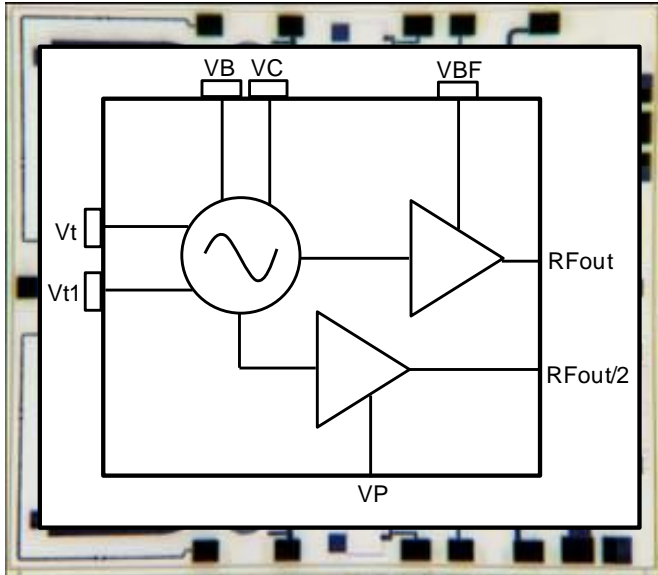


Ku-Band GaAs HBT VCO



Product Description

MECVOKU2 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).

To improve the output power flatness, the tuning voltage Vt1, normally swept as Vt, can be set to a fixed value.

In the frequency range from 11 GHz to 12.56 GHz MECVCOKU2 provides more than 7 dBm of output power and a noise phase of about -75 dBc/Hz at 10 KHz offset with 5 V supply voltage.

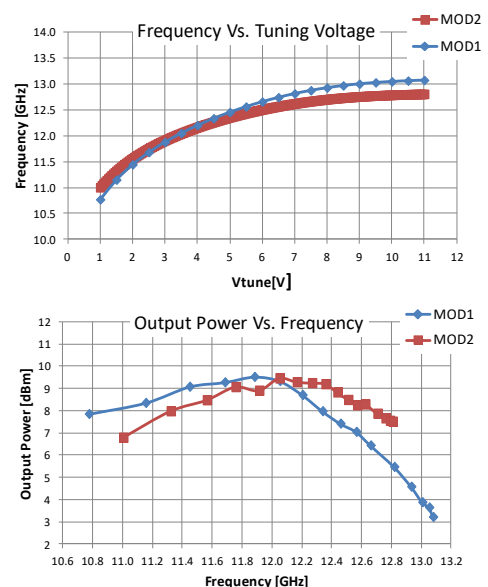
Main Features

- GaAs HBT Technology
- Dual output frequency range: f_{out} and $f_{out}/2$
 - **MOD1:** $V_t=V_{t1}$ from 1 to 11 V
 $f_{out} = 10.77$ to 13.08 GHz
 Phase Noise = -75 dBc/Hz @ 10 kHz
 - **MOD2:** V_t from 1 to 11 V, $V_{t1}=3.5$ V
 $f_{out} = 11$ to 12.81 GHz
 Phase Noise = -75 dBc/Hz @ 10 kHz
- No external resonator needed
- Chip size: 2.6×3 mm²

Typical Applications

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

Measured Data



Main Characteristics

Test Conditions: $T_{\text{base_plate}} = 25\text{ }^{\circ}\text{C}$, MOD1 (sweeping $V_t=V_{t1}$)

Parameter	Min	Typ	Max	Unit
Frequency Range				
Output Frequency (f_{out})	11		12.56	GHz
Half Output Frequency ($f_{\text{out}}/2$)	5.5		6.28	GHz
Output Power				
RF_{out}	7		9.5	dBm
$RF_{\text{out}}/2$	6		7.7	dBm
Phase Noise				
@ 10 kHz Offset		-75		dBc/Hz
@ 100 kHz Offset		-104		dBc/Hz
@ 1 MHz Offset		-128		dBc/Hz
Tuning Voltage ($V_t=V_{t1}$)	1.3		5.5	V
Supply Voltage (V_{cc})		5		V
Supply Current (I_{cc})		145		mA
Harmonic Attenuation				
1/2	-19			dBc
3/2	-39			dBc
2nd	-33			dBc
Pulling (into a 2.0:1 VSWR)			0.3	MHz _{pp}
Pushing @ $V_{\text{tune}}=5\text{V}$			32	MHz/V
Sensitivity			700	MHz/V
DC Power Consumption		0.725		W

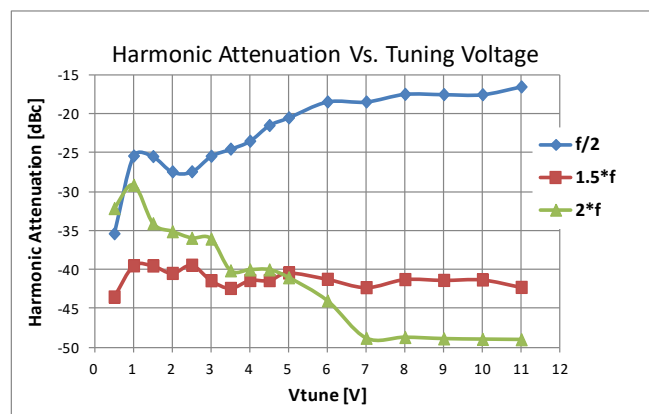
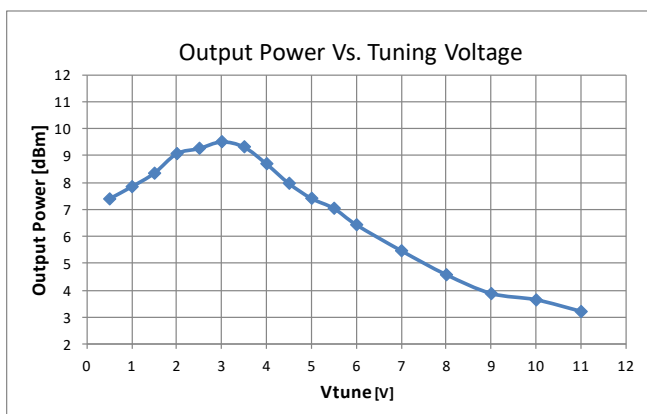
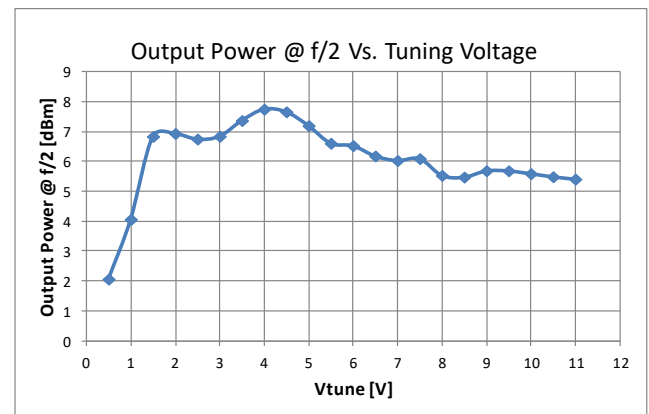
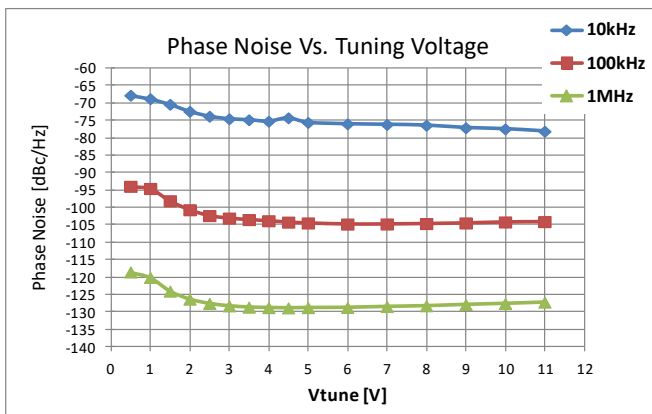
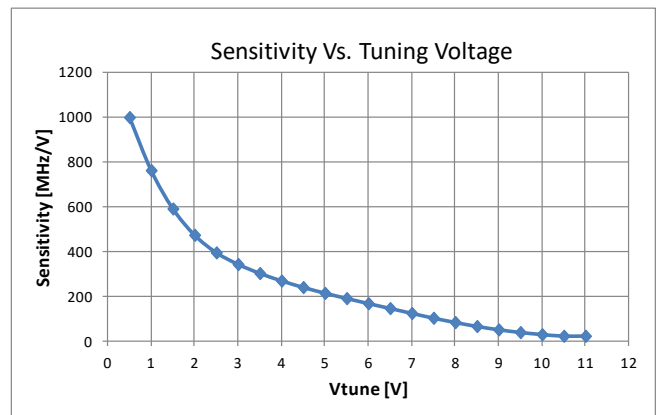
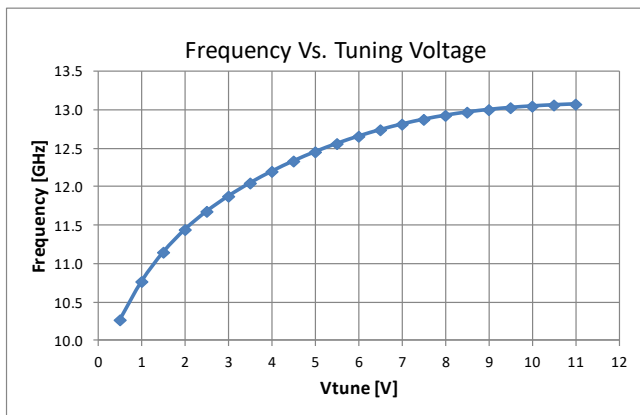
Main Characteristics

Test Conditions: $T_{\text{base_plate}} = 25\text{ }^{\circ}\text{C}$, MOD2 (sweeping V_t , $V_{t1}=3.5\text{ V}$)

Parameter	Min	Typ	Max	Unit
Frequency Range				
Output Frequency (f_{out})	11.65		12.81	GHz
Half Output Frequency ($f_{\text{out}}/2$)	5.78		6.4	GHz
Output Power				
RF_{out}	7.5		9.4	dBm
$RF_{\text{out}}/2$	6.5		8	dBm
Phase Noise				
@ 10 kHz Offset		-75		dBc/Hz
@ 100 kHz Offset		-103		dBc/Hz
@ 1 MHz Offset		-128		dBc/Hz
Tuning Voltage (V_t), $V_{t1}=3.5\text{ V}$	2		11	V
Supply Voltage (V_{cc})		5		V
Supply Current (I_{cc})		145		mA
Sensitivity			430	MHz/V
DC Power Consumption		0.725		W

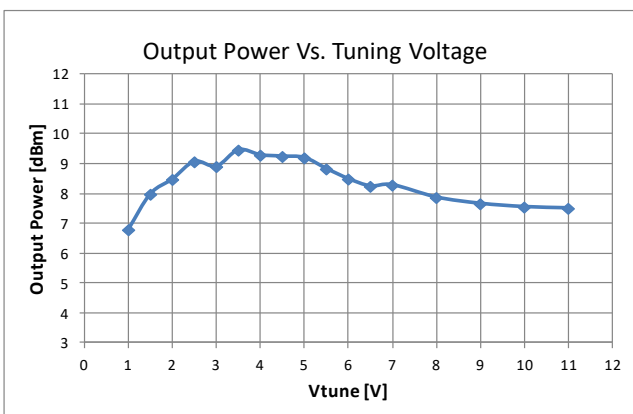
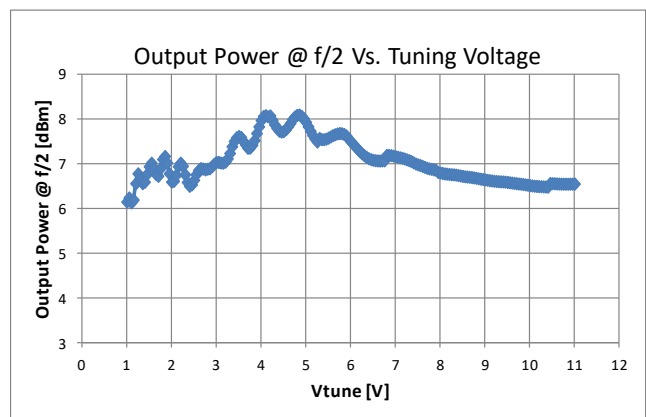
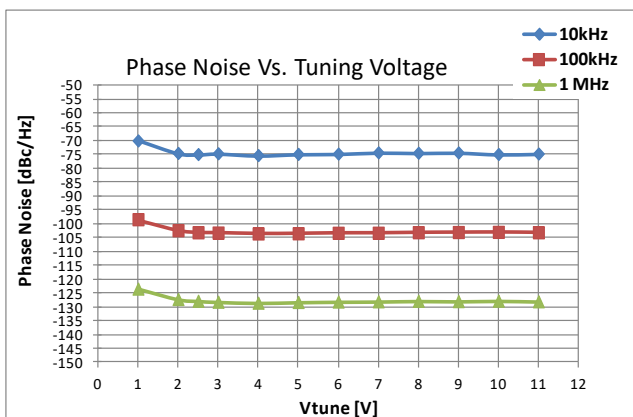
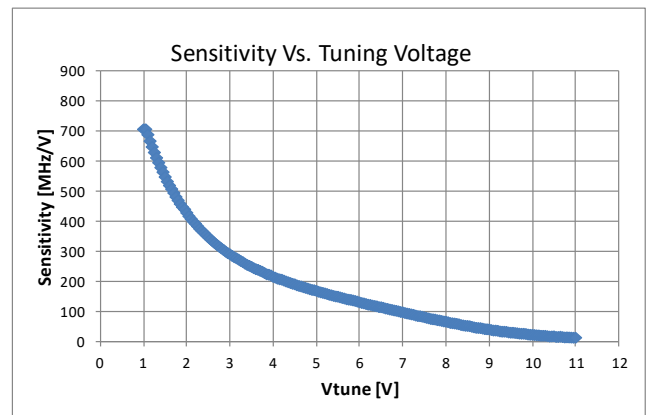
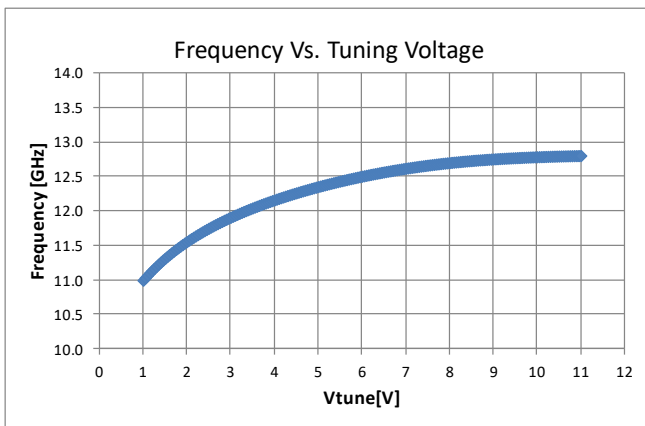
Measurement Performances

Test Conditions: $T_{\text{base_plate}} = 25\text{ }^{\circ}\text{C}$, $V_{\text{cc}} = 5\text{ V}$, $I_{\text{cc}} = 145\text{ mA}$, MOD1 (sweeping $V_t = V_{t1}$)



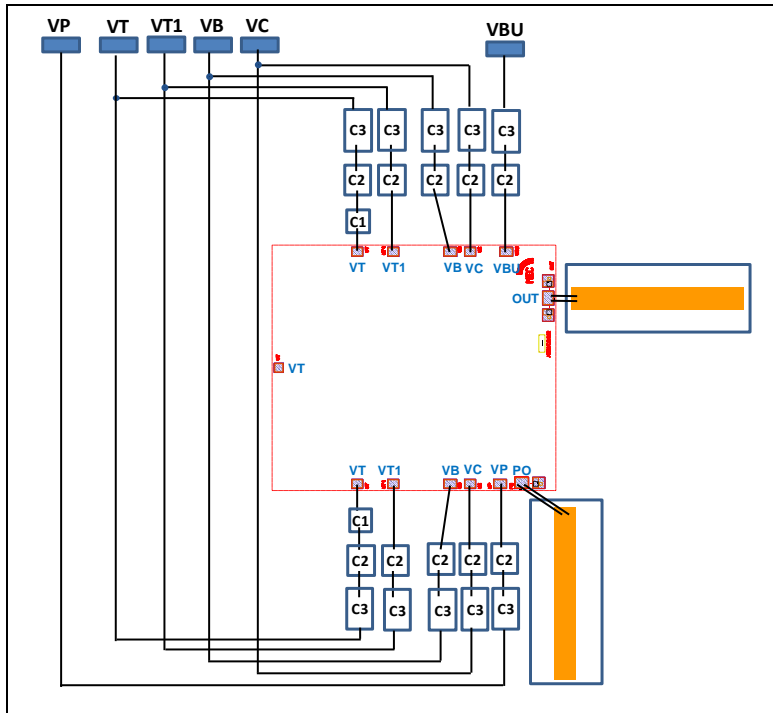
Measurement Performances

Test Conditions: $T_{\text{base_plate}} = 25\text{ }^{\circ}\text{C}$, $V_{\text{cc}} = 5\text{ V}$, $I_{\text{cc}} = 145\text{ mA}$, MOD2 (sweeping V_t , $V_{t1}=3.5\text{ V}$)

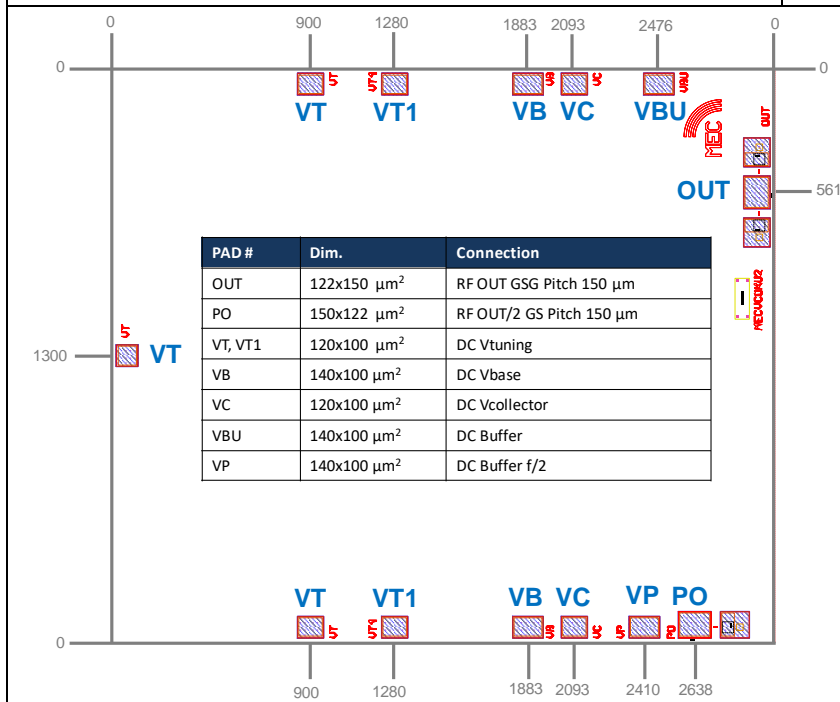


Bond Pad Configuration & Assembly Recommendations

1st configuration



Bond Pad #	Connection	External Components
OUT and PO	2 Bonding Wires $L_{bond} = 0.3nH$	
VT Vtuning	$L_{bond} \leq 1 nH$	C1 = 100pF/10V C2 = 10nF/10V C3 = 1μF/10V
VT1 Vtuning	$L_{bond} \leq 1 nH$	C2 = 10nF/10V C3 = 1μF/10V
VB Vbase	$L_{bond} \leq 1 nH$	C2 = 10nF/10V C3 = 1μF/10V
VC Vcollector	$L_{bond} \leq 1 nH$	C2 = 10nF/10V C3 = 1μF/10V
VBU Vbuffer	$L_{bond} \leq 1 nH$	C2 = 10nF/10V C3 = 1μF/10V
VP Vbufferf/2	$L_{bond} \leq 1 nH$	C2 = 10nF/10V C3 = 1μF/10V



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

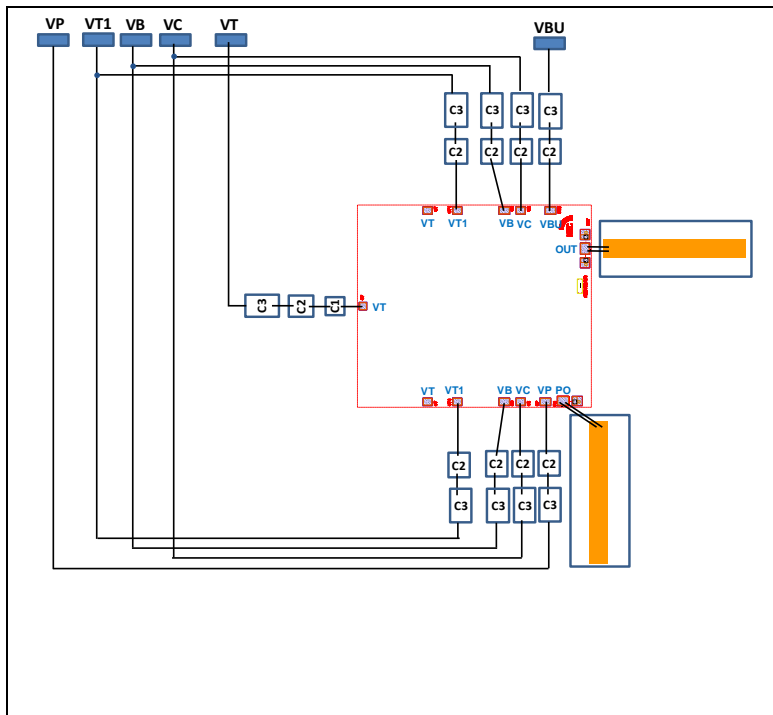
The backside of the die is the Source (ground) contact.

Thermosonic ball or wedge bonding are the preferred connection methods.

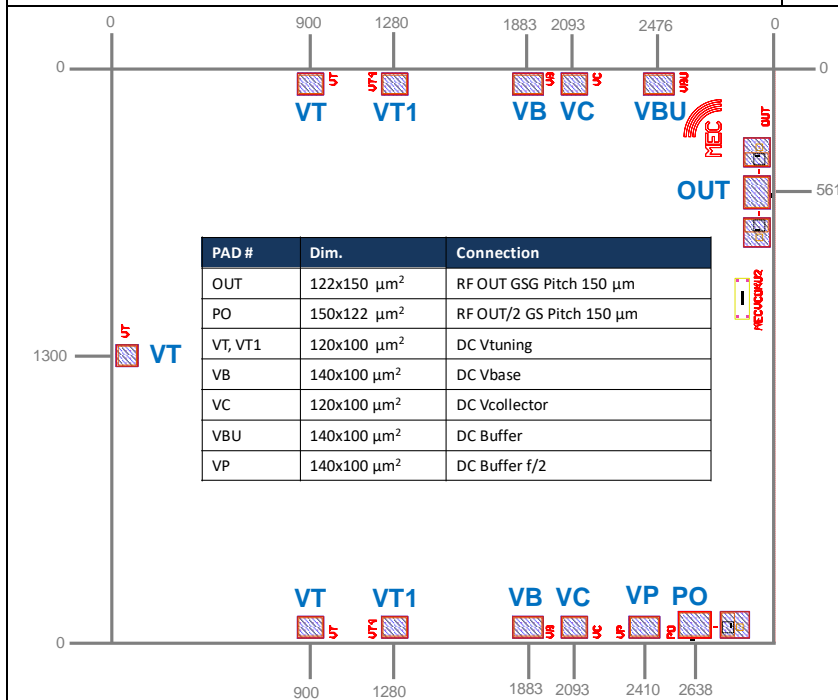
Gold wire must be used for connections.

Bond Pad Configuration & Assembly Recommendations

2nd configuration



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



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 (MOD1)

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 ($IBU \approx 18$ mA).
5. Increase VP to 5 V ($IP \approx 25$ 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 ($IB \approx 26$ mA, $IC = 76$ 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.

Bias Procedure (MOD2)

Bias-Up

1. Set VT and VT1 to 5 V and turn on.
2. Set Vt1 to 3.5 V and turn on.
3. Set VBU to 0 V and turn on.
4. Set VP to 0 V and turn on.
5. Increase VBU to 5 V ($IBU \approx 18$ mA).
6. Increase VP to 5 V ($IP \approx 25$ mA).
7. Set VB to 0 V and turn on.
8. Set VC to 0 V and turn on.
9. Increase VB to 5 V ($IB \approx 26$ mA, $IC = 76$ mA).
10. Sweep VT 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.

MEVCOKU2

Ku-Band GaAs HBT VCO



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Notice

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