

Application Note for CHT4690-QAG and CHT4690-99F

Single control supply configuration

GaAs Monolithic Packaged Microwave IC

This note gives general recommendations for implementing and using the CHT4690 and CHT4690-QAG, in terms of control voltage.

CHT4690-99F and CHT4690-QAG use two supply voltages, one for 1st stage, and the other for 2nd stage. Both can be operated from -5V to 0V.

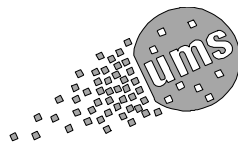
As described in the data-sheet, biasing voltage should be applied as following to obtain the best performances in linearity (dual control):

- 1st stage attenuation control with V1 from -5V to 0V, with V2 fixed at -5V
- 2nd stage attenuation control with V2 from -5V to 0V, with V1 fixed at 0V

Nevertheless, it is possible to use a common control, and this is the subject of this application note, driving with the same supply both V1 & V2.

There is no impact on the dynamic range: the minimum and maximum attenuation levels remain the same. The drawback will be the in-between linearity behaviour.

As a matter of fact, the 1st stage will not protect the 2nd stage in terms of power as it does with the dual control. The linearity is then reduced. The worst case in term of linearity is obtained for V1= V2 = -3.5V with an input power at -1dB minimum of 20dBm instead of 24dBm for the standard polarisation (configuration V1 = -3.5V / V2 = -5V).



1. Single control supply for CHT4690-QAG (QFN packaged product)

The electrical characteristics of CHT4690-QAG (at 25°C) for both configurations are given in the table below.

Electrical Characteristics

Temp. = 25°C

CHT4690-QAG		Dual control			Single control			Unit
Symbol	Parameter	Min	Typ	Max	Min	Typ	Max	
Fin	Input frequency range	5		30	5		30	GHz
Min Att.	S21 (V1=-5V;V2=-5V) (5 to 10GHz)		-2	-3		-2	-3	dB
	S21 (V1=-5V;V2=-5V) (11 to 24GHz)		-4	-5.5		-4	-5.5	dB
	S21 (V1=-5V;V2=-5V) (25 to 30GHz)		-6	-7.5		-6	-7.5	dB
Max Att.	S21 (V1=0V;V2=0V) (5 to 10GHz)	-22	-24		-22	-24		dB
	S21 (V1=0V;V2=0V) (11 to 30GHz)	-28	-35		-28	-35		dB
VSWR in	Input VSWR (any attenuation) (5 to 26GHz)		2.0:1			2.0:1		
VSWR out	Output VSWR (any attenuation) (6 to 26GHz)		2.5:1			2.5:1		
Pin1dB	Input 1dB compression point (any attenuation) (5 to 25GHz)	24	25		19	20		dBm
C/I3	C/I3 @ Pin/tone=12dBm (any attenuation) (to 26GHz)	36	40		28	32		dB
V1,V2	Voltage control range	-5		0	-5		0	V
Worst case in terms of linearity		V1 = -3.5V V2 = -5V			V1 = -3.5V V2 = -3.5V			

These values are representative of on board measurements as defined on the drawing 96272 (see paragraph "Proposed assembly board" of the data-sheet of CHT4690-QAG).

Typical Results with single control supply

Temp. = +25°C

Measurements in the package access, using the proposed land pattern & board 96272, as defined in the CHT4690-QAG data-sheet.

CHT4690-QAG: attenuation versus frequency

V1 = V2 = -5V to 0V

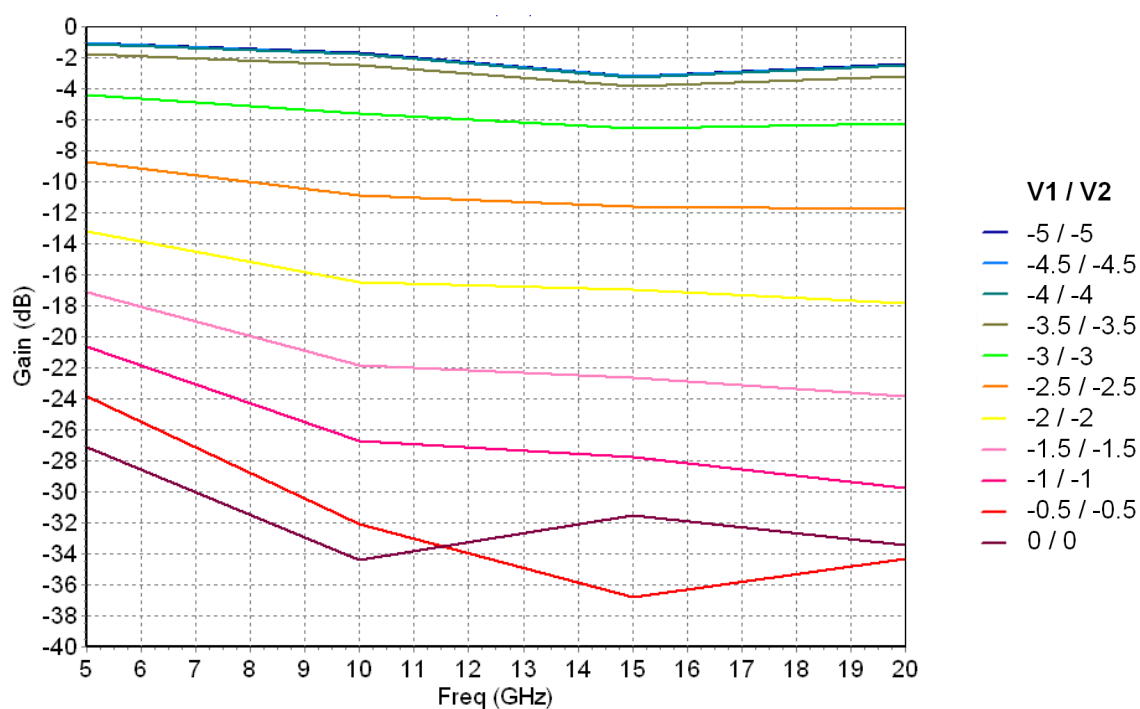
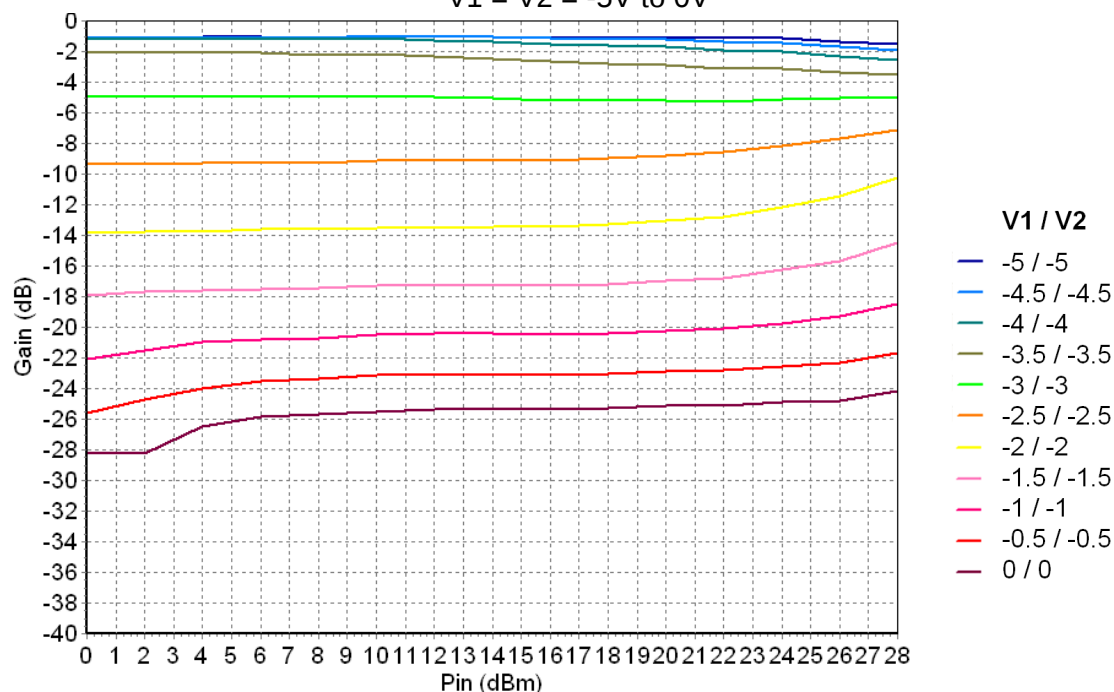


Figure 1 : Attenuation as a function of frequency

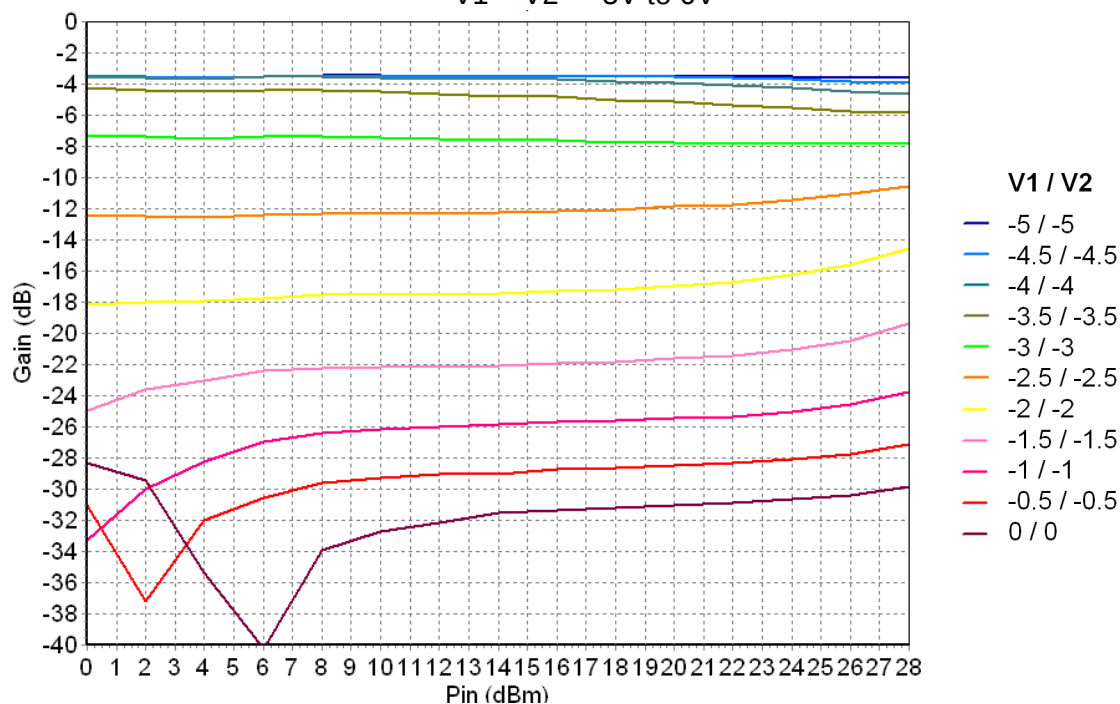
CHT4690-QAG: attenuation versus input power @ 5GHz

V1 = V2 = -5V to 0V



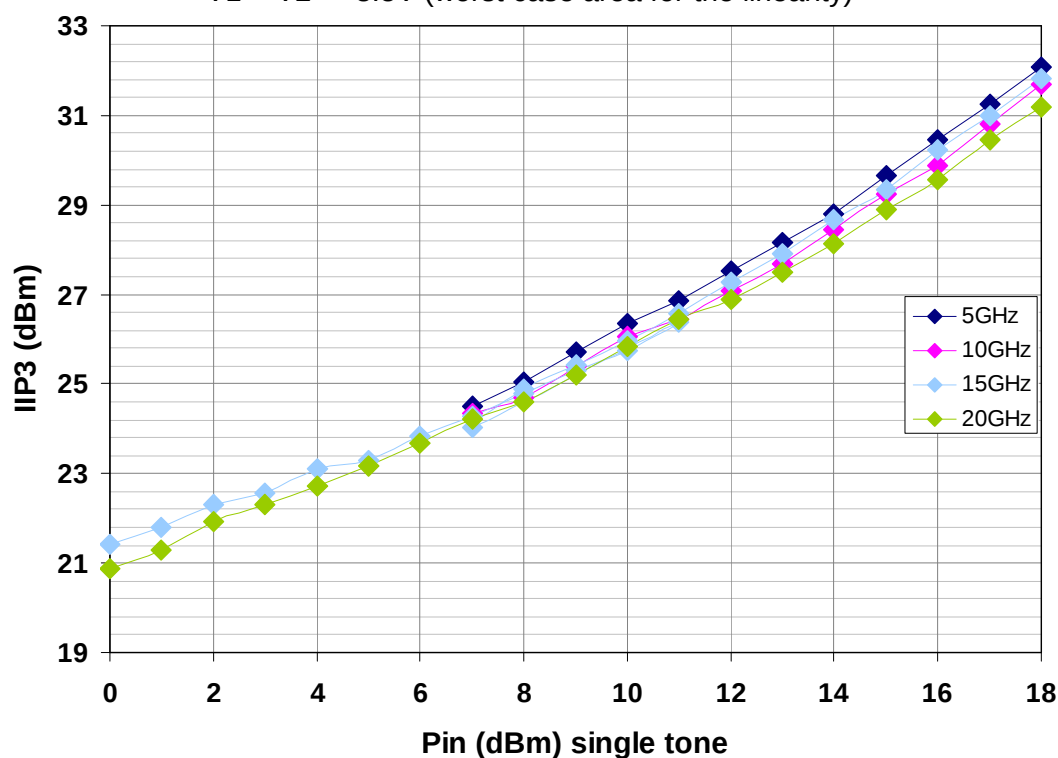
CHT4690-QAG: attenuation versus input power @ 15GHz

V1 = V2 = -5V to 0V



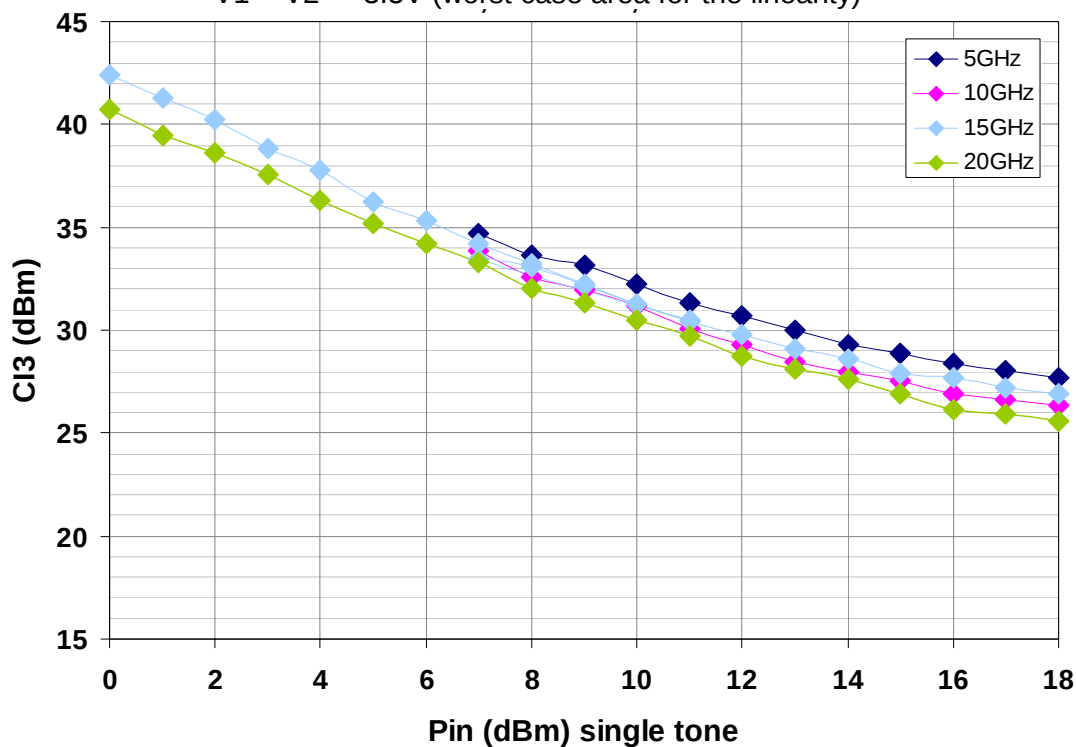
CHT4690-QAG: input IP3 versus input power

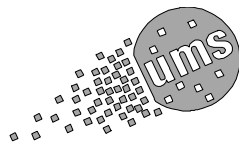
V1 = V2 = -3.5V (worst case area for the linearity)



CHT4690-QAG: C/I3 versus input power

V1 = V2 = -3.5V (worst case area for the linearity)





2. Single power supply for CHT4690-99F (die product)

The electrical characteristics of the die version can be deduced from the packaged product measurements.

Electrical Characteristics

Temp. = 25°C

CHT4690-99F		Dual power supply			Single power supply			Unit
Symbol	Parameter	Min	Typ	Max	Min	Typ	Max	
Fin	Input frequency range	5		30	5		30	GHz
Min Att.	S21 (V1=-5V;V2=-5V) (5 to 12GHz)		-2.5	-3		-2.5	-3	dB
	S21 (V1=-5V;V2=-5V) (13 to 30GHz)		-6.5	-7.5		-6.5	-7.5	dB
Max Att.	S21 (V1=0V;V2=0V) (5 to 12GHz)	-22	-25		-22	-25		dB
	S21 (V1=0V;V2=0V) (13 to 30GHz)	-27	-34		-27	-34		dB
VSWR in	Input VSWR (any attenuation) (5 to 30GHz)			2.3:1			2.3:1	
VSWR out	Output VSWR (any attenuation) (8 to 30GHz)			2.5:1			2.5:1	
Pin1dB	Input 1dB compression point (any attenuation) (5 to 20GHz)	24	25		19	20		dBm
C/I3	C/I3 @ Pin/tone=12dBm (any attenuation) (up to 26GHz)	36	40		28	32		dB
V1,V2	Voltage control range	-5		0	-5		0	V
Worst case in terms of linearity		V1 = -3.5V V2 = -5V			V1 = -3.5V V2 = -3.5V			

Contacts:

Web site: www.ums-gaas.com
 email: mktsales@ums-gaas.com
 Phone: 33 (1) 69 33 02 26 (France)
 +1 973 812 2139 (USA)
 +86 21 6103 1635 (China)

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.**