## **MSA-0711** Cascadable Silicon Bipolar MMIC Amplifier

## **Data Sheet**



#### Description

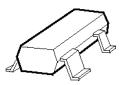
The MSA-0711 is a low cost silicon bipolar Monolithic Microwave Integrated Circuit (MMIC) housed in the surface mount plastic SOT-143 package. This MMIC is designed for use as a general purpose 50  $\Omega$  gain block. Typical applications include narrow and broad band IF and RF amplifiers in commercial 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  $\Omega$  Gain Block
- 3 dB Bandwidth: DC to 1.9 GHz
- 12.0 dB Typical Gain 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



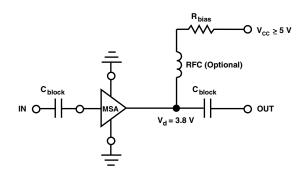
**Pin Connections and Package Marking** 



Notes:

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

#### **Typical Biasing Configuration**



#### MSA-0711 Absolute Maximum Ratings

Parameter	Absolute Maximum <sup>[1]</sup>	
Device Current	50 mA	
Power Dissipation <sup>[2,3]</sup>	175 mW	[
RF Input Power	+13 dBm	
Junction Temperature	150°C	
Storage Temperature	–65 to 150°C	

Thermal Resistance<sup>[2]</sup>:

 $\theta_{jc} = 505^{\circ}C/W$ 

#### Notes:

1. Permanent damage may occur if any of these limits are exceeded.

2.  $T_{CASE} = 25^{\circ}C.$ 

3. Derate at 2.0 mW/°C for  $T_C > 62$ °C.

### Electrical Specifications<sup>[1]</sup>, $T_A = 25^{\circ}C$

Symbol	Parameters and Test Conditions: I	Units	Min.	Тур.	Max.	
G <sub>P</sub>	Power Gain ( S <sub>21</sub>   <sup>2</sup> )	f = 0.1 GHz f = 1.0 GHz	dB	10.0	13.0 12.0	
$\Delta G_P$	Gain Flatness	f = 0.1 to 1.3 GHz	dB		±0.8	
f <sub>3 dB</sub>	3 dB Bandwidth		GHz		3.2	
VSWR	Input VSWR	f = 0.1 to 2.0 GHz			1.5:1	
VOVIK	Output VSWR	f = 0.1 to 2.0 GHz			1.5:1	
NF	50 Ω Noise Figure	f = 1.0 GHz	dB		5.0	
P <sub>1 dB</sub>	Output Power at 1 dB Gain Compression	f = 1.0 GHz	dBm		5.5	
IP <sub>3</sub>	Third Order Intercept Point	f = 1.0 GHz	dBm		18.0	
t <sub>D</sub>	Group Delay	f = 1.0 GHz	psec		145	
V <sub>d</sub>	Device Voltage	$T_C = 25^{\circ}C$	V	3.0	3.8	4.6
dV/dT	Device Voltage Temperature Coefficient		mV/°C		-7.0	

Note:

1. The recommended operating current range for this device is 15 to 30 mA. Typical performance as a function of current is on the following page.

#### **Ordering Information**

Part Numbers	No. of Devices	Comments
MSA-0711-BLK	100	Bulk
MSA-0711-BLKG	100	Bulk
MSA-0711-TR1	3000	7" Reel
MSA-0711-TR1G	3000	7" Reel
MSA-0711-TR2	10000	13" Reel
MSA-0711-TR2G	10000	13" Reel

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

Freq.	<b>S</b> 1	11		S <sub>21</sub>			S <sub>12</sub>			S <sub>22</sub>
GHz	Mag	Ang	dB	Mag	Ang	dB	Mag	Ang	Mag	Ang
0.1	.03	1	13.0	4.47	174	-18.6	.118	1	.19	-8
0.2	.04	1	12.9	4.42	168	-18.5	.119	2	.19	-18
0.4	.04	-4	12.8	4.38	157	-18.4	.120	4	.19	-36
0.6	.05	-19	12.6	4.28	146	-18.1	.125	9	.19	-52
0.8	.07	-32	12.3	4.14	135	-17.7	.130	10	.20	-68
1.0	.08	-44	12.0	3.99	123	-17.4	.135	12	.19	-82
1.5	.13	-88	10.9	3.52	98	-16.1	.157	13	.19	-113
2.0	.18	-130	9.8	3.08	75	-15.2	.173	8	.18	-138
2.5	.25	-155	8.6	2.68	61	-14.7	.184	9	.18	-151
3.0	.32	-178	7.2	2.30	42	-14.7	.185	5	.17	-158
3.5	.38	165	5.8	1.96	26	-14.8	.181	3	.17	-150
4.0	.42	152	4.5	1.68	12	-14.7	.184	1	.20	-142

MSA-0711 Typical Scattering Parameters (Z\_0 = 50  $\Omega,$  T\_A = 25°C,  $I_d$  = 22 mA)

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

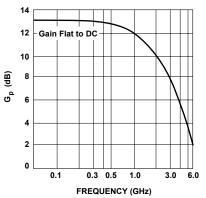
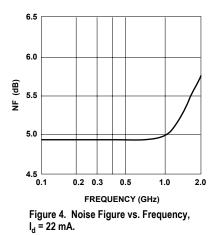


Figure 1. Power Gain vs. Frequency,  $\rm I_d$  = 22 mA.



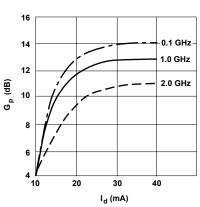


Figure 2. Power Gain vs. Current.

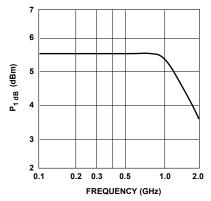
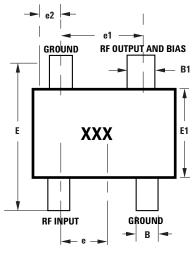
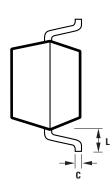
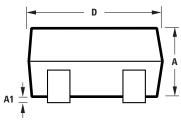


Figure 3. Output Power at 1 dB Gain Compression vs. Frequency,  $I_d = 22 \text{ mA}$ .

#### SOT-143 Package Dimensions







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

Notes: XXX-package marking Drawings are not to scale

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