

C Band High Power Amplifier

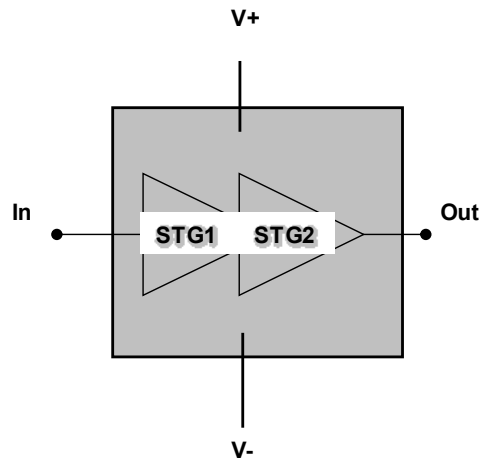
GaAs Monolithic Microwave IC

Description

CHA8012-99F is a monolithic two-stage GaAs High Power Amplifier (HPA) designed for C band applications. The HPA provides typically 12W of output power on the 5.2 to 6.0GHz frequency band associated with 43% of power added efficiency at 3dB gain compression. The small signal gain is 22dB. The overall power supply is of 8V/2.1A.

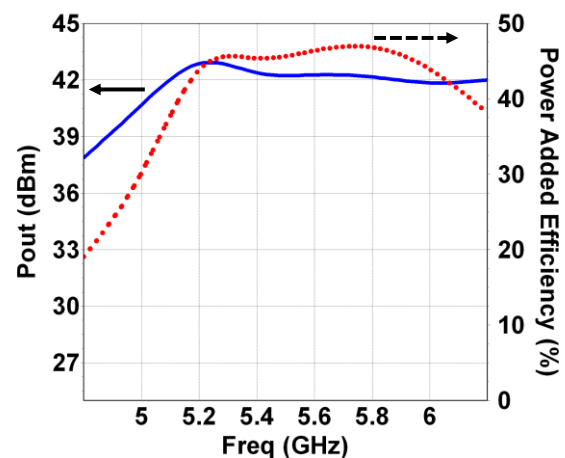
The circuit is dedicated to defense and space applications and is also well suited for a wide range of microwave and millimeter wave applications and systems.

This device is manufactured using 0.25µm Power pHEMT process, including via holes through the substrate and air bridges. It is available in chip form.



Main Features

- Broadband performances: 5.2-6GHz
- High output power: +41.5dBm
- High PAE: 43%
- Linear Gain: 22dB
- DC bias: Vd=8Volt @Id=2.1A
- Chip size 5.61x4.51x0.07mm



Main Electrical Characteristics

Tamb.= +25°C, Vd = +8V Idq=2.1A Pulsed mode (conditions: length=25µs Period=250µs)

Symbol	Parameter	Min	Typ	Max	Unit
Freq	Frequency range	5.2		6.0	GHz
Gain	Linear Gain		22		dB
P_3dBcomp	Output power @ 3dB compression		41.5		dBm
PAE_3dB	Power Added Efficiency @ 3dB comp.		43.0		%

Electrical Characteristics

Tamb.= +25°C, Vd = +8V Idq=2.1A Pulsed mode (conditions: length=25µs Period=250µs)

Symbol	Parameter	Min	Typ	Max	Unit
Freq	Frequency range	5.2		6.0	GHz
Gain	Linear Gain		22		dB
RLin	Input Return Loss		10		dB
RLout	Output Return Loss		10		dB
P_3dBcomp	Output power @ 3dBcomp		41.5		dBm
PAE_3dB	Power Added Efficiency @ 3dBcomp		43		%
Id_3dB	Supply drain current @ 3dBcomp		4.5		A
Vd1, Vd2	Drain supply voltage		8		V
Id	Supply quiescent current		2.1		A
Vg	Gate supply voltage		-1.4		V

A bonding wire of typically 0.3nH on input and output RF port is recommended.

Absolute Maximum Ratings ⁽¹⁾

Tamb= +25°C

Symbol	Parameter	Values	Unit
Vd	Drain bias voltage	9.5V	V
Id	Drain bias current	4	A
Vg	Gate bias voltage	-5 to -0.6	V
Pin	Maximum peak input power overdrive	+26	dBm
Tj	Junction temperature	175	°C
Ta	Operating temperature range	-40 to +85	°C
Tstg	Storage temperature range	-55 to +155	°C

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

Typical Bias Conditions

Tamb= +25°C

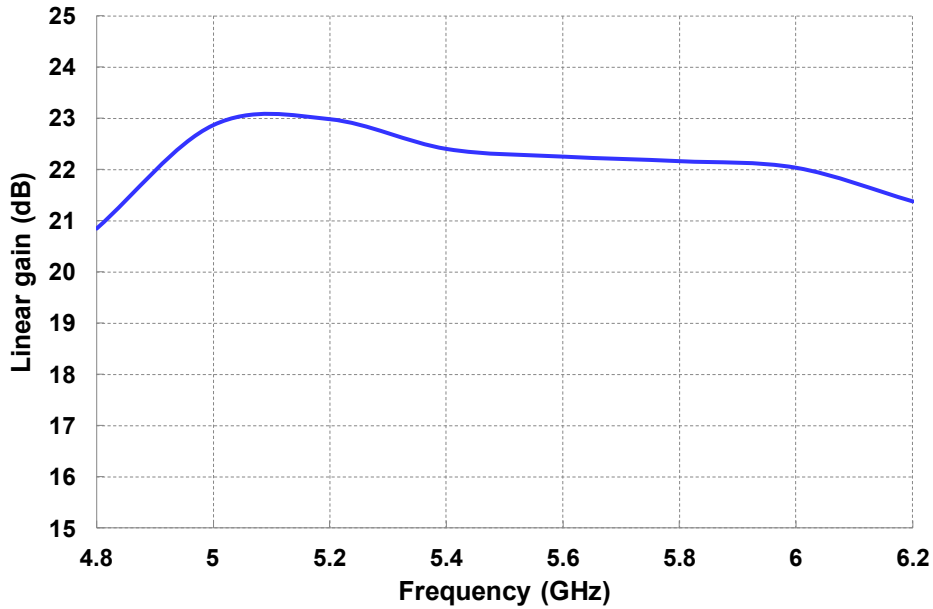
Symbol	Pad N°	Parameter	Values	Unit
Vd	7, 11, 15, 19	Drain Supply Voltage	8	V
Vg	6, 20	Gate Supply Voltage	-1.4	V

Typical Board Measurements

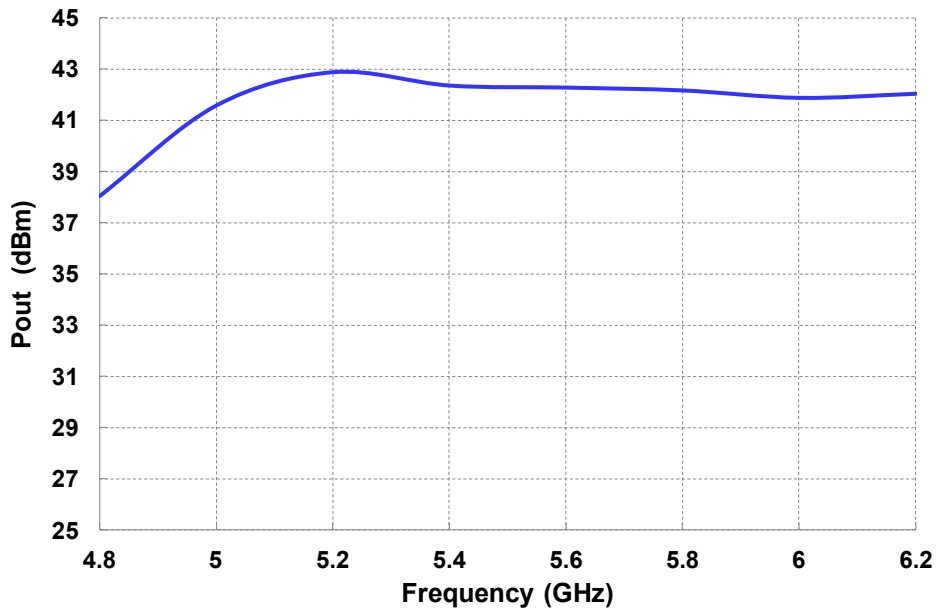
Tamb.= +25°C, Vd = +8V, Idq = 2.1A Pulsed mode

Pulse conditions: Pulse length=25µs Period=250µs

Linear Gain versus Frequency



Pout @ 3dBcomp versus Frequency

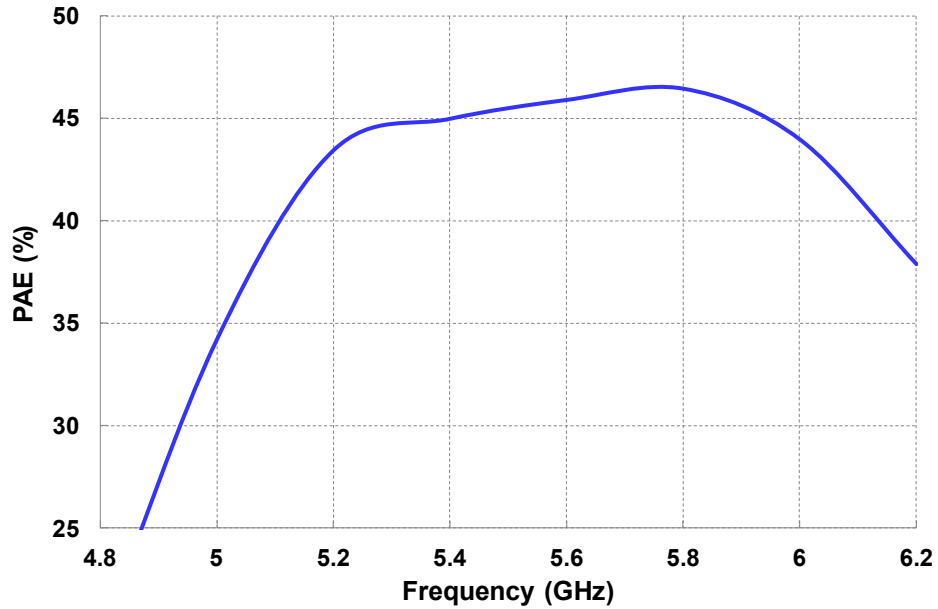


Typical Board Measurements

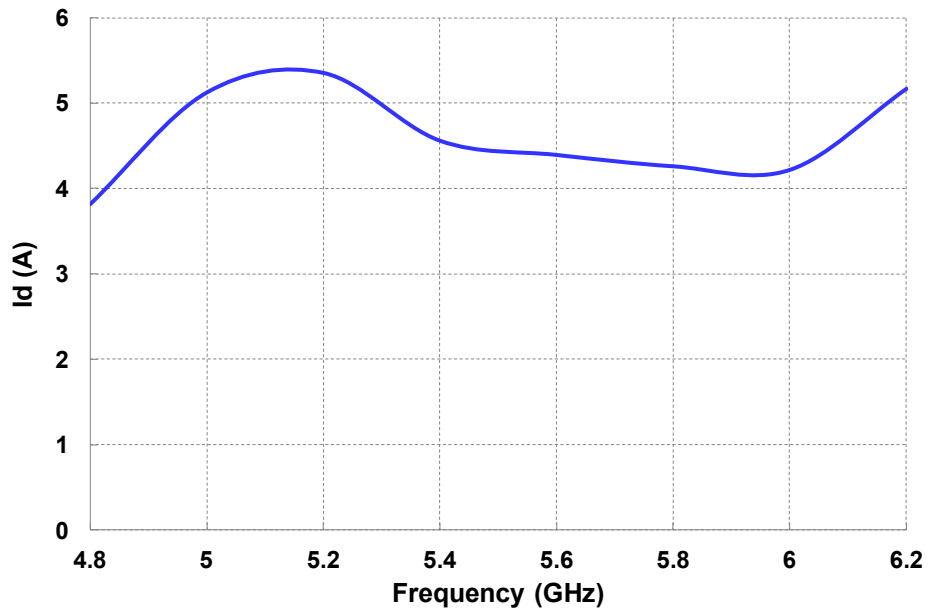
Tamb.= +25°C, Vd = +8V, Idq = 2.1A Pulsed mode

Pulse conditions: Pulse length=25µs Period=250µs

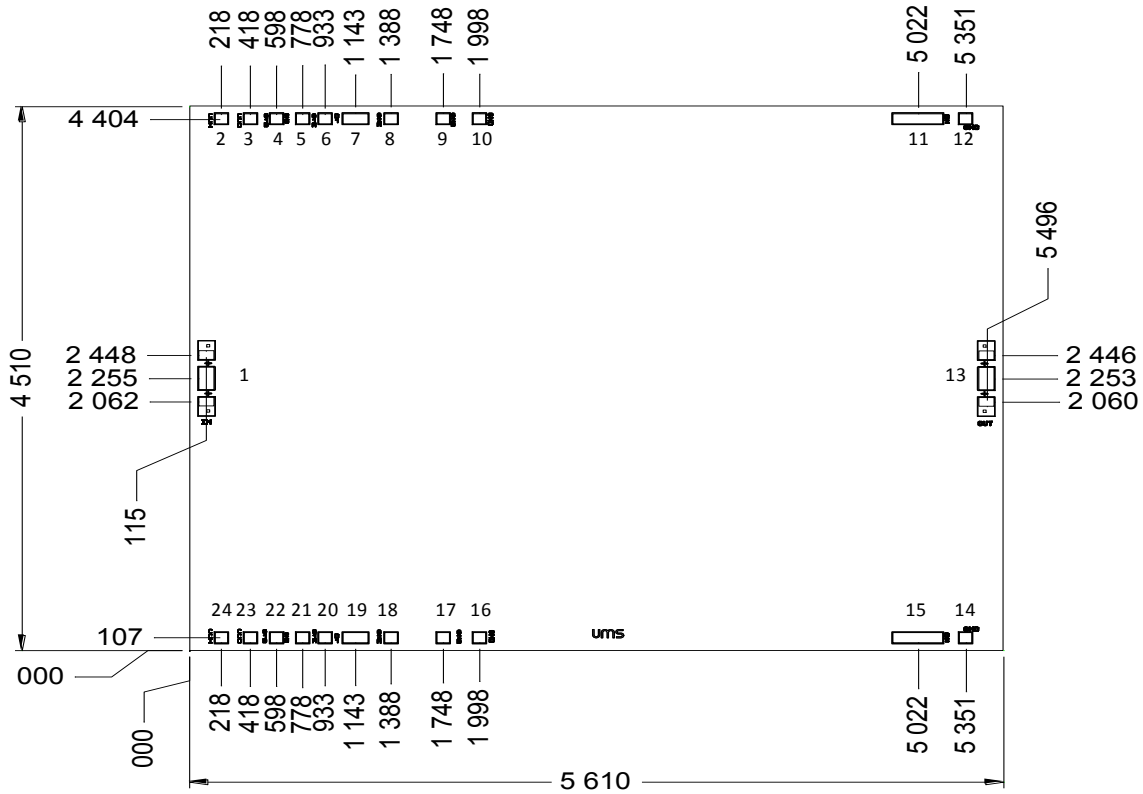
PAE @ 3dBcomp versus Frequency



Id @ 3dBcomp versus Frequency



Mechanical Data

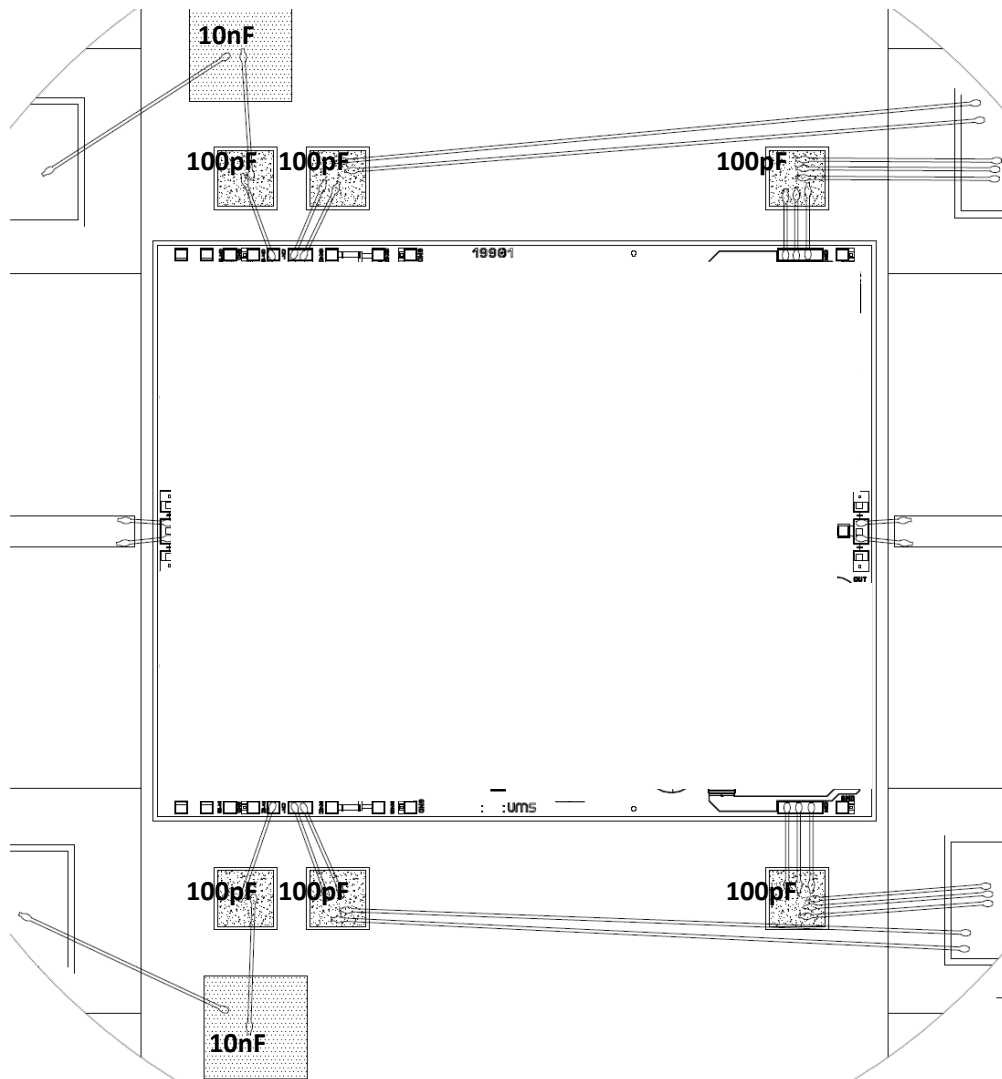


Chip thickness: 70μm
 Chip size: 5610x4510 ±35μm
 All dimensions are in micrometers

- RF pad (1 and 13) size= 120x200μm²
- DC pad (2-6, 8-10, 12, 14, 16-18 and 20-24) size= 100x100μm²
- DC pad (7 and 19) size= 185x100μm²
- DC pad (11 and 15) size= 360x100μm²

Pin number	Pin name	Description
1	IN	RF input
6, 20	G1A	Vg1& Vg2
7, 19	D1	Vd1
11, 15	D2	Vd2
5, 10, 12, 14, 16, 21	Gnd	Not connected
2, 3, 4, 8, 9, 17, 18, 22, 23, 24		Not connected
13	OUT	RF output

Recommended Assembly Plan



Note: 25µm-diameter gold wire and 25µm-wedge bonding are preferred.

Recommended Circuit Bonding Table

Label	Type	Decoupling	Comment
D1, D2	Vd	100pF	Drain Supply
G1A	Vg	100pF & 10nF	Gate Supply
IN	Input RF	N/A	Inductance~0.3nH (two golden bonding wires with ~700µm length and 25µm diameter)
OUT	Output RF	N/A	Inductance~0.3nH (two golden bonding wires with ~700µm length and 25µm diameter)

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:

CHA8012-99F/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.**