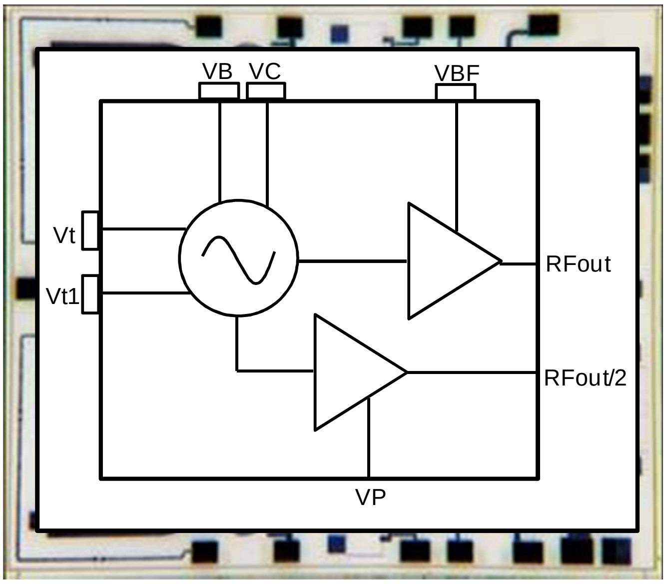
MECVCOKU1

Ku-Band GaAs HBT VCO



Main Features

- GaAs HBT Technology
- Dual output frequency range: f_{out} and $f_{out}/2$
  Vt=Vt1 from 1.5 to 11 V
  f_{out} = 10.39 to 12.31 GHz
  Phase Noise = -75 dBc/Hz @10 kHz
- No external resonator needed
- Chip size: 2.6 x 3 mm^2

Typical Applications

- Point to point and multipoint radios
- Test equipment and industrial controls
- SAR antennas

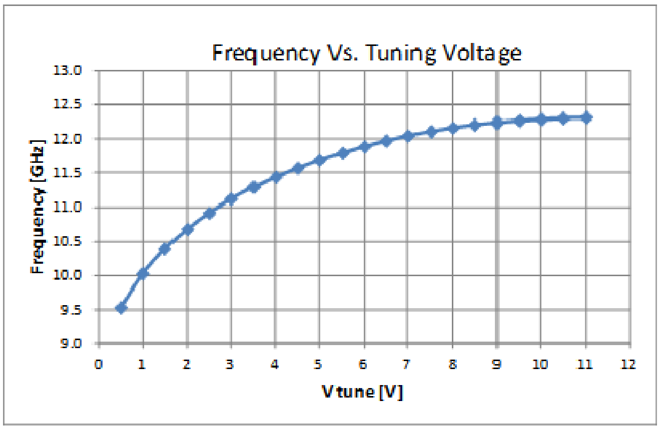
Product Description

MECVCOKU1 is a monolithic microwave integrated circuit (MMIC) voltage controlled oscillator (VCO) designed and tested by MEC for Ku-Band applications.

In addition to the Ku band RF output (RFout), this VCO provides a half frequency output (RFout/2).

In the frequency range from 10.4 GHz to 12.3 GHz MECVCOKU1 provides more than 7 dBm of output power and a phase noise of about -75 dBc/Hz at 10 KHz offset with 5 V supply voltage.

Measured Data



Main Characteristics

Test Conditions: T_{base_plate} = 25 °C

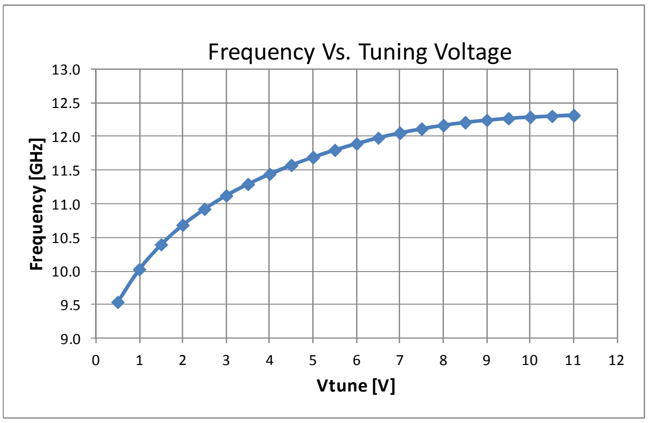
Parameter	Min	Typ	Max	Unit
Frequency Range Output Frequency (fout) Half Output Frequency (fout/2)	 10.39 5.19		 12.31 6.15	 GHz GHz
Output Power RFout RFout/2	 7 2.7		 10.1 6.2	 dBm dBm
Phase Noise @ 10 kHz Offset @ 100 kHz Offset @ 1 MHz Offset		 -75 -105 -130		 dBc/Hz dBc/Hz dBc/Hz
Tuning Voltage (Vt=Vt1)	1.5		11	V
Supply Voltage (Vcc)		5		V
Supply Current (Icc)		143		mA
Harmonic Attenuation 1/2 3/2 2nd	 -22 -47 -35			 dBc dBc dBc
Pulling (into a 2.0:1 VSWR)			0.4	MHz_pp
Pushing @ Vtune=5V			12.8	MHz/V
Sensitivity			580	MHz/V
DC Power Consumption		0.715		W

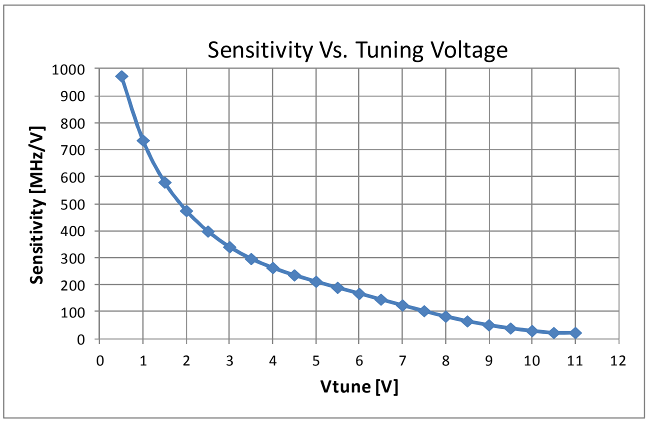
MECVCOKU1

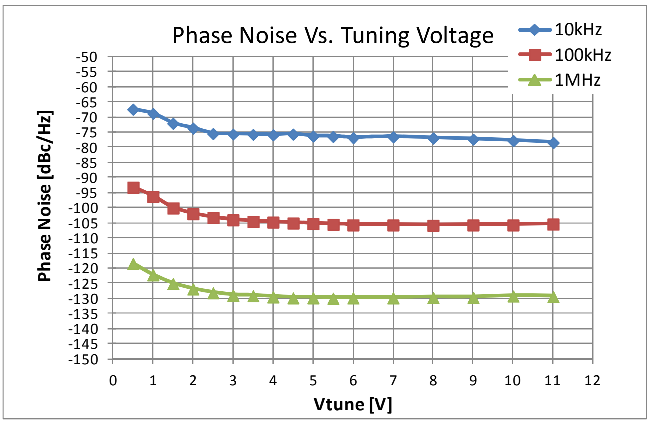
Ku-Band GaAs HBT VCO

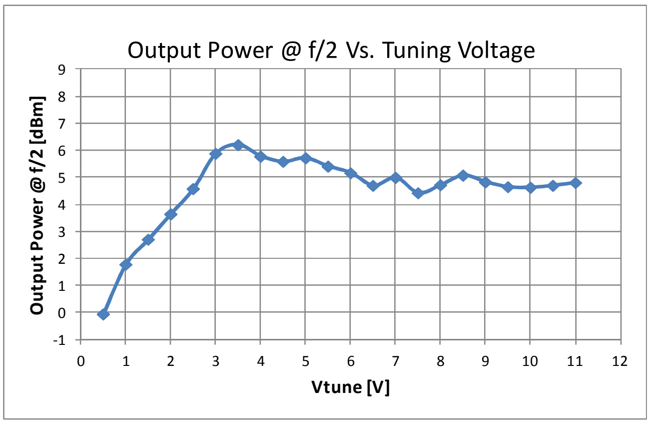
Measurement Performances

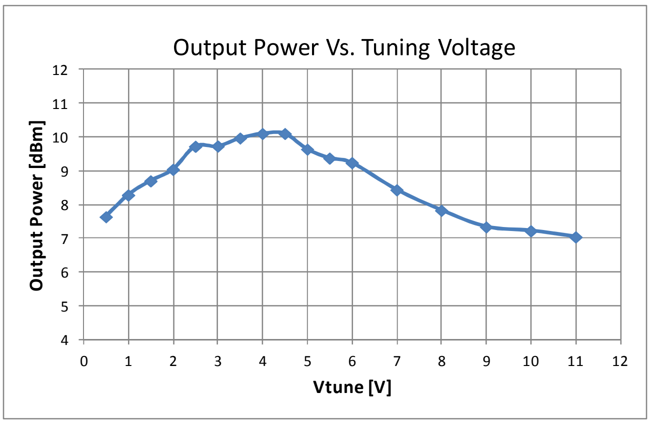
Test Conditions: T_{base_plate} = 25 °C, Vcc = 5 V, Icc = 143 mA

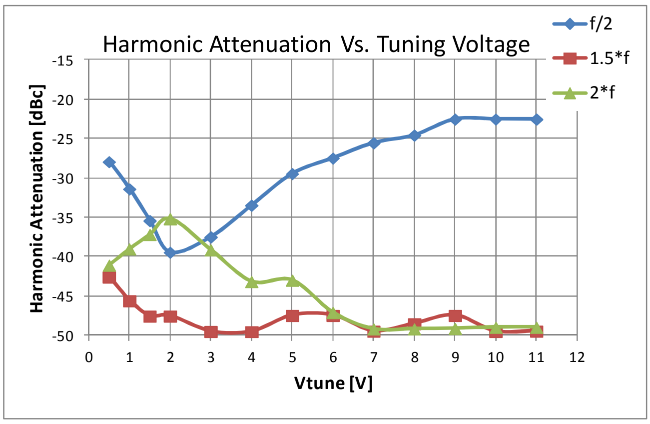






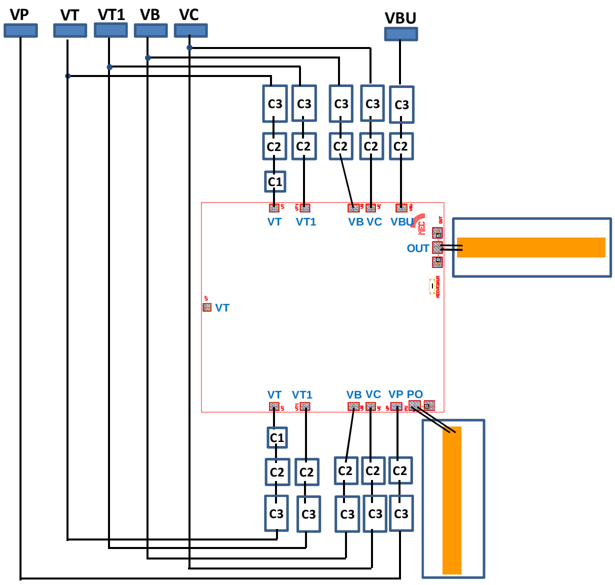




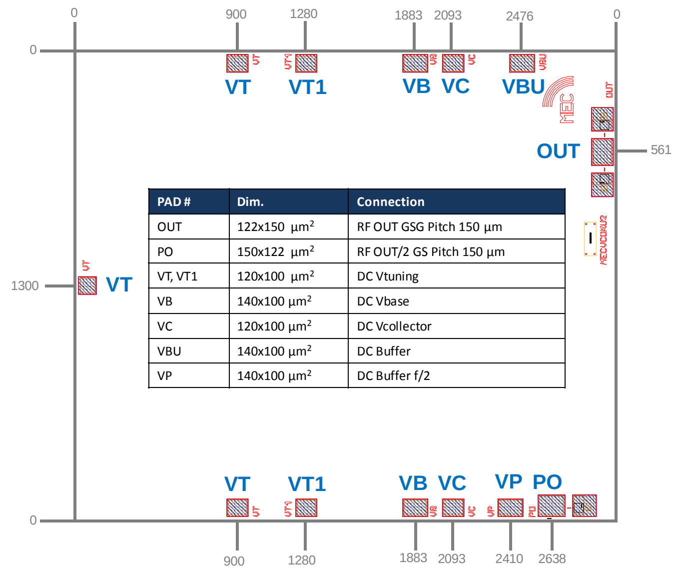


Bond Pad Configuration & Assembly Recommendations

1st configuration



Bond Pad #	Connection	External Components
OUT and PO	2 Bonding Wires L_bond = 0.3 nH	
VT Vtuning	L_bond ≤ 1 nH	C1 = 100pF/10V C2 = 10nF/10V C3 = 1μF/10V
VT1 Vtuning	L_bond ≤ 1 nH	C2 = 10nF/10V C3 = 1μF/10V
VB Vbase	L_bond ≤ 1 nH	C2 = 10nF/10V C3 = 1μF/10V
VC Vcollector	L_bond ≤ 1 nH	C2 = 10nF/10V C3 = 1μF/10V
VBU Vbuffer	L_bond ≤ 1 nH	C2 = 10nF/10V C3 = 1μF/10V
VP Vbuffer f/2	L_bond ≤ 1 nH	C2 = 10nF/10V C3 = 1μF/10V



PAD #	Dim.	Connection
OUT	122x150 μm²	RF OUT GSG Pitch 150 μm
PO	150x122 μm²	RF OUT/2 GS Pitch 150 μm
VT, VT1	120x100 μm²	DC Vtuning
VB	140x100 μm²	DC Vbase
VC	120x100 μm²	DC Vcollector
VBU	140x100 μm²	DC Buffer
VP	140x100 μm²	DC Buffer f/2

Eutectic Die bond using AuSn (80/20) solder is recommended.

The backside of the die is the Source (ground) contact.

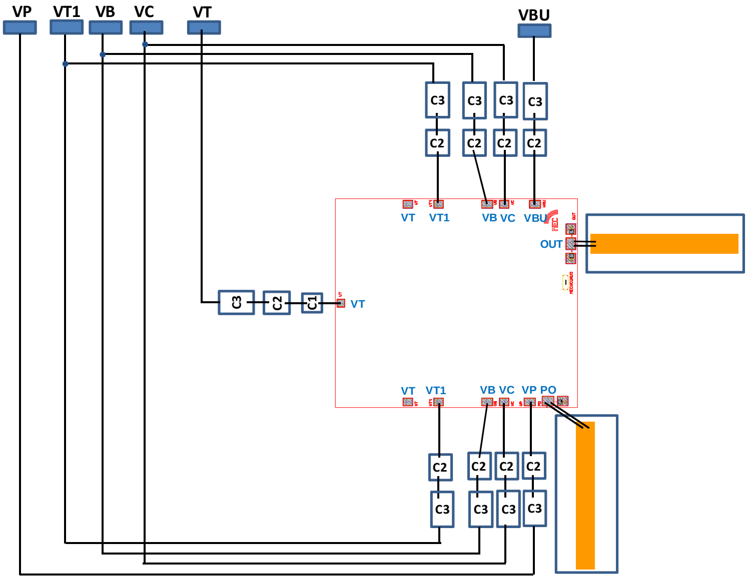
Thermosonic ball or wedge bonding are the preferred connection methods.

Gold wire must be used for connections.

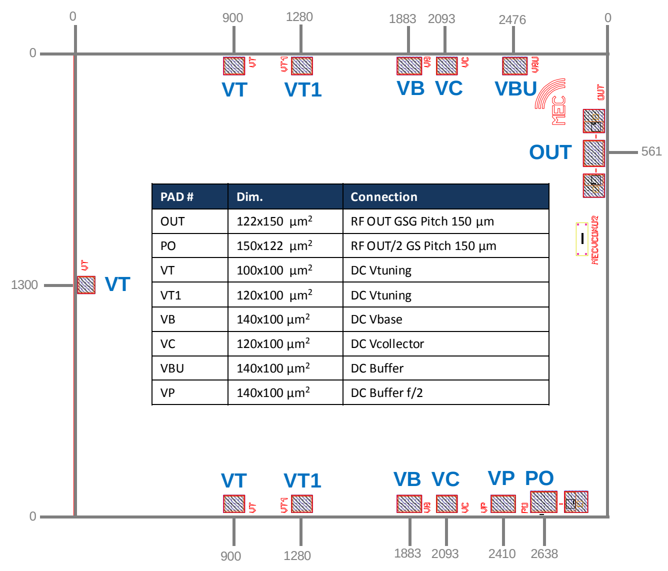
MICROWAVE ELECTRONICS FOR COMMUNICATIONS

Bond Pad Configuration & Assembly Recommendations

2nd configuration



Bond Pad #	Connection	External Components
OUT and PO	2 Bonding Wires L_bond = 0.3 nH	
VT Vtuning	L_bond ≤ 1 nH	C1 = 100pF/10V C2 = 10nF/10V C3 = 1µF/10V
VT1 Vtuning	L_bond ≤ 1 nH	C2 = 10nF/10V C3 = 1µF/10V
VB Vbase	L_bond ≤ 1 nH	C2 = 10nF/10V C3 = 1µF/10V
VC Vcollector	L_bond ≤ 1 nH	C2 = 10nF/10V C3 = 1µF/10V
VBU Vbuffer	L_bond ≤ 1 nH	C2 = 10nF/10V C3 = 1µF/10V
VP Vbuffer f/2	L_bond ≤ 1 nH	C2 = 10nF/10V C3 = 1µF/10V



PAD #	Dim.	Connection
OUT	122x150 µm²	RF OUT GSG Pitch 150 µm
PO	150x122 µm²	RF OUT/2 GS Pitch 150 µm
VT	100x100 µm²	DC Vtuning
VT1	120x100 µm²	DC Vtuning
VB	140x100 µm²	DC Vbase
VC	120x100 µm²	DC Vcollector
VBU	140x100 µm²	DC Buffer
VP	140x100 µm²	DC Buffer f/2

Eutectic Die bond using AuSn (80/20) solder is recommended.

The backside of the die is the Source (ground) contact.

Thermosonic ball or wedge bonding are the preferred connection methods.

Gold wire must be used for connections.

Bias Procedure

Bias-Up

1. Set VT and Vt1 to 5 V and turn on.
2. Set VBU to 0 V and turn on.
3. Set VP to 0 V and turn on.
4. Increase VBU to 5 V (IBU ≈ 18 mA).
5. Increase VP to 5 V (IP ≈ 25 mA).
6. Set VB to 0 V and turn on.
7. Set VC to 0 V and turn on.
8. Increase VC to 5 V.
9. Increase VB to 5 V (IB ≈ 26 mA, IC = 74 mA).
10. Sweep VT and Vt1 from 0.5 V to 11 V.

Bias-Down

1. Set VB to 0 V and turn off.
2. Set VC to 0 V and turn off.
3. Set VP to 0 V and turn off.
4. Set VBU to 0 V and turn off.
5. Turn off VT and Vt1.

Contact Information

For additional technical Information and Requirements:

Email**:** **contact.mec@mec-mmic.com** Tel: **+39 0516333403**

For sales Information and Requirements:

Email**:** **sales@mec-mmic.com** Tel: **+39 0637511124**

Notice

The furbished information is believed to be reliable. However, performances and specifications contained herein are based on preliminary characterizations and then susceptible to possible variations. On the basis of customer requirements the product can be tested and characterized in specific operating conditions and, if needed, tuned to meet custom specifications.

The contents of this document are under the copyright of MEC srl. It is released by MEC srl on condition that it shall not be copied in whole, in part or otherwise reproduced (whether by photographic, reprographic, or any other method) and the contents thereof shall not be divulged to any person other than inside the company at which has been provided by MEC.