## **AT-64020** Up to 4 GHz Linear Power Silicon Bipolar Transistor

# **Data Sheet**



### Description

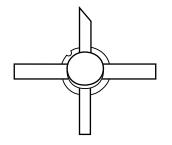
The AT-64020 is a high performance NPN silicon bipolar transistor housed in a hermetic BeO disk package for good thermal characteristics. This device is designed for use in medium power, wide band amplifier and oscillator applications operating over VHF, UHF and microwave frequencies.

Excellent device uniformity, performance and reliability are produced by the use of ion-implantation, selfalignment techniques, and gold metallization in the fabrication of these devices. The use of ion-implanted ballast resistors ensures uniform current distribution through the multiple emitter fingers.

#### Features

- High Output Power: 27.5 dBm Typical P1 dB at 2.0 GHz 26.5 dBm Typical P1 dB at 4.0 GHz
- High Gain at 1 dB Compression: 10.0 dB Typical G1 dB at 2.0 GHz 6.5 dB Typical G1 dB at 4.0 GHz
- 35% Total Efficiency
- Emitter Ballast Resistors
- Hermetic, Metal/Beryllia Package

### 200 mil BeO Package



### AT-64020 Absolute Maximum Ratings

Symbol	Parameter	Units	Absolute Maximum <sup>[1]</sup>
V <sub>EBO</sub>	Emitter-Base Voltage	٧	2
V <sub>CBO</sub>	Collector-Base Voltage	۷	40
V <sub>CEO</sub>	Collector-Emitter Voltage	۷	20
Ι <sub>C</sub>	Collector Current	mA	200
PT	Power Dissipation <sup>[2,3]</sup>	W	3
Tj	Junction Temperature	°C	200
T <sub>STG</sub>	Storage Temperature	°C	-65 to 200

## Thermal Resistance<sup>[2,4]</sup>:

 $\theta_{jc} = 40^{\circ}C/W$ 

#### Notes:

- 1. Permanent damage may occur if any of these limits are exceeded.
- 2. Tcase = 25°C.
- 3. Derate at 25 mW/°C for Tc  $> 80^\circ C.$
- 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.

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

Symbol	Parameters and Test Conditions <sup>[1]</sup>		Units	Min.	Тур.	Max.
S <sub>21E</sub>   <sup>2</sup>	Insertion Power Gain; $V_{CE} = 16$ V, $I_C = 110$ mA	f = 2.0  GHz f = 4.0  GHz	dB		7.0 2.0	
P <sub>1 dB</sub>	Power Output @ 1 dB Gain Compression $V_{CE} = 16 V, I_C = 110 mA$	f = 2.0 GHz f= 4.0 GHz	dBm	26.5	27.5 26.5	
G <sub>1 dB</sub>	1 dB Compressed Gain; $V_{CE}$ = 16 V, $I_{C}$ = 110 mA	f = 2.0  GHz f = 4.0  GHz	dB	8.5	10.0 6.5	
$\eta_T$	Total Efficiency at 1 dB Compression: $V_{CE} = 16 V$ , $I_C = 110 mA$	f = 4.0 GHz	%		35.0	
h <sub>FE</sub>	Forward Current Transfer Ratio; $V_{CE} = 8 V$ , $I_C = 110 mA$		_	20	50	200
I <sub>CBO</sub>	Collector Cutoff Current; $V_{CB} = 16 V$		μA			100
I <sub>EBO</sub>	Emitter Cutoff Current; $V_{EB} = 1 V$		μA			5.0

Note:

1.  $\eta T = (RF Output Power)/(RF Input Power + VCEIC).$ 

## AT-64020 Typical Performance, $T_{A}=25^{\circ}\text{C}$

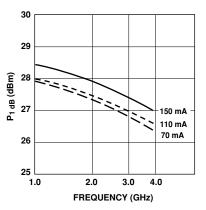


Figure 1. Power Output @ 1 dB Gain Compression vs. Frequency and Collector Current.  $V_{CE}$  = 16 V.

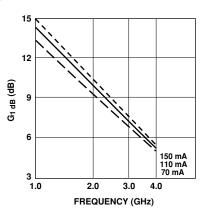


Figure 2. 1 dB Compressed Gain vs. Frequency and Collector Current.  $V_{CE} = 16$  V.

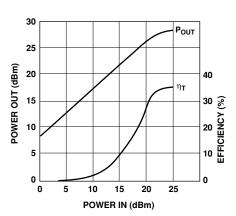


Figure 3. Output Power and Efficiency vs. Input Power.  $V_{CE}$  = 16 V,  $I_{C}$  = 110 mA, f = 4.0 GHz.

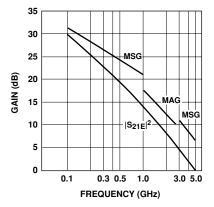


Figure 4. Insertion Power Gain, Maximum Available Gain and Maximum Stable Gain vs. Frequency.  $V_{CE} = 16$  V,  $I_C = 110$  mA.

	-			-						
Freq.		S <sub>11</sub>	S <sub>21</sub>		S <sub>12</sub>			\$ <sub>22</sub>		
GHz	Mag.	Ang.	dB	Mag.	Ang.	dB	Mag.	Ang.	Mag.	Ang.
0.1	.61	-116	30.0	31.51	130	-33.1	.022	57	.67	-48
0.5	.75	-173	18.4	8.27	86	-28.8	.036	41	.23	-88
1.0	.75	171	12.5	4.23	66	-27.4	.043	49	.20	-100
1.5	.74	159	9.2	2.90	50	-23.5	.067	48	.21	-110
2.0	.74	148	7.0	2.23	35	-21.6	.083	46	.25	-120
2.5	.73	141	5.2	1.82	26	-19.8	.103	47	.27	-127
3.0	.73	130	3.8	1.56	12	-17.5	.133	41	.32	-135
3.5	.74	119	2.7	1.37	-2	-16.1	.157	35	.35	-146
4.0	.73	107	1.8	1.23	-16	-14.7	.186	26	.38	-158
4.5	.72	93	0.9	1.11	-30	-13.3	.217	18	.41	-168
5.0	.71	79	0.1	1.01	-43	-11.8	.256	8	.42	179

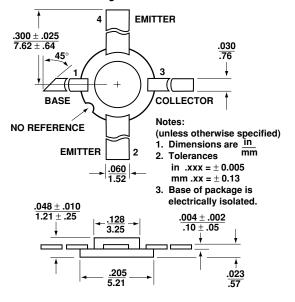
Typical Scattering Parameters, Common Emitter,  $Z_0 = 50 \ \Omega$ ,  $T_A = 25^{\circ}$ C,  $V_{CE} = 16 \ V$ ,  $I_C = 110 \ mA$ 

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

**Ordering Information** 

Part Number	No. of Devices				
AT-64020	100				

## 200 mil BeO Package Dimensions



For product information and a complete list of distributors, please go to our web site: www.avagotech.com

Avago, Avago Technologies, and the A logo are trademarks of Avago Technologies, Limited in the United States and other countries. Data subject to change. Copyright © 2008 Avago Technologies Limited. All rights reserved. Obsoletes 5989-2657EN AV02-1220EN May 5, 2008

