

Prüfbericht-Nr.: Test report no.:	50343091 001	Auftrags-Nr.: Order no.:	238111259	Seite 1 von 42 Page 1 of 42
Kunden-Referenz-Nr.: Client reference no.:	N/A	Auftragsdatum: Order date:	2019.11.08	
Auftraggeber: Client:	Vencer Co., Ltd. 14F-12, No.79, Sec. 1, Hsin Tai Wu Road, His-Chih, New Taipei City, Taiwan 22101 Manufacturer: WANSTONIC ELECTRONICS (DONG GUAN) CO., LTD. TUNG FU RD. WEST, SHI JIE TOWN, DONGGUAN CITY, GUANGDONG, CHINA			
Prüfgegenstand: Test item:	Truly Wireless Earphones			
Bezeichnung / Typ-Nr.: Identification / Type no.:	TW-E5A			
Auftrags-Inhalt: Order content:	FCC Part 15C / IC RSS-247 Test report (BLE)			
Prüfgrundlage: Test specification:	FCC 47CFR Part 15: Subpart C Section 15.247 ISED RSS-247 Issue 2, Feb 2017			
Wareneingangsdatum: Date of sample receipt:	2019.11.28			
Prüfmuster-Nr.: Test sample no.:	A001041513-004, 005 A001020252-002, 003			
Prüfzeitraum: Testing period:	2019.11.29 - 2020.02.12			
Ort der Prüfung: Place of testing:	EMC/RF Laboratory Taipei			
Prüflaboratorium: Testing laboratory:	TUV Rheinland Taiwan Ltd.			
Prüfergebnis*: Test result*:	Pass			
überprüft von: reviewed by:			genehmigt von: authorized by:	
Datum: 2020.02.14 Date:	Mars Y.J. Lin		Datum: 2020.02.14 Date:	Ryan W.T. Chen
Stellung / Position:	Project Engineer		Stellung / Position:	Project Manager
Sonstiges / Other:				
Zustand des Prüfgegenstandes bei Anlieferung: Condition of the test item at delivery:		Prüfmuster vollständig und unbeschädigt Test item complete and undamaged		
* Legende:	1 = sehr gut P(ass) = entspricht o.g. Prüfgrundlage(n)	2 = gut F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	3 = befriedigend N/A = nicht anwendbar	4 = ausreichend N/T = nicht getestet
* Legend:	1 = very good P(ass) = passed a.m. test specification(s)	2 = good F(ail) = failed a.m. test specification(s)	3 = satisfactory N/A = not applicable	4 = sufficient N/T = not tested
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>				

TEST SUMMARY

5.1.1 ANTENNA REQUIREMENT

RESULT: Passed

5.1.2 PEAK OUTPUT POWER

RESULT: Passed

5.1.3 6dB BANDWIDTH AND 99% BANDWIDTH

RESULT: Passed

5.1.4 POWER DENSITY

RESULT: Passed

5.1.5 CONDUCTED SPURIOUS EMISSIONS AND FREQUENCY BAND EDGE MEASURED IN 100kHz BANDWIDTH

RESULT: Passed

5.1.6 SPURIOUS EMISSION

RESULT: Passed

5.2.1 MAINS CONDUCTED EMISSIONS

RESULT: N/A

6.1.1 ELECTROMAGNETIC FIELDS

RESULT: Passed

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1. General Remarks

1.1 Complementary Materials

The following attachments are integral parts of this test report:

Appendix P: Photo Documentation internal view
(File Name: 50343090 001, 50343091 001 Appendix P)

Appendix D: Test Result of Radiated Emissions
(File Name: 50343091 001 Appendix D)

Test Specifications

The following standards were applied.

Table 1: Applied Standard and Test Levels

Radio
FCC CFR47 Part 15: Subpart C Section 15.247 FCC 47CFR Part 2: Subpart J Section 2.1093 ANSI C63.10:2013 ISED RSS-247 Issue 2, Feb 2017 ISED RSS-102 Issue 5, March 2015 FCC KDB Publication 447498 D01 v06

1.2 Decision Rule of conformity

The decision rule of conformity of this test report is following the requirements of the requested standard in the quotation, and agreed among testing laboratory and manufacturer (applicant) to exclude the consideration of Measurement Uncertainty, unless it is required by the specific standard

2. Test Sites

2.1 Test Laboratory

TUV Rheinland Taiwan Ltd.

11F. No.758, Sec. 4, Bade Rd., Songshan Dist.
Taipei City 105
Taiwan (R.O.C.)

2.2 Test Facility

TUV Rheinland Taiwan Ltd.

AC Mains Conduction:
11F. No.758, Sec. 4, Bade Rd., Songshan Dist.
Taipei City 105
Taiwan (R.O.C.)
FCC Registration No.: 180491
IC Canada Registration No.: 9465A

Conducted Test / Radiated Test:
No. 458-18, Sec 2, Fenliao., Linkou Dist.
New Taipei City 244
Taiwan (R.O.C.)
FCC Registration No.: 226631
IC Canada Registration No.: 25563

TAF Accredited NCC Test Lab. No.:3567
TAF ISO17025 Certification effective period: 6th-May-2019 to 05th-May-2022



Testing Laboratory
3567

2.3 List of Test and Measurement Instruments

Table 2: List of Test and Measurement Equipment

Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due Date
EMI Test Receiver	R&S	ESR7	102108	2019/4/17	2020/4/16
Spectrum Analyzer	R&S	FSV40	101508	2020/2/05	2021/2/04
Pre-Amplifier	Agilent	8447D	2944A10772	2019/2/22	2020/2/21
Pre-Amplifier	EMCI	EMC051845SE	980633	2019/2/25	2020/2/24
Pre-Amplifier	EMCI	EMC184045SE	980657	2019/2/23	2020/2/22
Bilog Antenna	SCHWARZBECK	VULB-9168	00951	2020/1/14	2021/1/13
Horn Antenna	ETS-Lindgren	3117	00218930	2020/12/27	2021/12/26
Horn Antenna	SCHWARZBECK	BBHA 9170	00887	2019/4/12	2020/4/11
Loop Antenna	EMCI	LPA600	287	2019/12/20	2020/12/19
Test Software	Audix	e3	Ver. 9	N/A	N/A
Test Cable	HUBER+SUHNER	SUCOFLEX 104EA_9k~18G	800056/4EA	2019/4/18	2020/4/17
Test Cable	HUBER+SUHNER	SUCOFLEX 104_9k~18G	804680/4	2019/4/18	2020/4/17
Test Cable	HUBER+SUHNER	SUCOFLEX 104_9k~18G	MY37202/4	2019/4/18	2020/4/17
Test Cable	HUBER+SUHNER	SUCOFLEX 102EA_1G~40G	800898/2EA	2019/4/18	2020/4/17
Test Cable	HUBER+SUHNER	SUCOFLEX 102EA_1G~40G	800901/2EA	2019/4/18	2020/4/17
Test Cable	HUBER+SUHNER	SUCOFLEX 102EA_1G~40G	801027/2EA	2019/4/18	2020/4/17
Spectrum Analyzer	R&S	FSV40	101513	2020/2/8	2021/2/8
Thermo Chamber	Giant Force	GHT-150-40-CP-SD	MAA1902-010	2020/2/1	2021/2/1
Signal Generator	R&S	SMB100A03	181335	2020/1/23	2021/1/23
Power Meter	Anritsu	ML2495A	1901008	2019/4/29	2020/4/28
Power Sensor	Anritsu	MA2411B	1725269	2019/4/29	2020/4/28
EMI Test Receiver	Rohde & Schwarz	ESCI 7	100797	2019/01/16	2020/02/16
Two-Line V-Network (for EUT)	Rohde & Schwarz	ENV216	101243	2019/06/23	2020/06/23
Two-Line V-Network	Rohde & Schwarz	ENV216	101262	2019/07/16	2020/07/16
Telecom ISN 4 Line	Fischer Custom Communications	FFCC-TLISN- T4-02-09	101168	2020/2/8	2021/2/8
Impedance Stabilization Network	TESEQ	ISN T800	51949	2019/02/20	2020/02/20
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	0357.8810.54- 102102-HN	2019/07/25	2020/07/25
Test Software	Audix	e3	Ver. 9	N/A	N/A

2.4 Traceability

All measurement equipment calibrations are traceable to NML(Taiwan)/NIST(USA) or where calibration is performed outside Taiwan, to equivalent nationally recognized standards organizations.

2.5 Calibration

Equipment requiring calibration is calibrated periodically in a suitably accredited Calibration Lab. Additionally all equipment is verified for proper performance on a regular schedule using in house standards or comparisons.

2.6 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements .

Table 3: Emission Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	± 0.1 ppm
RF power, conducted	± 1.5 dB
RF power density, conducted	± 3 dB
spurious emissions, conducted	± 3 dB
all emissions, radiated	± 6 dB
Temperature	± 1 °C
Humidity	± 5 %
DC and low frequency voltages	±3 %

3. General Product Information

3.1 Product Function and Intended Use

The EUT is a Truly Wireless Earphones. It contains a Bluetooth compatible module enabling the user to communicate data through a Wireless interface.
For details refer to the User Guide, Data Sheet and Block Diagram.

3.2 System Details and Ratings

Table 4: Basic Information of EUT

Item	EUT information
Kind of Equipment/Test Item	Truly Wireless Earphones
Type Identification	TW-E5A
FCC ID	VHVTWE5A
IC	10565A-TWE5A
HVIN	TW-E5A

Table 5: Technical Specification of EUT

Technical Specification	Value
Operating Frequencies	2402MHz ~ 2480MHz
Channel Spacing	2 MHz
Channel number	40
Operation Voltage	3.7Vdc
Modulation	GFSK
Antenna gain	-0.4 dBi

3.3 Independent Operation Modes

Basic operation modes are:

- A. Transmitting
 - 1. Low channel
 - 2. Middle channel
 - 3. High channel
- B. Receiving
- C. Normal

3.4 Noise Generating and Noise Suppressing Parts

Refer to the Block Diagram.

3.5 Submitted Documents

- Block Diagram
- Instruction Manual
- Rating Label
- Technical Description

4. Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

The test modes were adapted accordingly in reference to the instructions for use.

During testing, Channel and Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

Table 6: Table for Parameters of Test Software Setting_ Left Ear

Mode	Channel Frequency		
	2402 MHz	2440 MHz	2480 MHz
GFSK	Default	Default	Default

Table 7: Table for Parameters of Test Software Setting_ Right Ear

Mode	Channel Frequency		
	2402 MHz	2440 MHz	2480 MHz
GFSK	Default	Default	Default

4.2 Test Operation and Test Software

Setup for testing: Test samples are provided with a USB interface which makes it possible to control them through a test software installed on a notebook computer.

This software was running on the laptop computer connected to the EUT. It was used to enable the operation modes listed in section 3.3 as appropriate.

The samples were used as follows:

Conducted: A001041513-004(Right Ear), 005(Left Ear)

Radiation: A001020252-002(Right Ear), 003(Left Ear)

Full test was applied on all test modes, but only worst case was shown

Test Software	Bluesuite 3.2.2.144
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4.3 Special Accessories and Auxiliary Equipment

The product has been tested together with the following additional accessories:

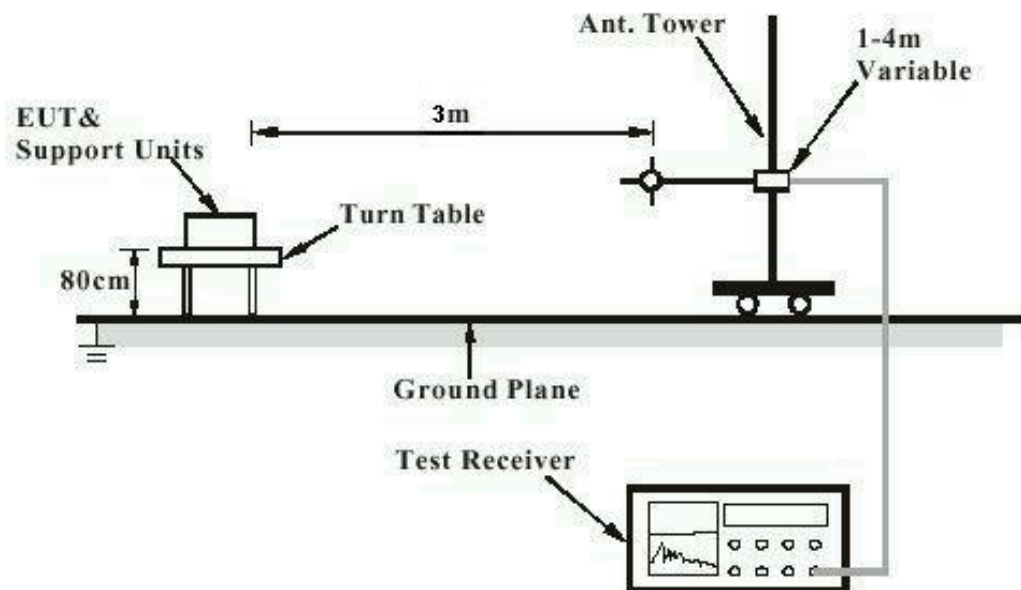
Description	Manufacturer	Model No.	Serial No.
Notebook(EMC-06)	Lenovo	TP00048A	PB-0F8B2

4.4 Countermeasures to achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Constructional Data Form or the Technical Construction File. No additional measures were employed to achieve compliance.

4.5 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test



Note: Measurements above 1 GHz are done with a table height of 1.5m

Diagram of Measurement Equipment Configuration for Mains Conduction Measurement (if applicable)

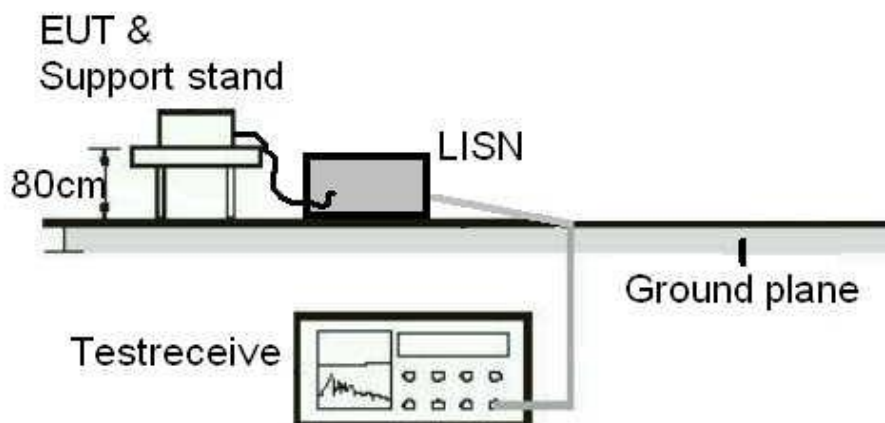
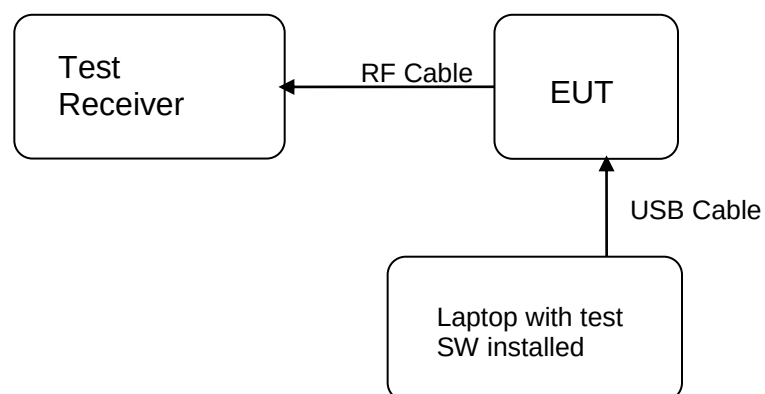


Diagram of Measurement Equipment Configuration for Conducted Transmitter Measurement



5. Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT:

Passed

Test standard : FCC Part 15.247(b)(4), Part 15.203

According to the manufacturer declaration, the EUT has an antenna with a directional gain of -0.4 dBi. The antenna is a Polarization Pillar Antenna with no possibility of replacement with a non-approved antenna by the end-user.

Refer to EUT photo for details.

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5.1.2 Peak Output Power

RESULT:

Passed

Test standard : FCC Part 15.247(b)(3), ISSED RSS-247 5.4(d)
Basic standard : ANSI C63.10:2013, KDB558074
Limit : 1 Watt
Kind of test site : Shielded room

Test setup

Test Channel : Low/ Middle/ High
Operation Mode : A

Ambient temperature : 20-24 °C
Relative humidity : 50-65 %
Atmospheric pressure : 100-103 kPa

Table 8: Test result of Peak Output Power_ Left Ear

Channel	Channel Frequency (MHz)	Output Power		Average Output Power	Limit
		(dBm)	(W)	(W)	(W)
Low Channel	2402	3.53	0.00225	0.00221	1
Middle Channel	2440	3.23	0.00210	0.00207	1
High Channel	2480	2.98	0.00199	0.00195	1

Pmax: 2.2542 mW

Table 9: Test result of Peak Output Power_ Right Ear

Channel	Channel Frequency (MHz)	Output Power		Average Output Power	Limit
		(dBm)	(W)	(W)	(W)
Low Channel	2402	4.38	0.00274	0.00270	1
Middle Channel	2440	3.15	0.00207	0.00204	1
High Channel	2480	2.92	0.00196	0.00192	1

Pmax: 2.7416 mW

5.1.3 6dB Bandwidth and 99% Bandwidth

RESULT:

Passed

Test standard : FCC Part 15.247(a)(2) , ISED RSS-247 5.2(a)
ISED RSS-Gen
Basic standard : ANSI C63.10 (2013)
Kind of test site : Shielded room

Test setup

Test Channel : Low/ Middle/ High
Operation Mode : A

Ambient temperature : 20-24°C
Relative humidity : 50-65%
Atmospheric pressure : 100-103 kPa

Table 10: Test result of 6dB Bandwidth_ Left Ear

Channel	Channel Frequency (MHz)	6dB Bandwidth (kHz)	Limit (kHz)	Result
Low Channel	2402	725.27	>500	Pass
Mid Channel	2440	719.28	>500	Pass
High Channel	2480	716.28	>500	Pass

Table 11: Test result of 6dB Bandwidth_ Right Ear

Channel	Channel Frequency (MHz)	6dB Bandwidth (kHz)	Limit (kHz)	Result
Low Channel	2402	725.27	>500	Pass
Mid Channel	2440	725.27	>500	Pass
High Channel	2480	716.28	>500	Pass

Table 12: Test result of 99%Bandwidth_ Left Ear

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)
Low Channel	2402	1.0339
Mid Channel	2440	1.0309
High Channel	2480	1.0309

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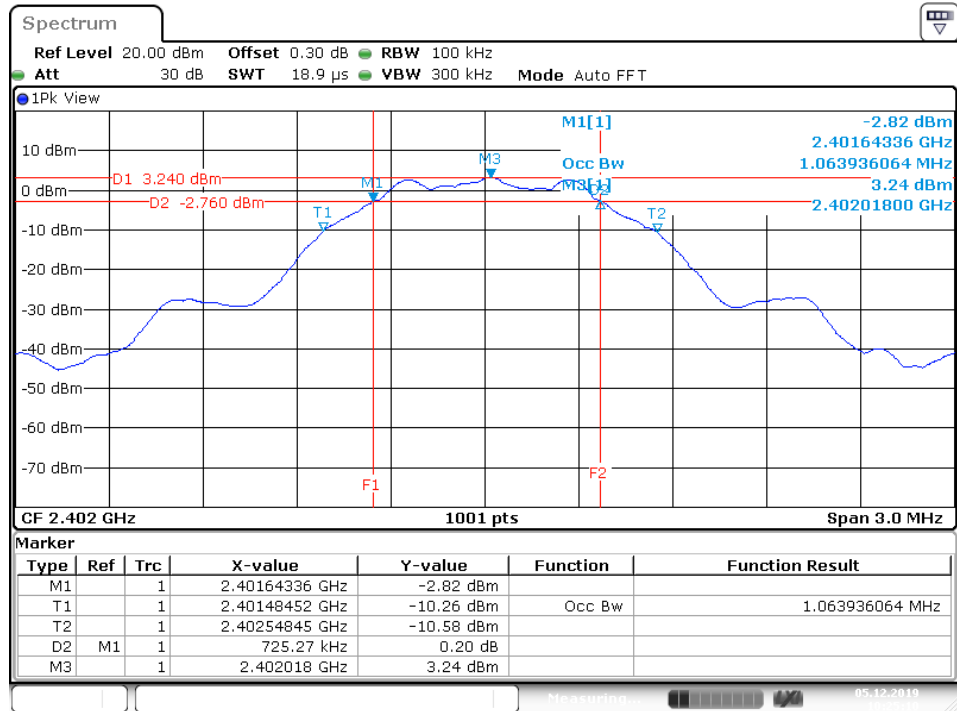
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Table 13: Test result of 99%Bandwidth_ Right Ear

Channel	Channel Frequency (MHz)	6dB Bandwidth (kHz)
Low Channel	2402	1.0369
Mid Channel	2440	1.0369
High Channel	2480	1.0309

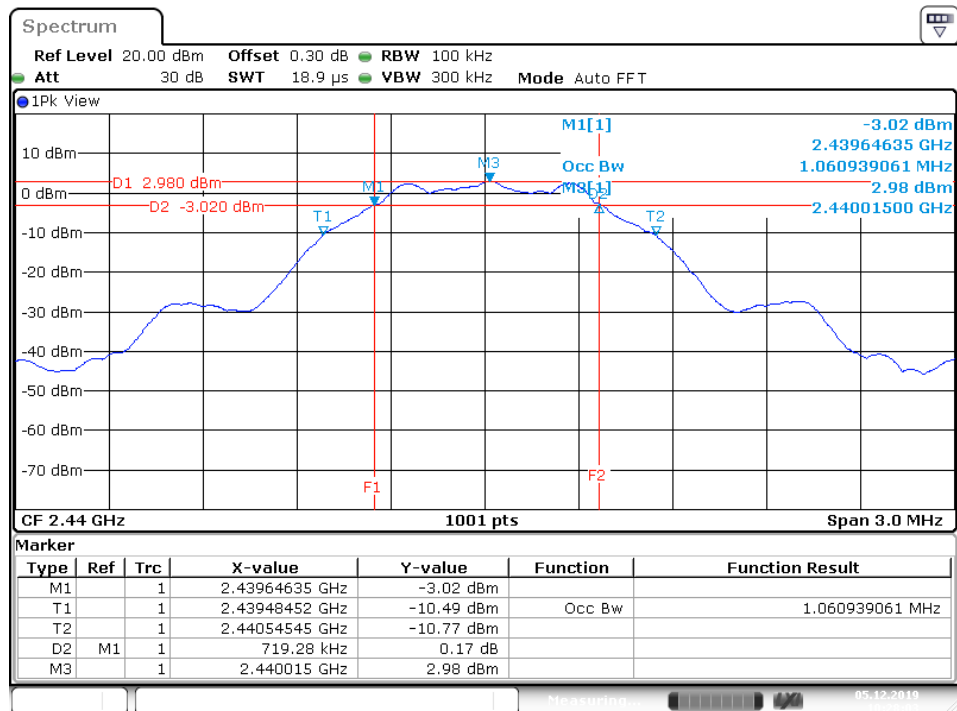
Test Plot of 6dB Bandwidth_ Left Ear

Low Channel



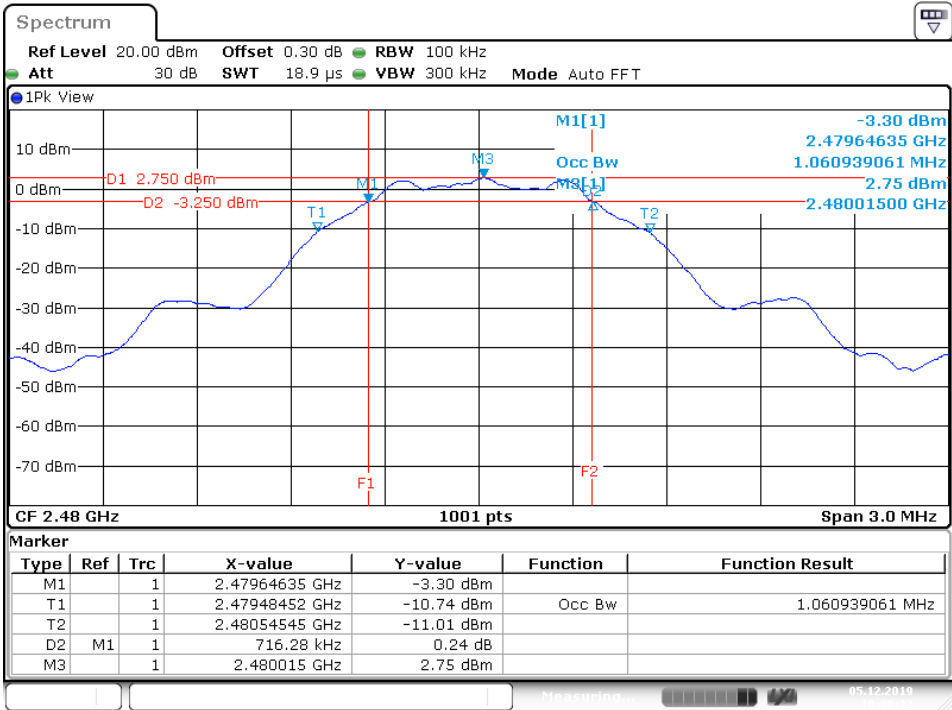
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Middle Channel



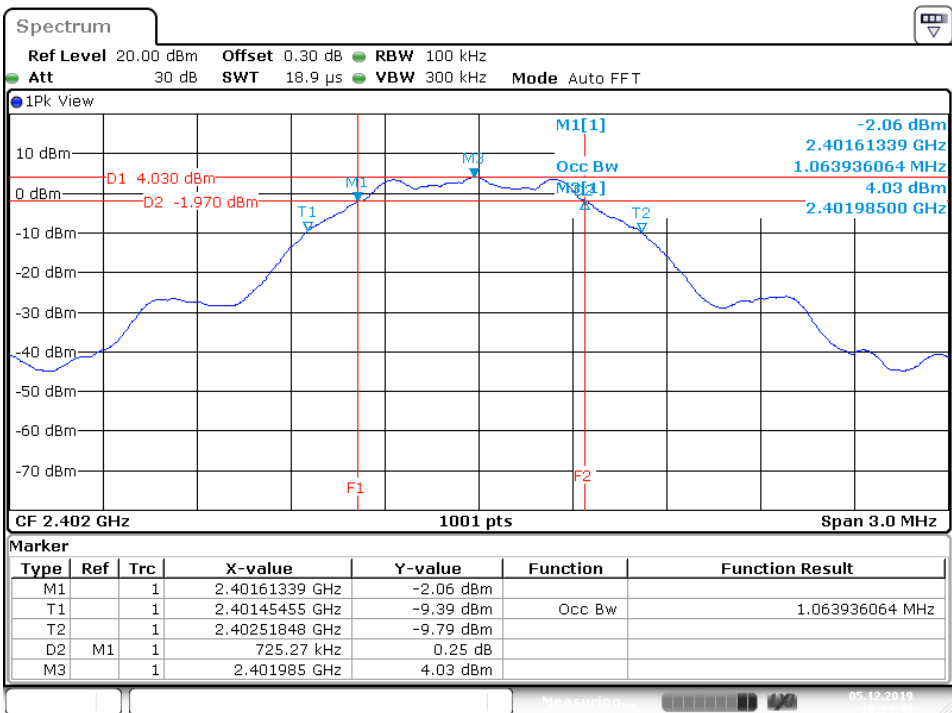
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High Channel

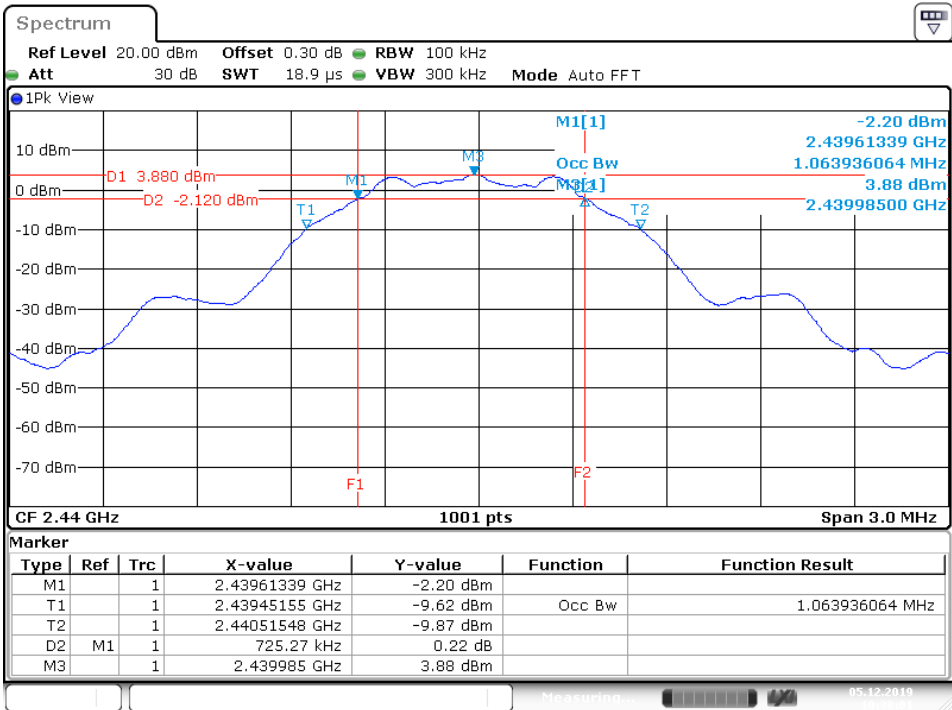


Test Plot of 6dB Bandwidth_ Right Ear

Low Channel

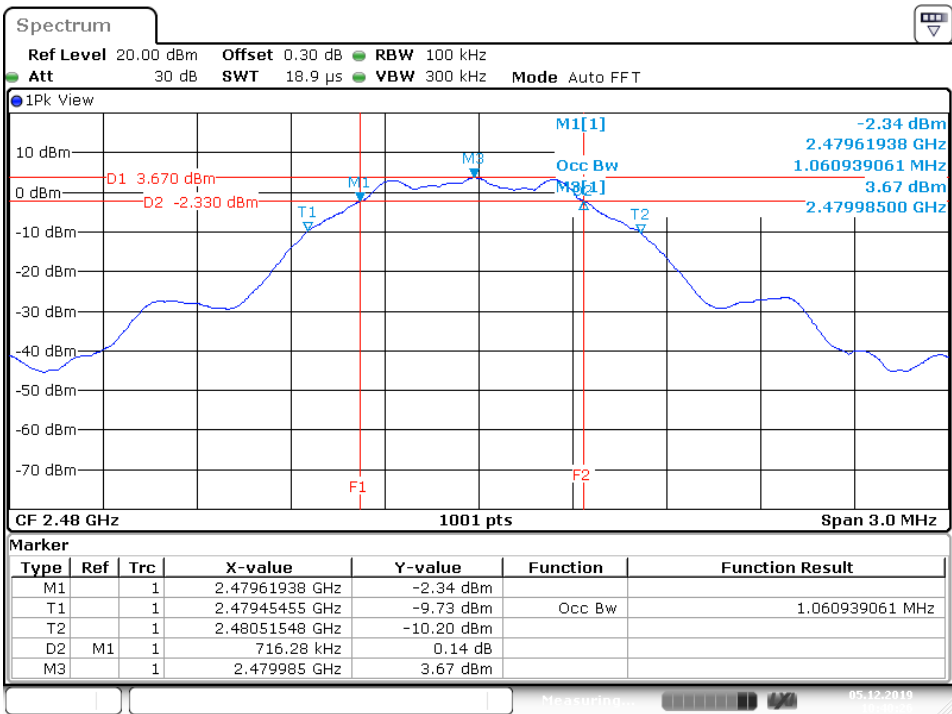


Middle Channel



Date: 5.DEC.2019 10:38:01

High Channel



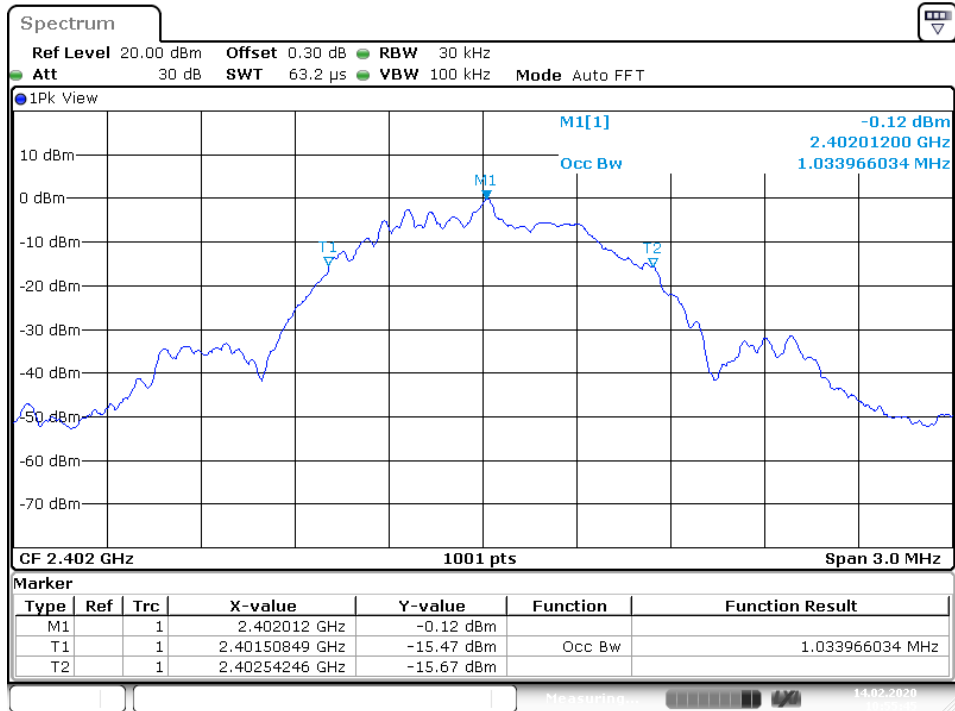
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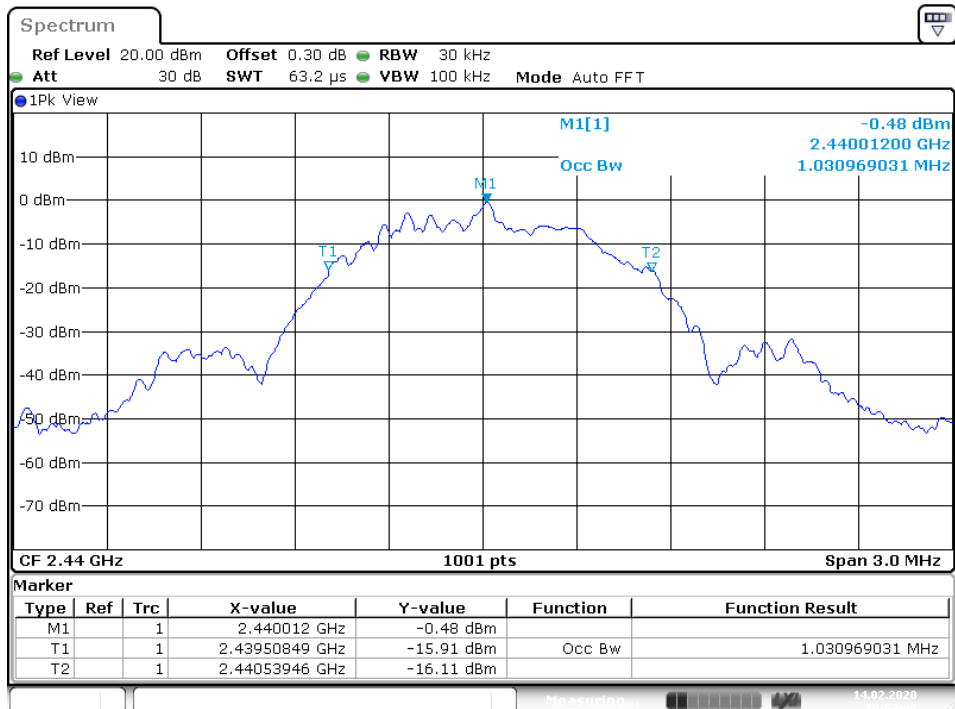
Test Plot of 99% Bandwidth_ Left Ear

Low Channel



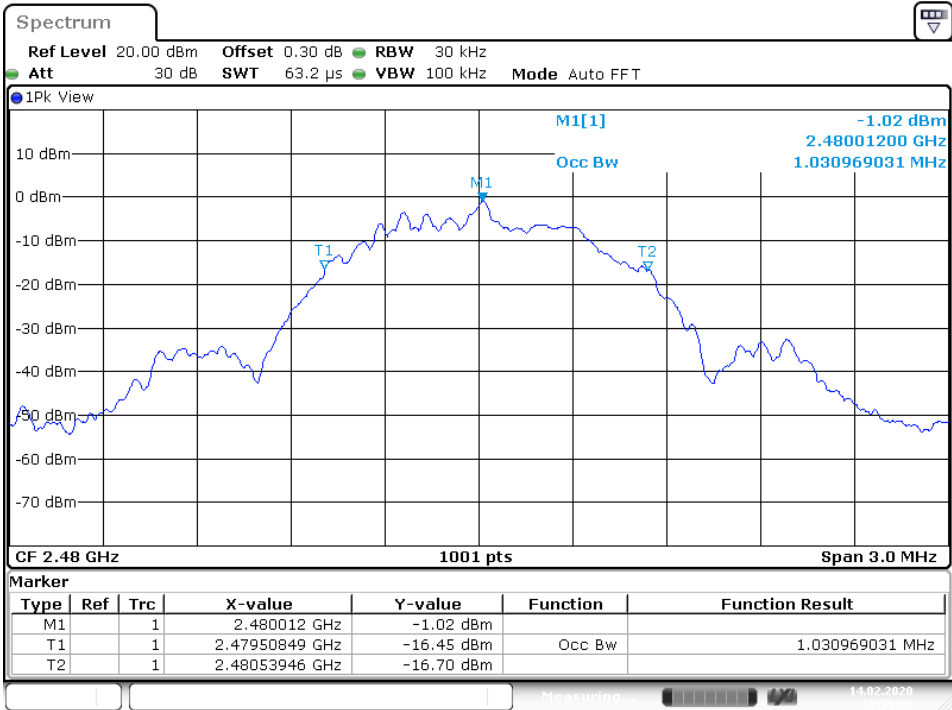
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Middle Channel



Date: 14.FEB.2020 10:57:48

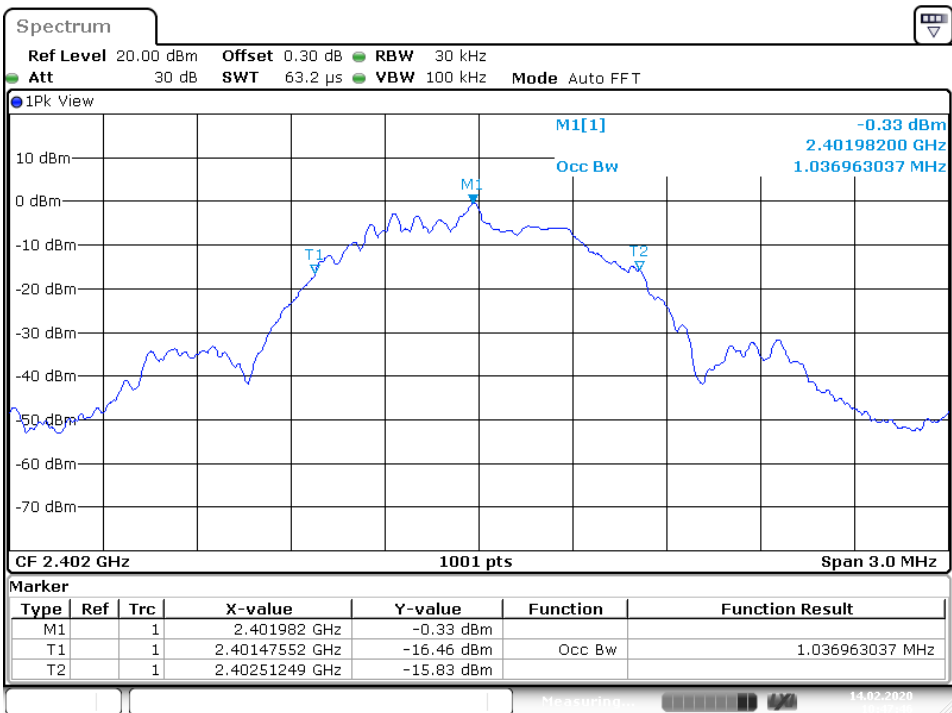
High Channel



Date: 14.FEB.2020 10:59:31

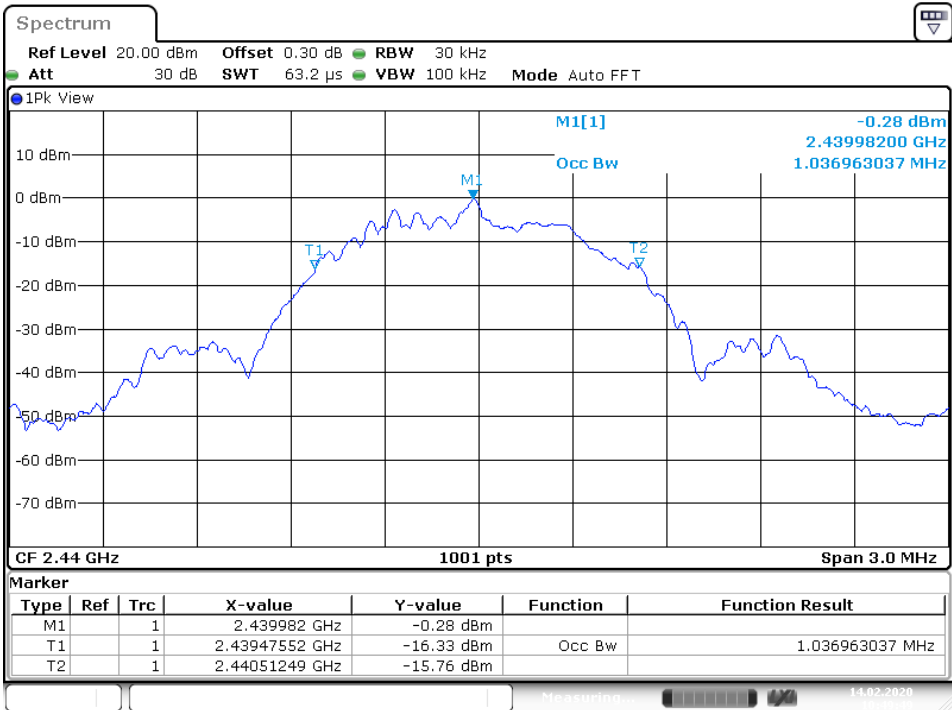
Test Plot of 99% Bandwidth_ Right Ear

Low Channel



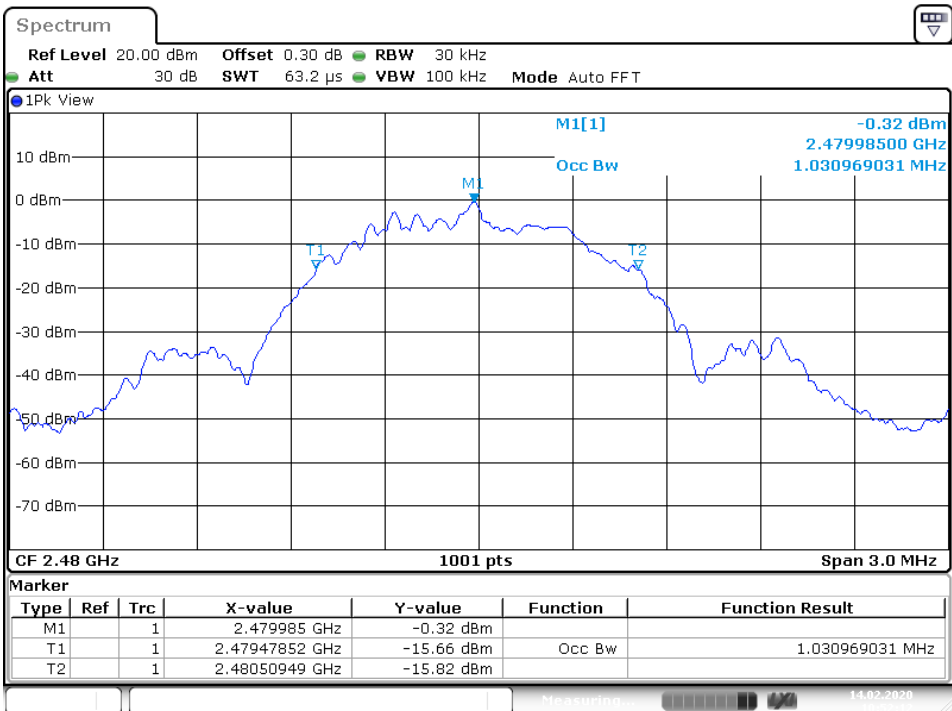
Date: 14.FEB.2020 10:47:46

Middle Channel



Date: 14.FEB.2020 10:49:49

High Channel



Date: 14.FEB.2020 10:52:11

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5.1.4 Power Density

RESULT:

Passed

Test standard : FCC Part 15.247(e), ISED RSS-247 5.2(b)
Basic standard : ANSI C63.10:2013, KDB558074
Kind of test site : Shielded room

Test setup

Test Channel : Low/ Middle/ High
Operation Mode : A
Ambient temperature : 20-24°C
Relative humidity : 50-65%
Atmospheric pressure : 100-103 kPa

Table 14: Test result of Power Density_ Left Ear

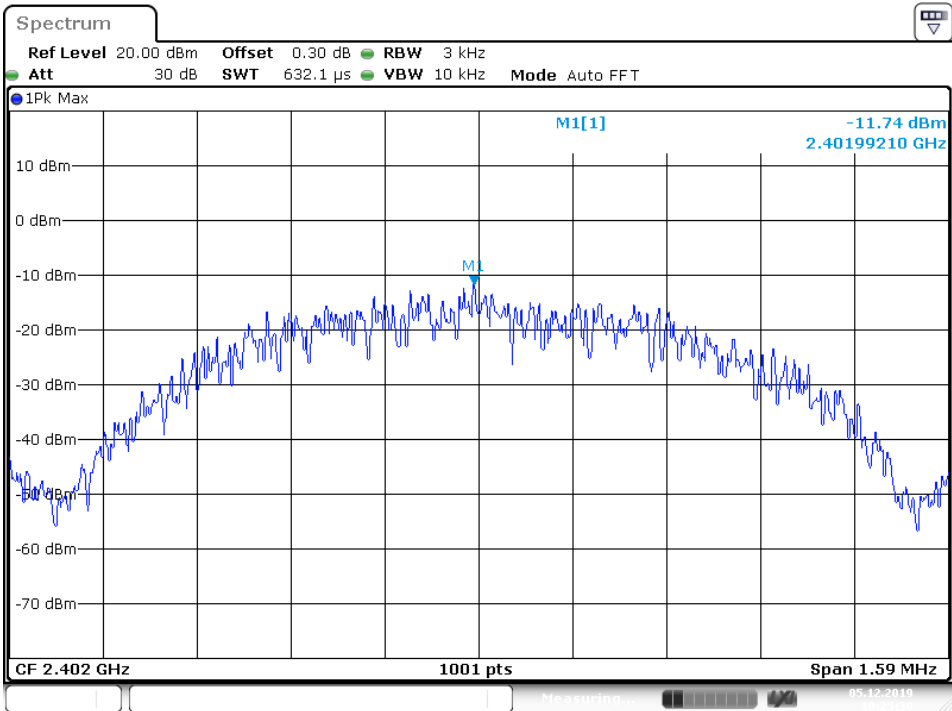
Channel	Channel Frequency (MHz)	Power Density	Limit
		(dBm)	(dBm)
Low Channel	2402	-11.74	8
Middle Channel	2440	-11.88	8
High Channel	2480	-12.07	8

Table 15: Test result of Power Density_ Right Ear

Channel	Channel Frequency (MHz)	Power Density	Limit
		(dBm)	(dBm)
Low Channel	2402	-10.96	8
Middle Channel	2440	-11.06	8
High Channel	2480	-11.32	8

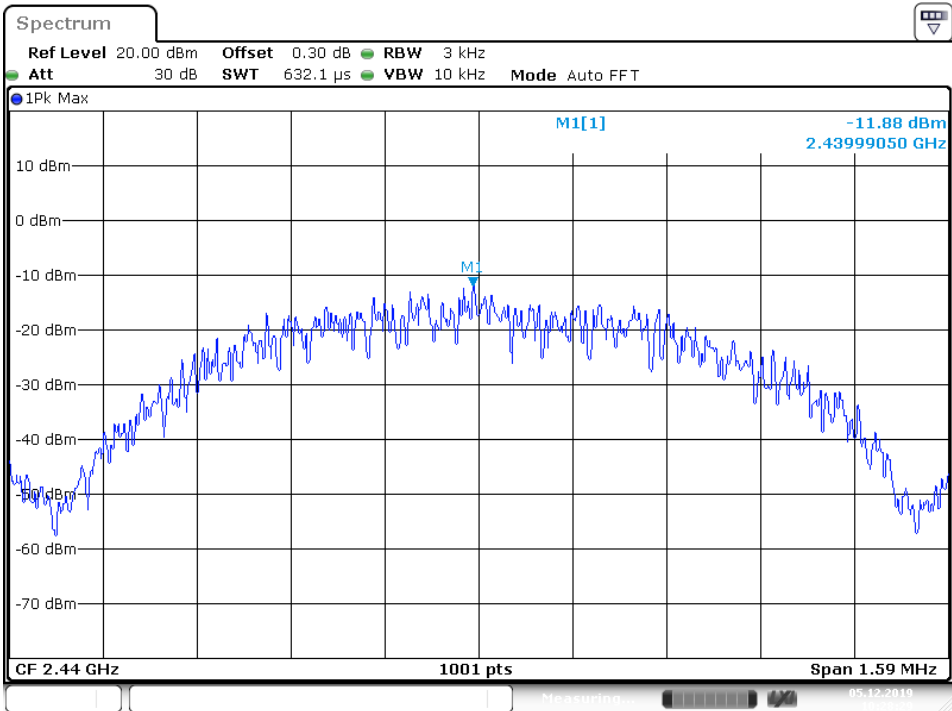
Test Plot of Power Density_ Left Ear

Low Channel



Date: 5.DEC.2019 10:25:31

Middle Channel

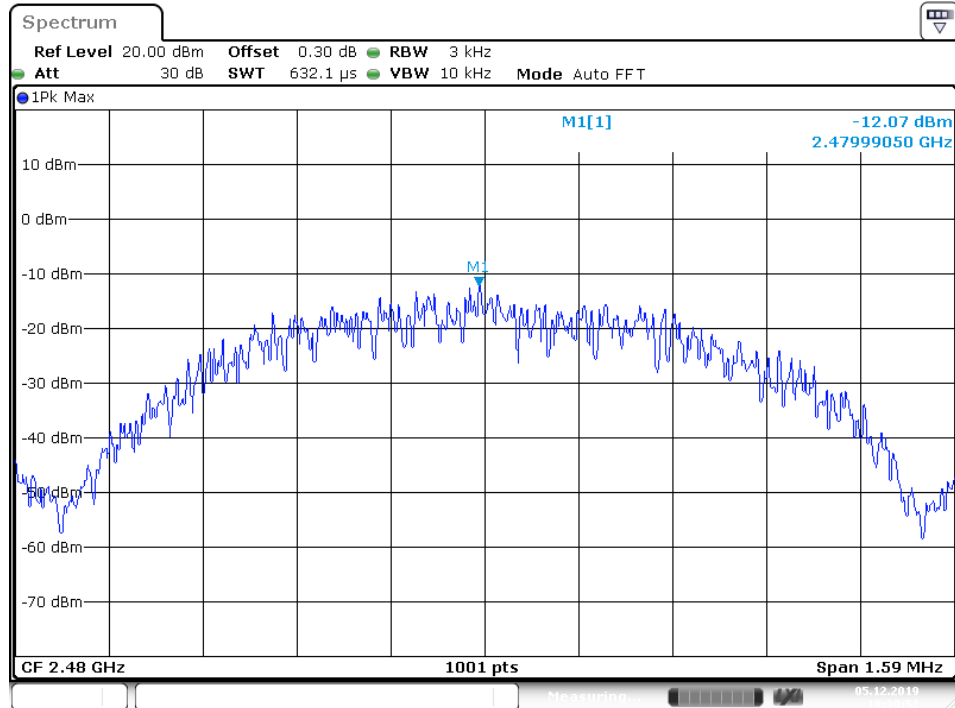


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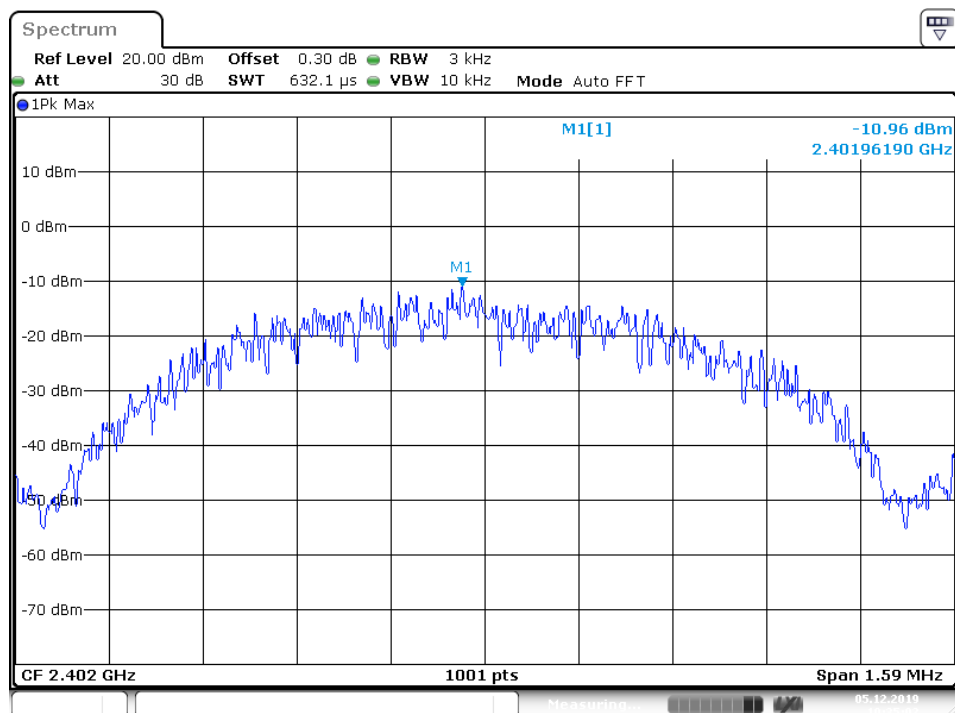
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High Channel

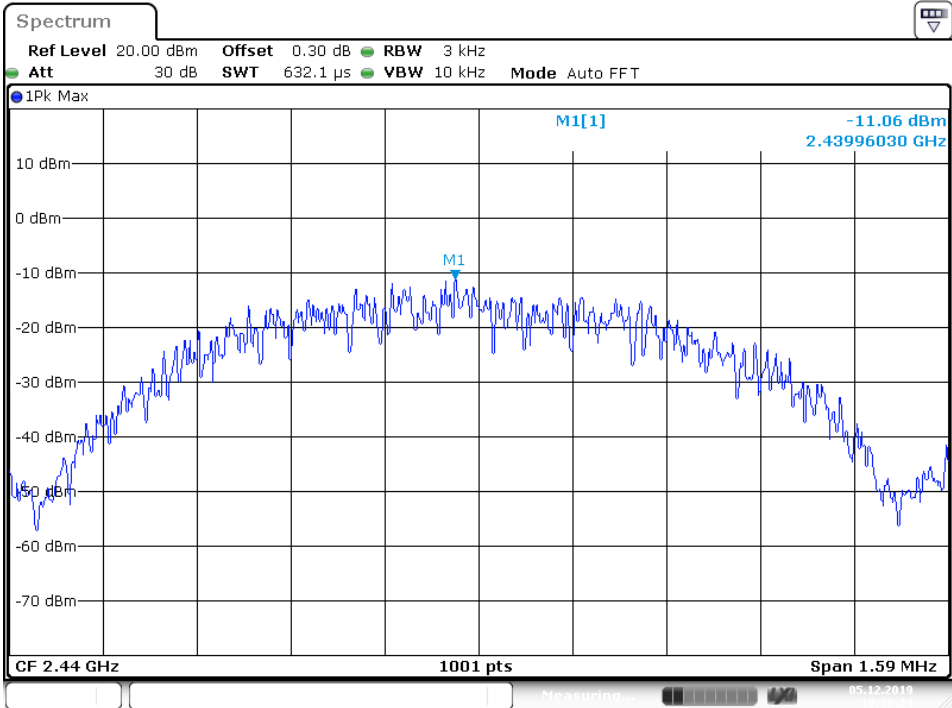


Test Plot of Power Density_ Right Ear

Low Channel

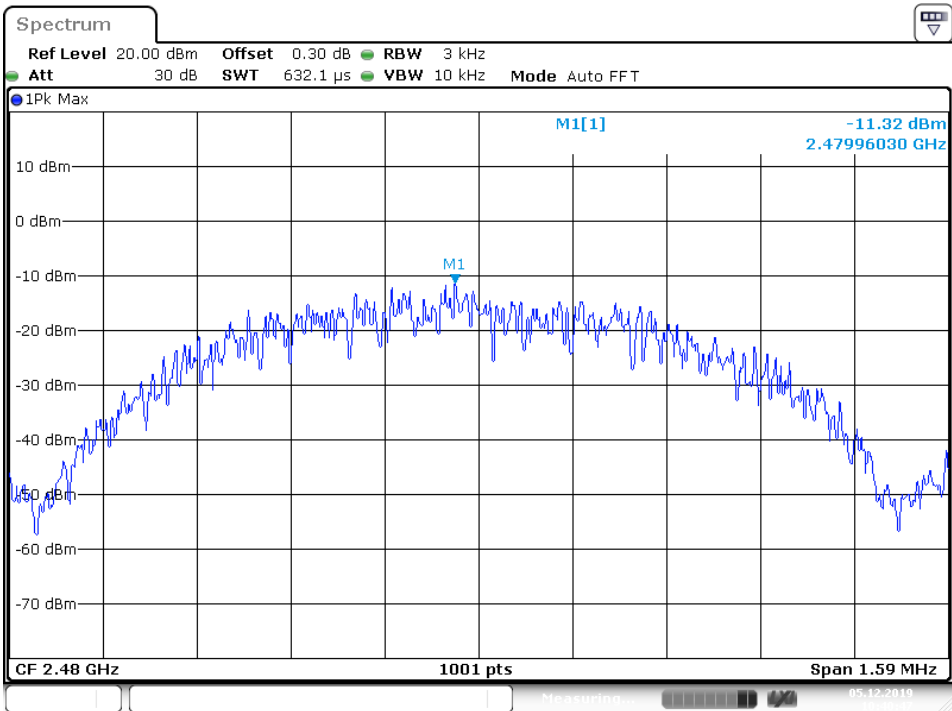


Middle Channel



Date: 5.DEC.2019 10:38:24

High Channel



Date: 5.DEC.2019 10:40:47

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5.1.5 Conducted spurious emissions and Frequency Band Edge measured in 100kHz Bandwidth

RESULT:

Passed

Test standard	:	FCC part 15.247(d), ISED RSS-247 5.5
Basic standard	:	ANSI C63.10:2013, KDB558074
Limit	:	20dB (below that in the 100kHz bandwidth within the band that contains the highest level of the desired power)
Kind of test site	:	Shielded room

Test setup

Test Channel	:	Low/ Middle/ High for Conducted Spurious Emissions Low/ High for Frequency Band Edge
Operation Mode	:	A
Ambient temperature	:	20-24°C
Relative humidity	:	50-65%
Atmospheric pressure	:	100-103 kPa

All emissions are more than 20dB below fundamental, details refer to following test plot, and compliance is achieved as well.

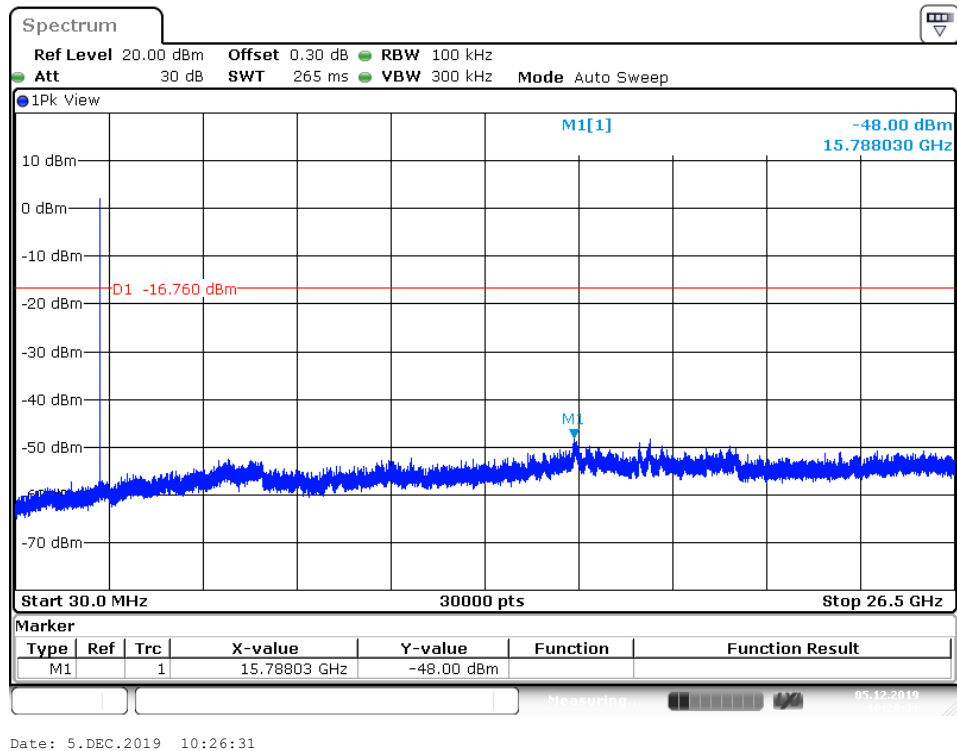
Due to the small size of the product and that there are no inductive components of significant size, 9kHz to 30MHz frequency range is not tested based on technical judgment.

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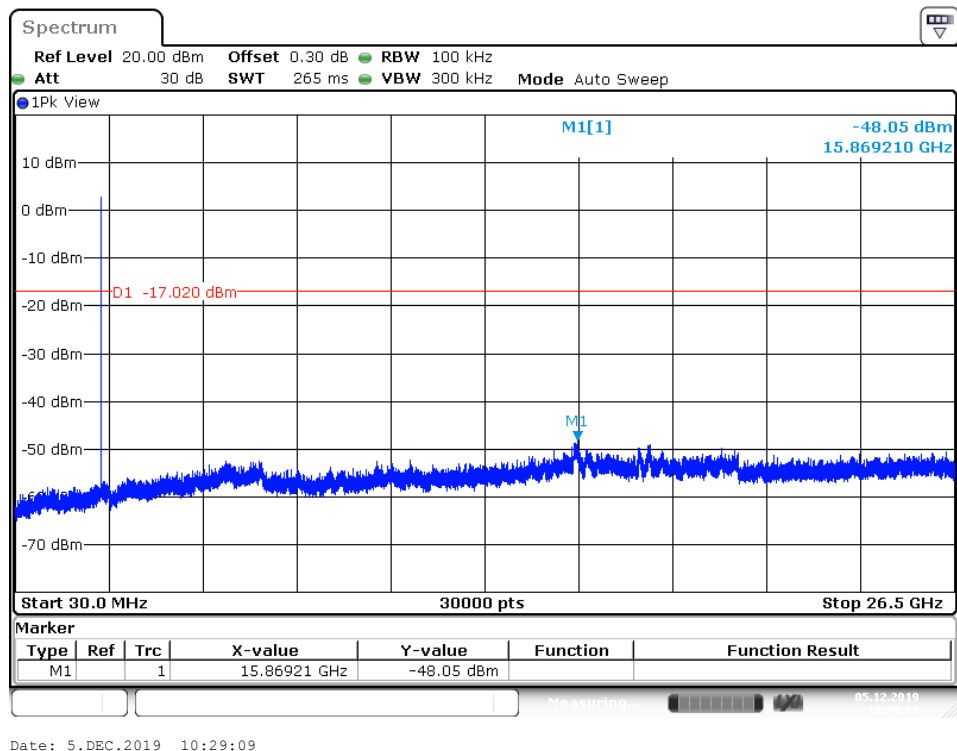
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Test Plot 100kHz Conducted Emissions_ Left Ear

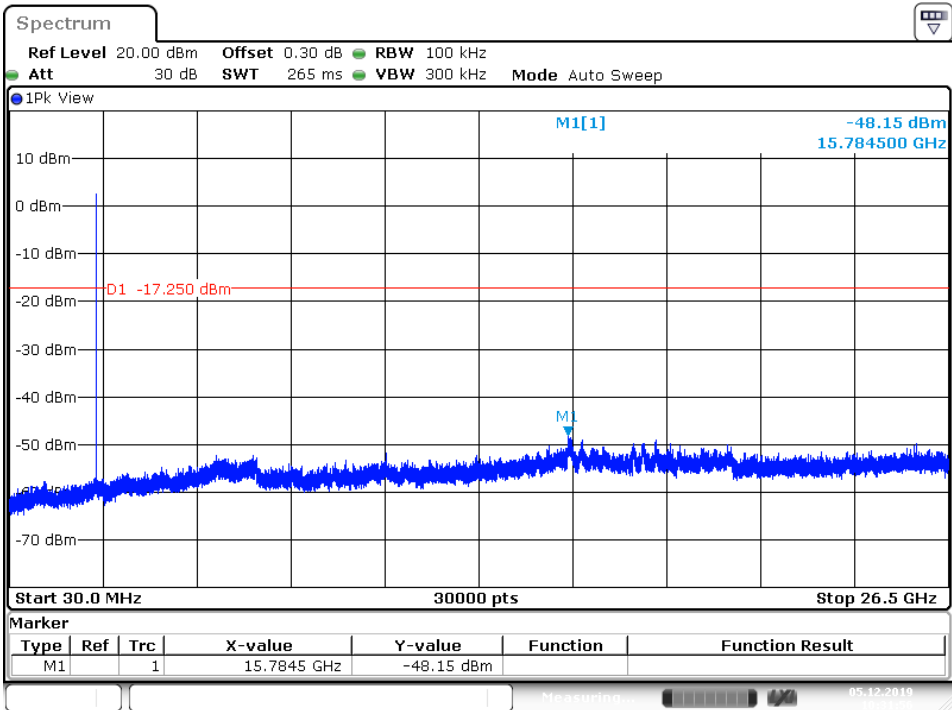
Low Channel



Middle Channel



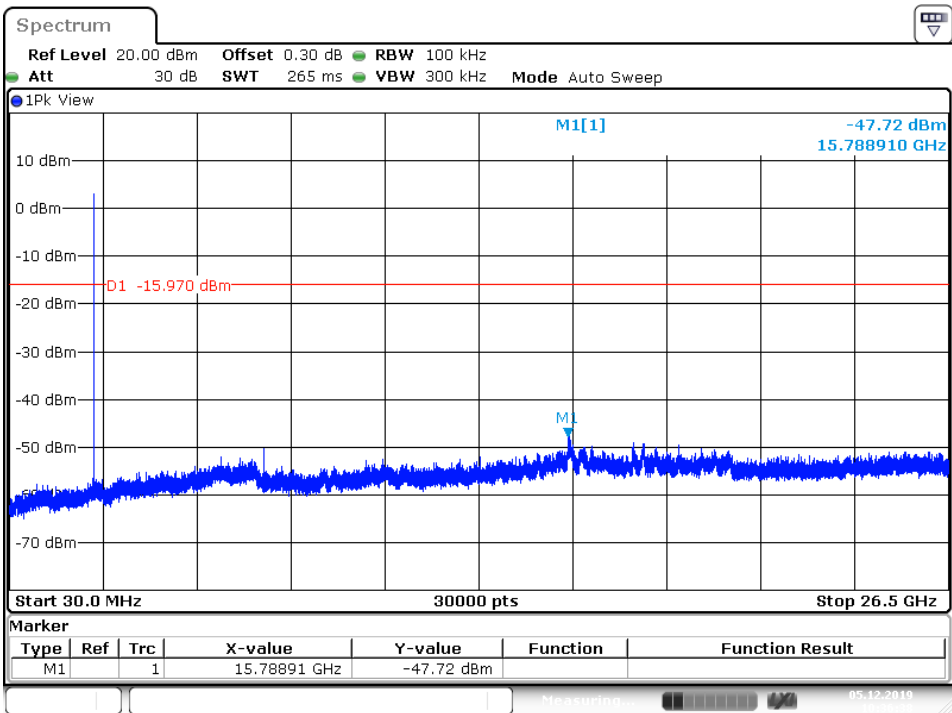
High Channel



Date: 5.DEC.2019 10:31:56

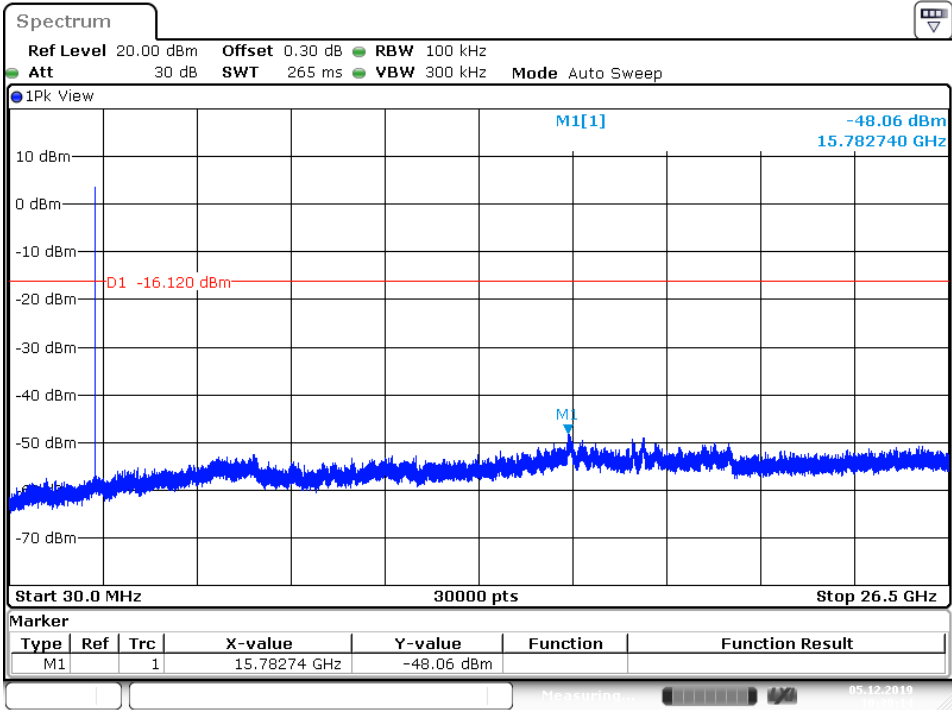
Test Plot 100kHz Conducted Emissions_ Right Ear

Low Channel



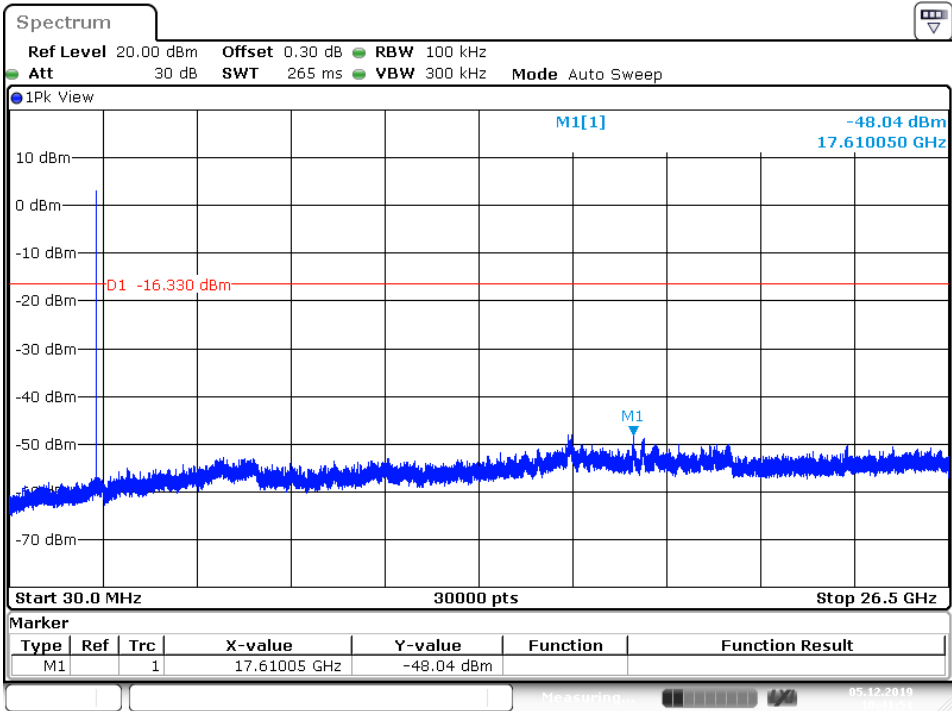
Date: 5.DEC.2019 10:36:38

Middle Channel



Date: 5.DEC.2019 10:39:14

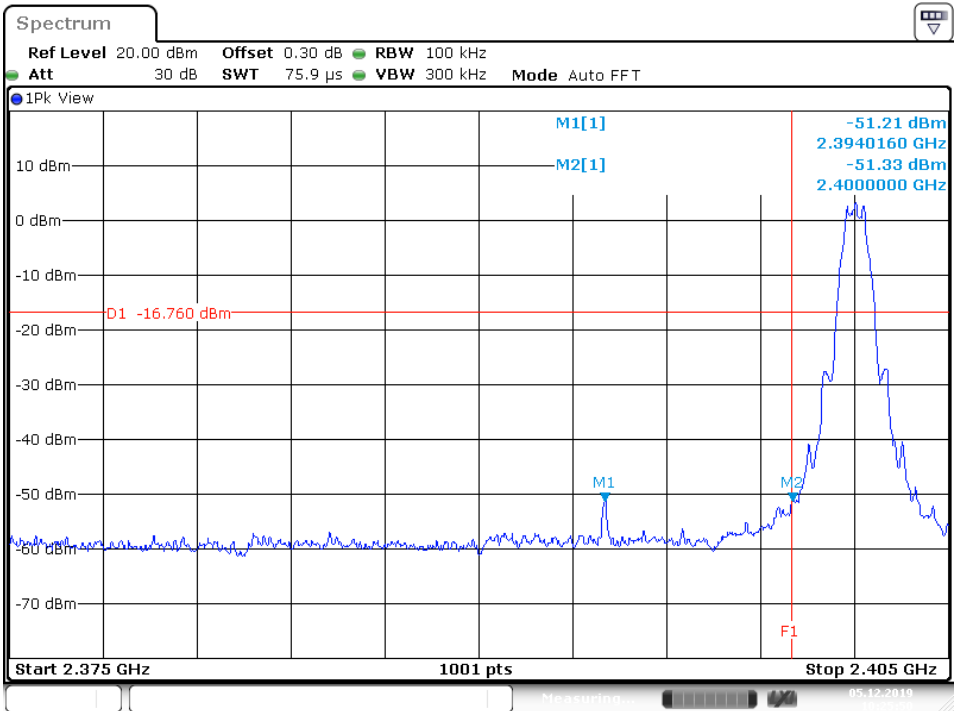
High Channel



Date: 5.DEC.2019 10:41:52

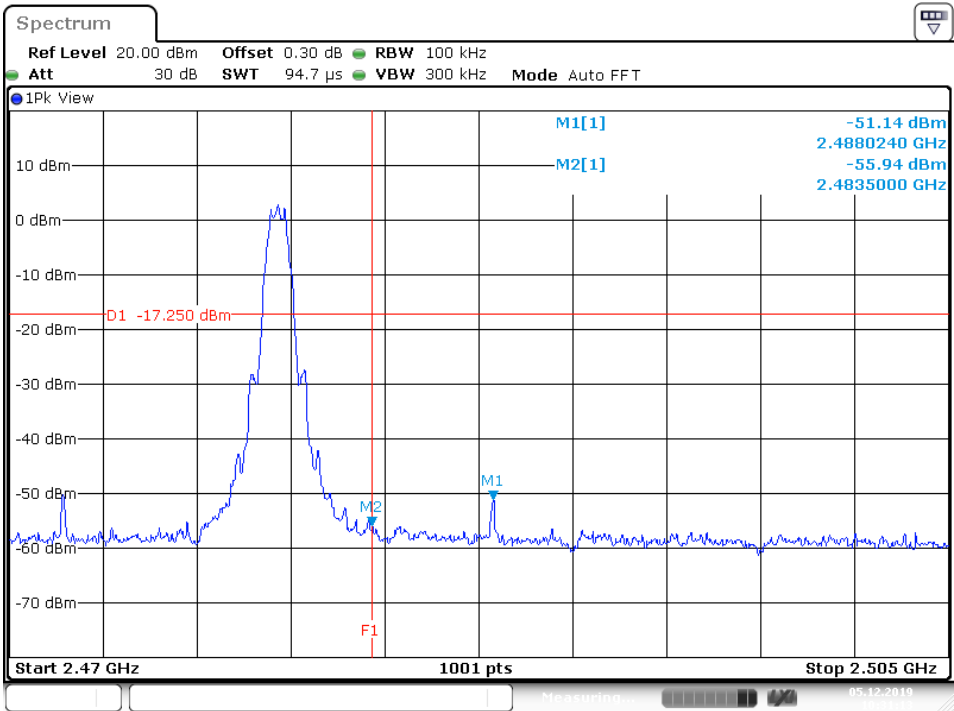
Test Plot 100kHz RBW of Band Edge_ Left Ear

Low Channel



Date: 5.DEC.2019 10:25:51

High Channel



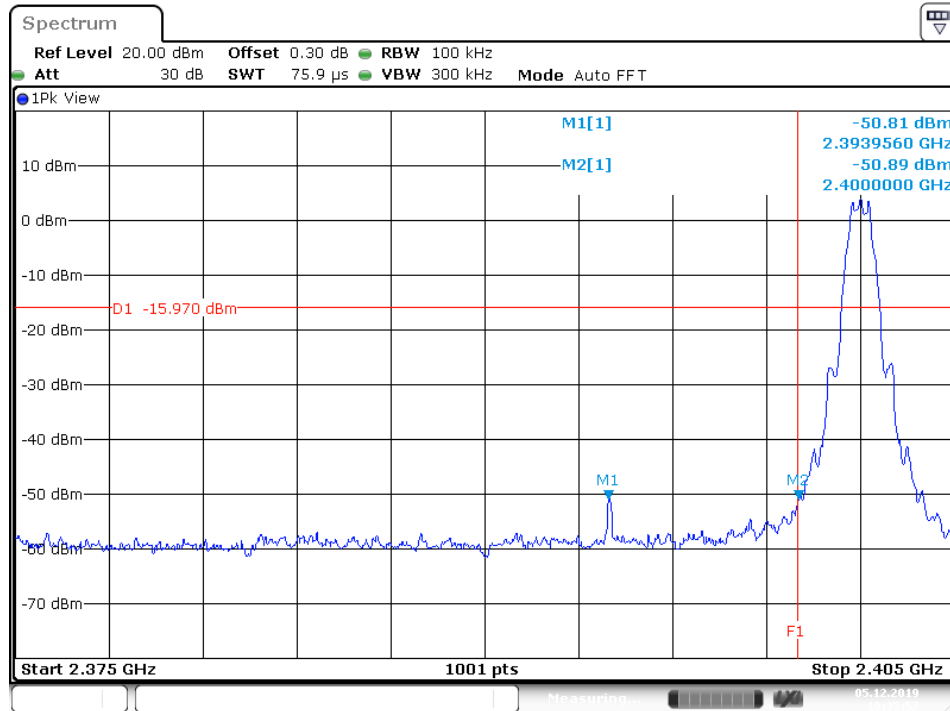
Date: 5.DEC.2019 10:31:14

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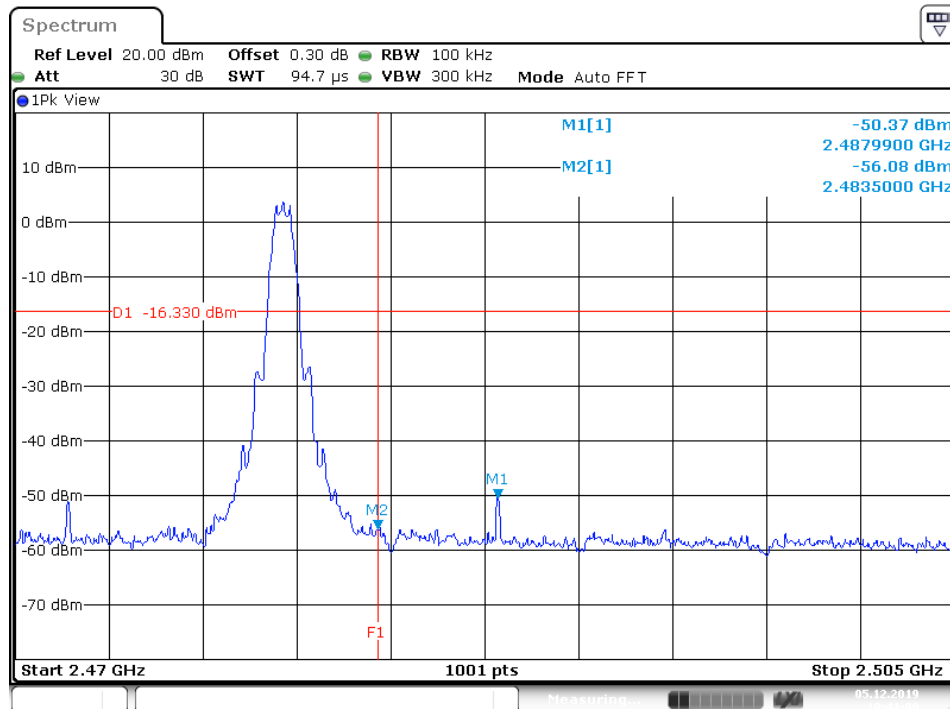
Test Plot 100kHz RBW of Band Edge_ Right Ear

Low Channel



Date: 5.DEC.2019 10:35:57

High Channel



Date: 5.DEC.2019 10:41:09

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5.1.6 Spurious Emission

RESULT:

Passed

Test standard : FCC part 15.247(d), FCC 15.205, FCC 15.209 and ISED RSS-247 clause 3.3
Basic standard : ANSI C63.10 (2013)
Limits : Radiated emissions which fall in the restricted bands, as defined in FCC 15.205(a) and ISED RSS-Gen i5, 8.10 (Table 7), must comply with the radiated emission limits specified in FCC 15.209(a) and ISED RSS-Gen i5, 8.9 (Table 5 and 6).

Emission radiated outside the restricted and authorized frequency bands must either comply with the radiated emission limits specified for the restricted bands or in FCC15.247(d) and ISED RSS-247 i2, 5.5

Kind of test site : 3m Semi-Anechoic Chamber

Test setup

Test Channel : Low/ Middle/ High
Operation mode : A
Test Lab : Linkou

Factor (dB/m)=Antenna Factor(dB/m)+Cable loss (dB)
Level(dBuV/m)=Reading(dBuV)+ Factor(dB/m)

Testing was carried out within frequency range 9kHz to the tenth harmonic. For details refer to Appendix D. The Radiated Emissions testing was performed in the X, Y and Z axis orientation. The worst-case Axis orientation is recorded in this test report.

5.2 Mains Emissions

5.2.1 Mains Conducted Emissions

RESULT:

N/A

Test standard	:	FCC Part 15.207 FCC Part 15.107 ISED RSS-Gen 8.8
Limits	:	Mains Conducted emissions as defined in above test standards must comply with the mains conducted emission limits specified.
Kind of test site	:	Shielded Room

The Bluetooth connection cannot be used while charging, so this test item is exempt from evaluation test.

6. Safety Human exposure

6.1 Radio Frequency Exposure Compliance

6.1.1 Electromagnetic Fields

RESULT:

Passed

Test standard : FCC KDB Publication 447498 D01 v06
ISED RSS-102 issue 5

Left Ear

FCC:

Therefore the maximum output power of the transmitter is 2.21mW < 10mW (Distance: 5 mm), hence the EUT is excluded from SAR evaluation according to FCC KDB publication 447498 D01: Mobile Portable RF Exposure.

Canada:

Maximum conducted average power: 2.21mW
Antenna Gain: -0.4dbi
Maximum EIRP available 2.01mW

Since maximum output power of the transmitter is 2.21mW < 4mW (distance ≤ 5 mm), hence the EUT is excluded from SAR evaluation according to Table 1 in RSS-102, For limb-worn devices where the 10 gram value applies, the exemption limits for routine evaluation in Table 1 of RSS-102 are multiplied by a factor of 2.5.

Right Ear

FCC:

Therefore the maximum output power of the transmitter is 2.7mW < 10mW (Distance: 5 mm), hence the EUT is excluded from SAR evaluation according to FCC KDB publication 447498 D01: Mobile Portable RF Exposure.

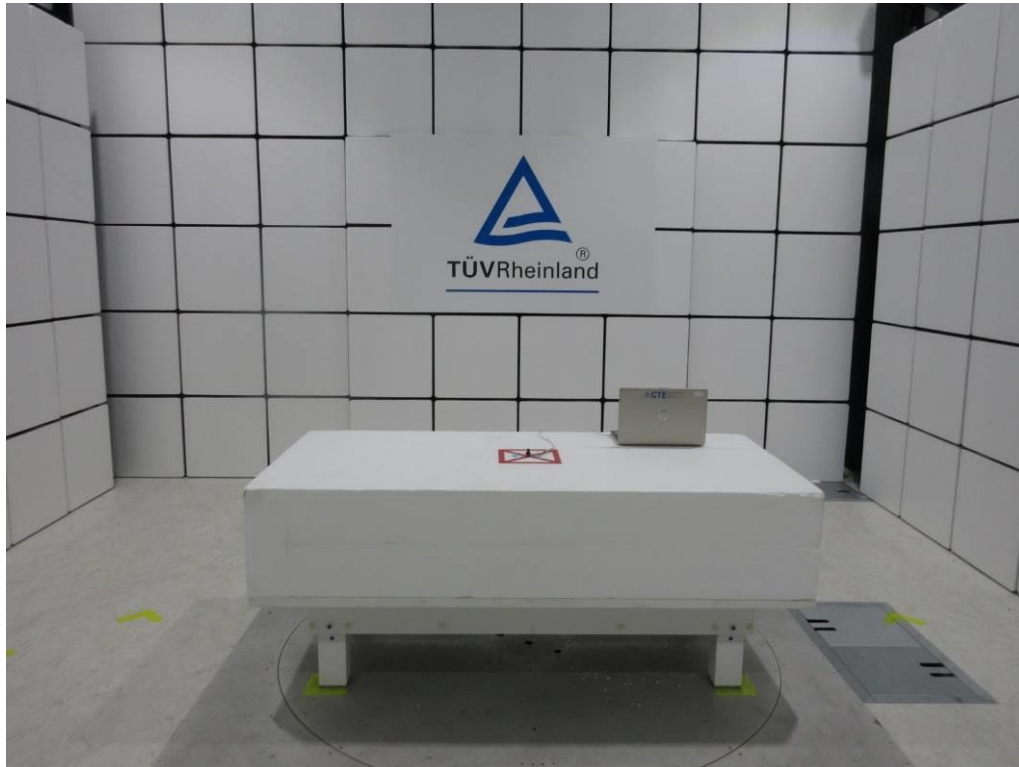
Canada:

Maximum conducted average power: 2.7mW
Antenna Gain: -0.4dbi
Maximum EIRP available 2.46mW

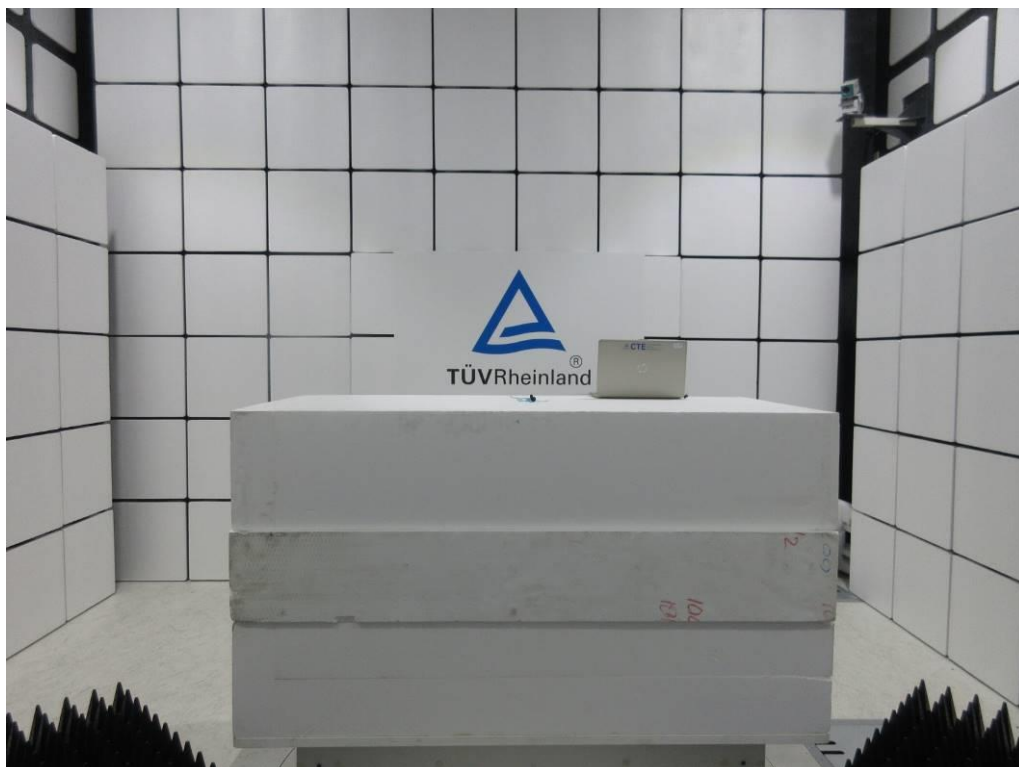
Since maximum output power of the transmitter is 2.7mW < 4mW (distance ≤ 5 mm), hence the EUT is excluded from SAR evaluation according to Table 1 in RSS-102, For limb-worn devices where the 10 gram value applies, the exemption limits for routine evaluation in Table 1 of RSS-102 are multiplied by a factor of 2.5.

7. Photographs of the Test Set-Up

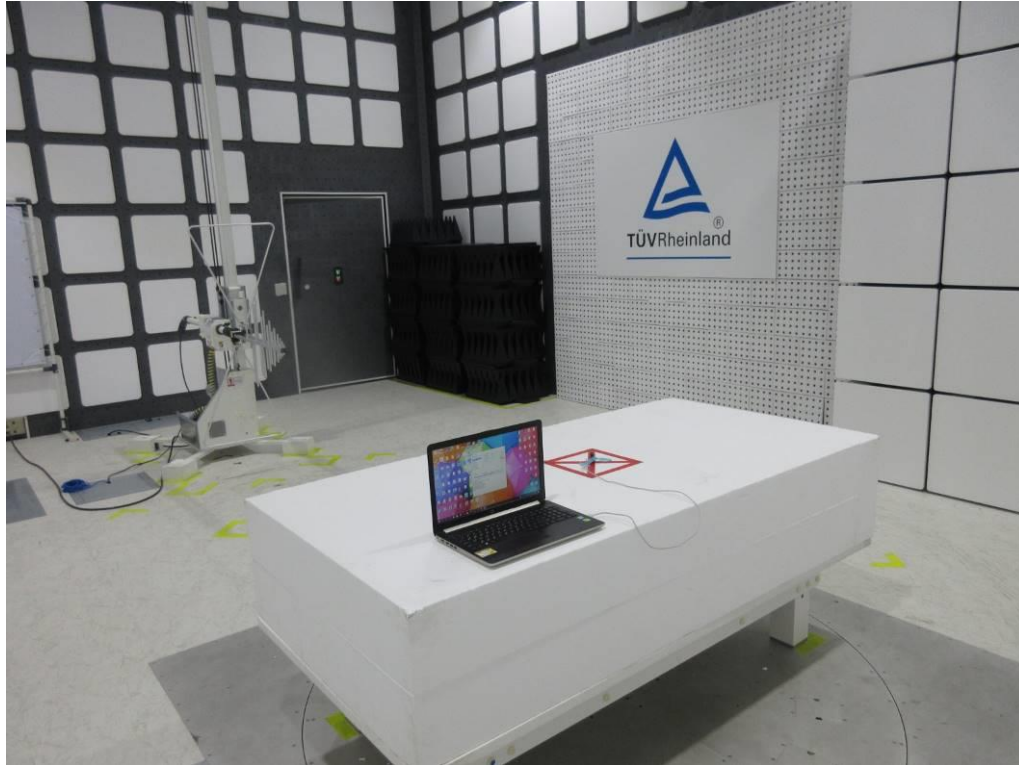
Photograph 1: Set-up for Spurious Emissions (Front View 1)



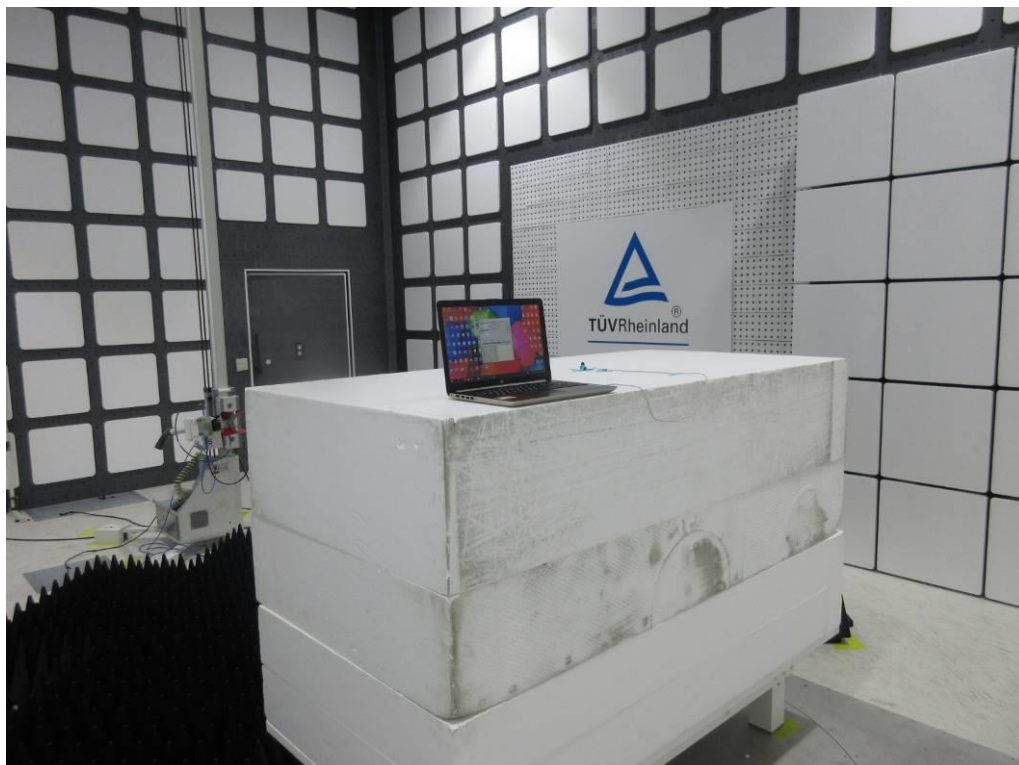
Photograph 2: Set-up for Spurious Emissions (Front View 2)



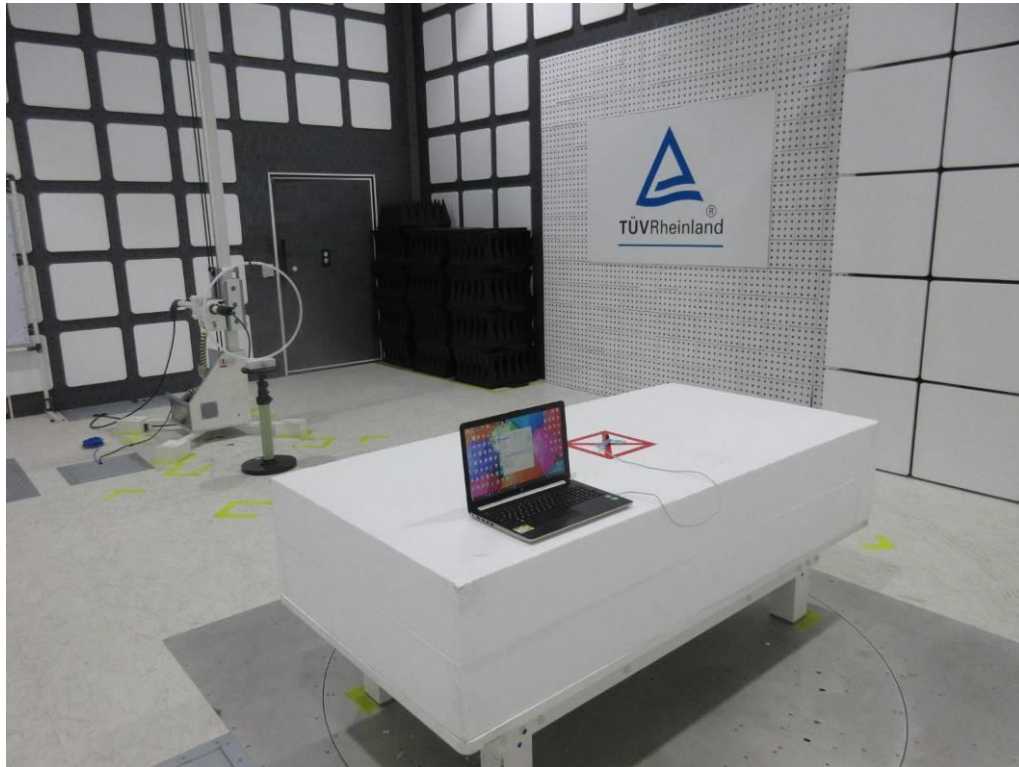
Photograph 3: Set-up for Spurious Emissions (Back View 1)



Photograph 4: Set-up for Spurious Emissions (Back View 2)



Photograph 5: Set-up for Spurious Emissions (Back View 3)



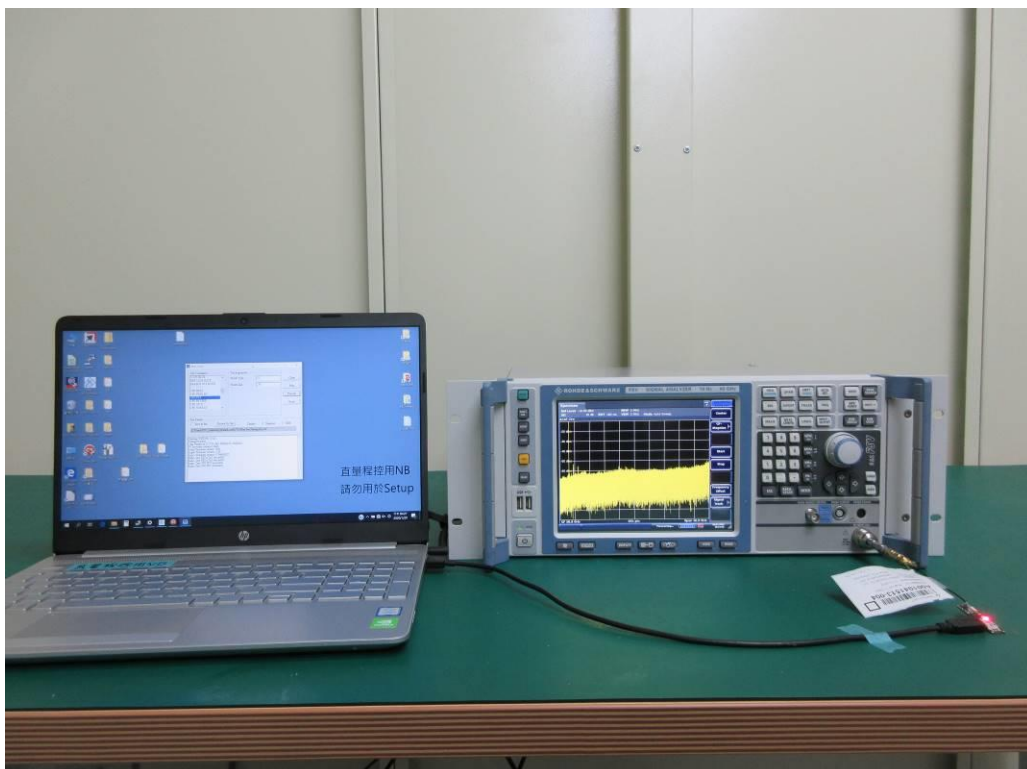
Photograph 6: Set-up for Spurious Emissions (Back View 4)



Photograph 7: Set-up for Conducted testing (View 1)



Photograph 8: Set-up for Conducted testing (View 2)



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