product datasheet
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Leonis Ka-band MMIC

LE-Ka1340301

IQ MMIC Mixer, 17-21 GHz

Overview

LE-Ka1340301 is an I/Q MMIC diode mixer with integrated quadrature coupler for single sideband (LO-IF/LO-RF) operation in either upconverter or downconverter modes. LE-Ka1340301 is fabricated using GaAs Schottky diode technology and is designed for output frequencies in the range from 17 GHz to 21GHz using fixed LO (24 GHz) and varying IF (2GHz–7GHz) or vice versa. The circuit typically supplies flat conversion loss at moderate levels of LO power.

The underside of the die is gold plated. The LE-Ka1340301 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 herein is measured with the chip in a 50 Ohm environment and contacted with RF probes, with results calibrated to the probe tips.

Features

- 17 - 21 GHz RF
- 2 - 7 GHz IF
- 10 dB Conversion Loss
- 13 dBm LO Drive
- 30 dB IF/ LO Isolation

Applications

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

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Specification Overview

(based on tests where IF = 4 GHz, LO = +13 dBm)

Parameter	Min.	Typ.	Max.	Units
Frequency	17		21	GHz
LO Frequency		24		GHz
LO Power	10	13	16	dBm
IF Frequency	2	4	7	GHz
Conversion Loss		10	13	dB
LO-IF Isolation		30		dB

Notes
All tests are carried out at 25°C.

Absolute Maximum Ratings

Parameter	Rating
LO Power	25 dBm
IF / RF Power	22 dBm
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), (Downconverter Mode))

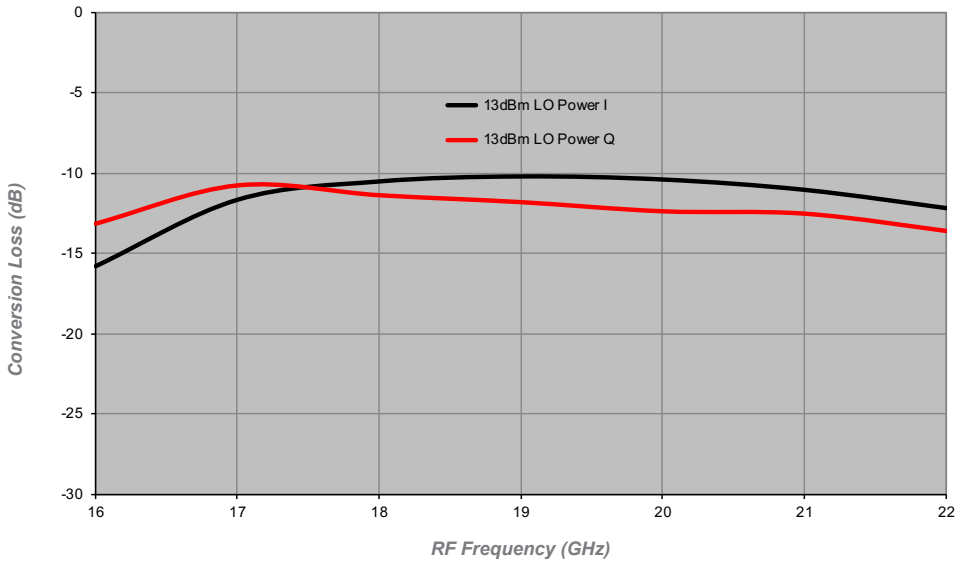


Figure 1
LE-Ka1340301
Conversion Loss v IF Frequency

(LO=24GHz; RF=16-22GHz, -10dBm; IF=(LO-RF), (Downconverter Mode))

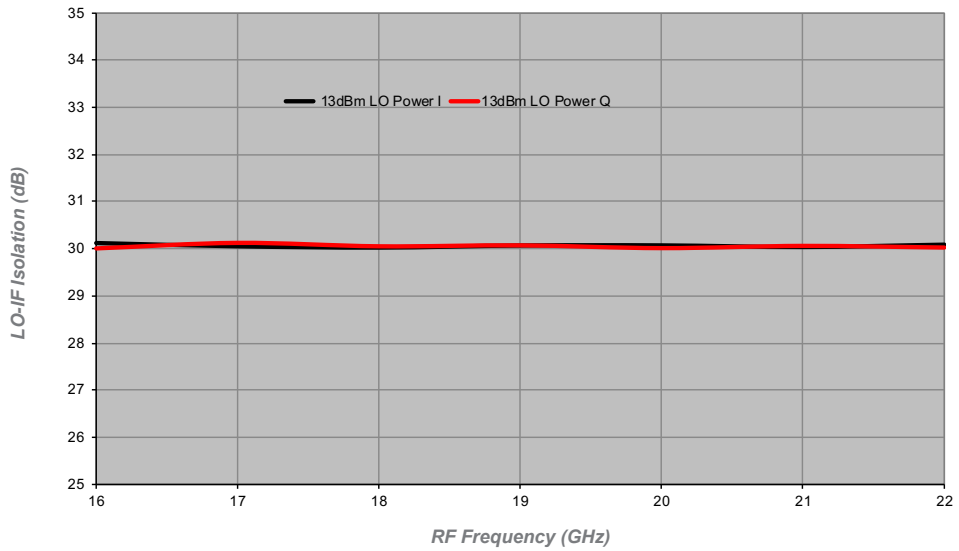


Figure 2
LE-Ka1340301
LO-IF Isolation

Measured Performance Data

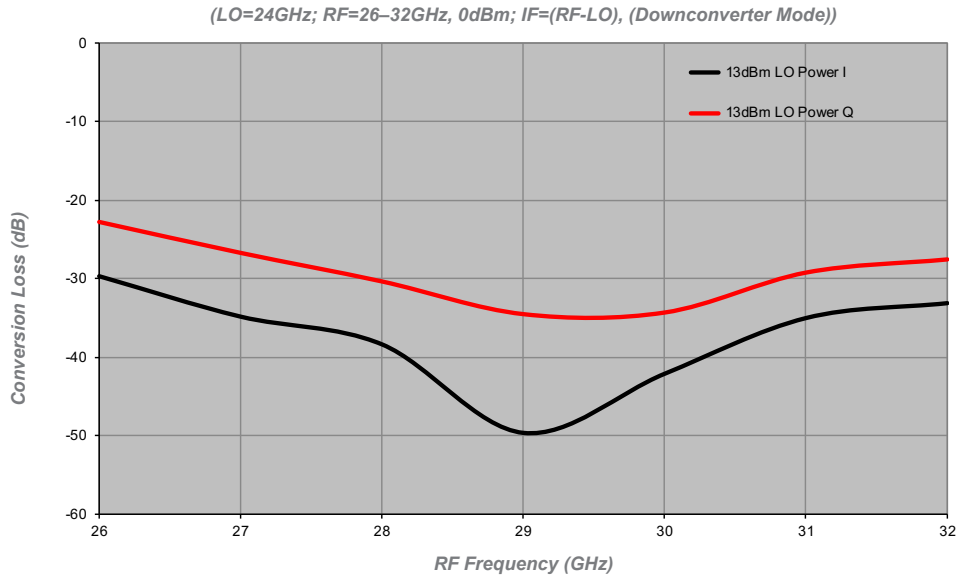


Figure 3
LE-Ka1340301
Conversion Loss (Image Band)

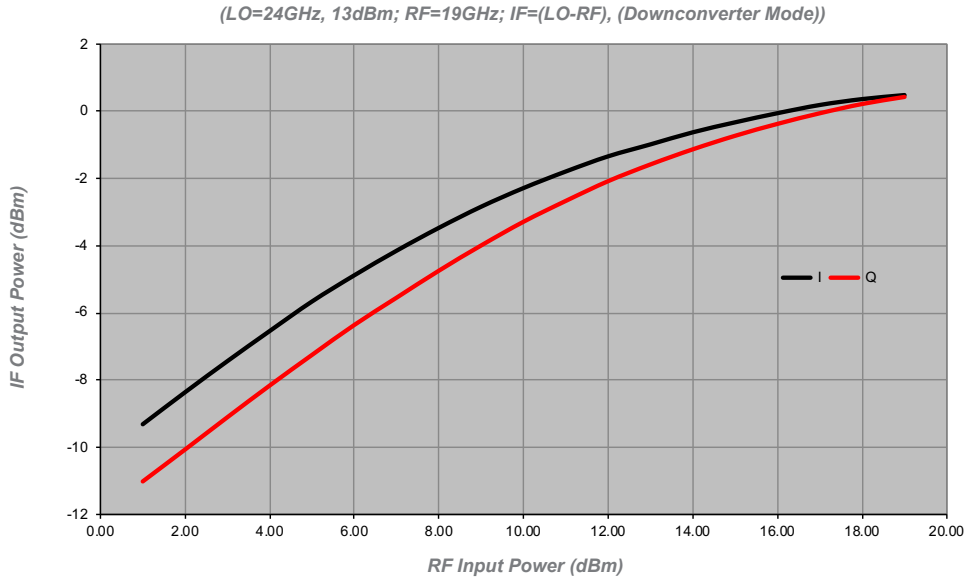
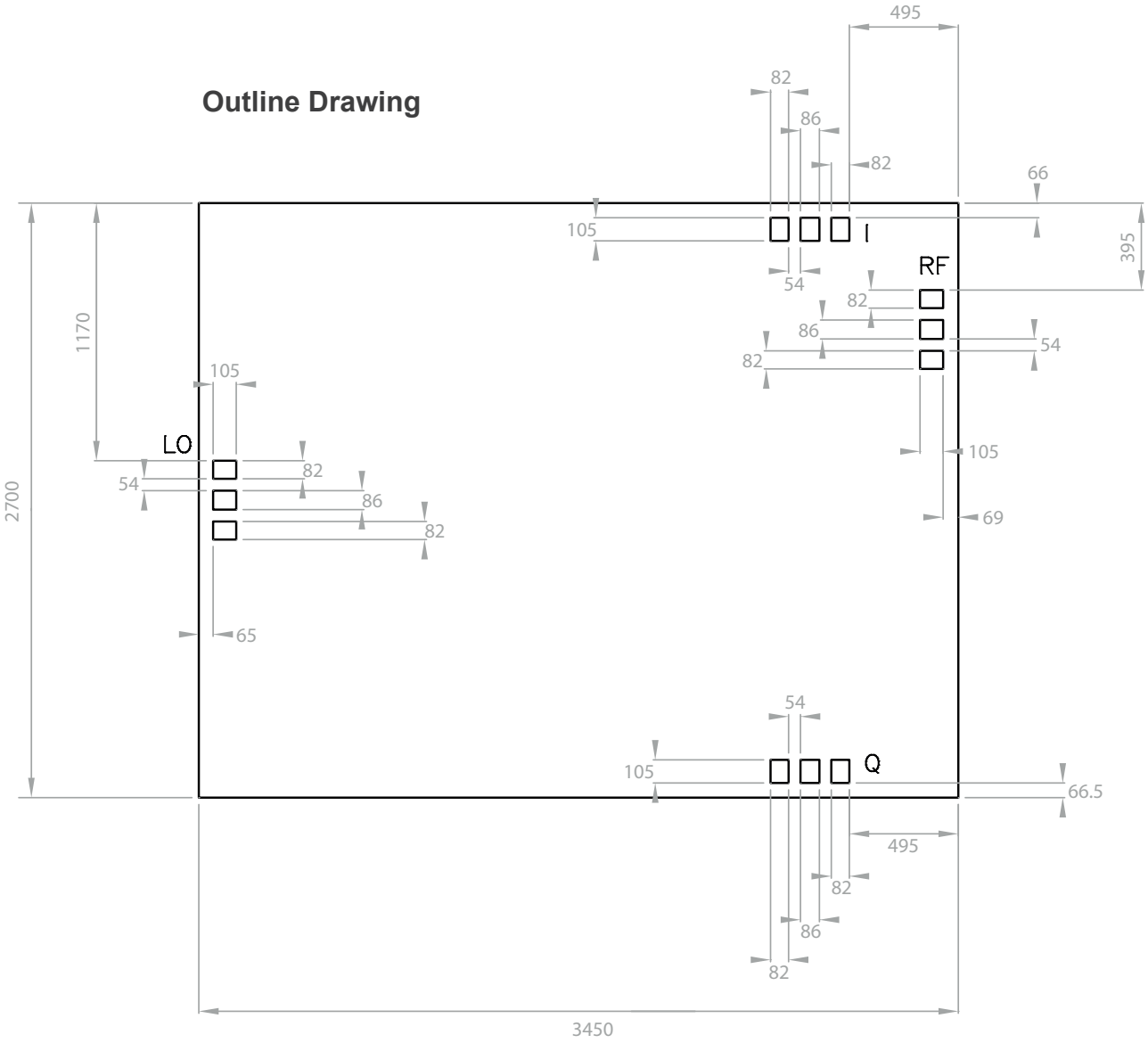


Figure 4
LE-Ka1340301
Pin v Pout

Outline Drawing



Notes

1. All dimensions are in um.
2. RF bond pads are 105 x 86um.
3. Gold backside metalisation.
4. Backside metal is ground.
5. Die thickness is 100um

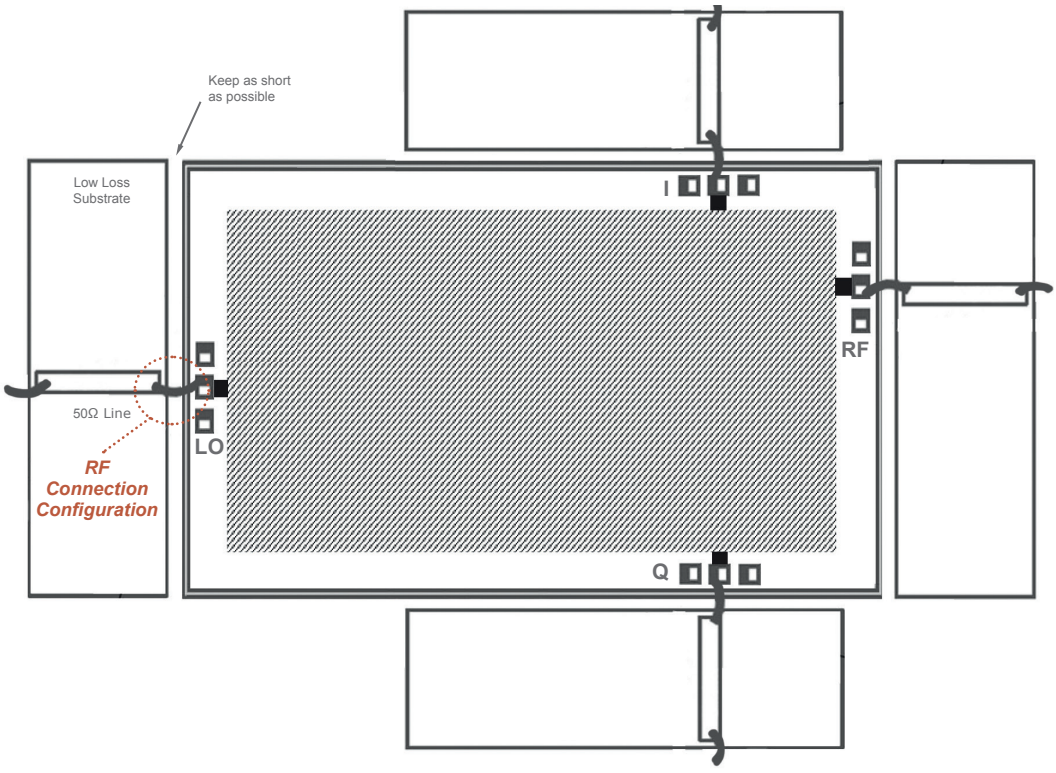
Die Packing Information

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

Pad Descriptions

Name	Description
LO	*LO pad. This pad is ac coupled.*
RF	*RF pad. This pad is ac coupled.*
I	*I pad. This pad is ac coupled.*
Q	*Q pad. This pad is ac coupled.*
BOTTOM	*The die backside must be connected to RF/dc ground.*

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. Aluminium wire must not be used.

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