HEWLETT PACKARD

MSA-0435, -0436
MODAMP™ Cascadable Silicon Bipolar Monolithic Microwave Integrated Circuit Amplifiers

Features

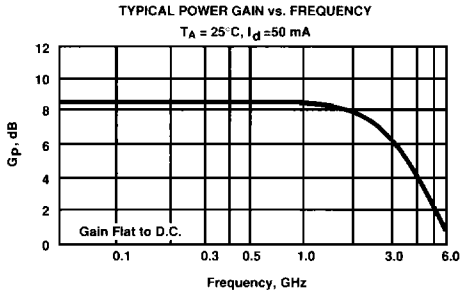
- **Cascadable 50 Ω Gain Block**
- **3 dB Bandwidth: DC to 3.8 GHz**
- **12.5 dBm typical $P_{1\,dB}$ at 1.0 GHz**
- **8.5 dB typical Gain at 1.0 GHz**
- **Unconditionally Stable (k>1)**
- **Cost Effective Ceramic Microstrip Package**

Description

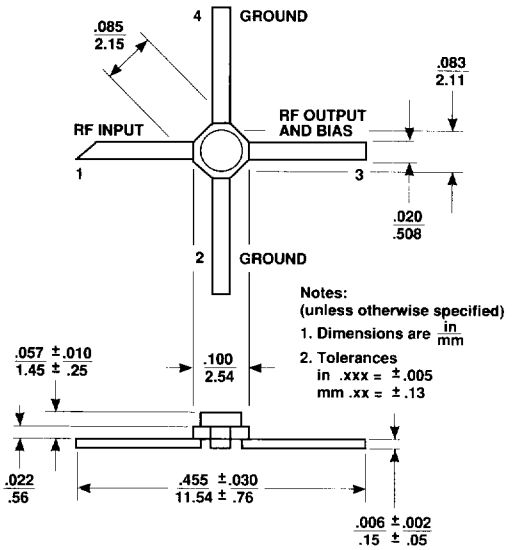
The MSA-0435 is a high performance silicon bipolar Monolithic Microwave Integrated Circuit (MMIC) housed in a cost effective, microstrip package. This MODAMP™ MMIC is designed for use as a general purpose 50 Ω gain block. Typical applications include narrow and broad band IF and RF amplifiers in industrial and military applications.

The MODAMP MSA-series is fabricated using a 10 GHz f_T, 25 GHz f_{MAX} silicon bipolar MMIC process which utilizes nitride self-alignment, ion implantation and gold metallization to achieve excellent uniformity, performance, and reliability. The use of an external bias resistor for temperature and current stability also allows bias flexibility.

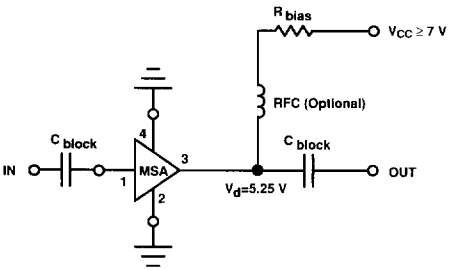
Available in cut lead version (package 36) as MSA-0436.



35 micro-X Package[1]



Typical Biasing Configuration



Electrical Specifications[2], T_A = 25°C

Symbol	Parameters and Test Conditions: I_d = 50 mA, Z_O = 50 Ω		Units	Min.	Typ.	Max.
G_P	Power Gain ($\|S_{21}\|^2$)	f = 0.1 GHz	dB	7.5	8.5	9.5
ΔG_P	Gain Flatness	f = 0.1 to 2.5 GHz	dB		±0.6	±1.0
$f_{3\,dB}$	3 dB Bandwidth		GHz		3.8	
VSWR	Input VSWR	f = 0.1 to 2.5 GHz			1.4:1	
	Output VSWR	f = 0.1 to 2.5 GHz			1.9:1	
$P_{1\,dB}$	Output Power @ 1 dB Gain Compression	f = 1.0 GHz	dBm		12.5	
NF	50 Ω Noise Figure	f = 1.0 GHz	dB		6.5	
IP_3	Third Order Intercept Point	f = 1.0 GHz	dBm		25.5	
t_D	Group Delay	f = 1.0 GHz	psec.		125	
V_d	Device Voltage		V	4.75	5.25	5.75
dV/dT	Device Voltage Temperature Coefficient		mV/°C		-8.0	

Notes: 1. Short leaded 36 package available upon request.
2. The recommended operating current range for this device is 30 mA to 70 mA. Typical performance as a function of current is on the following page.

Absolute Maximum Ratings

Parameter	Absolute Maximum[1]
Device Current	100 mA
Power Dissipation[2,3]	650 mW
RF Input Power	+13 dBm
Junction Temperature	200°C
Storage Temperature[4]	–65°C to 200°C

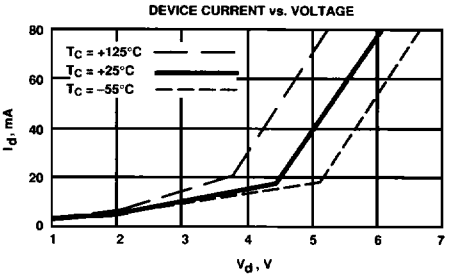
Thermal Resistance[2,5]: θ_{jc} = 140°C/W

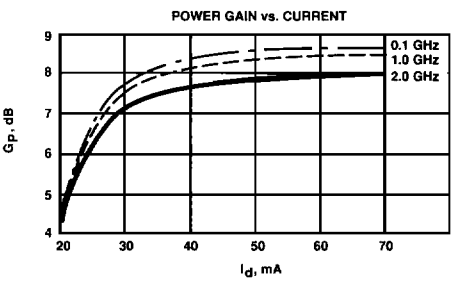
Notes:

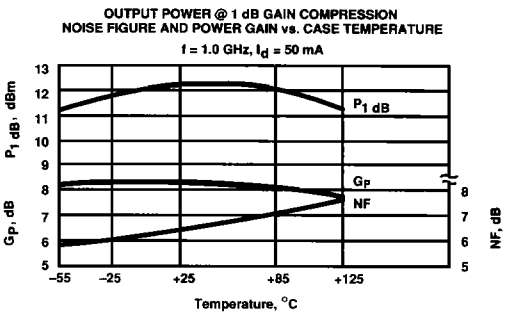
1. Permanent damage may occur if any of these limits are exceeded.
2. T_{CASE} = 25°C
3. Derate at 7.1 mW/°C for T_C > 109°C.
4. Storage above +150°C may tarnish the leads of this package making it difficult to solder into a circuit.
5. The small spot size of this technique results in a higher, though more accurate determination of θ_{jc} than do alternate methods. See MEASUREMENTS section "Thermal Resistance" for more information.

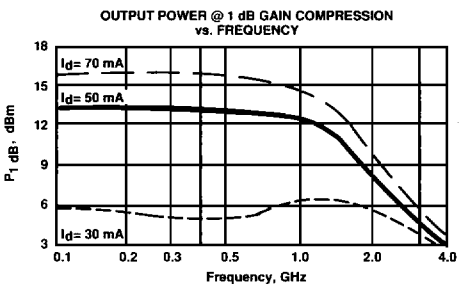
Typical Performance, T_A = 25°C

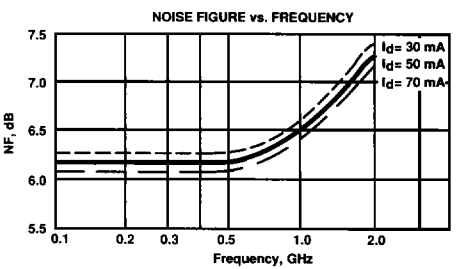
(unless otherwise noted)











Typical Scattering Parameters: Z_O = 50 Ω

T_A = 25°C, I_d = 50 mA

Freq. GHz	S_{11}		S_{21}			S_{12}			S_{22}	
	Mag	Ang	dB	Mag	Ang	dB	Mag	Ang	Mag	Ang
0.1	.08	175	8.5	2.67	175	–16.4	.151	1	.20	–10
0.2	.08	172	8.5	2.68	170	–16.3	.153	2	.20	–16
0.4	.07	171	8.5	2.67	161	–16.4	.151	3	.20	–33
0.6	.07	166	8.5	2.66	151	–16.2	.155	6	.21	–45
0.8	.05	169	8.4	2.64	142	–16.1	.156	8	.22	–57
1.0	.05	175	8.3	2.61	136	–16.0	.159	10	.24	–68
1.5	.04	–142	8.1	2.55	109	–15.0	.178	13	.26	–96
2.0	.09	–145	7.8	2.46	87	–14.2	.196	15	.28	–123
2.5	.14	–154	7.3	2.33	71	–13.1	.221	18	.31	–140
3.0	.22	–175	6.6	2.14	50	–12.5	.238	14	.33	–160
3.5	.28	170	5.8	1.94	32	–11.7	.260	9	.35	–173
4.0	.34	156	4.8	1.74	15	–11.3	.271	4	.34	–179
4.5	.37	140	3.9	1.57	–1	–10.7	.291	–2	.33	–171
5.0	.42	120	3.0	1.41	–16	–10.4	.302	–8	.32	–160

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