



시험 성적서

TEST REPORT

페이지(page) : (1) / (총 31)

성적서 번호 Report No.		ICRT-TR-E181663-0A	
신청자 Client	기관명 Name	Sentech Korea Corp	
	주 소 Address	21-6, Jimokro75-gil, Paju-Si, Gyeonggi-Do, 10880, Republic of Korea	
시험대상품목 Sample description		Breathanalyzer	
모델명 Type designation		iSober S	
정 격 Ratings		DC 3 V	
시험기간 Date of test		Nov. 27, 2018 ~ Nov. 28, 2018	
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	기술책임자 Technical Manager	
	성 명 Name	성 명 Name	
Hong-Kyu, Lee (Signature)		Jun-Hui, Lee (Signature)	
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112, Hwanggeum3-ro 7beon-gil, Yangchon-eup, Gimpo-si, Gyeonggi-do, Korea



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Revision History

Issued Report No.	Issued Date	Revisions	Effect Section
ICRT-TR-E181663-0A	12-Dec-2018	Initial Issue	All



1. Applicant & Manufacturer & Test Laboratory Information

1.1 Applicant information

Applicant	Sentech Korea Corp
Address	21-6, Jimokro75-gil, Paju-Si, Gyeonggi-Do, 10880, Republic of Korea
Contact Person	JunNo Lee
Telephone No.	+82-10-5028-0706
Fax No.	+82-31-8071-4411
E-mail	jnlee@sentechkorea.com

1.2 Manufacturer Information

Manufacturer	Sentech Korea Corp
Address	21-6, Jimokro75-gil, Paju-Si, Gyeonggi-Do, 10880, Republic of Korea

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	Breathanalyzer
Brand Name	-
Model Name	iSober S
Additional Model Name	Dingo E-030, iScreen, Promiler, AC-018, ISOBER 70 PRO
Hardware Version	-
Software Version	-
Power Supply	DC 3 V

2.2 Additional Information

Equipment Class	DTS-Digital Transmission System
Device Type	Stand-alone
Operating Frequency	2 402 MHz ~ 2 480 MHz
RF Output Power	-0.03 dBm
Number of Channel	40
Modulation Type	GFSK
Antenna Type	Integral Antenna (Chip Antenna)
Antenna Gain	0.5 dBi
Antenna Operating Mode	Single Antenna Equipment with only one antenna
List of Each Oscillator or Crystal Frequency	8 MHz

2.3 Mode of operation during the test

- The EUT is continuous transmission mode during the test

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) (1)	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 (See Note)
§15.203	Antenna Requirement	☒	PASS

※ Note: This test is not performed because the EUT is operated by DC battery.

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 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.

3.3.1 Result: Pass

The transmitter has an *integral Chip antenna*. The directional gain of the antenna is *0.5* dBi.



4. Used equipment on test

	Description	Model Name	Serial Number	Manufacturer	Last Cal. (cycle)
☐	Spectrum Analyzer	FSW85	100864	Rohde & Schwarz	2018. 03. 22 (1Y)
☒	Spectrum Analyzer	FSV40	101455	Rohde & Schwarz	2018 .07. 10 (1Y)
☒	Signal Generator	SMB100A	180607	Rohde & Schwarz	2018. 03. 05 (1Y)
☐	Power Sensor	NRP-Z81	103673	Rohde & Schwarz	2018. 03. 05 (1Y)
☐	Open Switch and Control Platform	OSP150	101000	Rohde & Schwarz	2018. 03. 22 (1Y)
☐	Environmental Test Chamber	MHK-408NKDA	1060908	TERCHY	2018. 03. 14 (1Y)
☒	DC Power Supply	XDL 35-5P	J00385373	Sorensen	2018. 03. 05 (1Y)
☐	DC Power Supply	6603D	672483	Topward	2018. 03. 05 (1Y)
☒	Loop Antenna	HFH2-Z2	100506	Rohde & Schwarz	2017. 06. 19 (2Y)
☒	TRILOG BROADBAND ANTENNA	VULB9162	120	SCHWARZBECK	2018. 11. 23 (2Y)
☒	RF Pre Amplifier	SCU08	100747	Rohde & Schwarz	2018. 04. 17 (1Y)
☒	DOUBLE-RIDGE WAVEGUIDE HORN ANTENNA	HF907	102556	Rohde & Schwarz	2017. 07. 05 (2Y)
☒	RF Pre Amplifier	SCU18	102342	Rohde & Schwarz	2018. 04. 17 (1Y)
☒	Horn Antenna	LB-42-10-C-KF	J202024625	AINFO Inc.	2018. 04. 20 (2Y)
☒	RF Pre Amplifier	AMF-4F-18265-35-8P-1	771846	MITEQ	2018. 03. 06(1Y)
☐	Horn Antenna	LB-28-10-C-KF	J202024627	AINFO Inc.	2018. 04. 20 (2Y)
☐	RF Pre Amplifier	AMF-4D-260400-45-6P	779919	MITEQ	2018. 03. 22 (1Y)
☒	EMI Test Receiver	ESR26	101461	Rohde & Schwarz	2018. 04. 17 (1Y)
☐	EMI Test Receiver	ESR3	102119	Rohde & Schwarz	2018. 04. 17 (1Y)
☐	LISN	ENV216	102193	Rohde & Schwarz	2018. 04. 16 (1Y)

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



5. 6 dB Bandwidth

5.1 Operating environment

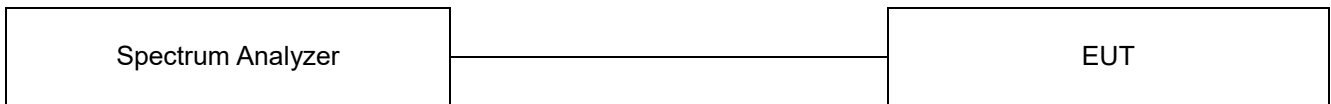
Temperature : 25 °C
Relative humidity : 48 %

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 kHz, 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.





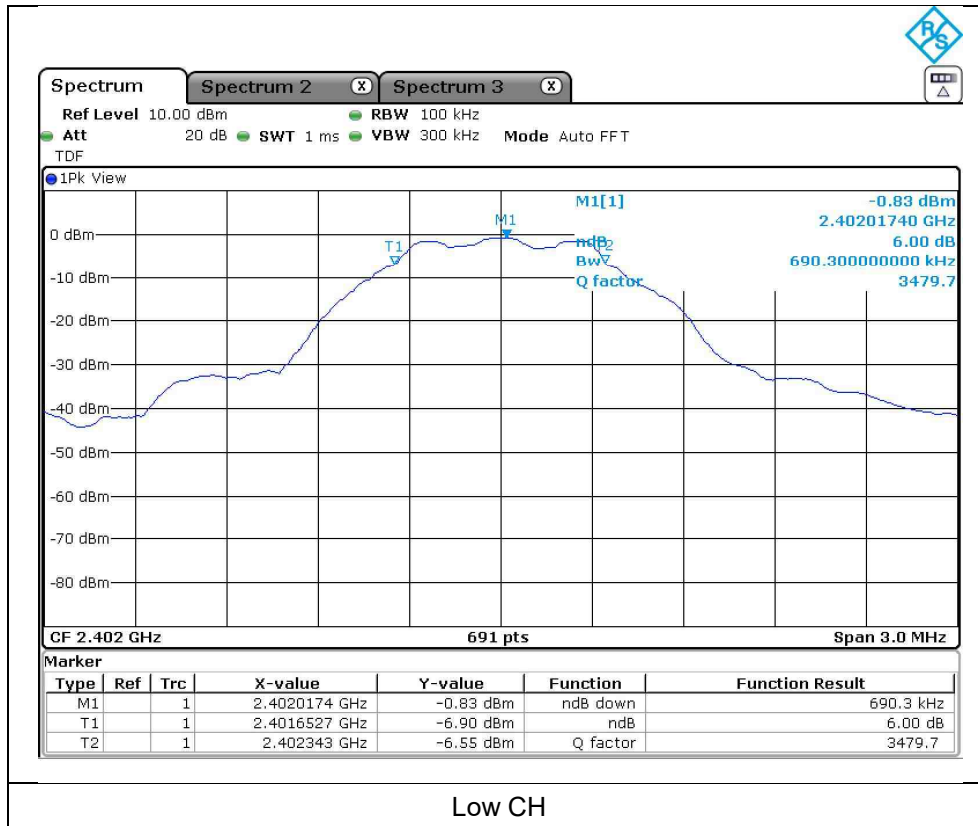
5.4 Test data

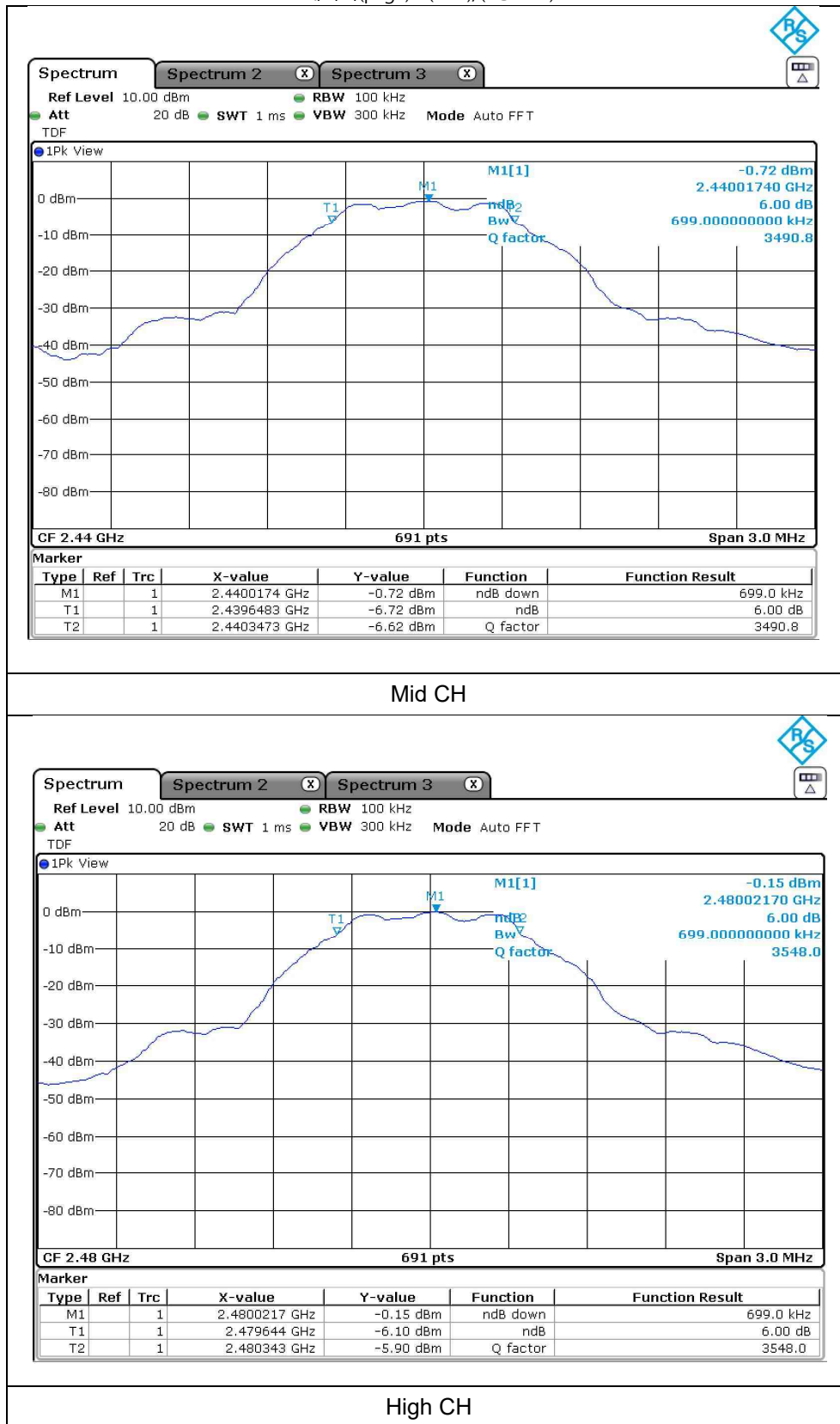
Test date : 27. Nov. 2018
Operating mode : Transmit mode
Test Result : Pass

5.4.1 Measured Results

Modulation Type	Channel (Frequency)	Measured Value (kHz)	Limit (kHz)
Bluetooth LE	0 (2 402 MHz)	690.3	at least 500
	19 (2 440 MHz)	699.0	
	39 (2 480 MHz)	699.0	

5.4.2 Measured Graph







6. Maximum Conducted Output Power

6.1 Operating environment

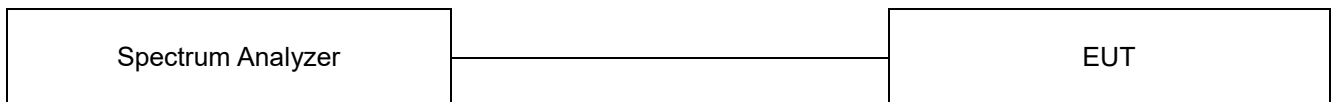
Temperature : 25 °C
Relative humidity : 48 %

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.





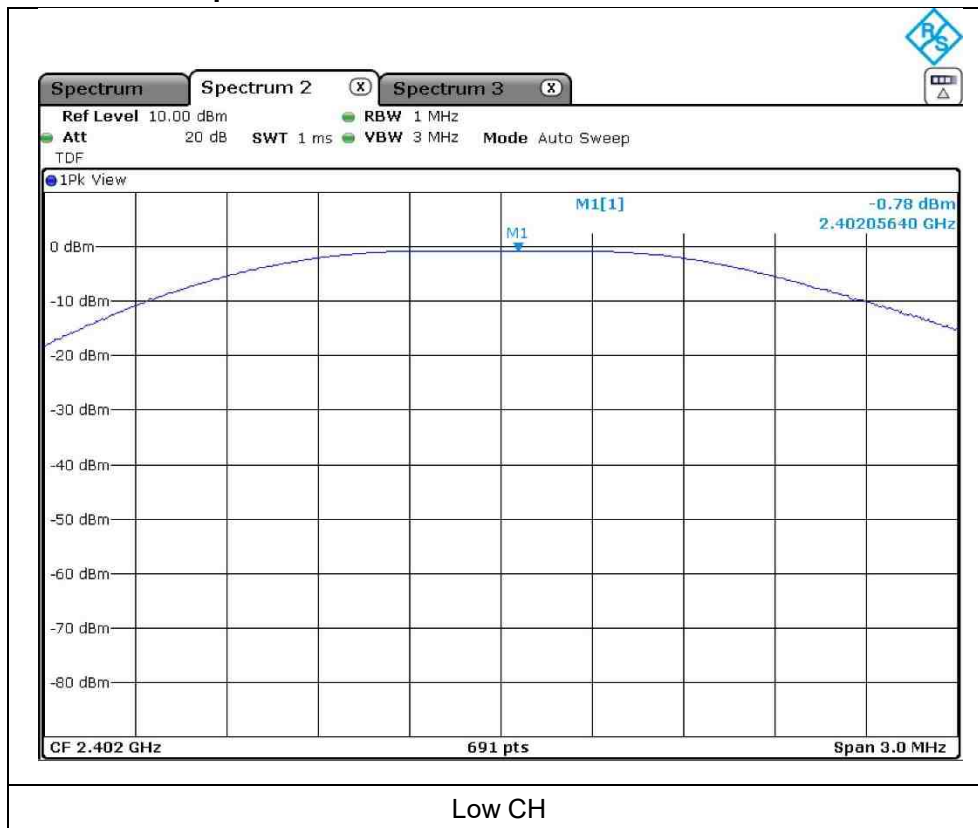
6.4 Test data

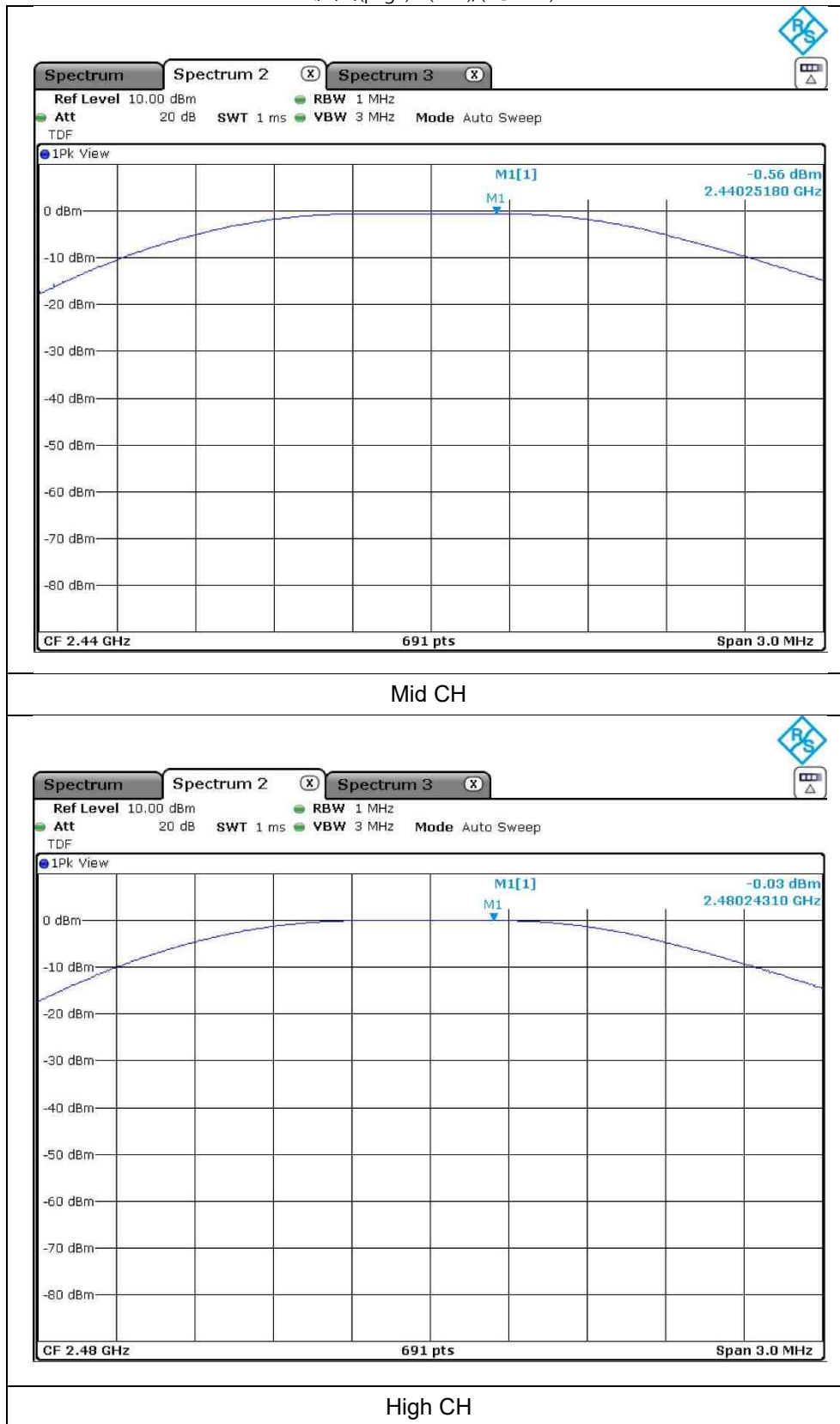
Test date : 27. Nov. 2018
Operating mode : Transmit mode
Test Result : Pass

6.4.1 Measured Results

Modulation Type	Channel (Frequency)	Highest signal level (dBm)	Limit (dBm)
Bluetooth LE	0 (2 402 MHz)	-0.78	30 (1 Watt)
	19 (2 440 MHz)	-0.56	
	39 (2 480 MHz)	-0.03	

6.4.2 Measured Graph







7. Power Spectral Density

7.1 Operating environment

Temperature : 25 °C

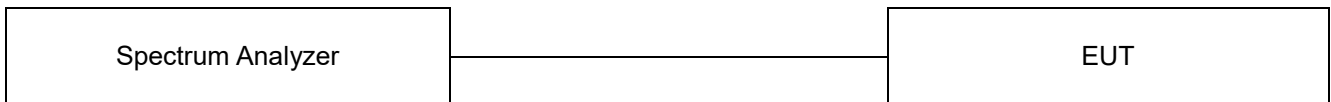
Relative humidity : 48 %

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 kHz, the video bandwidth is set to 3 times the resolution bandwidth.





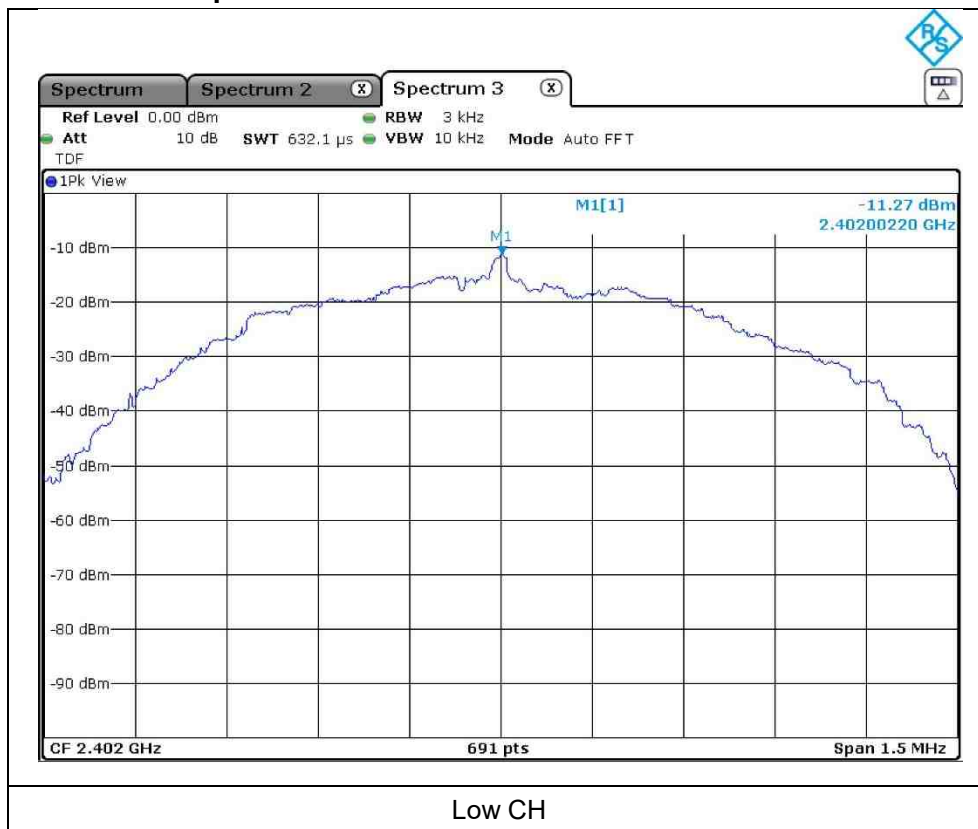
7.4 Test data

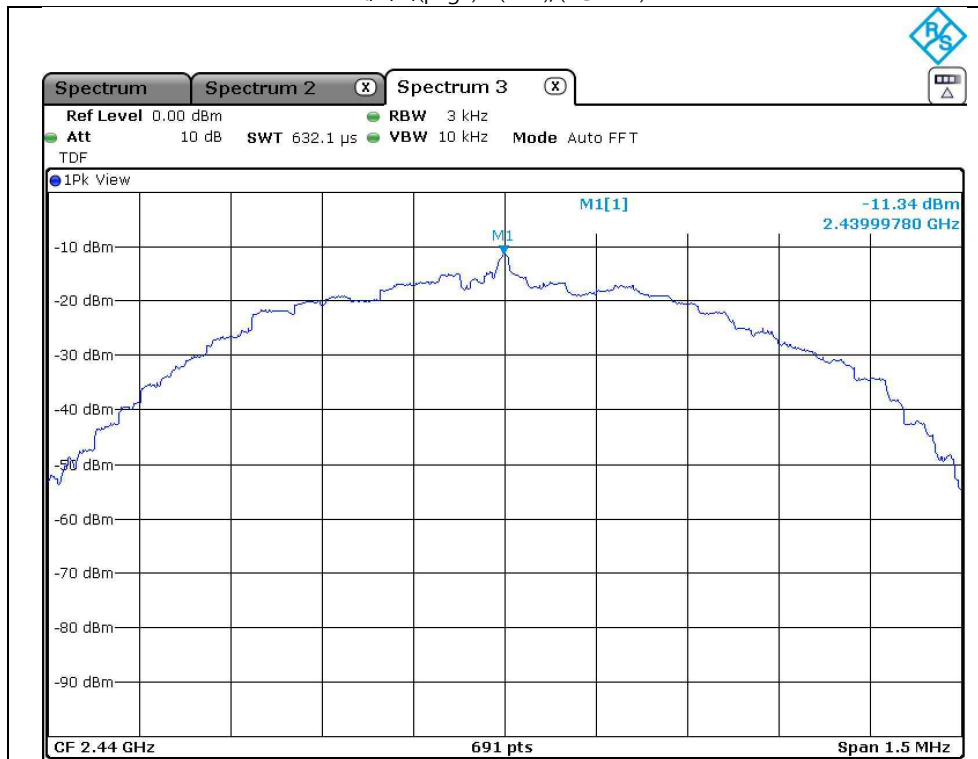
Test date : 27. Nov. 2018
Operating mode : Transmit mode
Test Result : Pass

7.4.1 Measured Results

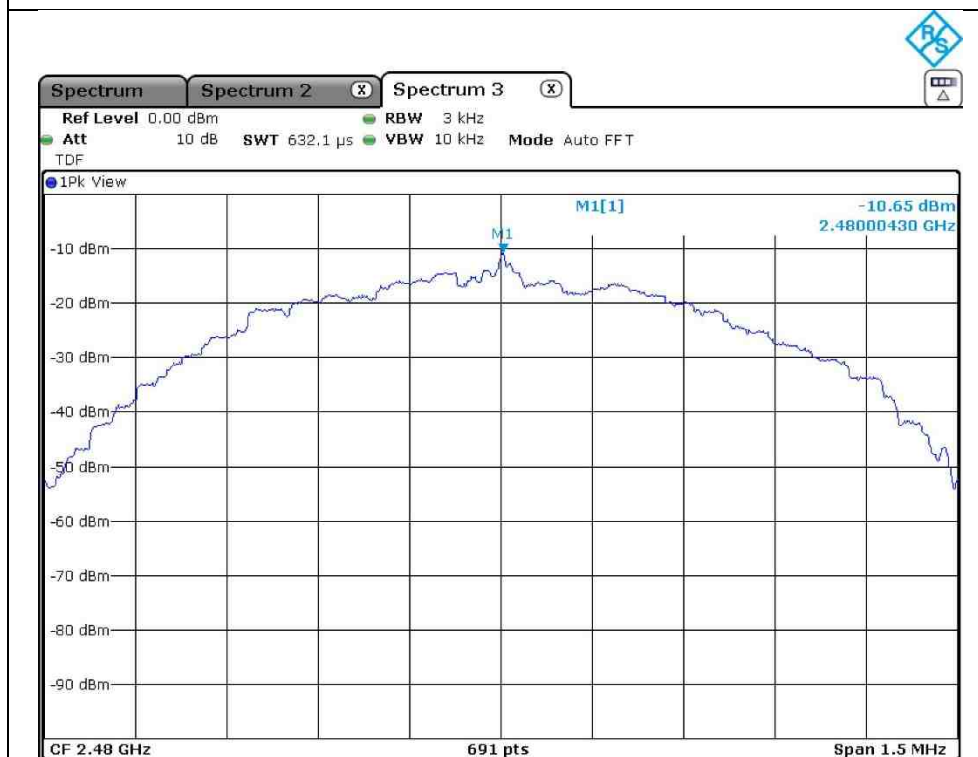
Modulation Type	Channel (Frequency)	Highest signal level (dBm)	Limit (dBm/3 kHz)
Bluetooth LE	0 (2 402 MHz)	-11.27	8
	19 (2 440 MHz)	-11.34	
	39 (2 480 MHz)	-10.65	

7.4.2 Measured Graph





Mid CH



High CH



8. Conducted Spurious Emission

8.1 Operating environment

Temperature : 25 °C

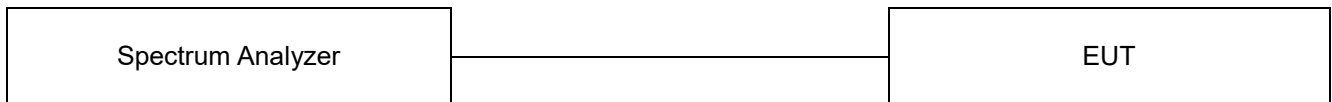
Relative humidity : 48 %

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 kHz, and peak detection was used.



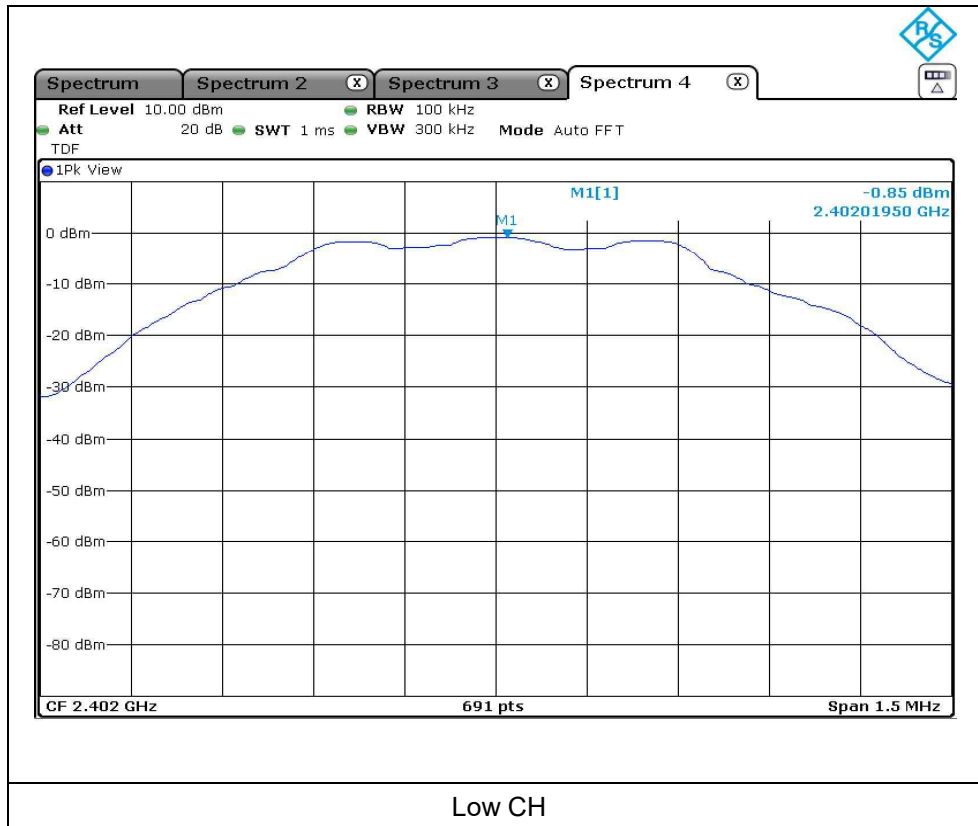


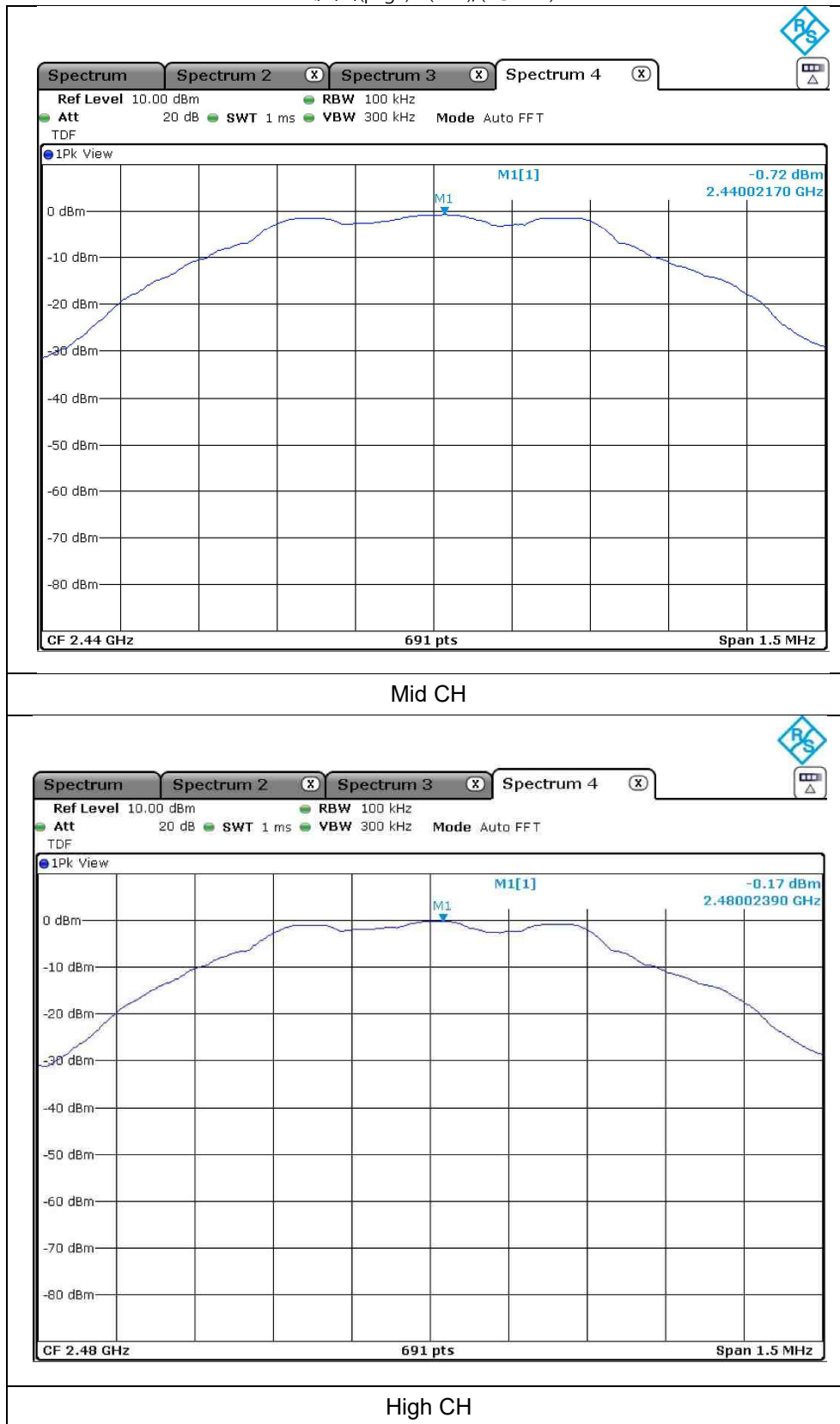
8.4 Test data

Test date : 27. Nov. 2018
Operating mode : Transmit mode
Test Result : Pass

8.4.1 Measured Results

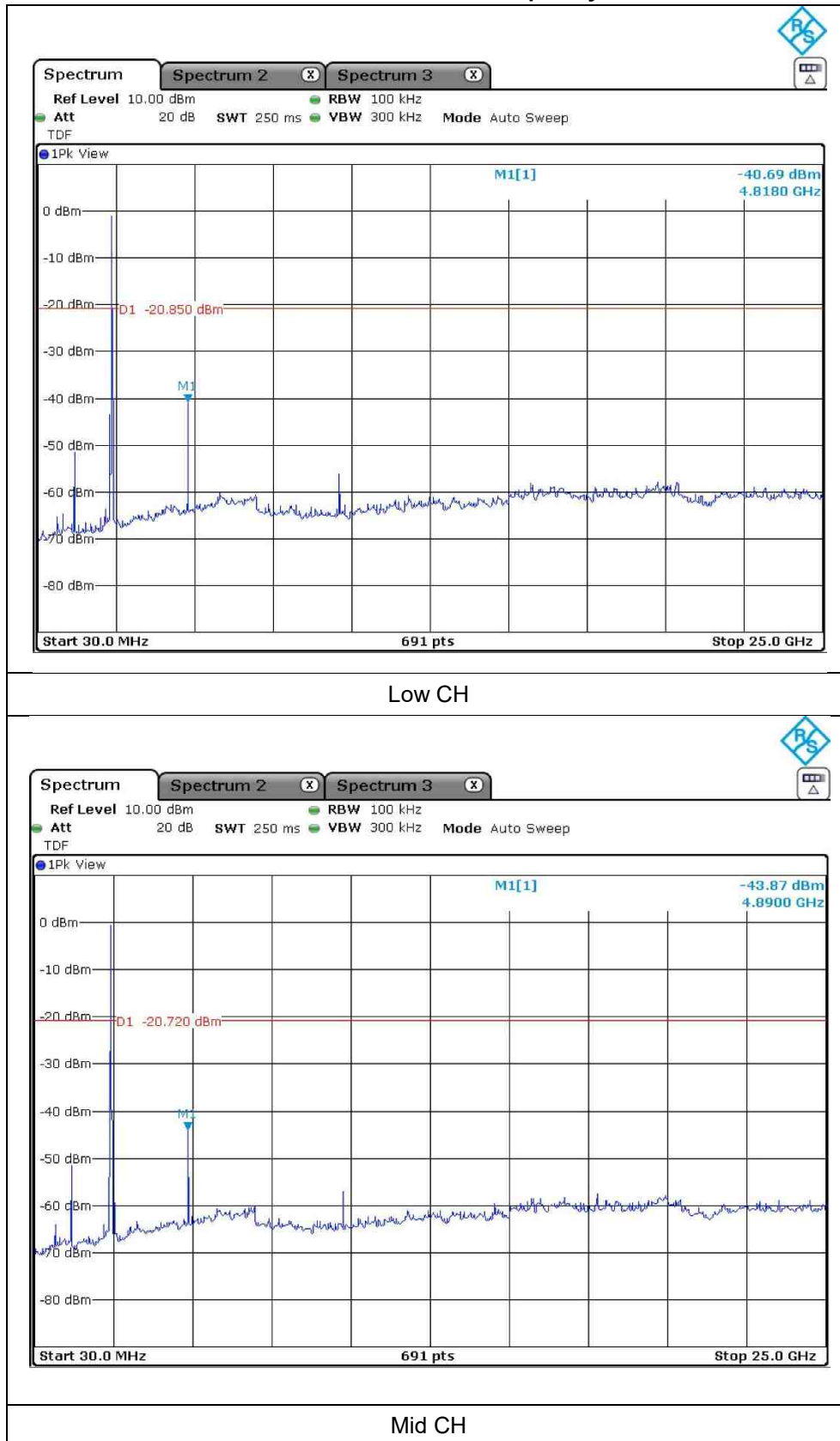
8.4.1.1 Signal level (dB m)

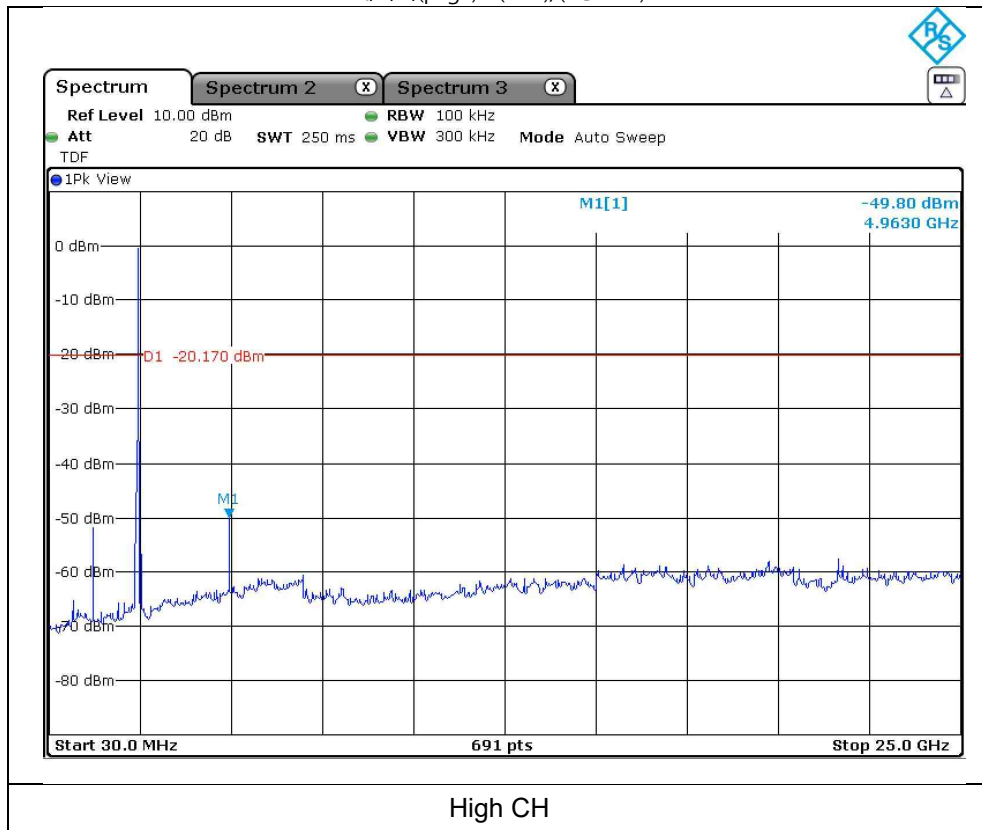






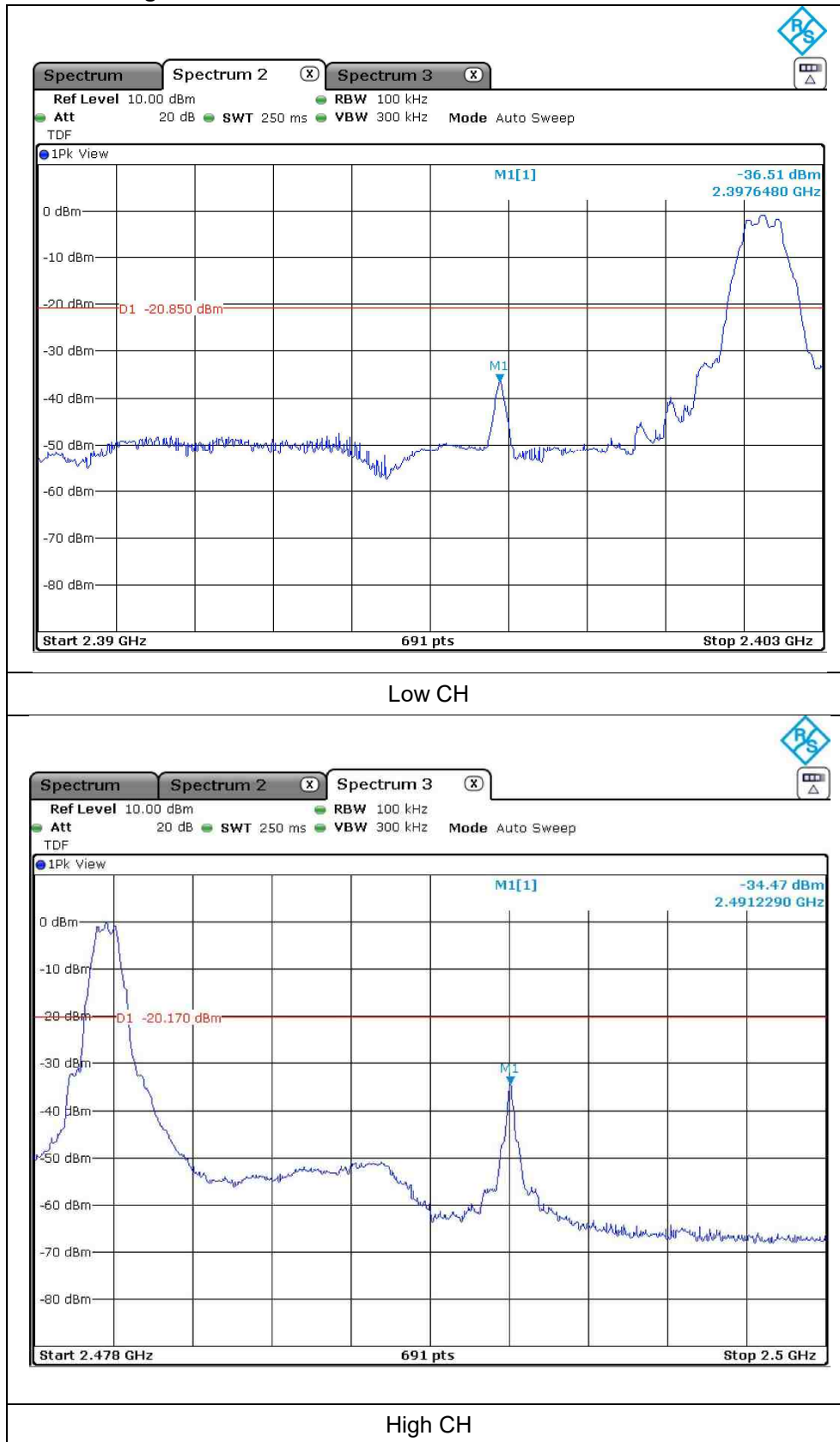
8.4.1.2 Unwanted Emissions In Non-Restricted Frequency Bands







8.4.1.3 Band Edge



9. Radiated Spurious Emission

9.1 Operating environment

Temperature : 25 °C
Relative humidity : 53 %

9.2 Measurement method

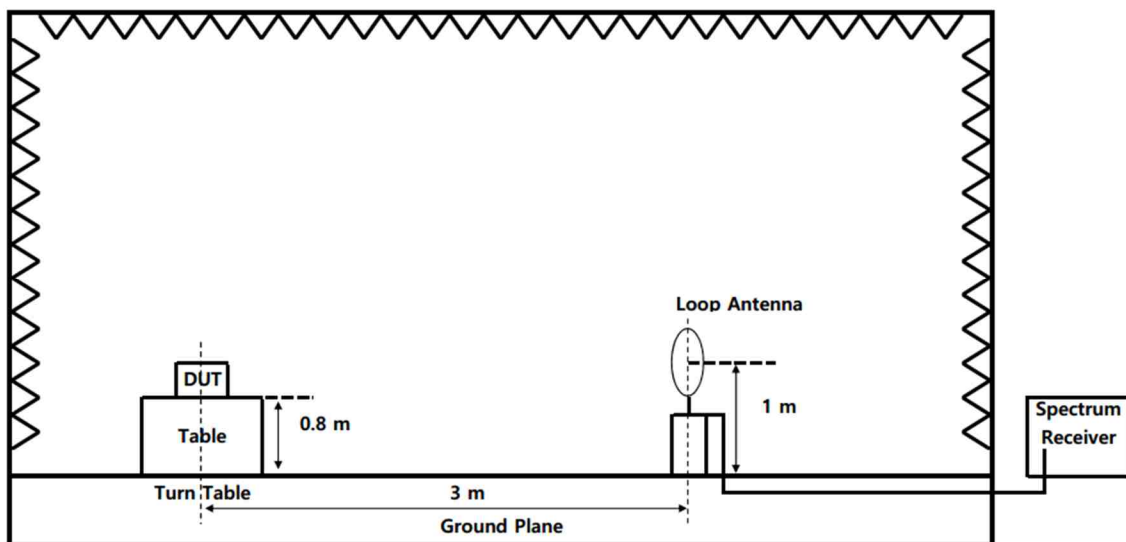
Standard : §15.247 (d), §15.209, §15.205

9.3 Test setup

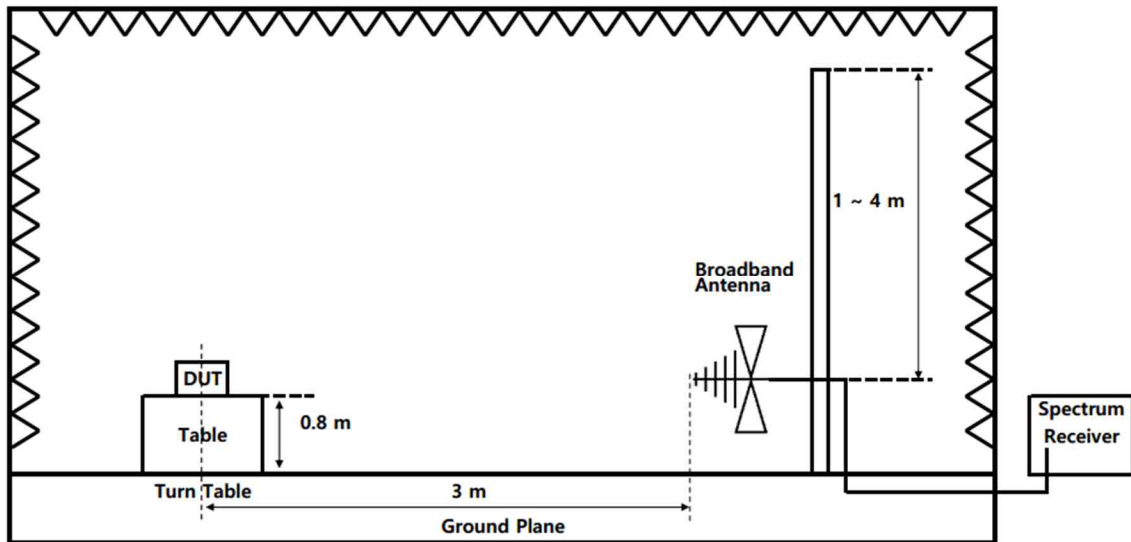
The radiated emissions measurements were performed on the 3 m, open-field test site. The EUT was placed on a non-conductive turntable above the ground plane.

The frequency spectrum from 9 kHz to 26.5 GHz 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.

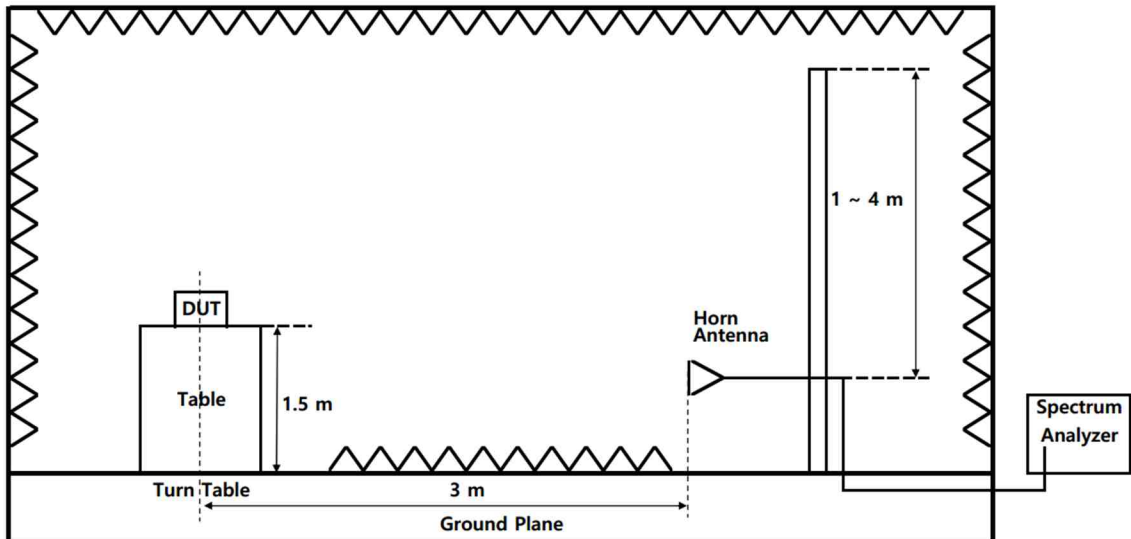
9.3.1 Below 30 MHz



9.3.2 30 MHz to 1 GHz



9.3.3 Above 1 GHz





9.4 Test data

Test date : 28. Nov. 2018
Operating mode : Transmit mode
Test Result : Pass

9.4.1 Test data for Restricted band

Frequency (MHz)	Reading (dB μ V)	Detector	Ant. Pol. (H/V)	Corr. Factor (dB)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
Low CH							
2 387.19	62.90	Peak	H	-11.30	51.60	73.98	-22.38
	46.01	Average	H		34.71	53.98	-19.27
High CH							
2 483.56	63.52	Peak	V	-10.50	53.02	73.98	-20.96
	45.34	Average	V		34.84	53.98	-19.14

- ※ 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

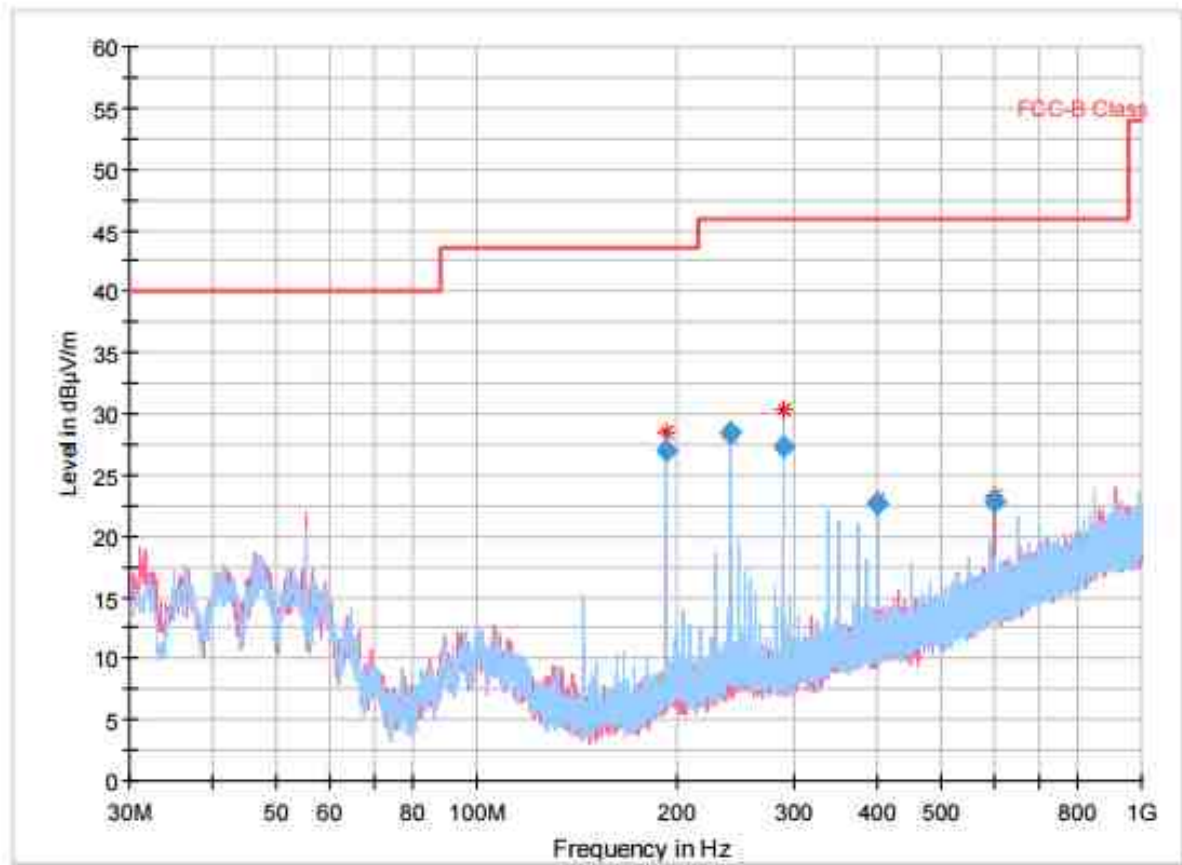
9.4.2.1 Measurement Results for below 30 MHz

Frequency (MHz)	Reading (dB μ V)	Detector	Ant. Pol. (H/V)	Corr. Factor (dB)	Result (dB μ V/m)	Limit (dB μ V/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



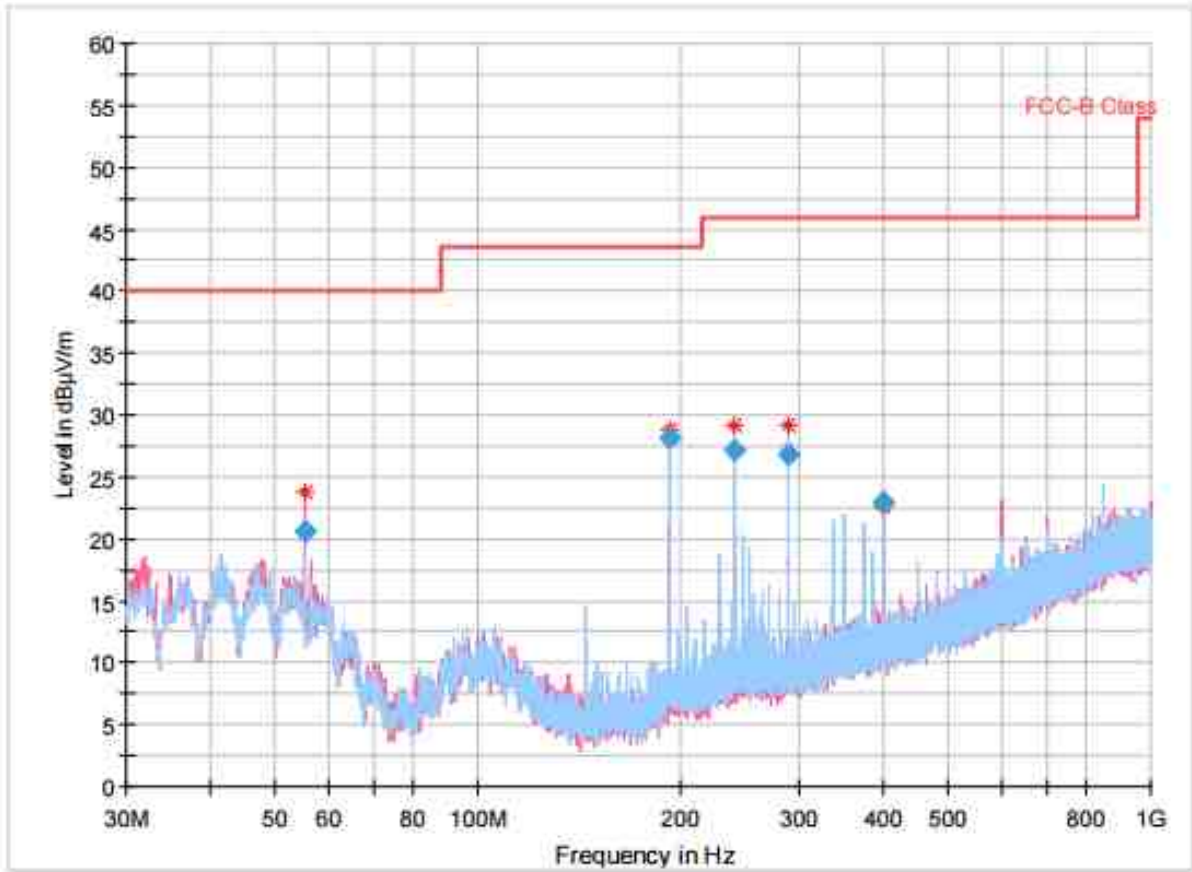
9.4.2.2 Measurement Results for below 1 GHz



Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
192.838750	26.98	43.50	16.52	1000.0	120.000	150.2	H	257.0	-21.6
241.096250	28.51	46.00	17.49	1000.0	120.000	99.7	H	137.0	-19.9
289.475000	27.32	46.00	18.68	1000.0	120.000	99.7	H	164.0	-18.8
399.994375	22.69	46.00	23.31	1000.0	120.000	99.7	V	346.0	-16.0
599.996250	22.78	46.00	23.22	1000.0	120.000	99.7	V	50.0	-12.4

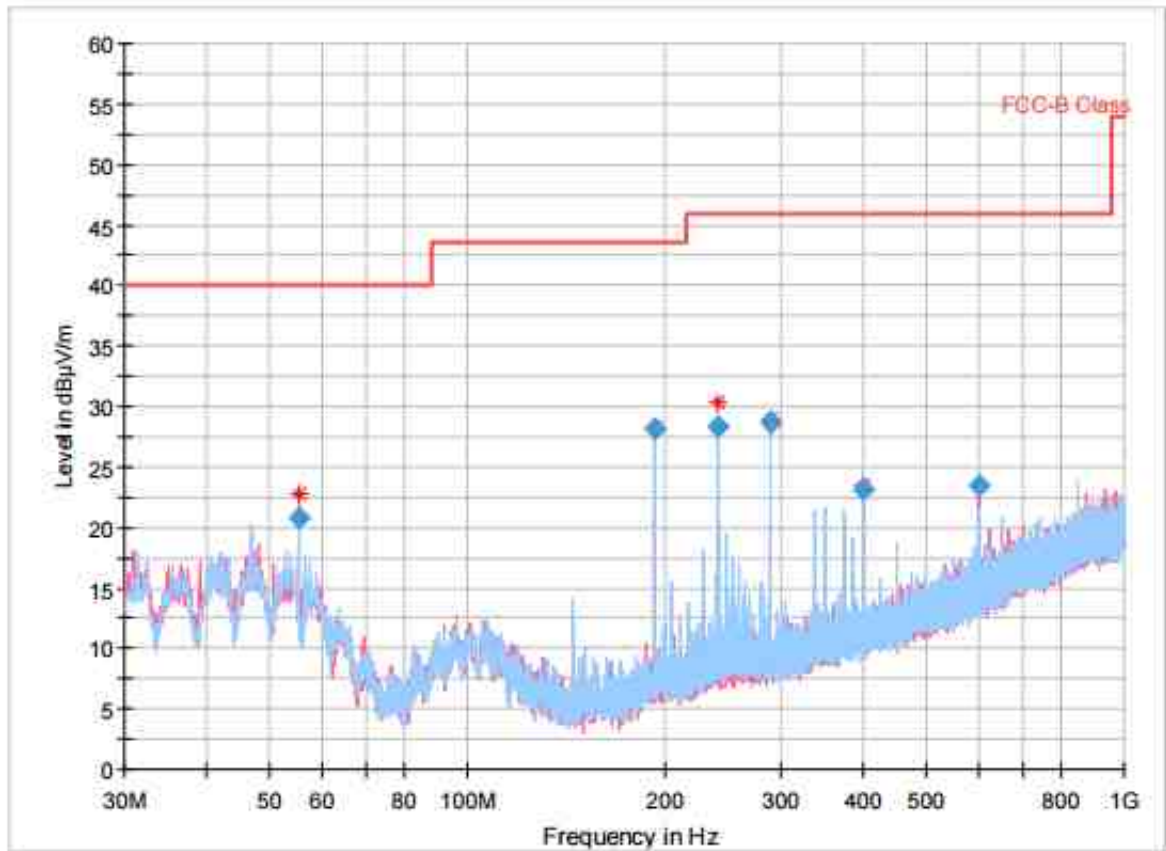
Low CH



Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
55.280625	20.62	40.00	19.38	1000.0	120.000	99.7	V	244.0	-19.0
192.960000	28.14	43.50	15.36	1000.0	120.000	99.7	H	259.0	-21.6
241.217500	27.09	46.00	18.91	1000.0	120.000	99.7	H	289.0	-19.9
289.414375	26.90	46.00	19.10	1000.0	120.000	99.7	H	172.0	-18.8
399.994375	22.89	46.00	23.11	1000.0	120.000	99.7	V	333.0	-16.0

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)
55.280625	20.84	40.00	19.16	1000.0	120.000	100.0	V	344.0	-19.0
192.838750	28.23	43.50	15.27	1000.0	120.000	100.0	H	289.0	-21.6
241.096250	28.28	46.00	17.72	1000.0	120.000	100.0	H	289.0	-19.9
289.293125	28.62	46.00	17.38	1000.0	120.000	100.0	H	147.0	-18.8
399.994375	23.11	46.00	22.89	1000.0	120.000	100.0	H	127.0	-16.0
599.996250	23.52	46.00	22.48	1000.0	120.000	100.0	V	63.0	-12.4

High CH

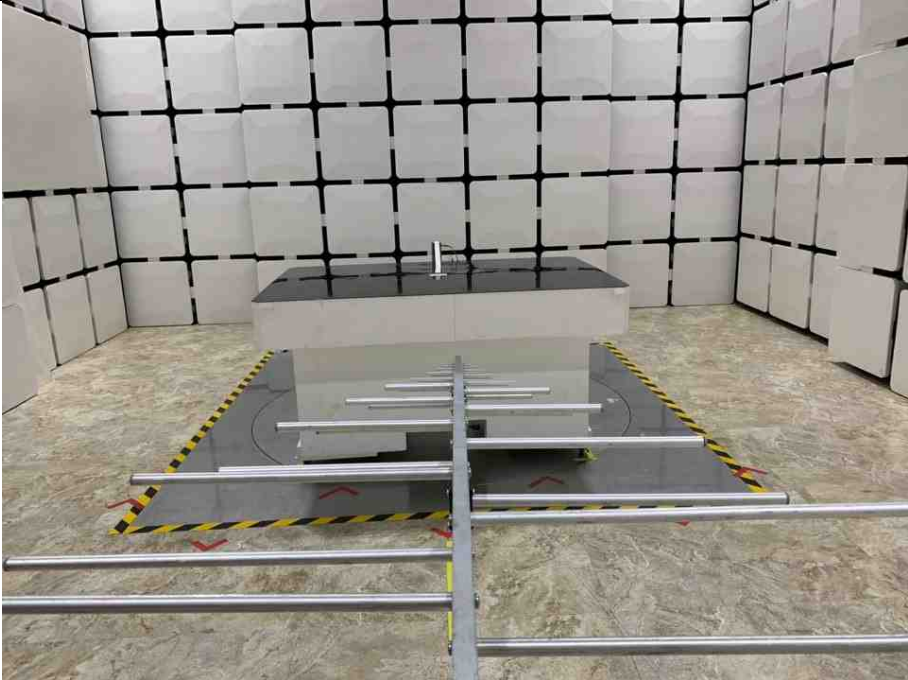


9.4.2.3 Measurement Results for Above 1 GHz

Frequency (MHz)	Reading (dB μ V)	Detector	Ant. Pol. (H/V)	Corr. Factor (dB)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
Low CH							
1 595.00	59.92	Peak	V	-15.10	44.82	73.98	-29.16
	36.62	Average	V		21.52	53.98	-32.46
4 804.00	48.02	Peak	H	-2.70	45.32	73.98	-28.66
	35.51	Average	H		32.81	53.98	-21.17
9 608.00	48.01	Peak	H	3.00	51.01	73.98	-22.97
	36.37	Average	H		39.37	53.98	-14.61
Mid CH							
1 595.00	63.41	Peak	V	-15.10	48.31	73.98	-25.67
	37.84	Average	V		22.74	53.98	-31.24
4 880.00	48.39	Peak	V	-2.50	45.89	73.98	-28.09
	39.13	Average	V		36.63	53.98	-17.35
12 429.10	47.33	Peak	H	6.10	53.43	73.98	-20.55
	32.39	Average	H		38.49	53.98	-15.49
High CH							
1 595.00	64.09	Peak	V	-15.10	48.99	73.98	-24.99
	35.02	Average	V		19.92	53.98	-34.06
1 695.30	53.67	Peak	V	-14.80	38.87	73.98	-35.11
	43.59	Average	V		28.79	53.98	-25.19
4 960.00	50.54	Peak	H	-2.40	48.14	73.98	-25.84
	42.07	Average	H		39.67	53.98	-14.31

- ※ Ant. Pol. : Antenna Polarization
- ※ Corr. Factor. : Antenna Factor + Cable Loss - Amplifier Gain
- ※ Result = Reading + Corr. Factor
- ※ Margin = Result - Limit

10. Test Setup Photo

Test Setup	Radiated measurement for below 1 GHz (Front side)
	
Test Setup	Radiated measurement for below 1 GHz (Rear side)
	

Test Setup	Radiated measurement for Above 1 GHz (Front side)
	
Test Setup	Radiated measurement for Above 1 GHz (Rear side)
	