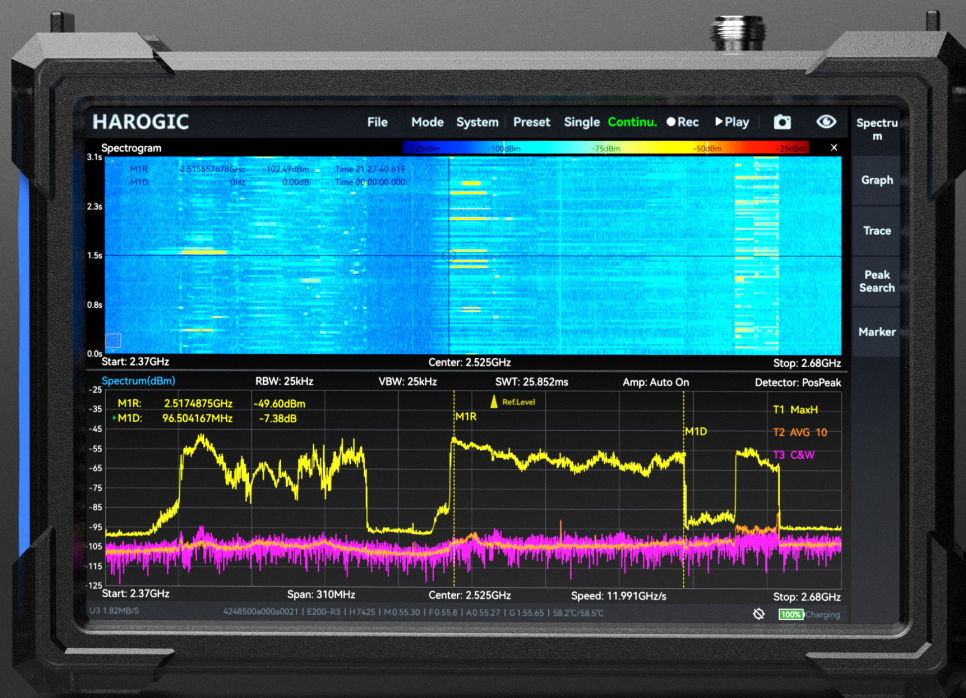


# PXE-90

## Handheld real-time spectrum analyzer

9.5GHz · Powerful Performance · 1.5kg Ultra Portable



Product Brochure

V0.9 2024-08-14

<https://en.harogic.com/>

# PXE-90 Introduction

## Real Portable · Real Performance · Real Affordable

PXE-90 is the latest released 9.5 GHz handheld real-time time spectrum analyzer from HAROGIC Technologies. Building on continuous innovation and SWaP-C design principle, the PXE-90 offers an unmatched combination of size, performance and cost. RF measurements and analysis from 9kHz to 9.5 GHz is now carried out in a robust instrument with 10.1-inch full-touch screen and weight only 1.5kg.

PXE-90 is a 9.5GHz real-time spectrum analyzer with analytical bandwidth of 100 MHz and ultra-fast speed of 800 GHz/s, delivering standard spectrum sweep (SWP), IQ streaming (IQS), zero span (DET) and real-time analysis (RTA) working mode. The PXE-90 is equipped with preamplifier and 14-segment preselector, achieving good dynamic range and phase noise level. It can provide customers with spectrum analyzer, spectrum monitoring, interference finding, RF test and measurement functions.

## Features Highlights

Frequency range: 9 kHz-9.5 GHz;	SHR architecture, 14-segments pre-selected filters;
Sweep speed > 800 GHz/s (RBW ≥ 300 kHz);	Analytical bandwidth: 100 MHz
Standard preamplifier, DANL: -166 dBm/Hz (typ.);	SSB Phase Noise: -100 dBc/Hz @10kHz (1 GHz typ.);
Typical IF rejection > 90dB;	Typical image suppression: 90 dB (≤9 GHz), >60 dB (≤20 GHz);
Channel power, ACPR, IM3, OBW, Phase noise	Real-time spectrum analysis based on FPGA, 100% POI < 3us;
Analog modulation analysis: AM/FM;	Time domain IQ, PvT, real-time spectrum R&P;
Weight: 1.5 kg, 10.1-inch all touch screen;	Battery life: 3h+, support power bank supply;
3 years warranty.	HDMI interface support, expandable desktop station;



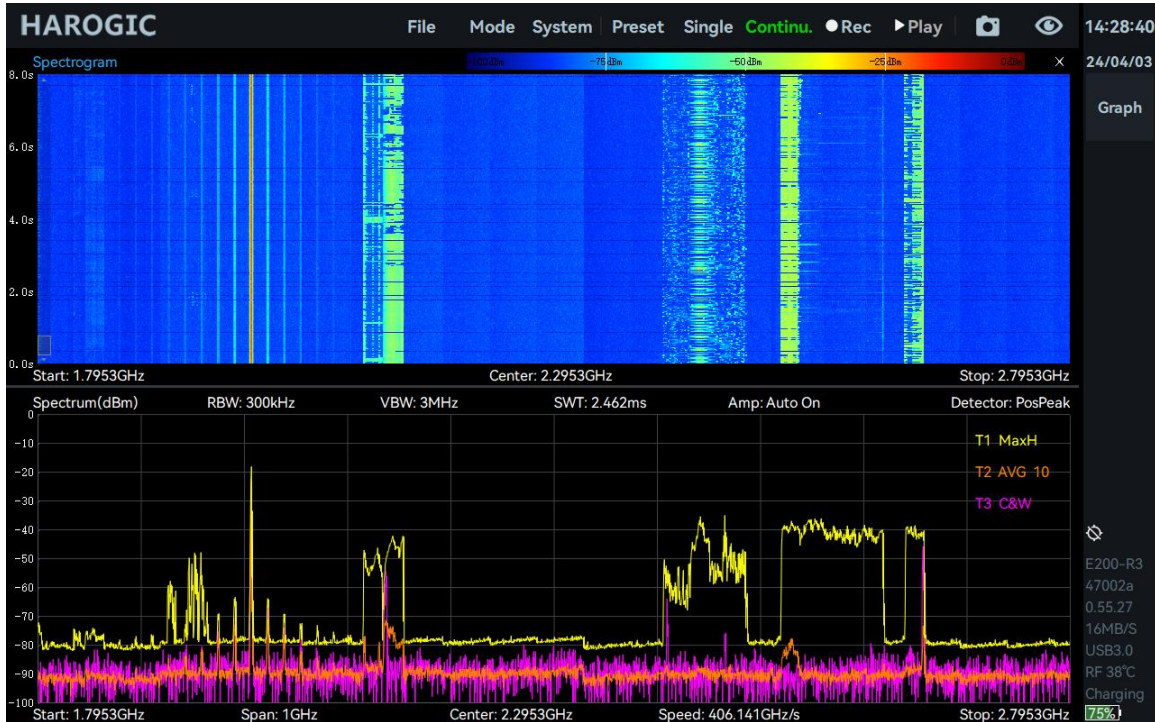
PXE-90 Product Brochure



# Working model overview

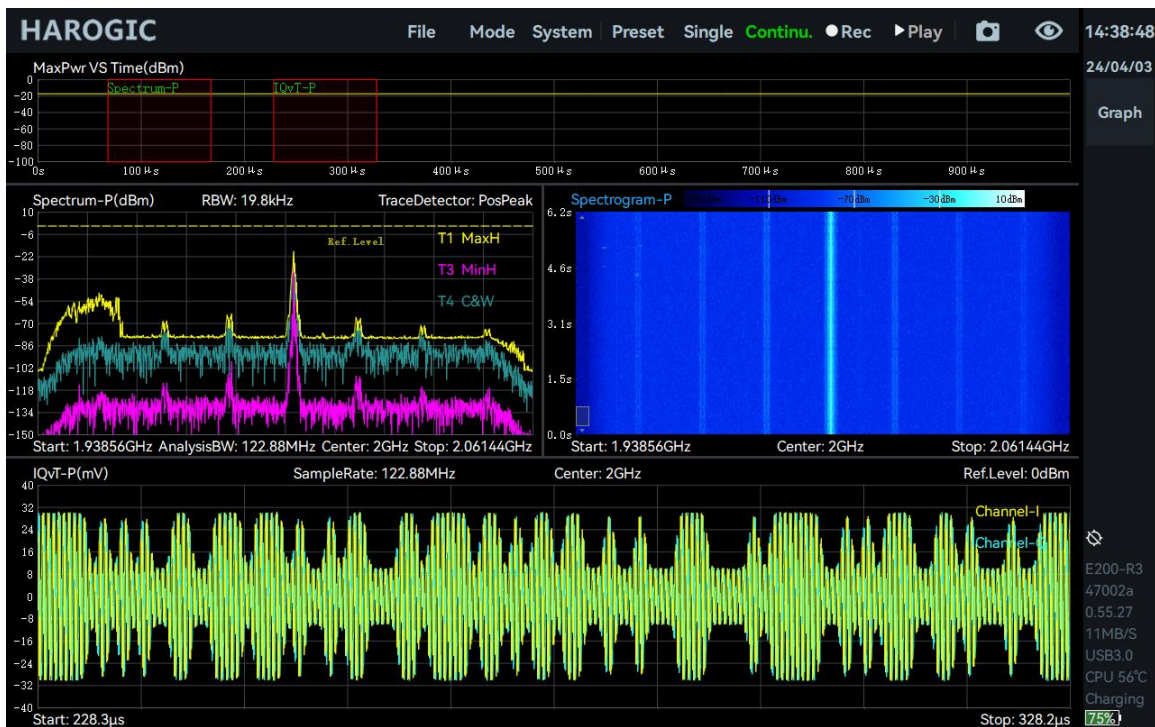
## Standard Spectrum Mode

This mode Provides standard spectrogram, waterfall graph, probability density graph, phase noise graph and other measurement graphs. It offers measurement functions such as channel power, adjacent channel suppression, occupied bandwidth, XdB bandwidth, phase noise, and IM3.



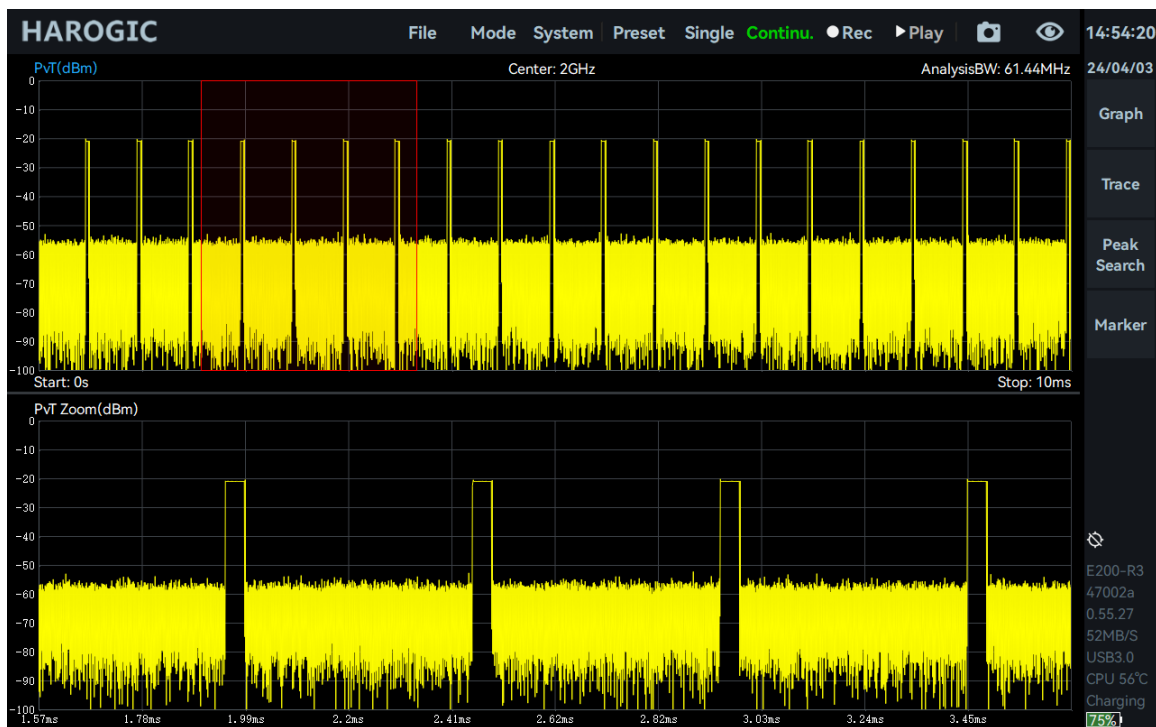
## IQ Streaming Mode

This mode provides time domain and spectrum view of IQ waveform, DDC function and AM/FM demodulation function, ASK/FSK/BPSK/QPSK/GMSK/QAM and delivers modulation depth and modulation frequency offset test.



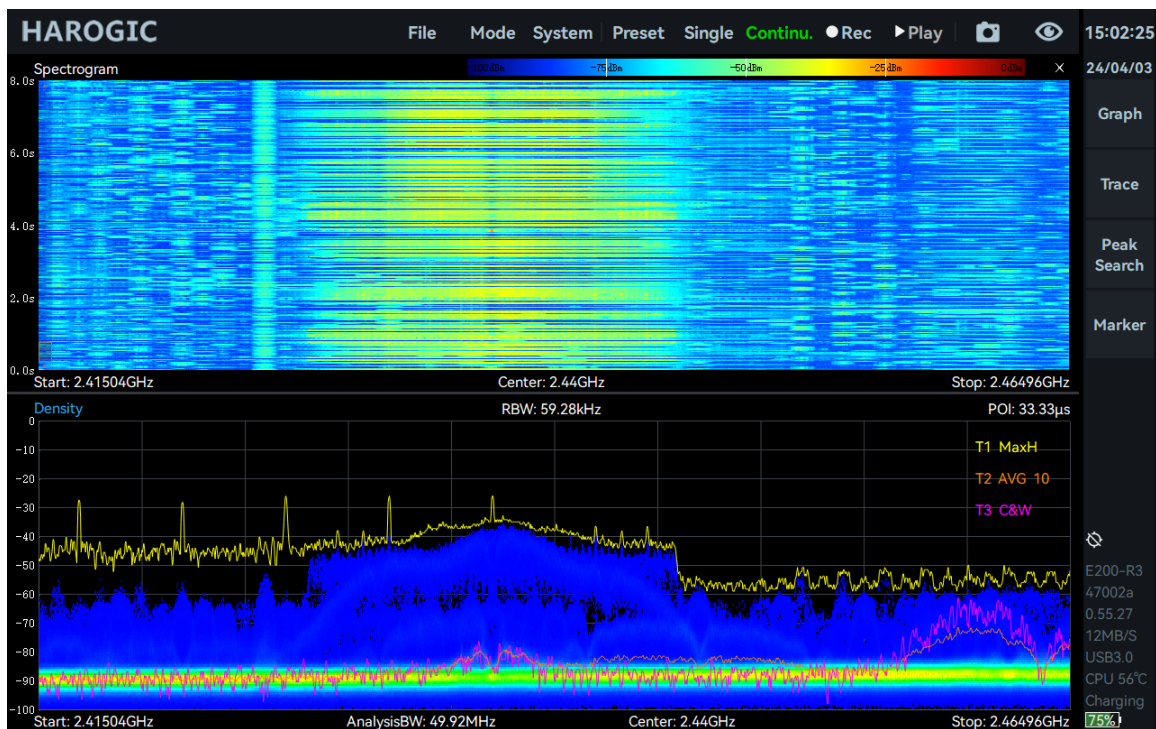
### Power Detection Mode (Zero Span)

This mode provides power time diagram (PvT) and its scaling, timing trigger, level trigger and other triggers.



### Real-time spectrum Analysis mode

This mode provides spectrum, probability density graph, waterfall graph and other measurement graphs. It offers timing trigger, level trigger and other triggers.



Technical Specifications * (typical value)						
Test basis	Hardware Version: R3		API: 0.55.45	FPGA: 0.55.15	MCU: 0.55.38	SAS4: 4.2.55.21
Frequency						
Frequency Range	9 kHz~9.5 GHz					
Initial Frequency Accuracy	<1 ppm, supporting program manual correction					
Reference Clock	Internal or external, program-controlled switching Internal TCXO aging<1 ppm/year, temperature drift<1 ppm Internal OCXO (option): temperature drift <0.15 ppm					
Spectrum Purity						
SSB Phase Noise	dBc/Hz					
Carrier Frequency	1 GHz	3 GHz	10 GHz	19.9 GHz		
1 kHz	-95.2	-96.6	-93.9	-91.5		
10 kHz	-101.6	-102.6	-101.6	-98.5		
100 kHz	-100.6	-103.9	-103.2	-99.7		
1 MHz	-120.9	-121.8	-120.3	-116.2		
10 MHz	-134.2	-133.5	-134.2	-131.4		
Residual Response Spurious rejection off dBm RBW =1 kHz Positive Peak Detector	Frequency Range	R.L.=0 dBm	R.L.=-20 dBm	R.L.=-50 dBm		
	9 kHz~1.0 GHz	< -83	< -110	< -120		
	1.0 GHz~3.0 GHz	< -83	< -92	< -120		
	3.0 GHz~9.5 GHz	< -90	< -100	< -130		
Image Frequency Suppression	9 kHz~3.0 GHz	>90 dBc (spurious rejection off), >90 dBc (spurious rejection on)				
	3.0 GHz~9.5 GHz	>60 dBc (spurious rejection off), >90 dBc (spurious rejection on)				
IF rejection (R.L.=0 dB)	>90 dBc (spurious rejection on), >80 dBc (spurious rejection off)					
Local Oscillator Related Spurious	<-65 dBc (Offset Center Frequency +/- (N/M)*125 MHz, N/M = 1,2,3,4,5...)					
Input Related Spurious	<-75 dBc (spurious rejection on), <-50 dBc (spurious rejection off)					
Linearity						
IIP3 (dBm)	1 GHz	3 GHz	9 GHz			
R.L.= 20 dBm	48.1	45.1	40.5			
R.L.= 0 dBm	26.7	23.5	21.2			
R.L.= -20 dBm	5.1	2.6	-0.9			
R.L.= -50 dBm	-21.2	-22.6	-25.9			
Signal Processing						
Analysis Bandwidth	Maximum 100 MHz, Decimate Factor: 1					
IQ Data	122.88 MSPS, decimate factor: 1,2,4,8,16,32,64,128,256,512,1024,2048,4096 supported (FPGA)					
IQ Data Cache Depth	128 MBytes					
	When the data generation rate is smaller than the EMMC write rate, the cache depth depends only on the EMMC capacity					
External Trigger Response	Maximum response frequency 500 times/sec					
Analog IF Output	Supporting, 307.2 MHz +/-50 MHz					
Amplitude						
Maximum safe input power (CW)	23 dBm	50 MHz~9.5 GHz and the preamplifier off (R.L. ≥ 0 dBm)				
	10 dBm	9 kHz~50 MHz or preamplifier on (R.L. <0 dBm)				

Maximum DC Voltage	+/-10 VDC			
Display Range	DANL~23 dBm			
Amplitude Accuracy	+/- 2.0 dB			
IF in band spectrum ripple	+/- 2.0 dB			
Reference level	-50 dBm~23 dBm			
RF Preamplifiers	Converting bands (frequency ≥ 50 MHz) are equipped with preamplifier that can be set as automatically turn on or forcibly turn off			
Displayed Average Noise Level (DANL) dBm/Hz RBW = 10 kHz RMS detector	Frequency Range	R.L.= 0 dBm (IFGainGrade = 2)	R.L.=-20 dBm (IFGainGrade = 2)	R.L.=-50 dBm (IFGainGrade = 2)
	9 kHz	-120.4	-136.8	-142.4
	1 MHz~100 MHz	-134.2	-146.3	-150.9
	1 GHz	-134.8	-150.3	-169.5
	100 MHz~3.0 GHz	-131.0	-145.7	-165.1
	3.0 GHz~6.0 GHz	-136.2	-150.2	-164.6
	9.0 GHz~9.5 GHz	-135.4	-148.9	-157.4
<b>Standard Spectrum Analysis</b>				
Detector	Positive peak, Negative peak, Sampling, Average, RMS, Max Power			
RBW	0.1 Hz~10 MHz			
VBW	0.1 Hz~10 MHz			
Trace Function	Sample, Positive Peak, Negative Peak, Local average, Maximum hold, Minimum hold, Average			
Data Chart	SAStudio4 software provides regular spectrum, waterfall chart, and historical trace			
Measurements	Phase noise, Channel power, Occupied bandwidth, X dB bandwidth, Adjacent channel suppression, IM3			
Sweep speed - Standard Spectrum Analysis	840 GHz/s	FPGA	RBW≥1 MHz, B-Nuttal window, spurious rejection: Bypass	
	560 GHz/s	FPGA	RBW=250 kHz, B-Nuttal window, spurious rejection: Standard	
	150 GHz/s	FPGA	RBW=30 kHz, B-Nuttal window, spurious rejection: Bypass	
	3 GHz/s	CPU	RBW=1 kHz, B-Nuttal window, spurious rejection: Bypass	
<b>Detection Analysis/Zero Span</b>				
Highest Time Resolution	8 ns			
Maximum Analysis Bandwidth	100 MHz			
Detector	Positive peak, Negative peak, Sampling, Average, RMS, Max Power			
<b>Real Time Spectrum Analysis</b>				
FFT Analysis	Variable point FFT engine implemented by FPGA. frame rate compression and trace detection are supported. There is strictly no gap and overlap between FFT frames			
	FFT refresh rate = $10^9 \text{ ns} / (N * D * 8 \text{ ns})$ ; POI = $2 * N * D * 8 \text{ ns}$ N is the number of FFT points (2048,1024,512,256,128,64,32), D is the decimate factor (1,2,4,8...)			
	Typical Settings	FFT Refresh Rate		POI
	N = 2048, D = 1	61,035 times/sec		32.768 us
	N = 32, D = 1	3,906,250 times/sec		0.512 us
Real-time Bandwidth	100 MHz			
Window Function	B-Nuttall, FlatTop			
RBW	14.73 MHz-3.59 kHz (FlatTop); 7.81 MHz~1.90 kHz (B-Nuttall); 13 grades for each window type			
Amplitude Resolution	0.75 dB			

General information		
Input and output	Power Supply	USB PD (20 V)
	USB interface	USB3.0 Type-C*1, USB2.0 Type-C*1, USB2.0 Type-A*1
	Video and audio interface	Micro HDMI*1 (Support for extended display), 3.5mm Headphone port*1
	RF input	N (F), Input impedance 50 Ω
	External reference clock input	MMCX (F)(1), amplitude≥1.5 Vpp, input impedance 330 Ω
	External reference clock output	Integrated in MUXIO, 3.3 V CMOS, programmable on/off
	External trigger input	Integrated in MUXIO, 3.3V CMOS, input: high impedance
	External trigger output	Integrated in MUXIO, 3.3V CMOS
	Analog IF Output	MMCX (F)(2), maximum output power -25 dBm, output impedance 50 Ω
Display	IPS LCD 1280x800, 10.1inch multi-touch screen	
EMMC storage	16 GB	
Size (D * W * H) and weight	246x76x33 mm, ≤1.4 kg 259.5x184.5x45.5 mm, ≤1.5 kg (including protective shell and bracket)	
Power Consumption	Typical 25 W	
Power adapter	100-240 V, 50/60 Hz USB PD	
Operating Temperature	-10~50 °C	
Storage Temperature	-20~70 °C	
Packaging and Accessories	Spectrum analyzer with protective shell*1, Power adapter*1, Power cable*1	

\*The typical values of the indicators are applicable for the following conditions: (1) Start up and warm up for 10 minutes; (2) Ambient temperature 25 °C; (3) standard spectrum sweep Spurious rejection off; (4) 100MHz bandwidth and IFGainGrade=2

No	Opt.	Explanation
01	Built-in OCXO reference clock	Providing a reference clock with better stability than the standard configuration, with a temperature drift of<0.15 ppm