

30 kHz-30 GHz GaAs MMIC Optical Modulator Driver Amplifier



August 2006 - Rev 02-Aug-06

CMM3030-BD

Features

- ❑ Small Size
- ❑ High Gain: 9 dB Typical
- ❑ Output Voltage up to 7.5 V Peak-to-Peak
- ❑ 30 kHz to 30 GHz Bandwidth
- ❑ Low Gain Ripple: 1.0 dB pp Typical
- ❑ Sub 0.25 Micron PHEMT

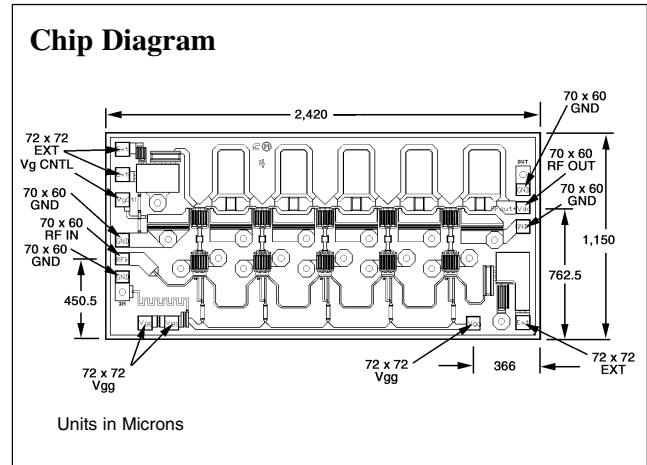
Applications

- ❑ Driver Amplifier for LiNbO₃ Modulator @ OC192 bit rate SONET/SHD Transmission Systems
- ❑ Medium Power Linear Gain Block for Broadband Systems

Description

The CMM3030-BD is a precision GaAs MMIC, medium power amplifier and is part of Celeritek's family of WideFiber™ products.

The CMM3030-BD optical driver amplifier gives fiber optic system designers a unique combination of wide-band frequency coverage, along with a flat response and very low internal jitter. It is a precision PHEMT GaAs MMIC medium power amplifier with +23 dBm @ P1dB. It operates from 30 kHz to 30 GHz with a 9 dB linear gain. Low internal jitter makes it especially well suited for high speed digital



data applications. Maximum output voltage is 7.5 V peak-to-peak.

It is an excellent choice as a driver amplifier for Lithium Niobate (Mach-Zehnder) external optical modulators, to achieve high extinction ratio. Targeted for OC-192/STM64 metropolitan and long-haul dense wave-division multiplexed optical networking applications and other high speed applications. The bit rate can be as high as 15 Gb/s to provide overhead for forward error-correction algorithms. The bias voltage can be adjusted to reduce the output voltage as needed.

CMM3030-BD amplifiers are shipped in Gel Pack from Celeritek's foundry.

Specifications (T_A = 25°C, V_{DD} = 8V) (On-Wafer Probe)

Parameters	Units	Min	Typ	Max
Frequency Range	—	30 kHz		30.0 GHz
Small Signal Gain	dB	8.0	9.0	
Gain Flatness	±dB		0.5	0.75
Input/Output VSWR	—		1.8:1	2.0:1
Power Output (@ 1 dB Gain Compression) @ 12 GHz	dBm	22.0	24.0	
Second Order Intercept Point @ 12 GHz	dBm		40.0	
Third Order Intercept Point @ 12 GHz	dBm		30.0	
Current	mA		275	350

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Absolute Maximum Ratings

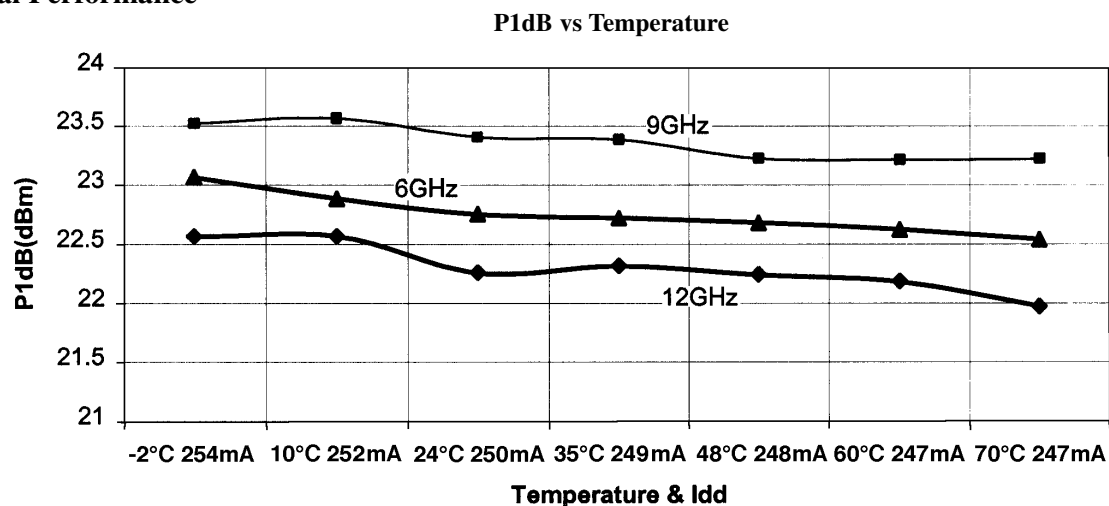
Parameter	Rating
Drain Voltage	12 V
Gate Voltage	-5 V
Drain Current	375 mA
Continuous Power Dissipation	3.0 W
Channel Temperature	+175°C
Storage Temperature	-65°C to +175°C
Mounting Temperature	+320°C
Input Power	+23 dBm

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.

Typical Performance



Performance Optimization

Using the Gain-Ctl facility of the CMM3030-BD, output power may be increased by application of 1.2 to 1.8 Volts to the Bias Control pad. If the Gain-Ctl facility is not used, a fixed voltage at the Bias Control pad can be implemented by

connecting a off-chip parallel resistor to the pad which will lower the output voltage accordingly.

If Bias Control voltage is decreased further than those lowest values given in the tables, both gain and output power will start to drop.

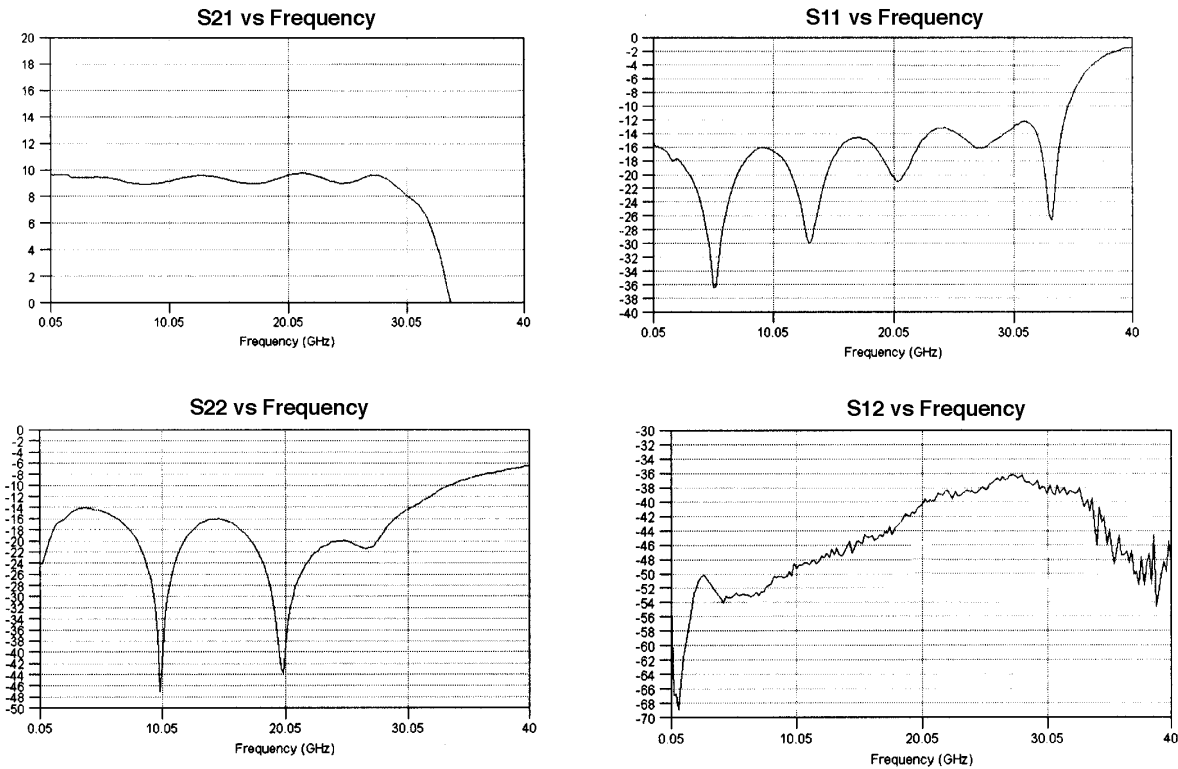
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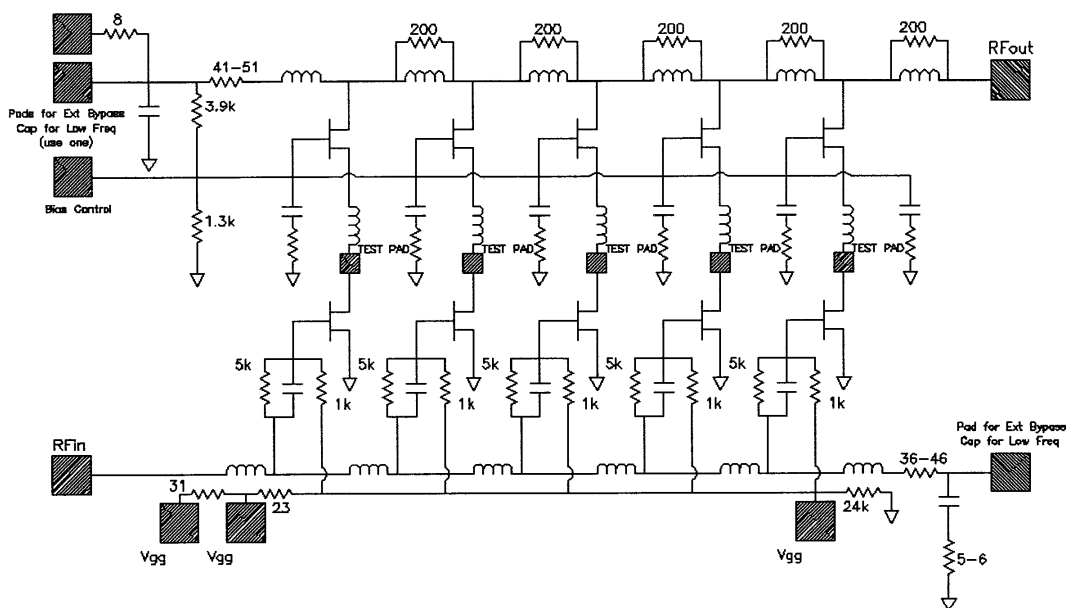
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Typical Performance



Schematic Diagram

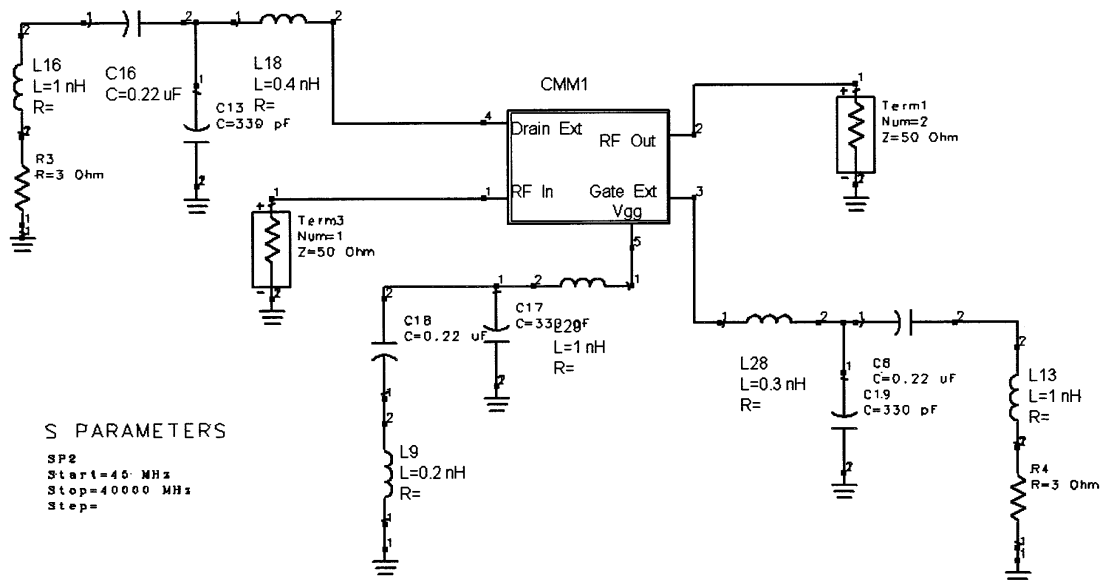


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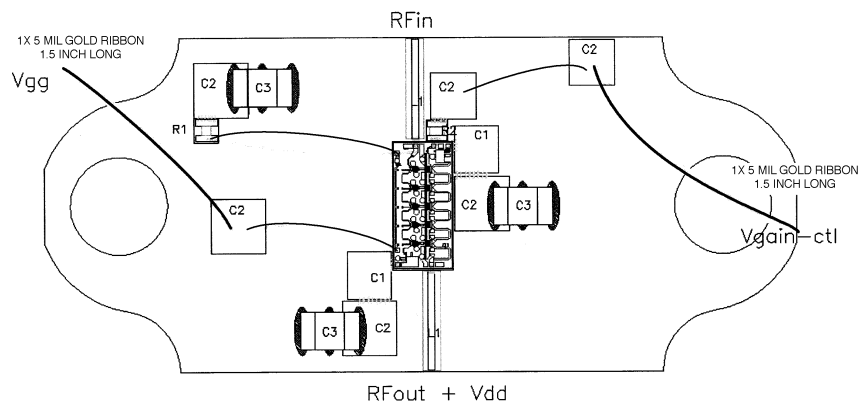
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CMM3030-BD

MMIC termination Circuit Design



Bonding Sample



Ordering Information

Part Number for Ordering
CMM3030-BD

Description
Optical Modulator Driver Amplifier