K/Ka band MMIC Low Noise Amplifier

KKa-LNA-1929 Previously named LE-Ka1320302

GaAs PHEMT MMIC Low Noise Amplifier 17-21GHz & 27-31GHz

Overview

KKa-LNA-1929 is a 3-stage MMIC low noise amplifier that covers frequencies from 17GHz to 21GHz and from 27GHz to 31GHz. This MMIC provides up to 20dB of stable gain, with a noise figure of 2.5dB from a 4V supply voltage and 41mA current. By incorporating a self-biased configuration the MMIC provides enhanced temperature stability with no need for a negative supply voltage.

The MMIC is fully passivated for additional protection and has all bond pads and backside gold plated. It 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.

Features

- 17 – 21GHz & 27-31GHz.
- 20dB gain.
- 2.5dB noise figure.
- Unconditionally stable.
- No negative DC supply requirement.

Applications

- High speed data communications.
- Space communications.
- IOT.
- Security.

Specification Overview

Parameter	Min.	Typ.	Max.	Units
Frequency	17		21	GHz
Gain	21	21.6	22.5	dB
Input Return Loss	10	20		dB
Output Return Loss	5.5	8		dB
Noise Figure		2.5	3.2	dB
Frequency	27		31	GHz
Gain	16	20	24	dB
Input Return Loss	6	7		dB
Output Return Loss	8	10		dB
Noise Figure		2.5	3.5	dB
Drain Voltage		4		V
Current		41		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.

Absolute Maximum Ratings

Parameter	Rating
Drain Voltage	6V
Drain Current	132mA
RF Input Power	7dBm
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

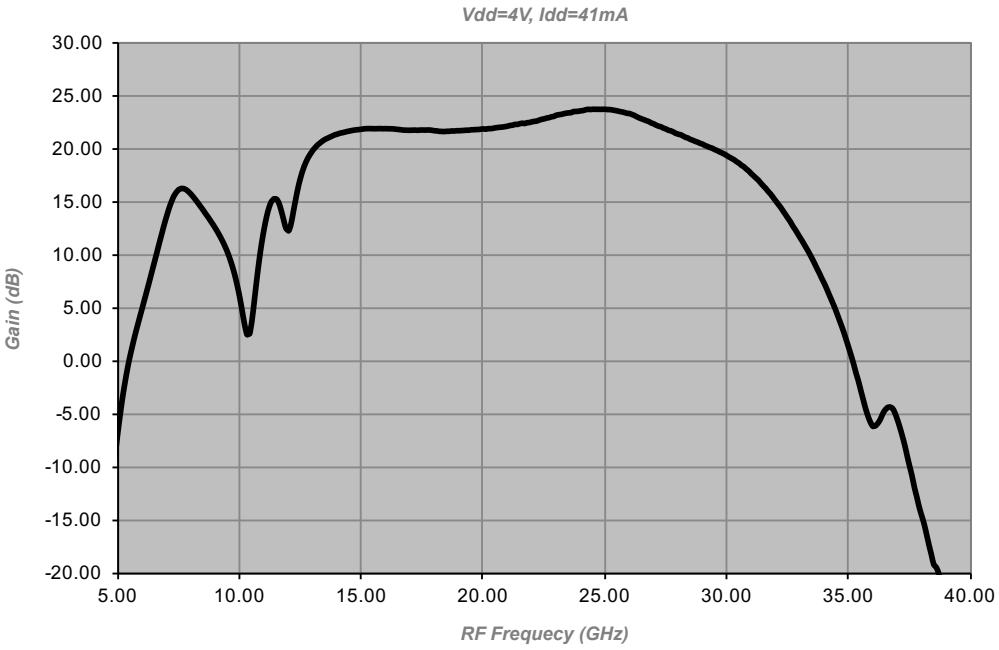


Figure 1
Gain

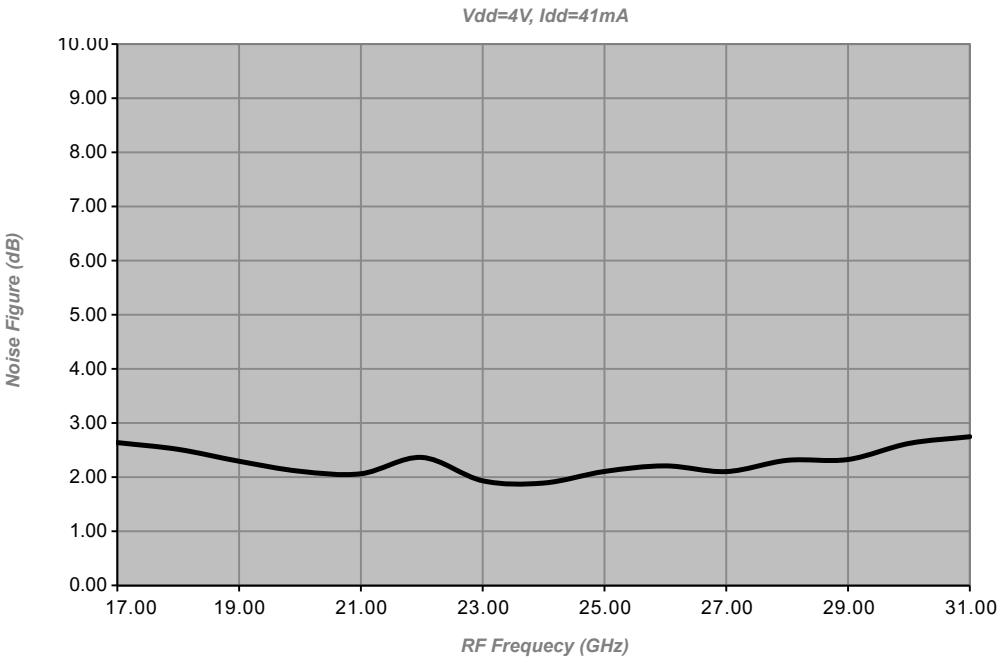


Figure 2
Noise Figure

Measured Performance Data

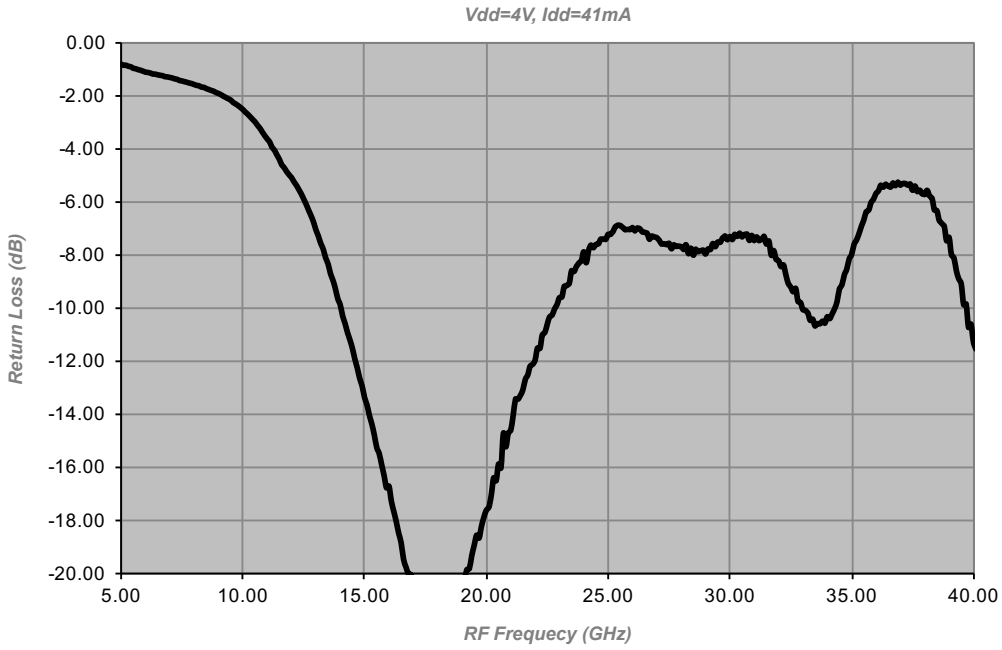


Figure 3
Input Return Loss

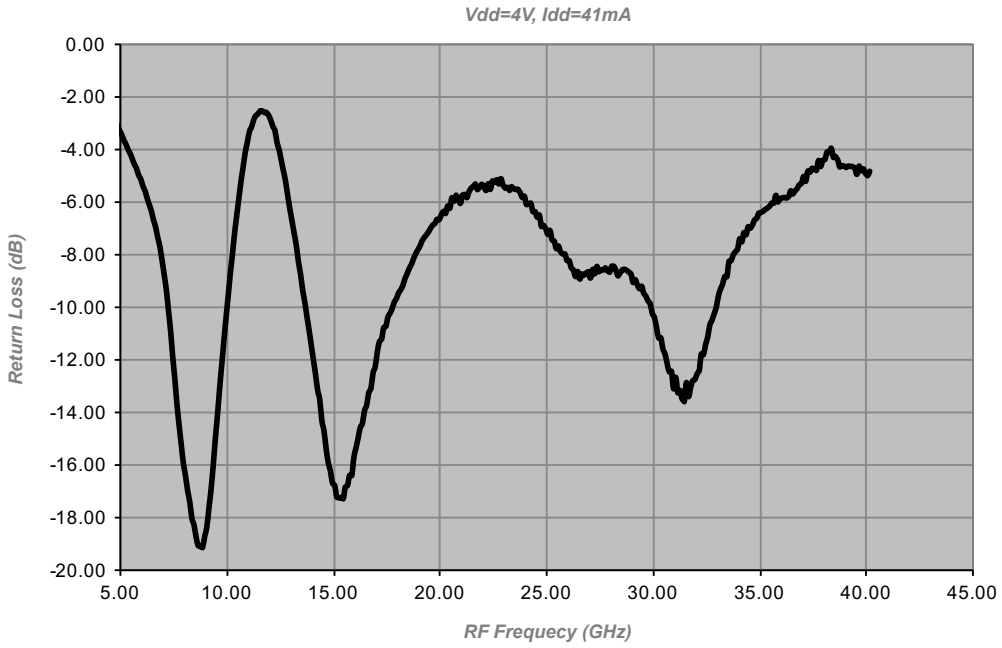
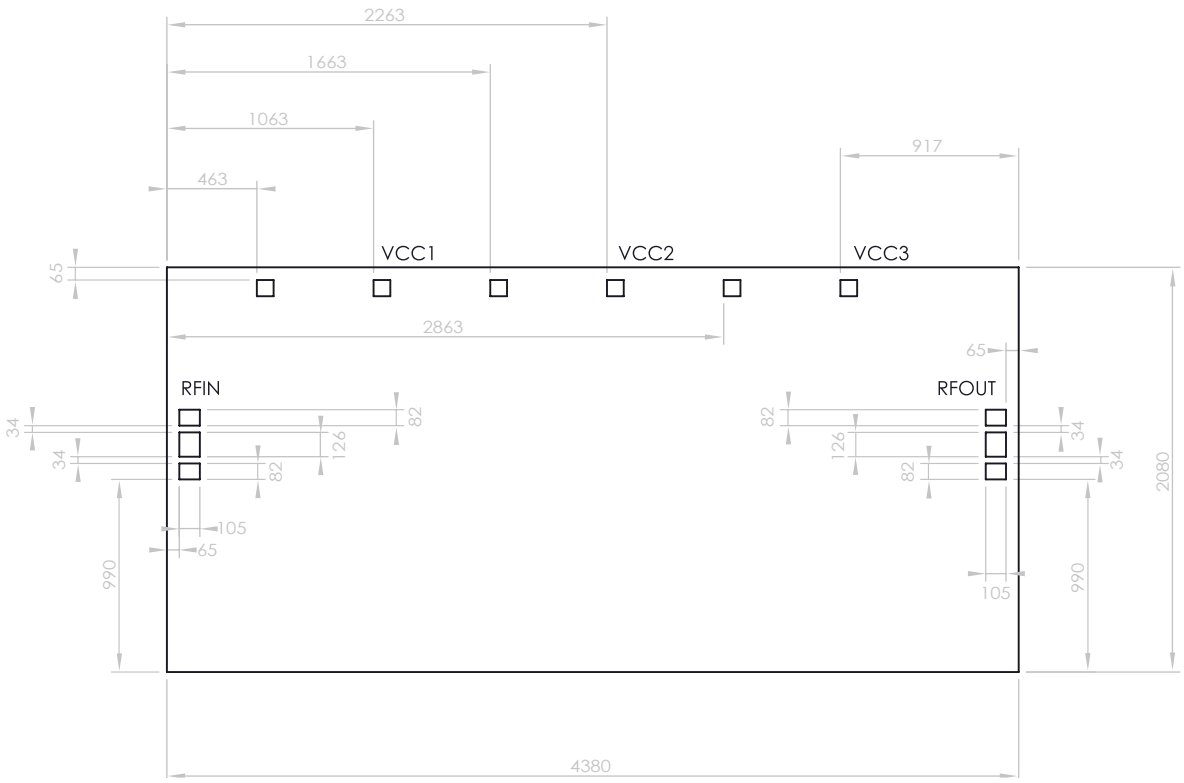


Figure 4
Output Return Loss

Outline Drawing



Notes

1. All dimensions are in um.
2. Typical DC bond pads are 80um square.
3. RF bond pads are 105 x 120um square.
4. All pads have gold metalisation.
5. Gold backside metalisation.
6. Backside metal is ground.
7. Connections are not required for unlabelled bond pads.
8. Die thickness is 100um

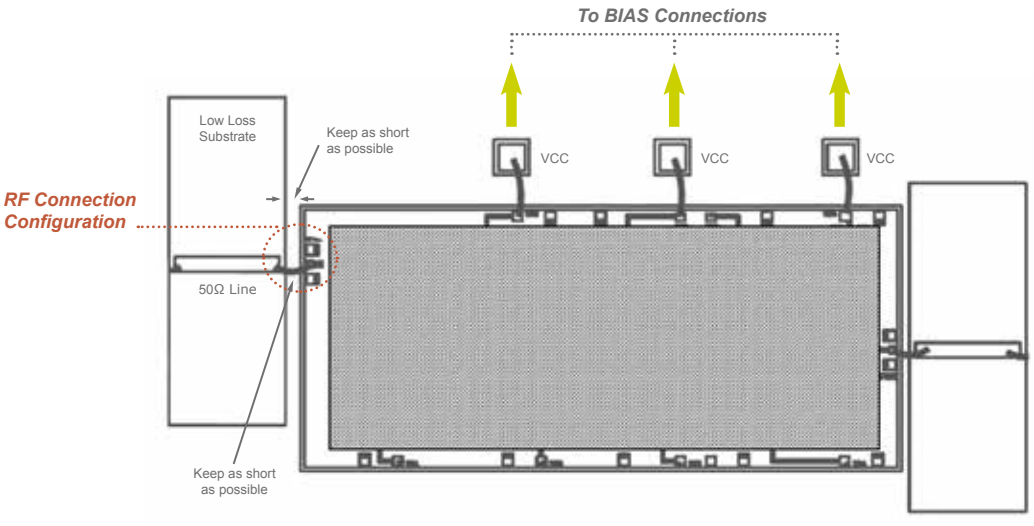
Die Packing Information

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

Pad Descriptions

Name	Description
RFIN	Input RF pad. This pad is AC coupled.
RFOUT	Output RF pad. This pad is AC coupled.
VCCx	Drain bias pad for stage x
BOTTOM	The die backside must be connected to RF/DC ground.

Connection Configurations



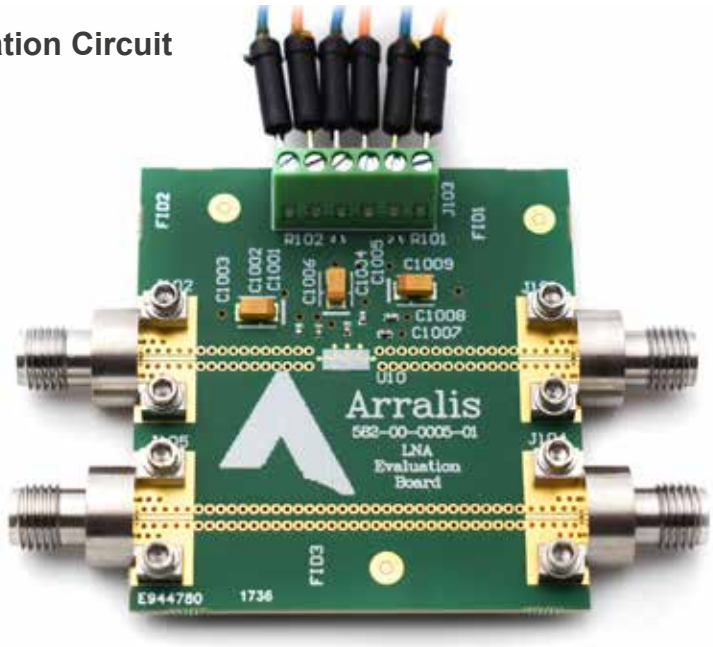
(Not actual die – these rules are applied to all MMICs unless otherwise stated)

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.

Application Circuit



KKa-LNA-1929-EVAL evaluation PCB is available to assist in the testing of the KKa-LNA-1929 MMIC. Boards are available both fully assembled or for self-assembly and come with an additional 50Ω line (connectors added on request) to help with calibration to the MMIC die. Further details can be found in the evaluation board application note document.

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