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# AT-64000

## Up to 4 GHz Linear Power Silicon Bipolar Transistor Chip



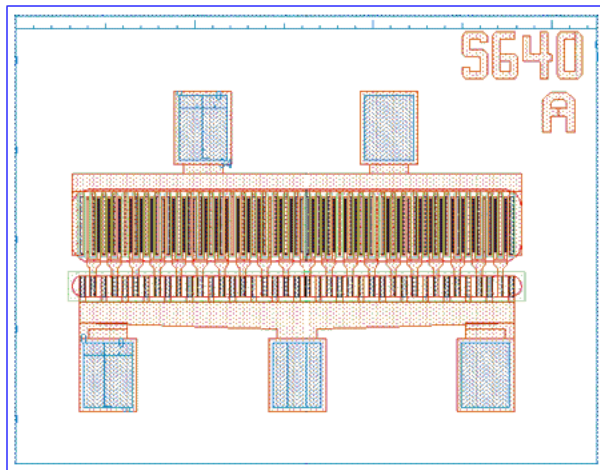
## Data Sheet

### Description

The AT-64000 of Avago Technologies is a high performance NPN silicon bipolar transistor. This device is designed for use in medium power, wideband 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 golf metallization in the fabrication of these devices. The use of ion-implanted ballast resistors ensures uniform current distribution through the multiple emitter fingers.

### Chip Outline



### Features

Performance in 230 mil BeO package:

- High Output Power:  
27.5 dBm typical P1dB at 2.0 GHz  
26.5 dBm typical P1dB at 4.0 GHz
- High Gain at 1 dB Compression:  
12.5 dB typical G1dB at 2.0 GHz  
9.5 dB typical G1dB at 4.0 GHz
- 35% Total Efficiency
- Emitter Ballast Resistors

**Table 1. Absolute Maximum Ratings at Tc = +25°C**

Symbol	Parameter	Unit	Max Rating
V <sub>EBO</sub>	Emitter-Base Voltage	V	2.2
V <sub>CBO</sub>	Collector-Base Voltage	V	40
V <sub>CEO</sub>	Collector-Emitter Voltage	V	20
I <sub>C</sub>	Collector Current	mA	200
P <sub>T</sub>	Power Dissipation <sup>[3]</sup>	W	3
T <sub>j</sub>	Junction Temperature	°C	200
T <sub>stg</sub>	Storage Temperature	°C	-65 to 200
θ <sub>jc</sub>	Thermal Resistance	°C/W	40

Notes:

1. Operation in excess of any one of these conditions may result in permanent damage to the device.
2. Maximum ratings are tested in 230 mil BeO packages.
3. T—CASE = 25 °C. Derate at 25 mW/°C for Tc > 80°C

**Table 2. Electrical Specifications <sup>[1,2]</sup> at Tc = +25°C**

Symbol	Parameter and Test Condition		Units	Min.	Typ.	Max.
S <sub>21E</sub>   <sup>2</sup>	Insertion Power Gain; Vce = 16V, Ic = 110 mA	f = 2.0 GHz f = 4.0 GHz	dB		6.5 2.0	
P1dB	Power Output @1dB Gain Compression Vce = 16V, Ic = 110 mA	f = 2.0 GHz f = 4.0 GHz	dBm	25.5	27.5 26.5	
G1dB	1 dB Compressed Gain Vce = 16V, Ic = 110 mA	f = 2.0 GHz f = 4.0 GHz	dB	7.0	12.5 9.5	
η <sub>T</sub>	Total Efficiency <sup>[3]</sup> at 1 dB Gain Compression Vce = 16V, Ic = 110 mA	f = 4.0 GHz	%		35.0	
h <sub>FE</sub>	Forward Current Transfer Ratio; Vce = 8V, Ic = 110 mA		-	20	50	200
I <sub>CBO</sub>	Collector Cutoff Current; V <sub>CB</sub> = 16 V		uA			100
I <sub>EBO</sub>	Emitter Cutoff Current; V <sub>EB</sub> = 1V		uA			5.0

Notes:

1. RF performance is determined by packaging and testing 10 devices per wafer.
2. RF performance is measured in 230 mil BeO packages.
3. η<sub>T</sub> = (RF Output Power)/(RF Input Power + VCE x IC)

### Typical Performance Curves at Tc = +25°C

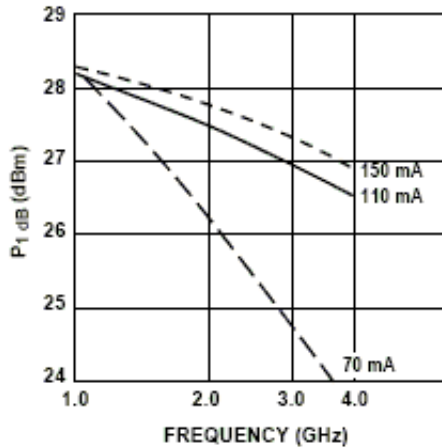


Figure 1. Power Output @ 1 dB Gain Compression vs. Frequency and Collector Current. VCE = 16 V.

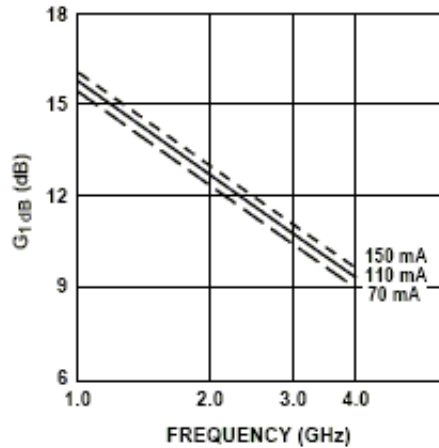


Figure 2. 1 dB Compressed Gain vs. Frequency and Collector Current. VCE = 16 V.

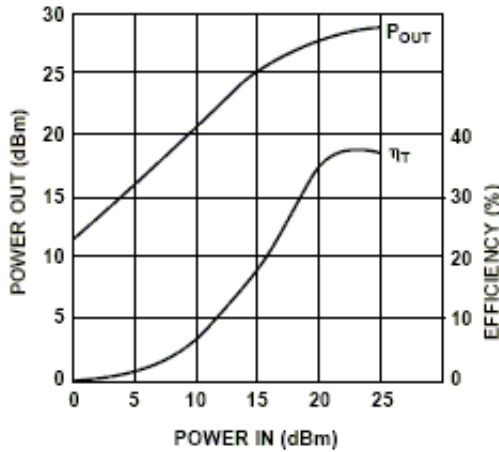


Figure 3. Output Power and Efficiency vs. Input Power. VCE = 16 V, IC = 110 mA, f = 4.0 GHz.

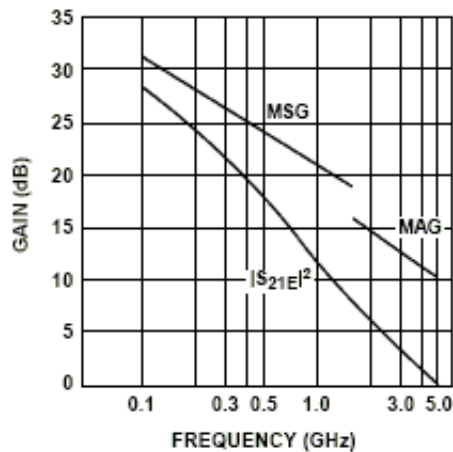


Figure 4. Insertion Power Gain, Maximum Available Gain and Maximum Stable Gain vs. Frequency. VCE = 16 V, IC = 110 mA.

### Typical Scattering Parameters at Tc = +25°C

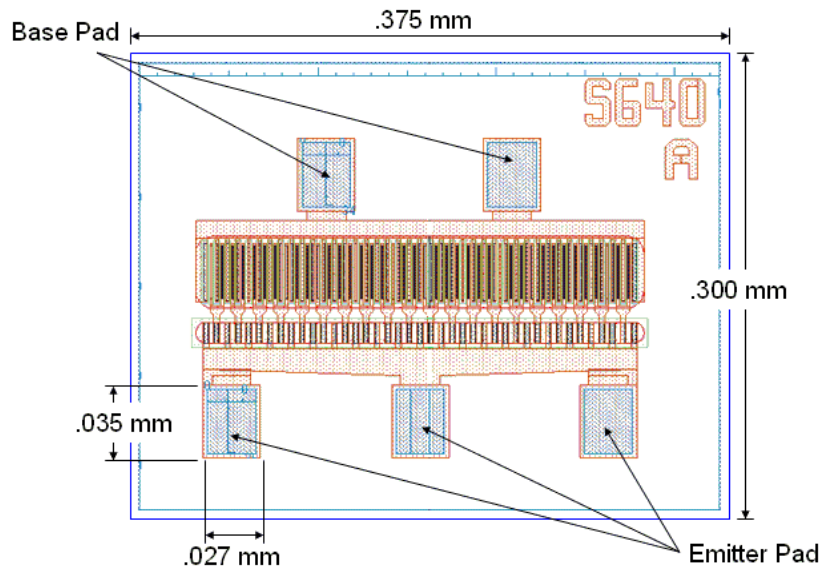
VCE = 16 V, IC = 110 mA, ZO = 50 Ohm, Common Emitter

Freq. GHz	S11		S21		S12		S22			
	Mag.	Ang.	dB	Mag.	Ang.	dB	Mag.	Ang.	Mag.	Ang.
0.1	.54	-124	28.2	25.71	135	-33.3	.022	42	.72	-51
0.5	.80	-178	17.6	7.57	78	-29.5	.034	18	.33	-119
1.0	.80	162	11.9	3.92	47	-28.6	.037	10	.33	-142
1.5	.80	147	8.6	2.70	21	-27.9	.040	12	.40	-156
2.0	.78	133	6.3	2.07	-4	-27.6	.042	1	.48	-169
2.5	.77	127	5.1	1.80	-24	-25.5	.053	-5	.58	-178
3.0	.73	116	3.8	1.56	-51	-25.0	.056	-20	.67	170
3.5	.66	106	2.9	1.40	-79	-25.8	.051	-28	.78	156
4.0	.60	99	2.2	1.28	-109	-27.2	.044	-49	.86	142
4.5	.55	98	1.4	1.18	-141	-31.2	.028	-70	.93	127
5.0	.54	99	0.6	1.07	-175	-40.9	.009	-144	.93	112

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



## AT-64000 Chip Dimensions



Notes :

- 1) The bottom of the die is Collector.
- 2) Die thickness is 5 to 6 mils.

## Part Number Ordering Information

Part number	Devices Per Tray
AT-64000-GP4	100

For product information and a complete list of distributors, please go to our web site: [www.avagotech.com](http://www.avagotech.com)

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