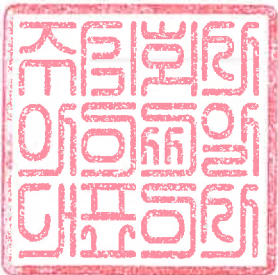




시험 성적서

TEST REPORT

페이지(page) : (1) / (총(Total) 37)

성적서 번호 Report No.		ICRT-TR-E211778-0A	
신청자 Client	기관명 Name	AJAX SYSTEMS CYPRUS HOLDINGS LTD	
	주 소 Address	Ifigeneias, 17, Strovolos, 2007, Nicosia, Cyprus	
시험대상품목 Sample description		Motion detector	
모델명 Type designation		Ajax MotionProtect (9NA)	
정 격 Ratings		DC 3.0 V	
시험장소 Place of test		☒ 고정시험(Inside test) ☐ 현장시험(Field test) 주소지(Address): 112, 113 Hwanggeum 3-ro 7beon-gil, Hagun-ri, Yangchon-eup, Gimpo-si, Gyeonggi-do, Korea	
시험기간 Date of test		19. May. 2021 ~ 30. June. 2021	
시험방법/항목 Test Method/Item		FCC Part 15 Subpart C §15.247 / IC RSS-247	
시험결과 Test Results		Refer to 3. Test Summary	
확 인 Affirmation	작성자 Tested by	기술책임자 Technical Manager	
	성 명 Name Yeong-Hwan, Hong (Signature)	성 명 (서 명) Name Min-Gi, Son (Signature)	
☐ 위 성적서는 고객이 제공한 시료에 대한 시험결과입니다. This is certified that the above mentioned products have been tested for the sample ☐ 위 성적서는 KS Q ISO/IEC 17025 및 한국인정기구(KOLAS)인정과 관련이 없습니다. The above test report is not related to accreditation by KS Q ISO/IEC 17025 and Korea Laboratory Accreditation scheme. ☐ 위 성적서는 주식회사 아이씨알의 승인 없이는 일부 복제에 대해 금지됩니다. The test report is prohibited for some reproduction without the approval of the ICR.			
2021. 08. 02 주식회사 아이씨알 대표이사 The head of INTERNATIONAL CERTIFICATION REGISTRAR			

본 성적서의 진위 확인은 G4B 혹은 ICR 홈페이지에서 가능합니다.

The authenticity of the test report can be checked on the G4B or ICR website.

경기도 김포시 양촌읍 황금3로7번길 112 / Tel: 02-6351-9001 ~ 6



Contents

1. Applicant & Manufacturer & Test Laboratory Information	4
1.1 Applicant information.....	4
1.2 Manufacturer Information	4
1.3 Test Laboratory Information	4
2. Equipment under Test(EUT) Information	5
2.1 General Information.....	5
2.2 Additional Information	5
2.3 Mode of operation during the test	5
2.4 Modifications of EUT	5
3. Test Summary	6
3.1 Test standards and results	6
3.2 Purpose of the test	6
3.3 Test Methodology	6
3.4 Configuration of Test System.....	6
3.5 Antenna requirement.....	7
4. Used equipment on test	8
5. 20 dB Bandwidth & 99 % Bandwidth.....	9
5.1 Operating environment	9
5.2 Measurement method	9
5.3 Test setup	9
5.4 Test data	10
6. Maximum Conducted Peak Output Power	14
6.1 Operating environment	14
6.2 Measurement method	14
6.3 Test setup	14
6.4 Test data	15
7. Hopping Channel Separation	17
7.1 Operating environment	17
7.2 Measurement method	17
7.3 Test setup	17
7.4 Test data	17
8. Number of Hopping Frequency.....	20
8.1 Operating environment	20
8.2 Measurement method	20
8.3 Test setup	20
8.4 Test data	20
9. Average Time of Occpuancy (Dwell Time).....	22
9.1 Operating environment	22
9.2 Measurement method	22
9.3 Test setup	22
9.4 Test data	22
10. Conducted Spurious Emission	25



페이지(page) : (3)/(총(Total) 37)

10.1 Operating environment	25
10.2 Measurement method	25
10.3 Test setup	25
10.4 Test data	25
11. Radiated Spurious Emission	31
11.1 Operating environment	31
11.2 Measurement method	31
11.3 Test setup	31
11.4 Test data	33

Revision History

Issued Report No.	Issued Date	Revisions	Effect Section
ICRT-TR-E211778-0A	02-Aug-2021	Initial Issue	All



1. Applicant & Manufacturer & Test Laboratory Information

1.1 Applicant information

Applicant	AJAX SYSTEMS CYPRUS HOLDINGS LTD
Address	Ifigeneias, 17, Strovolos, 2007, Nicosia, Cyprus
Contact Person	Iryna Khimych
Telephone No.	+380502279000
Fax No.	+380502279000
E-mail	ajax.systems.fcc@gmail.com

1.2 Manufacturer Information

Manufacturer 1	Ajax Systems Manufacturing Limited Liability Company
Address	Sklyarenka, 5, Kyiv, 04073 Ukraine

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
Test Firm Registration Number	490614



2. Equipment under Test(EUT) Information

2.1 General Information

Product Name	Motion detector
Model Name	Ajax MotionProtect (9NA)
Additional Model Name	-
FCC ID / IC ID	2AX5VMOTPRO-NA / 26860-MOTPRONA1
Power Supply	DC 3.0 V

2.2 Additional Information

Equipment Class	DSS-Spread Spectrum Transmitter
Device Type	Stand-alone
Operating Frequency	905 MHz ~ 926.5 MHz
RF Output Power	13.17 dBm
Number of Channel	103
Modulation Type	FHSS Modulation
Antenna Type	Spring Antenna
Antenna Gain	-2dBi
Antenna Operating Mode	Single Antenna Equipment with only one antenna

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) (1)	RSS-247 5.1 (a) RSS-Gen 6.7	20 dB Bandwidth & 99 % Bandwidth	☒	PASS
§15.247 (b) (2)	RSS-247 5.4 (b)	Peak Output Power	☒	PASS
§15.247 (e)	RSS-247 5.1 (d)	Number of Hopping Frequency	☒	PASS
§15.247 (a) (1)	RSS-247 5.1 (b)	Hopping Channel Separation	☒	PASS
§15.247 (i)	RSS-247 5.1 (d)	Average Time of Occpuancy	☒	PASS
§15.247 (d)	RSS-247 5.5	Conducted Spurious Emission	☒	PASS
§15.247 (d) & §15.209 & §15.205	RSS-247 5.5 RSS-GEN 8.9 RSS-GEN 8.10	Radiated Spurious Emission	☒	PASS
§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 ***Spring Antenna***. The directional gain of the antenna is ***-2.0 dBi***.



4. Used equipment on test

	Description	Model Name	Serial Number	Manufacturer	Next Cal. (cycle)
☒	Spectrum analyzer	FSV40	101455	Rohde & Schwarz	2022. 06. 16 (1Y)
☒	Signal Generator	SMB100A	180607	Rohde & Schwarz	2022. 03. 03 (1Y)
☒	DC Power Supply	XDL 35-5P	J00385373	Sorensen	2022. 03. 03 (1Y)
☒	Loop Antenna	HFH2-Z2	100506	Rohde & Schwarz	2023. 07. 05 (2Y)
☒	TRILOG BROADBAND ANTENNA	VULB9162	120	SCHWARZBECK	2022. 12. 15 (2Y)
☒	RF Pre Amplifier	SCU08	100747	Rohde & Schwarz	2022. 04. 14 (1Y)
☒	DOUBLE-RIDGE WAVEGUIDE HORN ANTENNA	HF907	102556	Rohde & Schwarz	2022. 08. 21 (1Y)
☒	RF Pre Amplifier	SCU18	102342	Rohde & Schwarz	2022. 04. 14 (1Y)
☒	Horn Antenna	LB-42-10-C-KF	J202024625	AINFO Inc.	2022. 03. 04 (1Y)
☒	RF Pre Amplifier	AMF-4F-18265-35-8P-1	771846	MITEQ	2022 .03. 04 (1Y)
☒	Horn Antenna	LB-28-10-C-KF	J202024627	AINFO Inc.	2022. 03. 04 (1Y)
☒	RF Pre Amplifier	AMF-4D-260400-45-6P	779919	MITEQ	2022 .03. 04 (1Y)
☒	EMI Test Receiver	ESR26	101461	Rohde & Schwarz	2022. 04. 14 (1Y)
☒	EMI Test Receiver	ESR26	101462	Rohde & Schwarz	2022. 04. 14 (1Y)
☒	ATTENUATOR	WA76-20-1313	1633	WEINSCHEL	2022. 03. 14 (1Y)
☒	Spectrum analyzer	N9020A	MY51110087	Agilent	2022. 07. 12 (1Y)

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



5. 20 dB Bandwidth & 99 % Bandwidth

5.1 Operating environment

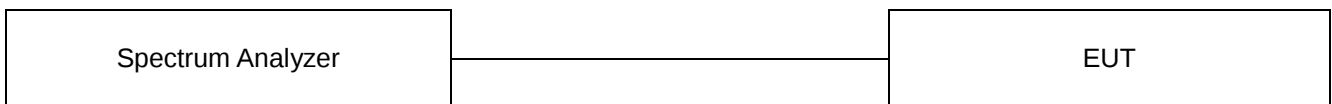
Temperature : 25 °C
Relative humidity : 46 %

5.2 Measurement method

Standard : §15.247 (a) (1) / RSS-247 (5.1 a) & RSS-Gen(6.7)

5.3 Test setup

The antenna output of the EUT was connected to the spectrum analyzer. The resolution bandwidth is set to 10 kHz, and peak detection was used. The 20 dB bandwidth is defined as the total spectrum over which the power is higher than the peak power minus 20 dB.





5.4 Test data

Test date : 01. June. 2021
Operating mode : Transmit mode
Test Result : Pass

5.4.1 Measured Results

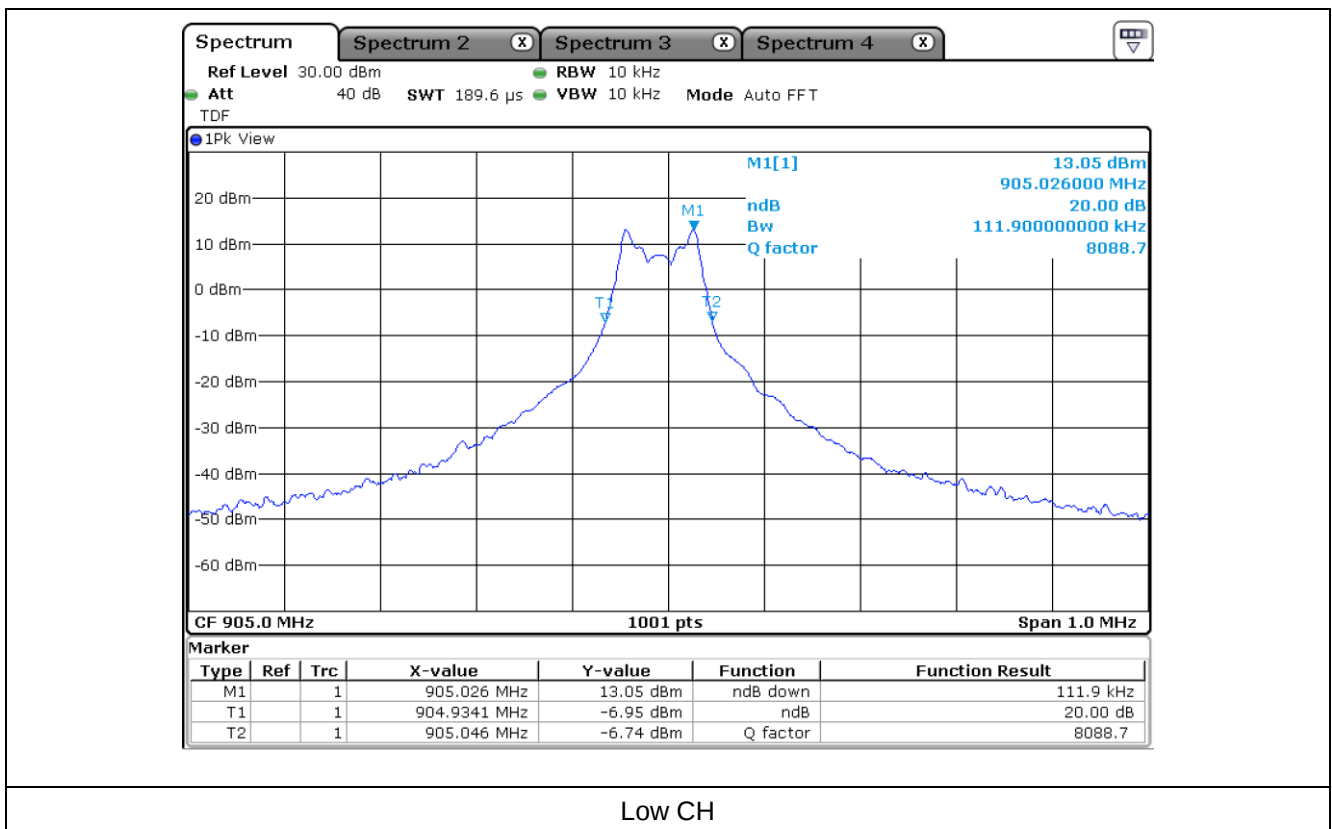
5.4.1.1 20 dB Bandwidth Measured Results

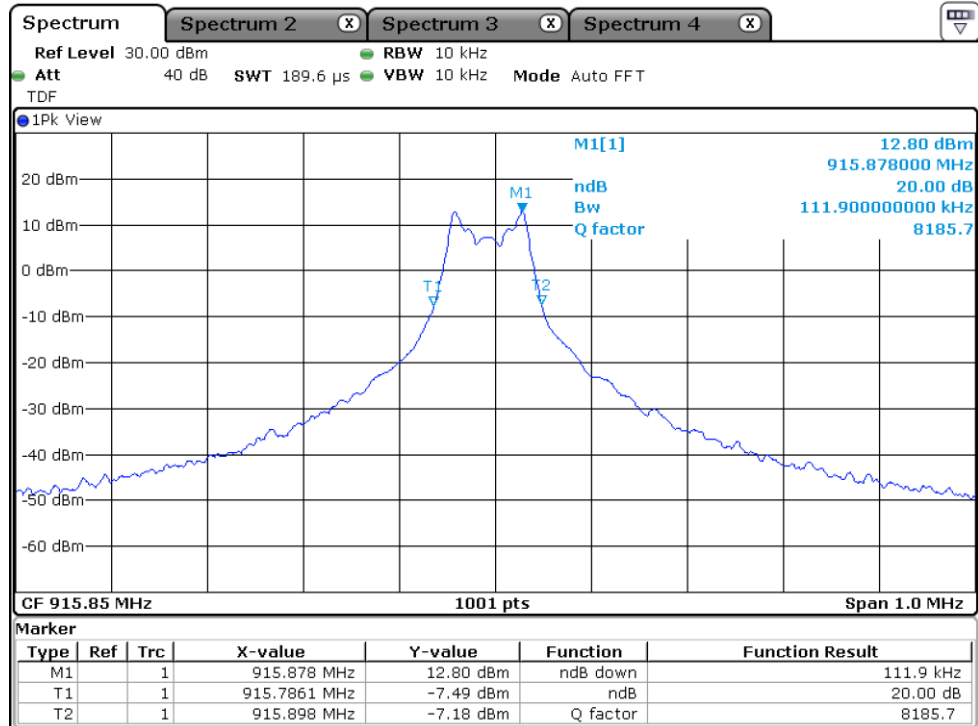
Modulation Type	Channel (Frequency)	Measured Value (MHz)	Limit (kHz)
GFSK	1 (905 MHz)	111.9	250
	52 (915.85 MHz)	111.9	
	103 (926.5 MHz)	110.9	

5.4.1.2 99 % Bandwidth Measured Results

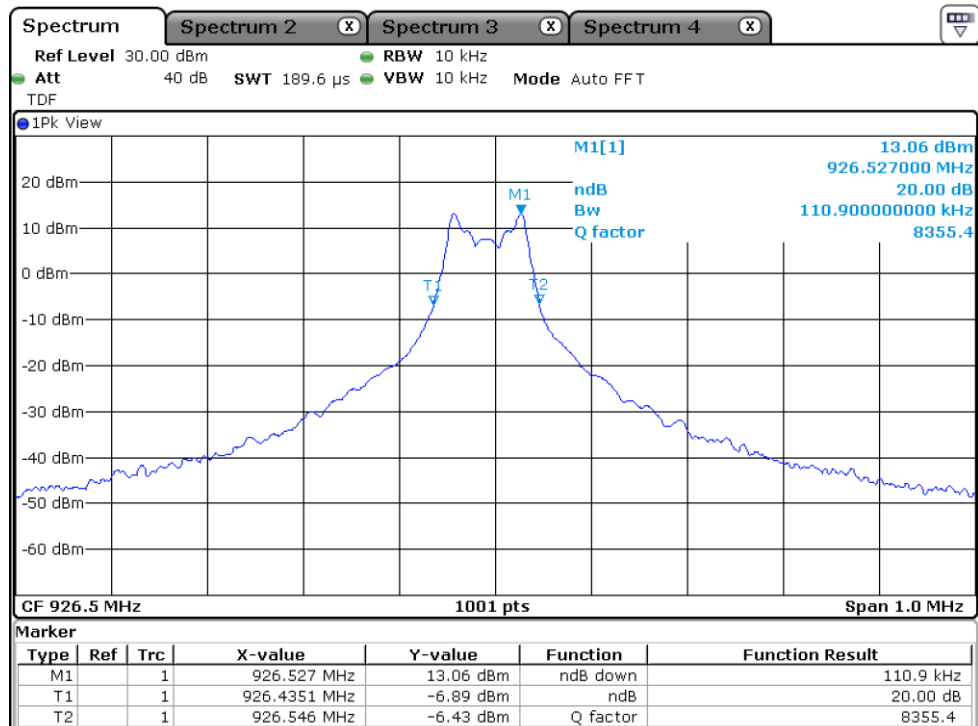
GFSK	1 (905 MHz)	101.9	250
	52 (915.85 MHz)	101.9	
	103 (926.5 MHz)	100.9	

5.4.2 Measured Graph for 20 dB Bandwidth





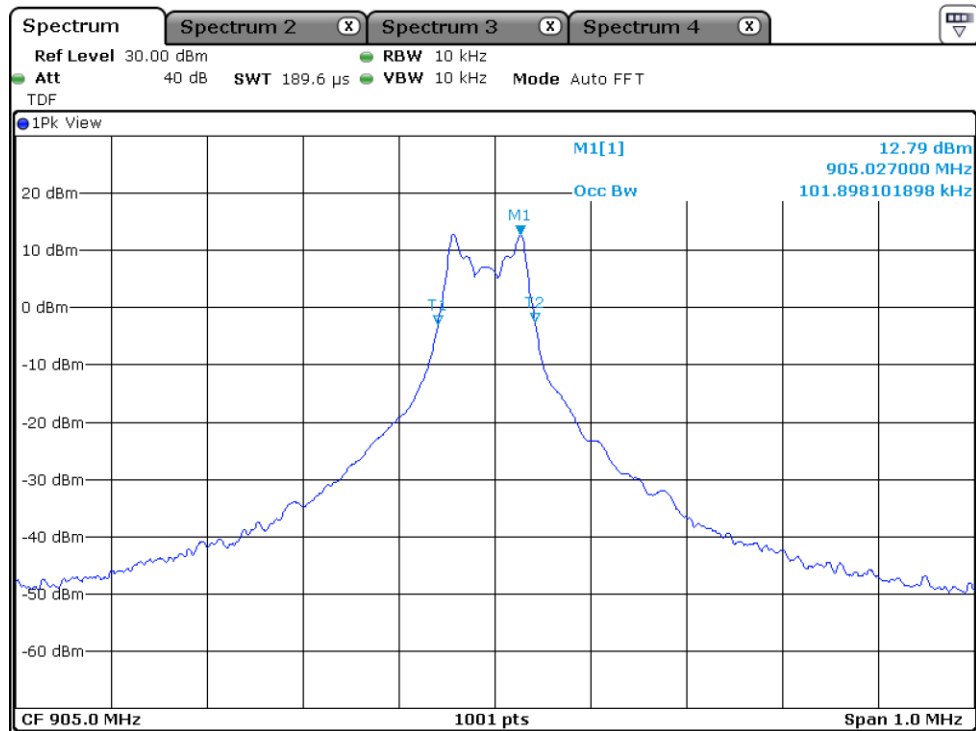
Mid CH



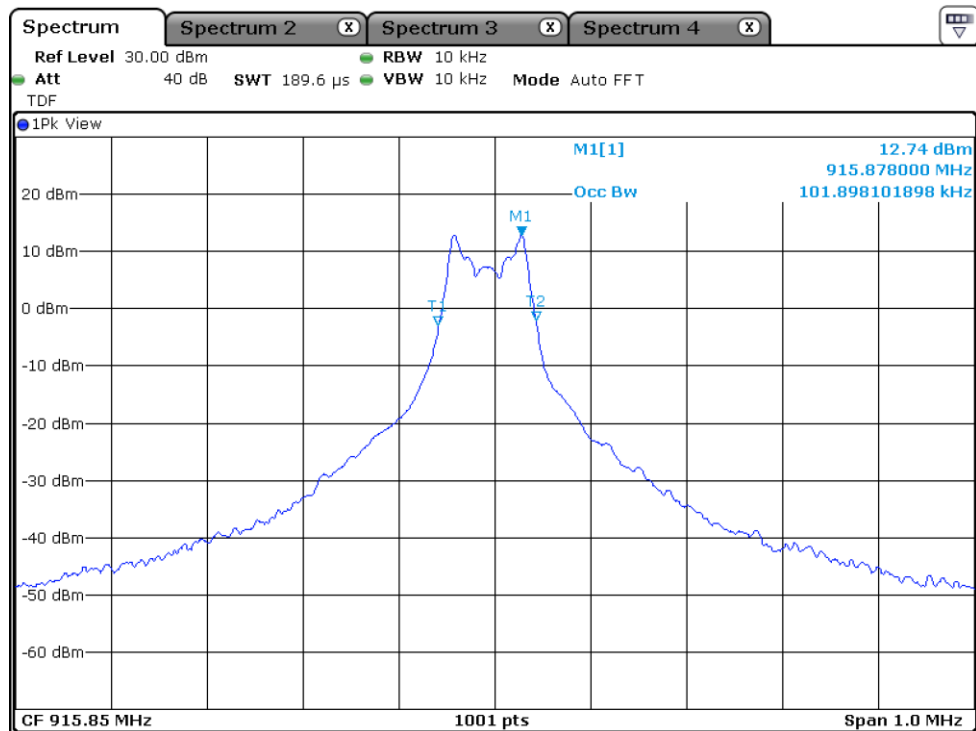
High CH



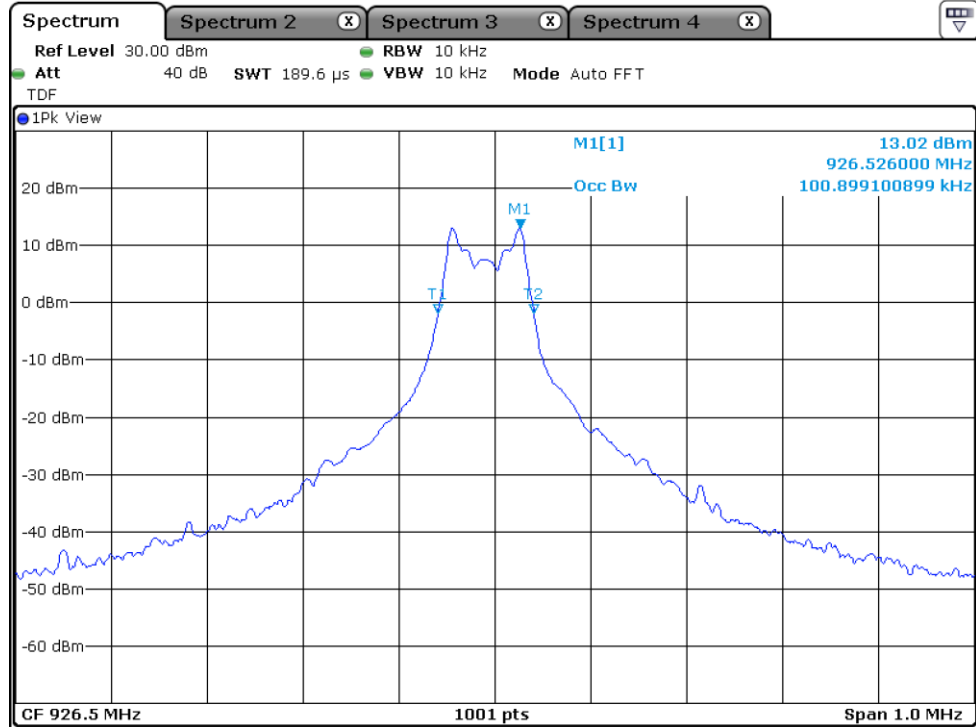
5.4.3 Measured Graph for 99 % Bandwidth



Low CH



Mid CH



High CH



6. Maximum Conducted Peak Output Power

6.1 Operating environment

Temperature : 25 °C

Relative humidity : 46 %

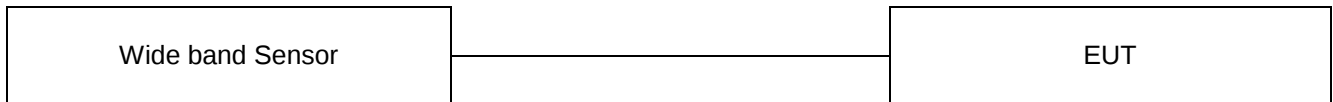
6.2 Measurement method

Standard : §15.247 (b) (2) / RSS-247 (5.4 b)

6.3 Test setup

The maximum peak output power was measured with the wide band sensor connected to the antenna output power of the EUT. The Wide Band Sensor is measured when the EUT is transmitting at the appropriate center frequency its maximum power control level as described in Section 8.3(558074 D01 15.247 Meas Guidance v05r02).

Since this measurement is made only during the ON time of the transmitter, no duty cycle correction is required.





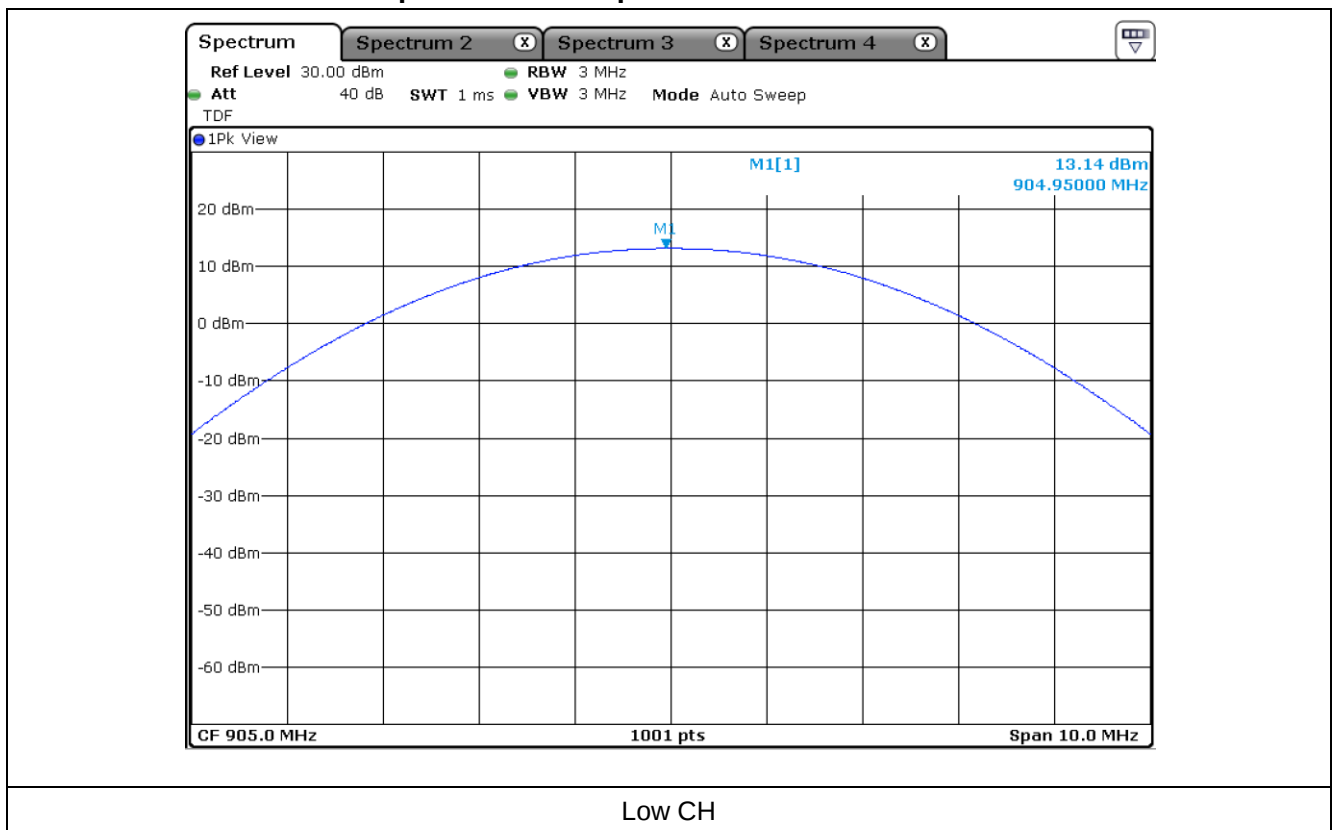
6.4 Test data

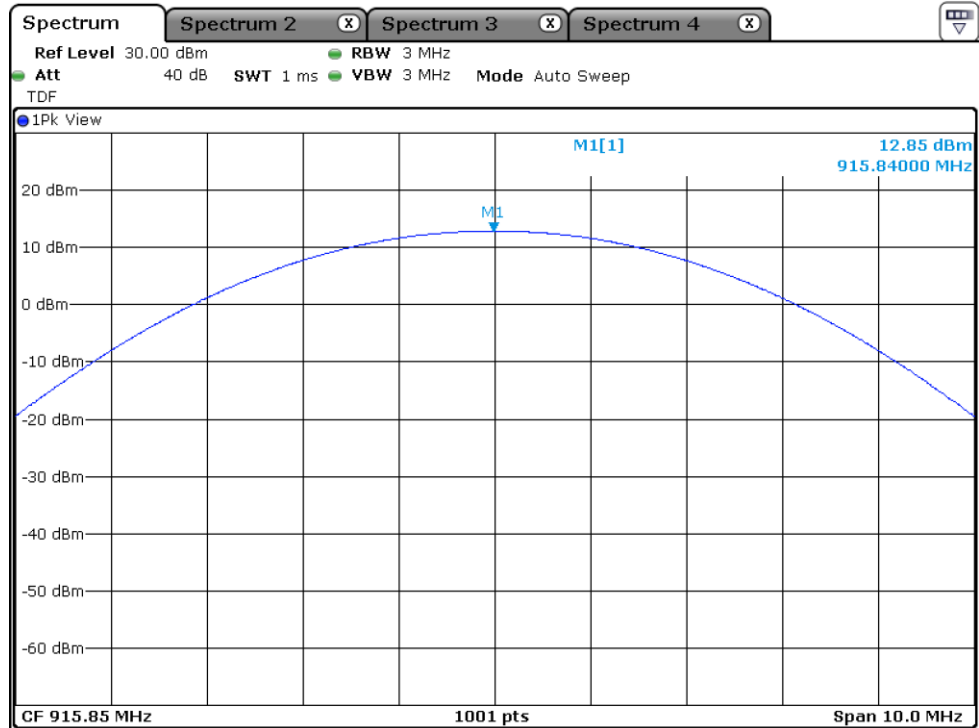
Test date : 01. June. 2021
 Operating mode : Transmit mode
 Test Result : Pass

6.4.1 Measured Results

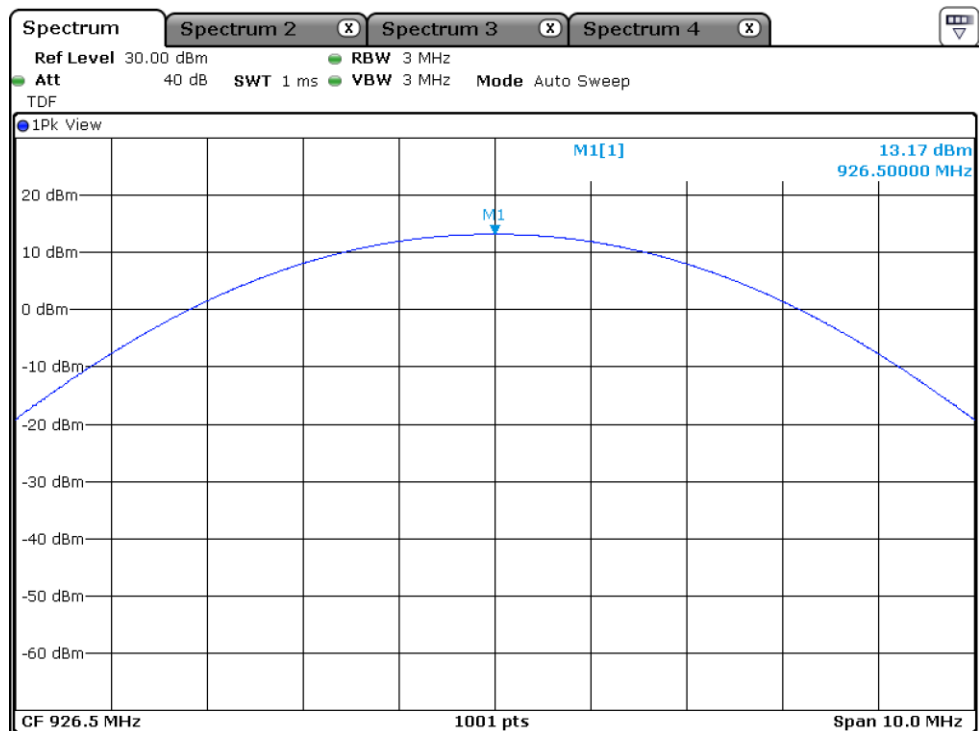
Modulation Type	Channel (Frequency)	Measured Value (dBm)	Limit (dBm)
GFSK	1 (905 MHz)	13.14	30
	52 (915.85 MHz)	12.85	
	103 (926.5 MHz)	13.17	

6.4.2 Measured Graph for Peak Output Power





Mid CH



High CH



7. Hopping Channel Separation

7.1 Operating environment

Temperature : 25 °C

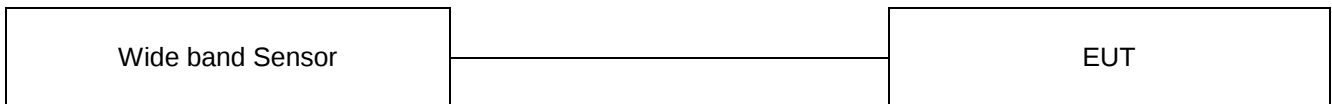
Relative humidity : 46 %

7.2 Measurement method

Standard : §15.247 (a) (1) / RSS-247 (5.1 b)

7.3 Test setup

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



7.4 Test data

Test date : 01. June. 2021

Operating mode : Transmit mode

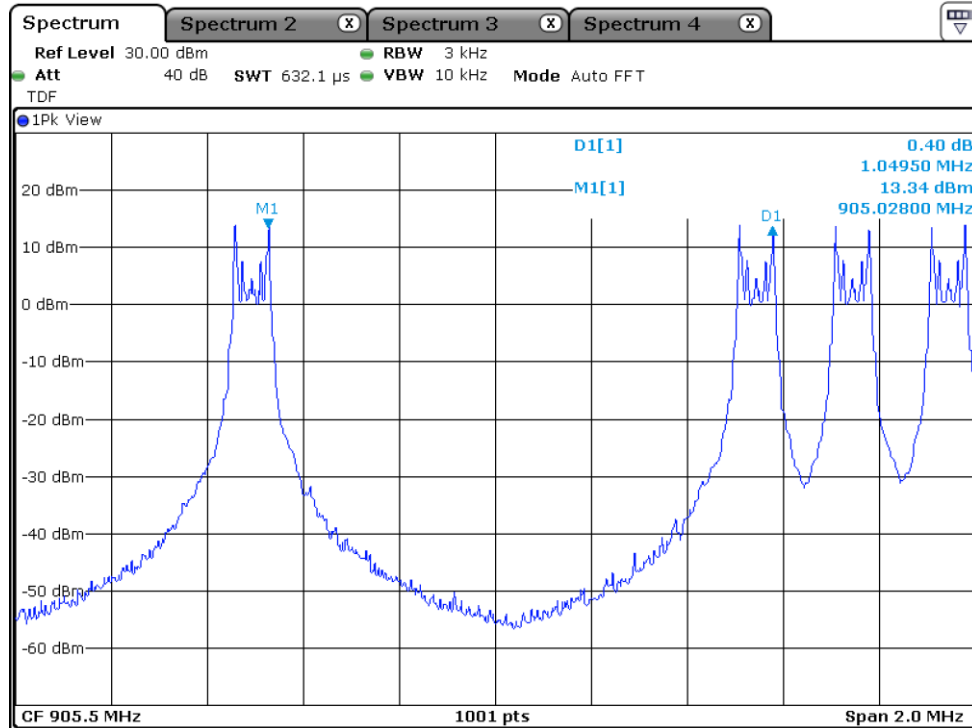
Test Result : Pass

7.4.1 Measured Results

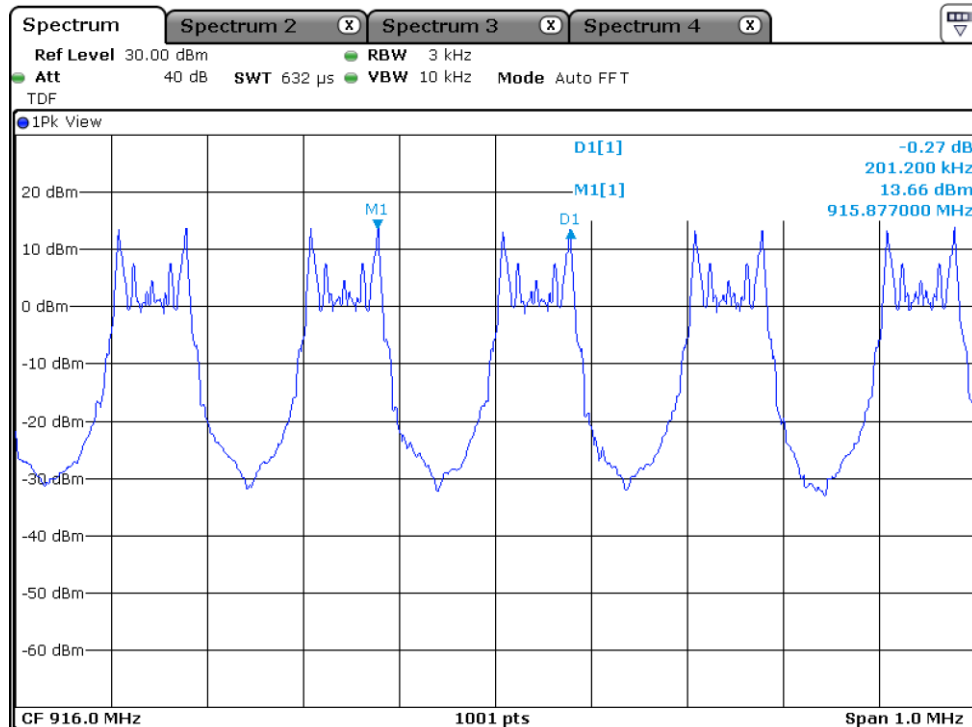
Modulation Type	Channel (Frequency)	Measured Value (kHz)	Limit (kHz)
GFSK	1 (905 MHz)	1049.5	> 111.9
	52 (915.85 MHz)	201.2	> 111.9
	103 (926.5 MHz)	649.9	> 110.9



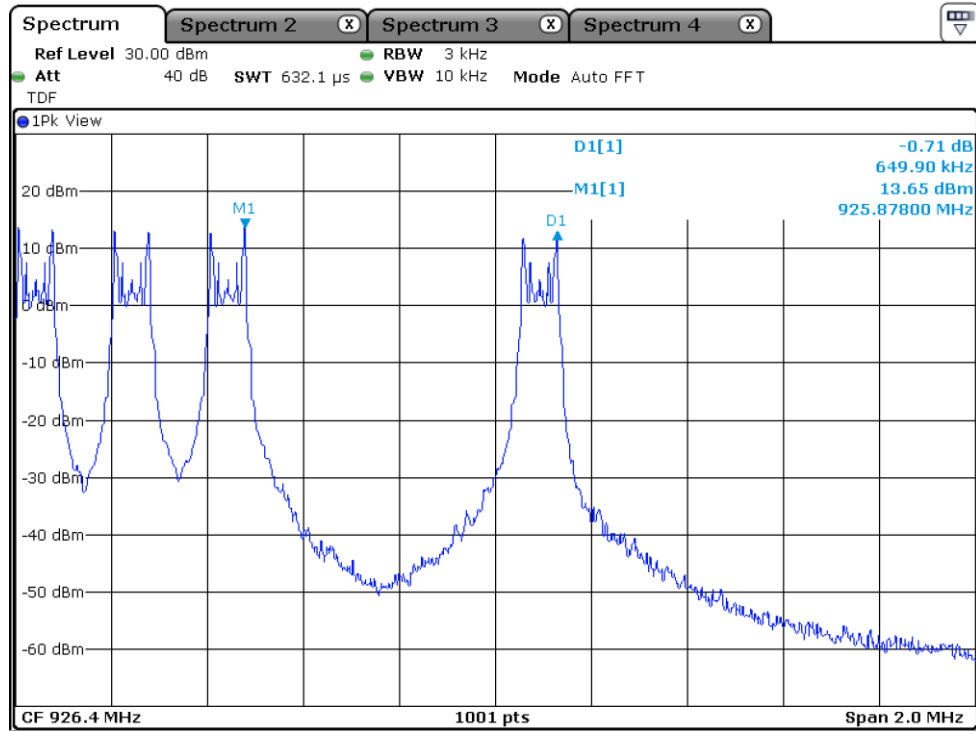
7.4.2 Measured Graph for Peak Output Power



Low CH



Mid CH



High CH



8. Number of Hopping Frequency

8.1 Operating environment

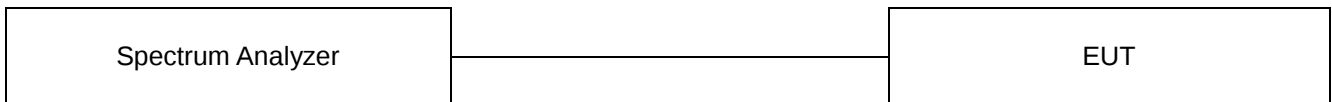
Temperature : 25 °C
Relative humidity : 46 %

8.2 Measurement method

Standard : §15.247 (i) / RSS-247 (5.1 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



8.4 Test data

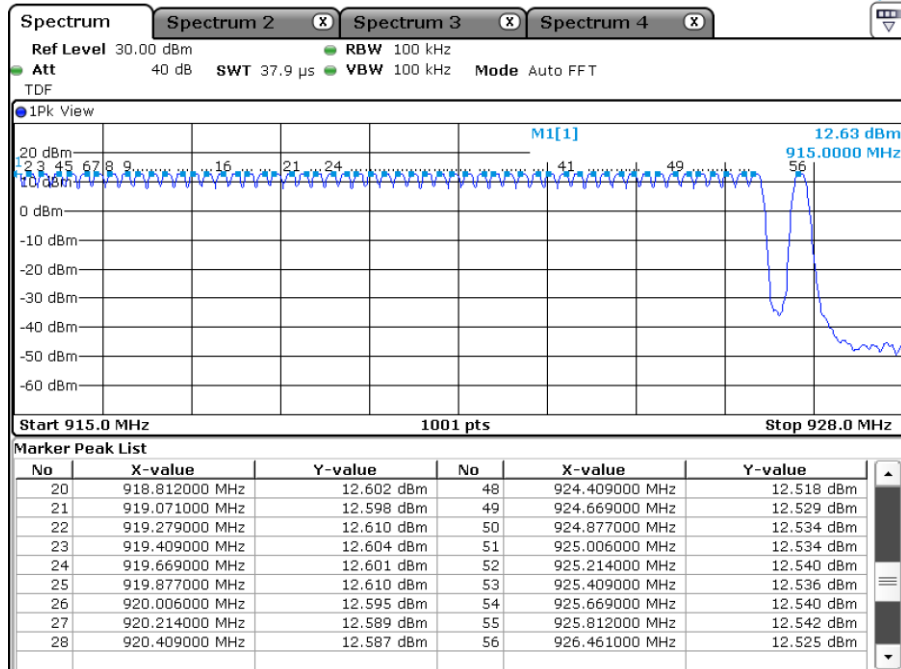
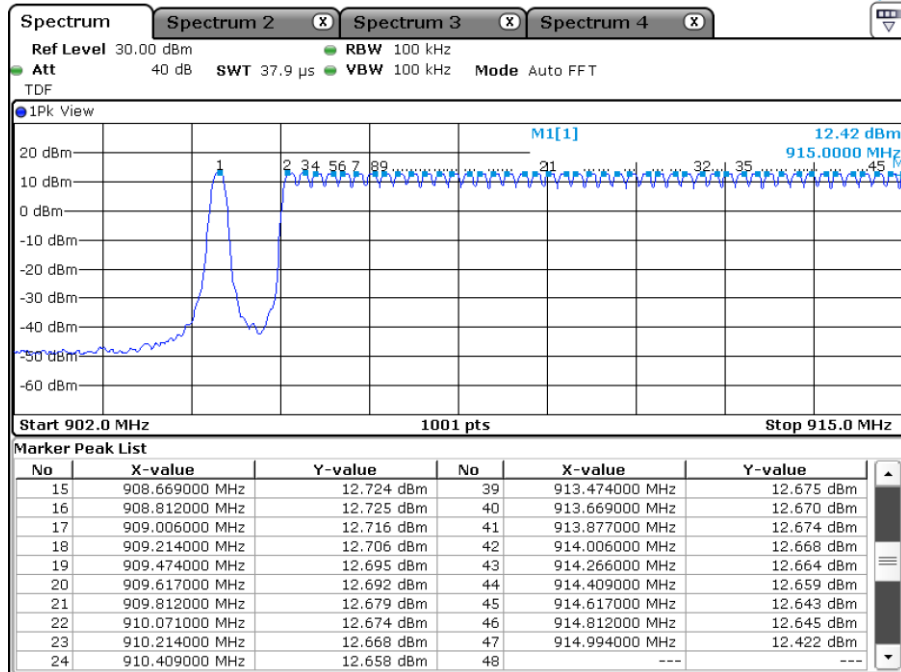
Test date : 01. June. 2021
Operating mode : Transmit mode
Test Result : Pass

8.4.1 Measured Results

Modulation Type	Number of Hopping (Channel)
GFSK	103



8.4.2 Measured Graph for Number of Hopping Frequency





9. Average Time of Occpuancy (Dwell Time)

9.1 Operating environment

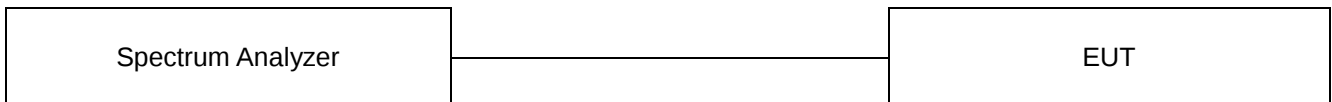
Temperature : 25 °C
Relative humidity : 46 %

9.2 Measurement method

Standard : §15.247 (a)(i) / RSS-247 (5.1 d)

9.3 Test setup

The antenna output of the EUT was connected to the spectrum analyzer. The resolution and Video bandwidth is set to 1 MHz, and peak detection was used.



9.4 Test data

Test date : 30. July. 2021
Operating mode : Transmit mode
Test Result : Pass

9.4.1 Measured Results

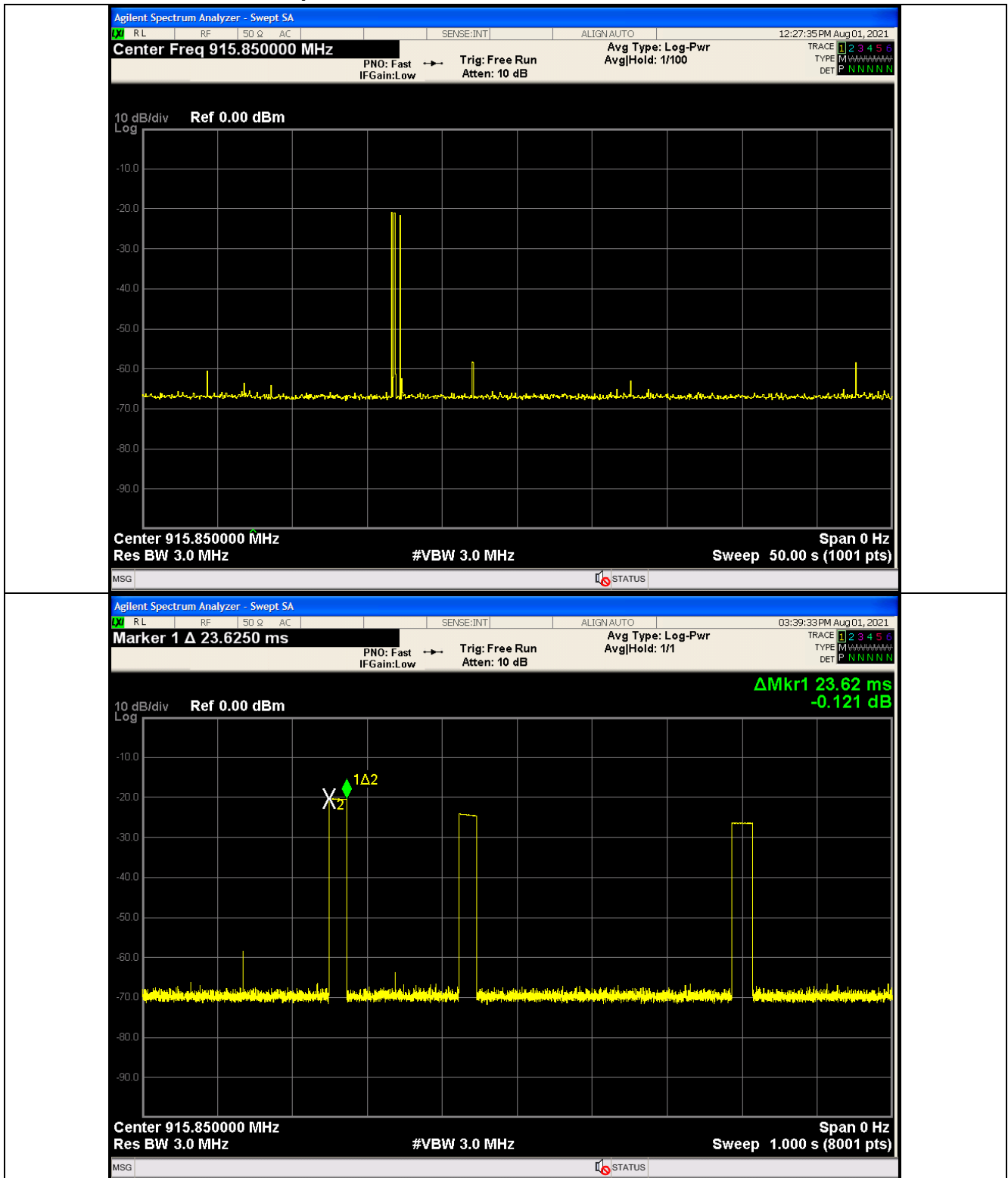
Modulation type	Channel (Frequency)	Transmit Time per Hop (ms)	The Numberof Hop Withina limited time (N)	Dwell Time (s)	Limit (s)
GFSK	52 (915.85 MHz)	75.11	1	0.075	0.4

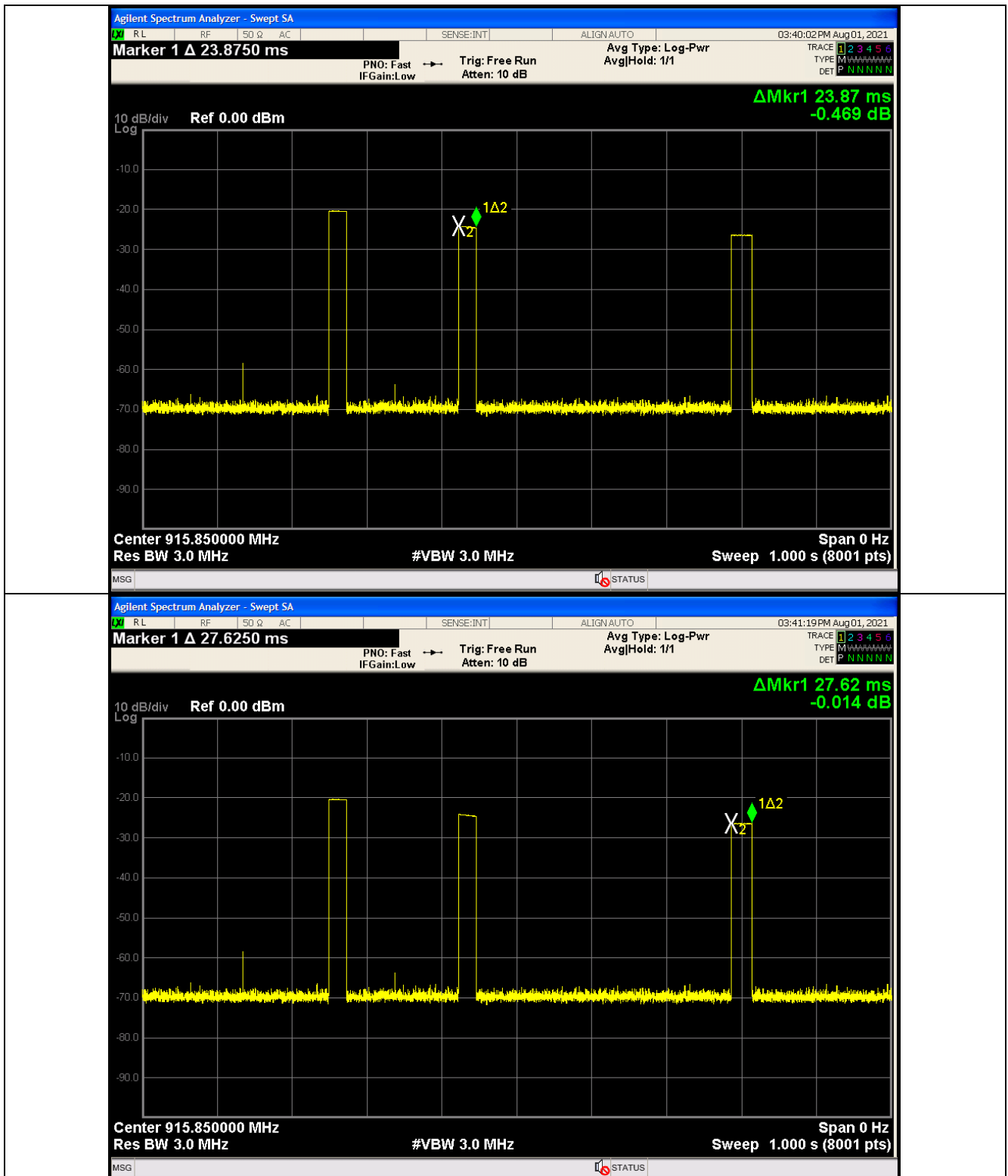
※ $T_{on} = 23.62 \text{ ms} + 23.87 \text{ ms} + 27.62 \text{ ms} = 75.11 \text{ ms}$

※ $Dwell \text{ Time(s)} = \text{Transmit Timeper Hop} \times N$



9.4.2 Measured Graph for Dwell Time







10. Conducted Spurious Emission

10.1 Operating environment

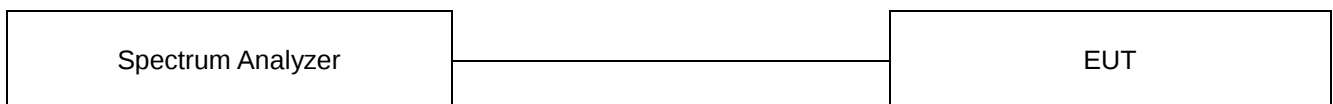
Temperature : 25 °C
Relative humidity : 46 %

10.2 Measurement method

Standard : §15.247 (d) / RSS-247 (5.5)

10.3 Test setup

The antenna output of the EUT was connected to the spectrum analyzer. The resolution bandwidth is set to 100 kHz and video bandwidth is 3 times the resolution bandwidth, and peak detection was used.

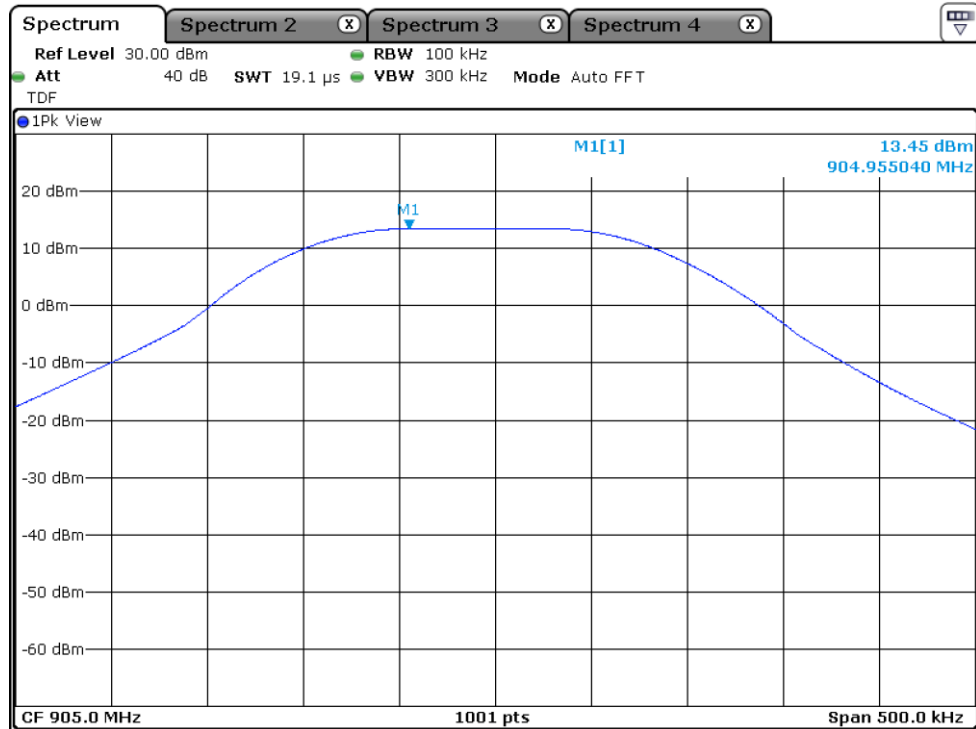


10.4 Test data

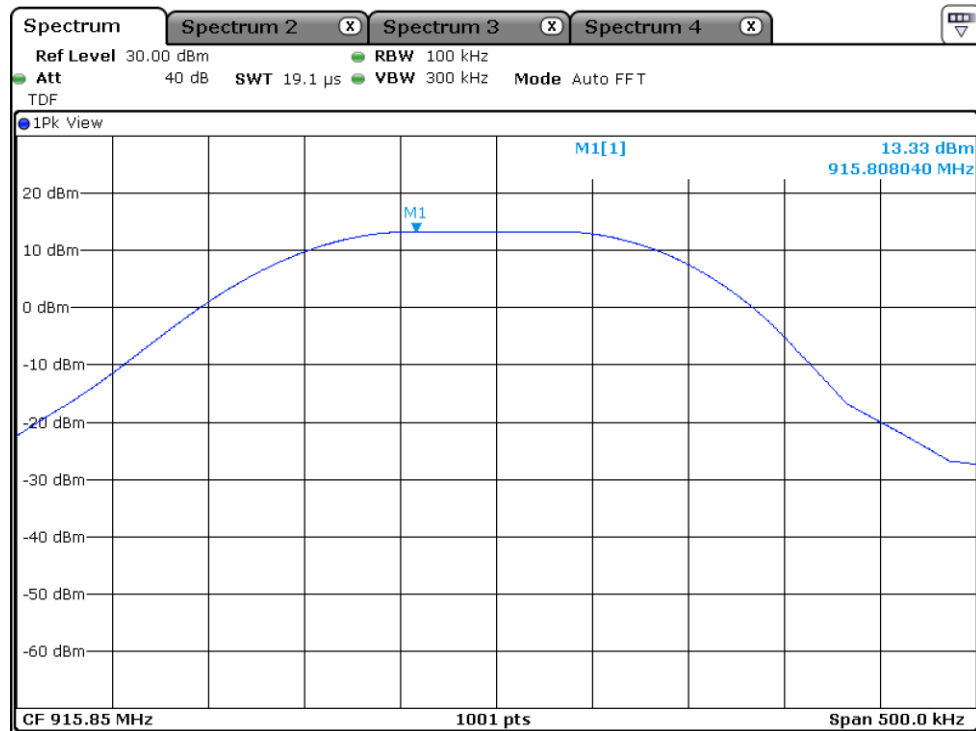
Test date : 01. June. 2021
Operating mode : Transmit mode
Test Result : Pass



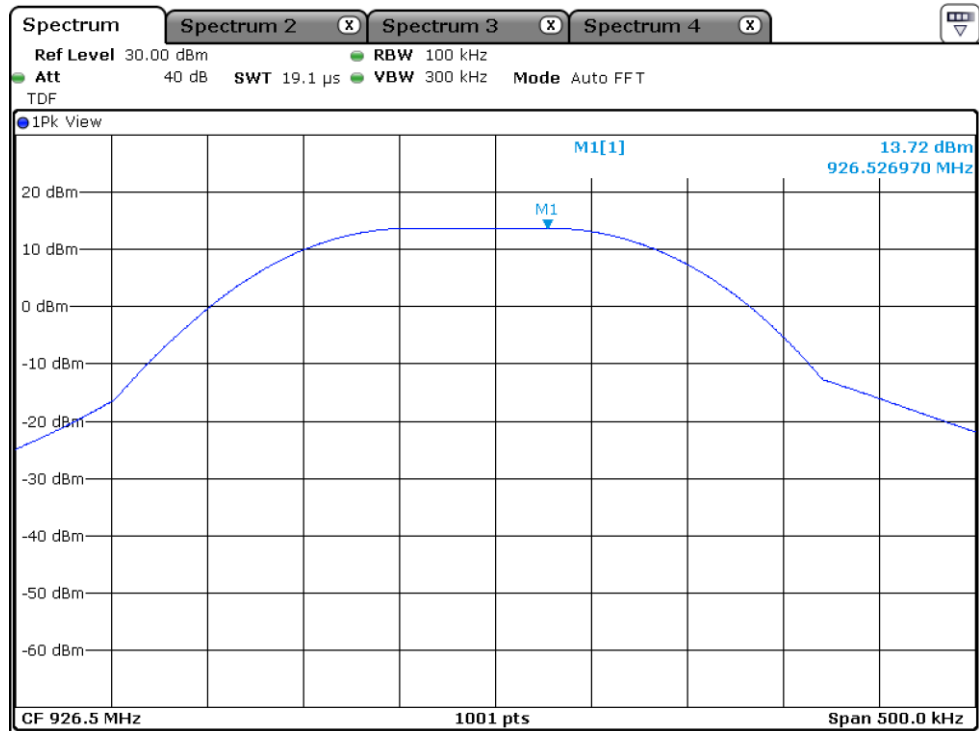
10.4.1.1 Signal level (dB m)



Low CH

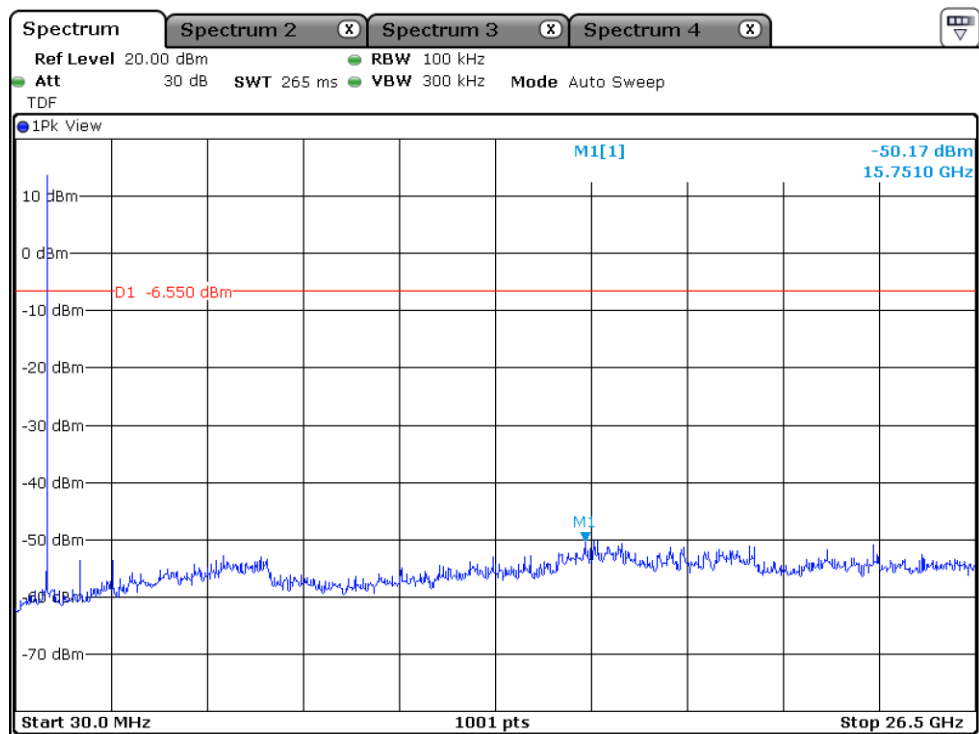


Mid CH

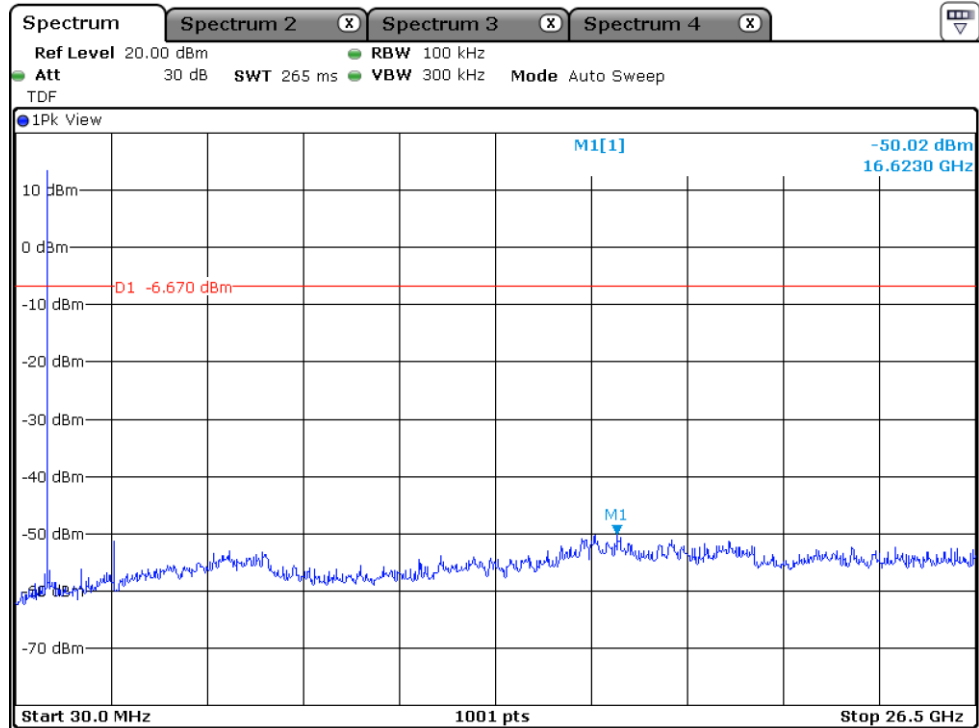


High CH

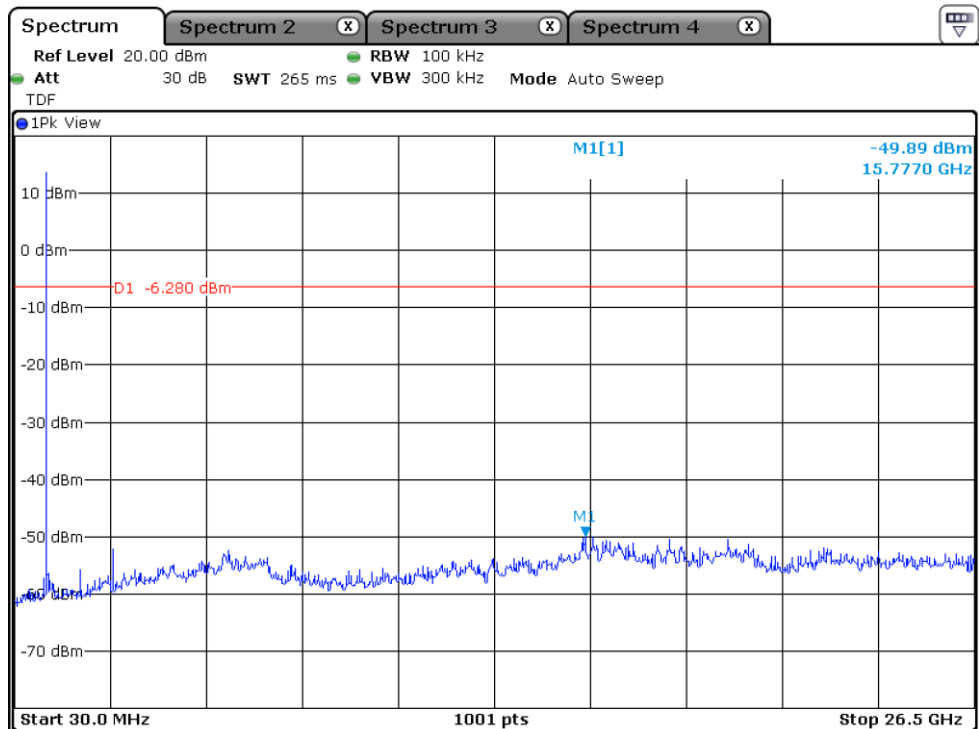
10.4.1.2 Spurious Emissions (dB m)



Low CH



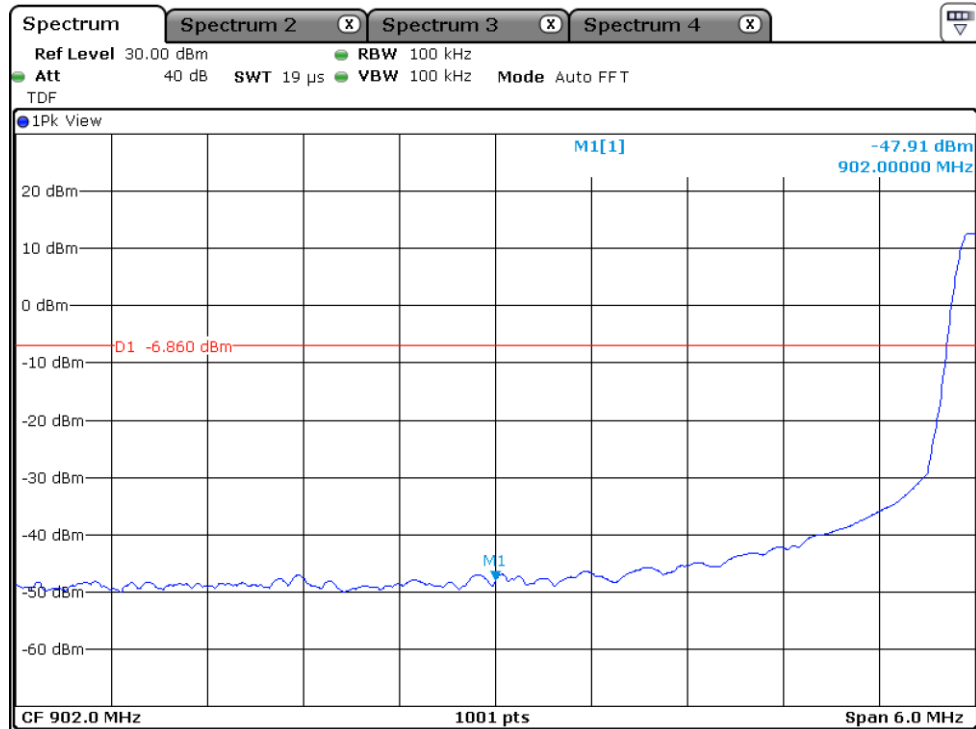
Mid CH



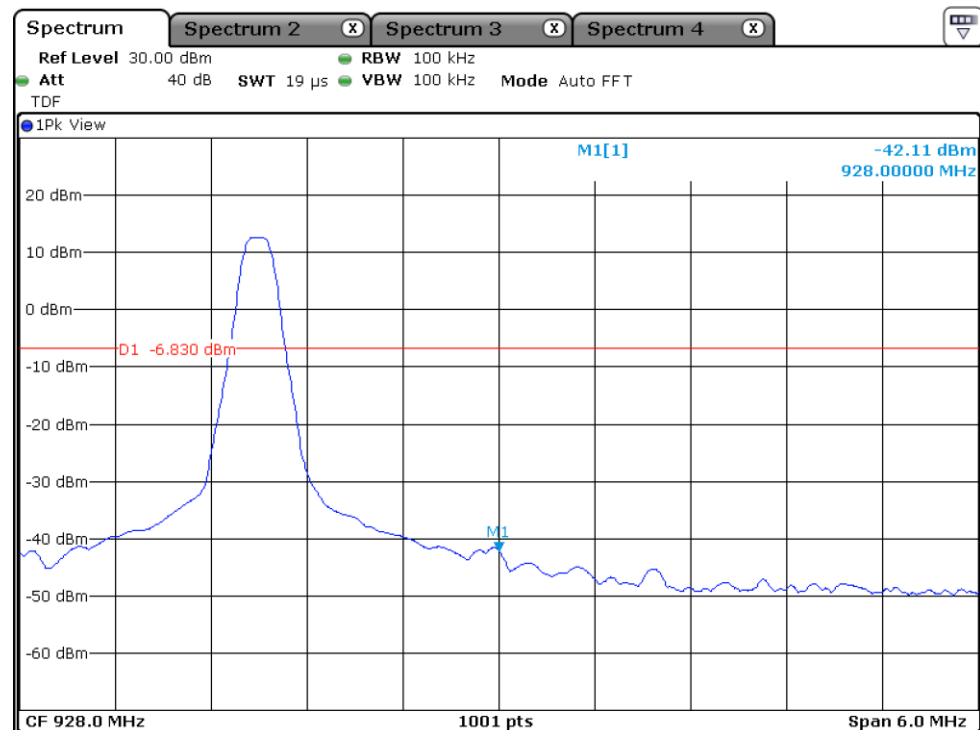
High CH



10.4.1.3 Band Edge



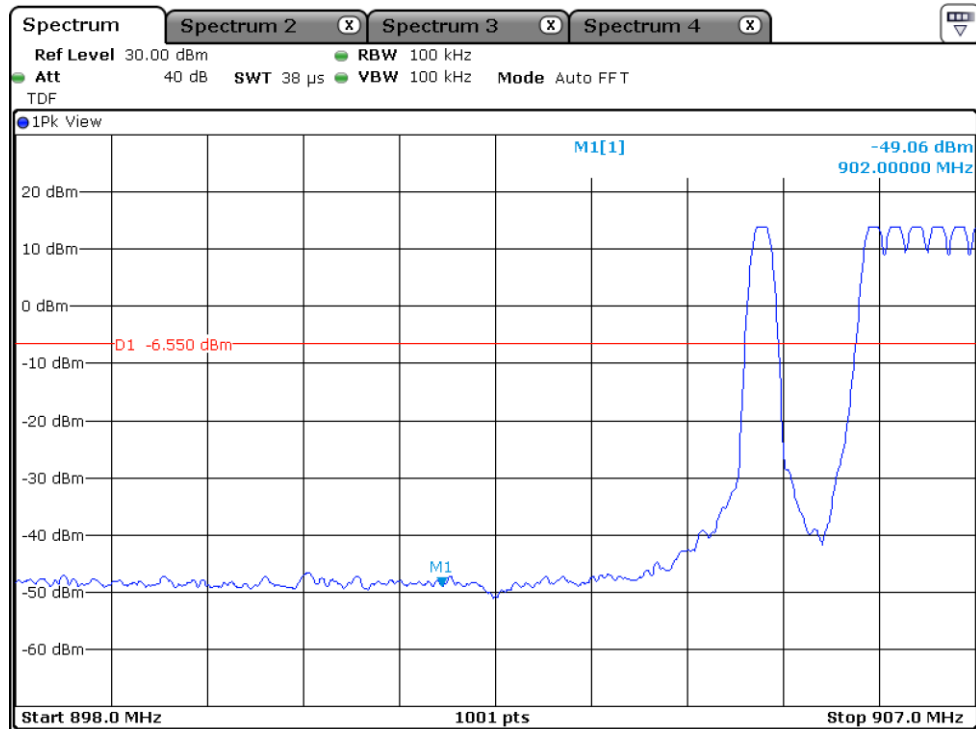
Low CH



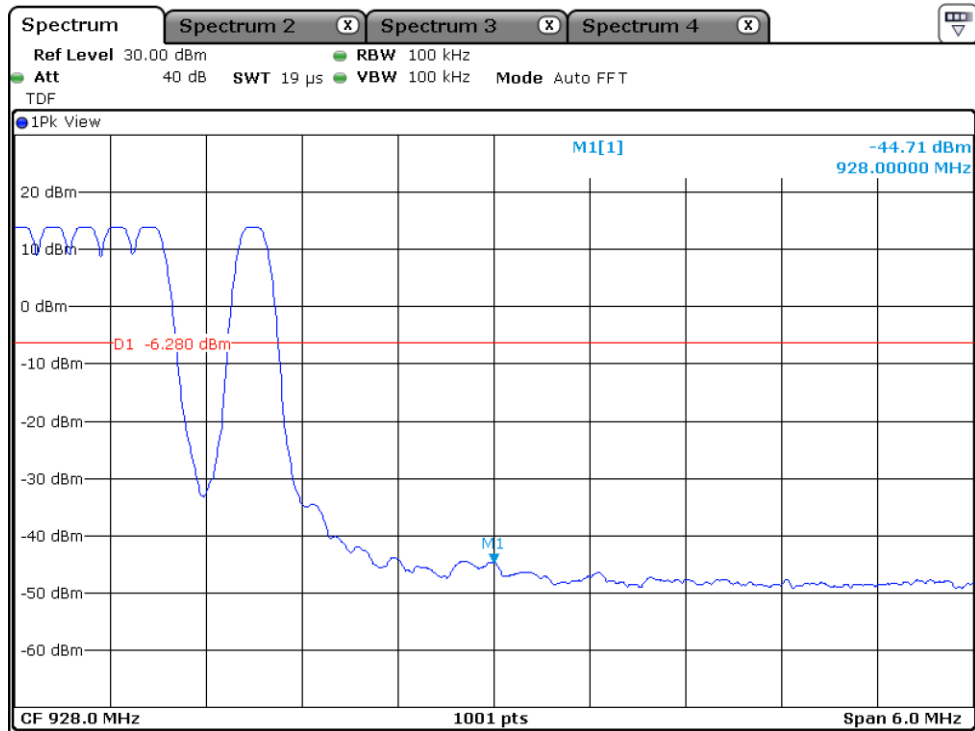
High CH



1.1.1.1 Band Edge_Hopping Mode



Low CH



High CH

11. Radiated Spurious Emission

11.1 Operating environment

Temperature : 24 °C

Relative humidity : 45 %

11.2 Measurement method

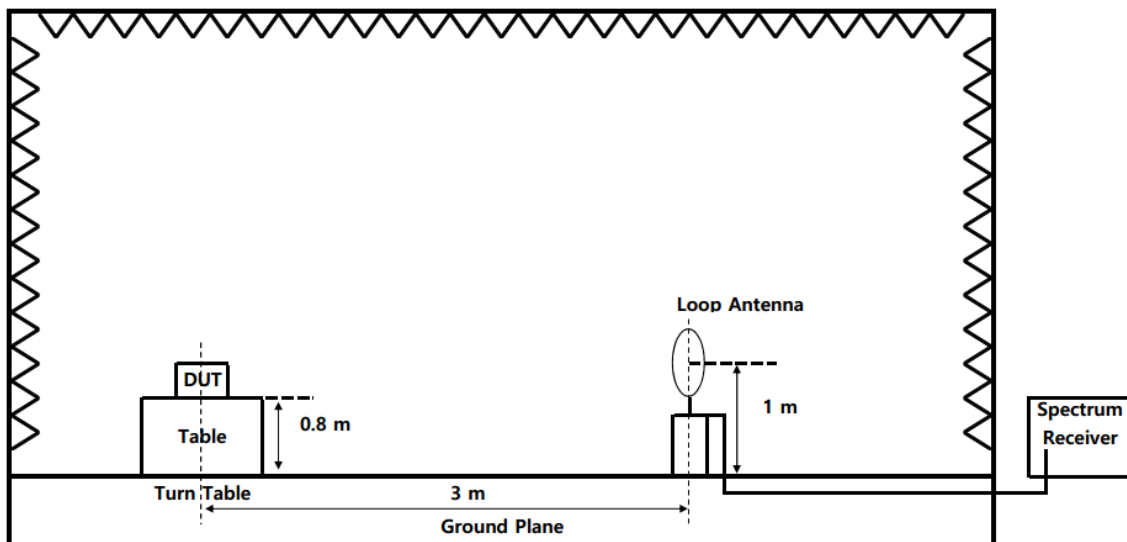
Standard : §15.247 (d), §15.209, §15.205 .
RSS-247 (5.5) & RSS-Gen (8.9 & 8.10)

11.3 Test setup

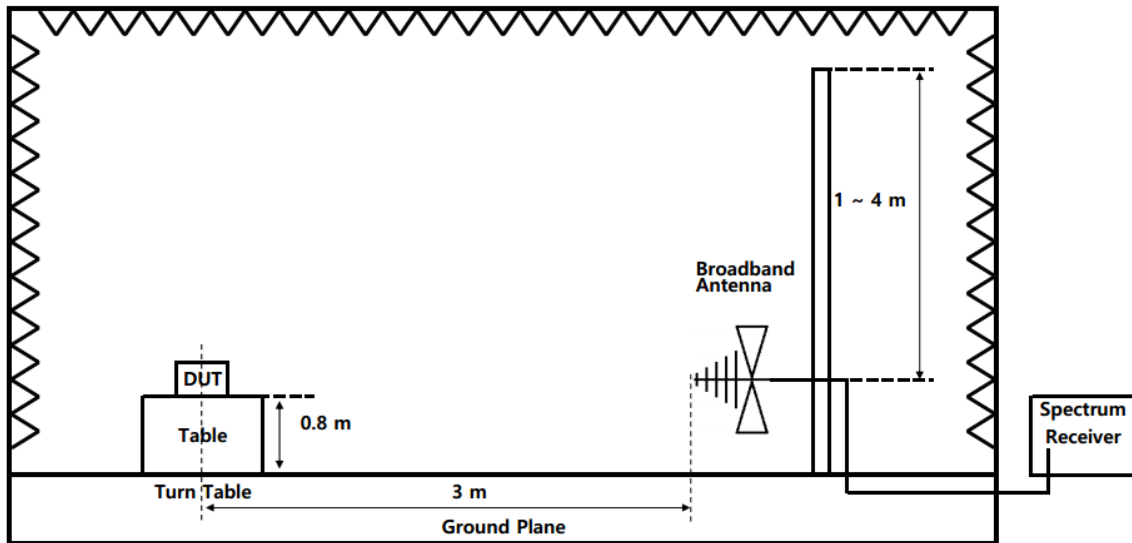
The radiated emissions measurements were performed on the 3 m, Semi-Anechoic Chamber. The EUT was placed on a non-conductive turntable above the ground plane.

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.

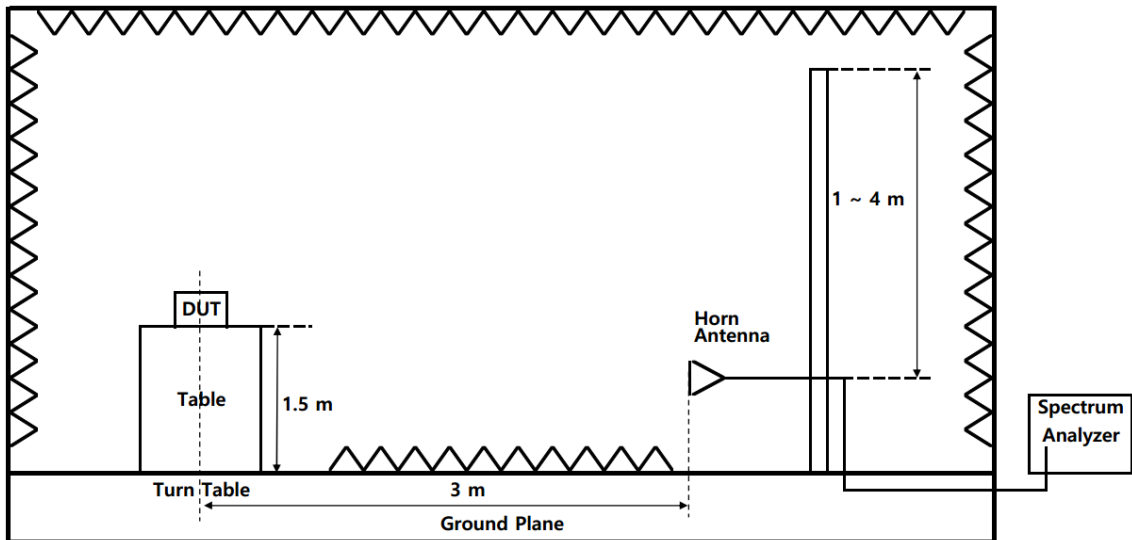
11.3.1 Below 30 MHz



11.3.2 30 MHz to 1 GHz



11.3.3 Above 1 GHz





11.4 Test data

Test date : 02. June. 2021
Operating mode : Transmit mode
Test Result : Pass

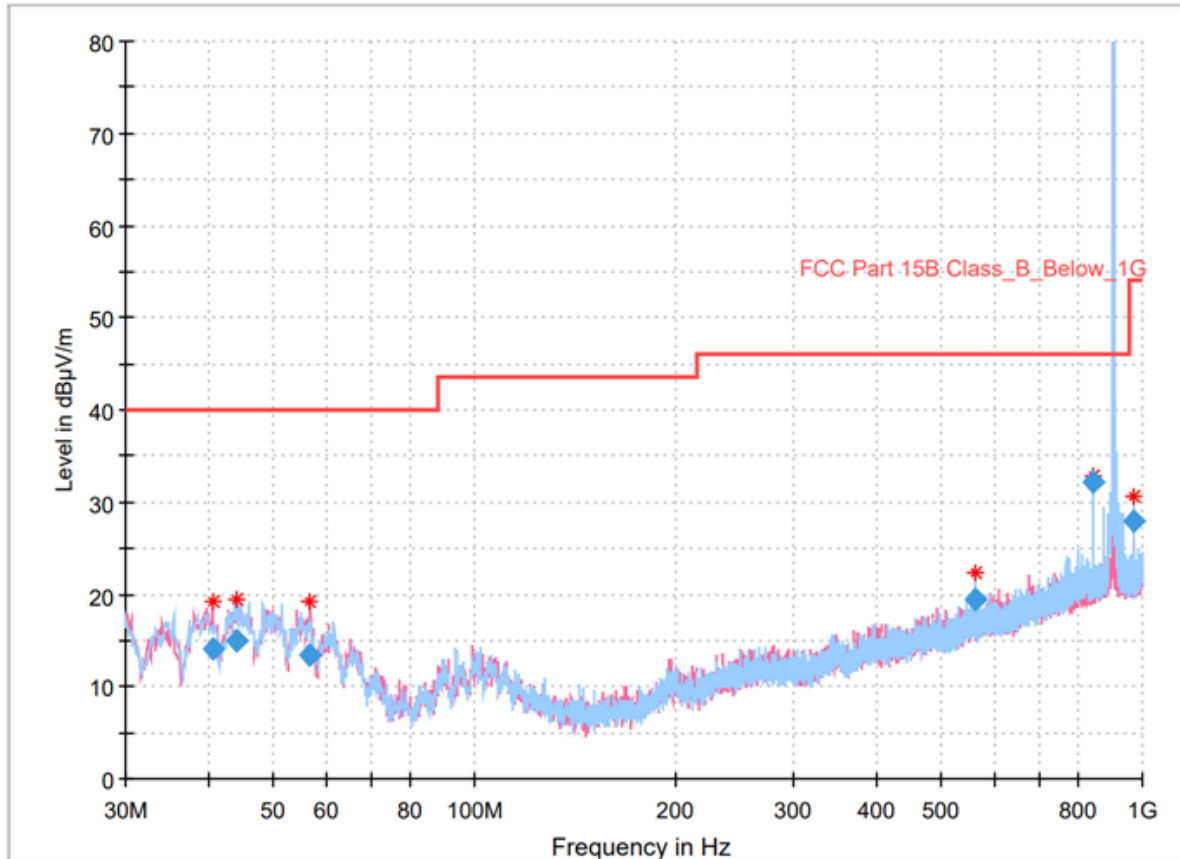
11.4.1 Test data for Spurious & Harmonic

11.4.1.1 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.							



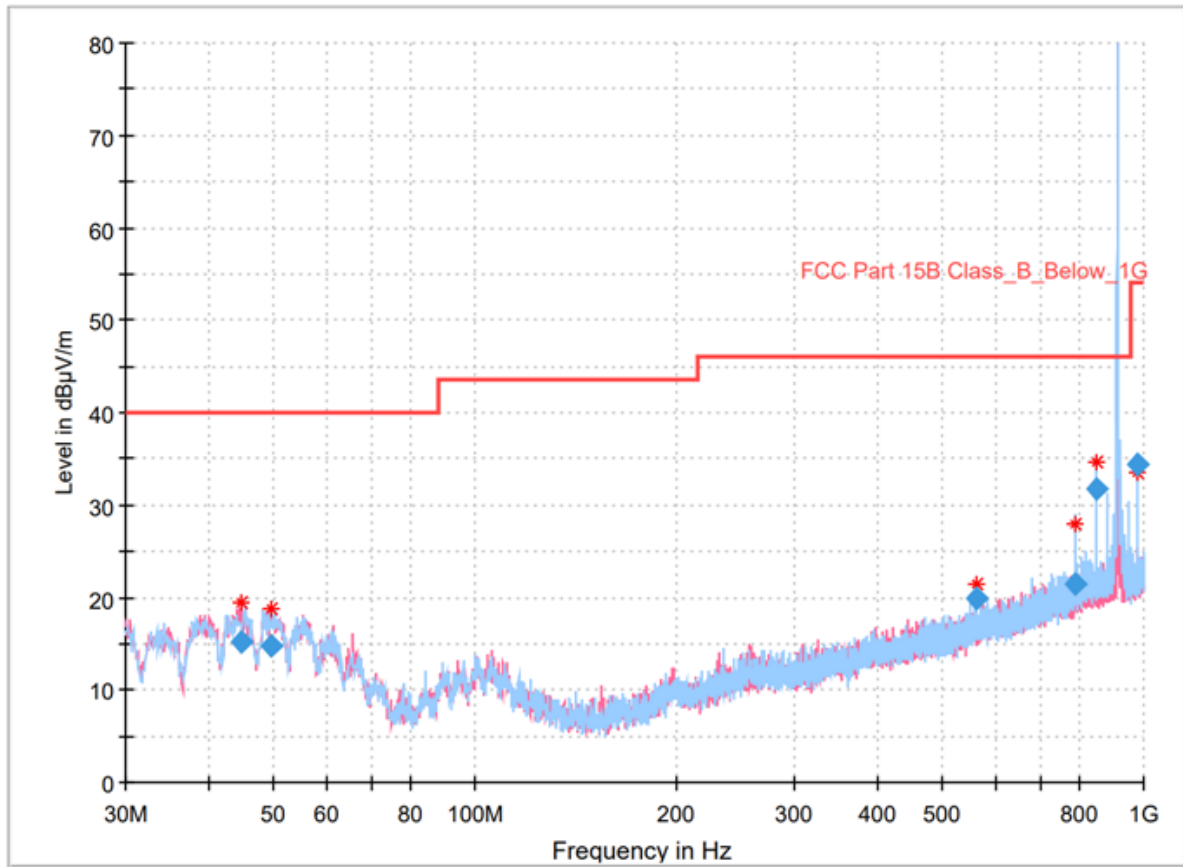
11.4.1.2 Measurement Results for below 1 GHz



Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
40.573000	14.12	40.00	25.88	15000.0	120.000	300.0	V	150.0	-20.4
43.968000	15.06	40.00	24.94	15000.0	120.000	400.0	H	85.0	-19.5
56.772000	13.41	40.00	26.59	15000.0	120.000	200.0	V	33.0	-19.6
562.530000	19.34	46.00	26.66	15000.0	120.000	400.0	H	322.0	-12.2
841.017000	32.23	46.00	13.77	15000.0	120.000	100.0	H	293.0	-8.1
969.057000	27.98	54.00	26.02	15000.0	120.000	100.0	H	230.0	-6.9

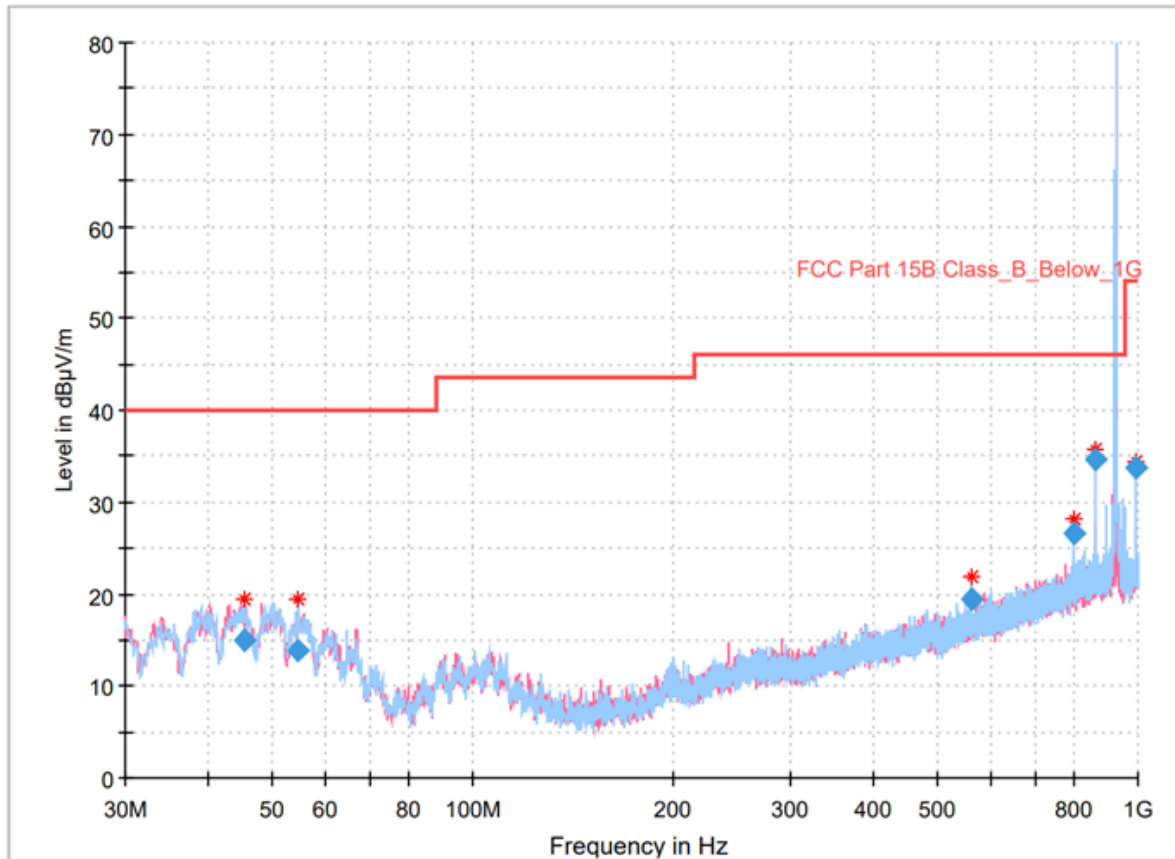
Low CH



Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
44.744000	15.09	40.00	24.91	15000.0	120.000	400.0	V	42.0	-19.4
49.594000	14.84	40.00	25.16	15000.0	120.000	300.0	V	6.0	-19.1
562.530000	19.82	46.00	26.18	15000.0	120.000	400.0	H	315.0	-12.2
787.958000	21.41	46.00	24.59	15000.0	120.000	100.1	H	267.0	-8.7
851.978000	31.66	46.00	14.34	15000.0	120.000	100.1	H	285.0	-7.7
979.824000	34.50	54.00	19.50	15000.0	120.000	100.1	H	78.0	-6.9

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)
45.520000	14.98	40.00	25.02	15000.0	120.000	200.1	H	259.0	-19.3
54.735000	13.88	40.00	26.12	15000.0	120.000	300.1	H	148.0	-19.6
562.530000	19.42	46.00	26.58	15000.0	120.000	400.1	H	69.0	-12.2
798.531000	26.68	46.00	19.32	15000.0	120.000	100.1	H	105.0	-8.4
862.551000	34.71	46.00	11.29	15000.0	120.000	100.1	H	78.0	-7.5
990.494000	33.67	54.00	20.33	15000.0	120.000	100.1	H	242.0	-6.6

High CH



11.4.1.3 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							
2 714.5	33.52	Peak	H	-11.50	45.02	73.98	28.96
	53.11	Average	H		41.61	53.98	12.37
4 525.3	47.15	Peak	V	-5.50	52.65	73.98	21.33
	50.48	Average	V		44.98	53.98	9.00
8 145.1	45.81	Peak	V	0.70	47.95	73.98	26.03
	41.16	Average	V		41.86	53.98	12.12
9 050.5	45.81	Peak	V	1.20	50.50	73.98	23.48
	38.76	Average	V		39.96	53.98	14.02
Mid CH							
2 746.9	32.41	Peak	H	-11.50	43.91	73.98	30.07
	47.57	Average	H		36.07	53.98	17.91
4 579.3	49.87	Peak	V	-5.50	55.37	73.98	18.61
	49.89	Average	V		44.39	53.98	9.59
High CH							
2 779.5	54.88	Peak	H	-11.50	43.38	73.98	30.60
	50.57	Average	H		39.07	53.98	14.91

- END OF REPORT.