PX Series

Portable
Makes Possible.

REAL-TIME
SPECTRUM ANALYZER
UP TO 40 GHz

HAROGIC

CONTENT

1. Quick Start Guide

This chapter covers Quick Start Guide for HAROGIC PX series handheld spectrum analyzer, with key topics including safety instructions, instrument power on/off, SAStudio4 software operation and external interface descriptions.

1.1 Safety Instruction

1.1.1 Safety rules

1. Please check the following items before running the instrument:

- The appearance of instrument is intact;
- The power cable and adapter are not damaged;
- The fan's air vent is unobstructed;
- The instrument is dry, without moisture or condensation;
- The ambient temperature meets specifications in product datasheet;
- If any damage is found before first operation, please contact HAROGIC official after-sales service.

2. During operation, please follow these guidelines:

- The fans work properly and the operating temperature meets the requirements from the product datasheet;
- Please connect the external port properly and ensure that input signal level is within maximum input power;
- Battery is suggested to be above 5%;
- It is prohibited to open the instrument's casing to avoid the risk of electric shock;
- In case of any error, please contact HAROGIC official after-sales service.

3. After completing the use of the instrument, please follow the guidelines below:

- After the instrument is properly shut down, ensure that the storage temperature and humidity meet the range specified in the product datasheet.

1.1.2 Replacing the power adapter

If you are unable to use the original power adapter for certain situations, please select an appropriate power adapter according to the corresponding product datasheet.

1.1.3 Replacing the battery

HAROGIC offers the service for PX series battery replacement. If you need to replace the battery, please contact HAROGIC official after-sales service for assistance.

1.2 External Interface Description

All external interfaces are integrated on the top panel of PX series instrument. Please refer to Table 1 for detailed information of each interface.

Table 1 Detailed information of external interface

No	Interface	Description
1	Power	On/Off instrument
2	Charging	Instrument charging port, USB PD 20V 3.25A. Please connect the power supply according to the datasheet
3	Micro HDMI	For extended display
4	USB3	USB interface: USB1 and USB3 are USB 3.0 interfaces, USB2 is a USB 2.0 interface. This interface connects to external storage devices, USB keyboards, or mice. It can also be used to connect a driver-free Hub with an Ethernet port, allowing the instrument to be remotely controlled by a PC via network cable
5	USB2	
6	USB1	
7	Audio Output	3.5mm headphone jack. Volume can be adjusted via the menu: "System" → "Device" → "Volume."
8	MUXIO	Reference output and other functions. Please refer to Table 2 for more details
9	Charging Indicator Light	Green flash indicates charging, and green solid light indicates a full charge
10	Analog IF Output	MMCX(F), maximum output power -25 dBm, output impedance 50 Ω
11	Trigger Output	3.3V CMOS
12	Trigger Input	3.3V CMOS, high impedance input
13	Reference Clock Input	MMCX (F), amplitude 1.5Vpp, input impedance 330 Ω. Sine wave, square wave, and clipped sine wave are supported
14	GNSS Antenna	MMCX (F), amplitude 1.5Vpp, input impedance 330 Ω
15	RF Input	N (F) or 2.4 mm (M), input impedance 50 Ω

Table 2 Pin description for MUXIO interface 8 (from left to right)

Pin	Name	Direction	Voltage Standard	Description
1	GPIO0	/	/	Reserved
2	TRG IO2	/	/	Reserved
3	GPIO1	/	/	Reserved
4	GND	/	/	Ground
5	GPIO2	/	/	Reserved
6	3V3/5VIN	O	/	Power output, 5V output for PXN-400 and PXE series
7	GPIO3	/	/	Reserved
8	GND	/	/	Ground
9	USART_TX_FP	/	/	Reserved
10	SYNC_RXRFLO	I	3.3V	RF LO synchronization
11	SYNC_ADCCLK	I	3.3V	ADC clock synchronization
12	SYNC_RXIFLO	I	3.3V	IF LO synchronization
13	GND	/	/	Ground
14	REFCLK_OUT_FP	O	/	Reference clock output outputs a standard clock signal of 10 MHz

1.3 First Use of the Instrument

The battery level may be below 5% after long-distance transportation. It is recommended to connect the power adapter before powering on the instrument for the first time.

### 1.3.1 Power on/off the Instrument

Turn on/off the instrument using the power button (Interface 1) on the top of the instrument. After powering on, the blue power indicator will light up. After powering off, the power indicator light will go out.

1.3.2 Charging indicator

When the instrument is connected to the power adapter, the charging status light (Interface 9) will flash green. Once fully charged, the charging status light will always stay on green.

1.3.3 SAStudio4 operation

Press the power button to turn on the instrument. After booting up, the instrument will enter the desktop and automatically launch the SAStudio4 software. The standard operating UI is shown in the following picture:
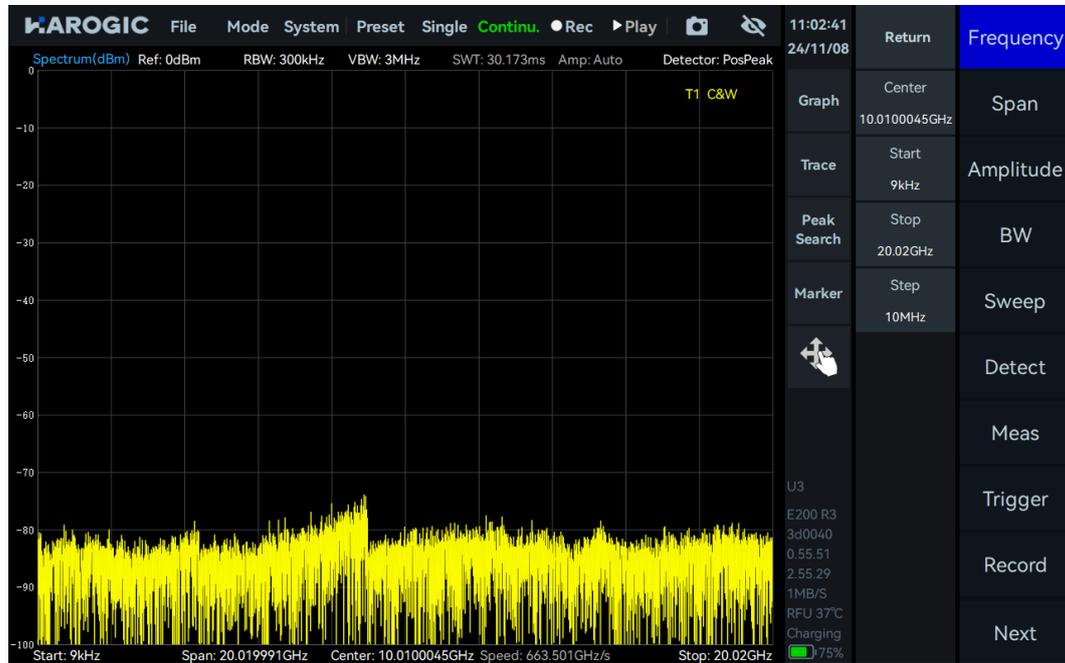
2. SAStudio4 Operation Overview

This chapter mainly explains the UI layout, working modes, and common features of SAStudio4 software.

2.1 Working Modes Overview

HAROGIC PX series handheld spectrum analyzers offer multiple working modes, including Standard Spectrum Analysis (SWP), IQ Streaming (IQS), Power Detection Analysis (DET), Real-time Spectrum Analysis (RTA) and Basic Digital Demodulation. The measurement functions available in each working mode will be explained in detail in the following sections.

2.1.1 Standard spectrum analysis (SWP)

In SWP mode, the instrument performs frequency hopping to realize frequency sweep. This mode is suitable for frequency trace-based measurement and analysis applications. The measurement and analysis functions provided in SWP mode include:

- Spectrum panoramic sweep
- Local spectrum zoom display
- Waterfall graph
- Spectrum record and playback
- Signal tracking

- IP3/IM3
- Channel Power
- OBW
- ACPR
- Peak table

2.1.2 IQ streaming (IQS)

In IQS analysis mode, the instrument keeps the LO configuration unchanged to obtain IQ time domain data. IQS mode is suitable for time-domain signal recording, basic demodulation analysis, and other applications. The functions provided in IQS mode include:

- IQ time domain waveform
- Waterfall graph
- Power-time waveform
- Multi-channel DDC

- Spectrum analysis of IQ data
- AM/FM demodulation
- Audio analysis
- IQ record and playback

2.1.3 Power detection mode (DET)

In DET analysis mode, the instrument keeps the LO configuration unchanged to obtain IQ time domain data. DET mode is suitable for observing the relationship between time and power within a certain bandwidth. The functions provided in DET mode include:

- Power-time waveform
- Record and playback

2.1.4 Real time analysis mode (RTA)

In RTA analysis mode, the instrument keeps the LO configuration unchanged to obtain IQ time domain data. RTA mode is suitable for applications that focus on transient and burst signals. The functions provided in RTA mode include:

- Real-time spectrum probability density graph and waterfall graph
- Record and playback

2.1.5   Digital demodulation mode (Option71, Beta Version)

In digital demodulation mode, the instrument demodulates the modulated signal and analyzes the modulation quality from various perspectives. The demodulation functionality is suitable for multiple applications, especially in environments where known modulated signals need to be analyzed, quality-assessed, and data extracted. The functions provided in digital demodulation mode include:

- Constellation and eye diagram
- Modulated signal spectrum analysis
- Bit table and demodulation
- ASK/FSK/PSK/MSK/QAM

2.2 SAStudio4 UI Layout

The SAStudio4 UI consists of the following sections:

- Menu
- Graph Display Area
- Instrument State
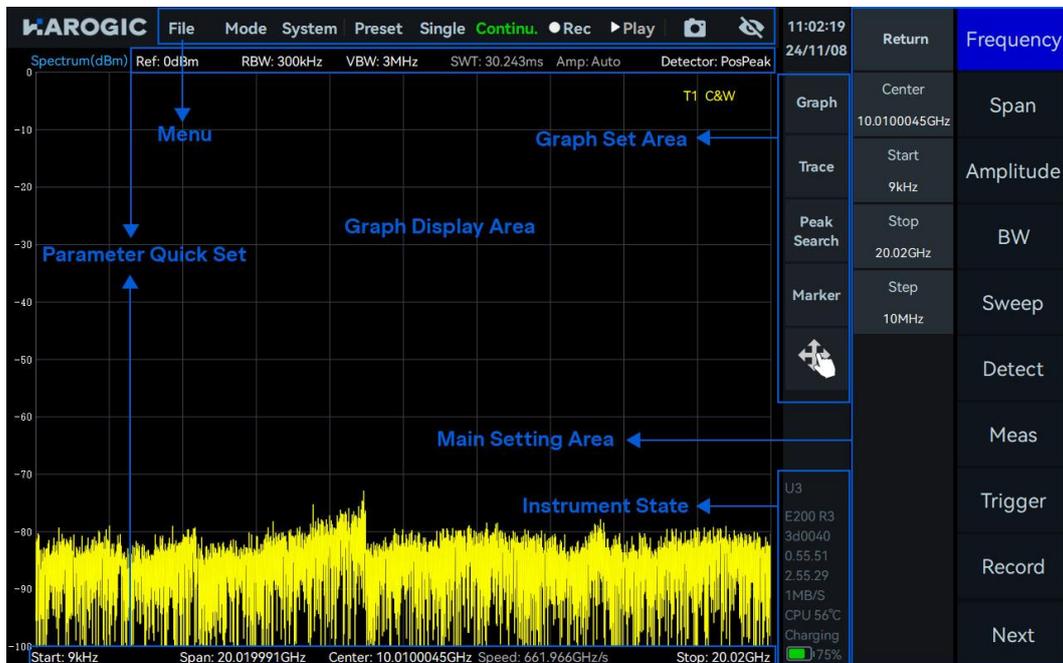- Graph Set Area
- Main Setting Area
- Parameter Quick Set

Figure 1 SAStudio4 UI layout

2.2.1   Menu

- Save and load configuration
- Working mode switch
- Single/Continue preview
- Quick screenshot
- Set startup state
- System setting
- Record and playback
- Hide main setting area

2.2.2   Graph set area

- Graph settings
- Marker settings
- Trace settings
- Multi-touch settings

2.2.3　Main settings area

- Measurement and analysis settings
- Data record and playback
- Trigger settings
- System settings

2.2.4　Instrument state

- Instrument model
- Current instrument temperature
- GNSS antenna connection status
- Software and firmware versions
- Bus data throughput
- Instrument battery status