product datasheet
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Leonis Ka-band MMIC

LE-Ka1360302

GaAs PHEMT DOWNCONVERTER CORE CHIP, 17 – 21GHz

Overview

LE-Ka1360302 is an integrated low noise amplifier and IQ mixer MMIC that down-converts frequencies from the 17 – 21GHz band into the 3 - 7GHz frequency band. With an integrated amplifier to allow lower LO signal levels, the LE-Ka1360302 provides >6dB gain, with LO Isolation >18dB and a noise figure of 2.5dB while running from a +4V supply voltage at 60mA. By incorporating a self-biased configuration LE-Ka1360302 also provides enhanced temperature stability with no need for a negative supply voltage.

All bond pads and the die underside are gold plated. The LE-Ka1360302 MMIC is compatible with conventional die attach methods, as well as thermo-compression and thermosonic wire bonding, making it ideal for MCM and hybrid microcircuit applications. All data shown herein is provisional and is measured with the chip in a 50 Ohm environment and contacted with RF probes.
LE-Ka1360302 is available both as a bare die and in a QFN package.

Features

- 3 – 7GHz Output
- 17 – 21GHz Input
- >6dB Conversion Gain
- 2.5dB Noise Figure

Applications

- High Speed Data Communications
- Space Communications
- IOT
- Security
- Frequency Translation

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Specification Overview

Parameter	Min.	Typ.	Max.	Units
Output Frequency	3		7	GHz
IF Frequency	17		21	GHz
Conversion Gain		6		dB
LO Frequency		24		GHz
LO Power	7	10		dBm
Noise Figure*		2.5		dB
Voltage (LOAMP)		3		V
Voltage (VCCx)		4		V
Total Current* (ICC and ILOAMP)		60		mA

Notes
The tests indicated have all been performed with a 10Ω / 120pF de-coupling network on all bias pads. All tests are carried out at 25°C.

*Measurement carried out on LNA section

Absolute Maximum Ratings

Parameter	Rating
LO Power	15 dBm
RF Power	7 dBm
VCC	6V
LOAMP Voltage	5V
ILOAMP	40mA
Storage Temperature	−65°C to +175°C
Channel Temperature	+175°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

(LO=24GHz; RF=16–22GHz, -10dBm; IF=(LO-RF); Vdd=4V, 60mA)

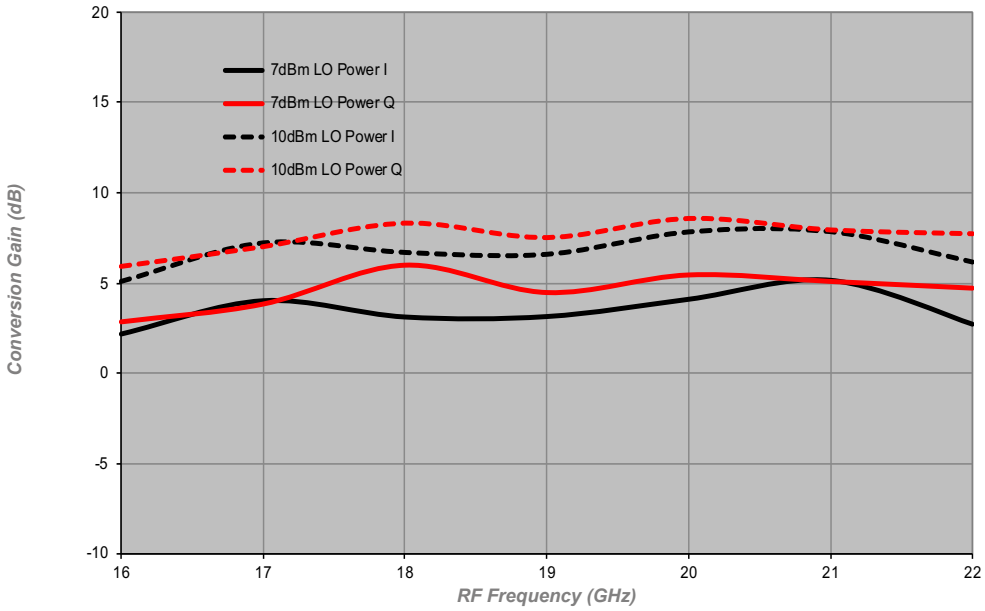


Figure 1
LE-Ka1360302
Conversion Gain v RF Frequency

(LO=24GHz; RF=16-22GHz, -10dBm; IF=(LO-RF); Vdd=4V, 60mA)

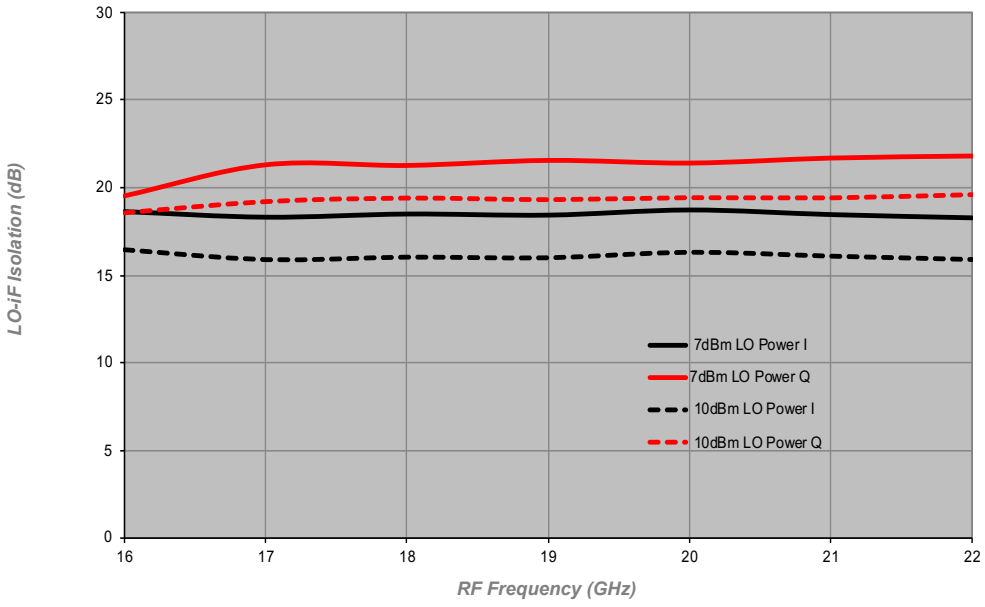


Figure 2
LE-Ka1360302
LO-IF Isolation

Measured Performance Data

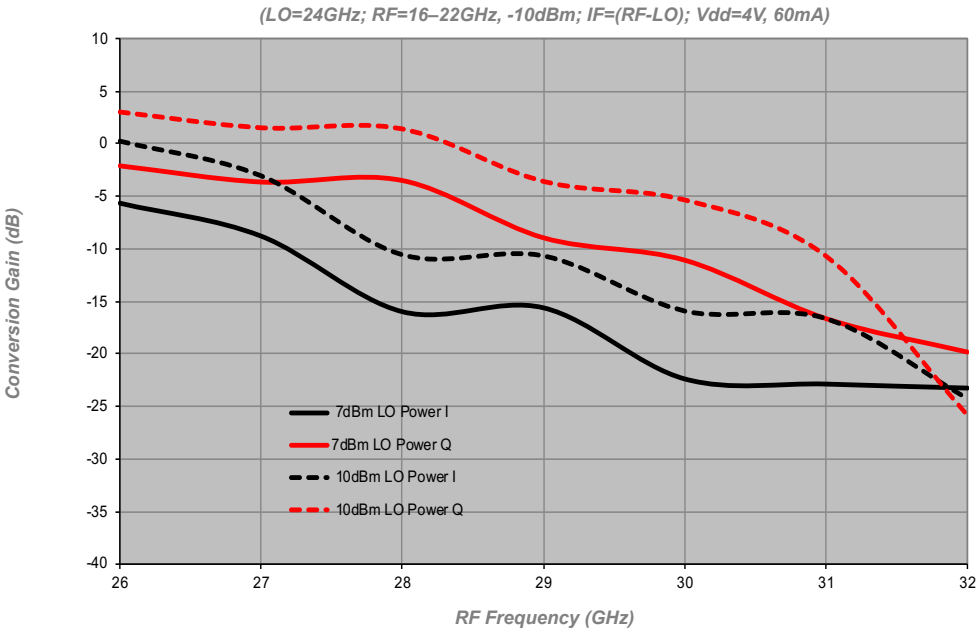


Figure 3
LE-Ka1360302
Conversion Gain

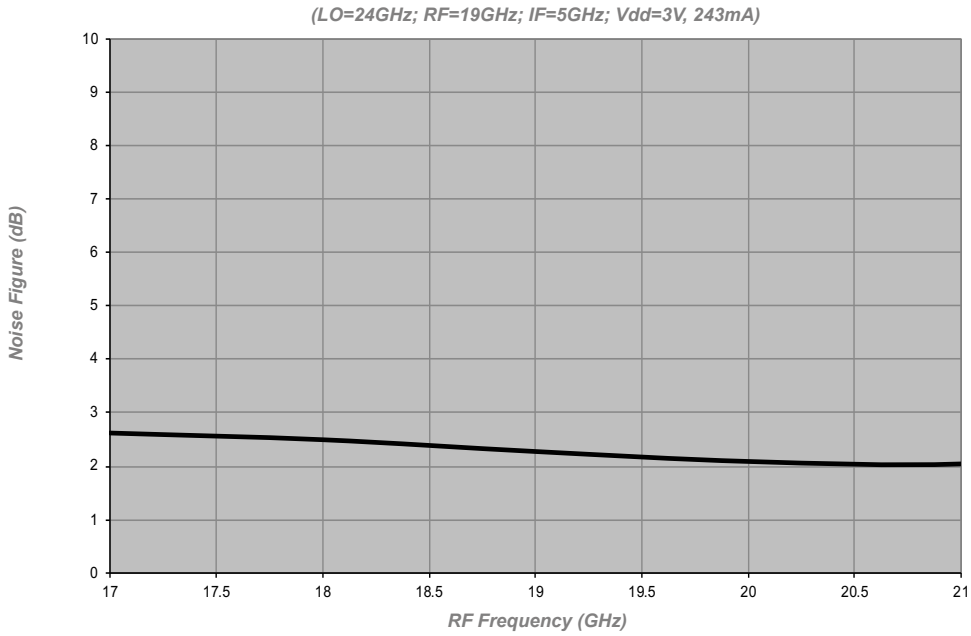
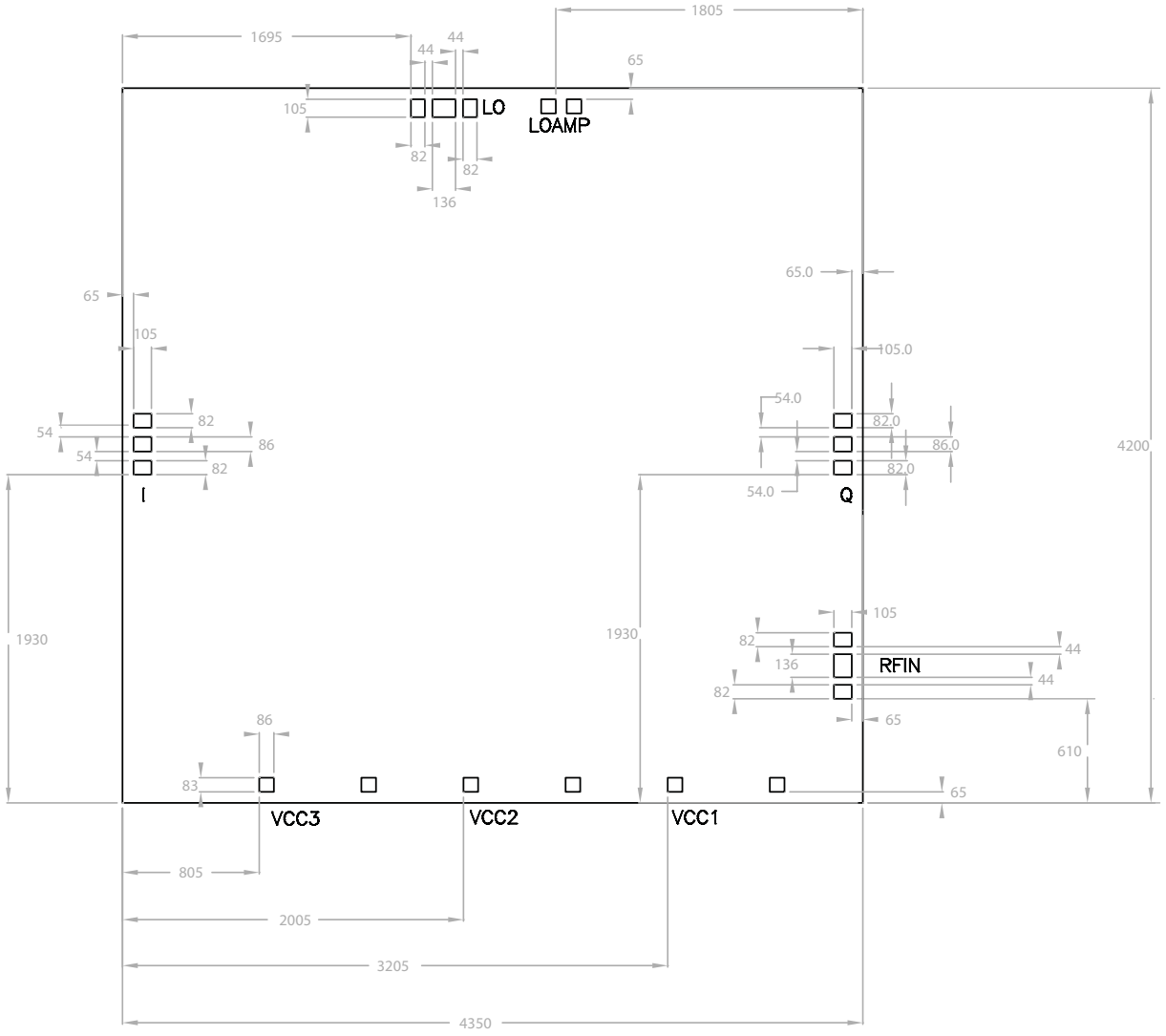


Figure 4
Noise Figure*

*Noise Figure measurement carried out on LNA section

Outline Drawing

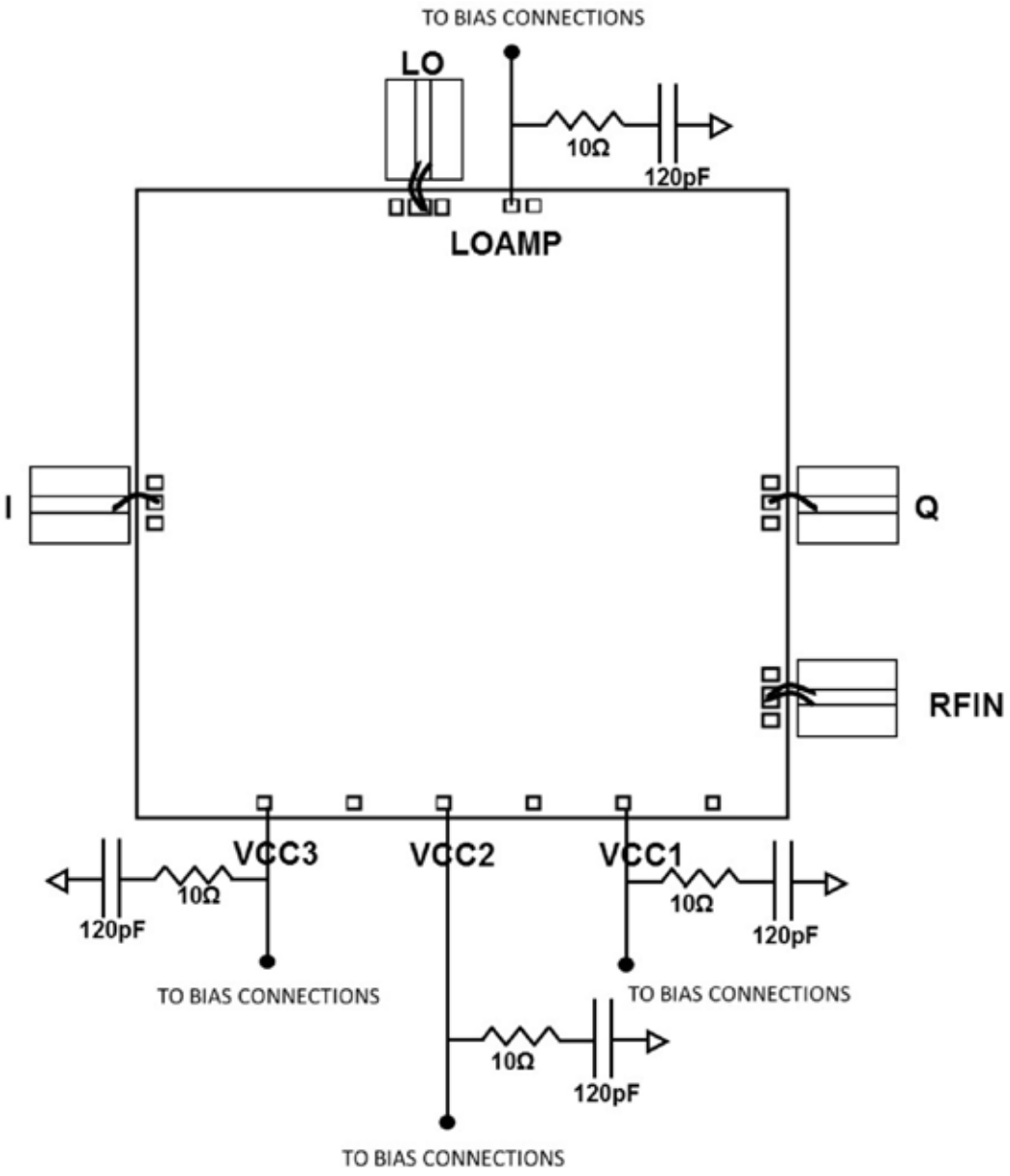
Die Packing Information
All die are delivered using gel-paks unless otherwise requested.



Notes

1. ALL DIMENSIONS ARE IN UM.
2. DC BOND PADS ARE 86 x 83UM.
3. LO AND RFOUT BOND PADS ARE 105 x 136UM.
4. I AND Q BOND PADS ARE 105 x 86UM.
5. ALL PADS HAVE GOLD METALISATION.
6. GOLD BACKSIDE METALISATION.
7. BACKSIDE METAL IS GROUND.
8. CONNECTIONS ARE NOT REQUIRED FOR UNLABELED BOND PADS.
9. DIE THICKNESS IS 100UM.

Connection Configurations



Pad Descriptions

Name	Description
LO	LO signal input pad. This pad is ac coupled.
RFIN	RF input pad. This pad is ac coupled.
I	I pad. This pad is dc coupled.
Q	Q pad. This pad is dc coupled.
VCCx	Voltage pad for stage x of the Low Noise Amplifier
LOAMP	LO amplifier bias pad.
BOTTOM	The die backside must be connected to RF/DC ground.

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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