GFT7513
13 GHz Low Noise Synthesizer

KEY FEATURES

- 100 KHz – 13 GHz Frequency range
- 0.0001 Hz Frequency step
- -140 dBc/Hz Phase noise @ 1 GHz center, 20 KHz offset
- 3.5 µs Frequency switching time (200 MHz VCO step)
- USB or RS-232 interface for remote control (CP102 USB to COM bridge)
- +12 Vdc Power Supply (AC/DC adaptor included)
- Compact packaging: 105 mm W x 256 mm D x 27 mm H
- Option:
  High stability Internal Reference

APPLICATIONS

- Local Oscillator for receiver
- Signal simulation (Radar, UWB, Telecom)
- R&D low noise signal source
- Test and measurement
- Manufacturing testing
- Service and maintenance
- Test on high speed circuits
- Automatic Test Equipment

DESCRIPTION

The GFT7513 is a low noise and fast-switching Frequency Synthesizer covering a frequency range from 100 KHz to 13 GHz; The Synthesizer provides a 0.1 mHz frequency resolution, and a wide and accurately leveled output power range.

The GFT7513 is well suited for application in Local Oscillator for receivers because it has specific electronic design to provide very low phase noise and none subharmonics.
The GFT7513 operates with high stability internal reference and can be phase-locked to any external reference from 1 MHz to 250 MHz. In option a ± 10 ppb high stability internal Reference is provided.

The module has a USB and RS-232 interface for remote control. It is supplied with windows software application which includes a front panel graphical interface.
This software application can be used to control and explore the capabilities of the 13 GHz low noise synthesizer.

The generator is a compact packaging with only 27 mm in height and 1.8 Kg in Weigh.

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SPECIFICATIONS

The specifications in the following pages describe the warranted performance of the signal generator for 23 ± 10 °C after a 30 minute warm-up period.

Parameter	Conditions	Value		Unit
		min	max	
RF Output & General Characteristics				
RF Output Frequency Range		100	13000	MHz
LF Output Frequency Range		0.1	250	MHz
Min. Frequency Step	all frequency range		$1 \cdot 10^{-4}$	Hz
Frequency Switching Time	200 MHz VCO step		3.5	us
	1 GHz VCO step		30	us
	6 GHz VCO step		120	us
RF Output Power	RF Out, 0.1 to 13GHz	-14	+15	dBm
RF Output Power Step	RF Out, 0.1 to 13GHz	0.5		dB
LF Output Power	LF Out, 0.1 to 250 MHz	0	+10	dBm
LF Output Power Step	LF Out, 0.1 to 250 MHz	0.01		dB
Output Power Flatness (uncalibrated)	RF Out, 0.1 to 12GHz		6	dBpp
Nominal Output Impedance		50		Ohm
Output VSWR			2.1	
Spectral Purity & Phase Noise Characteristics				
Phase Noise normalized to 1GHz center frequency, Pout=+17dBm, typ.	Fout=1GHz, @ Offset:			
	100 Hz	-110		dBc/Hz
	1 kHz	-129		dBc/Hz
	10 kHz	-139		dBc/Hz
	100 kHz	-141		dBc/Hz
	1 MHz	-141		dBc/Hz
	10 MHz	-143		dBc/Hz
	30 MHz	-151		dBc/Hz
Spurious Suppression (except harmonics), all frequency range	worst		-60	dBc
	typ.		-80	dBc
Harmonic Suppression	6GHz to 13GHz, +10 dBm		-23	dBc
	<6GHz, 2-nd harmonics	-45	-30	dBc
	<6GHz, 3-nd harmonics		-10	dBc

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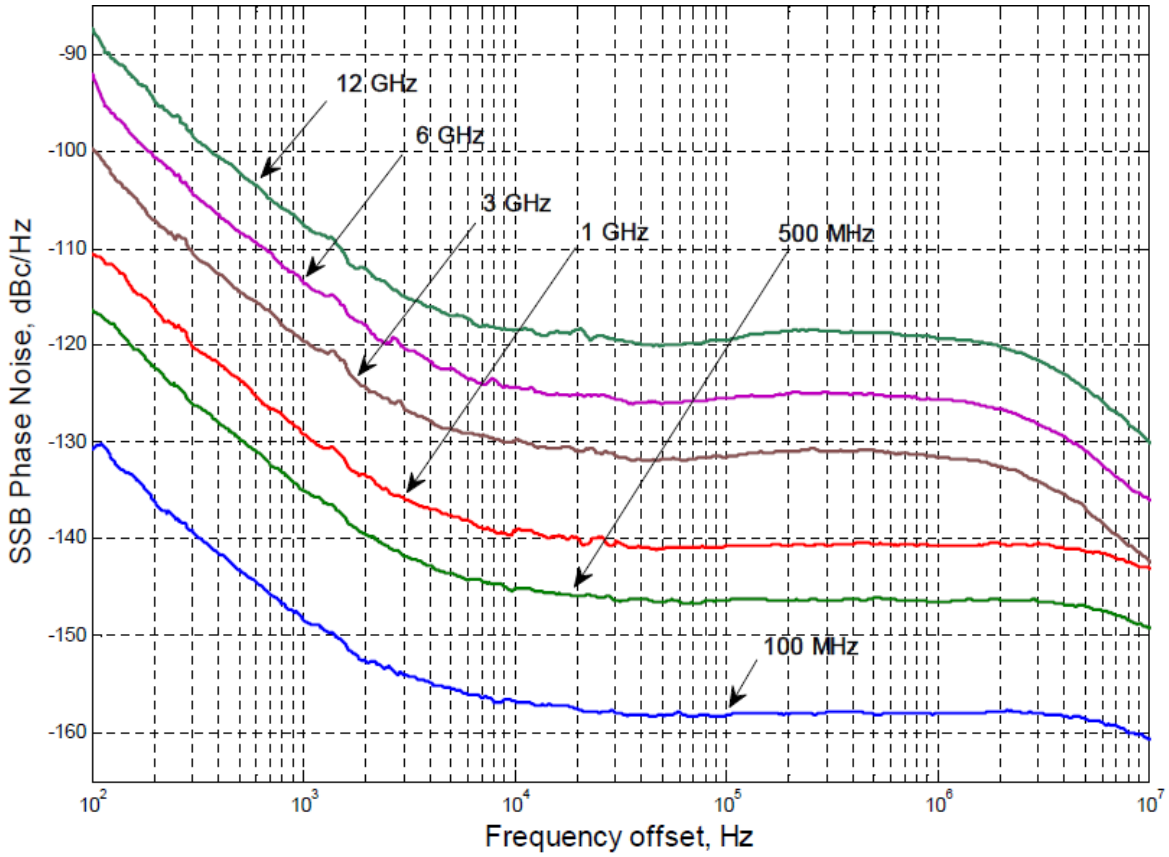
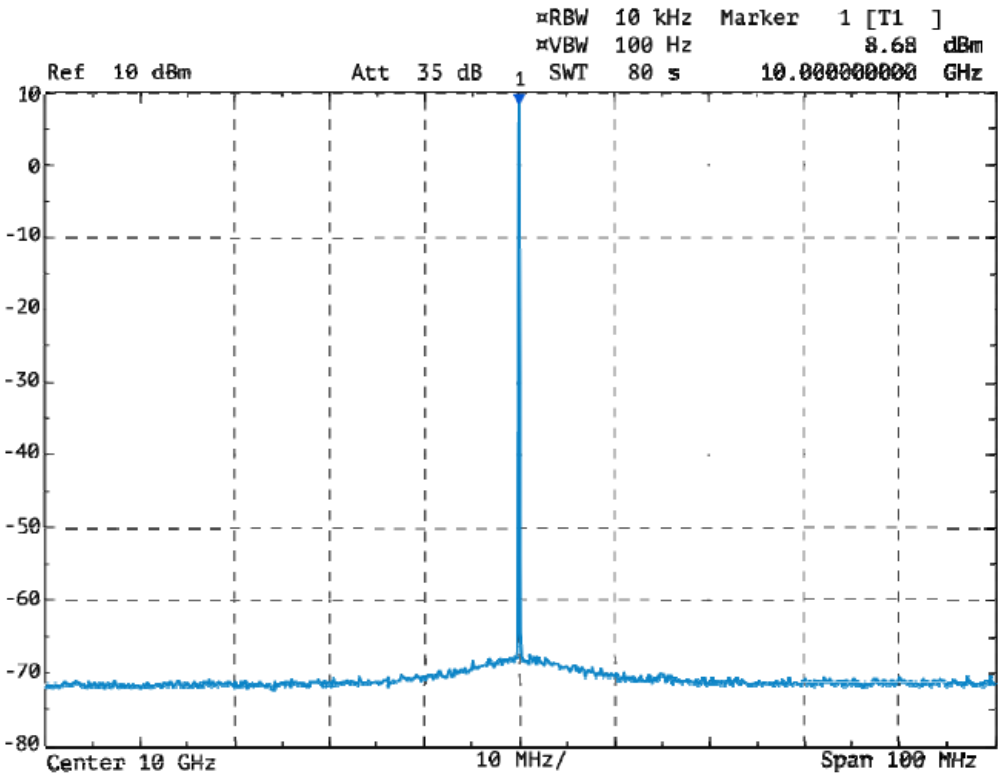
Internal Reference Frequency Characteristics				
Temperature Stability	0..+50 °C (high stab. option)		±10	ppb
	0..+50 °C (base "M" version)		±100	ppb
Digital Frequency Adjustment		±0.5	±1	ppm
Aging 1-st year			±50	ppb
Allan Variance	at 1 s		$20 \cdot 10^{-12}$	
External Frequency Reference Characteristics				
Frequency	1 MHz step	1	250	MHz
Operating Temp. Range		-40	+65	°C
Input Level of External Reference Signal		-10	+10	dBm
REF Output	10 or 100 MHz, 50 Ω load	10±3		dBm
Power Supply				
+12V Supply Voltage Current			1.9	A
Dimensions & Weight				
Length	excluding SMA connectors		256	mm
Width			105	mm
Height			27	mm
Weight			1.8	kg



Phase noise vs frequency offset, +10 dBm, internal reference



SFDR at 10 GHz, +10 dBm, internal reference

FUNCTIONNAL OVERWIEW

GFT7513 synthesizer consists of two blocks:

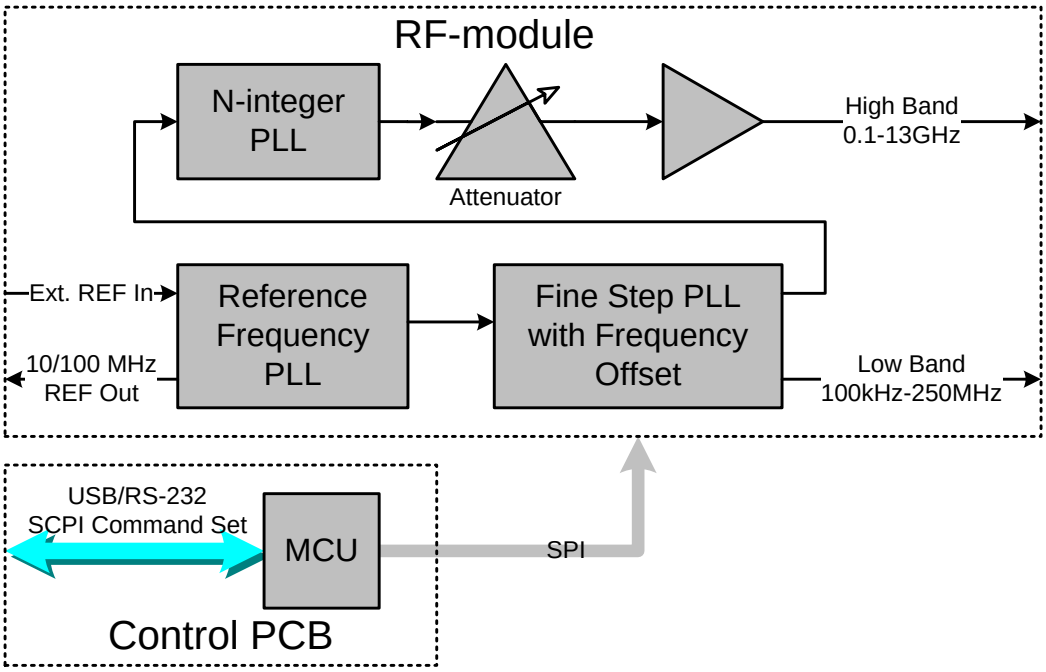
- Control PCB based on the microcontroller
- RF-module based on three PLL loops.

First PLL with very narrow band is used to clear external reference and to produce high quality 100 MHz internal signal.

Second PLL with frequency offset is used to produce fine frequency resolution signal. This signal is fed to third N-integer PLL following by variable attenuator and amplifier.

Low band signal is fed directly from DDS which is used in the second PLL.

The remote control of the synthesizer is based on the SCPI (Standard Commands for Programmable Instruments) protocol. It is implemented via RS-232 and USB interface located on rear panel of the instrument.



Block diagram of GFT7513 Synthesizer

FRONT and REAR PANELS

Front Panel

Rear Panel