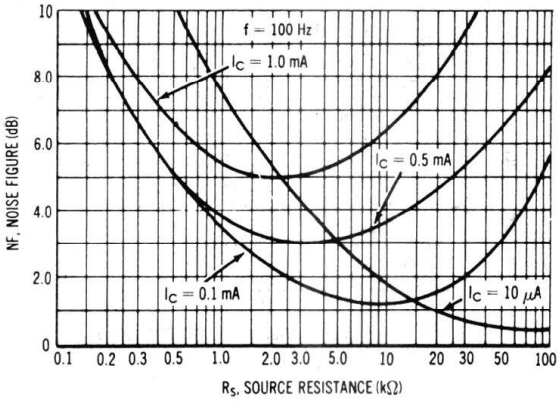


FIGURE 2 – SOURCE RESISTANCE EFFECTS



MOTOROLA

h PARAMETERS

V_{CE} = 10 Vdc, f = 1.0 kHz, T_A = 25°C
(For Figures 3, 4, 5, 6, 8)

This group of graphs illustrates the relationship of the "h" parameters for this series of transistors. To obtain these curves, 4 units were selected and identified by number — the same units were used to develop curves on each graph.

FIGURE 3 — INPUT IMPEDANCE

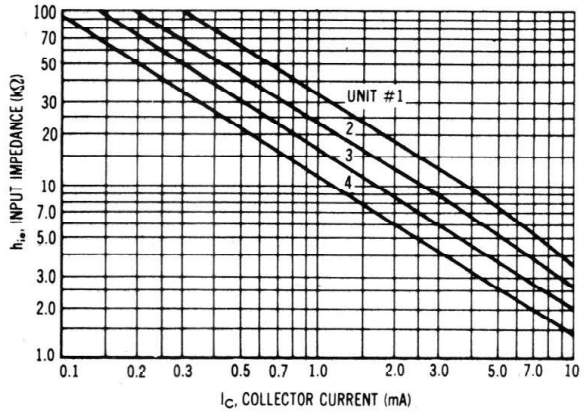


FIGURE 4 — VOLTAGE FEEDBACK RATIO

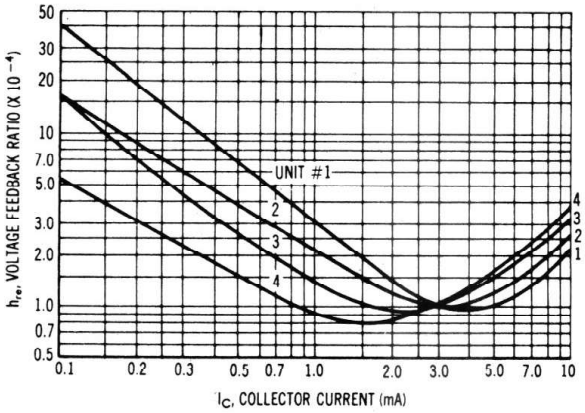


FIGURE 5 — CURRENT GAIN

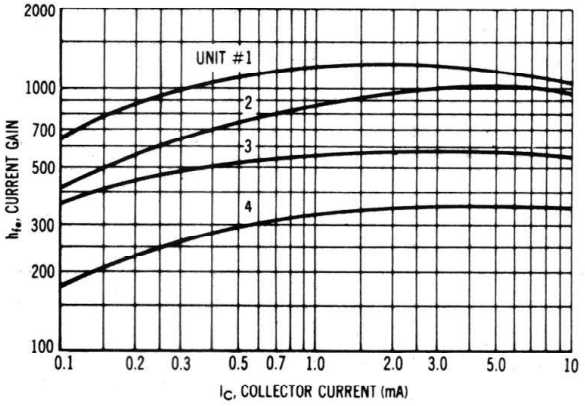


FIGURE 6 — OUTPUT ADMITTANCE

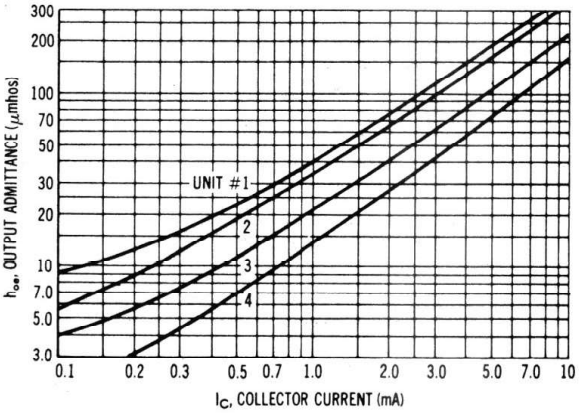


FIGURE 7 — EFFECT OF VOLTAGE

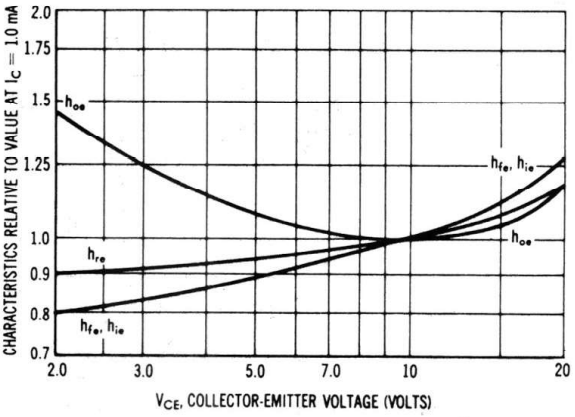
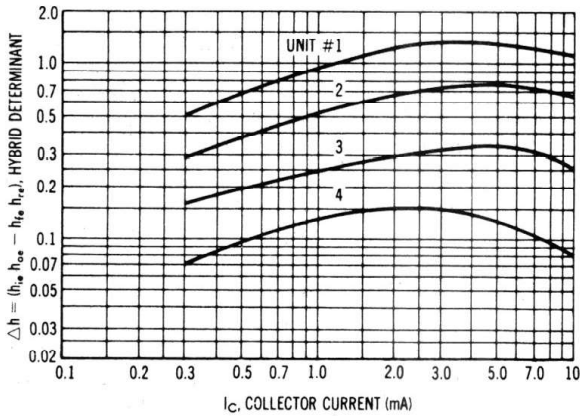


FIGURE 8 — DETERMINANT



2N5088, 2N5089 (continued)

FIGURE 9 — DC CURRENT GAIN

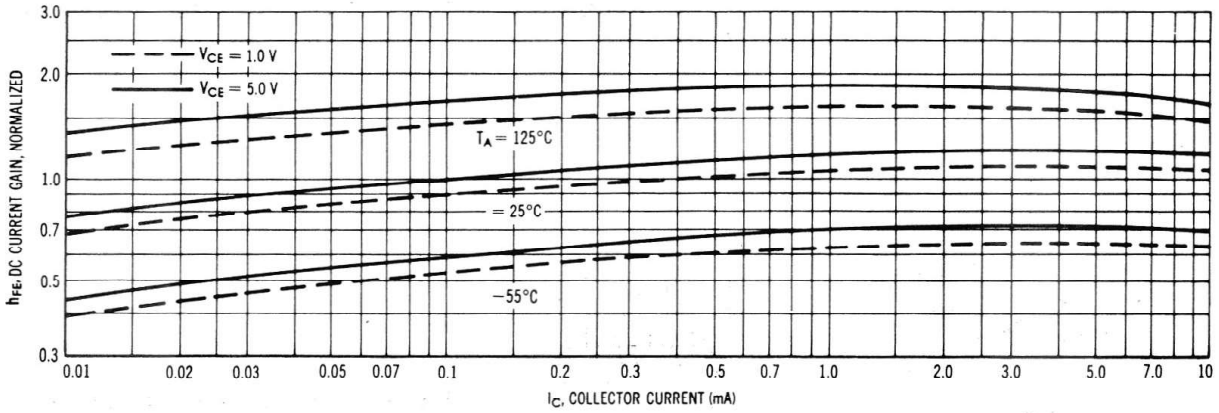


FIGURE 10 — COLLECTOR SATURATION REGION

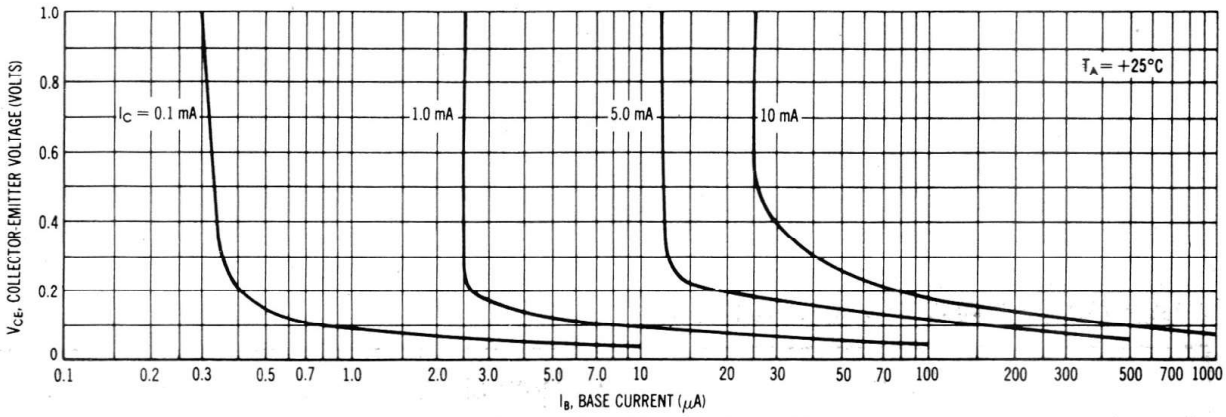


FIGURE 11 — CURRENT GAIN — BANDWIDTH PRODUCT

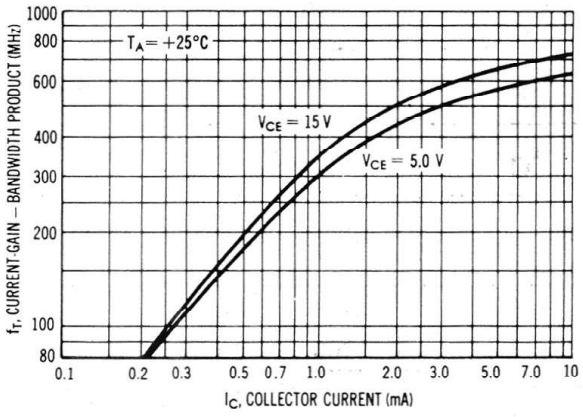


FIGURE 12 — CAPACITANCE