APMSXXG-(1 to 8) Target Specification 1.20

A compact, 10 MHz to 6.2, 12.5, or 20 GHz ultra low phase noise, phase coherent signal generator with up to 8 independent outputs

Introduction

The APMSXXG is a phase coherent multi-output fast switching and low phase noise signal generator with a frequency range from 10 MHz to 6.2, 12.5 or 20.0 GHz and is ideally suited for a wide range of application, where good signal quality accurate and wide output power range is required. Excellent phase noise is combined with spurious and harmonic rejection.

A high-stability OCXO reference provides excellent frequency accuracy and stability. The generator accepts external 10, 100 or 1000 MHz references.

The APMSXXG comes in standard 19 inch 1U (up to 4 channels) or 3U (4 to 8 channels) enclosure and offers various control interfaces like USB, LAN, or GPIB. Each interface allows easy and fast communication using SCPI 1999 command set. Remote control of the instrument can be quickly attained from any host system. A customer-supplied application programming interface (API) or programming examples for Matlab, Labview, C++, and other commercially available tools make implementation very straightforward.

CW Specifications

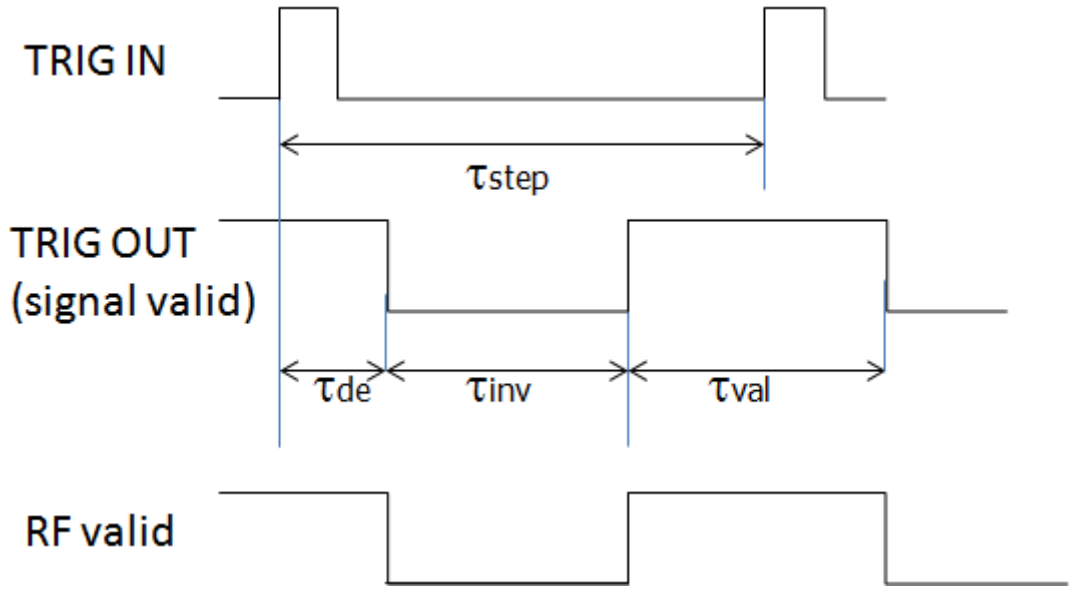
The specifications in the following pages describe the warranted performance of the signal generator for 25 ± 10 °C after a 30 minute warm-up period. Typical specifications describe expected, but not warranted performance. Min and Max specifications are warranted.

Parameter	Min.	Typ.	Max.	Note
Frequency range	10 MHz 10 MHz 10 MHz		6.2 GHz 12.5 GHz 20.0 GHz	APMS06G APMS12G APMS20G
resolution		0.1 Hz		
Switching speed			0.05 ms	
SSB Phase noise at 500 MHz				
At 10 Hz from carrier 20 kHz 100 kHz		-105 dBc/Hz -141 dBc/Hz -147 dBc/Hz		scales with frequency at 20 dB/dec
Power level				
Range -20 dBm -20 dBm -20 dBm			 +18 dBm +15 dBm +18 dBm	 <6.2 GHz <12.5 GHz, APMS12G 0.1 to 20 GHz, APMS20G
Resolution		0.01 dB		
Thermal drift		0.015 dB / degC		
Level uncertainty		0.25 dB	±1.0 dB	
Output impedance		50 Ohms		
VSWR		1.5	2	
Reverse Power Protection				
DC Voltage		15 V		
RF power			+26 dBm	
Spectral purity Output harmonics			 -35 dBc	 at + 5 dBm output power
Non-harmonic spurious			-60 dBc	offsets > 1 kHz
Internal reference frequency				
Temperature stability (10 to 45 degC)			±0.01 ppm	
Reference IN/OUT		10 MHz / 100 / 1000 MHz		
Power consumption	10 W per channel 12 W per channel			6 and 12 GHz versions 20 GHz version

Sweeping Capability

Sweeps can be performed with combined internal or external AM/FM/PM/pulse modulation running. With modulation enabled, the minimum step time increases to 2 ms.

Parameter	Min.	Typ.	Max.	Note
Digital power / frequency / list sweeps Sweep type: linear, logarithmic, random				
Step time (τ_{step})	40 µs		19998 s	For 1 channel, if N channels are swept synchronously, minimum step time is N times 40 µs
Dwell time (τ_{val})	10 µs		9999 s	
Off-time (incl. transient time) (t_{off})	0		9999 s	
Transient time (τ_{inv})			30 µs	
Timing delay (τ_{de})		50 ns		
Time resolution		5 ns		
Timing accuracy per point		5 ns		



Modulation Capabilities

Any combination of sweeps and internal/external AM and pulse modulation is allowed

Parameter	Min.	Typ.	Max.	Note
Pulse Modulation On/off ratio		>70 dB		at +10 dBm
Repetition frequency	0.1 Hz		20 MHz	Internal or external
Duty cycle	1 % to 99 % in 1% steps			within specified minimum pulse width
Minimum Pulse width	50 ns			
Pulse rise/fall time		10 ns		
External input amplitude	TTL			

Multi Purpose Output (FUNC OUT)

Output is FUNC OUT at rear panel

Parameter	Min.	Typ.	Max.	Note
MULTIFUNCTION GENERATOR	sine, triangle, square wave			
Frequency range	1 Hz 1 Hz		3 MHz 1 MHz 50 kHz	sine triangle square
Frequency resolution		0.1 Hz		
Output voltage amplitude peak-peak	10 mV	 5V	2 V	Sine, triangle Square (CMOS output)
Harmonic Distortion		1 %		< 100 kHz, 1 Vpp
Output impedance		50 Ohms CMOS		Sine, triangle square wave
VIDEO OUTPUT (of internal pulse modulator)				
Output		CMOS		
Period	30 ns		50 s	
Pulse Width	15 ns		50 s	
RF delay		10 ns		
TRIGGER OUT	**Synchronization mode for multiple sources**			
Modes	Trigger on sweep start Trigger on each point SIgnal Valid			
Trigger waveform pulse width		100 ns		

Trigger (TRIG IN)

Input is TRIG IN at rear panel

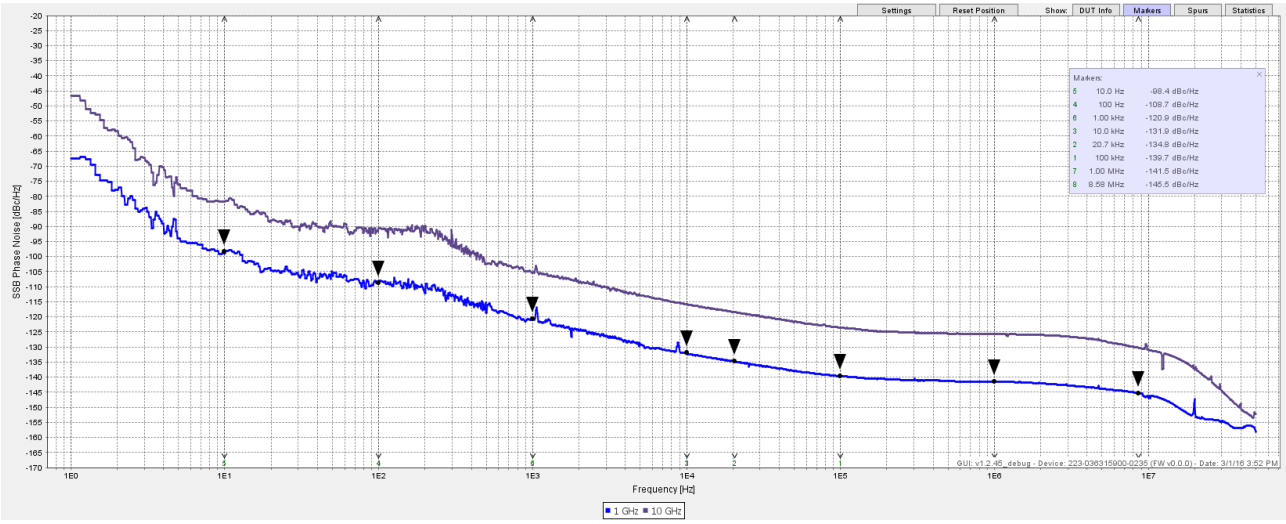
Parameter	Min.	Typ.	Max.	Note
Trigger Types	**Continuous, single, gated, gated direction**			
Trigger Source	**external, bus (GPIB, LAN, USB)**			
Trigger Modes	**continuous free run, trigger and run, reset and run**			
Trigger latency		5 ns		
Trigger uncertainty		10 ns		
External trigger delay	50 ns		10 s	programmable
External delay Resolution		10 ns		
Trigger Modulo	1		255	Execute only on Nth trigger event
Trigger Polarity	Rising, falling			

Trigger Output (TRIG OUT)

see Multi Purpose Output (FUNC OUT)

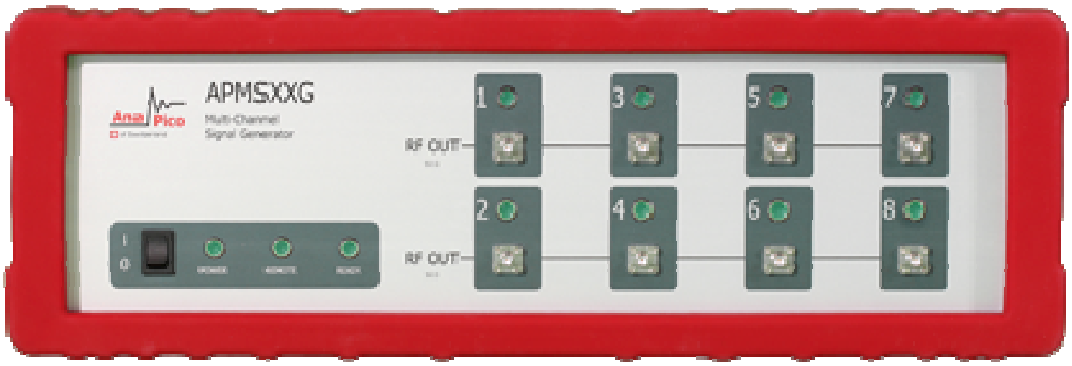
Typical Performance

1 and 10 GHz SSB Phase Noise



Connectors

Front panel:



1. RF outputs 1 to N: SMA female
2. DC power switch

Rear panel:

1. Trigger input: BNC female
2. Trigger output: BNC female
3. External reference input: BNC female
4. Internal reference output: BNC female
5. Pulse modulation: BNC female
6. LAN connection: RJ-45

7. USB 2.0 host and device
8. GPIB: IEEE-488.2, 1987 with listen and talk (optional)
9. DC Power plug (24V, 6A)

Options

- ***HP***: High output power (only APMS20G-N)
- ***GPIB****: IEEE-488.2,1987 programming interface*

General Characteristics

Remote programming interfaces

Ethernet 100BaseT LAN interface,
USB 2.0 , USBTMC
GPIB (IEEE-488.2,1987) with listen and talk (optional)

Control language SCPI Version 1999.0

Power requirements 100 or 240 VAC, 50 or 60 Hz
Operating temperature range 0 to 45 °C
Storage temperature range –40 to 70 °C
Operating and storage altitude up to 15,000 feet

Dimensions:
19'' 1HE enclosure : 43 mm H x 426 mm W x 460 mm L [1.7 in H x 16.8 in W x 18.1 in L]

19'' 3HE enclosure incl. rubber: 154 mm H x 467.5 mm W x 342 mm L [6.1 in H x 18.4 in W x 13.5 in L]

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

Recommended calibration cycle 24 months
ISO compliant Instrument is manufactured in an ISO-9001 registered facility under high quality standards.

Document History

Version/Status	Date	Author		Notes
V10	2015-06-15	jk		first release
V1.01	2015-08-15	jk		Updated power ranges
V1.02	2015-09-15	jk		Added harmonic and spurious specs
V1.10	2016-02-15	jk		Refined parameters

V1.11	2016-02-22	jk		Added phase noise plot
V1.20	2016-04-08	jk		Pictures, Sweeping and Trigger information, Dimensions, Options