DOEWE
TEST SOLUTION EXPERT

COMPANY PROFILE

Doewe Technologies, headquartered in Beijing, has been operating for a decade and currently has branches including the Beijing R&D Center, Chengdu R&D Center, Doewe Shanghai, Doewe Shenzhen, and Doewe Hong Kong. The company is fully committed to building its independent brand "Doewe," with its business covering two main categories: Advanced Sensing Measurement and Control (ASMC) and Professional Test and Measurement Solutions (PTMS).

The ASMC product line provides innovative high-precision sensing acquisition and data analytics solutions. PTMS focuses on industry-specific test and measurement solutions for audio, video, and RF applications. It has established the 5XC product system, serving sectors such as transportation, broadcasting, automotive electronics, consumer electronics, and university research institutes.

Through relentless effort, several of the company's products have become benchmark test instruments in their respective industries. Doewe Technologies also holds multiple core patents and software copyrights, participates in relevant industry standards working groups, and contributes to the formulation of national and industry standards. Building on past achievements, Doewe continues to increase its R&D investment. We have never forgotten our original aspiration, firmly believing that only profound technological accumulation creates value. We persistently pursue innovation in test and measurement technology, dedicated to technology development, application software services, and research in test and measurement solutions.

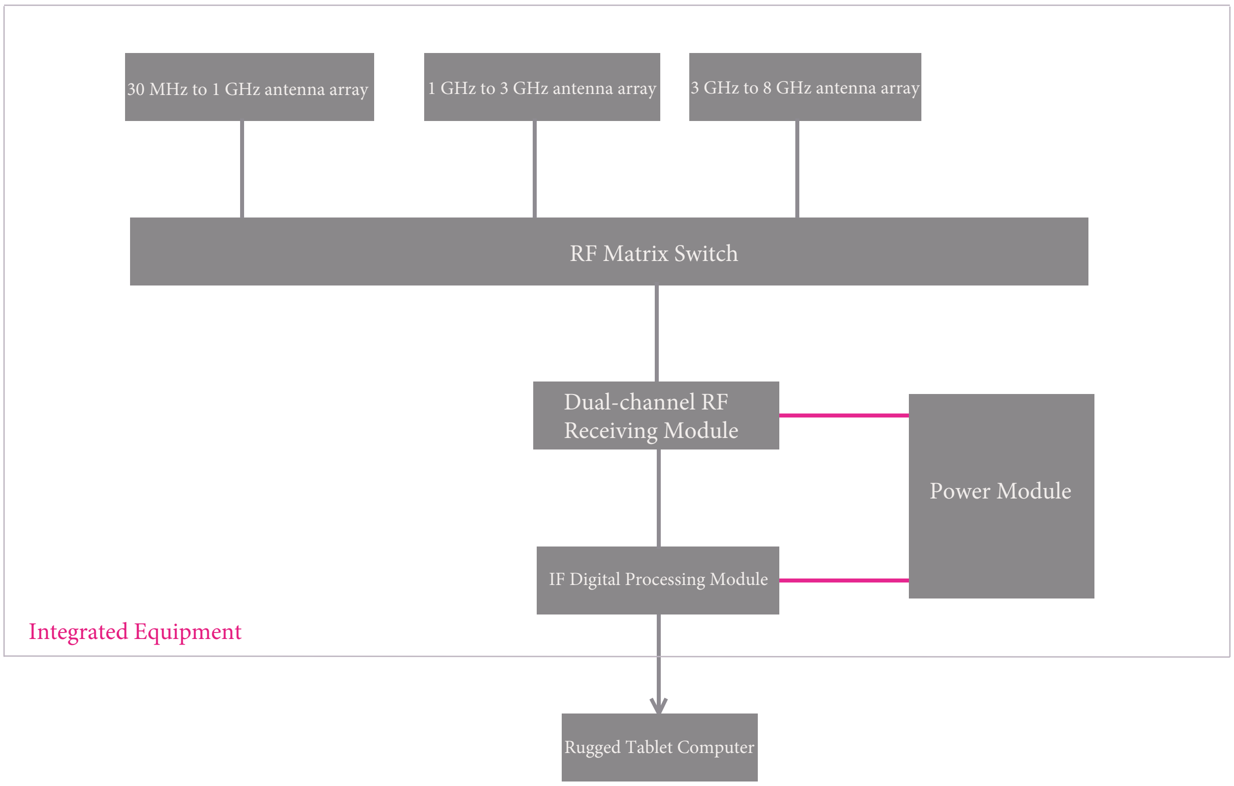
Leveraging its Beijing headquarters, related technical centers, and subsidiaries, Doewe Technologies has gradually established a nationwide pre-sales and after-sales service network, providing customers with professional technical consultation. Guided by the principles of "Rigorous, Efficient, Professional, Innovative," Doewe Technologies will continue steadfastly on this path, living up to the trust of every customer.

The journey ahead is long and challenging. We will accompany you on this path of growth to create a new future of technology together.

overview

The wireless monitoring and positioning system MDFS fully considers the requirements of portability, quick installation, and index performance. For the 30MHz-8GHz frequency band, a seven-element dipole uniform circular array is adopted, while an eight-element horn antenna uniform circular array is used for the 8GHz-18GHz band. Paired with a dual-channel monitoring and direction-finding receiver, it realizes the monitoring and direction-finding functions in the 30MHz-18GHz range.

The equipment composition of the wireless monitoring and positioning system MDFS is shown in the following figure

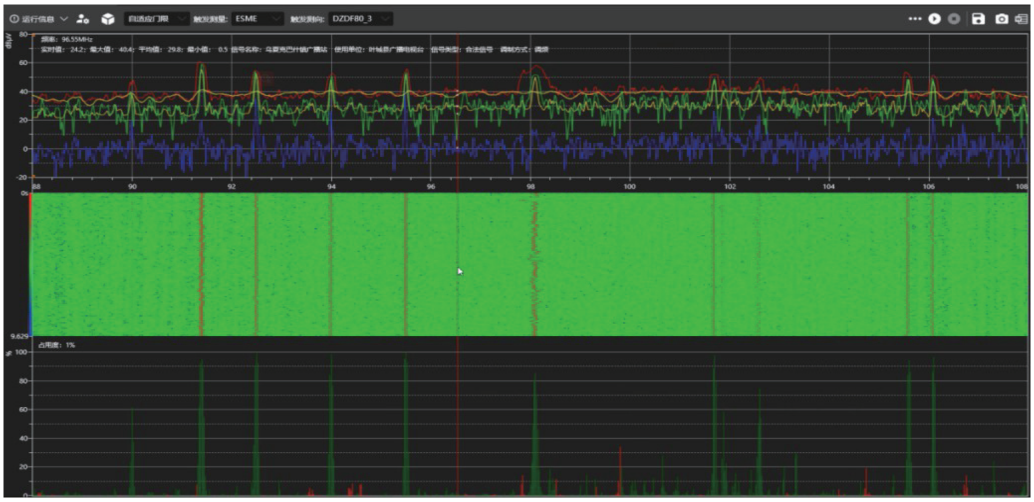

30 MHz to 1 GHz antenna array
1 GHz to 3 GHz antenna array
3 GHz to 8 GHz antenna array
RF Matrix Switch
Dual-channel RF Receiving Module
Power Module
IF Digital Processing Module
Integrated Equipment
Rugged Tablet Computer

System Introduction

Main Functions

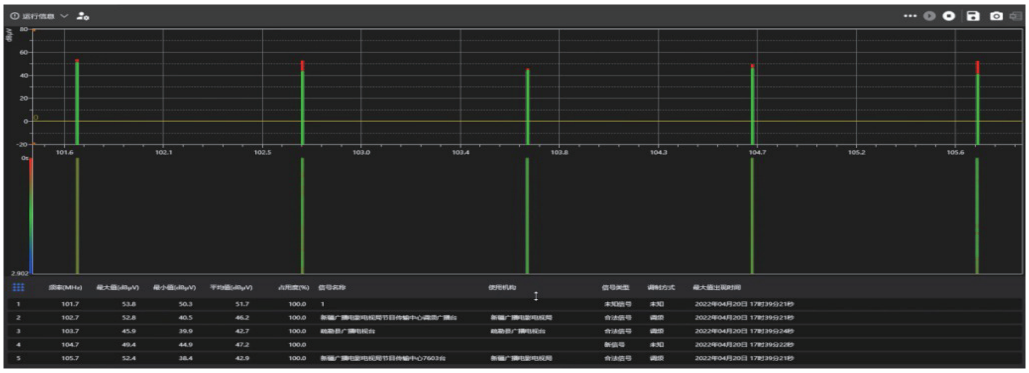
- **Panoramic Spectrum Monitoring**

The function of continuous scanning according to the set tasks and parameters integrates signal scanning, signal detection, signal type discrimination, occupancy measurement, rain plot, amplitude-time domain distribution, etc. It can acquire power spectrum distribution data, signal or noise level data, and dynamic data of signal level changes, which can be used as needed. All measurement results can be displayed in a way combining data and graphics, and statistical reports of the measurement results can be generated.



Continuous Scanning Screenshots

Discrete scanning can monitor any set of unrelated discrete frequencies, and real-time measure the instantaneous value, maximum value, minimum value and average value of signal level and field strength for each frequency. This function can extract radio signals according to the set threshold, and real-time calculate the channel occupancy of radio signals. The system carries out graphical analysis and display through real-time scanning spectrogram, waterfall diagram, channel occupancy statistical chart and signal list.



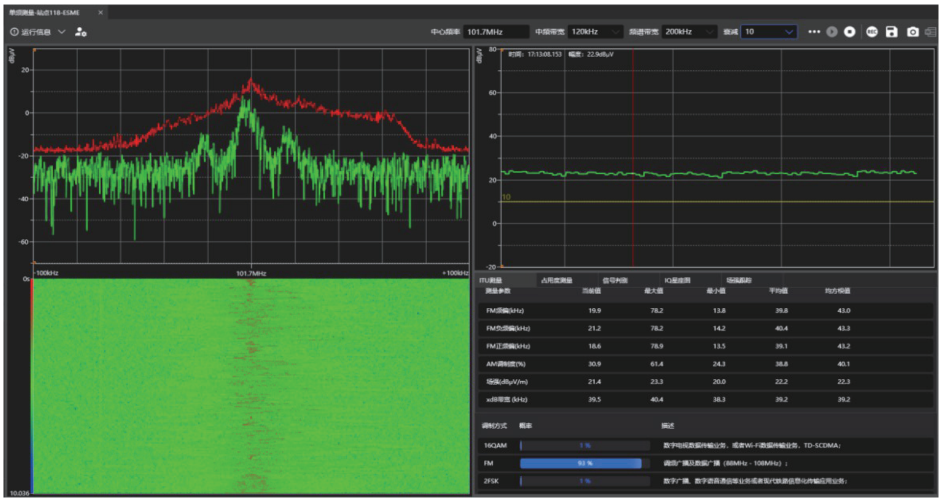
	频率(MHz)	最大值(dBμV)	最小值(dBμV)	平均值(dBμV)	占用度(%)	信号名称	使用机构	信号类型	调制方式	最大值出现时间
1	101.7	53.8	50.3	51.7	100.0	1		未知信号	未知	2022年04月20日 17时39分21秒
2	102.7	52.8	40.5	46.2	100.0	新疆广播电影电视局节目传输中心调频广播台	新疆广播电影电视局	合法信号	调频	2022年04月20日 17时39分21秒
3	103.7	45.9	39.9	42.7	100.0	[illegible]	[illegible]	合法信号	调频	2022年04月20日 17时39分24秒
4	104.7	49.4	44.9	47.2	100.0			新信号	未知	2022年04月20日 17时39分22秒
5	105.7	52.4	38.4	42.9	100.0	新疆广播电影电视局节目传输中心7603台	新疆广播电影电视局	合法信号	调频	2022年04月20日 17时39分21秒

Discrete Scan Screenshot

Main Functions

- **Specific Signal Spectrum Monitoring**

It monitors specific frequency bands, frequencies, and signal types to provide a basis for frequency surveillance. It can conduct comprehensive measurement and analysis of frequency, field strength, bandwidth, modulation, intermediate frequency spectrum, IQ, and other measurement parameters recommended by the ITU. The measurement standards comply with ITU-R specifications such as SM.377, SM.378, SM.433, SM.328, SM.1880, and SM.1600.



中心频率 101.7MHz　中频带宽 120kHz　频谱带宽 200kHz　衰减 10

测量参数	当前值	最大值	最小值	平均值	均方根值
FM频偏(kHz)	19.9	78.2	13.8	39.8	43.0
FM负频偏(kHz)	21.2	78.2	14.2	40.4	43.3
FM正频偏(kHz)	18.6	78.9	13.5	39.1	43.2
AM调制度(%)	30.9	61.4	24.3	38.8	40.1
场强(dBμV/m)	21.4	23.3	20.0	22.2	22.3
xdB带宽 (kHz)	39.5	40.4	38.3	39.2	39.2

调制方式	概率	描述
16QAM	1 %	数字电视数据传输业务，或者Wi-Fi数据传输业务，TD-SCDMA；
FM	93 %	调频广播及数据广播（88MHz - 108MHz）；
2FSK	1 %	数字广播、数字语音通信等业务或者现代铁路信息化传输应用业务；

- **Parameter Measurement**

It supports parameter measurement and analysis of conventional fixed-frequency, frequency-hopping, spread-spectrum, and pulse signals within the operating frequency band, and can measure parameters such as signal frequency, level, and bandwidth.

1)Frequency Hopping Signal Monitoring

The frequency-hopping signal monitoring function of the device, based on broadband swept frequency spectrum, enables automatic monitoring of frequency-hopping signals over an extremely wide frequency band. It can quickly detect multiple frequency-hopping signals and preliminarily acquire and provide the frequency set of frequency hopping. The system then automatically locks onto each frequency-hopping signal for parameter measurement based on IQ signals, allowing the acquisition of frequency sets, hopping rates, frequency-hopping patterns, etc., of the frequency-hopping signals.

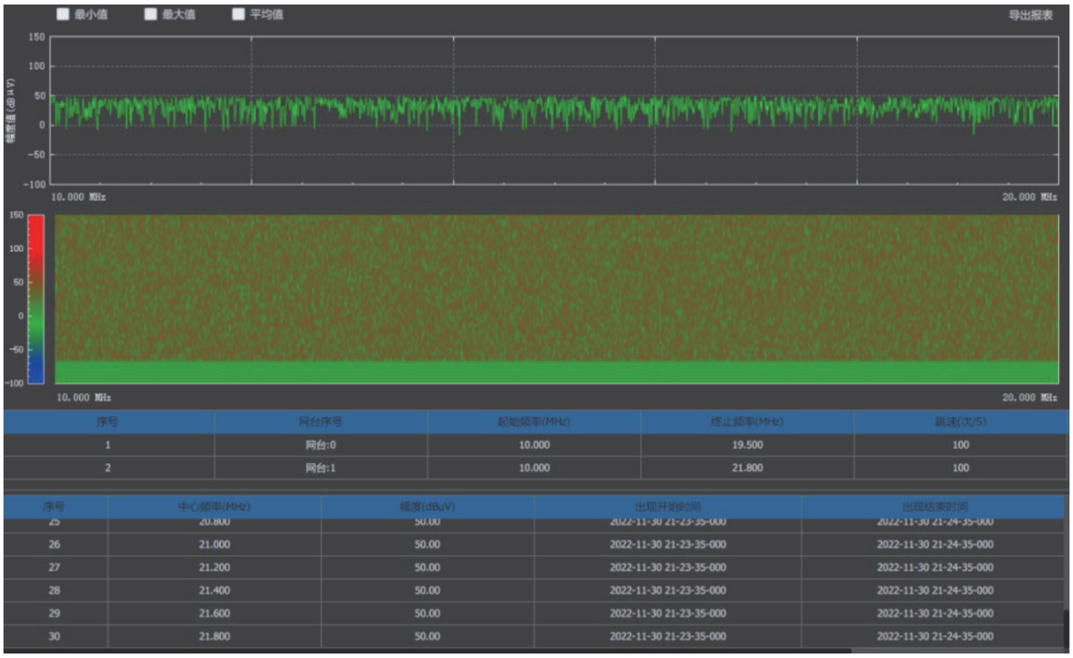
2)Spread Spectrum Signal Monitoring

The spread-spectrum signal monitoring involves the monitoring and analysis of spread-spectrum signals. The system intercepts the mean value of the mean square correlation function and the maximum eigenvalue of the covariance matrix of the signal, using them as the Fx-axis and Fy-axis respectively to form a two-dimensional feature plane. Through the quantum Memetic algorithm, it optimizes the parameter combination of the decision function under the minimum error criterion to obtain the optimal decision function, which is used to distinguish between noise and signals. These parameters can be estimated by correlation methods or cyclic spectrum methods.

3)Pulse Signal Monitoring

It realizes real-time detection of pulse signals within the bandwidth range of the specified center frequency, measures and analyzes the center frequency, pulse amplitude, repetition period, intra-pulse feature type, and intra-pulse modulation parameters of pulse signals, and real-time displays the intermediate frequency spectrum and time-signal amplitude diagram.

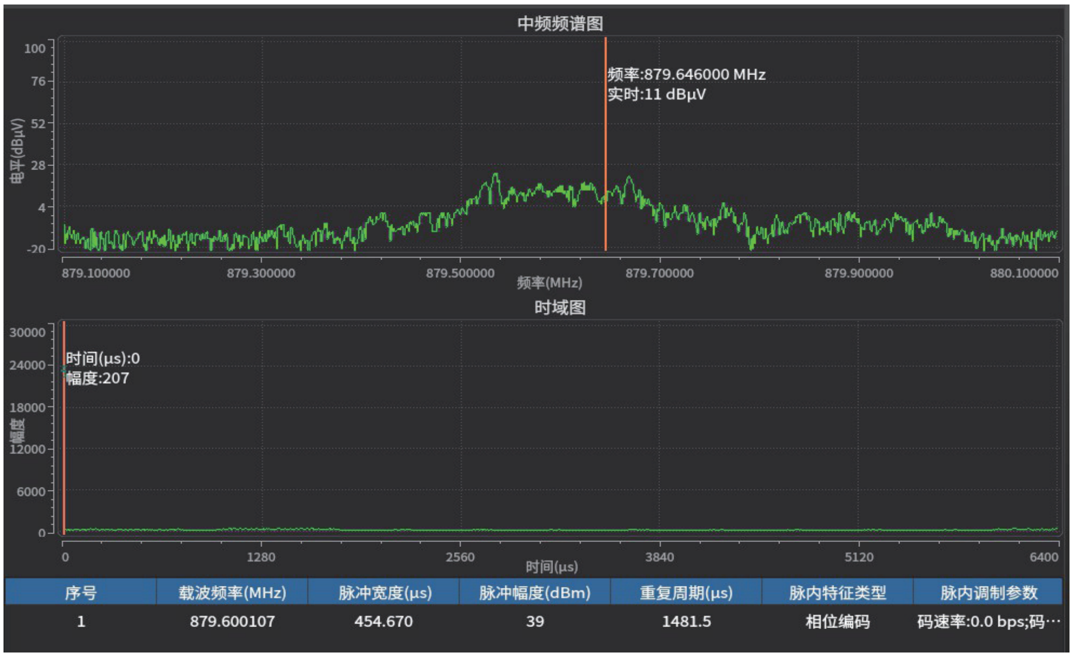
Main Functions


☐ 最小值
☐ 最大值
☐ 平均值
导出报表
幅度值(dBμV)
150
100
50
0
-50
-100
10.000 MHz
20.000 MHz
150
100
50
0
-50
-100
10.000 MHz
20.000 MHz

序号	网台序号	起始频率(MHz)	终止频率(MHz)	跳速(次/S)
1	网台:0	10.000	19.500	100
2	网台:1	10.000	21.800	100

序号	中心频率(MHz)	幅度(dBμV)	出现开始时间	出现结束时间
25	20.800	50.00	2022-11-30 21-23-35-000	2022-11-30 21-24-35-000
26	21.000	50.00	2022-11-30 21-23-35-000	2022-11-30 21-24-35-000
27	21.200	50.00	2022-11-30 21-23-35-000	2022-11-30 21-24-35-000
28	21.400	50.00	2022-11-30 21-23-35-000	2022-11-30 21-24-35-000
29	21.600	50.00	2022-11-30 21-23-35-000	2022-11-30 21-24-35-000
30	21.800	50.00	2022-11-30 21-23-35-000	2022-11-30 21-24-35-000

Signal Monitoring


中频频谱图
电平(dBμV)
100
76
52
28
4
-20
频率:879.646000 MHz
实时:11 dBμV
879.100000
879.300000
879.500000
879.700000
879.900000
880.100000
频率(MHz)
时域图
幅度
30000
24000
18000
12000
6000
0
时间(μs):0
幅度:207
0
1280
2560
3840
5120
6400
时间(μs)

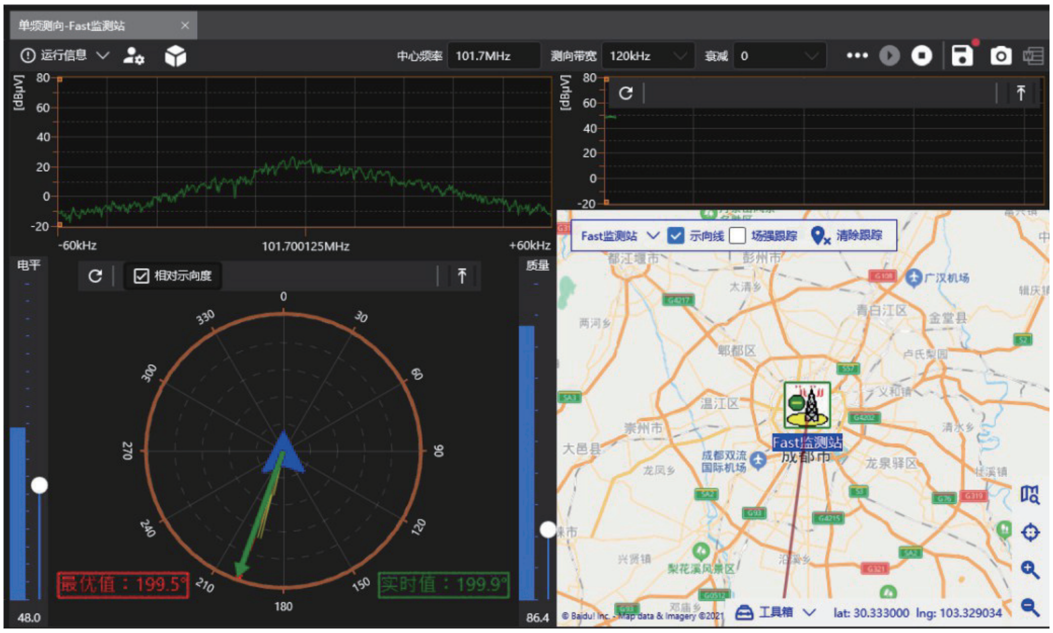
序号	载波频率(MHz)	脉冲宽度(μs)	脉冲幅度(dBm)	重复周期(μs)	脉内特征类型	脉内调制参数
1	879.600107	454.670	39	1481.5	相位编码	码速率:0.0 bps;码…

Screenshot of Parameter Measurement

Main Functions

Direction Finding and Positioning

It has functions such as fixed-frequency direction finding, broadband multi-signal direction finding, and scanning direction finding. It can real-time indicate data such as the azimuth and amplitude value of signals, and can perform intersection positioning according to the direction-finding results of a single station or multiple devices.



单频测向-Fast监测站

中心频率 101.7MHz　测向带宽 120kHz　衰减 0

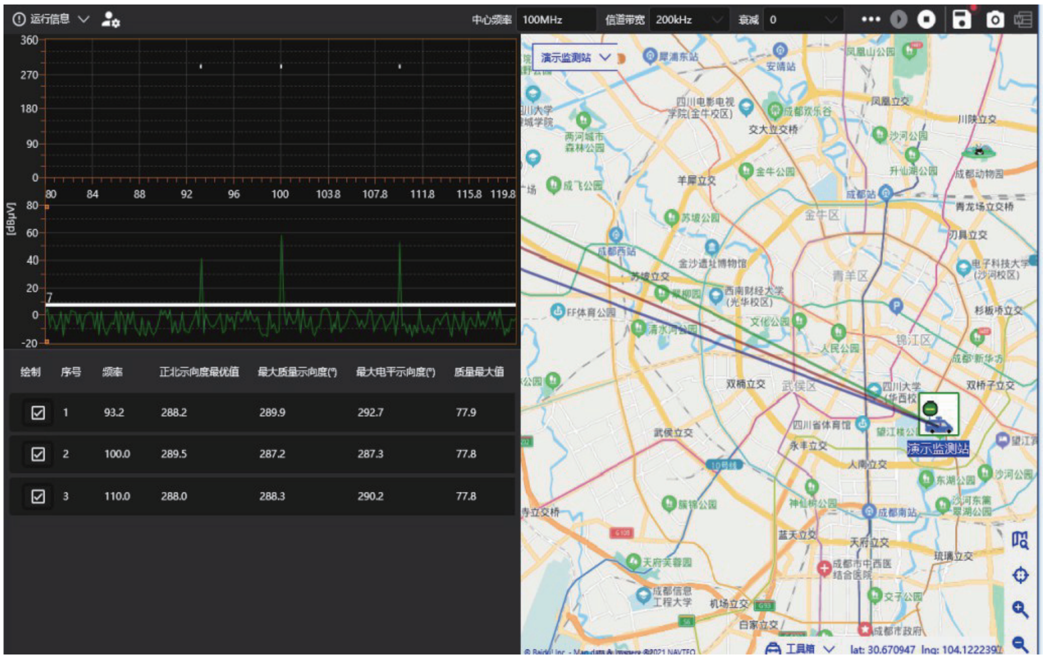
最优值：199.5°

实时值：199.9°

lat: 30.333000 lng: 103.329034

运行信息
[dBμV]
80
60
40
20
0
-20
-60kHz
101.700125MHz
+60kHz
电平
相对示向度
质量
0
30
60
90
120
150
180
210
240
270
300
330
48.0
86.4
Fast监测站
示向线
场强跟踪
清除跟踪
Fast监测站
成都市
© Baidu! Inc. - Map data & Imagery ©2021
工具箱

Screenshot of Fixed Frequency Direction Finding



中心频率 100MHz　信道带宽 200kHz　衰减 0

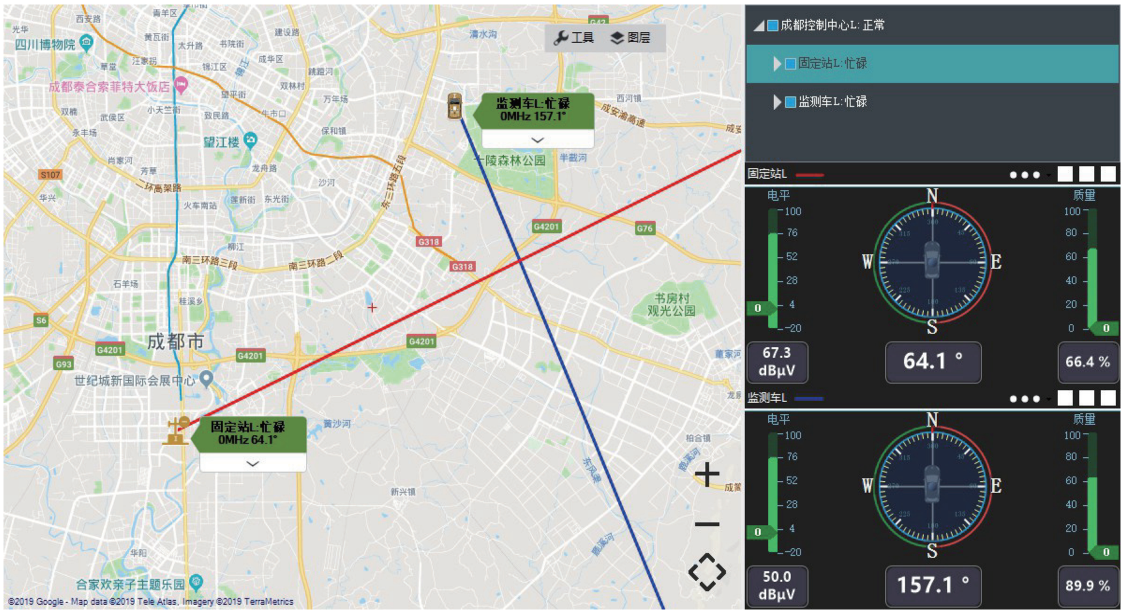
绘制	序号	频率	正北示向度最优值	最大质量示向度(°)	最大电平示向度(°)	质量最大值
☑	1	93.2	288.2	289.9	292.7	77.9
☑	2	100.0	289.5	287.2	287.3	77.8
☑	3	110.0	288.0	288.3	290.2	77.8

lat: 30.670947 lng: 104.1222390

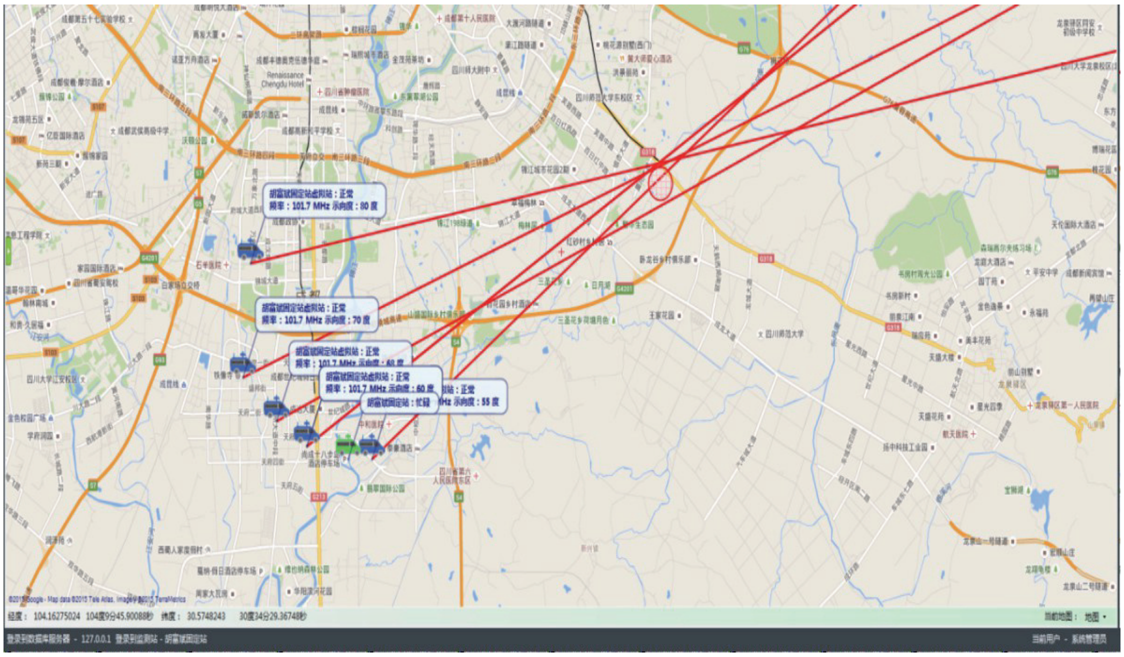
运行信息
360
270
180
90
0
80
84
88
92
96
100
103.8
107.8
111.8
115.8
119.8
[dBμV]
80
60
40
20
0
-20
7
演示监测站
演示监测站
工具箱

Discrete Direction Finding Screenshot

Main Functions


工具
图层
成都控制中心L: 正常
固定站L: 忙碌
监测车L: 忙碌
监测车L:忙碌
0MHz 157.1°
固定站L:忙碌
0MHz 64.1°
成都市
固定站L
电平
质量
N
S
W
E
67.3 dBμV
64.1 °
66.4 %
监测车L
50.0 dBμV
157.1 °
89.9 %
©2019 Google - Map data ©2019 Tele Atlas, Imagery ©2019 TerraMetrics

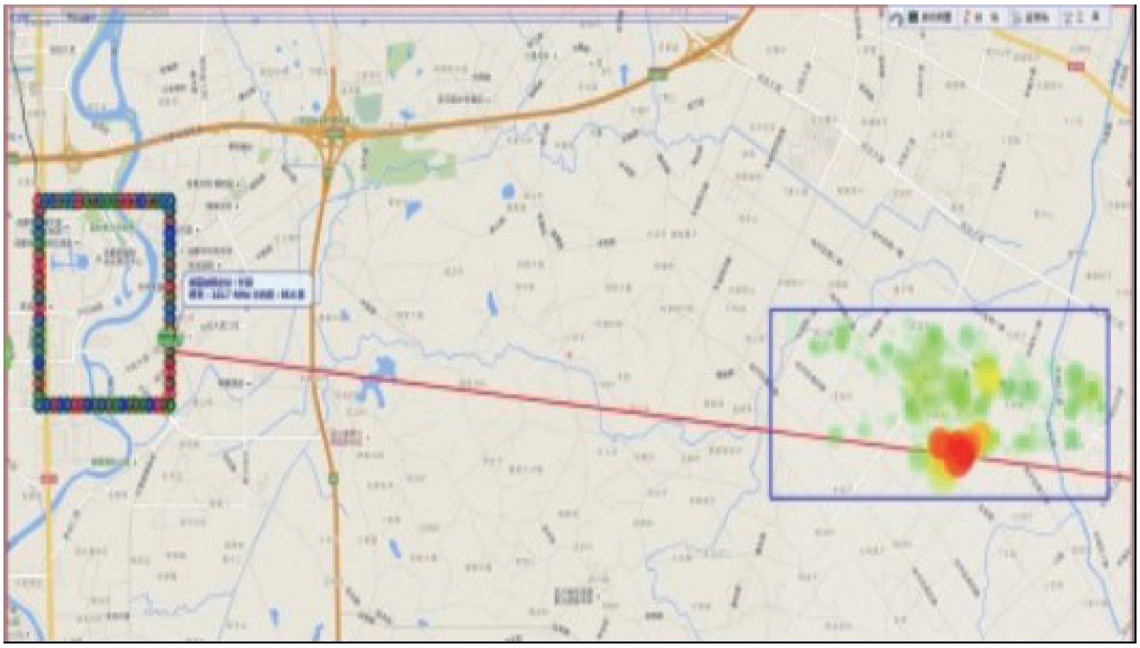
Intersection positioning screenshot



Single-station Mobile Positioning Collection Screenshot

Main Functions

The system supports displaying the results of automatic positioning in the form of a heat map:

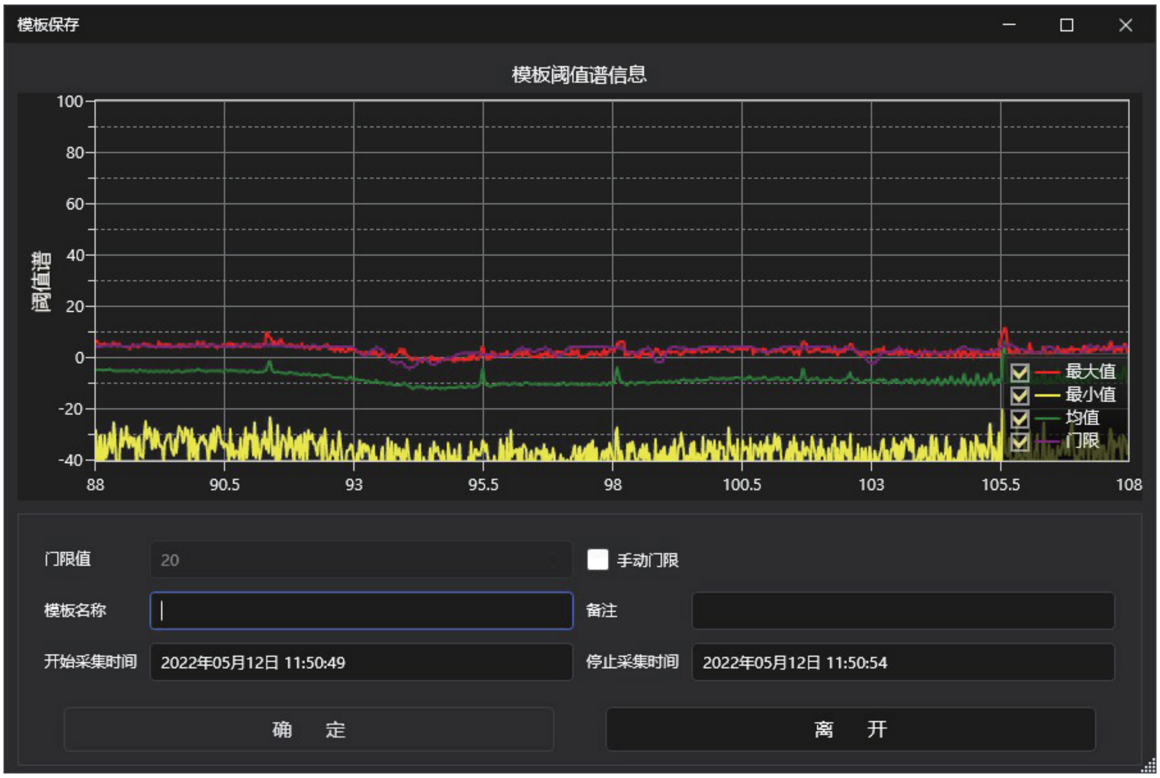


The screenshot of the single - station mobile positioning result

- **Signal Warning**

Both the scanning and signal analysis functions have manual threshold or automatic noise threshold capabilities, with automatic measurement and alarm functions for excessive signals, and can perform signal discrimination and alarming based on thresholds. Three types of thresholds are supported: manual threshold, automatic noise threshold, and electromagnetic environment template threshold. The electromagnetic environment template threshold scans and monitors one or more frequency bands, real-time measures parameters such as the instantaneous value, maximum value, average value, and minimum value of the signal level at each frequency, extracts signals based on automatic or manual thresholds, and saves the maximum value, minimum value, mean value, signal list, and other information to form a signal template. This signal template characterizes the electromagnetic environment status of these service frequency bands.

Main Functions


模板保存
模板阈值谱信息
阈值谱
100
80
60
40
20
0
-20
-40
88
90.5
93
95.5
98
100.5
103
105.5
108
☑ 最大值
☑ 最小值
☑ 均值
☑ 门限
确　定
离　开

门限值: 20

☐ 手动门限

模板名称:

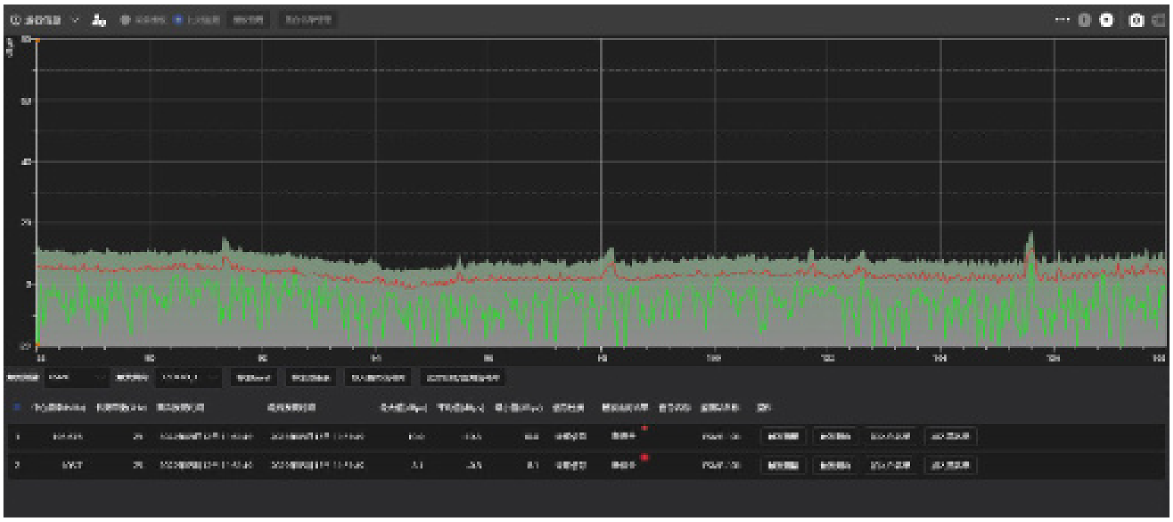
备注:

开始采集时间: 2022年05月12日 11:50:49

停止采集时间: 2022年05月12日 11:50:54

Electromagnetic Environment Template

The generated template is used for comparative scanning. Signals exceeding the template form a new signal list, and alarms are triggered for new or suspected signals.



Automatic Signal Extraction Screenshot

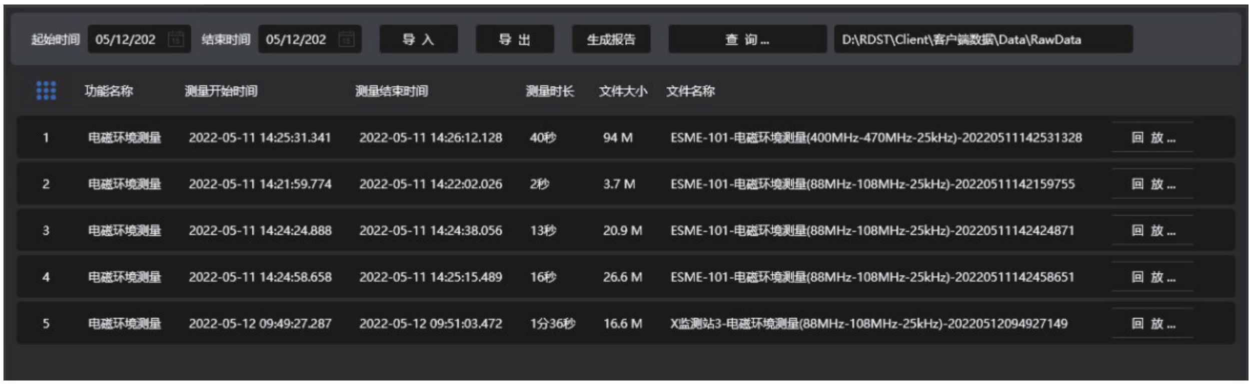
Main Functions

- **Burst Signal Capture**

The system has the capabilities of fast spectrum scanning and broadband monitoring. When collecting and analyzing an 80MHz real-time bandwidth, it can real-time capture all signals within the bandwidth.

- **Monitoring Data Collection and Storage**

The data acquisition and processing software of the spectrum monitoring and direction-finding equipment can store, record, and replay measurement raw data, analysis statistical data, etc., and can statistically analyze the field strength values, occupancy, and other information of each frequency based on the frequency monitoring results.



起始时间 05/12/202
结束时间 05/12/202
D:\RDST\Client\客户端数据\Data\RawData

	功能名称	测量开始时间	测量结束时间	测量时长	文件大小	文件名称	
1	电磁环境测量	2022-05-11 14:25:31.341	2022-05-11 14:26:12.128	40秒	94 M	ESME-101-电磁环境测量(400MHz-470MHz-25kHz)-20220511142531328	回 放 ...
2	电磁环境测量	2022-05-11 14:21:59.774	2022-05-11 14:22:02.026	2秒	3.7 M	ESME-101-电磁环境测量(88MHz-108MHz-25kHz)-20220511142159755	回 放 ...
3	电磁环境测量	2022-05-11 14:24:24.888	2022-05-11 14:24:38.056	13秒	20.9 M	ESME-101-电磁环境测量(88MHz-108MHz-25kHz)-20220511142424871	回 放 ...
4	电磁环境测量	2022-05-11 14:24:58.658	2022-05-11 14:25:15.489	16秒	26.6 M	ESME-101-电磁环境测量(88MHz-108MHz-25kHz)-20220511142458651	回 放 ...
5	电磁环境测量	2022-05-12 09:49:27.287	2022-05-12 09:51:03.472	1分36秒	16.6 M	X监测站3-电磁环境测量(88MHz-108MHz-25kHz)-20220512094927149	回 放 ...

Screenshot of Data Collection

System Metrics

- Monitoring and direction-finding frequency range: 30MHz to 8GHz
- Direction-finding sensitivity: ≤20dBuV/m
- Direction-finding error: ≤2° (R.M.S)
- Continuous scanning speed: ≥60 GHz/s (25 KHz step)
- Instantaneous dynamic range: ≥65 dB
- Monitoring sensitivity: better than -110 dBm
- Max. instantaneous intermediate freq. BW: ≥80 MHz

Main parameters of the electronic compass

Major Term	Project	Parameters	Unit	Note
Magnetic Field	Measurement Range	0~360	°	
	Display Resolution	0.1	°	
	Accuracy	0.1	°	horizontal
		0.1~0.5	°	tilt
	Repeatability	0.1	°	
	Temperature Drift	±0.018	℃	-40~85℃
Inclination (3D compass)	Roll Angle Range	±180	°	
	Pitch Angle Range	±80	°	
	Zero-point accuracy	±0.5	°	
	Accuracy	0.1	°	
	Repeatability	0.1	°	
	Resolution	0.1	°	
	Temperature Drift	±0.0016	℃	-40~85℃

DOEWE
TEST SOLUTION EXPERT

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the official website