

K band MMIC Voltage Controlled Oscillator

K-VCO-2325

Previously named LE-Ka1310301

GaAs PHEMT MMIC Voltage Controlled Oscillator 23.5 - 24.8 GHz

Overview

K-VCO-2325 is a bare die Voltage Controlled Oscillator MMIC, with integrated sub-harmonic mixer, covering frequencies from 23.5GHz to 24.8GHz, by using a tuning voltage between 0 and 1.6V. This MMIC provides a constant 15dBm output power over all tuning voltages, running from a 3V supply with currents <60mA. By applying a signal at F/2 from the required operational frequency (F) to the integrated sub-harmonic mixer, and provides an additional output signal which is proportional in frequency to F and which can be introduced into a PLL for frequency stability.

The MMIC is fully passivated for additional protection and has all bond pads and backside 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 and contacted with RF probes.

Features

- 23.5 – 24.8GHz.
- 15dBm output power.
- Integrated sub-harmonic mixer for phase stability.

Applications

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

Specification Overview

Parameter	Min.	Typ.	Max.	Units
Output Frequency (F _{out})	23.5		24.8	GHz
Output Power		15		dBm
Reference / LO Frequency	10.8	12	13.6	GHz
PLL / IF Frequency	0		3.2	GHz
Phase Noise @100KHz Offset (1Hz Bandwidth)		-100		dBc/Hz
Supply Voltage, VOSC, VAMP		3		V
Tuning Voltage	0	0.6	1.6	V
Current		56		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
Supply Voltage (VOSC, VAMP)	5V
Tuning Voltage	0 – 2V
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

(V_{osc} , $V_{amp}=3V$, $I_{cc}=56mA$, $12REF=12GHz$, $8dBm$)

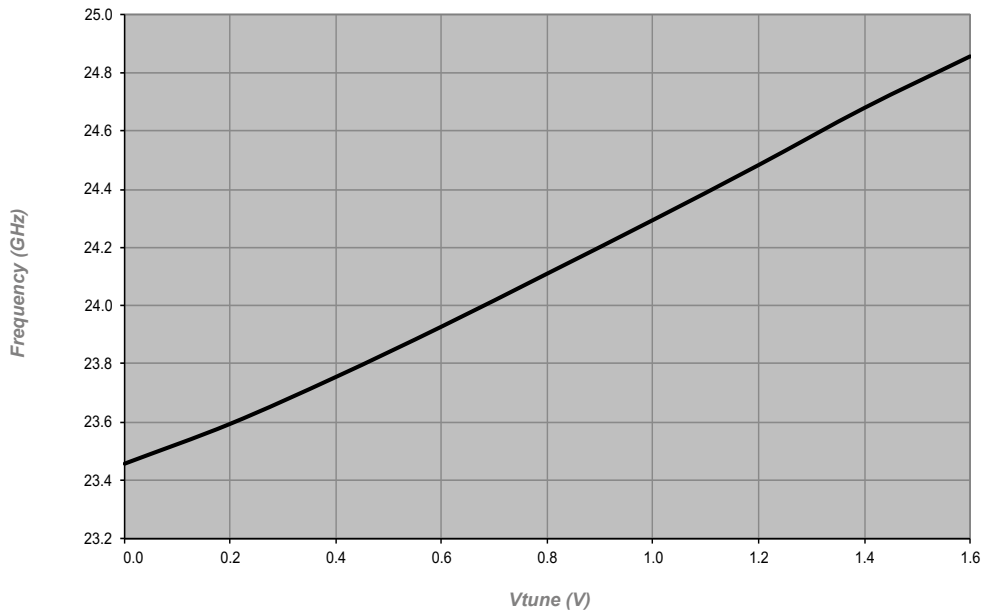


Figure 1
Output Frequency

(V_{osc} , $V_{amp}=3V$, $I_{cc}=56mA$, $12REF=12GHz$, $8dBm$)

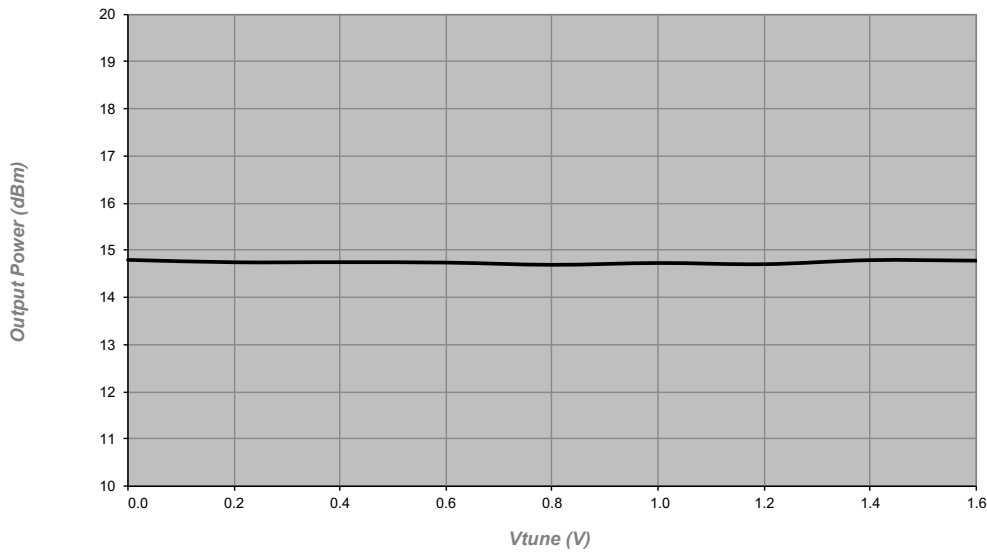


Figure 2
Output Power

Measured Performance Data

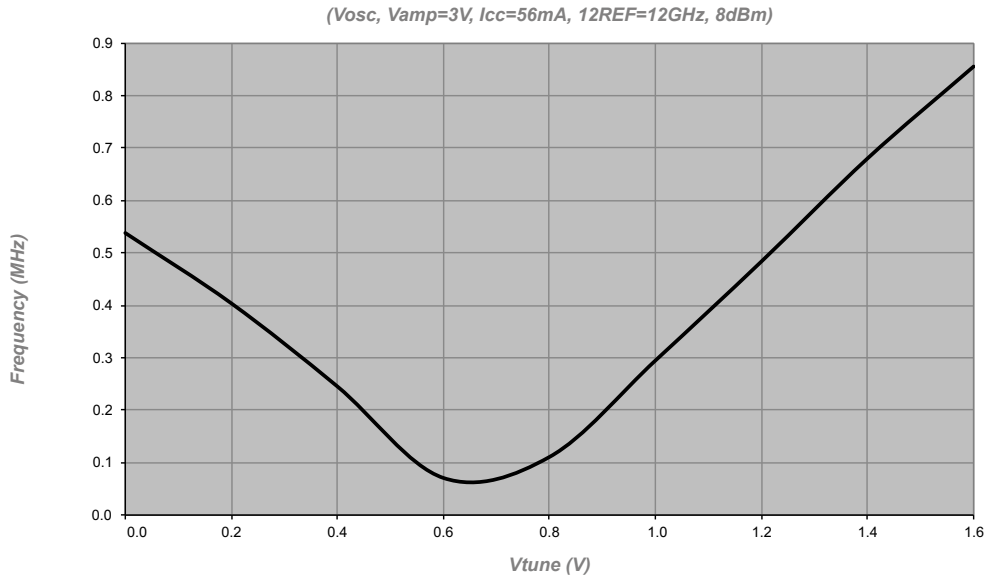


Figure 3
PLL Output Frequency

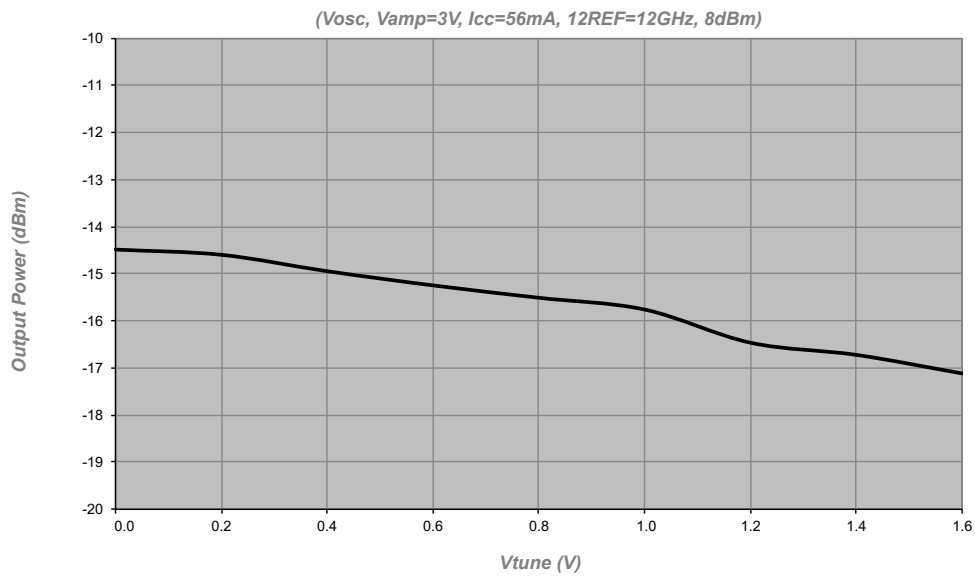


Figure 4
PLL Output Power

Measured Performance Data

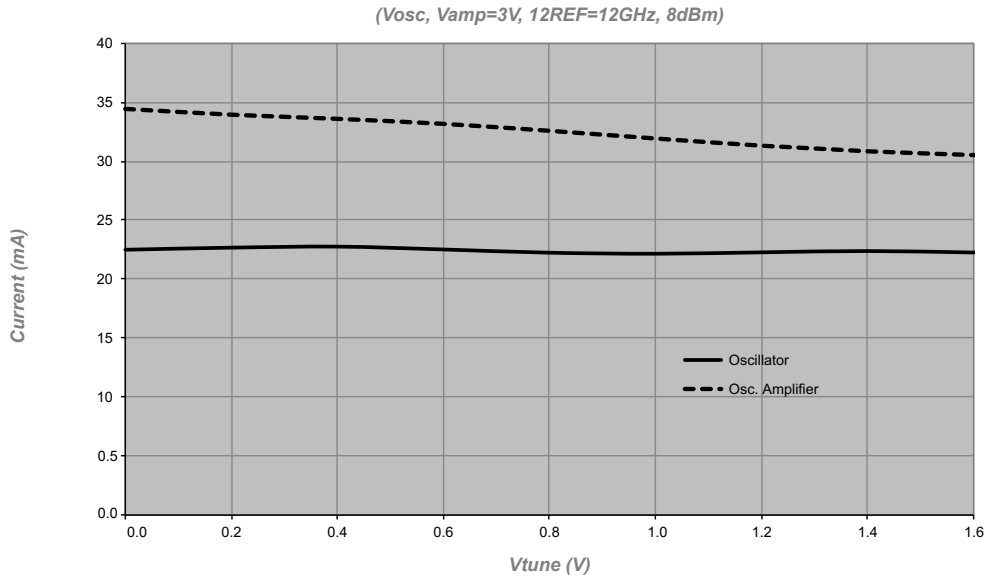
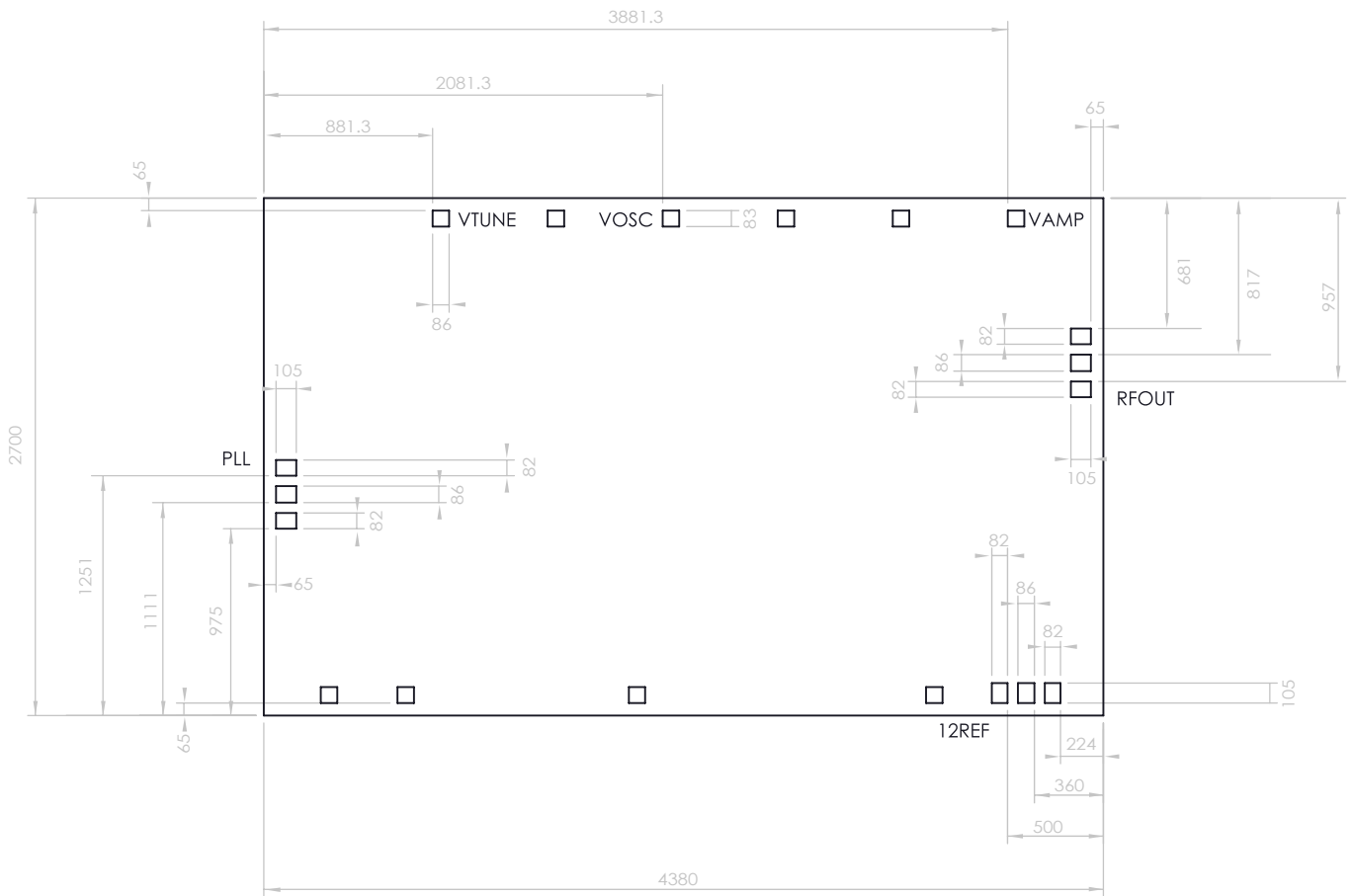


Figure 5
Current Draw

Outline Drawing



Notes

1. All dimensions are in um.
2. Typical DC bond pads are 80um square.
3. RF bond pads are 105 x 80um.
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

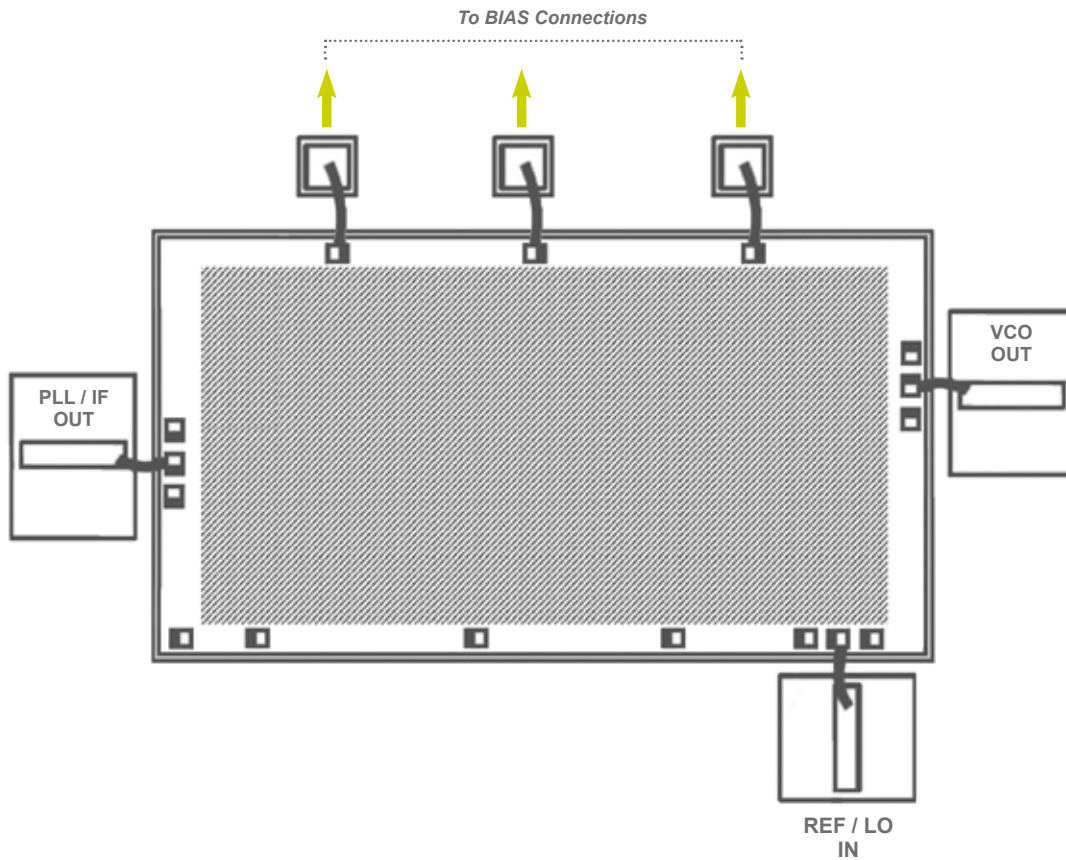
All die are delivered using gel-paks unless otherwise requested.

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Pad Descriptions

Name	Description
RFOUT	Output RF pad for oscillator frequency. This pad is AC coupled.
VTUNE	Frequency tuning voltage pad.
VOSC	Bias pad for oscillator circuit.
VAMP	Bias pad for amplifier circuit.
12REF	Input pad for 12GHz reference or LO signal. This pad is AC coupled.

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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