

## 7.5-30GHz Frequency Multiplier

### GaAs Monolithic Microwave IC

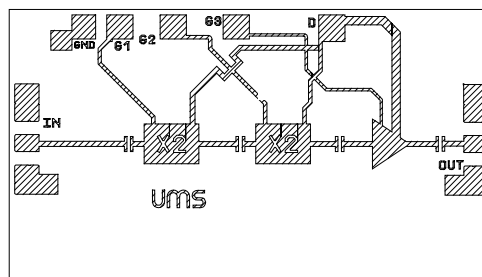
#### Description

The CHX2095a99F is a by 4 frequency multiplier monolithic integrated circuit.

It is designed for a wide range of applications, from military to commercial communication systems.

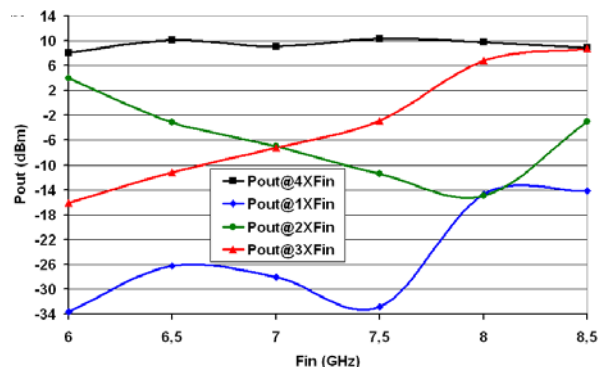
The backside of the chip is both RF and DC grounded. This helps to simplify the assembly process.

The circuit is manufactured with a pHEMT process, 0.25 $\mu$ m gate length, via holes through the substrate, air bridges and electron beam gate lithography.



#### Main Features

- Broadband performance: 6.25-8.25GHz
- 11dBm Pout @ +12dBm Pin
- DC power consumption, 75mA @ 3.5V
- Chip size: 2.02 x 0.89 x 0.10mm



#### Main Electrical Characteristics

Tamb.= +25°C

Symbol	Parameter	Min	Typ.	Max	Unit
Fin	Input frequency range	6.25		8.25	GHz
Fout	Output frequency range	25.00		33.00	GHz
Pin	Input power		12		dBm
Pout	Output power for +12dBm input power (4xFin)	8	11	14	dBm

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

## Electrical Characteristics

Tamb = +25°C, Vd = 3.5V

Vg1 = Vg2 = -0.9V, Vg3 adjusted for Id = 75mA under RF Pin = +12dBm.

Symbol	Parameter	Min	Typ.	Max	Unit
Fin	Input frequency range	6.25		8.25	GHz
Fout	Output frequency range	25.00		33.00	GHz
Pin	Input power		12		dBm
Pout 4xFin	Output power for +12dBm input power	8	11	14	dBm
Pout 1xFin	Fin level at the output for +12dBm input power (6.25 < Fin < 8.25GHz)		0	2	dBm
Pout 2xFin	2Fin level at the output for +12dBm input power (12.5 < 2Fin < 16.5GHz)		-10	3	dBm
Pout 3xFin	3Fin level at the output for +12dBm input power (18.75 < 3Fin < 24.75GHz)		0	12	dBm
Pout 5xFin	5Fin level at the output for +12dBm input power (31.25 < 5Fin < 41.25GHz)		0		dBm
VSWRin	Input VSWR		2.5:1		
VSWRout	Output VSWR		2.5:1		
Id	Bias current		75		mA

These values are representative of on-wafer measurements that are made without bonding wires at the RF ports.

A bonding wire of typically 0.1 to 0.15nH will improve the matching at the accesses.

## Absolute Maximum Ratings <sup>(1)</sup>

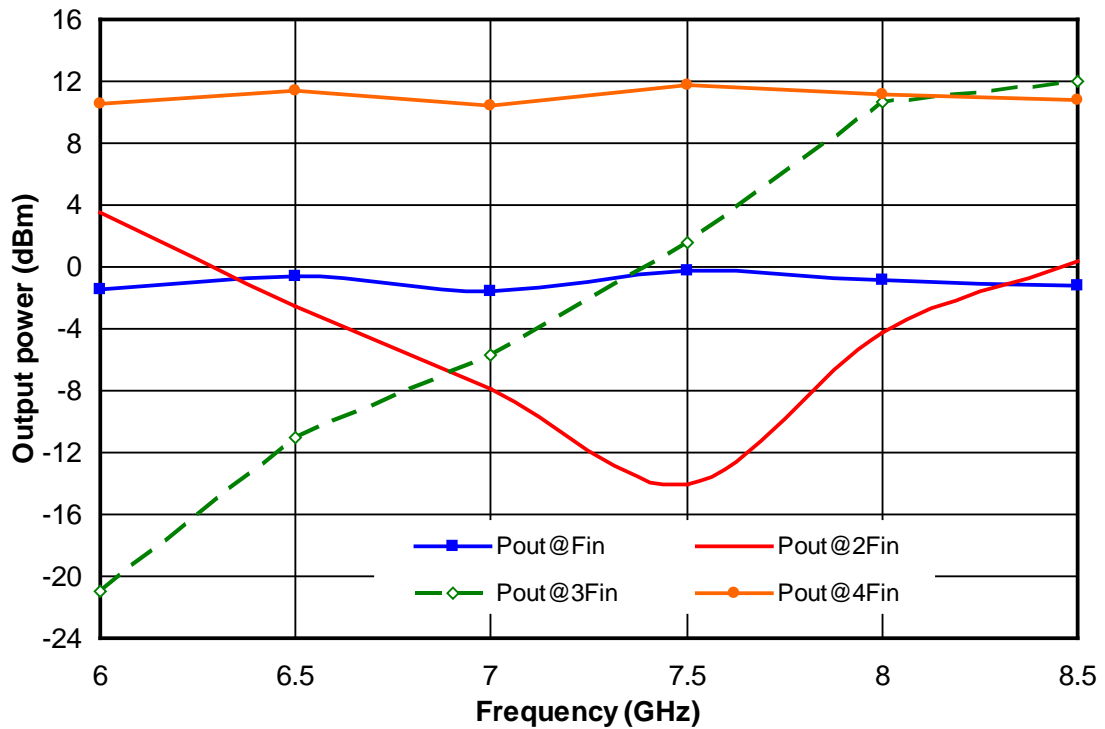
Tamb. = +25°C

Symbol	Parameter	Values	Unit
Vd	Supply voltage	4.0	V
Id	Supply current	150	mA
Pin	Input power	20	dBm
Ta	Operating temperature range	-40 to +85	°C
Tstg	Storage temperature range	-55 to +150	°C

<sup>(1)</sup> Operation of this device above any one of these parameters may cause permanent damage.

**Typical on wafer Measurements**

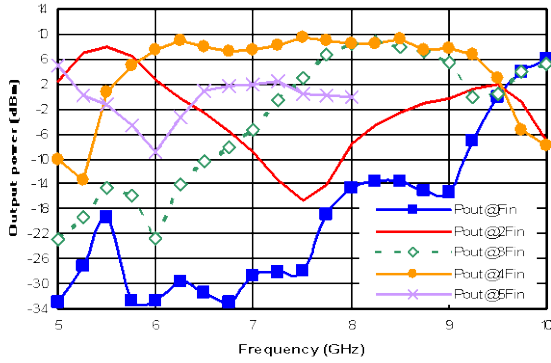
Tamb = +25°C & Bias conditions: Vd = 3.5V, Vg1 = Vg2 = -0.9V,  
Vg3 adjusted for Id = 75mA under RF Pin = +12dBm.



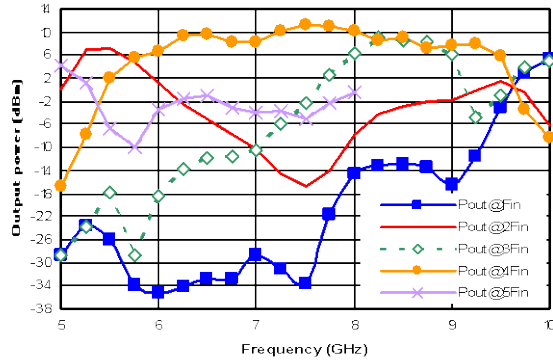
## Typical Test Fixture Measurements

Tamb = +25°C & Bias conditions: Vd = 3.5V, Pin = +11dBm (jig losses are not corrected and are evaluated to 1.5dB at 30GHz)

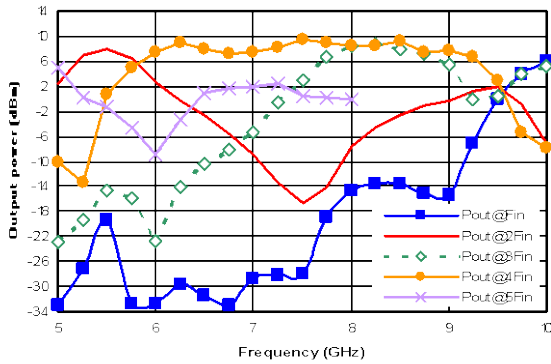
Gate voltage Vg1=Vg2=-0.8V Id=70mA



Gate voltage Vg1=Vg2=-0.95V Id=75mA



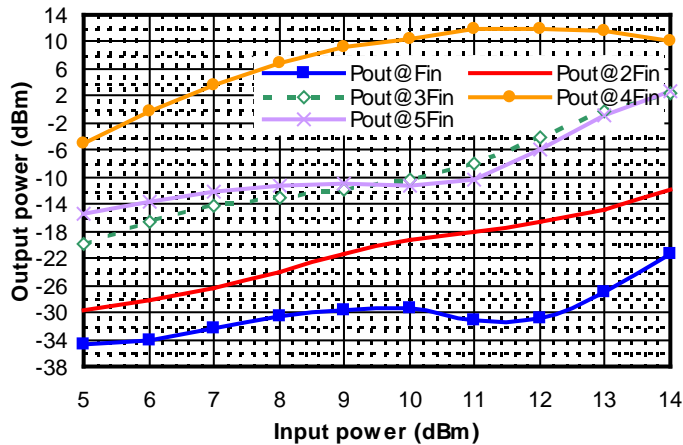
Gate voltage Vg1=Vg2=-1.1V Id=80mA



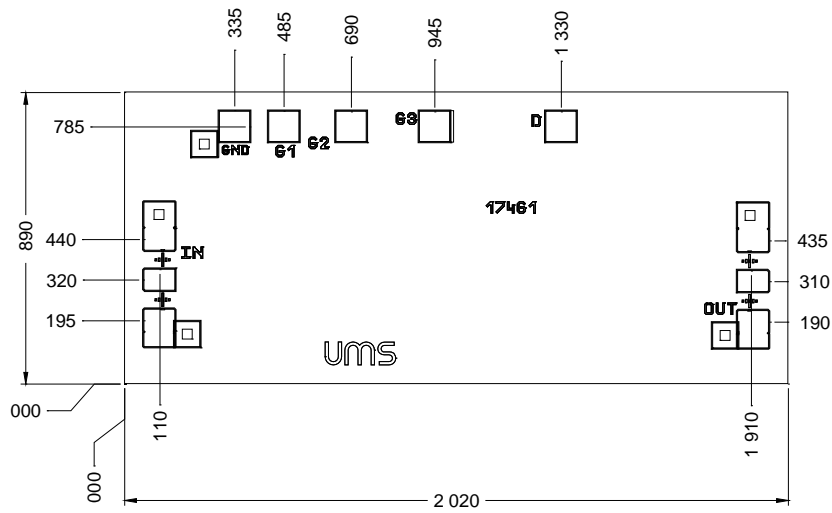
Tamb = +25°C & Bias conditions:

Vd = 3.5V, Id = 75mA under RF nominal Pin = +12dBm

Fin = 7.5GHz (jig losses are not corrected and are evaluated to 1.5dB at 30GHz)

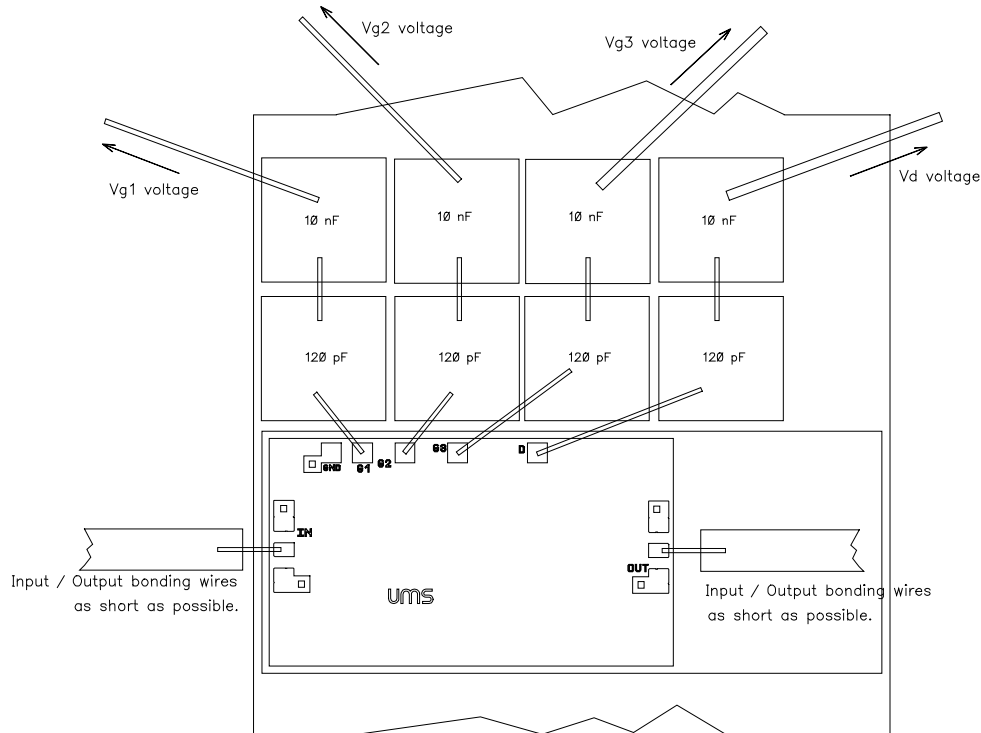


**Mechanical data: Bonding pad positions.**



Chip thickness: 100μm.  
 Chip size: 2020 x 890 ±35μm  
 All dimensions are in micrometers

## Recommended assembly plan



25 $\mu$ m wedge bonding is preferred

Note: Supply feed should be bypassed. 25 $\mu$ m diameter gold wire is to be preferred.

## Recommended circuit bonding table

Label	Type	Decoupling	Comment
Vg1, Vg2			Gate Supply (Multiplier, typically -0.9V)
Vg3	Vg	120pF/10nF	Gate Supply (adjusted for $I_d = 75\text{mA}$ under RF Pin = +12dBm)
Vd	Vd	120pF/10nF	Drain Supply

**Notes**



## Recommended ESD management

Refer to the application note AN0020 available at <https://www.ums-rf.com> for ESD sensitivity and handling recommendations for the UMS products.

## Recommended environmental management

UMS products are compliant with the regulation in particular with the directives RoHS N°2011/65 and REACH N°1907/2006. More environmental data are available in the application note AN0019 also available at <https://www.ums-rf.com>.

## Ordering Information

Chip form:

CHX2095a99F/00

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