

TEST REPORT

FCC HAC T-COIL Test for SM-F761U
Certification

APPLICANT
SAMSUNG Electronics Co., Ltd.

REPORT NO.
HCT-SR-2504-FC013

DATE OF ISSUE
April 30, 2025

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TEST REPORT

HAC T-COIL Test
for certification

REPORT NO.**HCT-SR-2504-FC013****DATE OF ISSUE****Apr. 30, 2025****FCC ID****A3LSMF761U****Applicant****SAMSUNG Electronics Co., Ltd****129, Samsung-ro, Yeongtong-gu, Suwon-Si, Gyeonggi-do, 16677, Korea****Product Name****Mobile Phone****Model Name****SM-F761U****Additional Model Name****SM-F761U1****Date of Test****Mar. 14, 2025~ Apr. 18, 2025****Location of Test**☒ **Permanent Testing Lab** ☐ **On Site Testing Lab****(Address: 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si,
Gyeonggi-do, Republic of Korea)****FCC Rule Part(s)****FCC 47 CFR § 20.19 , ANSI C63.19-2019****C63.19-2019HACResult:****PASS**

REVISION HISTORY

The revision history for this test report is shown in table.

Revision No.	Date of Issue	Description
0	Apr. 30, 2025	Initial Release

Notice

Content

The results shown in this test report only apply to the sample(s), as received, provided by the applicant, unless otherwise stated.

The test results have only been applied with the test methods required by the standard(s).

The laboratory is not accredited for the test results marked *.

Information provided by the applicant is marked **.

Test results provided by external providers are marked ***.

When confirmation of authenticity of this test report is required, please contact www.hct.co.kr

The test results in this test report are not associated with the ((KS Q) ISO/IEC 17025) accreditation by KOLAS (Korea Laboratory Accreditation Scheme) / A2LA (American Association for Laboratory Accreditation) that are under the ILAC (International Laboratory Accreditation Cooperation) Mutual Recognition Agreement (MRA).

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1. Test Regulations

The tests were performed according to the following regulations:

Test Standard	FCC 47 CFR § 20.19, ANSI C63.19-2019
Test Method	• FCC CFR47 Part 20.19 • ANSI C63.19 2019-version • FCC KDB 285076 D01 HAC Guidance v06r04 • FCC KDB 285076 D02 T Coil testing v04 • FCC KDB 285076 D03 HAC FAQ v01r07 • TCB workshop updates

2. Test Location

2.1 Test Laboratory

Company Name	HCT Co., Ltd.
Address	74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Republic of Korea
Telephone	031-645-6300
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2.2 Test Facilities

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

Korea	National Radio Research Agency (Designation No. KR0032)
	KOLAS (Testing No. KT197)

3. DEVICE UNDER TEST DESCRIPTION

3.1 General Information of the EUT

Model Name	SM-F761U
Additional Model Name	SM-F761U1
Equipment Type	Mobile Phone
FCC ID	A3LSMF761U
Application Type	Certification
Applicant	SAMSUNG Electronics Co., Ltd.

3.2 DUT specification

Device Wireless specification overview		
Band & Mode	Operating Mode	Tx Frequency
GSM850	Voice / Data	824.2 MHz ~ 848.8 MHz
GSM1900	Voice / Data	1 850.2 MHz ~ 1 909.8 MHz
UMTS Band 2	Voice / Data	1 852.4 MHz ~ 1 907.6 MHz
UMTS Band 4	Voice / Data	1 712.4 MHz ~ 1 752.6 MHz
UMTS Band 5	Voice / Data	826.4 MHz ~ 846.6 MHz
LTE FDD Band 2 (PCS)	Voice / Data	1 850.7 MHz ~ 1 909.3 MHz
LTE FDD Band 4 (AWS)	Voice / Data	1 710.7 MHz ~ 1 754.3 MHz
LTE FDD Band 5 (Cell)	Voice / Data	824.7 MHz ~ 848.3 MHz
LTE FDD Band 7	Voice / Data	2 502.5 MHz ~ 2 567.5 MHz
LTE FDD Band 12	Voice / Data	699.7 MHz ~ 715.3 MHz
LTE FDD Band 13	Voice / Data	779.5 MHz ~ 784.5 MHz
LTE FDD Band 14	Voice / Data	790.5 MHz ~ 795.5 MHz
LTE FDD Band 25	Voice / Data	1 850.7 MHz ~ 1 914.3 MHz
LTE FDD Band 26	Voice / Data	814.7 MHz ~ 848.3 MHz
LTE FDD Band 30	Voice / Data	2 307.5 MHz ~ 2 312.5 MHz
LTE TDD Band 38	Voice / Data	2 572.5 MHz ~ 2 617.5 MHz
LTE TDD Band 41	Voice / Data	2 498.5 MHz ~ 2 687.5 MHz
LTE TDD Band 48	Voice / Data	3 552.5 MHz ~ 3 697.5 MHz
LTE FDD Band 66 (AWS)	Voice / Data	1 710.7 MHz ~ 1 779.3 MHz
LTE FDD Band 71	Voice / Data	665.5 MHz ~ 695.5 MHz
NR FDD Band n2 (PCS)	Voice / Data	1 852.5 MHz ~ 1 907.5 MHz
NR FDD Band n5	Voice / Data	826.5 MHz ~ 846.5 MHz
NR FDD Band n7	Voice / Data	2 502.5 MHz ~ 2 567.5 MHz
NR FDD Band n12	Voice / Data	701.5 MHz ~ 713.5 MHz
NR FDD Band n14	Voice / Data	790.5 MHz ~ 795.5 MHz
NR FDD Band n25 (PCS)	Voice / Data	1 852.5 MHz ~ 1 912.5 MHz
NR FDD Band n26	Voice / Data	816.5 MHz ~ 846.5 MHz
NR FDD Band n30	Voice / Data	2 307.5 MHz ~ 2 312.5 MHz
NR TDD Band n38	Voice / Data	2 575 MHz ~ 2 615 MHz
NR TDD Band n41	Voice / Data	2 501.01 MHz ~ 2 685 MHz
NR TDD Band n48	Voice / Data	3 555 MHz ~ 3 695.01 MHz
NR FDD Band n66	Voice / Data	1 712.5 MHz ~ 1 777.5 MHz
NR FDD Band n70	Voice / Data	1 697.5 MHz ~ 1 707.5 MHz
NR FDD Band n71	Voice / Data	665.5 MHz ~ 695.5 MHz
NR TDD Band n77	Voice / Data	3 705 MHz ~ 3 975 MHz
NR TDD Band n77 DoD	Voice / Data	3 445.01 MHz ~ 3 544.98 MHz
NR TDD Band n78	Voice / Data	3 705 MHz ~ 3 795 MHz
NR TDD Band n78 DoD	Voice / Data	3 455.01 MHz ~ 3 544.98 MHz
U-NII-1	Voice / Data	5 180 MHz ~ 5 240 MHz
U-NII-2A	Voice / Data	5 260 MHz ~ 5 320 MHz
U-NII-2C	Voice / Data	5 500 MHz ~ 5 720 MHz
U-NII-3	Voice / Data	5 745 MHz ~ 5 825 MHz
U-NII-4	Voice / Data	5 845 MHz ~ 5 885 MHz
U-NII-5	Voice / Data	5 925 MHz ~ 6 425 MHz
U-NII-6	Voice / Data	6 425 MHz ~ 6 525 MHz
U-NII-7	Voice / Data	6 525 MHz ~ 6 865 MHz
U-NII-8	Voice / Data	6 865 MHz ~ 7 115 MHz
2.4 GHz WLAN	Voice / Data	2 412 MHz ~ 2 462 MHz
Bluetooth / LE 5.4	Data	2 402 MHz ~ 2 480 MHz
NFC	Data	13.56 MHz
WPC	Data	110 kHz ~ 148 kHz

4. Measuring Instrument Calibration

The measuring equipment used to perform the tests documented in this report has been calibrated in accordance with the manufacturers' recommendations and is traceable to recognized national standards.

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
ABM Probe	SPEAG	AM1DV3	3049	11/14/2025
ABM Probe	SPEAG	AM1DV3	3050	01/20/2026
Data Acquisition Electronics	SPEAG	DAE4ip	1866	05/02/2025
Data Acquisition Electronics	SPEAG	DAE4	466	09/03/2025
DAC	Sound Devices	USBPre 2	HB1319212059	N/A
DAC	Sound Devices	USBPre 2	HB1318341009	N/A
Radio Communication Tester	R & S	CMW 500	167916	09/11/2025
Radio Communication Tester	R & S	CMW 500	127521	04/23/2025
Radio Communication Tester	R & S	CMX 500	100325	10/14/2025
USB Audio Module	KEYSIGHT	U8903B-UAM	101006	N/A
UXM 5G Wireless Test Set	KEYSIGHT	E7515B	MY58460166	07/30/2025
External Media Audio	R & S	CMX-ZG180A	101186	N/A

5. Measurement Uncertainty

Measurement Uncertainty for Audio Band Magnetic Measurement

Error Description	Uncertainty ± %	Probability distribution	Div.	c/ ABM _d	c/ ABM _u	Std. Unc. ABM _d	Std. Unc. ABM _u
Probe Sensitivity							
Reference Level	3.00	N	1	1	1	3.00	3.00
AMCC Geometry	0.40	R	1.73	1	1	0.23	0.23
AMCC Current	1.00	R	1.73	1	1	0.58	0.58
Probe Positioning during Calibr.	0.10	R	1.73	1	1	0.06	0.06
Noise Contribution	0.70	R	1.73	0.0143	1	0.01	0.40
Frequency Slope	5.90	R	1.73	0.1	1	0.34	3.41
Probe System							
Repeatability / Drift	1.00	R	1.73	1	1	0.58	0.58
Linearity / Dynamic Range	0.60	R	1.73	1	1	0.35	0.35
Acoustic Noise	1.00	R	1.73	0.1	1	0.06	0.58
Probe Angle	1.00	R	1.73	1	1	0.58	0.58
Spectral Processing	0.90	R	1.73	1	1	0.52	0.52
Integration Time	0.60	N	1.00	1	5	0.60	3.00
Field Distribution	0.20	R	1.73	1	1	0.12	0.12
Test Signal							
Ref. Signal Spectral Response	0.60	R	1.73	0	1	0.00	0.35
Positioning							
Probe Positioning	1.90	R	1.73	1	1	1.10	1.10
Phantom Thickness	0.90	R	1.73	1	1	0.52	0.52
DUT Positioning	1.90	R	1.73	1	1	1.10	1.10
External Contributions							
RF Interference	0.00	R	1.73	1	0.3	0.00	0.00
Test Signal Variation	2.00	R	1.73	1	1	1.15	1.15
Combined Uncertainty							
Combined Std. Uncertainty	(k=1)					3.87	5.97
Expanded uncertainty	(Coverage factor for 95%, k=2)					7.74	11.94
Notes for table : N –Normal, R –Rectangular, Div. - Divisor used to obtain standard uncertainty							

6. Test Procedures for all Technologies

6.1 General Procedures C63.19-2019, Section 6

ANSI C63.19-2019, Section 6

This document describes the measurement of the baseband (audio frequency) magnetic T-Coil signal from a WD. The goal is to evaluate the size of the area where a user could position their WD relative to their hearing aid's telecoil and receive an acceptable magnetically coupled signal. Three quantities are measured and evaluated. The first is the field strength of the desired signal at the center of the audio band (desired ABM signal).³¹ The second is the frequency response of the desired signal measured across the audio band.

This subclause describes the procedures used to measure the ABM (T-Coil) performance of the WD. Measurements shall be performed over a measurement area 50 mm square, in the measurement plane, as specified in A.3. The measurement area shall be scanned with a uniform measurement point spacing of $2.0 \text{ mm} \pm 0.5 \text{ mm}$ in each X-Y axis of the plane, yielding 676 measurement points with approximately even spacing throughout the area. In addition to measuring the desired ABM signal levels, the weighted magnitude of the unintended signal shall also be determined. Weighting of the unintended and undesired ABM field shall be by the spectral and temporal weighting described in D.4 through D.6. Measurements shall not include undesired properties from the WD's RF field; therefore, use of a coaxial connection to a base station simulator or non-radiating load may be necessary. However, even then with a coaxial connection to a base station simulator or non-radiating load there may still be RF leakage from the WD, which may interfere with the desired measurement.

Measurements shall be performed with the probe coil oriented in the transverse direction, as illustrated in A.3, that is, aligned in the plane of the measurement area and perpendicular to the long dimension of the WD. A multi-stage sequence consists of first measuring the field strength of the desired T-Coil signal (desired ABM signal) that is useful to a hearing aid T-Coil at each specified measurement point. The undesired magnetic component (undesired ABM field) is then measured in the same transverse orientation at each of the same measurement points. At a single location only, taken at or near the highest desired ABM signal reading, the desired ABM signal frequency response shall be determined in a third measurement stage.

Test flow for T-Coil signal test

The following steps summarize the basic test flow for determining desired ABM signal and undesired ABM field. These steps assume that a sine wave or narrowband 1/3 octave signal can be used for the measurement of desired ABM signal level. An alternative procedure, yielding equivalent results, using a broadband excitation is described in 6.5.

- a) A validation of the test setup and instrumentation shall be performed. This may be done using a TMFS or Helmholtz Coil. Measure the emissions and confirm that they are within tolerance of the expected values.
- b) Confirm that equipment that requires calibration has been calibrated, and that the noise level meets the requirements given in 6.3.2.
- c) Position the WD in the test setup and connect the WD RF connector to a base station simulator or a non-radiating load (if necessary to control RF interference in the measurement equipment) as shown in Figure 6.1 or Figure 6.2.
- d) The drive level to the WD is set such that the reference input level specified in Table 6.1 is input to the base station simulator (or manufacturer's test mode equivalent) in the 1 kHz, 1/3 octave band. This drive level shall be used for the T-Coil signal test (desired ABM signal) at $f = 1 \text{ kHz}$.
Either a sine wave at 1025 Hz, or a voice-like signal, band-limited to the 1 kHz 1/3 octave, as specified in 6.4.3, shall be used for the reference audio signal. If interference is found at 1025 Hz an alternative nearby reference audio signal frequency may be used.³⁵ The same drive

level will be used for the desired ABM signal frequency response measurements at each 1/3 octave band center frequency. The WD volume control may be set at any level up to maximum, provided that a signal at any frequency at maximum modulation would not result in clipping or signal overload.

e) At each measurement location over the measurement area and in the transverse orientation, measure and record the desired 1 kHz T-Coil magnetic signal (desired ABM signal) as described in Step c).

f) At or near a location representing a maximum in the just-measured desired ABM signal, measure and record the desired T-Coil magnetic signals (desired ABM signal at f_i) as described in 6.4.5.2 in each individual ISO 266:1975 R10 standard 1/3 octave band. The desired audio band input frequency (f_i) shall be centered in each 1/3 octave band maintaining the same drive level as determined in Step c), and the reading taken for that band. Equivalent methods of determining the frequency response may also be employed, such as fast Fourier transform (FFT) analysis using noise excitation or input-output comparison using simulated speech. The full-band integrated or half-band integrated probe output, as described in D.9, may be used, as long as the appropriate calibration curve is applied to the measured result, so as to yield an accurate measurement of the field magnitude. (The resulting measurement shall be an accurate measurement in dB(A/m).) Compare the frequency response found to the requirements of 6.6.3.

g) At the same locations measured in Step d), measure and record the undesired broadband audio magnetic signal (undesired ABM field) with no audio signal applied (or digital zero applied, if appropriate) using the specified spectral weighting, the half-band integrator followed by the temporal weighting.

h) Calculate and record the location and number of the measurement points that satisfy both the minimum desired ABM signal level and the maximum undesired ABM field level specified in 6.6.2. Compare this to the requirements in 6.6.4 and record the result.

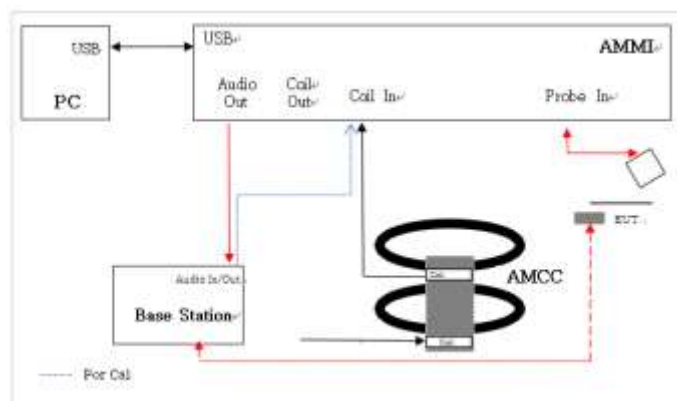
i) Calculate and record the location and number of the measurement points that satisfy the maximum undesired ABM field level and distribution requirements specified in 6.6.4.

All measurements of the desired signal shall be shown to be of the desired signal and not of an undesired signal. This may be shown by turning the desired signal ON and OFF with the probe measuring the scanned locations.

At the measurement location for each orientation, measure and record the undesired broadband audio magnetic signal (ABM2) as specified in 6.4.2 g) with no audio signal applied (or digital zero applied, if appropriate) using A-weighting and the half-band integrator. Calculate the ratio of the desired to undesired signal strength (i.e., signal quality).

Obtain the data from the postprocessor, SEMCAD, and determine the primary group, secondary group that properly the signal quality based on Table 8.

Test Setup Diagram



This device supports Wi-Fi calling (aka Voice over Wi-Fi or VoWiFi) which is an extended feature of the carriers CMRS service to offload VoLTE calls onto local area networks over WI-FI via the internet and subject to HAC assessment for phones with a HAC rating.

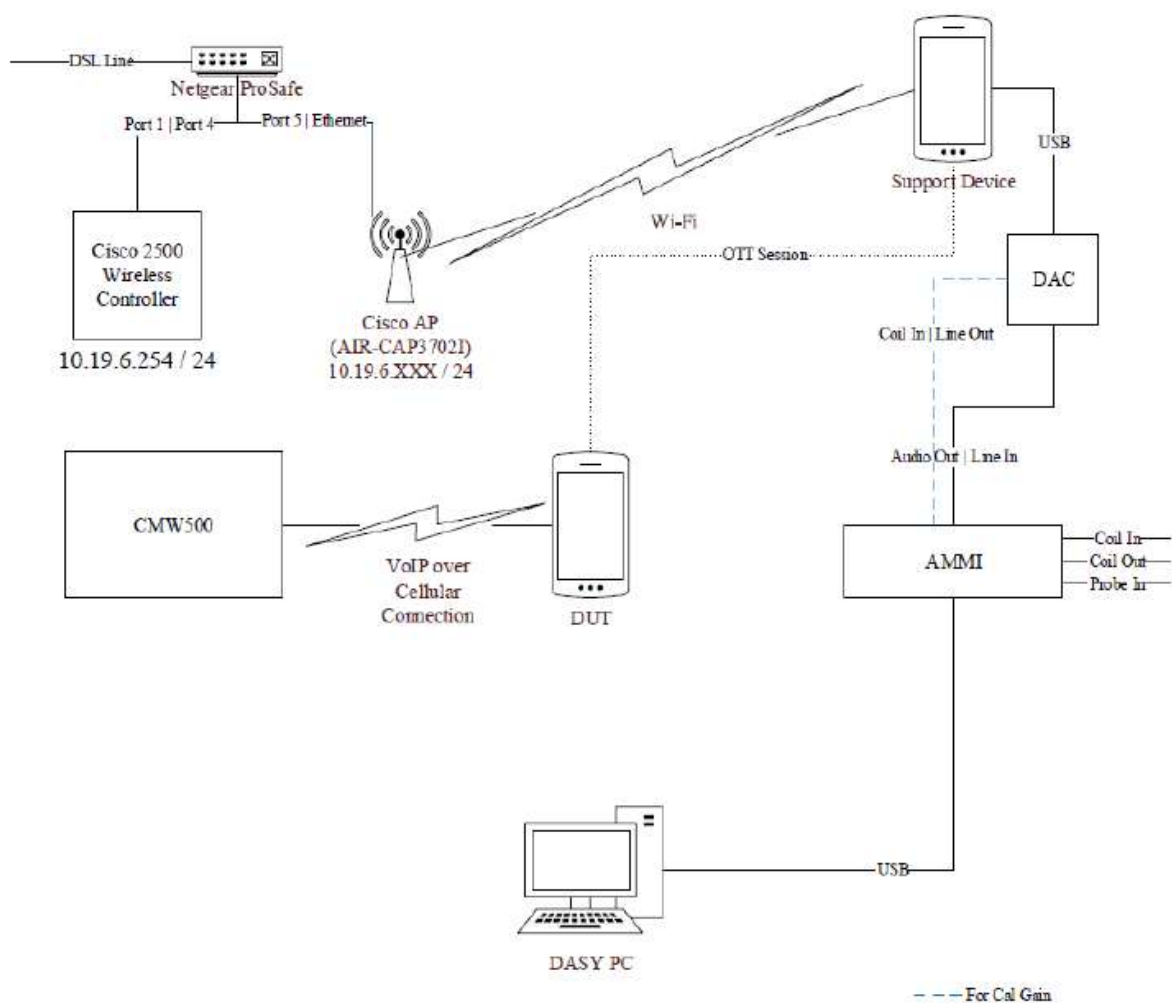
The set up for VoWiFi uses the Base station as described in section 7.1 with the exception that the reference audio level is set at -16dBm0. The reference level is calibrated using the standard call box calibration procedures with the exception of the -16dBm0 reference level being used.

An investigation was performed to determine worst case codec, bit rate and air interface configuration (refer to sections 11.3, 11.4 and 11.5).

This device supports VoIP via a preinstalled application that uses the Google Meet service, using OPUS as its only codec (refer to § 10 for air interface details and § 11.6 for codec bit rates). VoIP capabilities require HAC assessment when voice calls are supported over the cellular data connection via pre-installed VoIP applications.

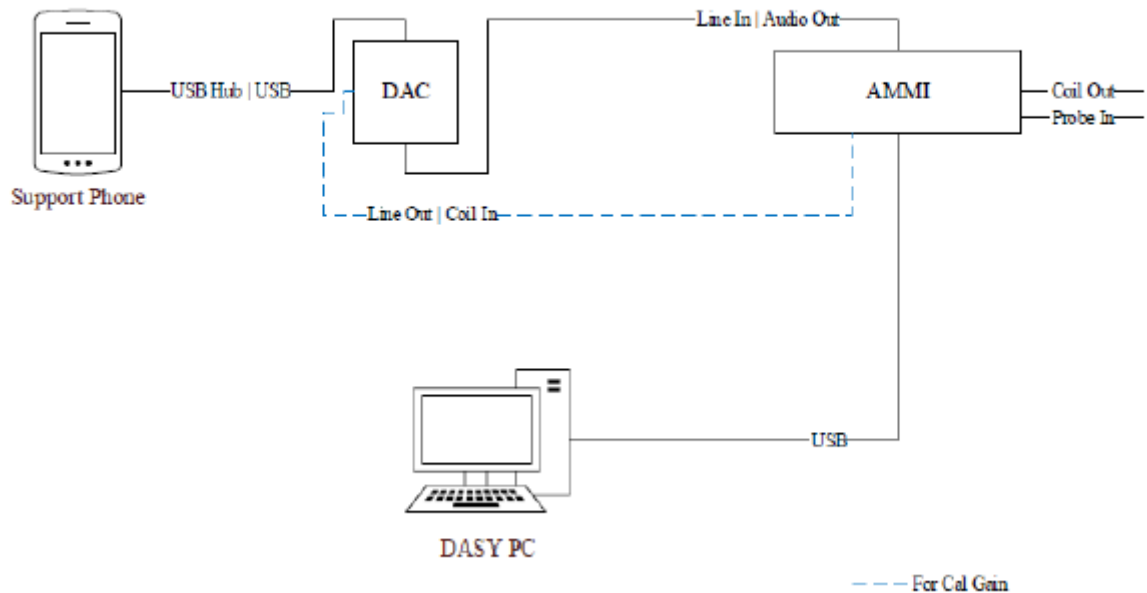
The equipment is set up as shown below with a support device used to originate the call using the IP transport. The support device connects to the cloud-based Google Meet service via Wi-Fi access point and router, or RJ45. The DUT connects to the VoIP service via a cellular/unlicensed air interface to the call box and an Ethernet connection from call box to Internet. The various codec bit rate and air interface configurations are evaluated to determine the worst-case configuration (refer to § 11.6).

Test Setup configuration for OTT calls



For the OTT call, the calibrated audio card within the CMW500 cannot be used so the AMMI is connected to an external Digital-Analog Converter (DAC) and the DAC is connected to the Support Device via USB. The test signal is sent from the DASY PC to the AMMI, from the AMMI to the DAC, from the DAC to the Support Device, and, via the VoIP call, to the DUT.

As this test set up uses an external DAC between the AMMI's audio output and support device, the appropriate gain factor for the OTT call needs be determined. This is done by connecting the DAC between the AMMI Audio output and Coil input as shown below.



Using the metering function on the DAC, the DAC gain is adjusted until the volume reaches 0dBFS (3.14 dBm0 based on TIA/EIA 810-A).

7. Audio Level and Gain Measurements

7.1 GSM, UMTS, VoLTE, VoNR, VoWifi

Refer to the below table for the gains used to measure.

GSM

Signal Type	Audio Level [dBm]	Peak to Full Scale [dB]	Peak to RMS Scale [dB]	BWC [dB]	Scaling [Gain]
Voice 1 kHz	-16	-0.37	15.74	0.07	-12.18
Normal Voice	-16	0	21.57	10.81	-6.35

UMTS

Signal Type	Audio Level [dBm]	Peak to Full Scale [dB]	Peak to RMS Scale [dB]	BWC [dB]	Scaling [Gain]
Voice 1 kHz	-16	-0.37	15.74	0.07	-12.12 to -12.08
Normal Voice	-16	0	21.57	10.81	-6.27 to -6.26

VoLTE

Signal Type	Audio Level [dBm]	Peak to Full Scale [dB]	Peak to RMS Scale [dB]	BWC [dB]	Scaling [Gain]
Voice 1 kHz	-16	-0.37	15.74	0.07	-12.15 to -12.10
Normal Voice	-16	0	21.57	10.81	-6.37 to -6.25

VoNR

Signal Type	Audio Level [dBm]	Peak to Full Scale [dB]	Peak to RMS Scale [dB]	BWC [dB]	Scaling [Gain]
Voice 1 kHz	-16	-0.37	15.74	0.07	-7.58 to -7.50
Normal Voice	-16	0	21.57	10.81	-1.75 to -1.66

VoWifi 2.4GHz

Signal Type	Audio Level [dBm]	Peak to Full Scale [dB]	Peak to RMS Scale [dB]	BWC [dB]	Scaling [Gain]
Voice 1 kHz	-16	-0.37	15.74	0.07	-12.37 to -12.31
Normal Voice	-16	0	21.57	10.81	-6.54 to -6.47

VoWifi 5GHz

Signal Type	Audio Level [dBm]	Peak to Full Scale [dB]	Peak to RMS Scale [dB]	BWC [dB]	Scaling [Gain]
Voice 1 kHz	-16	-0.37	15.74	0.07	-12.12 to -12.06
Normal Voice	-16	0	21.57	10.81	-6.29 to -6.23

Refer to the below table for the gains used to measure VoLTE.

The following software/firmware was used to simulate the VoLTE server for testing:

Firmware	License Keys	Software Name
V4.0.24 for LTE	KS500	LTE FDD R8 SIG BASIC
	KS550	LTE TDD R8 SIG BASIC
V4.0.56 for Audio	KA100	IP APPL ENABLING IPv4
	KA150	IP APPL ENABLING IPv6
	KAA20	IP APPL IMS BASIC
	KM050	DATA APPL MEAS
	KS104	EVS SPEECH CODEC

Refer to the below table for the gains used to measure VoWifi.

Firmware	License Keys	Software Name
V4.0.23 for WLAN	KS650	WLAN A/B/G SIG BASIC
	KS651	WLAN N SIG BASIC
	KS656	WLAN IEEE 802.11ac
	KS657	WLAN IEEE 802.11ax
V4.0.56for Audio	KA100	IP APPL ENABLING IPv4
	KA150	IP APPL ENABLING IPv4
	KAA20	IP APPL IMS BASIC
	KM050	DATA APPL MEAS
	KS104	EVS SPEECH CODEC

Firmware	License Keys	Software Name
V8.0.0.164 for WLAN	KM350	WLAN IEEE a/b/g/n/ac SIG BASIC
	KM351	WLAN IEEE SIG 802.11ax
	KM351	WLAN IEEE 802.11ax
	KM360	WLAN IEEE 802.11 MIMO
	KS350B	WLANIEEE a/b/g/n/ac APs
	KS355B	WLANIEEE ax
V8.0.0.164 for Audio	KA110	IP APPL ENABLING IPv4, DATA APPL MEAS
	KA180	Audio Enabler

Refer to the below table for the gains used to measure VoNR of Call Box(E7515B)

The following software/firmware was used to simulate the VoNR server for testing:

Firmware	License Model	Software Name
5G NR	C8700200A	Test Application Framework
Audio	C8700201A	IMS-SIP Emulation
	C87300P1A	LTE IP data
	C87350P1A	5G NR IP data

7.2 Over the Top(OTT)

For EDGE, HSPA, LTE, NR and Wi-Fi the linear gain levels listed below were used. The results below are based on a reference input level of -16 dBm.

To calibrate the DAC (refer § 6.3), three. Way audio files (sine wave, 1 kHz voice, and 300 to 3 kHz voice) are sent from the DASY PC to the AMMI, then to the DAC. The Helmholtz resonator measures the field strength, which represents the AMMI to DAC input sensitivity. After determining the input sensitivity, the adjusted linear gain values can then be calculated.

OTT LTE , NR

Signal Type	Audio Level [dBm]	Peak to Full Scale [dB]	Peak to RMS Scale [dB]	BWC [dB]	Scaling [Gain]
Voice 1 kHz	-16	-0.37	15.74	0.07	-8.59
Normal Voice	-16	0	21.57	10.81	-2.76

OTT GSM, UMTS, Wifi

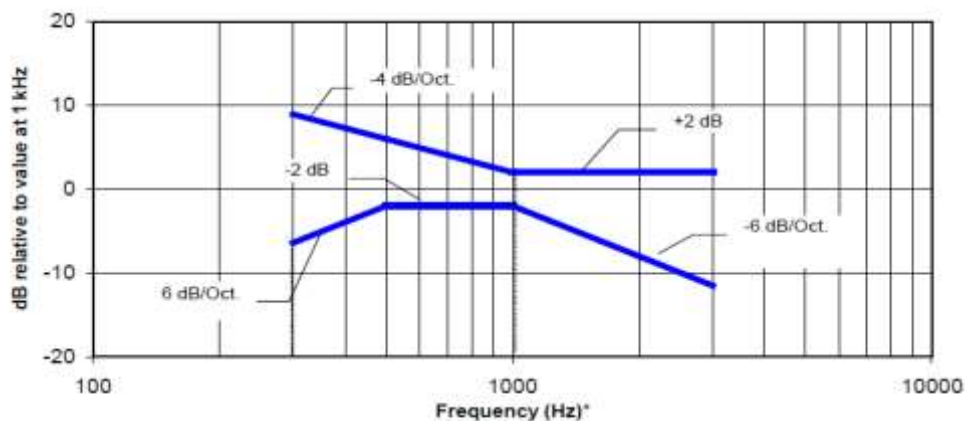
Signal Type	Audio Level [dBm]	Peak to Full Scale [dB]	Peak to RMS Scale [dB]	BWC [dB]	Scaling [Gain]
Voice 1 kHz	-16	-0.37	15.74	0.07	-9.08 to -8.96
Normal Voice	-16	0	21.57	10.81	-3.25 to -3.17

8 T-coil Measurement Criteria

8.1 Frequency Response

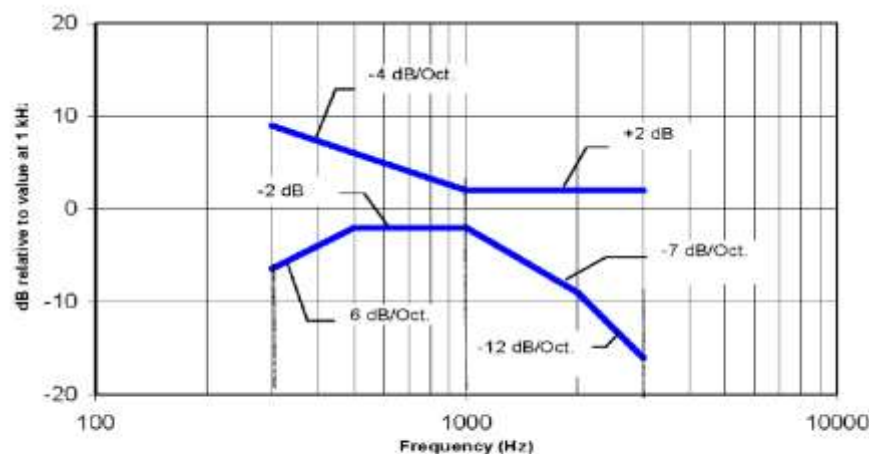
The frequency response of the axial component of the magnetic field, measured in 1/3 octave bands, shall follow the response curve, over the frequency range 300 Hz to 3000 Hz.

Figure 6.4 and Figure 6.5 provide the boundaries for the specified frequency. These response curves are for true field strength measurements of the T-Coil signal. Thus the 6 dB/octave probe response has been corrected from the raw readings.



NOTE—Frequency response is between 300 Hz and 3 kHz.

Figure 6.4—Magnetic field frequency response for WDs with a maximum field ≤ -15 dB(A/m) at 1 kHz



NOTE—Frequency response is between 300 Hz and 3000 Hz.

Figure 6.5—Magnetic field frequency response for WDs with a maximum field that exceeds -15 dB(A/m) at 1 kHz

8.2 Desired ABM Signal, Undesired ABM Field qualification requirements

ANSI C63.19-2019, Section 6.6.4.1

For a WD that is expected to operate primarily in radio access technologies that include 2G GSM for legacy support, the WD shall be qualified for telecoil compatibility one of two ways:

- a) The WD shall be rated for telecoil use for all other voice operating modes, exclusive of 2G GSM, according to the criteria of 6.6.4.2.
- b) If the WD is to be rated for telecoil use in its 2G GSM operating modes, these modes shall be qualified according to the criteria of 6.6.4.3.

ANSI C63.19-2019, 6.6.4.2 Non-2G GSM operating modes

The goal of this requirement is to ensure an adequate area where desired ABM signal is sufficiently strong to be heard clearly and a larger area where undesired ABM field is sufficiently low as to avoid undue annoyance. Qualifying measurement points shall fulfill the requirements of 6.6.2; both the primary and secondary group requirements shall be met:

- The primary group shall include at least 75 measurement points.
- The secondary group shall include at least 300 contiguous measurement points.

Additionally, to avoid an oddly shaped area of low noise, the secondary group shall include at least one longitudinal column of at least 10 contiguous qualifying points and at least one transverse row containing at least 15 contiguous qualifying points.

ANSI C63.19-2019, 6.6.4.3 2G GSM operating modes

If the 2G GSM operating mode(s) are selected for qualification, the qualifying measurement points shall fulfill the requirements of 6.6.2; both the primary and secondary group requirements shall be met:

- The primary group shall include at least 25 measurement points.
- The secondary group shall include at least 125 contiguous measurement points.

9. Device Under Test

Normal operation	Held to head	
Back Cover	The Back Cover is not removable	
Test sample information	S/N	Notes
	YBC2130M, YBC0416M	T-coil Test
	YBC2125M, YD80170M	

Note : T-Coil Measurements in this report were performed by Maximum Power (Pmax) in static power condition.

10. Air Interfaces and Operating Mode

Air Interface	Bands (MHz)	Type	C63.19 Tested	Simultaneous Transmitter	Audio Codecs Evaluated	
GSM	850	VO	Yes	Wi-Fi, BT	EFR ¹	
	1900					
	GPRS/EDGE	VD	Yes	Wi-Fi, BT	OPUS ¹	
UMTS	850	VO	Yes	Wi-Fi, BT	AMR-NB &AMR-WB ¹	
	1700					
	1900					
	HSPA	VD	Yes	Wi-Fi, BT	OPUS ¹	
LTE - FDD	680 (B71)	VD	Yes	NR, Wi-Fi, BT	(AMR-NB, AMR- WB, EVS-NB, EVS-WB& OPUS) ¹	
	700 (B12/13/14)					
	850 (B5/26)					
	1700 (B4/66)					
	1900 (B2/25)					
	2300 (B30)					
	2500 (B7)					
LTE – TDD	2600 (B38/41)	VD	Yes	NR, Wi-Fi, BT	(AMR-NB, AMR- WB, EVS-NB, EVS-WB& OPUS) ¹	
	3600 (B48)					
NR -FDD	680(B71)	VD	Yes	LTE, Wi-Fi, BT	(AMR-NB, AMR- WB, EVS-NB, EVS-WB& OPUS) ¹	
	700(B12/14)					
	850(B5/26)					
	1700(B66,B70)					
	1900(B2/25)					
	2300(B30)					
	2500 (B7)					
NR -TDD	2600(B38,B41)	VD	Yes	LTE, Wi-Fi, BT	(AMR-NB, AMR- WB, EVS-NB, EVS-WB& OPUS) ¹	
	3600 (B48)		Yes			
	3800(B77, B78)		Yes			
Wi-Fi	2450	VD	Yes	WWAN and BT, Wifi 5/6GHz	(AMR-NB, AMR- WB, EVS-NB, EVS-WB& OPUS) ¹	
	5200 (U-NII-1)			WWAN and Wifi 2.4GHz, BT		
	5300 (U-NII-2A)					
	5500 (U-NII-2C)					
	5800 (U-NII-3)		Yes ²			WWAN and Wifi 2.4GHz, BT
	5900 (U-NII-4)					
	6200(UNII 5)					
	6500(UNII 6)			No ³		
	6700(UNII 7)					
7000(UNII 8)						
BT	2450	DT	N/A	WWAN and Wifi 2.4GHz, Wifi 5/6GHz	N/A	
Type: VO: Legacy Cellular Voice Service DT: Digital Transport only(no voice) CMRS: Commercial Mobile Radio Service VD: IP Voice service over Digital Transport				Note: 1. Ref Lev in accordance with the ANSI 63.19-2019 Table 6.1 2. UNII band 5 was evaluated for operations which are entirely below 6 GHz. 3. Wifi 6GHz(UNII 6~8) are currently outside the scope of ANSI C63.19 and FCC HAC regulations.		

11. HAC (T-coil) Test Results

11.1 Codec Investigation

An investigation between the various codec configurations (Low/High bit rates for Narrowband, Wideband) and specific parameters are documented (Primary Group, Secondary Group, longitudinal contiguous points, transverse row contiguous points, frequency response) to determine the worst-case bit rates for each voice service type. The table below compares the varying codec configurations. A codec investigation was performed on one band of each GSM, UMTS, LTE FDD/TDD, NR FDD/TDD.

The highlighted results below were determined to be the worst case codec configuration(s) for GSM, UMTS and LTE, NR.

GSM

Codec Investigation				
Codec State	AMR-NB (kbit/s)		Orientation	Band/ Channel
	FR V1	HR V1		
Freq. Response(dB)	1.59	1.94	y (Transversal)	GSM 850 CH.190 ANT A
Primary	49	48		
Secondary	195	215		
Contiguous Longitudinal	14	14		
Contiguous Transverse	26	26		

UMTS

Codec Investigation								
Codec State	AMR-NB (kbit/s)			AMR-WB (kbit/s)			Orientation	Band/ Channel
	4.75	7.4	12.2	6.6	15.85	23.85		
Freq. Response(dB)	2.00	1.69	1.45	2.00	1.97	1.92	y (Transversal)	UMTS Band 2 Rel.99 CH.9400 ANT A
Primary	380	391	397	337	401	405		
Secondary	604	613	593	552	597	598		
Contiguous Longitudinal	26	26	26	26	26	26		
Contiguous Transverse	26	26	26	26	26	26		

LTE FDD

Codec Investigation								
Codec State	AMR-NB (kbit/s)			AMR-WB (kbit/s)			Orientation	Band/ Bandwidth/ Channel
	4.75	7.4	12.2	6.6	15.85	23.85		
Freq. Response(dB)	1.89	1.32	1.42	1.89	2.00	1.99	y (Transversal)	LTE Band25 CH.26365 20 Mhz QPSK 1RB 0offset ANT A
Primary	363	365	368	265	280	272		
Secondary	578	576	579	518	515	505		
Contiguous Longitudinal	26	25	25	25	24	24		
Contiguous Transverse	26	26	26	26	26	26		

Codec Investigation											
Codec State	EVS-NB (kbit/s)			EVS-WB (kbit/s)			EVS-SWB (kbit/s)			Orientation	Band/ Bandwidth/ Channel
	5.9	13.2	24.4	5.9	13.2	24.4	9.6	16.4	24.4		
Freq. Response(dB)	1.68	1.49	1.52	1.52	1.98	1.87	2.00	1.77	2.00	y (Transversal)	LTE Band25 CH.26365 20 MHz QPSK 1RB 0offset ANT A
Primary	321	338	343	239	294	296	312	307	312		
Secondary	548	534	541	542	523	526	547	543	546		
Contiguous Longitudinal	23	23	24	24	24	24	24	25	24		
Contiguous Transverse	26	26	26	26	26	26	26	26	26		

LTE TDD

Codec Investigation								
Codec State	AMR-NB (kbit/s)			AMR-WB (kbit/s)			Orientation	Band/ Bandwidth/ Channel
	4.75	7.4	12.2	6.6	15.85	23.85		
Freq. Response(dB)	1.14	1.32	1.56	1.95	1.75	1.99	y (Transversal)	LTE Band41 CH.40620 20 Mhz QPSK 1RB 0offset ANT B
Primary	258	262	261	227	224	224		
Secondary	466	467	452	442	414	415		
Contiguous Longitudinal	20	20	20	20	20	20		
Contiguous Transverse	26	26	26	26	26	26		

Codec Investigation											
Codec State	EVS-NB (kbit/s)			EVS-WB (kbit/s)			EVS-SWB (kbit/s)			Orientation	Band/ Bandwidth/ Channel
	5.9	13.2	24.4	5.9	13.2	24.4	9.6	16.4	24.4		
Freq. Response(dB)	1.56	1.39	1.58	1.97	1.64	2.00	2.00	2.00	2.00	y (Transversal)	LTE Band41 CH.40620 20 MHz QPSK 1RB 0offset ANT B
Primary	232	270	270	182	243	218	243	274	261		
Secondary	460	468	468	434	430	440	469	509	498		
Contiguous Longitudinal	22	20	20	21	21	21	22	26	24		
Contiguous Transverse	26	26	26	26	26	26	26	26	26		

NR FDD

Codec Investigation								
Codec State	AMR-NB (kbit/s)			AMR-WB (kbit/s)			Orientation	Band/ Bandwidth/ Channel
	4.75	7.4	12.2	6.6	15.85	23.85		
Freq. Response(dB)	1.78	2.00	1.44	1.82	1.66	1.65	y (Transversal)	NR Band n25 CH.376500 DFT-s OFDM QPSK 40 Mhz 1RB 1offset ANT A
Primary	314	301	330	284	330	340		
Secondary	525	512	530	530	520	533		
Contiguous Longitudinal	26	24	24	24	25	25		
Contiguous Transverse	26	26	26	26	26	26		

Codec Investigation											
Codec State	EVS-NB (kbit/s)			EVS-WB (kbit/s)			EVS-SWB (kbit/s)			Orientation	Band/ Bandwidth/ Channel
	5.9	13.2	24.4	5.9	13.2	24.4	9.6	16.4	24.4		
Freq. Response(dB)	1.33	1.27	1.51	1.98	2.00	1.91	1.93	1.79	2.00	y (Transversal)	NR Band n25 CH.376500 DFT-s OFDM QPSK 40 MHz 1RB 1offset ANT A
Primary	260	323	281	232	302	305	298	300	298		
Secondary	520	511	466	535	529	533	530	533	530		
Contiguous Longitudinal	24	23	23	25	25	26	25	25	26		
Contiguous Transverse	26	26	26	26	26	26	26	26	26		

NR TDD

Codec Investigation								
Codec State	AMR-NB (kbit/s)			AMR-WB (kbit/s)			Orientation	Band/ Bandwidth/ Channel
	4.75	7.4	12.2	6.6	15.85	23.85		
Freq. Response(dB)	2.00	1.44	1.55	2.00	1.87	1.79	y (Transversal)	NR Band n41 CH.518598 DFT-s OFDM QPSK 100 Mhz 1 RB 1 offset PC2 ANT I
Primary	191	196	199	158	173	172		
Secondary	379	381	382	378	380	379		
Contiguous Longitudinal	18	18	18	18	18	18		
Contiguous Transverse	26	26	26	26	26	26		

Codec Investigation											
Codec State	EVS-NB (kbit/s)			EVS-WB (kbit/s)			EVS-SWB (kbit/s)			Orientation	Band/ Bandwidth/ Channel
	5.9	13.2	24.4	5.9	13.2	24.4	9.6	16.4	24.4		
Freq. Response(dB)	1.37	1.48	1.65	1.62	2.00	2.00	2.00	1.99	1.99	y (Transversal)	NR Band n41 CH.518598 DFT-s OFDM QPSK 100 Mhz 1 RB 1 offset PC2 ANT I
Primary	132	195	197	117	176	173	165	170	170		
Secondary	381	381	383	378	383	381	380	383	383		
Contiguous Longitudinal	18	18	18	18	18	18	18	18	18		
Contiguous Transverse	26	26	26	26	26	26	26	26	26		

11.2 Air Interface Investigation

Use the worst-case codec test and document a limited set of bands/modulations/channels/bandwidth. Observe the effect of changing the band and bandwidth to ensure that there are no unexpected variations.

11.2.1 GSM / UMTS

Mode	Ch. Freq.	Ambient Noise dB (A/m)	Primary	Secondary	Contiguous longitudinal	Contiguous Transverse	Freq. Response(dB)	Hmax dB(A/m)	Plot No.
GSM 850 Codec: HR V1 ANT A	CH.190 836.5 MHz	-52.44	48	215	14	26	1.94	12.35	1
GSM 1900 Codec: HR V1 ANT A	CH.661 1880.0 MHz	-52.44	186	364	18	26	2.00	13.71	
GSM 850 Codec: HR V1 ANT A	CH.128 824.2 MHz	-52.44	66	225	14	26	1.89	13.68	2
	CH.251 848.8 MHz	-52.44	61	217	14	26	1.69	13.85	3
UMTS Band 2 AMR-WB Codec: 6.6kbit/s ANT A	CH.9400 1880.0 MHz	-52.44	337	552	26	26	2.00	11.91	
UMTS Band 2 AMR-WB Codec: 6.6kbit/s ANT I	CH.9400 1880.0 MHz	-52.44	327	543	26	26	1.73	12.21	
UMTS Band 4 AMR-WB Codec: 6.6kbit/s ANT A	CH.1412 1732.4 MHz	-52.44	332	547	26	26	2.00	12.27	
UMTS Band 4 AMR-WB Codec: 6.6kbit/s ANT I	CH.1412 1732.4 MHz	-52.44	332	544	26	26	2.00	12.25	
UMTS Band 5 AMR-WB Codec: 6.6kbit/s ANT A	CH.4183 836.6 MHz	-52.44	306	518	25	26	1.75	12.55	4
UMTS Band 5 AMR-WB Codec: 6.6kbit/s ANT A	CH.4132 826.4 MHz	-52.44	311	524	26	26	2.00	12.26	5
	CH.4233 846.6 MHz	-52.44	314	525	25	26	2.00	12.31	6

11.2.2 LTE-FDD

RB/ Modulation configuration

Mode	Ch. Freq.	BW	Mod.	RB Config.	Ambient Noise dB (A/m)	Primary	Secondary	Contiguous longitudinal	Contiguous Transverse	Freq. Response(dB)	Hmax dB (A/m)	Plot No.
LTE Band 25 ANT B Codec: EVS-WB 5.9kbit/s	CH.26365 1882.5 MHz	20 MHz	QPSK	1/0	-52.51	239	542	24	26	1.52	8.46	
				1/49	-52.53	265	556	24	26	2.00	6.50	
				1/99	-52.53	241	549	23	26	1.60	7.21	
				50/0	-52.53	255	559	24	26	1.94	6.26	
				50/25	-52.53	257	559	25	26	1.69	7.26	
				50/49	-52.53	258	552	24	26	2.00	7.50	
				100/0	-52.29	262	559	24	26	1.67	8.36	
		15 MHz 10 MHz 5 MHz 3 MHz 1.4 MHz	16QAM	1/0	-52.29	225	501	23	26	2.00	7.69	
			64QAM	1/0	-52.29	249	529	56	26	1.42	7.28	
			256QAM	1/0	-52.29	226	497	22	26	1.05	7.27	
			16QAM	1/0	-52.29	258	538	26	26	1.86	8.34	
				1/0	-52.29	245	515	26	26	1.11	7.70	
				1/0	-52.29	299	581	26	26	1.84	7.57	
				1/0	-52.29	220	500	22	26	1.38	7.88	
				1/0	-52.29	258	547	26	26	2.00	6.96	

Mode	Ch. Freq.	BW	Mod.	RB Config.	Ambient Noise dB (A/m)	Primary	Secondary	Contiguous longitudinal	Contiguous Transverse	Freq. Response(dB)	Hmax dB (A/m)	Plot No.
LTE Band 25 ANT I Codec: EVS-WB 5.9kbit/s	CH.26365 1882.5 MHz	3 MHz	16QAM	1/0	-52.46	221	513	23	26	2.00	7.62	
LTE Band 7 ANT B Codec: EVS-WB 5.9kbit/s	CH.21100 2535 MHz	5 MHz	16QAM	1/0	-52.46	269	530	24	26	1.63	9.51	
LTE Band 7 ANT I Codec: EVS-WB 5.9kbit/s	CH.21100 2535 MHz	5 MHz	16QAM	1/0	-52.46	202	484	21	26	1.71	7.65	
LTE Band 12 ANT A Codec: EVS-WB 5.9kbit/s	CH.23095 707.5 MHz	3 MHz	16QAM	1/0	-52.29	199	469	20	26	2.00	7.27	
LTE Band 13 ANT A Codec: EVS-WB 5.9kbit/s	CH.23230 782 MHz	5 MHz	16QAM	1/0	-52.29	181	450	19	26	1.83	7.01	
LTE Band 14 ANT A Codec: EVS-WB 5.9kbit/s	CH.23330 793 MHz	5 MHz	16QAM	1/0	-52.29	193	468	22	26	1.56	8.25	
LTE Band 26 ANT A Codec: EVS-WB 5.9kbit/s	CH.26865 831.5 MHz	5 MHz	16QAM	1/0	-52.29	186	465	20	26	2.00	8.23	
LTE Band 30 ANT B Codec: EVS-WB 5.9kbit/s	CH.27710 2310 MHz	5 MHz	16QAM	1/0	-52.46	297	559	26	26	1.69	9.16	
LTE Band 30 ANT I Codec: EVS-WB 5.9kbit/s	CH.27710 2310 MHz	5 MHz	16QAM	1/0	-52.46	198	477	20	26	2.00	7.33	
LTE Band 66 ANT A Codec: EVS-WB 5.9kbit/s	CH.132322 1745 MHz	3 MHz	16QAM	1/0	-52.29	267	553	26	26	2.00	7.64	
LTE Band 66 ANT I Codec: EVS-WB 5.9kbit/s	CH.132322 1745 MHz	3 MHz	16QAM	1/0	-52.46	215	491	21	26	1.48	7.87	
LTE Band 71 ANT A Codec: EVS-WB 5.9kbit/s	CH.133297 680.5 MHz	5 MHz	16QAM	1/0	-52.29	178	454	19	26	1.87	8.80	7
LTE Band 71 ANT A Codec: EVS-WB 5.9kbit/s	CH.133147 665.5 MHz	5 MHz	16QAM	1/0	-52.46	205	462	20	26	2.00	9.99	8
LTE Band 71 ANT A Codec: EVS-WB 5.9kbit/s	CH.133447 695.5 MHz	5 MHz	16QAM	1/0	-52.46	207	456	20	26	1.74	9.00	9

11.2.3 LTE-TDD

RB/ Modulation configuration

Mode	Ch. Freq.	BW	Mod.	RB Config.	Ambient Noise dB (A/m)	Primary	Secondary	Contiguous longitudinal	Contiguous Transverse	Freq. Response(dB)	Hmax dB (A/m)	Plot No.
LTE Band 41 ANT B Codec: EVS-WB 5.9kbit/s	CH.40620 2593 MHz	20 MHz	QPSK	1/0	-52.27	182	434	21	26	1.97	11.74	
				1/49	-52.39	227	488	23	26	2.00	11.30	
				1/99	-52.39	219	487	23	26	1.52	10.35	
				50/0	-52.39	235	493	24	26	1.42	10.25	
				50/25	-52.39	226	486	24	26	2.00	11.03	
				50/49	-52.39	221	480	26	26	2.00	11.42	
				100/0	-52.39	243	504	26	26	1.58	9.02	
		15 MHz	16QAM	1/0	-52.39	234	508	26	26	1.34	9.37	
			64QAM	1/0	-52.39	238	496	24	26	1.42	9.76	
			256QAM	1/0	-52.39	227	489	23	26	2.00	10.19	
			QPSK	1/0	-52.39	221	478	23	26	1.58	9.63	
				1/0	-52.39	228	483	23	26	1.93	11.81	
				1/0	-52.39	222	479	23	26	1.48	10.97	

Mode	Ch. Freq.	BW	Mod.	RB Config.	Ambient Noise dB (A/m)	Primary	Secondary	Contiguous longitudinal	Contiguous Transverse	Freq. Response(dB)	Hmax dB (A/m)	Plot No.
LTE Band 41 ANT I Codec: EVS-WB 5.9kbit/s	CH.40620 2593 MHz	20 MHz	QPSK	1/0	-52.33	134	378	17	26	1.83	9.73	10
LTE Band 48 ANT F Codec: EVS-WB 5.9kbit/s	CH.55990 3625 MHz	20 MHz	QPSK	1/0	-52.33	187	435	20	26	2.00	10.36	
LTE Band 41 ANT I Codec: EVS-WB 5.9kbit/s	CH.39750 2506 MHz	20 MHz	QPSK	1/0	-52.33	153	404	18	26	2.00	9.78	11
LTE Band 41 ANT I Codec: EVS-WB 5.9kbit/s	CH.40185.2 549.5 MHz	20 MHz	QPSK	1/0	-52.33	164	400	18	26	2.00	10.12	12
LTE Band 41 ANT I Codec: EVS-WB 5.9kbit/s	CH.41055 2636.5 MHz	20 MHz	QPSK	1/0	-52.33	159	393	18	26	1.87	9.77	13
LTE Band 41 ANT I Codec: EVS-WB 5.9kbit/s	CH.41490 2680 MHz	20 MHz	QPSK	1/0	-52.33	144	381	17	26	1.59	10.48	14

11.2.4 NR-FDD

RB/ Modulation configuration

Mode	Ch. Freq.	BW	Waveform	Mod.	RB Config.	Ambient Noise dB (A/m)	Primary	Secondary	Contiguous longitudinal	Contiguous Transverse	Freq. Response (dB)	Hmax dB (A/m)	Plot No.
NR Band n25 ANT A Codec: EVS-WB 5.9kbit/s	CH.376500 1882.5 MHz	40 MHz	CP-OFDM	QPSK	1/1	-56.76	239	507	23	26	2.00	7.56	
					1/108	-56.76	246	516	23	26	2.00	6.91	
					1/214	-56.76	236	511	23	26	1.57	7.91	
					108/0	-56.76	259	522	24	26	1.76	7.88	
					108/54	-56.76	262	523	25	26	2.00	8.02	
					108/108	-56.76	241	517	24	26	2.00	7.96	
					216/0	-56.76	250	519	24	26	2.00	9.27	
				16QAM	1/214	-56.63	240	500	24	26	2.00	8.23	
				64QAM	1/214	-56.63	240	508	24	26	1.14	8.26	
				256QAM	1/214	-56.63	255	518	23	26	2.00	7.51	
			DFT-s-OFDM	QPSK	1/1	-56.75	232	535	25	26	1.98	6.42	
					1/108	-56.75	249	520	25	26	1.55	6.79	
					1/214	-56.75	305	533	26	26	1.23	6.71	
					108/0	-56.76	232	500	22	26	2.00	6.92	
					108/54	-56.76	247	515	23	26	2.00	7.63	
					108/108	-56.76	238	507	22	26	1.53	6.34	
					216/0	-56.76	246	511	23	26	1.59	7.48	
				BPSK	108/0	-56.76	254	527	24	26	1.66	7.69	
				16QAM	108/0	-56.76	261	533	26	26	1.32	7.80	
				64QAM	108/0	-56.76	257	527	25	26	1.23	7.32	
				256QAM	108/0	-56.76	264	526	24	26	1.88	7.84	

Mode	Ch. Freq.	BW	Waveform	Mod.	RB Config.	Ambient Noise dB (A/m)	Primary	Secondary	Contiguous longitudinal	Contiguous Transverse	Freq. Response (dB)	Hmax dB (A/m)	Plot No.
NR Band n25 ANT A Codec: EVS-WB 5.9kbit/s	CH.376500 1882.5 MHz	35 MHz	DFT-s-OFDM	QPSK	90/0	-56.63	259	523	25	26	2.00	8.10	
		30 MHz			80/0	-56.63	219	476	24	26	1.59	6.45	
		25 MHz			64/0	-56.63	268	531	26	26	2.00	7.34	
		20 MHz			50/0	-56.63	267	538	26	26	2.00	7.12	
		15 MHz			36/0	-56.63	231	490	24	26	2.00	6.84	
		10 MHz			25/0	-56.63	264	545	25	26	1.91	6.84	
		5 MHz			12/0	-56.63	240	518	22	26	1.66	7.92	

Mode	Ch. Freq.	BW	Waveform	Mod.	RB Config.	Ambient Noise dB (A/m)	Primary	Secondary	Contiguous longitudinal	Contiguous Transverse	Freq. Response (dB)	Hmax dB (A/m)	Plot No.
NR Band n25 ANT I Codec: EVS-WB 5.9kbit/s	CH.376500 1882.5 MHz	30 MHz	DFT-s-OFDM	QPSK	80/0	-56.82	233	500	25	26	1.90	8.07	
NR Band n7 ANT B Codec: EVS-WB 5.9kbit/s	CH.507000 2535 MHz	30 MHz	DFT-s-OFDM	QPSK	80/0	-56.63	204	466	23	26	1.75	8.35	15
NR Band n7 ANT I Codec: EVS-WB 5.9kbit/s	CH.507000 2535 MHz	30 MHz	DFT-s-OFDM	QPSK	80/0	-56.82	258	524	26	26	2.00	8.16	
NR Band n12 ANT A Codec: EVS-WB 5.9kbit/s	CH.141500 707.5 MHz	15 MHz	DFT-s-OFDM	QPSK	36/0	-56.63	257	530	24	26	1.94	7.69	
NR Band n14 ANT A Codec: EVS-WB 5.9kbit/s	CH.158600 793 MHz	10 MHz	DFT-s-OFDM	QPSK	25/0	-56.63	280	553	24	26	1.71	8.82	
NR Band n26 ANT A Codec: EVS-WB 5.9kbit/s	CH.166300 831.5 MHz	20 MHz	DFT-s-OFDM	QPSK	50/0	-56.63	226	494	23	26	1.95	8.47	
NR Band n30 ANT B Codec: EVS-WB 5.9kbit/s	CH.462000 2310 MHz	10 MHz	DFT-s-OFDM	QPSK	25/0	-56.63	260	531	24	26	1.65	7.50	
NR Band n30 ANT I Codec: EVS-WB 5.9kbit/s	CH.462000 2310 MHz	10 MHz	DFT-s-OFDM	QPSK	25/0	-56.82	249	515	23	26	1.82	7.81	
NR Band n66 ANT A Codec: EVS-WB 5.9kbit/s	CH.349000 1745 MHz	30 MHz	DFT-s-OFDM	QPSK	80/0	-56.63	252	526	25	26	1.86	6.96	
NR Band n66 ANT I Codec: EVS-WB 5.9kbit/s	CH.349000 1745 MHz	30 MHz	DFT-s-OFDM	QPSK	80/0	-56.82	248	522	23	26	1.81	7.54	
NR Band n70 ANT A Codec: EVS-WB 5.9kbit/s	CH.340500 1702.5 MHz	15 MHz	DFT-s-OFDM	QPSK	36/0	-56.63	240	516	23	26	1.41	7.53	
NR Band n70 ANT I Codec: EVS-WB 5.9kbit/s	CH.340500 1702.5 MHz	15 MHz	DFT-s-OFDM	QPSK	36/0	-56.82	262	530	25	26	2.00	7.94	
NR Band n71 ANT A Codec: EVS-WB 5.9kbit/s	CH.136100 680.5 MHz	20 MHz	DFT-s-OFDM	QPSK	50/0	-56.63	262	533	23	26	1.77	7.78	
NR Band n7 ANT B Codec: EVS-WB 5.9kbit/s	CH.503000 2515 MHz	30 MHz	DFT-s-OFDM	QPSK	80/0	-56.63	245	518	24	26	1.84	8.13	16
NR Band n7 ANT B Codec: EVS-WB 5.9kbit/s	CH.511000 2555 MHz	30 MHz	DFT-s-OFDM	QPSK	80/0	-56.63	244	516	25	26	1.67	8.68	17

11.2.5 NR-TDD

RB/ Modulation configuration

Mode	Ch. Freq.	BW	Waveform	Mod.	RB Config.	Ambient Noise dB (A/m)	Primary	Secondary	Contiguous longitudinal	Contiguous Transverse	Freq. Response (dB)	Hmax dB (A/m)	Plot No.
NR Band n41 PC2 ANT I Codec: EVS-WB 5.9kbit/s	CH.518598 2592.99 MHz	100 MHz	CP-OFDM	QPSK	1/1	-56.76	136	410	18	26	1.59	6.23	
					1/137	-56.76	133	402	18	26	2.00	5.29	
					1/271	-56.76	128	400	18	26	1.84	5.96	
					137/0	-56.76	142	417	19	26	2.00	5.95	
					137/68	-56.76	138	406	18	26	1.63	6.14	
					137/136	-56.76	143	416	19	26	2.00	7.00	
					273/0	-56.76	146	418	19	26	2.00	6.69	
				16QAM	1/271	-56.76	135	403	18	26	2.00	6.62	
				64QAM	1/271	-56.76	142	414	19	26	2.00	6.19	
				256QAM	1/271	-56.76	174	462	21	26	2.00	6.54	
			DFT-s-OFDM	QPSK	1/1	-56.8	117	378	18	26	1.62	7.57	
					1/137	-56.8	116	382	18	26	1.73	6.44	
					1/271	-56.8	116	381	18	26	1.90	6.73	
					135/0	-56.8	128	398	18	26	2.00	6.94	
					135/67	-56.8	116	385	18	26	2.00	5.97	
					135/138	-56.8	125	400	18	26	1.92	5.56	
					270/0	-56.8	124	395	18	26	1.91	5.84	
				BPSK	1/271	-56.8	108	372	18	26	2.00	6.22	
				16QAM	1/271	-56.8	119	385	18	26	1.40	5.78	
				64QAM	1/271	-56.8	132	399	18	26	1.96	4.99	
				256QAM	1/271	-56.76	279	601	26	26	1.92	6.28	

Mode	Ch. Freq.	BW	Waveform	Mod.	RB Config.	Ambient Noise dB (A/m)	Primary	Secondary	Contiguous longitudinal	Contiguous Transverse	Freq. Response (dB)	Hmax dB (A/m)	Plot No.
NR Band 41PC2 ANT I Codec: EVS-WB 5.9 kbit/s	CH.518598 2592.99 MHz	90 MHz	DFT-s-OFDM	BPSK	1/243	-56.76	279	601	26	26	2.00	6.42	
		80 MHz			1/215	-56.77	113	378	18	26	2.00	6.31	
		70 MHz			1/187	-56.77	114	375	18	26	2.00	5.52	
		60 MHz			1/160	-56.77	107	378	18	26	2.00	5.63	18
		50 MHz			1/131	-56.77	145	420	19	26	2.00	5.74	
		40 MHz			1/104	-56.77	149	417	19	26	2.00	5.75	
		30 MHz			1/76	-56.77	145	415	19	26	2.00	4.81	
		25 MHz			1/63	-56.77	118	375	18	26	1.79	6.59	
		20 MHz			1/49	-56.77	127	395	18	26	2.00	6.11	
		15 MHz			1/36	-56.77	127	393	18	26	1.82	4.90	
		10 MHz			1/22	-56.77	125	396	18	26	2.00	6.45	
NR Band n38 ANT B Codec: EVS-WB 5.9kbit/s	CH.519000 2595 MHz	40 MHz	DFT-s-OFDM	BPSK	1/104	-56.77	152	413	19	26	2.00	7.11	
NR Band n48 ANT F Codec: EVS-WB 5.9kbit/s	CH.641666 3624.99 MHz	40 MHz	DFT-s-OFDM	BPSK	1/104	-56.77	150	433	18	26	2.00	5.84	
NR Band n77 ANT F Codec: EVS-WB 5.9kbit/s	CH.650000 3750 MHz	60 MHz	DFT-s-OFDM	BPSK	1/160	-56.77	127	405	18	26	1.88	5.80	
NR Band n77 DoD ANT F Codec: EVS-WB 5.9kbit/s	CH.633334 3500.01 MHz	60 MHz	DFT-s-OFDM	BPSK	1/160	-56.77	145	415	18	26	1.19	5.92	
NR Band n41 ANT I Codec: EVS-WB 5.9kbit/s	CH.505200 2526 MHz	60 MHz	DFT-s-OFDM	BPSK	1/160	-56.77	125	386	18	26	2.00	5.33	19
NR Band n41 ANT I Codec: EVS-WB 5.9kbit/s	CH.531996 2659.98 MHz	60 MHz	DFT-s-OFDM	BPSK	1/160	-56.77	121	386	18	26	1.95	6.53	20

11.3 VoWi-Fi Codec Investigation

An investigation between the various codec configurations (Low/High bit rates for Narrowband, Wideband) and specific parameters are documented (Primary Group, Secondary Group, longitudinal contiguous points, transverse row contiguous points, frequency response) to determine the worst-case bit rates for each voice service type. The table below compares the varying codec configurations. A codec investigation was performed for each Wi-Fi 2.4 GHz and 5 GHz.

The highlighted results below were determined to be the worst case codec configuration(s) for Wi-Fi 2.4 GHz and 5 GHz.

Wi-Fi 2.4 GHz

Codec Investigation								
Codec State	AMR-NB (kbit/s)			AMR-WB (kbit/s)			Orientation	Band/ Bandwidth/ Channel
	4.75	7.4	12.2	6.6	15.85	23.85		
Freq. Response(dB)	2.00	1.46	1.55	2.00	2.00	2.00	y (Transversal)	802.11b CH.6 2437 MHz DSSS 1Mbps
Primary	269	272	277	240	247	255		
Secondary	472	470	473	472	470	477		
Contiguous Longitudinal	23	23	22	23	23	23		
Contiguous Transverse	26	26	26	26	26	26		

Codec Investigation											
Codec State	EVS-NB (kbit/s)			EVS-WB (kbit/s)			EVS-SWB (kbit/s)			Orientation	Band/ Bandwidth/ Channel
	5.9	13.2	24.4	5.9	13.2	24.4	9.6	16.4	24.4		
Freq. Response(dB)	1.87	1.73	1.75	2.00	2.00	2.00	2.00	2.00	2.00	y (Transversal)	802.11b CH.6 2437 MHz DSSS 1Mbps
Primary	263	330	332	239	298	312	291	291	290		
Secondary	517	522	525	519	517	532	519	521	517		
Contiguous Longitudinal	23	24	23	23	23	24	24	23	23		
Contiguous Transverse	26	26	26	26	26	26	26	26	26		

Wi-Fi 5 GHz

Codec Investigation								
Codec State	AMR-NB (kbit/s)			AMR-WB (kbit/s)			Orientation	Band/ Bandwidth/ Channel
	4.75	7.4	12.2	6.6	15.85	23.85		
Freq. Response(dB)	2.00	1.78	1.61	2.00	1.97	2.00	y (Transversal)	802.11a CH.40 5200 MHz BPSK 6Mbps
Primary	301	311	311	294	300	293		
Secondary	493	502	495	493	486	480		
Contiguous Longitudinal	23	23	22	22	22	22		
Contiguous Transverse	26	26	26	26	26	26		

Codec Investigation											
Codec State	EVS-NB (kbit/s)			EVS-WB (kbit/s)			EVS-SWB (kbit/s)			Orientation	Band/ Bandwidth/ Channel
	5.9	13.2	24.4	5.9	13.2	24.4	9.6	16.4	24.4		
Freq. Response(dB)	1.06	1.85	1.73	2.00	2.00	1.81	2.00	2.00	2.00	y (Transversal)	802.11a CH.40 5200 MHz BPSK 6Mbps
Primary	265	305	302	236	287	295	213	220	212		
Secondary	495	499	493	485	476	485	438	450	435		
Contiguous Longitudinal	22	22	22	22	22	22	22	22	22		
Contiguous Transverse	26	26	26	26	26	26	26	26	26		

11.4 VoWi-Fi Antennas Investigation

EVS-WB 5.9 kbit/s was the worst case bit-rates for 2.4GHz 802.11b, EVS-SWB 24.4 kbit/s was the worst case bit-rates for 5GHz 802.11a. The secondary antenna was investigated to determine which antennas yields a worse Primary Group.

The worst case codec and bit-rate from 802.11b 2.4GHz, 802.11a 5GHz Antenna MIMO was used to determine Antenna 1, 2 exclusions.

2.4GHz Antenna Investigation					
Codec State	ANT1	ANT2	MIMO	Orientation	Band/ Bandwidth/ Channel
	EVS-WB (kbit/s)				
	5.9				
Freq. Response(dB)	2	2	2	y (Transversal)	802.11b CH.6 2437 MHz 1Mbps
Primary	258	278	239		
Secondary	549	527	519		
Contiguous Longitudinal	26	23	23		
Contiguous Transverse	26	26	26		

5GHz Antenna Investigation					
Codec State	ANT1	ANT2	MIMO	Orientation	Band/ BandWidth/ Channel
	EVS-SWB (kbit/s)				
	24.4				
Freq. Response(dB)	2	2	2.00	y (Transversal)	802.11a CH.40 5200 MHz 6Mbps
Primary	214	226	212		
Secondary	399	453	435		
Contiguous Longitudinal	21	22	22		
Contiguous Transverse	26	26	26		

11.5 VoWi-Fi Air Interface Investigation

Using the data from § 11.4, further testing was performed on the remaining 802.11 modes. The objective of these measurements is to ensure that changing the modulation, bandwidth, and data rate, whilst using the worst case codec configuration measured in § 11.3, § 11.4, yields no unexpected variations.

VoWi-Fi Air Interface Investigation (Continued)

Mode	Ch. Freq.	BW	Mod.	Ambient Noise dB (A/m)	Primary	Secondary	Contiguous longitudinal	Contiguous Transverse	Freq. Response (dB)	Hmax dB (A/m)	Plot No.
802.11b Codec: EVS-WB 5.9kbit/s	CH.6 2437 MHz	20 MHz	1 Mbps	-56.69	239	519	23	26	2.00	7.30	
			5.5 Mbps	-56.69	248	515	24	26	2.00	7.45	
			11 Mbps	-56.69	237	513	24	26	2.00	7.21	21
802.11g Codec: EVS-WB 5.9kbit/s	CH.6 2437 MHz	20 MHz	6 Mbps	-56.69	263	540	24	26	1.67	7.68	
802.11n HT20 Codec: EVS-WB 5.9kbit/s	CH.6 2437 MHz	20 MHz	MCS 0	-56.69	255	536	22	26	2.00	7.22	
802.11ac VHT20 Codec: EVS-WB 5.9kbit/s	CH.6 2437 MHz	20 MHz	MCS 0	-56.69	264	546	24	26	2.00	7.36	
802.11ax HE20 Codec: EVS-WB 5.9kbit/s	CH.6 2437 MHz	20 MHz	MCS 0	-56.69	251	53	24	26	2.00	7.40	
802.11b Codec: EVS-WB 5.9kbit/s	CH.1 2412 MHz	20 MHz	11Mbps	-56.69	245	534	24	26	1.54	7.98	22
	CH.11 2462 MHz			-56.69	252	534	23	26	2.00	9.15	23

Mode	Ch. Freq.	BW	Mod.	Ambient Noise dB (A/m)	Primary	Secondary	Contiguous longitudinal	Contiguous Transverse	Freq. Response (dB)	Hmax dB (A/m)	Plot No.
802.11a Codec: EVS-SWB 24.4kbit/s	CH.40 5200 MHz	20 MHz	6 Mbps	-52.37	213	438	22	26	2.00	10.76	
			18 Mbps	-52.37	222	455	22	26	2.00	10.42	
			54 Mbps	-52.37	213	445	22	26	2.00	10.53	
802.11n HT20 Codec: EVS-SWB24.4 kbit/s	CH.40 5200 MHz	20 MHz	MCS 0	-52.37	216	442	22	26	2.00	10.69	
			MCS 3	-52.37	219	446	22	26	2.00	10.56	
			MCS 7	-52.37	220	446	22	26	2.00	10.56	
802.11n HT40 Codec: EVS-SWB 24.4 kbit/s	CH.38 5190 MHz	40 MHz	MCS 0	-52.37	220	450	22	26	2.00	10.57	
			MCS 3	-52.37	218	452	22	26	2.00	10.59	
			MCS 7	-52.37	205	435	22	26	2.00	10.58	
802.11acVHT20 Codec: EVS-SWB 24.4 kbit/s	CH.40 5200 MHz	20 MHz	MCS 0	-52.37	210	437	22	26	2.00	10.32	
			MCS 4	-52.37	211	439	22	26	2.00	10.25	
			MCS 8	-52.37	220	448	22	26	2.00	10.59	
802.11ac VHT40 Codec: EVS-SWB 24.4 kbit/s	CH.38 5190 MHz	40 MHz	MCS 0	-52.42	227	459	22	26	2.00	11.17	
			MCS 4	-52.42	223	455	21	26	2.00	11.19	
			MCS 9	-52.42	230	461	22	26	2.00	11.24	
802.11ac VHT80 Codec: EVS-SWB 24.4 kbit/s	CH.42 5210 MHz	80 MHz	MCS 0	-52.42	229	455	22	26	2.00	11.18	
			MCS 4	-52.42	225	459	22	26	2.00	10.99	
			MCS 9	-52.42	229	465	22	26	2.00	11.02	
802.11ac VHT160 Codec: EVS-SWB 24.4 kbit/s	CH.50 5250 MHz	160 MHz	MCS 0	-52.42	214	444	21	26	2.00	10.83	
			MCS 4	-52.42	221	462	24	26	2.00	10.62	
			MCS 9	-52.42	219	458	22	26	2.00	10.37	
802.11ax HE20 Codec: EVS-SWB 24.4 kbit/s	CH.40 5200 MHz	20 MHz	MCS 0	-52.42	224	455	22	26	2.00	10.75	
			MCS 6	-52.42	227	462	22	26	2.00	10.64	
			MCS 11	-52.42	227	462	22	26	2.00	10.58	
802.11axHE40 Codec: EVS-SWB24.4 kbit/s	CH.38 5190 MHz	40 MHz	MCS 0	-52.42	225	456	22	26	2.00	10.69	
			MCS 6	-52.42	225	462	22	26	2.00	10.55	
			MCS 11	-52.42	226	465	22	26	2.00	10.48	
802.11axHE80 Codec: EVS-SWB 24.4 kbit/s	CH.42 5210 MHz	80 MHz	MCS 0	-52.36	199	421	21	26	2.00	10.69	24
			MCS 6	-52.36	219	446	21	26	2.00	10.92	
			MCS 11	-52.36	209	431	21	26	2.00	10.77	
802.11ax HE160 Codec: EVS-SWB 24.4 kbit/s	CH.50 5250 MHz	160 MHz	MCS 0	-52.36	207	431	21	26	2.00	10.40	
			MCS 6	-52.36	219	450	22	26	2.00	10.81	
			MCS 11	-52.36	222	448	22	26	2.00	10.72	

Mode	Ch. Freq.	BW	Mod.	Ambient Noise dB (A/m)	Primary	Secondary	Contiguous longitudinal	Contiguous Transverse	Freq. Response (dB)	Hmax dB (A/m)	Plot No.
802.11ax HE20 Codec: EVS-SWB 24.4 kbit/s	CH.5 5975 MHz	20 MHz	MCS 0	-52.41	220	447	22	26	1.74	10.69	
802.11ax HE40 Codec: EVS-SWB 24.4 kbit/s	CH.3 5965 MHz	40 MHz	MCS 0	-52.41	227	457	22	26	1.85	10.84	
802.11ax HE80 Codec: EVS-SWB 24.4 kbit/s	CH.58 5290 MHz	80 MHz	MCS 0	-52.41	220	448	22	26	1.87	10.87	25
	CH.122 5610 MHz	80 MHz	MCS 0	-52.41	225	463	22	26	2.00	10.61	26
	CH.155 5775 MHz	80 MHz	MCS 0	-52.41	225	462	22	26	2.00	10.96	27
	CH.171 5855 MHz	80 MHz	MCS 0	-52.41	228	465	22	26	2.00	11.32	28

11.6 OTT Codec Investigation

The DUT's nested OTT application supports range of codec bit rate 6 – 75 kbit/s, thus an investigation between the various codec configurations (6/75 as Low/High bit rates) and specific parameters are documented (Primary Group, Secondary Group, longitudinal contiguous points, transverse row contiguous points, Frequency Response) to determine the worst-case bit rates for each service type.

The table below compares the varying codec configurations.

Codec Investigation					
Codec State	codec bit rate (kbit/s)			Orientation	Band/ BandWidth/ Channel
	6	40	75		
Freq. Response(dB)	2.00	1.69	2.00	y(Transversal)	GSM 850 EDGE 2 slot CH.128 824.2 MHz ANT A
Primary	130	147	133		
Secondary	287	318	292		
Contiguous Longitudinal	15	16	15		
Contiguous Transverse	26	26	26		
Freq. Response(dB)	1.89	2.00	2.00	y(Transversal)	UMTS Band 2 HSUPA subtest 1 CH.9262 1852.4 MHz ANT A
Primary	486	500	344		
Secondary	651	657	512		
Contiguous Longitudinal	26	26	23		
Contiguous Transverse	26	26	26		
Freq. Response(dB)	1.76	2.00	2.00	y(Transversal)	LTE Band 71 5 MHz 16QAM 1RB 0offset CH.133297 680.5 MHz ANT A
Primary	275	289	280		
Secondary	446	448	440		
Contiguous Longitudinal	19	20	20		
Contiguous Transverse	26	26	26		
Freq. Response(dB)	2.00	2.00	2.00	y(Transversal)	LTE Band 41 PC3 5 MHz QPSK 1RB 0offset CH.40620 MHz ANT I
Primary	253	260	252		
Secondary	412	407	401		
Contiguous Longitudinal	18	18	18		
Contiguous Transverse	26	26	26		

Codec Investigation					
Codec State	codec bit rate (kbit/s)			Orientation	Band/ Bandwidth/ Channel
	6	40	75		
Freq. Response (dB)	1.34	2.00	2.00	y(Transversal)	2.4 GHz 802.11b 11Mbps CH.6 2437 MHz
Primary	290	292	295		
Secondary	417	418	417		
Contiguous Longitudinal	20	20	20		
Contiguous Transverse	26	26	26		
Freq. Response (dB)	1.38	2.00	1.99	y(Transversal)	5 GHz 802.11ax80 MCS0 CH.42 5210 MHz
Primary	337	356	342		
Secondary	463	484	471		
Contiguous Longitudinal	20	21	20		
Contiguous Transverse	26	26	26		
Freq. Response(dB)	1.64	2.00	2.00	y(Transversal)	NR Band n7 30 MHz DFT-s-OFDM QPSK 80RB 0offset CH.507000 2535 MHz ANT B
Primary	330	339	333		
Secondary	503	507	501		
Contiguous Longitudinal	22	21	22		
Contiguous Transverse	26	26	26		
Freq. Response(dB)	1.64	2.00	2.00	y(Transversal)	NR Band n41 60 MHz DFT-s-OFDM BPSK 1RB 160offset CH.518598 2592.99 MHz ANT I
Primary	241	245	245		
Secondary	406	403	402		
Contiguous Longitudinal	18	18	18		
Contiguous Transverse	26	26	26		

11.7 OTT Air Interface Investigation

Mode	Ch. Freq.	BW	Mod.	RB Config.	Ambient Noise dB (A/m)	Primary	Secondary	Contiguous longitudinal	Contiguous Transverse	Freq. Response (dB)	Hmax dB (A/m)	Plot No.
GSM850 EDGE 2 slots GoogleMeet Codec: 6kbit/s ANT A	CH.190 836.6 MHz				-52.46	130	287	15	26	2.00	15.82	29
GSM1900 EDGE 2 slots GoogleMeet Codec: 6kbit/s ANT A	CH.661 1880 MHz				-52.46	221	391	18	26	1.58	15.05	
GSM850 EDGE 2 slots GoogleMeet Codec: 6kbit/s ANT A	CH.128 824.2 MHz				-52.46	112	282	15	26	1.68	14.82	30
GSM850 EDGE 2 slots GoogleMeet Codec: 6kbit/s ANT A	CH.251 848.8 MHz				-52.46	113	283	15	26	1.78	15.99	31
UMTS Band 2 HSUPA subtest1 GoogleMeet Codec: 75kbit/s ANT A	CH.9400 1880 MHz				-52.46	346	516	23	26	2.00	14.60	
UMTS Band 2 HSUPA subtest1 GoogleMeet Codec: 75kbit/s ANT I	CH.9400 1880 MHz				-52.46	380	518	23	26	2.00	16.69	
UMTS Band 4 HSUPA subtest1 GoogleMeet Codec: 75kbit/s ANT A	CH.1412 1732.4 MHz				-52.46	342	501	21	26	2.00	14.91	32
UMTS Band 4 HSUPA subtest1 GoogleMeet Codec: 75kbit/s ANT I	CH.1412 1732.4 MHz				-52.46	342	501	21	26	1.97	15.67	
UMTS Band 5 HSUPA subtest1 GoogleMeet Codec: 75kbit/s ANT A	CH.4183 836.6 MHz				-52.46	344	512	23	26	2.00	14.72	
LTE Band 7 Google Meet Codec: 6kbit/s ANT B	CH.21100 2535 MHz	5 MHz	16QAM	1/0	-56.76	339	510	22	26	1.65	14.69	
LTE Band 7 Google Meet Codec: 6kbit/s ANT I	CH.21100 2535 MHz	5 MHz	16QAM	1/0	-56.76	323	494	21	26	1.20	14.18	
LTE Band 12 Google Meet Codec: 6kbit/s ANT A	CH.23095 70 7.5 MHz	3 MHz	16QAM	1/0	-56.76	318	486	22	26	1.40	14.92	
LTE Band 13 Google Meet Codec: 6kbit/s ANT A	CH.23230 782.0 MHz	5 MHz	16QAM	1/0	-56.76	296	466	21	26	1.52	14.68	
LTE Band 14 Google Meet Codec: 6kbit/s ANT A	CH.23330 793 MHz	5 MHz	16QAM	1/0	-56.76	296	470	20	26	1.45	14.72	
LTE Band 25 Google Meet Codec: 6kbit/s ANT A	CH.26365 1882.5 MHz	3 MHz	16QAM	1/0	-56.76	357	529	22	26	1.19	14.09	
LTE Band 25 Google Meet Codec: 6kbit/s ANT I	CH.26365 1882.5 MHz	3 MHz	16QAM	1/0	-56.76	330	502	21	26	2.00	14.33	
LTE Band 26 Google Meet Codec: 6kbit/s ANT A	CH.26865 831.5 MHz	5 MHz	16QAM	1/0	-56.76	308	461	20	26.00	1.48	14.74	

Mode	Ch. Freq.	BW	Mod.	RB Config.	Ambient Noise dB (A/m)	Primary	Secondary	Contiguous longitudinal	Contiguous Transverse	Freq. Response (dB)	Hmax dB (A/m)	Plot No.
LTE Band 30 Google Meet Codec: 6kbit/s ANT B	CH.27710 2310 MHz	5 MHz	16QAM	1/0	-56.76	313	482	20	26	1.72	13.60	
LTE Band 30 Google Meet Codec: 6kbit/s ANT I	CH.27710 2310 MHz	5 MHz	16QAM	1/0	-56.76	321	490	21	26	1.34	14.48	
LTE Band 66 Google Meet Codec: 6kbit/s ANT A	CH.132322 1745 MHz	3 MHz	16QAM	1/0	-56.76	351	517	22	26	1.35	13.79	
LTE Band 66 Google Meet Codec: 6kbit/s ANT I	CH.132322 1745 MHz	3 MHz	16QAM	1/0	-56.76	342	514	22	26	2.00	14.49	
LTE Band 71 Google Meet Codec: 6kbit/s ANT A	CH.133297 680.5 MHz	5 MHz	16QAM	1/0	-56.87	275	446	19	26	1.76	14.58	33
LTE Band 41 PC3 Google Meet Codec: 75kbit/s ANT B	CH.40620 2593 MHz	20 MHz	QPSK	1/0	-56.68	331	486	21	26	2.00	14.34	
LTE Band 41 PC3 Google Meet Codec: 75kbit/s ANT I	CH.40620 2593 MHz	20 MHz	QPSK	1/0	-56.68	252	401	18	26	2.00	14.21	34
LTE Band 48 PC3 Google Meet Codec: 75kbit/s ANT E	CH.55990 3625 MHz	20 MHz	QPSK	1/0	-56.68	294	447	20	26	2.00	14.32	
Wi-Fi 2.4 GHz 802.11b Google Meet Codec: 6 kbit/s	CH.6 2437 MHz	20 MHz	11Mbps		-52.46	290	417	20	26	1.34	17.04	35
U-NII 5.2 GHz 802.11ax80 Google Meet Codec: 6kbit/s	CH.42 5210 MHz	80 MHz	MCS0		-52.45	337	463	20	26	1.38	16.74	36
U-NII 5.3 GHz 802.11ax80 Google Meet Codec: 6kbit/s	CH.58 5290 MHz	80 MHz	MCS0		-52.45	348	485	20	26	1.80	16.08	
U-NII 5.6 GHz 802.11ax80 Google Meet Codec: 6kbit/s	CH.122 5610 MHz	80 MHz	MCS0		-52.45	354	501	21	26	1.96	16.27	
U-NII 5.8 GHz 802.11ax80 Google Meet Codec: 6kbit/s	CH.155 5775 MHz	80 MHz	MCS0		-52.45	356	500	23	26	2.00	16.39	
U-NII 5.8 GHz 802.11ax80 Google Meet Codec: 6kbit/s	CH.171 5855 MHz	80 MHz	MCS0		-52.45	343	492	20	26	1.56	16.09	

Mode	Ch. Freq.	BW	Wave form	Mod.	RB Config.	Ambient Noise dB (A/m)	Primary	Secondary	Contiguous longitudinal	Contiguous Transverse	Freq. Response (dB)	Hmax dB (A/m)	Plot No.
NR Band n7 Google Meet Codec: 6kbit/s ANT B	CH.507000 2535 MHz	30 MHz	DFT-s-OFDM	QPSK	80/0	-56.89	330	503	22	26	1.64	13.55	
NR Band n7 Google Meet Codec: 6kbit/s ANT I	CH.507000 2535 MHz	30 MHz	DFT-s-OFDM	QPSK	80/0	-56.89	335	504	22	26	1.89	14.59	
NR Band n12 Google Meet Codec: 6kbit/s ANT A	CH.141500 707.5 MHz	15 MHz	DFT-s-OFDM	QPSK	36/0	-56.89	359	530	23	26	1.69	13.68	
NR Band n14 Google Meet Codec: 6kbit/s ANT A	CH.158600 793 MHz	10 MHz	DFT-s-OFDM	QPSK	25/0	-56.89	343	513	22	26	1.64	14.73	
NR Band n25 Google Meet Codec: 6kbit/s ANT A	CH.376500 1882.5 MHz	30 MHz	DFT-s-OFDM	QPSK	80/0	-56.89	326	497	22	26	1.08	14.78	
NR Band n25 Google Meet Codec: 6kbit/s ANT B	CH.376500 1882.5 MHz	30 MHz	DFT-s-OFDM	QPSK	80/0	-56.89	342	514	22	26	1.27	14.41	
NR Band n26 Google Meet Codec: 6kbit/s ANT A	CH.166300 831.5 MHz	20 MHz	DFT-s-OFDM	QPSK	50/0	-56.89	304	480	22	26	1.07	13.47	37
NR Band n30 Google Meet Codec: 6kbit/s ANT B	CH.462000 2310 MHz	10 MHz	DFT-s-OFDM	QPSK	25/0	-56.89	334	506	22	26	1.76	14.41	
NR Band n30 Google Meet Codec: 6kbit/s ANT I	CH.462000 2310 MHz	10 MHz	DFT-s-OFDM	QPSK	25/0	-56.89	331	505	22	26	1.08	14.08	
NR Band n66 Google Meet Codec: 6kbit/s ANT A	CH.349000 1745 MHz	30 MHz	DFT-s-OFDM	QPSK	80/0	-56.89	310	485	22	26	2.00	14.37	
NR Band n66 Google Meet Codec: 6kbit/s ANT I	CH.349000 1745 MHz	30 MHz	DFT-s-OFDM	QPSK	80/0	-56.89	288	461	21	26	1.66	14.33	
NR Band n70 Google Meet Codec: 6kbit/s ANT A	CH.340500 1702.5 MHz	15 MHz	DFT-s-OFDM	QPSK	36/0	-56.89	317	491	21	26	2.00	14.84	
NR Band n70 Google Meet Codec: 6kbit/s ANT I	CH.340500 1702.5 MHz	15 MHz	DFT-s-OFDM	QPSK	36/0	-56.89	318	491	22	26	2.00	14.30	
NR Band n71 Google Meet Codec: 6kbit/s ANT A	CH.136100 680.5 MHz	20 MHz	DFT-s-OFDM	QPSK	50/0	-56.89	328	498	21	26	2.00	14.73	
NR Band n41 Google Meet Codec: 6kbit/s ANT I	CH.518598 2592.99 MHz	60 MHz	DFT-s-OFDM	BPSK	1/160	-56.78	241	406	18	26	1.64	13.40	
NR Band n38 Google Meet Codec: 6kbit/s ANT B	CH.519000 2595 MHz	40 MHz	DFT-s-OFDM	BPSK	1/104	-56.78	252	410	18	26	2.00	14.07	
NR Band n48 Google Meet Codec: 6kbit/s ANT F	CH.641666 3624.99 MHz	40 MHz	DFT-s-OFDM	BPSK	1/104	-56.78	242	410	18	26	1.61	14.53	
NR Band n77 Google Meet Codec: 6kbit/s ANT F	CH.653556 3803.34 MHz	60 MHz	DFT-s-OFDM	BPSK	1/160	-56.78	220	387	17	26	1.84	14.51	
NR Band n77 DoD Google Meet Codec: 6kbit/s ANT F	CH.633334 3500.01 MHz	60 MHz	DFT-s-OFDM	BPSK	1/160	-56.78	220	387	17	26	1.69	14.40	38

Appendix 1. TEST SETUP PHOTO

Please refer to test Setup Photo file no. as follows;

Rev. No.	File No.
0	HCT-SR-2504-FC013-P

Appendix 2. HAC T-COIL Test Plots

Plot 1 GSM 850 CH.190 Voice Codec Speech Codec: HR V1 ANT A

Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
AM1DV3 - 3050	January 20, 2025	DAE4 Sn466	September 03, 2024

Communication Systems

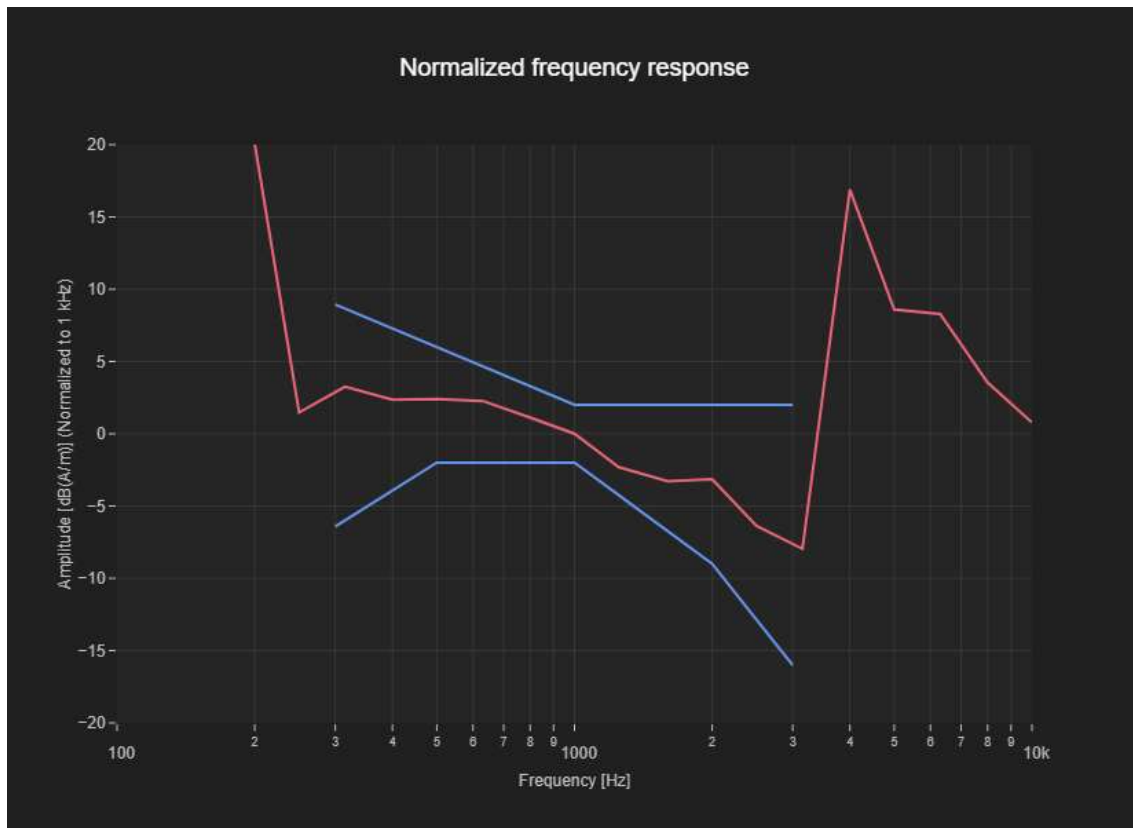
Band Name	Communication Systems Name	Channel	Frequency [MHz]
GSM 850	GSM-FDD (TDMA, GMSK)	190	836.6

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
52.0	52.0	4.0	4.0	10.0

Results

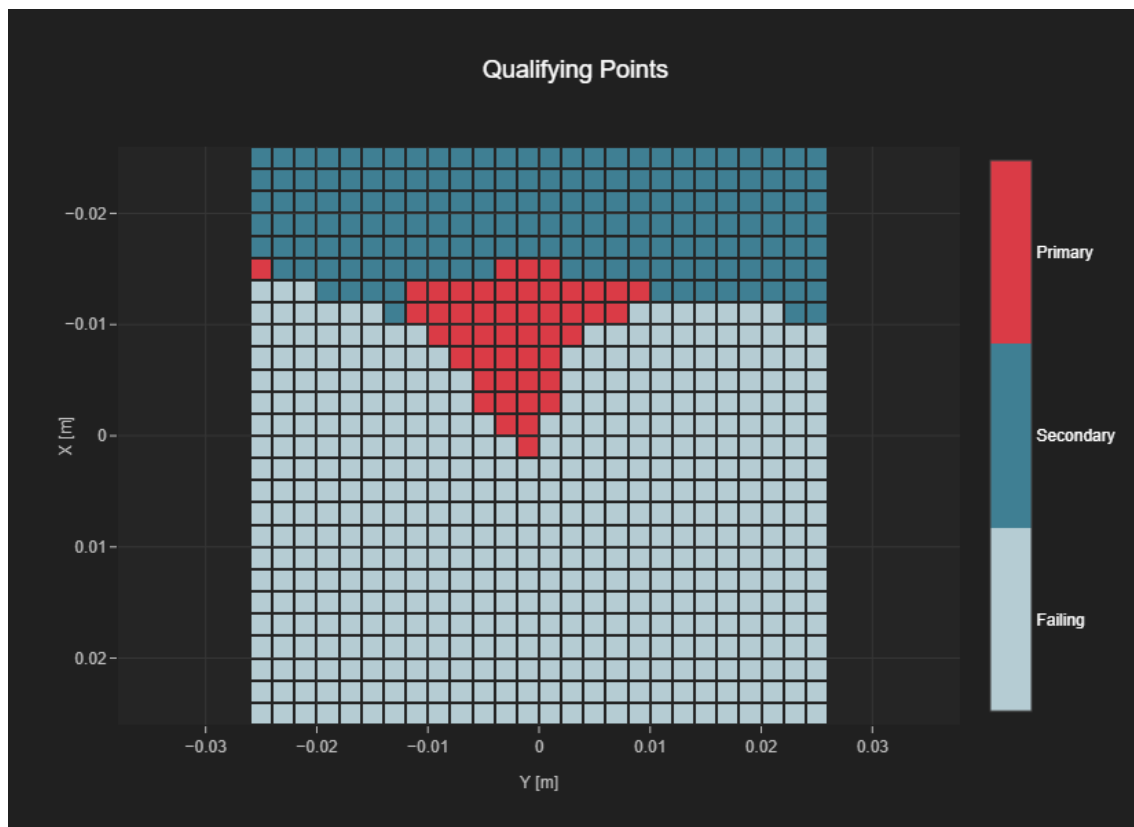
Audio File	Measurement Duration [s]	Margin Upper Bound [dB]	Margin Lower Bound [dB]
48k_voice_300-3000_2s.wav	2.0	2.0	1.94



T-Coil Coupling Mode Test Report

Results

Primary Group Contiguous Point Count	Secondary Group Point Count	Secondary Group Max Longitudinal	Secondary Group Max Transverse
48	215	14	26



Plot 2 GSM 850 CH.128 Voice Codec Speech Codec: HR V1 ANT A
T-Coil Signal Test Report

Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
AM1DV3 - 3050	January 20, 2025	DAE4 Sn466	September 03, 2024

Communication Systems

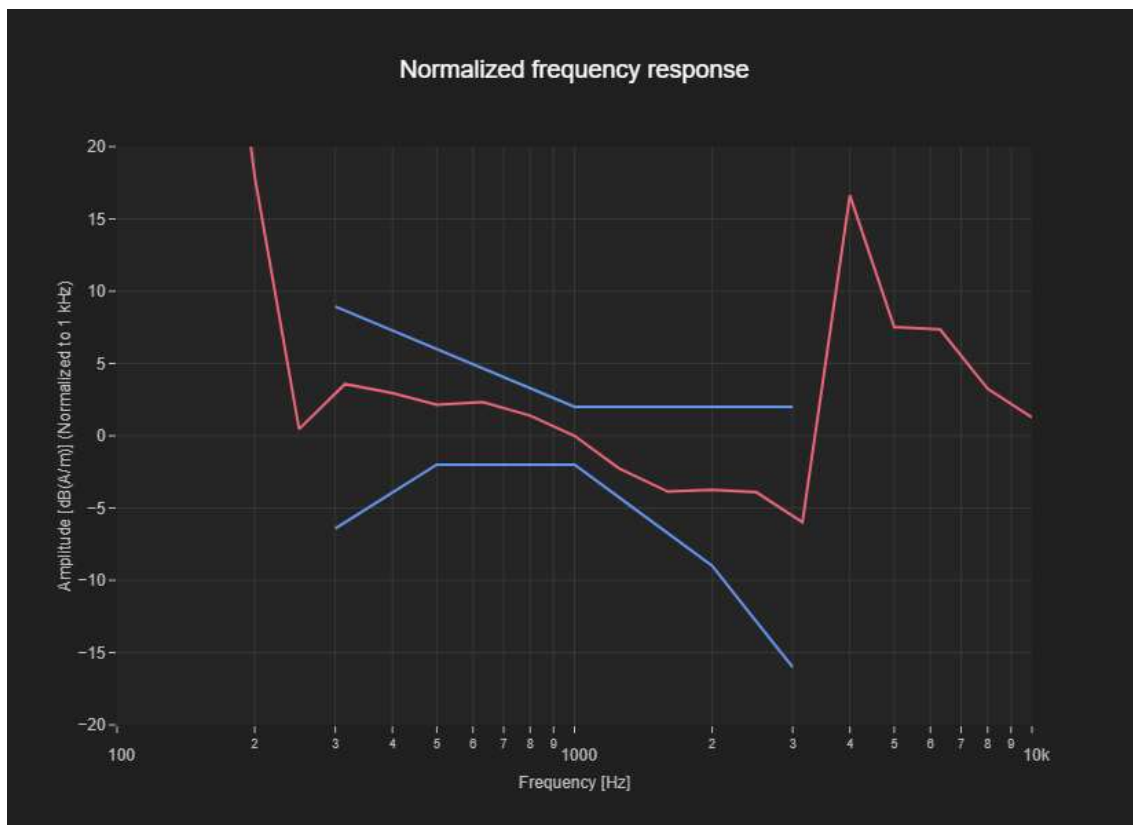
Band Name	Communication Systems Name	Channel	Frequency [MHz]
GSM 850	GSM-FDD (TDMA, GMSK)	1128	824.2

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
52.0	52.0	4.0	4.0	10.0

Results

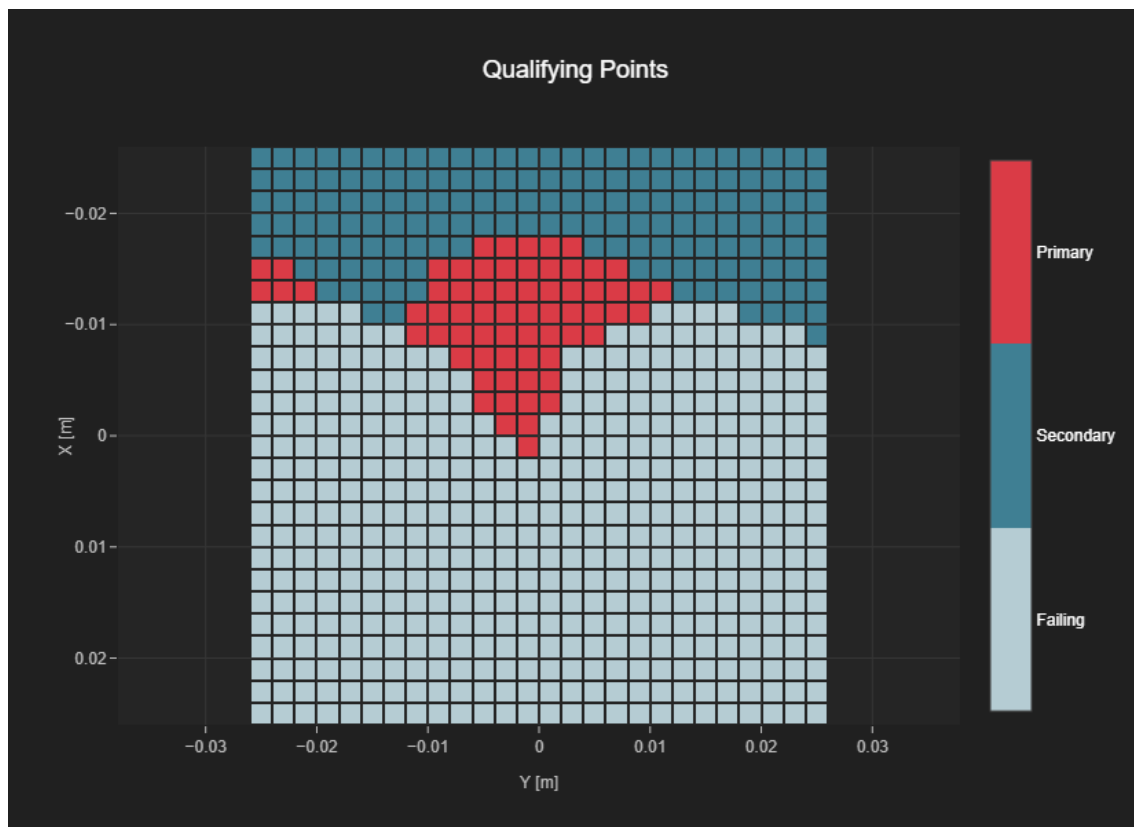
Audio File	Measurement Duration [s]	Margin Upper Bound [dB]	Margin Lower Bound [dB]
48k_voice_300-3000_2s.wav	2.0	1.89	2.0



T-Coil Coupling Mode Test Report

Results

Primary Group Contiguous Point Count	Secondary Group Point Count	Secondary Group Max Longitudinal	Secondary Group Max Transverse
66	225	14	26



Plot 3 GSM 850 CH.251 Voice Codec Speech Codec: HR V1 ANT A T-Coil Signal Test Report

Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
AM1DV3 - 3050	January 20, 2025	DAE4 Sn466	September 03, 2024

Communication Systems

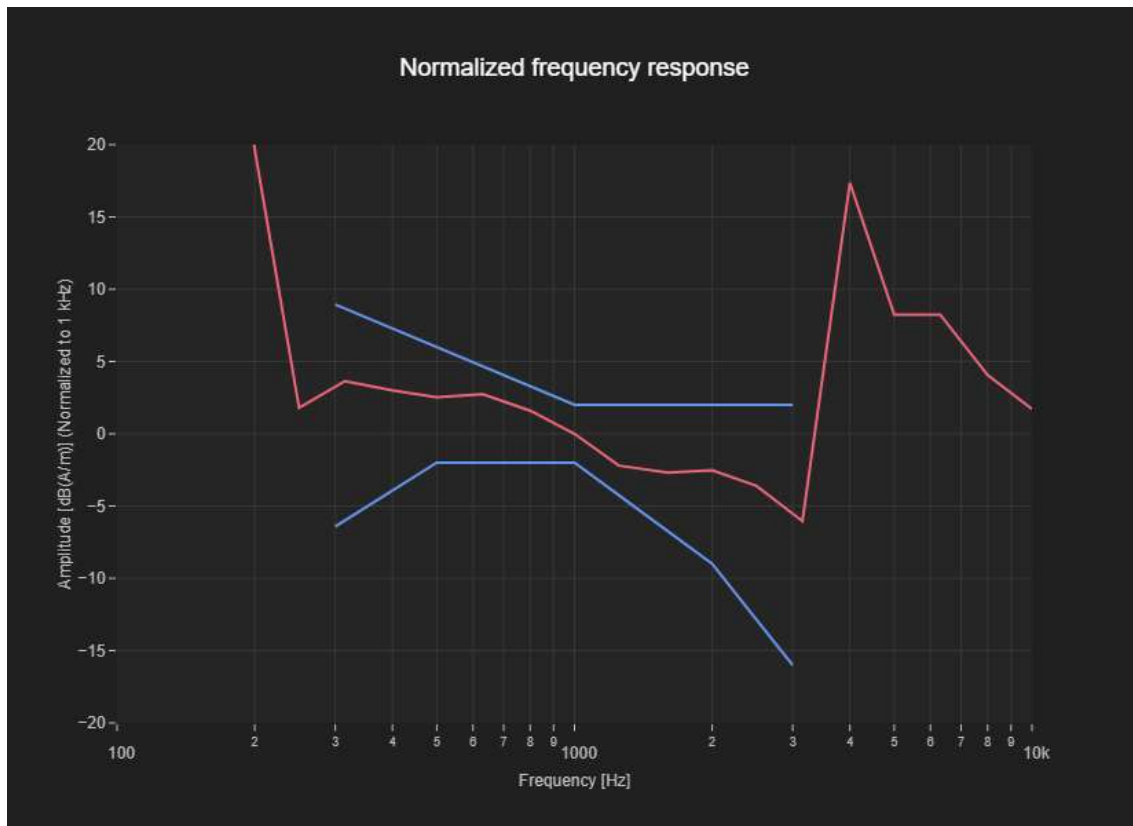
Band Name	Communication Systems Name	Channel	Frequency [MHz]
GSM 850	GSM-FDD (TDMA, GMSK)	251	848.8

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
52.0	52.0	4.0	4.0	10.0

Results

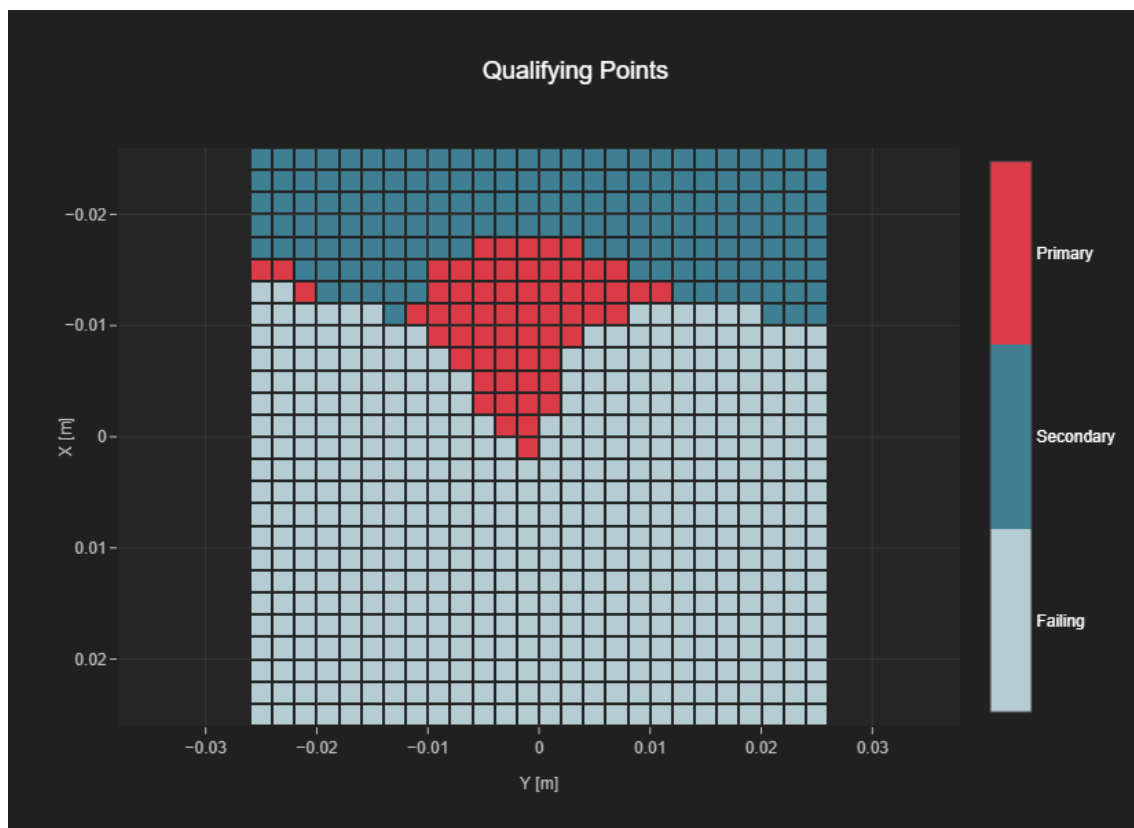
Audio File	Measurement Duration [s]	Margin Upper Bound [dB]	Margin Lower Bound [dB]
48k_voice_300-3000_2s.wav	2.0	1.69	2.0



T-Coil Coupling Mode Test Report

Results

Primary Group Contiguous Point Count	Secondary Group Point Count	Secondary Group Max Longitudinal	Secondary Group Max Transverse
61	217	14	26



Plot 4 UMTS Band 5 CH.4183 Voice AMR-WB Codec: 6.6kbit/s
T-Coil Signal Test Report
Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
AM1DV3 - 3050	January 20, 2025	DAE4 Sn466	September 03, 2024

Communication Systems

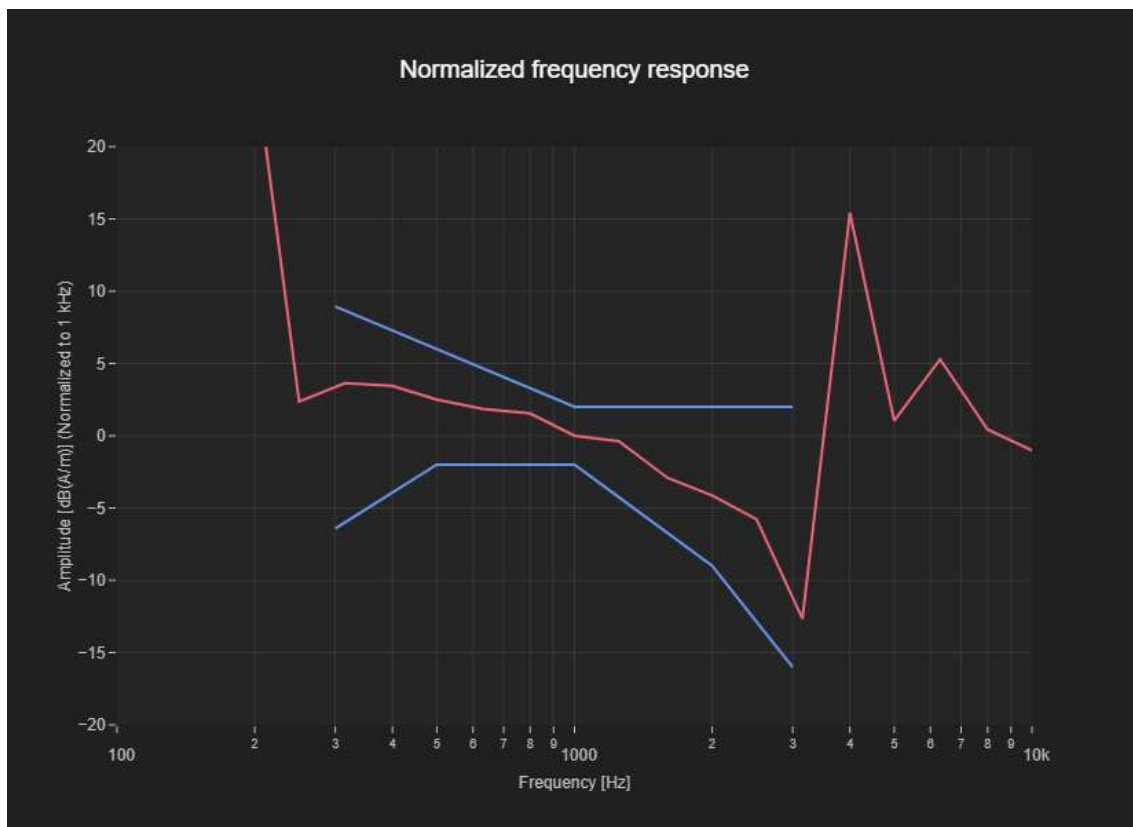
Band Name	Communication Systems Name	Channel	Frequency [MHz]
Band 5	UMTS-FDD (WCDMA, AMR)	4183	836.6

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
52.0	52.0	4.0	4.0	10.0

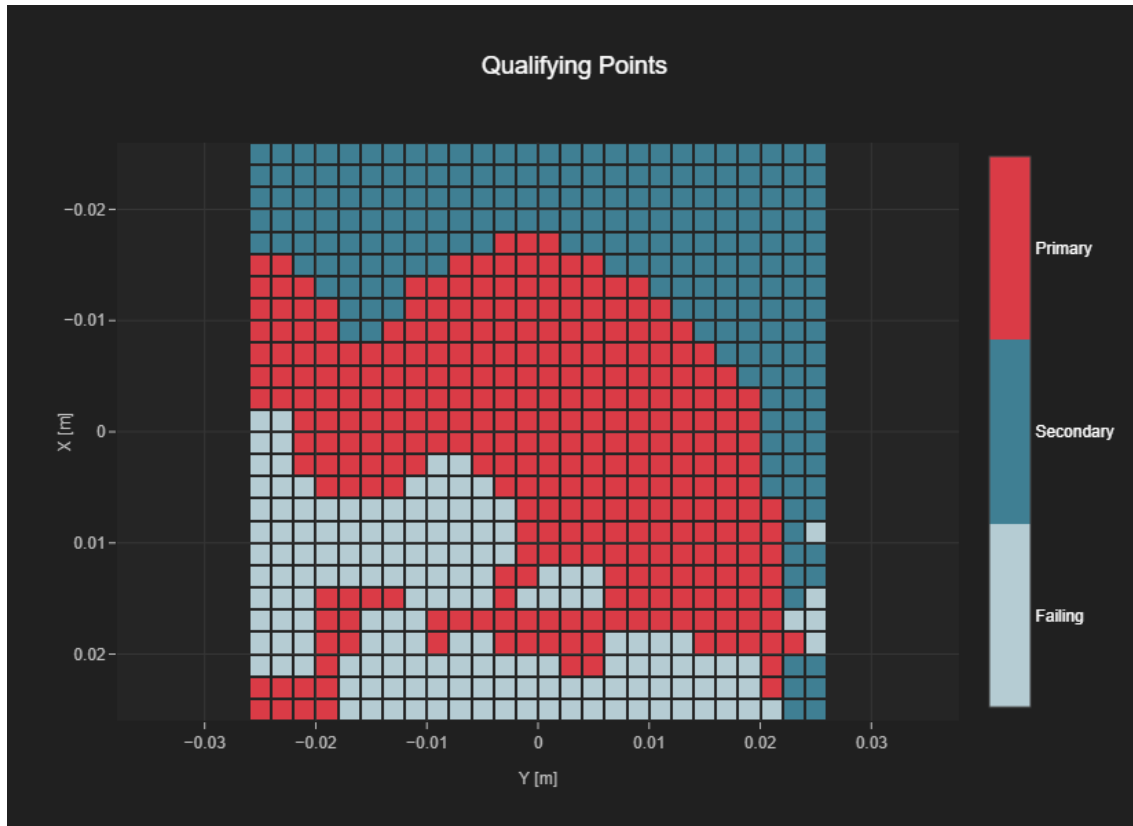
Results

Audio File	Measurement Duration [s]	Margin Upper Bound [dB]	Margin Lower Bound [dB]
48k_voice_300-3000_2s.wav	2.0	1.75	2.0



T-Coil Coupling Mode Test Report Results

Primary Group Contiguous Point Count	Secondary Group Point Count	Secondary Group Max Longitudinal	Secondary Group Max Transverse
306	518	25	26



Plot 5 UMTS Band 5 CH.4132 Voice AMR-WB Codec: 6.6kbit/s
T-Coil Signal Test Report
Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
AM1DV3 - 3050	January 20, 2025	DAE4 Sn466	September 03, 2024

Communication Systems

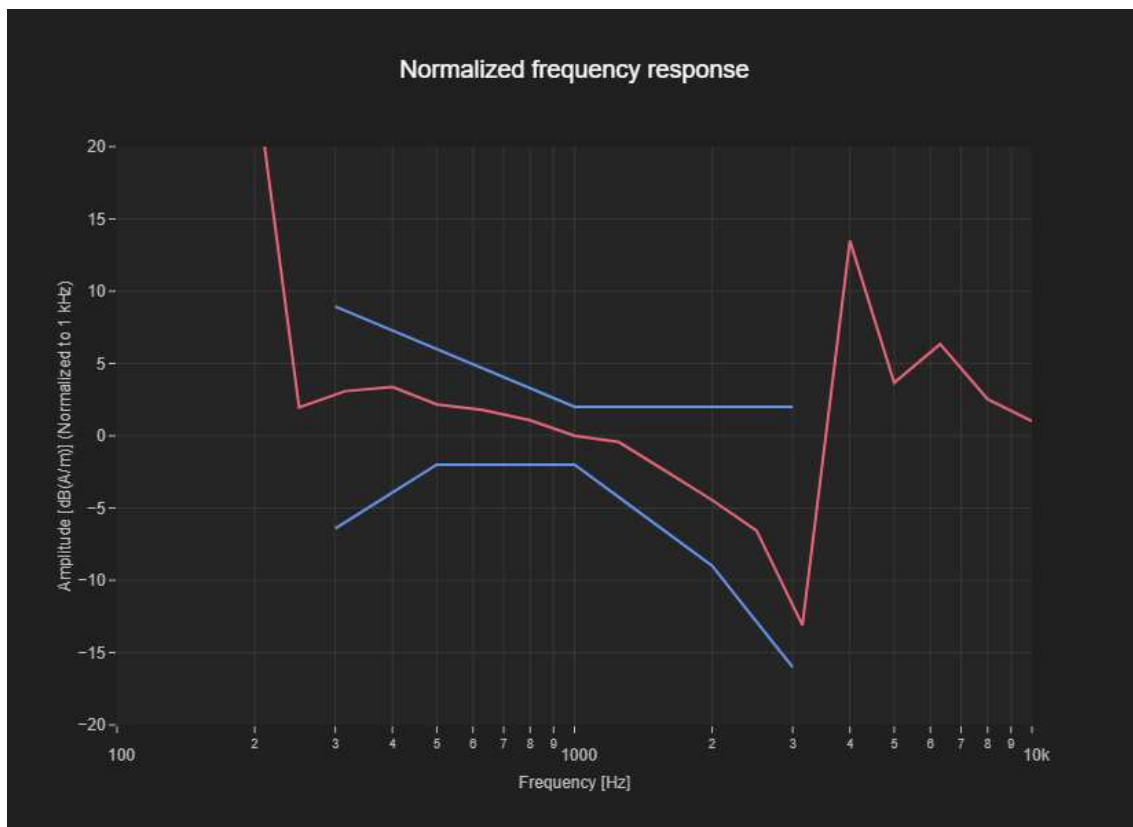
Band Name	Communication Systems Name	Channel	Frequency [MHz]
Band 5	UMTS-FDD (WCDMA, AMR)	4132	826.4

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
52.0	52.0	4.0	4.0	10.0

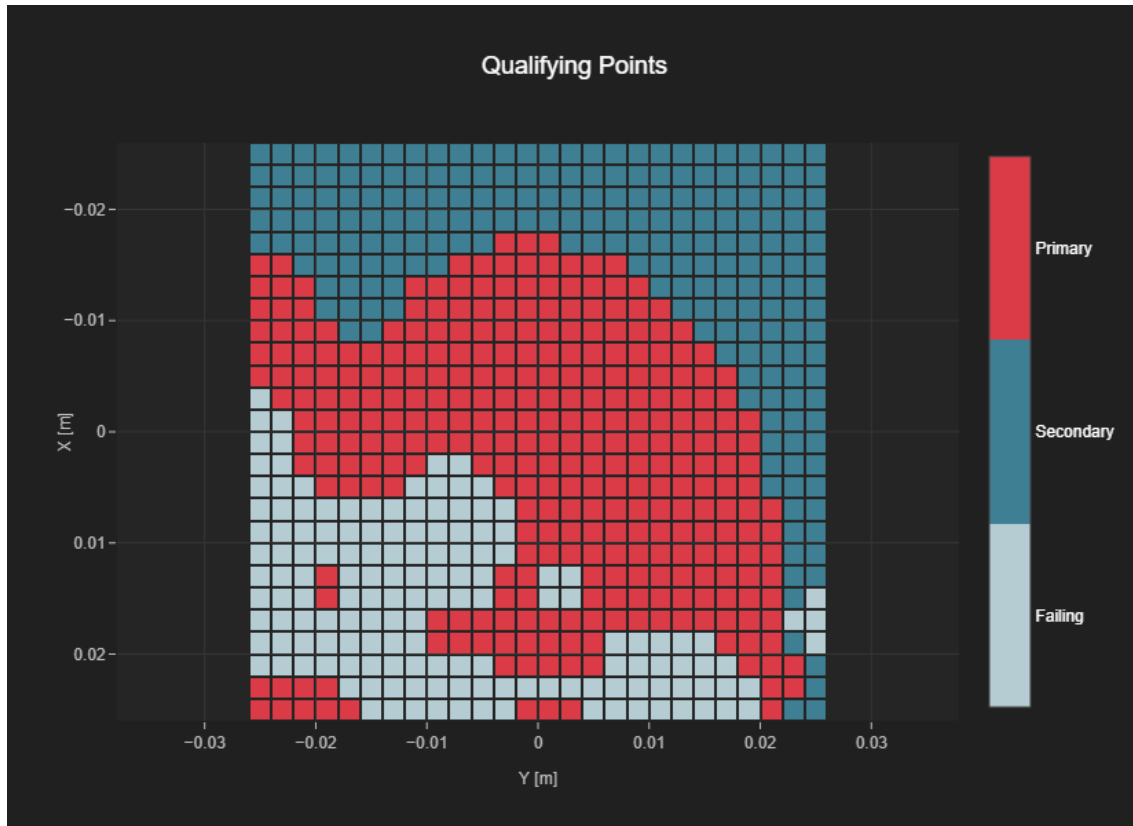
Results

Audio File	Measurement Duration [s]	Margin Upper Bound [dB]	Margin Lower Bound [dB]
48k_voice_300-3000_2s.wav	2.0	2.0	2.0



T-Coil Coupling Mode Test Report Results

Primary Group Contiguous Point Count	Secondary Group Point Count	Secondary Group Max Longitudinal	Secondary Group Max Transverse
311	524	26	26



Plot 6 UMTS Band 5 CH.4233 Voice AMR-WB Codec: 6.6kbit/s
T-Coil Signal Test Report
Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
AM1DV3 - 3050	January 20, 2025	DAE4 Sn466	September 03, 2024

Communication Systems

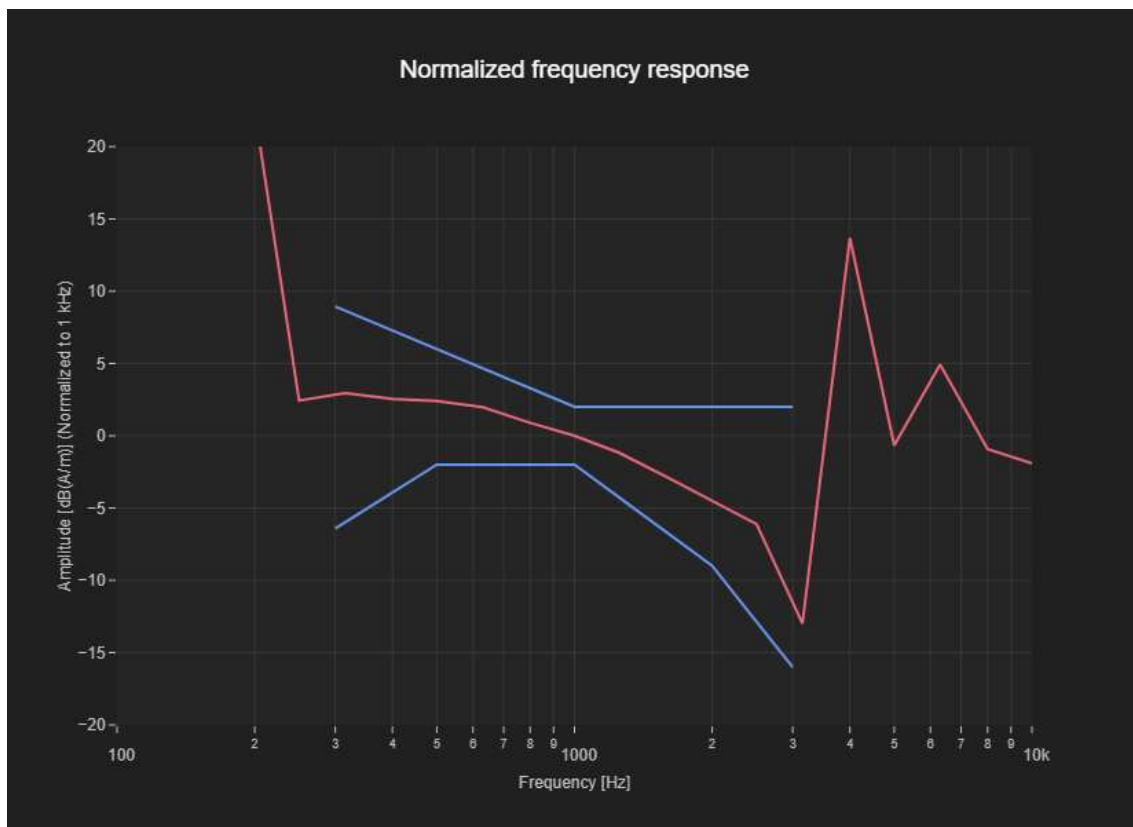
Band Name	Communication Systems Name	Channel	Frequency [MHz]
Band 5	UMTS-FDD (WCDMA, AMR)	4233	846.6

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
52.0	52.0	4.0	4.0	10.0

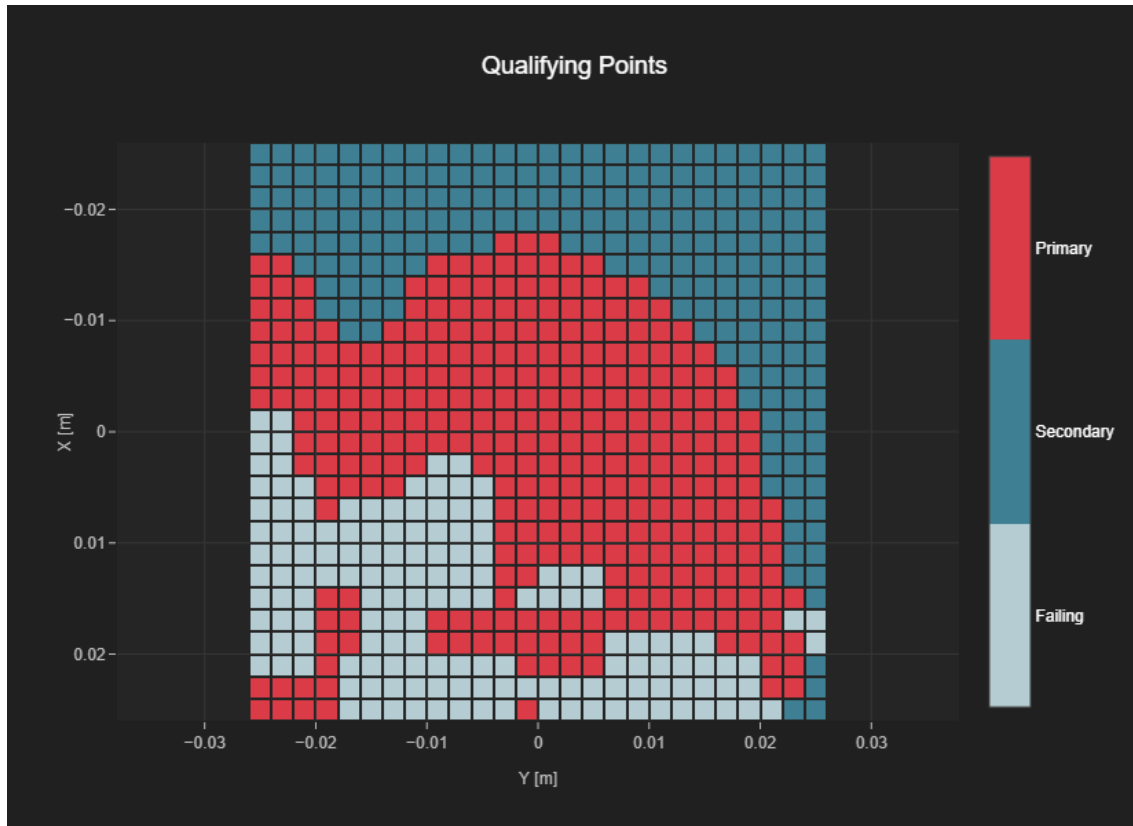
Results

Audio File	Measurement Duration [s]	Margin Upper Bound [dB]	Margin Lower Bound [dB]
48k_voice_300-3000_2s.wav	2.0	2.0	2.0



T-Coil Coupling Mode Test Report Results

Primary Group Contiguous Point Count	Secondary Group Point Count	Secondary Group Max Longitudinal	Secondary Group Max Transverse
314	525	25	26



Plot 7 LTE Band 71 5MHz 16QAM 1RB 0offset CH.133297 Voice EVS-WB Codec 5.9kbit/s
ANT A
T-Coil Signal Test Report
Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
AM1DV3 - 3050	January 20, 2025	DAE4 Sn466	September 03, 2024

Communication Systems

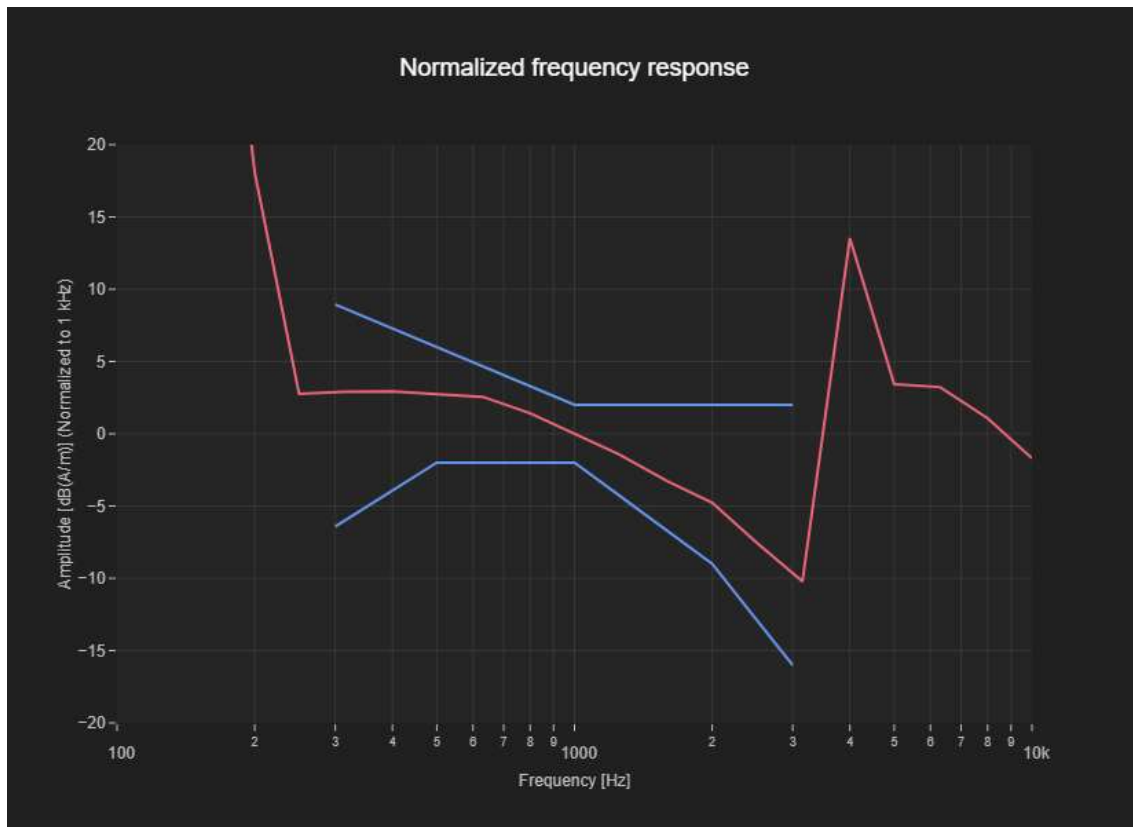
Band Name	Communication Systems Name	Channel	Frequency [MHz]
Band 71	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	133297	680.5

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
52.0	52.0	4.0	4.0	10.0

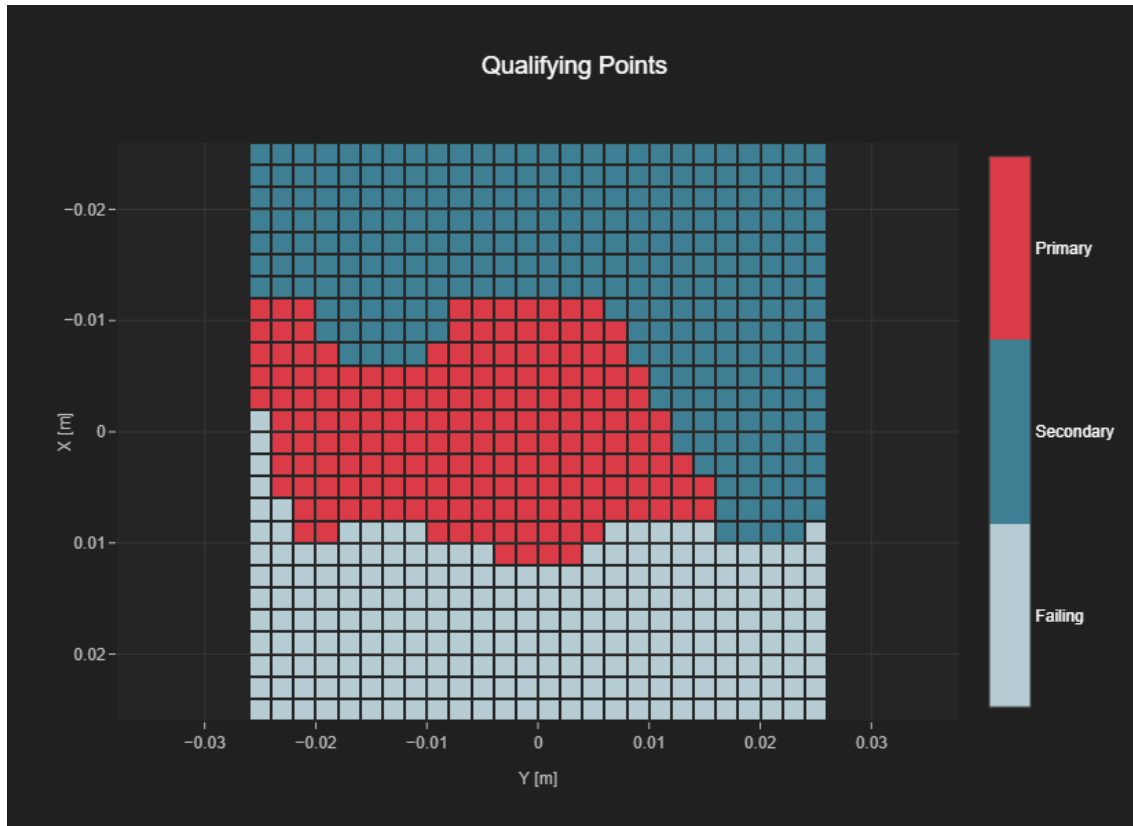
Results

Audio File	Measurement Duration [s]	Margin Upper Bound [dB]	Margin Lower Bound [dB]
48k_voice_300-3000_2s.wav	2.0	1.87	2.0



T-Coil Coupling Mode Test Report Results

Primary Group Contiguous Point Count	Secondary Group Point Count	Secondary Group Max Longitudinal	Secondary Group Max Transverse
178	454	19	26



Plot 8 LTE Band 71 5MHz 16QAM 1RB 0offset CH.133147 Voice EVS-WB Codec: 5.9kbit/s
ANT A
T-Coil Signal Test Report
Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
AM1DV3 - 3050	January 20, 2025	DAE4 Sn466	September 03, 2024

Communication Systems

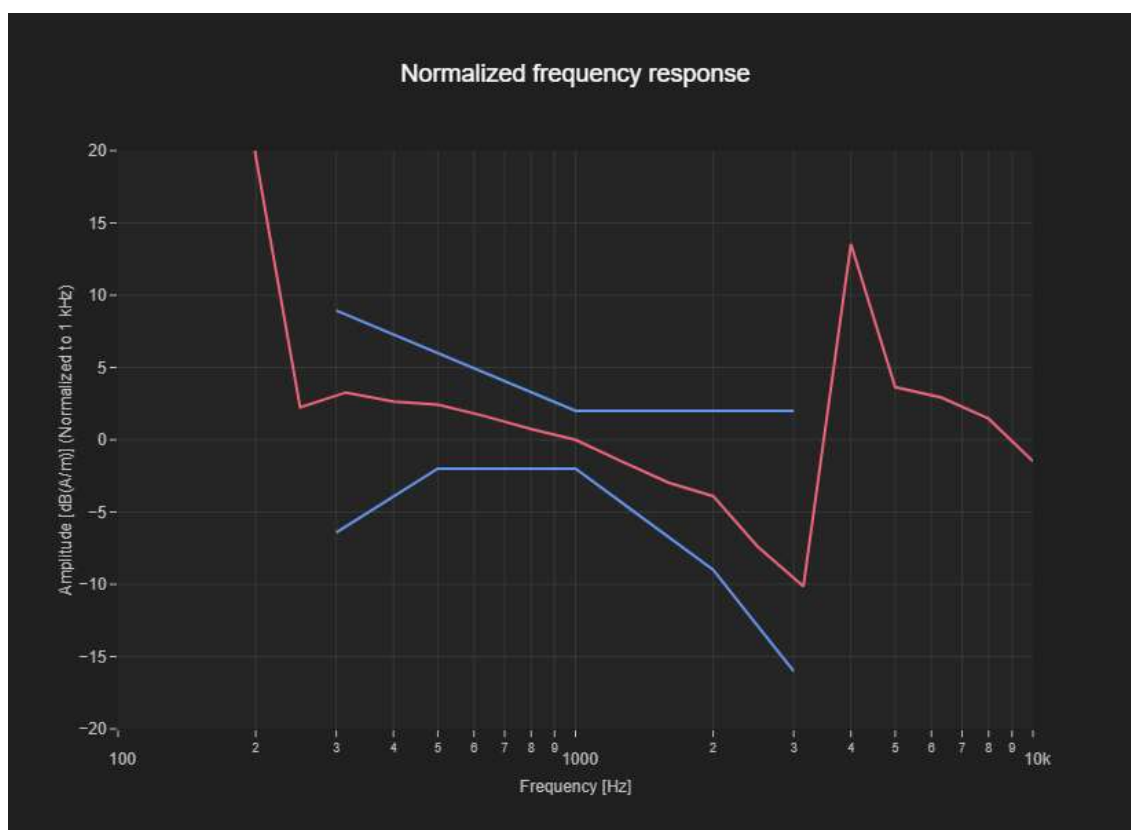
Band Name	Communication Systems Name	Channel	Frequency [MHz]
Band 71	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	133147	665.5

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
52.0	52.0	4.0	4.0	10.0

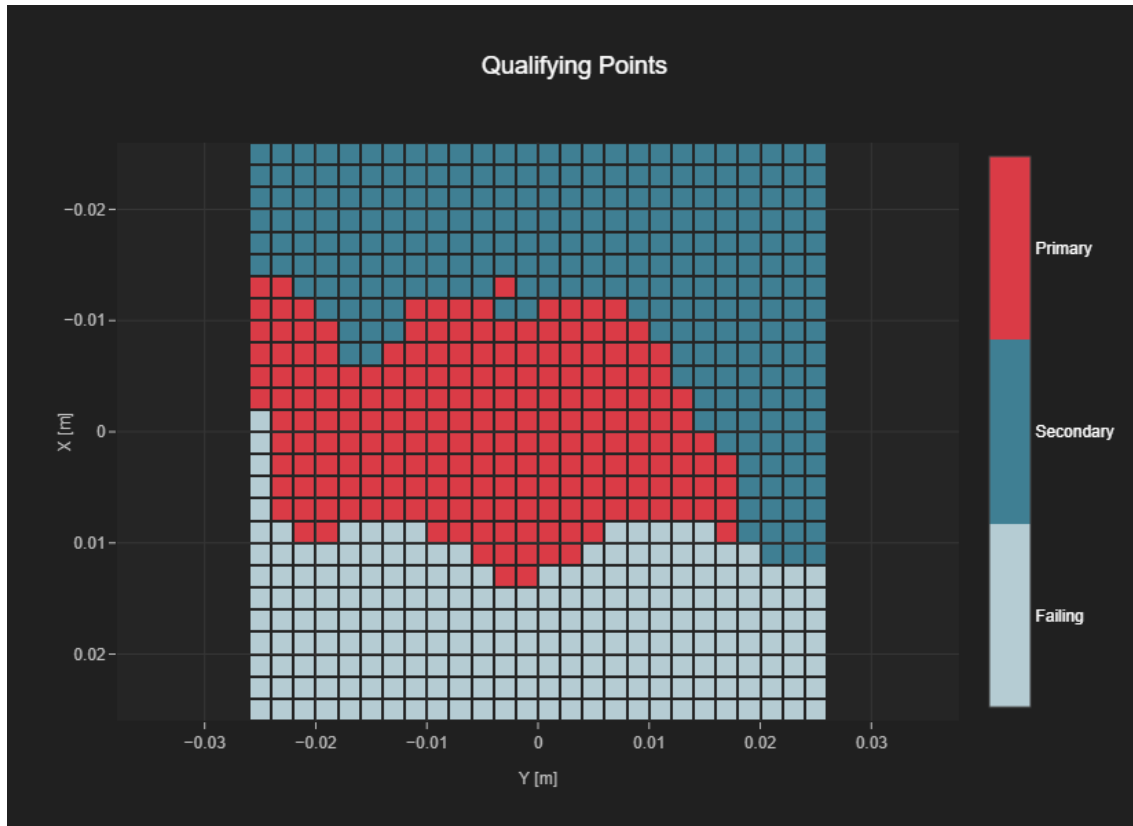
Results

Audio File	Measurement Duration [s]	Margin Upper Bound [dB]	Margin Lower Bound [dB]
48k_voice_300-3000_2s.wav	2.0	2.0	2.0



T-Coil Coupling Mode Test Report Results

Primary Group Contiguous Point Count	Secondary Group Point Count	Secondary Group Max Longitudinal	Secondary Group Max Transverse
205	462	20	26



Plot 9 LTE Band 71 5MHz 16QAM 1RB 0offset CH.133447 Voice EVS-WB Codec: 5.9kbit/s
ANT A
T-Coil Signal Test Report
Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
AM1DV3 - 3050	January 20, 2025	DAE4 Sn466	September 03, 2024

Communication Systems

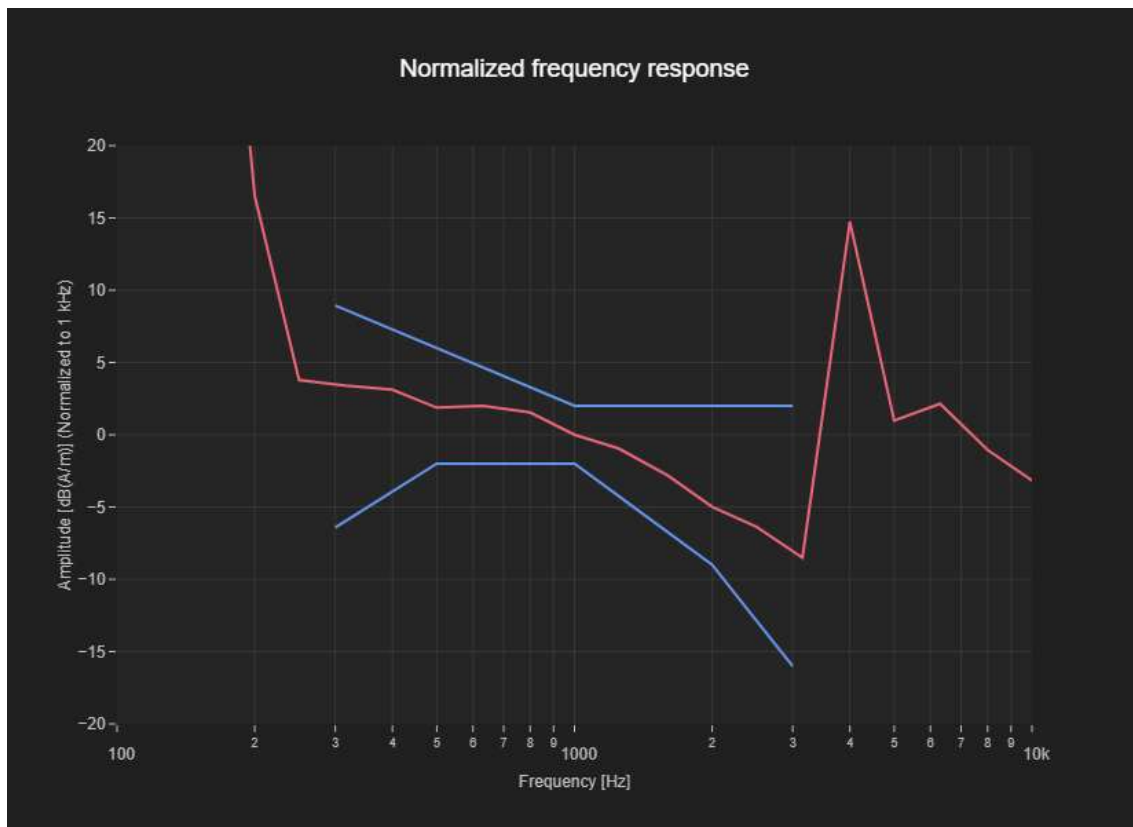
Band Name	Communication Systems Name	Channel	Frequency [MHz]
Band 71	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	133447	695.5

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
52.0	52.0	4.0	4.0	10.0

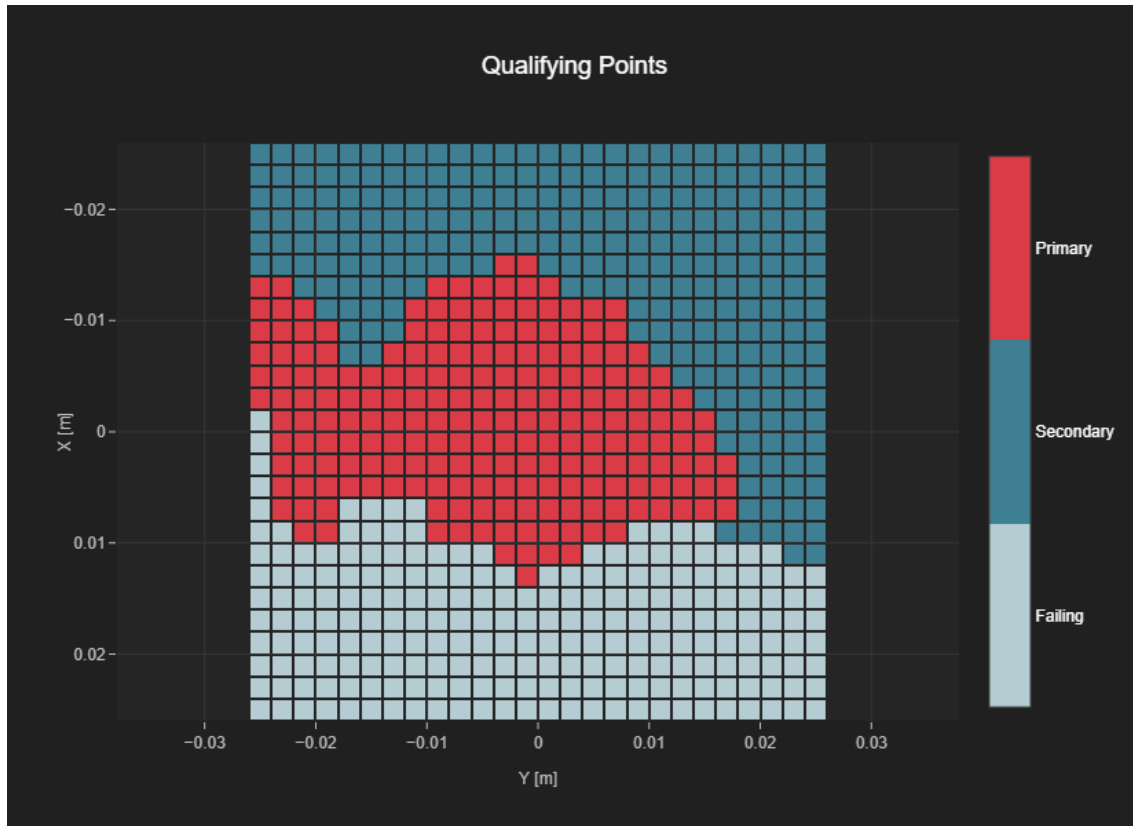
Results

Audio File	Measurement Duration [s]	Margin Upper Bound [dB]	Margin Lower Bound [dB]
48k_voice_300-3000_2s.wav	2.0	1.74	2.0



T-Coil Coupling Mode Test Report Results

Primary Group Contiguous Point Count	Secondary Group Point Count	Secondary Group Max Longitudinal	Secondary Group Max Transverse
207	456	20	26



Plot 10 LTE Band 41 20MHz QPSK 1RB 0offset CH.40620 Voice EVS-WB Codec: 5.9kbit/s
ANT I
T-Coil Signal Test Report
Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
AM1DV3 - 3050	January 20, 2025	DAE4 Sn466	September 03, 2024

Communication Systems

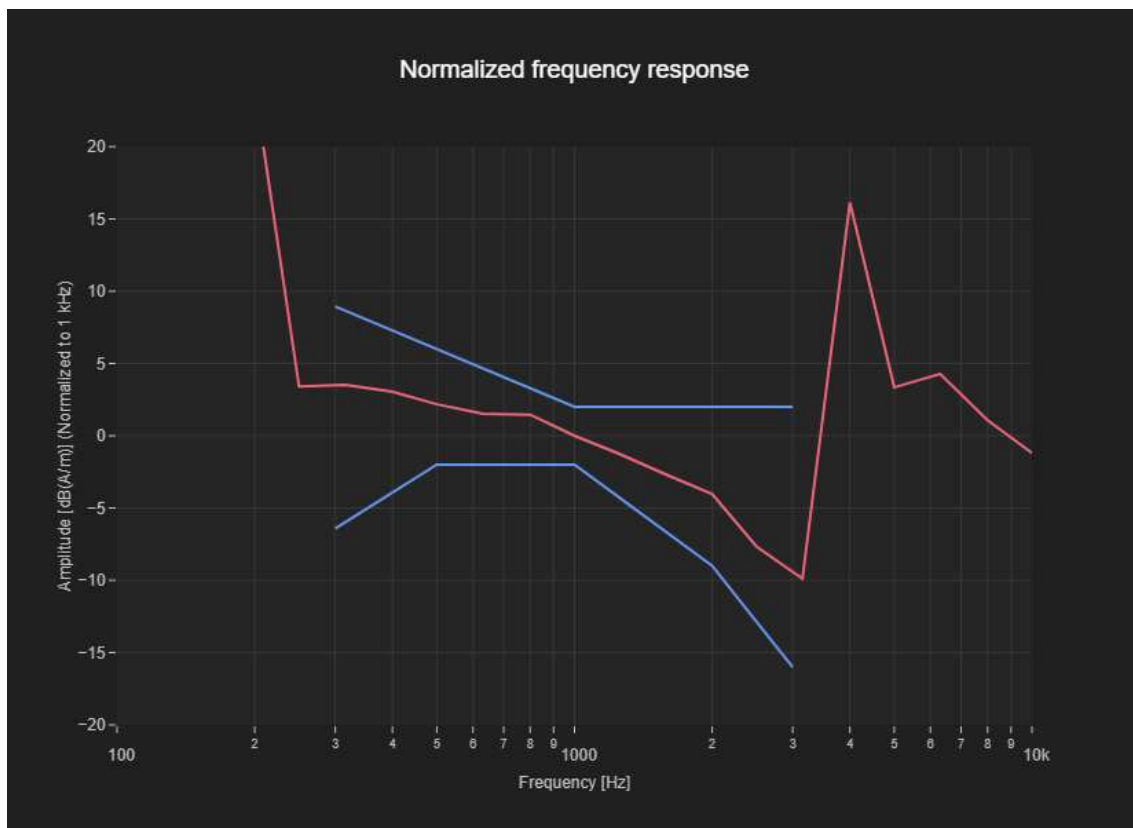
Band Name	Communication Systems Name	Channel	Frequency [MHz]
Band 41	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	40620	2593.0

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
52.0	52.0	4.0	4.0	10.0

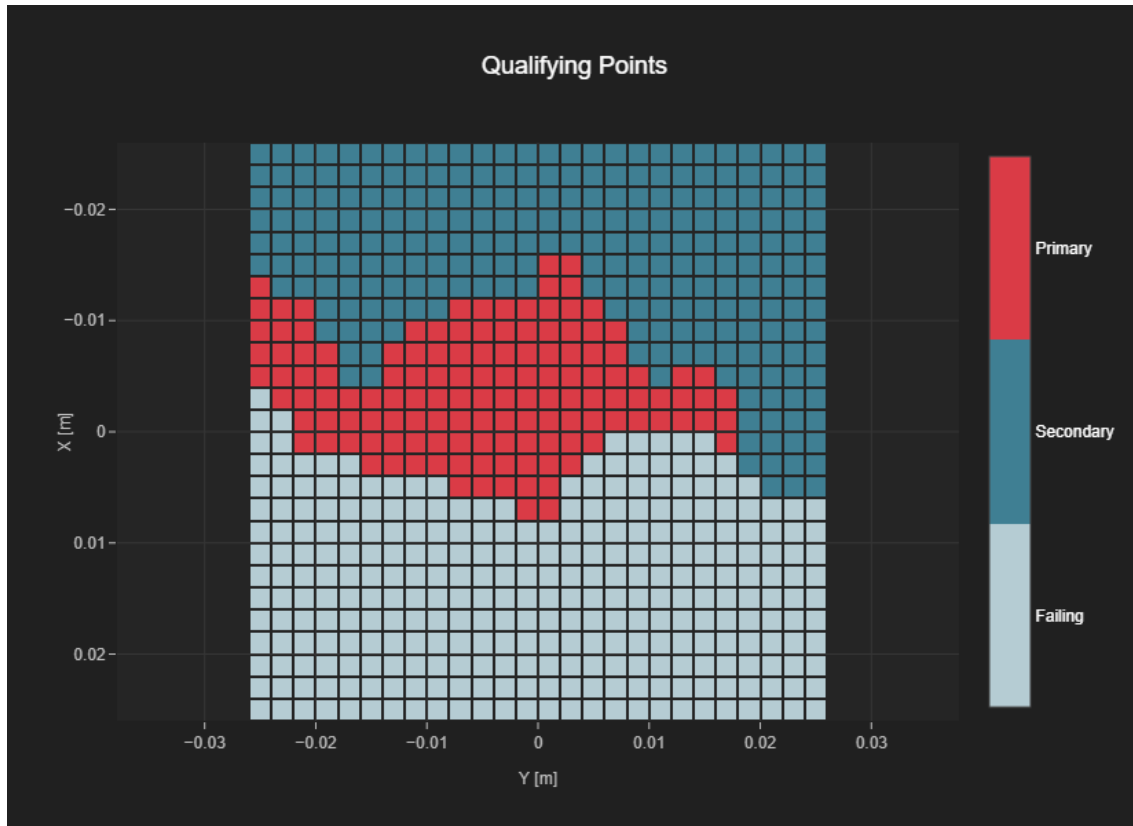
Results

Audio File	Measurement Duration [s]	Margin Upper Bound [dB]	Margin Lower Bound [dB]
48k_voice_300-3000_2s.wav	2.0	1.83	2.0



T-Coil Coupling Mode Test Report Results

Primary Group Contiguous Point Count	Secondary Group Point Count	Secondary Group Max Longitudinal	Secondary Group Max Transverse
134	378	17	26



Plot 11 LTE Band 41 20MHz QPSK 1RB 0offset CH.39750 Voice EVS-WB Codec: 5.9kbit/s
ANT I
T-Coil Signal Test Report
Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
AM1DV3 - 3050	January 20, 2025	DAE4 Sn466	September 03, 2024

Communication Systems

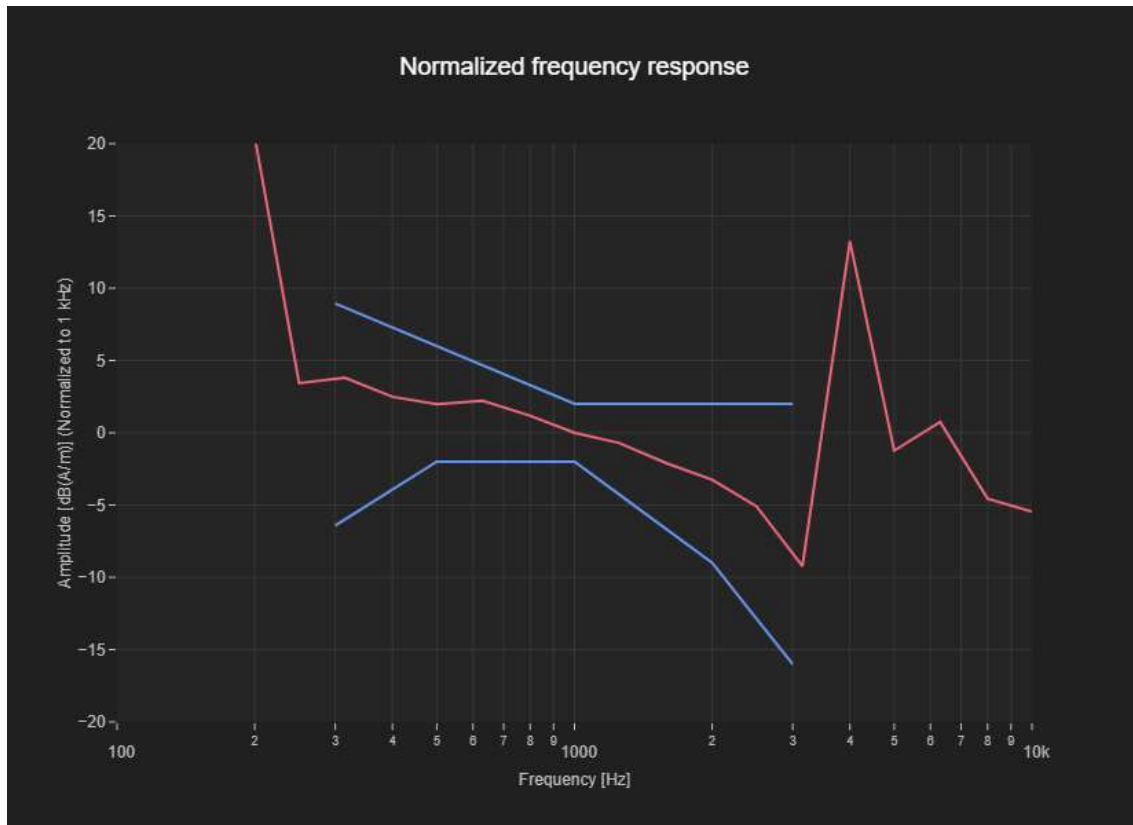
Band Name	Communication Systems Name	Channel	Frequency [MHz]
Band 41	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	39750	2506.0

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
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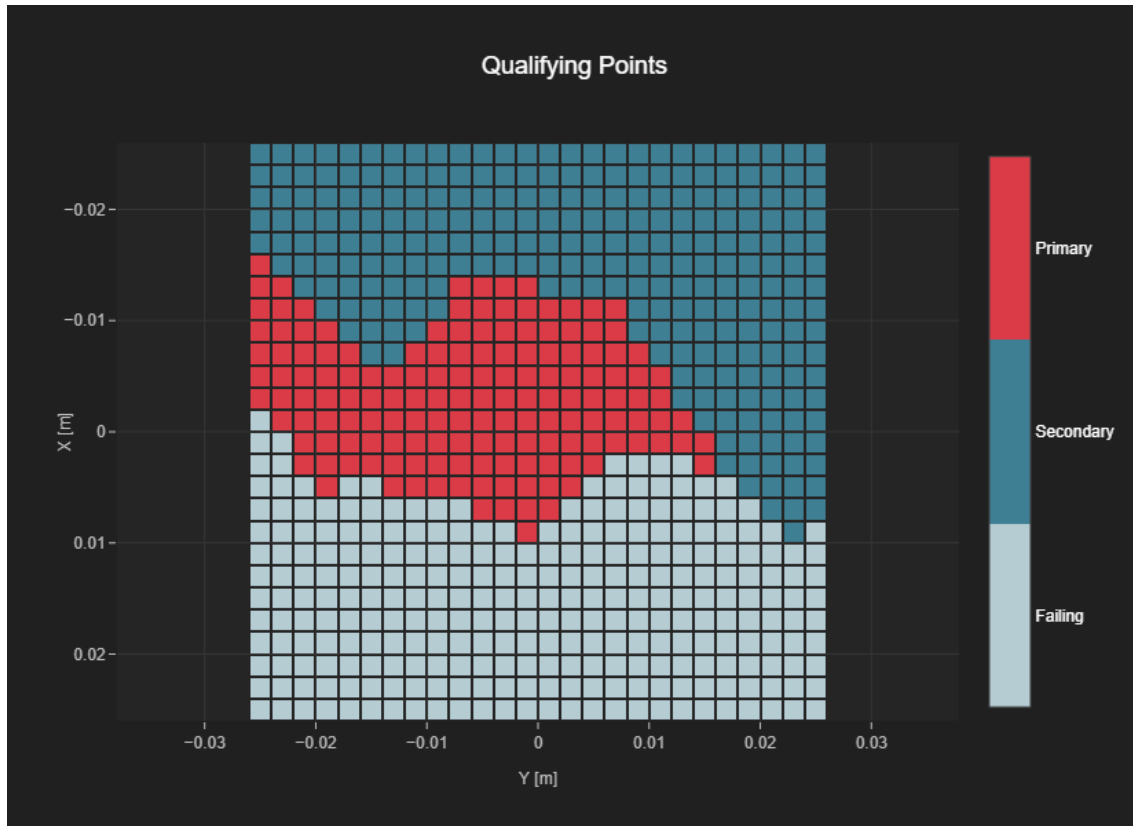
Results

Audio File	Measurement Duration [s]	Margin Upper Bound [dB]	Margin Lower Bound [dB]
48k_voice_300-3000_2s.wav	2.0	2.0	2.0



T-Coil Coupling Mode Test Report Results

Primary Group Contiguous Point Count	Secondary Group Point Count	Secondary Group Max Longitudinal	Secondary Group Max Transverse
153	404	18	26



Plot 12 LTE Band 41 20MHz QPSK 1RB 0offset CH.40185 Voice EVS-WB Codec: 5.9kbit/s
ANT I

T-Coil Signal Test Report Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
AM1DV3 - 3050	January 20, 2025	DAE4 Sn466	September 03, 2024

Communication Systems

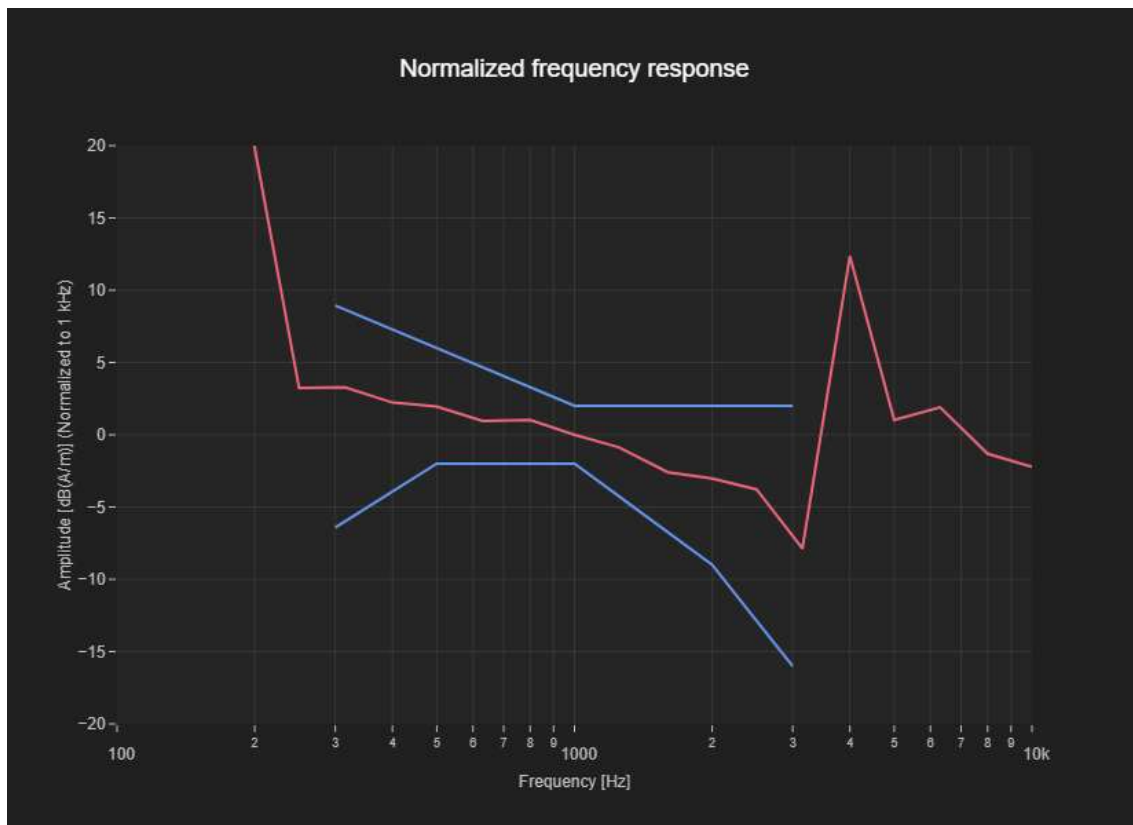
Band Name	Communication Systems Name	Channel	Frequency [MHz]
Band 41	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	40185	2549.5

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
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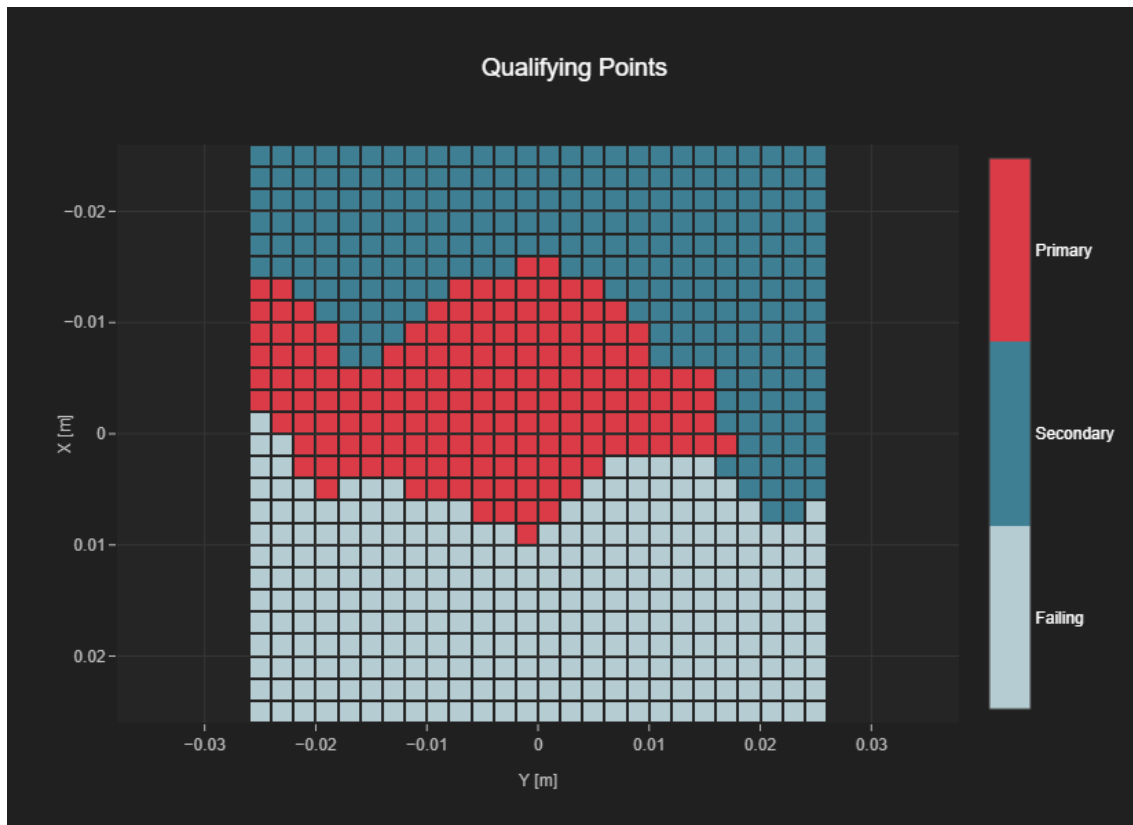
Results

Audio File	Measurement Duration [s]	Margin Upper Bound [dB]	Margin Lower Bound [dB]
48k_voice_300-3000_2s.wav	2.0	2.0	2.0



T-Coil Coupling Mode Test Report Results

Primary Group Contiguous Point Count	Secondary Group Point Count	Secondary Group Max Longitudinal	Secondary Group Max Transverse
164	400	18	26



Plot 13 LTE Band 41 20MHz QPSK 1RB 0offset CH.41055 Voice EVS-WB Codec: 5.9kbit/s
ANT I
T-Coil Signal Test Report
Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
AM1DV3 - 3050	January 20, 2025	DAE4 Sn466	September 03, 2024

Communication Systems

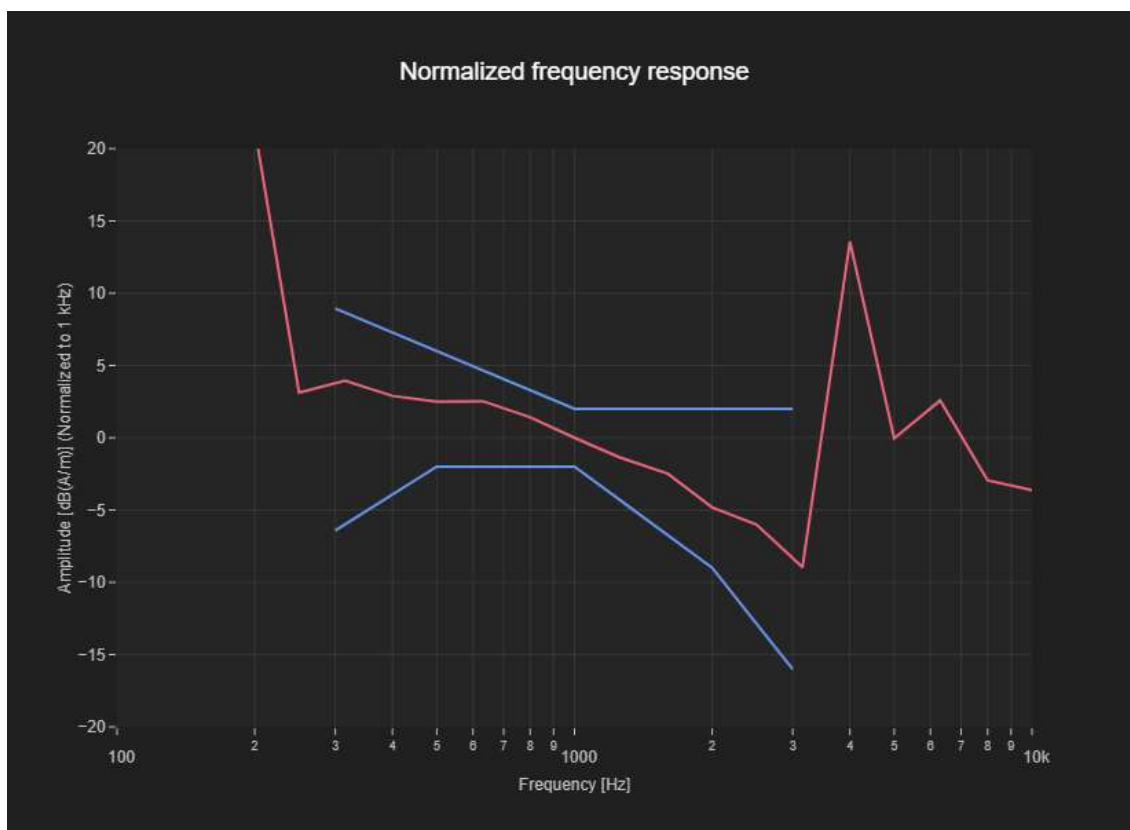
Band Name	Communication Systems Name	Channel	Frequency [MHz]
Band 41	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	41055	2636.5

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
52.0	52.0	4.0	4.0	10.0

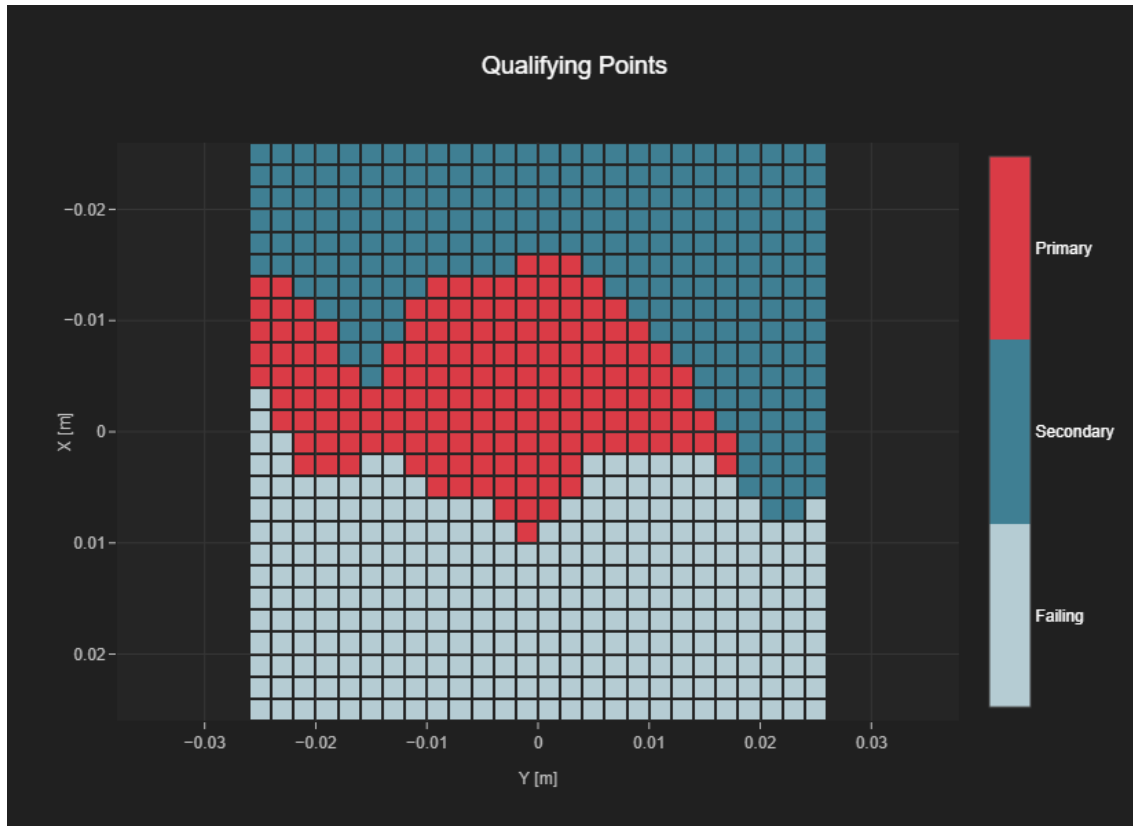
Results

Audio File	Measurement Duration [s]	Margin Upper Bound [dB]	Margin Lower Bound [dB]
48k_voice_300-3000_2s.wav	2.0	1.87	2.0



T-Coil Coupling Mode Test Report Results

Primary Group Contiguous Point Count	Secondary Group Point Count	Secondary Group Max Longitudinal	Secondary Group Max Transverse
159	393	18	26



Plot 14 LTE Band 41 20MHz QPSK 1RB 0offset CH.41490 Voice EVS-WB Codec: 5.9kbit/s
ANT I
T-Coil Signal Test Report
Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
AM1DV3 - 3050	January 20, 2025	DAE4 Sn466	September 03, 2024

Communication Systems

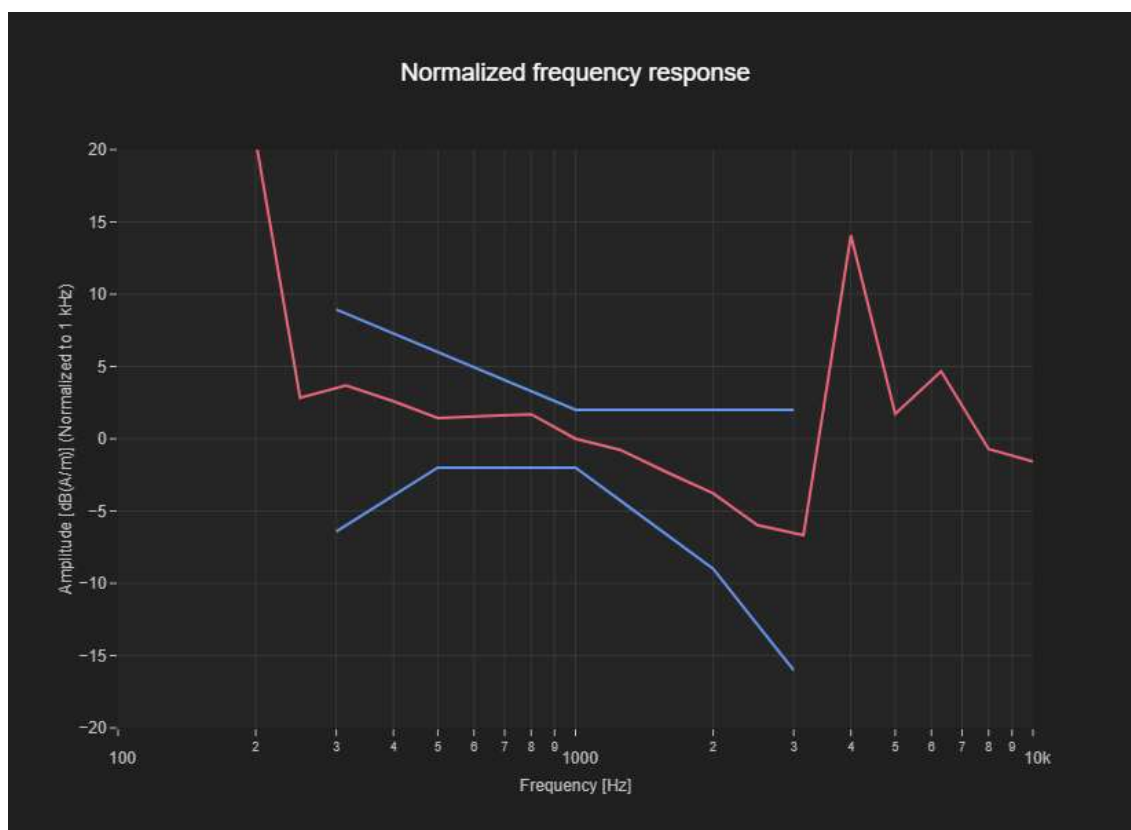
Band Name	Communication Systems Name	Channel	Frequency [MHz]
Band 41	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	41490	2680.0

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
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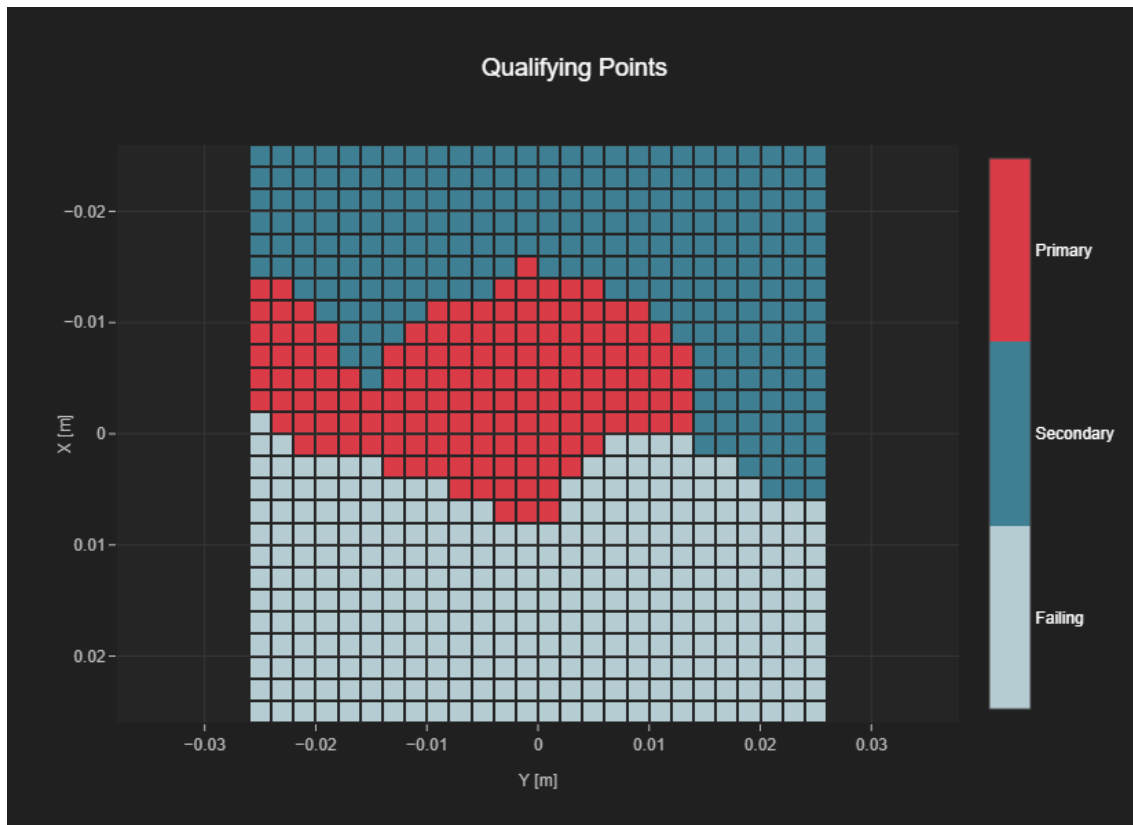
Results

Audio File	Measurement Duration [s]	Margin Upper Bound [dB]	Margin Lower Bound [dB]
48k_voice_300-3000_2s.wav	2.0	1.59	2.0



T-Coil Coupling Mode Test Report Results

Primary Group Contiguous Point Count	Secondary Group Point Count	Secondary Group Max Longitudinal	Secondary Group Max Transverse
144	381	17	26



Plot 15 NR Band n7 30MHz DFTs OFDM QPSK 80RB 0offset CH.507000
EVS-WB Codec: 5.9kbit/s ANT B
T-Coil Signal Test Report
Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
AM1DV3 - 3049	November 14, 2024	DAE4ip Sn1866	May 02, 2024

Communication Systems

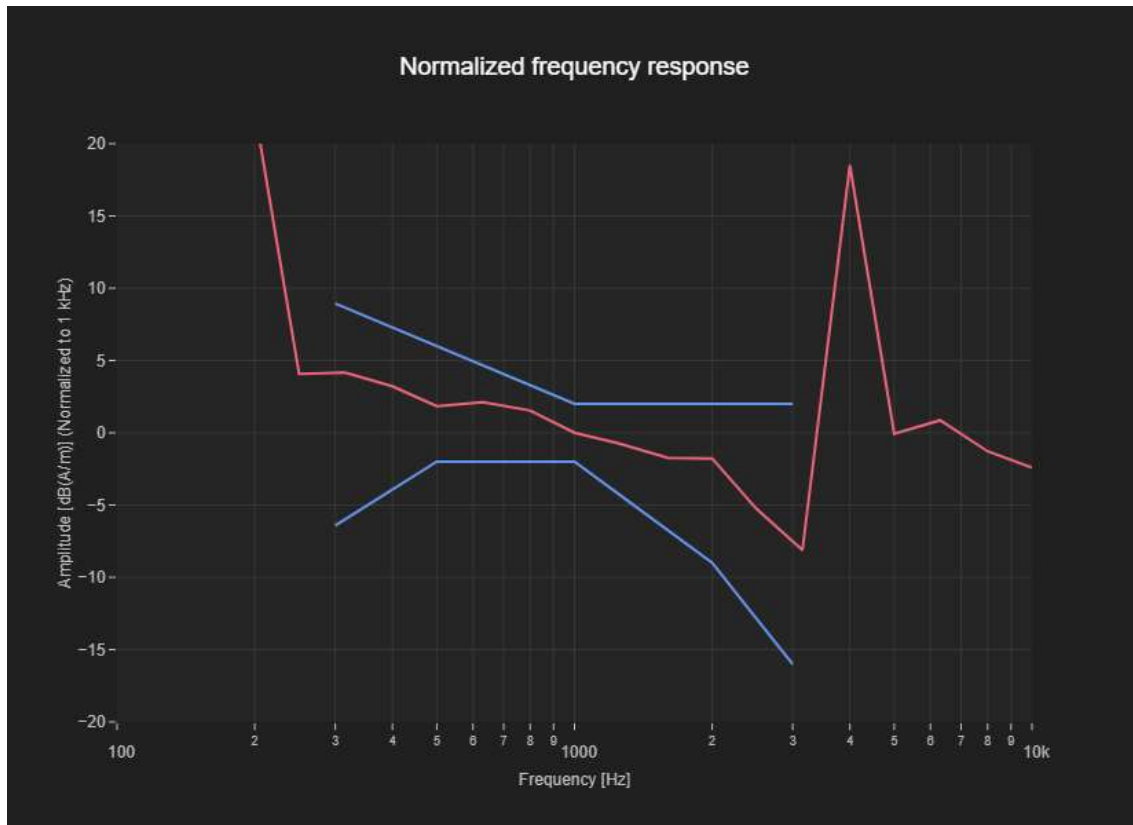
Band Name	Communication Systems Name	Channel	Frequency [MHz]
Band n7	5G NR (DFT-s-OFDM, 50% RB, 30 MHz, QPSK, 15 kHz)	507000	2535.0

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
52.0	52.0	4.0	4.0	10.0

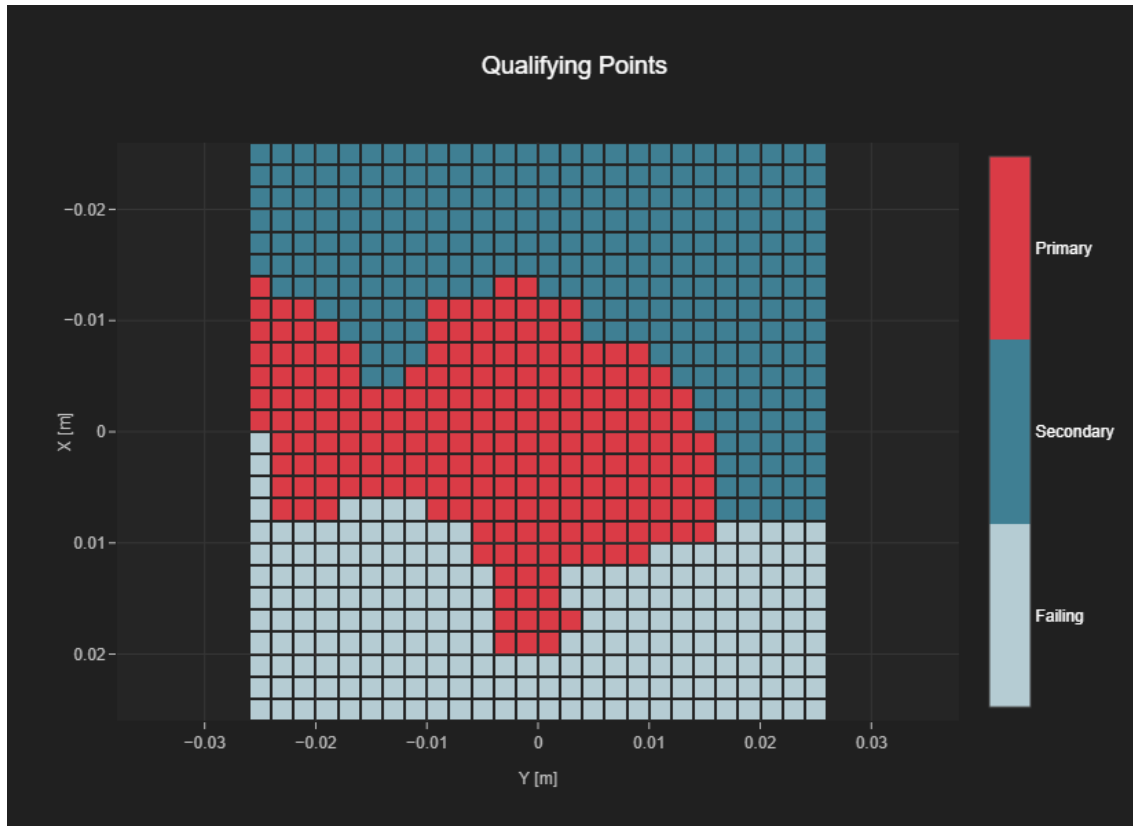
Results

Audio File	Measurement Duration [s]	Margin Upper Bound [dB]	Margin Lower Bound [dB]
48k_voice_300-3000_2s.wav	2.0	1.75	2.0



T-Coil Coupling Mode Test Report Results

Primary Group Contiguous Point Count	Secondary Group Point Count	Secondary Group Max Longitudinal	Secondary Group Max Transverse
204	466	23	26



Plot 16 NR Band n7 30MHz DFTs OFDM QPSK 80RB 0offset CH.503000
EVS-WB Codec: 5.9kbit/s ANT B
T-Coil Signal Test Report
Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
AM1DV3 - 3049	November 14, 2024	DAE4ip Sn1866	May 02, 2024

Communication Systems

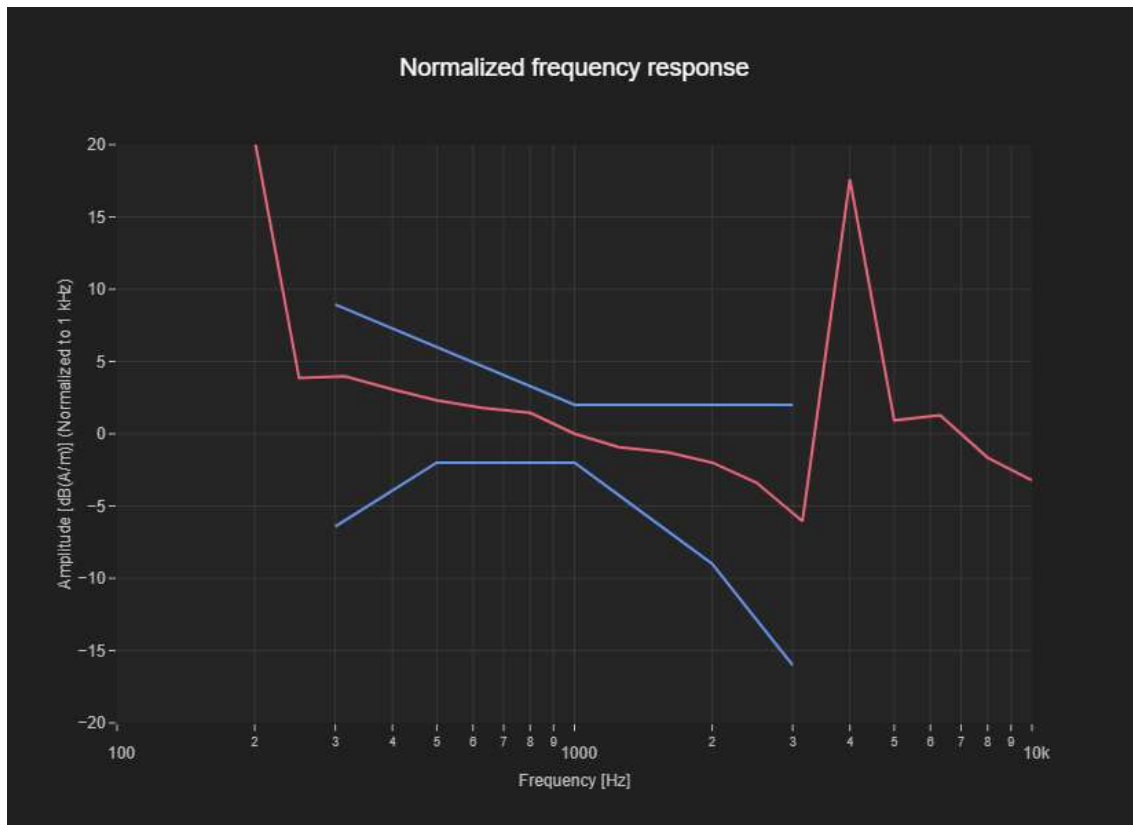
Band Name	Communication Systems Name	Channel	Frequency [MHz]
Band n7	5G NR (DFT-s-OFDM, 50% RB, 30 MHz, QPSK, 15 kHz)	503000	2515.0

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
52.0	52.0	4.0	4.0	10.0

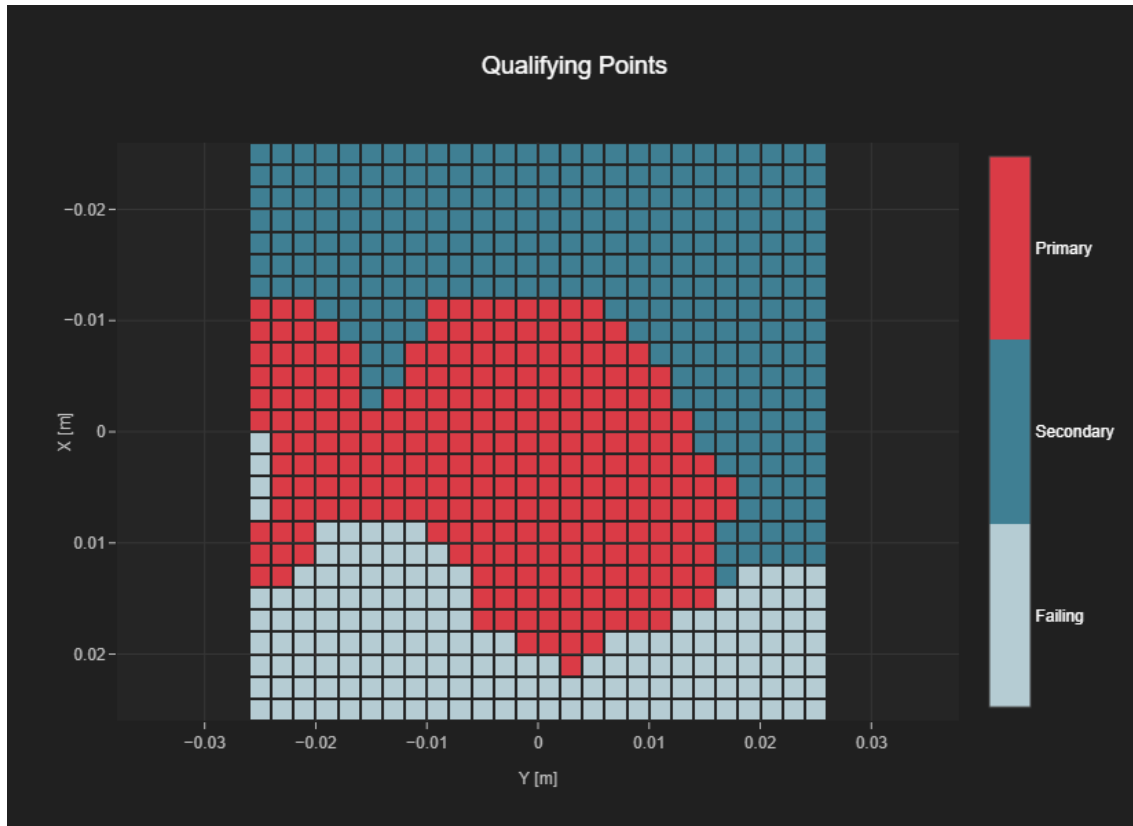
Results

Audio File	Measurement Duration [s]	Margin Upper Bound [dB]	Margin Lower Bound [dB]
48k_voice_300-3000_2s.wav	2.0	1.84	2.0



T-Coil Coupling Mode Test Report Results

Primary Group Contiguous Point Count	Secondary Group Point Count	Secondary Group Max Longitudinal	Secondary Group Max Transverse
245	518	24	26



Plot 17 NR Band n7 30MHz DFTs OFDM QPSK 80RB 0offset CH.511000
EVS-WB Codec: 5.9kbit/s ANT B
T-Coil Signal Test Report
Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
AM1DV3 - 3049	November 14, 2024	DAE4ip Sn1866	May 02, 2024

Communication Systems

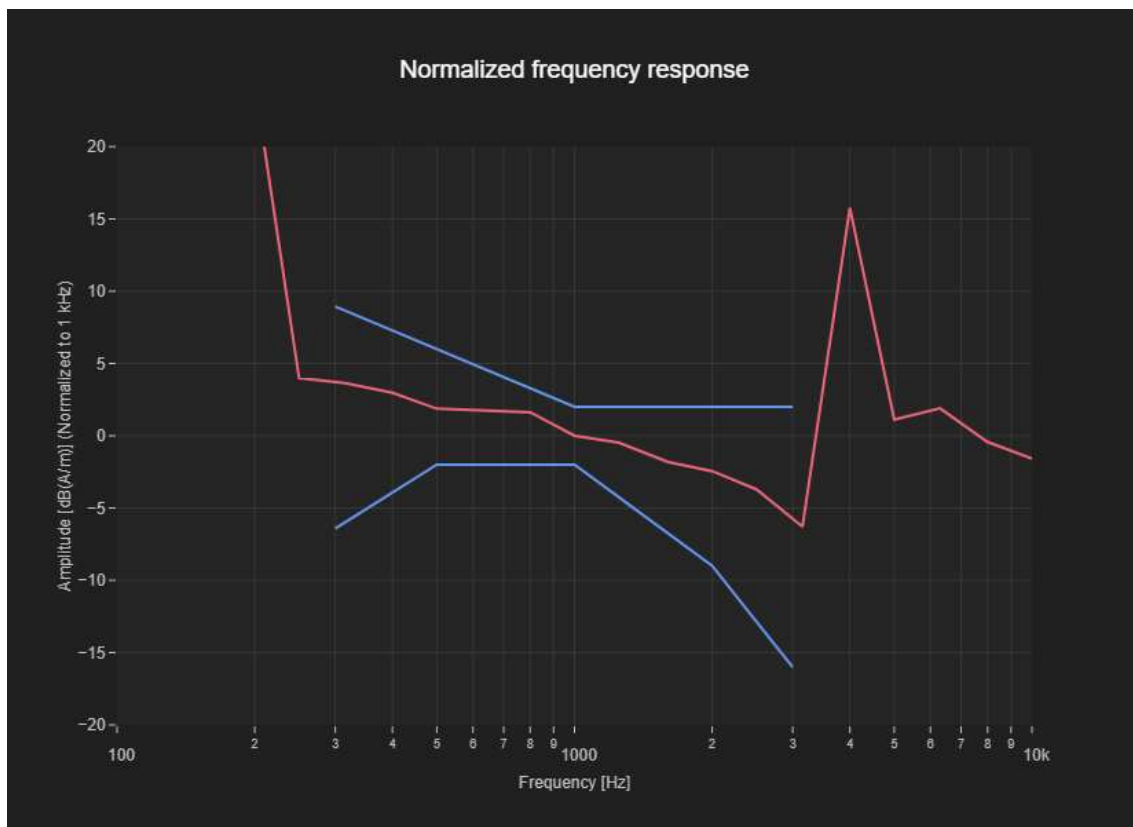
Band Name	Communication Systems Name	Channel	Frequency [MHz]
Band n7	5G NR (DFT-s-OFDM, 50% RB, 30 MHz, QPSK, 15 kHz)	511000	2555.0

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
52.0	52.0	4.0	4.0	10.0

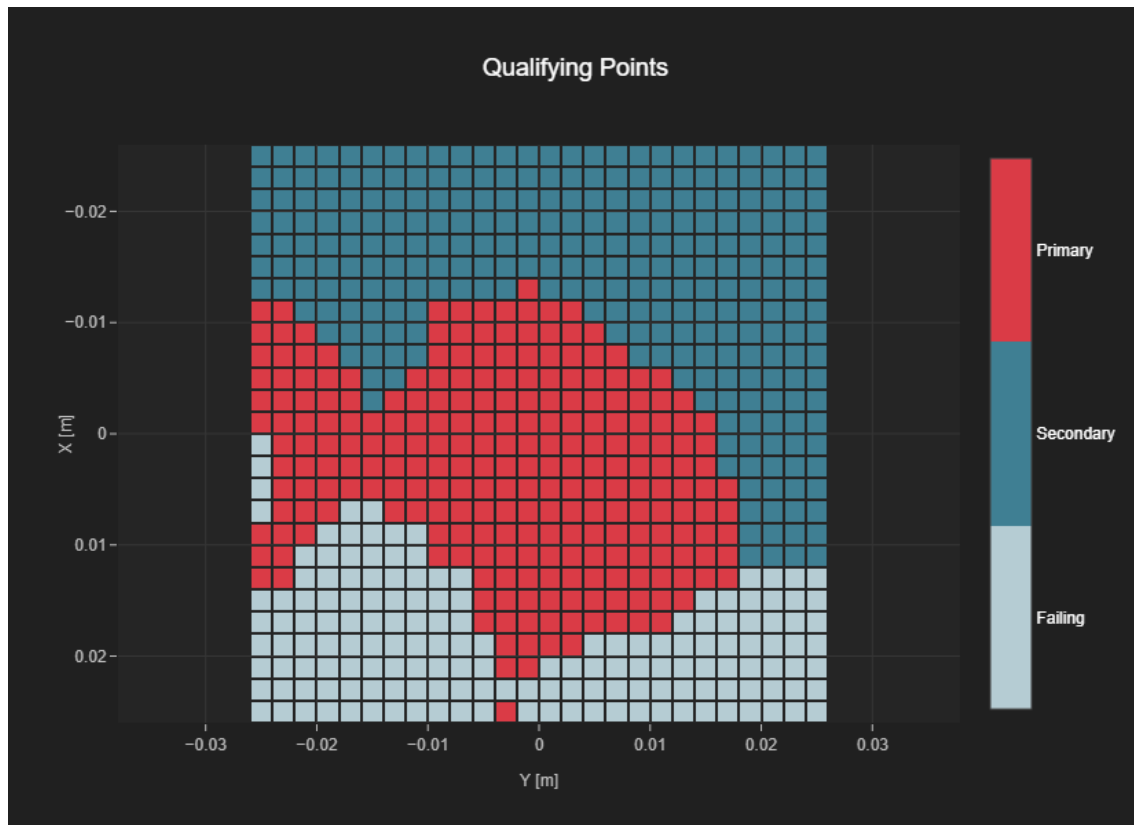
Results

Audio File	Measurement Duration [s]	Margin Upper Bound [dB]	Margin Lower Bound [dB]
48k_voice_300-3000_2s.wav	2.0	1.67	2.0



T-Coil Coupling Mode Test Report Results

Primary Group Contiguous Point Count	Secondary Group Point Count	Secondary Group Max Longitudinal	Secondary Group Max Transverse
244	516	25	26



Plot 18 NR Band n41 60MHz DFTs OFDM QPSK 1RB 160offset CH.518598
EVS-WB Codec: 5.9kbit/s ANT I
T-Coil Signal Test Report
Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
AM1DV3 - 3049	November 14, 2024	DAE4ip Sn1866	May 02, 2024

Communication Systems

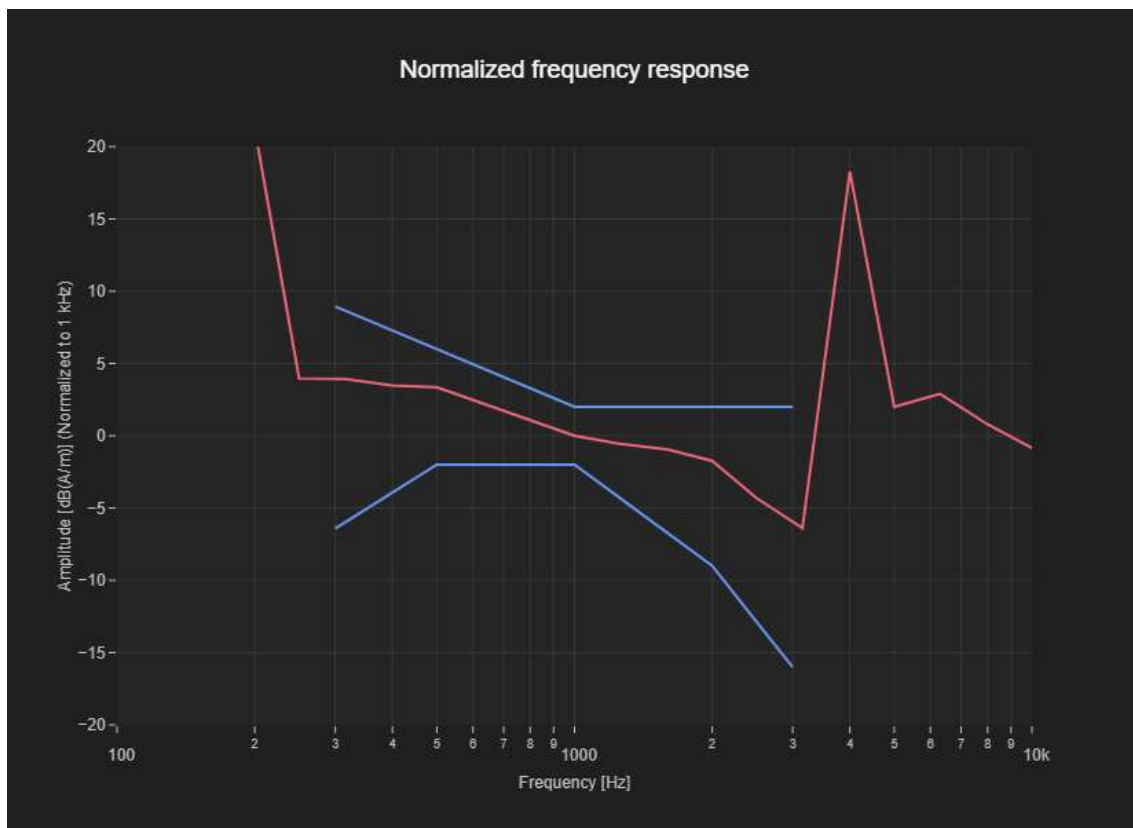
Band Name	Communication Systems Name	Channel	Frequency [MHz]
Band n41	5G NR (DFT-s-OFDM, 1 RB, 60 MHz, QPSK, 30 kHz)	518598	2592.99

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
52.0	52.0	4.0	4.0	10.0

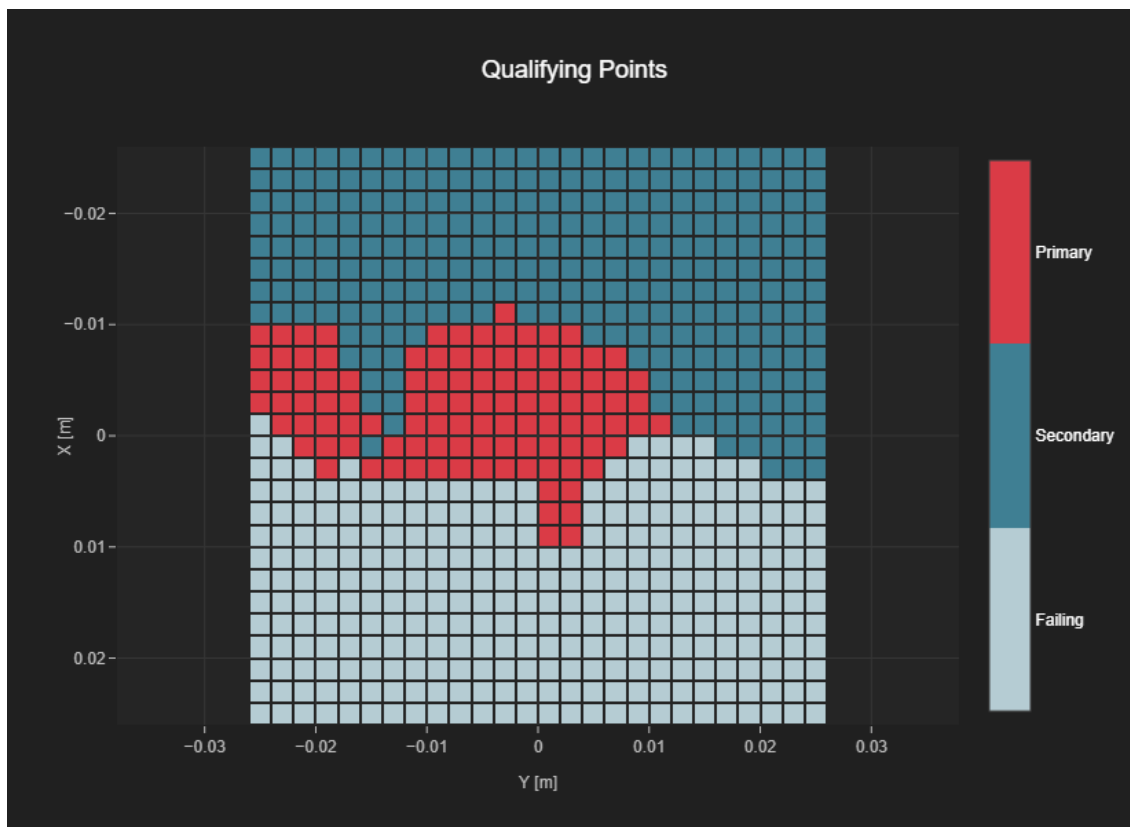
Results

Audio File	Measurement Duration [s]	Margin Upper Bound [dB]	Margin Lower Bound [dB]
48k_voice_300-3000_2s.wav	2.0	2.0	2.0



T-Coil Coupling Mode Test Report Results

Primary Group Contiguous Point Count	Secondary Group Point Count	Secondary Group Max Longitudinal	Secondary Group Max Transverse
107	378	18	26



Plot 19 NR Band n41 60MHz DFTs OFDM QPSK 1RB 160offset CH.505200

EVS-WB Codec: 5.9kbit/s ANT I

T-Coil Signal Test Report

Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
AM1DV3 - 3049	November 14, 2024	DAE4ip Sn1866	May 02, 2024

Communication Systems

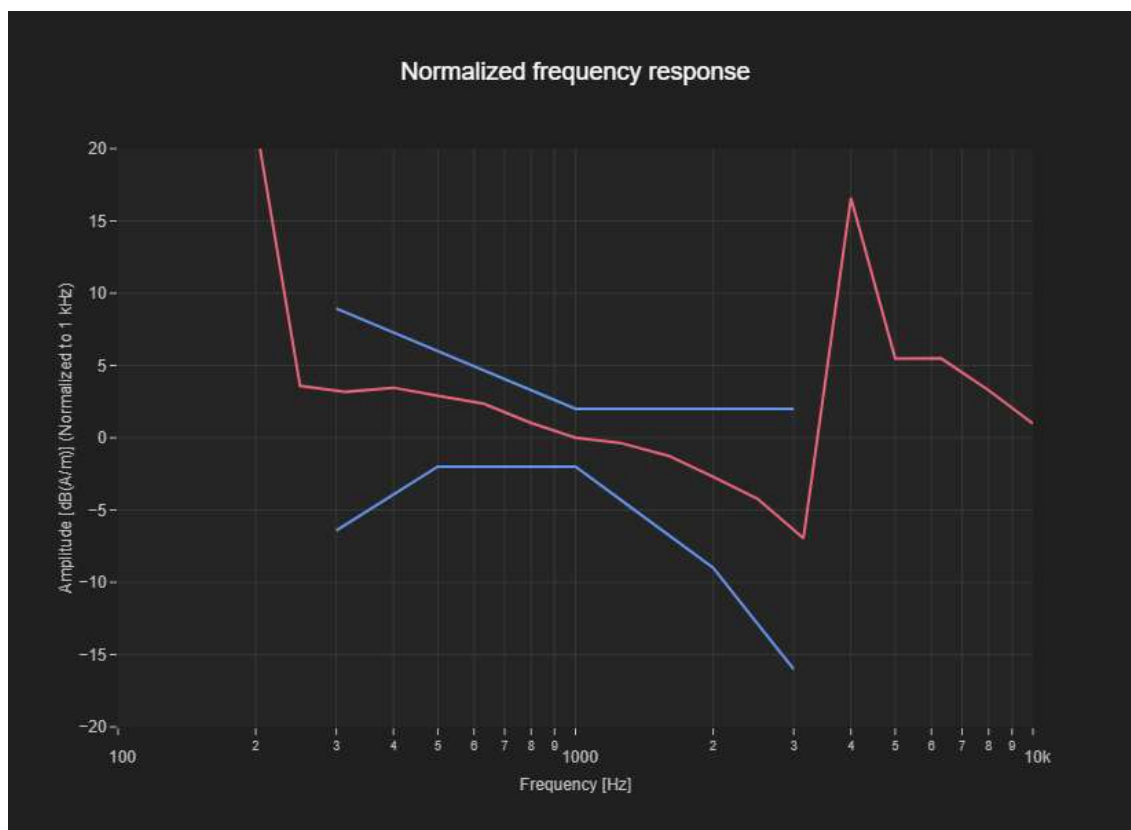
Band Name	Communication Systems Name	Channel	Frequency [MHz]
Band n41	5G NR (DFT-s-OFDM, 1 RB, 60 MHz, QPSK, 30 kHz)	505200	2526.0

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
52.0	52.0	4.0	4.0	10.0

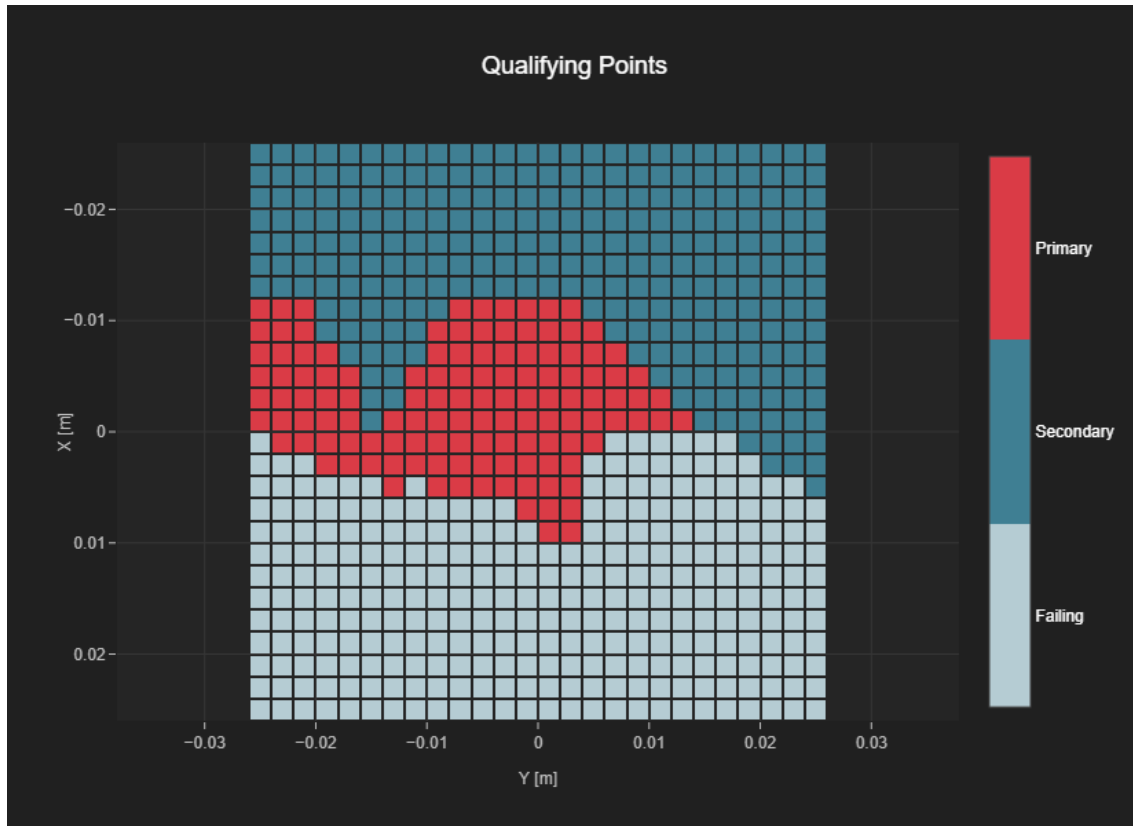
Results

Audio File	Measurement Duration [s]	Margin Upper Bound [dB]	Margin Lower Bound [dB]
48k_voice_300-3000_2s.wav	2.0	2.0	2.0



T-Coil Coupling Mode Test Report Results

Primary Group Contiguous Point Count	Secondary Group Point Count	Secondary Group Max Longitudinal	Secondary Group Max Transverse
125	386	18	26



Plot 20 NR Band n41 60MHz DFTs OFDM QPSK 1RB 160offset CH.531996
EVS-WB Codec: 5.9kbit/s ANT I
T-Coil Signal Test Report
Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
AM1DV3 - 3049	November 14, 2024	DAE4ip Sn1866	May 02, 2024

Communication Systems

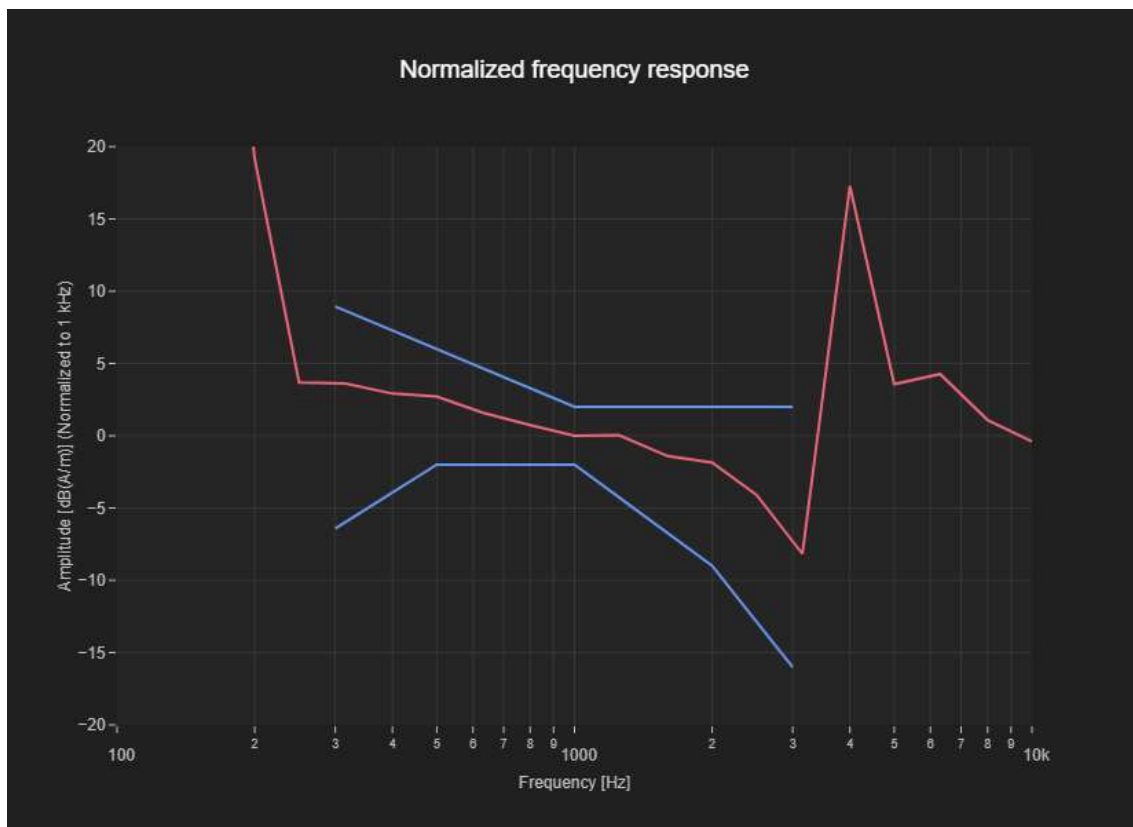
Band Name	Communication Systems Name	Channel	Frequency [MHz]
Band n41	5G NR (DFT-s-OFDM, 1 RB, 60 MHz, QPSK, 30 kHz)	531996	2659.98

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
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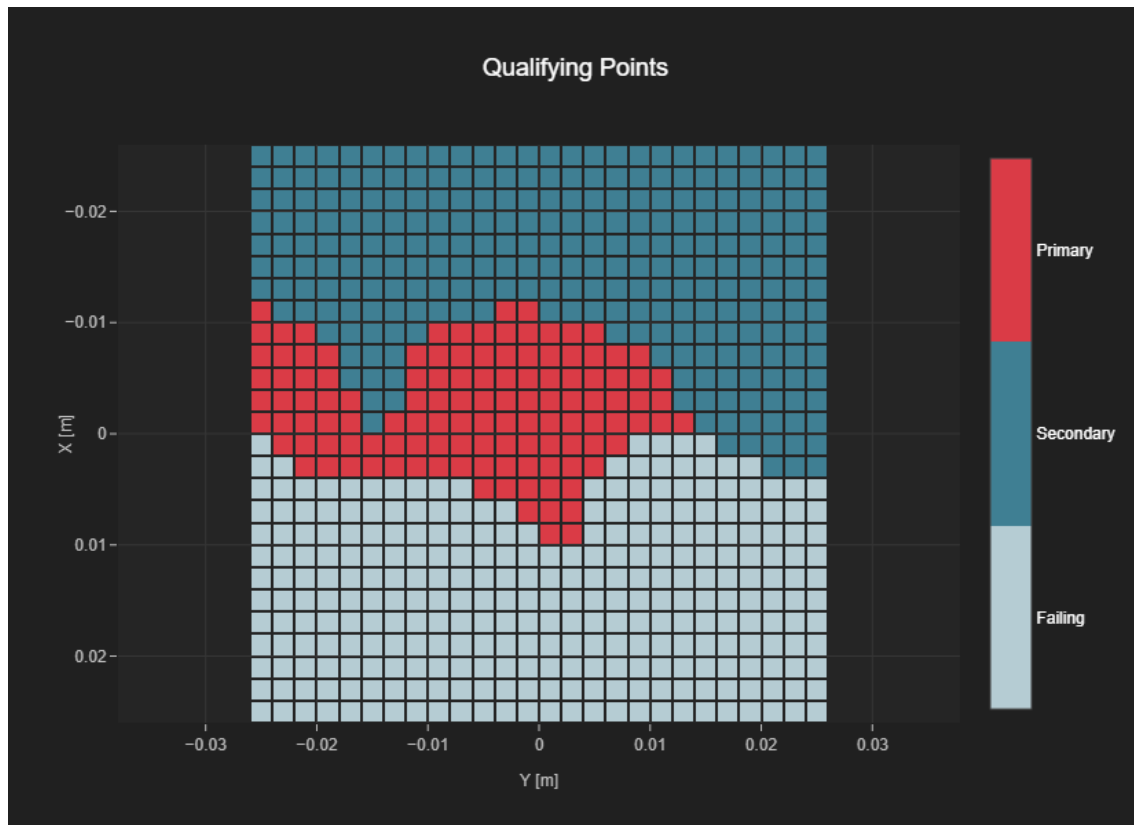
Results

Audio File	Measurement Duration [s]	Margin Upper Bound [dB]	Margin Lower Bound [dB]
48k_voice_300-3000_2s.wav	2.0	1.95	2.0



T-Coil Coupling Mode Test Report Results

Primary Group Contiguous Point Count	Secondary Group Point Count	Secondary Group Max Longitudinal	Secondary Group Max Transverse
121	386	18	26



Plot 21 802.11b CH.6 11Mbps Voice EVS-WB Codec: 5.9 kbit/s

T-Coil Signal Test Report

Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
AM1DV3 - 3049	November 14, 2024	DAE4ip Sn1866	May 02, 2024

Communication Systems

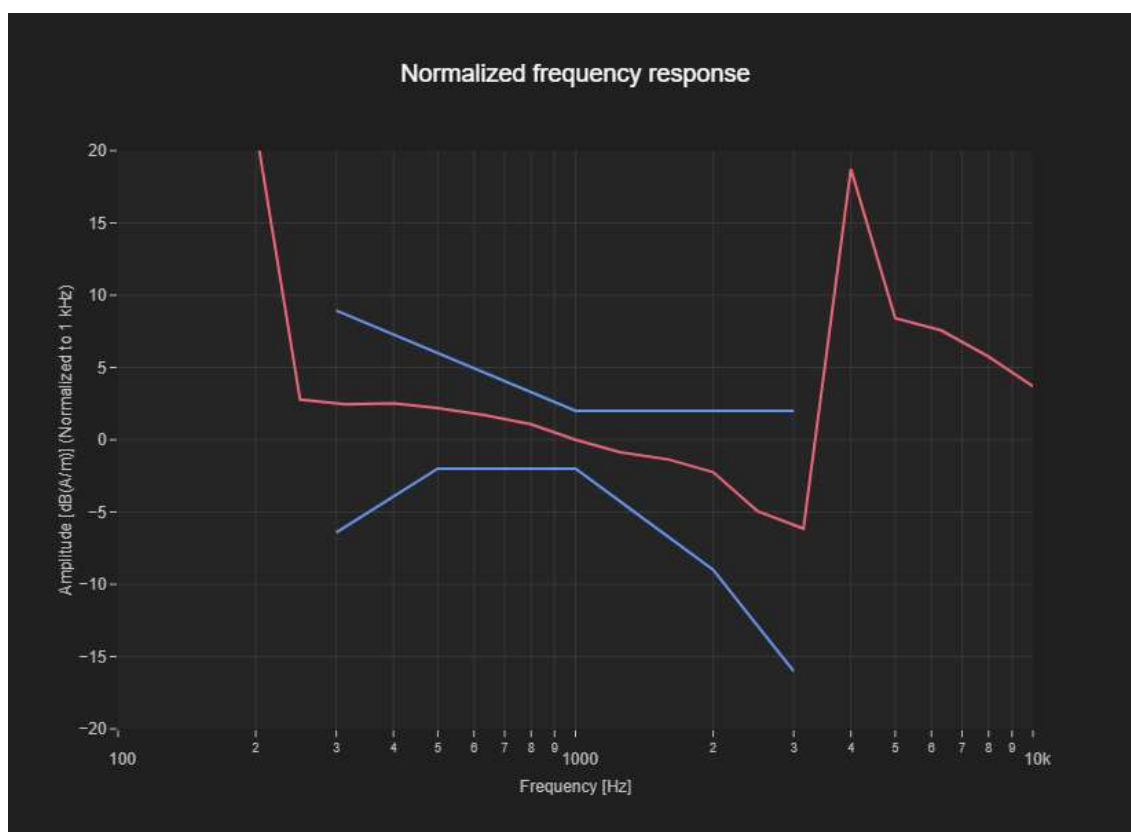
Band Name	Communication Systems Name	Channel	Frequency [MHz]
WLAN 2.4GHz	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps, 90pc duty cycle)	6	2437.0

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
52.0	52.0	4.0	4.0	10.0

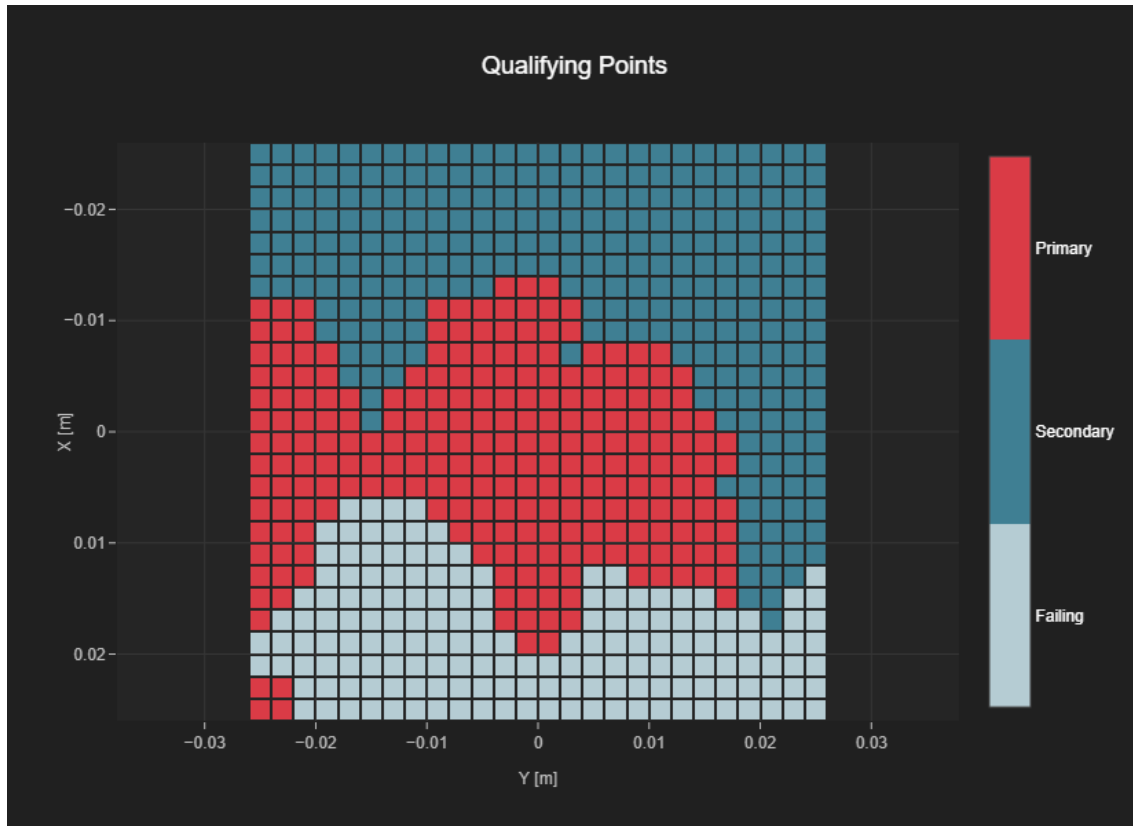
Results

Audio File	Measurement Duration [s]	Margin Upper Bound [dB]	Margin Lower Bound [dB]
48k_voice_300-3000_2s.wav	2.0	2.0	2.0



T-Coil Coupling Mode Test Report Results

Primary Group Contiguous Point Count	Secondary Group Point Count	Secondary Group Max Longitudinal	Secondary Group Max Transverse
237	513	24	26



Plot 22 802.11b CH.1 11Mbps Voice EVS-WB Codec: 5.9 kbit/s

T-Coil Signal Test Report

Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
AM1DV3 - 3049	November 14, 2024	DAE4ip Sn1866	May 02, 2024

Communication Systems

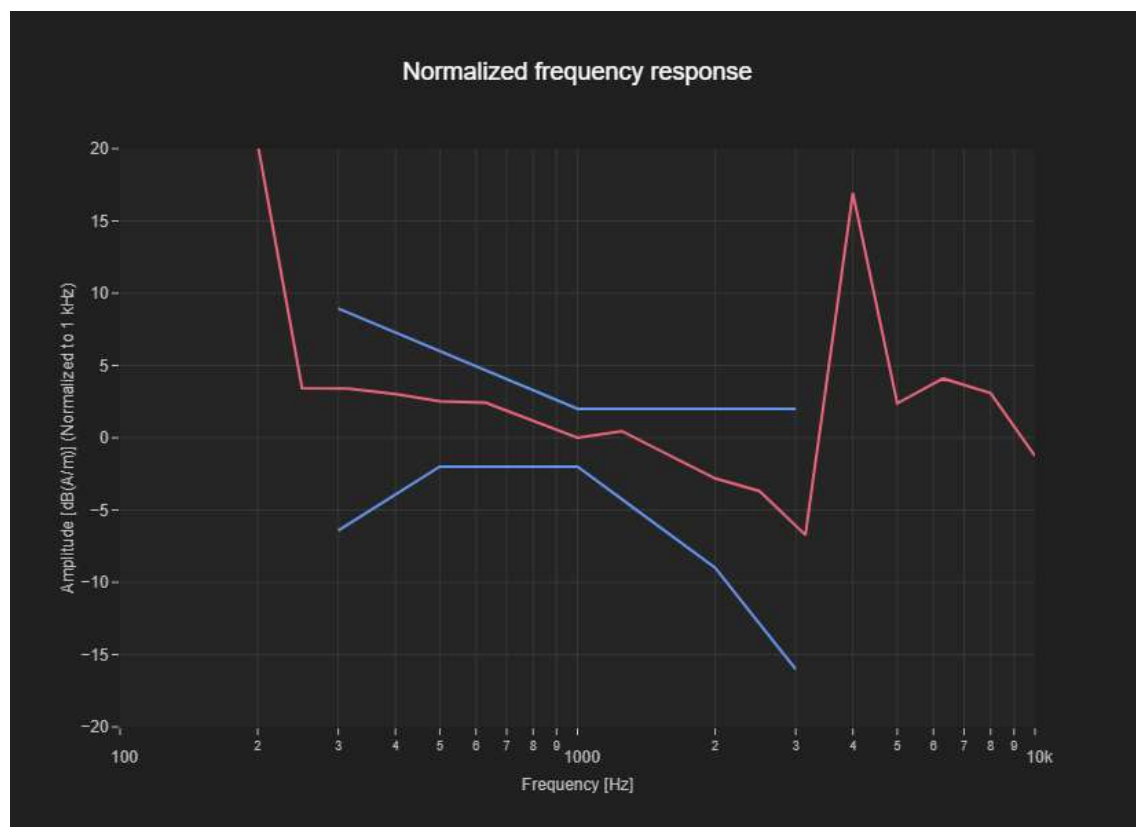
Band Name	Communication Systems Name	Channel	Frequency [MHz]
WLAN 2.4GHz	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps, 90pc duty cycle)	1	2412.0

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
52.0	52.0	4.0	4.0	10.0

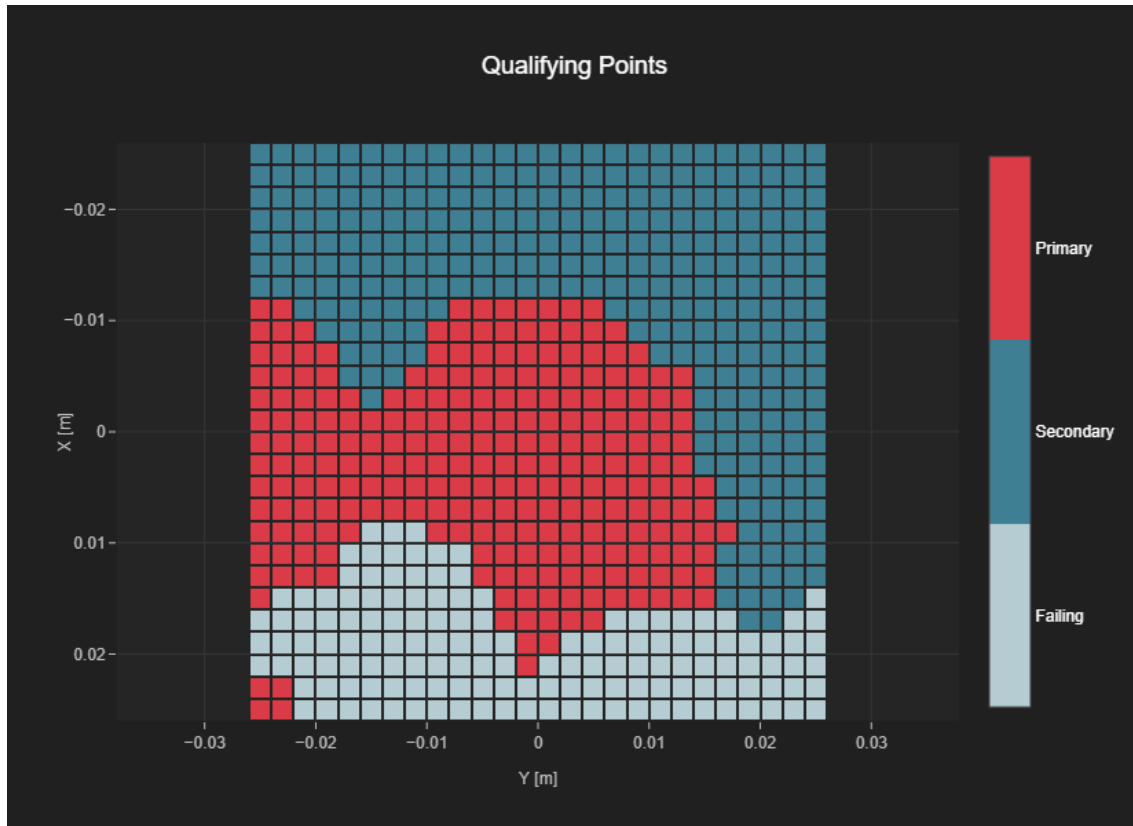
Results

Audio File	Measurement Duration [s]	Margin Upper Bound [dB]	Margin Lower Bound [dB]
48k_voice_300-3000_2s.wav	2.0	1.54	2.0



T-Coil Coupling Mode Test Report Results

Primary Group Contiguous Point Count	Secondary Group Point Count	Secondary Group Max Longitudinal	Secondary Group Max Transverse
245	534	24	26



Plot 23 802.11b CH.11 11Mbps Voice EVS-WB Codec: 5.9 kbit/s

T-Coil Signal Test Report

Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
AM1DV3 - 3049	November 14, 2024	DAE4ip Sn1866	May 02, 2024

Communication Systems

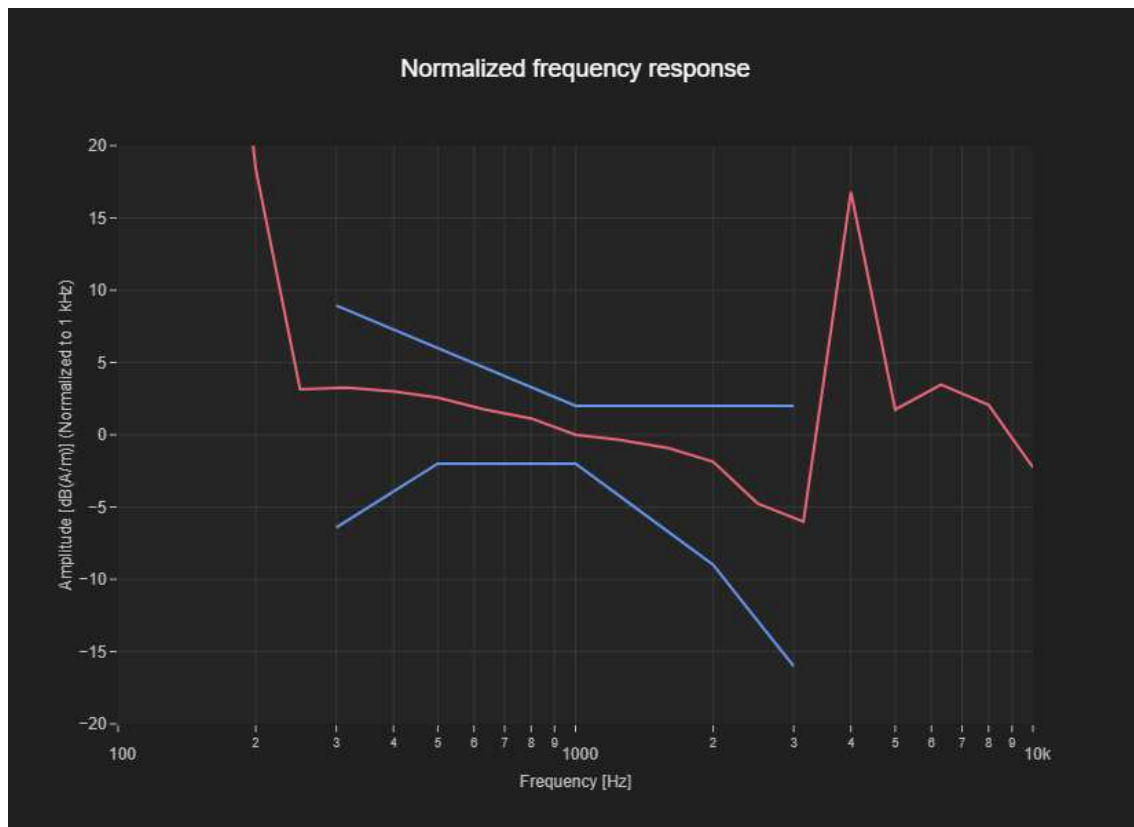
Band Name	Communication Systems Name	Channel	Frequency [MHz]
WLAN 2.4GHz	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps, 90pc duty cycle)	11	2462.0

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
52.0	52.0	4.0	4.0	10.0

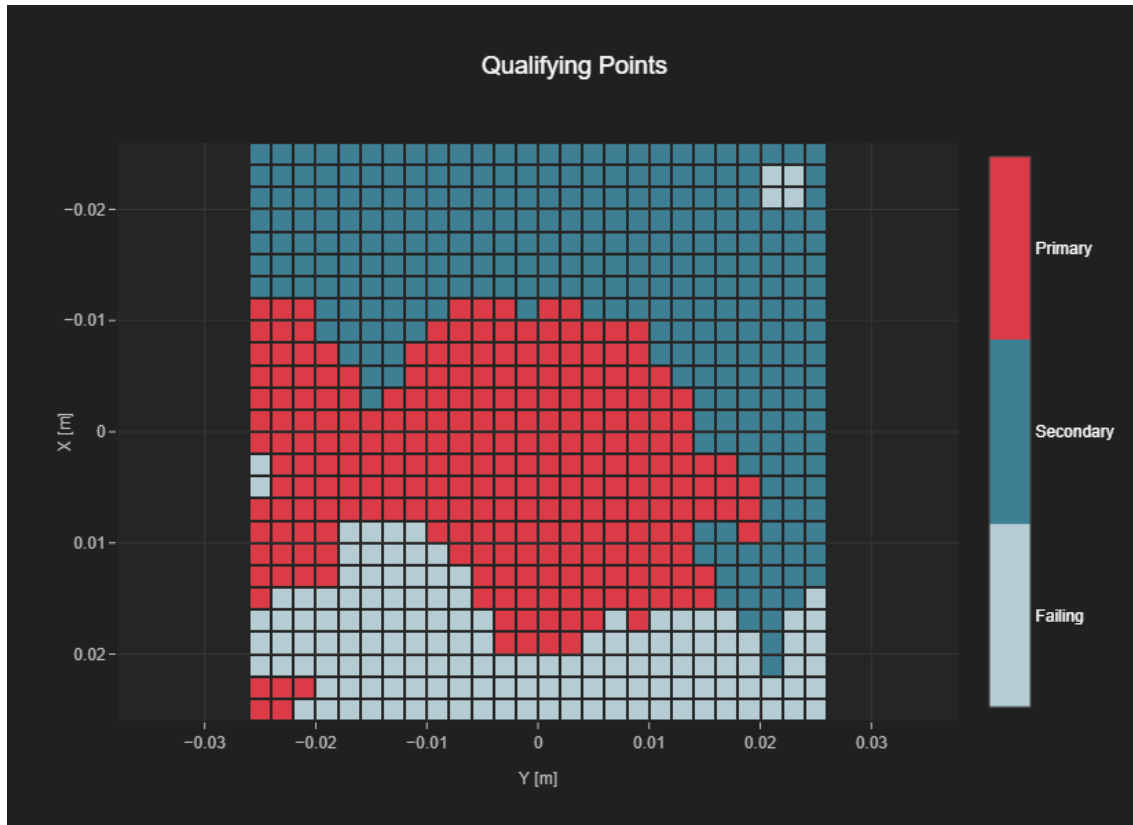
Results

Audio File	Measurement Duration [s]	Margin Upper Bound [dB]	Margin Lower Bound [dB]
48k_voice_300-3000_2s.wav	2.0	2.0	2.0



T-Coil Coupling Mode Test Report Results

Primary Group Contiguous Point Count	Secondary Group Point Count	Secondary Group Max Longitudinal	Secondary Group Max Transverse
252	534	23	26



Plot 24 802.11ax80 CH.42 MCS0 Voice EVS-SWB Codec: 24.4 kbit/s

T-Coil Signal Test Report

Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
AM1DV3 - 3050	January 20, 2025	DAE4 Sn466	September 03, 2024

Communication Systems

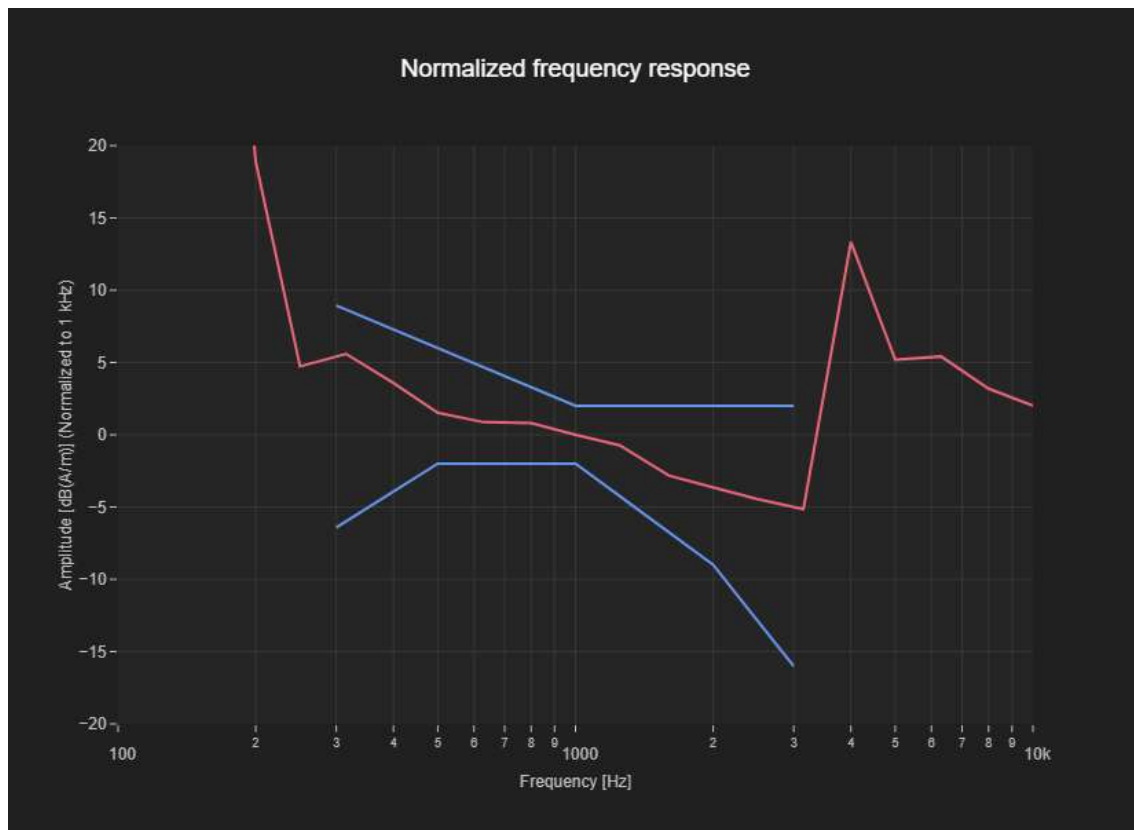
Band Name	Communication Systems Name	Channel	Frequency [MHz]
U-NII-1, U-NII-2A	IEEE 802.11ax (80MHz, MCS0, 90pc duty cycle)	42	5210.0

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
52.0	52.0	4.0	4.0	10.0

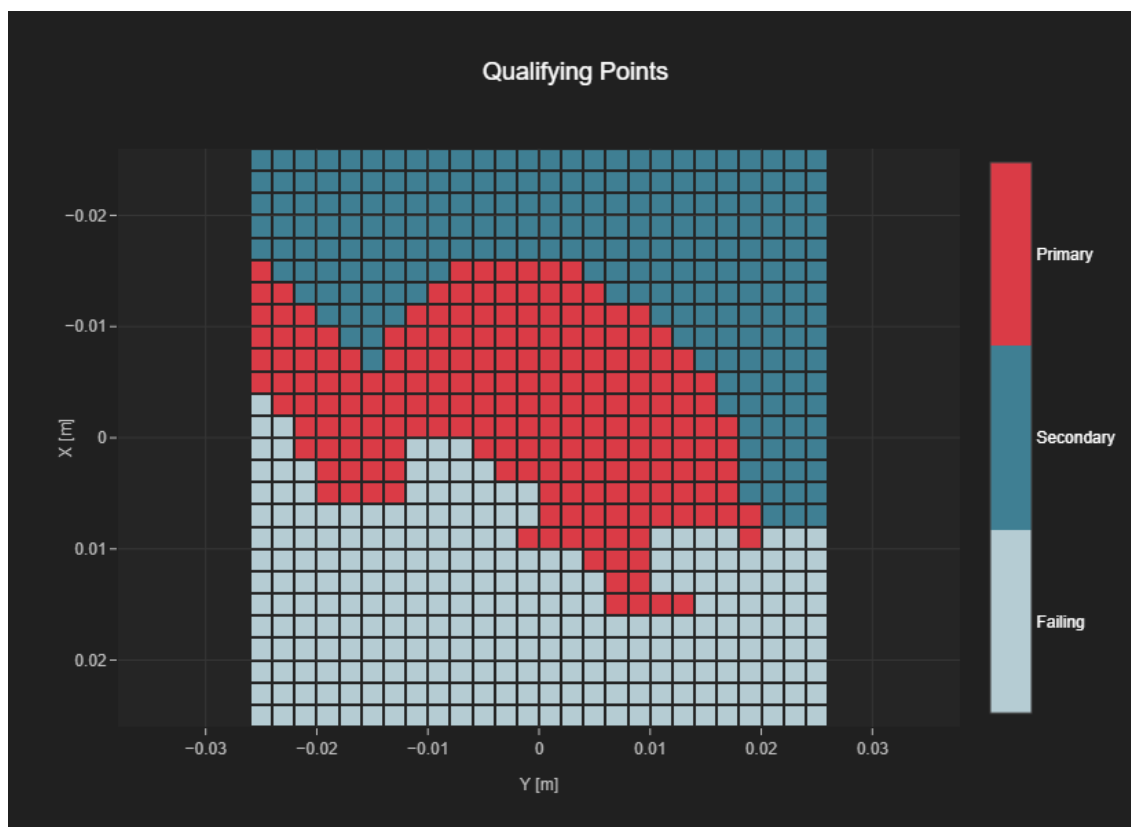
Results

Audio File	Measurement Duration [s]	Margin Upper Bound [dB]	Margin Lower Bound [dB]
48k_voice_300-3000_2s.wav	2.0	2.0	2.0



T-Coil Coupling Mode Test Report Results

Primary Group Contiguous Point Count	Secondary Group Point Count	Secondary Group Max Longitudinal	Secondary Group Max Transverse
199	421	21	26



Plot 25 802.11ax80 CH.58 MCS0 Voice EVS-SWB Codec: 24.4 kbit/s

T-Coil Signal Test Report

Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
AM1DV3 - 3050	January 20, 2025	DAE4 Sn466	September 03, 2024

Communication Systems

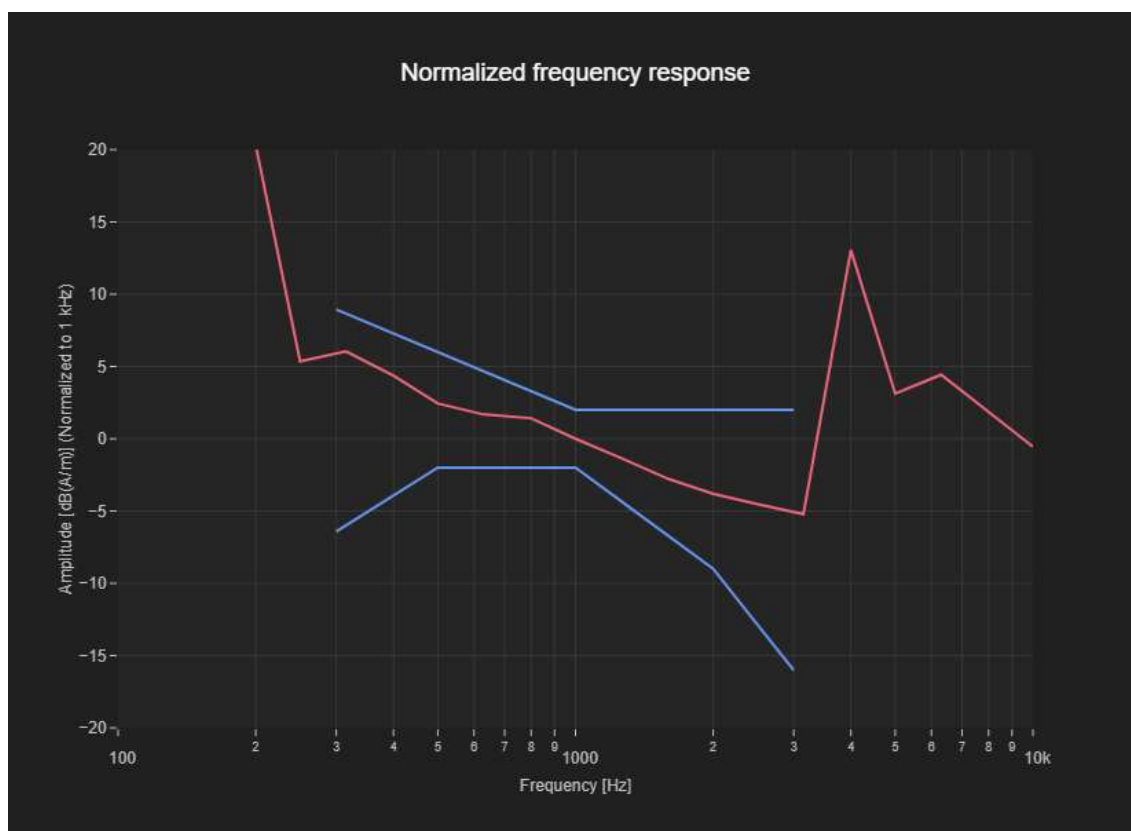
Band Name	Communication Systems Name	Channel	Frequency [MHz]
U-NII-1, U-NII-2A	IEEE 802.11ax (80MHz, MCS0, 90pc duty cycle)	58	5290.0

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
52.0	52.0	4.0	4.0	10.0

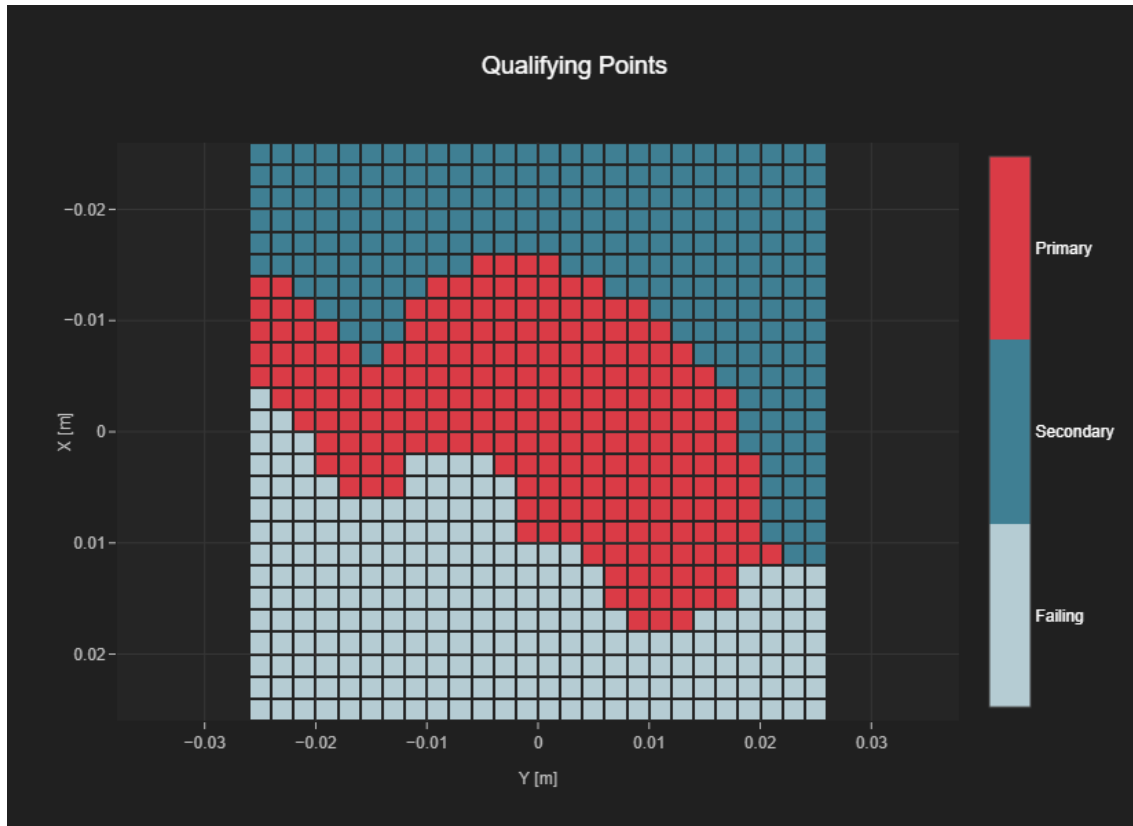
Results

Audio File	Measurement Duration [s]	Margin Upper Bound [dB]	Margin Lower Bound [dB]
48k_voice_300-3000_2s.wav	2.0	1.87	2.0



T-Coil Coupling Mode Test Report Results

Primary Group Contiguous Point Count	Secondary Group Point Count	Secondary Group Max Longitudinal	Secondary Group Max Transverse
220	448	22	26



Plot 26 802.11ax80 CH.122 MCS0 Voice EVS-SWB Codec: 24.4 kbit/s

T-Coil Signal Test Report

Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
AM1DV3 - 3050	January 20, 2025	DAE4 Sn466	September 03, 2024

Communication Systems

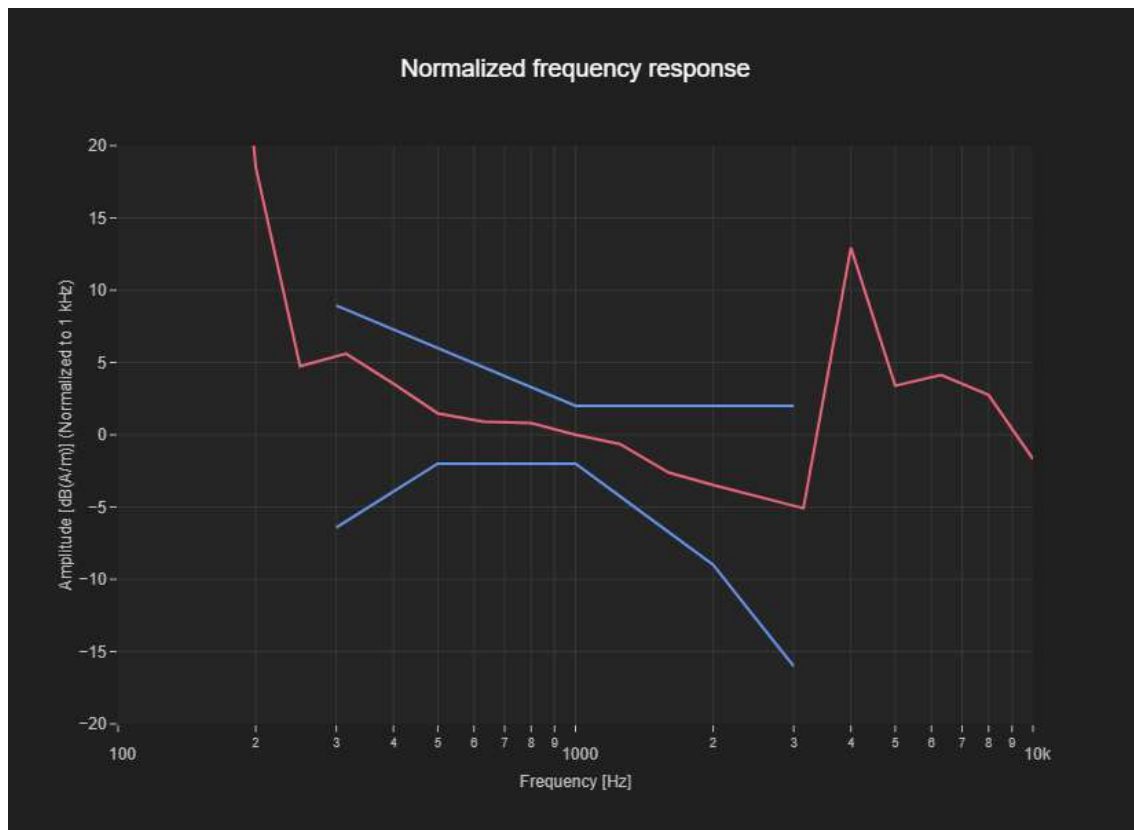
Band Name	Communication Systems Name	Channel	Frequency [MHz]
U-NII-2C Standalone	IEEE 802.11ax (80MHz, MCS0, 90pc duty cycle)	122	5610.0

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
52.0	52.0	4.0	4.0	10.0

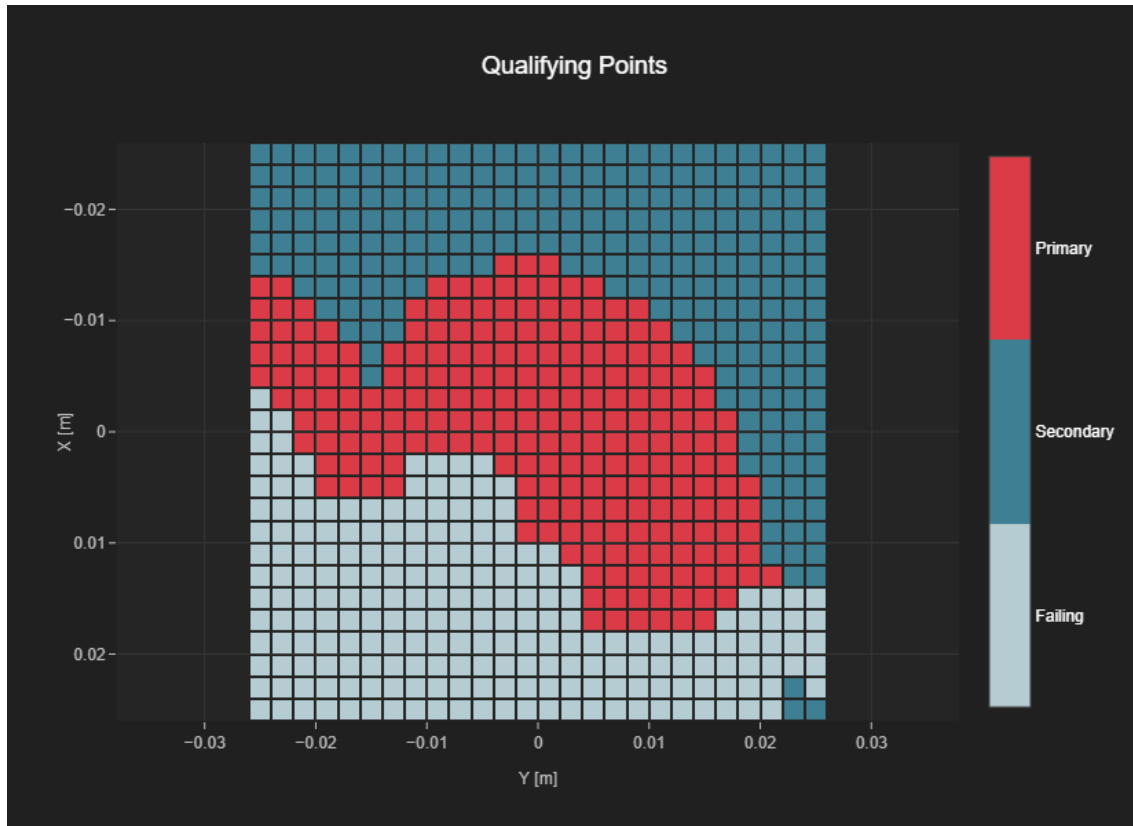
Results

Audio File	Measurement Duration [s]	Margin Upper Bound [dB]	Margin Lower Bound [dB]
48k_voice_300-3000_2s.wav	2.0	2.0	2.0



T-Coil Coupling Mode Test Report Results

Primary Group Contiguous Point Count	Secondary Group Point Count	Secondary Group Max Longitudinal	Secondary Group Max Transverse
225	463	22	26



Plot 27 802.11ax80 CH.155 MCS0 Voice EVS-SWB Codec: 24.4 kbit/s

T-Coil Signal Test Report

Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
AM1DV3 - 3050	January 20, 2025	DAE4 Sn466	September 03, 2024

Communication Systems

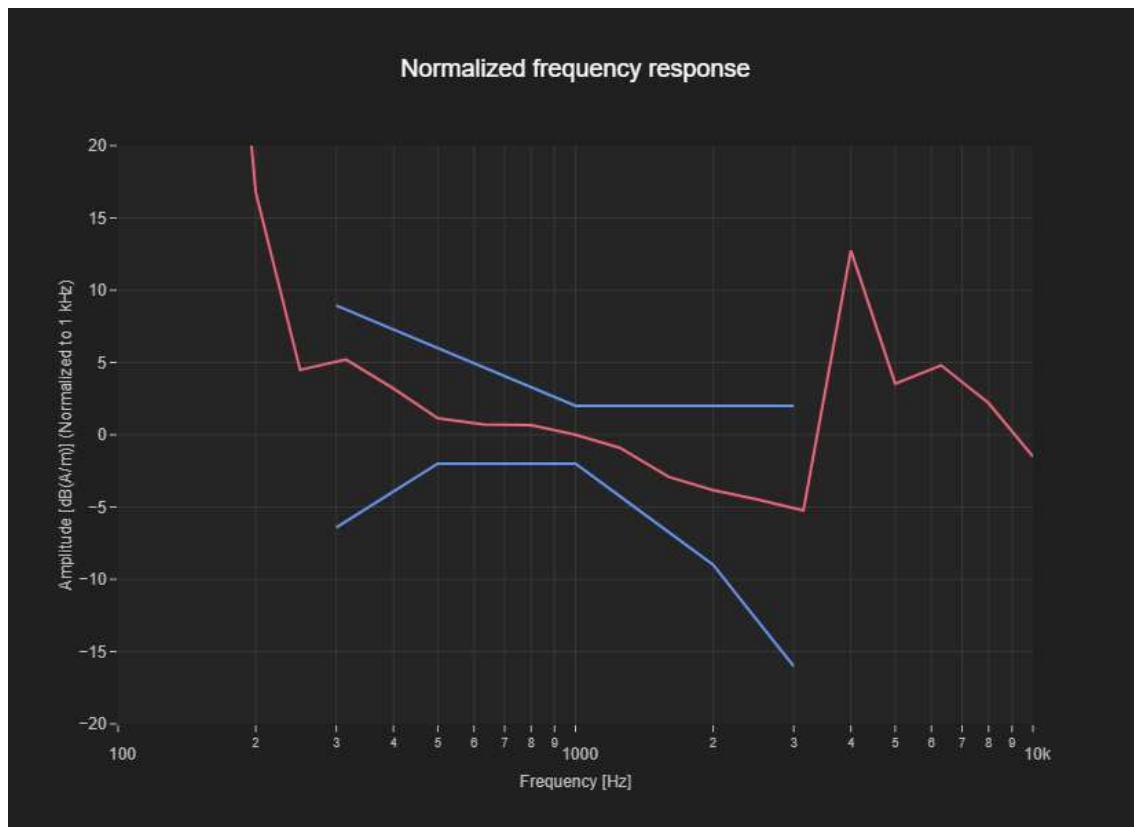
Band Name	Communication Systems Name	Channel	Frequency [MHz]
WLAN 5GHz	IEEE 802.11ax (80MHz, MCS0, 90pc duty cycle)	155	5775.0

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
52.0	52.0	4.0	4.0	10.0

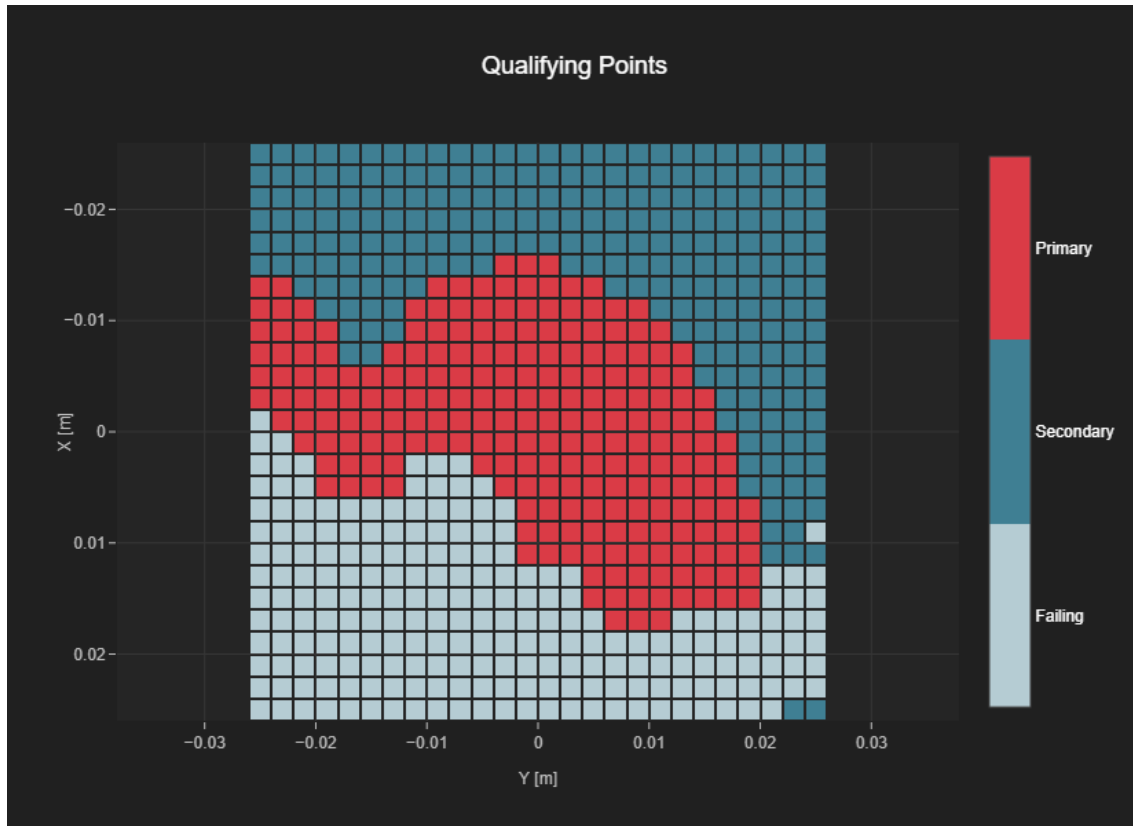
Results

Audio File	Measurement Duration [s]	Margin Upper Bound [dB]	Margin Lower Bound [dB]
48k_voice_300-3000_2s.wav	2.0	2.0	2.0



T-Coil Coupling Mode Test Report Results

Primary Group Contiguous Point Count	Secondary Group Point Count	Secondary Group Max Longitudinal	Secondary Group Max Transverse
225	462	22	26



Plot 28 802.11ax80 CH.171 MCS0 Voice EVS-SWB Codec: 24.4 kbit/s

T-Coil Signal Test Report

Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
AM1DV3 - 3050	January 20, 2025	DAE4 Sn466	September 03, 2024

Communication Systems

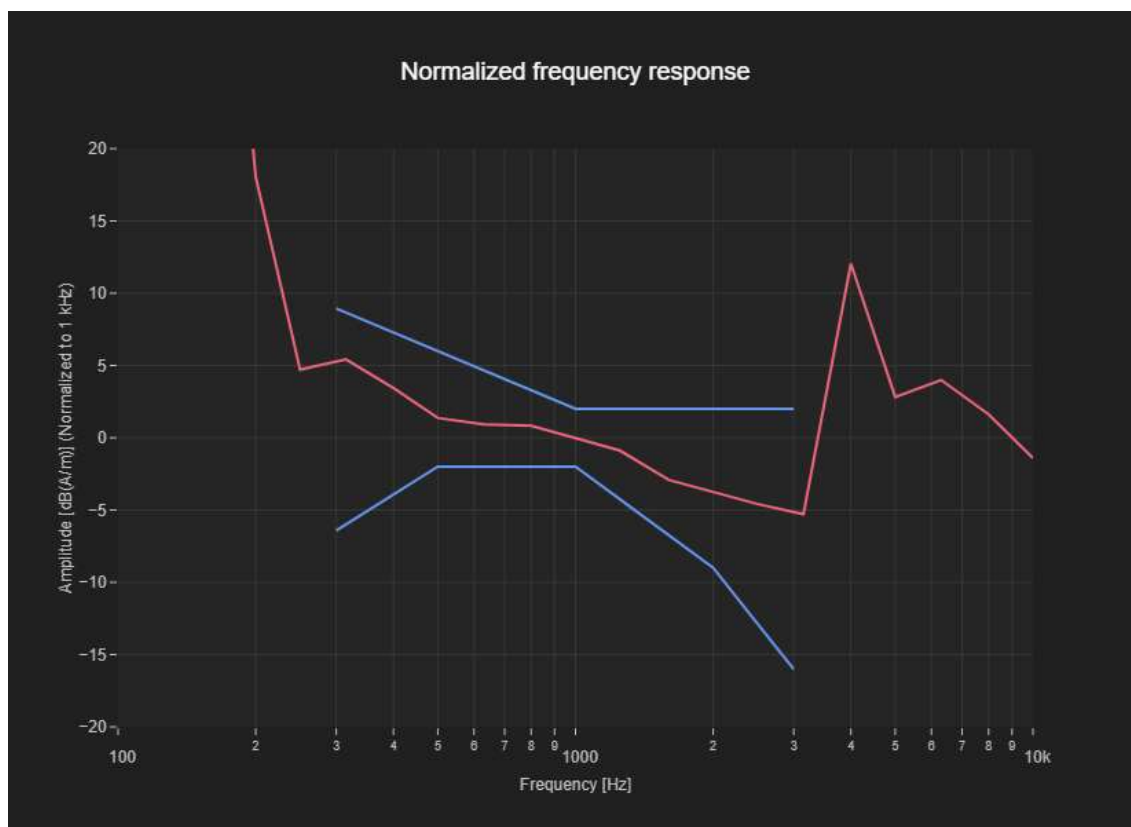
Band Name	Communication Systems Name	Channel	Frequency [MHz]
U-NII-4	IEEE 802.11ax (80MHz, MCS0, 90pc duty cycle)	171	5855.0

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
52.0	52.0	4.0	4.0	10.0

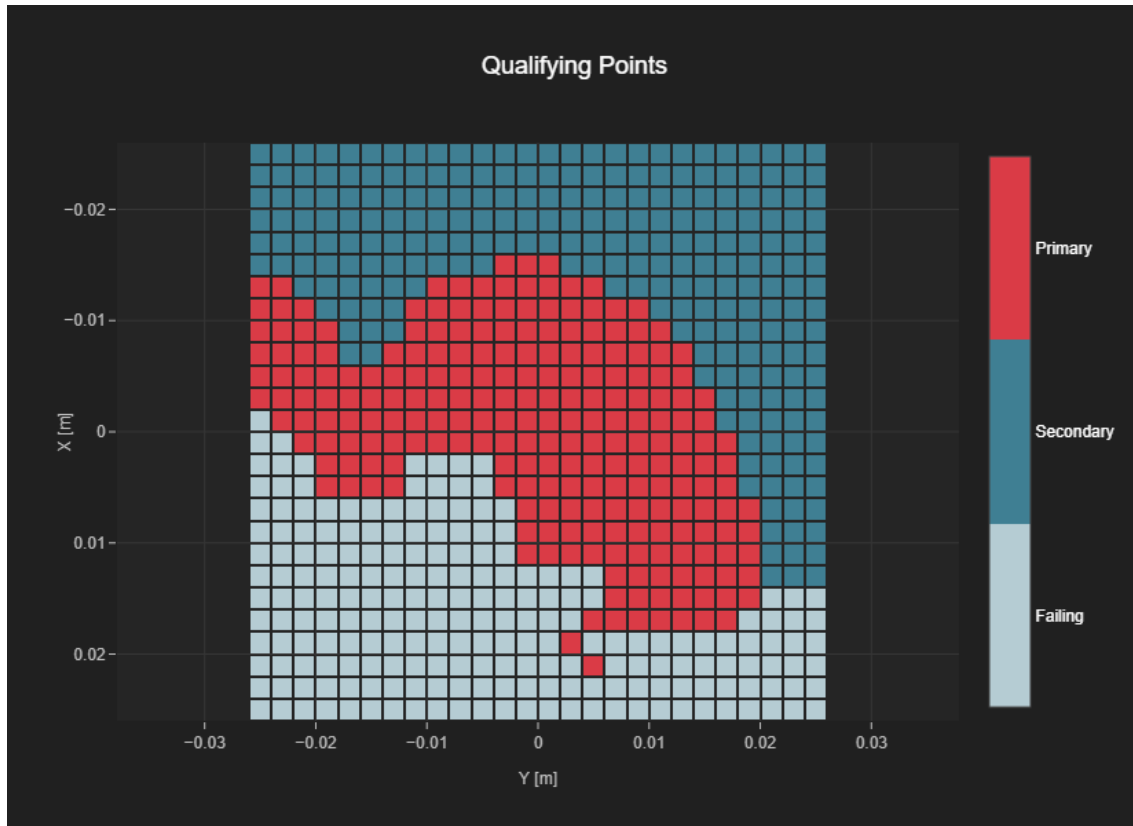
Results

Audio File	Measurement Duration [s]	Margin Upper Bound [dB]	Margin Lower Bound [dB]
48k_voice_300-3000_2s.wav	2.0	2.0	2.0



T-Coil Coupling Mode Test Report Results

Primary Group Contiguous Point Count	Secondary Group Point Count	Secondary Group Max Longitudinal	Secondary Group Max Transverse
228	465	22	26



Plot 29 GSM850 CH.190 EDGE 2 slots Google Meet Codec: 6 kbit/s ANT A

T-Coil Signal Test Report

Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
AM1DV3 - 3050	January 20, 2025	DAE4 Sn466	September 03, 2024

Communication Systems

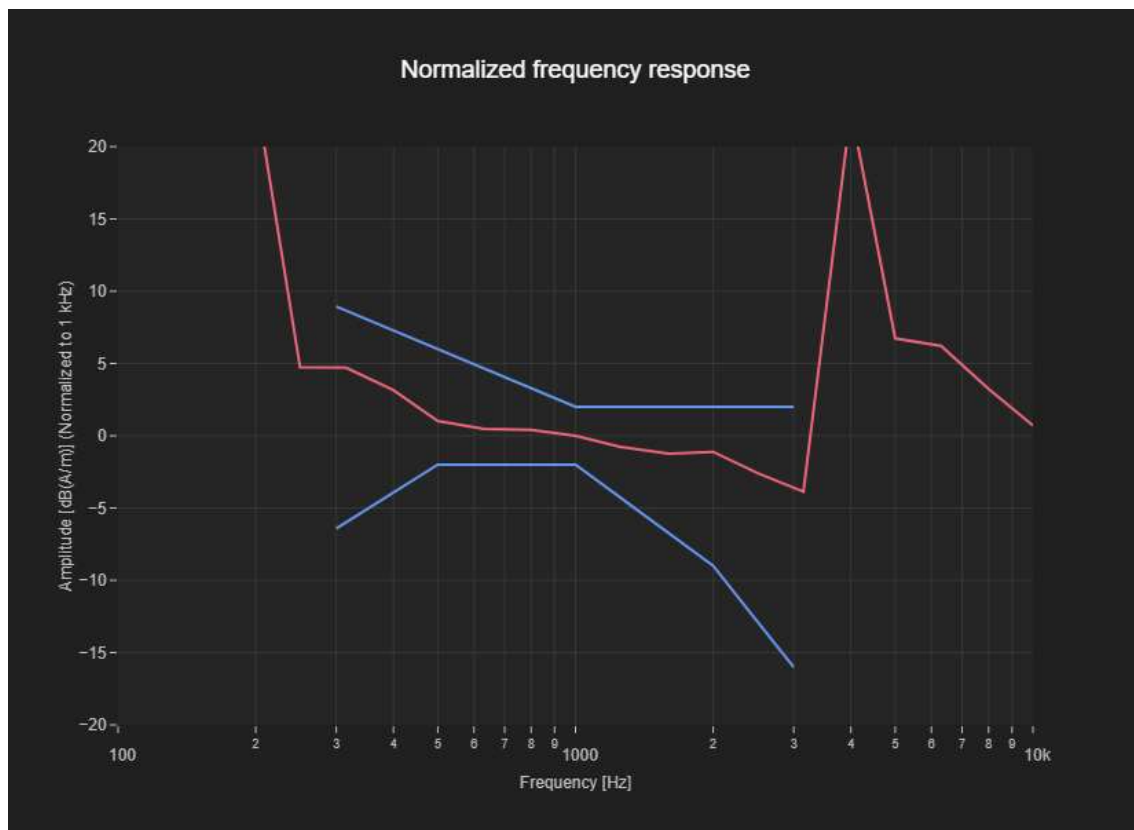
Band Name	Communication Systems Name	Channel	Frequency [MHz]
GSM 850	EDGE-FDD (TDMA, 8PSK, TN 0-1)	190	836.6

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
52.0	52.0	4.0	4.0	10.0

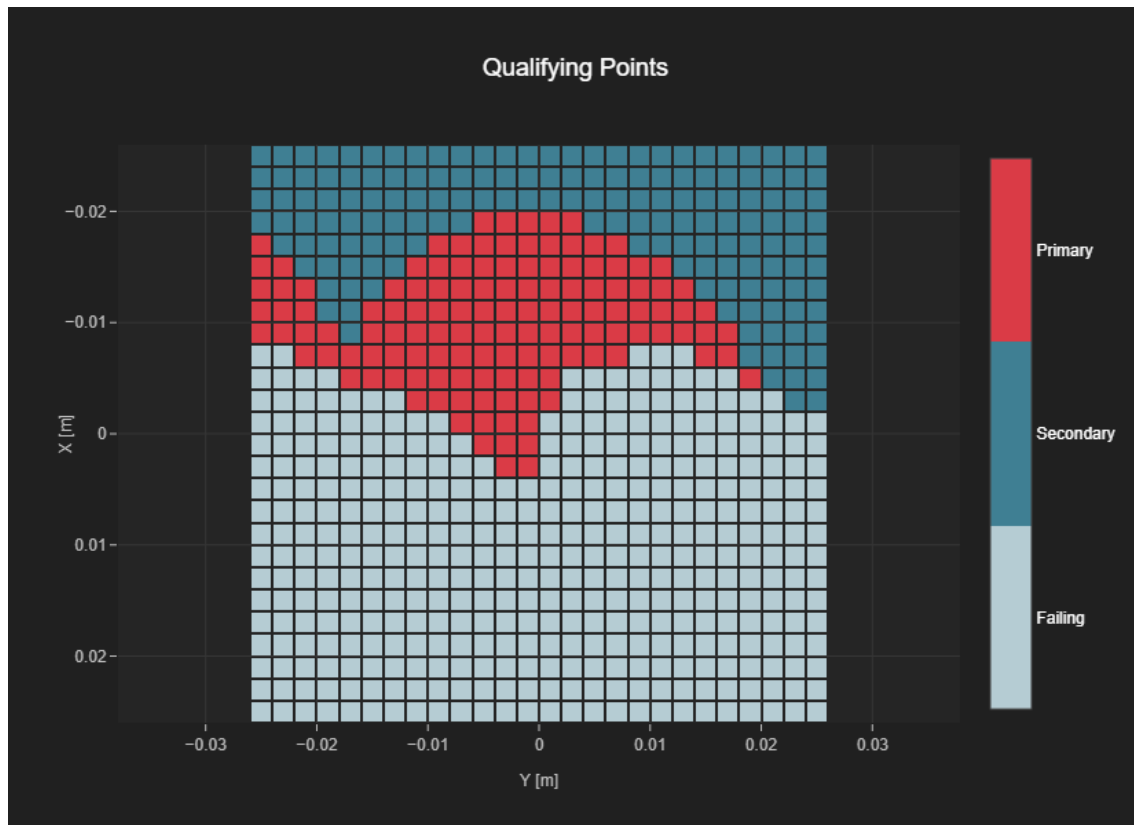
Results

Audio File	Measurement Duration [s]	Margin Upper Bound [dB]	Margin Lower Bound [dB]
48k_voice_300-3000_2s.wav	10.0	2.0	2.0



T-Coil Coupling Mode Test Report Results

Primary Group Contiguous Point Count	Secondary Group Point Count	Secondary Group Max Longitudinal	Secondary Group Max Transverse
130	287	15	26



Plot 30 GSM850 CH.128 EDGE 2 slots Google Meet Codec: 6 kbit/s ANT A
T-Coil Signal Test Report
Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
AM1DV3 - 3050	January 20, 2025	DAE4 Sn466	September 03, 2024

Communication Systems

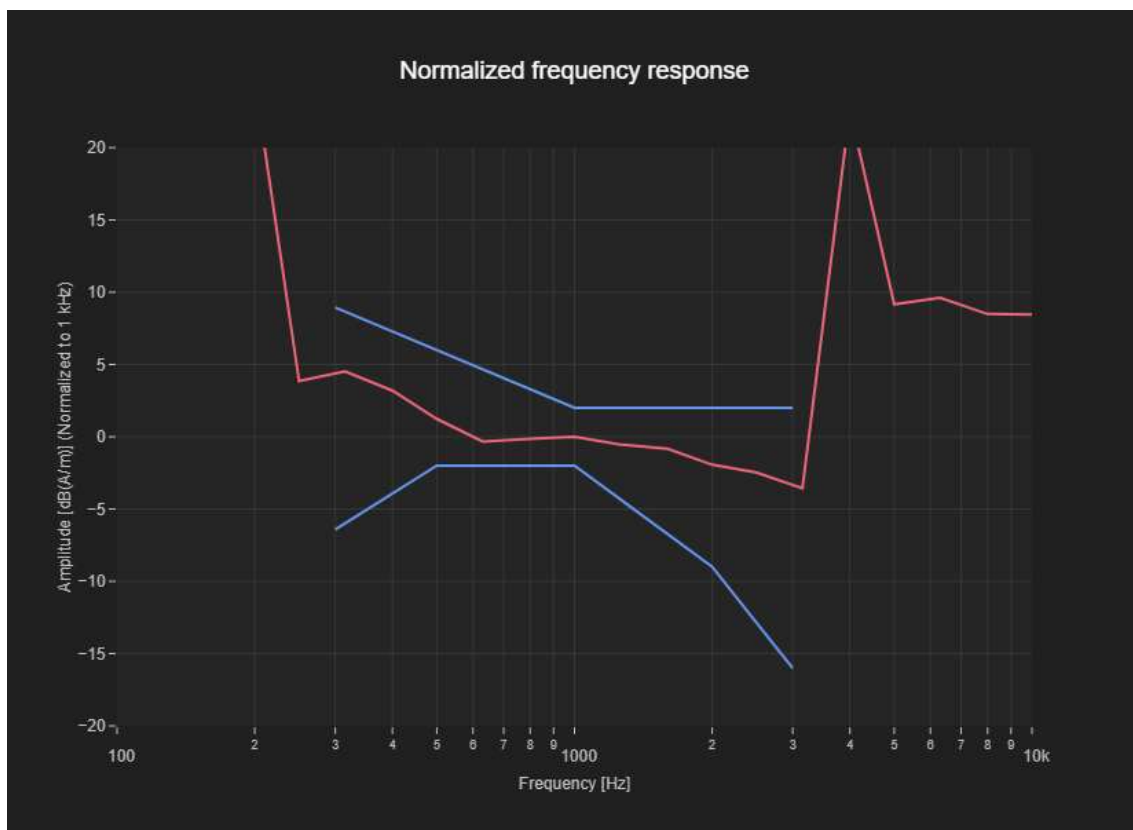
Band Name	Communication Systems Name	Channel	Frequency [MHz]
GSM 850	EDGE-FDD (TDMA, 8PSK, TN 0-1)	128	824.2

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
52.0	52.0	4.0	4.0	10.0

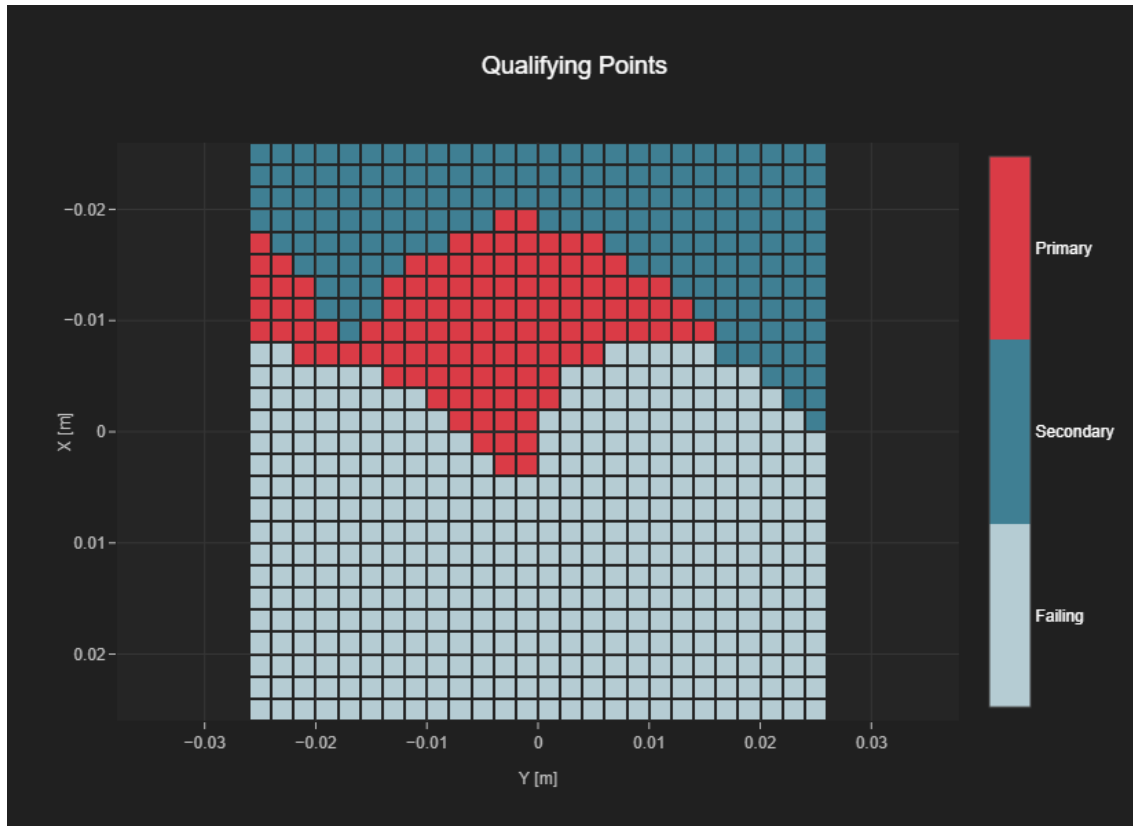
Results

Audio File	Measurement Duration [s]	Margin Upper Bound [dB]	Margin Lower Bound [dB]
48k_voice_300-3000_2s.wav	4.0	2.0	1.68



T-Coil Coupling Mode Test Report Results

Primary Group Contiguous Point Count	Secondary Group Point Count	Secondary Group Max Longitudinal	Secondary Group Max Transverse
112	282	15	26



Plot 31 GSM850 CH.251 EDGE 2 slots Google Meet Codec: 6 kbit/s ANT A
T-Coil Signal Test Report
Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
AM1DV3 - 3050	January 20, 2025	DAE4 Sn466	September 03, 2024

Communication Systems

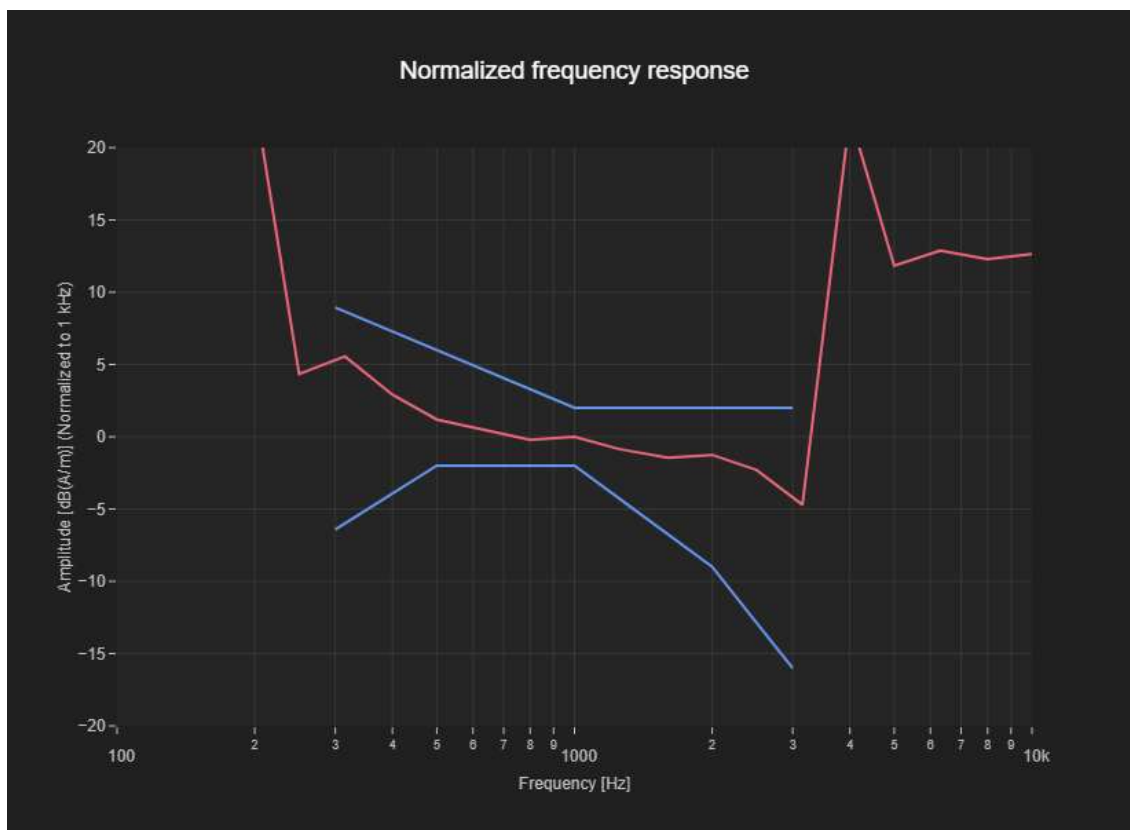
Band Name	Communication Systems Name	Channel	Frequency [MHz]
GSM 850	EDGE-FDD (TDMA, 8PSK, TN 0-1)	251	848.8

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
52.0	52.0	4.0	4.0	10.0

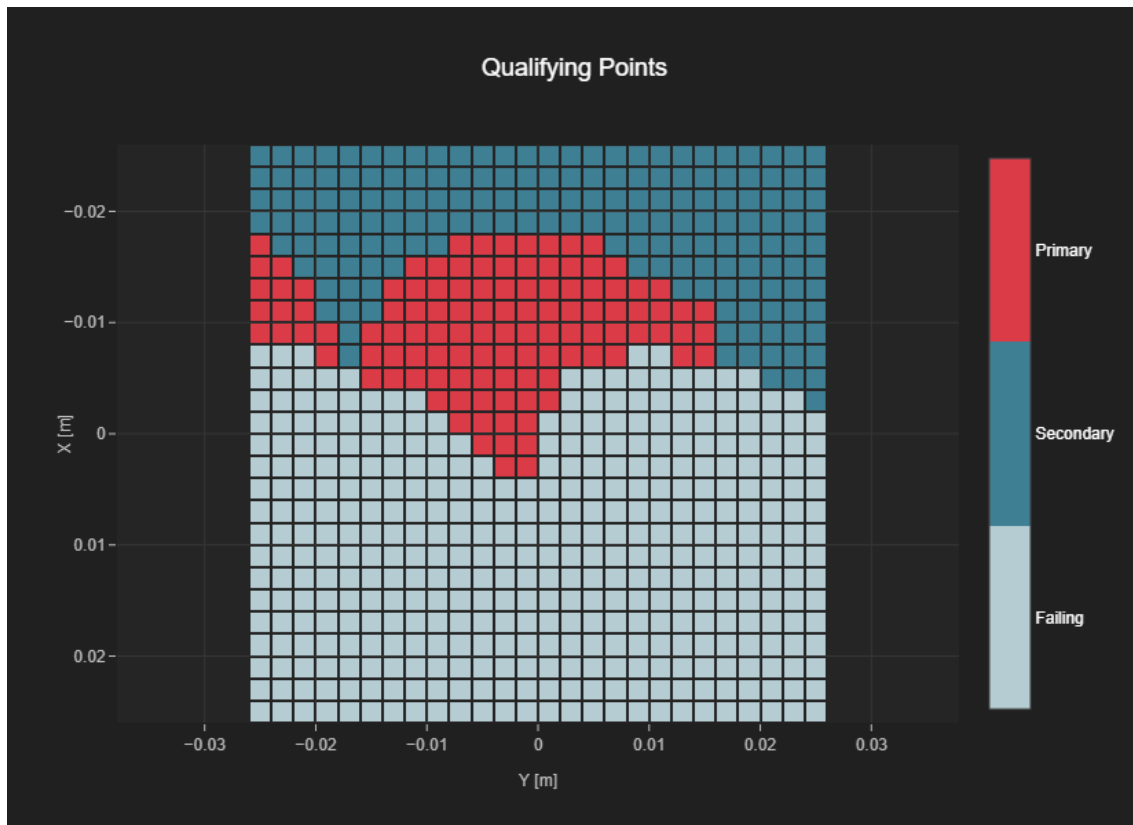
Results

Audio File	Measurement Duration [s]	Margin Upper Bound [dB]	Margin Lower Bound [dB]
48k_voice_300-3000_2s.wav	4.0	2.0	1.78



T-Coil Coupling Mode Test Report Results

Primary Group Contiguous Point Count	Secondary Group Point Count	Secondary Group Max Longitudinal	Secondary Group Max Transverse
113	283	15	26



Plot 32 UMTS Band 4 CH.1412 Google Meet Codec: 75 kbit/s ANT A

Google Meet Codec: 6 kbit/s ANT A

T-Coil Signal Test Report

Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
AM1DV3 - 3050	January 20, 2025	DAE4 Sn466	September 03, 2024

Communication Systems

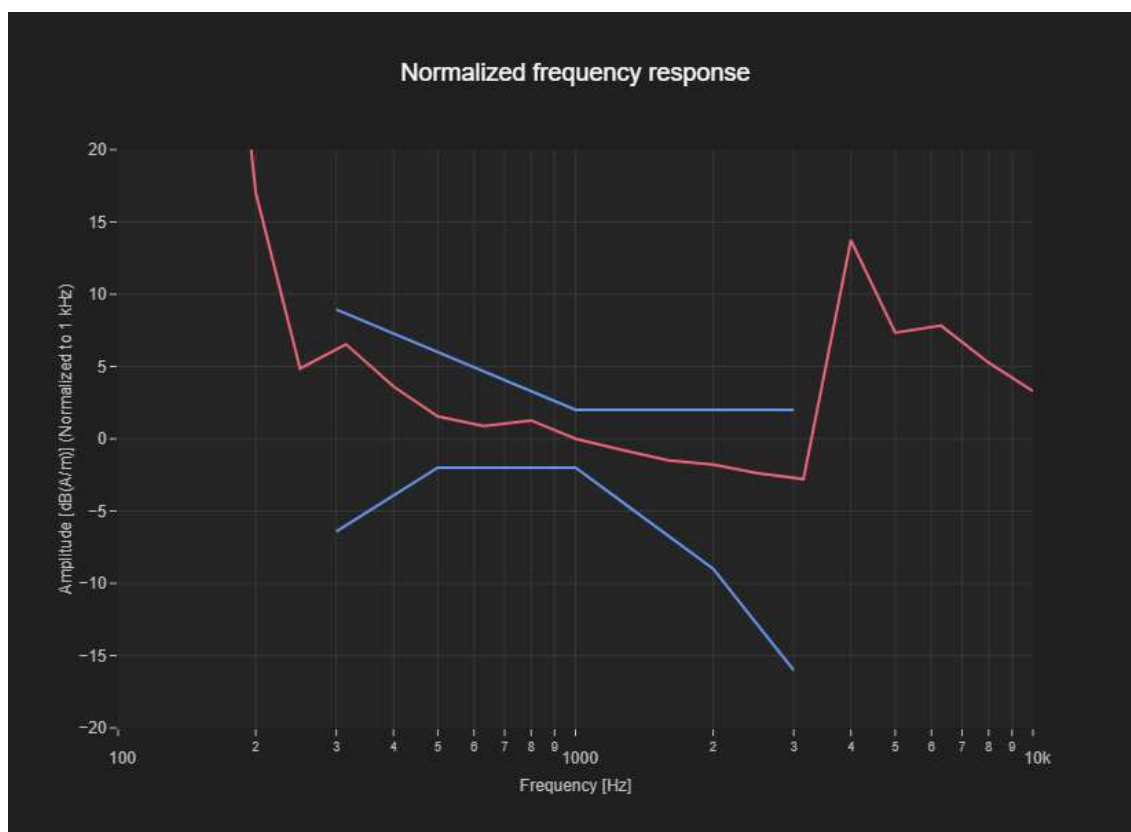
Band Name	Communication Systems Name	Channel	Frequency [MHz]
Band 4	UMTS-FDD (HSUPA, Subtest 1, 3GPP Rel8.10)	1412	1732.4

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
52.0	52.0	4.0	4.0	10.0

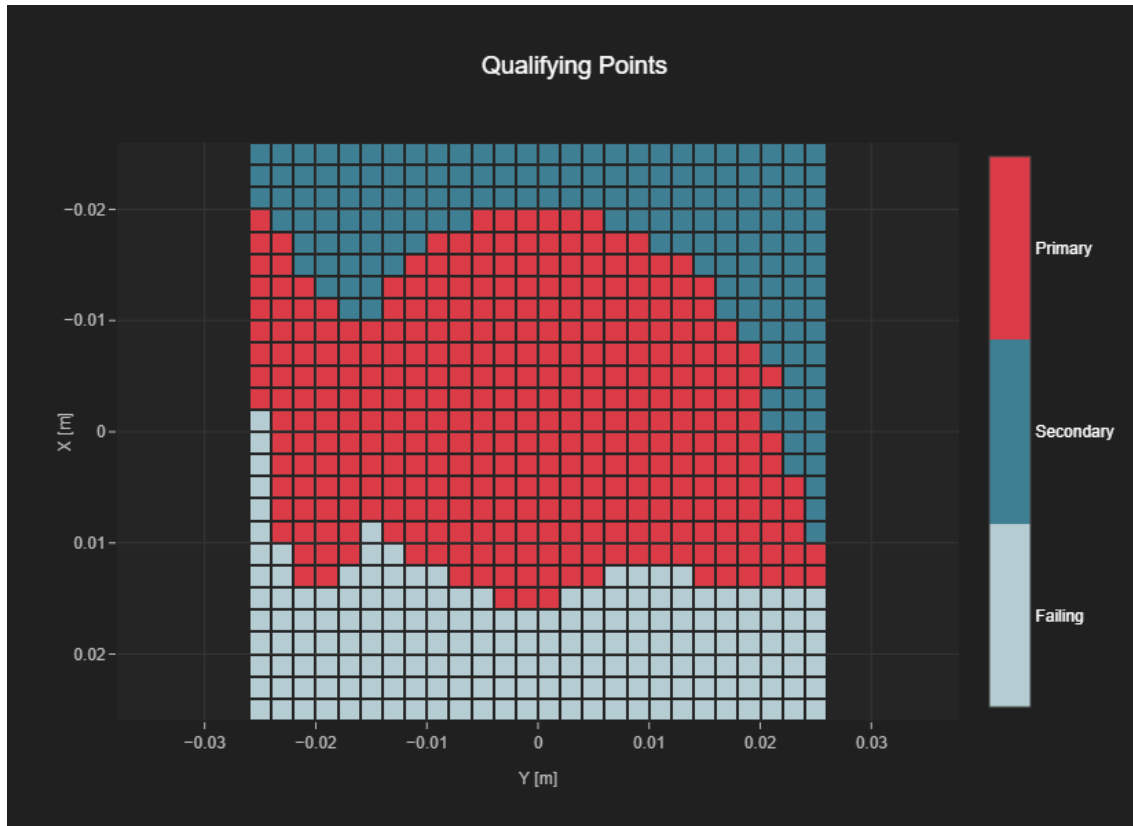
Results

Audio File	Measurement Duration [s]	Margin Upper Bound [dB]	Margin Lower Bound [dB]
48k_voice_300-3000_2s.wav	2.0	2.0	2.0



T-Coil Coupling Mode Test Report Results

Primary Group Contiguous Point Count	Secondary Group Point Count	Secondary Group Max Longitudinal	Secondary Group Max Transverse
342	501	21	26



Plot 33 LTE Band 71 5MHz 16QAM 1RB 0offset CH.133297

Google Meet Codec: 6 kbit/s ANT A

T-Coil Signal Test Report

Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
AM1DV3 - 3049	November 14, 2024	DAE4ip Sn1866	May 02, 2024

Communication Systems

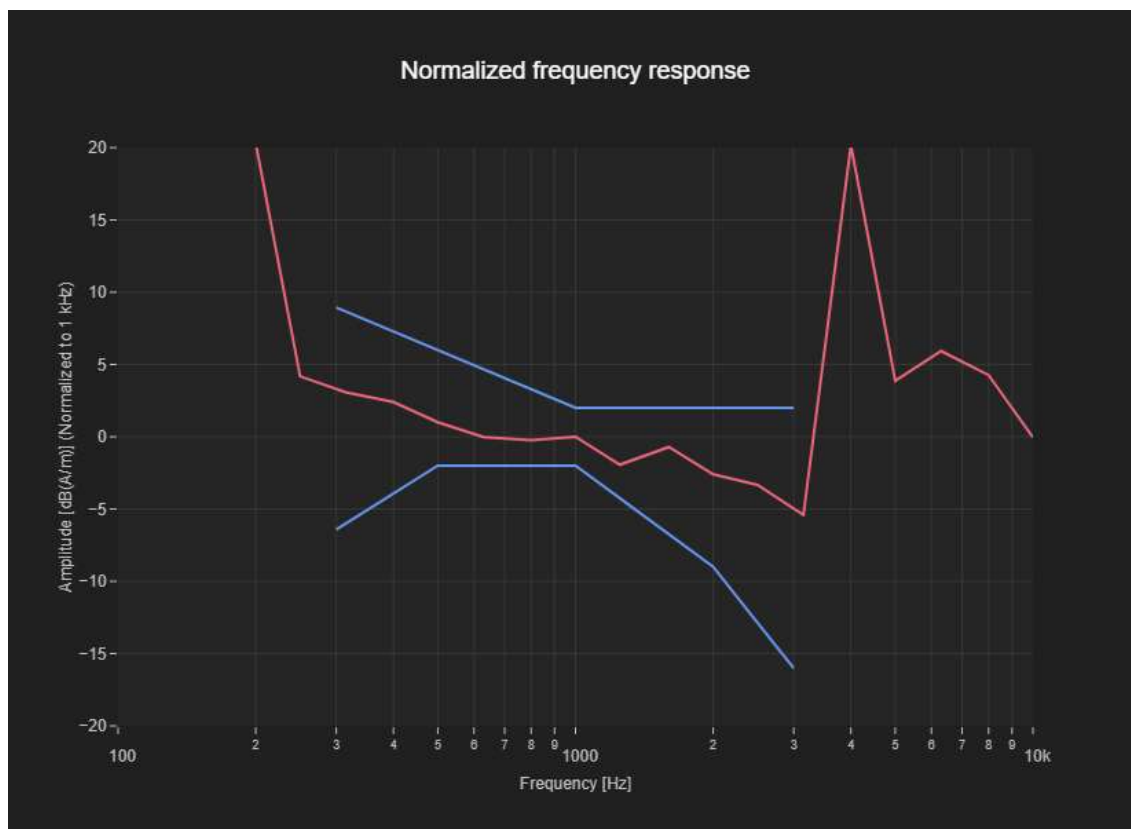
Band Name	Communication Systems Name	Channel	Frequency [MHz]
Band 71	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	133297	680.5

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
52.0	52.0	4.0	4.0	10.0

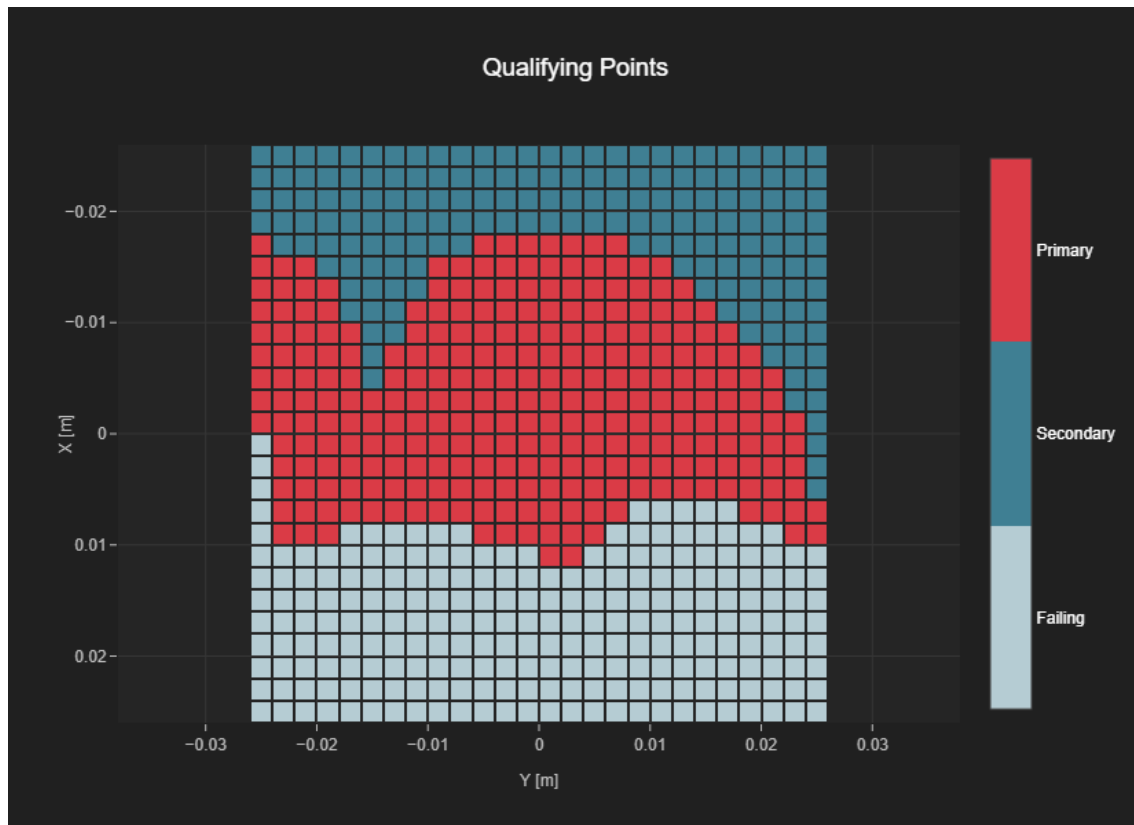
Results

Audio File	Measurement Duration [s]	Margin Upper Bound [dB]	Margin Lower Bound [dB]
48k_voice_300-3000_2s.wav	2.0	2.0	1.76



T-Coil Coupling Mode Test Report Results

Primary Group Contiguous Point Count	Secondary Group Point Count	Secondary Group Max Longitudinal	Secondary Group Max Transverse
275	446	19	26



Plot 34 LTE Band 41 20MHz QPSK 1RB 0offset CH.40620 PC3

Google Meet Codec: 75 kbit/s ANT I

T-Coil Signal Test Report

Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
AM1DV3 - 3049	November 14, 2024	DAE4ip Sn1866	May 02, 2024

Communication Systems

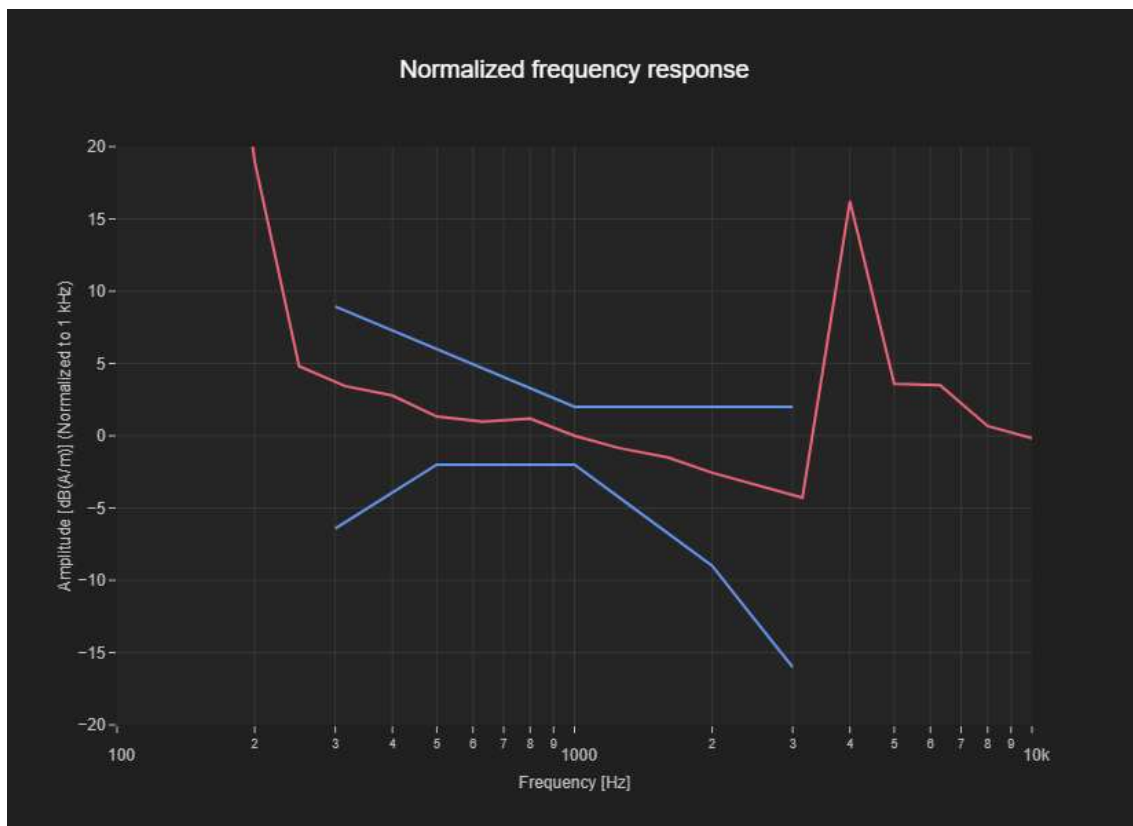
Band Name	Communication Systems Name	Channel	Frequency [MHz]
Band 41	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	40620	2593.0

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
52.0	52.0	4.0	4.0	10.0

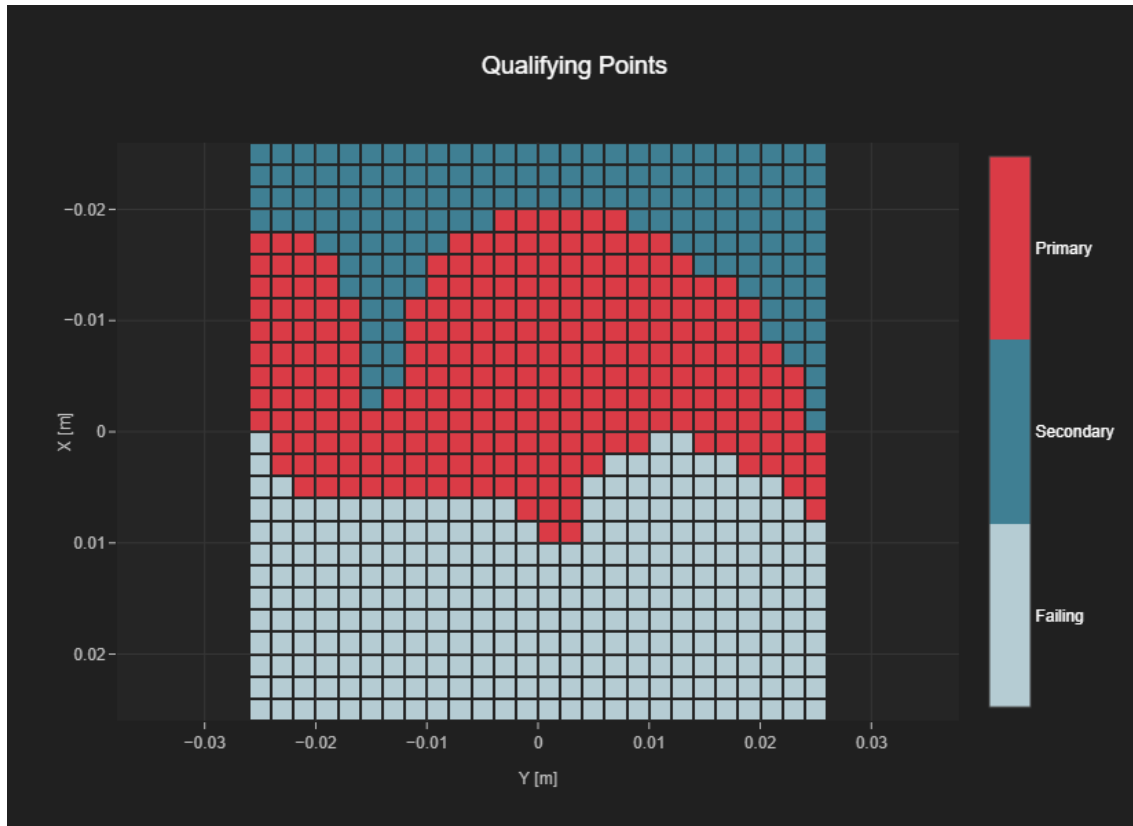
Results

Audio File	Measurement Duration [s]	Margin Upper Bound [dB]	Margin Lower Bound [dB]
48k_voice_300-3000_2s.wav	2.0	2.0	2.0



T-Coil Coupling Mode Test Report Results

Primary Group Contiguous Point Count	Secondary Group Point Count	Secondary Group Max Longitudinal	Secondary Group Max Transverse
252	401	18	26



Plot 35 Wi-Fi 2.4 GHz 802.11b 11Mbps CH.6 Google Meet Codec: 6 kbit/s
T-Coil Signal Test Report
Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
AM1DV3 - 3050	January 20, 2025	DAE4 Sn466	September 03, 2024

Communication Systems

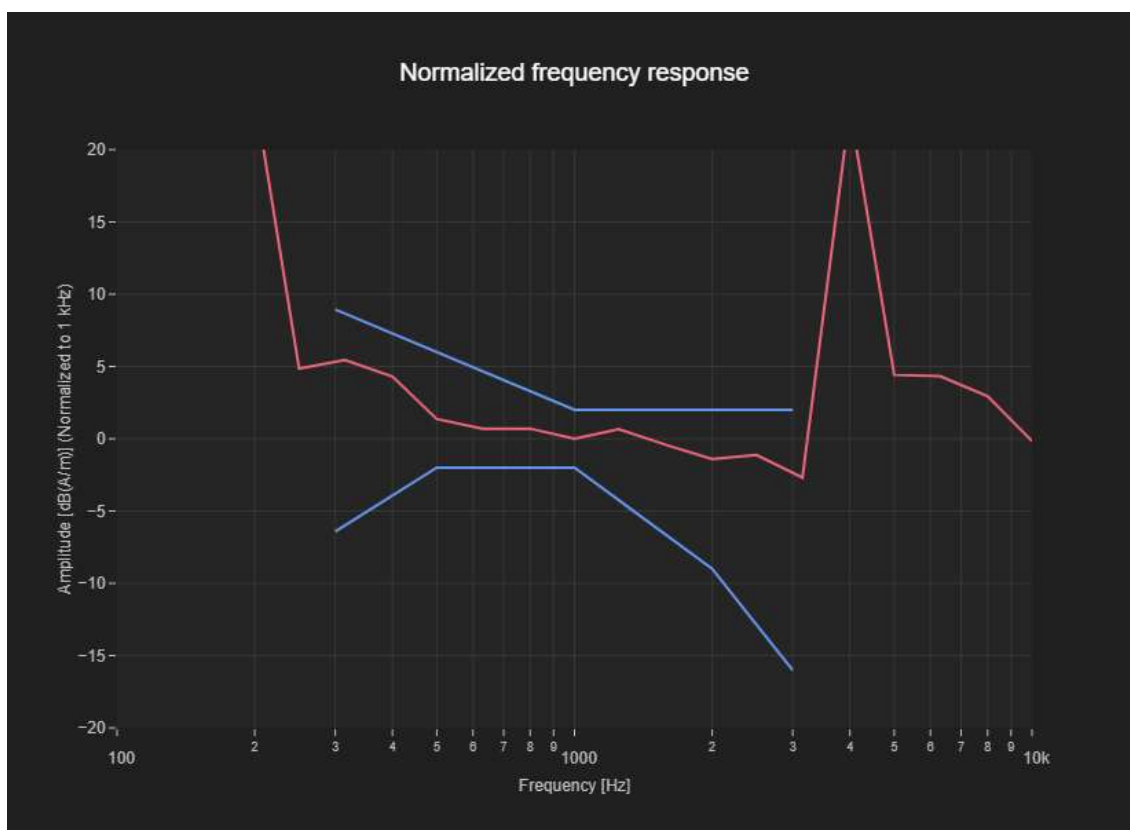
Band Name	Communication Systems Name	Channel	Frequency [MHz]
WLAN 2.4GHz	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps)	6	2437.0

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
52.0	52.0	4.0	4.0	10.0

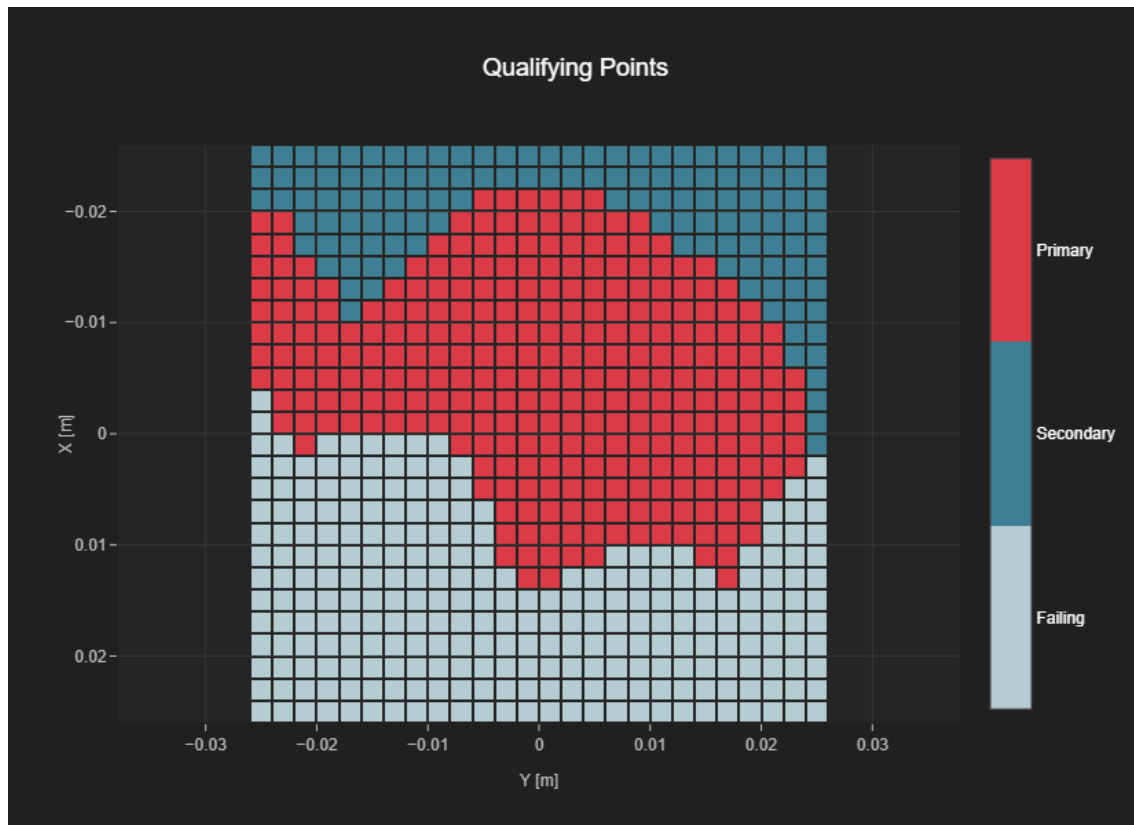
Results

Audio File	Measurement Duration [s]	Margin Upper Bound [dB]	Margin Lower Bound [dB]
48k_voice_300-3000_2s.wav	2.0	1.34	2.0



T-Coil Coupling Mode Test Report Results

Primary Group Contiguous Point Count	Secondary Group Point Count	Secondary Group Max Longitudinal	Secondary Group Max Transverse
290	417	20	26



Plot 36 Wi-Fi 5.2 GHz 802.11ax80 MCS0 CH.42 Google Meet Codec: 6 kbit/s
T-Coil Signal Test Report
Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
AM1DV3 - 3050	January 20, 2025	DAE4 Sn466	September 03, 2024

Communication Systems

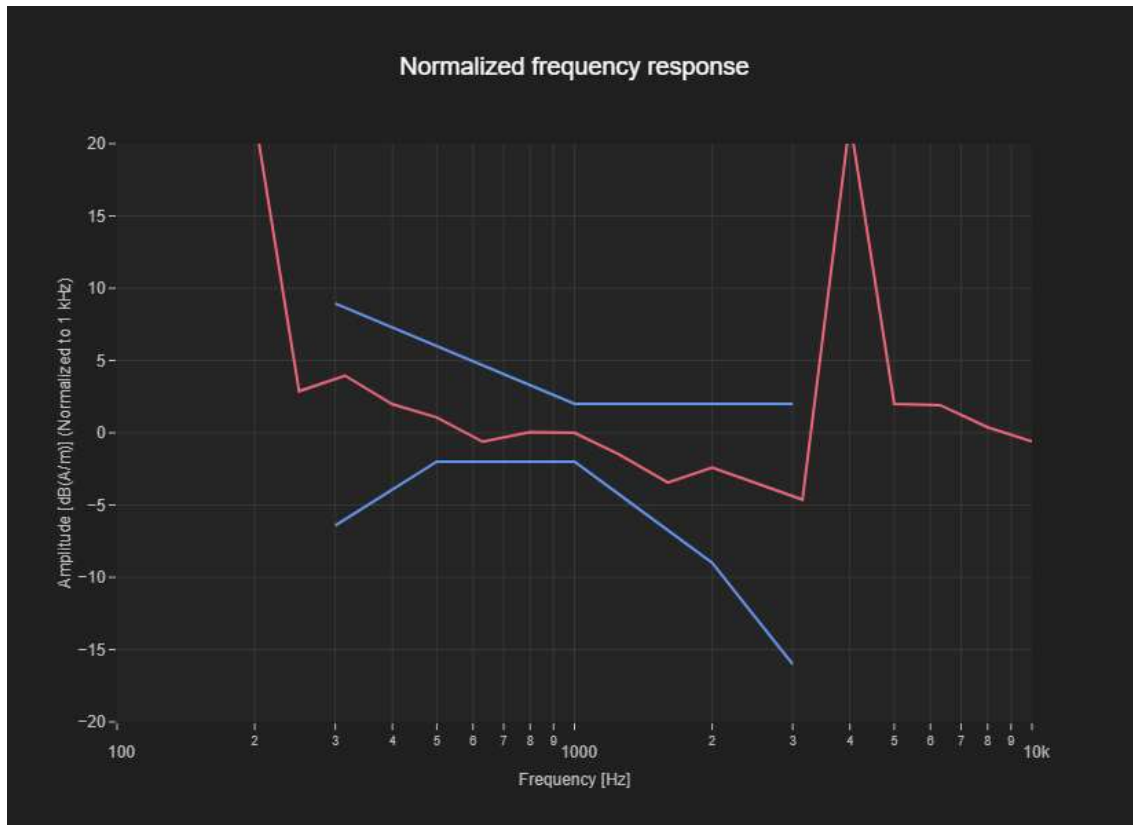
Band Name	Communication Systems Name	Channel	Frequency [MHz]
WLAN 5GHz	IEEE 802.11ax (80MHz, MCS0, 90pc duty cycle)	42	5210.0

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
52.0	52.0	4.0	4.0	10.0

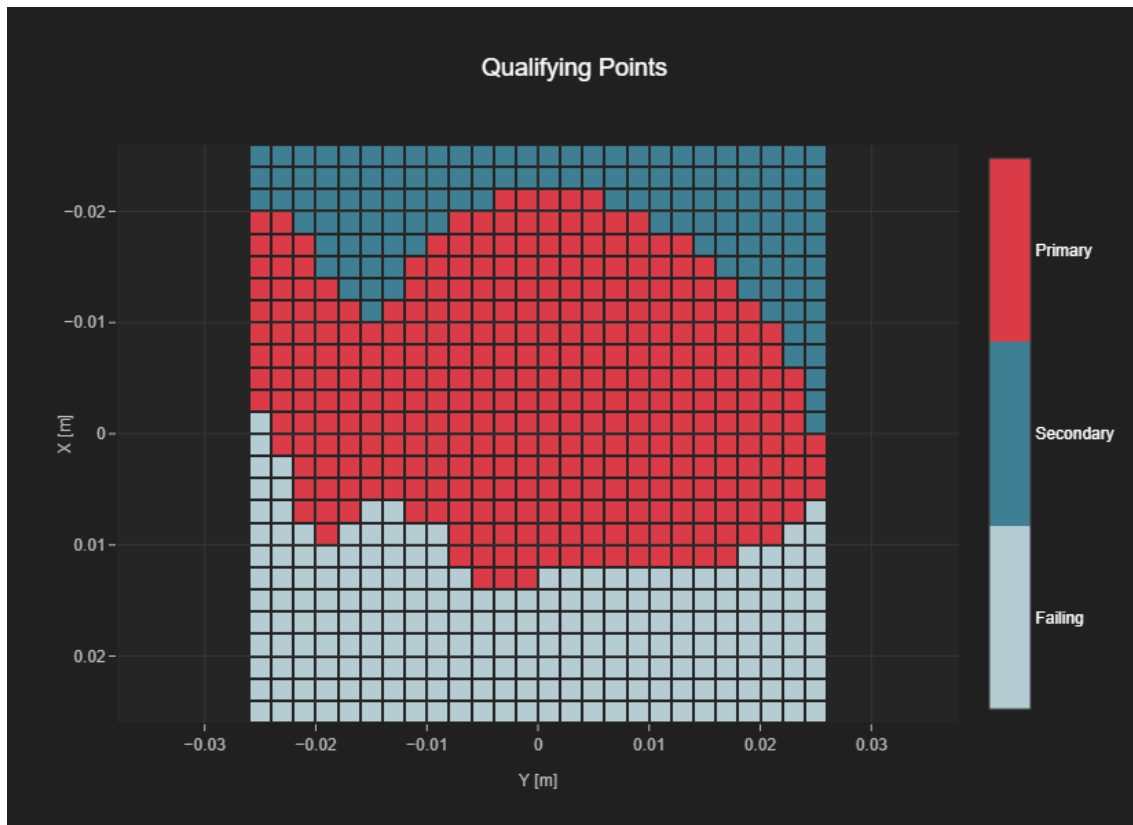
Results

Audio File	Measurement Duration [s]	Margin Upper Bound [dB]	Margin Lower Bound [dB]
48k_voice_300-3000_2s.wav	2.0	2.0	1.38



T-Coil Coupling Mode Test Report Results

Primary Group Contiguous Point Count	Secondary Group Point Count	Secondary Group Max Longitudinal	Secondary Group Max Transverse
337	463	20	26



Plot 37 NR Band n26 DFT-s OFDM 20MHz QPSK 50RB 0offset CH.166300

Google Meet Codec: 6 kbit/s

T-Coil Signal Test Report

Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
AM1DV3 - 3049	November 14, 2024	DAE4ip Sn1866	May 02, 2024

Communication Systems

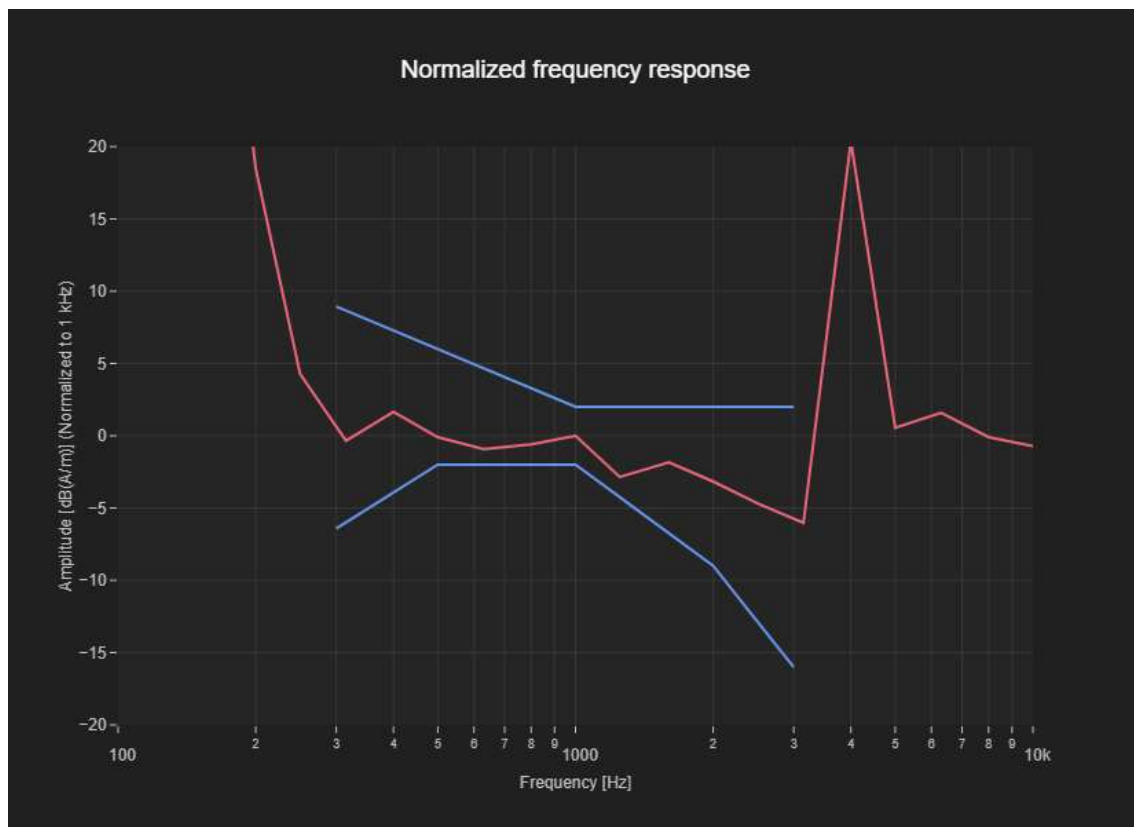
Band Name	Communication Systems Name	Channel	Frequency [MHz]
Band n26	5G NR (DFT-s-OFDM, 50% RB, 20 MHz, QPSK, 15 kHz)	166300	831.5

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
52.0	52.0	4.0	4.0	10.0

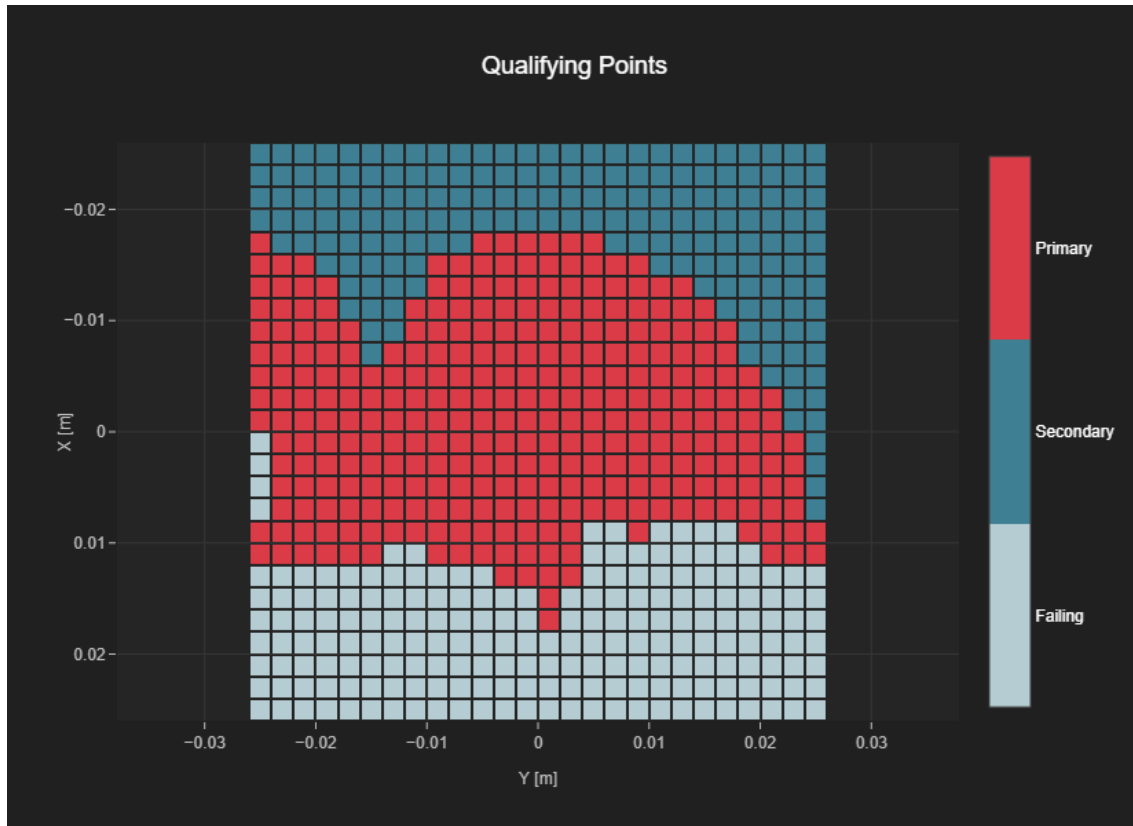
Results

Audio File	Measurement Duration [s]	Margin Upper Bound [dB]	Margin Lower Bound [dB]
48k_voice_300-3000_2s.wav	2.0	2.0	1.07



T-Coil Coupling Mode Test Report Results

Primary Group Contiguous Point Count	Secondary Group Point Count	Secondary Group Max Longitudinal	Secondary Group Max Transverse
304	480	22	26



Plot 38 NR Band n77 DOD DFT-s OFDM 60MHz QPSK 1RB 160offset CH.633334

Google Meet Codec: 6 kbit/s

T-Coil Signal Test Report

Hardware Setup

Probe Name	Probe Calibration Date	DAE Name	DAE Calibration Date
AM1DV3 - 3049	November 14, 2024	DAE4ip Sn1866	May 02, 2024

Communication Systems

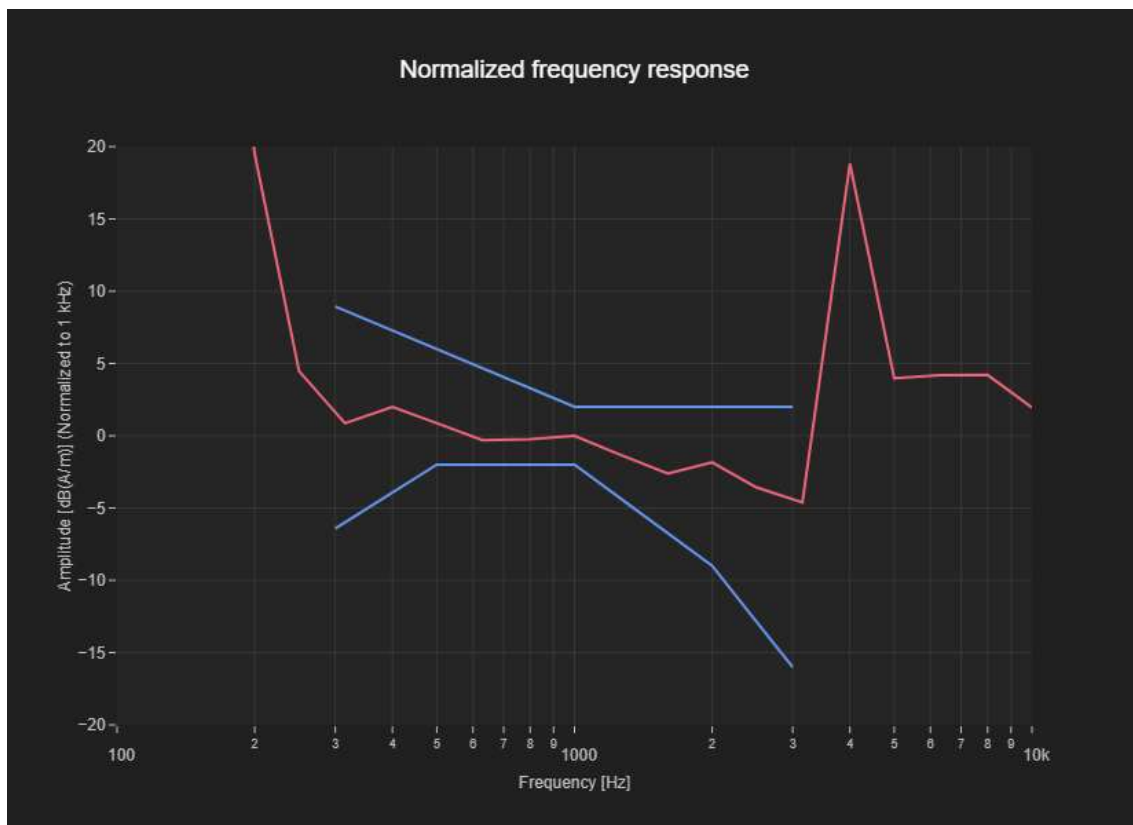
Band Name	Communication Systems Name	Channel	Frequency [MHz]
Band n77	5G NR (DFT-s-OFDM, 1 RB, 60 MHz, QPSK, 30 kHz)	633334	3500.01

Grid Settings

Extent X [mm]	Extent Y [mm]	Step X [mm]	Step Y [mm]	Distance [mm]
52.0	52.0	4.0	4.0	10.0

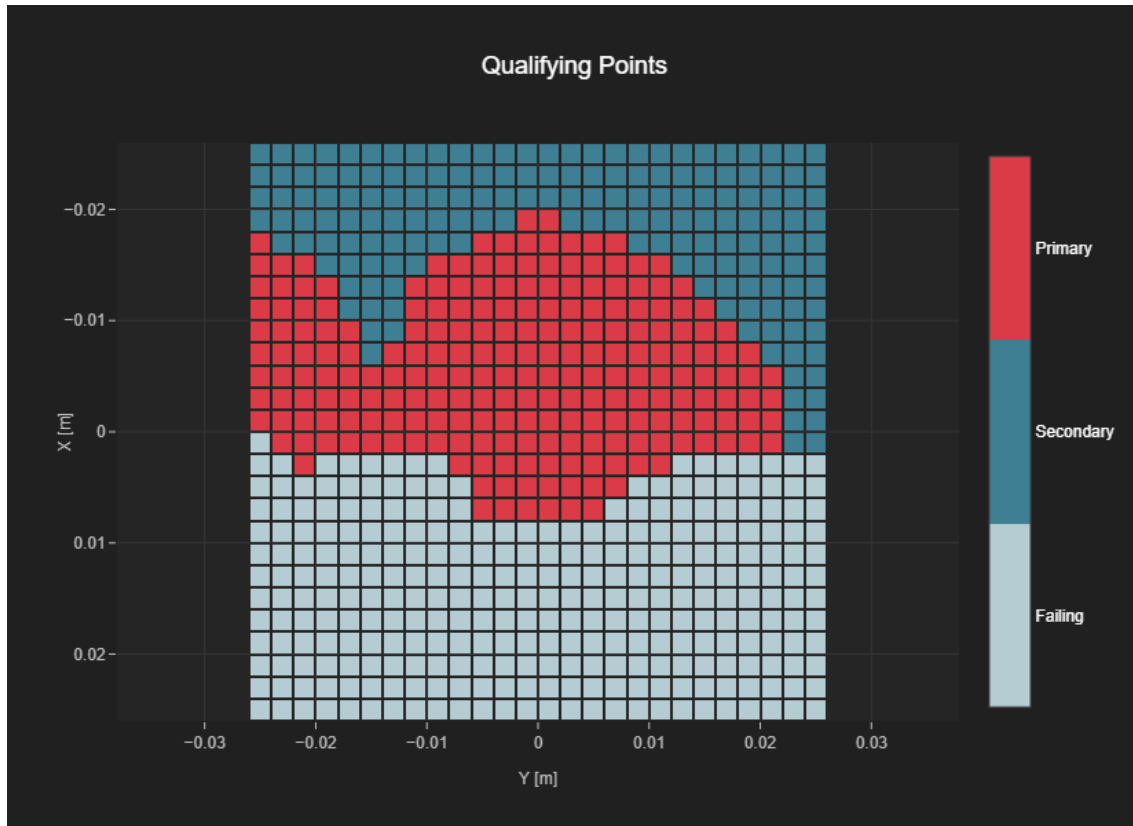
Results

Audio File	Measurement Duration [s]	Margin Upper Bound [dB]	Margin Lower Bound [dB]
48k_voice_300-3000_2s.wav	2.0	2.0	1.69



T-Coil Coupling Mode Test Report Results

Primary Group Contiguous Point Count	Secondary Group Point Count	Secondary Group Max Longitudinal	Secondary Group Max Transverse
220	387	17	26



Appendix 3. HAC T-Coil Probe Certificates

Calibration Laboratory of
Schmid & Partner
Engineering AG
 Zeughausstrasse 43, 8004 Zurich, Switzerland



S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
 The Swiss Accreditation Service is one of the signatories to the EA
 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 0108

Client **HCT**
 Gyeonggi-do, Republic of Korea

Certificate No. **AM1DV3-3049_Nov24**

CALIBRATION CERTIFICATE		제	발	행	자	화	인	자																												
Object	AM1DV3 - SN: 3049	제	7/2/3	발	5m / V ₂ /3	행	2024.12.07	자																												
Calibration procedure(s)	QA CAL-24.v4 Calibration procedure for AM1D magnetic field probes and TMFS in the audio range																																			
Calibration date:	November 14, 2024																																			
This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate. All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%. Calibration Equipment used (M&TE critical for calibration) <table border="1"> <thead> <tr> <th>Primary Standards</th> <th>ID #</th> <th>Cal Date (Certificate No.)</th> <th>Scheduled Calibration</th> </tr> </thead> <tbody> <tr> <td>Keithley Multimeter Type 2001</td> <td>SN: 0810278</td> <td>27-Aug-24 (No. 40547)</td> <td>Aug-25</td> </tr> <tr> <td>Reference Probe AM1DV3</td> <td>SN: 3000</td> <td>25-Sep-24 (No. AM1DV3-3000_Sep24)</td> <td>Sep-25</td> </tr> <tr> <td>DAE4</td> <td>SN: 781</td> <td>16-Feb-24 (No. DAE4-781_Feb24)</td> <td>Feb-25</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>Secondary Standards</th> <th>ID #</th> <th>Check Date (in house)</th> <th>Scheduled Check</th> </tr> </thead> <tbody> <tr> <td>AMDC</td> <td>SN: 1050</td> <td>01-Oct-13 (in house check Sep-24)</td> <td>Sep-25</td> </tr> <tr> <td>AMMI Audio Measuring Instrument</td> <td>SN: 1062</td> <td>26-Sep-12 (in house check Sep-24)</td> <td>Sep-25</td> </tr> </tbody> </table>									Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration	Keithley Multimeter Type 2001	SN: 0810278	27-Aug-24 (No. 40547)	Aug-25	Reference Probe AM1DV3	SN: 3000	25-Sep-24 (No. AM1DV3-3000_Sep24)	Sep-25	DAE4	SN: 781	16-Feb-24 (No. DAE4-781_Feb24)	Feb-25	Secondary Standards	ID #	Check Date (in house)	Scheduled Check	AMDC	SN: 1050	01-Oct-13 (in house check Sep-24)	Sep-25	AMMI Audio Measuring Instrument	SN: 1062	26-Sep-12 (in house check Sep-24)	Sep-25
Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration																																	
Keithley Multimeter Type 2001	SN: 0810278	27-Aug-24 (No. 40547)	Aug-25																																	
Reference Probe AM1DV3	SN: 3000	25-Sep-24 (No. AM1DV3-3000_Sep24)	Sep-25																																	
DAE4	SN: 781	16-Feb-24 (No. DAE4-781_Feb24)	Feb-25																																	
Secondary Standards	ID #	Check Date (in house)	Scheduled Check																																	
AMDC	SN: 1050	01-Oct-13 (in house check Sep-24)	Sep-25																																	
AMMI Audio Measuring Instrument	SN: 1062	26-Sep-12 (in house check Sep-24)	Sep-25																																	
Calibrated by:	Name Claudio Leubler	Function Laboratory Technician	Signature 																																	
Approved by:	Name Sven Kühn	Function Technical Manager	Signature 																																	
Issued: November 14, 2024 This calibration certificate shall not be reproduced except in full without written approval of the laboratory.																																				

References

- [1] ANSI-C63.19-2007
American National Standard for Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids.
- [2] ANSI-C63.19-2019 (ANSI-C63.19-2011)
American National Standard, Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids.
- [3] DASY System Handbook

Description of the AM1D probe

The AM1D Audio Magnetic Field Probe is a fully shielded magnetic field probe for the frequency range from 100 Hz to 20 kHz. The pickup coil is compliant with the dimensional requirements of [1+2]. The probe includes a symmetric low noise amplifier for the signal available at the shielded 3 pin connector at the side. Power is supplied via the same connector (phantom power supply) and monitored via the LED near the connector. The 7 pin connector at the end of the probe does not carry any signals, but determines the angle of the sensor when mounted on the DAE. The probe supports mechanical detection of the surface.

The single sensor in the probe is arranged in a tilt angle allowing measurement of 3 orthogonal field components when rotating the probe by 120° around its axis. It is aligned with the perpendicular component of the field, if the probe axis is tilted nominally 35.3° above the measurement plane, using the connector rotation and sensor angle stated below.

The probe is fully RF shielded when operated with the matching signal cable (shielded) and allows measurement of audio magnetic fields in the close vicinity of RF emitting wireless devices according to [1+2] without additional shielding.

Handling of the item

The probe is manufactured from stainless steel. In order to maintain the performance and calibration of the probe, it must not be opened. The probe is designed for operation in air and shall not be exposed to humidity or liquids. For proper operation of the surface detection and emergency stop functions in a DASY system, the probe must be operated with the special probe cup provided (larger diameter).

Methods Applied and Interpretation of Parameters

- *Coordinate System:* The AM1D probe is mounted in the DASY system for operation with a HAC Test Arch phantom with AMCC Helmholtz calibration coil according to [3], with the tip pointing to "southwest" orientation.
 - *Functional Test:* The functional test preceding calibration includes test of Noise level
RF immunity (1kHz AM modulated signal). The shield of the probe cable must be well connected.
Frequency response verification from 100 Hz to 10 kHz.
 - *Connector Rotation:* The connector at the end of the probe does not carry any signals and is used for fixation to the DAE only. The probe is operated in the center of the AMCC Helmholtz coil using a 1 kHz magnetic field signal. Its angle is determined from the two minima at nominally +120° and -120° rotation, so the sensor in the tip of the probe is aligned to the vertical plane in z-direction, corresponding to the field maximum in the AMCC Helmholtz calibration coil.
 - *Sensor Angle:* The sensor tilting in the vertical plane from the ideal vertical direction is determined from the two minima at nominally +120° and -120°. DASY system uses this angle to align the sensor for radial measurements to the x and y axis in the horizontal plane.
- Sensitivity:* With the probe sensor aligned to the z-field in the AMCC, the output of the probe is compared to the magnetic field in the AMCC at 1 kHz. The field in the AMCC Helmholtz coil is given by the geometry and the current through the coil, which is monitored on the precision shunt resistor of the coil.

AM1D probe identification and configuration data

Item	AM1DV3 Audio Magnetic 1D Field Probe
Type No	SP AM1 001 BA
Serial No	3049

Overall length	296 mm
Tip diameter	6.0 mm (at the tip)
Sensor offset	3.0 mm (centre of sensor from tip)
Internal Amplifier	20 dB

Manufacturer / Origin	Schmid & Partner Engineering AG, Zurich, Switzerland
-----------------------	--

Calibration data

Connector rotation angle	(in DASY system)	281.2°	+/- 3.6 ° (k=2)
Sensor angle	(in DASY system)	-0.30°	+/- 0.5 ° (k=2)
Sensitivity at 1 kHz	(in DASY system)	0.00747 V/(A/m)	+/- 2.2 % (k=2)

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Calibration Laboratory of
Schmid & Partner
Engineering AG
 Zeughausstrasse 43, 8004 Zurich, Switzerland



S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
 The Swiss Accreditation Service is one of the signatories to the EA
 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **HCT**
 Gyeonggi-do, Republic of Korea

Certificate No. **AM1DV3-3050_Jan25**

CALIBRATION CERTIFICATE

Object **AM1DV3 - SN: 3050**

Calibration procedure(s) **QA CAL-24.v4**
 Calibration procedure for AM1D magnetic field probes and TMFS in the
 audio range

Calibration date: **January 20, 2025**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
 The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature $(22 \pm 3)^\circ\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Kelthley Multimeter Type 2001	SN: 0810278	27-Aug-24 (No. 40547)	Aug-25
Reference Probe AM1DV3	SN: 3000	25-Sep-24 (No. AM1DV3-3000_Sep24)	Sep-25
DAE4	SN: 781	16-Feb-24 (No. DAE4-781_Feb24)	Feb-25

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
AMCC	SN: 1050	01-Oct-13 (in house check Sep-24)	Sep-25
AMMI Audio Measuring Instrument	SN: 1062	26-Sep-12 (in house check Sep-24)	Sep-25

Calibrated by: **Aldonia Georgiadou** **Laboratory Technician**

Approved by: **Sven Kühn** **Technical Manager**

Issued: January 20, 2025

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Certificate No: AM1DV3-3050_Jan25

Page 1 of 3

Handwritten notes and signatures:
 2/21/25
 76214
 2025.01.20
 2025.02.02

References

- [1] ANSI-C63.19-2007
American National Standard for Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids.
- [2] ANSI-C63.19-2019 (ANSI-C63.19-2011)
American National Standard, Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids.
- [3] DASY System Handbook

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The AM1D Audio Magnetic Field Probe is a fully shielded magnetic field probe for the frequency range from 100 Hz to 20 kHz. The pickup coil is compliant with the dimensional requirements of [1+2]. The probe includes a symmetric low noise amplifier for the signal available at the shielded 3 pin connector at the side. Power is supplied via the same connector (phantom power supply) and monitored via the LED near the connector. The 7 pin connector at the end of the probe does not carry any signals, but determines the angle of the sensor when mounted on the DAE. The probe supports mechanical detection of the surface.

The single sensor in the probe is arranged in a tilt angle allowing measurement of 3 orthogonal field components when rotating the probe by 120° around its axis. It is aligned with the perpendicular component of the field, if the probe axis is tilted nominally 35.3° above the measurement plane, using the connector rotation and sensor angle stated below.

The probe is fully RF shielded when operated with the matching signal cable (shielded) and allows measurement of audio magnetic fields in the close vicinity of RF emitting wireless devices according to [1+2] without additional shielding.

Handling of the item

The probe is manufactured from stainless steel. In order to maintain the performance and calibration of the probe, it must not be opened. The probe is designed for operation in air and shall not be exposed to humidity or liquids. For proper operation of the surface detection and emergency stop functions in a DASY system, the probe must be operated with the special probe cup provided (larger diameter).

Methods Applied and Interpretation of Parameters

- *Coordinate System:* The AM1D probe is mounted in the DASY system for operation with a HAC Test Arch phantom with AMCC Helmholtz calibration coil according to [3], with the tip pointing to "southwest" orientation.
- *Functional Test:* The functional test preceding calibration includes test of Noise level
RF immunity (1kHz AM modulated signal). The shield of the probe cable must be well connected. Frequency response verification from 100 Hz to 10 kHz.
- *Connector Rotation:* The connector at the end of the probe does not carry any signals and is used for fixation to the DAE only. The probe is operated in the center of the AMCC Helmholtz coil using a 1 kHz magnetic field signal. Its angle is determined from the two minima at nominally +120° and –120° rotation, so the sensor in the tip of the probe is aligned to the vertical plane in z-direction, corresponding to the field maximum in the AMCC Helmholtz calibration coil.
- *Sensor Angle:* The sensor tilting in the vertical plane from the ideal vertical direction is determined from the two minima at nominally +120° and –120°. DASY system uses this angle to align the sensor for radial measurements to the x and y axis in the horizontal plane.

Sensitivity: With the probe sensor aligned to the z-field in the AMCC, the output of the probe is compared to the magnetic field in the AMCC at 1 kHz. The field in the AMCC Helmholtz coil is given by the geometry and the current through the coil, which is monitored on the precision shunt resistor of the coil.

AM1D probe identification and configuration data

Item	AM1DV3 Audio Magnetic 1D Field Probe
Type No	SP AM1 001 BA
Serial No	3050

Overall length	296 mm
Tip diameter	6.0 mm (at the tip)
Sensor offset	3.0 mm (centre of sensor from tip)
Internal Amplifier	20 dB

Manufacturer / Origin	Schmid & Partner Engineering AG, Zurich, Switzerland
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Calibration data

Connector rotation angle	(in DASY system)	215.2°	+/- 3.6 ° (k=2)
Sensor angle	(in DASY system)	0.27°	+/- 0.5 ° (k=2)
Sensitivity at 1 kHz	(in DASY system)	0.00753 V/(A/m)	+/- 2.2 % (k=2)

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.