

**Low Noise Amplifier
1.575 GHz**

AM50-0002

V7

Features

- Low Noise Figure: 1.15 dB
- High Gain: 27 dB
- Low Power Consumption: 5V, 20 mA
- High Dynamic Range
- Low Cost SOIC-8 Lead Package

Description

M/A-COM's AM50-0002 is a high performance GaAs MMIC low noise amplifier in a low cost SOIC 8 Lead surface mount plastic package. The AM50-0002 employs a monolithic 3-stage self-bias design and a simple external matching network to obtain minimum noise figure.

The AM50-0002 is ideally suited for use where low noise figure, high gain, high dynamic range and low power consumption are required. Typical applications include receiver front ends in the Global Positioning System (GPS) market, as well as standard gain blocks, buffer amps, driver amps, and IF amps in both fixed and portable systems.

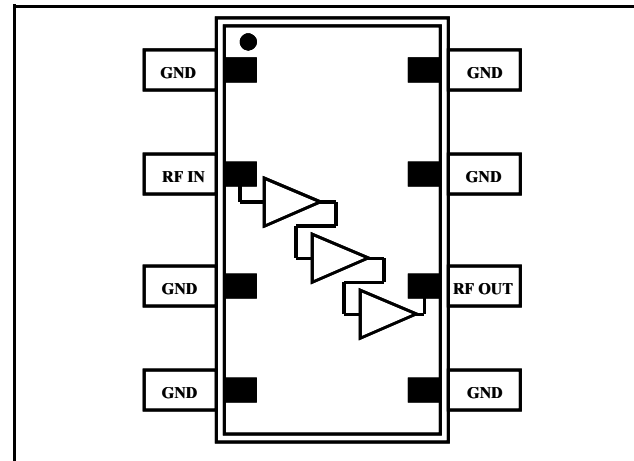
M/A-COM'S AM50-0002 is fabricated using a mature 0.5-micron gate length GaAs process. The process features full passivation for increased performance reliability.

Ordering Information

Part Number	Package
AM50-0002	SOIC-8 Lead Package
AM50-0002TR	Forward Tape and Reel, 1000 pcs
AM50-0002TR-3000	Forward Tape and Reel, 3000 pcs
AM50-0002SMB	Sample Test Board (Includes 5 Samples)

Note: Reference Application Note M513 for reel size information.

Functional Diagram



Pin Configuration

PIN No.	PIN Name	Description
1	GND	Ground
2	RF _{IN}	RF Input
3	GND	Ground
4	GND	Ground
5	GND	Ground
6	RF _{OUT}	RF Output, V _{DD}
7	GND	Ground
8	GND	Ground

1. Pins 1, 3, 4, 5, 7, and 8 must be RF and DC grounded as shown.
2. Pin 2 is the RF input and must be connected to the simple matching network shown.
3. Pin 6 is the RF output, V_{DD} is also applied on Pin 6.

Absolute Maximum Ratings⁴

Parameter	Absolute Maximum
VDD	+10 VDC
Input Power	17 dBm
Channel Temperature ²	+150 °C
Operating Temperature	-40 °C to +85 °C
Storage Temperature	-65 °C to +150 °C

4. Exceeding any one or combination of these limits may cause permanent damage to this device.
5. Typical thermal resistance (θ_{jc}) = +165 °C/W

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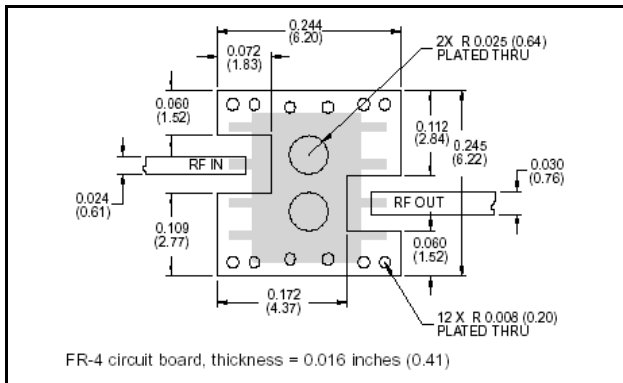
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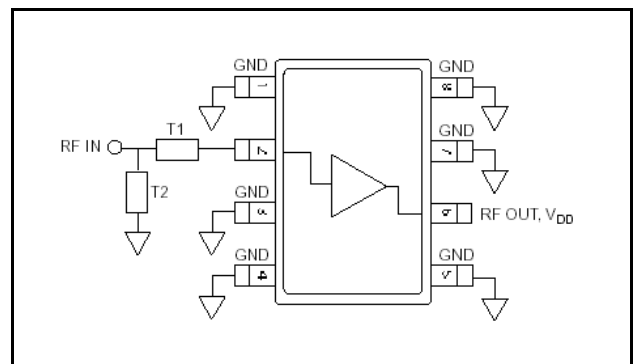
Electrical Specifications: $T_A = +25^\circ\text{C}$, $Z_0 = 50 \text{ Ohm}$, $V_{DD} = +5\text{V}$, $P_{IN} = -35 \text{ dBm}$, $F = 1.575 \text{ GHz}$

Parameter	Test Conditions	Units	Min	Typ	Max
Gain	—	dB	25	27	29
Noise Figure	—	dB	-	1.15	1.4
Input VSWR	—	Ratio	-	2.0:1	-
Output VSWR	—	Ratio	-	1.5:1	-
Output P1dB Compression	—	dBm	-	1	-
Input IP ₃	—	dBm	-	-14	-
Reverse Isolation	—	dB	-	48	-
Bias Current	—	mA	15	20	25

Recommended PCB Configuration

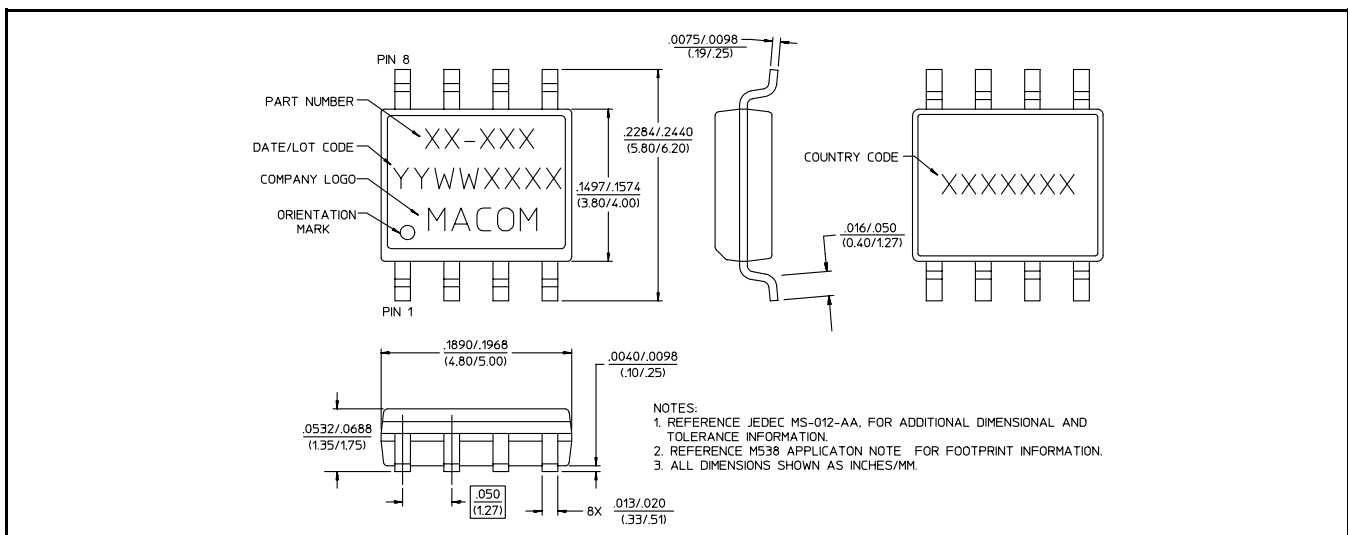


Application Schematic



Frequency = 1.575 GHz		
	Impedance	Electrical Length
T1	57.2 Ω	36.0°
T2	82.7 Ω	16.2°

SOIC-8



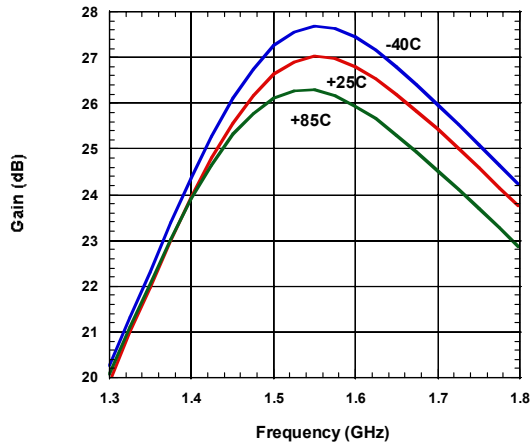
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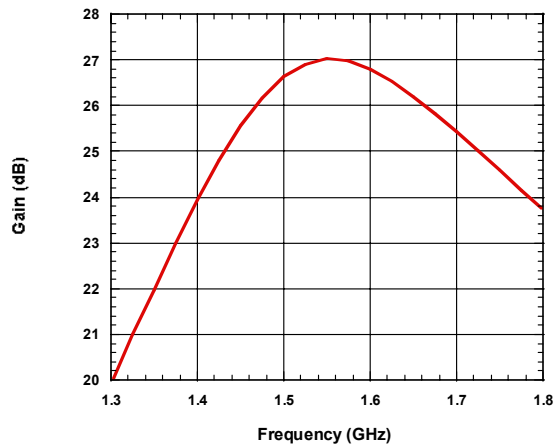
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Typical Performance

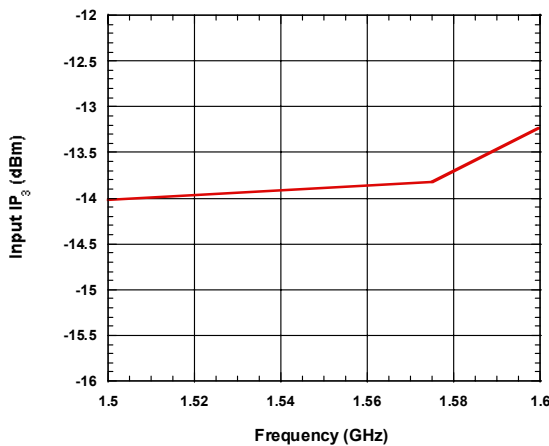
Gain vs. Frequency over Temperature



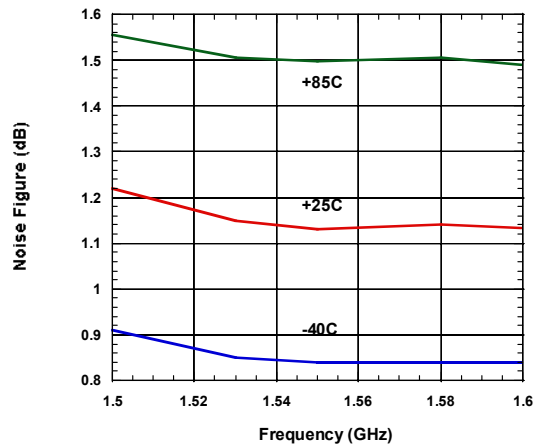
Gain vs. Frequency, TA = +25C



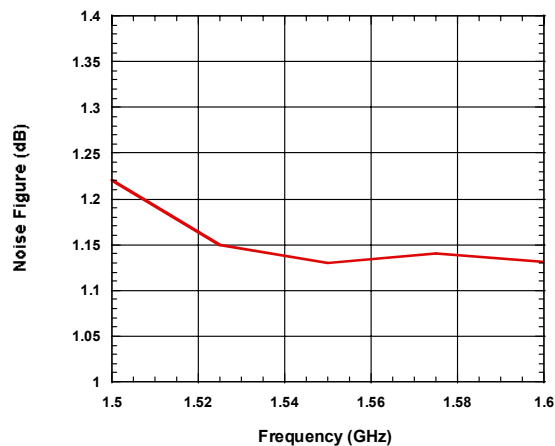
Input IP₃ vs. Frequency, TA = +25C



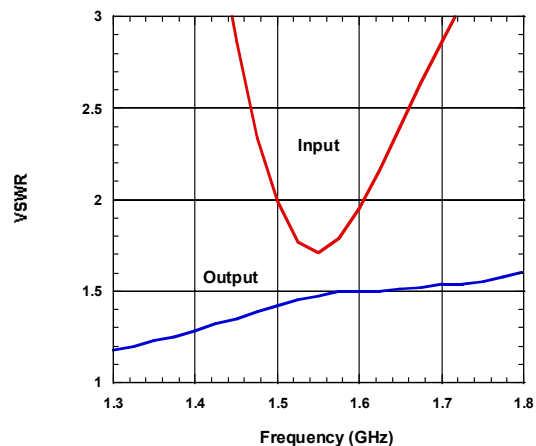
Noise Figure vs. Frequency over Temperature



Noise Figure vs. Frequency, TA = +25C



VSWR vs. Frequency, TA = +25C



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S-Parameters

FREQ (GHz)	S11 (MAG)	S11 (ANG)	S21 (MAG)	S21 (ANG)	S12 (MAG)	S12 (ANG)	S22 (MAG)	S22 (ANG)
0.75	0.921	-30.81	2.509	25.55	0.00148	8.86	0.166	-177.94
0.80	0.913	-32.28	2.819	22.22	0.00130	8.34	0.160	178.21
0.85	0.910	-33.76	3.187	18.24	0.00129	2.77	0.154	174.64
0.90	0.907	-35.75	3.593	13.38	0.00121	21.43	0.148	172.18
0.95	0.909	-37.74	4.061	8.14	0.00102	4.10	0.140	169.61
1.00	0.901	-39.48	4.562	2.42	0.00107	7.73	0.134	167.83
1.05	0.892	-41.10	5.138	-3.96	0.00106	6.05	0.125	166.68
1.10	0.898	-43.16	5.787	-10.74	0.00083	1.77	0.116	166.54
1.15	0.902	-45.17	6.477	-18.10	0.00066	-6.72	0.108	169.20
1.20	0.899	-47.10	7.253	-26.07	0.00065	-31.71	0.099	172.34
1.25	0.896	-49.30	8.079	-34.70	0.00055	-24.54	0.095	179.35
1.30	0.894	-51.27	8.956	-43.79	0.00041	-29.08	0.094	-170.96
1.35	0.894	-54.18	9.894	-53.69	0.00028	-63.69	0.102	-161.31
1.40	0.892	-56.58	10.808	-64.44	0.00053	-134.67	0.119	-153.00
1.45	0.885	-59.28	11.727	-75.73	0.00070	-137.52	0.145	-149.06
1.50	0.873	-62.30	12.525	-87.83	0.00115	-157.96	0.178	-148.14
1.55	0.857	-65.21	13.091	-100.40	0.00154	-162.50	0.214	-150.19
1.60	0.832	-67.38	13.498	-113.16	0.00208	-173.25	0.252	-154.73
1.65	0.810	-69.51	13.577	-126.00	0.00253	-178.80	0.289	-160.02
1.70	0.782	-71.55	13.373	-138.81	0.00294	173.91	0.322	-166.25
1.75	0.760	-73.07	12.964	-150.86	0.00347	167.10	0.351	-172.30
1.80	0.739	-74.16	12.390	-162.47	0.00382	162.87	0.375	-178.46
1.85	0.724	-75.18	11.688	-173.46	0.00423	155.47	0.394	175.75
1.90	0.712	-75.70	10.981	176.38	0.00474	150.99	0.409	170.19
1.95	0.699	-77.01	10.218	166.80	0.00498	148.83	0.423	165.01
2.00	0.699	-77.56	9.495	157.89	0.00544	146.02	0.432	160.40
2.05	0.692	-78.24	8.807	149.48	0.00565	142.63	0.440	155.71
2.10	0.690	-79.57	8.163	141.76	0.00600	139.72	0.448	151.79
2.15	0.688	-80.62	7.551	134.45	0.00640	136.31	0.454	147.76
2.20	0.690	-81.76	6.996	127.26	0.00673	135.38	0.459	144.08
2.25	0.689	-83.14	6.477	120.81	0.00681	132.88	0.464	140.70
2.30	0.691	-84.63	6.005	114.57	0.00740	131.06	0.467	137.31
2.35	0.691	-86.09	5.576	108.60	0.00754	129.17	0.472	134.28
2.40	0.693	-87.58	5.181	102.95	0.00793	126.95	0.475	131.15
2.45	0.693	-89.37	4.811	97.37	0.00831	126.73	0.478	128.24
2.50	0.697	-90.85	4.483	92.22	0.00854	125.02	0.481	125.56

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Noise Figures

FREQ	Fmin[dB]	MAG	ANG	rn
0.750	0.8052	0.8697	26.5001	0.7376
0.800	0.7869	0.8620	27.9959	0.6796
0.850	0.7699	0.8544	29.5150	0.6303
0.900	0.7572	0.8467	31.0675	0.5897
0.950	0.7467	0.8390	32.6540	0.5551
1.000	0.7397	0.8312	34.2760	0.5259
1.050	0.7351	0.8234	35.9319	0.5007
1.100	0.7333	0.8154	37.6196	0.4788
1.150	0.7333	0.8072	39.3353	0.4593
1.200	0.7348	0.7990	41.0771	0.4418
1.250	0.7383	0.7906	42.8431	0.4260
1.300	0.7432	0.7821	44.6308	0.4114
1.350	0.7491	0.7735	46.4387	0.3977
1.400	0.7563	0.7647	48.2651	0.3850
1.450	0.7645	0.7559	50.1090	0.3730
1.500	0.7734	0.7469	51.9696	0.3615
1.550	0.7834	0.7378	53.8492	0.3506
1.600	0.7943	0.7287	55.7432	0.3402
1.650	0.8057	0.7195	57.6514	0.3301
1.700	0.8180	0.7102	59.5725	0.3204
1.750	0.8312	0.7007	61.5065	0.3111
1.800	0.8450	0.6912	63.4539	0.3020
1.850	0.8596	0.6817	65.4128	0.2933
1.900	0.8748	0.6721	67.3846	0.2849
1.950	0.8910	0.6625	69.3678	0.2768
2.000	0.9079	0.6529	71.3635	0.2689
2.050	0.9254	0.6432	73.3575	0.2614
2.100	0.9437	0.6335	75.3681	0.2541
2.150	0.9631	0.6239	77.3914	0.2471
2.200	0.9833	0.6143	79.4309	0.2403
2.250	1.0050	0.6050	81.4808	0.2340
2.300	1.0277	0.5957	83.5485	0.2278
2.350	1.0516	0.5866	85.6304	0.2219
2.400	1.0768	0.5777	87.7262	0.2163
2.450	1.1035	0.5689	89.8387	0.2109
2.500	1.1317	0.5604	91.9643	0.2058