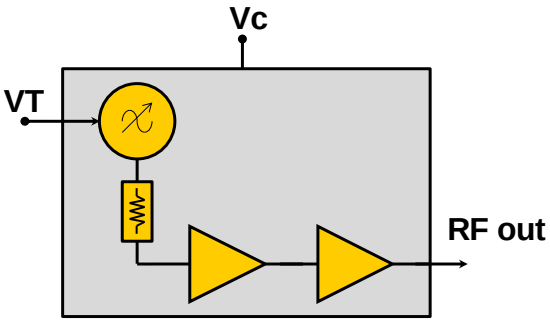
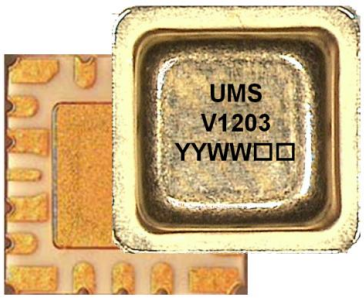
Advanced Information: AI1703

Low Phase Noise S band HBT VCO

GaAs Monolithic Microwave IC in SMD package



UMS proposes a low phase noise S-band HBT Voltage Controlled Oscillator in leadless surface mount hermetic metal ceramic 6x6mm² package. This fully integrated VCO includes negative resistor, varactors, buffer amplifiers, and provides an excellent phase noise of -108dBc/Hz at 100kHz offset. The overall power supply is of 3V/50mA.
It is designed for a wide range of applications, from space to commercial communication systems.
The circuit is manufactured with a standard InGaP HBT process: 2µm emitter length, via holes through the substrate and high Q passive elements.



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Electrical Characteristics

Tamb.= +25°C, Vd = +3V

Symbol	Parameter	Min	Typ	Max	Unit
F_out	Output frequency range	2.6		3	GHz
V_Tune	Voltage Tuning range	0		10	V
	Tuning sensitivity	40		110	MHz/V
	Frequency drift rate		0.3		MHz/°C
H1	Harmonics ½ F_out rejection		43		dBc
H3	Harmonics 3/2 F_out rejection		35		dBc
H4	Harmonics 2 F_out rejection		35		dBc
PN_10	SSB Phase Noise given @ F_out @ 10 kHz		-85		dBc/Hz
PN_100	SSB Phase Noise given @ F_out @ 100 kHz		-108		dBc/Hz
	Pulling into 2:1 VSWR for all phases		0.1		MHz
	Pushing vs Vc		14		MHz/V
P_out	Output Power on RF_out port		8		dBm
	Output power variation vs Tuning Voltage		0.8		dB
Vc	Positive supply voltage		3	3.5	V
I_Vc	Positive supply current		50		mA

These values are representative of on board measurements as defined on the drawing 99622 (see below).

Absolute Maximum Ratings (1)

Tamb.= +25°C

Symbol	Parameter	Values	Unit
VT	Tuning voltage	15	V
Vd	Drain bias voltage	4	V
Id	Drain bias current	100	mA
Tj	Junction temperature	175	°C
Ta	Operating temperature range	-55 to +125	°C
Tstg	Storage temperature range	-55 to +150	°C

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

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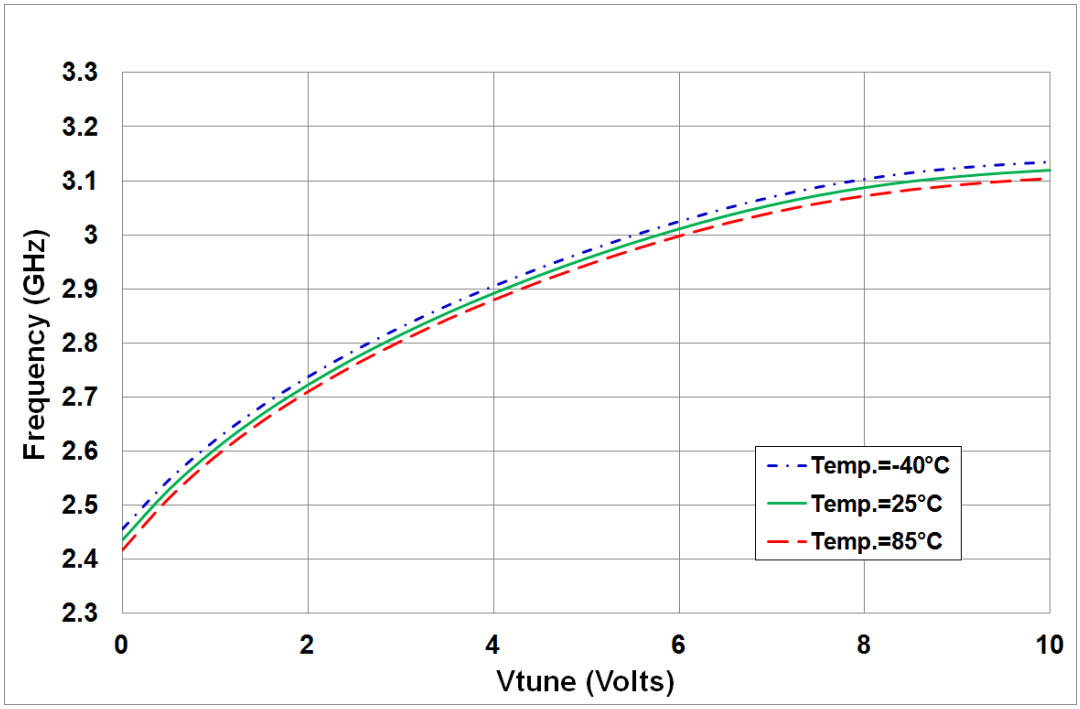
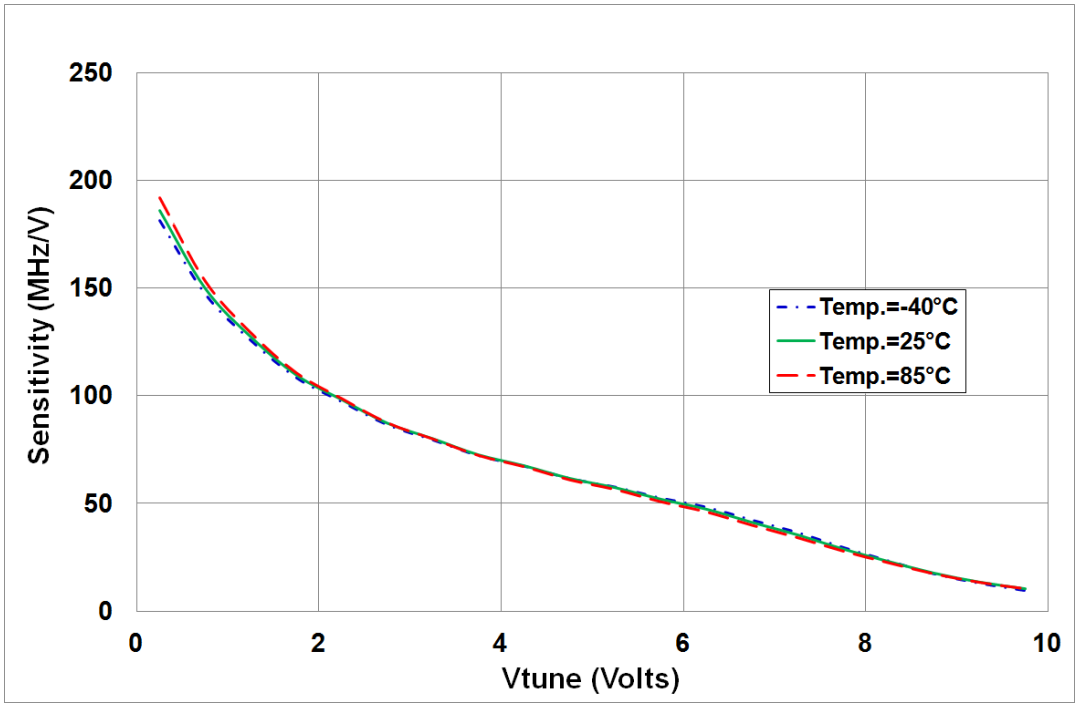
Typical Board Measurements

Temperature = -40, +25, +85°C, Vd = +3V, Id = 50mA
Measurements in the package planes.

Output Frequency versus Tuning Voltage



Sensitivity versus Tuning Voltage



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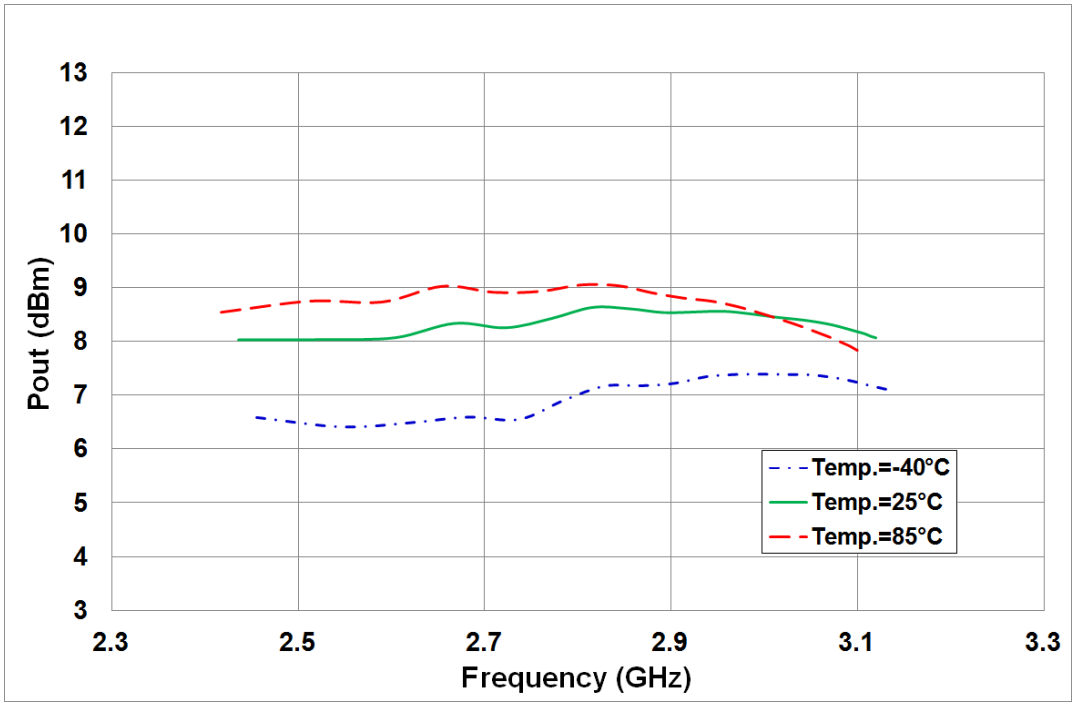
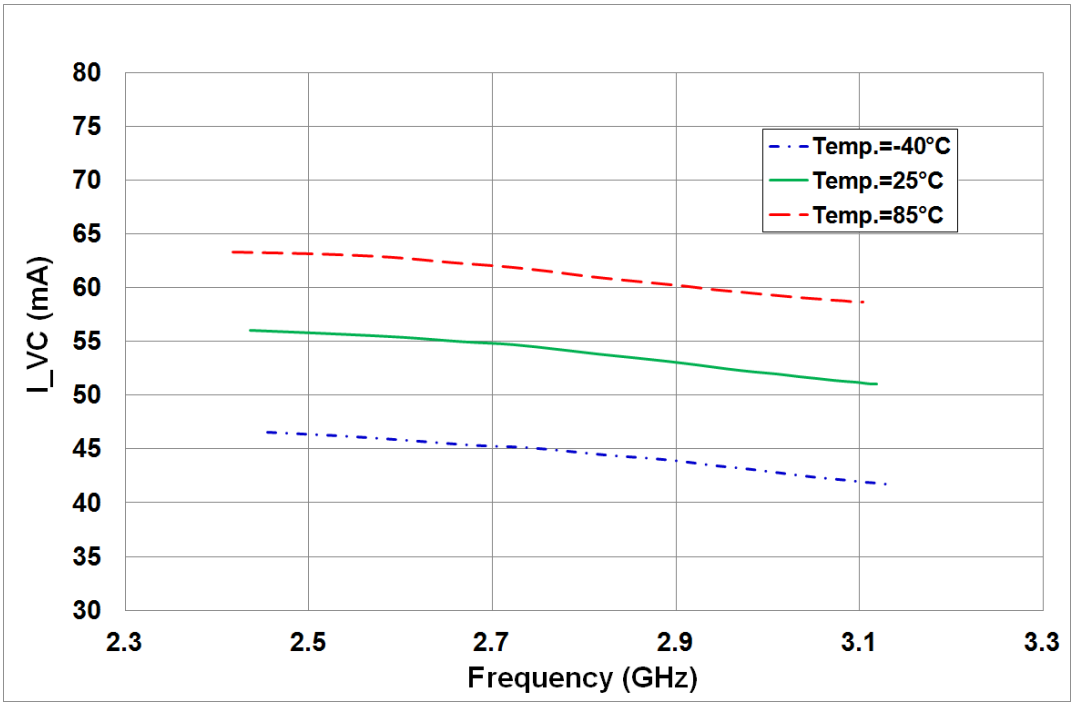
Typical Board Measurements

Temperature = -40, +25, +85°C, Vd = +3V, Id = 50mA
Measurements in the package planes.

Output Power versus Frequency



Supply Current versus Frequency



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Typical Board Measurements

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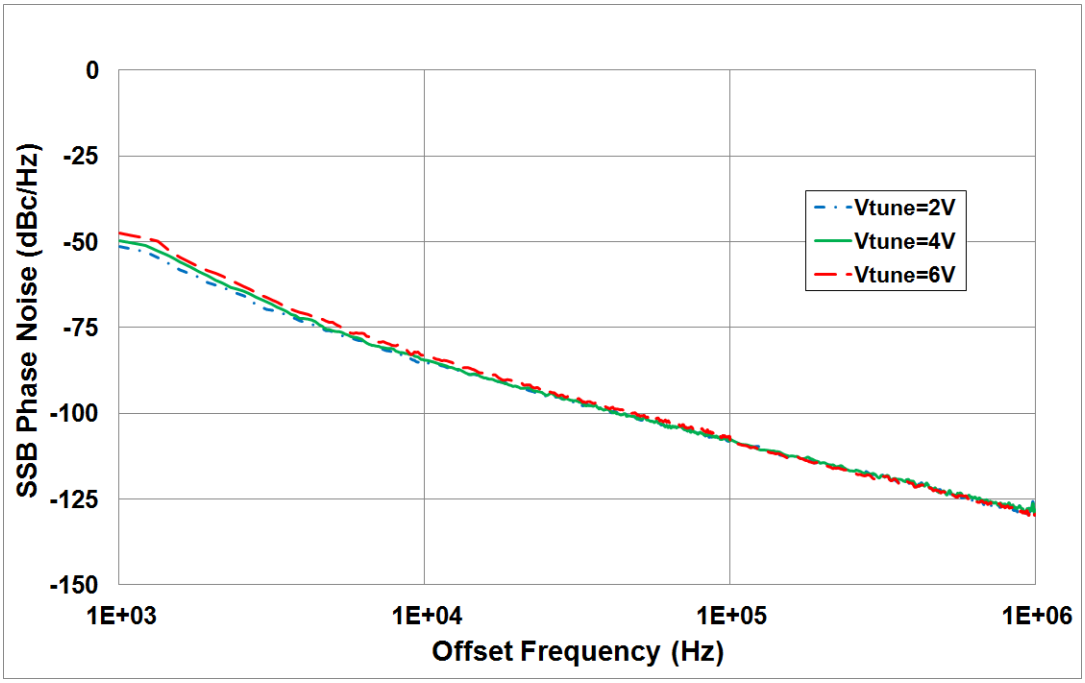
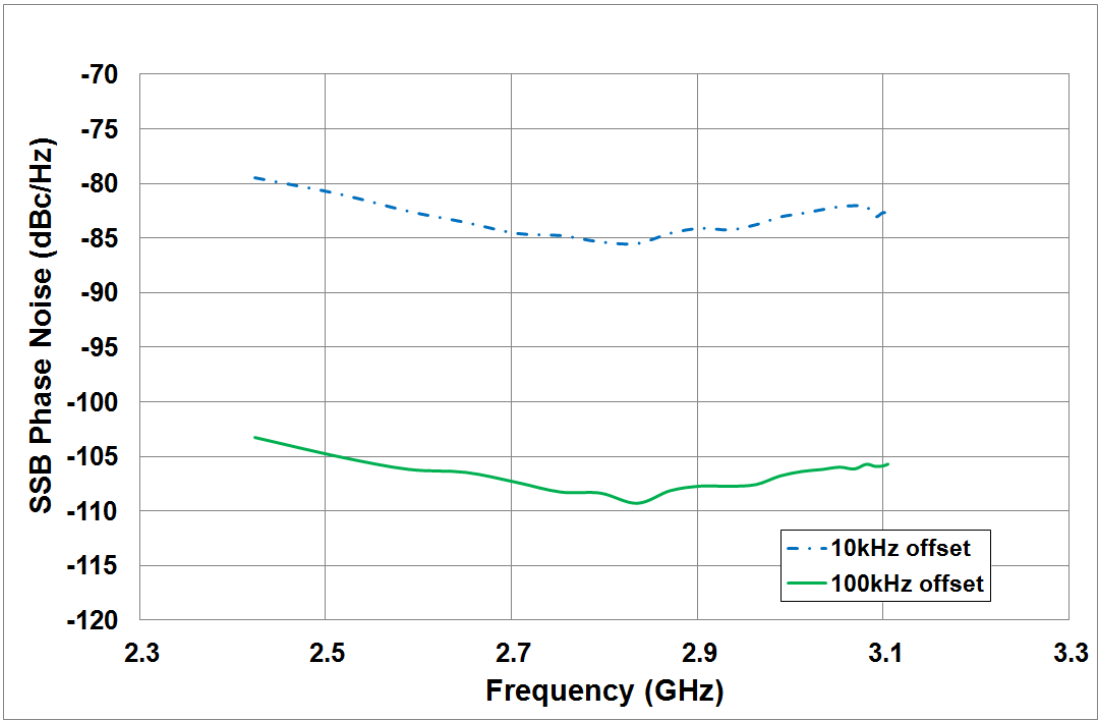
Measurements in the package planes.

Typical SSB Phase Noise @ Vtune= +2 / +4 / +6V



Phase Noise versus Frequency



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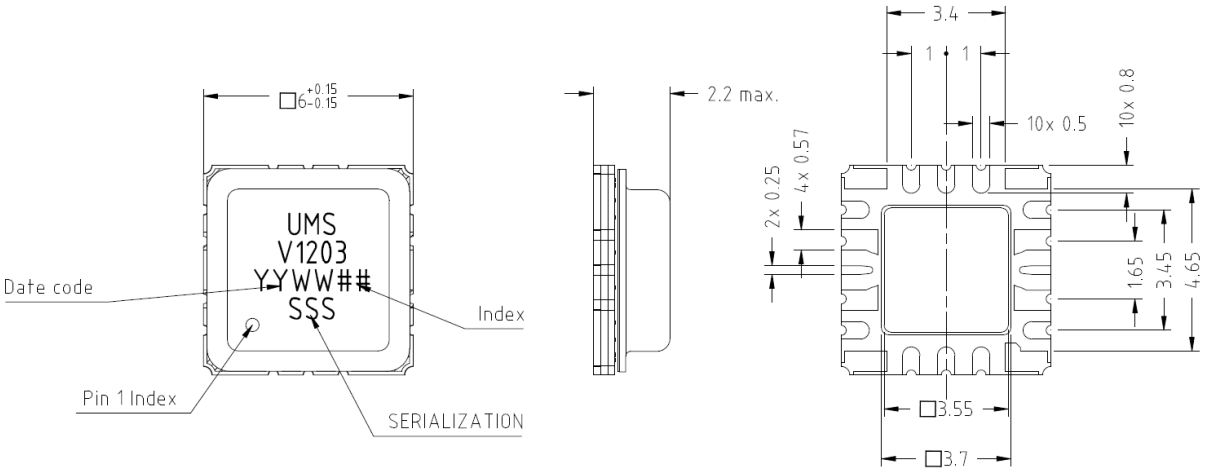
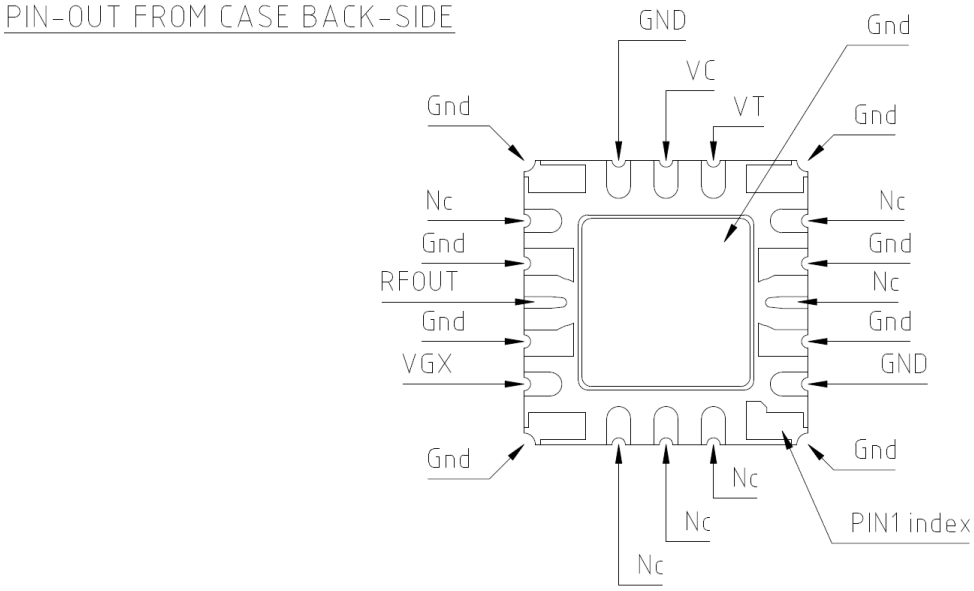
Package outline (1)





All dimensions are in mm

(1) 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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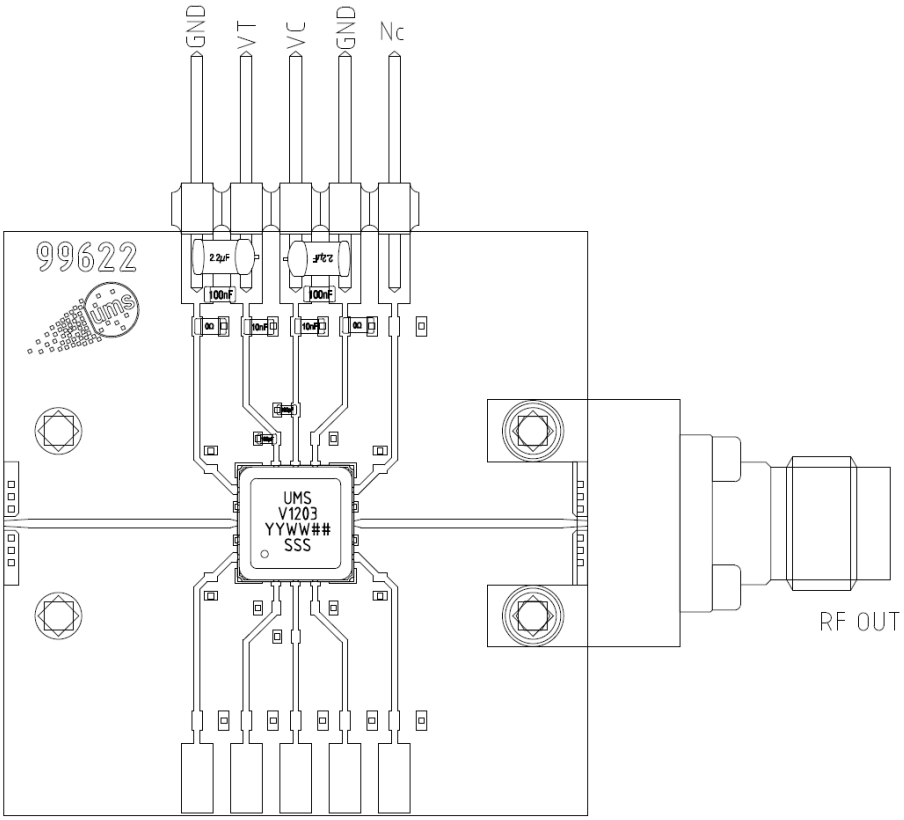
Evaluation mother board

- Compatible with the proposed footprint.
- Based on typically Ro4003 / 8mils or equivalent.
- Using a micro-strip to coplanar transition to access the package.
- Recommended for the implementation of this product on a module board.
- Decoupling capacitors of 100pF, 10nF ±10% and 100nF, 2.2µF ±10% are recommended for all DC accesses.



Typical Bias Conditions

Tamb.= +25°C

Symbol	Pad N°	Parameter	Values	Unit
Vc	VC	Positive supply voltage	3	V
VT	VT	Tuning Voltage	0 to 10	V

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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.

FAA Type Surface Mount Hermetic Package

Refer to the application note AN0024 available at http://www.ums-gaas.com for assembly recommendations for the UMS FAA package products.

Sampling request reference

Leadless hermetic package: ES-CHV1203-FAA

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