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Avago Technologies US, Inc.
MSA-0711-BLKG

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MSA-0711

Cascadable Silicon Bipolar MMIC Amplifier

Data Sheet

Description

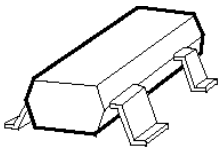
The MSA-0711 is a low cost silicon bipolar Monolithic Microwave Integrated Circuit (MMIC) housed in the surface mount plastic SOT-143 package. This MMIC is designed for use as a general purpose 50 Ω gain block. Typical applications include narrow and broad band IF and RF amplifiers in commercial and 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.

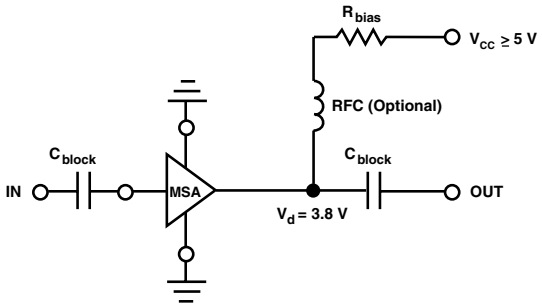
Features

- Cascadable 50 Ω Gain Block
- 3 dB Bandwidth:
  DC to 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

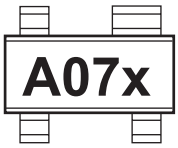
SOT-143 Package



Typical Biasing Configuration



Pin Connections and Package Marking



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

MSA-0711 Absolute Maximum Ratings

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

Thermal Resistance[2]:
θ_{jc} = 505°C/W

Notes:
1. Permanent damage may occur if any of these limits are exceeded.
2. T_{CASE} = 25°C.
3. Derate at 2.0 mW/°C for T_C > 62°C.

Electrical Specifications[1], T_A = 25°C

Symbol	Parameters and Test Conditions: I_d = 22 mA, Z_0 = 50 Ω		Units	Min.	Typ.	Max.
G_P	Power Gain ($\|S_{21}\|^2$)	f = 0.1 GHz f = 1.0 GHz	dB	 10.0	13.0 12.0	
ΔG_P	Gain Flatness	f = 0.1 to 1.3 GHz	dB		±0.8	
$f_{3\ dB}$	3 dB Bandwidth		GHz		3.2	
VSWR	Input VSWR	f = 0.1 to 2.0 GHz			1.5:1	
	Output VSWR	f = 0.1 to 2.0 GHz			1.5:1	
NF	50 Ω Noise Figure	f = 1.0 GHz	dB		5.0	
$P_{1\ dB}$	Output Power at 1 dB Gain Compression	f = 1.0 GHz	dBm		5.5	
IP_3	Third Order Intercept Point	f = 1.0 GHz	dBm		18.0	
t_D	Group Delay	f = 1.0 GHz	psec		145	
V_d	Device Voltage	T_C = 25°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.

MSA-0711 Typical Scattering Parameters ($Z_0 = 50\ \Omega$, $T_A = 25°C$, $I_d = 22$ mA)

Freq. GHz	S_{11}		S_{21}			S_{12}			S_{22}	
	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

Typical Performance, $T_A = 25°C$

(unless otherwise noted)

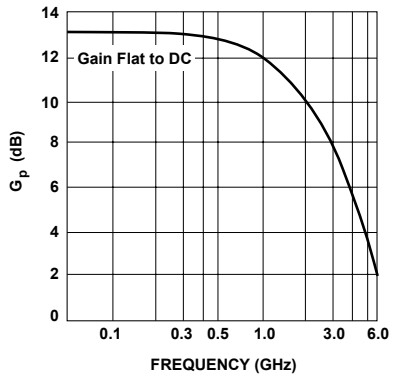


Figure 1. Power Gain vs. Frequency, I_d = 22 mA.

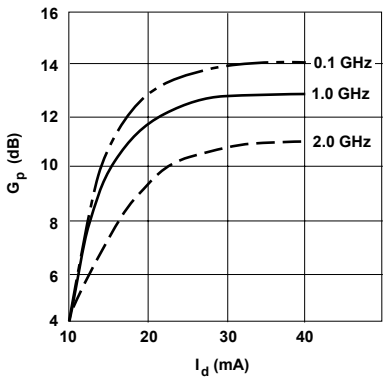


Figure 2. Power Gain vs. Current.

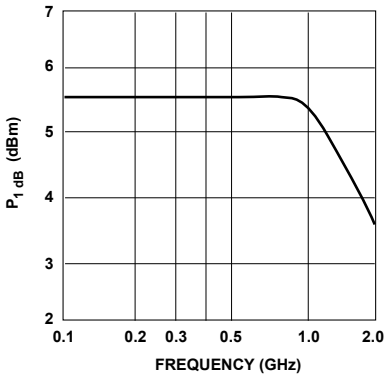


Figure 3. Output Power at 1 dB Gain Compression vs. Frequency, I_d = 22 mA.

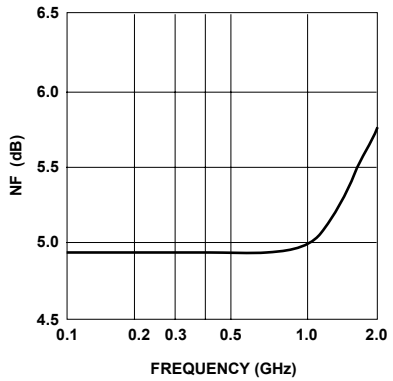
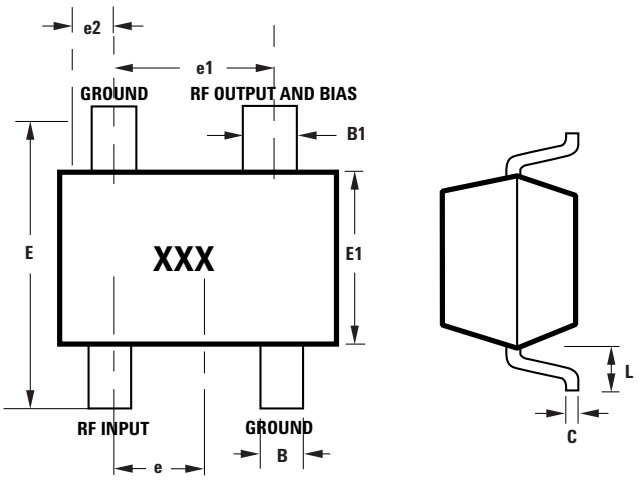
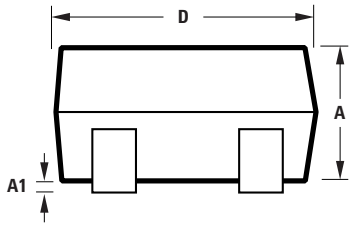


Figure 4. Noise Figure vs. Frequency, I_d = 22 mA.

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