Up to 4 GHz Linear Power Silicon Bipolar Transistor

Technical Data

AT-64023

Features

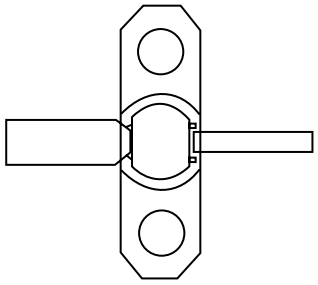
- **High Output Power:**
  27.5 dBm Typical $P_{1\,dB}$ at 2.0 GHz
  26.5 dBm Typical $P_{1\,dB}$ at 4.0 GHz
- **High Gain at 1 dB Compression:**
  12.5 dB Typical $G_{1\,dB}$ at 2.0 GHz
  9.5 dB Typical $G_{1\,dB}$ at 4.0 GHz
- **35% Total Efficiency**
- **Emitter Ballast Resistors**
- **Hermetic, Metal/Beryllia Stripline Package**

Description

The AT-64023 is a high performance NPN silicon bipolar transistor housed in a hermetic BeO flange 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, self-alignment 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.

230 mil BeO Package



AT-64023 Absolute Maximum Ratings

Symbol	Parameter	Units	Absolute Maximum[1]
V_{EBO}	Emitter-Base Voltage	V	2.2
V_{CBO}	Collector-Base Voltage	V	40
V_{CEO}	Collector-Emitter Voltage	V	20
I_C	Collector Current	mA	200
P_T	Power Dissipation [2,3]	W	3
T_j	Junction Temperature	°C	200
T_{STG}	Storage Temperature	°C	-65 to 200

Thermal Resistance [2,4]:
$\theta_{jc} = 40°C/W$

Notes:
1. Permanent damage may occur if any of these limits are exceeded.
2. $T_{CASE} = 25°C$.
3. Derate at 25 mW/°C for $T_C > 80°C$.
4. The small spot size of this technique results in a higher, though more accurate determination of θ_{jc} than do alternate methods. See MEASUREMENTS section "Thermal Resistance" for more information.

Electrical Specifications, $T_A = 25°C$

Symbol	Parameters and Test Conditions		Units	Min.	Typ.	Max.
$\|S_{21E}\|^2$	Insertion Power Gain; $V_{CE} = 16$ V, $I_C = 110$ mA	f = 2.0 GHz f = 4.0 GHz	dB		6.5 2.0	
$P_{1\ dB}$	Power Output @ 1 dB Gain Compression $V_{CE} = 16$ V, $I_C = 110$ mA	f = 2.0 GHz f= 4.0 GHz	dBm	 25.5	27.5 26.5	
$G_{1\ dB}$	1 dB Compressed Gain; $V_{CE} = 16$ V, $I_C = 110$ mA	f = 2.0 GHz f = 4.0 GHz	dB	 7.0	12.5 9.5	
η_T	Total Efficiency[1] at 1 dB Compression: $V_{CE} = 16$ V, $I_C = 110$ mA	f = 4.0 GHz	%		35.0	
h_{FE}	Forward Current Transfer Ratio; $V_{CE} = 8$ V, $I_C = 110$ mA		—	20	50	200
I_{CBO}	Collector Cutoff Current; $V_{CB} = 16$ V		μA			100
I_{EBO}	Emitter Cutoff Current; $V_{EB} = 1$ V		μA			5.0

Note:
1. η_T = (RF Output Power)/(RF Input Power + $V_{CE}I_C$).

AT-64023 Typical Performance, T_A = 25°C

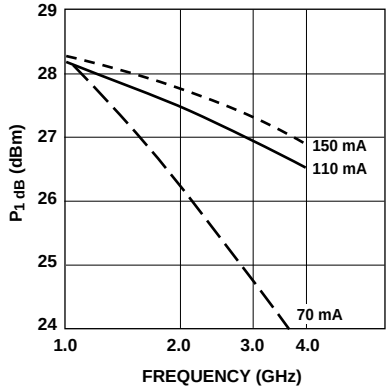


Figure 1. Power Output @ 1 dB Gain Compression vs. Frequency and Collector Current. V_{CE} = 16 V.

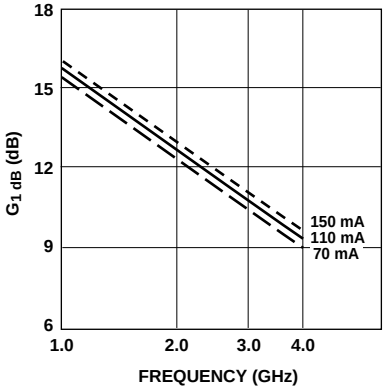


Figure 2. 1 dB Compressed Gain vs. Frequency and Collector Current. V_{CE}= 16 V.

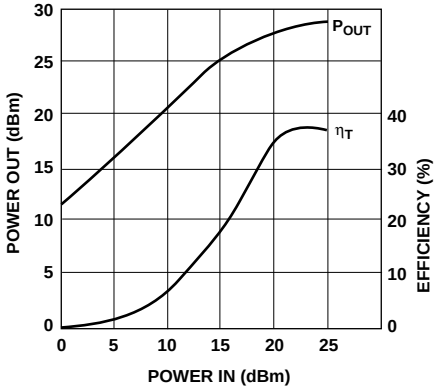


Figure 3. Output Power and Efficiency vs. Input Power. V_{CE} = 16 V, I_C = 110mA, f = 4.0 GHz.

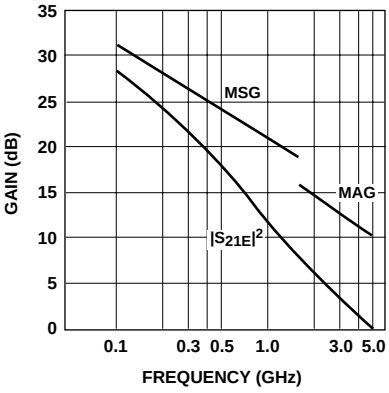


Figure 4. Insertion Power Gain, Maximum Available Gain and Maximum Stable Gain vs. Frequency. V_{CE} = 16 V, I_C = 110 mA.

Typical Scattering Parameters, Common Emitter, Z_O = 50 Ω, T_A = 25°C, V_{CE} = 16 V, I_C = 110 mA

Freq.	S_{11}		S_{21}			S_{12}			S_{22}	
GHz	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.

S-parameters at other bias conditions are available on the Hewlett-Packard Design Pak disk.

230 mil BeO Package Dimensions