

Data Sheet

Description

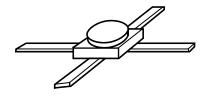
The MSA-0270 is a high performance silicon bipolar Monolithic Microwave Integrated Circuit (MMIC) housed in a hermetic, high reliability package. This MMIC is designed for use as a general purpose 50Ω gain block. Typical applications include narrow and broad band IF and RF amplifiers in industrial and military 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.

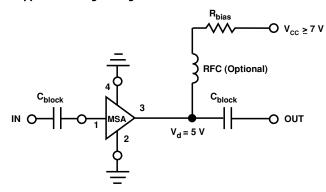
Features

- Cascadable 50Ω Gain Block
- 3 dB Bandwidth: DC to 2.8 GHz
- 12.0 dB Typical Gain at 1.0 GHz
- Unconditionally Stable (k>1)
- Hermetic Gold-ceramic Microstrip Package

70 mil Package



Typical Biasing Configuration



MSA-0270 Absolute Maximum Ratings

Parameter	Absolute Maximum ^[1]		
Device Current	60 mA		
Power Dissipation ^[2,3]	325 mW		
RF Input Power	+13 dBm		
Junction Temperature	200°C		
Storage Temperature	−65 to 200°C		

Thermal Resistance^[2,4]:

 $\theta_{ic} = 120$ °C/W

Notes:

- 1. Permanent damage may occur if any of these limits are exceeded.
- T_{CASE} = 25°C.
 Derate at 8.3 mW/°C for T_C > 161°C.
- 4. The small spot size of this technique results in a higher, though more accurate determination of $\theta_{\rm jc}$ than do alternate methods.

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

Symbol	Parameters and Test Conditions: $I_d = 25$	Units	Min.	Тур.	Max.	
G _P	Power Gain (S ₂₁ ²)	f = 0.1 GHz	dB	11.5	12.5	13.5
ΔG_P	Gain Flatness	f = 0.1 to 1.8 GHz	dB		±0.6	±1.0
f _{3 dB}	3 dB Bandwidth		GHz		2.8	
VSWR	Input VSWR	f = 0.1 to 3.0 GHz			1.4:1	
VOVIN	Output VSWR	f = 0.1 to 3.0 GHz			1.4:1	
NF	50 Ω Noise Figure	f = 1.0 GHz	dB		6.5	
P _{1 dB}	Output Power at 1 dB Gain Compression	f = 1.0 GHz	dBm		4.5	
IP ₃	Third Order Intercept Point	f = 1.0 GHz	dBm		17.0	
t _D	Group Delay	f = 1.0 GHz	psec		125	
V _d	Device Voltage		V	4.5	5.0	5.5
dV/dT	Device Voltage Temperature Coefficient		mV/°C		-8.0	

Note:

1. The recommended operating current range for this device is 18 to 40 mA. Typical performance as a function of current is on the following

MSA-0270 Typical Scattering Parameters ($Z_0 = 50 \Omega$, $T_A = 25^{\circ}$ C, $I_d = 25 \text{ mA}$)

Freq.		S ₁₁			S ₂₁		S	12	S	22
GHz	Mag	Ang	dB	Mag	Ang	dB	Mag	Ang	Mag	Ang
0.1	.11	179	12.6	4.26	176	-18.4	.120	1	.12	-8
0.2	.11	174	12.6	4.24	171	-18.6	.117	3	.12	-15
0.4	.10	169	12.5	4.21	162	-18.4	.120	4	.13	-30
0.6	.09	165	12.4	4.17	154	-18.2	.123	5	.14	-44
0.8	.08	161	12.3	4.11	146	-18.2	.123	7	.14	-55
1.0	.06	161	12.2	4.05	137	-18.0	.126	9	.15	-64
1.5	.02	-150	11.7	3.85	116	-17.2	.138	11	.16	-84
2.0	.06	-110	11.1	3.57	96	-16.3	.153	11	.16	-102
2.5	.11	-112	10.3	3.27	82	-15.7	.165	14	.14	-106
3.0	.17	-134	9.3	2.92	65	-15.2	.174	12	.13	-114
3.5	.22	-147	8.2	2.56	48	-14.7	.185	6	.15	-111
4.0	.26	156	7.0	2.23	33	-14.3	.192	3	.19	-107
5.0	.28	179	4.7	1.72	8	-14.0	.199	-6	.27	-107
6.0	.30	143	3.0	1.41	-13	-13.8	.204	-14	.29	-119

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

(unless otherwise noted)

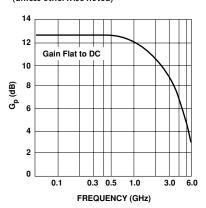


Figure 1. Typical Power Gain vs. Frequency, $T_A = 25^{\circ}\text{C}$, $I_d = 25$ mA.

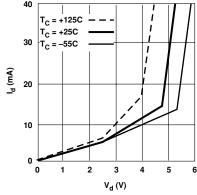


Figure 2. Device Current vs. Voltage.

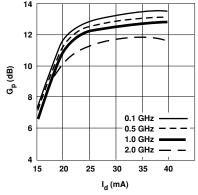


Figure 3. Power Gain vs. Current.

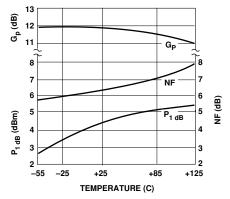


Figure 4. Output Power at 1 dB Gain Compression, NF and Power Gain vs. Mounting Surface Temperature, $f=1.0~\text{GHz}, I_d=25~\text{mA}.$

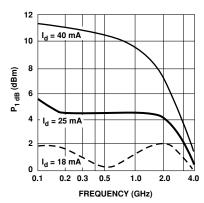


Figure 5. Output Power at 1 dB Gain Compression vs. Frequency.

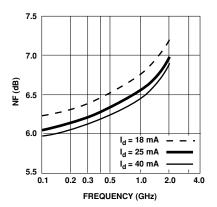
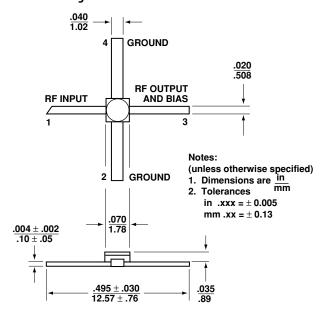


Figure 6. Noise Figure vs. Frequency.

Ordering Information

Part Number	No. of Devices	Comments
MSA-0270	100	Bulk

70 mil Package Dimensions



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