

F9652A Vertical Compact Antenna Test Range (CATR)

Over-the-air measurement chamber for millimeter-wave, NTN, and automotive radar frequencies

Introduction

The Keysight F9652A Vertical Compact Antenna Test Range (CATR) chamber can be configured for different use cases – FR2 UE, NTN UE, and Automotive Radar module manufacturing.



Overview

The Keysight F9652A Over-The-Air (OTA) Vertical Compact Antenna Test Range (CATR) chamber provides a measurement environment for characterizing wireless and antenna system performance of devices at the required frequencies for FR2 UE, NTN UE, and Automotive Radar technologies.

Key Features

The key features of Keysight F9652A Vertical CATR are:

- Compact Antenna Test Range (CATR)
 - Shielded anechoic chamber
 - Rolled-edge parabolic reflector
 - Dual polarized feed horn assembly without roll motor
 - Roll-over-azimuth DUT positioner
- Controller for feed and Device Under Test (DUT) positioners with triggered data acquisition capability
- Probe feed options for in-band only test frequency ranges
- Calibration kits for chamber validation and calibration
- LED lighting
- USB camera
- Crosshair laser guide for DUT alignment
- Chamber control software
- 3GPP FR1 and/or FR2 link antenna options
- Optional DUT and Phantom mounting fixtures
- Optional RF Automation Toolset
- Optional RF Application Toolset
- Optional Test Application
- Optional Antenna Measurement Toolset

Supported Use Cases

Keysight F9652A Vertical CATR supports, for example, the following use cases:

- Antenna characterization
- Signaling and non-signaling device characterization
- Used with Keysight S8702A RF Automation Toolset for devices
 - FR2 RF in-band Tx/Rx test cases
- Used with Keysight S8714A RF Application Toolset for devices
 - FR2 RF in-band Tx/Rx test cases
- Used with Keysight S8711A Test Application
 - FR2 RF in-band Tx/Rx testing
- Used with S7601A Antenna Measurement Toolset
 - F7601001A Antenna Pattern Measurement

Contact Keysight for a comprehensive analysis of your custom use case(s).

System Specifications

F9652A: Anechoic chamber

Description	Specification (nominal)	Supplemental information
Construction	Not applicable	Aluminum frame and panels
Anechoic treatment	100 mm pyramidal anechoic foam	
Isolation		
600 MHz – 7.125 GHz	> 70 dB	
7.125 GHz – 18 GHz	> 75 dB	
18 GHz – 50 GHz	> 75 dB	
Supported Quiet Zone sizes	40 cm	
Operating voltage	110 – 220 V AC	
Power consumption	320 W input power	
Illumination	LED-based	
Camera	HDMI DVR output	
Ventilation	Dual intakes at the bottom right side of the chamber and dual exhausts at the top left side of the chamber	

F9652A-810: Vertical CATR for FR2 UE

Description	Specification (nominal)	Supplemental information
Enclosure		
Height	2000 mm	Fully assembled
Width	1400 mm	Fully assembled
Depth	1100 mm	Fully assembled
Weight	481 kg (1060 lbs)	Fully assembled
Reflector		
Focal length	0.7 m	
Edge treatment	Rolled edge	
Quiet Zone size	40 cm	
DUT positioner		
Azimuth Axis		
Range	$\pm 180^\circ$	
Resolution	0.01°	
Accuracy	$\pm 0.1^\circ$	
Speed	45 °/s maximum	
Roll Axis		
Range	$\pm 180^\circ$	
Resolution	0.01°	
Accuracy	$\pm 0.1^\circ$	
Speed	72 °/s maximum	
DUT max weight	10 kg (22 lbs)	5.0 Nm max torque
Communications	USB 3.0	
Power requirements	110/220 V AC	320 W input power
Access panels		
Power ports	1 x AC power 1 x DC 4 x DC feedthroughs	120/220 V, 15 Amp max. 100 W max. each
Connectivity ports	2 x Ethernet RJ45 1 x Ethernet RJ45 2 x USB 3.0 Type A 1 x USB 3.0 Type A 1 x USB 3.1 Gen 2 Type C, filtered, powered 3 x BNC	100/1000/10 G, PoE 10 G 10 G, includes external power supply
RF connections	2 x SMA 50 Ω 18 GHz 3 x SMA 50 Ω 18 GHz 4 x 1.85 mm	For 0.6-5.2 GHz link ant

F9632A-AA1: 0.6-5.2 GHz link antenna

Description	Specification (nominal)	Supplemental information
Antenna frequency range	600-5200 MHz	Required quantity 2

F9632A-AB1: 24-50 GHz link antenna

Description	Specification (nominal)	Supplemental information
Antenna frequency range	24-50 GHz	

F9632A-AD1, -BA1: 24-43.5 GHz DP feed horn assembly

Description	Specification (nominal)	Supplemental information
Type	Corrugated dual-polarized horn	
Gain	15 dBi	Varies with frequency
Cross-polarization	30 dB	
Cable loss (to bulkhead)	~5 dB	Varies with frequency
Feed roll	Not applicable	

40 cm Quiet Zone performance for FR2 UE

Description	Specification (nominal)	Supplemental information
Quiet zone dimensions	40 cm diameter	
24-43.5 GHz maximum amplitude variation	2.0 dB at 24 GHz 2.0 dB at 28 GHz 2.0 dB at 39 GHz	Varies with frequency
24-43.5 GHz maximum phase variation	15 ° at 24 GHz 15 ° at 28 GHz 15 ° at 39 GHz	Varies with frequency
24-43.5 GHz path loss	52 dB at 24 GHz 53 dB at 28 GHz 55 dB at 39 GHz	Varies with frequency

F9632A-CA2: RF cable 2.4 mm 60 cm

Description	Specification (nominal)	Supplemental information
Type	2.4 mm	
Connectors	M-M	
Length	60 cm (24 inches)	

F9632A-CA4: RF cable 2.4 mm 120 cm

Description	Specification (nominal)	Supplemental information
Type	2.4 mm	
Connectors	M-M	
Length	120 cm (48 inches)	

F9632A-CC5: RF cable N-SMA

Description	Specification (nominal)	Supplemental information
Type	N-SMA	
Connectors	M-M	
Length	150 cm (59 inches)	

F9632A-CD3: USB 2.0 cable 100 cm

Description	Specification (nominal)	Supplemental information
Type	Type A	
Connectors	M-M	
Length	100 cm (39 inches)	

F9632A-CE3: USB 2.1 cable 100 cm

Description	Specification (nominal)	Supplemental information
Type	Type C	
Connectors	M-M	
Length	100 cm (39 inches)	

F9632A-CF7: LAN cable 213 cm

Description	Specification (nominal)	Supplemental information
Type	CAT6 RJ45	
Connectors	M-M	
Length	213 cm (85 inches)	

F9632A-Dxx: DUT holders

Description	Specification (nominal)	Supplemental information
Alignment option	DUT type	Model option
1	Small Smartphone	F9632A-DA1
1	Large Smartphone	F9632A-DB1
1	Tablet	F9632A-DC1
1	Mobile Test Platform	F9632A-DD1
1	Large Mobile Test Platform	F9632A-DE1
2	Smartphone	F9632A-DF1
2	Small Tablet	F9632A-DG1
2	Large Tablet	F9632A-DH1
3	Small Smartphone	F9632A-DJ1
3	Large Smartphone	F9632A-DK1

F9632A-Fxx: Phantom fixtures

Description	Specification (nominal)	Supplemental information
Phantom type	DUT type	Model option
Single hand	Smartphones	F9632A-FA1
Dual hand	Smartphones	F9632A-FB1
Single hand / head	Smartphones	F9632A-FC1

F9632QA1A: 6-67 GHz calibration kit

Description	Specification (nominal)	Supplemental information
Type	2.4 mm	
Connectors	F	
Frequency range	6-67 GHz	

F9652A-840: Vertical CATR for NTN UE

Description	Specification (nominal)	Supplemental information
Enclosure		
Height	2000 mm	Fully assembled
Width	1400 mm	Fully assembled
Depth	1100 mm	Fully assembled
Weight	481 kg (1060 lbs)	Fully assembled
Reflector		
Focal length	0.7 m	
Edge treatment	Rolled edge	
Quiet Zone size	40 cm	
DUT positioner		
Azimuth Axis		
Range	$\pm 180^\circ$	
Resolution	0.01°	
Accuracy	$\pm 0.1^\circ$	
Speed	45 $^\circ/\text{s}$ maximum	
Roll Axis		
Range	$\pm 180^\circ$	
Resolution	0.01°	
Accuracy	$\pm 0.1^\circ$	
Speed	72 $^\circ/\text{s}$ maximum	
DUT max weight	10 kg (22 lbs)	5.0 Nm max torque
Communications	USB 3.0	
Power requirements	110/220 V AC	320 W input power
Access panels		
Power ports	1 x AC power 1 x DC 4 x DC feedthroughs	120/220 V, 15 Amp max. 100 W max. each
Connectivity ports	2 x Ethernet RJ45 1 x Ethernet RJ45 2 x USB 3.0 Type A 1 x USB 3.0 Type A 1 x USB 3.1 Gen 2 Type C, filtered, powered 3 x BNC	100/1000/10 G, PoE 10 G 10 G, includes external power supply
RF connections	2 x SMA 50 Ω 18 GHz 3 x SMA 50 Ω 18 GHz 4 x 1.85 mm	For 0.6-5.2 GHz link ant

F9632A-AE1, -BA3: 17-30 GHz DP feed horn assembly

Description	Specification (nominal)	Supplemental information
Type	Corrugated dual-polarized horn	
Gain	8 dBi	Varies with frequency
Cross-polarization	30 dB	
Cable loss (to bulkhead)	~1.2 dB	Varies with frequency

40 cm Quiet Zone performance for NTN UE

Description	Specification (nominal)	Supplemental information
Quiet zone dimensions	40 cm diameter	
17-30 GHz maximum amplitude variation	2.0 dB at 17 GHz 2.0 dB at 19 GHz 2.0 dB at 25 GHz 2.0 dB at 30 GHz	Varies with frequency
17-30 GHz maximum phase variation	15 ° at 17 GHz 15 ° at 19 GHz 15 ° at 25 GHz 15 ° at 30 GHz	Varies with frequency
17-30 GHz path loss	47 dB at 17 GHz 48 dB at 19 GHz 50 dB at 25 GHz 52 dB at 30 GHz	Varies with frequency

F9652A-831: Vertical CATR for radar manufacturing

Description	Specification (nominal)	Supplemental information
Enclosure		
Height	2000 mm	Fully assembled
Width	1400 mm	Fully assembled
Depth	1100 mm	Fully assembled
Weight	481 kg (1060 lbs)	Fully assembled
Reflector		
Focal length	0.7 m	
Edge treatment	Rolled edge	
Quiet Zone size	30 cm	
DUT positioner		
Azimuth Axis		
Range	$\pm 180^\circ$	
Resolution	0.01°	
Accuracy	$\pm 0.1^\circ$	
Speed	45 °/s maximum	
Roll Axis		
Range	$\pm 180^\circ$	
Resolution	0.01°	
Accuracy	$\pm 0.1^\circ$	
Speed	72 °/s maximum	
DUT max weight	10 kg (22 lbs)	5.0 Nm max torque
Communications	USB 3.0	
Power requirements	110/220 V AC	320 W input power
Access panels		
Power ports	1 x AC power	120/220 V, 15 Amp max.
	1 x AC out 1 x AC in 2 x DC feedthroughs 1 x 4 pin	100 W max. each
Connectivity ports	5 x Ethernet RJ45 2 x USB 3.0 Type A 2 x Waveguide	6-Bore 44.2 GHz, 3 mm optical fiber
	2 x WR-12 1 x DB-15 2 x DB-9	
RF connections	1 x SMA 50 Ω 18 GHz 1 x 2.4 mm	
Other connections	6 x Pneumatic	

F9632A-AF1, -BA4: 60-90 GHz DP feed horn assembly

Description	Specification (nominal)	Supplemental information
Type	Corrugated dual-polarized horn	
Gain	15 dBi	Varies with frequency
Cross-polarization	30 dB	
Cable loss (to bulkhead)	~5 dB	Varies with frequency

30 cm Quiet Zone performance for automotive radar mfg

Description	Specification (nominal)	Supplemental information
Quiet zone dimensions	30 cm diameter	
60-90 GHz maximum amplitude variation	2.0 dB at 65 GHz 2.0 dB at 75 GHz 2.0 dB at 85 GHz	Varies with frequency
60-90 GHz maximum phase variation	15 ° at 65 GHz 15 ° at 75 GHz 15 ° at 85 GHz	Varies with frequency
60-90 GHz path loss	58 dB at 65 GHz 59 dB at 75 GHz 60 dB at 85 GHz	Varies with frequency

Keysight enables innovators to push the boundaries of engineering by quickly solving design, emulation, and test challenges to create the best product experiences. Start your innovation journey at www.keysight.com.