

K band MMIC Voltage Controlled Oscillator

K-VCO-2324

Previously named LE-Ka1310304

GaAs PHEMT MMIC Voltage Controlled Oscillator 23.25 – 24.25GHz

Overview

K-VCO-2324 is a bare die Voltage Controlled Oscillator MMIC that covers frequencies from 23.25GHz to 24.25GHz using a tuning voltage between 0V and 1V. This MMIC provides a constant 15dBm output power over all tuning voltages, and runs from a 3V supply with currents <95mA. With an integrated frequency divider this MMIC provides an additional output signal at F/2, with power levels >4dBm in the frequency range 11.625GHz to 12.125GHz for simple adoption into PLL circuitry.

The MMIC is fully passivated for additional protection and has all bond pads and backside gold plated. K-VCO-2324 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

- 23.25 – 24.25GHz.
- 15dBm output power.
- Integrated F/2 signal generation.

Applications

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

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Specification Overview

Parameter	Min.	Typ.	Max.	Units
Frequency	23.25		24.25	GHz
Output Power		15		dBm
F/2 Frequency	11.625		12.125	GHz
F/2 Output Power		4		dBm
Phase Noise @100KHz Offset (1Hz Bandwidth)		-100		dBc/Hz
Supply Voltage, VOOSC, VAMP, VD		3		V
Supply Voltage, VDIO		0.9		V
Nominal Gate Voltage, VG*		-0.2		V
Tuning Voltage	0	0.6	1	V
Current		95		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. *Should be adjusted to ensure that the F/2 amplifier draws 32mA.

Absolute Maximum Ratings

Parameter	Rating
Supply Voltage (VOOSC, VAMP, VD)	5V
Supply Voltage (VDIO)	2V
Drain Current (ID)	50mA
Tuning Voltage	0 – 2V
Storage Temperature	-65°C to +150°C
Channel Temperature	+150°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

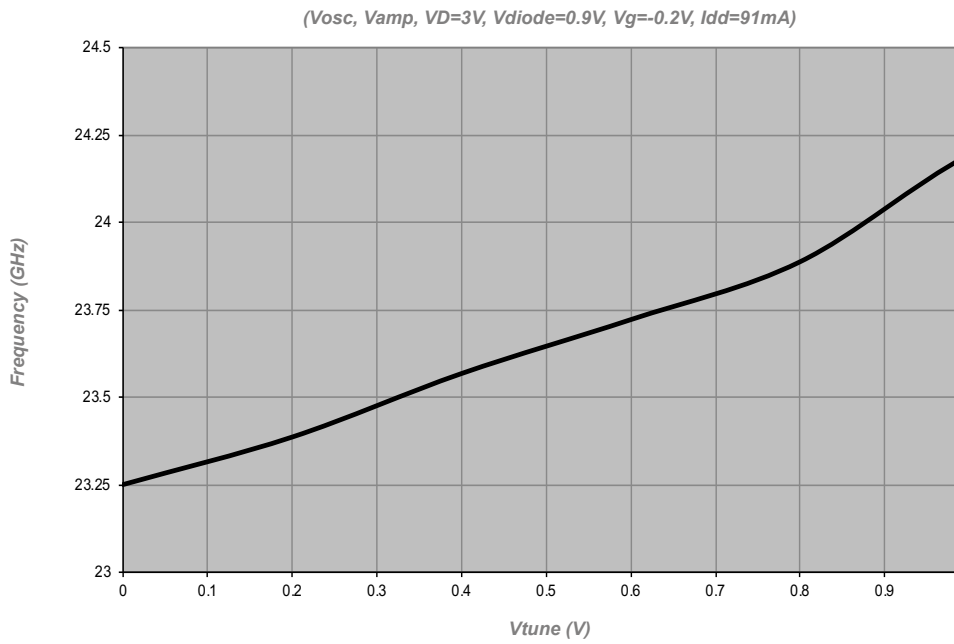


Figure 1
Output Frequency

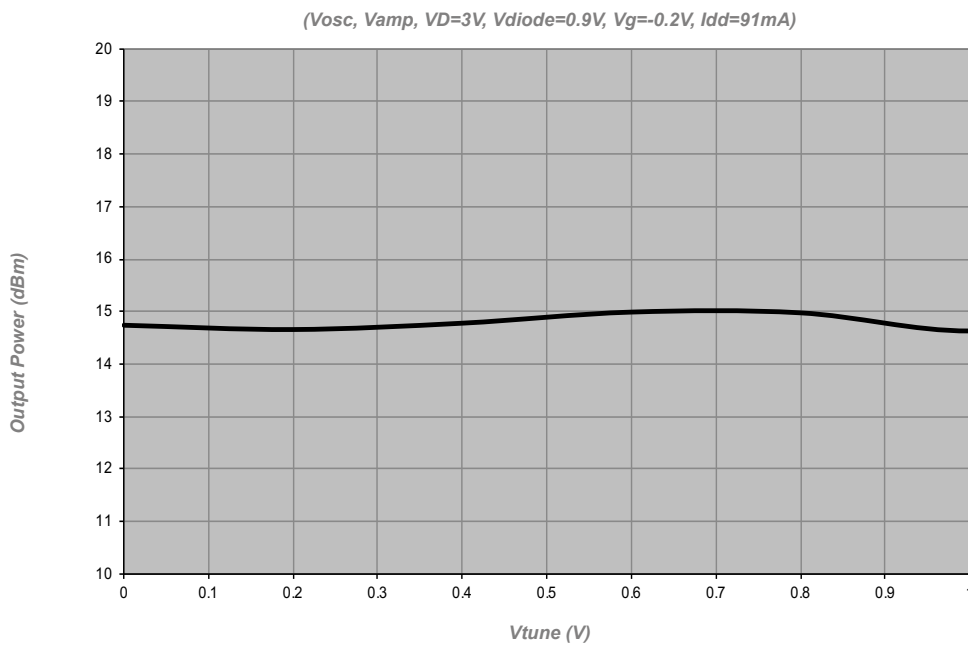


Figure 2
Output Power

Measured Performance Data

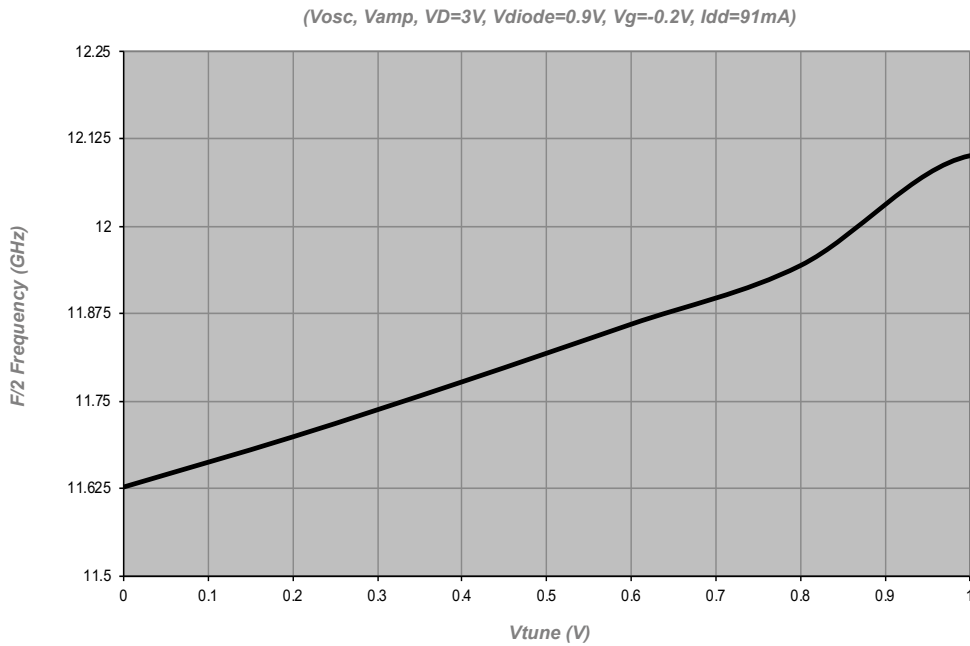


Figure 3
F/2 Frequency

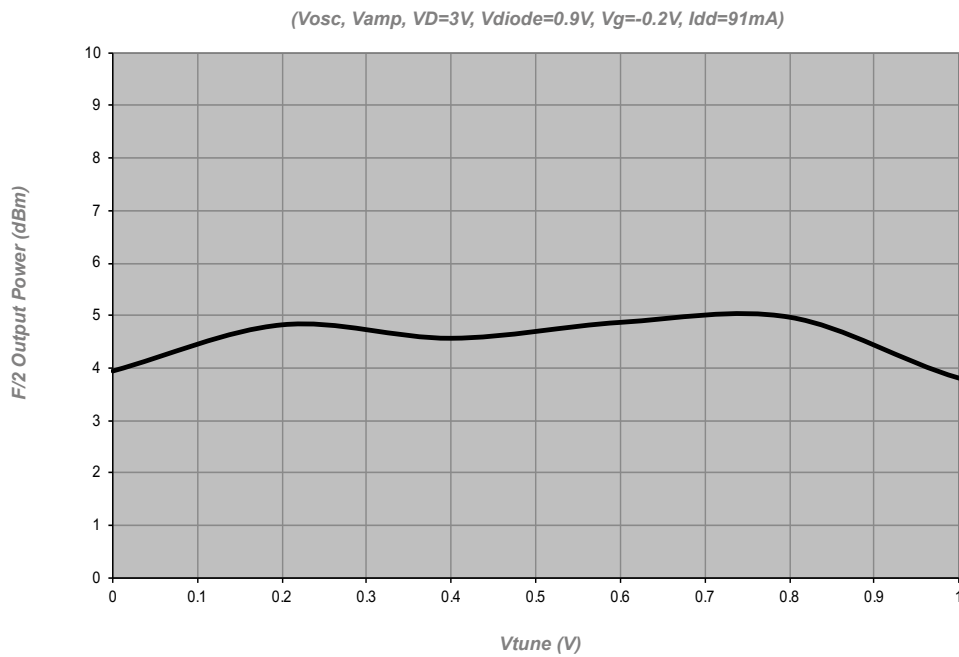


Figure 4
F/2 Power

Measured Performance Data

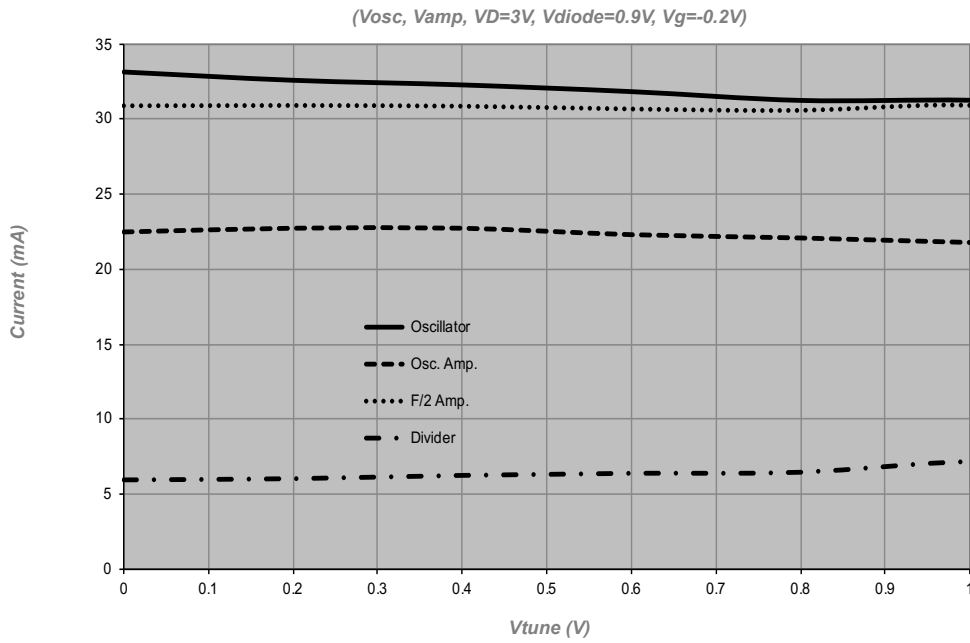
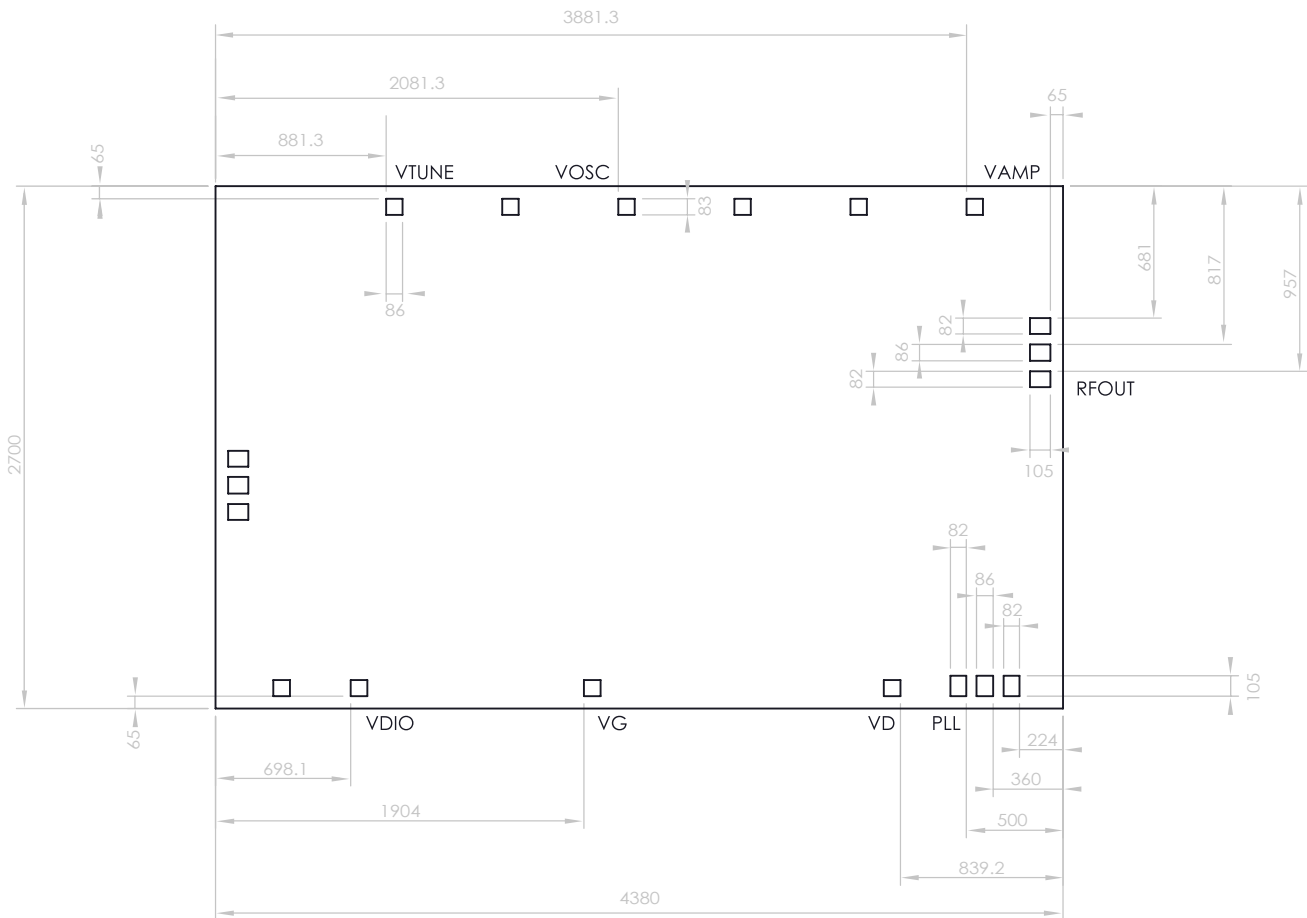


Figure 5
Current Draw

Outline Drawing



Notes

1. All dimensions are in um.
2. Typical DC bond pads are 83 x 86um square.
3. RF bond pads are 86 x 105um.
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

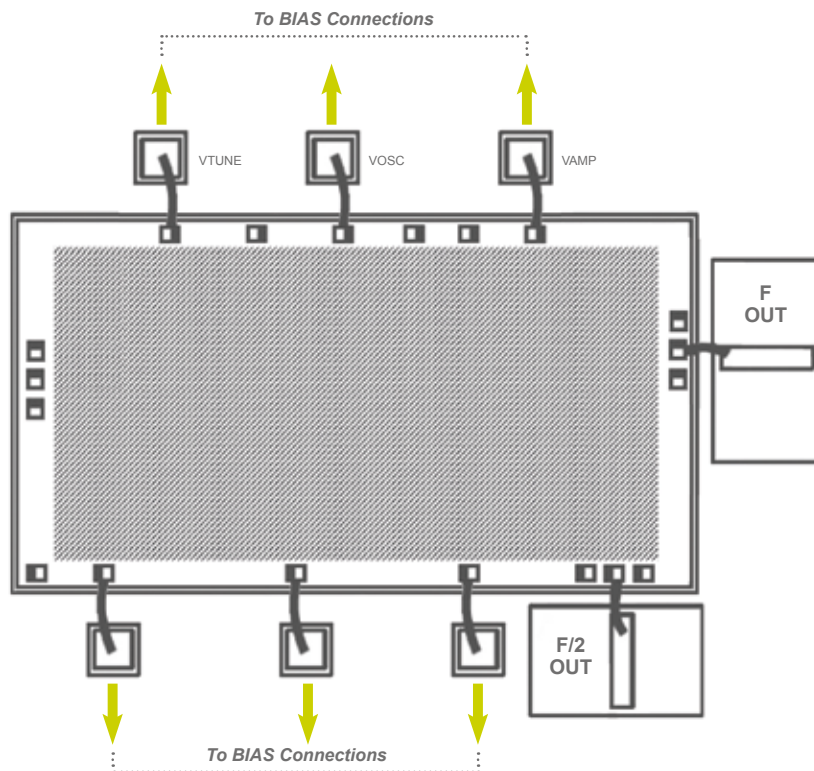
All die are delivered using gel-paks unless otherwise requested.

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Pad Descriptions

Name	Description
RFOUT	Output RF pad for main frequency (F). This pad is AC coupled
VTUNE	Frequency tuning voltage pad
VOSC	Bias pad for oscillator circuit
VAMP	Bias pad for amplifier circuit @F
VDIO	Bias pad for frequency divider circuit
VD	Drain bias pad for F/2 amplifier
VG	Gate bias pad for F/2 amplifier
PLL	Output RF pad for F/2. This pad is AC coupled
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.

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