MSA-0505
Cascadable Silicon Bipolar MMIC Amplifier

Data Sheet

Description

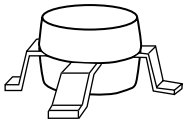
The MSA-0505 is a high performance medium power silicon bipolar Monolithic Microwave Integrated Circuit (MMIC) housed in a low cost, surface mount package. This MMIC is designed for use as a general purpose 50Ω gain block. Typical applications include narrow and broad band IF and RF amplifiers in commercial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

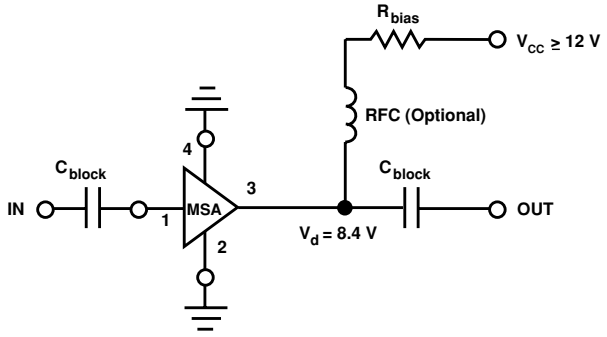
Features

- Cascadable 50 Ω Gain Block
- High Output Power:
  18.0 dBm Typical $P_{1\ dB}$ 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]:

$\theta_{jc} = 85°C/W$

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

Electrical Specifications[1], $T_A = 25°C$

Symbol	Parameters and Test Conditions: $I_d = 80$ mA, $Z_O = 50\ \Omega$		Units	Min.	Typ.	Max.
$P_{1\ dB}$	Output Power at 1 dB Gain Compression	f = 0.5 GHz	dBm		19.0	
		f = 1.0 GHz	dBm	16.0	18.0	
G_P	Power Gain ($\|S_{21}\|^2$)	f = 0.5 GHz	dB		7.5	
		f = 1.0 GHz		6.0	7.0	
ΔG_P	Gain Flatness	f = 0.1 to 1.5 GHz	dB		±0.75	
$f_{3\ dB}$	3 dB Bandwidth[2]		GHz		2.3	
VSWR	Input VSWR	f = 0.1 to 1.5 GHz			1.6:1	
	Output VSWR	f = 0.1 to 1.5 GHz			2.0:1	
IP_3	Third Order Intercept Point	f = 1.0 GHz	dBm		29.0	
NF	50 Ω Noise Figure	f = 1.0 GHz	dB		6.5	
t_D	Group Delay	f = 1.0 GHz	psec		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 ($T_A = 25°C$, $I_d = 80$ mA)

Freq.	S_{11}			S_{21}			S_1		S_{22}		
MHz	Mag	Ang	dB	Mag	Ang	dB	Mag	Ang	Mag	Ang	k
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, $T_A = 25°C$

(unless otherwise noted)

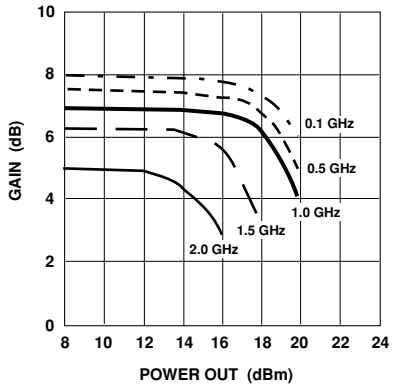


Figure 1. Typical Gain vs. Power Out, $T_A = 25°C$, $I_d = 80$ mA.

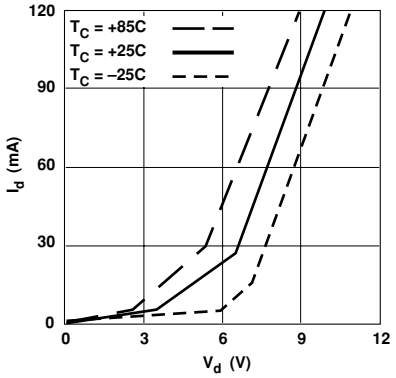


Figure 2. Device Current vs. Voltage.

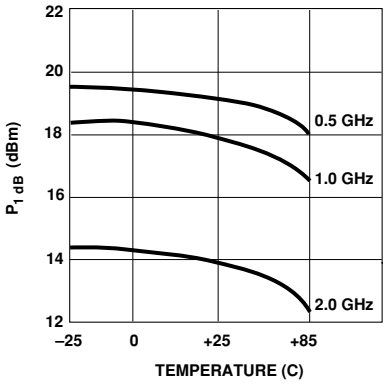


Figure 3. Output Power at 1 dB Gain Compression, vs. Case Temperature, $I_d = 80$ mA.

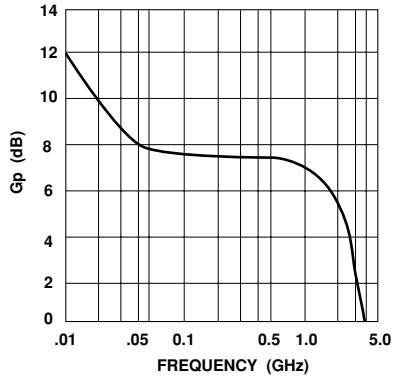


Figure 4. Gain vs. Frequency, $I_d = 80$ to 100 mA.

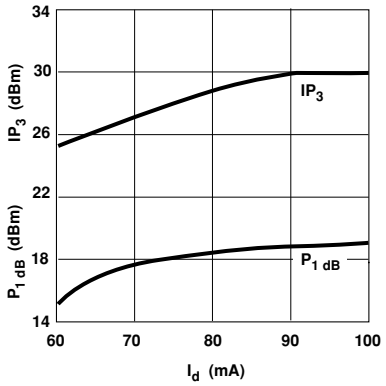
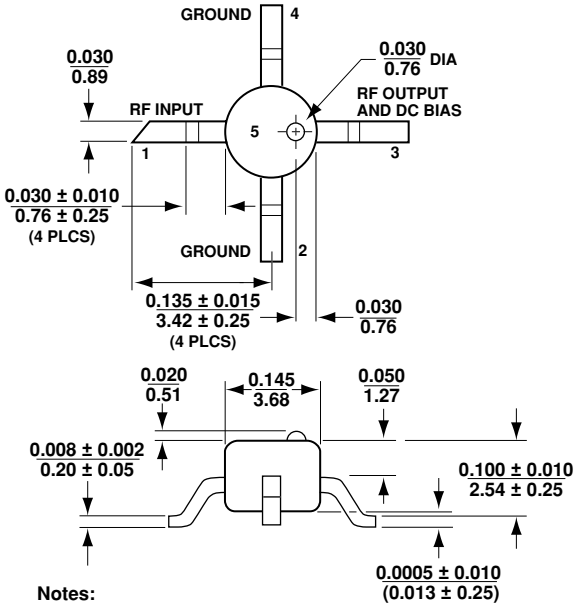


Figure 5. Output Power at 1 dB Gain Compression, Third Order Intercept vs. Case Temperature, f = 1.0 GHz.

05 Plastic Package Dimensions



Notes:
(unless otherwise specified)
1. Dimensions are in / 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**

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