DATASHEET

The Wireless Connector®

RC-01-0202

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The Wireless Connector®

Millimeter-wave over-the-air measurement chamber

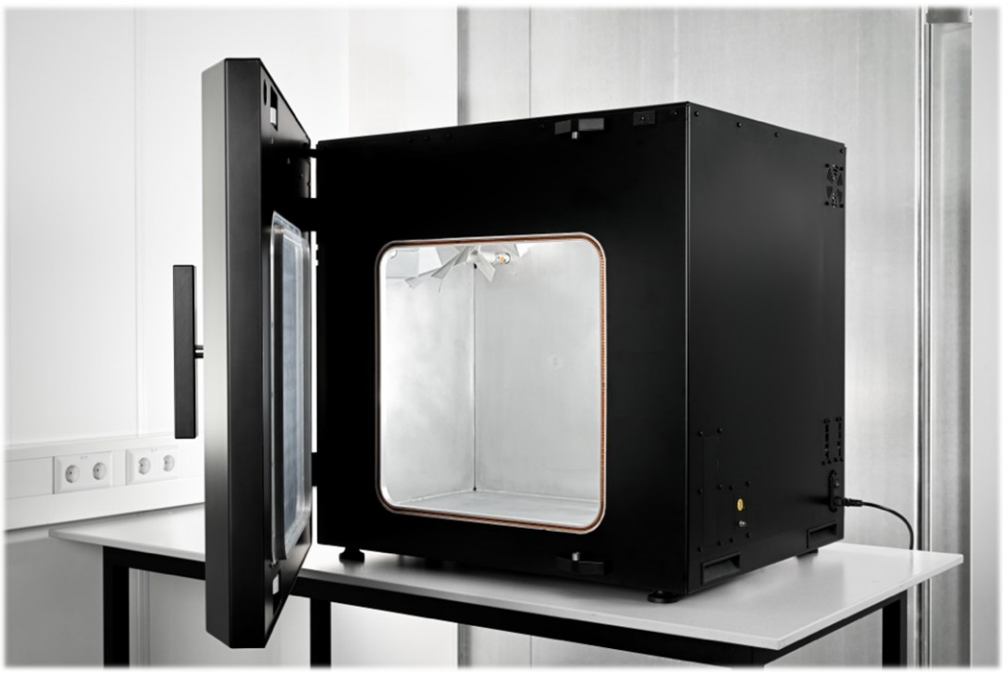
The Wireless Connector® is a tabletop measurement chamber for testing radiated or received power spectral density of integrated wireless devices. This document provides an overview of the specifications of the system.

Overview

The Wireless Connector® type RC-01-0202 is a tabletop shielded reverberation chamber for fast over-the-air measurements of metrics related to power spectral density. Type RC-01-0202 covers the 5-140 GHz band.

The chamber includes two mode-stirring mechanisms and a reflective pyramid at the ceiling for optimal performance when the DUT is placed inside a dedicated region. The chamber has two bulkhead feedthroughs with RF and DC heads supporting integration of reference antennas, and connections to the DUT. The chamber has a third panel in the ceiling for integration of calibration and extension modules.

An integrated control panel with GUI is included to control the measurement system and process the data. The chamber can also be controlled with an API. The software allows automatic connection with Spectrum Analyzers of several selected vendors.



Inside of the measurement chamber.

Key Features

The Wireless Connector® type RC-01-0202 has the following key features:

- Full spectrum testing in Tx and Rx (PSD, ACLR, out-of-band emissions, LOFT, etc.)
- Software to control and calibrate the chamber, and for data processing and analysis
- Software to control and connect automatically to selected-vendor instruments
- Custom bulkhead feedthroughs for access to the DUT
- Fast mode for accelerated testing
- Specified working volume for easy configuration and set up
- Fully electromagnetically shielded
- Connector panels for DUT and for reference antennas

Supported Use Cases

The Wireless Connector® type RC-01-0202 supports, among others, the following use cases:

- Radiated and received power spectral density testing for both modulated and CW signals
- Mapping of TRP reduction for wide scan angles in phased arrays
- Fast feedback of RFIC bias settings for optimized performance
- Detection of time-varying spurious emissions
- Out-of-band emissions for radar and telecommunication applications
- Spectrum testing for communications (e.g. spectral regrowth, ACLR)
- Testing of harmonic distortion and compression in modules with power amplifiers
- System gain and efficiency testing for various beamforming settings in phased arrays
- Antenna efficiency testing of passive modules
- EMC testing for radiated emissions and immunity in the mmWave band
- Spectrogram of FMCW radars
- Etc..

Services

Included with purchasing The Wireless Connector® is installation, warranty and training.

System Specifications

RC-01-0202: Reverberation chamber

DESCRIPTION	SPECIFICATION (NOMINAL)	ADDITIONAL INFORMATION
Construction	Aluminum body	
Length (external / internal)	846 mm (33.3″) / 800 mm (31.5″)	
Depth (external / internal)	803 mm (31.6″) / 528 mm (20.8″)	
Height (external / internal)	808 mm (31.8″) / 695 mm (27.4″)	501 mm (19.7″) to the tip of the pyramid in the ceiling
Volume (external / internal)	0.466 m^3 / 0.257 m^3	
Weight	55 kg (121 lbs.)	
Frequency range	5 – 140 GHz	Verified frequency range. The product can be used up to at least 170GHz.
Empty chamber losses	5 GHz: 15.2 dB 10 GHz: 20.1 dB 15 GHz: 23.8 dB 20 GHz: 25.6 dB 25 GHz: 27.8 dB 30 GHz: 29.5 dB 35 GHz: 31.0 dB 40 GHz: 32.1 dB 45 GHz: 33.2 dB 50 GHz: 33.9 dB 55 GHz: 35.2 dB 60 GHz: 36.6 dB 65 GHz: 36.8 dB 70 GHz: 37.3 dB 75 GHz: 38.0 dB 80 GHz: 38.5 dB 85 GHz: 39.1 dB 90 GHz: 39.7 dB 95 GHz: 40.2 dB 100 GHz: 40.7 dB 105 GHz: 41.1 dB 110 GHz: 41.5 dB 115 GHz: 41.9 dB 120 GHz: 42.4 dB 125 GHz: 42.7 dB 130 GHz: 43.1 dB 135 GHz: 43.5 dB 140 GHz: 43.8 dB	The provided losses are typical values; actual losses may vary slightly. Each chamber is individually measured and calibrated. The empty chamber loss values are supplied with the product upon delivery.
Operating voltage	110 – 230 V AC (+/- 10%)	Euro C13 connector
Typical power consumption	60 W	
DUT region	300 x 300 x 300 mm (11.8″ x 11.8″ x 11.8″)	Optimized region in the chamber for a phased array scan angle range of -60° to 60°

Connectivity ports	4x USB 3.0 2x RJ45 Ethernet 1x HDMI	 1x for connection to local measurement instrumentation 1x for remote control For external display
Display size	12″ (Multi-touch)	
Display resolution	1920 x 1080 pixels	
Operating temperature	10 – 30 °C	
Operating humidity	20 – 80 % (non-condensing)	
Operating altitude	Max. 2000 m	
Storage temperature	5 - 50 °C	

CT-02-0104: Chamber control box

DESCRIPTION	SPECIFICATION (NOMINAL)	ADDITIONAL INFORMATION
Stirrer stepped rotation		
Step size	0.1 °	
Range	0 - 360 ° (continuous rotation)	
Speed	2 rpm (12 °/s)	
Acceleration	120 °/s^2	
Stirrer continuous rotation		
Step size	0.1 rpm (0.6 °/s)	
Range	0 – 20 rpm	
Acceleration	120 °/s^2	

Calibration modules

CT-01-0104: RF control box for calibration modules

CT-01-0201: Calibration module 18 – 55 GHz

DESCRIPTION	SPECIFICATION (NOMINAL)	ADDITIONAL INFORMATION
Frequency range	18 – 55 GHz	
Maximum output power	3 dBm	

CT-01-0301: Calibration module 55 – 90 GHz

DESCRIPTION	SPECIFICATION (NOMINAL)	ADDITIONAL INFORMATION
Frequency range	55 – 90 GHz	
Maximum output power	-3 dBm	

CT-01-0401: Calibration module 90 – 140 GHz

DESCRIPTION	SPECIFICATION (NOMINAL)	ADDITIONAL INFORMATION
Frequency range	90 – 140 GHz	
Maximum output power	3 dBm	

Connector panels

FT-04-01XX: Connector panel Reference Antenna

DESCRIPTION	SPECIFICATION (NOMINAL)	ADDITIONAL INFORMATION
RF Connection option		
Option 01	Empty	FT-04-0101
Option 02	1x Waveguide	FT-04-0102: WR band
Option 03	1x 1.85mm Coax	FT-04-0103: 0-67 GHz
Option 04	1x 1.85mm Coax 1x Waveguide	FT-04-0104: 0-67 GHz / WR band
Option 05	1x 2.92mm Coax	FT-04-0105: 0-40 GHz
Option 06	1x 1.85mm Coax 1x 2.92mm Coax	FT-04-0106: 0-67 GHz
Option 07	2x Waveguide	FT-04-0107: WR band
Dimensions (inner / outer)	70 x 45 x 8 mm (2.76″ x 1.77″ x 0.31″) 106 x 81 x 8 mm (4.17″ x 3.19″ x 0.31″)	

FT-04-02XX: Connector panel DUT

DESCRIPTION	SPECIFICATION (NOMINAL)	ADDITIONAL INFORMATION
RF Connection option		
Option 01	Empty	FT-04-0201
Option 02	4x 2.92mm Coax 2x BNC 1x Ethernet/USB 1x Waveguide	FT-04-0202: 0-40 GHz + WR band, with Ethernet/USB
Option 03	4x BNC 2x 1.85mm Coax 1x Ethernet/USB 1x Waveguide	FT-04-0203: 0-67 GHz + WR band, with Ethernet/USB
Option 04	4x 1.85mm Coax 2x BNC 1x Ethernet/USB 1x Waveguide	FT-04-0204: 0-67 GHz + WR band, with Ethernet/USB
Option 05	2x 2.92mm Coax 4x 1.85mm Coax 4x BNC 1x Waveguide	FT-04-0205: 0-67 GHz + WR band, without Ethernet/USB
Option 06	4x 2.92mm Coax 4x 1.85mm Coax 6x BNC	FT-04-0206: 0-67 GHz, without Ethernet/USB

Option 07	2x 1.85mm Coax 4x 2.92mm Coax 4x BNC 1x Ethernet/USB	FT-04-0207: 0-67 GHz, with Ethernet/USB
Dimensions (inner / outer)	170 x 47.6 x 8 mm (6.69″ x 1.87″ x 0.31″) 200 x 90 x 8 mm (7.87″ x 3.54″ x 0.31″)	

FT-05-XXXX: Custom connector panel DUT

DESCRIPTION	SPECIFICATION (NOMINAL)	ADDITIONAL INFORMATION
RF Connections	Custom	
Power Connections	Custom	
Connectivity ports	Custom	
Dimensions (inner / outer)	170 x 47.6 x 8 mm (6.69″ x 1.87″ x 0.31″) 200 x 90 x 8 mm (7.87″ x 3.54″ x 0.31″)	

RA-05-0101: Reference Vivaldi antenna 5-40 GHz

Each antenna is individually measured and calibrated. The antenna efficiency values are supplied with the product upon delivery.

DESCRIPTION	SPECIFICATION (NOMINAL)	ADDITIONAL INFORMATION
RF Connection	2.92mm Coax	
Dimensions	17.0 x 52.3 x 71.1 mm (0.67″ x 2.06″ x 2.80″)	

RA-01-0101: Reference Vivaldi antenna 18-55 GHz

Each antenna is individually measured and calibrated. The antenna efficiency values are supplied with the product upon delivery.

DESCRIPTION	SPECIFICATION (NOMINAL)	ADDITIONAL INFORMATION
RF Connection	1.85mm Coax	
Dimensions	17.0 x 32.9 x 62.3 mm (0.67″ x 1.30″ x 2.45″)	

RA-02-0101: Reference OEWG antenna 55-90 GHz

Each antenna is individually measured and calibrated. The antenna efficiency values are supplied with the product upon delivery.

DESCRIPTION	SPECIFICATION (NOMINAL)	ADDITIONAL INFORMATION
RF Connection	WR12 Waveguide	
Gain	6.5 dBi	
Return loss	9 dB	
Dimensions	19.1 x 19.1 x 30.5 mm (0.75″ x 0.75″ x 1.20″)	

RA-03-0101: Reference OEWG antenna 90-140 GHz

Each antenna is individually measured and calibrated. The antenna efficiency values are supplied with the product upon delivery.

DESCRIPTION	SPECIFICATION (NOMINAL)	ADDITIONAL INFORMATION
RF Connection	WR8 Waveguide	
Gain	6.5 dBi	
Return loss	9 dB	
Dimensions	19.1 x 19.1 x 25.4 mm (0.75″ x 0.75″ x 1.00″)	

Supported Measurement Instruments

The Wireless Connector® simplifies your measurement setup by automating control of your measurement equipment. The following instruments are currently supported:

Spectrum Analyzers (for spectrum application):
- Keysight PXA Signal Analyzer
- Rohde & Schwarz FSW Signal and Spectrum analyzer

Vector Network Analyzers (for chamber calibration without calibration module):
- Keysight PNA/PNA-X Network Analyzer
- Rhode & Schwarz ZNA Vector Network Analyzer

Oscilloscopes (for FMCW application):
- Tektronix MSO (high sample rate required)
- Keysight DSO (high sample rate required)

This list of supported equipment is continuously expanding as more devices are added over time.

Supported Software Versions

The API provides a way to interact with The Wireless Connector®, enabling automation of your measurements through simple commands. The API is available in both MATLAB and python. No additional toolboxes are required. To ensure full functionality, make sure your setup meets the minimum version requirements:
- MATLAB: Version 2023b or later
- Python: Version 3.8 or later

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