

Fully Integrated HBT Q-band VCO based on Ku-band Oscillator and Q-band Multiplier

GaAs Monolithic Microwave IC

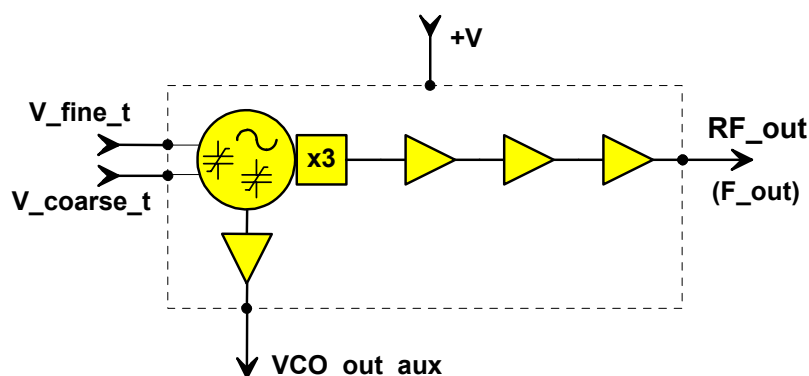
Description

The CHV2244A is a monolithic multifunction for frequency generation. It integrates a Ku-band oscillator with frequency control (VCO), a Q-band filter and buffer amplifiers. The VCO is fully integrated on HBT process. On chip base-collector diodes are used as varactors. Two tuning ports are available with different tuning sensitivity. All the active devices are internally self biased.

The circuit is manufactured on HBT process: 2 μ m emitter length, via holes through the substrate and high Q passive elements.

Main Features

- Ku-band VCO + Q-band buffers
- Fully integrated VCO
- Two tuning ports
- Low phase noise
- Wide frequency tuning range
- PLL oriented: output at VCO frequency
- High temperature range
- High frequency stability
- On-chip self biasing
- Automatic assembly oriented
- Chip size 2.0 x 1.46 x 0.1 mm
- BCB layer protection



Multifunction block diagram

Main Characteristics

Tamb = +25°C

Symbol	Parameter	Min	Typ	Max	Unit
F_out	Specified output frequency range	38	38.25	38.5	GHz
F_vco	Oscillator frequency	F_out/3			
F_tune1	Total output frequency tuning range		5		GHz
Pout	Output power		4		dBm

ESD Protections : Electrostatic discharge sensitive device observe handling precautions !

Electrical Characteristics

Full temperature range

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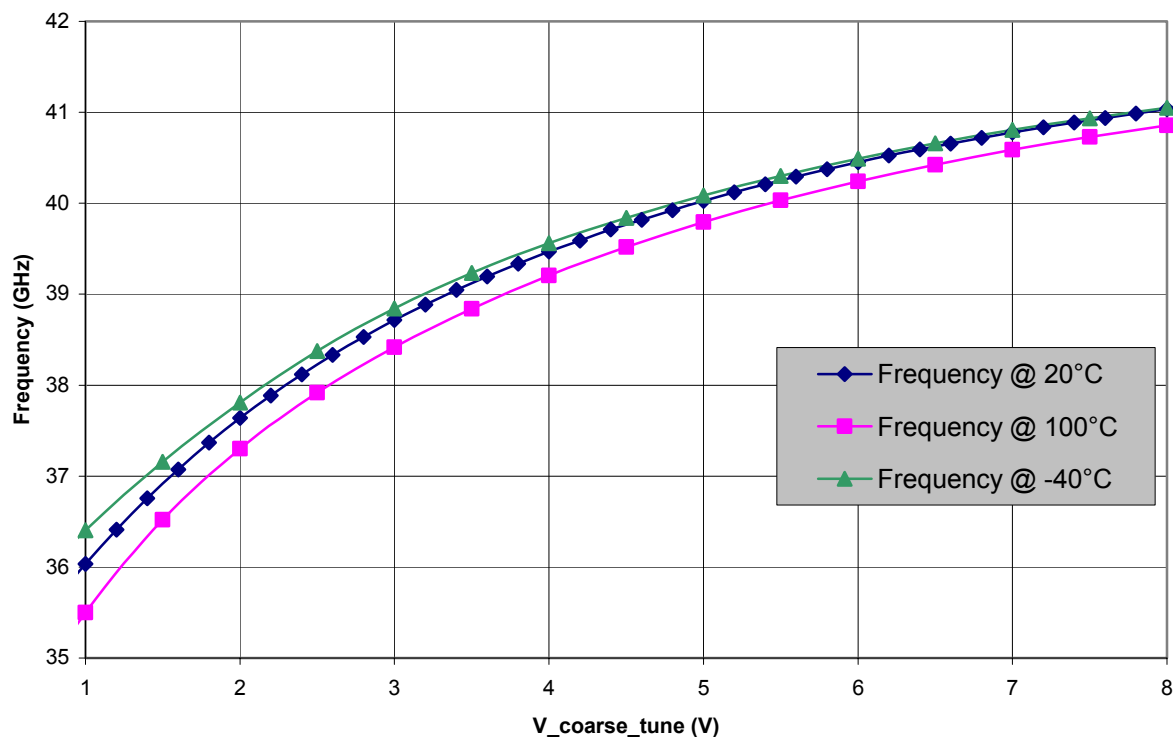
Symbol	Parameter	Min	Typ	Max	Unit
F_out	Specified output frequency range	38	38.25	38.5	GHz
F_vco	VCO frequency	F_out/3			
F_tune1	Total frequency tuning range using V_coarse_tune and V_fine_tune in parallel (@ F_out)		5		GHz
F_tune2	Frequency tuning range using V_fine_tune (@ F_out)		1000		MHz
$\Delta F_{tune}(T)$	Maximum variation of Frequency over temperature (1)		500	1000	MHz
P_out	Output power on RF_out port (1)	0	4		dBm
H1	Sub-harmonics rejection (Fout/3) (1)		10		dBc
H2	Sub-harmonics rejection (2*Fout/3) (1)		20		dBc
P_VCO	VCO output power on VCO_out_aux port (1)	-10	-0		dBm
V_coarse_tune	Control voltage range on V_coarse_tune port		1 - 8		V
V_fine_tune	Control voltage range on V_fine_tune port		1 - 4		V
F_slope_1	Frequency tuning slope using V_coarse_tune and V_fine_tune in parallel	600	1200	2400	MHz/v
F_slope_2	Frequency tuning slope on V_fine_tune port	300	600	1200	MHz/v
P_V+	Frequency pushing vs. supply voltage (2)		200		MHz/v
PN	Phase noise (given at F_out) (2) @ 10kHz @ 100kHz @ 1MHz		-52 -82 -109	-47 -77 -104	dBc/ Hz
+V	Positive supply voltage	4.75	5	5.25	V
+I	Positive supply current		180		mA
Top	Operating temperature range	-40		+100	°C

Specified within F_out (38 to 38.5GHz).

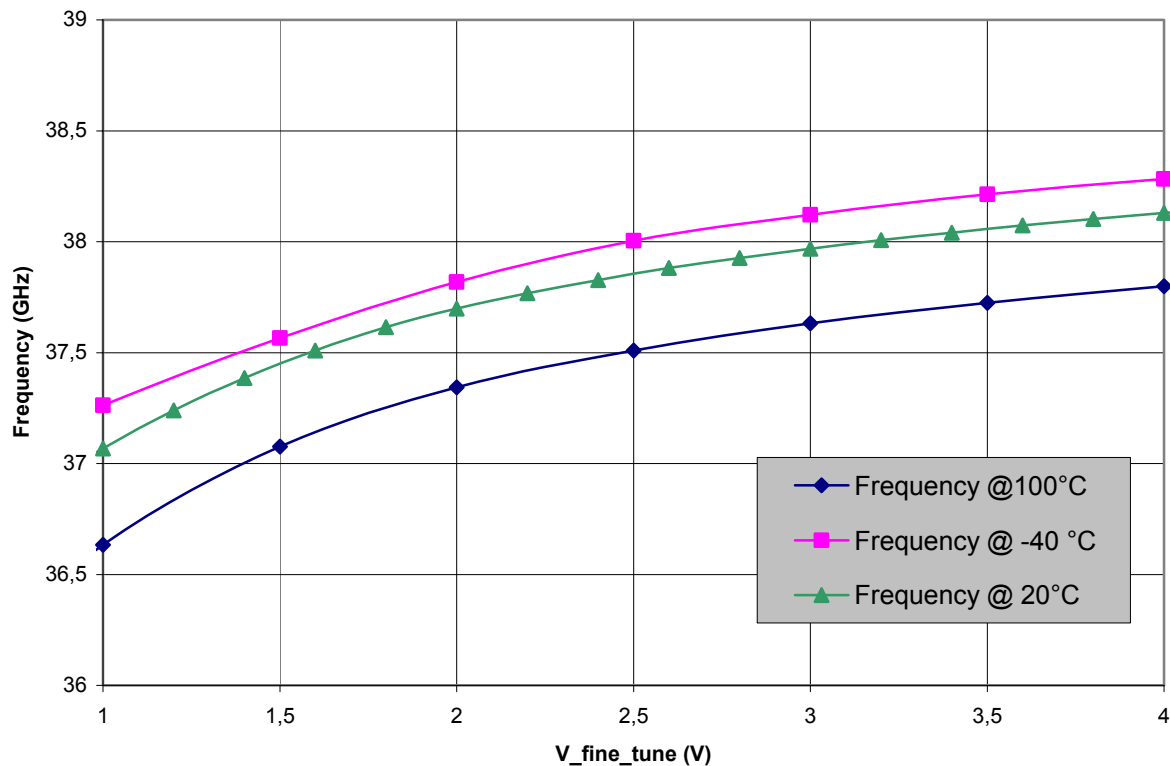
Absolute Maximum Ratings (1)

Symbol	Parameter	Values	Unit
V_tune	Tuning voltage	12	V
+V	Positive supply voltage	6	V
+I	Positive supply current	250	mA
Tstg	Storage temperature range	-55 to +155	°C

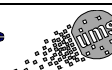
(1) Operation of this device above anyone of these parameters may cause permanent damage.

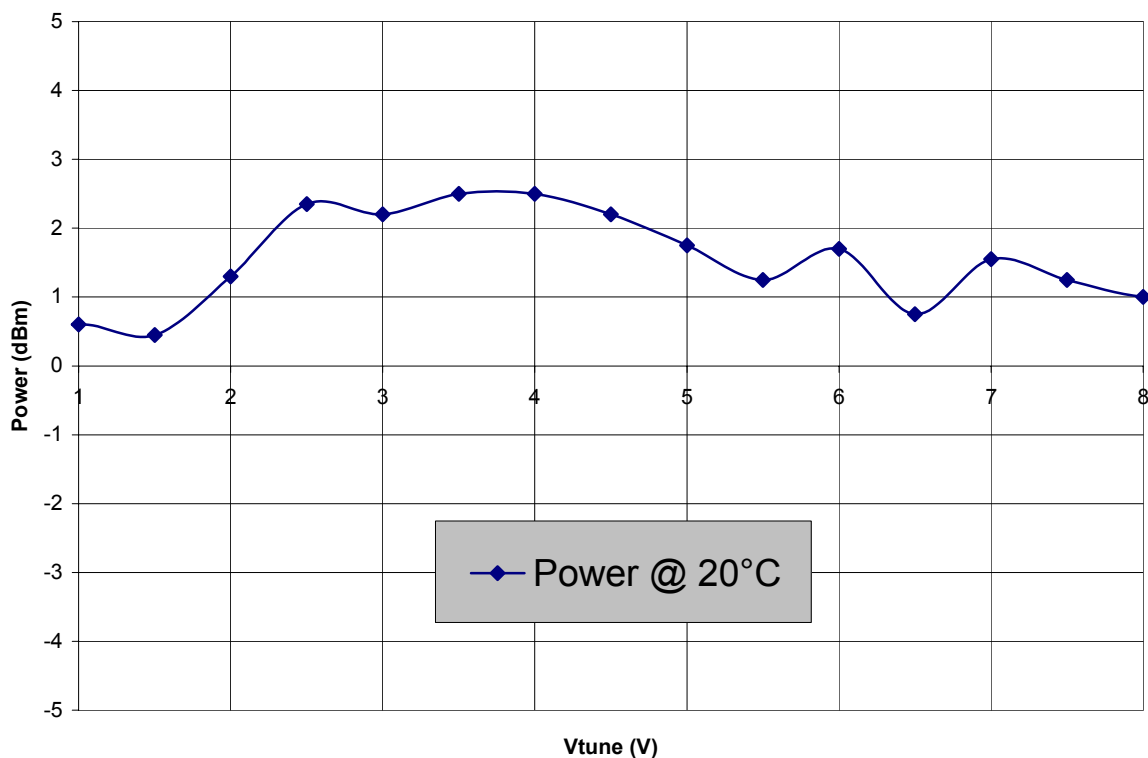
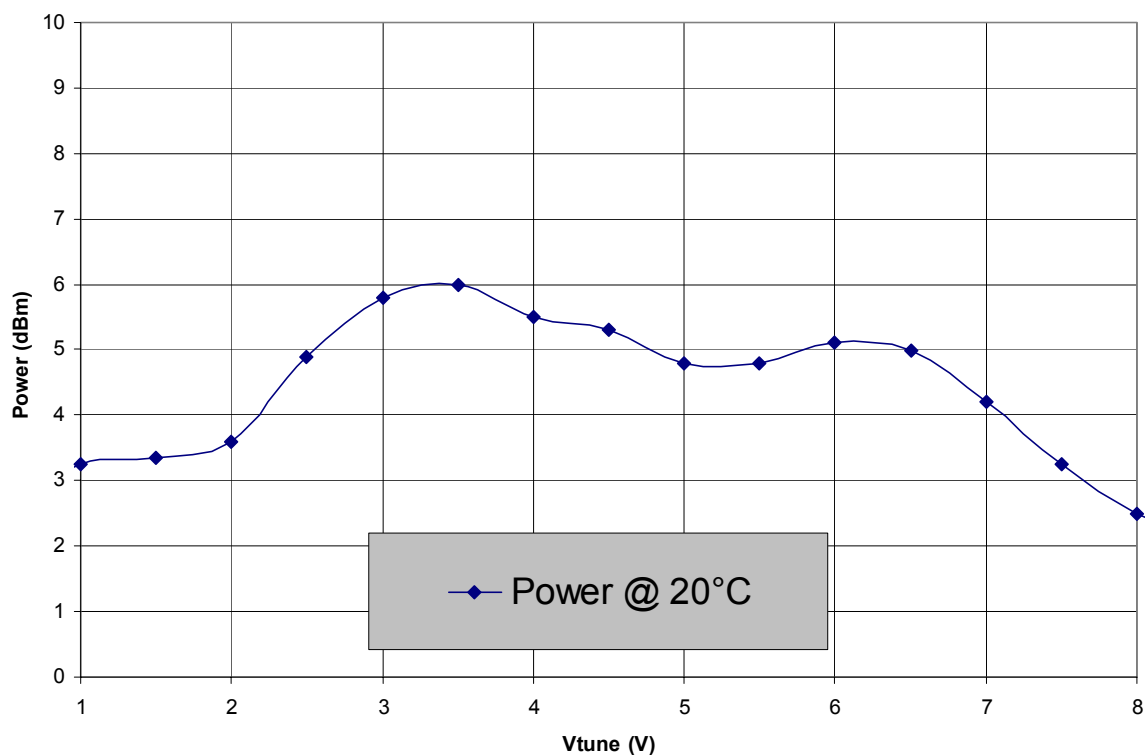
Frequency Characteristics**PRELIMINARY**

Frequency tuning characteristic (RF_out) with V_{coarse_t} in parallel with V_{fine_t}



Frequency tuning characteristic on (RF_out) vs. V_{coarse_tune}
 ($V_{fine_tune} = 1$ to 4V step 0.25V @ $V_{coarse_tune} = 2$ V)

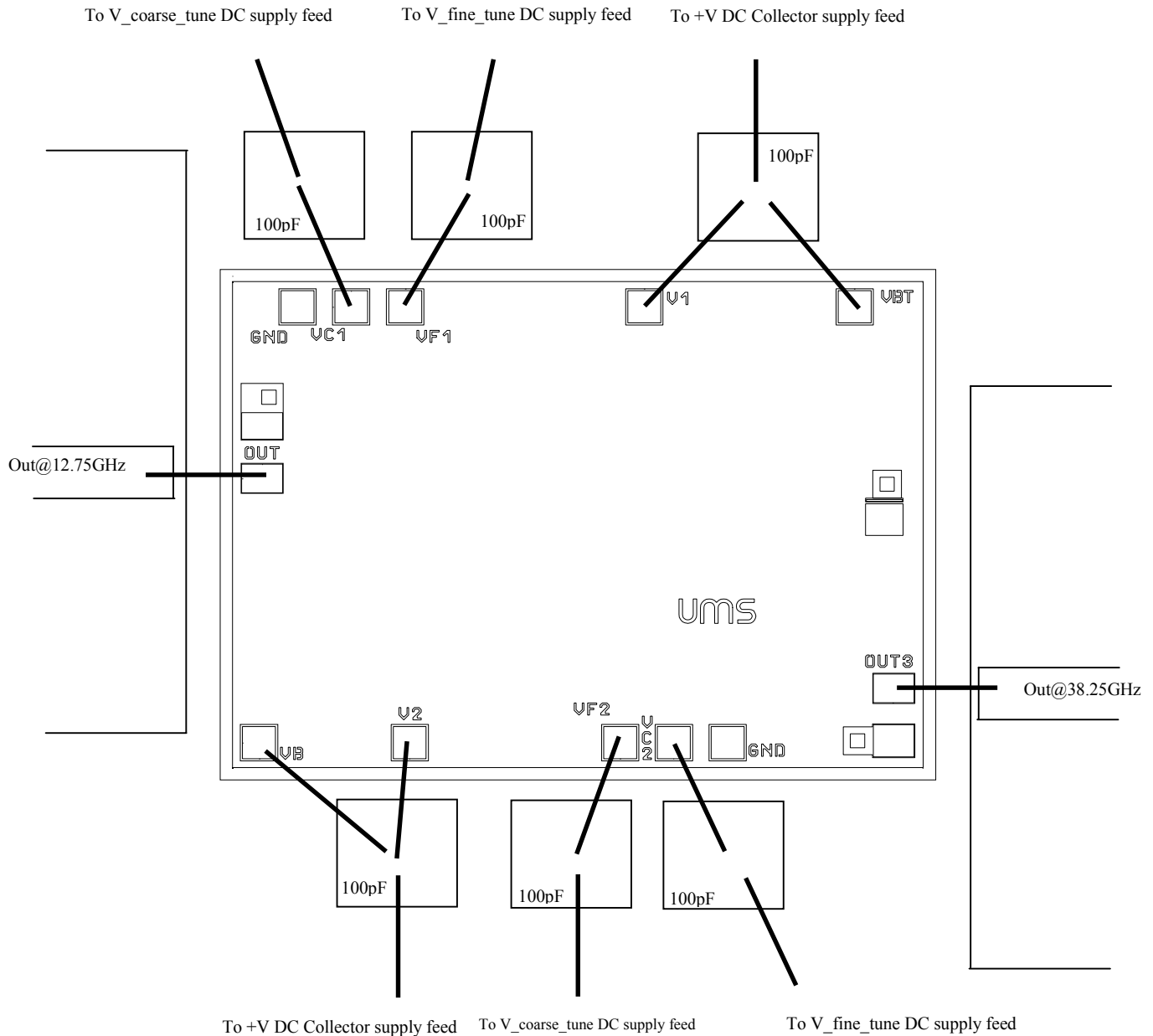


Output Powers on Main and Prescaler Ports**PRELIMINARY****Output Power @ 12.75GHz (VCO_out_aux) vs. V_coarse_tune in parallel with V_fine_tune****Output Power @ 38.25GHz (RF_out) vs. V_coarse_tune in parallel with V_fine_tune**

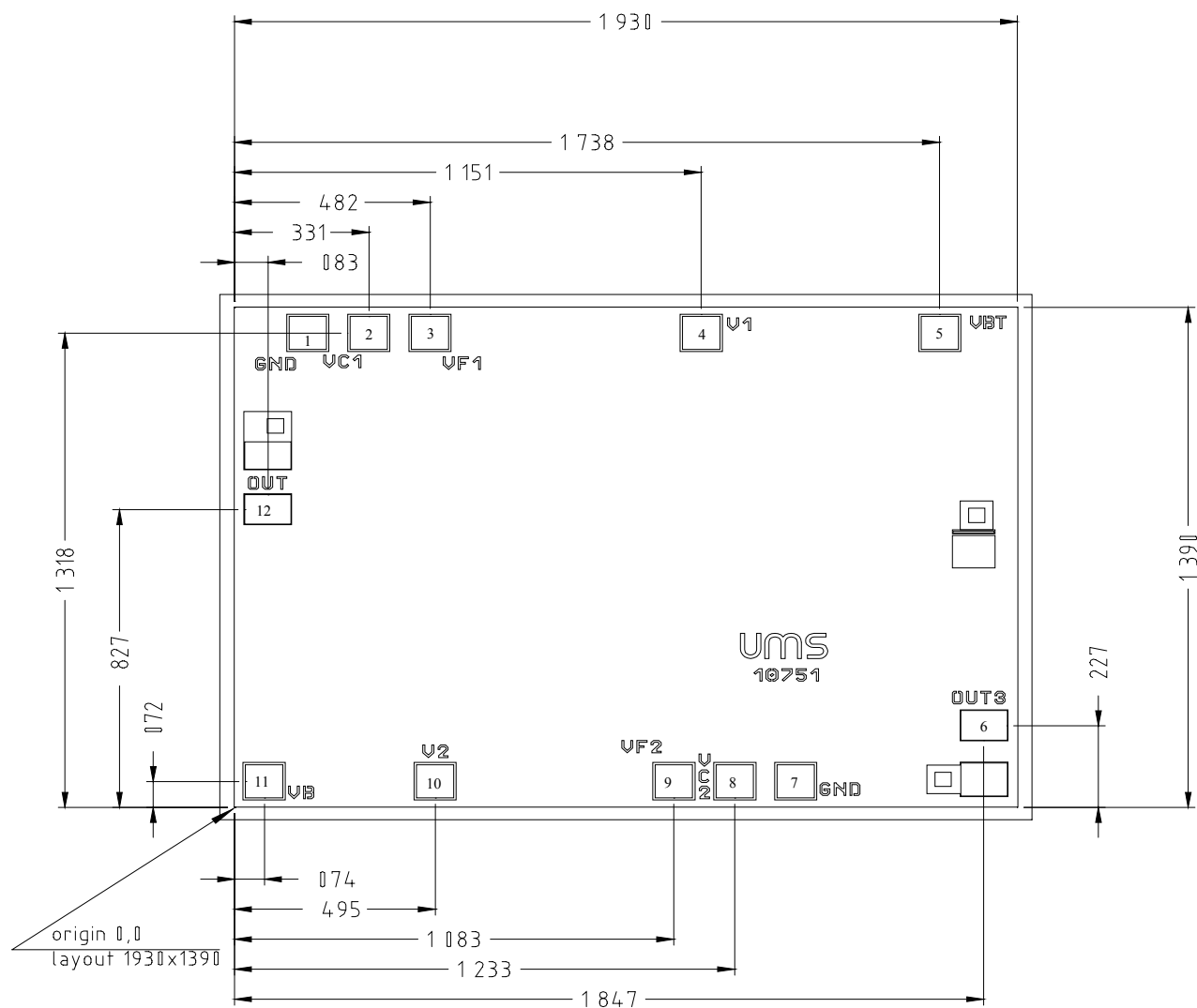
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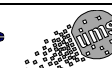
Specifications subject to change without notice

Chip Assembly and Bias Configuration**PRELIMINARY**

This drawing shows an example of assembly and bias configuration. All the transistors are internally self biased. The positive and tuning voltages can be respectively connected together according to the recommended values given in the electrical characteristics table. **Due to the high value of frequency sensitivity versus tuning voltage (around 1000 MHz/V), the signal applied to V_{coarse_tune} and V_{fine_tune} ports must exhibit very low level of noise.**

Chip Mechanical Data and Pin References**PRELIMINARY**Unit = μm External chip size (including dicing streets) = $2000 \pm 35 \times 1460 \pm 35 \mu\text{m}$ Chip thickness = $100 \pm 10 \mu\text{m}$ HF Pads (Pins 6 and 12) = $108 \times 76 \mu\text{m}$ DC/IF Pads (Pins 2, 3, 4, 5, 8, 9, 10 and 11) = $86 \times 86 \mu\text{m}$

Pin number	Pin name	Symbol Name	Description
1,7	GND		Ground : optional use
2,8	VC1, VC2	V_coarse_tune	Coarse Tuning Ports
3,9	VF1, VF2	V_fine_tune	Fine Tuning Ports
4,5,10,11	V1, VBT, V2, VB	+V	Positive supply voltage
6	OUT3	F_out	RF output at 38.25 GHz
12	OUT	F_out/3	RF output at 12.75 GHz



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Ordering Information

Chip form : CHV2244A-98F/00

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