

T-31-19

Features

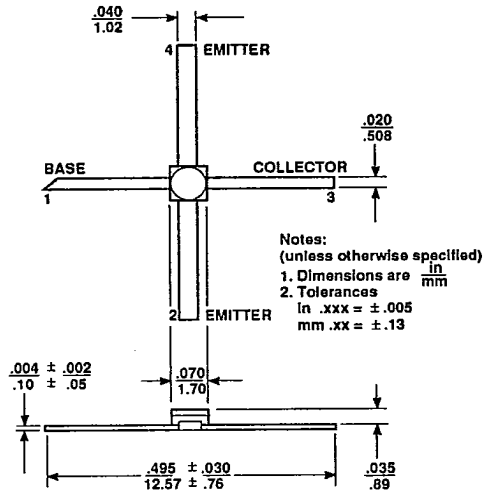
- Low Bias Current Operation:
- Low Noise Figure: 1.8 dB typical at 2.0 GHz
2.8 dB typical at 4.0 GHz
- High Associated Gain: 12.5 dB typical at 2.0 GHz
8.0 dB typical at 4.0 GHz
- High Gain-Bandwidth Product: 8.0 GHz typical f_T
- Hermetic Gold-ceramic Microstrip Package

Description

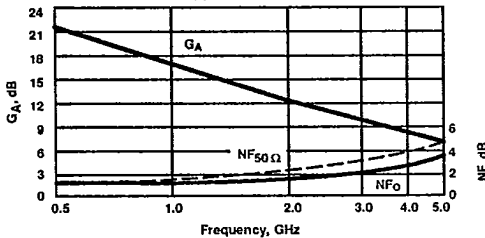
Avantek's AT-60570 is a high performance NPN silicon bipolar transistor housed in a hermetic, high reliability package. This device is designed for use in low noise, wide band amplifier and oscillator applications operating over VHF, UHF and micro-wave frequencies.

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 70 mil Package



NOISE FIGURE AND ASSOCIATED GAIN
vs. FREQUENCY
 $V_{CE} = 8\text{ V}, I_C = 2\text{ mA}$



Noise Parameters: $V_{CE} = 8\text{ V}, I_C = 2\text{ mA}$

Freq. GHz	NF ₀ dB	Gamma Mag	Opt Ang	R _N /50
1.0	1.4	.54	48	0.20
2.0	1.8	.44	98	0.28
4.0	2.8	.40	180	0.28

Electrical Specifications, $T_A = 25^\circ\text{C}$

Symbol	Parameters and Test Conditions	Units	Min.	Typ.	Max.
NF ₀	Optimum Noise Figure: $V_{CE} = 8\text{ V}, I_C = 2\text{ mA}$	dB			2.1
	$f = 1.0\text{ GHz}$				
	$f = 2.0\text{ GHz}$				
GA	Gain @ NF ₀ : $V_{CE} = 8\text{ V}, I_C = 2\text{ mA}$	dB	11.0	16.5	
	$f = 2.0\text{ GHz}$				
	$f = 4.0\text{ GHz}$				
S _{21E} ²	Insertion Power Gain: $V_{CE} = 8\text{ V}, I_C = 10\text{ mA}$	dB		12.0	6.5
	$f = 4.0\text{ GHz}$				
P ₁ dB	Power Output @ 1 dB Gain Compression: $V_{CE} = 8\text{ V}, I_C = 10\text{ mA}$	dBm		16.0	
G ₁ dB	1 dB Compressed Gain: $V_{CE} = 8\text{ V}, I_C = 10\text{ mA}$	dB		12.5	
f_T	Gain Bandwidth Product: $V_{CE} = 8\text{ V}, I_C = 10\text{ mA}$	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
C _{CB}	Collector Base Capacitance ¹ : $V_{CB} = 8\text{ V}, f = 1\text{ MHz}$	pF		0.15	

Note: 1. For this test the emitter is grounded.

Absolute Maximum Ratings

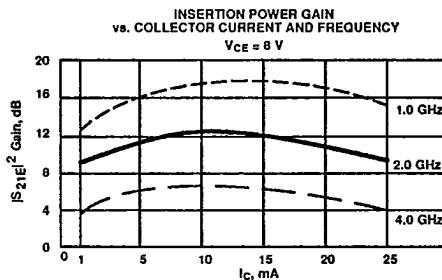
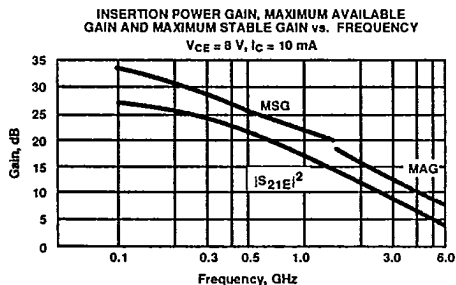
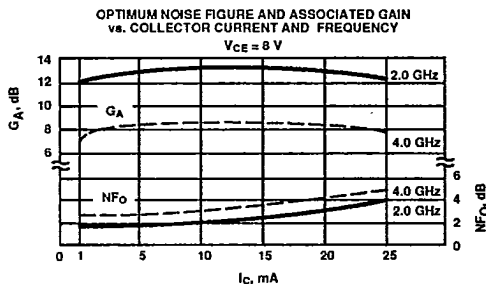
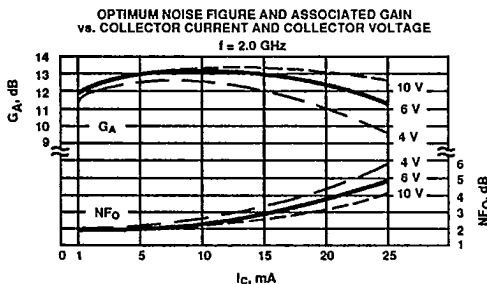
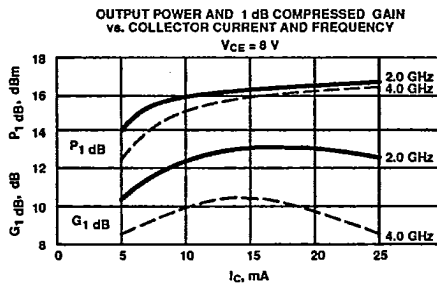
Parameter	Symbol	Absolute Maximum ¹
Emitter-Base Voltage	VEBO	1.5 V
Collector-Base Voltage	VCBO	20 V
Collector-Emitter Voltage	VCEO	12 V
Collector Current	IC	40 mA
Power Dissipation ^{2,3}	PT	400 mW
Junction Temperature	TJ	200°C
Storage Temperature	TSTG	-65°C to 200°C
Thermal Resistance ^{2,4} : $\theta_{JC} = 200^\circ\text{C/W}$		

Notes:

1. Operation of this device above any one of these parameters may cause permanent damage.
2. TCASE = 25°C.
3. Derate at 5 mW/°C for TC > 120°C.
4. The small spot size of this technique results in a higher, though more accurate determination of θ_{JC} than do alternate methods. See MEASUREMENTS section "Thermal Resistance" for more information.

Typical Performance, TA = 25°C

(unless otherwise noted)



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

$T_A = 25^\circ\text{C}$, $V_{CE} = 8 \text{ V}$, $I_C = 2 \text{ mA}$

Freq. GHz	S ₁₁		S ₂₁			S ₁₂			S ₂₂	
	Mag	Ang	dB	Mag	Ang	dB	Mag	Ang	Mag	Ang
0.1	.95	-10	16.6	6.74	171	-38.4	.012	86	.99	-4
0.5	.86	-48	15.3	5.81	141	-27.2	.044	63	.92	-19
1.0	.72	-83	12.8	4.38	113	-23.0	.070	43	.81	-30
1.5	.62	-108	10.7	3.42	95	-22.0	.080	35	.74	-37
2.0	.56	-128	8.8	2.75	80	-21.2	.088	28	.70	-43
2.5	.52	-141	7.4	2.34	72	-20.6	.094	28	.67	-44
3.0	.51	-153	6.1	2.02	61	-20.8	.092	27	.66	-51
3.5	.51	-164	4.9	1.75	50	-20.4	.095	24	.67	-58
4.0	.49	-172	3.8	1.55	40	-20.0	.099	25	.67	-65
4.5	.48	-179	2.8	1.38	31	-19.8	.102	22	.69	-71
5.0	.46	-169	2.1	1.27	22	-19.5	.106	21	.69	-76
5.5	.44	-158	1.5	1.19	14	-19.2	.110	22	.70	-80
6.0	.44	-145	0.9	1.11	4	-18.4	.120	20	.69	-86

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

0.1	.77	-26	27.3	23.25	161	-39.2	.011	79	.96	-9
0.5	.57	-98	22.6	13.51	116	-31.0	.028	49	.69	-27
1.0	.49	-136	17.8	7.72	92	-27.8	.041	45	.58	-31
1.5	.45	-156	14.6	5.36	79	-26.2	.049	45	.54	-34
2.0	.44	-171	12.3	4.10	69	-24.6	.059	48	.53	-39
2.5	.44	-177	10.5	3.35	63	-23.0	.070	51	.52	-39
3.0	.45	174	9.1	2.84	55	-23.0	.071	52	.52	-47
3.5	.45	167	7.8	2.46	46	-21.4	.086	52	.53	-56
4.0	.44	160	6.7	2.16	37	-20.2	.097	50	.55	-63
4.5	.42	153	5.7	1.92	29	-19.3	.108	47	.57	-70
5.0	.40	144	4.9	1.75	21	-18.7	.116	44	.59	-75
5.5	.40	132	4.2	1.62	13	-18.1	.124	41	.60	-79
6.0	.41	121	3.5	1.49	4	-17.3	.137	38	.60	-86

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