MSA-0286
Cascadable Silicon Bipolar MMIC Amplifier

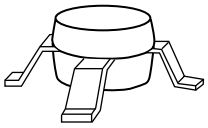
Data Sheet

Description
The MSA-0286 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.

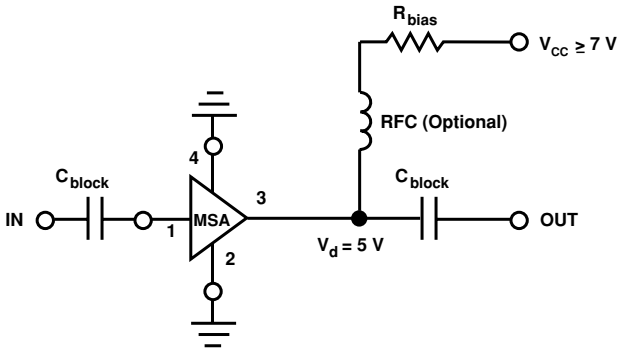
The MSA-series is fabricated using Avago's 10 GHz f_T, 25 GHz f_{MAX}, silicon bipolar MMIC process which uses nitride self-alignment, ion implantation, and gold metallization to achieve excellent performance, uniformity and reliability. The use of an external bias resistor for temperature and current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

Features
- Cascadable 50 Ω Gain Block
- 3 dB Bandwidth: DC to 2.5 GHz
- 12.0 dB Typical Gain at 1.0 GHz
- Unconditionally Stable (k>1)
- Surface Mount Plastic Package
- Tape-and-Reel Packaging Option Available
- Lead-free Option Available

86 Plastic Package



Typical Biasing Configuration



MSA-0286 Absolute Maximum Ratings

Parameter	Absolute Maximum[1]
Device Current	60 mA
Power Dissipation[2,3]	325 mW
RF Input Power	+13 dBm
Junction Temperature	150°C
Storage Temperature	–65 to 150°C

Thermal Resistance[2]:
θ_{jc} = 105°C/W

Notes:
1. Permanent damage may occur if any of these limits are exceeded.
2. T_{CASE} = 25°C.
3. Derate at 9.5 mW/°C for T_C > 116°C.

Electrical Specifications[1], T_A = 25°C

Symbol	Parameters and Test Conditions: I_d = 25 mA, Z_O = 50 Ω		Units	Min.	Typ.	Max.
G_P	Power Gain ($\|S_{21}\|^2$)	f = 0.1 GHz f = 1.0 GHz	dB	 10.0	12.5 12.0	
ΔG_P	Gain Flatness	f = 0.1 to 1.6 GHz	dB		±0.6	
$f_{3\ dB}$	3 dB Bandwidth		GHz		2.5	
VSWR	Input VSWR	f = 0.1 to 3.0 GHz			1.5:1	
	Output VSWR	f = 0.1 to 3.0 GHz			1.4:1	
NF	50 Ω Noise Figure	f = 1.0 GHz	dB		6.5	
$P_{1\ dB}$	Output Power at 1 dB Gain Compression	f = 1.0 GHz	dBm		4.5	
IP_3	Third Order Intercept Point	f = 1.0 GHz	dBm		17.0	
t_D	Group Delay	f = 1.0 GHz	psec		140	
V_d	Device Voltage		V	4.0	5.0	6.0
dV/dT	Device Voltage Temperature Coefficient		mV/°C		–8.0	

Note:
1. The recommended operating current range for this device is 18 to 40 mA. Typical performance as a function of current is on the following page.

Ordering Information

Part Numbers	No. of Devices	Comments
MSA-0286-BLK	100	Bulk
MSA-0286-BLKG	100	Bulk
MSA-0286-TR1	1000	7" Reel
MSA-0286-TR1G	1000	7" Reel
MSA-0286-TR2	4000	13" Reel
MSA-0286-TR2G	4000	13" Reel

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

MSA-0286 Typical Scattering Parameters (Z_0 = 50 Ω, T_A = 25°C, I_d = 25 mA)

Freq. GHz	S_{11}		S_{21}			S_{12}			S_{22}	
	Mag	Ang	dB	Mag	Ang	dB	Mag	Ang	Mag	Ang
0.1	.10	171	12.5	4.22	175	–18.5	.119	1	.16	–5
0.2	.10	161	12.5	4.20	170	–18.3	.121	3	.16	–11
0.4	.10	144	12.4	4.16	159	–18.2	.122	6	.15	–24
0.6	.09	129	12.2	4.09	149	–18.0	.126	6	.15	–36
0.8	.08	119	12.1	4.01	139	–18.0	.127	9	.14	–48
1.0	.08	108	11.9	3.91	129	–17.4	.135	8	.14	–62
1.5	.06	111	11.3	3.67	106	–16.5	.149	12	.11	–99
2.0	.08	141	10.5	3.35	84	–15.7	.164	11	.11	–141
2.5	.14	150	9.6	3.01	67	–14.8	.182	9	.12	–176
3.0	.21	142	8.6	2.68	48	–14.3	.194	5	.13	155
3.5	.29	132	7.5	2.37	30	–14.0	.200	1	.14	140
4.0	.36	121	6.4	2.09	15	–13.5	.211	–3	.16	134
5.0	.50	101	4.1	1.61	–12	–13.3	.216	–12	.20	132

Typical Performance, T_A = 25°C

(unless otherwise noted)

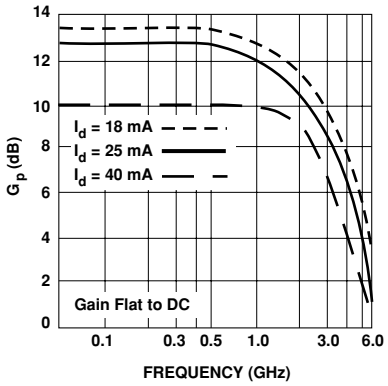


Figure 1. Typical Power Gain vs. Frequency.

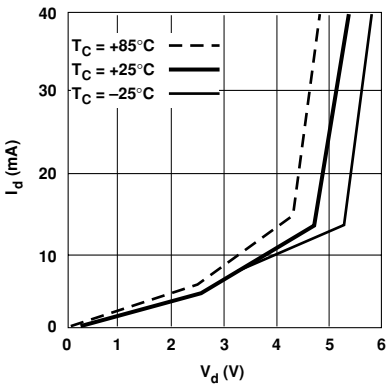


Figure 2. Device Current vs. Voltage.

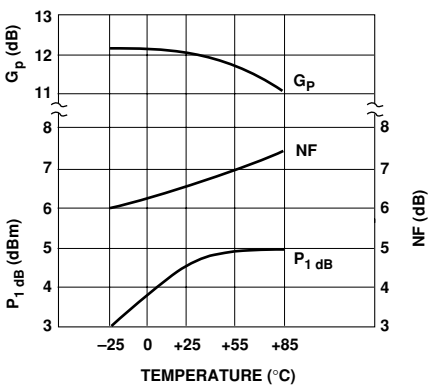


Figure 3. Output Power at 1 dB Gain Compression, NF and Power Gain vs. Case Temperature, f = 1.0 GHz, I_d = 25 mA.

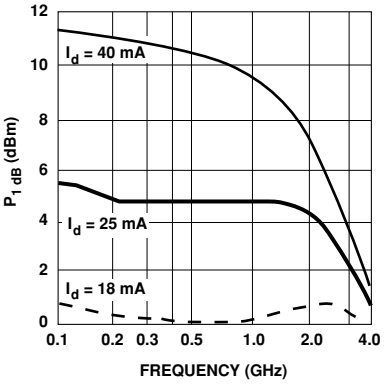


Figure 4. Output Power at 1 dB Gain Compression vs. Frequency.

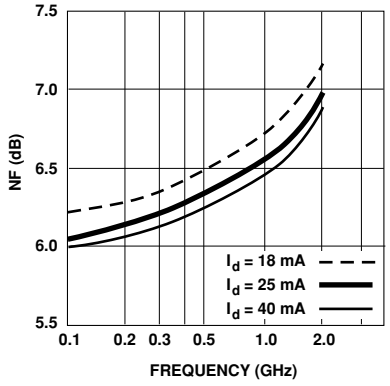
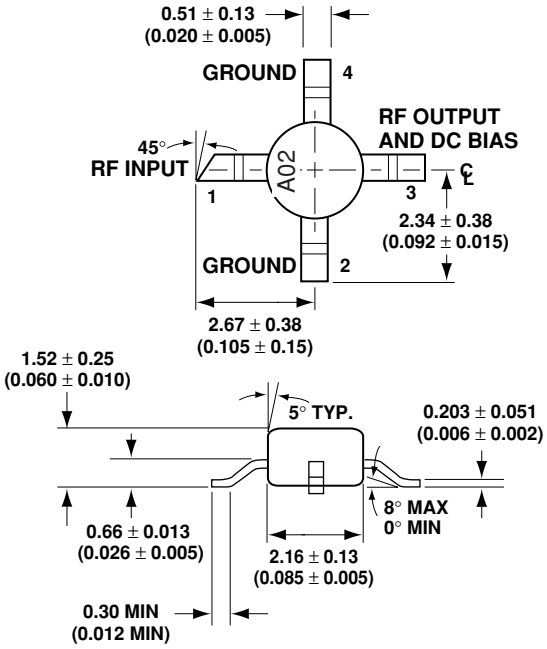


Figure 5. Noise Figure vs. Frequency.

86 Plastic Package Dimensions



DIMENSIONS ARE IN MILLIMETERS (INCHES)

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www.avagotech.com

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