



AT-60586 Up to 6 GHz Low Noise Silicon Bipolar Transistor

Features

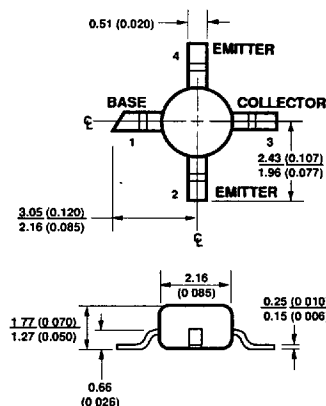
- Low Bias Current Operation
- Low Noise Figure: 1.4 dB typical at 1.0 GHz
1.9 dB typical at 2.0 GHz
- High Associated Gain: 16.0 dB typical at 1.0 GHz
11.0 dB typical at 2.0 GHz
- High Gain-Bandwidth Product: 8.0 GHz typical
- Surface Mount Plastic Package
- Tape-and-Reel Packaging Option Available¹

Description

The AT-60586 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.

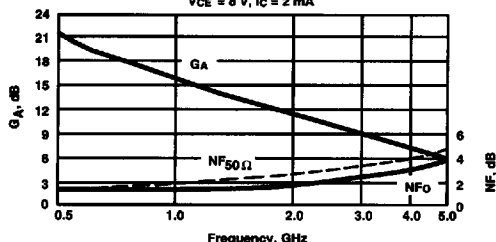
86 Plastic Package



DIMENSIONS ARE IN MILLIMETERS (INCHES)

NOISE FIGURE AND ASSOCIATED GAIN
vs. FREQUENCY

VCE = 8 V, IC = 2 mA



Electrical Specifications, TA = 25°C

Symbol	Parameters and Test Conditions	Units	Min.	Typ.	Max.
NF ₀	Optimum Noise Figure: VCE = 8 V, IC = 2 mA				
	f = 1.0 GHz	dB		1.4	
	f = 2.0 GHz			1.9	
	f = 4.0 GHz			2.9	
GA	Gain @ NF ₀ : VCE = 8 V, IC = 2 mA	dB	14.5	16.0	
	f = 1.0 GHz			11.0	
	f = 2.0 GHz			7.0	
	f = 4.0 GHz				
IS _{21E} ²	Insertion Power Gain: VCE = 8 V, IC = 10 mA	dB		17.0	
	f = 1.0 GHz			11.5	
	f = 2.0 GHz				
P ₁ dB	Power Output @ 1 dB Gain Compression: VCE = 8 V, IC = 10 mA	dBm		14.5	
G ₁ dB	1 dB Compressed Gain: VCE = 8 V, IC = 10 mA	dB		10.5	
f _T	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 ² : VCB = 8 V, f = 1 MHz	pF		0.2	

Notes: 1. Refer to PACKAGING section "Tape-and-Reel Packaging for Semiconductor Devices."

2. 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}: $\theta_{JC} = 190^{\circ}\text{C/W}$

Notes:

- Operation of this device above any one of these parameters may cause permanent damage.
- TCASE = 25°C.
- Derate at 5.3 mW/°C for $T_C > 74^{\circ}\text{C}$.
- See MEASUREMENTS section "Thermal Resistance" for more information.

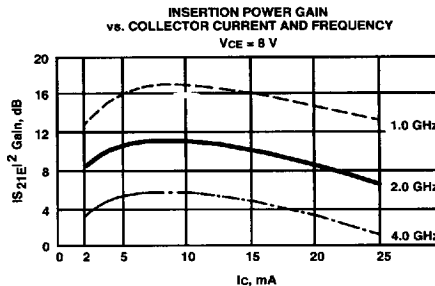
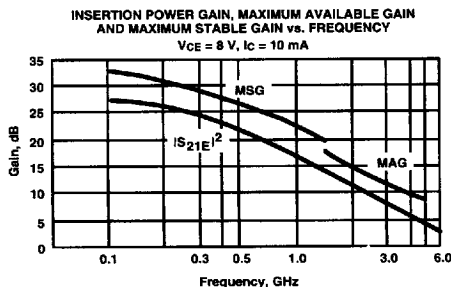
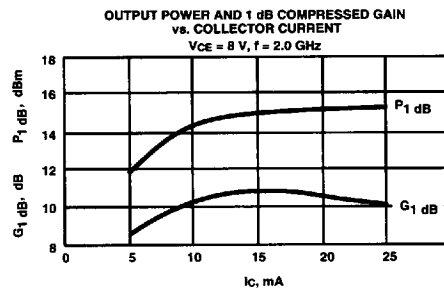
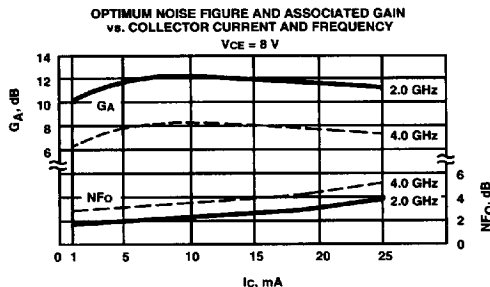
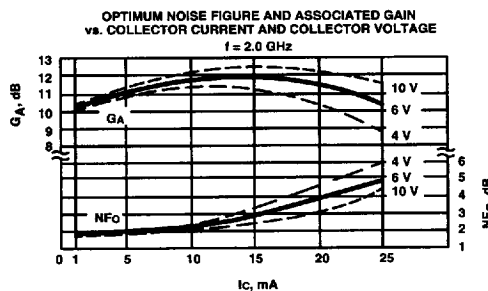
Part Number Ordering Information

Part Number	Devices Per Reel	Reel Size
AT-60586-TR1	1000	7"
AT-60586-TR2	4000	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)



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	16.4	6.60	171	-39.7	.010	81	.99	-4
0.5	.83	-50	15.2	5.76	139	-25.8	.051	63	.90	-18
1.0	.65	-91	12.6	4.26	110	-21.7	.082	43	.76	-29
1.5	.55	-125	10.5	3.36	88	-20.6	.093	33	.67	-36
2.0	.50	-153	8.5	2.64	71	-20.1	.099	29	.61	-42
2.5	.49	-173	7.1	2.27	60	-19.6	.105	29	.58	-45
3.0	.49	166	5.8	1.94	46	-19.6	.105	24	.55	-51
3.5	.51	151	4.6	1.69	34	-18.8	.114	25	.54	-59
4.0	.54	138	3.4	1.48	23	-18.5	.119	24	.52	-68
4.5	.58	127	2.5	1.34	12	-18.0	.125	25	.51	-77
5.0	.61	117	1.7	1.22	1	-17.3	.137	24	.51	-89
5.5	.63	109	1.0	1.12	-8	-16.7	.146	22	.50	-102
6.0	.65	102	0.3	1.03	-19	-15.9	.161	22	.50	-116

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

0.1	.76	-28	27.0	22.34	160	-40.8	.009	76	.95	-10
0.5	.51	-105	22.1	12.77	112	-30.2	.031	49	.66	-26
1.0	.42	-149	17.0	7.08	88	-26.5	.047	48	.54	-27
1.5	.42	-175	13.8	4.92	73	-24.9	.057	50	.49	-31
2.0	.44	165	11.5	3.75	60	-23.0	.071	51	.47	-36
2.5	.46	155	9.8	3.08	52	-21.3	.086	53	.45	-40
3.0	.48	143	8.2	2.56	42	-20.6	.093	48	.44	-46
3.5	.52	134	7.1	2.27	32	-19.1	.111	46	.42	-55
4.0	.55	125	6.0	2.00	22	-18.4	.120	44	.40	-64
4.5	.59	117	5.0	1.77	13	-17.3	.136	41	.39	-75
5.0	.62	110	4.1	1.61	3	-16.4	.151	36	.38	-88
5.5	.64	104	3.3	1.45	-5	-15.9	.160	34	.38	-100
6.0	.66	98	2.5	1.34	-15	-15.0	.178	30	.38	-117

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