

# 2.0-9.0 GHz GaAs MMIC Amplifier

Mimix  
BROADBAND™

August 2006 - Rev 02-Aug-06

CMM-9

## CMM-9 2.0 to 9.0 GHz GaAs MMIC Amplifier

- ❑ Wide Bandwidth
- ❑ 13 dB Typical Gain
- ❑ Small Size: 39 x 35 mils
- ❑ Directly Cascadable
- ❑ Self-Biased
- ❑ Single Power Supply

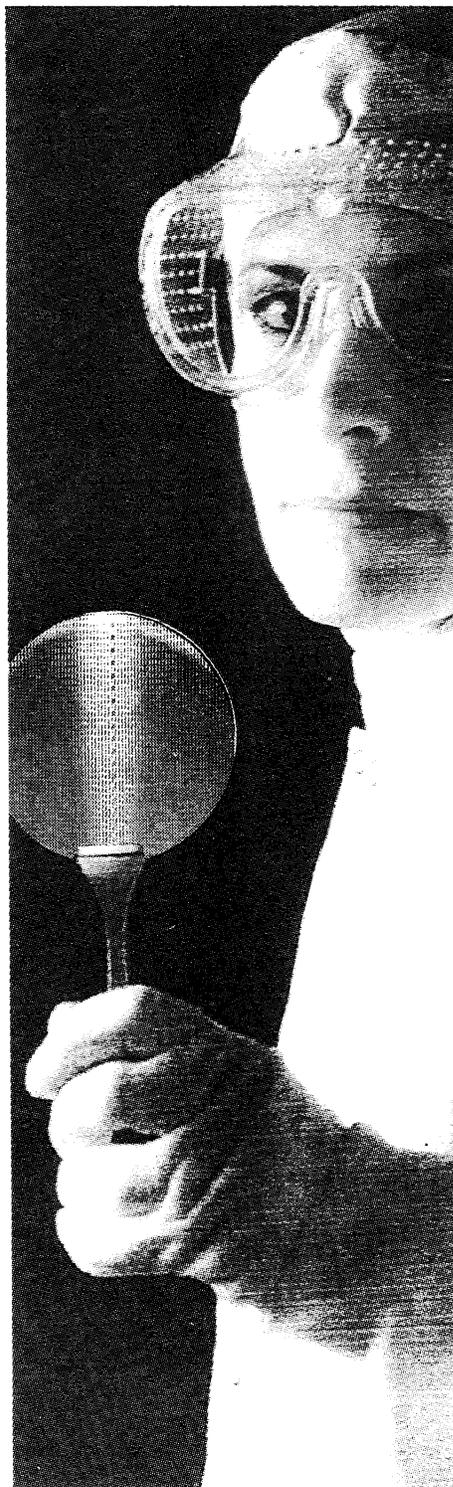
### Celeritek CMM-9 GaAs MMIC Amplifier

The CMM-9 is a 2 to 9 GHz GaAs MMIC amplifier. It is a two-stage feedback design which provides high gain and good power from a single power supply. Applications include oscillator buffers, RF and IF gain blocks and driver amplifiers.

The CMM-9 is a very small chip which provides 13 dB of gain and 17 dBm of power from a 6 volt supply. The chip is directly cascadable with no additional components. The circuit's self-biasing feature provides excellent performance from a 5 to 7 volt supply. Care must be taken to isolate the input from external DC voltages.

Celeritek MMIC's are fabricated on ion-implanted GaAs material with gold-based metalization. The FET gates are sub-half micron, tee, cross-section construction. Air bridges are used for top level interconnection. Silicon nitride serves as capacitor dielectric and surface passivation. Mesa resistors are used for feedback and bias functions.

The CMM-9 is available in chip form. It can be screened to meet commercial, military Hi-Rel or space grade reliability requirements. Custom wafer qualification for special electrical and/or reliability requirements is also available.



**CELERITEK**  
[ 105 ]

Mimix Broadband, Inc., 10795 Rockley Rd., Houston, Texas 77099  
Tel: 281.988.4600 Fax: 281.988.4615 mimixbroadband.com

Page 1 of 4

Characteristic Data and Specifications are subject to change without notice. ©2006 Mimix Broadband, Inc.  
Export of this item may require appropriate export licensing from the U.S. Government. In purchasing these parts, U.S. Domestic customers accept their obligation to be compliant with U.S. Export Laws.

# 2.0-9.0 GHz GaAs MMIC Amplifier

## CMM-9 GaAs MMIC Amplifier

Specifications ( $T_A = 25^\circ\text{C}$ , $V_{DD} = 6\text{V}$ , 2-9 GHz)				
Parameters	Units	Min	Typ	Max
Small Signal Gain	dB	11.5	13.0	
Gain Flatness	±dB		1.5	2.0
Input VSWR	—		1.8:1	2.0:1
Output VSWR	—		1.8:1	2.0:1
Reverse Isolation	dB	25	30	
Gain Variation Over Temperature (-55 to +95°C)	±dB		1.2	1.5
Noise Figure	dB		5.5	6.5
1 dB Gain Compression Power Output	dBm	15	17	
Current	mA		80	120

### Absolute Maximum Ratings

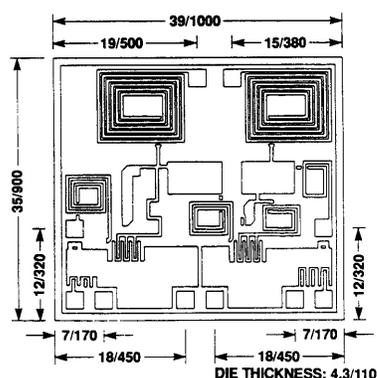
Parameter	Rating
Voltage	8V
Continuous Power Dissipation	1.25 W
Channel Temperature	+175°C
Storage Temperature	-65°C to +175°C
Mounting Temperature	+320°C
Input Power	+20 dBm
$\theta_{JC}$	80°C/W

### Die Attach and Bonding Procedures

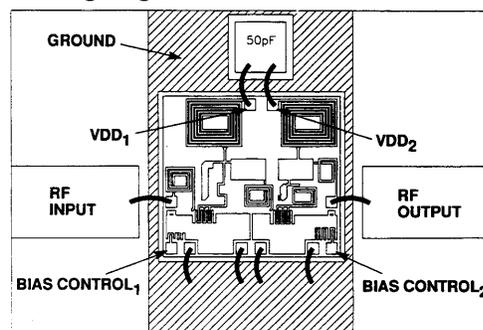
**Die Attach:** Conductive epoxy or preform die attach is recommended. For preform die attach: Preform: AuSn (80% Au, 20% Sn); Stage Temperature: 290°C, ±5°C; Handling Tool: Tweezers; Time: 1 min or less.

**Wire Bonding:** Wire Size: 0.7 to 1.0 mil in diameter (pre-stressed); Thermocompression bonding is preferred over thermosonic bonding. For thermocompression bonding: Stage Temperature: 250°C; Bond Tip Temperature: 150°C; Bonding Tip Pressure: 18 to 40 gms depending on size of wire.

Chip Diagram (Dimensions in mils/μm)



Bonding Diagram



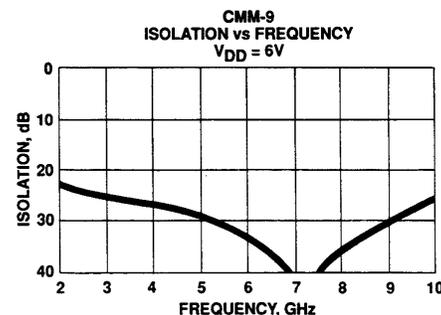
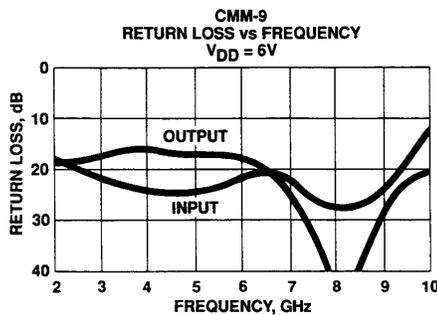
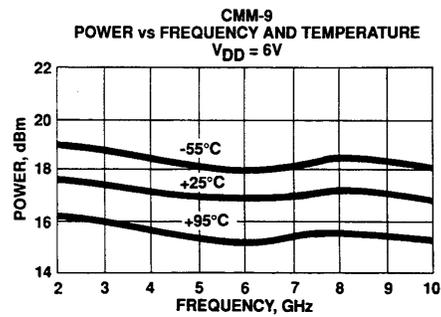
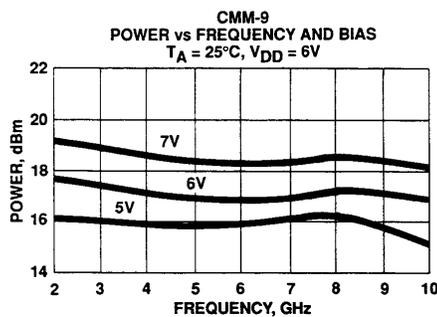
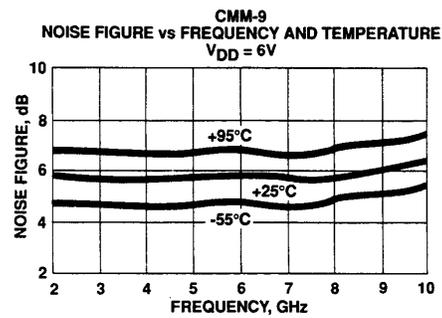
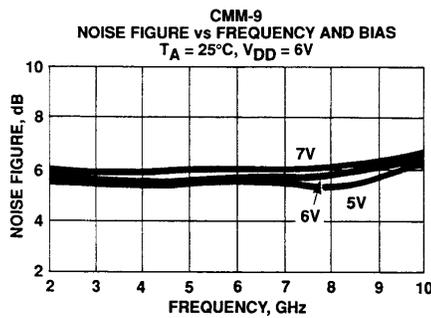
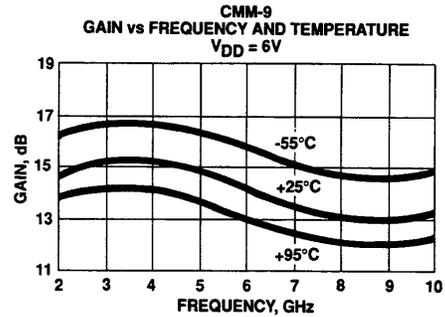
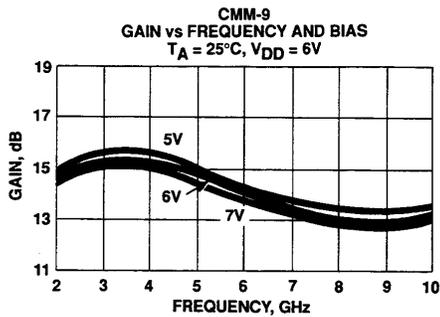
**CELERITEK**

[ 106 ]

# 2.0-9.0 GHz GaAs MMIC Amplifier

## CMM-9 GaAs MMIC Amplifier

### Typical Performance ( $T_A = 25^\circ\text{C}$ )



**CELERITEK**

[ 107 ]

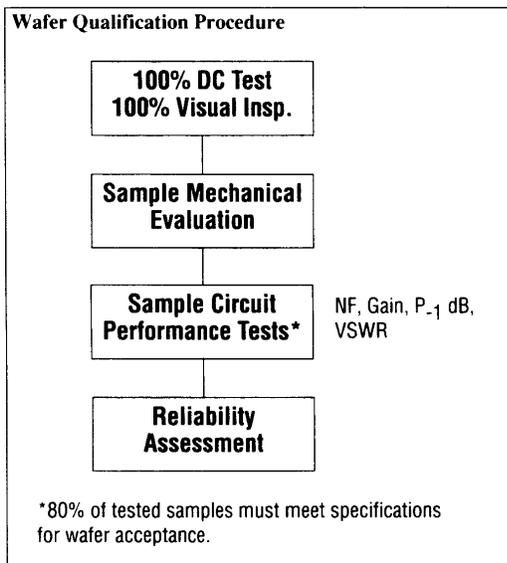
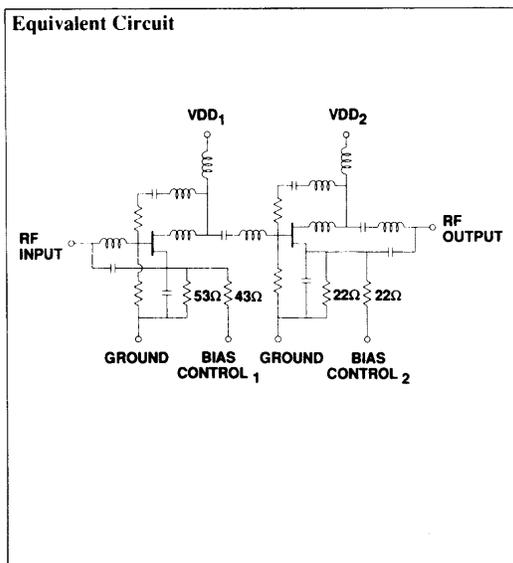
# 2.0-9.0 GHz GaAs MMIC Amplifier

## CMM-9 GaAs MMIC Amplifier

Typical Scattering Parameters,  $T_A = 25^\circ\text{C}$  (S-Parameters Include Bonding Wire Parasitics)

CMM-9  $V_{DD} = 6\text{ V}$

Frequency (GHz)	$S_{11}$		$S_{21}$			$S_{12}$			$S_{22}$		
	(dB)	(Mag) (Ang)	(dB)	(Mag) (Ang)	(dB)	(Mag) (Ang)	(dB)	(Mag) (Ang)	(dB)	(Mag) (Ang)	
2.0	-18.8	0.115 -113.94	14.8	5.505 -19.71	-33.8	0.020 38.50	-19.5	0.106 -87.88			
3.0	-22.0	0.079 -126.77	15.3	5.821 -71.15	-35.3	0.017 15.38	-18.0	0.126 -133.66			
4.0	-24.7	0.058 -135.91	15.2	5.754 -118.33	-36.9	0.014 6.02	-17.0	0.141 -174.54			
5.0	-26.2	0.049 -156.87	14.8	5.495 -161.63	-39.8	0.010 1.40	-17.7	0.130 148.74			
6.0	-21.2	0.087 166.67	14.1	5.070 158.96	-43.7	0.006 10.60	-18.6	0.117 139.19			
7.0	-22.7	0.073 151.20	13.4	4.677 122.26	-51.3	0.005 27.55	-24.7	0.058 116.68			
8.0	-27.3	0.043 116.76	13.0	4.467 87.16	-46.6	0.005 107.50	-44.4	0.006 112.43			
9.0	-24.3	0.061 6.11	13.0	4.467 51.62	-40.4	0.010 124.79	-27.9	0.040 -93.09			
10.0	-13.3	0.216 -32.75	13.3	4.624 12.23	-36.0	0.016 128.34	-20.4	0.095 -84.82			



3236 Scott Boulevard  
Santa Clara, California 95054  
(408) 986-5060  
Fax: (408) 986-5095

09-92

Specifications subject to change.

**CELERITEK**

[ 108 ]