Instruction Manual

DS100 Interference and Direction Analyzer

DEVISER

Ver: 1.0

Safety Requirement

Safety Level

This manual has the following conversions for presenting information.

WARNING: A warning marker alerts you any harmful matters that users should pay attention to the operation method. Users must not do any operation or process before the condition of this marker is met, otherwise it might cause personal injury.

CAUTION: A caution alerts you to any danger matters that users should pay attention to the operation method. Users must not do any operation or process before the condition of this marker is met, otherwise it might damage the device.

Before connecting to the power switch, please make sure that the voltage and currency of external AC-DC power supply or the cigarette lighter meet the equipment requirements, otherwise it might damage the device or adaptor.

Since there are multiple circuit joints in the device, and touching might cause personal injuries and device damages, only trained maintenance personnel could remove the case and maintain the device.

Warranty

This instrument is guaranteed for a period of 2 years since the date of shipment, you can extend the warranty for one year before maturity, the battery warranty for one year. Under warranty, any fault which is not caused by improper use will be repaired for free.

Users must use and check the instrument according to the manual. If maintenance is needed, please send back to our company our authorized maintenance stations.

Generally, in the warranty period all faults which are not caused by imporper use would be repaired by our company free. Users need to pay for the freight and insurance to send the product back. The freight sending the product back to users would pay by our company or authorized maintenance stations.

The device would execute the programming command after installing all software and hardware correctly. But we do not guarantee the operation continuity and absence of faults.

The guarantee is limited only to the instrument and does not involve any damage of equipment, personnel and property caused by improper use of the instrument.

Limitation

The warranty is not applicable for the faults resulted by improper use or inadequate maintenance (including software and interfaces), and unauthorized open of the instrument. Within the 2 years warranty period, calibration, maintenance service and consultation shall be free. After the 2 years warranty period, you can extend the warranty for one year before maturity, to extend the warranty period of one year you need pay 16% of Sales price , fees for material and repair will be charged reasonably.

The following items are not under warranty:

①Damage caused by improper voltage or AC/DC currency input.

②Deformation or damage of panel, switches, devices and case as well as defects involving interval parts caused by external mechanical force (shocking and dropping, etc.).

③Defects caused by unauthorized repair.

④When users pick up the device, please check it on the nail. If there is any damage, please contact with the transport company. Only receivers (the person and department of receiving the product) has the right to ask for compensation for the transportation damages.

⑤Defects caused by the instrument worked beyond the required technology specification.

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Contents

1 Instrument overview

The DS100 Interference and Directional Analyzer is a handheld instrument designed for radio monitoring with spectrum analysis, signal demodulation, interference troubleshooting, and directional mode. With features such as rich functions, excellent performance and convenient operation, it is an ideal instrument for field signal detection and analysis.

The instrument has built-in and integrated receiver, direction finder, cluster signal analyzer,road measurement analyzer and other optional accessories. Users can also quickly deploy our directional antennas to the roof and use the controller for concealed monitoring in the car.

2 About Instrument

2.1 Interface

Upper panel

① N-type antenna interface ② Serial/antenna data and control interface ③ USB2.0 tablet interface ④Headphone interface ⑤GPS antenna interface ⑥Volume knob

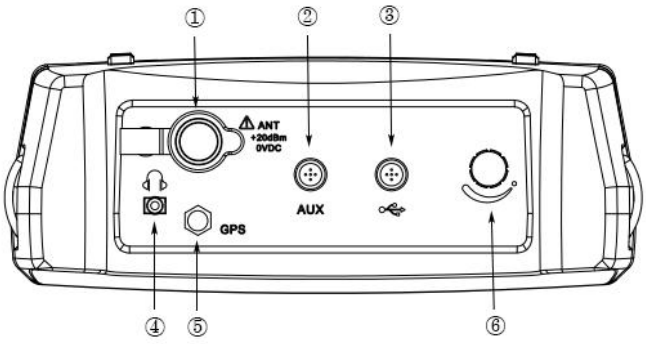


Fig.2-1 Upper panel

Left panel

① IF Output ②REF Input

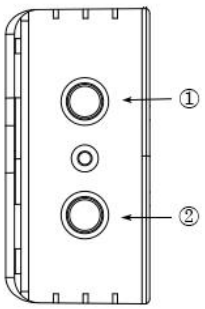


Fig.2-2 Left panel

Right panel

① USB2.0 interface ② 100M LAN ③ 1000M LAN ④ USB3.0 interface ⑤ Power adapter interface

Warning: only battery, adaptors and chargers from Deviser could be used.

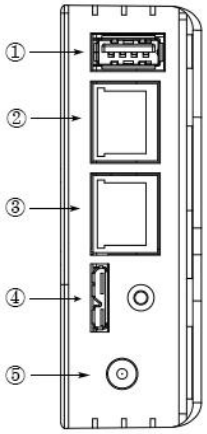


Fig.2-3 Right panel

2.2 Button Panel

① Function key②Digital key③Power button④Up and down key , wheel⑤Unit key⑥Lock key⑦Storage key

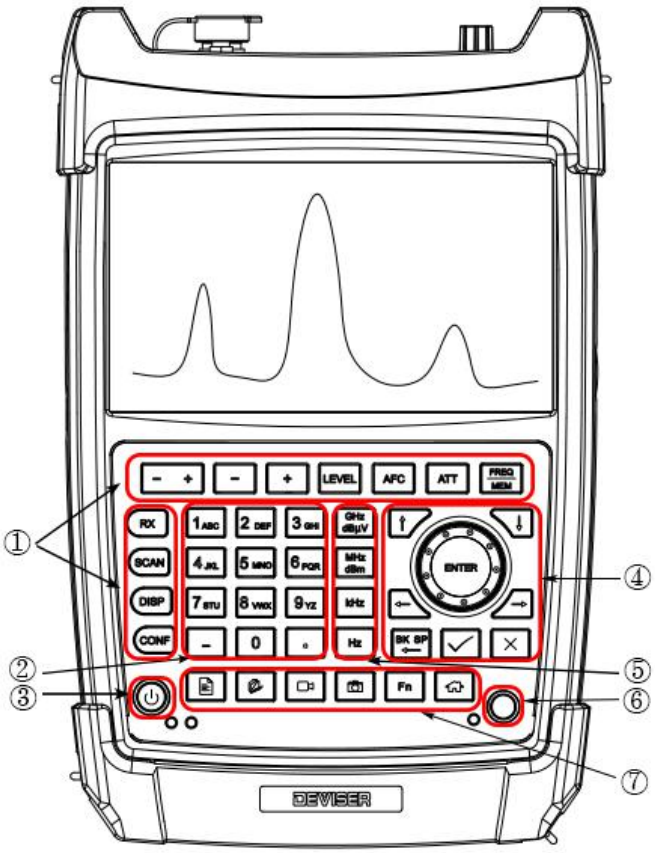


Fig.2-4 Button panel

2.3 Soft Bag

DS100 can be stored in the instrument package when idle, and accessories and adapters can be placed in the side pocket of the instrument package.

Fig.2-5 Instrument package

2.4 Interactive Interface

① Parameter status display area②Markers and Lines status display area③Waveform and measurement results④Parameter setting area

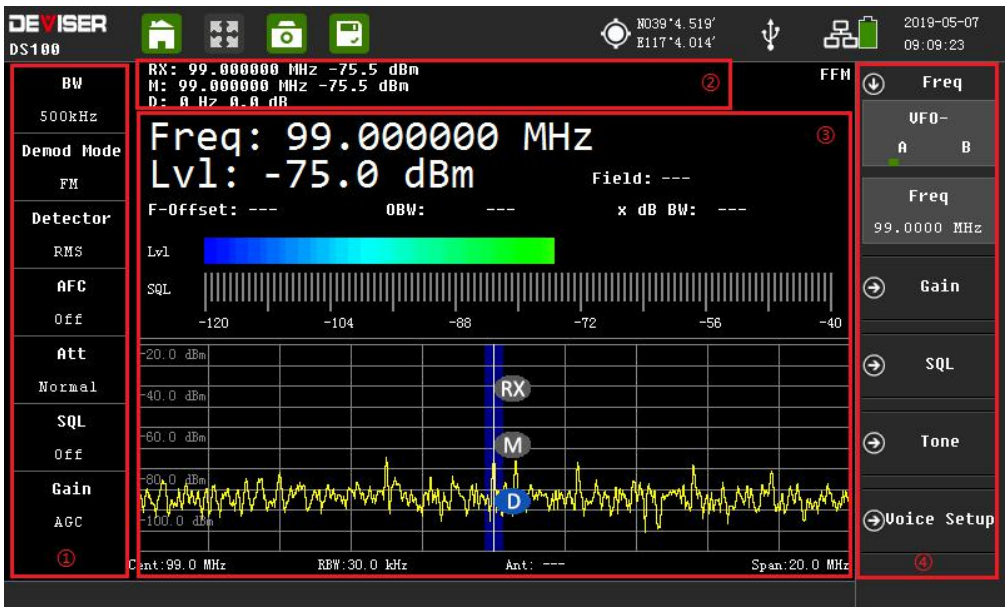
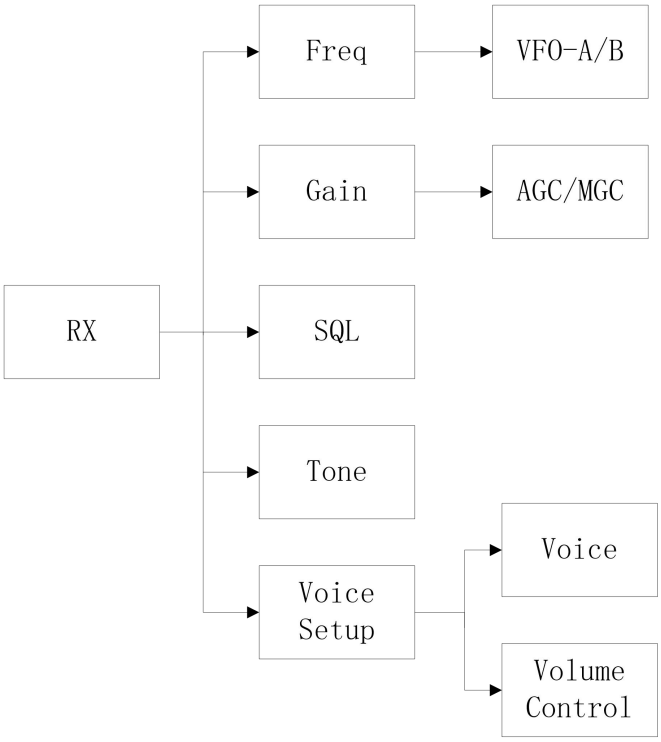


Fig.2-6 Interactive interface

3 Menu

3.1 RX

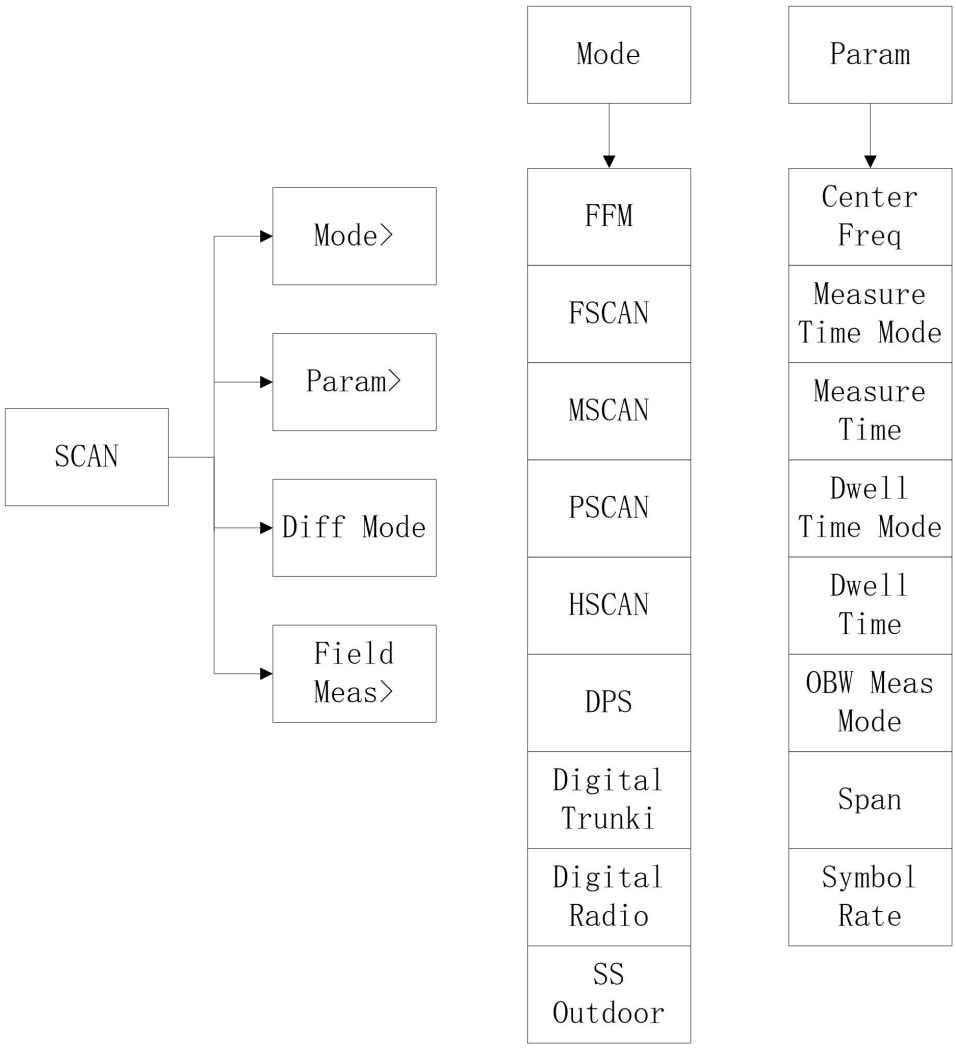
To set frequency, gain control, squelch level and other basic parameters.



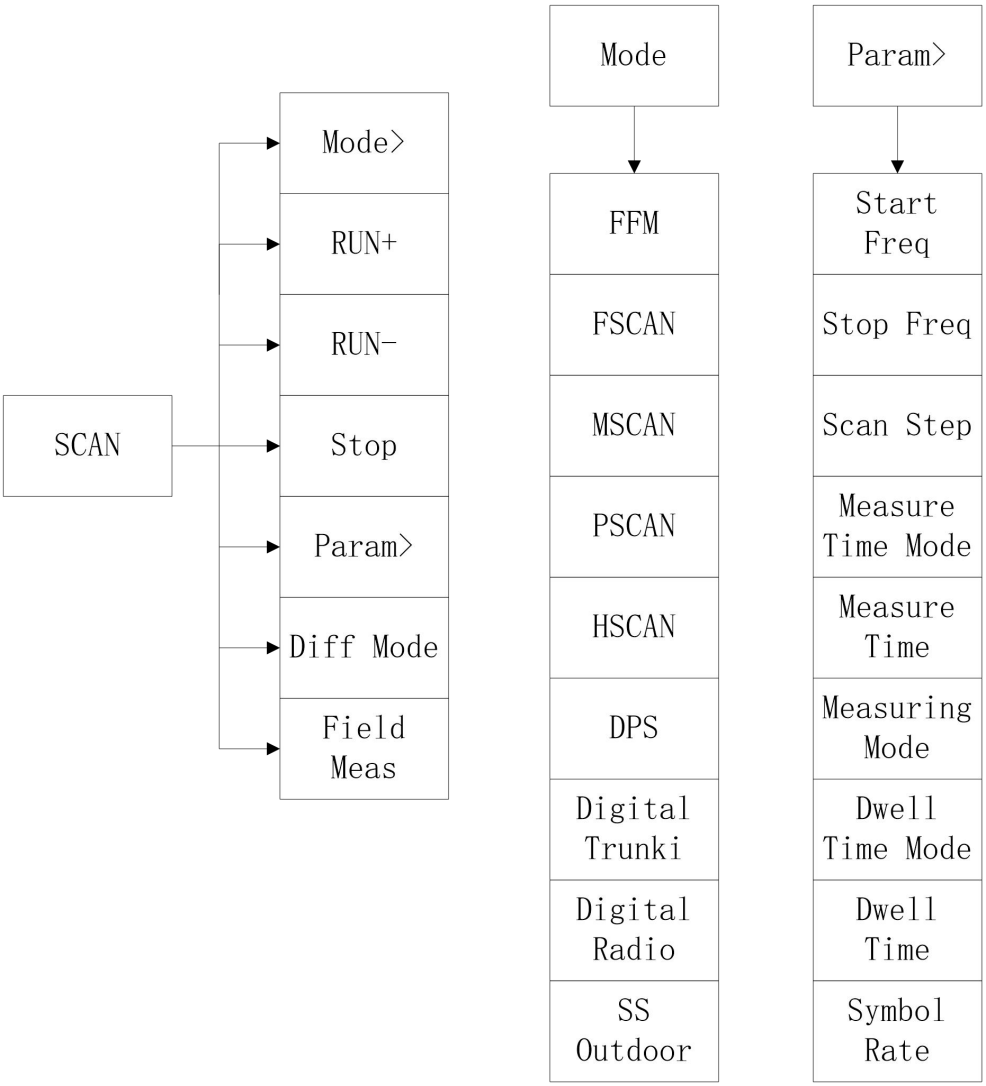
3.2 SCAN

To set scanning mode and other parameters (In different scanning modes, the Settings of measurement parameters are also different).

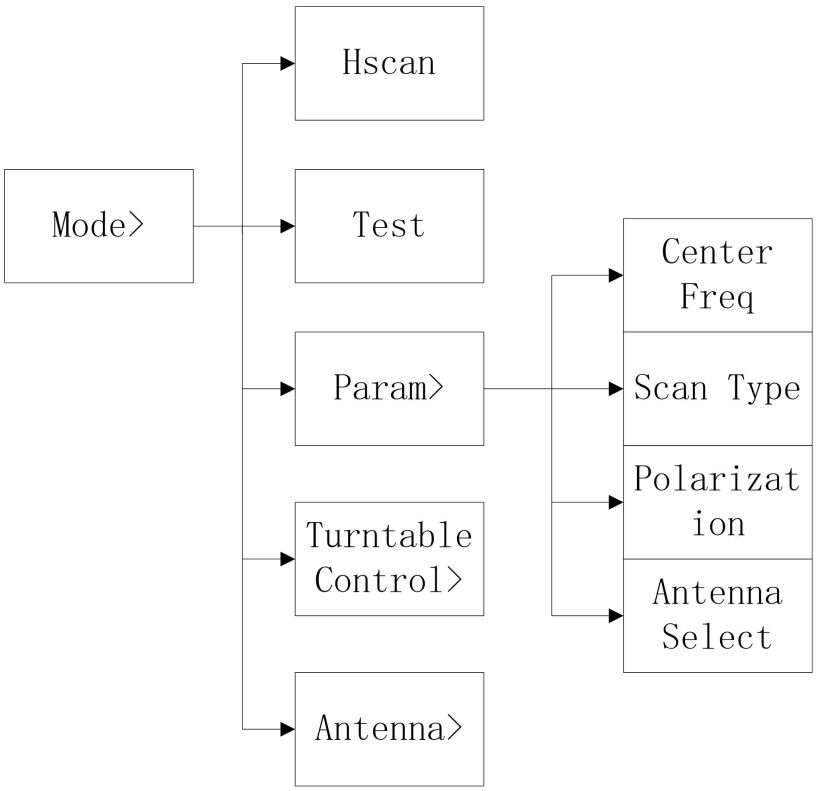
In FFM mode:



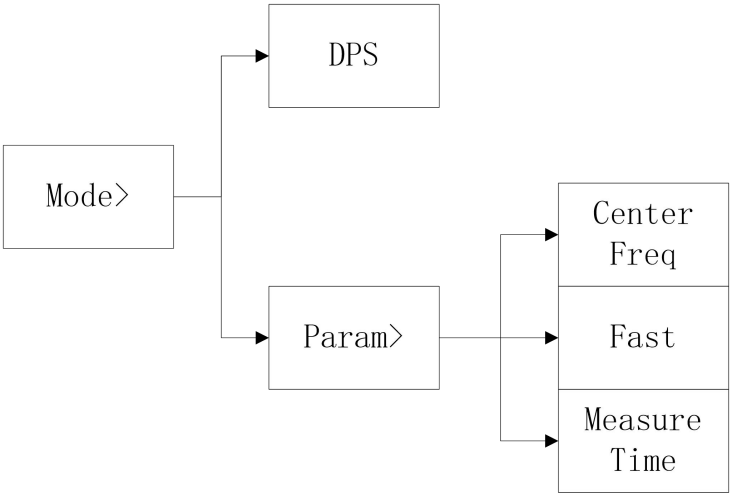
In FSCAN mode (Same as MSCAN, PSCAN, Digital Trunking, Digital Radio) **:**



In HSCAN mode:

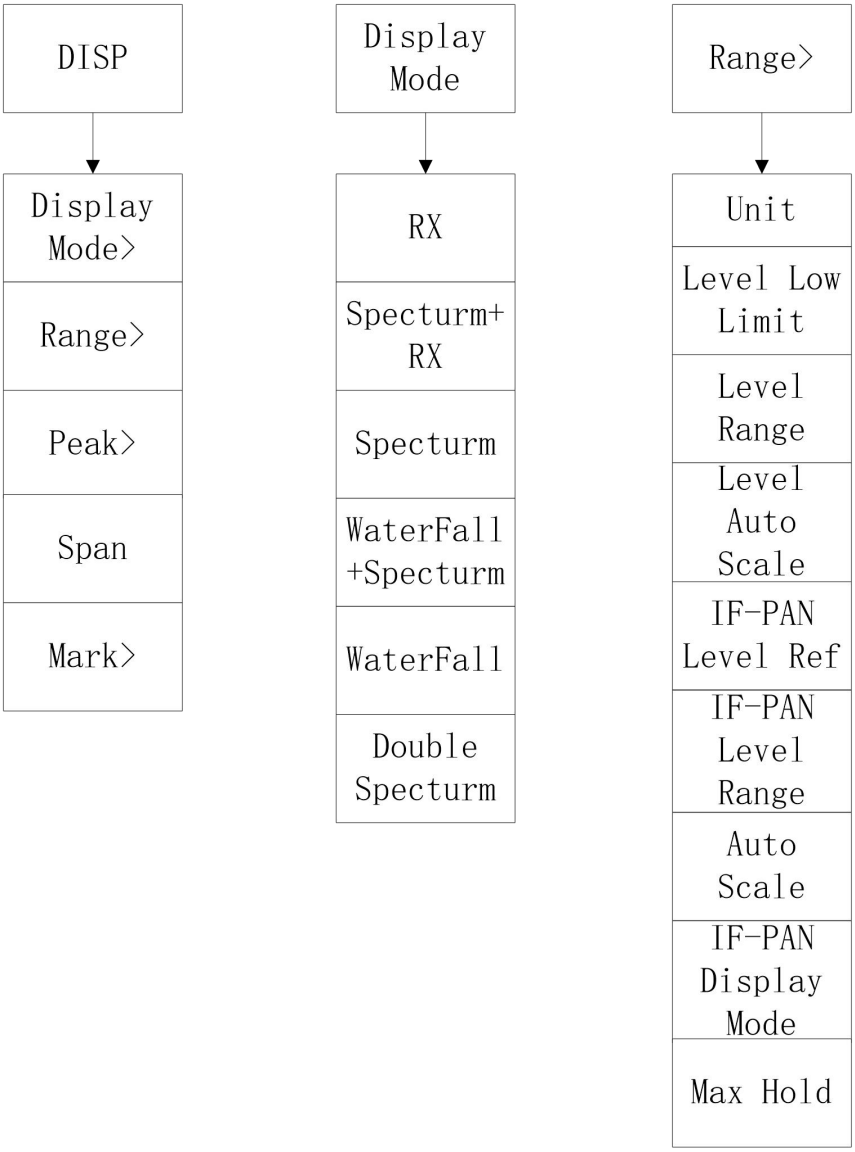


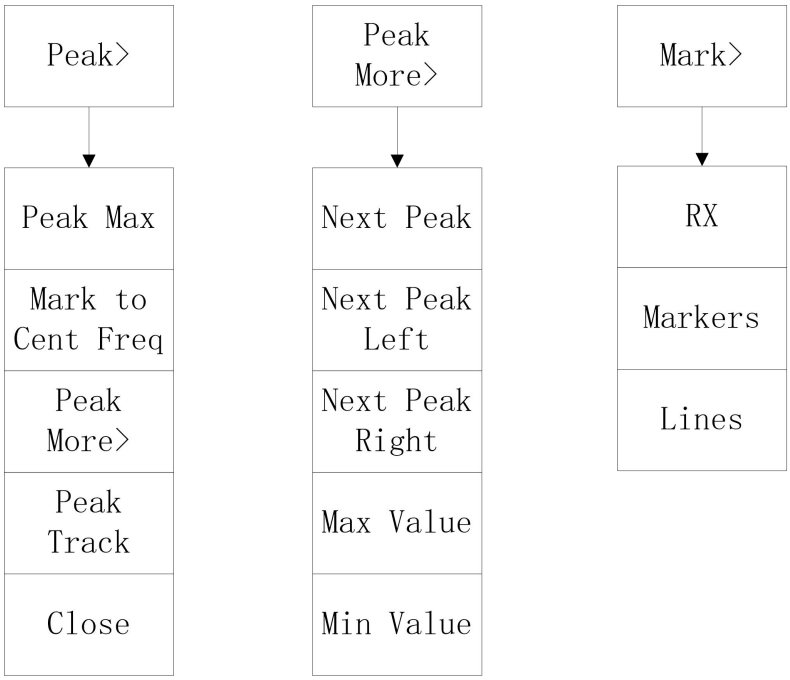
In DPS mode:



3.3 DISP

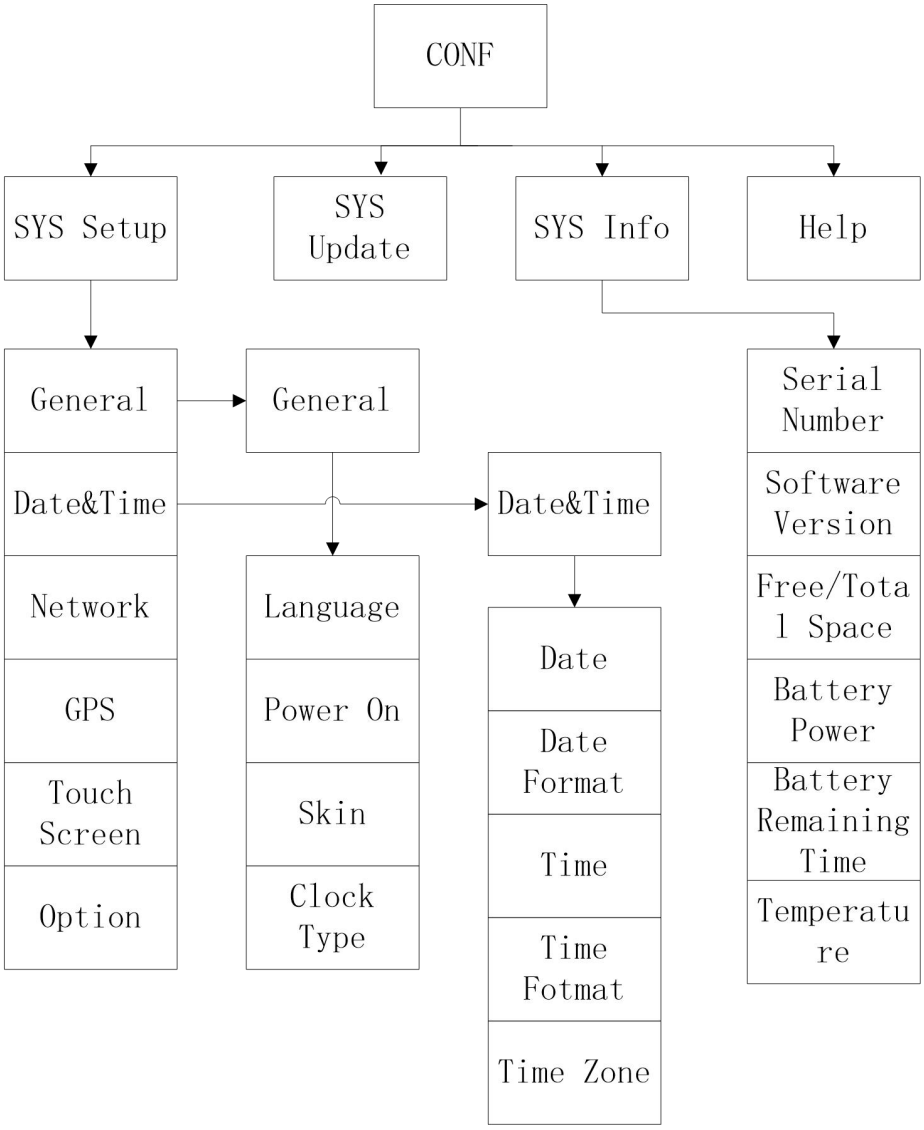
To set display mode, display range and so on.



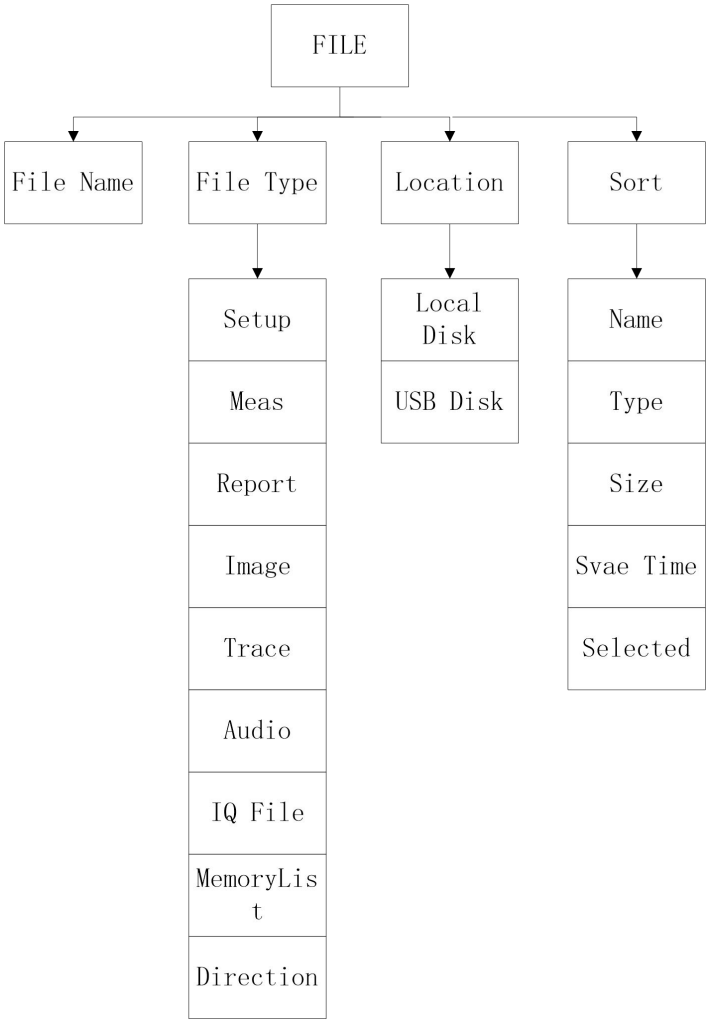

Peak>
Peak Max
Mark to Cent Freq
Peak More>
Peak Track
Close
Peak More>
Next Peak
Next Peak Left
Next Peak Right
Max Value
Min Value
Mark>
RX
Markers
Lines

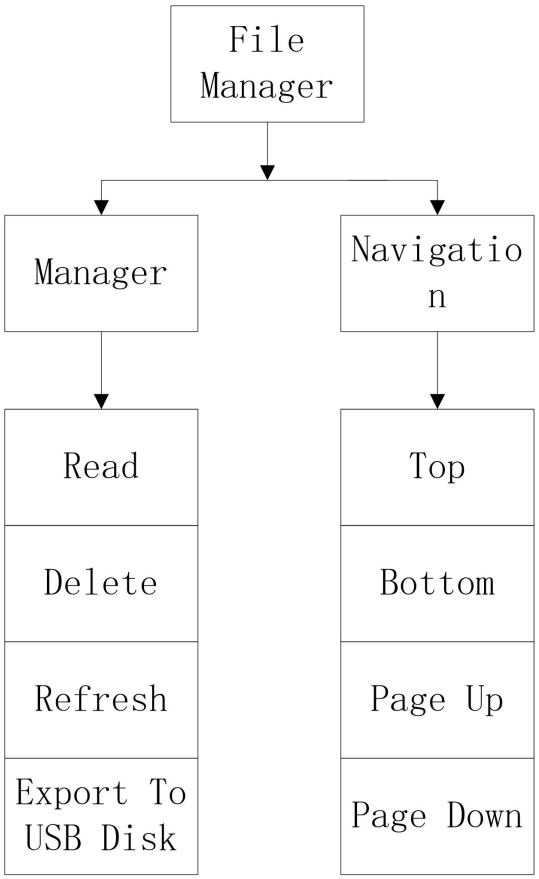
3.4 CONF

To set system parameters, view system information, etc.



3.5 FILE


FILE
File Name
File Type
Location
Sort
Setup
Meas
Report
Image
Trace
Audio
IQ File
MemoryLis
t
Direction
Local
Disk
USB Disk
Name
Type
Size
Svae Time
Selected



4 Function

4.1 FFM

Measure Mode

Measure mode: FFM、FSCAN、MSCAN、PSCAN、HSCAN、DPS、Digital Trunki、Digital Radio、SS Outdoor.

Switch measure mode: press the panel key <SCAN>→click the virtual key <Mode>

Display Mode

Display Mode: RX、Spectrum + RX、Spectrum、Waterfall + Spectrum、Waterfall (The double spectrum mode is introduced under the PSCAN measurement)

Switch display mode: press the panel key <DISP> → click the virtual key <Display Mode>.

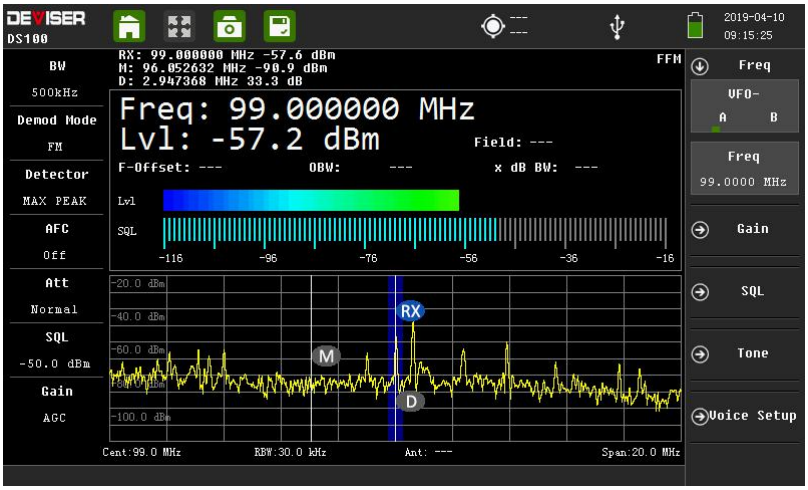


Fig.4-1 FFM interface in Spectrum +RX mode

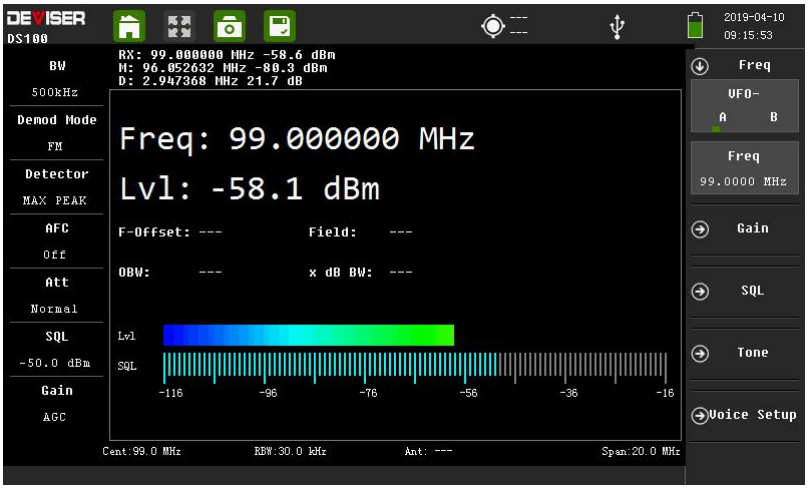


Fig.4-2 RX mode

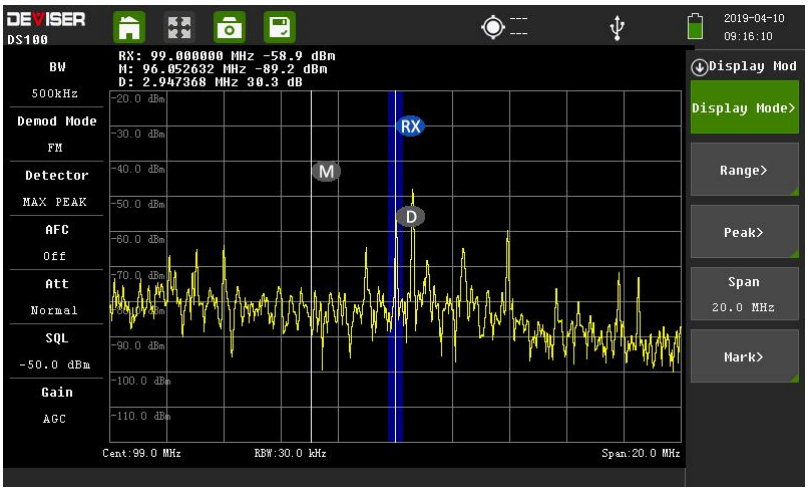


Fig.4-3 Spectrum mode

Waterfall mode: In the waterfall, different colors represent different signal amplitudes. The instrument can realize the three-dimensional comprehensive monitoring and recording of the signal frequency, time and amplitude, which is helpful to capture the short pulse signal of the order of us. The maximum time for data recording is 72 hours, and it can be recorded according

to the threshold value set by the user and stored directly in the USB peripheral. It supports online playback and looks for interference information at a specified time.

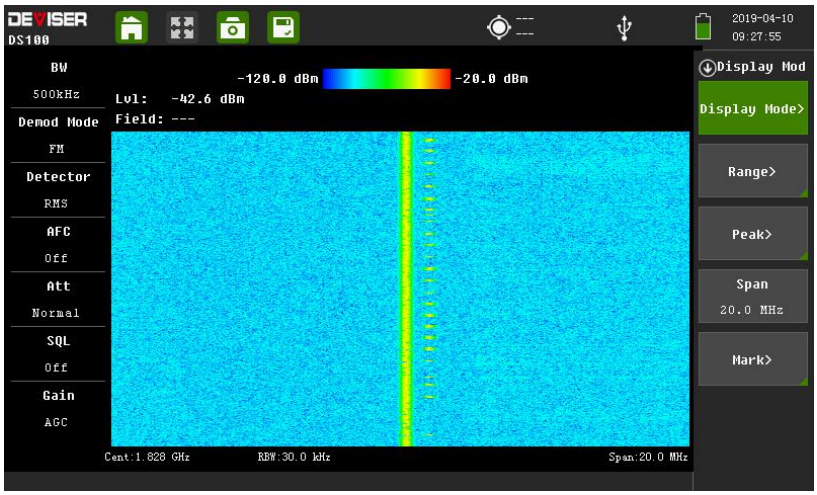


Fig.4-4 Waterfall mode

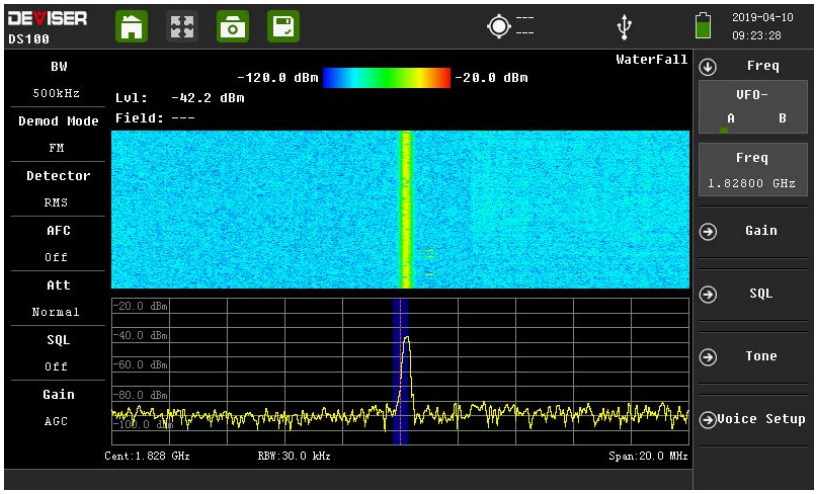


Fig.4-5 Waterfall + Spectrum mode

FFM: real-time display of field intensity information.

The scanning bandwidth ranges from 1kHz to 20MHz.

The measured parameters(The same parameters under other measurements are not described):

Bandwidth:1.5kHz/2.4kHz/6kHz/9kHz/12kHz/15kHz/30kHz/50kHz/120kHz/150kHz/250kHz/300kHz/500kHz

Demod Mode: FM/AM/USB/LSB/ISB/CW/ASK/PSK

Detector: SAMP/MAX PEAK/AVG/RMS

Att: Normal/L-Distortion/H-Sens.

Measuring steps

Set the center frequency: press the panel key <FREQ/MEM>, click the virtual key <center freq> , use the number key to Enter the center frequency, and press <Enter> to confirm.

Set the span: press the panel key <DISP> key and click the virtual key , change the span using the up and down keys or spinning wheel.

Set the marks: press the panel key <DISP>, click the virtual key <Mark> to Enter the Mark menu. Click the key <M> or the key <D>, change the frequency value using the up and down keys or spinning wheel, and press Enter to confirm.

4.2 FSCAN

FSCAN: The instrument can continuously scan radio signals in a certain frequency range according to the preset scan step. The instrument presets a channel table, which can edit frequency dwell time, no signal time, scan time, etc. Suppression frequency list can be edited, one key to record the current frequency point set to the suppression frequency list.

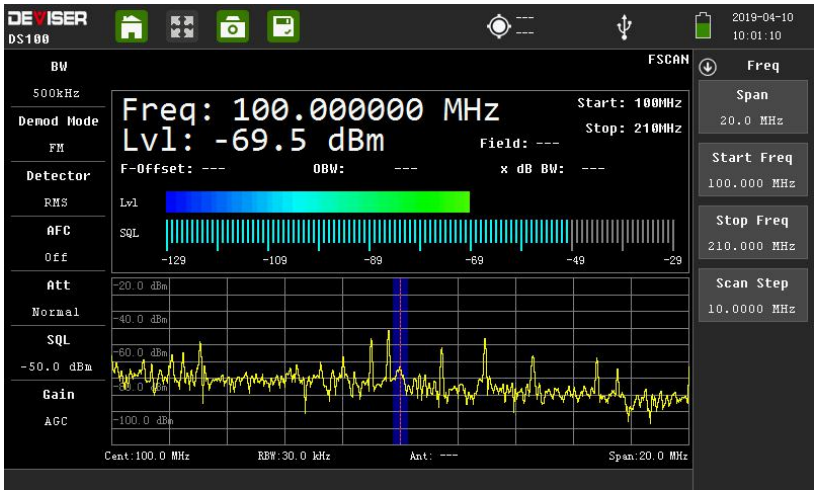


Fig.4-6 FSCAN

Measuring Steps:

According to the frequency step set by the user, the instrument performs spectrum analysis in a certain range. Press the panel key <SCAN>, click the virtual key <Param> to enter the start frequency, stop frequency and step, and click the virtual key <RUN+> or <RUN-> to start scan, click <STOP> to end scanning.

4.3 MSCAN

In this mode, demodulation mode, demodulation bandwidth and other parameters of different frequency can be set independently. The storage list in the channel table has a capacity of 1024 items, which is convenient for users to continuously scan multiple frequency points.

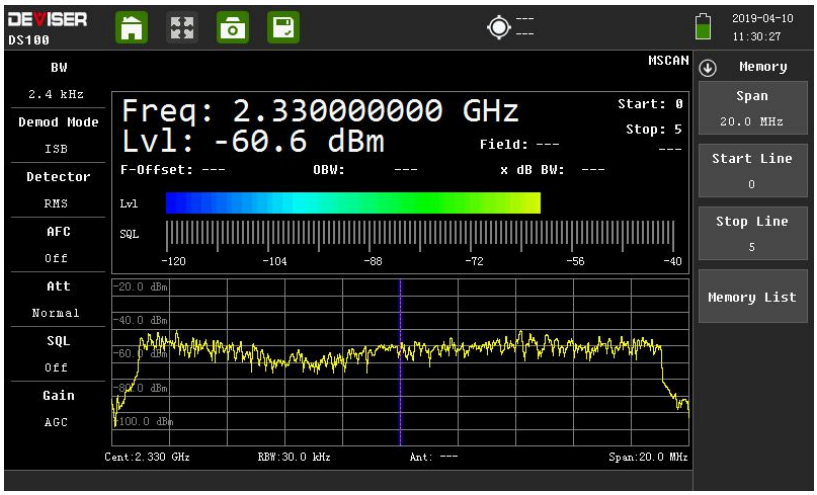


Fig.4-7 MSCAN

Measuring steps:

In the mode, the instrument can perform spectrum analysis according to the channel table set by the users. Press the panel key <SCAN>, click the virtual key <Param> to enter the start line and stop line, and click the virtual key <RUN+> or <RUN-> to start scan, click <STOP> to end scanning.

4.4 PSCAN

This mode is a full-band spectrum scan with a span from 0Hz to 6GHz and RBW range from 30Hz to 1MHz. The display mode is set to double spectrum, and the instrument can display IF-PAN and RF-PAN in the same screen.

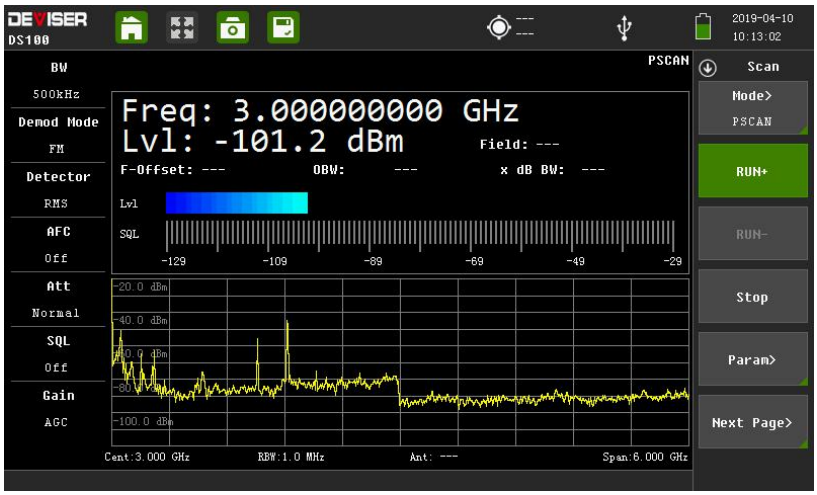


Fig.4-8 PSCAN

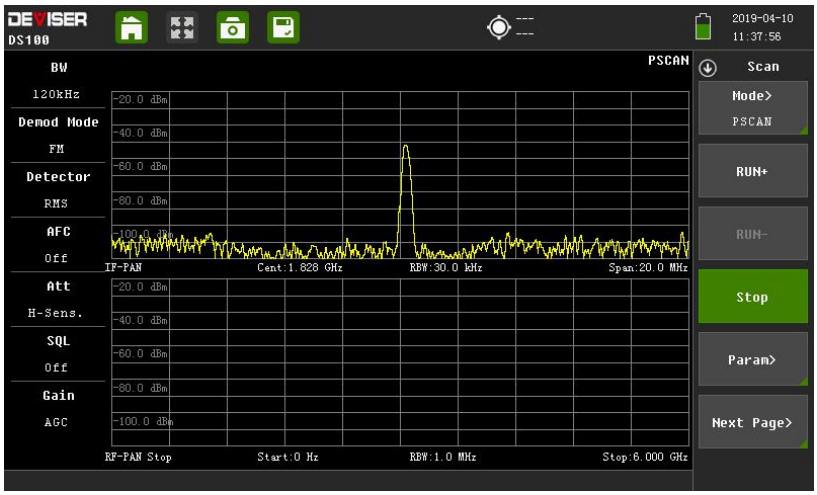


Fig.4-9 Double Spectrum

Measuring Steps:

PSCAN can analyze the spectrum of frequency band up to 6GHz. Press the panel key <SCAN>, click the virtual key <Param> to enter the start frequency, stop frequency and RBW, and click the virtual key <RUN+> to start scan, click <STOP> to end scanning.

4.5 HSCAN

DS100 has perfect directional and positioning functions. Interference signals are directed using a matching directional antenna with GPS and an electronic compass. Based on the principle of three-point location, the interference source is located on the electronic map.

Directional antenna is used to test the direction of the strongest signal at the interference frequency point. Electronic compass is used to automatically record the direction information of

the value of the test signal. GPS is used to automatically record the longitude and latitude of the current test point, and display the target position in real time in combination with the electronic map.

For complex environment statistical mode, it can carry out a statistical analysis to the multiple measurement results and estimate the direction of maximum probability of interference signal. The yellow pointer shows the direction the current antenna is pointing to in real time. The gray pointer outputs the position of the source determined after a single test. The red pointer shows the azimuth and angle of the transmitting source obtained after multiple probability statistics, and the statistical results are displayed in the bar chart below the interface.

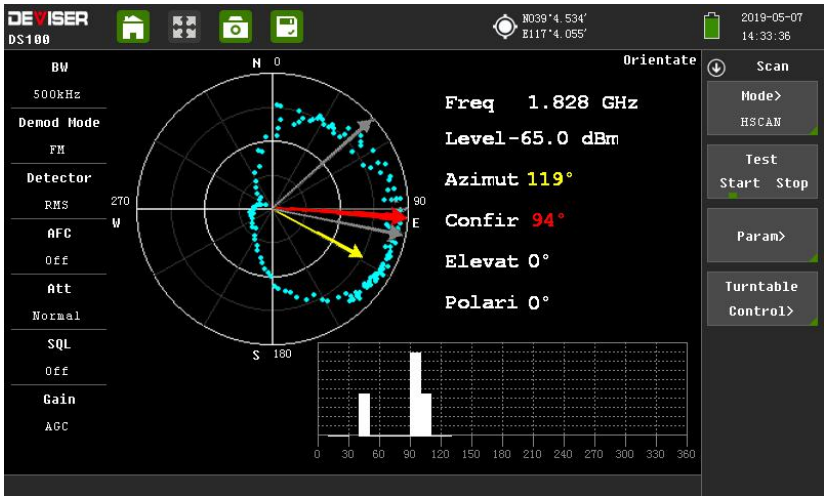


Fig.4-10 HSCAN

The instrument supports open source maps such as OpenStreetMap and updates maps via U disk. Enter map mode: Press the panel key <DISP> and click <Show Map>.

Fig.4-11 Show Map

Measuring steps

1.Single Scanning: wait for GPS to lock successfully, press the panel key <SCAN> and set “Test” to “Start”. The directional antenna in your hand rotates 360 degrees smoothly in place. The final red confirmation Angle will appear on the interface, which is the direction of the maximum probability of interference signal.

2.Multiple Scanning: press the panel key <SCAN>, click <param> and set “Test” to “Start”. The directional antenna in your hand totates many turns smoothly in place. For each rotation, add a white arrow to the interface. After multiple white arrows appear in the interface, set "Test" to "Stop". At this time, a red confirmation arrow appears on the interface, which is the direction maximum probability of interference signal.

4.6 DPS

In wireless communication system, multiple signals in the same frequency band are often superimposed together, and the strong signal will cover the weak signal. The radio signal monitoring using the traditional spectrum is faced with many difficulties. DPS can superimpose the FFT spectrum within a certain time and use color temperature to display the frequency of signal occurrence. It is a very effective and fast method to find and capture the same frequency interference signal hidden under the normal signal.

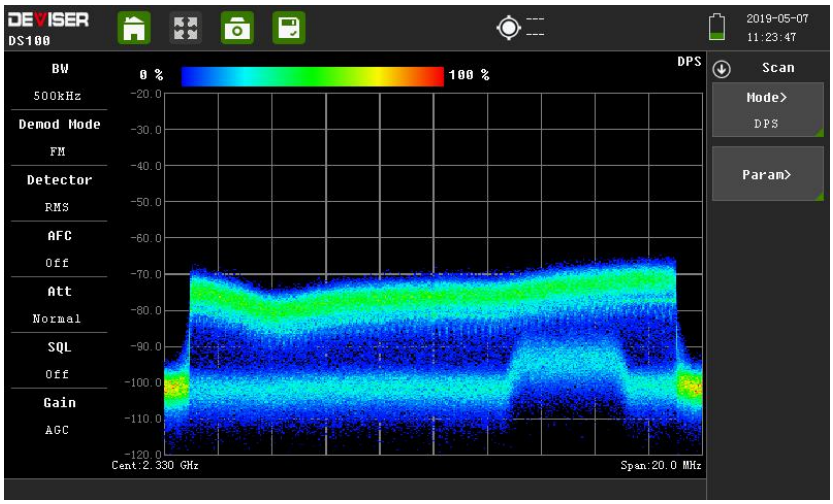


Fig.4-12 DPS

4.7 Digital Trunking

In the Digital Trunking, the instrument can intercept the voice and short message signals sent by the digital intercom, and it can listen to intercepted voice and display intercepted SMS messages on the DS100 machine.

Measuring Steps: First, set the correct center frequency that is sent by the digital intercom. Then, after receiving the intercom signal of the space, turn on the voice playback, and the voice of the interphone can be heard locally in DS100. If the device intercepts the message, we can observe the content of the message in the interface.

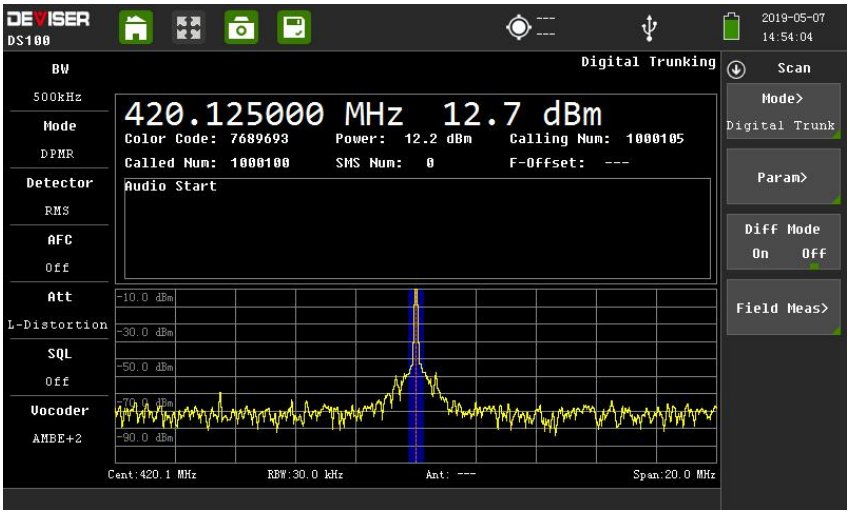


Fig.4-13 Digital Trunking(audio)

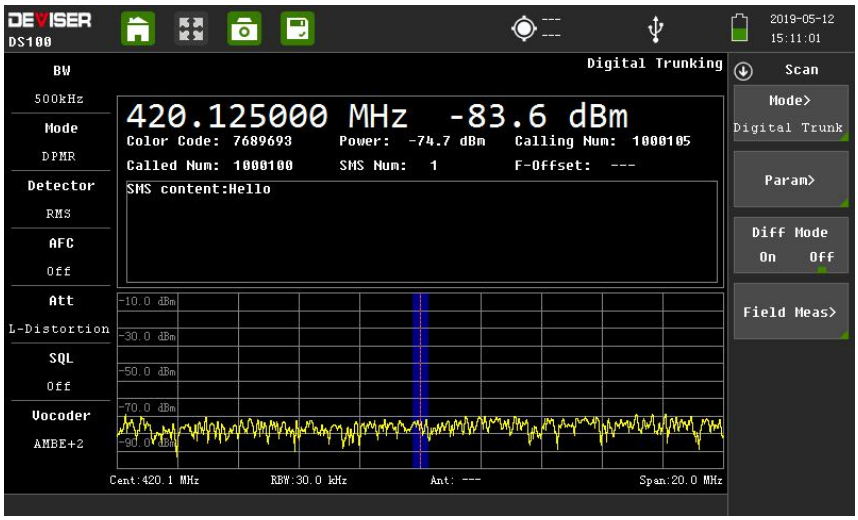


Fig.4-14 Digital Trunking(SMS content)

4.8 Digital Radio

In the Digital Radio, user can demodulate the modulated digital signal sent by the digital radio transmitter and display the demodulation result on the interface. At present, the instrument only supports demodulation LoRa mode.

Measuring Steps: First, set the correct center frequency that is sent by the digital transmitter. Then, the demodulation data is displayed on the interface.

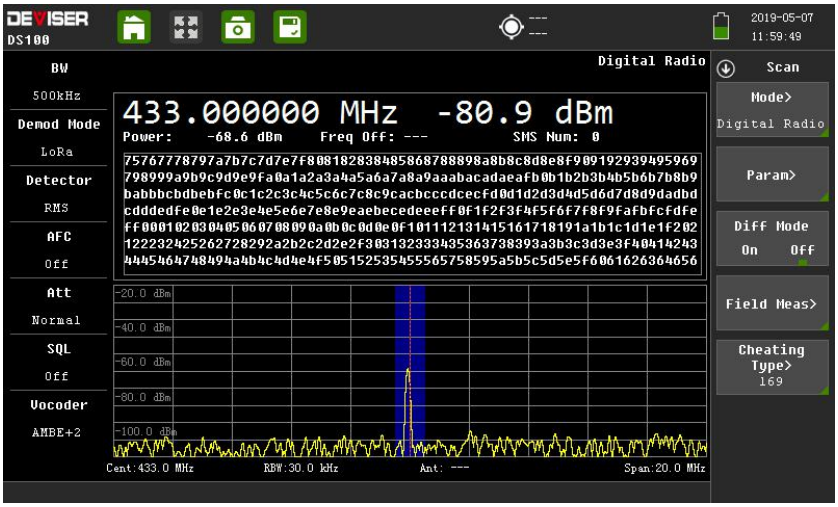


Fig.4-15 Digital Radio

4.9 SS Outdoor

In SS Outdoor, the instrument provides outdoor road test for users. The user can import the map of the area to be tested through the PC, and after obtaining the GPS information, the user can conduct automatic dotting test by according to the "time" or "distance" interval.

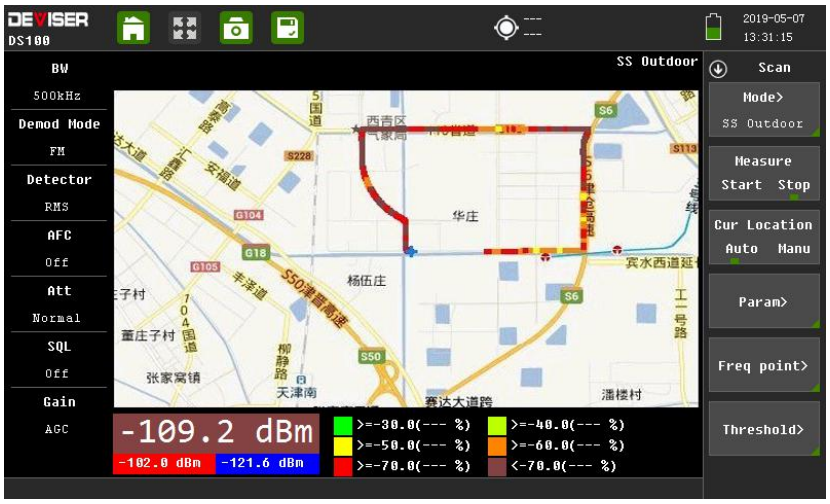


Fig.4-16 SS Outdoor

Measuring Steps:

Setup mode: Press the panel key <SCAN>. If the "Cur Location" is set to "Auto", the map automatically adjusts the map with the change of the GPS position; if it is set to "Manu", the user need to move the map through the "Browser" function.

Setup frequency: press the panel key <SCAN>, and click <Freq point>. Start and stop frequencies can be set, and up to 12 frequency points can be set in this range.

Setup parameter: press the panel key <SCAN>,and click <Param> to set "record mode".

Time mode: Select time mode to set the “Time” interval.

Distance mode: Select the distance mode to set the “Distance” interval.

Time interval: In Time mode, the instrument automatically marks the sample points on the map at the set time interval during the measurement. The setting range is from 100ms to 60sec.

Distance interval: In distance mode, the instrument automatically marks the sample points on the map at the set distance interval during the measurement. The setting range is from 1m to 500m.

Setup Threshold: Press the panel key <SCAN>, and click <Threshold> to set the threshold values of "Excellent", "Very good", "Good", "Poor" and "Fail". When the measurement starts, the trace will be displayed by the color of the set threshold.

Map Manager： Press the panel key <DISP>, and click <Map Manage> . The user can import outdoor map to the instrument via USB peripherals, and set the ”Location” to “Local” to load the map.

Browser： Press the panel key<DISP>, and click <Browser> . The user need to touch the screen to click the up, down, left, and right buttons.

Measure： Press the panel key<SCAN>, and click <Measure> to set the “Start” or “Stop” test.

File Save： Supporting set file name, file type, saving location.

File Type： The rdo format file can load measurement results in the instrument and view the test track. The csv format file belongs to the data table file, which is opened by the EXCEL of the PC to view the test data. The kml format file needs to use Google Earth software to open the test file for data analysis.

Location:The default is local disk. If the user insert USB Disk,USB disk can be used as a save location.

5 File Manager

Screen Shot: Press the storage key “  ”. The user can take a screenshot of the current interface and save it to the local disk. The file is named after the current time.

Recording Audio: Press the storage key “  ”**,** users can start or end recording audio. Click <save file> to choose a variety of saving forms, including Setup file, Measurement file, Image file and wav file.

File List: Press the storage key “  ”, users can directly enter the file management menu. The users can preview the file, export to the USB disk and delete by checking the specified file.

Channel Table: In the MSCAN mode, press the storage key “  ”, the users enter the channel table manager interface. We can view each channel parameter information, edit and delete operation.

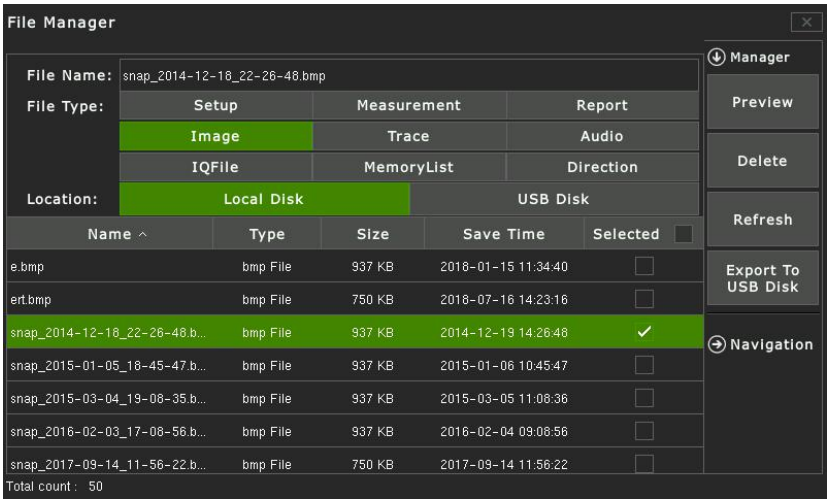


Fig.5-1 File Manager

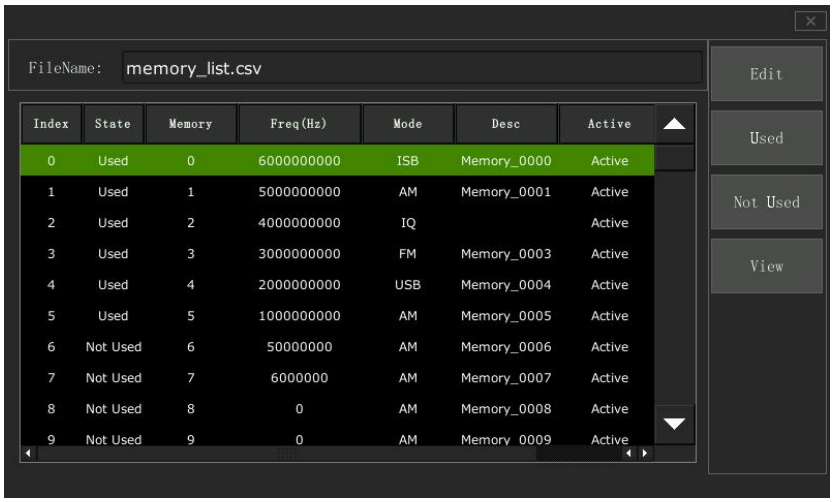


Fig.5-2 Channel Table

Fig.5-3 Edit Channel

6 Technical Parameters

RF indicators

Frequency Range	9kHz-6GHz
Input Impedance	50 Ω
VSWR	≤3:1
Input Level	Typical Max 0dBm
Primary Function	
9kHz-30MHz	30MHz low pass filter
20MHz-1140MHz	Tunable bandpass filter
1140MHz-1900MHz	1140MHz high pass filter
1.8GHz-3GHz	1.8GHz high pass filter
3GHz-6GHz	2.7GHz high pass filter
Noise Factor (High sensitive mode)	
9kHz-20MHz	Typical 23dB
20MHz-1140MHz	Typical 10dB
1140MHz-1900MHz	Typical 12dB
1.8GHz-3GHz	Typical 13dB
3GHz-6GHz	Typical 27dB
IP3(normal mode)	+15dBm (-20dBm two tone signal frequency interval is 1MHz, when the center frequency is 150MHz)
IP3 (low noise)	-10dBm (-40dBm two tone signal frequency interval is 1MHz, when the center frequency is 150MHz)
Phase noise	Typical≤-100dBc/Hz@10kHz carrier frequency 150MHz

IF indicators

IF demodulation bandwidth	13 filter (3dB bandwidth)
	1.5 kHz, 2.4 kHz, 6 kHz, 9 kHz, 12kHz, 15 kHz, 30 kHz, 50 kHz, 120kHz, 150 kHz, 250 kHz, 300 kHz, 500 kHz
FFM	FFT, internal (4,096 points) average 18 frames/sec
Display frequency Range	10kHz-20MHz
Control	
Squelch	-120dBm~0dBm (step 1 dB)
Frequency control	AFC
signal processing	FM, AM, USB, LSB, ISB,CW,PULSE,ASK,FSK
Digital Trunking demodulation	DMR，DPMR
Digital Radio	LoRa

Scan

FSCAN	
start/stop frequency	selectable
scan step	selectable
PSCAN	
scan step	selectable
scanning speed	6GHz /s (300FFT/s)
MSCAN	
Memory location	512 channel, programmable
Measurement accuracy and display	
Frequency resolution	1Hz
Frequency accuracy	≤1ppm
Operating temperature range	≤1ppm
Aging rate	≤1ppm/year
Signal reference level	-137dBm~20dBm, 0.1dB resolution
Display error	Max±3 dB/Typical 1.5 dB
Level display mode	Max, Min, Avg, Normal

Interface

RF Input	
9kHz-6GHz	N type (50Ω)
Maximum damage level	+20dBm/ 0VDC
External Reference Input	
10MHz	SMA (50Ω)
Input amplitude range	0dBm~+10dBm
IF Output	
138.24MHz	SMA (50Ω)
IQ Output	USB3.0 (bandwidth 20MHz)
Audio Output	Stereo socket/100 Ω
	LAN (48kHz sps)
Data and control interface	LAN (100/1000M)
	choose between USB2.0 and WIFI

Power Supply

Adapter	15V
Battery Type	10.8V, 6800mAh
Charging Time	>4.5 hour
Full Power Supply Time	>3 hour

Other Index

Size (W x H x L)	293.6mm×196.5mm×74mm
Weight	Abt. 3.5kg
Storage Temperature	-30℃~70℃
Working Temperature	-10℃~+50℃
Display Resolution	800 x 480 pixel

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