



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of "Quality Parts,Customers Priority,Honest Operation,and Considerate Service",our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



MSA-0311

Cascadable Silicon Bipolar MMIC Amplifier



Data Sheet

Description

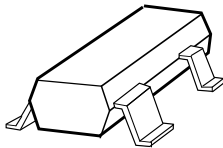
The MSA-0311 is a low cost silicon bipolar Monolithic Microwave Integrated Circuit (MMIC) housed in the surface mount plastic SOT-143 package. This MMIC is designed for use as a general purpose 50 Ω gain block. Typical applications include narrow and broad band IF and RF amplifiers in commercial and 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.

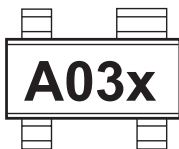
Features

- Cascadable 50 Ω Gain Block
- 3 dB Bandwidth: DC to 2.3 GHz
- 11.0 dB Typical Gain at 1.0 GHz
- 9.0 dBm Typical $P_{1\text{ dB}}$ at --1.0 GHz
- Unconditionally Stable ($k > 1$)
- Low Cost Surface Mount Plastic Package
- Tape-and-Reel Packaging Option Available
- Lead-free Option Available

SOT-143 Package



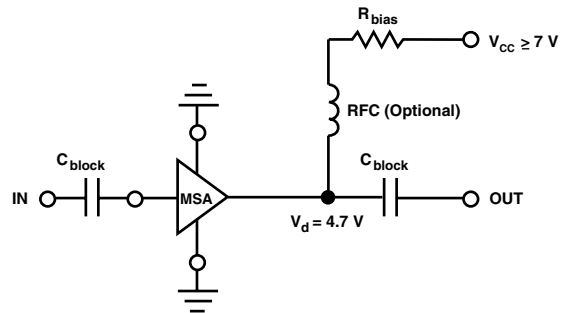
Pin Connections and Package Marking



Notes:

Top View. Package Marking provides orientation and identification. "x" is the date code.

Typical Biasing Configuration



MSA-0311 Absolute Maximum Ratings

Parameter	Absolute Maximum ^[1]
Device Current	60 mA
Power Dissipation ^[2,3]	240 mW
RF Input Power	+13 dBm
Junction Temperature	150°C
Storage Temperature	-65 to 150°C

Thermal Resistance^[2]: $\theta_{jc} = 500^{\circ}\text{C}/\text{W}$
--

Notes:

1. Permanent damage may occur if any of these limits are exceeded.
2. $T_{\text{CASE}} = 25^{\circ}\text{C}$.
3. Derate at 2.0 mW/°C for $T_C > 30^{\circ}\text{C}$.

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

Symbol	Parameters and Test Conditions: $I_d = 35 \text{ mA}$, $Z_0 = 50 \Omega$	Units	Min.	Typ.	Max.
G_p	Power Gain ($ S_{21} ^2$) f = 0.1 GHz f = 1.0 GHz	dB	9.0	11.5 11.0	
ΔG_p	Gain Flatness f = 0.1 to 1.6 GHz	dB		± 0.7	
$f_{3 \text{ dB}}$	3 dB Bandwidth	GHz		2.3	
VSWR	Input VSWR f = 0.1 to 3.0 GHz			1.5:1	
	Output VSWR f = 0.1 to 3.0 GHz			1.7:1	
NF	50 Ω Noise Figure f = 1.0 GHz	dB		6.0	
$P_{1 \text{ dB}}$	Output Power at 1 dB Gain Compression f = 1.0 GHz	dBm		9.0	
IP_3	Third Order Intercept Point f = 1.0 GHz	dBm		22.0	
t_D	Group Delay f = 1.0 GHz	psec		140	
V_d	Device Voltage $T_C = 25^{\circ}\text{C}$	V	3.8	4.7	5.6
dV/dT	Device Voltage Temperature Coefficient	mV/°C		-8.0	

Notes:

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

Ordering Information

Part Numbers	No. of Devices	Comments
MSA-0311-BLK	100	Bulk
MSA-0311-BLKG	100	Bulk
MSA-0311-TR1	3000	7" Reel
MSA-0311-TR1G	3000	7" Reel
MSA-0311-TR2	10000	13" Reel
MSA-0311-TR2G	10000	13" Reel

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

MSA-0311 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	.06	25	11.7	3.84	175	-17.9	.127	2	.24	-7
0.2	.07	31	11.7	3.83	170	-17.9	.128	3	.23	-13
0.4	.07	38	11.6	3.78	159	-17.8	.129	6	.24	-28
0.6	.07	30	11.4	3.72	149	-17.6	.132	18	.24	-40
0.8	.08	21	11.2	3.65	140	-17.3	.136	11	.24	-53
1.0	.08	10	11.0	3.56	130	-17.0	.141	13	.24	-65
1.5	.09	-32	10.4	3.31	106	-15.9	.160	17	.24	-91
2.0	.09	-105	9.5	2.99	84	-14.9	.179	16	.23	-115
2.5	.13	-151	8.5	2.66	70	-14.1	.197	19	.23	-133
3.0	.19	-176	7.4	2.35	51	-13.5	.212	15	.22	-145
3.5	.24	166	6.2	2.04	35	-13.0	.224	11	.23	-151
4.0	.27	152	5.1	1.80	20	-12.7	.232	6	.24	-151
5.0	.36	114	2.9	1.39	-6	-12.1	.250	-1	.25	-152
6.0	.50	88	0.8	1.10	-28	-11.8	.258	-8	.25	-166

Typical Performance, $T_A = 25^\circ\text{C}$
(unless otherwise noted)

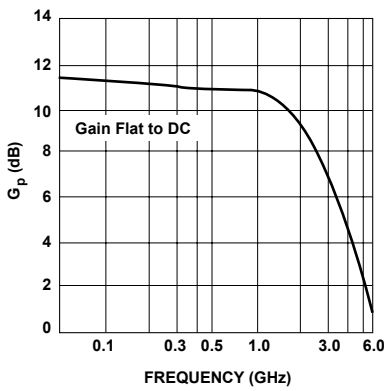


Figure 1. Typical Power Gain vs. Frequency, $I_d = 35 \text{ mA}$.

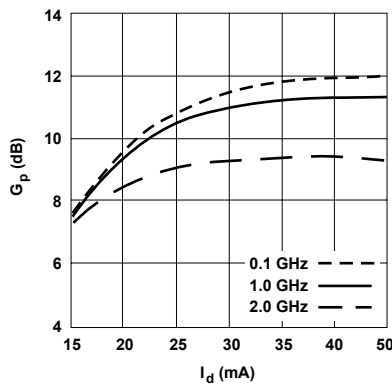


Figure 2. Power Gain vs. Current.

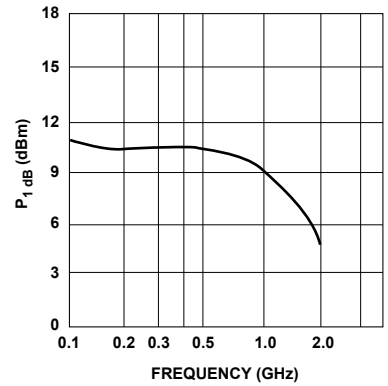


Figure 3. Output Power at 1 dB Gain Compression vs. Frequency, $I_d = 35 \text{ mA}$.

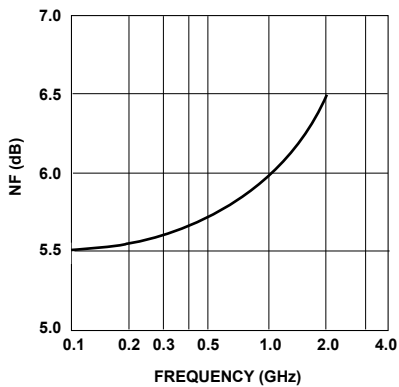
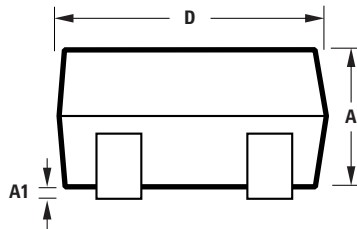
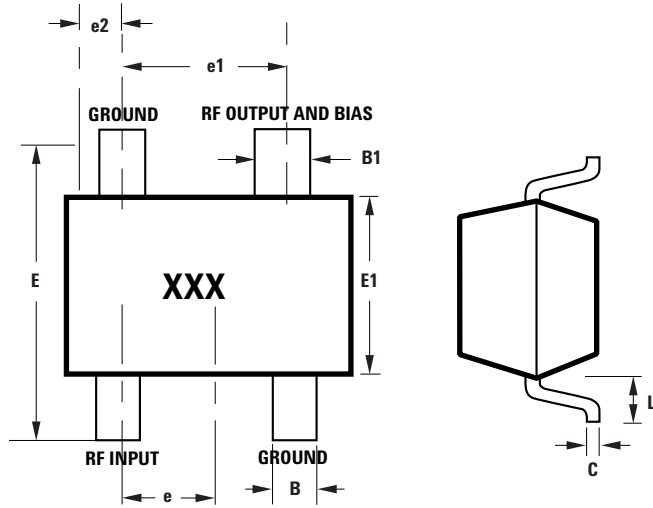


Figure 4. Noise Figure vs. Frequency, $I_d = 35 \text{ mA}$.

SOT-143 Package Dimensions



Notes:
 XXX-package marking
 Drawings are not to scale

SYMBOL	DIMENSIONS (mm)	
	MIN.	MAX.
A	0.79	1.097
A1	0.013	0.10
B	0.36	0.54
B1	0.76	0.92
C	0.086	0.152
D	2.80	3.06
E1	1.20	1.40
e	0.89	1.02
e1	1.78	2.04
e2	0.45	0.60
E	2.10	2.65
L	0.45	0.69

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 © 2006 Avago Technologies, Limited. All rights reserved. Obsoletes 5989-4452EN
 AV02-0788EN - October 30, 2007

