PX SERIES
PRODUCT MANUAL

HANDHELD REAL-TIME SPECTRUM ANALYZER

PXN Series
4.5/6/9 GHz

V1.0
27/03/2026

HAROGIC

PX Series

RF PERFORMANCE WITHIN REACH

New PXN series adopts a high-performance superheterodyne receiver architecture and is equipped with up to 14 high-performance preselector filters. It delivers outstanding phase noise, dynamic range and analysis speed with limited budget.

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: <-125 dBc/Hz @10 kHz offset
- Analysis bandwidth: 50 MHz/100 MHz (opt.)
- Sweep speed: up to 1 THz/s (RBW = 250 kHz)
- IF and image rejection: >95 dBc
- Integrated GNSS, supporting frequency calibration via GNSS
- 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

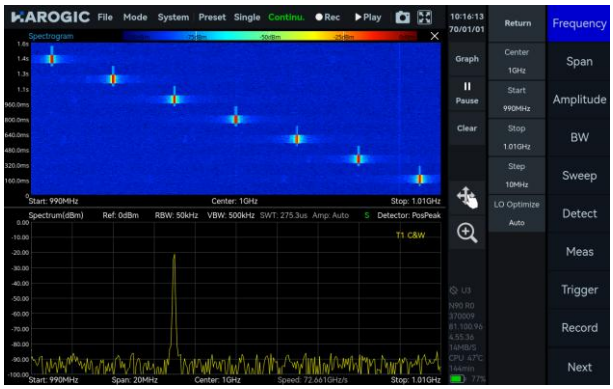
Main Working Modes Overview

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 Analysis and Mapping mode.

SAStudio4 Main Working Modes Description

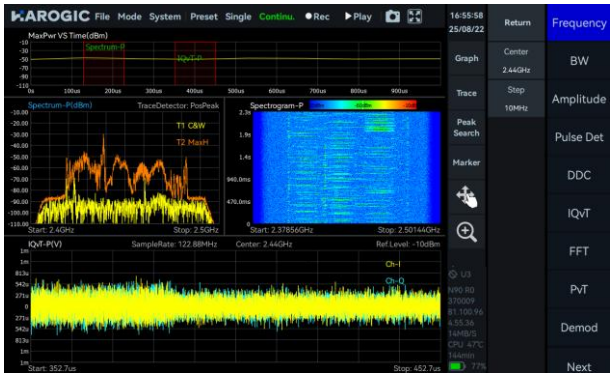
■ Standard Spectrum Analysis Mode

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).

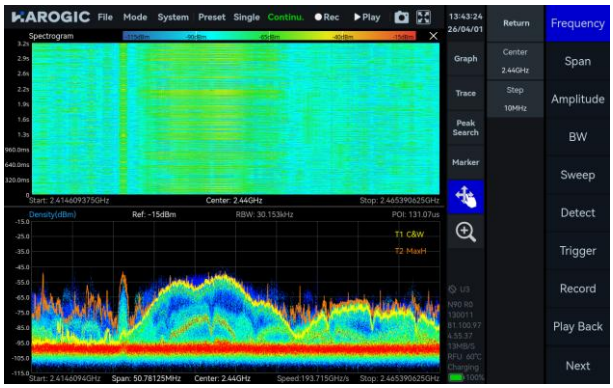


■ Power Detection Analysis Mode

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.

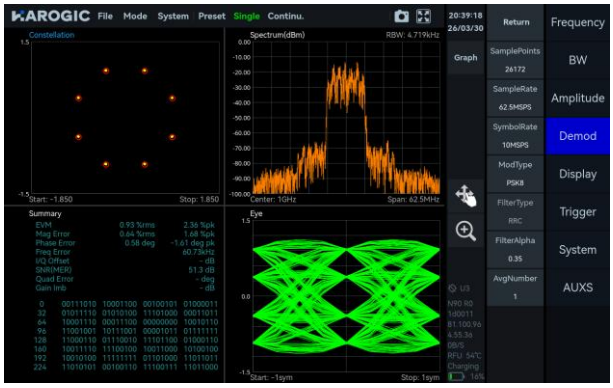
Real-time Spectrum Analysis Mode

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, 64QAM, 128QAM, and 256QAM signals.



Harmonic Analysis Mode

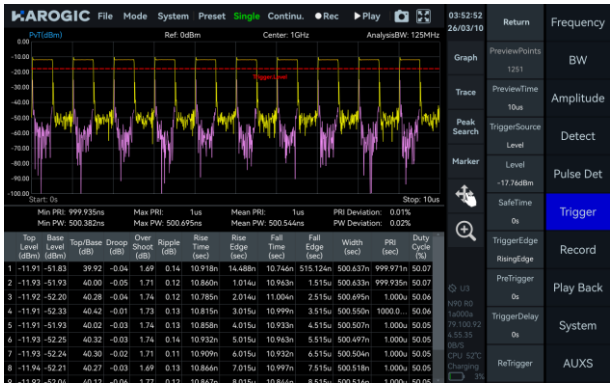
This mode supports detection and measurement of up to 10 harmonic components, including harmonic peaks, harmonic channel power, and total harmonic distortion.

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.



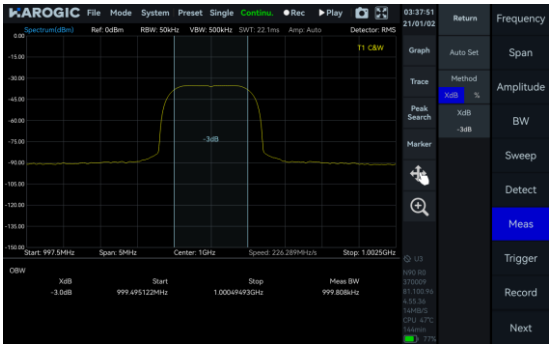
Mapping Mode

This mode integrates GPS positioning data to generate heat maps and other visual charts, displaying key information such as Channel Power, Occupied BW, Time, Coordinates (latitude/longitude), Altitude, Pixel Position, and Azimuth within a specific area. It is ideally suited for fields such as radio monitoring and interference analysis.

Main Functions Overview

Channel Power

OBW

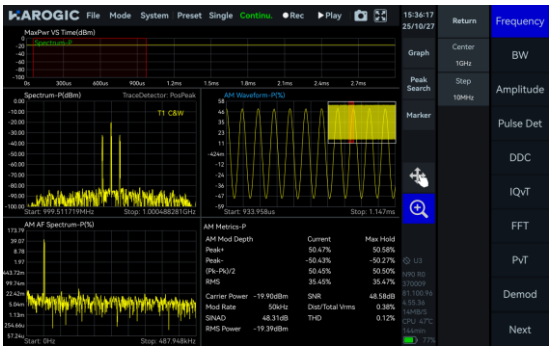


ACPR

IM3

SEM

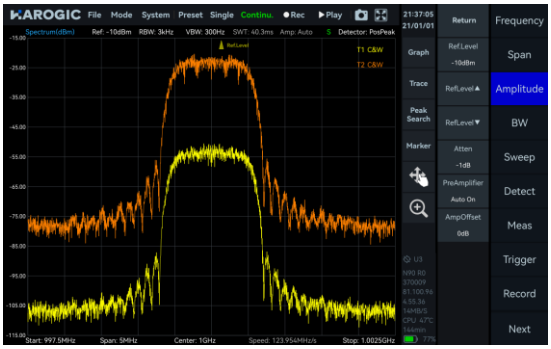
AM Demodulation



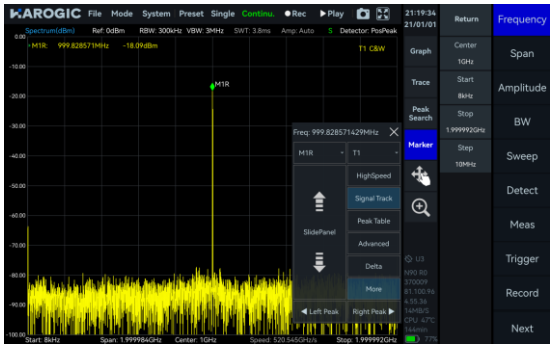
Multiple Unit Display

Antenna Factor

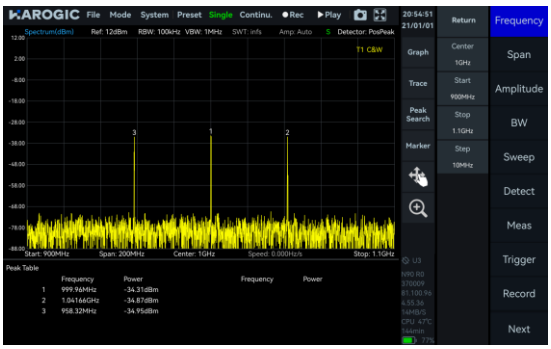
Amplitude Offset



Signal Track



Peak Table



Data Record and Playback

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	TCXO	<0.5 ppm, manual correction is available	
	OCXO (opt.01)	<0.2 ppm, manual correction is available	
Aging and temperature stability	TCXO	<1 ppm/year, <1 ppm	
	OCXO (opt.01)	<1 ppm/year, <0.15 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	
RF output	N (F), impedance 50 Ω	
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	
Built-in GNSS 1PPS accuracy	±100 ns, Built-in GNSS (external antenna only)	
Operating Temp. (Ambient)	0 to 50 °C	
Storage Temp. (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 / -125	-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

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 MODULATION ANALYSIS

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

*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		
01	Built-in OCXO reference clock	built-in hardware
34	External omnidirectional antenna, 400MHz to 8000MHz, Gain<2dBi	accessory
35	External active directional antenna, frequency range: 0.5 to 10 GHz Gain: < 5 dBi (amp off); < 25 dBi(amp on)	accessory
50	100 MHz analysis bandwidth	built-in hardware
71	Vector modulation analysis	software
72	Pulse analysis	software

www.harogic.com
info@harogic.com
+65-8299 8857