

# 2.0-6.0 GHz GaAs MMIC Low Noise Amplifier

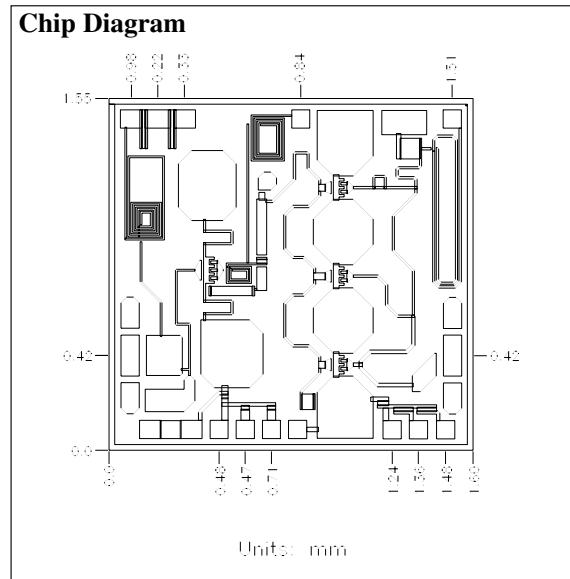
## 2.0 to 6.0 GHz GaAs MMIC Low-Noise Amplifier

Advanced Product Information  
May 2005 V1.5

(1 of 5)

### Features

- ❑ Small Size: 1.60 x 1.55 x 0.076 mm
- ❑ Integrated On-Chip Drain Bias Coil
- ❑ Integrated On-Chip DC Blocking
- ❑ Single Bias Operation
- ❑ Directly Cascadable – Fully Matched, Novel Feedback & Distributed Amplifier Design
- ❑ P1dB: 15.5 dBm @ 6 GHz, Typ.
- ❑ High Linear Gain: 17.5 dB Typ.
- ❑ Noise Figure: 3.3 dB Typ. @ 6 GHz
- ❑ pHEMT Technology
- ❑ Silicon Nitride Passivation



### Specifications (TA = 25°C, Vdd = 5V) <sup>1</sup>

Parameters	Units	Min	Typ	Max
Frequency Range	GHz	2.0		6.0
Linear Gain	dB	16.0	17.5	
Gain Variation (over operating frequency)	±dB			2.0
Power Output (@ 1 dB Gain Compression)	dBm	14.0	15.5	
P1dB Variation (over operating frequency)	dBm			1.0
Saturated Output Power	dBm	19.0		23.0
Third Order Intercept Point (@ 6 GHz)	dBm		25.5	
Second Order Intercept Point (@ 6 GHz)	dBm		41.0	
Noise Figure (@ 6 GHz)	dB		3.3	3.8
Input Return Loss <sup>2</sup>	dB			-9.5
Output Return Loss <sup>2</sup>	dB			-12.0
Current	mA	85	100	115
Thermal Resistance	°C/W		34.0	
Stability	Unconditionally Stable			

Notes: 1. Tested on Celeritek connectorized evaluation board.  
2. Measured on wafer.

### Absolute Maximum Ratings <sup>1</sup>

Parameter	Rating
Drain Voltage	4.5V (min.) / 8.0V (max.)
Drain Current	150 mA
Continuous Power Dissipation	1.2 W
Input Power	10 dBm
Storage Temperature	-50°C to +150°C
Channel Temperature	175°C
Operating Backside Temperature <sup>2</sup>	-40°C Min.

Notes: 1. Operation outside these limits can cause permanent damage.  
2. Calculation maximum operating temperature:  
 $T_{max} = 175 - (P_{dis} [W] \times 34) [^{\circ}C]$ .

### Die Attach and Bonding Procedures

**Die Attach:** Eutectic die attach is recommended. For eutectic 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.

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August 2006 - Rev 02-Aug-06

**CMMI200**

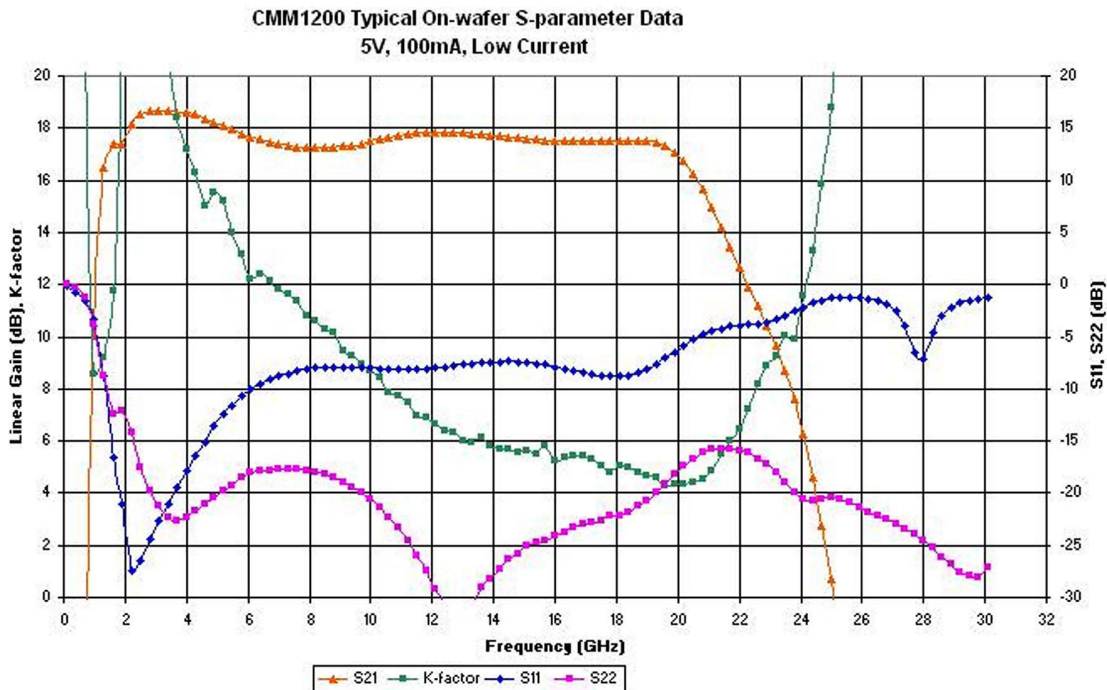
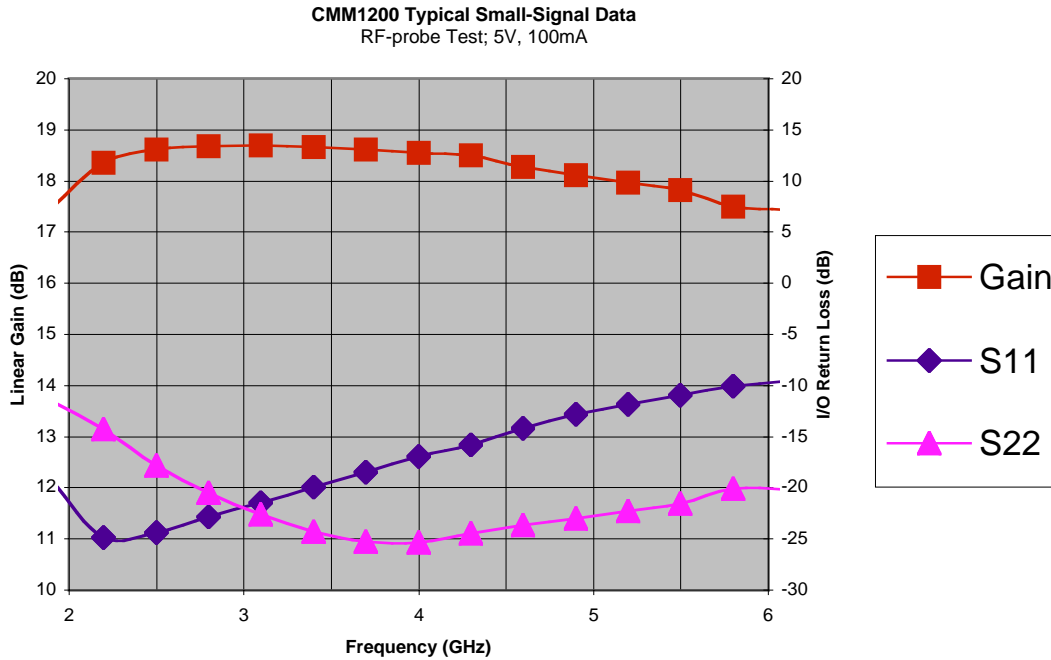
## Typical On-Wafer Scattering Parameters (Vd = +5.0V, Icc = 101 mA, T = 23°C, device in a 50 ohm system)

Frequency (MHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	(Mag)	(Ang)	(Mag)	(Ang)	(Mag)	(Ang)	(Mag)	(Ang)
0.10	0.813	-0.57	0.001	0.00	0.000	0.00	0.970	-0.23
1.00	-0.461	0.50	-1.411	-3.07	0.004	0.00	-0.474	-0.44
1.90	0.060	0.07	1.612	7.22	-0.001	0.00	-0.245	-0.03
2.20	0.041	-0.01	5.064	6.32	0.000	0.00	-0.192	0.04
2.50	0.008	-0.05	7.462	3.94	-0.001	0.00	-0.127	0.04
3.40	-0.021	-0.09	7.667	-3.82	0.000	0.00	-0.077	0.00
3.70	-0.023	-0.10	6.413	-5.62	0.001	0.00	-0.074	-0.01
4.00	-0.027	-0.13	4.857	-6.95	0.002	0.00	-0.075	-0.02
4.90	-0.059	-0.20	-0.337	-8.14	0.003	0.00	-0.092	-0.03
5.20	-0.085	-0.22	-1.893	-7.81	0.003	0.00	-0.099	-0.03
5.50	-0.111	-0.24	-3.305	-7.21	0.004	0.00	-0.106	-0.03
5.80	-0.140	-0.26	-4.492	-6.28	0.004	0.00	-0.117	-0.03
6.10	-0.179	-0.26	-5.314	-5.42	0.005	0.00	-0.126	-0.01
7.00	-0.267	-0.25	-7.084	-2.16	0.005	0.00	-0.128	0.02
7.90	-0.338	-0.20	-7.165	1.27	0.004	0.00	-0.117	0.05
8.20	-0.355	-0.18	-6.874	2.35	0.004	0.00	-0.109	0.06
8.50	-0.368	-0.16	-6.436	3.37	0.004	0.00	-0.100	0.07
9.10	-0.387	-0.11	-5.152	5.20	0.003	-0.01	-0.077	0.08
10.00	-0.395	-0.06	-2.289	7.12	0.001	-0.01	-0.036	0.09
10.90	-0.392	-0.01	1.328	7.55	0.000	-0.01	0.000	0.07
12.10	-0.394	0.05	5.852	5.16	-0.004	-0.01	0.027	0.02
13.00	-0.394	0.12	7.603	1.63	-0.007	-0.01	0.024	-0.02
13.90	-0.368	0.21	7.341	-2.28	-0.009	0.00	0.002	-0.04
14.50	-0.324	0.28	6.104	-4.58	-0.009	0.00	-0.016	-0.05
15.10	-0.253	0.34	4.167	-6.32	-0.010	0.00	-0.033	-0.04
16.00	-0.101	0.39	0.436	-7.50	-0.010	0.00	-0.053	-0.03
17.20	0.125	0.35	-4.701	-5.86	-0.006	0.01	-0.072	0.00
18.10	0.262	0.25	-7.183	-2.26	-0.003	0.01	-0.065	0.04
19.00	0.369	0.13	-7.082	2.49	0.003	0.01	-0.021	0.09
20.20	0.501	-0.10	-1.719	6.64	0.010	0.01	0.117	0.07
21.10	0.481	-0.36	2.707	4.90	0.012	0.00	0.152	-0.06
22.00	0.348	-0.53	4.002	1.55	0.008	-0.01	0.080	-0.14
23.20	0.198	-0.65	2.532	-1.66	0.000	-0.01	-0.012	-0.12
24.10	0.078	-0.78	0.354	-2.02	-0.005	-0.01	-0.019	-0.09
25.00	-0.150	-0.85	-0.597	-0.90	-0.006	0.00	-0.022	-0.09
26.20	-0.437	-0.73	-0.379	-0.17	-0.006	0.00	-0.033	-0.07
26.80	-0.537	-0.60	-0.265	-0.05	-0.004	0.00	-0.033	-0.07
28.00	-0.204	-0.39	-0.136	-0.02	-0.002	0.00	-0.028	-0.05
29.20	-0.466	-0.67	-0.076	0.03	-0.003	0.00	-0.011	-0.04
30.10	-0.637	-0.58	-0.040	0.03	-0.001	0.00	0.011	-0.04

S-Parameter Data Files are available on-line at: [www.mimixbroadband.com](http://www.mimixbroadband.com)

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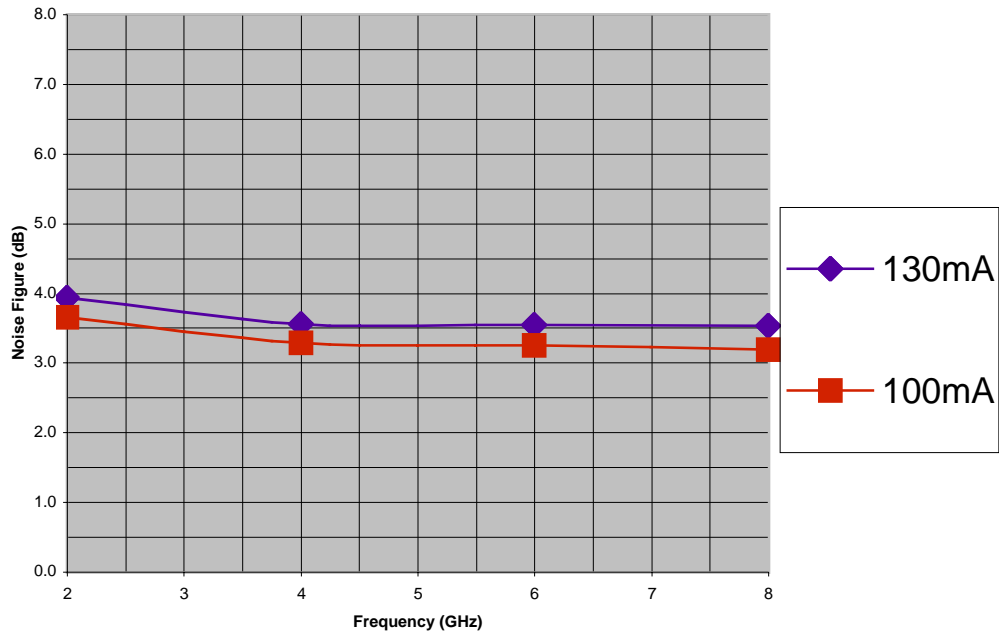
## Typical Narrow and Wideband S-Parameter Performance



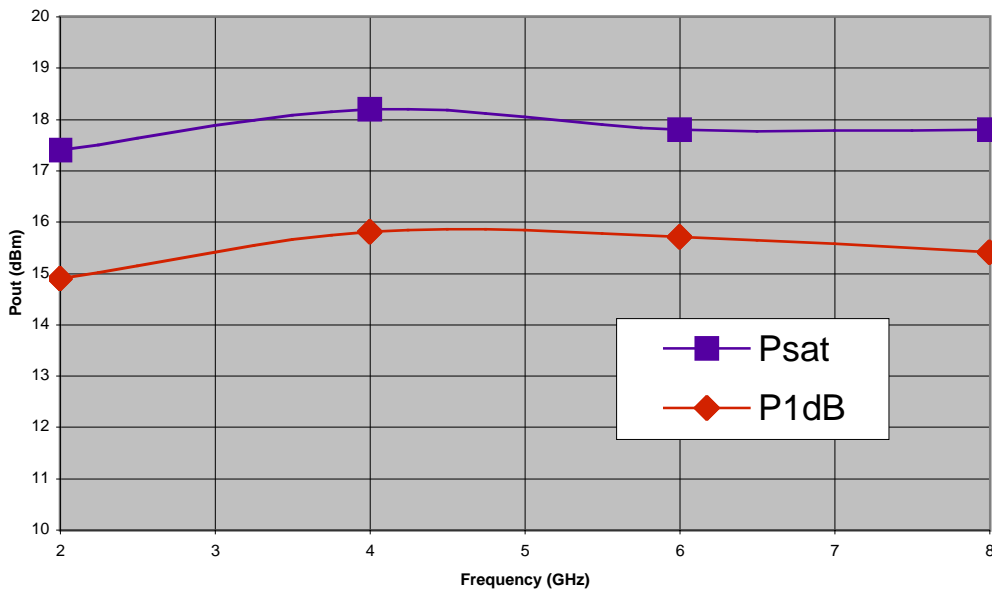
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## Typical Noise and Power Performance

CMM1200 Typical Noise Figure Data  
Connectorized Fixture; Vdd=5V

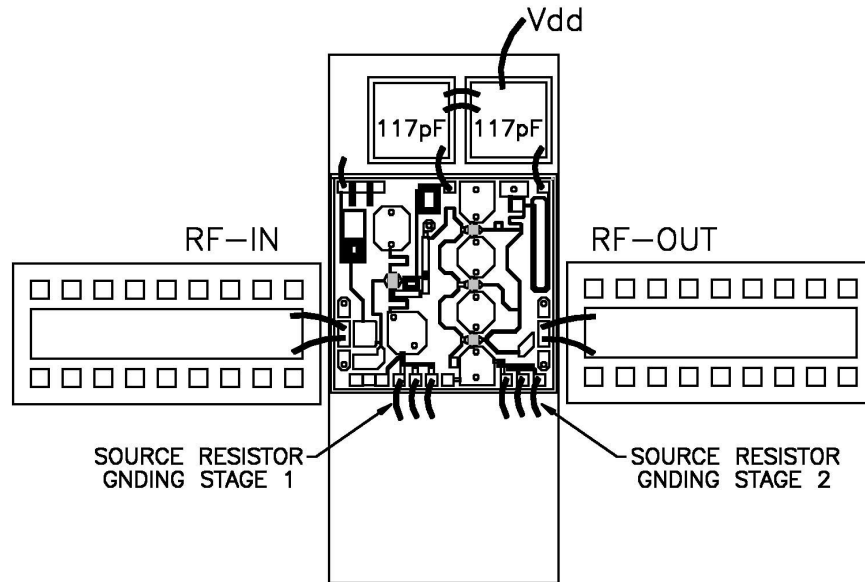


CMM1200 Typical Power Data  
Connectorized Fixture; 5V, 100mA



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## Assembly Example



## Ordering Information

The CMM1200-BD is available in bare die and is shipped in Gel Pak.

Part Number for Ordering  
**CMM1200-BD**

Package  
**Bare Die**