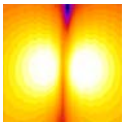
PCTEST
7185 Oakland Mills Road, Columbia, MD 21046 USA
Tel. 410.290.6652 / Fax 410.290.6654
http://www.pctest.com



HEARING AID COMPATIBILITY

Applicant Name:
Microsoft Corporation
One Microsoft Way
Redmond, WA 98052
United States

Date of Testing:
09/13/2021 - 9/20/2021
Test Site/Location:
PCTEST, Columbia, MD, USA
Test Report Serial No.:
1M2109100105-01.C3K
Date of Issue:
09/22/2021

FCC ID:	**C3K1995**
APPLICANT:	**MICROSOFT CORPORATION**

Scope of Test:	Audio Band Magnetic Testing (T-Coil)
Application Type:	Class II Permissive Change
FCC Rule Part(s):	CFR §20.19(b)
HAC Standard:	ANSI C63.19-2011 285076 D01 HAC Guidance v05 285076 D02 T-Coil testing for CMRS IP v03
DUT Type:	Portable Handset
Model:	1995
Test Device Serial No.:	*Pre-Production Sample* [S/N: 51385]
Class II Permissive Change(s):	See FCC Change Document

C63.19-2011 HAC Category:	**T3 (SIGNAL TO NOISE CATEGORY, OTT VoIP Application (MS Teams) Only)**

This report and category only pertain to the pre-installed OTT VoIP application, MS Teams, supported by this wireless device. The overall category rating of the device is determined by the lowest rating obtained over all air interfaces supported by the device. This wireless portable device has been shown to be hearing-aid compatible under the above rated category, specified in ANSI/IEEE Std. C63.19-2011 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.

Randy Ortanez
President

ACCREDITED
CERT #2041.01

TABLE OF CONTENTS

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

The hearing aid must 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.

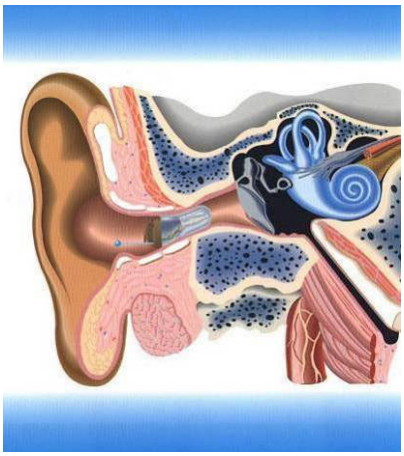


Figure 1-1 Hearing Aid *in-situ*

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

2. DUT DESCRIPTION

FCC ID:	C3K1995
Applicant:	Microsoft Corporation One Microsoft Way Redmond, WA 98052 United States
Model:	1995
Serial Number:	51385
HW Version:	EV3 Debug
SW Version:	16.40.137 (Touch Version)
Antenna:	Internal Antenna
DUT Type:	Portable Handset

I. LTE Band Selection

This device supports the following pair of LTE bands with similar frequencies: LTE B66 & B4. This pair of LTE bands has the same target power and shares the same transmission path. Since the supported frequency span for the smaller LTE band is completely covered by the larger LTE band, only the larger LTE band (LTE B66) was evaluated for hearing-aid compliance. LTE B5 and B2 are LTE anchor bands for dual connectivity (EN-DC) scenarios between LTE and NR so they were additionally evaluated as independent LTE bands.

II. NR Band Selection

This device supports the following pair of NR bands with similar frequencies: NR n25 & n2. This pair of NR bands has the same target power and shares the same transmission path. Since the supported frequency span for the smaller NR band is completely covered by the larger NR band, only the larger NR band (n25) was evaluated for hearing-aid compliance.

III. Flat Configuration Testing

This device supports held-to-ear scenarios in both flip and flat postures. All supported modes for this device were fully evaluated in both postures.

Table 2-1
C3K1995 HAC Air Interfaces

Air-Interface	Band (MHz)	Type Transport	HAC Tested	Simultaneous But Not Tested	Name of Voice Service	Audio Codec Evaluated
GSM	850	VO	No[6]	Yes: WIFI or BT	CMRS Voice[1]	EFR
	1900					
	GPRS	VD	Yes[6]	Yes: WIFI or BT	Google Duo, MS Teams[2]	Google Duo: OPUS MS Teams: Satin, Silk
UMTS	850	VD	No[6]	Yes: WIFI or BT	CMRS Voice[1]	NB AMR, WB AMR
	1900					
	HSPA	VD	Yes[6]	Yes: WIFI or BT	Google Duo, MS Teams[2]	Google Duo: OPUS MS Teams: Satin, Silk
LTE (FDD)	680 (B71)	VD	Yes[3,6]	Yes: NR, WIFI or BT	VoLTE[1], Google Duo, MS Teams[2]	VoLTE: NB AMR, WB AMR, EVS Google Duo: OPUS MS Teams: Satin, Silk
	700 (B12)		Yes[6]			
	780 (B13)					
	790 (B14)					
	850 (B5)					
	850 (B26)					
	1700 (B4)					
	1700 (B66)					
	1900 (B2)					
	1900 (B25)					
	2300 (B30)					
	2500 (B7)					
LTE (TDD)	2600 (B41)	VD	Yes[6]	Yes: NR, WIFI or BT	VoLTE[1], Google Duo, MS Teams[2]	VoLTE: NB AMR, WB AMR, EVS Google Duo: OPUS MS Teams: Satin, Silk
	3600 (B48)					
NR (FDD)	680 (n71)	VD	Yes[3,4,6]	Yes: LTE, WIFI or BT	Google Duo, MS Teams[2]	Google Duo: OPUS MS Teams: Satin, Silk
	850 (n5)		Yes[4,6]			
	1700 (n66)					
	1900 (n2)					
	1900 (n25)					
NR (TDD)	2600 (n41)	VD	Yes[4,6]	Yes: LTE, WIFI or BT	Google Duo, MS Teams[2]	Google Duo: OPUS MS Teams: Satin, Silk
	28000 (n261)		No[5]			
	39000 (n260)					
WIFI	2450	VD	Yes[6]	Yes: GSM, UMTS, LTE, or NR	VoWIFI[2], Google Duo, MS Teams[2]	VoWIFI: NB AMR, WB AMR, EVS Google Duo: OPUS MS Teams: Satin, Silk
	5200 (U-NII 1)					
	5300 (U-NII 2A)					
	5500 (U-NII 2C)					
	5800 (U-NII 3)					
BT	2450	DT	No	Yes: GSM, UMTS, LTE, or NR	N/A	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. Reference level in accordance with 7.4.2.1 of ANSI C63.19-2011 and July 2012 C63 VoLTE Interpretation.
2. Reference level is -20dBm0 in accordance with FCC KDB 285076 D02
3. LTE B71 and NR n71, while outside the scope of ANSI C63.19 and FCC HAC regulations, were additionally tested according to the existing HAC procedures with currently available test equipment.
4. NR was evaluated using an interim procedure outlined in Section 5.II.6.
5. n260 and n261 are currently outside the scope of ANSI C63.19 and FCC HAC regulations therefore they were not evaluated.
6. This report only pertains to data modes capable of using MS Teams. For full data, please refer to the Original Certification Test Report (Report S/N: 1M2105060048-19.C3K).

3. ANSI C63.19-2011 PERFORMANCE CATEGORIES

I. MAGNETIC COUPLING

Axial and Radial Field Intensity

All orientations of the magnetic field, in the axial and radial position along the measurement plane shall be ≥ -18 dB(A/m) at 1 kHz in a 1/3 octave band filter per §8.3.1.

Frequency Response

The frequency response of the axial component of the magnetic field shall follow the response curve specified in EIA RS-504-1983, over the frequency range 300 Hz – 3000 Hz per §8.3.2.

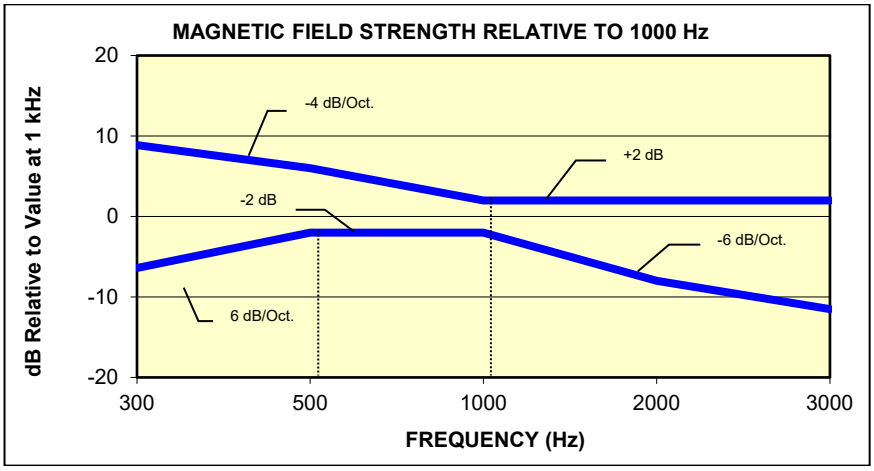


Figure 3-1
Magnetic field frequency response for Wireless Devices with an axial field ≤-15 dB(A/m) at 1 kHz

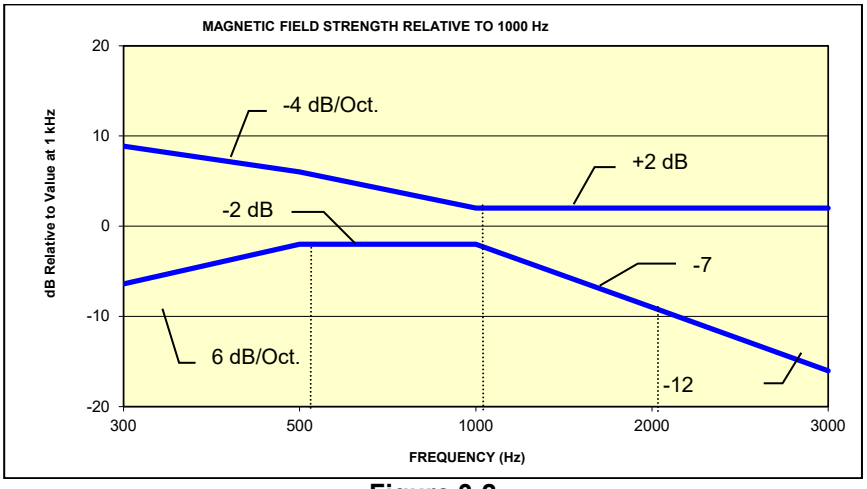


Figure 3-2
Magnetic Field frequency response for wireless devices with an axial field that exceeds -15 dB(A/m) at 1 kHz

Signal Quality

The table below provides the signal quality requirement for the intended audio magnetic signal from a wireless device. Only the RF immunity of the hearing aid is measured in T-coil mode. It is assumed that a hearing aid can have no immunity to an interference signal in the audio band, which is the intended reception band for this mode. The only criterion that can be measured is the RF immunity in T-coil mode. This is measured using the same procedure as the audio coupling mode at the same levels.

The signal quality of the axial and radial components of the magnetic field was used to determine the T-coil mode category.

Category	Telephone RF Parameters
	Wireless Device Signal Quality [(Signal + Noise)-to-noise ratio in dB]
T1	0 to 10 dB
T2	10 to 20 dB
T3	20 to 30 dB
T4	> 30 dB

Table 3-1
Magnetic Coupling Parameters

Note: The FCC limit for SNNR is 20dB and the test data margins will indicate a margin from the FCC limit for compliance.

4. METHOD OF MEASUREMENT

I. Test Setup

The equipment was connected as shown in an acoustic/RF hemi-anechoic chamber:

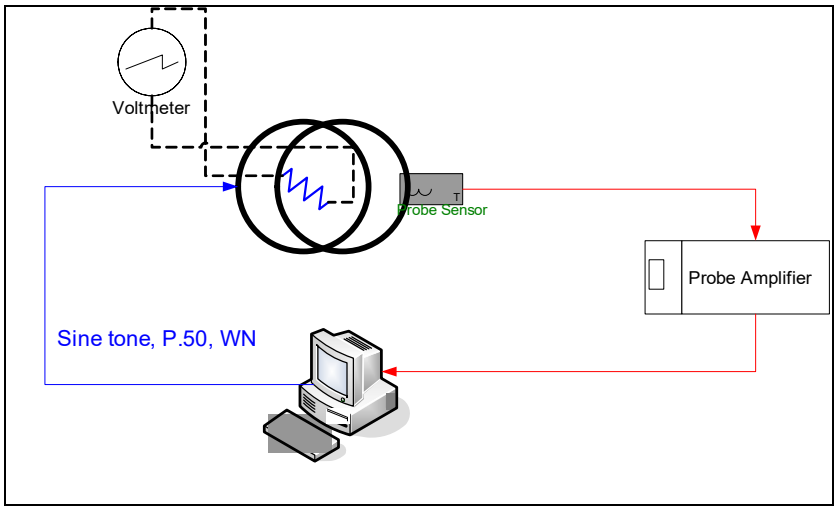


Figure 4-1
Validation Setup with Helmholtz Coil

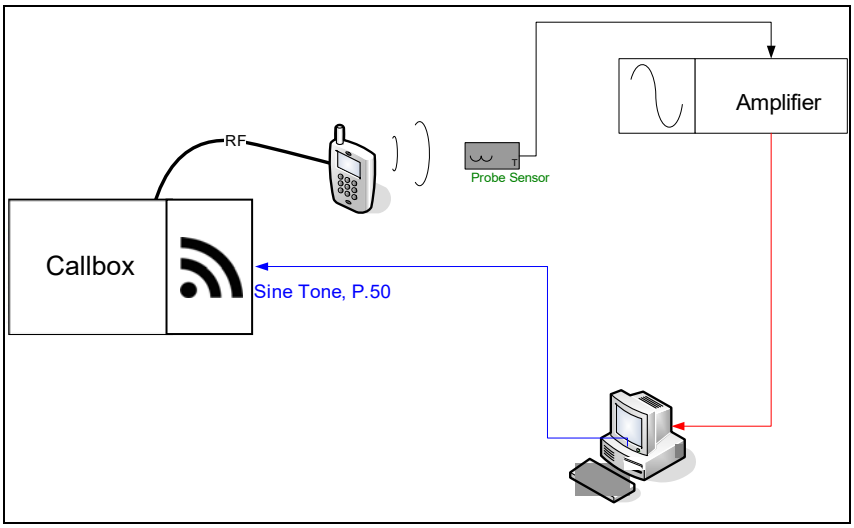


Figure 4-2
T-Coil Test Setup

II. Scanning Mechanism

Manufacturer:	TEM
Accuracy:	± 0.83 cm/meter
Minimum Step Size:	0.1 mm
Maximum speed	6.1 cm/sec
Line Voltage:	115 VAC
Line Frequency:	60 Hz
Material Composite:	Delrin (Acetal)
Data Control:	Parallel Port
Dynamic Range (X-Y-Z):	45 x 31.75 x 47 cm
Dimensions:	36” x 25” x 38”
Operating Area:	36” x 49” x 55”
Reflections:	< -20 dB (in anechoic chamber)

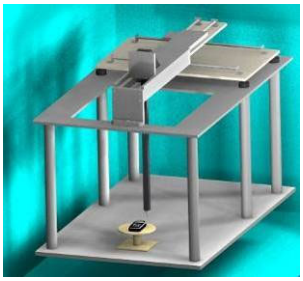


Figure 4-3
RF Near-Field Scanner

III. ITU-T P.50 Artificial Voice

Manufacturer:	ITU-T
Active Frequency Range:	100 Hz – 8 kHz
Stimulus Type:	Male and Female, no spaces
Single Sample Duration:	20.96 seconds
Activity Level:	100%

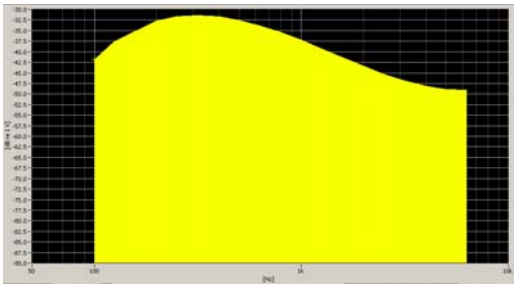


Figure 4-4
Spectral Characteristic of full P.50

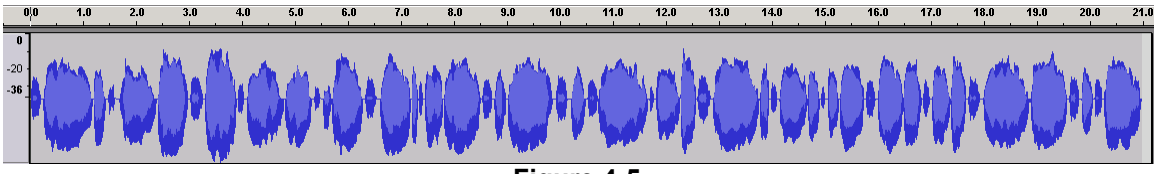
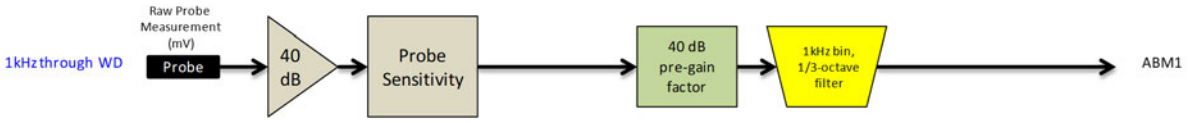


Figure 4-5
Temporal Characteristic of full P.50

ABM1 Measurement Block Diagram:



ABM2 Measurement Block Diagram:

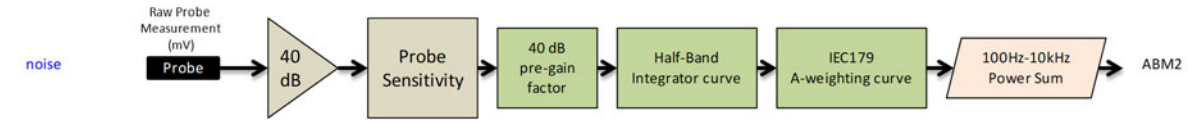


Figure 4-6 Magnetic Measurement Processing Steps

IV. Test Procedure

1. Ambient Noise Check per C63.19 §7.3.1
   a. Ambient interference was monitored using a Real-Time Analyzer between 100-10,000 Hz with 1/3 octave filtering.
   b. "A-weighting" and Half-Band Integration was applied to the measurements.
   c. Since this measurement was measured in the same method as ABM2 measurements, this level was verified to be more than 10 dB below the lowest measurement signal (which is the highest ABM2 measurement for a T4 WD). Therefore the maximum noise level for a T4 WD with an ABM1 = -18 dBA/m is:

      -18 - 30 - 10= -58 dBA/m

2. Measurement System Validation (See Figure 4-1)
   a. The measurement system including the probe, pre-amplifier and acquisition system were validated as an entire system to ensure the reliability of test measurements.
   b. ABM1 Validation
      The magnetic field at the center of the Helmholtz coil is given by the equation (per C63.19 Annex D.10.1):

$$H_c = \frac{NI}{r\sqrt{1.25^3}} = \frac{N(\frac{V}{R})}{r\sqrt{1.25^3}}$$

      Where H_c = magnetic field strength in amperes per meter
      N = number of turns per coil

      For the Helmholtz Coil, N=20; r=0.08m; R=10.2Ω and using V=18mV:

$$H_c = \frac{20\cdot(\frac{0.018}{10.2})}{0.08\cdot\sqrt{1.25^3}} = 0.316A/m \approx -10dB(A/m)$$

      Therefore a pure tone of 1kHz was applied into the coils such that 18mV was observed across the resistor. The voltmeter used for measurement was verified to be capable of measurements in the audio band range. This theoretically generates an expected field of -10 dB(A/m) in the center of the Helmholtz coil which was used to validate the probe measurement at -10dB(A/m). This was verified to be within ± 0.5 dB of the -10dB(A/m) value (see Page 44).

c. Frequency Response Validation

The frequency response through the Helmholtz Coil was verified to be within 0.5 dB relative to 1kHz, between 300 – 3000 Hz using the P.50 signal as shown below:

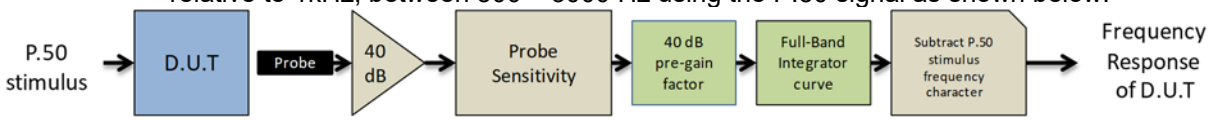


Figure 4-7 Frequency Response Validation

d. ABM2 Measurement Validation

WD noise measurements are filtered with A-weighting and Half-Band Integration over a frequency range of 100Hz – 10kHz to process ABM2 measurements. Below is the verification of the system processing A-weighting and Half-Band integration between system input to output within 0.5 dB of the theoretical result:

Table 4-1
ABM2 Frequency Response Validation

f (Hz)	HBI, A - Measured (dB re 1kHz)	HBI, A - Theoretical (dB re 1kHz)	dB Var.
100	-16.180	-16.170	-0.010
125	-13.257	-13.250	-0.007
160	-10.347	-10.340	-0.007
200	-8.017	-8.010	-0.007
250	-5.925	-5.920	-0.005
315	-4.045	-4.040	-0.005
400	-2.405	-2.400	-0.005
500	-1.212	-1.210	-0.002
630	-0.349	-0.350	0.001
800	0.071	0.070	0.001
1000	0.000	0.000	0.000
1250	-0.503	-0.500	-0.003
1600	-1.513	-1.510	-0.003
2000	-2.778	-2.780	0.002
2500	-4.316	-4.320	0.004
3150	-6.166	-6.170	0.004
4000	-8.322	-8.330	0.008
5000	-10.573	-10.590	0.017
6300	-13.178	-13.200	0.022
8000	-16.241	-16.270	0.029
10000	-19.495	-19.520	0.025

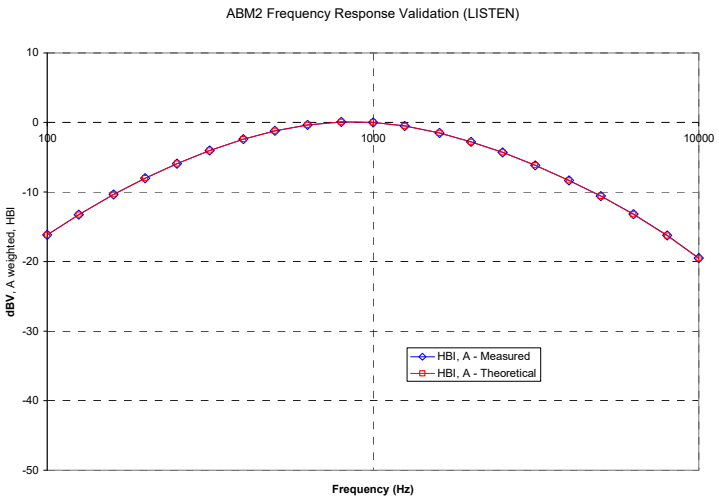


Figure 4-8
ABM2 Frequency Response Validation

The ABM2 result is a power sum from 100Hz to 10kHz with half-band integration and A-weighting. To verify the power sum measurement, a power sum over the full band was measured and verified to track with the source level (See Figure 4-9). Therefore the setup in this step was used to verify the power sum post-processing for ABM2 measurements. See below block diagram:

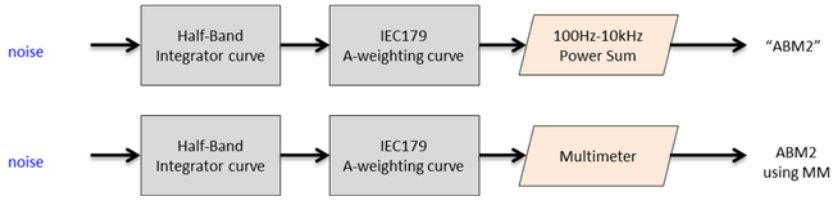


Figure 4-9
ABM2 Validation Block Diagram

The power summed output results for a known input were compared to the multi-meter results to verify any deviation in the post-processing implemented with the power-sum.

Table 4-2
ABM2 Power Sum Validation

WN Input (dBV)	Power Sum (dBV)	Multimeter-Full (dBV)	Dev (dB)
-60	-60.36	-60.2	0.16
-50	-50.19	-50.13	0.06
-40	-40.14	-40.03	0.11
-30	-30.13	-30.01	0.12
-20	-20.12	-20	0.12
-10	-10.14	-10	0.14

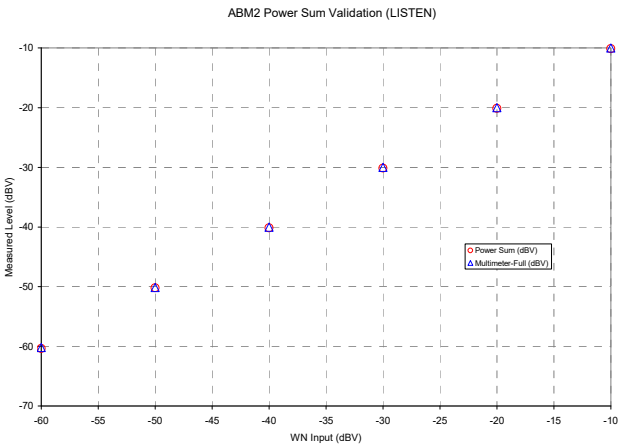


Figure 4-10
ABM2 Power Sum Validation

3. Measurement Test Setup
    a. Fine scan above the WD (TEM)
        i. A multitone signal was applied to the handset such that the phone acoustic output was stable within 1dB over the probe settling time and with the acoustic output level at the C63.19 specified levels (below). The measurement step size was in 2 mm increments at a distance of 10 mm between the surface of the wireless device as shown below (note that in Figure 4-12, the grid is not to scale but merely a graphical representation of the coordinate system in use):

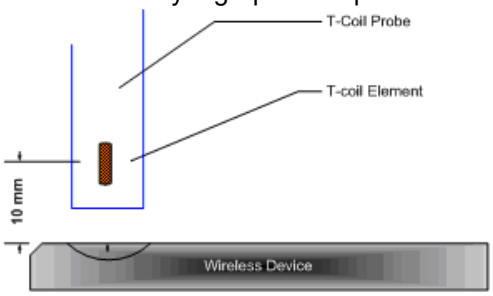


Figure 4-11
Measurement Distance

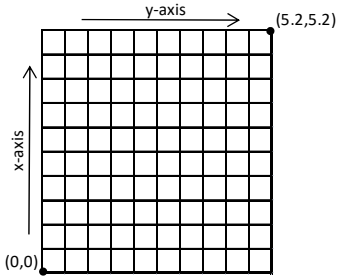


Figure 4-12
Measurement Grid

        ii. After scanning, the planar field maximum point was determined. The position of the probe was moved to this location to setup the test using the SoundCheck system.
        iii. These steps were repeated for all T-coil orientations (axial and radial) per Figure 4-14 after a T-coil orientation was fully measured with the SoundCheck system.
    b. Speech Signal Setup to Base Station Simulator
        i. C63.19 Table 7-1 states audio reference input levels for various technologies:

Standard	Technology	Input Level (dBm0)
TIA/EIA/IS-2000	CDMA	-18
J-STD-007	GSM (217)	-16
T1/T1P1/3GPP	UMTS (WCDMA)	-16
iDEN™	TDMA (22 and 11 Hz)	-18

ii. See Section 5 for more information regarding audio level settings for Over-The-Top (OTT) Voice Over IP (VoIP) Testing.

c. Real-Time Analyzer (RTA)
   i. The Real-Time Analyzer was configured to analyze measurements using 1/3 Octave band weighted filtering.

d. WD Radio Configuration Selection
   i. The device was chosen to be tested in the worst-case ABM2 condition (LTE and NR configuration information can be found in Section 5. WIFI configuration information can be found in Section 6.)

4. Signal Quality Data Analysis
   a. Narrow-band Magnetic Intensity
      i. The standard specifies a 1kHz 1/3 octave band minimum field intensity for a sine tone. The ABM1 measurements were evaluated at 1kHz with 1/3 octave band filtering over an averaged period of 10 seconds.

   b. Frequency Response
      i. The appropriate frequency response curve was measured to curves in Figure 3-1 or Figure 3-2 between 300 – 3000 Hz using digital linear averaging (limit lines chosen according to measurement found in step 4a). A linear average over 3x the length of the artificial voice signal (3x sampling) was performed. A 10 second delay was configured in the measurement process of the stimulus to ensure handset vocoder latency effects and echo cancellation devices (if any) were appropriately stabilized during measurements.
      ii. The appropriate post-processing was applied according to the system processing chain illustrated in Figure 4-7. All R10 frequencies were plotted with respect to 0dB at 1kHz value and aligned with respect to the EIA-504 mask.
      iii. The margin is represented by the closest measured data point on the curve to the EIA-504 limit lines, in dB.

   c. Signal Quality Index
      i. Ensuring the WD was at maximum RF power, maximum volume, backlight off, display on, maximum contrast setting, keypad lights on (when possible) with no audio signal through the vocoder, the WD was measured over at least 100 Hz – 10,000 Hz, maximized over 5 seconds with a 50ms sample time for the ABM2 measurement (5 second time period is used in noise measurements under standards such as IEEE 269, etc.).
      ii. After applying half-band integration and A-weighting to the result, a power sum was applied over each 1/3 octave bandwidth frequency for an ABM2 value.
      iii. This result was subtracted from the ABM1 result in step a, to obtain the Signal Quality.

V. Test Setup

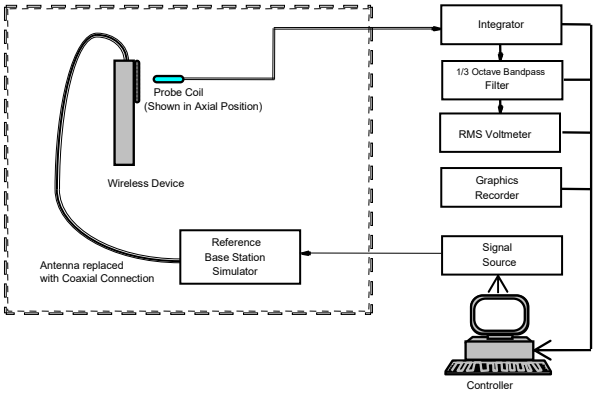


Figure 4-13
Audio Magnetic Field Test Setup

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.

VI. Deviation from C63.19 Test Procedure

Non-conducted RF connection due to inaccessibility of RF ports with battery installed.

VII. Air Interface Technologies Tested

All air interfaces which support voice capabilities over a managed CMRS, or pre-installed OTT VoIP applications were tested for T-coil unless otherwise noted. See Table 2-1 for more details regarding which modes were tested.

VIII. Wireless Device Channels and Frequencies

1. 2G/3G Modes

The frequencies listed in the table below are those that lie in the center of the bands used for cellular telephony. Only middle channels were evaluated for data modes.

Table 4-3
Center Channels and Frequencies

Test frequencies & associated channels	
Channel	**Frequency (MHz)**
Cellular 850	
190 (GSM)	836.60
4183 (UMTS)	836.60
PCS 1900	
661 (GSM)	1880
9400 (UMTS)	1880

2. 4G (LTE) Modes

The middle channel and supported bandwidths from the worst-case LTE FDD band according to Table 5-6 and worst-case LTE TDD band according to Table 5-7 was evaluated with OTT VoIP for each probe orientation. The band and bandwidth combination from each probe orientation resulting in the worst-case SNNR was additionally tested using low and high channels for that band and bandwidth combination. Low-mid and mid-high channels are additionally tested for LTE TDD. See Tables 6-6 through 6-13 for LTE bandwidths and channels.

3. 5G (NR) Modes

The middle channel and supported bandwidths from the worst-case NR FDD band according to Table 5-21 was evaluated with OTT VoIP for each probe orientation. NR TDD n41 (Power Class 3) was additionally evaluated with OTT VoIP for each probe orientation as well. The band and bandwidth combination from each probe orientation resulting in the worst-case SNNR was additionally tested using low and high channels for that band and bandwidth combination. Low-mid and mid-high channels are additionally tested for NR TDD. See Tables 6-14 to 6-29 for NR bandwidths and channels.

4. WIFI

The middle channel for each IEEE 802.11 standard was tested for each probe orientation. The 2.4GHz IEEE 802.11 standard from each probe orientation resulting in the worst-case SNNR was additionally tested using low and high channels. The 5GHz IEEE 802.11 standard from each probe orientation resulting in the worst-case SNNR was additionally tested on higher U-NII bands as well as applicable low and high channels. See Tables 6-30 to 6-39 for WIFI standards and channels.

IX. Test Flow

The flow diagram below was followed (From C63.19):

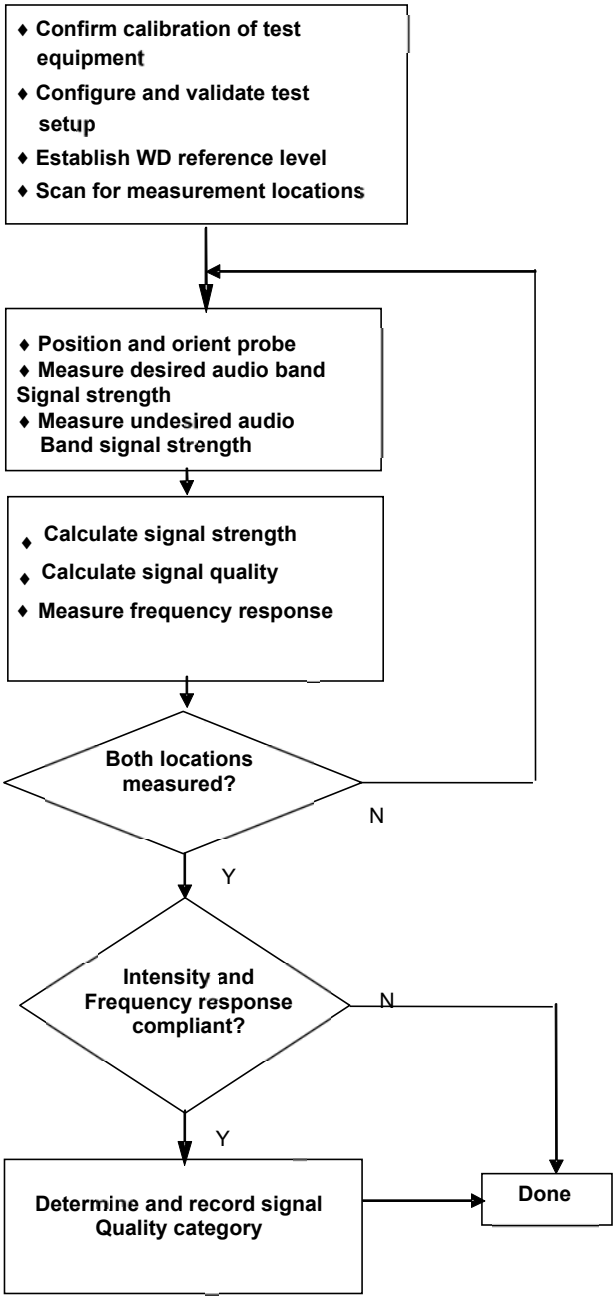


Figure 4-14
C63.19 T-Coil Signal Test Process

5. OTT VOIP TEST SYSTEM AND DUT CONFIGURATION

I. Test System Setup for OTT VoIP T-Coil Testing

1. OTT VoIP Application

MS Teams is a pre-installed application on the DUT which allows for VoIP calls in a held-to-ear scenario. Teams uses the Satin audio codec which supports a bitrate range of 6kb/s to 13kb/s and the Silk audio codec which supports a bitrate range of 6kb/s to 36kb/s. All air interfaces capable of a data connection were evaluated with MS Teams.

2. Equipment Setup

A CMW500 callbox was used to perform OTT VoIP T-coil measurements. The Data Application Unit (DAU) of the CMW500 was connected to the internet and allowed for an IP data connection on the DUT. An auxiliary VoIP unit was used to initiate an OTT VoIP call to the DUT. The auxiliary VoIP unit allowed for the configuration of the OTT VoIP codec bitrate during a call. All bitrate settings were evaluated in to determine the worst-case configuration.

3. Audio Level Settings

According to KDB 285076 D02, the average speech level of -20dBm0 shall be used for protocols not specifically listed in Table 7.1 of ANSI C63.19-2011 or the ANSI C63.19-2011 VoLTE interpretation[2]. The auxiliary VoIP unit allowed for monitoring the signal input level to ensure that the settings for speech input and full-scale levels resulted in the -20dBm0 speech input level to the DUT for the OTT VoIP call.

Note: The green highlighted text is approved by FCC under the TCB PAG Re-Use Policy 388624 D01 IV. D. for T-Coil Testing for WI-FI calling and Google Duo.

II. DUT Configuration for OTT VoIP T-Coil Testing

1. Codec Configuration

An investigation was performed with the Satin and Silk codecs across all bitrates to determine the audio codec configuration to be used for testing. The effects of codec configuration were found to be independent of radio configuration; therefore, only one radio configuration for each applicable data mode was used for these investigations. The Satin 10kbps setting was used for the audio codec on the auxiliary VoIP unit for OTT VoIP T-Coil testing. See below tables for comparisons between codec bitrates on all applicable data modes:

[2] FCC Office of Engineering and Technology KDB, "285076 D02 T-Coil Testing for CMRS IP v03," September 13, 2017

Table 5-1
Codec Investigation for Satin

Bitrate (kbps)	6	7	8	9	10	11	12	13	Worst-case Bitrate for Satin (10 kbps)			
Air Interface	2.4GHz WIFI								GPRS850	HSPA V	LTE TDD B41 PC2	2.4GHz WIFI
Radio Configuration	IEEE 802.11ax RU, Ch. 11								Ch. 190	Ch. 4183	15MHz BW, Ch. 41055	IEEE 802.11ax RU, Ch. 11
Probe Orientation	Axial											
ABM1 (dBA/m)	9.09	8.81	10.06	10.00	8.52	8.56	9.62	9.93	8.93	8.72	8.41	8.20
ABM2 (dBA/m)	-43.52	-44.08	-43.77	-44.12	-43.58	-44.27	-44.74	-42.36	-25.22	-43.64	-36.29	-43.52
SNNR (dB)	52.61	52.89	53.83	54.12	**52.10**	52.83	54.36	52.29	34.15	52.36	44.70	51.72
Frequency Response (dB)	0.94	0.76	0.84	0.88	0.81	0.89	0.83	0.89	0.72	1.29	1.13	1.08

Table 5-2
Codec Investigation for Silk (6kbps to 17kbps)

Bitrate (kbps)	6	7	8	9	10	11	12	13	14	15	16	17
Air Interface	2.4GHz WIFI											
Radio Configuration	IEEE 802.11ax RU, Channel 11											
Probe Orientation	Axial											
ABM1 (dBA/m)	11.05	11.02	11.14	11.17	10.92	11.92	11.94	11.93	11.94	11.88	11.95	11.92
ABM2 (dBA/m)	-42.83	-43.68	-43.15	-43.12	-42.89	-42.86	-42.78	-42.91	-42.39	-42.77	-42.35	-42.18
SNNR (dB)	53.88	54.70	54.29	54.29	53.81	54.78	54.72	54.84	54.33	54.65	54.30	54.10
Frequency Response (dB)	0.81	1.02	0.85	0.94	0.85	0.92	0.84	0.91	0.75	0.88	0.89	0.91

Table 5-3
Codec Investigation for Silk (18kbps to 29kbps)

Bitrate (kbps)	18	19	20	21	22	23	24	25	26	27	28	29
Air Interface	2.4GHz WIFI											
Radio Configuration	IEEE 802.11ax RU, Channel 11											
Probe Orientation	Axial											
ABM1 (dBA/m)	11.88	11.83	11.48	11.88	11.80	11.31	10.86	11.44	11.55	10.77	10.84	11.16
ABM2 (dBA/m)	-42.55	-42.28	-42.56	-42.71	-43.07	-42.46	-42.72	-41.80	-42.64	-42.51	-42.22	-43.36
SNNR (dB)	54.43	54.11	54.04	54.59	54.87	53.77	53.58	53.24	54.19	53.28	53.06	54.52
Frequency Response (dB)	0.91	0.96	0.93	0.95	0.97	0.83	0.97	0.91	0.91	0.90	0.78	0.84

Table 5-4
Codec Investigation for Silk (29kbps to 36kbps)

Bitrate (kbps)	30	31	32	33	34	35	36	Worst-case Bitrate for Silk (28 kbps)			
Air Interface	2.4GHz WIFI							GPRS850	HSPA V	LTE TDD B41 PC2	2.4GHz WIFI
Radio Configuration	IEEE 802.11ax RU, Channel 11							Ch. 190	Ch. 4183	15MHz BW, Ch. 41055	IEEE 802.11ax RU, Ch. 11
Probe Orientation	Axial										
ABM1 (dBA/m)	10.81	10.77	11.13	10.70	10.79	10.76	10.78	10.68	10.43	10.82	10.70
ABM2 (dBA/m)	-43.60	-42.62	-42.97	-43.61	-42.63	-43.23	-42.79	-24.78	-45.77	-36.34	-42.67
SNNR (dB)	54.41	53.39	54.10	54.31	53.42	53.99	53.57	35.46	56.20	47.16	53.37
Frequency Response (dB)	0.92	0.80	0.99	0.97	0.94	0.94	0.85	0.67	0.95	0.99	0.91

- Mute on; Backlight off; Max Volume; Max Contrast
- Radio Configurations can be found in Section 6.II.B

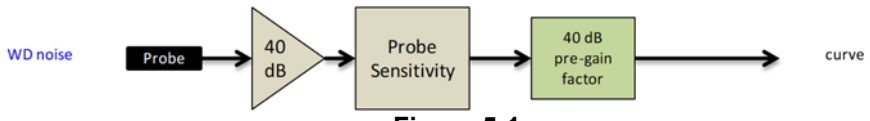


Figure 5-1
Audio Band Magnetic Curve Measurement Block Diagram

2. Radio Configuration for OTT VoIP (LTE)

An investigation was performed to determine the modulation and RB configuration to be used for testing. 16QAM, 1RB, 0RB offset was used for the testing as the worst-case configuration for the handset. See below table for SNNR comparison between different radio configurations:

Table 5-5
OTT VoIP (LTE) SNNR by Radio Configuration

Band	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	ABM1 [dB(A/m)]	ABM2 [dB(A/m)]	SNNR [dB]
66	1745.0	132322	20	QPSK	1	0	8.51	-45.23	53.74
66	1745.0	132322	20	QPSK	1	50	8.87	-45.79	54.66
66	1745.0	132322	20	QPSK	1	99	8.76	-45.12	53.88
66	1745.0	132322	20	QPSK	50	0	9.00	-45.95	54.95
66	1745.0	132322	20	QPSK	50	25	8.67	-46.37	55.04
66	1745.0	132322	20	QPSK	50	50	8.60	-46.64	55.24
66	1745.0	132322	20	QPSK	100	0	8.98	-46.13	55.11
66	1745.0	132322	20	16QAM	1	0	8.87	-43.53	**52.40**
66	1745.0	132322	20	16QAM	1	50	8.94	-43.58	52.52
66	1745.0	132322	20	16QAM	1	99	8.70	-43.77	52.47
66	1745.0	132322	20	16QAM	50	0	8.79	-46.20	54.99
66	1745.0	132322	20	16QAM	50	25	8.87	-46.52	55.39
66	1745.0	132322	20	16QAM	50	50	8.56	-46.53	55.09
66	1745.0	132322	20	16QAM	100	0	8.72	-46.37	55.09
66	1745.0	132322	20	64QAM	1	0	8.93	-43.95	52.88
66	1745.0	132322	20	64QAM	1	50	8.58	-43.96	52.54
66	1745.0	132322	20	64QAM	1	99	8.71	-44.21	52.92
66	1745.0	132322	20	64QAM	50	0	9.18	-46.00	55.18
66	1745.0	132322	20	64QAM	50	25	8.05	-46.12	54.17
66	1745.0	132322	20	64QAM	50	50	8.38	-45.65	54.03
66	1745.0	132322	20	64QAM	100	0	8.14	-45.79	53.93

An investigation was performed to determine the worst-case LTE FDD band to be used for OTT VoIP testing. LTE FDD Band 7 was used for the testing as the worst-case configuration for the handset. See below table for SNNR comparison between different LTE FDD bands:

Table 5-6
OTT VoIP (LTE FDD) SNNR by LTE Band

Band	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	ABM1 [dB(A/m)]	ABM2 [dB(A/m)]	SNNR [dB]
71	680.5	133297	20	16QAM	1	0	8.39	-42.64	51.03
12	707.5	23095	10	16QAM	1	0	8.40	-42.88	51.28
13	782.0	23230	10	16QAM	1	0	8.42	-42.92	51.34
14	793.0	23330	10	16QAM	1	0	8.33	-43.56	51.89
26	831.5	26865	15	16QAM	1	0	8.05	-43.42	51.47
5	836.5	20525	10	16QAM	1	0	8.59	-43.81	52.40
66	1745.0	132322	20	16QAM	1	0	8.21	-43.64	51.85
2	1880.0	18900	20	16QAM	1	0	8.23	-42.83	51.06
25	1882.5	26365	20	16QAM	1	0	8.65	-41.95	50.60
30	2310.0	27710	10	16QAM	1	0	8.36	-40.64	49.00
7	2535.0	21100	20	16QAM	1	0	8.37	-39.43	**47.80**

An investigation was performed to determine the worst-case LTE TDD band to be used for OTT VoIP testing. LTE TDD Band 41 (PC2) was used for the testing as the worst-case configuration for the handset. See below table for SNNR comparison between different LTE TDD bands:

Table 5-7
OTT VoIP (LTE TDD) SNNR by LTE Band

Band	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	ABM1 [dB(A/m)]	ABM2 [dB(A/m)]	SNNR [dB]
41 (PC3)	2593.0	40620	20	16QAM	1	0	8.37	-35.96	44.33
41 (PC2)	2593.0	40620	20	16QAM	1	0	8.09	-34.70	**42.79**
48	3625.0	55990	20	16QAM	1	0	8.25	-35.22	43.47

3. LTE TDD Uplink-Downlink Configuration Investigation for OTT VoIP

An investigation was performed to determine the worst-case Uplink-Downlink configuration for OTT VoIP T-Coil testing.

Per 3GPP TS 36.211, the total frame length for each TDD radio frame of length $T_f = 307200 \cdot T_s$ = 10 ms, where T_s is a number of time units equal to 1/(15000 x 2048) seconds. Additionally, each radio frame consists of 10 subframes, each of length $30720 \cdot T_s$ = 1 ms, and subframes can be designated as uplink (U), downlink (D), or special subframe (S), depending on the Uplink-Downlink configuration as indicated in Table 4.2-2 of 3GPP TS 36.211. In the transmission duty factor calculation, the special subframe configuration with the shortest UpPTS duration within the special subframe is used and will be applied for measurement. From 3GPP TS 36.211 Table 4.2-1, the shortest UpPTS is 2192 · Ts which occurs in the normal cyclic prefix and special subframe configuration 4.

See table below outlining the calculated transmission duty cycles for each Uplink-Downlink configuration:

Table 5-8
Uplink-Downlink Configurations for Type 2 Frame Structures

Uplink-downlink configuration	Downlink-to-Uplink Switch-point periodicity	Subframe number										Calculated Transmission Duty Cycle (%)
		0	1	2	3	4	5	6	7	8	9	
0	5 ms	D	S	U	U	U	D	S	U	U	U	61.4%
1	5 ms	D	S	U	U	D	D	S	U	U	D	41.4%
2	5 ms	D	S	U	D	D	D	S	U	D	D	21.4%
3	10 ms	D	S	U	U	U	D	D	D	D	D	30.7%
4	10 ms	D	S	U	U	D	D	D	D	D	D	20.7%
5	10 ms	D	S	U	D	D	D	D	D	D	D	10.7%
6	5 ms	D	S	U	U	U	D	S	U	U	D	51.4%

a. Power Class 3 Uplink-Downlink Configuration Investigation

Power Class 3 was evaluated with the following radio configuration: channel 40620, 20MHz BW, 16QAM, 1RB, 0RB Offset. For Power Class 3, all configurations (0-6) are supported. The configuration which resulted in the worst SNNR was used for full testing. Uplink-Downlink configuration 0 was used as the worst-case configuration for Power Class 3 OTT VoIP T-Coil testing. See table below for the SNNR comparison between each Uplink-Downlink configuration:

Table 5-9
Power Class 3 OTT VoIP SNNR by UL-DL Configuration

Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	UL-DL Configuration	ABM1 [dB(A/m)]	ABM2 [dB(A/m)]	SNNR [dB]
2593.0	40620	20	16QAM	1	0	0	8.10	-36.02	**44.12**
2593.0	40620	20	16QAM	1	0	1	8.14	-36.08	44.22
2593.0	40620	20	16QAM	1	0	2	8.52	-36.00	44.52
2593.0	40620	20	16QAM	1	0	3	8.19	-37.95	46.14
2593.0	40620	20	16QAM	1	0	4	8.15	-38.38	46.53
2593.0	40620	20	16QAM	1	0	5	8.16	-38.01	46.17
2593.0	40620	20	16QAM	1	0	6	8.39	-36.08	44.47

b. Power Class 2 Uplink-Downlink Configuration Investigation

Power Class 2 was evaluated with the following radio configuration: channel 40620, 20MHz BW, 16QAM, 1RB, 0RB Offset. For Power Class 2, configurations 1-5 are supported. The configuration which resulted in the worst SNNR was used for full testing. Uplink-Downlink configuration 1 was used as the worst-case configuration for Power Class OTT VoIP T-Coil testing. See table below for the SNNR comparison between each Uplink-Downlink configuration:

Table 5-10
Power Class 2 OTT VoIP SNNR by UL-DL Configuration

Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	UL-DL Configuration	ABM1 [dB(A/m)]	ABM2 [dB(A/m)]	SNNR [dB]
2593.0	40620	20	16QAM	1	0	1	8.40	-34.94	**43.34**
2593.0	40620	20	16QAM	1	0	2	8.70	-35.04	43.74
2593.0	40620	20	16QAM	1	0	3	8.59	-37.17	45.76
2593.0	40620	20	16QAM	1	0	4	8.20	-37.27	45.47
2593.0	40620	20	16QAM	1	0	5	8.47	-36.89	45.36

Note: LTE TDD B41 Power Class 2 only supports UL-DL configurations 1-5, not 0 or 6.

c. Conclusion

Per the investigations above, UL-DL Configuration 0 was used to evaluate Power Class 3 OTT VoIP and UL-DL Configuration 1 was used to evaluate Power Class 2 OTT VoIP.

4. LTE FDD Uplink Carrier Aggregation for OTT VoIP

LTE FDD ULCA was additionally evaluated with LTE FDD standalone. The configurations in Tables 5-11 through 5-14 were determined from Table 5-6 and satisfy the configuration requirements as defined in 3GPP 36.101.

Table 5-11
LTE FDD SNNR for OTT VoIP Uplink Carrier Aggregation (South – Flip)

Combination	PCC							SCC							ABM1 [dB(A/m)]	ABM2 [dB(A/m)]	SNNR [dB]
	PCC Band	PCC Bandwidth [MHz]	PCC (UL) Channel	PCC (UL) Frequency [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	SCC Band	SCC Bandwidth [MHz]	SCC (UL) Channel	SCC (UL) Frequency [MHz]	Modulation	SCC UL# RB	SCC UL RB Offset			
CA_5B	LTE B5	10	20525	836.5	16QAM	1	0	LTE B5	5	20453	829.3	16QAM	1	24	8.37	-44.38	52.75
CA_66C	LTE B66	20	132322	1745.0	16QAM	1	0	LTE B66	20	132124	1725.5	16QAM	1	99	8.22	-42.28	50.50
CA_7C	LTE B7	20	21100	2535.0	16QAM	1	0	LTE B7	20	20902	2515.2	16QAM	1	99	8.35	-40.98	49.33

Table 5-12
LTE FDD SNNR for OTT VoIP Uplink Carrier Aggregation (South – Flat)

Combination	PCC							SCC							ABM1 [dB(A/m)]	ABM2 [dB(A/m)]	SNNR [dB]
	PCC Band	PCC Bandwidth [MHz]	PCC (UL) Channel	PCC (UL) Frequency [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	SCC Band	SCC Bandwidth [MHz]	SCC (UL) Channel	SCC (UL) Frequency [MHz]	Modulation	SCC UL# RB	SCC UL RB Offset			
CA_5B	LTE B5	10	20525	836.5	16QAM	1	0	LTE B5	5	20453	829.3	16QAM	1	24	7.75	-45.92	53.67
CA_66C	LTE B66	20	132322	1745.0	16QAM	1	0	LTE B66	20	132124	1725.5	16QAM	1	99	8.14	-41.74	49.88
CA_7C	LTE B7	20	21100	2535.0	16QAM	1	0	LTE B7	20	20902	2515.2	16QAM	1	99	8.20	-40.50	48.70

Table 5-13
LTE FDD SNNR for OTT VoIP Uplink Carrier Aggregation (North – Flip)

Combination	PCC							SCC							ABM1 [dB(A/m)]	ABM2 [dB(A/m)]	SNNR [dB]
	PCC Band	PCC Bandwidth [MHz]	PCC (UL) Channel	PCC (UL) Frequency [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	SCC Band	SCC Bandwidth [MHz]	SCC (UL) Channel	SCC (UL) Frequency [MHz]	Modulation	SCC UL# RB	SCC UL RB Offset			
CA_5B	LTE B5	10	20525	836.5	16QAM	1	0	LTE B5	5	20453	829.3	16QAM	1	24	8.26	-44.35	52.61
CA_66C	LTE B66	20	132322	1745.0	16QAM	1	0	LTE B66	20	132124	1725.5	16QAM	1	99	7.59	-42.27	49.86
CA_7C	LTE B7	20	21100	2535.0	16QAM	1	0	LTE B7	20	20902	2515.2	16QAM	1	99	8.11	-42.27	50.38

Table 5-14
LTE FDD SNNR for OTT VoIP Uplink Carrier Aggregation (North – Flat)

Combination	PCC							SCC							ABM1 [dB(A/m)]	ABM2 [dB(A/m)]	SNNR [dB]
	PCC Band	PCC Bandwidth [MHz]	PCC (UL) Channel	PCC (UL) Frequency [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	SCC Band	SCC Bandwidth [MHz]	SCC (UL) Channel	SCC (UL) Frequency [MHz]	Modulation	SCC UL# RB	SCC UL RB Offset			
CA_5B	LTE B5	10	20525	836.5	16QAM	1	0	LTE B5	5	20453	829.3	16QAM	1	24	7.92	-46.34	54.26
CA_66C	LTE B66	20	132322	1745.0	16QAM	1	0	LTE B66	20	132124	1725.5	16QAM	1	99	8.09	-42.38	50.47
CA_7C	LTE B7	20	21100	2535.0	16QAM	1	0	LTE B7	20	20902	2515.2	16QAM	1	99	8.05	-40.30	48.35

5. LTE TDD Uplink Carrier Aggregation for OTT VoIP

LTE TDD ULCA was additionally evaluated with LTE TDD standalone. The configurations in Tables 5-15 through 5-18 were determined from Table 5-7 and satisfy the configuration requirements as defined in 3GPP 36.101.

Table 5-15
LTE TDD SNNR for OTT VoIP Uplink Carrier Aggregation (South – Flip)

Combination	PCC							SCC							ABM1 [dB(A/m)]	ABM2 [dB(A/m)]	SNNR [dB]
	PCC Band	PCC Bandwidth [MHz]	PCC (UL/DL) Channel	PCC (UL/DL) Frequency [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	SCC Band	SCC Bandwidth [MHz]	SCC (UL/DL) Channel	SCC (UL/DL) Frequency [MHz]	Modulation	SCC UL# RB	SCC UL RB Offset			
CA_41C (PC3)	LTE B41	20	40620	2593.0	16QAM	1	0	LTE B41	20	40422	2573.2	16QAM	1	99	7.86	-35.70	43.56
CA_41C (PC2)	LTE B41	20	40620	2593.0	16QAM	1	0	LTE B41	20	40422	2573.2	16QAM	1	99	7.86	-35.50	43.36
CA_48C	LTE B48	20	55990	3625.0	16QAM	1	0	LTE B48	20	55792	3605.2	16QAM	1	99	8.29	-39.15	47.44

Table 5-16
LTE TDD SNNR for OTT VoIP Uplink Carrier Aggregation (South – Flat)

Combination	PCC							SCC							ABM1 [dB(A/m)]	ABM2 [dB(A/m)]	SNNR [dB]
	PCC Band	PCC Bandwidth [MHz]	PCC (UL/DL) Channel	PCC (UL/DL) Frequency [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	SCC Band	SCC Bandwidth [MHz]	SCC (UL/DL) Channel	SCC (UL/DL) Frequency [MHz]	Modulation	SCC UL# RB	SCC UL RB Offset			
CA_41C (PC3)	LTE B41	20	40620	2593.0	16QAM	1	0	LTE B41	20	40422	2573.2	16QAM	1	99	8.26	-35.13	43.39
CA_41C (PC2)	LTE B41	20	40620	2593.0	16QAM	1	0	LTE B41	20	40422	2573.2	16QAM	1	99	8.11	-34.59	42.70
CA_48C	LTE B48	20	55990	3625.0	16QAM	1	0	LTE B48	20	55792	3605.2	16QAM	1	99	8.63	-39.03	47.66

Table 5-17
LTE TDD SNNR for OTT VoIP Uplink Carrier Aggregation (North – Flip)

Combination	PCC							SCC							ABM1 [dB(A/m)]	ABM2 [dB(A/m)]	SNNR [dB]
	PCC Band	PCC Bandwidth [MHz]	PCC (UL/DL) Channel	PCC (UL/DL) Frequency [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	SCC Band	SCC Bandwidth [MHz]	SCC (UL/DL) Channel	SCC (UL/DL) Frequency [MHz]	Modulation	SCC UL# RB	SCC UL RB Offset			
CA_41C (PC3)	LTE B41	20	40620	2593.0	16QAM	1	0	LTE B41	20	40422	2573.2	16QAM	1	99	7.57	-33.78	41.35
CA_41C (PC2)	LTE B41	20	40620	2593.0	16QAM	1	0	LTE B41	20	40422	2573.2	16QAM	1	99	7.41	-33.07	40.48
CA_48C	LTE B48	20	55990	3625.0	16QAM	1	0	LTE B48	20	55792	3605.2	16QAM	1	99	8.46	-36.58	45.04

Table 5-18
LTE TDD SNNR for OTT VoIP Uplink Carrier Aggregation (North – Flat)

Combination	PCC							SCC							ABM1 [dB(A/m)]	ABM2 [dB(A/m)]	SNNR [dB]
	PCC Band	PCC Bandwidth [MHz]	PCC (UL/DL) Channel	PCC (UL/DL) Frequency [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	SCC Band	SCC Bandwidth [MHz]	SCC (UL/DL) Channel	SCC (UL/DL) Frequency [MHz]	Modulation	SCC UL# RB	SCC UL RB Offset			
CA_41C (PC3)	LTE B41	20	40620	2593.0	16QAM	1	0	LTE B41	20	40422	2573.2	16QAM	1	99	7.82	-32.40	40.22
CA_41C (PC2)	LTE B41	20	40620	2593.0	16QAM	1	0	LTE B41	20	40422	2573.2	16QAM	1	99	7.68	-31.74	39.42
CA_48C	LTE B48	20	55990	3625.0	16QAM	1	0	LTE B48	20	55792	3605.2	16QAM	1	99	8.09	-35.44	43.53

6. Interim Procedure for evaluation OTT VoIP (NR)

The following procedure is used to evaluate OTT VoIP (NR) given equipment limitations.

a. This procedure is applicable for OTT VoIP (NR) voice calls that use the same protocol, codec(s), and reference level as OTT VoIP (LTE) (i.e. -20dBm0).
b. Establish the $ABM1_{NR}$ value by using the $ABM1_{LTE}$ magnetic intensity for an LTE call using a correlating LTE band through existing procedures and test equipment.
c. Establish an $ABM2_{NR}$ value using factory test mode (FTM) to simulate a NR connection for the desired NR band and channel under test.
d. The following information is documented in Section 6:
    i. $ABM2_{LTE}$ and $ABM2_{NR}$ for respective tests.
    ii. Calculate SNNR:
        1. ABM1 = $ABM1_{LTE}$
        2. ABM2 = $ABM2_{NR}$
        3. $SNNR_{NR}$ = [$ABM1_{LTE}$ – $ABM2_{NR}$] – 3dB
            a. A 3dB margin is built in to ensure conservative results with this interim procedure.

The above is only applicable for OTT VoIP scenarios, this device does not support VoNR over IMS.

The manufacturer has confirmed the handset as designed is expected to exhibit similar audio intensity levels between an OTT VoIP call placed over a 4G LTE and a 5G Sub-6GHz data connection.

7. Radio Configuration for OTT VoIP (NR)

An investigation was performed to determine the waveform, modulation, and RB configuration to be used for testing. Due to equipment limitations, the procedure outlined in 5.II.6 was used to evaluate the SNNR for each radio configuration below. DFT-s-OFDM 256QAM, 1RB, 99%RB offset was determined to be the worst-case configuration for the handset and will be used for full testing in Section 6.

Table 5-19
NR OTT VoIP SNNR by Radio Configuration (CP-OFDM)

Band	Frequency [MHz]	Channel	Bandwidth [MHz]	Waveform	Modulation	RB Size	RB Offset	$ABM1_{LTE}$ [dB(A/m)]	$ABM2_{NR}$ [dB(A/m)]	$SNNR_{NR}$ [dB]
n71	680.5	136100	20	CP-OFDM	QPSK	1	1	8.39	-45.90	54.29
n71	680.5	136100	20	CP-OFDM	QPSK	1	53	8.39	-45.25	53.64
n71	680.5	136100	20	CP-OFDM	QPSK	1	104	8.39	-46.22	54.61
n71	680.5	136100	20	CP-OFDM	QPSK	53	0	8.39	-46.36	54.75
n71	680.5	136100	20	CP-OFDM	QPSK	53	26	8.39	-47.21	55.60
n71	680.5	136100	20	CP-OFDM	QPSK	53	53	8.39	-47.08	55.47
n71	680.5	136100	20	CP-OFDM	QPSK	106	0	8.39	-46.87	55.26
n71	680.5	136100	20	CP-OFDM	16QAM	1	1	8.39	-47.58	55.97
n71	680.5	136100	20	CP-OFDM	16QAM	1	53	8.39	-44.93	53.32
n71	680.5	136100	20	CP-OFDM	16QAM	1	104	8.39	-44.95	53.34
n71	680.5	136100	20	CP-OFDM	16QAM	53	0	8.39	-46.28	54.67
n71	680.5	136100	20	CP-OFDM	16QAM	53	26	8.39	-46.31	54.70
n71	680.5	136100	20	CP-OFDM	16QAM	53	53	8.39	-46.43	54.82
n71	680.5	136100	20	CP-OFDM	16QAM	106	0	8.39	-46.45	54.84
n71	680.5	136100	20	CP-OFDM	64QAM	1	1	8.39	-45.58	53.97
n71	680.5	136100	20	CP-OFDM	64QAM	1	53	8.39	-45.14	53.53
n71	680.5	136100	20	CP-OFDM	64QAM	1	104	8.39	-46.08	54.47
n71	680.5	136100	20	CP-OFDM	64QAM	53	0	8.39	-46.35	54.74
n71	680.5	136100	20	CP-OFDM	64QAM	53	26	8.39	-46.52	54.91
n71	680.5	136100	20	CP-OFDM	64QAM	53	53	8.39	-46.64	55.03
n71	680.5	136100	20	CP-OFDM	64QAM	106	0	8.39	-46.66	55.05
n71	680.5	136100	20	CP-OFDM	256QAM	1	1	8.39	-46.58	54.97
n71	680.5	136100	20	CP-OFDM	256QAM	1	53	8.39	-46.72	55.11
n71	680.5	136100	20	CP-OFDM	256QAM	1	104	8.39	-45.98	54.37
n71	680.5	136100	20	CP-OFDM	256QAM	53	0	8.39	-46.45	54.84
n71	680.5	136100	20	CP-OFDM	256QAM	53	26	8.39	-46.85	55.24
n71	680.5	136100	20	CP-OFDM	256QAM	53	53	8.39	-45.86	54.25
n71	680.5	136100	20	CP-OFDM	256QAM	106	0	8.39	-45.85	54.24

Table 5-20
NR OTT VoIP SNNR by Radio Configuration (DFT-s-OFDM)

Band	Frequency [MHz]	Channel	Bandwidth [MHz]	Waveform	Modulation	RB Size	RB Offset	$ABM1_{LTE}$ [dB(A/m)]	$ABM2_{NR}$ [dB(A/m)]	$SNNR_{NR}$ [dB]
n71	680.5	136100	20	DFT-s-OFDM	π/2-BPSK	1	1	8.39	-46.51	54.90
n71	680.5	136100	20	DFT-s-OFDM	π/2-BPSK	1	53	8.39	-46.79	55.18
n71	680.5	136100	20	DFT-s-OFDM	π/2-BPSK	1	104	8.39	-46.89	55.28
n71	680.5	136100	20	DFT-s-OFDM	π/2-BPSK	50	0	8.39	-46.44	54.83
n71	680.5	136100	20	DFT-s-OFDM	π/2-BPSK	50	28	8.39	-46.47	54.86
n71	680.5	136100	20	DFT-s-OFDM	π/2-BPSK	50	56	8.39	-46.55	54.94
n71	680.5	136100	20	DFT-s-OFDM	π/2-BPSK	100	0	8.39	-46.65	55.04
n71	680.5	136100	20	DFT-s-OFDM	QPSK	1	1	8.39	-46.80	55.19
n71	680.5	136100	20	DFT-s-OFDM	QPSK	1	53	8.39	-46.83	55.22
n71	680.5	136100	20	DFT-s-OFDM	QPSK	1	104	8.39	-46.59	54.98
n71	680.5	136100	20	DFT-s-OFDM	QPSK	50	0	8.39	-46.52	54.91
n71	680.5	136100	20	DFT-s-OFDM	QPSK	50	28	8.39	-46.49	54.88
n71	680.5	136100	20	DFT-s-OFDM	QPSK	50	56	8.39	-46.56	54.95
n71	680.5	136100	20	DFT-s-OFDM	QPSK	100	0	8.39	-46.94	55.33
n71	680.5	136100	20	DFT-s-OFDM	16QAM	1	1	8.39	-48.08	56.47
n71	680.5	136100	20	DFT-s-OFDM	16QAM	1	53	8.39	-45.35	53.74
n71	680.5	136100	20	DFT-s-OFDM	16QAM	1	104	8.39	-45.09	53.48
n71	680.5	136100	20	DFT-s-OFDM	16QAM	50	0	8.39	-46.91	55.30
n71	680.5	136100	20	DFT-s-OFDM	16QAM	50	28	8.39	-47.13	55.52
n71	680.5	136100	20	DFT-s-OFDM	16QAM	50	56	8.39	-46.65	55.04
n71	680.5	136100	20	DFT-s-OFDM	16QAM	100	0	8.39	-46.52	54.91
n71	680.5	136100	20	DFT-s-OFDM	64QAM	1	1	8.39	-45.75	54.14
n71	680.5	136100	20	DFT-s-OFDM	64QAM	1	53	8.39	-46.44	54.83
n71	680.5	136100	20	DFT-s-OFDM	64QAM	1	104	8.39	-45.75	54.14
n71	680.5	136100	20	DFT-s-OFDM	64QAM	50	0	8.39	-46.62	55.01
n71	680.5	136100	20	DFT-s-OFDM	64QAM	50	28	8.39	-46.70	55.09
n71	680.5	136100	20	DFT-s-OFDM	64QAM	50	56	8.39	-45.02	53.41
n71	680.5	136100	20	DFT-s-OFDM	64QAM	100	0	8.39	-45.73	54.12
n71	680.5	136100	20	DFT-s-OFDM	256QAM	1	1	8.39	-45.18	53.57
n71	680.5	136100	20	DFT-s-OFDM	256QAM	1	53	8.39	-45.51	53.90
n71	680.5	136100	20	DFT-s-OFDM	256QAM	1	104	8.39	-44.44	**52.83**
n71	680.5	136100	20	DFT-s-OFDM	256QAM	50	0	8.39	-49.01	57.40
n71	680.5	136100	20	DFT-s-OFDM	256QAM	50	28	8.39	-49.88	58.27
n71	680.5	136100	20	DFT-s-OFDM	256QAM	50	56	8.39	-49.15	57.54
n71	680.5	136100	20	DFT-s-OFDM	256QAM	100	0	8.39	-49.72	58.11

An investigation was performed to determine the worst-case NR FDD band to be used for OTT VoIP testing. NR n71 was used for the testing as the worst-case configuration for the handset. See below table for SNNR comparison between different NR FDD bands:

Table 5-21
OTT VoIP (NR FDD) SNNR by Band

Band	Frequency [MHz]	Channel	Bandwidth [MHz]	Waveform	Modulation	RB Size	RB Offset	$ABM1_{LTE}$ [dB(A/m)]	$ABM2_{NR}$ [dB(A/m)]	$SNNR_{NR}$ [dB]
n71	680.5	136100	20	DFT-s-OFDM	256QAM	1	104	8.39	-44.13	**52.52**
n5	836.5	167300	20	DFT-s-OFDM	256QAM	1	104	8.59	-45.23	53.82
n66	1745.0	349000	40	DFT-s-OFDM	256QAM	1	214	8.21	-47.52	55.73
n25	1882.5	376500	40	DFT-s-OFDM	256QAM	1	214	8.65	-47.94	56.59

6. T-COIL TEST SUMMARY

Table 6-1
Consolidated Tabled Results

C63.19 Section		Freq. Response Margin		Magnetic Intensity Verdict		FCC SNNR Verdict		Margin from FCC Limit (dB)	C63.19-2011 Rating
		8.3.2		8.3.1		8.3.4			
		Axial	Radial	Axial	Radial	Axial	Radial		
GPRS (OTT VoIP) South - Flip	Cellular	PASS	NA	PASS	PASS	PASS	PASS	-1.72	T3
	PCS	PASS	NA	PASS	PASS	PASS	PASS		
GPRS (OTT VoIP) South - Flat	Cellular	PASS	NA	PASS	PASS	PASS	PASS	-4.77	T3
	PCS	PASS	NA	PASS	PASS	PASS	PASS		
HSPA (OTT VoIP) South - Flip	Cellular	PASS	NA	PASS	PASS	PASS	PASS	-19.34	T4
	PCS	PASS	NA	PASS	PASS	PASS	PASS		
HSPA (OTT VoIP) South - Flat	Cellular	PASS	NA	PASS	PASS	PASS	PASS	-20.63	T4
	PCS	PASS	NA	PASS	PASS	PASS	PASS		
LTE FDD (OTT VoIP) South - Flip	B7	PASS	NA	PASS	PASS	PASS	PASS	-18.40	T4
LTE FDD (OTT VoIP) South - Flat	B7	PASS	NA	PASS	PASS	PASS	PASS	-18.18	T4
LTE FDD (OTT VoIP) North - Flip	B7	PASS	NA	PASS	PASS	PASS	PASS	-18.90	T4
LTE FDD (OTT VoIP) North - Flat	B7	PASS	NA	PASS	PASS	PASS	PASS	-19.63	T4
LTE TDD (OTT VoIP) South - Flip	B41 (PC2)	PASS	NA	PASS	PASS	PASS	PASS	-11.47	T4
LTE TDD (OTT VoIP) South - Flat	B41 (PC2)	PASS	NA	PASS	PASS	PASS	PASS	-12.42	T4
LTE TDD (OTT VoIP) North - Flip	B41 (PC2)	PASS	NA	PASS	PASS	PASS	PASS	-15.11	T4
LTE TDD (OTT VoIP) North - Flat	B41 (PC2)	PASS	NA	PASS	PASS	PASS	PASS	-13.52	T4

C63.19 Section		Freq. Response Margin		Magnetic Intensity Verdict		FCC SNNR Verdict		Margin from FCC Limit (dB)	C63.19-2011 Rating
		8.3.2		8.3.1		8.3.4			
		Axial	Radial	Axial	Radial	Axial	Radial		
NR FDD (OTT VoIP) South - Flip	n71	NA	NA	PASS	PASS	PASS	PASS	**-19.62**	**T4**
NR FDD (OTT VoIP) South - Flat	n71	NA	NA	PASS	PASS	PASS	PASS	**-22.27**	**T4**
NR FDD (OTT VoIP) North - Flip	n71	NA	NA	PASS	PASS	PASS	PASS	**-17.73**	**T4**
NR FDD (OTT VoIP) North - Flat	n71	NA	NA	PASS	PASS	PASS	PASS	**-21.48**	**T4**
NR TDD (OTT VoIP) South - Flip	n41 (PC3)	NA	NA	PASS	PASS	PASS	PASS	**-6.85**	**T3**
NR TDD (OTT VoIP) South - Flat	n41 (PC3)	NA	NA	PASS	PASS	PASS	PASS	**-7.81**	**T3**
NR TDD (OTT VoIP) North - Flip	n41 (PC3)	NA	NA	PASS	PASS	PASS	PASS	**-6.81**	**T3**
NR TDD (OTT VoIP) North - Flat	n41 (PC3)	NA	NA	PASS	PASS	PASS	PASS	**-8.36**	**T3**
WLAN (OTT VoIP) South - Flip	IEEE 802.11b	PASS	NA	PASS	PASS	PASS	PASS	**-19.21**	**T4**
	IEEE 802.11g	PASS	NA	PASS	PASS	PASS	PASS		
	IEEE 802.11n	PASS	NA	PASS	PASS	PASS	PASS		
	IEEE 802.11ax SU	PASS	NA	PASS	PASS	PASS	PASS		
	IEEE 802.11ax RU	PASS	NA	PASS	PASS	PASS	PASS		
WLAN (OTT VoIP) South - Flat	IEEE 802.11b	PASS	NA	PASS	PASS	PASS	PASS	**-17.27**	**T4**
	IEEE 802.11g	PASS	NA	PASS	PASS	PASS	PASS		
	IEEE 802.11n	PASS	NA	PASS	PASS	PASS	PASS		
	IEEE 802.11ax SU	PASS	NA	PASS	PASS	PASS	PASS		
	IEEE 802.11ax RU	PASS	NA	PASS	PASS	PASS	PASS		
U-NII (OTT VoIP) South - Flip	IEEE 802.11a	PASS	NA	PASS	PASS	PASS	PASS	**-19.28**	**T4**
	IEEE 802.11n	PASS	NA	PASS	PASS	PASS	PASS		
	IEEE 802.11ac	PASS	NA	PASS	PASS	PASS	PASS		
	IEEE 802.11ax SU	PASS	NA	PASS	PASS	PASS	PASS		
	IEEE 802.11ax RU	PASS	NA	PASS	PASS	PASS	PASS		
U-NII (OTT VoIP) South - Flat	IEEE 802.11a	PASS	NA	PASS	PASS	PASS	PASS	**-18.32**	**T4**
	IEEE 802.11n	PASS	NA	PASS	PASS	PASS	PASS		
	IEEE 802.11ac	PASS	NA	PASS	PASS	PASS	PASS		
	IEEE 802.11ax SU	PASS	NA	PASS	PASS	PASS	PASS		
	IEEE 802.11ax RU	PASS	NA	PASS	PASS	PASS	PASS		

I. Raw Handset Data

Table 6-2
Raw Data Results for GPRS (OTT VoIP) – South Antenna, Flip Posture

Mode	Orientation	Channel	ABM1 [dB(A/m)]	ABM2 [dB(A/m)]	Ambient Noise [dB(A/m)]	Frequency Response Margin (dB)	S+N/N (dB)	FCC Limit (dB)	Margin from FCC Limit (dB)	C63.19-2011 Rating	Test Coordinates
GPRS850	Axial	190	8.45	-26.13	-63.89	0.86	34.58	20.00	-14.58	T4	1.6, 3.6
	Radial	190	-0.76	-22.48	-61.60	N/A	21.72	20.00	-1.72	T3	1.6, 3.0
GPRS1900	Axial	661	8.40	-30.23	-63.89	0.78	38.63	20.00	-18.63	T4	1.6, 3.6
	Radial	661	-0.39	-29.99	-61.60	N/A	29.60	20.00	-9.60	T3	1.6, 3.0

Table 6-3
Raw Data Results for GPRS (OTT VoIP) – South Antenna, Flat Posture

Mode	Orientation	Channel	ABM1 [dB(A/m)]	ABM2 [dB(A/m)]	Ambient Noise [dB(A/m)]	Frequency Response Margin (dB)	S+N/N (dB)	FCC Limit (dB)	Margin from FCC Limit (dB)	C63.19-2011 Rating	Test Coordinates
GPRS850	Axial	190	8.13	-24.35	-63.89	1.17	32.48	20.00	-12.48	T4	1.6, 3.6
	Radial	190	-0.65	-25.42	-61.60	N/A	24.77	20.00	-4.77	T3	1.6, 3.0
GPRS1900	Axial	661	8.04	-29.42	-63.89	0.74	37.46	20.00	-17.46	T4	1.6, 3.6
	Radial	661	-0.11	-28.21	-61.60	N/A	28.10	20.00	-8.10	T3	1.6, 3.0

Table 6-4
Raw Data Results for HSPA (OTT VoIP) – South Antenna, Flip Posture

Mode	Orientation	Channel	ABM1 [dB(A/m)]	ABM2 [dB(A/m)]	Ambient Noise [dB(A/m)]	Frequency Response Margin (dB)	S+N/N (dB)	FCC Limit (dB)	Margin from FCC Limit (dB)	C63.19-2011 Rating	Test Coordinates
HSPA V	Axial	4183	8.67	-45.35	-63.89	0.77	54.02	20.00	-34.02	T4	1.6, 3.6
	Radial	4183	-0.23	-41.50	-61.60	N/A	41.27	20.00	-21.27	T4	1.6, 3.0
HSPA II	Axial	9400	8.89	-45.58	-63.89	0.82	54.47	20.00	-34.47	T4	1.6, 3.6
	Radial	9400	-0.33	-39.67	-61.60	N/A	39.34	20.00	-19.34	T4	1.6, 3.0

Table 6-5
Raw Data Results for HSPA (OTT VoIP) – South Antenna, Flat Posture

Mode	Orientation	Channel	ABM1 [dB(A/m)]	ABM2 [dB(A/m)]	Ambient Noise [dB(A/m)]	Frequency Response Margin (dB)	S+N/N (dB)	FCC Limit (dB)	Margin from FCC Limit (dB)	C63.19-2011 Rating	Test Coordinates
HSPA V	Axial	4183	8.48	-40.67	-63.89	0.67	49.15	20.00	-29.15	T4	1.6, 3.6
	Radial	4183	-0.13	-40.76	-61.60	N/A	40.63	20.00	-20.63	T4	1.6, 3.0
HSPA II	Axial	9400	8.54	-42.23	-63.89	0.62	50.77	20.00	-30.77	T4	1.6, 3.6
	Radial	9400	-0.48	-41.67	-61.60	N/A	41.19	20.00	-21.19	T4	1.6, 3.0

Table 6-6
Raw Data Results for LTE FDD B7 (OTT VoIP) - South Antenna, Flip Posture

Mode	Orientation	Bandwidth	Channel	ABM1 [dB(A/m)]	ABM2 [dB(A/m)]	Ambient Noise [dB(A/m)]	Frequency Response Margin (dB)	S+N/N (dB)	FCC Limit (dB)	Margin from FCC Limit (dB)	C63.19-2011 Rating	Test Coordinates
LTE Band 7	Axial	20MHz	21100	8.69	-39.08	-63.89	1.29	47.77	20.00	-27.77	T4	1.6, 3.6
		15MHz	21100	8.72	-39.67		1.28	48.39	20.00	-28.39	T4	
		10MHz	21400	8.26	-39.59		1.08	47.85	20.00	-27.85	T4	
		10MHz	21100	8.30	-39.46		1.14	47.76	20.00	-27.76	T4	
		10MHz	20800	8.44	-38.44		1.15	46.88	20.00	-26.88	T4	
		5MHz	21100	8.67	-39.43		1.15	48.10	20.00	-28.10	T4	
	Radial	20MHz	21100	-0.16	-38.66	-61.60	N/A	38.50	20.00	-18.50	T4	1.6, 3.0
		15MHz	21375	0.01	-38.84			38.85	20.00	-18.85	T4	
		15MHz	21100	-0.10	-38.50			38.40	20.00	-18.40	T4	
		15MHz	20825	0.07	-38.62			38.69	20.00	-18.69	T4	
		10MHz	21100	-0.30	-39.09			38.79	20.00	-18.79	T4	
		5MHz	21100	-0.23	-39.05			38.82	20.00	-18.82	T4	

Table 6-7
Raw Data Results for LTE FDD B7 (OTT VoIP) - South Antenna, Flat Posture

Mode	Orientation	Bandwidth	Channel	ABM1 [dB(A/m)]	ABM2 [dB(A/m)]	Ambient Noise [dB(A/m)]	Frequency Response Margin (dB)	S+N/N (dB)	FCC Limit (dB)	Margin from FCC Limit (dB)	C63.19-2011 Rating	Test Coordinates
LTE Band 7	Axial	20MHz	21100	8.55	-42.39	-63.89	0.78	50.94	20.00	-30.94	T4	1.6, 3.6
		15MHz	21100	8.37	-42.85		0.77	51.22	20.00	-31.22	T4	
		10MHz	21400	8.73	-42.18		0.84	50.91	20.00	-30.91	T4	
		10MHz	21100	8.32	-41.90		0.80	50.22	20.00	-30.22	T4	
		10MHz	20800	8.78	-41.89		0.78	50.67	20.00	-30.67	T4	
		5MHz	21100	8.53	-42.11		0.74	50.64	20.00	-30.64	T4	
	Radial	20MHz	21100	1.06	-37.80	-61.60	N/A	38.86	20.00	-18.86	T4	1.6, 3.0
		15MHz	21100	1.15	-37.83			38.98	20.00	-18.98	T4	
		10MHz	21400	1.07	-38.32			39.39	20.00	-19.39	T4	
		10MHz	21100	0.50	-37.68			38.18	20.00	-18.18	T4	
		10MHz	20800	0.88	-37.32			38.20	20.00	-18.20	T4	
		5MHz	21100	1.04	-38.11			39.15	20.00	-19.15	T4	

Table 6-8
Raw Data Results for LTE FDD B7 (OTT VoIP) - North Antenna, Flip Posture

Mode	Orientation	Bandwidth	Channel	ABM1 [dB(A/m)]	ABM2 [dB(A/m)]	Ambient Noise [dB(A/m)]	Frequency Response Margin (dB)	S+N/N (dB)	FCC Limit (dB)	Margin from FCC Limit (dB)	C63.19-2011 Rating	Test Coordinates
LTE Band 7	Axial	20MHz	21100	8.45	-40.31	-63.89	0.77	48.76	20.00	-28.76	T4	1.6, 3.6
		15MHz	21100	8.83	-40.65		0.84	49.48	20.00	-29.48	T4	
		10MHz	21100	8.52	-40.80		0.90	49.32	20.00	-29.32	T4	
		5MHz	21425	8.83	-41.04		1.04	49.87	20.00	-29.87	T4	
		5MHz	21100	8.65	-40.10		0.80	48.75	20.00	-28.75	T4	
		5MHz	20775	8.36	-38.49		0.80	46.85	20.00	-26.85	T4	
	Radial	20MHz	21100	0.56	-38.82	-61.60	N/A	39.38	20.00	-19.38	T4	1.6, 3.0
		15MHz	21100	0.47	-39.37			39.84	20.00	-19.84	T4	
		10MHz	21100	0.46	-39.01			39.47	20.00	-19.47	T4	
		5MHz	21425	0.73	-38.17			38.90	20.00	-18.90	T4	
		5MHz	21100	0.29	-38.90			39.19	20.00	-19.19	T4	
		5MHz	20775	1.10	-38.85			39.95	20.00	-19.95	T4	

Table 6-9
Raw Data Results for LTE FDD B7 (OTT VoIP) - North Antenna, Flat Posture

Mode	Orientation	Bandwidth	Channel	ABM1 [dB(A/m)]	ABM2 [dB(A/m)]	Ambient Noise [dB(A/m)]	Frequency Response Margin (dB)	S+N/N (dB)	FCC Limit (dB)	Margin from FCC Limit (dB)	C63.19-2011 Rating	Test Coordinates
LTE Band 7	Axial	20MHz	21100	8.47	-41.15	-60.35	1.13	49.62	20.00	-29.62	T4	1.6, 3.6
		15MHz	21375	8.79	-41.52		0.89	50.31	20.00	-30.31	T4	
		15MHz	21100	8.39	-40.58		1.11	48.97	20.00	-28.97	T4	
		15MHz	20825	8.43	-40.53		1.11	48.96	20.00	-28.96	T4	
		10MHz	21100	8.35	-40.72		1.10	49.07	20.00	-29.07	T4	
		5MHz	21100	8.52	-40.65		1.04	49.17	20.00	-29.17	T4	
	Radial	20MHz	21100	1.33	-38.35	-61.60	N/A	39.68	20.00	-19.68	T4	1.6, 3.0
		15MHz	21375	1.11	-38.53			39.64	20.00	-19.64	T4	
		15MHz	21100	1.20	-38.43			39.63	20.00	-19.63	T4	
		15MHz	20825	0.62	-40.95			41.57	20.00	-21.57	T4	
		10MHz	21100	1.30	-39.01			40.31	20.00	-20.31	T4	
		5MHz	21100	1.13	-38.84			39.97	20.00	-19.97	T4	

Table 6-10
Raw Data Results for LTE TDD B41 (PC2) (OTT VoIP) - South Antenna, Flip Posture

Mode	Orientation	Bandwidth	Channel	ABM1 [dB(A/m)]	ABM2 [dB(A/m)]	Ambient Noise [dB(A/m)]	Frequency Response Margin (dB)	S+N/N (dB)	FCC Limit (dB)	Margin from FCC Limit (dB)	C63.19-2011 Rating	Test Coordinates
LTE Band 41 (PC2)	Axial	20MHz	40620	8.08	-34.71	-63.89	1.22	42.79	20.00	-22.79	T4	1.6, 3.6
		15MHz	41490	8.24	-33.92		1.15	42.16	20.00	-22.16	T4	
		15MHz	41055	8.60	-34.75		1.12	43.35	20.00	-23.35	T4	
		15MHz	40620	8.23	-34.32		1.12	42.55	20.00	-22.55	T4	
		15MHz	40185	8.25	-34.94		1.18	43.19	20.00	-23.19	T4	
		15MHz	39750	8.26	-35.06		1.13	43.32	20.00	-23.32	T4	
		10MHz	40620	8.47	-34.17		1.12	42.64	20.00	-22.64	T4	
		5MHz	40620	8.48	-34.21		1.17	42.69	20.00	-22.69	T4	
	Radial	20MHz	41490	-0.23	-32.00	-61.60	N/A	31.77	20.00	-11.77	T4	1.6, 3.0
		20MHz	41055	-0.33	-33.67			33.34	20.00	-13.34	T4	
		20MHz	40620	-0.13	-31.60			31.47	20.00	-11.47	T4	
		20MHz	40185	0.08	-35.44			35.52	20.00	-15.52	T4	
		20MHz	39750	-0.14	-33.99			33.85	20.00	-13.85	T4	
		15MHz	40620	-0.23	-34.16			33.93	20.00	-13.93	T4	
		10MHz	40620	-0.13	-34.04			33.91	20.00	-13.91	T4	
		5MHz	40620	-0.26	-33.78			33.52	20.00	-13.52	T4	

Table 6-11
Raw Data Results for LTE TDD B41 (PC2) (OTT VoIP) - South Antenna, Flat Posture

Mode	Orientation	Bandwidth	Channel	ABM1 [dB(A/m)]	ABM2 [dB(A/m)]	Ambient Noise [dB(A/m)]	Frequency Response Margin (dB)	S+N/N (dB)	FCC Limit (dB)	Margin from FCC Limit (dB)	C63.19-2011 Rating	Test Coordinates
LTE Band 41 (PC2)	Axial	20MHz	40620	8.69	-36.11	-63.89	0.77	44.80	20.00	-24.80	T4	1.6, 3.6
		15MHz	40620	8.45	-35.71		0.76	44.16	20.00	-24.16	T4	
		10MHz	40620	8.51	-35.64		1.07	44.15	20.00	-24.15	T4	
		5MHz	41490	8.25	-35.08		0.88	43.33	20.00	-23.33	T4	
		5MHz	41055	8.30	-35.75		0.85	44.05	20.00	-24.05	T4	
		5MHz	40620	8.37	-35.69		0.82	44.06	20.00	-24.06	T4	
		5MHz	40185	8.09	-36.64		0.82	44.73	20.00	-24.73	T4	
		5MHz	39750	8.13	-36.08		0.87	44.21	20.00	-24.21	T4	
	Radial	20MHz	40620	0.80	-34.19	-61.60	N/A	34.99	20.00	-14.99	T4	1.6, 3.0
		15MHz	41490	0.76	-33.78			34.54	20.00	-14.54	T4	
		15MHz	41055	0.99	-33.99			34.98	20.00	-14.98	T4	
		15MHz	40620	0.42	-33.94			34.36	20.00	-14.36	T4	
		15MHz	40185	1.04	-35.24			36.28	20.00	-16.28	T4	
		15MHz	39750	0.95	-31.47			32.42	20.00	-12.42	T4	
		10MHz	40620	1.04	-34.38			35.42	20.00	-15.42	T4	
		5MHz	40620	0.89	-34.32			35.21	20.00	-15.21	T4	

Table 6-12
Raw Data Results for LTE TDD B41 (PC2) (OTT VoIP) - North Antenna, Flip Posture

Mode	Orientation	Bandwidth	Channel	ABM1 [dB(A/m)]	ABM2 [dB(A/m)]	Ambient Noise [dB(A/m)]	Frequency Response Margin (dB)	S+N/N (dB)	FCC Limit (dB)	Margin from FCC Limit (dB)	C63.19-2011 Rating	Test Coordinates
LTE Band 41 (PC2)	Axial	20MHz	40620	8.26	-34.94	-63.89	1.35	43.20	20.00	-23.20	T4	1.6, 3.6
		15MHz	41490	8.39	-34.84		0.77	43.23	20.00	-23.23	T4	
		15MHz	41055	8.46	-34.34		0.84	42.80	20.00	-22.80	T4	
		15MHz	40620	8.12	-34.44		0.72	42.56	20.00	-22.56	T4	
		15MHz	40185	8.64	-35.81		0.87	44.45	20.00	-24.45	T4	
		15MHz	39750	8.08	-35.59		0.64	43.67	20.00	-23.67	T4	
		10MHz	40620	8.41	-34.39		0.78	42.80	20.00	-22.80	T4	
		5MHz	40620	8.41	-34.33		0.81	42.74	20.00	-22.74	T4	
	Radial	20MHz	40620	0.97	-35.19	-61.60	N/A	36.16	20.00	-16.16	T4	1.6, 3.0
		15MHz	40620	0.89	-35.29			36.18	20.00	-16.18	T4	
		10MHz	40620	1.20	-35.19			36.39	20.00	-16.39	T4	
		5MHz	41490	0.89	-34.22			35.11	20.00	-15.11	T4	
		5MHz	41055	0.89	-35.06			35.95	20.00	-15.95	T4	
		5MHz	40620	0.71	-35.21			35.92	20.00	-15.92	T4	
		5MHz	40185	1.26	-36.74			38.00	20.00	-18.00	T4	
		5MHz	39750	1.21	-35.53			36.74	20.00	-16.74	T4	

Table 6-13
Raw Data Results for LTE TDD B41 (PC2) (OTT VoIP) - North Antenna, Flat Posture

Mode	Orientation	Bandwidth	Channel	ABM1 [dB(A/m)]	ABM2 [dB(A/m)]	Ambient Noise [dB(A/m)]	Frequency Response Margin (dB)	S+N/N (dB)	FCC Limit (dB)	Margin from FCC Limit (dB)	C63.19-2011 Rating	Test Coordinates
LTE Band 41 (PC2)	Axial	20MHz	41490	8.76	-34.70	-60.35	0.78	43.46	20.00	-23.46	T4	1.6, 3.6
		20MHz	41055	8.71	-35.40		0.78	44.11	20.00	-24.11	T4	
		20MHz	40620	8.11	-34.89		0.74	43.00	20.00	-23.00	T4	
		20MHz	40185	7.88	-37.47		0.77	45.35	20.00	-25.35	T4	
		20MHz	39750	8.13	-35.67		0.80	43.80	20.00	-23.80	T4	
		15MHz	40620	8.22	-35.24		0.73	43.46	20.00	-23.46	T4	
		10MHz	40620	8.45	-35.48		0.77	43.93	20.00	-23.93	T4	
		5MHz	40620	8.13	-35.61		0.78	43.74	20.00	-23.74	T4	
	Radial	20MHz	41490	0.81	-34.22	-61.60	N/A	35.03	20.00	-15.03	T4	1.6, 3.0
		20MHz	41055	1.18	-33.64			34.82	20.00	-14.82	T4	
		20MHz	40620	1.34	-32.18			33.52	20.00	-13.52	T4	
		20MHz	40185	0.93	-35.65			36.58	20.00	-16.58	T4	
		20MHz	39750	1.39	-34.21			35.60	20.00	-15.60	T4	
		15MHz	40620	1.05	-34.25			35.30	20.00	-15.30	T4	
		10MHz	40620	1.07	-34.12			35.19	20.00	-15.19	T4	
		5MHz	40620	1.18	-34.15			35.33	20.00	-15.33	T4	

Table 6-14
Raw Data Results for NR FDD n71 (OTT VoIP) South Antenna, Flip Posture

Mode	Orientation	Bandwidth	Channel	$ABM1_{LTE}$ [dB(A/m)]	$ABM2_{NR}$ [dB(A/m)]	$ABM2_{LTE}$ [dB(A/m)]	Ambient Noise [dB(A/m)]	Frequency Response Margin (dB)	$S+N/N_{NR}$ (dB)	$S+N/N_{NR}$ - 3 dB (dB)	FCC Limit (dB)	Margin from FCC Limit (dB)	C63.19-2011 Rating	Test Coordinates
NR n71	Axial	20MHz	136100	8.22	-44.80	-44.12	-63.89	N/A	53.02	50.02	20.00	-30.02	T4	1.6, 3.6
		15MHz	138100	8.22	-43.97	-44.12			52.19	49.19	20.00	-29.19	T4	
		15MHz	136100	8.22	-44.65	-44.12			52.87	49.87	20.00	-29.87	T4	
		15MHz	134100	8.22	-44.22	-44.12			52.44	49.44	20.00	-29.44	T4	
		10MHz	136100	8.22	-46.44	-44.12			54.66	51.66	20.00	-31.66	T4	
		5MHz	136100	8.22	-47.04	-44.12			55.26	52.26	20.00	-32.26	T4	
	Radial	20MHz	136100	0.53	-42.92	-40.29	-61.60	N/A	43.45	40.45	20.00	-20.45	T4	1.6, 3.0
		15MHz	136100	0.53	-43.10	-40.29			43.63	40.63	20.00	-20.63	T4	
		10MHz	138600	0.53	-43.00	-40.29			43.53	40.53	20.00	-20.53	T4	
		10MHz	136100	0.53	-42.09	-40.29			42.62	39.62	20.00	-19.62	T4	
		10MHz	133600	0.53	-43.29	-40.29			43.82	40.82	20.00	-20.82	T4	
		5MHz	136100	0.53	-42.61	-40.29			43.14	40.14	20.00	-20.14	T4	

Table 6-15
Raw Data Results for LTE FDD B71 (OTT VoIP – Additional Measurements for NR)

Mode	Orientation	Bandwidth	Channel	$ABM1_{LTE}$ [dB(A/m)]	$ABM2_{NR}$ [dB(A/m)]	$ABM2_{LTE}$ [dB(A/m)]	Ambient Noise [dB(A/m)]	Frequency Response Margin (dB)	$S+N/N_{LTE}$ (dB)	$S+N/N_{NR}$ - 3 dB (dB)	FCC Limit (dB)	Margin from FCC Limit (dB)	C63.19-2011 Rating	Test Coordinates
LTE Band 71	Axial	20MHz	133297	8.22	N/A	-44.12	-63.89	N/A	52.34	N/A	20.00	-32.34	T4	1.6, 3.6
	Radial	20MHz	133297	0.53		-40.29	-61.60		40.82		20.00	-20.82	T4	1.6, 3.0

Table 6-16
Raw Data Results for NR FDD n71 (OTT VoIP) - South Antenna, Flat Posture

Mode	Orientation	Bandwidth	Channel	ABM1$_{LTE}$ [dB(A/m)]	ABM2$_{NR}$ [dB(A/m)]	ABM2$_{LTE}$ [dB(A/m)]	Ambient Noise [dB(A/m)]	Frequency Response Margin (dB)	S+N/N$_{NR}$ (dB)	S+N/N$_{NR}$ - 3 dB (dB)	FCC Limit (dB)	Margin from FCC Limit (dB)	C63.19-2011 Rating	Test Coordinates
NR n71	Axial	20MHz	136100	8.65	-48.28	-43.90	-63.89	N/A	56.93	53.93	20.00	-33.93	T4	1.6, 3.6
		15MHz	138100	8.65	-48.01	-43.90			56.66	53.66	20.00	-33.66	T4	
		15MHz	136100	8.65	-47.72	-43.90			56.37	53.37	20.00	-33.37	T4	
		15MHz	134100	8.65	-48.54	-43.90			57.19	54.19	20.00	-34.19	T4	
		10MHz	136100	8.65	-48.42	-43.90			57.07	54.07	20.00	-34.07	T4	
		5MHz	136100	8.65	-48.29	-43.90			56.94	53.94	20.00	-33.94	T4	
	Radial	20MHz	136100	1.05	-45.04	-39.49	-61.60	N/A	46.09	43.09	20.00	-23.09	T4	1.6, 3.0
		15MHz	136100	1.05	-45.49	-39.49			46.54	43.54	20.00	-23.54	T4	
		10MHz	136100	1.05	-45.81	-39.49			46.86	43.86	20.00	-23.86	T4	
		5MHz	139100	1.05	-46.26	-39.49			47.31	44.31	20.00	-24.31	T4	
		5MHz	136100	1.05	-44.22	-39.49			45.27	42.27	20.00	-22.27	T4	
		5MHz	133100	1.05	-46.36	-39.49			47.41	44.41	20.00	-24.41	T4	

Table 6-17
Raw Data Results for LTE FDD B71 (OTT VoIP – Additional Measurements for NR)

Mode	Orientation	Bandwidth	Channel	ABM1$_{LTE}$ [dB(A/m)]	ABM2$_{NR}$ [dB(A/m)]	ABM2$_{LTE}$ [dB(A/m)]	Ambient Noise [dB(A/m)]	Frequency Response Margin (dB)	S+N/N$_{LTE}$ (dB)	S+N/N$_{NR}$ - 3 dB (dB)	FCC Limit (dB)	Margin from FCC Limit (dB)	C63.19-2011 Rating	Test Coordinates
LTE Band 71	Axial	20MHz	133297	8.65	N/A	-43.90	-63.89	N/A	52.55	N/A	20.00	-32.55	T4	1.6, 3.6
	Radial	20MHz	133297	1.05		-39.49	-61.60		40.54		20.00	-20.54	T4	1.6, 3.0

Table 6-18
Raw Data Results for NR FDD n71 (OTT VoIP) – North Antenna, Flip Posture

Mode	Orientation	Bandwidth	Channel	ABM1$_{LTE}$ [dB(A/m)]	ABM2$_{NR}$ [dB(A/m)]	ABM2$_{LTE}$ [dB(A/m)]	Ambient Noise [dB(A/m)]	Frequency Response Margin (dB)	S+N/N$_{NR}$ (dB)	S+N/N$_{NR}$ - 3 dB (dB)	FCC Limit (dB)	Margin from FCC Limit (dB)	C63.19-2011 Rating	Test Coordinates
NR n71	Axial	20MHz	137600	8.81	-47.52	-44.04	-63.89	N/A	56.33	53.33	20.00	-33.33	T4	1.6, 3.6
		20MHz	136100	8.81	-44.18	-44.04			52.99	49.99	20.00	-29.99	T4	
		20MHz	134600	8.81	-46.53	-44.04			55.34	52.34	20.00	-32.34	T4	
		15MHz	136100	8.81	-45.02	-44.04			53.83	50.83	20.00	-30.83	T4	
		10MHz	136100	8.81	-47.19	-44.04			56.00	53.00	20.00	-33.00	T4	
		5MHz	136100	8.81	-46.41	-44.04			55.22	52.22	20.00	-32.22	T4	
	Radial	20MHz	136100	0.43	-41.78	-40.17	-61.60	N/A	42.21	39.21	20.00	-19.21	T4	1.6, 3.0
		15MHz	136100	0.43	-42.53	-40.17			42.96	39.96	20.00	-19.96	T4	
		10MHz	138600	0.43	-41.53	-40.17			41.96	38.96	20.00	-18.96	T4	
		10MHz	136100	0.43	-40.30	-40.17			40.73	37.73	20.00	-17.73	T4	
		10MHz	133600	0.43	-43.43	-40.17			43.86	40.86	20.00	-20.86	T4	
		5MHz	136100	0.43	-42.03	-40.17			42.46	39.46	20.00	-19.46	T4	

Table 6-19
Raw Data Results for LTE FDD B71 (OTT VoIP – Additional Measurements for NR)

Mode	Orientation	Bandwidth	Channel	ABM1$_{LTE}$ [dB(A/m)]	ABM2$_{NR}$ [dB(A/m)]	ABM2$_{LTE}$ [dB(A/m)]	Ambient Noise [dB(A/m)]	Frequency Response Margin (dB)	S+N/N$_{LTE}$ (dB)	S+N/N$_{NR}$ - 3 dB (dB)	FCC Limit (dB)	Margin from FCC Limit (dB)	C63.19-2011 Rating	Test Coordinates
LTE Band 71	Axial	20MHz	133297	8.81	N/A	-44.04	-63.89	N/A	52.85	N/A	20.00	-32.85	T4	1.6, 3.6
	Radial	20MHz	133297	0.43		-40.17	-61.60		40.60		20.00	-20.60	T4	1.6, 3.0

Table 6-20
Raw Data Results for NR FDD n71 (OTT VoIP) - North Antenna, Flat Posture

Mode	Orientation	Bandwidth	Channel	ABM1$_{LTE}$ [dB(A/m)]	ABM2$_{NR}$ [dB(A/m)]	ABM2$_{LTE}$ [dB(A/m)]	Ambient Noise [dB(A/m)]	Frequency Response Margin (dB)	S+N/N$_{NR}$ (dB)	S+N/N$_{NR}$ - 3 dB (dB)	FCC Limit (dB)	Margin from FCC Limit (dB)	C63.19-2011 Rating	Test Coordinates
NR n71	Axial	20MHz	136100	8.56	-47.48	-42.78	-60.35	N/A	56.04	53.04	20.00	-33.04	T4	1.6, 3.6
		15MHz	138100	8.56	-47.94	-42.78			56.50	53.50	20.00	-33.50	T4	
		15MHz	136100	8.56	-46.67	-42.78			55.23	52.23	20.00	-32.23	T4	
		15MHz	134100	8.56	-47.84	-42.78			56.40	53.40	20.00	-33.40	T4	
		10MHz	136100	8.56	-47.42	-42.78			55.98	52.98	20.00	-32.98	T4	
		5MHz	136100	8.56	-47.98	-42.78			56.54	53.54	20.00	-33.54	T4	
	Radial	20MHz	137600	0.92	-43.87	-40.10	-61.60	N/A	44.79	41.79	20.00	-21.79	T4	1.6, 3.0
		20MHz	136100	0.92	-43.56	-40.10			44.48	41.48	20.00	-21.48	T4	
		20MHz	134600	0.92	-44.98	-40.10			45.90	42.90	20.00	-22.90	T4	
		15MHz	136100	0.92	-45.24	-40.10			46.16	43.16	20.00	-23.16	T4	
		10MHz	136100	0.92	-44.69	-40.10			45.61	42.61	20.00	-22.61	T4	
		5MHz	136100	0.92	-44.92	-40.10			45.84	42.84	20.00	-22.84	T4	

Table 6-21
Raw Data Results for LTE FDD B71 (OTT VoIP – Additional Measurements for NR)

Mode	Orientation	Bandwidth	Channel	ABM1$_{LTE}$ [dB(A/m)]	ABM2$_{NR}$ [dB(A/m)]	ABM2$_{LTE}$ [dB(A/m)]	Ambient Noise [dB(A/m)]	Frequency Response Margin (dB)	S+N/N$_{LTE}$ (dB)	S+N/N$_{NR}$ - 3 dB (dB)	FCC Limit (dB)	Margin from FCC Limit (dB)	C63.19-2011 Rating	Test Coordinates
LTE Band 71	Axial	20MHz	133297	8.56	N/A	-42.78	-60.35	N/A	51.34	N/A	20.00	-31.34	T4	1.6, 3.6
	Radial	20MHz	133297	0.92		-40.10	-61.60		41.02		20.00	-21.02	T4	1.6, 3.0

Table 6-22
Raw Data Results for NR TDD n41 (PC3) (OTT VoIP) - South Antenna, Flip Posture

Mode	Orientation	Bandwidth	Channel	ABM1$_{LTE}$ [dB(A/m)]	ABM2$_{NR}$ [dB(A/m)]	ABM2$_{LTE}$ [dB(A/m)]	Ambient Noise [dB(A/m)]	Frequency Response Margin (dB)	S+N/N$_{NR}$ (dB)	S+N/N$_{NR}$ - 3 dB (dB)	FCC Limit (dB)	Margin from FCC Limit (dB)	C63.19-2011 Rating	Test Coordinates
NR n41 (PC3)	Axial	100MHz	518598	8.26	-31.10	-37.30	-63.89	N/A	39.36	36.36	20.00	-16.36	T4	1.6, 3.6
		90MHz	518598	8.26	-30.99	-37.30			39.25	36.25	20.00	-16.25	T4	
		80MHz	518598	8.26	-29.85	-37.30			38.11	35.11	20.00	-15.11	T4	
		60MHz	518598	8.26	-29.56	-37.30			37.82	34.82	20.00	-14.82	T4	
		50MHz	532998	8.26	-30.95	-37.30			39.21	36.21	20.00	-16.21	T4	
		50MHz	525798	8.26	-30.51	-37.30			38.77	35.77	20.00	-15.77	T4	
		50MHz	518598	8.26	-29.28	-37.30			37.54	34.54	20.00	-14.54	T4	
		50MHz	511398	8.26	-31.44	-37.30			39.70	36.70	20.00	-16.70	T4	
		50MHz	504204	8.26	-29.83	-37.30			38.09	35.09	20.00	-15.09	T4	
		40MHz	518598	8.26	-29.35	-37.30			37.61	34.61	20.00	-14.61	T4	
		30MHz	518598	8.26	-29.33	-37.30			37.59	34.59	20.00	-14.59	T4	
		20MHz	518598	8.26	-30.13	-37.30			38.39	35.39	20.00	-15.39	T4	
	Radial	100MHz	518598	0.42	-32.76	-34.71	-61.60	N/A	33.18	30.18	20.00	-10.18	T4	1.6, 3.0
		90MHz	518598	0.42	-32.64	-34.71			33.06	30.06	20.00	-10.06	T4	
		80MHz	518598	0.42	-32.54	-34.71			32.96	29.96	20.00	-9.96	T3	
		60MHz	518598	0.42	-32.11	-34.71			32.53	29.53	20.00	-9.53	T3	
		50MHz	532998	0.42	-32.17	-34.71			32.59	29.59	20.00	-9.59	T3	
		50MHz	525798	0.42	-29.43	-34.71			29.85	26.85	20.00	-6.85	T3	
		50MHz	518598	0.42	-31.72	-34.71			32.14	29.14	20.00	-9.14	T3	
		50MHz	511398	0.42	-30.56	-34.71			30.98	27.98	20.00	-7.98	T3	
		50MHz	504204	0.42	-29.89	-34.71			30.31	27.31	20.00	-7.31	T3	
		40MHz	518598	0.42	-31.77	-34.71			32.19	29.19	20.00	-9.19	T3	
		30MHz	518598	0.42	-31.73	-34.71			32.15	29.15	20.00	-9.15	T3	
		20MHz	518598	0.42	-31.98	-34.71			32.40	29.40	20.00	-9.40	T3	

Table 6-23
Raw Data Results for LTE TDD B41 (PC3) (OTT VoIP – Additional Measurements for NR)

Mode	Orientation	Bandwidth	Channel	ABM1$_{LTE}$ [dB(A/m)]	ABM2$_{NR}$ [dB(A/m)]	ABM2$_{LTE}$ [dB(A/m)]	Ambient Noise [dB(A/m)]	Frequency Response Margin (dB)	S+N/N$_{LTE}$ (dB)	S+N/N$_{NR}$ - 3 dB (dB)	FCC Limit (dB)	Margin from FCC Limit (dB)	C63.19-2011 Rating	Test Coordinates
LTE Band 41 (PC3)	Axial	20MHz	40620	8.26	N/A	-37.30	-63.89	N/A	45.56	N/A	20.00	-25.56	T4	1.6, 3.6
	Radial	20MHz	40620	0.42		-34.71	-61.60		35.13		20.00	-15.13	T4	1.6, 3.0

Table 6-24
Raw Data Results for NR TDD n41 (PC3) (OTT VoIP) - South Antenna, Flat Posture

Mode	Orientation	Bandwidth	Channel	$ABM1_{LTE}$ [dB(A/m)]	$ABM2_{NR}$ [dB(A/m)]	$ABM2_{LTE}$ [dB(A/m)]	Ambient Noise [dB(A/m)]	Frequency Response Margin (dB)	$S+N/N_{NR}$ (dB)	$S+N/N_{NR}$ - 3 dB (dB)	FCC Limit (dB)	Margin from FCC Limit (dB)	C63.19-2011 Rating	Test Coordinates
NR n41 (PC3)	Axial	100MHz	518598	8.16	-28.65	-38.18	-63.89	N/A	36.81	33.81	20.00	-13.81	T4	1.6, 3.6
		90MHz	518598	8.16	-28.69	-38.18			36.85	33.85	20.00	-13.85	T4	
		80MHz	518598	8.16	-28.68	-38.18			36.84	33.84	20.00	-13.84	T4	
		60MHz	518598	8.16	-28.41	-38.18			36.57	33.57	20.00	-13.57	T4	
		50MHz	532998	8.16	-29.80	-38.18			37.96	34.96	20.00	-14.96	T4	
		50MHz	525798	8.16	-28.40	-38.18			36.56	33.56	20.00	-13.56	T4	
		50MHz	518598	8.16	-27.66	-38.18			35.82	32.82	20.00	-12.82	T4	
		50MHz	511398	8.16	-29.74	-38.18			37.90	34.90	20.00	-14.90	T4	
		50MHz	504204	8.16	-29.15	-38.18			37.31	34.31	20.00	-14.31	T4	
		40MHz	518598	8.16	-28.37	-38.18			36.53	33.53	20.00	-13.53	T4	
		30MHz	518598	8.16	-28.01	-38.18			36.17	33.17	20.00	-13.17	T4	
		20MHz	518598	8.16	-28.10	-38.18			36.26	33.26	20.00	-13.26	T4	
	Radial	100MHz	518598	0.95	-31.09	-35.33	-61.60	N/A	32.04	29.04	20.00	-9.04	T3	1.6, 3.0
		90MHz	518598	0.95	-31.08	-35.33			32.03	29.03	20.00	-9.03	T3	
		80MHz	518598	0.95	-30.88	-35.33			31.83	28.83	20.00	-8.83	T3	
		60MHz	518598	0.95	-30.43	-35.33			31.38	28.38	20.00	-8.38	T3	
		50MHz	518598	0.95	-30.22	-35.33			31.17	28.17	20.00	-8.17	T3	
		40MHz	518598	0.95	-30.95	-35.33			31.90	28.90	20.00	-8.90	T3	
		30MHz	534996	0.95	-31.53	-35.33			32.48	29.48	20.00	-9.48	T3	
		30MHz	526800	0.95	-30.39	-35.33			31.34	28.34	20.00	-8.34	T3	
		30MHz	518598	0.95	-29.86	-35.33			30.81	27.81	20.00	-7.81	T3	
		30MHz	510402	0.95	-31.69	-35.33			32.64	29.64	20.00	-9.64	T3	
		30MHz	502200	0.95	-30.77	-35.33			31.72	28.72	20.00	-8.72	T3	
		20MHz	518598	0.95	-29.97	-35.33			30.92	27.92	20.00	-7.92	T3	

Table 6-25
Raw Data Results for LTE TDD B41 (PC3) (OTT VoIP – Additional Measurements for NR)

Mode	Orientation	Bandwidth	Channel	$ABM1_{LTE}$ [dB(A/m)]	$ABM2_{NR}$ [dB(A/m)]	$ABM2_{LTE}$ [dB(A/m)]	Ambient Noise [dB(A/m)]	Frequency Response Margin (dB)	$S+N/N_{LTE}$ (dB)	$S+N/N_{NR}$ - 3 dB (dB)	FCC Limit (dB)	Margin from FCC Limit (dB)	C63.19-2011 Rating	Test Coordinates
LTE Band 41 (PC3)	Axial	20MHz	40620	8.16	N/A	-38.18	-63.89	N/A	46.34	N/A	20.00	-26.34	T4	1.6, 3.6
	Radial	20MHz	40620	0.95		-35.33	-61.60		36.28		20.00	-16.28	T4	1.6, 3.0

Table 6-26
Raw Data Results for NR TDD n41 (PC3) (OTT VoIP) - North Antenna, Flip Posture

Mode	Orientation	Bandwidth	Channel	$ABM1_{LTE}$ [dB(A/m)]	$ABM2_{NR}$ [dB(A/m)]	$ABM2_{LTE}$ [dB(A/m)]	Ambient Noise [dB(A/m)]	Frequency Response Margin (dB)	$S+N/N_{NR}$ (dB)	$S+N/N_{NR}$ - 3 dB (dB)	FCC Limit (dB)	Margin from FCC Limit (dB)	C63.19-2011 Rating	Test Coordinates
NR n41 (PC3)	Axial	100MHz	518598	8.25	-28.63	-37.40	-60.35	N/A	36.88	33.88	20.00	-13.88	T4	1.6, 3.6
		90MHz	518598	8.25	-28.67	-37.40			36.92	33.92	20.00	-13.92	T4	
		80MHz	518598	8.25	-28.45	-37.40			36.70	33.70	20.00	-13.70	T4	
		60MHz	531996	8.25	-29.86	-37.40			38.11	35.11	20.00	-15.11	T4	
		60MHz	525300	8.25	-29.19	-37.40			37.44	34.44	20.00	-14.44	T4	
		60MHz	518598	8.25	-28.32	-37.40			36.57	33.57	20.00	-13.57	T4	
		60MHz	511902	8.25	-29.49	-37.40			37.74	34.74	20.00	-14.74	T4	
		60MHz	505200	8.25	-30.04	-37.40			38.29	35.29	20.00	-15.29	T4	
		50MHz	518598	8.25	-28.46	-37.40			36.71	33.71	20.00	-13.71	T4	
		40MHz	518598	8.25	-29.12	-37.40			37.37	34.37	20.00	-14.37	T4	
		30MHz	518598	8.25	-28.93	-37.40			37.18	34.18	20.00	-14.18	T4	
		20MHz	518598	8.25	-29.10	-37.40			37.35	34.35	20.00	-14.35	T4	
	Radial	100MHz	518598	0.49	-29.44	-35.06	-61.60	N/A	29.93	26.93	20.00	-6.93	T3	1.6, 3.0
		90MHz	518598	0.49	-29.39	-35.06			29.88	26.88	20.00	-6.88	T3	
		80MHz	518598	0.49	-29.36	-35.06			29.85	26.85	20.00	-6.85	T3	
		60MHz	531996	0.49	-31.08	-35.06			31.57	28.57	20.00	-8.57	T3	
		60MHz	525300	0.49	-30.26	-35.06			30.75	27.75	20.00	-7.75	T3	
		60MHz	518598	0.49	-29.32	-35.06			29.81	26.81	20.00	-6.81	T3	
		60MHz	511902	0.49	-30.55	-35.06			31.04	28.04	20.00	-8.04	T3	
		60MHz	505200	0.49	-30.24	-35.06			30.73	27.73	20.00	-7.73	T3	
		50MHz	518598	0.49	-29.49	-35.06			29.98	26.98	20.00	-6.98	T3	
		40MHz	518598	0.49	-29.77	-35.06			30.26	27.26	20.00	-7.26	T3	
		30MHz	518598	0.49	-29.95	-35.06			30.44	27.44	20.00	-7.44	T3	
		20MHz	518598	0.49	-30.20	-35.06			30.69	27.69	20.00	-7.69	T3	

Table 6-27
Raw Data Results for LTE TDD B41 (PC3) (OTT VoIP – Additional Measurements for NR)

Mode	Orientation	Bandwidth	Channel	ABM1$_{LTE}$ [dB(A/m)]	ABM2$_{NR}$ [dB(A/m)]	ABM2$_{LTE}$ [dB(A/m)]	Ambient Noise [dB(A/m)]	Frequency Response Margin (dB)	S+N/N$_{LTE}$ (dB)	S+N/N$_{NR}$ - 3 dB (dB)	FCC Limit (dB)	Margin from FCC Limit (dB)	C63.19-2011 Rating	Test Coordinates
LTE Band 41 (PC3)	Axial	20MHz	40620	8.25	N/A	-37.40	-60.35	N/A	45.65	N/A	**20.00**	-25.65	**T4**	1.6, 3.6
	Radial	20MHz	40620	0.49		-35.06	-61.60		35.55		**20.00**	-15.55	**T4**	1.6, 3.0

Table 6-28
Raw Data Results for NR TDD n41 (PC3) (OTT VoIP) - North Antenna, Flat Posture

Mode	Orientation	Bandwidth	Channel	ABM1$_{LTE}$ [dB(A/m)]	ABM2$_{NR}$ [dB(A/m)]	ABM2$_{LTE}$ [dB(A/m)]	Ambient Noise [dB(A/m)]	Frequency Response Margin (dB)	S+N/N$_{NR}$ (dB)	S+N/N$_{NR}$ - 3 dB (dB)	FCC Limit (dB)	Margin from FCC Limit (dB)	C63.19-2011 Rating	Test Coordinates
NR n41 (PC3)	Axial	100MHz	518598	8.13	-32.70	-37.32	-60.35	N/A	40.83	37.83	**20.00**	-17.83	**T4**	1.6, 3.6
		90MHz	528996	8.13	-28.88	-37.32			37.01	34.01	**20.00**	-14.01	**T4**	
		90MHz	523800	8.13	-28.38	-37.32			36.51	33.51	**20.00**	-13.51	**T4**	
		90MHz	518598	8.13	-31.27	-37.32			39.40	36.40	**20.00**	-16.40	**T4**	
		90MHz	513402	8.13	-27.83	-37.32			35.96	32.96	**20.00**	-12.96	**T4**	
		90MHz	508200	8.13	-28.87	-37.32			37.00	34.00	**20.00**	-14.00	**T4**	
		80MHz	518598	8.13	-33.03	-37.32			41.16	38.16	**20.00**	-18.16	**T4**	
		60MHz	518598	8.13	-31.47	-37.32			39.60	36.60	**20.00**	-16.60	**T4**	
		50MHz	518598	8.13	-33.12	-37.32			41.25	38.25	**20.00**	-18.25	**T4**	
		40MHz	518598	8.13	-34.81	-37.32			42.94	39.94	**20.00**	-19.94	**T4**	
		30MHz	518598	8.13	-34.36	-37.32			42.49	39.49	**20.00**	-19.49	**T4**	
		20MHz	518598	8.13	-35.44	-37.32			43.57	40.57	**20.00**	-20.57	**T4**	
	Radial	100MHz	518598	1.01	-31.21	-35.43	-61.60	N/A	32.22	29.22	**20.00**	-9.22	**T3**	1.6, 3.0
		90MHz	518598	1.01	-31.01	-35.43			32.02	29.02	**20.00**	-9.02	**T3**	
		80MHz	518598	1.01	-30.83	-35.43			31.84	28.84	**20.00**	-8.84	**T3**	
		60MHz	531996	1.01	-32.62	-35.43			33.63	30.63	**20.00**	-10.63	**T4**	
		60MHz	525300	1.01	-31.68	-35.43			32.69	29.69	**20.00**	-9.69	**T3**	
		60MHz	518598	1.01	-30.35	-35.43			31.36	28.36	**20.00**	-8.36	**T3**	
		60MHz	511902	1.01	-31.77	-35.43			32.78	29.78	**20.00**	-9.78	**T3**	
		60MHz	505200	1.01	-32.71	-35.43			33.72	30.72	**20.00**	-10.72	**T4**	
		50MHz	518598	1.01	-31.88	-35.43			32.89	29.89	**20.00**	-9.89	**T3**	
		40MHz	518598	1.01	-32.20	-35.43			33.21	30.21	**20.00**	-10.21	**T4**	
		30MHz	518598	1.01	-31.45	-35.43			32.46	29.46	**20.00**	-9.46	**T3**	
		20MHz	518598	1.01	-31.77	-35.43			32.78	29.78	**20.00**	-9.78	**T3**	

Table 6-29
Raw Data Results for LTE TDD B41 (PC3) (OTT VoIP – Additional Measurements for NR)

Mode	Orientation	Bandwidth	Channel	ABM1$_{LTE}$ [dB(A/m)]	ABM2$_{NR}$ [dB(A/m)]	ABM2$_{LTE}$ [dB(A/m)]	Ambient Noise [dB(A/m)]	Frequency Response Margin (dB)	S+N/N$_{LTE}$ (dB)	S+N/N$_{NR}$ - 3 dB (dB)	FCC Limit (dB)	Margin from FCC Limit (dB)	C63.19-2011 Rating	Test Coordinates
LTE Band 41 (PC3)	Axial	20MHz	40620	8.13	N/A	-37.32	-60.35	N/A	45.45	N/A	**20.00**	-25.45	**T4**	1.6, 3.6
	Radial	20MHz	40620	1.01		-35.43	-61.60		36.44		**20.00**	-16.44	**T4**	1.6, 3.0

Table 6-30
Raw Data Results for 2.4GHz WIFI (OTT VoIP) - Flip Posture

Mode	Orientation	Channel	ABM1 [dB(A/m)]	ABM2 [dB(A/m)]	Ambient Noise [dB(A/m)]	Frequency Response Margin (dB)	S+N/N (dB)	FCC Limit (dB)	Margin from FCC Limit (dB)	C63.19-2011 Rating	Test Coordinates
IEEE 802.11b	Axial	6	8.46	-41.00	-63.89	0.80	49.46	20.00	-29.46	T4	1.6, 3.6
	Radial	1	1.11	-38.10	-61.60	N/A	39.21	20.00	-19.21	T4	1.6, 3.0
		6	1.09	-38.43			39.52	20.00	-19.52	T4	
		11	0.91	-38.53			39.44	20.00	-19.44	T4	
IEEE 802.11g	Axial	6	8.19	-41.20	-63.89	0.82	49.39	20.00	-29.39	T4	1.6, 3.6
	Radial	6	0.59	-40.45	-61.60	N/A	41.04	20.00	-21.04	T4	1.6, 3.0
IEEE 802.11n 20MHz	Axial	1	8.21	-41.74	-63.89	1.12	49.95	20.00	-29.95	T4	1.6, 3.6
		6	8.76	-40.22		0.77	48.98	20.00	-28.98	T4	
		11	8.32	-41.91		0.86	50.23	20.00	-30.23	T4	
	Radial	6	0.58	-39.77	-61.60	N/A	40.35	20.00	-20.35	T4	1.6, 3.0
IEEE 802.11n 40MHz	Axial	6	8.13	-41.68	-63.89	0.85	49.81	20.00	-29.81	T4	1.6, 3.6
	Radial	6	1.40	-40.17	-61.60	N/A	41.57	20.00	-21.57	T4	1.6, 3.0
IEEE 802.11ax SU 20MHz	Axial	6	8.25	-41.79	-63.89	0.89	50.04	20.00	-30.04	T4	1.6, 3.6
	Radial	6	1.49	-39.19	-61.60	N/A	40.68	20.00	-20.68	T4	1.6, 3.0
IEEE 802.11ax SU 40MHz	Axial	6	8.50	-42.08	-63.89	0.81	50.58	20.00	-30.58	T4	1.6, 3.6
	Radial	6	0.71	-40.16	-61.60	N/A	40.87	20.00	-20.87	T4	1.6, 3.0
IEEE 802.11ax RU 20MHz	Axial	6	8.69	-41.21	-63.89	0.87	49.90	20.00	-29.90	T4	1.6, 3.6
	Radial	6	1.19	-40.49	-61.60	N/A	41.68	20.00	-21.68	T4	1.6, 3.0
IEEE 802.11ax RU 40MHz	Axial	6	8.44	-42.04	-63.89	1.01	50.48	20.00	-30.48	T4	1.6, 3.6
	Radial	6	0.61	-40.24	-61.60	N/A	40.85	20.00	-20.85	T4	1.6, 3.0

Table 6-31
Raw Data Results for 2.4GHz WIFI (OTT VoIP) - Flat Posture

Mode	Orientation	Channel	ABM1 [dB(A/m)]	ABM2 [dB(A/m)]	Ambient Noise [dB(A/m)]	Frequency Response Margin (dB)	S+N/N (dB)	FCC Limit (dB)	Margin from FCC Limit (dB)	C63.19-2011 Rating	Test Coordinates
IEEE 802.11b	Axial	6	8.94	-43.05	-63.89	0.75	51.99	20.00	-31.99	T4	1.6, 3.6
	Radial	1	0.87	-37.82	-61.60	N/A	38.69	20.00	-18.69	T4	1.6, 3.0
		6	1.05	-36.22			37.27	20.00	-17.27	T4	
		11	1.07	-38.23			39.30	20.00	-19.30	T4	
IEEE 802.11g	Axial	6	8.13	-44.74	-63.89	0.52	52.87	20.00	-32.87	T4	1.6, 3.6
	Radial	6	1.34	-39.39	-61.60	N/A	40.73	20.00	-20.73	T4	1.6, 3.0
IEEE 802.11n 20MHz	Axial	1	8.82	-44.23	-63.89	0.78	53.05	20.00	-33.05	T4	1.6, 3.6
		6	8.60	-41.67		0.79	50.27	20.00	-30.27	T4	
		11	8.50	-44.14		0.95	52.64	20.00	-32.64	T4	
	Radial	6	0.84	-38.07	-61.60	N/A	38.91	20.00	-18.91	T4	1.6, 3.0
IEEE 802.11n 40MHz	Axial	6	8.51	-44.28	-63.89	1.09	52.79	20.00	-32.79	T4	1.6, 3.6
	Radial	6	0.81	-39.05	-61.60	N/A	39.86	20.00	-19.86	T4	1.6, 3.0
IEEE 802.11ax SU 20MHz	Axial	6	8.23	-46.37	-63.89	0.67	54.60	20.00	-34.60	T4	1.6, 3.6
	Radial	6	0.87	-37.82	-61.60	N/A	38.69	20.00	-18.69	T4	1.6, 3.0
IEEE 802.11ax SU 40MHz	Axial	6	8.76	-42.63	-63.89	0.65	51.39	20.00	-31.39	T4	1.6, 3.6
	Radial	6	0.88	-39.61	-61.60	N/A	40.49	20.00	-20.49	T4	1.6, 3.0
IEEE 802.11ax RU 20MHz	Axial	6	8.81	-46.59	-63.89	0.79	55.40	20.00	-35.40	T4	1.6, 3.6
	Radial	6	0.82	-37.71	-61.60	N/A	38.53	20.00	-18.53	T4	1.6, 3.0
IEEE 802.11ax RU 40MHz	Axial	6	8.49	-43.76	-63.89	0.72	52.25	20.00	-32.25	T4	1.6, 3.6
	Radial	6	0.90	-38.97	-61.60	N/A	39.87	20.00	-19.87	T4	1.6, 3.0

Table 6-32
Raw Data Results for 5GHz WIFI IEEE 802.11a (OTT VoIP) - Flip Posture

Mode	Orientation	Bandwidth	U-NII	Channel	ABM1 [dB(A/m)]	ABM2 [dB(A/m)]	Ambient Noise [dB(A/m)]	Frequency Response Margin (dB)	S+N/N (dB)	FCC Limit (dB)	Margin from FCC Limit (dB)	C63.19-2011 Rating	Test Coordinates
IEEE 802.11a	Axial	20MHz	1	40	8.48	-42.65	-63.89	0.88	51.13	20.00	-31.13	T4	1.6, 3.6
	Radial	20MHz	1	40	0.43	-39.97	-61.60	N/A	40.40	20.00	-20.40	T4	1.6, 3.0

Table 6-33
Raw Data Results for 5GHz WIFI IEEE 802.11a (OTT VoIP) - Flat Posture

Mode	Orientation	Bandwidth	U-NII	Channel	ABM1 [dB(A/m)]	ABM2 [dB(A/m)]	Ambient Noise [dB(A/m)]	Frequency Response Margin (dB)	S+N/N (dB)	FCC Limit (dB)	Margin from FCC Limit (dB)	C63.19-2011 Rating	Test Coordinates
IEEE 802.11a	Axial	20MHz	1	40	8.44	-45.22	-60.35	0.75	53.66	20.00	-33.66	T4	1.6, 3.6
	Radial	20MHz	1	36	0.78	-38.50	-61.60	N/A	39.28	20.00	-19.28	T4	1.6, 3.0
		20MHz	1	40	0.45	-37.87			38.32	20.00	-18.32	T4	
		20MHz	1	48	1.14	-39.59			40.73	20.00	-20.73	T4	
		20MHz	2A	56	1.12	-39.52			40.64	20.00	-20.64	T4	
		20MHz	2C	120	1.33	-39.86			41.19	20.00	-21.19	T4	
		20MHz	3	157	0.95	-38.51			39.46	20.00	-19.46	T4	

Table 6-34
Raw Data Results for 5GHz WIFI IEEE 802.11n (OTT VoIP) - Flip Posture

Mode	Orientation	Bandwidth	U-NII	Channel	ABM1 [dB(A/m)]	ABM2 [dB(A/m)]	Ambient Noise [dB(A/m)]	Frequency Response Margin (dB)	S+N/N (dB)	FCC Limit (dB)	Margin from FCC Limit (dB)	C63.19-2011 Rating	Test Coordinates
IEEE 802.11n	Axial	40MHz	1	38	8.20	-42.11	-63.89	1.00	50.31	20.00	-30.31	T4	1.6, 3.6
		20MHz	1	40	8.16	-41.80		0.87	49.96	20.00	-29.96	T4	
	Radial	40MHz	1	38	0.99	-40.06	-61.60	N/A	41.05	20.00	-21.05	T4	1.6, 3.0
		20MHz	1	40	-0.20	-40.19			39.99	20.00	-19.99	T4	

Table 6-35
Raw Data Results for 5GHz WIFI IEEE 802.11n (OTT VoIP) - Flat Posture

Mode	Orientation	Bandwidth	U-NII	Channel	ABM1 [dB(A/m)]	ABM2 [dB(A/m)]	Ambient Noise [dB(A/m)]	Frequency Response Margin (dB)	S+N/N (dB)	FCC Limit (dB)	Margin from FCC Limit (dB)	C63.19-2011 Rating	Test Coordinates
IEEE 802.11n	Axial	40MHz	1	38	8.18	-44.20	-63.89	0.68	52.38	20.00	-32.38	T4	1.6, 3.6
		20MHz	1	40	8.55	-44.29		0.80	52.84	20.00	-32.84	T4	
	Radial	40MHz	1	38	0.52	-38.77	-61.60	N/A	39.29	20.00	-19.29	T4	1.6, 3.0
		20MHz	1	40	1.21	-37.78			38.99	20.00	-18.99	T4	

Table 6-36
Raw Data Results for 5GHz WIFI IEEE 802.11ac (OTT VoIP) - Flip Posture

Mode	Orientation	Bandwidth	U-NII	Channel	ABM1 [dB(A/m)]	ABM2 [dB(A/m)]	Ambient Noise [dB(A/m)]	Frequency Response Margin (dB)	S+N/N (dB)	FCC Limit (dB)	Margin from FCC Limit (dB)	C63.19-2011 Rating	Test Coordinates
IEEE 802.11ac	Axial	40MHz	1	38	8.15	-43.33	-63.89	0.72	51.48	20.00	-31.48	T4	1.6, 3.6
		20MHz	1	40	8.31	-42.02		0.96	50.33	20.00	-30.33	T4	
	Radial	40MHz	1	38	0.99	-39.06	-61.60	N/A	40.05	20.00	-20.05	T4	1.6, 3.0
		20MHz	1	40	0.79	-40.37			41.16	20.00	-21.16	T4	

Table 6-37
Raw Data Results for 5GHz WIFI IEEE 802.11ac (OTT VoIP) - Flat Posture

Mode	Orientation	Bandwidth	U-NII	Channel	ABM1 [dB(A/m)]	ABM2 [dB(A/m)]	Ambient Noise [dB(A/m)]	Frequency Response Margin (dB)	S+N/N (dB)	FCC Limit (dB)	Margin from FCC Limit (dB)	C63.19-2011 Rating	Test Coordinates
IEEE 802.11ac	Axial	40MHz	1	38	8.12	-43.11	-63.89	0.64	51.23	20.00	-31.23	T4	1.6, 3.6
		20MHz	1	40	8.78	-42.72		0.80	51.50	20.00	-31.50	T4	
		40MHz	2A	54	8.65	-41.91		0.62	50.56	20.00	-30.56	T4	
		20MHz	2A	56	8.29	-43.63		0.82	51.92	20.00	-31.92	T4	
		40MHz	2C	102	8.51	-41.81		0.65	50.32	20.00	-30.32	T4	
		40MHz	2C	118	8.50	-41.19		0.68	49.69	20.00	-29.69	T4	
		40MHz	2C	142	8.21	-42.98		0.66	51.19	20.00	-31.19	T4	
		20MHz	2C	120	8.76	-43.41		0.76	52.17	20.00	-32.17	T4	
		40MHz	3	151	8.57	-44.03		0.67	52.60	20.00	-32.60	T4	
		20MHz	3	157	8.57	-41.93		0.99	50.50	20.00	-30.50	T4	
	Radial	40MHz	1	38	1.53	-39.47	-61.60	N/A	41.00	20.00	-21.00	T4	1.6, 3.0
		20MHz	1	40	1.19	-39.45			40.64	20.00	-20.64	T4	

Table 6-38
Raw Data Results for 5GHz WIFI IEEE 802.11ax (OTT VoIP) - Flip Posture

Mode	Orientation	Bandwidth	U-NII	Channel	ABM1 [dB(A/m)]	ABM2 [dB(A/m)]	Ambient Noise [dB(A/m)]	Frequency Response Margin (dB)	S+N/N (dB)	FCC Limit (dB)	Margin from FCC Limit (dB)	C63.19-2011 Rating	Test Coordinates
IEEE 802.11ax SU	Axial	40MHz	1	38	8.66	-41.84	-63.89	0.88	50.50	20.00	-30.50	T4	1.6, 3.6
		20MHz	1	40	8.47	-41.48		0.66	49.95	20.00	-29.95	T4	
	Radial	40MHz	1	38	1.37	-38.81	-61.60	N/A	40.18	20.00	-20.18	T4	1.6, 3.0
		20MHz	1	40	1.03	-38.67			39.70	20.00	-19.70	T4	
		40MHz	2A	54	0.75	-40.29			41.04	20.00	-21.04	T4	
		20MHz	2A	52	0.73	-39.18			39.91	20.00	-19.91	T4	
		20MHz	2A	56	0.70	-38.58			39.28	20.00	-19.28	T4	
		20MHz	2A	64	1.67	-39.29			40.96	20.00	-20.96	T4	
		40MHz	2C	118	1.68	-40.53			42.21	20.00	-22.21	T4	
		20MHz	2C	120	1.25	-39.69			40.94	20.00	-20.94	T4	
		40MHz	3	151	1.42	-39.91			41.33	20.00	-21.33	T4	
		20MHz	3	157	1.24	-38.17			39.41	20.00	-19.41	T4	
IEEE 802.11ax RU	Axial	40MHz	1	38	8.31	-41.71	-63.89	0.81	50.02	20.00	-30.02	T4	1.6, 3.6
		20MHz	1	36	8.57	-41.36		0.86	49.93	20.00	-29.93	T4	
		20MHz	1	40	8.54	-40.87		0.63	49.41	20.00	-29.41	T4	
		20MHz	1	48	8.28	-40.81		0.87	49.09	20.00	-29.09	T4	
		40MHz	2A	54	8.70	-41.39		1.13	50.09	20.00	-30.09	T4	
		20MHz	2A	56	8.74	-40.83		1.00	49.57	20.00	-29.57	T4	
		40MHz	2C	118	8.66	-41.19		0.97	49.85	20.00	-29.85	T4	
		20MHz	2C	120	8.04	-41.49		0.88	49.53	20.00	-29.53	T4	
		40MHz	3	151	8.25	-41.66		1.03	49.91	20.00	-29.91	T4	
		20MHz	3	157	8.64	-41.40		0.88	50.04	20.00	-30.04	T4	
	Radial	40MHz	1	38	1.56	-39.38	-61.60	N/A	40.94	20.00	-20.94	T4	1.6, 3.0
		20MHz	1	40	1.25	-39.73			40.98	20.00	-20.98	T4	

Table 6-39
Raw Data Results for 5GHz WIFI IEEE 802.11ax (OTT VoIP) - Flat Posture

Mode	Orientation	Bandwidth	U-NII	Channel	ABM1 [dB(A/m)]	ABM2 [dB(A/m)]	Ambient Noise [dB(A/m)]	Frequency Response Margin (dB)	S+N/N (dB)	FCC Limit (dB)	Margin from FCC Limit (dB)	C63.19-2011 Rating	Test Coordinates
IEEE 802.11ax SU	Axial	40MHz	1	38	8.19	-44.42	-63.89	0.70	52.61	20.00	-32.61	T4	1.6, 3.6
		20MHz	1	40	8.00	-43.90		0.56	51.90	20.00	-31.90	T4	
	Radial	40MHz	1	38	1.42	-40.89	-61.60	N/A	42.31	20.00	-22.31	T4	1.6, 3.0
		20MHz	1	40	1.22	-39.32			40.54	20.00	-20.54	T4	
IEEE 802.11ax RU	Axial	40MHz	1	38	8.65	-43.77	-63.89	0.59	52.42	20.00	-32.42	T4	1.6, 3.6
		20MHz	1	40	8.28	-43.37		0.67	51.65	20.00	-31.65	T4	
	Radial	40MHz	1	38	1.20	-39.52	-61.60	N/A	40.72	20.00	-20.72	T4	1.6, 3.0
		20MHz	1	40	1.14	-39.20			40.34	20.00	-20.34	T4	

II. Test Notes

A. General

1. Phone Condition: Mute on; Backlight off; Max Volume; Max Contrast
2. 'Radial' orientation refers to radial transverse.
3. Hearing Aid Mode (**Phone→Call Settings→Accessibility→Hearing aids**) was set to ON for Frequency Response compliance
4. Speech Signal: ITU-T P.50 Artificial Voice
5. Bluetooth and WIFI were disabled while testing 2G/3G/4G/5G modes.
6. Licensed data modes and Bluetooth were disabled while testing WIFI modes.
7. The Margin from FCC limit column indicates a margin from the FCC limit for compliance (T3).

B. OTT VoIP

1. Vocoder Configuration: Satin, 10kbps
2. GPRS Configuration
    a. Coding Scheme: CS-4

b. Number of TX slots: 2

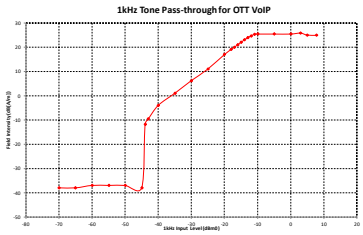
3. HSPA Configuration:
   a. Release: 6
   b. 3GPP 34.121 Subtest 1
4. LTE FDD Configuration:
   a. Power Configuration: TPC = “Max Power”
   b. Radio Configuration: 16QAM, 1RB, 0RB offset
   c. LTE Band 7 was the worst-case band from Table 5-6 and was used to test both Axial and Radial probe orientations.
   d. The worst-case band and bandwidth combination for each probe orientation is additionally tested on the low and high channels for those combinations.
   e. For South Antenna in Flip configuration, LTE Band 7 at 10MHz is the worst-case for the Axial probe orientation. LTE Band 7 at 15MHz bandwidth is the worst-case for the Radial probe orientation.
   f. For South Antenna in Flat configuration, LTE Band 7 at 10MHz is the worst-case for both Axial and Radial probe orientations.
   g. For North Antenna in Flip configuration, LTE Band 7 at 5MHz is the worst-case for both Axial and Radial probe orientations.
   h. For North Antenna in Flat configuration, LTE Band 7 at 15MHz is the worst-case for both Axial and Radial probe orientations.
5. LTE TDD Configuration:
   a. Power Configuration: TPC = “Max Power”
   b. Radio Configuration: 16QAM, 1RB, 0RB offset
   c. Power Class 2 Uplink-Downlink configuration: 1
   d. LTE Band 41 (Power Class 2) was the worst-case band from Table 5-7 and was used to test both Axial and Radial probe orientations.
   e. The worst-case band and bandwidth combination for each probe orientation is additionally tested on the low, low-mid, high-mid, and high channels for those combinations.
   f. For South Antenna in Flip Configuration, LTE Band 41 (Power Class 2) at 15MHz is the worst-case for the Axial probe orientation. LTE Band 41 (Power Class 2) at 20MHz is the worst-case for the Radial probe orientation.
   g. For South Antenna in Flat Configuration, LTE Band 41 (Power Class 2) at 5MHz is the worst-case for the Axial probe orientation. LTE Band 41 (Power Class 2) at 15MHz is the worst-case for the Radial probe orientation.
   h. For North Antenna in Flip Configuration, LTE Band 41 (Power Class 2) at 15MHz is the worst-case for the Axial probe orientation. LTE Band 41 (Power Class 2) at 5MHz is the worst-case for the Radial probe orientation.
   i. For North Antenna in Flat Configuration, LTE Band 41 (Power Class 2) at 20MHz is the worst-case for both Axial and Radial probe orientations.
6. NR FDD Configuration
   a. Power Configuration: TxAGC is set such that the DUT operates at max power.
   b. Radio Configuration: DFT-s-OFDM, 256QAM, 1RB, 99% RB Offset
   c. Due to equipment limitations, ABM1 measurements were not possible. Therefore, the procedure outlined in Section 5.II.6 was followed to obtain SNNR values. Additionally, Frequency Response measurements were not possible due to equipment limitations.
   d. NR Band n71 was the worst-case band from Table 5-21 and was used to test both Axial and Radial probe orientations.
   e. The worst-case band and bandwidth combination for each probe orientation is additionally tested on the low and high channels for those combinations.
   f. For South Antenna in Flip Configuration, NR n71 at 15MHz is the worst-case for the Axial probe orientation. NR n71 at 10MHz bandwidth is the worst-case for the Radial probe orientation.

g. For South Antenna in Flat Configuration, NR n71 at 15MHz is the worst-case for the Axial probe orientation. NR n71 at 5MHz bandwidth is the worst-case for the Radial probe orientation.
h. For North Antenna in Flip Configuration, NR n71 at 20MHz is the worst-case for the Axial probe orientation. NR n71 at 10MHz bandwidth is the worst-case for the Radial probe orientation.
i. For North Antenna in Flat Configuration, NR n71 at 15MHz is the worst-case for the Axial probe orientation. NR n71 at 20MHz bandwidth is the worst-case for the Radial probe orientation.

7. NR TDD Configuration
   a. Power Configuration: TxAGC is set such that the DUT operates at max power.
   b. Radio Configuration: DFT-s-OFDM, 256QAM, 1RB, 99% RB Offset
   c. Due to equipment limitations, ABM1 measurements were not possible. Therefore, the procedure outlined in Section 5.II.6 was followed to obtain SNNR values. Additionally, Frequency Response measurements were not possible due to equipment limitations.
   d. NR Band n41 (PC3) was used to test both Axial and Radial probe orientations.
   e. The worst-case band and bandwidth combination for each probe orientation is additionally tested on the low and high channels for those combinations.
   f. For South Antenna in Flip Configuration, NR n41 (Power Class 3) at 50MHz is the worst-case for both Axial and Radial probe orientations.
   g. For South Antenna in Flat Configuration, NR n41 (Power Class 3) at 50MHz is the worst-case for the Axial probe orientation. NR n41 (Power Class 3) at 30MHz bandwidth is the worst-case for the Radial probe orientation.
   h. For North Antenna in Flip Configuration, NR n41 (Power Class 3) at 60MHz is the worst-case for both Axial and Radial probe orientations.
   i. For North Antenna in Flat Configuration, NR n41 (Power Class 3) at 90MHz is the worst-case for the Axial probe orientation. NR n41 (Power Class 3) at 60MHz bandwidth is the worst-case for the Radial probe orientation.
8. WIFI Configuration:
   a. Please refer to the Original Certification test report for more information regarding the radio configuration and RU index selections below.
   b. Radio Configuration
      i. IEEE 802.11b: CCK, 5.5Mbps
      ii. IEEE 802.11g/a: 16QAM, 24Mbps
      iii. IEEE 802.11n/ac 20MHz: 16QAM, MCS 4
      iv. IEEE 802.11ax SU 20MHz: QPSK, MCS 2
      v. IEEE 802.11n/ac 40MHz: QPSK, MCS 1
      vi. IEEE 802.11ax SU 40MHz: QPSK, MCS 2
   c. RU Index
      i. IEEE 802.11ax RU 20MHz: 0
      ii. IEEE 802.11ax RU 40MHz: 17
   d. The worst-case standard for 2.4GHz WIFI in each probe orientation is additionally tested on the low and high channels.
      i. For Flip Configuration, IEEE 802.11n 20MHz BW is the worst-case for the Axial probe orientation. IEEE 802.11b is the worst-case for the Radial probe orientation.
      ii. For Flat Configuration, IEEE 802.11n 20MHz BW is the worst-case for the Axial probe orientation. IEEE 802.11b is the worst-case for the Radial probe orientation.
   e. The worst-case standard for 5GHz WIFI in each probe orientation is additionally tested on higher U-NII bands as well as applicable low and high channels.
      i. For Flip Configuration, IEEE 802.11ax RU 20MHz (U-NII 1) is the worst-case for the Axial probe orientation. IEEE 802.11ax SU 20MHz (U-NII 2A) is the worst-case for the Radial probe orientation.

ii. For Flat Configuration, IEEE 802.11ac 40MHz (U-NII 2C) is the worst-case for the Axial probe orientation. IEEE 802.11a (U-NII 1) is the worst-case for the Radial probe orientation.

III. 1 kHz Vocoder Application Check



This model was verified to be within the linear region for ABM1 measurements at -20 dBm0 for OTT VoIP. This measurement was taken in the axial configuration above the maximum location.

IV. T-Coil Validation Test Results

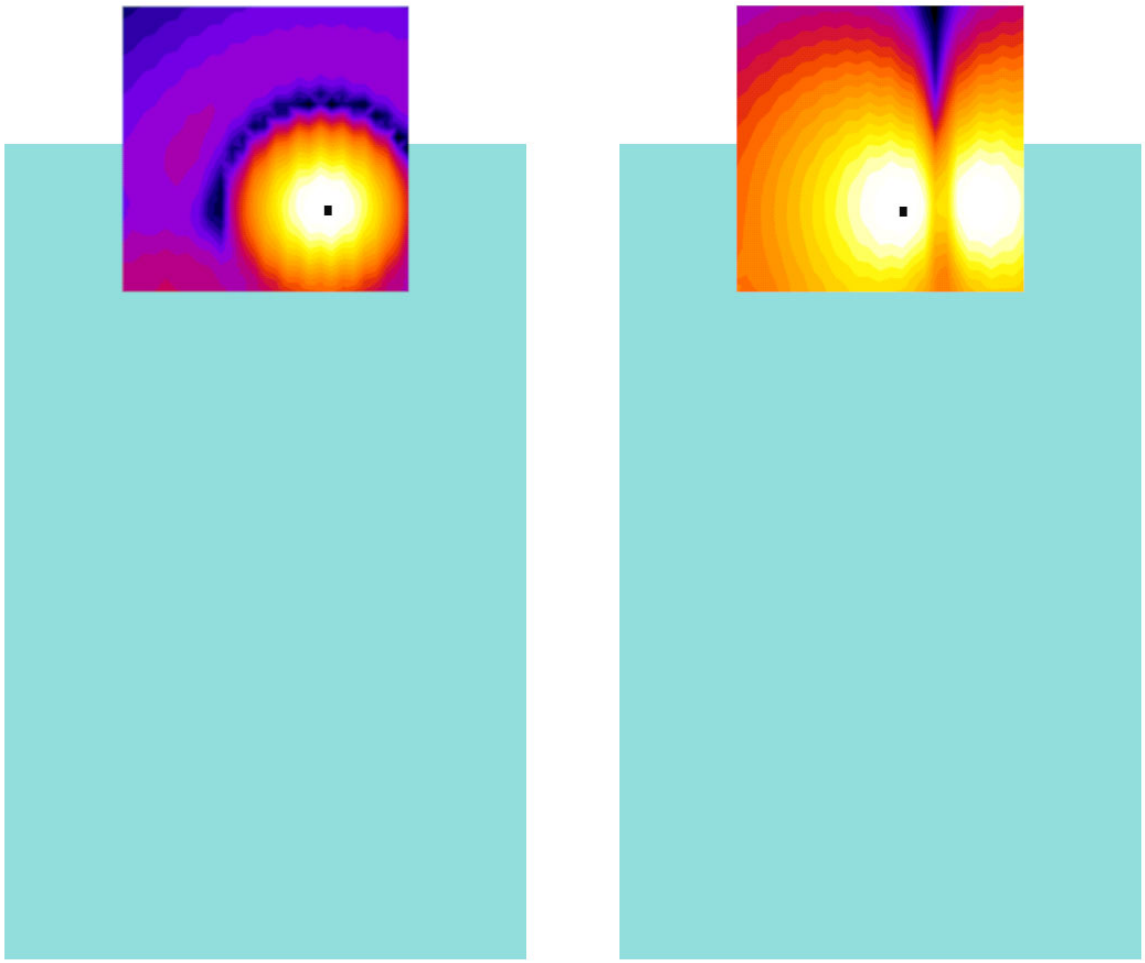
Table 6-40
Helmholtz Coil Validation Table of Results – 09/13/2021

Item	Target	Result	Verdict
Axial			
Magnetic Intensity, -10 dBA/m	*-10 ± 0.5 dB*	-10.238	**PASS**
Environmental Noise	< -58 dBA/m	-63.89	**PASS**
Frequency Response, from limits	*> 0 dB*	0.80	**PASS**
Radial			
Magnetic Intensity, -10 dBA/m	*-10 ± 0.5 dB*	-10.235	**PASS**
Environmental Noise	< -58 dBA/m	-64.07	**PASS**
Frequency Response, from limits	*> 0 dB*	0.80	**PASS**

Table 6-41
Helmholtz Coil Validation Table of Results – 09/20/2021

Item	Target	Result	Verdict
Axial			
Magnetic Intensity, -10 dBA/m	*-10 ± 0.5 dB*	-10.189	**PASS**
Environmental Noise	< -58 dBA/m	-60.35	**PASS**
Frequency Response, from limits	*> 0 dB*	0.80	**PASS**
Radial			
Magnetic Intensity, -10 dBA/m	*-10 ± 0.5 dB*	-10.128	**PASS**
Environmental Noise	< -58 dBA/m	-61.60	**PASS**
Frequency Response, from limits	*> 0 dB*	0.80	**PASS**

V. ABM1 Magnetic Field Distribution Scan Overlays



Axial Radial (Transverse)

Figure 6-1
T-Coil Scan Overlay Magnetic Field Distributions

Notes:
1. Final measurement locations are indicated by a cursor on the contour plots.
2. See Test Setup Photographs for actual WD overlay.

7. MEASUREMENT UNCERTAINTY

Table 7-1
Uncertainty Estimation Table

Contribution	Data +/- %	Data +/- dB	Data Type	Probability distribution	Divisor	Standard uncertainty	Standard Uncertainty (dB)
ABM Noise	7.0%	0.29	Std. Dev.	Normal k=1	1.00	7.0%	
RF Reflections	4.7%	0.20	Specification	Rectangular	1.73	2.7%	
Reference Signal Level	12.2%	0.50	Specification	Rectangular	1.73	7.0%	
Positioning Accuracy	10.0%	0.41	Uncertainty	Rectangular	1.73	5.8%	
Probe Coil Sensitivity	12.2%	0.50	Specification	Rectangular	1.73	7.0%	
Probe Linearity	2.4%	0.10	Std. Dev.	Normal k=1	1.00	2.4%	
Cable Loss	2.8%	0.12	Specification	Rectangular	1.73	1.6%	
Frequency Analyzer	5.0%	0.21	Specification	Rectangular	1.73	2.9%	
System Repeatability	5.0%	0.21	Std. Dev.	Normal k=1	1.00	5.0%	
WD Repeatability	9.0%	0.37	Std. Dev.	Normal k=1	1.00	9.0%	
Positioner Accuracy	1.0%	0.04	Specification	Rectangular	1.73	0.6%	
Combined standard uncertainty, uc (k=1)						17.7%	0.71
Expanded uncertainty (k=2), 95% confidence level						35.3%	1.31

Notes:
1. Test equipments are calibrated according to techniques outlined in NIS81, NIS3003 and NIST Tech Note 1297.
2. 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.

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 compatibility 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.

8. EQUIPMENT LIST

Table 8-1
Equipment List

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
RME	Fireface UC	Acoustic Analyzer External Audio Interface	3/29/2021	Biennial	3/29/2023	23857555
Listen	SoundConnect	Microphone Power Supply	3/29/2021	Biennial	3/29/2023	PS3099
Rohde & Schwarz	CMW500	Radio Communication tester	7/19/2021	Annual	7/19/2022	128635
Rohde & Schwarz	CMW500	Wideband Radio Communication Tester	3/22/2021	Annual	3/22/2022	162125
Rohde & Schwarz	CMW500	Wideband Radio Communication Tester	2/10/2021	Annual	2/10/2022	161662
Seekonk	NC-100	Torque Wrench (8" lb)	8/4/2020	Biennial	8/4/2022	21053
TEM	Axial T-Coil Probe	Axial T-Coil Probe	3/29/2021	Biennial	3/29/2023	TEM-1139
TEM	Radial T-Coil Probe	Radial T-Coil Probe	3/29/2021	Biennial	3/29/2023	TEM-1133
TEM		HAC Positioner	N/A		N/A	N/A
TEM		HAC System Controller with Software	N/A		N/A	N/A
TEM	C63.19	Helmholtz Coil	3/29/2021	Biennial	3/29/2023	925

9. TEST DATA

PCTEST Proud to be part of element

PCTEST Hearing-Aid Compatibility Facility

DUT: HH Coil – SN: 925

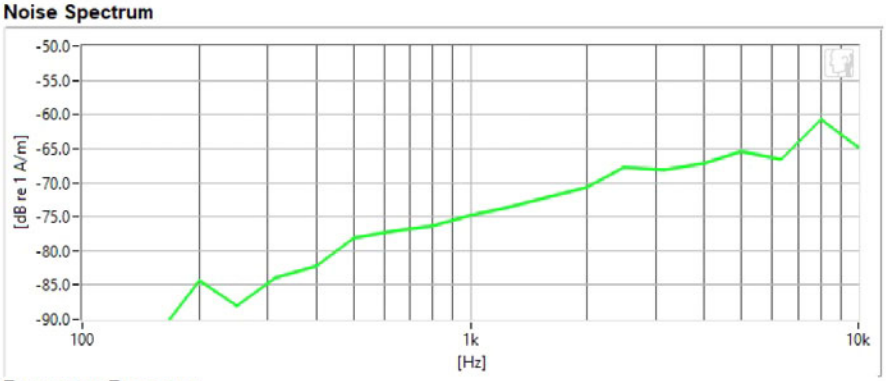
Type: HH Coil
Serial: 925

Measurement Standard: ANSI C63.19-2011

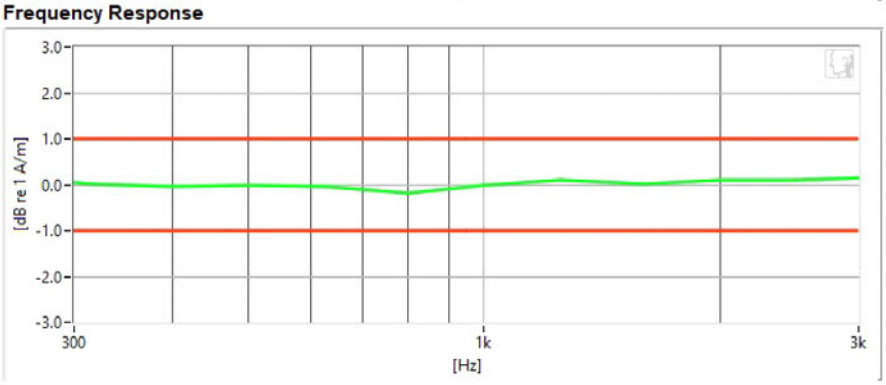
Equipment:

- Probe: Axial T-Coil Probe – SN: TEM-1139; Calibrated: 3/29/2021
- Helmholtz Coil – SN: 925; Calibrated: 3/29/2021

Noise Spectrum



Frequency Response



Results

Verification 1kHz Intensity	-10.238 dB	✓	Max/Min	-9.5/-10.5
Verification ABM2	-63.89 dB	✓	Maximum	-58.0
Frequency Response Margin	800m dB	✓	Tolerance curves	Aligned Data

PCTEST Hearing-Aid Compatibility Facility

DUT: HH Coil – SN: 925

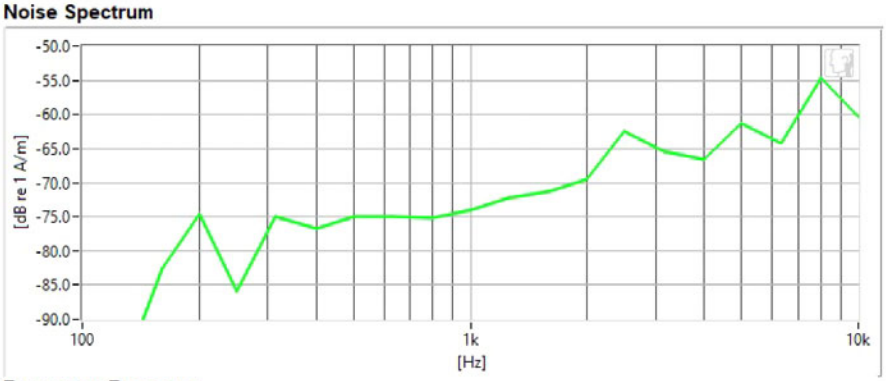
Type: HH Coil
Serial: 925

Measurement Standard: ANSI C63.19-2011

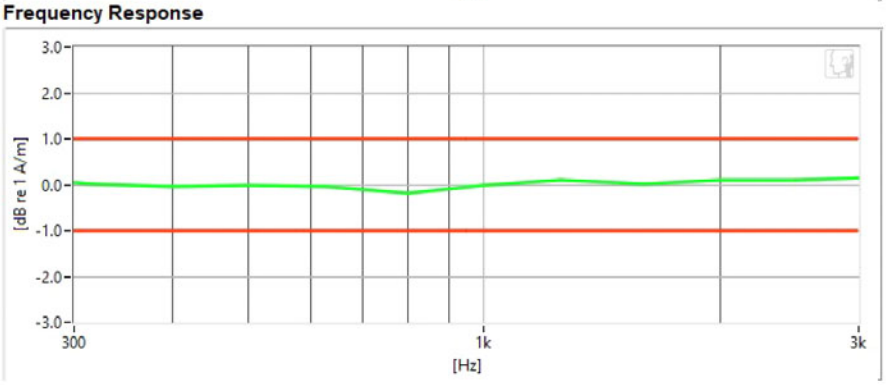
Equipment:

- Probe: Axial T-Coil Probe – SN: TEM-1139; Calibrated: 3/29/2021
- Helmholtz Coil – SN: 925; Calibrated: 3/29/2021

Noise Spectrum



Frequency Response



Results

Verification 1kHz Intensity	-10.189 dB	✓	Max/Min	-9.5/-10.5
Verification ABM2	-60.35 dB	✓	Maximum	-58.0
Frequency Response Margin	800m dB	✓	Tolerance curves	Aligned Data

PCTEST Hearing-Aid Compatibility Facility

DUT: HH Coil – SN: 925

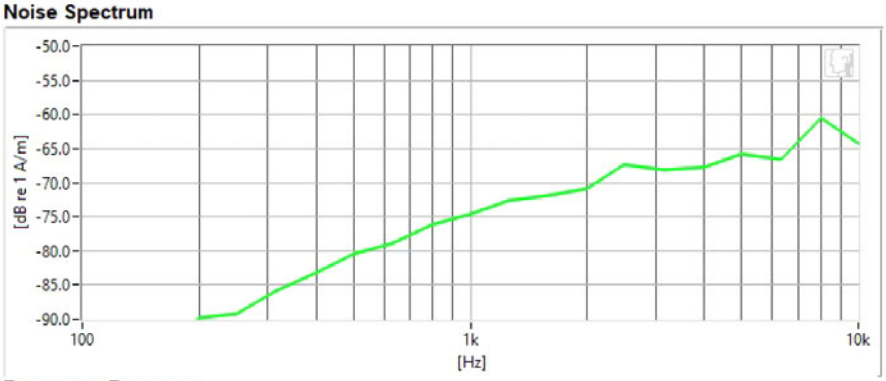
Type: HH Coil
Serial: 925

Measurement Standard: ANSI C63.19-2011

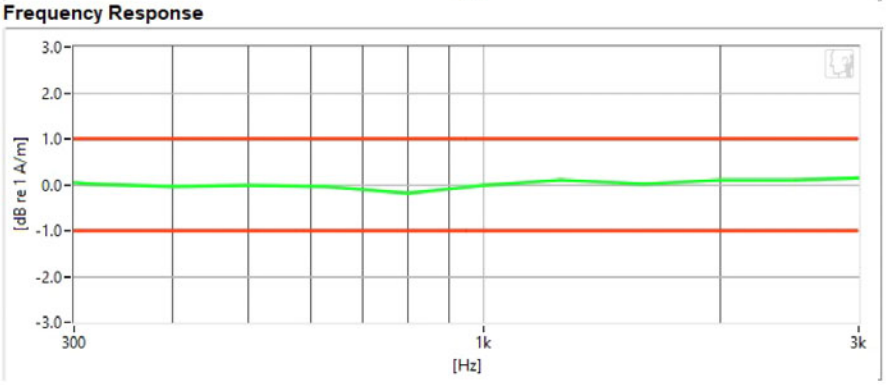
Equipment:

- Probe: Radial T-Coil Probe – SN: TEM-1133; Calibrated: 3/29/2021
- Helmholtz Coil – SN: 925; Calibrated: 3/29/2021

Noise Spectrum



Frequency Response



Results

Verification 1kHz Intensity	-10.235 dB	✓	Max/Min	-9.5/-10.5
Verification ABM2	-64.07 dB	✓	Maximum	-58.0
Frequency Response Margin	800m dB	✓	Tolerance curves	Aligned Data

9/20/2021

PCTEST Hearing-Aid Compatibility Facility

DUT: HH Coil – SN: 925

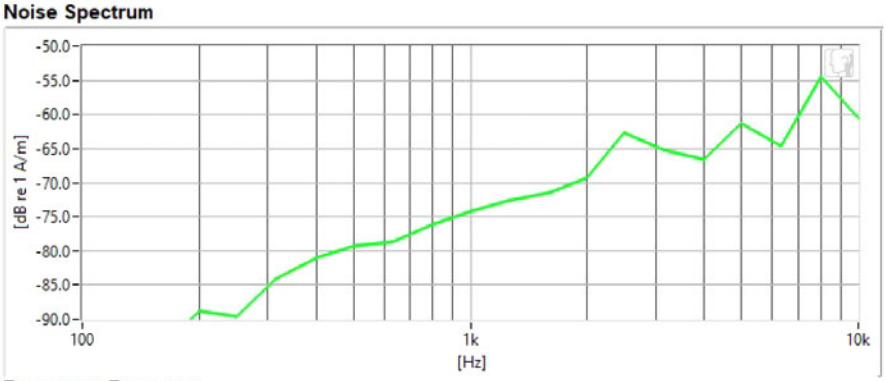
Type: HH Coil
Serial: 925

Measurement Standard: ANSI C63.19-2011

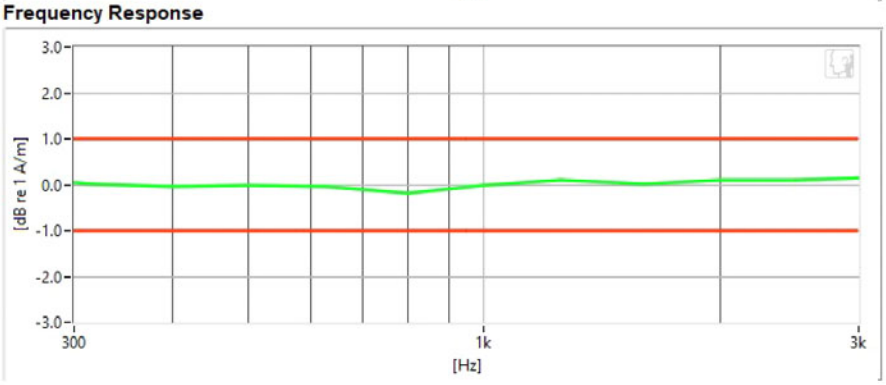
Equipment:

- Probe: Radial T-Coil Probe – SN: TEM-1133; Calibrated: 3/29/2021
- Helmholtz Coil – SN: 925; Calibrated: 3/29/2021

Noise Spectrum



Frequency Response



Results

Verification 1kHz Intensity	-10.128 dB	✓	Max/Min	-9.5/-10.5
Verification ABM2	-61.6 dB	✓	Maximum	-58.0
Frequency Response Margin	800m dB	✓	Tolerance curves	Aligned Data

PCTEST Hearing-Aid Compatibility Facility

DUT: C3K1995

Type: Portable Handset
Serial: 51385

Measurement Standard: ANSI C63.19-2011

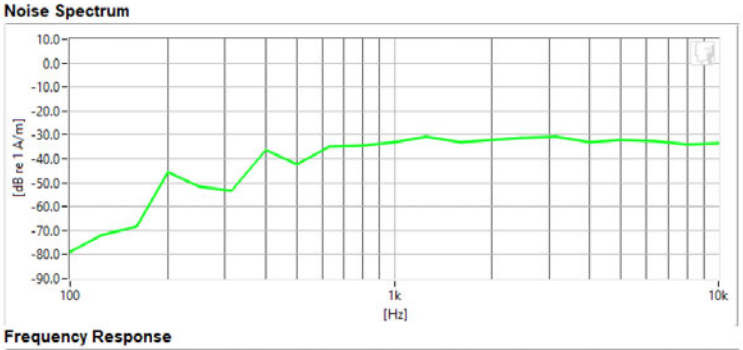
Equipment:

- Probe: Axial T-Coil Probe – SN: TEM-1139; Calibrated: 03/29/2021

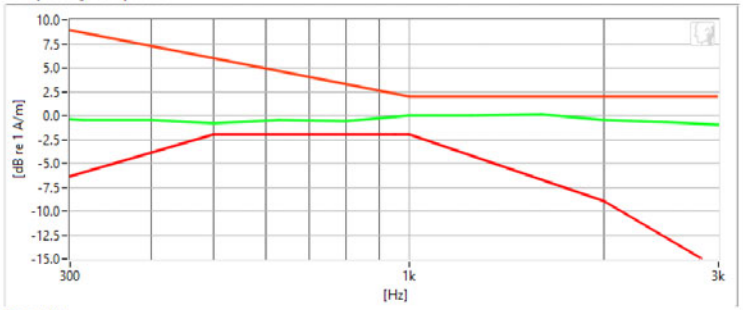
Test Configuration:

- VoIP Application: MS Teams
- Mode: GPRS850
- Channel: 190
- Speech Signal: ITU-T P.50 Artificial Voice
- Posture: Flat

Noise Spectrum



Frequency Response



Results

ABM1	8.13 dB	✓	Minimum	-18.0
ABM2	-24.35 dB	✓	Maximum	0
SNNR	32.48 dB	✓	Minimum	20
Aligned Response - P.50	1.17 dB	✓	Tolerance curves	Aligned Data

PCTEST Hearing-Aid Compatibility Facility

DUT: C3K1995

Type: Portable Handset
Serial: 51385

Measurement Standard: ANSI C63.19-2011

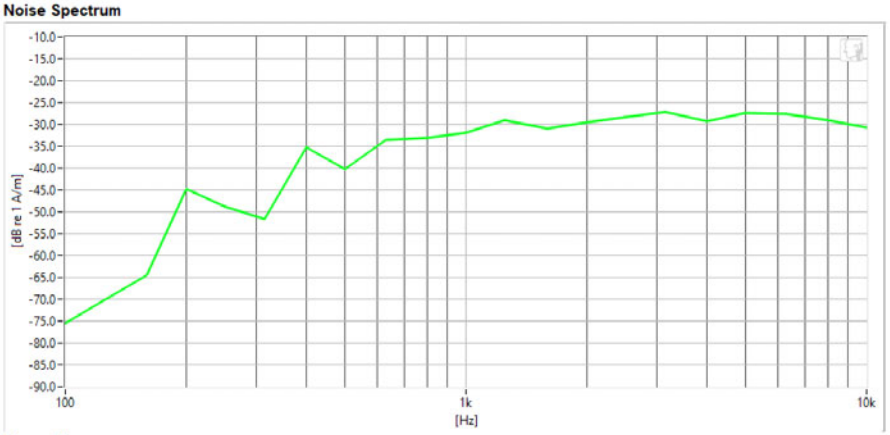
Equipment:

- Probe: Radial T-Coil Probe – SN: TEM-1133; Calibrated: 03/29/2021

Test Configuration:

- VoIP Application: MS Teams
- Mode: GPRS850
- Channel: 190
- Posture: Flip

Noise Spectrum



Results

ABM1	-760m dB	✓	Minimum	-18.0
ABM2	-22.47 dB	✓	Maximum	0.0
SNNR	21.72 dB	✓	Minimum	20.0

10. CALIBRATION CERTIFICATES

West Caldwell Calibration Laboratories Inc.

Certificate of Calibration

for

AXIAL T COIL PROBE

Manufactured by:	TEM CONSULTING, LP
Model No:	AXIAL T COIL PROBE
Serial No:	TEM-1139
Calibration Recall No:	31813

VaA
4/7/2021

Submitted By:

Customer:	ANDREW HARWELL
Company:	PCTEST ENGINEERING LAB
Address:	7185 OAKLAND MILLS ROAD
	COLUMBIA MD 21046

The subject instrument was calibrated to the indicated specification using standards traceable to the SI through the National Institute of Standards and Technology or to accepted values of natural physical constants. This document certifies that the instrument met the following specification upon its return to the submitter.

West Caldwell Calibration Laboratories Procedure No. AXIAL T C TEM C

Upon receipt for Calibration, the instrument was found to be:

Within (X)

tolerance of the indicated specification. See attached Report of Calibration.
The information supplied relates to the calibrated item listed above and statement of conformance for ALL given specifications and standards fall under the decision rule: A= (L-(U95)*M), where A is acceptance limit, L is manufacturer specifications, U95 is confidence level of 95% at k=2, and M is managed guard-band mulitiplier. The guard-band multiplier increases false-accept risk in favor of decreasing false-reject risk. Although the false accept risk increases, it is still below the Z540.3 2% risk requirement. The decision rule has been communicated and approved by customer during contract review.

West Caldwell Calibration Laboratories' calibration control system meets the following requirements, ISO 10012-1 MIL STD 45662A, ANSI/NCSL Z540-1, IEC Guide 25, ISO 9001:2015, and ISO 17025

Note: With this Certificate, Report of Calibration is included.

Approved by:

James Zhu

Quality Manager

ISO/IEC 17025:2017

Calibration Date: 29-Mar-21

Certificate No: 31813 -3

QA Doc. #1051 Rev. 3.0 5/29/20

Certificate Page 1 of 1

ACCREDITED

Calibration Lab. Cert. # 1533.01

uncompromised calibration

West Caldwell Calibration Laboratories, Inc.

1575 State Route 96, Victor, NY 14564, U.S.A.

West Caldwell Calibration Laboratories, Inc.
uncompromised calibration
1575 State Route 96, Victor NY 14564

ISO/IEC 17025: 2017
ACCREDITED
Calibration Lab. Cert. # 1533.01

REPORT OF CALIBRATION

for

TEM Consulting LP Axial T Coil Probe **Model No.: Axial T Coil Probe** **Serial No.: TEM-1139**
Company: PCTest Engineering Lab **I. D. No.: XXXX**

Calibration results:

Probe Sensitivity measured with Helmholtz Coil

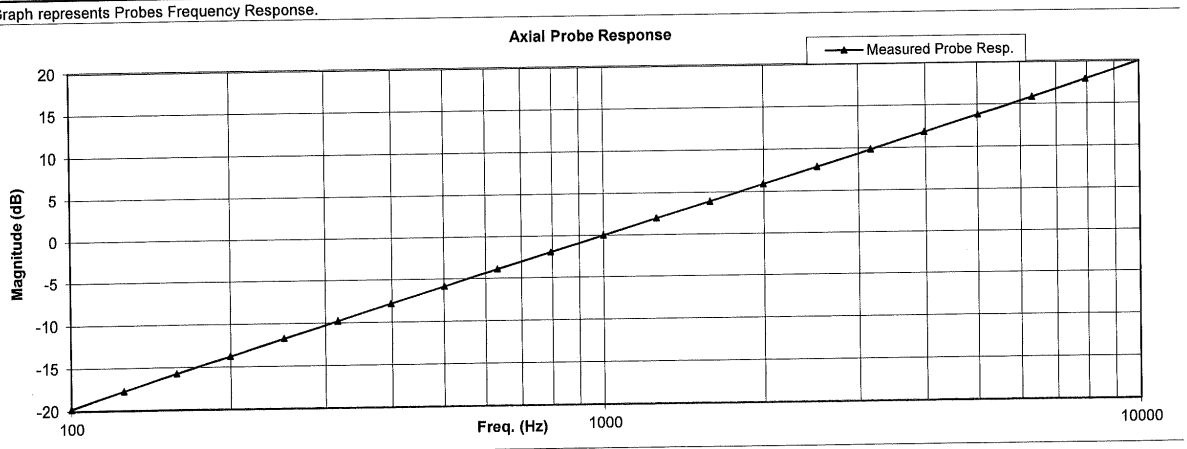
Helmholtz Coil;		
the number of turns on each coil;	10	No.
the radius of each coil, in meters;	0.204	m
the current in the coils, in amperes.;	0.08	A
Helmholtz Coil Constant;	7.09	A/m/V
Helmholtz Coil magnetic field;	5.92	A/m
Probe Sensitivity at	1000	Hz.
was	-60.26	dBV/A/m
	0.970	mV/A/m
Probe resistance	873	Ohms

Before & after data same: ...X...

Laboratory Environment:		
Ambient Temperature:	20.4	°C
Ambient Humidity:	29.3	% RH
Ambient Pressure:	99.394	kPa
Calibration Date:	29-Mar-2021	
Calibration Due:		
Report Number:		31813 -3
Control Number:		31813

The above listed instrument meets or exceeds the tested manufacturer's specifications.
This Calibration is traceable through NIST test numbers: 684.07/O-0000001126-20
The expanded uncertainty of calibration: 0.30dB at 95% confidence level with a coverage factor of k=2.

Graph represents Probes Frequency Response.



The above listed instrument was checked using calibration procedure documented in West Caldwell Calibration Laboratories Inc. procedure : **Rev. 7.0 Jan. 24, 2014 Doc. # 1038 HCATEMC**
Calibration was performed by West Caldwell Calibration Laboratories Inc. under Operating Procedures intended to implement the requirements of ISO10012-1, IEC Guide 25, ANSI/NCSL Z540-1, (MIL-STD-45662A) and ISO 9001:2015, ISO 17025

Cal. Date: 29-Mar-2021

Measurements performed by: .....
James Zhu
Rev. 7.0 Jan. 24, 2014 Doc. # 1038 HCATEMC

Calibrated on WCCL system type 9700

Page 1 of 2

HCATEMC_TEM-1139_Mar-29-2021.xls

West Caldwell Calibration Laboratories Inc.

1575 State Route 96, Victor NY 14564
Tel. (585) 586-3900 FAX (585) 586-4327

Calibration Data Record

for

TEM Consulting LP Axial T Coil Probe — Model No.: Axial T Coil Probe — Serial No.: TEM-1139
Company: PCTest Engineering Lab

Test	Function	Tolerance		Measured values		
				Before	Out	Remarks
1.0	Probe Sensitivity at	1000 Hz.	dBV/A/m	-60.26		
2.0	Probe Level Linearity		dB			
		Ref. (0 dB)	6	5.94		
			0	0.00		
			-6	-6.03		
			-12	-12.04		
3.0	Probe Frequency Response		Hz			
			100	-19.8		
			126	-17.8		
			158	-15.7		
			200	-13.8		
			251	-11.8		
			316	-9.8		
			398	-7.8		
			501	-5.9		
			631	-3.9		
			794	-2.0		
		Ref. (0 dB)	1000	0.0		
			1259	2.0		
			1585	3.9		
			1995	5.9		
			2512	7.9		
			3162	9.8		
			3981	11.8		
			5012	13.8		
			6310	15.8		
			7943	17.9		
			10000	20.0		

Instruments used for calibration:			Date of Cal.	Traceablity No.	Due Date
HP	34401A	S/N US360641	2-Jul-2020	,610119	2-Jul-2021
HP	34401A	S/N US361024	2-Jul-2020	,610119	2-Jul-2021
HP	33120A	S/N US360437	2-Jul-2020	,610119	2-Jul-2021
B&K	2133	S/N 1583254	1-Jul-2020	684.07/O-0000001126-20	1-Jul-2021

Cal. Date: 29-Mar-2021 — Tested by: James Zhu

Calibrated on WCCL system type 9700

Rev. 7.0 Jan. 24, 2014 Doc. # 1038 HCATEMC

West Caldwell Calibration Laboratories Inc.

Certificate of Calibration

for

RADIAL T COIL PROBE

Manufactured by:	**TEM CONSULTING, LP**
Model No:	**RADIAL T COIL PROBE**
Serial No:	**TEM-1133**
Calibration Recall No:	**31813**

Submitted By:

4/7/2021

Customer:	**ANDREW HARWELL**
Company:	**PCTEST ENGINEERING LAB**
Address:	**7185 OAKLAND MILLS ROAD**
	COLUMBIA MD 21046

The subject instrument was calibrated to the indicated specification using standards traceable to the SI through the National Institute of Standards and Technology or to accepted values of natural physical constants. This document certifies that the instrument met the following specification upon its return to the submitter.

West Caldwell Calibration Laboratories Procedure No. RADIAL T TEM C

Upon receipt for Calibration, the instrument was found to be:

Within (**X**)

tolerance of the indicated specification. See attached Report of Calibration.
The information supplied relates to the calibrated item listed above and statement of conformance for ALL given specifications and standards fall under the decision rule: A= (L-(U95)*M), where A is acceptance limit, L is manufacturer specifications, U95 is confidence level of 95% at k=2, and M is managed guard-band mulitiplier. The guard-band multiplier increases false-accept risk in favor of decreasing false-reject risk. Although the false accept risk increases, it is still below the Z540.3 2% risk requirement. The decision rule has been communicated and approved by customer during contract review.

West Caldwell Calibration Laboratories' calibration control system meets the following requirements, ISO 10012-1 MIL STD 45662A, ANSI/NCSL Z540-1, IEC Guide 25, ISO 9001:2015, and ISO 17025

Note: With this Certificate, Report of Calibration is included.

Approved by:

James Zhu

Quality Manager
ISO/IEC 17025:2017

Calibration Date: **29-Mar-21**

Certificate No: **31813** - 2

QA Doc. #1051 Rev. 3.0 5/29/20

Certificate Page 1 of 1

West Caldwell Calibration Laboratories, Inc.
uncompromised calibration
1575 State Route 96, Victor, NY 14564, U.S.A.

ACCREDITED
Calibration Lab. Cert. # 1533.01

ISO/IEC 17025: 2017

West Caldwell Calibration Laboratories, Inc.
uncompromised calibration

ACCREDITED
Calibration Lab. Cert. # 1533.01

1575 State Route 96, Victor NY 14564

REPORT OF CALIBRATION

for

TEM Consulting LP Radial T Coil Probe **Model No.: Radial T Coil Probe** **Serial No.: TEM-1133**
Company: PCTest Engineering Lab **I. D. No.: XXXX**

Calibration results:

Probe Sensitivity measured with Helmholtz Coil

Helmholtz Coil;		
the number of turns on each coil;	10	No.
the radius of each coil, in meters;	0.204	m
the current in the coils, in amperes.;	0.09	A
Helmholtz Coil Constant;	7.09	A/m/V
Helmholtz Coil magnetic field;	5.97	A/m
Probe Sensitivity at	1000	Hz.
was	-60.18	dBV/A/m
	0.980	mV/A/m
Probe resistance	896	Ohms

Before & after data same: ...X...

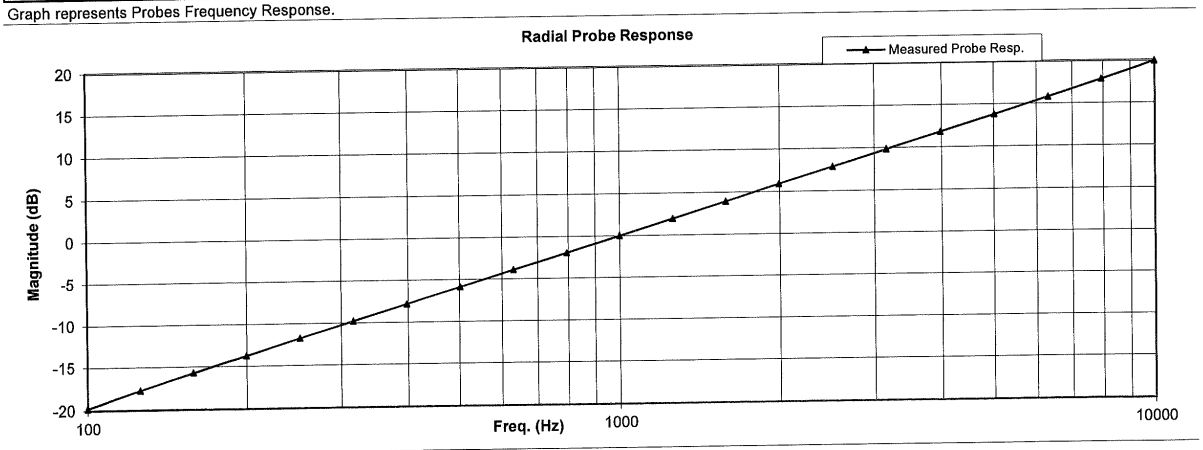
Laboratory Environment:		
Ambient Temperature:	20.4	°C
Ambient Humidity:	29.3	% RH
Ambient Pressure:	99.394	kPa
Calibration Date:	29-Mar-2021	
Re-calibration Due:		
Report Number:		31813 -2
Control Number:		31813

The above listed instrument meets or exceeds the tested manufacturer's specifications.

This Calibration is traceable through NIST test numbers: 684.07/O-0000001126-20

The expanded uncertainty of calibration: 0.30dB at 95% confidence level with a coverage factor of k=2.

Graph represents Probes Frequency Response.



The above listed instrument was checked using calibration procedure documented in West Caldwell Calibration Laboratories Inc. procedure : **Rev. 7.0 Jan. 24, 2014 Doc. # 1038 HCRTEMC**

Calibration was performed by West Caldwell Calibration Laboratories Inc. under Operating Procedures intended to implement the requirements of ISO10012-1, IEC Guide 25, ANSI/NCSL Z540-1, (MIL-STD-45662A) and ISO 9001:2015, ISO 17025

Cal. Date: 29-Mar-2021

Calibrated on WCCL system type 9700

Measurements performed by: .....
James Zhu
Rev. 7.0 Jan. 24, 2014 Doc. # 1038 HCRTEMC

HCRTEMC_TEM-1133_Mar-29-2021.xls

West Caldwell Calibration Laboratories Inc.
1575 State Route 96, Victor NY 14564
Tel. (585) 586-3900 FAX (585) 586-4327

Calibration Data Record

for

TEM Consulting LP Radial T Coil Probe | Model No.: Radial T Coil Probe | Serial No.: TEM-1133
Company: PCTest Engineering Lab

Test	Function	Tolerance		Measured values		
				Before	Out	Remarks
1.0	Probe Sensitivity at	1000 Hz.	dBV/A/m	-60.18		
			dB			
2.0	Probe Level Linearity		6	6.04		
		Ref. (0 dB)	0	0.00		
			-6	-6.03		
			-12	-12.06		
			Hz			
3.0	Probe Frequency Response		100	-19.8		
			126	-17.8		
			158	-15.7		
			200	-13.8		
			251	-11.8		
			316	-9.8		
			398	-7.8		
			501	-5.9		
			631	-3.9		
			794	-2.0		
		Ref. (0 dB)	1000	0.0		
			1259	2.0		
			1585	3.9		
			1995	5.9		
			2512	7.8		
			3162	9.8		
			3981	11.8		
			5012	13.8		
			6310	15.8		
			7943	17.8		
			10000	20.0		

Instruments used for calibration:			Date of Cal.	Traceability No.	Due Date
HP	34401A	S/N US360641	2-Jul-2020	,610119	2-Jul-2021
HP	34401A	S/N US361024	2-Jul-2020	,610119	2-Jul-2021
HP	33120A	S/N US360437	2-Jul-2020	,610119	2-Jul-2021
B&K	2133	S/N 1583254	1-Jul-2020	684.07/O-0000001126-20	1-Jul-2021

Cal. Date: 29-Mar-2021
Calibrated on WCCL system type 9700

Tested by: James Zhu

Rev. 7.0 Jan. 24, 2014 Doc. # 1038 HCRTEMC

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11. CONCLUSION

The measurements indicate that the pre-installed OTT VoIP application, MS Teams, supported by the wireless communications device complies with the HAC limits specified in accordance with the ANSI C63.19 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.

The measurement system and techniques presented in this evaluation are proposed in the ANSI standard as a means of best approximating wireless device compatibility with a hearing-aid. The literature is under continual re-construction.

12. REFERENCES

1. ANSI C63.19-2011, American National Standard for Methods of Measurement of Compatibility between Wireless communication devices and Hearing Aids.", New York, NY, IEEE, May 2011

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3. FCC Office of Engineering and Technology KDB, "285076 D02 T-Coil Testing for CMRS IP v03," September 13, 2017

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