

MSA-0386

Cascadable Silicon Bipolar MMIC Amplifier



Data Sheet

Description

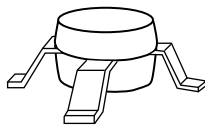
The MSA-0386 is a high performance silicon bipolar Monolithic Microwave Integrated Circuit (MMIC) housed in a low cost, surface mount plastic package. This MMIC is designed for use as a general purpose 50Ω gain block. Typical applications include narrow and broad band IF and RF amplifiers in commercial and industrial 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.

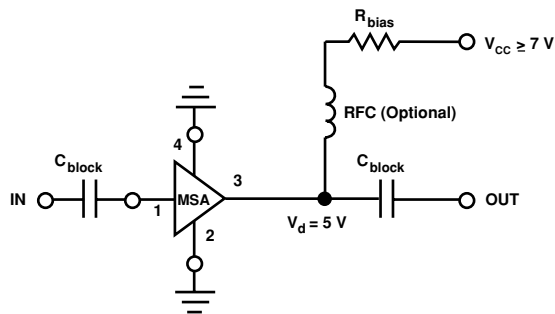
Features

- Lead-free Option Available
- Cascadable 50Ω Gain Block
- 3 dB Bandwidth: DC to 2.4 GHz
- 12.0 dB Typical Gain at 1.0 GHz
- 10.0 dBm Typical $P_{1\text{ dB}}$ at 1.0 GHz
- Unconditionally Stable ($k > 1$)
- Surface Mount Plastic Package
- Tape-and-Reel Packaging Option Available

86 Plastic Package



Typical Biasing Configuration



MSA-0386 Absolute Maximum Ratings

Parameter	Absolute Maximum ^[1]
Device Current	70 mA
Power Dissipation ^[2,3]	400 mW
RF Input Power	+13 dBm
Junction Temperature	150°C
Storage Temperature	-65 to 150°C

Thermal Resistance^{[2]:}

$$\theta_{jc} = 115^{\circ}\text{C}/\text{W}$$

Notes:

1. Permanent damage may occur if any of these limits are exceeded.
2. $T_{\text{CASE}} = 25^{\circ}\text{C}$.
3. Derate at $9.5 \text{ mW}/^{\circ}\text{C}$ for $T_{\text{C}} > 116^{\circ}\text{C}$.

Electrical Specifications^[1], $T_{\text{A}} = 25^{\circ}\text{C}$

Symbol	Parameters and Test Conditions: $I_{\text{d}} = 35 \text{ mA}$, $Z_{\text{O}} = 50 \Omega$	Units	Min.	Typ.	Max.
G_{P}	Power Gain ($ S_{21} ^2$) $f = 0.1 \text{ GHz}$ $f = 1.0 \text{ GHz}$	dB	10.0	12.5 12.0	
ΔG_{P}	Gain Flatness $f = 0.1 \text{ to } 1.6 \text{ GHz}$	dB		± 0.7	
$f_{\text{3 dB}}$	3 dB Bandwidth	GHz		2.4	
VSWR	Input VSWR $f = 0.1 \text{ to } 3.0 \text{ GHz}$			1.5:1	
	Output VSWR $f = 0.1 \text{ to } 3.0 \text{ GHz}$			1.7:1	
NF	50 Ω Noise Figure $f = 1.0 \text{ GHz}$	dB		6.0	
$P_{1 \text{ dB}}$	Output Power at 1 dB Gain Compression $f = 1.0 \text{ GHz}$	dBm		10.0	
IP_3	Third Order Intercept Point $f = 1.0 \text{ GHz}$	dBm		23.0	
t_{D}	Group Delay $f = 1.0 \text{ GHz}$	psec		140	
V_{d}	Device Voltage	V	4.0	5.0	6.0
dV/dT	Device Voltage Temperature Coefficient	$\text{mV}/^{\circ}\text{C}$		-8.0	

Note:

1. The recommended operating current range for this device is 20 to 40 mA. Typical performance as a function of current is on the following page.

Ordering Information

Part Numbers	No. of Devices	Comments
MSA-0386-BLK	100	Bulk
MSA-0386-BLKG	100	Bulk
MSA-0386-TR1	1000	7" Reel
MSA-0386-TR1G	1000	7" Reel
MSA-0386-TR2	4000	13" Reel
MSA-0386-TR2G	4000	13" Reel

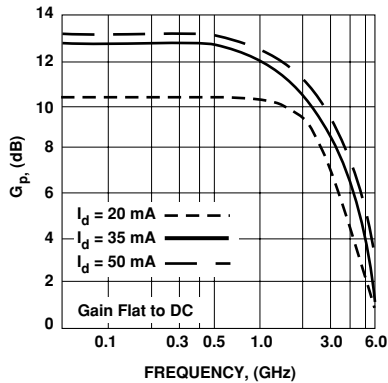
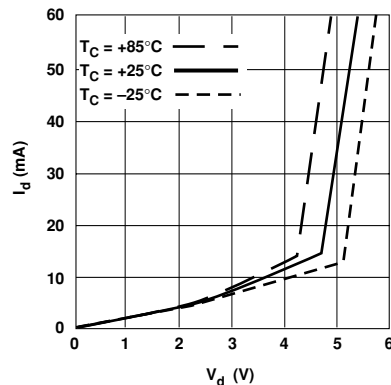
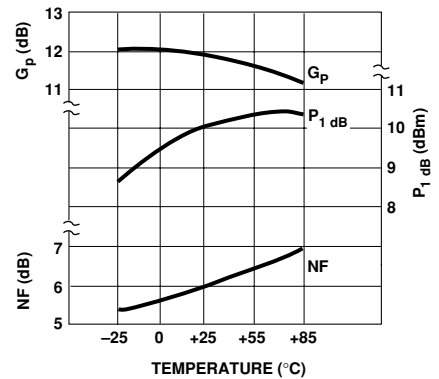
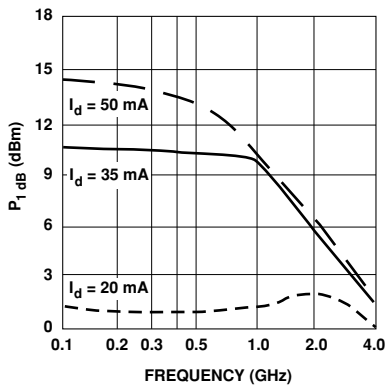
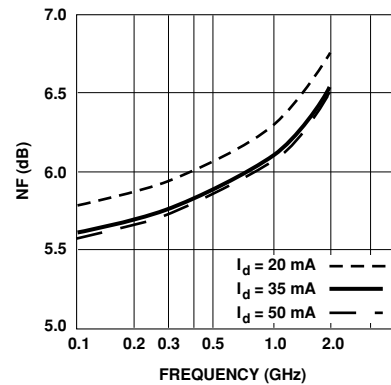
Note: Order part number with a "G" suffix if lead-free option is desired.

MSA-0386 Typical Scattering Parameters ($Z_0 = 50 \Omega$, $T_A = 25^\circ\text{C}$, $I_d = 35 \text{ mA}$)

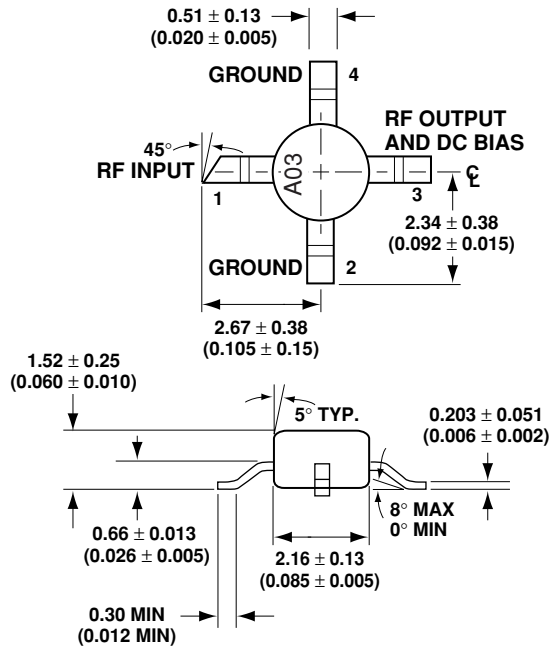
Freq. GHz	S_{11}		S_{21}			S_{12}			S_{22}	
	Mag	Ang	dB	Mag	Ang	dB	Mag	Ang	Mag	Ang
0.1	.11	174	12.5	4.22	175	-18.3	.122	1	.13	-11
0.2	.11	169	12.5	4.20	170	-18.2	.124	2	.13	-20
0.4	.11	159	12.4	4.16	159	-18.1	.124	5	.14	-41
0.6	.10	149	12.2	4.09	149	-17.9	.128	8	.15	-60
0.8	.10	142	12.1	4.00	139	-17.6	.131	9	.16	-78
1.0	.09	137	11.9	3.93	129	-17.4	.136	11	.18	-93
1.5	.09	139	11.2	3.61	106	-16.6	.149	14	.20	-129
2.0	.12	149	10.3	3.28	83	-15.3	.171	13	.23	-157
2.5	.18	150	9.4	2.95	66	-14.4	.190	12	.26	-176
3.0	.25	142	8.3	2.60	48	-13.7	.207	9	.29	167
3.5	.32	133	7.2	2.29	31	-13.2	.219	3	.30	152
4.0	.40	124	6.0	2.01	15	-13.0	.224	-1	.31	142
5.0	.53	106	3.7	1.53	-13	-12.8	.228	-11	.32	128

Typical Performance, $T_A = 25^\circ\text{C}$

(unless otherwise noted)


Figure 1. Typical Power Gain vs. Frequency, $T_A = 25^\circ\text{C}$.

Figure 2. Device Current vs. Voltage.

Figure 3. Output Power at 1 dB Gain Compression, NF and Power Gain vs. Case Temperature, $f = 1.0 \text{ GHz}$, $I_d = 35 \text{ mA}$.

Figure 4. Output Power at 1 dB Gain Compression vs. Frequency.

Figure 5. Noise Figure vs. Frequency.

86 Plastic Package Dimensions



DIMENSIONS ARE IN MILLIMETERS (INCHES)

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