SONOS

Antenna Test Report

May 27, 2024

FCC ID:	SBVRM055
IC:	5373A-RM055
Model:	S55
Product Description:	802.11 a/b/g/n/ac/ax 2x2 Client Device with BLE

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1. Measurement Method

Antenna Measurements in Anechoic Chambers

The influence of atmospheric conditions and surrounding objects are non-ideal for accurate antenna measurements. An anechoic chamber offers a non-reflective, no-echo room for performing the antenna measurements. The anechoic chamber can simulate outer space, which is the most ideal location for antenna measurements. All gain measurements were performed in accordance with IEEE Std. 149 (IEEE Standard Procedures for Antenna Measurements). Losses of any test cables were calibrated out post-measurement. Please refer to Figure 1 as the measurement chamber diagram

1. Perform chamber calibration using reference antennas.
2. Center the EUT in the chamber using the laser alignment system.
3. Connect the antenna micro-coax cable to the mast cable.
4. Capture antenna gain pattern using the automated measurement software.
5. Export the measurement data.
6. De-embed any additional cable losses in the setup (i.e., losses of any test cables that are not present in the actual product assembly).
7. Post-process the measured data to extract the peak gain.

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2. Antenna Information

Antenna Name (Cable Color)	Location*	Primary Polarization*	Operating Bands (GHz)	Internal P/N
ANT1 (W)	Right, Rear	Horizontal	2.4, 5, & 6	105-00309
ANT2 (Blk)	Left, Rear	Vertical	2.4, 5, & 6	105-00341
ANT3 (R)	Right, Front	Horizontal	2.4, 5, & 6	105-00323
ANT4 (Y)	Left, Front	Vertical	2.4, 5, & 6	105-00308

Antenna Name (Cable Color)	Location*	Primary Polarization*	Operating Bands (GHz)	Internal P/N
BLE	Rear, Right	Vertical	2.4	N/A (Onboard)

: Referenced from when the DUT is placed **upright*

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3. Antenna Gain

S55 WIFI ANTENNA GAINS					
Band	**Type**	**Peak (dBi)**	**DUT Orientation**	**Antenna Combination**	**Polarization**
2.4G 2400 - 2483 MHz	SISO Min	**2.0**	Side	ANT4	V
	SISO Max	**5.7**	Side	ANT3	V
	MIMO Correlated Max	**8.0**	Upright	ANT1+ANT3	V
	MIMO Uncorrelated Max	**5.2**	Upright	ANT1+ANT3	V
5G U-NII 1 5150-5250 MHz	SISO Min	**2.7**	Side	ANT2	V
	SISO Max	**7.3**	Upright	ANT3	H
	MIMO Correlated Max	**9.1**	Upright	ANT1+ANT3	H
	MIMO Uncorrelated Max	**6.1**	Upright	ANT1+ANT3	H
5G U-NII 2A 5250-5350 MHz	SISO Min	**2.5**	Side	ANT2	V
	SISO Max	**6.9**	Upright / Side	ANT3	H
	MIMO Correlated Max	**9.0**	Upright	ANT1+ANT3	H
	MIMO Uncorrelated Max	**6.0**	Upright	ANT1+ANT3	H
5G U-NII 2C 5470-5725 MHz	SISO Min	**3.8**	Side	ANT2	V
	SISO Max	**7.1**	Side	ANT3	V
	MIMO Correlated Max	**8.7**	Side	ANT1+ANT3	V
	MIMO Uncorrelated Max	**6.1**	Side	ANT1+ANT3	V
5G U-NII 3 5725-5850 MHz	SISO Min	**4.3**	Side	ANT2	V
	SISO Max	**6.2**	Upright / Side	ANT2 / ANT3	V
	MIMO Correlated Max	**8.0**	Side	ANT2+ANT4	V
	MIMO Uncorrelated Max	**5.8**	Side	ANT2+ANT4	V
6G U-NII 5 5925-6425 MHz	SISO Min	**2.8**	Side	ANT4	H
	SISO Max	**5.6**	Upright	ANT3	H
	MIMO Correlated Max	**8.0**	Side	ANT2+ANT4	V
	MIMO Uncorrelated Max	**5.8**	Side	ANT2+ANT4	V
6G U-NII 6 6425-6525 MHz	SISO Min	**2.0**	Side	ANT2	V
	SISO Max	**4.5**	Side	ANT1	V
	MIMO Correlated Max	**5.8**	Side	ANT1+ANT3	V
	MIMO Uncorrelated Max	**2.9**	Side	ANT1+ANT3	V
6G U-NII 7 6525-6875 MHz	SISO Min	**2.3**	Side	ANT2	V
	SISO Max	**4.2**	Side	ANT3	V
	MIMO Correlated Max	**5.4**	Upright	ANT1+ANT3	H
	MIMO Uncorrelated Max	**2.8**	Side	ANT2+ANT4	V
6G U-NII 8 6875-7125 MHz	SISO Min	**2.0**	Side	ANT2	V
	SISO Max	**4.2**	Side	ANT3	V
	MIMO Correlated Max	**5.6**	Upright	ANT1+ANT3	H
	MIMO Uncorrelated Max	**2.8**	Side	ANT1+ANT3	V

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S55 BLE ANTENNA GAINS					
Band	**Type**	**Peak (dBi)**	**DUT Orientation**	**Antenna Combination**	**Polarization**
BLE 2.4G	SISO Min	**1.9**	Upright	BLE	V
	SISO Max	**3.6**	Side	BLE	H

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1. Antenna Test Setup

The test setup for the S55 antenna gain measurements is shown below:

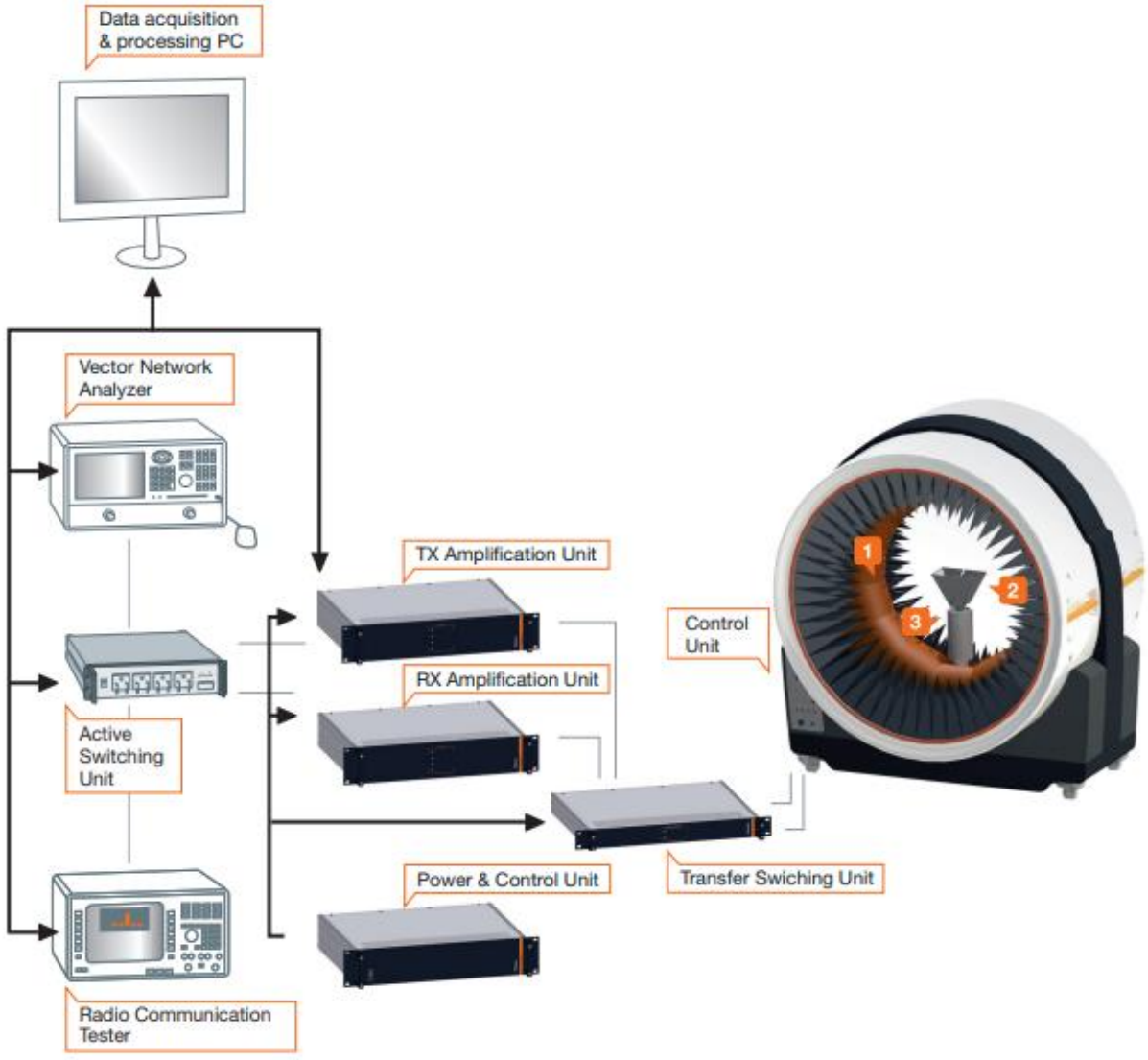

Figure 1 - Measurement Chamber Diagram

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2. Test location

Sonos Antenna Chamber, 2 Avenue de Lafayette, Boston, MA 02111 USA.

Peak Gain was measured using the antenna test chamber. The antennas for S55 were measured in the full product assembly.

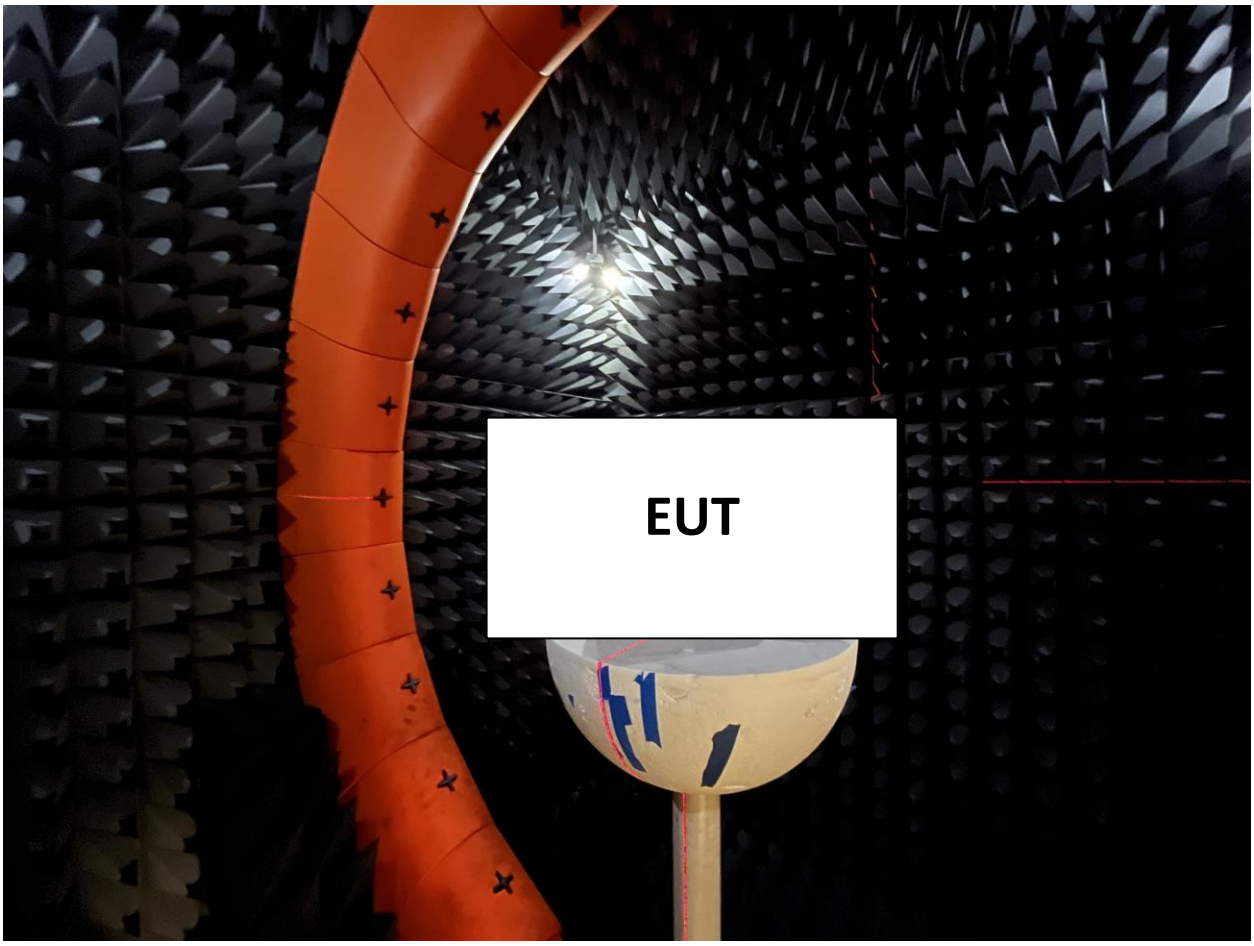

Figure 2 - EUT in the test chamber

Test Method and Environment - Gain Substitution Method in an Anechoic Environment
Resolution – 3° in both azimuth and elevation
Calibration Method - Efficiency Calibration using Standard Reference Dipoles
Additional corrections - Removal of setup cable losses measured using VNA (E5071C)

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6. Test Equipment list

Description	Manufacturer	ID number
Antenna measurement system	MVG	Sonos 02

Calibrated test equipment:

MVG SG24S
E5071C ENA
MVG Standard Reference Dipoles
1. SD2450
2. SD5150
3. SD5650
4. WD6000

The chamber is calibrated annually by the vendor.

3. Test Personnel

Test Engineer(s)	Test Date
Welkis Rodriguez James Hoder	March 4-12, 2024

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