

AM Broadcast Transmitter Index Testing: Modulation Depth

Doewe Technologies Application Notes-023-V1.0

<https://www.doewe.com>

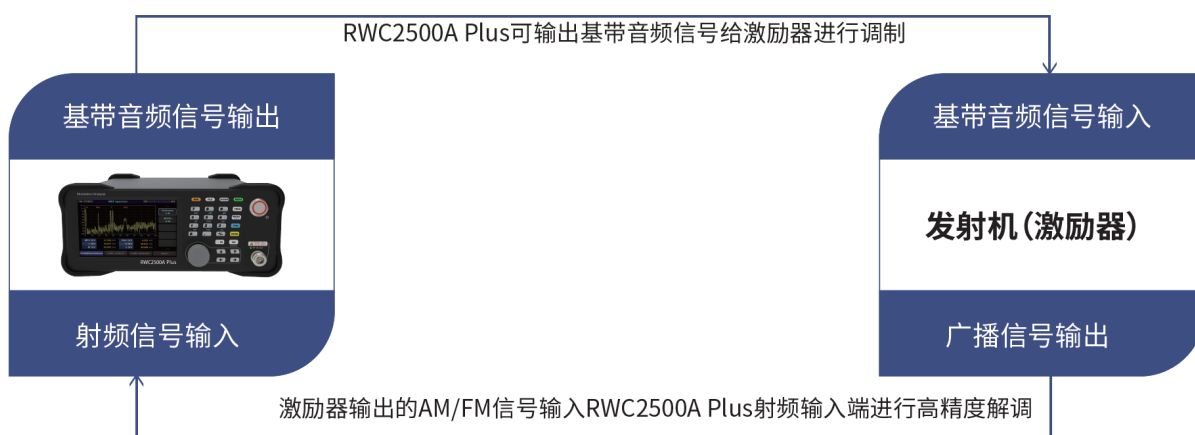
1. Introduction

2. Common Problems

3. Measurement Method

The core equipment used for the measurement method described in this article is the RWC2500A Plus. For specific device information, please visit www.doewe.com.

3.1 Equipment Connection



3.2 Test Procedure

The RWC2500A Plus features a modulation analysis module, an audio analysis module, and a baseband audio signal output module. To measure modulation depth, we use the baseband

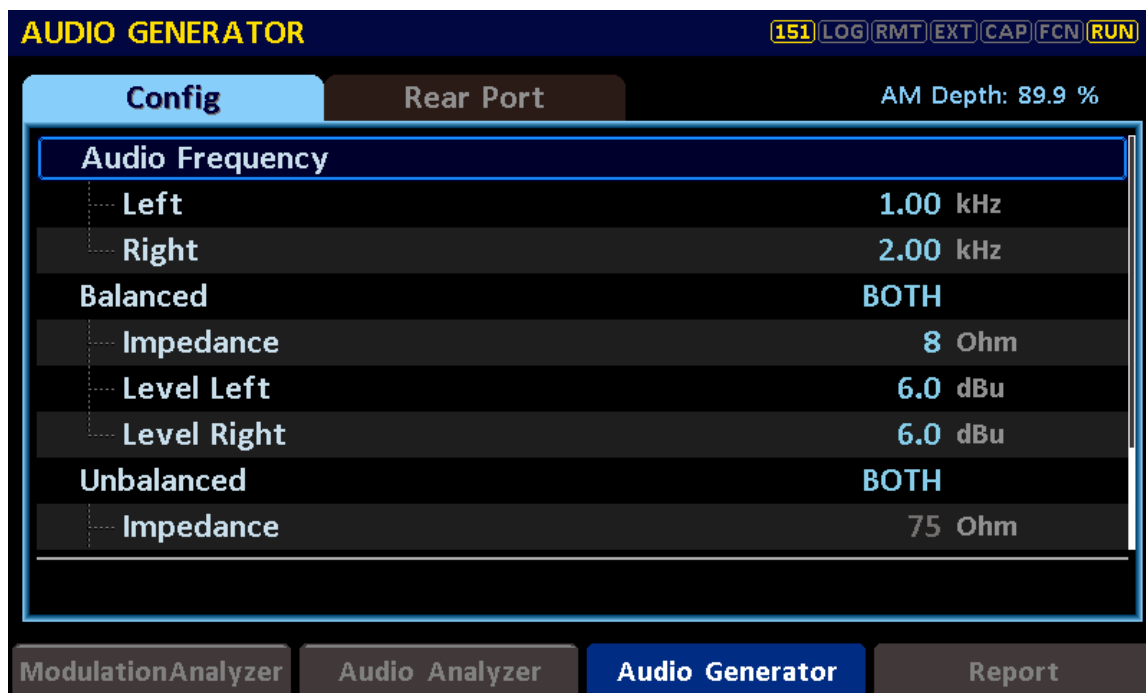
audio signal output module. The baseband audio signal is input into the transmitter's audio input port. After the transmitter is modulated for broadcast, connect its output (via a dummy load and a TEST signal tap) to the RF input interface of the RWC2500A Plus. Use the modulation analysis module for analysis.

3.2.1 Baseband Audio Signal Generation

1. When using the RWC2500A Plus's baseband audio signal generator module, first select the "Rear Port" in the Audio Generator interface. In this interface, you can quickly adjust the required audio output interface (Balanced/Unbalanced/Digital). After selection, proceed to the next step.

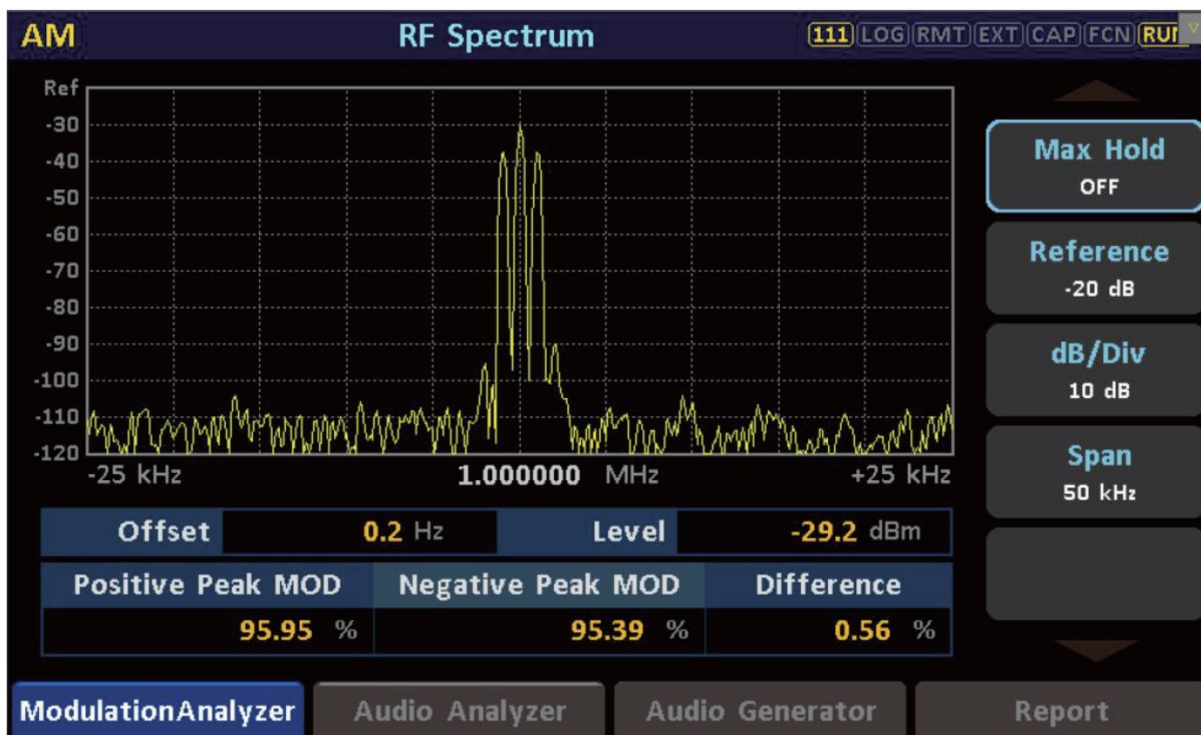


2. In this step, the user can adjust the audio signal level and frequency. For modulation depth testing, a 1 kHz audio signal is generally used. After setting the frequency, adjust the audio level on this interface. Simultaneously observe the "AM Depth" value in the upper right corner to see if the current modulation depth reaches above 90%.



3.2.2 Modulation Analysis: AM Modulation Depth Reading

After setting the baseband audio signal input to the transmitter, the AM modulation depth and positive/negative modulation levels can be viewed directly in the RF Spectrum display of the Modulation Analyzer interface. It can also be read directly within the audio generator module.



4. Core Equipment: RWC2500A Plus

4.1 Functional Overview

The RWC2500A Plus is a professional broadcast modulation analyzer primarily used for AM/FM transmitter testing. It can comprehensively test RF parameters, modulation performance, and audio aspects as a single instrument.

The device can demodulate AM/FM (mono and stereo) with high precision in real-time, testing parameters such as carrier power, frequency error, AM modulation depth, FM frequency deviation, and pilot signal related parameters. It supports real-time output of the demodulated audio signal. The device can be configured for audio generation, outputting baseband audio signals with independent level and frequency settings for left and right channels. It features both digital (AES/EBU) and analog (balanced & unbalanced) audio output interfaces. The device includes audio analysis capabilities, analyzing the demodulated baseband audio signal, supporting frequency and time domain analysis to display audio spectrum and waveforms.

Based on its multifunctional combination, the RWC2500A Plus can directly analyze key broadcast transmitter indicators such as: carrier parameters, audio distortion, audio signal-to-noise ratio (SNR), audio frequency response, and stereo audio separation. A single instrument fulfills transmitter index testing requirements, meeting the complete testing needs for broadcast transmitters in the radio and television industry.

4.2 Product Features

- Supports high-precision AM/FM demodulation and parameter analysis, including stereo FM.
- Completely replaces the industry classic product FMAB.
- Local oscillator frequency accuracy up to 1 ppb, SNR > 80 dB.
- Demodulates and outputs baseband audio, supporting Balanced/Unbalanced/Digital interfaces.
- Displays RF spectrum, demodulated audio spectrum, and waveforms in real-time.

- Supports audio analysis, measuring distortion, SNR, frequency response, and separation.
- Supports audio generation, outputting tone or sweep signals via multiple interfaces.
- Supports custom test item upper/lower limits with real-time alerts for out-of-limit indicators.
- Supports test result overview and data export, generating reports with one click.
- Color touchscreen and button co-operative operation.

4.3 Performance Specifications

射频性能	
项目	指标
频率范围	500kHz ~ 30MHz (AM), 76MHz ~ 108MHz(FM)
频率分辨率	1Hz
输入功率	-30dBm~30dBm
功率测量误差	<0.5dB, Typ
低噪声本地振荡器	<-130dBc@1GHz, Typ
10MHz参考信号稳定性	1 ppb, 老化<1×10 ⁻⁹ /天
频率测量误差@100MHz	200Hz (2ppm)
测量信噪比	>80dB
接口	
项目	指标
射频信号输入接口	1个N型 母头
解调音频输出接口	-平衡:2个卡农接口 (左、右) -非平衡:2个BNC接口 (左、右) -数字:1个BNC接口 (AES/EBU)
基带音频输出接口	-平衡:2个卡农接口 (左、右) -非平衡:2个BNC接口 (左、右) -数字:1个BNC接口 (AES/EBU)
10MHz参考时钟端口	-输入:1个BNC型 (50Ω) -输出:1个BNC型 (50Ω)
数字I/O	-局域网:RJ45 -RS232:USB-C型 (VCOM)
其他指标	
项目	指标
显示器	5英寸LCD (800×400)
工作温度	5~40℃
尺寸	250×110×648mm
重量	5Kg