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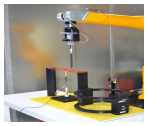

HEARING AID COMPATIBILITY

Applicant Name:
Samsung Electronics Co., Ltd.
129, Samsung-ro, Maetan dong,
Yeongtong-gu, Suwon-si
Gyeonggi-do 16677, Korea

Date of Testing:
04/28/2025 – 05/16/2025
Test Site/Location:
Element Washington DC LLC,
Columbia, MD, USA
Test Report Serial No.:
1M2504220043-01.A3L
Date of Issue:
05/22/2025

FCC ID:	**A3LSMF966U**
APPLICANT:	**SAMSUNG ELECTRONICS CO., LTD.**

Scope of Test:	RF Emissions Testing
Application Type:	Class II Permissive Change
FCC Rule Part(s):	CFR §20.19(b)
HAC Standard:	ANSI C63.19-2019 285076 D01 HAC Guidance v06r02 285076 D02 T-Coil testing for CMRS IP v04
DUT Type:	Portable Handset
Model:	SM-F966U
Additional Model(s):	SM-F966U1
Test Device Serial No.:	*Pre-Production Sample* [S/N: 1759M]
Class II Permissive Change(s):	*See FCC Change Document*

C63.19-2019 HAC Compliance: PASS

This report only pertain to antenna G of this wireless portable device. Antenna G includes LTE Bands 66/4/25/2/30/7/38/41(PC3), and NR bands n66/70/25/2/30/7/41(PC2) modes. This wireless portable device has been shown to be hearing-aid compatible as specified in ANSI/IEEE Std. C63.19-2019 and has been tested in accordance with the specified measurement procedures. Test results reported herein relate only to the item(s) tested. Hearing-Aid Compatibility is based on the assumption that all production units will be designed electrically identical to the device tested in this report. North American Bands only.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

RJ Ortanez
Executive Vice President

ACCREDITED
CERT #2041.01

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1. INTRODUCTION

On July 10, 2003, the Federal Communications Commission (FCC) adopted new rules requiring wireless manufacturers and service providers to provide digital wireless phones that are compatible with hearing aids. The FCC has modified the exemption for wireless phones under the Hearing Aid Compatibility Act of 1998 (HAC Act) in WT Docket 01-309 RM-8658[1] to extend the benefits of wireless telecommunications to individuals with hearing disabilities. These benefits encompass business, social and emergency communications, which increase the value of the wireless network for everyone. An estimated more than 10% of the population in the United States show signs of hearing impairment and of that fraction, almost 80% use hearing aids. Approximately 500 million people worldwide and 30 million people in the United States suffer from hearing loss.

Compatibility Tests Involved:

The standard calls for wireless communications devices to be measured for:

- RF Electric-field emissions
- T-coil mode, magnetic-signal strength in the audio band
- T-coil mode, magnetic-signal frequency response through the audio band
- T-coil mode, magnetic-signal and noise articulation index
- Volume Control, receive volume control performance
- Volume Control, receive distortion and noise performance
- Volume Control, receive acoustic frequency response performance

The hearing aid may be measured for:

- RF immunity in microphone mode
- RF immunity in T-coil mode

In the following tests and results, this report includes the evaluation for a wireless communications device.

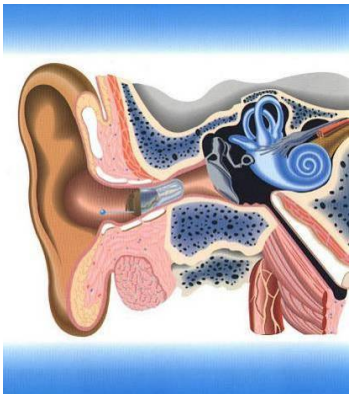

Figure 1-1 Hearing Aid *in-vitu*

[1] FCC Rule & Order, WT Docket 01-309 RM-8658

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2. DUT DESCRIPTION

FCC ID:	A3LSMF966U
Manufacturer:	Samsung Electronics Co., Ltd. 129, Samsung-ro, Maetan dong, Yeongtong-gu, Suwon-si Gyeonggi-do 16677, Korea
Model:	SM-F966U
Additional Model(s):	SM-F966U1
Serial Number:	1759M
Antenna Configurations:	Internal Antenna
DUT Type:	Portable Handset

I. LTE/NR Band Selection

This device supports LTE/NR capabilities with overlapping transmission frequency ranges. When the supported frequency range of a band falls completely within a band with a larger transmission frequency range, both bands have the same target power (or the band with the larger transmission frequency range has a higher target power), and both bands share the same transmission path and signal characteristics, hearing-aid compatibility compliance was only assessed for the band with the larger transmission frequency range. However, overlapped LTE bands which are anchor bands for dual connectivity (EN-DC) scenarios between LTE and NR were evaluated as independent LTE bands.

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Table 2-1
HAC Air Interfaces

	Band (MHz)	Type Transport	HAC Tested	Simultaneous But Not Tested	Name of Voice Service
GSM	850	VO	No[1, 5]	Yes: WIFI or BT	CMRS Voice
	1900				
	GPRS/EDGE	VD	No[1, 5]	Yes: WIFI or BT	Google Meet
UMTS	850	VD	No[1, 5]	Yes: WIFI or BT	CMRS Voice
	1700				
	1900				
	HSPA	VD	No[1, 5]	Yes: WIFI or BT	Google Meet
LTE (FDD)	680 (B71)	VD	No[1, 5]	Yes: NR, WIFI or BT	VoLTE, Google Meet
	700 (B12)				
	780 (B13)				
	790 (B14)				
	850 (B5)				
	850 (B26)				
	1700 (B4)				
	1700 (B66)				
	1900 (B2)				
	1900 (B25)				
	2300 (B30)				
	2500 (B7)				
LTE (TDD)	2600 (B38)	VD	No[1, 5]	Yes: NR, WIFI or BT	VoLTE, Google Meet
	2600 (B41)				
	3600 (B48)				
LTE NTN	1640 (B255)	DT	No	N/A	N/A
NR (FDD)	680 (n71)	VD	No[1, 5]	Yes: LTE, WIFI or BT	VoNR, Google Meet
	700 (n14)				
	850 (n5)				
	1700 (n70)				
	1700 (n66)				
	1900 (n2)				
	1900 (n25)				
	2300 (n30)				
NR (TDD)	2600 (n41)	VD	No[1, 5]	Yes: LTE, WIFI or BT	VoNR, Google Meet
	3500 (n77, DoD)				
	3500 (n78, DoD)				
	3600 (n48)				
	3750 (n78)				
	3800 (n77)				
WIFI	2450	VD	No[1, 5]	Yes: GSM, UMTS, LTE, or NR	VoWIFI, Google Meet
	5200 (U-NII 1)				
	5300 (U-NII 2A)				
	5500 (U-NII 2C)				
	5800 (U-NII 3)				
	5900 (U-NII 4)				
	6175 (U-NII 5)		No[1, 3, 5]		
	6475 (U-NII 6)		No[4, 5]		
	6700 (U-NII 7)				
	7000 (U-NII 8)				
BT	2450	DT	No	Yes: GSM, UMTS, LTE, or NR	N/A

Type Transport
VO = Voice Only
DT = Digital Data - Not intended for Voice Services
VD = CMRS and/or IP Voice over Data Transport

Notes:
1. Evaluated for WD RF peak power level requirements.
2. NR FR2 bands are currently outside the scope of ANSI C63.19 and FCC HAC regulations therefore they were not evaluated.
3. WIFI U-NII band 5 was evaluated for operations which are entirely below 6GHz. Operations partially or entirely above 6GHz were not evaluated due to equipment limitations and being outside of the current scope of ANSI C63.19 and FCC HAC regulations.
4. WIFI U-NII bands through 8 were not evaluated due to being outside of the current scope of ANSI C63.19 and FCC HAC regulations.
5. This report only pertains to LTE Bands 66/4/25/2/30/7/38/41(PC3), and NR n66/70/25/2/30/7/41(PC2) modes supported on Antenna G. For full data, please refer to the Original Certification Test Report (Report S/N: 1M2502210015-31.A3L)

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3. ANSI/IEEE C63.19-2019 PERFORMANCE REQUIRMENTS

I. WD EMISSIONS Requirements

The ANSI Standard provides guidance on measuring the potential for wireless device (WD) RF emissions to cause audio frequency interference in a hearing aid. When the performance requirements of the Standard below are met, the WD demonstrates compliance to emission requirements for operation in close proximity with a hearing aid. The WD may demonstrate compliance by meeting any of the four requirements listed below for each of its operating bands.

Frequency Range (MHz)	RF_{AIPL} (dBm)
<960	29
960-2000	26
>2000	25

Table 3-1
WD RF audio interference power level requirements

Frequency Range (MHz)	$RF_{Peak\ Power}$ (dBm)
<960	35
960-2000	32
>2000	31

Table 3-2
WD RF peak power level requirements

Frequency Range (MHz)	RF_{AIL} (dB(V/m))
<960	39
960-2000	36
>2000	35

Table 3-3
WD RF audio interference level requirements

Frequency Range (MHz)	RF_{Peak} (dB(V/m))
<960	29
960-2000	26
>2000	25

Table 3-4
WD RF peak near-field level requirements

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4. RF SYSTEM SPECIFICATIONS

Description of test system for measurement of near-field RF audio interference level

EF3DV3 E-Field Probe Description

Construction:	One dipole parallel, two dipoles normal to probe axis Built-in shielding against static charges
Calibration:	In air from 30 MHz to 6.0 GHz (absolute accuracy ±5.1%, k=2)
Frequency:	30 MHz to > 6 GHz; Linearity: ± 0.2 dB (30 MHz to 6 GHz)
Directivity	± 0.2 dB in air (rotation around probe axis) ± 0.4 dB in air (rotation normal to probe axis)
Dynamic Range	2 V/m to > 1000 V/m (M3 or better device readings fall well below diode compression point)
Linearity:	± 0.2 dB
Dimensions	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 4.0 mm (Body: 12 mm) Distance from probe tip to dipole centers: 1.5 mm

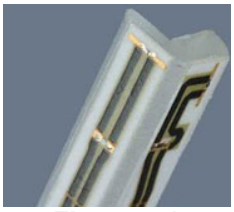
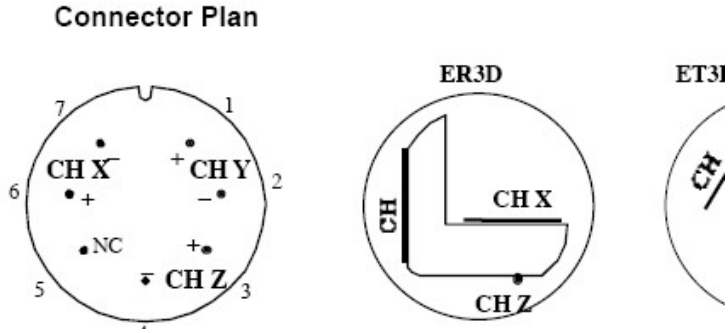


Figure 4-1
E-field Free-space Probe

Probe Tip Description

HAC field measurements take place in the close near field with high gradients. Increasing the measuring distance from the source will generally decrease the measured field values (in case of the validation dipole approx. 10% per mm).

The electric field probes have an irregular internal geometry because it is physically not possible to have the 3 orthogonal sensors situated with the same center. The effect of the different sensor centers is accounted for in the HAC uncertainty budget ("sensor displacement").



The antistatic shielding inside the probe is connected to the probe connector case.

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Instrumentation Chain

Equation 1

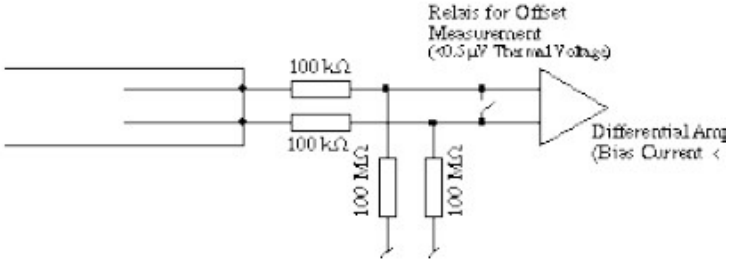
Conversion of Connector Voltage u_i to

$$E_i = \sqrt{\frac{u_i + (u_i^2 \cdot CF)/(D}{Norm_i \cdot Conv}}$$

whereby

E_i:	electric field in V/m
u_i:	voltage of channel i at the connector in µ\
$Norm_i$:	sensitivity of channel i in µV/(V/m)^2

Conditions of Calibration



Probe Response to Frequency

The E-field sensors have inherently a very flat frequency response. They are calibrated with a number of frequencies resulting in a common calibration factor, with the frequency behavior documented in the calibration certificate (See also below).

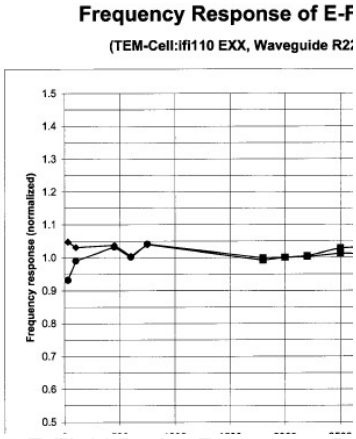


Figure 4-2 E-Field Probe Frequency Response

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SPEAG Robotic System

E-field measurements are performed using the DASY5 automated dosimetric assessment system. The DASY5 is made by Schmid & Partner Engineering AG (SPEAG) in Zurich, Switzerland and consists of high precision robotics system (Staubli), robot controller, Intel CORE i7 computer, near-field probe, probe alignment sensor, and the HAC phantom. The robot is a six-axis industrial robot performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF).

Figure 4-3
SPEAG Robotic System

System Hardware

A cell controller system contains the power supply, robot controller, teach pendant (Joystick), and a remote control used to drive the robot motors. The PC consists of the computer with operating system and RF Measurement Software DASY5 v52.8 (with HAC Extension), A/D interface card, monitor, mouse, and keyboard. The Staubli Robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit that performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the PC plug-in card.

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System Electronics

The DAE consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the PC-card is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe mounting device includes two different sensor systems for frontal and sidewise probe contacts. They are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer.

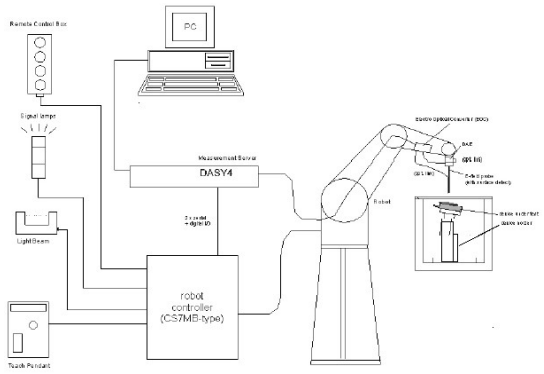

Figure 4-4
SPEAG Robotic System Diagram

DASY5 Instrumentation Chain

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics. If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power. The formula for each channel can be given as:

$$V_i = U_i + U_i^2 \cdot \frac{cf}{dcp_i}$$

with	V_i	= compensated signal of channel i	(i = x, y, z)
	U_i	= input signal of channel i	(i = x, y, z)
	cf	= crest factor of exciting field	(DASY parameter)
	dcp_i	= diode compression point	(DASY parameter)

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From the compensated input signals the primary field data for each channel can be evaluated:

$$\text{E} - \text{fieldprobes}: \qquad E_i = \sqrt{\frac{V_i}{Norm_i \cdot ConvF}}$$

with V_i = compensated signal of channel i (i = x, y, z)
$Norm_i$ = sensor sensitivity of channel i (i = x, y, z)
$\mu\text{V}/(\text{V/m})^2$ for E-field Probes
$ConvF$ = sensitivity enhancement in solution
E_i = electric field strength of channel i in V/m

The RSS value of the field components gives the total field strength (Hermitian magnitude):

$$E_{tot} = \sqrt{E_x^2 + E_y^2 + E_z^2}$$

The primary field data are used to calculate the derived field units.

The measurement/integration time per point, as specified by the system manufacturer is >500ms.

The signal response time is evaluated as the time required by the system to reach 90% of the expected final value after an on/off switch of the power source with an integration time of 500ms and a probe response time of <5 ms. In the current implementation, DASY5 waits longer than 100ms after having reached the grid point before starting a measurement, i.e., the response time uncertainty is negligible.

If the device under test does not emit a CW signal, the integration time applied to measure the electric field at a specific point may introduce additional uncertainties due to the discretization.
The tolerances for the different systems had the worst-case of 2.6%.

Environmental Conditions

Environmental conditions such as temperature and relative humidity are monitored to ensure there are no impacts on system specifications. Proper voltage and power line frequency conditions are maintained with three phase power sources. Environmental noise and reflections are monitored through system checks.

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5. TEST PROCEDURE

I. PEAK POWER LEVEL EVALUATION

To demonstrate hearing aid compliance with the ANSI standard C63.19-2019, an evaluation was performed using the peak power level requirements detailed in Table 3-2. Conducted power measurements were performed to verify maximum target power levels for all relevant operating bands/modes. An evaluation of each applicable air interface was performed to ensure compliance for each band.

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6. CONDUCTED POWER CONFIGURATIONS AND TARGETS

I. Procedures Used to Establish RF Signal for HAC Testing

The handset was configured to transmit the required air interface in a shielded chamber. Measurements were taken with a fully charged battery.

II. HAC Target Powers

All applicable modes supported by the device have their held-to-ear conducted power targets listed below and were used for the individual mode evaluations in Section 7. All conducted power targets have a tolerance of +1.0dB and -1.5dB unless otherwise noted. For WIFI modes, the overall maximum power amongst all bands per IEEE standards is listed.

III. RF Conducted Power Measurement Setup and Conditions

Output Power Verification
Maximum output power is verified for all applicable test channels for all air interfaces which require HAC compliance. See Table 6-1 for air interface specific settings of transmit power parameters.

Table 6-1
Power Control Parameters and Settings by Air Interface

Air Interface:	Parameter Name:	Parameter Set To:
GSM	PCL	GSM850: “5”; GSM1900: “0”
UMTS	TPC	“All 1’s”
LTE	TPC	“Max Power”
NR	PLS	“Max Power”
WIFI	PLS	Mfr Specified

The general setup for conducted powers included in Tables 6-2 to 6-17 is shown in Figure 6-1 below. The power measurement equipment could be a base station simulator, signal analyzer, or power meter depending on the applicable air interface.

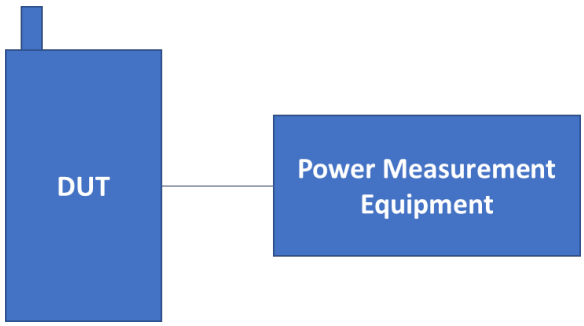

Figure 6-1
Power Measurement Setup

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IV. LTE FDD Target Powers

Table 6-2
LTE FDD Conducted Power Targets

Band	Modulated Average Output Power (in dBm)
LTE Band 66	24.5
LTE Band 25	24.0
LTE Band 30	23.5
LTE Band 7	24.0

V. LTE TDD Target Powers

Table 6-3
LTE TDD Conducted Power Targets

Band	Modulated Average Output Power (in dBm)
LTE Band 41 PC3	24.0

VI. NR FDD Target Powers

Table 6-4
NR FDD Conducted Power Targets

Band	Modulated Average Output Power (in dBm)
NR Band n70	23.5
NR Band n66	24.0
NR Band n25	24.0
NR Band n7	23.0
NR Band n30	23.0

VII. NR TDD Target Powers

Table 6-5
NR TDD Conducted Power Targets

Band	Modulated Average Output Power (in dBm)
NR Band n41 PC2	26.0

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VIII. Conducted Power Measurements

Table 6-6
LTE Band 66/4 Conducted Powers – Ant G

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
20 MHz	QPSK	132072	1720.0	1 / 50	25.12
		132322	1745.0	1 / 0	24.98
		132572	1770.0	1 / 99	24.81
	16-QAM	132072	1720.0	1 / 50	24.24
		132322	1745.0	1 / 0	23.98
		132572	1770.0	1 / 99	23.78
15 MHz	QPSK	132047	1717.5	1 / 0	25.46
		132322	1745.0	1 / 0	25.16
		132597	1772.5	1 / 74	24.91
	16-QAM	132047	1717.5	1 / 0	24.63
		132322	1745.0	1 / 0	24.28
		132597	1772.5	1 / 74	23.60
10 MHz	QPSK	132022	1715.0	1 / 49	25.37
		132322	1745.0	1 / 0	24.97
		132622	1775.0	1 / 0	24.80
	16-QAM	132022	1715.0	1 / 49	24.45
		132322	1745.0	1 / 0	24.12
		132622	1775.0	1 / 0	24.06
5 MHz	QPSK	131997	1712.5	1 / 12	25.34
		132322	1745.0	1 / 12	25.03
		132647	1777.5	1 / 12	24.82
	16-QAM	131997	1712.5	1 / 12	24.85
		132322	1745.0	1 / 12	24.17
		132647	1777.5	1 / 12	24.16
3 MHz	QPSK	131987	1711.5	1 / 0	25.48
		132322	1745.0	1 / 7	25.04
		132657	1778.5	1 / 7	24.83
	16-QAM	131987	1711.5	1 / 0	24.49
		132322	1745.0	1 / 7	24.11
		132657	1778.5	1 / 7	24.05
1.4 MHz	QPSK	131979	1710.7	1 / 5	25.43
		132322	1745.0	1 / 3	24.85
		132665	1779.3	1 / 5	24.70
	16-QAM	131979	1710.7	1 / 5	24.67
		132322	1745.0	1 / 3	24.21
		132665	1779.3	1 / 5	24.06

Table 6-7
LTE Band 25/2 Conducted Powers – Ant G

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
20 MHz	QPSK	26140	1860.0	1 / 50	24.74
		26365	1882.5	1 / 0	24.29
		26590	1905.0	1 / 99	24.43
	16-QAM	26365	1882.5	1 / 0	23.49

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Table 6-8
LTE Band 30 Conducted Powers – Ant G

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
10 MHz	QPSK	27710	2310.0	1 / 25	23.99
	16-QAM	27710	2310.0	1 / 25	23.06
5 MHz	QPSK	27685	2307.5	1 / 0	23.82
		27710	2310.0	1 / 12	23.75
		27735	2312.5	1 / 0	24.00
	16-QAM	27685	2307.5	1 / 0	22.80
		27710	2310.0	1 / 12	23.06
		27735	2312.5	1 / 0	22.98

Table 6-9
LTE Band 7 Conducted Powers – Ant G

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
20 MHz	QPSK	20850	2510.0	1 / 99	23.72
		21100	2535.0	1 / 0	23.51
		21350	2560.0	1 / 50	23.54
	16-QAM	20850	2510.0	1 / 99	23.01
		21100	2535.0	1 / 0	22.87
		21350	2560.0	1 / 50	22.56
15 MHz	QPSK	20825	2507.5	1 / 37	23.61
		21100	2535.0	1 / 0	23.61
		21375	2562.5	1 / 0	23.44
	16-QAM	20825	2507.5	1 / 37	22.95
		21100	2535.0	1 / 0	22.76
		21375	2562.5	1 / 0	22.44
10 MHz	QPSK	20800	2505.0	1 / 49	23.77
		21100	2535.0	1 / 25	23.72
		21400	2565.0	1 / 49	23.50
	16-QAM	20800	2505.0	1 / 49	22.88
		21100	2535.0	1 / 25	22.81
		21400	2565.0	1 / 49	22.72
5 MHz	QPSK	20775	2502.5	1 / 24	23.71
		21100	2535.0	1 / 0	23.66
		21425	2567.5	1 / 12	23.72
	16-QAM	20775	2502.5	1 / 24	22.98
		21100	2535.0	1 / 0	22.88
		21425	2567.5	1 / 12	22.56

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Table 6-10
LTE Band 41/38 Power Class 3 Conducted Powers – Ant G

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
20 MHz	QPSK	39750	2506.0	1 / 50	24.20
		40620	2593.0	1 / 50	24.16
		41490	2680.0	1 / 50	24.90
	16-QAM	39750	2506.0	1 / 50	22.94
		40620	2593.0	1 / 50	23.00
		41490	2680.0	1 / 50	24.13
15 MHz	QPSK	39725	2503.5	1 / 37	24.05
		40620	2593.0	1 / 0	24.16
		41515	2682.5	1 / 0	24.96
	16-QAM	39725	2503.5	1 / 37	23.16
		40620	2593.0	1 / 0	23.03
		41515	2682.5	1 / 0	24.00
10 MHz	QPSK	39700	2501.0	1 / 0	24.00
		40620	2593.0	1 / 0	24.35
		41540	2685.0	1 / 49	24.59
	16-QAM	39700	2501.0	1 / 0	22.90
		40620	2593.0	1 / 0	23.12
		41540	2685.0	1 / 49	23.29
5 MHz	QPSK	39675	2498.5	1 / 24	24.05
		40620	2593.0	1 / 0	24.28
		41565	2687.5	1 / 12	24.96
	16-QAM	39675	2498.5	1 / 24	23.11
		40620	2593.0	1 / 0	23.38
		41565	2687.5	1 / 12	24.26

Table 6-11
NR Band 70 Conducted Powers – Ant G

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
15 MHz	π/2 BPSK	340500	1702.5	1 / 77	24.43
	QPSK	340500	1702.5	1 / 1	24.44
	16-QAM	340500	1702.5	1 / 77	23.39
10 MHz	π/2 BPSK	340000	1700.0	1 / 50	23.97
		340500	1702.5	1 / 50	24.04
		341000	1705.0	1 / 26	24.14
	QPSK	340000	1700.0	1 / 50	24.15
		340500	1702.5	1 / 26	24.13
		341000	1705.0	1 / 50	24.05
	16-QAM	340000	1700.0	1 / 50	22.81
		340500	1702.5	1 / 26	22.68
		341000	1705.0	1 / 26	23.01
5 MHz	π/2 BPSK	339500	1697.5	1 / 23	24.17
		340500	1702.5	1 / 1	24.12
		341500	1707.5	1 / 23	24.09
	QPSK	339500	1697.5	1 / 1	24.11
		340500	1702.5	1 / 12	24.06
		341500	1707.5	1 / 12	24.04
	16-QAM	339500	1697.5	1 / 23	22.89
		340500	1702.5	1 / 1	23.06
		341500	1707.5	1 / 23	22.93

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Table 6-12
NR Band 66 Conducted Powers – Ant G

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
45 MHz	π/2 BPSK	346500	1732.5	1 / 1	24.82
		349000	1745.0	1 / 1	24.64
		351500	1757.5	1 / 1	24.60
	QPSK	346500	1732.5	1 / 1	24.73
		349000	1745.0	1 / 1	24.70
		351500	1757.5	1 / 1	24.66
	16-QAM	346500	1732.5	1 / 1	23.75
		349000	1745.0	1 / 1	23.74
		351500	1757.5	1 / 1	23.56
40 MHz	π/2 BPSK	346000	1730.0	1 / 1	24.10
		349000	1745.0	1 / 214	24.21
		352000	1760.0	1 / 214	24.08
	QPSK	346000	1730.0	1 / 1	24.14
		349000	1745.0	1 / 214	24.16
		352000	1760.0	1 / 214	24.21
	16-QAM	346000	1730.0	1 / 1	22.93
		349000	1745.0	1 / 1	22.94
		352000	1760.0	1 / 1	22.74
35 MHz	π/2 BPSK	346000	1727.5	1 / 1	24.80
		349000	1745.0	1 / 1	24.08
		352000	1762.5	1 / 94	24.14
	QPSK	346000	1727.5	1 / 1	24.76
		349000	1745.0	1 / 1	24.07
		352000	1762.5	1 / 94	24.22
	16-QAM	346000	1727.5	1 / 1	23.62
		349000	1745.0	1 / 1	23.06
		352000	1762.5	1 / 94	23.12
30 MHz	π/2 BPSK	345000	1725.0	1 / 1	24.08
		349000	1745.0	1 / 158	24.18
		353000	1765.0	1 / 80	24.26
	QPSK	345000	1725.0	1 / 158	24.27
		349000	1745.0	1 / 158	24.26
		353000	1765.0	1 / 158	24.26
	16-QAM	345000	1725.0	1 / 1	23.02
		349000	1745.0	1 / 1	22.95
		353000	1765.0	1 / 1	23.03
25 MHz	π/2 BPSK	344500	1722.5	1 / 1	24.23
		349000	1745.0	1 / 1	24.22
		353500	1767.5	1 / 131	24.21
	QPSK	344500	1722.5	1 / 1	24.26
		349000	1745.0	1 / 131	24.23
		353500	1767.5	1 / 1	24.29
	16-QAM	344500	1722.5	1 / 1	22.99
		349000	1745.0	1 / 1	22.94
		353500	1767.5	1 / 1	22.96
20 MHz	π/2 BPSK	344000	1720.0	1 / 53	23.92
		349000	1745.0	1 / 104	23.99
		354000	1770.0	1 / 53	24.11
	QPSK	344000	1720.0	1 / 53	23.98
		349000	1745.0	1 / 104	23.99
		354000	1770.0	1 / 53	24.12
	16-QAM	344000	1720.0	1 / 1	22.76
		349000	1745.0	1 / 1	22.65
		354000	1770.0	1 / 1	22.73
15 MHz	π/2 BPSK	343500	1717.5	1 / 1	24.00
		349000	1745.0	1 / 39	24.06
		354500	1772.5	1 / 77	24.13
	QPSK	343500	1717.5	1 / 1	24.11
		349000	1745.0	1 / 77	24.06
		354500	1772.5	1 / 1	24.10
	16-QAM	343500	1717.5	1 / 1	22.93
		349000	1745.0	1 / 1	22.72
		354500	1772.5	1 / 1	22.83
10 MHz	π/2 BPSK	343000	1715.0	1 / 26	24.04
		349000	1745.0	1 / 26	23.94
		355000	1775.0	1 / 50	24.07
	QPSK	343000	1715.0	1 / 1	24.09
		349000	1745.0	1 / 50	23.96
		355000	1775.0	1 / 26	24.17
	16-QAM	343000	1715.0	1 / 1	22.82
		349000	1745.0	1 / 1	22.73
		355000	1775.0	1 / 1	22.87
5 MHz	π/2 BPSK	342500	1712.5	1 / 12	24.00
		349000	1745.0	1 / 12	23.99
		355500	1777.5	1 / 12	24.03
	QPSK	342500	1712.5	1 / 12	23.96
		349000	1745.0	1 / 12	23.98
		355500	1777.5	1 / 12	24.07
	16-QAM	342500	1712.5	1 / 1	22.79
		349000	1745.0	1 / 1	22.81
		355500	1777.5	1 / 1	22.91

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Table 6-13
NR Band 25/2 Conducted Powers – Ant G

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
40 MHz	π/2 BPSK	374000	1870.0	1 / 1	24.56
		376500	1882.5	1 / 1	24.40
		379000	1895.0	1 / 108	24.49
	QPSK	374000	1870.0	1 / 1	24.58
		376500	1882.5	1 / 1	24.35
		379000	1895.0	1 / 1	24.51

Table 6-14
NR Band 30 Conducted Powers – Ant G

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
10 MHz	π/2 BPSK	27710	2310.0	1 / 1	23.31
	QPSK	27710	2310.0	1 / 26	23.28
	16-QAM	27710	2310.0	1 / 1	22.27
5 MHz	π/2 BPSK	27685	2307.5	1 / 12	23.37
		27710	2310.0	1 / 1	23.34
		27735	2312.5	1 / 12	23.27
	QPSK	27685	2307.5	1 / 23	23.03
		27710	2310.0	1 / 23	23.41
		27735	2312.5	1 / 1	23.28
	16-QAM	27685	2307.5	1 / 23	22.14
		27710	2310.0	1 / 12	22.31
		27735	2312.5	1 / 1	22.38

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Table 6-15
NR Band 7 Conducted Powers – Ant G

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
50 MHz	π/2 BPSK	505000	2525.0	1 / 135	23.06
		507000	2535.0	1 / 135	22.71
		509000	2545.0	1 / 1	22.95
	QPSK	505000	2525.0	1 / 135	22.93
		507000	2535.0	1 / 135	22.62
		509000	2545.0	1 / 1	22.77
	16-QAM	505000	2525.0	1 / 135	21.67
		507000	2535.0	1 / 135	21.33
		509000	2545.0	1 / 1	21.42
40 MHz	π/2 BPSK	504000	2520.0	1 / 108	22.97
		507000	2535.0	1 / 108	22.86
		510000	2550.0	1 / 1	22.88
	QPSK	504000	2520.0	1 / 108	22.79
		507000	2535.0	1 / 108	22.68
		510000	2550.0	1 / 1	22.69
	16-QAM	504000	2520.0	1 / 108	21.56
		507000	2535.0	1 / 108	21.68
		510000	2550.0	1 / 1	21.73
35 MHz	π/2 BPSK	503500	2517.5	1 / 1	22.81
		507000	2535.0	1 / 1	23.03
		510500	2552.5	1 / 1	23.04
	QPSK	503500	2517.5	1 / 1	22.95
		507000	2535.0	1 / 1	22.84
		510500	2552.5	1 / 1	23.00
	16-QAM	507000	2535.0	1 / 1	21.93
30 MHz	π/2 BPSK	503000	2515.0	1 / 1	23.04
		507000	2535.0	1 / 1	23.06
		511000	2555.0	1 / 80	22.78
	QPSK	503000	2515.0	1 / 1	22.68
		507000	2535.0	1 / 1	22.91
		511000	2555.0	1 / 80	22.59
	16-QAM	511000	2555.0	1 / 80	21.59
25 MHz	π/2 BPSK	502500	2512.5	1 / 1	23.05
		507000	2535.0	1 / 1	22.92
		511500	2557.5	1 / 66	22.84
	QPSK	502500	2512.5	1 / 1	22.78
		507000	2535.0	1 / 1	22.72
		511500	2557.5	1 / 66	22.56
	16-QAM	507000	2535.0	1 / 1	21.43
20 MHz	π/2 BPSK	502000	2510.0	1 / 104	22.98
		507000	2535.0	1 / 1	22.88
		512000	2560.0	1 / 1	22.49
	QPSK	502000	2510.0	1 / 104	22.77
		507000	2535.0	1 / 1	22.54
		512000	2560.0	1 / 1	22.46
	16-QAM	507000	2535.0	1 / 1	21.48
15 MHz	π/2 BPSK	501500	2507.5	1 / 77	22.63
		507000	2535.0	1 / 39	22.91
		512500	2562.5	1 / 1	22.39
	QPSK	501500	2507.5	1 / 77	22.14
		507000	2535.0	1 / 39	22.51
		512500	2562.5	1 / 1	22.24
	16-QAM	507000	2535.0	1 / 39	21.54
10 MHz	π/2 BPSK	501000	2505.0	1 / 1	22.92
		507000	2535.0	1 / 26	22.56
		513000	2565.0	1 / 1	22.32
	QPSK	501000	2505.0	1 / 1	22.61
		507000	2535.0	1 / 26	22.48
		513000	2565.0	1 / 1	22.27
	16-QAM	507000	2535.0	1 / 26	21.32
5 MHz	π/2 BPSK	500500	2502.5	1 / 23	22.89
		507000	2535.0	1 / 23	22.60
		513500	2567.5	1 / 1	22.54
	QPSK	500500	2502.5	1 / 23	22.73
		507000	2535.0	1 / 23	22.44
		513500	2567.5	1 / 1	22.40
	16-QAM	513500	2567.5	1 / 1	21.45

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Table 6-16
NR Band 41 Power Class 2 Conducted Powers (100MHz through 45MHz) – Ant G

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
100 MHz	π/2 BPSK	509202	2546.01	1 / 136	26.28
		518598	2592.99	1 / 271	26.80
		528000	2640.00	1 / 136	26.10
	QPSK	509202	2546.01	1 / 136	26.24
		518598	2592.99	1 / 271	26.85
		528000	2640.00	1 / 136	26.06
	16-QAM	518598	2592.99	1 / 271	25.85
90 MHz	π/2 BPSK	508200	2541.00	1 / 122	26.68
		518598	2592.99	1 / 243	26.56
		528996	2644.98	1 / 122	26.49
	QPSK	508200	2541.00	1 / 122	25.72
		518598	2592.99	1 / 243	25.76
		528996	2644.98	1 / 122	25.60
	16-QAM	518598	2592.99	1 / 243	24.89
80 MHz	π/2 BPSK	507204	2536.02	1 / 215	26.67
		518598	2592.99	1 / 215	26.51
		529998	2649.99	1 / 1	26.58
	QPSK	507204	2536.02	1 / 108	25.96
		518598	2592.99	1 / 215	25.79
		529998	2649.99	1 / 108	25.65
	16-QAM	518598	2592.99	1 / 215	24.86
70 MHz	π/2 BPSK	506202	2531.01	1 / 94	26.65
		518598	2592.99	1 / 187	26.67
		531000	2655.00	1 / 187	26.64
	QPSK	506202	2531.01	1 / 94	26.00
		518598	2592.99	1 / 187	25.77
		531000	2655.00	1 / 1	26.32
	16-QAM	506202	2531.01	1 / 94	25.01
60 MHz	π/2 BPSK	505200	2526.00	1 / 160	26.64
		518598	2592.99	1 / 1	26.54
		531996	2659.98	1 / 1	26.62
	QPSK	505200	2526.00	1 / 81	26.09
		518598	2592.99	1 / 160	25.60
		531996	2659.98	1 / 1	25.80
	16-QAM	505200	2526.00	1 / 160	25.12
50 MHz	π/2 BPSK	504204	2521.02	1 / 131	26.89
		518598	2592.99	1 / 1	26.63
		532998	2664.99	1 / 1	26.88
	QPSK	504204	2521.02	1 / 131	26.13
		518598	2592.99	1 / 131	25.65
		532998	2664.99	1 / 1	25.96
	16-QAM	504204	2521.02	1 / 131	25.12
45 MHz	π/2 BPSK	503703	2518.50	1 / 117	26.88
		518598	2592.99	1 / 1	26.58
		533449	2667.50	1 / 1	26.92
	QPSK	503703	2518.50	1 / 117	26.41
		518598	2592.99	1 / 1	25.48
		533449	2667.50	1 / 1	26.03
	16-QAM	503703	2518.50	1 / 117	25.35
		518598	2592.99	1 / 1	24.67
		533449	2667.50	1 / 1	25.13

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Table 6-17
NR Band 41 Power Class 2 Conducted Powers (40MHz through 10MHz) – Ant G

40 MHz	π/2 BPSK	503202	2516.01	1 / 104	26.76
		518598	2592.99	1 / 1	26.55
		534000	2670.00	1 / 1	26.70
	QPSK	503202	2516.01	1 / 104	26.22
		518598	2592.99	1 / 104	25.57
		534000	2670.00	1 / 1	25.91
	16-QAM	503202	2516.01	1 / 104	25.40
35 MHz	π/2 BPSK	502701	2513.50	1 / 90	26.85
		518598	2592.99	1 / 1	26.59
		534448	2672.50	1 / 1	26.57
	QPSK	502701	2513.50	1 / 90	26.11
		518598	2592.99	1 / 90	25.57
		534448	2672.50	1 / 1	25.80
	16-QAM	502701	2513.50	1 / 90	25.47
		518598	2592.99	1 / 1	24.70
		534448	2672.50	1 / 1	24.80
30 MHz	π/2 BPSK	502200	2511.00	1 / 76	26.85
		518598	2592.99	1 / 76	26.68
		534996	2674.98	1 / 1	26.79
	QPSK	502200	2511.00	1 / 76	26.35
		518598	2592.99	1 / 76	25.50
		534996	2674.98	1 / 1	25.85
	16-QAM	502200	2511.00	1 / 76	25.35
25 MHz	π/2 BPSK	501702	2508.50	1 / 63	26.76
		518598	2592.99	1 / 63	26.58
		535497	2677.50	1 / 1	26.79
	QPSK	501702	2508.50	1 / 63	26.35
		518598	2592.99	1 / 63	25.43
		535497	2677.50	1 / 1	25.72
	16-QAM	501702	2508.50	1 / 63	25.41
20 MHz	π/2 BPSK	501204	2506.02	1 / 25	26.57
		518598	2592.99	1 / 49	26.48
		535998	2679.99	1 / 1	26.72
	QPSK	501204	2506.02	1 / 49	26.37
		518598	2592.99	1 / 49	25.56
		535998	2679.99	1 / 1	25.94
	16-QAM	501204	2506.02	1 / 25	25.12
15 MHz	π/2 BPSK	500706	2503.50	1 / 1	26.74
		518598	2592.99	1 / 36	26.41
		536449	2682.50	1 / 1	26.57
	QPSK	500706	2503.50	1 / 36	26.08
		518598	2592.99	1 / 36	25.56
		536449	2682.50	1 / 36	25.54
	16-QAM	500706	2503.50	1 / 1	24.97
10 MHz	π/2 BPSK	500208	2501.00	1 / 12	26.56
		518598	2592.99	1 / 12	26.01
		537000	2685.00	1 / 22	26.35
	QPSK	500208	2501.00	1 / 22	25.74
		518598	2592.99	1 / 12	25.09
		537000	2685.00	1 / 12	25.32
	16-QAM	500208	2501.00	1 / 12	24.82

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7. JUSTIFICATION OF HELD TO EAR MODES TESTED

I. Analysis of RF Air Interface Technologies

An analysis was performed, following the guidance of §4.7 of the ANSI standard, of the RF air interface technologies being evaluated. For this analysis, the stated peak power levels were verified to be within the requirements detailed in Table 3-2.

II. Individual Mode Evaluations

Table 7-1
Peak power levels of individual air interfaces evaluated for emission compliance

Air Interface	Peak Power [dBm]	Peak Power Level Margin [dB]	Emission Compliance
LTE FDD	25.50	9.50	PASS
LTE TDD - Band 41 (PC3)	25.00	6.00	PASS
NR FDD	25.00	10.00	PASS
NR TDD - n41 PC2	27.00	4.00	PASS
NR TDD - n41 PC1.5 UL MIMO*	30.00	1.00	PASS

* Note: NR TDD was additionally evaluated at a higher power level due to PC1.5 UL MIMO operations.

III. WD RF Peak power level conclusions

Per ANSI C63.19-2019, all applicable air interfaces demonstrate compliance to the peak power requirements shown in Table 3-2 of this report.

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8. EQUIPMENT LIST

Table 8-1
Equipment List

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Keysight Technologies	N9020A	MXA Signal Analyzer	2/7/2025	Annual	2/7/2026	MY53421544
Amplifier Research	15S1G6	Amplifier	N/A	CBT*	N/A	433978
Anritsu	MA24106A	USB Power Sensor	10/29/2024	Annual	10/29/2025	1248508
Control Company	4040	Digital Thermometer	4/15/2024	Biennial	4/15/2026	240310265
Mini-Circuits	NLP-1200+	Low Pass Filter DC to 1000 MHz	N/A	CBT*	N/A	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	N/A	CBT*	N/A	N/A
Mini-Circuits	BW-N20W5	Power Attenuator	N/A	CBT*	N/A	1226
Pasternack	PE2237-20	Bidirectional Coupler	N/A	CBT*	N/A	N/A
Rohde & Schwarz	CMW500	Wideband Radio Communication Tester	8/9/2023	Biennial	8/9/2025	162125
Rohde & Schwarz	CMW500	Radio Communication Tester	8/10/2023	Biennial	8/10/2025	140144
Rohde & Schwarz	CMX500	Radio Communication Tester	11/11/2024	Annual	11/11/2025	100298
Seekonk	NC-100	Torque Wrench (8" lb)	N/A		N/A	21053

Calibration traceable to the National Institute of Standards and Technology (NIST).

***Note: CBT (Calibrated Before Testing).** Prior to testing, the measurement paths containing a cable, attenuator, coupler or filter were connected to a calibrated source (i.e. a signal generator) to determine the losses of the measurement path. The power meter offset was then adjusted to compensate for the measurement system losses. This level offset is stored within the power meter before measurements are made. This calibration verification procedure applies to the system verification and output power measurements. The calibrated reading is then taken directly from the power meter after compensation of the losses for all final power measurements.

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9. MEASUREMENT UNCERTAINTY

Table 9-1
Uncertainty Estimation Table

Wireless Communications Device Near-Field Measurement Uncertainty Estimation							
Uncertainty Component	Data (dB)	Data Type	Prob. Dist.	Divisor	Ci (E)	Unc. (dB)	Notes/Comments
Measurement System							
RF System Reflections	0.50	Tolerance	N	1.00	1	0.50	* Refl. < -20 dB
Field Probe Calibration	0.21	Tolerance	N	1.00	1	0.21	
Field Probe Isotropy	0.01	Tolerance	N	1.00	1	0.01	
Field Probe Frequency Response	0.135	Tolerance	N	1.00	1	0.14	
Field Probe Linearity	0.013	Tolerance	N	1.00	1	0.01	
Modulation Interference Factor	0.20	Tolerance	R	1.73	1	0.12	Applicable for M-rating testing
Boundary Effects	0.105	Accuracy	R	1.73	1	0.06	*
Probe Positioning Accuracy	0.20	Accuracy	R	1.73	1	0.12	*
Probe Positioner	0.050	Accuracy	R	1.73	1	0.03	*
Extrapolation/Interpolation	0.045	Tolerance	R	1.73	1	0.03	*
Resolution to 2mm error	0.21	Tolerance	N	1.00	1	0.21	
System Detection Limit	0.05	Tolerance	R	1.73	1	0.03	*
Readout Electronics	0.015	Tolerance	N	1.00	1	0.02	*
Integration Time	0.11	Tolerance	R	1.73	1	0.06	*
Response Time	0.033	Tolerance	R	1.73	1	0.02	*
Phantom Thickness	0.10	Tolerance	R	1.73	1	0.06	*
System Repeatability (Field x 2=power)	0.17	Tolerance	N	1.00	1	0.17	*
Test Sample Related							
Device Positioning Vertical	0.2	Tolerance	R	1.73	1	0.12	*
Device Positioning Lateral	0.045	Tolerance	R	1.73	1	0.03	*
Device Holder and Phantom	0.1	Tolerance	R	1.73	1	0.06	*
Power Drift	0.21	Tolerance	R	1.73	1	0.12	
Combined Standard Uncertainty (k=1)						0.66	16.3%
Expanded Uncertainty [95% confidence]						1.31	32.6%
Expanded Uncertainty [95% confidence] on Field						0.66	16.3%

Notes:
1. Test equipments are calibrated according to techniques outlined in NIS81, NIS3003 and NIST Tech Note 1297. All equipments have traceability according to NIST. Measurement Uncertainties are defined in further detail in NIS 81 and NIST Tech Note 1297 and UKAS M3003.
2. * Uncertainty specifications from Schmidt & Partner Engineering AG (not site specific)

Measurement uncertainty reflects the quality and accuracy of a measured result as compared to the true value. Such statements are generally required when stating results of measurements so that it is clear to the intended audience that the results may differ when reproduced by different facilities. Measurement results vary due to the measurement uncertainty of the instrumentation, measurement technique, and test engineer. Most uncertainties are calculated using the tolerances of the instrumentation used in the measurement, the measurement setup variability, and the technique used in performing the test. While not generally included, the variability of the equipment under test also figures into the overall measurement uncertainty. Another component of the overall uncertainty is based on the variability of repeated measurements (so-called Type A uncertainty). This may mean that the Hearing Aid immunity tests may have to be repeated by taking down the test setup and resetting it up so that there are a statistically significant number of repeat measurements to identify the measurement uncertainty. By combining the repeat measurement results with that of the instrumentation chain using the technique contained in NIS 81 and NIS 3003, the overall measurement uncertainty was estimated.

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10. CONCLUSION

The measurements indicate that the referenced wireless communications device complies with the HAC limits specified in accordance with the ANSI C63.19-2019 Standard and FCC WT Docket No. 01-309 RM-8658. Precise laboratory measures were taken to assure repeatability of the tests. The tested device complies with the requirements in respect to all parameters specific to the test. The test results and statements relate only to the item(s) tested.

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