

7.5-30GHz Frequency Multiplier

GaAs Monolithic Microwave IC

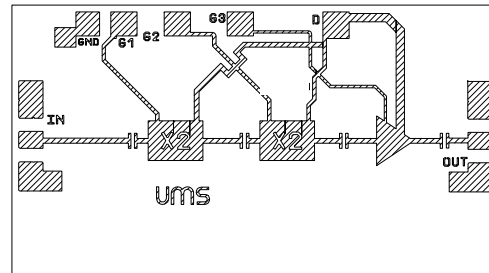
Description

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.

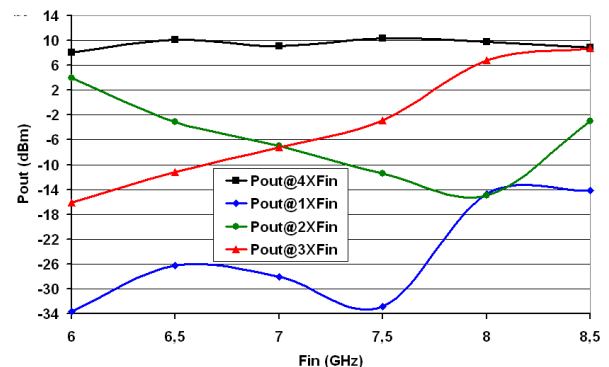
The backside of the chip is both RF and DC grounded. This helps to simplify the assembly process.

The circuit is manufactured with a pHEMT process, 0.25µm 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 ⁽¹⁾

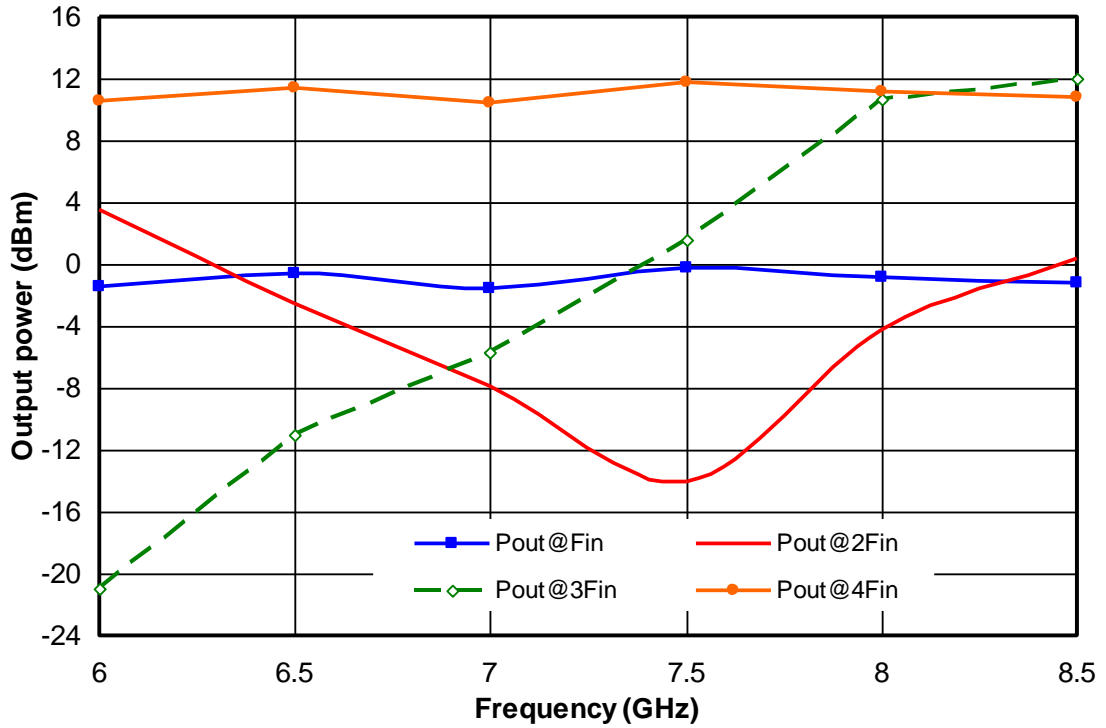
Tamb.= +25°C

| 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 +125 | °C |

⁽¹⁾ Operation of this device above anyone of these parameters may cause permanent damage.

Typical on wafer Measurements

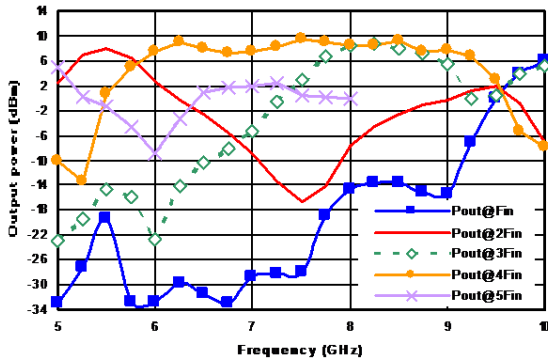
Tamb = +25°C & Bias conditions: Vd = 3.5V, Vg1 = Vg2 = -0.9V, Vg3 adjusted for Id = 75mA under RF Pin = +12dBm.



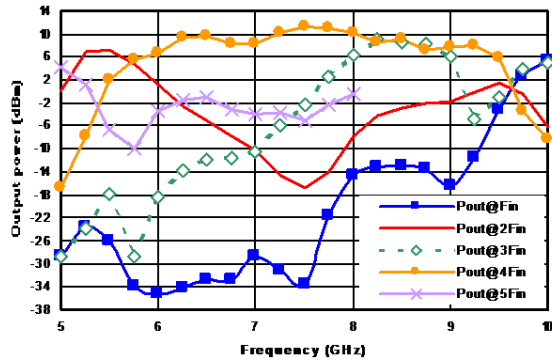
Typical Test Fixture Measurements

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

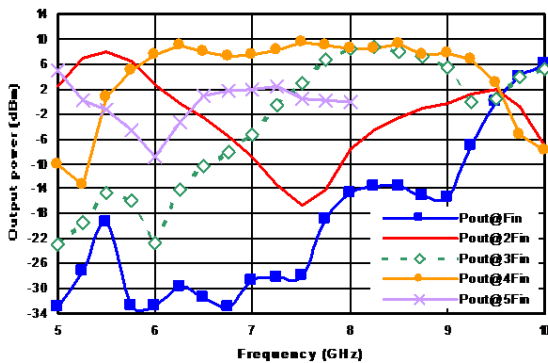
Gate voltage Vg1=Vg2=-0.8V Id=70mA



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



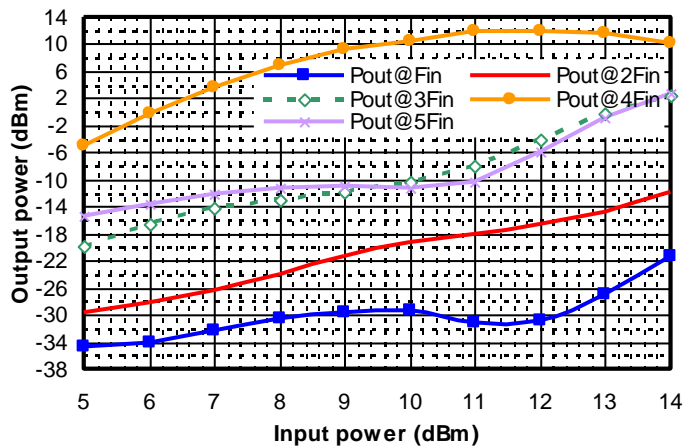
Gate voltage Vg1=Vg2=-1.1V Id=80mA



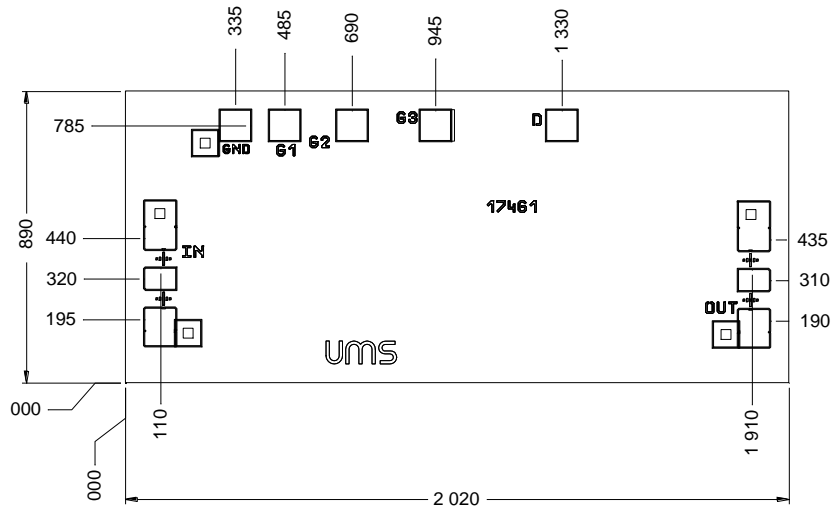
Tamb = +25°C & Bias conditions:

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)

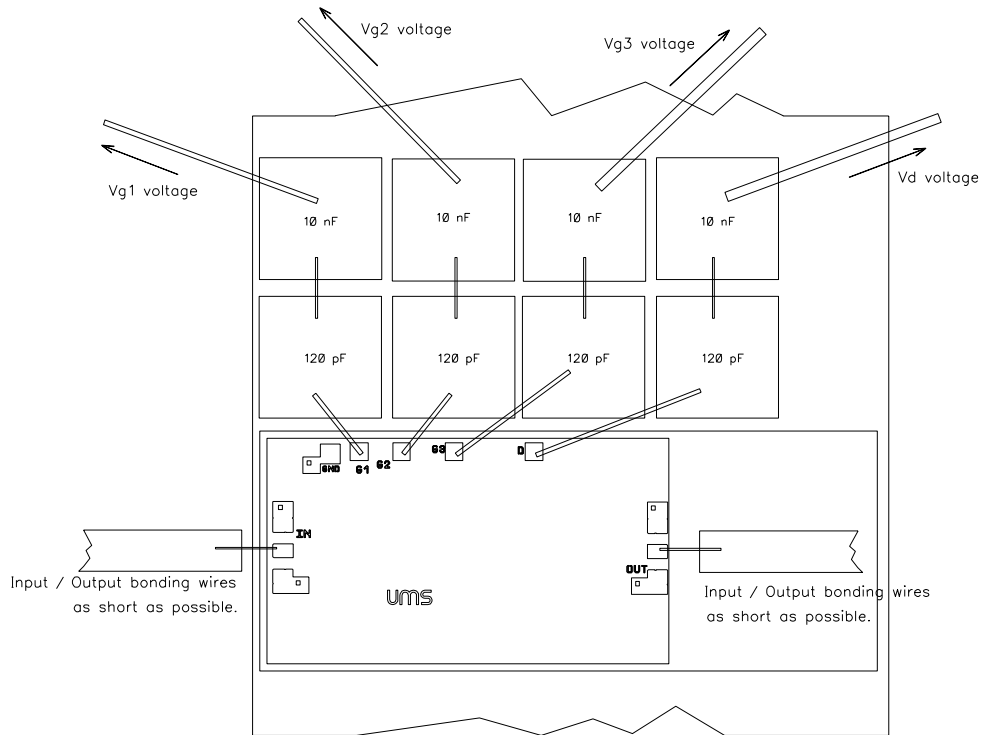


Mechanical data: Bonding pad positions.



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

Recommended assembly plan



25µm wedge bonding is preferred

Note: Supply feed should be bypassed. 25µm 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 $\text{RF Pin} = +12\text{dBm}$) |
| Vd | Vd | 120pF/10nF | Drain Supply |

Notes



Recommended ESD management

Refer to the application note AN0020 available at <http://www.ums-gaas.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 <http://www.ums-gaas.com>.

Ordering Information

Chip form:

CHX2095a99F/00

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