MSA-1105

Cascadable Silicon Bipolar MMIC Amplifier



Data Sheet

Description

The MSA-1105 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 high dynamic range in either 50 or 75 Ω systems by combining low noise figure with high IP3. Typical applications include narrow and broadband linear amplifiers in commercial and industrial systems.

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.

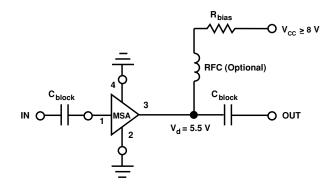
Features

- High Dynamic Range Cascadable 50Ω or 75Ω Gain Block
- 3 dB Bandwidth: 50 MHz to 1.3 GHz
- 17.5 dBm Typical P_{1 dB} at 0.5 GHz
- 3.6 dB Typical Noise Figure at 0.5 GHz
- Surface Mount Plastic Package
- Tape-and-Reel Packaging Option Available
- Lead-free Option Available

05 Plastic Package



Typical Biasing Configuration



MSA-1105 Absolute Maximum Ratings

Parameter	Absolute Maximum ^[1]
Device Current	80 mA
Power Dissipation ^[2,3]	550 mW
RF Input Power	+13 dBm
lunction Temperature	150°C
Storage Temperature	−65 to 150°C

Thermal Resistance^[2]:

 $\theta_{ic} = 125$ °C/W

- 1. Permanent damage may occur if any of these limits are exceeded.
- T_{CASE} = 25°C.
 Derate at 8 mW/°C for T_C > 124°C.

Electrical Specifications^[1], $T_A = 25^{\circ}C$

Symbol	Parameters and Test Conditions: $I_d = 60$	Units	Min.	Тур.	Max.	
Gp	Power Gain (S ₂₁ ²)	f = 0.05 GHz f = 0.5 GHz f = 1.0 GHz	dB dB dB	10.0	12.7 12.0 10.5	
ΔG_P	Gain Flatness	f = 0.1 to 1.0 GHz	dB		±1.0	
f _{3 dB}	3 dB Bandwidth ^[2]		GHz		1.3	
VSWR —	Input VSWR	f = 0.1 to 1.0 GHz			1.5:1	
	Output VSWR	f = 0.1 to 1.0 GHz			1.7:1	
NF	50 Ω Noise Figure	f = 0.5 GHz	dB		3.6	
P _{1 dB}	Output Power at 1 dB Gain Compression	f = 0.5 GHz	dBm		17.5	
IP ₃	Third Order Intercept Point	f = 0.5 GHz	dBm		30.0	
t _D	Group Delay	f = 0.5 GHz	psec		200	
V _d	Device Voltage		V	4.4	5.5	6.6
dV/dT	Device Voltage Temperature Coefficient		mV/°C		-8.0	

Notes:

Ordering Information

No. of Devices	Comments
10	Bulk
100	Bulk
500	7" Reel
500	7" Reel
1500	13" Reel
1500	13" Reel
	10 100 500 500 1500

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

^{1.} The recommended operating current range for this device is 40 to 70 mA. Typical performance as a function of current is on the following page.

^{2.} Referenced from 50 MHz gain (GP).

MSA-1105 Typical Scattering Parameters (Z $_0$ = 50 Ω , T $_A$ = 25°C, I $_d$ = 60 mA)

Freq.	:	S ₁₁		S ₂₁			S ₁₂			S ₂₂		
GHz	Mag	Ang	dB	Mag	Ang	dB	Mag	Ang	Mag	Ang	k	
.0005	.80	-17	19.0	8.94	171	-26.0	.050	51	.81	-16	0.53	
.005	.26	-62	13.9	4.98	163	-16.8	.144	15	.26	-64	0.93	
.025	.07	-48	12.8	4.36	174	-16.4	.151	4	.08	-52	1.08	
.050	.06	-38	12.7	4.33	174	-16.3	.153	2	.06	-48	1.08	
.100	.05	-41	12.7	4.31	170	-16.4	.152	3	.06	-52	1.09	
.200	.06	-58	12.6	4.26	162	-16.2	.155	5	.08	-73	1.08	
.300	.07	-74	12.4	4.19	154	-16.1	.157	7	.10	-91	1.07	
.400	.09	-91	12.2	4.10	146	-15.8	.163	8	.12	-105	1.06	
.500	.10	-105	12.0	4.00	138	-15.6	.166	8	.14	-116	1.05	
.600	.11	-116	11.8	3.88	131	-15.4	.171	10	.17	-126	1.04	
.700	.13	-128	11.5	3.76	123	-15.0	.178	11	.18	-135	1.03	
.800	.15	-136	11.2	3.63	116	-14.7	.184	11	.21	-144	1.01	
.900	.16	-145	10.9	3.49	109	-15.5	.188	11	.22	-151	1.01	
1.000	.18	-152	10.5	3.37	102	-14.1	.197	11	.24	-159	1.00	
1.500	.28	174	8.8	2.75	72	-13.2	.219	7	.31	170	1.00	
2.000	.38	150	7.1	2.28	48	-12.1	.248	0	.34	151	0.99	
2.500	.46	133	5.6	1.90	28	-11.9	.254	-4	.38	134	1.02	
3.000	.53	118	4.2	1.62	11	-11.6	.262	-8	.40	122	1.04	

Typical Performance, $T_A = 25$ °C, $Z_0 = 50 \Omega$

(unless otherwise noted)

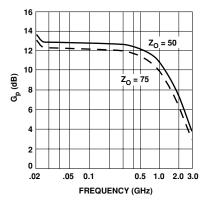


Figure 1. Typical Power Gain vs. Frequency, $I_{\rm d} = 60$ mA.

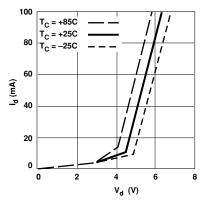


Figure 2. Device Current vs. Voltage.

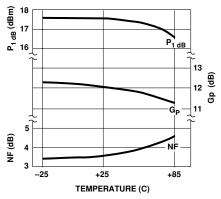


Figure 3. Output Power at 1 dB Gain Compression, Noise Figure and Power Gain vs. Case Temperature, $f=0.5~{\rm GHz}$, $I_d=60~{\rm mA}$.

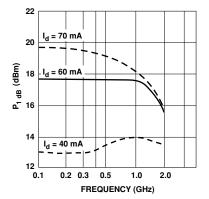


Figure 4. Output Power at 1 dB Gain Compression vs. Frequency.

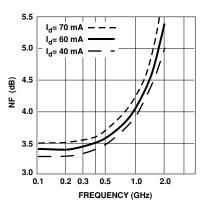
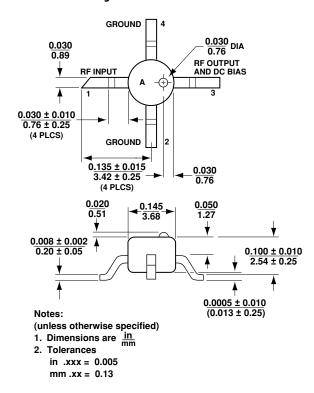


Figure 5. Noise Figure vs. Frequency.

05 Plastic Package Dimensions



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