SOT-11414413200-08-E6

Advanced Rev 1.2

Frequency Synthesizer Module, Low Phase Noise, F Band

Description:

Model SOT-11414413200-08-E6 is a low phase noise frequency synthesizer module designed and manufactured for standard test instrumentation, communication, and Radar systems as a local oscillator. The module covers a frequency range of 110 to 140 GHz with an exceptional low harmonics and spurious emissions as well as superior low phase noise performance. The model is externally referenced. The output power of the module +13 dBm with ±2 dB power flatness. The frequency step resolution of the module is up to 1.2 Hz. The phase noise of the oscillator is dependent on the quality of the reference source. The oscillator has a built-in voltage regulator to further improve the signal quality and provide over voltage protection. The normal operating state of the oscillator is external referenced. This module can be directly controlled with digital signals following SPI communication protocol through Micro-D connector. Eravant offers an evaluation kit including the control board under model number, **SOT-EVA-S1**, with the GUI (Graphic User Interface) for initial system set and rapid system development as a separate product.

Features:

- Low Phase Noise and Harmonics
- External Referenced
- SPI Communication Port

Applications:

- Radar Systems
- Communication Systems
- Test instrumentations

Electrical Specifications:

Parameter	Minimum	Typical	Maximum
Output Frequency Range	110 GHz		140 GHz
Step Size		1.2 Hz	
Output Power		+13 dBm	
Output Power Flatness	±2 dB		
Frequency Stability	Same as External Reference		
Frequency Accuracy	Same as External Reference		
Output Spurious		-50 dBc	
Output Harmonics		-15 dBc	
External Reference	100 MHz/ +5 dBm ± 3 dBm		
Lock Indicator (LD)	TTL High		
Phase Noise	REF Phase Noise + (20Log(N)+6) dBc/Hz*		
Frequency Switching Time	≤200 µs (Excludes the Series Port Communication Time.)		
Control Interface	SPI		
Supply Voltage/Current (Synthesizer)		+12 V_{DC}/900 mA	
Supply Voltage/Current (Multiplier)		+8 V_{DC}/800 mA	
Specification Temperature		+25 °C	
Operating Temperature	0 °C		+50 °C

*N is the frequency multiplication factor.

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Phone: 424-757-0168 | Fax: 424-757-0188 | Email: support@eravant.com

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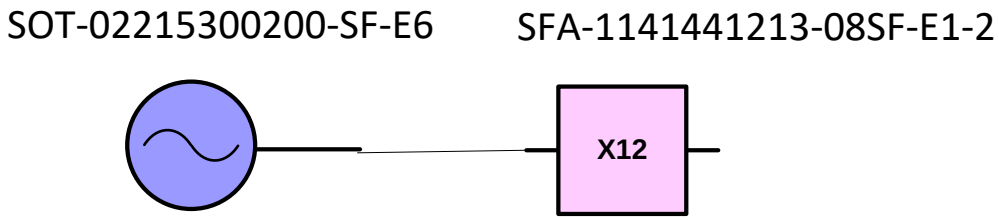
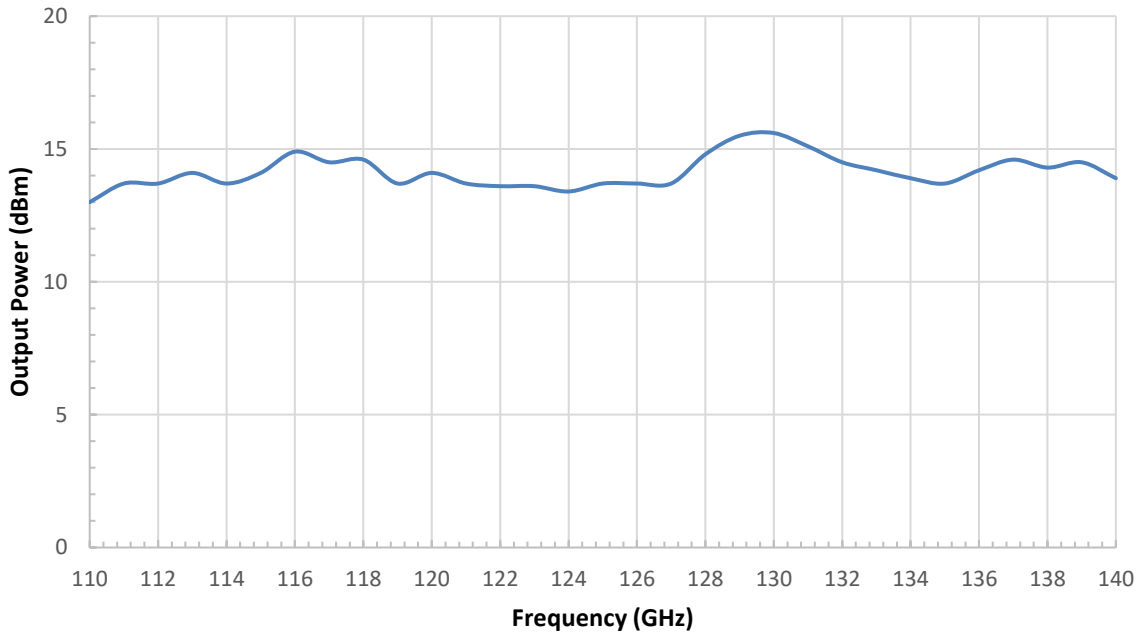
Mechanical Specifications:

Item	Specification
RF Port	WR-08 Waveguide with UG-387/U-M Anti-Cocking Flange
Bias, Control and Lock Indicator (Synthesizer)	9 Position D-Type, Micro-D Socket (Female)
Bias (Frequency Multiplier)	Solder Pin
External Reference Input Port	SMA(F) Connector
Body Material	Aluminum
Finish	Black Anodized
Weight	8 Oz
Dimension	6.00” (L) x 3.60” (W) x 1.00” (H)
Outline	OT-EF-A-FM

System Block Diagram:



Output Power vs. Frequency



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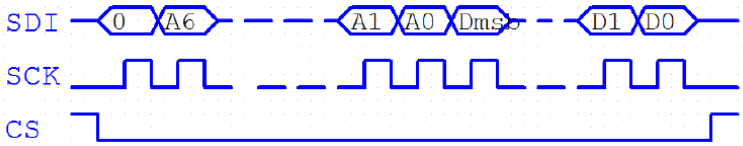
SPI Communication Port:



The device is controlled with a SPI communication port. Digital high level (TTL High) is +3.3 V, and its effective range is from +2.7 V to +3.6 V; digital low level (TTL Low) is 0 V and its effective range is from 0 to +0.6 V. To send control signal to this module, the W/R bit is first sent, followed by register address, and data.

W/R Control Register Bit:

High-order Bit (W/R)	Definition	Note
0	Write	-
1	Read	Reserved

Register Map and Bit Descriptions:

Register Address	Bit Range	Description	Default Value
0x02	[63:16]	Synthesized Frequency	0x00174876E800
	[15:0]	Reserved	0x0000

The synthesized frequency unit is 0.1 Hz before being multiplied by x12. For instance, when synthesizing a frequency of 120 GHz, the data in bits [63:16] should be 120 GHz divided by 12, which equals 12 GHz. Considering the 0.1 Hz unit, the value should be $12\times10^{9}\times10$ or 1.2×10^{11}. In hexadecimal notation (using 6 bytes), it is represented as 001BF08EB000. The data sent through SPI should be 0x02_001BF08EB000_0000.

Evaluation Kit:

The evaluation kit includes a control board, **SOT-EVA-S1**, and GUI. The control board is not included in this product, but it can be ordered separately. The evaluation kit allows the users to easily set up the system and control the synthesized frequency of this module manually. The computer display of the GUI interface is shown below.

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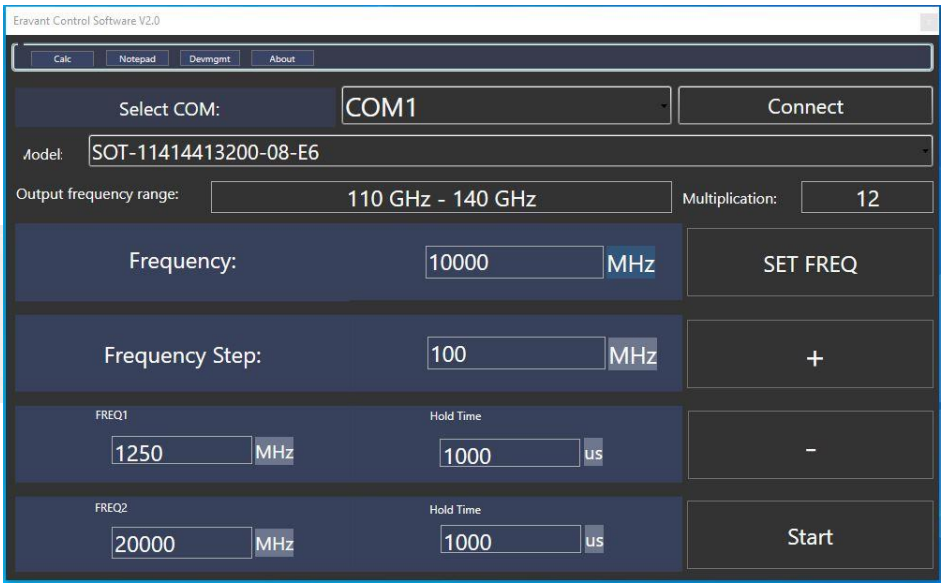
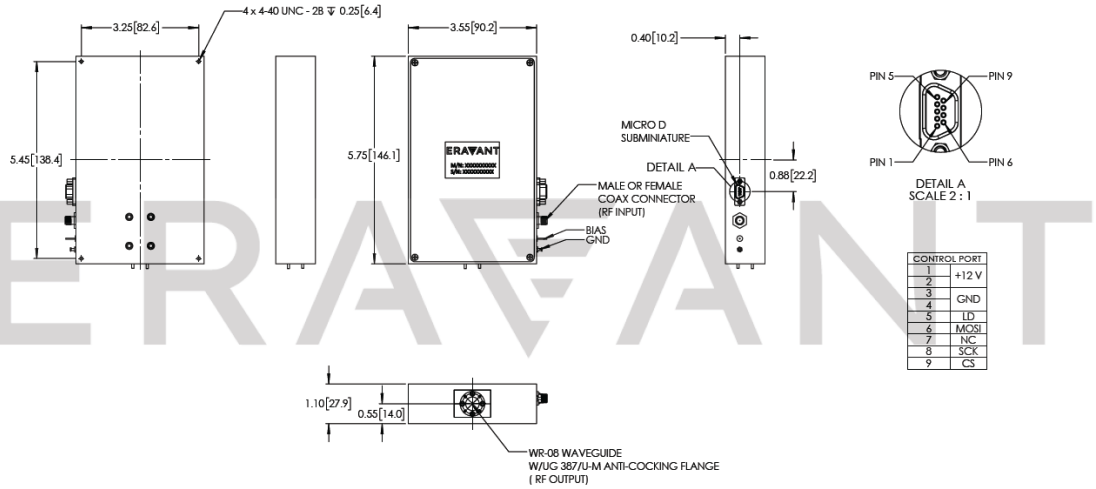


Mechanical Outline: (Unless otherwise specified, all dimensions are in inches [millimeters])



Note:

- All data presented is collected from a sample lot. Actual data may vary unit to unit, slightly.
- All testing was performed under +25 °C case temperature.
- Two well-regulated DC power supplies capable of delivering +12 V_{DC}/1.0 A are required to drive synthesizer module. The proper connection of the power supply to the Micro-D connector is illustrated in the outline drawing above.
- Standard Micro-D9 male to Micro-D9 male cable **SOT-CC-M9MM9M-S1** is provided to connect synthesizer with Evaluation Kit **SOT-EVA-S1.**
- The device is controlled via Personal Computer. A SPI-to-serial adapter is needed between the device and PC.
- Eravant reserves the right to change the information presented without notice.

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Caution:

- The device is static sensitive. Always follow ESD rules when working with the device.
- Wrong bias or reverse bias on the sensor will damage the device.
- Exceeding absolute maximum ratings shown will damage the device. Use additional heatsink or fan if necessary. The case temperature of the device shall never exceed **+75 ˚C**.
- Proper torque, 8.0 ± 0.15 inch-pounds (0.90 ± 0.02 Nm), should be applied. **Eravant torque wrench, model SCH-08008-S1, is highly recommended.**

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