APPH20G Specification V1.1

A fully integrated high-performance cross-correlation signal source analyzer for 5 MHz to 26.5 GHz

Introduction

The APPH20G an integrated solution that offers an indispensable set of measurement functions for evaluating signal sources ranging from VHF to microwave frequencies such as crystal oscillators, PLL synthesizers, clocks, phase-locked VCOs, DROs, and others.

The instrument provides a complete set of measurement such as phase noise and amplitude noise measurements, residual noise characterization or direct access to the 40 MHz FFT analyzer, transient and power measurements.

Using proven cross-correlation measurement procedures and self-calibration routines, reproducible, and accurate measurements are obtained even under changing environmental conditions. Fully automated frequency acquisition and self-calibration greatly simplify use and applicability of the instrument, resulting in much faster measurement throughput and greater ease-of-use in actual operation.

It is a compact and powerful instrument available with LAN (VXI-11), USBTMC, or with GPIB (optionally) interfaces. Platform independent intuitive graphical user interface (GUI), API library, and powerful SCPI command language set is available.

Measurement supported:

- **Additive or absolute phase noise measurement**
- **Transient measurements**
- **45+ MHz bandwidth FFT analyzer mode**

Specifications

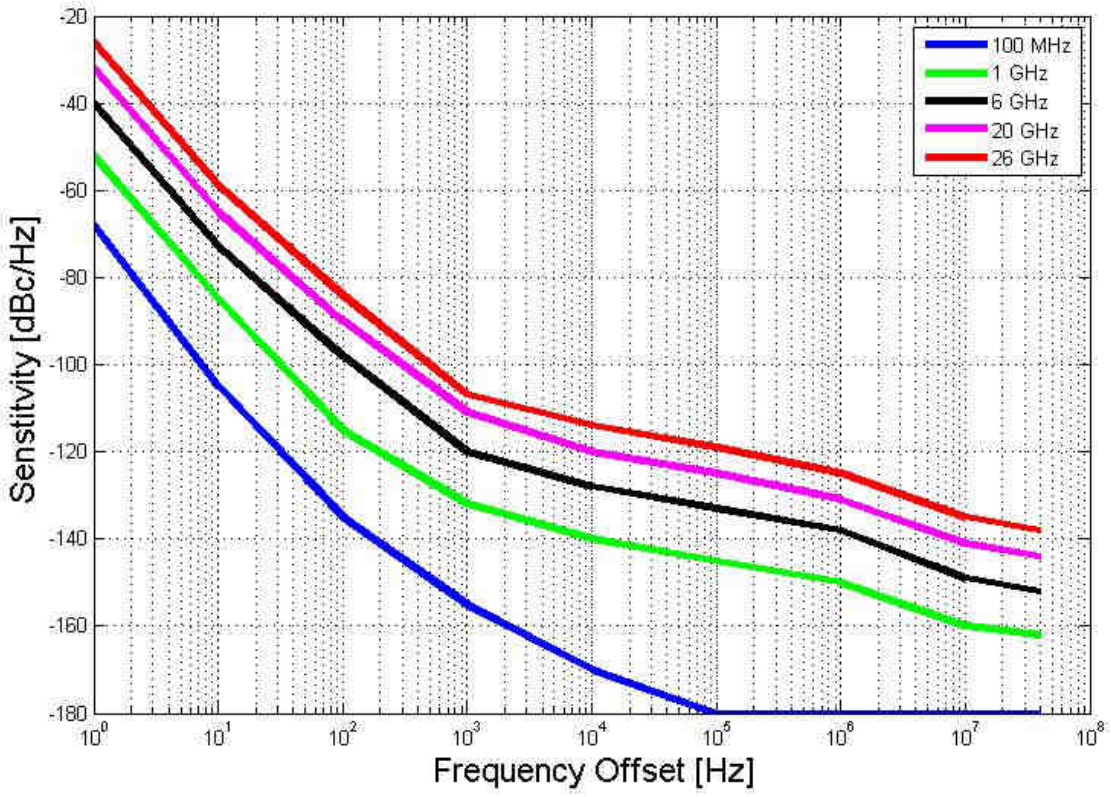
The specifications in the following pages describe the warranted performance of the instrument for 25 ± 10 °C after a 30 minute warm-up period. Typical specifications describe expected, but not warranted performance. Min and Max specifications are warranted.

Parameter	Min.	Typ.	Max.	Note
RF Input Section				
RF Frequency Range	5 MHz		26.5 GHz	
Input Power Range	-12 dBm	+5 dBm	+18 dBm	
Input impedance		50 Ω		
VSWR		2		
Offset Analysis Range	0.1 Hz		45 MHz 5 MHz	for RF > 80 MHz RF < 80 MHz
Phase Noise Measurement				
Measurement Accuracy		±4 dB ±3 dB ±2 dB		< 10 Hz offset < 1 kHz offset > 1 kHz
Residual Phase Noise Floor				
1 Hz 10 Hz 100 Hz 1 kHz 10 kHz 1 MHz		-140 dBc/Hz -150 dBc/Hz -160 dBc/Hz -175 dBc/Hz -180 dBc/Hz -180 dBc/Hz		Channel noise floor (cross-correlation, external references)
Measurement time				See Table "Measurement Time"
Internal References				
Frequency Range	5 MHz		26.5 GHz	
Phase Noise Sensitivity				See Plots "Sensitivity"
Tracking Range		±20 ppm / s		
External References				
Reference Level Range	+8 dBm	+13 dBm	+ 18 dBm	
Tuning Voltage Range	0 V		+20 V	settable
Output current			10 mA	

Baseband Input Range Input Impedance Voltage noise density	-12 V	 1 kΩ 1.2 nV√Hz	+ 12 V	 DC Input shorted, f > 1 kHz
Supply Voltage Range (Supply 1 & 2)	0 V		+5 V	
Resolution		10 mV		
Output current			140 mA	
Noise Density		<10 nV/√Hz		f > 100 Hz
Transient Measurements				
Frequency range	5 MHz 100 MHz		6 GHz 26 GHz	
Measurement	Frequency, Phase			
Measurement bandwidth		tbd		See table
Frequency resolution		tbd		See table
Phase resolution		tbd		See table
Measurement time	50 us		10 s	
Time resolution	20 ns			
FFT Analyzer				
Offset range	1 Hz		50 MHz	
Input Noise Density		< 2 nV/√Hz		f > 100 Hz

Phase Noise Sensitivity (dBc /Hz)

Measurement time ~25 seconds, after first cross-correlation; further correlations will improve sensitivity by 5 dB by for 10, 10 dB for 100, and 15 dB for 1000 respective correlations performed.



Measurement Time

Total measurement time consists of setup time, transfer time plus the number of performed correlations times the time per correlation

	Typical setup time (sec)	Time per average (sec)	Nr. of points
0.1 Hz to 45 MHz	3	115	~ 1400
1 Hz to 45 MHz	3	12	~ 1200
10 Hz to 45 MHz	3	1.5	~ 1000
100 Hz to 45 MHz	3	0.5	~ 800
1 kHz to 45 MHz	<2	0.2	~ 600
10 kHz to 45 MHz	<2	<0.1	~ 400

Data Processing Capabilities

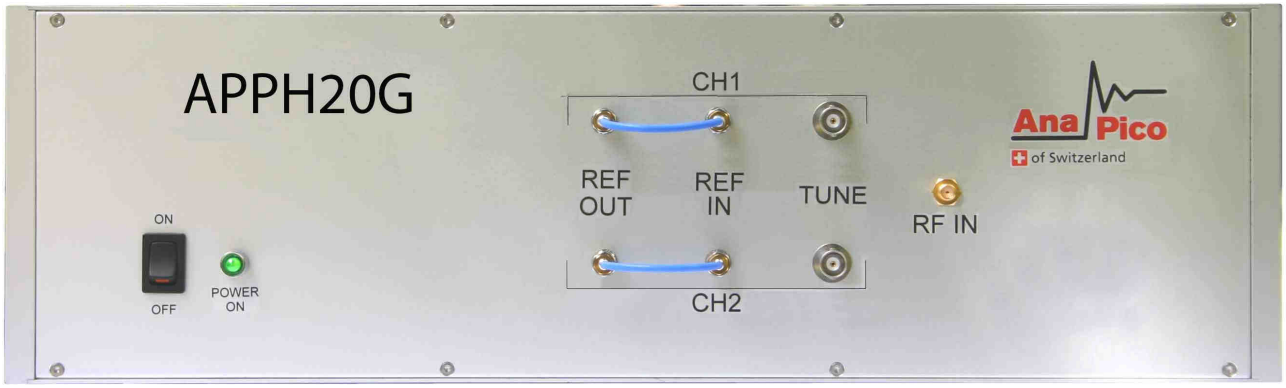
The analyzer employs a graphical user interface based on Windows OS.

GUI Interface

Display Functions	**Phase Noise, Time Domain, Data Table, Residual, Statistics**
Trace Functions **Data Traces**	**Display current measurement and/or multiple memory data (up to 16 traces)**
Math	**Addition, subtraction, multiplication, or division of trace data, offset corrections**
Title	**Add customized title to each measurement window, legends**
Auto-Scale	**Automatically selects scale resolution and reference value to vertically center the trace.**
Statistics	**Calculates and displays mean, standard deviation, and peak-to-peak deviation of the trace.**
Marker Functions	**16 independent markers**

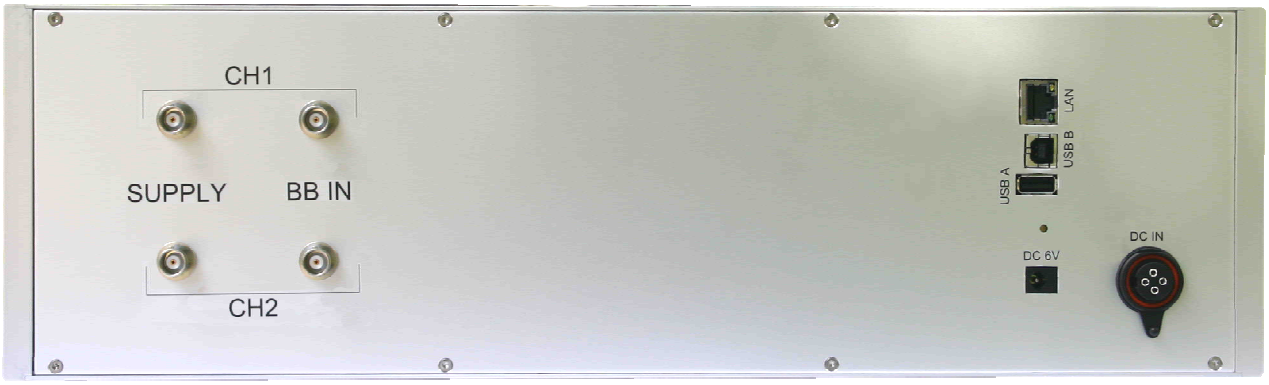
Connectors

1. **RF inputs: , RF IN, REFIN1, REFIN2, REFOUT1, REFOUT2 : SMA female**
2. **Tuning outputs: Tune1, Tune2 : BNC female**
3. **DC power switch**



Connectors (Rear)

1. **Supply outputs: Supply1, Supply2 : BNC female**
2. **Baseband inputs: BBIN1, BBIN2) BNC female**
3. **LAN connection: RJ-45**
4. **USB 2.0 host and device**
5. **DC Power plug (6V, 2.5A)**



General Characteristics

Remote programming interfaces
Ethernet 100BaseT LAN interface,
USB 2.0 host & device
GPIB (IEEE-488.2,1987) with listen and talk (optional)
Control language SCPI Version 1999.0

Power requirements 6 VDC; 24 W maximum
Mains adapter supplied: 100-240 VAC in/ 6V, 6A DC out
Operating temperature range 0 to 45 °C
Storage temperature range –40 to 70 °C
Operating and storage altitude up to 15,000 feet

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

Weight ≤ 4 kg (9 lbs) net
Dimensions

Options

- ***GPIB: IEEE-488.2,1987 programming interface***

Document History

Version/Status	Date	Author	Notes
V10	2012-10-30	jk	first release
V11	2012-12-27	jk	Modified frequency range, added transient measurement info