

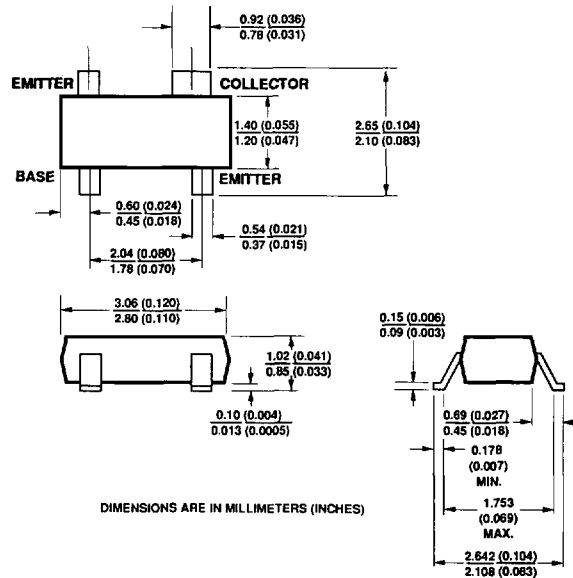
Features

- 11 dB Typical P_{1dB} at 2.0 GHz
- 11.5 dB Typical G_{1dB} at 2.0 GHz
- 1.8 dB typical NF_o at 1.0 GHz
- High Gain-Bandwidth Product: 7.0 GHz Typical f_T
- Low Cost Surface Mount Plastic Package
- Tape-and-Reel Package Option Available¹

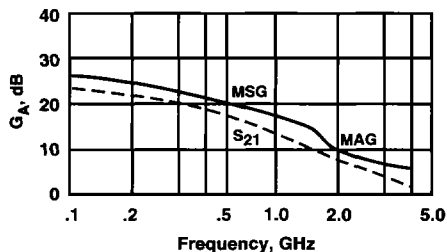
Description

The AT-00511 is a low cost NPN silicon bipolar transistor housed in the surface mount plastic SOT-143 package. This device is designed for use in low noise, wideband amplifier and oscillator applications operating over VHF, UHF and microwave frequencies.

Excellent device uniformity, performance and reliability are produced by the use of ion-implantation, self-alignment techniques, and gold metallization in the fabrication of these devices.

SOT-143 Plastic Package


**Insertion Power Gain, Maximum Available
Gain and Maximum Stable Gain vs. Frequency**
 $V_{CE} = 8V, I_C = 5mA$



Typical Noise Parameters: $V_{CE} = 8V, I_C = 10mA$

FREQ GHz	NF_o dB	Γ_{OPT} MAG	ANG	R/NZ_o -
0.1	1.3	.50	4	0.45
0.5	1.4	.46	19	0.44
1.0	1.8	.37	38	0.42
2.0	2.7	.22	87	0.37
4.0	4.4	.20	-154	0.42

Electrical Specifications, $T_A = 25^\circ C$

Symbol	Parameters and Test Conditions	Units	Min.	Typ.	Max.
$ S_{21} ^2$	Insertion Power Gain: $V_{CE} = 8V, I_C = 5mA$ $f = 1.0\text{ GHz}$	dB	11.0	12.5	
	$f = 2.0\text{ GHz}$			7.2	
P_{1dB}	Power Output @ 1 dB Compression: $V_{CE} = 8V, I_C = 15mA$ $f = 2.0\text{ GHz}$	dBm		11.0	
G_{1dB}	1 dB Compressed Gain: $V_{CE} = 8V, I_C = 15mA$ $f = 2.0\text{ GHz}$	dB		11.5	
NF_o	Optimum Noise Figure: $V_{CE} = 8V, I_C = 5mA$ $f = 1.0\text{ GHz}$	dB		1.8	
G_A	Gain @ NF_o : $V_{CE} = 8V, I_C = 10mA$ $f = 1.0\text{ GHz}$	dB		11.0	
f_T	Gain Bandwidth Product: $V_{CE} = 8V, I_C = 15mA$	GHz		7.0	
h_{FE}	Forward Current Transfer Ratio: $V_{CE} = 8V, I_C = 20mA$		30	150	300
I_{CBO}	Collector Cutoff Current: $V_{CB} = 8V$	μA			0.2
I_{EBO}	Emitter Cutoff Current: $V_{EB} = 1V$	μA			1.0

Notes: 1. Refer to PACKAGING Section of Data Book, "Tape-and-Reel Packaging for Semiconductor Devices."

AT-00511
Low Noise Silicon Bipolar Transistor

Absolute Maximum Ratings

Parameter	Symbol	Absolute Maximum ¹
Emitter-Base Voltage	V_{EBO}	1.5 V
Collector-Base Voltage	V_{CBO}	20 V
Collector-Emitter Voltage	V_{CEO}	12 V
Collector Current	I_C	50 mA
Power Dissipation ^{2,3}	P_T	230 mW
Junction Temperature	T_J	150°C
Storage Temperature	T_{STG}	-65°C to 150°C

Thermal Resistance^{2,4}: $\theta_{jc}=530^\circ\text{C/W}$

Notes:

1. Operation of this device above any one of these parameters may cause permanent damage.
2. $T_{case} = 25^\circ\text{C}$
3. Derate at 1.9 mW/°C for $T_C > 28^\circ\text{C}$
4. See MEASUREMENTS section of DATA BOOK for more information

Part Number Order Information

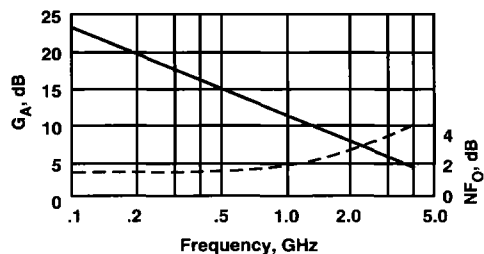
Part Number	Devices Per Reel	Reel Size
AT-00511-TR1	3000	7"
AT-00511-TR2	10000	13"

For more information, see "Tape and Reel Packaging for Semiconductor Devices", page 14-14.

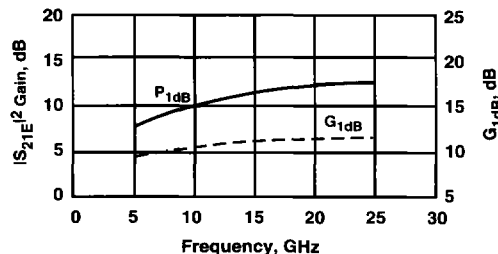
Typical Performance, $T_A = 25^\circ\text{C}$

(Unless otherwise noted)

Noise Figure and Associated Gain vs. Frequency
 $V_{CE} = 8\text{V}, I_C = 5\text{mA}$



Output Power and 1dB Compressed Gain vs. Collector Current
 $V_{CE} = 8\text{V}, f = 2\text{GHz}$



Typical Scattering Parameters: Common Source, $Z_0 = 50 \Omega$

$T_A = 25^\circ\text{C}, V_{CE} = 8\text{V}, I_C = 5\text{mA}$

Freq. GHz	S_{11}		S_{21}			S_{12}			S_{22}	
	Mag	Ang	dB	Mag	Ang	dB	Mag	Ang	Mag	Ang
0.1	.88	-28	22.76	13.73	159	-31.42	.027	79	.95	-15
0.5	.59	-100	17.52	7.52	110	-23.12	.070	43	.60	-43
1.0	.45	-138	12.54	4.23	85	-20.73	.092	41	.47	-52
1.5	.40	-162	9.45	2.97	69	-19.12	.111	42	.45	-57
2.0	.38	178	7.25	2.30	56	-17.70	.130	41	.44	-62
2.5	.39	163	5.60	1.91	47	-16.69	.146	44	.44	-65
3.0	.41	147	4.19	1.62	36	-15.75	.163	44	.43	-73
3.5	.46	136	2.88	1.39	25	-14.81	.182	39	.43	-83
4.0	.49	127	1.73	1.22	15	-13.95	.201	37	.44	-94

Typical Scattering Parameters: Common Source, $Z_0 = 50 \Omega$

$T_A = 25^\circ\text{C}, V_{CE} = 8\text{V}, I_C = 15\text{mA}$

Freq. GHz	S_{11}		S_{21}			S_{12}			S_{22}	
	Mag	Ang	dB	Mag	Ang	dB	Mag	Ang	Mag	Ang
0.1	.71	-51	28.12	25.48	147	-33.11	.022	70	.85	-25
0.5	.49	-136	19.56	9.51	99	-26.28	.049	50	.41	-50
1.0	.43	-166	14.00	5.01	80	-22.83	.072	52	.34	-54
1.5	.41	176	10.72	3.43	67	-20.61	.093	53	.34	-58
2.0	.41	160	8.41	2.63	55	-18.27	.122	54	.35	-64
2.5	.42	149	6.68	2.16	48	-16.70	.146	53	.35	-68
3.0	.45	137	5.21	1.82	38	-15.56	.167	52	.34	-76
3.5	.48	127	3.94	1.57	28	-14.45	.189	49	.35	-89
4.0	.51	119	2.75	1.37	20	-13.45	.213	45	.36	-99