PNG-A Phase Noise Generator
Universal Phase Noise Calibrator

Datasheet

The PNG-A is a high precision generator used in Test and Measurement instruments calibration. It is a Signal Generator with precisely computed phase and amplitude noise characteristics.

With its wide frequency offset range, 1Hz to 1 MHz offset, and its programmable Phase and Amplitude noise in real time, this is the ideal standard to calibrate phase noise analyzers, Signal Source Analyzers and Spectrum Analyzers.

The PNG-A can also be programmed in Random and Deterministic Jitter in order to test Oscilloscopes or even test clock recovery systems or receivers in the presence of noise or jitter.

Much more flexible than traditional noise sources; the PNG-A allows the user to tailor the noise shape and its Phase and Amplitude distribution.

Specifications below describe the RF Output and its operational characteristics.

RF Output Specifications

Description	Specification
Output Frequency	5 to 35 MHz
Frequency Resolution	0.1 Hz
Output Level	-10 to +5 dBm (typical)
Level Resolution	0.1 dB
Non-Harmonic spurious	-60 dBc (typical)
Output connector	SMA-type female, 50 Ohms

Phase Noise profile

Typical Phase Noise limits

dBc/Hz vs offset (Hz)	1	10	100	1k	10k	100k	1M
MAX	0	-20	-40	-60	-77	-80	-80
DEFAULT	-40	-60	-80	-97	-100	-100	-100
MIN	-50	-70	-90	-110	-120	-120	-120

Amplitude Noise profile

Typical Amplitude Noise limits

dBc/Hz vs offset (Hz)	1	10	100	1k	10k	100k	1M
MAX	-80	-80	-80	-80	-80	-80	-80
DEFAULT	-100	-100	-100	-100	-100	-100	-100
MIN	-120	-120	-120	-120	-120	-120	-120

Noise Shape

The PNG-A is based on Real-Time continuous generation of pseudo-random noise and sine waves. Those noise elements can be applied to phase, amplitude and frequency internal modulation, separately or all at the same time.

Phase Noise can carry 3 types of combined shapes
- White noise (flat, horizontal)
- Brownian noise, also called Red noise ($1/f^2$ or -20dB/decade down slope)
- 1x Discrete spurious

Amplitude Noise can carry 3 types of combined shapes
- White noise (flat, horizontal)
- 1x Discrete spurious

Here are some typical examples below:
    "Min" plot shows the lowest phase noise settings
    "Typical" shows the default settings providing a standard phase noise profile
    "Max" shows almost the highest phase noise setting possible on the RF output
    "Phase Mod" uses the lowest phase noise mode but adds a programmed spur level at a
    programmed offset (here 8kHz and -40dBc).
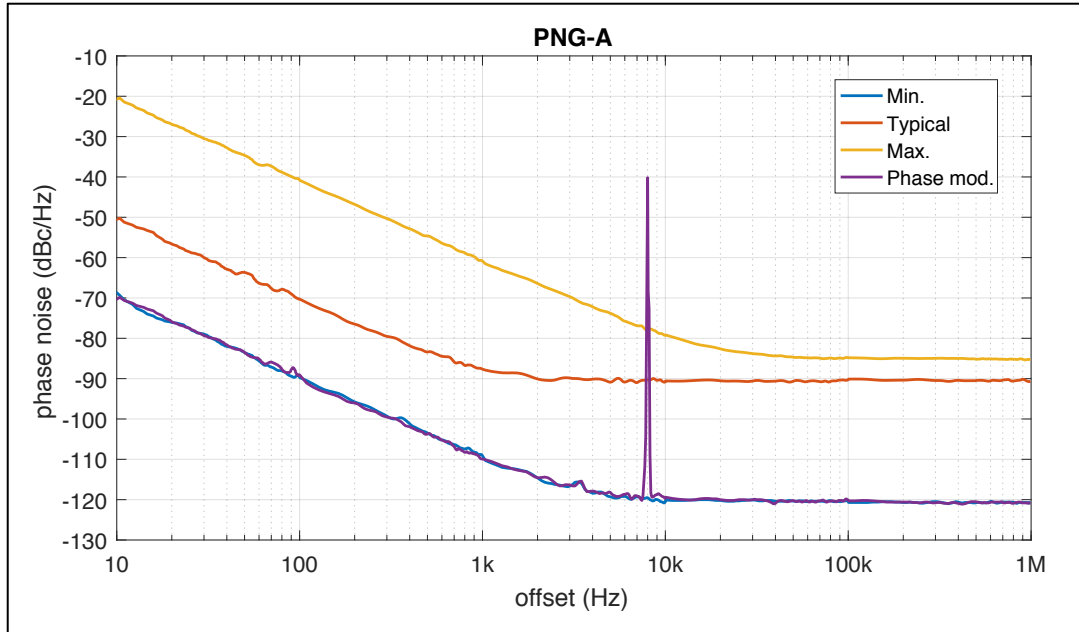
Typical white and 1/f^2 Phase Noise profile at various levels

Typical Jitter Generation

Based on the phase noise generated, the Jitter can be predicted for some typical frequencies like 10MHz and integration bandwidth. The following table shows the jitter for three different settings.

jitter RMS (sec) vs settings and BW	MIN	Default	MAX
10Hz-1MHz	31.84p	744p	7.49n
100Hz-1MHz	23.94p	713p	3.18n
1kHz-1MHz	22.53p	709p	2.35n
10kHz-1MHz	22.33p	705p	2.24n

So the PNG-A can be used to verify RMS jitter analyzers in a given integration bandwidth.

Graphical User Interface

The Graphical User Interface runs on Microsoft Windows 10

However, this external control is not required as the PNG keeps in memory the last settings programmed. It is possible to program a profile and never have to change it afterwards; the PNG will always deliver the same calibrated noise profile every time it is powered on.
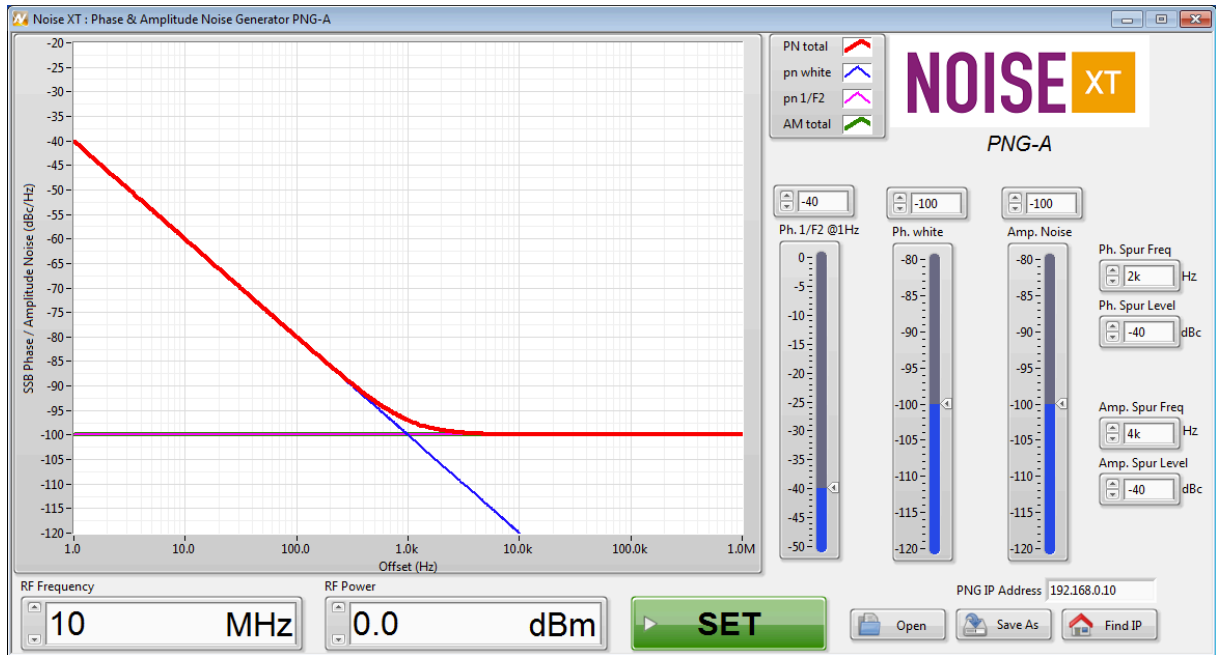
Graphical User Interface allowing remote programming of PM/AM profiles

Programming features

| Description	Supplemental information
Ethernet Port	TCP/IP with ssh at port 22
Interface	National Instruments LabView® examples for Ethernet programming
	Windows® OS compatible
	Graphical User Interface for Windows®

General Information

Rear panel information

Description	Supplemental information
Ethernet	1 ports (RJ45)
DC power	+12V (+/- 200mV) , an AC/DC 100-240V adapter is delivered with each PNG
Power	10W max
FAN	Exhaust

Generator environment

Description	Supplemental information
Operating environment:	
Temperature	+10 degC to +30 degC
Humidity	RH 20% to 80% at wet bulb temp.<29 degC (non-condensing)
Altitude	0 to +2 000 m
Non-operating storage environment:	
Temperature	-10 degC to +60 degC
Humidity	RH 20% to 90% at wet bulb temp.<40 degC (non-condensing)
Altitude	-427 to +4 807 m
Vibration	0.5 G maximum, 5 Hz to 500 Hz
Instrument dimensions	192 x 124 x 93 mm
Weight (NET)	< 1 kg
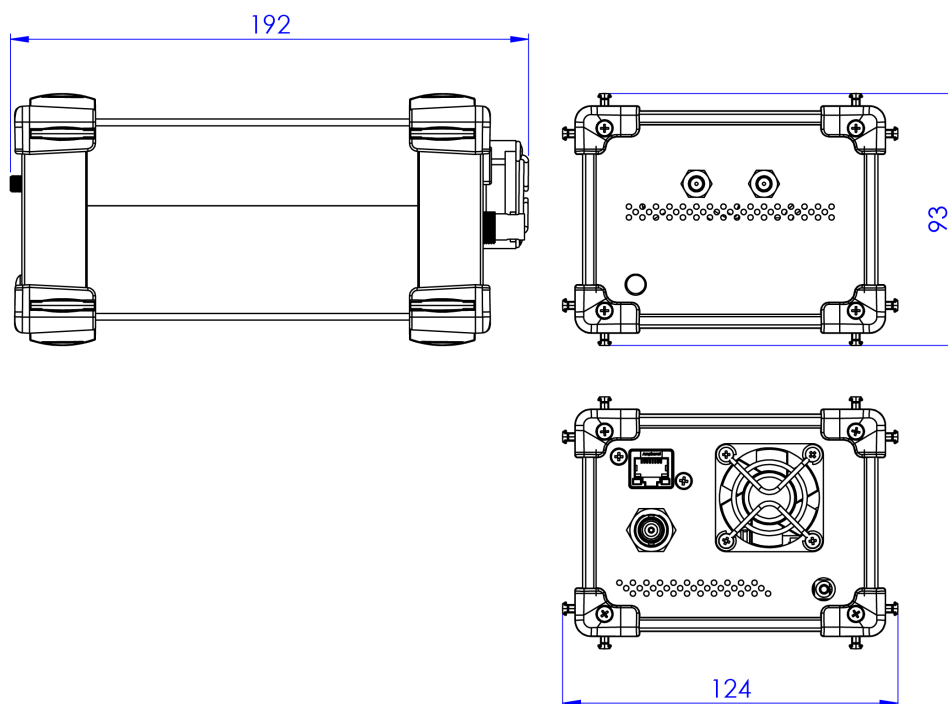
Ordering Information

Part Number   *Name*
PNG-A   Phase noise generator

Noise eXtended Technologies
An ISO 9001 : 2008 certified company

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