MSA-0520
Cascadable Silicon Bipolar MMIC Amplifier

Data Sheet

Description

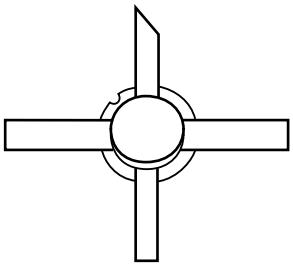
The MSA-0520 is a high performance silicon bipolar Monolithic Microwave Integrated Circuit (MMIC) housed in a hermetic, BeO disk package for good thermal characteristics. This MMIC is designed for use as a general purpose 50Ω gain block. Typical applications include narrow and broad band IF and RF amplifiers 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.

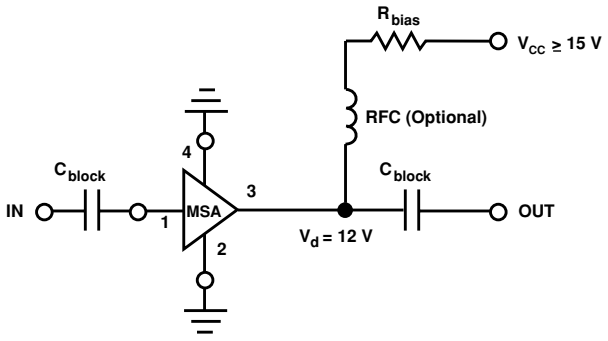
Features

- Cascadable 50 Ω Gain Block
- High Output Power:
  +23 dBm Typical $P_{1\ dB}$ at 1.0 GHz
- Low Distortion:
  33 dBm Typical IP_3 at 1.0 GHz
- 8.5 dB Typical Gain at 1.0 GHz
- Hermetic Metal/Beryllia Microstrip Package

200 mil BeO Package



Typical Biasing Configuration



MSA-0520 Absolute Maximum Ratings

Parameter	Absolute Maximum[1]
Device Current	225 mA
Power Dissipation[2,3]	3.0 W
RF Input Power	+25 dBm
Junction Temperature	200°C
Storage Temperature	–65 to 200°C

Notes:
1. Permanent damage may occur if any of these limits are exceeded.
2. T_{CASE} = 25°C.
3. Derate at 40 mW/°C for T_C > 125°C.
4. The small spot size of this technique results in a higher, though more accurate determination of θ_{jc} than do alternate methods.

Thermal Resistance[2,4]:

θ_{jc} = 25°C/W

Electrical Specifications[1], T_A = 25°C

Symbol	Parameters and Test Conditions: I_d = 165 mA, Z_0 = 50 Ω		Units	Min.	Typ.	Max.
$P_{1\,dB}$	Output Power at 1 dB Gain Compression	f = 1.0 GHz	dBm	21.0	23.0	
G_P	Power Gain ($\|S_{21}\|^2$)	f = 0.1 GHz	dB	7.5	8.5	9.5
ΔG_P	Gain Flatness	f = 0.1 to 2.0 GHz	dB		±0.75	
$f_{3\,dB}$	3 dB Bandwidth[2]		GHz		2.8	
VSWR	Input VSWR	f = 0.1 to 2.0 GHz			2.0:1	
	Output VSWR	f = 0.1 to 2.0 GHz			2.5:1	
IP_3	Third Order Intercept Point	f = 1.0 GHz	dBm		33.0	
$NF_{50\,\Omega}$	50 Ω Noise Figure	f = 1.0 GHz	dB		6.5	
t_D	Group Delay	f = 1.0 GHz	psec		170	
V_d	Device Voltage		V	10.5	12.0	13.5
dV/dT	Device Voltage Temperature Coefficient		mV/°C		–16.0	

Notes:
1. The recommended operating current range for this device is 80 to 200 mA. Typical performance as a function of current is on the following page.
2. Referenced from 0.1 GHz Gain (GP).

MSA-0520 Typical Scattering Parameters ($T_A = 25°C$, $I_d = 165$ mA)

Freq.	S_{11}			S_{21}			S_{12}		S_{22}		
MHz	Mag	Ang	dB	Mag	Ang	dB	Mag	Ang	Mag	Ang	k
5	.57	−38	14.4	5.25	165	−19.4	.107	38	.67	−35	0.57
25	.25	−90	10.7	3.42	160	−14.9	.180	17	.29	−81	0.93
50	.15	−111	9.5	2.97	163	−14.4	.190	9	.18	−97	1.10
100	.11	−138	8.9	2.80	166	−14.2	.195	3	.11	−113	1.16
200	.10	−152	8.8	2.75	163	−14.1	.197	1	.10	−125	1.17
400	.10	−152	8.7	2.72	152	−14.1	.198	−2	.14	−123	1.16
600	.11	−147	8.6	2.70	140	−14.0	.199	−4	.18	−123	1.14
800	.13	−142	8.5	2.67	128	−14.1	.199	−6	.22	−127	1.12
1000	.15	−140	8.4	2.64	115	−14.1	.198	−8	.27	−131	1.09
1500	.22	−142	8.0	2.52	85	−13.7	.206	−12	.34	−143	0.98
2000	.30	−156	7.4	2.36	55	−13.3	.216	−16	.43	−158	0.85
2500	.37	−170	6.7	2.16	33	−12.9	.227	−18	.48	−166	0.75
3000	.41	170	5.6	1.91	8	−12.7	.232	−23	.51	−177	0.70
3500	.45	149	4.5	1.68	−16	−12.1	.249	−31	.55	173	0.63
4000	.46	124	3.3	1.45	−40	−11.7	.259	−39	.56	162	0.66

Typical Performance, $T_A = 25°C$

(unless otherwise noted)

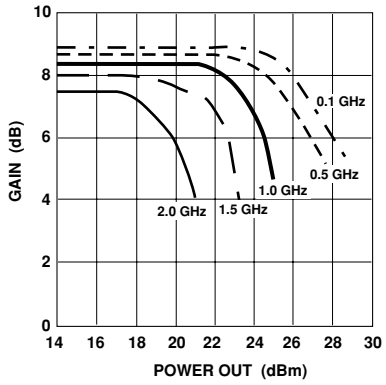


Figure 1. Typical Gain vs. Power Out, $T_A = 25°C$, $I_d = 165$ mA.

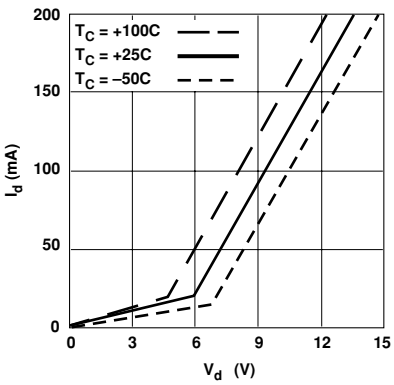


Figure 2. Device Current vs. Voltage.

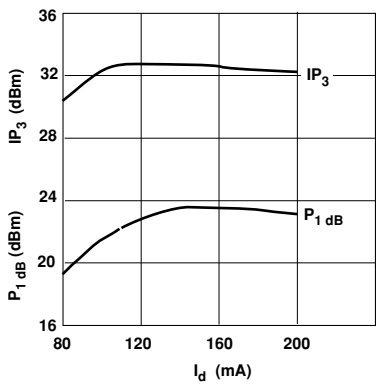


Figure 3. Output Power at 1 dB Gain Compression, Third Order Intercept vs. Current, f = 1.0 GHz.

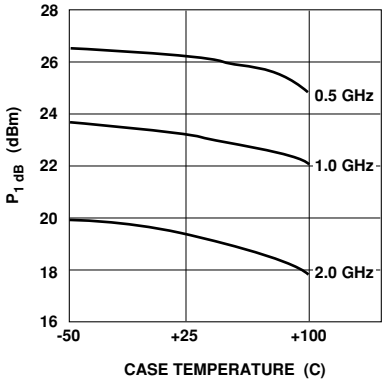


Figure 4. Output Power @ 1 dB Gain Compression vs. Temperature, $I_d = 165$ mA.

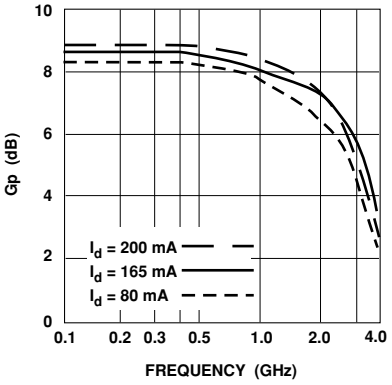


Figure 5. Gain vs. Frequency.

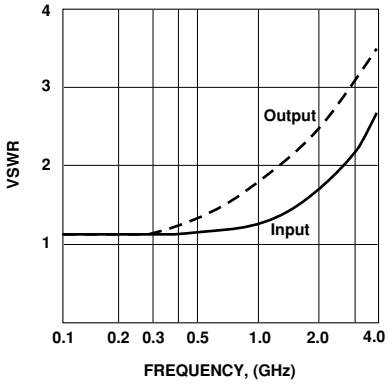
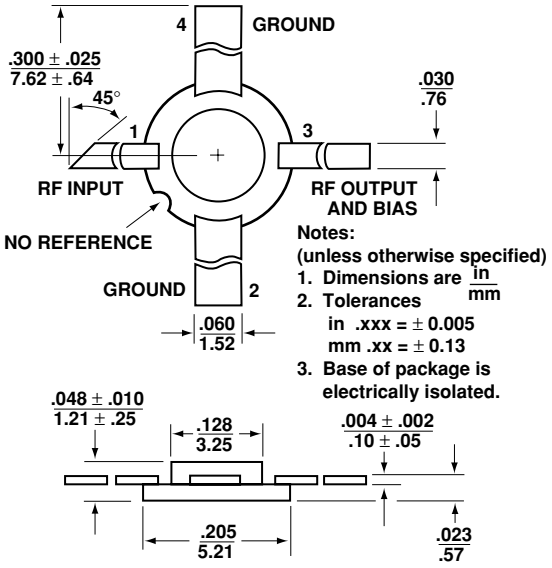


Figure 6. VSWR vs. Frequency, $I_d = 165$ mA.

Ordering Information

Part Numbers	No. of Devices	Comments
MSA-0520	100	Bulk

200 mil BeO Package Dimensions



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