AVANTEK

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

T-33-05

Features

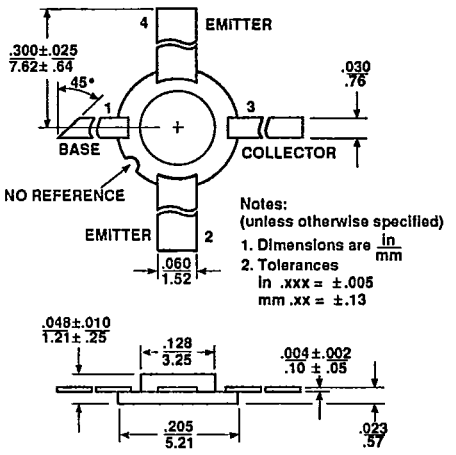
- **High Output Power:**
  28.0 dBm typical $P_{1\,dB}$ at 2.0 GHz
  27.0 dBm typical $P_{1\,dB}$ at 4.0 GHz
- **High Gain at 1 dB Compression:**
  10.0 dB typical $G_{1\,dB}$ at 2.0 GHz
  6.5 dB typical $G_{1\,dB}$ at 4.0 GHz
- **35% Total Efficiency**
- **Emitter Ballast Resistors**
- **Hermetic, Metal/Beryllia Microstrip Package**

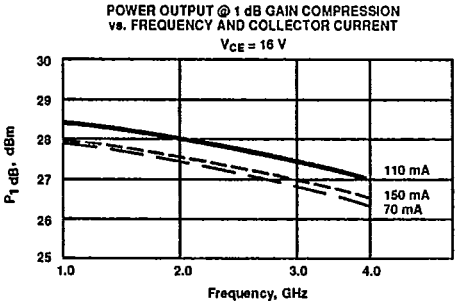
Description

Avantek's 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, 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.

Avantek 200 mil BeO Package





Electrical Specifications, T_A = 25°C

Symbol	Parameters and Test Conditions		Units	Min.	Typ.	Max.
$P_{1\,dB}$	Power Output @ 1 dB Gain Compression: V_{CE} = 16 V, I_C = 110 mA	f = 2.0 GHz f = 4.0 GHz	dBm	27.0	28.0 27.0	
$G_{1\,dB}$	1 dB Compressed Gain: V_{CE} = 16 V, I_C = 110 mA	f = 2.0 GHz f = 4.0 GHz	dB	9.0	10.0 6.5	
η_T	Total Efficiency[1] at 1 dB Compression: V_{CE} = 16 V, I_C = 110 mA	f = 4.0 GHz	%		35.0	
$\lvert S_{21E}\rvert^2$	Insertion Power Gain: V_{CE} = 16 V, I_C = 110 mA	f = 2.0 GHz f = 4.0 GHz	dB		7.0 2.0	
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. $\eta_T = \frac{\text{RF Output Power}}{\text{RF Input Power} + V_{CE}I_C}$

AVANTEK INC T-33-05

AT-64020
Linear Power Silicon Bipolar Transistor

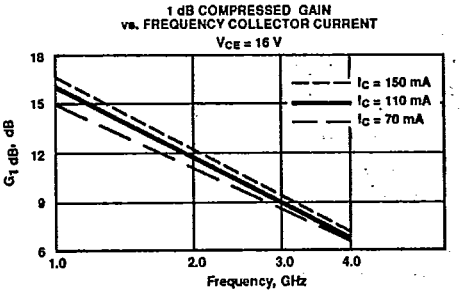
Absolute Maximum Ratings

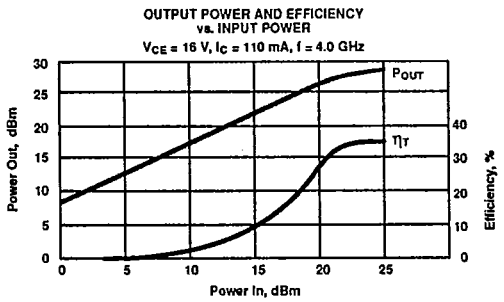
Parameter	Symbol	Absolute Maximum[1]
Emitter-Base Voltage	V_{EBO}	2 V
Collector-Base Voltage	V_{CBO}	40 V
Collector-Emitter Voltage	V_{CEO}	20 V
Collector Current	I_C	200 mA
Power Dissipation[2,3]	P_T	3 W
Junction Temperature	T_j	200°C
Storage Temperature	T_{STG}	–65°C to 200°C

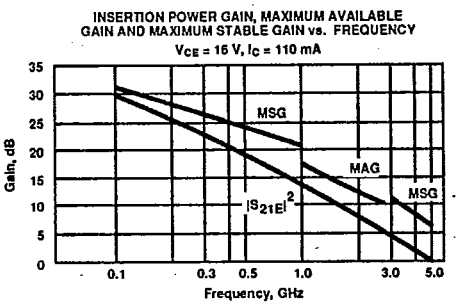
Thermal Resistance[2,4]: θ_{jc} = 40°C/W

Notes:
1. Operation of this device above any one of these parameters may cause permanent damage.
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.

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







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

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

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