



Frequency Synthesizer Module, High Speed, 1.25 to 20 GHz, 500 ns

Description:

Model SOT-01320313001-SF-B6 is a fast-hopping 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 1.25 to 20 GHz with an exceptional high hopping speed of 500 ns, low spurious emissions as well as superior low phase noise performance. The frequency resolution of the module is up to 10 kHz. The phase noise of the oscillator is dependent on the quality of the reference source. When the oscillator operates with the internal reference, the phase noise is -105 dBc/Hz at 10 kHz offset at 20 GHz frequency point. The oscillator has a typical spurious of -60 dBc. The oscillator has a built-in voltage regulator to further improve the signal quality and provide over voltage protection. This module can be directly controlled with digital signals following parallel communication protocol through D-Sub 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.



Features:

- 500 ns Frequency hopping Speed
- Low Phase Noise
- External Referenced with Internal Backup

Applications:

- Radar Systems
- Communication Systems
- Test instrumentations

Electrical Specifications:

Parameter	Minimum	Typical	Maximum
Output Frequency Range	1.250 GHz		20.000 GHz
Step Size	10 kHz		
Output Power	+13 dBm	+15 dBm	
Frequency Stability	±0.5 ppm or Same as External Reference		
Frequency Accuracy	±0.5 ppm or Same as External Reference		
Output Spurious		-60 dBc	-55 dBc
Output Harmonics		-7 dBc (Typ)	
Internal Reference	100 MHz		
Internal Reference Output	100 MHz/+5 dBm (Typical)		
External Reference	10 MHz/ +5 dBm ± 3 dBm		
Lock Indicator	TTL High		
Phase Noise (Internal) RF Frequency at 10 GHz	≤-105 dBc/Hz @ 1 kHz; ≤-110 dBc/Hz @ 10 kHz ≤-110 dBc/Hz @ 100 kHz; ≤-110 dBc/Hz @ 1,000 kHz		
Frequency Hopping Time	≤500 ns		
Power Stability		±2 dB	
Control Method	Parallel Port Communication Protocol		
Pulse Modulation Depth	≥60 dBc		
Pulse Modulation Pulse Width	0.1 ms	5 ms	10 ms
Pulse Modulation Time	≤50 ns Raise/100 ns Fall		





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Bias and Environmental Specifications:

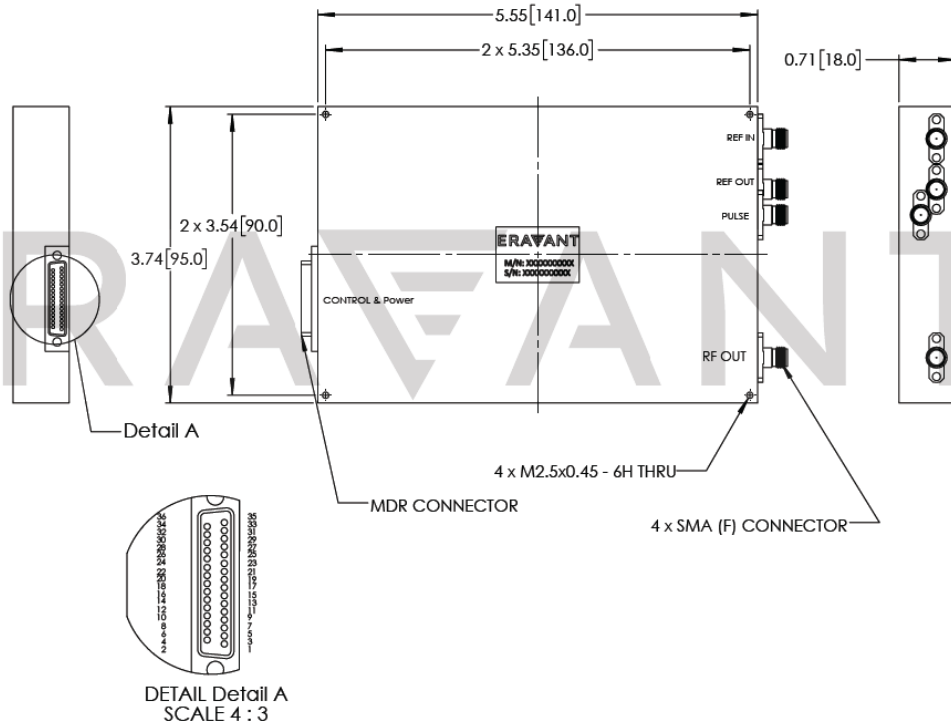
Parameter	Minimum	Typical	Maximum
Supply Voltage/Current	+10.8 V _{DC}	+12 V _{DC} /1,600 mA	+13.2 V _{DC}
Specification Temperature		+25 °C	
Operating Temperature	-40 °C		+70 °C
Storage Temperature	-55 °C		+85 °C

Mechanical Specifications:

Item	Specification
RF Port	SMA(F) Connector
Bias and Control Port	Mini Delta Ribbon (MDR) Socket, 36 Positions, 2 Rows
External Reference Input Port	SMA(F) Connector
Internal Reference Output Port	SMA(F) Connector
Pulse Modulation Input Port	SMA(F) Connector
Body Material	Aluminum
Finish	Nickel Plating
Weight	0.7 Lbs
Dimension	5.75" (L) x 3.75" (W) x 0.91" (H)
Outline	OT-BC-SM3

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

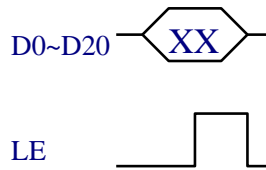
CONTROL PORT	
1	LF
2	LD
3	D0
4	D1
5	D2
6	D3
7	D4
8	D5
9	D6
10	D7
11	D8
12	D9
13	D10
14	D11
15	D12
16	D13
17	D14
18	D15
19	D16
20	D17
21	D18
22	D19
23	D20
24	D21
25	
26	NC
27	
28	
29	
30	GND
31	
32	
33	
34	+12V
35	
36	





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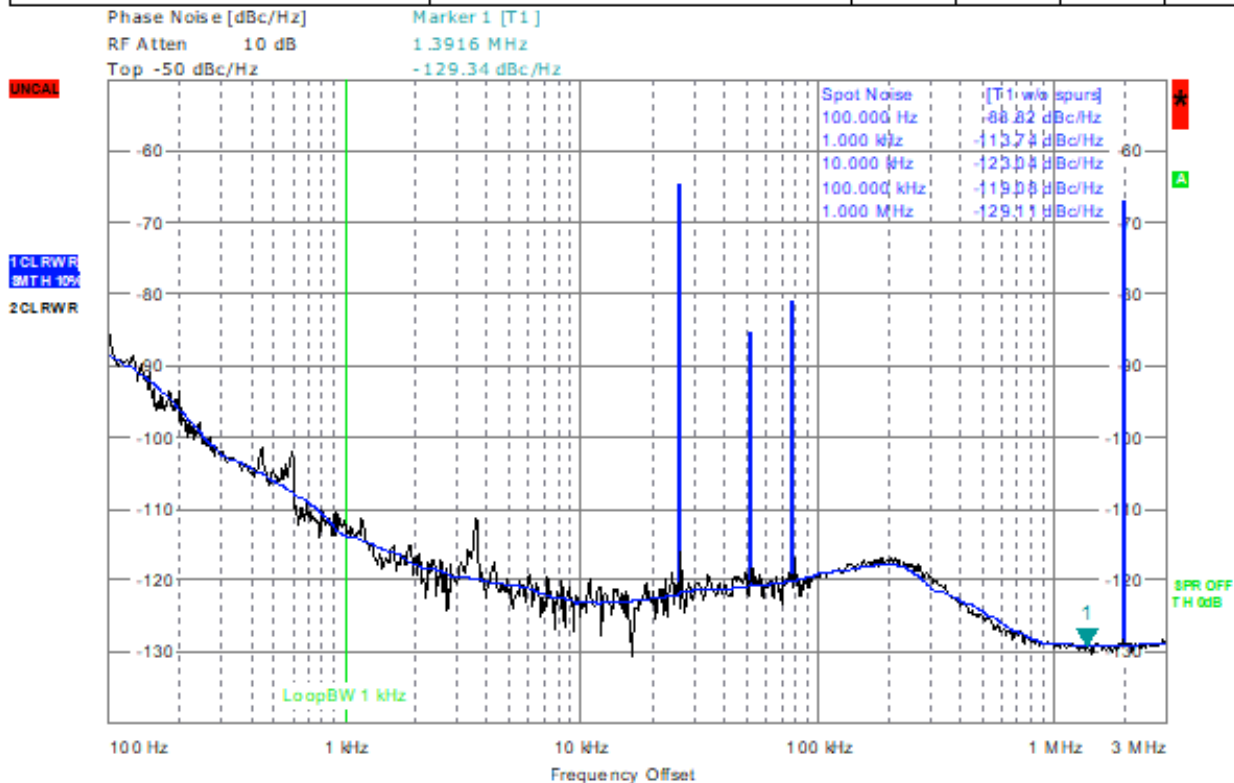
Parallel Communication Port:



The device is controlled with a parallel 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. The data is sampled at the rising edge of LE (latch enable) signal. The TTL High and TTL Low of LE needs to maintain at least 30 ns. Pins D0-D20 controls the synthesized frequency. The unit of synthesized frequency is 10 KHz. For example, when frequency is synthesized to 9.8 GHz, the control data is 980000. The data sent through parallel port is EF420H. Pin D21 is reserved.

Measured Phase Noise @ 10 GHz Output:

Settings		Residual Noise [T1 w/o spurs]		Phase Detect or +20 dB	
Signal Frequency:	9.99989 GHz	Int PHN (100.0 .. 3.0 M)	-60.5 dBc		
Signal Level:	20.22 dBm	Residual PM	76.317 m°		
Cross Corr Mode	Harmonic 1	Residual FM	1.508 kHz		
Internal Ref Tuned	Internal Phase Det	RMS Jitter	0.0212 ps		





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GUI (Graphic User Interface)

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.



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}/2A is required. The proper connection of the power supply to the D-Sub Micro-D connector is illustrated in the outline drawing above.
- Standard MDR male to MDR male cable **SOT-CC-M36MM36M-S1** is provided to connect synthesizer with Evaluation Kit **SOT-EVA-S1**.
- The phase noise shown is with internal reference at room temperature. If external reference is used, phase noise can be estimated from the **external reference phase noise + 20*log(N)+3**, where N is the multiplication factor.
- The device is controlled via Personal Computer. A parallel-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 **+50 °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.**

