E band MMIC Low Noise Amplifier

E-LNA-7590 Previously named CO-E1320303

GaAs PHEMT MMIC Low Noise Amplifier 75-90GHz

Overview

E-LNA-7590 is a 4-stage MMIC low noise amplifier that covers frequencies from 75GHz to 90GHz band. This MMIC provides up to 20dB of stable gain, with a noise figure of 4.5dB from a 2.5V supply voltage and 30mA current. With less than ±2dB variation in gain across the band, this LNA provides a low noise solution for both radar and communication applications.

All bond pads and the backside of the MMIC are gold plated. The MMIC is compatible with precision die attach methods, as well as thermo-compression and thermosonic wire bonding, making it ideal for MCM and hybrid microcircuit applications. All data shown is measured with the chip in a 50 Ohm environment, with 100pF decoupling capacitors on all DC connections and is contacted using RF probes.

An option with two of these LNA circuits on a single MMIC die is available as part number E-DLNA-7590 (previously named CO-E1320304).

Features

- 75 – 90GHz.
- 20dB gain.
- 4.5dB noise figure.
- Unconditionally stable.
- < ±2dB gain variation.

Applications

- Millimeter-wave imaging.
- High resolution radar.
- Sensing.
- P2P communications;short haul/ high capacity/low interference links.
- Medical.
- Automotive radar.

Specification Overview

Parameter	Min.	Typ.	Max.	Units
Frequency	75		90	GHz
Gain	17.5	18.5	20.5	dB
Gain Flatness		±2		dB
Input Return Loss		10		dB
Output Return Loss		12		dB
P1dB		4		dBm
Noise Figure*		4.5		dB
Drain Voltage		2.5		V
Current**		30		mA

Notes
The tests indicated have all been performed with 100pF de-coupling capacitors on all bias pads.
All tests are carried out at 25°C.

*Measured over the 76-82GHz band.

**Gate voltage is set to draw the correct drain current.

Absolute Maximum Ratings

Parameter	Rating
Gate Voltage	-5V to 0.2V
Drain Voltage	3.5V
Drain Current	40mA
RF Input Power	-5dBm
Storage Temperature	−65°C to +150°C
Channel Temperature	+150°C
Operating Temperature	−40°C to +85°C

ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features proprietary protection circuitry, damage may occur on devices subjected to ESD. Proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

Measured Performance Data

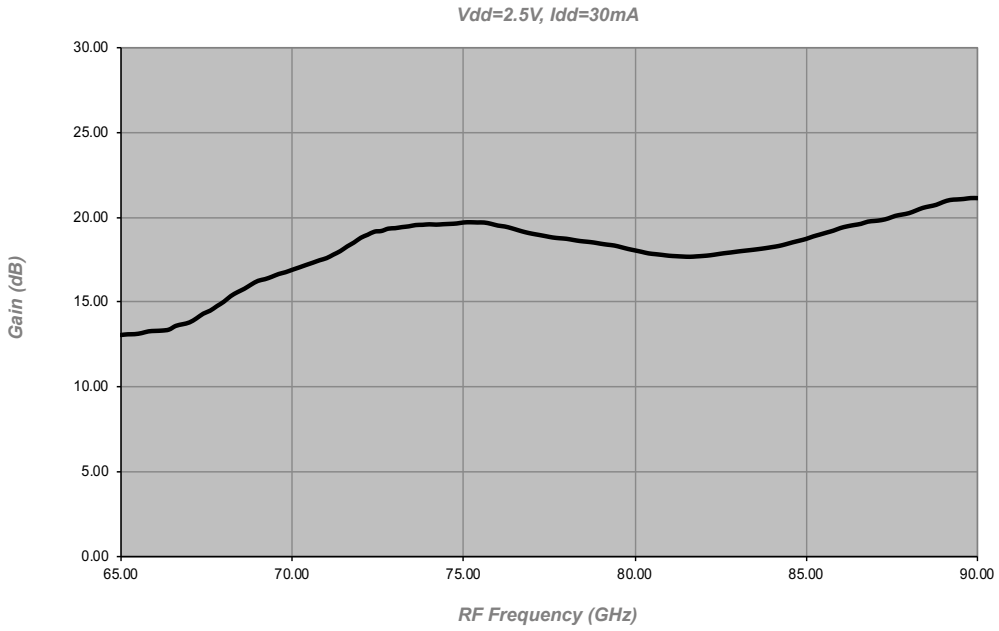


Figure 1
Gain

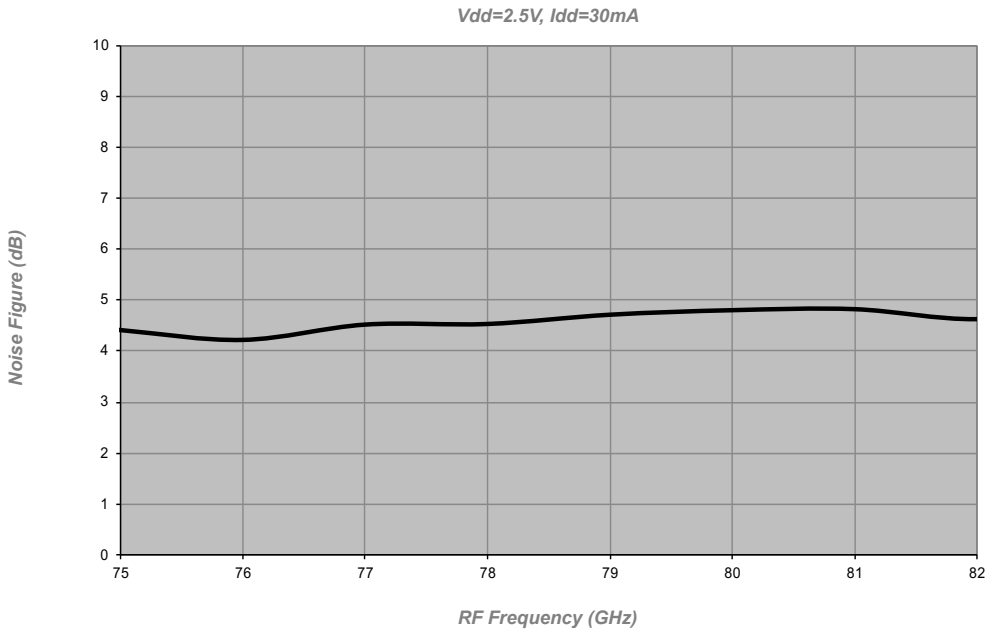


Figure 2
Noise Figure

Measured Performance Data

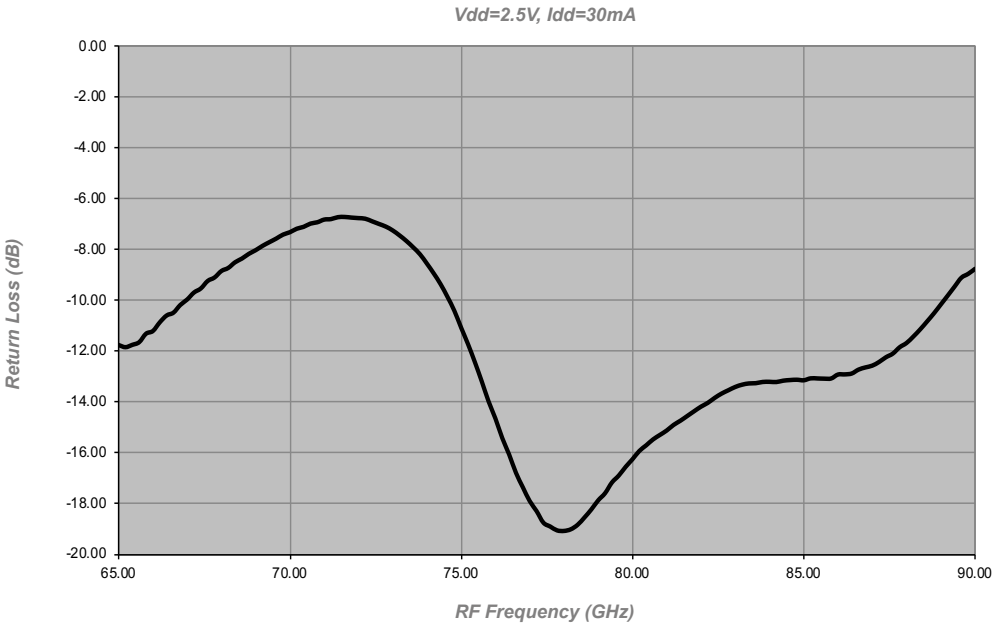


Figure 3
Input Return Loss

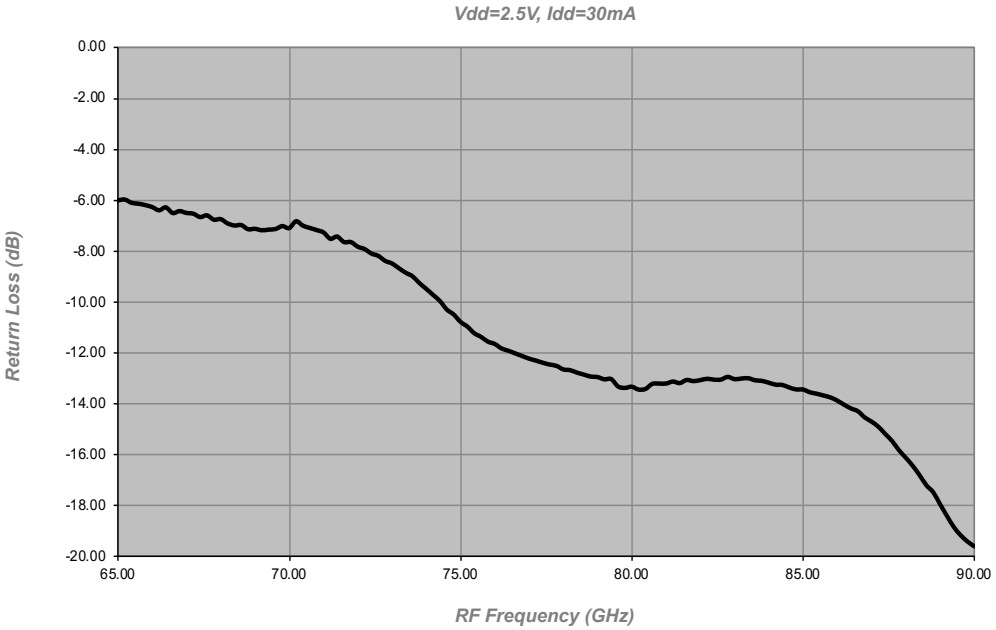


Figure 4
Output Return Loss

Measured Performance Data

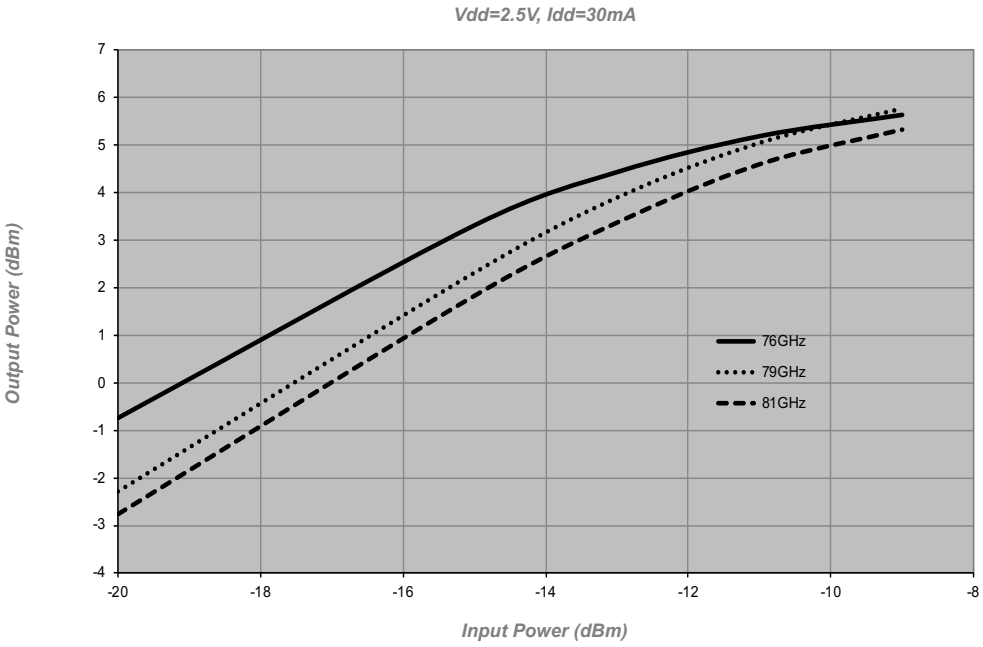


Figure 5
Power Characteristic

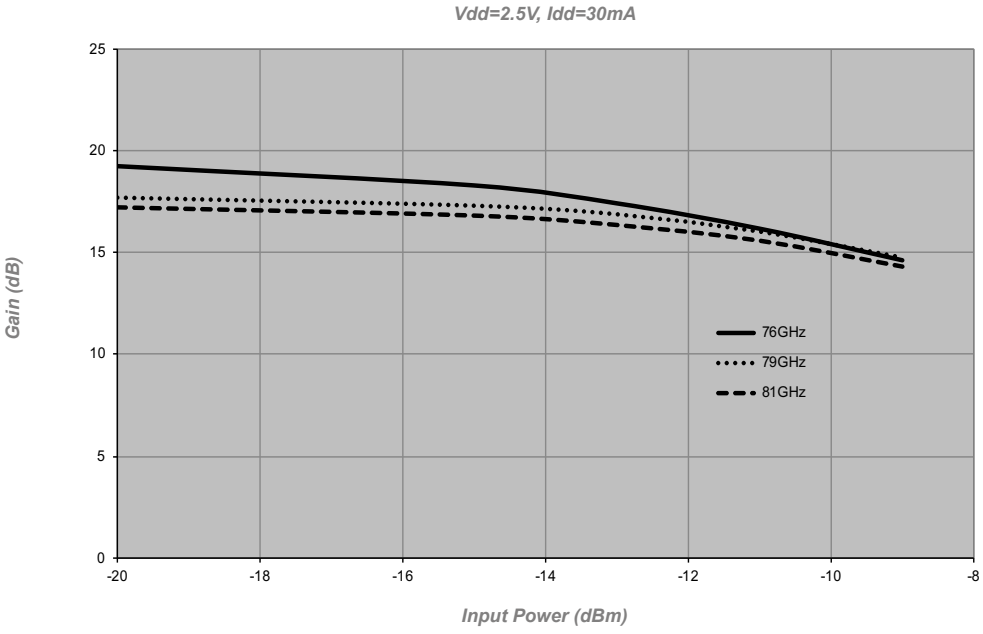
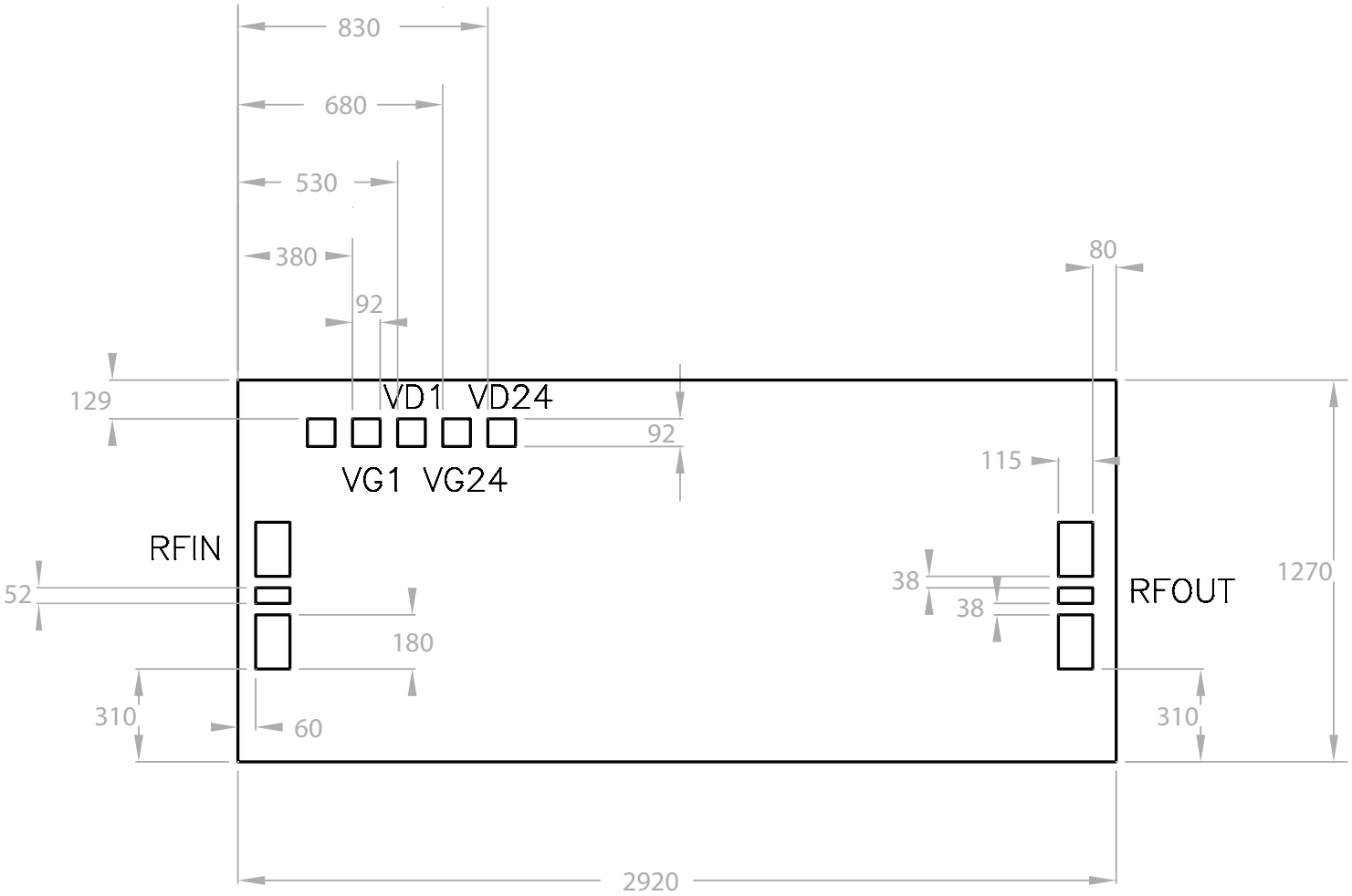


Figure 6
Gain Compression

Outline Drawing

Die Packing Information
All die are delivered using gel-paks unless otherwise requested.



Notes

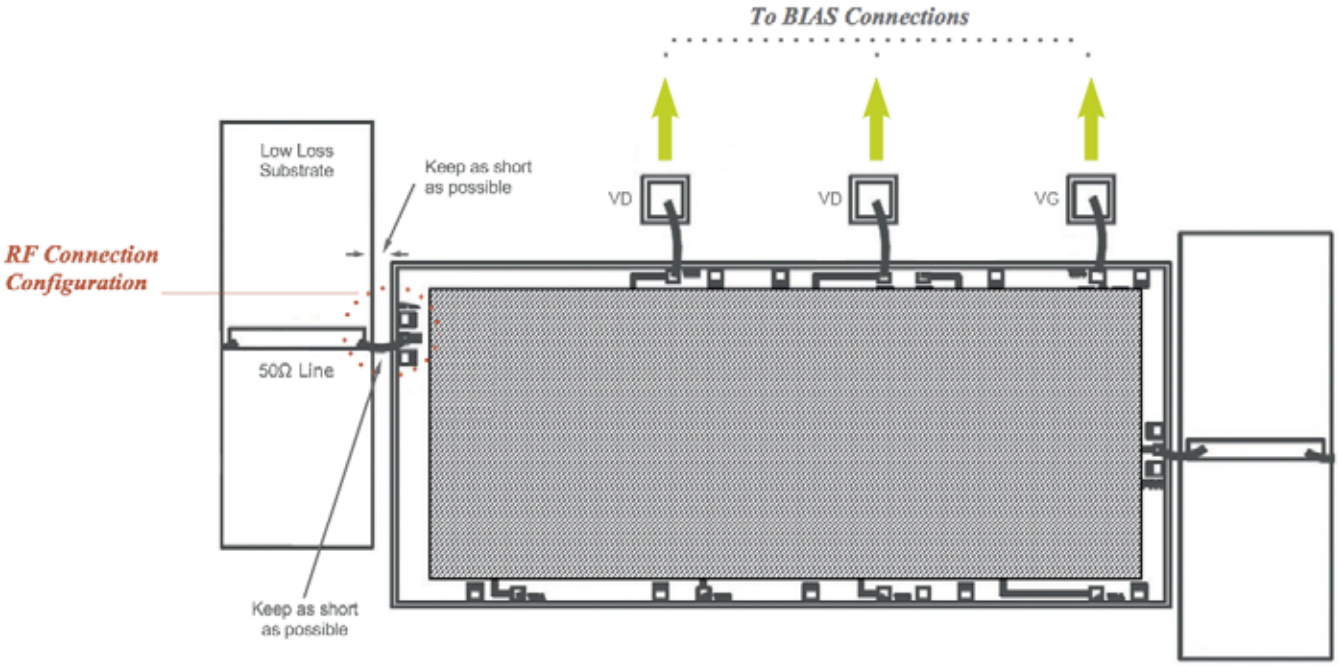
1. All dimensions are in um.
2. Typical DC bond pads are 92um square.
3. RF bond pads are 52 x 115um.
4. All pads have gold metalisation.
5. Gold backside metalisation.
6. Backside metal is ground.
7. Connections are not required for unlabeled bond pads.
8. Die thickness is 70um.

Pad Descriptions

Name	Description
RFIN	Input RF pad. This pad is ac coupled.
RFOUT	Output RF pad. This pad is ac coupled.
VD1	Drain bias pad for stage 1.
VD24	Drain bias pad for stages 2, 3 & 4.
VG1	Gate bias pad for stage 1.
VG24	Gate bias pad for stages 2, 3 & 4.
BOTTOM	The die backside must be connected to RF/dc ground.

(Not actual die – these rules are applied to all MMICs unless otherwise stated)

Connection Configurations



General Notes on Assembly

Die should be mounted on conductive material such as gold-plated metal to provide a good ground and suitable heat sink, if necessary.

1. Attaching the die using Au/Sn preforms is preferable. The Eutectic melt for Au/Sn occurs at approximately 280°C so the die (plus mount and preform) is initially heated up to 180°C and then it is heated for approximately 10 seconds to 280°C using a nitrogen heat gun. The device will survive 10 seconds at this temperature. The static breakdown for GaAs devices is approximately 330°C.
2. Pure, dry nitrogen should be used as the heat source.
3. If the devices cannot be lifted/ placed by a vacuum device, then ESD die-lifting tweezers are preferable.
4. Supply lines should be decoupled with 100pF capacitors. Larger planar capacitors could be used if available.
5. Aluminium wire must not be used.

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