

Prüfbericht-Nr.: <i>Test report no.:</i>	50344748 001	Auftrags-Nr.: <i>Order no.:</i>	238112413	Seite 1 von 81 Page 1 of 81
Kunden-Referenz-Nr.: <i>Client reference no.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	2019.11.15	
Auftraggeber: <i>Client:</i>	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: <i>Test item:</i>	Truly Wireless Earphones			
Bezeichnung / Typ-Nr.: <i>Identification / Type no.:</i>	TW-E7A			
Auftrags-Inhalt: <i>Order content:</i>	FCC Part 15C / IC RSS-247 Test report			
Prüfgrundlage: <i>Test specification:</i>	FCC 47CFR Part 15: Subpart C Section 15.247 (FHSS) ISED RSS-247 Issue 2, Feb 2017			
Wareneingangsdatum: <i>Date of sample receipt:</i>	2019.11.21			
Prüfmuster-Nr.: <i>Test sample no.:</i>	A001029320-007. A001029320-008			
Prüfzeitraum: <i>Testing period:</i>	2019.11.29 - 2020.06.02			
Ort der Prüfung: <i>Place of testing:</i>	EMC/RF Laboratory Taipei			
Prüflaboratorium: <i>Testing laboratory:</i>	Taipei Testing laboratories			
Prüfergebnis*: <i>Test result*:</i>	Pass			
überprüft von: reviewed by:	genehmigt von: authorized by:			
Datum: 2020.06.03 <i>Date:</i>			Datum: 2020.06.03 <i>Date:</i>	
Stellung / Position:	Jack H.C. Chang Project Manager			
Stellung / Position:	Project Manager		Ryan W.T. Chen Project Manager	
Sonstiges / Other:				
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>		Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>		
* Legende: 1 = sehr gut 2 = gut 3 = befriedigend 4 = ausreichend 5 = mangelhaft P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet * Legend: 1 = very good 2 = good 3 = satisfactory 4 = sufficient 5 = poor P(ass) = passed a.m. test specification(s) F(ail) = failed a.m. test specification(s) N/A = not applicable 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>				

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TEST SUMMARY

5.1.1 ANTENNA REQUIREMENT

RESULT: Passed

5.1.2 PEAK OUTPUT POWER

RESULT: Passed

5.1.3 20dB BANDWIDTH AND 99% BANDWIDTH

RESULT: Passed

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

RESULT: Passed

5.1.5 SPURIOUS EMISSION

RESULT: Passed

5.1.6 FREQUENCY SEPARATION

RESULT: Passed

5.1.7 NUMBER OF HOPPING FREQUENCY

RESULT: Passed

5.1.8 TIME OF OCCUPANCY

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: 50344748 001, 50344749 001 Appendix P)

Appendix D: Test Result of Radiated Emissions
(File Name: 50344748 001 001 Appendix D)

Test Specifications

The following standards were applied.

Table 1: Applied Standard and Test Levels

Radio
NCC Low-power Radio-frequency Devices Technical Regulations LP0002(2018)(107 年 1 月 10 日)

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

Taipei Testing laboratories

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

2.2 Test Facility

Taipei Testing laboratories

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



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	2020/4/22	2021/4/22
Spectrum Analyzer	R&S	FSV40	101508	2020/2/05	2021/2/04
Pre-Amplifier	Agilent	8447D	2944A10772	2020/2/11	2021/2/10
Pre-Amplifier	EMCI	EMC051845SE	980633	2020/2/17	2021/2/16
Pre-Amplifier	EMCI	EMC184045SE	980657	2020/2/17	2021/2/16
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	2020/4/10	2021/4/10
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	2020/3/25	2021/3/25
Test Cable	HUBER+SUHNER	SUCOFLEX 104_9k~18G	804680/4	2020/3/25	2021/3/25
Test Cable	HUBER+SUHNER	SUCOFLEX 104_9k~18G	MY37202/4	2020/3/25	2021/3/25
Test Cable	HUBER+SUHNER	SUCOFLEX 102EA_1G~40G	800898/2EA	2020/4/22	2021/4/22
Test Cable	HUBER+SUHNER	SUCOFLEX 102EA_1G~40G	800901/2EA	2020/4/22	2021/4/22
Test Cable	HUBER+SUHNER	SUCOFLEX 102EA_1G~40G	801027/2EA	2020/4/22	2021/4/22
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	2020/4/6	2021/4/6
Power Sensor	Anritsu	MA2411B	1725269	2020/4/7	2021/4/7
EMI Test Receiver	Rohde & Schwarz	ESCI 7	100797	2020/3/13	2021/3/13
Two-Line V-Network (for EUT)	Rohde & Schwarz	ENV216	101243	2019/6/23	2020/6/23
Two-Line V-Network	Rohde & Schwarz	ENV216	101262	2019/7/16	2020/7/16
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	2020/2/20	2021/2/20
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	0357.8810.54- 102102-HN	2019/7/25	2020/7/25
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/RF Exposure(MPE), 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 Circuit 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-E7A
FCC ID	VHVTWE7A
IC ID	10565A-TWE7A
HVIN	TW-E7A

Table 5: Technical Specification of EUT

Technical Specification	Value
Operating Frequencies	2402~2480 MHz
Channel Spacing	1 MHz
Channel number	79
Operation Voltage	3.7 Vdc
Modulation	GFSK, $\pi/4$ DQPSK, 8 DPSK
Antenna gain	-0.4 dBi

Table 6: Frequency hopping information

Technical Specification	Description
Hopping Range	Hereby we declare that the maximum frequency of this device is: 2402-2480MHz. The product is contain Bluetooth chipset as QCC5124 which is support Bluetooth v5.0 specification fully qualified software. This was checked during the Bluetooth Qualification tests (Test Case: TRM/CA/04).
Hopping Sequence	Example of a 79 hopping sequence in data mode: 33,04,21,44,23,42,53,46,55,48,40,59,72,29,76,31,08,73,07,75,09,45,60,39,58,13,47,11,77,52,35,50,65,54,67,56,69,62,71,64, 7,25,27,66,57,70,74,61,78,63,10,41,05,43,15,44,64,68,02,70,06,01,51,03,55,05,03,66,53,49,36,47,
Receiver input bandwidth	The input bandwidth of the receiver is 1MHz. In every connection one Bluetooth device is the master and the other one is the slave. The master determines the hopping sequence. The slave follows this sequence. Both devices shift between RX and TX time slot according to the clock of the master. Additionally the type of connection is set up at the beginning of the connection. The master adapts its hopping frequency and its TX/RX timing according to the packet type of the connection. Also the slave of the connection will use these settings. Repeating of a packer has no influence on the hopping sequence. The hopping sequence generated by the master of the connection will be followed in any case. That means a repeated packet will not be send on the same frequency, it is send on the next frequency of the hopping sequence.

3.3 Independent Operation Modes

Basic operation modes are:

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

3.4 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram.

3.5 Submitted Documents

- Circuit 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 7: Table for Parameters of Test Software Setting_ Left Ear

Mode	Channel Frequency		
	2402 MHz	2441 MHz	2480 MHz
1-DH5	0,3,0	0,3,0	0,3,0
2-DH5	0,3,0	0,3,0	0,3,0
3-DH5	0,3,0	0,3,0	0,3,0

Table 8: Table for Parameters of Test Software Setting_ Right Ear

Mode	Channel Frequency		
	2402 MHz	2441 MHz	2480 MHz
1-DH5	0,1,0	0,1,0	0,1,0
2-DH5	0,1,0	0,1,0	0,1,0
3-DH5	0,1,0	0,1,0	0,1,0

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: A001029320-008

Radiated: A001029320-007

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

Test Software	Bluesuite 3.2.2.144
---------------	---------------------

4.3 Special Accessories and Auxiliary Equipment

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

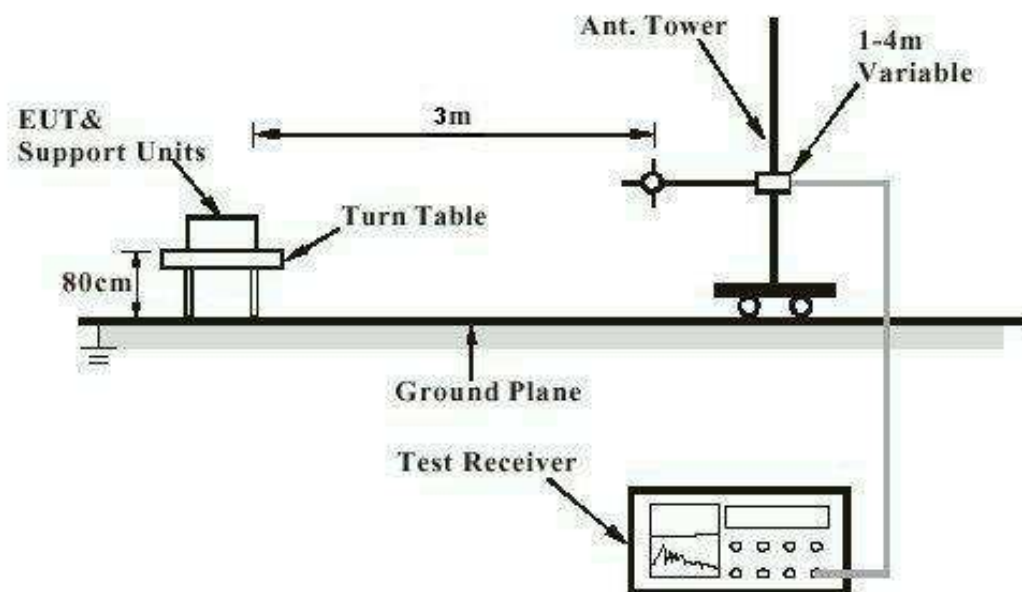
Description	Manufacturer	Model No.	Serial No.
Notebook(EMC-06)	Lenovo	TP00048A	PB-0F8B2

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

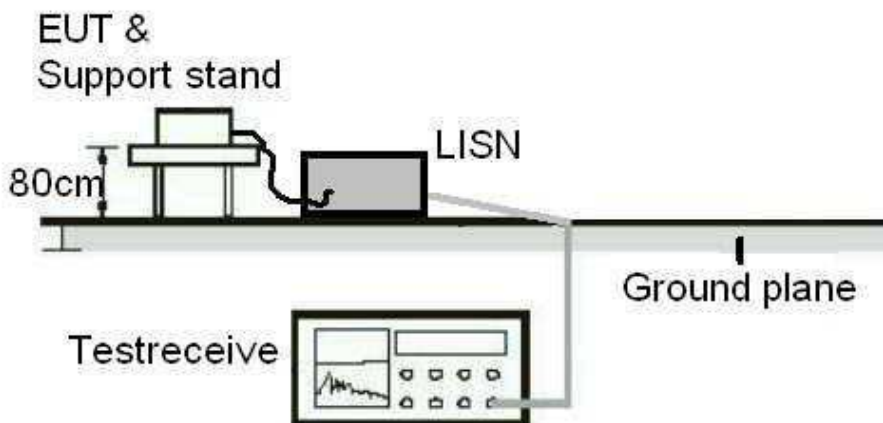
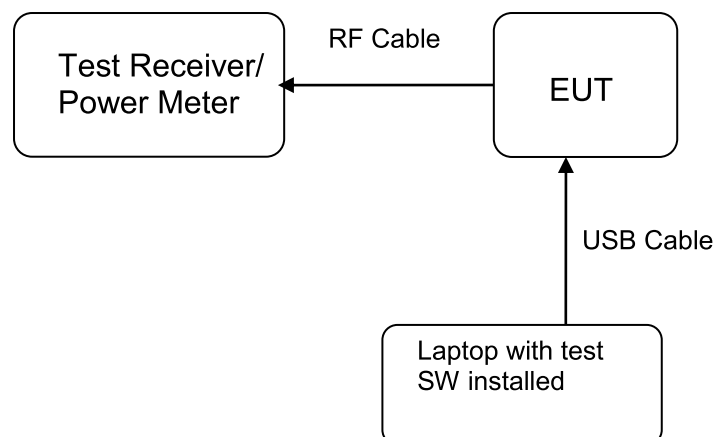


Diagram of Measurement Equipment Configuration for Conducted Transmitter Measurement



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 and ISSED
RSS-Gen 6.8

Requirement : use of approved antennas only with directional gains that
do not exceed 6 dBi

According to the manufacturer declaration, the EUT has an antenna with a directional gain of -0.4 dBi. The antenna is chip antenna with no possibility of replacement with a non-approved antenna by the end-user. Therefore, the EUT is considered to comply with this provision.

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)(1), ISSED RSS-247 5.4(b)
Basic standard : ANSI C63.10:2013
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 9: Test result of Peak Output Power 1-DH5_Left Ear

Channel	Channel Frequency (MHz)	Output Power		Average Output Power (W)	Limit (W)
		(dBm)	(W)		
Low Channel	2402.0	9.47	0.00885	0.00871	0.125
Middle Channel	2441.0	9.27	0.00845	0.00830	0.125
High Channel	2480.0	9.21	0.00834	0.00818	0.125

Table 10: Test result of Peak Output Power 2-DH5_Left Ear

Channel	Channel Frequency (MHz)	Output Power		Average Output Power (W)	Limit (W)
		(dBm)	(W)		
Low Channel	2402.0	11.44	0.01393	0.00841	0.125
Middle Channel	2441.0	11.35	0.01365	0.00807	0.125
High Channel	2480.0	11.28	0.01343	0.00796	0.125

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Table 11: Test result of Peak Output Power 3-DH5_Left Ear

Channel	Channel Frequency (MHz)	Output Power		Average Output Power (W)	Limit (W)
		(dBm)	(W)		
Low Channel	2402.0	11.45	0.01396	0.00843	0.125
Middle Channel	2441.0	11.36	0.01368	0.00809	0.125
High Channel	2480.0	11.29	0.01346	0.00798	0.125

Table 12: Test result of Peak Output Power 1-DH5_Right Ear

Channel	Channel Frequency (MHz)	Output Power		Average Output Power (W)	Limit (W)
		(dBm)	(W)		
Low Channel	2402.0	9.52	0.00895	0.00881	0.125
Middle Channel	2441.0	9.02	0.00798	0.00782	0.125
High Channel	2480.0	8.89	0.00774	0.00760	0.125

Table 13: Test result of Peak Output Power 2-DH5_Right Ear

Channel	Channel Frequency (MHz)	Output Power		Average Output Power (W)	Limit (W)
		(dBm)	(W)		
Low Channel	2402.0	11.8	0.01514	0.00818	0.125
Middle Channel	2441.0	11.52	0.01419	0.00764	0.125
High Channel	2480.0	11.36	0.01368	0.00733	0.125

Table 14: Test result of Peak Output Power 3-DH5_Right Ear

Channel	Channel Frequency (MHz)	Output Power		Average Output Power (W)	Limit (W)
		(dBm)	(W)		
Low Channel	2402.0	12.21	0.01663	0.00822	0.125
Middle Channel	2441.0	11.93	0.01560	0.00766	0.125
High Channel	2480.0	11.73	0.01489	0.00735	0.125

5.1.3 20dB Bandwidth and 99% Bandwidth

RESULT:

Passed

Test standard : FCC Part 15.247(a)(1), ISSED RSS-247 5.1(a)
Basic standard : ANSI C63.10:2013, ISSED RSS-Gen
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 15: Test result of 20dB Bandwidth 1-DH5_Left Ear

Channel	Channel Frequency (MHz)	20dB Bandwidth (kHz)	Result
Low Channel	2402	959.5	Pass
Mid Channel	2441	955.1	Pass
High Channel	2480	955.1	Pass

Table 16: Test result of 20dB Bandwidth 2-DH5_Left Ear

Channel	Channel Frequency (MHz)	20dB Bandwidth (MHz)	Result
Low Channel	2402	1.3242	Pass
Mid Channel	2441	1.3242	Pass
High Channel	2480	1.3285	Pass

Table 17: Test result of 20dB Bandwidth 3-DH5_Left Ear

Channel	Channel Frequency (MHz)	20dB Bandwidth (MHz)	Result
Low Channel	2402	1.3025	Pass
Mid Channel	2441	1.3068	Pass
High Channel	2480	1.3068	Pass

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Table 18: Test result of 20dB Bandwidth 1-DH5_Right Ear

Channel	Channel Frequency (MHz)	20dB Bandwidth (kHz)	Result
Low Channel	2402	959.5	Pass
Mid Channel	2441	955.1	Pass
High Channel	2480	955.1	Pass

Table 19: Test result of 20dB Bandwidth 2-DH5_Right Ear

Channel	Channel Frequency (MHz)	20dB Bandwidth (MHz)	Result
Low Channel	2402	1.3242	Pass
Mid Channel	2441	1.3329	Pass
High Channel	2480	1.3329	Pass

Table 20: Test result of 20dB Bandwidth 3-DH5_Right Ear

Channel	Channel Frequency (MHz)	20dB Bandwidth (MHz)	Result
Low Channel	2402	1.3025	Pass
Mid Channel	2441	1.2981	Pass
High Channel	2480	1.2981	Pass

Table 21: Test result of 99% Bandwidth 1-DH5_Left Ear

Channel	Channel Frequency (MHz)	99% Bandwidth (kHz)
Mid Channel	2441	868.263

Table 22: Test result of 99% Bandwidth 3-DH5_Left Ear

Channel	Channel Frequency (MHz)	99% Bandwidth (MHz)
Mid Channel	2441	1.5968

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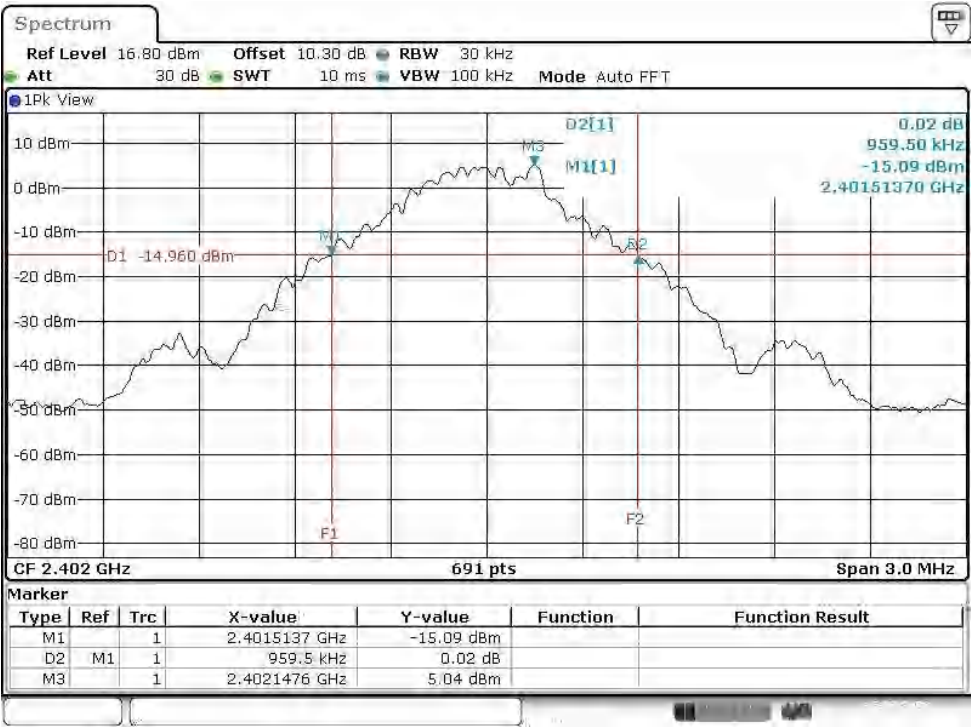
Table 23: Test result of 99% Bandwidth 1-DH5_Right Ear

Channel	Channel Frequency (MHz)	99% Bandwidth (kHz)
Mid Channel	2441	868.263

Table 24: Test result of 99% Bandwidth 3-DH5_Right Ear

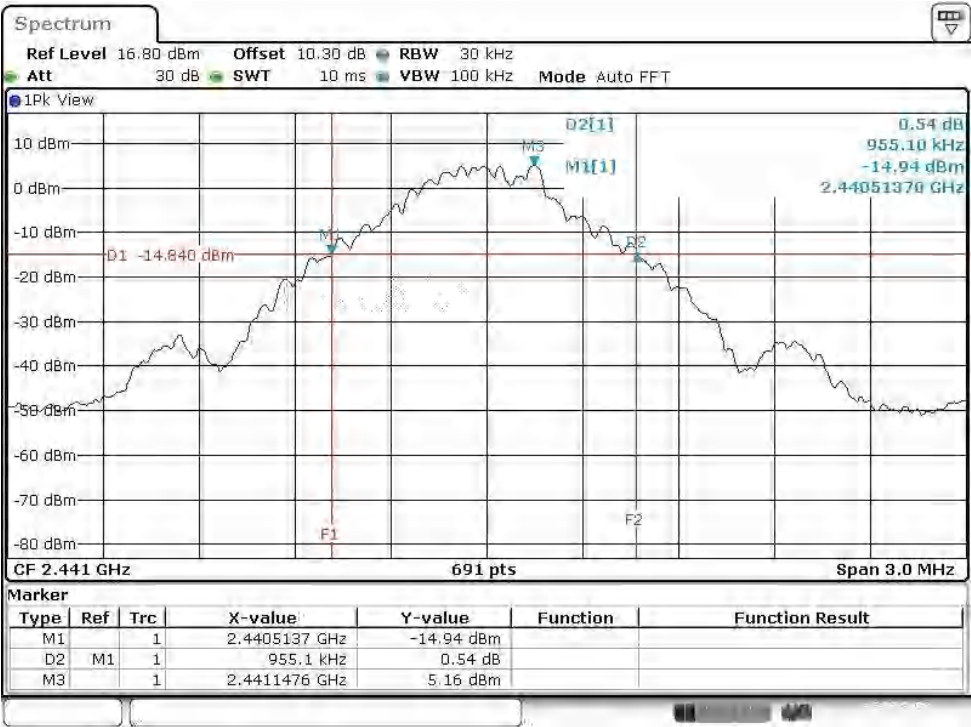
Channel	Channel Frequency (MHz)	99% Bandwidth (MHz)
Mid Channel	2441	1.6367

Test Plot of 20dB Bandwidth 1-DH5_Left Ear
Low Channel



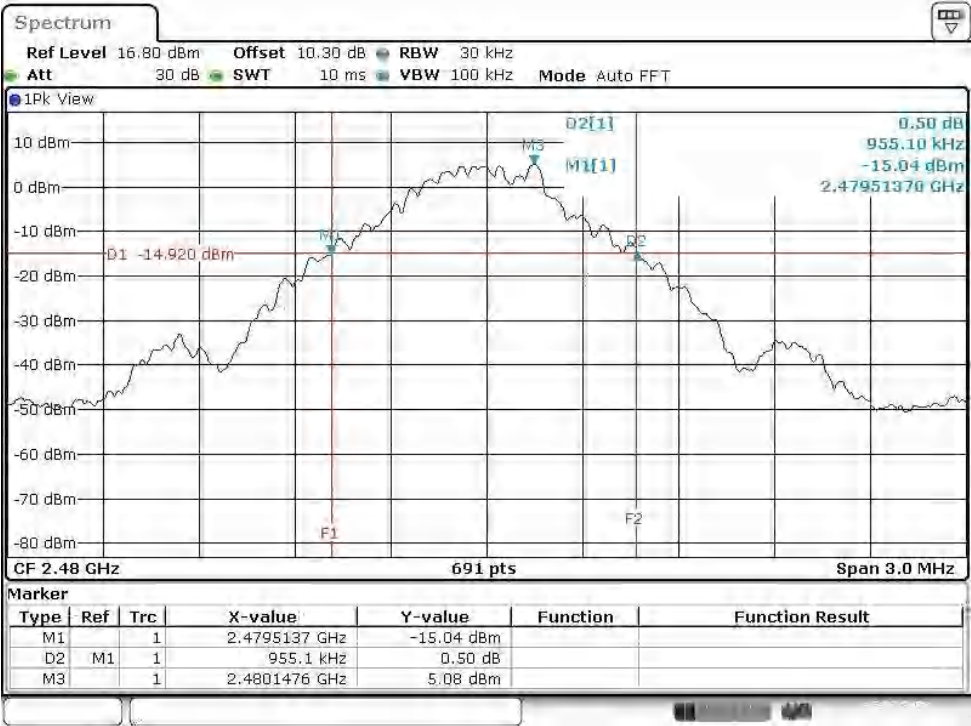
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Middle Channel



Date: 15.FEB.2020 12:59:35

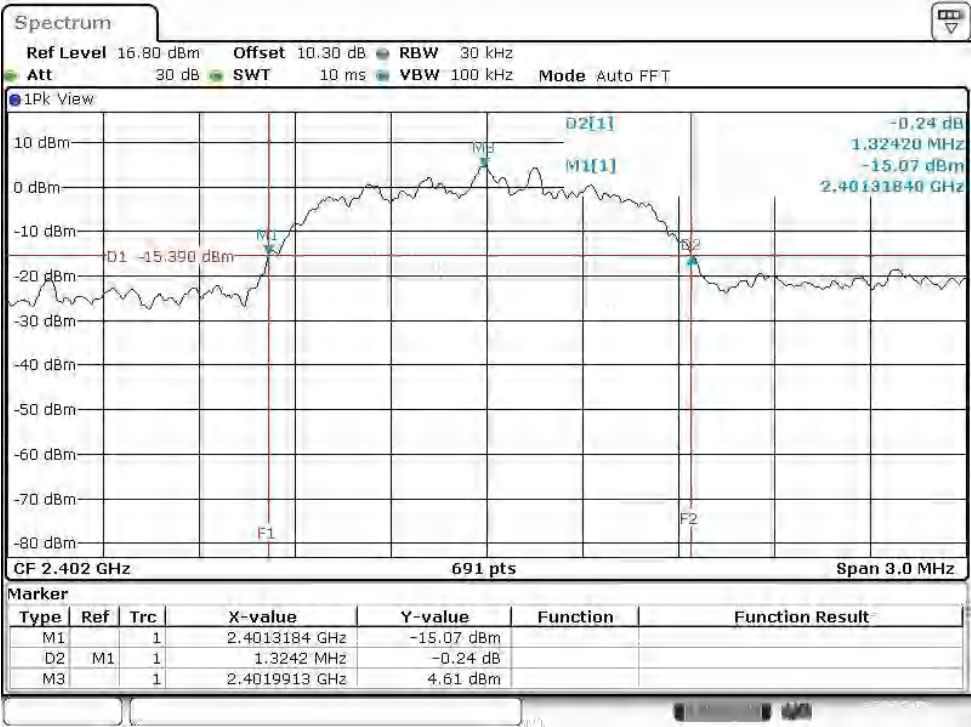
High Channel



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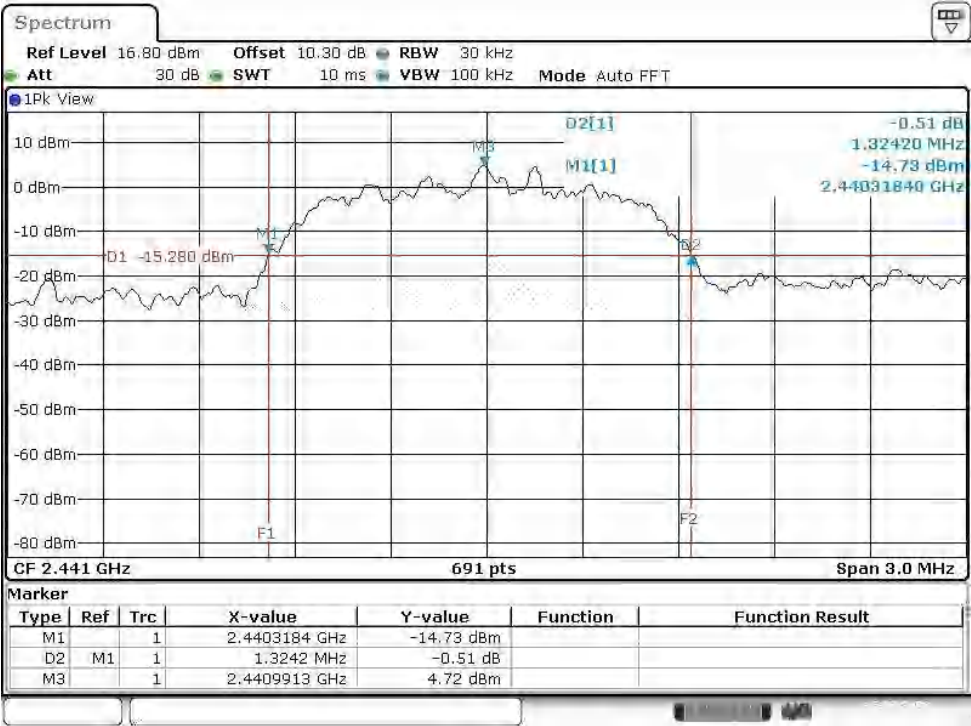
Test Plot of 20dB Bandwidth 2-DH5_Left Ear

Low Channel



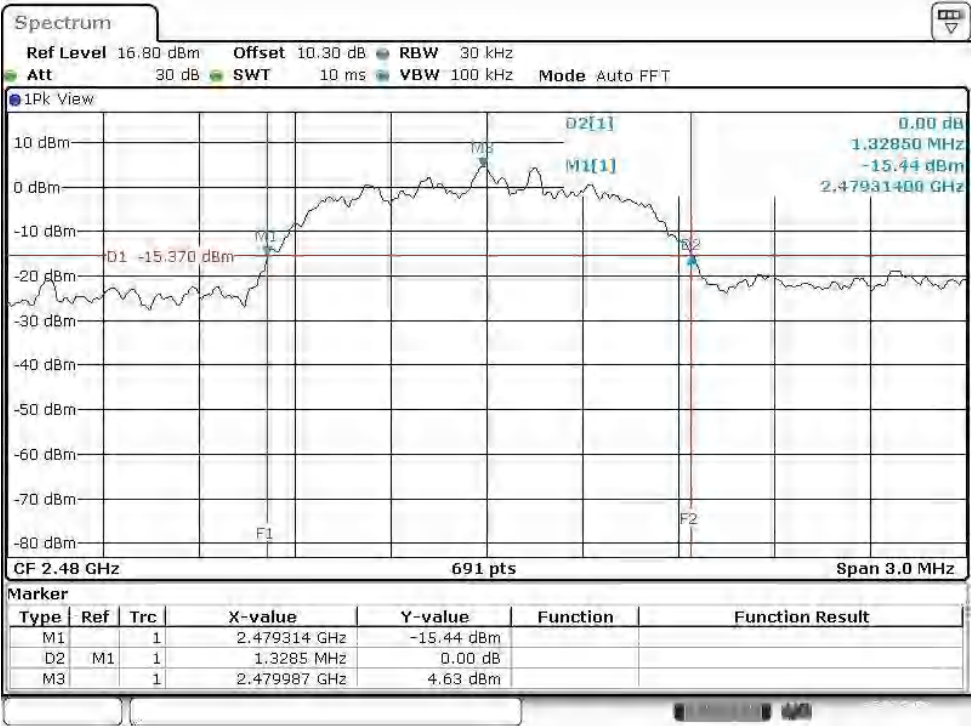
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Middle Channel



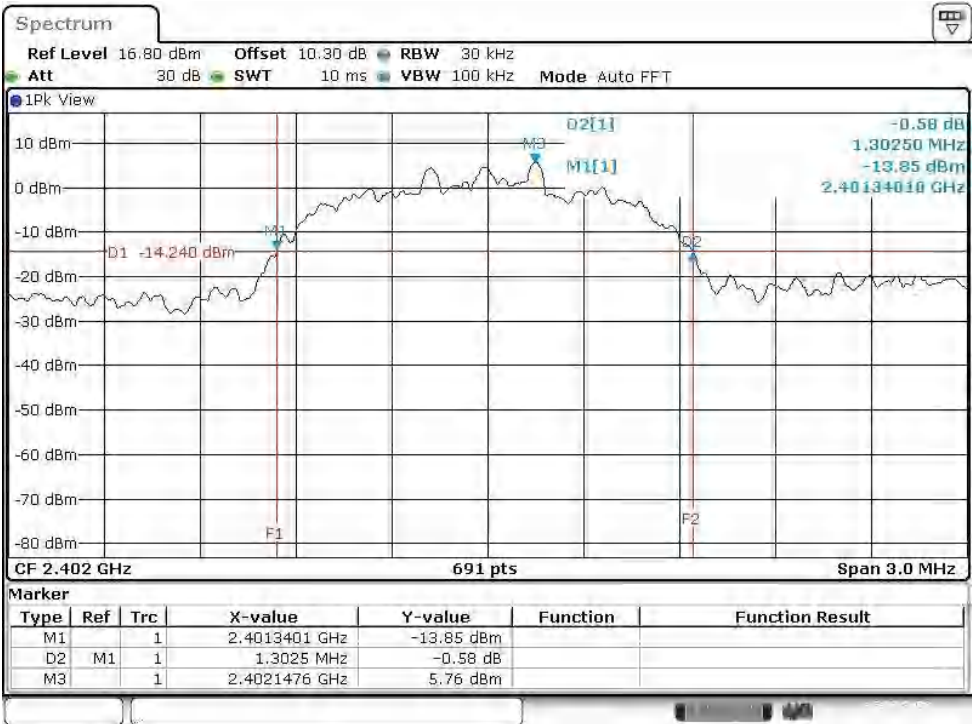
Date: 15.FEB.2020 13:00:43

High Channel



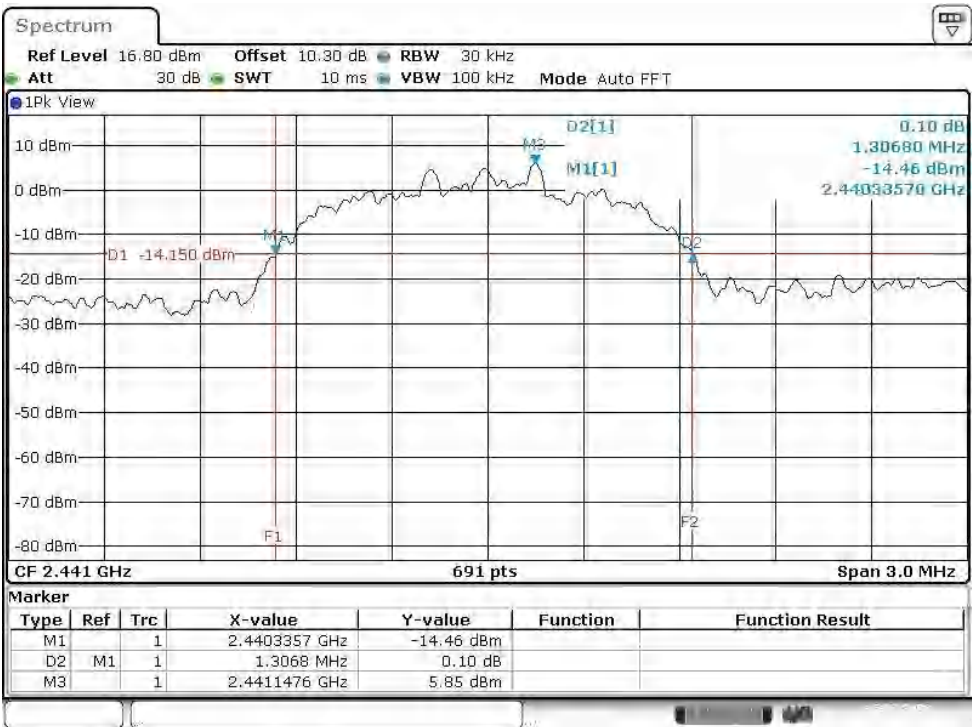
Date: 15.FEB.2020 13:04:29

Test Plot of 20dB Bandwidth 3-DH5_Left Ear
Low Channel



Date: 15.FEB.2020 12:58:05

Middle Channel

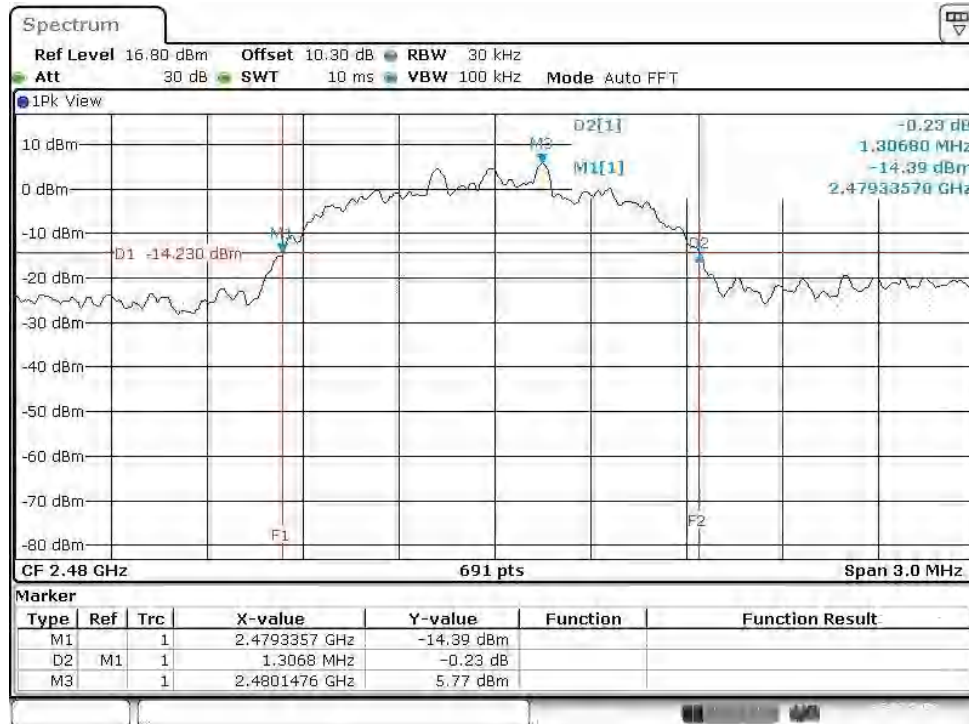


Date: 15.FEB.2020 13:01:55

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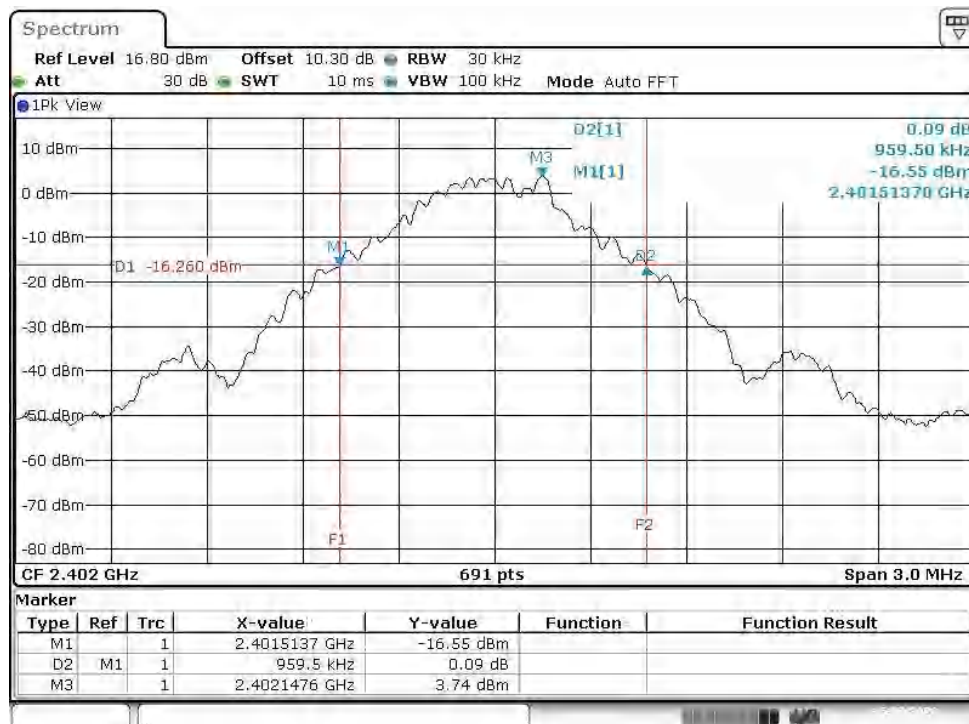
High Channel



Date: 15.FEB.2020 13:03:18

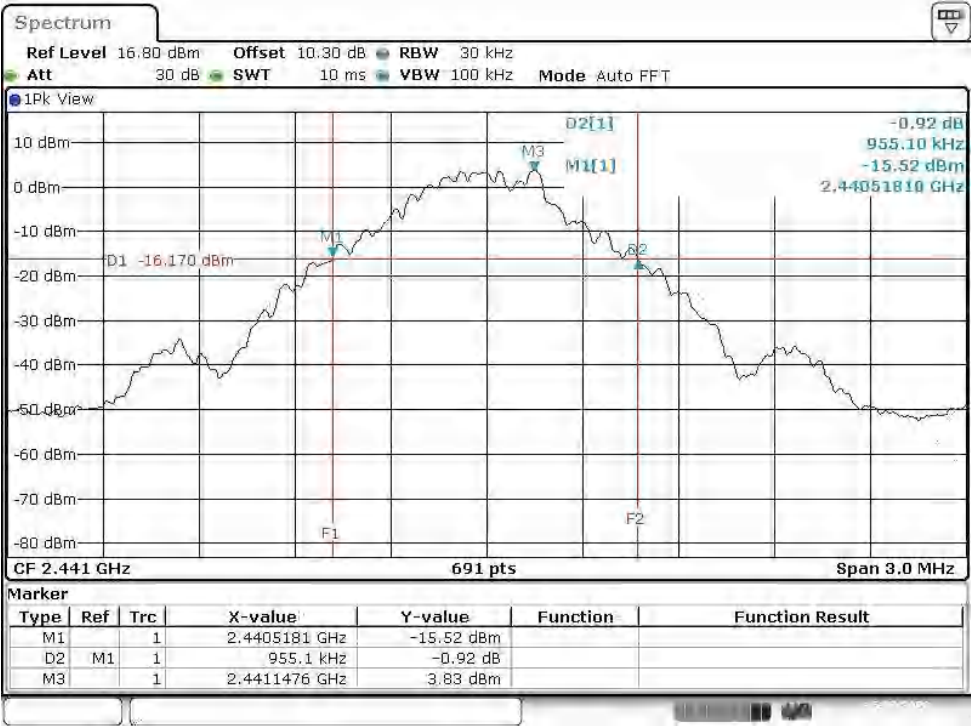
Test Plot of 20dB Bandwidth 1-DH5_Right Ear

Low Channel



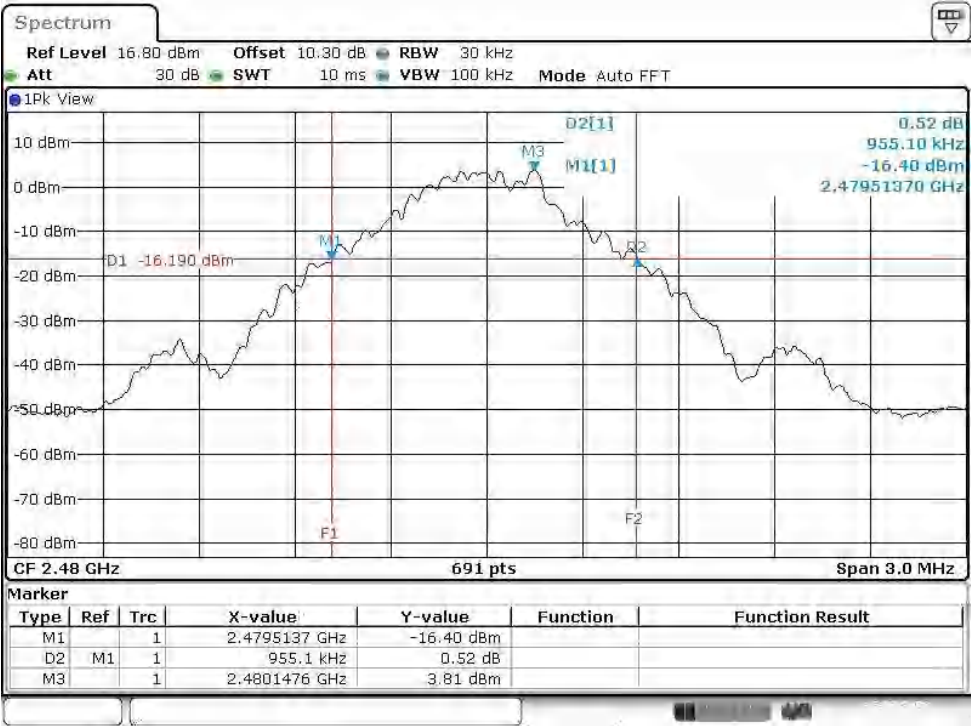
Date: 15.FEB.2020 13:17:50

Middle Channel



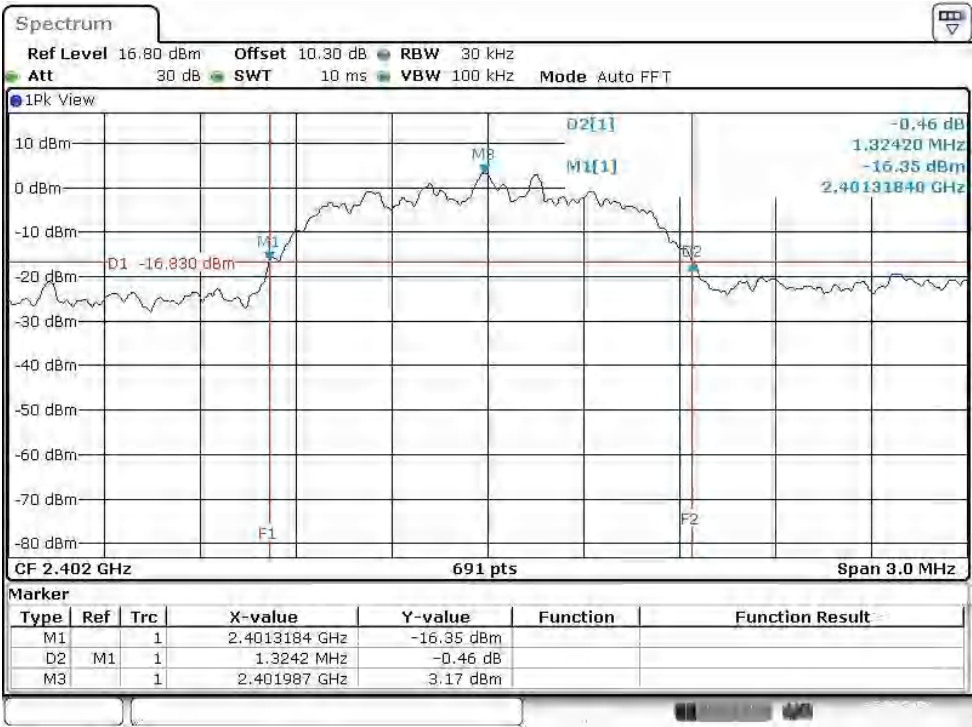
Date: 15.FEB.2020 13:19:22

High Channel



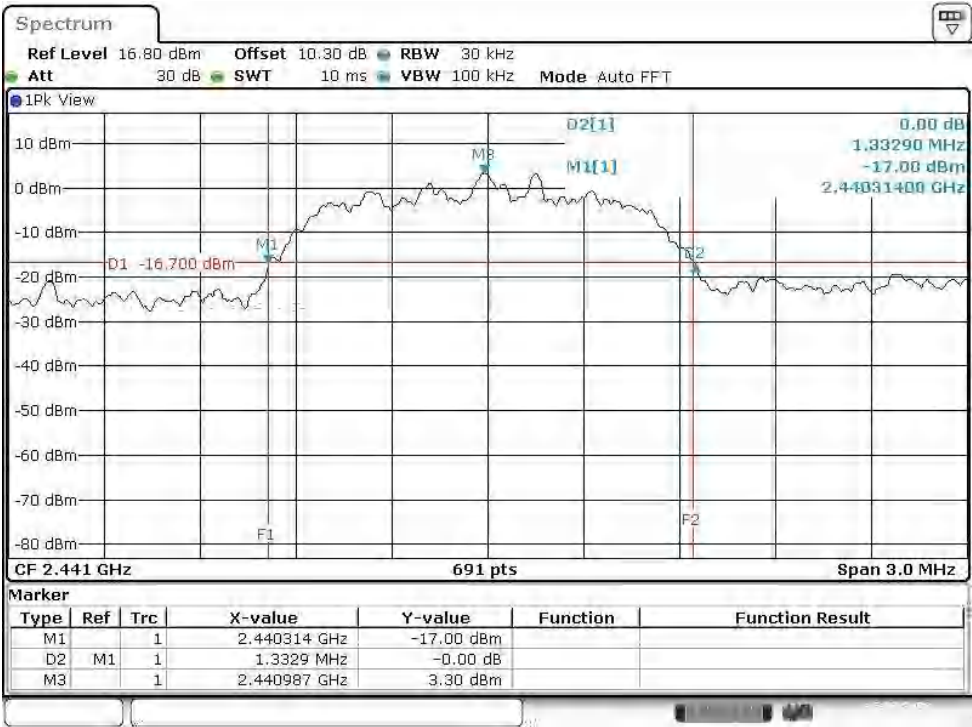
Date: 15.FEB.2020 13:11:17

Test Plot of 20dB Bandwidth 2-DH5_Right Ear
Low Channel



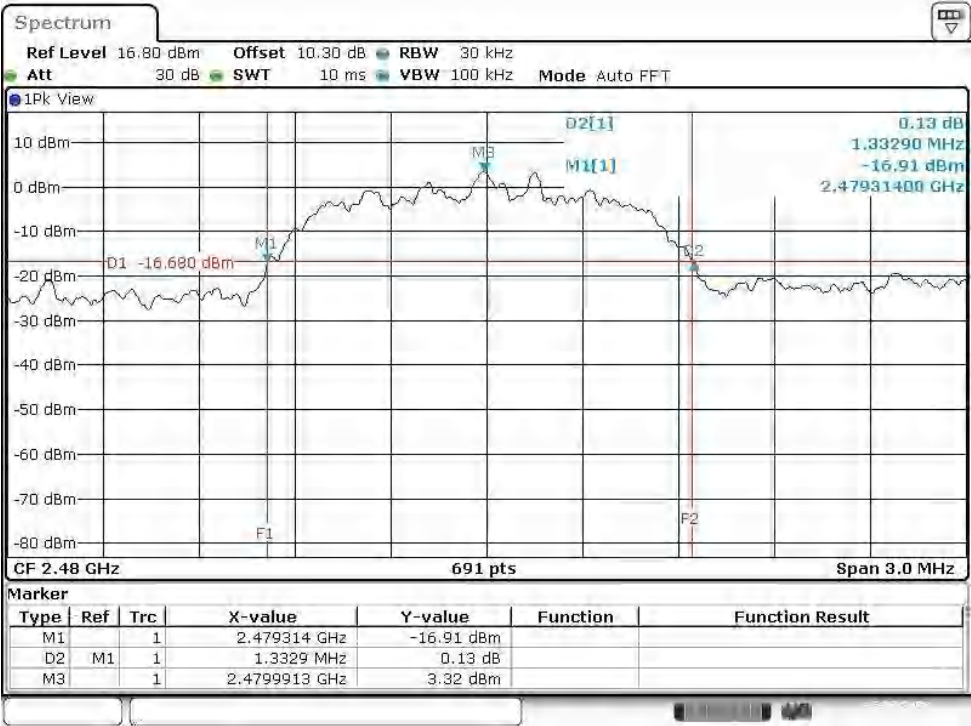
Date: 15.FEB.2020 13:16:43

Middle Channel



Date: 15.FEB.2020 13:20:48

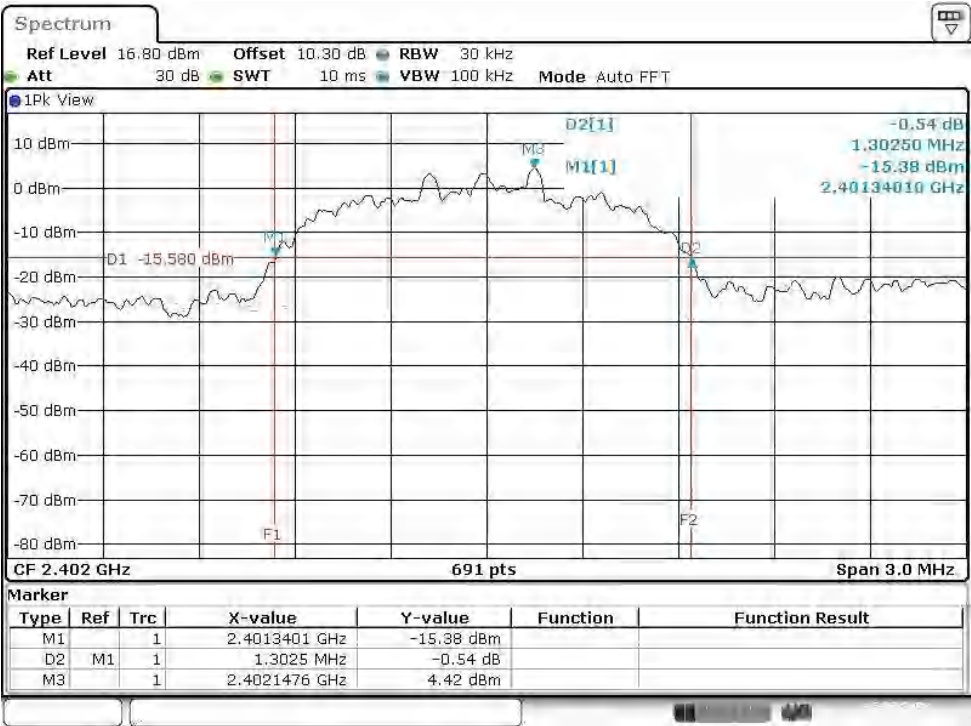
High Channel



Date: 15.FEB.2020 13:12:45

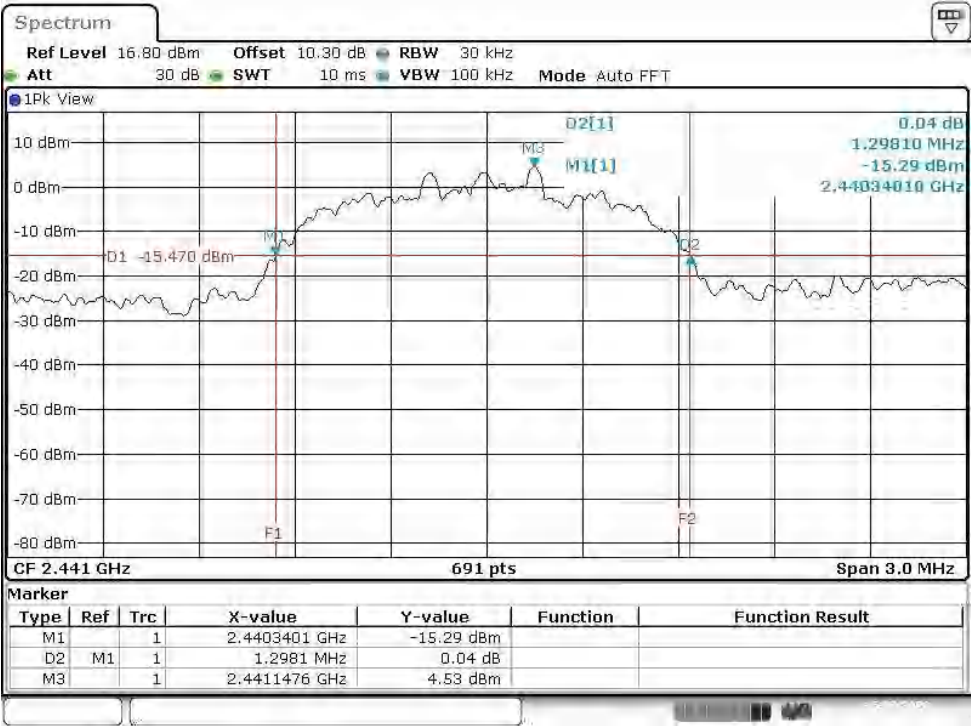
Test Plot of 20dB Bandwidth 3-DH5_Right Ear

Low Channel



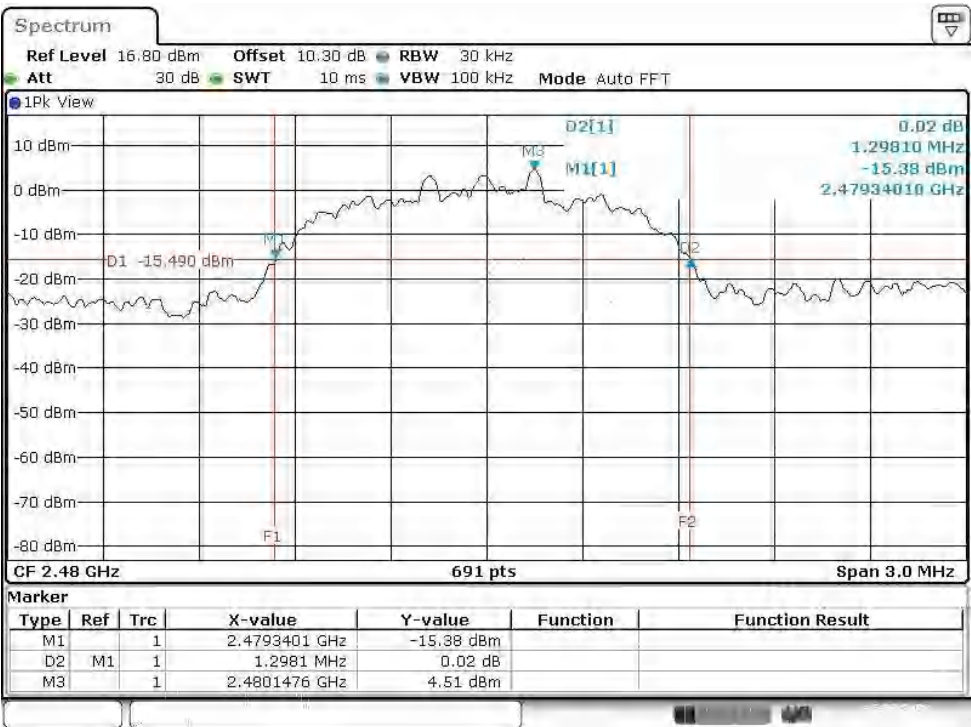
Date: 15.FEB.2020 13:15:17

Middle Channel



Date: 15.FEB.2020 13:22:19

High Channel



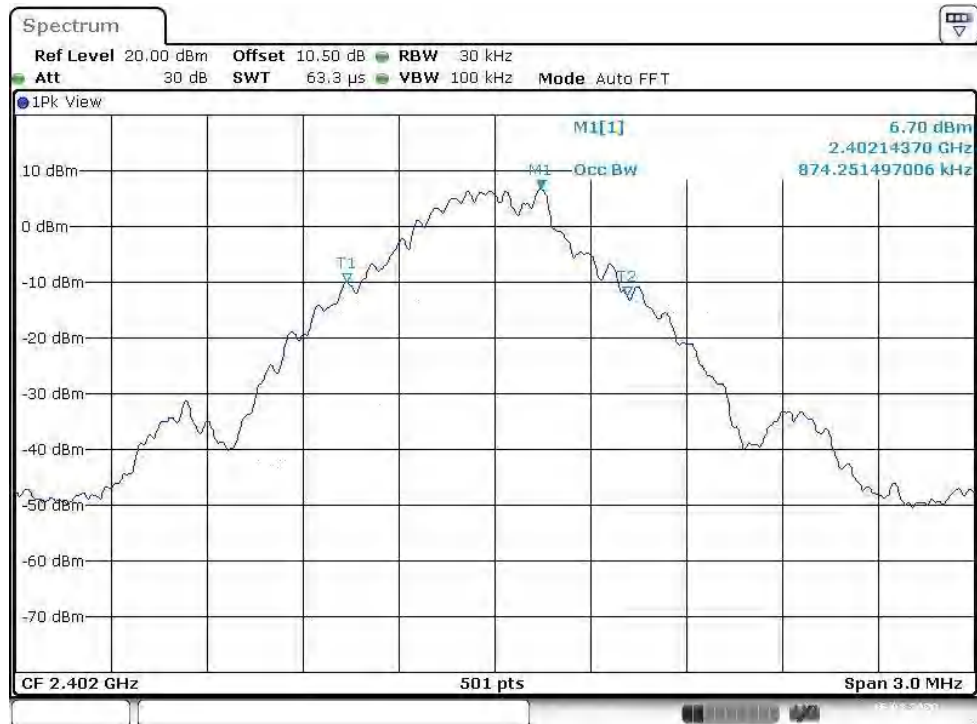
Date: 15.FEB.2020 13:13:55

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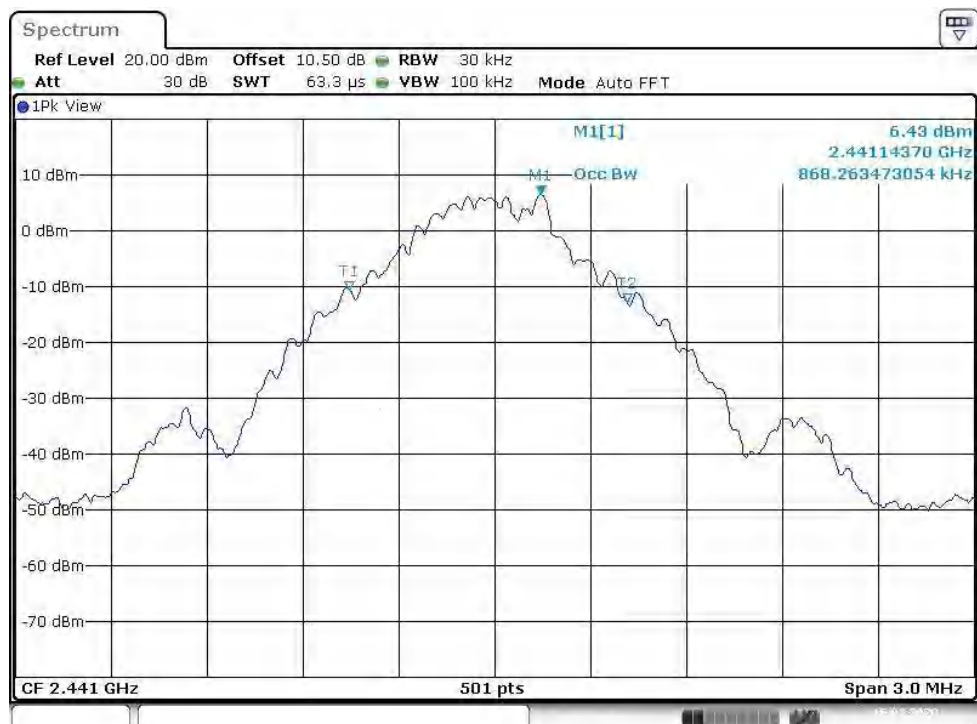
Test Plot of 99% Bandwidth 1-DH5_Left Ear

Low Channel



Date: 16.JAN.2020 10:48:16

Middle Channel

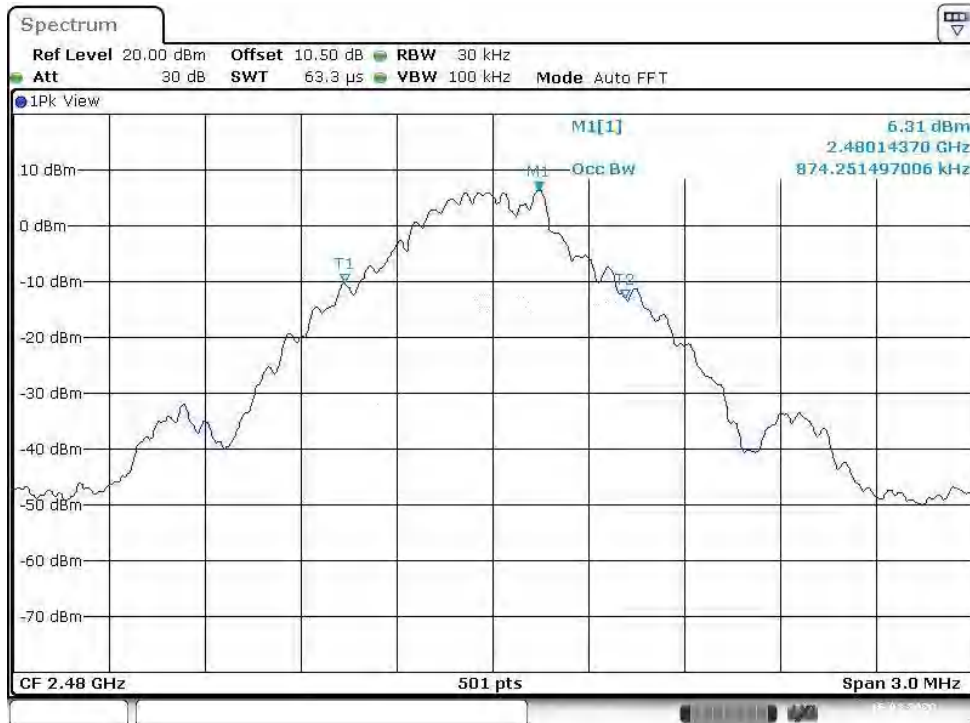


Date: 16.JAN.2020 10:47:27

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High Channel



Date: 16.JAN.2020 10:46:23

Test Plot of 99% Bandwidth 3-DH5_Left Ear

Low Channel



Date: 16.JAN.2020 10:49:05

Middle Channel



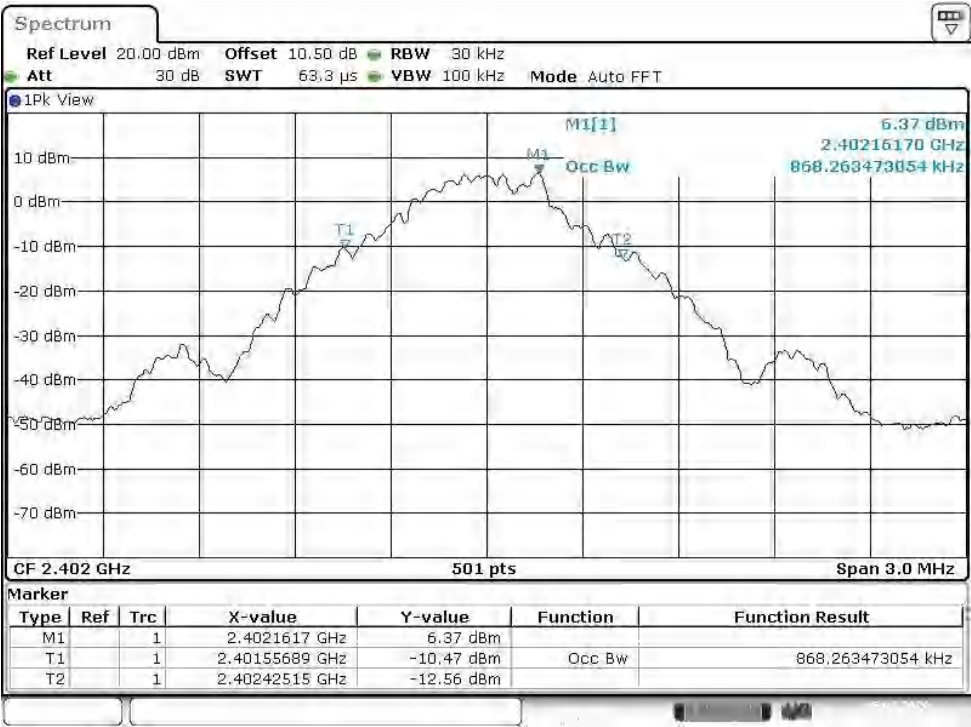
Date: 16.JAN.2020 10:49:55

High Channel



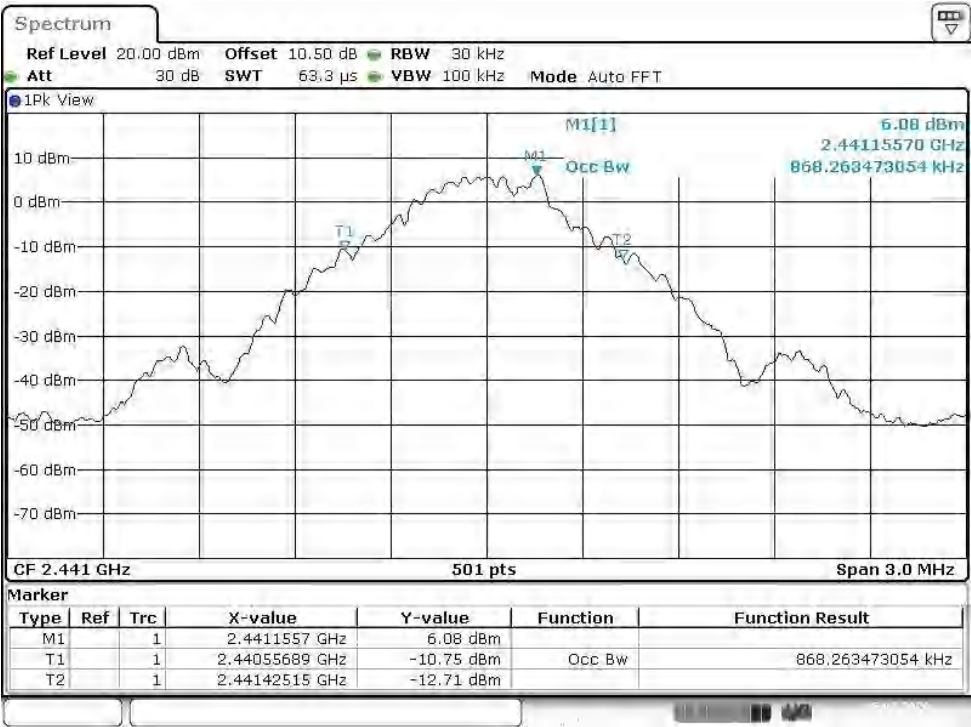
Date: 16.JAN.2020 10:44:36

Test Plot of 99% Bandwidth 1-DH5_Right Ear
Low Channel



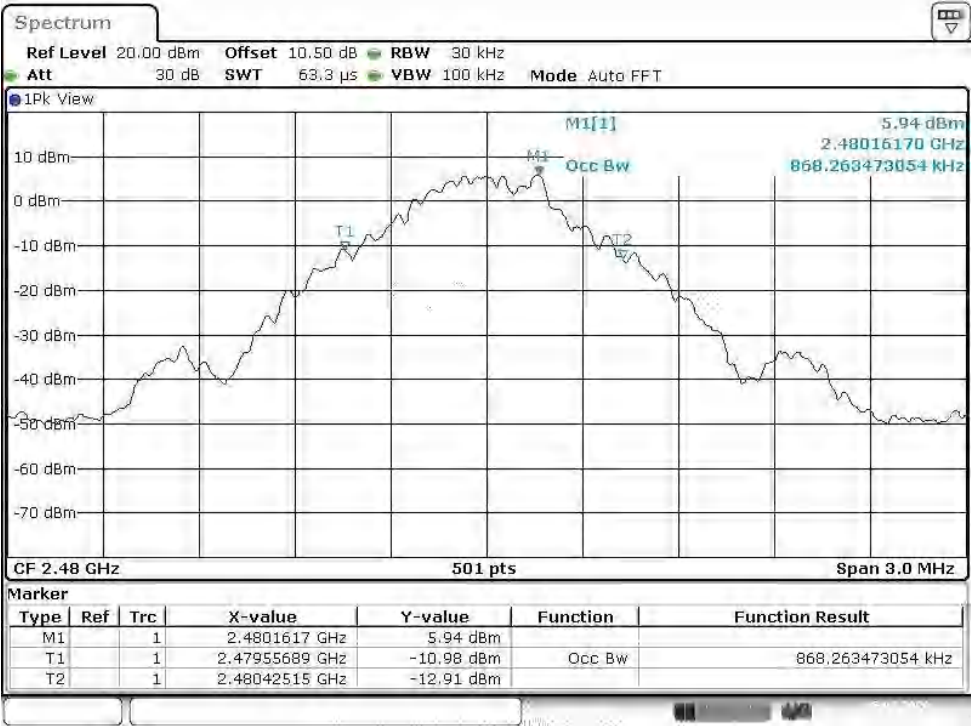
Date: 16.JAN.2020 12:33:24

Middle Channel



Date: 16.JAN.2020 12:31:05

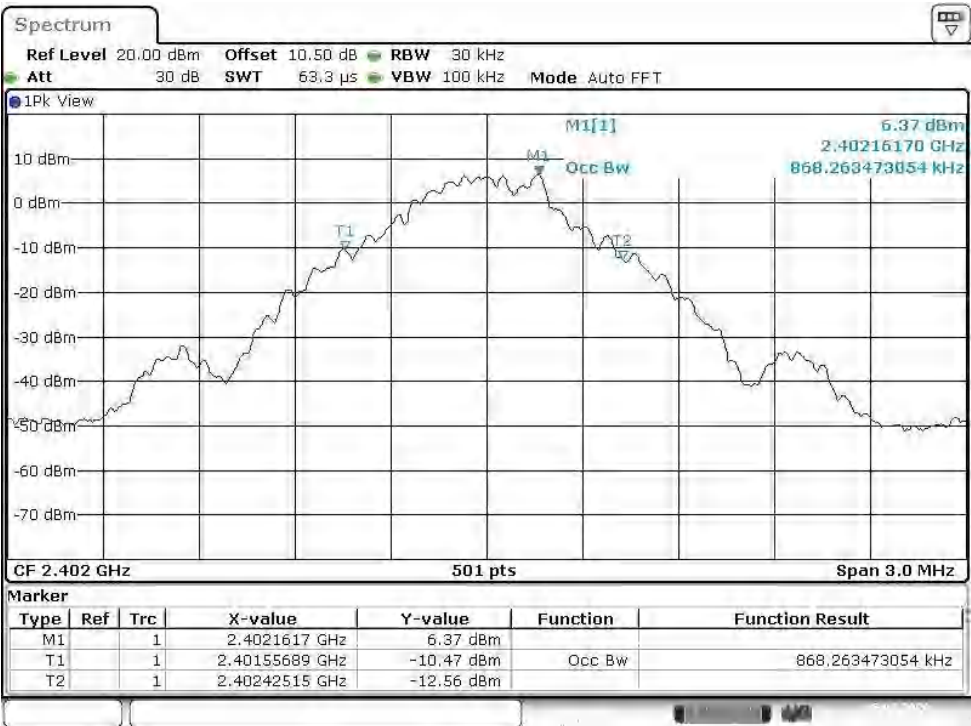
High Channel



Date: 16.JAN.2020 12:30:07

Test Plot of 99% Bandwidth 2-DH5_Right Ear

Low Channel

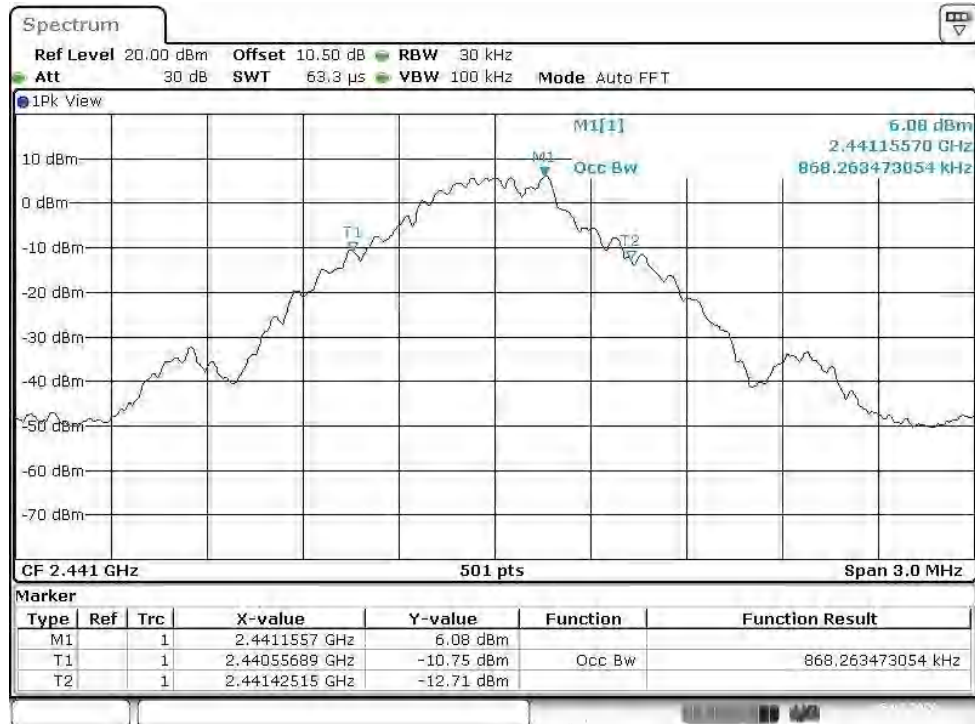


Date: 16.JAN.2020 12:33:24

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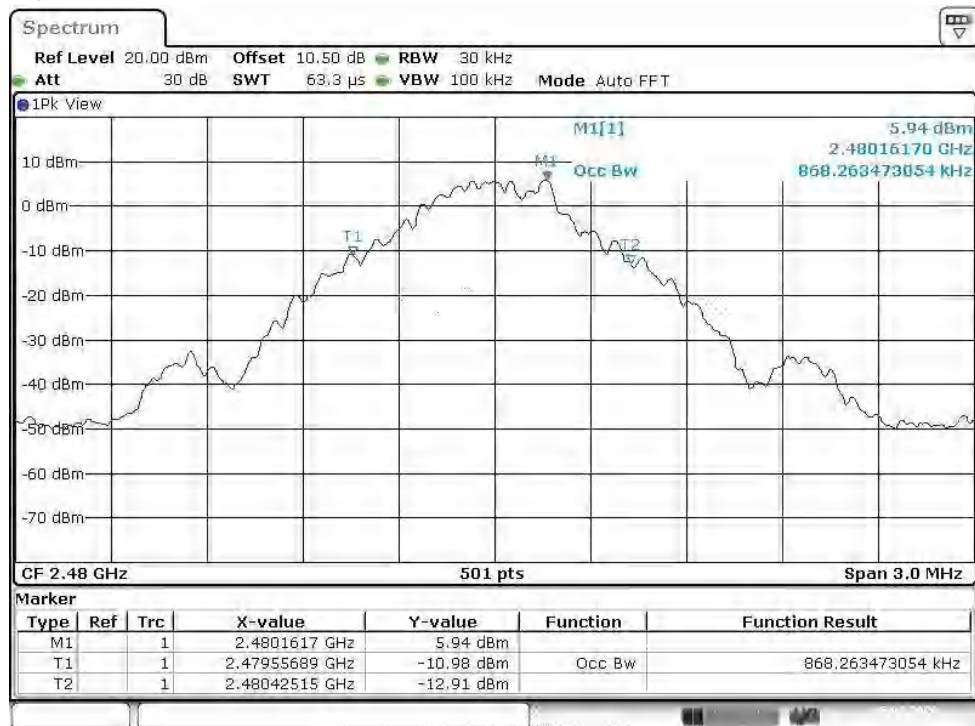
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Middle Channel



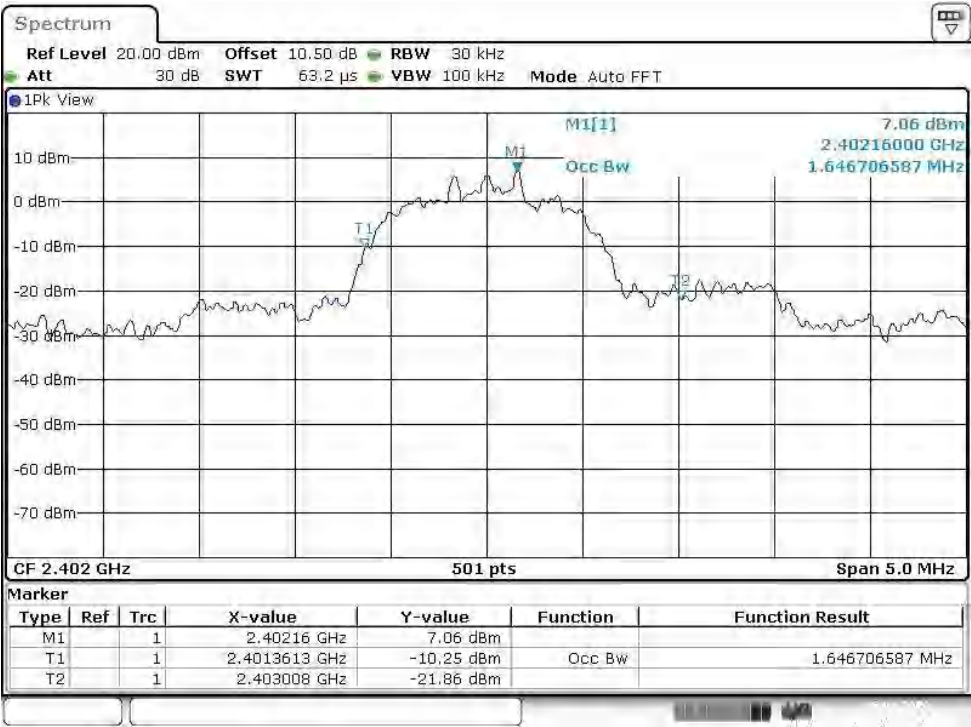
Date: 16.JAN.2020 12:31:05

High Channel



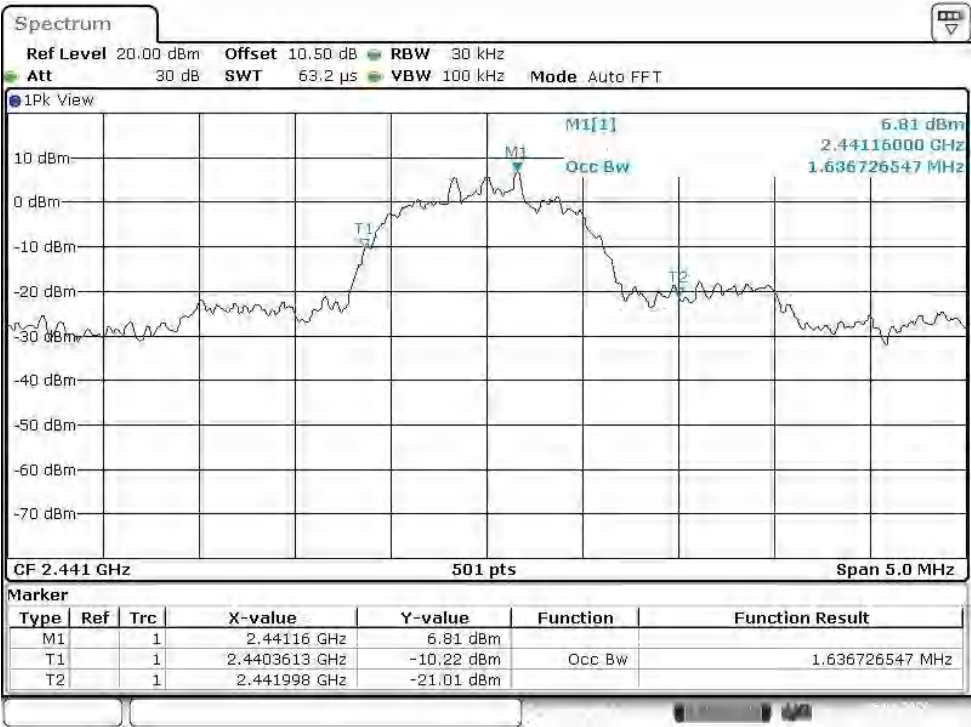
Date: 16.JAN.2020 12:30:07

Test Plot of 99% Bandwidth 3-DH5_Right Ear
Low Channel



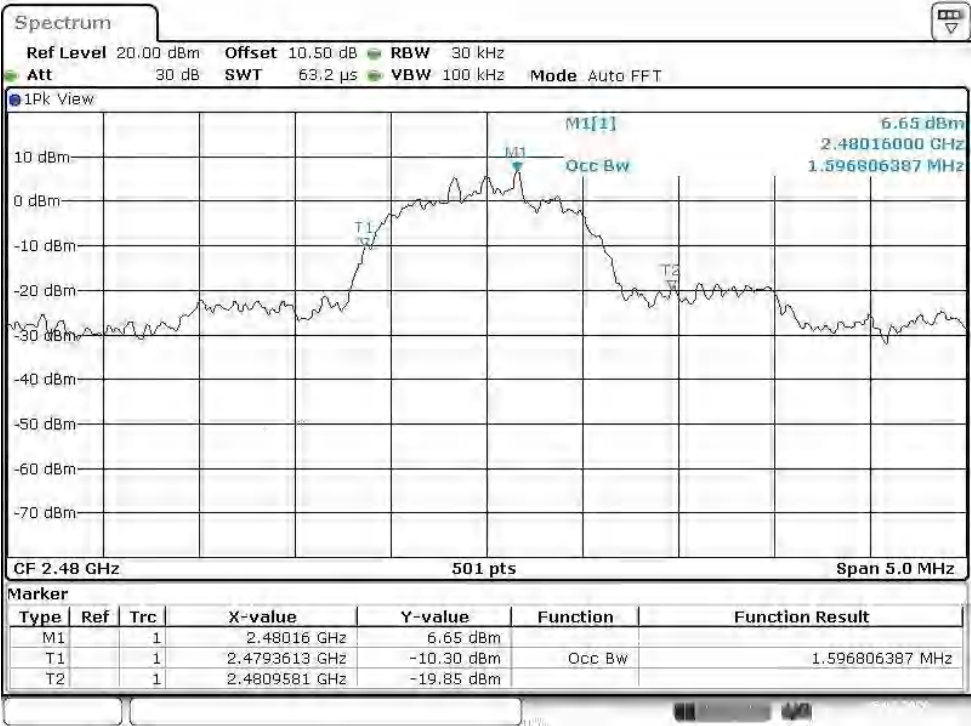
Date: 16.JAN.2020 12:32:51

Middle Channel



Date: 16.JAN.2020 12:31:44

High Channel



Date: 16.JAN.2020 12:29:14

5.1.4 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
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.

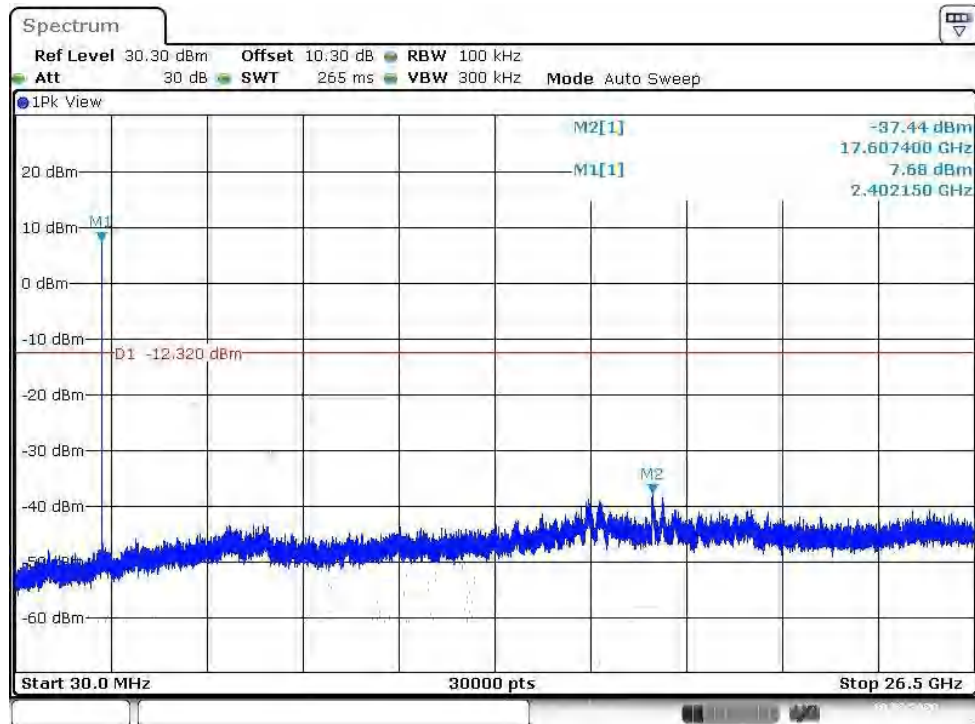
Due to the small size of the RF circuit and that there are no inductive components of significant size connected to the antenna port, 9kHz to 30MHz frequency range is not tested based on technical judgment.

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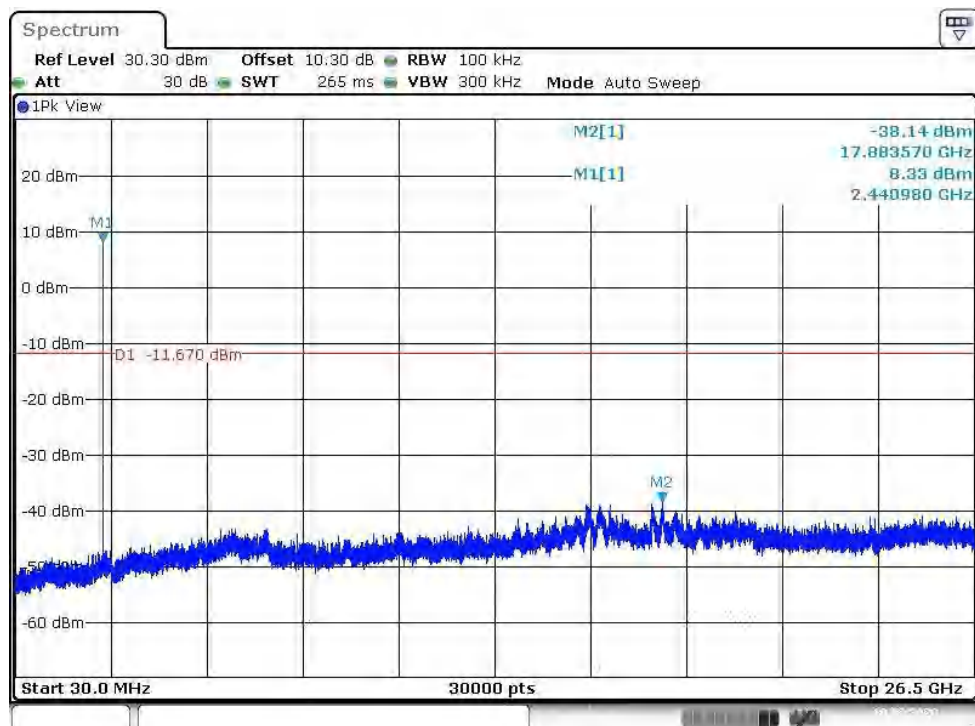
Test Plot 100kHz Conducted Emissions 1-DH5_Left Ear

Low Channel



Date: 19.FEB.2020 10:36:01

Middle Channel

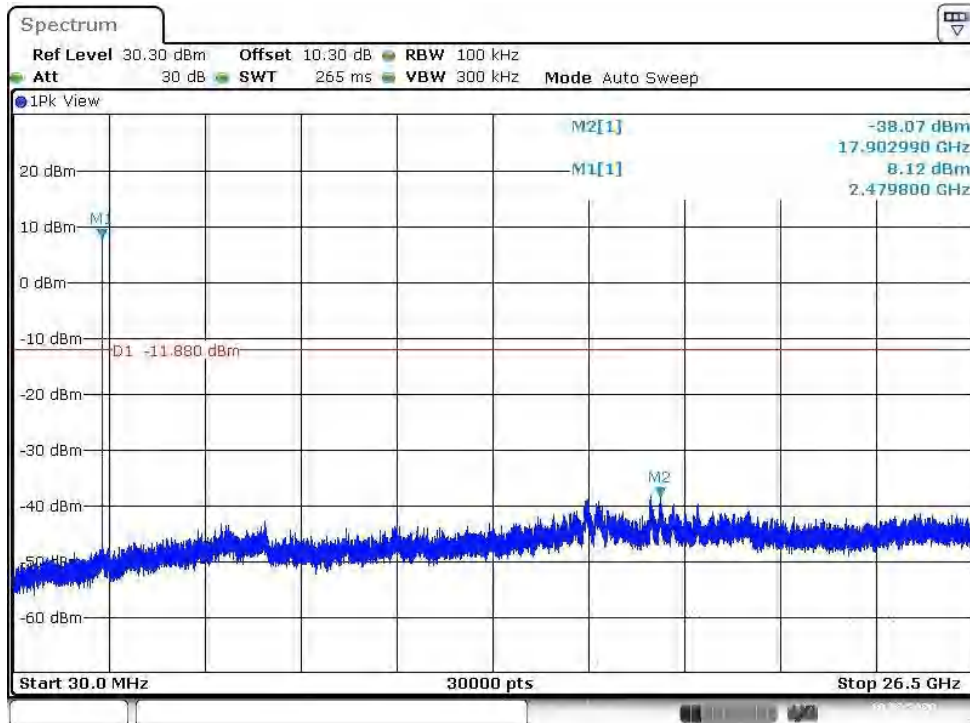


Date: 19.FEB.2020 10:42:21

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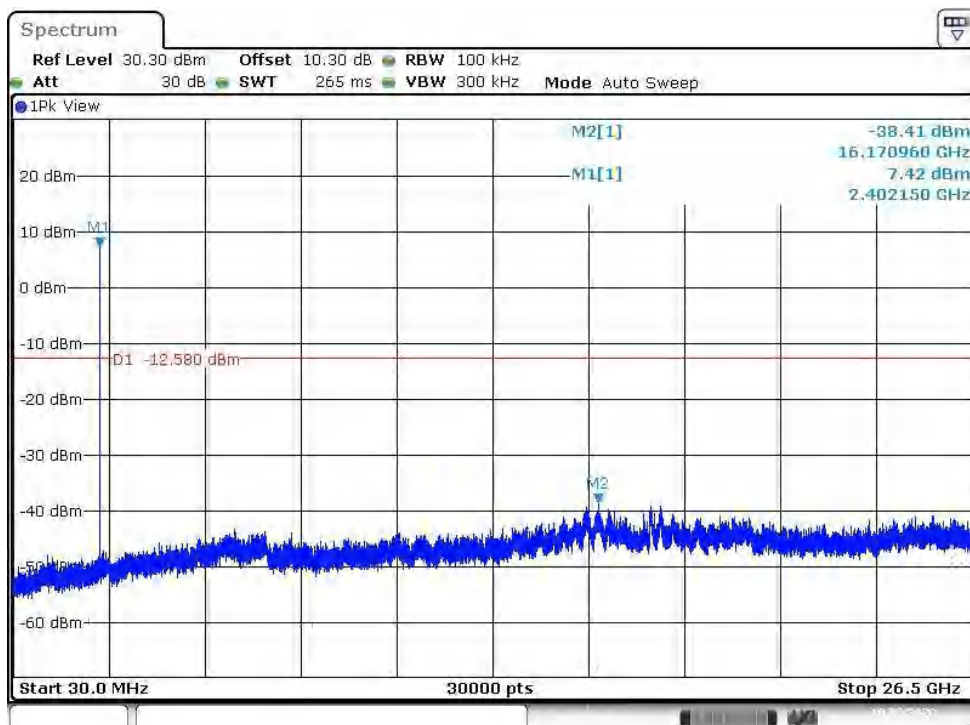
High Channel



Date: 19.FEB.2020 10:43:25

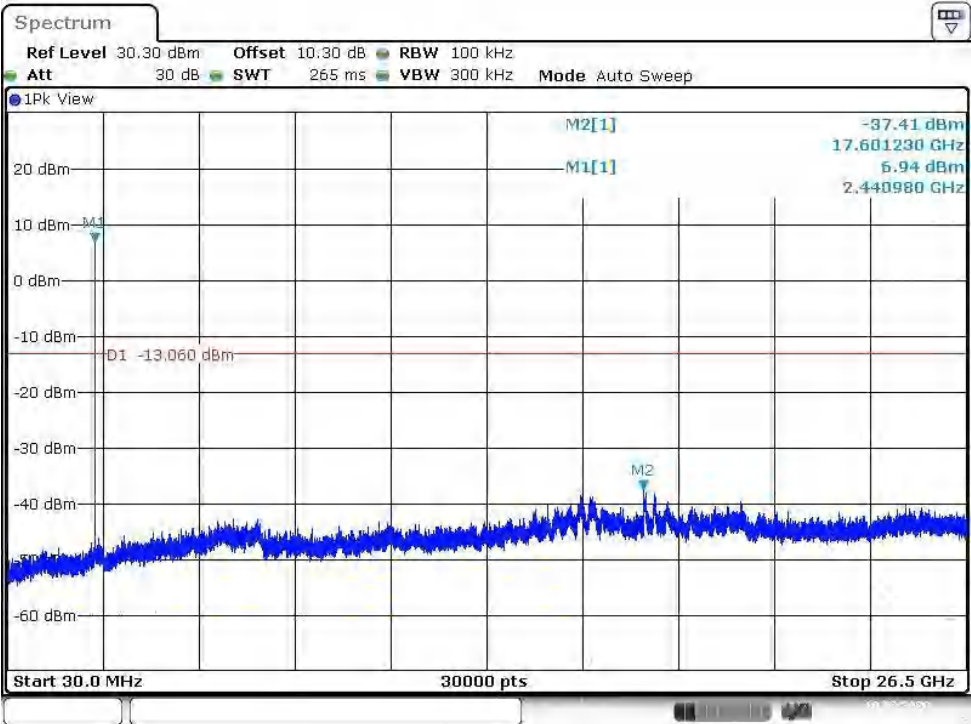
Test Plot 100kHz Conducted Emissions 2-DH5_Left Ear

Low Channel



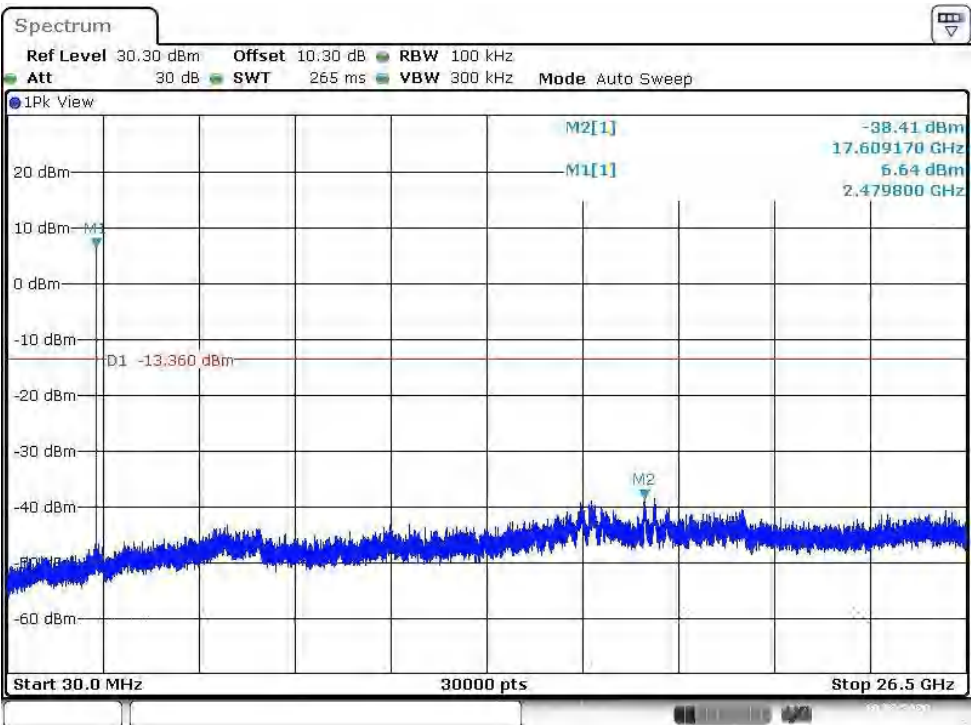
Date: 19.FEB.2020 10:37:04

Middle Channel



Date: 19.FEB.2020 10:40:54

High Channel



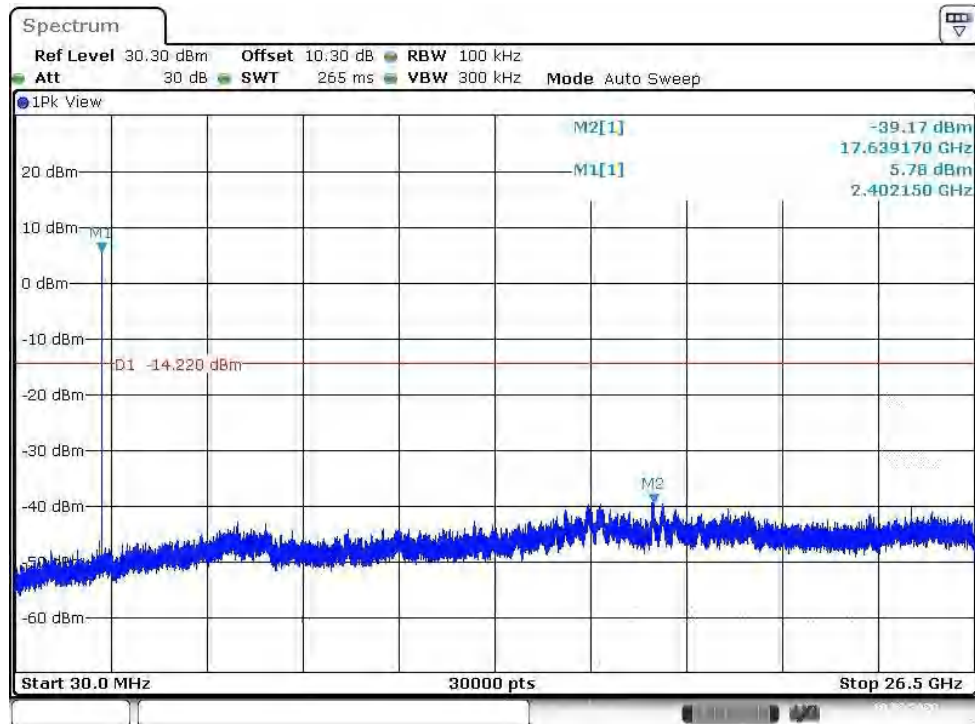
Date: 19.FEB.2020 10:44:31

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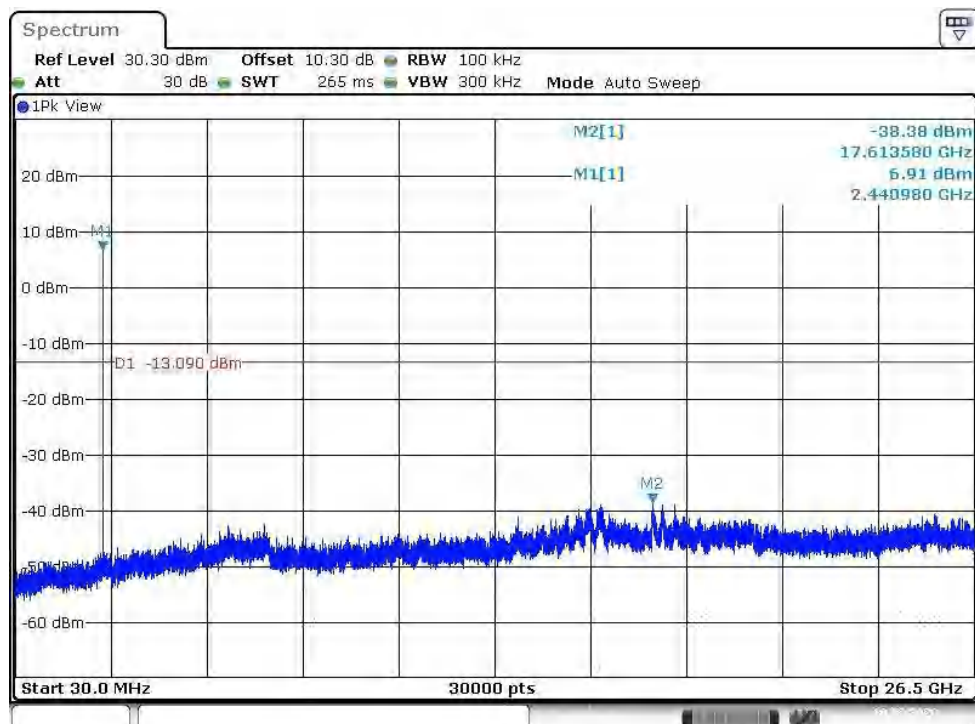
Test Plot 100kHz Conducted Emissions 3-DH5_Left Ear

Low Channel



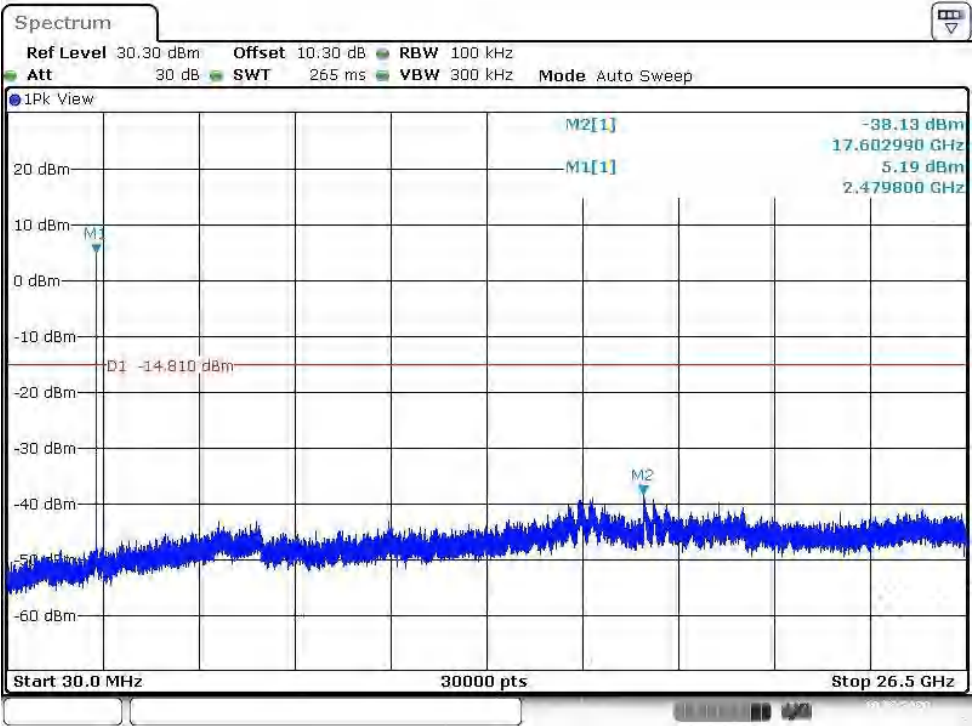
Date: 19.FEB.2020 10:38:05

Middle Channel



Date: 19.FEB.2020 10:39:21

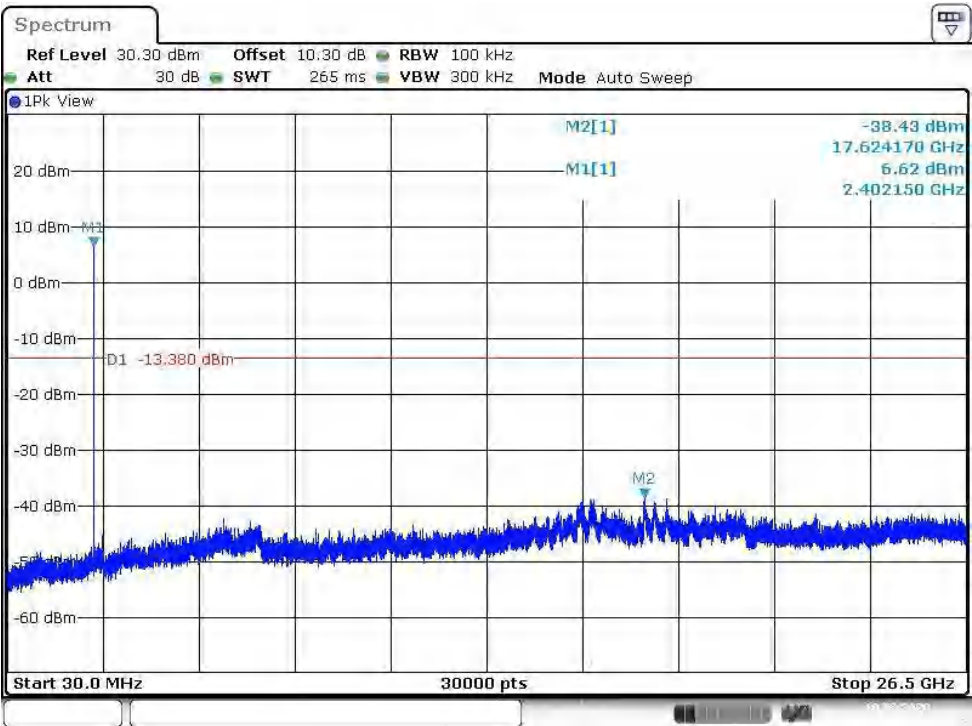
High Channel



Date: 19.FEB.2020 10:45:32

Test Plot 100kHz Conducted Emissions 1-DH5_Right Ear

Low Channel

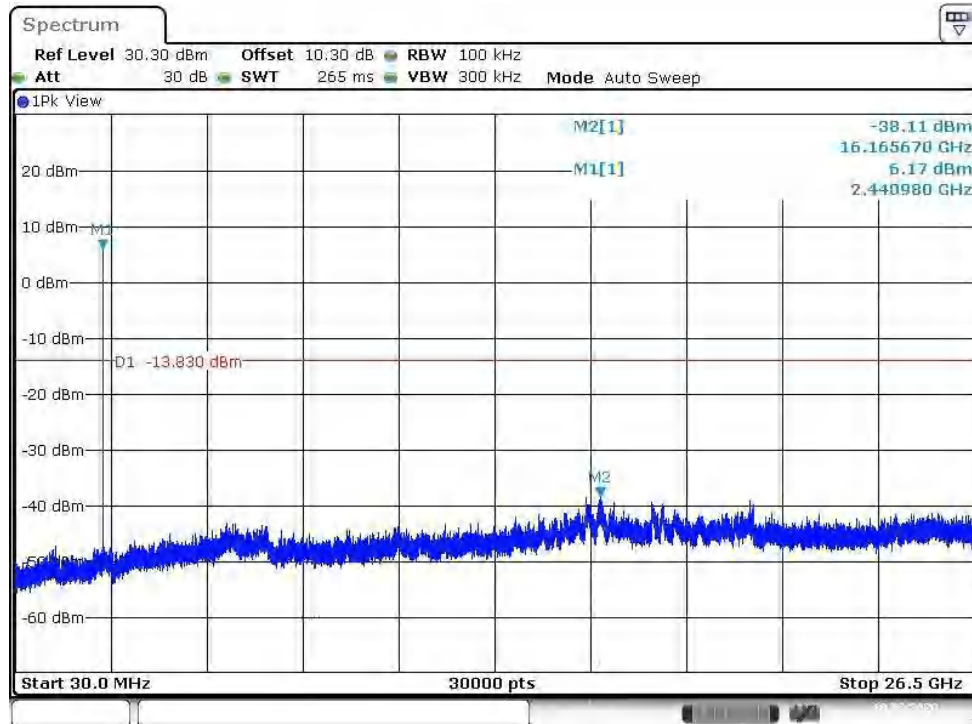


Date: 19.FEB.2020 10:22:00

Prüfbericht - Nr.: 50344748 001
Test Report No.

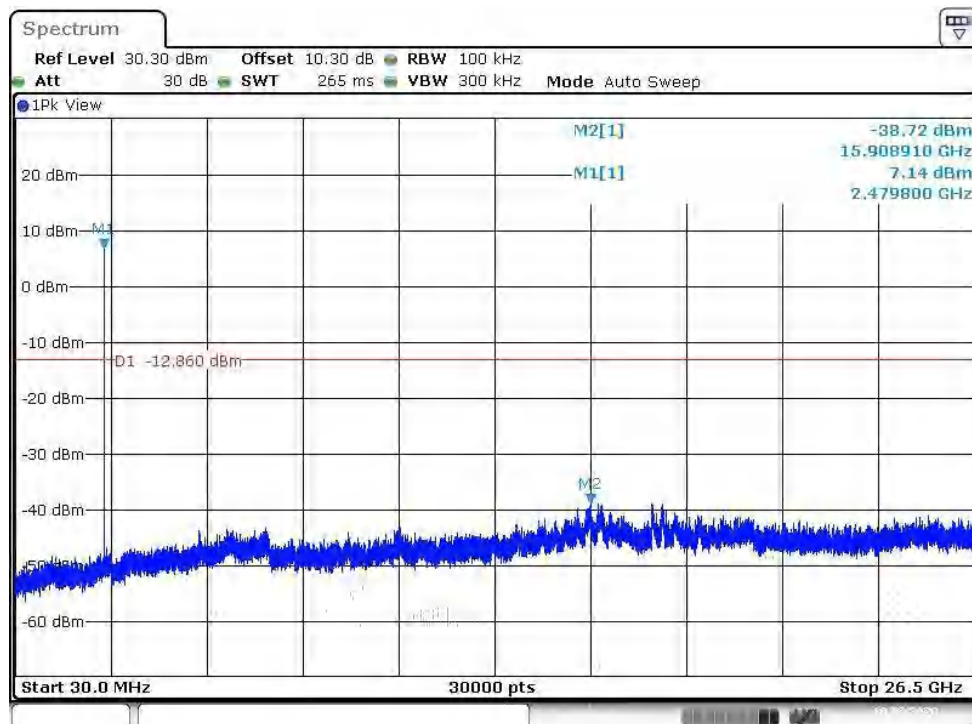
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Middle Channel



Date: 19.FEB.2020 10:28:26

High Channel



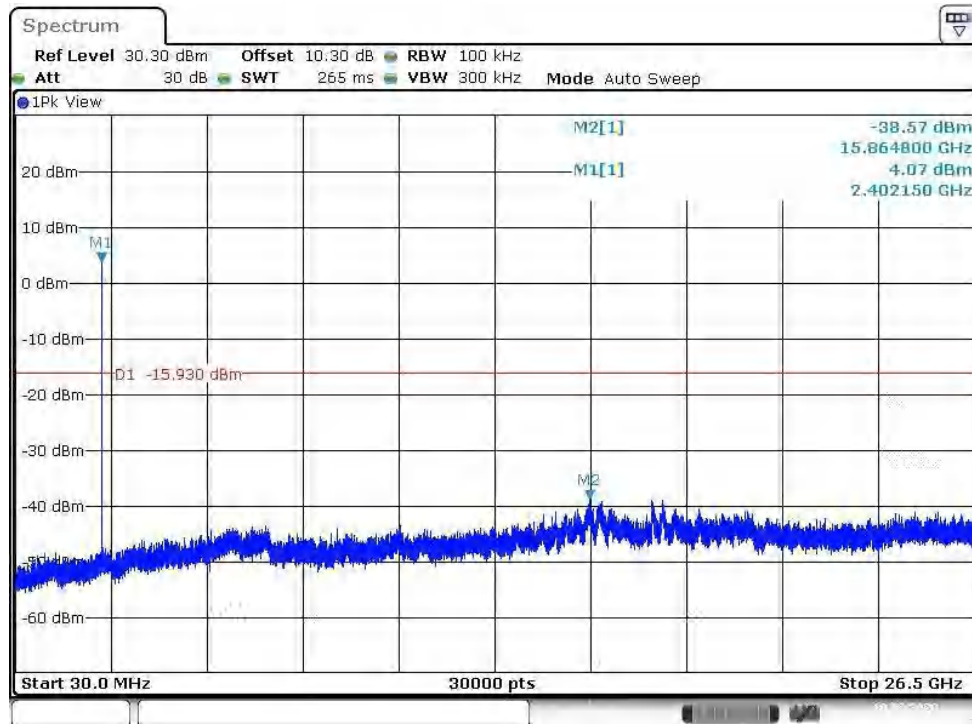
Date: 19.FEB.2020 10:29:43

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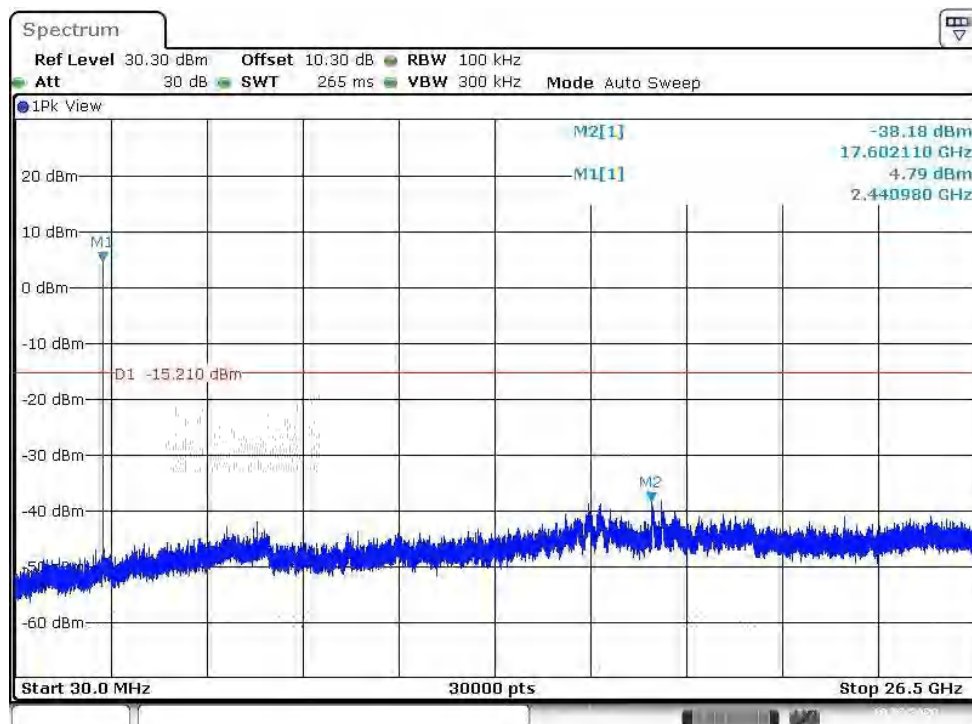
Test Plot 100kHz Conducted Emissions 2-DH5_Right Ear

Low Channel



Date: 19.FEB.2020 10:23:23

Middle Channel

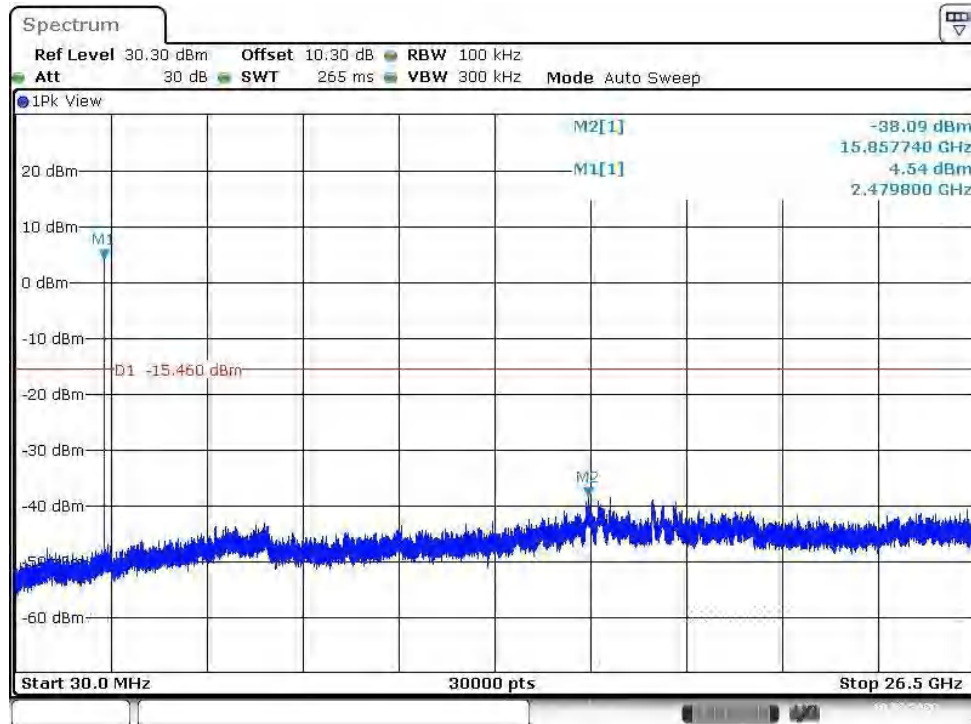


Date: 19.FEB.2020 10:27:03

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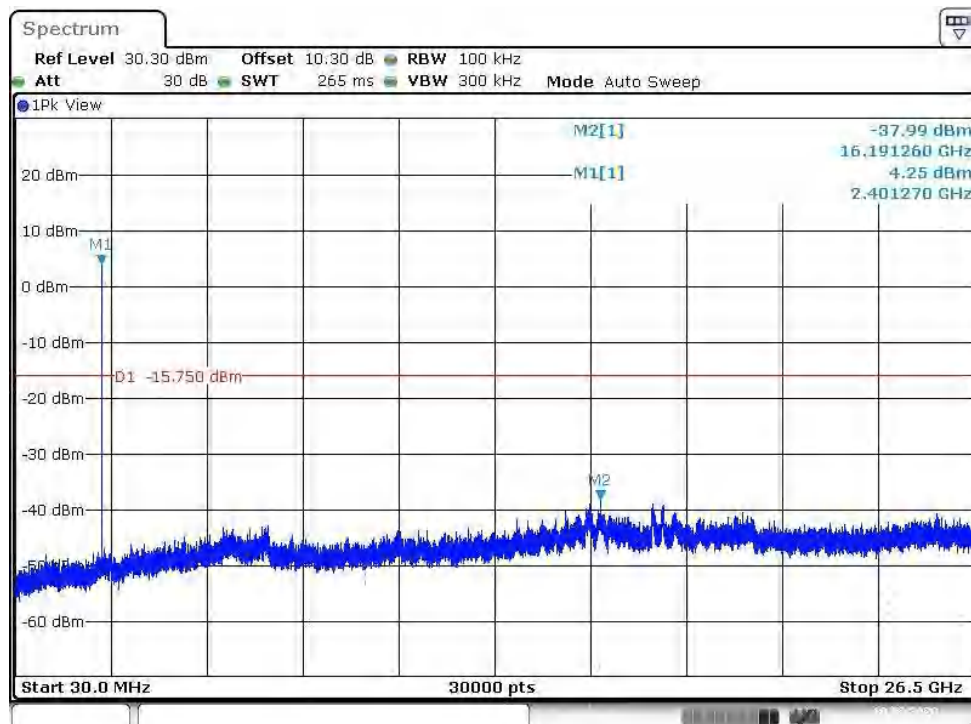
High Channel



Date: 19.FEB.2020 10:30:54

Test Plot 100kHz Conducted Emissions 3-DH5_Right Ear

Low Channel

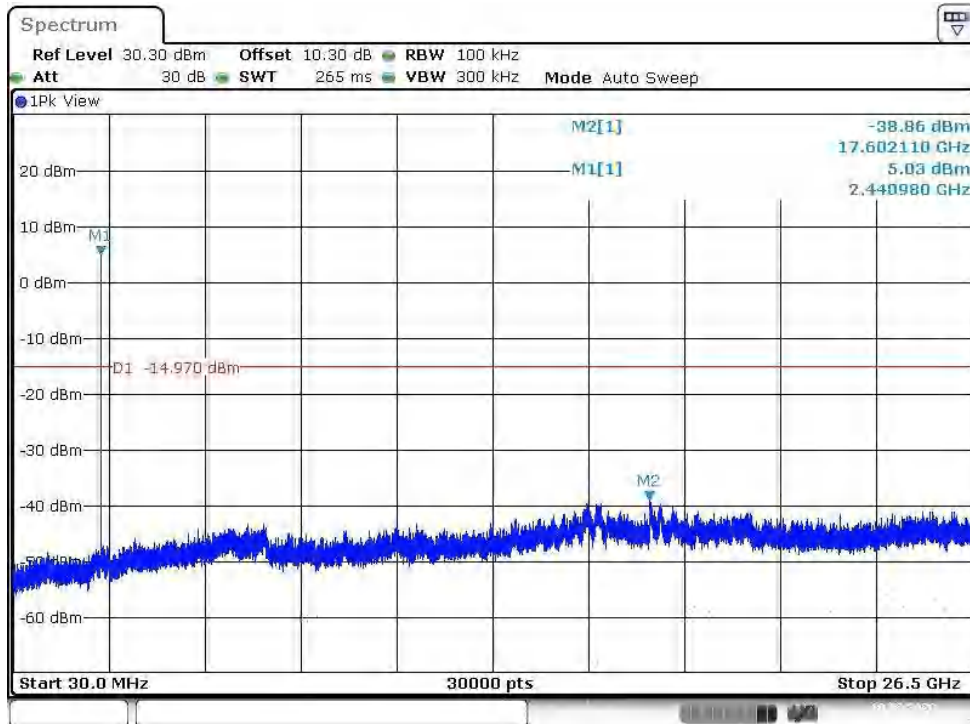


Date: 19.FEB.2020 10:24:46

Prüfbericht - Nr.: 50344748 001
Test Report No.

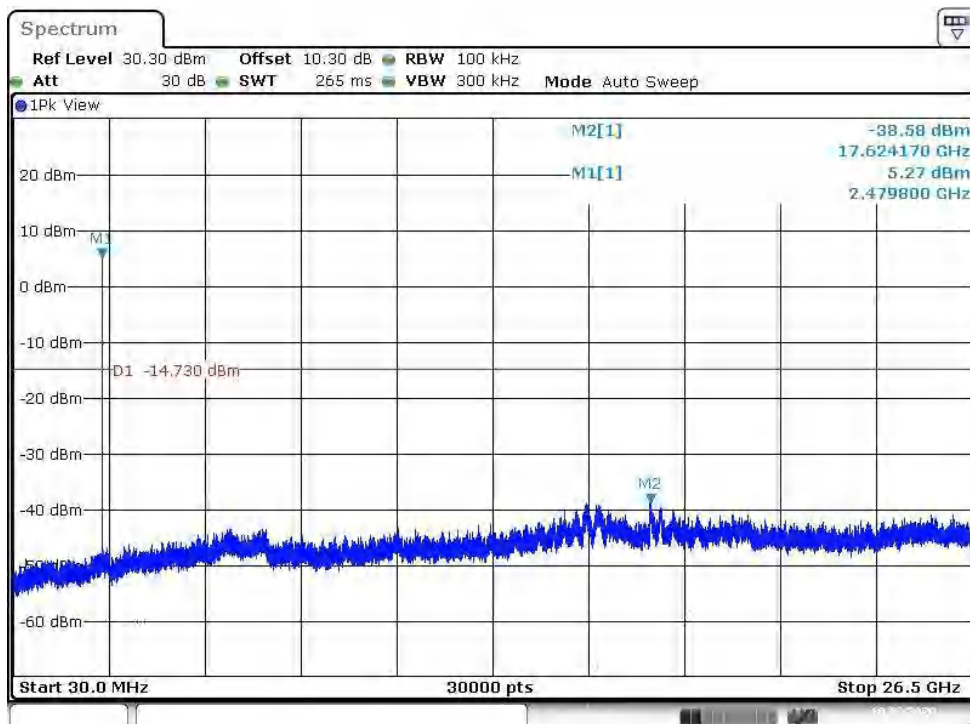
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Middle Channel



Date: 19.FEB.2020 10:26:05

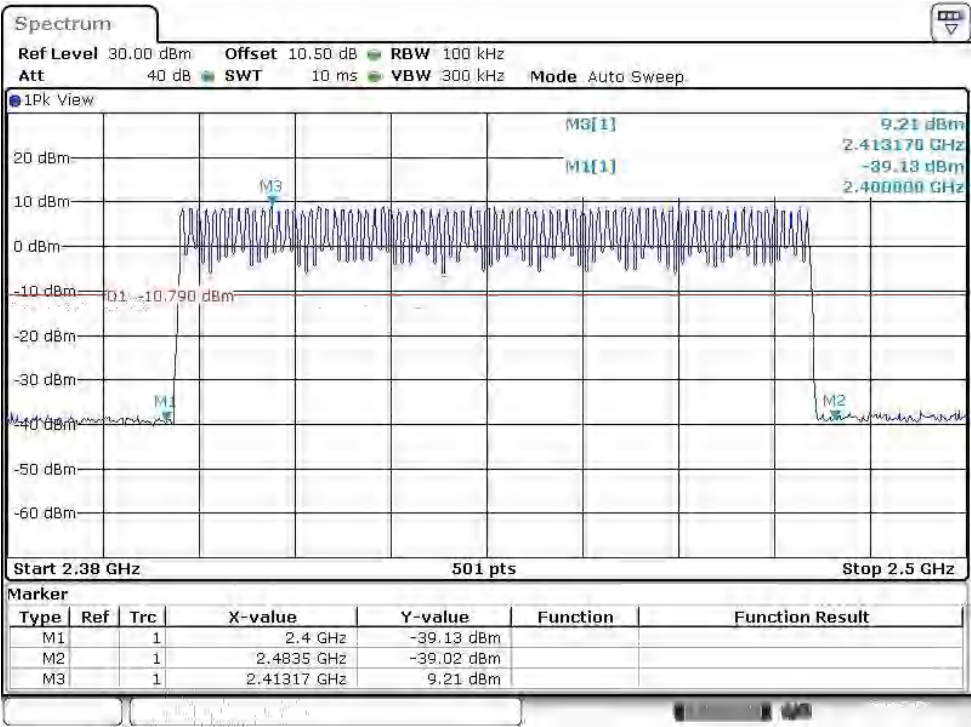
High Channel



Date: 19.FEB.2020 10:32:06

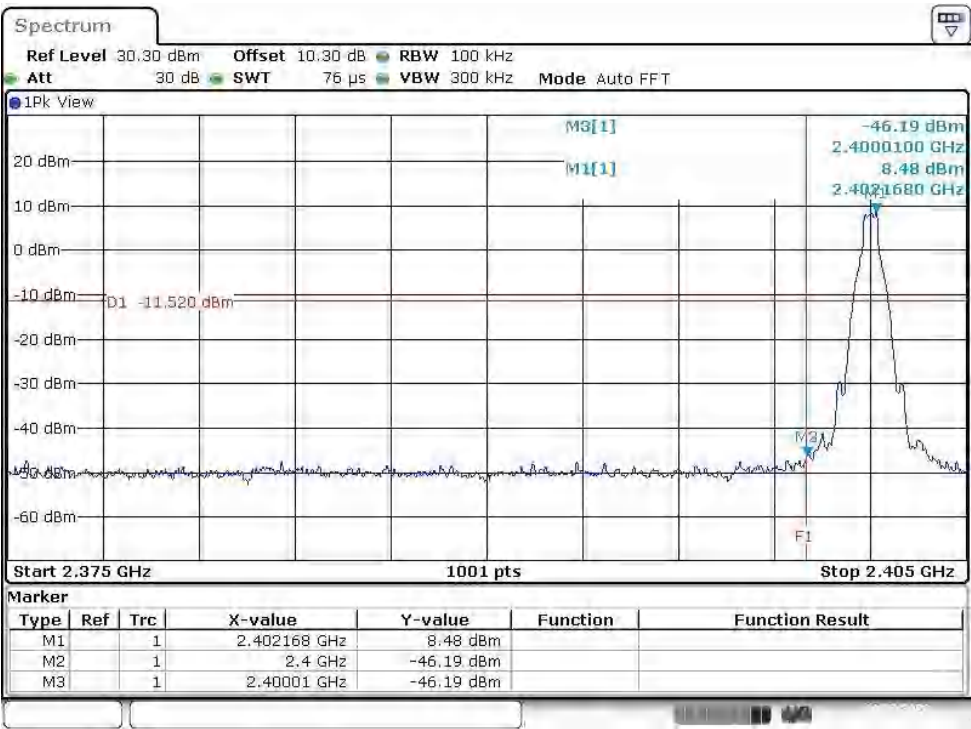
Test Plot 100kHz RBW of Band Edge 1-DH5_Left Ear

Hopping



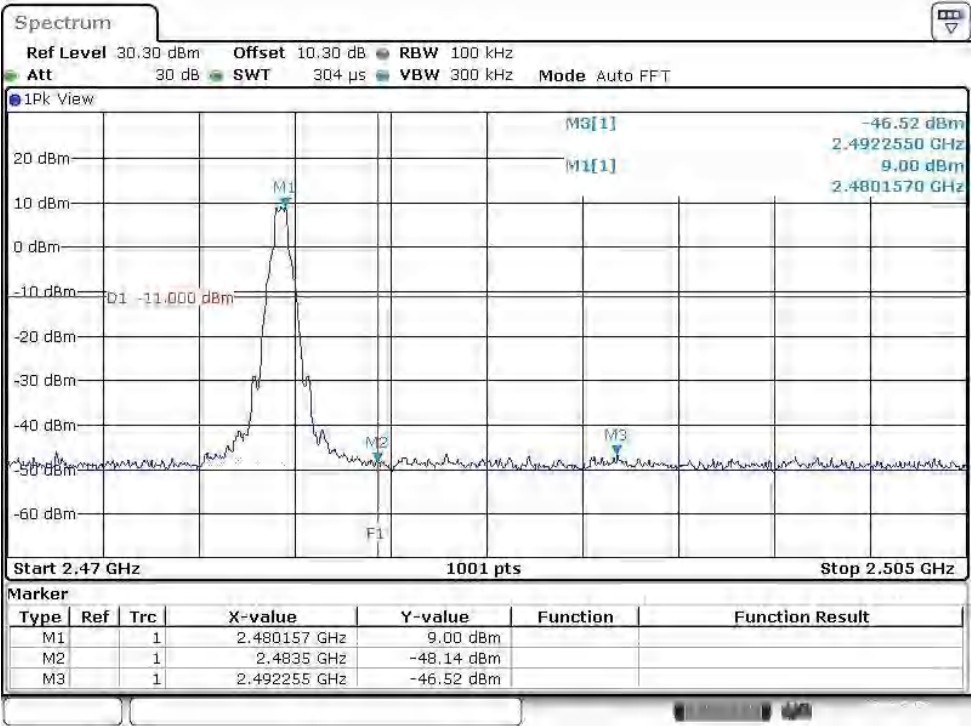
Date: 16.JAN.2020 09:40:25

Low Channel



Date: 19.FEB.2020 11:59:36

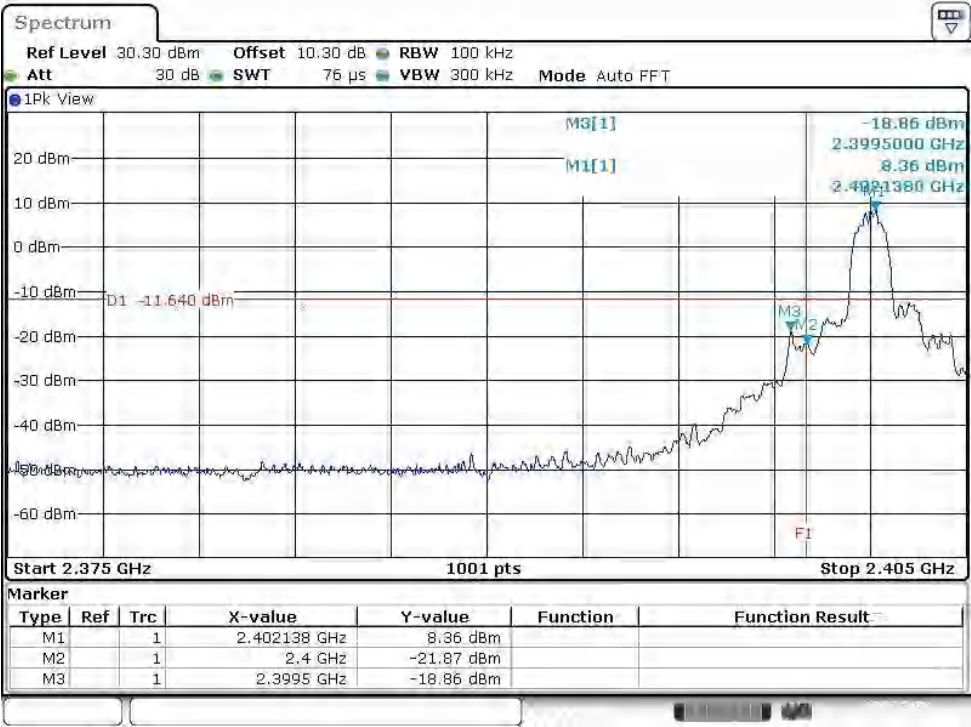
High Channel



Date: 19.FEB.2020 12:26:48

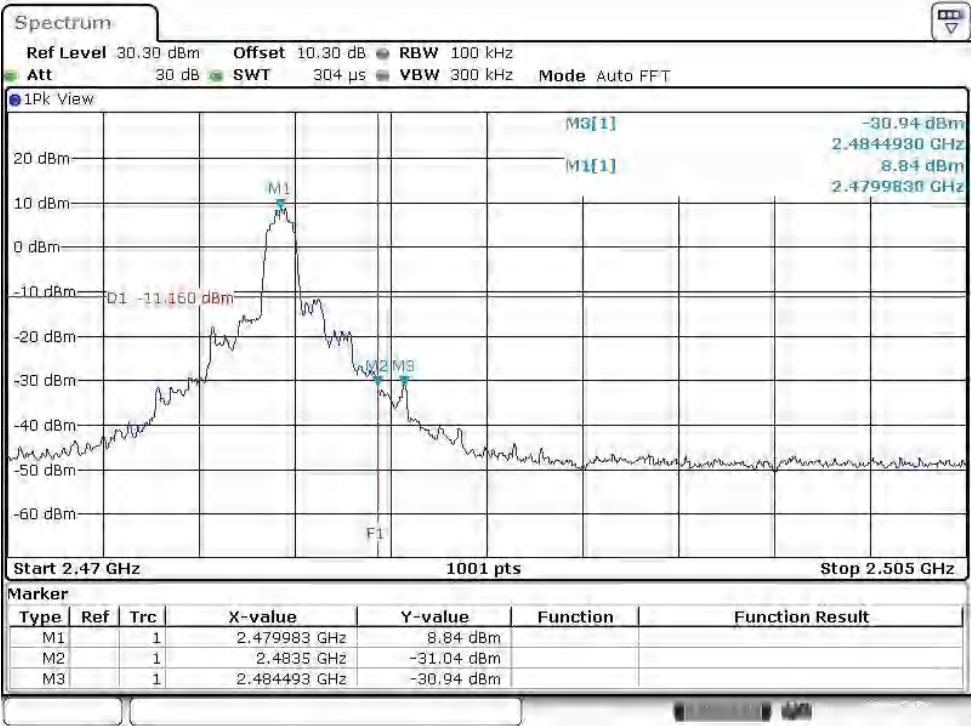
Test Plot 100kHz RBW of Band Edge 2-DH5_Left Ear

Low Channel



Date: 19.FEB.2020 12:01:14

High Channel



Date: 19.FEB.2020 12:28:36

Test Plot 100kHz RBW of Band Edge 3-DH5_Left Ear

Low Channel

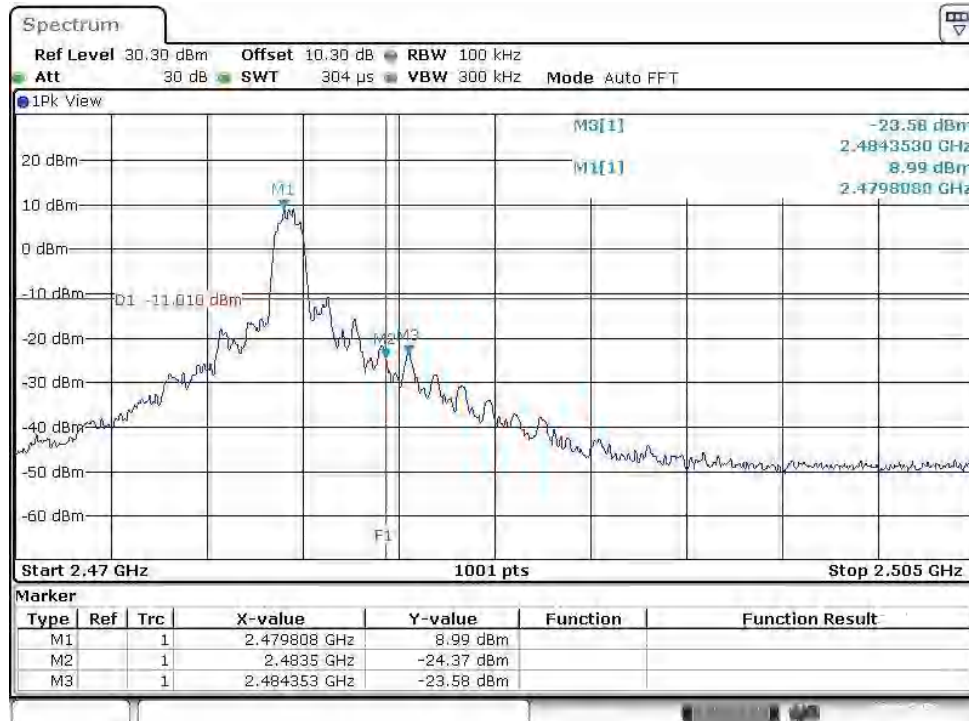


Date: 19.FEB.2020 12:02:22

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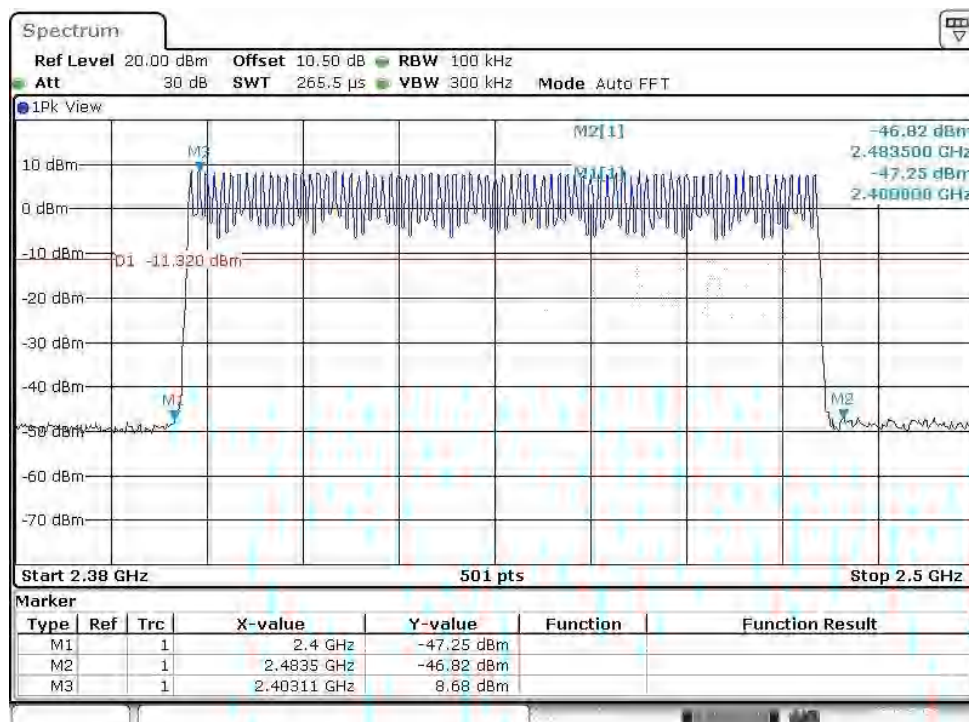
High Channel



Date: 19.FEB.2020 12:29:47

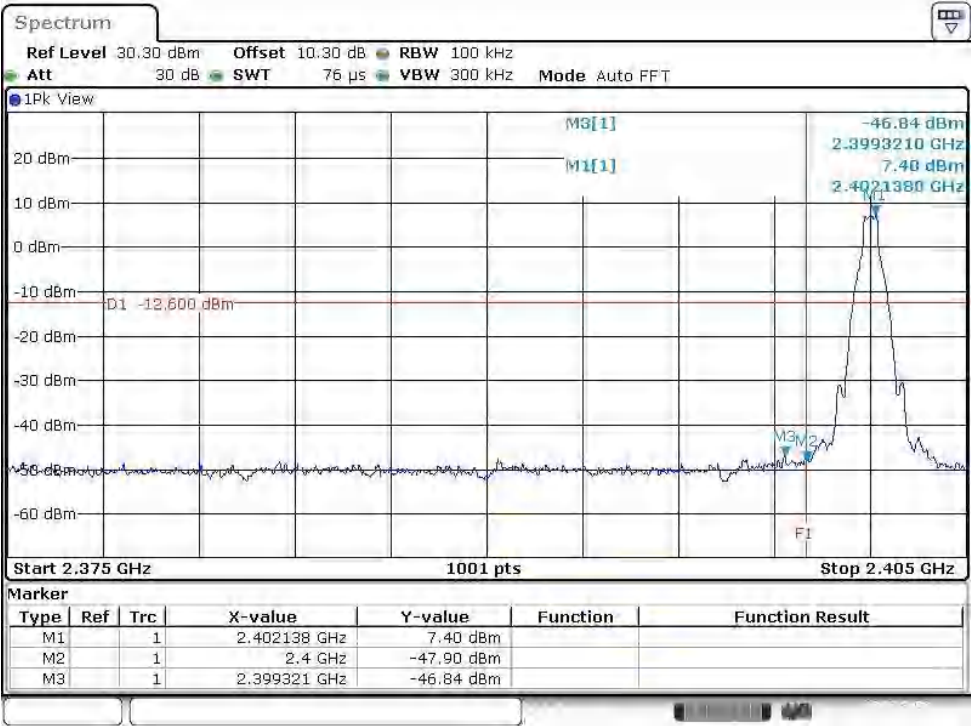
Test Plot 100kHz RBW of Band Edge 1-DH5_Right Ear

Hopping



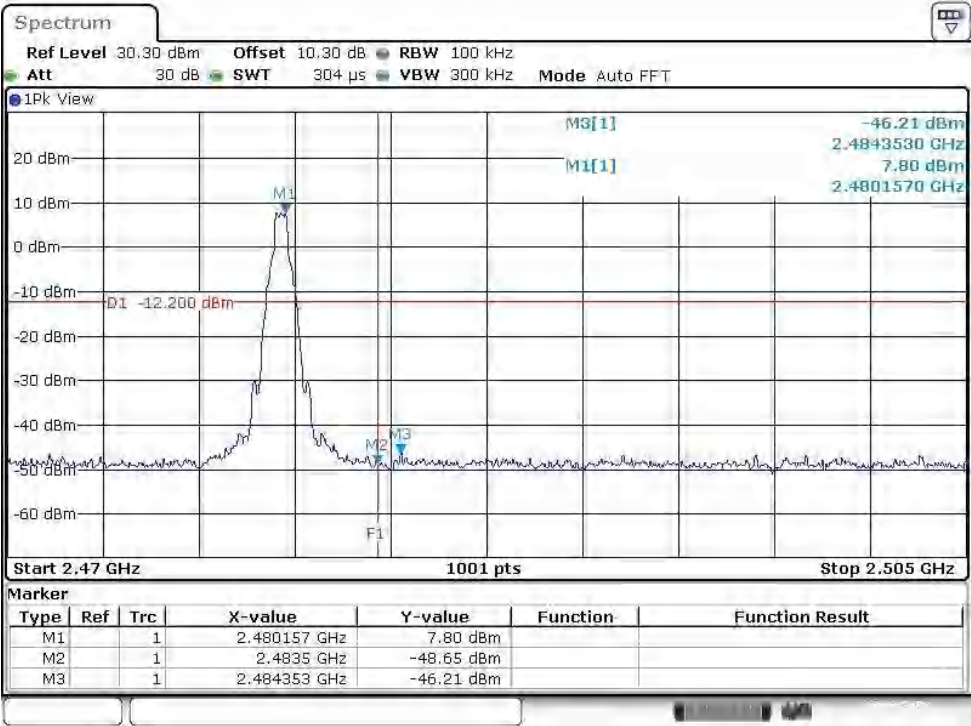
Date: 16.JAN.2020 12:11:15

Low Channel



Date: 19.FEB.2020 12:04:48

High Channel



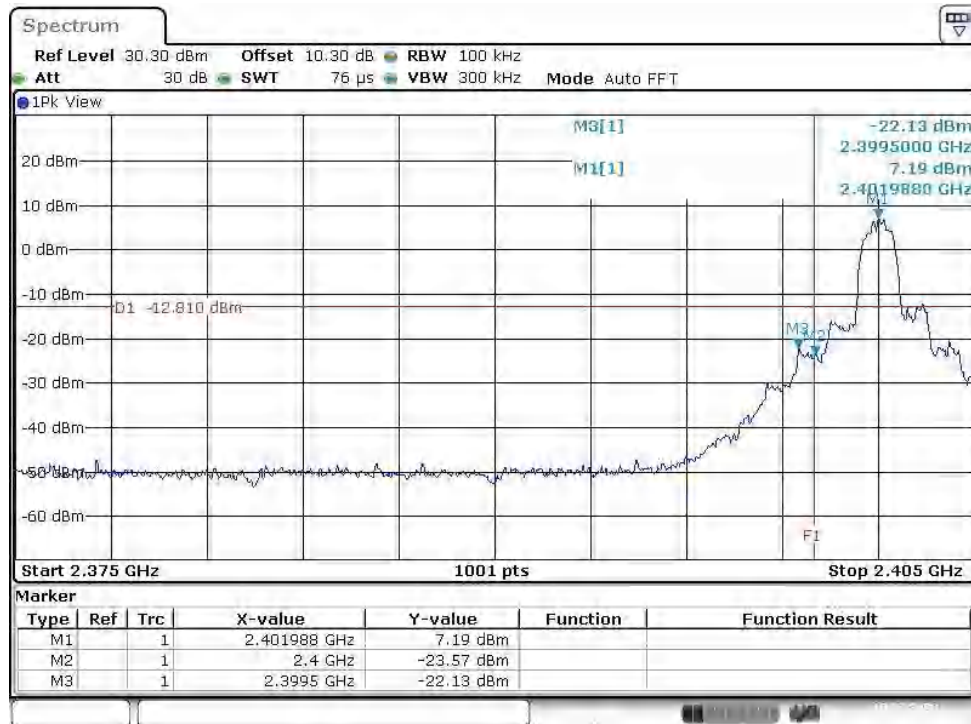
Date: 19.FEB.2020 12:21:00

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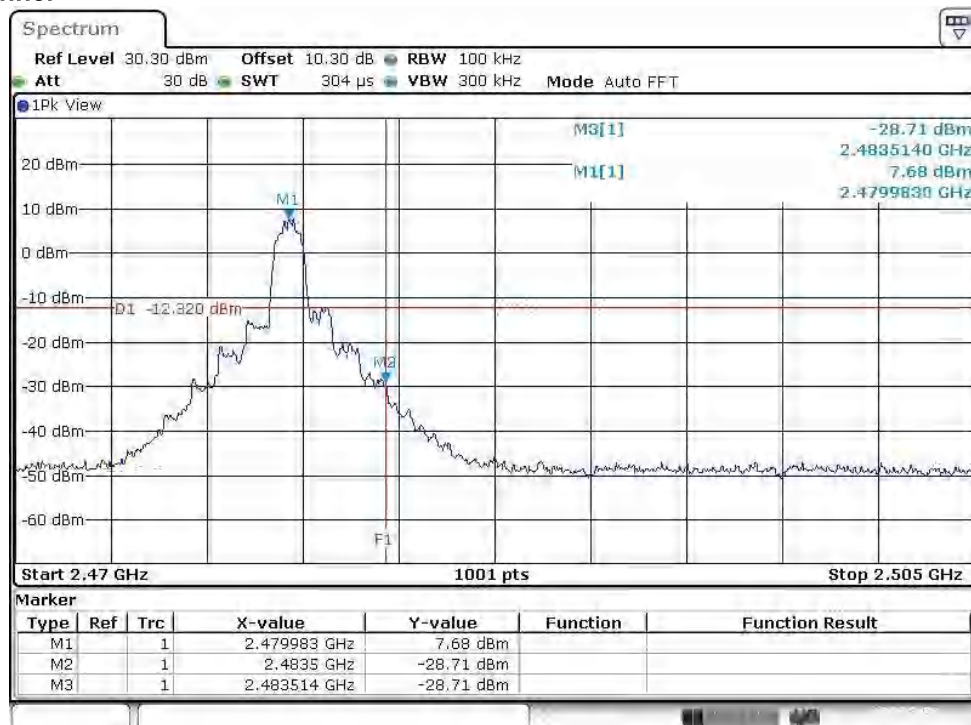
Test Plot 100kHz RBW of Band Edge 2-DH5_Right Ear

Low Channel



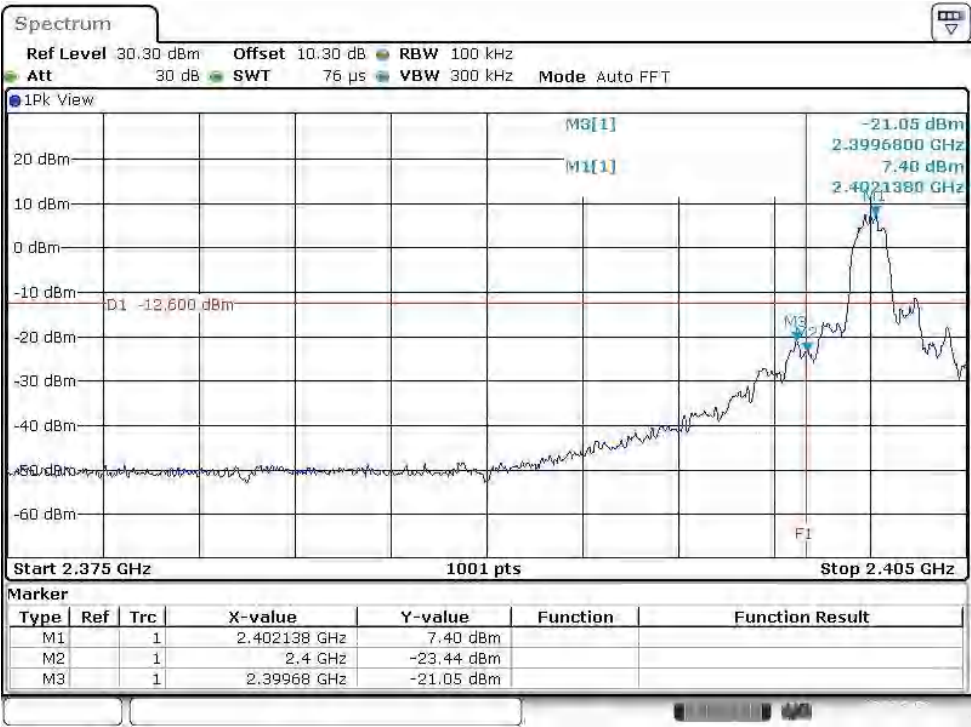
Date: 19.FEB.2020 12:05:54

High Channel



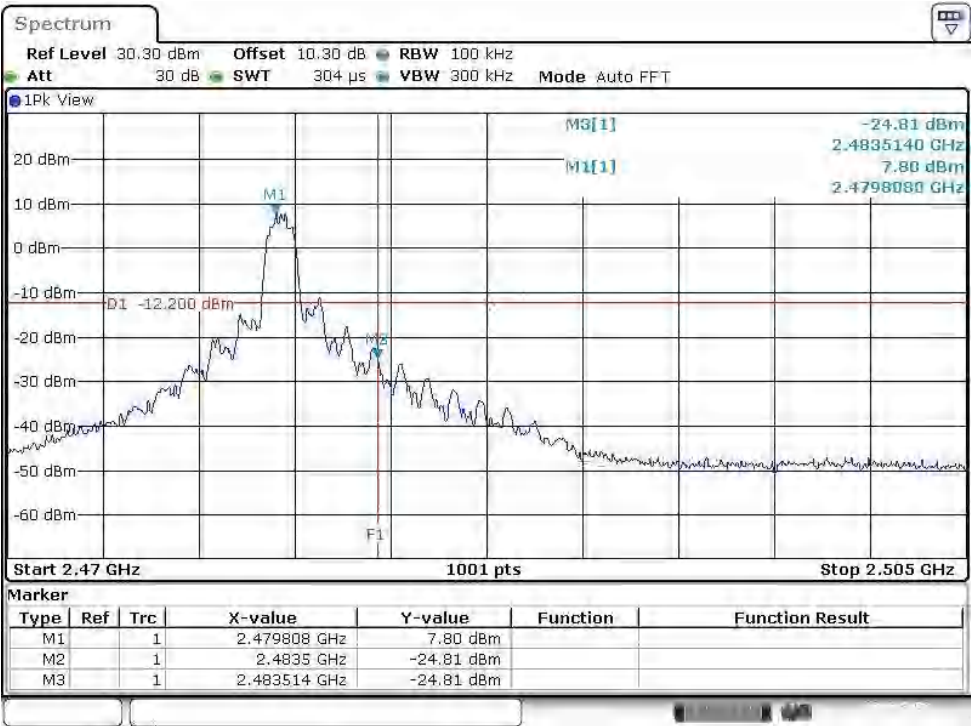
Date: 19.FEB.2020 12:22:51

Test Plot 100kHz RBW of Band Edge 3-DH5_Right Ear
Low Channel



Date: 19.FEB.2020 12:06:50

High Channel



Date: 19.FEB.2020 12:24:06

5.1.5 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 5, 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, B
Ambient temperature	:	20-24 °C
Relative humidity	:	50-65 %
Atmospheric pressure	:	100-103 kPa

Factor (dB/m)=Antenna Factor(dB/m)+Cable loss (dB)

Level(dBuV/m)=Reading(dBuV)+ Factor(dB/m)

For details refer to Appendix D.

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.

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5.1.6 Frequency Separation

RESULT:

Passed

Test standard : FCC part 15.247(a)(1), ISSED RSS-247 5.1(b)
Basic standard : ANSI C63.10:2013
Limits : $\geq 25\text{kHz}$ or $2/3$ of 20dB bandwidth, whichever is greater

Test setup

Test Channel : Hopping On
Operation mode : C

Ambient temperature : 20-24 °C
Relative humidity : 50-65 %

Table 25: Test result of Frequency Separation, 1-DH5_Left Ear

Channel	Channel Frequency (MHz)	Measured Channel Separation (MHz)	Limit (kHz)	Result
Record Channel	2441	1	$\geq 25\text{kHz}$ or $2/3$ of 20dB bandwidth	Pass
Record Channel adj 1	2440			
Record Channel adj 2	2442			

Table 26: Test result of Frequency Separation, 1-DH5_Right Ear

Channel	Channel Frequency (MHz)	Measured Channel Separation (MHz)	Limit (kHz)	Result
Record Channel	2441	1	$\geq 25\text{kHz}$ or $2/3$ of 20dB bandwidth	Pass
Record Channel adj 1	2440			
Record Channel adj 2	2442			

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Table 27: Test result of Frequency Separation, 3-DH5_Left Ear

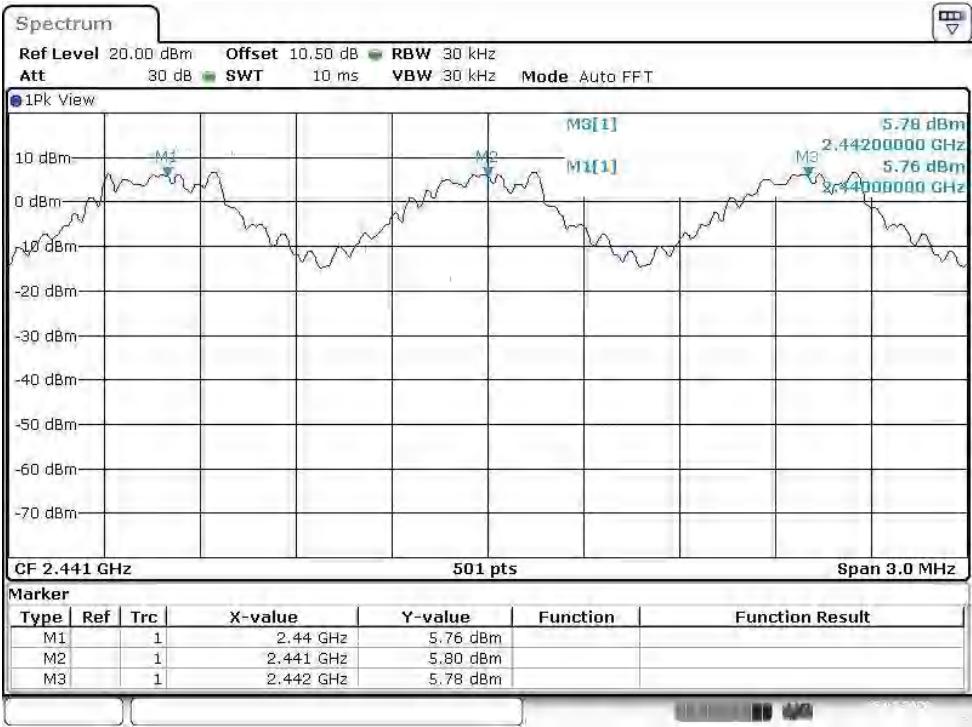
Channel	Channel Frequency (MHz)	Measured Channel Separation (MHz)	Limit (kHz)	Result
Record Channel	2441	1	$\geq 25\text{kHz}$ or 2/3 of 20dB bandwidth	Pass
Record Channel adj 1	2440			
Record Channel adj 2	2442			

Table 28: Test result of Frequency Separation, 3-DH5_Right Ear

Channel	Channel Frequency (MHz)	Measured Channel Separation (MHz)	Limit (kHz)	Result
Record Channel	2441	1	$\geq 25\text{kHz}$ or 2/3 of 20dB bandwidth	Pass
Record Channel adj 1	2440			
Record Channel adj 2	2442			

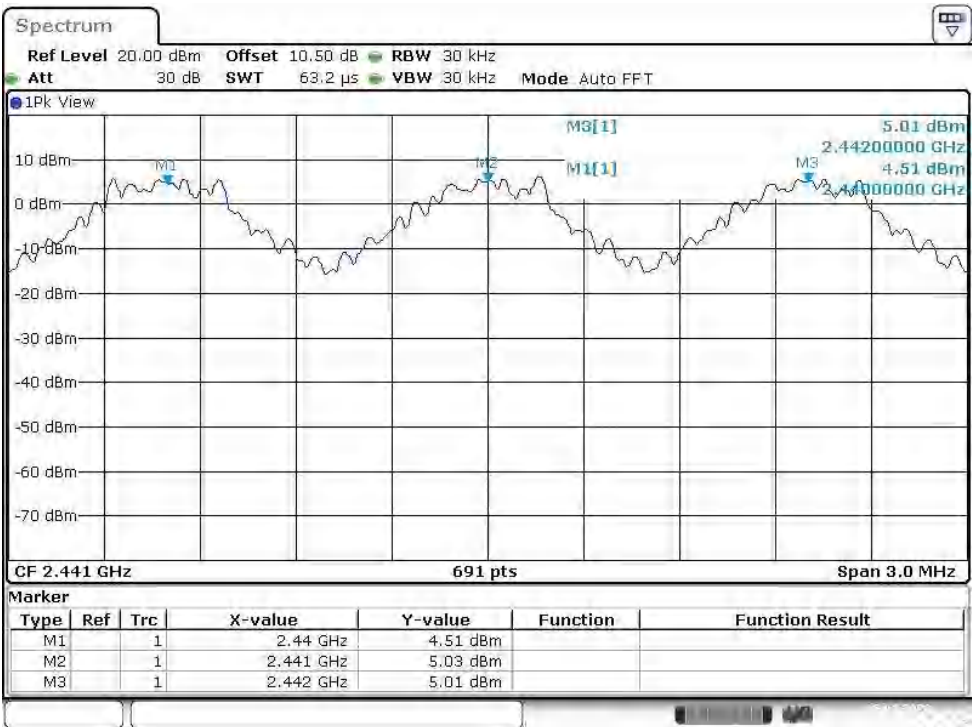
Test Plot of Frequency Separation

1-DH5, Left Ear



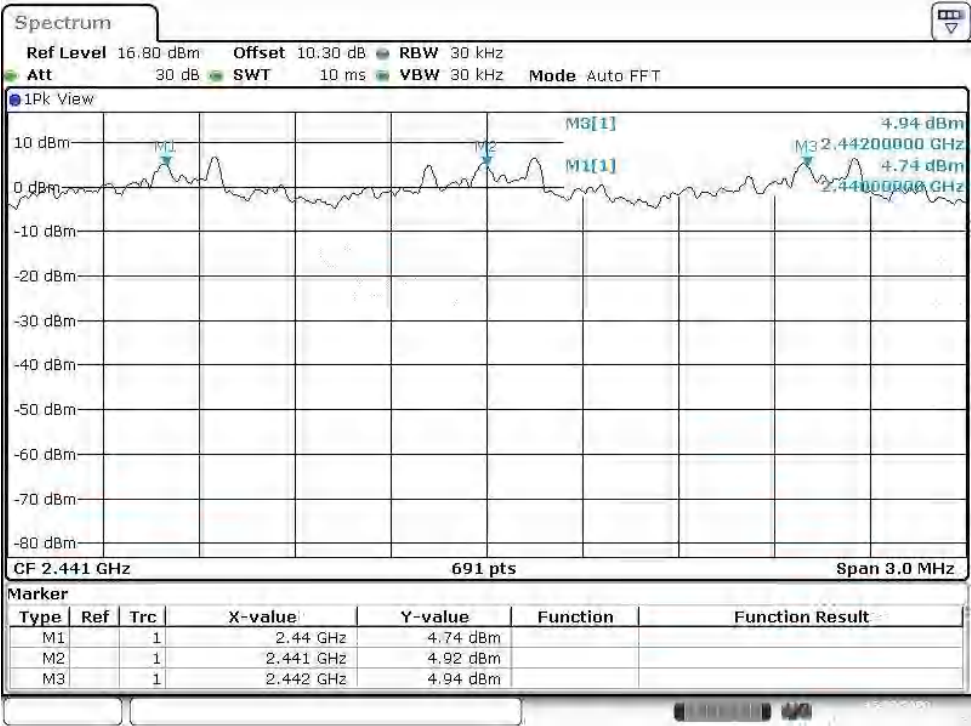
Date: 16.JAN.2020 09:32:01

1-DH5, Right Ear



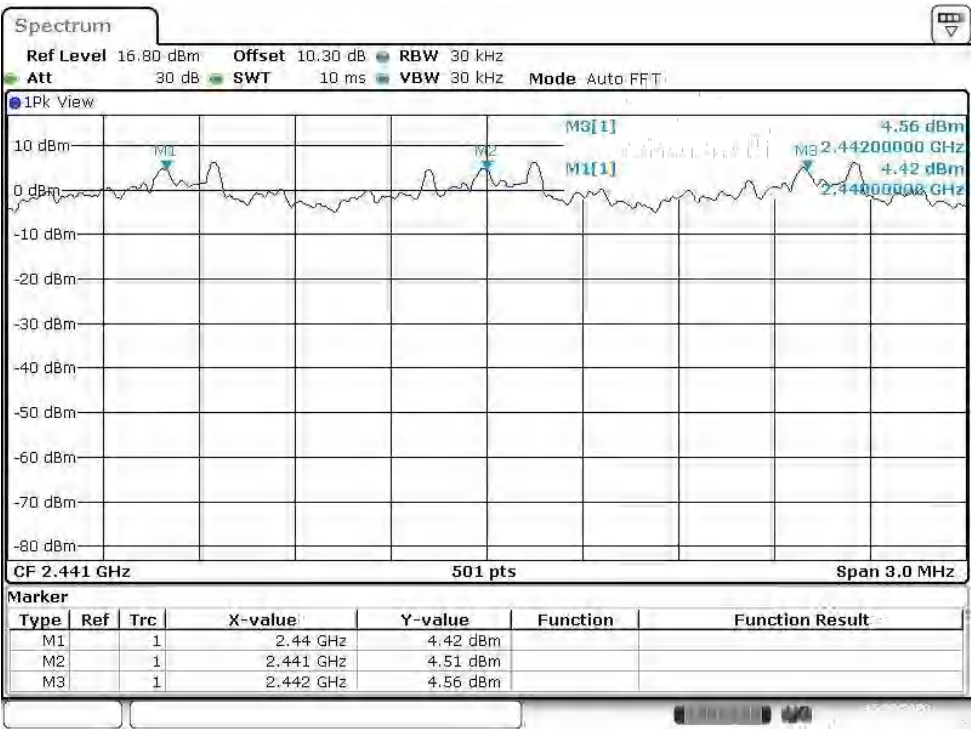
Date: 16.JAN.2020 12:04:44

3-DH5, Left Ear



Date: 15.FEB.2020 12:51:03

3-DH5, Right Ear



Date: 15.FEB.2020 12:41:53

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5.1.7 Number of hopping frequency

RESULT:

Passed

Test standard : FCC part 15.247(a)(1)(iii), ISSED RSS-247 5.1(e)
Basic standard : ANSI C63.10:2013
Limits : ≥ 15 non-overlapping channels
Kind of test site : Shield room

Test setup

Test Channel : Hopping On
Operation mode : C

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

Table 29: Test result of Number of hopping frequency, 1-DH5_Left Ear

Frequency Range	Measured Quantity of Hopping Channel	Limit	Result
<u>2402</u> to <u>2480</u> MHz	79	≥ 15	Pass

Table 30: Test result of Number of hopping frequency, 1-DH5_Right Ear

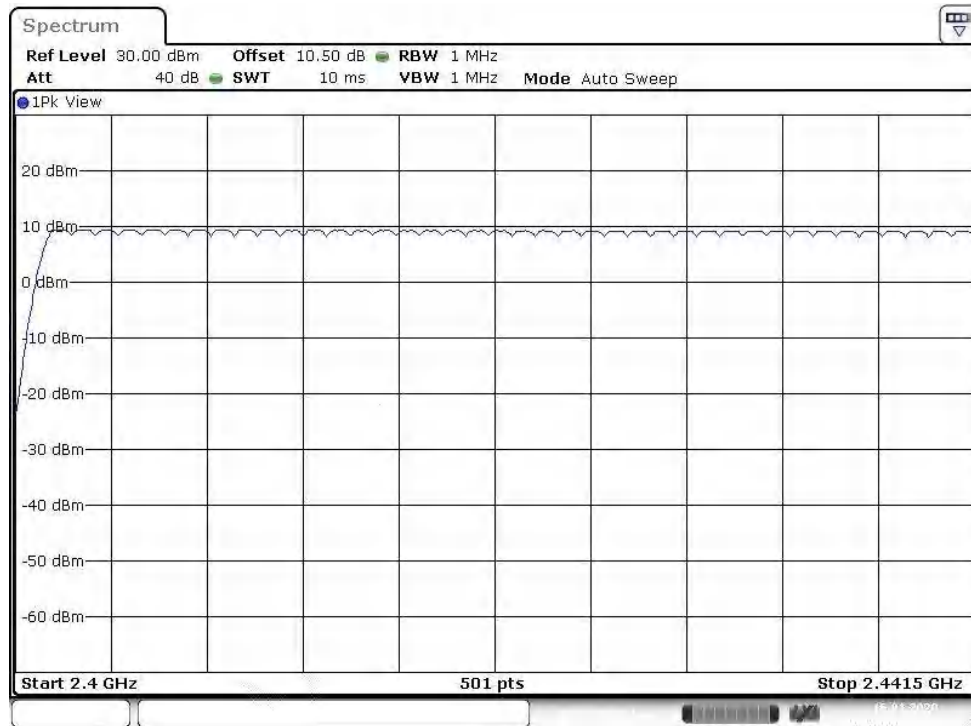
Frequency Range	Measured Quantity of Hopping Channel	Limit	Result
<u>2402</u> to <u>2480</u> MHz	79	≥ 15	Pass

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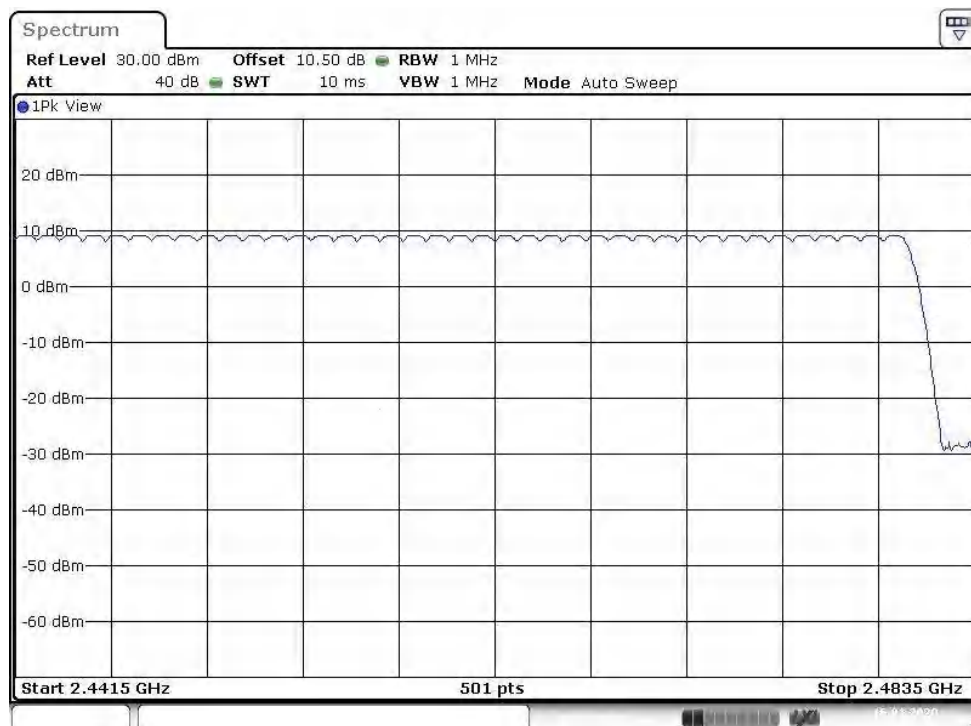
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Test Plot of Number of hopping frequencies

1-DH5, Left Ear

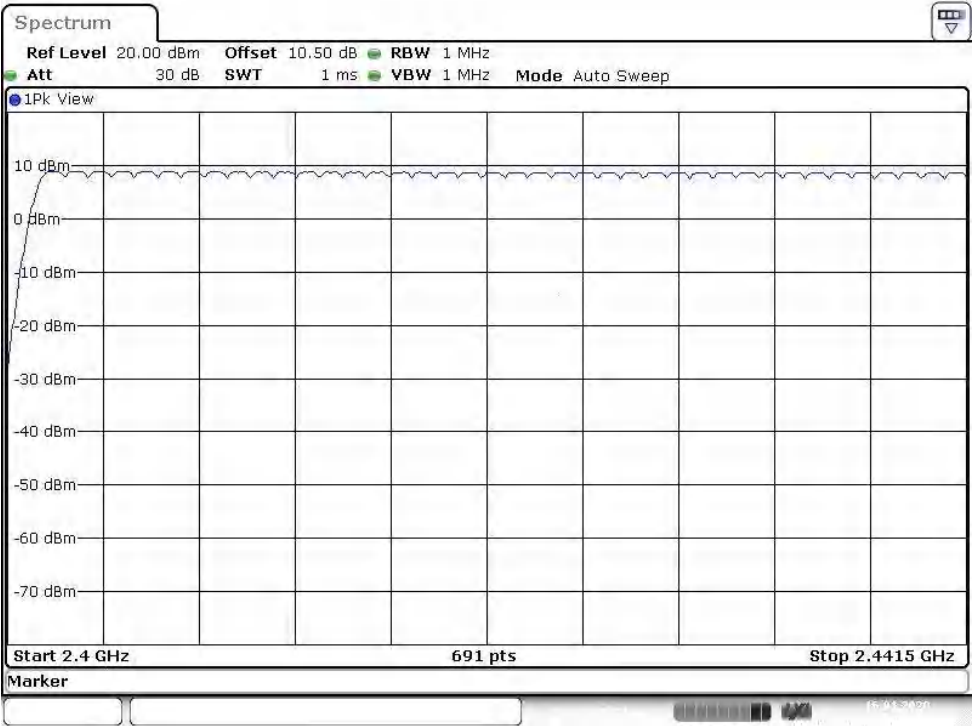


Date: 16.JAN.2020 09:34:59

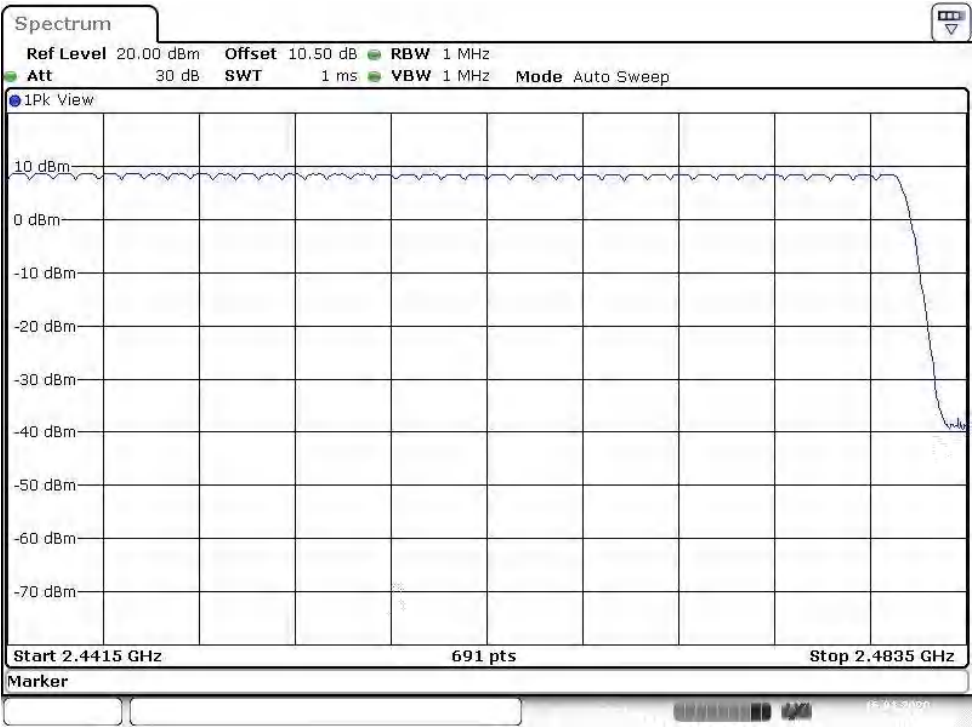


Date: 16.JAN.2020 09:36:24

1-DH5, Right Ear

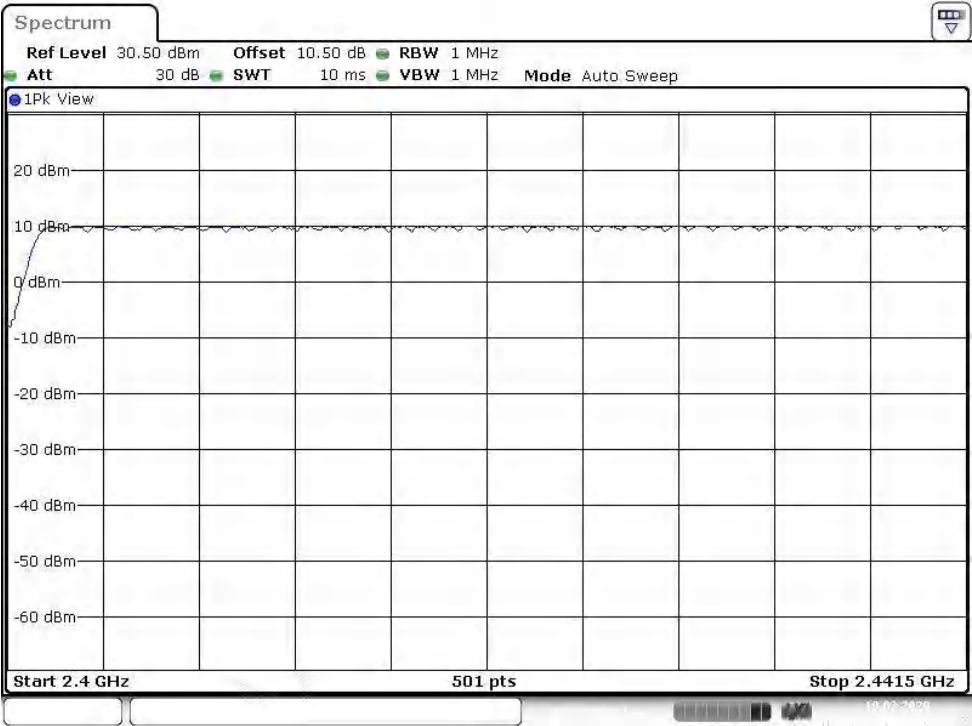


Date: 16.JAN.2020 12:06:21

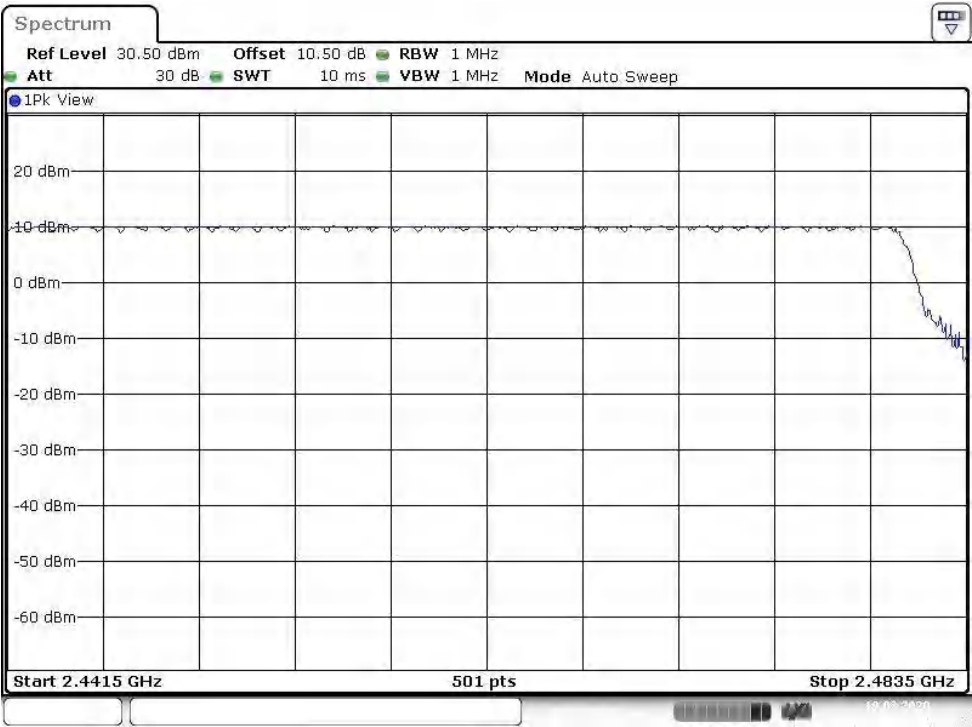


Date: 16.JAN.2020 12:07:20

3-DH5, Left Ear

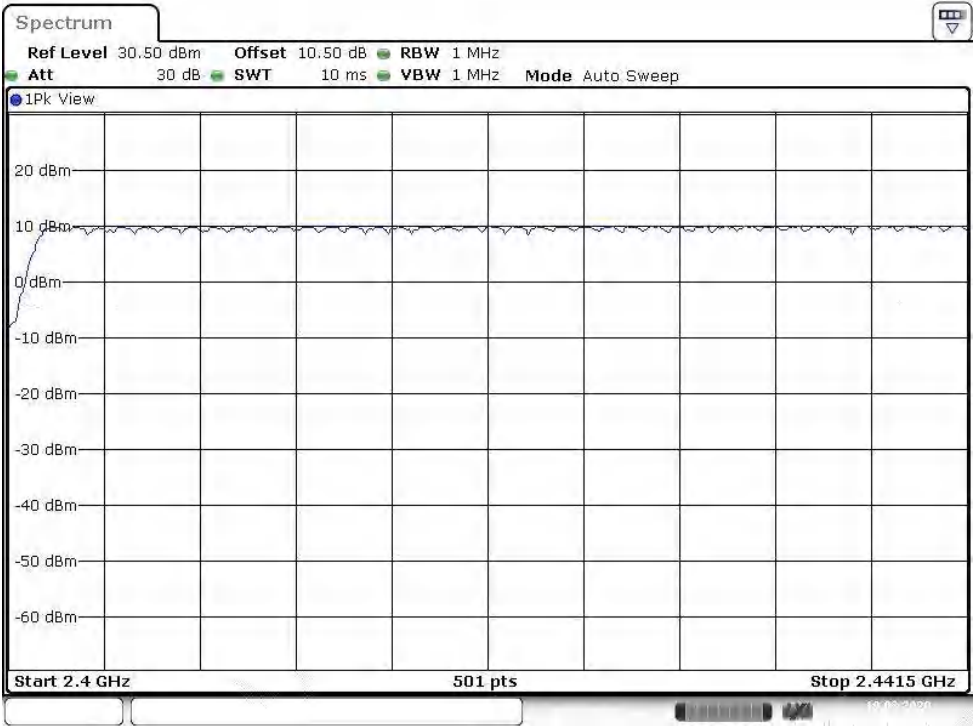


Date: 19.FEB.2020 16:21:47

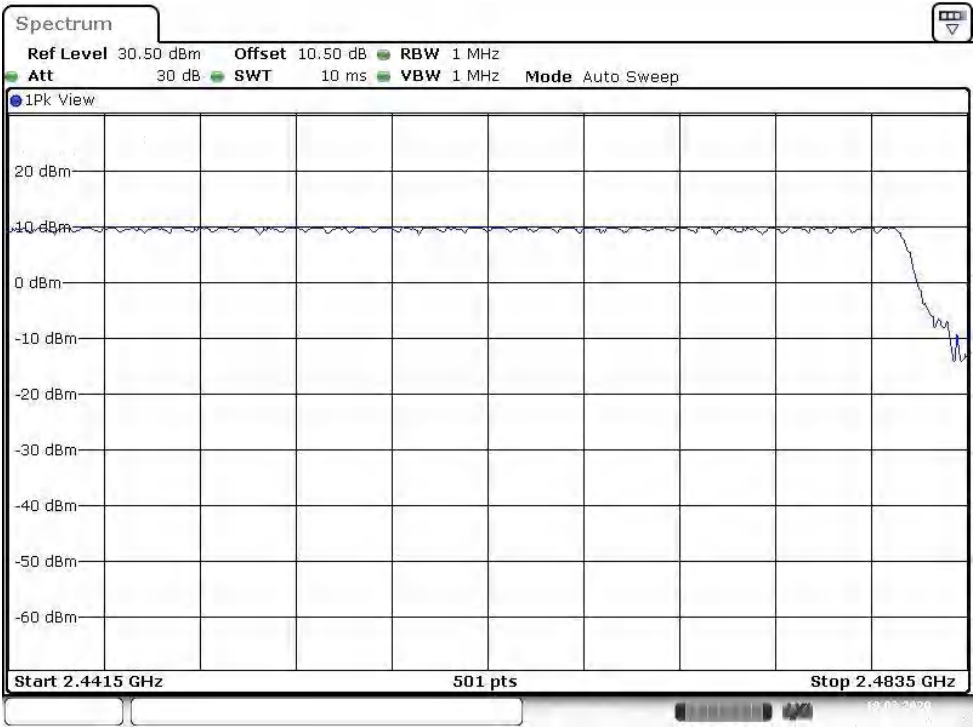


Date: 19.FEB.2020 16:22:17

3-DH5, Right Ear



Date: 19.FEB.2020 16:20:39



Date: 19.FEB.2020 16:20:06

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5.1.8 Time of Occupancy

RESULT:

Passed

Test standard : FCC part 15.247(a)(1)(iii), ISSED RSS-247 5.1(e)
Basic standard : ANSI C63.10:2013
Limits : 0.4s
Kind of test site : Conducted room

Test setup

Test Channel : Low
Operation Mode : A

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

Table 31: Test result of Time of Occupancy_Left Ear

Package Mode	Average Hopping Channel	Package Transfer Time (ms)	Sweep Time (s)	Dwell Time (ms)	Limit (ms)	Result
1-DH5	17.00	2.89	5.00	310.5	400	Pass
3-DH5	17.00	2.92	5.00	313.72	400	Pass

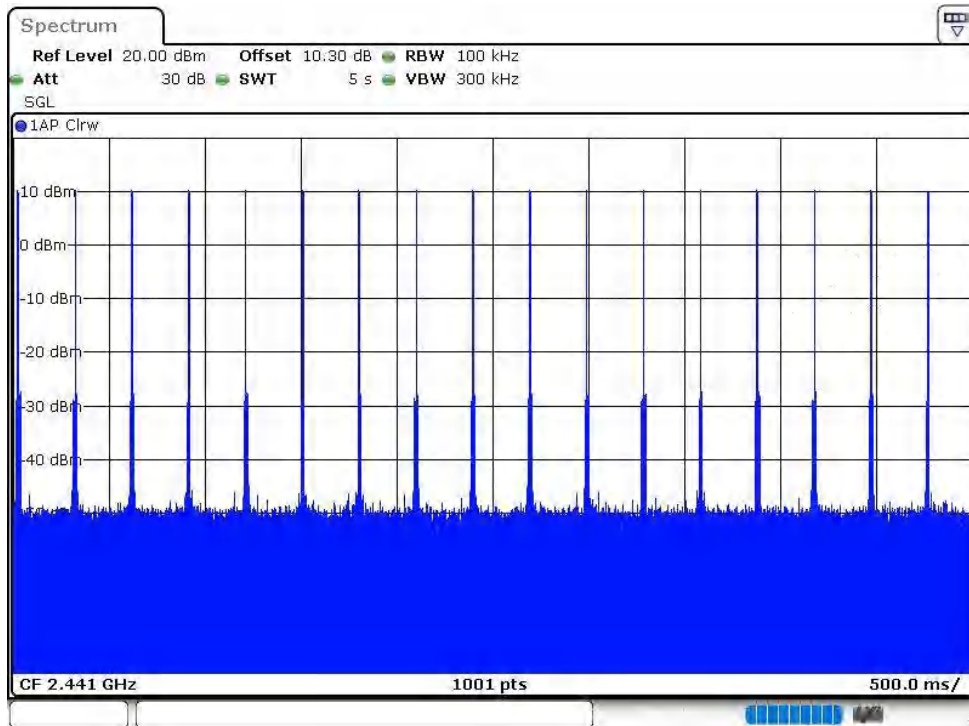
Table 32: Test result of Time of Occupancy_Right Ear

Package Mode	Average Hopping Channel	Package Transfer Time (ms)	Sweep Time (s)	Dwell Time (ms)	Limit (ms)	Result
1-DH5	17.00	2.89	5.00	310.5	400	Pass
3-DH5	16.00	2.92	5.00	295.27	400	Pass

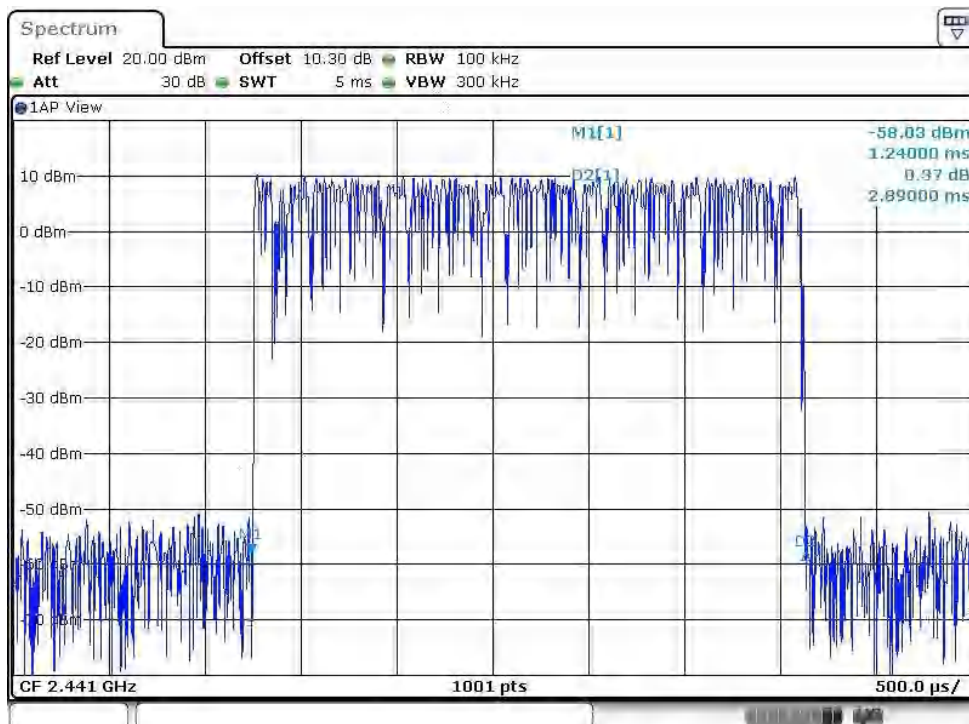
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Test Plot of Time of Occupancy, 1-DH5_Left Ear



Date: 2.JUN.2020 16:05:54

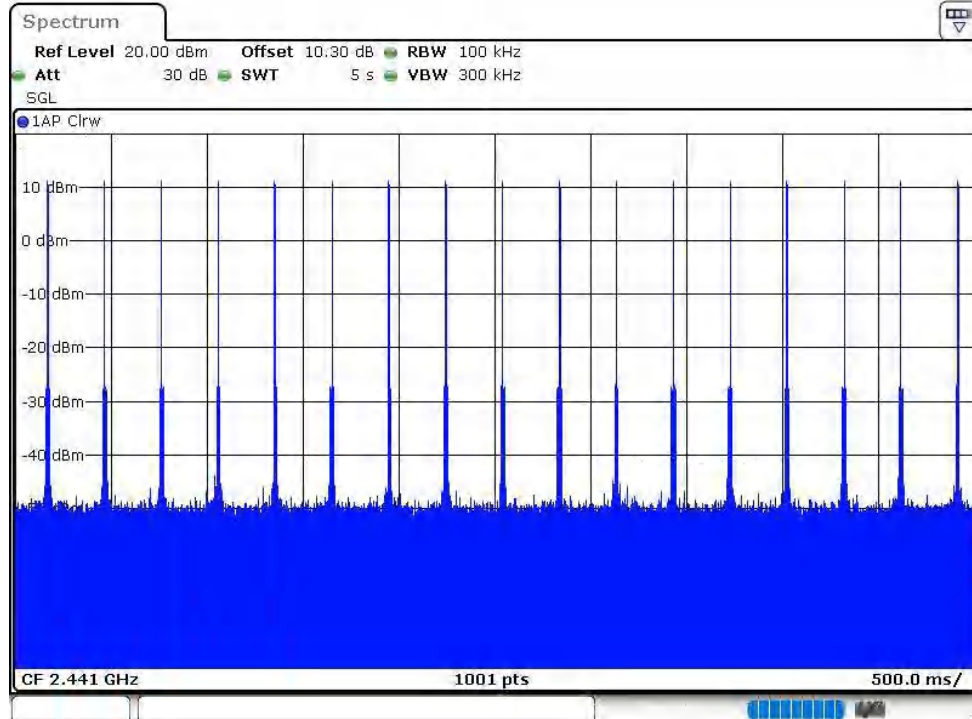


Date: 2.JUN.2020 16:06:12

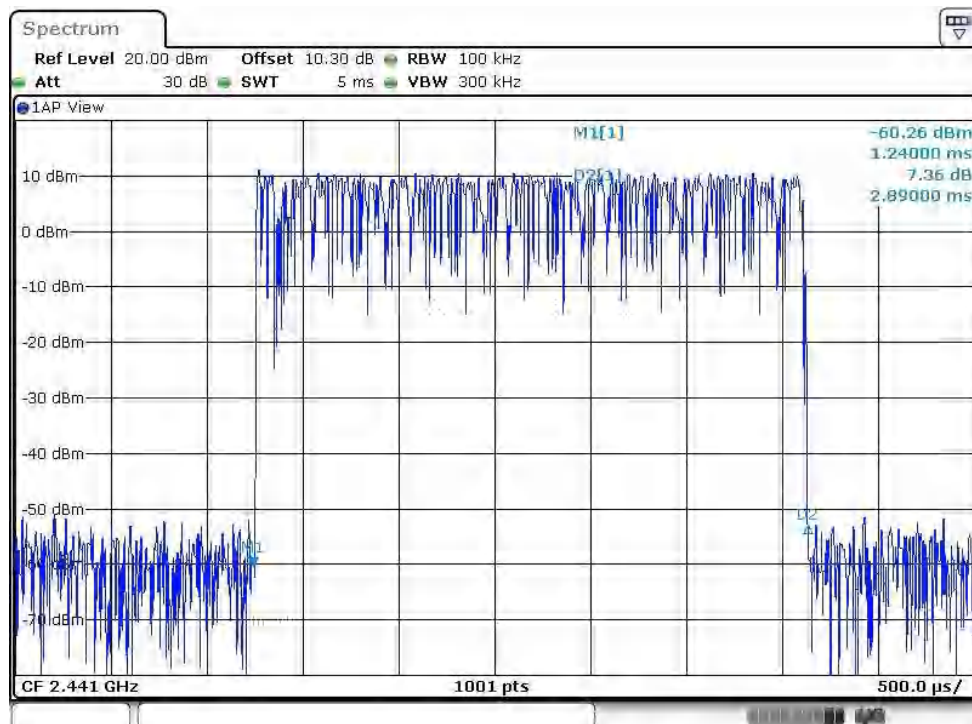
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Test Plot of Time of Occupancy, 1-DH5_Right Ear



Date: 2.JUN.2020 16:10:16

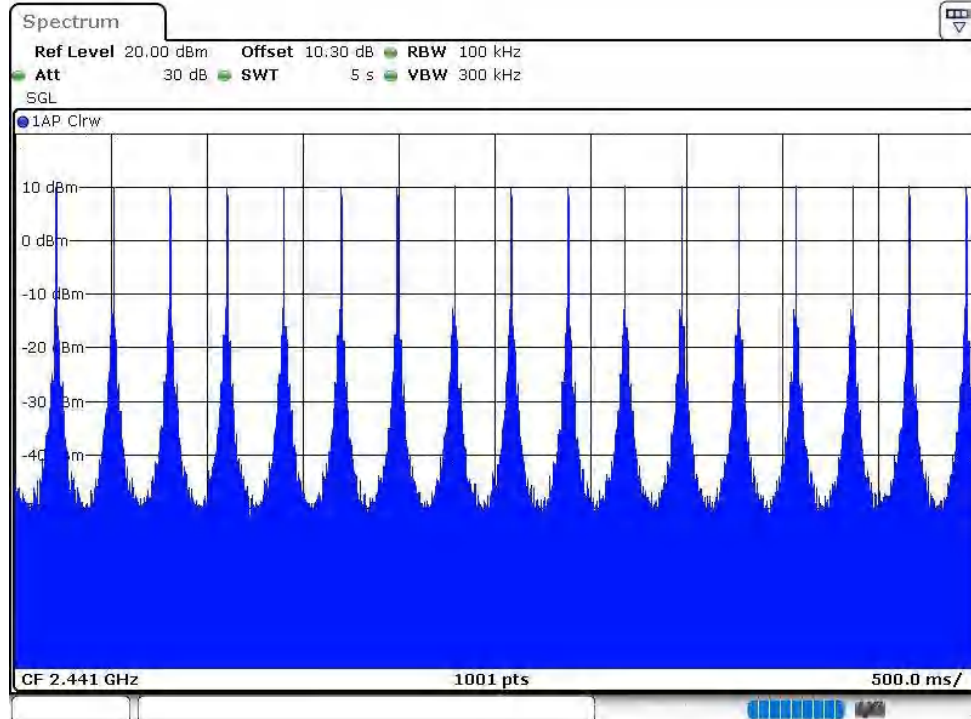


Date: 2.JUN.2020 16:10:34

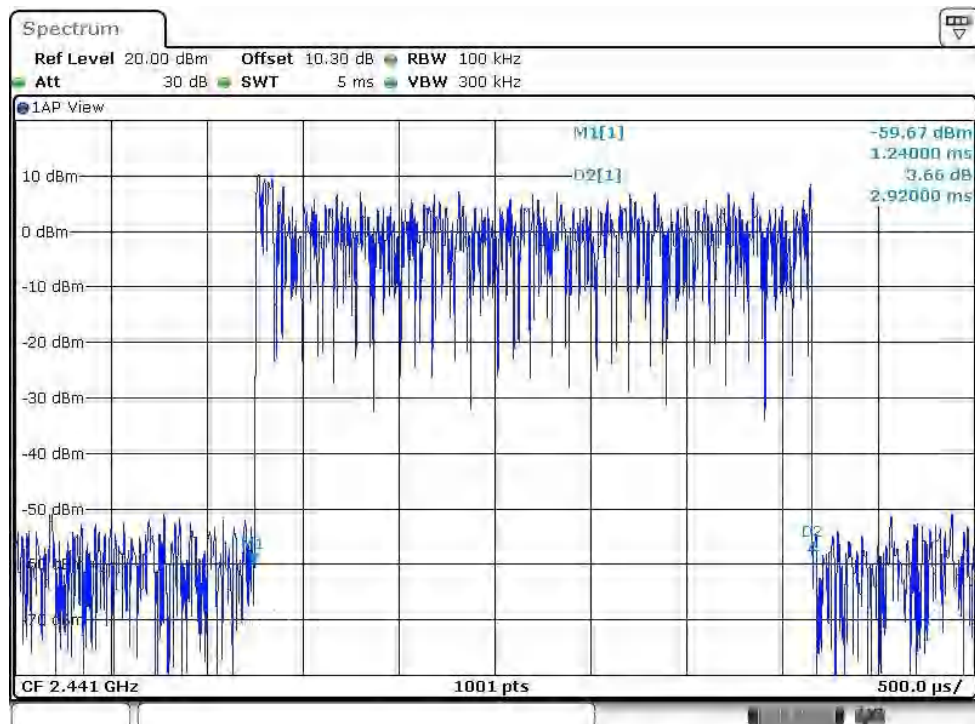
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Test Plot of Time of Occupancy, 3-DH5_Left Ear



Date: 2.JUN.2020 16:06:39

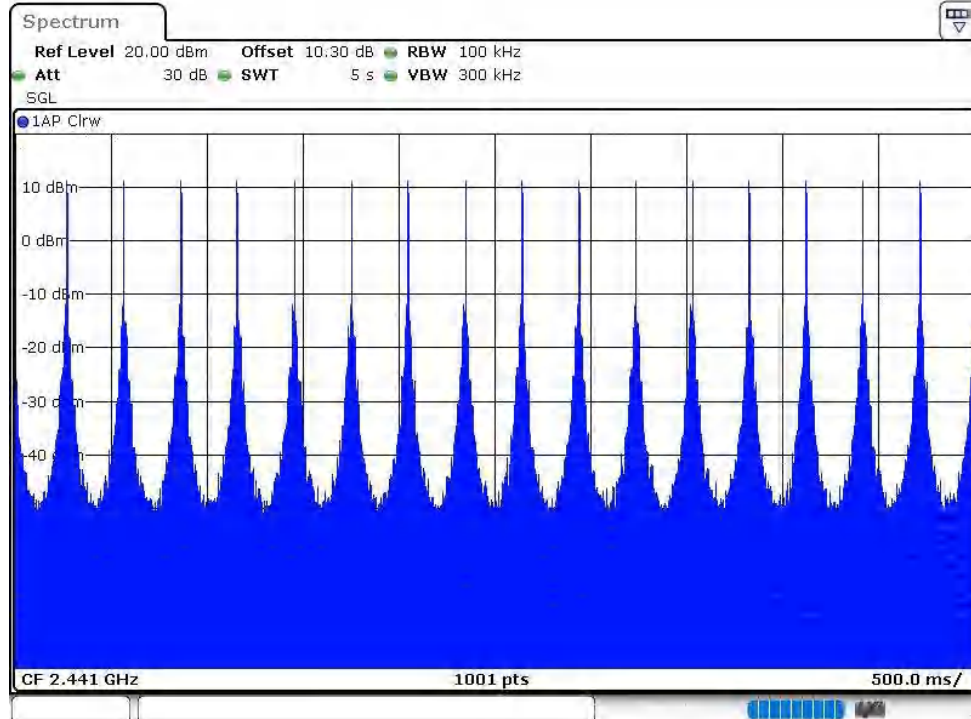


Date: 2.JUN.2020 16:06:58

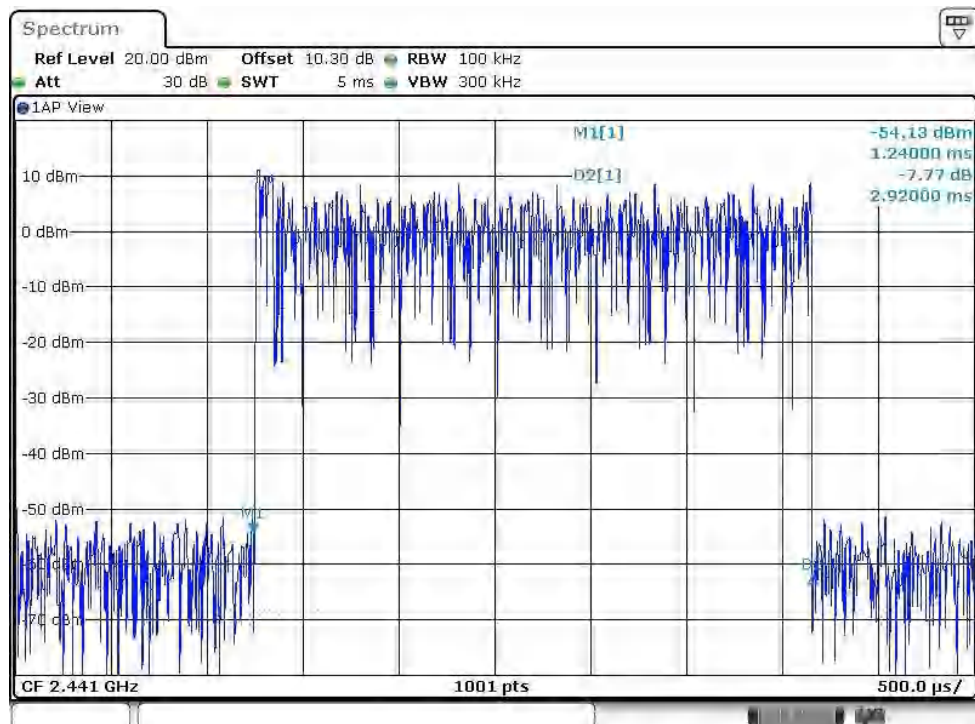
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Test Plot of Time of Occupancy, 3-DH5_Right Ear



Date: 2.JUN.2020 16:09:18



Date: 2.JUN.2020 16:09:36

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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 standards
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

Left Ear

FCC:

Therefore the maximum output power of the transmitter is $8.43\text{mW} < 10\text{mW}$ (Distance: 5 mm), hence the EUT is excluded from SAR evaluation according to FCC KDB publication 447498 D01: Mobile Portable RF Exposure.

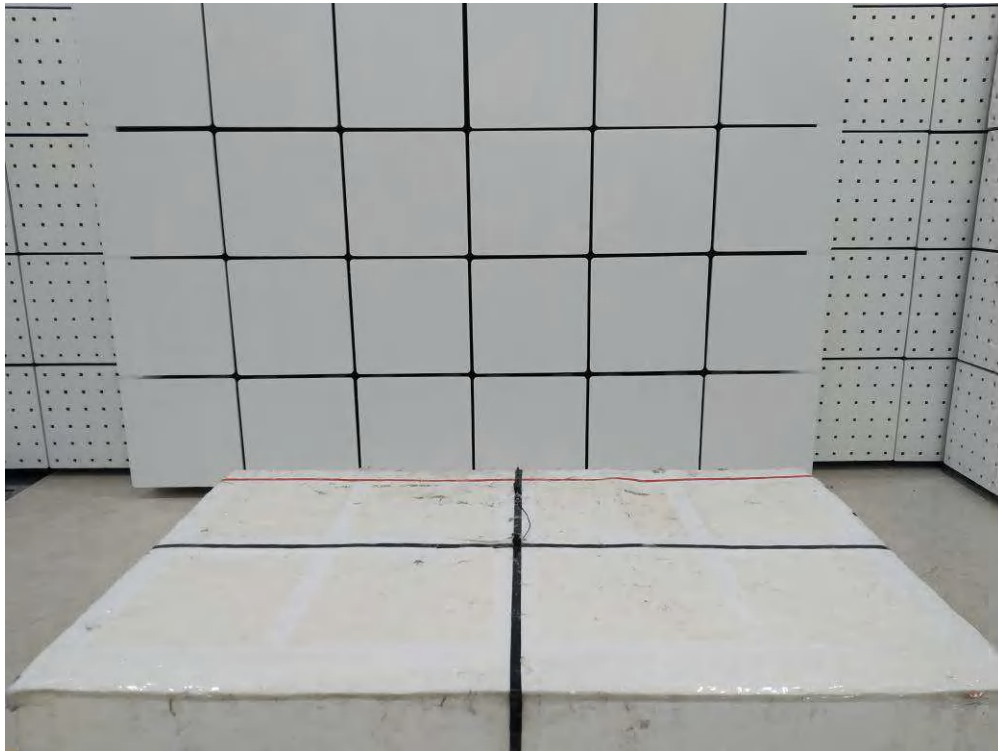
Right Ear

FCC:

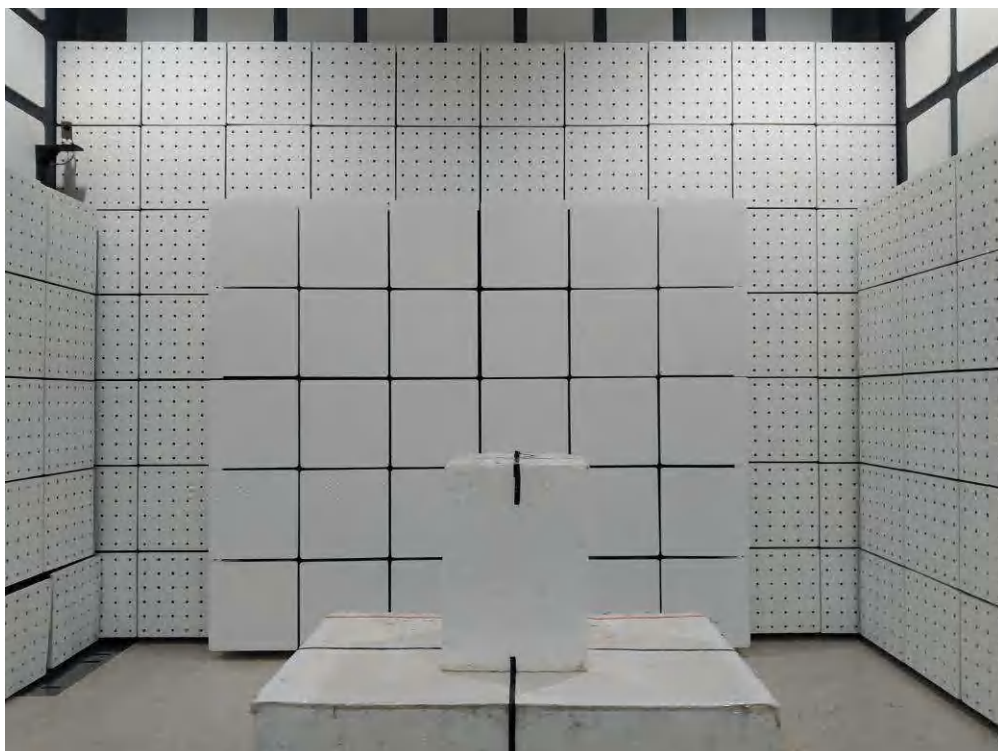
Therefore the maximum output power of the transmitter is $8.22\text{ mW} < 10\text{mW}$ (Distance: 5 mm), hence the EUT is excluded from SAR evaluation according to FCC KDB publication 447498 D01: Mobile Portable RF Exposure.

7. Photographs of the Test Set-Up

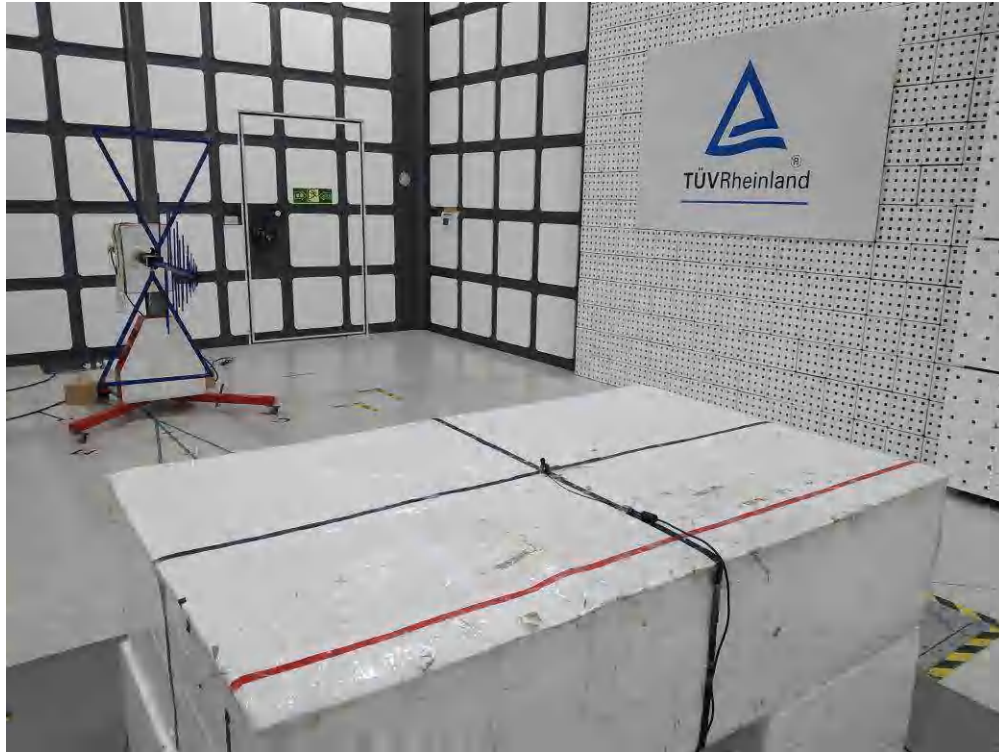
Photograph 1: Set-up for Spurious Emissions (Front View 1), Left Ear



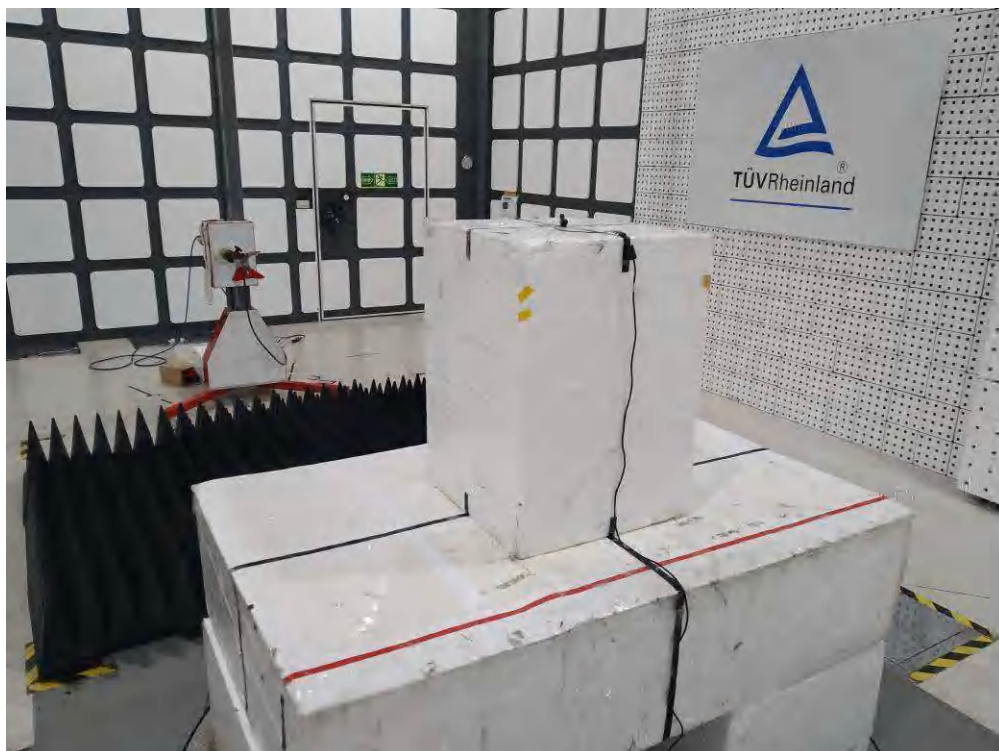
Photograph 2: Set-up for Spurious Emissions (Front View 2), Left Ear



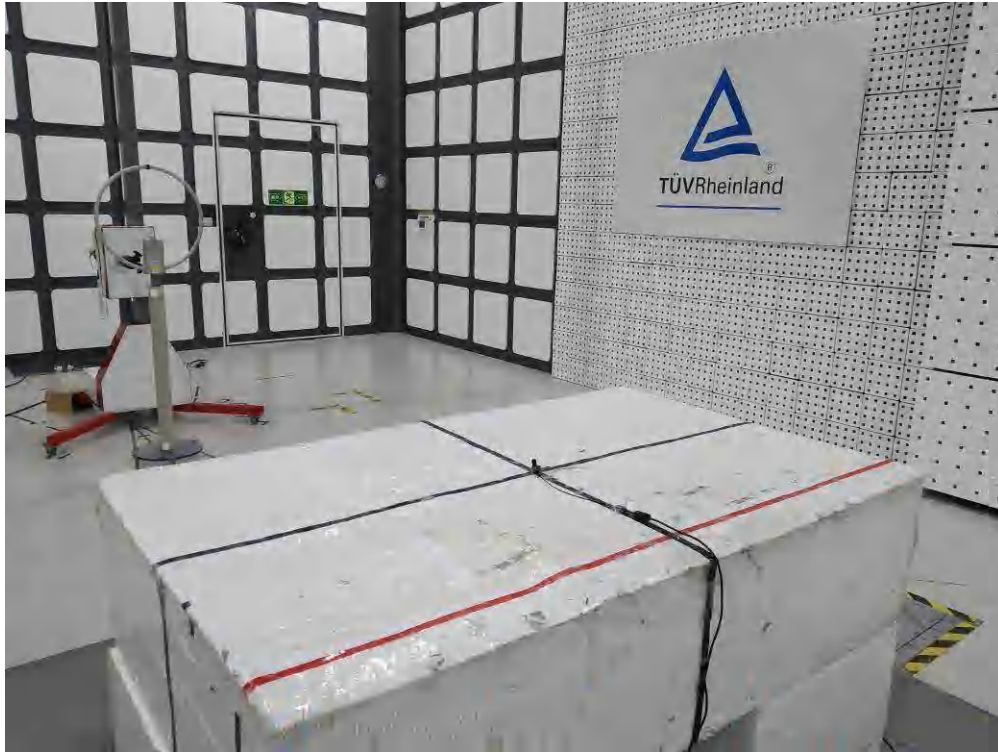
Photograph 3: Set-up for Spurious Emissions (Back View 1), Left Ear



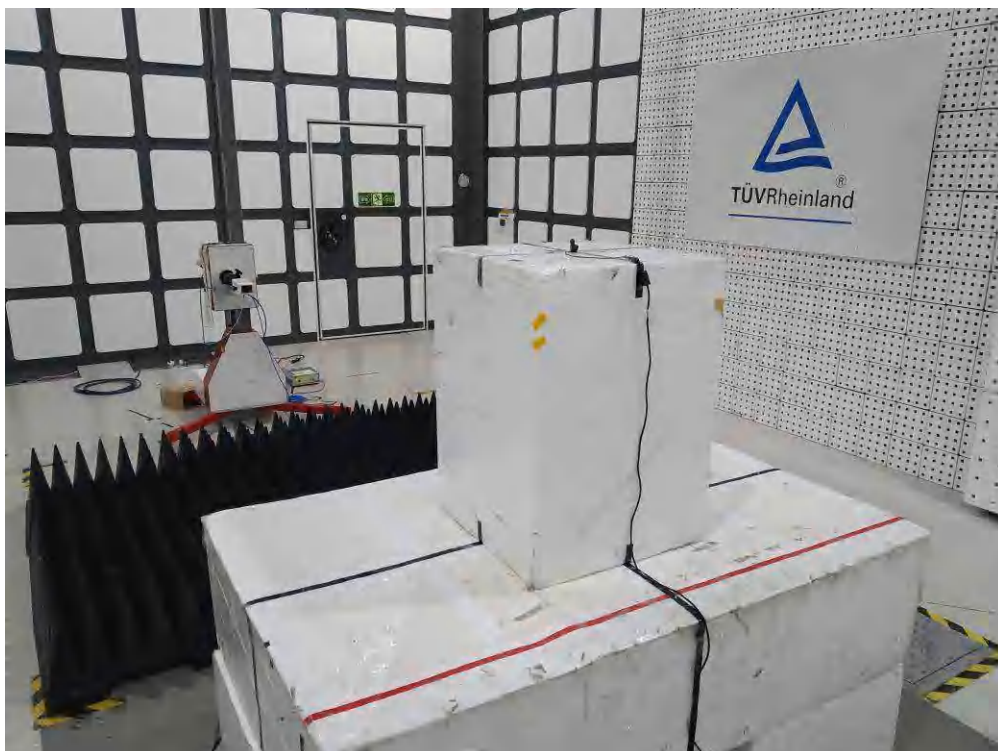
Photograph 4: Set-up for Spurious Emissions (Back View 2), Left Ear



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



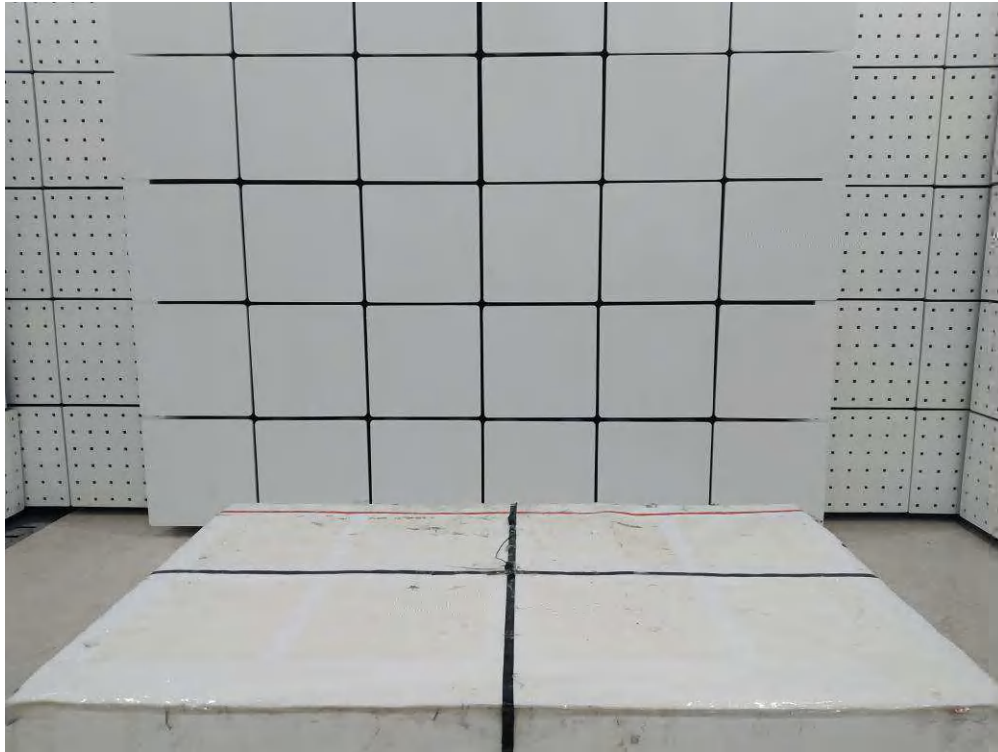
Photograph 6: Set-up for Spurious Emissions (Back View 4), Left Ear



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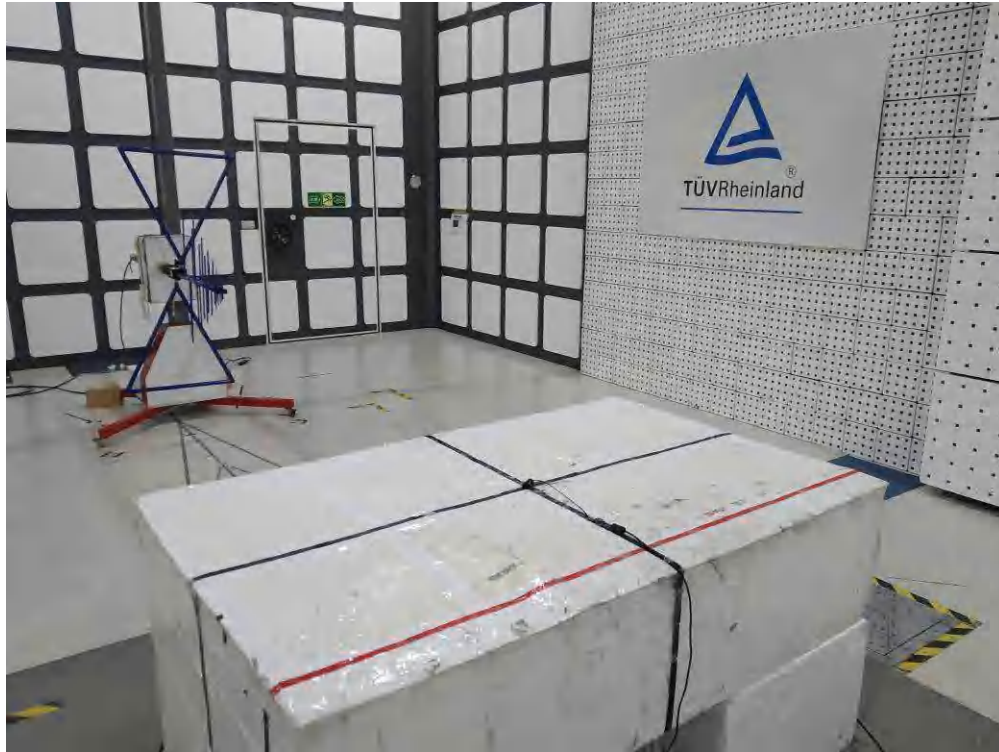
Photograph 7: Set-up for Spurious Emissions (Front View 1), Right Ear



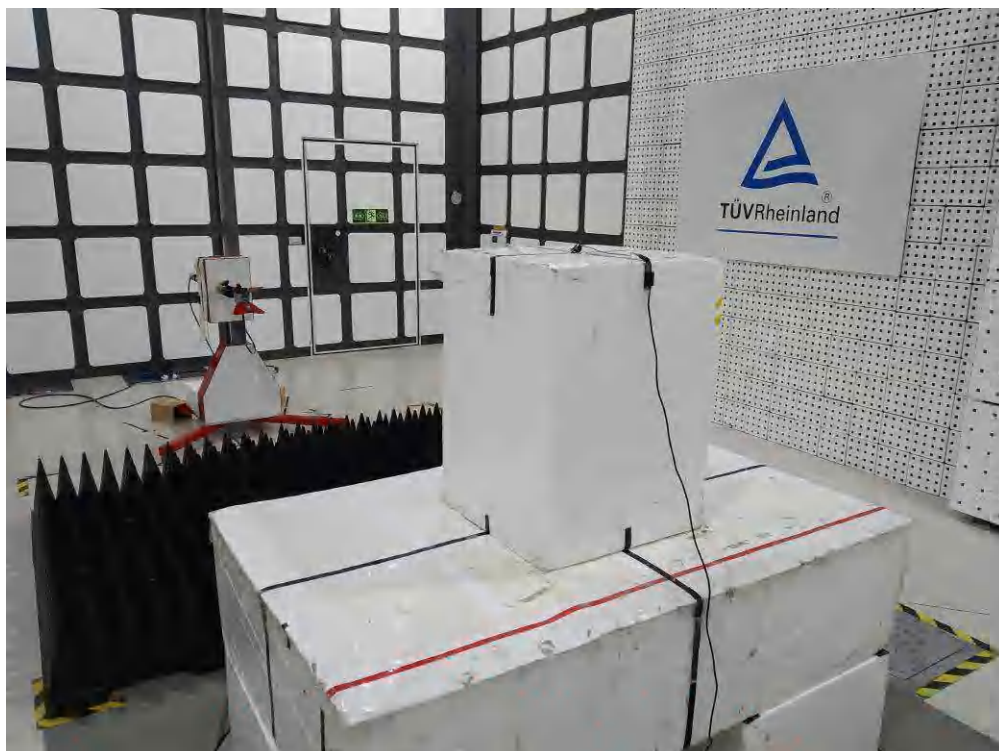
Photograph 8: Set-up for Spurious Emissions (Front View 2), Right Ear



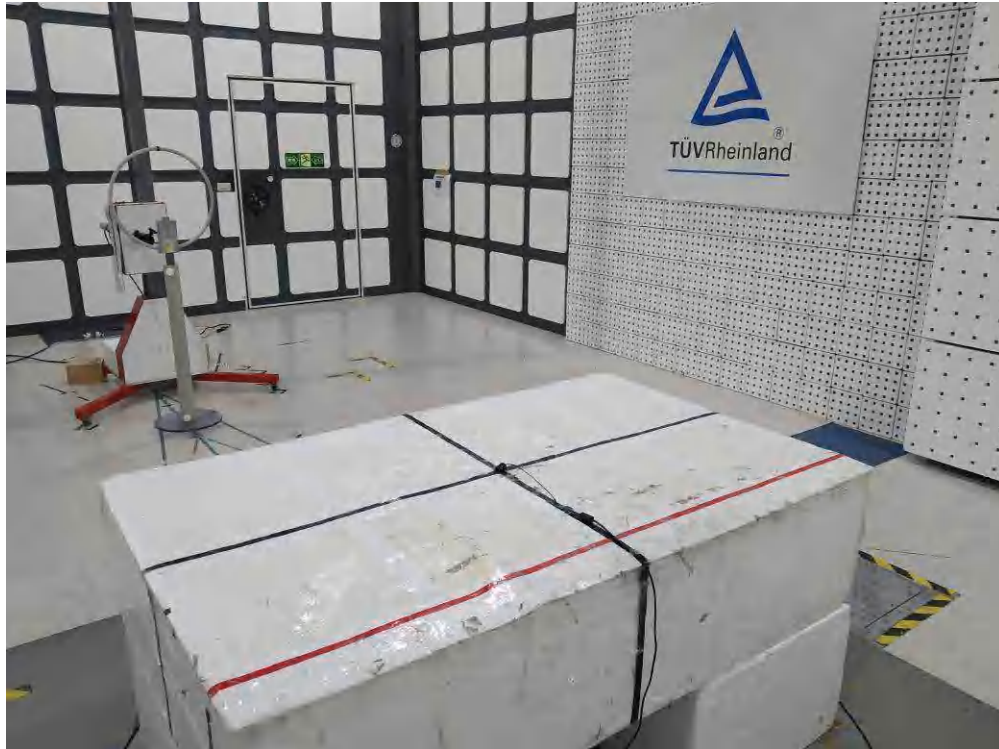
Photograph 9: Set-up for Spurious Emissions (Back View 1), Right Ear



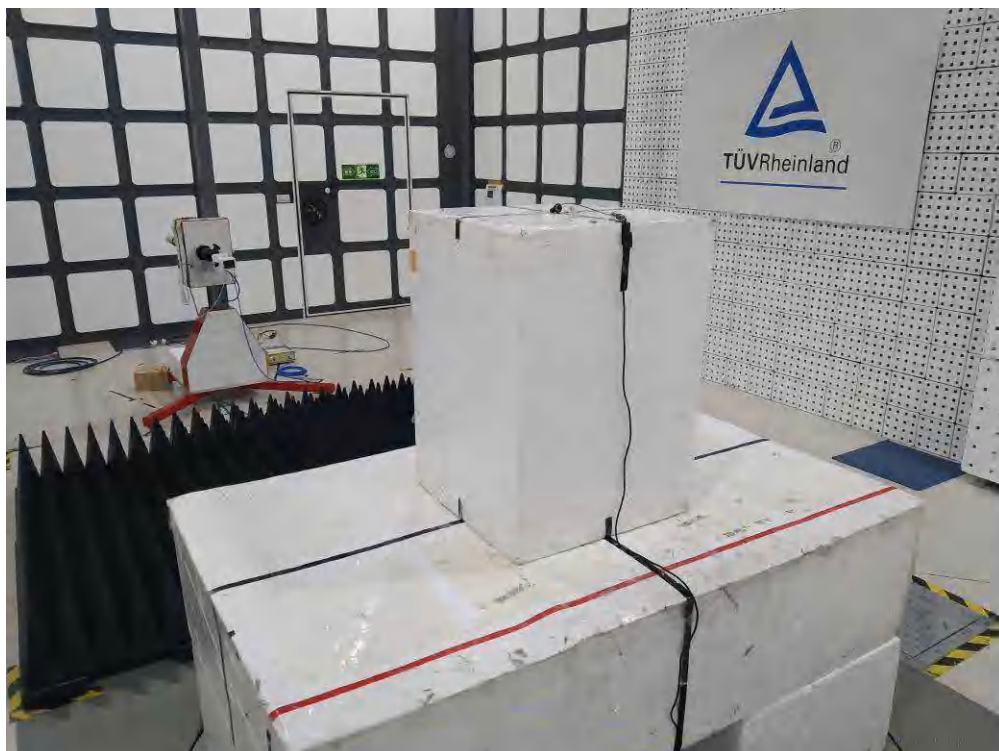
Photograph 10: Set-up for Spurious Emissions (Back View 2), Right Ear



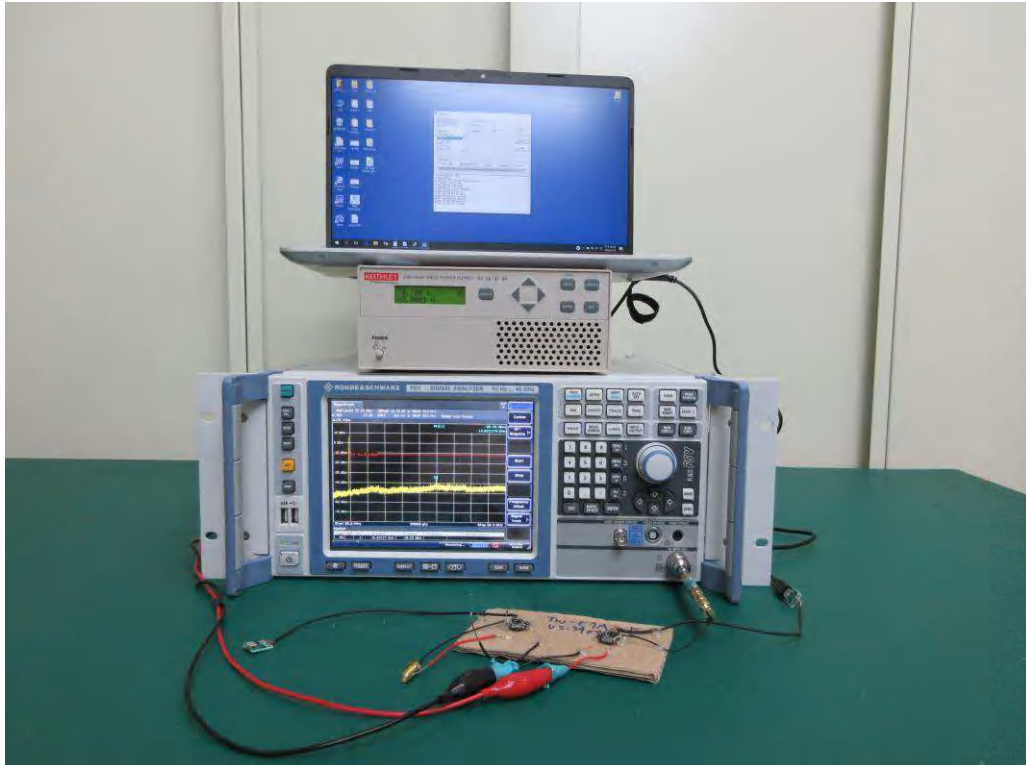
Photograph 11: Set-up for Spurious Emissions (Back View 3), Right Ear



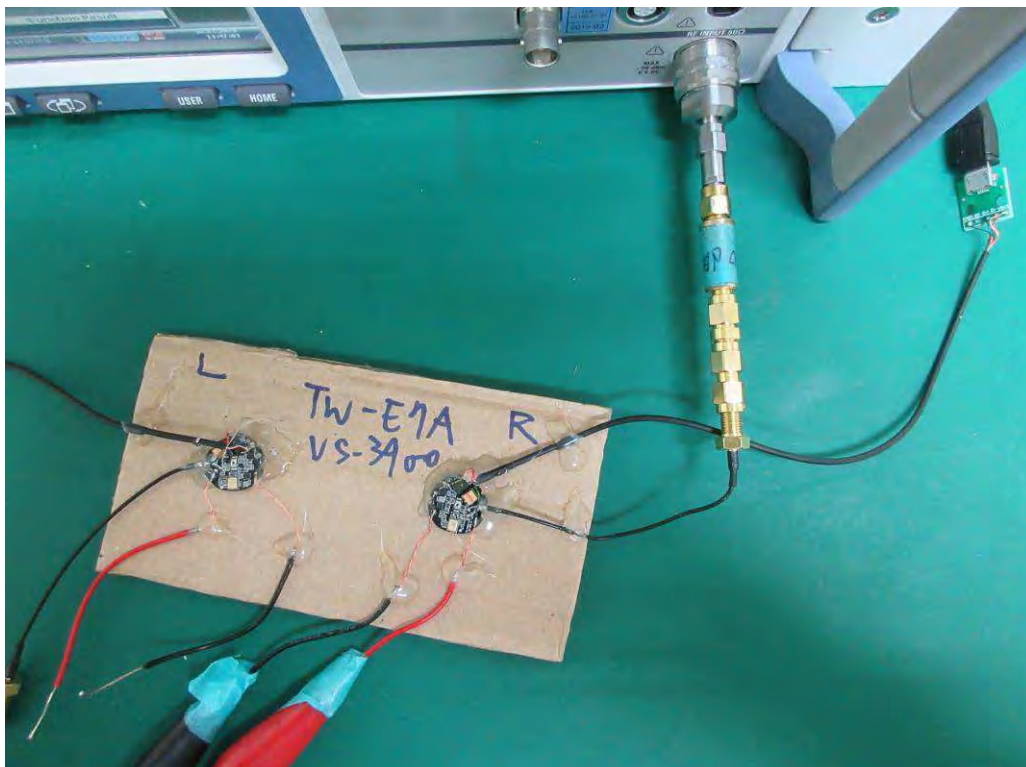
Photograph 12: Set-up for Spurious Emissions (Back View 4), Right Ear



Photograph 13: Set-up for Conducted testing (View 1)



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