

## 7.5-15GHz Frequency Multiplier

### GaAs Monolithic Microwave IC

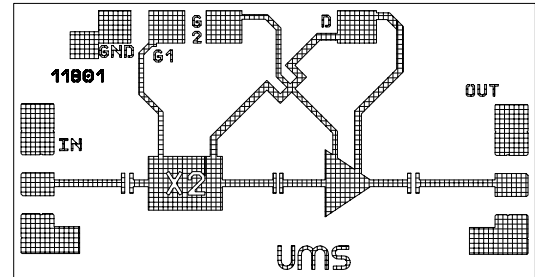
*preliminary*

### Description

The CHX2193 is a frequency multiplier by 2 monolithic circuit.

It is designed for a wide range of applications, from military to commercial communication systems. The backside of the chip is both RF and DC ground. This helps to simplify the assembly process.

The circuit is manufactured with a PM-HEMT process, 0.25µm gate length, via holes through the substrate, air bridges and electron beam gate lithography.



### Main Features

- Broadband performance : 6.25-8.25 GHz
- 12dBm output power for +12dBm input power
- DC power consumption, 60mA @ 3.5V (with RF)
- Chip size : 1.62 x 0.89 x 0.10 mm

### Main Characteristics

Tamb. = 25°C

Symbol	Parameter	Min	Typ	Max	Unit
F <sub>in</sub>	Input frequency range	6.25		8.25	GHz
F <sub>out</sub>	Output frequency range	12.5		16.5	GHz
P <sub>in</sub>	Input power		12		dBm
P <sub>out</sub>	Output power for +12dBm input power	10	12	16	dBm

ESD Protection : Electrostatic discharge sensitive device. Observe handling precautions !

*preliminary*

## Electrical Characteristics

$T_{amb} = +25^{\circ}\text{C}$ ,  $V_{g1} = -0.9\text{V}$   $V_{g2}$  adjusted for  $I_d = 60\text{mA}$  under RF  $P_{in}=+12\text{dBm}$

Symbol	Parameter	Min	Typ	Max	Unit
$F_{in}$	Input frequency range	6.25		8.25	GHz
$F_{out}$	Output frequency range	12.5		16.5	GHz
$P_{in}$	Input power		12		dBm
$P_{out}$	Output power for +12 dBm input power	10	12	16	dBm
$I_s/F_o$	$F_{in}$ level at the output ( $6.25 < F_{in} < 8.25\text{GHz}$ ), for +12dBm input power	-8	-16	-30	dBm
$VSWR_{in}$	Input VSWR		2.5:1		
$VSWR_{out}$	Output VSWR		2.5:1		
$V_d$	Drain bias voltage		3.5		V
$I_d$	Bias current (with RF)		60		mA

A wire bond of typically 0.1 to 0.15 nH will improve the input and output matching.

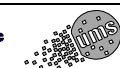
## Absolute Maximum Ratings

$T_{amb} = +25^{\circ}\text{C}$

Symbol	Parameter	Values	Unit
$V_d$	Drain bias voltage	4.0	V
$I_d$	Drain bias current	150	mA
$T_a$	Operating temperature range (1)	-40 to +85	$^{\circ}\text{C}$
$T_{stg}$	Storage temperature range	-55 to +125	$^{\circ}\text{C}$

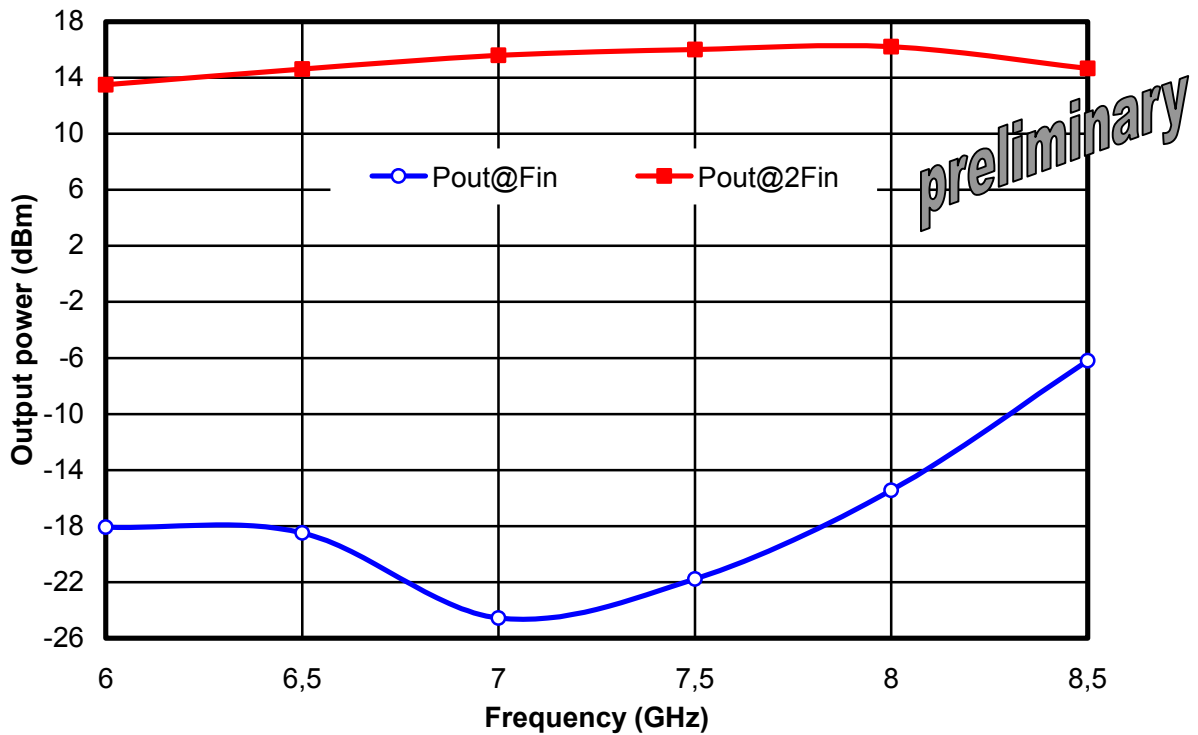
Operation of device above anyone of these parameters may cause permanent damage.

(1) Reference : backside of the chip

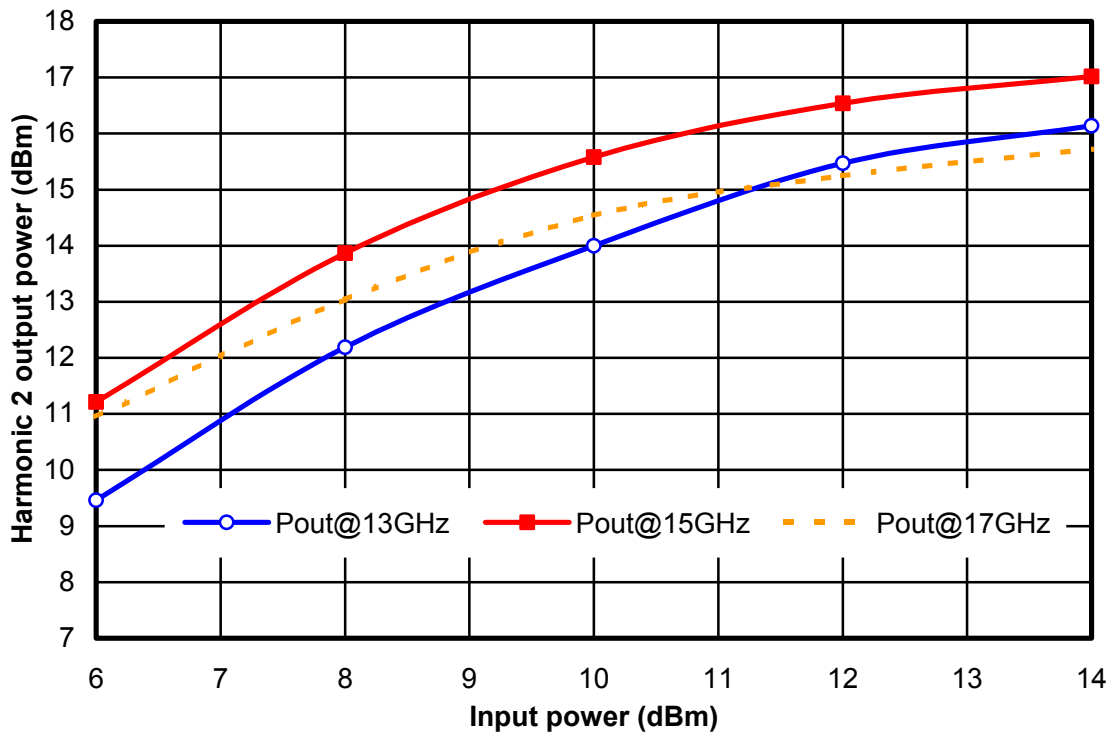


**Typical on Wafer Measurements**

Bias conditions:  $T_{amb} = +25^{\circ}\text{C}$ ,  $V_d = 3.5\text{V}$   $V_{g1} = -0.9\text{V}$   $V_{g2}$  adjusted for  $I_d = 60\text{mA}$  under RF  $P_{in}=+12\text{dBm}$



Bias conditions:  $T_{amb} = +25^{\circ}\text{C}$ ,  $V_d = 3.5\text{V}$   $V_{g1} = -0.9\text{V}$   $V_{g2}$  adjusted for  $I_d = 60\text{mA}$  under RF  $F_{in}=6.5\text{GHz} - 7.5\text{GHz} - 8.5\text{GHz}$

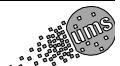
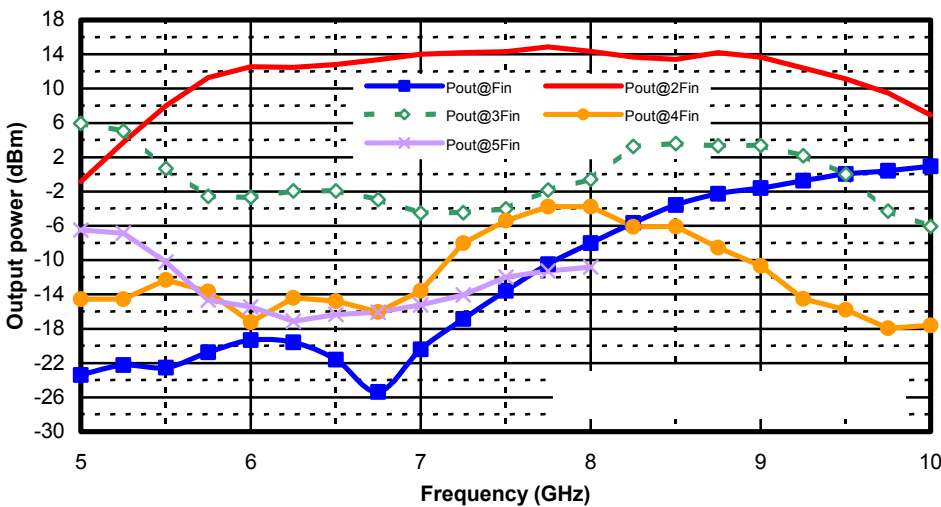
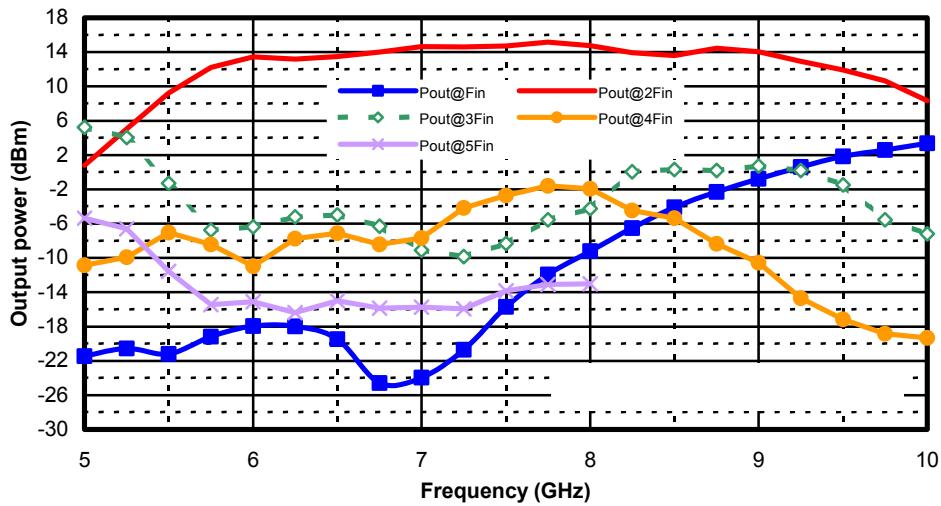
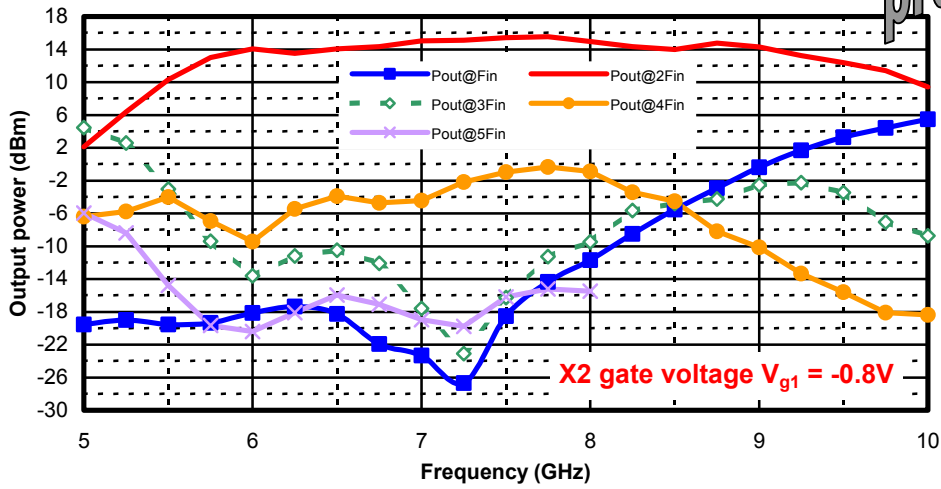


## Typical In-Jig Measurements

Bias conditions:  $T_{amb} = +25^{\circ}\text{C}$ ,  $V_d = 3.5\text{V}$   $V_{g2}$  adjusted for  $I_d = 60\text{mA}$  under RF  $P_{in} = +10\text{dBm}$

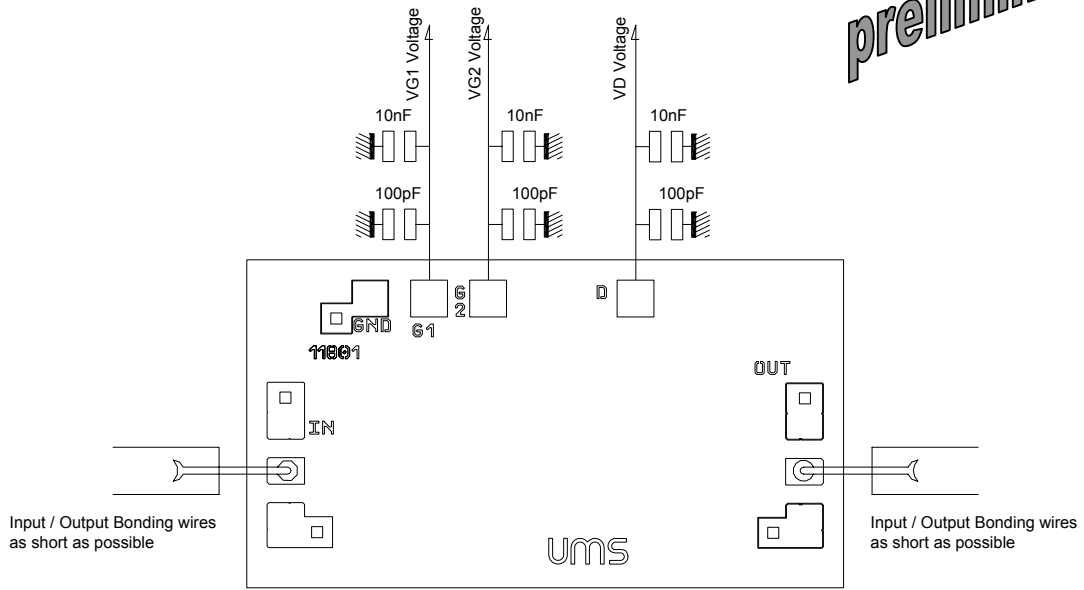
Harmonics output power versus gate voltage  $V_{g1}$

preliminary

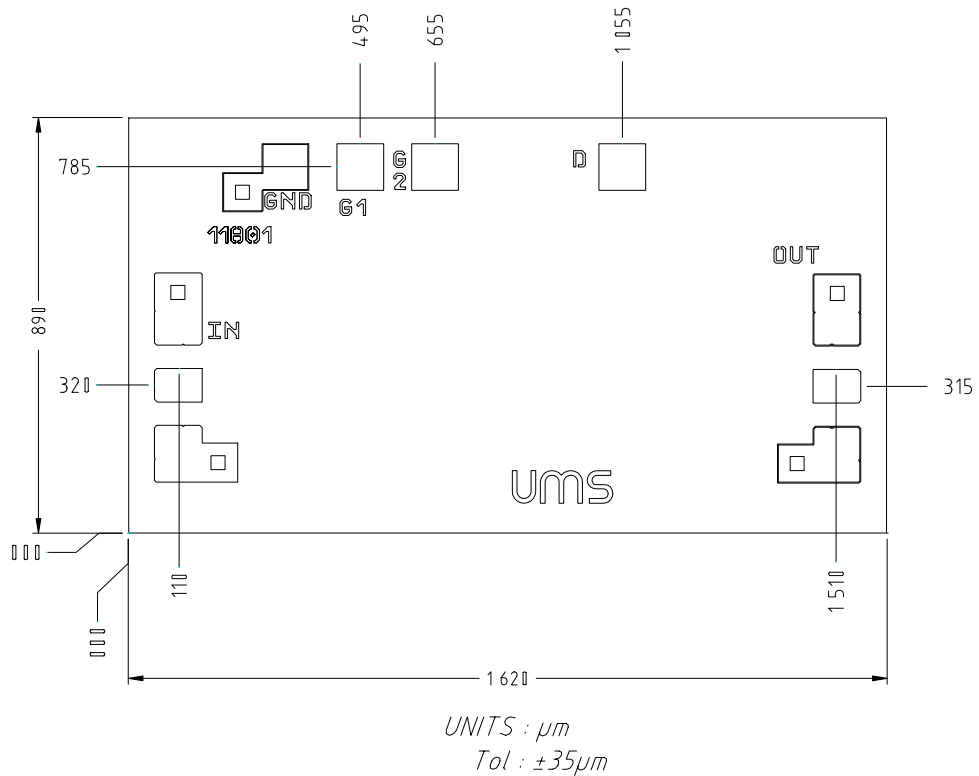


Chip Assembly and Mechanical Data

preliminary



Note : Supply feed should be capacitively bypassed. 25µm diameter gold wire is to be preferred.



**Bonding pad positions.**  
( Chip thickness : 100µm. All dimensions are in micrometers )

*preliminary*

## Ordering Information

Chip form : CHX2193-99F/00

Information furnished is believed to be accurate and reliable. However **United Monolithic Semiconductors S.A.S.** assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of **United Monolithic Semiconductors S.A.S.**. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. **United Monolithic Semiconductors S.A.S.** products are not authorised for use as critical components in life support devices or systems without express written approval from **United Monolithic Semiconductors S.A.S.**