



Frequency Synthesizer Module, Low Phase Noise, 0.2 to 15 GHz

Description:

Model SOT-02215300200-SF-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 0.2 to 15 GHz with an exceptional low harmonics and spurious emissions as well as superior low phase noise performance. The module is externally referenced. The output power of the module -3 dBm with ± 4 dB power flatness. The frequency step resolution of the module is up to 0.1 Hz. The phase noise of the oscillator is dependent on the quality of the reference source. The oscillator has a maximum spurious of -65 dBc. 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	0.2 GHz		15.0 GHz
Step Size		0.1 Hz	
Output Power	-3 dBm	0 dBm	
Output Power Flatness	± 4 dBm		
Frequency Stability	Same as External Reference		
Frequency Accuracy	Same as External Reference		
Output Spurious		-70 dBc	-65 dBc
Output Harmonics			-5 dBc
External Reference	100 MHz/ +5 dBm ± 3 dBm		
Lock Indicator (LD)	TTL High		
Phase Noise	REF Phase Noise + (20Log(N)+3) dBc/Hz*		
Frequency Switching Time	$\leq 200 \mu s$ (Excludes the Series Port Communication Time.)		
Control Interface	SPI		
Supply Voltage/Current		+12 V _{DC} /900 mA	
Specification Temperature		+25 °C	
Operating Temperature	-40 °C		+70 °C

*N is the frequency multiplication factor.



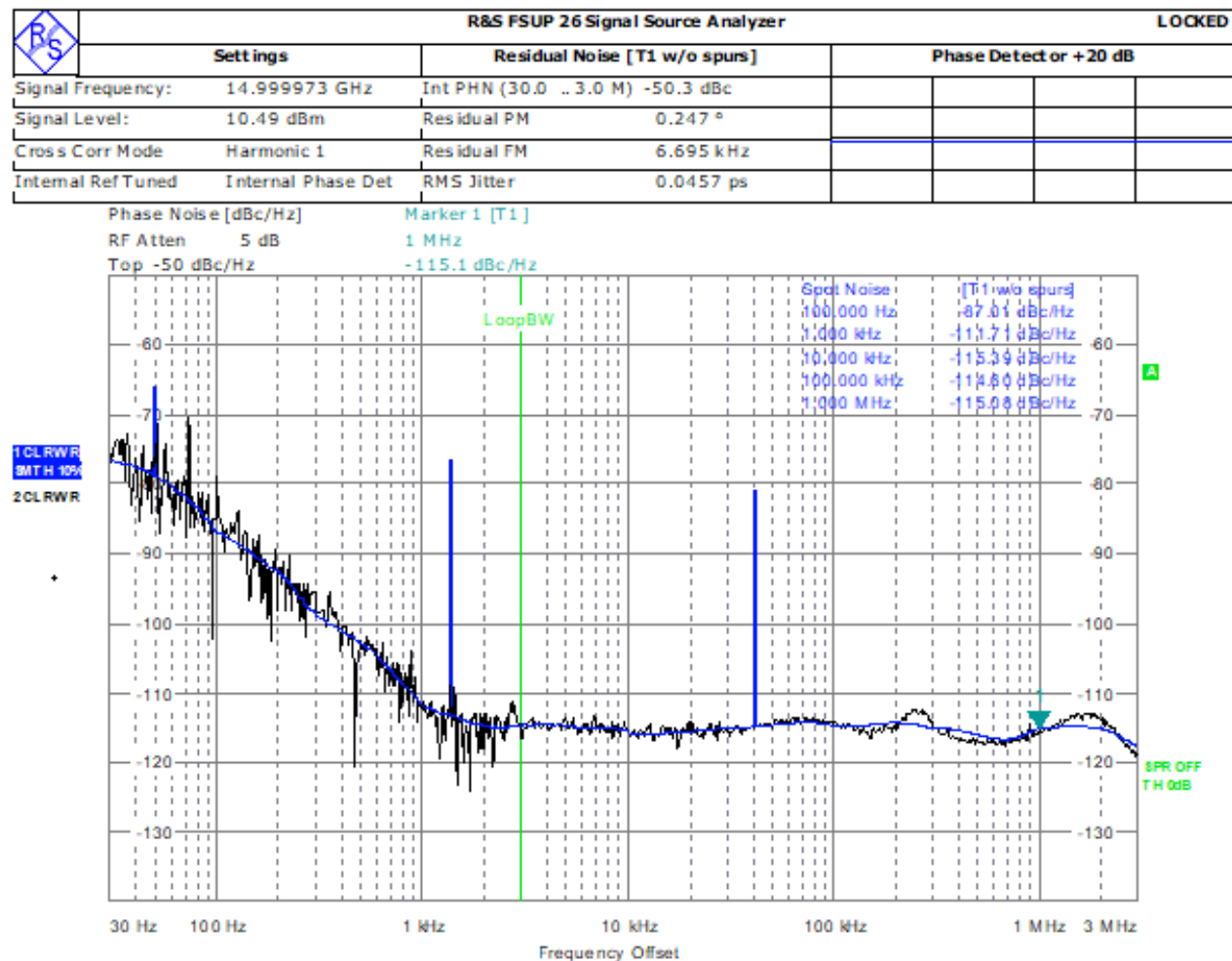


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Mechanical Specifications:

Item	Specification
RF Port	SMA(F) Connector
Bias and Control Port	9 Position D-Type, Micro-D Socket (Female)
Lock Indicator (LD)	9 Position D-Type, Micro-D Socket (Female)
External Reference Input Port	SMA(F) Connector
Body Material	Aluminum
Finish	Nickel Plating
Weight	5 Oz
Dimension	3.15"(L) x 2.56" (W) x 0.5" (H)
Outline	OT-EC-SM1

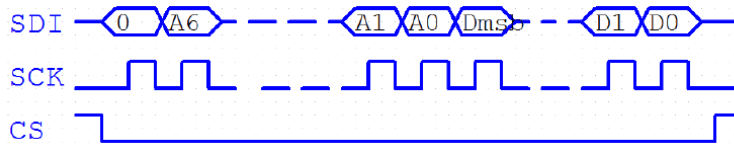
Measured Phase Noise @ 15 GHz with External Reference:





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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

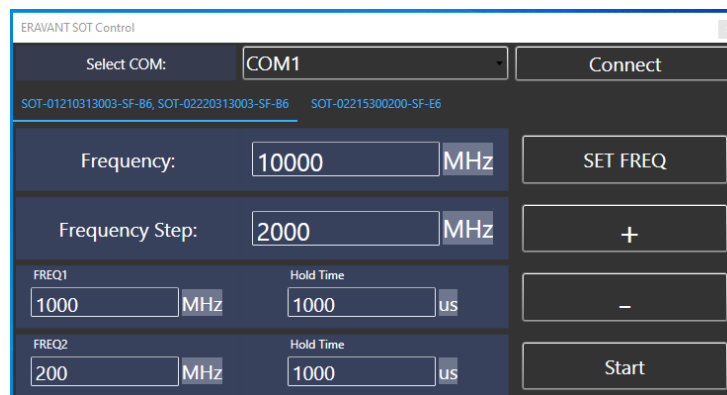
Register Map and Bit Descriptions:

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

The unit of synthesized frequency is 0.1 Hz. For example, when frequency is synthesized to 5 GHz, the data in bits [63:16] is 50000000000. The data sent through SPI is 0x02_000BA43B7400_0000. The default synthesized frequency is 10 GHz.

Evaluation Kit:

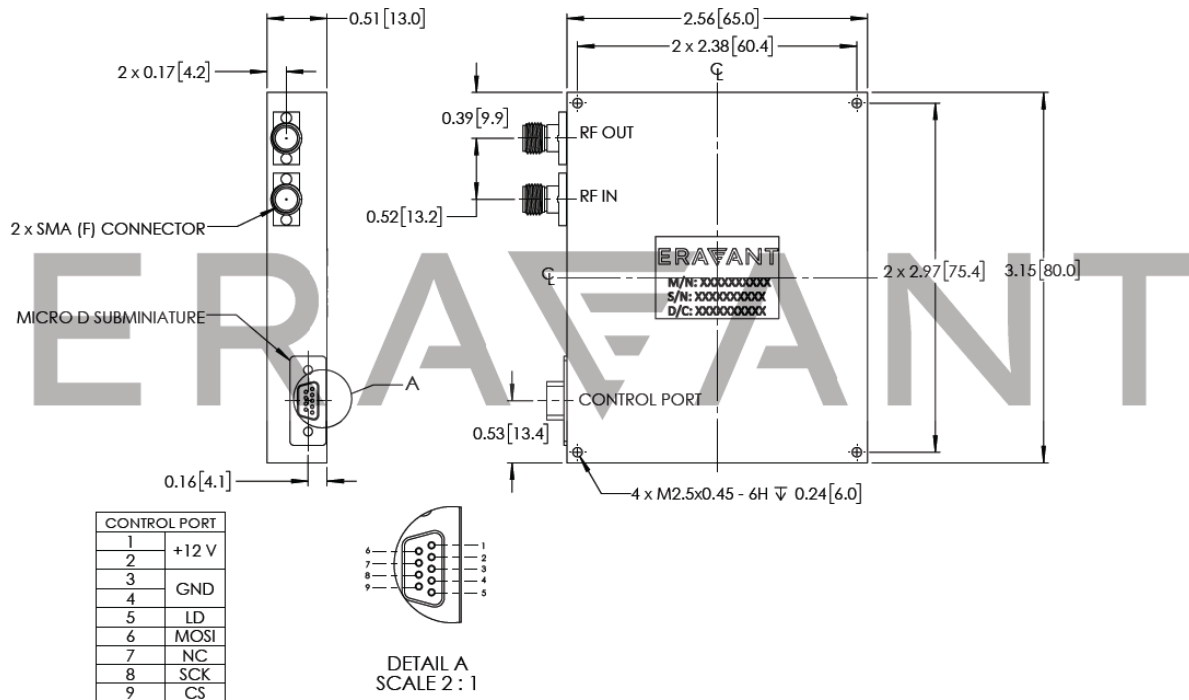
The evaluation kit includes a control board, **SOT-EVA-S1**, and GUI. The control board is not included in this product, but it can be ordered separately. The evaluation kit allows the users to easily set up the system and control the synthesized frequency of this module manually. The computer display 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.
- A well-regulated DC power supply capable of delivering +12 V_{DC}/1.5 A is required. The proper connection of the power supply to the Micro-D connector is illustrated in the outline drawing above.
- Standard MDR male to MDR 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.
- SAGE Millimeter, Inc. reserves the right to change the information presented without notice.

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. **SAGE Millimeter torque wrench, model SCH-08008-S1, is highly recommended.**

