

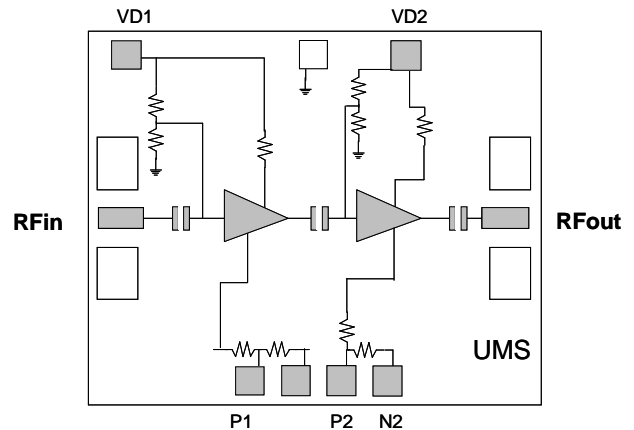
6-17GHz Low Noise Amplifier

GaAs Monolithic Microwave IC

Description

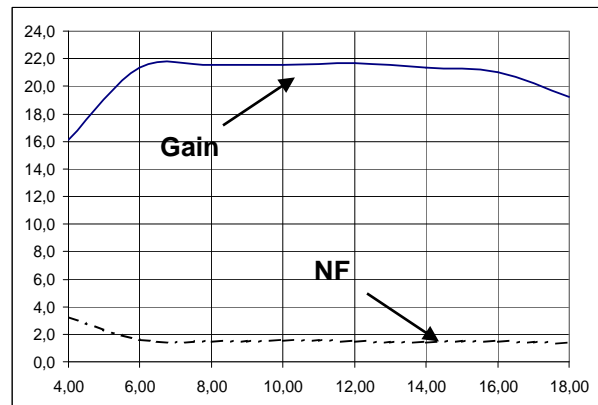
The CHA3666 is a two-stage self biased wide band monolithic low noise amplifier.

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



Main Features

- Broadband performance 6-17GHz
- 1.8dB noise figure
- 26dBm 3rd order intercept point
- 17dBm power at 1dB compression
- 21dB gain
- Low DC power consumption



Main Characteristics

Temp = +25°C, Vd1=Vd2= +4V Pads: P1, N2=GND

Symbol	Parameter	Min	Typ	Max	Unit
NF	Noise figure		1.8	2	dB
G	Gain	19	21		dB
IP3	3rd order intercept point		26		dBm

ESD Protections: Electrostatic discharge sensitive device observe handling precautions!

Electrical Characteristics

Temp = +25°C, Pads: P1, N2 = GND (1)

Symbol	Parameter	Min	Typ	Max	Unit
Fop	Operating frequency range	6		17	GHz
G	Gain (2)	19	21		dB
ΔG	Gain flatness		± 0.5		dB
NF	Noise figure (2)		1.8	2	dB
IS11I	Input return loss (2)		2.5:1	2.7:1	dB
IS22I	Output return loss (2)		2.0:1	2.2:1	dB
IP3	3rd order intercept point (2)		26		dBm
P1dB	Output power at 1dB gain comp.(2) (3)	15	17		dBm
Vd	Drain bias voltage		4		V
Id	Drain bias current	60	80	100	mA

(1) The other pads are not connected

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

(3) P1dB can be increased (+0.5dBm) when P1 & P2 are connected and N2 non-connected. In this case Id is typically 85mA

Absolute Maximum Ratings (1)

Temp = +25°C

Symbol	Parameter	Values	Unit
Vd	Drain bias voltage	4.5	V
Pin	RF input power	10	dBm
Top	Operating temperature range (chip backside)	-40 to +85	°C
Tj	Junction temperature	175	°C
Tstg	Storage temperature range	-55 to +125	°C

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

Typical Scattering Parameters (On wafer Sij measurements)

Bias Conditions : Vd1=Vd2= +4V Pads: P1, N2 = GND.

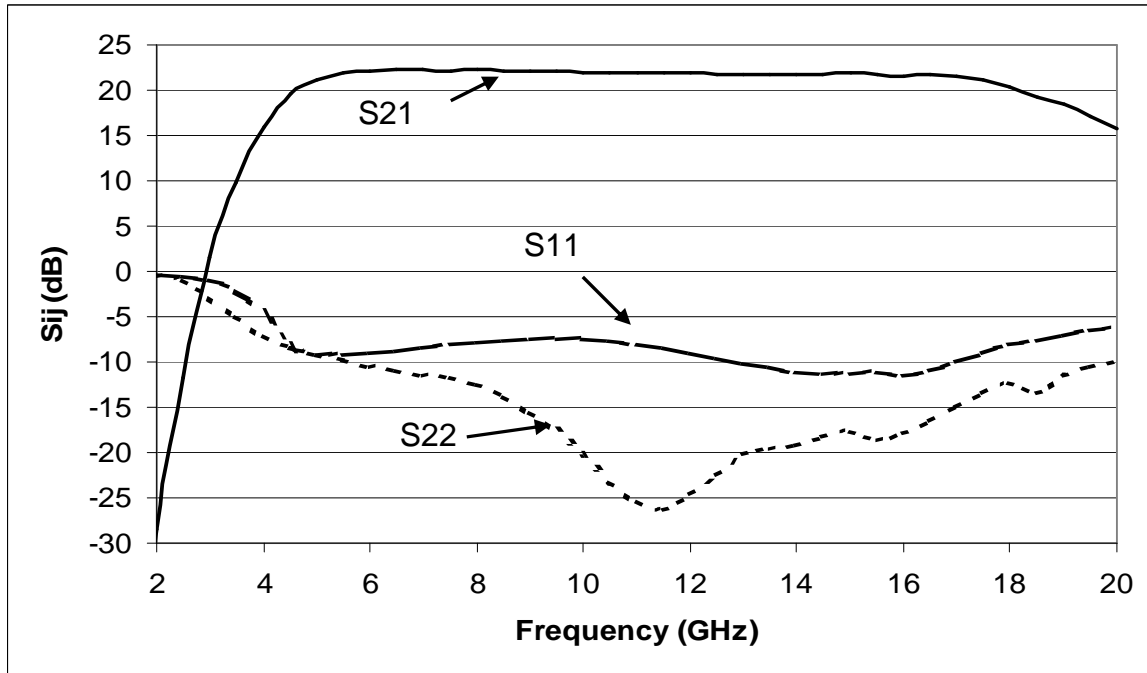
Freq GHZ	dBS11 dB	PhS11 °	dBS12 dB	PhS12 °	dBS21 dB	PhS21 °	dBS22 dB	PhS22 °
0,5	-0,12	-12,41	-58,07	-75,30	-55,39	74,95	-0,16	-11,79
1,0	-0,15	-25,18	-66,93	158,40	-59,74	86,43	-0,19	-23,89
1,5	-0,21	-38,83	-68,19	-42,37	-55,53	-2,66	-0,26	-37,09
2,0	-0,31	-54,17	-70,23	132,40	-28,46	25,79	-0,62	-51,84
2,5	-0,53	-72,61	-66,09	-174,80	-11,74	2,26	-1,03	-68,34
3,0	-0,99	-96,30	-58,45	112,50	1,55	-54,65	-2,92	-84,65
3,5	-2,07	-129,20	-57,93	51,75	9,78	-105,90	-5,03	-92,78
4,0	-4,44	179,00	-53,52	-50,92	15,92	-157,20	-7,10	-98,70
4,5	-8,15	104,20	-48,40	-119,10	19,62	149,90	-8,51	-98,52
5,0	-9,23	35,18	-45,69	-159,90	21,13	103,90	-9,15	-100,90
5,5	-9,21	-2,42	-43,80	169,70	21,84	65,87	-9,80	-104,20
6,0	-9,07	-20,75	-42,66	145,70	22,14	34,89	-10,53	-107,90
6,5	-8,93	-30,17	-40,68	125,10	22,22	6,85	-10,91	-113,20
7,0	-8,37	-38,97	-40,46	107,20	22,22	-17,33	-11,49	-119,50
7,5	-7,99	-47,52	-39,16	88,92	22,19	-39,18	-11,76	-128,70
8,0	-7,87	-56,29	-38,17	75,16	22,23	-59,70	-12,47	-141,30
8,5	-7,75	-63,59	-38,58	62,12	22,19	-79,40	-13,87	-154,90
9,0	-7,54	-71,38	-37,51	42,64	22,08	-97,96	-15,57	-168,10
9,5	-7,50	-79,76	-37,26	36,06	22,03	-115,30	-17,57	176,80
10,0	-7,55	-88,86	-36,90	26,77	21,97	-132,00	-20,19	157,60
10,5	-7,77	-97,01	-36,76	12,22	21,93	-148,40	-23,18	132,40
11,0	-8,11	-105,90	-36,05	-1,08	21,90	-164,10	-25,38	96,42
11,5	-8,53	-114,50	-35,65	-13,41	21,88	-179,90	-26,39	54,20
12,0	-8,98	-122,60	-35,55	-24,05	21,86	164,70	-24,69	16,73
12,5	-9,62	-130,10	-35,31	-35,87	21,82	149,40	-22,43	-8,28
13,0	-10,22	-135,40	-35,13	-50,20	21,75	134,30	-20,23	-25,56
13,5	-10,60	-143,40	-35,13	-60,43	21,72	119,10	-19,67	-36,11
14,0	-11,07	-153,70	-34,80	-76,43	21,74	104,00	-19,22	-45,27
14,5	-11,34	-160,80	-34,90	-81,33	21,73	88,96	-18,20	-51,93
15,0	-11,28	-175,20	-36,47	-95,20	21,84	73,08	-17,69	-63,45
15,5	-11,14	164,00	-36,88	-112,40	21,64	55,53	-18,61	-77,33
16,0	-11,46	146,10	-37,33	-119,70	21,52	41,16	-17,96	-72,90
16,5	-10,91	125,00	-38,29	-129,70	21,68	24,37	-16,63	-75,48
17,0	-10,01	100,10	-38,86	-155,40	21,60	5,25	-14,95	-83,86
17,5	-9,02	72,69	-41,04	-161,40	21,15	-14,81	-13,51	-102,40
18,0	-8,00	45,92	-42,41	-173,60	20,44	-35,47	-12,40	-120,70
18,5	-7,75	21,28	-45,21	-161,70	19,26	-51,39	-13,47	-130,90
19,0	-7,02	0,74	-47,61	-177,80	18,39	-69,18	-11,57	-142,30
19,5	-6,59	-18,52	-50,99	-127,80	17,14	-86,07	-10,58	-160,60
20,0	-6,38	-35,21	-45,57	-104,20	15,75	-101,50	-9,99	-176,80

Typical on wafer Measured Performance

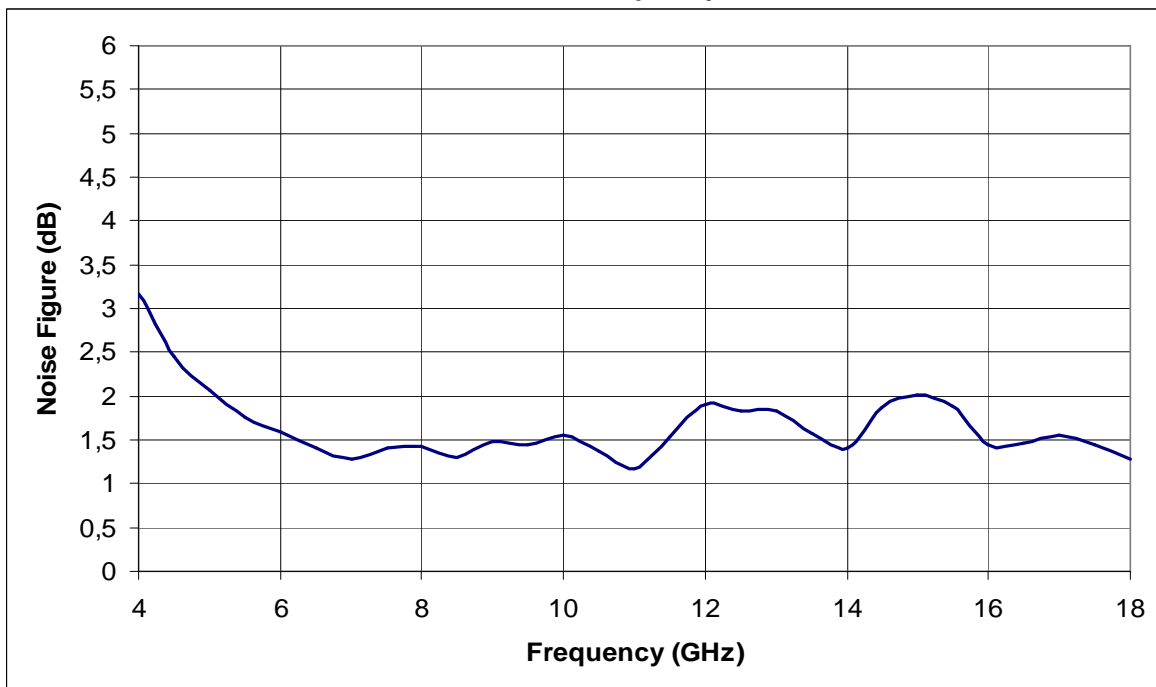
Temp = +25°C

Vd1=Vd2= +4V - Pads: P1, N2 = GND - Id=80mA Typical
 Measurements on wafer (without bonding wires at the RF ports)

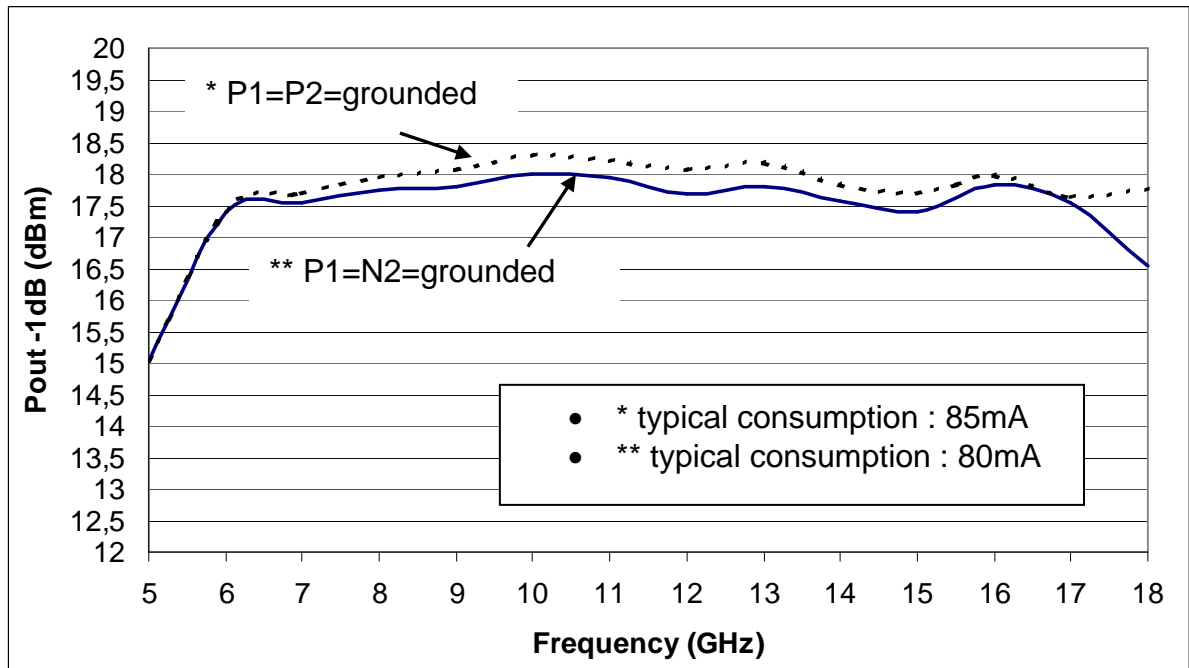
S parameters versus frequency

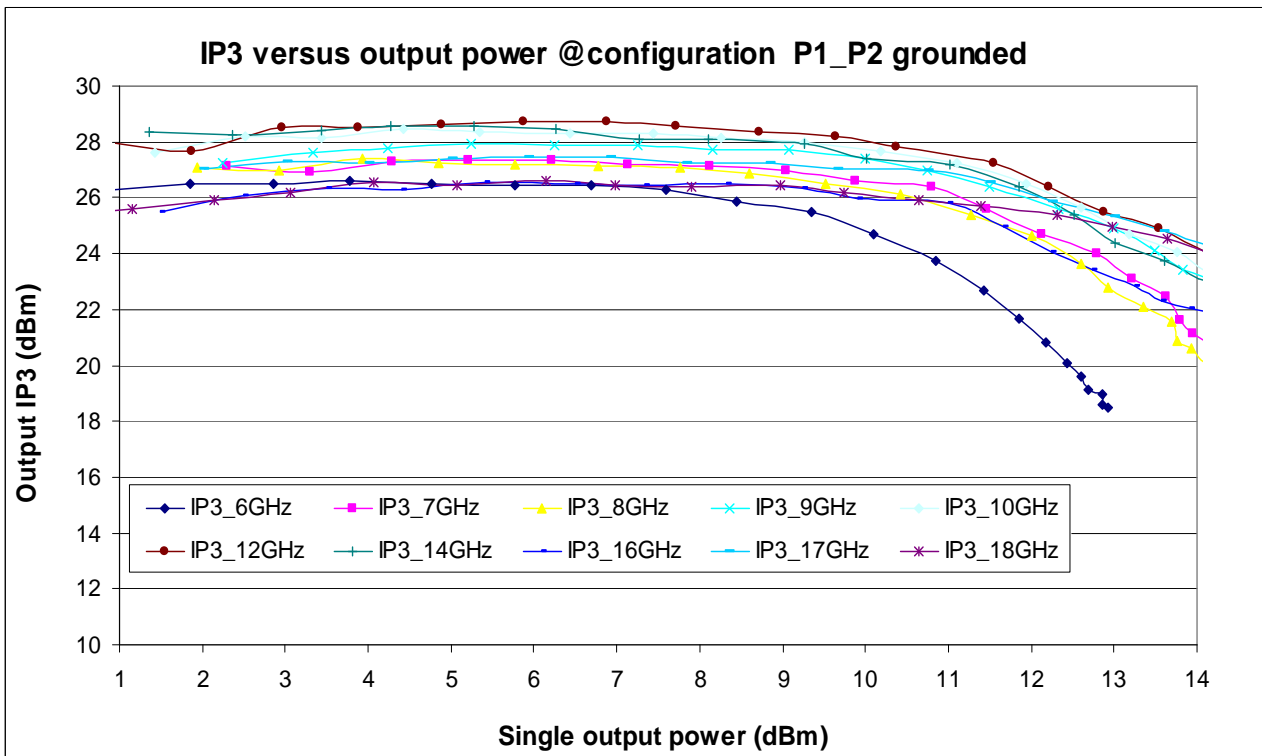
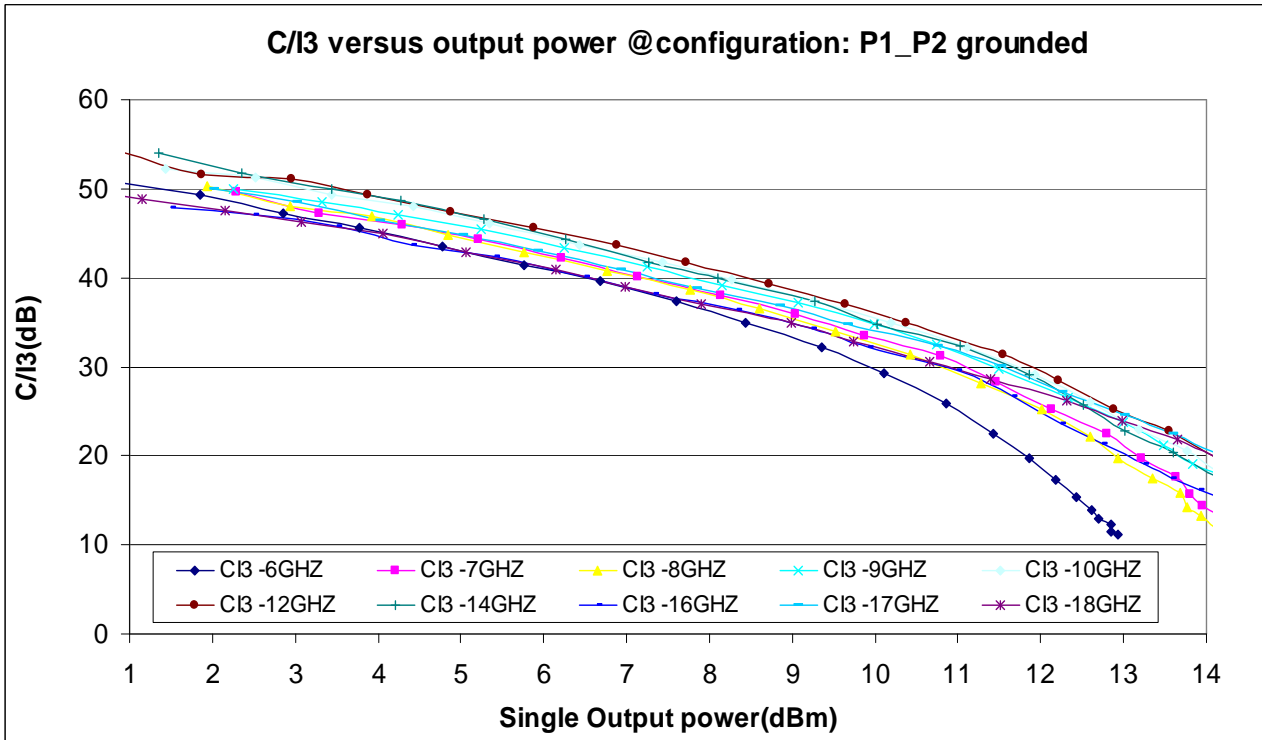


NF versus frequency

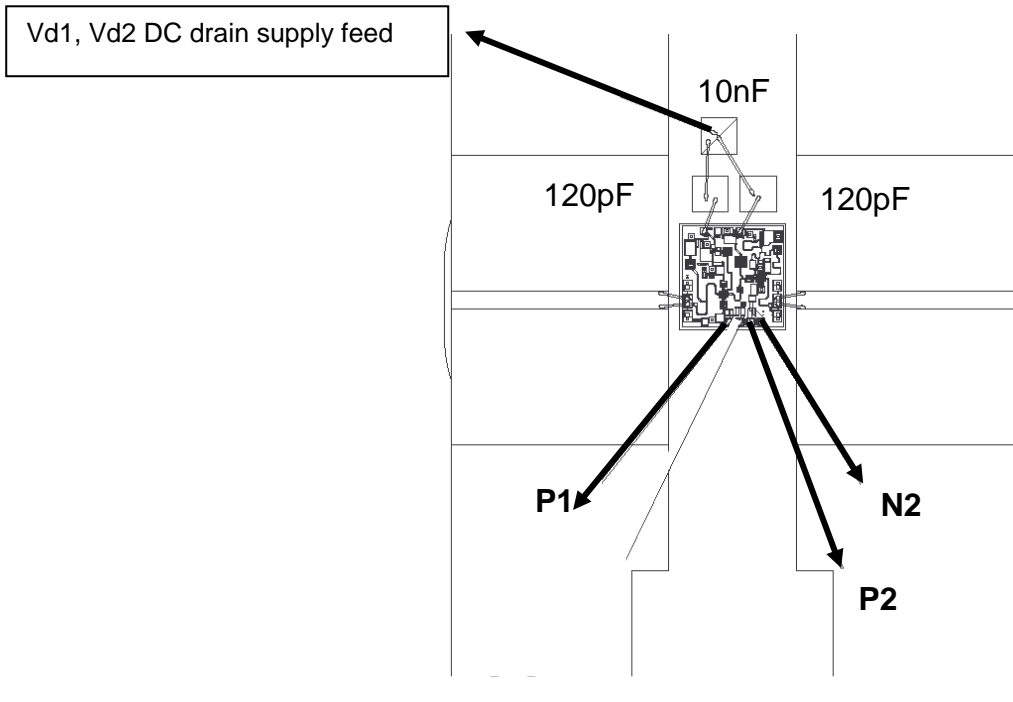


Output power at 1dB compression gain versus frequency



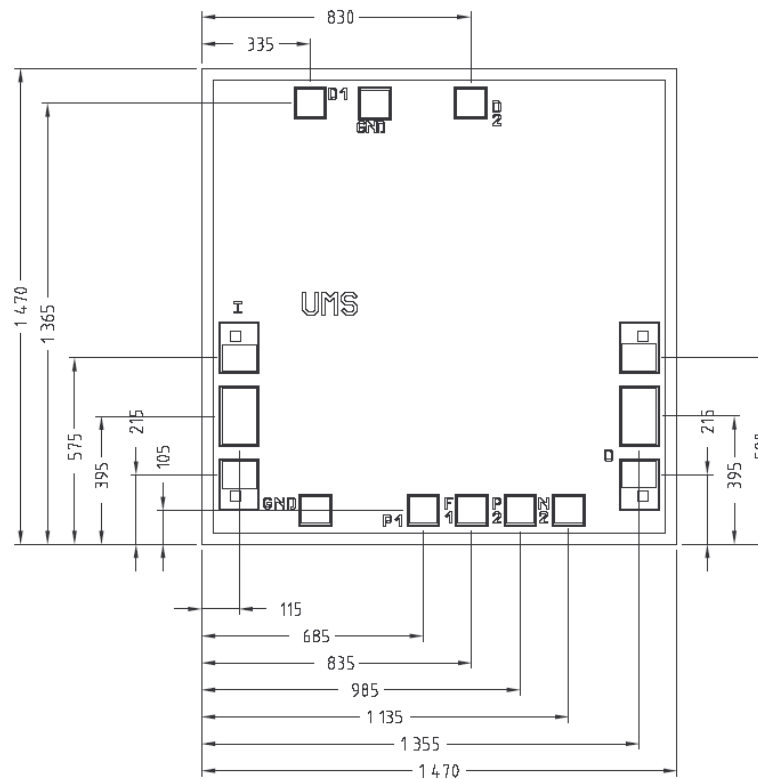


Chip Assembly and Mechanical Data



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

Bonding pad position

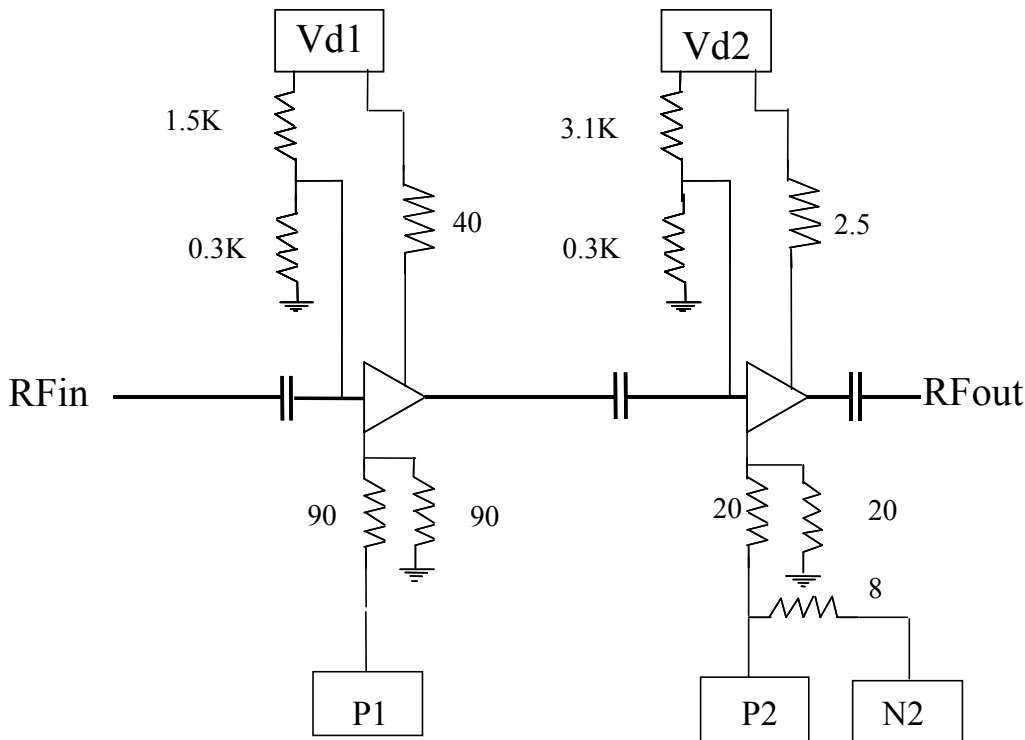


UNITS : µm
Tol : ±35µm

DC Pads size: 100/100µm, Chip thickness: 100µm

Chip Biasing options

This chip is self-biased, and flexibility is provided by the access to number of pads. The internal DC electrical schematic is given in order to use these pads in a safe way.



Two standard biasing:

Low Noise and low consumption:

Vd1=Vd2 = 4V and P1, N2 grounded.
P2 pads non connected (NC).
Idd = 80mA & Pout-1dB = 17dBm Typical.

Low Noise and higher output power

Vd1=Vd2 = 4V and P1, P2 grounded.
N2 pads non connected (NC).
Idd = 85mA & Pout-1dB = 17.5dBm Typical.

Ordering Information

Chip form: CHA3666-99F/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.**