MSA-0670
Cascadable Silicon Bipolar MMIC Amplifier

Data Sheet

Description

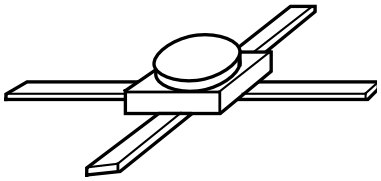
The MSA-0670 is a high performance silicon bipolar Monolithic Microwave Integrated Circuit (MMIC) housed in a hermetic, high reliability package. This MMIC is designed for use as a general purpose 50Ω gain block. Typical applications include narrow and broad band IF and RF amplifiers in industrial and military applications.

The MSA-series is fabricated using Avago's 10 GHz f_T, 25 GHz f_{MAX}, silicon bipolar MMIC process which uses nitride self-alignment, ion implantation, and gold metallization to achieve excellent performance, uniformity and reliability. The use of an external bias resistor for temperature and current stability also allows bias flexibility.

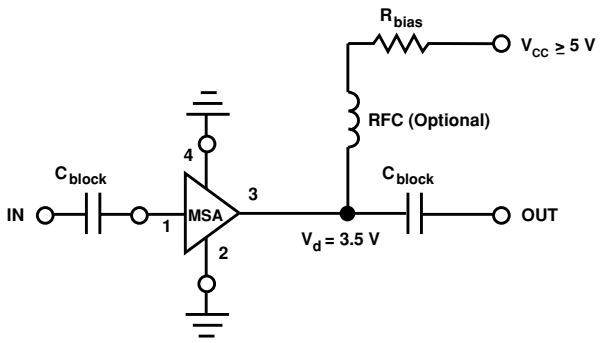
Features

- Cascadable 50 Ω Gain Block
- Low Operating Voltage:
  3.5 V Typical V_d
- 3 dB Bandwidth:
  DC to 1.0 GHz
- High Gain:
  19.5 dB Typical at 0.5 GHz
- Low Noise Figure:
  2.8 dB Typical at 0.5 GHz
- Hermetic Gold-ceramic Microstrip Package

70 mil Package



Typical Biasing Configuration



MSA-0670 Absolute Maximum Ratings

Parameter	Absolute Maximum[1]
Device Current	50 mA
Power Dissipation[2,3]	200 mW
RF Input Power	+13 dBm
Junction Temperature	200°C
Storage Temperature	–65 to 200°C

Thermal Resistance[2,4]:

θ_{jc} = 130°C/W

Notes:
1. Permanent damage may occur if any of these limits are exceeded.
2. T_{CASE} = 25°C.
3. Derate at 7.7 mW/°C for T_C > 174°C.
4. The small spot size of this technique results in a higher, though more accurate determination of θ_{jc} than do alternate methods.

Electrical Specifications[1], T_A = 25°C

Symbol	Parameters and Test Conditions: I_d = 16 mA, Z_0 = 50 Ω		Units	Min.	Typ.	Max.
G_P	Power Gain ($\|S_{21}\|^2$)	f = 0.1 GHz	dB	19.0	20.5	22.0
ΔG_P	Gain Flatness	f = 0.1 to 0.6 GHz	dB		±0.7	±1.0
$f_{3\ dB}$	3 dB Bandwidth		GHz		1.0	
VSWR	Input VSWR	f = 0.1 to 1.5 GHz			1.9:1	
	Output VSWR	f = 0.1 to 1.5 GHz			1.8:1	
NF	50 Ω Noise Figure	f = 0.5 GHz	dB		2.8	4.0
$P_{1\ dB}$	Output Power at 1 dB Gain Compression	f = 0.5 GHz	dBm		2.0	
IP_3	Third Order Intercept Point	f = 0.5 GHz	dBm		14.5	
t_D	Group Delay	f = 0.5 GHz	psec		200	
V_d	Device Voltage		V	3.1	3.5	3.9
dV/dT	Device Voltage Temperature Coefficient		mV/°C		–8.0	

Note:
1. The recommended operating current range for this device is 12 to 30 mA. Typical performance as a function of current is on the following page.

MSA-0670 Typical Scattering Parameters ($Z_0 = 50\ \Omega$, $T_A = 25°C$, $I_d = 16$ mA)

Freq.	S_{11}			S_{21}			S_{12}		S_{22}		
GHz	Mag	Ang	dB	Mag	Ang	dB	Mag	Ang	Mag	Ang	k
0.1	.05	−147	20.5	10.62	172	−23.3	.068	4	.05	−69	1.05
0.2	.07	−134	20.4	10.41	164	−23.0	.070	8	.09	−92	1.04
0.3	.09	−126	20.1	10.16	156	−22.6	.074	12	.13	−104	1.02
0.4	.11	−123	19.9	9.85	148	−22.4	.076	14	.16	−113	1.00
0.5	.13	−123	19.6	9.50	141	−22.0	.079	26	.20	−121	0.99
0.6	.15	−123	19.2	9.09	135	−21.3	.082	18	.22	−128	0.97
0.8	.19	−126	17.4	8.28	122	−20.7	.093	22	.25	−141	0.94
1.0	.24	−129	16.5	7.46	110	−19.8	.103	22	.27	−154	0.92
1.5	.31	−141	15.2	5.76	87	−18.2	.124	23	.27	−176	0.91
2.0	.38	−157	13.0	4.47	68	−17.2	.138	19	.24	166	0.94
2.5	.42	−167	11.1	3.59	57	−16.7	.146	20	.21	158	1.01
3.0	.46	178	9.5	2.97	45	−16.4	.152	16	.17	156	1.07
3.5	.48	173	7.9	2.49	33	−16.2	.155	11	.14	163	1.15
4.0	.48	164	6.6	2.13	22	−16.1	.156	9	.11	−175	1.27
4.5	.48	155	5.5	1.87	13	−15.9	.161	5	.11	−154	1.35
5.0	.48	143	4.5	1.67	3	−15.8	.163	3	.14	−141	1.46

Typical Performance, $T_A = 25°C$

(unless otherwise noted)

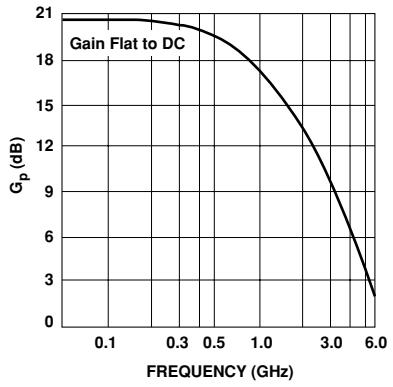


Figure 1. Typical Power Gain vs. Frequency, $T_A = 25°C$, $I_d = 16$ mA.

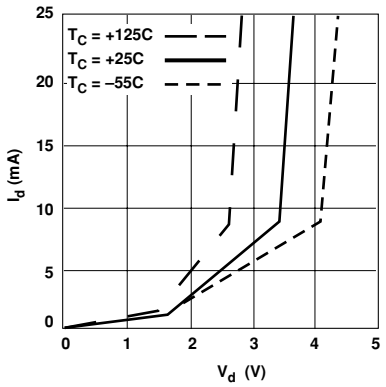


Figure 2. Device Current vs. Voltage.

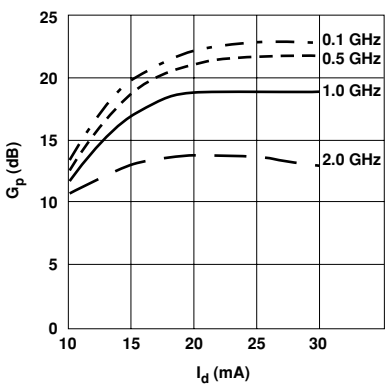


Figure 3. Power Gain vs. Current.

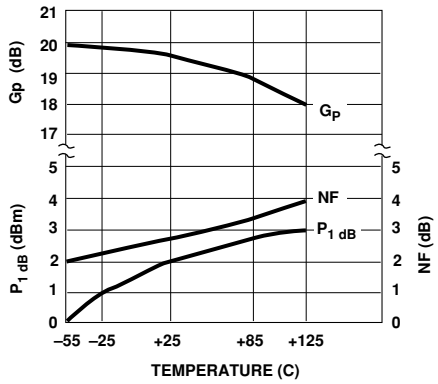


Figure 4. Output Power at 1 dB Gain Compression, NF and Power Gain vs. Case Temperature, f = 0.5 GHz, $I_d = 16$ mA.

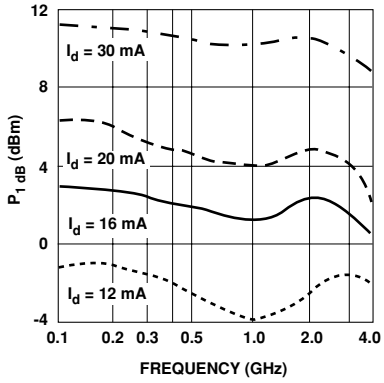


Figure 5. Output Power at 1 dB Gain Compression vs. Frequency.

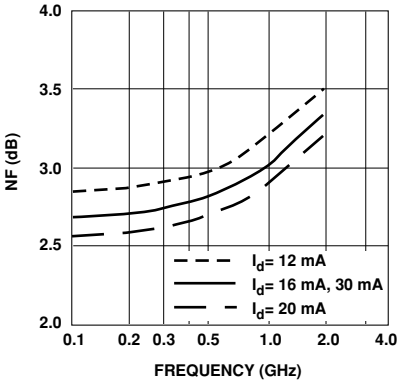
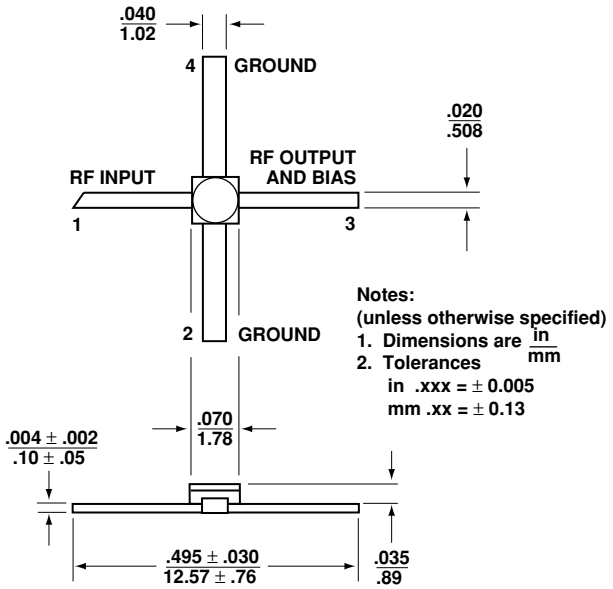


Figure 6. Noise Figure vs. Frequency.

Ordering Information

Part Numbers	No. of Devices	Comments
MSA-0670	100	Bulk

70 mil Package Dimensions



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