product datasheet
arralis.com

K band MMIC
Upcoverter Core Chip

K-UC-1721 Previously named LE-Ka1360301

GaAs PHEMT Upconverter Core Chip 17 – 21GHz

Overview

K-UC-1721 is an integrated IQ mixer and medium power amplifier MMIC that upconverts frequencies from 3 – 7GHz into the 17 - 21GHz frequency band. With an integrated amplifier to allow lower LO signal levels, this MMIC provides >10dB gain with a maximum output power of 20dBm while running from a +3V supply voltage and at less than 245mA.

All bond pads and the die underside are gold plated. The 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.

Features

- 17 – 21GHz output.
- 3 – 7GHz input.
- >10dB conversion gain.
- 20dBm saturated output power.

Applications

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

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Specification Overview

Parameter	Min.	Typ.	Max.	Units
Output Frequency	17		21	GHz
IF Frequency	3		7	GHz
Conversion Gain		10		dB
LO Frequency		24		GHz
LO Power	7	10		dBm
Power Output			20	dBm
Drain Voltages (VD and LOAMP)		3		V
Total Current* (ID and ILOAMP)		245		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.

***VG is set to allow 220mA to be drawn from VD.**

Absolute Maximum Ratings

Parameter	Rating
LO Power	15 dBm
IF Power	15 dBm
VD / LOAMP	5V
ID	260mA
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.

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Measured Performance Data

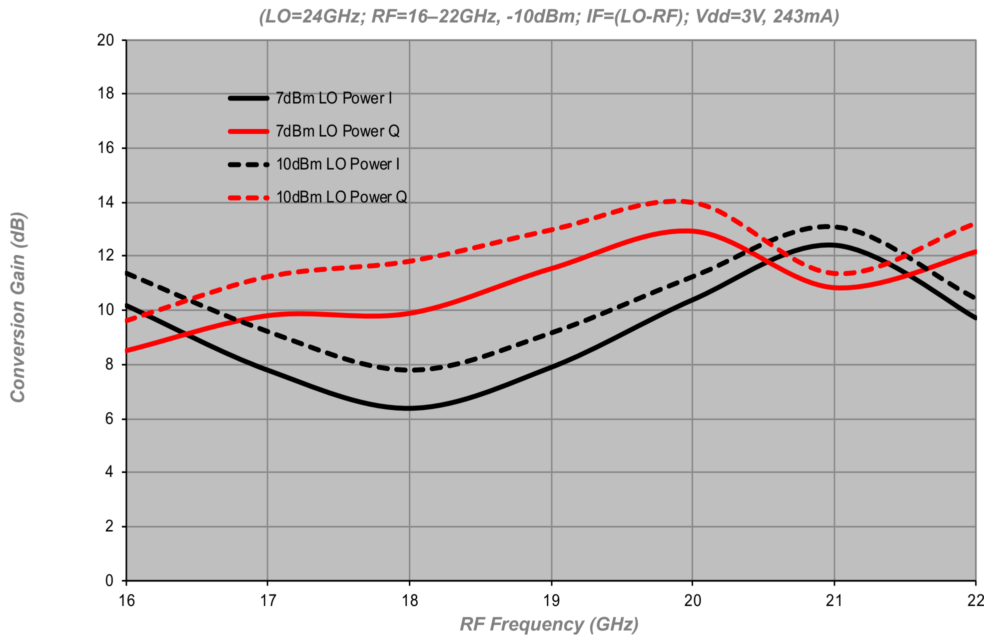

Figure 1
Conversion Gain v RF Frequency

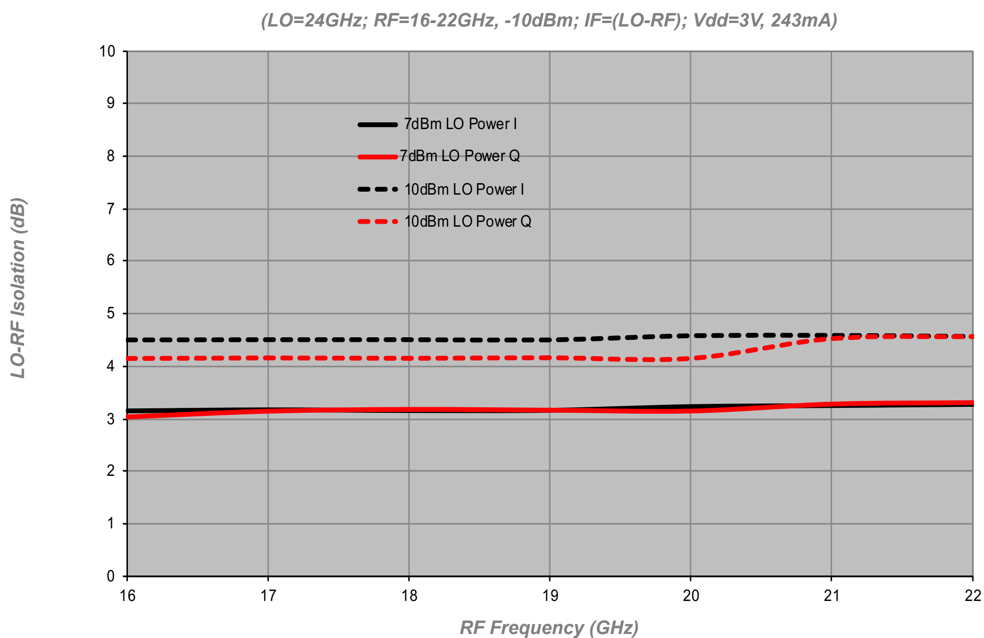

Figure 2
LO-RF Isolation

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Measured Performance Data

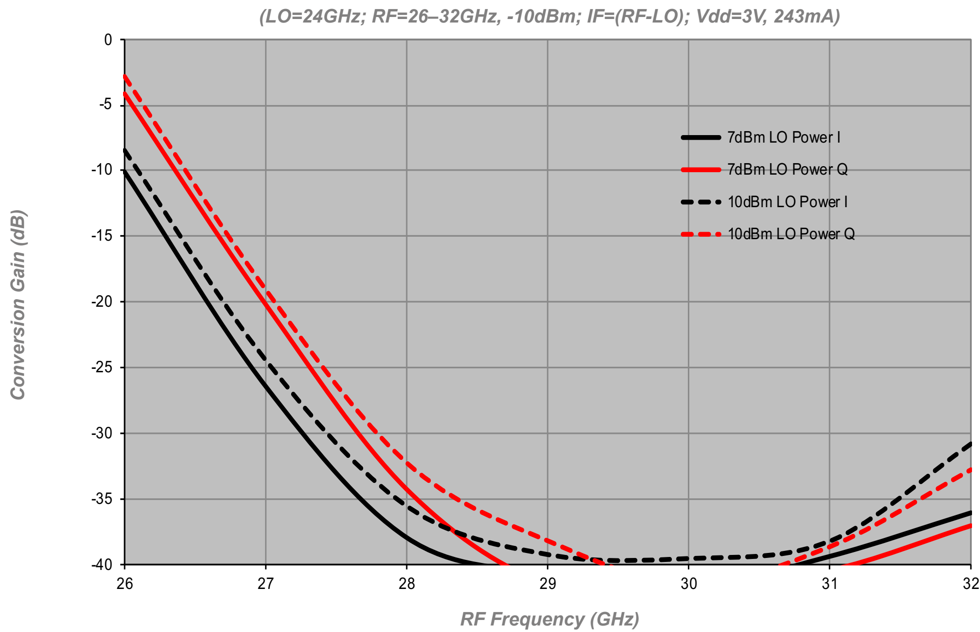

Figure 3
Image Conversion Gain

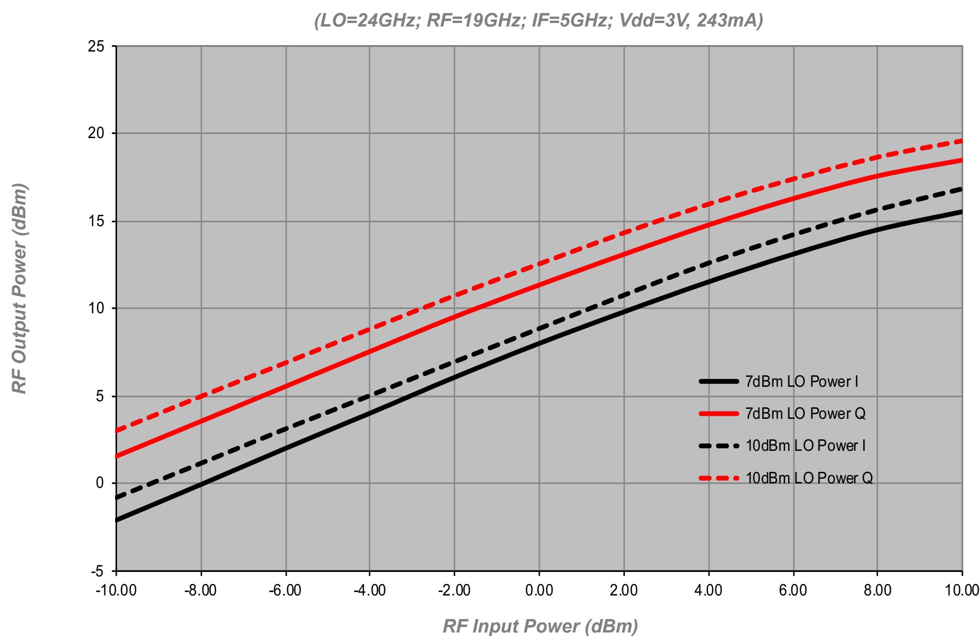

Figure 4
Pin v Pout

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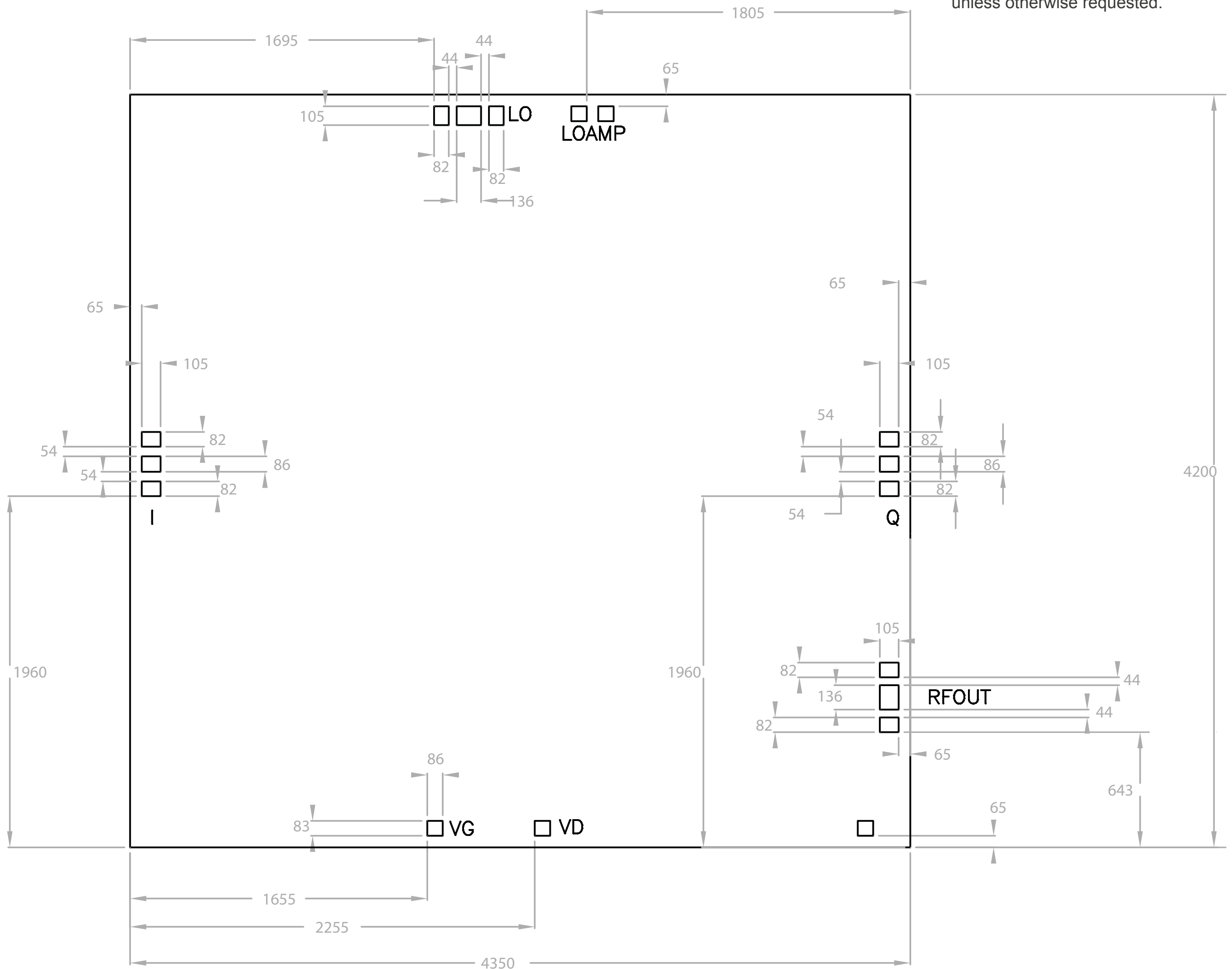
Outline Drawing

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.

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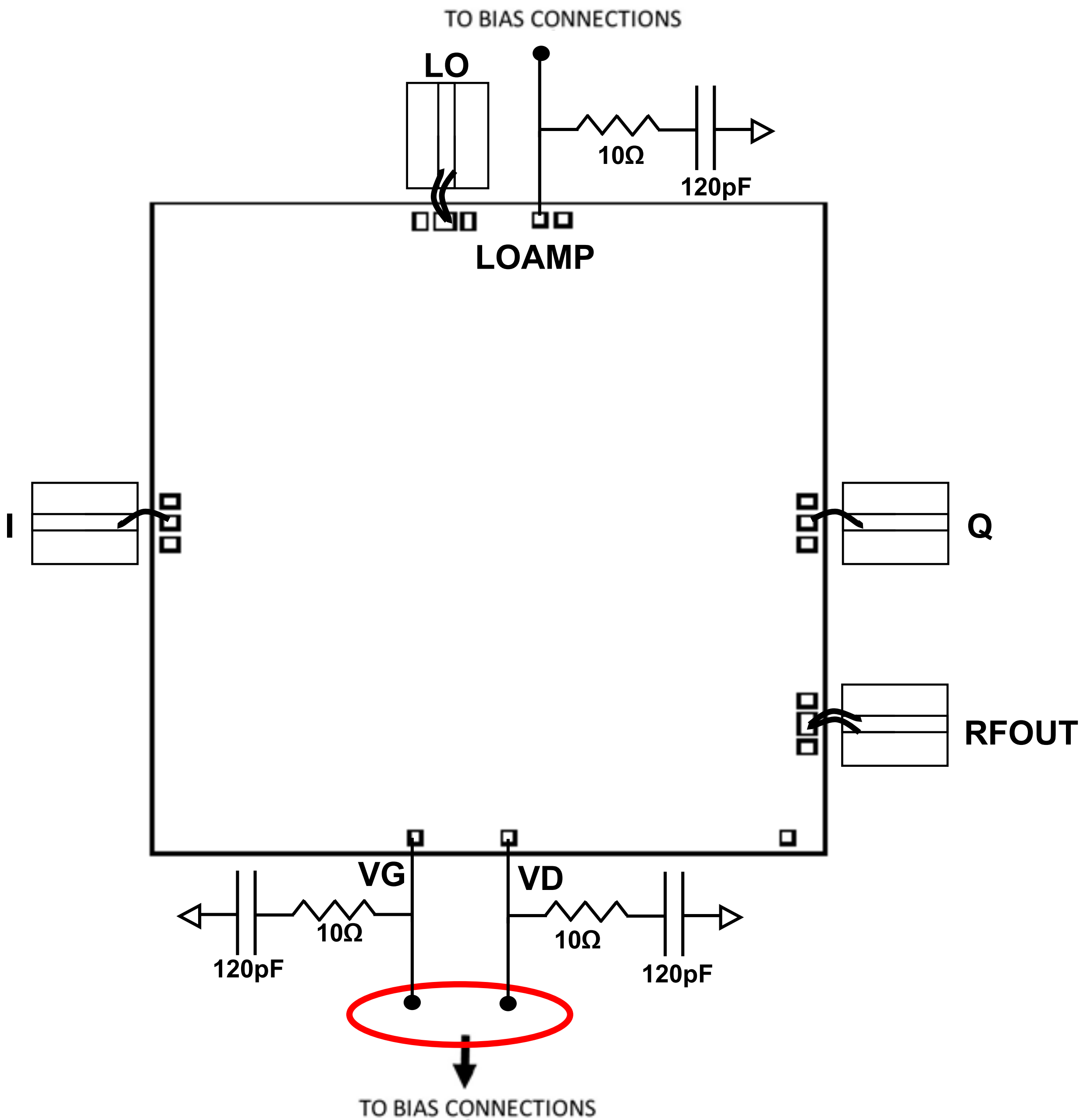
Connection Configurations



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Pad Descriptions

Name	Description
LO	LO signal input pad. This pad is AC coupled.
RFOUT	RF output pad. This pad is AC coupled.
I	I pad. This pad is DC coupled.
Q	Q pad. This pad is DC coupled.
VD	Drain Voltage pad.
VG	Gate Voltage pad.
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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