

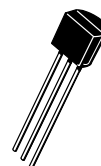
The RF Line NPN Silicon High-Frequency Transistors

The LP1001 is designed for CATV and other Broadband linear applications. This Motorola series of small-signal plastic transistors offers superior quality and performance at low cost.

- High Current Gain–Bandwidth Product
 $f_T = 5 \text{ GHz (Typ) @ } I_C = 10 \text{ mAdc}$
- High Power Gain
 $G_{pe} = 12.5 \text{ dB (Typ) @ } 1 \text{ GHz}$
- Low Noise Figure
 $NF = 3 \text{ dB (Typ) @ } 1 \text{ GHz}$
- Low Feedback Capacitance
 $C_{ob} = 0.5 \text{ pF (Typ) @ } V_{CB} = 10 \text{ Volts}$

**LP1001
LP1001A**

**LOW NOISE
HIGH-FREQUENCY
TRANSISTORS**



**CASE 29-04, STYLE 2
TO-226AA
(TO-92)**

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Base Voltage	V_{CEO}	15	Vdc
Collector–Base Voltage	V_{CBO}	20	Vdc
Emitter–Base Voltage	V_{EBO}	2	Vdc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$	P_D	625	mW

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance — Junction to Ambient	$R_{\theta JA}$	200	$^\circ\text{C/W}$
— Junction to Case	$R_{\theta JC}$	83.3	

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Collector–Emitter Breakdown Voltage ($I_C = 1 \text{ mA}, I_E = 0$)	$V_{(BR)CEO}$	15	—	—	Vdc
Collector–Base Breakdown Voltage ($I_C = 0.1 \text{ mA}, I_E = 0$)	$V_{(BR)CBO}$	20	—	—	Vdc
Emitter–Base Breakdown Voltage ($I_E = 10 \mu\text{A}, I_C = 0$)	$V_{(BR)EBO}$	2	—	—	Vdc
Collector Cutoff Current ($V_{CB} = 10 \text{ Vdc}, I_E = 0$)	I_{CBO}	—	—	50	nA

ON CHARACTERISTICS

DC Current Gain ($I_C = 10 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}$)	LP1001 LP1001A	h_{FE}	25 50	80 —	— —
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(continued)

ELECTRICAL CHARACTERISTICS — continued ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
DYNAMIC CHARACTERISTICS					
Collector–Base Capacitance ($V_{CB} = 10\text{ Vdc}$, $I_E = 0$, $f = 1\text{ MHz}$)	C_{ob}	—	—	0.7	pF
Current Gain–Bandwidth Product ($V_{CE} = 10\text{ Vdc}$, $I_C = 10\text{ mAdc}$, $f = 500\text{ MHz}$)	f_{τ}	—	5	—	GHz
FUNCTIONAL TESTS					
Gain @ Noise Figure ($I_C = 10\text{ mAdc}$, $V_{CE} = 10\text{ Vdc}$)	G_{NF}	$f = 500\text{ MHz}$	14	—	dB
		$f = 1\text{ GHz}$	12.5	—	
Noise Figure ($I_C = 10\text{ mAdc}$, $V_{CE} = 10\text{ Vdc}$)	NF	$f = 500\text{ MHz}$	2.7	—	dB
		$f = 1\text{ GHz}$	3.2	—	

V_{CE}	I_C	f	S_{11}		S_{21}		S_{12}		S_{22}	
(Volts)	(mA)	(MHz)	$ S_{11} $	$\angle \phi$	$ S_{21} $	$\angle \phi$	$ S_{12} $	$\angle \phi$	$ S_{22} $	$\angle \phi$
10	3	100	0.75	–25	8.56	152	0.03	70	0.94	–12
		200	0.61	–47	7.06	132	0.05	62	0.84	–21
		300	0.47	–61	5.79	116	0.07	60	0.75	–25
		400	0.37	–74	4.81	105	0.08	58	0.70	–28
		500	0.30	–84	4.11	96	0.09	58	0.66	–30
		600	0.22	–94	3.51	86	0.10	58	0.63	–31
		700	0.16	–155	3.15	78	0.11	57	0.59	–34
		800	0.16	–128	2.85	72	0.13	55	0.57	–38
		900	0.12	–144	2.60	67	0.14	53	0.56	–41
		1000	0.12	–169	2.41	61	0.15	52	0.53	–44
		1100	0.12	179	2.26	56	0.17	51	0.52	–51
		1200	0.12	155	2.10	54	0.18	51	0.52	–51
10	10	100	0.48	–36	16.23	137	0.02	69	0.82	–18
		200	0.33	–55	10.98	115	0.04	68	0.68	–23
		300	0.22	–62	8.05	102	0.06	68	0.60	–25
		400	0.16	–70	6.33	93	0.07	67	0.57	–26
		500	0.12	–73	5.21	87	0.09	68	0.55	–27
		600	0.07	–72	4.39	81	0.10	67	0.53	–27
		700	0.04	–117	3.89	74	0.12	64	0.50	–29
		800	0.04	–142	3.45	67	0.13	61	0.48	–34
		900	0.02	–169	3.14	63	0.14	60	0.47	–37
		1000	0.05	127	2.87	58	0.16	58	0.45	–41
		1100	0.06	130	2.68	53	0.18	56	0.44	–47
		1200	0.08	112	2.49	52	0.19	54	0.44	–47

Table 1. Common Emitter S–Parameters

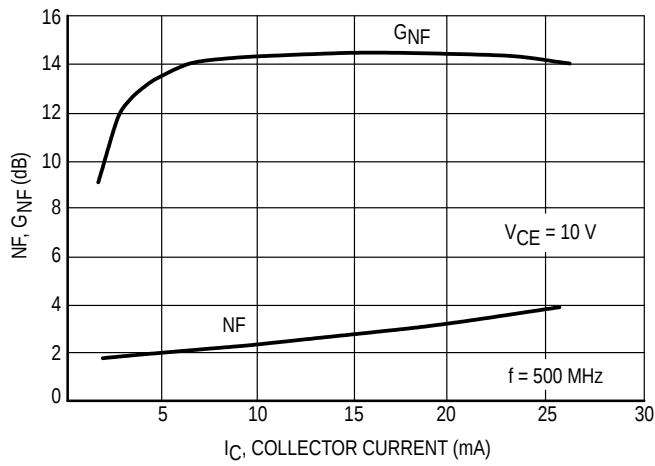


Figure 1. Gain at Noise Figure and Noise Figure versus Collector Current

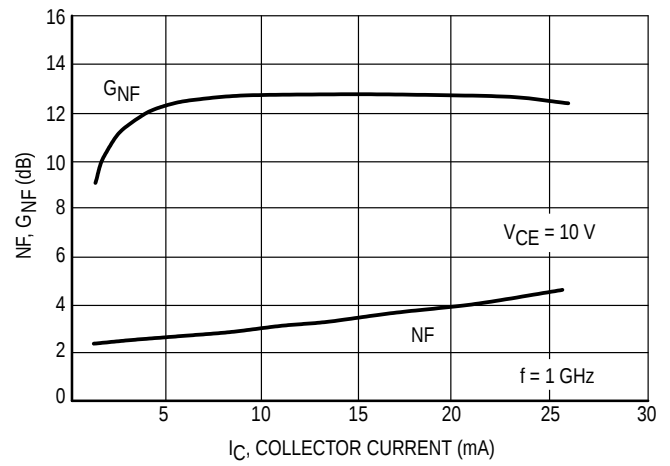


Figure 2. Gain at Noise Figure and Noise Figure versus Collector Current

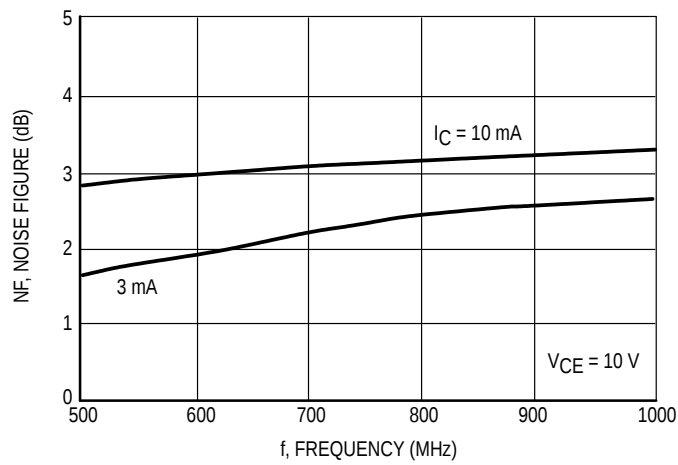
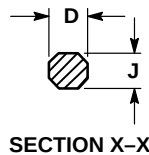
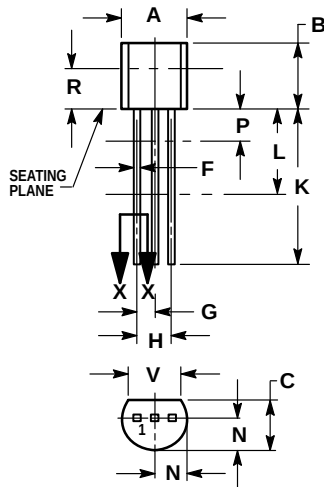


Figure 3. Noise Figure versus Frequency

PACKAGE DIMENSIONS



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. DIMENSION F APPLIES BETWEEN P AND L. DIMENSION D AND J APPLY BETWEEN L AND K MINIMUM. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.175	0.205	4.45	5.20
B	0.170	0.210	4.32	5.33
C	0.125	0.165	3.18	4.19
D	0.016	0.022	0.41	0.55
F	0.016	0.019	0.41	0.48
G	0.045	0.055	1.15	1.39
H	0.095	0.105	2.42	2.66
J	0.015	0.020	0.39	0.50
K	0.500	—	12.70	—
L	0.250	—	6.35	—
N	0.080	0.105	2.04	2.66
P	—	0.100	—	2.54
R	0.115	—	2.93	—
V	0.135	—	3.43	—

STYLE 2:

- PIN 1. BASE
- EMITTER
- COLLECTOR

**CASE 29-04
ISSUE AD**

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LP1001/D

