

DATASHEET RFSYN20(-X) Specification v1.22

Ultra-Agile Signal Source from 8 kHz to 20 GHz
(single and multi-channel version)



Document size:

1 title page
11 content pages

DEFINITIONS



The specifications in the following pages describe the warranted performance of the instrument for 23 ± 5 °C after a 30-minute warm-up period (unless otherwise stated).

Min/Max: Parameter range that is guaranteed by product design, and/or production tested. Warranted performance specifications include guard-bands to account for the expected statistical performance distribution, measurement uncertainties, and changes in performance due to environmental conditions.

Typical: Expected mean values, not warranted performance.

INTRODUCTION



The RFSYN20 is a very compact, very agile signal source up to 20 GHz. It combines fast switching speeds with good phase noise and signal quality.

The single-channel unit is available as mountable module or in a compact enclosure with display and front panel control.

The multi-channel version RFSYN20-X is available in 1,2,3 or 4 channel configurations in a standard 1U 19" rack-mountable enclosure. For high phase coherence, RF channels are locked to a single reference source.

The RFSYN20 has USB, LAN and a parallel port interface and can be controlled using the SCPI 1999 command set.

SPECIFICATIONS



PARAMETER	MIN	TYPICAL	MAX	NOTE
Frequency range	100 kHz 9 kHz		20 GHz	Option 9K
Resolution		0.01 Hz		
Phase resolution		0.1 deg		
Switching speed		200 μ s 1 μ s	500 μ s 5 μ s	Option FS
SSB Phase noise at 1 GHz				See also plots
at 1 kHz from carrier		-120 dBc/Hz		
at 20 kHz from carrier		-130 dBc/Hz		
Spectral purity				
Output harmonics		-20 dBc	-10 dBc	$P_{out} = +10$ dBm < 10 GHz > 10 GHz
Sub-harmonics		-80 dBc	-70 dBc	
		-60 dBc	-50 dBc	
Non-harmonic spurious (>10 kHz offset)		-65 dBc	-55 dBc	
Power level				
Range	0 dBm		+18 dBm	Settable to -10 to +23 dBm
Resolution		0.5 dB		
Level uncertainty		± 1.5 dB		
Output impedance VSWR		50 Ω 1.7	2.0	
Reference frequency input	1 MHz		200 MHz	Integer MHz
Reference input level	-5 dBm	0 dBm	+13 dBm	
Lock Range			+/- 1.0 ppm	
Reference input impedance		50 Ω		
Internal reference frequency output		100 MHz		
Initial accuracy of internal reference		± 40 ppb		calibrated at 23 ± 3 °C at time of calibration
Temperature stability (0 to 50 degC)			± 100 ppb	
Aging 1 st year		0.5 ppm		
Aging per day (after 30days operations)			5 ppb	
Warm-Up time		5 min		
Output of internal reference		+0dBm 50 Ω		
Reverse power protection				
DC voltage		7 V		
RF power			23 dBm	

Dimensions	standard
Including connectors	W x L x H = 270 x 105 x 60 mm, < 1.0 kg
Dimensions benchtop enclosure	option TOUCH
Including connectors	W x L x H = 172 x 273 x 106 mm
Dimensions 1HE	RFSYN20-X
Including connectors	W x L x H = 43 mm H x 426 mm W x 480 mm



Sweeping Capability

PARAMETER	MIN	TYPICAL	MAX	NOTE
Frequency / List sweep				
Sweep type: linear, logarithmic, random				
Step time	500 μ s 5 μ s		200 s	Option FS
Timing resolution		5 ns		
Timing accuracy per point		20 ns		

Generalized list sweep

allows individual setting of frequency, step-time, and off-time for each point



Modulation Capabilities

PARAMETER	MIN	TYPICAL	MAX	NOTE
Pulse modulation				
On/off ratio		60 dB		
Repetition frequency	DC		10 MHz	
Pulse width	30 ns		20 s	
Pulse rise/fall time		9 ns		
Pulse trainslength (pulses)	2		4192	
Video crosstalk		-40 dB		
Modulation source		Internal/ External		
External input amplitude		1 V TTL		AC DC
Delay (to RF)		20 ns	40 ns	



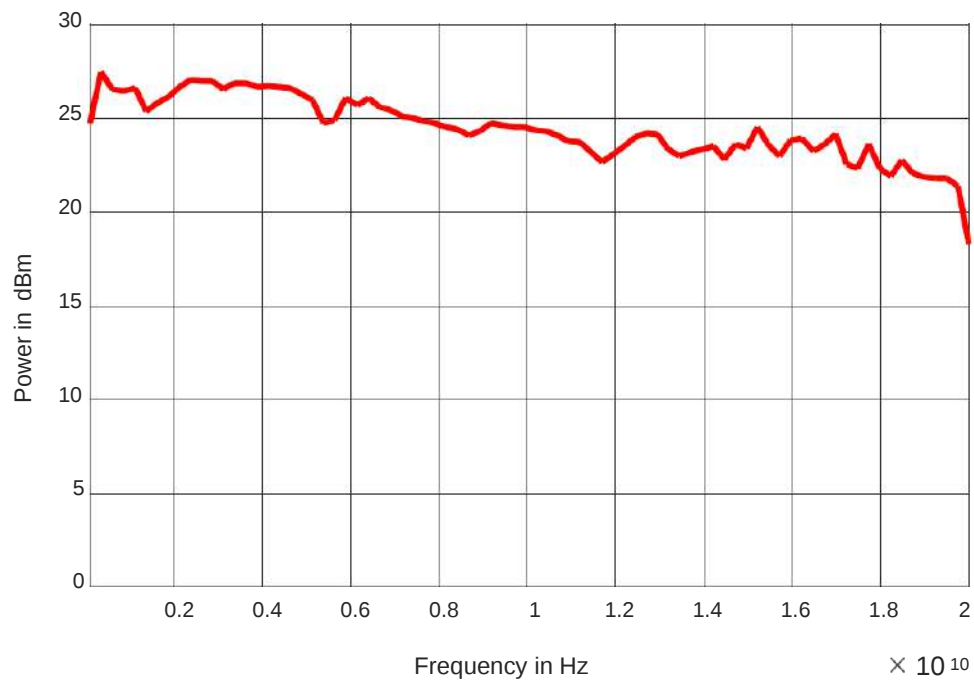
Trigger (TRIG IN/OUT)

PARAMETER	MIN	TYPICAL	MAX	NOTE
Trigger Types				Continuous, single (point), gated, gated direction
Trigger Source				external, bus (LAN, USB)
Trigger Modes				Continuous free run, trigger and run, reset and run
Trigger uncertainty		5 μ s		
External Trigger delay	50 μ s		40 s	
External Delay Resolution		15 ns		
Trigger Modulo	1		255	Execute only on Nth trigger event
Trigger Polarity		Rising, falling		

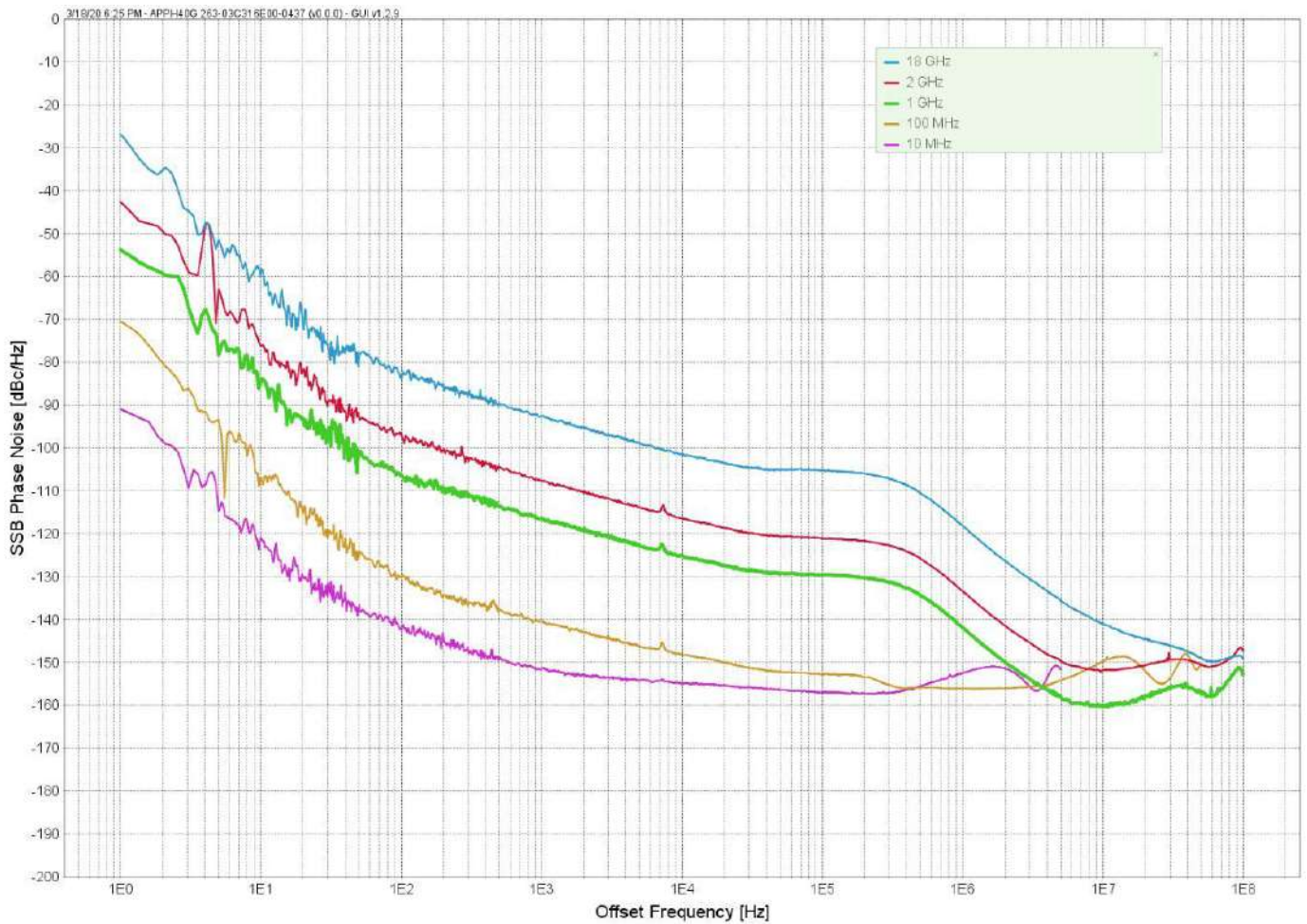
PERFORMANCE CURVES

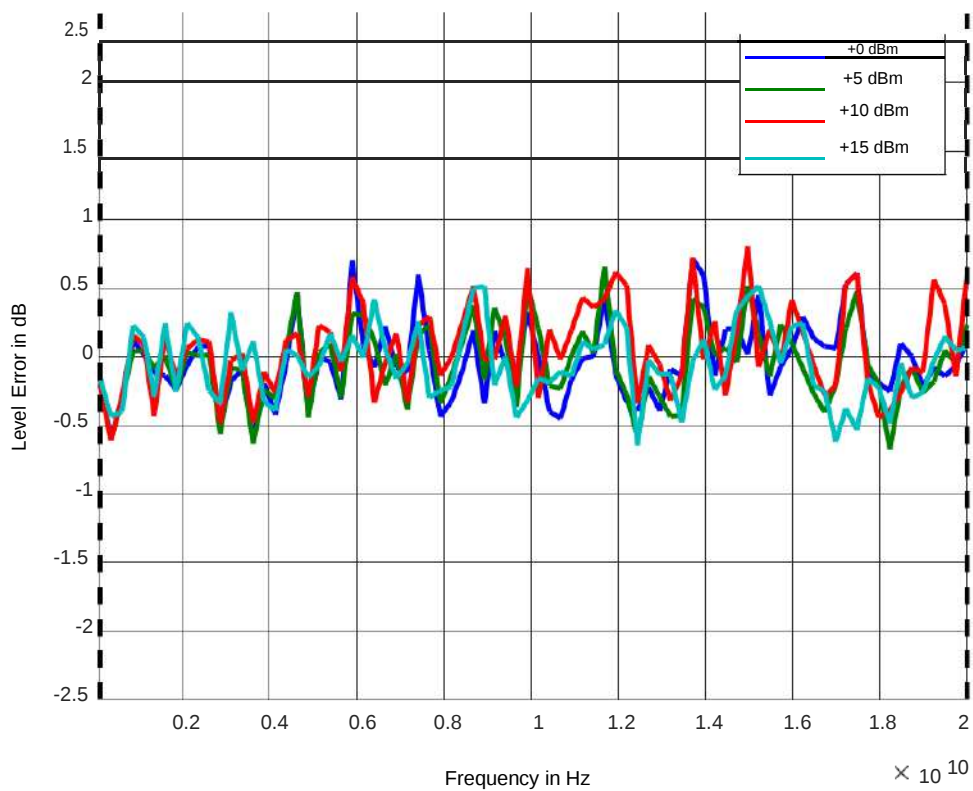
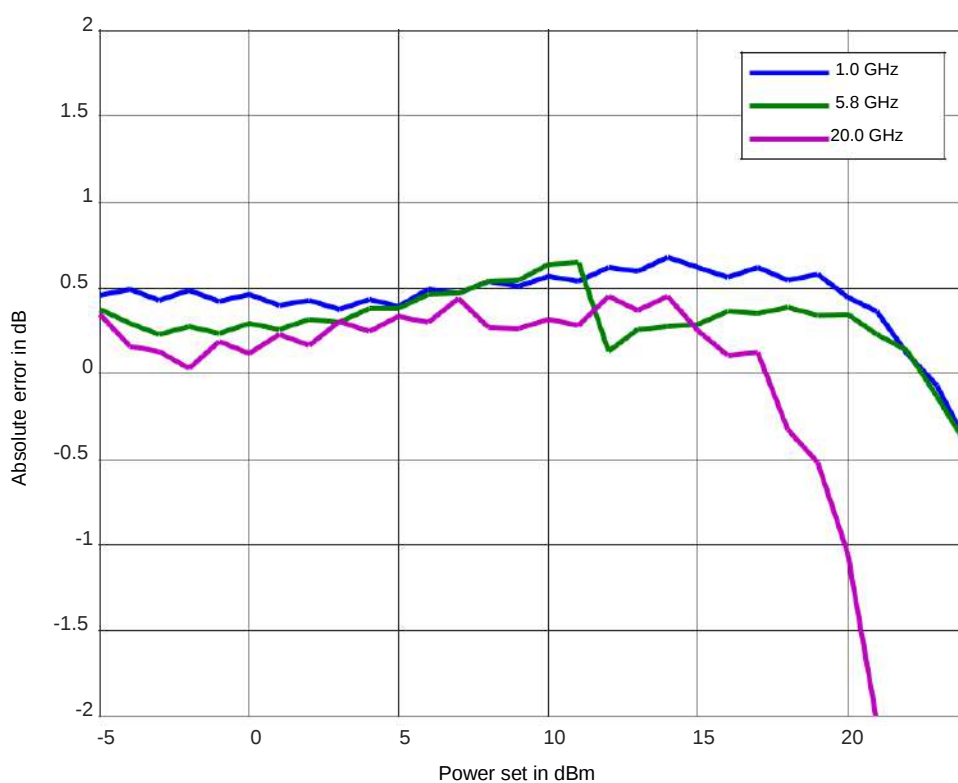


Typical Maximum Output Power

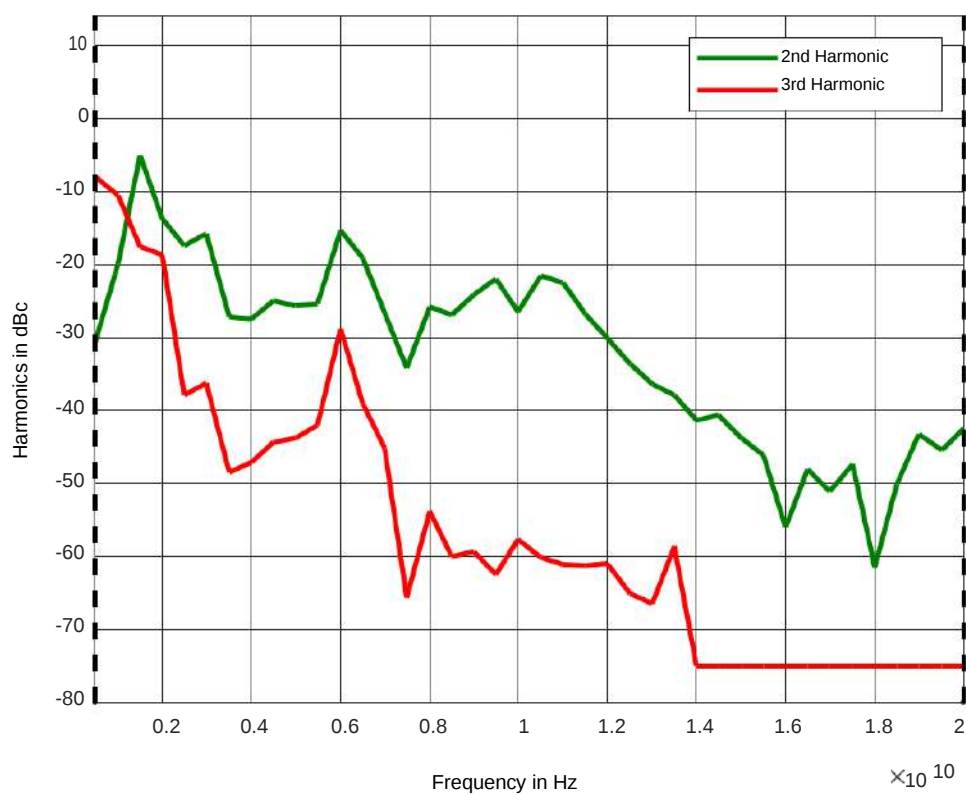


Phase Noise Performance





Harmonic performance at + 10 dBm



Connectors (Front)



Connectors (Rear)



RFSYN20-X Front view



RFSYN20-X Rear view



Fast Control Port

RFSYN20 TOUCH option





Operating modes:

- sequential submission of 48 bit frequency word or access to pre-defined frequency table
- optional amplitude control and support for multi-channel systems ('input mode 2' only)

Connector: 26 pin 3M Mini-D Ribbon

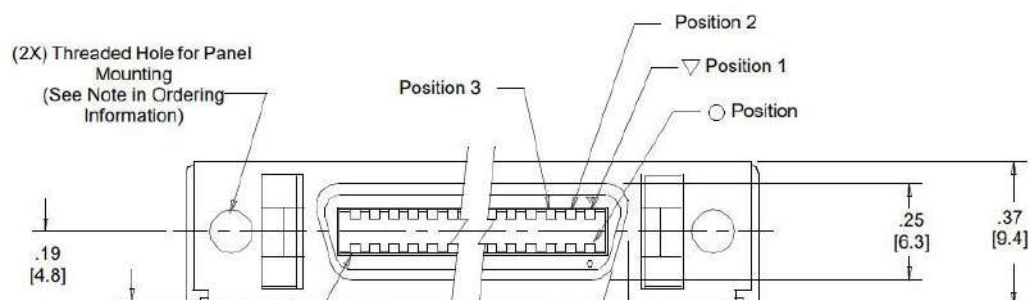
Input mode 1: Address A<3..0>, Data D<3..0>, STROBE, ACK, BUSY

Input mode 2: Address A<7..0>, Data D<7..0>, STROBE, BUSY

Input signal: 0V to 5 V

Input impedance: 4,7 kΩ

Maximum toggle rate: 10 MHz, frequency switching starts after transfer of last byte



Connector: 26 pin 3M Mini-D Ribbon 1

Pin	Signal		Pin	Signal	
	Mode 1	Mode 2		Mode 1	Mode 2
1	STROBE (in)	STROBE (in)	14	RFU	Data 3
2	Address 0	Address 0	15	RFU	Data 4
3	Address 1	Address 1	16	RFU	Data 5
4	Address 2	Address 2	17	RFU	Data 6
5	Address 3	Address 3	18	RFU	Data 7
6	Data 0	Address 4	19	GND	GND
7	Data 1	Address 5	20	GND	GND
8	Data 2	Address 6	21	GND	GND
9	Data 3	Address 7	22	RFU	RFU
10	ACK (out)	Data 0	23	GND	GND
11	BUSY (out)	BUSY (out)	24	RFU	RFU
12	RFU	Data 1	25	GND	GND
13	RFU	Data 2	26	GND	GND

ORDERING INFORMATION



HOST MODEL	PRODUCT	DESCRIPTION
RFSYN20	RFSYN20	20 GHz wideband synthesizer
RFSYN20-X	RFSYN20-X	Multi-output 20 GHz Synthesizer, 19" 1U rack-mount module
RFSYN20	Option TOUCH	Enclosure with touch display control
RFSYN20	Option 9K	Frequency range extension to 9 kHz
RFSYN20	Option FS	Fast switching option (with FCP port)
RFSYN20	Option GPIB	GPIB interface (only with option TOUCH or as 1U rack-mount)

GENERAL CHARACTERISTICS RFSYN20

Remote programming interfaces

- Ethernet interface
- USB 2.0 device interface
- Control language: SCPI Version 1999.0
- Fast Control Port FCP

Power requirements: 24 VDC; 20 W maximum

Mains adapter supplied: 100-240 VAC in / 24 V 2 A DC out

Storage temperature range: –50 to 85 °C

Operating temperature range: –20 to 75 °C

Operating and storage altitude: up to 15,000 feet



Safety/EMC complies with applicable Safety and EMC regulations and directives.

Weight: ≤ 0.5 kg (1 lbs) net

Recommended calibration cycle: 24 months



Document History

Version	Date	Author	Notes
V10	2019-05-20	jk	first release
V11	2019-09-20	jk	added options
V12	2020-02-27	jk	Single and multi-channel version
V121	2020-03-25	jk	Plots added
V122	2020-05-08	jk	FCP specification added