

MOTOROLA
SEMICONDUCTOR
TECHNICAL DATA
The RF Line
NPN Silicon
High Frequency Transistor

... designed primarily for use in low noise, small-signal amplifiers in satellite down conversion links, microwave radio relays, communication links, ECM receivers, oscillators, mixers and multipliers.

Use of ion implementation techniques, arsenic emitters, gold metallization and a hermetic package results in an ultra-reliable transistor with low noise, high gain and wide dynamic range.

- Fully Implanted Base and Emitter Structure
- High Cutoff Frequency — 6 GHz Typ
- High Gain — 12.5 dB Typ @ $f = 500$ MHz
- Gold Metallization

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	12	Vdc
Collector-Base Voltage	V_{CBO}	20	Vdc
Emitter-Base Voltage	V_{EBO}	3	Vdc
Collector Current — Continuous	I_C	50	mAdc
Operating Junction Temperature	T_J	200	°C
Storage Temperature Range	T_{stg}	-65 to +200	°C

ELECTRICAL CHARACTERISTICS

Characteristic	Symbol	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Collector-Emitter Breakdown Voltage ($I_C = 1$ mA, $I_B = 0$)	$V_{(BR)CEO}$	12	—	—	Vdc
Emitter-Base Breakdown Voltage ($I_E = 0.1$ mA, $I_C = 0$)	$V_{(BR)EBO}$	3	—	—	Vdc
Collector Cutoff Current ($V_{CB} = 10$ V, $I_E = 0$)	I_{CBO}	—	—	1	μ Adc

ON CHARACTERISTICS

DC Current Gain ($I_C = 25$ mA, $V_{CE} = 5$ V)	h_{FE}	70	150	300	—
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DYNAMIC CHARACTERISTICS

Collector-Base Capacitance ($V_{CB} = 8$ V, $I_E = 0$, $f = 1$ MHz)	C_{cb}	—	0.5	—	pF
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FUNCTIONAL TESTS

Noise Figure, Minimum ($V_{CE} = 8$ V, $I_C = 5$ mA)	$f = 300$ MHz	NF_{MIN}	—	1.3	—	dB
	$f = 500$ MHz		—	1.6	—	
	$f = 1000$ MHz		—	2.7	—	
Cutoff Frequency ($V_{CE} = 8$ V, $I_C = 25$ mA)		f_T	—	6	—	GHz
Maximum Unilateral Gain ($V_{CE} = 8$ V, $I_C = 25$ mA)	$f = 300$ MHz	G_{UMAX}	—	19	—	dB
	$f = 500$ MHz		—	14.5	—	
	$f = 1000$ MHz		—	8.5	—	
Insertion Gain ($V_{CE} = 8$ V, $I_C = 25$ mA)	$f = 300$ MHz	$ S_{21} ^2$	—	17	—	dB
	$f = 500$ MHz		—	13	—	
	$f = 1000$ MHz		—	7	—	
Gain at Associated Noise Figure ($V_{CE} = 8$ V, $I_C = 5$ mA)	$f = 300$ MHz	G_{ANF}	—	19	—	dB
	$f = 500$ MHz		—	13	—	
	$f = 1000$ MHz		—	7.5	—	

LT4772
 $I_C = 50$ mA
HIGH FREQUENCY
TRANSISTOR
NPN SILICON

TO-72
CASE 20-03, STYLE 10
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TYPICAL CHARACTERISTICS

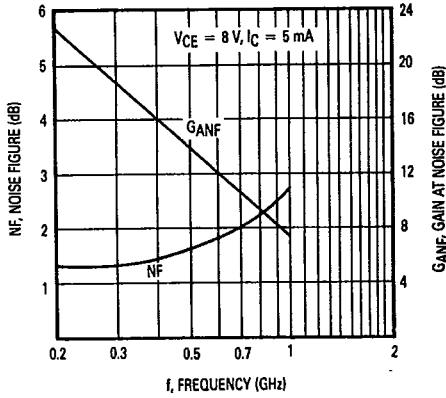


Figure 1. Noise Figure and Associated Gain versus Frequency

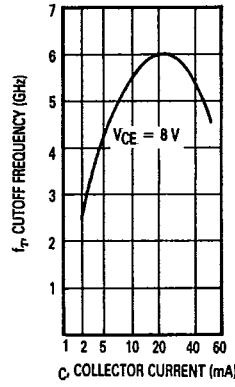


Figure 2. Gain-Bandwidth Product versus Collector Current

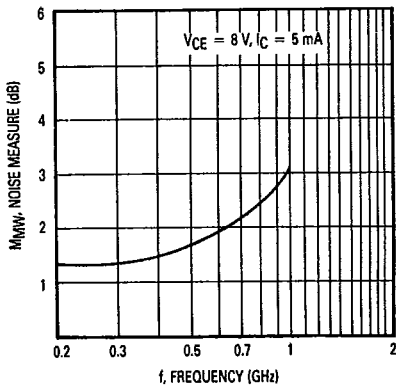


Figure 3. Noise Measure versus Frequency

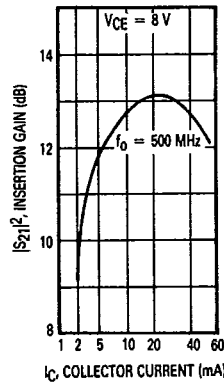


Figure 4. Insertion Gain versus Collector Current

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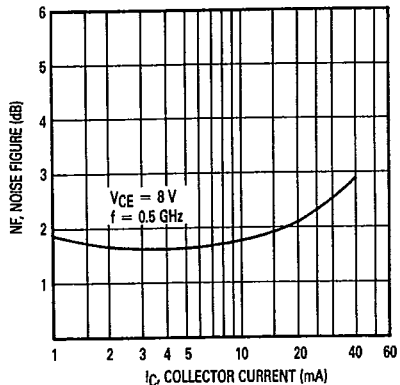


Figure 5. Noise Figure versus Collector Current

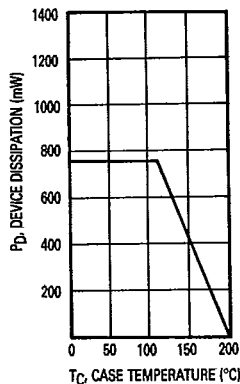


Figure 6. Device Dissipation Operating Range

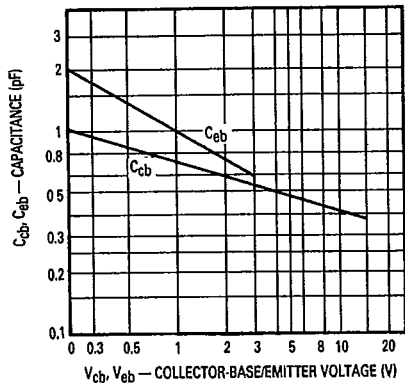


Figure 7. Junction Capacitance versus Voltage

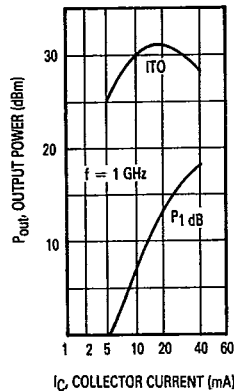


Figure 8. Typical Third Order Intercept versus Collector Current (VCE = 8 V)

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Frequency (MHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂		k
VCE = 8 V, IC = 25 mA									
100	-6.45	-35.8	24.14	116.4	-30.87	75.8	-3.93	-19.3	0.847
200	-9.83	-36.1	20.29	101.4	-25.81	77.1	-5.42	-17.4	0.974
300	-11.46	-34.1	17.08	93.8	-22.72	77.7	-5.93	-15.8	1.025
400	-12.26	-30.9	14.70	88.3	-20.48	77.6	-6.08	-15.0	1.049
500	-12.82	-27.8	12.89	84.2	-18.83	77.5	-6.15	-14.8	1.066
600	-13.02	-26.9	11.38	79.9	-17.50	76.4	-6.10	-15.6	1.077
700	-12.88	-25.3	10.15	76.4	-16.50	75.6	-6.02	-16.8	1.089
800	-12.73	-25.7	9.06	73.2	-15.57	74.6	-5.89	-18.2	1.094
900	-12.60	-26.6	7.99	69.9	-15.00	73.9	-5.71	-20.3	1.117
1000	-12.07	-27.8	7.15	67.3	-14.52	73.2	-5.54	-22.1	1.134
1100	-11.76	-32.0	6.32	64.4	-14.11	72.4	-5.35	-23.7	1.151
1200	-11.37	-33.6	5.42	61.5	-14.02	71.6	-5.17	-27.9	1.199
VCE = 8 V, IC = 5 mA									
100	-2.29	-29.5	20.86	139.7	-29.35	73.0	-1.64	-18.0	0.468
200	-5.22	-44.0	18.07	118.2	-24.93	69.4	-3.40	-23.1	0.742
300	-7.65	-50.4	15.51	105.9	-22.49	69.8	-4.47	-23.2	0.905
400	-9.52	-51.5	13.56	97.4	-20.62	70.8	-5.02	-22.7	0.995
500	-10.84	-50.4	11.81	91.4	-19.21	71.9	-5.35	-22.1	1.062
600	-11.82	-49.8	10.41	85.3	-18.07	71.9	-5.48	-22.3	1.104
700	-12.46	-46.7	9.19	81.3	-17.06	72.2	-5.53	-23.0	1.135
800	-12.81	-45.8	8.12	77.3	-16.31	72.3	-5.50	-24.2	1.162
900	-13.00	-44.5	7.21	73.4	-15.63	72.3	-5.38	-25.5	1.177
1000	-12.78	-43.2	6.33	70.3	-15.15	72.4	-5.28	-27.1	1.205
1100	-12.53	-45.4	5.54	67.0	-14.82	72.4	-5.15	-28.5	1.235
1200	-12.27	-45.4	4.66	63.9	-14.73	72.2	-4.99	-32.2	1.295

Figure 9. Common Emitter S-Parameters

Freq.	NFOPT.	Γ _S OPT.	R _n
0.3 GHz	1.3 dB	0.486 / +36°	0.78 Ω
0.5 GHz	1.6 dB	0.412 / +66°	0.130 Ω
0.7 GHz	2.0 dB	0.120 / +51°	0.720 Ω
1.0 GHz	2.7 dB	0.237 / +58°	0.8 Ω

Reflection coefficient of source and the noise resistance at optimum noise figure for VCE = 8 V, IC = 5 mA

Figure 10. Noise Parameters