

DATASHEET RFLCXX(-X) Target Specification v1.01

Ultra-low Phase Noise Agile Signal Source
from 100 kHz to 12.75, 20 or 40 GHz
(Single and Multi-Channel Versions)



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 RFLCXX is an agile ultra-low phase noise signal generator from 100 kHz to 12.75 (RFLC12), 20 GHz (RFLC20) or 40 GHz (RFLC40) with excellent harmonic and spurious performance.

It is available with 1 to 4 phase coherent outputs. The single-channel unit is available as mountable module or in a compact enclosure with display and front panel control.

The multi-channel version RFLCXX-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 RFLCXX-X has USB, LAN and a fast control port interface (FCP) and can be controlled using the SCPI 1999 command set.

Using the FCP port, frequency and amplitude can be switched within less than 20 us.

SPECIFICATIONS



PARAMETER	MIN	TYPICAL	MAX	NOTE
Frequency range	100 kHz		12.75 GHz 20 GHz 40 GHz	RFLC12 RFLC20 RFLC40
Resolution		0.001 Hz		
Phase resolution		0.1 deg		
Switching speed		200 μ s	500 μ s 10 μ s	Option FS
SSB Phase noise at 1 GHz				(see also plots / tables)
at 10 Hz from carrier		-87 dBc/Hz -100 dBc/Hz		Option LN
at 1 kHz from carrier		-140 dBc/Hz		
at 20 kHz from carrier		-150 dBc/Hz		
at 100 kHz from carrier		-152 dBc/Hz		
SSB Phase noise at 4 GHz				
at 10 Hz from carrier		-74 dBc/Hz -90 dBc/Hz		Option LN
at 1 kHz from carrier		-128 dBc/Hz		
at 20 kHz from carrier		-138 dBc/Hz		
at 100 kHz from carrier		-140 dBc/Hz		
SSB Phase noise at 10 GHz				
at 10 Hz from carrier		-67 dBc/Hz -80 dBc/Hz		Option LN
at 1 kHz from carrier		-120 dBc/Hz		
at 20 kHz from carrier		-130 dBc/Hz		
at 100 kHz from carrier		-132 dBc/Hz		
Harmonics (at +5 dBm Pout)				
0.01 to 0.2 GHz		-45 dBc	-40 dBc	
>0.2 GHz		-55 dBc	-50 dBc	
Sub-Harmonics				
<8 GHz		-75 dBc		
8 - 20 GHz		-70 dBc		
Non-Harmonic Spurious (> 10 kHz offset)				
<1.2 GHz		-90 dBc	-85 dBc	
1.2 - 2.5 GHz		-92 dBc	-88 dBc	
2.5 - 5 GHz		-90 dBc	-86 dBc	
5 - 10 GHz		-84 dBc	-80 dBc	
10 - 20 GHz		-80 dBc	-74 dBc	
Output power level (APLC12/20)				
<10 MHz	-60 dBm		+13 dBm	
0.01 to 6 GHz	-60 dBm		+15 dBm	
6 to 12 GHz	-60 dBm		+14 dBm	
12 to 20 GHz	-60 dBm		+13 dBm	
Output power level (APLC40)				
<10 MHz	-60 dBm		+13 dBm	
0.01 to 6 GHz	-60 dBm		+15 dBm	
6 to 20 GHz	-60 dBm		+13 dBm	
20 to 40 GHz	-50 dBm		+10 dBm	
Power Resolution		0.01 dB		

Power Level Uncertainty				
<6 GHz		0.25 dB	0.8 dB 1.2 dB	-15 dBm to Pmax -60 to -15 dBm
6 to 12.75 GHz		0.3 dB	0.9 dB 1.3 dB	-15 dBm to Pmax -60 to -15 dBm
12.75 to 20 GHz		0.3 dB	1.0 dB 1.6 dB	-15 dBm to Pmax -60 to -15 dBm
26 to 40 GHz		0.4 dB	1.2 dB 2.0 dB	-15 dBm to Pmax -50 to -15 dBm
Reverse Power Protection				
DC Voltage			±10 V	
RF Power			30 dBm	
Output impedance				
VSWR		50 Ohms	1.4	1.8
Frequency reference				
Internal reference frequency				
		100 MHz 10 MHz		Option LN
Temperature stability 0 to 50 degC			±100 ppb ±20 ppb	Option LN
Aging 1st year			1 ppm 0.03 ppm	Option LN
Aging per day			5 ppb 0.5 ppb	after 30 days operations Option LN
Warm-up time		5 min		
Output of internal reference				
Output power		10/100 MHz		
Output impedance		0 dBm		
		50 Ohms		
Bypass Internal reference Input				
		100 MHz		High phase synchronous mode
Phase Lock to External Reference				
Bypass Mode	5	10 MHz integer MHz 100 MHz	250	Option VREF
Reference input level				
10 MHz or 1-250 MHz	-5 dBm	0 dBm	+10 dBm	
100 MHz	5 dBm		+15 dBm	
Lock Range				
10 MHz or 1-250 MHz			±1.5 ppm	
100 MHz			>100 ppm	
Reference input impedance				
		50 Ohms		



Sweeping Capability

PARAMETER	MIN	TYPICAL	MAX	NOTE
Frequency / List sweep				
Sweep type: linear, logarithmic, random				
Step time	500 μs 10 μs		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 (option MOD)**

PARAMETER	MIN	TYPICAL	MAX	NOTE
Pulse modulation				
On/off ratio		60 dB		
Repetition frequency	DC		10MHz	
Pulse width	30 ns		20 s	
Pulse rise/fall time		9 ns		
Video crosstalk		-40 dB		
Modulation source		Internal/ external		
External input amplitude		1 V TTL		AC DC
Delay (to RF)		20 ns	40 ns	
Amplitude Modulation				
Modulation source		Internal		
Modulation Depth	0%		80%	
Deviation accuracy		2%	4%	1 kHz rate, 30% depth
Deviation resolution		1%		
Distortion (THD)			1%	1 kHz rate, 30% depth
Modulation rate	0.1 Hz		30 kHz	
Modulation waveforms	Sine			
Frequency Modulation				
Modulation source		Internal		
Maximum Frequency deviation (peak)		10% off out N · 50 MHz		< 1.25 GHz (N=1) 1.25 GHz to 2.5 GHz (N=0.125) 2.5 GHz to 5 GHz (N=0.25) 5 GHz to 10 GHz (N=0.5) 10 GHz to 20 GHz (N=1) 20 GHz to 40 GHz (N=2)
Deviation accuracy		0.50%	2%	
Distortion (THD)		< 1 %		1 kHz rate, 10 kHz deviation
Modulation rate	0.1 Hz		30 kHz	
Modulation waveforms	Sine			
Phase Modulation				
Modulation source		Internal		
Phase deviation (peak)	0		100 · N · rad	
Deviation accuracy		0.50%	2%	
Modulation rate	0.1 Hz		30 kHz	
Modulation waveforms	Sine			
Distortion (THD)	< 1%	1 kHz rate & N x rad deviation		



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		tbd		
External Trigger delay	1 μ s		40 s	
External Delay Resolution		15 ns		
Trigger Polarity		Rising, falling		

PERFORMANCE CURVES

Typical Maximum Output Power

tba

Phase Noise Performance

tba

Power linearity

tba

Power level accuracy

tba

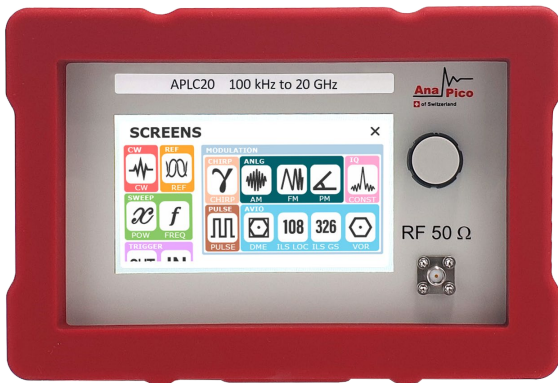
Harmonic performance at + 10 dBm

tba

Connectors (Front)

Connectors (Rear)

RFLC20 Front view



RFLC40-4 Front view



RFLCX0-X Rear view

tba



Fast Control Port

- 8-bit or 16-bit parallel port for fast, time critical settings like frequency
- sequential submission of 48-bit frequency word or access to pre-defined frequency table
- optional amplitude control and support for multi-channel systems (only with 16-bit bus)
- signal generator confirms the received data with ACK (only in 8-bit mode) and informs the controller by the BUSY signal while processing the information.

Connector: 26 pin 3M Mini-D Ribbon Receptacle

8-bit Mode: Address A<3..0>, Data D<3..0>, STROBE, ACK, BUSY

16-bit Mode: Address A<7..0>, Data D<7..0>, STROBE, BUSY

Input signal: TTL, 0V / 5 V

Input impedance: 4,7 k Ω

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

ORDERING INFORMATION

HOST MODEL	PRODUCT	DESCRIPTION
RFLCX-X	RFLC12	Single output 12.75 GHz version
RFLCX-X	RFLC12-X	Multi-output 12.75 GHz version, 19" 1U rack-mount module
RFLCX-X	RFLC20	Single output 20 GHz version
RFLCX-X	RFLC20-X	Multi-output 20 GHz version, 19" 1U rack-mount module
RFLCX-X	RFLC40	Single output 40 GHz version
RFLCX-X	RFLC40-X	Multi-output 40 GHz version, 19" 1U rack-mount module
RFLCX-X	Option LN	Enhanced frequency stability, improved close-in phase noise
RFLCX-X	Option FS	Fast switching option (with FCP port)
RFLCX-X	Option MOD	Analog modulation capability added
RFLCX-X	Option GPIB	GPIB interface (only with option TOUCH or as 1U rack-mount)

GENERAL CHARACTERISTICS APUASYN20

Remote programming interfaces

Ethernet interface
USB2.0 device interface
Control language: SCPI Version 1999.0
Fast Control Port FCP

Power requirements: *tba*

Mains adapter supplied: *tba*

Storage temperature range: -50 to 85 °C

Operating temperature range: 0 to 40 °C

Operating and storage altitude: up to 15,000 feet



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

Weight: *tba*

Recommended calibration cycle: 24 months