

DIELECTRIC RESONATOR OSCILLATOR MODULE, 8.0 - 8.3 GHz

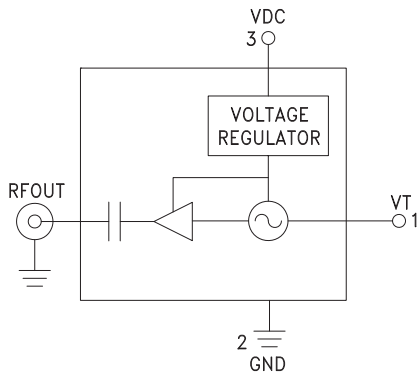


Typical Applications

The HMC-C200 DRO Module is ideal for:

- Test & Measurement Equipment
- Lab Instrumentation
- Industrial / Medical Equipment
- Military / EW / ECM / Communications

Functional Diagram



Ordering Instructions

Each HMC-C200 DRO requires tuning to a specific frequency in the 8.0 - 8.3 GHz range. To order an HMC-C200, this frequency must be specified at the time of purchase. Hittite guarantees a ± 250 kHz range around this target upon delivery. In the case of classified or proprietary frequencies, an HMC-C200 can be ordered with a target frequency close to the desired frequency without communicating sensitive information. A tuning screw is provided that can adjust the center frequency by approximately ± 20 MHz from the target. Please refer to the application instructions for more details. For example, when ordering an HMC-C200 centered at 8.200 GHz, specify HMC-C200-8200.

Electrical Specifications, $T_A = +25^\circ\text{C}$, Frequency = 8.2 GHz, VDC = +6.5V

Parameter	Min.	Typ.	Max.	Units
Frequency Range	8.0	8.2	8.3	GHz
Frequency Accuracy		± 250		kHz
Power Output, Center Frequency	13	14.5		dBm
SSB Phase Noise @ 1 kHz Offset, Center Frequency		-95		dBc/Hz
SSB Phase Noise @ 10 kHz Offset, Center Frequency	-120	-124		dBc/Hz
SSB Phase Noise @ 100 kHz Offset, Center Frequency		-140		dBc/Hz
SSB Phase Noise @ 1 MHz Offset, Center Frequency		-150		dBc/Hz

Features

- Customizable Tuning Frequency: 8.0 - 8.3 GHz
- Low SSB Phase Noise: -124 dBc/Hz @ 10 kHz Offset
- Single Positive Supply: +6 to +15V @ 125 mA
- Internal Voltage Regulator
- Internal Buffer Amplifier
- High Output Power: +14.5 dBm
- 40°C to +85°C Operating Temperature

General Description

The HMC-C200 is a high performance dielectric resonator oscillator (DRO) that incorporates Hittite's ultra-low phase noise technology and provides -124 dBc/Hz SSB phase noise at 10 kHz offset. The output buffer also provides 14.5 dBm of output power. Internal temperature compensation allows this DRO to operate over a temperature range of -40°C to +85°C with a frequency drift of only 2ppm/°C. The Vtune port accepts an analog tuning voltage from +7 to +12V and provides a range of ± 1 MHz from the center frequency. The DRO is packaged in a small, moisture sealed 1.5"x1.5" (36 x 36 mm) module with a field replaceable SMA Connector. The HMC-C200 can be used as a drop-in module if the SMA connector is not used.

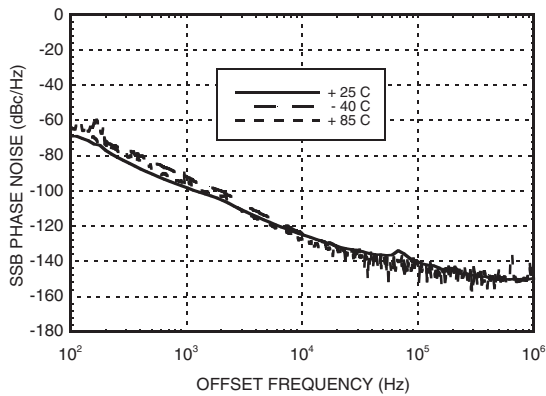


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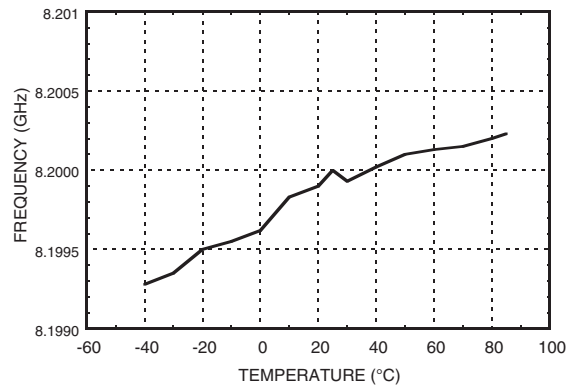
Electrical Specifications (Continued)

Parameter	Min.	Typ.	Max.	Units
Tune Voltage (VT)	7	9	12	V
Electric Tuning Range		±1		MHz
2nd Harmonic (2Fo)		-28		dBc
3rd Harmonic (3Fo)		-35		dBc
Frequency Pushing		5		kHz/V
Frequency Pulling (into 2.0:1 VSWR)		5		kHz pp
Output Return Loss		12		dB
Frequency Drift Rate (Temperature)		2		ppm/°C
Voltage Supply (VDC)	6		15	V
Supply Current		125		mA
Frequency Drift vs. Time @ 25°C		1		ppm/year

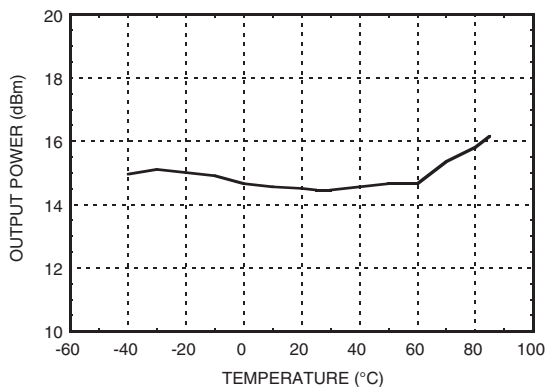
Phase Noise vs. Temperature @ 8.2 GHz



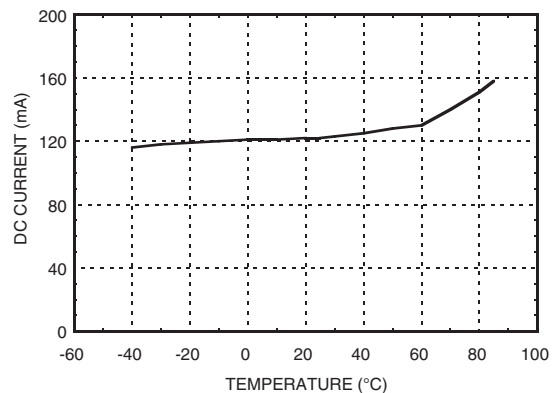
Output Frequency vs. Temperature



Output Power vs. Temperature @ 8.2 GHz

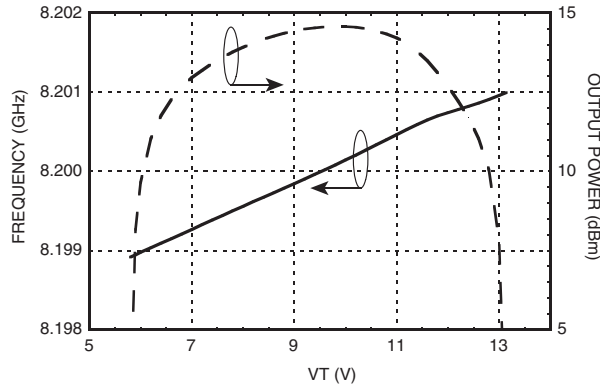


VDC Current vs. Temperature @ 8.2 GHz

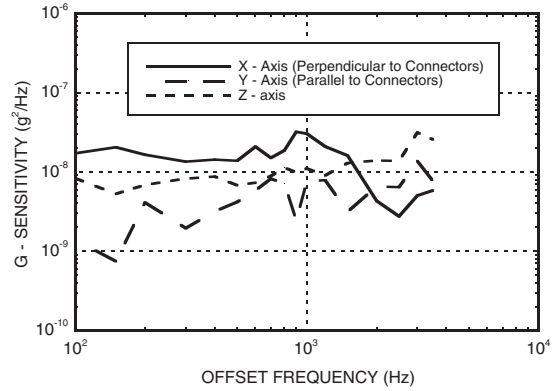




Frequency & Power vs. Tuning Voltage



Vibration Sensitivity



Absolute Maximum Ratings

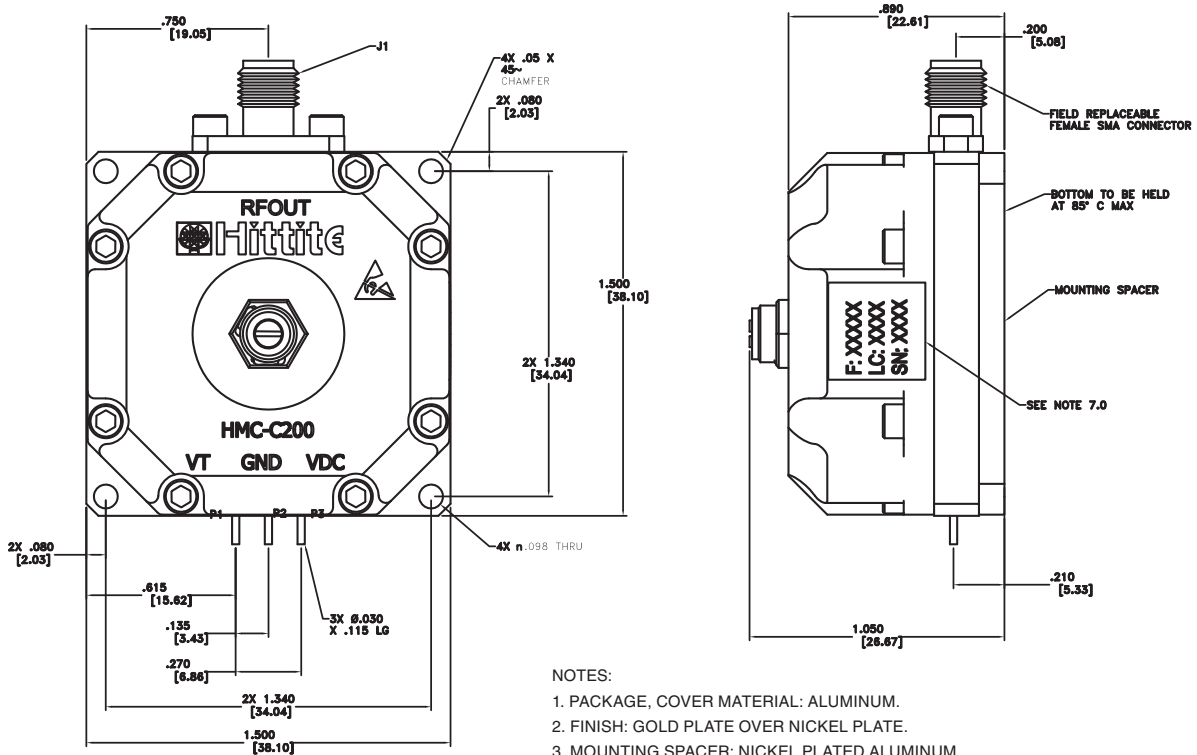
VDC	0 Vdc to +15 Vdc
VT	0 to +15V
Storage Temperature	-65 to +150 °C
Operating Temperature	-40 to +85 °C

Pin Descriptions

Pin Number	Function	Description	Interface Schematic
SMA	RFOUT	RF output (AC coupled) uses a female SMA connector.	
2	GND	Must be connected to power supply ground.	
3	VDC	Supply Voltage Vdc = +6V to +15V.	
1	VT	Control Voltage and Modulation Input uses a female SMA connector. Modulation bandwidth dependent on drive source impedance.	

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Outline Drawing



- NOTES:
1. PACKAGE, COVER MATERIAL: ALUMINUM.
 2. FINISH: GOLD PLATE OVER NICKEL PLATE.
 3. MOUNTING SPACER: NICKEL PLATED ALUMINUM.
 4. ALL DIMENSIONS ARE IN INCHES [MILLIMETERS].
 5. TOLERANCES: UNLESS OTHERWISE SPECIFIED
 - 5.1 .XX = $\pm .02$ [.51]
 - 5.2 .XXX = $\pm .010$ [.25]
 6. MARK LABEL PER PART NO. 124587 AS SHOWN.

Package Information

Package Type	C-18
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Application Instructions

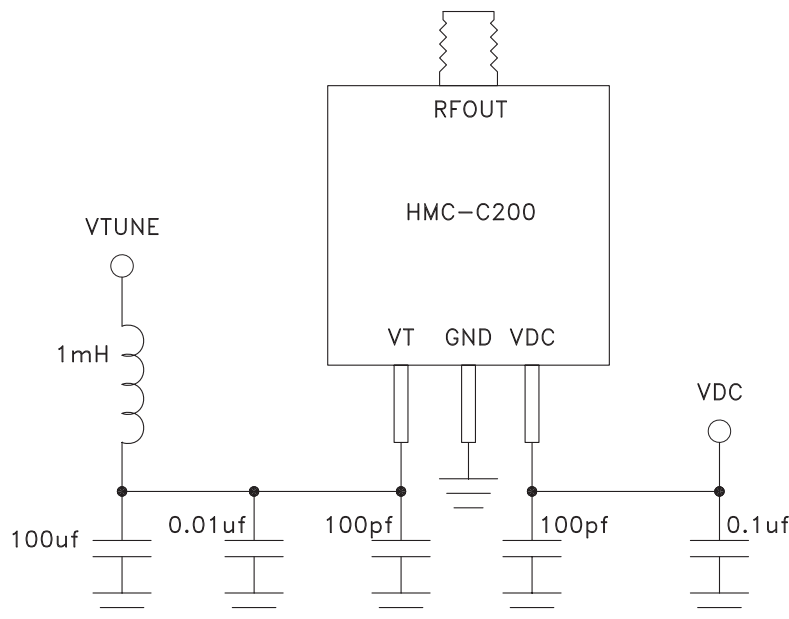
DRO Customer Tuning Procedure:

1. Connect the RF output to a Spectrum Analyzer and adjust the mechanical tuner to set the output frequency to within 1 MHz of the desired value.
2. Set up the Spectrum Analyzer settings for a 10 MHz span centered on the desired output frequency. Change the Reference Value of the Spectrum Analyzer to be about 15 dBm and change the vertical scale to be 1dB / division such that the peak oscillation frequency is visible on the screen.
3. Use the tune voltage to maximize the output power and note the frequency. **Note: the tune voltage should never be adjusted higher than 15V.**
4. If the frequency is meeting the new requirement and the output power is greater than 12 dBm, then the tuning procedure is complete. If the frequency is not meeting the requirement then carefully readjust the mechanical tuner and tune voltage until the output frequency is within the required range.

Warnings:

1. The tune voltage only sustains oscillation over a fairly narrow range (approximately 1 MHz) before output power, temperature stability and phase noise performance start to suffer. In some cases it is possible for the tune voltage to be adjusted to the point where oscillation stops. Therefore the mechanical tuner should be used as a coarse tune and the tune voltage is effectively a fine tune. In PLL applications where the tune voltage is used within the loop, this limited voltage range must be considered during the design of the loop. A limiting circuit must be used to prevent the loop from becoming unstable.
2. If the output power is less than 12 dBm then the DRO may be at the correct frequency but the phase noise performance and the stability over temperature may both have been degraded. It is therefore recommended that the customer verify phase noise and stability after custom tuning.

Fixed Output Frequency Application



Phase Locked Application