

Data Sheet

Description

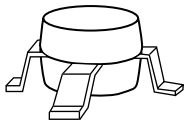
The MSA-0505 is a high performance medium power silicon bipolar Monolithic Microwave Integrated Circuit (MMIC) housed in a low cost, surface mount package. This MMIC is designed for use as a general purpose 50 Ω gain block. Typical applications include narrow and broad band IF and RF amplifiers in commercial 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.

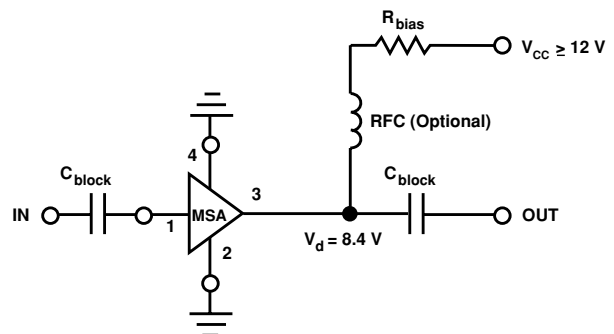
Features

- Cascadable 50 Ω Gain Block
- High Output Power:
18.0 dBm Typical $P_{1\text{ dB}}$ at 1.0 GHz
- Low Distortion:
29.0 dBm Typical IP_3 at 1.0 GHz
- 7.0 dB Typical Gain at 1.0 GHz
- Surface Mount Plastic Package
- Tape-and-Reel Packaging Option Available
- Lead-free Option Available

05 Plastic Package



Typical Biasing Configuration



MSA-0505 Absolute Maximum Ratings

Parameter	Absolute Maximum ^[1]
Device Current	135 mA
Power Dissipation ^[2,3]	1.5 W
RF Input Power	+25 dBm
Junction Temperature	200°C
Storage Temperature	-65 to 150°C

Thermal Resistance^[2]:

$$\theta_{jc} = 85^{\circ}\text{C/W}$$

Notes:

1. Permanent damage may occur if any of these limits are exceeded.
2. $T_{\text{CASE}} = 25^{\circ}\text{C}$.
3. Derate at 11.8 mW/°C for $T_C > 73^{\circ}\text{C}$.

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

Symbol	Parameters and Test Conditions: $I_d = 80 \text{ mA}$, $Z_0 = 50 \Omega$	Units	Min.	Typ.	Max.
$P_1 \text{ dB}$	Output Power at 1 dB Gain Compression	$f = 0.5 \text{ GHz}$		19.0	
		$f = 1.0 \text{ GHz}$	16.0	18.0	
G_p	Power Gain ($ S_{21} ^2$)	$f = 0.5 \text{ GHz}$		7.5	
		$f = 1.0 \text{ GHz}$	6.0	7.0	
ΔG_p	Gain Flatness	$f = 0.1 \text{ to } 1.5 \text{ GHz}$		± 0.75	
$f_3 \text{ dB}$	3 dB Bandwidth ^[2]			2.3	
VSWR	Input VSWR	$f = 0.1 \text{ to } 1.5 \text{ GHz}$		1.6:1	
	Output VSWR	$f = 0.1 \text{ to } 1.5 \text{ GHz}$		2.0:1	
IP_3	Third Order Intercept Point	$f = 1.0 \text{ GHz}$		29.0	
NF	50 Ω Noise Figure	$f = 1.0 \text{ GHz}$		6.5	
t_D	Group Delay	$f = 1.0 \text{ GHz}$		190	
V_d	Device Voltage	V	6.7	8.4	10.1
dV/dT	Device Voltage Temperature Coefficient	mV/°C		-16.0	

Notes:

1. The recommended operating current range for this device is 60 to 100 mA.
Typical performance as a function of current is on the following page.
2. Referenced from 0.1 GHz Gain (GP).

Ordering Information

Part Numbers	No. of Devices	Comments
MSA-0505-STR	10	Bulk
MSA-0505-STRG	100	Bulk
MSA-0505-TR1	500	7" Reel
MSA-0505-TR1G	500	7" Reel

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

MSA-0505 Typical Scattering Parameters ($T_A = 25^\circ\text{C}$, $I_d = 80\text{ mA}$)

Freq. MHz	S_{11}			S_{21}			S_1		S_{22}		k
	Mag	Ang	dB	Mag	Ang	dB	Mag	Ang	Mag	Ang	
5	.56	-39	14.9	5.56	161	-18.5	.120	39	.65	-36	0.60
25	.24	-103	9.7	3.05	156	-13.9	.202	12	.25	-90	0.97
50	.15	-130	8.2	2.57	163	-13.7	.207	7	.15	-116	1.15
100	.13	-155	7.8	2.45	165	-13.7	.207	3	.11	-132	1.21
200	.12	-170	7.7	3.43	161	-13.5	.211	1	.11	-145	1.21
400	.12	178	7.5	2.37	148	-13.6	.209	-1	.14	-146	1.23
600	.13	172	7.4	2.34	134	-13.6	.209	-2	.17	-151	1.23
800	.13	168	7.2	2.29	119	-13.6	.209	-3	.21	-157	1.23
1000	.14	166	7.0	2.24	105	-13.4	.213	-4	.25	-164	1.21
1500	.21	159	6.4	2.09	72	-13.3	.217	-6	.34	176	1.16
2000	.30	148	5.2	1.82	42	-13.1	.222	-9	.42	159	1.12
2500	.40	136	4.1	1.60	17	-12.9	.227	-11	.48	146	1.05
3000	.52	121	2.7	1.36	-7	-12.6	.234	-16	.55	133	0.92

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

(unless otherwise noted)

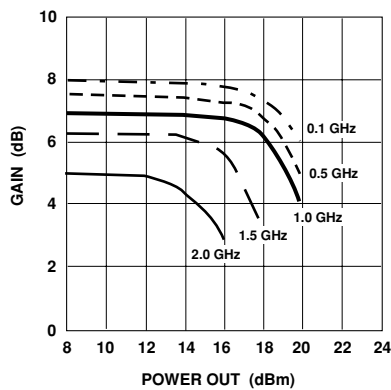


Figure 1. Typical Gain vs. Power Out, $T_A = 25^\circ\text{C}$, $I_d = 80\text{ mA}$.

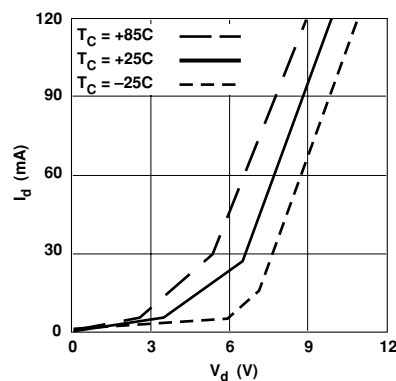


Figure 2. Device Current vs. Voltage.

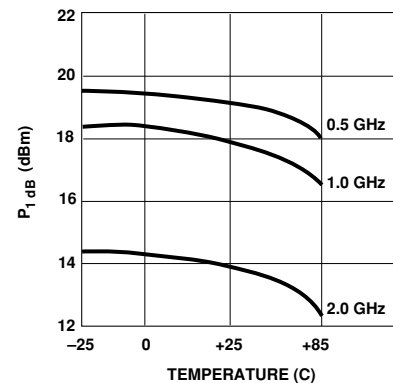


Figure 3. Output Power at 1 dB Gain Compression, vs. Case Temperature, $I_d = 80\text{ mA}$.

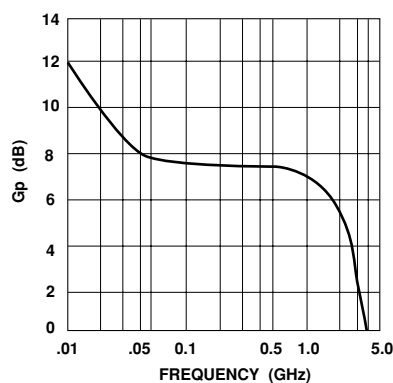


Figure 4. Gain vs. Frequency, $I_d = 80$ to 100 mA .

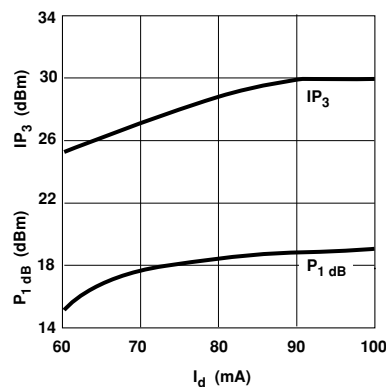
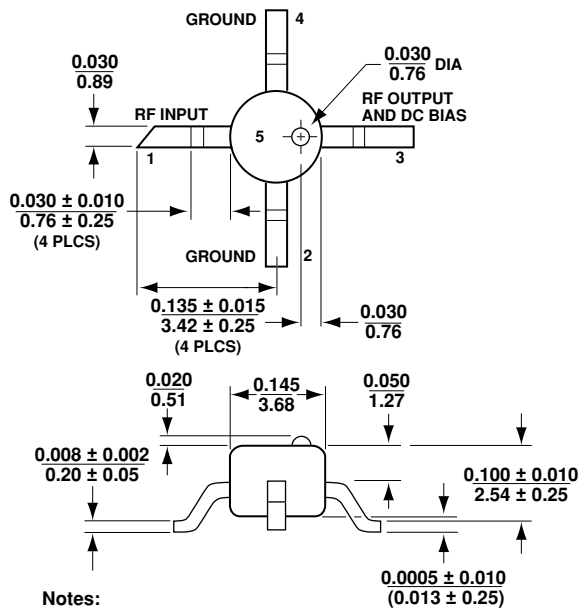


Figure 5. Output Power at 1 dB Gain Compression, Third Order Intercept vs. Case Temperature, $f = 1.0\text{ GHz}$.

05 Plastic Package Dimensions



Notes:

(unless otherwise specified)

1. Dimensions are $\frac{\text{in}}{\text{mm}}$

2. Tolerances

in .xxx = 0.005

mm .xx = 0.13

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

Avago, Avago Technologies, and the A logo are trademarks of Avago Technologies, Limited in the United States and other countries. Data subject to change. Copyright © 2008 Avago Technologies, Limited. All rights reserved. Obsoletes 5989-2754EN
AV02-1227EN May 14, 2008

AVAGO
TECHNOLOGIES