

**Advanced Product Information**  
**February 2002** (1 of 6)

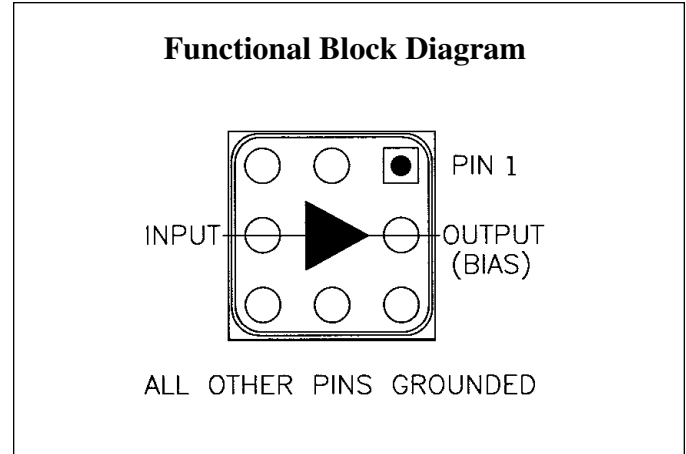
## 0.25 to 6.0 GHz High Dynamic Range Amplifier

### Features

- ❑ 0.25 to 6.0 GHz Frequency Range
- ❑ 41 dBm Output IP3
- ❑ 1.7 dB Noise Figure
- ❑ 18.5 dB Gain
- ❑ 23 dBm P1dB
- ❑ LGA Package
- ❑ Single Power Supply
- ❑ Single Input Matching

### Applications

- ❑ Wireless Local Loop Transmit and Receive
- ❑ UNII Transmit and Receive
- ❑ Dual Band 802.11 WLAN



### Description

The CMM6004-AH is a high dynamic range amplifier designed for applications operating within the 0.25 to 6.0 GHz frequency range. It is an ideal solution for numerous transmit and receive functions in wireless local loop (WLL) and UNII applications where high linearity is required.

The amplifier has the flexibility of being optimized for a number of wireless applications. It is an ideal solution when used as a driver amplifier in applications including cellular and PCS (personal communications service) operating from 0.8 to 2.2 GHz; MMDS (multichannel multipoint distrib-

ution systems) operating from 2.2 to 2.7 GHz; WLAN (wireless LAN) operating at 2.4 GHz; WLL (wireless local loop) operating at 3.5 GHz; and HiperLAN (high performance LAN) and U-NII (unlicensed national information infrastructure) operating from 5.0 to 6.0 GHz.

The CMM6004-AH is packaged in a low-cost, space efficient, Land Grid Array (LGA) package which provides excellent electrical stability and low thermal resistance. All devices are 100% RF and DC tested. With single input matching the part simplifies design by keeping board space and cost to a minimum.

### Electrical Characteristics

Unless otherwise specified, the following specifications are guaranteed at room temperature in a Celeritek test fixture.

| Parameter               | Condition          | Min  | Typ  | Max  | Units |
|-------------------------|--------------------|------|------|------|-------|
| Frequency Range         |                    | 0.25 |      | 6.0  | GHz   |
| Gain                    | Externally matched | 17.0 | 18.5 | 19.5 | dB    |
| Input Return Loss       | Externally matched | -24  | -10  |      | dB    |
| Output IP3              |                    | 38   | 41   | 45   | dBm   |
| Noise Figure            |                    | 1.5  | 1.7  | 1.85 | dB    |
| Output P1dB             |                    | 22.5 | 23.0 | 23.5 | dBm   |
| Operating Current Range |                    | 175  | 185  | 200  | mA    |
| Supply Voltage          |                    |      | 5.0  |      | V     |

#### Notes:

1. T = 22°C, Vdd = 5.0, Frequency = 800 MHz, 50 Ohm system
2. Thermal resistance = 50°C/W.

### Absolute Maximum Ratings

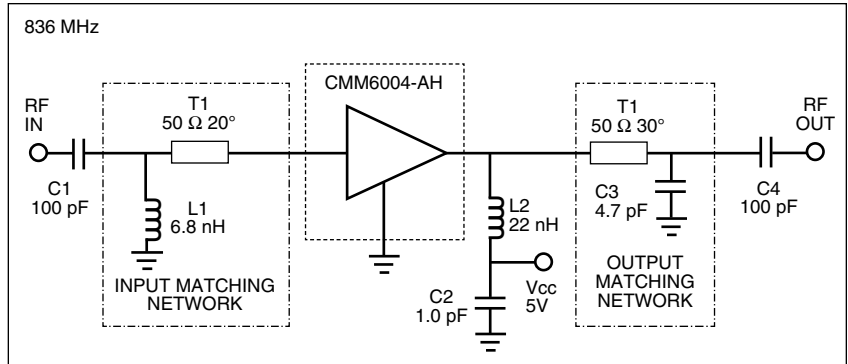
| Parameter      | Rating  | Parameter            | Rating          | Parameter             | Rating         |
|----------------|---------|----------------------|-----------------|-----------------------|----------------|
| Supply Voltage | +6.0 V  | Storage Temperature  | -40°C to +125°C | Operating Temperature | -40°C to +85°C |
| RF Input Power | +13 dBm | Junction Temperature | 150°C           |                       |                |

Operation of this device above any of these parameters may cause damage.

## Application Circuit (836 MHz)

Typical Performance (50 Ohm System)

|                    |   |
|--------------------|---|
| Frequency          | 836 MHz                                       |
| Gain               | 18 dB   |
| Input Return Loss  | -23 dB  |
| Output Return Loss | -14 dB  |
| OIP3               | 40 dBm  |
| Noise Figure       | 1.75 dB                                       |
| Bias               | V <sub>ds</sub> = 5V, I <sub>d</sub> = 175 mA |

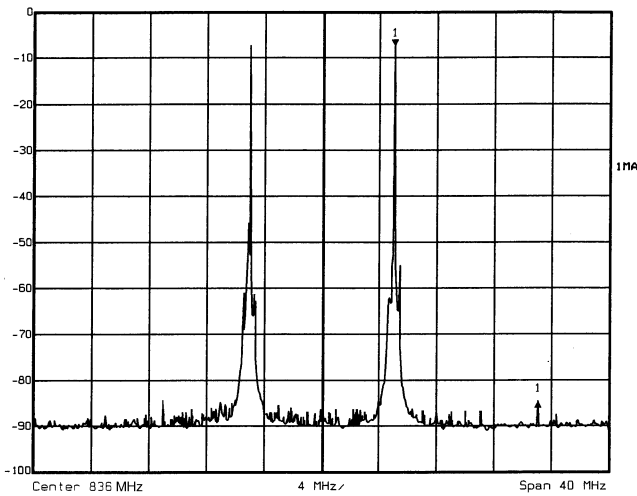


### Circuit Board Parts List

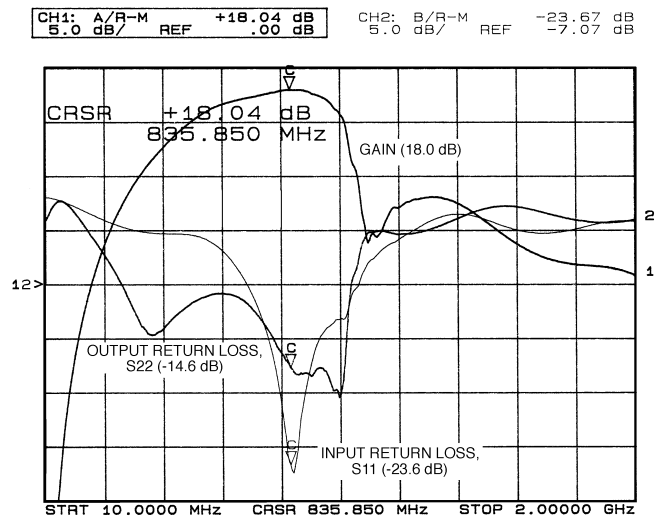
| Part Type | Reference Designator | Description                   |
|-----------|----------------------|-------------------------------|
| Inductor  | L1                   | 0603, 6.8 nH                  |
| Inductor  | L2                   | 0603, 22 nH                   |
| Capacitor | C1, C4               | SMD 0805 NPO, 100 pF          |
| Capacitor | C2                   | 0603, 1 pF                    |
| Capacitor | C3                   | SMD 0805, 50V ±0.25 pF 4.7 pF |

## Typical Performance

IP3 measured with 2 tones at an output power of 5 dBm/tone separated by 10 MHz



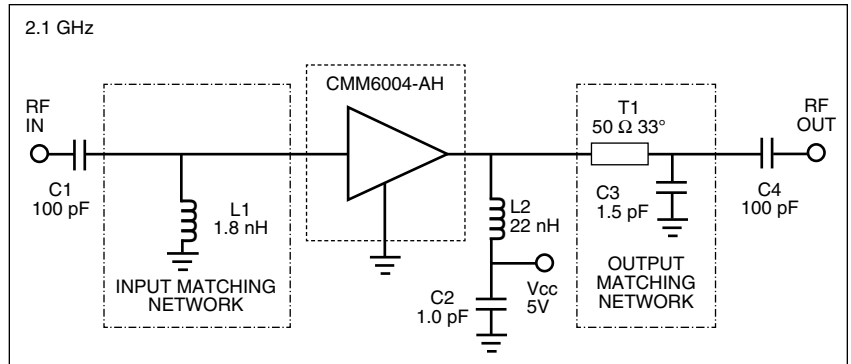
Gain, Input Return Loss and Output Return Loss vs Frequency



### Application Circuit (2.1 GHz)

Typical Performance (50 Ohm System)

|                    |   |
|--------------------|---|
| Frequency          | 2.1 GHz                                       |
| Gain               | 15.8 dB                                       |
| Input Return Loss  | -14 dB  |
| Output return Loss | -16.5 dB                                      |
| OIP3               | 40 dBm  |
| Noise Figure       | 2.95 dB                                       |
| Bias               | V <sub>ds</sub> = 5V, I <sub>d</sub> = 175 mA |

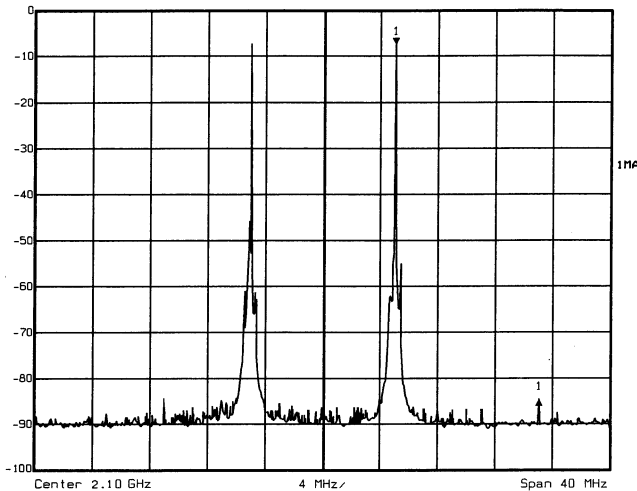


### Circuit Board Parts List

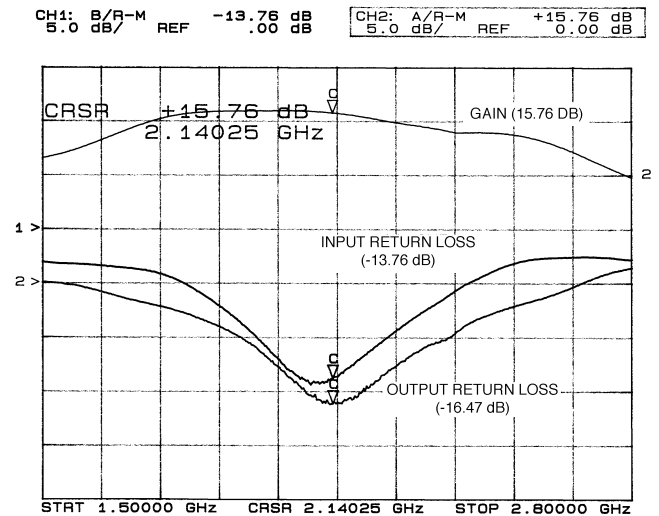
| Part Type | Reference Designator | Description                  |
|-----------|----------------------|------------------------------|
| Inductor  | L1                   | 0603, ±0.3, 1.8 nH           |
| Inductor  | L2                   | 0603, 22 nH                  |
| Capacitor | C1, C4               | SMD 0805 NPO, 100 pF         |
| Capacitor | C2                   | 0603, 1 pF                   |
| Capacitor | C3                   | SMD 0603, 50V ±0.1 pF 1.5 pF |

### Typical Performance

IP3 measured with 2 tones at an output power of 5 dBm/tone separated by 10 MHz



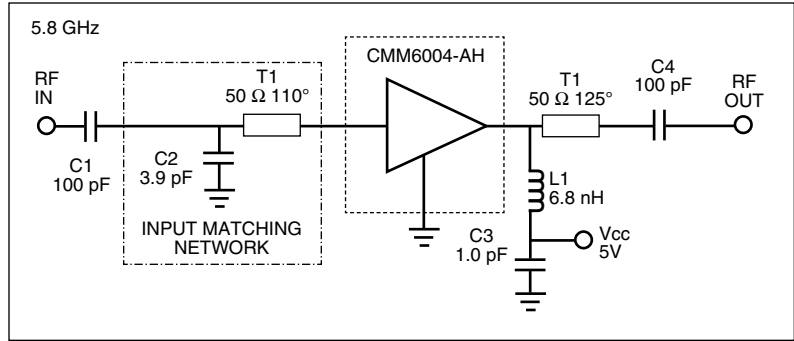
Gain, Input Return Loss and Output Return Loss vs Frequency



## Application Circuit (5.8 GHz)

Typical Performance (50 Ohm System)

|                    |  |
|--------------------|--|
| Frequency          | 5.8 GHz  |
| Gain               | 10.5 dB  |
| Input Return Loss  | -11.5 dB                                       |
| Output Return Loss | -17.2 dB                                       |
| OIP3               | 40 dBm   |
| Noise Figure       | 3.8 dB   |
| Bias               | V <sub>ds</sub> = 5V, I <sub>ds</sub> = 175 mA |

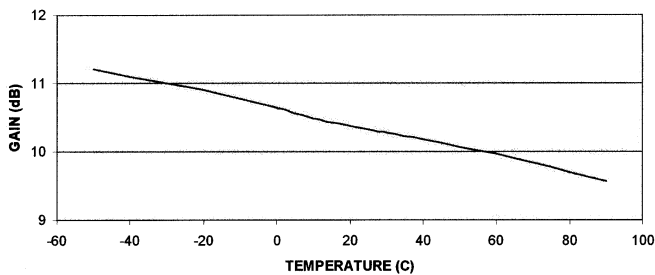


### Circuit Board Parts List

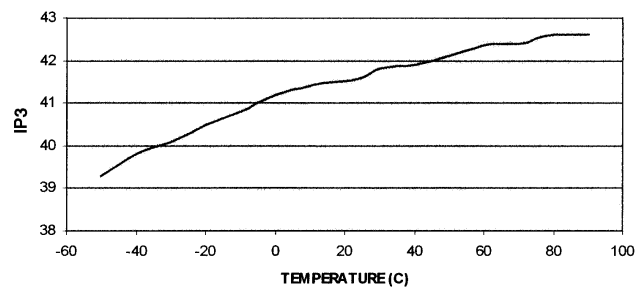
| Part Type | Reference Designator | Description          |
|-----------|----------------------|----------------------|
| Inductor  | L1                   | 0603, 6.8 nH         |
| Capacitor | C1, C4               | SMD 0805 NPO, 100 pF |
| Capacitor | C2                   | SMD 0805, 3.9 pF     |
| Capacitor | C3                   | 0603, 1 pF           |

## Typical Performance

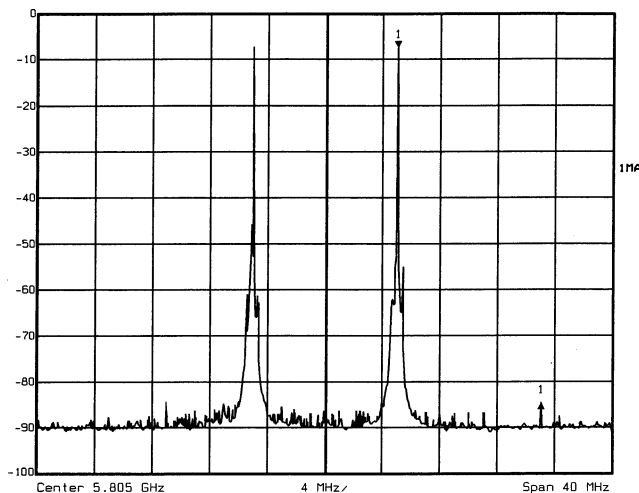
Gain vs Temperature @ 5.8 GHz



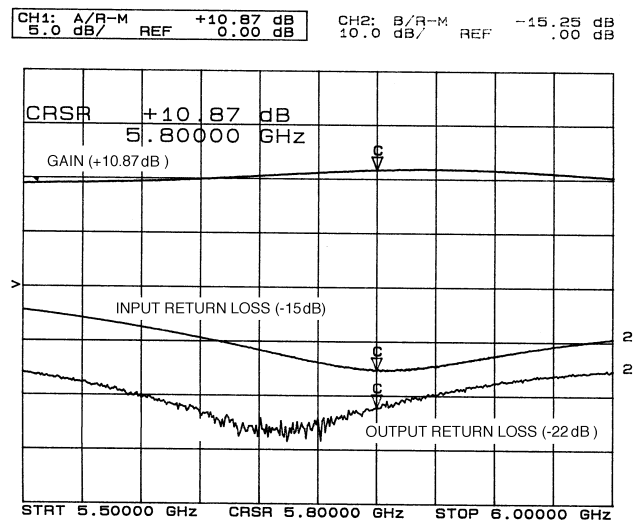
IP3 vs Temperature @ 5.8 GHz



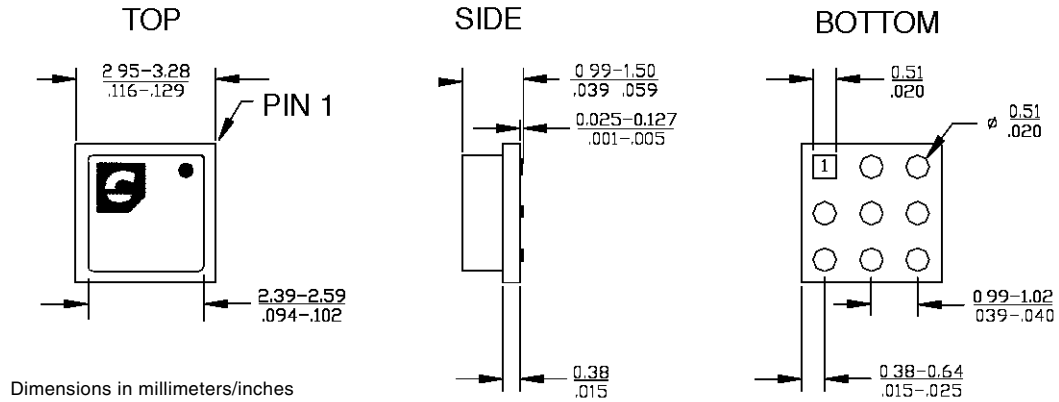
IP3 measured with 2 tones at an output power of 5 dBm/tone separated by 10 MHz



Gain, Input Return Loss and Output Return Loss vs Frequency

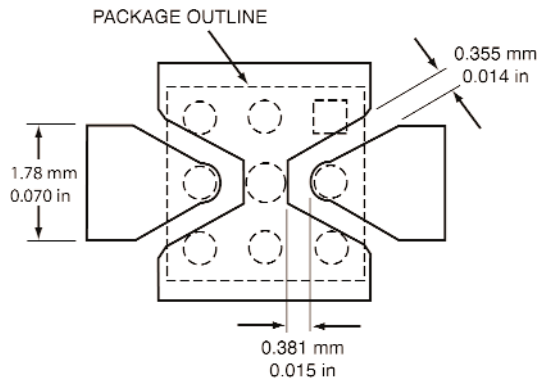


## Physical Dimensions



## Mounting Recommendation

Board substrate:  
RO-4003  
Thickness = 31 mil



## Ordering Information

The CMM6004-AH is available in a surface-mount LGA package and devices are available in tape and reel.

Part Number for Ordering

**CMM6004-AH**

**PB-CMM6004-AH**

Package

**LGA surface-mount power package in tape and reel**

**Evaluation Board with SMA connectors for CMM6004-AH**

## Notes

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