



AT-60585

Up to 6 GHz Low Noise

Silicon Bipolar Transistor

Features

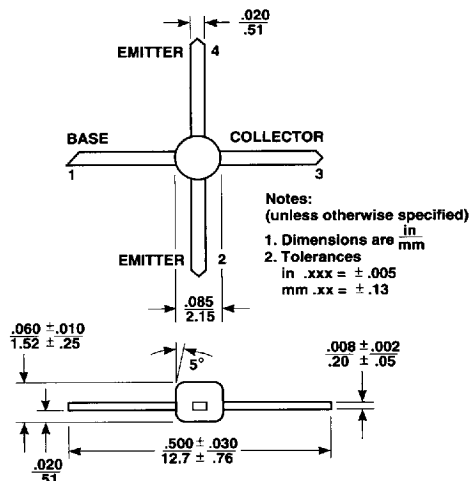
- Low Bias Current Operation
- Low Noise Figure: 1.4 dB typical at 1.0 GHz
1.9 dB typical at 2.0 GHz
- High Associated Gain: 16.5 dB typical at 1.0 GHz
11.5 dB typical at 2.0 GHz
- High Gain-Bandwidth Product: 8.0 GHz typical fr
- Low Cost Plastic Package

Description

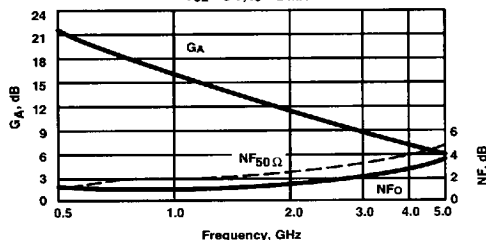
The AT-60585 is a high performance NPN silicon bipolar transistor housed in a low cost plastic package. This device is designed for use in low noise, wide band amplifier and oscillator applications operating over VHF, UHF and microwave frequencies.

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.

85 Plastic Package



NOISE FIGURE AND ASSOCIATED GAIN
vs. FREQUENCY
VCE = 8 V, IC = 2 mA



Noise Parameters: VCE = 8 V, IC = 2 mA

Freq. GHz	NF0 dB	Gamma Opt Mag	Ang	RN/50
1.0	1.4	.50	53	0.32
2.0	1.9	.44	108	0.34
4.0	2.9	.40	-144	0.46

Electrical Specifications, TA = 25°C

Symbol	Parameters and Test Conditions	Units	Min.	Typ.	Max.
NF0	Optimum Noise Figure: VCE = 8 V, IC = 2 mA f = 1.0 GHz f = 2.0 GHz f = 4.0 GHz	dB		1.4 1.9 2.9	1.8
GA	Gain @ NF0: VCE = 8 V, IC = 2 mA f = 1.0 GHz f = 2.0 GHz f = 4.0 GHz	dB	15.0	16.5 11.5 7.5	
IS21E1 ²	Insertion Power Gain: VCE = 8 V, IC = 10 mA f = 1.0 GHz f = 2.0 GHz	dB		17.0 11.5	
P1 dB	Power Output @ 1 dB Gain Compression: VCE = 8 V, IC = 10 mA f = 2.0 GHz	dBm		15.0	
G1 dB	1 dB Compressed Gain: VCE = 8 V, IC = 10 mA f = 2.0 GHz	dB		11.5	
fr	Gain Bandwidth Product: VCE = 8 V, IC = 10 mA	GHz		8.0	
hFE	Forward Current Transfer Ratio: VCE = 8 V, IC = 10 mA		30	150	300
ICBO	Collector Cutoff Current: VCB = 8 V	μA			0.2
IEBO	Emitter Cutoff Current: VEB = 1 V	μA			1.0
CCB	Collector Base Capacitance ¹ : VCB = 8 V, f = 1 MHz	pF		0.2	

Note 1 For this test the emitter is grounded.

Absolute Maximum Ratings

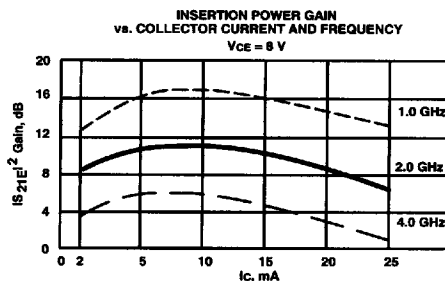
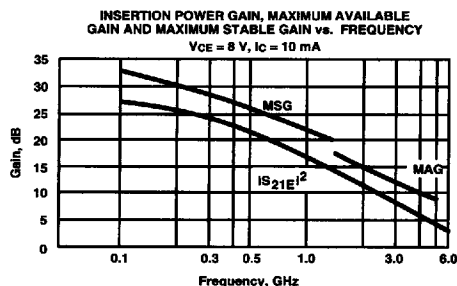
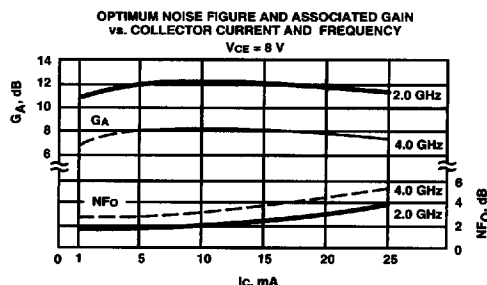
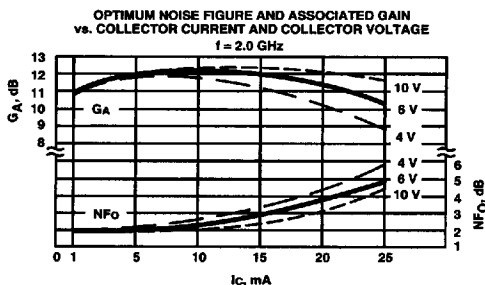
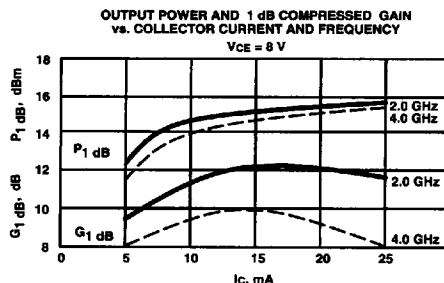
Parameter	Symbol	Absolute Maximum ¹
Emitter-Base Voltage	VEBO	1.5 V
Collector-Base Voltage	VCBO	20 V
Collector-Emitter Voltage	VCEO	12 V
Collector Current	IC	40 mA
Power Dissipation ^{2,3}	PT	400 mW
Junction Temperature	TJ	150°C
Storage Temperature	TSTG	-65°C to 150°C

Thermal Resistance^{2,4}: $\theta_{JC} = 180^\circ\text{C/W}$

Notes:

- Operation of this device above any one of these parameters may cause permanent damage.
- TCASE = 25°C.
- Derate at 5.6 mW/°C for $T_C > 78^\circ\text{C}$.
- See MEASUREMENTS section "Thermal Resistance" for more information.

Typical Performance, $T_A = 25^\circ\text{C}$ (unless otherwise noted)



HEWLETT-PACKARD/ CMPNTS

61E D

Low Noise Silicon Bipolar Transistor

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	16.3	6.56	171	-38.5	.012	82	.99	-4
0.5	.84	-30	15.1	5.66	139	-26.0	.050	61	.90	-18
1.0	.67	-86	12.5	4.22	110	-22.6	.074	43	.78	-29
1.5	.55	-114	10.4	3.29	90	-21.1	.088	35	.70	-35
2.0	.48	-139	8.4	2.64	74	-20.3	.096	29	.65	-41
2.5	.44	-155	7.0	2.25	65	-20.4	.096	31	.63	-41
3.0	.44	-174	5.7	1.92	53	-19.9	.101	32	.60	-48
3.5	.44	171	4.5	1.67	42	-19.7	.104	28	.62	-54
4.0	.44	157	3.3	1.47	30	-19.2	.109	29	.63	-61
4.5	.44	144	2.3	1.31	20	-18.8	.115	30	.65	-66
5.0	.44	128	1.5	1.19	11	-18.2	.124	29	.66	-70
5.5	.47	110	0.8	1.10	1	-17.4	.135	29	.64	-74
6.0	.52	94	0.1	1.01	-9	-16.7	.146	27	.62	-80

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

0.1	.73	-28	27.0	22.47	160	-39.5	.011	84	.96	-9
0.5	.52	-105	21.9	12.44	113	-30.8	.029	49	.68	-23
1.0	.44	-145	16.9	7.00	90	-28.1	.039	51	.58	-25
1.5	.41	-168	13.7	4.85	76	-25.8	.051	57	.55	-28
2.0	.41	174	11.4	3.70	65	-24.2	.061	57	.53	-33
2.5	.42	165	9.7	3.06	60	-22.8	.072	58	.51	-34
3.0	.44	155	8.1	2.56	51	-21.3	.086	64	.50	-42
3.5	.46	145	7.0	2.23	41	-20.2	.098	60	.50	-50
4.0	.46	136	5.8	1.96	32	-18.8	.114	58	.52	-59
4.5	.46	127	4.9	1.75	23	-17.7	.130	57	.53	-65
5.0	.47	115	4.0	1.58	14	-17.0	.141	52	.54	-71
5.5	.50	103	3.3	1.46	5	-16.0	.159	47	.54	-75
6.0	.55	91	2.5	1.34	-3	-15.0	.177	42	.51	-84

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