SGS-CSTC Standards Technical Services Co., Ltd.
Shenzhen Branch

No. 1 Workshop, M-10, Middle section, Science & Technology Park,
Shenzhen, Guangdong, China 518057

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TEST REPORT

Application No.:	SZEM1703001530CR
Applicant:	Shenzhen 3Nod Digital Technology Co., Ltd.
Address of Applicant:	Building D, No.8 Langhui Road, Tangxiayong Community, Songgang Street, Baoan District, Shenzhen City, Guangdong Province, P.R. China
Manufacturer:	Shenzhen 3Nod Digital Technology Co., Ltd.
Address of Manufacturer:	Building D, No.8 Langhui Road, Tangxiayong Community, Songgang Street, Baoan District, Shenzhen City, Guangdong Province, P.R. China
Factory:	Shenzhen 3Nod Digital Technology Co., Ltd.
Address of Factory:	Building D, No.8 Langhui Road, Tangxiayong Community, Songgang Street, Baoan District, Shenzhen City, Guangdong Province, P.R. China
Equipment Under Test (EUT):	
EUT Name:	Jam True Wireless Earbuds
Model No.:	HX-EP900
FCC ID:	2AA3H-HXEP900
Trade mark:	Jam
Standards:	47 CFR Part 15, Subpart C (2016)
Date of Receipt:	2017-03-07
Date of Test:	2017-03-13 to 2017-03-22
Date of Issue:	2017-03-27
Test Result :	**Pass***

* In the configuration tested, the EUT complied with the standards specified above.

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Jack Zhang
EMC Laboratory Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.

Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
01		2017-03-27		Original

Authorized for issue by:				
Tested By		Benson Wang		2017-03-27
		Benson Wang /Project Engineer		**Date**
Checked By		Eric Fu		2017-03-27
		Eric Fu /Reviewer		**Date**

2 Test Summary

Radio Spectrum Technical Requirement				
Item	**Standard**	**Method**	**Requirement**	**Result**
Antenna Requirement	47 CFR Part 15, Subpart C 15.247	N/A	47 CFR Part 15, Subpart C 15.203 & 15.247(c)	Pass
Other requirements Frequency Hopping Spread Spectrum System Hopping Sequence	47 CFR Part 15, Subpart C 15.247	N/A	47 CFR Part 15, Subpart C 15.247(a)(1),(g), (h)	Pass

Radio Spectrum Matter Part				
Item	**Standard**	**Method**	**Requirement**	**Result**
20dB Bandwidth	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.7	47 CFR Part 15, Subpart C 15.247(a)(1)	Pass
Conducted Peak Output Power	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.5	47 CFR Part 15, Subpart C 15.247(b)(1)	Pass
Carrier Frequencies Separation	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.2	47 CFR Part 15, Subpart C 15.247a(1)	Pass
Hopping Channel Number	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.3	47 CFR Part 15, Subpart C 15.247a(1)(iii)	Pass
Dwell Time	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.4	47 CFR Part 15, Subpart C 15.247a(1)(iii)	Pass
Conducted Spurious Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.8	47 CFR Part 15, Subpart C 15.247(d)	Pass
Radiated Spurious Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.4,6.5,6.6	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass
Radiated Emissions which fall in the restricted bands	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.10.5	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass
Conducted Band Edges Measurement	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.6	47 CFR Part 15, Subpart C 15.247(d)	Pass

3 Contents

4 General Information

4.1 Details of E.U.T.

Power supply:	Left earbuds: Li-Ion Polymer Battery 3.7V 60mAh (Charge by travel case) Right earbuds: Li-Ion Polymer Battery 3.7V 60mAh (Charge by travel case) travel case with backup battery: Li-Ion Polymer Battery 3.7V 2200mAh (Charge by USB) USB DC output of the travel case: 5V, 1.0A
Cable:	USB cable: 31.5cm unshielded
Internal source	16MHz
Bluetooth version	BT 4.1 single mode+EDR
Operation Frequency:	2402MHz~2480MHz
Modulation Technique:	Frequency Hopping Spread Spectrum(FHSS)
Modulation Type:	GFSK, π/4DQPSK, 8DPSK
Number of Channel:	79
Hopping Channel Type:	Adaptive Frequency Hopping systems
Sample Type:	Portable production
Antenna type	Monopole
Antenna gain	-0.6dBi

4.2 Description of Support Units

The EUT has been tested independent unit.

4.3 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	7.25 x 10-8
2	Timeout	2s
3	Duty cycle	0.37%
4	Occupied Bandwidth	3%
5	RF conducted power	0.75dB
6	RF power density	2.84dB
7	Conducted Spurious emissions	0.75dB
8	RF Radiated power	4.5dB (below 1GHz)
		4.8dB (above 1GHz)
9	Radiated Spurious emission test	4.5dB (30MHz-1GHz)
		4.8dB (1GHz-18GHz)
10	Temperature test	1℃
11	Humidity test	3%
12	Supply voltages	1.5%
13	Time	3%

4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch

No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, Guangdong, China. 518057.

Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

No tests were sub-contracted.

4.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

• **CNAS (No. CNAS L2929)**

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

• **A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

• **VCCI**

The 10m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-823, R-4188, T-1153 and C-2383 respectively.

• **FCC – Registration No.: 556682**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No.: 556682.

• **Industry Canada (IC)**

Two 3m Semi-anechoic chambers and the 10m Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1, 4620C-2, 4620C-3.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None

5 Equipment List

RF Conducted					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
DC Power Supply	ZhaoXin	RXN-305D	SEM011-02	2016-10-09	2017-10-09
Spectrum Analyzer	Rohde & Schwarz	FSP	SEM004-06	2016-10-09	2017-10-09
Signal Generator	Rohde & Schwarz	SML03	SEM006-02	2016-04-25	2017-04-25
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2016-10-09	2017-10-09

RE in Chamber					
Test Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal. Date**	**Cal. Due date**
3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEM001-01	2016-05-13	2017-05-13
EMI Test Receiver	Agilent Technologies	N9038A	SEM004-05	2016-10-09	2017-10-09
BiConiLog Antenna (26-3000MHz)	ETS-LINDGREN	3142C	SEM003-01	2014-11-01	2017-11-01
Double-ridged horn (1-18GHz)	ETS-LINDGREN	3117	SEM003-11	2015-10-17	2018-10-17
Horn Antenna (18-26GHz)	ETS-LINDGREN	3160	SEM003-12	2014-11-24	2017-11-24
Pre-amplifier (0.1-1300MHz)	Agilent Technologies	8447D	SEM005-01	2016-04-25	2017-04-25
Band filter	Amindeon	Asi 3314	SEM023-01	N/A	N/A
DC Power Supply	Zhao Xin	RXN-305D	SEM011-02	2016-10-09	2017-10-09
Loop Antenna	Beijing Daze	ZN30401	SEM003-09	2015-05-13	2018-05-13

RE in Chamber					
Test Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal. Date**	**Cal. Due date**
3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2016-05-13	2017-05-13
EXA Spectrum Analyzer	Agilent Technologies Inc	N9010A	SEM004-09	2016-07-19	2017-07-19
BiConiLog Antenna (26-3000MHz)	ETS-Lindgren	3142C	SEM003-02	2014-11-15	2017-11-15
Amplifier (0.1-1300MHz)	HP	8447D	SEM005-02	2016-10-09	2017-10-09
Horn Antenna (1-18GHz)	Rohde & Schwarz	HF907	SEM003-07	2015-06-14	2018-06-14
Horn Antenna (18-26GHz)	ETS-Lindgren	3160	SEM003-12	2014-11-24	2017-11-24
Horn Antenna(26GHz-40GHz)	A.H.Systems, inc.	SAS-573	SEM003-13	2015-02-12	2018-02-12
Low Noise Amplifier	Black Diamond Series	BDLNA-0118-352810	SEM005-05	2016-10-09	2017-10-09
Band filter	Amindeon	Asi 3314	SEM023-01	N/A	N/A

General used equipment					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-03	2016-10-12	2017-10-12
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-04	2016-10-12	2017-10-12
Humidity/ Temperature Indicator	Mingle	N/A	SEM002-08	2016-10-12	2017-10-12
Barometer	Changchun Meteorological Industry Factory	DYM3	SEM002-01	2016-05-18	2017-05-18

6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.247

6.1.2 Conclusion

Standard Requirment:

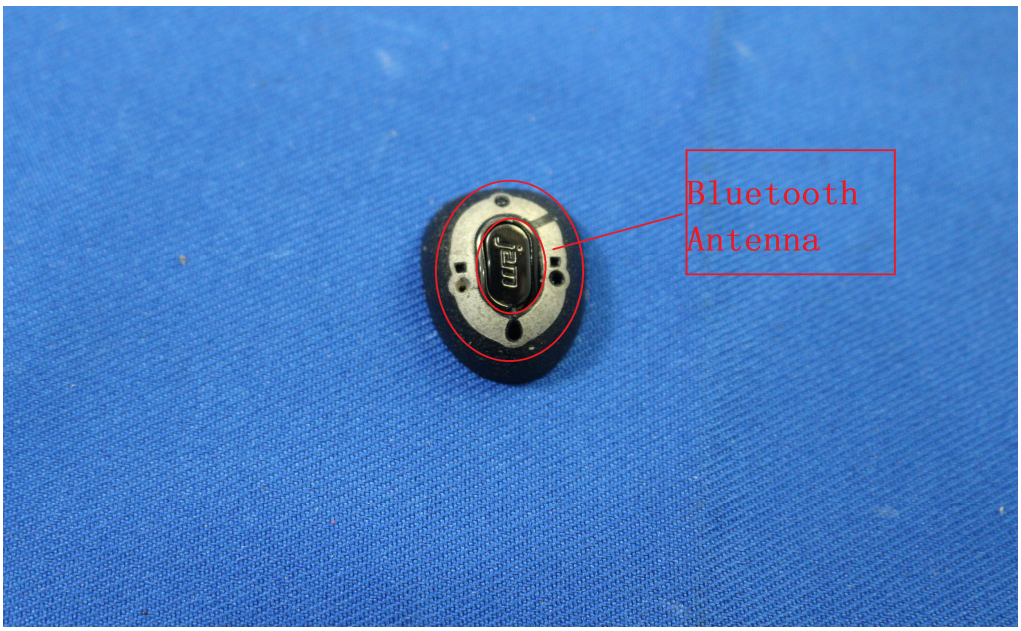
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna:

Left earbuds/ Right earbuds:



The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is -0.6dBi.

6.2 Other requirements Frequency Hopping Spread Spectrum System Hopping Sequence

6.2.1 Test Requirement:

47 CFR Part 15, Subpart C 15.247

6.2.2 Conclusion

Standard Requirment:

The system shall hop to channel frequencies that are selected at the system hopping rate from a Pseudorandom ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. However, the system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this section should the transmitter be presented with a continuous data (or information) stream. In addition, a system employing short transmission bursts must comply with the definition of a frequency hopping system and must distribute its transmissions over the minimum number of hopping channels specified in this section.

The incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hopsets to avoid hopping on occupied channels is permitted. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

Compliance for section 15.247(a)(1):

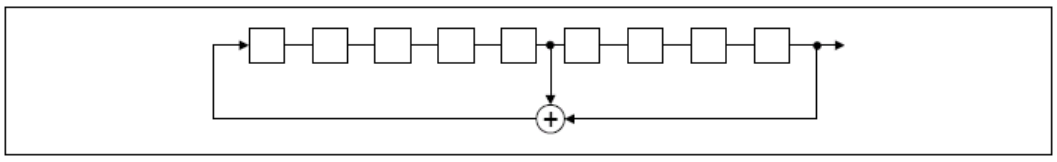
According to Technical Specification, the pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONEs; i.e. the shift register is initialized with nine ones.

> Number of shift register stages: 9

> Length of pseudo-random sequence: 29 -1 = 511 bits

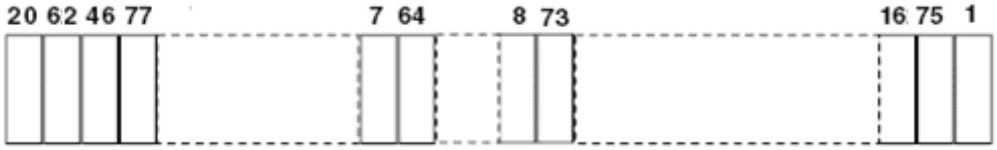
> Longest sequence of zeros: 8 (non-inverted signal)

Linear Feedback Shift Register for Generation of the PRBS sequence



Linear Feedback Shift Register for Generation of the PRBS sequence

An example of Pseudorandom Frequency Hopping Sequence as follow:



Each frequency used equally on the average by each transmitter.

According to Technical Specification, the receivers are designed to have input and IF bandwidths that match the hopping channel bandwidths of any transmitters and shift frequencies in synchronization with the transmitted signals.

Compliance for section 15.247(g):

According to Technical Specification, the system transmits the packet with the pseudorandom hopping frequency with a continuous data and the short burst transmission from the Bluetooth system is also transmitted under the frequency hopping system with the pseudorandom hopping frequency system.

Compliance for section 15.247(h):

According to Technical specification, the system incorporates with an adaptive system to detect other user within the spectrum band so that it individ

7 Radio Spectrum Matter Test Results

7.1 20dB Bandwidth

Test Requirement	47 CFR Part 15, Subpart C 15.247(a)(1)
Test Method:	ANSI C63.10 (2013) Section 7.8.7
Limite:	N/A

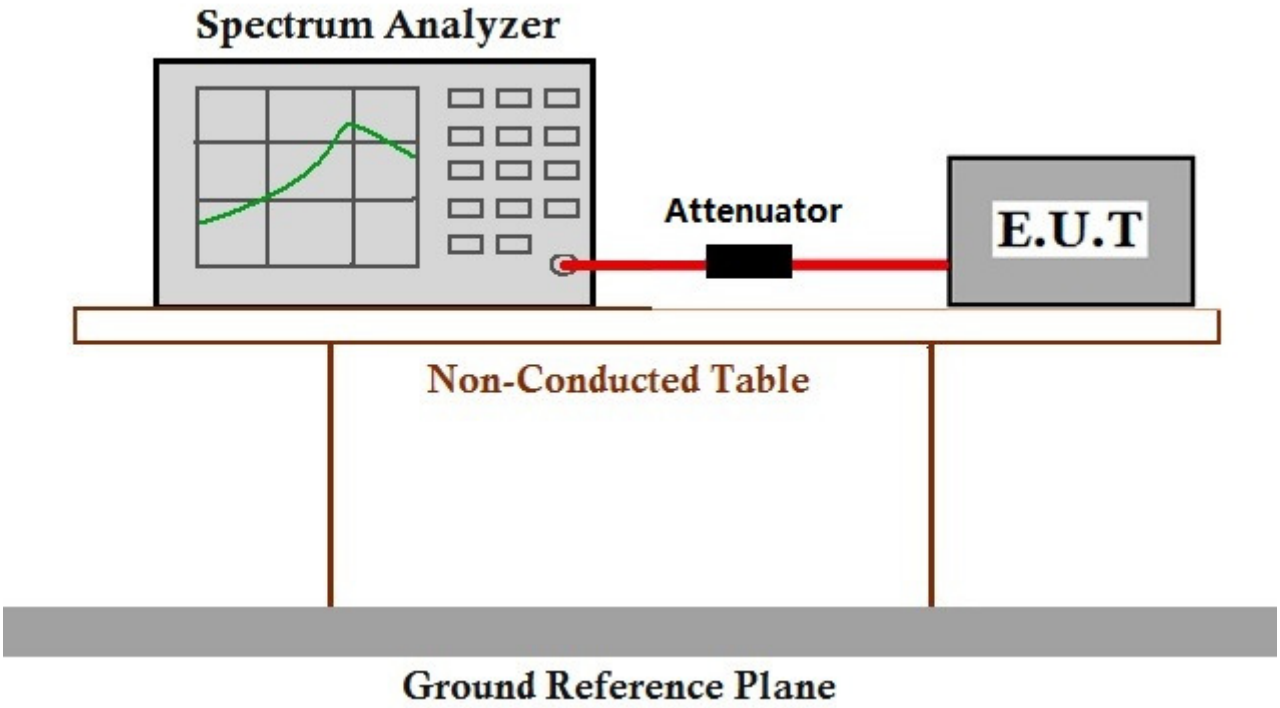
7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 23.0 °C Humidity: 56 % RH Atmospheric Pressure: 1020 mbar

Pretest these mode to find the worst case:	b: TX for Left earbuds c: TX for Right earbuds (Through Pre-scan, find the DH5 of data type is the worst case of GFSK modulation type, 2-DH5 of data type is the worst case of π/4DQPSK modulation type, 3-DH5 of data type is the worst case of 8DPSK modulation type.)
The worst case for final test:	b: TX for Left earbuds c: TX for Right earbuds (Through Pre-scan, find the DH5 of data type is the worst case of GFSK modulation type, 2-DH5 of data type is the worst case of π/4DQPSK modulation type, 3-DH5 of data type is the worst case of 8DPSK modulation type.)

7.1.2 Test Setup Diagram



7.1.3 Measurement Data

The detailed test data see: Appendix 15.247

7.2 Conducted Peak Output Power

Test Requirement	47 CFR Part 15, Subpart C 15.247(b)(1)
Test Method:	ANSI C63.10 (2013) Section 7.8.5
Limit:	0.125W for all other frequency hopping systems

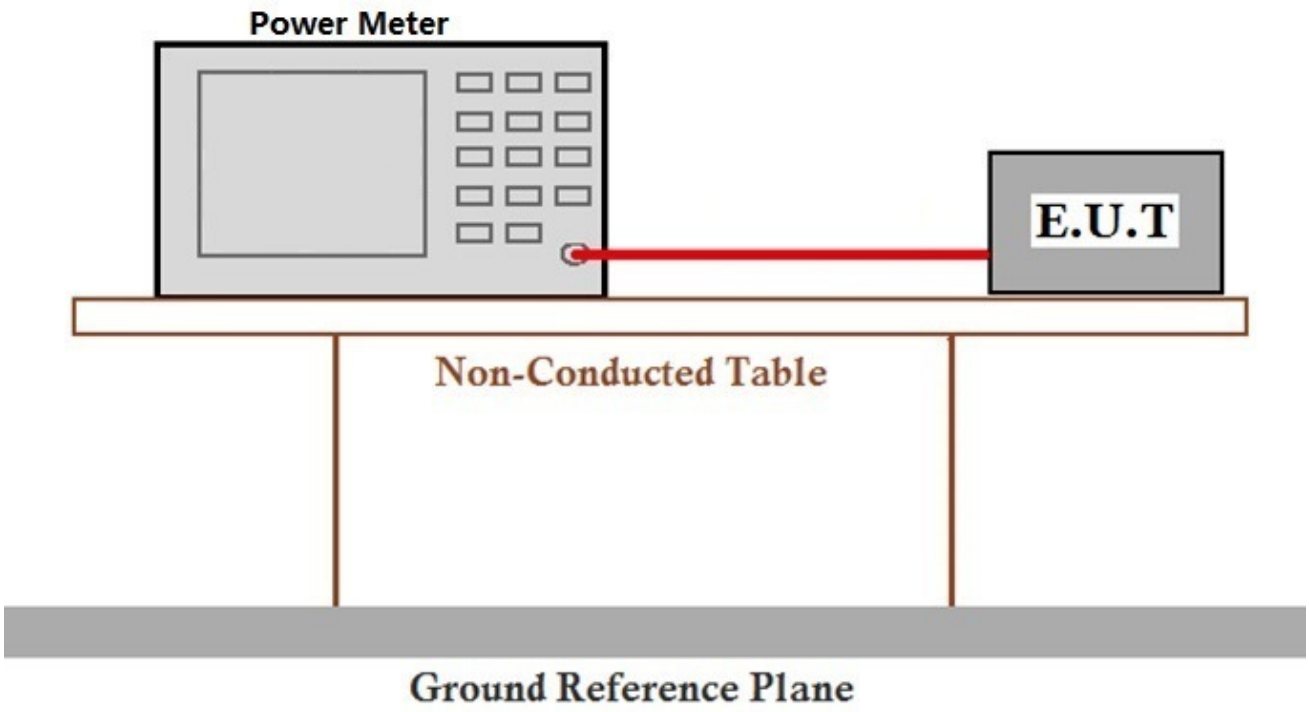
7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 23.0 °C Humidity: 56 % RH Atmospheric Pressure: 1020 mbar

Pretest these mode to find the worst case:	b: TX for Left earbuds c: TX for Right earbuds (Through Pre-scan, find the DH5 of data type is the worst case of GFSK modulation type, 2-DH5 of data type is the worst case of π/4DQPSK modulation type, 3-DH5 of data type is the worst case of 8DPSK modulation type.)
The worst case for final test:	b: TX for Left earbuds c: TX for Right earbuds (Through Pre-scan, find the DH5 of data type is the worst case of GFSK modulation type, 2-DH5 of data type is the worst case of π/4DQPSK modulation type, 3-DH5 of data type is the worst case of 8DPSK modulation type.)

7.2.2 Test Setup Diagram



7.2.3 Measurement Data

The detailed test data see: Appendix 15.247

7.3 Carrier Frequencies Separation

Test Requirement	47 CFR Part 15, Subpart C 15.247a(1)
Test Method:	ANSI C63.10 (2013) Section 7.8.2
Limit:	2/3 of the 20dB bandwidth base on the transmission power is less than 0.125W

7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 23.0 °C Humidity: 56 % RH Atmospheric Pressure: 1020 mbar

Pretest these mode to find the worst case:

b: TX for Left earbuds

c: TX for Right earbuds

(Through Pre-scan, find the DH5 of data type is the worst case of GFSK modulation type, 2-DH5 of data type is the worst case of π/4DQPSK modulation type, 3-DH5 of data type is the worst case of 8DPSK modulation type.)

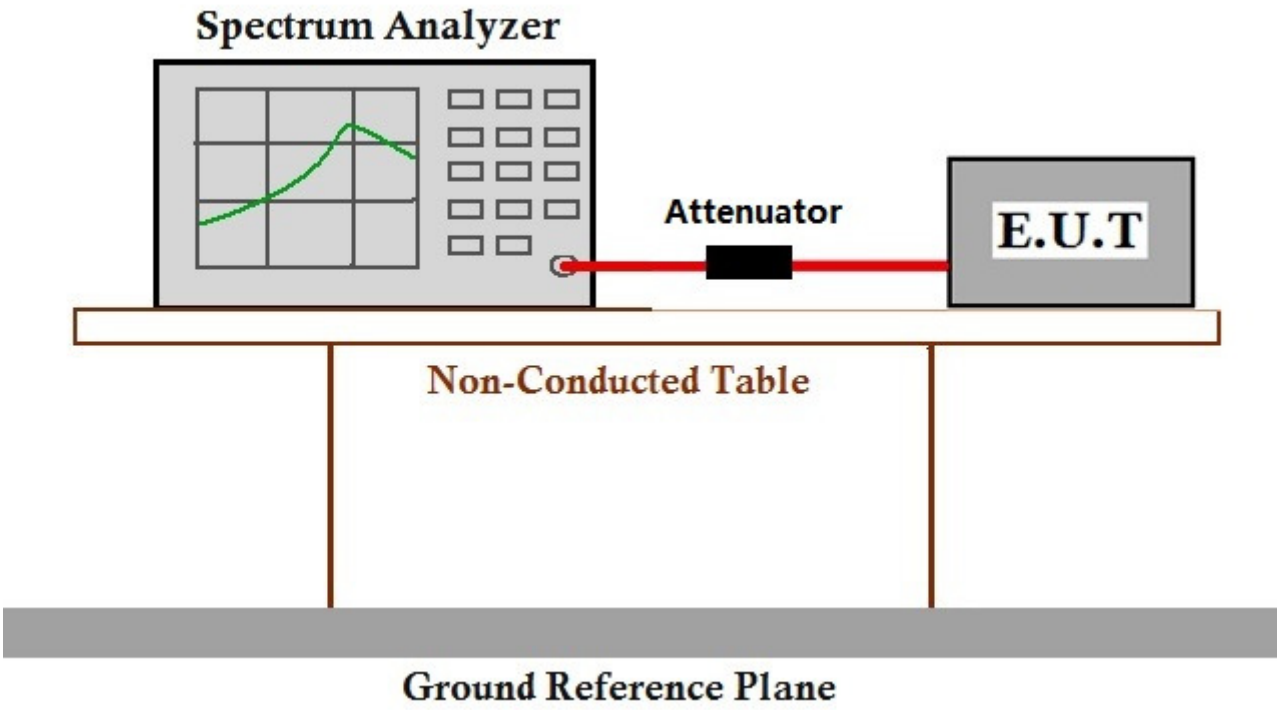
The worst case for final test:

b: TX for Left earbuds

c: TX for Right earbuds

(Through Pre-scan, find the DH5 of data type is the worst case of GFSK modulation type, 2-DH5 of data type is the worst case of π/4DQPSK modulation type, 3-DH5 of data type is the worst case of 8DPSK modulation type.)

7.3.2 Test Setup Diagram



7.3.3 Measurement Data

The detailed test data see: Appendix 15.247

7.4 Hopping Channel Number

Test Requirement	47 CFR Part 15, Subpart C 15.247a(1)(iii)
Test Method:	ANSI C63.10 (2013) Section 7.8.3
Limit:	At least 15 channels

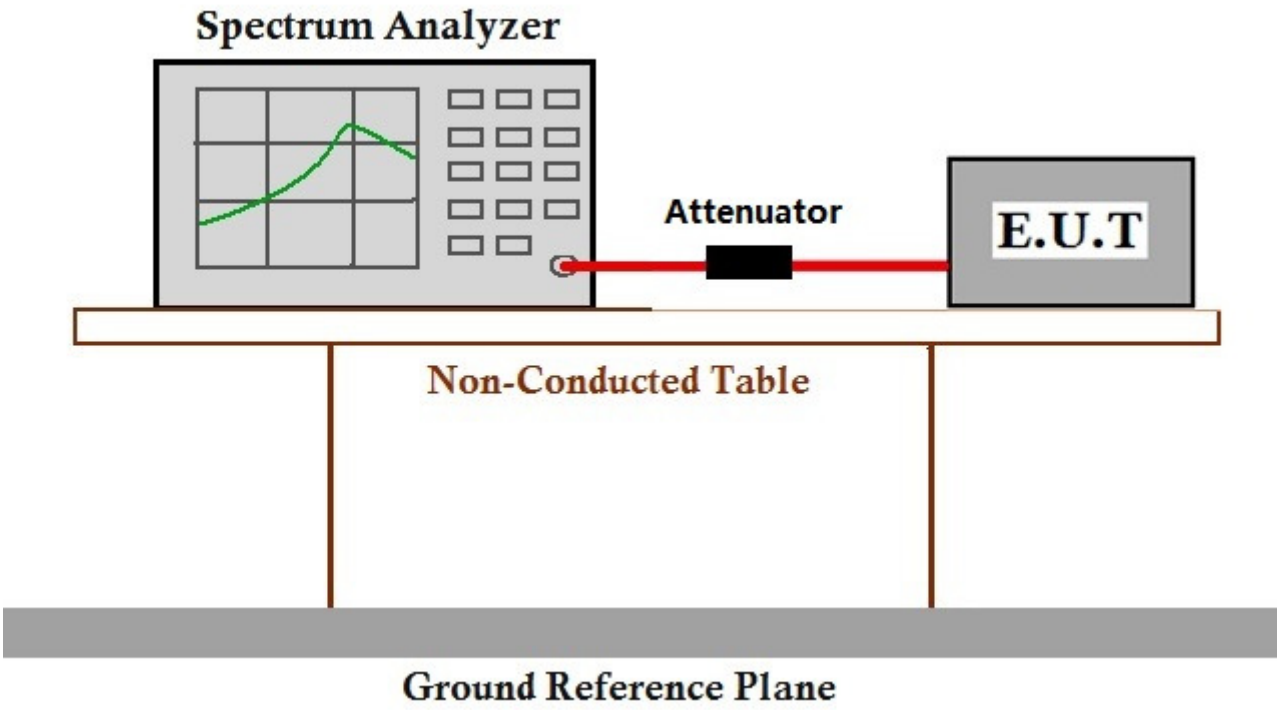
7.4.1 E.U.T. Operation

Operating Environment:

Temperature: 23.0 °C Humidity: 56 % RH Atmospheric Pressure: 1020 mbar

Pretest these mode to find the worst case:	b: TX for Left earbuds c: TX for Right earbuds (Hopping transmitting with all kind of modulation and all kind of data type.)
The worst case for final test:	b: TX for Left earbuds c: TX for Right earbuds (Hopping transmitting with all kind of modulation and all kind of data type.)

7.4.2 Test Setup Diagram



7.4.3 Measurement Data

The detailed test data see: Appendix 15.247

7.5 Dwell Time

Test Requirement	47 CFR Part 15, Subpart C 15.247a(1)(iii)
Test Method:	ANSI C63.10 (2013) Section 7.8.4
Limit:	0.4S within a period of 0.4S

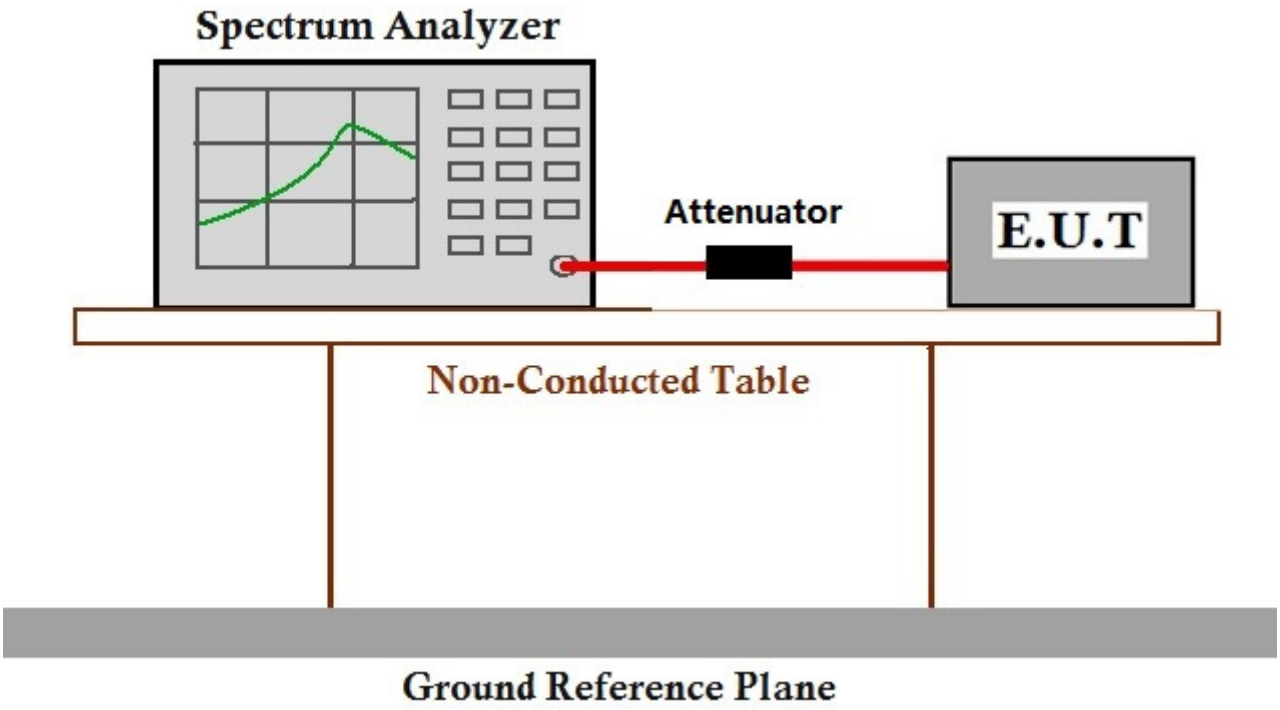
7.5.1 E.U.T. Operation

Operating Environment:

Temperature: 23.0 °C Humidity: 56 % RH Atmospheric Pressure: 1020 mbar

Pretest these mode to find the worst case:	b: TX for Left earbuds c: TX for Right earbuds (Hopping transmitting with all kind of modulation and all kind of data type.)
The worst case for final test:	b: TX for Left earbuds c: TX for Right earbuds (Hopping transmitting with all kind of modulation and all kind of data type.)

7.5.2 Test Setup Diagram



7.5.3 Measurement Data

The detailed test data see: Appendix 15.247

7.6 Conducted Spurious Emissions

Test Requirement	47 CFR Part 15, Subpart C 15.247(d)
Test Method:	ANSI C63.10 (2013) Section 7.8.8
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

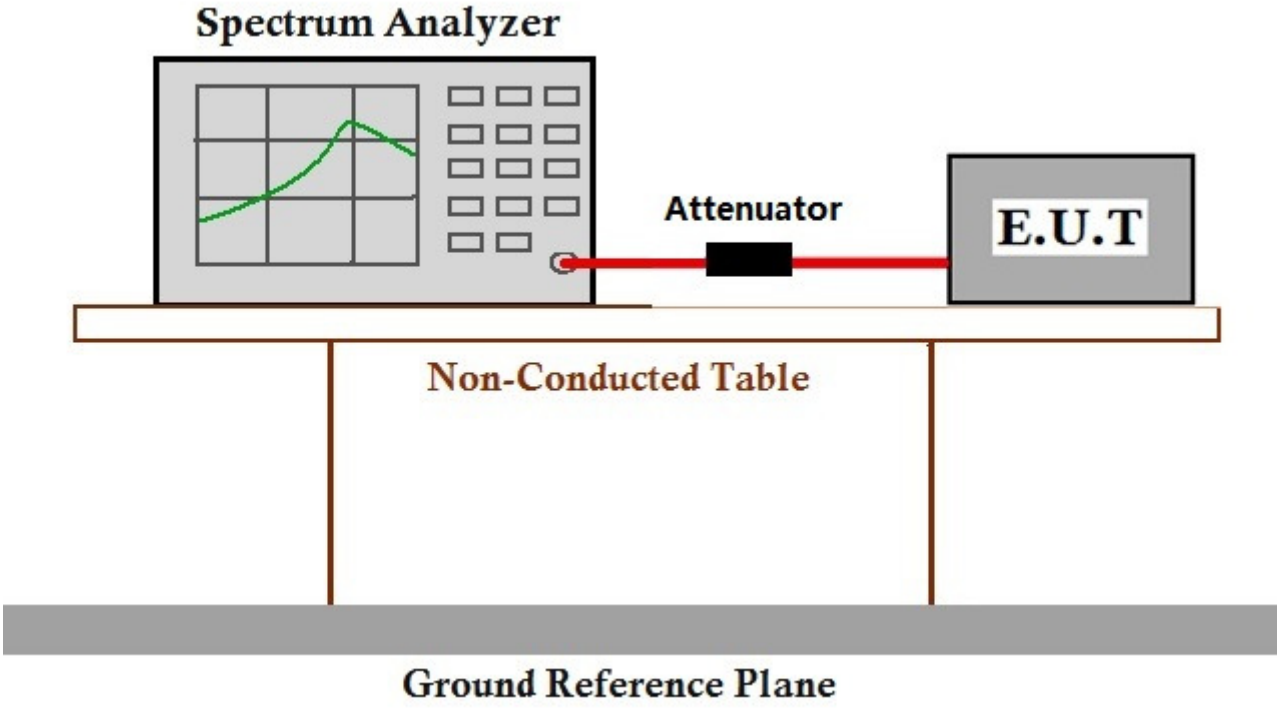
7.6.1 E.U.T. Operation

Operating Environment:

Temperature: 23.0 °C Humidity: 56 % RH Atmospheric Pressure: 1020 mbar

Pretest these mode to find the worst case:	b: TX for Left earbuds c: TX for Right earbuds (Through Pre-scan, find the DH5 of data type is the worst case of GFSK modulation type, 2-DH5 of data type is the worst case of π/4DQPSK modulation type, 3-DH5 of data type is the worst case of 8DPSK modulation type.)
The worst case for final test:	b: TX for Left earbuds c: TX for Right earbuds (Through Pre-scan, find the DH5 of data type is the worst case of GFSK modulation type, 2-DH5 of data type is the worst case of π/4DQPSK modulation type, 3-DH5 of data type is the worst case of 8DPSK modulation type.)

7.6.2 Test Setup Diagram



7.6.3 Measurement Data

The detailed test data see: Appendix 15.247

7.7 Radiated Spurious Emissions

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209
Test Method: ANSI C63.10 (2013) Section 6.4,6.5,6.6
Measurement Distance: 3m
Limit:

Frequency	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
0.009MHz-0.490MHz	2400/F(kHz)	-	-	300
0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
1.705MHz-30MHz	30	-	-	30
30MHz-88MHz	100	40.0	Quasi-peak	3
88MHz-216MHz	150	43.5	Quasi-peak	3
216MHz-960MHz	200	46.0	Quasi-peak	3
960MHz-1GHz	500	54.0	Quasi-peak	3
Above 1GHz	500	54.0	Average	3
Note: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.				

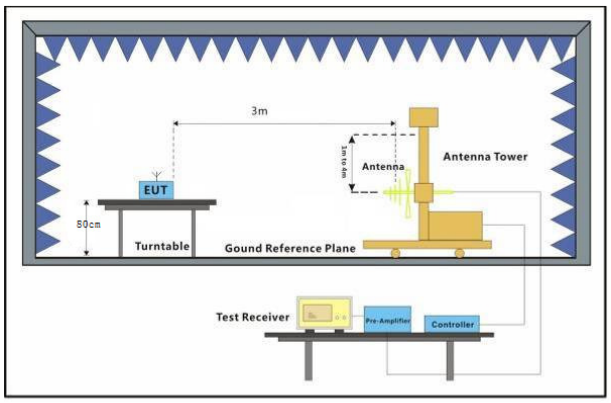
7.7.1 E.U.T. Operation

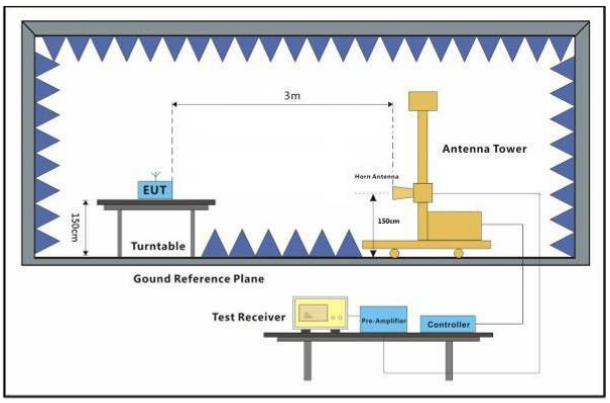
Operating Environment:

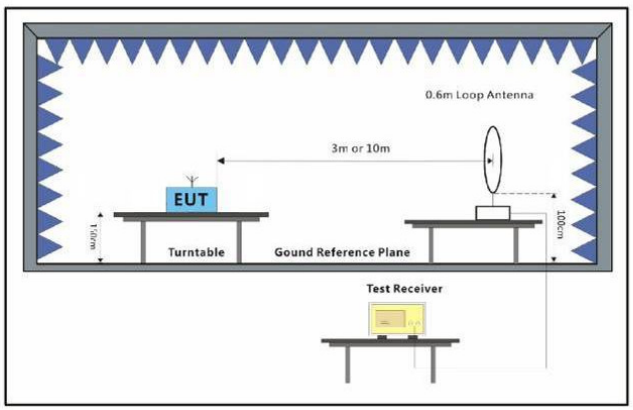
Temperature: 22.0 °C Humidity: 54 % RH Atmospheric Pressure: 1015 mbar

Pretest these mode to find the worst case:	b: TX for Left earbuds c: TX for Right earbuds (Through Pre-scan, find the DH1 of data type and GFSK modulation is the worst case. For below 1GHz part, through pre-scan, the worst case is the lowest channel. Only the worst case is recorded in the report.)
The worst case for final test:	b: TX for Left earbuds c: TX for Right earbuds (Through Pre-scan, find the DH1 of data type and GFSK modulation is the worst case. For below 1GHz part, through pre-scan, the worst case is the lowest channel. Only the worst case is recorded in the report.)

7.7.2 Test Setup Diagram







7.7.3 Measurement Data

a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

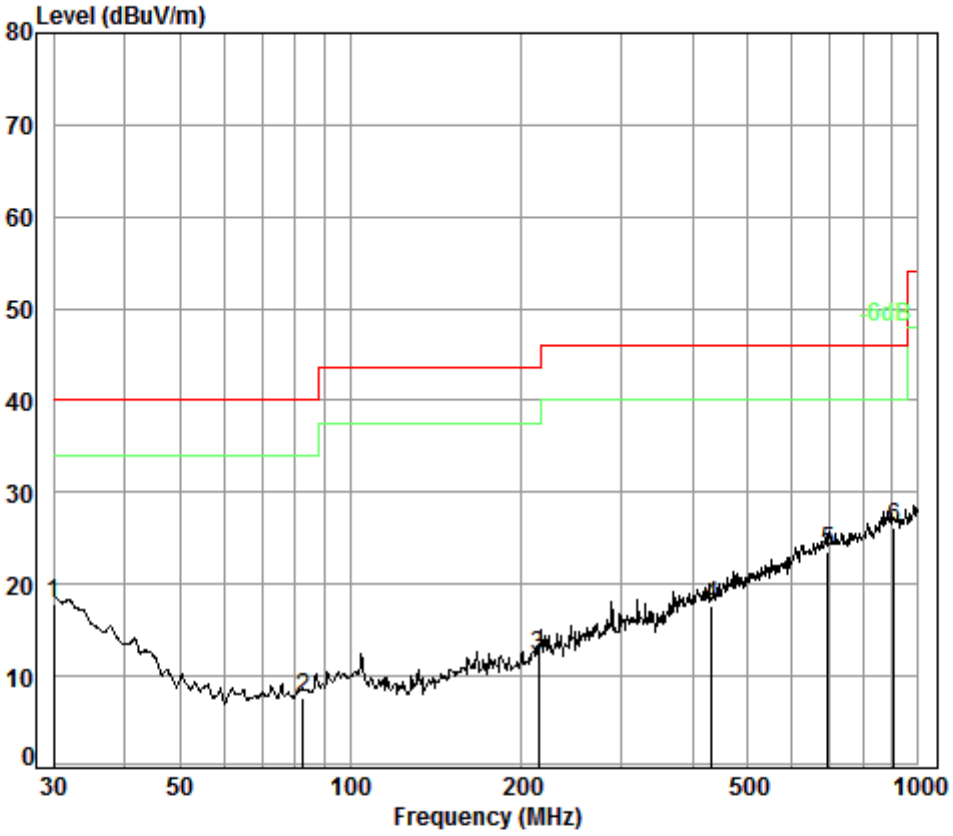
h. Test the EUT in the lowest channel (2402MHz),the middle channel (2441MHz),the Highest channel (2480MHz)

i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.

j. Repeat above procedures until all frequencies measured was complete.

Radiated Emission below 1GHz

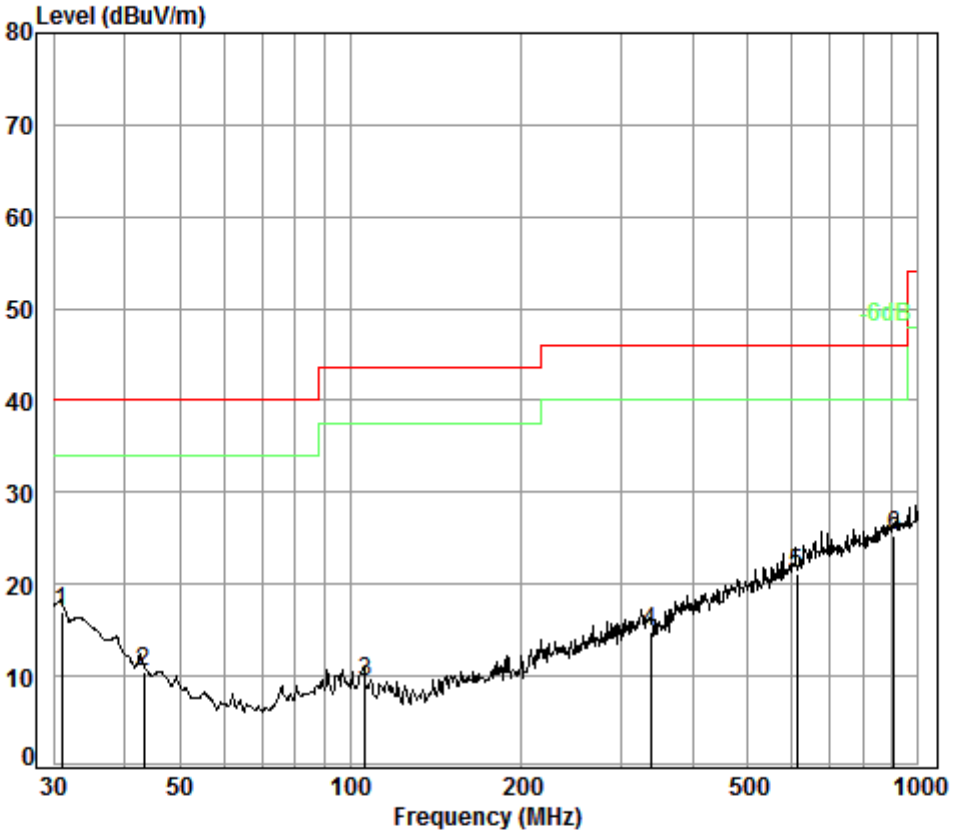
30MHz~1GHz (QP)		
Test mode:	b (Through Pre-scan left and right earbuds, find the mode b is the worst case, only show the worst case in the report)	Vertical



Condition: 3m Vertical
Job No. : 01530CR
Test mode: b

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	30.00	0.60	18.70	27.36	26.02	17.96	40.00	-22.04
2	82.65	1.10	7.96	27.22	25.84	7.68	40.00	-32.32
3	214.51	1.49	10.95	26.65	26.34	12.13	43.50	-31.37
4	432.55	2.34	16.55	27.33	26.05	17.61	46.00	-28.39
5	691.99	2.89	21.54	27.42	26.59	23.60	46.00	-22.40
6 pp	906.48	3.61	23.23	26.75	26.07	26.16	46.00	-19.84

Test mode:	b (Through Pre-scan left and right earbuds, find the mode b is the worst case, only show the worst case in the report)	Horizontal



Condition: 3m HORIZONTAL
Job No. : 01530CR
Test mode: b

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	31.07	0.60	18.10	27.35	25.68	17.03	40.00	-22.97
2	43.20	0.67	11.69	27.31	25.35	10.40	40.00	-29.60
3	106.01	1.22	8.80	27.16	26.49	9.35	43.50	-34.15
4	338.40	2.02	14.32	26.70	25.27	14.91	46.00	-31.09
5	612.06	2.73	20.14	27.53	25.77	21.11	46.00	-24.89
6 pp	906.48	3.61	23.23	26.75	25.12	25.21	46.00	-20.79

Radiated Emission above 1GHz

Mode:b; Polarization:Horizontal; Modulation Type:GFSK; Channel:Low

Frequency (MHz)	Antenna factors (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading Level (dBμV)	Level (dBμV/m)	Limit (dBμV/m)	Over limit (dB)
1585.248	26.18	4.57	38.04	45.07	38.78	74	-35.22
3168.080	31.62	6.06	37.92	44.32	45.71	74	-28.29
4804.000	34.17	7.73	38.40	44.01	48.21	74	-25.79
7206.000	36.41	9.65	37.11	39.10	51.57	74	-22.43
9608.000	37.52	11.06	35.09	36.79	52.88	74	-21.12
11994.380	38.59	12.40	35.60	34.52	53.68	74	-20.32

Mode:b; Polarization:Vertical; Modulation Type:GFSK; Channel:Low

Frequency (MHz)	Antenna factors (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading Level (dBμV)	Level (dBμV/m)	Limit (dBμV/m)	Over limit (dB)
1453.818	25.61	4.42	38.05	46.57	39.46	74	-34.54
2905.419	30.97	5.84	37.91	43.23	44.34	74	-29.66
4804.000	34.17	7.73	38.40	42.30	46.50	74	-27.50
7206.000	36.41	9.65	37.11	38.61	51.08	74	-22.92
9608.000	37.52	11.06	35.09	37.05	53.14	74	-20.86
12303.620	38.78	12.85	36.33	35.15	53.50	74	-20.50

Mode:b; Polarization:Horizontal; Modulation Type:GFSK; Channel:middle

Frequency (MHz)	Antenna factors (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading Level (dBμV)	Level (dBμV/m)	Limit (dBμV/m)	Over limit (dB)
1724.166	26.77	4.73	38.03	42.78	37.64	74	-36.36
3176.155	31.63	6.07	37.92	44.01	45.42	74	-28.58
4882.000	34.30	7.84	38.44	47.92	52.31	74	-21.69
7323.000	36.37	9.73	37.01	41.18	53.69	74	-20.31
9764.000	37.55	11.21	35.02	35.82	52.28	74	-21.72
12272.340	38.76	12.81	36.25	34.57	53.01	74	-20.99

Mode:b; Polarization:Vertical; Modulation Type:GFSK; Channel:middle

Frequency (MHz)	Antenna factors (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading Level (dBμV)	Level (dBμV/m)	Limit (dBμV/m)	Over limit (dB)
1453.818	25.61	4.42	38.05	48.79	41.68	74	-32.32
1978.230	27.72	4.99	38.00	48.05	44.29	74	-29.71
3350.560	31.95	6.20	37.94	45.64	47.54	74	-26.46
4882.000	34.30	7.84	38.44	46.73	51.12	74	-22.88
7323.000	36.37	9.73	37.01	40.07	52.58	74	-21.42
9764.000	37.55	11.21	35.02	36.86	53.32	74	-20.68

Mode:b; Polarization:Horizontal; Modulation Type:GFSK; Channel:High

Frequency (MHz)	Antenna factors (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading Level (dBμV)	Level (dBμV/m)	Limit (dBμV/m)	Over limit (dB)
1724.166	26.77	4.73	38.03	42.89	37.75	74	-36.25
3160.026	31.60	6.05	37.92	43.94	45.30	74	-28.70
4960.000	34.43	7.94	38.48	45.56	50.14	54	-3.86
4960.000	34.43	7.94	38.48	50.36	54.94	74	-19.06
7440.000	36.33	9.81	36.91	40.49	53.02	74	-20.98
9920.000	37.58	11.35	34.95	35.84	52.66	74	-21.34

Mode:b; Polarization:Vertical; Modulation Type:GFSK; Channel:High

Frequency (MHz)	Antenna factors (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading Level (dBμV)	Level (dBμV/m)	Limit (dBμV/m)	Over limit (dB)
1453.818	25.61	4.42	38.05	49.18	42.07	74	-31.93
3143.979	31.57	6.04	37.91	43.99	45.31	74	-28.69
4960.000	34.43	7.94	38.48	48.35	52.93	74	-21.07
7440.000	36.33	9.81	36.91	40.90	53.43	74	-20.57
9920.000	37.58	11.35	34.95	35.43	52.25	74	-21.75
12303.620	38.78	12.85	36.33	35.52	53.87	74	-20.13

Mode: c; Polarization:Horizontal; Modulation Type:GFSK; Channel:Low

Frequency (MHz)	Antenna factors (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading Level (dBμV)	Level (dBμV/m)	Limit (dBμV/m)	Over limit (dB)
1634.419	26.40	4.63	38.04	45.35	39.45	74	-34.55
2950.135	31.13	5.88	37.90	44.51	45.47	74	-28.53
4804.000	34.17	7.73	38.40	43.14	47.34	74	-26.66
7206.000	36.41	9.65	37.11	39.64	52.11	74	-21.89
9608.000	37.52	11.06	35.09	36.41	52.50	74	-21.50
12148.020	38.69	12.62	35.96	34.98	53.74	74	-20.26

Mode: c; Polarization:Vertical; Modulation Type:GFSK; Channel:Low

Frequency (MHz)	Antenna factors (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading Level (dBμV)	Level (dBμV/m)	Limit (dBμV/m)	Over limit (dB)
1453.818	25.61	4.42	38.05	49.12	42.01	74	-31.99
2905.419	30.97	5.84	37.91	44.21	45.32	74	-28.68
4804.000	34.17	7.73	38.40	42.84	47.04	74	-26.96
7206.000	36.41	9.65	37.11	38.73	51.20	74	-22.80
9608.000	37.52	11.06	35.09	35.95	52.04	74	-21.96
12210.020	38.73	12.71	36.10	34.77	53.38	74	-20.62

Mode:c; Polarization:Horizontal; Modulation Type:GFSK; Channel:middle

Frequency (MHz)	Antenna factors (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading Level (dBμV)	Level (dBμV/m)	Limit (dBμV/m)	Over limit (dB)
1453.818	25.61	4.42	38.05	48.99	41.88	74	-32.12
3143.979	31.57	6.04	37.91	45.41	46.73	74	-27.27
4882.000	34.30	7.84	38.44	47.60	51.99	74	-22.01
7323.000	36.37	9.73	37.01	39.86	52.37	74	-21.63
9764.000	37.55	11.21	35.02	36.15	52.61	74	-21.39
12210.020	38.73	12.71	36.10	34.90	53.51	74	-20.49

Mode: c; Polarization:Vertical; Modulation Type:GFSK; Channel:middle

Frequency (MHz)	Antenna factors (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading Level (dBμV)	Level (dBμV/m)	Limit (dBμV/m)	Over limit (dB)
1296.469	24.94	4.21	38.07	45.00	37.10	74	-36.90
1978.230	27.72	4.99	38.00	44.89	41.13	74	-32.87
3480.968	32.17	6.29	37.95	44.99	47.17	74	-26.83
4882.000	34.30	7.84	38.44	48.85	53.24	74	-20.76
7323.000	36.37	9.73	37.01	40.01	52.52	74	-21.48
9764.000	37.55	11.21	35.02	37.28	53.74	74	-20.26

Mode: c; Polarization:Horizontal; Modulation Type:GFSK; Channel:High

Frequency (MHz)	Antenna factors (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading Level (dBμV)	Level (dBμV/m)	Limit (dBμV/m)	Over limit (dB)
1553.293	26.04	4.54	38.04	42.54	36.06	74	-37.94
2184.699	28.43	5.17	37.98	41.30	40.53	74	-33.47
3700.260	32.78	6.47	37.97	43.24	45.93	74	-28.07
4960.000	34.43	7.94	38.48	48.50	53.08	74	-20.92
7440.000	36.33	9.81	36.91	39.41	51.94	74	-22.06
9920.000	37.58	11.35	34.95	37.05	53.87	74	-20.13

Mode: c; Polarization:Vertical; Modulation Type:GFSK; Channel:High

Frequency (MHz)	Antenna factors (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Reading Level (dBμV)	Level (dBμV/m)	Limit (dBμV/m)	Over limit (dB)
1453.818	25.61	4.42	38.05	47.95	40.84	74	-33.16
3308.185	31.87	6.16	37.93	43.57	45.35	74	-28.65
4960.000	34.43	7.94	38.48	47.59	52.17	74	-21.83
7440.000	36.33	9.81	36.91	40.92	53.45	74	-20.55
9920.000	37.58	11.35	34.95	35.77	52.59	74	-21.41
12366.420	38.82	12.95	36.48	35.31	53.50	74	-20.50

Remark:

1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

   Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

2) Scan from 9kHz to 25GHz, the disturbance above 13GHz and below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

3) As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. So, only the peak measurements were shown in the report.

7.8 Radiated Emissions which fall in the restricted bands

Test Requirement	47 CFR Part 15, Subpart C 15.205 & 15.209
Test Method:	ANSI C63.10 (2013) Section 6.10.5
Measurement Distance:	3m

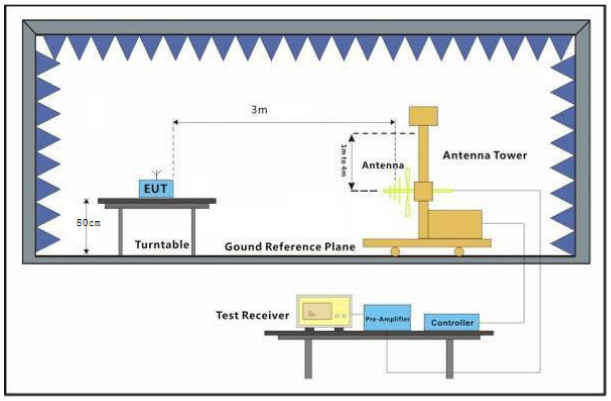
7.8.1 E.U.T. Operation

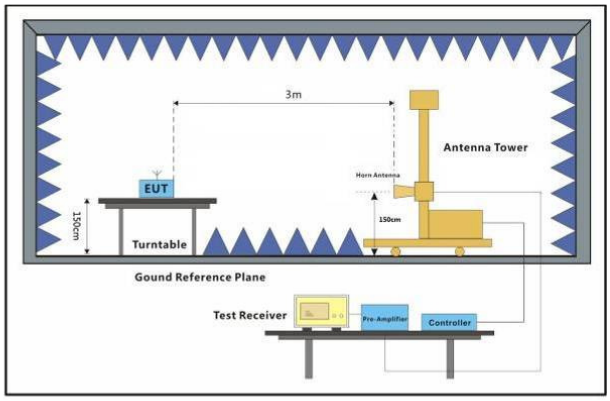
Operating Environment:

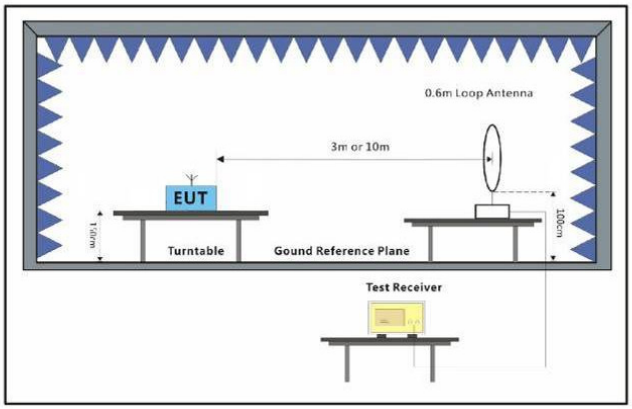
Temperature: 23.0 °C Humidity: 54 % RH Atmospheric Pressure: 1015 mbar

Pretest these mode to find the worst case:	b: TX for Left earbuds c: TX for Right earbuds (Through Pre-scan, find the DH5 of data type and GFSK modulation is the worst case. Only the worst case is recorded in the report.)
The worst case for final test:	b: TX for Left earbuds c: TX for Right earbuds (Through Pre-scan, find the DH5 of data type and GFSK modulation is the worst case. Only the worst case is recorded in the report.)

7.8.2 Test Setup Diagram







7.8.3 Measurement Data

a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

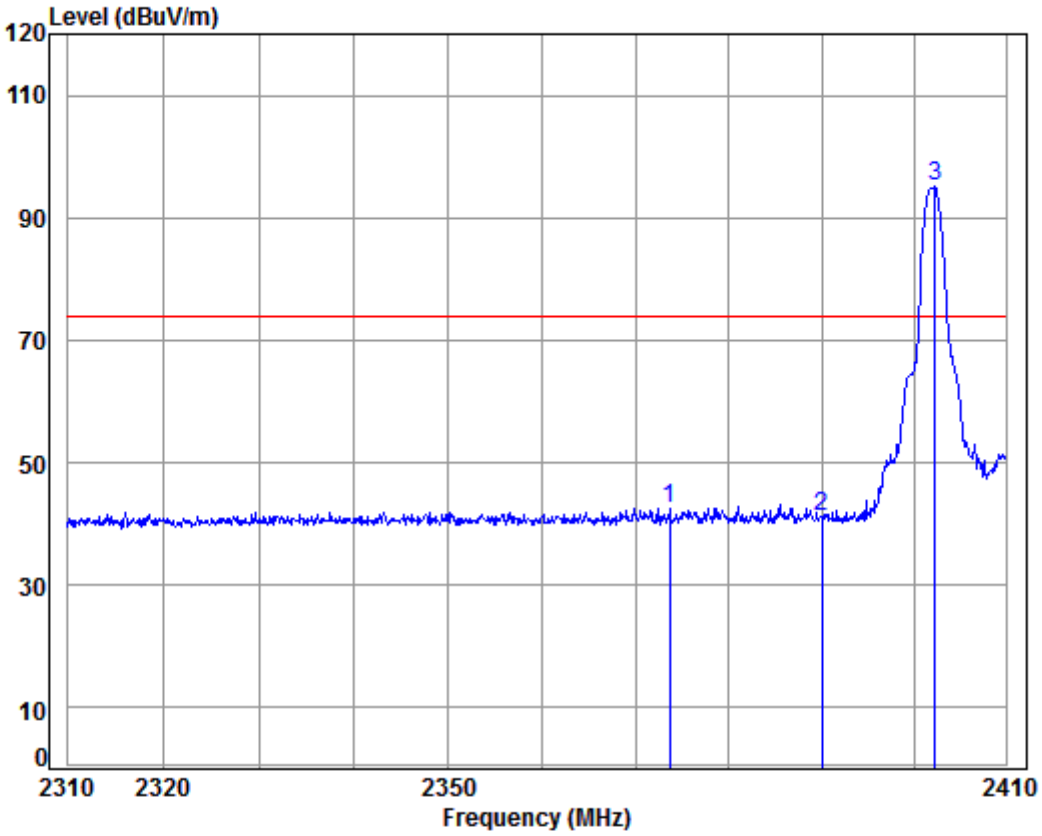
g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

h. Test the EUT in the lowest channel (2402MHz),the middle channel (2441MHz),the Highest channel (2480MHz)

i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.

j. Repeat above procedures until all frequencies measured was complete.

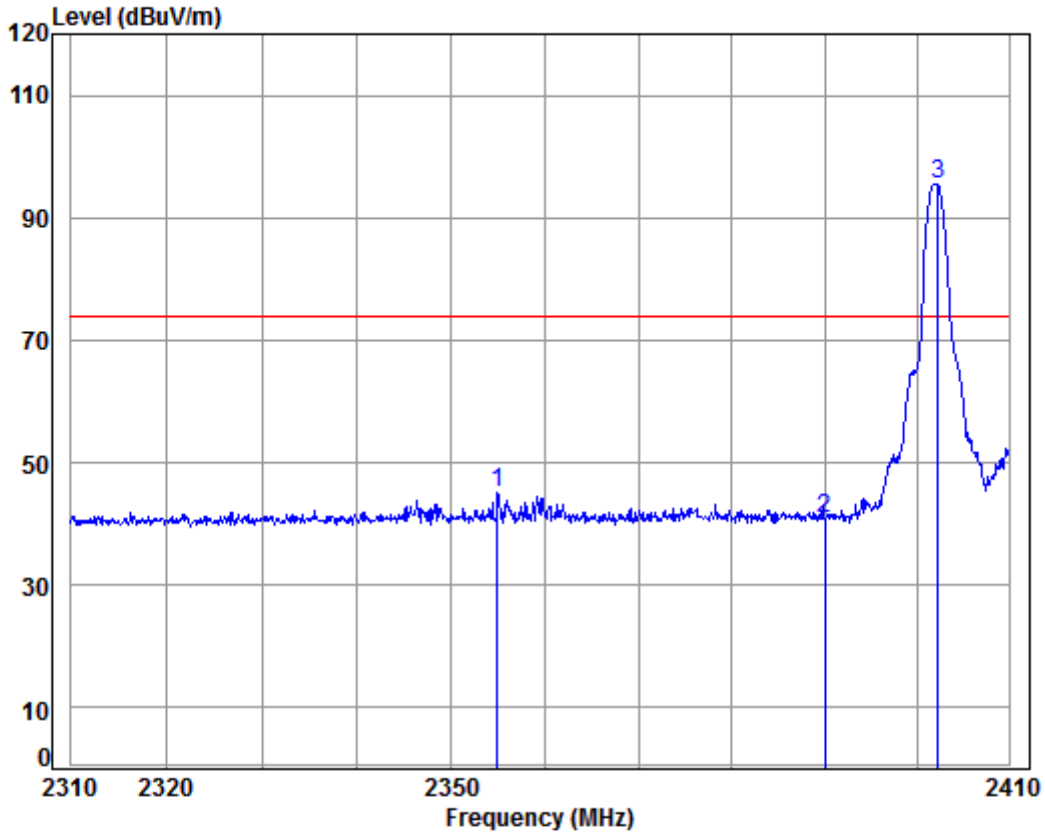
Mode:b; Polarization:Horizontal; Modulation Type:GFSK; Channel:Low



Condition: 3m Horizontal
Job No: : 01530CR
Mode: : 2402 Bandedge
: BT-L

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	2373.712	5.32	29.03	37.96	46.13	42.52	74.00	-31.48	
2	2390.000	5.34	29.08	37.96	44.70	41.16	74.00	-32.84	
3 pp	2402.250	5.35	29.11	37.96	98.50	95.00	74.00	21.00	

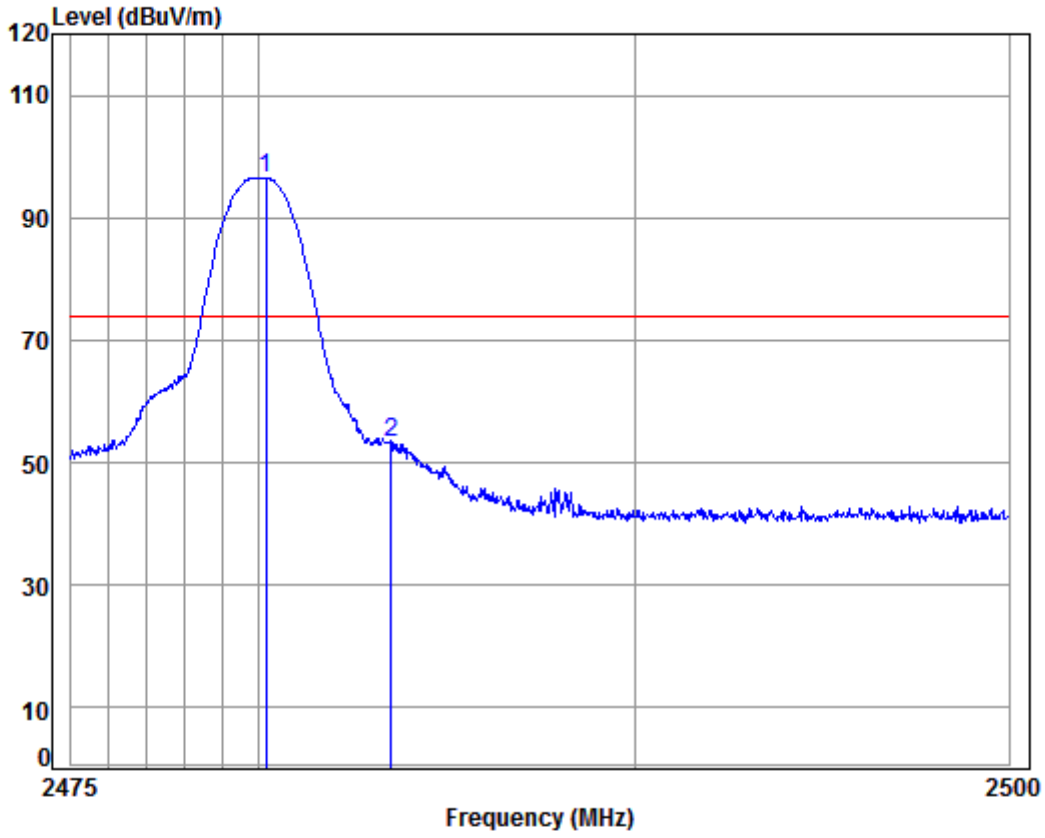
Mode:b; Polarization:Vertical; Modulation Type:GFSK; Channel:Low



Condition: 3m VERTICAL
Job No: : 01530CR
Mode: : 2402 Bandedge
: BT-L

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	2354.975	5.31	28.97	37.96	48.71	45.03	74.00	-28.97	
2	2390.000	5.34	29.08	37.96	44.47	40.93	74.00	-33.07	
3 pp	2402.250	5.35	29.11	37.96	98.94	95.44	74.00	21.44	

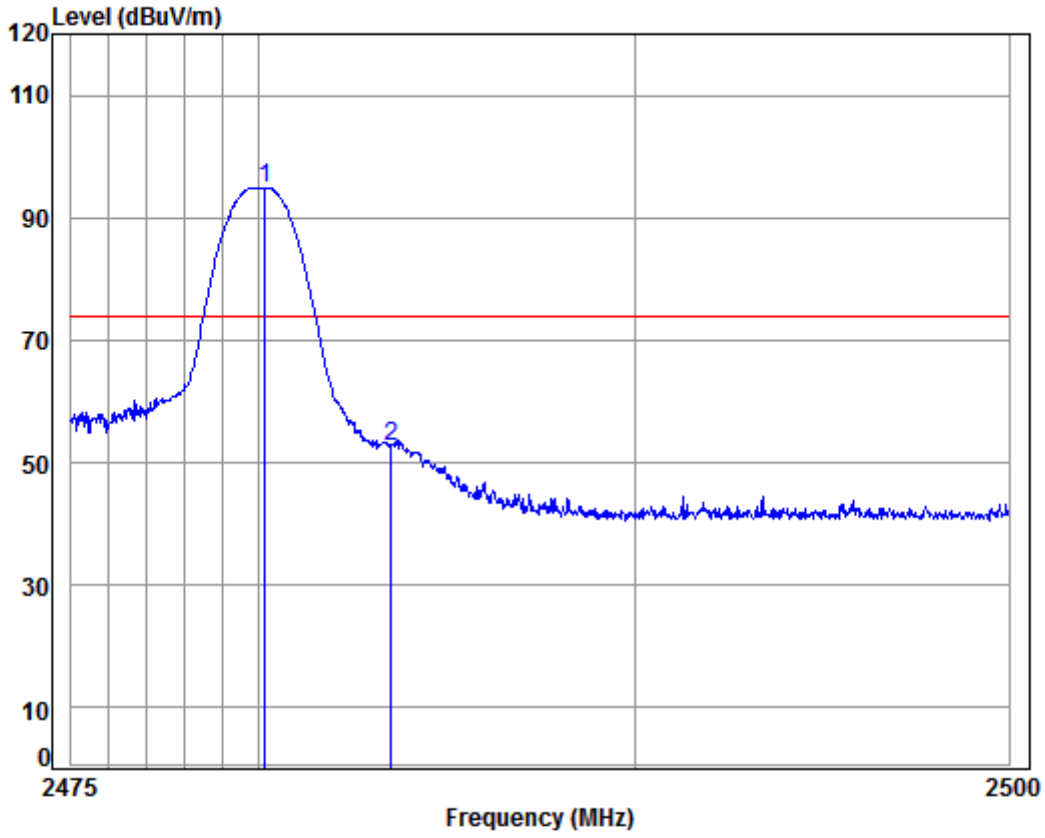
Mode:b; Polarization:Horizontal; Modulation Type:GFSK; Channel:High



Condition: 3m HORIZONTAL
Job No: : 01530CR
Mode: : 2480 Bandedge
: BT-L

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1 pp	2480.179	5.41	29.34	37.95	99.67	96.47	74.00	22.47	
2	2483.500	5.41	29.35	37.95	56.38	53.19	74.00	-20.81	

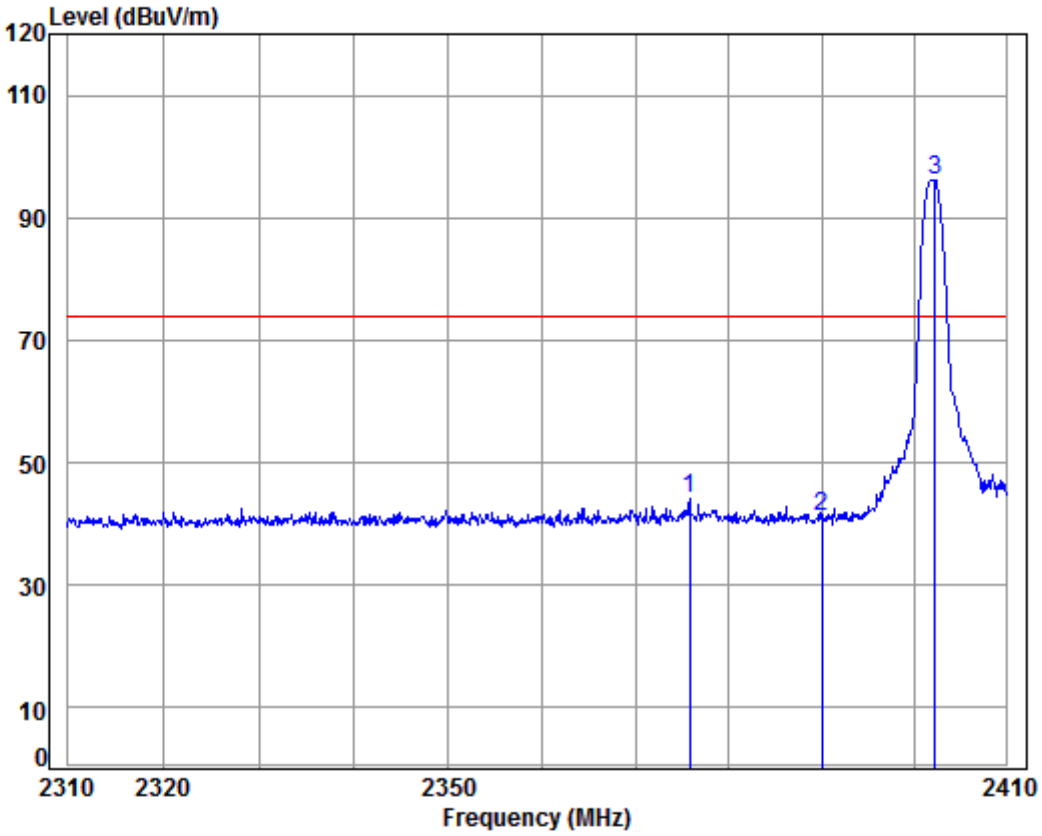
Mode:b; Polarization:Vertical; Modulation Type:GFSK; Channel:High



Condition: 3m VERTICAL
Job No: : 01530CR
Mode: : 2480 Bandedge
: BT-L

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1 pp	2480.154	5.41	29.34	37.95	98.18	94.98	74.00	20.98	
2	2483.500	5.41	29.35	37.95	55.99	52.80	74.00	-21.20	

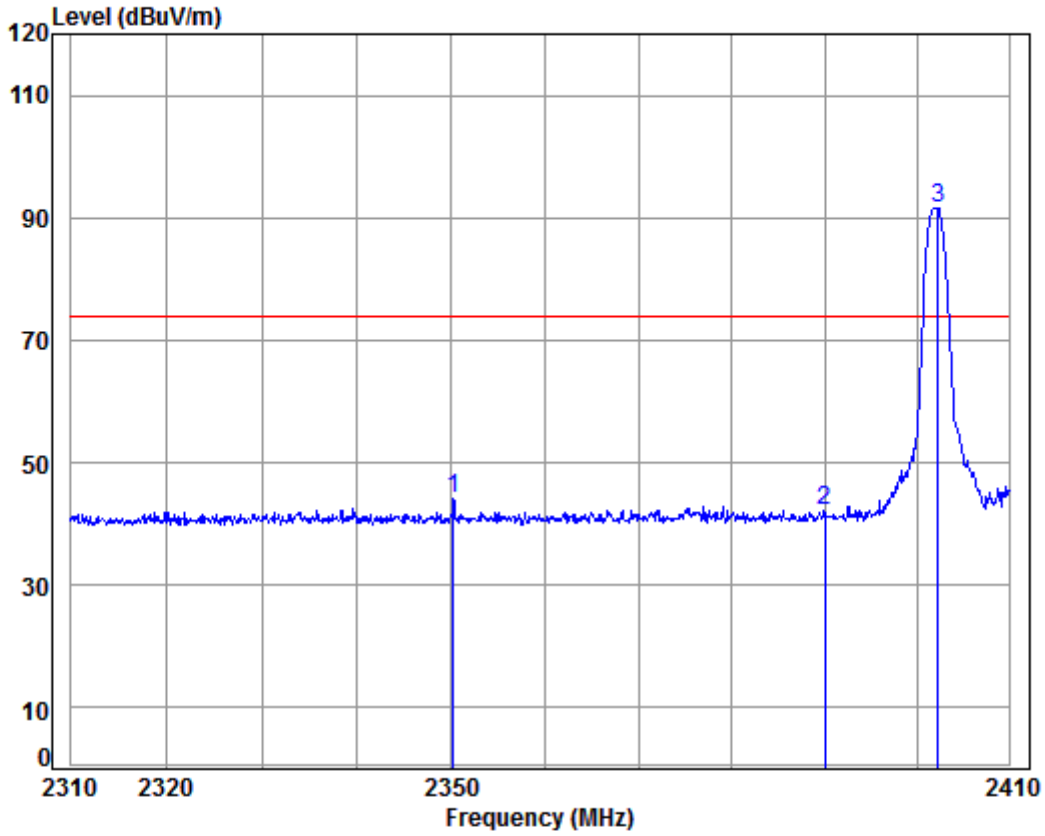
Mode:c; Polarization:Horizontal; Modulation Type:GFSK; Channel:Low



Condition: 3m HORIZONTAL
Job No: : 01530CR
Mode: : 2402 Bandedge
: BT-R

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	2375.825	5.33	29.03	37.96	47.71	44.11	74.00	-29.89	
2	2390.000	5.34	29.08	37.96	44.78	41.24	74.00	-32.76	
3 pp	2402.250	5.35	29.11	37.96	99.78	96.28	74.00	22.28	

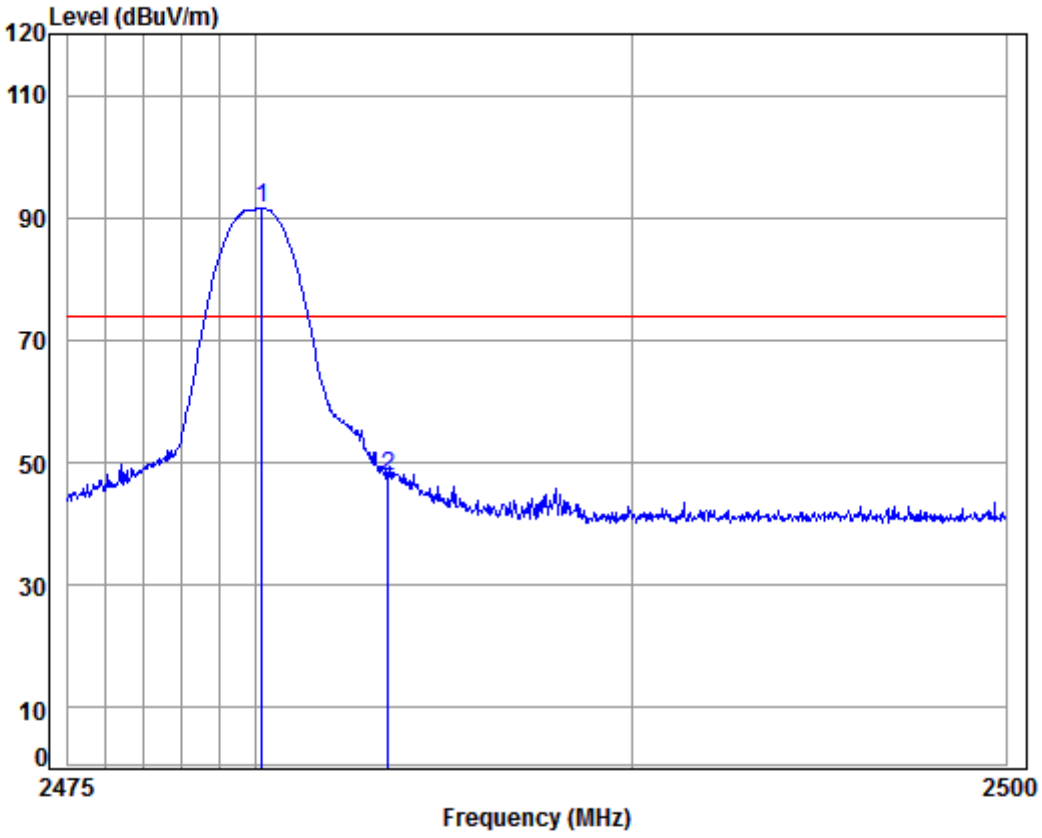
Mode:c; Polarization:Vertical; Modulation Type:GFSK; Channel:Low



Condition: 3m VERTICAL
Job No: : 01530CR
Mode: : 2402 Bandedge
: BT-R

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	2350.289	5.31	28.96	37.96	47.86	44.17	74.00	-29.83	
2	2390.000	5.34	29.08	37.96	45.82	42.28	74.00	-31.72	
3 pp	2402.250	5.35	29.11	37.96	95.19	91.69	74.00	17.69	

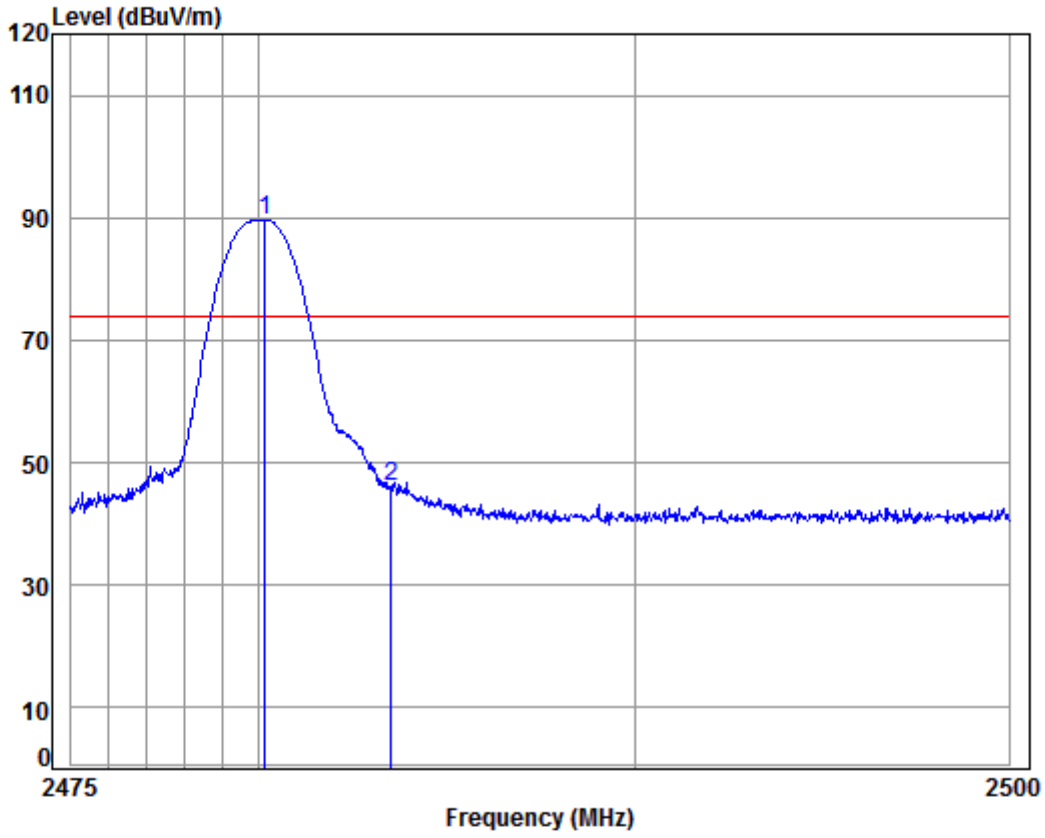
Mode:c; Polarization:Horizontal; Modulation Type:GFSK; Channel:High



Condition: 3m HORIZONTAL
Job No: : 01530CR
Mode: : 2480 Bandedge
: BT-R

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1 pp	2480.154	5.41	29.34	37.95	94.71	91.51	74.00	17.51	
2	2483.500	5.41	29.35	37.95	51.08	47.89	74.00	-26.11	

Mode:c; Polarization:Vertical; Modulation Type:GFSK; Channel:High



Condition: 3m VERTICAL
Job No: : 01530CR
Mode: : 2480 Bandedge
: BT-R

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1 pp	2480.154	5.41	29.34	37.95	92.83	89.63	74.00	15.63	
2	2483.500	5.41	29.35	37.95	49.32	46.13	74.00	-27.87	

7.9 Conducted Band Edges Measurement

Test Requirement: 47 CFR Part 15, Subpart C 15.247

Test Method: ANSI C63.10 (2013) Section 7.8.6

7.9.1 E.U.T. Operation

Operating Environment:

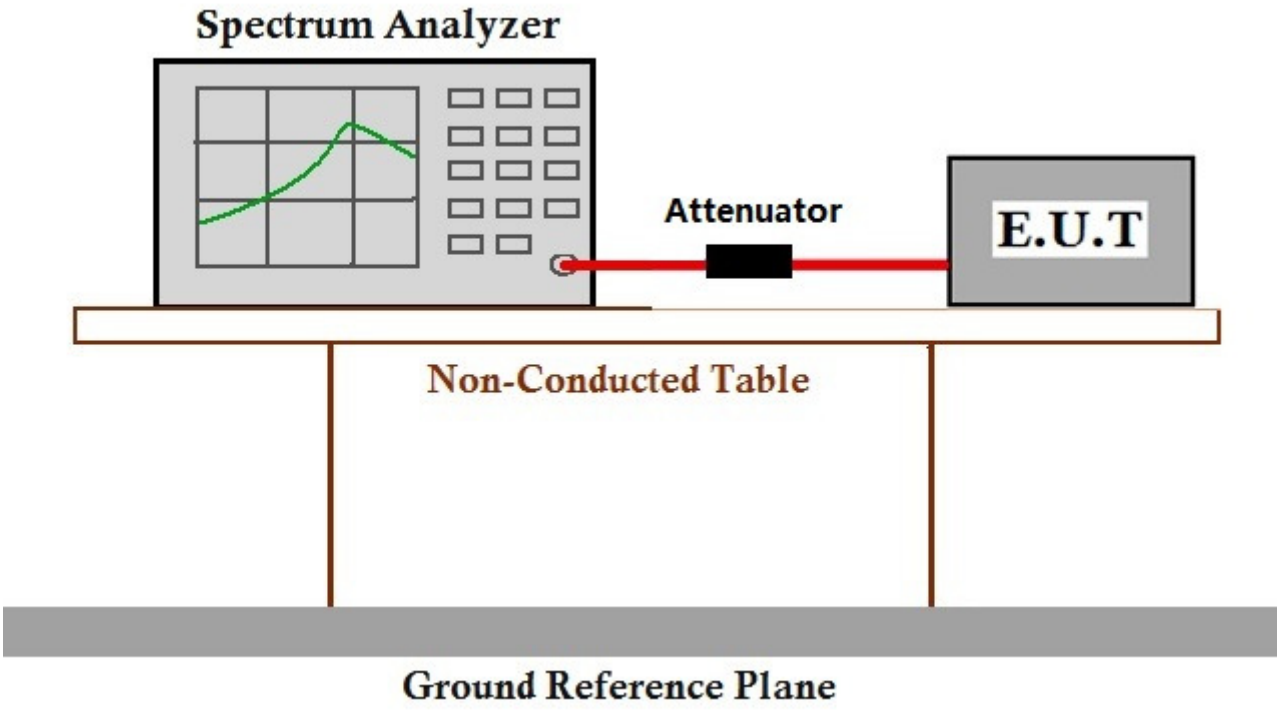
Temperature: 23.0 °C Humidity: 56 % RH Atmospheric Pressure: 1020 mbar

b: TX for Left earbuds

c: TX for Right earbuds

Test mode: (Through Pre-scan, find the DH5 of data type is the worst case of GFSK modulation type, 2-DH5 of data type is the worst case of π/4DQPSK modulation type, 3-DH5 of data type is the worst case of 8DPSK modulation type.)

7.9.2 Test Setup Diagram

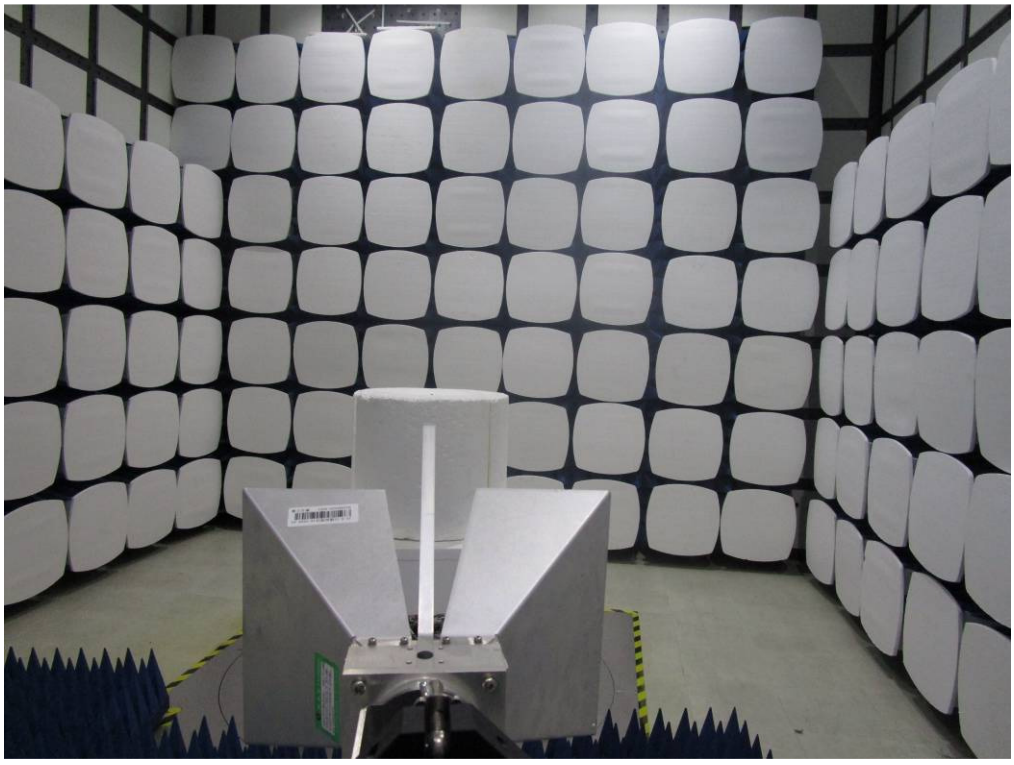


7.9.3 Measurement Data

The detailed test data see: Appendix 15.247

8 Photographs

8.1 Radiated Spurious Emissions Test Setup



8.2 EUT Constructional Details

Refer to Appendix A - Photographs of EUT Constructional Details for SZEM1703001530CR.

9 Appendix

9.1 Appendix 15.247

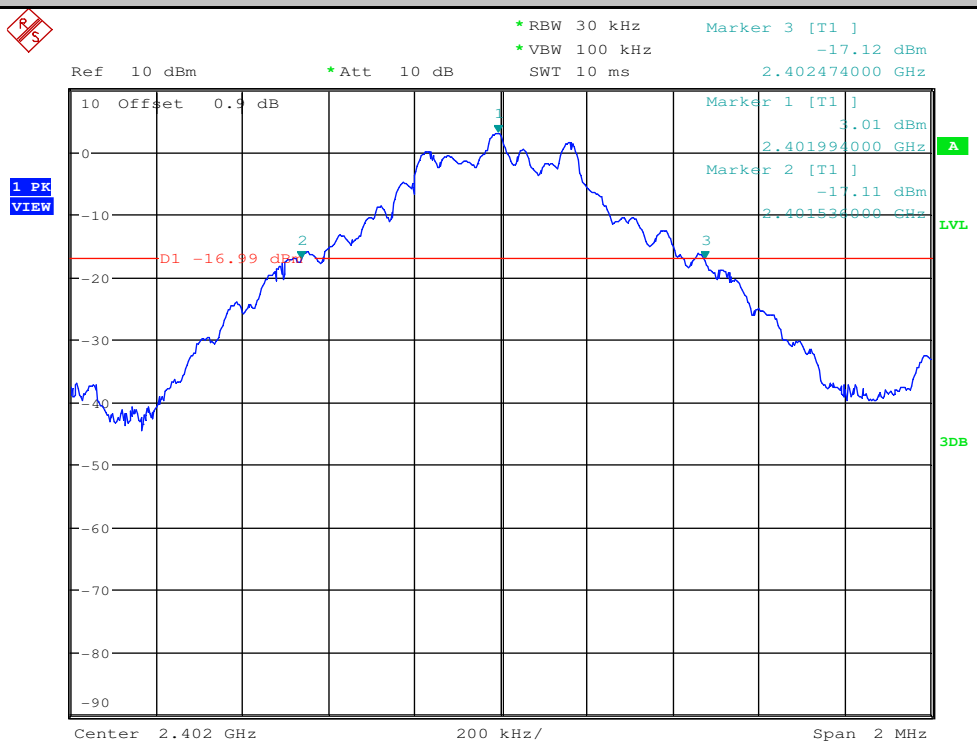
1. 20dB Bandwidth

Left earbuds

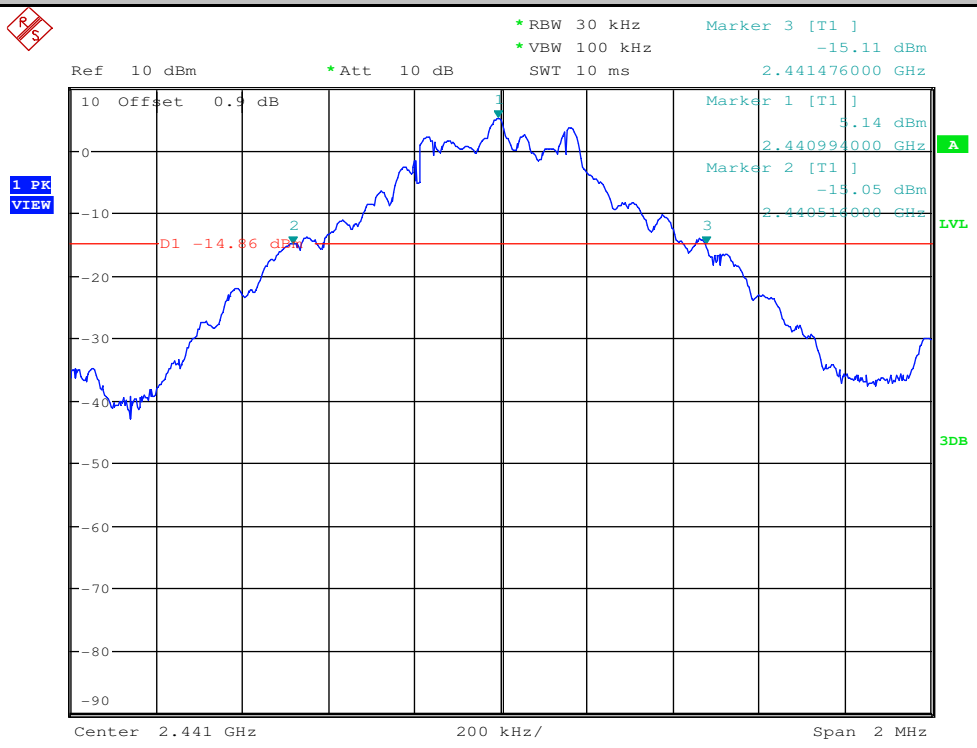
Test Mode	Test Channel	EBW[MHz]	Limit[MHz]	Verdict
DH5	2402	0.938	---	PASS
DH5	2441	0.960	---	PASS
DH5	2480	0.940	---	PASS
2DH5	2402	1.248	---	PASS
2DH5	2441	1.248	---	PASS
2DH5	2480	1.246	---	PASS
3DH5	2402	1.260	---	PASS
3DH5	2441	1.262	---	PASS
3DH5	2480	1.262	---	PASS

TEST PLOT

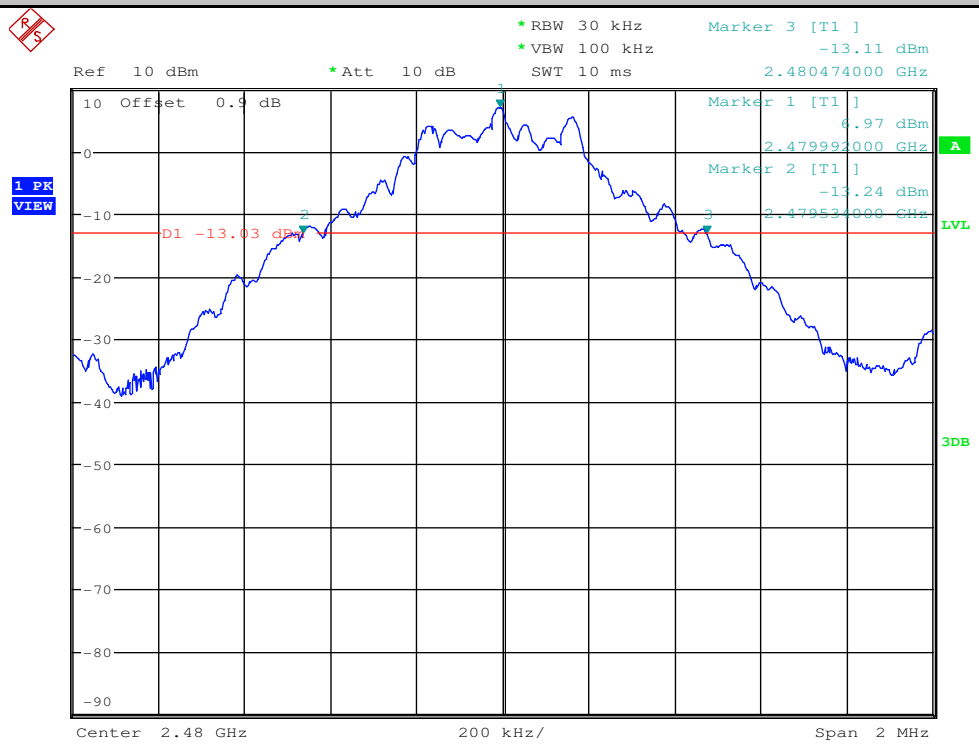
20 dB Bandwidth_DH5_2402



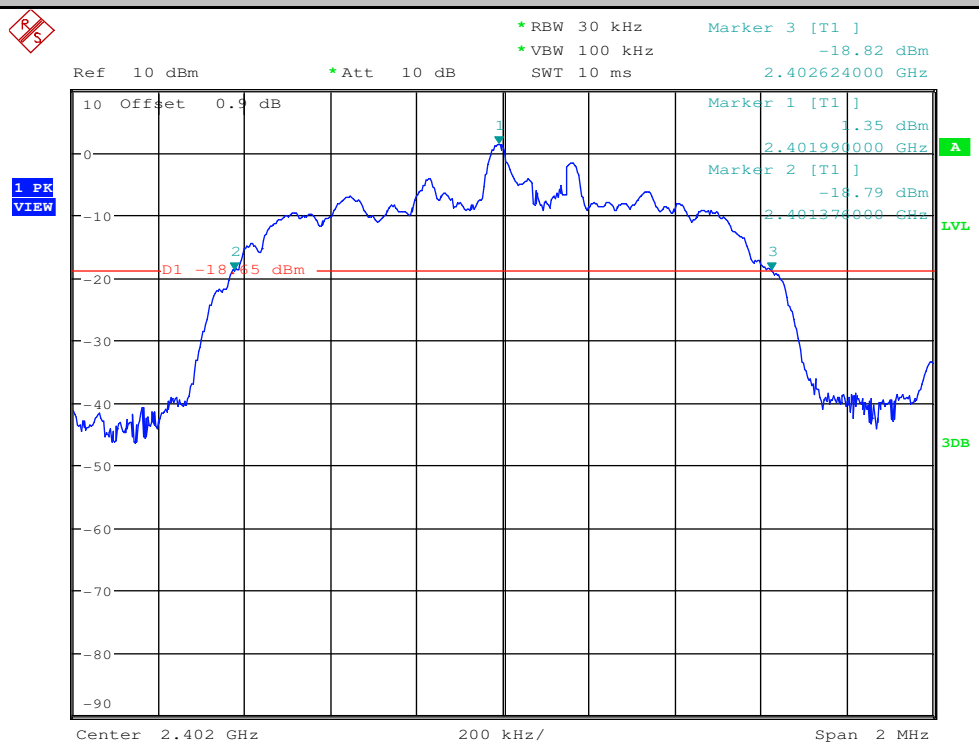
20 dB Bandwidth_DH5_2441



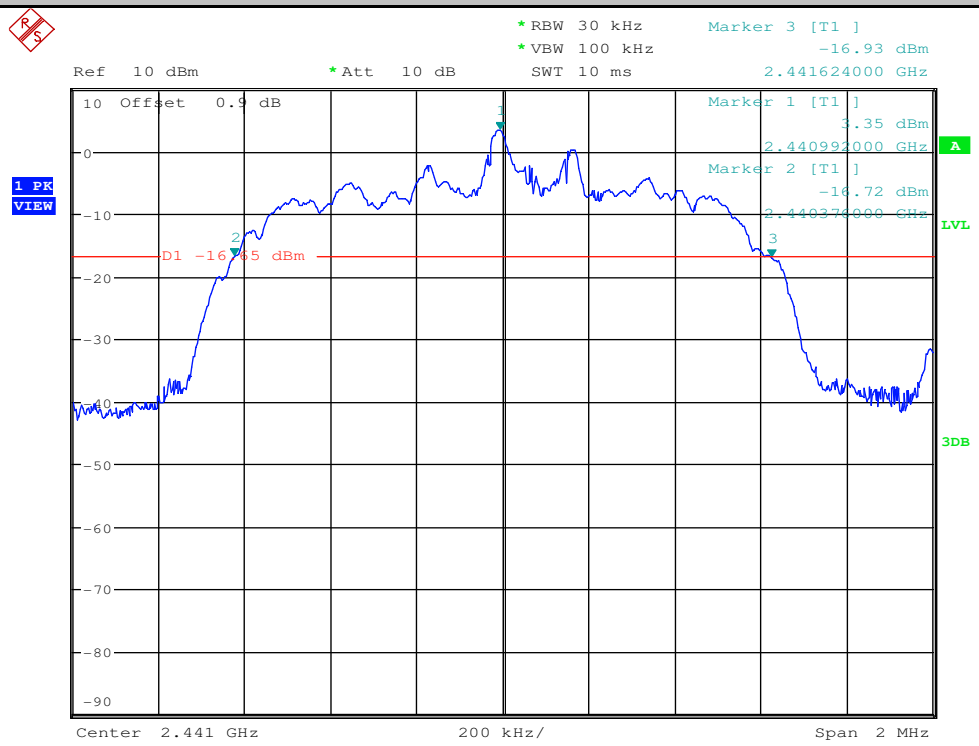
20 dB Bandwidth_DH5_2480



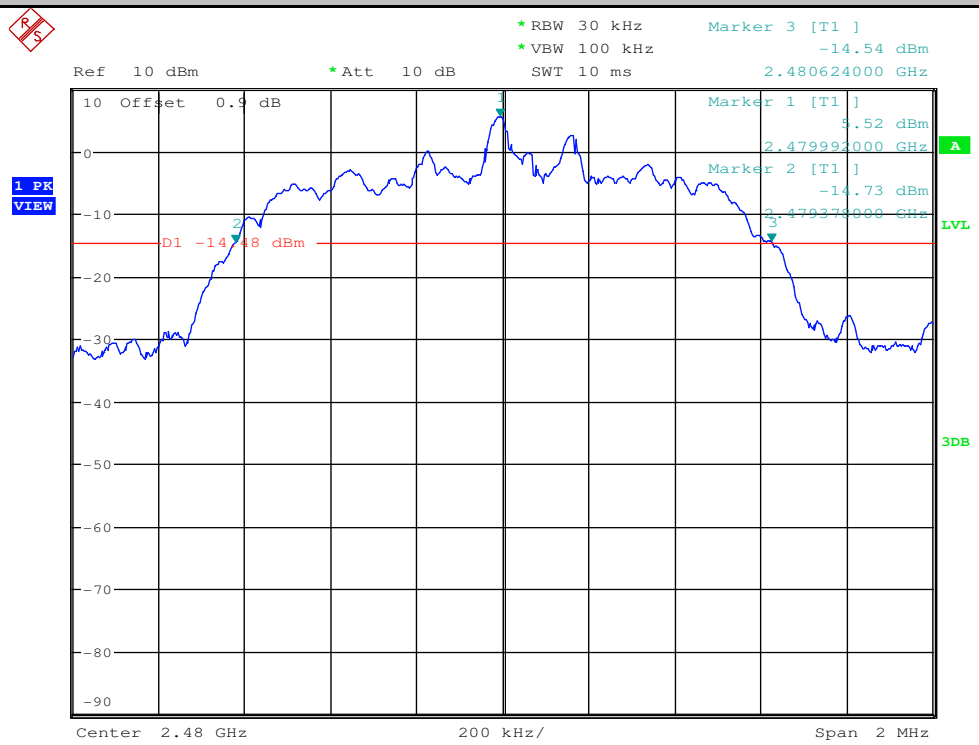
20 dB Bandwidth_2DH5_2402



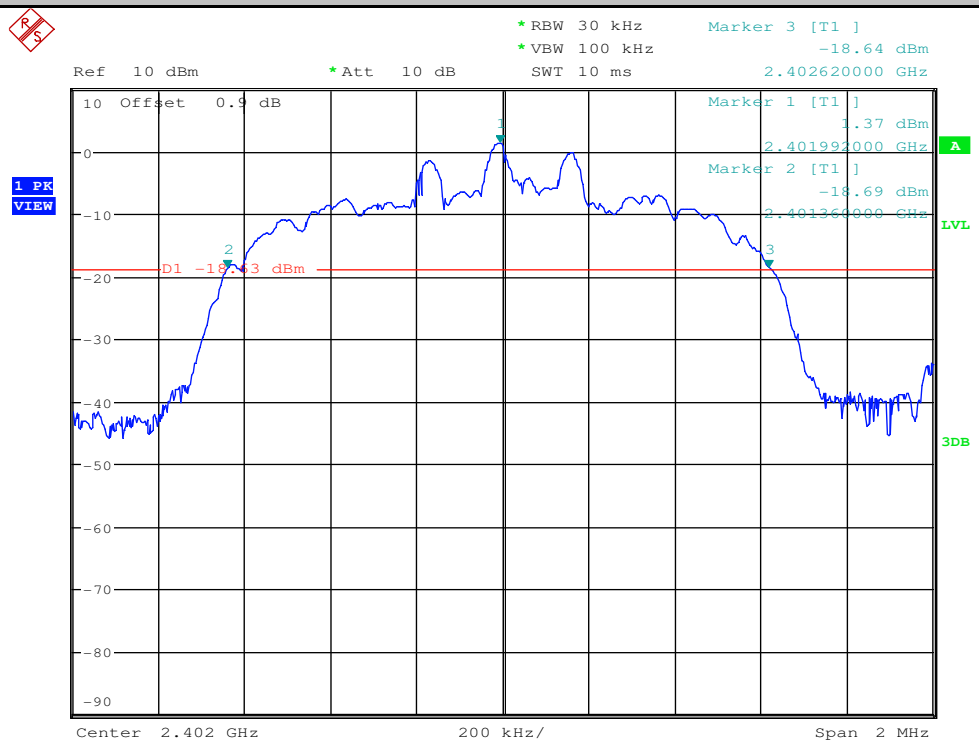
20 dB Bandwidth_2DH5_2441



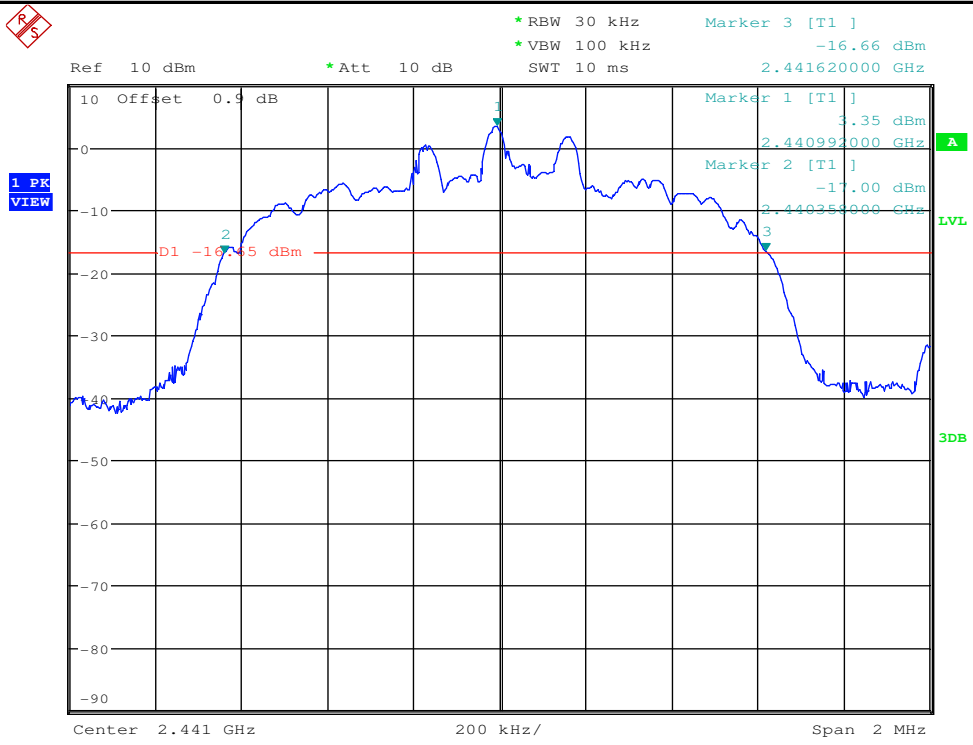
20 dB Bandwidth_2DH5_2480



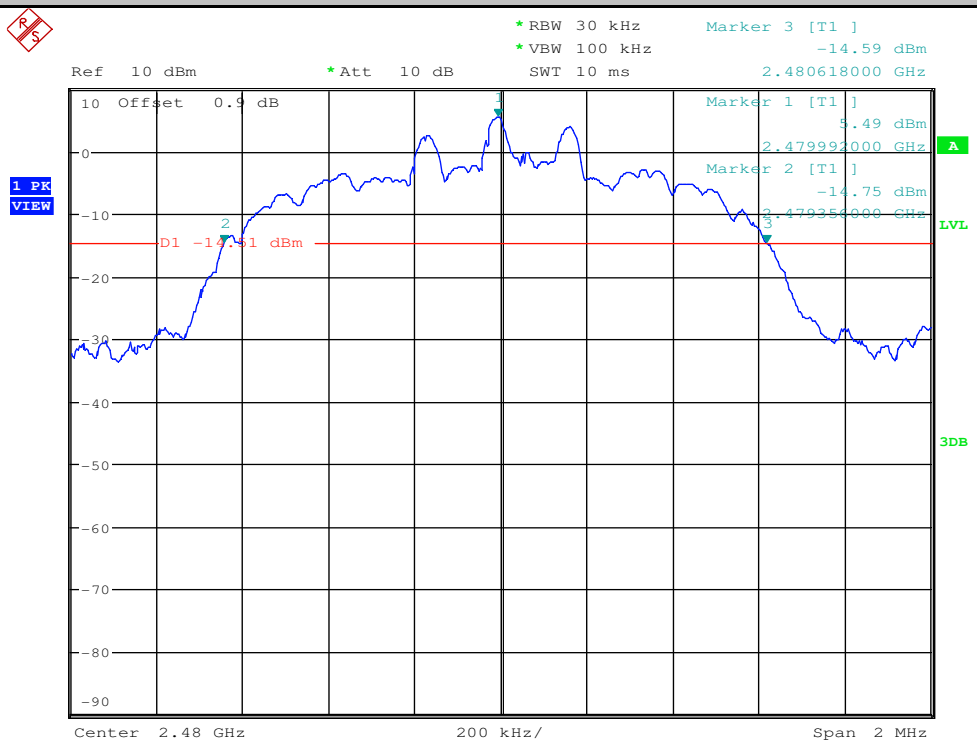
20 dB Bandwidth_3DH5_2402



20 dB Bandwidth_3DH5_2441



20 dB Bandwidth_3DH5_2480

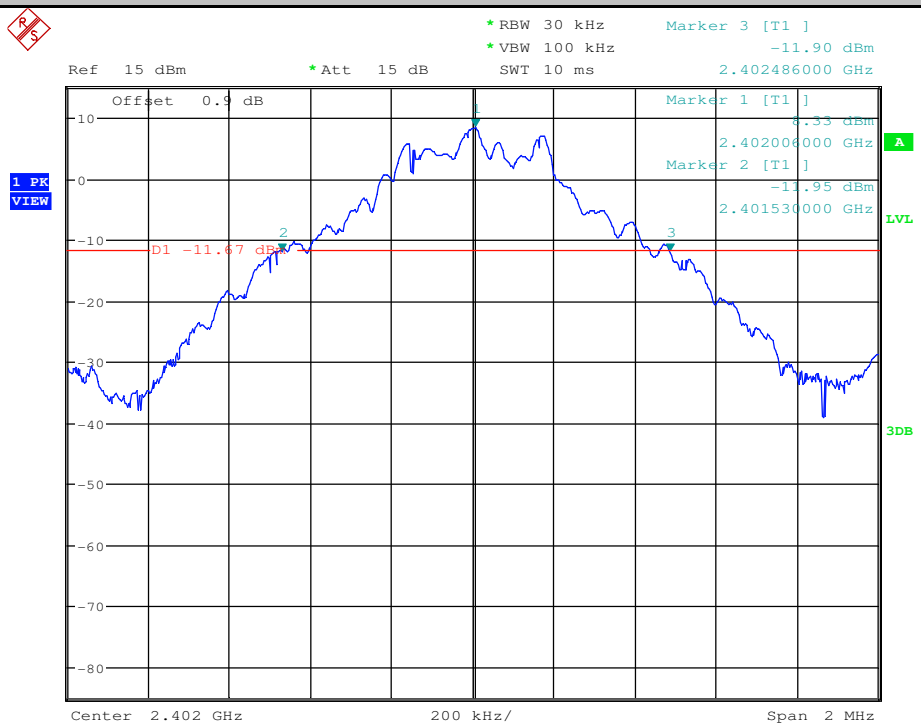


Right earbuds

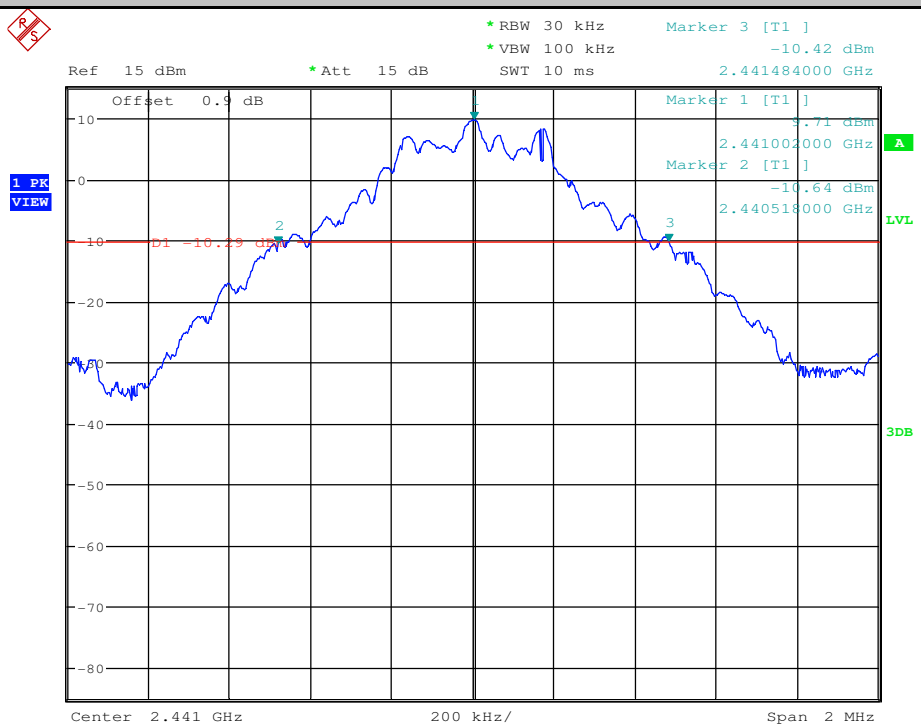
Test Mode	Test Channel	EBW[MHz]	Limit[MHz]	Verdict
DH5	2402	0.956	---	PASS
DH5	2441	0.966	---	PASS
DH5	2480	0.964	---	PASS
2DH5	2402	1.252	---	PASS
2DH5	2441	1.256	---	PASS
2DH5	2480	1.256	---	PASS
3DH5	2402	1.268	---	PASS
3DH5	2441	1.270	---	PASS
3DH5	2480	1.278	---	PASS

TEST PLOT

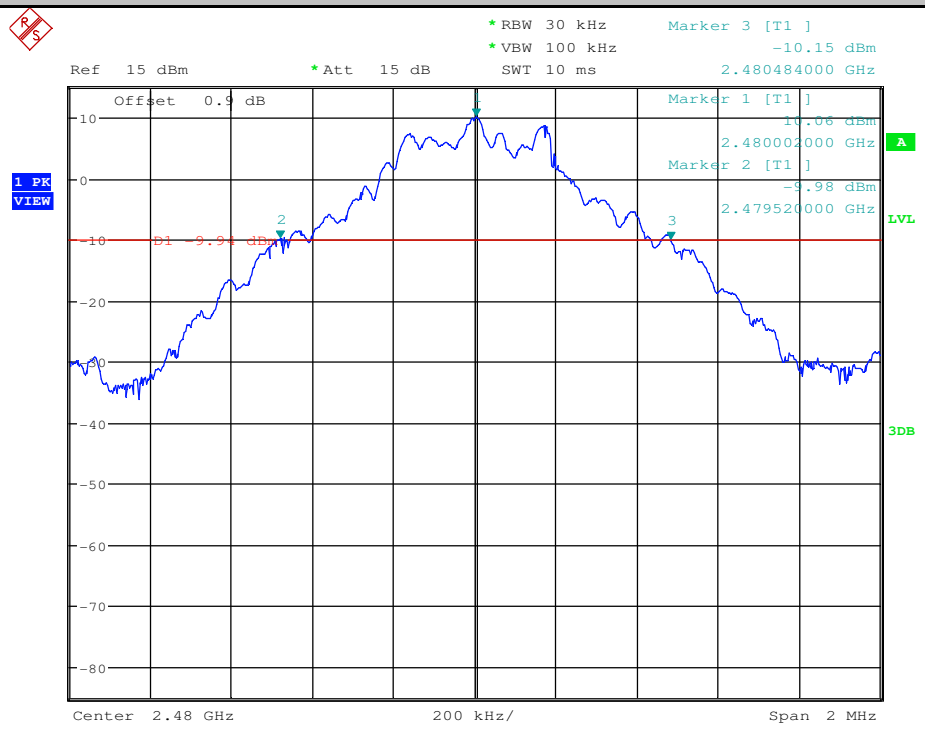
20 dB Bandwidth_DH5_2402



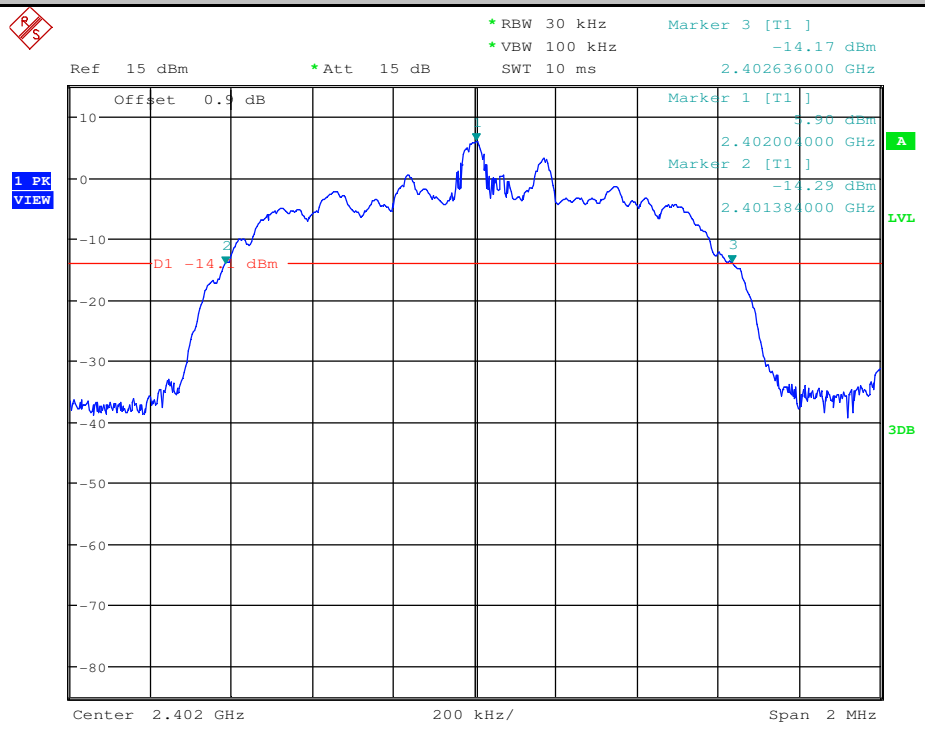
20 dB Bandwidth_DH5_2441



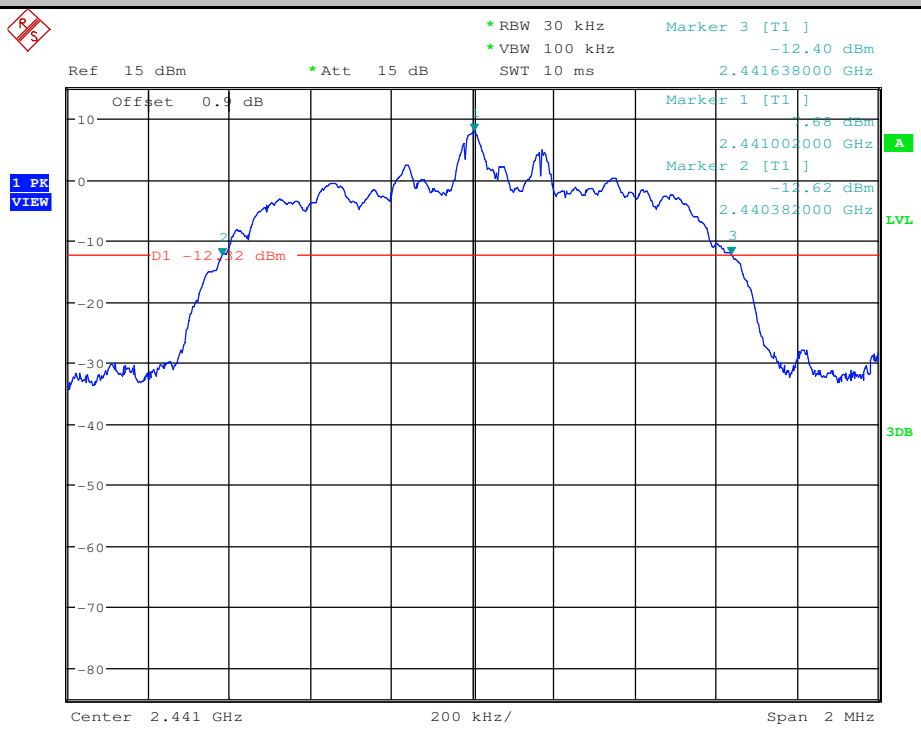
20 dB Bandwidth_DH5_2480



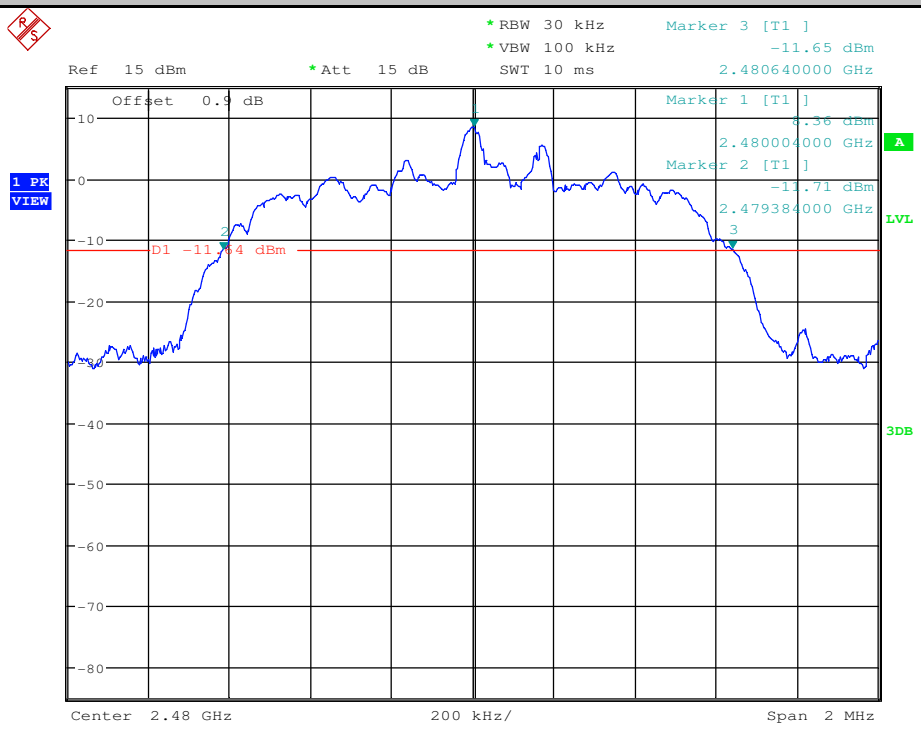
20 dB Bandwidth_2DH5_2402



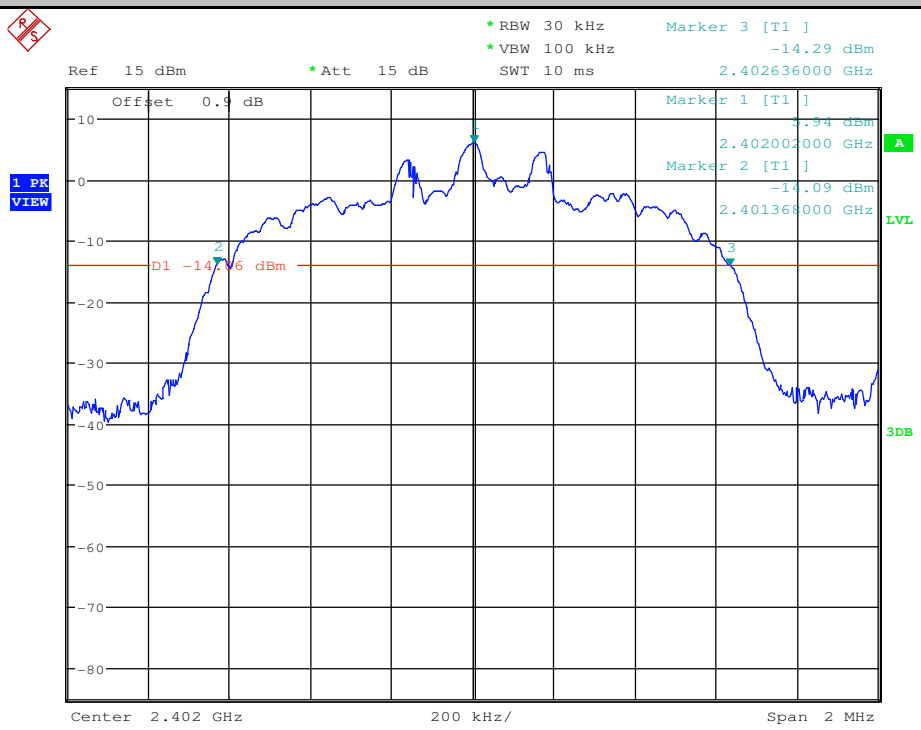
20 dB Bandwidth_2DH5_2441



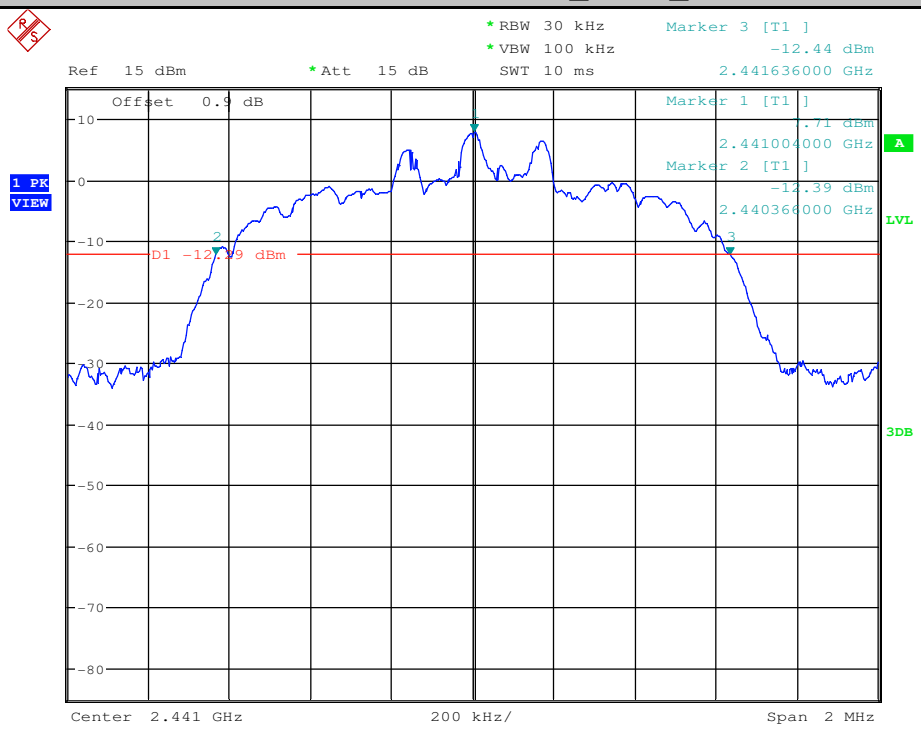
20 dB Bandwidth_2DH5_2480



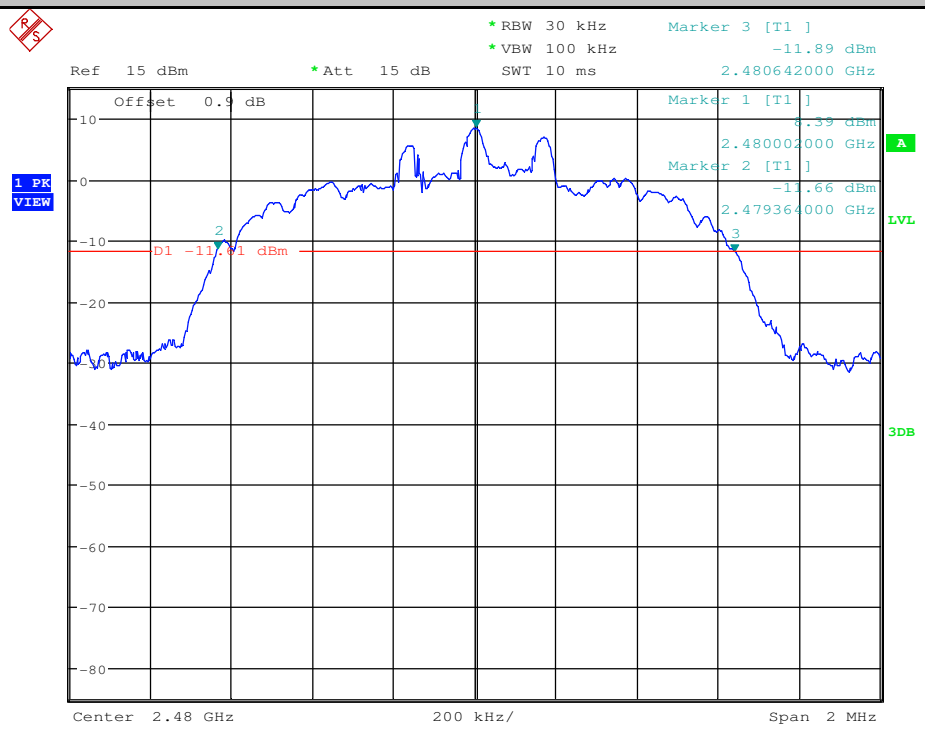
20 dB Bandwidth_3DH5_2402



20 dB Bandwidth_3DH5_2441



20 dB Bandwidth_3DH5_2480



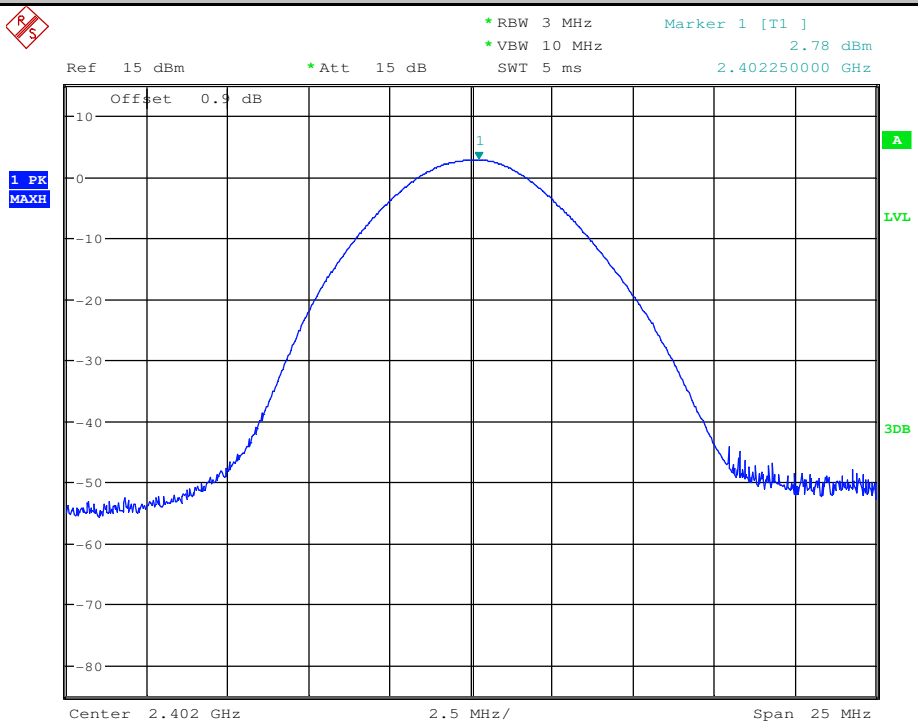
2.Conducted Peak Output Power

Left earbuds

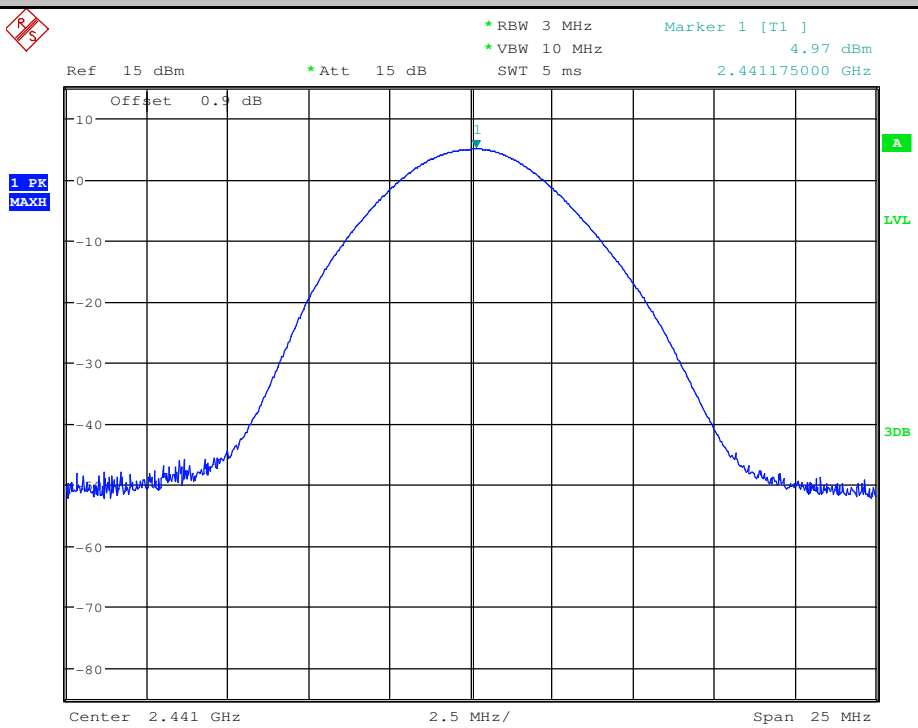
Test Mode	Test Channel	Power[dBm]	Limit[dBm]	Verdict
DH5	2402	2.78	<21.97	PASS
DH5	2441	4.97	<21.97	PASS
DH5	2480	6.94	<21.97	PASS
2DH5	2402	3.17	<21.97	PASS
2DH5	2441	5.29	<21.97	PASS
2DH5	2480	7.17	<21.97	PASS
3DH5	2402	2.99	<21.97	PASS
3DH5	2441	5.03	<21.97	PASS
3DH5	2480	7.05	<21.97	PASS

TEST PLOT

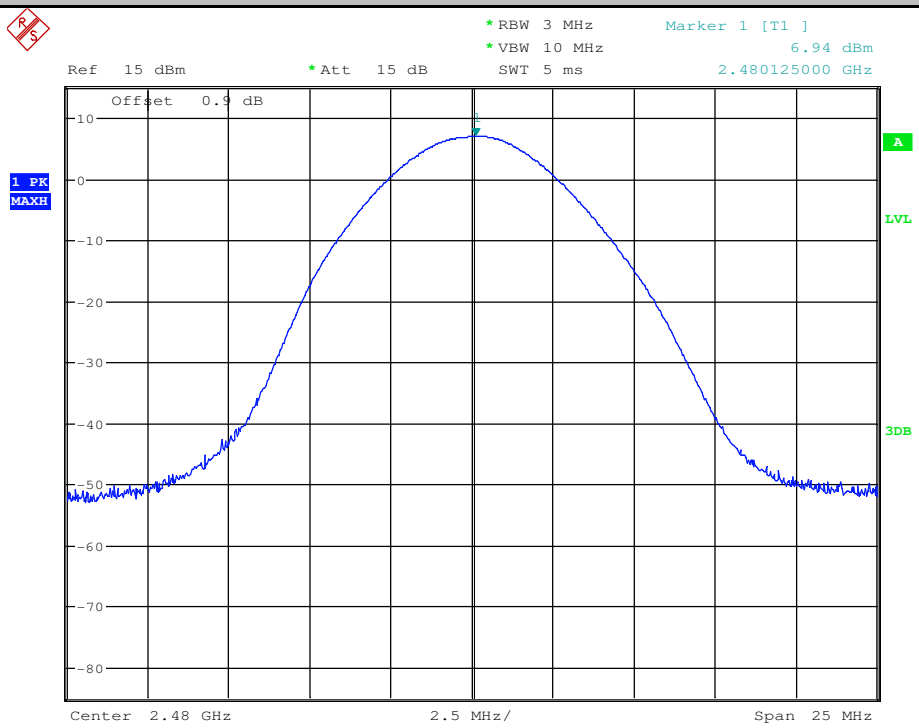
Conducted Peak Output Power_DH5_2402



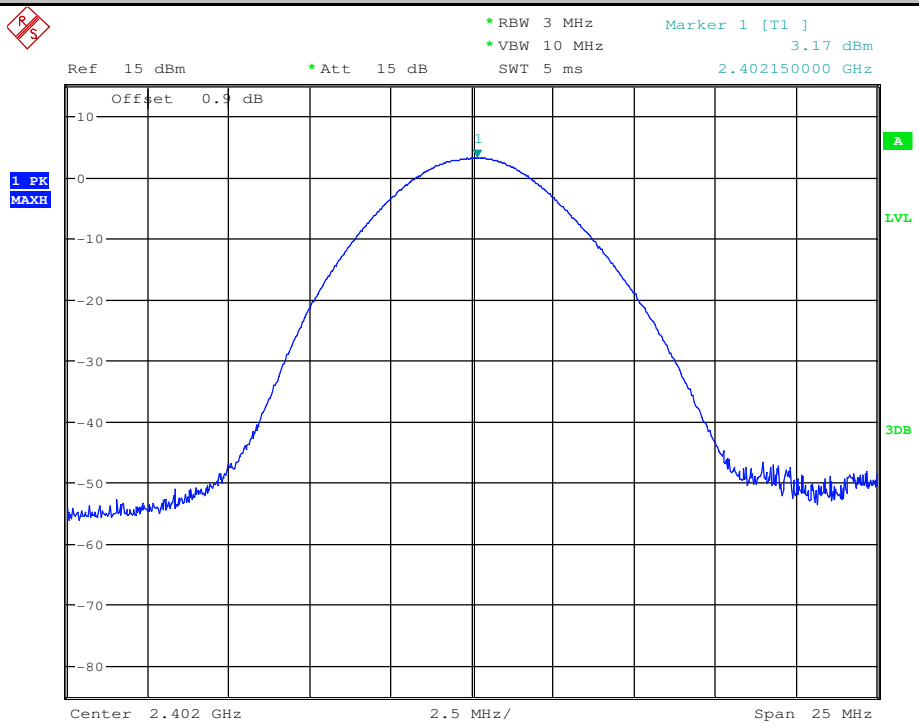
Conducted Peak Output Power_DH5_2441



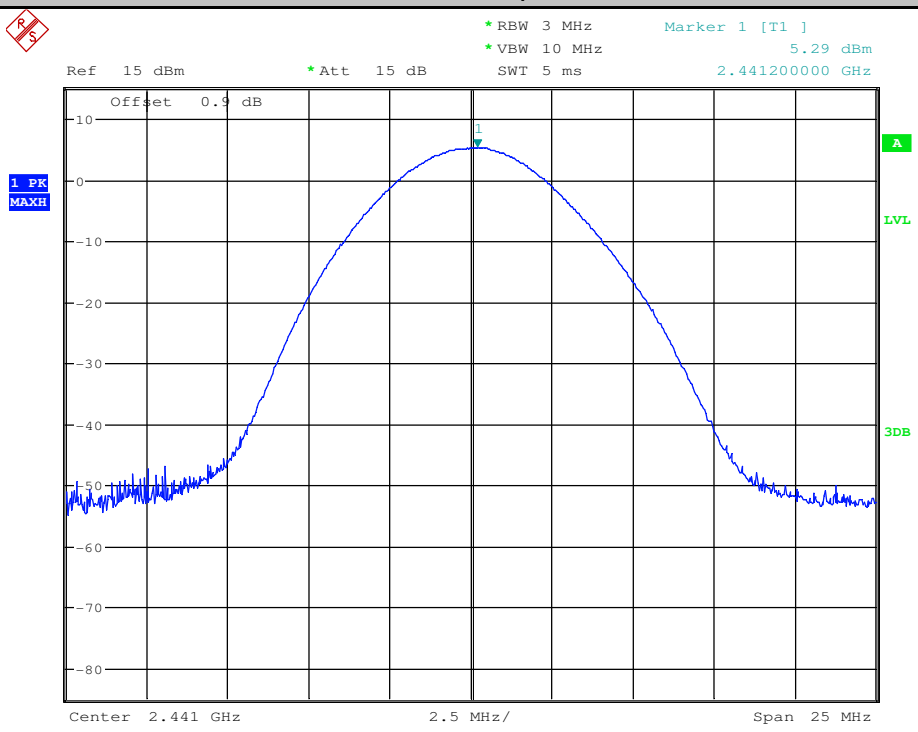
Conducted Peak Output Power_DH5_2480



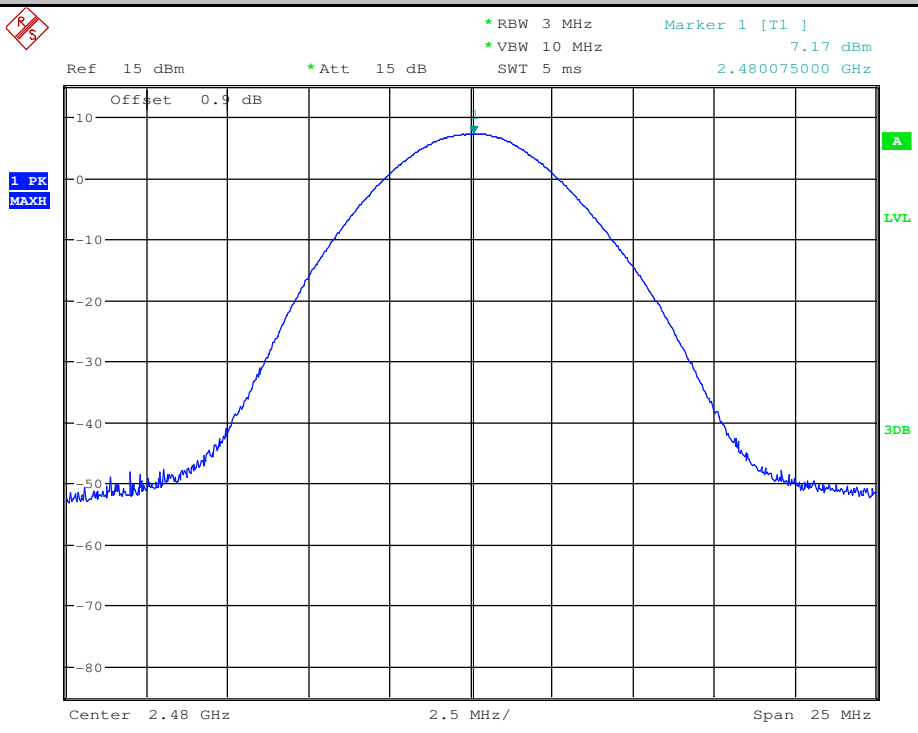
Conducted Peak Output Power_2DH5_2402



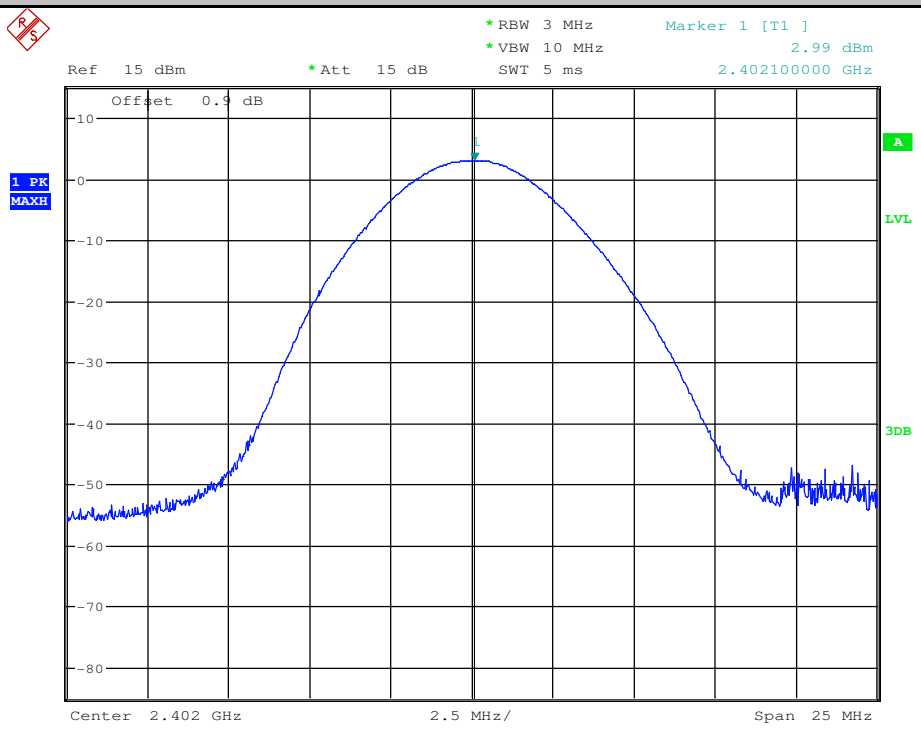
Conducted Peak Output Power_2DH5_2441



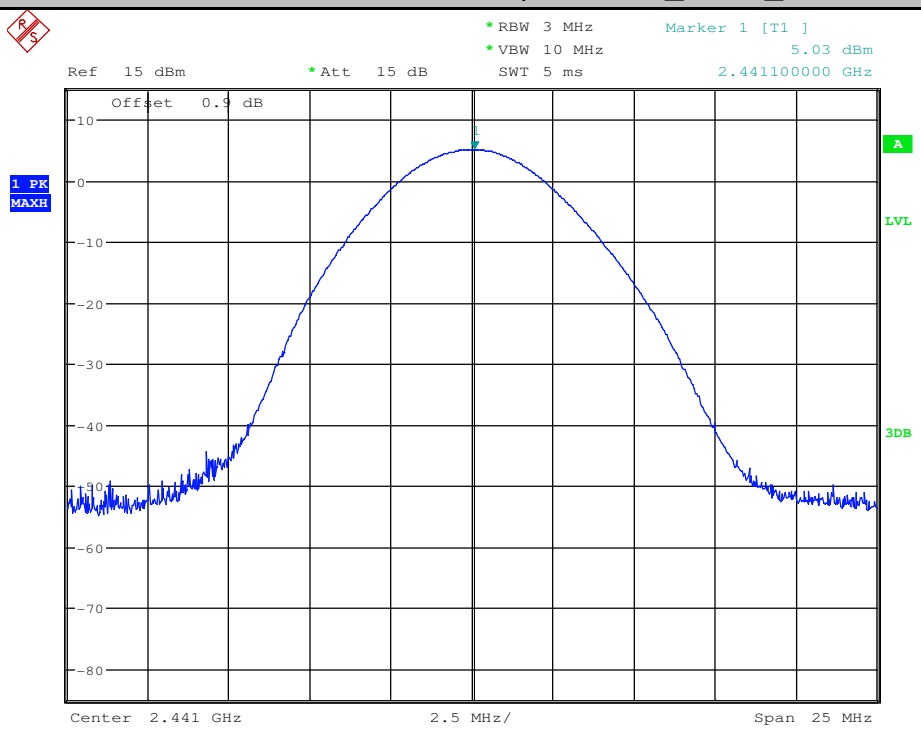
Conducted Peak Output Power_2DH5_2480



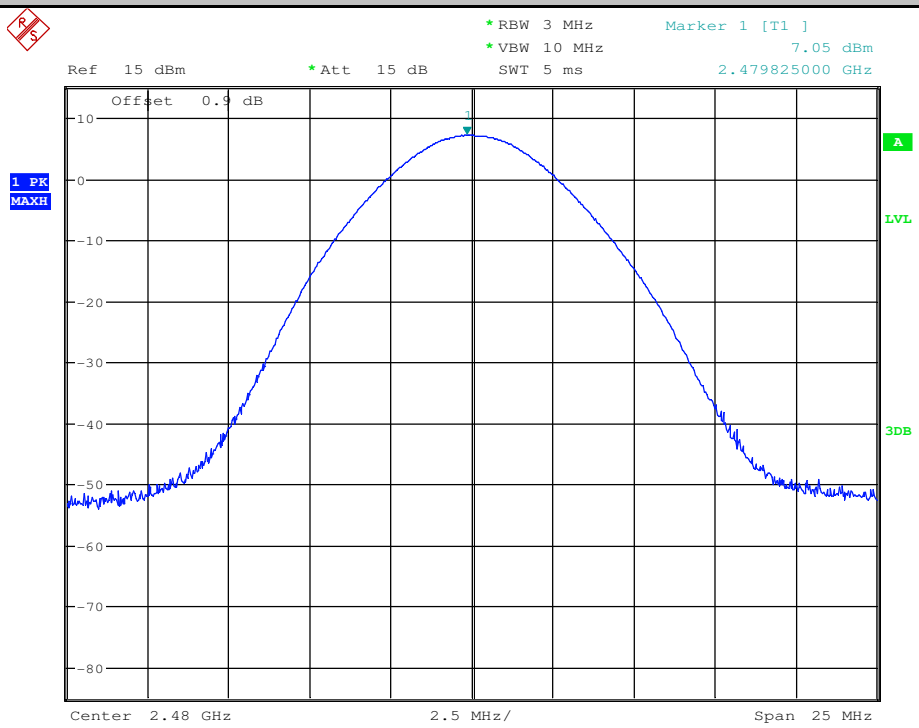
Conducted Peak Output Power_3DH5_2402



Conducted Peak Output Power_3DH5_2441



Conducted Peak Output Power_3DH5_2480

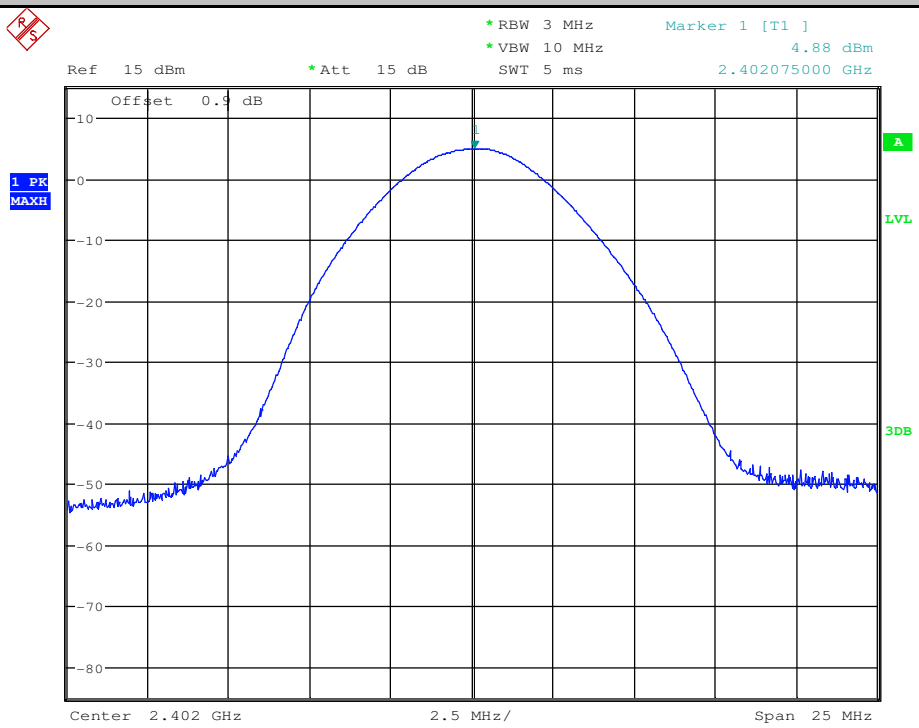


Right earbuds

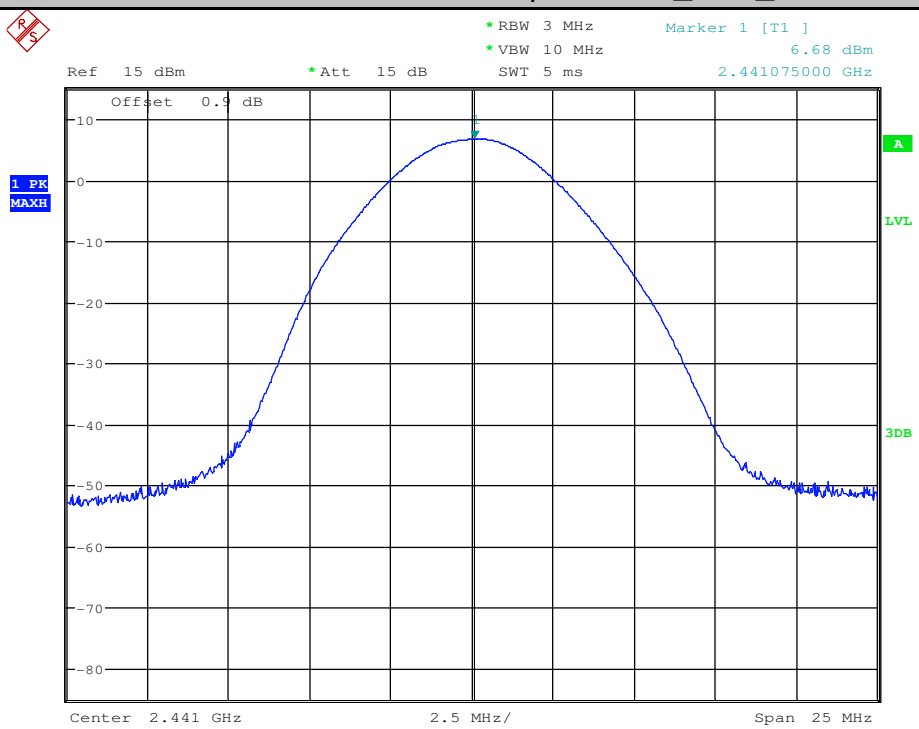
Test Mode	Test Channel	Power[dBm]	Limit[dBm]	Verdict
DH5	2402	4.88	<21.97	PASS
DH5	2441	6.68	<21.97	PASS
DH5	2480	7.49	<21.97	PASS
2DH5	2402	5.26	<21.97	PASS
2DH5	2441	7.02	<21.97	PASS
2DH5	2480	7.74	<21.97	PASS
3DH5	2402	5.16	<21.97	PASS
3DH5	2441	6.91	<21.97	PASS
3DH5	2480	7.68	<21.97	PASS

TEST PLOT

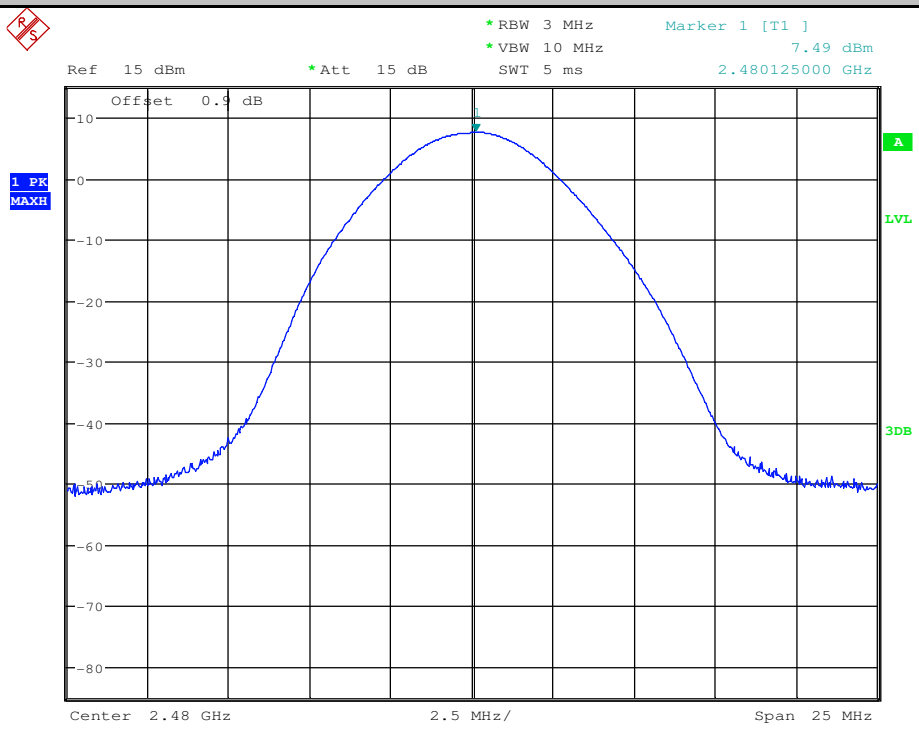
Conducted Peak Output Power_DH5_2402



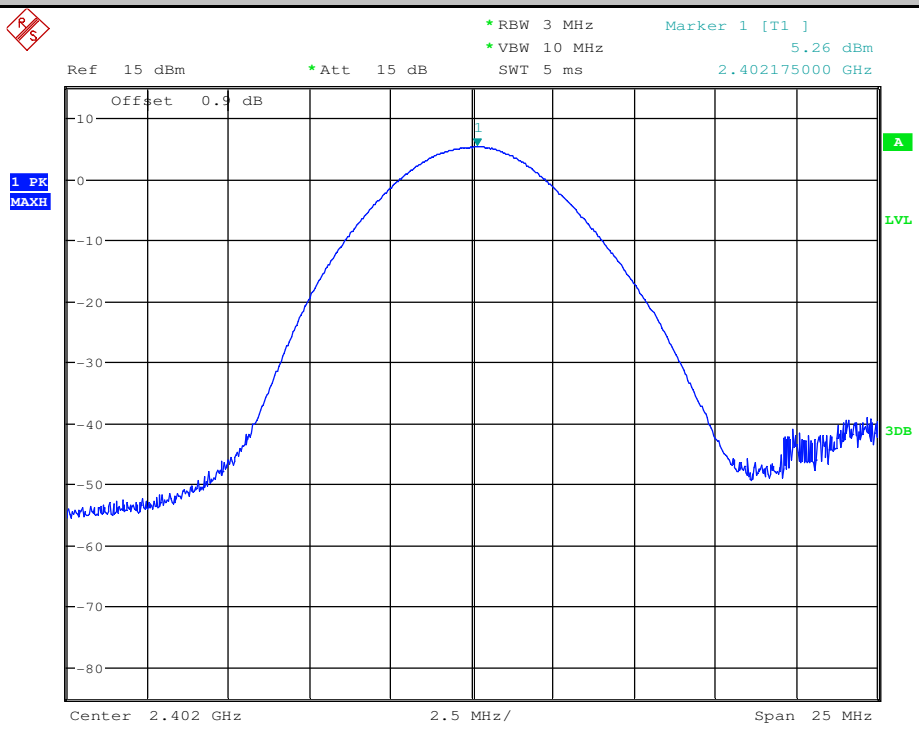
Conducted Peak Output Power_DH5_2441



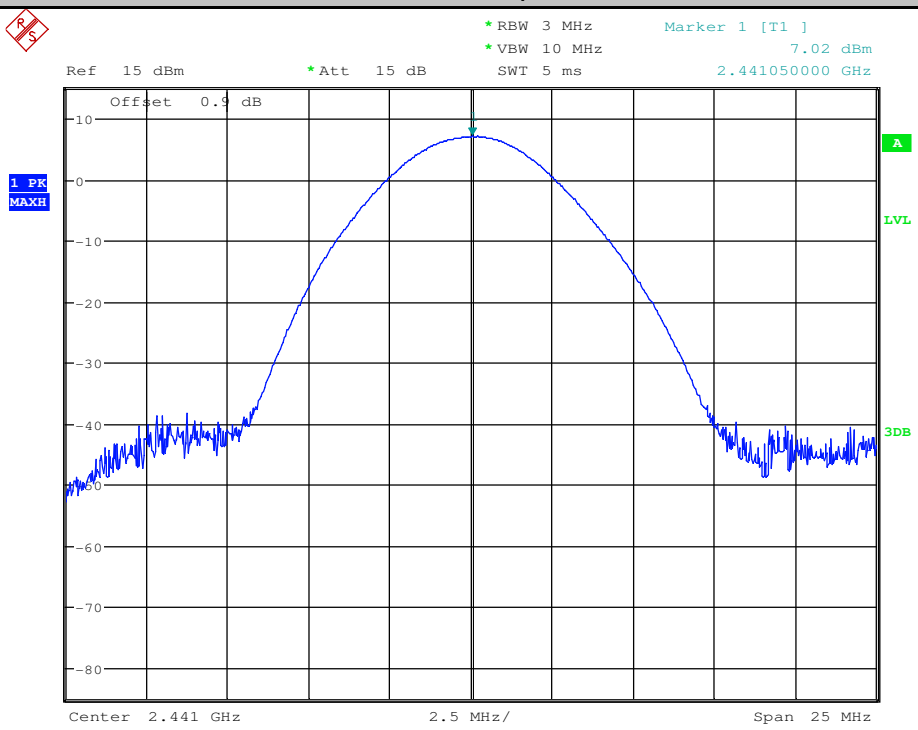
Conducted Peak Output Power_DH5_2480



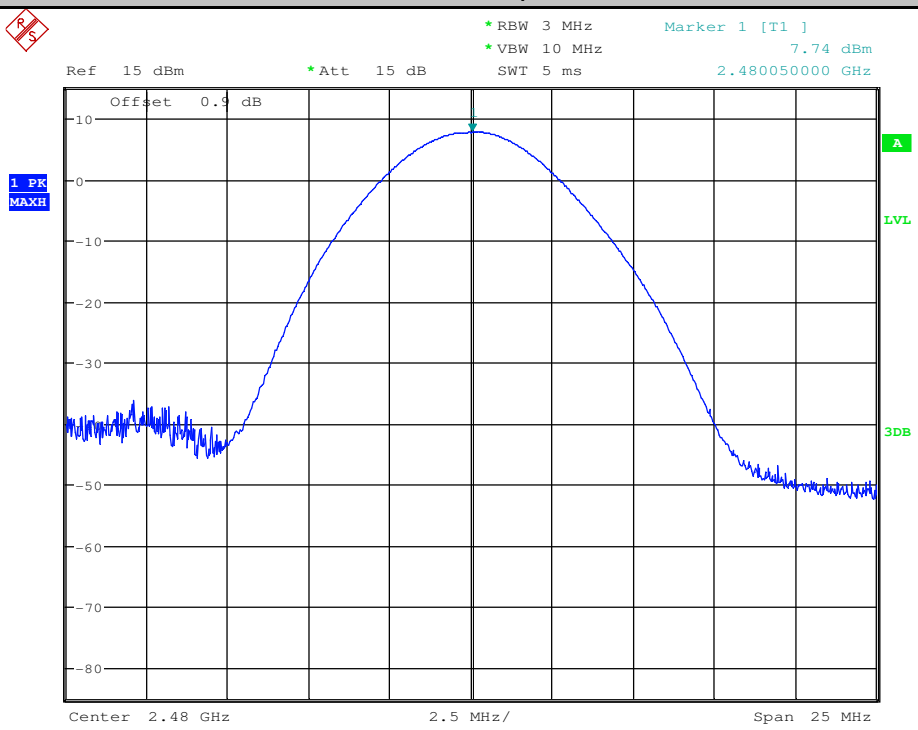
Conducted Peak Output Power_2DH5_2402



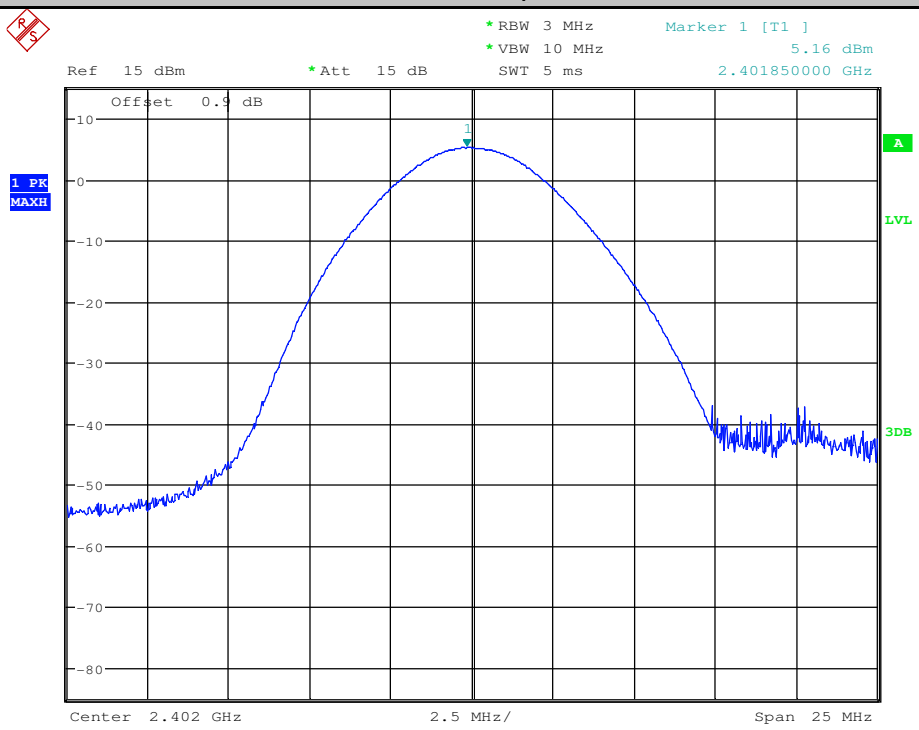
Conducted Peak Output Power_2DH5_2441



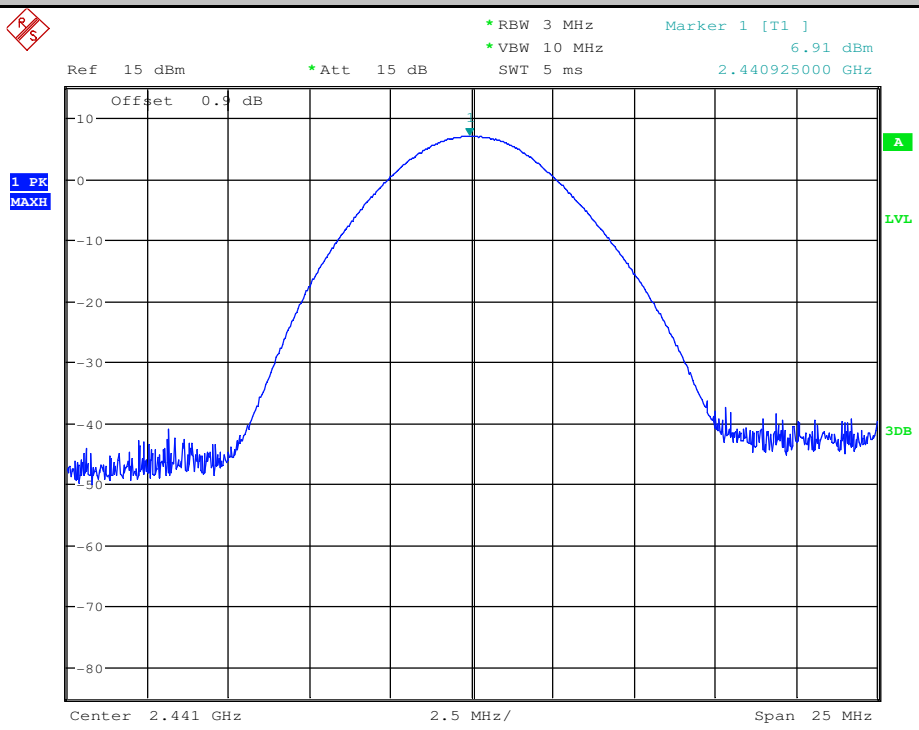
Conducted Peak Output Power_2DH5_2480



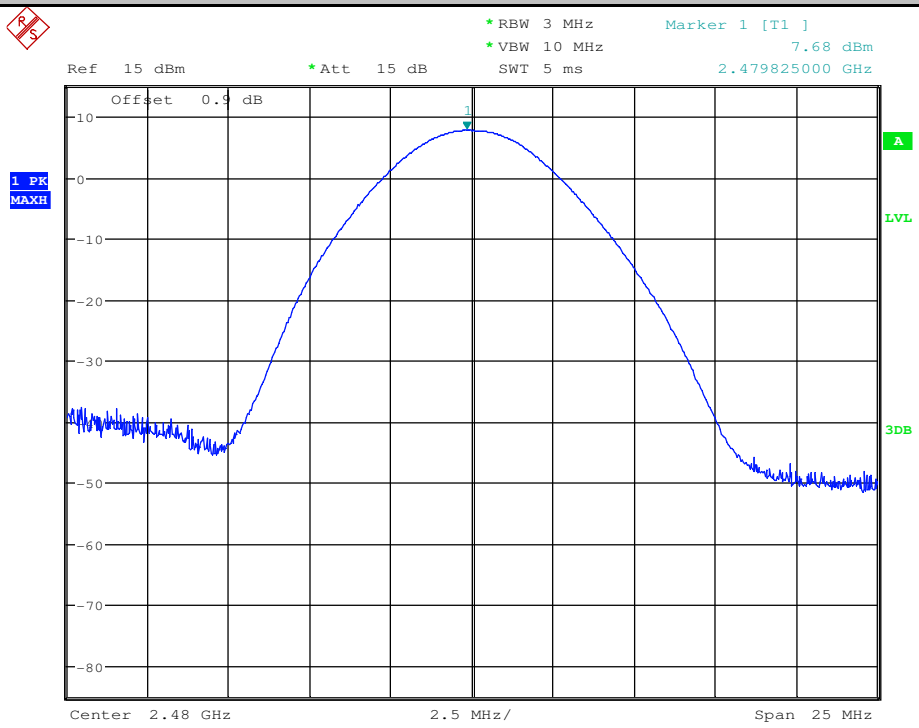
Conducted Peak Output Power_3DH5_2402



Conducted Peak Output Power_3DH5_2441



Conducted Peak Output Power_3DH5_2480



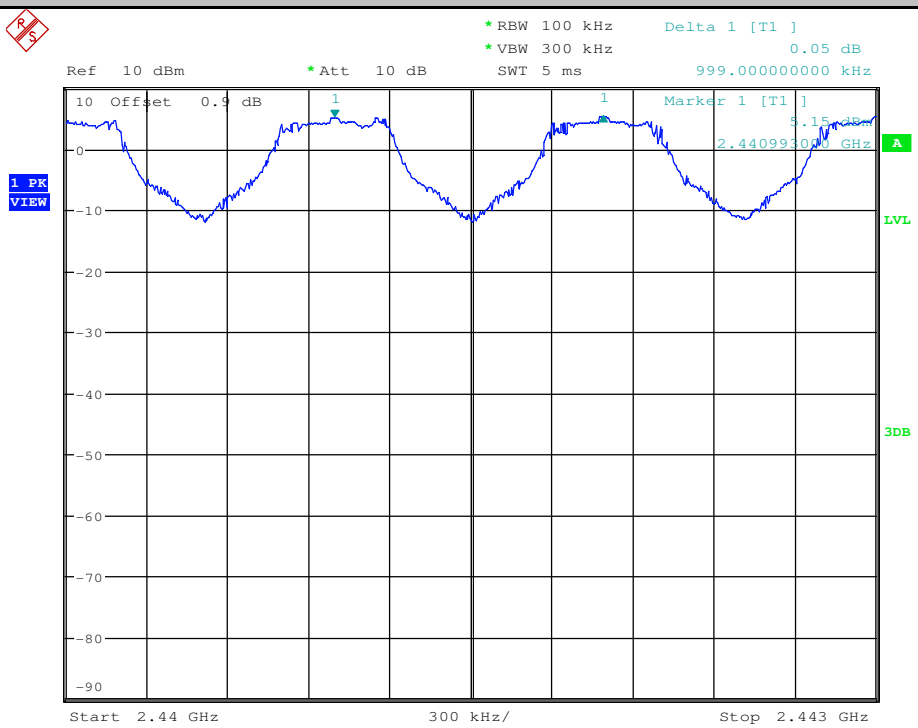
3.Carrier Frequency Separation

Left earbuds

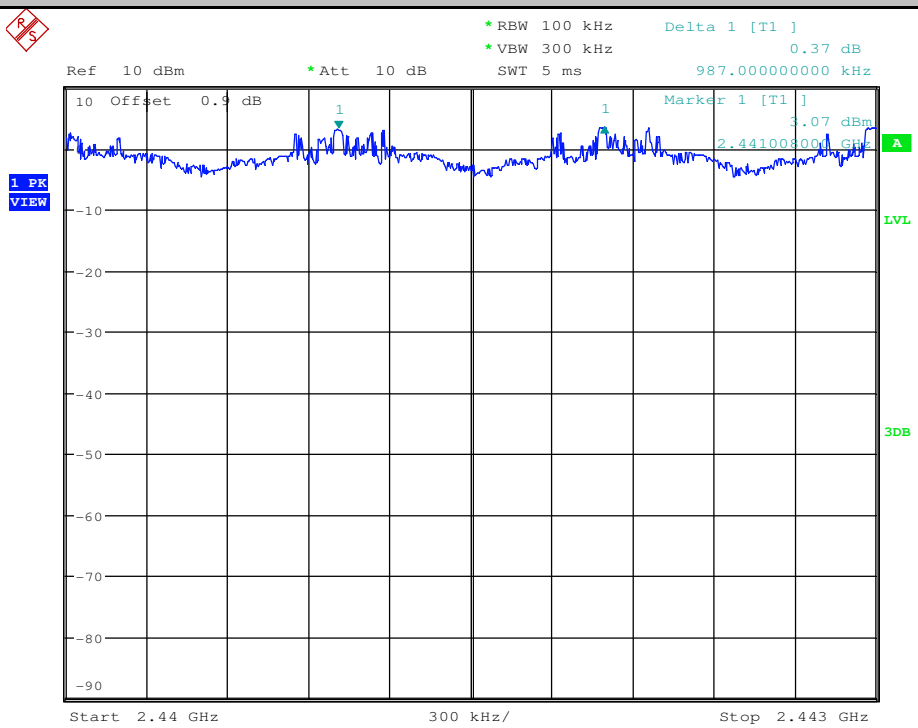
Test Mode	Test Channel	Result[MHz]	Limit[MHz]	Verdict
DH5	2441	0.999	>=0.640	PASS
2DH5	2441	0.987	>=0.832	PASS
3DH5	2441	0.999	>=0.841	PASS

TEST PLOT

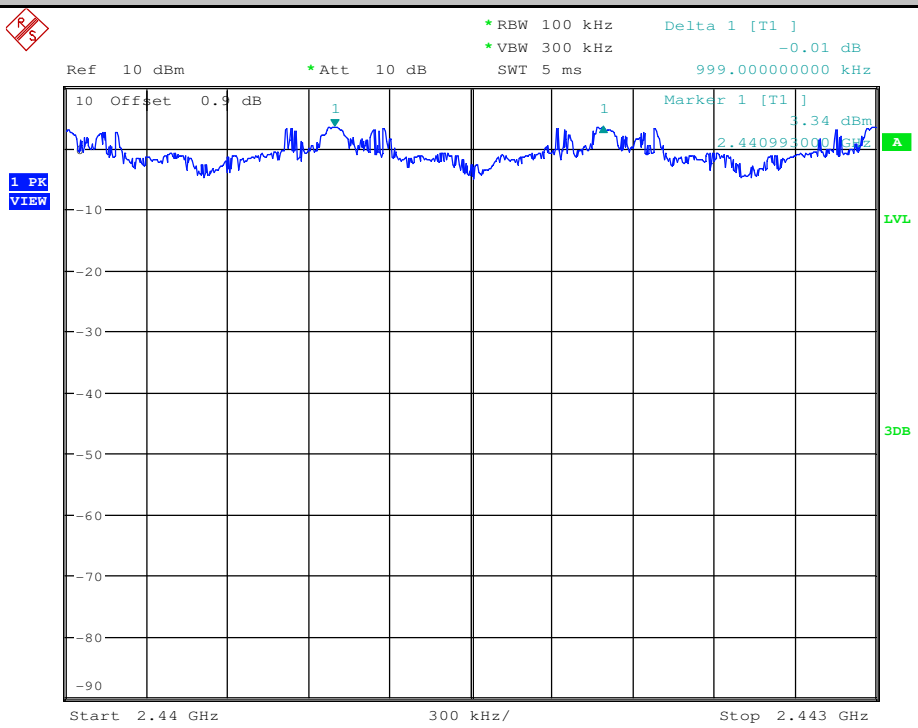
Carrier Frequency Separation_DH5_2441



Carrier Frequency Separation_2DH5_2441



Carrier Frequency Separation_3DH5_2441

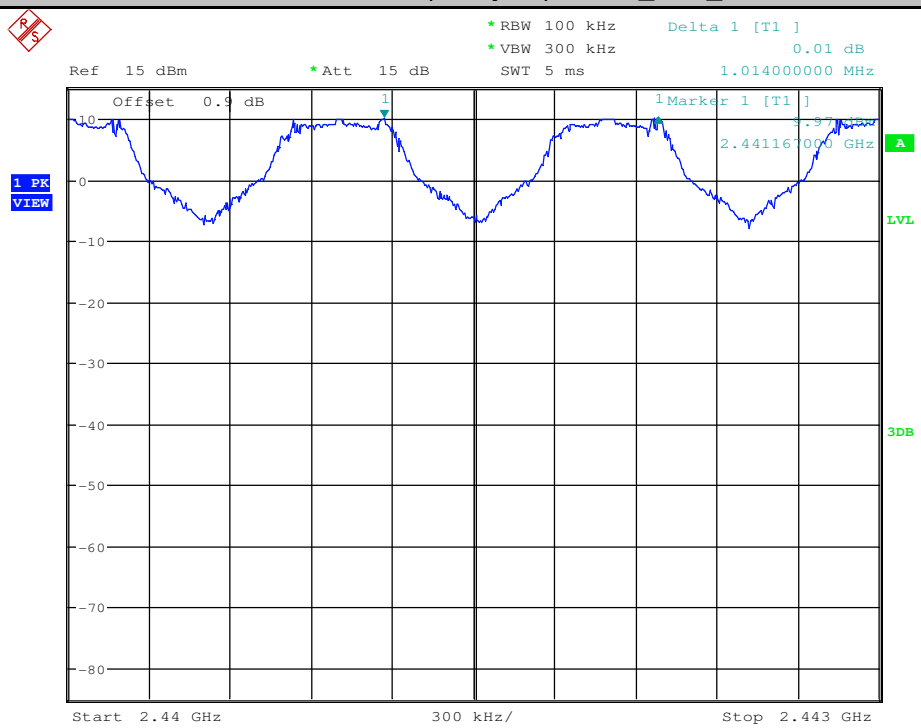


Right earbuds

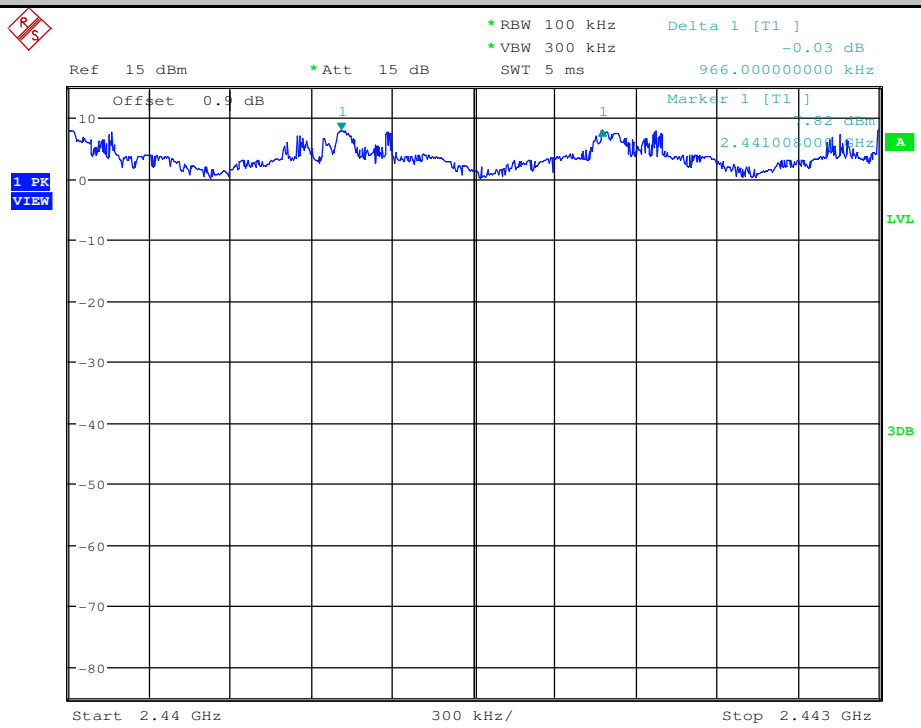
Test Mode	Test Channel	Result[MHz]	Limit[MHz]	Verdict
DH5	2441	1.014	>=0.644	PASS
2DH5	2441	0.966	>=0.837	PASS
3DH5	2441	0.987	>=0.852	PASS

TEST PLOT

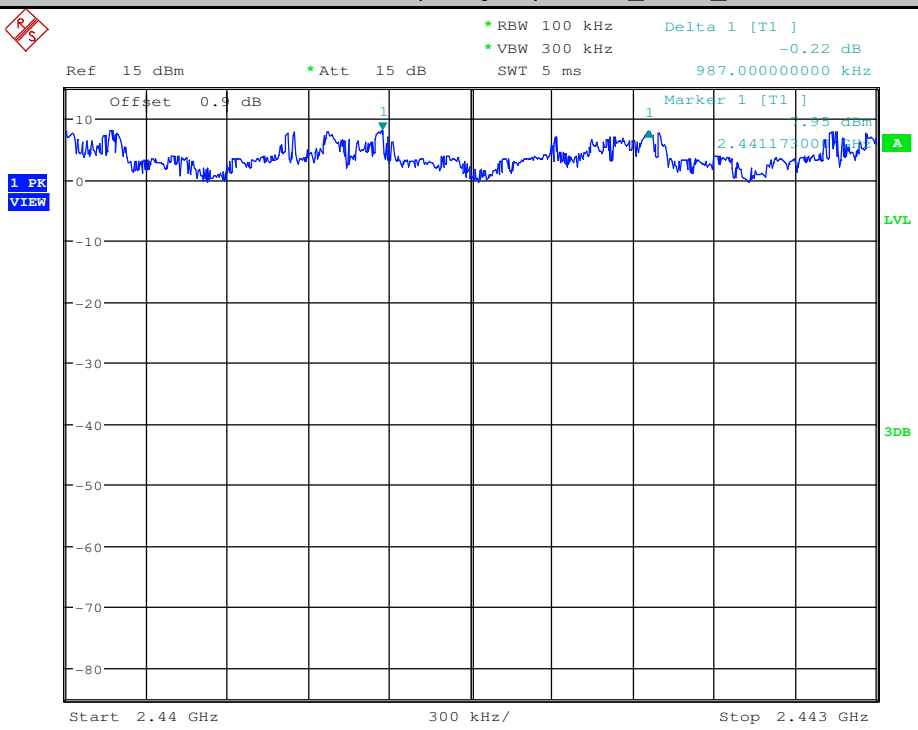
Carrier Frequency Separation_DH5_2441



Carrier Frequency Separation_2DH5_2441



Carrier Frequency Separation_3DH5_2441

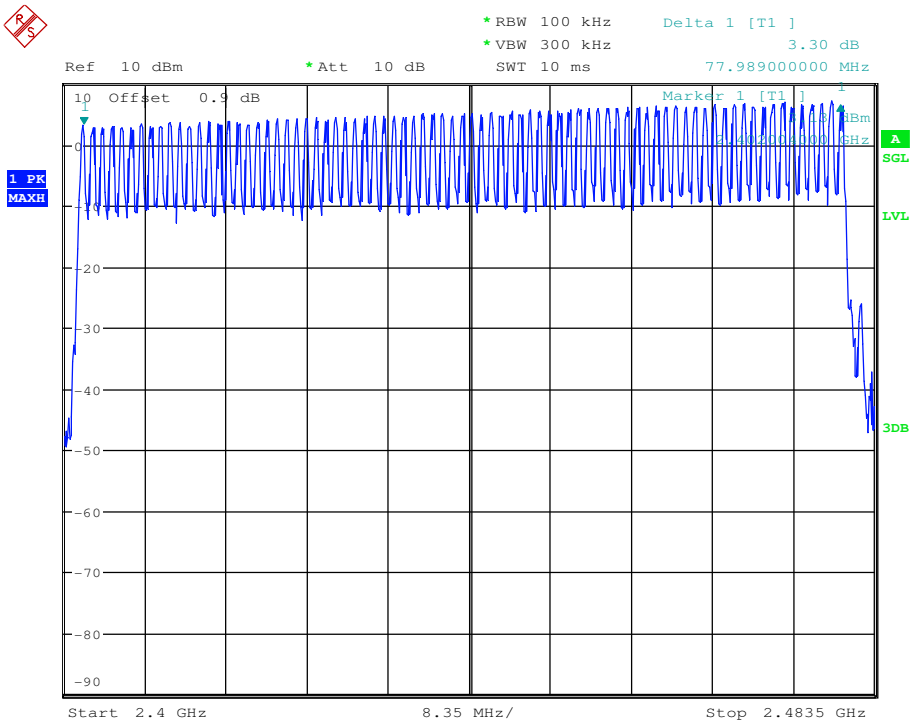


4.Hopping Channel Number

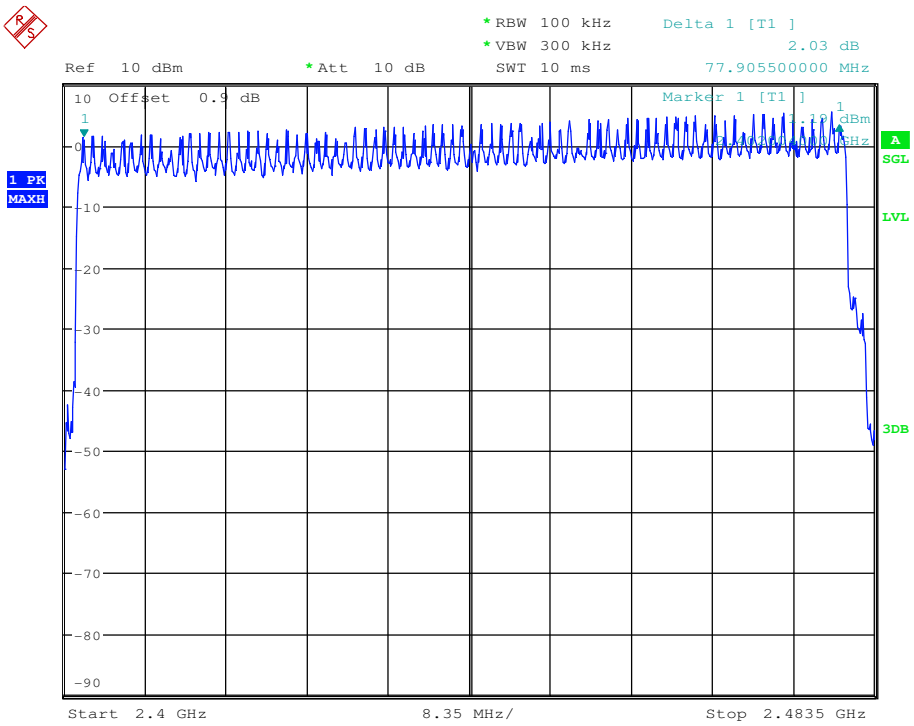
Left earbuds

Test Mode	Test Channel	Number of Hopping Channel[N]	Limit[N]	Verdict
DH5	2402	79	>=15	PASS
2DH5	2402	79	>=15	PASS
3DH5	2402	79	>=15	PASS

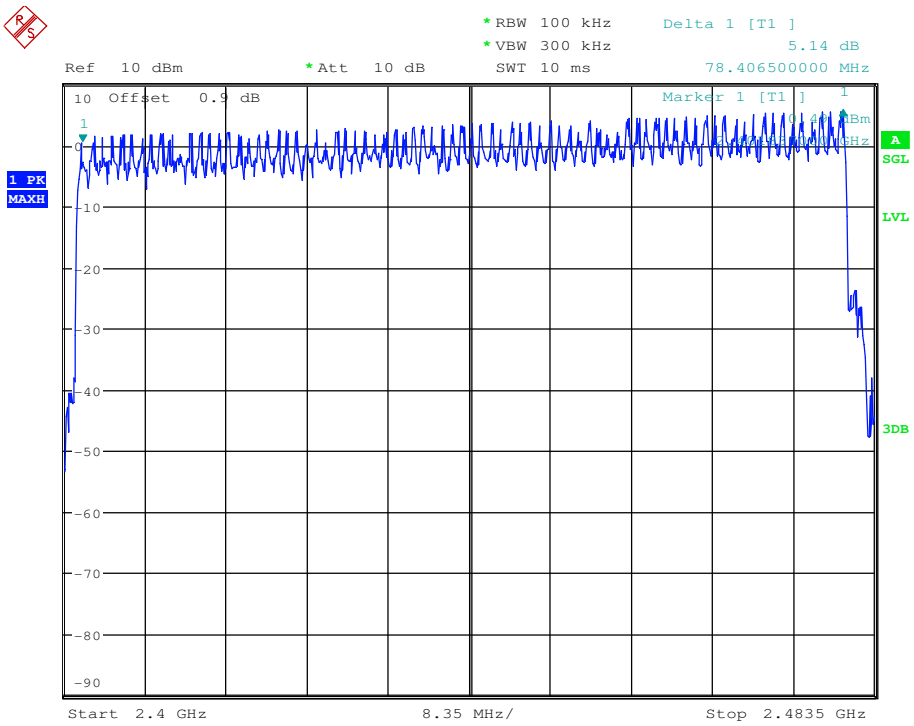
TEST PLOT
Hopping Channel Number_DH5_2402



Hopping Channel Number_2DH5_2402



Hopping Channel Number_3DH5_2402

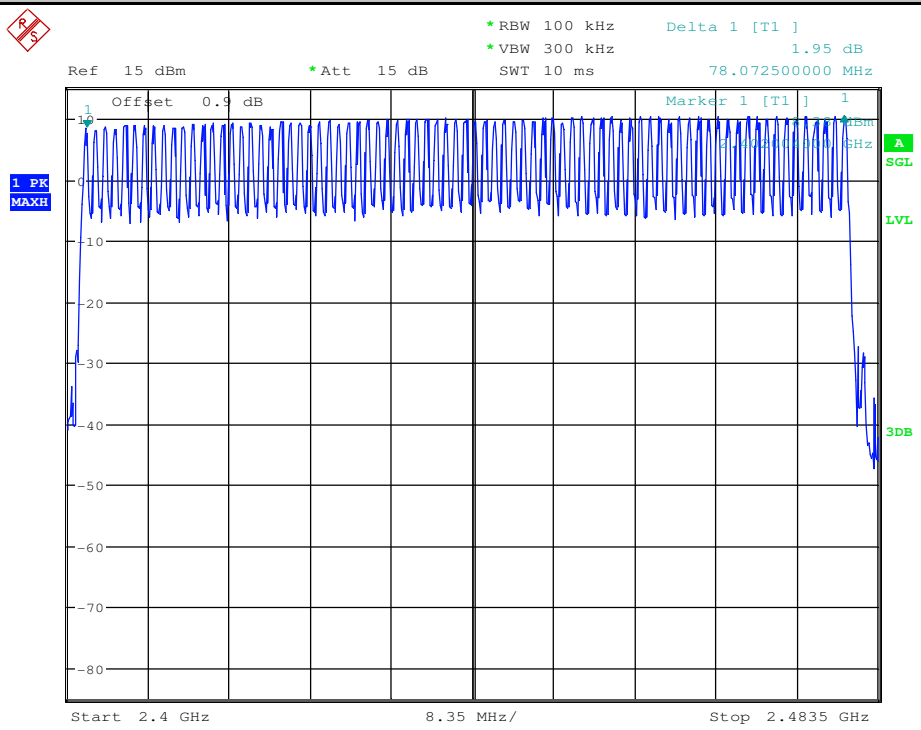


Right earbuds

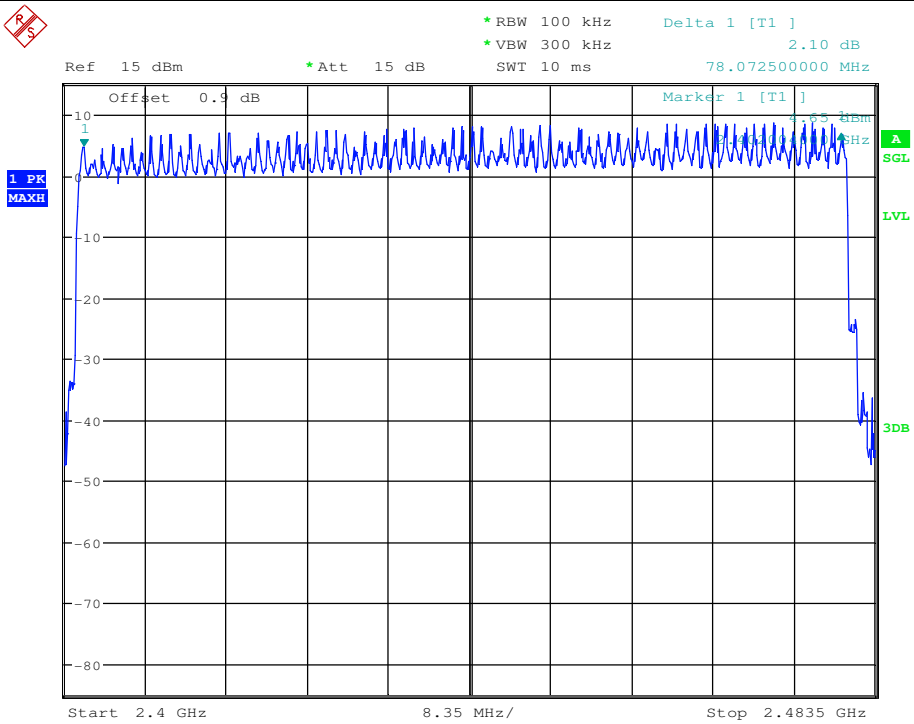
Test Mode	Test Channel	Number of Hopping Channel[N]	Limit[N]	Verdict
DH5	2402	79	>=15	PASS
2DH5	2402	79	>=15	PASS
3DH5	2402	79	>=15	PASS

TEST PLOT

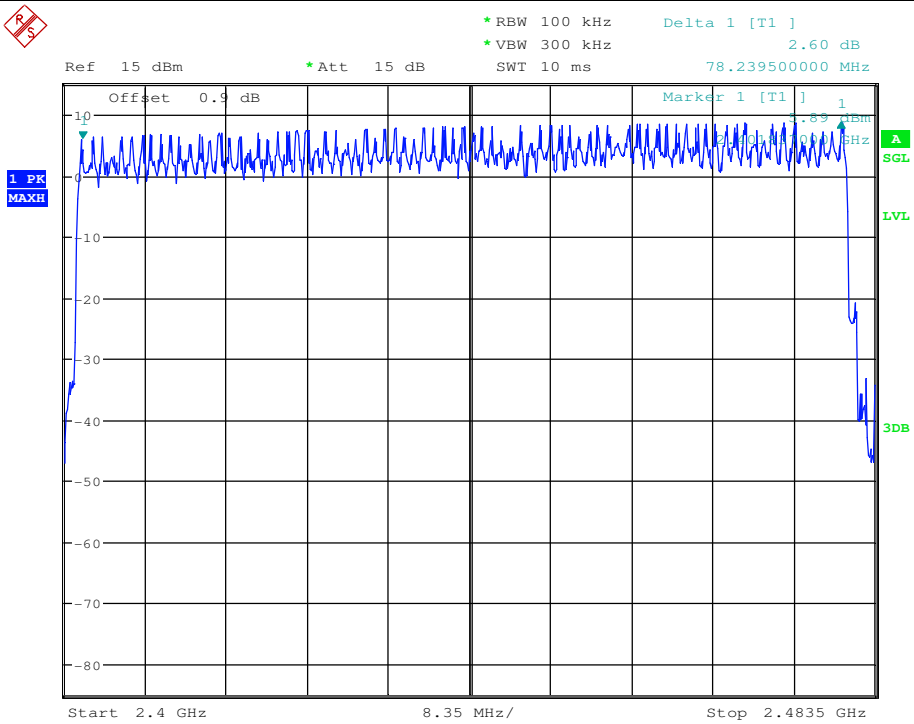
Hopping Channel Number_DH5_2402



Hopping Channel Number_2DH5_2402



Hopping Channel Number_3DH5_2402



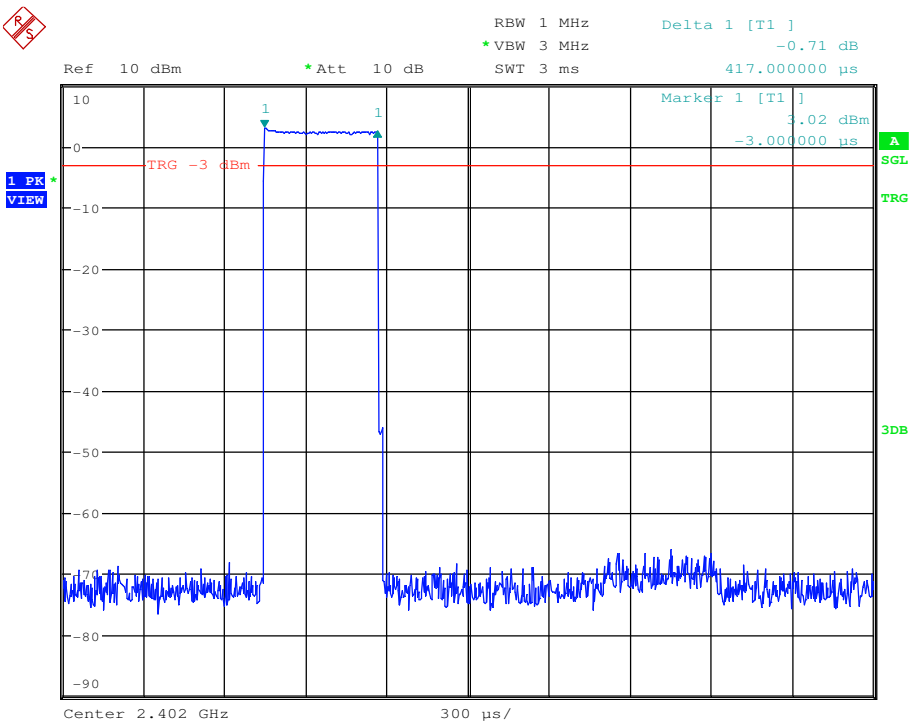
5.Dwell Time

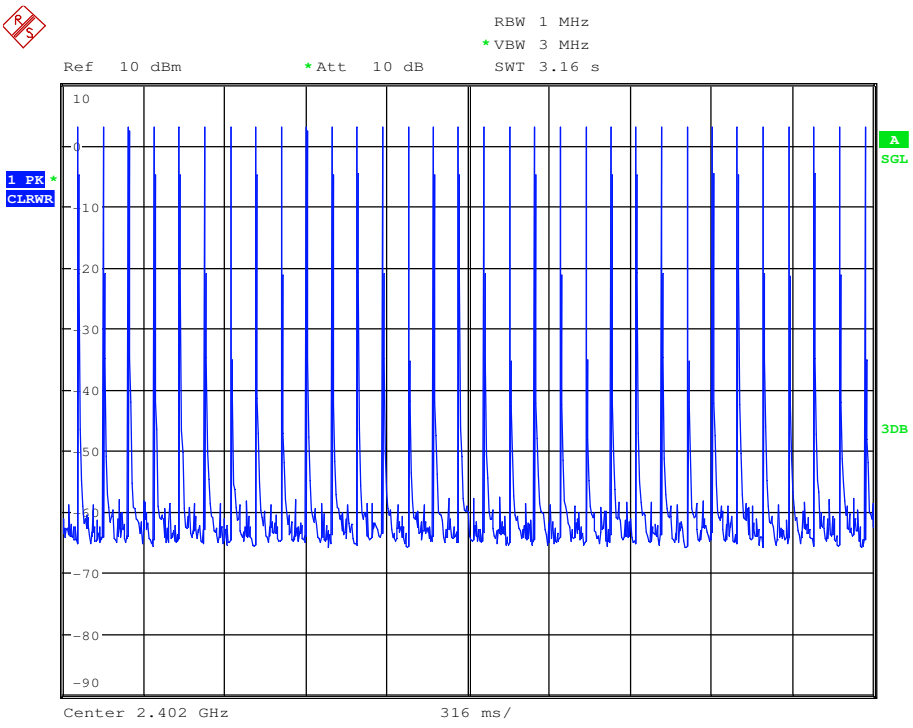
Left earbuds

Test Mode	Test Channel	Burst Width[ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit[s]	Verdict
DH1	2402	0.42	320	0.134	<0.4	PASS
DH3	2402	1.68	160	0.269	<0.4	PASS
DH5	2402	2.92	100	0.292	<0.4	PASS
2DH1	2402	0.40	320	0.128	<0.4	PASS
2DH3	2402	0.42	320	0.134	<0.4	PASS
2DH5	2402	2.93	100	0.293	<0.4	PASS
3DH1	2402	0.43	310	0.133	<0.4	PASS
3DH3	2402	1.69	160	0.27	<0.4	PASS
3DH5	2402	2.93	110	0.322	<0.4	PASS

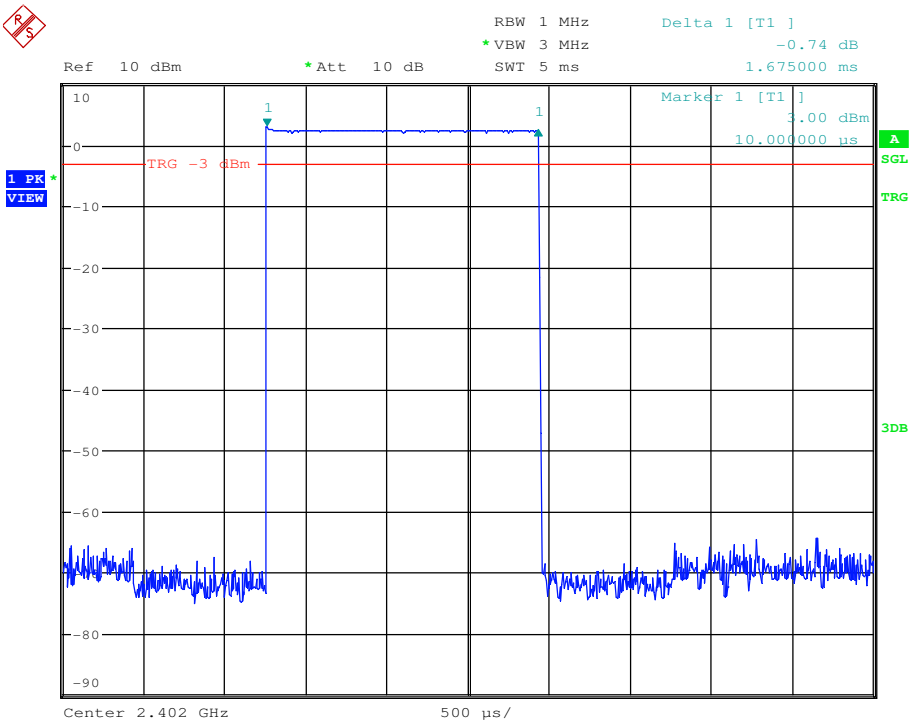
TEST PLOT

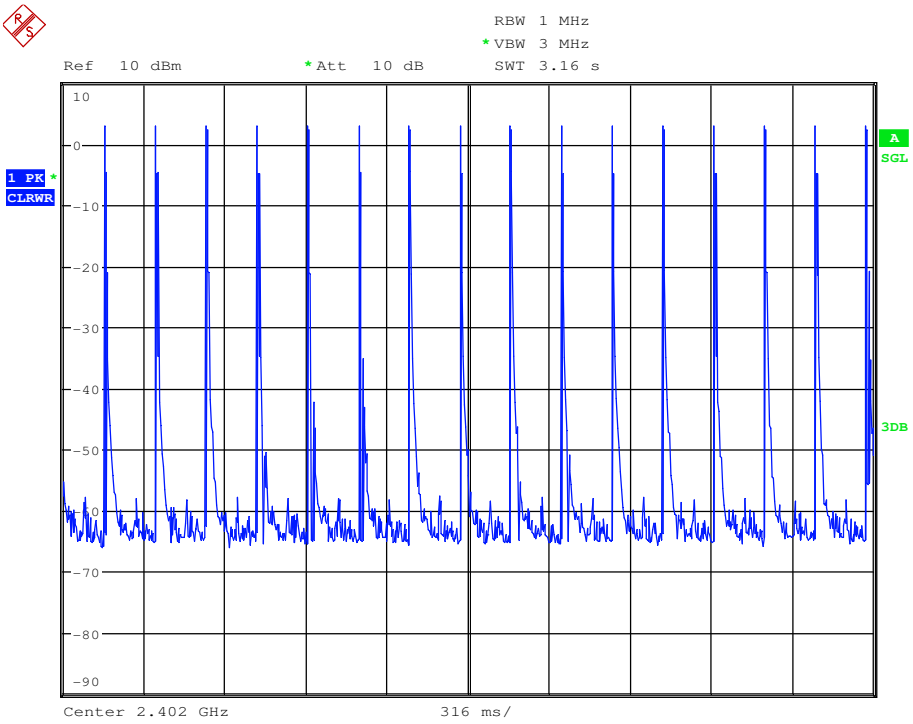
Dwell Time_DH1_2402



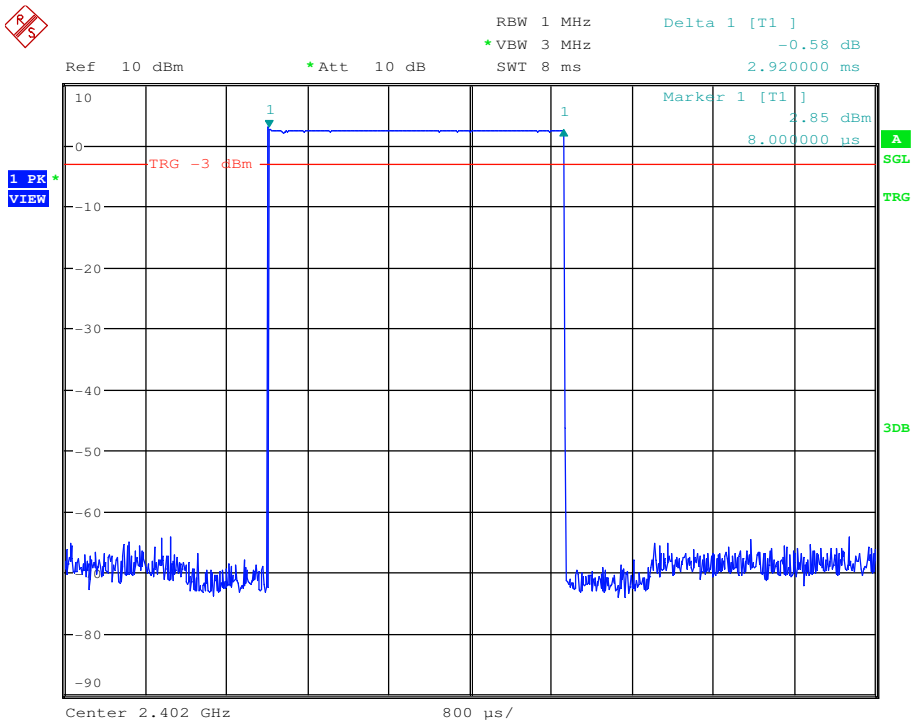


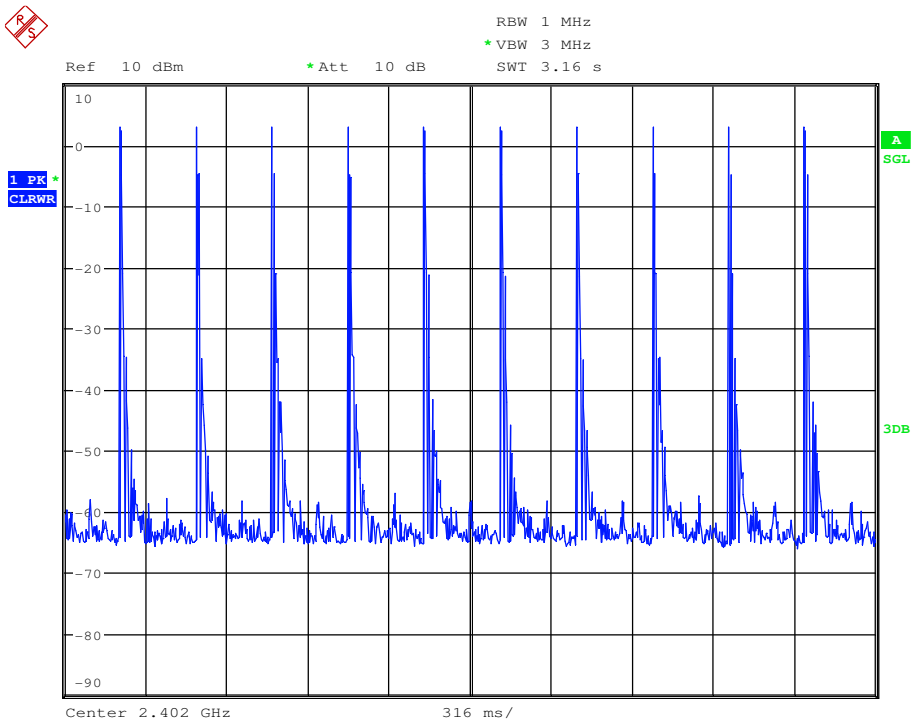
Dwell Time_DH3_2402



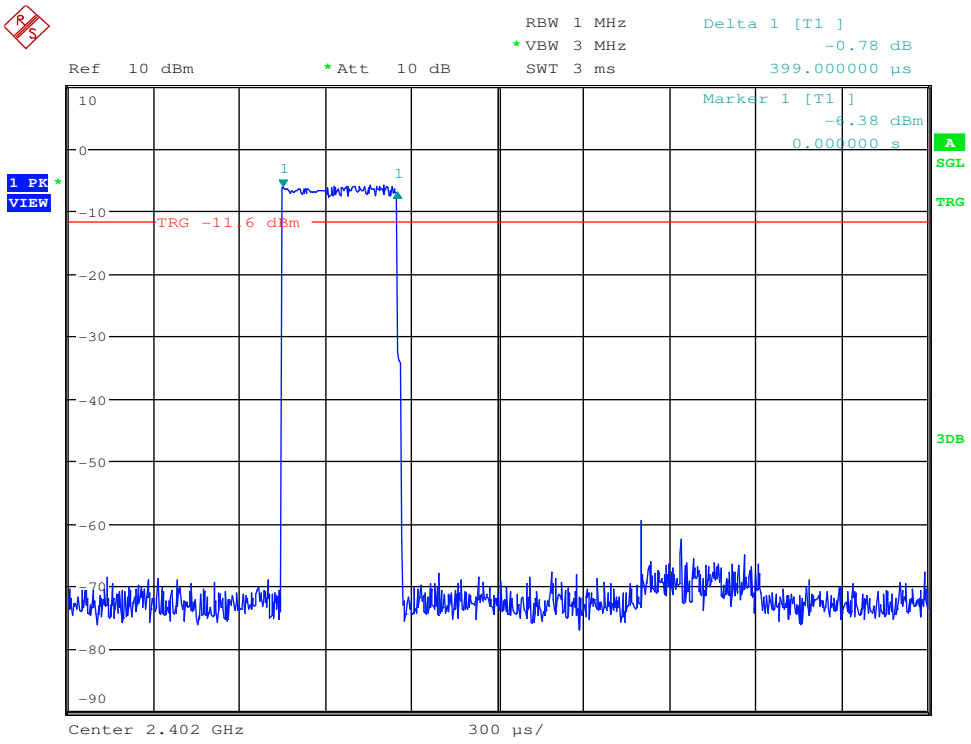


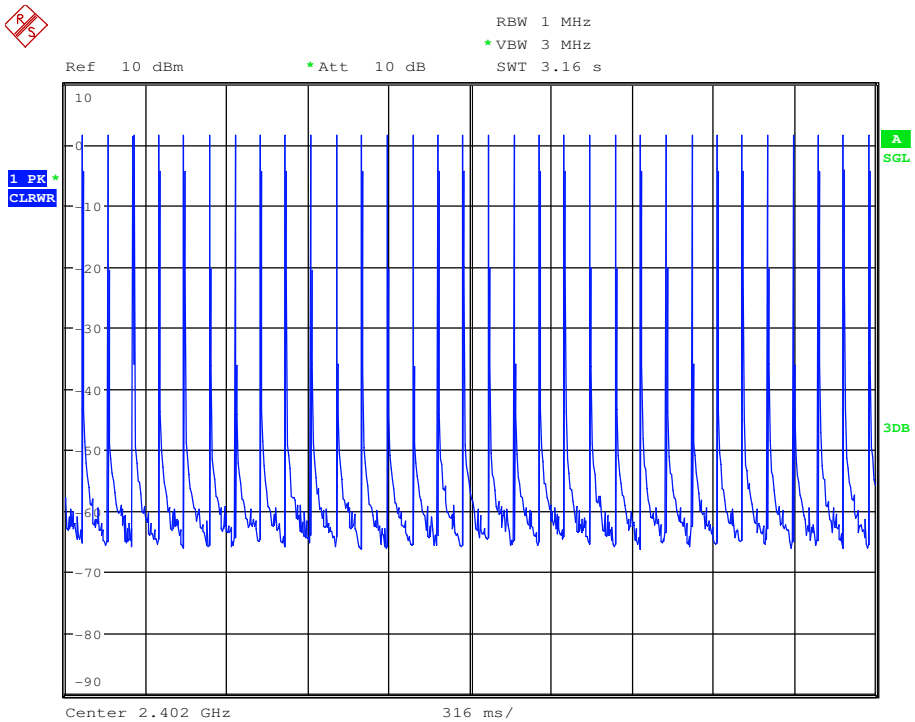
Dwell Time_DH5_2402



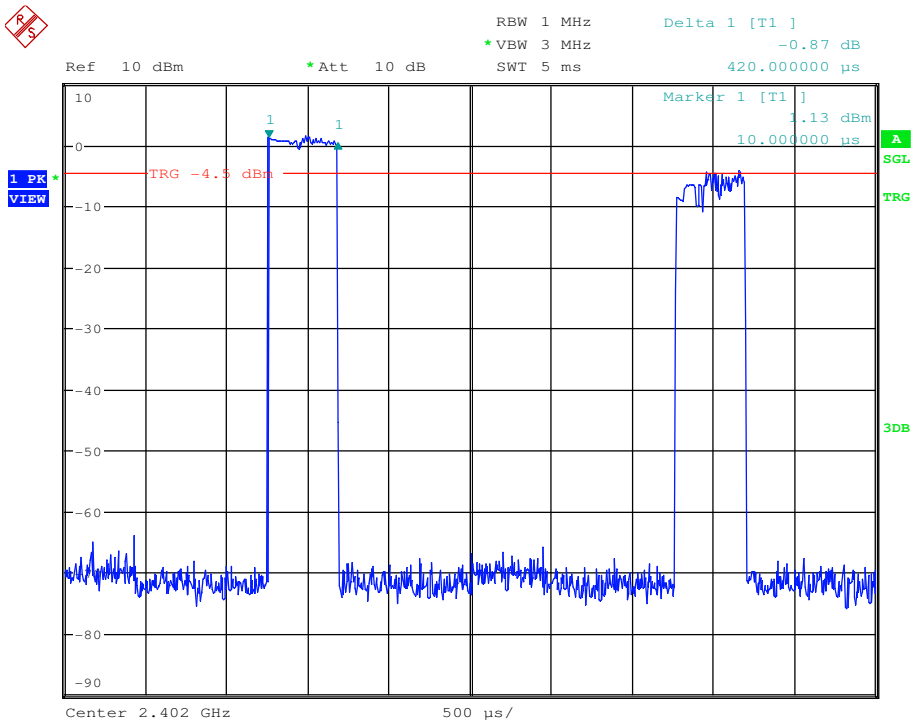


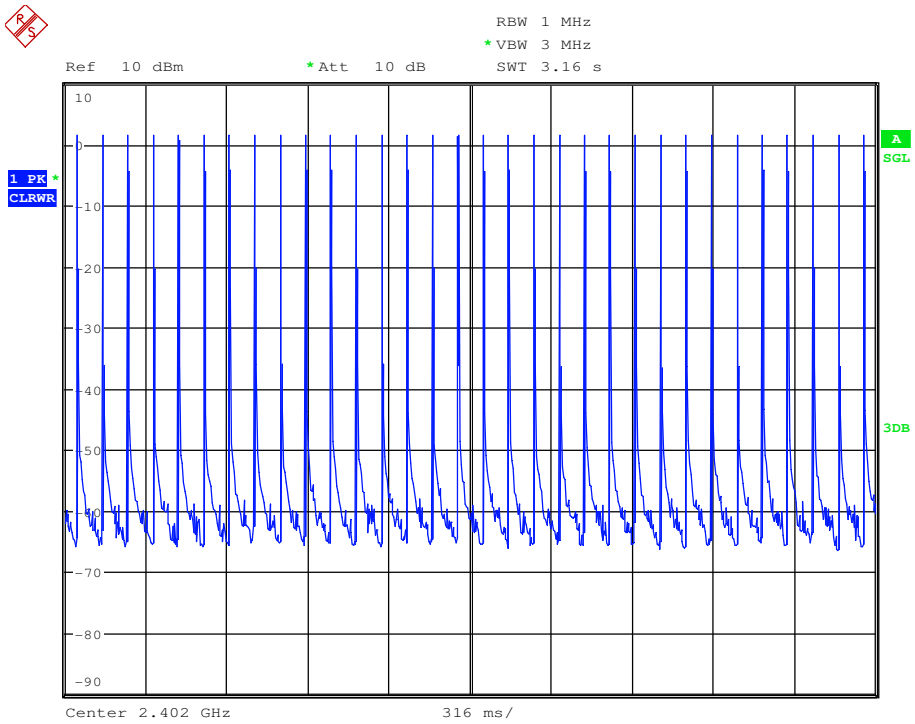
Dwell Time_2DH1_2402



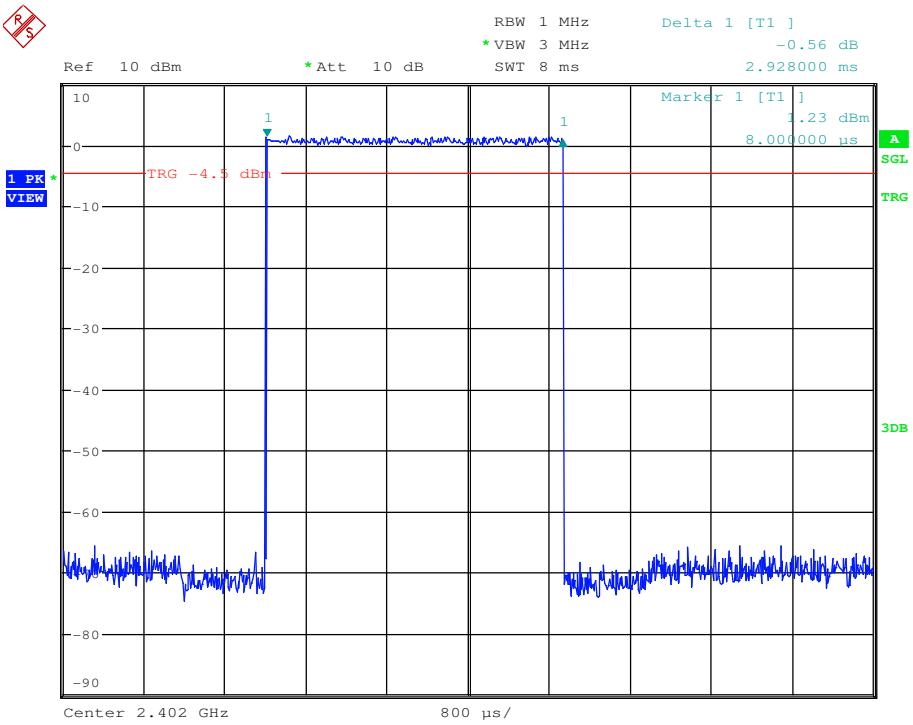


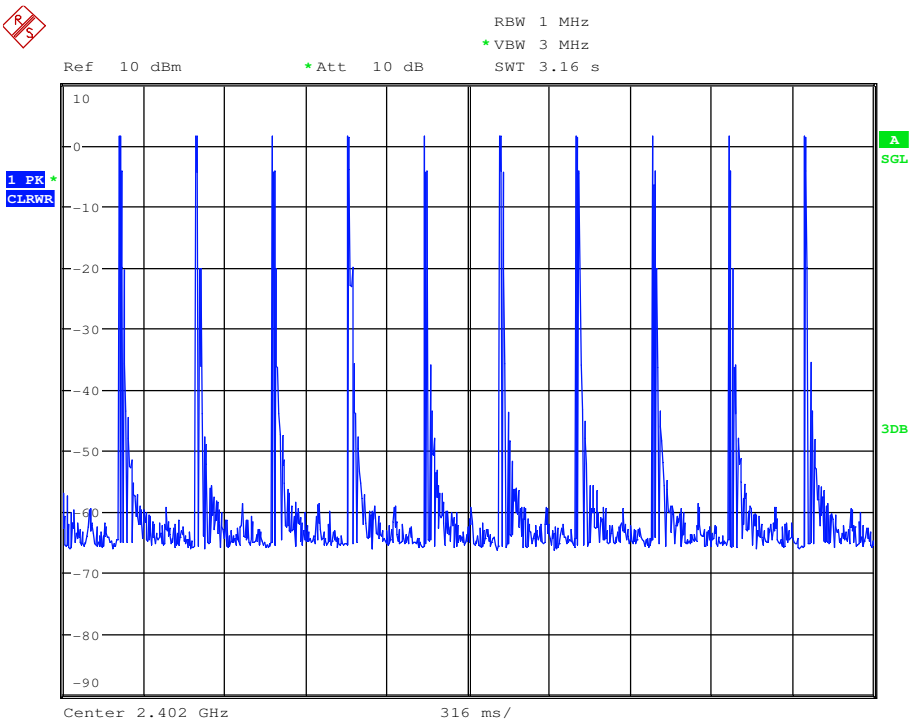
Dwell Time_2DH3_2402



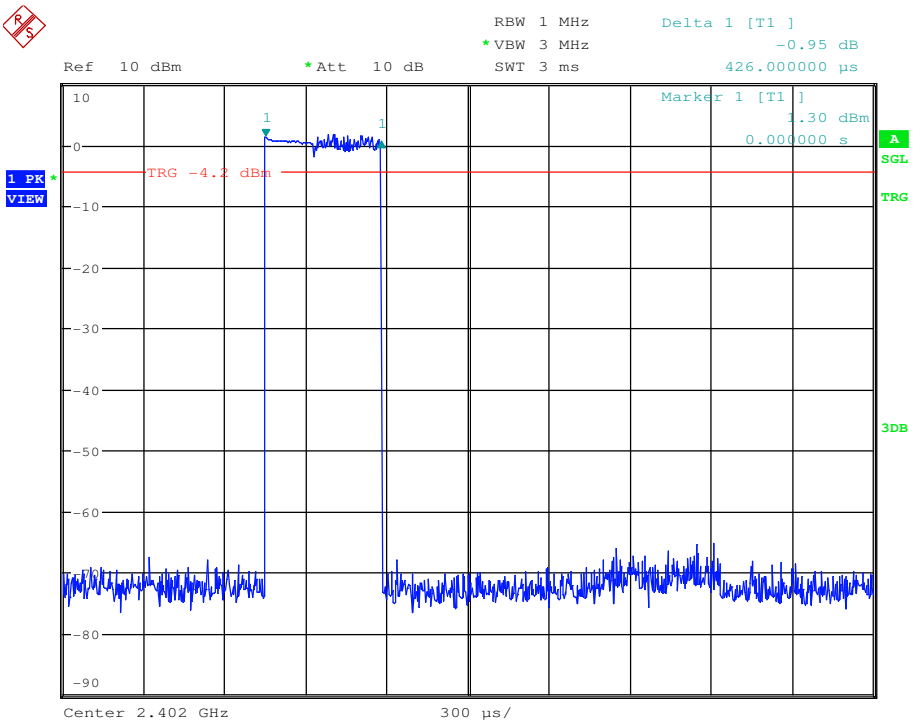


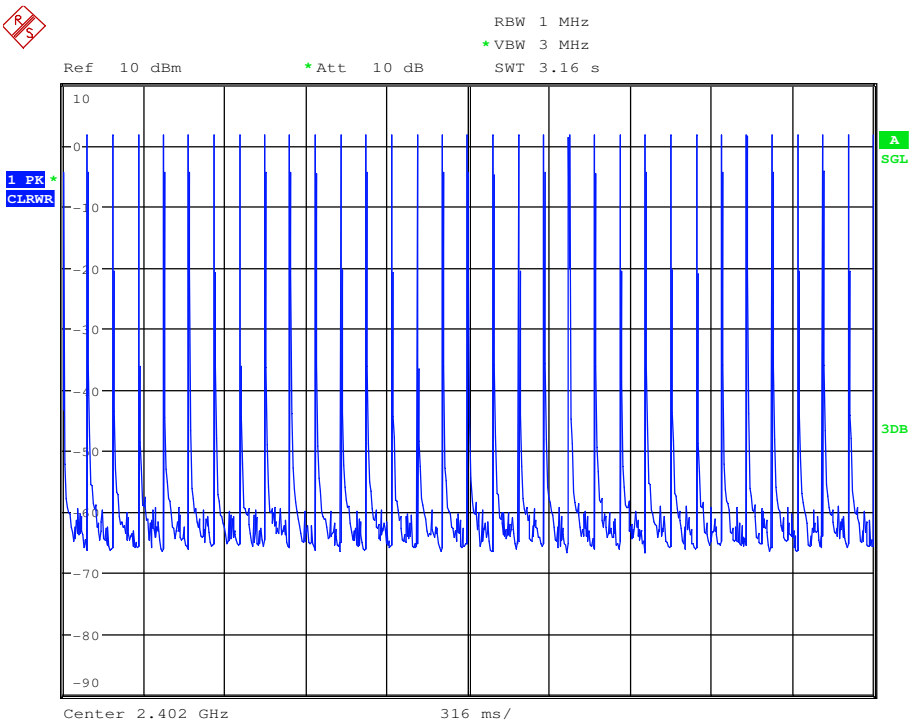
Dwell Time_2DH5_2402



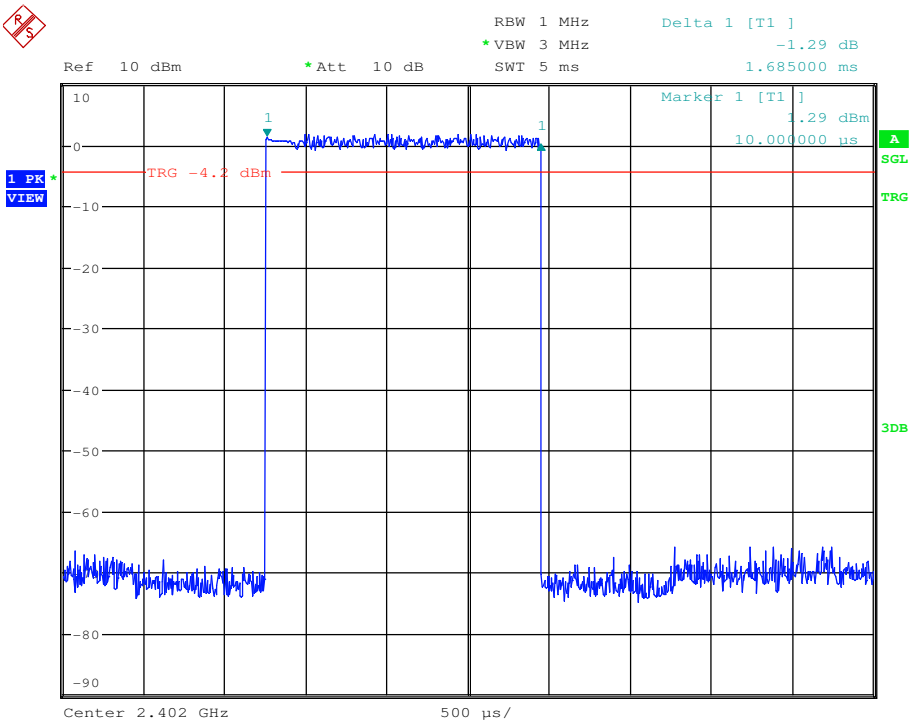


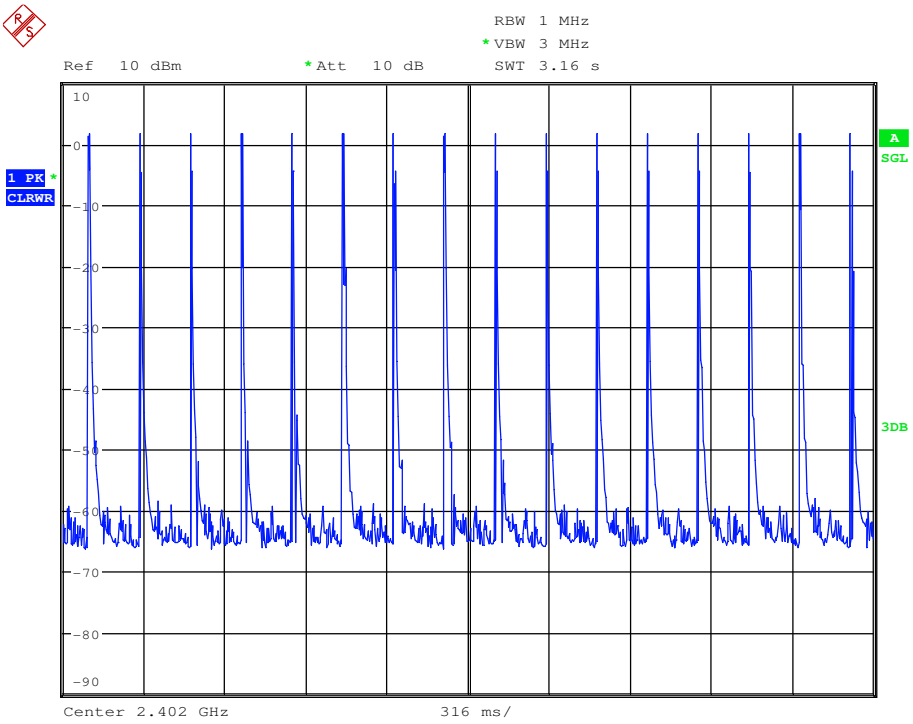
Dwell Time_3DH1_2402



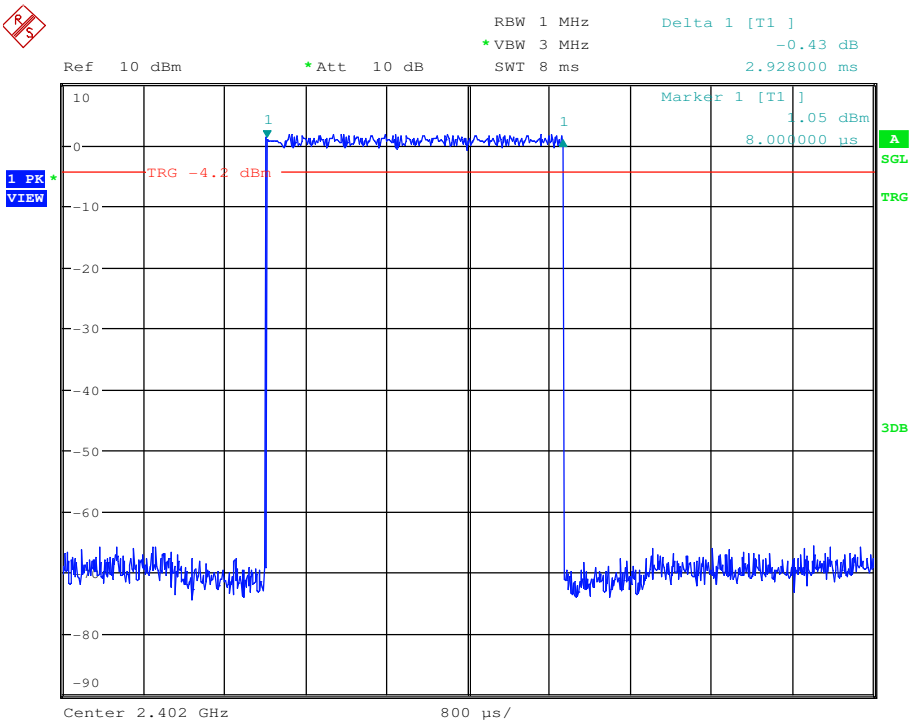


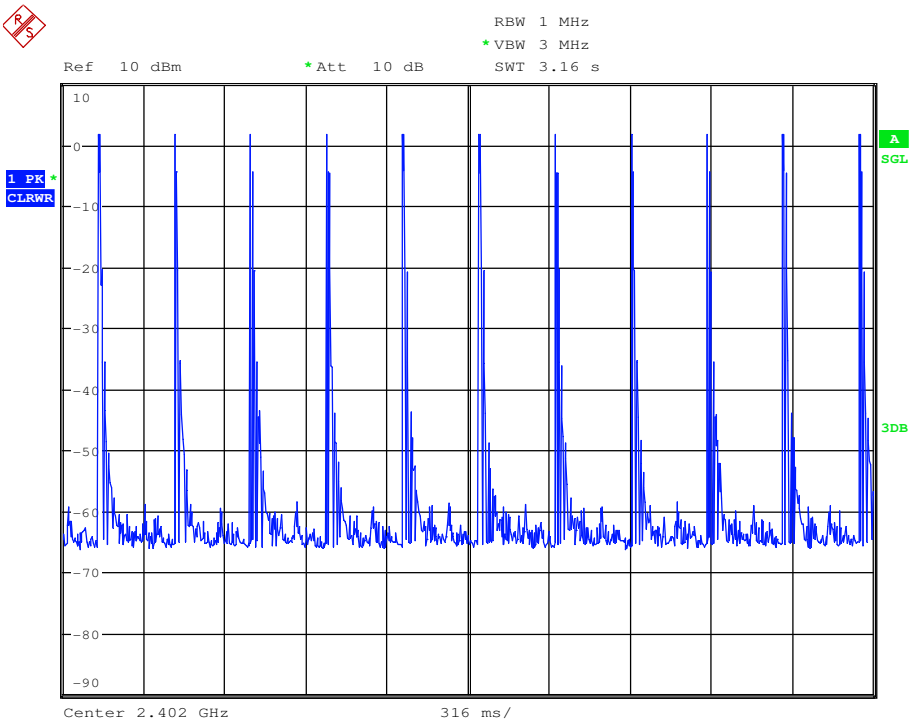
Dwell Time_3DH3_2402





Dwell Time_3DH5_2402



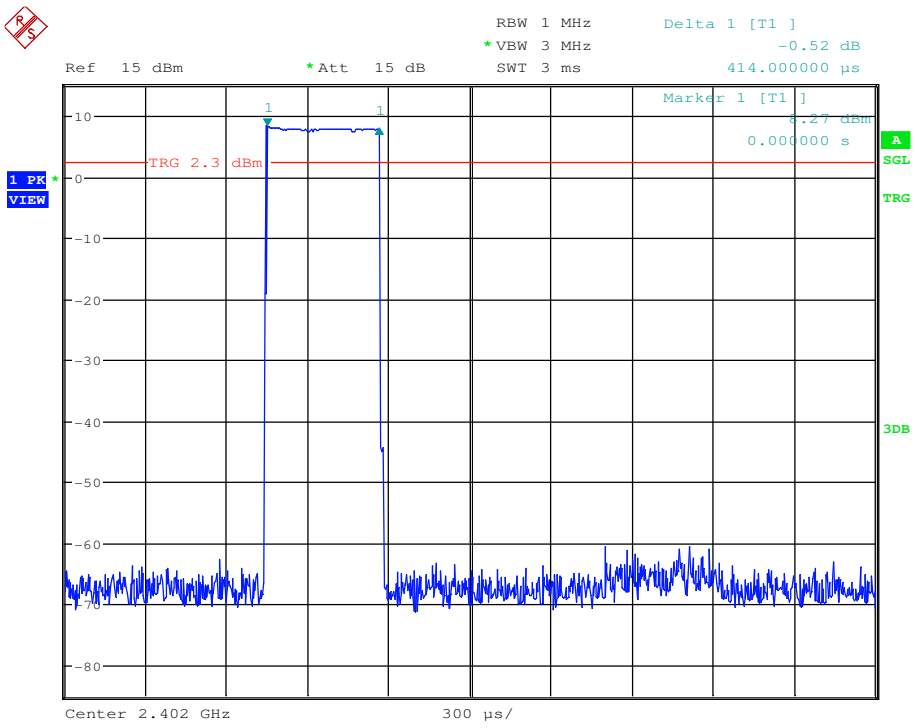


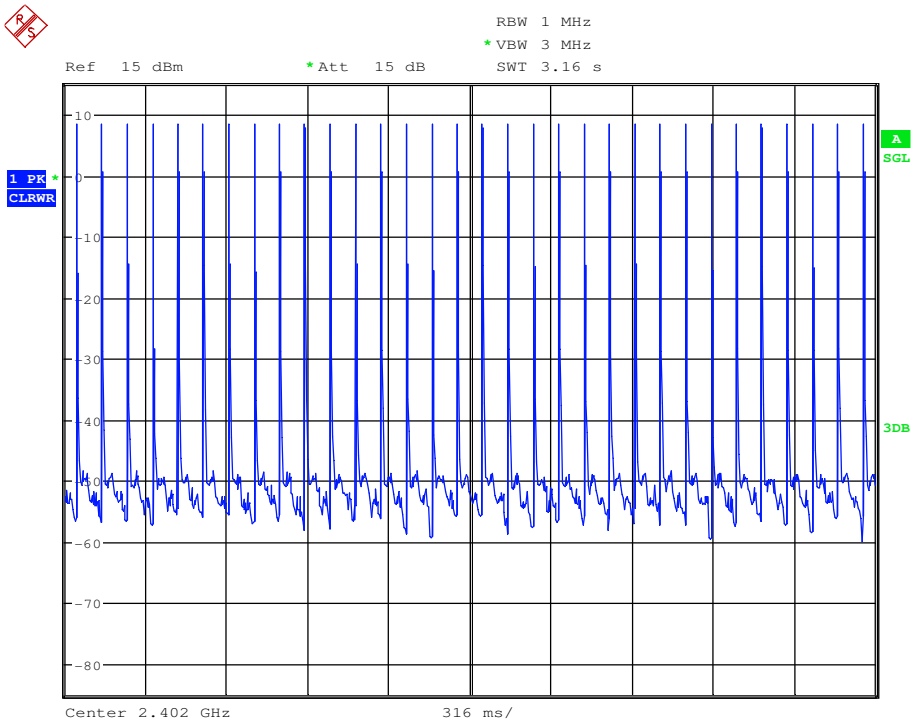
Right earbuds

Test Mode	Test Channel	Burst Width[ms/hop/ch]	Total	Dwell Time[s]	Limit[s]	Verdict
DH1	2402	0.41	320	0.131	<0.4	PASS
DH3	2402	1.68	160	0.269	<0.4	PASS
DH5	2402	2.92	110	0.321	<0.4	PASS
2DH1	2402	0.43	320	0.138	<0.4	PASS
2DH3	2402	1.69	160	0.27	<0.4	PASS
2DH5	2402	2.92	100	0.292	<0.4	PASS
3DH1	2402	0.43	320	0.138	<0.4	PASS
3DH3	2402	1.68	160	0.269	<0.4	PASS
3DH5	2402	2.93	110	0.322	<0.4	PASS

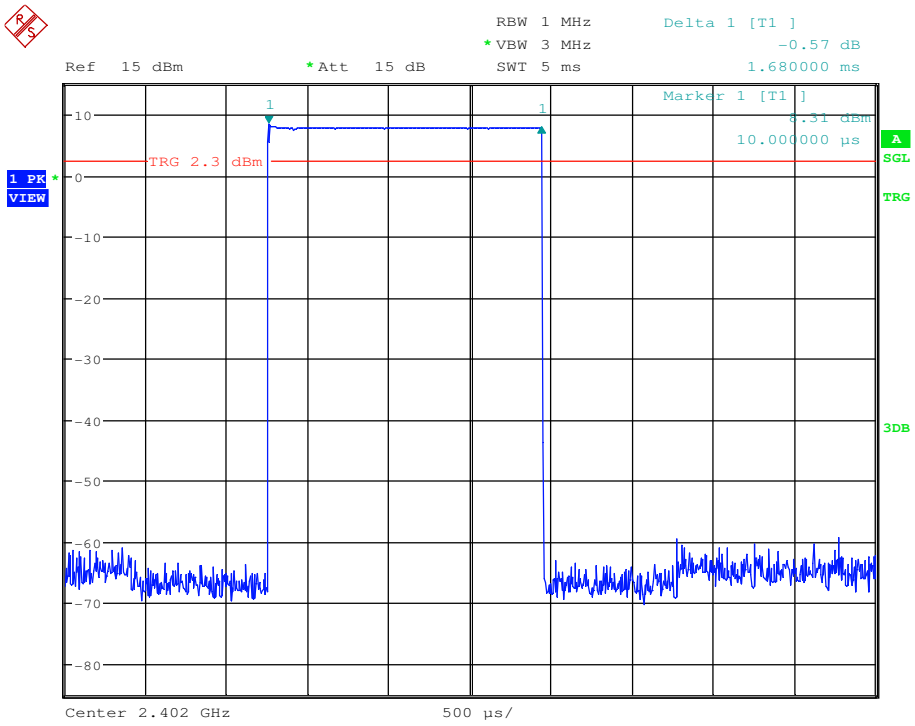
TEST PLOT

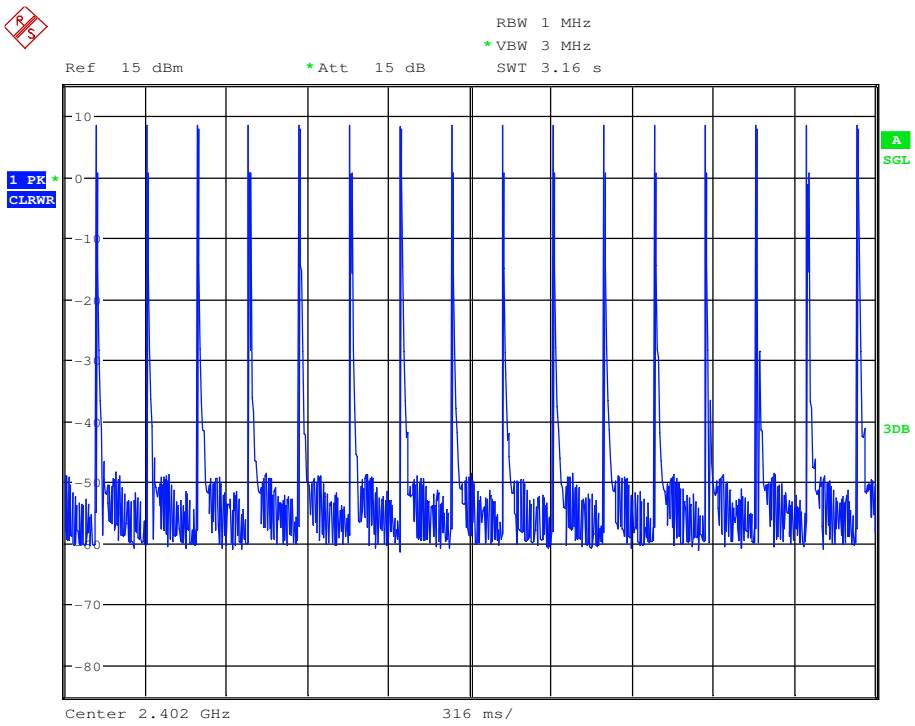
Dwell Time_DH1_2402



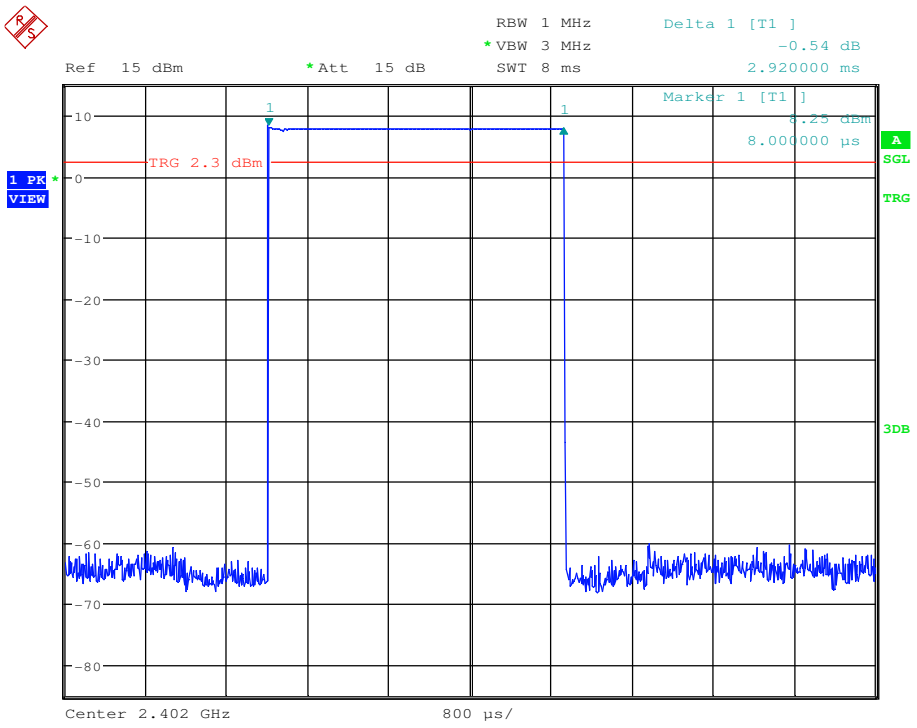


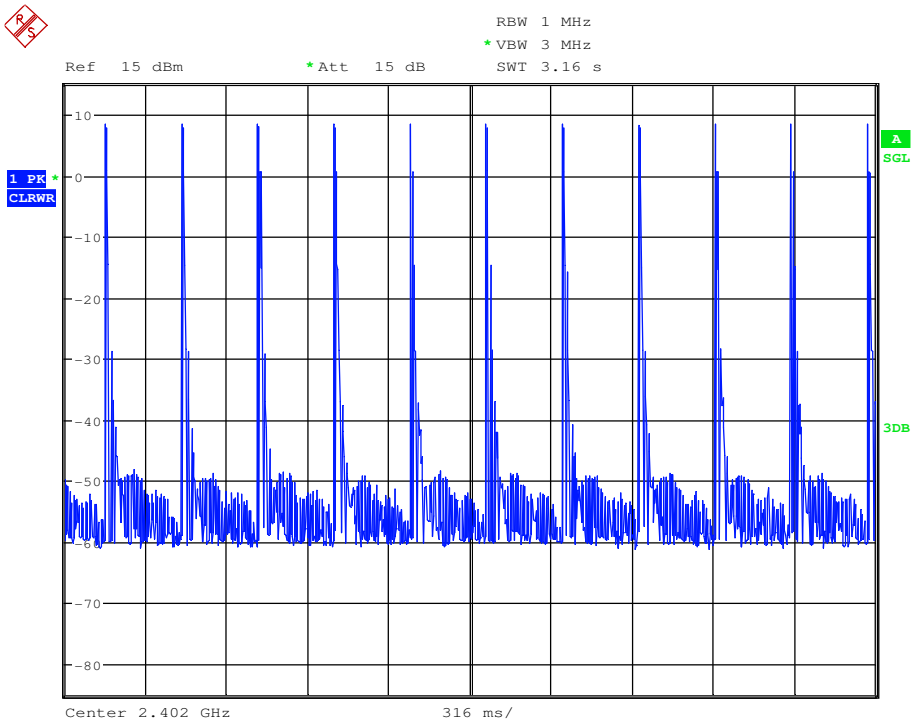
Dwell Time_DH3_2402



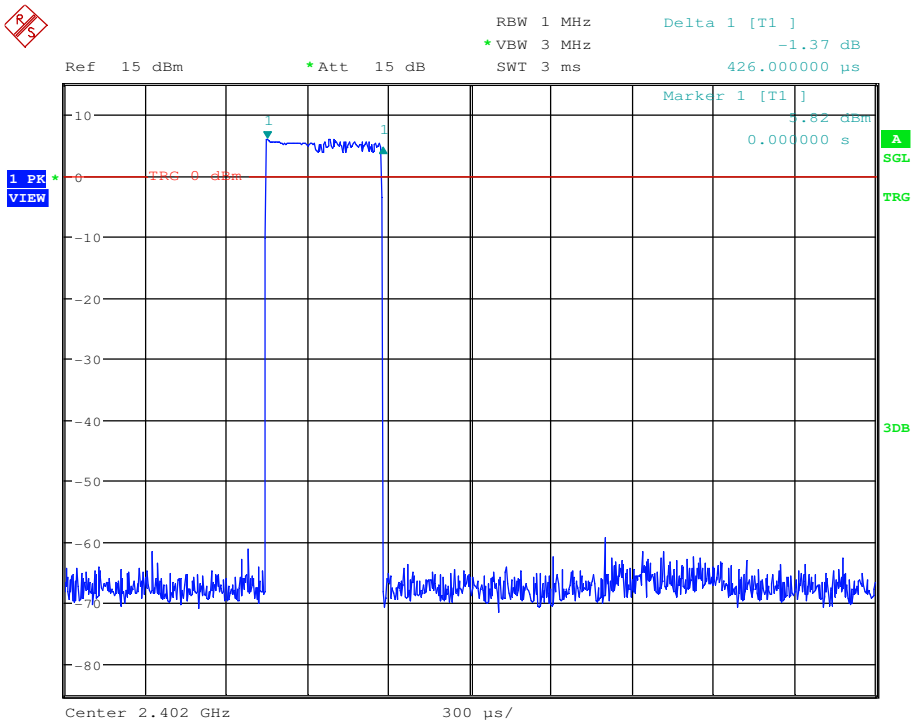


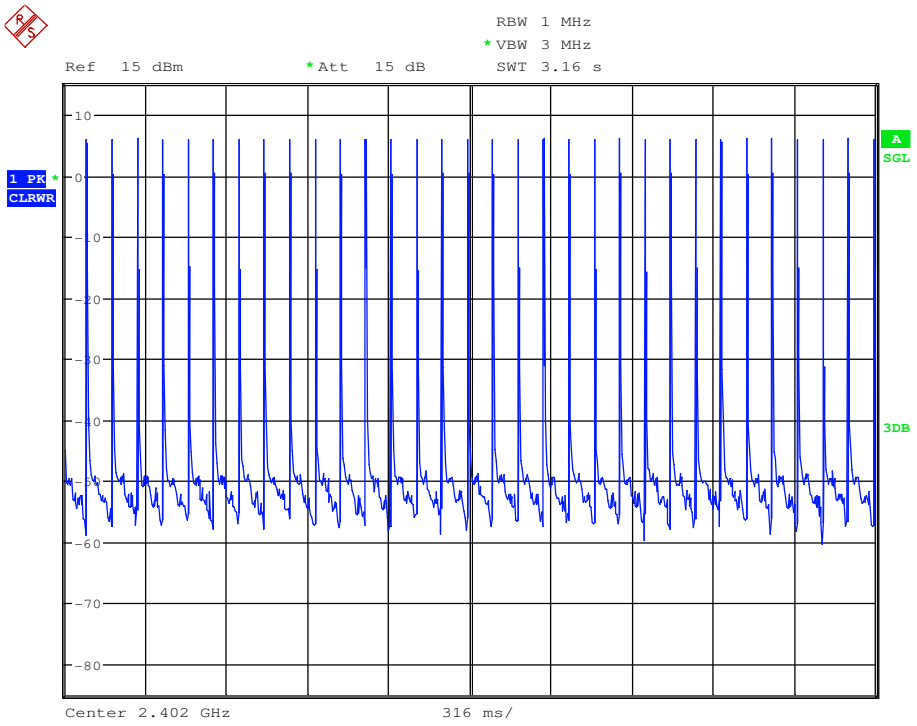
Dwell Time_DH5_2402



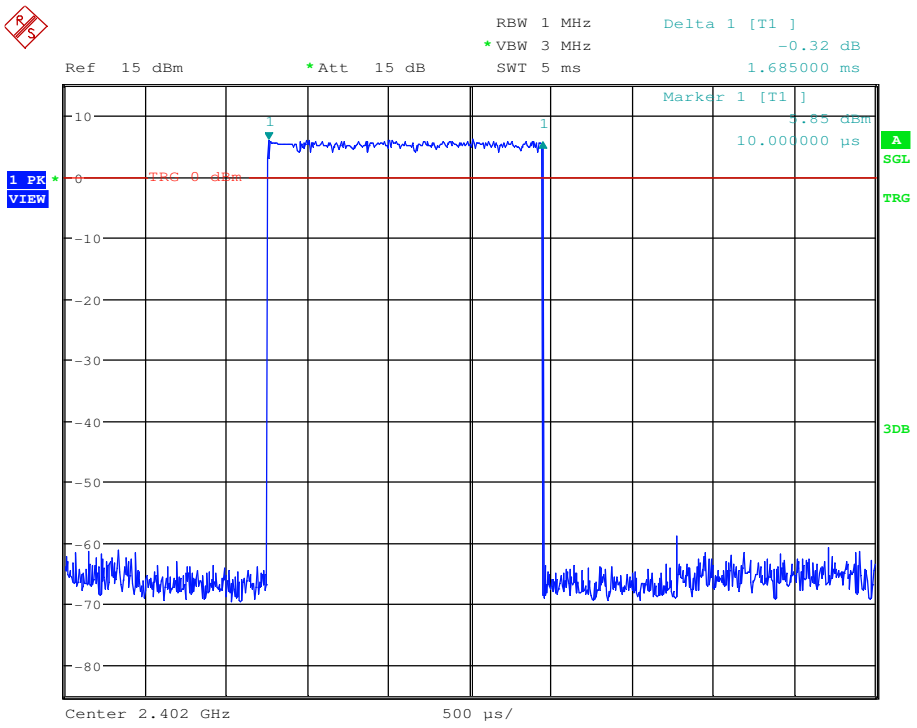


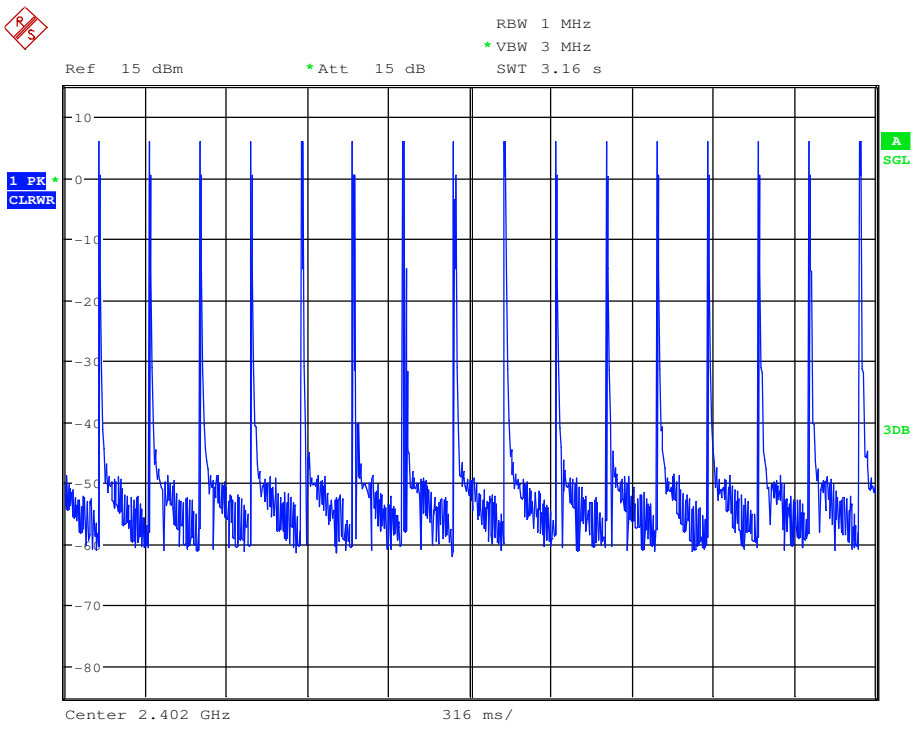
Dwell Time_2DH1_2402



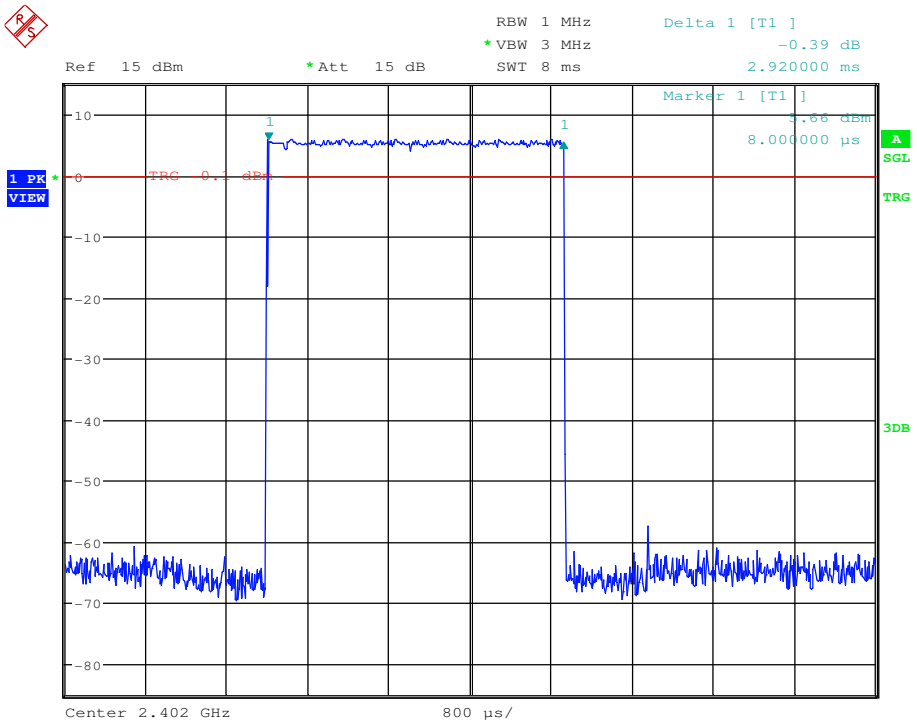


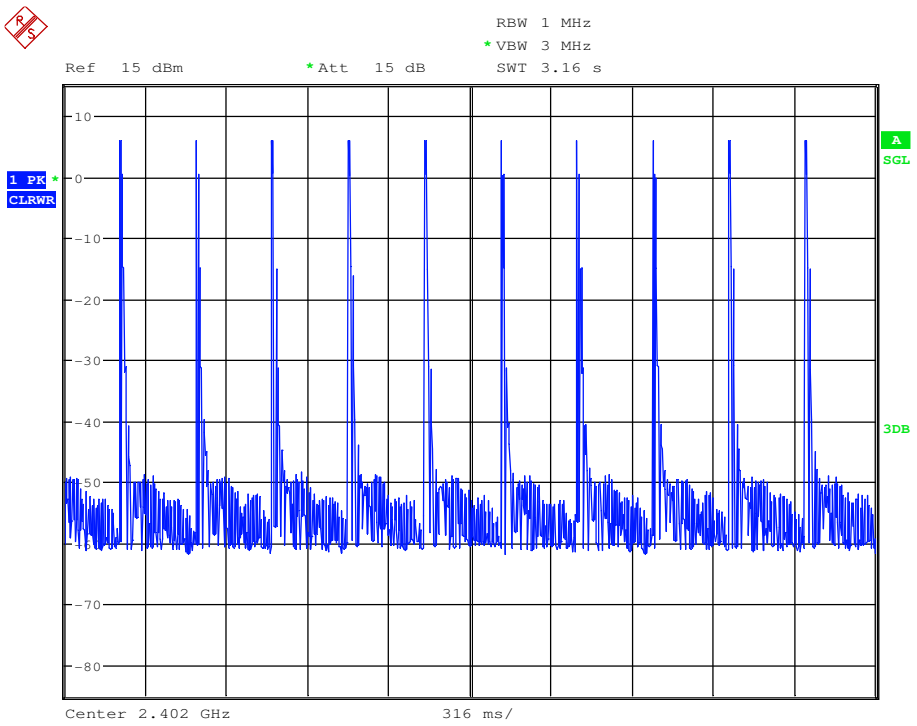
Dwell Time_2DH3_2402



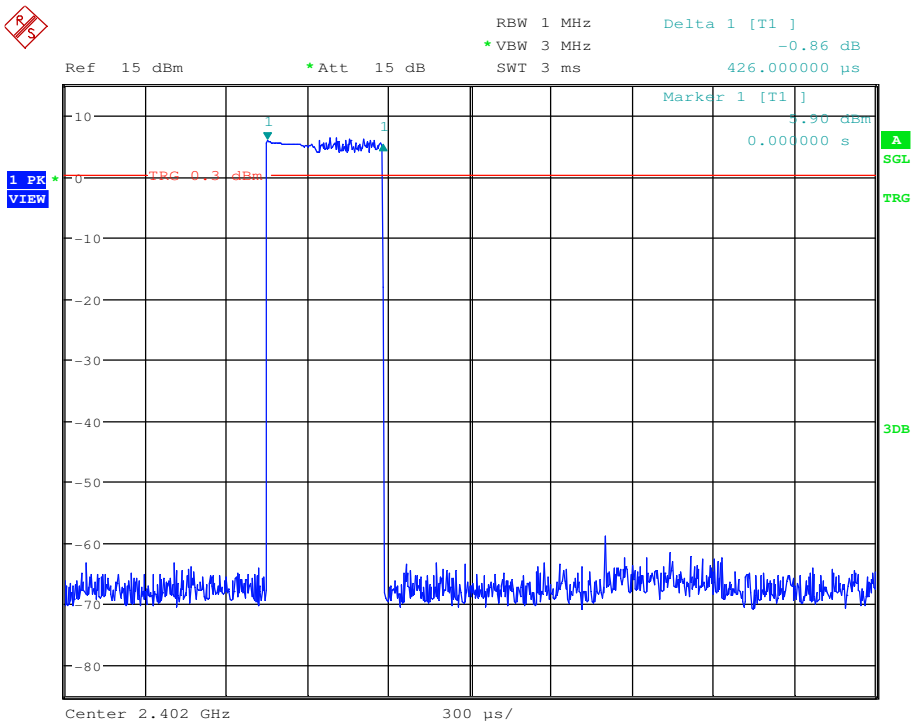


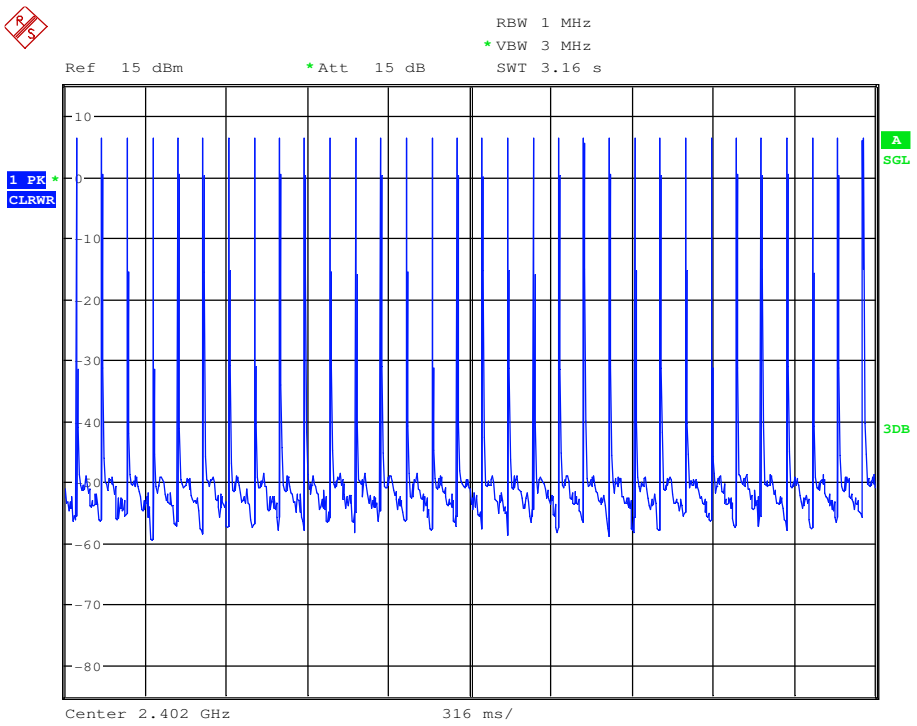
Dwell Time_2DH5_2402



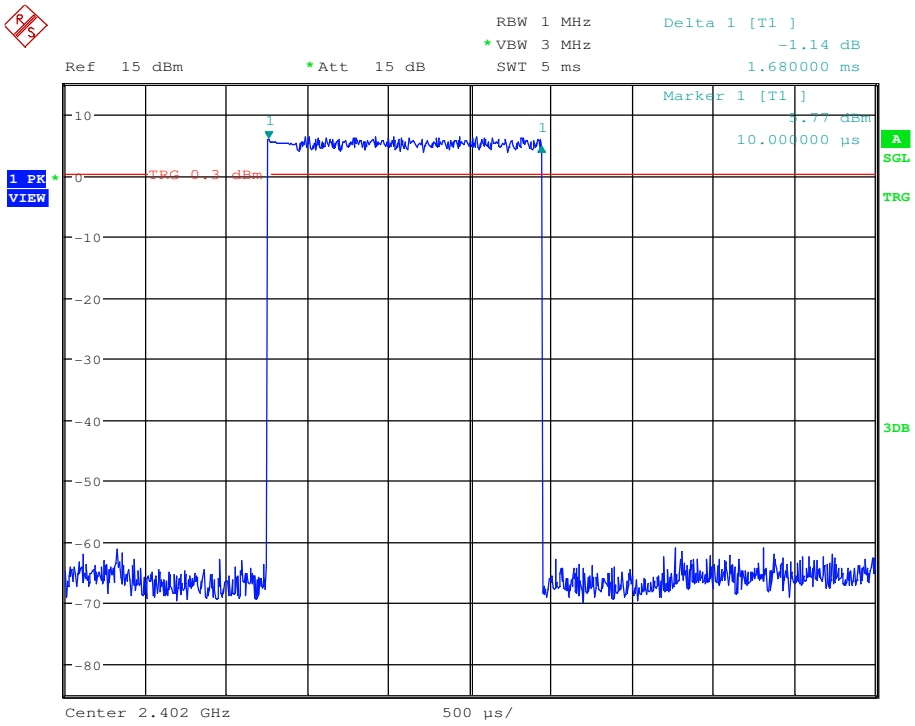


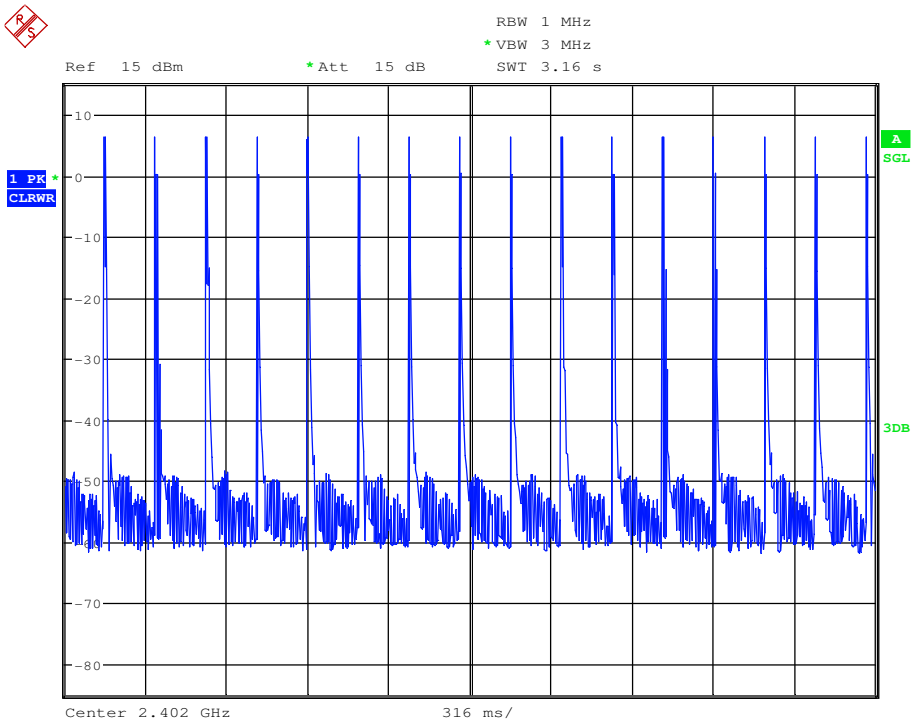
Dwell Time_3DH1_2402



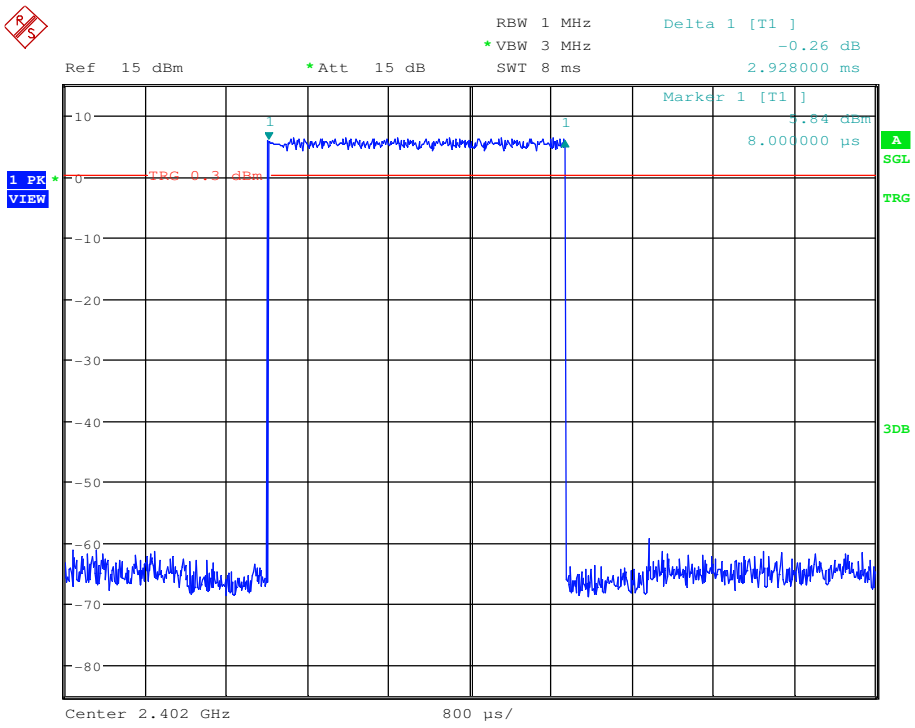


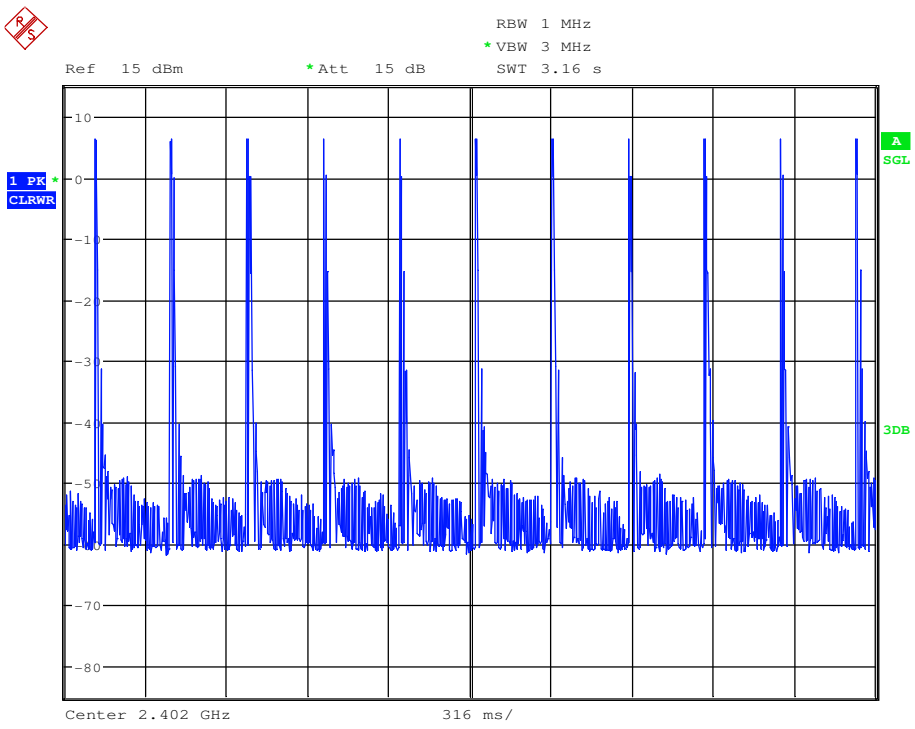
Dwell Time_3DH3_2402





Dwell Time_3DH5_2402

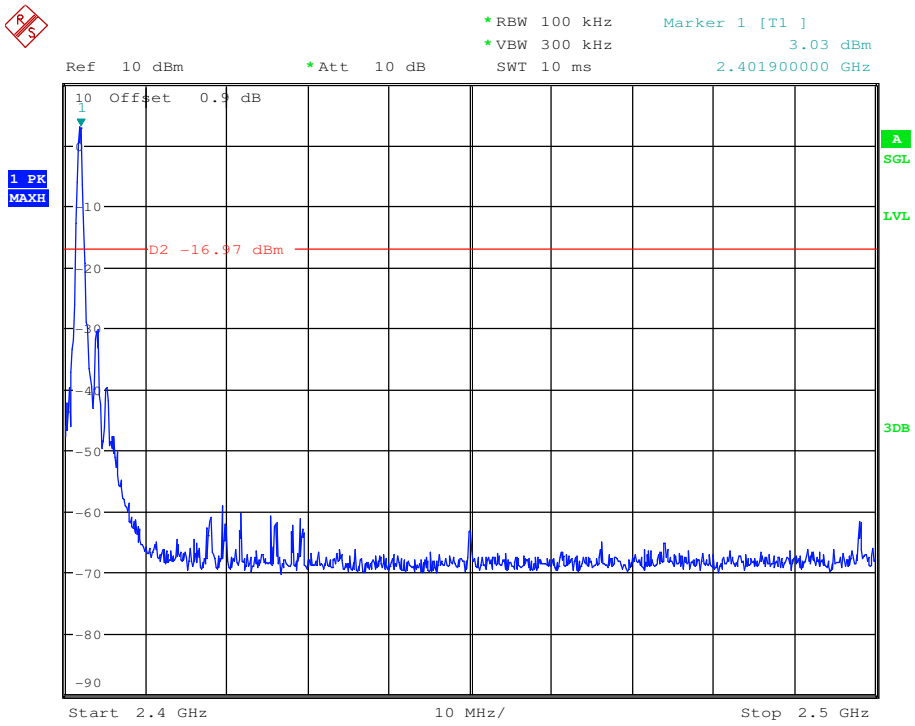




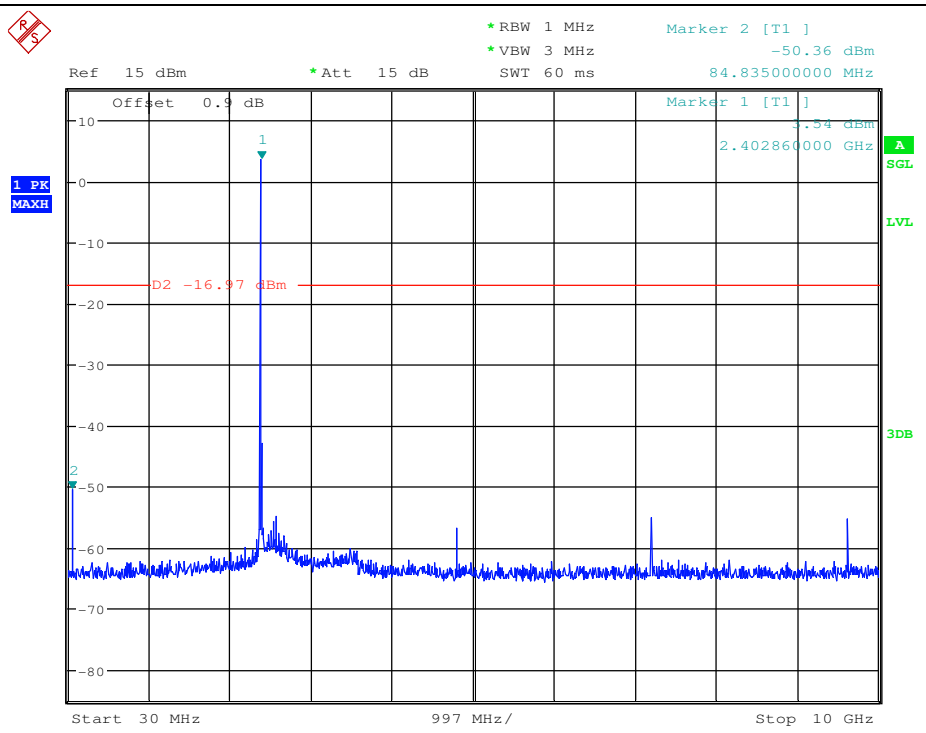
6.RF Conducted Spurious Emissions

Left earbuds

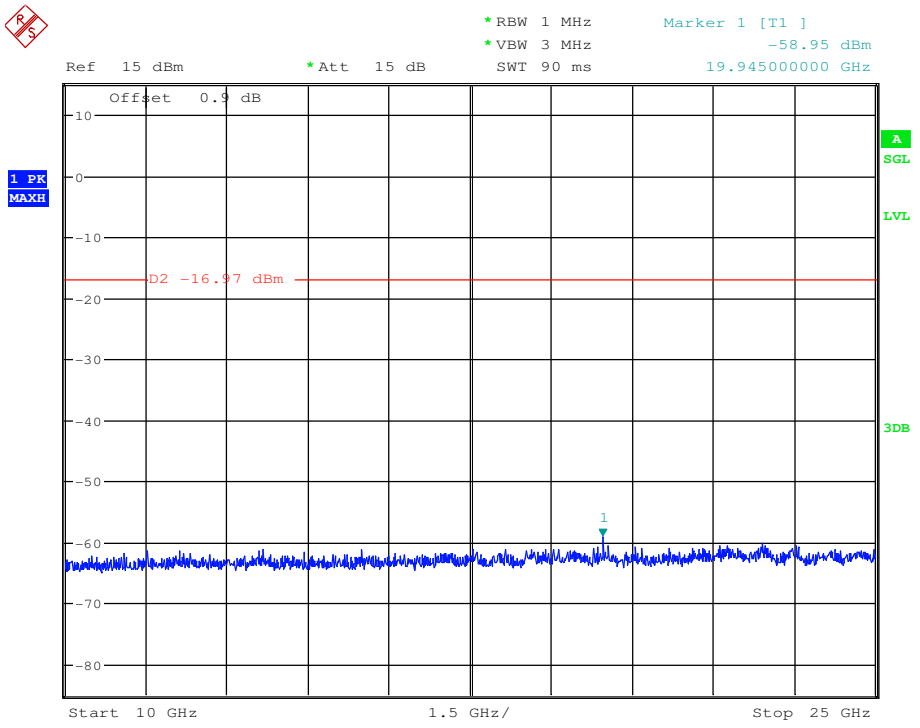
Test Mode	Test Channel	StartFre [MHz]	StopFre [MHz]	RBW [kHz]	VBW [kHz]	Pref[dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
DH5	2402	30	10000	1000	3000	3.03	-50.360	<-16.97	PASS
DH5	2402	10000	25000	1000	3000	3.03	-58.950	<-16.97	PASS
DH5	2441	30	10000	1000	3000	5.38	-47.000	<-14.62	PASS
DH5	2441	10000	25000	1000	3000	5.38	-60.010	<-14.62	PASS
DH5	2480	30	10000	1000	3000	7.23	-42.810	<-12.77	PASS
DH5	2480	10000	25000	1000	3000	7.23	-53.720	<-12.77	PASS
2DH5	2402	30	10000	1000	3000	1.49	-52.970	<-18.51	PASS
2DH5	2402	10000	25000	1000	3000	1.49	-60.040	<-18.51	PASS
2DH5	2441	30	10000	1000	3000	3.47	-49.210	<-16.53	PASS
2DH5	2441	10000	25000	1000	3000	3.47	-60.120	<-16.53	PASS
2DH5	2480	30	10000	1000	3000	5.67	-45.020	<-14.33	PASS
2DH5	2480	10000	25000	1000	3000	5.67	-57.600	<-14.33	PASS
3DH5	2402	30	10000	1000	3000	1.62	-52.210	<-18.38	PASS
3DH5	2402	10000	25000	1000	3000	1.62	-60.050	<-18.38	PASS
3DH5	2441	30	10000	1000	3000	3.51	-49.230	<-16.49	PASS
3DH5	2441	10000	25000	1000	3000	3.51	-59.600	<-16.49	PASS
3DH5	2480	30	10000	1000	3000	5.72	-45.470	<-14.28	PASS
3DH5	2480	10000	25000	1000	3000	5.72	-57.690	<-14.28	PASS

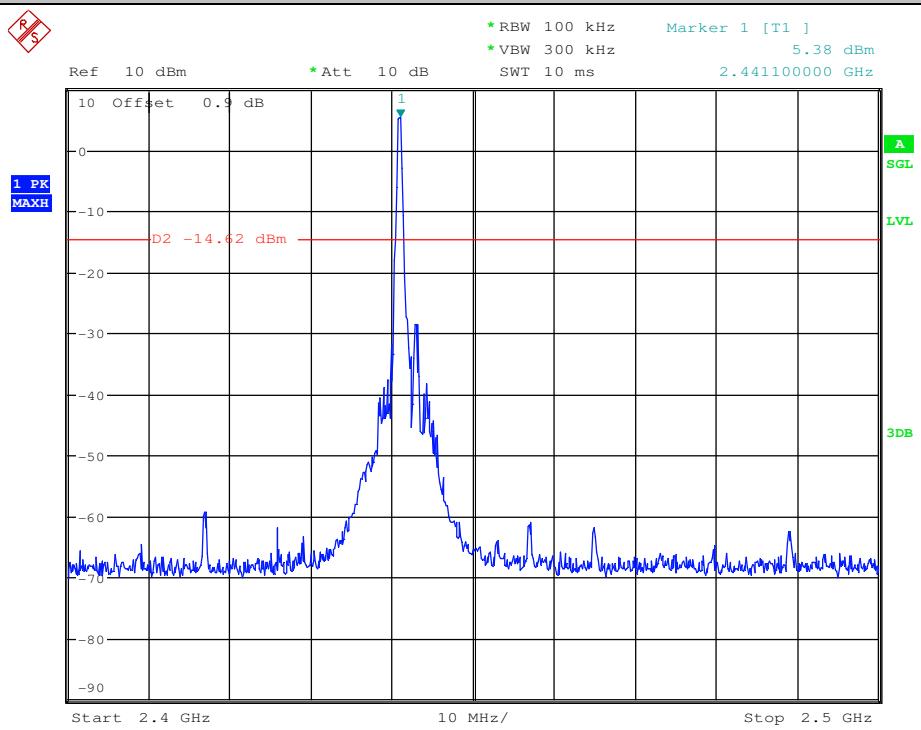
TEST PLOT	
RF Conducted Spurious Emissions_DH5_2402	
Pref	

CSE_1

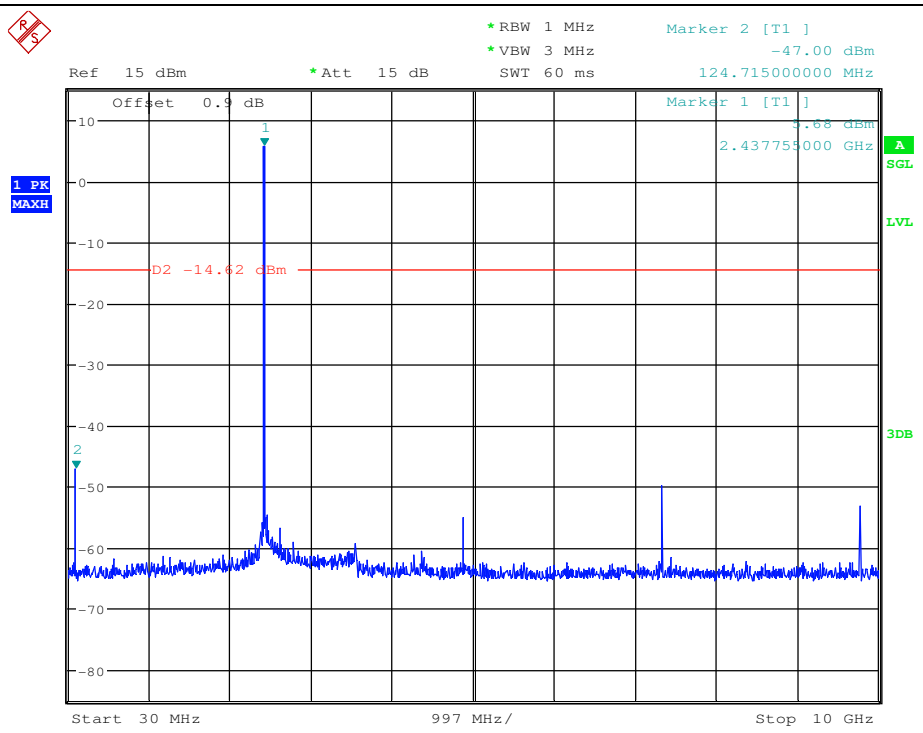


CSE_2

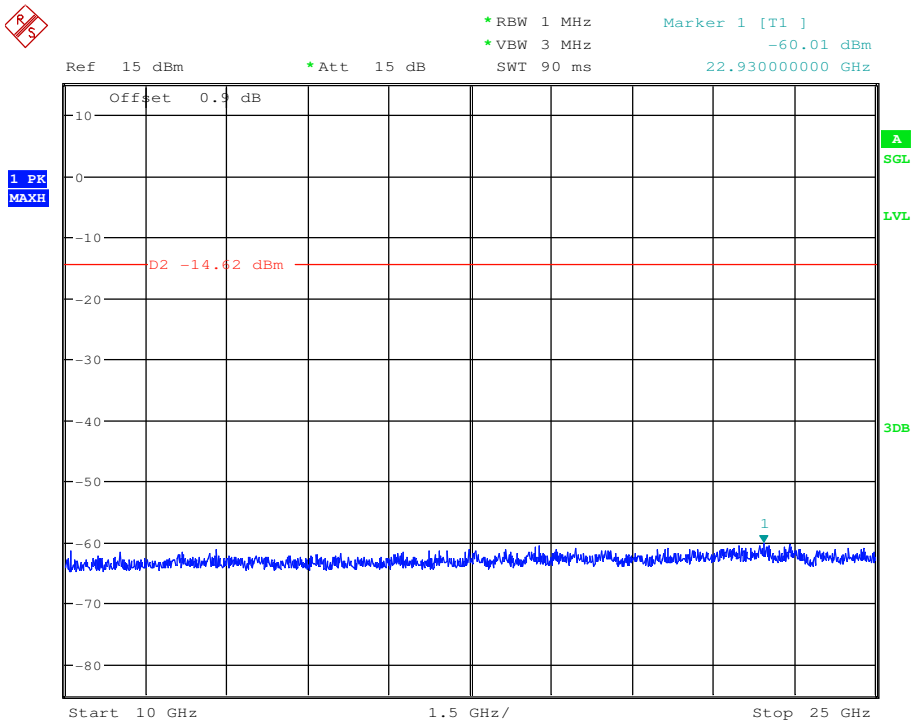


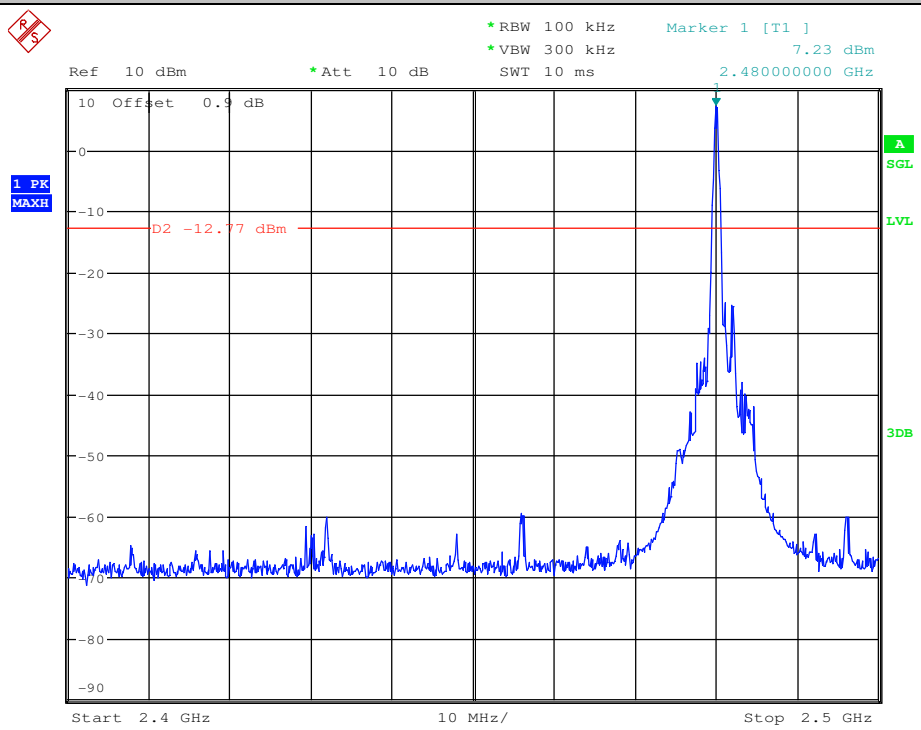
RF Conducted Spurious Emissions_DH5_2441	
Pref	

CSE_1

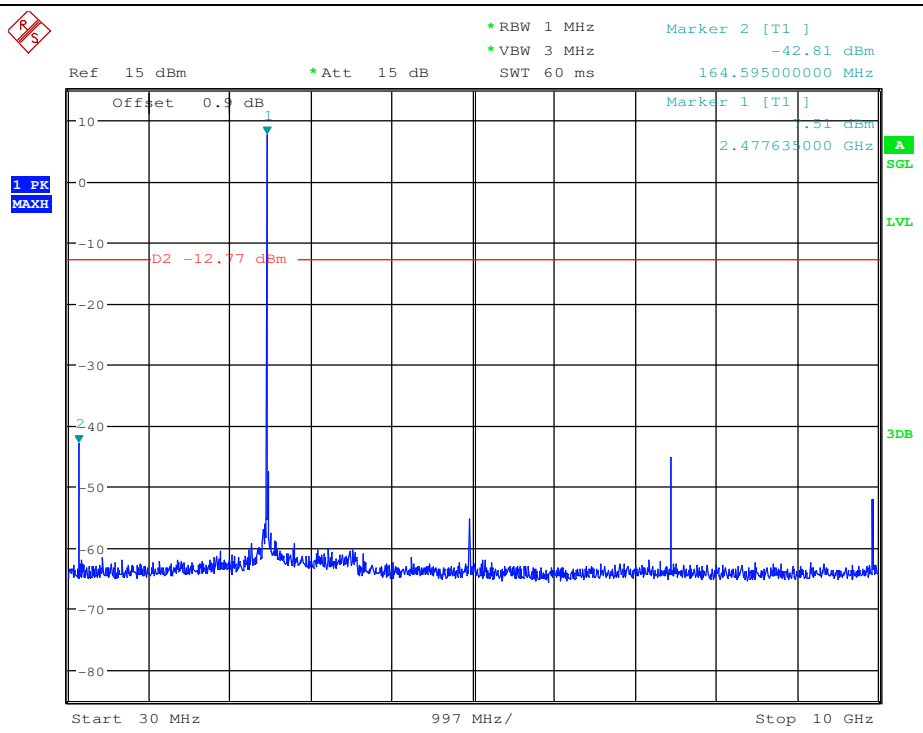


CSE_2

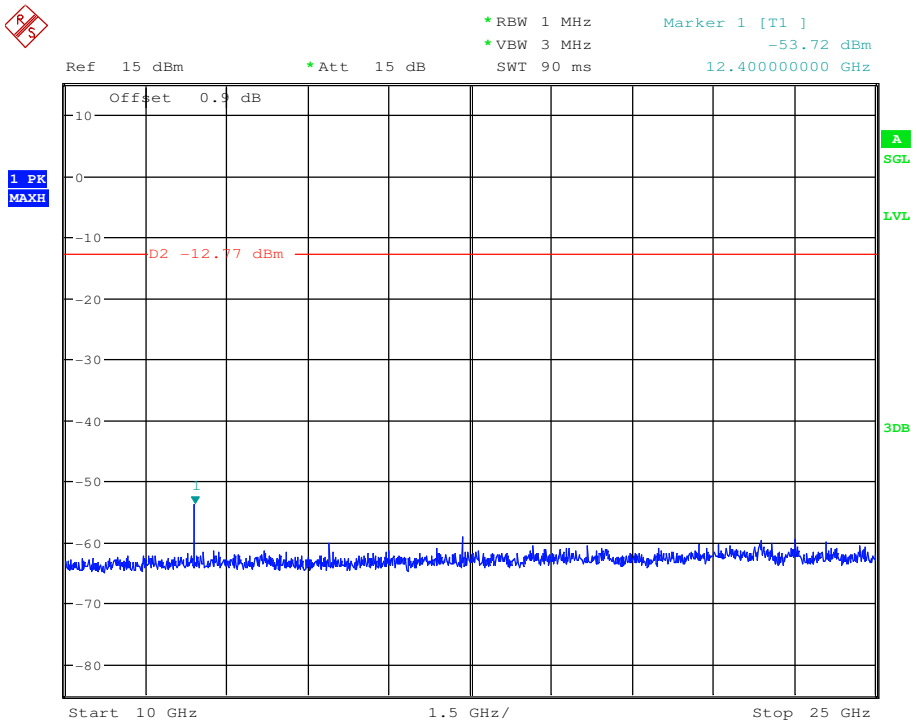


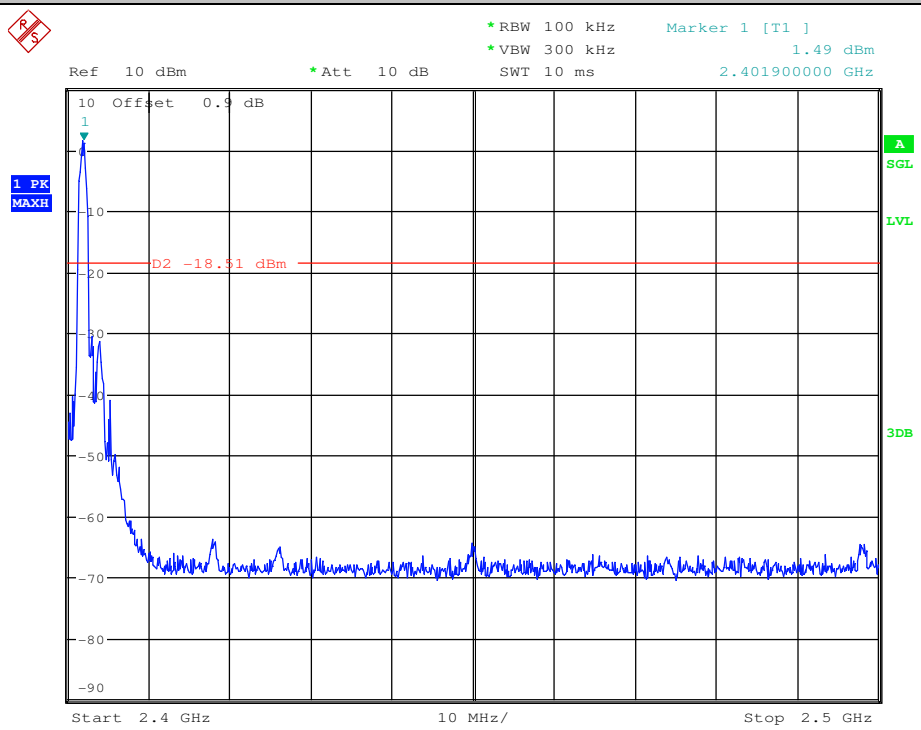
RF Conducted Spurious Emissions_DH5_2480	
Pref	

CSE_1

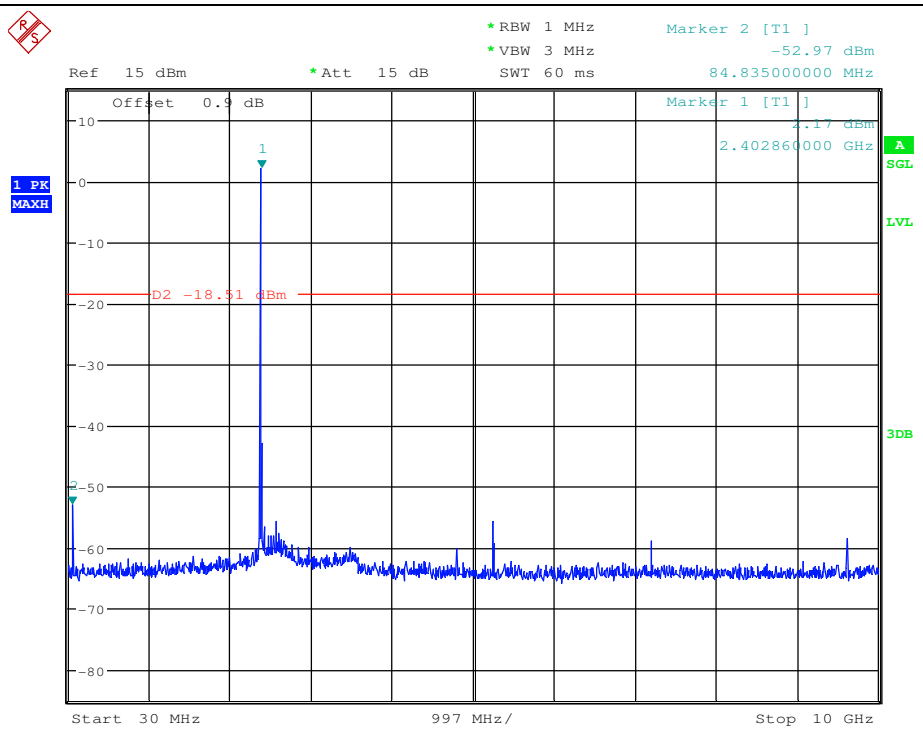


CSE_2

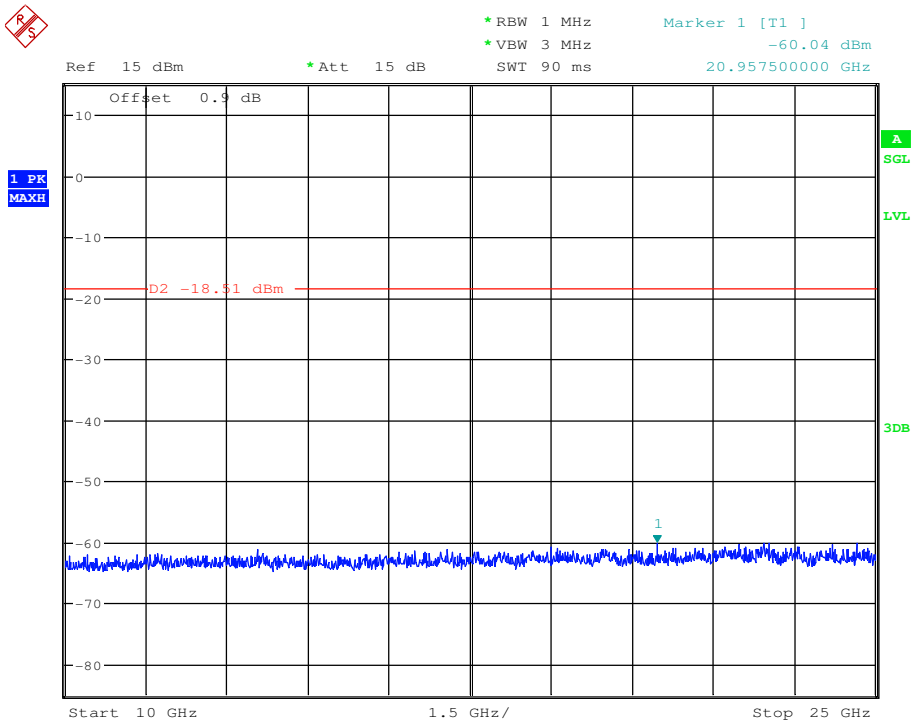


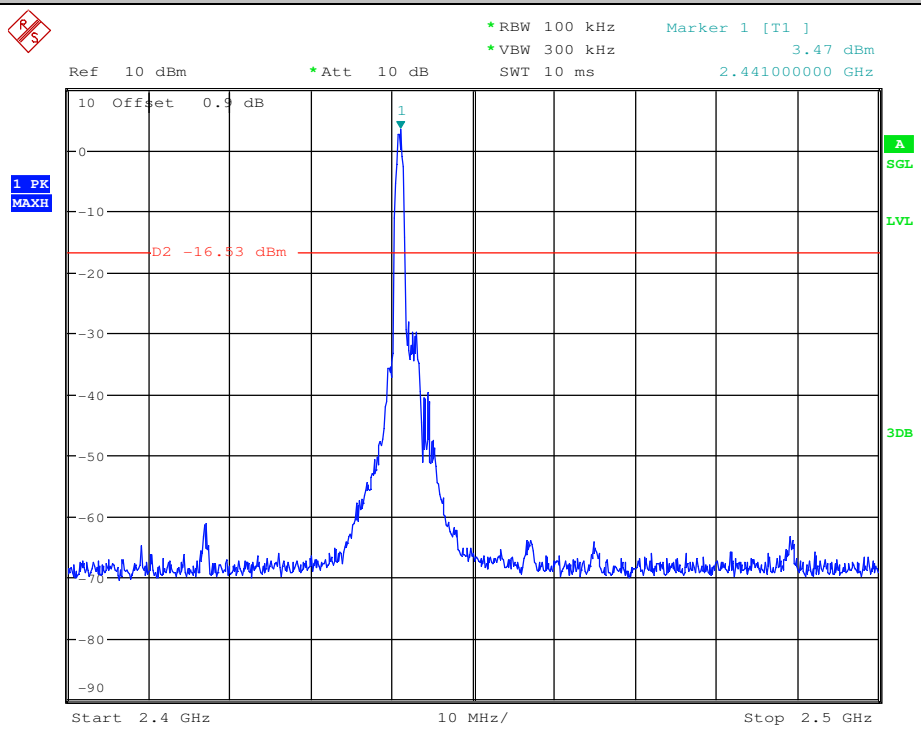
RF Conducted Spurious Emissions_2DH5_2402	
Pref	

CSE_1

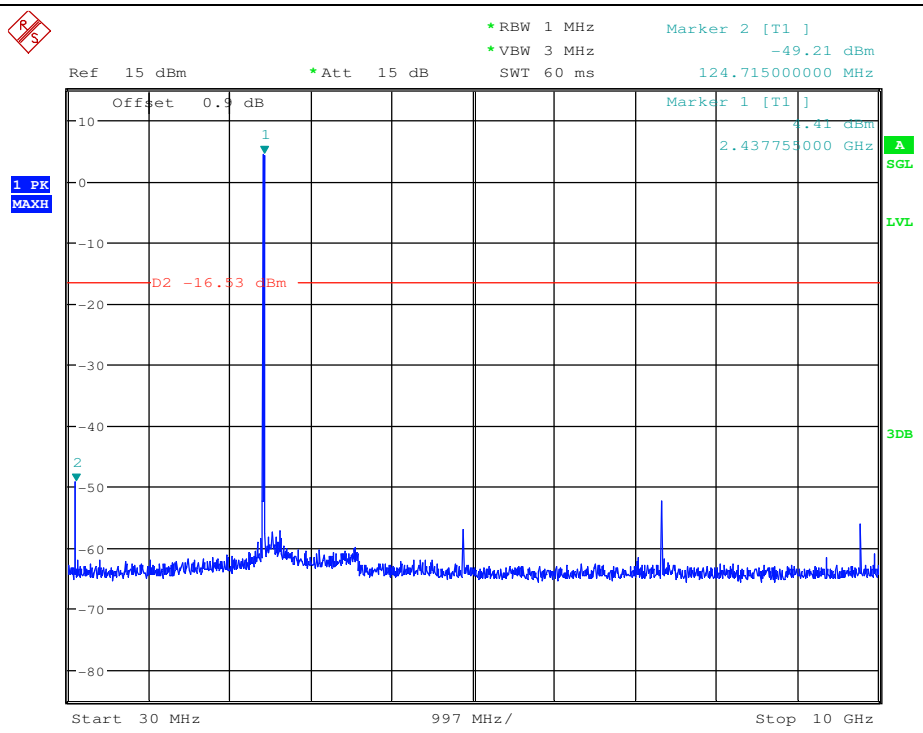


CSE_2

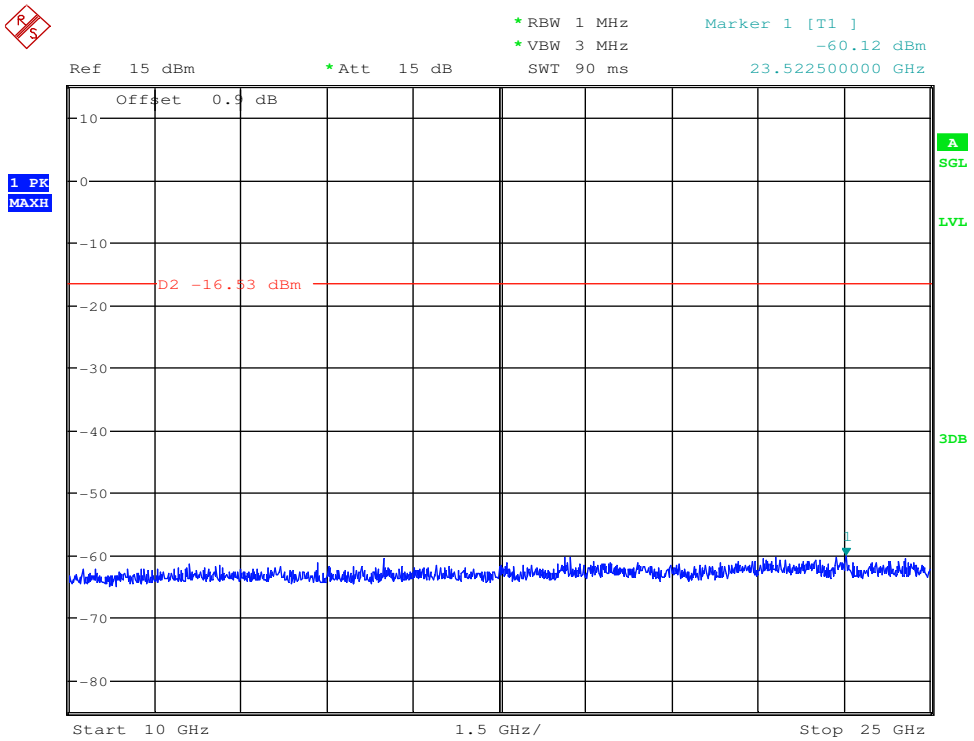


RF Conducted Spurious Emissions_2DH5_2441	
Pref	

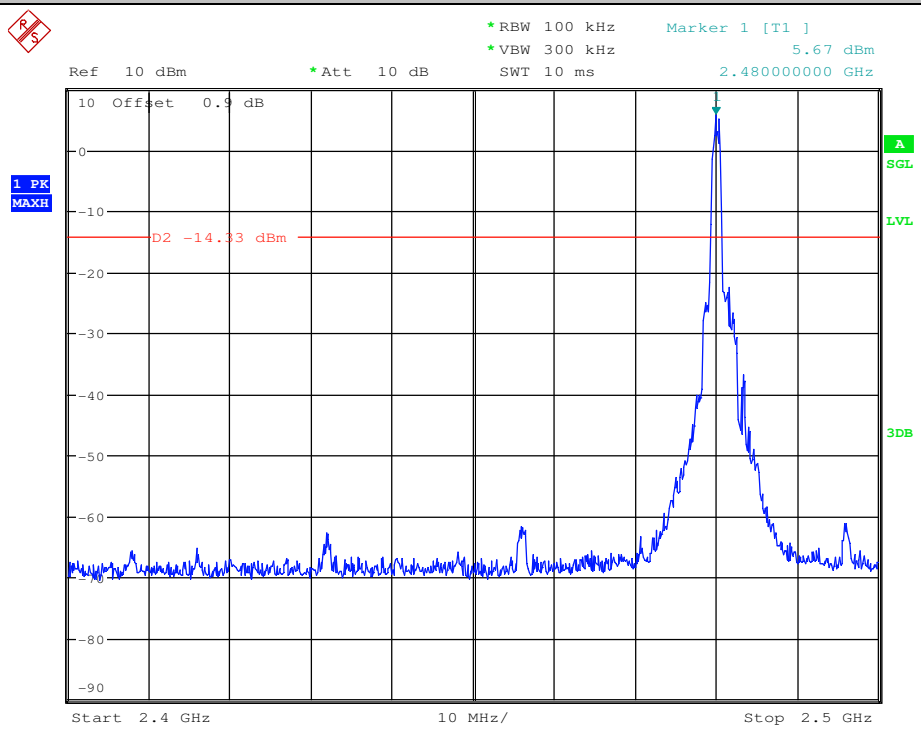
CSE_1



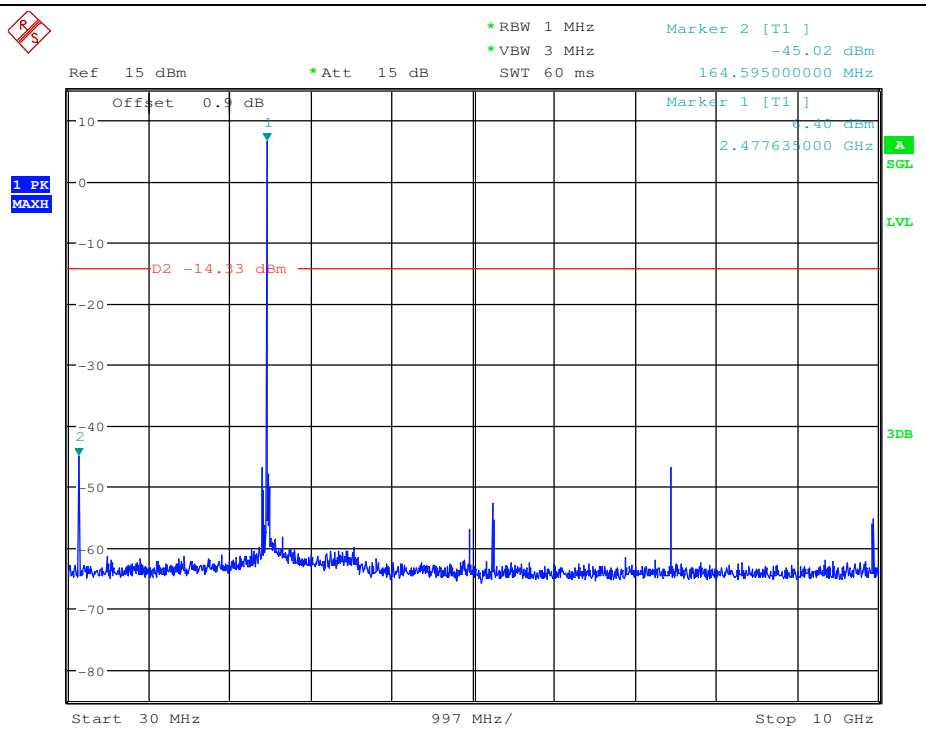
CSE_2



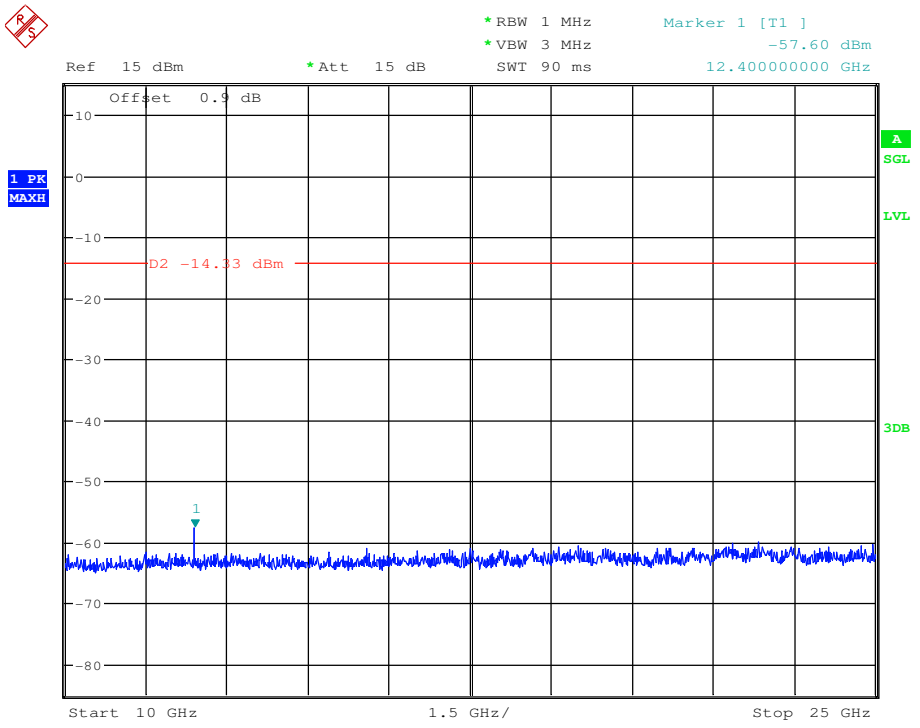
Date: 16.MAR.2017 09:12:09

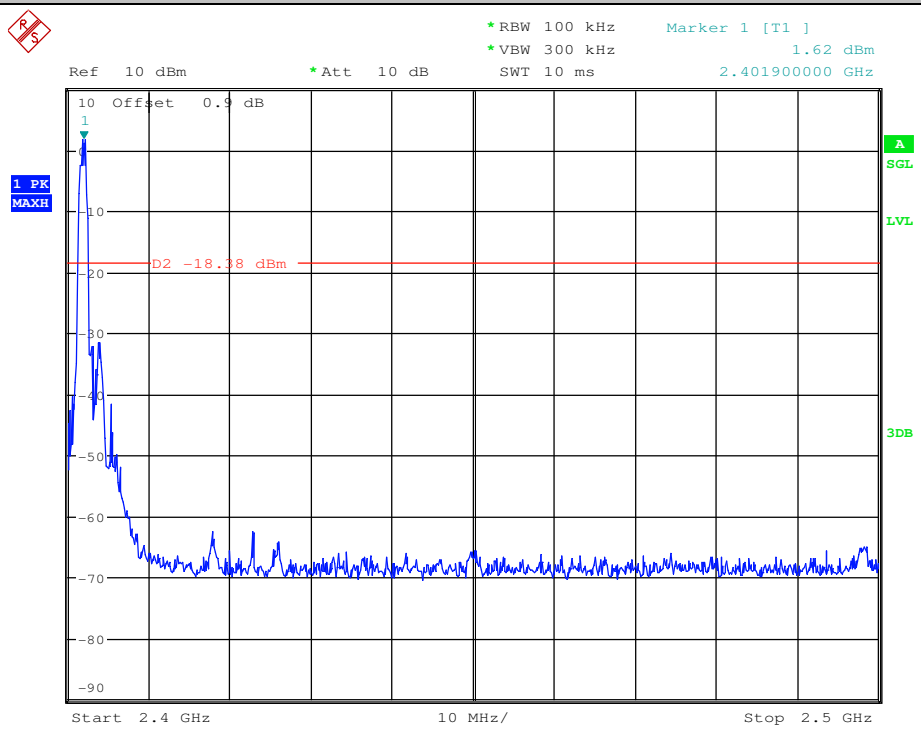
RF Conducted Spurious Emissions_2DH5_2480	
Pref	

CSE_1

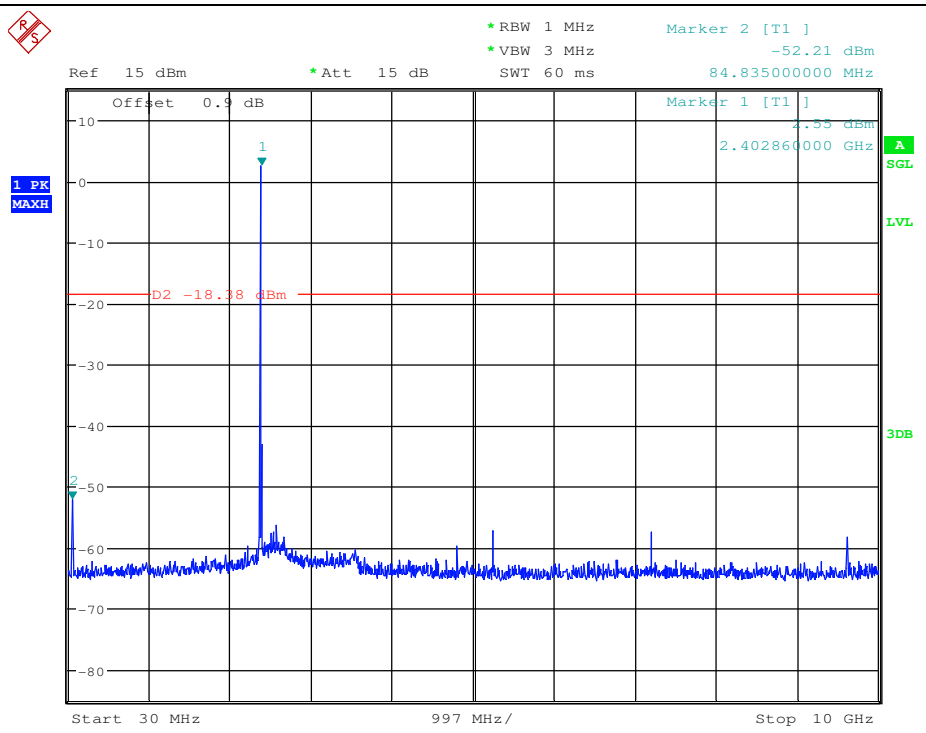


CSE_2

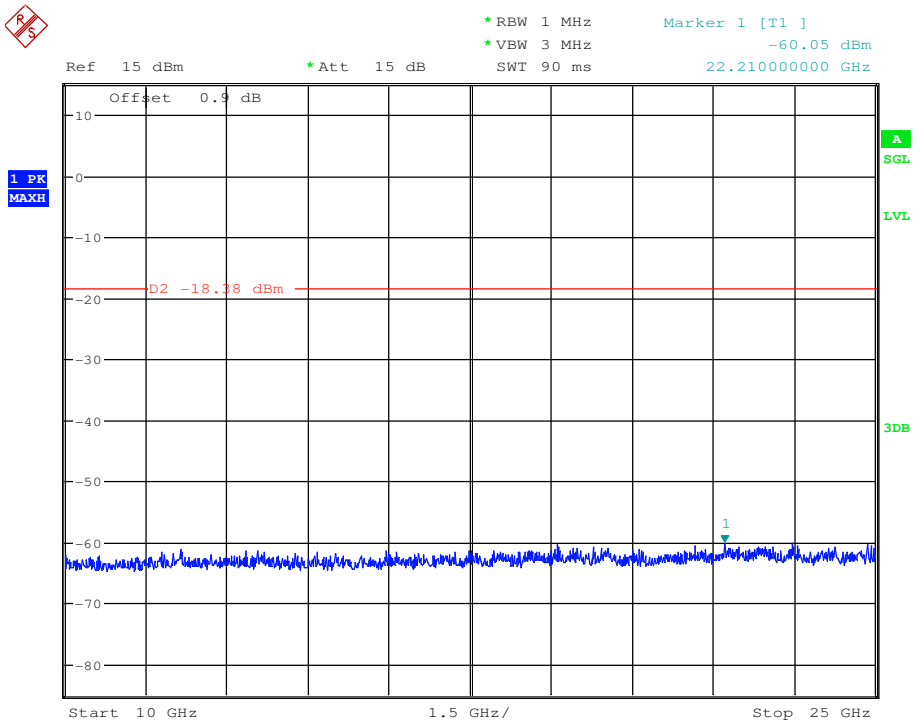


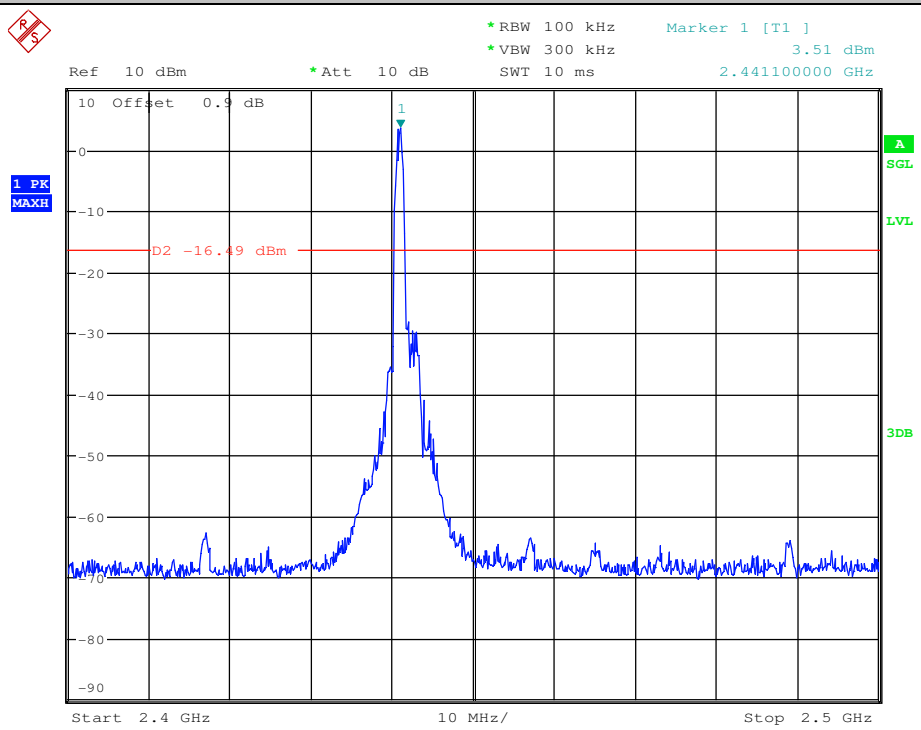
RF Conducted Spurious Emissions_3DH5_2402	
Pref	

CSE_1

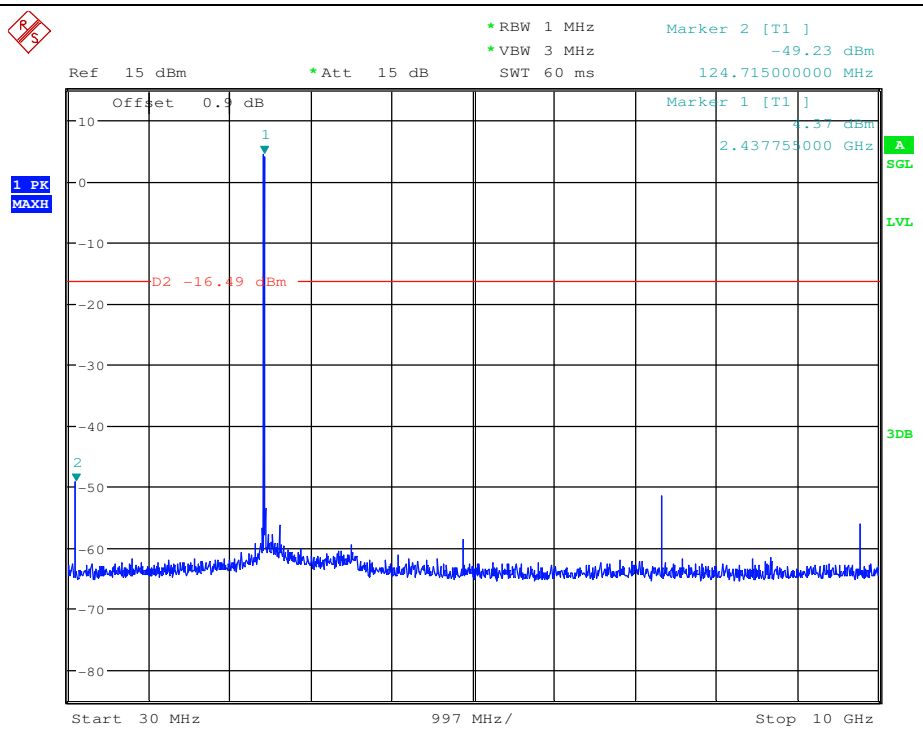


CSE_2

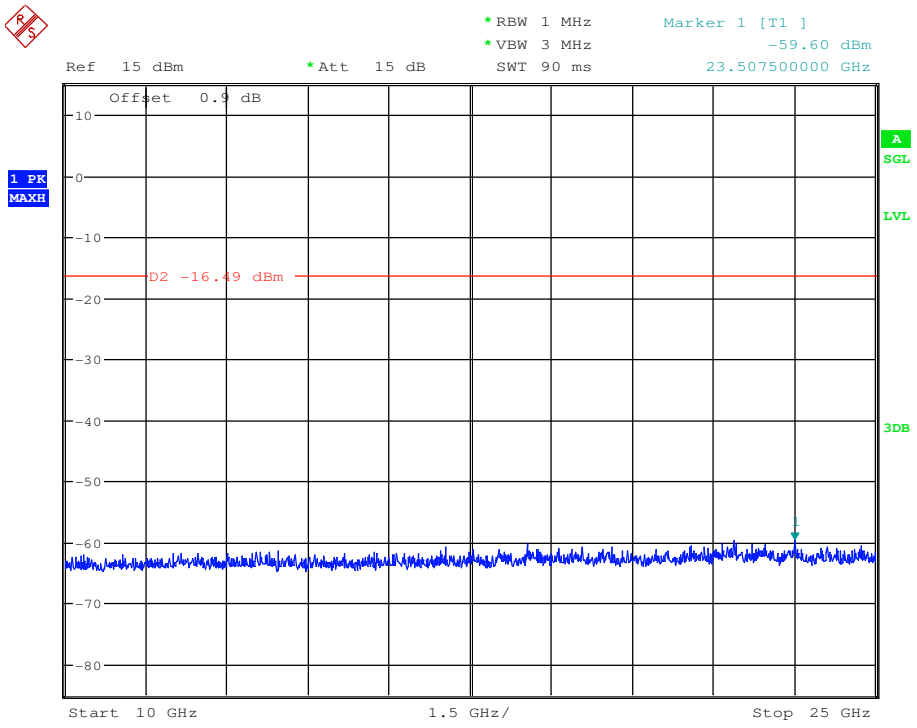


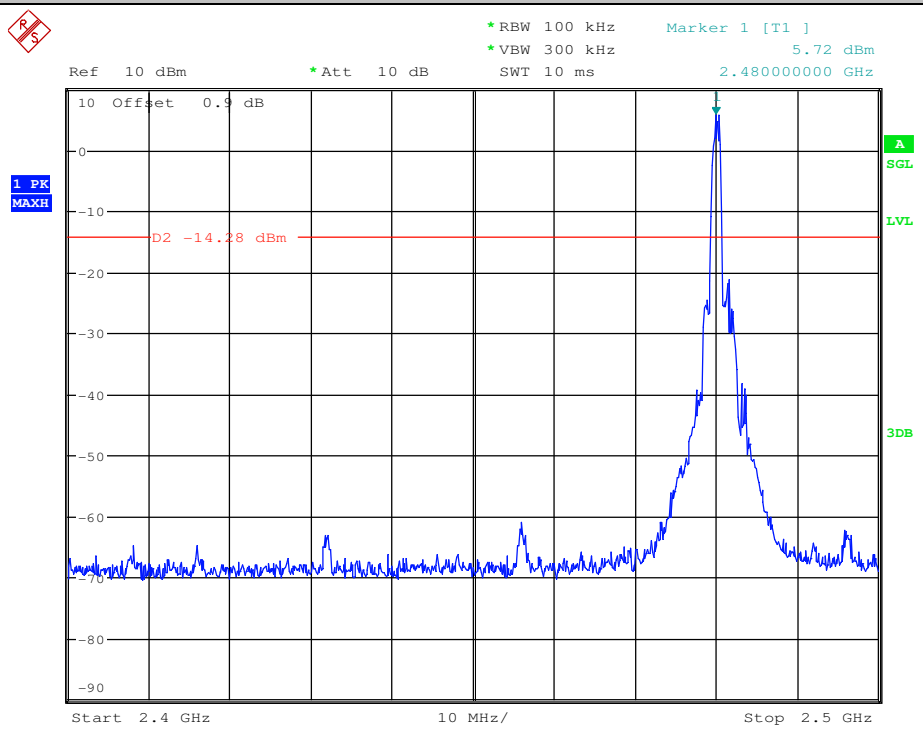
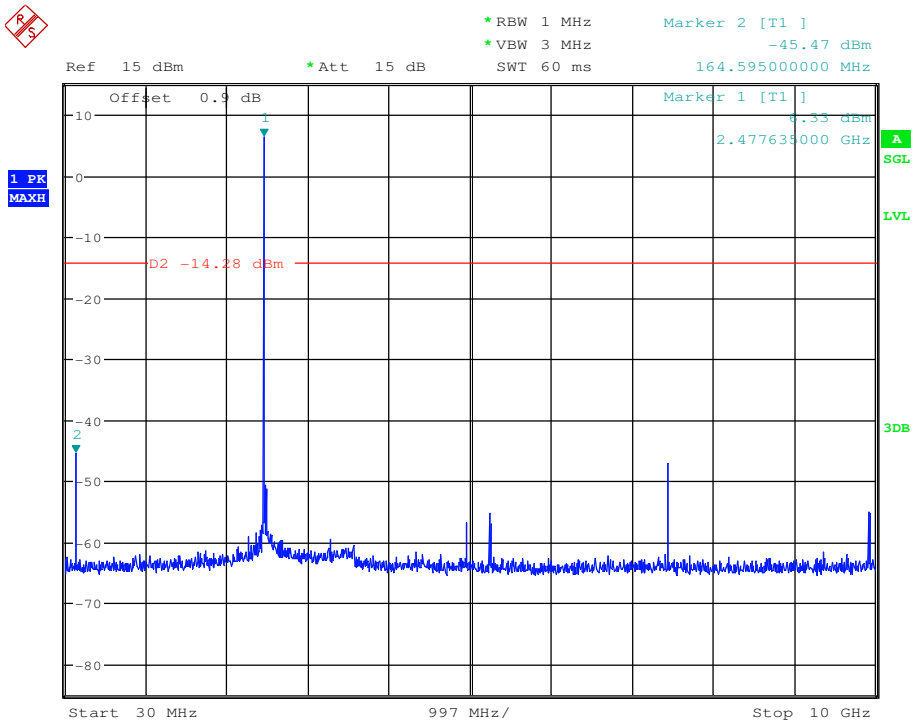
RF Conducted Spurious Emissions_3DH5_2441	
Pref	

CSE_1

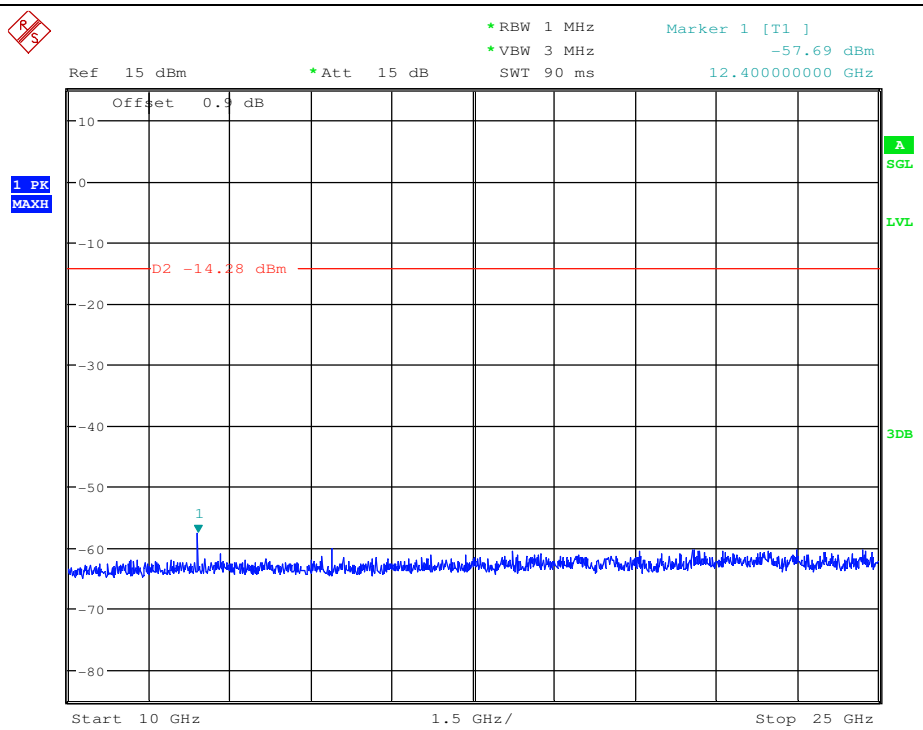


CSE_2



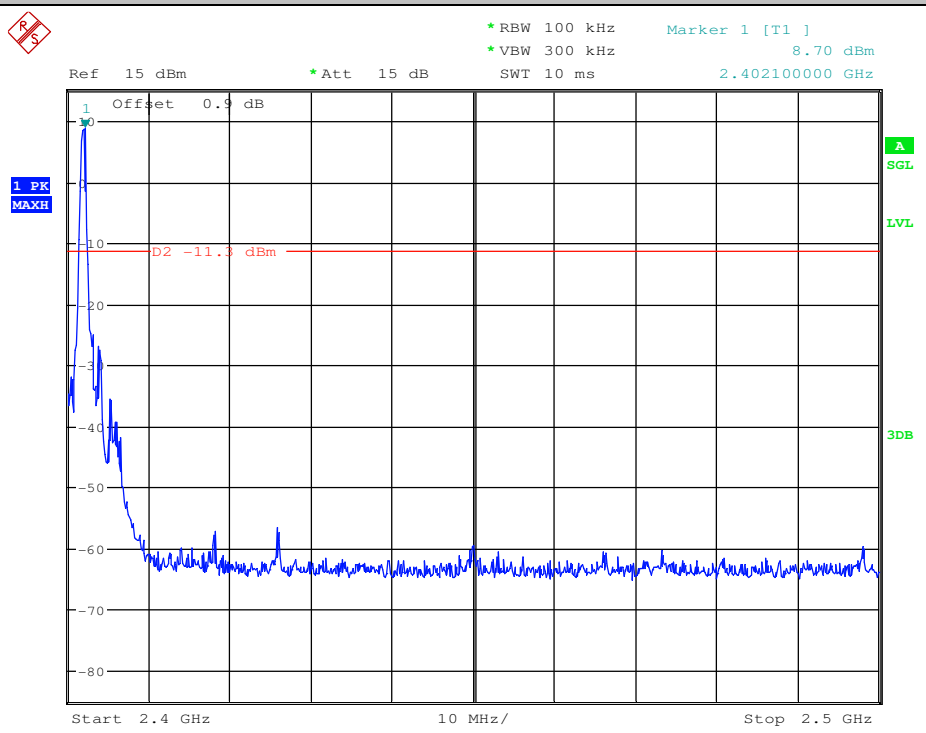
RF Conducted Spurious Emissions_3DH5_2480	
Pref	
CSE_1	

CSE_2

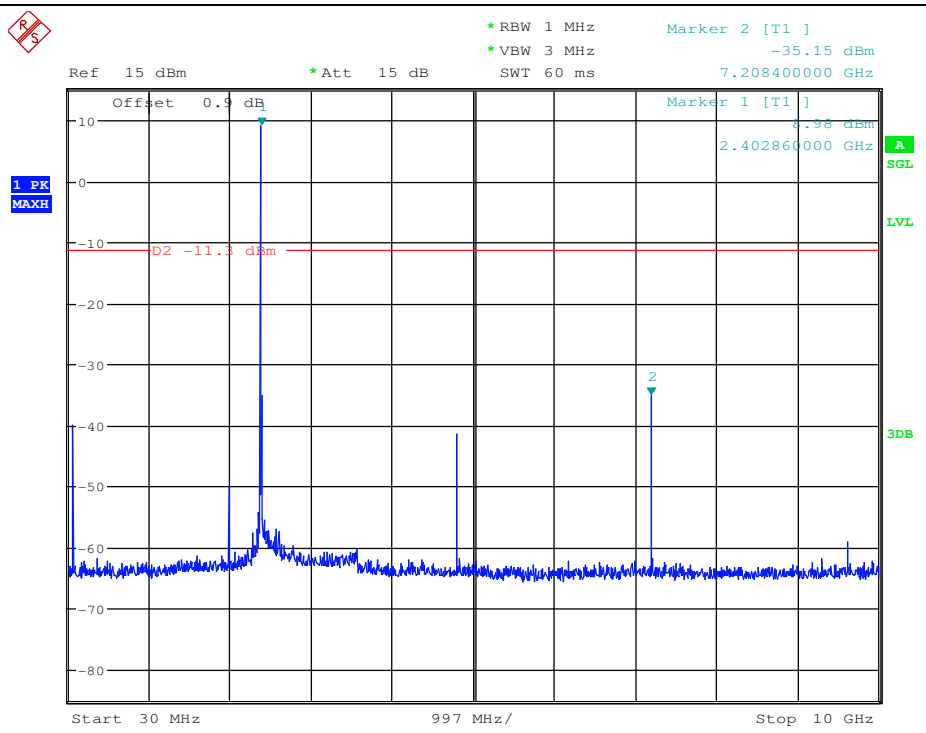


Right earbuds

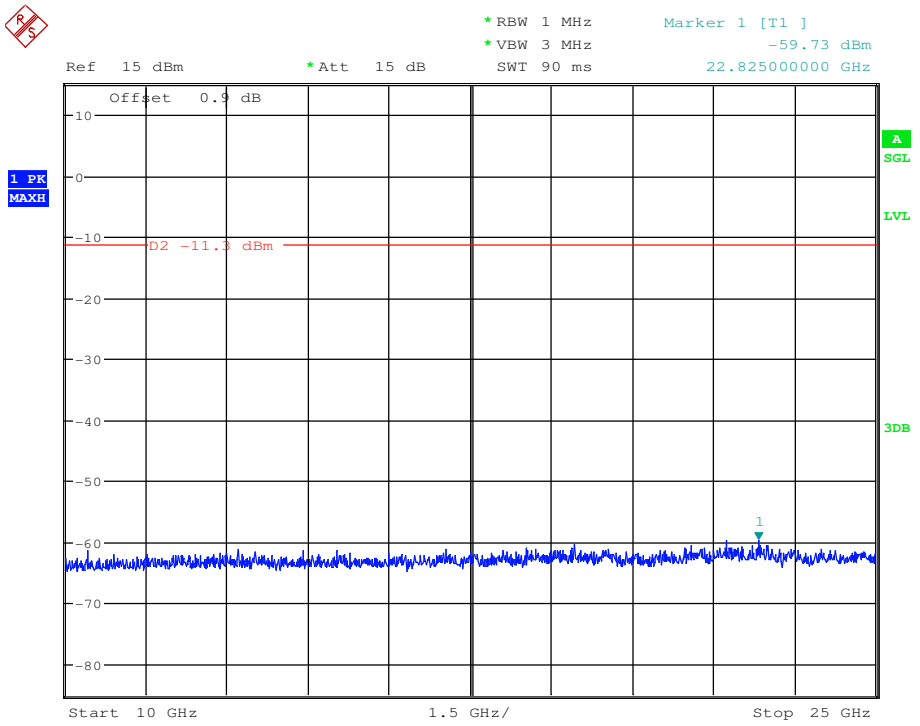
Test Mode	Test Channel	StartFre [MHz]	StopFre [MHz]	RBW [kHz]	VBW [kHz]	Pref[dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
DH5	2402	30	10000	1000	3000	8.7	-35.150	<-11.3	PASS
DH5	2402	10000	25000	1000	3000	8.7	-59.730	<-11.3	PASS
DH5	2441	30	10000	1000	3000	10.03	-29.360	<-9.97	PASS
DH5	2441	10000	25000	1000	3000	10.03	-59.540	<-9.97	PASS
DH5	2480	30	10000	1000	3000	10.37	-27.170	<-9.63	PASS
DH5	2480	10000	25000	1000	3000	10.37	-60.100	<-9.63	PASS
2DH5	2402	30	10000	1000	3000	6.05	-40.520	<-13.95	PASS
2DH5	2402	10000	25000	1000	3000	6.05	-60.140	<-13.95	PASS
2DH5	2441	30	10000	1000	3000	7.27	-34.110	<-12.73	PASS
2DH5	2441	10000	25000	1000	3000	7.27	-59.990	<-12.73	PASS
2DH5	2480	30	10000	1000	3000	8.55	-31.090	<-11.45	PASS
2DH5	2480	10000	25000	1000	3000	8.55	-59.630	<-11.45	PASS
3DH5	2402	30	10000	1000	3000	6.27	-40.260	<-13.73	PASS
3DH5	2402	10000	25000	1000	3000	6.27	-60.150	<-13.73	PASS
3DH5	2441	30	10000	1000	3000	7.94	-33.130	<-12.06	PASS
3DH5	2441	10000	25000	1000	3000	7.94	-60.410	<-12.06	PASS
3DH5	2480	30	10000	1000	3000	8.48	-30.700	<-11.52	PASS
3DH5	2480	10000	25000	1000	3000	8.48	-60.270	<-11.52	PASS

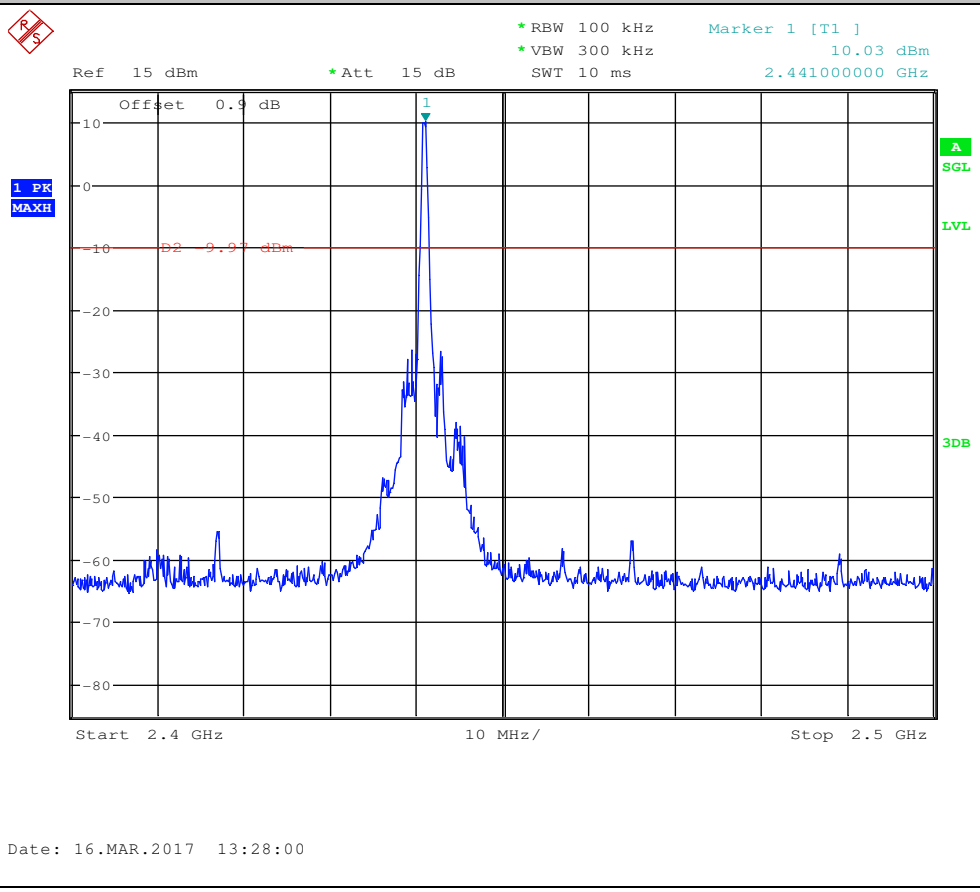
TEST PLOT	
RF Conducted Spurious Emissions_DH5_2402	
Pref	

CSE_1

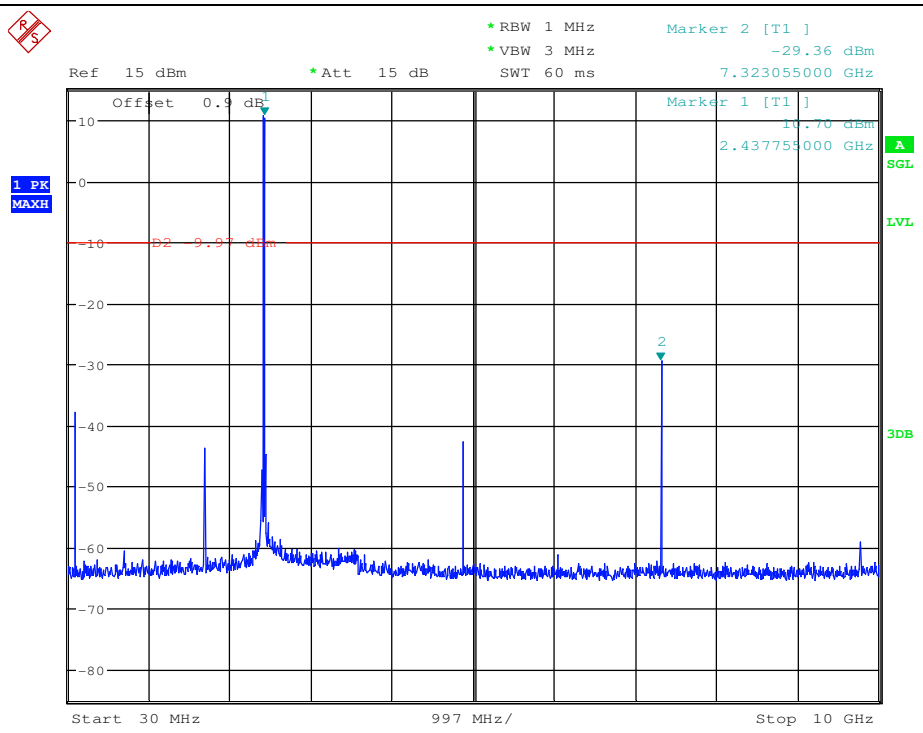


CSE_2

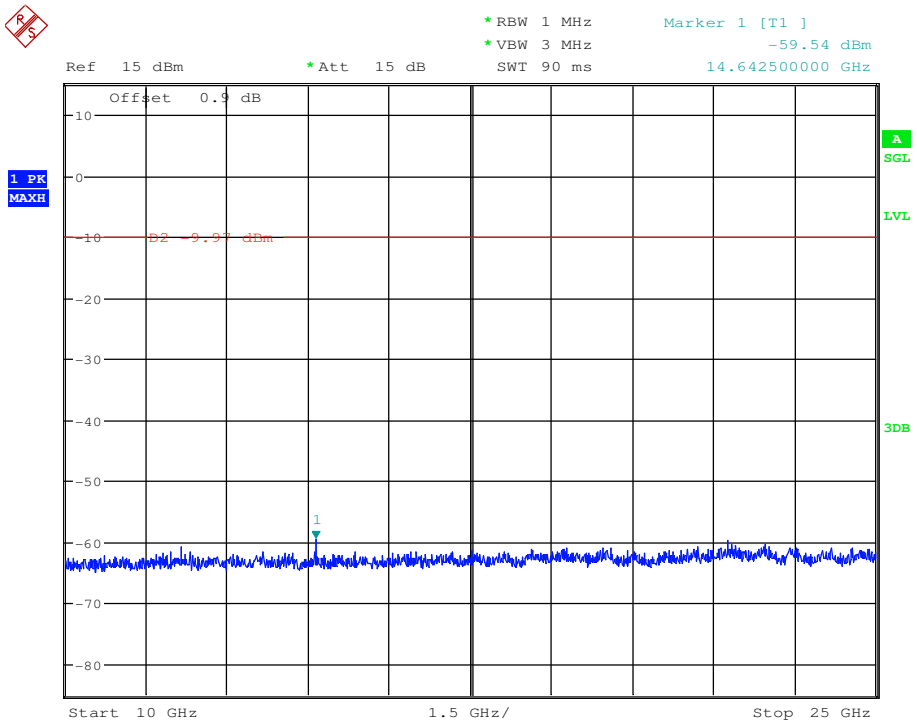


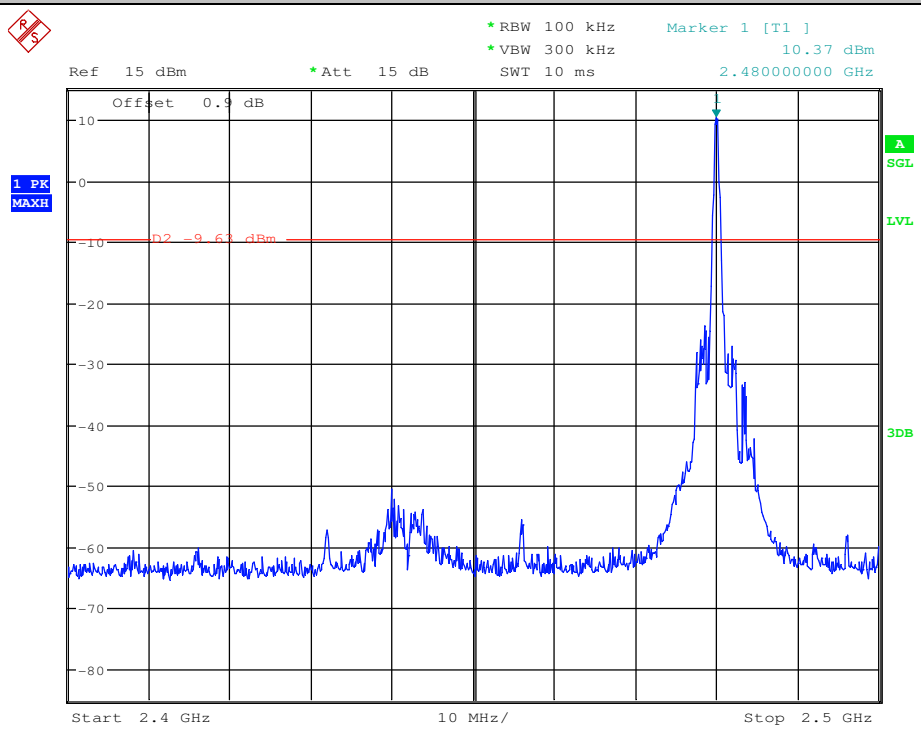
RF Conducted Spurious Emissions_DH5_2441	
Pref	

CSE_1

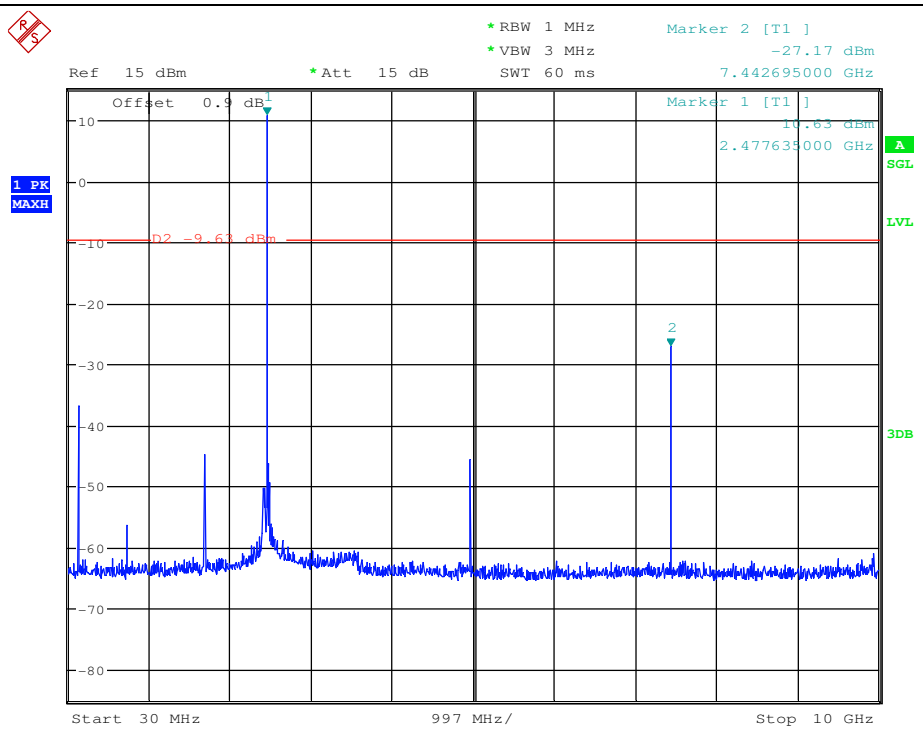


CSE_2

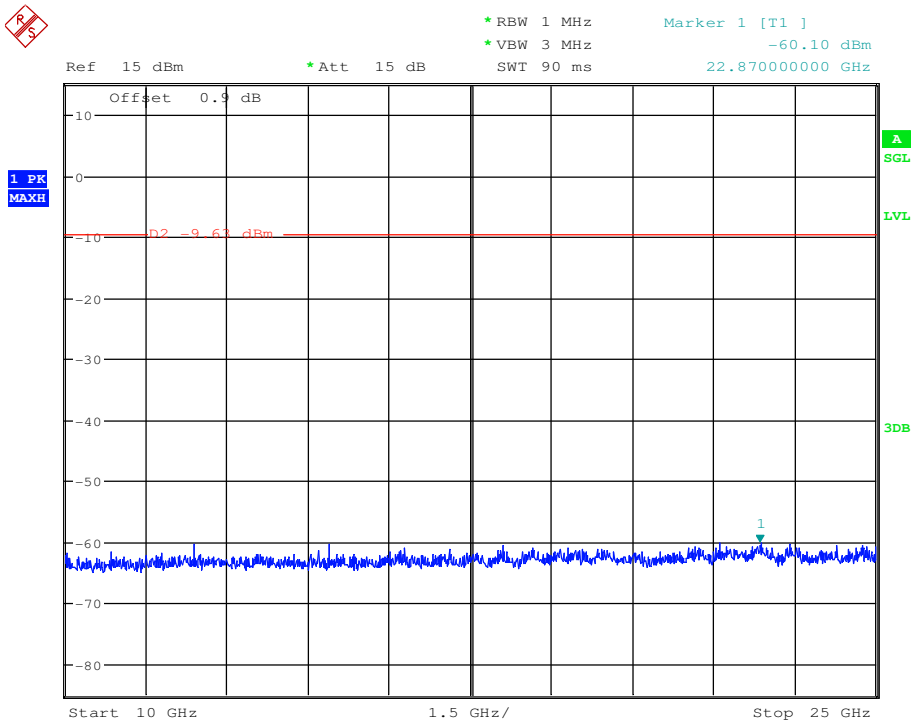


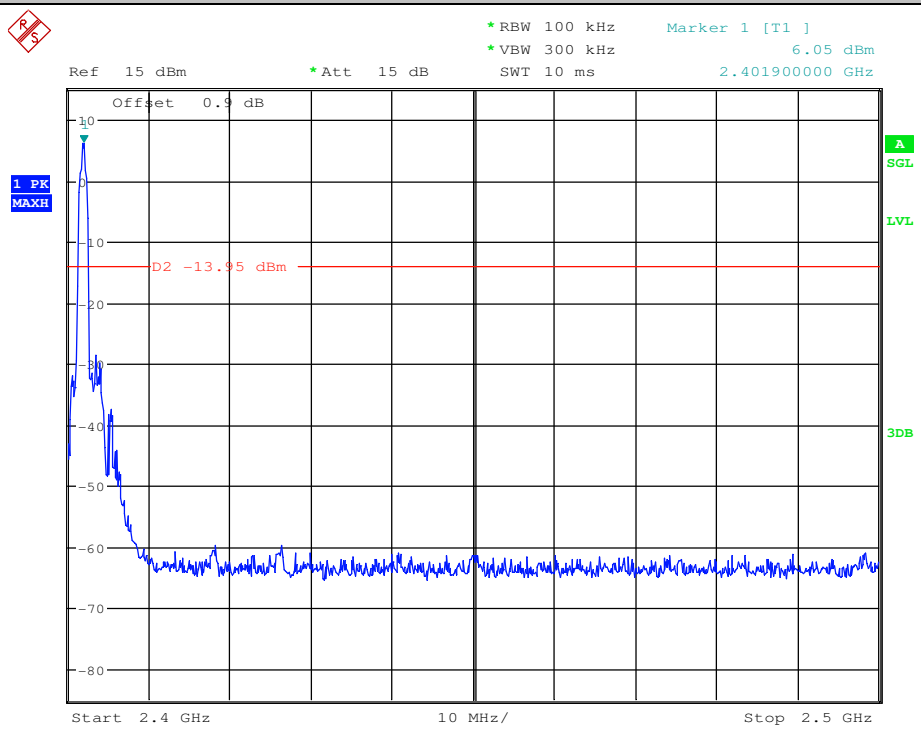
RF Conducted Spurious Emissions_DH5_2480	
Pref	

CSE_1

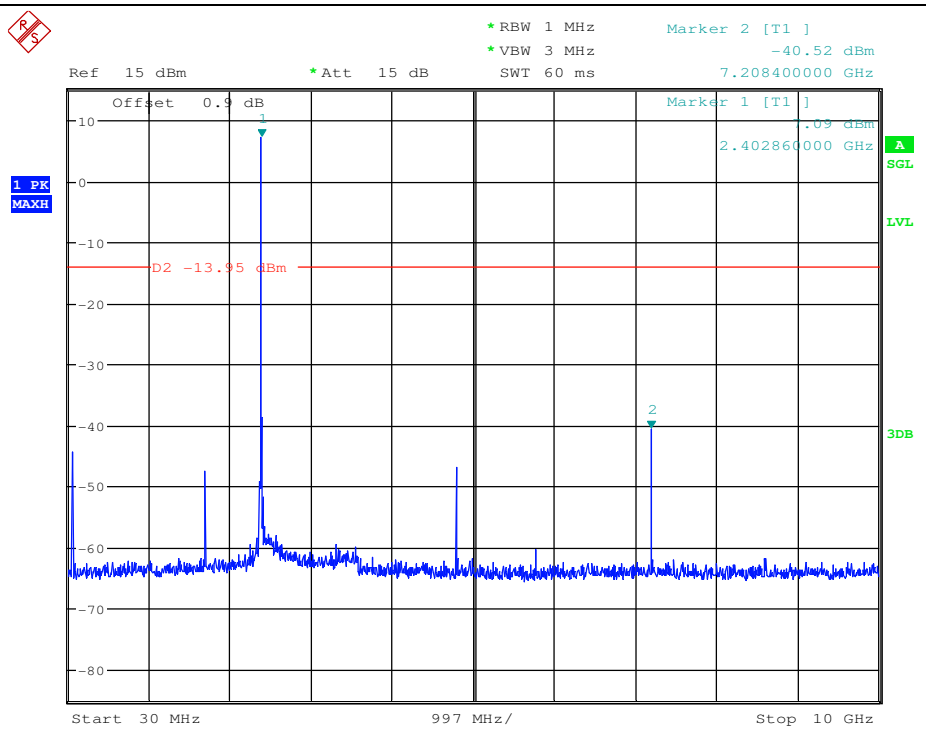


CSE_2

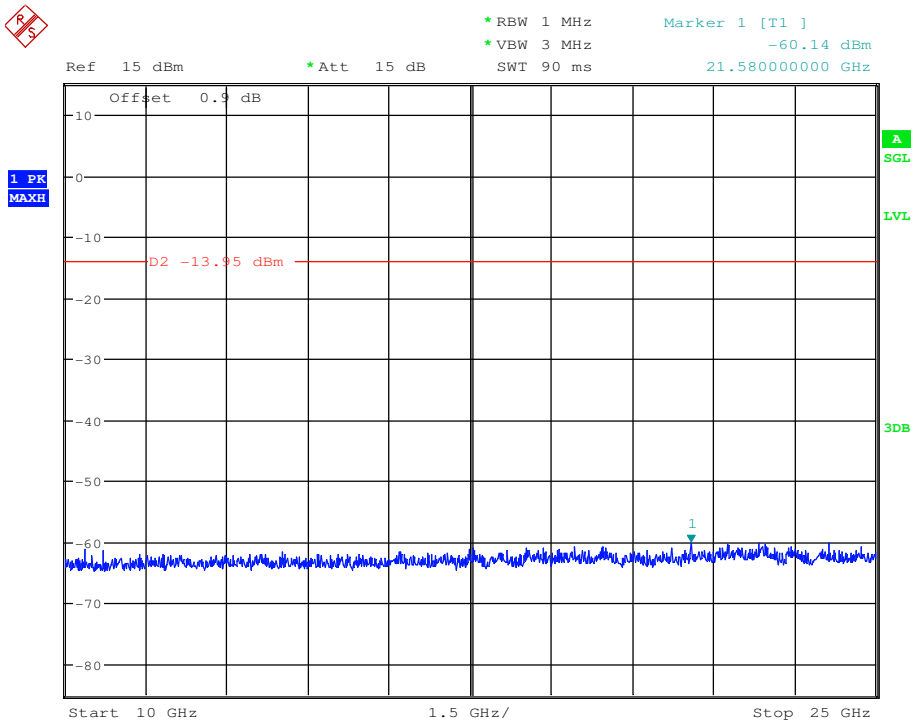


RF Conducted Spurious Emissions_2DH5_2402	
Pref	

CSE_1

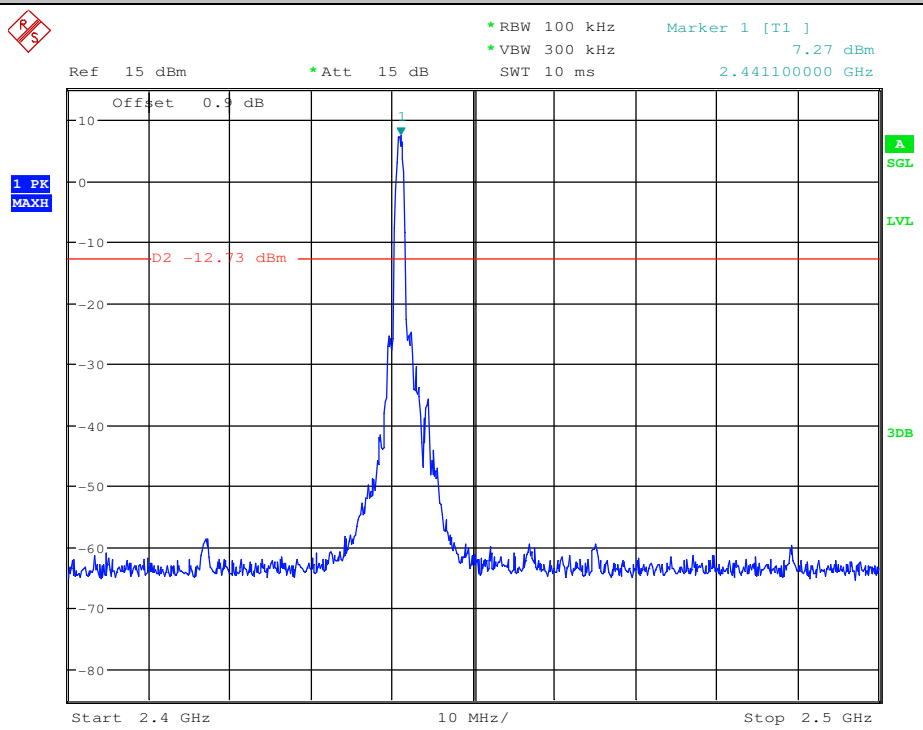


CSE_2

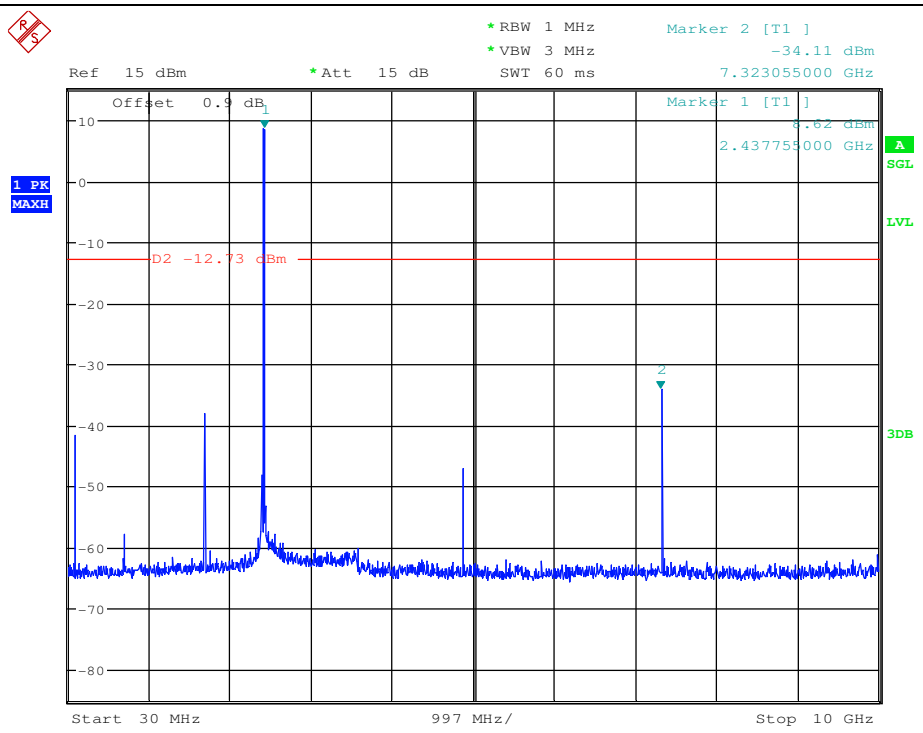


RF Conducted Spurious Emissions_2DH5_2441

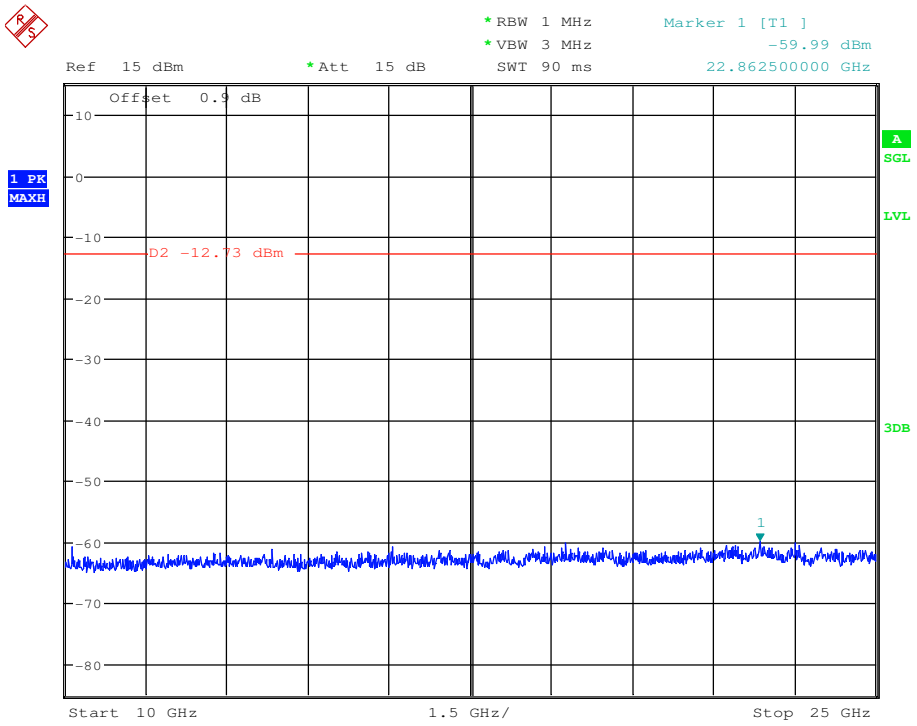
Pref

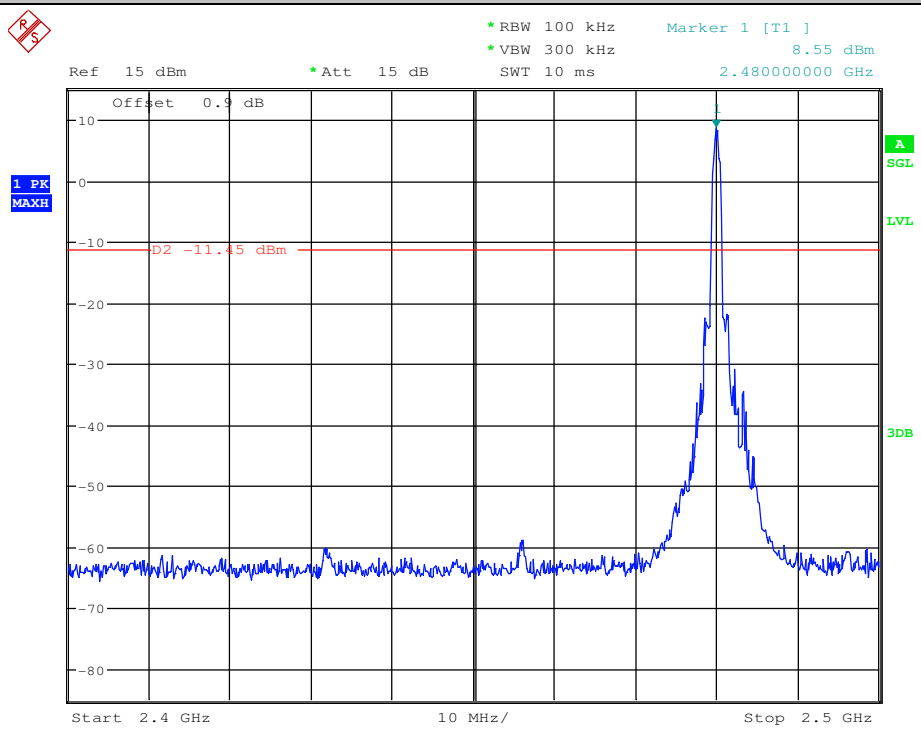


CSE_1

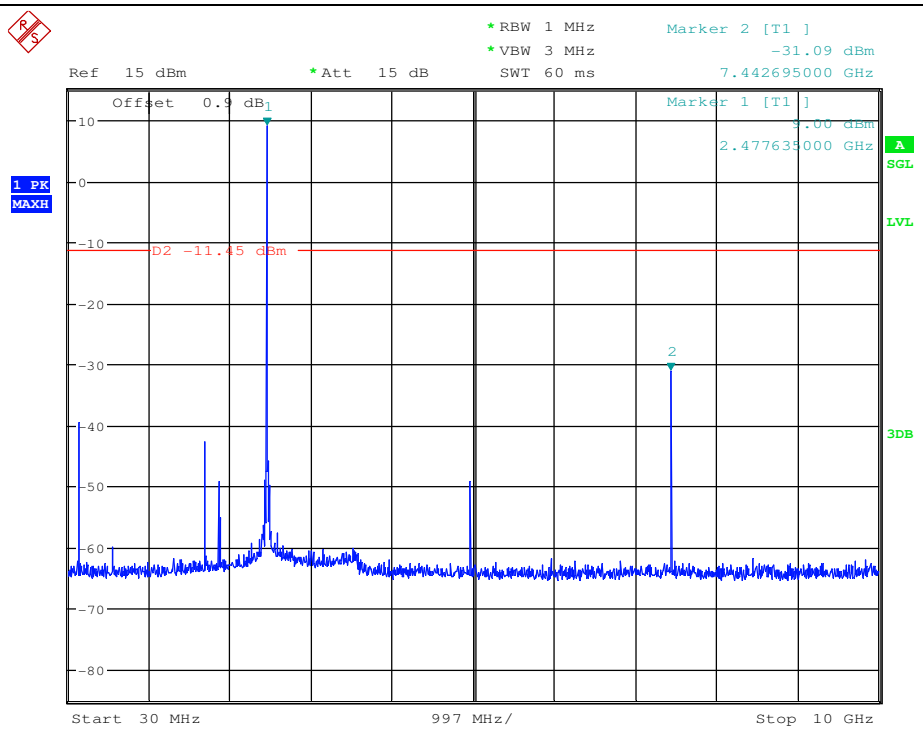


CSE_2

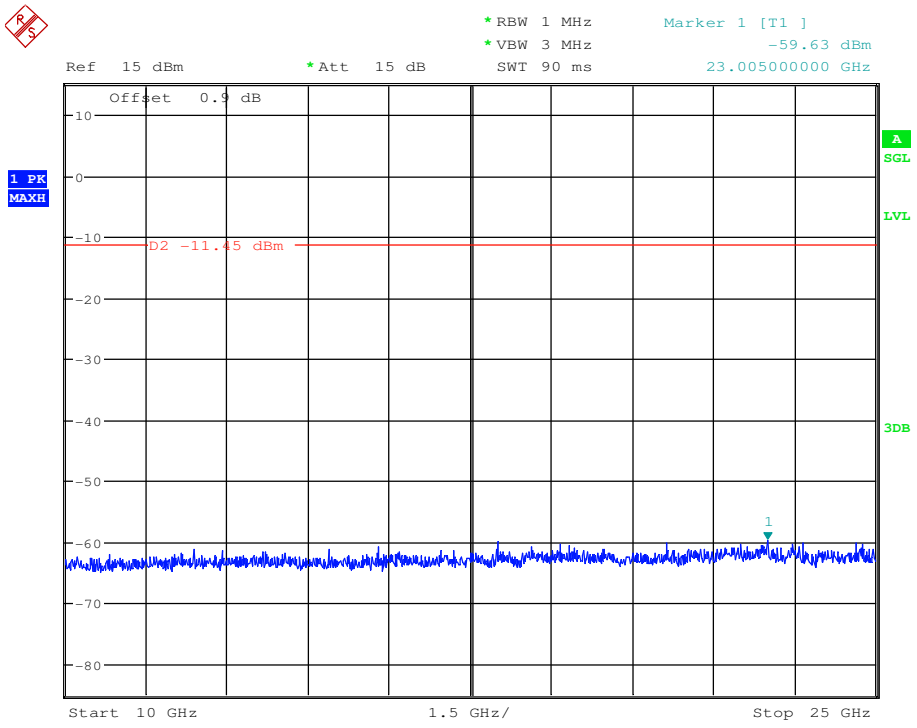


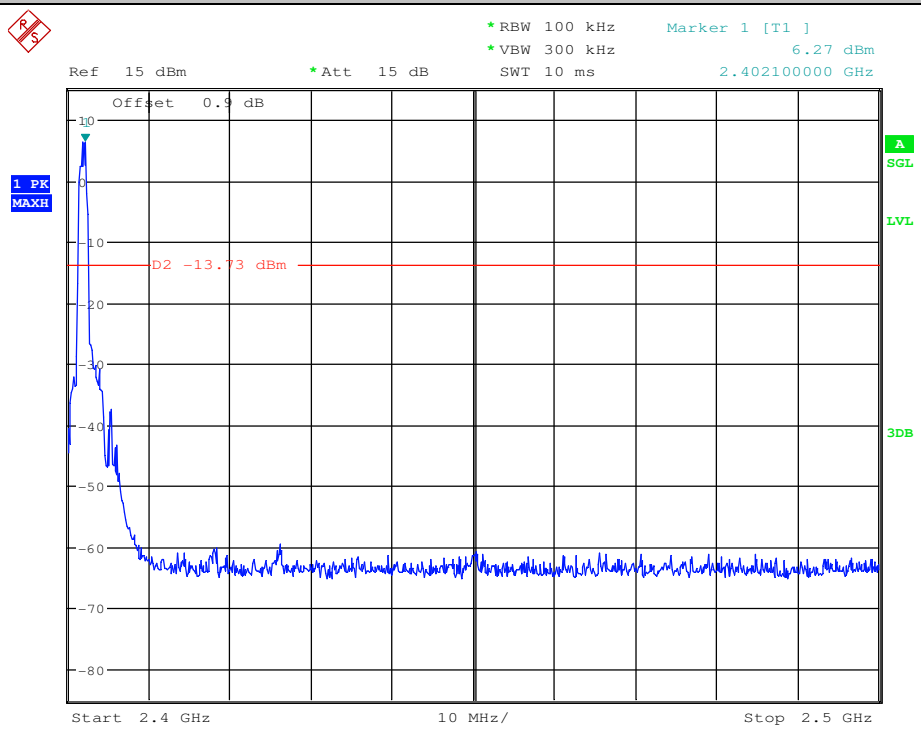
RF Conducted Spurious Emissions_2DH5_2480	
Pref	

CSE_1

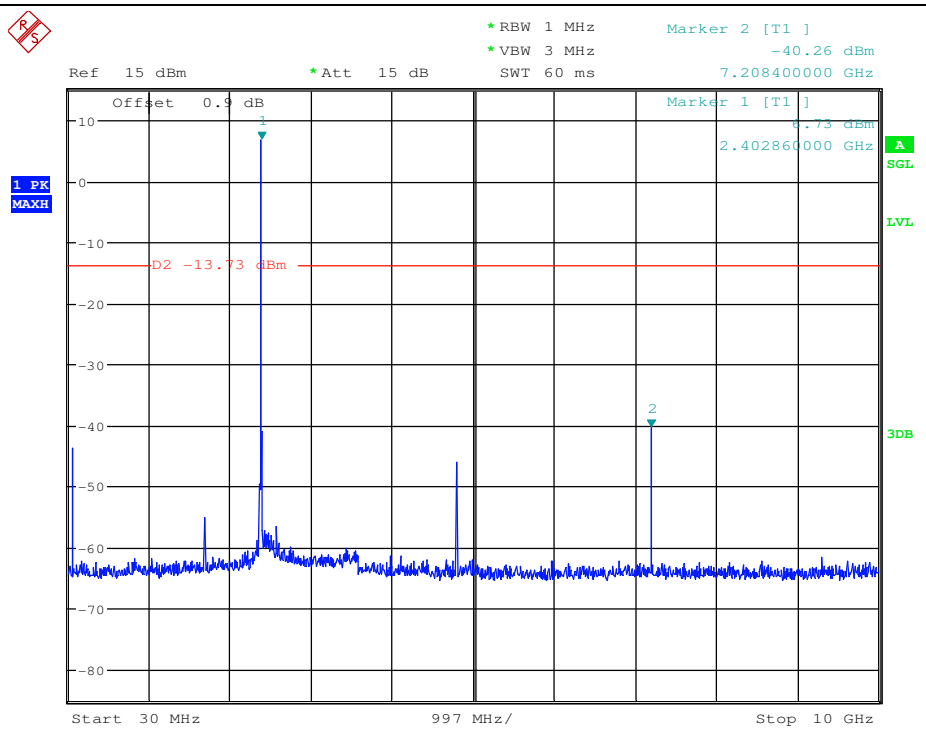


CSE_2

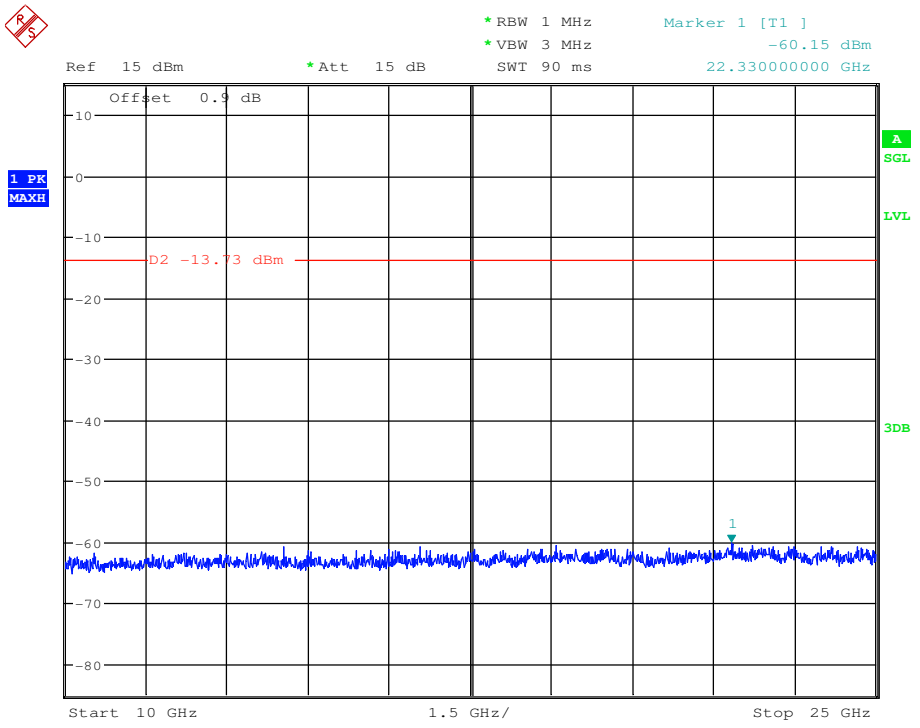


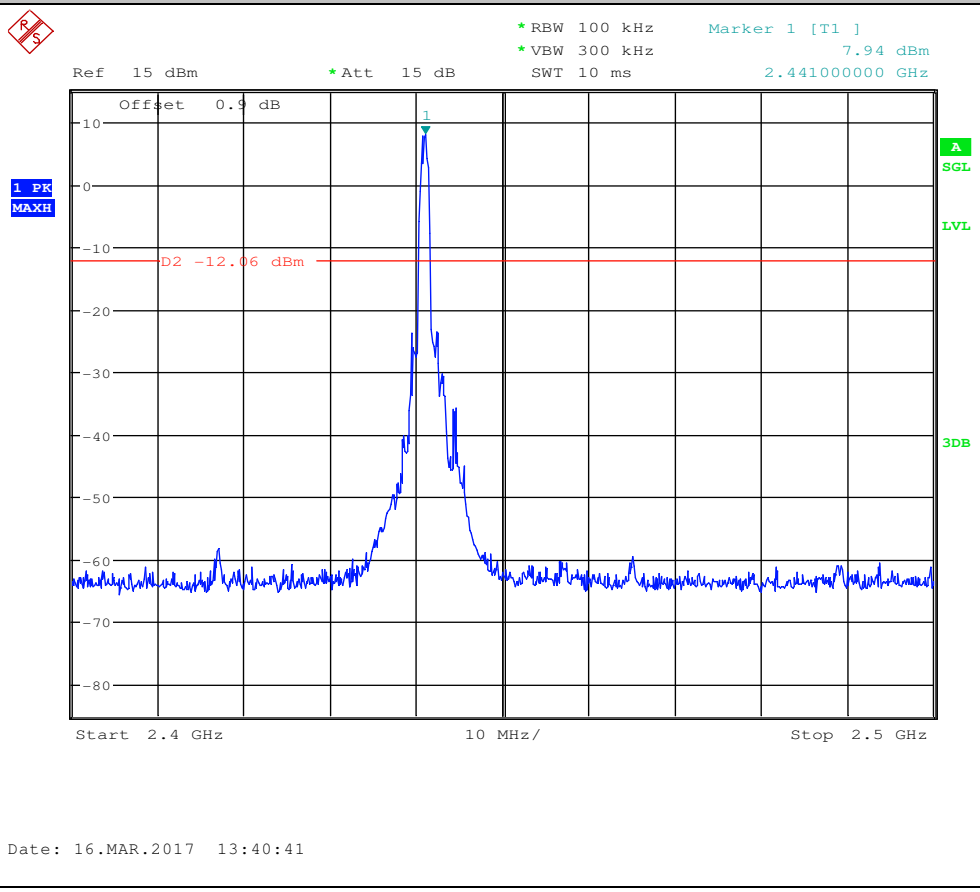
RF Conducted Spurious Emissions_3DH5_2402	
Pref	

CSE_1

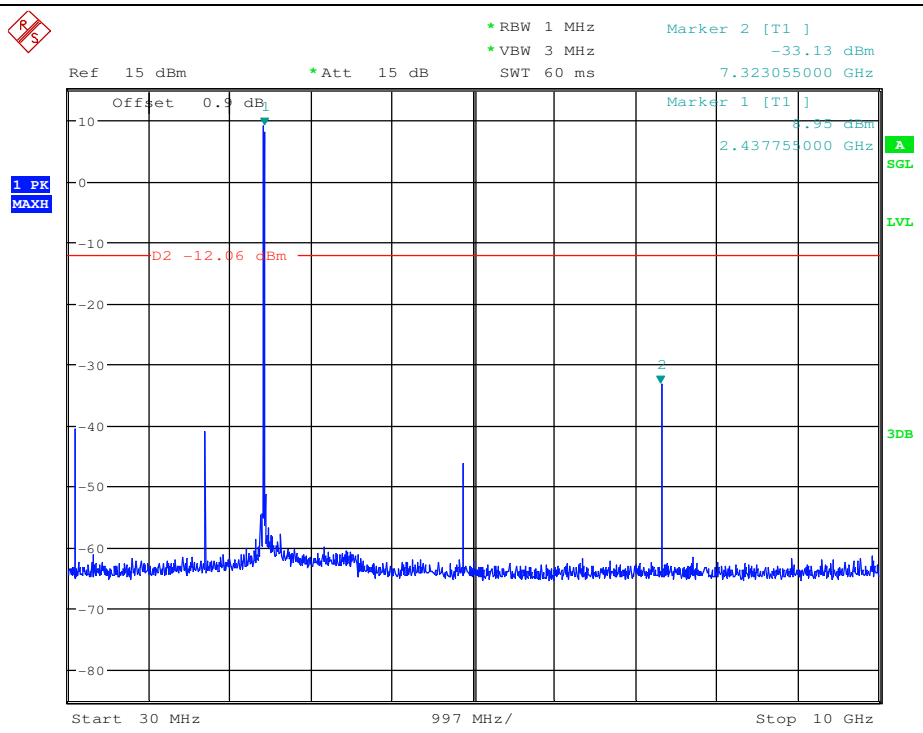


CSE_2

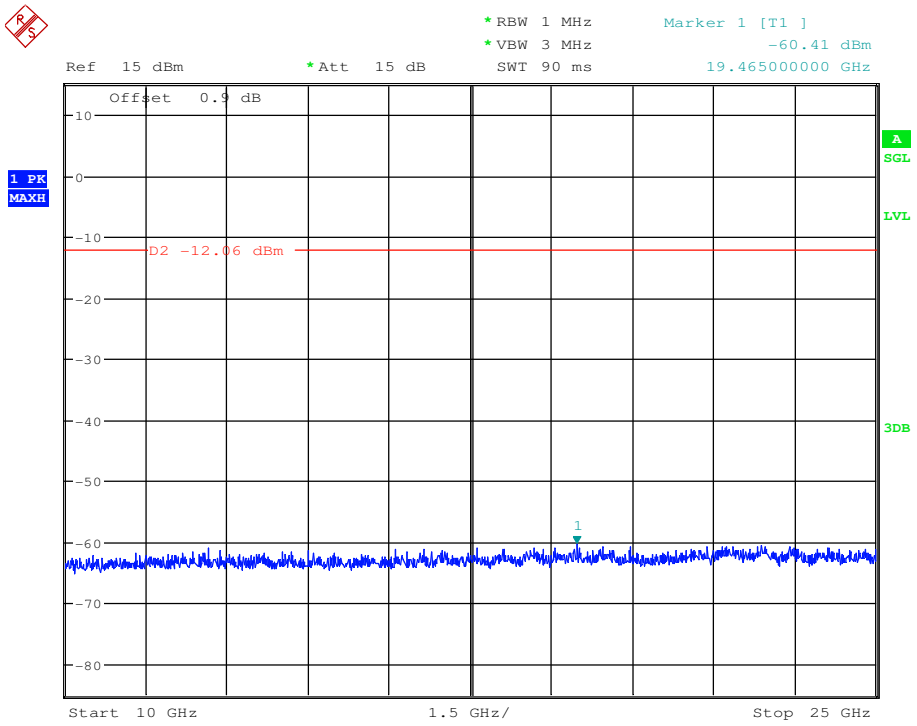


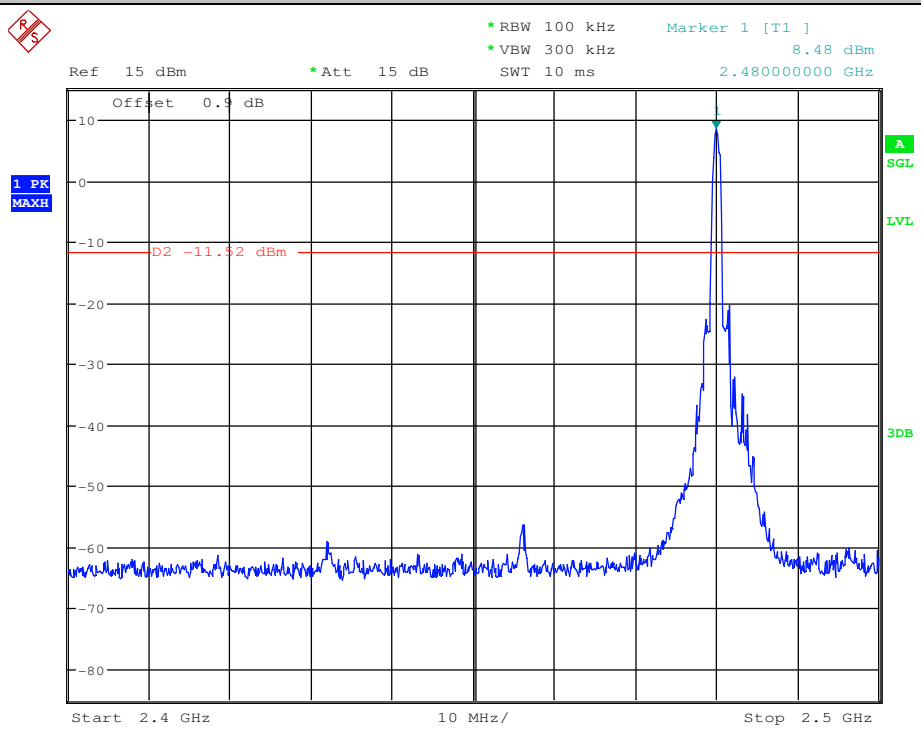
RF Conducted Spurious Emissions_3DH5_2441	
Pref	

CSE_1

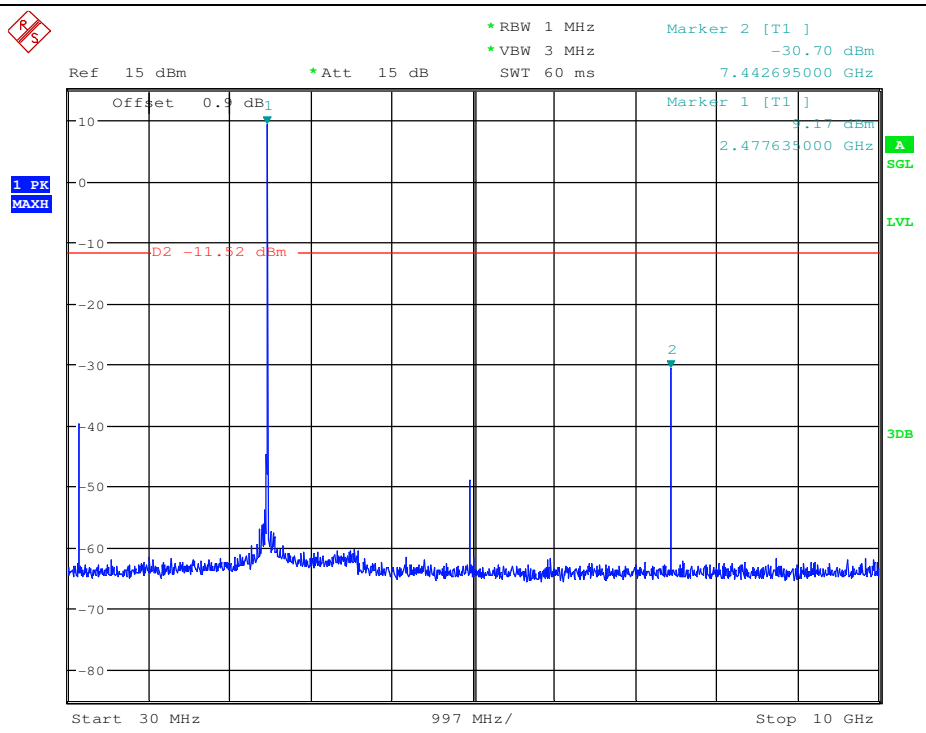


CSE_2

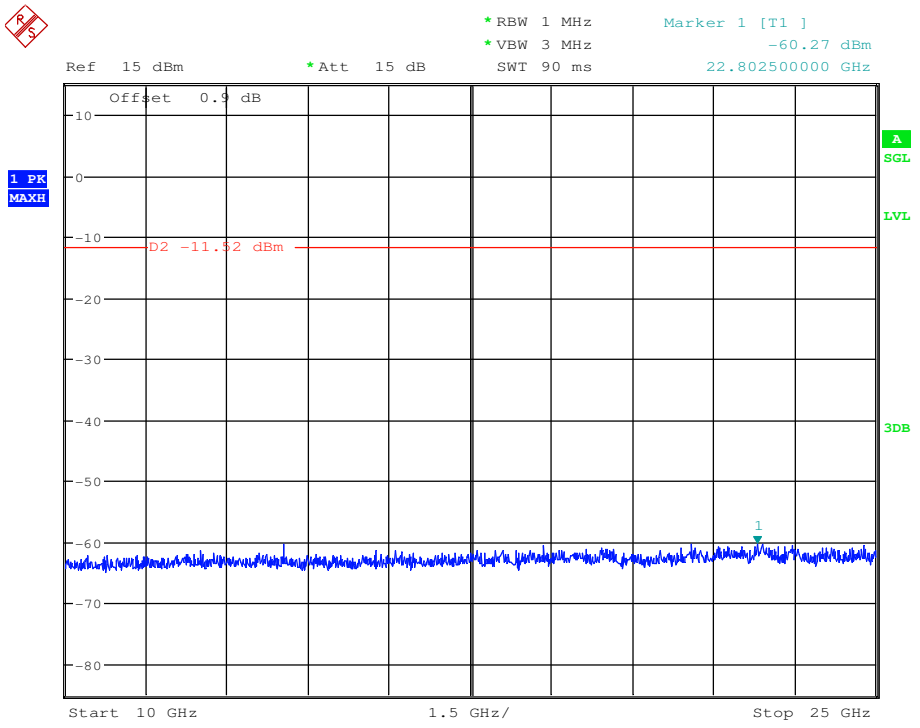


RF Conducted Spurious Emissions_3DH5_2480	
Pref	

CSE_1



CSE_2



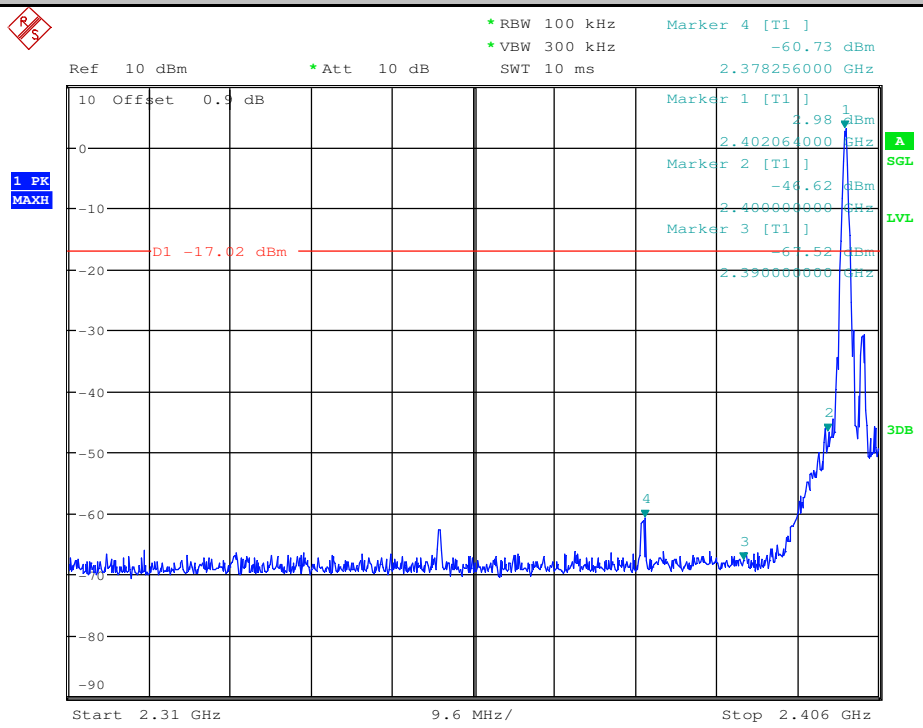
7.Band-edge for RF Conducted Emissions

Left earbuds

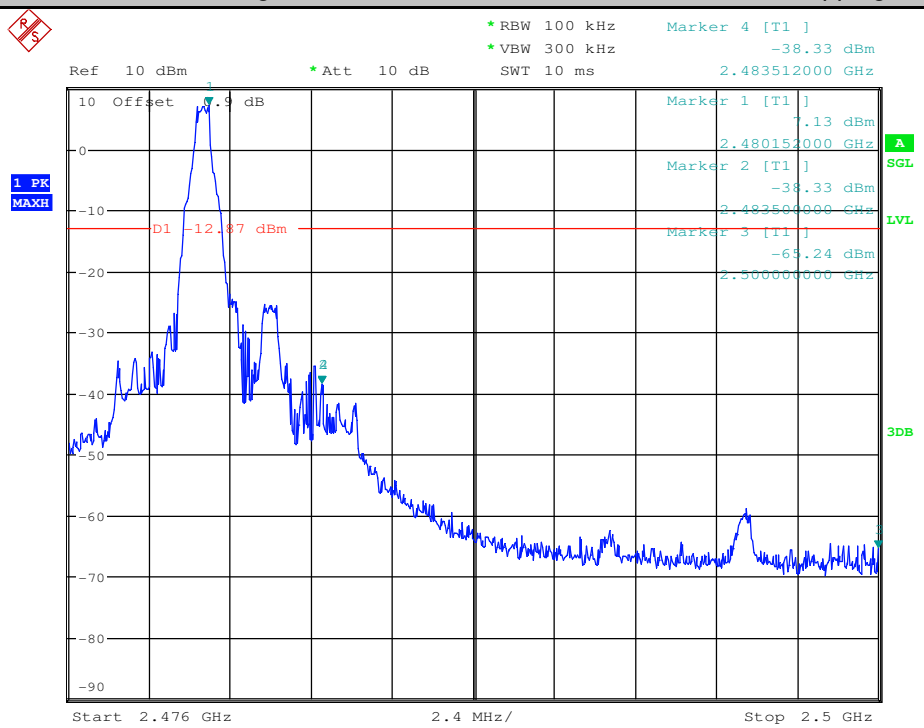
Test Mode	Test Channel	Hopping	Carrier Power[dBm]	Max. Spurious Level [dBm]	Limit[dBm]	Verdict
DH5	2402	Off	2.980	-60.727	<-17.02	PASS
DH5	2480	Off	7.130	-38.325	<-12.87	PASS
2DH5	2402	Off	-0.530	-63.724	<-20.53	PASS
2DH5	2480	Off	5.570	-44.253	<-14.43	PASS
3DH5	2402	Off	1.470	-62.800	<-18.53	PASS
3DH5	2480	Off	5.620	-39.518	<-14.38	PASS
DH5	2402	On	3.140	-60.570	<-16.86	PASS
DH5	2480	On	7.040	-41.952	<-12.96	PASS
2DH5	2402	On	1.540	-62.840	<-18.46	PASS
2DH5	2480	On	4.870	-47.035	<-15.13	PASS
3DH5	2402	On	-2.350	-62.075	<-22.35	PASS
3DH5	2480	On	5.440	-45.937	<-14.56	PASS

TEST PLOT

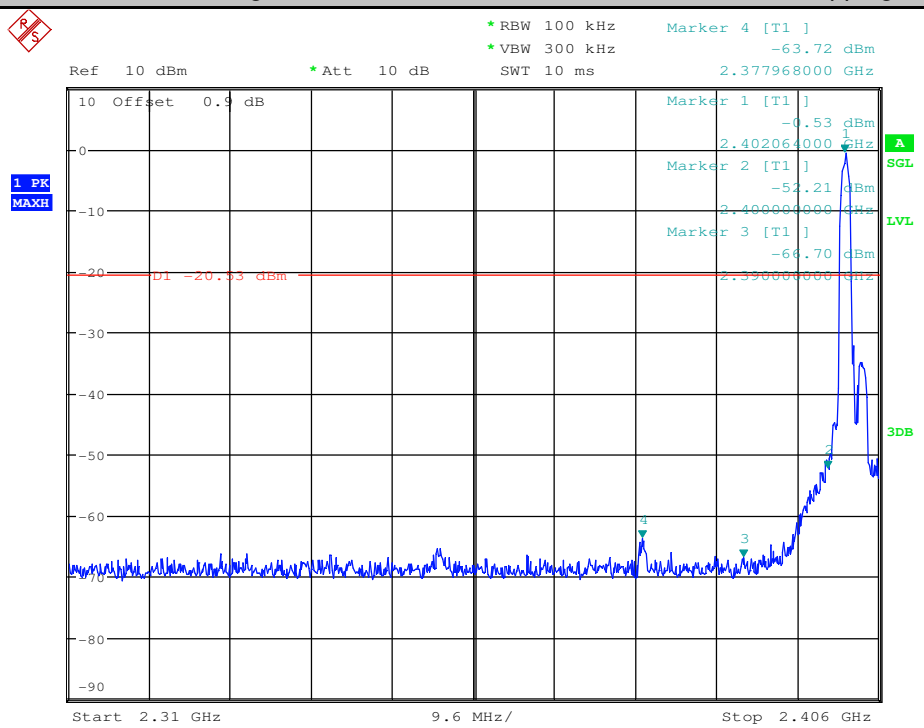
Band-edge for RF Conducted Emissions_DH5_2402_Hopping Off



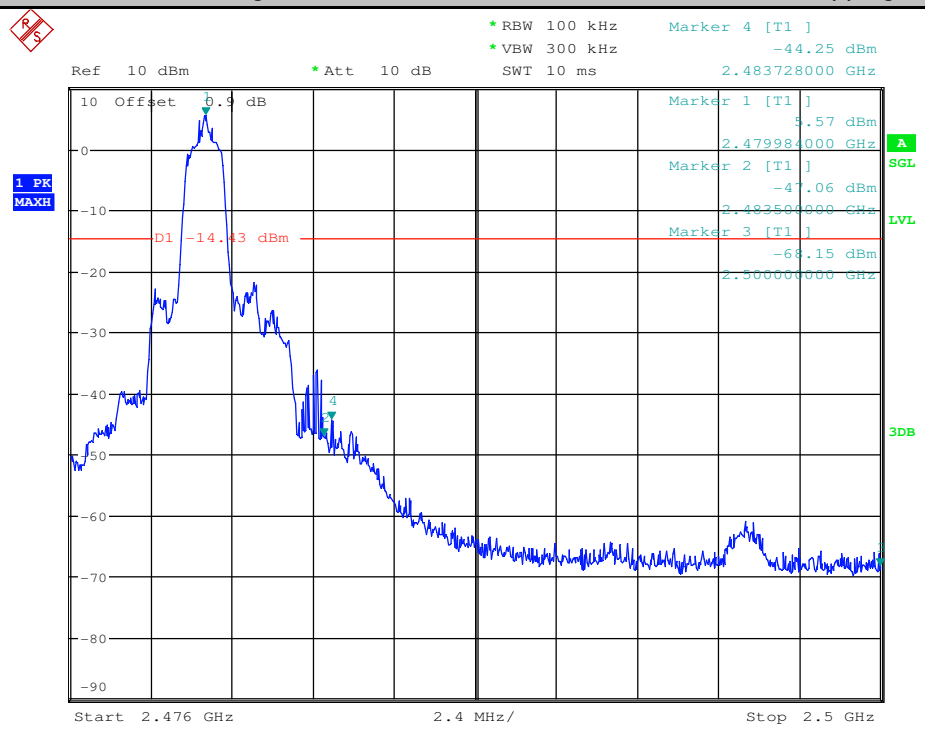
Band-edge for RF Conducted Emissions_DH5_2480_Hopping Off



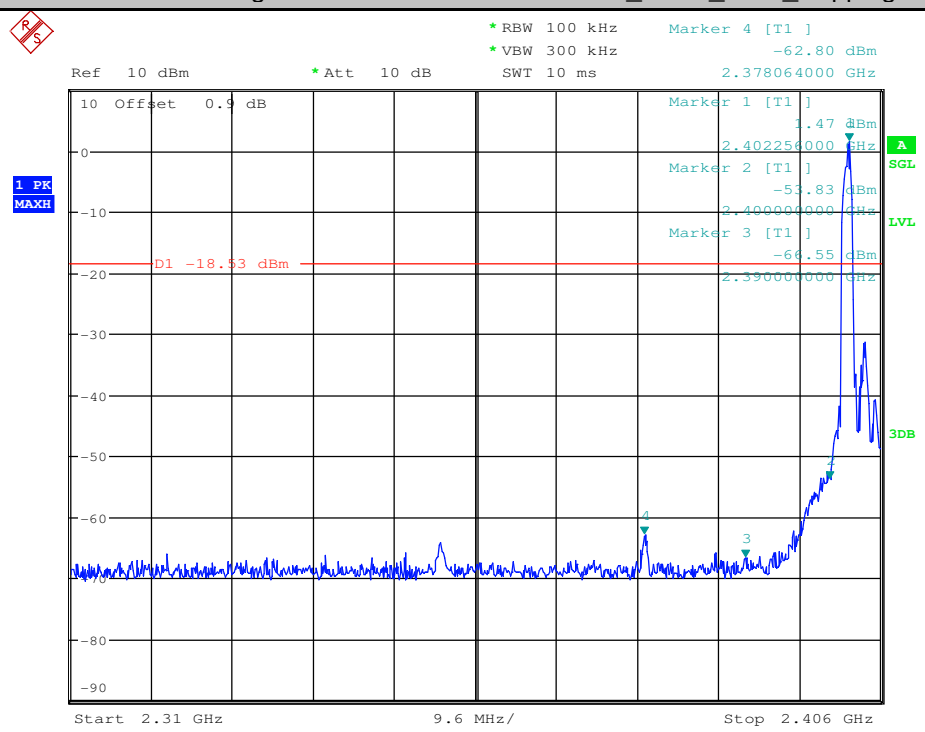
Band-edge for RF Conducted Emissions_2DH5_2402_Hopping Off



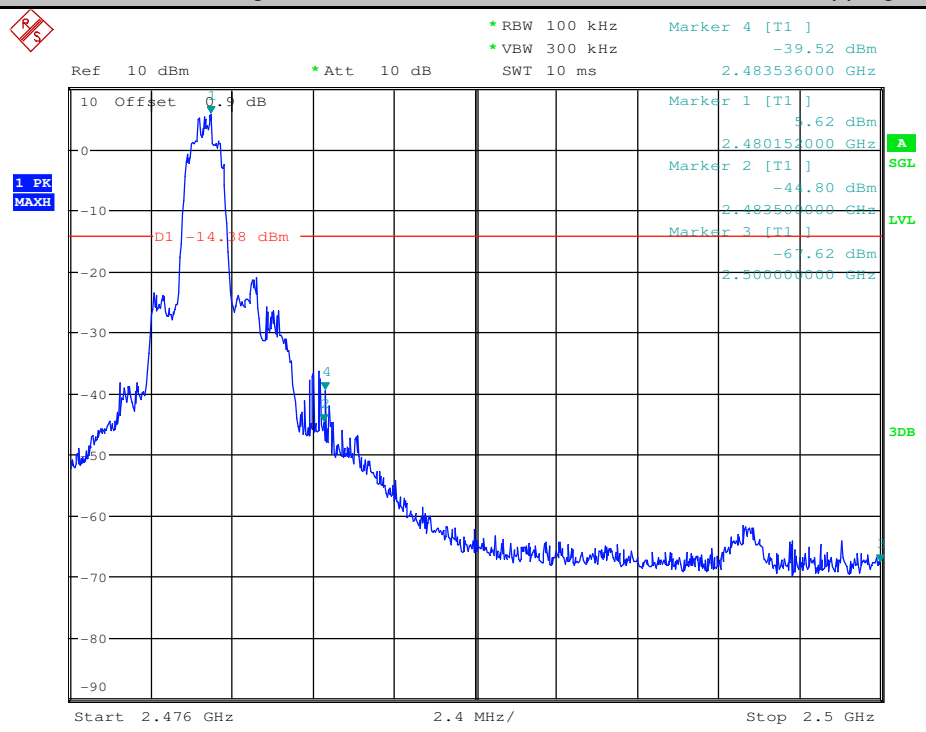
Band-edge for RF Conducted Emissions_2DH5_2480_Hopping Off



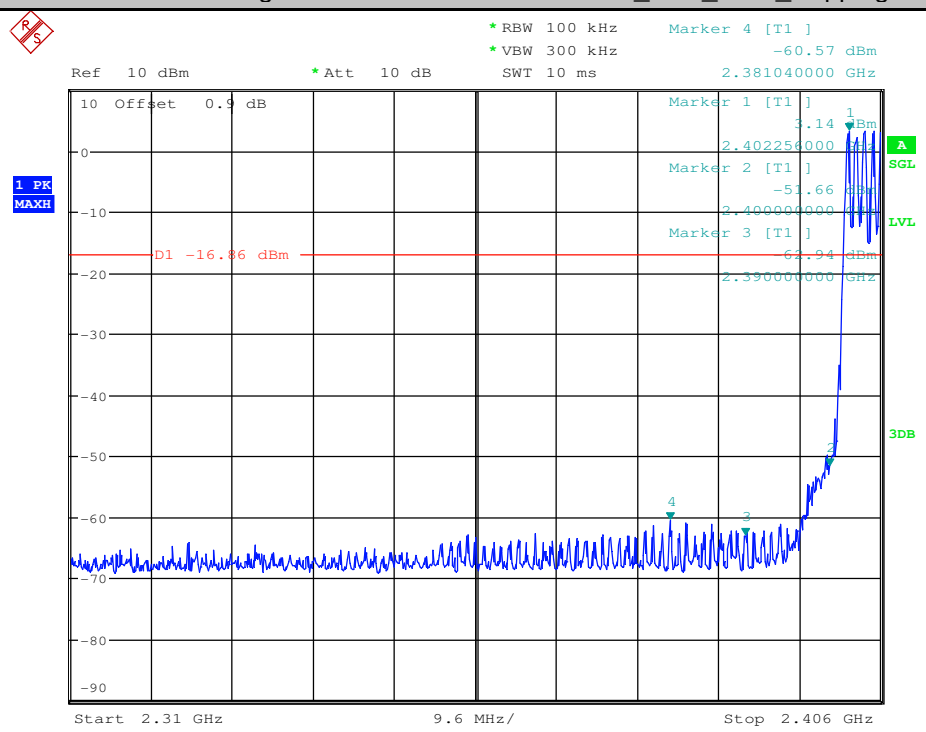
Band-edge for RF Conducted Emissions_3DH5_2402_Hopping Off



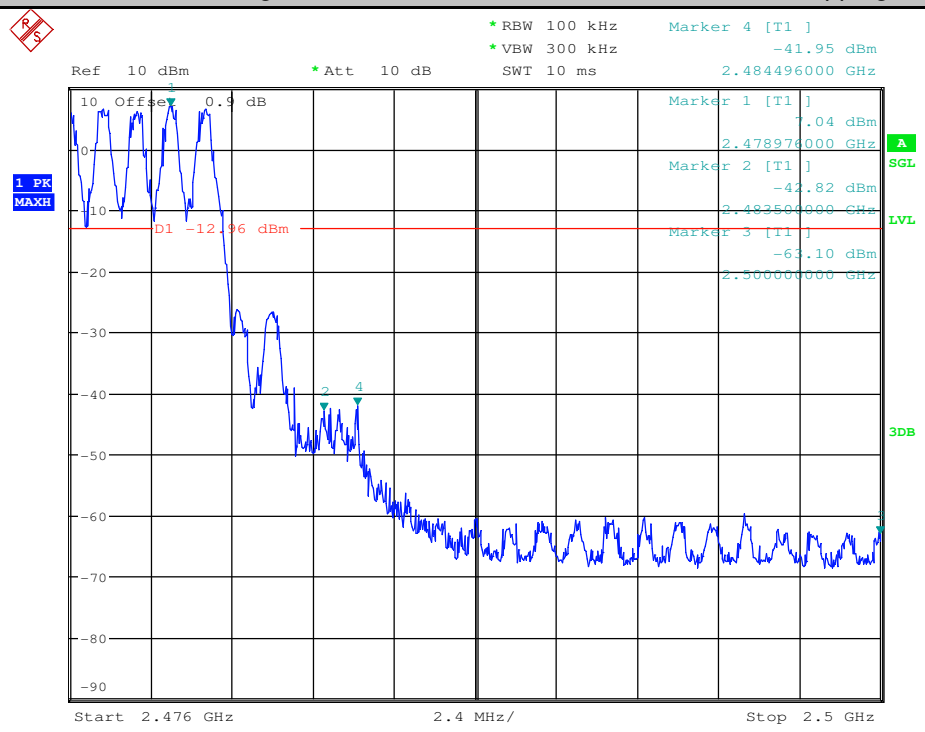
Band-edge for RF Conducted Emissions_3DH5_2480_Hopping Off



Band-edge for RF Conducted Emissions_DH5_2402_Hopping On



Band-edge for RF Conducted Emissions_DH5_2480_Hopping On



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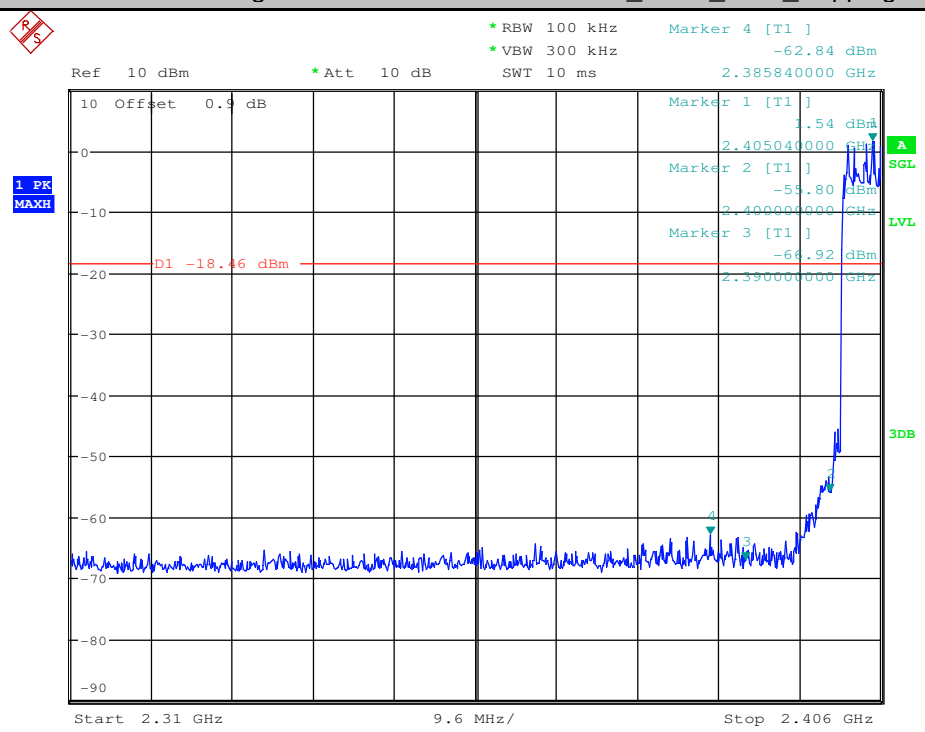
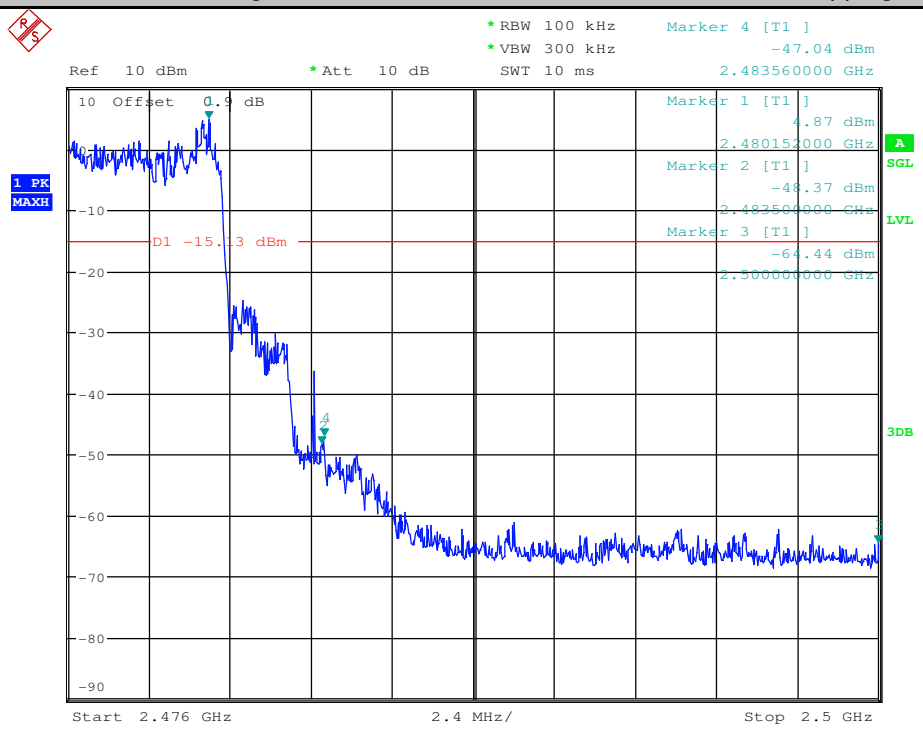
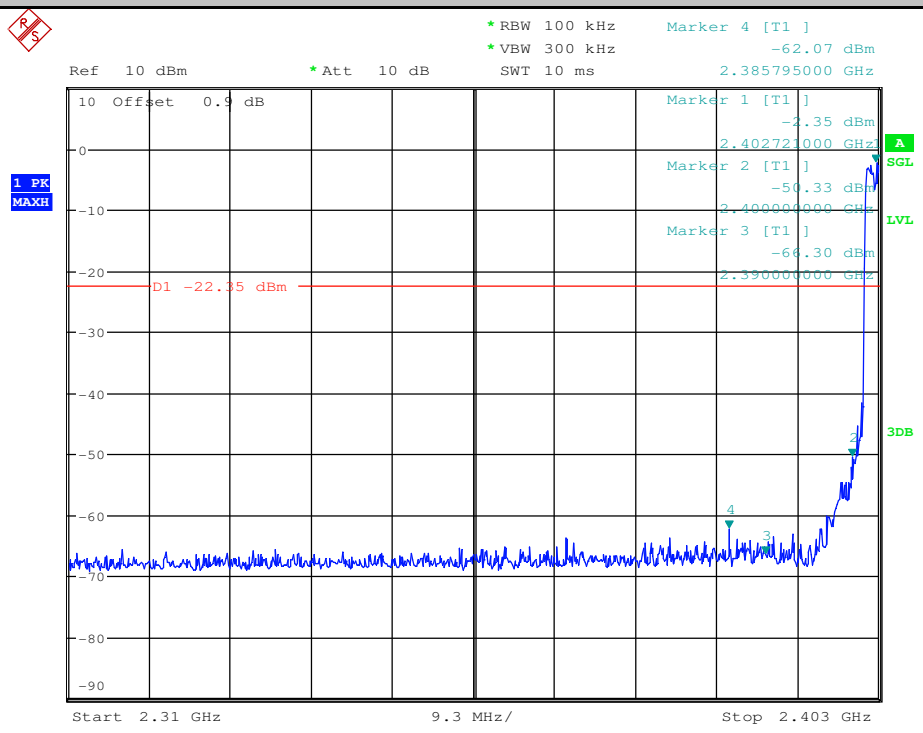


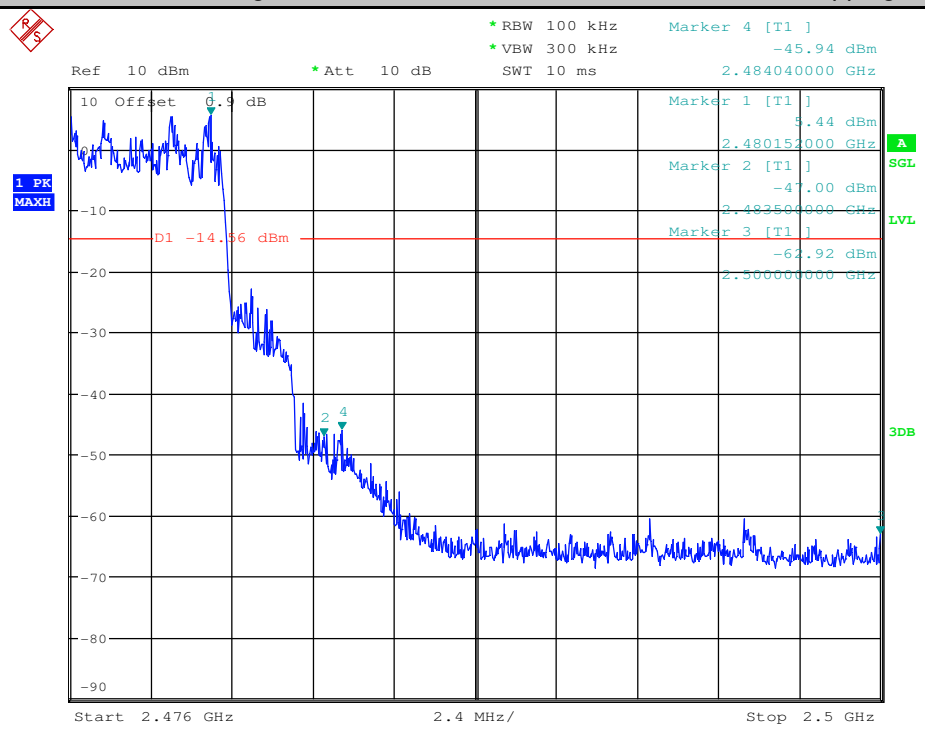
Band-edge for RF Conducted Emissions_2DH5_2480_Hopping On



Band-edge for RF Conducted Emissions_3DH5_2402_Hopping On



Band-edge for RF Conducted Emissions_3DH5_2480_Hopping On

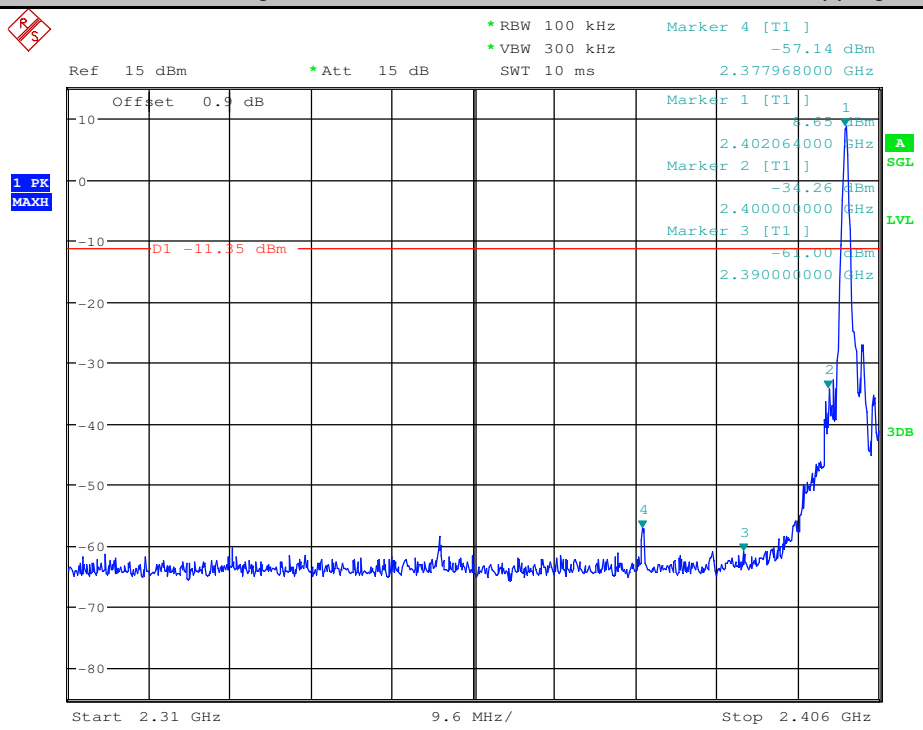


Right earbuds

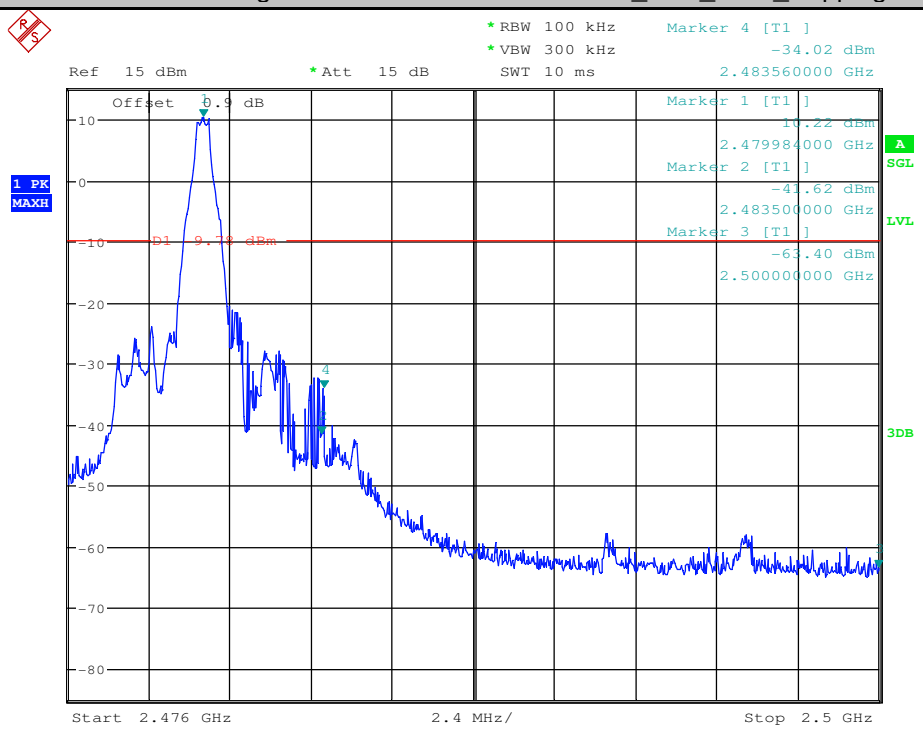
Test Mode	Test Channel	Hopping	Carrier Power[dBm]	Max. Spurious Level [dBm]	Limit[dBm]	Verdict
DH5	2402	Off	8.650	-57.142	<-11.35	PASS
DH5	2480	Off	10.220	-34.025	<-9.78	PASS
2DH5	2402	Off	4.000	-58.599	<-16	PASS
2DH5	2480	Off	8.480	-35.623	<-11.52	PASS
3DH5	2402	Off	6.360	-59.993	<-13.64	PASS
3DH5	2480	Off	8.550	-36.088	<-11.45	PASS
DH5	2402	On	8.830	-56.169	<-11.17	PASS
DH5	2480	On	10.000	-42.505	<-10	PASS
2DH5	2402	On	2.470	-58.313	<-17.53	PASS
2DH5	2480	On	5.060	-38.733	<-14.94	PASS
3DH5	2402	On	2.250	-60.245	<-17.75	PASS
3DH5	2480	On	8.490	-37.834	<-11.51	PASS

TEST PLOT

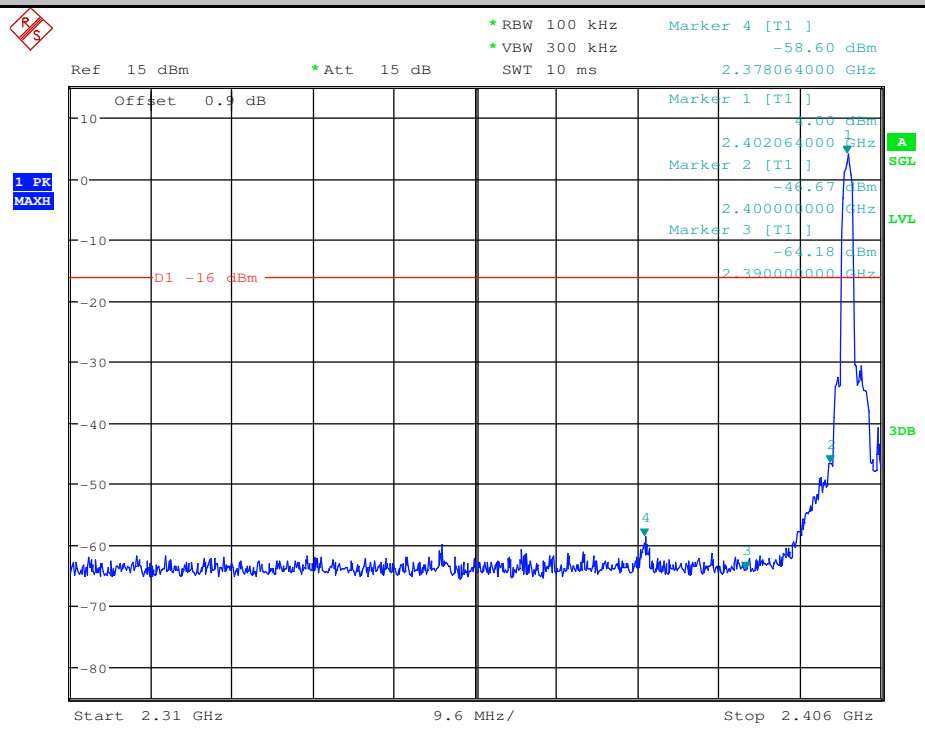
Band-edge for RF Conducted Emissions_DH5_2402_Hopping Off



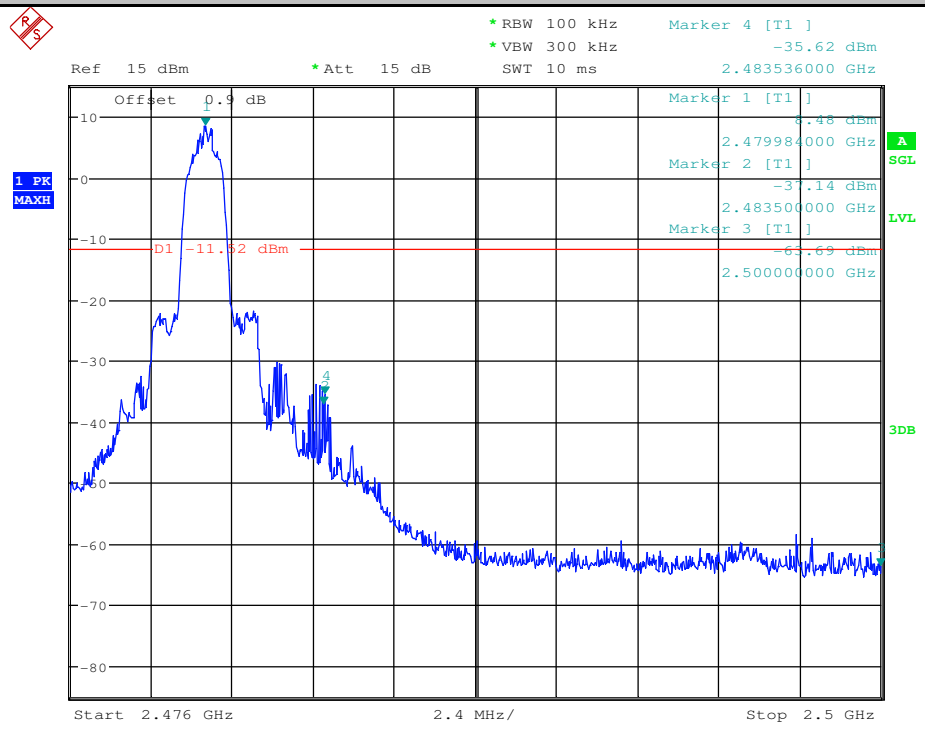
Band-edge for RF Conducted Emissions_DH5_2480_Hopping Off



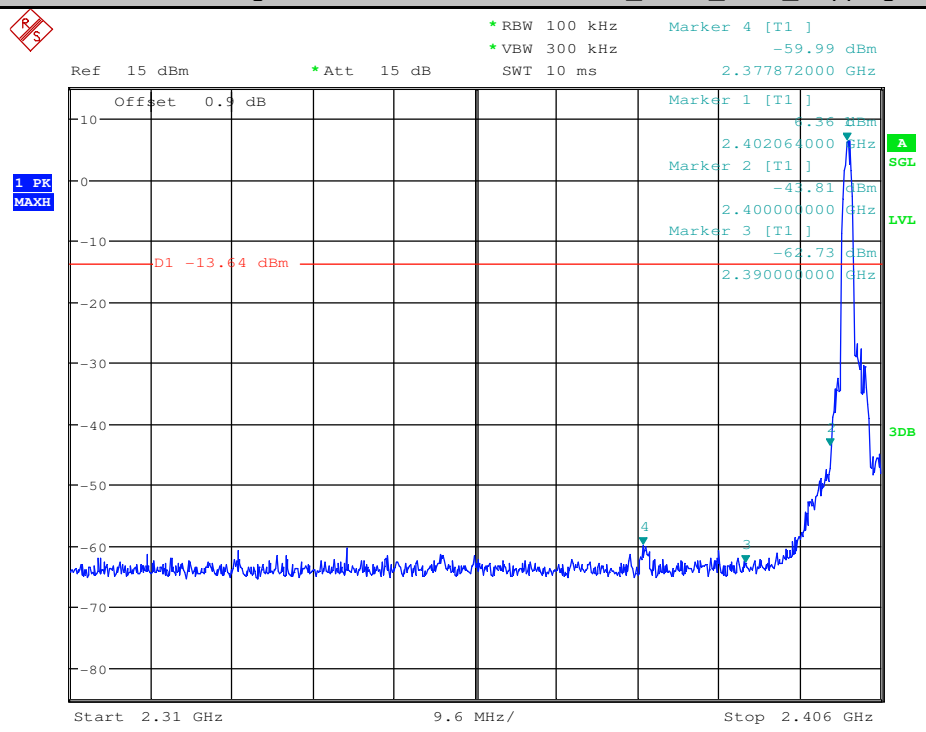
Band-edge for RF Conducted Emissions_2DH5_2402_Hopping Off



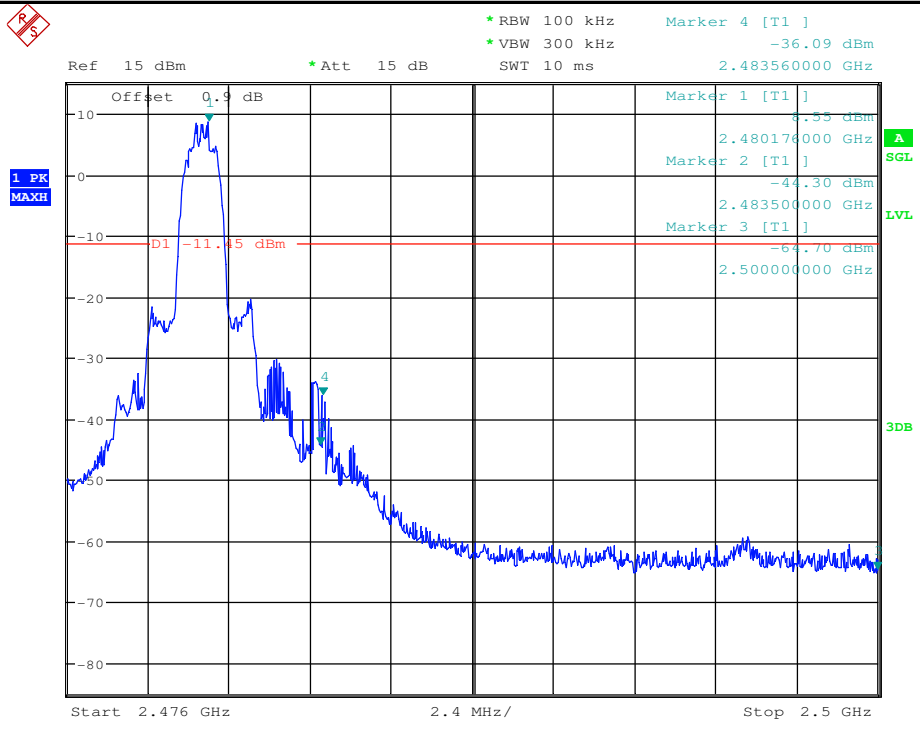
Band-edge for RF Conducted Emissions_2DH5_2480_Hopping Off



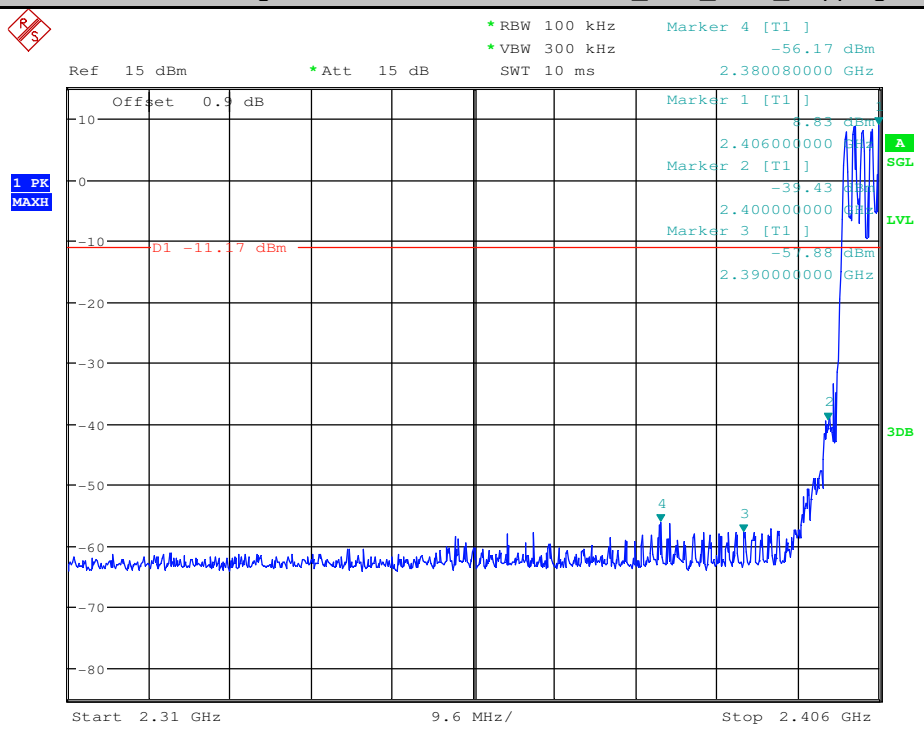
Band-edge for RF Conducted Emissions_3DH5_2402_Hopping Off



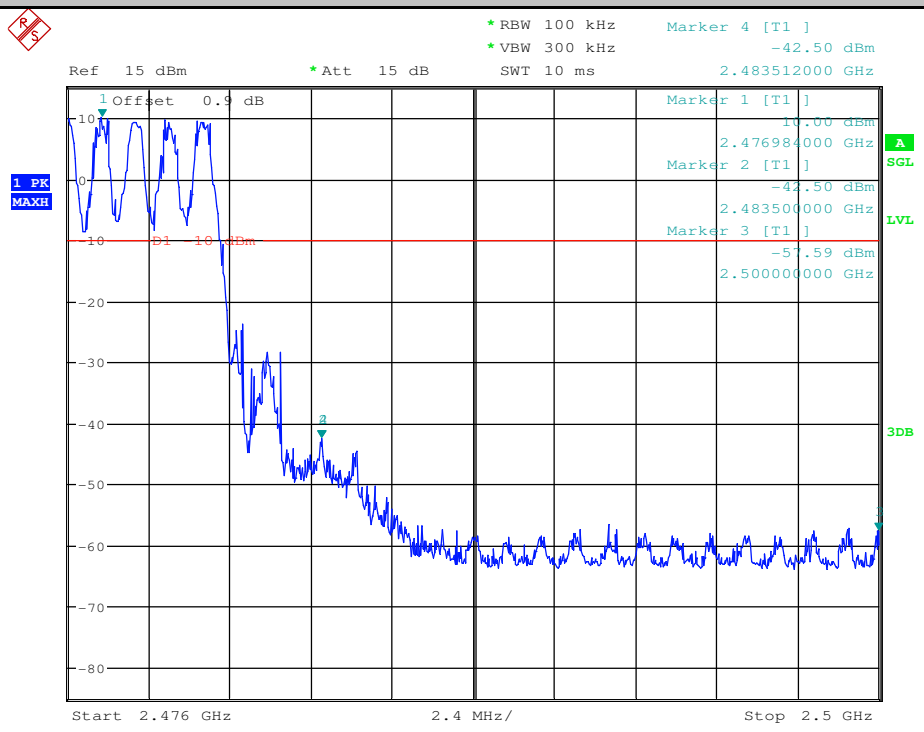
Band-edge for RF Conducted Emissions_3DH5_2480_Hopping Off



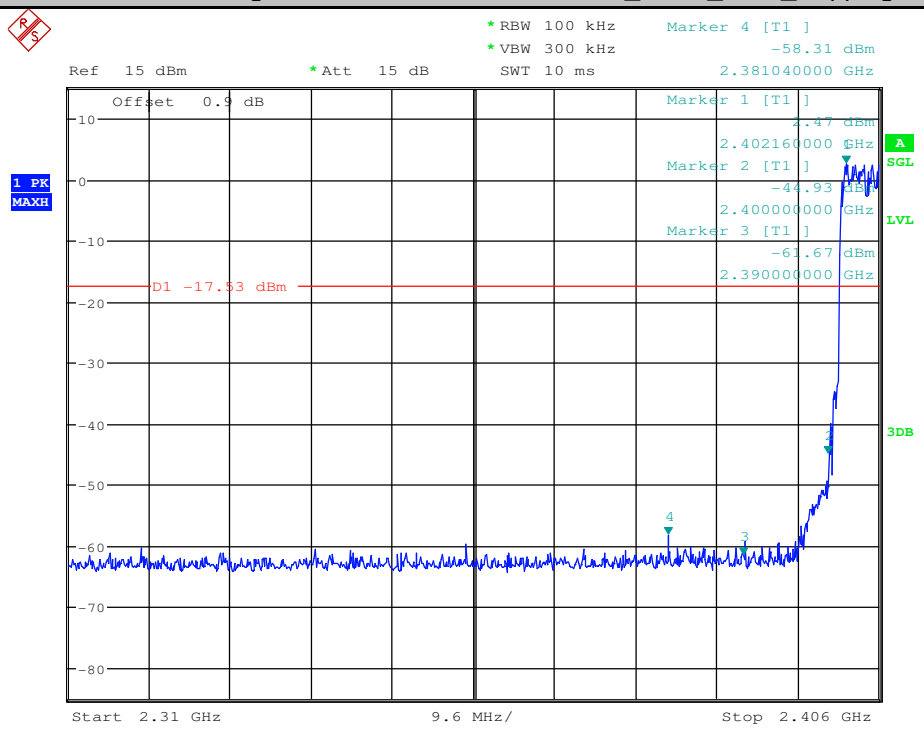
Band-edge for RF Conducted Emissions_DH5_2402_Hopping On



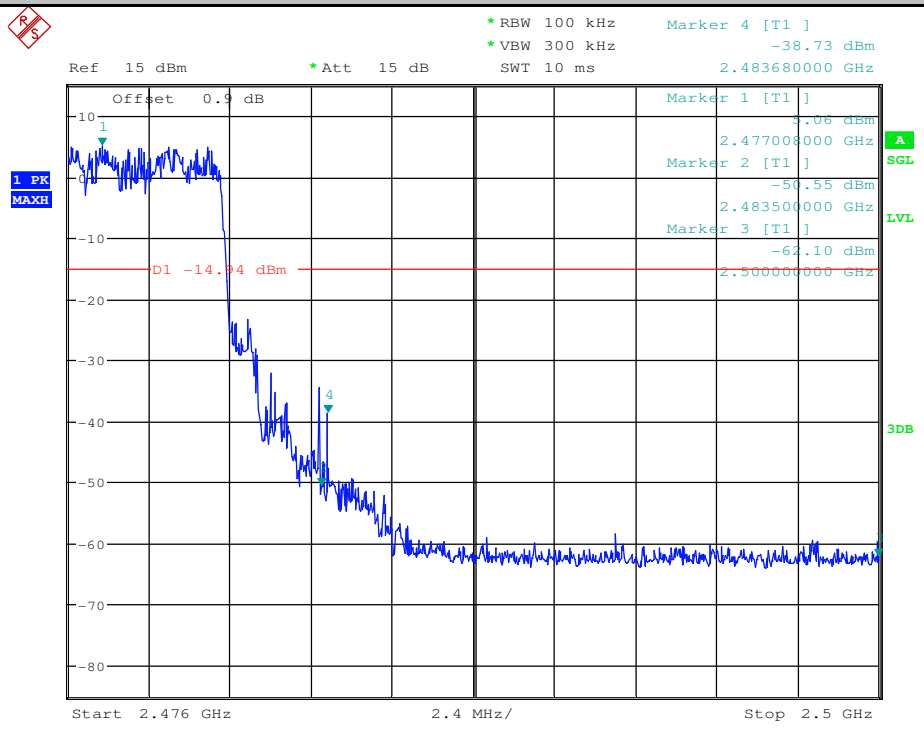
Band-edge for RF Conducted Emissions_DH5_2480_Hopping On



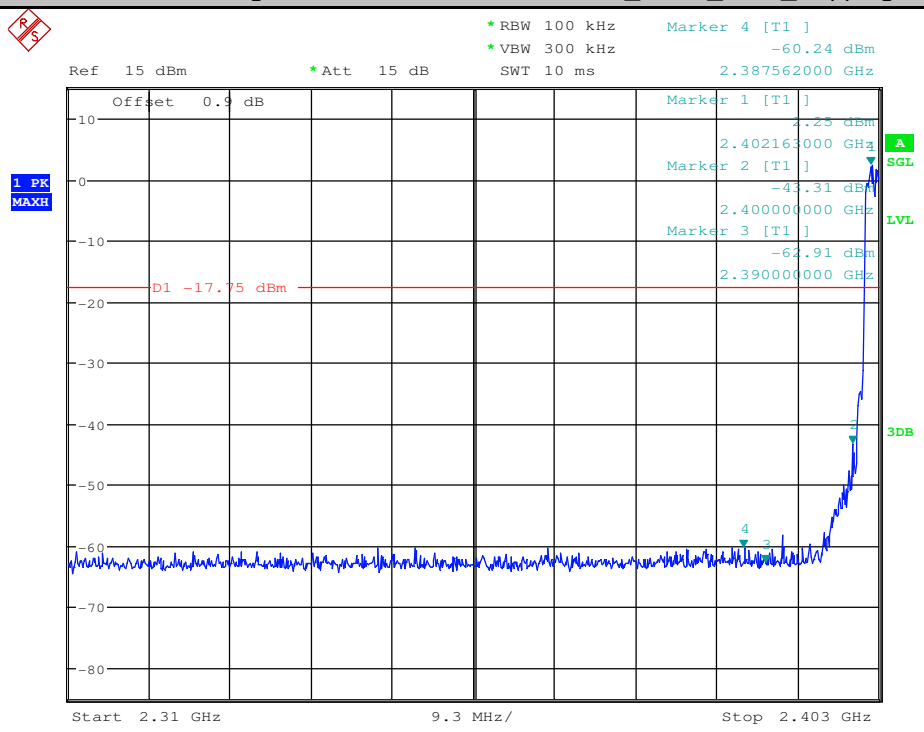
Band-edge for RF Conducted Emissions_2DH5_2402_Hopping On



Band-edge for RF Conducted Emissions_2DH5_2480_Hopping On



Band-edge for RF Conducted Emissions_3DH5_2402_Hopping On



Band-edge for RF Conducted Emissions_3DH5_2480_Hopping On