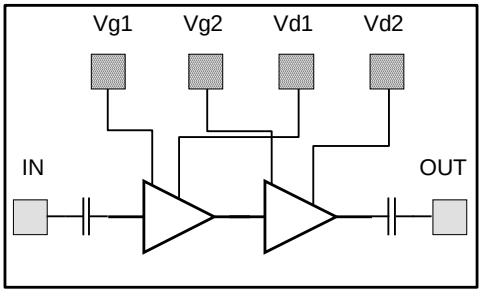
2-18GHz Low Noise Amplifier

GaAs Monolithic Microwave IC

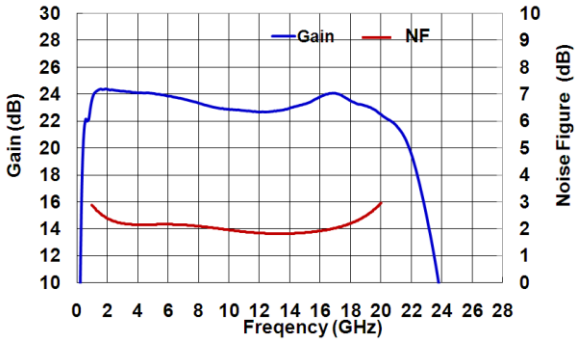
Description

The CHA3218-99F is a two stage very wide band Low Noise Amplifier.
The wide frequency band associated to a 2dB low noise figure makes this circuit very versatile for very high performance systems.
It is designed for a wide range of applications, from military to commercial communication systems.
The circuit is manufactured with a pHEMT process, 0.15µm gate length, via holes through the substrate, air bridges and electron beam gate lithography.
It is available in chip form.



Main Features

- Broadband performances: 2-18GHz
- Noise figure : 2dB
- Output power: 15dBm @ 1dBcomp
- Linear gain: 24dB
- High linearity: 25dBm
- Quiescent bias point: Vd=4V, Id=120mA
- Chip size 3.07x1.57x0.1mm



Main Electrical Characteristics

Tamb.= +25°C

Symbol	Parameter	Min	Typ	Max	Unit
Freq	Frequency range	2		18	GHz
Gain	Linear Gain		24		dB
NF	Noise Figure		2		dB
Pout	Output Power @1dB comp.		15		dBm

United Monolithic Semiconductors S.A.S.
Route Départementale 128 - BP46 - 91401 Orsay Cedex France
Tel.: +33 (0) 1 69 33 03 08 - Fax: +33 (0) 1 69 33 03 09

Electrical Characteristics

Tamb.= +25°C, Vd = +4V

Symbol	Parameter	Min	Typ	Max	Unit
Freq	Operating frequency	2		18	GHz
G	Small Signal Gain		24		dB
S11	Input Return Loss from 2GHz to 16GHz Input Return Loss from 16GHz to 18GHz		8 4		dB
S22	Output Return Loss		12		dB
NF	Noise Figure		2		dB
P1dB	Output power at 1dB gain compression		15		dBm
OIP3	Output 3rd order intercept point		25		dBm
Vd	Positive supply voltage		4		V
Vg	Negative supply voltage		-0.45V		V
Id	Positive supply DC current		120		mA

These values are representative of measurements made in test fixture that are made with bonding wires at the RF ports.

Route Départementale 128, BP46 - 91401 ORSAY Cedex - FRANCE
Tel.: +33 (0) 1 69 33 03 08 - Fax: +33 (0) 1 69 33 03 09

united monolithic semiconductors

Absolute Maximum Ratings (1)

Tamb.= +25°C

Symbol	Parameter	Values	Unit
Vd	Drain bias voltage	6V	V
Id	Drain bias current	200	mA
Vg	Gate bias voltage	-2 to -0.3	V
Tj	Junction temperature (2)	175	°C
Ta	Operating temperature range	-40 to +85	°C
Tstg	Storage temperature range	-55 to +150	°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	VD1, VD2	Drain supply voltage	4	V
Vg	VG1, VG2	Gate supply voltage	-0.45	V

Route Départementale 128, BP46 - 91401 ORSAY Cedex - FRANCE
Tel.: +33 (0) 1 69 33 03 08 - Fax: +33 (0) 1 69 33 03 09

Typical on-wafer Sij parameters

Tamb.= +25°C, Vd = +4.0V, Id = 120mA

Freq (GHz)	S11 (dB)	PhS11 (°)	S12 (dB)	PhS12 (°)	S21 (dB)	PhS21 (°)	S22 (dB)	PhS22 (°)
1.0	-6.54	-68.84	-66.51	120.80	20.22	9.61	-10.57	-165.20
1.5	-8.65	-90.41	-69.52	59.25	23.39	-18.22	-12.10	150.90
2.0	-8.98	-101.30	-66.71	-70.17	24.52	-44.21	-13.55	114.90
2.5	-8.81	-111.50	-66.45	-6.78	24.62	-67.98	-14.29	98.03
3.0	-8.84	-121.30	-63.63	31.22	24.81	-90.89	-15.82	82.15
3.5	-8.62	-130.40	-76.10	35.29	24.79	-110.50	-15.54	69.41
4.0	-8.41	-138.90	-82.38	120.20	24.83	-129.90	-15.35	54.40
4.5	-8.34	-146.60	-69.61	170.60	24.85	-149.10	-15.29	43.06
5.0	-8.15	-152.90	-80.83	-158.00	24.88	-167.80	-15.14	31.56
5.5	-8.01	-160.10	-70.41	-142.20	24.93	173.20	-15.48	17.93
6.0	-7.93	-166.70	-76.72	-100.20	24.90	154.10	-15.44	9.39
6.5	-7.88	-173.60	-66.20	-167.50	24.90	135.30	-15.84	1.16
7.0	-7.83	179.50	-74.37	141.10	24.86	116.40	-16.10	-8.84
7.5	-7.77	172.40	-68.59	83.30	24.80	97.70	-16.15	-13.36
8.0	-7.81	164.70	-61.56	22.11	24.76	78.88	-16.93	-19.65
8.5	-7.93	156.50	-74.50	-79.14	24.68	59.95	-17.15	-26.74
9.0	-8.14	148.10	-60.72	13.83	24.58	41.21	-17.41	-28.81
9.5	-8.45	138.90	-61.33	-160.50	24.50	22.53	-17.58	-28.73
10.0	-8.78	129.40	-57.71	61.63	24.40	3.86	-17.91	-30.03
10.5	-9.20	119.60	-66.95	135.60	24.32	-14.76	-17.34	-30.37
11.0	-9.69	109.00	-67.69	-46.82	24.24	-33.33	-17.57	-24.55
11.5	-10.20	98.09	-56.04	116.50	24.17	-51.94	-17.25	-32.41
12.0	-10.67	86.43	-63.65	139.60	24.14	-70.65	-16.07	-28.71
12.5	-10.97	73.94	-63.23	87.11	24.16	-89.46	-16.07	-26.83
13.0	-10.98	61.87	-69.79	-23.20	24.17	-108.70	-15.26	-31.21
13.5	-10.85	49.90	-58.09	26.48	24.25	-128.30	-14.55	-31.53
14.0	-10.26	36.84	-60.33	-45.50	24.32	-148.50	-13.76	-35.57
14.5	-9.52	25.18	-56.67	87.72	24.39	-169.30	-12.82	-38.97
15.0	-8.66	13.53	-56.17	82.83	24.40	169.50	-12.14	-43.52
15.5	-7.37	1.83	-55.80	131.80	24.40	147.50	-11.62	-47.52
16.0	-6.31	-9.73	-68.50	-19.80	24.29	125.20	-10.99	-50.85
16.5	-5.12	-19.29	-54.25	141.00	24.17	102.50	-10.17	-56.71
17.0	-4.21	-30.54	-52.76	-4.26	23.98	79.88	-9.57	-59.52
17.5	-3.42	-40.79	-49.86	-28.50	23.81	56.73	-9.61	-67.15
18.0	-2.70	-50.34	-55.04	163.50	23.55	33.18	-9.34	-75.01
18.5	-2.01	-59.27	-57.27	-112.00	23.28	8.48	-9.76	-77.78
19.0	-1.40	-67.90	-55.13	-111.50	22.96	-17.05	-10.46	-80.96
19.5	-0.89	-76.81	-59.46	52.25	22.21	-40.98	-9.23	-78.01
20.0	-0.44	-84.70	-47.07	-60.90	21.91	-60.36	-8.24	-93.21

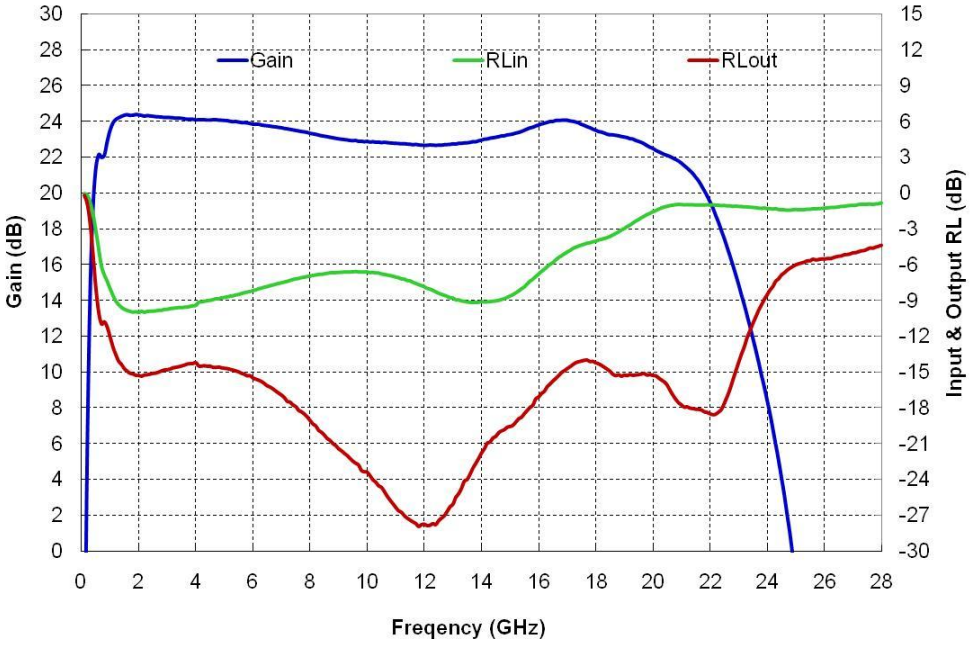
Route Départementale 128, BP46 - 91401 ORSAY Cedex - FRANCE
Tel.: +33 (0) 1 69 33 03 08 - Fax: +33 (0) 1 69 33 03 09

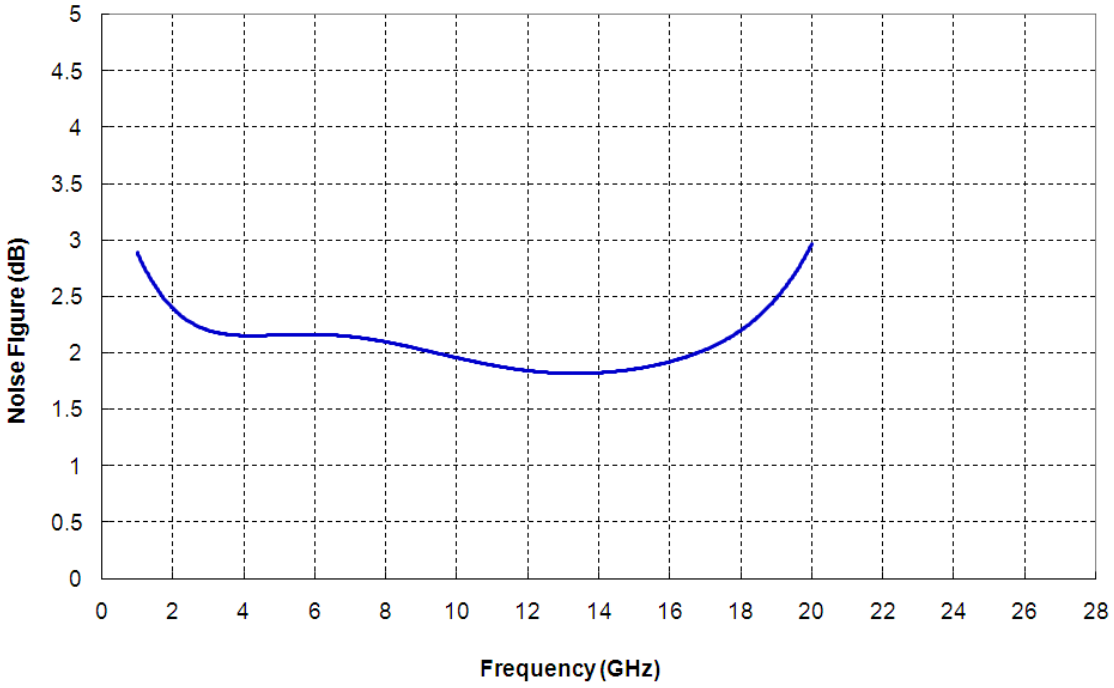
united monolithic semiconductors

Typical Board Measurements

Tamb.= +25°C, Vd = +4V, Id = 120mA

[S] parameters & Noise Figure





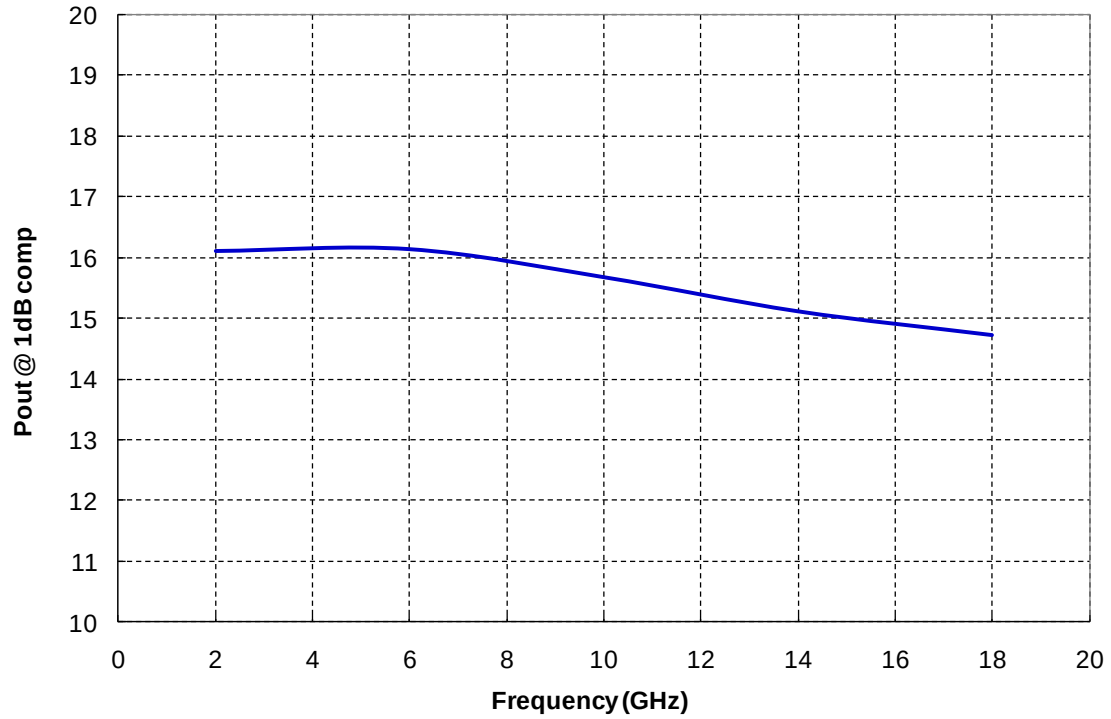
Route Départementale 128, BP46 - 91401 ORSAY Cedex - FRANCE
Tel.: +33 (0) 1 69 33 03 08 - Fax: +33 (0) 1 69 33 03 09

united monolithic semiconductors

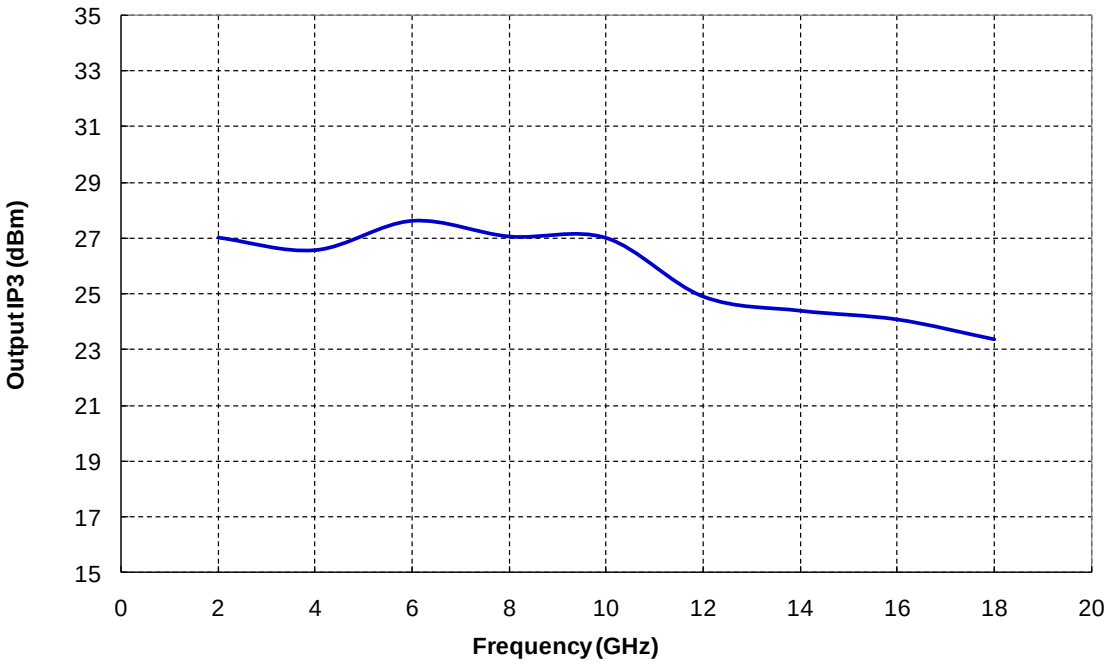
Typical Board Measurements

Tamb.= +25°C, Vd = +4V, Id = 120mA

Output Power @ 1dBcomp versus Frequency



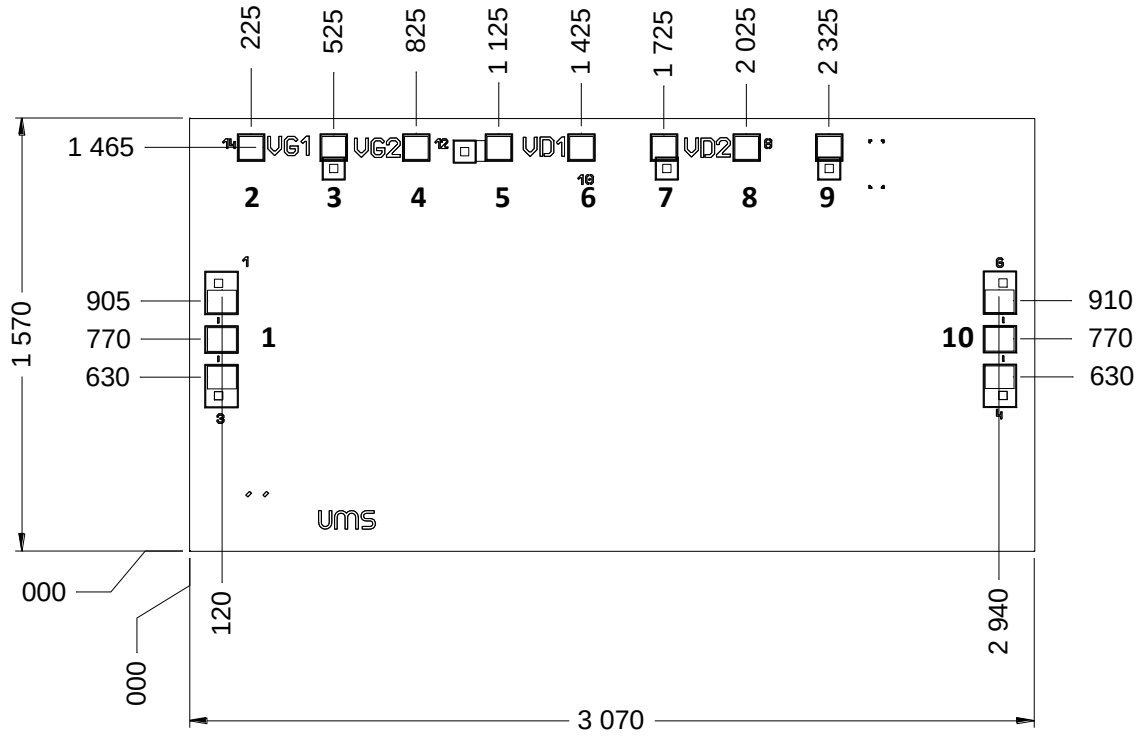
Output Power IP3 versus Frequency



Route Départementale 128, BP46 - 91401 ORSAY Cedex - FRANCE
Tel.: +33 (0) 1 69 33 03 08 - Fax: +33 (0) 1 69 33 03 09

united monolithic semiconductors

Mechanical data



Chip thickness: 100µm.
Chip size: 3070x1570 ±35µm
All dimensions are in micrometers

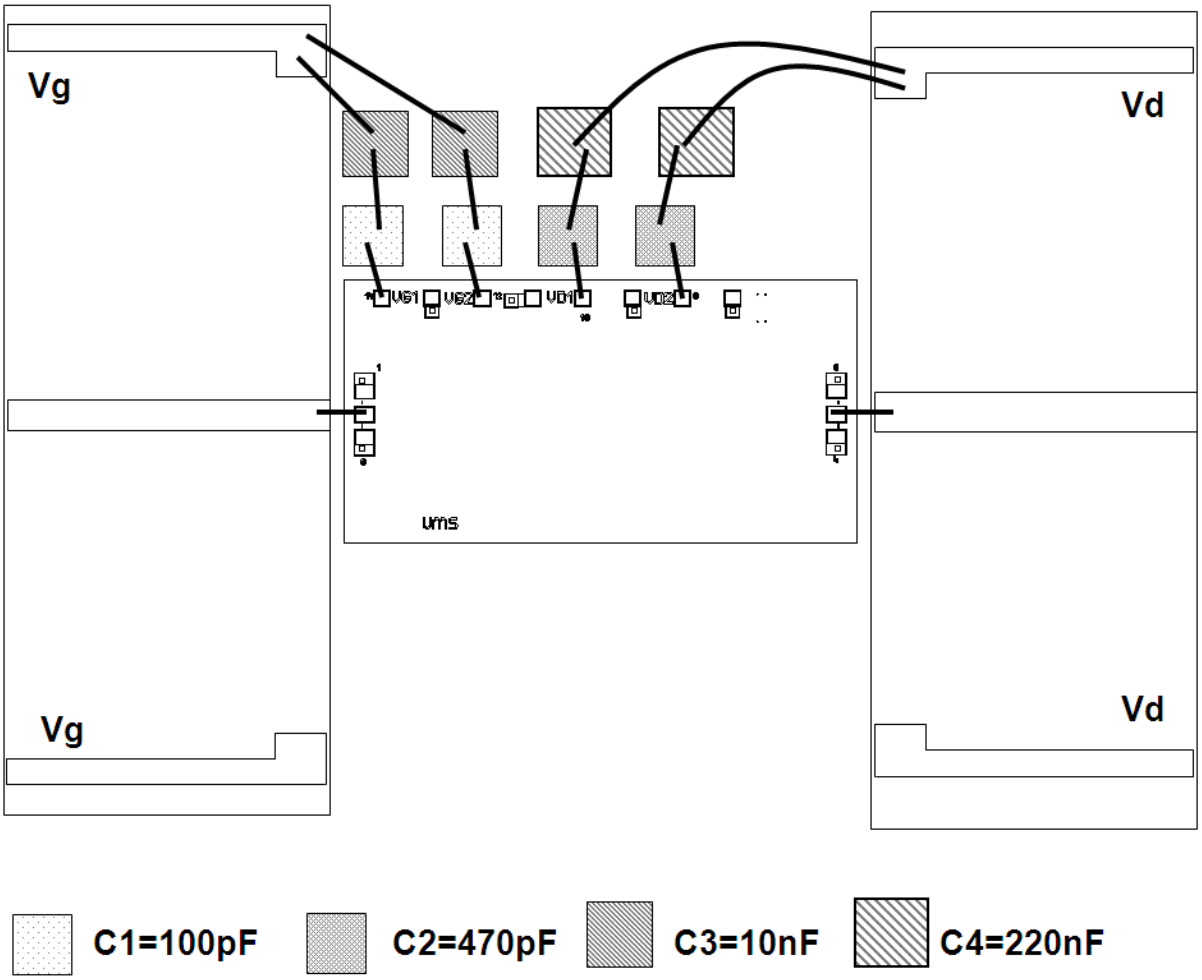
RF pads (1, 10) = 100 x 122µm²
DC pads (2, 4, 6, 8) = 100 x 100µm²

Pin number	Pin name	Description
1	IN	Input RF
2, 4,	VG1, VG2	Gate supply voltage
6, 8	VD1, VD2	Drain supply voltage
3, 5, 7, 9	GND	Ground (no bonding required)
10	OUT	Output RF

Route Départementale 128, BP46 - 91401 ORSAY Cedex - FRANCE
Tel.: +33 (0) 1 69 33 03 08 - Fax: +33 (0) 1 69 33 03 09

united monolithic semiconductors

Recommended assembly plan



25µm wedge bonding is preferred

Recommended circuit bonding table

Label	Type	Decoupling	Comment
VD1, VD2	Vd	470pF & 220nF	Drain supply voltage
VG1, VG2	Vg	100pF & 10nF	Gate supply voltage

Route Départementale 128, BP46 - 91401 ORSAY Cedex - FRANCE
Tel.: +33 (0) 1 69 33 03 08 - Fax: +33 (0) 1 69 33 03 09

united monolithic semiconductors

Notes

Route Départementale 128, BP46 - 91401 ORSAY Cedex - FRANCE
Tel.: +33 (0) 1 69 33 03 08 - Fax: +33 (0) 1 69 33 03 09

united monolithic semiconductors

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.

Ordering Information

Chip form:	CHA3218-99F/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.**

Route Départementale 128, BP46 - 91401 ORSAY Cedex - FRANCE
Tel.: +33 (0) 1 69 33 03 08 - Fax: +33 (0) 1 69 33 03 09