

Cascadable Silicon Bipolar MMIC Amplifier

Technical Data

MSA-0711

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^[1]

Note:

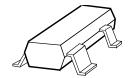
 Refer to PACKAGING section "Tapeand-Reel Packaging for Surface Mount Semiconductors".

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.

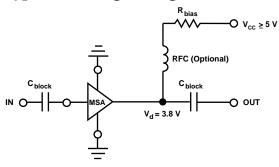
The MSA-series is fabricated using HP's $10\,\mathrm{GHz}\,\mathrm{f_T}, 25\,\mathrm{GHz}\,\mathrm{f_{MAX}},$ silicon bipolar MMIC process which uses nitride self-alignment, ion implantation, and gold metalli-

SOT-143 Package



zation to achieve excellent performance, uniformity and reliability. The use of an external bias resistor for temperature and current stability also allows bias flexibility.

Typical Biasing Configuration



5965-9590E 6-390

MSA-0711 Absolute Maximum Ratings

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

Thermal Resistance $^{[2,4]}$:	
$\theta_{\rm jc} = 505$ °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.
- 4. See MEASUREMENTS section "Thermal Resistance" for more information.

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

Symbol	Parameters and Test Conditions:	Units	Min.	Тур.	Max.	
GP	Power Gain $(S_{21} ^2)$	f = 0.1 GHz			13.0	
		f = 1.0 GHz		10.0	12.0	
$\Delta G_{ m P}$	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	50Ω 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	
IP3	Third Order Intercept Point	f = 1.0 GHz	dBm		18.0	
t_{D}	Group Delay	f = 1.0 GHz	psec		145	
Vd	Device Voltage	$T_C = 25$ °C	V	3.0	3.8	4.6
dV/dT	Device Voltage Temperature Coefficient		mV/°C		-7.0	

Note:

Part Number Ordering Information

<u> </u>							
Part Number	No. of Devices	Container					
MSA-0711-TR1	3000	7" Reel					
MSA-0711-BLK	100	Antistatic Bag					

For more information, see "Tape and Reel Packaging for Semiconductor Devices".

^{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.

MSA-0711 Typical Scattering Parameters (Z $_{O}$ = 50 $\Omega,$ T_{A} = 25 $^{\circ}C,$ I_{d} = 22 mA)

Freq.	S_{11}		\mathbf{S}_{21}		$\mathbf{S_{12}}$			\mathbf{S}_{22}		
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	-4 4	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

A model for this device is available in the DEVICE MODELS section.

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

(unless otherwise noted)

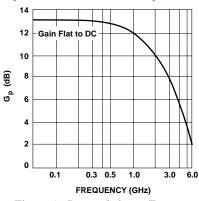


Figure 1. Power Gain vs. Frequency, $I_d = 22 \text{ mA}$.

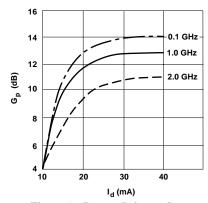


Figure 2. Power Gain vs. Current.

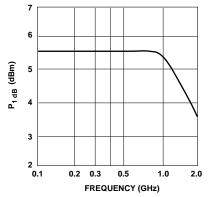


Figure 3. Output Power at 1 dB Gain Compression vs. Frequency, I_d = 22 mA.

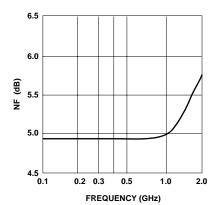
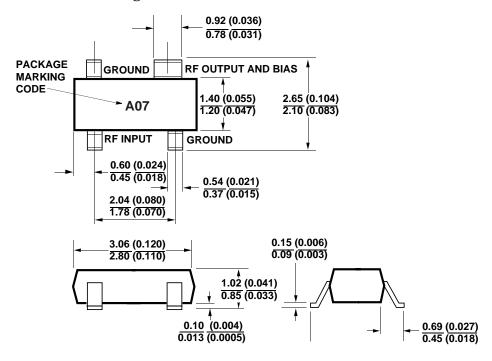


Figure 4. Noise Figure vs. Frequency, $I_d = 22 \text{ mA}$.

SOT-143 Package Dimensions



DIMENSIONS ARE IN MILLIMETERS (INCHES)