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.

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Overview & Features

System Overview

The On-board Broadcasting Signal Recording and Playback System (RFCS) is a complete integrated platform customized for highdynamic scenarios of on-board broadcasting. It supports recording of on-board broadcasting, GNSS, WIFI, and any RF signals within the system's bandwidth and frequency range. The system features broadband RF signal recording/playback and field strength mobile testing capabilities.

On-board broadcasting reception inherently requires high mobility and strong environmental adaptability: vehicles need to operate stably in complex scenarios such as urban dense building areas, suburban open terrains, tunnels/overpasses, etc. These scenarios commonly exhibit complex electromagnetic effects like Doppler frequency shift (signal frequency dynamically offset with vehicle speed) and multipath effects (interference superposition formed by signal reflection from buildings/terrain), which directly affect the reception quality and stability of broad-casting signals. Addressing these on-board-specific challenges, the core RF acquisition module of RFCS, with its excellent RF performance, accurately captures and reproduces signal states in real electromagnetic environments, providing authentic scenario-based evidence for performance verification and interference troubleshooting of on-board broadcasting equipment.

The system also features GNSS global navigation satellite system signal recording capability, supports 1PPS high-precision time pulse synchronization marking, and can support synchronized recording for up to 6 devices with Syncbox, enabling simul-taneous recording of signals from four major satellite systems (GPS, BDS, GLONASS, and GALILEO) with 600MHz broadband RF signals. This meets the needs of navigation receiver testing, on-board mobile scenario signal reproduction, and interference source location analysis, building a multi-channel synchronous testing system.

In addition, a single device supports recording and playback with up to 100MHz bandwidth. Combined with the master control software, it can achieve timed recording and triggered recording functions to meet different application scenario requirements.

System Features

- Comprehensive automotive RF signal acquisition capability, covering AM/FM (RDS)/CDR/HD-Radio/DAB/DRM broadcasting, GNSS signals, 5G signals, WIFI&BT, and other signal formats
- DAB recording supports ETI stream recording in addition to RF signals, enabling output with RWC2010C
- Recording bandwidth supports arbitrary settings from 2M to 100MHz; DAB band maximum real-time bandwidth is 40MHz, DRM band maximum real-time bandwidth is 50MHz
- Frequency range covers 300KHz to 6.0GHz
- IQ data rate: 500MBps
- RF acquisition module sampling rate: 250MS/s
- RF acquisition module ADC resolution: 16 Bit
- Data format compatible with MATLAB
- Provides IQ data processing tool software
- Provides Syncbox to achieve synchronized RF signal recording for up to 6 devices
- Can be paired with drive test software BroadCMS for field strength coverage testing (optional)

System Framework

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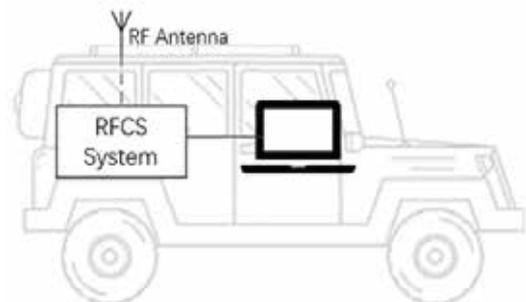
The On-board Broadcasting Signal Acquisition and Playback System (RFCS) consists of two parts: the RF Signal Acquisition and Processing Part, and the Playback Processing Part. The overall system architecture is shown in the figure below:

Acquisition Processing Part

Playback Processing Part
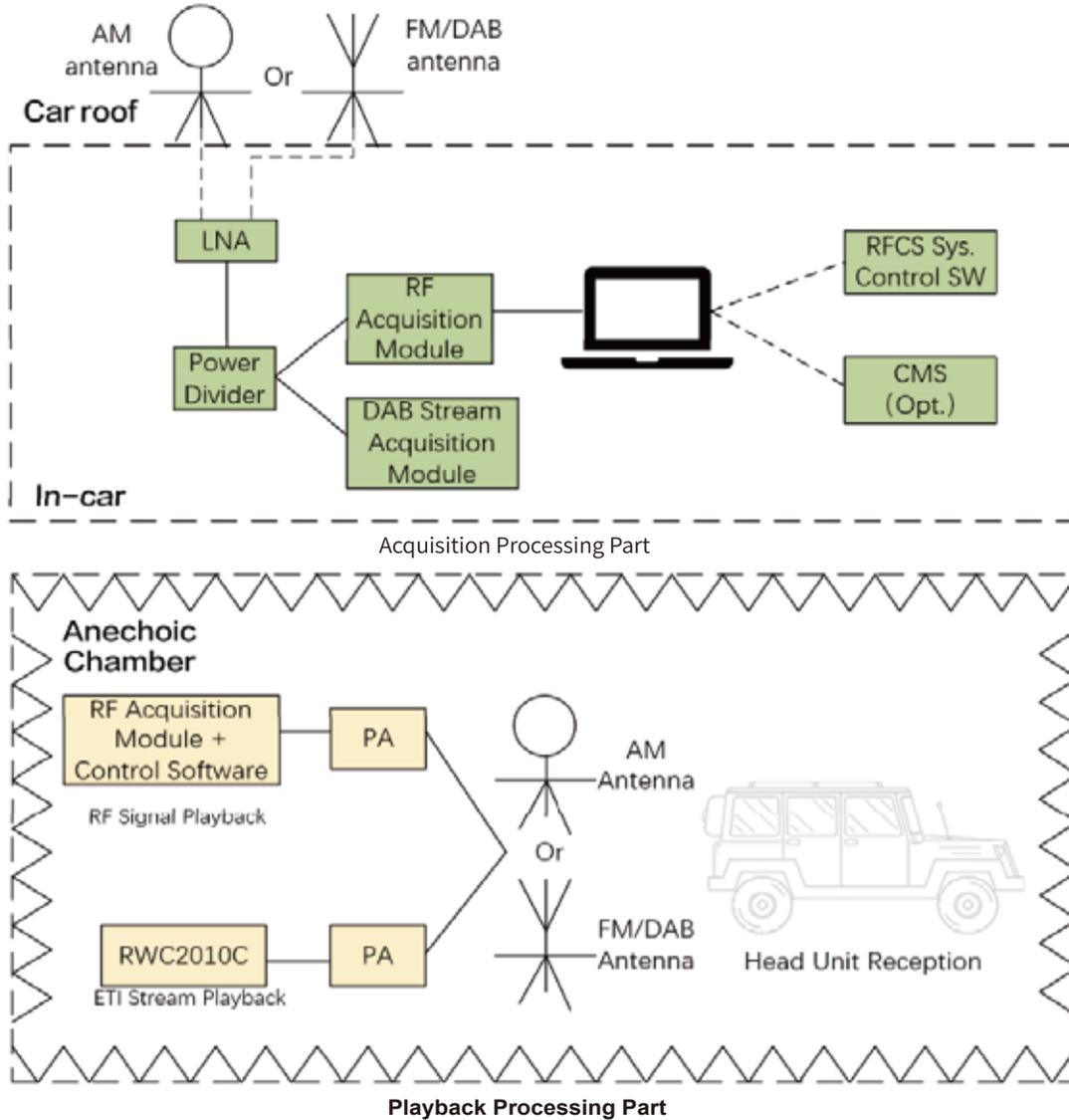
For acquisition processing part, an AM loop antenna or FM/DAB antenna is mounted on the vehicle roof for signal reception. The signal is amplified by an LNA (Low Noise Amplifier) to minimize additional noise introduction, then passes through a power splitter that divides it into two paths. One path connects to the RF acquisition module for RF signal acquisition and recording, while the other connects to the DAB stream acquisition module for DAB audio broadcast recording. Using a PC loaded with the RFCS system control software, related processing of signal acquisition and playback can be performed by connecting to the RF acquisition module, or actual drive testing can be conducted using the field strength CMS.

Playback Processing Part is conducted in an anechoic chamber, RF signal playback is performed through the RF acquisition module and RFCS system control software, while ETI stream playback is performed by the RWC2010C. Both signals pass through a power amplifier for amplification, then connect to an antenna for transmission, and are finally received by the head unit.
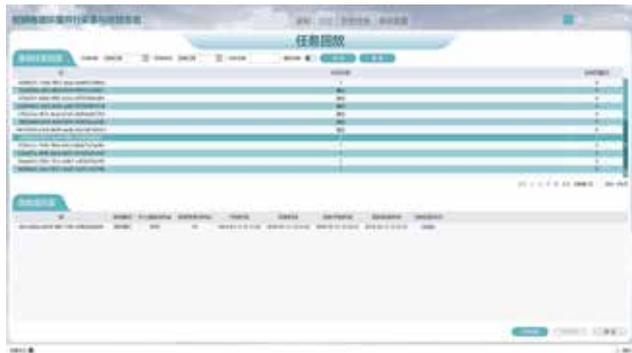
Control Software Overview

The entire process is automated by the RFCS system control software. Through the operation software, RF signal acquisition and playback can be processed, supporting timed recording, triggered recording, task playback, and file playback. It also supports viewing task records and generating reports for subsequent data analysis and testing.

The recording function interface supports setting recording mode, center frequency, recording bandwidth, and other parameters, including two recording modes. Timed recording allows setting the hardware to record within a specific time period without manual attendance; triggered recording supports user-defined trigger threshold, automatically starting recording when the signal reaches the threshold value, accurately capturing occasional/transient signal scenarios and avoiding invalid data redundancy.The playback function interface can view all recording tasks. The list shows all tasks to be played back, and allows task selection, editing, and playback start operations. One task can record multiple files. Task playback can play back all recorded files in a single task, while file playback supports selecting a single file for playback.The system configuration function interface can add or use configuration information, adjust and display channel names, IP addresses, port numbers, and corresponding physical channels. After configuration is completed, you can check whether the current connection status is normal.

Control Software interface

RF Acquisition Module

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The system's RF acquisition module is the industry's first device that can support 100MHz RF real-time recording bandwidth in a single unit. It features ultra-wide frequency range (supporting up to 6GHz) and recording bandwidth (supporting 100MHz) indicators. It can also provide a solution for up to 6 devices synchronized and cascaded to build an RF synchronous recording system. The device has four built-in 2.5-inch hard drive bays, default setting is 4×1TB, and can support up to 4×8TB. The overall dimensions are 41.6cm×34.7cm×12cm (L×W×H), weight is 10Kg, offering high portability for engineers.

In addition to meeting on-board broadcasting testing applications, the device can also satisfy more new application testing requirements, such as broadband satellite signal recording, WiFi signal recording, and multi-channel signal simultaneous recording.

Core Parameter

| Input Para.	Specification	Output Para.	Specification
Input Freq Range	300KHz- 6000MHz	Output Freq Range	300KHz- 6000MHz
Real-time BW	50MHz@300KHz 50MHz 20MHz@ Fc: >50-100MHz 40MHz@ Fc: >100-400MHz 100MHz@ Fc: >400MHz	Real-time BW	50MHz@300KHz 50MHz 20MHz@ Fc: >50-100MHz 40MHz@ Fc: >100-400MHz 100MHz@ Fc: >400MHz
Max Input Power	+20dBm(Peak) +10dBm(Average)	Max Output Power	0dBm
Input Sampling Rate	250MS/s	Output Sampling Rate	1000MS/s
ADC Resolution	16 Bits	DAC Resolution	16 Bits
Input Signal Noise Floor	<-160dBm/Hz	Output Signal Noise Floor	<-160dBm/Hz
Local Oscillator Leakage	<-50dBc	Local Oscillator Leakage	<-50dBc
Input Level Accuracy @(+20 to -75 dBm)	<±1.0dB @ <=3GHz <±1.5dB @ >3GHz	Output Level Accuracy @(0 to -95dBm)	±1.0dB @ -100dBm - 0dBm ±2.0dB @ <-100dBm
Phase Noise	<-100dBc @1KHz offset@2.4GHz <-95dBc @1KHz offset@5.8GHz	Phase Noise	<-100dBc @1KHz offset@2.4GHz <-95dBc @1KHz offset@5.8GHz
Frequency Accuracy	±50 ppb maximum (OCXO) @25℃ ,after 60 minutes warm-up	Frequency Accuracy	±50 ppb maximum (OCXO) @25℃ ,after 60 minutes warm-up

DAB Stream Acquisition Module

The DAB stream acquisition module enables deep stream-layer acquisition and analysis of DAB/DAB+ digital broadcasting signals. Through the dedicated Radio Analyzer mode, it achieves deep demodulation and high-quality audio content capture of over-the-air broadcasting signals, meeting various application scenarios including automotive R&D testing, on-board terminal performance verifi-cation, and broadcasting content on-board adaptation effect evaluation. The system supports synchronized and correlated recording of RF parameters and audio content, providing a complete data chain for tracing issues such as on-board broadcasting reception stability and audio quality performance. Working in conjunction with RF recording functions, it builds a complete signal-stream syn-chronized testing system, assisting in experience optimization and performance iteration of on-board broadcasting terminals.

Core Functionality Features

• Broadcast Analysis Mode: One-click switching to DAB/DAB+ dedicated analysis interface with automatic signal standard identification

• Program Audio Recording: Supports real-time recording of DAB/DAB+ broadcast audio with automatic sequential file generation

• Synchronous Parameter Monitoring: Real-time display of key indicators including Level, C/N (Carrier-to-Noise ratio), and MER (Modulation Error Ratio)

• Protocol Information Decoding: Real-time decoding and display of data including PS (Program Service), PTY (Program Type), and SID(Service Identifier)

• Completely Intuitive Operation: Four-step operation process design for quick recording task startup
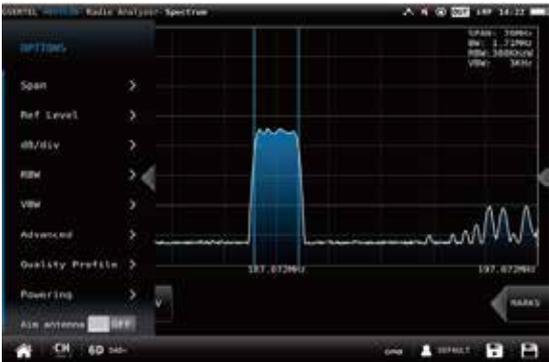
1.- Select Radio Analyzer mode

2.- Tap on Audio Recording icon
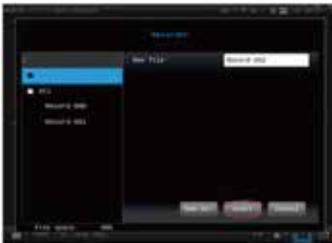
3.- Select the location an tap on Start

4.- Tap on Stop to stop recording

The interface is clear and intuitive, allowing selection of different modules such as spectrum and parameters as needed, enabling individual or simultaneous monitoring. Recording operation is fast and simple, allowing quick startup.

Field Strength BroadCMS

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The Field Strength Coverage Measurement System (BroadCMS),comprehensively supports comprehensive field strength coverage drive testing for AM, FM, CDR, DAB, and other signals. The system configures drive test platform software, GPS receiving system, and map solution, enabling drawing of point trajectories and line trajectories, and performing two-dimensional map coverage effect evaluation. BroadCMS can work with the on-board RF broadcasting acquisition and playback system CBRS, cooperate with professional receiving antennas and precision transmission cables, and support secondary integration with industry mainstream broadcasting and television testers.

Main Functions:

• Features signal level parameter display and intensity statistics functions; can automatically calculate field strength values in
   dBuV/m according to required antenna factors and cable loss input;

• Supports GPS positioning and real-time communication with test host, providing system working status during motion testing;

• Supports automatic saving of test information, including signal strength, longitude, and latitude;

• Supports both online map and offline map working modes; has map caching function;
   supports Google and Bing maps;

• Supports real-time display of current test position and related test data in map window;

• Can playback test process according to test path and data;

• Has coverage analysis function, capable of drawing area-shaped coverage analysis maps
   based on test data;

• Can automatically generate Word-format test reports;

• Allows custom threshold settings;

• Has statistical functions, enabling viewing of data distribution for current or completed tests;

• Features data export to Excel function.

Supports map point marking function, using different colors to mark field strength/level values at different positions on the map, intuitively reflecting signal strength.
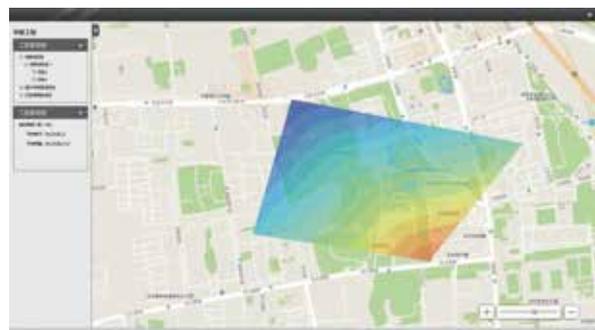
Supports coverage map functionality to visualize signal coverage quality.

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