OMMIC Innovating with III-V's

PRELIMINARY DATASHEET

CGY2470UH/C1

92-96 GHz Active UP-Mixer

DESCRIPTION

The CGY2470UH/C1 is a high performance active up mixer GaAs MMIC working in the W-Band.

The CGY2470UH/C1 active up mixer has an added power amplifier at the RF port decreasing conversion loss. The insersion loss is 3 dB with LO power of 7 dBm. The RF frequency range is 92 to 96GHz, the LO range is 86 to 90GHz and the IF is 5.2 to 5.6 GHz. The LO suppression is 4dBc at RF port and the image rejection is 20dBc. The device can be used in Radar, Telecommunication, Instrumentation applications and passive or active imaging.

The die is manufactured using OMMIC's Advanced 70 nm gate length high Indium content MHEMT Technology. The MMIC uses gold bonding pads and backside metallization and is fully protected with Silicon Nitride passivation to obtain the highest level of reliability.

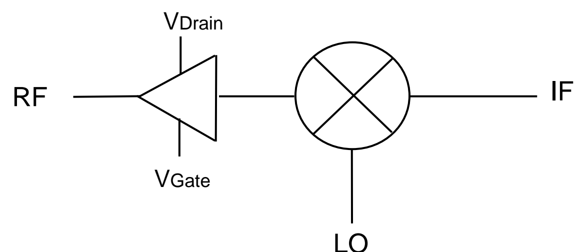
This part is a member of a chipset dedicated to build a transmit and receive radio in this band.

APPLICATIONS

- Radar
- Telecommunication
- Instrumentation
- Passive and active radar imaging

FEATURES

- RF Frequency Range : 92 to 96 GHz
- LO Frequency Range : 86 to 90 GHz
- IF Frequency Range : 5.2 to 5.6 GHz
- Conversion gain: - 3 dB
- LO input power: 7dBm
- IF Input P1dB : +2 dBm
- LO isolation at RF port 4dB
- Image rejection: 20dBc
- RF port return loss 13dB
- LO port return loss 7dB
- IF port return loss 20dB
- Die size = 4.15 x 1.65 x 0.1 mm
- Device Availability : Q1 2014
  - Tested, Inspected Known Good Die (KGD)



CGY2470UH/C1 Block Diagram

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MAXIMUM VALUES

Symbol	Parameter	Conditions	MIN.	MAX.	UNIT
RF port, LO port	Maximum RF power			15	dBm
V_{DRAIN}	Drain voltage		0	4.5	V
V_{GATE}	Gate voltage		-4.5	0	V
T_{amb}	Ambient temperature		- 40	+ 85	° C
T_j	Junction temperature			+ 150	° C
T_{stg}	Storage temperature		- 55	+ 150	° C

Operation of this device outside the parameter ranges given above may cause permanent damage

ELECTRICAL CHARACTERISTICS

Conditions : T_{amb} = + 25 °C, $V_{CTRL,}$ = 0 / -3V

Symbol	Parameter	Conditions	MIN.	TYP.	MAX.	UNIT
RF	RF frequency		92		96	GHz
LO	Local Oscillator frequency		86		90	GHz
IF	Intermediate frequency		5.2	5.4	5.6	GHz
I_{LOSS}	Insertion Loss	LO power 8 dBm		3		dB
LO_{POWER}	Local Oscillator Power		4	8		dBm
IF_{P1dB}	IF Input P1dB			2		dBm
LO_{ISOL}	LO isolation at RF port		4			dB
$IMAG_{REJ}$	Image Rejection			20		dBc
LO_{RL}	LO port return Loss			-7		dB
RF_{RL}	RF port return Loss			-13		dB
IF_{RL}	IF port return Loss			-20		dB

(*) Measurement reference planes are the INPUT and OUTPUT plans of the CGY2470UH/C1 MMIC.

ENVIRONMENTAL CARACTERISTICS

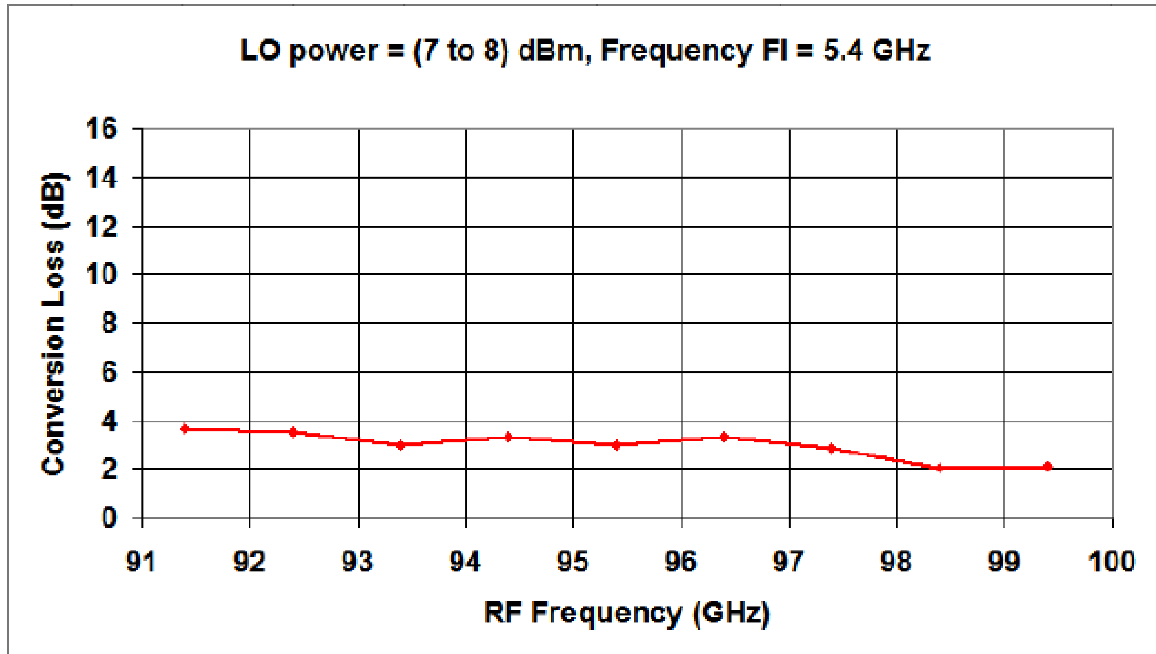
Symbol	Parameter	Value	UNIT
CS_{MAX}	Maximum chip size	4.15 x 1.75	mm2
C_{THICK}	Typical chip thickness	0.1	mm

Caution : This device is a high performance RF component and can be damaged by inappropriate handling. Standard ESD precautions should be followed. OMMIC document "OM-CI-MV/ 001/ PG" contains more information on the precautions to take.

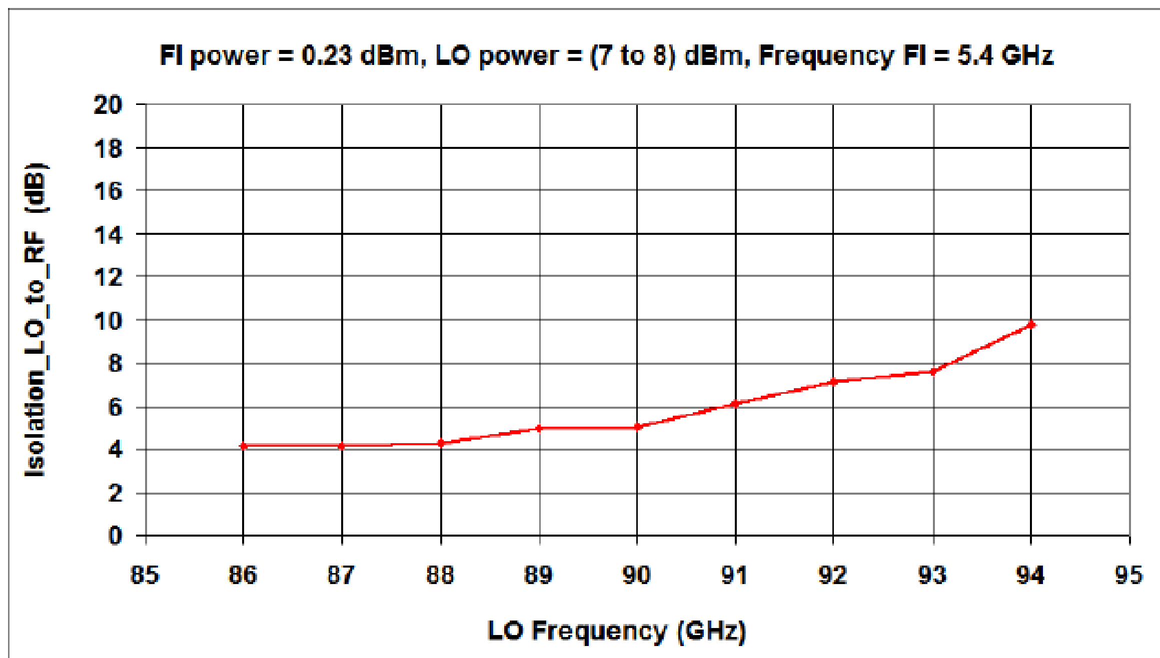
PARAMETERS MEASUREMENTS

Measurements conditions

The dies have been measured on-wafer and S parameter files have been captured.



Conversion loss vs frequency



LO to RF Isolation

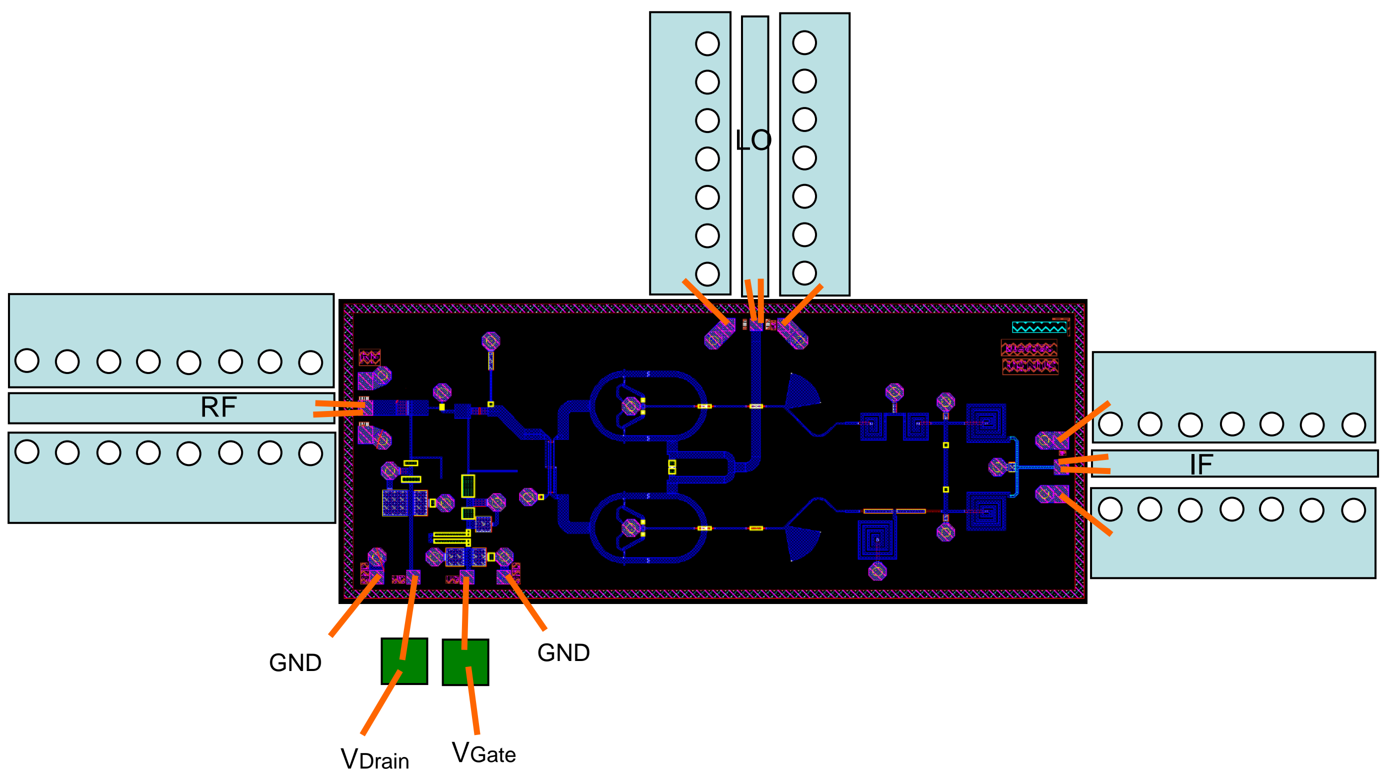
APPLICATION INFORMATIONS

Measurements conditions

The dies have been measured on-wafer and S parameter files have been captured. The active Up-Mixer is not 50 Ohms matched in the connector plan, it have been designed to be connected to 50 lines using 0.1nH equivalent bondings.

The alumina are coplanar wave-guide, it is recommended to connect central connector and ground to improve guidance. A microstrip 50 Ohms line can also be used.
Bondings should be kept as short as possible.

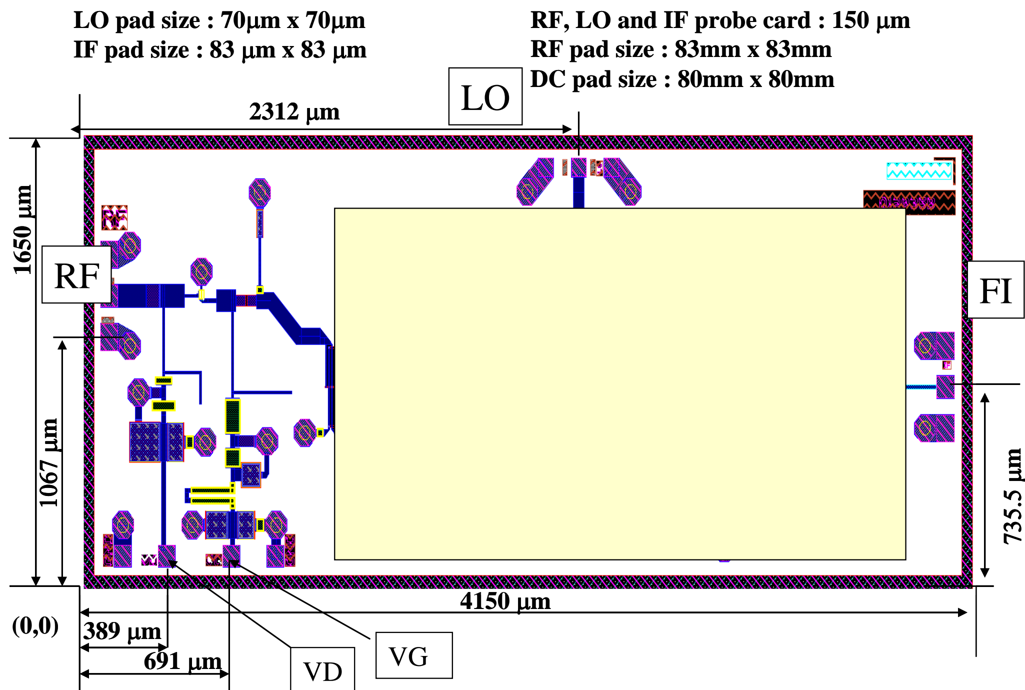
The die has vias to access the backside metallization made of TiAu layers. The die can be soldered using AuSn solder or glued using a conductive epoxy material.



MECANICAL INFORMATIONS

Die outline

The CGY2470UH/C1 SPST is not 50 Ohms matched in the connector plan, it have been designed to be connected to 50 lines using 0.1nH equivalent wire or ribbon bondings.



ORDERING INFORMATION

Generic type	Package type	Version	Description
CGY2470UH	Bare Die	C1	MHEMT Semi-conductor die. External dimensions : 4.15 x 1.65 µm (Tolerance : ±15 µm due to dicing). Die thickness: 0.1 mm. Backside material: TiAu

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DEFINITIONS

Limiting values definition

Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

Application information

Applications that are described herein for any of these products are for illustrative purposes only. OMMIC makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

DISCLAIMERS

Life support applications

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