Raytheon

RF Components

RMLA00400

40 Gb/s Transimpedance Amplifier

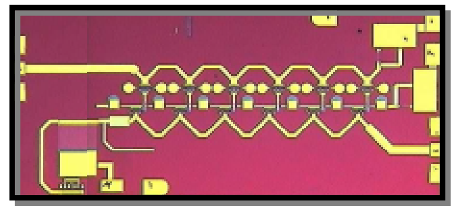
ADVANCED INFORMATION

Description

The Raytheon RF Components RMLA00400 is a very high speed Transimpedance Amplifier (TIA) MMIC for 40 Gb/s (OC768) fiber optic systems. It is available in die form, and is manufactured using Raytheon RF Components' advanced MHEMT process. The TIA is used in conjunction with a photodetector to convert optical signals into a voltage output, or as a general purpose low noise wideband gain stage.

Features

- MHEMT
- High bandwidth: 40 GHz
- Low group delay
- Low power dissipation: ~450mW.
- Single ended output
- DC coupled
- Effective wideband gain stage
- Chip size 3.71 mm x 1.70 mm



Absolute Ratings[1]

Parameter	Symbol	Value	Unit
Supply Voltage	Vd	+3.5	V
RF Input Power	Pin	-10	dBm
Case Operating Temperature	Tc	-40 to +85	°C
Storage Temperature	Tstg	-40 to +100	°C

Electrical Characteristics[2,3]

Parameter	Min	Typ	Max	Unit
Frequency Bandwidth (1 dB)		40		GHz
Frequency Bandwidth (3 dB)		45		GHz
Low frequency Cut-off		30		KHz
Gain		16		dB
Gain Flatness		±0.75		dB
Transimpedance		300		Ohms
Group Delay		30		pS p-p
Noise Figure		2.5		dB

Parameter	Min	Typ	Max	Unit
Output Voltage		400		mV p-p
Output Return Loss		15		dB
Quiescent Current		130		mA
Input Noise Current Density		25		pA/ √Hz
Vd		3.5		V
Vg1		-3.5		V
Vg2		2.5		V
Case Operating Temp	-40		+85	°C

Notes:
1. No permanent damage with only one parameter set at extreme limit. Other parameters set to typical values.
2. All parameters met at Tc = 25°C, Vd = 3.5V.
3. Measured in a 50 ohm system.

Characteristic performance data and specifications are subject to change without notice.

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Figure 1
Functional Block Diagram

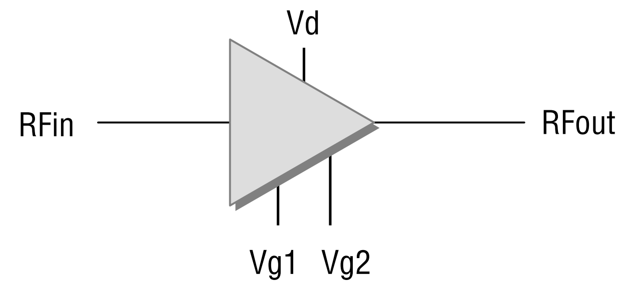

Figure 2
Recommended Application Schematic Circuit Diagram

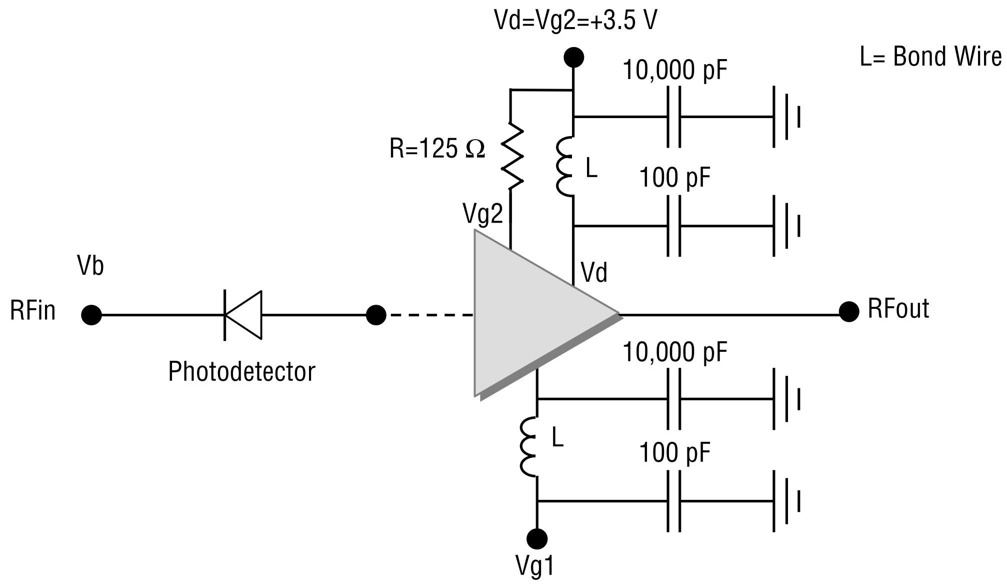

Figure 3
Chip Layout and Bond Pad Locations

(Chip Size=3.710 mm x 1.700 mm x 100 µm Typical, Back of Chip is RF and DC Ground)

Dimensions in mm

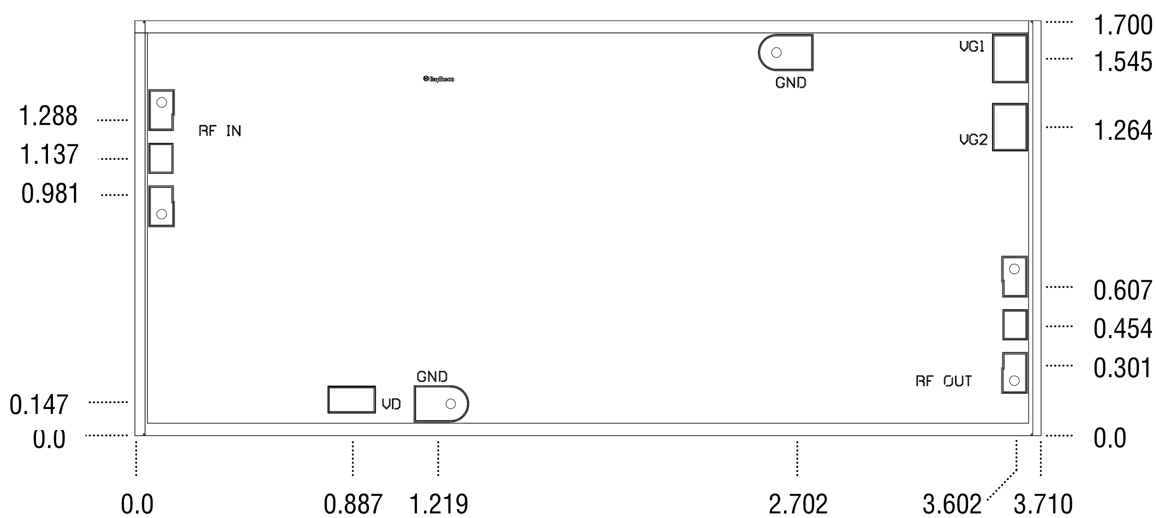

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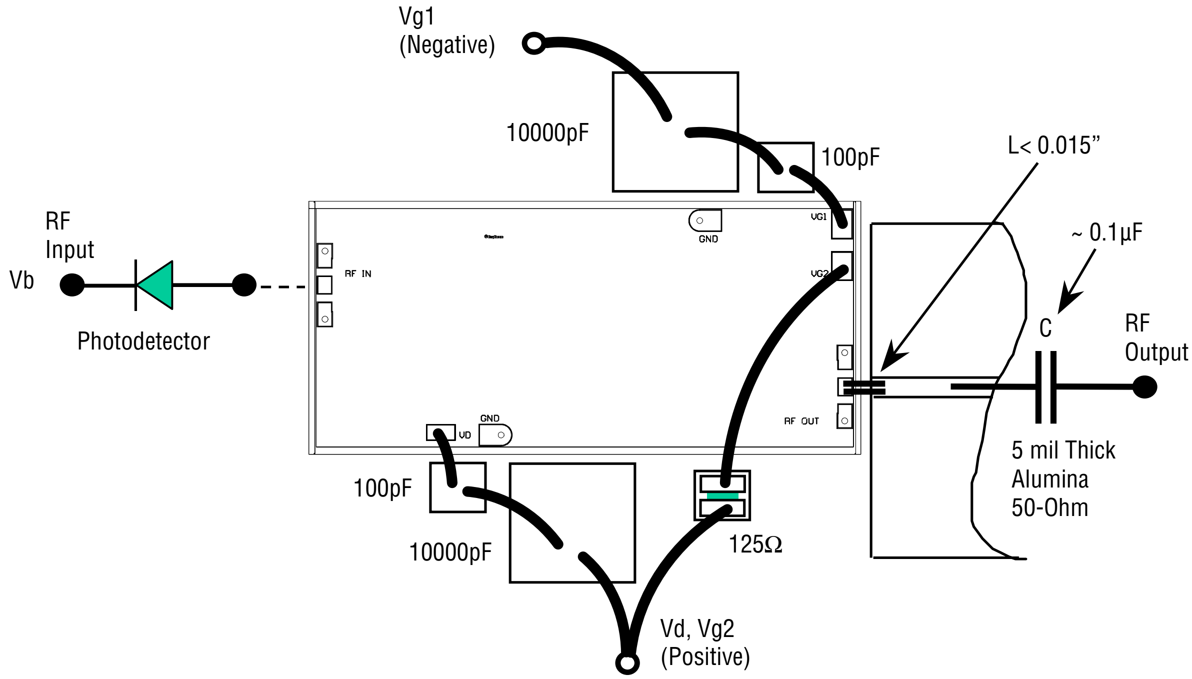
Figure 4
Recommended Assembly Diagram



Recommended Procedure for Biasing and Operation

CAUTION: LOSS OF GATE VOLTAGE (Vg1) WHILE DRAIN VOLTAGE (Vd) IS PRESENT MAY DAMAGE THE AMPLIFIER CHIP.

The following sequence of steps must be followed to properly test the amplifier.

Step 1: Turn off RF input power.

Step 2: Connect the DC supply grounds to the grounds of the chip carrier. Apply negative gate 1 bias supply voltage of -5.0 V to Vg1.

Step 3: Apply positive bias supply voltage of +3.5 V to Vd, Vg2 connection.

Step 4: Adjust gate 1 bias voltage Vg1 to set the quiescent current of Idq ~ 130 mA.

Step 5: After the bias condition is established, the RF input signal may now be applied at the appropriate frequency band. Adjust Vg1 for best gain flatness.

Step 6: Follow turn-off sequence of:

(i) Turn off RF input power,
(ii) Turn down and off drain voltage (Vd, Vg2),
(iii) Turn down and off gate bias voltage (Vg1).

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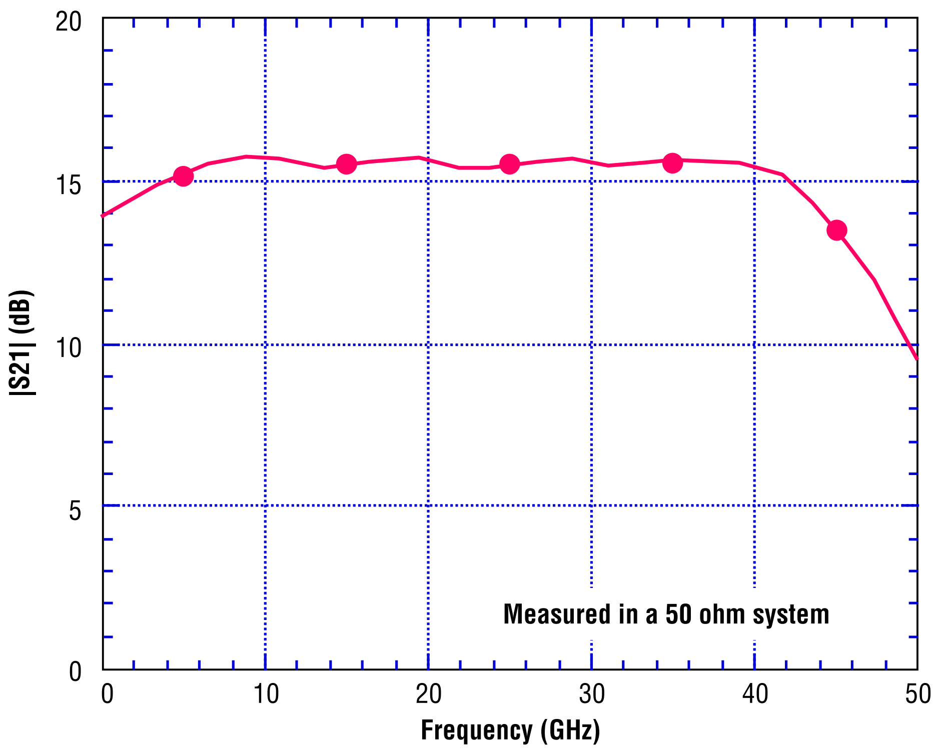
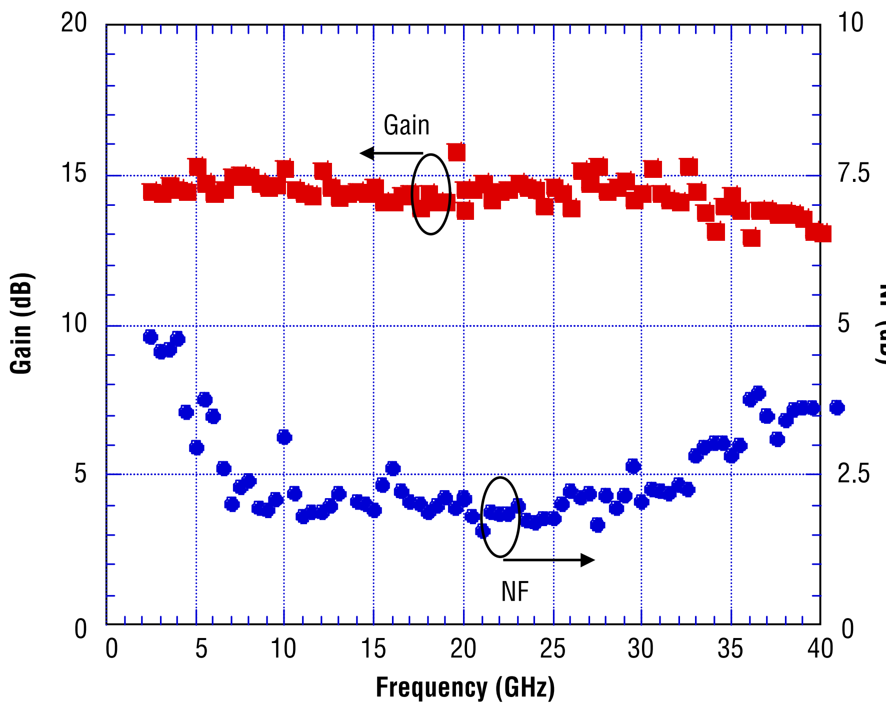
Performance Data

Typical Measured Gain Response



Gain & Noise Figure Vs. Frequency
Fixtured Measurement



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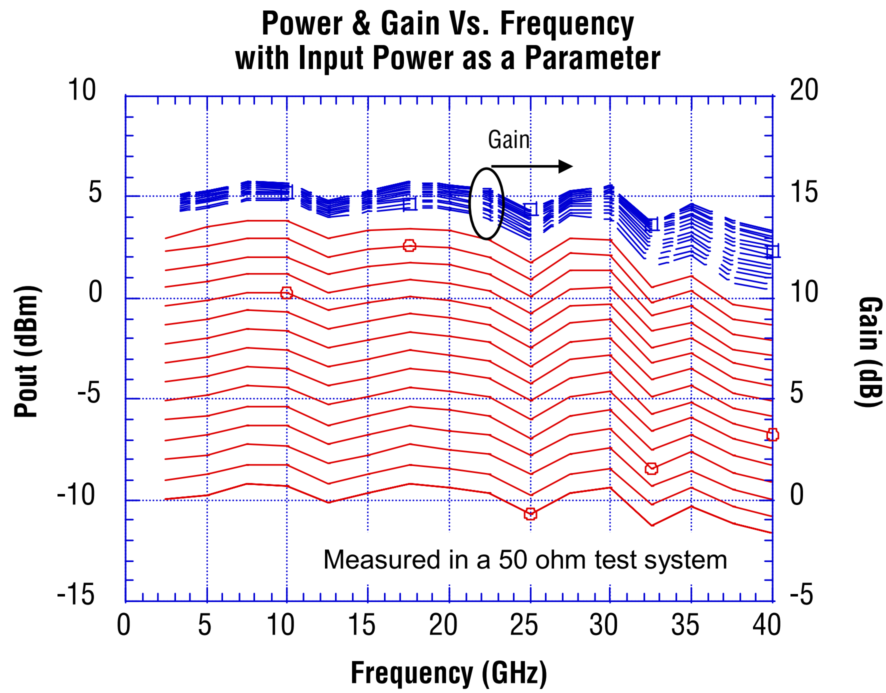

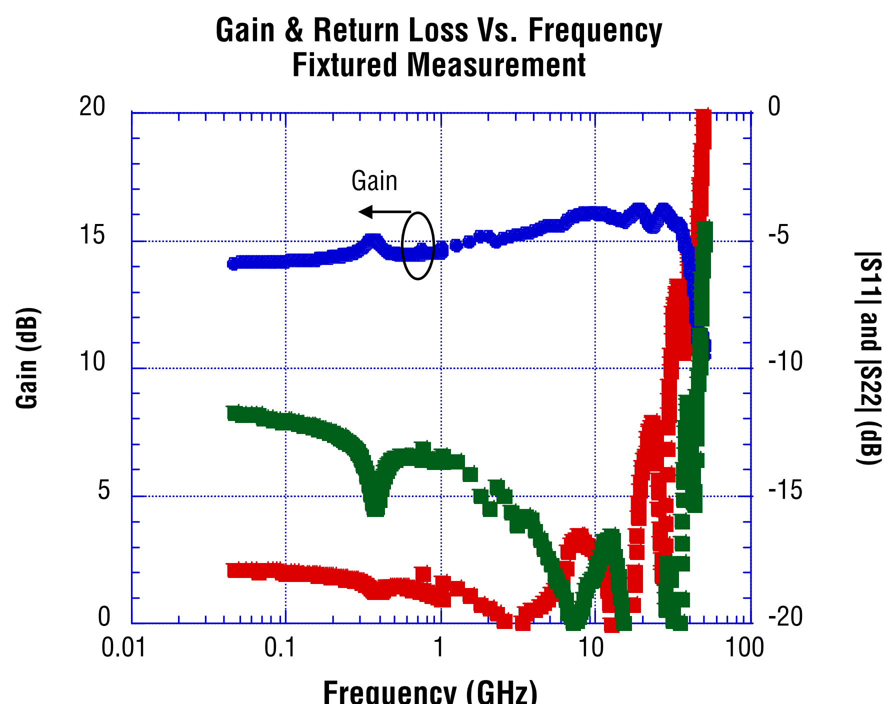

Measured in a 50 ohm test system

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