

# CMM-5 2.0 to 6.0 GHz GaAs MMIC Amplifier

- ❑ High Gain: 16.5 dB
- ❑ 18 dBm P<sub>1</sub> dB
- ❑ Small Size: 39 x 40 mils
- ❑ Directly Cascadable
- ❑ Self-Biased
- ❑ Single Power Supply

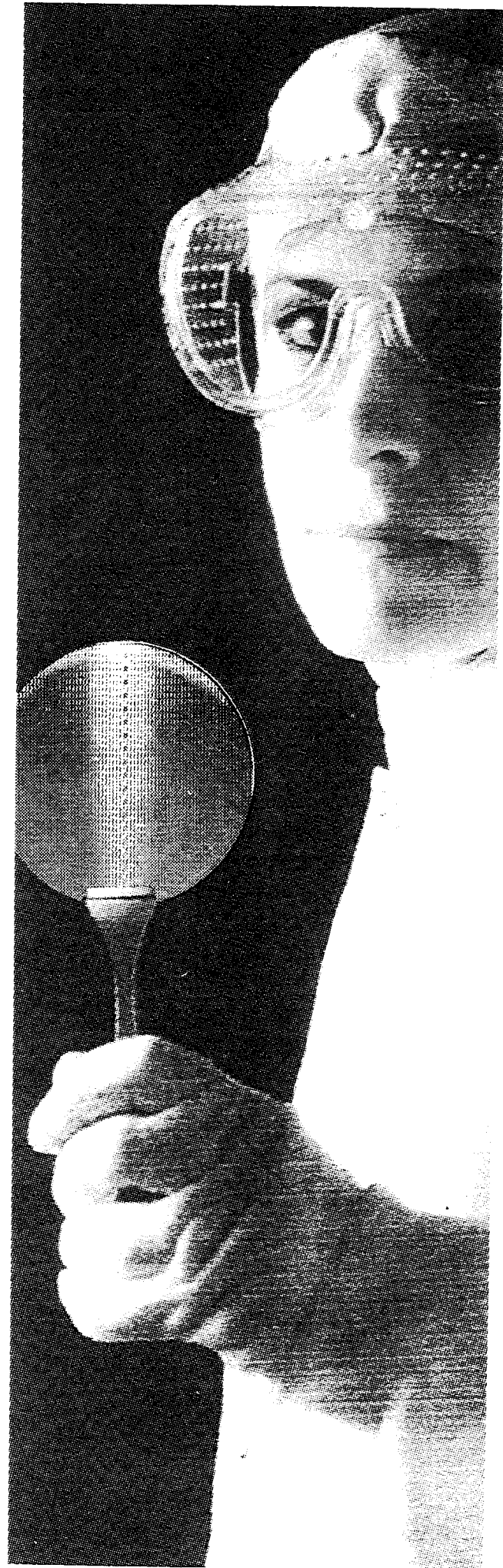
## Celeritek CMM-5 GaAs MMIC Amplifier

The CMM-5 is a 2 to 6 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-5 is a very small chip which provides 16.5 dB of gain and 18 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-5 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.



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Specifications ( $T_A = 25^\circ\text{C}$ , $V_{DD} = 6\text{V}$ , 2-6 GHz)				
Parameters	Units	Min	Typ	Max
Small Signal Gain	dB	15.0	16.5	
Gain Flatness	$\pm\text{dB}$		1.0	1.5
Input VSWR	—		2.0:1	2.2:1
Output VSWR	—		1.8:1	2.0:1
Reverse Isolation	dB	25	30	
Gain Variation Over Temperature (-55 to +95°C)	$\pm\text{dB}$		1.2	1.5
Noise Figure	dB		5.5	6.5
1 dB Gain Compression Power Output	dBm	16	18	
Current	mA		100	120

## Absolute Maximum Ratings

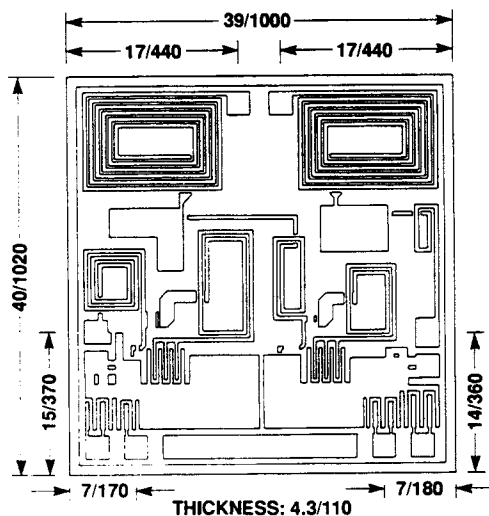
Parameter	Rating
Voltage	8V
Continuous Power Dissipation	1.25 W
Channel Temperature	+175°C
Storage Temperature	-65°C to +175°C
Mounting Temperature	+320°C
Input Power	+20 dBm
$\theta_{JC}$	60°C/W

## Die Attach and Bonding Procedures

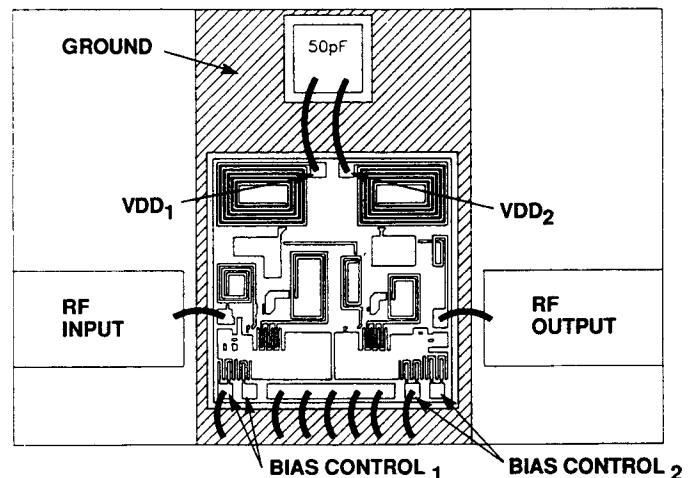
**Die Attach:** Conductive epoxy or preform die attach is recommended. For preform die attach: Preform: AuSn (80% Au, 20% Sn); Stage Temperature: 290°C,  $\pm 5^\circ\text{C}$ ; Handling Tool: Tweezers; Time: 1 min or less.

**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/ $\mu\text{m}$ )



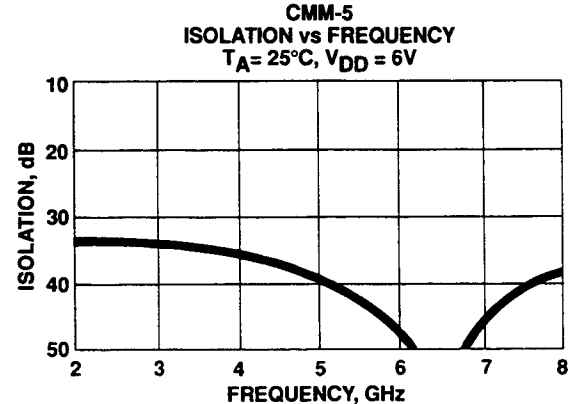
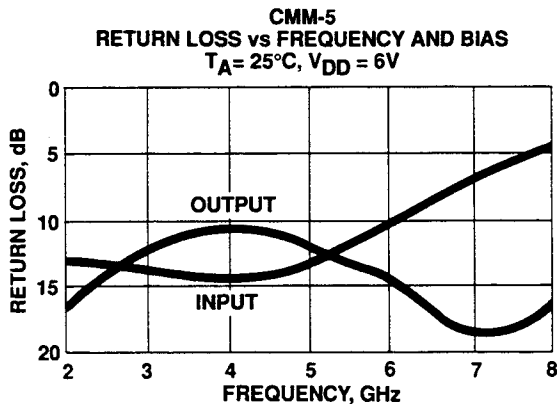
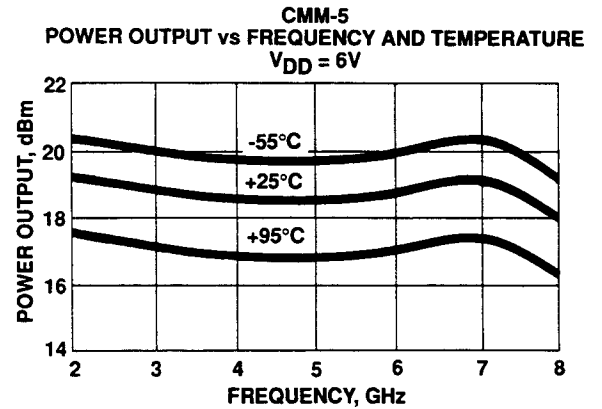
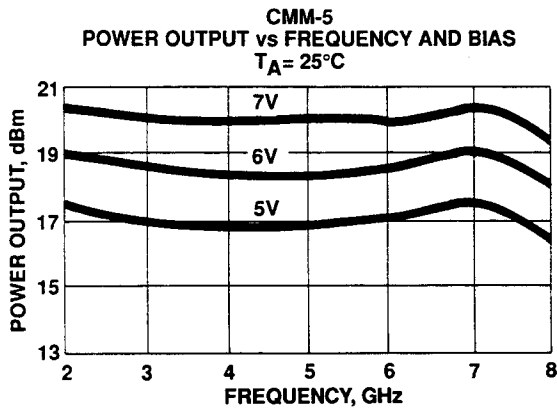
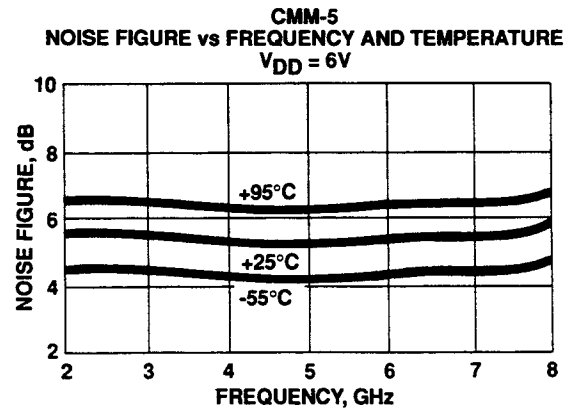
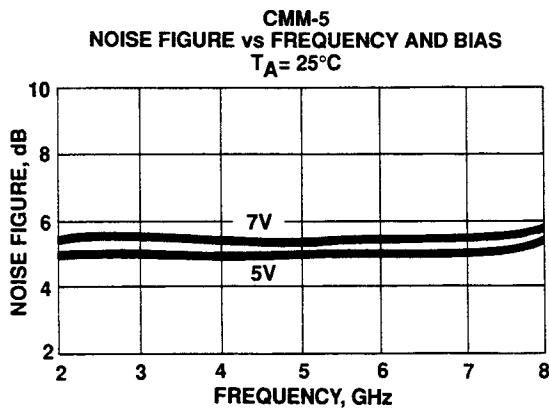
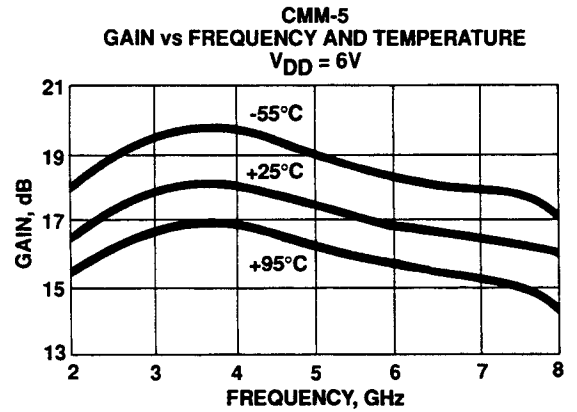
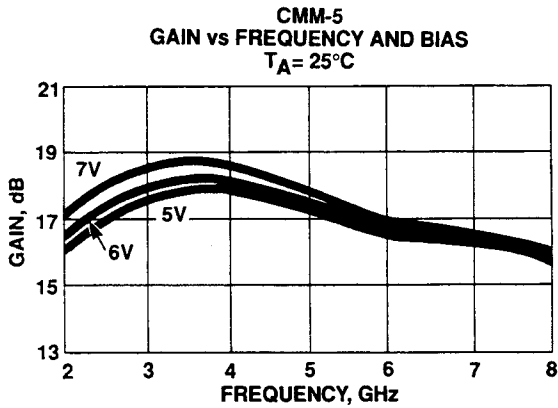
## Bonding Diagram



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



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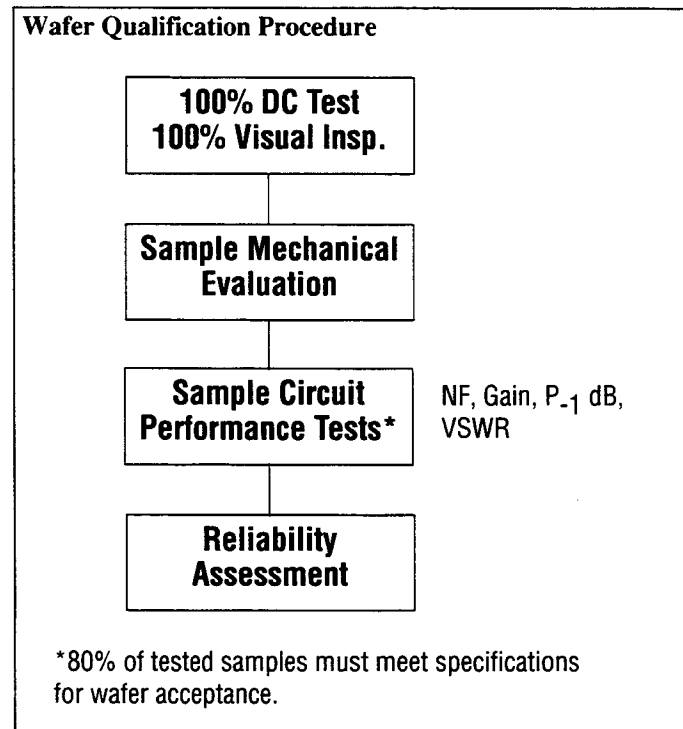
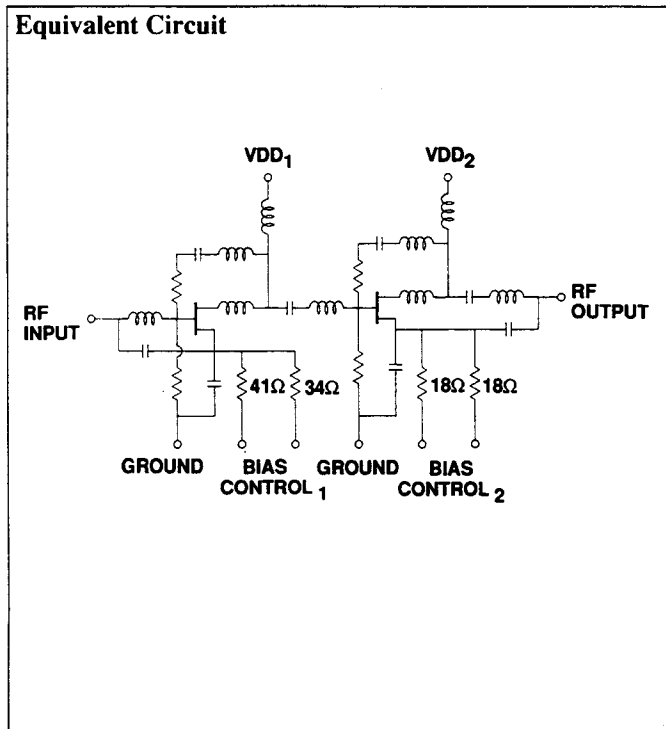
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Typical Scattering Parameters,  $T_A=25^\circ\text{C}$  (S-Parameters Include Bonding Wire Parasitics)

CMM-5

$V_{DD} = 6\text{ V}$

Frequency (GHz)	$S_{11}$		$S_{21}$			$S_{12}$		$S_{22}$				
	(dB)	(Mag)	(Ang)	(dB)	(Mag)	(Ang)	(dB)	(Mag)	(Ang)			
2.0	-13.0	0.223	-178.7	16.5	6.672	-45.6	-33.2	0.022	31.7	-17.1	0.139	-76.7
3.0	-14.2	0.195	160.6	17.9	7.833	-105.8	-34.9	0.018	12.1	-11.7	0.260	-136.3
4.0	-14.4	0.191	143.7	17.9	7.828	-166.9	-36.5	0.015	1.1	-10.5	0.298	174.2
5.0	-13.2	0.219	133.2	17.2	7.278	138.4	-40.0	0.010	-17.7	-12.0	0.253	137.6
6.0	-10.3	0.305	114.8	16.7	6.859	86.7	-50.5	0.003	-48.2	-14.6	0.186	105.4
7.0	-7.1	0.442	80.8	16.4	6.615	32.3	-46.0	0.005	158.2	-19.0	0.112	56.2
8.0	-4.4	0.605	30.6	15.5	5.966	-27.5	-40.0	0.010	114.7	-16.5	0.149	-37.5



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

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Specifications subject to change.

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