

APSIN6010 Specification 1.2

Portable Analog Signal Generator



Introduction

The APSIN 6010 is a low-noise and fast-switching analogue signal generator covering a frequency range from 9 kHz up to 6.1 GHz.

The APSIN 6010 provides full RF signal generator capabilities including OCXO-stabilized low phase-noise signal with micro-Hz frequency resolution, wide and accurately levelled output power range, extensive modulation capabilities, and fast switching.

It is targeted for a wide range of applications where a high-quality analog signal is mandatory, offering an alternative to expensive high-end RF signal generators.

here small size and excellent RF performance at an attractive cost is required.

The very compact and rugged design of the APSIN 6010 operates at very low DC power consumption (only 12 watts), with minor heat dissipation and not requiring noisy fan. This gives the APSIN 6010 a great advantage in laboratories or production test facilities.

The low power design allows the use of optional internal battery modules which make it a truly portable instrument, ideally suited for field testing, installation, and maintenance.

19 inch rack-mount solutions are also available.

The APSIN 6010 support various standard interfaces such as USB, LAN, RS232 or GPIB.

Signal 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	9 kHz		6.1 GHz	
resolution		0.001 Hz		
Phase resolution		0.1 deg		
Settling time		20 μ s	100 μ s	transient to reach frequency accuracy to 1 ppm and amplitude accuracy to 0.1 dB
Frequency update rate		200 μ s		time from receipt of SCPI command
List/Sweep mode			100 μ s	
SSB Phase noise at 1 GHz				
at 20 kHz from carrier		-129 dBc/Hz		
Wideband noise		-152 dBc/Hz		
Total jitter		100 fs RMS		BW over 10 Hz to 20 MHz
Spectral purity				
Output harmonics		-40 dBc	-30 dBc	$P_{out} = +10$ dBm; $f > 10$ MHz
Sub-harmonics		-70 dBc		
Non-harmonic spurious				
< 10 MHz		-60 dBc	-50 dBc	$P_{out} = +10$ dBm; $f > 10$ MHz
> 10 MHz		-70 dBc	-60 dBc	
Residual FM @ 1GHz			6 Hz	0.3 kHz to 3 kHz, weighted (ITU-T)
			12 Hz	0.03 kHz to 23 kHz
Residual AM @ 1GHz		tbd		RMS value (0.01 kHz to 15 kHz)
Power level				
Range				
9 kHz to 10 MHz	-30 dBm		+13 dBm	ALC ON
10 MHz to 6.1 GHz	-30 dBm		+16 dBm	
	-130 dBm		+16 dBm	with Option PE2
Resolution		0.01 dB		
Level uncertainty			< 0.8 dB < 1.2 dB	ALC ON, > -30 dBm ALC ON, > -110 dBm
Output impedance		50 Ω s		
Reference frequency input	1 MHz		150 MHz	must be integer N • 1 MHz
Reference input level	-5 dBm	0 dBm	+13 dBm	
Lock Range			+/- 1.0 ppm	
Reference input impedance		50 Ω s		
Internal reference frequency		100 MHz		
Temperature stability (0 to 50 degC)			± 100 ppb	
Aging 1 st year		0.5 ppm		
Aging per day (after 30days operations)			5 ppb	

Parameter	Min.	Typ.	Max.	Note
Warm-Up time		5 min		
Output of internal reference		+5 dBm 50 Ω s		
Reverse Power Protection				
DC Voltage		30 V		
RF power			36 dBm	
Dimensions				
Excluding connectors	W x L x H = 172 x 220 x 106 mm			
Including connectors	W x L x H = 172 x 243 x 106 mm			

Notes:

Sweeping Capability

Parameter	Min.	Typ.	Max.	Note
Frequency sweep				
Sweep type: linear, logarithmic, random				
Step time (t_{step})	200 μ s			
Dwell time (t_{dwell})	50 μ s			
Off-time (incl. transient time) (t_{off})	50 μ s		t_{step}	
Timing accuracy per point		1 μ s		
Generalized list sweep				
allows individual setting of frequency, power, dwell-time, and off-time for each point				
List size	2		65'000	
Step time (t_{step})	200 μ s			
Dwell time (t_{dwell})	50 μ s			
Off-time (incl. transient time) (t_{off})	50 μ s		t_{step}	
Time resolution		0.1 μ s		
Timing accuracy per point		1 μ s		
Trigger				
auto, bus (SCPI), trigger key, external				
Trigger delay	50 μ s		10'000 μ s	
Trigger modulo (use every Nth trigger)	1		255	
Trigger edge: positive or negative				

Modulation Capabilities

All modulation types (FM, PM, AM, and pulse modulation) may be simultaneously enabled except: FM and phase modulation can not be combined; two modulation types can not be simultaneously generated using the same modulation source.

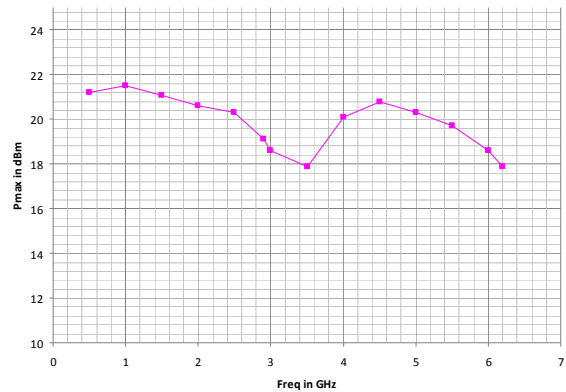
For example, AM and FM can run concurrently and will modulate the output RF.

Parameter	Min.	Typ.	Max.	Note
Multifunction Generator sine, triangle, square wave				
Output is Sync Out at rear panel				
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	5 V	2 V	Sine, triangle Square (CMOS output)
Harmonic Distortion		1 %		< 100 kHz, 1 Vpp
Output impedance		50 Ohms CMOS		Sine, triangle square wave
Pulse Modulation				
On/off ratio		70 dB		
Repetition frequency	DC		5 MHz	
Pulse width	40 ns 50 μs			ALC hold ALC on
Pulse rise/fall time		5 ns		
Video crosstalk		-40 dB		
External input amplitude		1 V TTL		AC DC
Frequency modulation Maximum Frequency deviation (peak)	> 2 MHz N x 200 MHz			< 0.37 GHz 0.37 GHz to 0.75 GHz (N=0.125) 0.75 GHz to 1.5 GHz (N=0.25) 1.5 GHz to 3 GHz (N=0.5) > 3 GHz to 6.1 GHz (N=1)
Modulation rate	1 Hz/DC		800 kHz	> -3dB frequency response
External input sensitivity	N · 100 MHz for 1 Vpp			adjustable
Total harmonic distortion	< 1%			1 kHz rate & N · 100 kHz deviation
Phase modulation				
Phase deviation (peak)	0		N·80 rad	
Modulation rate	1 Hz		800 kHz	> -3dB frequency response
External Input sensitivity	N · 80 rad for 1 Vpp			
Total harmonic distortion	< 1%			1 kHz rate & N · 20 rad deviation
AM Modulation				
Modulation rate	0.1 Hz		50 kHz	
Modulation depth	0 %		90 %	
Distortion		2 %		
Accuracy		3 %		

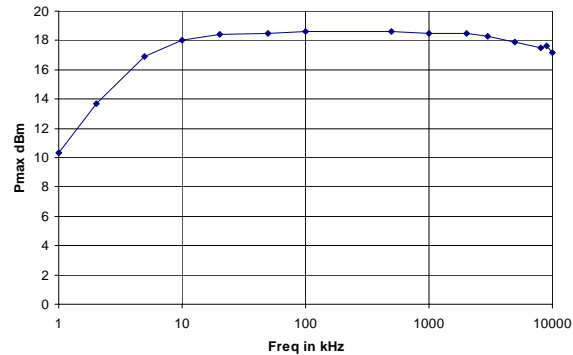
Notes:

Typical performance curves

Maximum Output Power



Maximum Output Power (1 kHz to 10 MHz)



Connectors

Front panel:

1. RF output: N female
2. RF on/off button
3. Rotary knob
4. Menu and \downarrow \uparrow \leftarrow \rightarrow arrow keys

Rear panel:



1. Trigger input: BNC female
2. Function output: BNC female
3. External reference input: BNC female
4. Internal reference output: BNC female
5. FM/PM modulation input: BNC female
6. AM and Pulse modulation: BNC female
7. LAN connection: RJ-45
8. USB 2.0 host and device
9. GPIB: IEEE-488.2, 1987 with listen and talk (optional)
10. DC Power plug (6V, 2.5A)
11. DC power switch

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; 20 W maximum

Mains adapter supplied: 100-240 VAC in/ 6V 2.5A DC out

Operating temperature range 0 to 55 °C

Storage temperature range -40 to 70 °C

Operating and storage altitude up to 15,000 feet



notice

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

Weight ≤ 2.5 kg (6 lbs) net, ≤ 4 kg (8 lb.) shipping

Dimensions 106 mm H x 172 mm W x 220 mm L
[4.21 in H x 6.77 in W x 8.66 in L]

Recommended calibration cycle 24 months

Compatibility languages supporting commonly used commands

Agilent Technologies N5181A MXG,

Aeroflex

Rohde & Schwarz SMA and SML models

- **B3**: Rechargeable battery pack (internal, up to 2.5 hours operation)
- **PE**: Extended power range (leveled down to -100 dBm)
- **PE2**: Extended power range (leveled down to -130 dBm)



- **GPIB**: IEEE-488.2,1987 programming interface
- **TB**: improved internal reference stability
- **19"** rackmount enclosure (contact AnaPico for more information)

Document History

Version/Status	Date	Author		Notes
V10	2010-06-01	jk		first release
V11	2010-08-01	jk		mechanical information added
V12	2010-11-01	jk		Options,