RFS10E: 10 MHz Rubidium Frequency Standard

Key Features

- Rubidium Oscillator as main frequency reference
- Five sinewave outputs as standard.
- Five additional outputs available as option 01
- Very Low Phase Noise and monthly ageing
- RS232 and Ethernet Interfaces

- Additional five outputs at different frequency
- Many options available. See list in this brochure
- Custom built options available upon request
- 19" 1U high rack mountable case
- Free Windows Software

Description

The RFS10E is a 10 MHz rubidium frequency standard with many options as described below. An optional input allows the RFS10E to be locked to a 1 pps signal such as GPS, or to other frequencies such as 5 or 10 MHz. Also the 1 pps output derived from the rubidium will align itself in time to the 1 pps input to within 50 ns. The RFS10E has very low phase noise and exceptional Allan Deviation for a rubidium oscillator.

Options

Various options are available such as:

- Very low phase noise outputs at 10.23 MHz, 13 MHz or 20 MHz. Other frequencies on request. All outputs locked to main rubidium reference.
- Very low Allan Deviation, $1.5 \times 10E\text{-}12$ (1 second) and $7 \times 10E\text{-}13$ (100 sec)
- Squarewave Outputs. TTL, ECL, RS232, RS422, E1 levels. Any frequency from 0.1 pps to 100 MHz
- DDS output programmable from 0 to 80 MHz in 1 µHz steps. Sinewave and squarewave outputs.
- Output levels to +19 dBm.
- Redundancy. Two units operate together for high reliability systems, or 2nd redundant input connector.
- Second redundant AC power supply or external DC input.
- Extra sinewave outputs.
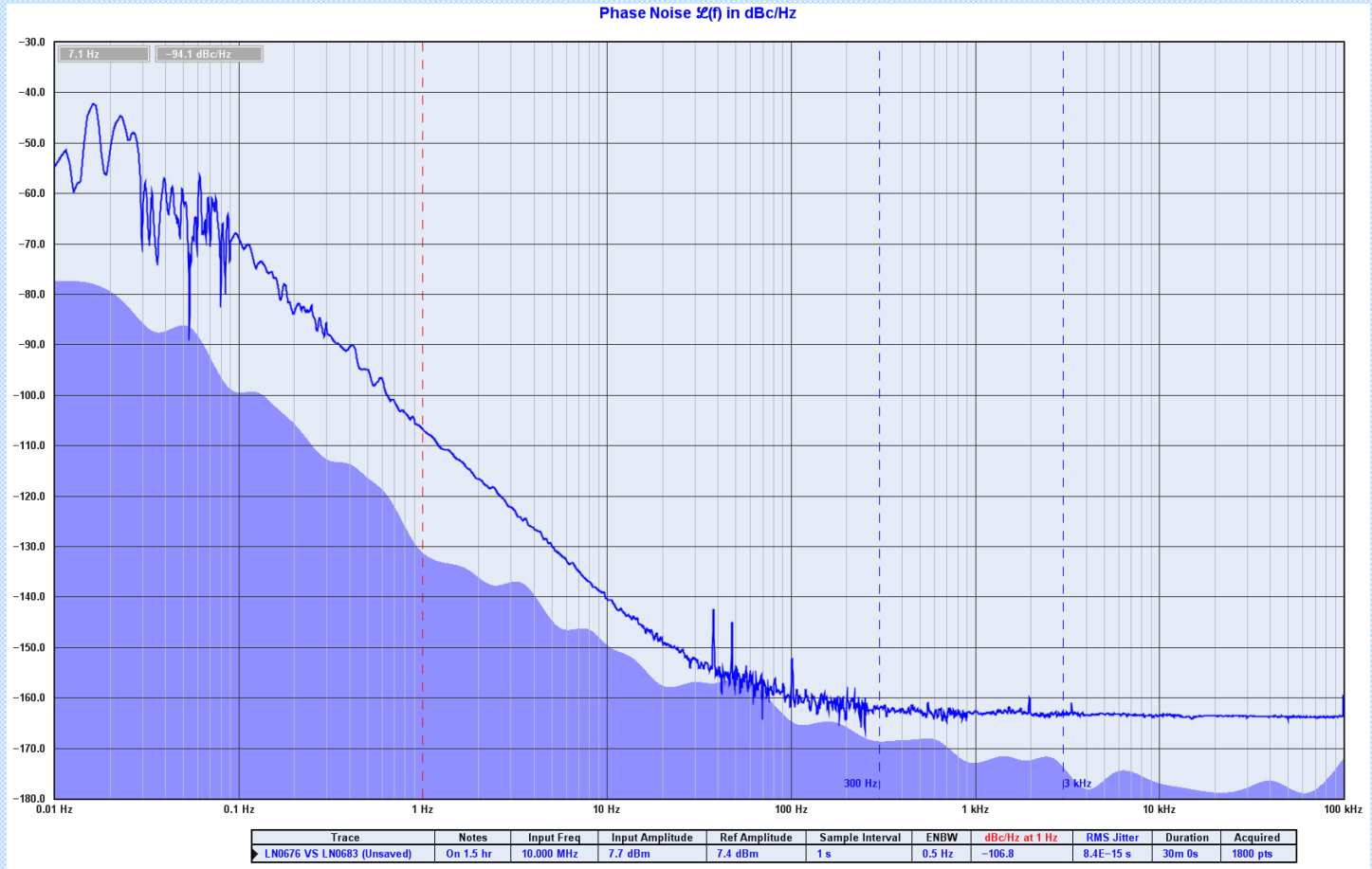- Multiplied or divided outputs.

Windows Software

The RFS10E is supplied with two types of windows software as well as Telnet commands. A Console program is PC software that connects to the RFS10E either via RS232 or Ethernet. The Console program monitors all parameters of the RFS10E to be monitored and controlled.

Also, there is an embedded web page inside the RFS10E. This allows any browser to simply connect to the RFS10E using its IP address. Again the Web page monitors all functions and allows many parameters to be changed. Also this software can be set up to allow remote viewing and control of the RFS10E from anywhere in the world.

Thirdly Telnet commands are available.

Typical phase noise for a 10.00 MHz Output

Phase Noise $\mathcal{L}(f)$ in dBc/Hz

Trace	Notes	Input Freq	Input Amplitude	Ref Amplitude	Sample Interval	ENBW	dBc/Hz at 1 Hz	RMS Jitter	Duration	Acquired
LN0676 VS LN0683 (Unsaved)	On 1.5 hr	10.000 MHz	7.7 dBm	7.4 dBm	1 s	0.5 Hz	−106.8	8.4E−15 s	30m 0s	1800 pts

Specifications

Description	Specification	Remarks
Rubidium Oscillator		
Output Frequency	10 MHz sinewave	Optional change to 5 MHz
Aging (after 90 days continuous operation)	$< 5 \times 10^{-11}$ /month or $< 5 \times 10^{-10}$ /year	Options to $< 1 \times 10^{-11}$ /month available.
Accuracy at shipment	$< \pm 5 \times 10^{-11}$ @ 25 °C	
Allan Deviation	$< 1.5 \times 10^{-12}$ (1s), $< 7\,0 \times 10^{-13}$ (100s),	Options to $< 1.2 \times 10E^{-12}$ (1 sec) exist.
Spurious	$<$-120 dBc (100 kHz BW)	
Frequency Retrace	$\pm 5 \times 10^{-11}$ (72 hours on, 72 hours off)	
Digital Frequency Adjustment	$\pm 5 \times 10^{-9}$ Resolution $< 5.12 \times 10^{-13}$	
Trim Range	$\pm 5 \times 10^{-9}$ (bottom panel),)	
Warm-Up Time	< 12 minutes to within 5×10^{-10}	Optional < 4 minutes
Temperature Coefficient	1×10^{-10} (-10 °C to +55 °C)	
Magnetic Field	$< 2 \times 10^{-10}$ for 1 Gauss field reversal	
Design Life	10 to 20 years	

10 MHz Outputs		
Number of Outputs	Five as standard, ten with option 01	Rear panel BNC connectors.
Frequency	10 MHz	
Accuracy	Same as main Rubidium Reference	
Signal Type	Sine wave	
Amplitude	0 dBm to + 12 dBm adjustable	Internally adjustable. Default = +10 dBm.
Harmonic Distortion	- 25 dBc (-45 dBc with option 07)	
Return Loss	> 20 dB @ 10 MHz	
Phase Noise (dBc/Hz) @ offset frequency @ 10 MHz carrier frequency.	-106 dB @ 1 Hz, -136 @ 10Hz, -155 @ 100 Hz, -160 @ 1 kHz, -161 @ 10 kHz	See graph for typical phase noise plot. Better phase noise is optionally available
1 pps Output		
Connector	BNC on rear panel	Pulse width programmable from 0 to 1 second in (133 ns steps).
Frequency	1 pulse per second	Output level 0 – 5V (open) or
Signal Type	Pulse Output	0-3.0V (50 Ω)
Amplitude (open circuit)	0 to 5 V, TTL Compatible	
Optional 10 MHz or 1 pps Input		
Connector	BNC socket on rear panel	Other external input frequencies available, e.g. 5 MHz, 10.23 MHz, 100 MHz
Input type (1pps)	1 pulse per second, TTL level.	
Input type (10 MHz)	10 MHz sinewave @ > 3 dBm	
PC Interface's		
RS232	Baud 115200, 8 daya bits, 1 stop bit, no parity	Free Console Software
Ethernet	RJ45 Connector	Embedded Web Page
Environmental		
Operating Temperature	0 °C to +50 °C	
Storage Temperature	-20 °C to +60°C	
Magnetic Field	$< 2 \times 10E^{-10}$ for 1 Gauss field reverse	
Humidity	GR-63 CORE, Section 5.1.2	
Operation Vibration	GR-63 CORE, section 5.4.2, Random & Sinusoidal MIL-PRF-28800F, Class 3,4	Phase noise may be impaired during vibration
G-Tip Over Test	< 2 x 10 /g in worst axis	
Miscellaneous		
AC Power Inlet with switch	IEC320 power cord	
AC Voltage Range	100 - 240 VAC	
Power consumption	100 W Max (warm up), 70 W (operating)	Rear Panel
Width x Depth x height. / Weight	482.6 x 280 x 44 mm / 6 kg's	Usable 90 - 260 VAC
Consult Precision Test Systems for further details of these options. Not all options can be fitted at the same time.		

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Specifications subject to change without notice (240616)