RADIO PERFORMANCE TEST REPORT
(CLASS II PERMISSIVE CHANGE)

Test Report No. : **OT-22N-RWD-078**

Reception No. : **2211003657**

Applicant : **Samsung Electronics Co Ltd**

Address : **19 Chapin Rd., Building D, Pine Brook, New Jersey, 07058, United States**

Manufacturer : **Samsung Electronics Co Ltd**

Address : **129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do 16677, Korea**

Type of Equipment : **Audio Transceiver**

FCC ID : **A3LWSA520S**

Model Name : **WSA520S**

Multiple Model Name : **N/A**

Serial number : **N/A**

Total page of Report : **44 pages (including this page)**

Date of Incoming : **November 11, 2022**

Date of Issuing : **November 23, 2022**

SUMMARY

The equipment complies with the requirements of ***FCC CFR 47 PART 15 SUBPART C Section 15.249***

This test report contains only the result of a single test of the sample supplied for the examination.

It is not a general valid assessment of the features of the respective products of the mass-production.

This report is not correlated with the "KS Q ISO/IEC 17025 and KOLAS accreditation" of Korean Laboratory Accreditation Scheme.

Tested by	Reviewed by	Approved by
Si-eon Lee / Assistant Manager	Tae-Ho, Kim / General Manager	Ki-Hong, Nam / General Manager
ONETECH Corp.	ONETECH Corp.	ONETECH Corp.

ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

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ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

Revision History

Rev. No.	Issue Report No.	Issued Date	Revisions	Section Affected
0	OT-20N-RWD-035	November 11, 2020	Initial Release	All
1	OT-216-RWD-093	June 30, 2021	The module LDO chip has changed. (Class II Permissive Change)	All
2	OT-227-RWD-037	July 27, 2022	Changed to use only Antenna 0 by firmware modification and Part L3 changed to 100pF. (Class II Permissive Change)	All
3	OT-22N-RWD-078	November 23, 2022	Operating frequency extension using software. (5 773.35 MHz ~ 5 871.35 MHz → 5 729.35 MHz ~ 5 871.35 MHz) (Class II Permissive Change)	All

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1. VERIFICATION OF COMPLIANCE

Applicant : Samsung Electronics Co Ltd

Address : 19 Chapin Rd., Building D, Pine Brook, New Jersey, 07058, United States

Contact Person : Hansung You / Staff Engineer

Telephone No. : +82-31-277-2746

FCC ID : A3LWSA520S

Model Name : WSA520S

Brand Name : SAMSUNG

Serial Number : N/A

Date : November 23, 2022

DEVICE TYPE	DXX – Low Power Communication Device Transmitter
E.U.T. DESCRIPTION	Modular Transmitter, Audio Transceiver
THIS REPORT CONCERNS	Class II Permissive Change
MEASUREMENT PROCEDURES	ANSI C63.10: 2013
TYPE OF EQUIPMENT TESTED	Pre-Production
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	Certification
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC CFR47 Part 15 Subpart C Section 15.249
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	None
FINAL TEST WAS CONDUCTED ON	3 m Semi Anechoic Chamber

-. The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

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2. TEST SUMMARY

2.1 Test items and results

SECTION	TEST ITEMS	RESULTS
15.249 (a)	Field Strength of Emission	Met the Limit / PASS
15.249 (c)	Measurement distance	Met the Requirement / PASS
15.249 (d)	Emissions Radiated Outside of the Specified Frequency Band	Met the Limit / PASS
15.249, 15.215	Minimum 20 dB Bandwidth	Met the Limit / PASS
15.249 (e)	Radiated Emissions above 1 000 MHz	Met the Limit / PASS
15.209	Radiated Emission Limits, General Requirement	Met the Limit / PASS
15.207	Conducted Limits	Met the Limit / PASS
15.203	Antenna Requirement	Met the Requirement / PASS

2.2 Related Submittal(s) / Grant(s)

Class II Permissive Change

Following modification(s) is/are made on the product, which was already granted on November 17, 2020

- Operating frequency extension using software. (5 773.35 MHz ~ 5 871.35 MHz → 5 729.35 MHz ~ 5 871.35 MHz)

2.3 Purpose of the test

To determine whether the equipment under test fulfills the requirements of the regulation stated in section 2.1.

2.4 Test Methodology

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

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

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2.5 Test Facility

The Onetech Corp. has been designated to perform equipment testing in compliance with ISO/IEC 17025.

The Electromagnetic compatibility measurement facilities are located at 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea.

-. Site Filing:

VCCI (Voluntary Control Council for Interference) – Registration No. R-20122/ C-14617/ G-10666/ T-11842

ISED (Innovation, Science and Economic Development Canada) – Registration No. Site# 3736A-3

KOLAS (Korea Laboratory Accreditation Scheme) - Accreditation NO. KT085

FCC (Federal Communications Commission) - Accreditation No. KR0013

RRA (Radio Research Agency) – Designation No. KR0013

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3. GENERAL INFORMATION

3.1 Product Description

The Samsung Electronics Co Ltd, Model WSA520S (referred to as the EUT in this report) is an Audio Transceiver, Product specification information described herein was obtained from product data sheet or user's manual.

DEVICE TYPE	Audio Transceiver	
Temperature Range	-5 °C ~ 40 °C	
OPERATING FREQUENCY	5 729.35 MHz ~ 5 871.35 MHz	
MODULATION TYPE	DQPSK	
Field Strength Of Fundamental	95.83 dBμV/m at 3 m	
ANTENNA TYPE	PCB Antenna	
ANTENNA GAIN	Antenna 0	3.10 dBi
	Antenna 1	3.10 dBi
List of each Osc. or crystal Freq.(Freq. >= 1 MHz)	16 MHz	

Note: This Device works a Diversity Antenna. So, We Tested only Antenna 0.

3.2 Alternative type(s)/model(s); also covered by this test report.

-. None

4. EUT MODIFICATIONS

-. None

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5. SYSTEM TEST CONFIGURATION

5.1 Justification

This device was configured for testing in a typical way as a normal customer is supposed to be used. During the test, the following components were installed inside of the EUT.

DEVICE TYPE	MANUFACTURER	MODEL/PART NUMBER	FCC ID
Main Board	Samsung Electronics Co Ltd	AVM510 REV1.0	N/A

5.2 Peripheral equipment

Defined as equipment needed for correct operation of the EUT, but not considered as tested:

Model	Manufacturer	Description	Connected to
WSA520S	Samsung Electronics Co Ltd	Audio Transceiver(EUT)	-
AVM500 ANTEATER REV01	N/A	Jig Board	EUT / Notebook PC
HP Probook	HP	Notebook PC	EUT
TPN-AA05	ACBEL ELECTRONIC (WUHAN) CO., LTD	AC Adapter	-

5.3 Mode of operation during the test

For the testing, software used to control the EUT for staying in continuous transmitting is programmed.

For final testing, the EUT was set at 5 729.35 MHz, 5 799.35 MHz, and 5 871.35 MHz to get a maximum emission levels from the EUT. The EUT was moved throughout the XY, XZ, and YZ planes and the worst case is “XY” axis, but the worst data was recorded in this report.

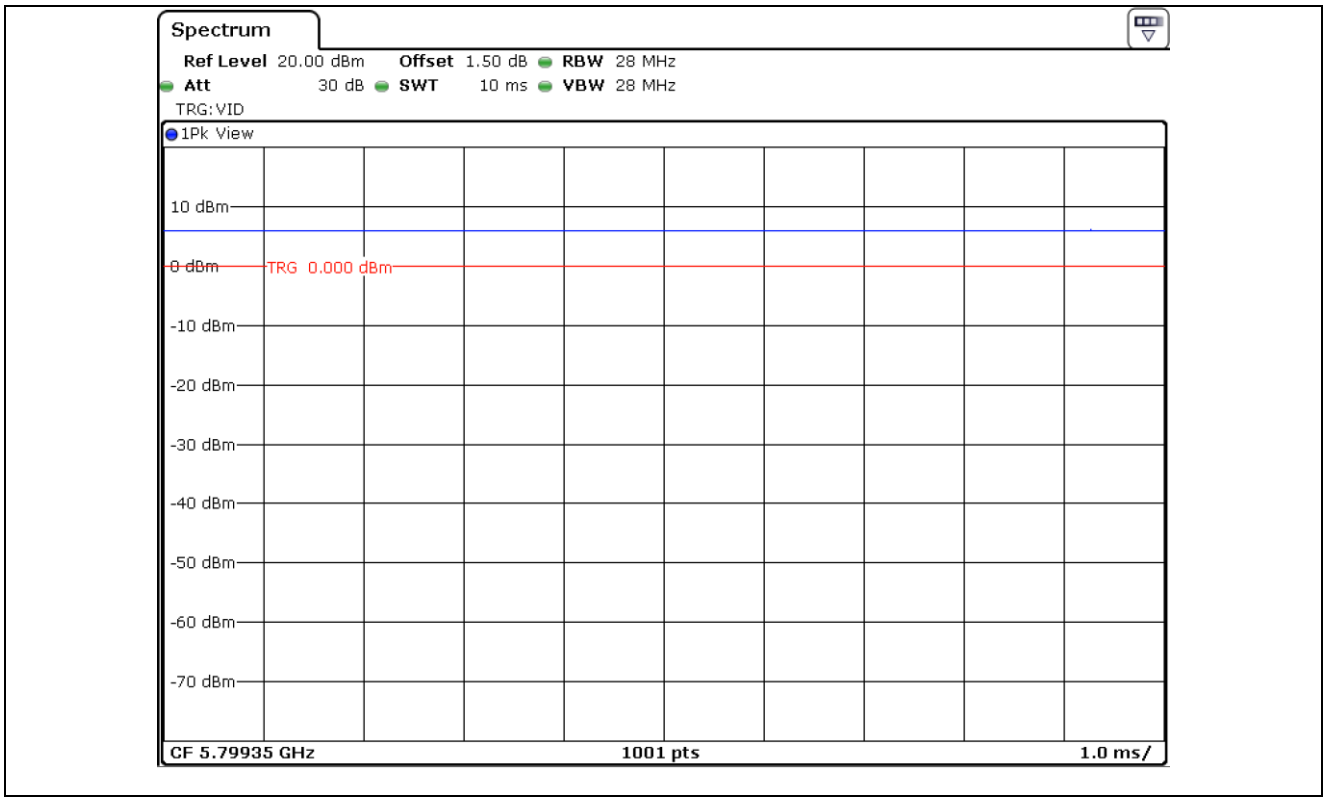
-. Duty Cycle

Mode	Tx On Time [ms]	Tx Off Time [ms]	Duty Cycle [%]	Correction Factor [dB]
-	-	-	100.00	-

Note – Duty Cycle : (Tx On Time / (Tx On Time + Tx Off Time)) * 100

Correction Factor : 10 * Log(1 / (Duty Cycle / 100))

-. Test Plot



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-. Channel List

Channel	Frequency[MHz]	Channel	Frequency[MHz]	Channel	Frequency[MHz]
0	5729.35	25	5779.35	50	5829.35
1	5731.35	26	5781.35	51	5831.35
2	5733.35	27	5783.35	52	5833.35
3	5735.35	28	5785.35	53	5835.35
4	5737.35	29	5787.35	54	5837.35
5	5739.35	30	5789.35	55	5839.35
6	5741.35	31	5791.35	56	5841.35
7	5743.35	32	5793.35	57	5843.35
8	5745.35	33	5795.35	58	5845.35
9	5747.35	34	5797.35	59	5847.35
10	5749.35	35	5799.35	60	5849.35
11	5751.35	36	5801.35	61	5851.35
12	5753.35	37	5803.35	62	5853.35
13	5755.35	38	5805.35	63	5855.35
14	5757.35	39	5807.35	64	5857.35
15	5759.35	40	5809.35	65	5859.35
16	5761.35	41	5811.35	66	5861.35
17	5763.35	42	5813.35	67	5863.35
18	5765.35	43	5815.35	68	5865.35
19	5767.35	44	5817.35	69	5867.35
20	5769.35	45	5819.35	70	5869.35
21	5771.35	46	5821.35	71	5871.35
22	5773.35	47	5823.35		
23	5775.35	48	5825.35		
24	5777.35	49	5827.35		

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5.4 Configuration of Test System

Line Conducted Test: The EUT was connected to Jig Board and the power of USB was connected to Notebook PC. All supporting equipment were connected to another LISN. Preliminary Power line Conducted Emission test was performed by using the procedure in ANSI C63.10: 2013 to determine the worse operating conditions

Radiated Emission Test : Preliminary radiated emissions test were conducted using the procedure in ANSI C63.10: 2013 to determine the worse operating conditions. The radiated emissions measurements were performed on the 10 m Semi Anechoic Chamber.

For frequencies from 150 kHz to 30 MHz measurements were made of the magnetic H field. The measuring antenna is an electrically screened loop antenna.

The frequency spectrum from 30 MHz to 1 000 MHz was scanned and maximum emission levels maximized 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 both horizontal and vertical polarization of the receiving antenna.

5.5 Antenna Requirement

For intentional device, according to section 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.

Antenna Construction:

The antenna of the EUT is PCB Antenna on the main board in the EUT, so no consideration of replacement by the user.

6. PRELIMINARY TEST

6.1 AC Power line Conducted Emissions Tests

During Preliminary Test, the following operating mode was investigated.

Operation Mode	The Worse operating condition (Please check one only)
Transmitting Mode	X

6.2 Radiated Emissions Tests

During Preliminary Tests, the following operating modes were investigated

Operation Mode	The Worse operating condition (Please check one only)
Transmitting Mode	X

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7. MINIMUM 20 dB BANDWIDTH

7.1 Operating environment

Temperature : 22 °C

Relative humidity : 46 % R.H.

7.2 Test set-up

The antenna output of the EUT was connected to the spectrum analyzer. The resolution bandwidth is set to 50 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.

7.3 Test Date

November 16, 2022 ~ November 18, 2022

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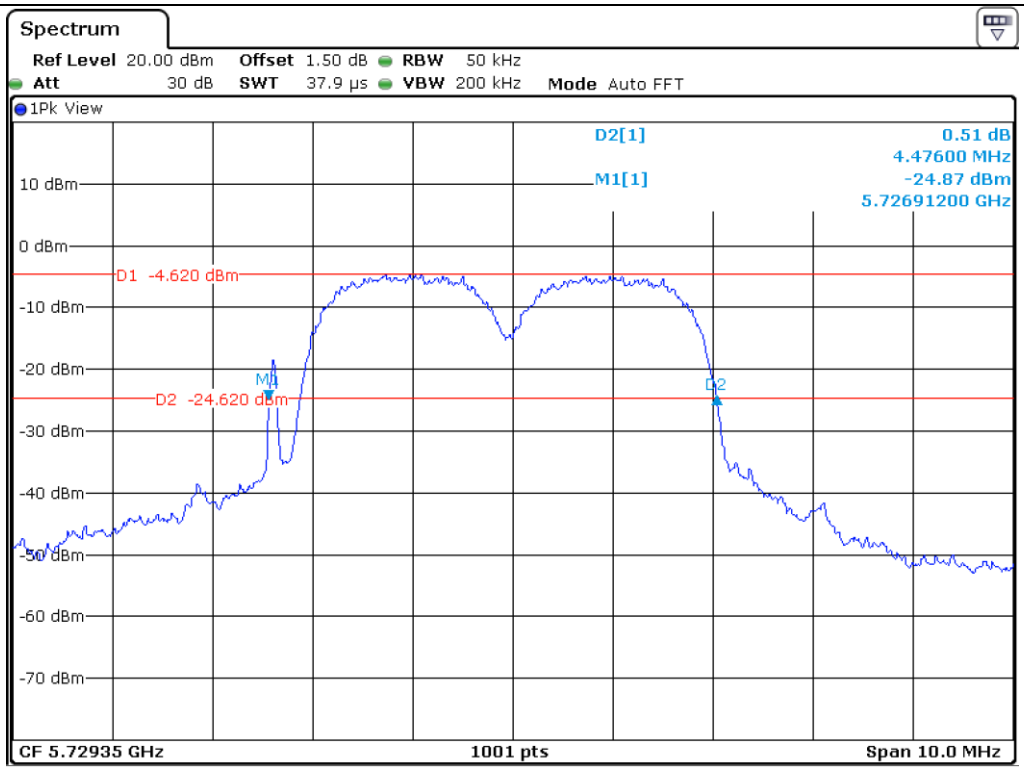
7.4 Test data

-. Test Result : Pass

CHANNEL	FREQUENCY(MHz)	MEASURED VALUE (MHz)
Low	5 729.35	4.48
Middle	5 799.35	4.46
High	5 871.35	4.48

Remark. Margin = Measured Value - Limit



Low Channel

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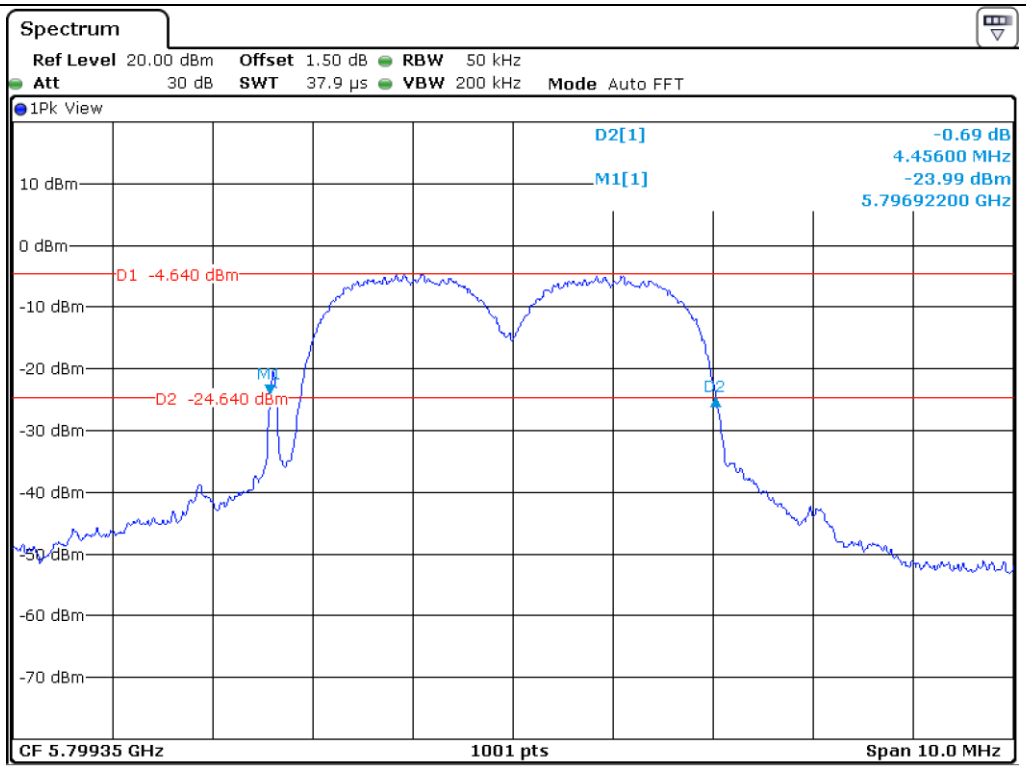
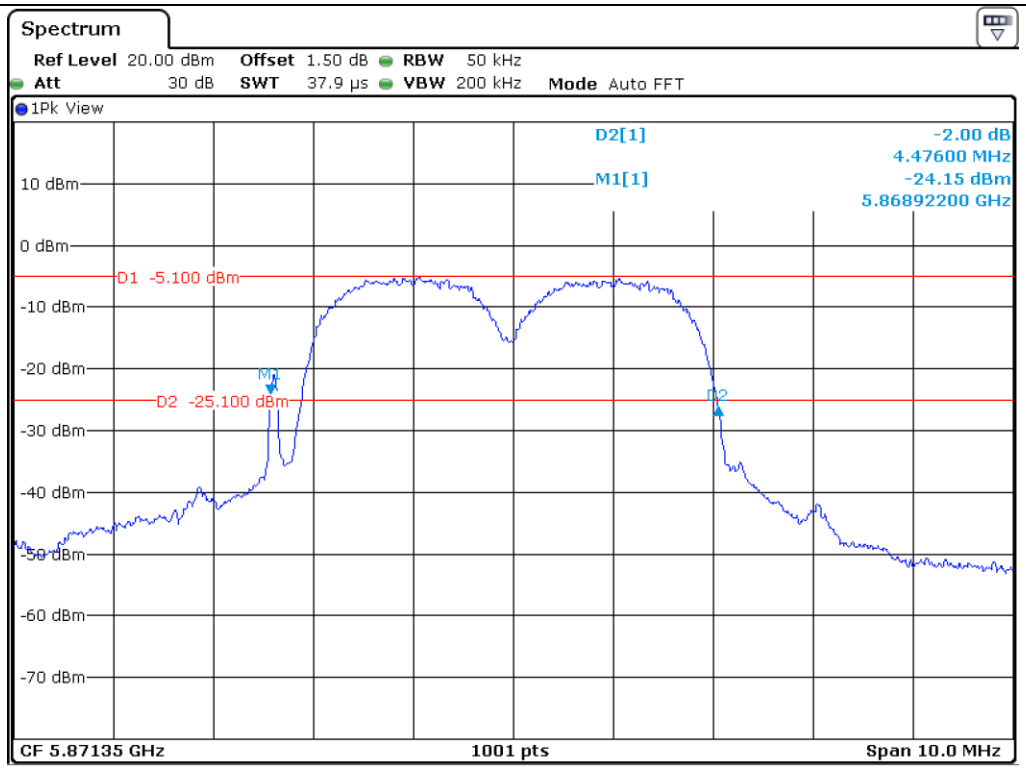


Middle Channel



High Channel

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8. RADIATED EMISSION TEST

8.1 Operating environment

Temperature : 22 °C

Relative humidity : 46 % R.H.

8.2 Test set-up

The radiated emissions measurements were on the 3 m, semi anechoic chamber. The EUT and other support equipment were placed on a non-conductive turntable above the ground plane. The interconnecting cables from outside test site were inserted into ferrite clamps at the point where the cables reach the turntable.

The frequency spectrum from up to 40 GHz was scanned and emission levels maximized at each frequency recorded. The system was rotated 360°, and the antenna was varied in height between 1.0 m and 4.0 m in order to determine the maximum emission levels. This procedure was performed for both horizontal and vertical polarization of the receiving antenna.

8.3 Measurement uncertainty

Radiated emission electric field intensity, 9 kHz ~ 30 MHz : ± 3.83 dB

Radiated emission electric field intensity, 30 MHz ~ 1000 MHz : ± 3.71 dB

Radiated emission electric field intensity, 1 GHz ~ 40 GHz : ± 4.86 dB

Measurement uncertainty is calculated in accordance with CISPR 16-4-2. The measurement uncertainty is given with a confidence of 95 % with the coverage factor, k = 2.

8.4 Test Date

November 16, 2022 ~ November 18, 2022

8.5 Final Result of Measurement

8.5.1 Field Strength of the Fundamental Frequency

The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical.

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.249(a)

Result : PASSED

EUT : Audio Transceiver

Operating Condition : TX mode

Distance : 3 m

Radiated Emissions			Ant	Correction Factors			Total	FCC Limit	
Carrier Freq. (MHz)	Reading (dBµV)	Detector Mode	Pol.	Ant. Factor	Cable Loss	Amp Gain	Amplitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)
Test Data for Low Channel									
5 729.35	99.73	Peak	H	32.00	8.50	44.40	95.83	114.00	18.17
	96.75	Average	H	32.00	8.50	44.40	92.85	94.00	1.15
	98.70	Peak	V	32.00	8.50	44.40	94.80	114.00	19.20
	95.96	Average	V	32.00	8.50	44.40	92.06	94.00	1.94
Test Data for Middle Channel									
5 799.35	98.85	Peak	H	32.20	8.60	44.40	95.25	114.00	18.75
	96.18	Average	H	32.20	8.60	44.40	92.58	94.00	1.42
	98.30	Peak	V	32.20	8.60	44.40	94.70	114.00	19.30
	95.58	Average	V	32.20	8.60	44.40	91.98	94.00	2.02
Test Data for High Channel									
5 871.35	98.50	Peak	H	32.30	8.70	44.40	95.10	114.00	18.90
	95.80	Average	H	32.30	8.70	44.40	92.40	94.00	1.60
	97.82	Peak	V	32.30	8.70	44.40	94.42	114.00	19.58
	95.08	Average	V	32.30	8.70	44.40	91.68	94.00	2.32

*Remark: To get a maximum emission level from the EUT, the EUT was moved throughout the XY, XZ, and YZ planes, but the worst plane data were recorded in the report.

Margin (dB) = Limit (dBuV/m) – Total (dBuV/m)

Total = Reading + Antenna Factor + Cable Loss + Duty Cycle Reduction

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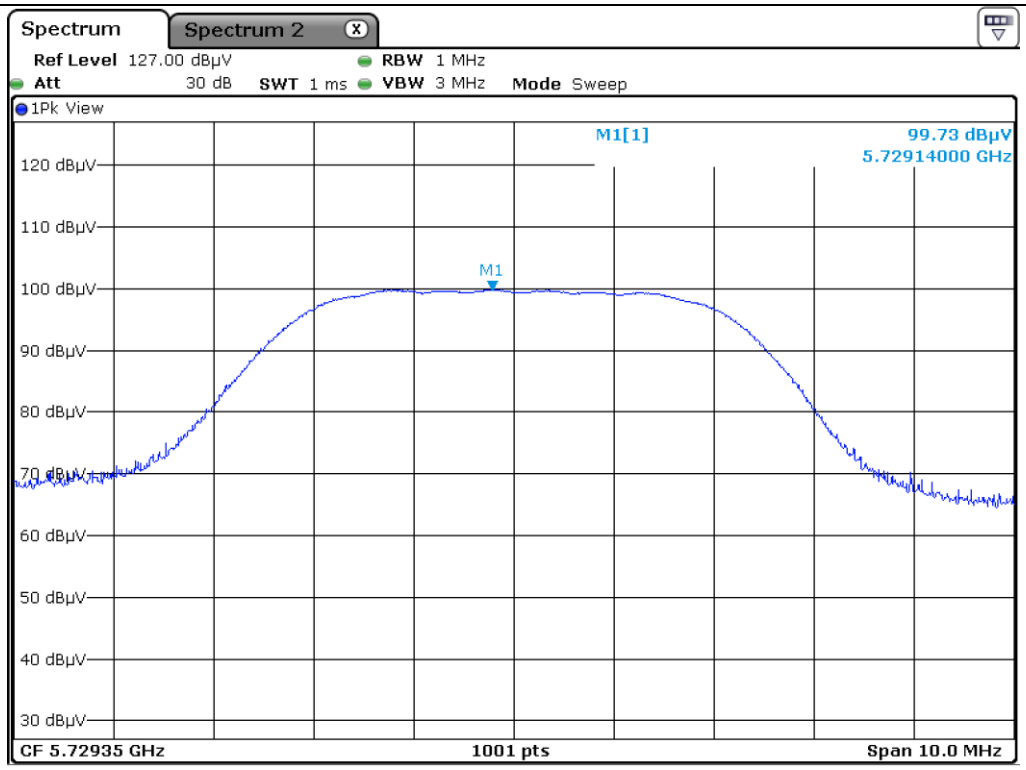
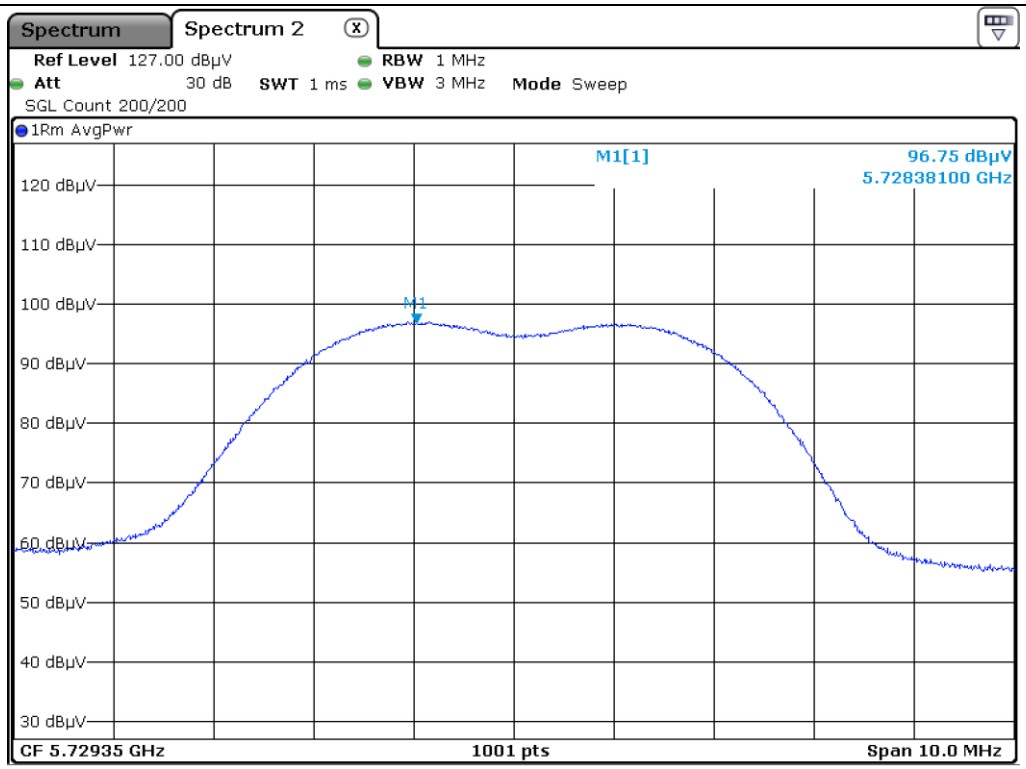


Low Channel_Peak_H



Low Channel_Average_H

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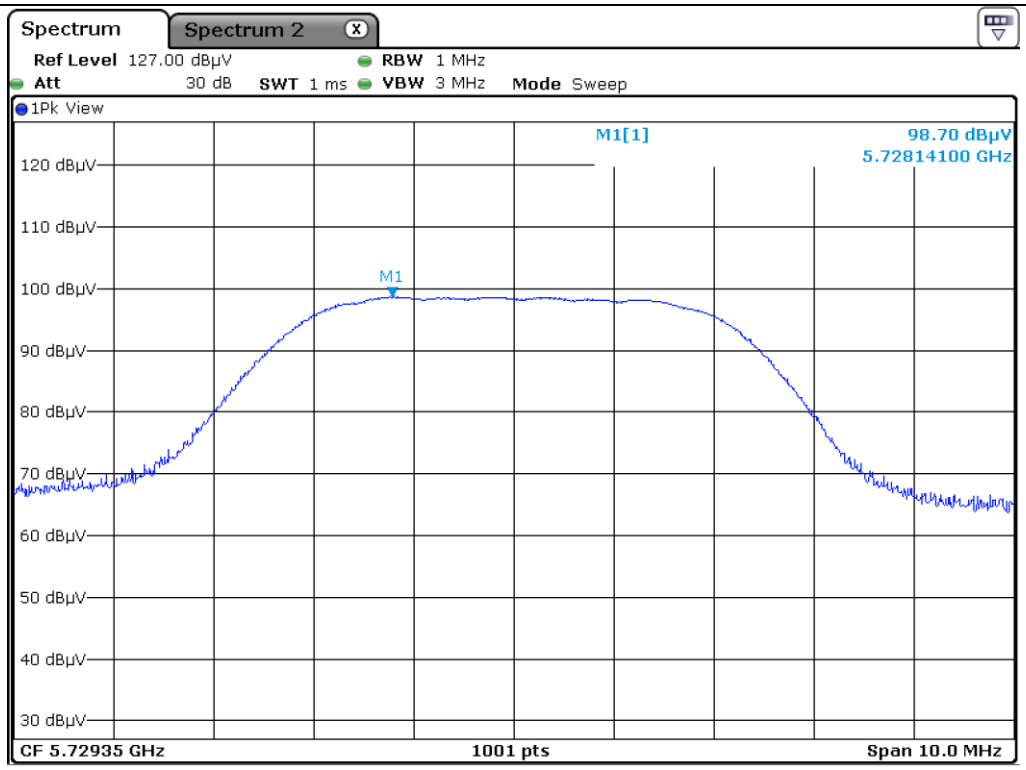

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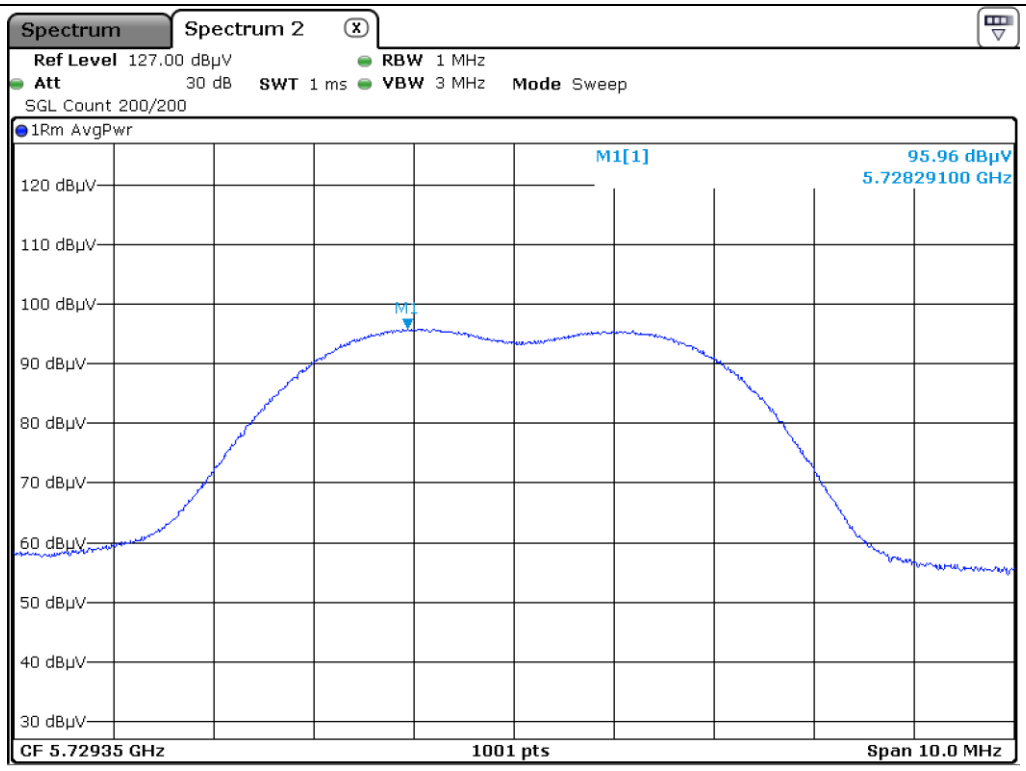

Low Channel_Average_V

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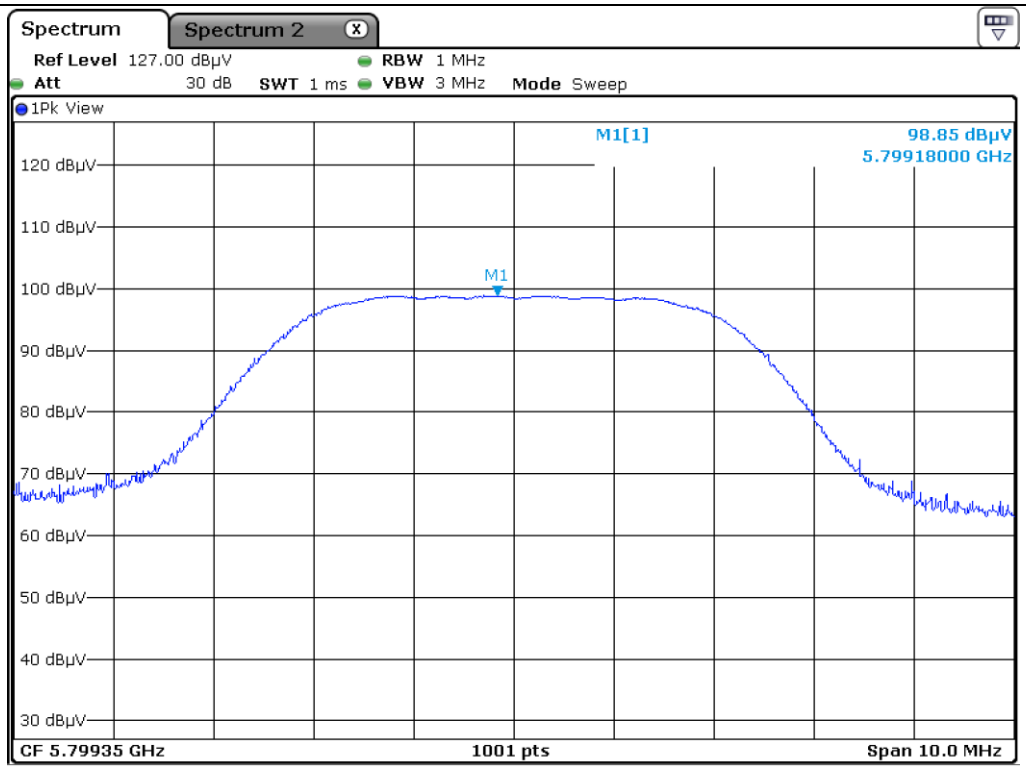
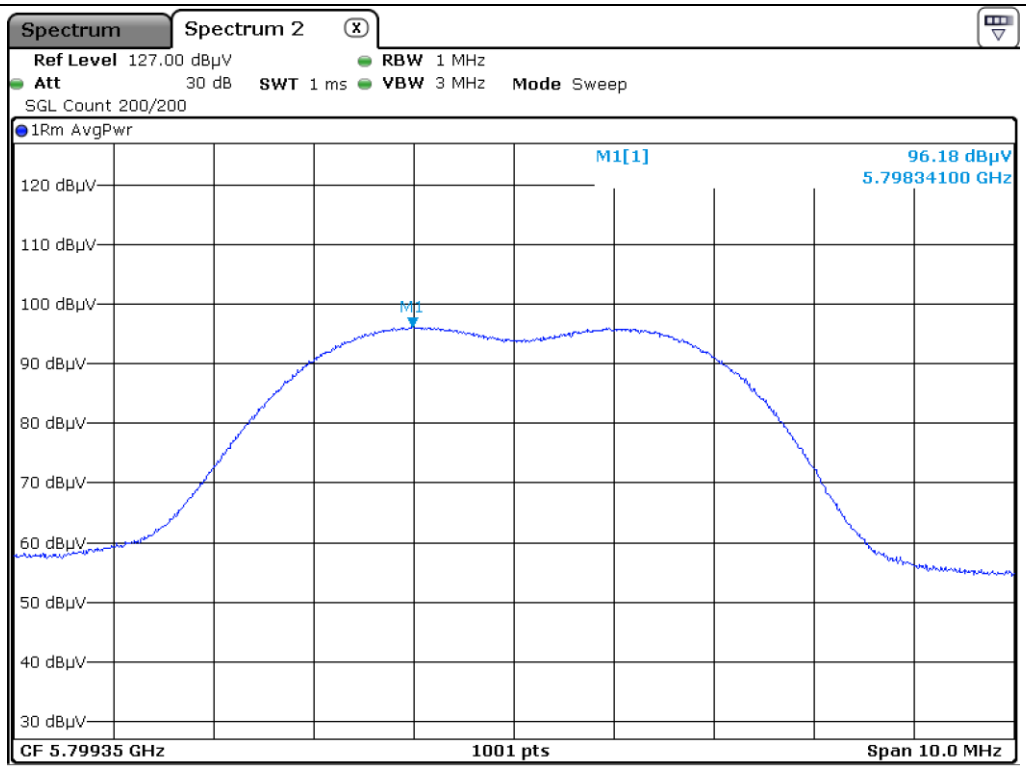


Middle Channel_Peak_H



Middle Channel_Average_H

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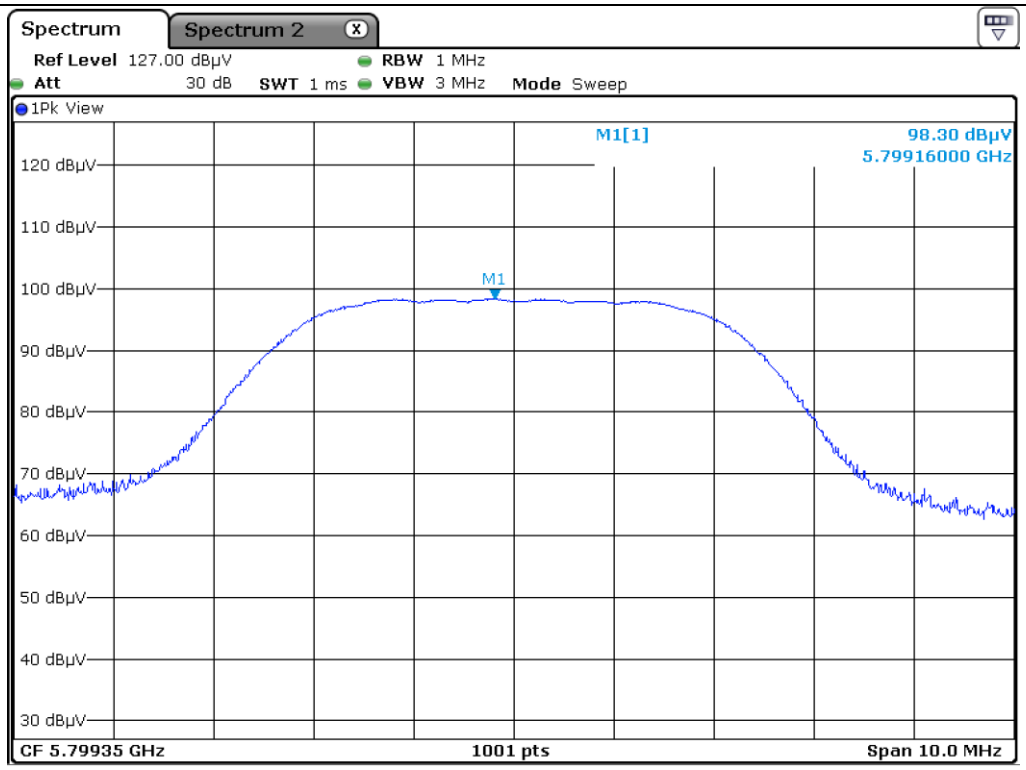
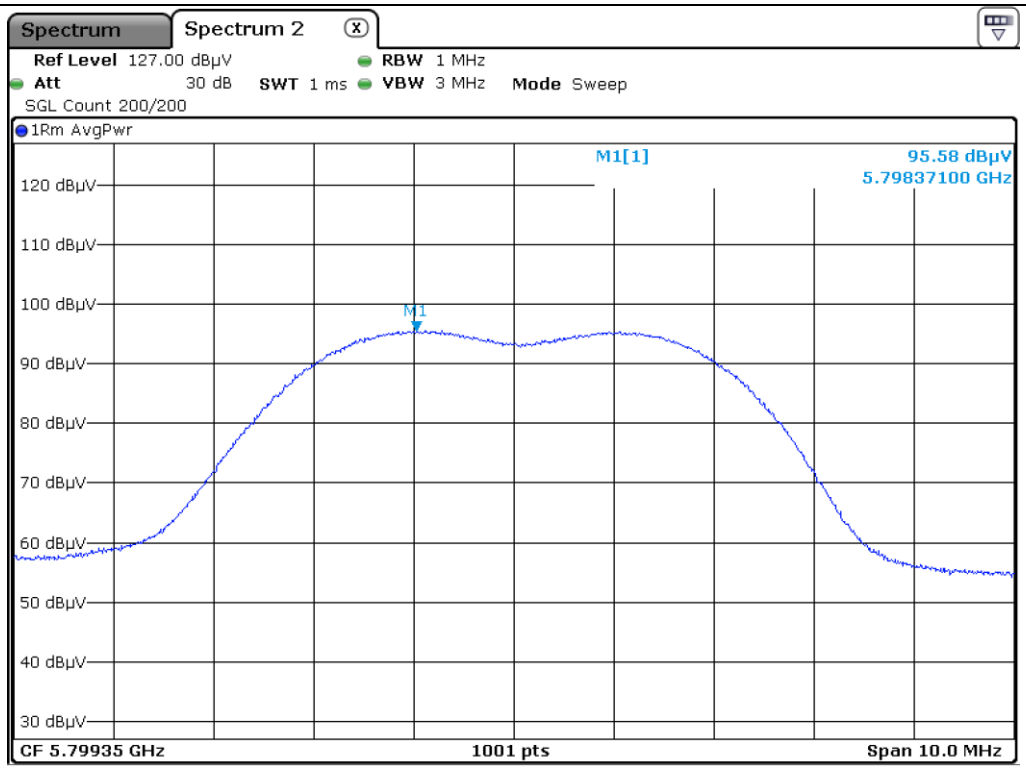


Middle Channel_Peak_V



Middle Channel_Average_V

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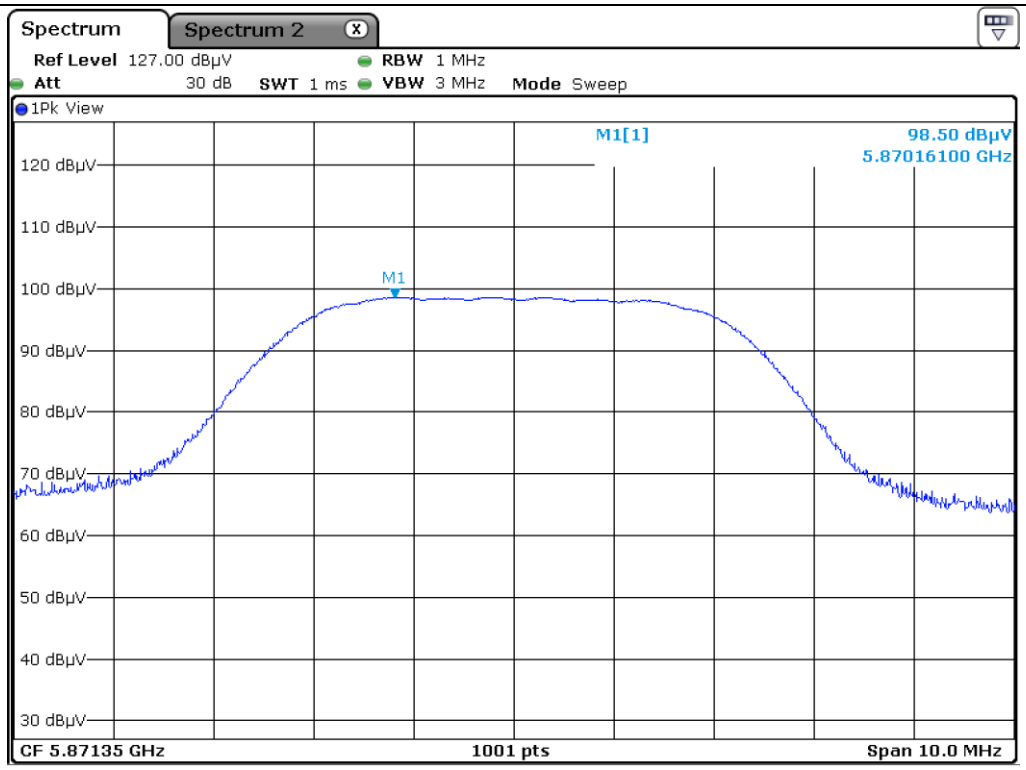
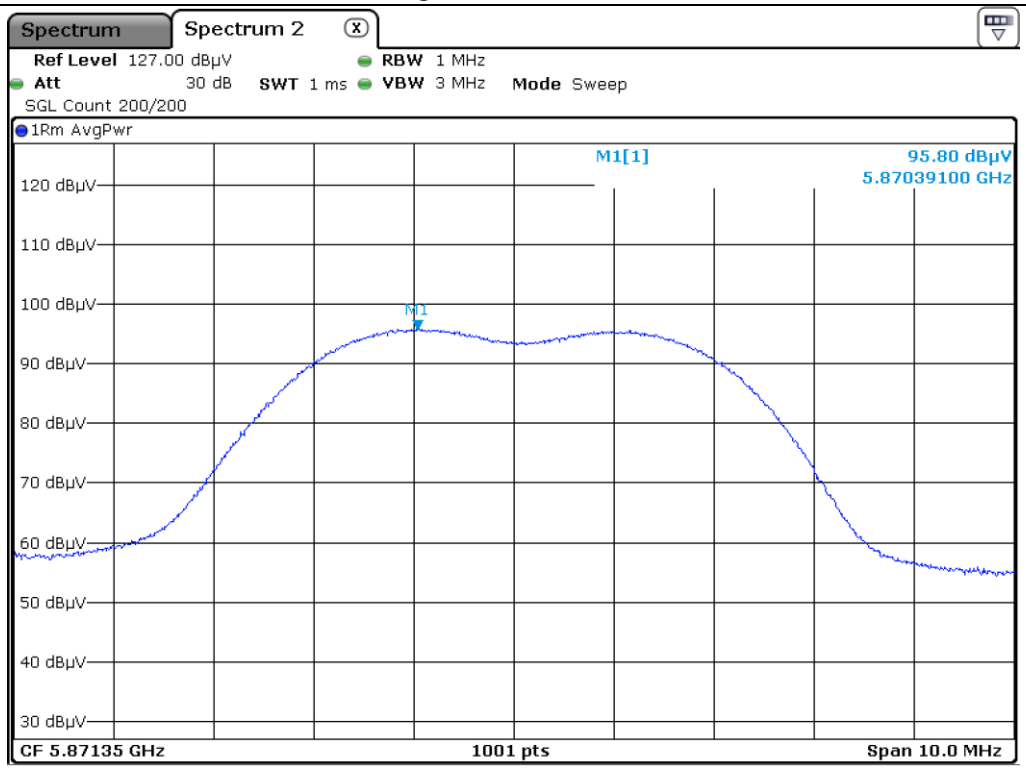


High Channel_Peak_H



High Channel_Average_H

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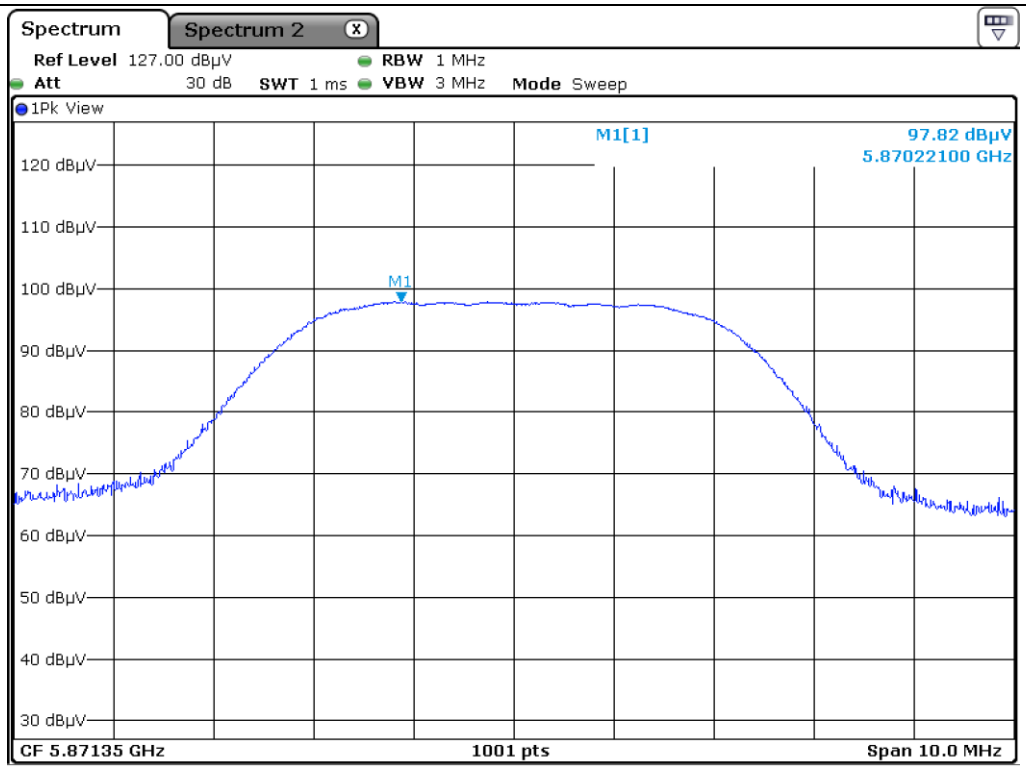
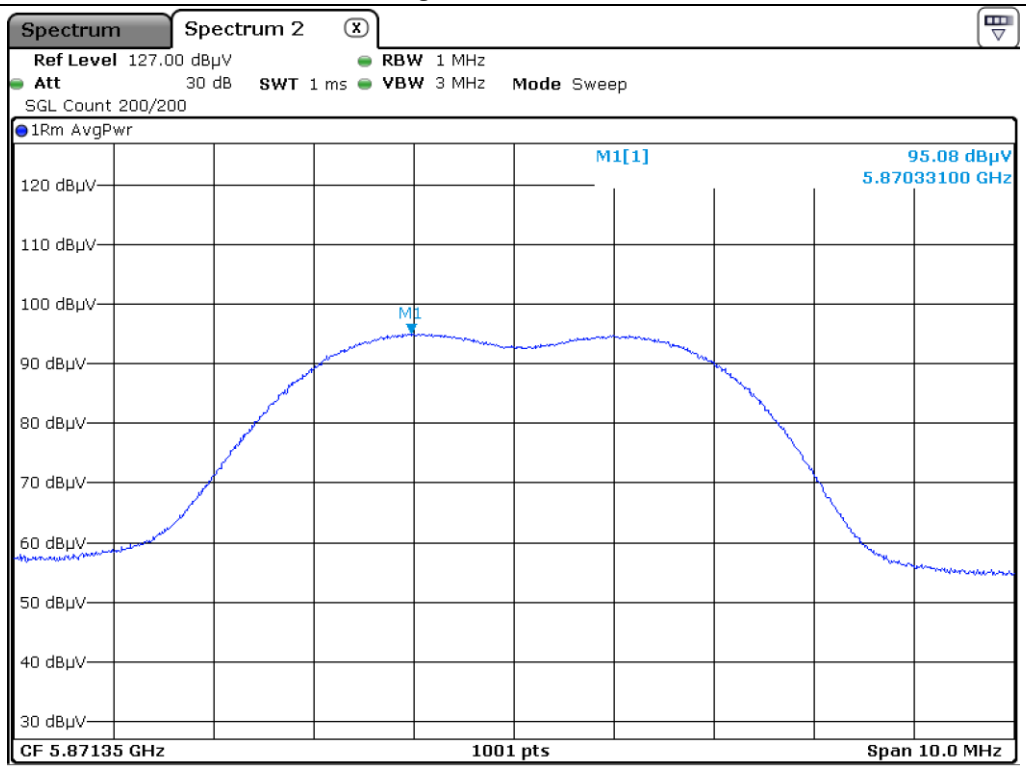


High Channel_Peak_V



High Channel_Average_V

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8.5.2 Emissions Radiated Outside of the Specified Frequency Bands_ Harmonic

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.249(a)

Result : PASSED

EUT : Audio Transceiver

Operating Condition : TX mode

Distance : 3 m

Radiated Emissions			Ant	Correction Factors			Total	FCC Limit	
Carrier Freq. (MHz)	Reading (dBµV)	Detector Mode	Pol.	Ant. Factor	Cable Loss	Amp Gain	Amplitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)
Test Data for Low Channel									
11 458.70	47.98	Peak	H	40.10	12.50	45.30	55.28	74.00	18.72
	36.21	Average	H	40.10	12.50	45.30	43.51	54.00	10.49
	47.58	Peak	V	40.10	12.50	45.30	54.88	74.00	19.12
	36.18	Average	V	40.10	12.50	45.30	43.48	54.00	10.52
Test Data for Middle Channel									
11 598.70	47.43	Peak	H	39.60	12.80	45.30	54.53	74.00	19.47
	35.93	Average	H	39.60	12.80	45.30	43.03	54.00	10.97
	47.32	Peak	V	39.60	12.80	45.30	54.42	74.00	19.58
	36.01	Average	V	39.60	12.80	45.30	43.11	54.00	10.89
Test Data for High Channel									
11 742.70	47.79	Peak	H	39.00	13.10	45.30	54.59	74.00	19.41
	36.60	Average	H	39.00	13.10	45.30	43.40	54.00	10.60
	47.91	Peak	V	39.00	13.10	45.30	54.71	74.00	19.29
	36.61	Average	V	39.00	13.10	45.30	43.41	54.00	10.59
Other frequencies were not found up to 10 GHz.									

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical, “*” Frequency fall in restricted band

Margin (dB) = Limit (dBuV/m) - Total (dBuV/m)

Total = Reading + Ant. Factor + Cable Loss + Amp Gain

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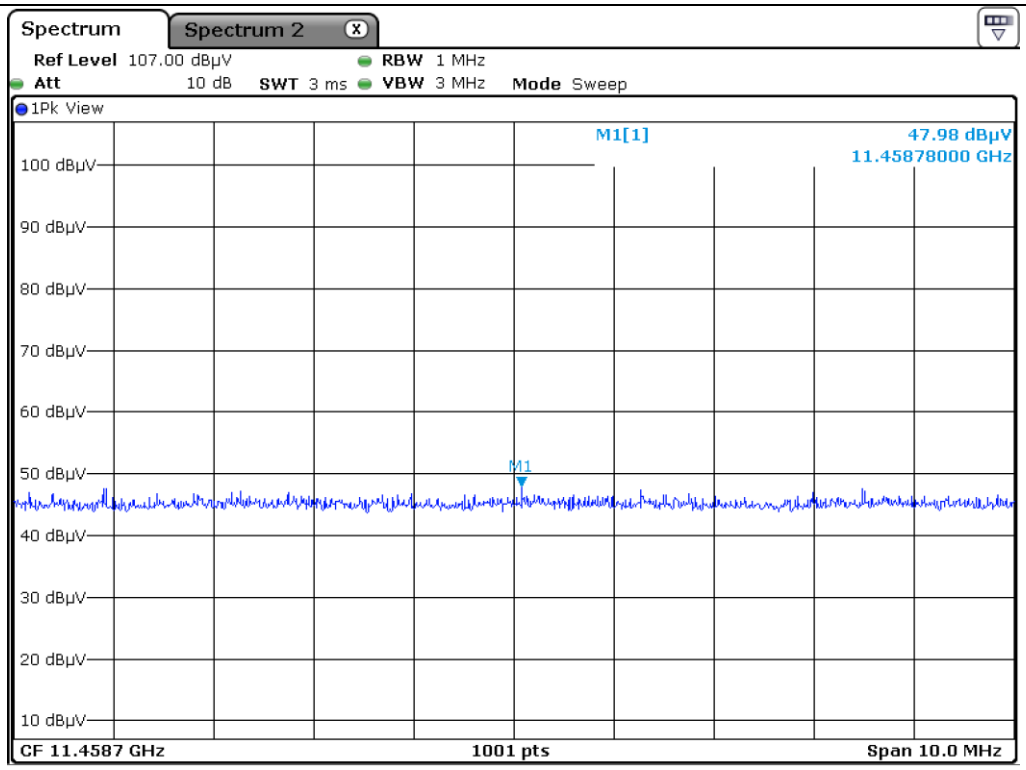
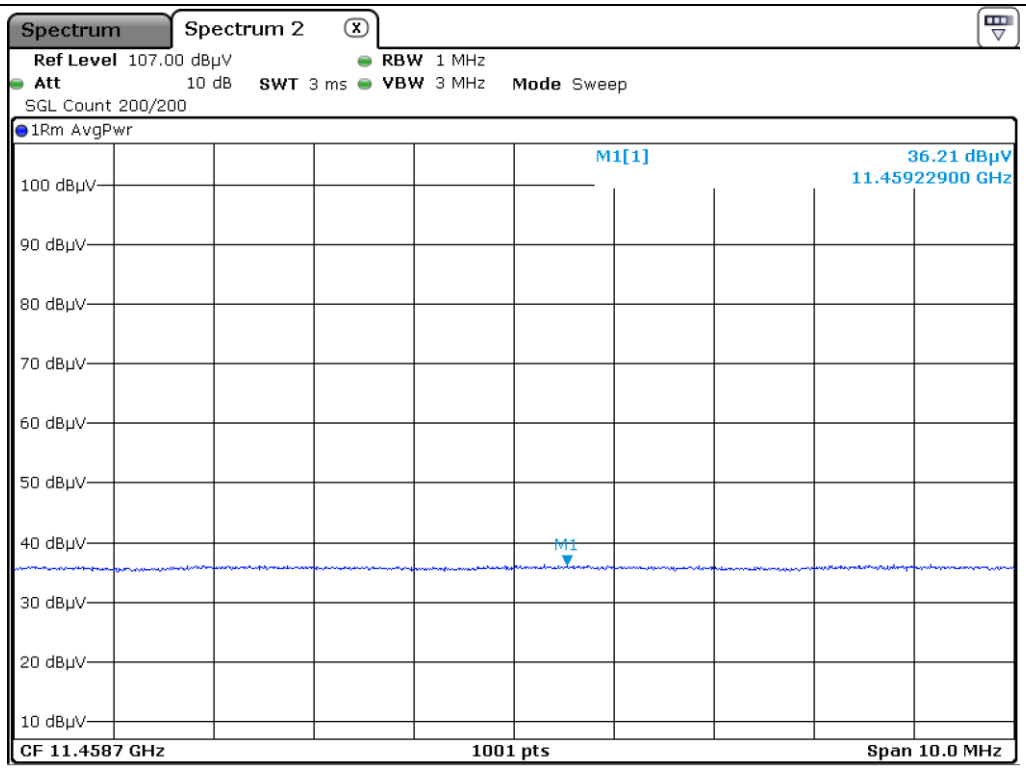


Low Channel_Peak_H



Low Channel_Average_H

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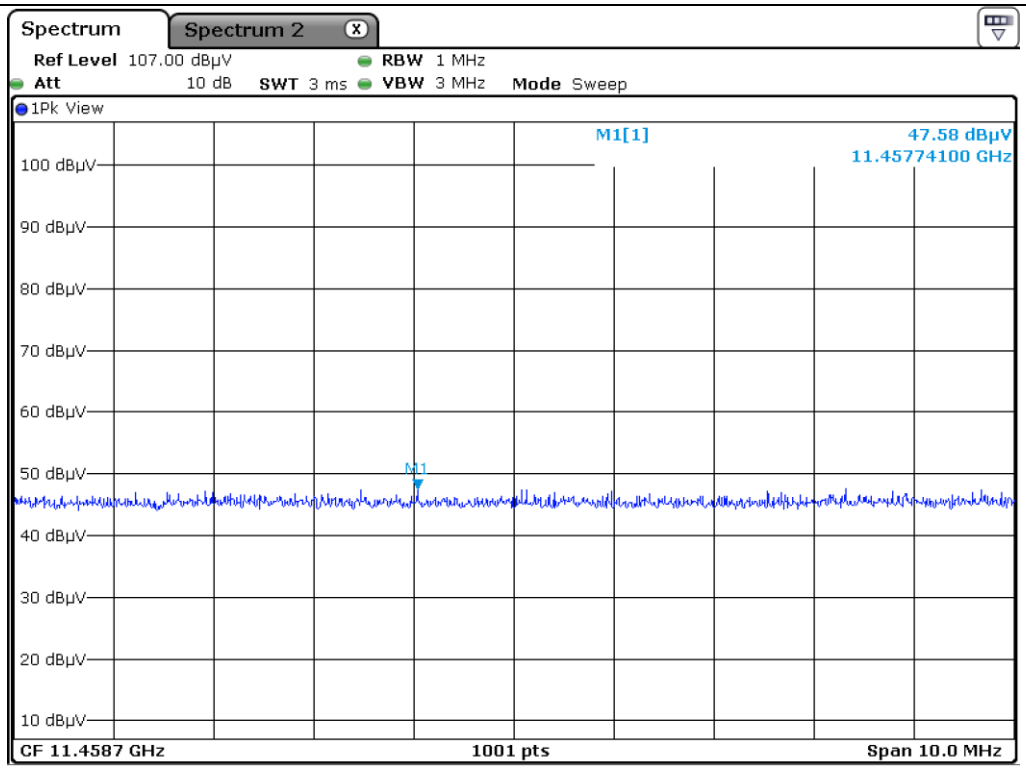
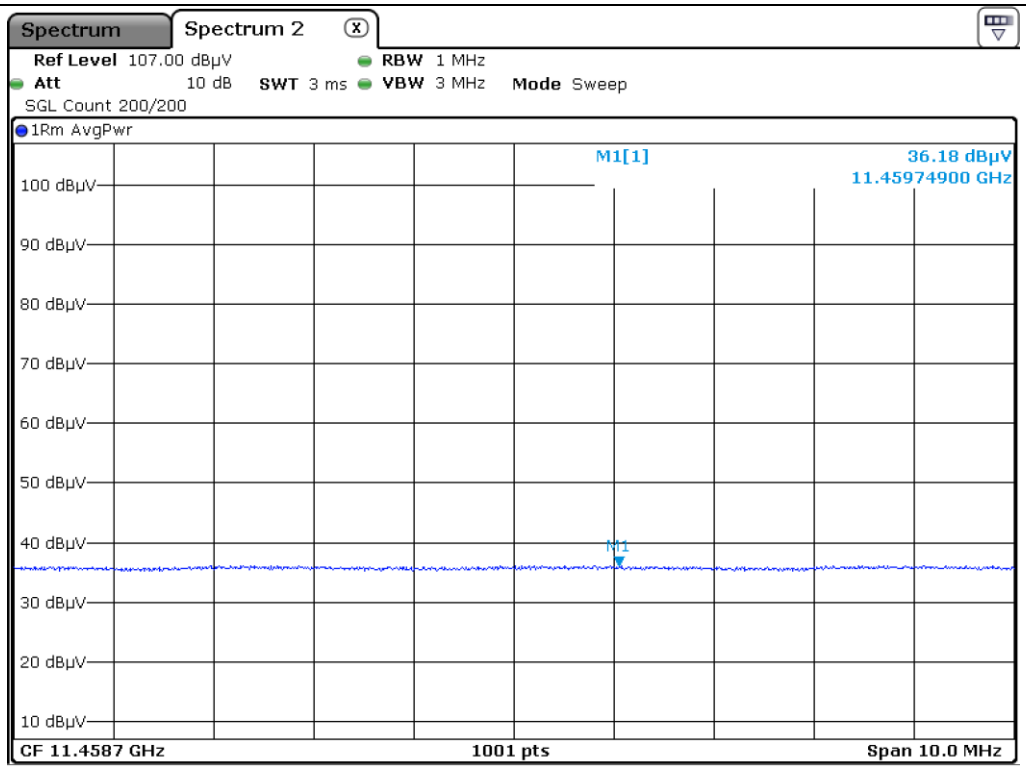
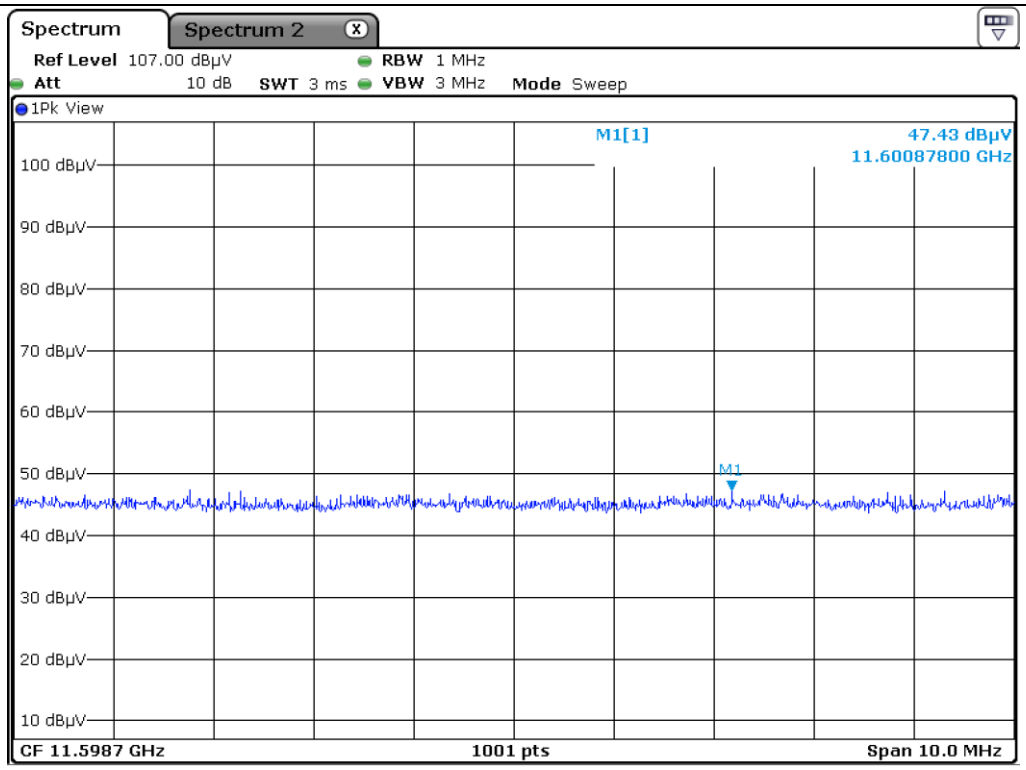


Low Channel_Peak_V

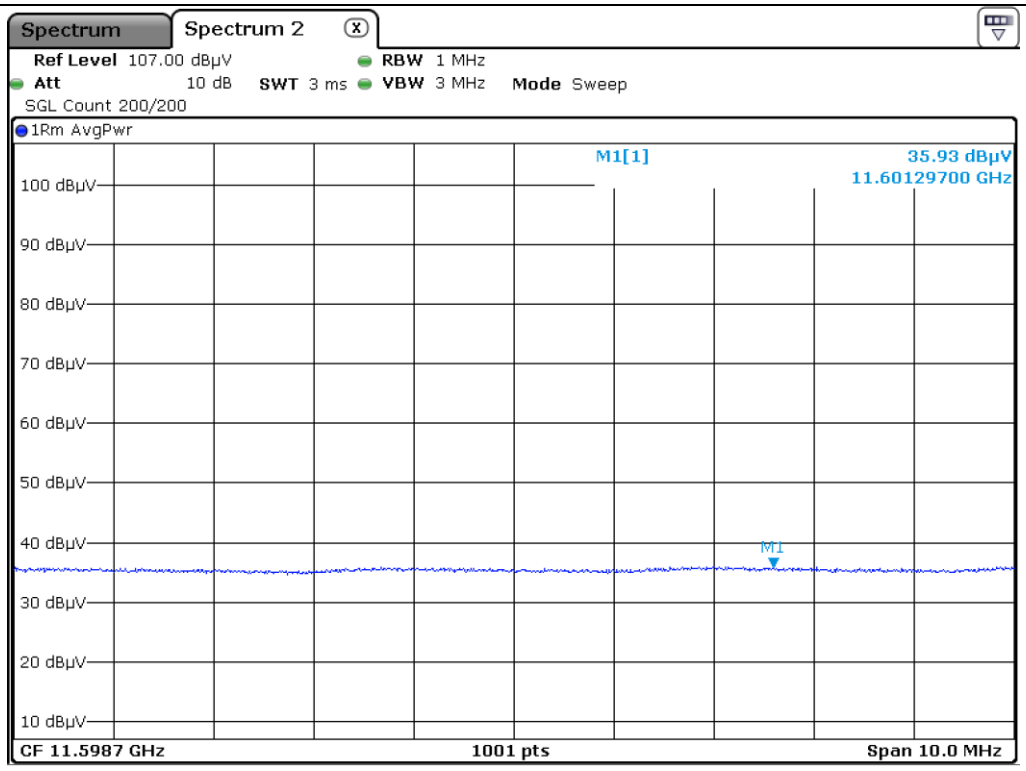


Low Channel_Average_V

ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)



Middle Channel_Peak_H



Middle Channel_Average_H

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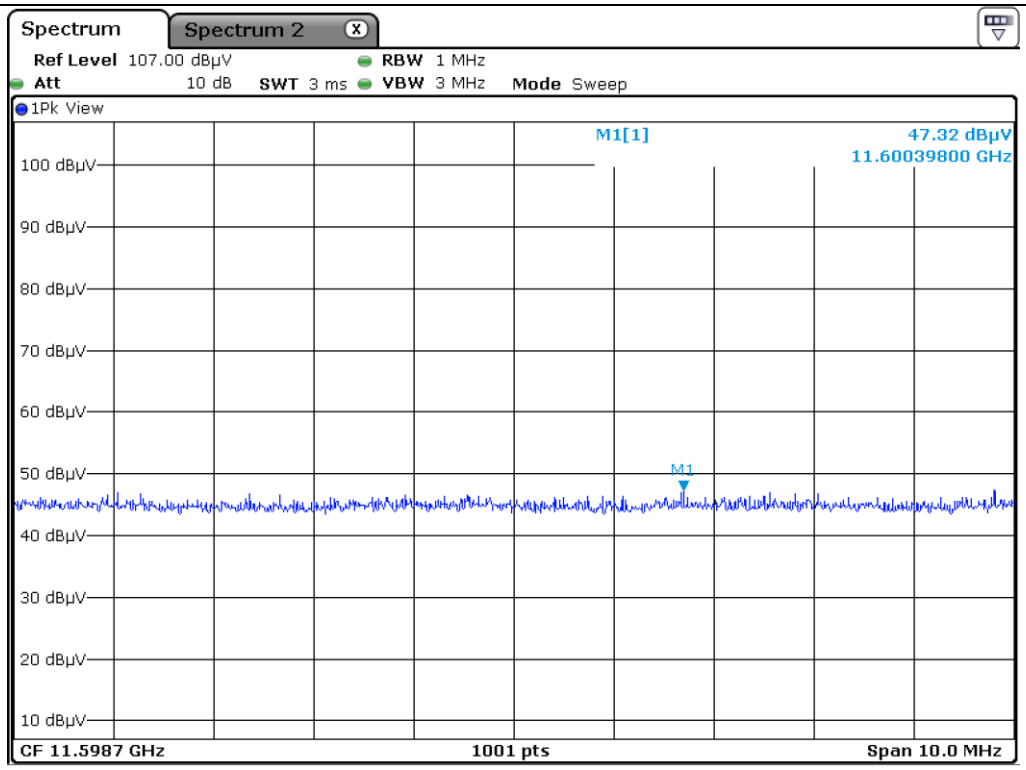
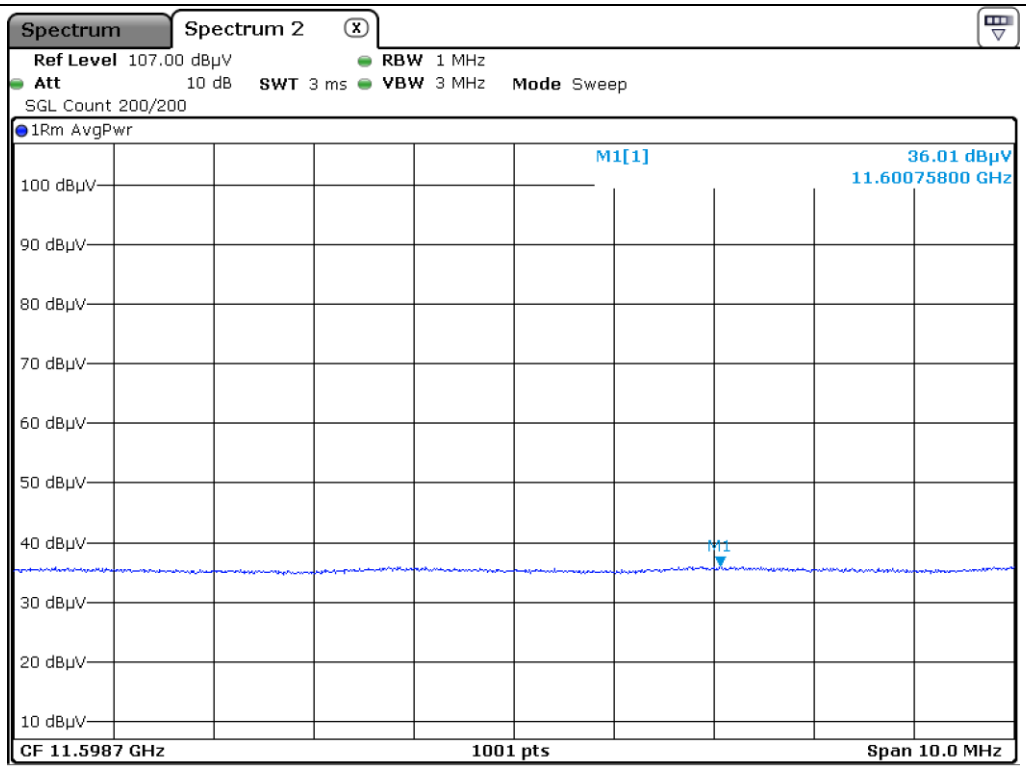


Middle Channel_Peak_V



Middle Channel_Average_V

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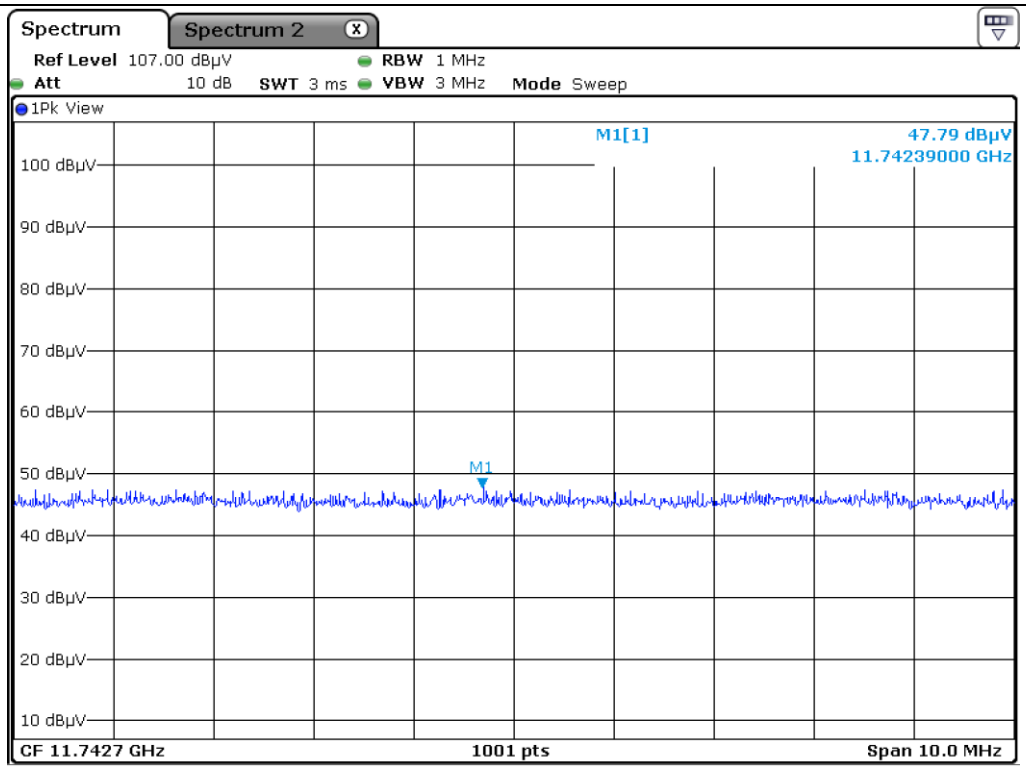
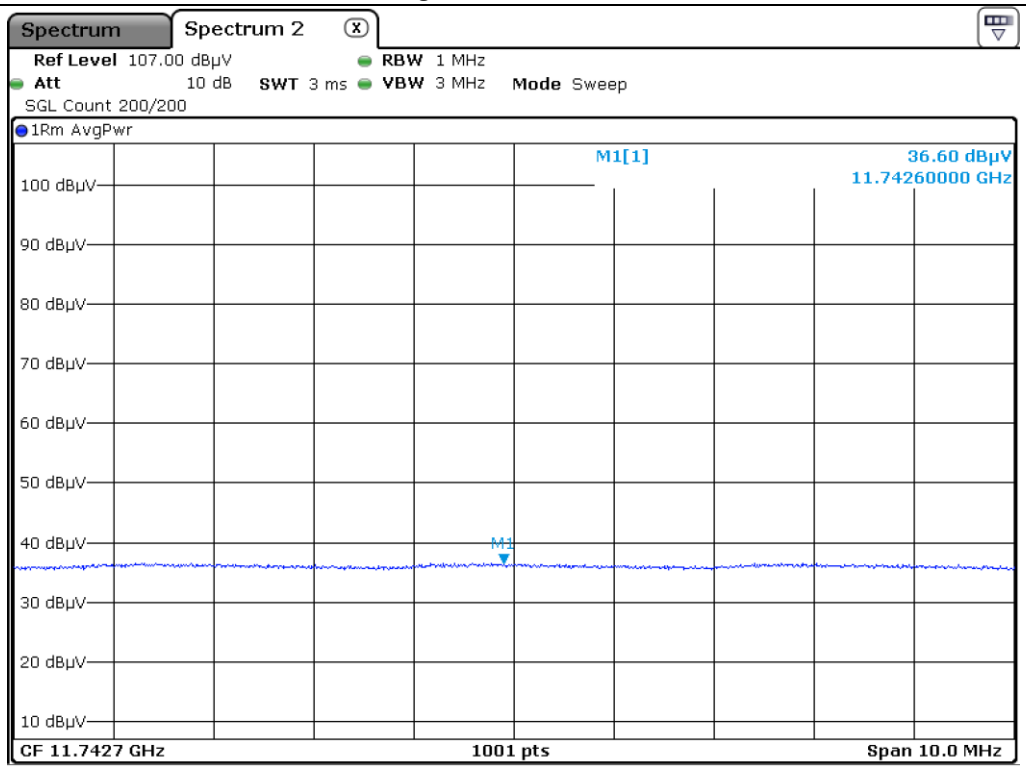
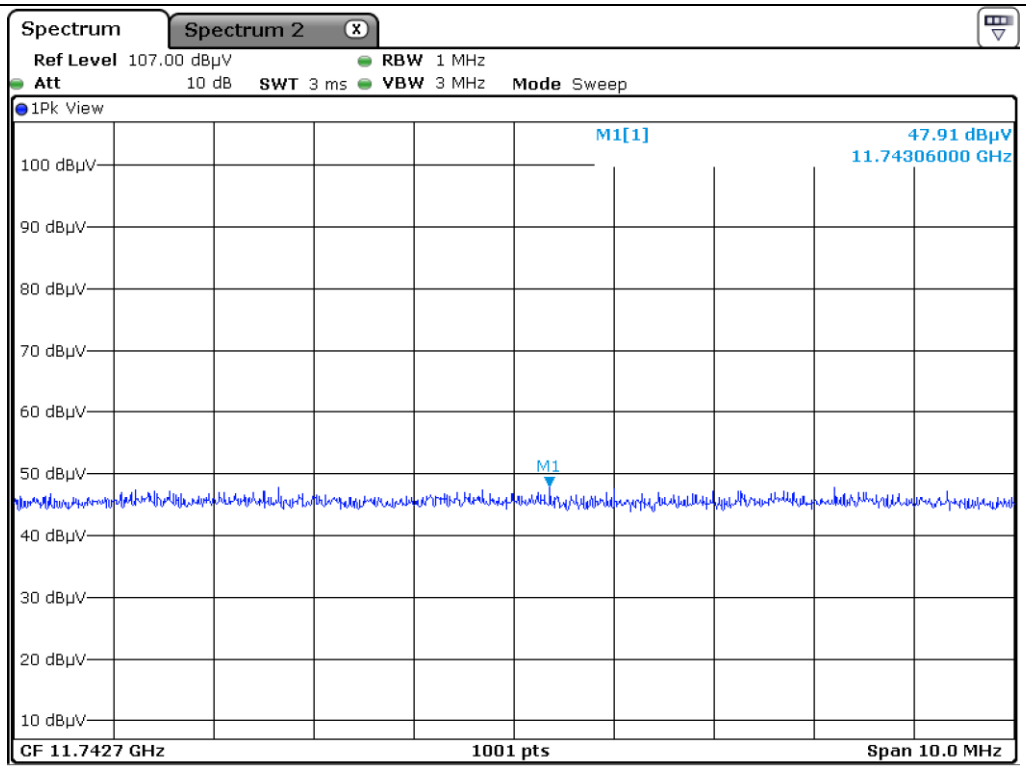


High Channel_Peak_H

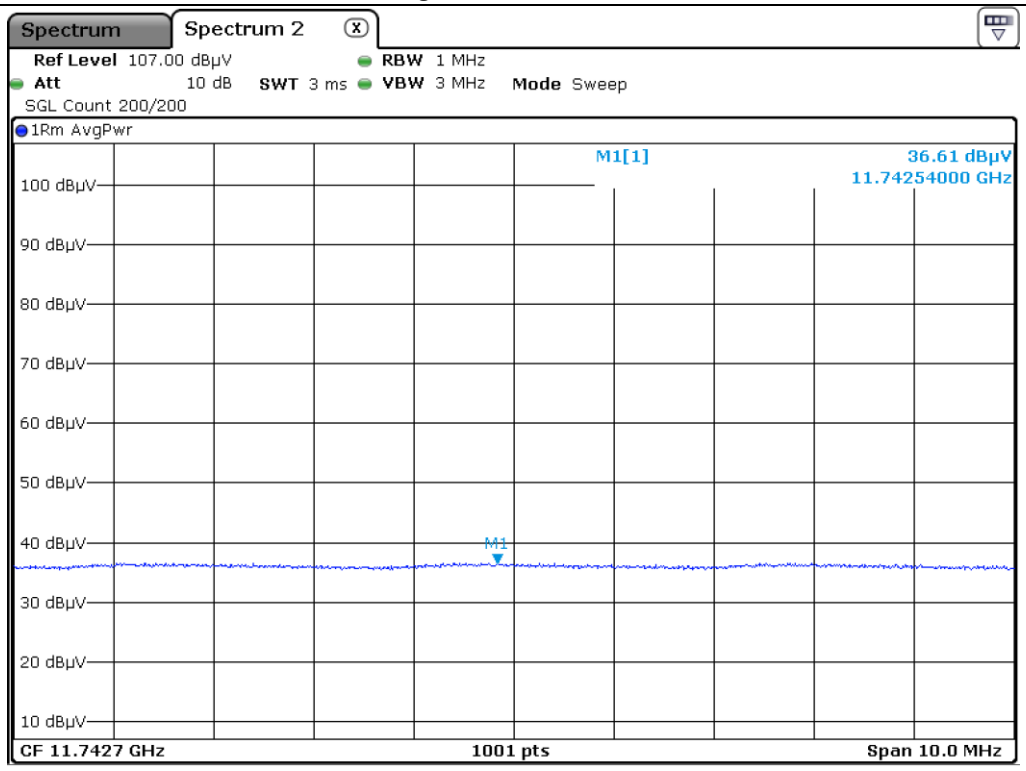


High Channel_Average_H

ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)



High Channel_Peak_V



High Channel_Average_V

ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

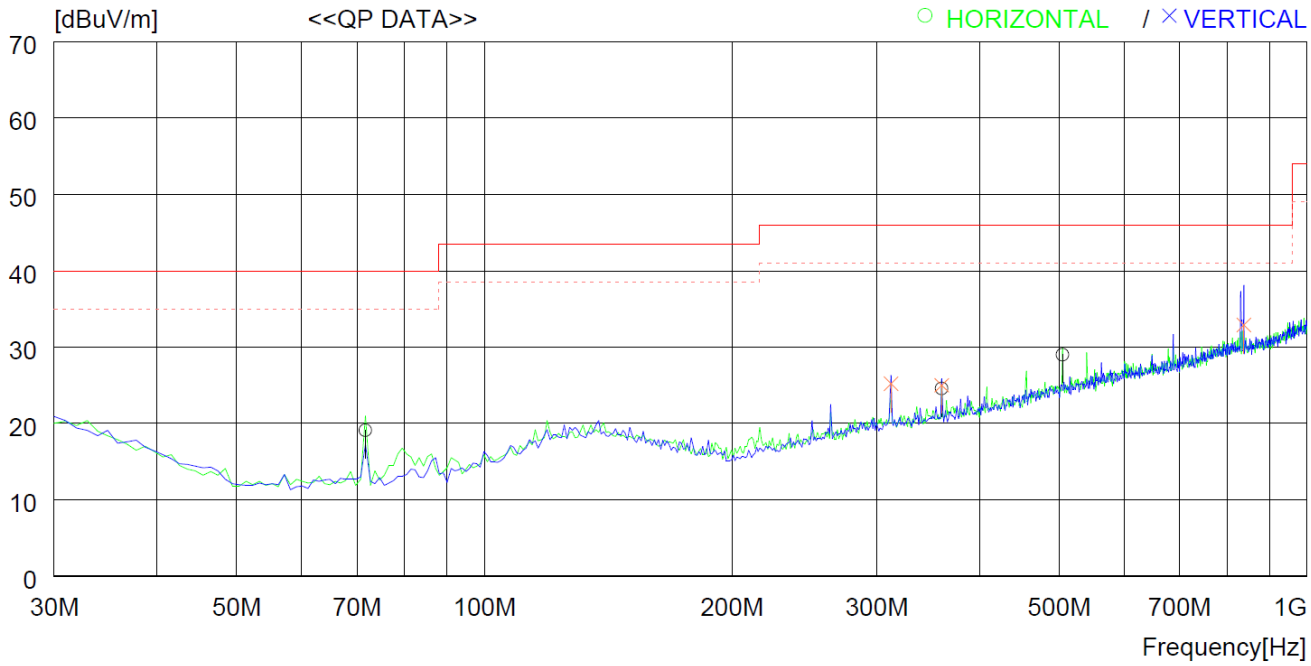
8.5.3 Test Data for Frequency range: 30 MHz ~ 1 000 MHz

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.249 (d)

Result : PASSED

EUT : Audio Transceiver

Detector : CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)



No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	71.710	36.9	13.1	1.1	32.0	19.1	40.0	20.9	300	0
2	359.800	34.2	20.0	2.4	32.0	24.6	46.0	21.4	100	0
3	504.331	35.1	23.1	2.9	32.1	29.0	46.0	17.0	100	0
----- Vertical ------										
4	312.270	35.5	19.4	2.3	32.0	25.2	46.0	20.8	200	220
5	359.800	34.6	20.0	2.4	32.0	25.0	46.0	21.0	200	245
6	838.001	34.2	27.2	3.8	32.3	32.9	46.0	13.1	300	359

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8.5.4 Test Data for Below 30 MHz

Resolution bandwidth : 200 Hz (from 9 kHz to 0.15 MHz), 9 kHz (from 0.15 MHz to 30 MHz)

Frequency range : 9 kHz ~ 30 MHz

Measurement distance : 3 m

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.249 (d)

Result : PASSED

Frequency (MHz)	Reading (dBµV)	Ant. Pol. (H/V)	Ant. Height (m)	Angle (°)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dBµV/m)	Limits (dBµV/m)	Margin (dB)
It was not observed any emissions from the EUT.									

8.5.5 Test Data above 1 GHz except for harmonic

-. Resolution bandwidth : 1 MHz and Peak Detector for Peak Mode

1 MHz and RMS Detector for Average Mode

-. Video bandwidth : 3 MHz for Peak and Average Mode

-. Frequency range : 1 GHz ~ 40 GHz

-. Measurement distance : 3 m

-. Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.249 (d)

- Result : PASSED

Frequency (MHz)	Reading (dBµV)	Ant. Pol. (H/V)	Ant. Height (m)	Angle (°)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dBµV/m)	Limits (dBµV/m)	Margin (dB)
It was not observed any emissions from the EUT.									

8.5.6 Band Edge

-. Resolution bandwidth : 1 MHz and Peak Detector for Peak Mode
1 MHz and RMS Detector for Average Mode

-. Video bandwidth : 3 MHz for Peak and Average Mode

-. Measurement distance : 3 m

-. Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.249 (d)

-. Result : PASSED

Radiated Emissions			Ant	Correction Factors			Total	FCC Limit	
Carrier Freq. (MHz)	Reading (dBµV)	Detector Mode	Pol.	Ant. Factor	Cable Loss	Amp Gain	Amplitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)
Test Data for Low Channel									
5 725.00	65.53	Peak	H	32.00	8.40	44.40	61.53	74.00	12.47
	56.96	Average	H	32.00	8.40	44.40	52.96	54.00	1.04
	64.97	Peak	V	32.00	8.40	44.40	60.97	74.00	13.03
	56.60	Average	V	32.00	8.40	44.40	52.60	54.00	1.40
5 875.00	49.28	Peak	H	32.30	8.80	44.40	45.98	74.00	28.02
	39.53	Average	H	32.30	8.80	44.40	36.23	54.00	17.77
	48.64	Peak	V	32.30	8.80	44.40	45.34	74.00	28.66
	39.83	Average	V	32.30	8.80	44.40	36.53	54.00	17.47
Test Data for Middle Channel									
5 725.00	50.80	Peak	H	32.00	8.40	44.40	46.80	74.00	27.20
	41.71	Average	H	32.00	8.40	44.40	37.71	54.00	16.29
	49.74	Peak	V	32.00	8.40	44.40	45.74	74.00	28.26
	41.50	Average	V	32.00	8.40	44.40	37.50	54.00	16.50
5 875.00	50.14	Peak	H	32.30	8.80	44.40	46.84	74.00	27.16
	41.23	Average	H	32.30	8.80	44.40	37.93	54.00	16.07
	49.75	Peak	V	32.30	8.80	44.40	46.45	74.00	27.55
	41.07	Average	V	32.30	8.80	44.40	37.77	54.00	16.23

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Radiated Emissions			Ant	Correction Factors			Total	FCC Limit	
Carrier Freq. (MHz)	Reading (dBµV)	Detector Mode	Pol.	Ant. Factor	Cable Loss	Amp Gain	Amplitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)
Test Data for High Channel									
5 725.00	46.55	Peak	H	32.00	8.40	44.40	42.55	74.00	31.45
	38.60	Average	H	32.00	8.40	44.40	34.60	54.00	19.40
	46.05	Peak	V	32.00	8.40	44.40	42.05	74.00	31.95
	38.87	Average	V	32.00	8.40	44.40	34.87	54.00	19.13
5 875.00	67.11	Peak	H	32.30	8.80	44.40	63.81	74.00	10.19
	56.37	Average	H	32.30	8.80	44.40	53.07	54.00	0.93
	66.78	Peak	V	32.30	8.80	44.40	63.48	74.00	10.52
	56.00	Average	V	32.30	8.80	44.40	52.70	54.00	1.30

Remark. Margin (dB) = Limit (dBuV/m) - Total (dBuV/m)

Total = Reading + Ant. Factor + Cable Loss + Amp Gain

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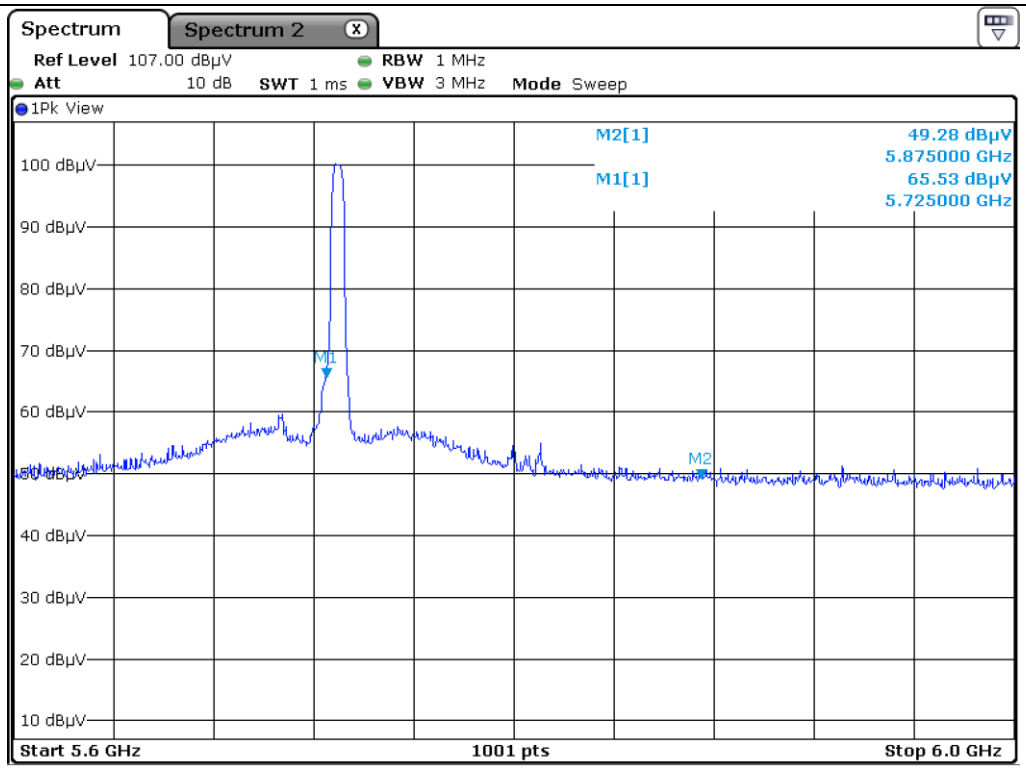
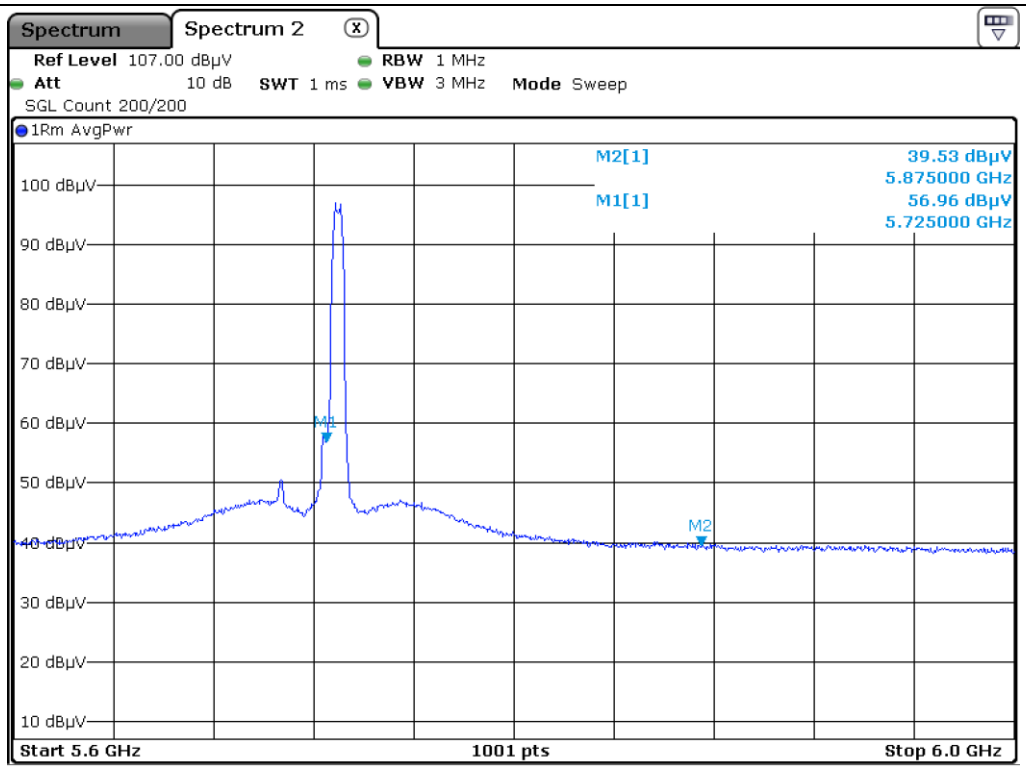
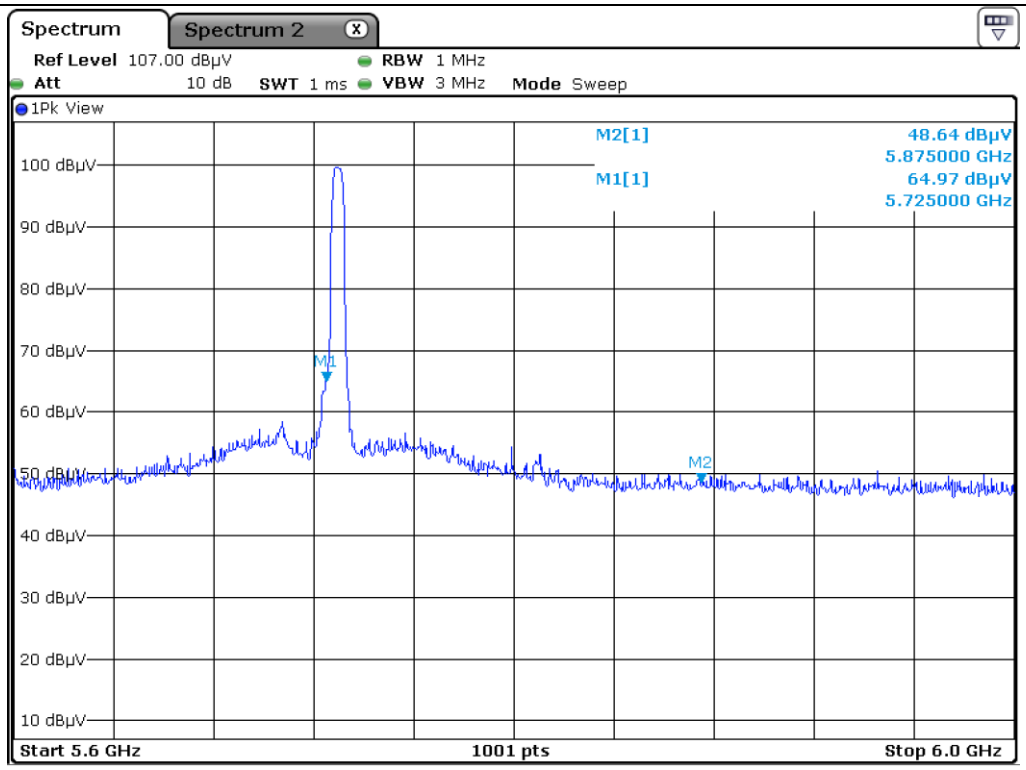


Low Channel_Peak_H

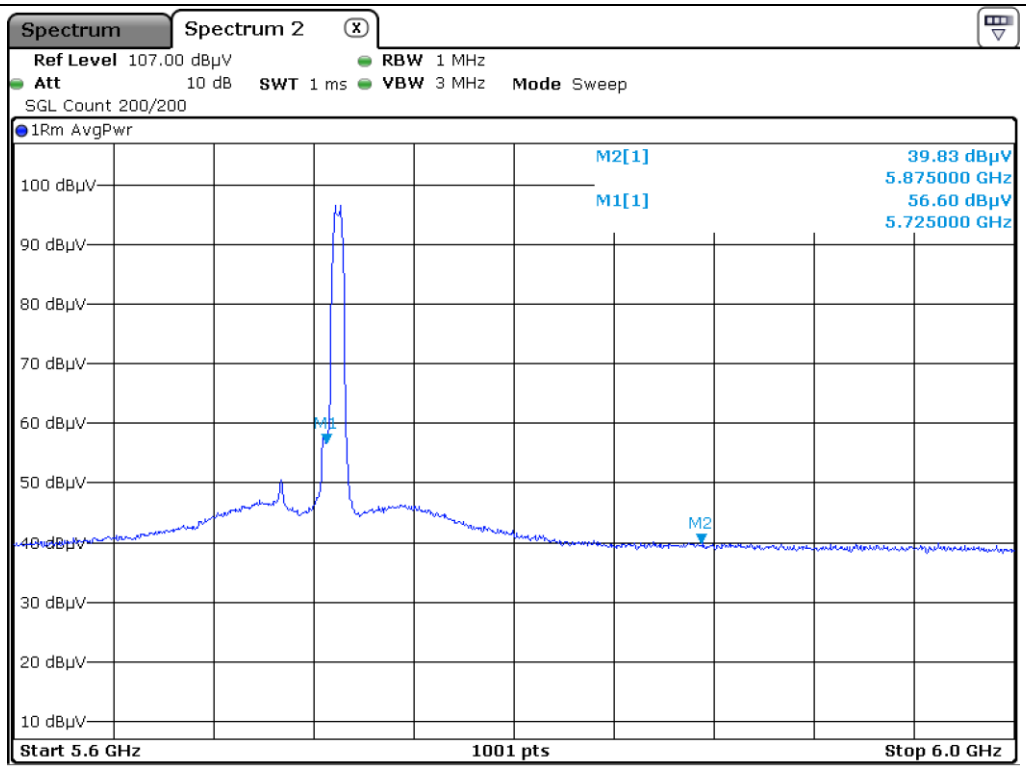


Low Channel_Average_H

ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)



Low Channel_Peak_V



Low Channel_Average_V

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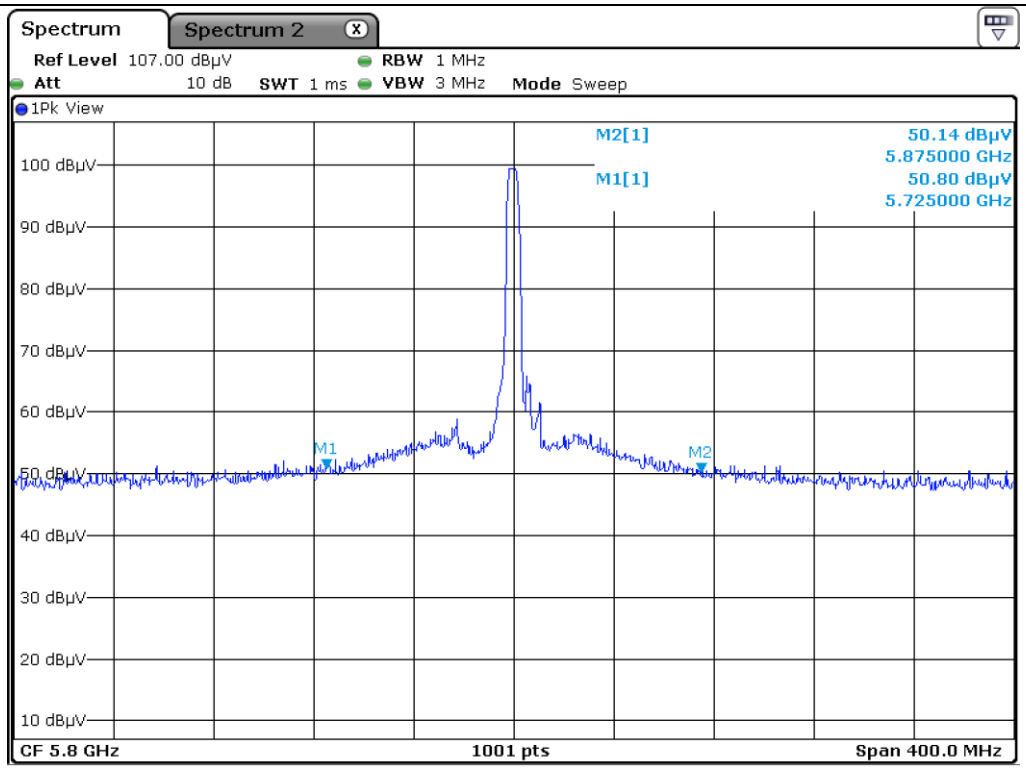
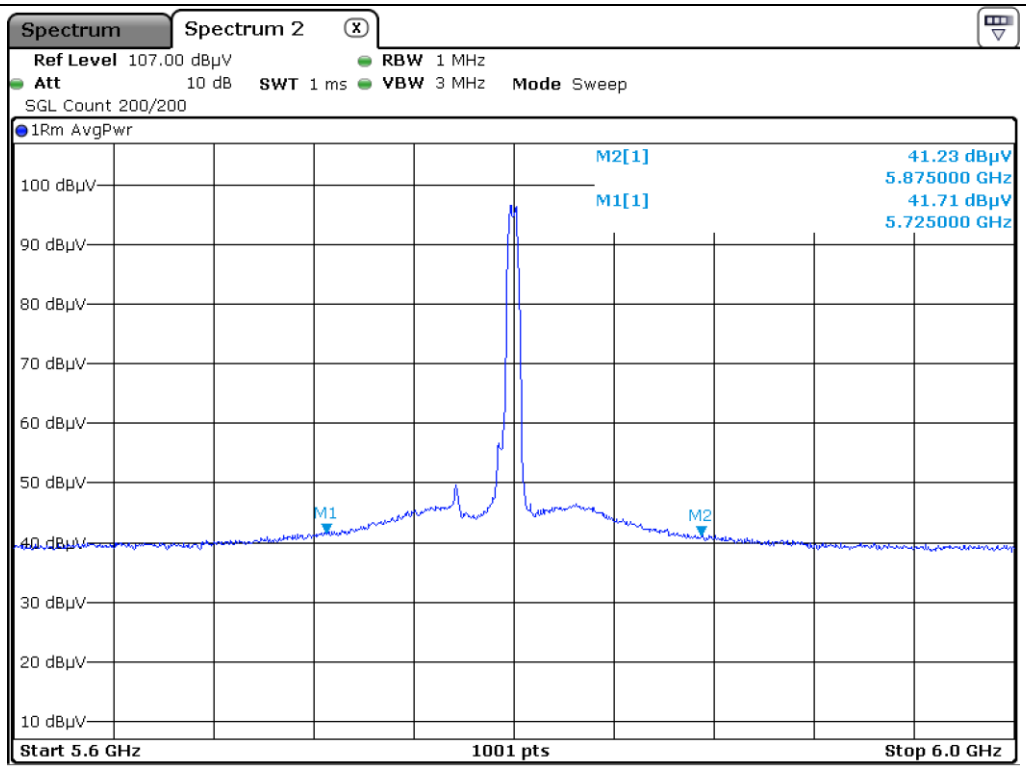
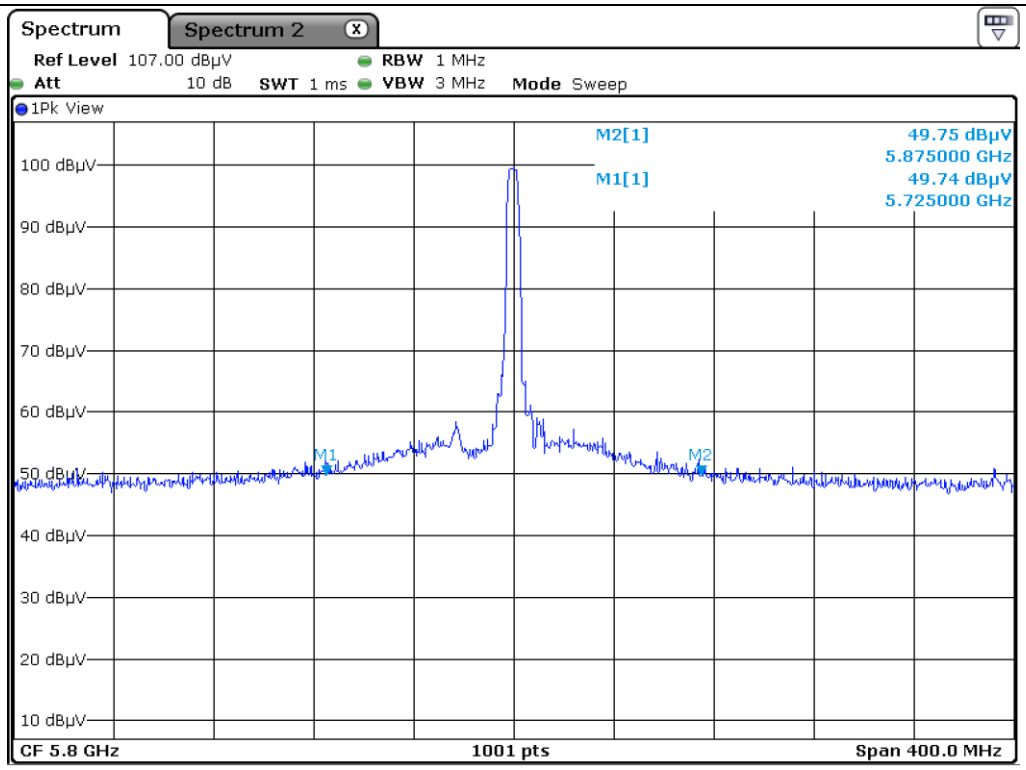


Middle Channel_Peak_H

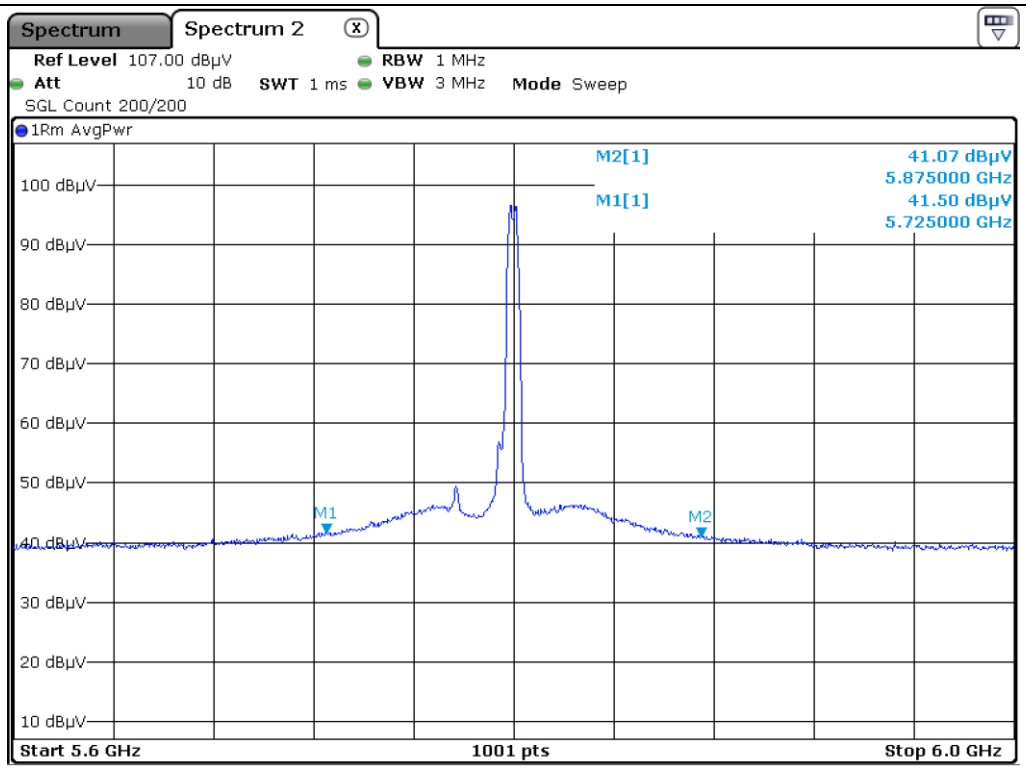


Middle Channel_Average_H

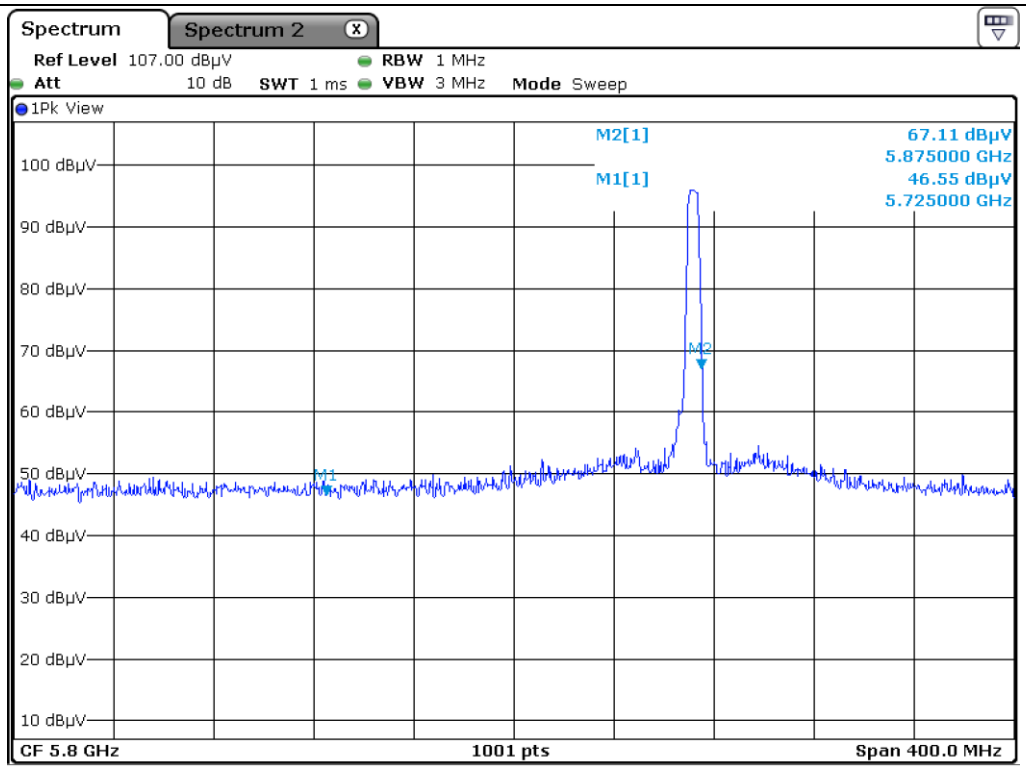
ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)



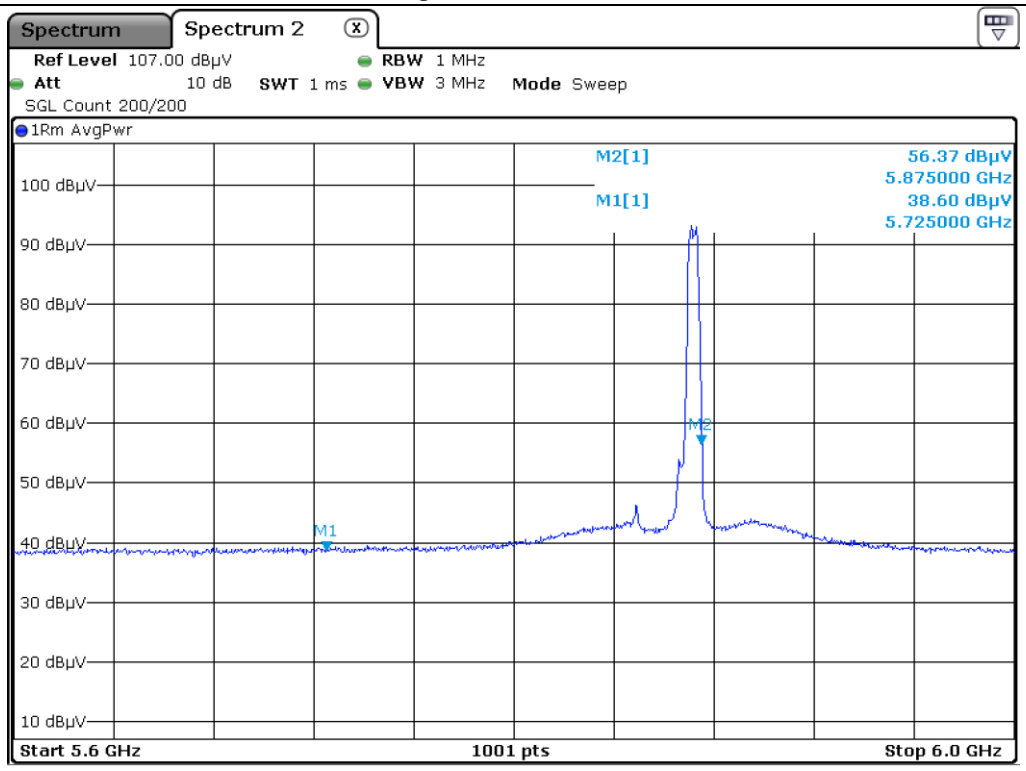
Middle Channel_Peak_V



Middle Channel_Average_V



High Channel_Peak_H



High Channel_Average_H

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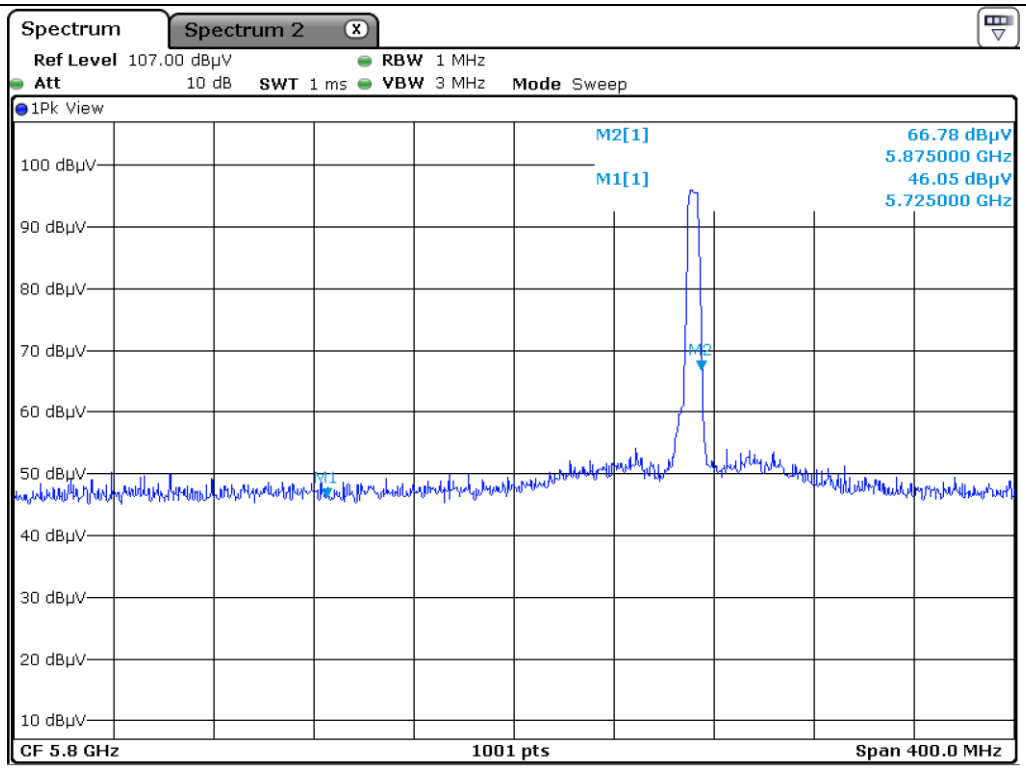
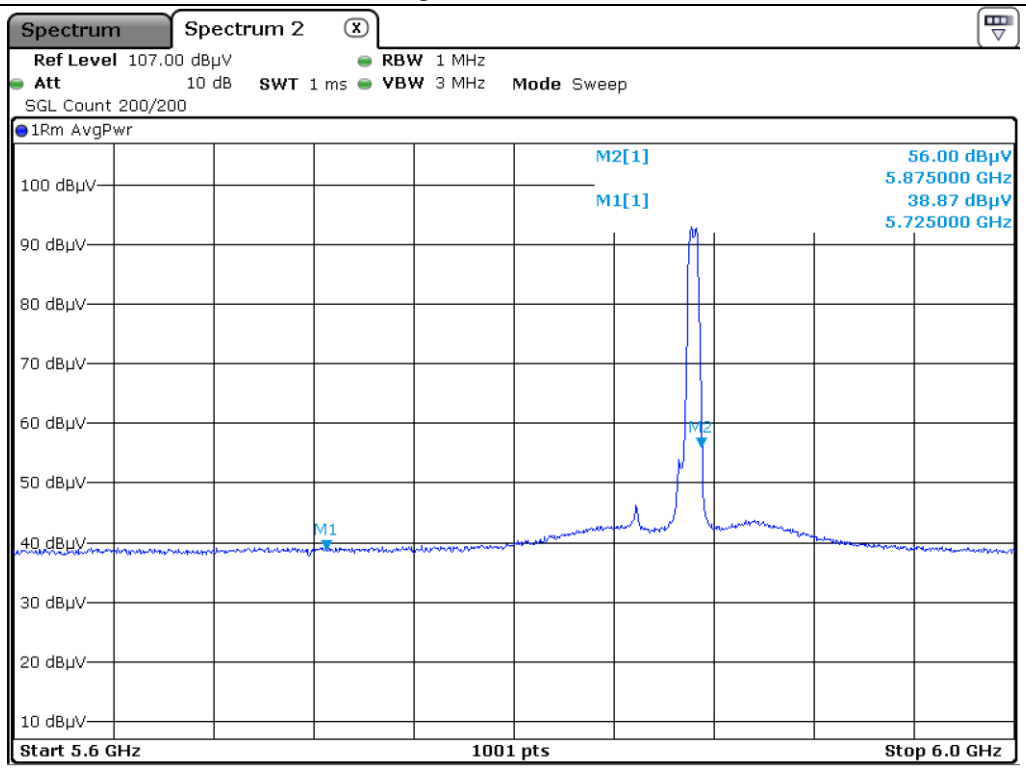


High Channel_Peak_V



High Channel_Average_V

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9. CONDUCTED EMISSION TEST

9.1 Operating environment

Temperature : 22 °C

Relative humidity : 46 % R.H.

9.2 Test set-up

The EUT was placed on a wooden table, 0.8 m height above the floor. Power was fed to the EUT through a 50 Ω / 50 μH + 5 Ω Artificial Mains Network (AMN). The ground plane was electrically bonded to the reference ground system and all power lines were filtered from ambient.

9.3 Test Date

November 16, 2022 ~ November 18, 2022

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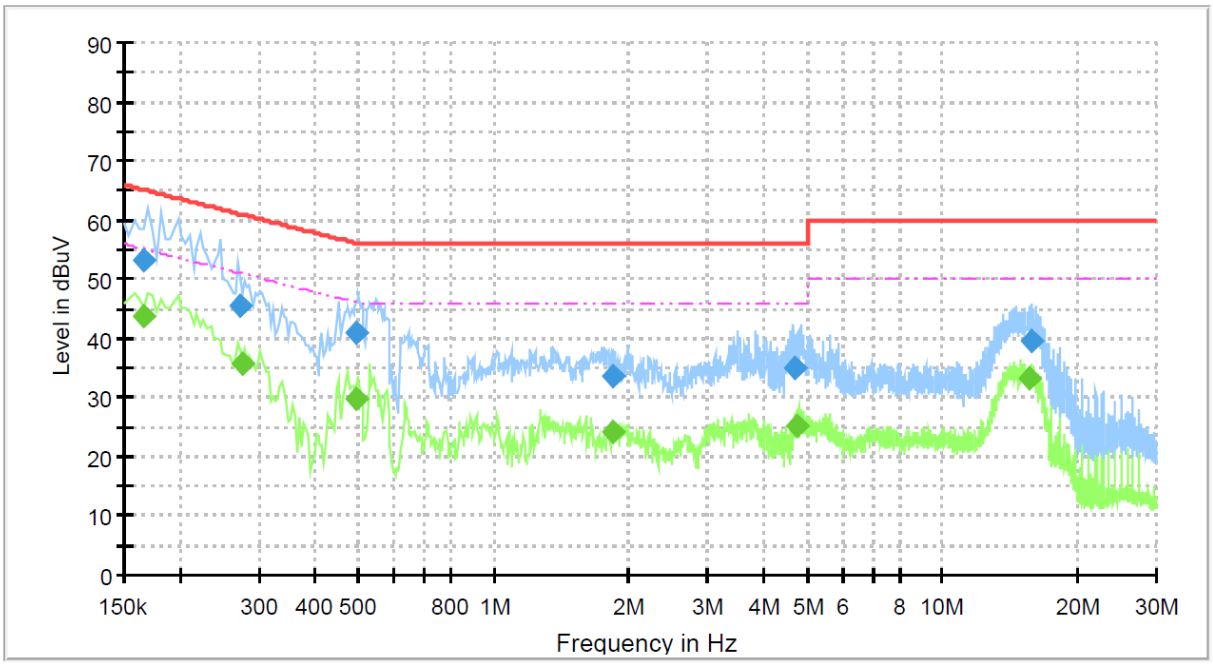
9.4 Test data

-. Resolution bandwidth : 9 kHz

-. Frequency range : 0.15 MHz ~ 30 MHz

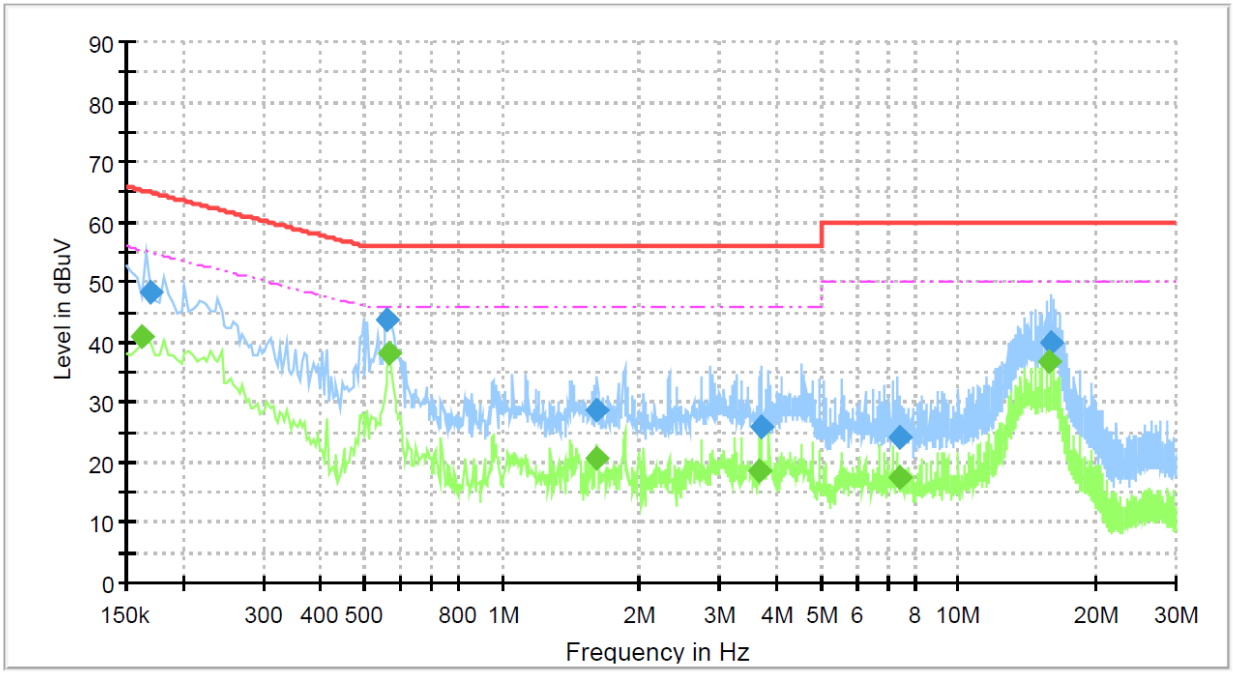
-. Tested Line : HOT LINE



Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.166	---	43.88	55.18	11.31	1000.0	9.0	L1	9.98
0.166	53.26	---	65.18	11.92	1000.0	9.0	L1	9.98
0.274	45.61	---	61.01	15.41	1000.0	9.0	L1	10.04
0.275	---	35.64	50.98	15.34	1000.0	9.0	L1	10.04
0.497	---	29.80	46.05	16.25	1000.0	9.0	L1	10.10
0.497	41.00	---	56.05	15.05	1000.0	9.0	L1	10.10
1.844	33.62	---	56.00	22.38	1000.0	9.0	L1	10.19
1.848	---	24.05	46.00	21.95	1000.0	9.0	L1	10.19
4.709	35.05	---	56.00	20.95	1000.0	9.0	L1	10.25
4.715	---	25.13	46.00	20.87	1000.0	9.0	L1	10.25
15.697	---	33.31	50.00	16.69	1000.0	9.0	L1	10.59
15.717	39.51	---	60.00	20.49	1000.0	9.0	L1	10.59

-. Tested Line : NEUTRAL LINE



Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.161	---	41.07	55.39	14.32	1000.0	9.0	N	9.95
0.171	48.30	---	64.94	16.63	1000.0	9.0	N	9.95
0.560	43.74	---	56.00	12.26	1000.0	9.0	N	9.97
0.568	---	38.02	46.00	7.98	1000.0	9.0	N	9.97
1.606	---	20.53	46.00	25.47	1000.0	9.0	N	10.02
1.606	28.84	---	56.00	27.16	1000.0	9.0	N	10.02
3.677	---	18.41	46.00	27.59	1000.0	9.0	N	10.08
3.709	25.82	---	56.00	30.18	1000.0	9.0	N	10.09
7.428	---	17.40	50.00	32.60	1000.0	9.0	N	10.23
7.432	24.27	---	60.00	35.73	1000.0	9.0	N	10.23
15.862	---	36.60	50.00	13.40	1000.0	9.0	N	10.58
16.030	39.80	---	60.00	20.20	1000.0	9.0	N	10.59

Remark: Margin (dB) = Limit – Level (Result)

The emission level in above table is included the transducer factor that means insertion loss (LISN), cable loss and attenuator.

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10. LIST OF TEST EQUIPMENT

Model Number	Manufacturer	Description	Serial Number	Last Cal.(Interval)
FSV30	Rohde & Schwarz	Signal Analyzer	101372	Jul. 14, 2022 (1Y)
ESU	Rohde & Schwarz	EMI Test Receiver	100261	Mar. 07, 2022 (1Y)
ESR3	Rohde & Schwarz	EMI Test Receiver	102602	Mar. 14, 2022 (1Y)
310N	Sonoma Instrument	Pre-Amplifier	392756	Oct. 13, 2022 (1Y)
SCU40A	Rohde & Schwarz	Signal Conditioning unit	100436	Jan. 18, 2022 (1Y)
SCU18	Rohde & Schwarz	Signal Conditioning unit	102266	Jul. 12, 2022 (1Y)
WT-A1856-R12	Microwave	Cavity Band Rejection Filter	WT22040502-4	Jun. 21, 2022 (1Y)
DT2000-2t	Innco Systems GmbH	Turn Table	N/A	N/A
MA-4000XPET	Innco System	Antenna Master	MA4000/509	N/A
CO3000	Innco System	Controller	1026/40960617/P	N/A
HLP-2008	TDK	Hybrid Antenna	131316	Mar. 07, 2022 (2Y)
BBHA9120D	Schwarzbeck	Horn Antenna	9120D-1366	Jul. 05, 2022 (1Y)
BBHA9170	Schwarzbeck	Horn Antenna	BBHA9170178	Jan. 06, 2022 (1Y)
FMZB 1513	Schwarzbeck	Active Loop Antenna	1513-235	Mar. 24. 2022 (2Y)
NSLK8126	Schwarzbeck	AMN	8126-404	Mar. 14, 2022 (1Y)
ESH3Z2	Rohde & Schwarz	PULSE LIMITER	357.8810.52	Mar. 14, 2022 (1Y)

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