

**Features**

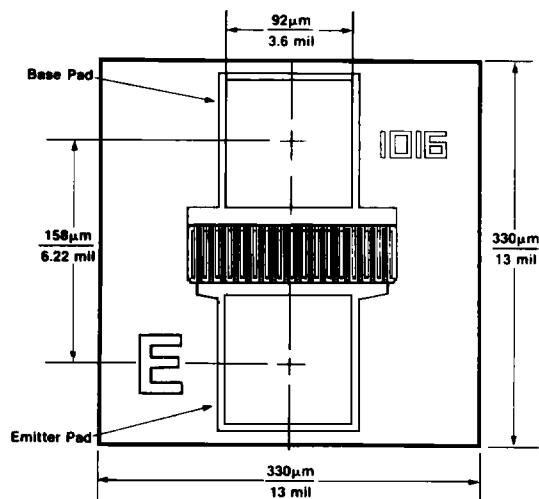
- 22.0 dBm typical  $P_1$  dB at 2.0 GHz
- 10.5 dB typical  $G_1$  dB at 2.0 GHz
- High Gain-Bandwidth Product: 8.0 GHz typical  $f_T$

**Description**

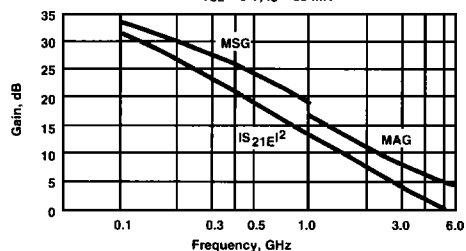
The AT-01600 is a high performance NPN silicon bipolar transistor chip designed for use in medium power, wide band amplifier and oscillator applications operating over VHF, UHF and microwave frequencies.

The die are nitride-passivated for surface protection. 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.

The recommended assembly procedure is gold-eutectic die attach at 400°C and either wedge or ball bonding using 0.7 mil gold wire. See also "Chip Use" in the APPLICATIONS section.

**Chip Outline**


INSERTION POWER GAIN, MAXIMUM AVAILABLE  
GAIN AND MAXIMUM STABLE GAIN  
vs. FREQUENCY  
 $V_{CE} = 8$  V,  $I_C = 35$  mA


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

Symbol	Parameters and Test Conditions <sup>1</sup>	Units	Min.	Typ.	Max.
$IS_{21}E^2$	Insertion Power Gain: $V_{CE} = 8$ V, $I_C = 35$ mA $f = 1.0$ GHz $f = 2.0$ GHz	dB		13.0 7.0	
$P_1$ dB	Power Output @ 1 dB Gain Compression: $V_{CE} = 8$ V, $I_C = 60$ mA $f = 2.0$ GHz	dBm		22.0	
$G_1$ dB	1 dB Compressed Gain: $V_{CE} = 8$ V, $I_C = 60$ mA $f = 2.0$ GHz	dB		10.5	
NFO	Optimum Noise Figure: $V_{CE} = 8$ V, $I_C = 35$ mA $f = 2.0$ GHz	dB		3.0	
GA	Gain @ NFO: $V_{CE} = 8$ V, $I_C = 35$ mA $f = 2.0$ GHz	dB		10.5	
$f_T$	Gain Bandwidth Product: $V_{CE} = 8$ V, $I_C = 35$ mA	GHz		8.0	
$h_{FE}$	Forward Current Transfer Ratio: $V_{CE} = 8$ V, $I_C = 35$ mA		30	150	300
ICBO	Collector Cutoff Current: $V_{CB} = 8$ V	$\mu\text{A}$			0.2
IEBO	Emitter Cutoff Current: $V_{EB} = 1$ V	$\mu\text{A}$			2.0
CCB	Collector Base Capacitance <sup>2</sup> : $V_{CB} = 8$ V, $f = 1$ MHz	pF		0.75	

Notes: 1. RF performance is determined by packaging and testing 10 devices per wafer.  
2. For this test, the emitter is grounded.

**Absolute Maximum Ratings**

Parameter	Symbol	Absolute Maximum <sup>1</sup>
Emitter-Base Voltage	VEBO	1.5 V
Collector-Base Voltage	VCBO	20 V
Collector-Emitter Voltage	VCEO	12 V
Collector Current	IC	150 mA
Power Dissipation <sup>2,3</sup>	PT	1000 mW
Junction Temperature	Tj	200°C
Storage Temperature	TSTG	-65°C to 200°C

Thermal Resistance<sup>2,4</sup>:  $\theta_{jC} = 40^\circ/W$

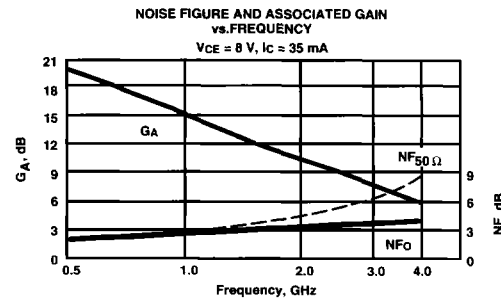
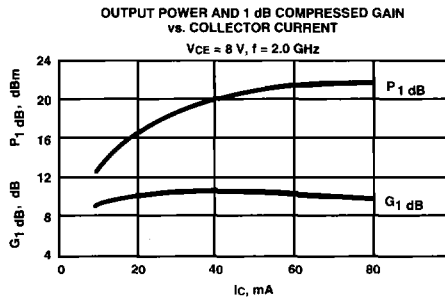
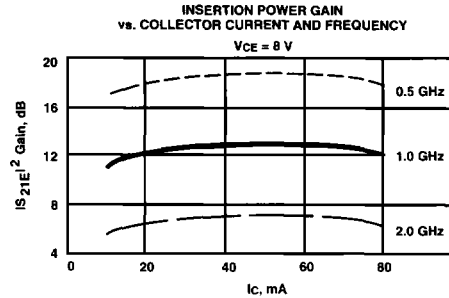
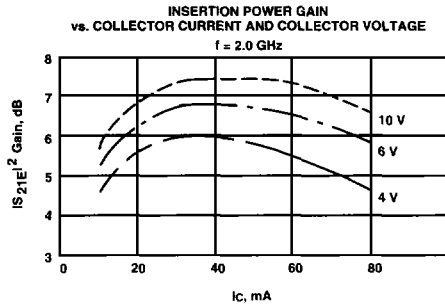
**Notes:**

1. Operation of this device above any one of these parameters may cause permanent damage.
2. TMOUNTING SURFACE = 25°C.
3. Derate at 25 mW/°C for TMOUNTING SURFACE > 160°C.
4. The small spot size of this technique results in a higher, though more accurate determination of  $\theta_{jC}$  than do alternate methods. See MEASUREMENTS section "Thermal Resistance" for more information.

**Part Number Ordering Information**

Part Number	Devices Per Tray
AT-01600-GP2	10
AT-01600-GP4	100
AT-01600-GP6	up to 300

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



**AT-01600**  
**General Purpose Silicon Bipolar Transistor**

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

**$T_A = 25^\circ\text{C}$ ,  $V_{CE} = 8 \text{ V}$ ,  $I_C = 35 \text{ mA}$**

Freq. GHz	S <sub>11</sub>		S <sub>21</sub>			S <sub>12</sub>			S <sub>22</sub>	
	Mag	Ang	dB	Mag	Ang	dB	Mag	Ang	Mag	Ang
0.1	.67	-124	31.1	35.75	123	-34.0	.020	47	.55	-71
0.5	.72	-172	18.7	8.64	90	-29.1	.035	53	.24	-128
1.0	.72	175	13.0	4.45	81	-24.9	.057	65	.22	-141
1.5	.72	169	9.4	2.94	73	-21.9	.080	69	.22	-143
2.0	.73	163	7.2	2.29	66	-19.7	.103	71	.22	-141
2.5	.72	160	5.4	1.86	60	-18.1	.124	72	.24	-139
3.0	.74	155	4.0	1.58	53	-16.6	.148	70	.25	-136
3.5	.73	150	2.9	1.40	49	-15.4	.170	71	.27	-135
4.0	.75	145	1.7	1.22	43	-14.0	.187	69	.29	-135
4.5	.75	141	0.8	1.10	39	-13.6	.210	69	.32	-133
5.0	.75	139	-0.2	0.98	35	-13.0	.225	67	.35	-132
5.5	.76	134	-0.7	0.92	29	-12.3	.242	67	.38	-133
6.0	.76	130	-1.7	0.82	26	-11.7	.261	66	.42	-134

**$T_A = 25^\circ\text{C}$ ,  $V_{CE} = 8 \text{ V}$ ,  $I_C = 60 \text{ mA}$**

0.1	.65	-146	31.6	38.06	119	-37.0	.014	48	.50	-77
0.5	.74	-178	19.0	8.94	90	-30.8	.029	65	.22	-134
1.0	.75	173	13.0	4.44	80	-25.7	.052	72	.21	-142
1.5	.75	168	9.5	2.99	73	-22.5	.075	76	.22	-142
2.0	.74	163	7.0	2.24	66	-20.4	.096	75	.23	-139
2.5	.75	157	5.4	1.86	62	-18.3	.121	76	.25	-137
3.0	.76	154	3.9	1.56	55	-16.8	.144	75	.27	-134
3.5	.75	150	2.7	1.36	50	-15.8	.162	75	.29	-133
4.0	.75	146	1.7	1.21	48	-14.8	.183	76	.32	-129
4.5	.76	143	0.5	1.06	42	-14.0	.200	74	.34	-130
5.0	.77	139	-0.2	0.98	39	-13.1	.221	74	.36	-127
5.5	.76	137	-1.0	0.89	35	-12.3	.243	73	.39	-127
6.0	.75	132	-1.6	0.83	31	-11.6	.262	71	.42	-126

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