PX Series

PX SERIES
PRODUCT MANUAL

HANDHELD REAL-TIME SPECTRUM ANALYZER

PXN Series
4.5/6/9 GHz

V1.2
08/10/2026

HAROGIC

PX Series

OUTSTANDING PERFORMANCE FOR DIVERSE APPLICATIONS

The PXN Series features a high-performance superheterodyne receiver architecture with up to 14 high-performance preselection filters. Delivering excellent noise performance, dynamic range, interference immunity, and analysis speed, the series is well suited for a wide range of measurement and engineering applications.

EASE OPERATION

New PXN series features a 10.1-inch multi-touch display with an intuitive, simple UI for ease operation. Weighing just 1.5 kg, its ultra-lightweight design ensures seamless deployment across both laboratory and field environments.

RICH MEASUREMENT FUNCTIONS

New PXN series comes standard with a professional-grade measurement suite for free, including Channel Power, Occupied Bandwidth (OBW), and X dB Bandwidth. Advanced capabilities such as Harmonic Analysis, AM/FM Demodulation, and automated Phase Noise measurements are fully integrated for precise signal characterization.

Key Features

- High-performance superheterodyne receiver with up to 14 preselector filter bands
- Frequency range: 9 kHz to 4.5/6/9 GHz
- Full-band preamplifier as standard
- 1 GHz DANL: -168 dBm/Hz
- 9 GHz DANL: -167 dBm/Hz
- 1 GHz phase noise: <-110 dBc/Hz@10 kHz offset
- 1 GHz phase noise measurement: <-124 dBc/Hz @10 kHz offset
- Analysis bandwidth: 50 MHz/100 MHz (opt.50)
- Sweep speed: ≥ 1 THz/s (RBW = 250 kHz)
- IF rejection and image rejection: >95 dBc
- Integrated GNSS, supporting frequency calibration via GNSS
- Optional built-in tracking generator/signal generator
- SCPI protocol supported for remote control
- Up to 2.5 hours battery life
- Portable 1.5 kg design with a 10.1-inch multi-touch screen

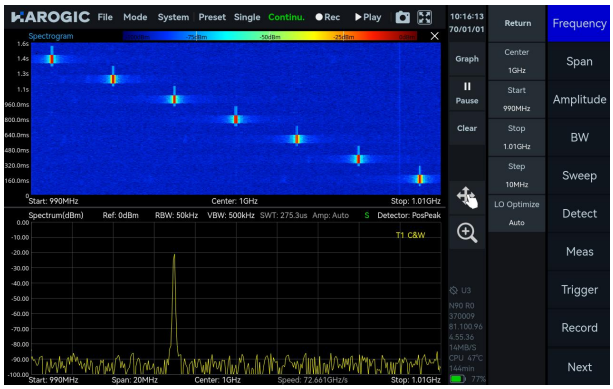
Main Operating Modes Overview

SAStudio4 software offers multiple working modes: Standard Spectrum Analysis, IQ Streaming, Power Detection Analysis, Real-Time Spectrum Analysis, Phase Noise Measurement, Basic Vector Modulation Analysis (opt.71), Pulse Analysis (opt.72), Harmonic, Mapping and EMI Pre-Compliance Measurement (opt.74).

SAStudio4 Main Working Modes Description

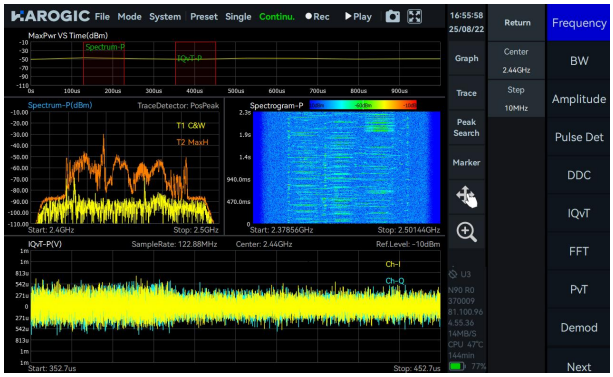
■ Standard Spectrum Analysis Mode

This mode provides a wide range of measurement functions, including spectrum sweep, channel power, OBW, ACPR, IM3 and SEM. It also supports spectrum recording and playback. Combined with auxiliary tools such as signal tracking, peak table, and amplitude correction, it delivers a one-stop platform for comprehensive spectrum check.



■ IQ Streaming Mode

This mode supports 50 MHz/100 MHz (opt) analysis bandwidth and allows IQ data acquisition through multiple trigger methods. It provides IQ time-domain waveform display, spectrum and spectrogram views, AM/FM demodulation, and digital down conversion (DDC).

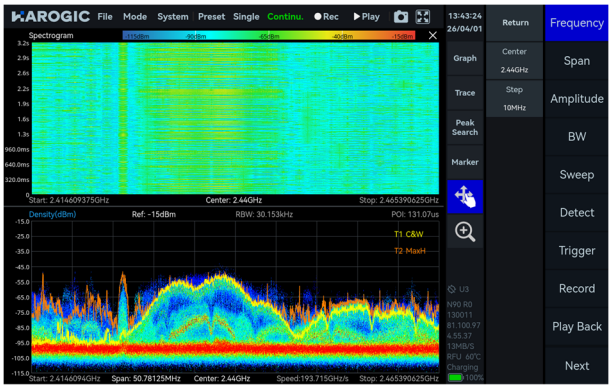


■ Power Detection Analysis Mode

This mode enables detection and analysis of time-domain signals within the analysis bandwidth, making it suitable for applications focused on in-band power-versus-time relationships, such as pulse signal measurements.

Real-time Spectrum Analysis Mode

This mode is powered by a high-speed FPGA-based FFT engine, featuring with strictly gapless and overlap-free FFT, achieving true real-time monitoring across the full bandwidth.



Basic Vector Modulation Analysis Mode (opt.71)

This mode supports 2ASK, 2FSK, 4FSK, GMSK, BPSK, QPSK, 8PSK, 16QAM, 32 QAM、64QAM, 128QAM, and 256QAM signals.

Harmonic Analysis Mode

This mode supports detection and measurement of up to 10 harmonic components, including harmonic peaks, harmonic channel power, and total harmonic distortion.

Phase Noise Measurement Mode

This mode supports offset ranges from 1 Hz to 10 MHz for evaluating carrier phase stability. With the built-in automatic carrier search function, the software can quickly locate the target carrier without manual adjustment.

Pulse Analysis (opt.72)

This mode supports the measurement of pulse signals with a pulse width of 32 ns or more, displaying key parameters such as Top level (dBm), Base level (dBm), Top/Base, Droop, Over Shoot, Ripple, Rise/Fall Time, Rise/Fall Edge, Width, PRI, and Duty Cycle.

EMI Pre-Compliance Measurement (opt.74)

This mode provides EMI measurement capabilities compliant with the CISPR 16-1-1 standard. It supports 6 dB EMI filter bandwidths of 200 Hz, 9 kHz, 120 kHz, and 1 MHz, as well as multiple detectors including Peak, Quasi-Peak, Average, and RMS. Combined with limit line comparison, signal list analysis, and test report export functions, it enables efficient pre-compliance measurements for radiated and conducted emissions.

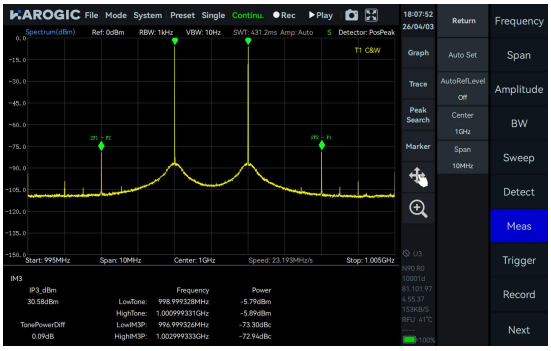
Main Functions Overview

Channel Power

OBW

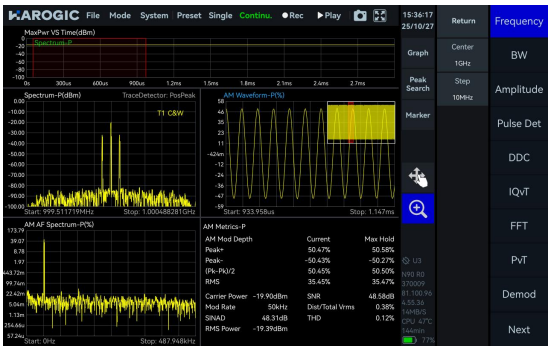
ACPR

IM3

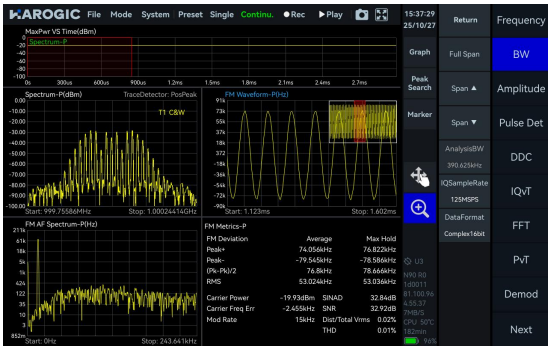


SEM

AM Demodulation



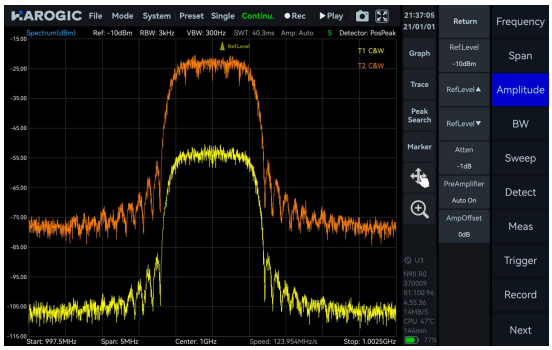
FM Demodulation



Multiple Unit Display

Antenna Factor

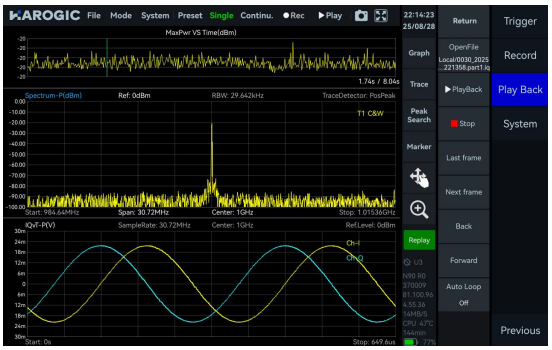
Amplitude Offset



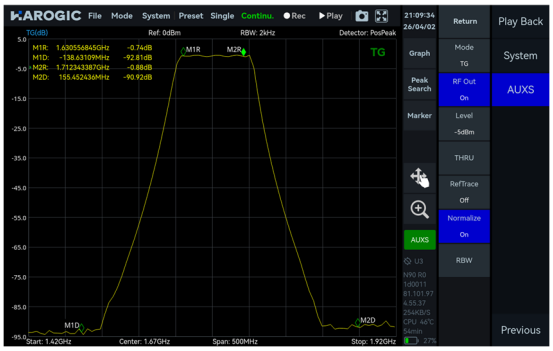
Signal Track

Peak Table

Data Record and Playback



Tracking Generator (opt.60/61/62)



Specifications*

FREQUENCY

	PXN-45	PXN-60	PXN-90
Frequency range	9 kHz to 4.5 GHz	9 kHz to 6 GHz	9 kHz to 9 GHz
Reference clock	Internal or external, manual correction of GNSS calibration is available		
Frequency accuracy	≤ 0.5 ppm, manual correction is available		
Aging and temperature stability	≤ 1 ppm/year, ≤ 1 ppm		
Built-in GNSS 1PPS accuracy	≤ 100 ns		

SPECTRUM PURITY

SSB phase noise (dBc/Hz)
Guaranteed/Typical

Carrier frequency	1 GHz	4.5 GHz	6 GHz	9 GHz
100 Hz	-85 / -88	-78 / -81	-75 / -78	-74 / -77
1 kHz	-97 / -99	-90 / -93	-86 / -89	-88 / -91
10 kHz	-110 / -112	-103 / -106	-100 / -103	-99 / -102
100 kHz	-114 / -115	-104 / -107	-104 / -107	-99 / -102
1 MHz	-131 / -132	-119 / -122	-118 / -121	-116 / -119

Residual response (dBm)
RBW = 1 kHz
Guaranteed/Typical

Reference level (R.L.)	0 dBm	-50 dBm
9 kHz to 100 MHz	-90 / -94	-115 / -117
100 MHz to 4.5 GHz	-90 / -95	-120 / -128
4.5 GHz to 6 GHz	-90 / -96	-120 / -130
6 GHz to 9 GHz	-90 / -98	-120 / -129

Image rejection	>90 dBc, >95 dBc (typ.)
IF rejection	>90 dBc, >95 dBc (typ.)
Local oscillator related spurious	<-65 dBc center frequency ± (N/M) × 100 MHz, N, M = 1, 2, 3, 4, 5...

IIP3/IIP2 (dBm)

Carrier frequency	1 GHz	4.5 GHz	6 GHz	9 GHz
R.L. = 20 dBm	42 / 80	37 / 80	32 / 80	36 / 80
R.L. = 0 dBm	23 / 80	22 / 80	20 / 80	14 / 80
R.L. = -20 dBm	3 / 60	3 / 45	-1 / 45	-5 / 45

AMPLITUDE

Max. input power (CW)	23 dBm	50 MHz to maximum frequency and the preamplifier is off
	10 dBm	9 kHz to 50 MHz or preamplifier is on
Max. DC voltage	±10 VDC	
Display range	DANL to 30 dBm	
Amplitude accuracy	±1.0 dB	from 20 °C to 30 °C, typical conditions
	±1.5 dB	full temperature range and all conditions
IF in-band flatness	<±1.5 dB 50 MHz analysis bandwidth	<±2.0 dB 100 MHz analysis bandwidth
Reference level	-70 dBm to +23 dBm	
RF preamplifiers	Auto or manual	
VSWR	<2.0:1 nominal, 90 MHz to maximum frequency	

Display average noise level (DANL)
dBm/Hz Guaranteed / Typical
RBW=1 kHz

	PXN-45		PXN-60		PXN-90	
Reference level (R.L.)	-20 dBm	-70 dBm	-20 dBm	-70 dBm	-20 dBm	-70 dBm
9 kHz to 1 MHz	-131 / -134	-141 / -144	-131 / -134	-141 / -144	-131 / -134	-141 / -144
1 MHz to 100 MHz	-151 / -154	-163 / -166	-151 / -154	-163 / -166	-151 / -154	-163 / -166
100 MHz to 3.0 GHz	-141 / -144	-165 / -168	-141 / -144	-165 / -168	-141 / -144	-165 / -168
3.0 GHz to 4.5 GHz	-142 / -145	-165 / -168	-142 / -145	-165 /-168	-142 / -145	-165 / -168
4.5 GHz to 6.0 GHz	-	-	-143 / -146	-165 / -168	-143 / -146	-165 / -168
6.0 GHz to 9.0 GHz	-	-	-	-	-144 / -147	-164 / -167

STANDARD SPECTRUM ANALYSIS

Detector	PosPeak, NegPeak, Sample, Average, RMS, RawFrames, MaxPower
RBW	0.1 Hz to 10 MHz
VBW	0.1 Hz to 10 MHz
Data chart	SAStudio4 software provides spectrum, spectrogram, and historical trace

Measurements	Channel power, OBW, X dB bandwidth, Adjacent channel power ratio, IM3			
Sweep Speed (Spur Rejection = Bypass)	RBW = 250 kHz	FPGA processing	B-Nuttall	≥ 1 THz/s
	RBW = 25 kHz	FPGA processing	Kaiser	≥ 290 GHz/s
	RBW = 1 kHz	CPU processing	B-Nuttall	≥ 2 GHz/s

IQ RECORDING

Continuous recording bandwidth	Maximum: 12.5 MHz
Burst recording bandwidth	Maximum: 50 MHz / 100 MHz (opt.50) The built-in memory depth is 128 Mbytes
IQ sample rate	Maximum: 62.5 MSPS / 125 MSPS (opt.50) Decimate factor: 1, 2, 4, 8, 16, 32, 64, 128, 256, 512, 1024, 2048
External trigger response	Maximum frequency response: 500 times/s

DETECTION ANAYLSYS

Min. time resolution	16 ns / 8 ns (opt.50)
Max. analysis bandwidth	50 MHz / 100 MHz (opt.50)
Detector	PosPeak, NegPeak, Sample, Average, RMS, MaxPower

REAL TIME SPECTRUM ANALYSIS

FFT analysis

FFT engine is implemented in FPGA. Frame compression and trace detection are supported. No missing samples between FFT frames

FFT frame update rate=10 ^ 9 ns/(N × D × Min. time resolution);
POI = 2 × N × D × Min. time resolution
N for FFT points (4096, 2048, 1024, 512, 256, 128, 64, 32)
D for decimate factor (1, 2, 4, 8...)

Typical	FFT refresh rate (times/s)		100% POI (us)	
	std.	opt.50	std.	opt.50
N = 4096, D = 1	15,258	30,517	131.072	65.536
N = 32, D = 1	1,953,125	3,906,250	1.024	0.512

Max. analysis bandwidth	50 MHz / 100 MHz (opt.50)
Window function	B-Nuttall, Flat-top, LowSideLobe, Rectangle, Kaiser
RBW	≥12 grades
Amplitude resolution	0.5 dB

GENERAL

Input and output	
RF input	N (F), impedance 50 Ω, max. DC voltage 10 V
RF output	N (F), impedance 50 Ω, max. DC voltage 10 V
Power	USB PD (65 W)
USB port	USB3.0 Type-C * 1, USB2.0 Type-C * 1, USB2.0 Type-A * 1
Ethernet port	RJ45, 1000 Mbps
Video and Audio interface	Micro HDMI * 1 (support for extended display), 3.5 mm headphone port * 1
External reference clock input	MMCX (F), 10 MHz, amplitude ≥ 1.5 Vpp, impedance 330 Ω
Reference clock output	MMCX (F), 100 MHz, 3.3 V CMOS, programmable on/off
External trigger input	MMCX (F), 3.3 V CMOS, high impedance
Trigger output	MMCX (F), 3.3V CMOS
External antenna input	MMCX (F)
Analog IF output	MMCX (F), -25 dBm max output power, impedance 50 Ω, 312.5 MHz ± 50 MHz

Display	IPS LCD 1280 × 800, 10.1-inch multi-touch screen	
RAM / EMMC storage	4 GB / 32 GB	
Power consumption	32 W (typ.)	
Battery life	about 2.5 hours, typical, external power bank supply supported	
Size (D × W × H)	260 × 185 × 46 mm	
Weight	1.5 kg	
Operating temperature (ambient)	0 to 50 °C	
Storage temperature (ambient)	-20 to +70 °C	
Operating relative humidity	Ambient Temp.: 0 to 40 °C	5 to 75%
	Ambient Temp.: > 40 °C	5 to 45%
Packaging and accessories	Protected main unit * 1, power adapter * 1, power cord * 1, lanyard * 1	

PHASE NOISE MEASUREMENT

Min. frequency offset	1 Hz			
Max. measurement frequency offset	10 MHz			
Trace smooth	Support			
SSB phase noise (dBc/Hz) Guaranteed/Typical				
Carrier frequency	1 GHz	4.5 GHz	6 GHz	9 GHz
100 Hz	-90 / -94	-80 / -83	-80 / -83	-78 / -81
1 kHz	-113 / -117	-102 / -105	-100 /-103	-95 / -98
10 kHz	-120 / -124	-112 / -115	-109 / -112	-106 / -109
100 kHz	-126 / -129	-114 / -117	-111 / -114	-108 / -111
1 MHz	-136 / -139	-125 / -128	-123 / -126	-119 / -122
10 MHz	-140 / -143	-137 / -140	-137 /-140	-136 / -139

PULSE DETECTION (opt.72)

Min. pulse width	64 ns / 32 ns (opt.50)
Measurement parameters	Top Level, Base Level, Top/Base, Droop, OverShoot, Ripple, Rise Time, Rise Edge, Fall Time, Fall Edge, Width, PRI, Duty Cycle

AM DEMODULATION

Measurement parameters	Modulation depth, carrier power, modulation rate, signal-to-noise ratio, RMS power, total harmonic distortion, etc.	
Modulation rate test range	20 Hz to 10 MHz	
Modulation rate test accuracy	<1 Hz when modulation rate <1 kHz	<0.1% when modulation rate ≥1 kHz
Modulation depth test range and accuracy	5% to 95%, ±5% (Nominal)	

FM DEMODULATION

Measurement parameters	Modulation frequency offset, carrier power, modulation rate, SINAD, signal-to-noise ratio, RMS power, total harmonic distortion, etc.	
Modulation rate test range	20 Hz to 2 MHz	
Modulation rate test accuracy	<1 Hz when modulation rate <1 kHz	<0.1% when modulation rate ≥ 1kHz
Frequency offset test range and accuracy	1 kHz to 10 MHz, ±6% (Nominal)	

BASIC VECTOR MODULATIONANALYSIS (opt.71)

Modulation type	ASK: 2ASK FSK: 2FSK, 4FSK MSK: GMSK PSK: BPSK, QPSK, 8PSK QAM: 16QAM, 32QAM, 64QAM, 128QAM, 256QAM
Symbol length	128 QAM and 256 QAM: 4000 Others: 2000
Symbol rate	(1/64 to 1/4) * sample rate, ≤32.5 MSPS
Filter	Root raised cosine
Filter roll-off factor	0.01 to 0.99
Display	Spectrum, constellation, eye diagrams, measurement results
Measurement	EVM, amplitude error, phase error, frequency error, signal-to-noise ratio, part of the bitstream

TRACKING GENERATOR (opt. 60/61/62）

Model	PXN-45	PXN-60	PXN-90
Frequency range	1 MHz - 4.5 GHz	1 MHz - 6 GHz	1 MHz - 9 GHz
Mode	FixedPoint, FreqSweep, PowerSweep, Tracking Generator		
Frequency resolution	10 Hz		
Power resolution	0.25 dB		
Power level	-20 dBm to 0 dBm		
Power level accuracy	±2 dB		

EMI PRE-COMPLIANCE MEASUREMENT (opt.74)

EMI filter (-6 dB bandwidth)	200 Hz, 9 kHz, 120 kHz, 1 MHz
Detector	Peak, Average, RMS, Quasi-Peak (CISPR 16-1-1 compliant)
Measurement time setting range	0.1 s to 10 s
Limit line standards	FCC Part 15, EN550xx, user defined
Report output	Signal list
Frequency axis	Linear and logarithmic

*Specification applies under the following conditions:

(1) Start up and warm up for 10 minutes

(2) Ambient temperature 25 °C

(3) Typical and nominal values are not guaranteed and do not include measurement uncertainty

(4) Specifications may vary with hardware and software versions without prior notice

OPTIONS

Code		
16	0 Hz start frequency (only applicable to PXN-45)	built-in hardware
50	100 MHz analysis bandwidth	built-in hardware
60	4.5 GHz tracking generator (only applicable to PXN-45)	built-in hardware
61	6 GHz tracking generator (only applicable to PXN-60)	built-in hardware
62	9 GHz tracking generator (only applicable to PXN-90)	built-in hardware
71	Basic vector modulation analysis	software
72	Pulse analysis	software
74	EMI pre-compliance measurement	software
80	4-year warranty	service
81	5-year warranty	service

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