Wide Band GaAs MMIC Amplifier 6 - 18 GHz

AM46-0006/AM46-0007

V 2.00

Features

- 11 dB Typical Gain[1]
- ±0.5 dB Typical Broadband Gain Flatness
- 0.4 dB Positive Gain Slope
- Single Bias Supply
- Low, Medium and High Bias Options
- DC Decoupled RF Input and Output

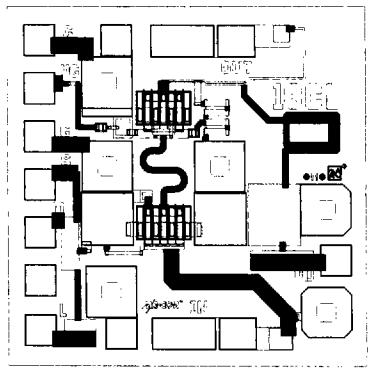
Description

M/A-COM's AM46-0006 and AM46-0007 are versatile broadband GaAs MMIC amplifier chips. The AM46-0006 and AM46-0007 are mirror images of each other. The design matches a cascode FET for flat gain from 6 GHz to 18 GHz. On-chip bias options enable the user to optimize gain and dynamic range.

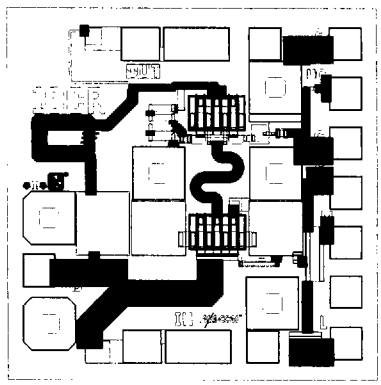
The AM46-0006 and AM46-0007 are ideally suited for use in single or multi-stage EW amplifier modules. Insertion of two devices between lange couplers creates a balanced amplifier. Multi-stage amplifier modules are easily created by cascading single stages. Although the AM46-0006 and AM46-0007 are not matched for VSWR, an external matching circuit can be used for specific narrow band applications.

The AM46-0006 and AM46-0007 are fabricated using a mature 0.5-micron gate length GaAs process for increased reliability and performance repeatability.

AM46-0006



AM46-0007



Electrical Specifications[1]

T_A= +25°C, V_{DD} = +6 V[2], I_{DD} = 50% I_{DSS}, f = 6 - 18 GHz

Parameter	Units	Min.	Typ.	Max.
Gain[1]	dB	9	11	
Noise Figure[1]	dB		5	
Output 1 dB Compression	dBm		16	
IP_3	dBm		26	
Reverse Isolation	dB		33	
Bias Current[1] (I_{DD})	mA		52	70

1. 100% on-wafer tested.
2. See following pages for 8-volt data.

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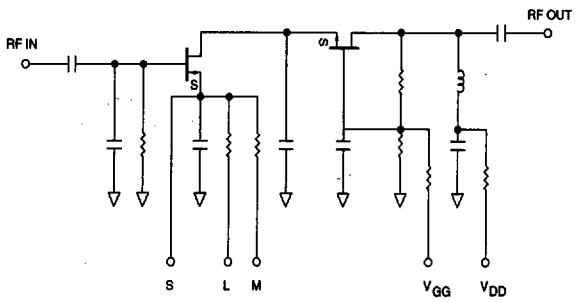
Absolute Maximum Ratings[1]

Parameter	Absolute Maximum
V_{DD}	+15 VDC
Input Power	+20 dBm
Junction Temperature	+150°C
Storage Temperature	-65°C to +150°C
Thermal Resistance	
0.002-Inch Conductive Epoxy Attach	90°C/W
0.002-Inch AuSn 80/20 Solder Attach	83°C/W

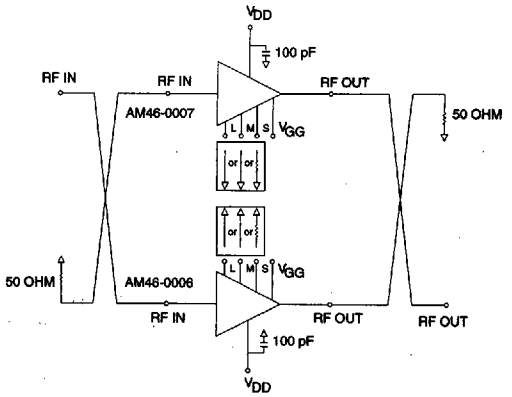
1. Operation of this device outside these limits may cause permanent damage.

Schematic



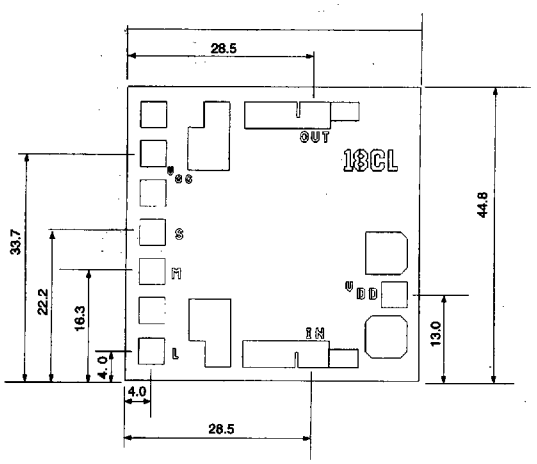
Recommended Circuit Configuration

The AM46-0006 and AM46-0007 are designed to be integrated between two lange or quadrature couplers as shown. The RF bond inductance is assumed to be 0.15 nH. Variations in bond inductance will result in variations in gain slope. A small capacitive stub may be needed depending on the inductance realized in the final assembly.

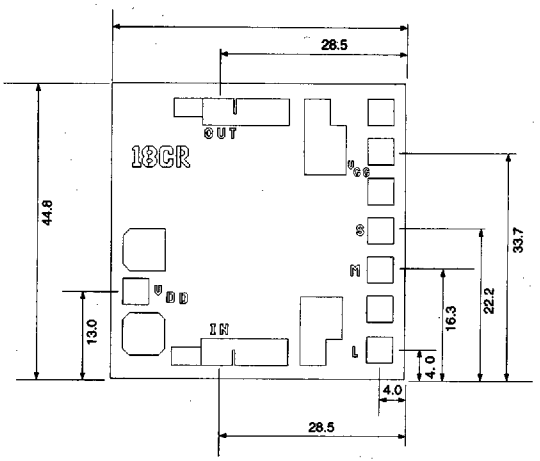


Outline

AM46-0006



AM46-0007



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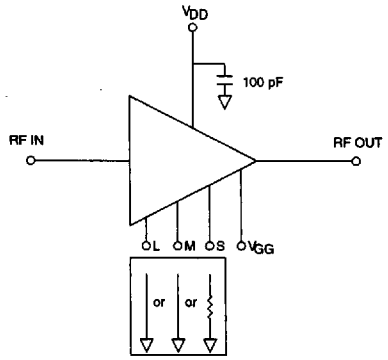
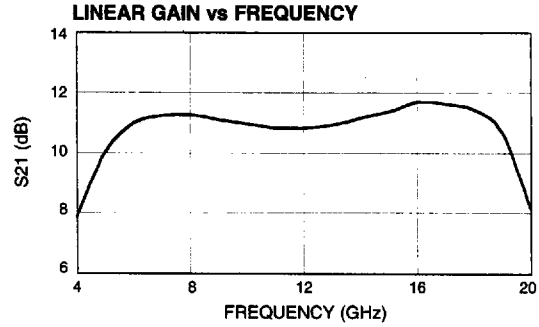
Typical Bias Configuration



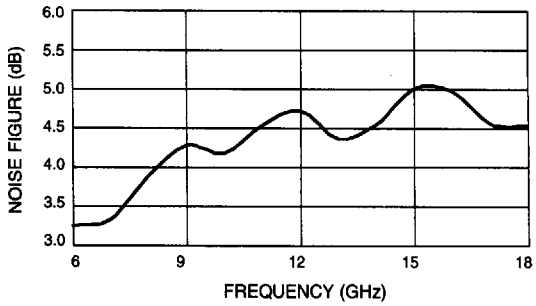
1. Nominal bias is obtained by grounding pad "M" and setting V_{DD} = 6 volts. This sets I_{DD} to 50% I_{DSS}.
2. For I_{DD} = 25% I_{DSS}, ground pad "L" instead of pad "M."
3. For I_{DD} = 60% I_{DSS}, ground both pads "L" and "M."
4. For a finer adjustment of I_{DD}, connect an external resistor in the range of 5 to 20 ohms from pad "S" to ground.
5. Increase V_{DD} to 8 volts for higher gain or output power.
6. Pad "V_{GG}" allows access to the gate of the cascode FET. An internal voltage divider sets this voltage to 0.4 V_{DD}. Since the divider uses large resistor values, this voltage can be forced from an external supply. Varying V_{GG} below 0.4 V_{DD} will reduce gain and available output power. This is sometimes used for gain adjustment or for limiting amplifiers. The device can also be switched off by reducing V_{GG} below -2.0 volts. Varying V_{GG} above 0.5 V_{DD} typically has little effect.

Typical Performance @ +25°C

LINEAR GAIN vs FREQUENCY



NOISE FIGURE vs FREQUENCY



Typical S-Parameters
Bias = 6 volts @ 50 mA

Freq. (GHz)	S11 Mag	S11 Ang	S21 Mag	S21 Ang	S12 Mag	S12 Ang	S22 Mag	S22 Ang
1.0	1.077	-22.08	0.258	-155.39	0.001	-1.95	0.983	-37.45
2.0	1.085	-48.03	0.399	-90.21	0.001	-65.75	0.956	-77.24
3.0	1.098	-72.92	1.450	-119.51	0.003	129.13	0.913	-122.07
4.0	1.075	-95.68	2.532	-164.53	0.005	93.82	0.820	-170.86
5.0	1.029	-115.60	3.232	153.54	0.011	72.75	0.733	140.87
6.0	0.998	-133.33	3.598	116.48	0.012	42.24	0.665	97.98
7.0	0.958	-149.80	3.677	83.93	0.013	14.52	0.627	62.03
8.0	0.923	-164.67	3.686	54.90	0.014	-3.48	0.599	32.09
9.0	0.893	-178.67	3.631	27.71	0.017	-23.40	0.577	7.02
10.0	0.849	167.50	3.569	2.15	0.017	-45.39	0.560	-14.73
11.0	0.817	155.38	3.528	-22.25	0.017	-66.80	0.541	-33.72
12.0	0.787	141.58	3.552	-46.81	0.019	-90.27	0.527	-50.99
13.0	0.767	127.62	3.610	-72.17	0.018	-116.90	0.527	-67.17
14.0	0.751	113.16	3.703	-97.32	0.019	-134.80	0.540	-83.88
15.0	0.730	95.68	3.824	-125.51	0.021	-169.99	0.585	-100.21
16.0	0.697	75.00	3.981	-156.44	0.022	158.21	0.642	-118.83
17.0	0.668	49.24	3.945	171.20	0.019	126.44	0.746	-140.13
18.0	0.623	20.83	3.855	131.92	0.017	88.03	0.859	-166.37
19.0	0.584	-8.26	3.528	93.94	0.019	60.22	0.969	166.94
20.0	0.536	-40.58	2.594	56.14	0.012	18.82	1.048	140.74

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