

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 @ $T_A = 25^\circ\text{C}$	PD	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 ($I_C = 1 \text{ mA}, I_B = 0$)	$V_{(BR)CEO}$	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)

REV 1

LP1001 LP1001A
2-56

MOTOROLA RF DEVICE DATA

6367254 0106422 772

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_t	—	5	—	GHz	
FUNCTIONAL TESTS						
Gain @ Noise Figure ($I_C = 10\text{ mAdc}$, $V_{CE} = 10\text{ Vdc}$)	GNF	$f = 500\text{ MHz}$	—	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} (Volts)	I_C (mA)	f (MHz)	S_{11}		S_{21}		S_{12}		S_{22}	
			$ 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

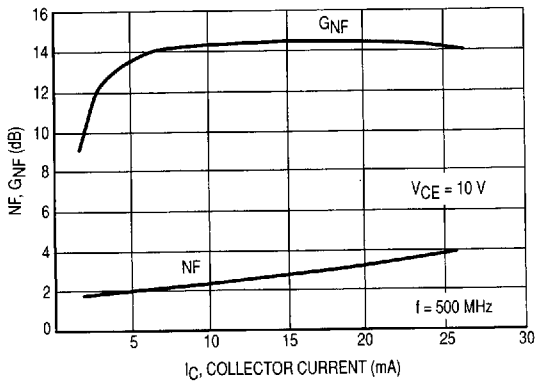


Figure 1. Gain at Noise Figure and Noise Figure versus Collector Current

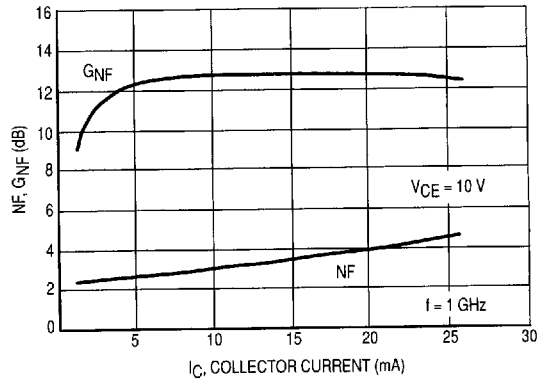


Figure 2. Gain at Noise Figure and Noise Figure versus Collector Current

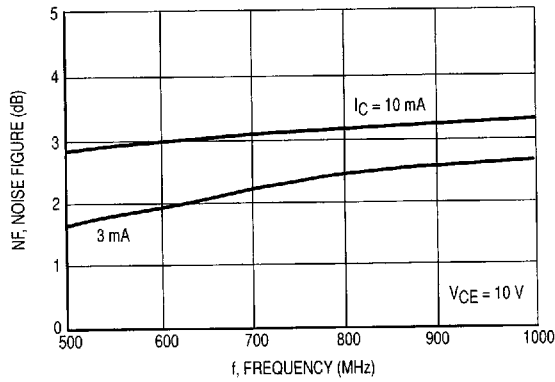


Figure 3. Noise Figure versus Frequency