

INTRODUCTION

The RC series of reverberation chamber includes the 200, 1100 and 5000 systems (see *figure 1&2*). Each is comprise of reflective metal walls, a positioner, and both horizontal and vertical stirrers. By inducing movement or rotation of the positioner and stirrers, the reverberation chamber creates a multipath reflection environment with multiple reflection signals. This dynamic environment, unlike traditional direct far-field testing methods, eliminates the need for the distance between the Device Under Test (DUT) and the test probe to adhere to far-field conditions.

As the positioner and stirrers manipulate the electromagnetic field within the chamber, signals are superimposed from various directions, resulting in a mathematical representation of plane waves superposition in different directions. Consequently, a quiet zone is achieved in the mathematical sense. Notably, this distinguishes the reverberation chamber from an anechoic chamber, as it can provide a larger quiet zone of the same size, making it particularly suitable for testing large-scale DUTs. Here are the specifications for the RC5000.

REVERBERATION CHAMBER

- **Size:** Max. DUT dimensions: 2.5 × 2.5 × 1.5 meters
- **Frequency Range:** 0.4 - 7.25 GHz

COMPATIBLE WIRELESS STANDARDS:

- 2G/3G/4G/5G(FR1): Encompassing a wide range of cellular technologies
- GNSS/A-GNSS: Global Navigation Satellite System and Assisted GNSS
- Wi-Fi/Bluetooth: Common short-range wireless communication standards

COMPATIBLE IOT STANDARDS:

- LTE Cat NB1(NB-IoT)/Cat-M1(e-MTC): Cellular standards tailored for IoT (Internet of Things) devices

WIRELESS OTA (OVER-THE-AIR) SOFTWARE:

- Supports antenna and OTA testing
- Provides visual data analysis for the wireless performance of devices

TESTING ANTENNA AND ARRAY:

- High-gain high-power testing antenna array for accurate and reliable measurements
- Positioner and wave-transparent fixture for precise positioning of devices during testing

MODULAR STRUCTURE:

- Modular design for flexibility
- Compact size for ease of installation and relocation



Figure 1: RC5000 Reverberation Chamber

TESTING FUNCTIONS:

- SISO (Single Input Single Output) TRP/TIS (Total Radiated Power/Total Isotropic Sensitivity) test
- 4x4 MIMO (Multiple Input Multiple Output) throughput testing.
- Passive antenna gain measurement
- Desense testing: Evaluating the impact of one wireless system on another
- ICS (Inter-Channel Spacing) testing: Examining the separation between communication channels
- CA (Carrier Aggregation) testing with 2CC/3CC/4CC: Assessing the performance of aggregated carriers
- Anti-jamming testing: Evaluating the device's ability to operate in the presence of interference



Figure 2: Chamber Interior View

In contrast to traditional anechoic chambers, where absorbers play a crucial role but may pose challenges related to chemical evaporation, a reverberation chamber does not rely on absorbers. This absence of absorbers enhances environmental friendliness and promotes a healthier testing environment, as it eliminates the introduction of chemicals into the chamber and their subsequent slow evaporation, which can affect the user experience over time.

The RC1100 specializes in WiFi device testing; the RC200 functions as an all-in-one production testing system incorporating integrated instruments, while RC5000 is designed for Over-the-Air (OTA) performance testing of large-sized Devices Under Test (DUTs) like smart home appliances, televisions, refrigerators, air conditioners, washing machines, and other wireless-enabled devices. It also extends its capability to perform OTA testing for mobile terminals, data modules, smart wearables, and more.

The RC series products offer distinct advantages over other reverberation chambers including:

- **Innovative Reverberation Chamber:** we introduced a cutting-edge five-axis stirring reverberation chamber, guided by fundamental principles, to significantly boost testing accuracy. This development involves the dynamic rotation of the positioner and the incorporation of horizontal and vertical stirrers, with the latter being movable to enhance field uniformity
- **Customized Chamber Design:** we go beyond standard products by offering the flexibility to design customized chambers tailored to the specific spatial constraints of individual customers. This unique approach ensures the maximization of the quiet zone size, even within limited spaces, providing a tailored solution for diverse testing need
- **Domestic Manufacturing Excellence:** we take pride in manufacturing these products in China, featuring self-developed key components such as probe antennas and core testing algorithms. The emphasis on domestic manufacturing is underscored by a high percentage of locally sourced materials, showcasing a commitment to quality and self-sufficiency
- **Flexible and Stable Software Platform:** The system leverages a high-performance software platform built on the principle of “high cohesion and low coupling.” This design philosophy not only enhances the current system’s flexibility and stability but also allows for convenient future upgrades. Notably, this includes the facilitation of customized anti-jamming testing, showcasing adaptability to evolving testing requirements

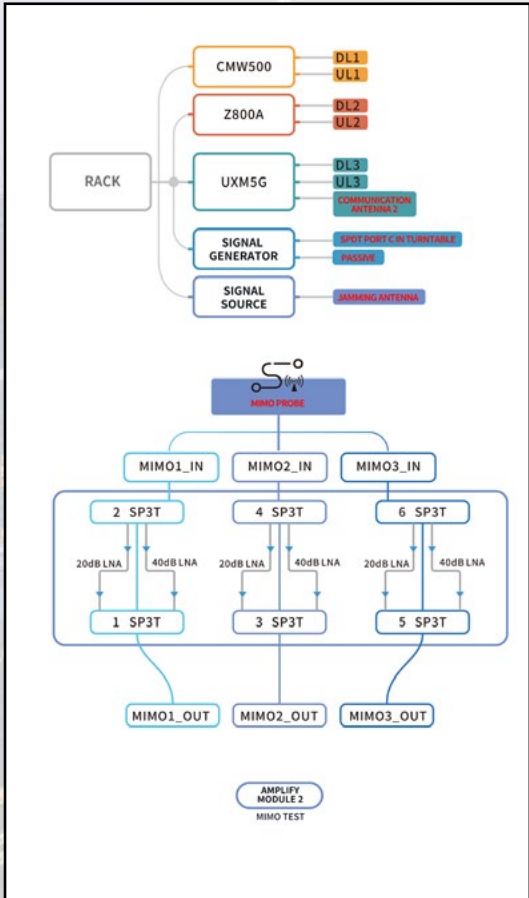
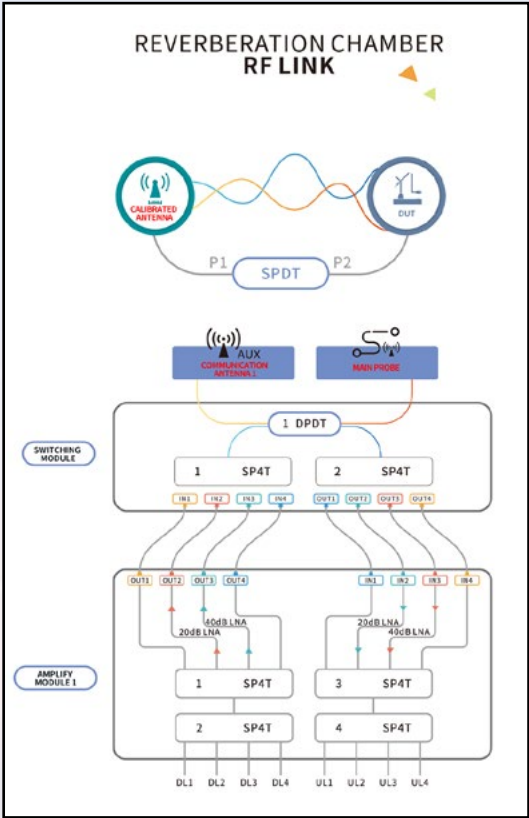
OTA TESTING SOFTWARE

The control and test automation software operates on the .NET Framework 4.0 platform, ensuring full compliance with CTIA test standards and continuous updates to align with the latest specifications. The software offers versatile applications, adaptable configurations, streamlined test processes, stable operation, and a user-friendly GUI. It caters to diverse test requirements throughout the product life cycle, spanning R&D, pre-certification, conformance, and QA in manufacturing.

Following principles of automation, efficiency, and comprehensiveness, the reverberation chamber software system is divided into two parts: calibration and testing.

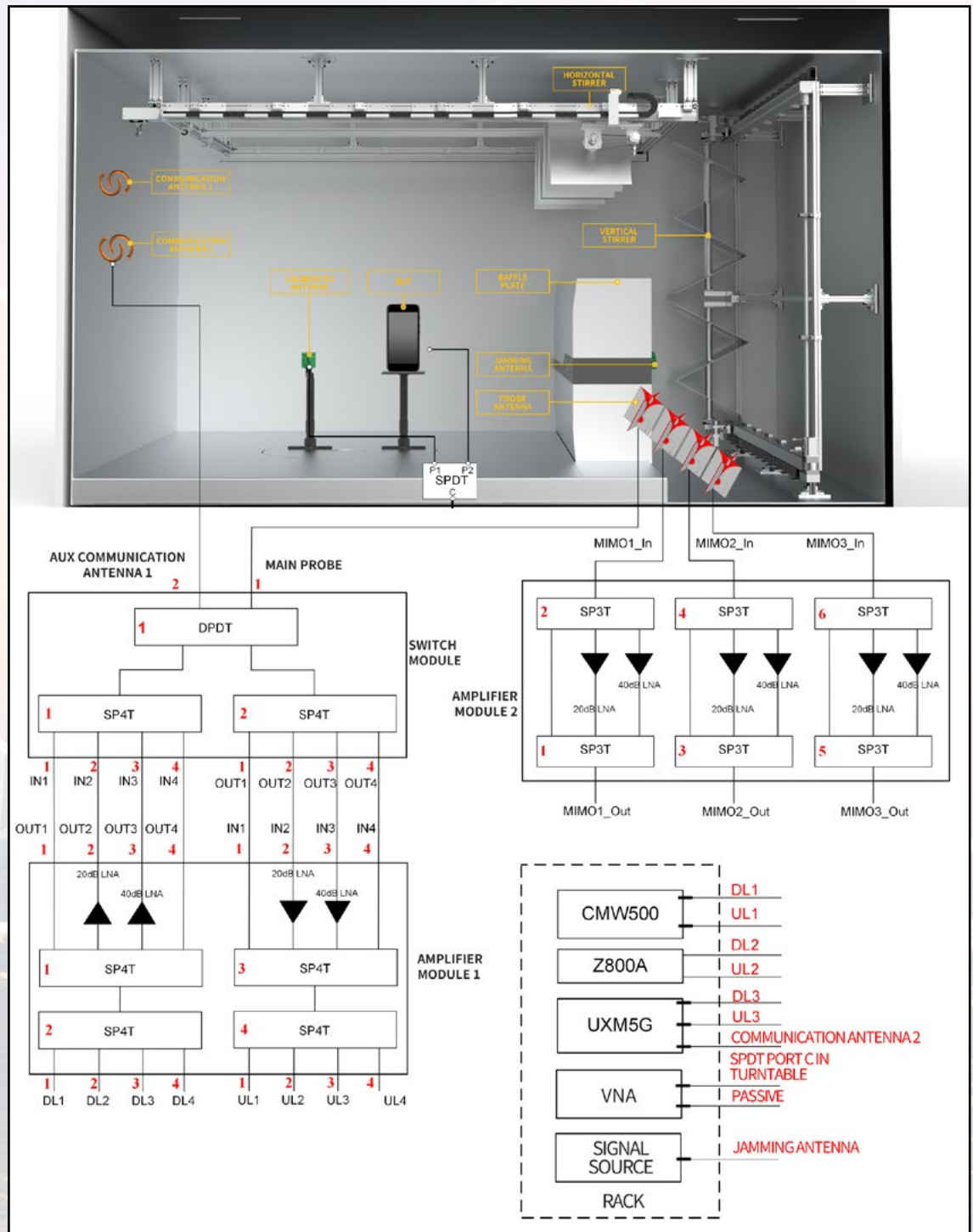
The calibration software facilitates comprehensive calibration for each signal link in the hardware system, consolidating calibration data into pathloss files required by the testing software. User-friendly and efficient, it serves as an ideal assistant tool for calibration personnel.

The testing software integrates chamber, positioner, stirrers, instruments, and other hardware components, enabling seamless control, communication, and data processing throughout the testing process. Noteworthy advantages include quick configuration, one-click testing, real-time viewing of report charts, and synchronized monitoring of system status.



Key testing items encompass Gain, Efficiency, TRP, TIS, and 4x4 Throughput. Here are some other notable features.

- Customizable test steps, angles, and configurations based on user preferences
- Utilization of built-in templates with preconfigured parameters compatible across different instruments and test platforms, ensuring simplicity and preventing operational errors
- Batch processing function for creating task lists, enabling continuous and automated unattended tests
- Comprehensive management of raw test data and log files, ensuring traceability and non-modifiability of the test process.
- Inclusion of a variety of test assistant functions, such as anti-drop-call, auto-recall, and abnormal situation warnings, enhancing the reliability and smoothness of test processes
- Flexibility for arbitrary selection of test points to review all associated test data



TECHNICAL SPECIFICATIONS	
Model Name	RC5000
Frequency Range	400MHz-7.25GHz (Option 400MHz-50GHz)
Shielding	400MHz-1GHz≥100dB Plane Wave
	1-18GHz ≥100dB Microwave
	18-50GHz ≥90dB Microwave
Power (W)	160-220 (Typical)
Exterior Dimensions (mm)	5000×3000×4000 (L×H×W)
Max. DUT Size (mm)	2500×1500×2500 (L×H×W)
Max. DUT Weight (kg)	150
Test Accuracy (dB)	≤1

RC5000	
Hardware	Shielding enclosure and door, stirrers, wideband antenna, RF switch module and cables, positioner, system controller and fixture

TESTING SOFTWARE MODULES AND TESTING ITEMS	
Basic Control Software	Including system control, instrument driver and passive test
GSM/GPRS/EGPRS/CDMA/CDMA 1xRTT	TRP/TIS
WCDMA/CDMA 1xEVDO	TRP/TIS
TD-SCDMA	TRP/TIS
Wi-Fi	TRP/TIS/Throughput
LTE SISO (FDD/TDD)	TRP/TIS
5G FR1 SISO (NSA/SA)	TRP/TIS
LTE/FR1 MIMO 2×2	Data Throughput
LTE/FR1 MIMO 4×4	Data Throughput
BeiDou	TIS
RTS MIMO OTA	FDD/TDD Throughput
Desense	Wi-Fi/Cellular
NB-IoT/Cat-M	TRP/TIS/EIRP/EIS

INSTRUMENTS SUPPORTED	
VNA	Keysight, R&S, Anritsu etc.
Signal Generator	Keysight E4438C, Keysight MXG N5182B, Spirent GSS6100/6300, GSS6560/6700 etc.
Wireless Test Set	Keysight UXM E7515A/B, Keysight 8960 (E5515C), R&S CMW500, CMX500 CMU200, Anritsu MT8820C/8821, MT8860C, MT8000, StarPoint SP6010

SERVICE & TECHNICAL SUPPORT	
System Calibration	Annual service during warranty period
Product Warranty	Free upgrades for 12 months
Software Upgrade	Free upgrades for 12 months



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