

## 24-30GHz Medium Power Amplifier

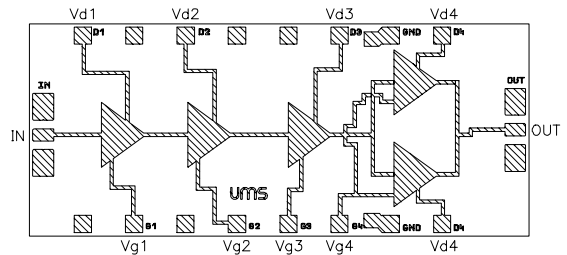
### GaAs Monolithic Microwave IC

*preliminary*

### Description

The CHA5390 is a high gain broadband four-stage monolithic medium power amplifier. 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 simplify the assembly process.

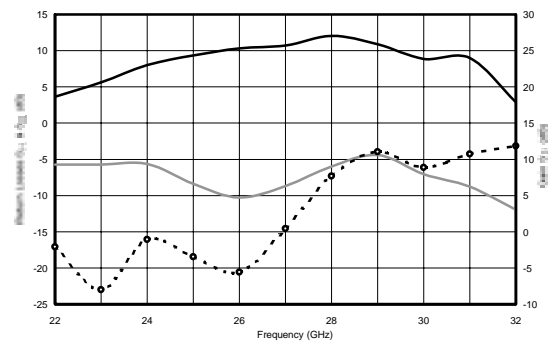
The circuit is manufactured with a PM-HEMT process, 0.25µm gate length, via holes through the substrate, air bridges and electron beam gate lithography. It is available in chip form.



### Main Features

- Broadband performances : 24-30GHz
- 25dBm output power.
- 24dB gain
- Good broadband matchings
- Low DC power consumption, 460mA @ 5V
- Chip size : 2.99 X 1.31 X 0.10 mm

*Typical in JIG measurements :*



*Input Loss : grey solid line - Output Loss : dash line.*

### Main Characteristics

Tamb. = 25°C

	Parameter	Min	Typ	Max	Unit
Fop	Operating frequency range	24		30	GHz
G	Small signal gain	21	24		dB
P01	Output power at 1dB gain compression	24	25		dBm
Id	Bias current		460	720	mA

ESD Protection : Electrostatic discharge sensitive device. Observe handling precautions !

**Electrical Characteristics for Broadband Operation**T<sub>amb</sub> = +25°C, V<sub>d1,2,3,4</sub> = 5V I<sub>d</sub>=460mA

Symbol	Parameter	Min	Typ	Max	Unit
Fop	Operating frequency range	24		30	GHz
G	Small signal gain (1)	21 (2)	24 (2)		dB
ΔG	Small signal gain flatness (1)		±2		dB
I <sub>s</sub>	Reverse isolation		50		dB
P1dB	Pulsed output power at 1dB compression (1)	24	25		dBm
IP3	3 <sup>rd</sup> order intercept point		33		dBm
PAE	Power added efficiency at saturation		16		%
VSWR <sub>in</sub>	Input VSWR			3.0:1	
VSWR <sub>out</sub>	Output VSWR			3.0:1	
I <sub>d</sub>	Bias current		460	720	mA

(1) On Wafer measurements

(2) [26-29 GHz]: 24dB min [24-31 GHz]: 21dB min

For T<sub>j</sub><175°C ( 80°C ambient ), I<sub>d</sub> should be below 475mA under 5V bias.

Current source biasing network is recommended.

**Absolute Maximum Ratings**T<sub>amb.</sub> = 25°C (1)

Symbol	Parameter	Values	Unit
V <sub>d</sub>	Drain bias voltage	6.0	V
I <sub>d</sub>	Drain bias current	720	mA
V <sub>g</sub>	Gate bias voltage	-2.0 to +0.4	V
P <sub>in</sub>	Maximum peak input power overdrive (2)	+15	dBm
T <sub>a</sub>	Operating temperature range	-40 to +85	°C
T <sub>stg</sub>	Storage temperature range	-55 to +155	°C

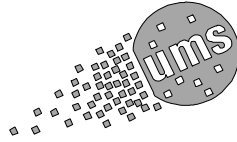
(1) Operation of this device above anyone of these parameters may cause permanent damage.

(2) Duration &lt; 1s.

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

Bias Conditions :  $V_{d1,2,3,4} = 5$  Volt,  $V_{g1}=V_{g2,3,4}$  for  $I_d$  total = 460 mA.

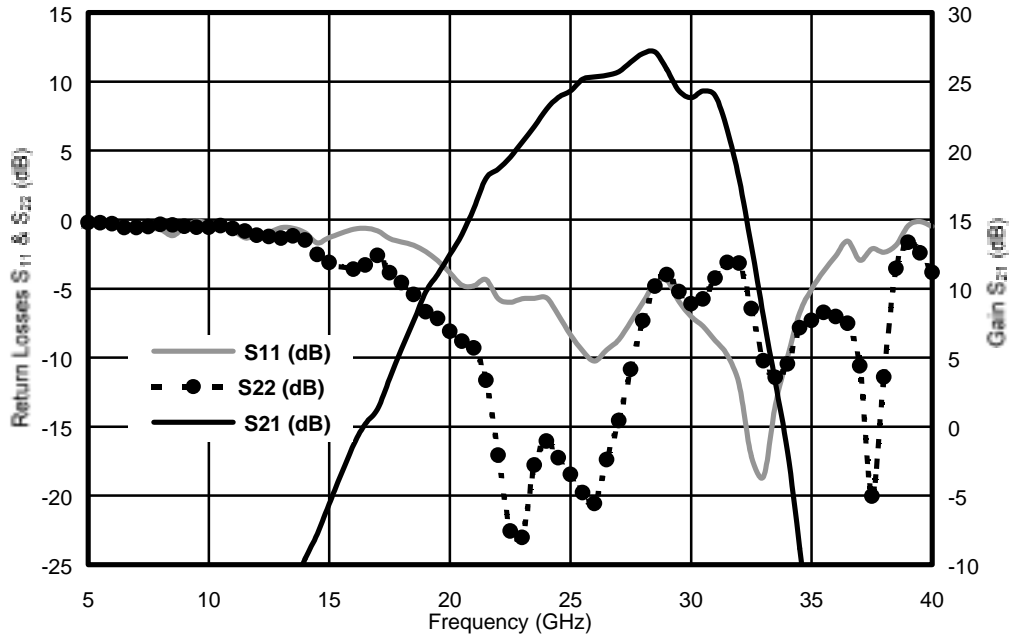
Freq GHz	S11 dB	S11 /°	S12 dB	S12 /°	S21 dB	S21 /°	S22 dB	S22 /°
10,00	-0,29	130,16	-75,37	-43,42	-34,97	121,53	-0,06	-86,95
11,00	-0,28	124,05	-81,16	-71,65	-28,63	83,18	-0,15	-96,45
12,00	-0,37	116,99	-72,11	-126,26	-22,61	38,63	-0,22	-107,06
13,00	-0,44	110,04	-67,15	-168,43	-16,98	-5,99	-0,60	-118,07
14,00	-0,52	101,55	-62,83	161,43	-11,59	-54,05	-1,15	-129,62
15,00	-0,72	92,63	-70,09	78,51	-6,39	-103,80	-1,82	-142,41
16,00	-0,90	82,31	-71,91	128,46	-1,14	-160,60	-3,31	-155,90
17,00	-1,27	70,45	-76,18	107,49	2,51	145,18	-4,18	-169,19
18,00	-1,67	56,58	-64,68	23,57	6,33	87,15	-5,81	178,80
19,00	-2,46	39,70	-57,90	-132,71	10,08	29,84	-7,79	163,19
20,00	-3,43	20,21	-70,93	-36,12	12,99	-40,94	-12,99	172,06
21,00	-4,70	-3,92	-72,62	-152,80	16,09	-93,03	-14,82	133,35
22,00	-6,51	-32,14	-63,69	-136,16	18,62	-165,91	-29,66	66,63
23,00	-8,25	-65,38	-63,11	-140,18	19,93	124,97	-19,94	-63,84
24,00	-9,14	-101,40	-58,44	139,63	21,09	56,97	-12,89	-82,46
25,00	-8,55	-132,96	-61,00	143,50	21,95	-10,22	-10,26	-100,64
26,00	-7,35	-166,59	-57,18	129,53	22,91	-80,46	-8,40	-116,75
27,00	-6,98	162,62	-58,79	86,49	24,06	-154,23	-7,08	-132,67
28,00	-7,08	131,98	-59,95	98,53	24,67	120,37	-6,87	-152,96
29,00	-8,55	104,51	-53,56	39,77	24,75	27,75	-7,49	-160,23
30,00	-10,35	86,80	-56,73	63,65	22,41	-81,77	-5,44	173,15
31,00	-10,35	55,09	-56,70	39,90	15,27	167,03	-5,66	134,04
32,00	-10,57	12,96	-60,16	8,74	5,20	76,86	-7,23	94,35
33,00	-9,06	-29,71	-60,33	3,48	-5,52	4,57	-8,61	52,15
34,00	-5,85	-67,30	-62,25	10,68	-13,87	-54,17	-8,80	13,41
35,00	-4,00	-102,02	-57,44	106,73	-25,98	-129,57	-7,32	-20,49
36,00	-2,75	-128,52	-50,88	63,61	-40,47	149,77	-5,61	-44,58
37,00	-2,05	-147,84	-54,34	37,74	-54,58	67,95	-4,56	-65,34
38,00	-1,57	-163,57	-52,72	21,62	-57,99	-11,22	-3,80	-81,87
39,00	-1,31	-176,44	-49,31	8,02	-44,73	-27,42	-2,84	-96,60
40,00	-1,13	172,84	-46,92	-24,29	-46,12	-20,40	-2,52	-109,78
41,00	-0,92	163,42	-50,28	-74,06	-50,08	-74,61	-2,34	-121,05
42,00	-0,78	154,77	-53,84	-95,08	-51,70	-137,05	-1,76	-132,13
43,00	-0,68	146,73	-52,16	-99,63	-53,15	-122,09	-1,64	-141,28
44,00	-0,65	139,75	-52,59	-134,12	-50,20	-107,23	-1,46	-149,16
45,00	-0,54	133,59	-61,38	-168,80	-54,54	110,71	-1,40	-157,67
46,00	-0,36	127,43	-51,37	122,79	-39,96	-168,88	-1,33	-165,36
47,00	-0,27	121,26	-46,98	89,44	-35,22	-157,54	-1,26	-171,65
48,00	-0,34	115,63	-41,66	36,57	-32,62	-134,30	-1,02	-179,72
49,00	-0,36	110,09	-51,95	3,01	-39,27	-123,83	-1,07	174,56
50,00	-0,33	104,27	-48,05	39,26	-35,81	-4,84	-1,07	168,39



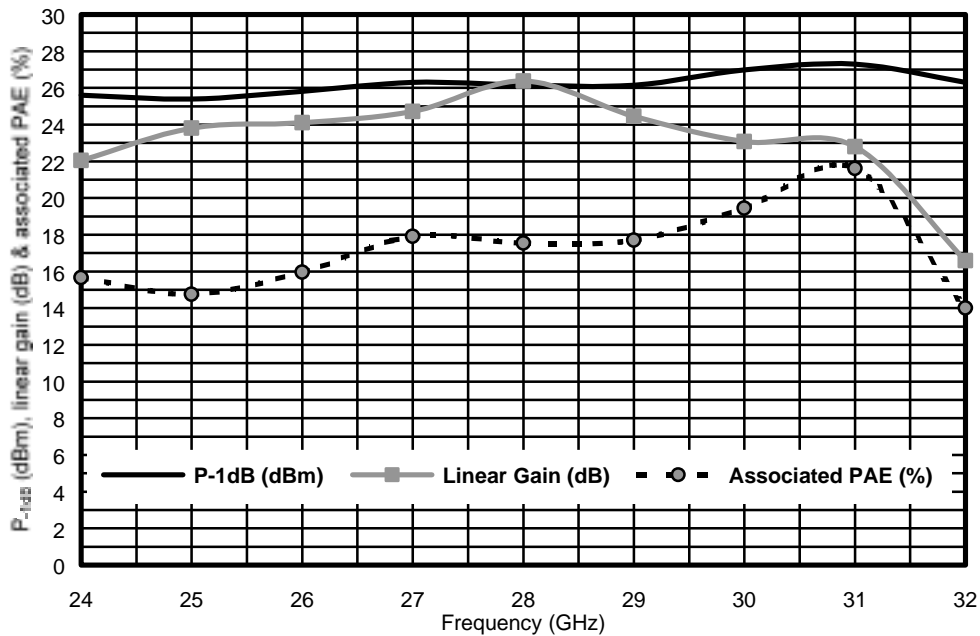
Typical In JIG Measurements

Bias Conditions : Vd1,2,3,4 = 5 Volt, Vg1,2,3,4 for Id = 460 mA

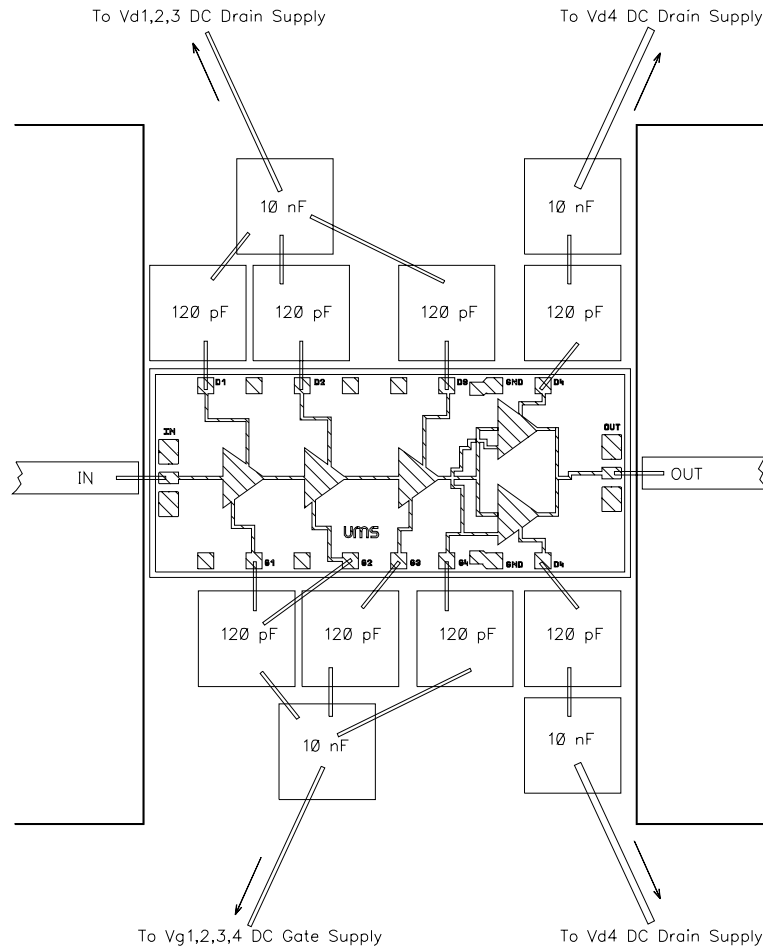
In JIG Scattering Parameters



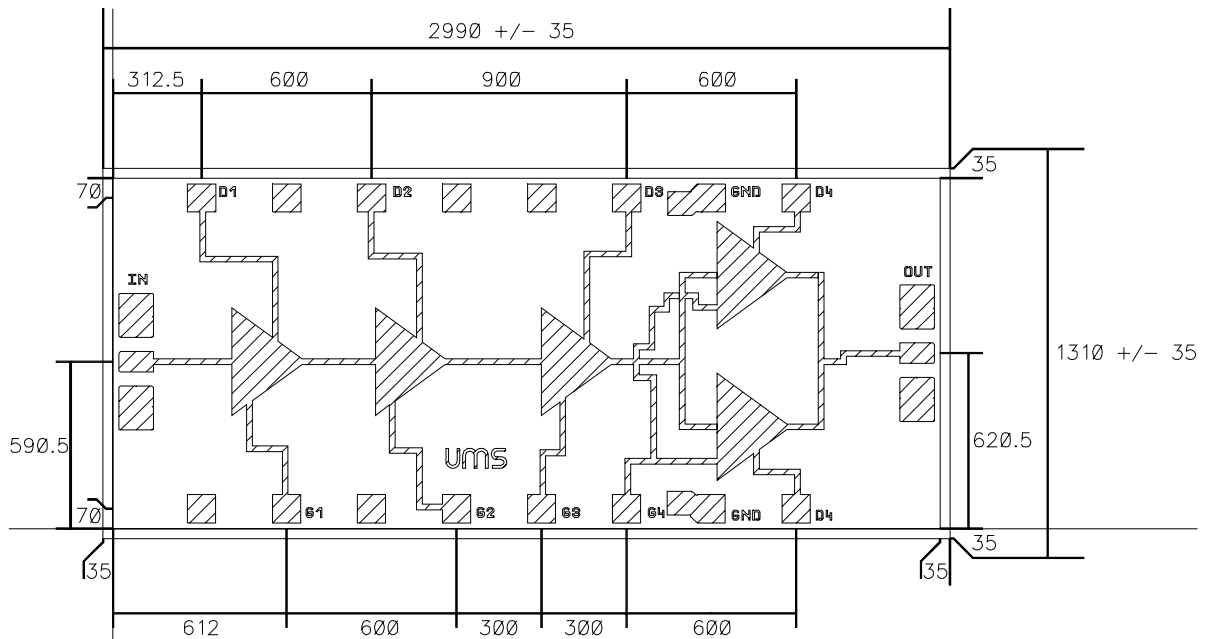
Power Measurements



Chip Assembly and Mechanical Data



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



Bonding pad positions

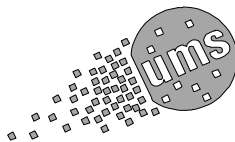
Ref. : CHA53901012 - 12-Jan.-01

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Specifications subject to change without notice

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( Chip thickness : 100 $\mu$ m. All dimensions are in micrometers )



## Ordering Information

Chip form : CHA5390-99F

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