2N6603

JAN, JTX, JTXV AVAILABLE
CASE 303-01, STYLE 1

HIGH FREQUENCY TRANSISTOR

NPN SILICON

MAXIMUM RATINGS (T_A = 25°C Free Air Temperature)

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	15	Vdc
Collector-Base Voltage	V_{CBO}	25	Vdc
Emitter-Base Voltage	V_{EBO}	3.0	Vdc
Collector Current — Continuous	I_C	30	mAdc
Total Device Dissipation @ T_C = 125°C Derate above 125°C	P_D	400 5.33	mW mW/°C
Storage Temperature	T_{stg}	−65 to +200	°C

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)	$V_{(BR)CEO}$	15	—	—	Vdc
Collector-Base Breakdown Voltage (I_C = 0.1 mAdc, I_E = 0)	$V_{(BR)CBO}$	25	—	—	Vdc
Emitter-Base Breakdown Voltage (I_E = 0.1 mAdc, I_C = 0)	$V_{(BR)EBO}$	3.0	—	—	Vdc
Collector Cutoff Current (V_{CB} = 15 Vdc, I_E = 0)	I_{CBO}	—	—	50	nAdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 15 mAdc, V_{CE} = 10 Vdc)	h_{FE}	30	—	200	—
SMALL SIGNAL CHARACTERISTICS					
Collector-Base Capacitance(1) (V_{CB} = 10 Vdc, I_E = 0, 0.1 MHz ≤ f ≤ 1.0 MHz)	C_{cb}	0.25	—	0.75	pF
FUNCTIONAL TEST					
Common-Emitter Amplifier Power Gain (Figure 1) (V_{CE} = 10 Vdc, I_C = 15 mA, f = 1.0 GHz)	G_{pe}	15	—	21	dB
Spot Noise Figure (R_S = Optimum) (Figure 1) (V_{CE} = 10 Vdc, I_C = 5.0 mA, f = 1.0 GHz)	NF	1.0	—	2.5	dB
Power Gain at Optimum Noise Figure (Figure 1) (V_{CE} = 10 Vdc, I_C = 5.0 mA, f = 1.0 GHz)	G_{NF}	10	—	—	dB
TYPICAL 2 GHz PERFORMANCE					
Maximum Available Gain (Figure 1)(2) (V_{CE} = 10 Vdc, I_C = 15 mA, f = 2.0 GHz)	MAG	—	11	—	dB
Noise Figure (R_S = Optimum) (Figure 1) (V_{CE} = 10 Vdc, I_C = 5.0 mA, f = 2.0 GHz)	NF	—	2.9	—	dB

(1) C_{cb} measurement employs a three-terminal capacitance bridge incorporating a guard circuit. The emitter terminal shall be connected to the guard terminal of the bridge.

(2) MAG is calculated from the S-Parameters using the equation $MAG = \frac{|S_{21}|^2}{(1-|S_{11}|^2)(1-|S_{22}|^2)}$

FIGURE 1 – BLOCK DIAGRAM FOR POWER GAIN AND NOISE FIGURE

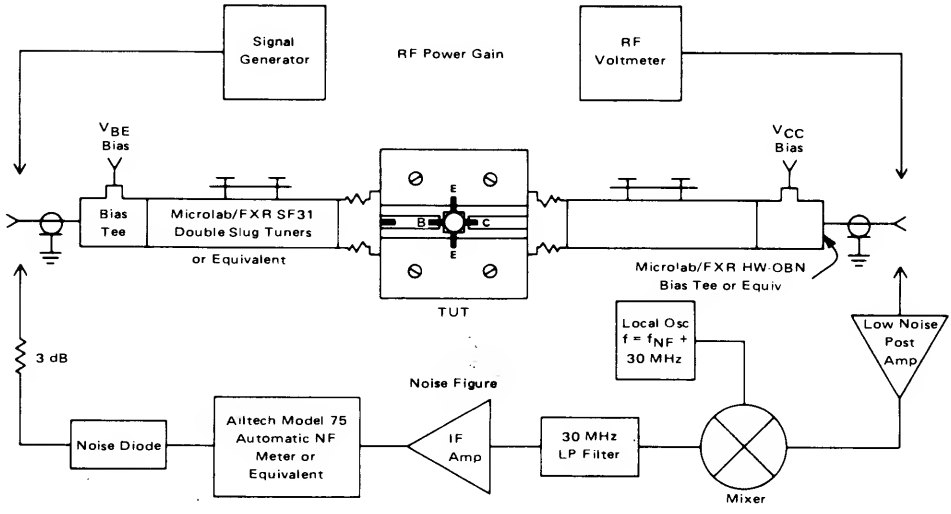


FIGURE 2 – POWER GAIN AND NOISE FIGURE versus FREQUENCY

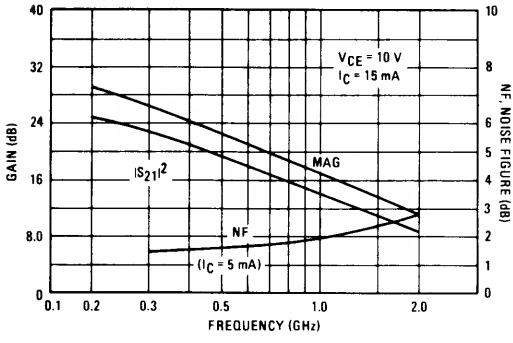


FIGURE 3 – OUTPUT CAPACITANCE versus VOLTAGE

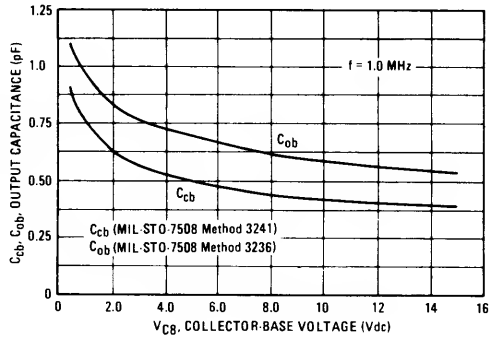


FIGURE 4 – CURRENT GAIN–BANDWIDTH PRODUCT versus COLLECTOR CURRENT

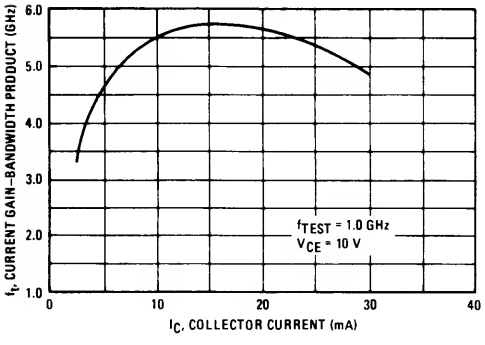


FIGURE 5 – POWER GAIN versus COLLECTOR CURRENT

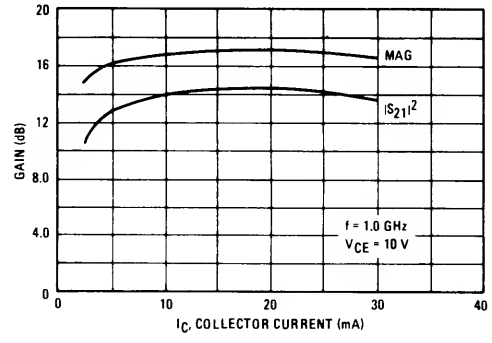
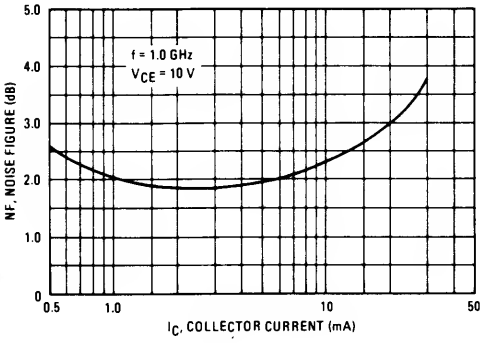


FIGURE 6 – NOISE FIGURE versus COLLECTOR CURRENT



COMMON EMITTER SCATTERING PARAMETERS

FIGURE 7 – INPUT AND OUTPUT REFLECTION COEFFICIENTS versus FREQUENCY

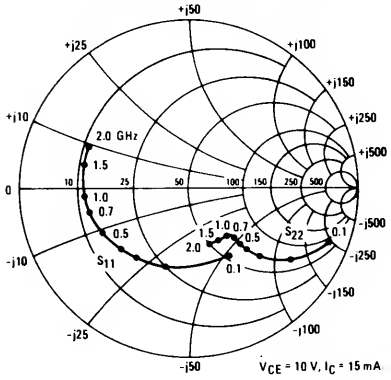
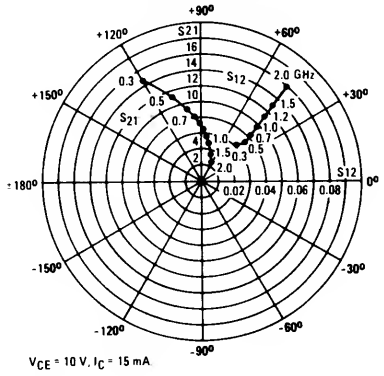


FIGURE 8 – FORWARD AND REVERSE TRANSMISSION COEFFICIENTS versus FREQUENCY



S – PARAMETERS

V_{CE} (Volts)	I_C (mA)	Frequency (MHz)	S11		S21		S12		S22	
			|S11|	∠φ	|S21|	∠φ	|S12|	∠φ	|S22|	∠φ
5.0	5	100	0.69	−30	12.16	160	0.026	72	0.95	−16
		200	0.65	−61	11.03	143	0.046	59	0.84	−31
		500	0.63	−122	7.05	111	0.074	36	0.56	−54
		1000	0.64	−158	4.13	88	0.087	28	0.39	−68
		2000	0.65	170	2.14	61	0.107	29	0.33	−91
	10	100	0.52	−50	18.74	154	0.022	69	0.91	−22
		200	0.54	−92	15.53	135	0.037	53	0.74	−40
		500	0.62	−146	8.49	104	0.052	38	0.43	−62
		1000	0.65	−172	4.66	84	0.065	37	0.29	−75
		2000	0.67	162	2.38	60	0.094	42	0.26	−97
	15	100	0.42	−70	22.72	150	0.019	66	0.87	−26
		200	0.51	−113	17.72	130	0.030	50	0.68	−44
		500	0.63	−157	8.96	100	0.042	41	0.38	−64
		1000	0.66	−178	4.80	82	0.056	44	0.26	−75
		2000	0.69	159	2.43	59	0.090	48	0.24	−97
	30	100	0.39	−116	24.57	142	0.014	62	0.80	−29
		200	0.55	−145	17.17	120	0.021	49	0.58	−42
		500	0.67	−171	7.96	95	0.030	49	0.34	−49
		1000	0.69	175	4.18	78	0.047	56	0.29	−56
		2000	0.71	157	2.13	55	0.084	58	0.29	−81
10	5	100	0.71	−27	12.01	161	0.021	73	0.96	−13
		200	0.67	−55	11.10	145	0.039	60	0.87	−25
		500	0.63	−115	7.44	114	0.064	39	0.62	−44
		1000	0.64	−153	4.43	90	0.077	30	0.46	−55
		2000	0.64	172	2.27	62	0.094	31	0.39	−76
	10	100	0.55	−43	18.77	155	0.018	71	0.92	−18
		200	0.55	−83	16.00	137	0.031	54	0.78	−32
		500	0.60	−140	9.06	106	0.046	39	0.49	−48
		1000	0.63	−168	5.02	85	0.058	39	0.36	−56
		2000	0.65	164	2.55	60	0.084	43	0.33	−76
	15	100	0.46	−60	23.14	152	0.016	68	0.90	−21
		200	0.51	−103	18.39	131	0.027	52	0.72	−36
		500	0.61	−152	9.67	102	0.037	42	0.43	−49
		1000	0.64	−175	5.21	83	0.049	45	0.33	−54
		2000	0.66	161	2.61	59	0.079	51	0.31	−74
	30	100	0.39	−98	27.29	144	0.013	63	0.83	−24
		200	0.53	−135	19.38	122	0.019	50	0.63	−35
		500	0.64	−167	9.11	96	0.027	48	0.41	−39
		1000	0.66	177	4.77	79	0.042	55	0.36	−45
		2000	0.69	157	2.41	56	0.074	58	0.35	−67