

MOTOROLA
SEMICONDUCTOR
TECHNICAL DATA

T33-06

LT3046
The RF Line
NPN Silicon
High Frequency Transistor

... designed for ultra-linear communications or instrumentation applications.

- Low Noise — 2.5 dB Typ @ $f = 200$ MHz
- High Gain — $|S_{21}|^2 = 15$ dB Typ @ $f = 300$ MHz
- Low Distortion — ITO = 45 dBm Typ @ $f = 300$ MHz

 $I_C = 150$ mA
HIGH FREQUENCY
TRANSISTOR
NPN SILICON
CASE 26-03, STYLE 1
(TO-46)**MAXIMUM RATINGS**

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	20	Vdc
Collector-Base Voltage	V_{CBO}	40	Vdc
Emitter-Base Voltage	V_{EBO}	3.5	Vdc
Collector Current — Continuous	I_C	0.15	Adc
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 ($I_C = 5$ mA, $I_B = 0$)	$V_{(BR)CEO}$	20	—	—	Vdc
Collector-Base Breakdown Voltage ($I_C = 1$ mA, $I_E = 0$)	$V_{(BR)CBO}$	40	—	—	Vdc
Emitter-Base Breakdown Voltage ($I_E = 0.1$ mA, $I_C = 0$)	$V_{(BR)EBO}$	3.5	—	—	Vdc
Collector Cutoff Current ($V_{CB} = 10$ V, $I_E = 0$)	I_{CBO}	—	50	—	μ Adc

ON CHARACTERISTICS

DC Current Gain ($I_C = 50$ mA, $V_{CE} = 5$ V)	h_{FE}	70	100	300	—
Collector-Emitter Saturation Voltage ($I_C = 50$ mA, $I_C/I_B = 10$)	$V_{CE(sat)}$	—	300	—	mV

DYNAMIC CHARACTERISTICS

Collector-Base Capacitance ($V_{CB} = 10$ V, $I_E = 0$, $f = 1$ MHz)	C_{cb}	—	1.5	—	pF
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(continued)

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MOTOROLA SC (XSTRS/R F)

46E D

6367254 0094225 6 M0T6

ELECTRICAL CHARACTERISTICS — continued

Characteristic	Symbol	Min	Typ	Max	Unit
FUNCTIONAL TESTS					
Noise Figure, Minimum ($V_{CE} = 8\text{ V}$, $I_C = 25\text{ mA}$, $f = 300\text{ MHz}$)	NF_{MIN}	—	2.5	—	dB
Cutoff Frequency ($V_{CE} = 14\text{ V}$, $I_C = 40\text{ mA}$)	f_T	—	3	—	GHz
Maximum Unilateral Gain ($V_{CE} = 14\text{ V}$, $I_C = 40\text{ mA}$, $f = 300\text{ MHz}$)	G_{UMAX}	—	17.5	—	dB
Insertion Gain ($V_{CE} = 14\text{ V}$, $I_C = 40\text{ mA}$, $f = 300\text{ MHz}$)	$ S_{21} ^2$	—	15.5	—	dB
Output Power (@ 1 dB Compression ($V_{CE} = 14\text{ V}$, $I_C = 40\text{ mA}$, $f = 300\text{ MHz}$)	$P_{o1\text{ dB}}$	—	22	—	dBm
Third Order Intercept ($V_{CE} = 14\text{ V}$, $I_C = 40\text{ mA}$, $f = 300\text{ MHz}$)	ITO	—	40	—	dBm

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TYPICAL CHARACTERISTICS

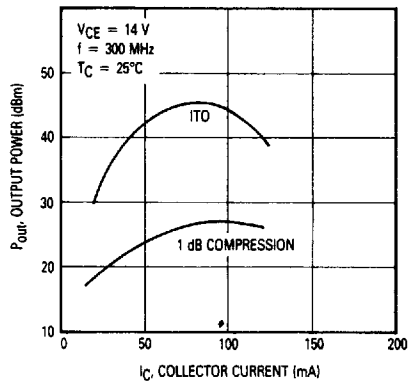


Figure 1. Third Order Intercept and 1 dB Compression versus Current

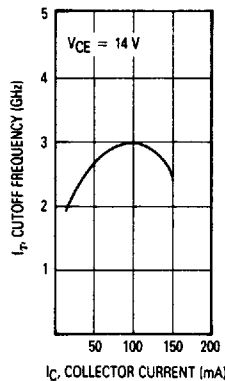


Figure 2. Gain-Bandwidth Product versus Collector Current

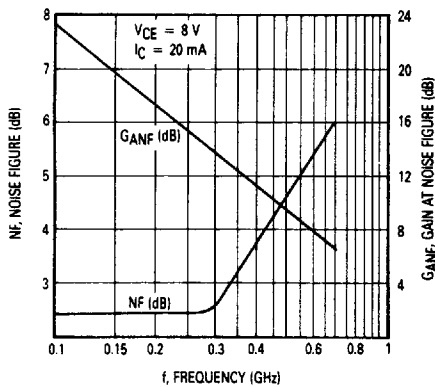
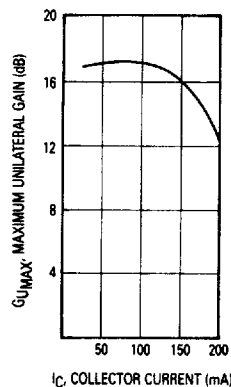


Figure 3. Noise Figure and Associated Gain versus Frequency

Figure 4. G_{UMAX} versus Collector Current

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MOTOROLA SC (XSTRS/R F) 46E D ■ 6367254 0094226 8 ■ M0T6

TYPICAL CHARACTERISTICS

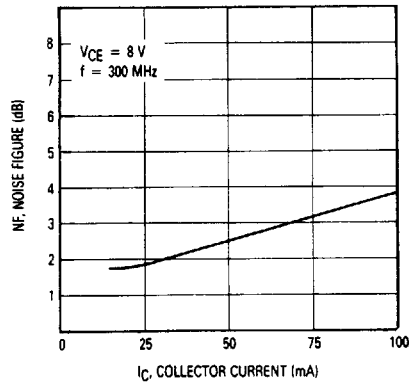


Figure 5. Noise Figure versus Collector Current

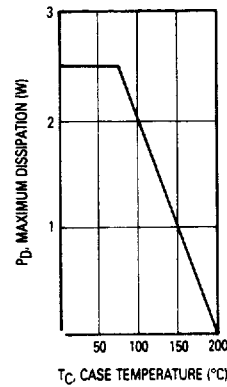


Figure 6. Dissipation versus Temperature

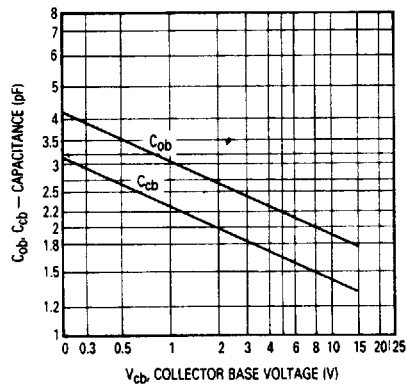


Figure 7. Junction Capacitance versus Voltage

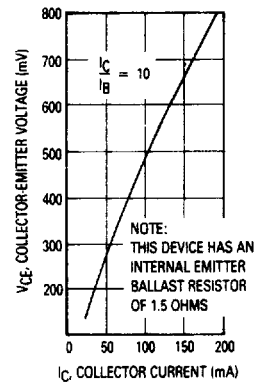


Figure 8. Collector Saturation Characteristics

VCE (Volts)	Ic (mA)	f (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
			Mag	$\angle \phi$	Mag	$\angle \phi$	Mag	$\angle \phi$	Mag	$\angle \phi$
8	20	0.1	0.47	-118	12.11	109	0.05	57	0.61	-61
		0.2	0.37	-155	6.3	90	0.07	64	0.36	-61
		0.3	0.38	-176	4.34	80	0.1	70	0.31	-71
		0.4	0.38	171	3.32	72	0.13	74	0.3	-76
		0.5	0.39	155	2.68	65	0.16	76	0.29	-89
		0.6	0.41	147	2.3	60	0.19	77	0.28	-96
		0.7	0.4	136	2.02	55	0.23	78	0.32	-106
		0.8	0.42	128	1.83	49	0.27	76	0.31	-126
		0.9	0.44	120	1.65	44	0.32	75	0.32	-136
		1	0.42	110	0.66	40	0.36	74	0.4	-147
14	40	0.1	0.61	-114	15.24	115	0.04	57	0.54	-61
		0.2	0.58	-146	8.48	97	0.05	64	0.38	-61
		0.3	0.59	-160	5.88	59	0.06	70	0.34	-71
		0.4	0.58	-168	4.45	81	0.07	74	0.33	-76
		0.5	0.59	-174	3.56	75	0.08	76	0.33	-89
		0.6	0.65	-179	2.98	70	0.09	77	0.34	-96
		0.7	0.59	177	2.61	65	0.1	78	0.37	-106
		0.8	0.59	173	2.28	61	0.11	76	0.39	-126
		0.9	0.6	169	2.04	57	0.13	75	0.41	-136
		1	0.61	164	1.83	54	0.14	74	0.43	-147

Figure 9. Common Emitter S-Parameters