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.

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Industry Background and Solution Overview

Overview

In the field of broadcast television and emergency communication, FM (Frequency Modulation) and AM (Amplitude Modulation) broadcasts remain indispensable transmission methods. Despite the rapid development of digital broadcasting technologies, analog broadcasting still holds a significant position in scenarios such as in-vehicle listening, rural area broadcasting, and disaster emergency communication, thanks to its strong anti-interference capability, wide coverage, and low-cost advantages. However, the quality of broadcast signals directly affects the user experience, while traditional testing methods suffer from low efficiency and bulky equipment, making it difficult to meet the needs of modern high-efficiency testing.

The AFBT solution, based on the broadcast modulation analyzer RWC2500A Plus and BroadCMS intelligent analysis software, provides a one-stop automated testing solution covering:

- **Transmitter Performance Testing** – Comprehensive parameter detection including radio frequency indicators, modulation quality, audio distortion, etc.
- **Field Strength Coverage Testing** – Real-time GPS positioning, signal strength measurement, and automatic generation of coverage heat maps.
- **Intelligent Data Analysis** – Automatic generation of test reports, supporting historical data comparison and trend analysis.

Centered on portability, automation, and visualization, it significantly improves testing efficiency, assists the broadcasting industry in optimizing signal coverage, and ensures stable and high-quality broadcasting services.

Industry Background

1. Pain Points in Broadcast Transmitter Testing

- Bulky traditional testing equipment: Industry benchmark devices like FMAB are large, complex to operate, and have been discontinued, leading to high maintenance costs.
- Incomplete testing items: Some institutions only test FM broadcasts or simply verify audio with radios, failing to comprehensively evaluate transmitter performance.
- Dependence on manual operation: Manual data recording is error-prone and struggles to meet the strict requirements of standards (e.g., GY/T169-2001, GY/T225-2007).

2. Challenges in Field Strength Coverage Testing

- Cumbersome testing procedures: Requires 1-2 personnel for on-site operation, manually recording GPS coordinates and signal strength with extremely low efficiency.
- Difficulty in intuitive data presentation: Traditional methods cannot generate real-time field strength distribution maps, relying on manual calculations that hinder coverage optimization decisions.
- Challenges in large-scale testing: With wide coverage of transmission towers, traditional instruments lack portability, struggling to meet mobile testing needs.

3. Upgraded Industry Demands

As users'requirements for broadcast quality and the reliability of emergency broadcasting increase, the industry urgently needs:

- Efficient automated testing – reducing manual intervention and improving testing accuracy
- Portable equipment – supporting mobile testing and adapting to complex environments
- Intelligent data analysis – real-time visualization to assist in optimizing coverage strategies

Scheme Block Diagram and Core Equipment

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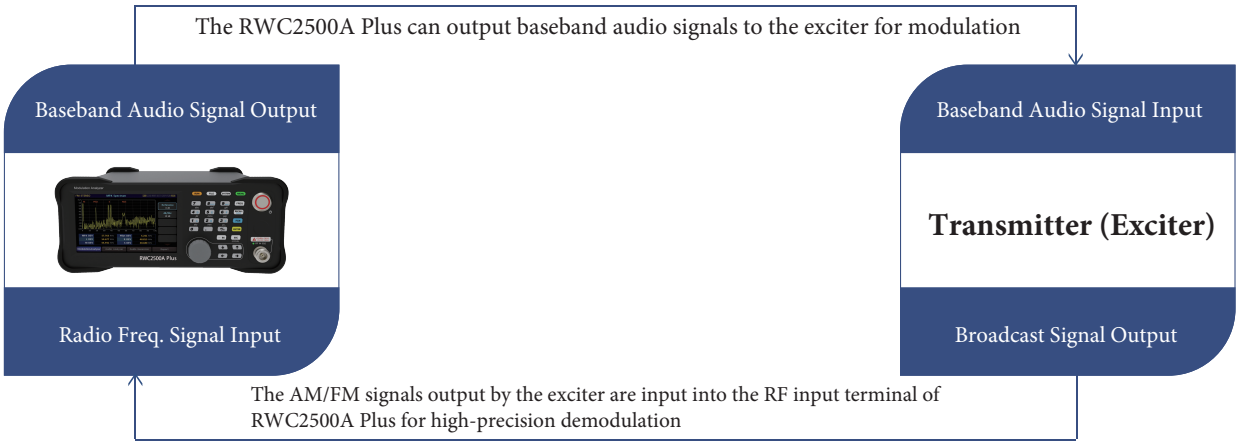
Scheme Block Diagram



Core Equipment

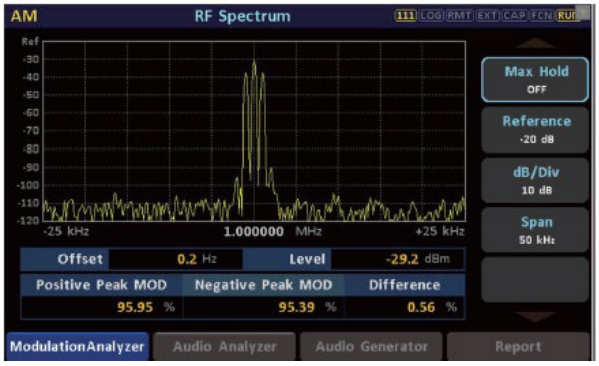
The RWC2500A Plus is a professional broadcast modulation analyzer primarily used for AM/FM transmitter testing, enabling comprehensive testing of RF parameters, modulation performance, and audio-level metrics through standalone operation.

The device supports high-precision real-time demodulation of AM/FM signals (mono and stereo), and can test parameters such as carrier power, frequency deviation, AM modulation depth, FM frequency deviation, and pilot signal-related metrics. It allows real-time output of demodulated audio signals. Equipped with an audio generation function, it can output baseband audio signals, supporting independent setting of left/right channel levels and frequencies, and features both digital (balanced) and analog (balanced/unbalanced) audio output interfaces.With audio analysis capabilities, it analyzes demodulated baseband audio signals, supporting frequency-domain and time-domain analysis, and can display audio spectra and waveforms. Through its multi-functional combination, the RWC2500A Plus directly analyzes key transmitter indicators such as carrier parameters, audio distortion, audio signal-to-noise ratio (SNR), audio frequency response, and stereo audio separation. It achieves complete transmitter performance testing with a single instrument, meeting the comprehensive testing requirements of the radio and television industry for broadcast transmitters.

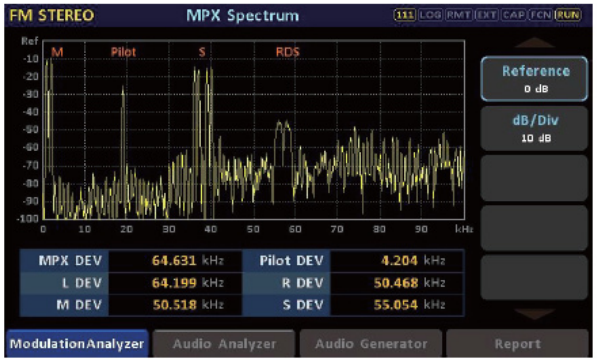
- Supports high-precision AM/FM demodulation and parameter analysis, as well as stereo FM;
- Completely replaces the industry classic product FMAB;
- Local oscillator frequency accuracy up to 1ppb, SNR >80dB;
- Capable of demodulating and outputting baseband audio, supporting balanced/unbalanced/digital interfaces;
- Can real-time test and display RF spectrum, as well as the spectrum and waveform of demodulated audio;
- Supports audio analysis, enabling measurement of distortion, signal-to-noise ratio, frequency response, and separation, etc.;
- Supports audio generation, capable of outputting tone or sweep signals, with multiple interface options;
- Allows customizing upper and lower thresholds for test items, with real-time prompts for out-of-threshold indicators;
- Supports test result overview and data export, enabling one-click report generation;
- Features a color touchscreen combined with button operation.

Modulation Analyzer

The RWC2500A Plus can demodulate and analyze AM and FM signals. It also allows users to intuitively view the spectra of radio - frequency signals and modulated signals. Moreover, it can measure indicators such as the modulation depth, positive - negative amplitude modulation asymmetry, modulation frequency deviation, carrier frequency offset, left - and - right channel frequency deviation, and pilot frequency deviation.



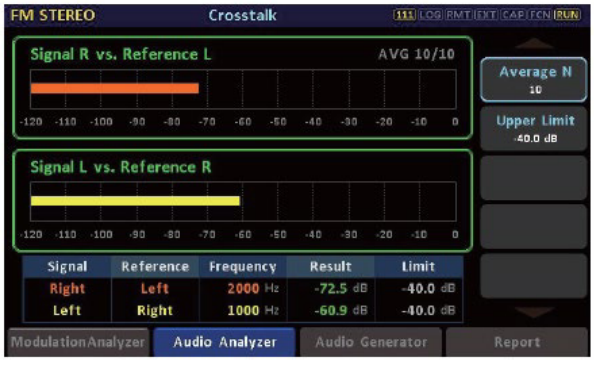
AM RF Spectrum



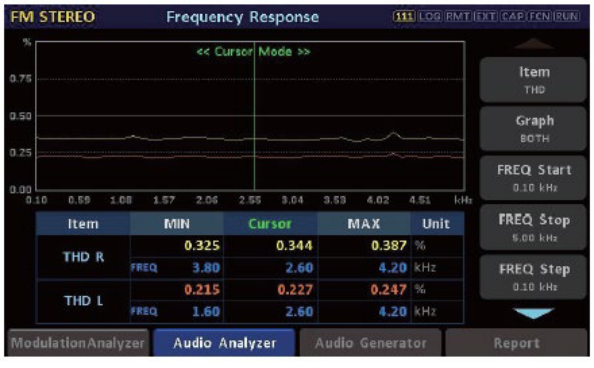
FM Stereo Modulation Spectrum/MPX Spectrum

Audio Analyzer

The RWC2500A Plus can analyze the demodulated baseband audio signal, visually display the waveform and spectrum of the audio signal, and measure parameters such as distortion, SNR, SINAD, frequency response, and left/right channel isolation.



Left and Right Channel Isolation/Crosstalk

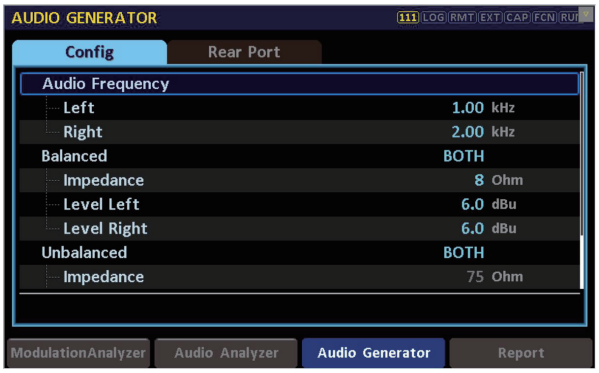


Frequency Response

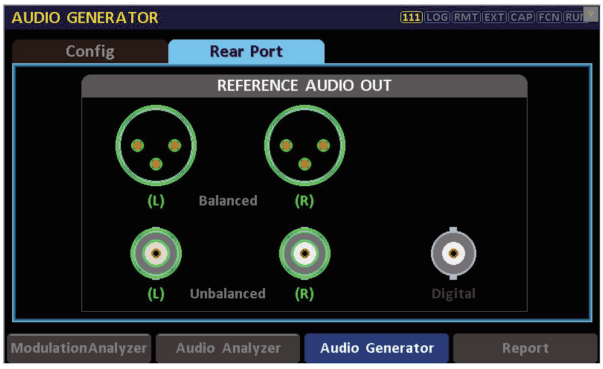
Function Module

Audio Generator

The RWC2500A Plus can generate baseband audio signals with configurable parameters such as frequency and amplitude. It offers multiple interfaces including balanced, unbalanced, and digital outputs, and features a one-touch switch for easy interface selection.



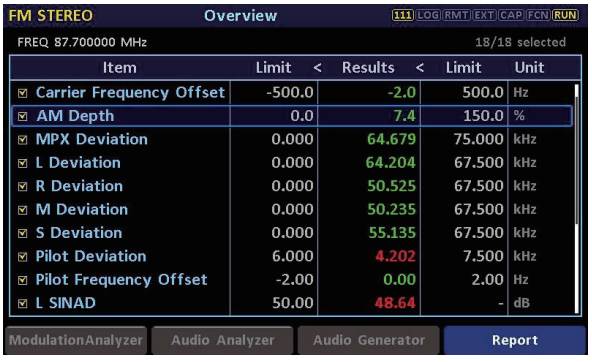
Level and Freq. Settings /Audio Generator



Quick Settings for Output Interfaces /Audio Generator

Report Overview

AM Report Overview



FM Report Overview

PC remote control software

The RWC2500A Plus comes with free remote control software, enabling users to connect to a PC via the LAN port for remote operation. It also provides an open control command interface, facilitating seamless integration into automated systems and simplifying user operations.

PC Remote Control Software

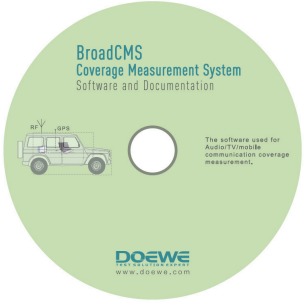
Field Strength Coverage Testing Software BroadCMS Plus

The Field Strength Coverage Testing Software BroadCMS Plus, designed specifically for the RWC2500A Plus, fully supports comprehensive AM/FM field strength coverage drive testing. The system integrates drive test platform software, a GPS receiver system, and mapping solutions to plot point and line trajectories, enabling 2D coverage evaluation.

BroadCMS is intended for use with the Broadcast Modulation Analyzer RWC2500A Plus, paired with professional receiving antennas and precision transmission cables.

The main functions of the field strength coverage testing software are as follows:

- The field strength coverage testing software is capable of displaying signal level parameters and performing intensity statistics. It allows users to input antenna factors and cable losses as required, and can automatically calculate the field strength value in dBuV/m;
- The field strength coverage testing software features GPS positioning and real-time communication with the test host, providing system status updates during mobile testing;
- The field strength coverage testing software has the function of automatically saving test information, including signal strength, longitude, latitude, etc;
- The field strength coverage testing software supports both online and offline map modes, with map caching functionality, and is compatible with maps such as Google and Bing;
- It can display the current test location and relevant test data in real time on the map window;
- The test data can be exported as Google Earth files;
- It can replay the testing process based on the test path and data;
- It has a coverage analysis function, which can draw area-shaped coverage analysis maps based on test data;
- It can automatically generate test reports in WORD format;
- It allows for customizable threshold settings;
- It has statistical functions, enabling users to view the data distribution of current or completed tests;
- It has the function of exporting data to Excel.



When the mouse moves to a specific data point, it will prompt the specific data information of that point.

It is used for measuring the straight-line distance between two points. Select the distance measurement tool from the navigation bar, move the mouse to the map area, click to set the starting anchor point, right-click to end the anchor point, the distance will be measured in real time and displayed to the right of the anchor points.

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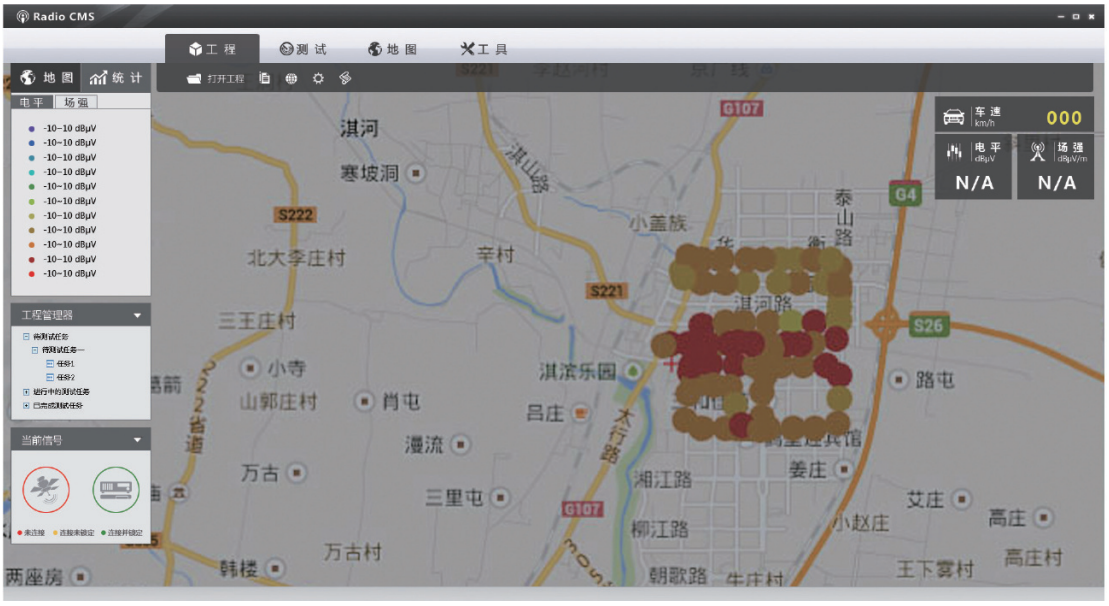
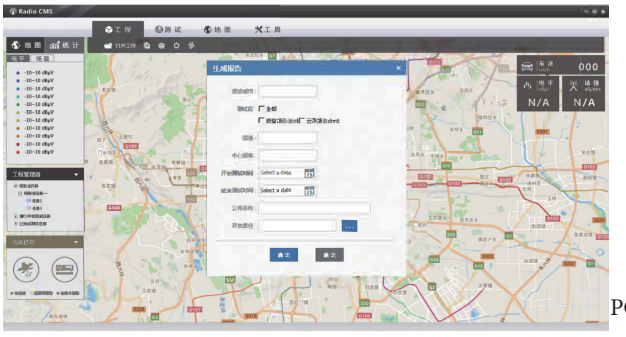
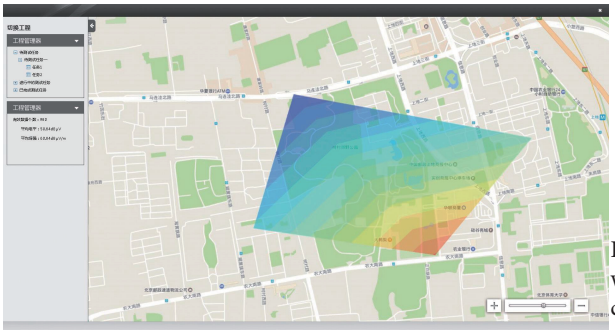
Field Strength Coverage Testing Software BroadCMS Plus



It is used for marking transmitter tower information. Select the "Mark Transmitter Tower" tool from the navigation bar, left-click on the map at the location where the transmitter tower needs to be marked, and a transmitter tower information dialog box will pop up.



PC Remote Control Software



It supports the coverage schematic function, which is used to indicate the quality of signal coverage.

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Beijing Doewe Technologies Co., Ltd

Beijing Headquarters

Address: Room 1821, Building 2, Soubao Business Center, No. 16 South Third Ring Road West, Fengtai District, Beijing.

Technology Center

Address: Room 1812, Building 2, Soubao Business Center, No. 16 South Third Ring Road West, Fengtai District, Beijing.

Doewe Technologies (Shanghai) Co., Ltd.

Address: Room 212, Kaidi Commercial Building, No. 688 Huajiang Road, Jiangqiao Town, Jiading District, Shanghai.

Phone：010-64327909

Website：https://www.doewe.com

Email：info@doewe.com

Scan the or code to visit
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