HEARING AID COMPATIBILITY
Volume Control Evaluation Report

FCC ID	:	**2ABZ2-OP23895**
Equipment	:	**Mobile Phone**
Brand Name	:	**ONEPLUS,**
Model Name	:	**CPH2655**
Receive Volume Control Results	:	**PASS**
Lowest Conversational Gain	:	**2N: 11.91 dB** **8N: 14.68 dB**
Applicant	:	**OnePlus Technology (Shenzhen) Co., Ltd. 18C02, 18C03, 18C04, and 18C05, Shum Yip Terra Building, Binhe Avenue North, Futian District, Shenzhen, Guangdong, P.R. China.**
Manufacturer	:	**OnePlus Technology (Shenzhen) Co., Ltd. 18C02, 18C03, 18C04, and 18C05, Shum Yip Terra Building, Binhe Avenue North, Futian District, Shenzhen, Guangdong, P.R. China.**
Standard	:	**FCC 47 CFR §20.19** **ANSI C63.19-2019** **ANSI/TIA-5050-2018**
Date Tested	:	**Jun. 27, 2024 ~ Jul. 26, 2024**

We, Sporton International Inc. (Kunshan), would like to declare that the tested sample provide by manufacturer and the test data has been evaluated in accordance with the test procedures given in ANSI C63.19-2019 / 47 CFR Part 20.19 / ANSI/TIA-5050-2018 and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. (Kunshan), the test report shall not be reproduced except in full.

Si Zhang

Approved by: Si Zhang

ACCREDITED Cert #5145.02

Sporton International Inc. (Kunshan)
No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China

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History of this test report

Report No.	Version	Description	Issued Date
HA461101C	Rev. 01	Initial issue of report	Sep. 27, 2024

1. General Information

Product Feature & Specification	
Applicant Name	OnePlus Technology (Shenzhen) Co., Ltd.
Equipment Name	Mobile Phone
Brand Name	ONEPLUS,
Model Name	CPH2655
IMEI Code	IMEI 1: 866493070023833 IMEI 2: 866493070023825
FCC ID	2ABZ2-OP23895
HW	11
SW	OxygenOS V15.0
EUT Stage	Production Unit
Frequency Band	GSM850: 824 MHz ~ 849 MHz GSM1900: 1850MHz ~ 1910MHz WCDMA Band II: 1850 MHz ~ 1910 MHz WCDMA Band IV: 1710 MHz ~ 1755 MHz WCDMA Band V: 824 MHz ~ 849 MHz LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 4: 1710 MHz ~ 1755 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 7: 2500 MHz ~ 2570 MHz LTE Band 12: 699 MHz ~ 716 MHz LTE Band 13: 777 MHz ~ 787 MHz LTE Band 17: 704 MHz ~ 716 MHz LTE Band 25: 1850 MHz ~ 1915 MHz LTE Band 26: 814 MHz ~ 849 MHz LTE Band 30: 2305 MHz ~ 2315 MHz LTE Band 38: 2570 MHz ~ 2620 MHz LTE Band 41: 2496 MHz ~ 2690 MHz LTE Band 48: 3550 MHz ~ 3700 MHz LTE Band 66: 1710 MHz ~ 1780 MHz LTE Band 71: 663 MHz ~ 698 MHz 5G NR n2 : 1850 MHz ~ 1910 MHz 5G NR n5 : 824 MHz ~ 849 MHz 5G NR n7 : 2500 MHz ~ 2570 MHz 5G NR n12 : 699 MHz ~ 716 MHz 5G NR n25 : 1850 MHz ~ 1915 MHz 5G NR n30 : 2305 MHz ~ 2315 MHz 5G NR n38 : 2570 MHz ~ 2620 MHz 5G NR n41 : 2496 MHz ~ 2690 MHz 5G NR n48 : 3550 MHz ~ 3700 MHz 5G NR n66 : 1710 MHz ~ 1780 MHz 5G NR n71 : 663 MHz ~ 698 MHz 5G NR n77: 3700 MHz ~ 3980 MHz, 3450MHz ~ 3550MHz 5G NR n78: 3700 MHz ~ 3800 MHz, 3450MHz ~ 3550MHz WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz WLAN 5.2GHz Band: 5180 MHz ~ 5240 MHz WLAN 5.3GHz Band: 5260 MHz ~ 5320 MHz WLAN 5.5GHz Band: 5500 MHz ~ 5700 MHz WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz WLAN U-NII 5: 5925 MHz ~ 6425 MHz WLAN U-NII 6: 6425 MHz ~ 6525 MHz WLAN U-NII 7: 6525 MHz ~ 6875 MHz WLAN U-NII 8: 6875 MHz ~ 7125 MHz Bluetooth: 2402 MHz ~ 2480 MHz NFC : 13.56 MHz WPT: 110.1KHz ~ 148.5KHz
Mode	GSM/GPRS/EGPRS/DTM RMC/AMR 12.2Kbps HSDPA HSUPA DC-HSDPA HSPA+ (16QAM uplink is supported) LTE: QPSK, 16QAM, 64QAM, 256QAM 5G NR: DFT-s-OFDM/CP-OFDM, Pi/2 BPSK/QPSK/16QAM/64QAM/256QAM WLAN 2.4GHz 802.11b/g/n HT20/HT40 WLAN 2.4GHz 802.11ac VHT20/VHT40

	WLAN 2.4GHz 802.11ax/be HE20/HE40/EHT20/EHT40 WLAN 5GHz 802.11a/n HT20/HT40 WLAN 5GHz 802.11ac VHT20/VHT40/VHT80/VHT160 WLAN 5GHz 802.11ax HE20/HE40/HE80/HE160 WLAN 5GHz 802.11be EHT20/EHT40/EHT80/EHT160 WLAN 6GHz 802.11a/ax HE20/HE40/HE80/HE160 WLAN 6GHz 802.11be EHT20/EHT40/EHT80/EHT160/EHT320 Bluetooth BR/EDR/LE NFC: ASK WPT: ASK

2. Testing Location

Sporton International Inc. (Kunshan) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Testing Laboratory			
Test Firm	Sporton International Inc. (Kunshan)		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	AC01-KS	CN1257	314309

3. Applied Standards

- FCC CFR47 Part 20.19
- ANSI C63.19-2019
- ANSI/TIA-5050-2018
- FCC KDB 285076 D01 HAC Guidance v06r04
- FCC KDB 285076 D04 Volume Control v02
- FCC KDB 285076 D05 CG Interim Waiver DA 23-914 v01

4. Air Interface and Operating Mode

Air Interface	Band MHz	Type	C63.19 Volume Control Tested	Simultaneous Transmitter	Name of Voice Service	Power State Compliance
GSM	GSM850	VO	Yes	WLAN, BT	CMRS Voice	Pmax
	GSM1900			WLAN, BT		
	EDGE850	VD	No	WLAN, BT	Google Meet(1)	
	EDGE1900					
UMTS	Band 2	VO	Yes	WLAN, BT	CMRS Voice	Pmax
	Band 4			WLAN, BT		
	Band 5			WLAN, BT		
	HSPA	VD	No	WLAN, BT	Google Meet(1)	
LTE (FDD)	Band 2	VD	Yes	5G NR, WLAN, BT	VoLTE / Google Meet(1)	Pmax
	Band 4			5G NR, WLAN, BT		
	Band 5			5G NR, WLAN, BT		
	Band 7			5G NR, WLAN, BT		
	Band 12			5G NR, WLAN, BT		
	Band 13			5G NR, WLAN, BT		
	Band 17			5G NR, WLAN, BT		
	Band 25			5G NR, WLAN, BT		
	Band 26			5G NR, WLAN, BT		
	Band 30			5G NR, WLAN, BT		
	Band 66			5G NR, WLAN, BT		
	Band 71			5G NR, WLAN, BT		
LTE (TDD)	Band 38	VD	Yes	5G NR, WLAN, BT	VoLTE / Google Meet(1)	
	Band 41			5G NR, WLAN, BT		
	Band 48			5G NR, WLAN, BT		
5G NR	n2	VD	No	LTE, WLAN, BT	Google Meet(1)	Pmax
	n5			LTE, WLAN, BT		
	n7			LTE, WLAN, BT		
	n12			LTE, WLAN, BT		
	n25			LTE, WLAN, BT		
	n30			LTE, WLAN, BT		
	n66			LTE, WLAN, BT		
	n71			LTE, WLAN, BT		
	n38			LTE, WLAN, BT		
	n41			LTE, WLAN, BT		
	n48			LTE, WLAN, BT		
	n77			LTE, WLAN, BT		
	n78			LTE, WLAN, BT		
Wi-Fi	2450	VD	Yes	GSM, WCDMA, LTE, 5G NR, 5GHz/6GHz WLAN	VoWiFi / Google Meet(1)	Pmax
	5200			GSM, WCDMA, LTE, 5G NR, 2.4GHz WLAN, BT		
	5300			GSM, WCDMA, LTE, 5G NR, 2.4GHz WLAN, BT		
	5500			GSM, WCDMA, LTE, 5G NR, 2.4GHz WLAN, BT		
	5800			GSM, WCDMA, LTE, 5G NR, 2.4GHz WLAN, BT		
Wi-Fi	U-NII 5	VD	Yes(3)	GSM, WCDMA, LTE, 5G NR, 2.4GHz WLAN, BT	VoWiFi / Google Meet(1)	Pmax
	U-NII 6		No(2)			
	U-NII 7					
	U-NII 8					
BT	2450	DT	No	GSM, WCDMA, LTE, 5G NR, 2.4GHz/5GHz/6GHz WLAN	NA	NA

Type Transport:
VO= Voice only
DT= Digital Transport only (no voice)
VD= CMRS and IP Voice Service over Digital Transport

Remark
1. Per KDB 285076 D05, Waiver DA 23-914 only requires conversational gain compliance for CMRS narrowband and CMRS wideband voice codecs as stated below. All other codecs either part of 3GPP set such as full-band and super-wideband codecs or OTT codecs are to be documented in the test report but not required to comply with the TIA 5050 Volume Control Standard.
2. The WLAN6GHz U-NII 6/7/8 were above 6GHz and were not evaluated due to outside of the current scope of ANSI C63.19 and FCC HAC regulations.
3. The WLAN6GHz U-NII-5 was evaluated for operations which are entirely below 6 GHz, above 6 GHz were not evaluated due outside of the current scope of ANSI C63.19 and FCC HAC regulations.
4. The product only 2G/3G/4G/5G/Wi-Fi/BT support time-average SAR feature, therefore GSM/UMTS/LTE/5GFR1/Wi-Fi HAC were tested at Pmax level(the maximum power).
5. This device not supported VONR function.
6. Volume Control test report for WLAN6GHz UNII-5 (entirely below 6 GHz) will be separately submitted.
7. There are two samples, the difference between them is material of back cover: sample 1 is with leather back cover, Sample 2 is with glass back cover. According to the difference, sample 1 was chosen to perform full testing.

5. Volume Control Requirements

<Conversational Gain>

a. Per KDB 285076 D05, With a mounting force of 8N, the DUT shall have at least one volume control setting that will produce a conversational gain of ≥ 6 dB
b. Per KDB 285076 D05, With a mounting force of 2N, the DUT shall have at least one volume control setting that will produce a conversational gain of ≥ 6 dB.
c. Calculate the Conversational Gain by subtracting 70 dB from the measured dBSPL.
[Conversational Gain = (Measured dBSPL Level – 70 dBSPL) dB]

<Receive Distortion And Noise Performance>

With a mounting force of 8N and 2N, the ratio of the stimulus signal power to the 100 Hz to 8000 Hz total A-weighted distortion and noise power shall be ≥ 20 dB when tested over the range of 1/3 octave band center frequencies:
a. Narrowband transmission mode: Each 1/3 octave band center frequency from 400 Hz to 3150 Hz
b. Wideband transmission mode: Each 1/3 octave band center frequency from 250 Hz to 5000 Hz
c. Per KDB 285076 D05, choose one narrowband and one wideband for all voice services, bands of operation and air interfaces over which it operates using one codec bit rate of the applicant's choosing to meet Receive Distortion And Noise Performance requirement.

<Receive Acoustic Frequency Response Performance>

For the volume control settings determined in ANSI/TIA-5050-2018 section 5.1.1 with a mounting force of 8N and 2N, the receive frequency response shall be measured at the DRP in 1/12 octave bands. After translation to the FF, it shall fall between the applicable upper and lower limits. The exact limit values at any 1/12 octave band center frequency falling between two consecutive points specified in the table may be calculated using the formula given in Eq 2 below:

$$X_f = X_1 + (X_2 - X_1) * \left(\frac{\log_{10} f - \log_{10} f_1}{\log_{10} f_2 - \log_{10} f_1}\right) \qquad \text{Eq 2}$$

Where

X_f = limit value at frequency f

X_1 = limit value at frequency f_1 as given in table

X_2 = limit value at frequency f_2 as given in table

For Narrowband: The 1/12 octave band frequency response after translation to the FF shall fall between the upper and lower limits given in Table 1.
For Wideband: The 1/12 octave band frequency response after translation to the FF shall fall between the upper and lower limits given in Table 2.

Table 1 – Narrowband Receive Frequency Response Limits

Lower Limit Frequency (Hz)	Lower Limit (dB)	Upper Limit Frequency (Hz)	Upper Limit (dB)
300	-6	100	+6
3400	-6	4000	+6

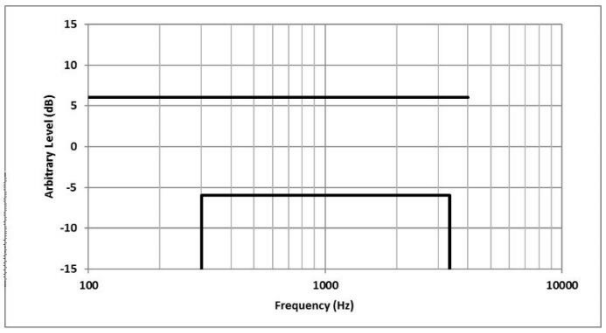
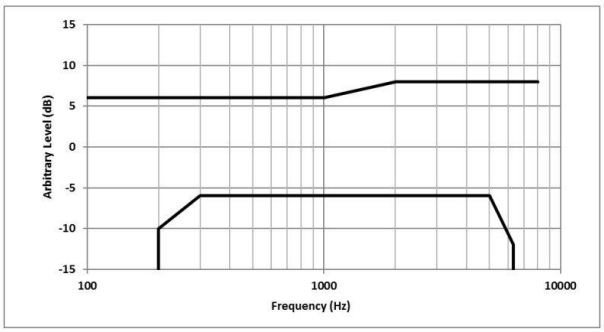
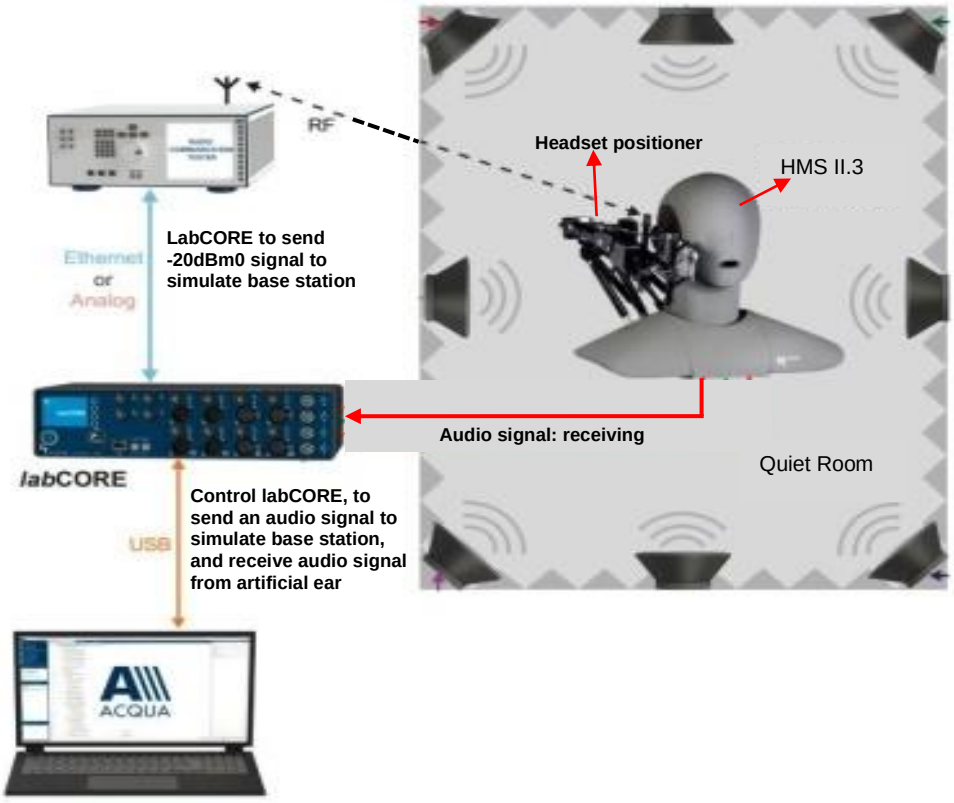


Table 2 – Wideband Receive Frequency Response Limits

Lower Limit Frequency (Hz)	Lower Limit (dB)	Upper Limit Frequency (Hz)	Upper Limit (dB)
200	-10	100	+6
300	-6	1000	+6
5000	-6	2000	+8
6300	-12	8000	+8



6. System Description



System Components:

Name of Equipment	Equipment Description
labCORE Audio Analyzer	labCORE is a high-precision measurement hardware platform. It provides multiple channels, a wide variety of analog and digital inputs and outputs, high processing power and high-performance interfaces. labCORE is an all-in-one solution for measuring the voice and audio quality of a wide range of devices. labCORE is used in conjunction with the communication quality analysis system ACQUA. Connected to a computer via USB (Plug & Play), it is configured and controlled by ACQUA. Combinations with other HEAD acoustics hardware platforms and software applications are possible. labCORE settings are controlled via the intuitive ACQUA settings. They can be stored and assigned to selectable measurement sequences.
HMS II.3, artificial head	HMS II.3 supports measurements in sending and receiving direction. For this purpose, the artificial head is equipped with an impedance simulator in the right ear and a two-way mouth loudspeaker – both meeting the requirements in the recommendations ITU-T P.57 and P.58
Handset positioner	Control the Newton's force(2N/8N) of the mobile phone on the artificial head
ACQUA, TIA-5050 Test Software	The SW version5.1.200 can be evaluated TIA-5050 section5.1, 5.2, 5.3
R&S base station simulator	RF connect with the mobile phone

7. Volume Control Test Procedure

<Conversational Gain>

1. Configure the DUT with a mounting force of 8N and test equipment as shown in section5 in an active call state with the applicable codec for the transmission mode under test.
2. Set the DUT volume control to the maximum setting.
3. If the DUT has an adjustable tone control feature, a tone control setting that meets the frequency response requirements in ANSI/TIA-5050 section 5.3.1 shall be used.
4. The ACQUA system is apply the real speech test signal at a level of -20 dBm0 at the RETP and measure the acoustic output at the Drum Reference Point (DRP) over one complete sequence of the test signal.
5. Translate the measurement made at the DRP to the Free Field (FF) using the translation data in ANSI/TIA-5050 Annex B.
6. Over the applicable frequency band, determine the ASL in dBSPL for the resulting sound pressure level in accordance with Method B of ITU-T Recommendation P.56:
   a. Narrowband 100 Hz through 4000 Hz.
   b. Wideband 100 Hz through 7720 Hz.
   Calculate the Conversational Gain by subtracting 70 dB from the measured dBSPL.
   [Conversational Gain = (Measured dBSPL Level – 70 dBSPL) dB]
7. Measure the output distortion per ANSI/TIA-5050 clause 5.2. If a distortion failure occurs at the maximum volume control setting, reduce the volume control setting and repeat the measurement to determine if a setting can be found for which the conversational gain requirement is met without a distortion failure.
8. Repeat steps 2-8 with a mounting force of 2N.

<Receive Distortion And Noise Performance>

1. Configure the DUT with a mounting force of 8N and test equipment as shown in section in an active call state with the applicable codec for the transmission mode under test.
2. Receive distortion and noise is measured using the PN-SDNR procedure as described in ANSI/TIA-5050 Annex A.
3. To ensure DUT activation, the ACQUA system is apply the real speech test signal at a level of -20 dBm0 followed immediately by the initial 1/3 octave center frequency PN test signal in ANSI/TIA-5050 Table A.1 based on the narrowband or wideband operating mode. Measure the acoustic output at the DRP over the complete sequence of the PN test signal.
4. Translate the measurement made at the DRP to the FF using the translation data in ANSI/TIA-5050 Annex B.
5. Calculate the acoustic output unweighted total signal power of the stimulus measurement band as described in ANSI/TIA-5050 A.2.
6. Calculate the notched A-weighting distortion and noise components as described in ANSI/TIA-5050 A.3.
7. Calculate the ratio of the signal power to the total A-weighted distortion and noise power using ANSI/TIA-5050 Eq A-1.
8. Repeat for each of the remaining 1/3 octave center frequencies in Table A.1 based on the narrowband or wideband operating mode.
9. Repeat steps 2-8 with a mounting force of 2N.
10. The measured value that the system equipment will automatically calculates or converts to define whether it meets the requirements of ANSI/TIA-5050 annex A and annex B.

<Receive Acoustic Frequency Response Performance>

1. Configure the DUT with a mounting force of 8N and test equipment as shown in Figure 1 in an active call state with the applicable codec for the transmission mode under test.
2. If the DUT has an adjustable tone control feature the initial measurement is to be performed with the default tone control setting.
3. The ACQUA system is apply the real speech test signal with a level of -20 dBm0 at the RETP.
4. Capture the frequency spectrum at the DRP of the HATS using real-time analysis with 1/12 octave bands over the frequency range from 100 Hz to 4000 Hz for narrowband measurements, or over the frequency range from 100 Hz to 8000 Hz for wideband measurements, averaged over the entire duration of the test signal.
5. Transform the DRP frequency spectrum measurement to the FF (include ANSI/TIA-5050 Annex B).
6. Divide the 1/12 octave measurement data by the 1/12 octave frequency spectrum of the test signal at the RETP and present the measurement in terms of dB(Pa/V).
7. Apply the applicable frequency response limits to determine compliance.
8. If the default tone control setting does not meet the requirement, repeat the above steps for other tone control settings to determine a tone control setting that meets the requirements.
9. Repeat with a mounting force of 2N.
10. The receive acoustic frequency response performance was perform at max tone control setting.

8. Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
HEAD acoustic GmbH	Audio Analyzer	labCORE	77000544	2023/10/27	2024/10/26
HEAD acoustic GmbH	Fullband artificial head	HMS II.3	12306242	2023/11/2	2024/11/1
G.R.A.S	Sound Calibrator	42AB	31744	2023/10/27	2024/10/26
R&S	Base Station	CMW500	143030	2024/7/4	2025/7/3
R&S	Wideband Radio Communication Tester	CMW500	157651	2023/12/28	2024/12/27
Testo	Thermo-Hygrometer	HTC-1	55011	2024/1/4	2025/1/3

9. Device Support Codec

General Note:

1. Per KDB 285076 D04, it is expected to investigate and document only the worst-case test conditions and results. Each submitted test report shall document the codec type (i.e., NB, WB, EVS, etc.), every air interface (i.e., LTE, 5G NR, WI-FI) and band supported for the worst-case codec bit rate, band channel, bandwidth, air interface bit rate, subcarrier spacings, and resource blocks
2. Through Internal codec and air interface configuration investigation (e.g. (i.e., NB, WB, EVS codec, bandwidth, modulation data rate, subcarrier spacing, and resource blocks) that the worst investigate results of codec, air interface configuration etc. were include in section10
3. Per KDB 285076 D05, Waiver DA 23-914 only requires conversational gain compliance for CMRS narrowband and CMRS wideband voice codecs as stated below. All other codecs either part of 3GPP set such as full-band and super-wideband codecs or OTT codecs are to be documented in the test report but not required to comply with the TIA 5050 Volume Control Standard
4. If a handset does not have a wideband codec or the handset only has an AMR wideband codec, then the test report must document this fact and the passing requirement under these circumstances for the wideband codec test is waived. The passing results for the distortion/noise and frequency response tests must be reported in the handset's test report

GSM Codec/bitrate			
Codec	AMR NB	AMR WB	EFR NB
Bitrate	4.75kbps	6.60kbps	12.2kbps
	5.15kbps	8.85kbps	
	5.9kbps	12.65kbps	
	6.7kbps		
	7.4kbps		
	7.95kbps		
	10.2kbps		
	12.2kbps		

WCDMA Codec/bitrate		
Codec	AMR NB	AMR WB
Bitrate	4.75kbps	6.60kbps
	5.15kbps	8.85kbps
	5.9kbps	12.65kbps
	6.7kbps	14.25kbps
	7.4kbps	15.85kbps
	7.95kbps	18.25kbps
	10.2kbps	19.85kbps
	12.2kbps	23.05kbps
		23.85kbps

VoLTE/VoWIFI Codec/bitrate					
Codec	AMR NB	AMR WB	EVS NB	EVS WB	EVS SWB
Bitrate	4.75kbps	6.60kbps	5.9kbps	5.9kbps	9.6kbps
	5.15kbps	8.85kbps	7.2kbps	7.2kbps	13.2kbps
	5.9kbps	12.65kbps	8kbps	8kbps	16.4kbps
	6.7kbps	14.25kbps	9.6kbps	9.6kbps	24.4kbps
	7.4kbps	15.85kbps	13.2kbps	13.2kbps	32kbps
	7.95kbps	18.25kbps	16.4kbps	16.4kbps	48kbps
	10.2kbps	19.85kbps	24.4kbps	24.4kbps	64kbps
	12.2kbps	23.05kbps		32kbps	96kbps
		23.85kbps		48kbps	128kbps
				64kbps	
				96kbps	
				128kbps	

Google meet Codec/bitrate investigation	
Codec	Opus (Full Band)
Bitrate	6Kbps~75Kbps

10. Volume Control Evaluation Results

General Note:

1. All the test result was done at quiet room and ambient noise is less than 40dBA.
2. Per KDB 285076 D05, in section2 addresses the technical testing requirements for the conversational gain, distortion, and frequency response tests that amends KDB 285076 D04 Volume Control under the conditions of the limited-term waiver DA 23-914, as follows:
   a. Under the waiver, only CMRS narrowband and CMRS wideband voice codecs are required to comply with the volume control requirements of the TIA 5050-2018 Volume Control Standard as amended as follows:
      1. For the 2N mounting force test, one narrowband and one wideband voice codec embedded with the handset must pass with at least one volume control setting with a conversational gain of ≥ 6 dB for all voice services, bands of operation and air interfaces over which it operates using one codec bit rate of the applicant's choosing
      2. For the 8N mounting force test, one narrowband and one wideband voice codec embedded with the handset must pass with at least one volume control setting with a conversational gain of ≥ 6 dB 8 for all voice services, bands of operation and air interfaces over which they operate but is not required to meet or exceed the full 18 dB of conversational gain specified in section 5.1.1 of the TIA 5050 Volume Control Standard using one codec bit rate of the applicant's choosing
   b. For all other narrowband and wideband codecs not evaluated in 2.a. above, TIA 5050-2018 Receive Distortion and Noise Performance and Receive Acoustic Frequency Response Performance evaluations are not required; however, these codecs shall be assessed for conversational gain and documented in the test report at the 2N and 8N levels with a gain of ≥ 6 dB for all voice services, bands of operation and air interfaces over which they operate. The handset volume setting used to comply with 2.a. shall be used for these other CMRS codec evaluations.
   c. Any other codec for voice services embedded in the handset, not identified in 2.a. and 2.b. above, is not required to comply or demonstrate in the test reports for conversational gain.
3. All Volume Control measurements were performed with Max Volume-2 level.
4. Conversational Gain = (measured dBSPL Level – 70 dBSPL) dB
5. Through Internal radio configuration investigation (e.g. bandwidth, modulation data rate, subcarrier spacing, and resource blocks) that the worst radio configuration was document as below table.
6. Per KDB 285076 D05 and document of DA 23-914 item 30, the manufacturer only perform EVS codec to meet distortion/noise and frequency response tests at the 2N and 8N force levels.
7. The device have similar frequency in some LTE bands: LTE B12/17, B5/26, B4/66, B2/25, B38/41, since the supported frequency spans for the smaller LTE bands are completely cover by the larger LTE bands, therefore, only larger LTE bands were required to be tested for hearing-aid compliance.
8. The worst case results of each air interface include in appendix A.

   The 2N mounting force lowest conversational gain is 11.91 dB with a hearing aid.
   The 8N mounting force lowest conversational gain is 14.68 dB without a hearing aid.

<Evaluation results for KDB 285076 D05 2.a>

<LTE>

HAC (Volume control) Test Record									Receive Volume Control Performance					Receive Distortion and Noise Performance				Receive Acoustic requency Response Performance
Plot No.	Air Interface	BW (MHz)	Modulation / Mode	RB Size	RB offset	Channel	Audio Codec	Mounting Force (N)	Measured dBSPL Level	Conversational Gain (Measured dBSPL Level – 70 dBSPL) (dB)	Limit (dB)	Margin to Limit (dB)	PASS/FAIL	Minimum PN-SDNR (dB) Doc. Section	Limit (dB)	Margin to Limit (dB)	PASS/FAIL	Free Field (FF)
	LTE Band 7	20M	QPSK	1	0	21100	EVS NB 24.4kbps	2N	83.14	13.14	≥6	7.14	PASS	26.17	≥20	6.17	PASS	0.84
	LTE Band 7	20M	QPSK	1	0	21100	EVS NB 24.4kbps	8N	86.53	16.53	≥6	10.53	PASS	26.16	≥20	6.16	PASS	0.86
	LTE Band 7	20M	QPSK	1	0	21100	EVS WB 128kbps	2N	82.94	12.94	≥6	6.94	PASS	23.37	≥20	3.37	PASS	1.46
	LTE Band 7	20M	QPSK	1	0	21100	EVS WB 128kbps	8N	86.36	16.36	≥6	10.36	PASS	23.75	≥20	3.75	PASS	1.42
	LTE Band 12	10M	QPSK	1	0	23095	EVS NB 24.4kbps	2N	83.39	13.39	≥6	7.39	PASS	25.54	≥20	5.54	PASS	0.84
	LTE Band 12	10M	QPSK	1	0	23095	EVS NB 24.4kbps	8N	86.6	16.6	≥6	10.6	PASS	26.5	≥20	6.5	PASS	0.8
	LTE Band 12	10M	QPSK	1	0	23095	EVS WB 128kbps	2N	83.21	13.21	≥6	7.21	PASS	23.67	≥20	3.67	PASS	1.31
	LTE Band 12	10M	QPSK	1	0	23095	EVS WB 128kbps	8N	86.43	16.43	≥6	10.43	PASS	23.97	≥20	3.97	PASS	1.31
	LTE Band 13	10M	QPSK	1	0	23230	EVS NB 24.4kbps	2N	83.28	13.28	≥6	7.28	PASS	26.08	≥20	6.08	PASS	0.81
	LTE Band 13	10M	QPSK	1	0	23230	EVS NB 24.4kbps	8N	86.55	16.55	≥6	10.55	PASS	26.33	≥20	6.33	PASS	0.76
	LTE Band 13	10M	QPSK	1	0	23230	EVS WB 128kbps	2N	83.24	13.24	≥6	7.24	PASS	23.53	≥20	3.53	PASS	1.38
	LTE Band 13	10M	QPSK	1	0	23230	EVS WB 128kbps	8N	86.34	16.34	≥6	10.34	PASS	23.88	≥20	3.88	PASS	1.33
	LTE Band 25	20M	QPSK	1	0	26340	EVS NB 24.4kbps	2N	85.53	15.53	≥6	9.53	PASS	26.14	≥20	6.14	PASS	0.9
	LTE Band 25	20M	QPSK	1	0	26340	EVS NB 24.4kbps	8N	86.93	16.93	≥6	10.93	PASS	25.99	≥20	5.99	PASS	0.8
	LTE Band 25	20M	QPSK	1	0	26340	EVS WB 128kbps	2N	83.24	13.24	≥6	7.24	PASS	23.51	≥20	3.51	PASS	1.42
	LTE Band 25	20M	QPSK	1	0	26340	EVS WB 128kbps	8N	86.28	16.28	≥6	10.28	PASS	23.73	≥20	3.73	PASS	1.43
	LTE Band 26	15M	QPSK	1	0	26865	EVS NB 24.4kbps	2N	83.3	13.3	≥6	7.3	PASS	26.19	≥20	6.19	PASS	0.93
	LTE Band 26	15M	QPSK	1	0	26865	EVS NB 24.4kbps	8N	86.51	16.51	≥6	10.51	PASS	26.15	≥20	6.15	PASS	0.85
	LTE Band 26	15M	QPSK	1	0	26865	EVS WB 128kbps	2N	81.91	11.91	≥6	5.91	PASS	23.35	≥20	3.35	PASS	1.5
	LTE Band 26	15M	QPSK	1	0	26865	EVS WB 128kbps	8N	84.68	14.68	≥6	8.68	PASS	23.54	≥20	3.54	PASS	1.56
	LTE Band 30	10M	QPSK	1	0	27710	EVS NB 24.4kbps	2N	83.42	13.42	≥6	7.42	PASS	26.41	≥20	6.41	PASS	0.85
	LTE Band 30	10M	QPSK	1	0	27710	EVS NB 24.4kbps	8N	86.65	16.65	≥6	10.65	PASS	26.25	≥20	6.25	PASS	0.94
	LTE Band 30	10M	QPSK	1	0	27710	EVS WB 128kbps	2N	83.2	13.2	≥6	7.2	PASS	23.54	≥20	3.54	PASS	1.57
	LTE Band 30	10M	QPSK	1	0	27710	EVS WB 128kbps	8N	86.3	16.3	≥6	10.3	PASS	23.89	≥20	3.89	PASS	1.46
	LTE Band 66	20M	QPSK	1	0	132322	EVS NB 24.4kbps	2N	83.84	13.84	≥6	7.84	PASS	25.47	≥20	5.47	PASS	0.91
	LTE Band 66	20M	QPSK	1	0	132322	EVS NB 24.4kbps	8N	86.55	16.55	≥6	10.55	PASS	25.85	≥20	5.85	PASS	0.86
	LTE Band 66	20M	QPSK	1	0	132322	EVS WB 128kbps	2N	83.07	13.07	≥6	7.07	PASS	23.57	≥20	3.57	PASS	1.45
	LTE Band 66	20M	QPSK	1	0	132322	EVS WB 128kbps	8N	86.27	16.27	≥6	10.27	PASS	23.91	≥20	3.91	PASS	1.39
	LTE Band 71	20M	QPSK	1	0	133297	EVS NB 24.4kbps	2N	83.89	13.89	≥6	7.89	PASS	25.69	≥20	5.69	PASS	0.92
	LTE Band 71	20M	QPSK	1	0	133297	EVS NB 24.4kbps	8N	87.03	17.03	≥6	11.03	PASS	26.54	≥20	6.54	PASS	0.78
	LTE Band 71	20M	QPSK	1	0	133297	EVS WB 128kbps	2N	83.27	13.27	≥6	7.27	PASS	23.41	≥20	3.41	PASS	1.44
	LTE Band 71	20M	QPSK	1	0	133297	EVS WB 128kbps	8N	86.31	16.31	≥6	10.31	PASS	23.81	≥20	3.81	PASS	1.38
	LTE Band 41	20M	QPSK	1	0	40620	EVS NB 24.4kbps	2N	83.12	13.12	≥6	7.12	PASS	26.27	≥20	6.27	PASS	0.71
	LTE Band 41	20M	QPSK	1	0	40620	EVS NB 24.4kbps	8N	85.42	15.42	≥6	9.42	PASS	26.79	≥20	6.79	PASS	0.73
01	LTE Band 41	20M	QPSK	1	0	40620	EVS WB 128kbps	2N	82.57	12.57	≥6	6.57	PASS	**23.17**	≥20	3.17	PASS	1.45
02	LTE Band 41	20M	QPSK	1	0	40620	EVS WB 128kbps	8N	84.69	14.69	≥6	8.69	PASS	**23.53**	≥20	3.53	PASS	1.37
	LTE Band 48	20M	QPSK	1	0	55830	EVS NB 24.4kbps	2N	83.49	13.49	≥6	7.49	PASS	26.74	≥20	6.74	PASS	0.78
	LTE Band 48	20M	QPSK	1	0	55830	EVS NB 24.4kbps	8N	86.55	16.55	≥6	10.55	PASS	26.53	≥20	6.53	PASS	0.59
	LTE Band 48	20M	QPSK	1	0	55830	EVS WB 128kbps	2N	83.25	13.25	≥6	7.25	PASS	23.65	≥20	3.65	PASS	1.4
	LTE Band 48	20M	QPSK	1	0	55830	EVS WB 128kbps	8N	86.4	16.4	≥6	10.4	PASS	23.86	≥20	3.86	PASS	1.31

<WLAN>

HAC (Volume control) Test Record						Receive Volume Control Performance					Receive Distortion and Noise Performance				Receive Acoustic requency Response Performance
Plot No.	Air Interface	Modulation / Mode	Channel	Audio Codec	Mounting Force (N)	Measured dBSPL Level	Conversational Gain (Measured dBSPL Level – 70 dBSPL) (dB)	Limit (dB)	Margin to Limit (dB)	PASS/FAIL	Minimum PN-SDNR (dB) Doc. Section	Limit (dB)	Margin to Limit (dB)	PASS/FAIL	Free Field (FF)
	WLAN2.4GHz	802.11b 1Mbps	6	EVS NB 24.4kbps	2N	82.34	12.34	≥6	6.34	PASS	27.5	≥20	7.5	PASS	1.62
	WLAN2.4GHz	802.11b 1Mbps	6	EVS NB 24.4kbps	8N	85.57	15.57	≥6	9.57	PASS	26.09	≥20	6.09	PASS	1.72
03	WLAN2.4GHz	802.11b 1Mbps	6	EVS WB 128kbps	2N	82.82	12.82	≥6	6.82	PASS	**21.59**	≥20	1.59	PASS	1.41
	WLAN2.4GHz	802.11b 1Mbps	6	EVS WB 128kbps	8N	86	16	≥6	10	PASS	27.24	≥20	7.24	PASS	1.34
	WLAN5GHz	802.11a 6Mbps	40	EVS NB 24.4kbps	2N	82.49	12.49	≥6	6.49	PASS	27.25	≥20	7.25	PASS	1.53
	WLAN5GHz	802.11a 6Mbps	40	EVS NB 24.4kbps	8N	85.64	15.64	≥6	9.64	PASS	27.59	≥20	7.59	PASS	1.47
	WLAN5GHz	802.11a 6Mbps	40	EVS WB 128kbps	2N	82.51	12.51	≥6	6.51	PASS	26.26	≥20	6.26	PASS	1.54
	WLAN5GHz	802.11a 6Mbps	40	EVS WB 128kbps	8N	85.84	15.84	≥6	9.84	PASS	27.54	≥20	7.54	PASS	1.53
	WLAN5GHz	802.11a 6Mbps	60	EVS NB 24.4kbps	2N	82.6	12.6	≥6	6.6	PASS	27.51	≥20	7.51	PASS	1.55
	WLAN5GHz	802.11a 6Mbps	60	EVS NB 24.4kbps	8N	85.86	15.86	≥6	9.86	PASS	26.07	≥20	6.07	PASS	1.63
	WLAN5GHz	802.11a 6Mbps	60	EVS WB 128kbps	2N	82.37	12.37	≥6	6.37	PASS	27.5	≥20	7.5	PASS	1.51
	WLAN5GHz	802.11a 6Mbps	60	EVS WB 128kbps	8N	86.03	16.03	≥6	10.03	PASS	27.46	≥20	7.46	PASS	1.52
	WLAN5GHz	802.11a 6Mbps	116	EVS NB 24.4kbps	2N	82.76	12.76	≥6	6.76	PASS	27.57	≥20	7.57	PASS	1.68
	WLAN5GHz	802.11a 6Mbps	116	EVS NB 24.4kbps	8N	86.13	16.13	≥6	10.13	PASS	26.29	≥20	6.29	PASS	1.74
	WLAN5GHz	802.11a 6Mbps	116	EVS WB 128kbps	2N	82.49	12.49	≥6	6.49	PASS	27.71	≥20	7.71	PASS	1.83
	WLAN5GHz	802.11a 6Mbps	116	EVS WB 128kbps	8N	86.37	16.37	≥6	10.37	PASS	27.67	≥20	7.67	PASS	1.62
	WLAN5GHz	802.11a 6Mbps	157	EVS NB 24.4kbps	2N	82.75	12.75	≥6	6.75	PASS	27.84	≥20	7.84	PASS	1.8
	WLAN5GHz	802.11a 6Mbps	157	EVS NB 24.4kbps	8N	86	16	≥6	10	PASS	26.25	≥20	6.25	PASS	1.72
	WLAN5GHz	802.11a 6Mbps	157	EVS WB 128kbps	2N	82.61	12.61	≥6	6.61	PASS	27.82	≥20	7.82	PASS	1.71
	WLAN5GHz	802.11a 6Mbps	157	EVS WB 128kbps	8N	86.11	16.11	≥6	10.11	PASS	27.59	≥20	7.59	PASS	1.69

<Codec Investigation and Evaluation results for KDB 285076 D05 2.b>

<GSM>

HAC (Volume control) Test Record						Receive Volume Control Performance				
Plot No.	Air Interface	Modulation / Mode	Channel	Audio Codec	Mounting Force (N)	Measured dBSPL Level	Conversational Gain (Measured dBSPL Level – 70 dBSPL) (dB)	Limit (dB)	Margin to Limit (dB)	PASS/FAIL
	GSM850	GSM Voice	189	EFR NB 12.2Kbps	2N	86.49	16.49	≥6	10.49	PASS
	GSM850	GSM Voice	189	EFR NB 12.2Kbps	8N	90.03	20.03	≥6	14.03	PASS
	GSM850	GSM Voice	189	AMR NB 4.75kbps	2N	85.23	15.23	≥6	9.23	PASS
	GSM850	GSM Voice	189	AMR NB 4.75kbps	8N	88.8	18.8	≥6	12.8	PASS
	GSM850	GSM Voice	189	AMR NB 12.2kbps	2N	86.25	16.25	≥6	10.25	PASS
	GSM850	GSM Voice	189	AMR NB 12.2kbps	8N	89.59	19.59	≥6	13.59	PASS
04	GSM850	GSM Voice	189	AMR WB 6.60kbps	2N	84.49	**14.49**	≥6	8.49	PASS
	GSM850	GSM Voice	189	AMR WB 6.60kbps	8N	87.55	17.55	≥6	11.55	PASS
	GSM850	GSM Voice	189	AMR WB 12.65kbps	2N	84.94	14.94	≥6	8.94	PASS
	GSM850	GSM Voice	189	AMR WB 12.65kbps	8N	88.34	18.34	≥6	12.34	PASS
	GSM1900	GSM Voice	661	EFR NB 12.2Kbps	2N	86.65	16.65	≥6	10.65	PASS
	GSM1900	GSM Voice	661	EFR NB 12.2Kbps	8N	90.04	20.04	≥6	14.04	PASS
	GSM1900	GSM Voice	661	AMR NB 4.75kbps	2N	85.33	15.33	≥6	9.33	PASS
	GSM1900	GSM Voice	661	AMR NB 4.75kbps	8N	88.95	18.95	≥6	12.95	PASS
	GSM1900	GSM Voice	661	AMR NB 12.2kbps	2N	86.33	16.33	≥6	10.33	PASS
	GSM1900	GSM Voice	661	AMR NB 12.2kbps	8N	89.63	19.63	≥6	13.63	PASS
	GSM1900	GSM Voice	661	AMR WB 6.60kbps	2N	84.55	14.55	≥6	8.55	PASS
	GSM1900	GSM Voice	661	AMR WB 6.60kbps	8N	87.62	17.62	≥6	11.62	PASS
	GSM1900	GSM Voice	661	AMR WB 12.65kbps	2N	84.99	14.99	≥6	8.99	PASS
	GSM1900	GSM Voice	661	AMR WB 12.65kbps	8N	88.45	18.45	≥6	12.45	PASS

<UMTS>

HAC (Volume control) Test Record						Receive Volume Control Performance				
Plot No.	Air Interface	Modulation / Mode	Channel	Audio Codec	Mounting Force (N)	Measured dBSPL Level	Conversational Gain (Measured dBSPL Level – 70 dBSPL) (dB)	Limit (dB)	Margin to Limit (dB)	PASS/FAIL
	WCDMA II	Voice	9400	AMR NB 4.75kbps	2N	85.79	15.79	≥6	9.79	PASS
	WCDMA II	Voice	9400	AMR NB 4.75kbps	8N	88.97	18.97	≥6	12.97	PASS
	WCDMA II	Voice	9400	AMR NB 12.2kbps	2N	86.32	16.32	≥6	10.32	PASS
	WCDMA II	Voice	9400	AMR NB 12.2kbps	8N	89.5	19.5	≥6	13.5	PASS
05	WCDMA II	Voice	9400	AMR WB 6.60kbps	2N	84.66	**14.66**	≥6	8.66	PASS
	WCDMA II	Voice	9400	AMR WB 6.60kbps	8N	87.82	17.82	≥6	11.82	PASS
	WCDMA II	Voice	9400	AMR WB 23.85kbps	2N	84.95	14.95	≥6	8.95	PASS
	WCDMA II	Voice	9400	AMR WB 23.85kbps	8N	88.09	18.09	≥6	12.09	PASS
	WCDMA IV	Voice	1413	AMR NB 4.75kbps	2N	85.88	15.88	≥6	9.88	PASS
	WCDMA IV	Voice	1413	AMR NB 4.75kbps	8N	88.99	18.99	≥6	12.99	PASS
	WCDMA IV	Voice	1413	AMR NB 12.2kbps	2N	86.52	16.52	≥6	10.52	PASS
	WCDMA IV	Voice	1413	AMR NB 12.2kbps	8N	89.63	19.63	≥6	13.63	PASS
	WCDMA IV	Voice	1413	AMR WB 6.60kbps	2N	84.72	14.72	≥6	8.72	PASS
	WCDMA IV	Voice	1413	AMR WB 6.60kbps	8N	87.85	17.85	≥6	11.85	PASS
	WCDMA IV	Voice	1413	AMR WB 23.85kbps	2N	84.96	14.96	≥6	8.96	PASS
	WCDMA IV	Voice	1413	AMR WB 23.85kbps	8N	88.12	18.12	≥6	12.12	PASS
	WCDMA V	Voice	4182	AMR NB 4.75kbps	2N	85.89	15.89	≥6	9.89	PASS
	WCDMA V	Voice	4182	AMR NB 4.75kbps	8N	89.03	19.03	≥6	13.03	PASS
	WCDMA V	Voice	4182	AMR NB 12.2kbps	2N	86.54	16.54	≥6	10.54	PASS
	WCDMA V	Voice	4182	AMR NB 12.2kbps	8N	89.66	19.66	≥6	13.66	PASS
	WCDMA V	Voice	4182	AMR WB 6.60kbps	2N	84.75	14.75	≥6	8.75	PASS
	WCDMA V	Voice	4182	AMR WB 6.60kbps	8N	87.99	17.99	≥6	11.99	PASS
	WCDMA V	Voice	4182	AMR WB 23.85kbps	2N	84.99	14.99	≥6	8.99	PASS
	WCDMA V	Voice	4182	AMR WB 23.85kbps	8N	88.16	18.16	≥6	12.16	PASS

<LTE>

HAC (Volume control) Test Record									Receive Volume Control Performance				
Plot No.	Air Interface	BW (MHz)	Modulation / Mode	RB Size	RB offset	Channel	Audio Codec	Mounting Force (N)	Measured dBSPL Level	Conversational Gain (Measured dBSPL Level – 70 dBSPL) (dB)	Limit (dB)	Margin to Limit (dB)	PASS/FAIL
	LTE Band 7	20M	QPSK	1	0	21100	AMR NB 4.75kbps	2N	83	13	≥6	7	PASS
	LTE Band 7	20M	QPSK	1	0	21100	AMR NB 4.75kbps	8N	86.59	16.59	≥6	10.59	PASS
	LTE Band 7	20M	QPSK	1	0	21100	AMR NB 12.2kbps	2N	83.21	13.21	≥6	7.21	PASS
	LTE Band 7	20M	QPSK	1	0	21100	AMR NB 12.2kbps	8N	86.46	16.46	≥6	10.46	PASS
	LTE Band 7	20M	QPSK	1	0	21100	AMR WB 6.60kbps	2N	83.24	13.24	≥6	7.24	PASS
	LTE Band 7	20M	QPSK	1	0	21100	AMR WB 6.60kbps	8N	86.69	16.69	≥6	10.69	PASS
	LTE Band 7	20M	QPSK	1	0	21100	AMR WB 23.85kbps	2N	83	13	≥6	7	PASS
	LTE Band 7	20M	QPSK	1	0	21100	AMR WB 23.85kbps	8N	86.5	16.5	≥6	10.5	PASS
	LTE Band 7	20M	QPSK	1	0	21100	EVS NB 5.9kbps	2N	83.06	13.06	≥6	7.06	PASS
	LTE Band 7	20M	QPSK	1	0	21100	EVS NB 5.9kbps	8N	86.43	16.43	≥6	10.43	PASS
	LTE Band 7	20M	QPSK	1	0	21100	EVS NB 24.4kbps	2N	83.14	13.14	≥6	7.14	PASS
	LTE Band 7	20M	QPSK	1	0	21100	EVS NB 24.4kbps	8N	86.53	16.53	≥6	10.53	PASS
	LTE Band 7	20M	QPSK	1	0	21100	EVS WB 5.9kbps	2N	83.21	13.21	≥6	7.21	PASS
	LTE Band 7	20M	QPSK	1	0	21100	EVS WB 5.9kbps	8N	86.58	16.58	≥6	10.58	PASS
	LTE Band 7	20M	QPSK	1	0	21100	EVS WB 128kbps	2N	82.94	12.94	≥6	6.94	PASS
	LTE Band 7	20M	QPSK	1	0	21100	EVS WB 128kbps	8N	86.36	16.36	≥6	10.36	PASS
	LTE Band 7	20M	QPSK	1	0	21100	EVS SWB 9.6kbps	2N	83.03	13.03	≥6	7.03	PASS
	LTE Band 7	20M	QPSK	1	0	21100	EVS SWB 9.6kbps	8N	86.59	16.59	≥6	10.59	PASS
	LTE Band 7	20M	QPSK	1	0	21100	EVS SWB 128kbps	2N	83.15	13.15	≥6	7.15	PASS
	LTE Band 7	20M	QPSK	1	0	21100	EVS SWB 128kbps	8N	86.46	16.46	≥6	10.46	PASS
	LTE Band 12	10M	QPSK	1	0	23095	AMR NB 4.75kbps	2N	83.5	13.5	≥6	7.5	PASS
	LTE Band 12	10M	QPSK	1	0	23095	AMR NB 4.75kbps	8N	86.52	16.52	≥6	10.52	PASS
	LTE Band 12	10M	QPSK	1	0	23095	AMR NB 12.2kbps	2N	83.4	13.4	≥6	7.4	PASS
	LTE Band 12	10M	QPSK	1	0	23095	AMR NB 12.2kbps	8N	86.63	16.63	≥6	10.63	PASS
	LTE Band 12	10M	QPSK	1	0	23095	AMR WB 6.60kbps	2N	83.4	13.4	≥6	7.4	PASS
	LTE Band 12	10M	QPSK	1	0	23095	AMR WB 6.60kbps	8N	86.75	16.75	≥6	10.75	PASS
	LTE Band 12	10M	QPSK	1	0	23095	AMR WB 23.85kbps	2N	83.31	13.31	≥6	7.31	PASS
	LTE Band 12	10M	QPSK	1	0	23095	AMR WB 23.85kbps	8N	86.75	16.75	≥6	10.75	PASS
	LTE Band 12	10M	QPSK	1	0	23095	EVS NB 5.9kbps	2N	83.39	13.39	≥6	7.39	PASS
	LTE Band 12	10M	QPSK	1	0	23095	EVS NB 5.9kbps	8N	86.71	16.71	≥6	10.71	PASS
	LTE Band 12	10M	QPSK	1	0	23095	EVS NB 24.4kbps	2N	83.39	13.39	≥6	7.39	PASS
	LTE Band 12	10M	QPSK	1	0	23095	EVS NB 24.4kbps	8N	86.6	16.6	≥6	10.6	PASS
	LTE Band 12	10M	QPSK	1	0	23095	EVS WB 5.9kbps	2N	83.52	13.52	≥6	7.52	PASS
	LTE Band 12	10M	QPSK	1	0	23095	EVS WB 5.9kbps	8N	86.5	16.5	≥6	10.5	PASS
	LTE Band 12	10M	QPSK	1	0	23095	EVS WB 128kbps	2N	83.21	13.21	≥6	7.21	PASS
	LTE Band 12	10M	QPSK	1	0	23095	EVS WB 128kbps	8N	86.43	16.43	≥6	10.43	PASS
	LTE Band 12	10M	QPSK	1	0	23095	EVS SWB 9.6kbps	2N	83.47	13.47	≥6	7.47	PASS
	LTE Band 12	10M	QPSK	1	0	23095	EVS SWB 9.6kbps	8N	86.53	16.53	≥6	10.53	PASS
	LTE Band 12	10M	QPSK	1	0	23095	EVS SWB 128kbps	2N	83.34	13.34	≥6	7.34	PASS
	LTE Band 12	10M	QPSK	1	0	23095	EVS SWB 128kbps	8N	86.7	16.7	≥6	10.7	PASS
	LTE Band 13	10M	QPSK	1	0	23230	AMR NB 4.75kbps	2N	83.49	13.49	≥6	7.49	PASS
	LTE Band 13	10M	QPSK	1	0	23230	AMR NB 4.75kbps	8N	86.49	16.49	≥6	10.49	PASS
	LTE Band 13	10M	QPSK	1	0	23230	AMR NB 12.2kbps	2N	83.43	13.43	≥6	7.43	PASS
	LTE Band 13	10M	QPSK	1	0	23230	AMR NB 12.2kbps	8N	86.49	16.49	≥6	10.49	PASS
	LTE Band 13	10M	QPSK	1	0	23230	AMR WB 6.60kbps	2N	83.57	13.57	≥6	7.57	PASS
	LTE Band 13	10M	QPSK	1	0	23230	AMR WB 6.60kbps	8N	86.47	16.47	≥6	10.47	PASS
	LTE Band 13	10M	QPSK	1	0	23230	AMR WB 23.85kbps	2N	83.53	13.53	≥6	7.53	PASS
	LTE Band 13	10M	QPSK	1	0	23230	AMR WB 23.85kbps	8N	86.43	16.43	≥6	10.43	PASS
	LTE Band 13	10M	QPSK	1	0	23230	EVS NB 5.9kbps	2N	83.3	13.3	≥6	7.3	PASS
	LTE Band 13	10M	QPSK	1	0	23230	EVS NB 5.9kbps	8N	86.67	16.67	≥6	10.67	PASS

	LTE Band 13	10M	QPSK	1	0	23230	EVS NB 24.4kbps	2N	83.28	13.28	≥6	7.28	PASS
	LTE Band 13	10M	QPSK	1	0	23230	EVS NB 24.4kbps	8N	86.55	16.55	≥6	10.55	PASS
	LTE Band 13	10M	QPSK	1	0	23230	EVS WB 5.9kbps	2N	83.55	13.55	≥6	7.55	PASS
	LTE Band 13	10M	QPSK	1	0	23230	EVS WB 5.9kbps	8N	86.56	16.56	≥6	10.56	PASS
	LTE Band 13	10M	QPSK	1	0	23230	EVS WB 128kbps	2N	83.24	13.24	≥6	7.24	PASS
	LTE Band 13	10M	QPSK	1	0	23230	EVS WB 128kbps	8N	86.34	16.34	≥6	10.34	PASS
	LTE Band 13	10M	QPSK	1	0	23230	EVS SWB 9.6kbps	2N	83.38	13.38	≥6	7.38	PASS
	LTE Band 13	10M	QPSK	1	0	23230	EVS SWB 9.6kbps	8N	86.51	16.51	≥6	10.51	PASS
	LTE Band 13	10M	QPSK	1	0	23230	EVS SWB 128kbps	2N	83.49	13.49	≥6	7.49	PASS
	LTE Band 13	10M	QPSK	1	0	23230	EVS SWB 128kbps	8N	86.58	16.58	≥6	10.58	PASS
	LTE Band 25	20M	QPSK	1	0	26340	AMR NB 4.75kbps	2N	85.69	15.69	≥6	9.69	PASS
	LTE Band 25	20M	QPSK	1	0	26340	AMR NB 4.75kbps	8N	87.11	17.11	≥6	11.11	PASS
	LTE Band 25	20M	QPSK	1	0	26340	AMR NB 12.2kbps	2N	85.79	15.79	≥6	9.79	PASS
	LTE Band 25	20M	QPSK	1	0	26340	AMR NB 12.2kbps	8N	87.02	17.02	≥6	11.02	PASS
	LTE Band 25	20M	QPSK	1	0	26340	AMR WB 6.60kbps	2N	83.42	13.42	≥6	7.42	PASS
	LTE Band 25	20M	QPSK	1	0	26340	AMR WB 6.60kbps	8N	86.36	16.36	≥6	10.36	PASS
	LTE Band 25	20M	QPSK	1	0	26340	AMR WB 23.85kbps	2N	83.5	13.5	≥6	7.5	PASS
	LTE Band 25	20M	QPSK	1	0	26340	AMR WB 23.85kbps	8N	86.49	16.49	≥6	10.49	PASS
	LTE Band 25	20M	QPSK	1	0	26340	EVS NB 5.9kbps	2N	85.86	15.86	≥6	9.86	PASS
	LTE Band 25	20M	QPSK	1	0	26340	EVS NB 5.9kbps	8N	86.98	16.98	≥6	10.98	PASS
	LTE Band 25	20M	QPSK	1	0	26340	EVS NB 24.4kbps	2N	85.53	15.53	≥6	9.53	PASS
	LTE Band 25	20M	QPSK	1	0	26340	EVS NB 24.4kbps	8N	86.93	16.93	≥6	10.93	PASS
	LTE Band 25	20M	QPSK	1	0	26340	EVS WB 5.9kbps	2N	83.33	13.33	≥6	7.33	PASS
	LTE Band 25	20M	QPSK	1	0	26340	EVS WB 5.9kbps	8N	86.46	16.46	≥6	10.46	PASS
	LTE Band 25	20M	QPSK	1	0	26340	EVS WB 128kbps	2N	83.24	13.24	≥6	7.24	PASS
	LTE Band 25	20M	QPSK	1	0	26340	EVS WB 128kbps	8N	86.28	16.28	≥6	10.28	PASS
	LTE Band 25	20M	QPSK	1	0	26340	EVS SWB 9.6kbps	2N	83.54	13.54	≥6	7.54	PASS
	LTE Band 25	20M	QPSK	1	0	26340	EVS SWB 9.6kbps	8N	86.57	16.57	≥6	10.57	PASS
	LTE Band 25	20M	QPSK	1	0	26340	EVS SWB 128kbps	2N	83.53	13.53	≥6	7.53	PASS
	LTE Band 25	20M	QPSK	1	0	26340	EVS SWB 128kbps	8N	86.55	16.55	≥6	10.55	PASS
	LTE Band 26	15M	QPSK	1	0	26865	AMR NB 4.75kbps	2N	83.46	13.46	≥6	7.46	PASS
	LTE Band 26	15M	QPSK	1	0	26865	AMR NB 4.75kbps	8N	86.65	16.65	≥6	10.65	PASS
	LTE Band 26	15M	QPSK	1	0	26865	AMR NB 12.2kbps	2N	83.43	13.43	≥6	7.43	PASS
	LTE Band 26	15M	QPSK	1	0	26865	AMR NB 12.2kbps	8N	86.7	16.7	≥6	10.7	PASS
	LTE Band 26	15M	QPSK	1	0	26865	AMR WB 6.60kbps	2N	82.12	12.12	≥6	6.12	PASS
	LTE Band 26	15M	QPSK	1	0	26865	AMR WB 6.60kbps	8N	85.02	15.02	≥6	9.02	PASS
	LTE Band 26	15M	QPSK	1	0	26865	AMR WB 23.85kbps	2N	82.14	12.14	≥6	6.14	PASS
	LTE Band 26	15M	QPSK	1	0	26865	AMR WB 23.85kbps	8N	84.77	14.77	≥6	8.77	PASS
	LTE Band 26	15M	QPSK	1	0	26865	EVS NB 5.9kbps	2N	83.52	13.52	≥6	7.52	PASS
	LTE Band 26	15M	QPSK	1	0	26865	EVS NB 5.9kbps	8N	86.67	16.67	≥6	10.67	PASS
	LTE Band 26	15M	QPSK	1	0	26865	EVS NB 24.4kbps	2N	83.3	13.3	≥6	7.3	PASS
	LTE Band 26	15M	QPSK	1	0	26865	EVS NB 24.4kbps	8N	86.51	16.51	≥6	10.51	PASS
	LTE Band 26	15M	QPSK	1	0	26865	EVS WB 5.9kbps	2N	81.96	11.96	≥6	5.96	PASS
	LTE Band 26	15M	QPSK	1	0	26865	EVS WB 5.9kbps	8N	84.79	14.79	≥6	8.79	PASS
06	LTE Band 26	15M	QPSK	1	0	26865	EVS WB 128kbps	2N	81.91	**11.91**	≥6	5.91	PASS
07	LTE Band 26	15M	QPSK	1	0	26865	EVS WB 128kbps	8N	84.68	**14.68**	≥6	8.68	PASS
	LTE Band 26	15M	QPSK	1	0	26865	EVS SWB 9.6kbps	2N	82.15	12.15	≥6	6.15	PASS
	LTE Band 26	15M	QPSK	1	0	26865	EVS SWB 9.6kbps	8N	84.84	14.84	≥6	8.84	PASS
	LTE Band 26	15M	QPSK	1	0	26865	EVS SWB 128kbps	2N	81.96	11.96	≥6	5.96	PASS
	LTE Band 26	15M	QPSK	1	0	26865	EVS SWB 128kbps	8N	84.95	14.95	≥6	8.95	PASS
	LTE Band 30	10M	QPSK	1	0	27710	AMR NB 4.75kbps	2N	83.29	13.29	≥6	7.29	PASS
	LTE Band 30	10M	QPSK	1	0	27710	AMR NB 4.75kbps	8N	86.39	16.39	≥6	10.39	PASS
	LTE Band 30	10M	QPSK	1	0	27710	AMR NB 12.2kbps	2N	83.44	13.44	≥6	7.44	PASS
	LTE Band 30	10M	QPSK	1	0	27710	AMR NB 12.2kbps	8N	86.41	16.41	≥6	10.41	PASS
	LTE Band 30	10M	QPSK	1	0	27710	AMR WB 6.60kbps	2N	83.54	13.54	≥6	7.54	PASS
	LTE Band 30	10M	QPSK	1	0	27710	AMR WB 6.60kbps	8N	86.48	16.48	≥6	10.48	PASS

	LTE Band 30	10M	QPSK	1	0	27710	AMR WB 23.85kbps	2N	83.33	13.33	≥6	7.33	PASS
	LTE Band 30	10M	QPSK	1	0	27710	AMR WB 23.85kbps	8N	86.63	16.63	≥6	10.63	PASS
	LTE Band 30	10M	QPSK	1	0	27710	EVS NB 5.9kbps	2N	83.29	13.29	≥6	7.29	PASS
	LTE Band 30	10M	QPSK	1	0	27710	EVS NB 5.9kbps	8N	86.4	16.4	≥6	10.4	PASS
	LTE Band 30	10M	QPSK	1	0	27710	EVS NB 24.4kbps	2N	83.42	13.42	≥6	7.42	PASS
	LTE Band 30	10M	QPSK	1	0	27710	EVS NB 24.4kbps	8N	86.65	16.65	≥6	10.65	PASS
	LTE Band 30	10M	QPSK	1	0	27710	EVS WB 5.9kbps	2N	83.55	13.55	≥6	7.55	PASS
	LTE Band 30	10M	QPSK	1	0	27710	EVS WB 5.9kbps	8N	86.52	16.52	≥6	10.52	PASS
	LTE Band 30	10M	QPSK	1	0	27710	EVS WB 128kbps	2N	83.2	13.2	≥6	7.2	PASS
	LTE Band 30	10M	QPSK	1	0	27710	EVS WB 128kbps	8N	86.3	16.3	≥6	10.3	PASS
	LTE Band 30	10M	QPSK	1	0	27710	EVS SWB 9.6kbps	2N	83.35	13.35	≥6	7.35	PASS
	LTE Band 30	10M	QPSK	1	0	27710	EVS SWB 9.6kbps	8N	86.51	16.51	≥6	10.51	PASS
	LTE Band 30	10M	QPSK	1	0	27710	EVS SWB 128kbps	2N	83.41	13.41	≥6	7.41	PASS
	LTE Band 30	10M	QPSK	1	0	27710	EVS SWB 128kbps	8N	86.37	16.37	≥6	10.37	PASS
	LTE Band 66	20M	QPSK	1	0	132322	AMR NB 4.75kbps	2N	83.15	13.15	≥6	7.15	PASS
	LTE Band 66	20M	QPSK	1	0	132322	AMR NB 4.75kbps	8N	86.34	16.34	≥6	10.34	PASS
	LTE Band 66	20M	QPSK	1	0	132322	AMR NB 12.2kbps	2N	83.42	13.42	≥6	7.42	PASS
	LTE Band 66	20M	QPSK	1	0	132322	AMR NB 12.2kbps	8N	86.49	16.49	≥6	10.49	PASS
	LTE Band 66	20M	QPSK	1	0	132322	AMR WB 6.60kbps	2N	83.26	13.26	≥6	7.26	PASS
	LTE Band 66	20M	QPSK	1	0	132322	AMR WB 6.60kbps	8N	86.33	16.33	≥6	10.33	PASS
	LTE Band 66	20M	QPSK	1	0	132322	AMR WB 23.85kbps	2N	83.35	13.35	≥6	7.35	PASS
	LTE Band 66	20M	QPSK	1	0	132322	AMR WB 23.85kbps	8N	86.38	16.38	≥6	10.38	PASS
	LTE Band 66	20M	QPSK	1	0	132322	EVS NB 5.9kbps	2N	83.33	13.33	≥6	7.33	PASS
	LTE Band 66	20M	QPSK	1	0	132322	EVS NB 5.9kbps	8N	86.56	16.56	≥6	10.56	PASS
	LTE Band 66	20M	QPSK	1	0	132322	EVS NB 24.4kbps	2N	83.84	13.84	≥6	7.84	PASS
	LTE Band 66	20M	QPSK	1	0	132322	EVS NB 24.4kbps	8N	86.55	16.55	≥6	10.55	PASS
	LTE Band 66	20M	QPSK	1	0	132322	EVS WB 5.9kbps	2N	83.18	13.18	≥6	7.18	PASS
	LTE Band 66	20M	QPSK	1	0	132322	EVS WB 5.9kbps	8N	86.49	16.49	≥6	10.49	PASS
	LTE Band 66	20M	QPSK	1	0	132322	EVS WB 128kbps	2N	83.07	13.07	≥6	7.07	PASS
	LTE Band 66	20M	QPSK	1	0	132322	EVS WB 128kbps	8N	86.27	16.27	≥6	10.27	PASS
	LTE Band 66	20M	QPSK	1	0	132322	EVS SWB 9.6kbps	2N	83.2	13.2	≥6	7.2	PASS
	LTE Band 66	20M	QPSK	1	0	132322	EVS SWB 9.6kbps	8N	86.43	16.43	≥6	10.43	PASS
	LTE Band 66	20M	QPSK	1	0	132322	EVS SWB 128kbps	2N	83.39	13.39	≥6	7.39	PASS
	LTE Band 66	20M	QPSK	1	0	132322	EVS SWB 128kbps	8N	86.54	16.54	≥6	10.54	PASS
	LTE Band 71	20M	QPSK	1	0	133297	AMR NB 4.75kbps	2N	83.62	13.62	≥6	7.62	PASS
	LTE Band 71	20M	QPSK	1	0	133297	AMR NB 4.75kbps	8N	86.6	16.6	≥6	10.6	PASS
	LTE Band 71	20M	QPSK	1	0	133297	AMR NB 12.2kbps	2N	83.58	13.58	≥6	7.58	PASS
	LTE Band 71	20M	QPSK	1	0	133297	AMR NB 12.2kbps	8N	86.54	16.54	≥6	10.54	PASS
	LTE Band 71	20M	QPSK	1	0	133297	AMR WB 6.60kbps	2N	83.42	13.42	≥6	7.42	PASS
	LTE Band 71	20M	QPSK	1	0	133297	AMR WB 6.60kbps	8N	86.57	16.57	≥6	10.57	PASS
	LTE Band 71	20M	QPSK	1	0	133297	AMR WB 23.85kbps	2N	83.44	13.44	≥6	7.44	PASS
	LTE Band 71	20M	QPSK	1	0	133297	AMR WB 23.85kbps	8N	86.42	16.42	≥6	10.42	PASS
	LTE Band 71	20M	QPSK	1	0	133297	EVS NB 5.9kbps	2N	83.43	13.43	≥6	7.43	PASS
	LTE Band 71	20M	QPSK	1	0	133297	EVS NB 5.9kbps	8N	86.4	16.4	≥6	10.4	PASS
	LTE Band 71	20M	QPSK	1	0	133297	EVS NB 24.4kbps	2N	83.89	13.89	≥6	7.89	PASS
	LTE Band 71	20M	QPSK	1	0	133297	EVS NB 24.4kbps	8N	87.03	17.03	≥6	11.03	PASS
	LTE Band 71	20M	QPSK	1	0	133297	EVS WB 5.9kbps	2N	83.51	13.51	≥6	7.51	PASS
	LTE Band 71	20M	QPSK	1	0	133297	EVS WB 5.9kbps	8N	86.65	16.65	≥6	10.65	PASS
	LTE Band 71	20M	QPSK	1	0	133297	EVS WB 128kbps	2N	83.27	13.27	≥6	7.27	PASS
	LTE Band 71	20M	QPSK	1	0	133297	EVS WB 128kbps	8N	86.31	16.31	≥6	10.31	PASS
	LTE Band 71	20M	QPSK	1	0	133297	EVS SWB 9.6kbps	2N	83.54	13.54	≥6	7.54	PASS
	LTE Band 71	20M	QPSK	1	0	133297	EVS SWB 9.6kbps	8N	86.62	16.62	≥6	10.62	PASS
	LTE Band 71	20M	QPSK	1	0	133297	EVS SWB 128kbps	2N	83.37	13.37	≥6	7.37	PASS
	LTE Band 71	20M	QPSK	1	0	133297	EVS SWB 128kbps	8N	86.38	16.38	≥6	10.38	PASS
	LTE Band 41	20M	QPSK	1	0	40620	AMR NB 4.75kbps	2N	83.19	13.19	≥6	7.19	PASS
	LTE Band 41	20M	QPSK	1	0	40620	AMR NB 4.75kbps	8N	85.73	15.73	≥6	9.73	PASS

	LTE Band 41	20M	QPSK	1	0	40620	AMR NB 12.2kbps	2N	83.35	13.35	≥6	7.35	PASS
	LTE Band 41	20M	QPSK	1	0	40620	AMR NB 12.2kbps	8N	85.68	15.68	≥6	9.68	PASS
	LTE Band 41	20M	QPSK	1	0	40620	AMR WB 6.60kbps	2N	82.8	12.8	≥6	6.8	PASS
	LTE Band 41	20M	QPSK	1	0	40620	AMR WB 6.60kbps	8N	84.88	14.88	≥6	8.88	PASS
	LTE Band 41	20M	QPSK	1	0	40620	AMR WB 23.85kbps	2N	82.68	12.68	≥6	6.68	PASS
	LTE Band 41	20M	QPSK	1	0	40620	AMR WB 23.85kbps	8N	85.04	15.04	≥6	9.04	PASS
	LTE Band 41	20M	QPSK	1	0	40620	EVS NB 5.9kbps	2N	83.27	13.27	≥6	7.27	PASS
	LTE Band 41	20M	QPSK	1	0	40620	EVS NB 5.9kbps	8N	85.56	15.56	≥6	9.56	PASS
	LTE Band 41	20M	QPSK	1	0	40620	EVS NB 24.4kbps	2N	83.12	13.12	≥6	7.12	PASS
	LTE Band 41	20M	QPSK	1	0	40620	EVS NB 24.4kbps	8N	85.42	15.42	≥6	9.42	PASS
	LTE Band 41	20M	QPSK	1	0	40620	EVS WB 5.9kbps	2N	82.65	12.65	≥6	6.65	PASS
	LTE Band 41	20M	QPSK	1	0	40620	EVS WB 5.9kbps	8N	84.92	14.92	≥6	8.92	PASS
	LTE Band 41	20M	QPSK	1	0	40620	EVS WB 128kbps	2N	82.57	12.57	≥6	6.57	PASS
	LTE Band 41	20M	QPSK	1	0	40620	EVS WB 128kbps	8N	84.69	14.69	≥6	8.69	PASS
	LTE Band 41	20M	QPSK	1	0	40620	EVS SWB 9.6kbps	2N	82.64	12.64	≥6	6.64	PASS
	LTE Band 41	20M	QPSK	1	0	40620	EVS SWB 9.6kbps	8N	84.84	14.84	≥6	8.84	PASS
	LTE Band 41	20M	QPSK	1	0	40620	EVS SWB 128kbps	2N	82.75	12.75	≥6	6.75	PASS
	LTE Band 41	20M	QPSK	1	0	40620	EVS SWB 128kbps	8N	84.87	14.87	≥6	8.87	PASS
	LTE Band 48	20M	QPSK	1	0	55830	AMR NB 4.75kbps	2N	83.38	13.38	≥6	7.38	PASS
	LTE Band 48	20M	QPSK	1	0	55830	AMR NB 4.75kbps	8N	86.68	16.68	≥6	10.68	PASS
	LTE Band 48	20M	QPSK	1	0	55830	AMR NB 12.2kbps	2N	83.58	13.58	≥6	7.58	PASS
	LTE Band 48	20M	QPSK	1	0	55830	AMR NB 12.2kbps	8N	86.63	16.63	≥6	10.63	PASS
	LTE Band 48	20M	QPSK	1	0	55830	AMR WB 6.60kbps	2N	83.41	13.41	≥6	7.41	PASS
	LTE Band 48	20M	QPSK	1	0	55830	AMR WB 6.60kbps	8N	86.49	16.49	≥6	10.49	PASS
	LTE Band 48	20M	QPSK	1	0	55830	AMR WB 23.85kbps	2N	83.57	13.57	≥6	7.57	PASS
	LTE Band 48	20M	QPSK	1	0	55830	AMR WB 23.85kbps	8N	86.67	16.67	≥6	10.67	PASS
	LTE Band 48	20M	QPSK	1	0	55830	EVS NB 5.9kbps	2N	83.59	13.59	≥6	7.59	PASS
	LTE Band 48	20M	QPSK	1	0	55830	EVS NB 5.9kbps	8N	86.53	16.53	≥6	10.53	PASS
	LTE Band 48	20M	QPSK	1	0	55830	EVS NB 24.4kbps	2N	83.49	13.49	≥6	7.49	PASS
	LTE Band 48	20M	QPSK	1	0	55830	EVS NB 24.4kbps	8N	86.55	16.55	≥6	10.55	PASS
	LTE Band 48	20M	QPSK	1	0	55830	EVS WB 5.9kbps	2N	83.47	13.47	≥6	7.47	PASS
	LTE Band 48	20M	QPSK	1	0	55830	EVS WB 5.9kbps	8N	86.51	16.51	≥6	10.51	PASS
	LTE Band 48	20M	QPSK	1	0	55830	EVS WB 128kbps	2N	83.25	13.25	≥6	7.25	PASS
	LTE Band 48	20M	QPSK	1	0	55830	EVS WB 128kbps	8N	86.4	16.4	≥6	10.4	PASS
	LTE Band 48	20M	QPSK	1	0	55830	EVS SWB 9.6kbps	2N	83.45	13.45	≥6	7.45	PASS
	LTE Band 48	20M	QPSK	1	0	55830	EVS SWB 9.6kbps	8N	86.51	16.51	≥6	10.51	PASS
	LTE Band 48	20M	QPSK	1	0	55830	EVS SWB 128kbps	2N	83.31	13.31	≥6	7.31	PASS
	LTE Band 48	20M	QPSK	1	0	55830	EVS SWB 128kbps	8N	86.47	16.47	≥6	10.47	PASS

<WLAN>

HAC (Volume control) Test Record						Receive Volume Control Performance				
Plot No.	Air Interface	Modulation / Mode	Channel	Audio Codec	Mounting Force (N)	Measured dBSPL Level	Conversational Gain (Measured dBSPL Level – 70 dBSPL) (dB)	Limit (dB)	Margin to Limit (dB)	PASS/FAIL
	WLAN2.4GHz	802.11b 1Mbps	6	AMR NB 4.75kbps	2N	82.61	12.61	≥6	6.61	PASS
	WLAN2.4GHz	802.11b 1Mbps	6	AMR NB 4.75kbps	8N	85.9	15.9	≥6	9.9	PASS
	WLAN2.4GHz	802.11b 1Mbps	6	AMR NB 12.2kbps	2N	82.48	12.48	≥6	6.48	PASS
	WLAN2.4GHz	802.11b 1Mbps	6	AMR NB 12.2kbps	8N	85.84	15.84	≥6	9.84	PASS
	WLAN2.4GHz	802.11b 1Mbps	6	AMR WB 6.60kbps	2N	82.6	12.6	≥6	6.6	PASS
	WLAN2.4GHz	802.11b 1Mbps	6	AMR WB 6.60kbps	8N	85.77	15.77	≥6	9.77	PASS
	WLAN2.4GHz	802.11b 1Mbps	6	AMR WB 23.85kbps	2N	82.6	12.6	≥6	6.6	PASS
	WLAN2.4GHz	802.11b 1Mbps	6	AMR WB 23.85kbps	8N	85.83	15.83	≥6	9.83	PASS
	WLAN2.4GHz	802.11b 1Mbps	6	EVS NB 5.9kbps	2N	82.62	12.62	≥6	6.62	PASS
	WLAN2.4GHz	802.11b 1Mbps	6	EVS NB 5.9kbps	8N	85.7	15.7	≥6	9.7	PASS
08	WLAN2.4GHz	802.11b 1Mbps	6	EVS NB 24.4kbps	2N	82.34	**12.34**	≥6	6.34	PASS
	WLAN2.4GHz	802.11b 1Mbps	6	EVS NB 24.4kbps	8N	85.57	15.57	≥6	9.57	PASS
	WLAN2.4GHz	802.11b 1Mbps	6	EVS WB 5.9kbps	2N	82.6	12.6	≥6	6.6	PASS
	WLAN2.4GHz	802.11b 1Mbps	6	EVS WB 5.9kbps	8N	85.83	15.83	≥6	9.83	PASS
	WLAN2.4GHz	802.11b 1Mbps	6	EVS WB 128kbps	2N	82.82	12.82	≥6	6.82	PASS
	WLAN2.4GHz	802.11b 1Mbps	6	EVS WB 128kbps	8N	86	16	≥6	10	PASS
	WLAN2.4GHz	802.11b 1Mbps	6	EVS SWB 9.6kbps	2N	82.5	12.5	≥6	6.5	PASS
	WLAN2.4GHz	802.11b 1Mbps	6	EVS SWB 9.6kbps	8N	85.76	15.76	≥6	9.76	PASS
	WLAN2.4GHz	802.11b 1Mbps	6	EVS SWB 128kbps	2N	82.51	12.51	≥6	6.51	PASS
	WLAN2.4GHz	802.11b 1Mbps	6	EVS SWB 128kbps	8N	85.87	15.87	≥6	9.87	PASS
	WLAN5GHz	802.11a 6Mbps	40	AMR NB 4.75kbps	2N	82.57	12.57	≥6	6.57	PASS
	WLAN5GHz	802.11a 6Mbps	40	AMR NB 4.75kbps	8N	85.8	15.8	≥6	9.8	PASS
	WLAN5GHz	802.11a 6Mbps	40	AMR NB 12.2kbps	2N	82.82	12.82	≥6	6.82	PASS
	WLAN5GHz	802.11a 6Mbps	40	AMR NB 12.2kbps	8N	85.91	15.91	≥6	9.91	PASS
	WLAN5GHz	802.11a 6Mbps	40	AMR WB 6.60kbps	2N	82.59	12.59	≥6	6.59	PASS
	WLAN5GHz	802.11a 6Mbps	40	AMR WB 6.60kbps	8N	85.71	15.71	≥6	9.71	PASS
	WLAN5GHz	802.11a 6Mbps	40	AMR WB 23.85kbps	2N	82.75	12.75	≥6	6.75	PASS
	WLAN5GHz	802.11a 6Mbps	40	AMR WB 23.85kbps	8N	85.91	15.91	≥6	9.91	PASS
	WLAN5GHz	802.11a 6Mbps	40	EVS NB 5.9kbps	2N	82.62	12.62	≥6	6.62	PASS
	WLAN5GHz	802.11a 6Mbps	40	EVS NB 5.9kbps	8N	85.81	15.81	≥6	9.81	PASS
	WLAN5GHz	802.11a 6Mbps	40	EVS NB 24.4kbps	2N	82.49	12.49	≥6	6.49	PASS
	WLAN5GHz	802.11a 6Mbps	40	EVS NB 24.4kbps	8N	85.64	15.64	≥6	9.64	PASS
	WLAN5GHz	802.11a 6Mbps	40	EVS WB 5.9kbps	2N	82.71	12.71	≥6	6.71	PASS
	WLAN5GHz	802.11a 6Mbps	40	EVS WB 5.9kbps	8N	85.77	15.77	≥6	9.77	PASS
	WLAN5GHz	802.11a 6Mbps	40	EVS WB 128kbps	2N	82.51	12.51	≥6	6.51	PASS
	WLAN5GHz	802.11a 6Mbps	40	EVS WB 128kbps	8N	85.84	15.84	≥6	9.84	PASS
	WLAN5GHz	802.11a 6Mbps	40	EVS SWB 9.6kbps	2N	82.58	12.58	≥6	6.58	PASS
	WLAN5GHz	802.11a 6Mbps	40	EVS SWB 9.6kbps	8N	85.88	15.88	≥6	9.88	PASS
	WLAN5GHz	802.11a 6Mbps	40	EVS SWB 128kbps	2N	82.69	12.69	≥6	6.69	PASS
	WLAN5GHz	802.11a 6Mbps	40	EVS SWB 128kbps	8N	85.85	15.85	≥6	9.85	PASS
	WLAN5GHz	802.11a 6Mbps	60	AMR NB 4.75kbps	2N	82.48	12.48	≥6	6.48	PASS
	WLAN5GHz	802.11a 6Mbps	60	AMR NB 4.75kbps	8N	86.3	16.3	≥6	10.3	PASS
	WLAN5GHz	802.11a 6Mbps	60	AMR NB 12.2kbps	2N	82.65	12.65	≥6	6.65	PASS
	WLAN5GHz	802.11a 6Mbps	60	AMR NB 12.2kbps	8N	86.22	16.22	≥6	10.22	PASS
	WLAN5GHz	802.11a 6Mbps	60	AMR WB 6.60kbps	2N	82.47	12.47	≥6	6.47	PASS
	WLAN5GHz	802.11a 6Mbps	60	AMR WB 6.60kbps	8N	86.26	16.26	≥6	10.26	PASS
	WLAN5GHz	802.11a 6Mbps	60	AMR WB 23.85kbps	2N	82.65	12.65	≥6	6.65	PASS
	WLAN5GHz	802.11a 6Mbps	60	AMR WB 23.85kbps	8N	86.08	16.08	≥6	10.08	PASS
	WLAN5GHz	802.11a 6Mbps	60	EVS NB 5.9kbps	2N	82.71	12.71	≥6	6.71	PASS
	WLAN5GHz	802.11a 6Mbps	60	EVS NB 5.9kbps	8N	86.36	16.36	≥6	10.36	PASS

	WLAN5GHz	802.11a 6Mbps	60	EVS NB 24.4kbps	2N	82.6	12.6	≥6	6.6	PASS
	WLAN5GHz	802.11a 6Mbps	60	EVS NB 24.4kbps	8N	85.86	15.86	≥6	9.86	PASS
	WLAN5GHz	802.11a 6Mbps	60	EVS WB 5.9kbps	2N	82.68	12.68	≥6	6.68	PASS
	WLAN5GHz	802.11a 6Mbps	60	EVS WB 5.9kbps	8N	86.3	16.3	≥6	10.3	PASS
	WLAN5GHz	802.11a 6Mbps	60	EVS WB 128kbps	2N	82.37	12.37	≥6	6.37	PASS
	WLAN5GHz	802.11a 6Mbps	60	EVS WB 128kbps	8N	86.03	16.03	≥6	10.03	PASS
	WLAN5GHz	802.11a 6Mbps	60	EVS SWB 9.6kbps	2N	82.67	12.67	≥6	6.67	PASS
	WLAN5GHz	802.11a 6Mbps	60	EVS SWB 9.6kbps	8N	86.3	16.3	≥6	10.3	PASS
	WLAN5GHz	802.11a 6Mbps	60	EVS SWB 128kbps	2N	82.66	12.66	≥6	6.66	PASS
	WLAN5GHz	802.11a 6Mbps	60	EVS SWB 128kbps	8N	86.15	16.15	≥6	10.15	PASS
	WLAN5GHz	802.11a 6Mbps	116	AMR NB 4.75kbps	2N	82.56	12.56	≥6	6.56	PASS
	WLAN5GHz	802.11a 6Mbps	116	AMR NB 4.75kbps	8N	86.62	16.62	≥6	10.62	PASS
	WLAN5GHz	802.11a 6Mbps	116	AMR NB 12.2kbps	2N	82.56	12.56	≥6	6.56	PASS
	WLAN5GHz	802.11a 6Mbps	116	AMR NB 12.2kbps	8N	86.43	16.43	≥6	10.43	PASS
	WLAN5GHz	802.11a 6Mbps	116	AMR WB 6.60kbps	2N	82.6	12.6	≥6	6.6	PASS
	WLAN5GHz	802.11a 6Mbps	116	AMR WB 6.60kbps	8N	86.45	16.45	≥6	10.45	PASS
	WLAN5GHz	802.11a 6Mbps	116	AMR WB 23.85kbps	2N	82.59	12.59	≥6	6.59	PASS
	WLAN5GHz	802.11a 6Mbps	116	AMR WB 23.85kbps	8N	86.6	16.6	≥6	10.6	PASS
	WLAN5GHz	802.11a 6Mbps	116	EVS NB 5.9kbps	2N	82.6	12.6	≥6	6.6	PASS
	WLAN5GHz	802.11a 6Mbps	116	EVS NB 5.9kbps	8N	86.65	16.65	≥6	10.65	PASS
	WLAN5GHz	802.11a 6Mbps	116	EVS NB 24.4kbps	2N	82.76	12.76	≥6	6.76	PASS
	WLAN5GHz	802.11a 6Mbps	116	EVS NB 24.4kbps	8N	86.13	16.13	≥6	10.13	PASS
	WLAN5GHz	802.11a 6Mbps	116	EVS WB 5.9kbps	2N	82.56	12.56	≥6	6.56	PASS
	WLAN5GHz	802.11a 6Mbps	116	EVS WB 5.9kbps	8N	86.65	16.65	≥6	10.65	PASS
	WLAN5GHz	802.11a 6Mbps	116	EVS WB 128kbps	2N	82.49	12.49	≥6	6.49	PASS
	WLAN5GHz	802.11a 6Mbps	116	EVS WB 128kbps	8N	86.37	16.37	≥6	10.37	PASS
	WLAN5GHz	802.11a 6Mbps	116	EVS SWB 9.6kbps	2N	82.6	12.6	≥6	6.6	PASS
	WLAN5GHz	802.11a 6Mbps	116	EVS SWB 9.6kbps	8N	86.47	16.47	≥6	10.47	PASS
	WLAN5GHz	802.11a 6Mbps	116	EVS SWB 128kbps	2N	82.63	12.63	≥6	6.63	PASS
	WLAN5GHz	802.11a 6Mbps	116	EVS SWB 128kbps	8N	86.59	16.59	≥6	10.59	PASS
	WLAN5GHz	802.11a 6Mbps	157	AMR NB 4.75kbps	2N	82.93	12.93	≥6	6.93	PASS
	WLAN5GHz	802.11a 6Mbps	157	AMR NB 4.75kbps	8N	86.33	16.33	≥6	10.33	PASS
	WLAN5GHz	802.11a 6Mbps	157	AMR NB 12.2kbps	2N	82.89	12.89	≥6	6.89	PASS
	WLAN5GHz	802.11a 6Mbps	157	AMR NB 12.2kbps	8N	86.39	16.39	≥6	10.39	PASS
	WLAN5GHz	802.11a 6Mbps	157	AMR WB 6.60kbps	2N	82.96	12.96	≥6	6.96	PASS
	WLAN5GHz	802.11a 6Mbps	157	AMR WB 6.60kbps	8N	86.3	16.3	≥6	10.3	PASS
	WLAN5GHz	802.11a 6Mbps	157	AMR WB 23.85kbps	2N	82.7	12.7	≥6	6.7	PASS
	WLAN5GHz	802.11a 6Mbps	157	AMR WB 23.85kbps	8N	86.45	16.45	≥6	10.45	PASS
	WLAN5GHz	802.11a 6Mbps	157	EVS NB 5.9kbps	2N	82.76	12.76	≥6	6.76	PASS
	WLAN5GHz	802.11a 6Mbps	157	EVS NB 5.9kbps	8N	86.35	16.35	≥6	10.35	PASS
	WLAN5GHz	802.11a 6Mbps	157	EVS NB 24.4kbps	2N	82.75	12.75	≥6	6.75	PASS
	WLAN5GHz	802.11a 6Mbps	157	EVS NB 24.4kbps	8N	86	16	≥6	10	PASS
	WLAN5GHz	802.11a 6Mbps	157	EVS WB 5.9kbps	2N	82.7	12.7	≥6	6.7	PASS
	WLAN5GHz	802.11a 6Mbps	157	EVS WB 5.9kbps	8N	86.39	16.39	≥6	10.39	PASS
	WLAN5GHz	802.11a 6Mbps	157	EVS WB 128kbps	2N	82.61	12.61	≥6	6.61	PASS
	WLAN5GHz	802.11a 6Mbps	157	EVS WB 128kbps	8N	86.11	16.11	≥6	10.11	PASS
	WLAN5GHz	802.11a 6Mbps	157	EVS SWB 9.6kbps	2N	82.68	12.68	≥6	6.68	PASS
	WLAN5GHz	802.11a 6Mbps	157	EVS SWB 9.6kbps	8N	86.27	16.27	≥6	10.27	PASS
	WLAN5GHz	802.11a 6Mbps	157	EVS SWB 128kbps	2N	82.87	12.87	≥6	6.87	PASS
	WLAN5GHz	802.11a 6Mbps	157	EVS SWB 128kbps	8N	86.26	16.26	≥6	10.26	PASS

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11. Uncertainty Assessment

The component of uncertainly may generally be categorized according to the methods used to evaluate them. The evaluation of uncertainly by the statistical analysis of a series of observations is termed a Type A evaluation of uncertainty. The evaluation of uncertainty by means other than the statistical analysis of a series of observation is termed a Type B evaluation of uncertainty. Each component of uncertainty, however evaluated, is represented by an estimated standard deviation, termed standard uncertainty, which is determined by the positive square root of the estimated variance.
The combined standard uncertainty of the measurement result represents the estimated standard deviation of the result. It is obtained by combining the individual standard uncertainties of both Type A and Type B evaluation using the usual “root-sum-squares” (RSS) methods of combining standard deviations by taking the positive square root of the estimated variances. Expanded uncertainty is a measure of uncertainty that defines an interval about the measurement result within which the measured value is confidently believed to lie. It is obtained by multiplying the combined standard uncertainty by a coverage factor. For purpose of this document, a coverage factor two is used, which corresponds to confidence interval of about 95 %.
The judgment of conformity in the report is based on the measurement results excluding the measurement uncertainty.

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Component	Standard uncertainty (dB)	U^2 (%²)
Generator Accuracy To enable harmonic distortion measurements to 0.1%, the generator distortion must be <0.05%. This is equivalent to a standard uncertainty of 0.043 dB.	0.043	0.25
Ear Simulator Pressure Sensitivity (incl. Measurement Mic.) The uncertainty of the ear simulator as per the standards and quoted on its calibration certificate is 0.3 dB with a coverage factor of k = 2. This is equivalent to a standard uncertainty of 0.3/2 = 0.15 dB.	0.15	3.03
Microphone Preamplifier The manufacturer quotes the preamp to be within ± 0.02 dB with a 95% probability or 2σ. This is equivalent to a standard uncertainty of 0.02/2 = 0.01 dB.	0.01	0.01
Analysis System / RMS Detector Typical measurement system detector accuracy is 0.1 dB with a coverage factor of k = 2. This is equivalent to a standard uncertainty of 0.1/2 = 0.05 dB.	0.05	0.33
Effect of Positioning on Mid-Band Sensitivity For a handset, with the HATS positioning jig, the typical standard deviation estimated from a statistically significant number of measurements is ±2 dB. This is equivalent to a standard uncertainty of 2 dB.	2	670.42
Time Varying Effects of the Mouth Simulator for Send & Sidetone For a receive measurement on a handset, the mouth simulator is not used (its uncertainty is zero), The standard uncertainty of 0 dB	0	0.00
Total Standard Uncertainty (%)	25.96	
UMAX (k = 2) (%)	51.9	
UMAX (k = 2) (dB)	3.6	

Uncertainty Budget of Volume Control assessment

12. References

[1] ANSI C63.19:2019, “American National Standard for Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids”, Aug. 2019.

[2] ANSI/TIA-5050-2018, “Receive Volume Control Requirements for Wireless (Mobile) Devices”, Jan. 2018

[3] FCC KDB 285076 D01v06r04, “Equipment Authorization Guidance for Hearing Aid Compatibility”, Sep. 2023.

[4] FCC KDB 285076 D04 Volume Control v02, “GUIDANCE FOR PERFORMING VOLUME CONTROL MEASUREMENTS ON MOBILE HANDSETS”, Sep. 2023

[5] FCC KDB 285076 D05 HAC Waiver DA 23-914 v01, “HAC COMPLIANCE UNDER WAIVER DA 23-914”, Sep. 2023

[6] Head Acoustic System Handbook