

TEST REPORT

Application No.: SZEM2008008550CR
Applicant: SKULLCANDY, INC.
Address of Applicant: 6301 N Landmark Dr Park City UT 84098, Utah United States of America
Manufacturer: SKULLCANDY, INC.
Address of Manufacturer: 6301 N Landmark Dr Park City UT 84098, Utah United States of America
Equipment Under Test (EUT):
EUT Name: Vinyl / Spoke
Model No.: V2VYW
Trade mark: 
FCC ID: Y22-V2VYW
Standard(s) : 47 CFR Part 15, Subpart C 15.247
Date of Receipt: 2020-08-28
Date of Test: 2020-08-28 to 2020-10-23
Date of Issue: 2020-10-26

Test Result:	Pass*
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* In the configuration tested, the EUT complied with the standards specified above.

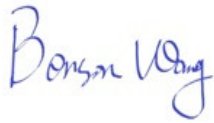
Keny Xu

Keny Xu
EMC Laboratory Manager



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Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2020-10-26		Original

Authorized for issue by:			
			
		Benson Wang/Project Engineer	
			
		Eric Fu/Reviewer	

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(b)(4)	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
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
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

Remark:

EUT Name: Vinyl / Spoke

Only the EUT name Vinyl was tested, since according to the declaration from the applicant, the electrical circuit design, layout, components used, internal wiring and functions were identical for the above models, with only difference on the product name.

This test report (Ref. No.: SZEM200800855002) is only valid with the original test report (Ref. No.: SZEM200700583602).

According to the declaration from the applicant, the model in this report and the model in original report were identical on module, the model in this report just changed the information as below:

- 1)Product change for Charging case: including D2, Q4 only change for the sub-supplier.
- 2)Product change for earbuds: including X1, E2, E3, L3, CON1, Q7, TP1, L4 only change for the sub-supplier.
- 3)The built-in memory of Bluetooth chip of headset is changed. The power voltage of the built-in memory of the headset master chip is changed from 3.3V, 8m flash to 1.8V 8m flash.

Considering to the difference, pre-scan were performed on the sample in this report to find the items which can be influential to the result in the original test report for fully retest.

Therefore in this report Conducted Peak Output Power and Radiated Emissions were fully retested on model V2VYW and shown the data in this report, other tests data please refer to original report SZEM200700583602.



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4 General Information

4.1 Details of E.U.T.

Battery:	Left earbuds: Li-Ion Polymer Battery 3.7V 43mAh (Charge by travel case) Right earbuds: Li-Ion Polymer Battery 3.7V 43mAh (Charge by travel case) travel case with backup battery: Li-Ion Polymer Battery 3.7V 370mAh (Charged by usb port)
Spectrum Spread Technology:	Frequency Hopping Spread Spectrum(FHSS)
Operation Frequency:	2402MHz to 2480MHz
Bluetooth Version:	V5.0 Classic
Modulation Type:	GFSK, Pi/4DQPSK, 8DPSK
Number of Channels:	79
Channel Spacing:	1MHz
Antenna Type:	Integral Antenna
Antenna Gain:	Left earbuds: -1.19dBi; Right earbuds: -2.81dBi

4.2 Cable

Cable	Length	Shielding	Core
Usb cable	22	Unshielded	Non-Core

4.3 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
--	--	--	--

The EUT has been tested as an independent unit.

4.4 Measurement Uncertainty

Test Item	Measurement Uncertainty
Conducted Peak Output Power	$\pm 0.75\text{dB}$
Radiated Spurious Emissions	$\pm 4.5\text{dB}$ (Below 1GHz); $\pm 4.8\text{dB}$ (Above 1GHz)

Remark:
The U_{lab} (lab Uncertainty) is less than U_{cispR} (CISPR Uncertainty), so the test results
– compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
– non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

4.5 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.

4.6 Test Facility

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

• **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 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

• **FCC –Designation Number: CN1178**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

• **Innovation, Science and Economic Development Canada**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.

4.7 Deviation from Standards

None

4.8 Abnormalities from Standard Conditions

None



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5 Equipment List

Conducted Peak Output Power					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Shielding Room	SAEMC	MSR733	SEM001-09	2019-06-13	2022-06-12
DC Power Supply	Rohde & Schwarz	NGSM 32/10	SEM011-04	2020-03-24	2021-03-23
Spectrum Analyzer	Rohde & Schwarz	FSU43	SEM004-08	2020-04-01	2021-03-31
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2019-09-24	2020-09-23
				2020-09-23	2021-09-22
Measurement Software	TST	TST PASS V1.0.5	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM031-02	2020-07-10	2021-07-09
Attenuator	Huber+Suhner	6620_SMA-50-1	SEM021-09	2020-05-21	2021-05-20

Radiated Spurious Emissions					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date	Cal. Due date
3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2018-03-13	2021-03-12
EXA Signal Analyzer (10Hz-44GHz)	Agilent Technologies Inc	N9010A	SEM004-12	2020-04-09	2021-04-08
BiConiLog Antenna (26-3000MHz)	ETS-Lindgren	3142C	SEM003-01	2020-06-26	2023-06-25
Horn Antenna (800MHz-18GHz)	Rohde & Schwarz	HF907	SEM003-07	2018-04-13	2021-04-12
Pre-Amplifier (0.1-26.5GHz)	Compliance Directions Systems Inc.	PAP-0126	SEM004-11	2019-09-24	2020-09-23
				2020-09-23	2021-09-22
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM026-01	2020-07-10	2021-07-09

Radiated Emissions					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
10m Semi-Anechoic Chamber	SAEMC	FSAC1018	SEM001-03	2018-03-31	2021-03-30
EMI Test Receiver (9kHz-7GHz)	Rohde&Schwarz	ESR	SEM004-03	2020-03-24	2021-03-23
Trilog-Broadband Antenna(25MHz-2GHz)	Schwarzbeck	VULB9168	SEM003-18	2019-08-08	2022-08-07
Pre-amplifier (9kHz-1GHz)	Sonoma Instrument Co	310N	SEM005-04	2020-04-09	2021-04-08
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM029-01	2019-07-11	2020-07-10
				2020-07-10	2021-07-09



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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	2019-09-26	2020-09-25
				2020-09-15	2021-09-14
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-04	2019-09-26	2020-09-25
				2020-09-15	2021-09-14
Humidity/ Temperature Indicator	Mingle	N/A	SEM002-08	2019-09-26	2020-09-25
				2020-09-15	2021-09-14
Barometer	Changchun Meteorological Industry Factory	DYM3	SEM002-01	2020-04-07	2021-04-06



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6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203 & 15.247(b)(4)

Standard Requirement:

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:

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is Left earbuds: -1.19dBi; Right earbuds: -2.81dBi

Antenna location: Refer to Internal photos.



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6.2 Other requirements Frequency Hopping Spread Spectrum System Hopping Sequence

6.2.1 Test Requirement:

47 CFR Part 15, Subpart C 15.247(a)(1),(g),(h)

Standard Requirement:

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.

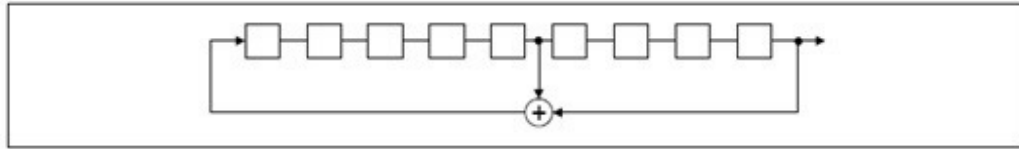
Compliance for section 15.247(a)(1):

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: $2^9 - 1 = 511$ bits
- > Longest sequence of zeros: 8 (non-inverted signal)

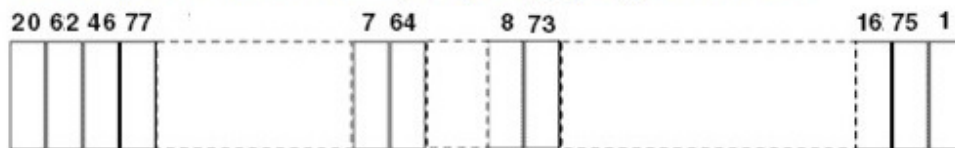
Linear Feedback Shift Register for Generation of the PRBS sequence

An example of Pseudorandom Frequency Hopping Sequence as follow:



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 individually and independently to avoid hopping on the occupied channels.

The system is designed not have the ability to coordinated with other FHSS System in an effort to avoid the simultaneous occupancy of individual hopping frequencies by multiple transmitter.



7 Radio Spectrum Matter Test Results

7.1 Conducted Peak Output Power

Test Requirement 47 CFR Part 15, Subpart C 15.247

Test Method: ANSI C63.10 (2013) Section 7.8.5

Limit:

Frequency range(MHz)	Output power of the intentional radiator(watt)
902-928	1 for ≥ 50 hopping channels
	0.25 for $25 \leq$ hopping channels < 50
	1 for digital modulation
2400-2483.5	1 for ≥ 75 non-overlapping hopping channels
	0.125 for all other frequency hopping systems
	1 for digital modulation
5725-5850	1 for frequency hopping systems and digital modulation

7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 23.3 °C

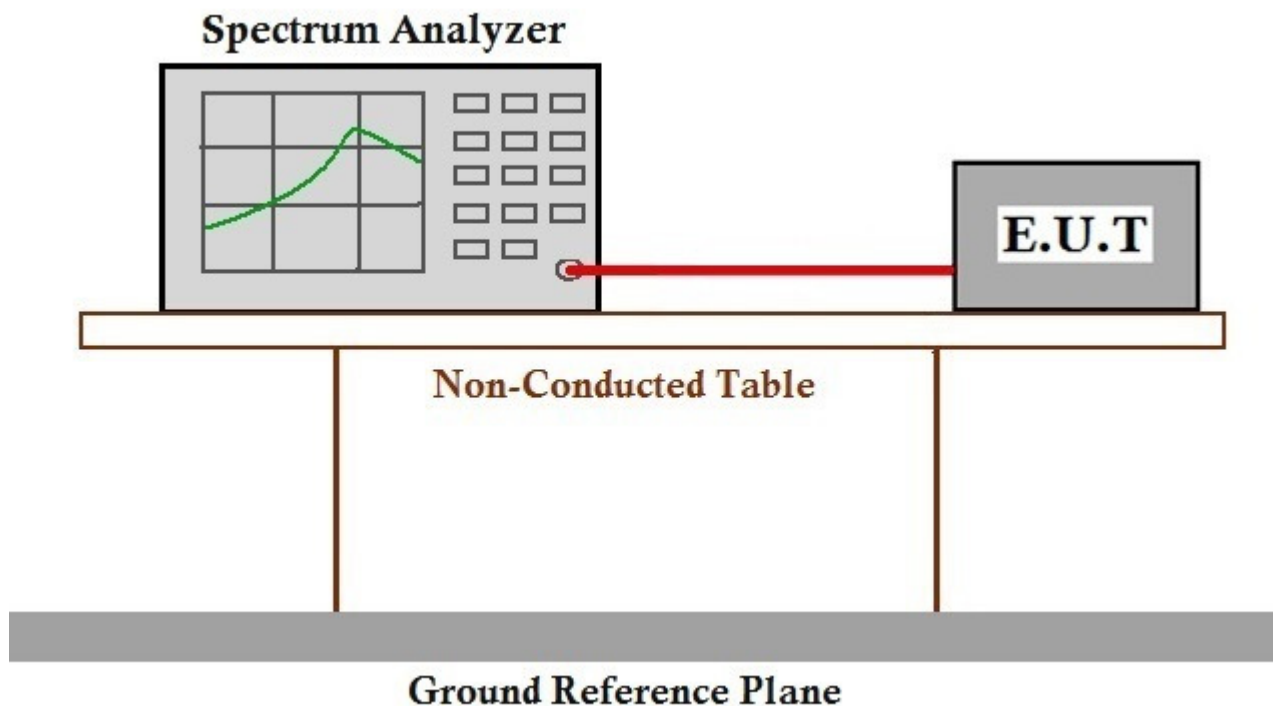
Humidity: 52.5 % RH

Atmospheric Pressure: 1010 mbar

7.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	03	TX_non-Hop mode (Left earbuds)_Keep the EUT in continuously transmitting mode with GFSK modulation, Pi/4DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.
Final test	04	TX_non-Hop mode (Right earbuds)_Keep the EUT in continuously transmitting mode with GFSK modulation, Pi/4DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report

7.1.3 Test Setup Diagram



7.1.4 Measurement Procedure and Data

Please Refer To Appendix For Details



7.2 Radiated Spurious Emissions

Test Requirement 47 CFR Part 15, Subpart C 15.209
Test Method: ANSI C63.10 (2013) Section 6.4,6.5,6.6
Measurement Distance: 10m (Below 1GHz) and 3m (Above 1GHz)

Limit:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, 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.

7.2.1 E.U.T. Operation

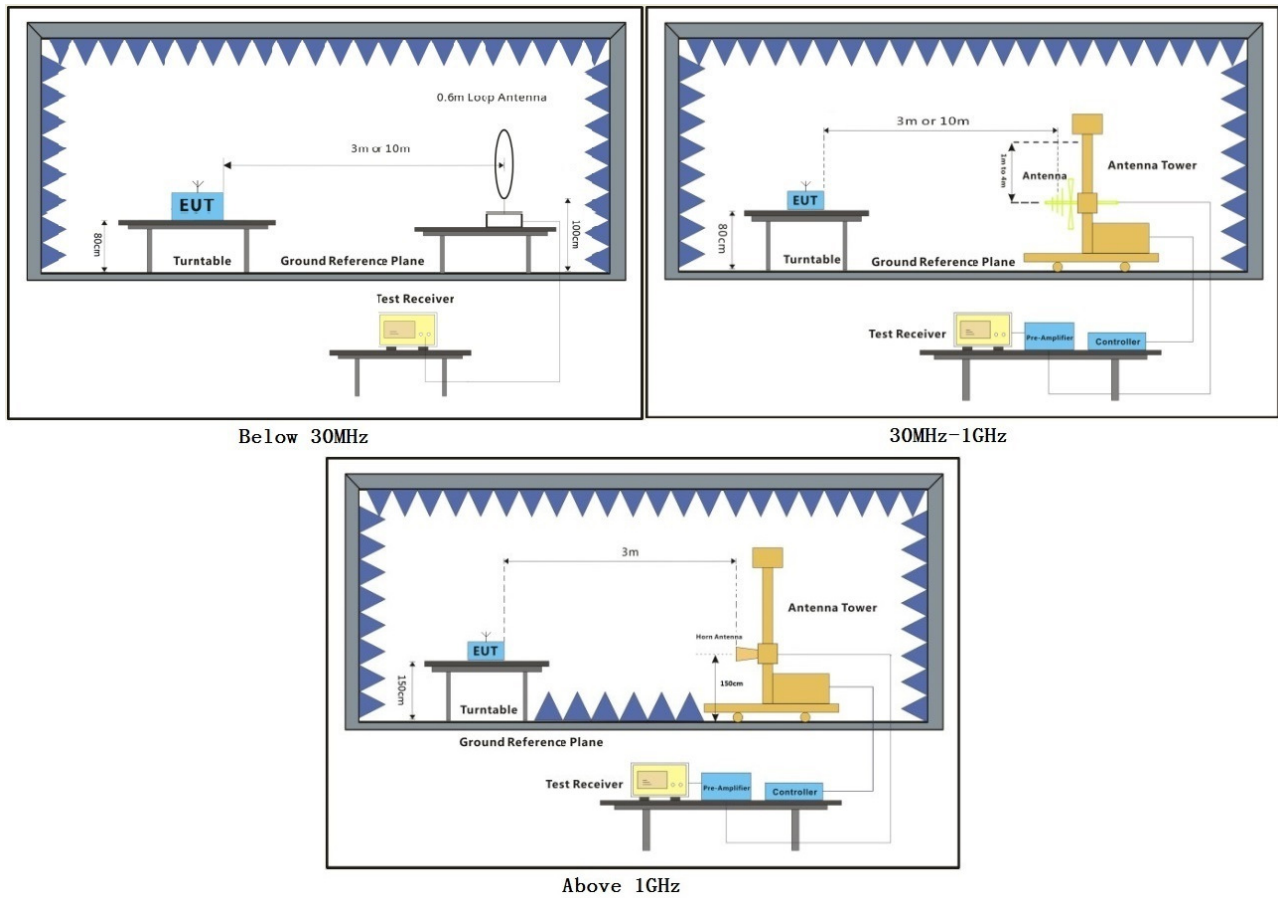
Operating Environment:

Temperature: 23 °C Humidity: 52 % RH Atmospheric Pressure: 1000 mbar

7.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	03	TX_non-Hop mode (Left earbuds) Keep the EUT in continuously transmitting mode with GFSK modulation, Pi/4DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.
Final test	04	TX_non-Hop mode (Right earbuds) Keep the EUT in continuously transmitting mode with GFSK modulation, Pi/4DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report

7.2.3 Test Setup Diagram



7.2.4 Measurement Procedure and Data

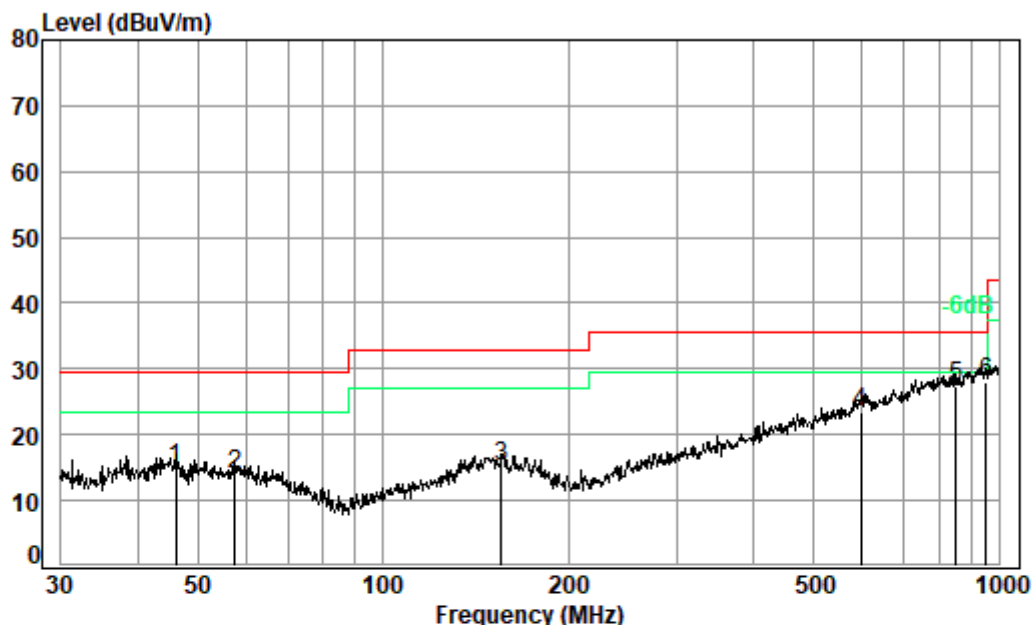
- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 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, the middle channel, the Highest channel.
- 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.

Remark:

- 1) For emission below 1GHz, through pre-scan found the worst case is the lowest channel. Only the worst case is recorded in the report.
- 2) 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
- 3) Scan from 9kHz to 25GHz, the disturbance above 18GHz and below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
- 4) 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. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

30MHz~1GHz

Test Mode: 03; Polarization: Horizontal;



Condition: 10m HORIZONTAL

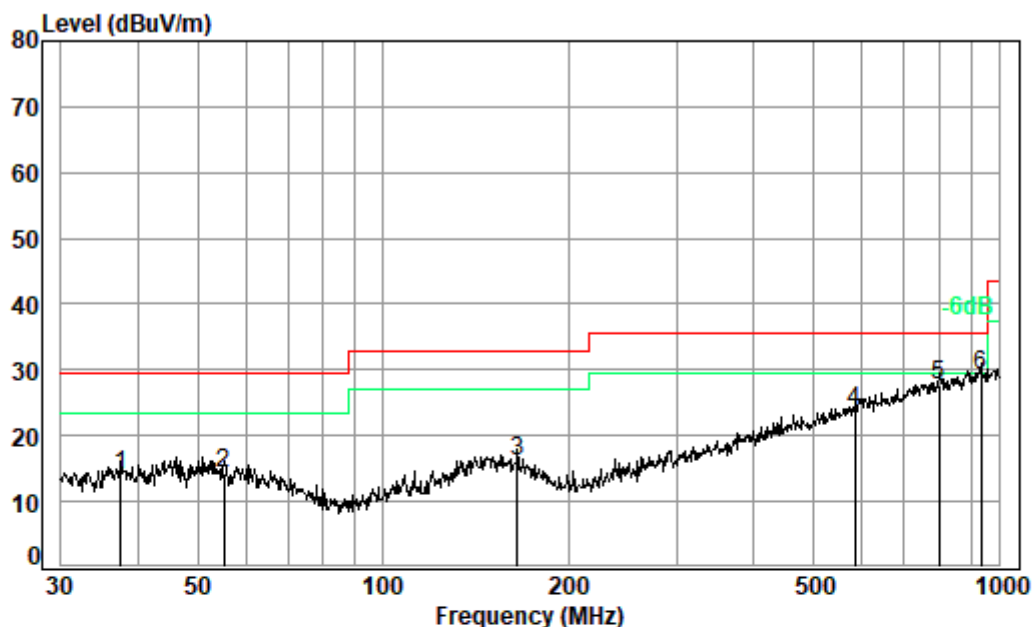
Job No. : 08550CR

Test Mode: 03

	Freq	Ant Factor	Preamp Factor	Cable Loss	Read Level	Level	Limit	Over Limit	Remark
	MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	dB	
1	46.178	20.47	32.45	0.97	25.92	14.91	29.50	-14.59	QP
2	57.594	19.66	32.43	1.03	25.66	13.92	29.50	-15.58	QP
3	155.910	19.96	32.30	1.49	25.98	15.13	33.00	-17.87	QP
4	597.223	25.99	32.04	3.16	26.42	23.53	35.60	-12.07	QP
5	851.035	28.71	31.71	3.40	26.90	27.30	35.60	-8.30	QP
6 pp	952.094	29.86	31.24	3.50	25.98	28.10	35.60	-7.50	QP



Test Mode:03; Polarization: Vertical



Condition: 10m VERTICAL

Job No. : 08550CR

Test Mode: 03

	Ant Freq	Preamp Factor	Cable Loss	Read Level	Limit Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	37.548	19.89	32.42	0.90	25.71	14.08	29.50	-15.42 QP
2	55.221	19.73	32.44	1.02	25.92	14.23	29.50	-15.27 QP
3	165.487	19.52	32.30	1.51	27.33	16.06	33.00	-16.94 QP
4	584.790	25.49	32.09	3.15	27.03	23.58	35.60	-12.02 QP
5	798.980	28.59	31.92	3.28	27.64	27.59	35.60	-8.01 QP
6 pp	935.546	29.80	31.33	3.47	27.16	29.10	35.60	-6.50 QP

The test was performed at a 10m test site. According to below formulate and the test data at 10m test distance,

$$L_3 / L_{10} = D_{10} / D_3$$

Note:

L_3 : Level @ 3m distance. Unit: uV/m;

L_{10} : Level @ 10m distance. Unit: uV/m;

D_3 : 3m distance. Unit: m

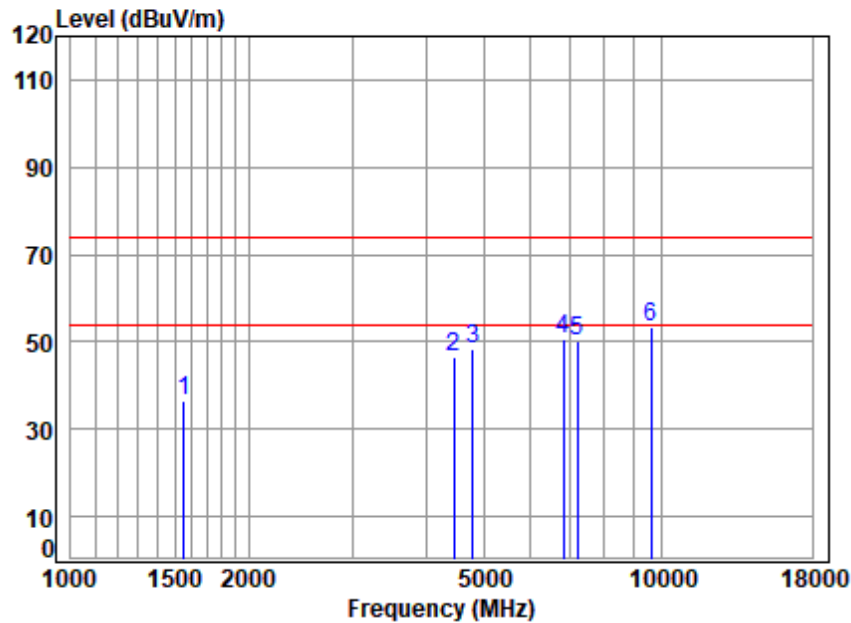
D_{10} : 10m distance. Unit: m

The level at 3m test distance is below:

Frequency (MHz)	Level @ 10m (dBuV/m)	Level @ 10m (uV/m)	Level @ 3m (uV/m)	Level @ 3m (dBuV/m)	Limit @ 3m (dBuV/m)	Margin (dB)	Ant. Polarization
37.548	14.08	5.06	16.86	24.54	40.00	-15.46	V
55.221	14.23	5.15	17.15	24.69	40.00	-15.31	V
165.487	16.06	6.35	21.18	26.52	43.50	-16.98	V
584.790	23.58	15.10	50.34	34.04	46.00	-11.96	V
798.980	27.59	23.96	79.87	38.05	46.00	-7.95	V
935.546	29.10	28.51	95.03	39.56	46.00	-6.44	V
46.178	14.91	5.57	18.55	25.37	40.00	-14.63	H
57.594	13.92	4.97	16.55	24.38	40.00	-15.62	H
155.910	15.13	5.71	19.03	25.59	43.50	-17.91	H
597.223	23.53	15.01	50.05	33.99	46.00	-12.01	H
851.035	27.30	23.17	77.25	37.76	46.00	-8.24	H
952.094	28.10	25.41	84.70	38.56	46.00	-7.44	H

Above 1GHz

Test Mode: 03; Polarity: Horizontal; Modulation:GFSK; Channel:Low



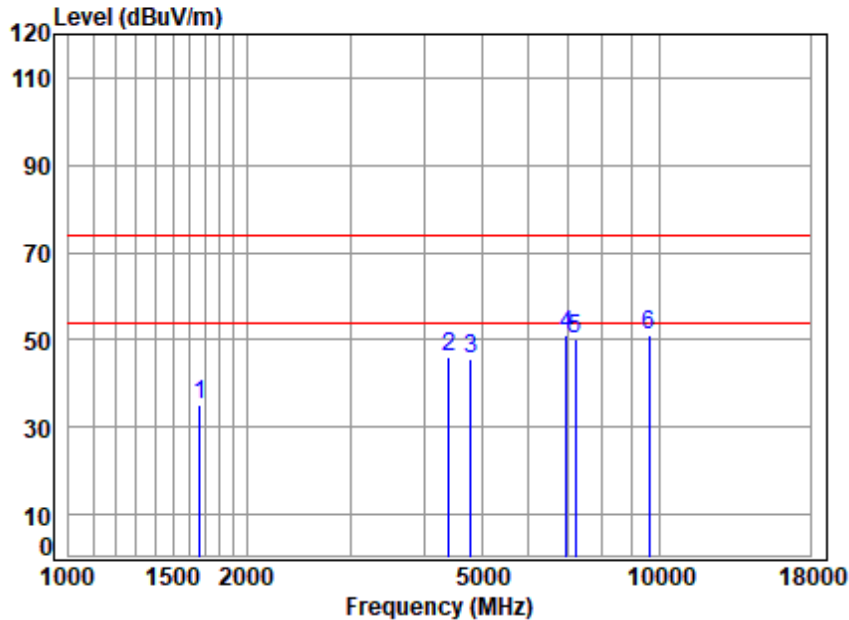
Site : chamber
Condition: 3m HORIZONTAL
Job No : 08550CR\08551CR
Mode : 2402 TX SE
Note : BT

	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	1551.677	3.31	26.04	40.54	47.47	36.28	74.00	-37.72	peak
2	4456.315	6.72	33.53	42.52	48.71	46.44	74.00	-27.56	peak
3	4804.000	7.10	33.97	42.77	49.97	48.27	74.00	-25.73	peak
4	6835.278	8.46	35.80	41.77	48.09	50.58	74.00	-23.42	peak
5	7206.000	8.74	36.07	41.58	47.16	50.39	74.00	-23.61	peak
6	9608.000	10.81	37.67	38.57	43.56	53.47	74.00	-20.53	peak



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Test Mode: 03; Polarity: Vertical; Modulation:GFSK; Channel:Low

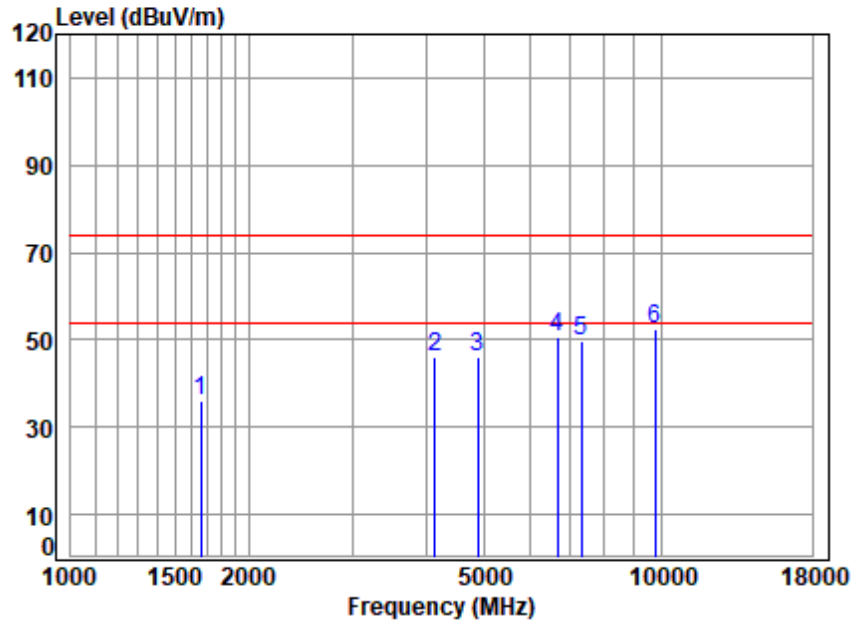


Site : chamber
Condition: 3m VERTICAL
Job No : 08550CR\08551CR
Mode : 2402 TX SE
Note : BT

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1667.951	3.40	26.54	40.61	45.78	35.11	74.00	-38.89	peak
2	4405.090	6.67	33.44	42.48	48.28	45.91	74.00	-28.09	peak
3	4804.000	7.10	33.97	42.77	47.37	45.67	74.00	-28.33	peak
4	6954.852	8.52	35.87	41.71	48.63	51.31	74.00	-22.69	peak
5	7206.000	8.74	36.07	41.58	46.92	50.15	74.00	-23.85	peak
6	9608.000	10.81	37.67	38.57	41.14	51.05	74.00	-22.95	peak



Test Mode: 03; Polarity: Horizontal; Modulation: GFSK; Channel: middle

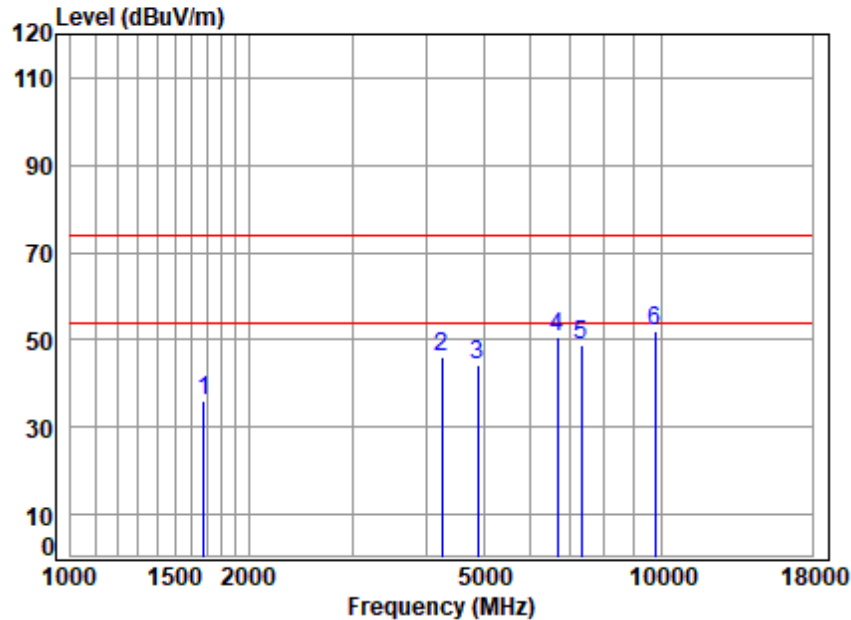


Site : chamber
Condition: 3m HORIZONTAL
Job No : 08550CR\08551CR
Mode : 2441 TX SE
Note : BT

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit	Over	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1663.137	3.40	26.52	40.61	46.58	35.89	74.00	-38.11	peak
2	4133.699	6.41	32.95	42.27	49.15	46.24	74.00	-27.76	peak
3	4882.000	7.18	34.06	42.82	47.60	46.02	74.00	-27.98	peak
4	6659.763	8.37	35.70	41.86	48.37	50.58	74.00	-23.42	peak
5	7323.000	8.85	36.16	41.52	46.25	49.74	74.00	-24.26	peak
6	9764.000	10.76	37.76	38.34	42.32	52.50	74.00	-21.50	peak



Test Mode: 03; Polarity: Vertical; Modulation: GFSK; Channel: middle

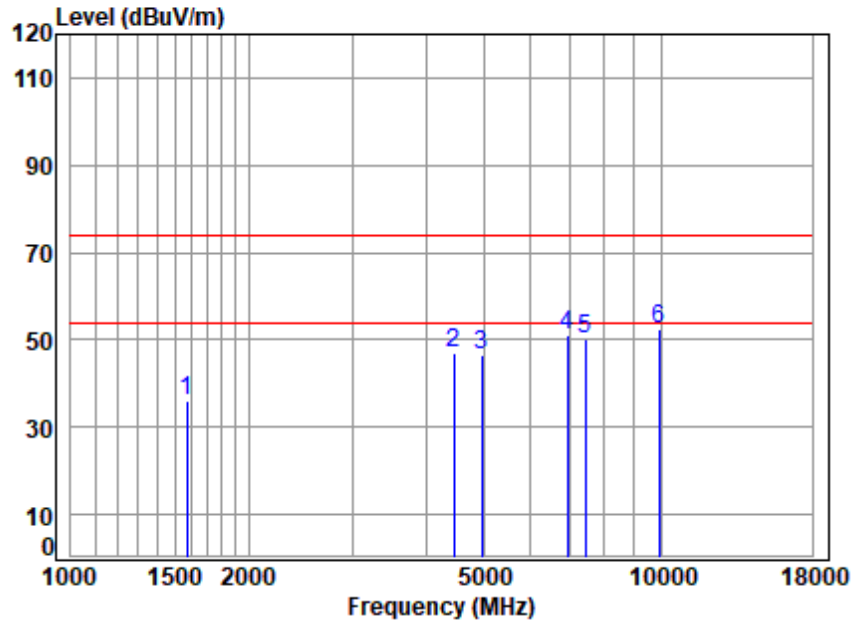


Site : chamber
Condition: 3m VERTICAL
Job No : 08550CR\08551CR
Mode : 2441 TX SE
Note : BT

	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	1682.477	3.42	26.60	40.62	46.65	36.05	74.00	-37.95	peak
2	4242.641	6.52	33.15	42.35	48.83	46.15	74.00	-27.85	peak
3	4882.000	7.18	34.06	42.82	45.98	44.40	74.00	-29.60	peak
4	6659.763	8.37	35.70	41.86	48.28	50.49	74.00	-23.51	peak
5	7323.000	8.85	36.16	41.52	45.21	48.70	74.00	-25.30	peak
6	9764.000	10.76	37.76	38.34	42.00	52.18	74.00	-21.82	peak



Test Mode: 03; Polarity: Horizontal; Modulation:GFSK; Channel:High

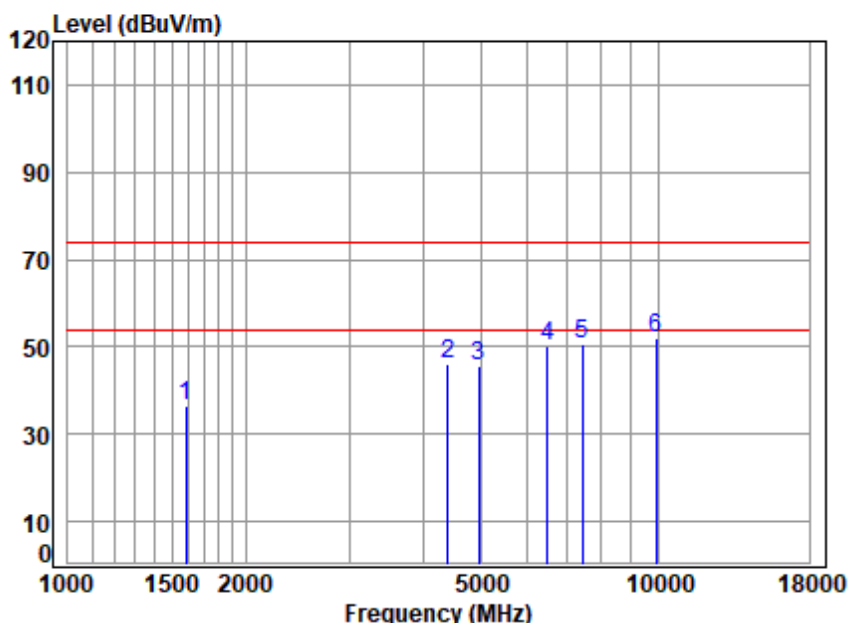


Site : chamber
Condition: 3m HORIZONTAL
Job No : 08550CR\08551CR
Mode : 2480 TX SE
Note : BT

	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	1574.265	3.33	26.14	40.55	47.15	36.07	74.00	-37.93	peak
2	4456.315	6.72	33.53	42.52	49.47	47.20	74.00	-26.80	peak
3	4960.000	7.26	34.15	42.87	48.20	46.74	74.00	-27.26	peak
4	6934.778	8.51	35.86	41.72	48.34	50.99	74.00	-23.01	peak
5	7440.000	8.96	36.25	41.46	46.29	50.04	74.00	-23.96	peak
6	9920.000	10.71	37.85	38.12	41.89	52.33	74.00	-21.67	peak



Test Mode: 03; Polarity: Vertical; Modulation:GFSK; Channel:High

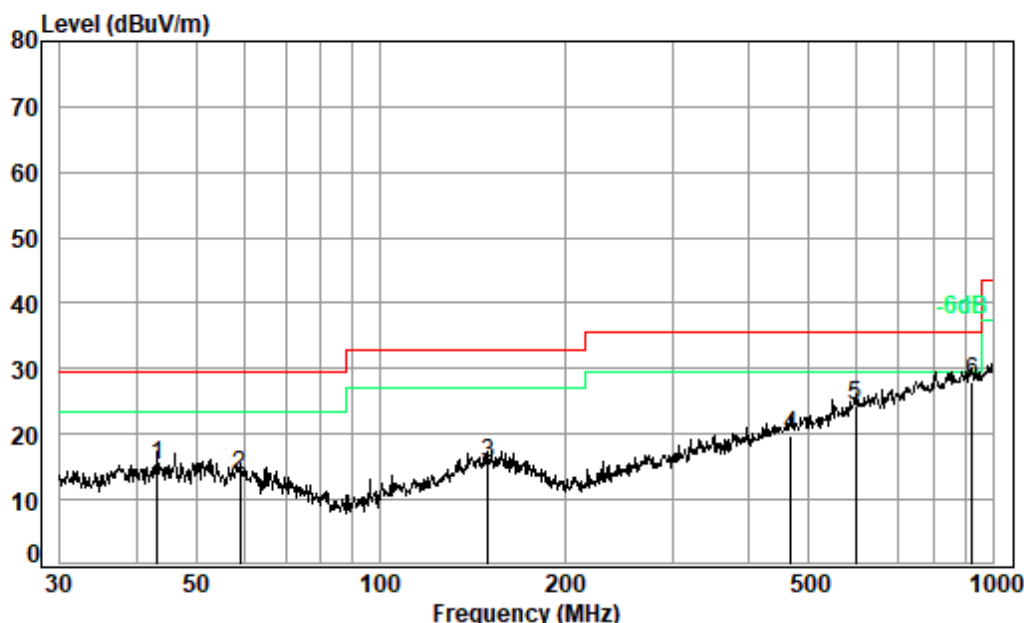


Site : chamber
Condition: 3m VERTICAL
Job No : 08550CR\08551CR
Mode : 2480 TX SE
Note : BT

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1583.392	3.33	26.18	40.56	47.33	36.28	74.00	-37.72	peak
2	4405.090	6.67	33.44	42.48	48.57	46.20	74.00	-27.80	peak
3	4960.000	7.26	34.15	42.87	47.00	45.54	74.00	-28.46	peak
4	6488.754	8.28	35.59	41.96	48.39	50.30	74.00	-23.70	peak
5	7440.000	8.96	36.25	41.46	46.92	50.67	74.00	-23.33	peak
6	9920.000	10.71	37.85	38.12	41.47	51.91	74.00	-22.09	peak

30MHz~1GHz

Test Mode: 04; Polarity: Horizontal



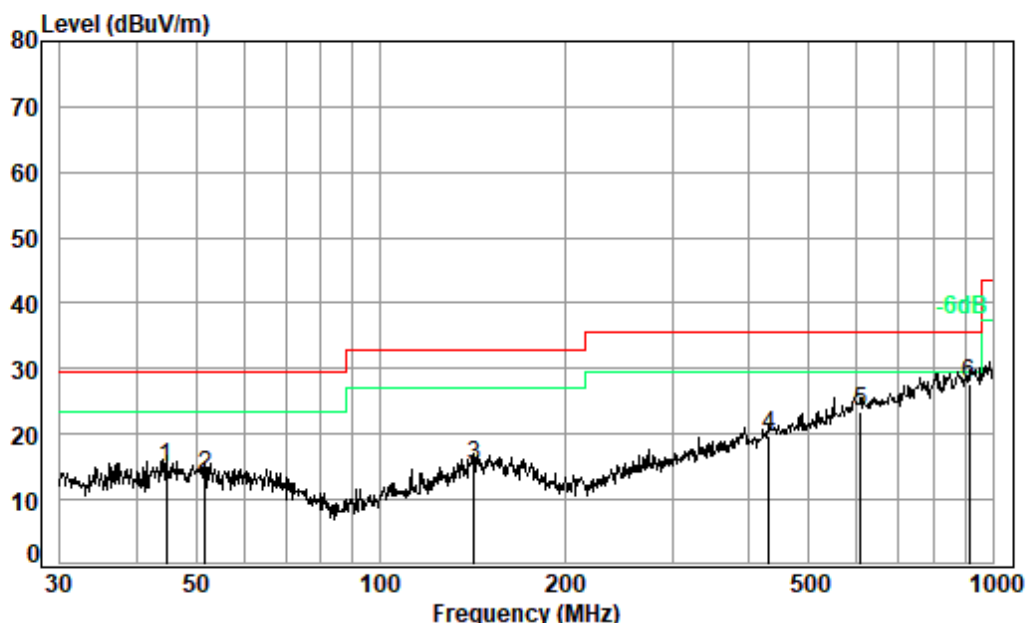
Condition: 10m HORIZONTAL

Job No. : 08550CR

Test Mode: 04

	Ant Freq	Preamp Factor	Cable Loss	Read Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dB	
1	43.202	20.34	32.44	0.94	26.48	15.32	29.50 -14.18 QP
2	59.025	19.39	32.42	1.04	25.57	13.58	29.50 -15.92 QP
3	150.011	20.20	32.30	1.47	26.03	15.40	33.00 -17.60 QP
4	467.235	23.67	32.35	2.78	25.80	19.90	35.60 -15.70 QP
5	597.223	25.99	32.04	3.16	27.09	24.20	35.60 -11.40 QP
6 pp	925.756	29.80	31.38	3.45	26.10	27.97	35.60 -7.63 QP

Test Mode: 04; Polarity: Vertical



Condition: 10m VERTICAL

Job No. : 08550CR

Test Mode: 04

	Ant Freq	Preamp Factor	Cable Loss	Read Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	44.743	20.38	32.44	0.96	25.92	14.82	29.50 -14.68 QP
2	51.843	19.93	32.45	1.00	25.06	13.54	29.50 -15.96 QP
3	142.324	19.82	32.30	1.45	26.17	15.14	33.00 -17.86 QP
4	431.032	22.73	32.22	2.65	26.56	19.72	35.60 -15.88 QP
5	607.787	26.41	32.05	3.17	25.93	23.46	35.60 -12.14 QP
6 pp	916.069	29.70	31.43	3.44	26.04	27.75	35.60 -7.85 QP

The test was performed at a 10m test site. According to below formulate and the test data at 10m test distance,

$$L_3 / L_{10} = D_{10} / D_3$$

Note:

L_3 : Level @ 3m distance. Unit: uV/m;

L_{10} : Level @ 10m distance. Unit: uV/m;

D_3 : 3m distance. Unit: m

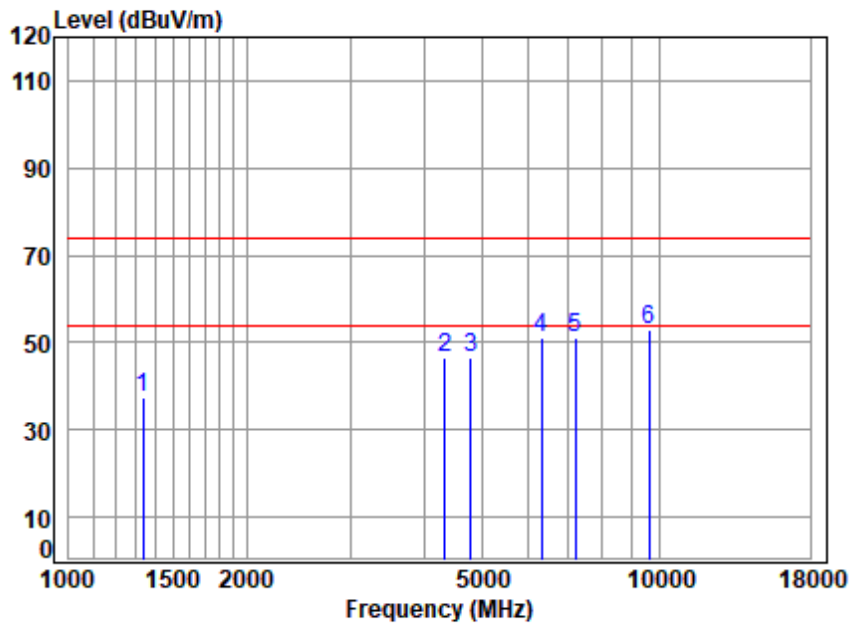
D_{10} : 10m distance. Unit: m

The level at 3m test distance is below:

Frequency (MHz)	Level @ 10m (dBuV/m)	Level @ 10m (uV/m)	Level @ 3m (uV/m)	Level @ 3m (dBuV/m)	Limit @ 3m (dBuV/m)	Margin (dB)	Ant. Polarization
44.743	14.82	5.51	18.36	25.28	40.00	-14.72	V
51.843	13.54	4.75	15.84	24.00	40.00	-16.00	V
142.324	15.14	5.71	19.05	25.60	43.50	-17.90	V
431.032	19.72	9.68	32.28	30.18	46.00	-15.82	V
607.787	23.46	14.89	49.65	33.92	46.00	-12.08	V
916.069	27.75	24.41	81.35	38.21	46.00	-7.79	V
43.202	15.32	5.83	19.45	25.78	40.00	-14.22	H
59.025	13.58	4.78	15.92	24.04	40.00	-15.96	H
150.011	15.40	5.89	19.63	25.86	43.50	-17.64	H
467.235	19.90	9.89	32.95	30.36	46.00	-15.64	H
597.223	24.20	16.22	54.06	34.66	46.00	-11.34	H
925.756	27.97	25.03	83.44	38.43	46.00	-7.57	H

Above 1GHz

Test Mode: 04; Polarity: Horizontal; Modulation:GFSK; Channel:Low

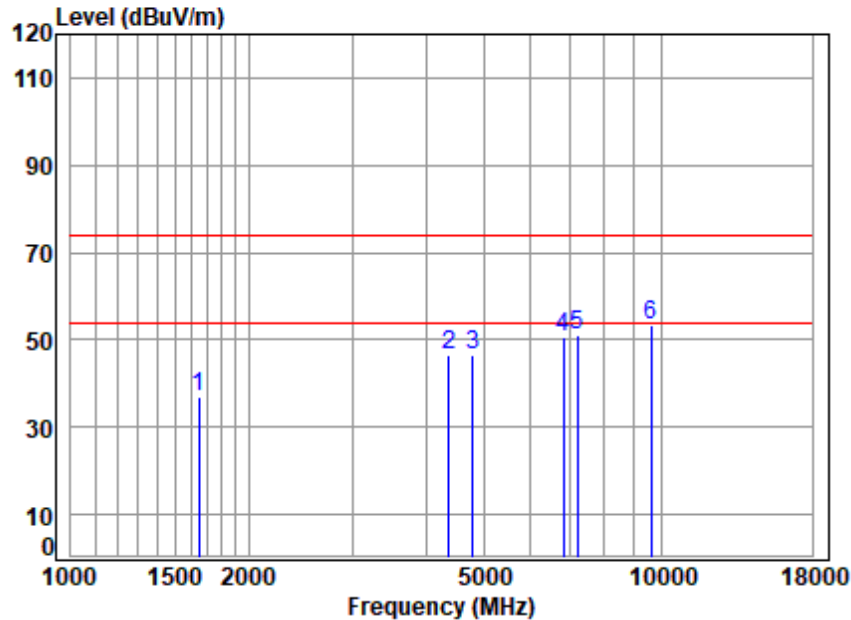


Site : chamber
Condition: 3m HORIZONTAL
Job No : 08550CR\08551CR
Mode : 2402 TX SE
Note : BT

		Cable	Ant	Preamp	Read		Limit	Over	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1335.141	3.00	25.17	40.39	49.45	37.23	74.00	-36.77	peak
2	4329.354	6.60	33.30	42.42	49.02	46.50	74.00	-27.50	peak
3	4804.000	7.10	33.97	42.77	48.41	46.71	74.00	-27.29	peak
4	6322.136	8.27	35.43	42.05	49.26	50.91	74.00	-23.09	peak
5	7206.000	8.74	36.07	41.58	47.89	51.12	74.00	-22.88	peak
6	9608.000	10.81	37.67	38.57	42.87	52.78	74.00	-21.22	peak



Test Mode: 04; Polarity: Vertical; Modulation:GFSK; Channel:Low



Site : chamber
Condition: 3m VERTICAL
Job No : 08550CR\08551CR
Mode : 2402 TX SE
Note : BT

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1648.778	3.39	26.46	40.60	47.76	37.01	74.00	-36.99	peak
2	4367.058	6.64	33.37	42.45	49.14	46.70	74.00	-27.30	peak
3	4804.000	7.10	33.97	42.77	48.32	46.62	74.00	-27.38	peak
4	6815.551	8.45	35.79	41.78	48.19	50.65	74.00	-23.35	peak
5	7206.000	8.74	36.07	41.58	47.80	51.03	74.00	-22.97	peak
6	9608.000	10.81	37.67	38.57	43.28	53.19	74.00	-20.81	peak

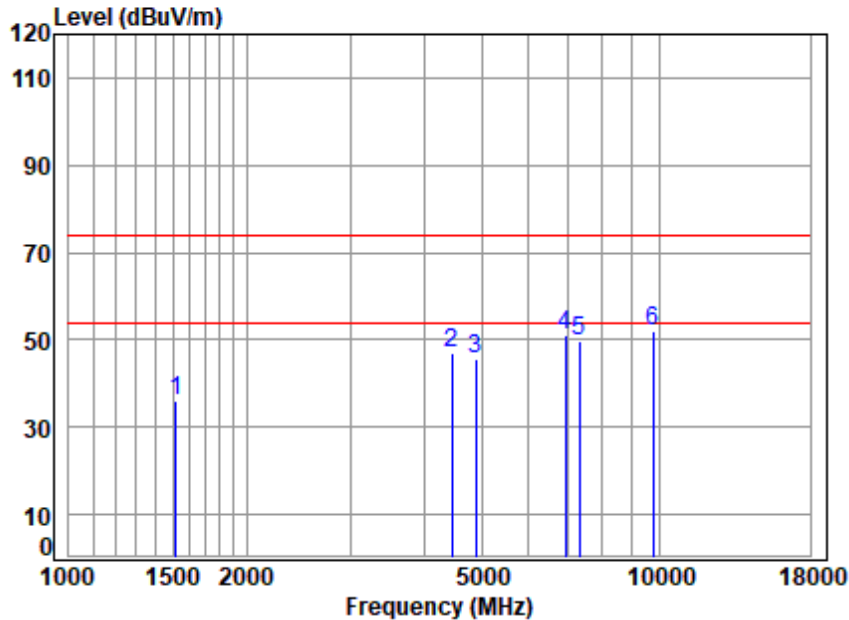


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Test Mode: 04; Polarity: Horizontal; Modulation:GFSK; Channel:middle

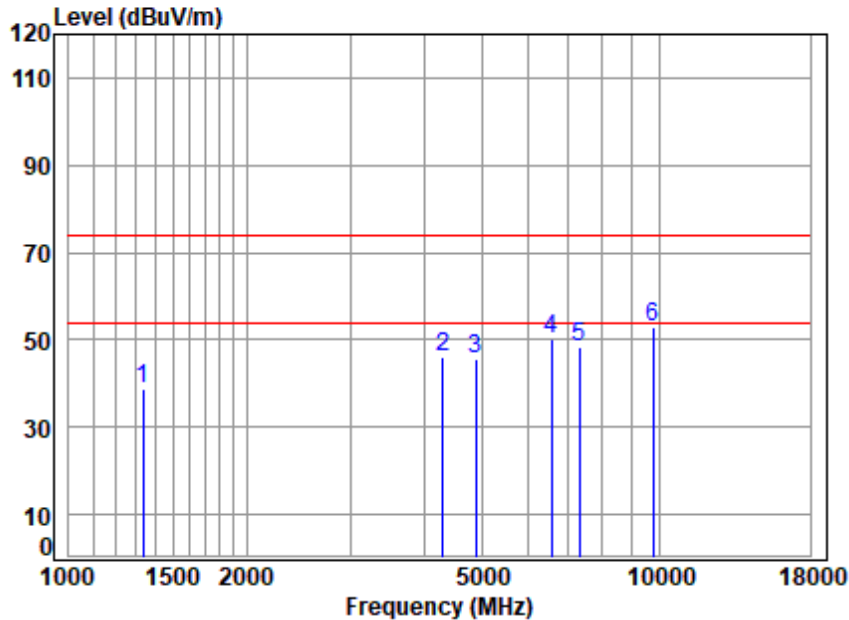


Site : chamber
Condition: 3m HORIZONTAL
Job No : 08550CR\08551CR
Mode : 2441 TX SE
Note : BT

	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	1520.598	3.28	25.89	40.52	47.33	35.98	74.00	-38.02	peak
2	4456.315	6.72	33.53	42.52	49.36	47.09	74.00	-26.91	peak
3	4882.000	7.18	34.06	42.82	47.19	45.61	74.00	-28.39	peak
4	6934.778	8.51	35.86	41.72	48.32	50.97	74.00	-23.03	peak
5	7323.000	8.85	36.16	41.52	46.07	49.56	74.00	-24.44	peak
6	9764.000	10.76	37.76	38.34	41.70	51.88	74.00	-22.12	peak



Test Mode: 04; Polarity: Vertical; Modulation: GFSK; Channel: middle

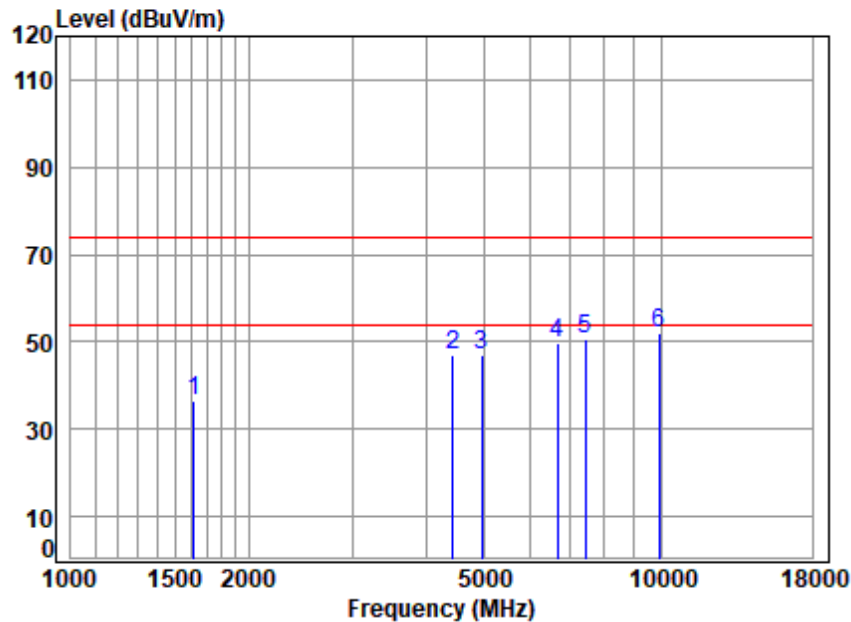


Site : chamber
Condition: 3m VERTICAL
Job No : 08550CR\08551CR
Mode : 2441 TX SE
Note : BT

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit	Over	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1335.141	3.00	25.17	40.39	51.01	38.79	74.00	-35.21	peak
2	4304.400	6.58	33.26	42.40	48.62	46.06	74.00	-27.94	peak
3	4882.000	7.18	34.06	42.82	47.11	45.53	74.00	-28.47	peak
4	6564.209	8.31	35.64	41.92	48.12	50.15	74.00	-23.85	peak
5	7323.000	8.85	36.16	41.52	44.79	48.28	74.00	-25.72	peak
6	9764.000	10.76	37.76	38.34	42.67	52.85	74.00	-21.15	peak



Test Mode: 04; Polarity: Horizontal; Modulation:GFSK; Channel:High

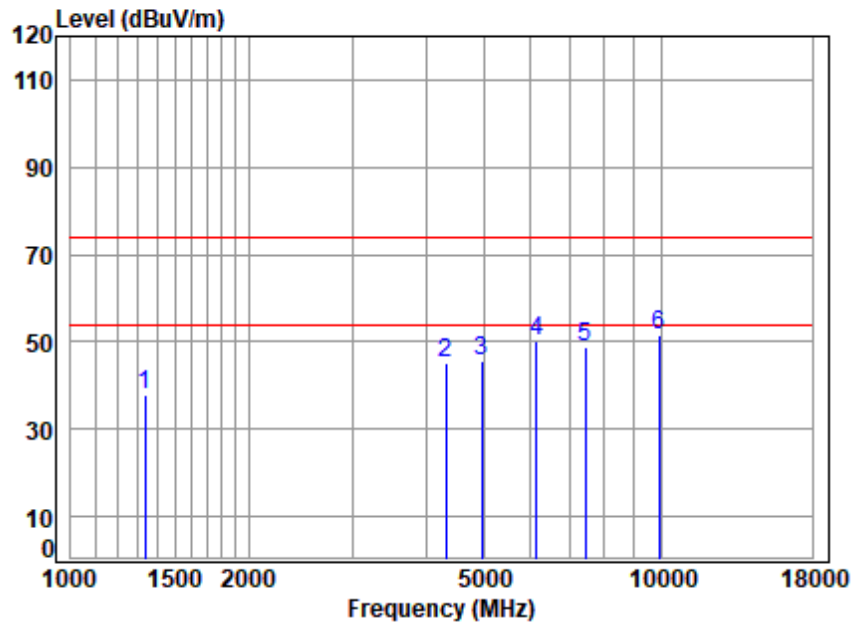


Site : chamber
Condition: 3m HORIZONTAL
Job No : 08550CR\08551CR
Mode : 2480 TX SE
Note : BT

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1615.754	3.36	26.32	40.58	47.44	36.54	74.00	-37.46	peak
2	4443.453	6.71	33.50	42.51	49.36	47.06	74.00	-26.94	peak
3	4960.000	7.26	34.15	42.87	48.58	47.12	74.00	-26.88	peak
4	6679.040	8.38	35.71	41.85	47.67	49.91	74.00	-24.09	peak
5	7440.000	8.96	36.25	41.46	47.10	50.85	74.00	-23.15	peak
6	9920.000	10.71	37.85	38.12	41.64	52.08	74.00	-21.92	peak



Test Mode: 04; Polarity: Vertical; Modulation:GFSK; Channel:High



Site : chamber
Condition: 3m VERTICAL
Job No : 08550CR\08551CR
Mode : 2480 TX SE
Note : BT

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1335.141	3.00	25.17	40.39	50.23	38.01	74.00	-35.99	peak
2	4316.859	6.59	33.28	42.41	47.76	45.22	74.00	-28.78	peak
3	4960.000	7.26	34.15	42.87	47.01	45.55	74.00	-28.45	peak
4	6142.019	8.27	35.25	42.16	48.71	50.07	74.00	-23.93	peak
5	7440.000	8.96	36.25	41.46	45.02	48.77	74.00	-25.23	peak
6	9920.000	10.71	37.85	38.12	41.35	51.79	74.00	-22.21	peak



8 Test Setup Photo

Please refer to setup photos.

9 EUT Constructional Details (EUT Photos)

Please refer to external and internal photos for details.



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10 Appendix

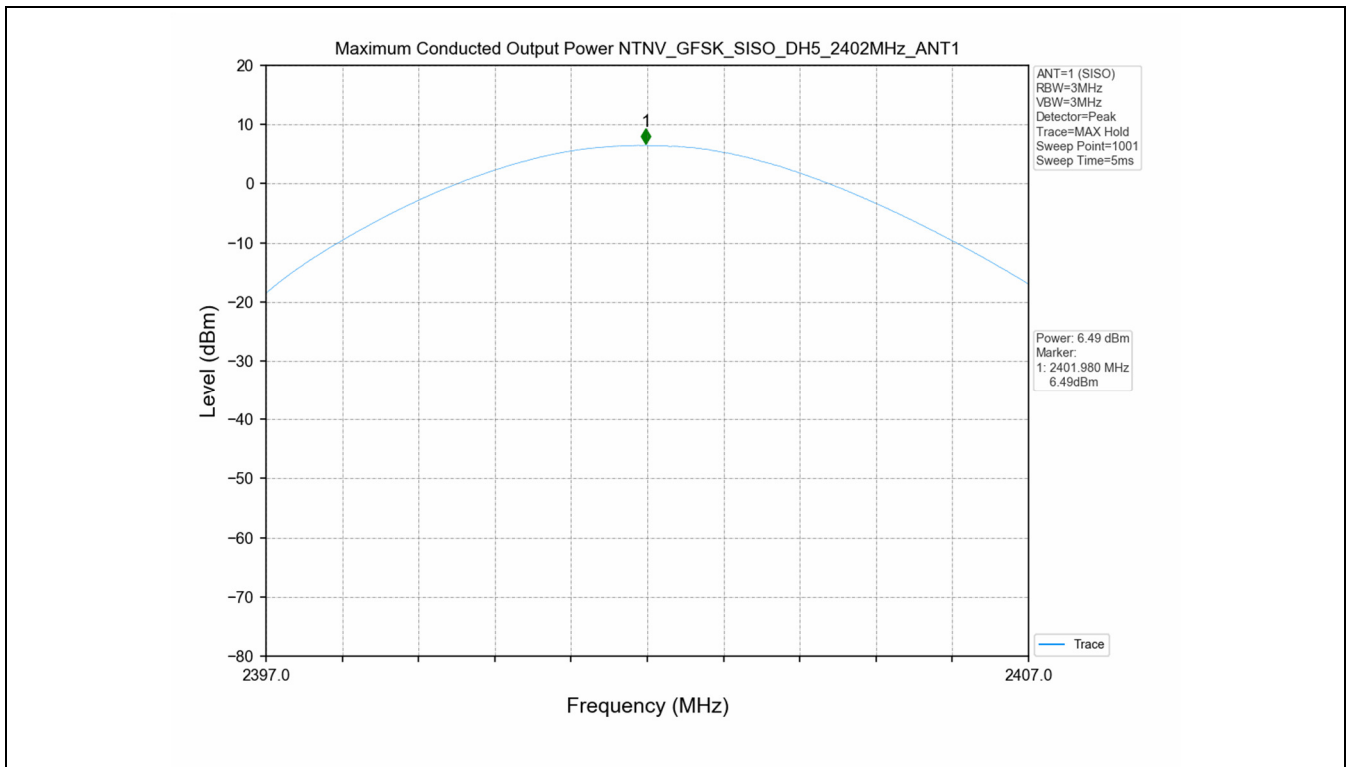
10.1 Appendix for 15.247-Left earbuds

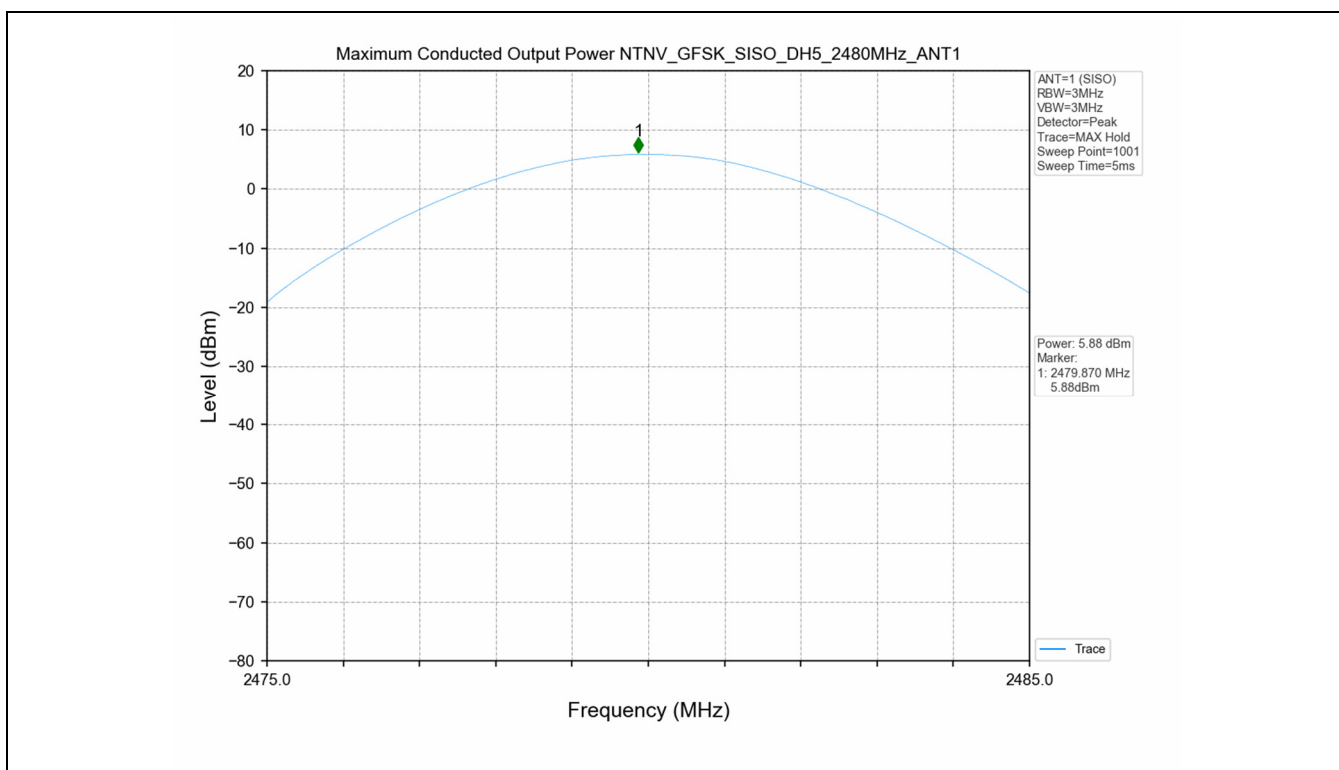
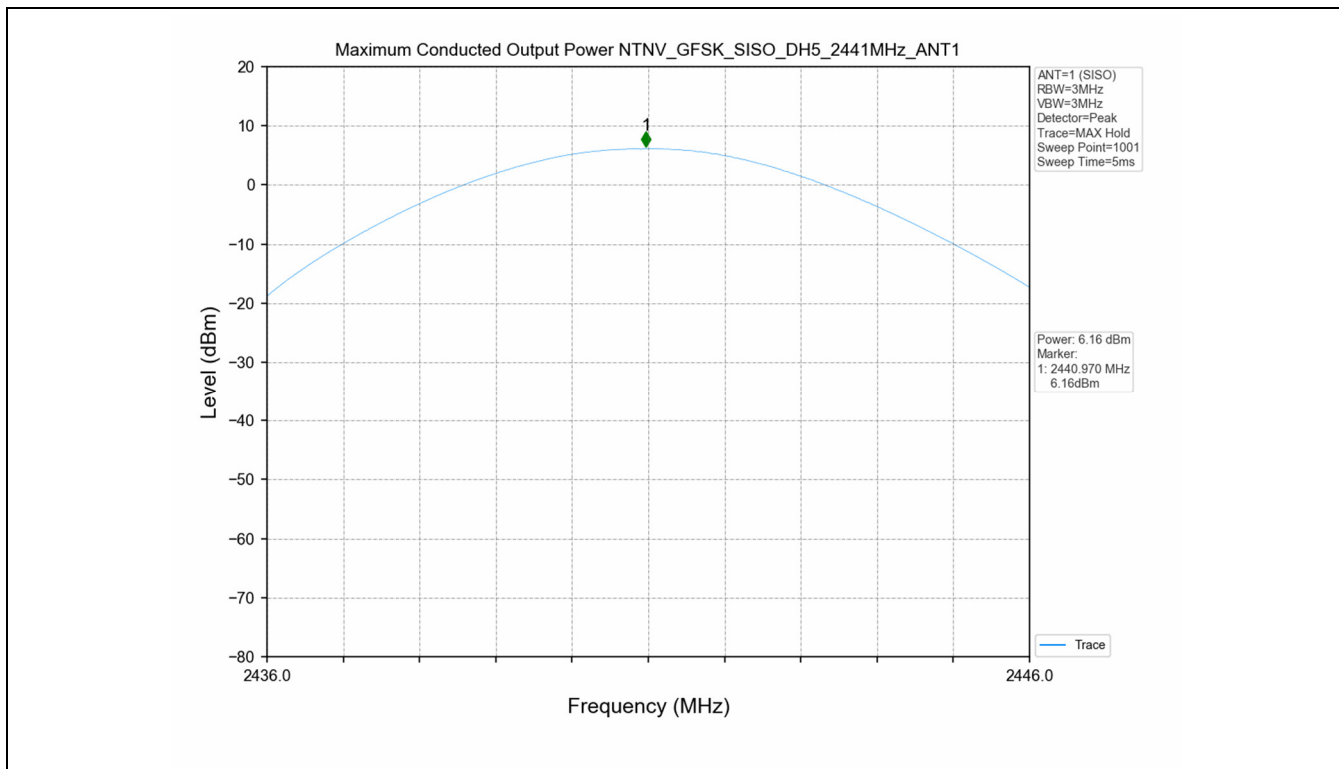
1. Maximum Conducted Output Power

1.1 Test Result

Test Mode	Frequency (MHz)	Tx Type	Measured Peak Output Power (dBm)	Limits (dBm)	Verdict
			Ant 1		
GFSK	2402	SISO	6.49	20.97	PASS
	2441	SISO	6.16	20.97	PASS
	2480	SISO	5.88	20.97	PASS
Pi/4DQPSK	2402	SISO	6.49	20.97	PASS
	2441	SISO	6.18	20.97	PASS
	2480	SISO	5.93	20.97	PASS
8DPSK	2402	SISO	6.54	20.97	PASS
	2441	SISO	6.20	20.97	PASS
	2480	SISO	5.94	20.97	PASS

1.2 Test Graph



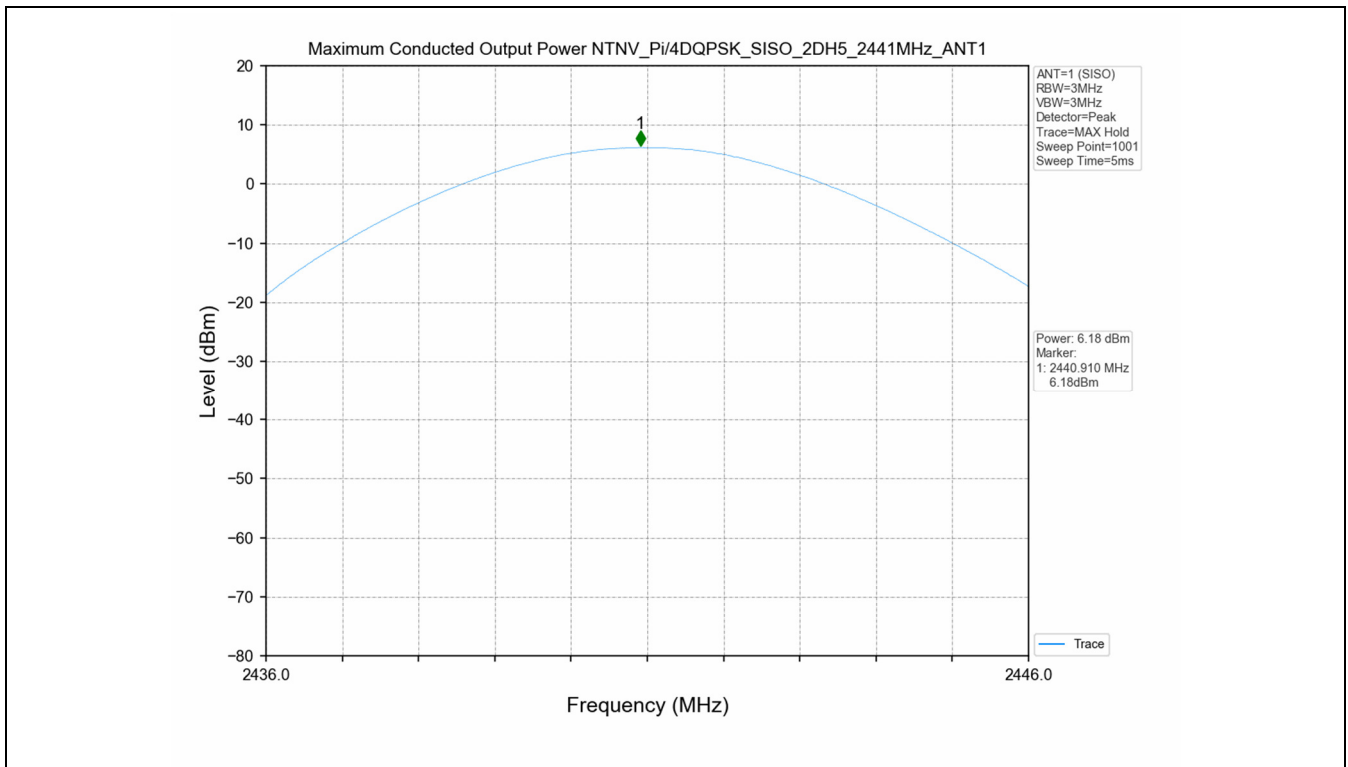
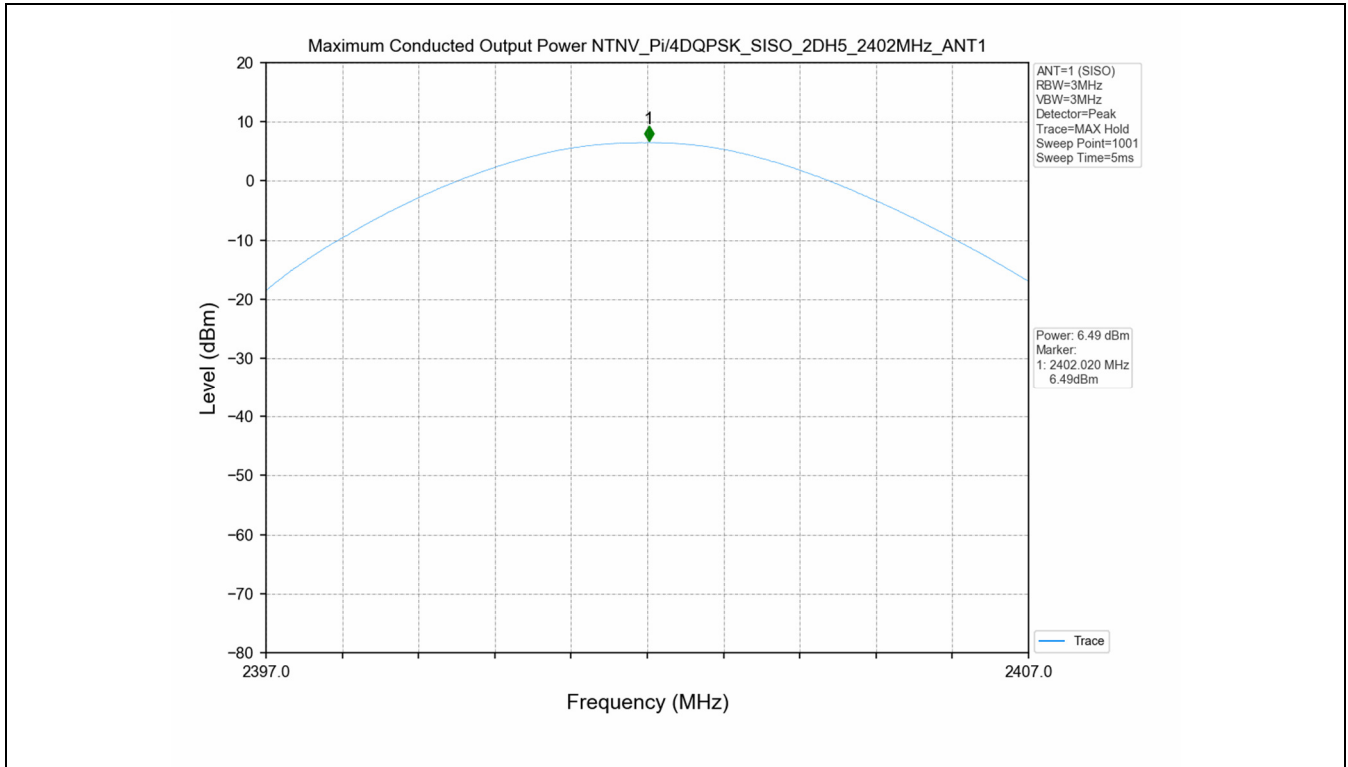


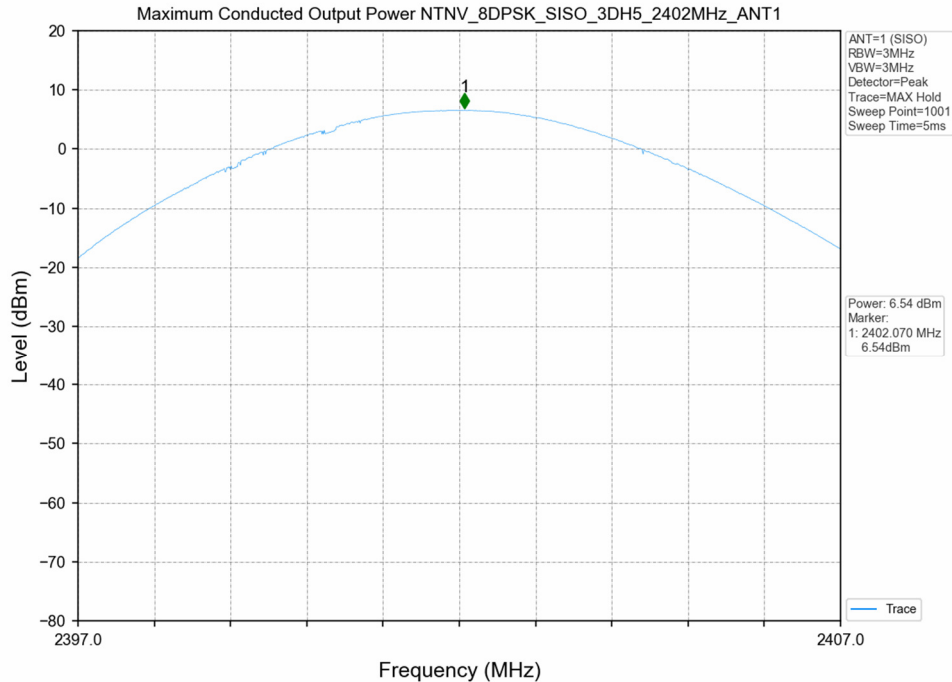
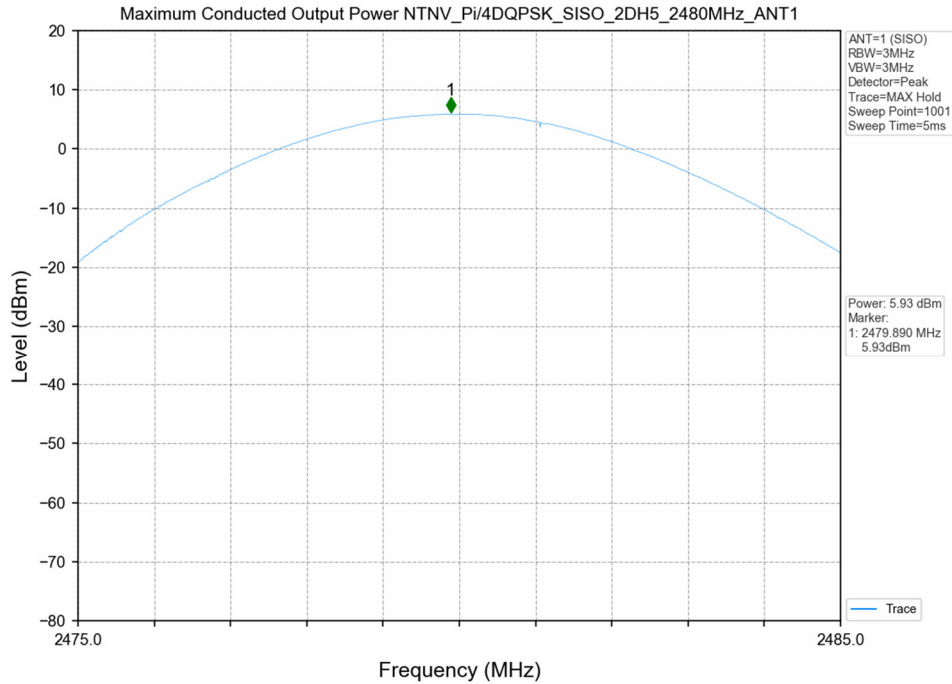
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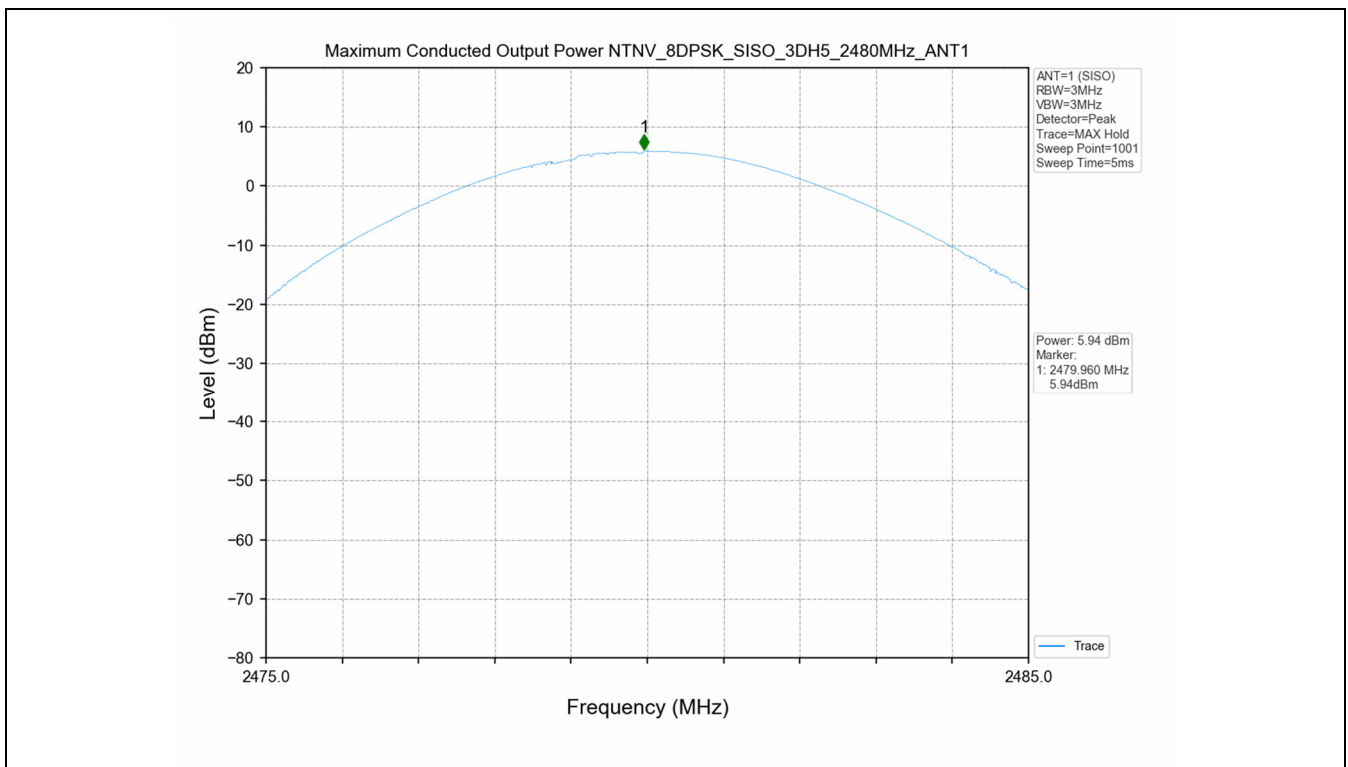
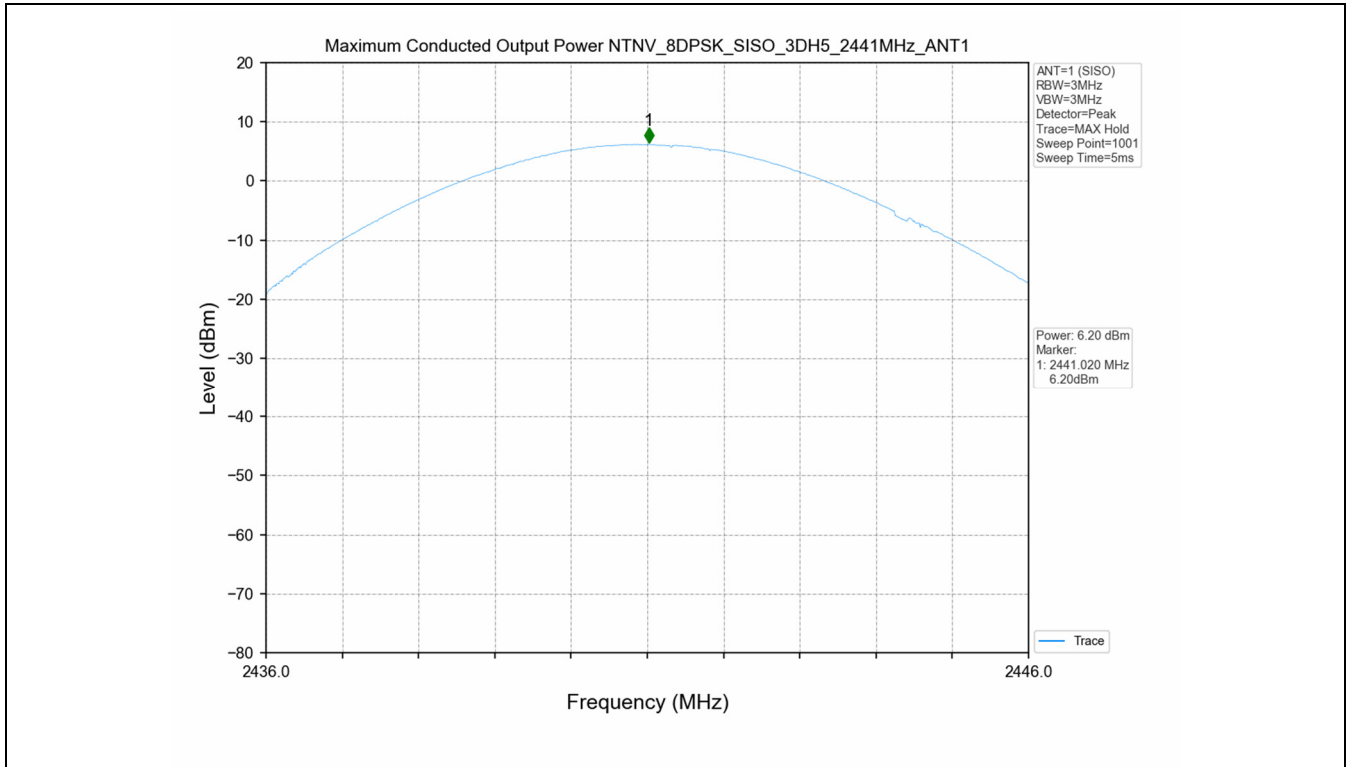
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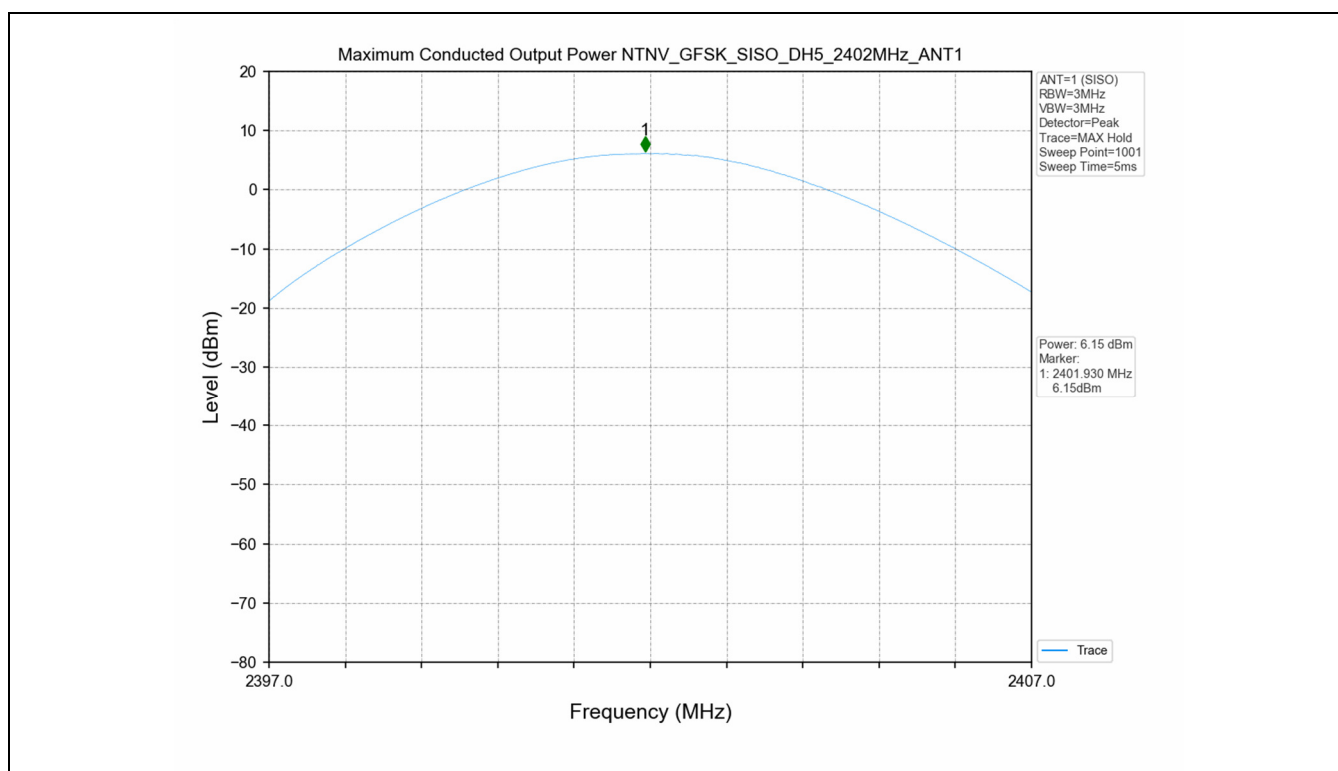
10.2 Appendix for 15.247-Right earbuds

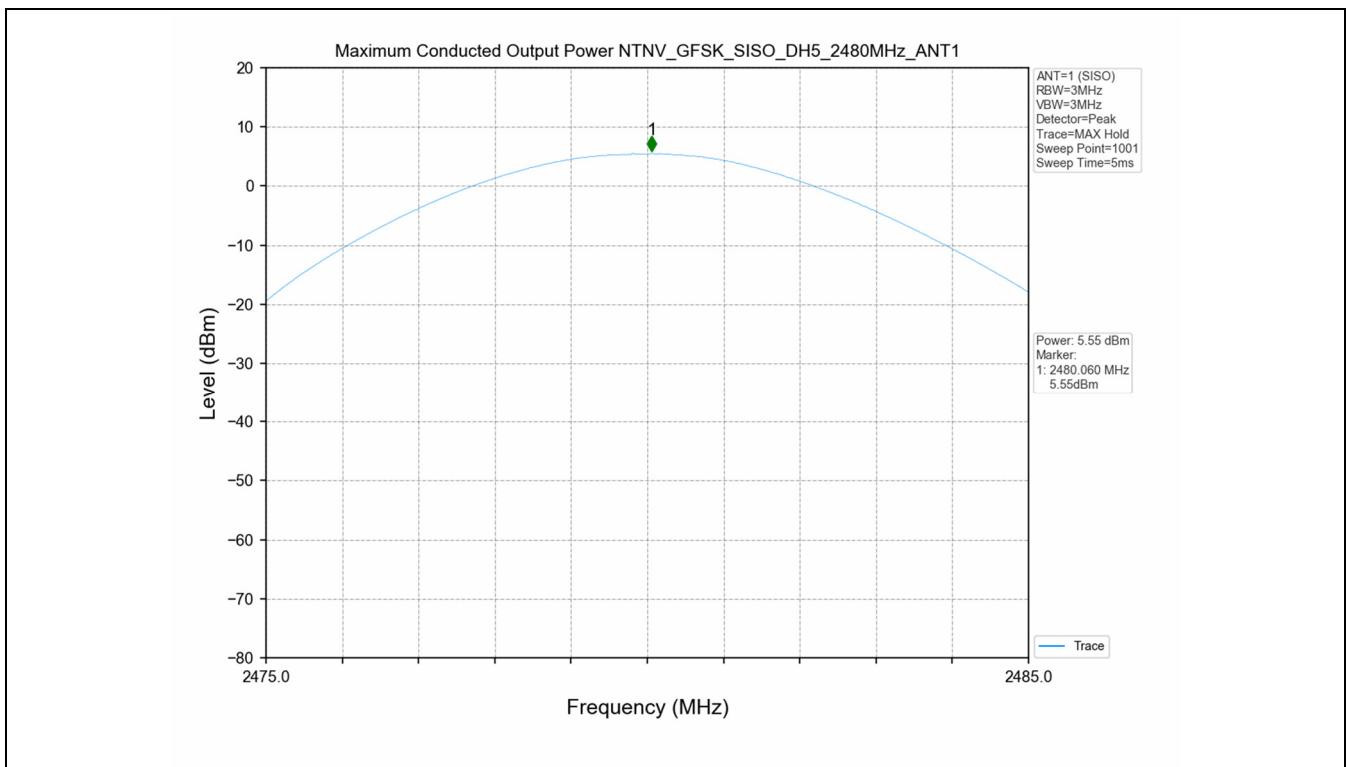
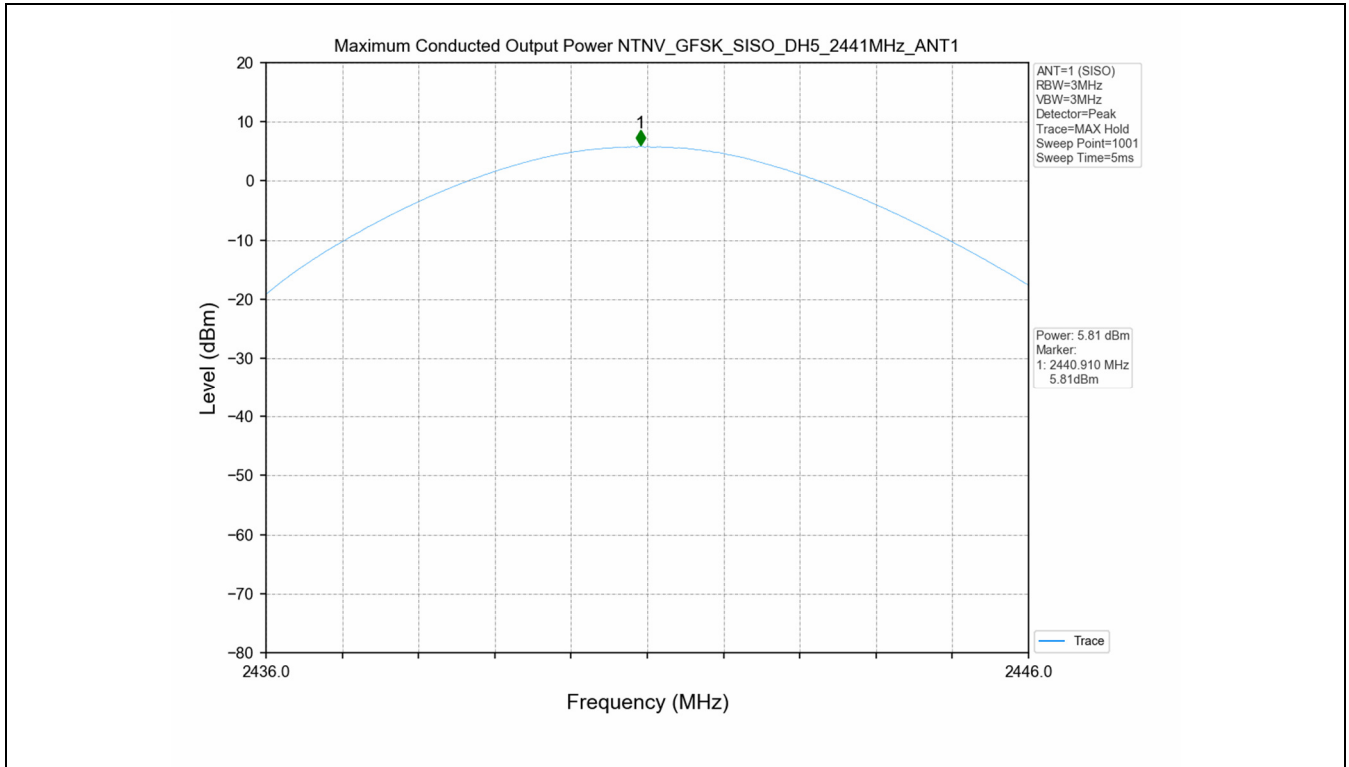
1. Maximum Conducted Output Power

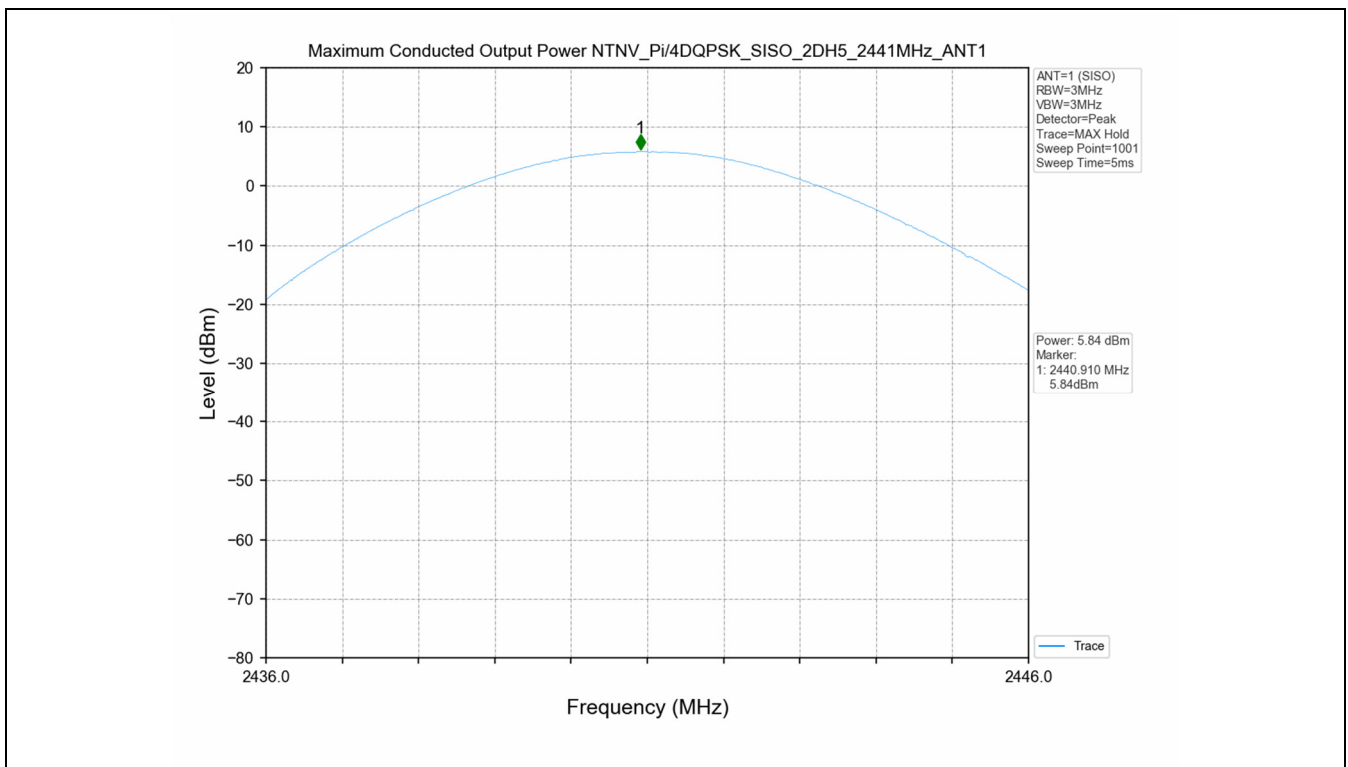
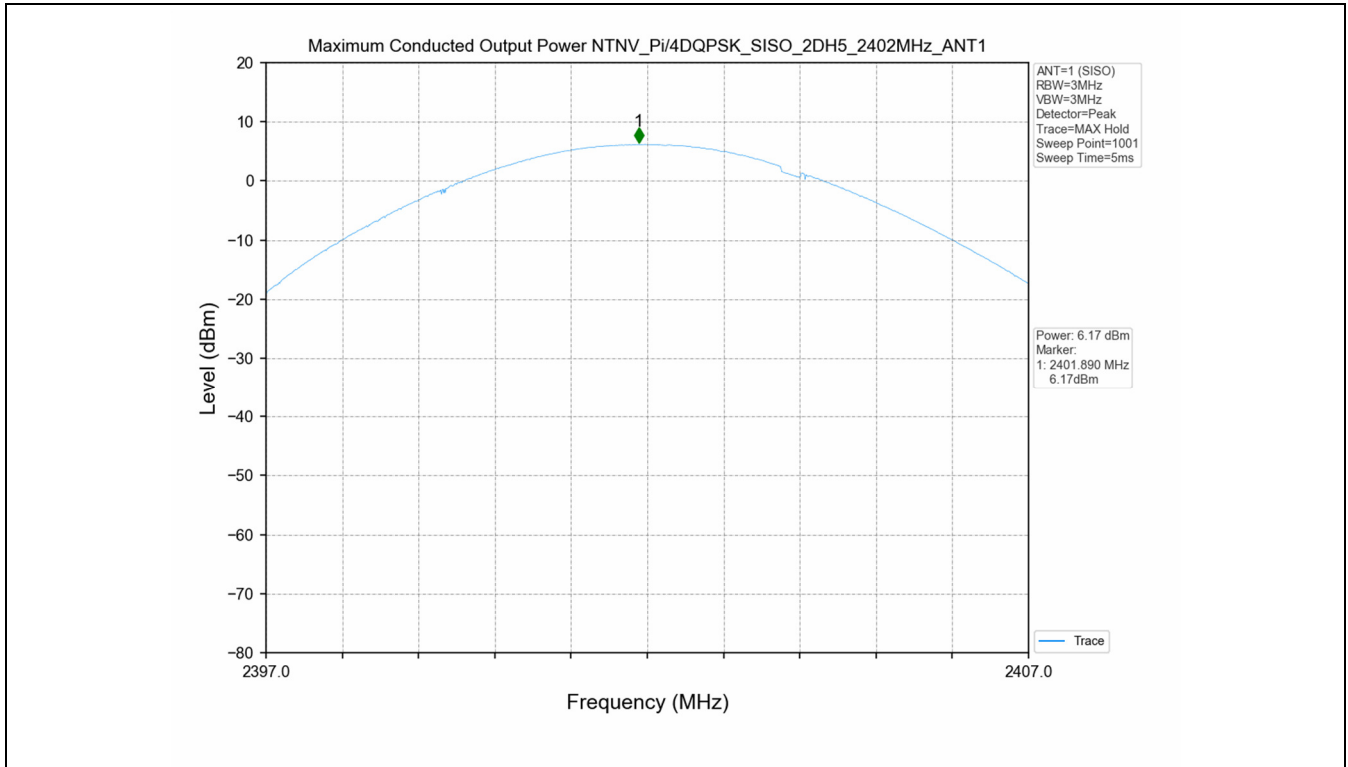
1.1 Test Result

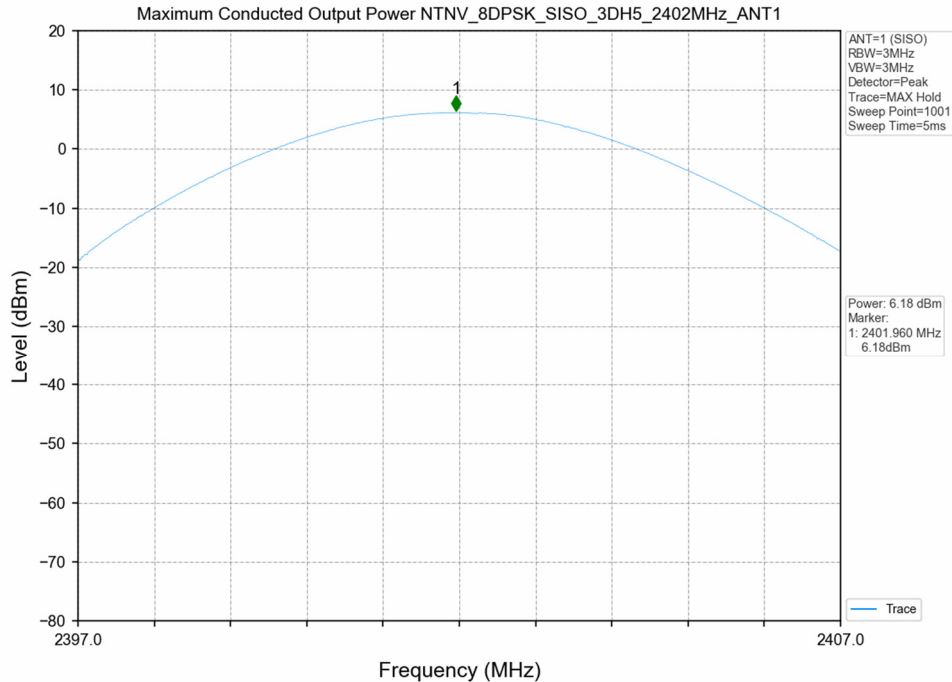
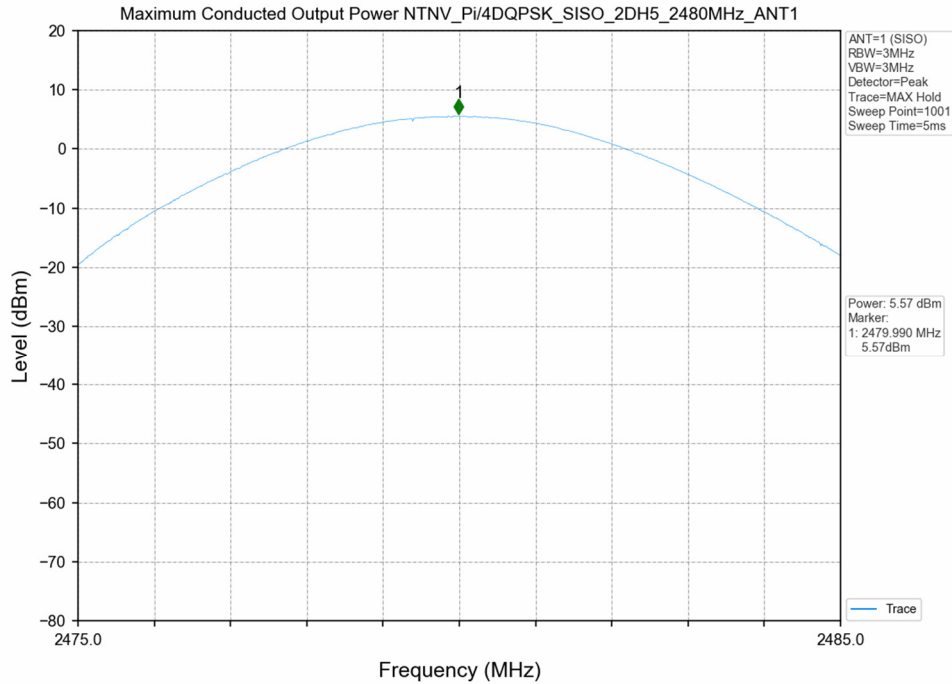
Test Mode	Frequency (MHz)	Tx Type	Measured Peak Output Power (dBm)	Limits (dBm)	Verdict
			Ant 1		
GFSK	2402	SISO	6.15	20.97	PASS
	2441	SISO	5.81	20.97	PASS
	2480	SISO	5.55	20.97	PASS
Pi/4DQPSK	2402	SISO	6.17	20.97	PASS
	2441	SISO	5.84	20.97	PASS
	2480	SISO	5.57	20.97	PASS
8DPSK	2402	SISO	6.18	20.97	PASS
	2441	SISO	5.85	20.97	PASS
	2480	SISO	5.59	20.97	PASS

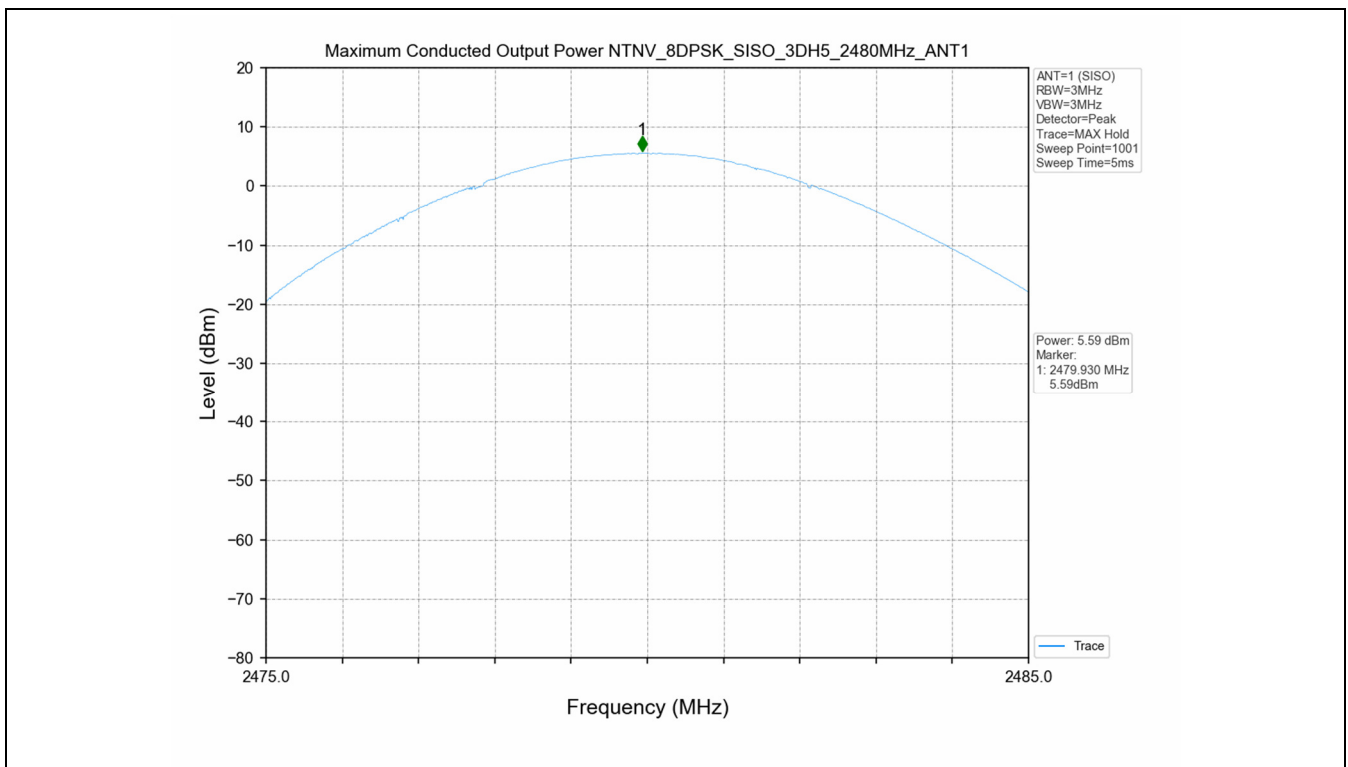
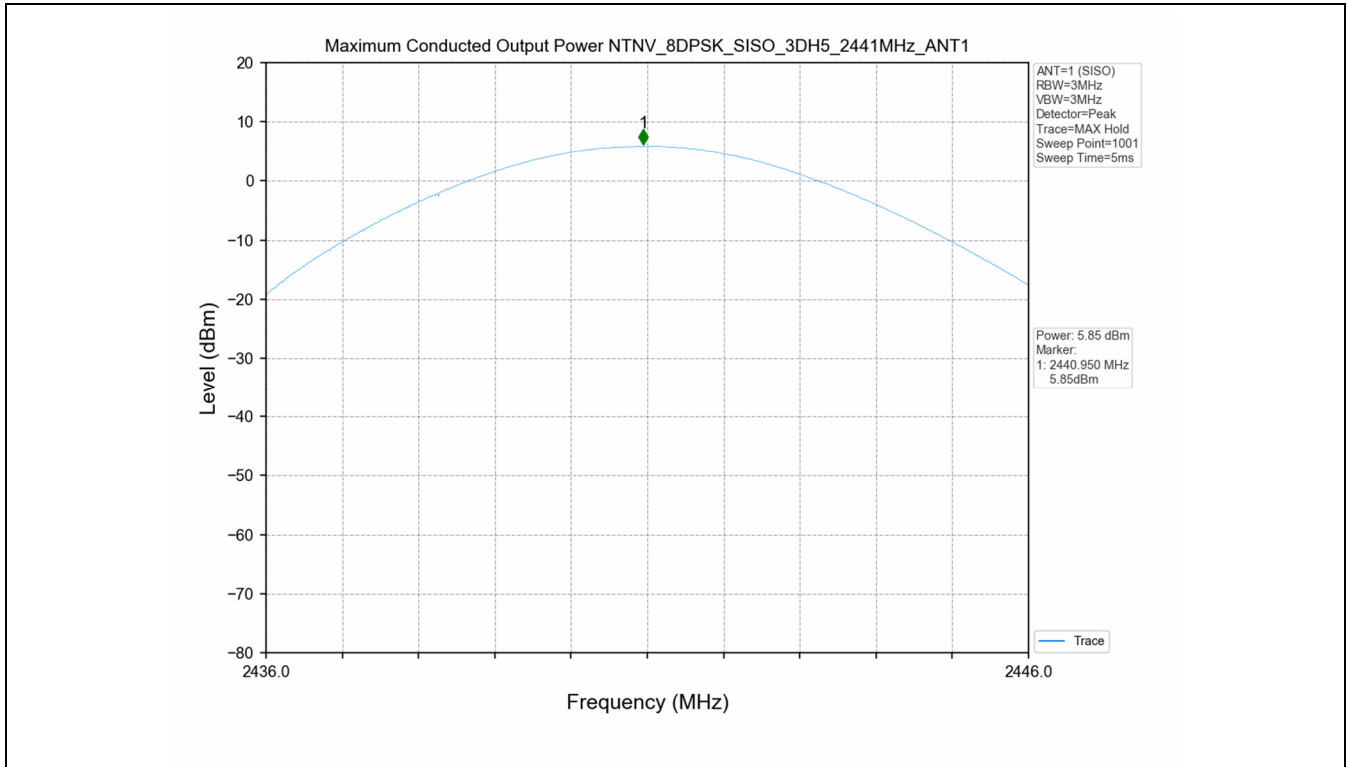
1.2 Test Graph











- End of the Report -



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