F9660A 3D Multi-Probe Anechoic Chamber (MPAC)

Millimeter-wave over-the-air measurement chamber

Introduction

The Keysight F9660A 3D Multi-Probe Anechoic Chamber (MPAC) is a shielded anechoic chamber for testing RRM 2 AoA with 6 probes or NR MIMO Performance with a choice of 2, 6 or 8 probes.

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Overview

Keysight 5G 3D MPAC OTA Test Bed is a multiprobe anechoic chamber for 5G device testing. 3D MPAC supports up to 36 RF heads that are connected to a set of dual-polarized feed antennas arranged on azimuth and elevation arcs to simulate variable angles of arrivals or multiple beams for different test needs. The device-under-test (DUT) is placed in a software-controlled positioner, capable of providing full spherical coverage.

Key Features

The key features of Keysight 3D MPAC OTA Test Bed are:

- Direct Far Field, Frequency Range 2
- Fully shielded and filtered with extensive connectivity
- Low path loss
- Lightweight chamber with small footprint
- Modular structure for easier transportation and installation
- Laser-guided crosshair for accurate DUT placement
- Camera and interior lighting for monitoring operation
- Effective cooling through forced air ventilation
- Software to provide positioner control, chamber calibration, and coordinate system mapping

Supported Use Cases

Keysight 3D MPAC OTA Test Bed supports, for example, the following use cases:

- MIMO OTA testing
- Dynamic Beam Management testing
- Radio Resource Management testing (multiple AoAs)
- Software protocol testing with various antenna configurations
- RF module testing
- Antenna testing (white box testing)
- Wireless cable connection (black box testing)
- Protocol / Demodulation / RRM (black box testing)

Contact Keysight to discuss about further use cases as the OTA Test Bed performance is a task to evaluate with care.

System Specifications

F9660A: Anechoic chamber

Description	Specification (nominal)	Supplemental information
Construction	Modular chamber with 3 pieces to enable easier transportation	Aluminum frame and aluminum panels
Height (external / internal)	2210 mm / 1820 mm	With RRHs and wheels
Width (external / internal)	2730 mm / 2400 mm	Total width of assembled chamber
Depth (external / internal)	1315 mm / 980 mm	Including connector / switch panel covers, door, and handle
Weight	454 kg (1001 lb)	Weight of assembled chamber with positioner. Excluding external devices needed for fully functional setup (RRHs, Rooks, PRN, and Switch driver)
Anechoic treatment	50 mm corrugated anechoic foam	
Enclosure frequency range	24 – 42 GHz	Upgrade required to cover 48 GHz
Operating voltage	24 V DC, 5 A	External power supply 100 – 240 V, 50/60 Hz, 1.4 A
Power consumption for NR MIMO Power consumption for RRM 1 AoA	<500 W <1150 W	With Positioner, excluding RRHs
DUT positioning	Laser-based Wavelength: 635 nm Max power: 7 mW	Two crosshair lasers for exact positioning of the DUT
Illumination	LED-based	
Camera	USB output	
Ventilation	Two honeycomb structures with 2 fans for forced air flow	
Operating temperature	22 ± 10 °C (71 ± 18 °F)	
Relative humidity	50 % RH ± 20 % RH	

F9660A: RF connector panel

Description	Specification (nominal)	Supplemental information
RF connections	8 x SMA (f) 2 x 2.4 mm (f) 2 x BNC	 Calibration antenna Trigger IN/OUT

F9660A-001: DUT connector panel

Description	Specification (nominal)	Supplemental information
Power ports	1 x DC power 1 x DC power 1 x AC power	for Chamber for DUT for Positioner, 100 – 240 V, 10 A, 1-phase
Connectivity ports	4 x USB 3.0 Type A 1 x RJ45 Ethernet	 PoE+, compliant for power over the ethernet requirement

F9660A-PA1: DUT positioner (dual axis)

Description	Specification (nominal)	Supplemental information
Azimuth Axis		
Range	±180 °	
Resolution	0.00225 °	
Accuracy	±0.01 °	
Speed	0.5 - 72 °/s	
Acceleration	72 m/sec^2	Max value
Roll Axis		
Range	±180 °	
Resolution	0.00225 °	
Accuracy	±0.1 °	
Speed	0.5 - 72 °/s	
Acceleration	72 m/sec^2	Max value
DUT max weight	12 kg (26.46 lb)	
DUT dimensions		
Full horizontal offset	217 mm	From center of rotation to DUT holder mounting disc
Full vertical offset	360 mm	From center of rotation to Positioner base

F9660A-Dxx: DUT holders

Description	Specification (nominal)	Supplemental information
Alignment Option	DUT type	Model option
1 & 3	Smartphones and tablets	F9660A-D11
2	Smartphones and tablets	F9660A-D14

F9660A: FR2 RF characteristics

Description	Specification (nominal)	Supplemental information
QoQZ size	⌀ 30 cm	
Frequency range	0.5 – 54 GHz	
Free space path loss	$FSPL = \frac{P_T \lambda 2}{(4\pi R)^2}$	e.g., 61.4 dB @ 1.0 m, at 28 GHz
Reflectivity	< -50 dB	Measured with an empty chamber
Minimum isolation at <6 GHz	80 dB (±5 dB)	From DUT to outside of the chamber
Minimum isolation 24 – 54 GHz	60 dB (±5 dB)	

F9660A: 5 – 50 GHz dual polarized antenna

Description	Specification (nominal)	Supplemental information
Connector type	2 x 2.4 mm (f)	
Antenna frequency range	5 – 50.0 GHz	
Return loss	14 dBi at 24 GHz 16 dBi at 40 GHz	
Gain	9.5 dBi at 24 GHz 12.5 dBi at 40 GHz	
Beamwidth vs frequency	40 ° at 24 GHz 30 ° at 40 GHz	3 dB
Cross port isolation	-30 dB	Isolation between the ports
Cross-polarization	-25 dB	Coupling to cross-polarized mode compared
Cable loss to the RF head	3.6 dB	MIMO configuration, @ 28 GHz

F9660A-AA1: FR1 link antenna

Description	Specification (nominal)	Supplemental information
Connector type	SMA (f)	
Antenna frequency range	500 – 5200 MHz	
Number of link antennae	2	Maximum 4

F9660BA1A: Calibration kit (single polarized)

Description	Specification (nominal)	Supplemental information
Antenna connector	1 x 2.4 mm (f)	RF transparent holding fixture with the cable
Antenna frequency range	26.5 – 40 GHz	

F9660A-xxx: Ordering options

Description	Description
F9660A-101	3D MPAC OTA Test Bed for RRM 2 AoA with 6 probes
F9660A-102	3D MPAC OTA Test Bed for Advanced Performance Test with 6 probes
F9660A-103	3D MPAC OTA Test Bed for Advanced Performance Test with 8 probes
F9660A-104	3D MPAC OTA Test Bed for Advanced Performance Test with 2 probes