

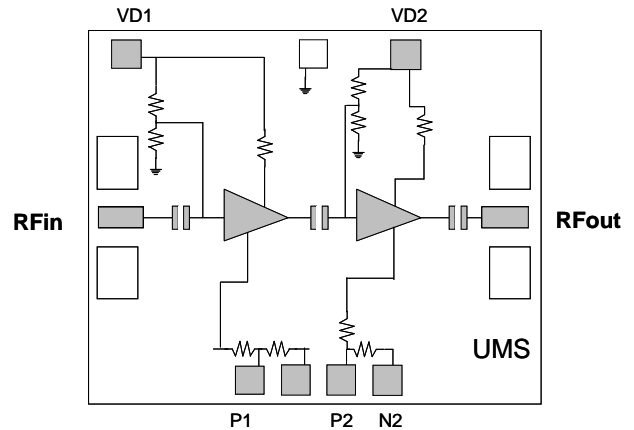
## 6-17GHz Low Noise Amplifier

### GaAs Monolithic Microwave IC

#### Description

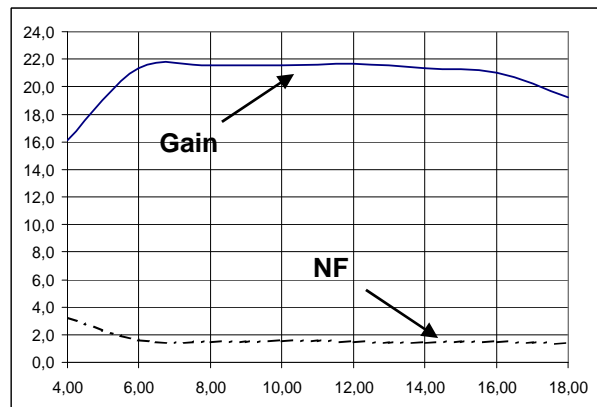
The CHA3666 is a two-stage self biased wide band monolithic low noise amplifier.

The circuit is manufactured with a standard pHEMT process: 0.25 $\mu$ 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 3<sup>rd</sup> 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
$\Delta G$	Gain flatness		$\pm 0.5$		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 &amp; 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 of these parameters may cause permanent damage.

**Typical Scattering Parameters (On wafer Sij measurements)**

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

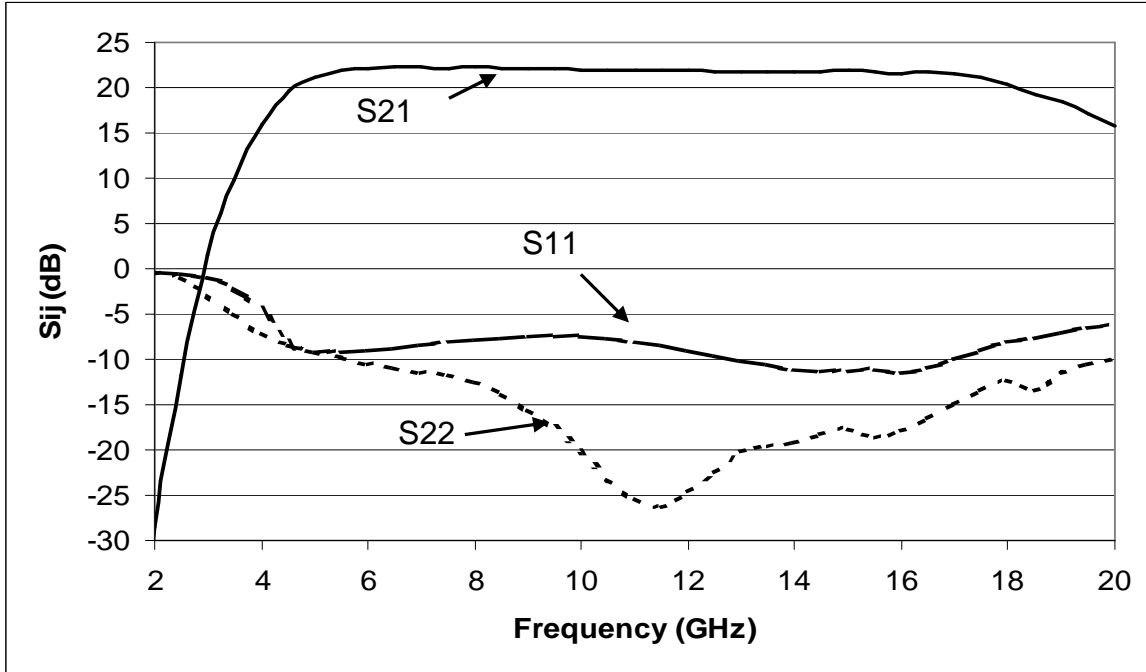
Freq GHZ	dBS11 dB	PhS11 °	dBS12 dB	PhS12 °	dBS21 dB	PhS21 °	dBS22 dB	PhS22 °
0,5	-0,12	-12,41	-58,07	-75,30	-55,39	74,95	-0,16	-11,79
1,0	-0,15	-25,18	-66,93	158,40	-59,74	86,43	-0,19	-23,89
1,5	-0,21	-38,83	-68,19	-42,37	-55,53	-2,66	-0,26	-37,09
2,0	-0,31	-54,17	-70,23	132,40	-28,46	25,79	-0,62	-51,84
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

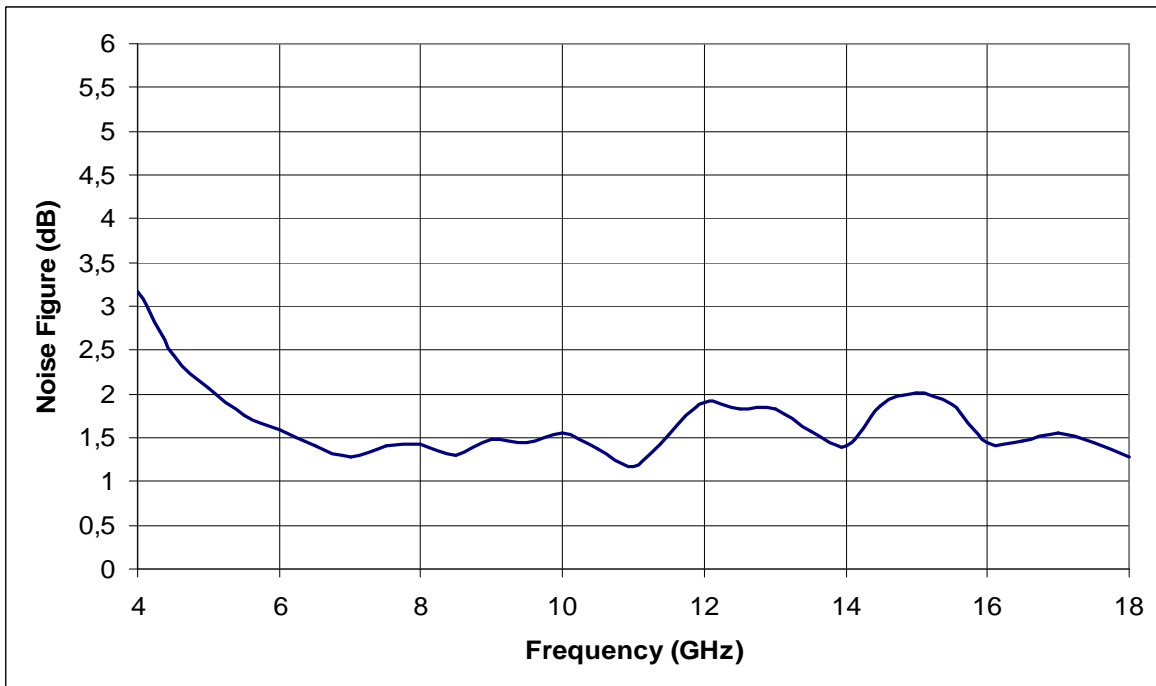
Temp = +25°C

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

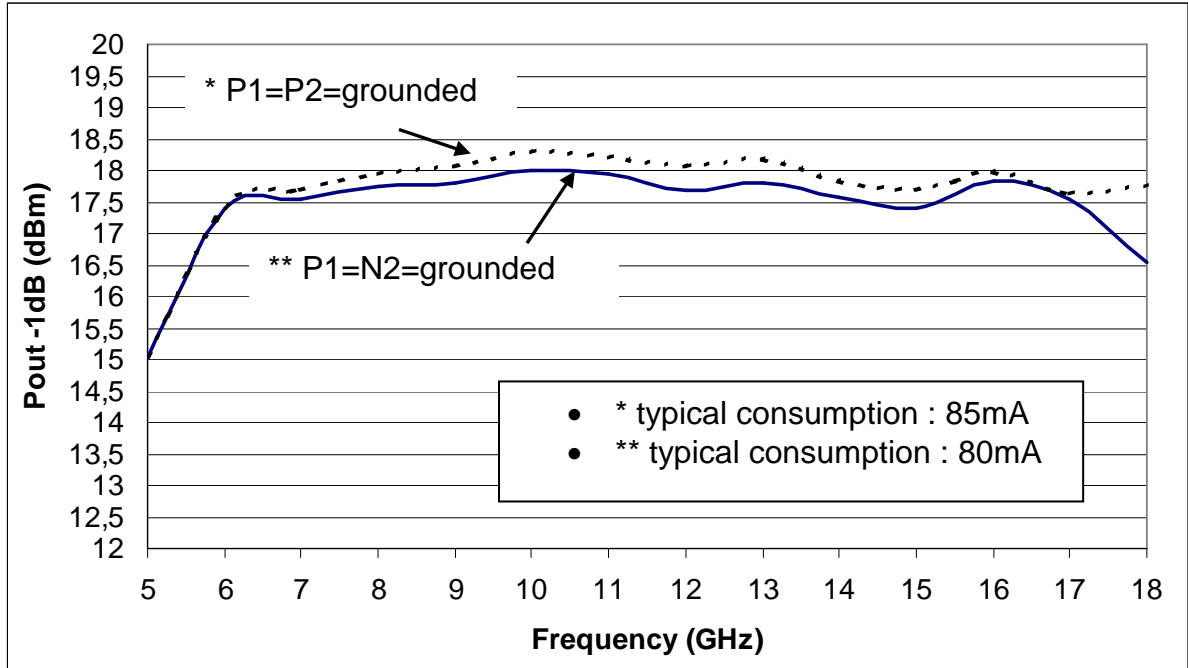
*S parameters versus frequency*

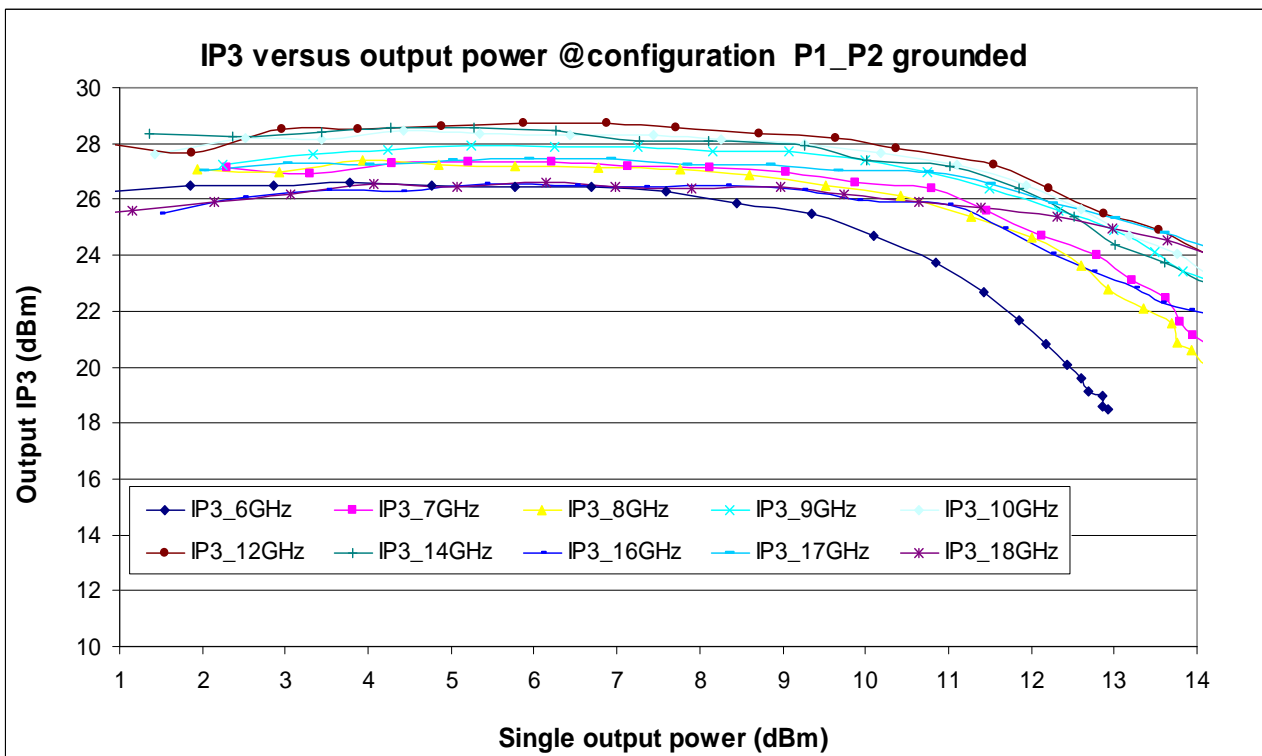
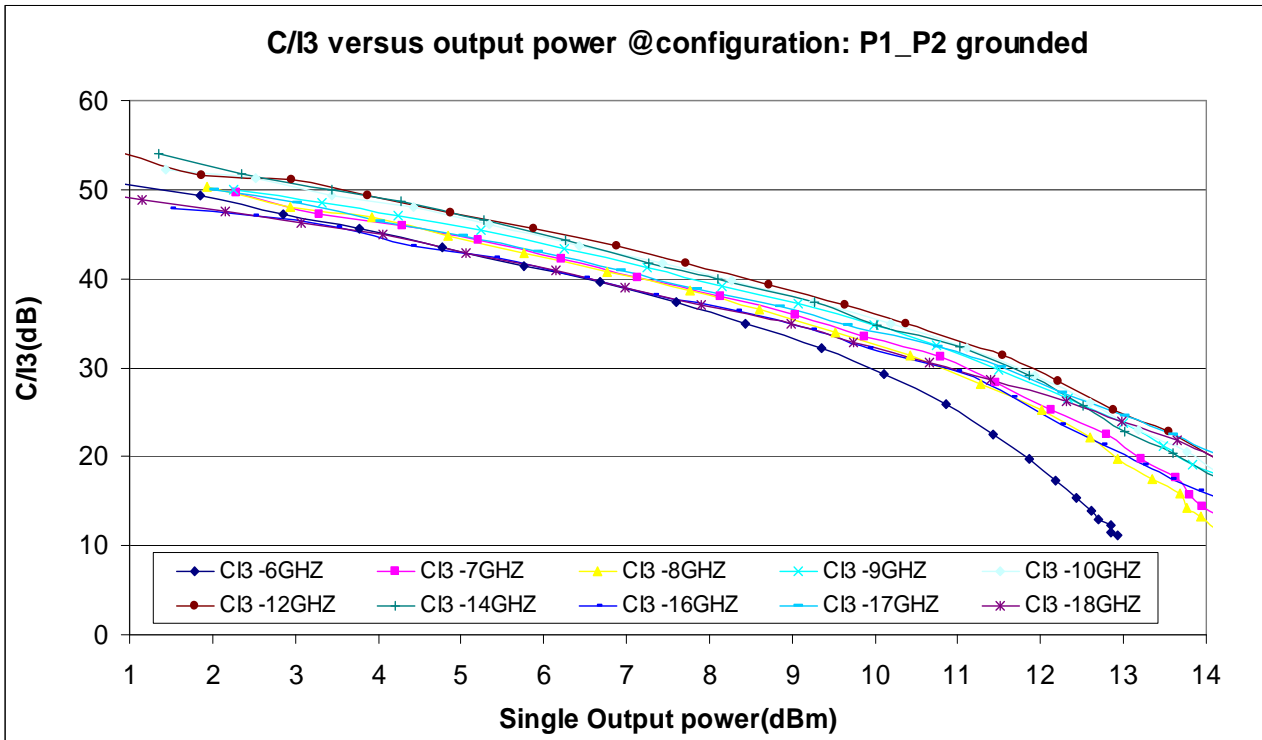


*NF versus frequency*

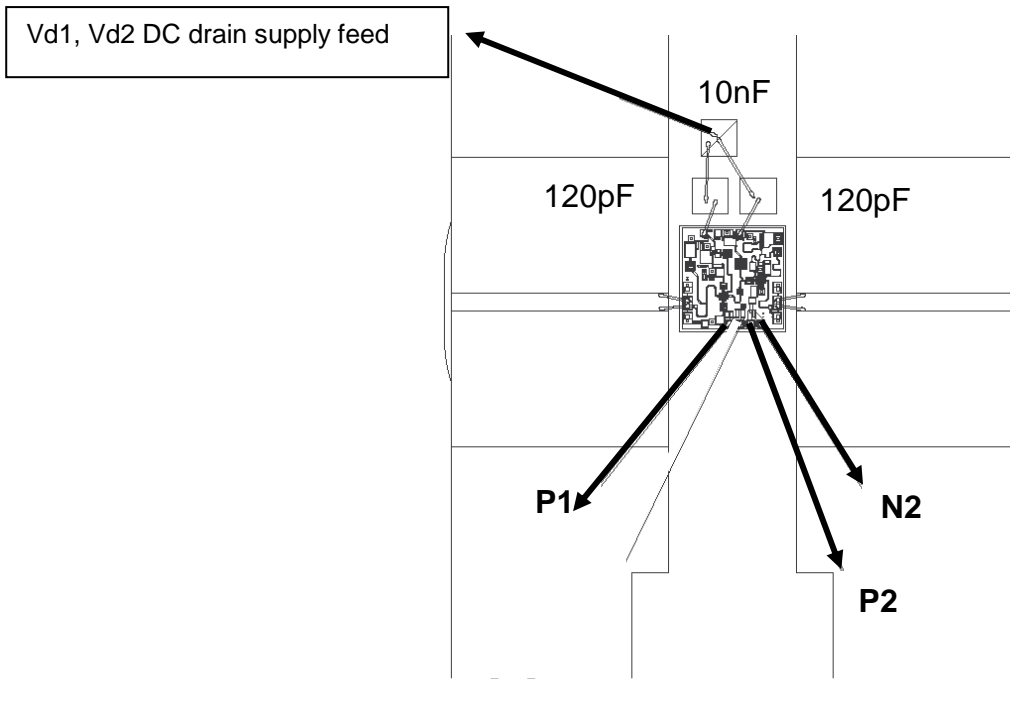


Output power at 1dB compression gain versus frequency



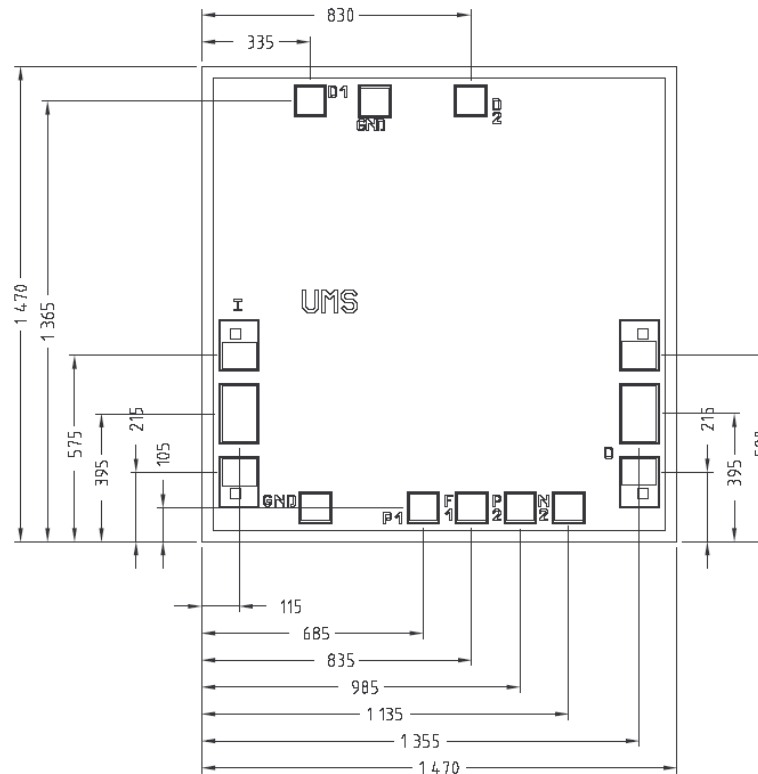


Chip Assembly and Mechanical Data



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

Bonding pad position

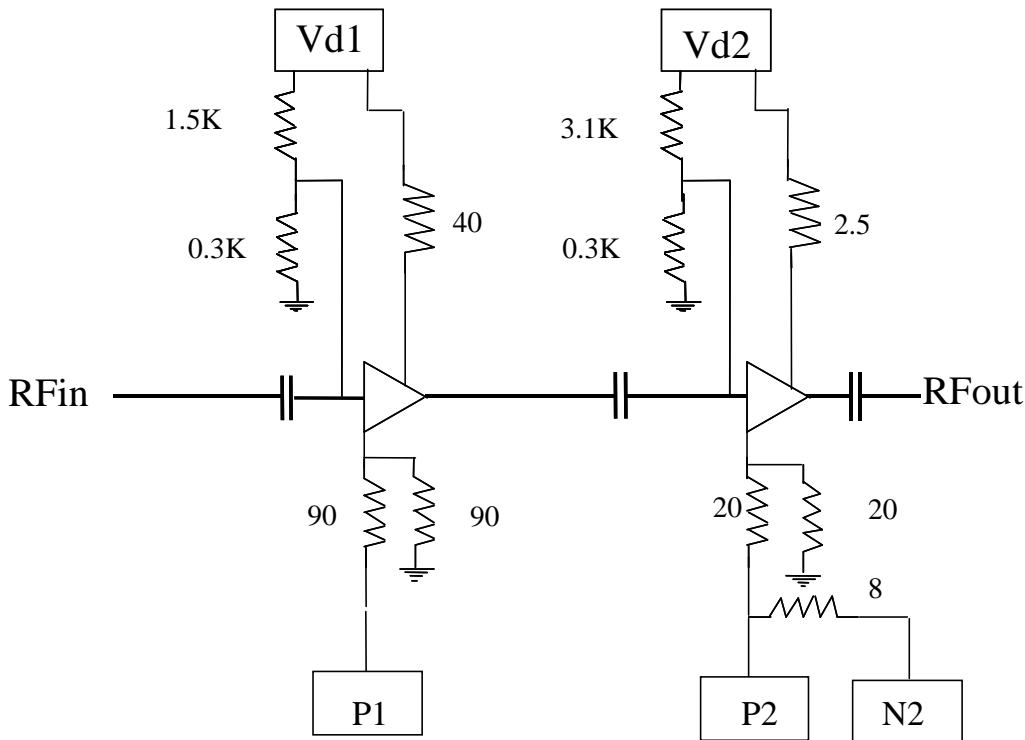


UNITS : µm  
Tol : ±35µm

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

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