



AT-41486
Up to 6 GHz Low Noise
Silicon Bipolar Transistor

T-31-21

Features

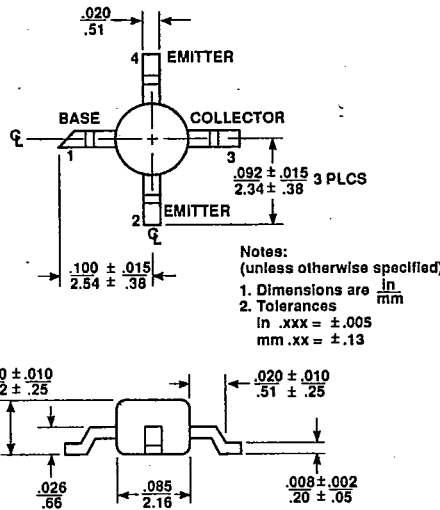
- Low Noise Figure: 1.4 dB typical at 1.0 GHz
1.7 dB typical at 2.0 GHz
- High Associated Gain: 18.0 dB typical at 1.0 GHz
13.0 dB typical at 2.0 GHz
- High Gain-Bandwidth Product: 8.0 GHz typical f_T
- Surface Mount Plastic Package
- Tape-and-Reel Packaging Option Available*

Description

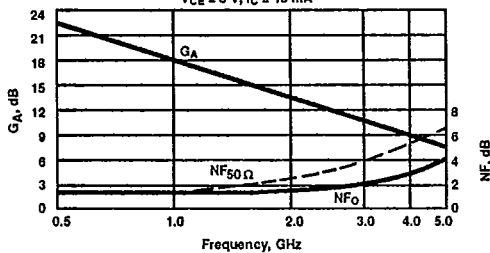
Avantek's AT-41486 is a high performance NPN silicon bipolar transistor housed in a low cost, surface mount plastic package. This device is designed for use in low noise, wide band amplifier and oscillator applications operating over VHF, UHF and microwave frequencies.

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.

Avantek 86 Plastic Package



NOISE FIGURE AND ASSOCIATED GAIN
vs. FREQUENCY
 $V_{CE} = 8\text{ V}, I_C = 10\text{ mA}$



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

Freq. GHz	NF ₀ dB	Gamma Opt Mag	Ang	R _N /50
0.1	1.3	.12	3	0.17
0.5	1.3	.10	16	0.17
1.0	1.4	.04	43	0.16
2.0	1.7	.12	-145	0.16
4.0	3.0	.44	-99	0.40

Electrical Specifications, T_A = 25°C

Symbol	Parameters and Test Conditions	Units	Min.	Typ.	Max.
NF ₀	Optimum Noise Figure: $V_{CE} = 8\text{ V}, I_C = 10\text{ mA}$	dB		1.4	1.8
GA	Gain @ NF ₀ : $V_{CE} = 8\text{ V}, I_C = 10\text{ mA}$	$f = 1.0\text{ GHz}$		17.0	18.0
		$f = 2.0\text{ GHz}$			13.0
		$f = 4.0\text{ GHz}$			9.0
$ S_{21E} ^2$	Insertion Power Gain: $V_{CE} = 8\text{ V}, I_C = 25\text{ mA}$	dB		17.5	
P ₁ dB	Power Output @ 1 dB Gain Compression: $V_{CE} = 8\text{ V}, I_C = 25\text{ mA}$	dBm		18.0	
G ₁ dB	1 dB Compressed Gain: $V_{CE} = 8\text{ V}, I_C = 25\text{ mA}$	dB		13.5	
f_T	Gain Bandwidth Product: $V_{CE} = 8\text{ V}, I_C = 25\text{ mA}$	GHz		8.0	
hFE	Forward Current Transfer Ratio: $V_{CE} = 8\text{ V}, I_C = 10\text{ mA}$		30	150	300
I _{CBO}	Collector Cutoff Current: $V_{CB} = 8\text{ V}$	μA			0.2
I _{EBO}	Emitter Cutoff Current: $V_{EB} = 1\text{ V}$	μA			1.0
CCB	Collector Base Capacitance ² : $V_{CB} = 8\text{ V}, f = 1\text{ MHz}$	pF		0.25	

Notes: 1. Refer to PACKAGING section "Tape-and-Reel Packaging for Surface Mount Semiconductors".
2. For this test, the emitter is grounded.

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Absolute Maximum Ratings

Parameter	Symbol	Absolute Maximum ¹
Emitter-Base Voltage	VEBO	1.5 V
Collector-Base Voltage	VCBO	20 V
Collector-Emitter Voltage	VCEO	12 V
Collector Current	IC	60 mA
Power Dissipation ^{2,3}	PT	500 mW
Junction Temperature	TJ	150°C
Storage Temperature	TSTG	-65°C to 150°C

Thermal Resistance^{2,4}: $\theta_{JC} = 165^\circ\text{C/W}$

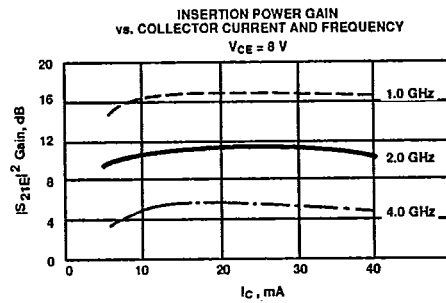
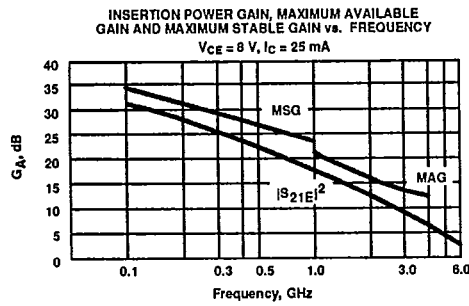
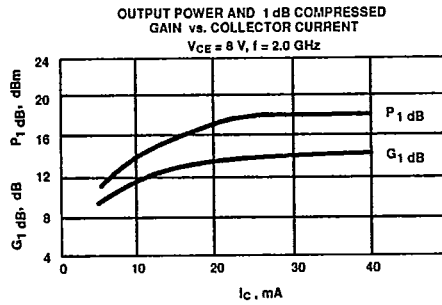
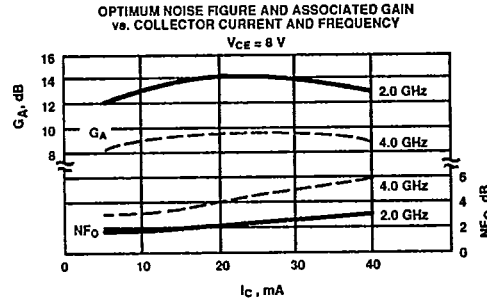
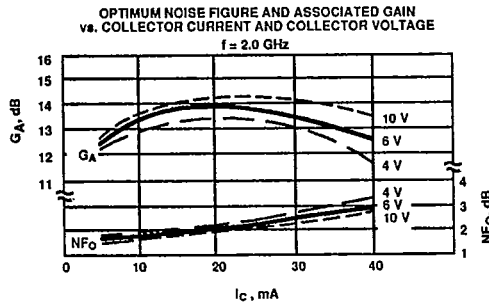
Notes:

1. Operation of this device above any one of these parameters may cause permanent damage.
2. TCASE = 25°C.
3. Derate at 6 mW/°C for TC > 68°C.
4. See MEASUREMENTS section "Thermal Resistance" for more information.

Part Number Ordering Information

Part Number	Devices Per Reel	Reel Size
AT-41486-TR1	1000	7"
AT-41486-TR2	4000	13"

Typical Performance, TA = 25°C
(unless otherwise noted)



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

$T_A = 25^\circ\text{C}$, $V_{CE} = 8 \text{ V}$, $I_C = 10 \text{ mA}$

Freq. GHz	S ₁₁		dB	S ₂₁		dB	S ₁₂		S ₂₂	
	Mag	Ang		Mag	Ang		Mag	Ang	Mag	Ang
0.1	.74	-38	28.1	25.46	157	-39.6	.011	68	.94	-12
0.5	.59	-127	22.0	12.63	107	-30.2	.031	47	.60	-29
1.0	.56	-168	16.8	6.92	84	-27.7	.041	46	.49	-29
1.5	.57	169	13.5	4.72	69	-26.2	.049	49	.45	-32
2.0	.62	152	11.1	3.61	56	-24.8	.058	43	.42	-39
2.5	.63	142	9.3	2.91	47	-23.4	.068	52	.40	-42
3.0	.64	130	7.6	2.41	37	-22.2	.078	52	.39	-50
3.5	.68	122	6.3	2.06	26	-20.6	.093	51	.37	-60
4.0	.71	113	5.1	1.80	16	-19.5	.106	48	.35	-70
4.5	.74	105	4.0	1.59	7	-18.0	.125	48	.35	-84
5.0	.77	99	3.1	1.42	-4	-17.2	.139	43	.35	-98
5.5	.79	93	2.0	1.27	-13	-16.3	.153	38	.35	-114
6.0	.81	87	1.1	1.13	-22	-15.4	.170	34	.35	-131

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

0.1	.50	-75	32.0	40.01	142	-41.3	.009	54	.85	-17
0.5	.55	-158	23.2	14.38	97	-34.1	.020	48	.51	-24
1.0	.57	177	17.5	7.50	78	-29.9	.032	61	.46	-24
1.5	.57	161	14.1	5.07	65	-27.3	.043	62	.44	-28
2.0	.59	148	11.5	3.75	53	-24.8	.058	59	.43	-35
2.5	.61	139	9.6	3.02	45	-22.9	.072	58	.40	-41
3.0	.65	128	8.0	2.52	34	-21.6	.083	57	.38	-49
3.5	.70	121	6.7	2.17	24	-20.1	.099	56	.36	-59
4.0	.74	113	5.7	1.92	14	-18.8	.115	52	.34	-72
4.5	.78	107	4.7	1.72	3	-17.6	.132	47	.32	-87
5.0	.78	102	3.7	1.53	-8	-16.6	.149	42	.31	-106
5.5	.78	96	2.7	1.36	-19	-15.4	.169	36	.31	-125
6.0	.76	91	1.6	1.21	-29	-14.5	.188	31	.33	-144

A model for this device is available in the DEVICE MODELS section.