시 험 성 적 서
TEST REPORT

성적서 번호 Report No.		ICRT-TR-E192298-0A
신청자 Client	기관명 Name	Monimoto UAB
	주 소 Address	Sauletekio al. 15, Vilnius LT-10224 Lithuania
시험대상품목 Sample description		GPS tracker MONIMOTO
모델명 Type designation		MM6
정 격 Ratings		DC 6.0 V
시험장소 Place of test		■ 고정시험(Inside test) □ 현장시험(Field test) 주소지(Address): 112, Hwanggeum 3-ro 7beon-gil, Hagun-ri, Yangchon-eup, Gimpo-si, Gyeonggi-do,
시험기간 Date of test		11. Nov. 2019 ~ 13. Nov. 2019
시험방법/항목 Test Method/Item		FCC Part 15 Subpart C §15.247
시험결과 Test Results		Refer to 3. Test Summary
확 인 Affirmation	작성자 Tested by 성 명 (서 명) Name Yeong-Hwan, Hong (Signature)	기술책임자 Technical Manager 성 명 (서 명) Name Hong-Kyu, Lee (Signature)

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This is certified that the above mentioned products have been tested for the sample

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2019. 12. 02

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112, Hwanggeum3-ro 7beon-gil, Yangchon-eup, Gimpo-si, Gyeonggi-do, Korea / Tel: 02-6351-9001 ~ 6

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Revision History

Issued Report No.	Issued Date	Revisions	Effect Section
ICRT-TR-E192298-0A	02-Dec-2019	Initial Issue	All

1. Applicant & Manufacturer & Test Laboratory Information

1.1 Applicant information

Applicant	Monimoto UAB
Address	Sauletekio al. 15, Vilnius LT-10224 Lithuania
Contact Person	Rolandas Dranseika
Telephone No.	+370 612 57330
Fax No.	+370 672 66478
E-mail	rolandas@monimoto.com

1.2 Manufacturer Information

Manufacturer	Monimoto UAB
Address	Sauletekio al. 15, Vilnius LT-10224 Lithuania

1.3 Test Laboratory Information

Conducted tests were performed at	
Laboratory	ICR Co., Ltd.
Address	112, Hwanggeum 3-ro 7beon-gil, Hagun-ri, Yangchon-eup, Gimpo-si, Gyeonggi-do, Korea
Telephone No.	+82-2-6351-9002
Fax No.	+82-2-6351-9007
RRA No.	KR0165
KOLAS No.	KT652

2. Equipment under Test(EUT) Information

2.1 General Information

Product Name	GPS tracker MONIMOTO
Brand Name	-
Model Name	MM6
Additional Model Name	-
FCC ID	2AU3KMM6
Hardware Version	1.0
Software Version	4.23
Power Supply	DC 6.0 V (Used to Only Battery)
EUT Firmware Version	10.0.0.8
Target Power	4.0
EUT Serial Number	mm.E2CE24A8D83E

2.2 Additional Information

Equipment Class	DTS-Digital Transmission System
Device Type	Stand-alone
Operating Frequency	2 402 ㎒ ~ 2 480 ㎒
RF Output Power	1.57 dBm
Number of Channel	40
Modulation Type	GFSK
Antenna Type	PCB Antenna
Antenna Gain	1.0 dBi
Antenna Operating Mode	Single Antenna Equipment with only one antenna
List of Each Oscillator or Crystal Frequency	32 ㎒

2.3 Mode of operation during the test

- The EUT is continuous transmission mode during the test with set at Low Channel, Middle Channel, and High Channel. To get a maximum radiated emission levels from the EUT, the EUT was moved throughout the XY, YZ, XZ planes.

2.4 Modifications of EUT

- None

3. Test Summary

3.1 Test standards and results

FCC Part 15 Subpart C			
Clause	Test items	Applied	Results
§15.247 (a) (2)	6 dB Bandwidth	☒	PASS
§15.247 (b) (3)	Maximum Conducted Output Power	☒	PASS
§15.247 (e)	Power Spectral Density	☒	PASS
§15.247 (d)	Conducted Spurious Emission	☒	PASS
§15.247 (d) & §15.209 & §15.205	Radiated Spurious Emission	☒	PASS
§15.207	Power Line Conducted Emission	☐	N/A
§15.203	Antenna Requirement	☒	PASS

3.2 Purpose of the test

- To determine whether the equipment under test fulfills the requirements of the standards stated in FCC Part 15 Subpart C Section 15.247.

3.3 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10: 2013.

Radiated testing was performed at a distance of 3 m from EUT to the antenna.

3.4 Configuration of Test System

3.4.1 Radiated emission test

Preliminary radiated emissions test were conducted using the procedure in ANSI C63.10: 2013 to determine the worse operating conditions. Final radiated emission tests were conducted at 3 m Semi Anechoic Chamber. The turntable was rotated through 360 degrees and the EUT was tested by positioned three orthogonal planes to obtain the highest reading on the field strength meter. Once maximum reading was determined, the search antenna was raised and lowered in both vertical and horizontal polarization.

3.5 Antenna requirement

According to §15.203, 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 shall be considered sufficient to comply with the provisions of this Section.
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.
And according to §15.247(b)(4), 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.

3.5.1 Result: Pass

The transmitter has a ***PCB Antenna.*** The directional gain of the antenna is ***1.0 dBi.***

4. Used equipment on test

	Description	Model Name	Serial Number	Manufacturer	Next Cal. (cycle)
☒	Spectrum analyzer	FSW85	100864	Rohde & Schwarz	2020. 03. 04 (1Y)
☐	Spectrum analyzer	FSV40	101455	Rohde & Schwarz	2020 .06. 27 (1Y)
☒	Signal Generator	SMB100A	180607	Rohde & Schwarz	2020. 03. 04 (1Y)
☐	Wideband Power Sensor	NRP-Z81	103673	Rohde & Schwarz	2020. 03. 05 (1Y)
☐	Open Switch and Control Platform	OSP150	101000	Rohde & Schwarz	2020. 03. 05 (1Y)
☐	Environmental Test Chamber	MHK-408NKDA	1060908	TERCHY	2020. 03. 04 (1Y)
☒	DC Power Supply	XDL 35-5P	J00385373	Sorensen	2020. 03. 05 (1Y)
☐	DC Power Supply	6603D	672483	Topward	2020. 03. 05 (1Y)
☒	Loop Antenna	HFH2-Z2	100506	Rohde & Schwarz	2021. 06. 27 (2Y)
☒	TRILOG BROADBAND ANTENNA	VULB9162	120	SCHWARZBECK	2020. 11. 23 (2Y)
☒	RF Pre Amplifier	SCU08	100747	Rohde & Schwarz	2020. 04. 17 (1Y)
☒	DOUBLE-RIDGE WAVEGUIDE HORN ANTENNA	HF907	102556	Rohde & Schwarz	2021. 08. 19 (2Y)
☒	RF Pre Amplifier	SCU18	102342	Rohde & Schwarz	2020. 04. 17 (1Y)
☒	Horn Antenna	LB-42-10-C-KF	J202024625	AINFO Inc.	2020. 04. 23 (2Y)
☒	RF Pre Amplifier	AMF-4F-18265-35-8P-1	771846	MITEQ	2020. 03. 04 (1Y)
☐	Horn Antenna	LB-28-10-C-KF	J202024627	AINFO Inc.	2020. 04. 23 (2Y)
☐	RF Pre Amplifier	AMF-4D-260400-45-6P	779919	MITEQ	2020. 03. 04 (1Y)
☒	EMI Test Receiver	ESR26	101461	Rohde & Schwarz	2020. 04. 17 (1Y)
☒	EMI Test Receiver	ESR26	101462	Rohde & Schwarz	2020. 04. 17 (1Y)
☐	LISN	ENV216	102194	Rohde & Schwarz	2020. 04. 16 (1Y)
☐	EMI Test Receiver	ESR3	102119	Rohde & Schwarz	2020. 04. 16(1Y)
☒	RF Cable	MULTIFLEX_86	-	HUBER & SUHNER	-
☒	Chamber Cable	mwx221	-	Junkosha	-

※ All test equipment used is calibration on a regular basis.

5. 6 dB Bandwidth

5.1 Operating environment

Temperature : 22 ℃

Relative humidity : 46 %

5.2 Measurement method

Standard : §15.247 (a) (2)

5.3 Test setup

The antenna output of the EUT was connected to the spectrum analyzer. The resolution bandwidth is set to 100 ㎑, and peak detection was used. The 6 dB bandwidth is defined as the total spectrum over which the power is higher than the peak power minus 6 dB.

Spectrum Analyzer	———	EUT

5.4 Test data

Test date : 11. Nov. 2019

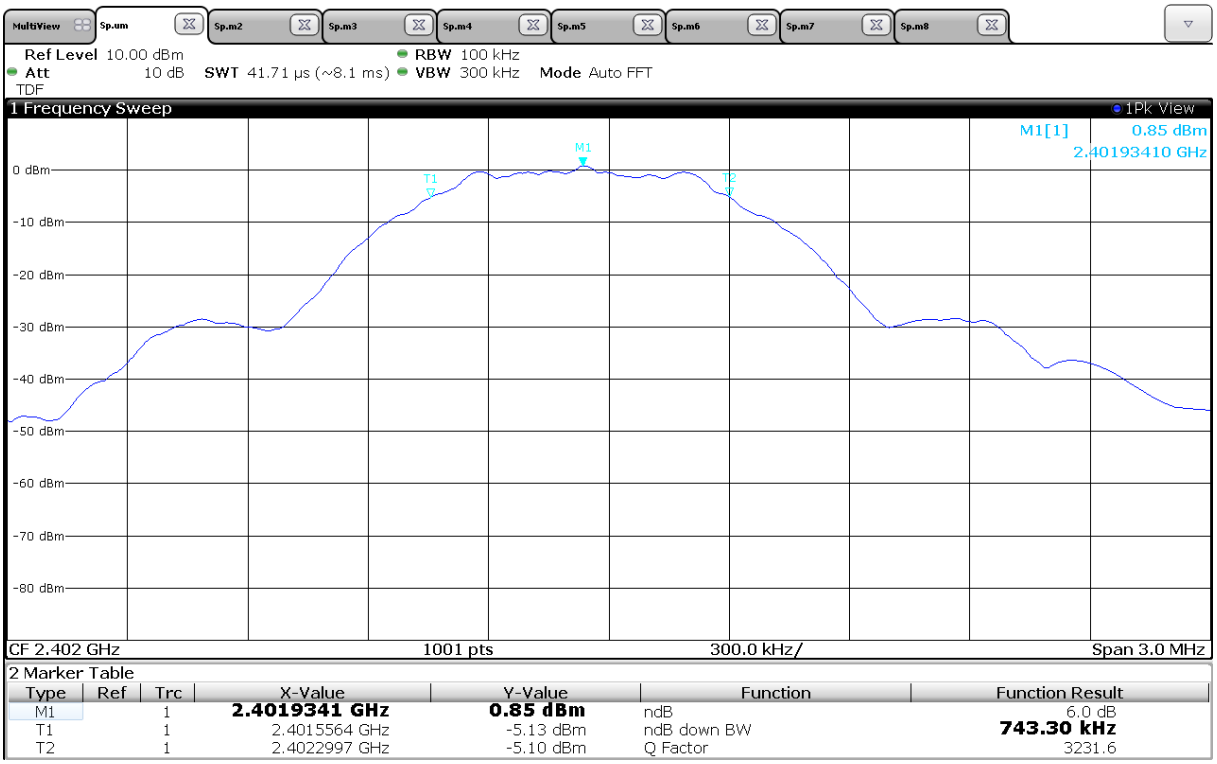
Operating mode : Transmit mode

Test Result : Pass

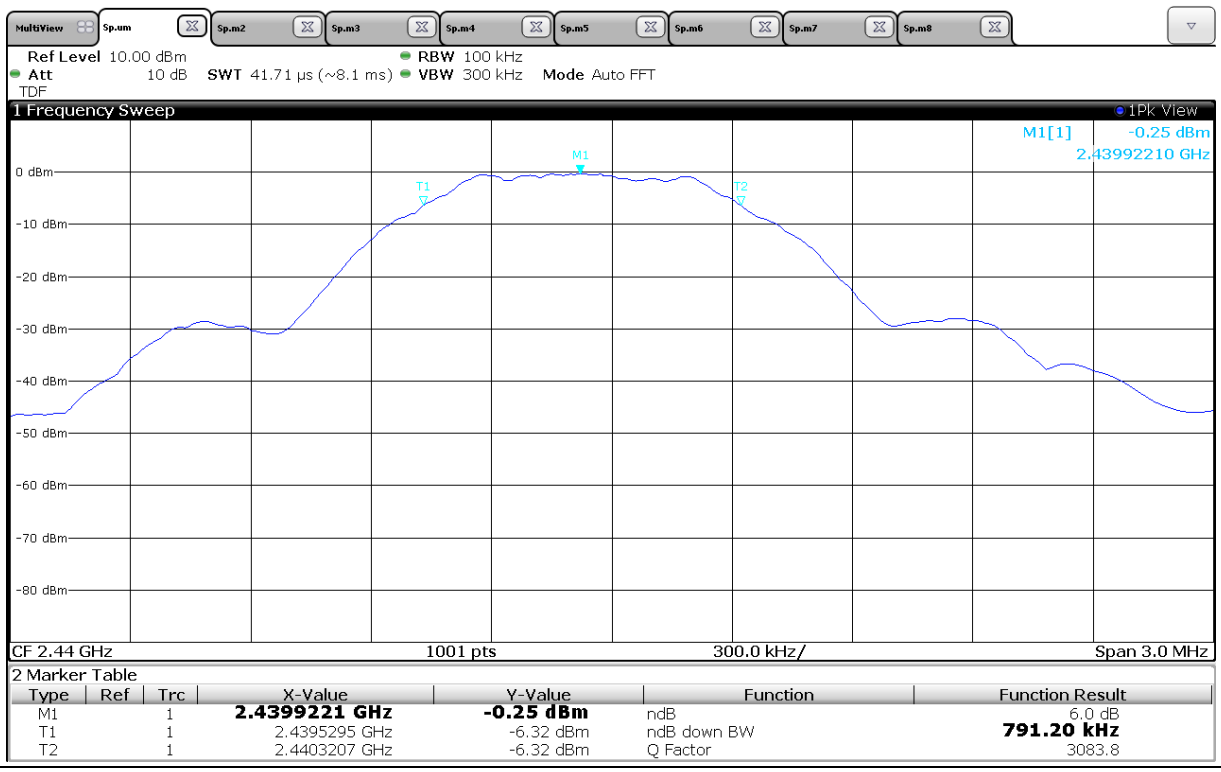
5.4.1 Measured Results

Modulation Type	Channel (Frequency)	Measured Value (㎑)	Limit (㎑)
Bluetooth LE	0 (2 402 ㎒)	743.3	at least 500
	19 (2 440 ㎒)	791.2	
	39 (2 480 ㎒)	746.3	

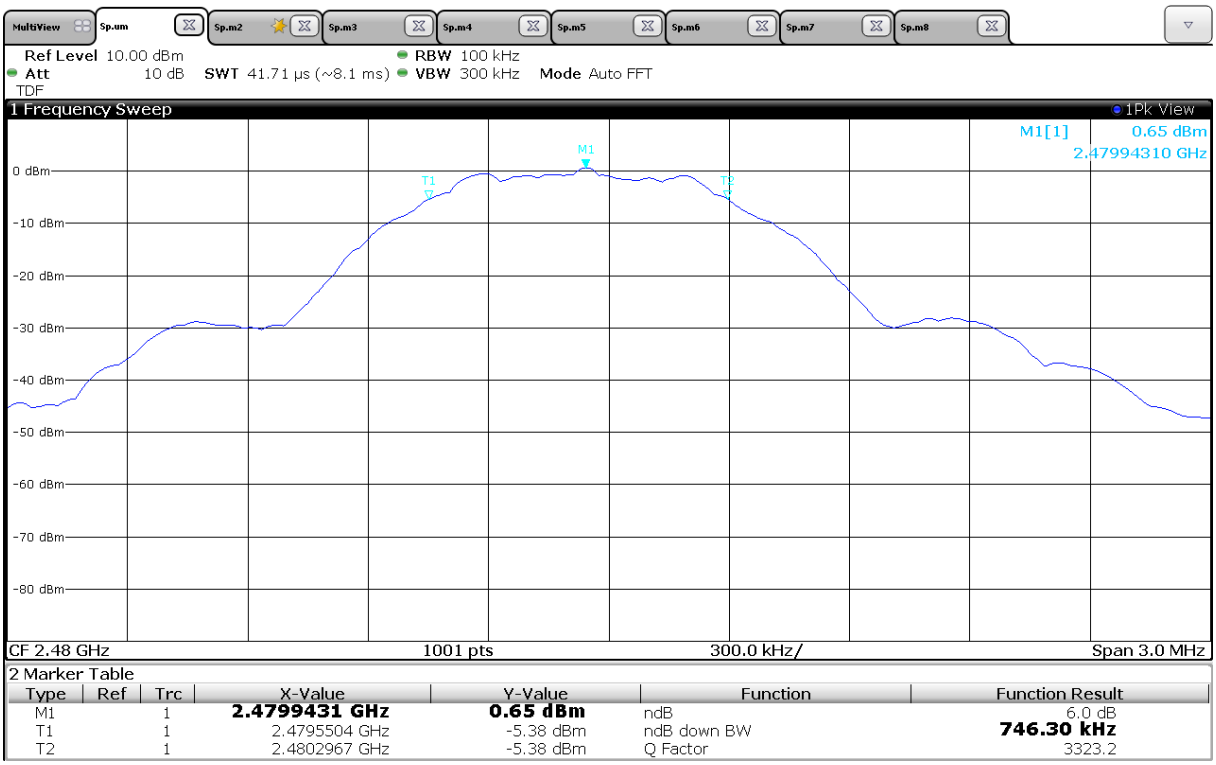
5.4.2 Measured Graph (6 ㏈ Bandwidth)



Low CH



Mid CH



High CH

6. Maximum Conducted Output Power

6.1 Operating environment

Temperature : 22 ℃

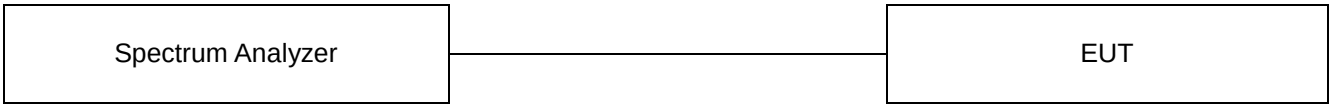
Relative humidity : 46 %

6.2 Measurement method

Standard : §15.247 (b) (3)

6.3 Test setup

The maximum peak output power was measured with the spectrum analyzer connected to the antenna output of the EUT. The spectrum analyzer's internal channel power integration function is used to integrate the power over a bandwidth greater than or equal to the 99 % bandwidth. The EUT was operating in transmit mode at the appropriate center frequency.
And e.i.r.p. is added antenna maximum gain with the Maximum Conducted Output Power.



6.4 Test data

Test date : 11. Nov. 2019

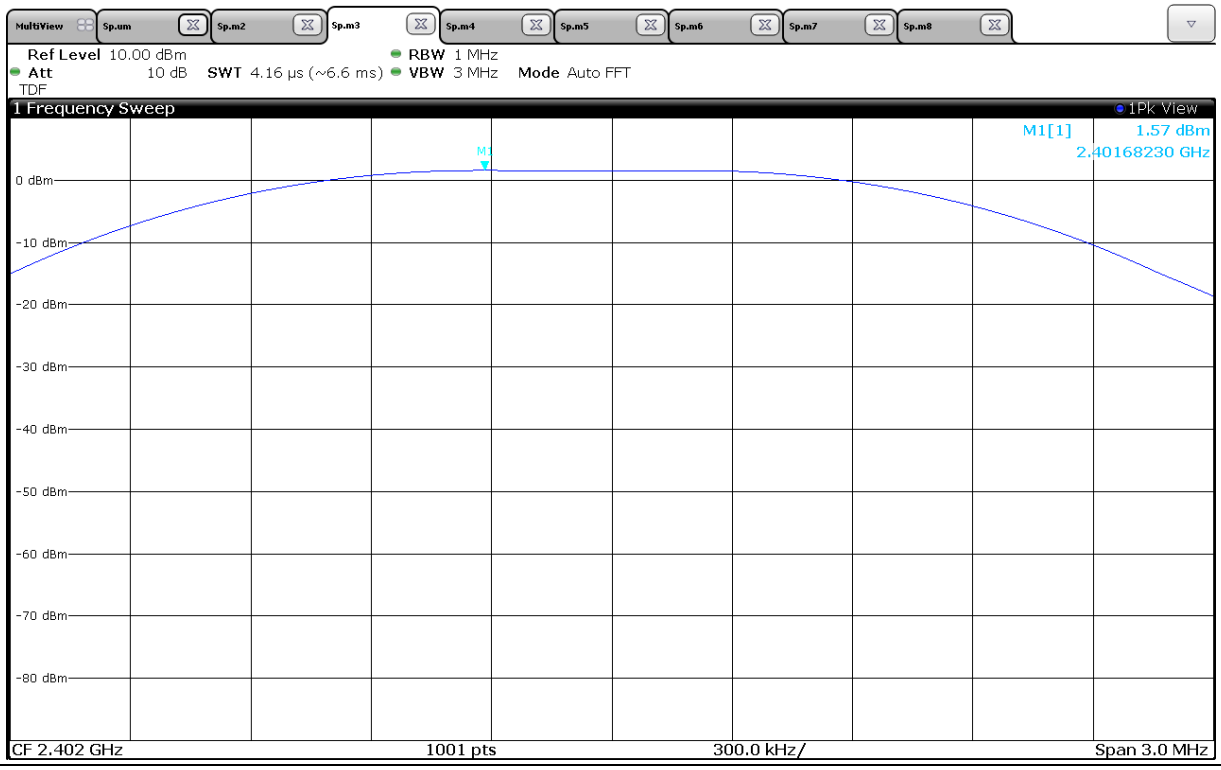
Operating mode : Transmit mode

Test Result : Pass

6.4.1 Measured Results

Modulation Type	Channel (Frequency)	Highest signal level (dBm)	Limit (dBm)
Bluetooth LE	0 (2 402 ㎒)	***1.57***	30 (1 Watt)
	19 (2 440 ㎒)	1.41	
	39 (2 480 ㎒)	1.17	

6.4.2 Measured Graph



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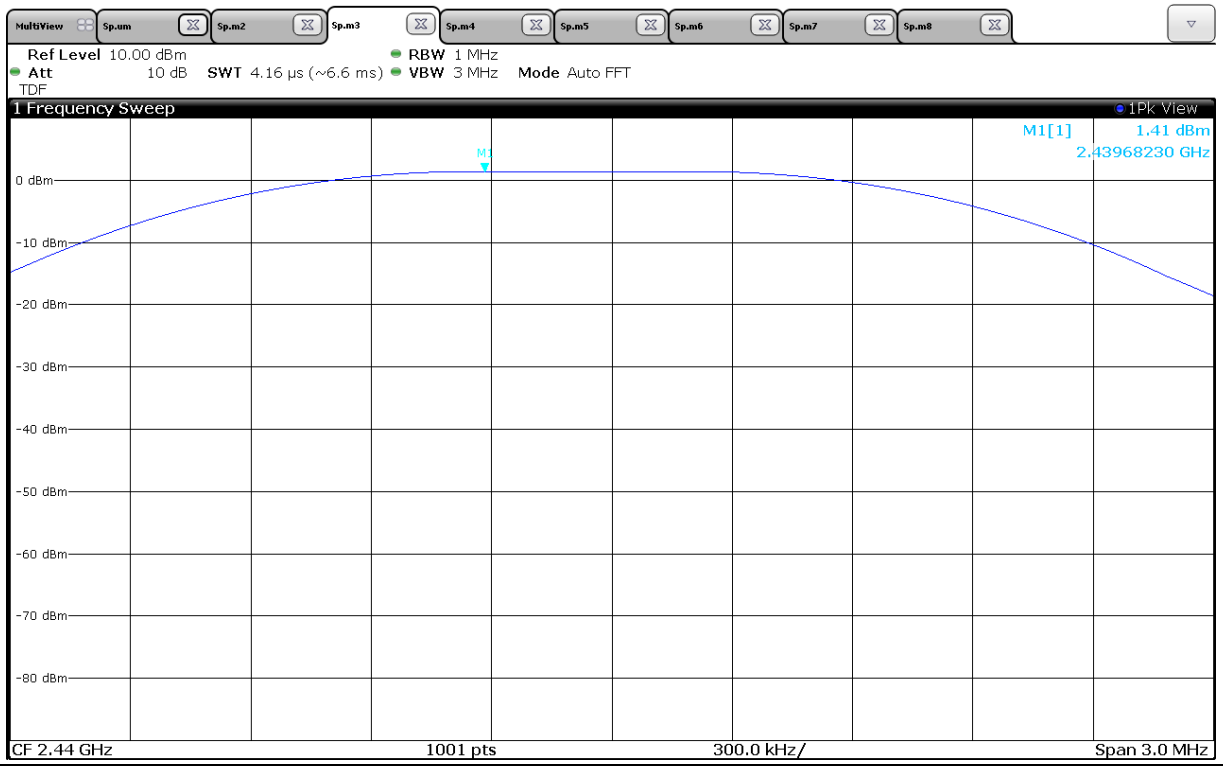
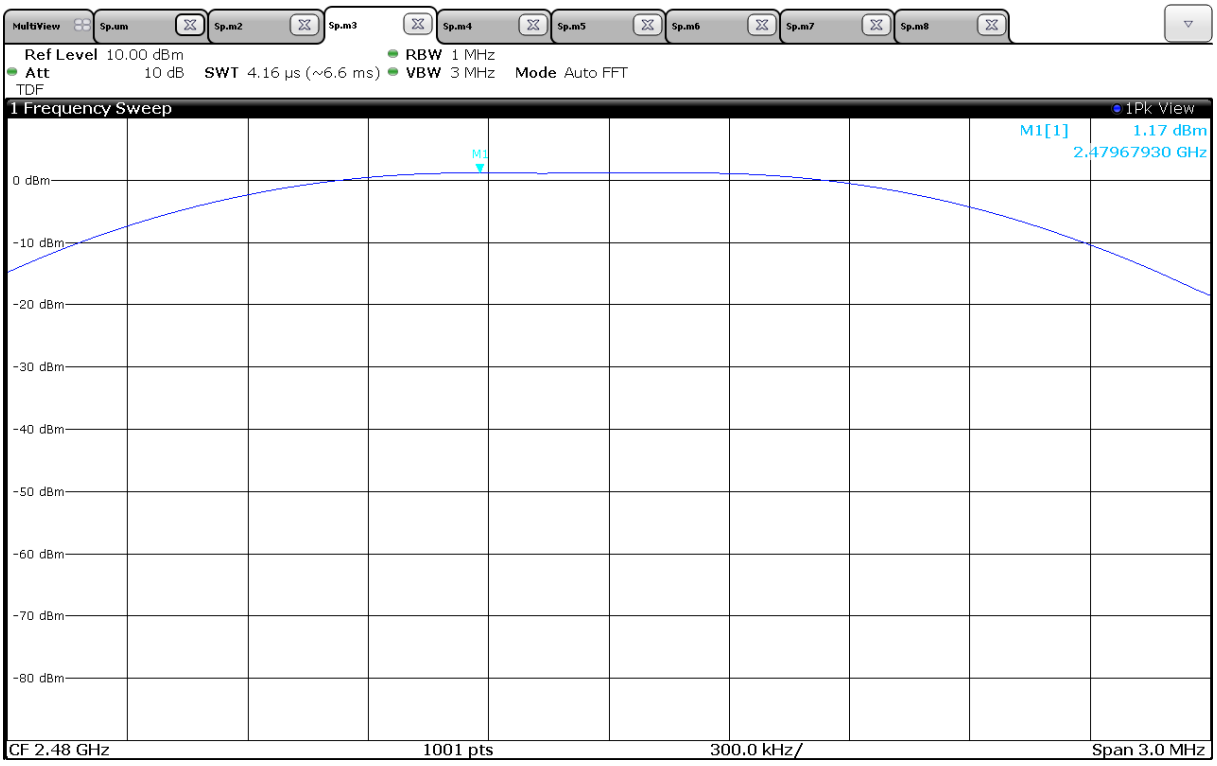


Mid CH



High CH

7. Power Spectral Density

7.1 Operating environment

Temperature : 22 ℃

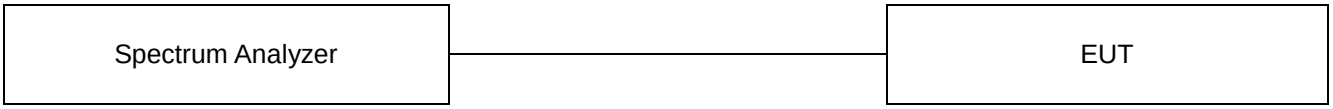
Relative humidity : 46 %

7.2 Measurement method

Standard : §15.247 (e)

7.3 Test setup

The antenna output of the EUT was connected to the spectrum analyzer. The resolution bandwidth is set to 3 ㎑, the video bandwidth is set to 3 times the resolution bandwidth.



7.4 Test data

Test date : 11. Nov. 2019

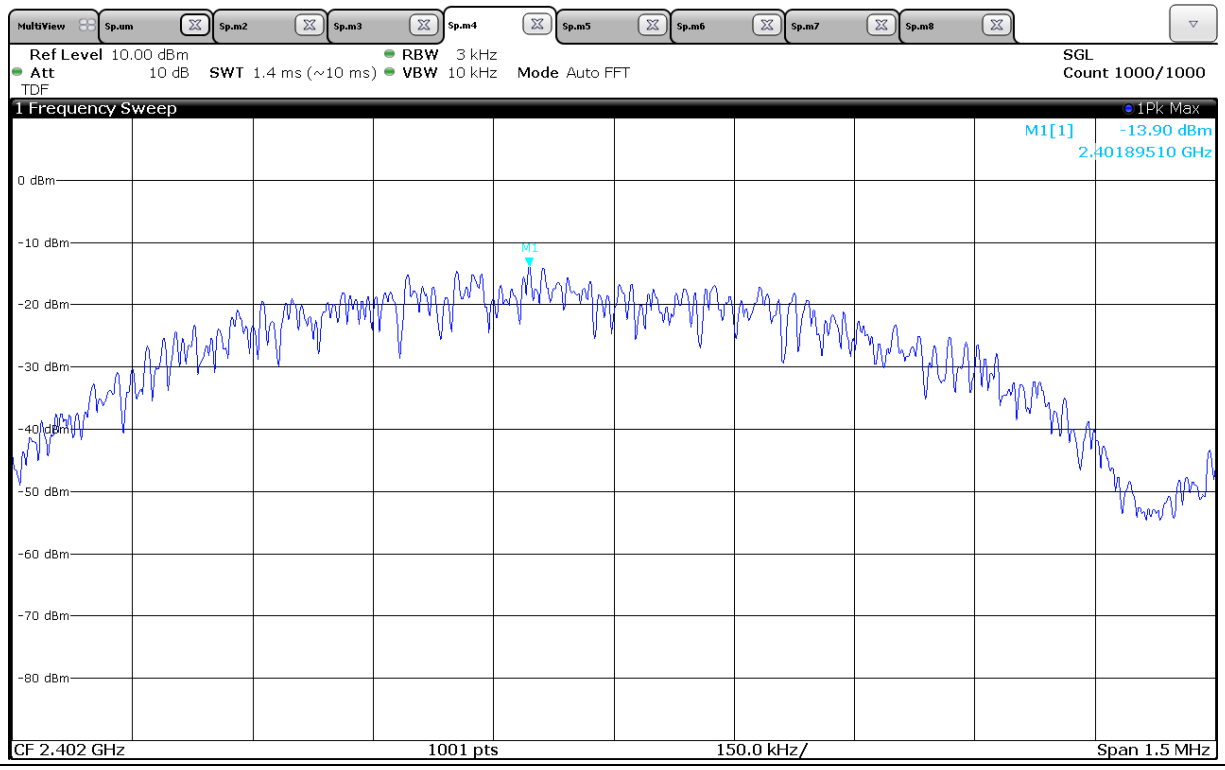
Operating mode : Transmit mode

Test Result : Pass

7.4.1 Measured Results

Modulation Type	Channel (Frequency)	Highest signal level (dBm)	Limit (dBm/3㎑)
Bluetooth LE	0 (2 402 ㎒)	-13.90	8
	19 (2 440 ㎒)	-14.06	
	39 (2 480 ㎒)	-14.39	

7.4.2 Measured Graph



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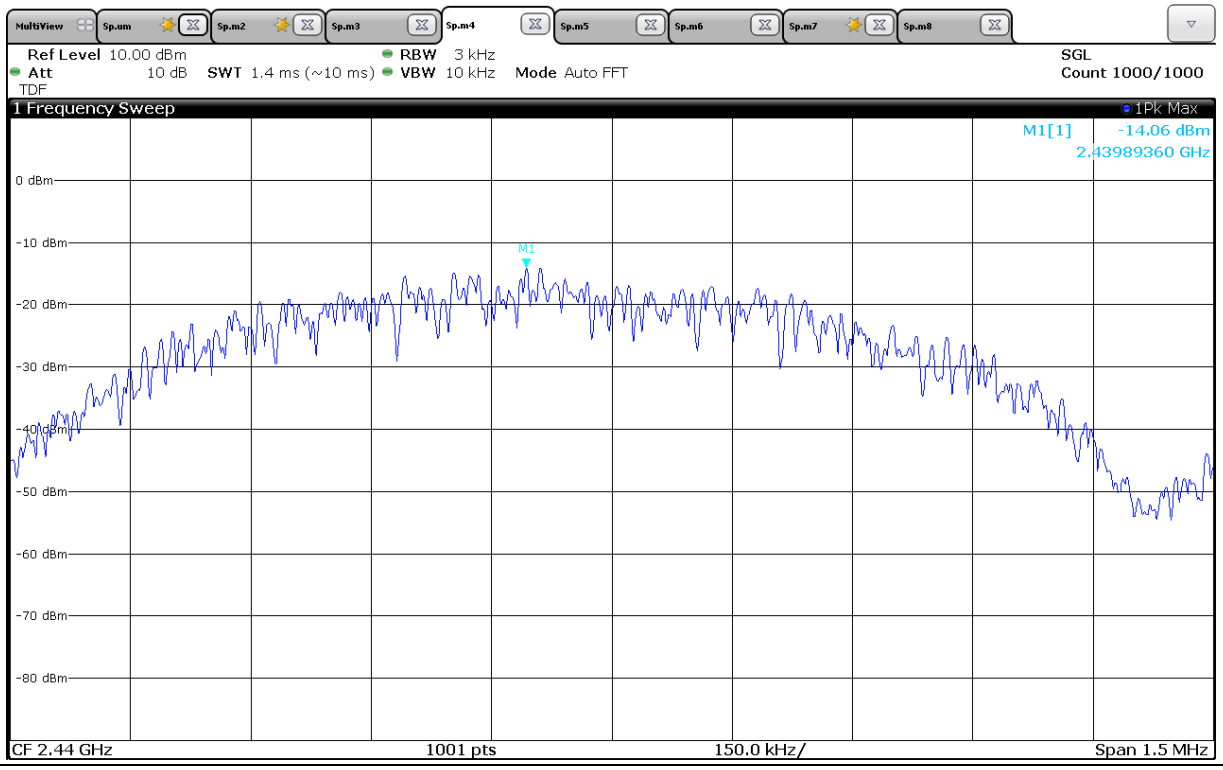
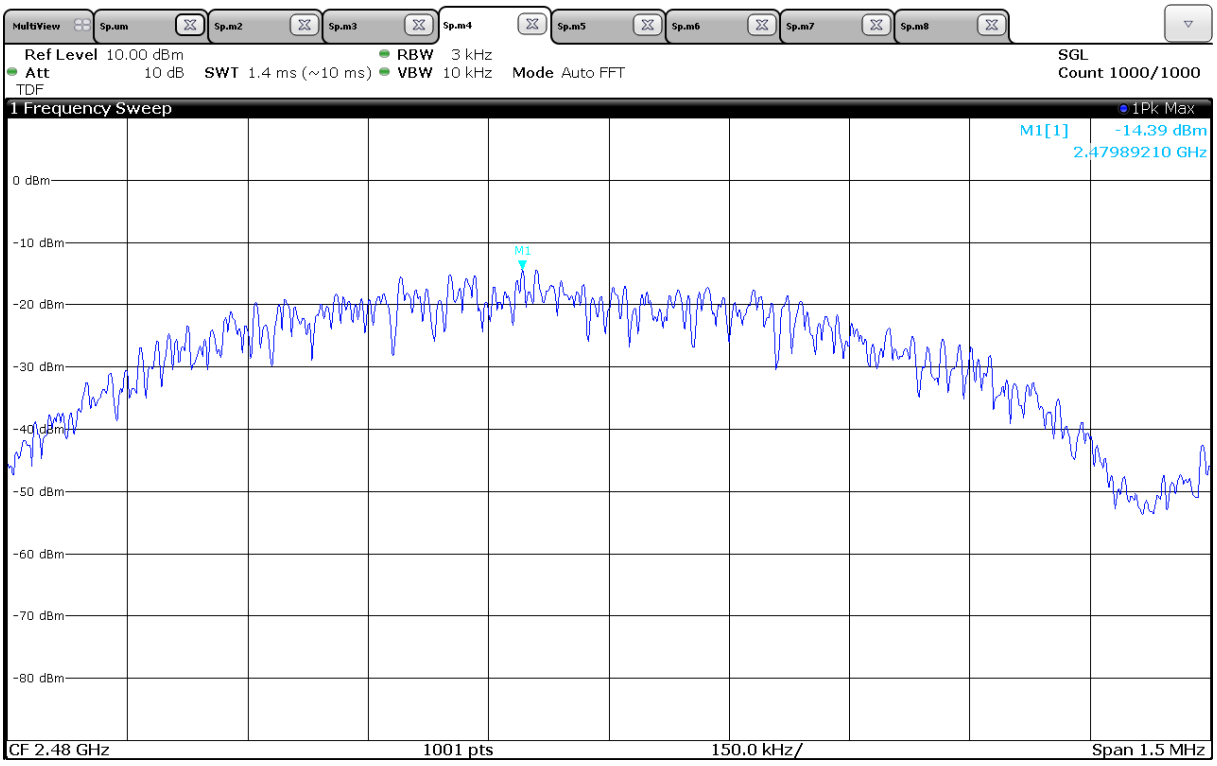


Mid CH



High CH

8. Conducted Spurious Emission

8.1 Operating environment

Temperature : 22 ℃

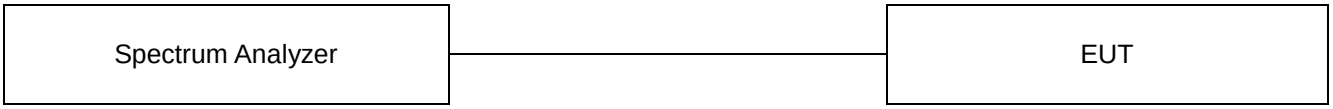
Relative humidity : 46 %

8.2 Measurement method

Standard : §15.247 (d)

8.3 Test setup

The antenna output of the EUT was connected to the spectrum analyzer. The resolution and video bandwidth is set to 100 ㎑, and peak detection was used.



8.4 Test data

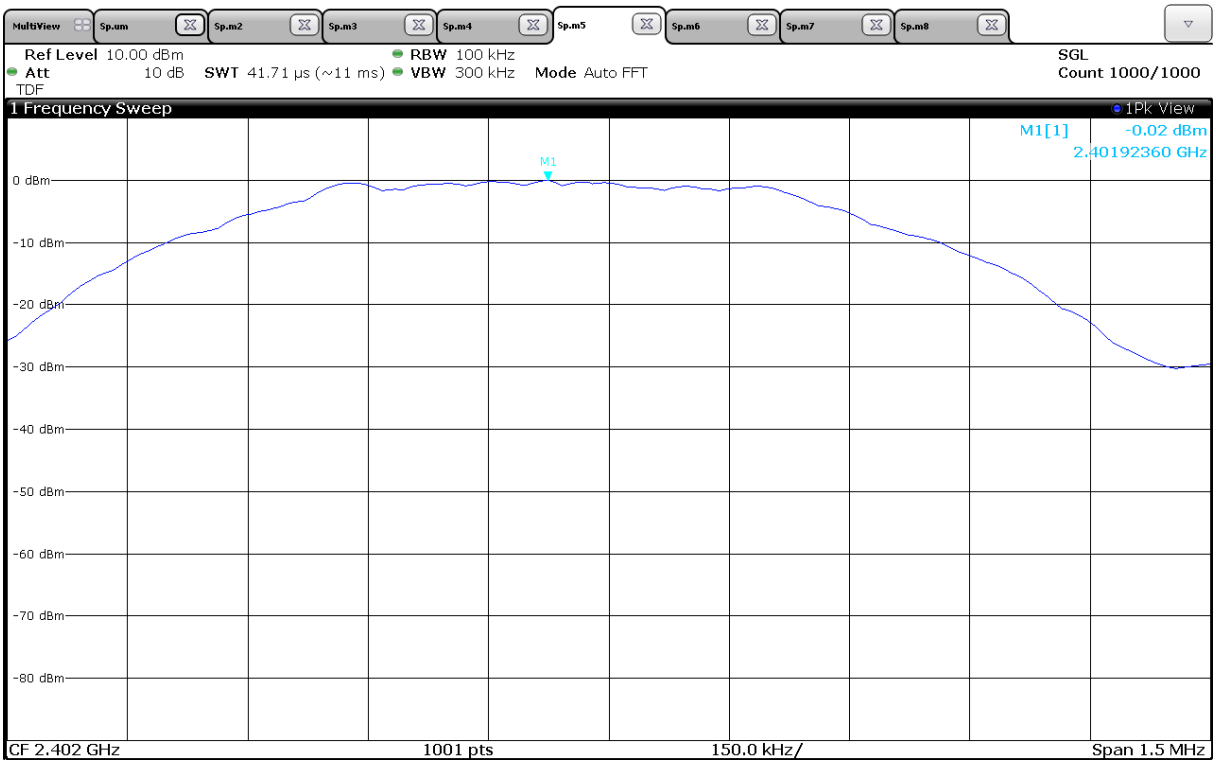
Test date : 11. Nov. 2019

Operating mode : Transmit mode

Test Result : Pass

8.4.1 Measured Results

8.4.1.1 Signal level (dB m)



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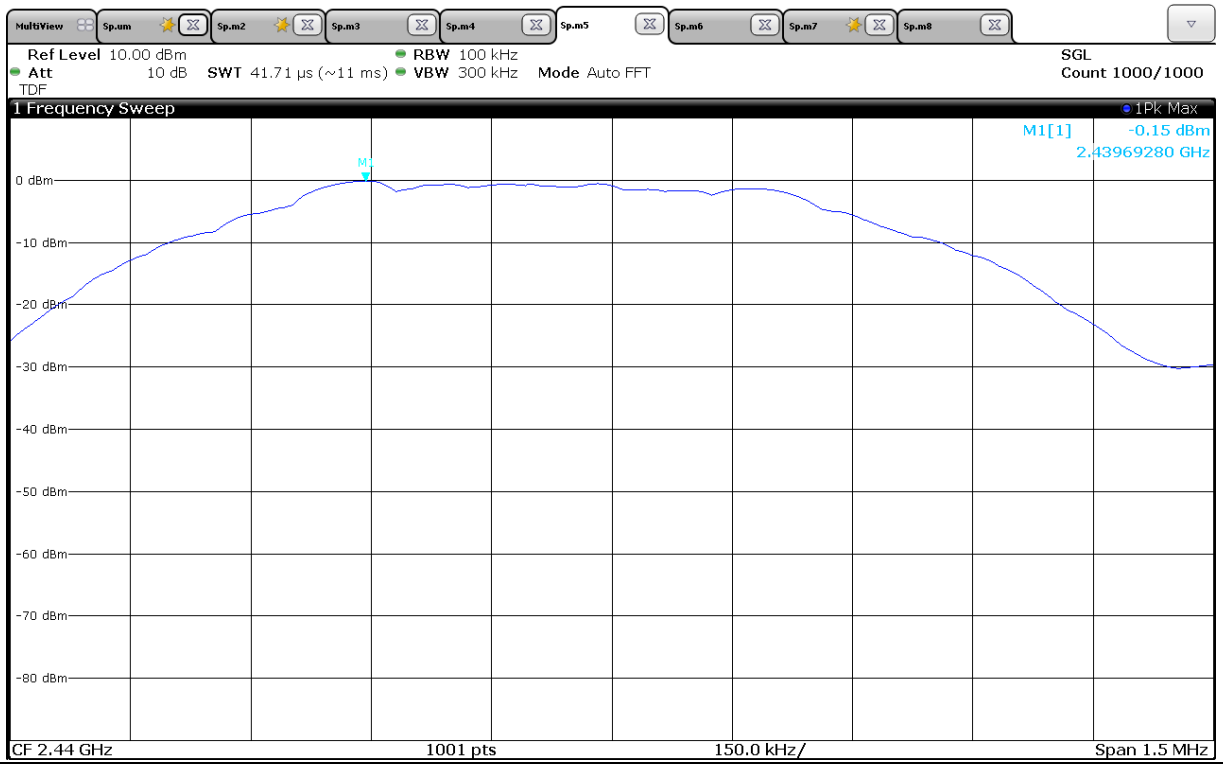
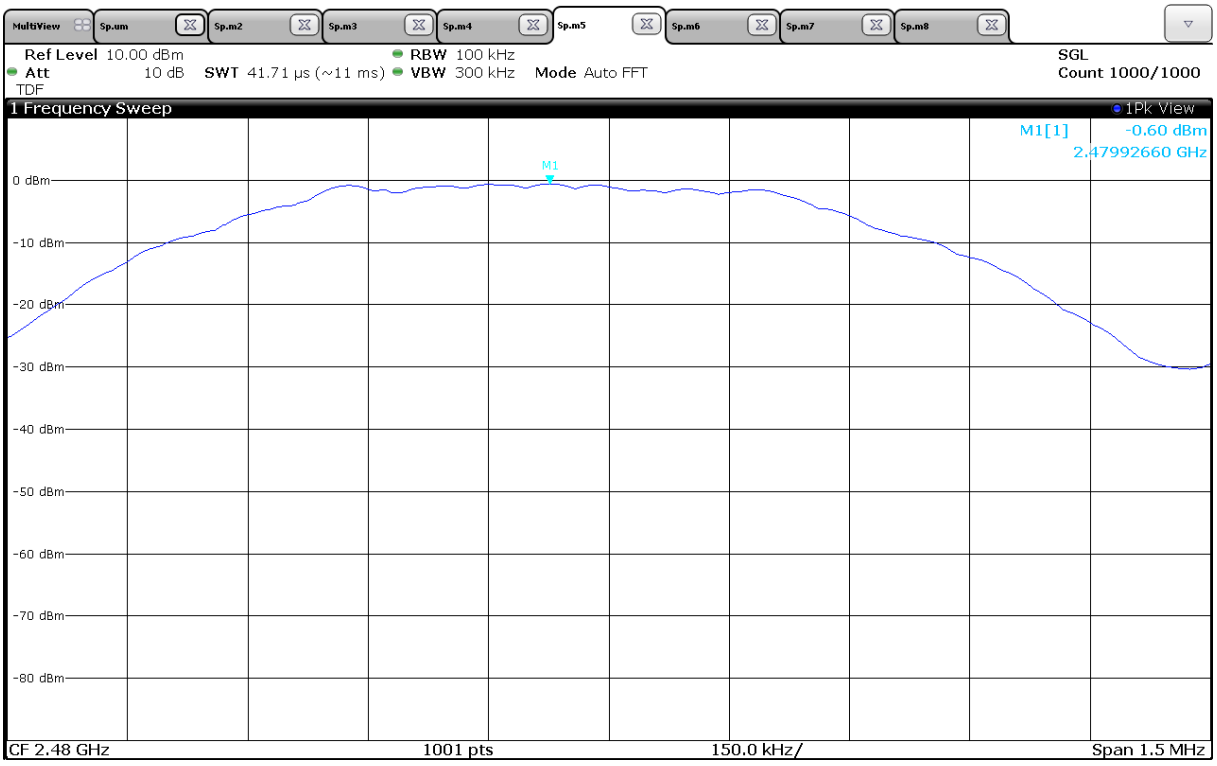
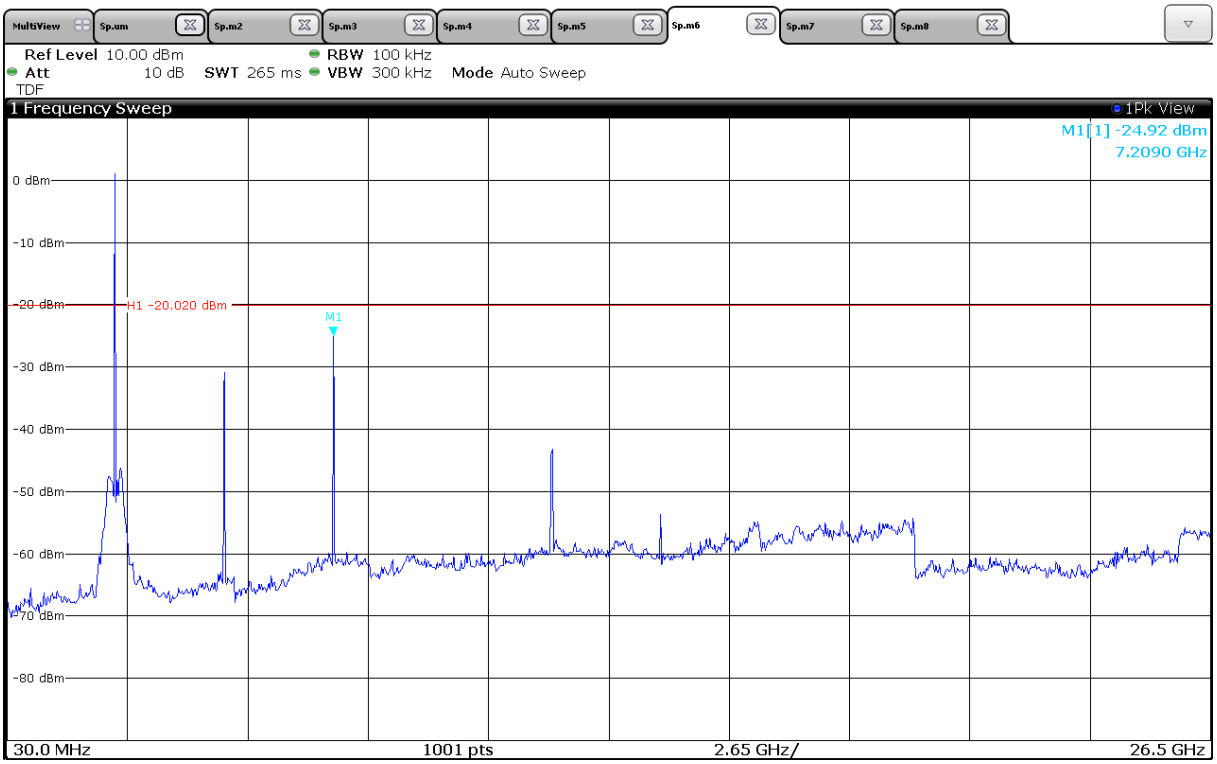


Mid CH



High CH

8.4.1.2 Unwanted Emissions In Non-Restricted Frequency Bands



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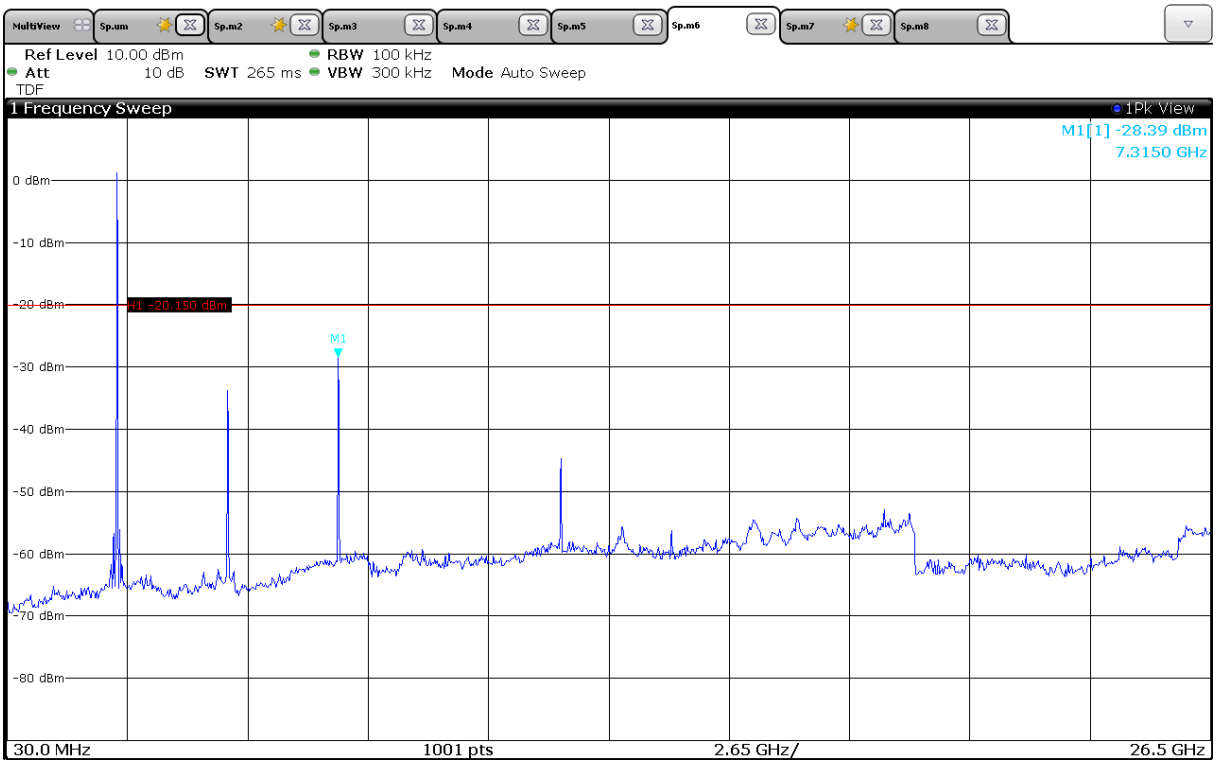
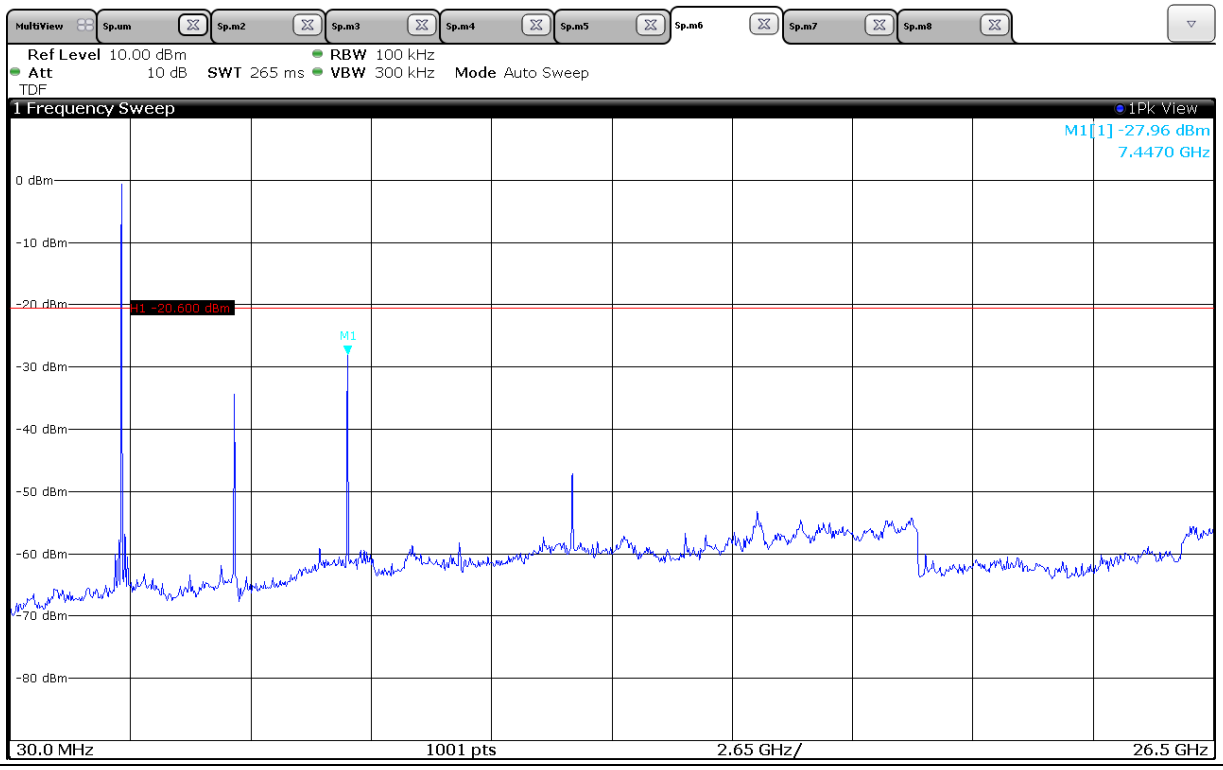
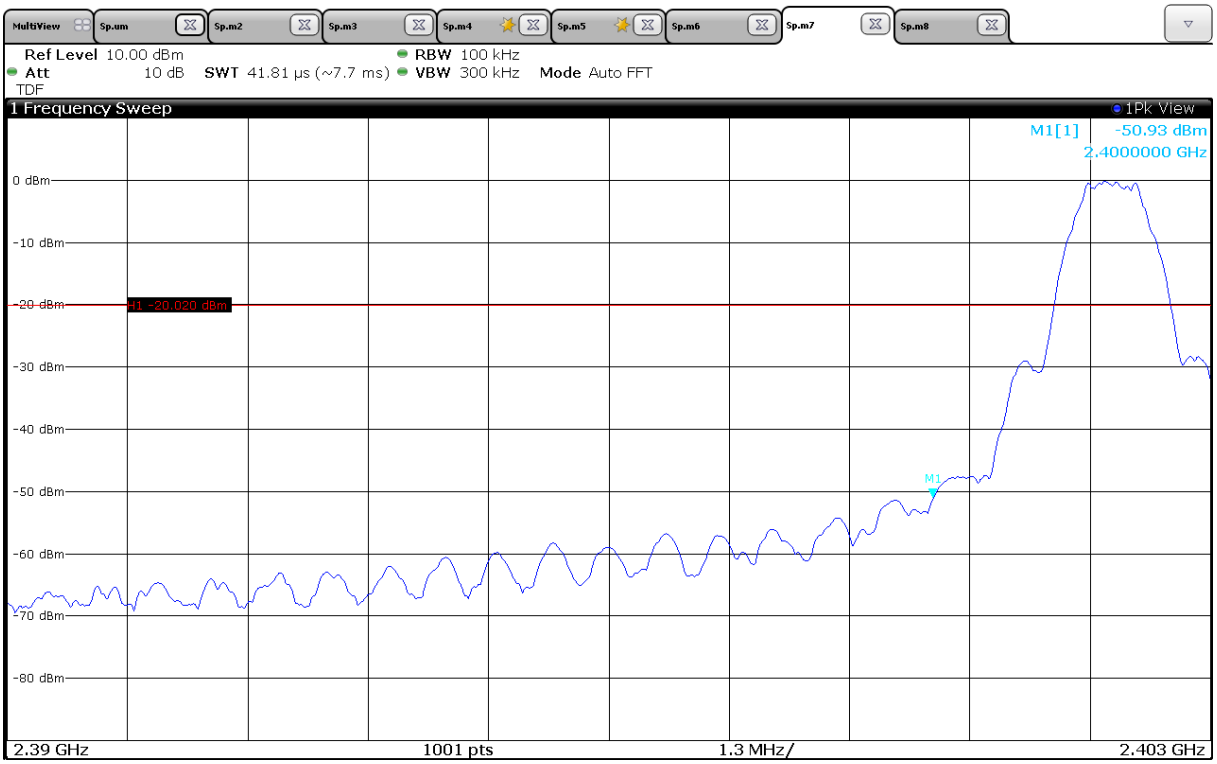


Mid CH

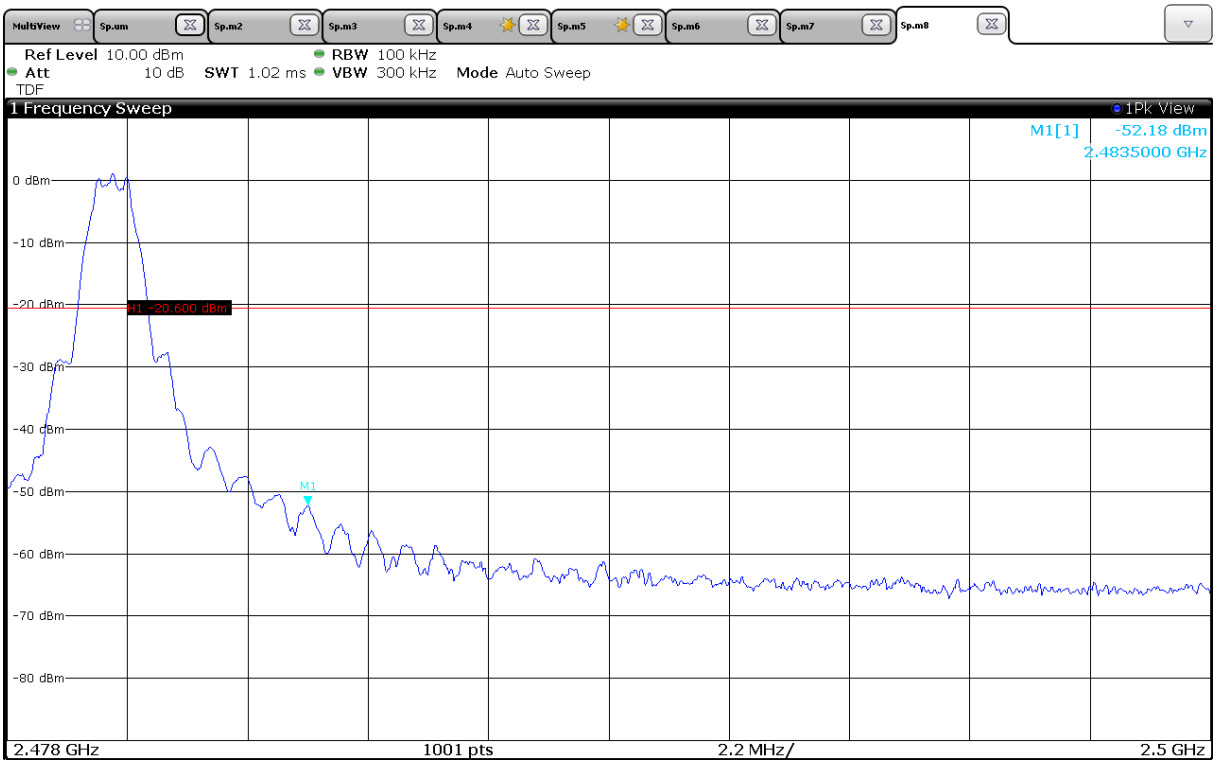

MultiView
Sp.um
Sp.m2
Sp.m3
Sp.m4
Sp.m5
Sp.m6
Sp.m7
Sp.m8
Ref Level 10.00 dBm
RBW 100 kHz
Att 10 dB
SWT 265 ms
VBW 300 kHz
Mode Auto Sweep
TDF
1 Frequency Sweep
1Pk View
M1[1] -27.96 dBm
7.4470 GHz
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
M1
30.0 MHz
1001 pts
2.65 GHz/
26.5 GHz

High CH

8.4.1.3 Band Edge



Low CH



High CH

9. Radiated Spurious Emission

9.1 Operating environment

Temperature : 24 ℃

Relative humidity : 48 %

9.2 Measurement method

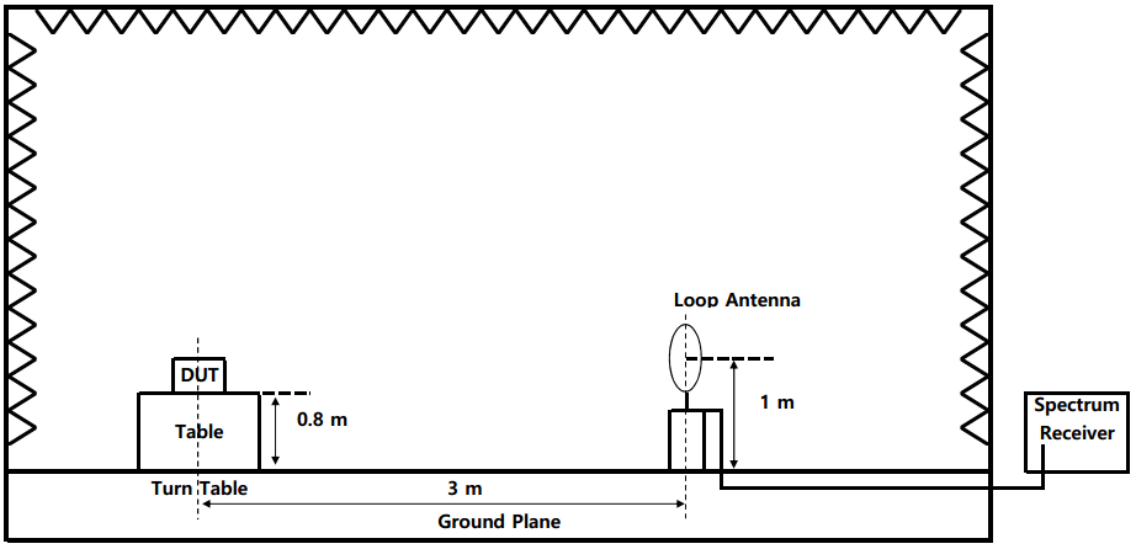
Standard : §15.247 (d), §15.209, §15.205

9.3 Test setup

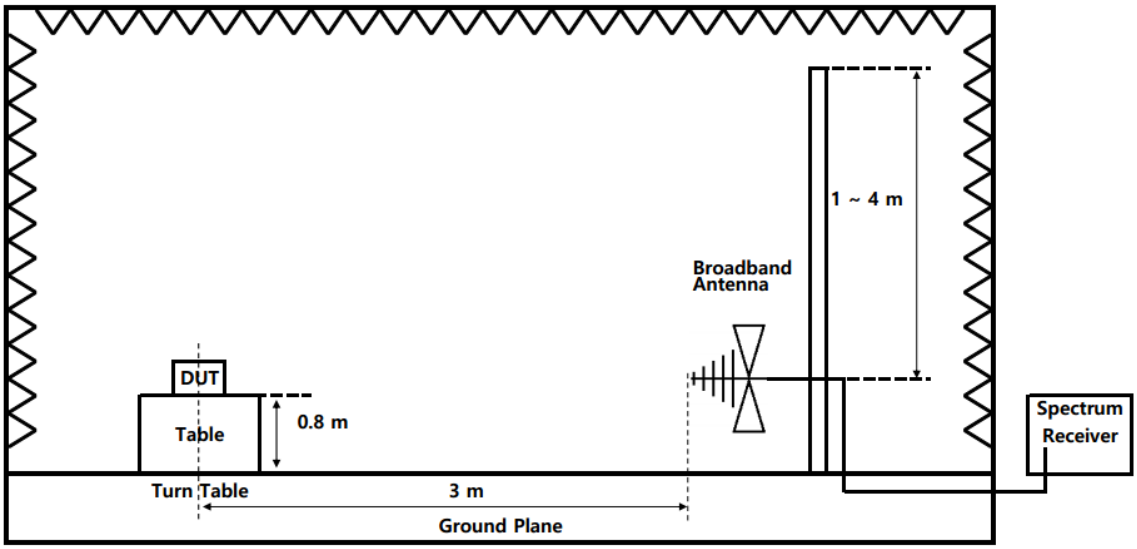
The radiated emissions measurements were performed on the 3 m,Semi-Anechoic Camber. The EUT was placed on a non-conductive turntable above the ground plane.

The frequency spectrum from 9 ㎑ to 26.5 ㎓ was scanned and maximum emission levels at each frequency recorded. The system was rotated 360°, and the antenna was varied in the height between 1.0 m and 4.0 m in order to determine the maximum emission levels. This procedure was performed for horizontal and vertical polarization of the receiving antenna.

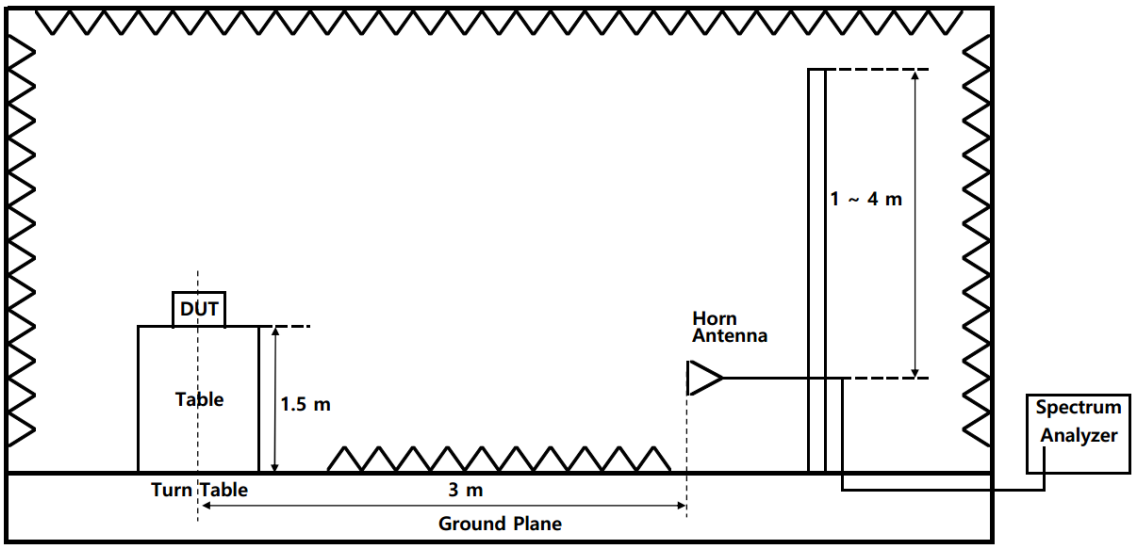
9.3.1 Below 30 ㎒



9.3.2 30 MHz to 1 GHz



9.3.3 Above 1 GHz



9.4 Test data

Test date : 13. Nov. 2019

Operating mode : Transmit mode

Test Result : Pass

9.4.1 Test data for Restricted band

Frequency (MHz)	Reading (dBμV)	Detector	Ant. Pol. (H/V)	Corr. Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Low CH							
2 316.77	47.43	Peak	H	-11.00	35.83	73.98	-38.15
	32.56	Average	H		20.96	53.98	-33.02
High CH							
2 483.50	47.12	Peak	H	-9.50	36.12	73.98	-37.86
	32.31	Average	H		21.31	53.98	-32.67

※ Ant. Pol. : Antenna Polarization

※ Corr. Factor. : Antenna Factor + Cable Loss - Amplifier Gain

※ Result = Reading + Corr. Factor

※ Margin = Result – Limit

9.4.2 Test data for Spurious & Harmonic

9.4.2.1 Measurement Results for below 30 MHz

Frequency (MHz)	Reading (dBμV)	Detector	Ant. Pol. (H/V)	Corr. Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Low CH							
It was not found any emissions peaks found from the EUT.							
Mid CH							
It was not found any emissions peaks found from the EUT.							
High CH							
It was not found any emissions peaks found from the EUT.							

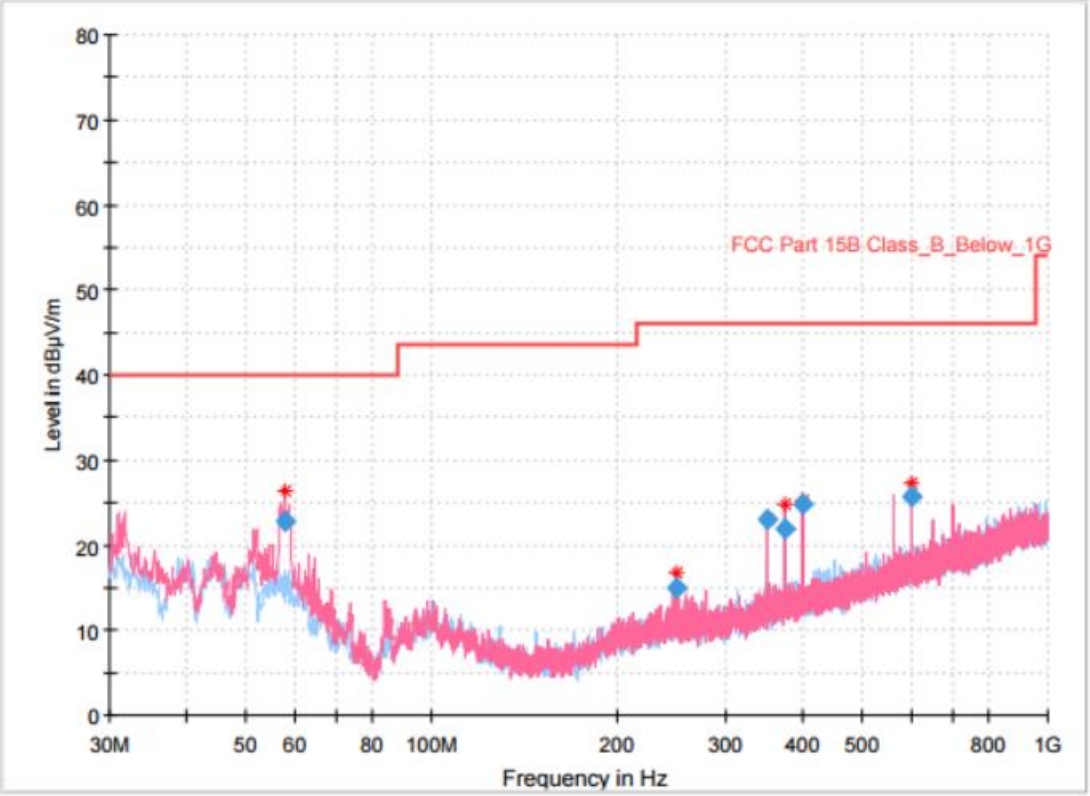
※ Ant. Pol. : Antenna Polarization

※ Corr. Factor. : Antenna Factor + Cable Loss - Amplifier Gain

※ Result = Reading + Corr. Factor

※ Margin = Result – Limit

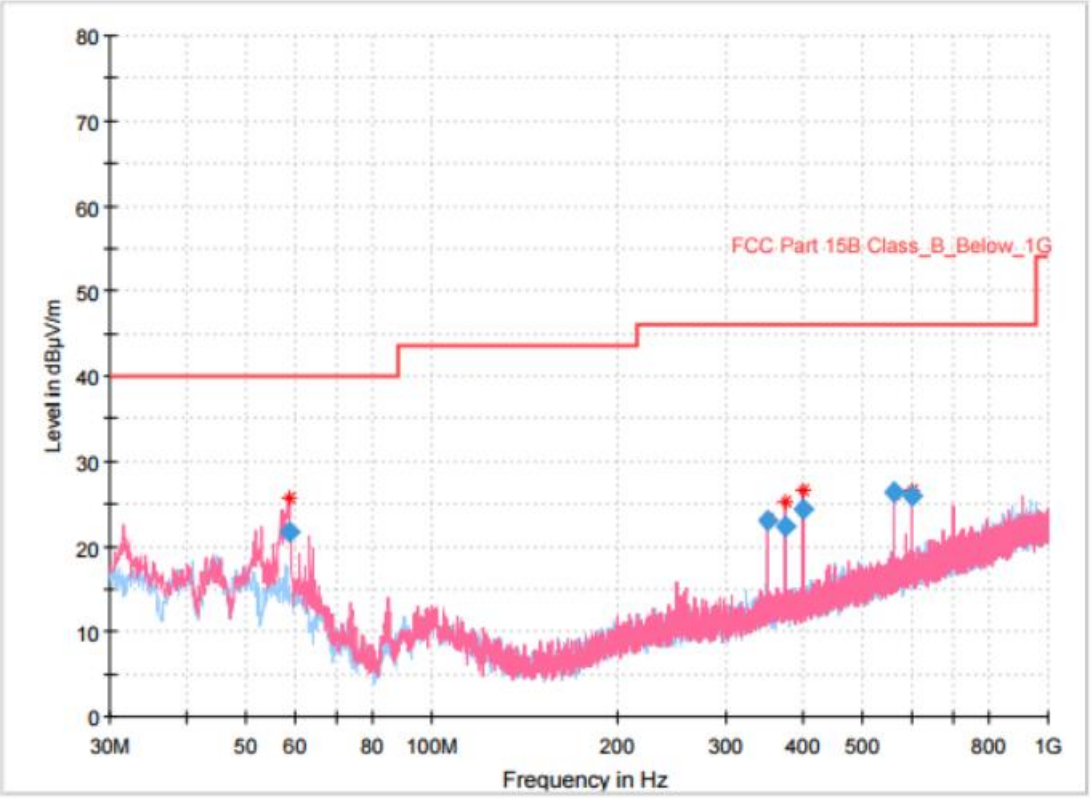
9.4.2.2 Measurement Results for below 1 ㎓



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
57.742000	22.86	40.00	17.14	1000.0	120.000	99.9	V	114.0	-20.3
249.996000	14.92	46.00	31.08	1000.0	120.000	99.9	V	310.0	-19.0
350.003000	23.11	46.00	22.89	1000.0	120.000	99.9	V	223.0	-16.6
375.029000	21.94	46.00	24.06	1000.0	120.000	99.9	V	191.0	-15.9
399.958000	24.71	46.00	21.29	1000.0	120.000	99.9	V	213.0	-15.6
599.972000	25.75	46.00	20.25	1000.0	120.000	99.9	V	0.0	-11.2

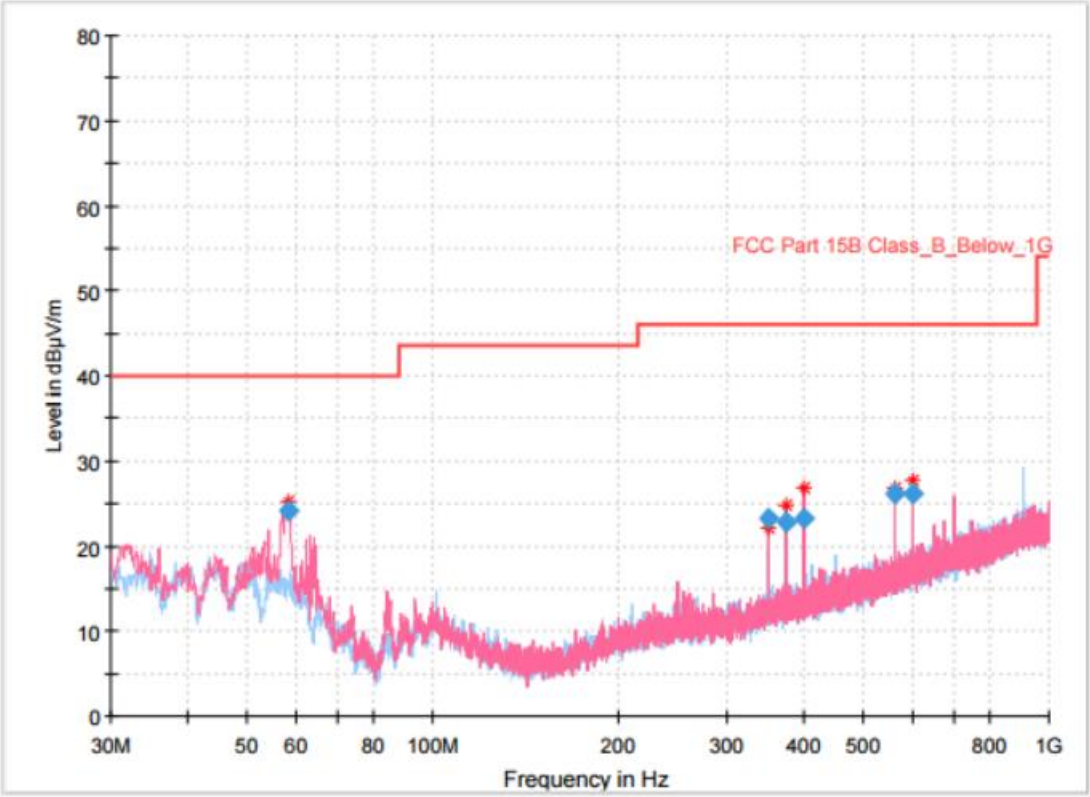
Low CH



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
58.712000	21.64	40.00	18.36	1000.0	120.000	99.9	V	5.0	-20.2
350.003000	23.11	46.00	22.89	1000.0	120.000	99.9	V	221.0	-16.6
375.029000	22.35	46.00	23.65	1000.0	120.000	99.9	V	221.0	-15.9
399.958000	24.31	46.00	21.69	1000.0	120.000	99.9	V	221.0	-15.6
562.530000	26.48	46.00	19.52	1000.0	120.000	249.9	V	243.0	-12.3
599.972000	25.82	46.00	20.18	1000.0	120.000	99.9	V	1.0	-11.2

Mid CH



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
58.421000	24.02	40.00	15.98	1000.0	120.000	99.9	V	126.0	-20.1
350.003000	23.14	46.00	22.86	1000.0	120.000	99.9	V	223.0	-16.6
375.029000	22.83	46.00	23.17	1000.0	120.000	99.9	V	244.0	-15.9
399.958000	23.28	46.00	22.72	1000.0	120.000	99.9	V	233.0	-15.6
562.530000	26.10	46.00	19.90	1000.0	120.000	250.0	V	0.0	-12.3
599.972000	26.20	46.00	19.80	1000.0	120.000	99.9	V	8.0	-11.2

High CH

9.4.2.3 Measurement Results for Above 1 GHz

Frequency (MHz)	Reading (dBμV)	Detector	Ant. Pol. (H/V)	Corr. Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Low CH							
4 804.00	55.78	Peak	H	-1.00	54.78	73.98	-19.20
	42.88	Average	H		41.88	53.98	-12.10
Mid CH							
4 880.00	59.38	Peak	H	-1.60	57.78	73.98	-16.20
	46.79	Average	H		45.19	53.98	-8.79
High CH							
4 960.00	61.21	Peak	H	-2.10	59.11	73.98	-14.87
	48.37	Average	H		46.27	53.98	-7.71

※ Ant. Pol. : Antenna Polarization

※ Corr. Factor. : Antenna Factor + Cable Loss - Amplifier Gain

※ Result = Reading + Corr. Factor

※ Margin = Result - Limit

- END OF REPORT.