

9kHz~6GHz

- SPECTRAN V4-C Handheld Sweep Analyzer

V 1.16



Warranty

The instrument is covered with a three-year warranty. The battery of the instrument is covered for one year. Manufacturer or the designated repair center is responsible for the necessary calibration or inspection work. The instrument will be packaged and returned to the user after it has been inspected and repaired.

The user's responsibility is to check and use the instrument according to the instructions, and if it needs to be repaired, send it to manufacturer or its designated repair center in time.

During the warranty period, all faults that are not caused by improper use or disassembly shall be repaired by manufacturer free of charge. The user needs to pay the freight and insurance fee for returning the instrument to the maintenance department, and the cost of delivering the repaired instrument to the user shall be paid by manufacturer or the designated repair center.

After the software and hardware designed by manufacturer for this instrument are properly installed, the instrument will execute its programmed functions. However, Manufacturer does not guarantee that the various operations of the instrument will be uninterrupted or error-free.

The warranty is limited to the instrument and does not cover damage to other equipment, personal and property caused by improper use.

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Safety Notice

Precautions

When preparing to use the instrument for the first time, follow steps below.

(1) Remove the instrument from the packing box and check whether damage occurs during shipment.

(2) Check all attachments and data.

Before turning on the power switch of the instrument, check whether the AC power supply voltage supplied by the external AC-DC power adapter meets the requirements of the instrument. Otherwise, the adapter or the instrument may be damaged.

Preventive care

Preventive care includes cleaning of instrument surfaces, cleaning of RF connectors, and cleaning of accessories. The surface of the instrument can be cleaned with a soft cotton cloth or cotton ball dipped in water

Note: To prevent damage to the LCD display, do not clean with solvents or corrosive liquids.

Clean RF connectors and inner conductors with a cotton ball dipped in anhydrous alcohol. The inner conductor of the N-type connector should be undamaged and the surface should be flat and smooth. The cable at the test port should not be stretched, twisted, or damaged.

Electrostatic discharge (ESD) protection method

Like many high-performance instruments, they are susceptible to electrostatic damage. Coaxial cables and antennas often accumulate a large amount of electrostatic charge, and if the instrument is discharged, it may damage the internal circuit of the instrument. Staff should be clearly aware of the potential harm of static electricity, and take appropriate preventive measures.

Power Adapter and Firmware Upgrade

Charge the instrument before use! If it is placed for a long time, charge and discharge the battery every three months to ensure that the battery works better!

Note: Use only the power adapter provided with the instrument to charge. Do not use modified or damaged AC-DC adapter. Using modified adapters may damage the instrument and human body.

The battery can be charged when the instrument is working or when it is turned off. Regardless charging the instrument when it's turned on or off, the instrument is heating up. To avoid overheating, disconnect the instrument and the AC-DC adapter before placing the instrument in carrying case.

The instrument should not be stored in an environment where the temperature is too high or too low, otherwise the battery performance will be degraded.

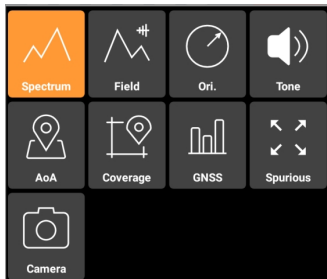
Charging: Use the AC-DC adapter to connect the external power supply. The charging indicator lights red, indicating that the battery is being charging. After charging is complete, the charging indicator lights green.

Firmware upgrade: There should be at least 60% of battery power left or plugin the AC-DC adapter to ensure successful firmware upgrade. If there is a power failure during the upgrade, it will cause malfunction of the instrument.

Key Features

The SPECTRAN V4-C Handheld Sweep Analyzer are Android based test and measurement instrument equipped with a daylight readable, high-definition 5.5-inch TFT color touchscreen display. A compact directional antenna and mapping tool for interference hunting are included.

- Built-in electronic compass and GNSS for accurate direction finding and positioning.
- USB (Type-C) interface for Ethernet adapter and other peripherals.
- Spectrum analysis includes Spectrum, Channel Power, Adjacent Channel Leakage Ratio (ACLR), Occupied Bandwidth (OBW), NdB Bandwidth, Digital Persistence Spectrum (DPS), Spectrogram and Field Intensity/Strength measurement.
- **Option:** Signal direction finding, Angle-of-Arrival (AoA) Interference Localization, Tone Approaching Search , GNSS Interference Hunting and Spurious.
- About 10GB internal storage for saving measurement results, screen capture and screen recording.
- Fast and intelligent interference algorithm can narrow down the interference area in 200 to 500 m².
- SCPI development SDK and VNC remote control.
- Outdoor/Indoor Coverage Mapping and Spectrum Clearance tests.
- Recording and Playback of previous measurement results.
- Battery operation time is about 3 hours.
- Compact, robust and light weight (2 lbs/0.9 kg).
- Equipped with car charger for outdoor emergency battery charging.
- Measurement APP's. (NOTE: The Orientation, Tone , AoA , GNSS Interference Hunting and Spurious APPs are **optional**)



Packing List (standard)

1	SPECTRAN V4-C Handheld Sweep Analyzer
2	Battery (Inside the unit)
3	AC-DC Power Adapter (12V/2A, 24W)
4	Power Adaptor Plug Cord (Europe)
5	Power Adaptor Plug Cord (Unite States)
6	DC Vehicle Power Adapter (12V/5A)
7	RF Connector, N/SMA-JK N to SMA(F)
8	Omnidirectional Antenna ET103 (30MHz to 6GHz Antenna Factor)
9	USB-C docking station Splitter
10	Plastics Tripod
11	Sucking Disc(Including 3m Cable)
12	GPS Dongle(USB Connector)
13	User Manual
14	Pelican Carrying Case

1 Overview

1.1 Interface



Instrument Interface



The back of the instrument

Power and Battery

The instrument can work continuously for 3 hours under fully charged condition, and can also work while the AC-DC power adapter is plugged in to charge the battery.

Warning: Only power adapter and charger provided by Manufacturer can be used. Make sure the socket is clean and dry when the power adapter is plugged in. When the plug is very hot, it should be disconnected immediately and stopped using. Non-professional personnel should not open the enclosure of the instrument.

The power adapter is used to supply power directly to the instrument or to charge the battery. The input DC voltage is 12V, and the maximum power is 24W. When the AC-DC power adapter starts to charge the battery, the indicator on the adapter interface lights red, and the indicator lights green when the battery is fully charged.

Power On

Press the red power button on the panel for 2 seconds, the power indicator lights up, and the instrument starts. Wait a few seconds, the main measurement menu is shown on screen.

Shutdown

Hold down the red power button on the panel for 2 seconds, and tap the "Shutdown" button on the screen. The instrument then shuts down and the power indicator goes off.

Restart

Hold down the red power button on the panel for 2 seconds, and tap the "Restart" button on the screen. The instrument automatically restarts. Wait a few seconds to allow the instrument to boot up.

Type-C USB

There is a Type-C USB connector at the bottom of the instrument, which is used to connect to the USB docking station for Ethernet adapter, access the flash drive, export configuration files and graphics files, or import offline map files.

WARNING : DO NOT CONNECT TYPE-C TO POWER BANK OR COMPUTERS!

RF Connector

N-type RF input, 50 Ω female connector, maximum input +20dBm, $\pm$ 50VDC.

Battery Removal Procedure



Loosen the two screws on the back shell



Open the battery compartment cover on the back

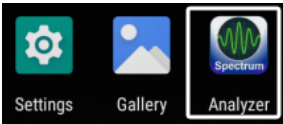


Disconnect the battery cable and remove the battery

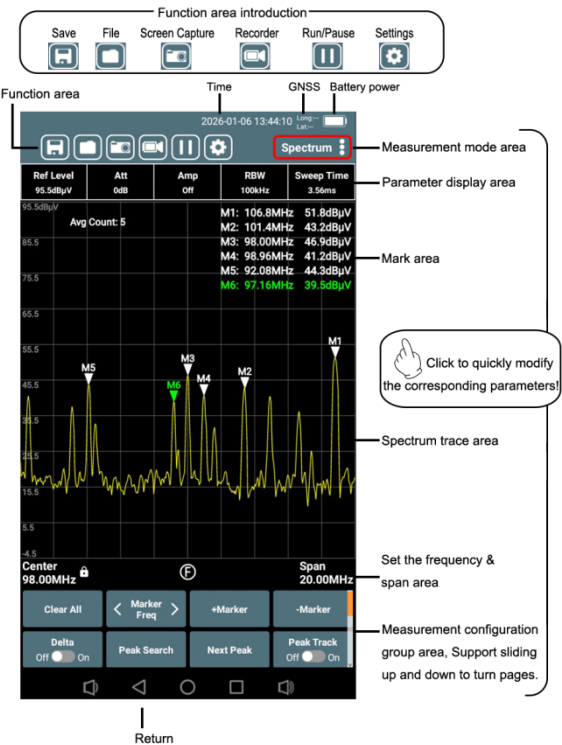


1.2 Android Desktop

When the instrument is powered on, the Android Desktop is displayed. Tap the “Analyzer” icon to show the main measurement menu. If the Android Desktop stays idle without interactions for more than two seconds, the main measurement menu is shown automatically.



1.3 User Interface Layout



Graphical User Interface

Measurement Menu

Slide down/up to change the Measurement menu.

Marker & Peak



Spectrum Trace

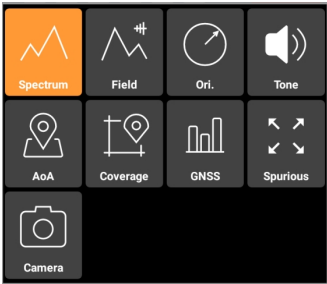


Measurement



1.4 Measurement Mode

Tap the measurement button  to select measurement function to engage.



Measurement Functions

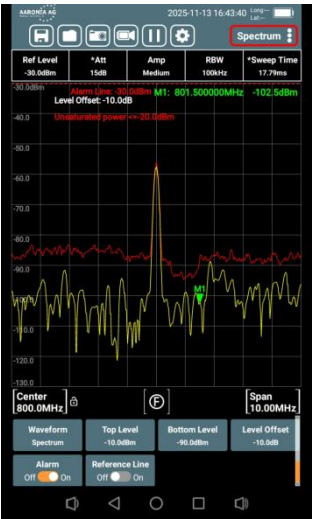
1.4.1 Spectrum Trace

Once a narrowband signal occurs, interference can be easily identified visually by presentation of Spectrum trace and Waterfall diagram.

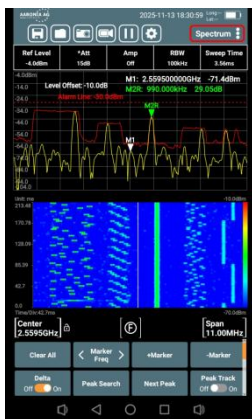
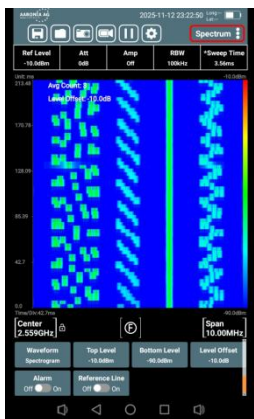
Scroll the Measurement menu bar to select the spectrum presentation between Spectrum (trace), Spectrogram or both.



Spectrum Presentation



Spectrum Trace



Spectrogram (left)
Spectrum & Spectrogram (right)

1.4.2 Parameters

Finger Gesture

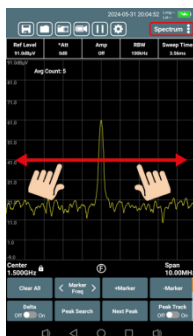
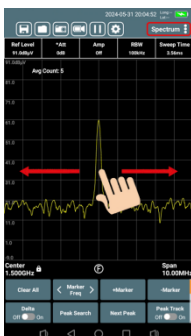
Just like any smart devices, zooming in/out, scrolling up/down or moving frequency range and reference level can be done with finger gestures on capacitive touch panel. For example, X-axis frequency, Y-axis amplitude, Marker can be dragged, zoomed or moved with finger gestures.

Scroll the Measurement menu bar and tap the

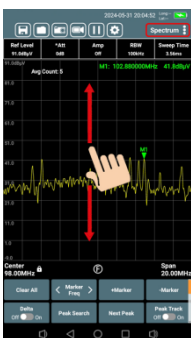


button to turn on/off the “Finger Drag” operation.

Or, tap the lock  symbol on the right side of the center frequency to unlock and use finger to drag or scroll the spectrum trace, change the start frequency and frequency range without changing the sweep bandwidth. Two-finger gesture can also be used to enlarge or shrink the spectrum trace, so that the sweep width increases or decreases without changing the center frequency.



***Drag to Move the Center Frequency (left)
Zoom In (right)***



***Drag the Reference Level (left)
Drag the Marker (right)***

Center Frequency and Span

Tap the center frequency and span buttons to set their values and tap "OK" or "Cancel" button to exit.

Start and Stop Frequency

Tap the **F** button in the middle of the screen to change the start frequency and stop frequency.



Tap the rectangle area of each parameter on screen can quickly pop up a window to change the parameter value.

Ref Level	Att	Amp	RBW	Sweep Time
95.5dBuV	0dB	Off	100kHz	3.56ms

Measurement Parameter Bar

Reference Level

The value of the reference level.

Attenuation

The attenuation value applied to the input signal between 0dB and 50dB can be configured to reduce the signal distortion before feeding to the mixer.

The use of the attenuation should be reasonable. The increase of the attenuation can reduce the distortion of the mixer, but the noise floor of the instrument increases, and the range of the signal measurement reduces. The attenuation value should be reasonably set in use, so that the instrument works in its best performance. The initial value of attenuation is 0dB.

The default of attenuation is "Auto", where the system automatically provides suitable attenuation when the attenuator and amplifier are limited by the reference level.

Tap the step buttons to manually change the value of the attenuation, tap the  or the  button to increase or decrease attenuation in 1dB step, tap the  or the  button to increase or decrease attenuation in 5dB step.

When the attenuation is set to manual, the attenuator and amplifier are not limited by the reference level and the "*" mark is appended to the attenuation parameter. The "*" mark is appended to the value of resolution bandwidth or scan time if these parameters are changed manually.

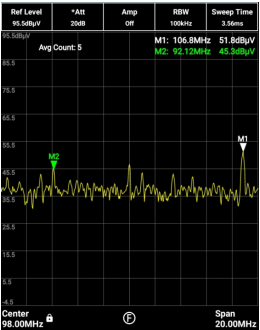
Amplifier

Turn on the built-in preamplifier to improve the measurement sensitivity. In order to ensure the amplifier is not overloaded to damage the instrument, the maximum value of the input signal should not exceed the signal threshold. A message box will warn the potential overloading.

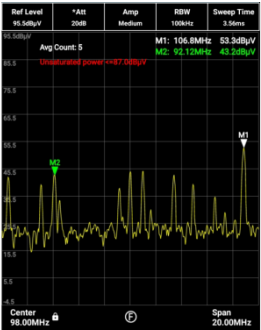


Pre-amplifier Setting

The noise level is reduced and the measurement sensitivity is increased if amplifier is turned on.



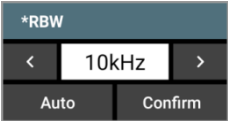
Amplifier Off



Amplifier Medium

Resolution / Video Bandwidth

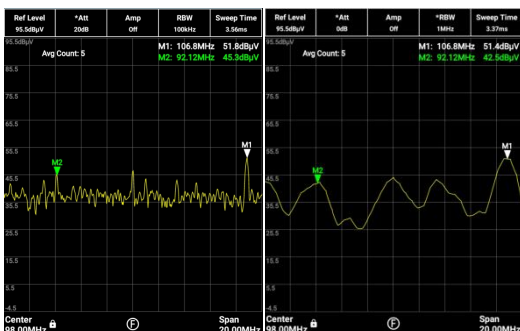
RBW/VBW can be configured in Automatic or Manual (in 1:3 step) mode.



RBW/VBW

Following values can be selected for Manual RBW: 10Hz, 30Hz, 100Hz, 300Hz, 1kHz, 3kHz, 10kHz, 25kHz, 30kHz, 100kHz, 300kHz, 1MHz, 3MHz, or 10MHz.

Note: The selected RBW should be less than the signal bandwidth, otherwise, the spectrum trace cannot be scanned correctly.



RBW = 100kHz

RBW = 1MHz

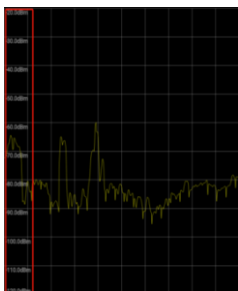
With RBW = 100 kHz, FM signal in 200 kHz bandwidth is clearly observed as shown above.

Sweep Time

Sweep time can be configured in Automatic or Manual mode.

Scale

Refer to the level magnitude of dB per cell. The default scale is 10dB/cell. Level scale can be modified by tapping the rectangle area where the level scale value is displayed.



Scale Modification



Marker and Peak Menu Bar

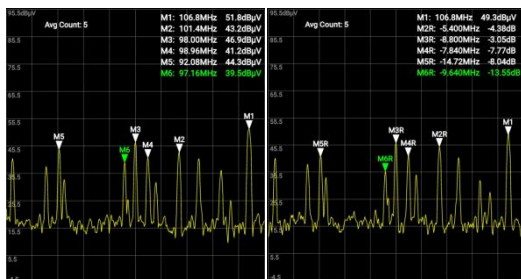
Marker

Tap the **+Marker** button to add a marker 'M_n'. Up to 6 markers from M1 to M6 can be created. Tap the **-Marker** button to remove the last marker. Tap the **Clear All** button to remove all markers.

Tap the **Marker Freq** button to set the marker frequency. Tap the **<** or **>** button to fine tune the marker frequency.

Delta Marker

Tap the "Delta Mark" button to display the frequency difference and amplitude difference between marker M1 and other markers. The marker symbol is then changed to MnR.



Normal Marker

Delta Marker

Peak

Tap the "Peak Search" button to show n number of amplitude peaks from spectrum trace.

Tap the "Next Peak" button to search the peak to the right of the current marker position.

Tap the "Peak Track" button to turn on/off peak track. If Peak Track is turned on, new peak will be identified in each refresh session. If Peak Track is turned off, the peak mark doesn't change dynamically.

Sweep

Single sweep or Continuous scanning.

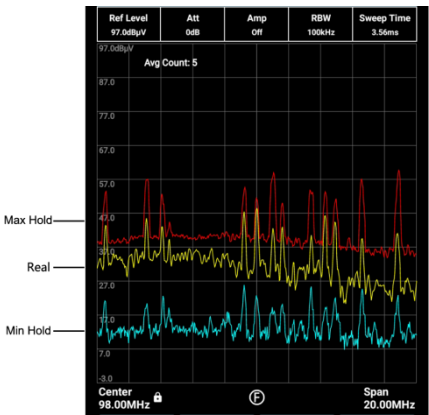
Trace Hold

Up to 3 traces - maximum hold, real-time, and minimum hold can be displayed in different colors

The **real-time** trace is continuously refreshed to reflect current measurement.

The **maximum-hold** trace shows the maximum amplitude value ever be measured for each frequency point.

The **minimum-hold** trace shows the minimum amplitude ever be measured for each frequency point.



Multiple Trace

Averaging Count

The averaging count of the current spectrum trace between 1 and 100 times. The initial value is 5 times.

Unit

Measurement unit in dBm, dBμV, V, mV, μV, A, mA, μA, W, mW, μW, or nW.

Detector

Detector in Real, Positive Peak, Negative Peak, Average, or RMS. Initial setting is Real.

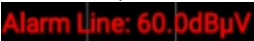
Top Level & Bottom Level

Top Level and Bottom Level are used to set the maximum and minimum level of signal amplitude of current spectrogram. They could be set manually.

Level Offset

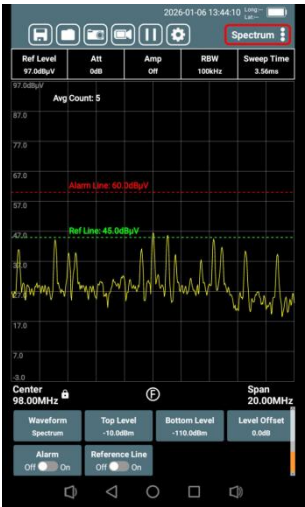
Level offset is either a positive or a negative value to compensate the attenuator or amplifier connected to the input port externally. The default value of level offset is 0dB.

Alarm

Tap the  button to turn on/off the alarm threshold line in red. Tap the alarm threshold rectangle  to change the alarm threshold value. The alarm is triggered if any measurement point on spectrum trace exceeds the threshold.

Reference Line

Tap the  button to turn on/off the reference line in green. Tap the reference line rectangle  to change reference line value.

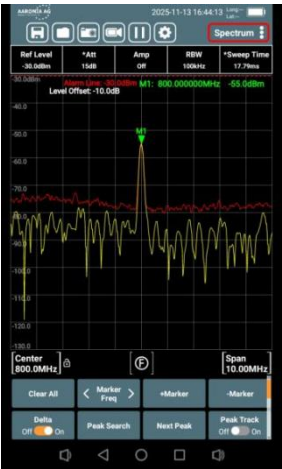


Alarm Line and the Reference Line

2 Measurement

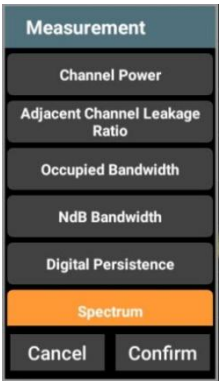
2.1 Spectrum

2.1.1 Spectrum Analysis



Spectrum Trace

From the Measurement menu bar, tap the "Measurement" button to select measurement function: Channel Power, Adjacent Channel Leakage Ratio (ACLR), Occupied Bandwidth, NdB Bandwidth, Digital Persistence Spectrum (DPS), or Spectrum (trace).



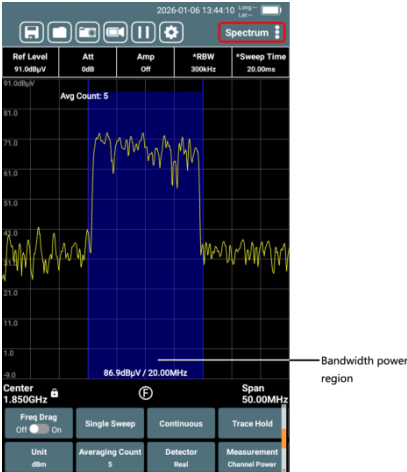
Measurement Functions

2.1.2 Channel Power

The channel power measurement refers to the RF power and power spectral density at a specific channel bandwidth. The channel power of any user-defined spectral bandwidth can be measured.

86.9dBμV / 20.00MHz represents the total power within the current channel bandwidth of 20 MHz.

Tap the rectangle area **86.9dBμV / 20.00MHz** to change the channel bandwidth to be measured.



Channel Power

2.1.3 Adjacent Channel Leakage Ratio

The ACLR measurement detects the signal leakage and identifies the interference source.

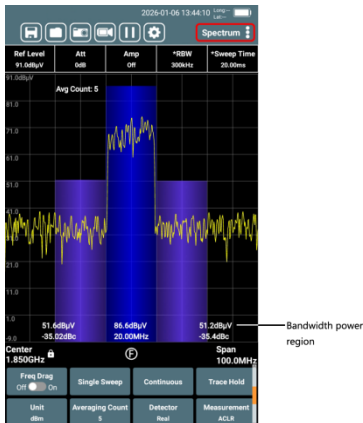
Note: In the ACLR measurement, the bandwidth of the main channel and adjacent channels is constant.

Measurement value **86.6dBμV / 20.00MHz** represents the carrier bandwidth and the total power within the current carrier bandwidth. Tap the rectangle area of measurement value to change the value of the main carrier bandwidth and the carrier bandwidth of adjacent channels.

Measurement value **51.6dBμV / -35.02dBc** shown on the left of main/center channel indicates the total power of the channel on the left of main channel is 51.6dBμV. The difference between the total power of main/ channel and the channel on the left is -35.02dBc.

51.2dBμV
-35.4dBc

Measurement value shown on the right of main channel indicates the total power of the channel on the right of main channel is 51.2dBμV. The difference between the total power of center channel and the channel on the right is -35.4dBc.

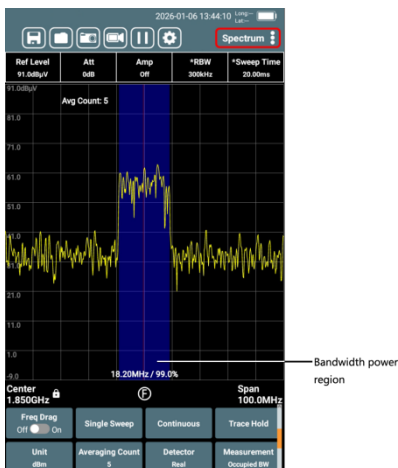


ACLR

2.1.4 Occupied Bandwidth

Occupied Bandwidth measures the percentage of bandwidth occupied by major signal power.

Tap the measurement value rectangle **18.20MHz / 99.0%** to change the percentage of occupied bandwidth.

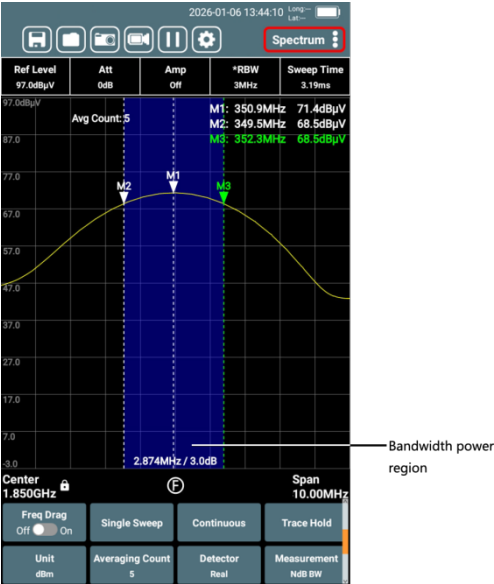


Occupied BW

2.1.5 NdB Bandwidth

The NdB Bandwidth measures the resolution bandwidth with NdB difference in signal power. For example, if the NdB bandwidth is set to -3dB, the bandwidth between the maximum power and 3dB less is calculated.

Tap the **2.874MHz / 3.0dB** rectangle area to change the dB value for NdB bandwidth measurement.



NdB Bandwidth

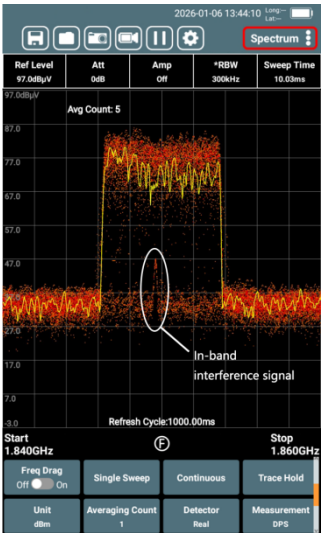
2.1.6 Digital Persistence Spectrum (DPS)

DPS analysis is presented in 3 dimensions

- Frequency in X-axis
- Amplitude in Y-axis
- Color coded signal occurrence

The DPS measurement is suitable for the same-frequency interference analysis, which can simultaneously display multiple signals superimposed together and capture the hidden interference signal under the normal signal.

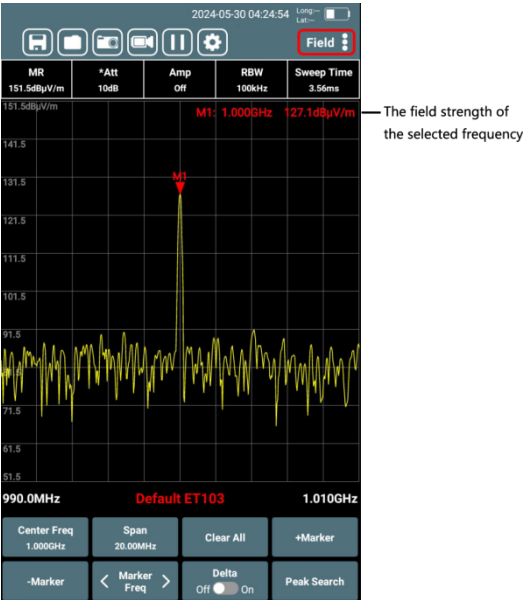
Tap the "Refresh cycle" button on menu bar to change the refresh time of the real-time scan.



Digital Persistence Spectrum

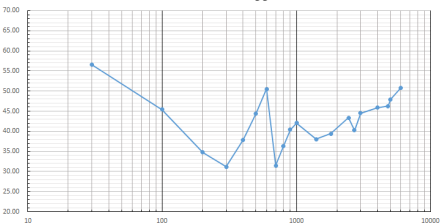
2.2 Field Strength

With the omnidirectional antenna ET103 installed, select the "Field Strength" measurement function and set the frequency to measure its field strength. After the instrument automatically compensates the antenna coefficient AF, the spatial field strength M1 (dBμV/m @ ± 5dB) is displayed on screen.



Field Strength

ET103 Antenna AF Coefficient Table



Antenna List

Antenna Facter

ET103

CancelConfirm

Customized antenna coefficient table can be copied to the root directory of a flash drive and tap the "AF Import" or "AF Export" button from the Measurement configuration menu to be imported to or exported from the instrument.

2.3 Orientation(Optional)

With the directional antenna from different suppliers installed, the instrument can easily find the direction of the interference signals. In order to run the direction finding, the instrument should be held horizontally facing up, turn on the direction-finding switch on menu bar, rotate the instrument and the antenna 360 degrees for 2 to 3 laps smoothly. Each lap takes about 6 seconds, and then turn off the direction-finding switch on menu bar to finish. The direction-finding radar diagram on screen shows the antenna azimuth angle in yellow and the interference signal angle in **red** respectively.



***Spectrum Trace and Radar Map
of Omnidirectional scan***

Antenna Azimuth

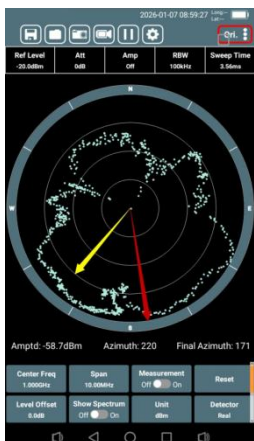
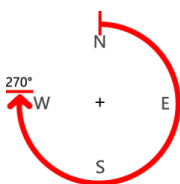
Antenna azimuth (yellow arrow) in real time, refers to the direction angle of the directional antenna.

Signal Azimuth

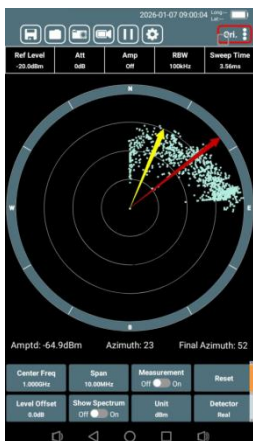
Signal azimuth angle of the calculated interference incoming signal (**red** arrow).

Definition of Direction Angle

The general concept of compass defines the North (N) as 0 (zero) degree and rotates clockwise to 359 degrees.



***Omnidirectional Scan
Radar Map***



90-Degree Sector Scan

The 90-degree sector scanning method

Identify the suspected interference area first, and then scan repeatedly in 90-degree sector to improve the accuracy and the efficiency of finding the source of interference signal.

Center Frequency and Span

According to the previous spectrum analysis information, set the center frequency and span of interference signal on suspicious.

Click **Antenna** button to select antenna type as the using now. And click **Polarization** button to select polarization.

Measurement

After the "Measurement" switch is turned on, rotate the instrument and the directional antenna smoothly in place. Once the "direction finding" ends, the **red** arrows points to the direction of the interference signal.

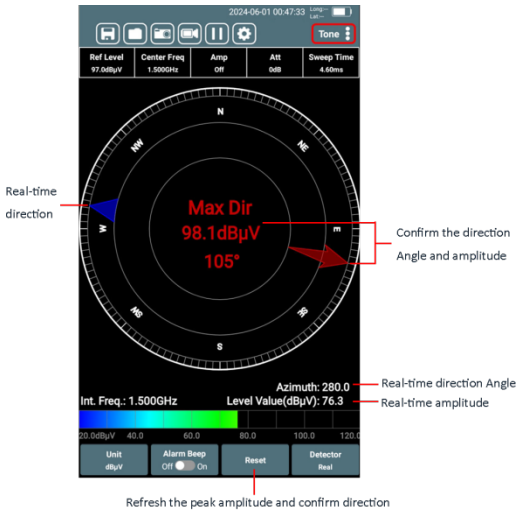
Level Offset

Level offset is a positive or a negative value to compensate the attenuator or amplifier connected to the input port. Enter the level offset compensation value. The default of level offset is 0dB.

2.4 Tone Approaching Search(Optional)

By using the directional antenna installed and the built-in speaker of the instrument, the interference transmitting source can be gradually approached and identified. The speaker tone volume increases according to the strength of the signal received.

On the Tone Approaching Search window shown below, the red text and arrow inside the ring present the direction and magnitude peak of the interference signal measured. The color bar beneath the compass ring presents the real-time measurement of signal strength of interference source. Pointing the directional antenna toward the interference source on suspicious and move slowly to locate it.



Tone Approaching Search

Alarm Beep

Tap the “Alarm Beep” button to turn on the speaker beep. The speaker volume increases with the increase of signal strength detected.

Reset

Reset the tone approach measurement values and direction.

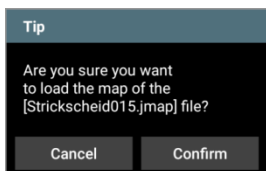
2.5 Angle-of-Arrival (AoA)(Optional)

See section 3.2 for procedure to import offline geographical map.

Loading Offline Map File

Tap the  button, select the map option and the map file to be loaded, tap “OK” to confirm.

Note: If the offline map file required is not available on the instrument, contact Manufacturer product support to request.



Click **Antenna** button to select antenna type as the using now. And click **Polarization** button to select polarization.

The directional antenna, built-in GNSS, the electronic compass, and the offline map are used for interference AoA analysis.

Interference Positioning Procedure

- Identify the interference frequency and select a test point

Identify the interference frequency first and then pick a test point where environmental occlusion is minimized. Use the instrument to measure surrounding area to identify the direction with high field strength of interference signal shown in red line on the measurement screen.

Continue to scan the 90-degree sector with the intelligent line convergence algorithm multiple times to narrow down the frequency and the area of interference source

- Proposed interference check area and path

Select several test points with a distance of hundreds of meters apart, say test point #1, #2, #3 ... to run direction finding measurement as described above. Several red lines with direction angles are shown on the map.

- Adaptive positioning software

The instrument automatically analyzes the reliability of each interference angle measured at each test point, eliminates the large angles, gathers most of the direction angles with high reliability, and finally form an adaptive interference convergence area, where suspected interference source is within 200 to 500 meters diameter of range.

- Secondary analysis and revision

Test points with low liability in measurement data can be deleted to improve and converge the localization of interference source.



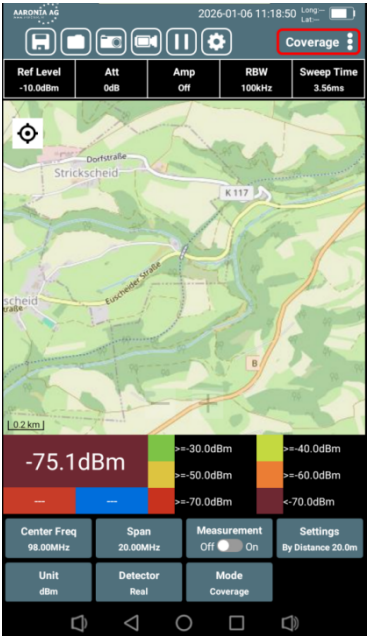
Angle-of-Arrival Localization

2.6 Coverage Mapping

Refer to section 2.5 and 3.2 for information of loading offline map file to the instrument.

In order to run drive/road test on specific frequency

- Magnetic disc can be used to mount the antenna on top of a vehicle.
- GNSS has to be locked to identify current position. GNSS may need several minutes to stabilize on cold start. Warm start just needs tens of seconds to stabilize.
- Depending on the signal strength, the sampling interval of measurement can be either in “time” or “distance” basis.



Coverage Mapping

Level Threshold

Tap the area with threshold settings to manually set the thresholds for Excellent, Good, Medium, Poor, and Unqualified measurement values. During the test, the measurement values are color coded according to threshold settings.

	>=-30.0dBm		>=-40.0dBm
	>=-50.0dBm		>=-60.0dBm
	>=-70.0dBm		<-70.0dBm

Threshold Settings

Sampling

Measurement sampling in Time or Distance interval.

Settings

☒ By Distance 20.0m

By Time

Cancel Confirm

Settings

By Distance

☒ By Time 5s

Cancel Confirm

Sampling by Distance or Time

Tap the **Measurement** **Off** ☐ **On** button to turn on measurement and start the road/drive test.

2.7 Camera

There is a camera on back of the unit, click the 'Camera' Measurement button to take photos.

Note: Under the function, prohibit any TYPE-C device from being connected to the instrument.

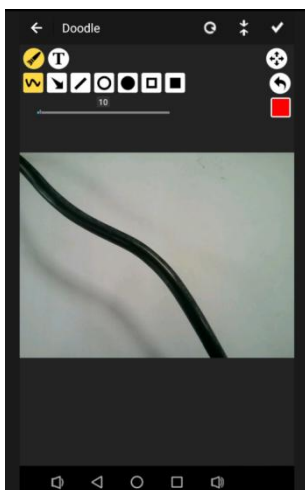
After taking the photo, press the return key  at the bottom of the screen to return to the measurement app.



Take a photo

Click the small picture on the right side of the photo button to doodle on this picture.

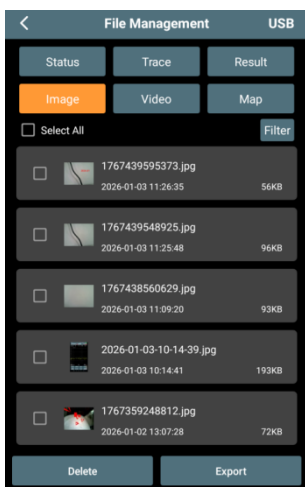
After the doodling operation is completed, click  to save this picture.



Doodle

Photos taken and doodled with are saved in file management.

Tap the  button and select the image file to be display on screen. Use figure gestures to scroll left/right to preview image.

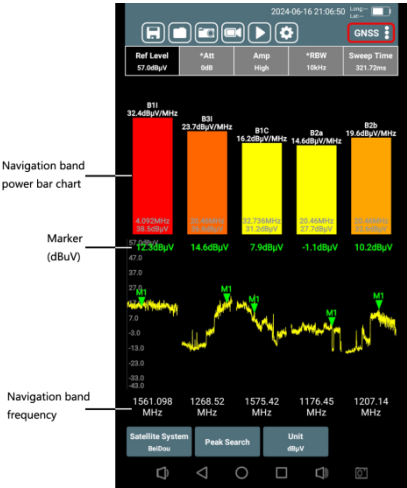


File location

2.8 GNSS Interference Hunting (Optional)

The interference signals of GNSS can be hidden and weak, it's necessary for a aviation control department to run interference analysis on aviation band near the airport. It's recommended to use Yagi antenna for aviation interference analysis.

Satellite signals can be normalized to 1MHz for integral calculation of channel power. The interference can be identified once the normalized channel power increases in heatmap. Higher integral power on specific channel indicates the frequency of interference signal is closer to the frequency of specific channel. By using the same theory, directional interference analysis on aviation band can be identified and approached with several iterations of measurement.



Normalized Channel Power

Parameters recommended for interference analysis on aviation band

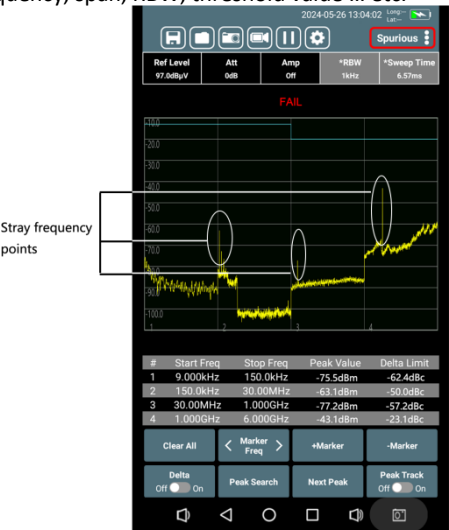
Reference Level	57dBuV
RBW	10kHz
Amplifier	High

GPS/BeiDou/GNSS Satellite Signal Frequency Table			
Sysyem	Signal	Frequency(MHz)	Channel bandwidth(MHz)
BeiDou	B1I	1561.098	4.092
	B3I	1268.52	20.46
	B1C	1575.42	32.736
	B2a	1176.45	20.46
	B2b	1207.14	20.46
GPS	L1 C/A	1575.42	2.046
	L1 C	1575.42	30.69
	L2 C	1227.6	2.046
	L2 P	1227.6	20.46
	L5	1176.45	20.46

2.9 Spurious (Optional)

Radio stations, telecommunication broadcasting equipment must follow the regulation to limit the transmission power, and most importantly, the stray radiation amplitude has to be managed under threshold value to comply with international standards.

Several frequency bands can be configured for measuring stray radiation. Each band includes center frequency, span, RBW, threshold value ... etc.



Stray Radiation Measurement of 4 Frequency Bands

Settings of Stray Radiation Measurement

According to 3GPP standards, the defaults of stray radiation frequency band and RBW are

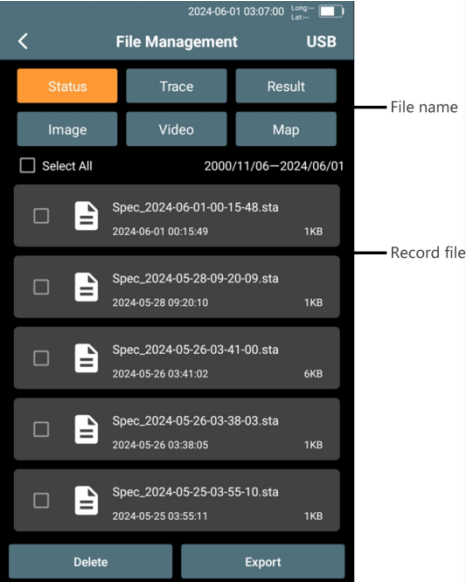
Band 1	9kHz to 150kHz,	RBW = 1kHz
Band 2	150kHz to 30Mhz,	RBW = 10kHz
Band 3	30MHz to 1GHz,	RBW = 100kHz
Band 4	1GHz to 6GHz,	RBW = 1MHz

The defaults of threshold value are defined as 5G NR Type A. The defaults of scan interval and sampling points are adjusted automatically by the instrument.

Tap the Measurement Settings button to define number of stray radiation band to measure, and configure start/stop frequency, RBW, Sweep Time and Base Limit.

3 Record and Playback

Tap the  button to list all previously saved files.



File List

Status (sta)	Trace (tra/rdo)	Result (csv)	Image (jpg)	Video (mp4)	Map (jmap)
					

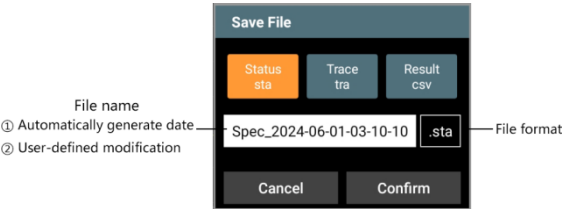
File Icons

3.1 File Management

3.1.1 Measurement File

Tap the button  to save following measurement files.

File Type	Content	Format	Functions
.sta	status, settings	binary	All
.tra	trace	binary	Spectrum, Field Strength
.csv	measurement results	CSV text	Spectrum, Orientation, Coverage
.rdo	measurement results	binary	Coverage



Save File

Tap the "status file" button to save the current test status in .sta file. The status files can be selected and loaded later by tapping the “File Management” button.

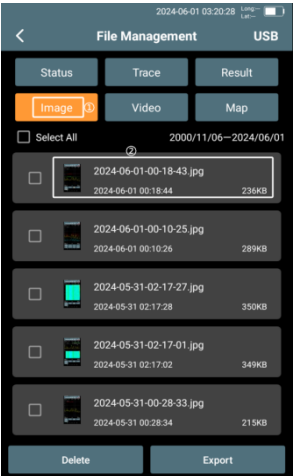


3.1.2 Screen Capture (.jpg)

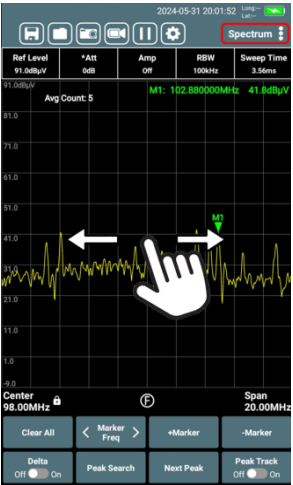
Tap the  button to capture the screen and save it in .jpg file.

Load the Image File

Tap the  button and select the image file to be display on screen. Use figure gestures to scroll left/right to preview image as shown below.



File Management



Load and Preview Screen Capture

Finger gesture to scroll or move

3.1.3 Screen Recording (.mp4)



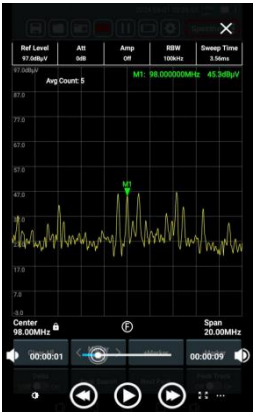
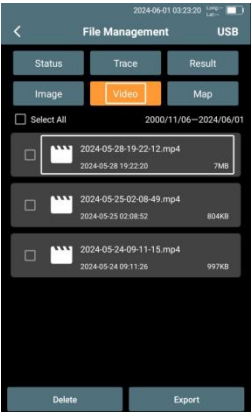
Tap the  button to start recording the screen for 10 seconds. During the recording process, ambient sounds are also recorded. It can be used to record video information.

Screen recording can be stopped anytime by tapping the  button again during the recording session. Tap the **Confirm** button in the "Save Video" pop-up window to save the recorded screen file in MPEG-4 (.mp4) format.

The default file name to be saved includes the timestamp when the recording finished but it can be renamed before saving.



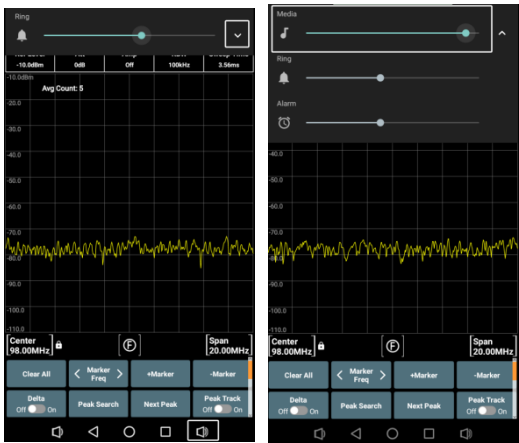
Tap the  button and select the "Video" option to list all video files. Select the file you want to play. It can play the screen and sound.



Playback of Screen Recording

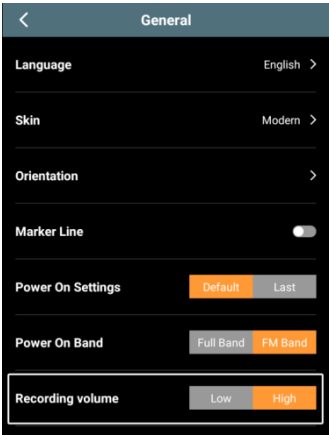
How to adjust the volume of the playing sound:

①Click the volume key at the lower right corner of the screen, and then click the drop-down button at the top of the screen to adjust the Media, that is, the volume.



Adjust the system volume

②Tap the  button and **General** button. Adjust the Recording volume option to **Low** or **High**.



Adjust the Recording volume

3.1.4 Trace Record (.tras)

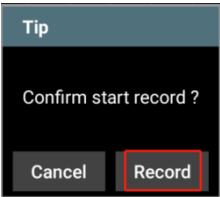
Trace Record

Trace recording and playback function. It is only available in spectrum mode.



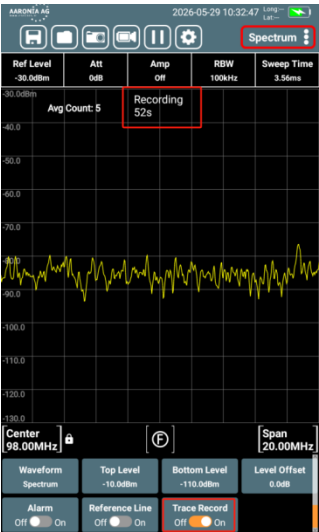
Trace Record Button

Set the "Trace Record" button to "On", then a box will pop up. Click "Record" to start the recording.



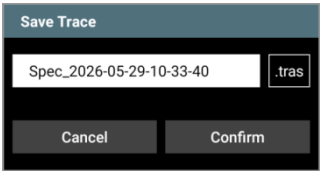
Confirm the Trace Record

By default, the recording will automatically stop after one minute. The interface shows the countdown for the recording.



Start the Trace Recording

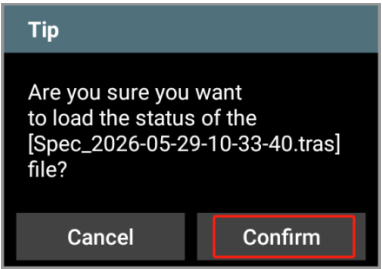
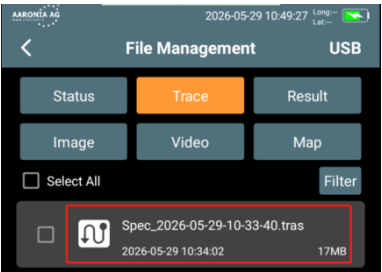
You can record for one minute. You can also stop the recording manually, set the "Trace Record" button to "Off". You can name the recorded file.



Name and Save the trace file

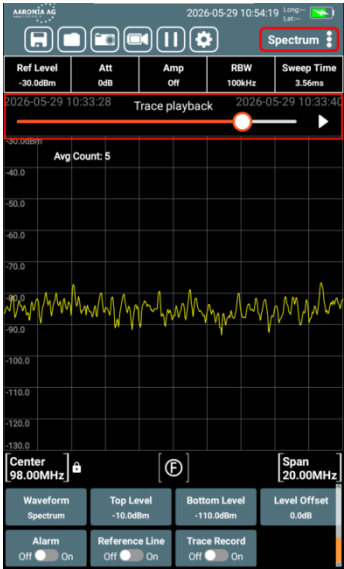
Playback

Click the file manager button , click Trace item. Files with the suffix "tras" are the recorded trace files. Click on the red box area of the trace file, and you can playback the file.



playback the trace file

During the playback, a progress bar is displayed at the top of the interface. You can pause the playback or drag the progress bar to view the playback.



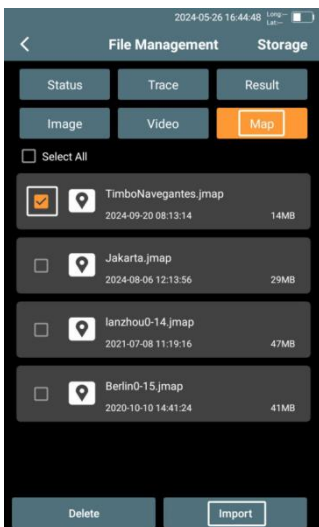
Replaying

After the playback is completed, it will automatically exit the playback mode and enter the normal scanning interface.

3.2 Import Offline Map File

Copy the map file to the root directory of an USB flash drive (NTFS or FAT32 formatted filesystem) and insert the drive to the USB port of the instrument.

Tap the  button for File Management window. Tap the “USB” button to list files on the flash drive. Tap the “Map” button and select the offline map file and then tap the “Import” button to load the map file to the instrument.



Import Offline Map

3.3 Export Files

Insert an USB flash drive to the USB port of the instrument, tap the  button to select file to export to the USB flash drive.

Tap the “USB” button on File Management window to list all files available on the USB flash drive.

4 Settings

Tap the  button for instrument settings.

Note: To set the system date and time, tap the return button  to go to Android desktop, and then tap the Android setting button , select "System", "Date and Time" to set the system date, time and time zone.

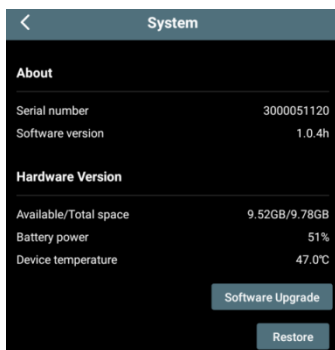
4.1 System Settings

Tap "System Settings" to view the serial number, software version, available/all disk space, battery power and temperature of the instrument. Software upgrade and factory reset can also be done.

Temperature Control

When the temperature inside the instrument reaches 50°C, the fan is turned on automatically.

When the temperature inside the instrument is below 47°C, the fan turns off automatically.



System Settings

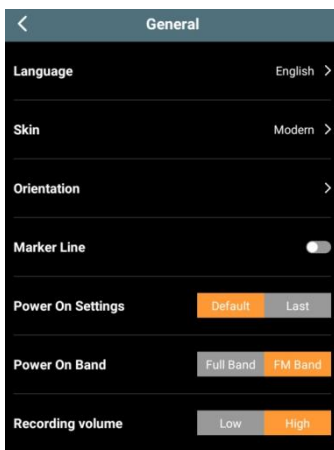
4.2 General

Language

English

(Background) Skin

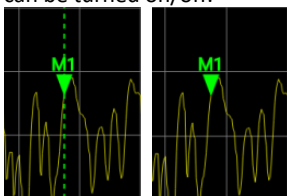
Choice of modern, daytime, night, or cool skin style for screen background, color and contrast. The default is modern skin.



General Settings

Marker Line

Marker line can be turned on/off.



Power On Settings

Select "Last" to boot up with settings of previous session. Select "Default" to boot up with factory defaults.

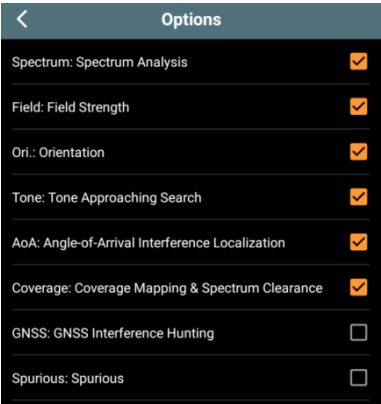
Power On Band

Full Band 0Hz to 6GHz

FM Band 88MHz to 108MHz

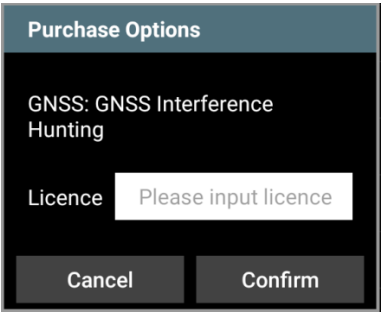
4.3 Options

Users can view both purchased and unpurchased options.



Purchased and unpurchased Options

Click on the row of the selected item you wish to purchase, enter the exclusive license number to enable the options. If needed, please contact the distributor.



Purchase Options

4.4 GNSS and Compass

By default, built-in GNSS is used for positioning, but external GNSS module can also be supported through USB for measurement functions.



GNSS and Compass

GNSS may take several minutes to stabilize on cold start. Warm start may only take tens of seconds to stabilize.

4.5 Calibrate the electronic compass

When the compass direction indication becomes inaccurate after a period of use, compass calibration is required.

Click the "Settings" button, then click "GNSS and Compass", and tap the word "Compass" five times. Enter the password: 800. A "Calibration" button will appear on the right side. Click "Calibration" to enter the compass calibration mode. It will display: "During calibration. Please rotate the machine slowly and uniformly around the X-axis, Y-axis, and Z-axis for 2 to 3 turns, and then rotate it at any angle." Before the countdown ends, follow the instructions to complete the calibration of the electronic compass.

5 VNC Remote Access



LAN Connection

Connect the instrument to computing devices (PC or Pad) with Ethernet cable. The IP addresses of the equipment and computing device must be assigned to the same subnet.

5.1 Assign IP address (VNC Remote Control)

① Go to the Android desktop of the instrument, tap the  button for “Settings”.

② Tap “Network & Internet” and “Ethernet”

③ Select “Static” as “Ethernet IP mode” and enter IP address, gateway and netmask.

Tap “CONNECT” to enable Ethernet connection to the computing device as shown below.



Ethernet	
IP address	192.168.75.180
netmask	255.255.255.0
gateway	192.168.75.254
dns1	192.168.1.1
dns2	0.0.0.0
Ethernet Ip mode	static

Assign IP Address

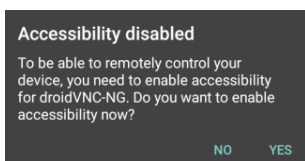
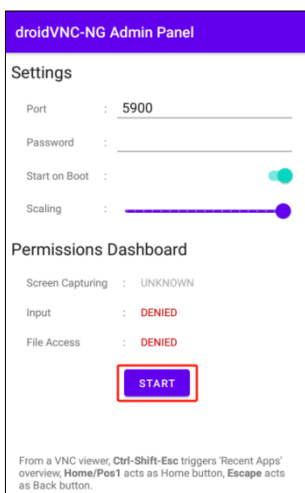
5.2 Install VNC Server Software

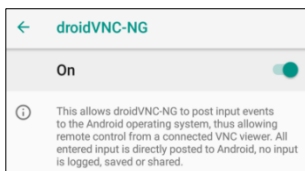
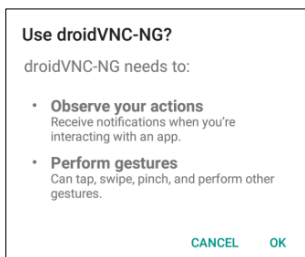
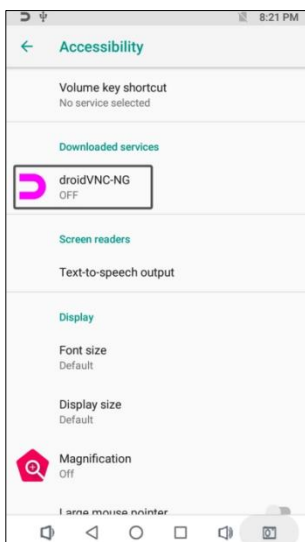
① Copy "*net.Christianbeier.Droidvnc_ng_14.Apk*" to the root directory of an USB flash drive.

Insert the flash drive to the USB port of the instrument.

- ② Tap the File Management  button and  button to select “USB Drive”.
- ③ Select “*net.christianbeier.droidvnc_ng_14.apk*”. Tap “CONTINUE” and “INSTALL” to install VNC server.

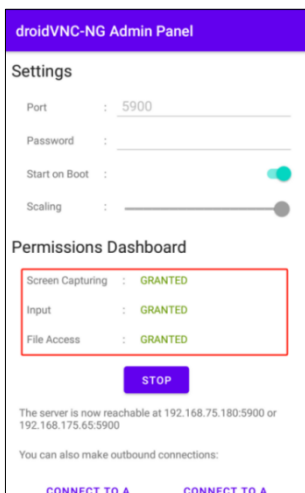
- ④ After installation is done, tap the  button on the Android desktop, go to the “droidVNC-NG Admin” Panel, tap “START”, “YES”, “droidVNC-NG” and turn the switch On.





droidVNC-NG Admin Panel

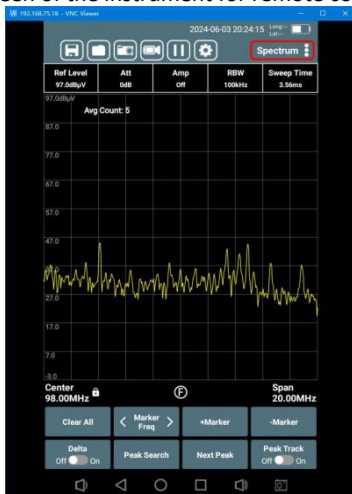
⑤ Go to the “droidVNC-NG Admin Panel”, tap “YES” to show popup dialog “Allow droidVNC-NG to...”. Tap “ALLOW” to see popup dialog “droidVNC-NG will start ...”. Tap “START NOW” to start VNC server on the instrument for remote access.



droidVNC-NG Admin Panel

5.3 VNC Remote Access

Visit www.realvnc.com to download and install VNC client on computing device. Launch VNC client and enter the IP address of the instrument to see the real-time screen of the instrument for remote control.



VNC Remote Access

6 Programming SDK and APIs

Standard SCPI programming API is supported for third-party software integration.

7 Specification

Technical Parameters (typical)	
Frequency range	9kHz to 6GHz Resolution: 1Hz
IF bandwidth	20MHz
Frequency accuracy	±1ppm
Power Level	DANL ~ +20dBm
Attenuator range	0 to 50dB (1dBstep)
Amplifier	≥30dB
Maximum safety level	+20dBm (Amplifier: off)
Display the average noise level (DANL) @1GHz	-160 dBm/Hz (High sensitivity mode)
Third order interception point	+14dBm (typical)
Phase noise	-100 dBc/Hz@ 100kHz
Display screen	5.5 inch, 720x1280
Operating system	Android
Memory space	About 10GB
RF input	N type 50Ω
USB	USB (Type-C)
GNSS and compass	Built-in
lithium battery	7.4V / 5AH
Operating time	About 3 hours
Working temperature	-5°C to +50°C
Dimension	215mm x 95mm x 55mm
Weight	About 0.9kg

