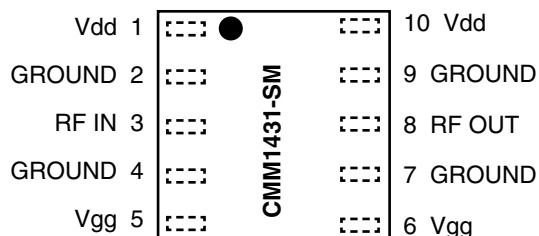


**Advanced Product Specifications**  
**October 2003** (1 of 4)**13.50 to 14.50 GHz**  
**1.5 Watt Power Amplifier****Features**

- ❑ **32.2 dBm (Typ.) Saturated Output Power**
- ❑ **30.5 dB (Typ.) Linear Gain**
- ❑ **Fully Matched**
- ❑ **Unconditionally Stable**
- ❑ **Low-Cost, Surface Mount Package**
- ❑ **Optimum Thermal Dissipation**

**Applications**

- ❑ **Ku-Band VSAT Transmit Subsystems**

**Pin Functional Diagram****Description**

The CMM1431-SM is a four-stage pHEMT GaAs MMIC power amplifier that is ideally suited for transmit subsystems designed for Ku-Band VSAT applications. The CMM1431-SM provides 30.5 dB linear gain and delivers 1.5 watts of output power at saturation operating from 13.50 to 14.50 GHz frequency.

The unconditional stability and internal matching provides for reduction of external components making this product a simple and low-cost solution. The low-cost, 6mm x 6mm x 1.6mm surface mount package, offers the same excellent RF and thermal properties as a typical flange package.

**Electrical Characteristics** (T = +25°C, Vd = 7V, Idq = 770mA)

| Parameter                        | Condition                | Min   | Typ   | Max   | Units |
|----------------------------------|--------------------------|-------|-------|-------|-------|
| Frequency Range                  |                          | 13.50 |       | 14.50 | GHz   |
| Output Power                     | @ 1dB compression        | 30.5  | 31.5  |       | dBm   |
| Saturated Output Power           | Pin = 5.0 dBm            | 31.2  | 32.2  |       | dBm   |
| Saturated Output Power Variation | Over operating frequency |       | 0.5   | 1.0   | dBm   |
| Linear Gain                      |                          | 27.0  | 30.5  | 34.0  | dB    |
| Linear Gain Variation            | Over operating frequency |       | 1.0   | 3.0   | dB    |
| Input Reflection Coefficient     |                          |       | -10.0 |       | dB    |
| Output Reflection Coefficient    |                          |       | -7.0  |       | dB    |
| Gate Supply Voltage              | Idq = 770 mA             | -1.1  | -0.9  | -0.7  | Volts |
| Drain Current                    | At Saturation            |       | 900   | 980   | mA    |
| Power Added Efficiency           | At Saturation            | 22    | 26    |       | %     |

**Electrical Specifications** (TA = -40°C to +75°C)

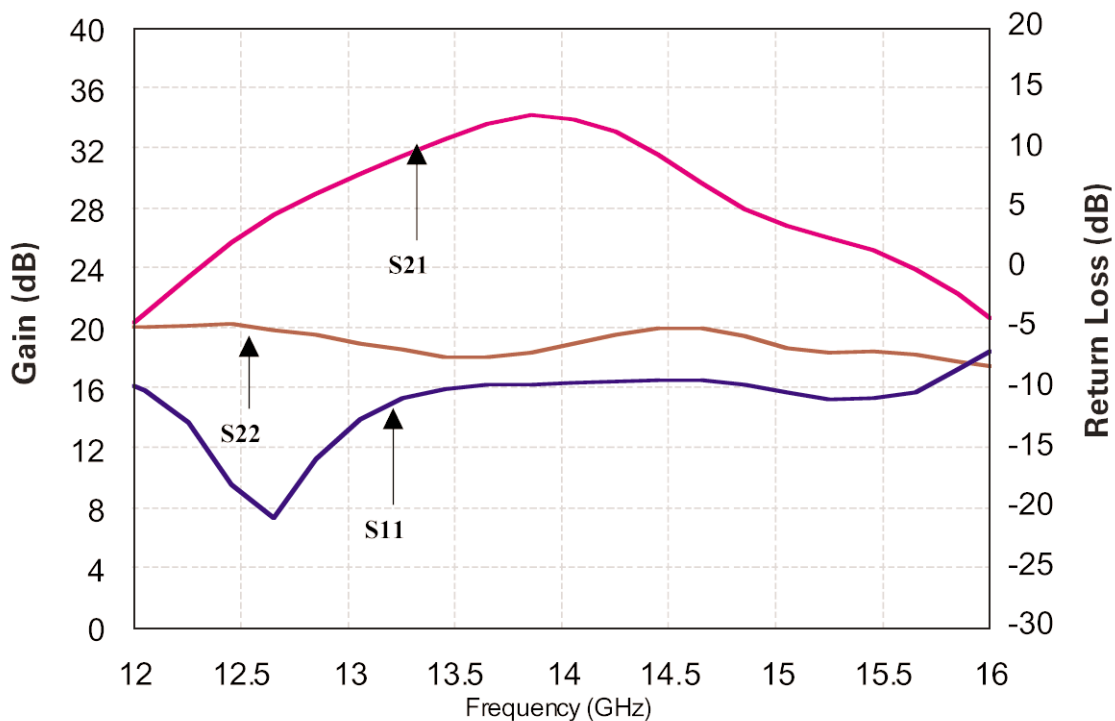
| Parameter              | Condition                       | Min                    | Typ | Max | Units |
|------------------------|---------------------------------|------------------------|-----|-----|-------|
| Saturated Output Power | Variation from Room Temperature | -0.5                   |     |     | dBm   |
| Linear Gain            | Variation from Room Temperature | -2.5                   |     | 3.5 | dB    |
| Stability              |                                 | Unconditionally stable |     |     |       |

**Maximum Ratings** (TA = -40°C to +75°C) Operation outside these limits can cause permanent damage.

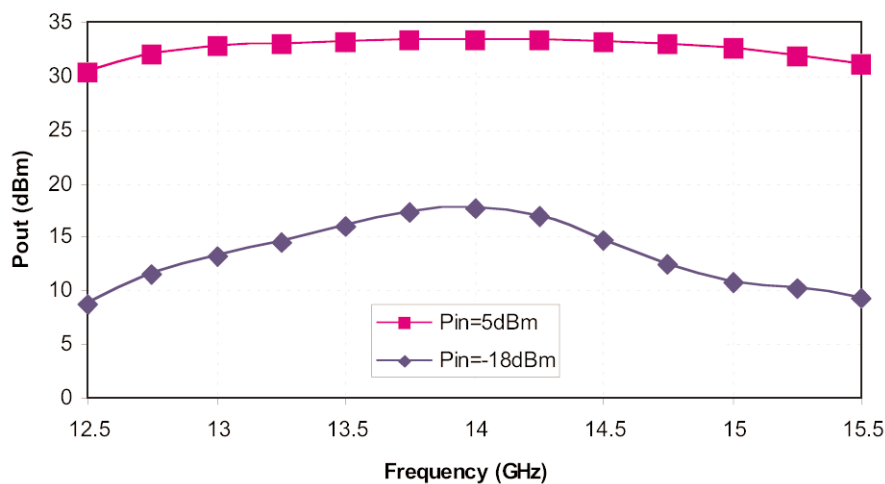
| Parameter                            | Typ  | Units | Parameter                             | Typ         | Units |
|--------------------------------------|------|-------|---------------------------------------|-------------|-------|
| Drain Voltage (+V <sub>dd</sub> )    | 8.5  | Volts | RF Input Power (P <sub>in</sub> )     | 7.0         | dBm   |
| Gate Voltage (V <sub>gg</sub> )      | -3.0 | Volts | Dissipated Power (P <sub>diss</sub> ) | 7.2         | Watts |
| Quiescent Current (I <sub>dq</sub> ) | 1000 | mA    | Storage Temperature                   | -50 to +150 | °C    |
| Gate Current (I <sub>g</sub> )       | 5    | mA    | Operating Backside Temperature        | -40 to +75  | °C    |

Typical Performance ( $V_{dd} = 7V$ ,  $I_{dq} = 770\text{ mA}$ )

### Gain and Return Loss vs Frequency



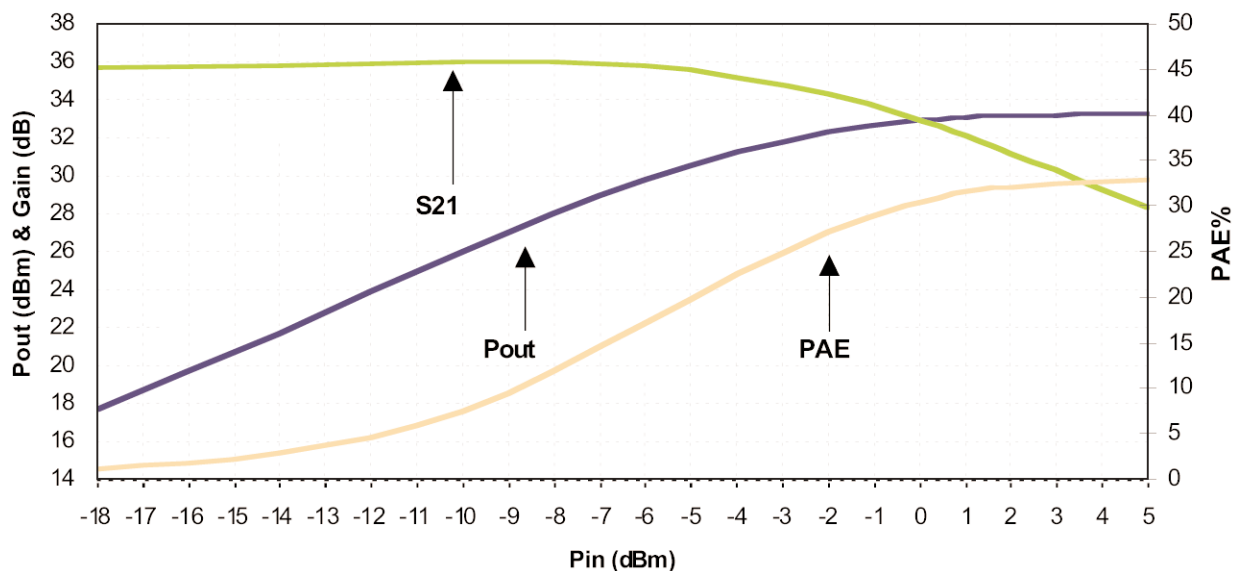
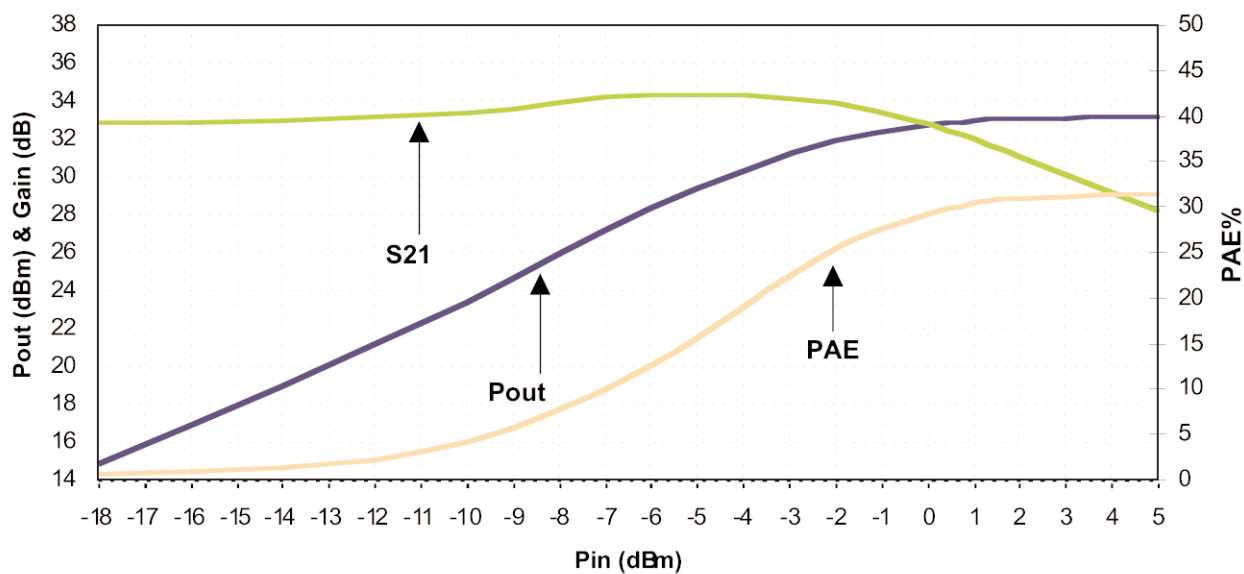
### Power Out vs Frequency



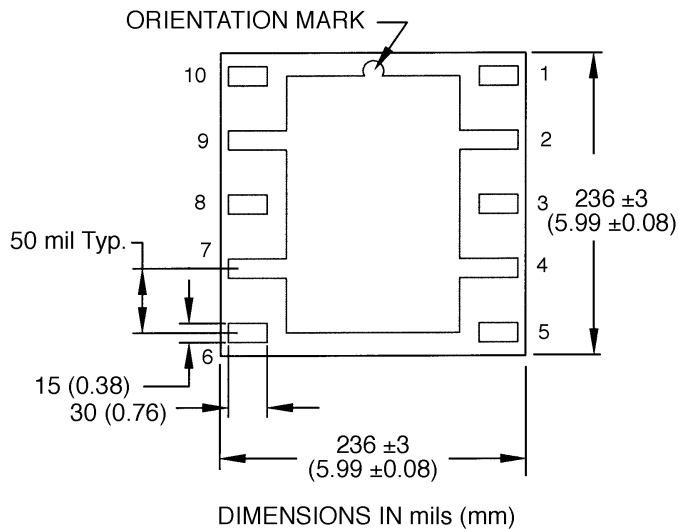
**Advanced Product Specifications - October 2003**

(3 of 4)

**Typical Performance** ( $V_{dd} = 7V$ ,  $I_{dq} = 770\text{ mA}$ )

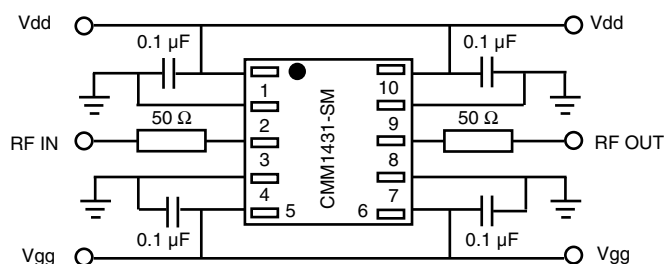
**Power Out, Gain and PAE vs Power In  
@14 GHz**

**Power Out, Gain and PAE vs Power In  
@14.5 GHz**


## Physical Dimensions (Bottom View)



## Recommended Application Circuit

Note: This schematic represents the topology of the application circuit recommended by Celeritek.



Note: Due to the high gain of this device it is highly recommended to maintain the reverse isolation (S12) above 50 dB.

## Biasing Notes

1. Dual bias is required
2. 0.1 µF bypass capacitors are needed on PC board as close as possible to pins 1, 5, 6 and 10.
3. Positive (+) bias can be applied either at pin 1 or pin 6.
4. Negative (-) bias can be applied either at pin 5 or pin 10.
5. No DC block is required at RF IN/OUT.
6. Negative (-) bias must be applied before applying positive (+) bias.

## Ordering Information

The CMM1431-SM is available in tube or tape and reel.

Part Number for Ordering

CMM1431-SM

Package

Surface mount package

Celeritek reserves the right to make changes without further notice to any products herein. Celeritek makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Celeritek assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters can and do vary in different applications. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. Celeritek does not convey any license under its patent rights nor the rights of others. Celeritek products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Celeritek product could create a situation where personal injury or death may occur. Should Buyer purchase or use Celeritek products for any such unintended or unauthorized application, Buyer shall indemnify and hold Celeritek and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Celeritek was negligent regarding the design or manufacture of the part. Celeritek is a registered trademark of Celeritek, Inc. Celeritek, Inc. is an Equal Opportunity/Affirmative Action Employer.