

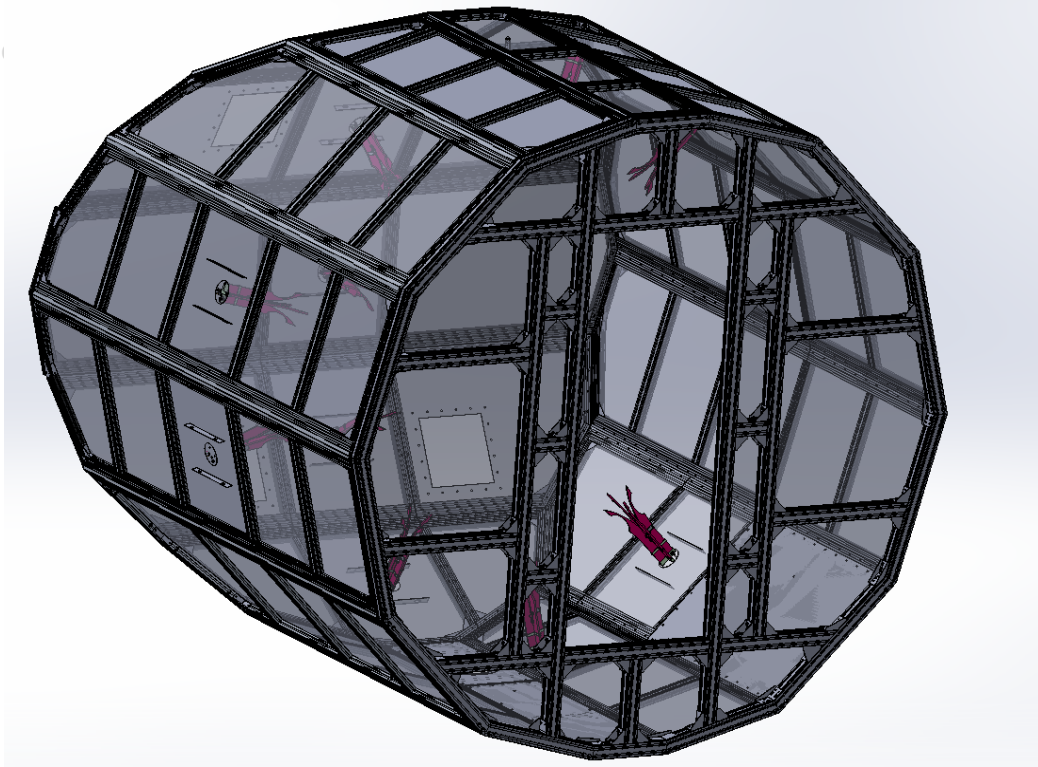
General Test Systems (GTS) Inc.

RayZone2800

Innovations Make MIMO OTA Simple



- Full Function: 2G/3G/4G, GPS/A-GPS, BeiDou, Wi-Fi, Bluetooth
- NB-IoT, Cat-M
- SISO, True 3D MIMO 2×2, 4×4
- Antenna Measurement, Full Band Fast Sensitivity Sweep
- Certified Level of Accuracy
- Compact, Fast, Accurate, Easy to Install and Reassemble



Specifications

RayZone2800 is designed for MIMO OTA (Over-the-air) test. Accurate, fast, compact, short lead-time and affordable, RayZone2800 provides the unprecedented solution and sets up a new benchmark for MIMO OTA test system.

RayZone2800 software supports all mobile standards and internet of things communication standards, including 2G/3G/4G/4.5G/5G SISO/MIMO OTA test, Wi-Fi, GPS and NB-IoT/eMTC. Especially, this innovative solution delivers true 3D MIMO OTA test for both 2×2 and 4×4 with fast test ability.

All the advantages of the powerful functions, high accuracy, fast speed, compact size, easy to install/reassemble/relocate, make RayZone2800 the best choice for a mobile phone OTA test system.

Size (L×W×H)	3m × 3m × 2.9 m
Quiet Zone (QZ)	Φ42 cm
Reflection Level (in QZ)	< -32 dB
Antenna Pattern Accuracy	±0.5 dB
Probe Antenna Coupling	< -40 dB
Turn Table Max Load	20 kg
Turn Table Max Speed	40°/s
φ-Resolution	0.5°
θ-Resolution	15°
Door (H×W)	1900mm × 700mm
Shielding Effect	>90 dB (600MHz - 6GHz)
Measurement Path	1.1 m
Number of Antennas	2×11+1
RF Interfaces	4 SMA In/Out, 1 calibration
Power	AC 220/110 V
Control Interface	RS 232
Hardware Structure	On-site Assembly & Reassembly



Certified Level of Accuracy

Quiet Zone (QZ): 42 cm Reflection in QZ: <-32dB Uncertainty by Chamber: <0.1dB

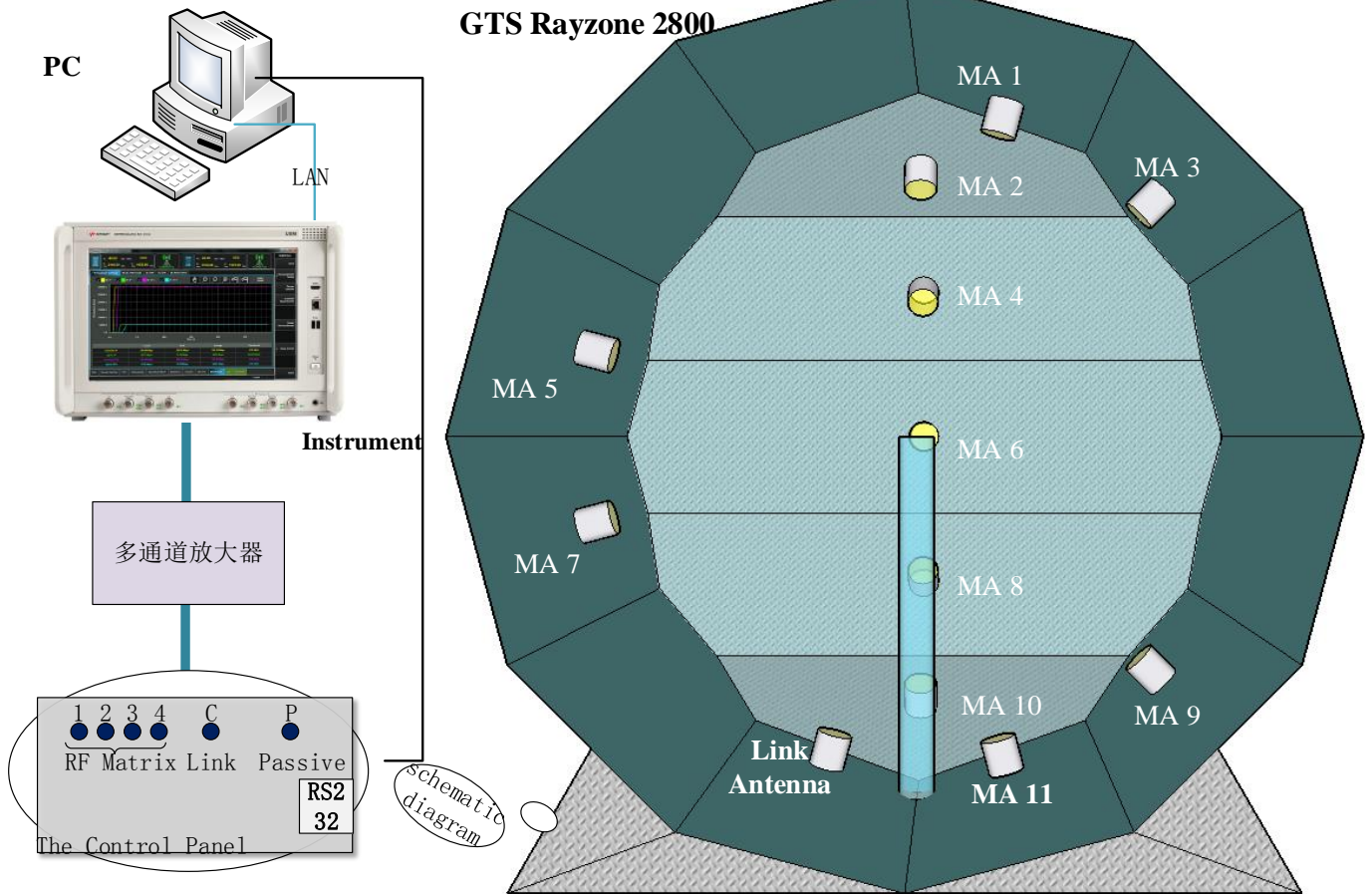
Frequency	700MHz	1GHz	3GHz	5GHz	10GHz	15GHz	24GHz
Reflection	-42 dB	-45 dB	-50 dB	-55 dB	-55 dB	-55 dB	-55 dB

MIMO OTA test urges a lower reflection within the Quiet Zone (QZ) in an anechoic chamber than SISO, which presents a sizable challenge for chamber design, especially with the target size being small enough to fit in an ordinary office. A SISO chamber with a measurement 0.6 SSD* can pass the CTIA certification, but it is not good enough for MIMO. For example, a reflection larger than -30dB in QZ would meet the requirement of SSD to be 0.6, but this reflection could cause 0.6dB errors in MIMO OTA test, which is too big to be accepted.

Utilizing system level simulations, custom-designed high performance absorbers, narrow beam probe antennas, and 3D distributed multi-probe antennas, the reflection in the QZ of RayZone2800 reaches -32dB across all the frequency band, which ensures a small measurement error caused by the chamber.

The size of RayZone2800 is 3m × 3m × 2.9m and QZ is 42cm in diameter, which makes RayZone2800 the smallest chamber for the 3D MIMO OTA test system with a certified level of accuracy.

* SSD (Surface Standard Deviation), Test Plan for Wireless Device Over-the-air Performance. CTIA



2×2 & 4×4 MIMO OTA Test Under 2D/3D Channel Model

Unique Function, Fastest, Compact

RayZone2800 supports all mobile standards, Wi-Fi, GPS, especially MIMO OTA throughput measurements. With 11 dual polarization probe antennas distributed on a spherical surface, the system perfectly implements Radiated Two-Stage (RTS*) method to measure 2×2 & 4×4 MIMO data throughput under both 2D and 3D channel models. Through this unique advantage, RayZone2800 provides cellphone and antenna companies with a powerful, cost effective test solution necessary to develop high performance products.

GTS has devoted many years of time to fundamental research on RTS, including algorithm, software and hardware implementations. Achievements include fast measurement algorithms, methods to eliminate the effect of reporting uncertainty, implementations of 4×4 inverse matrix, minimizing errors caused by the chamber and probes, minimizing chamber size while maintaining a big enough QZ, and etc. With all these achievements, RayZone2800 is recognized as the best MIMO OTA solution.

* Wei Yu, Yihong Qi, "Radiated Two-Stage Method for LTE MIMO User Equipment Performance Evaluation", *IEEE Trans. ON Electromagnetic Compatibility*, Vol56, No.6, Dec. 2014

	RTS/ MPAC (CTIA)	RayZone2800 Fast Test
2D MIMO OTA (UMi& UMa)	120 min	25 min
3D MIMO OTA	14 h (estimated)	40 min (estimated)

	CTIA	RayZone2800 Fast Test
SISO TIS (GSM)	40 min	6.5 min
SISO TIS (Wi-Fi)	160 min	5 min

20 Times Faster 3D MIMO

Fast & Accurate

Mobile phone companies want to improve the data throughput of mobile terminals which is related to user experiences. The standard MIMO OTA test system like MPAC is considered to be slow, high cost, and too large to fit in office buildings, and MIMO OTA measurement under full 3D channel models is even impracticable.

With the patented technology, GTS provides 20 times faster 3D MIMO OTA test solution without the expenses of accuracy. RayZone2800 brings customers much higher efficiency and cost-saving benefits. The MIMO OTA test will no longer be a big headache for the R&D teams to meet their deadlines.

Compact

Easy to Install, Relocated

RayZone2800 is designed to fit in ordinary office spaces. It can be easily assembled by light building modules, and it is also easy to be reassembled when the customer wants to relocate the test facility.

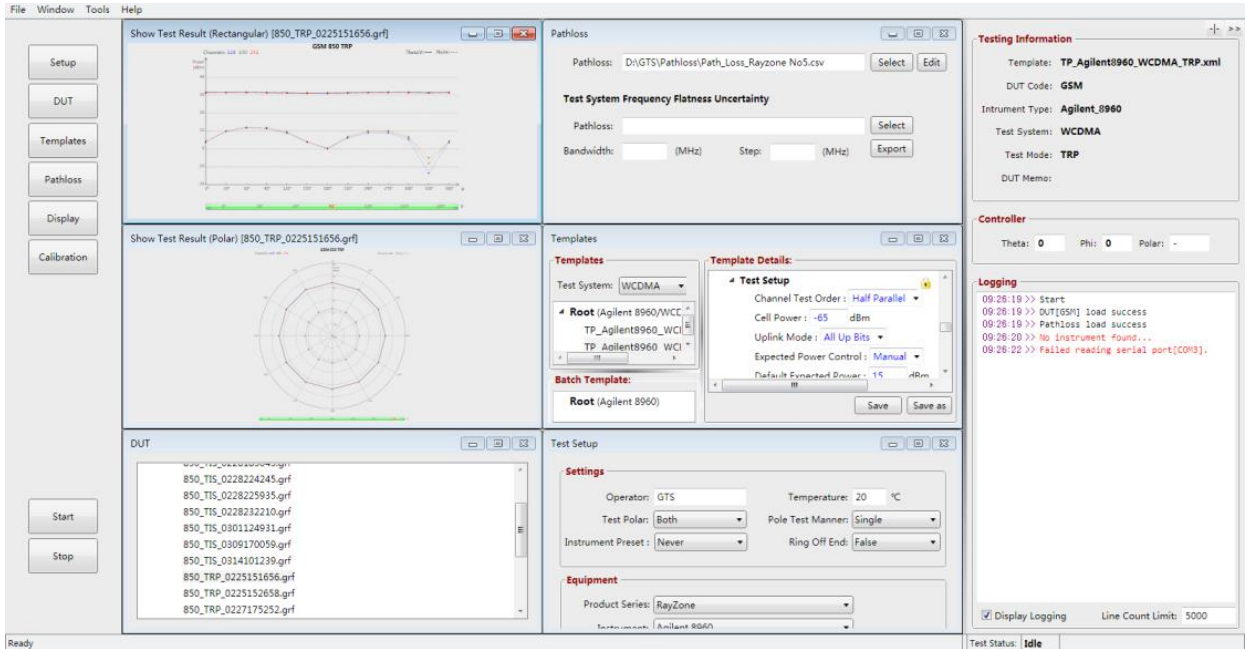
Locate Problems by Measurement

R&D Assistant

For engineers, the final test results, such as TRP/TIS/throughput, is not sufficient to identify problems during mobile phone R&D. They would also like to know the performances of each related parts in order to improve the capabilities of the whole device under development.

A few factors affect the MIMO throughput, for instance, the chipset, number of antennas, performance of each antenna, balance between antennas, envelope correlation coefficient (ECC), sensitivity of each receiver.

RayZone2800 provides the full functions for testing parameters of each part mentioned above. With this powerful diagnostic tool, R&D engineers will be able to locate problems by quantitative analyses of each performance related part to improve mobile devices more efficiently.



RayZone Software: MaxSign100

User-Friendly UI, Extensible

MaxSign100 test software is developed based on Net Framework 4.0 platform, implementing full CTIA test procedure and updated to follow the newest version of CTIA standard. The software is user-friendly, easy to operate, robust and stable. MaxSign100 can also be customized to measure R&D, pre-compliance, certification and production line parameters.

Measurements

- Gain
- Directivity
- Beamwidth
- Sidelobe Level
- Efficiency
- TRP
- TIS
- EIRP
- EIS
- NHPRP
- NHPIS
- ICS
- Radiation Pattern
- Desense
- Throughput

MaxSign 100 features:

High Test Efficiency

Reduced drop-calls significantly during the test procedures; Resume-on-error ability; Optimizing driver of the instruments to accelerate test speed.

Powerful Test Data Management

Measured raw data is protected by encryption; Logging system to track the test procedure in details.

Batch Test

Create batch test list to accomplish a few measurements by one click.

Easy to Operate

Selecting from abundant test templates, Users will enjoy ease of operation without worrying about numerous parameter settings on different instruments.

Powerful Data Visualization.

A 3D-view test data processing/analyzing tool is provided, optimized for UE antenna characterization.

Configuration & Order info

RayZone2800 Shielding Enclosure	
Chamber	Absorbers, Shielding Door, Dual Polarized Narrow Beam Probe Antennas, RF Switch Box, RF Cable, Positioner, System Controller and etc.

Services and Maintenance	
Calibration	On-site Annually
Maintenance	Free for 1 st Year
s/w Upgrade	Free for 1 st Year

Supported 3 rd Party Instruments	
Base station Emulator	Keysight UXM E7515A, Keysight E5515C 8960, R&S CMW500, R&S CMU200, Anritsu MT8820C, Anritsu 8860C, StarPoint SP6010
VNA	Keysight, R&S, Anritsu
Signal Generator	Keysight E4438C, Keysight MXG N5182B, Spirent GSS6100/6300, Spirent GSS6560/6700
Channel Emulator	Spirent VR5, Anite FS8

Max Sign 100 Software Modules	
MaxSign V2.1 Base Module	System Control/Passive Test
PatternPad	3D Data Viewer
GSM/GPRS/EGPRS/CDMA/CDMA 1xRTT	TRP/TIS/EIRP/EIS/ICS
WCDMA/CDMA 1xEVDO	TRP/TIS/EIRP/EIS/ICS
TD-SCDMA	TRP/TIS/EIRP/EIS/ICS
Wi-Fi	UE/AP TRP/TIS/Throughput
LTE SISO (FDD/TDD)	TRP/TIS/EIRP/EIS/ICS
LTE MIMO 2x2	Data Throughput
LTE MIMO 4x4	Data Throughput
LTE ECC	Passive ECC/Active ECC
WCDMA ECC	WCDMA Active ECC
GPS / A-GPS	C/No/EIS/TIS
BeiDou	TIS
Desense	Wi-Fi/Cellular/GPS
RTS MIMO OTA	FDD/TDD Throughput (Android Platform)
NB-IoT/Cat-M	TRP/TIS/EIRP/EIS

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Simple · Accurate · Fast