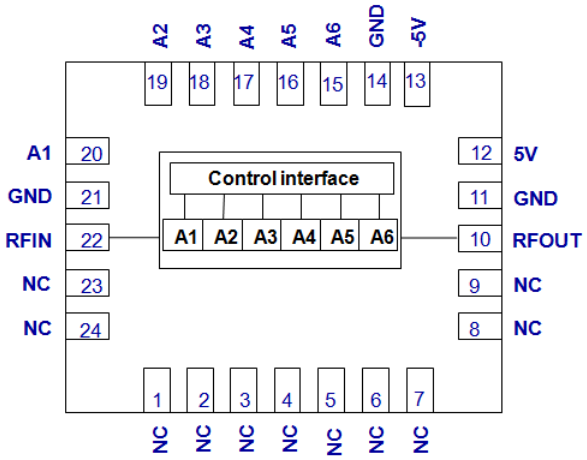
Advanced Information: AI1310

Packaged 4-14GHz 6-bit digital attenuator

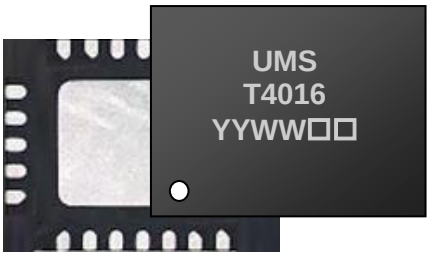
GaAs Monolithic Microwave IC



UMS develops a packaged monolithic 4-14GHz 6-bit digital attenuator with a LSB of 0.5dB offering 31.5 dynamic range and high accuracy. The RMS amplitude error is typically as low as 0.2dB. It is proposed in standard surface mount package.

The circuit is dedicated to space and defence applications and is well suited for a wide range of microwave and millimetre wave applications and systems.

It is developped on a robust 0.25µm gate length pHEMT process, and will be available in a standard surface mount 24 leads QFN4x5, compliant with the regulation in particular with the directives RoHS N°2011/65 and REACh N°1907/2006.



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Electrical Characteristics

Tamb.= +25°C

Symbol	Parameter	Min	Typ	Max	Unit
Freq	Operating frequency	4		14	GHz
IL	Insertion Loss		7		dB
S11	Input Return Loss		-14		dB
S22	Output Return Loss		-14		dB
P1dB	Input power at 1dB gain compression		23		dBm
Dyn	Dynamic		31.5		dB
LSB	Attenuator elementary step		0.5		dB
Att_err	Attenuation error		±0.8		dB
Rms_att	RMS attenuation error		0.2		dB
Phivar	Phase variation		-1/+13		°
Rms_Phivar	RMS of phase variation		6		°
V+	Positive supply voltage		5		V
V-	Negative supply voltage		-5		V
Vctrl_L	Control voltage low level	-1.5	0		V
Vctrl_H	Control voltage high level		-5	-3.5	V
I_V+	Positive supply DC current		6		mA
I_V-	Negative supply DC current		18		mA

The measurement calibration planes are defined in the paragraph “Definition of the Sij reference planes”.

Absolute Maximum Ratings (1)

Tamb.= +25°C

Symbol	Parameter	Values	Unit
V+	Maximum positive bias voltage	6	V
V-	Maximum negative bias voltage	-6	V
Ai	CTRL voltage (Vctrl_low, Vctrl_high)	-6,+2	V
Pin	Maximum peak input power overdrive (2)	+25	dBm
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.
(2) Duration < 1s.

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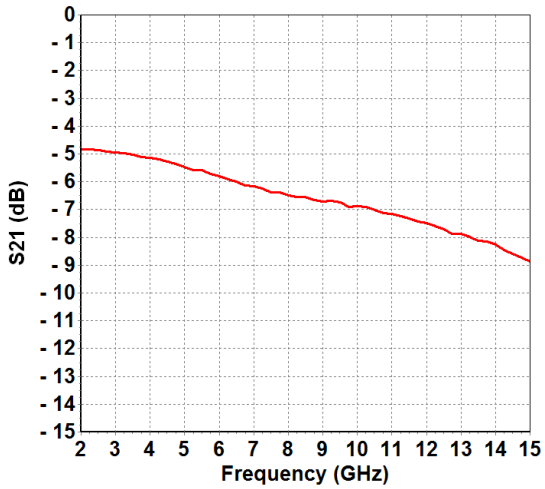
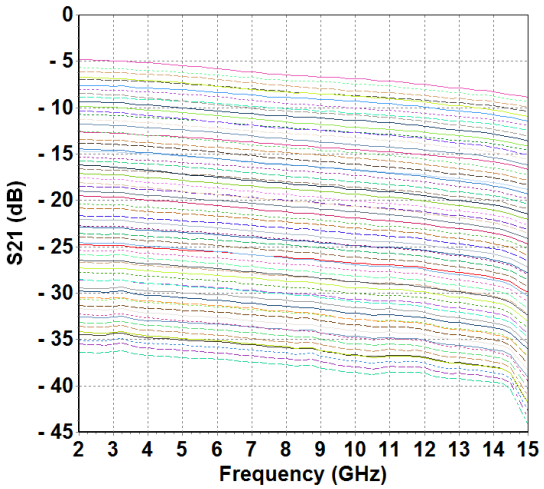
Typical Board Measurements

Tamb.= +25°C

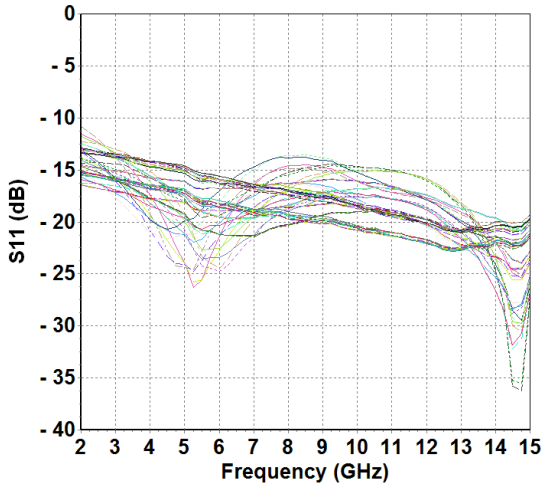
S21 versus Frequency
Attenuator state 0



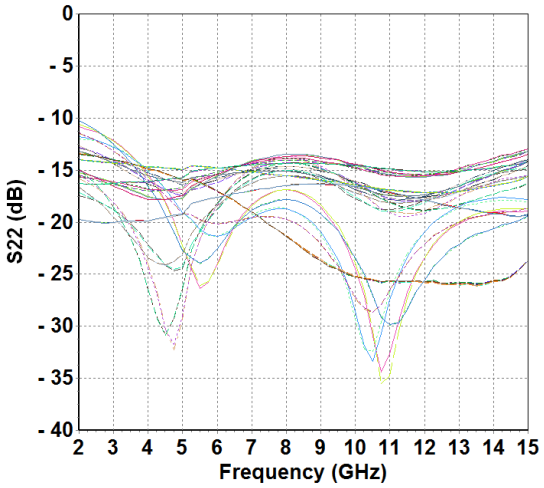
S21 versus Frequency
All attenuator states



S11 versus Frequency
All attenuator states



S22 versus Frequency
All attenuator states



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Typical Board Measurements

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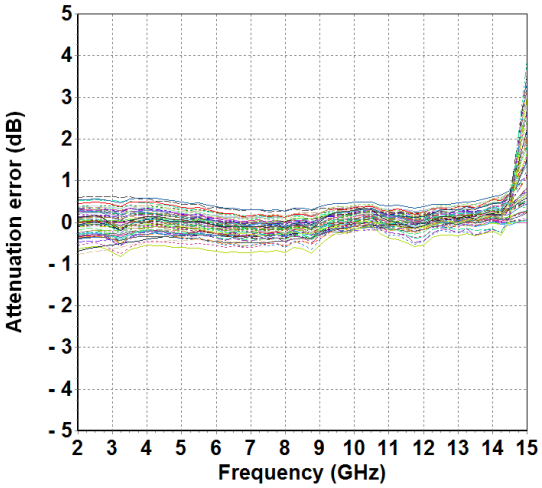
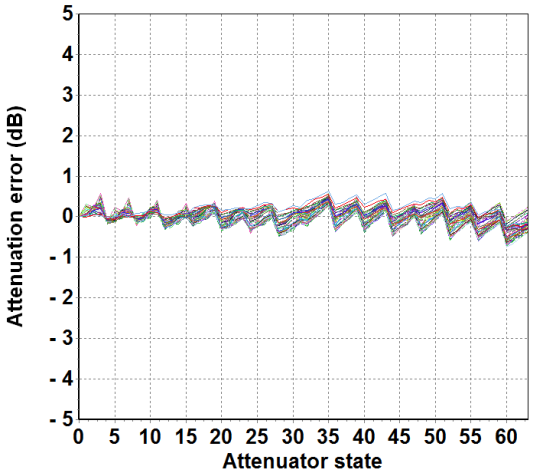
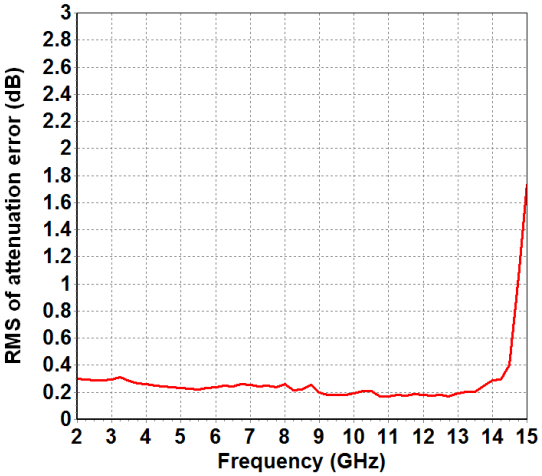
Attenuation error versus frequency
All attenuator states



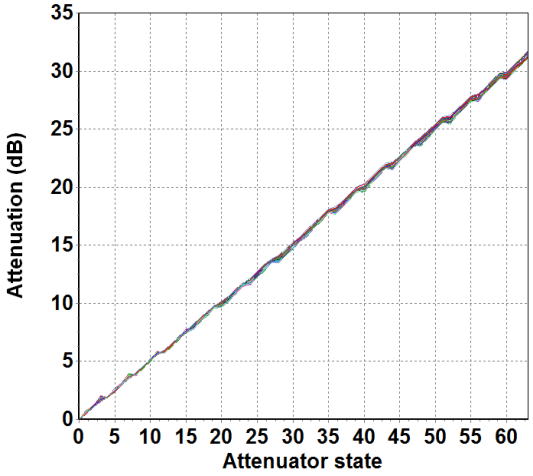
Attenuation error versus attenuator state
Frequency bandwidth 4-14GHz



RMS of attenuation error



Attenuation versus attenuator state
Frequency bandwidth 4-14GHz



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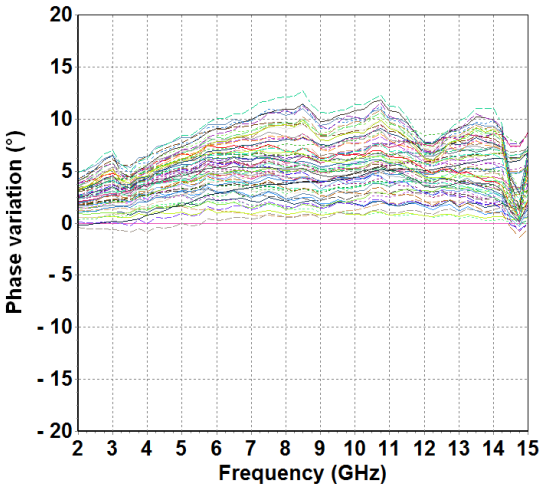
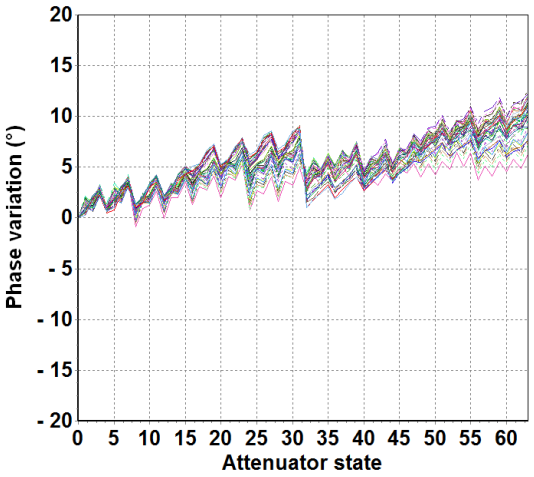
Typical Board Measurements

Tamb.= +25°C

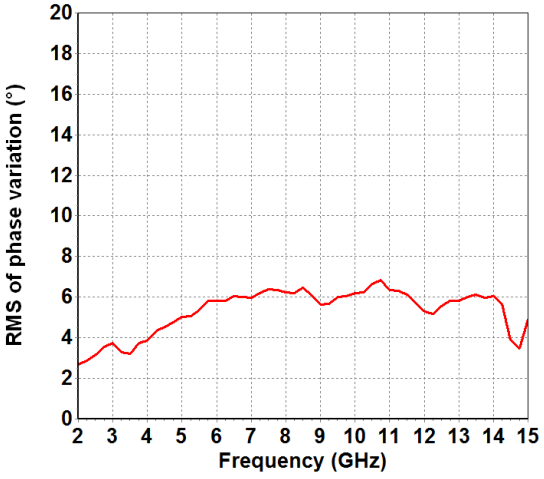
Phase variation versus Frequency
All attenuator states



Phase variation versus attenuator state
Frequency bandwidth 4-14GHz



RMS of phase variation



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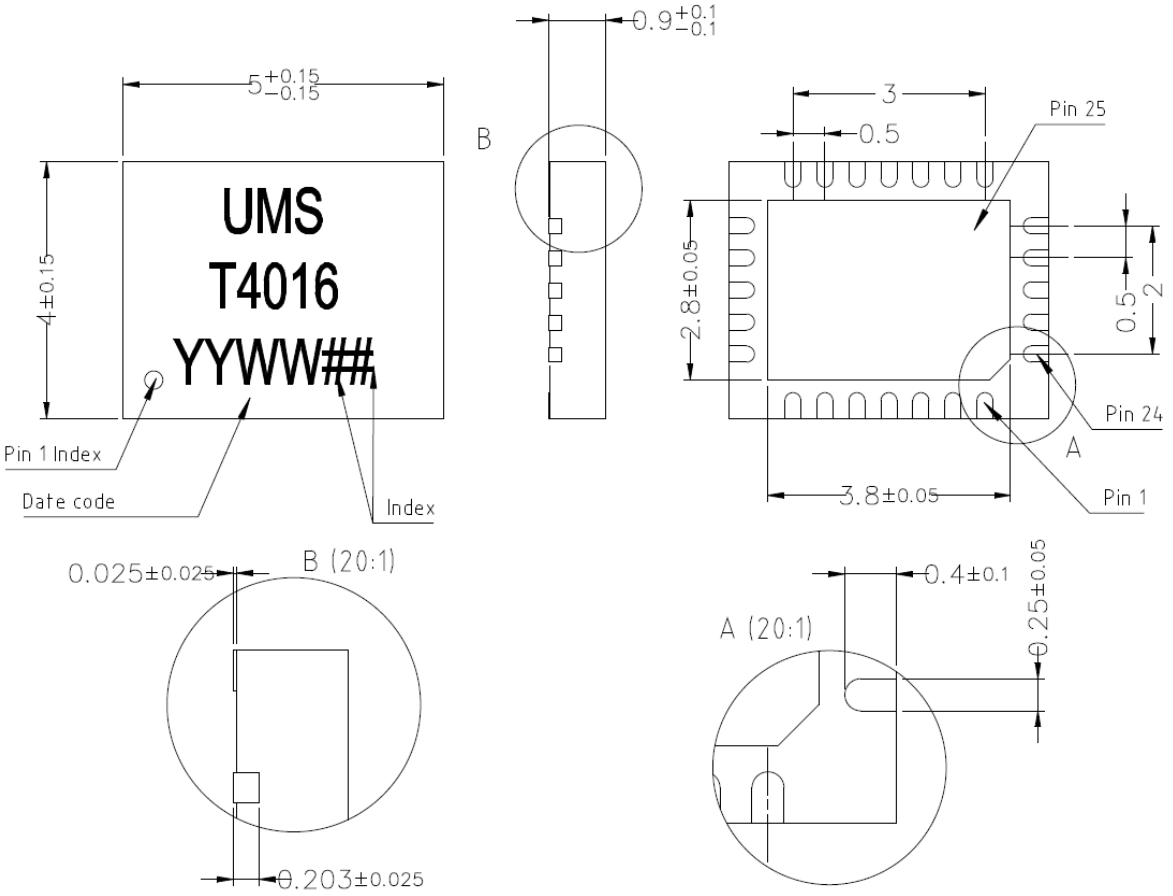
Package outline (1)



Matt tin, Lead Free	(Green)	1- Nc	9- Nc	17- A4
Units :	mm	2- Nc	10- RF out	18- A3
From the standard :	JEDEC MO-220	3- Nc	11- Gnd(2)	19- A2
	(VGHD)	4- Nc	12- 5V	20- A1
25-	GND	5- Nc	13- -5V	21- Gnd(2)
		6- Nc	14- Gnd(2)	22- RF in
		7- Nc	15- A6	23- Nc
		8- Nc	16- A5	24- Nc

(1) The package outline drawing included to this data-sheet is given for indication. Refer to the application note AN0017 (http://www.ums-gaas.com) for exact package dimensions.

(2) It is strongly recommended to ground all pins marked “Gnd” through the PCB board. Ensure that the PCB board is designed to provide the best possible ground to the package.

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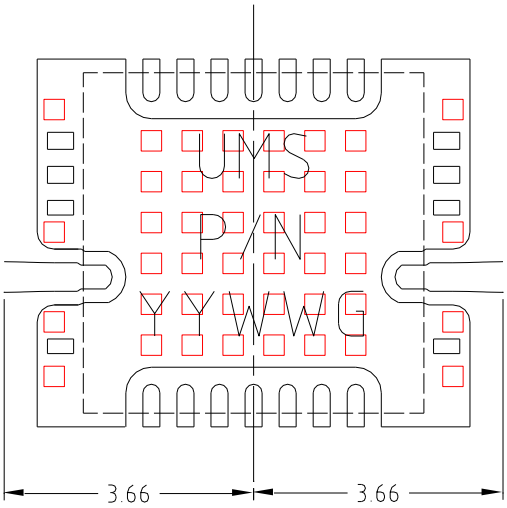
Definition of the Sij reference planes

The reference planes used for measurements given above are symmetrical from the symmetrical axis of the package (see drawing beside). The input and output reference planes are located at 3.66mm offset (input wise and output wise respectively) from this axis.



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Recommended package footprint

Refer to the application note AN0017 available at http://www.ums-gaas.com for package foot print recommendations and exact package dimensions.

SMD mounting procedure

For the mounting process standard techniques involving solder paste and a suitable reflow process can be used. For further details, see application note AN0017 available at http://www.ums-gaas.com.

Recommended environmental management

UMS products are compliant with the regulation in particular with the directives RoHS N°2011/65 and REACh N°1907/2006. More environmental data are available in the application note AN0019 also available at http://www.ums-gaas.com.

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 package products.

Sampling request reference

Package: ES-CHT4016-QEG

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