



APSIN 3000 Product Specification

High-Resolution Low-Noise CW Signal Source



Key performance

- Output frequency from 9 kHz to 3300 MHz
- Output power range from -50 to +15 dBm
- Low harmonics < -40 dBc typical
- Low phase noise (at 1 GHz and 20 kHz: -124 dBc/Hz)
- Fast power/frequency switching and settling time (2 ms max)



A General high performance instrument:

- **Fast: built-in programmable frequency hopping/sweeping**

Simultaneous power and frequency switching in less than two milliseconds makes the APSIN3000 a useful source in ATE applications.

- **Flexible operation via LAN (GUI, DLL, Web-server, VISA drivers available)**

Flexible control via LAN allows programming the APSIN3000 from any location within the local area network. The APSIN can store states that allow LAN independent operation.

- **Scalable: multiple synchronous sources easily cascaded**

Synchronizing multiple APSIN3000 units to any frequency reference is straightforward.

- **Handy: light weight and compact size (< 3 kgs fully equipped)**

Being small and lightweight, an APSIN3000 signal generator is as convenient for field troubleshooting use as it is for bench-top use, where space is often at a premium.

- **Portable: Rechargeable internal battery (optional)**

Take your APSIN3000 everywhere you want. Save operating states to be even independent of the any labtop control.



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1. Introduction

The new AnaPico APSIN product family consists of several modular low-noise CW signal sources. The frequency range covered with a 0.001 Hz resolution is from 9 kHz up to 3.3 GHz (APSIN3000), and 6 GHz (APSIN6000), respectively.

The APSIN3000 provides broadest frequency range, highest output power, and lowest harmonic levels amongst signal generators of its size and cost. It is targeted for applications where a high-quality CW source is required. It offers an alternative to expensive high-end RF signal generators, where small size and excellent RF performance at an attractive cost is required.

The very robust and compact enclosure of the APSIN allows multiple units to be stacked in crowded environments like laboratories or production test facilities. Light weight (less than three kilograms fully equipped) and optionally internal rechargeable batteries make the APSIN an easy-to-use portable instrument.

The APSIN operates with an ultra-stable temperature compensated 100 MHz reference (OCXO) and can be phase-locked to an external reference. Multiple units can be synchronized connecting one unit's reference output to the reference inputs of the remaining units. Integration of multiple signal sources within a production test environment is now easy, affordable and repeatable.

The APSIN uses a standard LAN interface (RJ-45) with a TCP/IP protocol, enabling remote control over the LAN or from any PC or Laptop computer running under Windows operating systems. Broad software support (DLL, GUI, Web-server and NI-VISA drivers) enable straightforward integration of the signal generator into larger automated test systems or measurement equipment.

An installation disk that accompanies each unit includes all the drivers required to remotely control the device as well as a user-friendly, lab-windows-based GUI interface that is compatible with Windows™ 2000, XP, and Vista. User control is facilitated via pulldown menus that enable programming of single or swept modes in frequency and power, modulation capabilities, and other settings.

In brief, the APSIN3000 is summarized as a broadband signal generator with excellent signal quality and switching performance, a light weight and a 100 % portable design that comes at an affordable price.



2. Specifications

The specifications in the following pages describe the warranted performance of the Signal generator for 25 ± 10 °C. Typical specifications describe expected, but not warranted performance.

Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Frequency range	f	9 kHz		3300	MHz	
resolution	f_{step}		0.001		Hz	1
Phase resolution	ϕ_{step}		0.1		deg	
Settling time				200	μ s	
Frequency update rate			2		ms	
SSB Phase noise						
at 20 kHz from carrier			-125		dBc/ Hz	2
at 1 MHz from carrier			-132		dBc/ Hz	2
at 10 MHz from carrier			-147		dBc/ Hz	2
Wideband noise			-150 -155		dBm/Hz	$f < 1.5$ GHz $f > 1.5$ GHz
Total jitter			120		fs RMS	3
Power level						
Range	P_{out}					
9 kHz to 3.3 GHz		-45		+13	dBm	
10 MHz to 2 GHz				+16	dBm	
Resolution			0.5		dB	
Level uncertainty				± 1	dB	4
Output impedance			50		Ohms	
Spectral purity						
Output harmonics			-45	-35	dBc	5
Sub-harmonics			-60		dBc	
Non-harmonic spurious						
$f < 400$ MHz			-60	-50	dBc	
$f > 400$ MHz			-70	-50	dBc	
Residual FM @ 1GHz			1.5		Hz RMS	0.3 kHz to 3 kHz, weighted (ITU-T)
			15		Hz RMS	0.01 kHz to 15 kHz
Residual AM @ 1GHz			0.01		%	RMS value (0.01 kHz to 15 kHz)



Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Frequency sweep Sweep type: linear, logarithmic, table, random						
Dwell time resolution		1	0.1	10'000	ms ms	
Sweep list		2		2'000	points	
Reference frequency input	f_{ref}	1	10	100	MHz	6
Reference input level		-8	0	+10	dBm	
Reference accuracy				+/- 1.0	Ppm	
Reference input impedance			50		Ohms	
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	
Warm-Up time			5		min	
Output of internal reference			-3 50		dBm Ohms	

Notes:

1. depending on output frequency
2. at 1 GHz output carrier frequency
3. $f = 1\text{GHz}$, jitter BW from 10 Hz to 20 MHz
4. $-40\text{ dBm} < P_{out} < +10\text{ dBm}$
5. at output connector, $P_{out} < +10\text{ dBm}$; $f > 10\text{ MHz}$
6. must be integer $N \cdot 1\text{ MHz}$



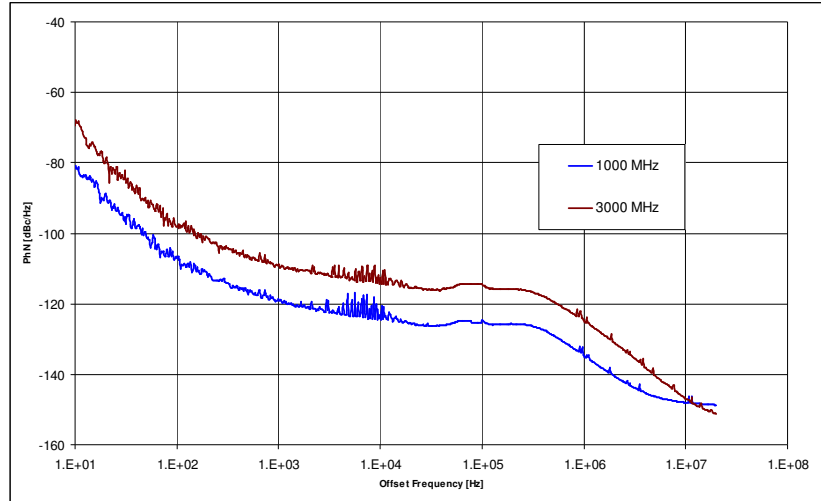
3. Modulation Capabilities

Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Pulse Modulation (internal & external)						
On/off ratio			60 45		dB dB	<1 GHz At 3 GHz
Repetition frequency		DC 0.1		4M 100k	Hz Hz	External internal
Pulse width		40 1.5		2 s	ns µs	External internal
Pulse rise/fall time			10		ns	
Video crosstalk			-50		dB	
External input amplitude			1 TTL		V	AC DC
Frequency modulation (external input)						
Frequency deviation				tbd	kHz	
Modulation rate		tbd		tbd	kHz	
Phase Modulation (external)						
Phase deviation					Rad	1Vpp input
Modulation rate		tbd		tbd	kHz	
PSK Modulation (internal)						
		tbd		tbd		
Reverse Power Protection						
DC Voltage				20	V	
RF power				36	dBm	

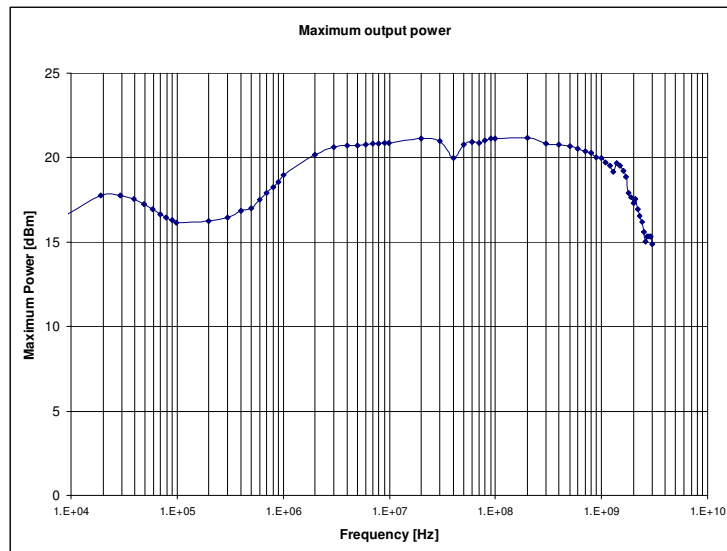


4. Typical performance curves

Phase Noise

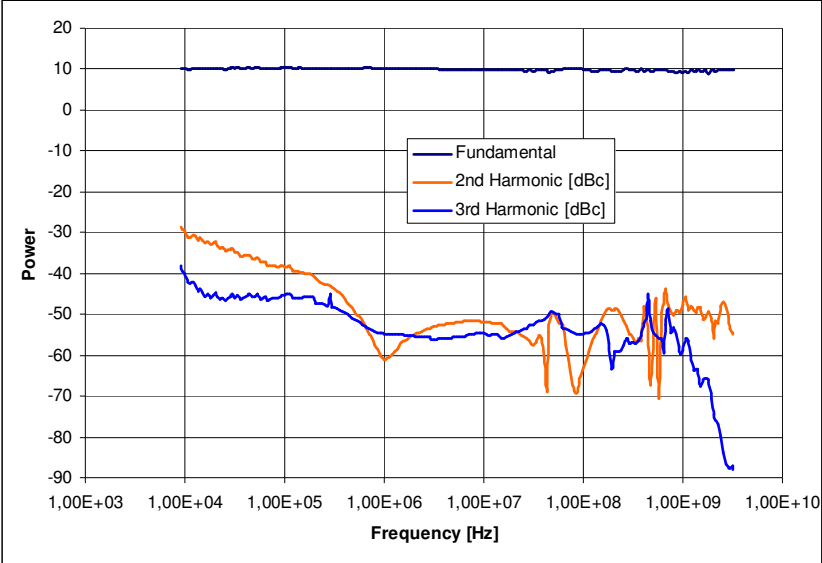


Maximum Output Power (unleveled)





Harmonic Distortion (+10 dBm output power)





5. Connectors

Front panel:

- RF output: N female

Rear panels:

- External reference input: BNC female
- Internal reference output: BNC female
- Modulation input: BNC female
- LAN connection: RJ-45
- DC Power plug (6V, 2.5A)

6. Options

- **B3**: Rechargeable battery pack (internal, >3 hours operation)
- **PE**: Extended power range (-95 to +15 dBm)
- **HC**: Hardware user interface (rotary knob)
- **APSIN6000**: Model with extended frequency range 9 kHz to 6 GHz

7. Document History

Version/Status	Date	Author		Notes
V10	2008-1-28	jk		first release
V11	2008-5-20	jk		Minor revision