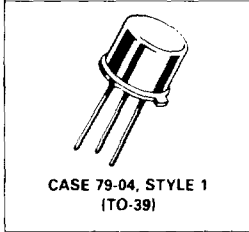


2

The RF Line
NPN Silicon
High Frequency Transistor

LT1001A

$I_C = 200$ mA
HIGH FREQUENCY
TRANSISTOR
NPN SILICON



... designed for ultra-linear communications or instrumentation applications. Low noise figure combined with high-output capability gives this device an exceptional dynamic range. Gold metallization and diffused emitter ballasting are combined to achieve the high reliability demanded by the most severe communications requirements. High gain makes this transistor ideal for broadband applications.

- Low Noise — 2.5 dB Typ @ $f = 300$ MHz
- High Gain — $|S_{21}|^2$ Typ = 13.5 dB @ $f = 300$ MHz
- Low Distortion — ITO = 45 dBm Typ @ $f = 300$ MHz
- Gold Metallization
- Diffused Ballast Resistors

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	200	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
----------------	--------	-----	-----	-----	------

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, $I_B = 5$ mA)	$V_{CE(sat)}$	—	500	—	mV

DYNAMIC CHARACTERISTICS

Collector-Base Capacitance ($V_{CB} = 10$ V, $I_E = 0$, $f = 1$ MHz)	C_{cb}	—	1.6	—	pF
--	----------	---	-----	---	----

(continued)

LT1001A

ELECTRICAL CHARACTERISTICS — continued

Characteristic	Symbol	Min	Typ	Max	Unit
FUNCTIONAL TESTS					
Noise Figure, Minimum ($V_{CE} = 8\text{ V}$, $I_C = 50\text{ mA}$, $f = 300\text{ MHz}$)	NF _{MIN}	—	2.5	—	dB
Cutoff Frequency ($V_{CE} = 14\text{ V}$, $I_C = 90\text{ mA}$)	f_T	—	3	—	GHz
Maximum Unilateral Gain ($V_{CE} = 14\text{ V}$, $I_C = 90\text{ mA}$, $f = 300\text{ MHz}$)	G_{UMAX}	—	15	—	dB
Insertion Gain ($V_{CE} = 14\text{ V}$, $I_C = 90\text{ mA}$, $f = 300\text{ MHz}$)	$ S_{21} ^2$	—	13.5	—	dB
Output Power (w/ 1 dB Compression ($V_{CE} = 14\text{ V}$, $I_C = 90\text{ mA}$, $f = 300\text{ MHz}$))	$P_{O1\text{ dB}}$	—	26	—	dBm
Third Order Intercept ($V_{CE} = 14\text{ V}$, $I_C = 90\text{ mA}$, $f = 300\text{ MHz}$)	ITO	—	45	—	dBm

2

TYPICAL CHARACTERISTICS

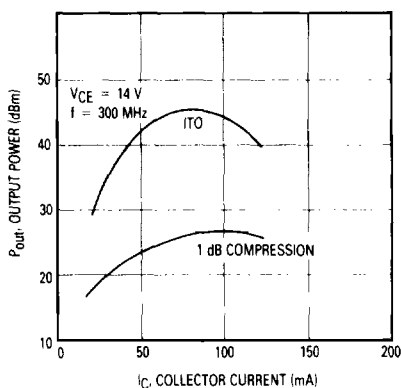


Figure 1. Third Order Intercept and 1 dB Compression versus Current

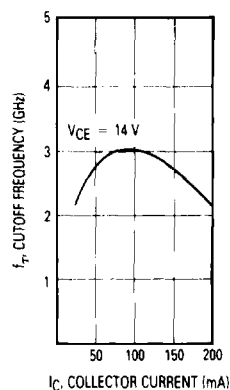


Figure 2. Gain-Bandwidth Product versus Collector Current

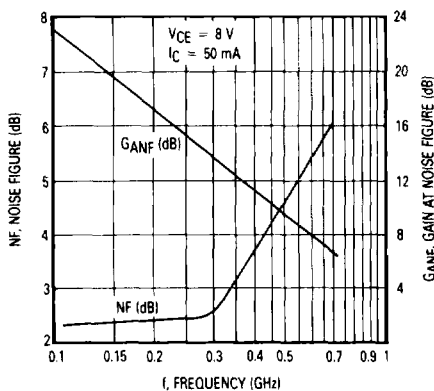


Figure 3. Noise Figure and Associated Gain versus Frequency

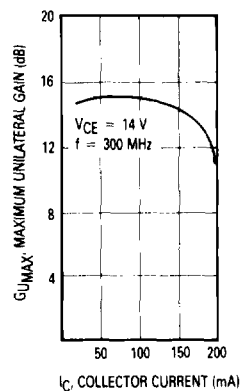


Figure 4. G_{UMAX} versus Collector Current

LT1001A

2

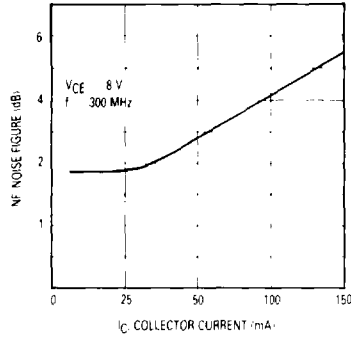


Figure 5. Noise Figure versus Collector Current

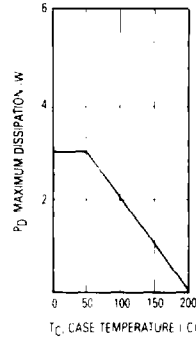


Figure 6. Dissipation versus Temperature

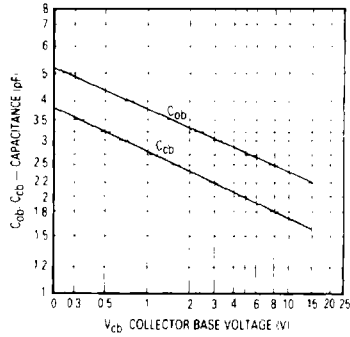


Figure 7. Junction Capacitance versus Voltage

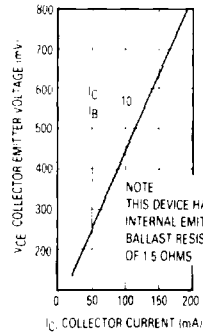


Figure 8. Collector Saturation Characteristics

VCE (Volts)	IC (mA)	f (GHz)	S11		S21		S12		S22	
			Mag	ϕ	Mag	ϕ	Mag	ϕ	Mag	ϕ
8	50	0.1	0.44	132	12.52	101	0.05	59	0.44	78
		0.2	0.35	168	6.32	85	0.08	66	0.26	86
		0.3	0.35	175	4.31	76	0.12	69	0.23	94
		0.4	0.36	161	3.28	68	0.15	70	0.23	103
		0.5	0.36	146	2.67	61	0.19	70	0.24	110
		0.6	0.37	136	2.28	55	0.23	69	0.26	120
		0.7	0.37	124	2.02	50	0.27	68	0.29	127
		0.8	0.36	114	1.81	44	0.3	66	0.32	136
		0.9	0.36	105	1.64	39	0.34	65	0.34	144
		1	0.35	94	1.52	35	0.38	63	0.65	152
14	90	0.1	0.41	127	13.58	103	0.04	58	0.46	48
		0.2	0.38	158	7.14	86	0.06	63	0.38	57
		0.3	0.39	173	4.85	76	0.08	66	0.39	66
		0.4	0.38	178	3.65	67	0.1	67	0.42	75
		0.5	0.39	174	3.02	61	0.13	70	0.43	79
		0.6	0.39	168	2.54	56	0.15	71	0.46	85
		0.7	0.39	161	2.2	49	0.17	70	0.49	92
		0.8	0.39	156	1.91	44	0.19	71	0.53	96
		0.9	0.39	150	1.69	38	0.22	70	0.57	102
		1	0.4	144	1.53	34	0.24	70	0.59	105

Figure 9. Common Emitter S-Parameters