

ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR LOW-POWER, NON-LICENSED TRANSMITTER

Test Report No. : OT-213-RWD-015

Reception No. : 2012005330

Applicant : LG Electronics USA

Address : 111 Sylvan Avenue, North Building, Englewood Cliffs, New Jersey, 07632, United States

Manufacturer : LG Electronics Inc.

Address : 84, Wanam-ro, Seongsan-gu, Changwon-si, Gyeongsangnam-do, Republic of Korea

Type of Equipment : Residential Remote Controller

FCC ID. : BEJ-PREMTA200

Model Name : PREMTA200

Serial number : N/A

Total page of Report : 57 pages (including this page)

Date of Incoming : January 13, 2021

Date of issue : March 04, 2021

SUMMARY

The equipment complies with the regulation; *FCC PART 15 SUBPART C Section 15.247*

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

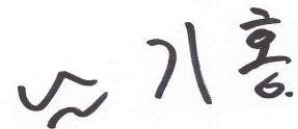
It is not a generally valid assessment of the features of the respective products of the mass-production.



Tested by
Hyung-Kwon, Oh / Manager
ONETECH Corp.



Reviewed by
Tae-Ho, Kim / Senior Manager
ONETECH Corp.



Approved by
Ki-Hong, Nam / General Manager
ONETECH Corp.

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Revision History

Rev. No.	Issue Report No.	Issued Date	Revisions	Section Affected
0	OT-213-RWD-015	March 04, 2021	Initial Release	All

1. VERIFICATION OF COMPLIANCE

Applicant : LG Electronics USA
 Address : 111 Sylvan Avenue, North Building, Englewood Cliffs, New Jersey, 07632, United States
 Contact Person : Choi young min / Research Engineer
 Telephone No. : +82-10-4699-9873
 FCC ID : BEJ-PREMTA200
 Model Name : PREMTA200
 Brand Name : -
 Serial Number : N/A
 Date : March 04, 2021

EQUIPMENT CLASS	DTS – DIGITAL TRNSMISSION SYSTEM
E.U.T. DESCRIPTION	Residential Remote Controller
THIS REPORT CONCERNS	Original Grant
MEASUREMENT PROCEDURES	ANSI C63.10: 2020
TYPE OF EQUIPMENT TESTED	Pre-Production
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	Certification
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC PART 15 SUBPART C Section 15.247 KDB 558074 D01 15.247 Meas Guidance v05r02
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.

2. TEST SUMMARY

2.1 Test items and results

SECTION	TEST ITEMS	RESULTS
15.247 (a) (2)	Minimum 6 dB Bandwidth	Met the Limit / PASS
15.247 (b) (3)	Maximum Conducted(average) Output Power	Met the Limit / PASS
15.247 (d)	100 kHz Bandwidth Outside the Frequency Band	Met the Limit / PASS
15.247 (d)	Radiated Emission which fall in the Restricted Band	Met the Limit / PASS
15.247 (e)	Peak Power Spectral Density	Met the Limit / PASS
15.209	Radiated Emission Limits	Met the Limit / PASS
15.207	Conducted Limits	N/A (See Note)
15.203	Antenna Requirement	Met requirement / PASS

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

2.2 Additions, deviations, exclusions from standards

No additions, deviations or exclusions have been made from standard.

2.3 Related Submittal(s) / Grant(s)

Original submittal only

2.4 Purpose of the test

To determine whether the equipment under test fulfills the requirements of the regulation stated in FCC PART 15 SUBPART C Section 15.247.

2.5 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10: 2020. Radiated testing was performed at a distance of 3 m from EUT to the antenna.

2.6 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

3. GENERAL INFORMATION

3.1 Product Description

The LG Electronics USA, Model PREMTA200 (referred to as the EUT in this report) is a Residential Remote Controller. The product specification described herein was obtained from product data sheet or user’s manual.

DEVICE TYPE	Residential Remote Controller
Temperature Range	-0 °C ~ 40 °C
OPERATING FREQUENCY	2 412 MHz ~ 2 462 MHz (802.11b/g/n(HT20))
MODULATION TYPE	802.11b: DSSS Modulation(DBPSK/DQPSK/CCK) 802.11g/n(HT20): OFDM Modulation(BPSK/QPSK/16QAM/64QAM)
RF OUTPUT POWER	12.80 dBm(802.11b) 11.99 dBm(802.11g) 11.85 dBm(802.11n_HT20)
ANTENNA TYPE	Chip Antenna
ANTENNA GAIN	3.0 dBi
List of each Osc. or crystal Freq.(Freq. >= 1 MHz)	32.768 kHz, 24 MHz

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

-. None

4. EUT MODIFICATIONS

-. None

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	LG Electronics Inc.	EAX69389601	N/A
LCD	N/A	BL-B0430099AV0 20-52	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
PREMTA200	LG Electronics Inc.	Residential Remote Controller (EUT)	
HP Probook	HP	Notebook PC	EUT
N/A	N/A	Jig Board	EUT
PWS-3003D	Protek	DC Power Supply	EUT

5.3 Mode of operation during the test

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

-. Frequency

Channel	Frequency
1	2 412
2	2 417
3	2 422
4	2 427
5	2 432
6	2 437
7	2 442
8	2 447
9	2 452
10	2 457
11	2 462

-. Channel Operations

Modulation	DATA RATE	OUTPUT POWER[dBm]
802.11 b (Low Channel)	1 Mbps	12.80
	2 Mbps	12.76
	5.5 Mbps	12.67
	11 Mbps	12.60
802.11 g (Low Channel)	6 Mbps	11.99
	9 Mbps	11.86
	12 Mbps	11.70
	18 Mbps	11.67
	24 Mbps	11.39
	36 Mbps	11.15
	48 Mbps	11.02
	54 Mbps	10.94
802.11 HT 20 (Low Channel)	6.5 Mbps	11.85
	13 Mbps	11.74
	19.5 Mbps	11.60
	26 Mbps	11.52
	39 Mbps	11.24
	52 Mbps	11.09
	58.5 Mbps	11.05
	65 Mbps	10.96

-. The worse case data rate for each modulation is determined 1 Mbps for IEEE 802.11b, 6 Mbps for IEEE 802.11g, 6.5 Mbps for HT20.

-. 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.

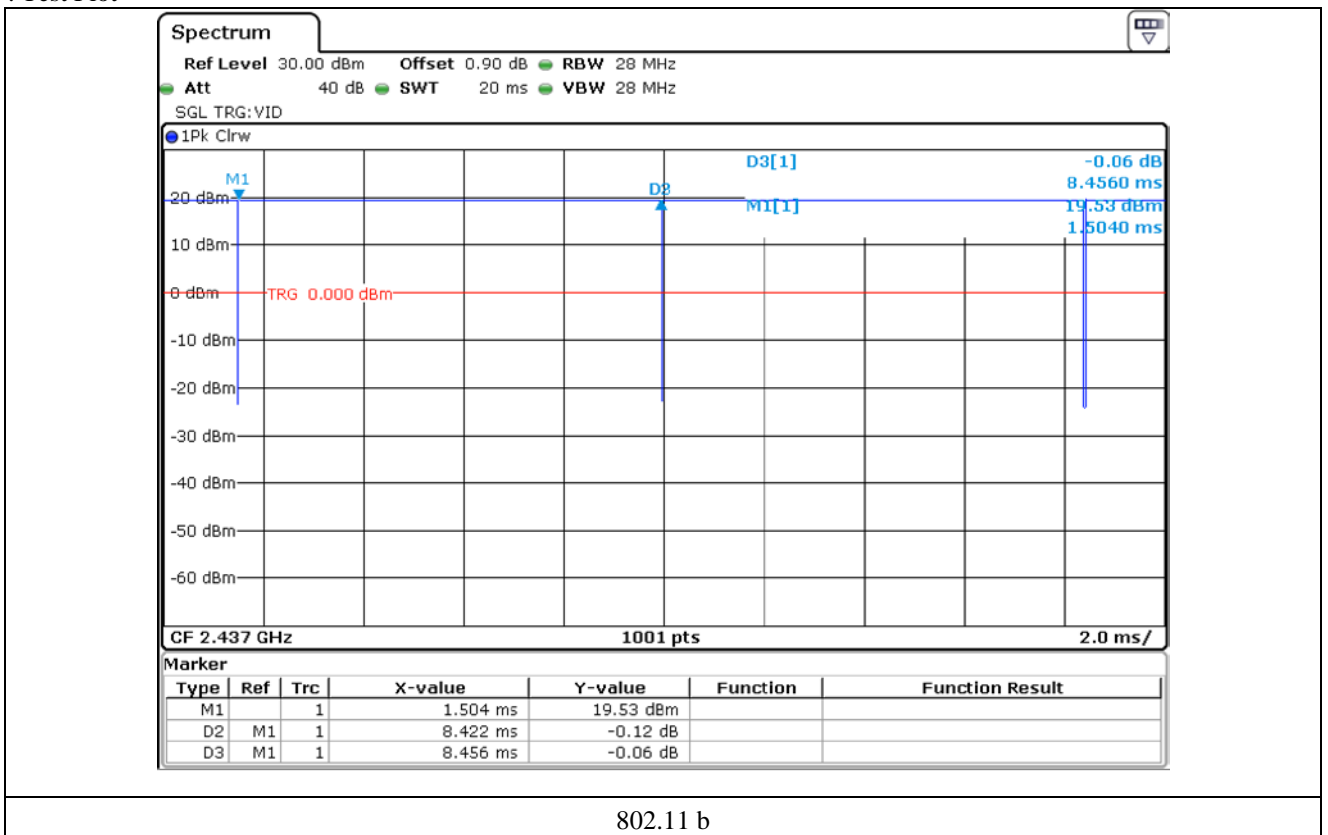
- . Duty Cycle

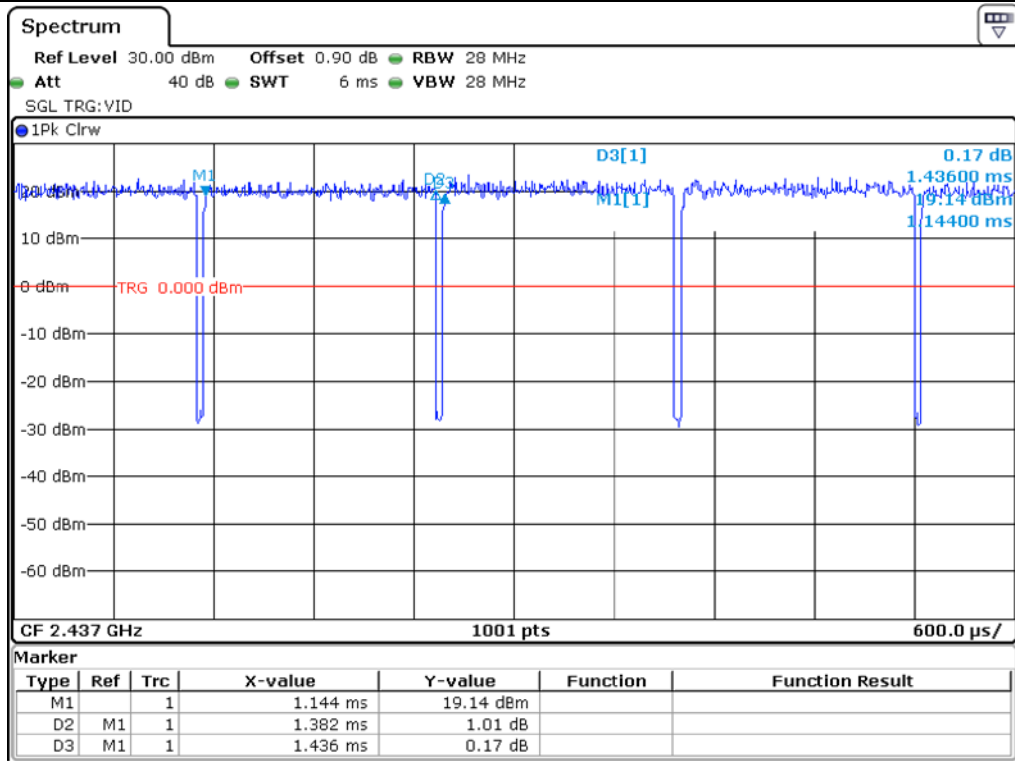
Mode	Tx On Time [ms]	Tx Off Time [ms]	Duty Cycle [%]	Correction Factor [dB]
802.11 b	8.422	0.034	99.60	0.02
802.11 g	1.382	0.054	96.24	0.17
802.11 HT 20	1.292	0.060	95.56	0.20

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

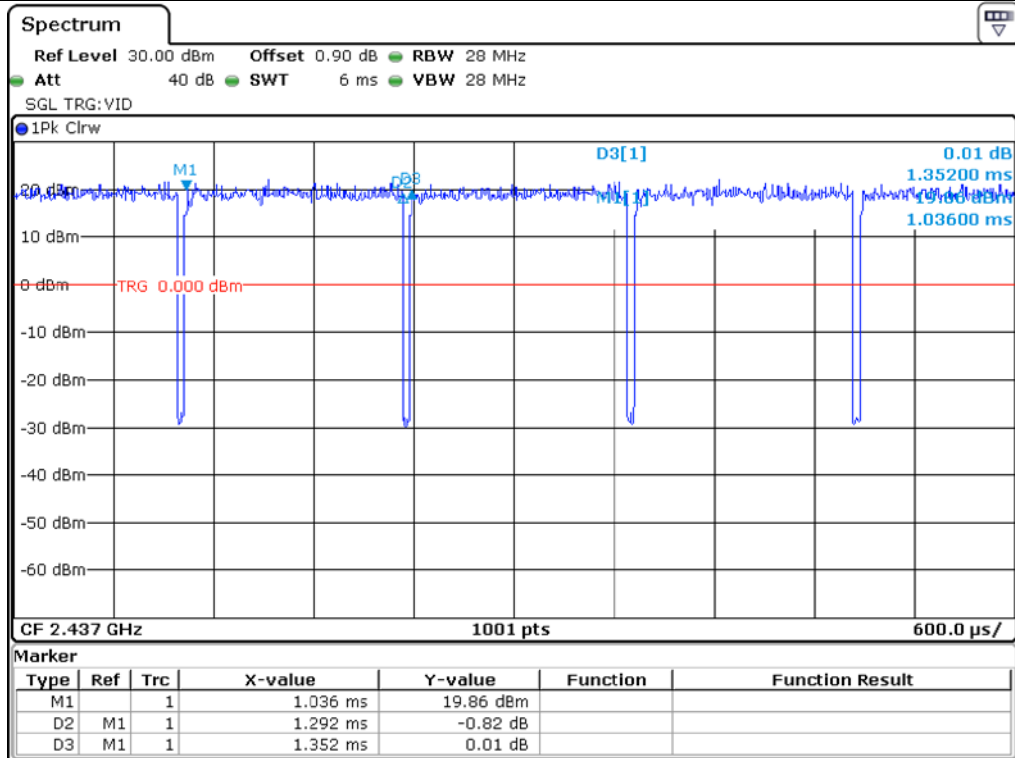
Correction Factor : 10 * Log(1 / (Duty Cycle / 100))

- . Test Plot





802.11 g



802.11 HT 20

5.4 Configuration of Test System

Line Conducted Test: It is not need to test this requirement, because the EUT shall be operated by DC Power.

Radiated Emission Test: Preliminary radiated emissions test were conducted using the procedure in ANSI C63.10: 2020 to determine the worse operating conditions. Final radiated emission tests were conducted at 3 meter 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.

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 Chip 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)
It is not need to test this requirement, because the power of the EUT is supplied by DC Power.	

6.2 General Radiated Emissions Tests

During Preliminary Test, the following operating mode was investigated.

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

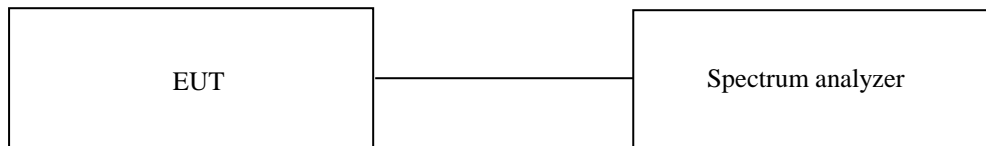
7. MIMIMUM 6 dB BANDWIDTH

7.1 Operating environment

Temperature : 23 °C
Relative humidity : 45 % R.H.

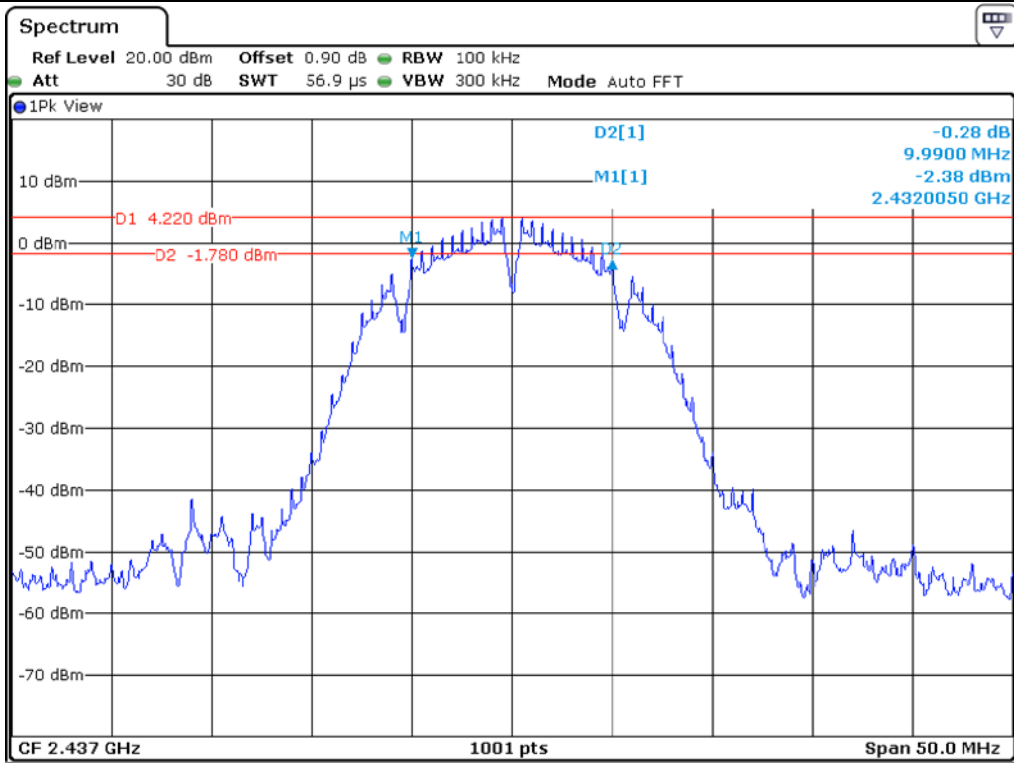
7.2 Test set-up

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

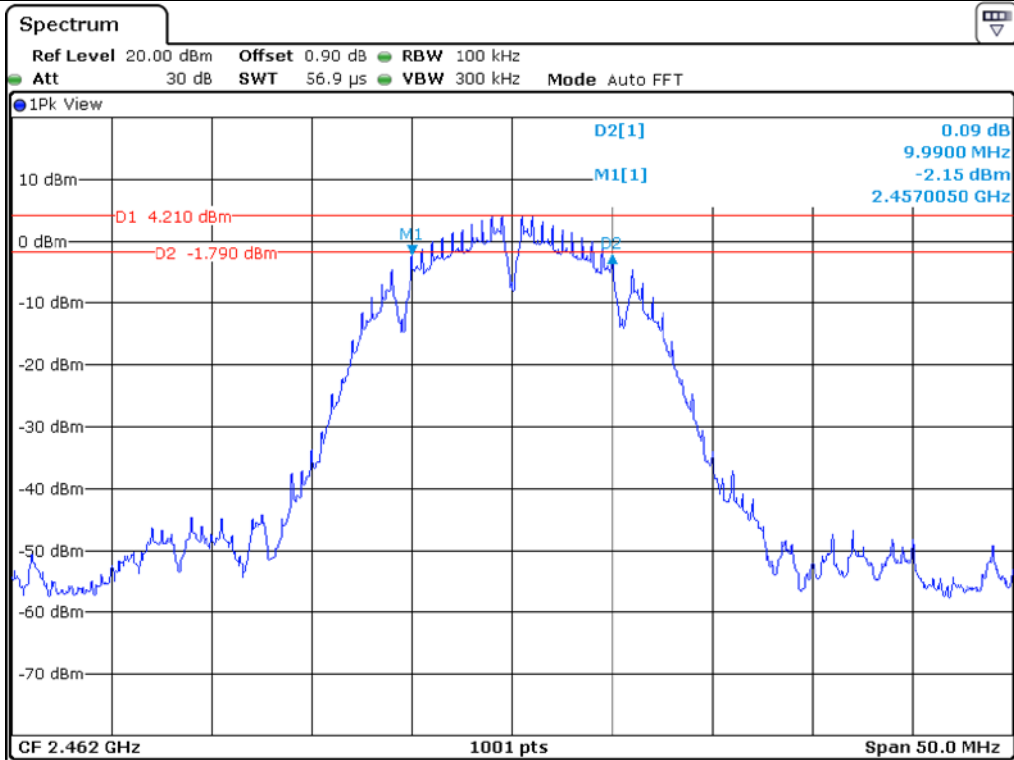


7.3 Test Date

January 13, 2021 ~ January 14, 2021



Middle Channel



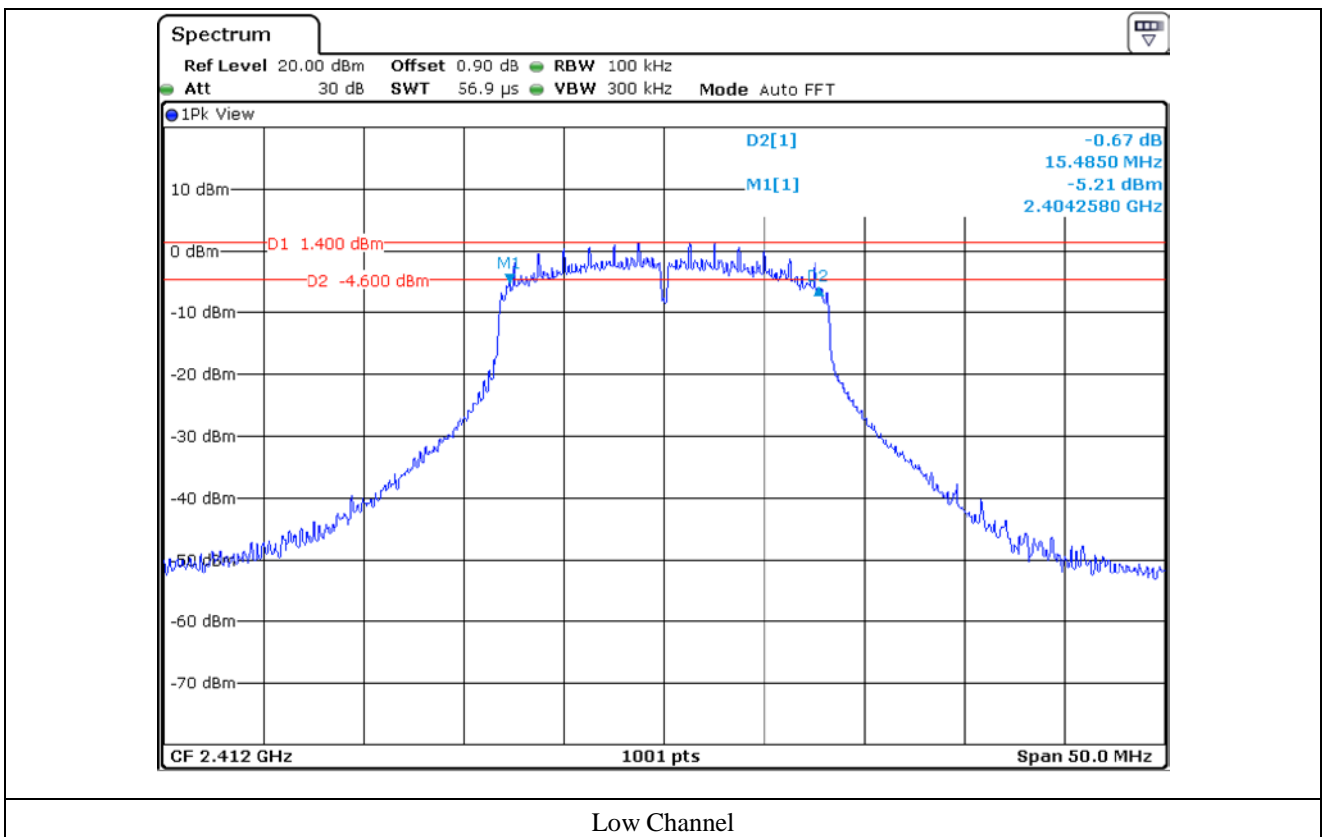
High Channel

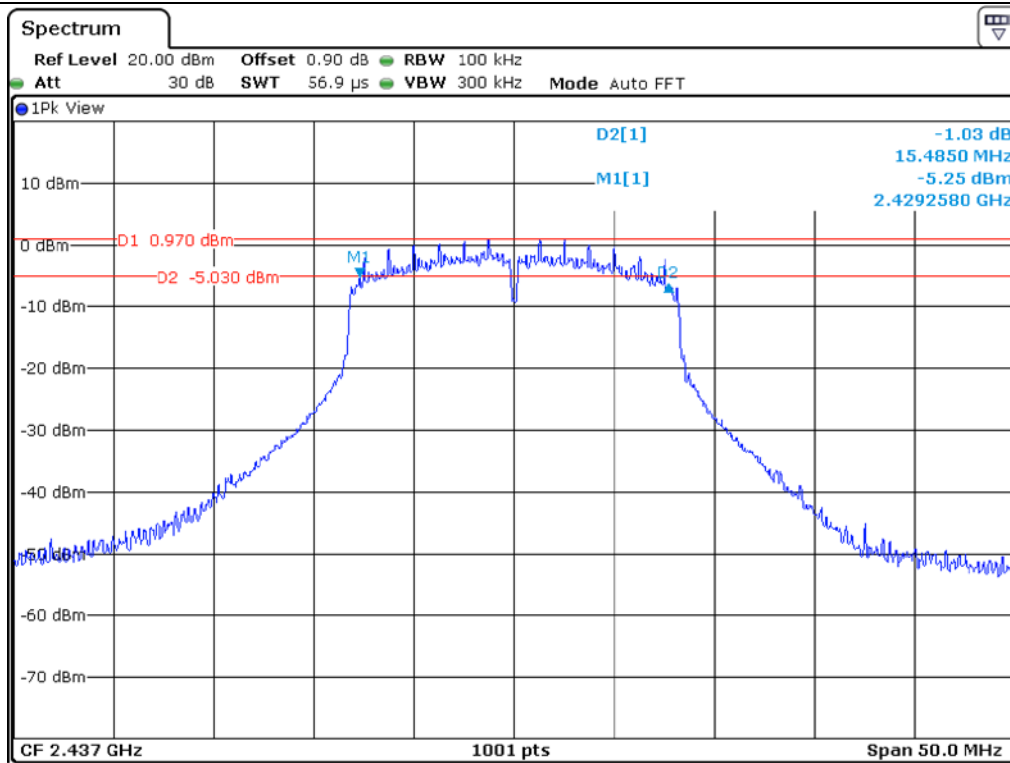
7.5 Test data for 802.11g WLAN Mode

-. Test Result : Pass

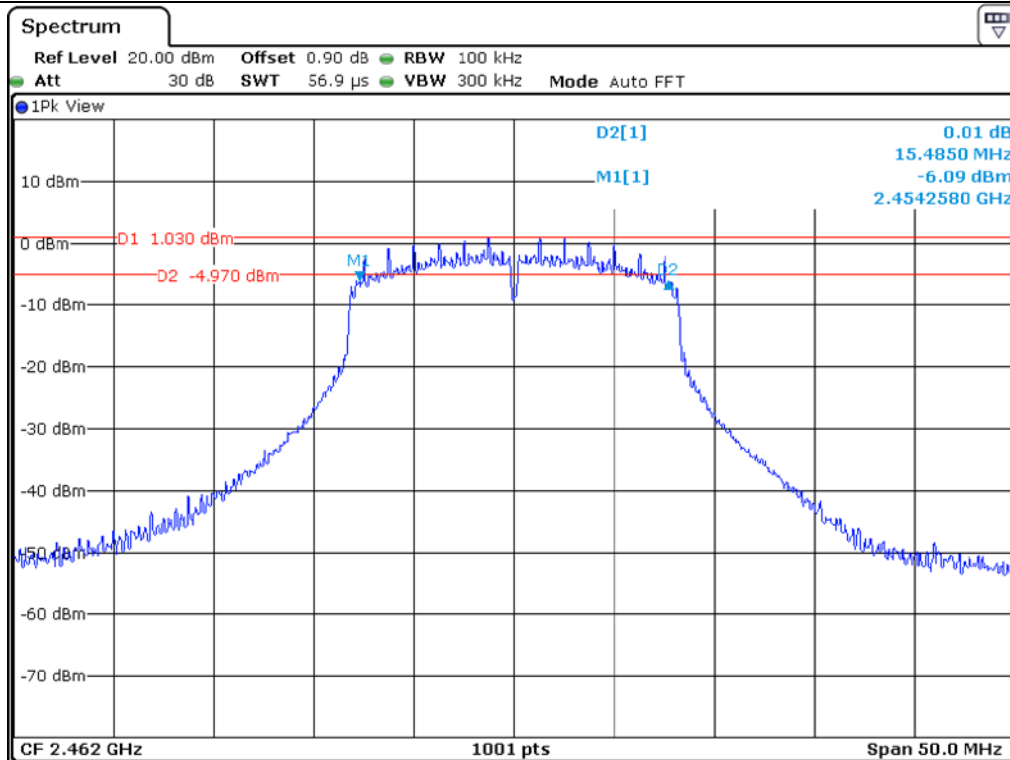
CHANNEL	FREQUENCY (MHz)	6 dB Bandwidth (MHz)	LIMIT (MHz)	Margin (MHz)
Low	2 412.00	15.49	0.50	14.99
Middle	2 437.00	15.49	0.50	14.99
High	2 462.00	15.49	0.50	14.99

Remark. Margin = Measured Value - Limit





Middle Channel



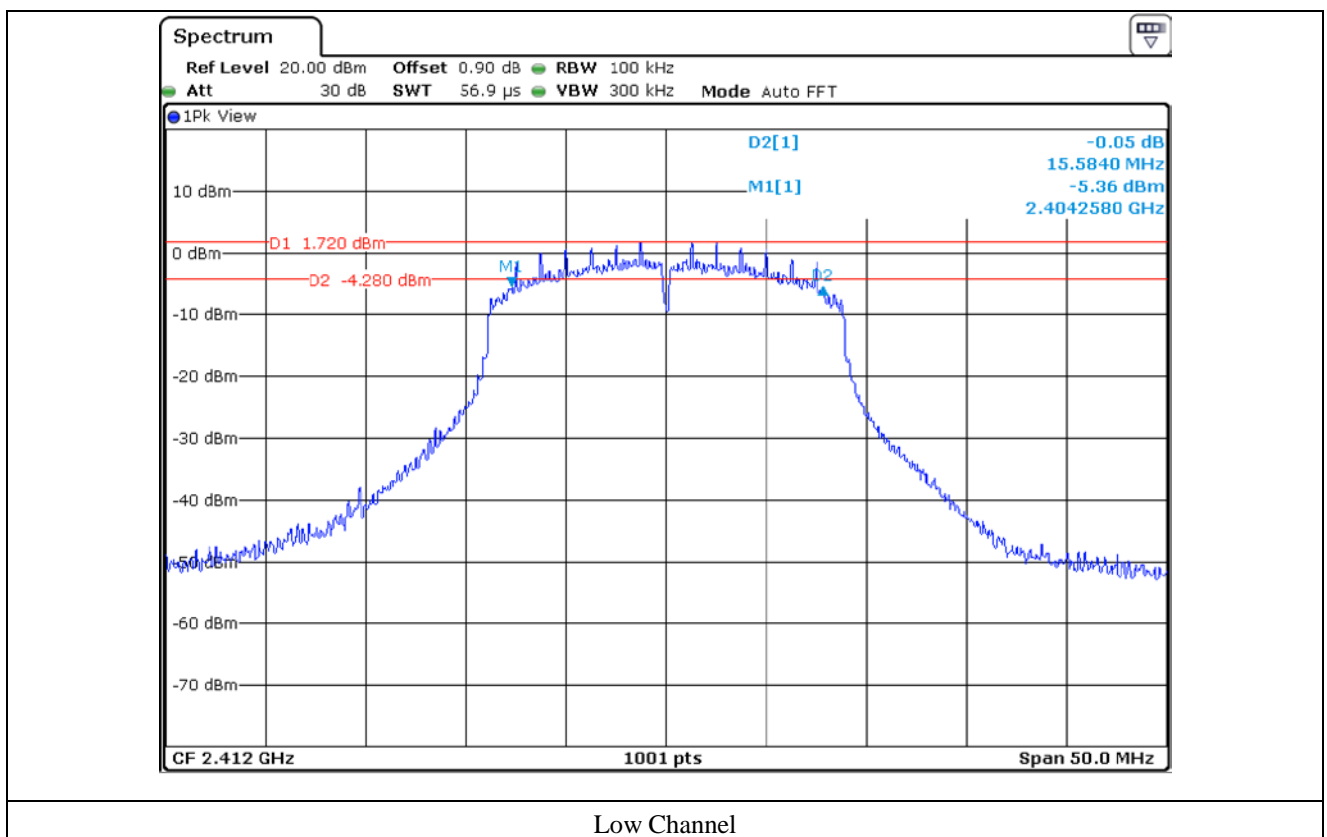
High Channel

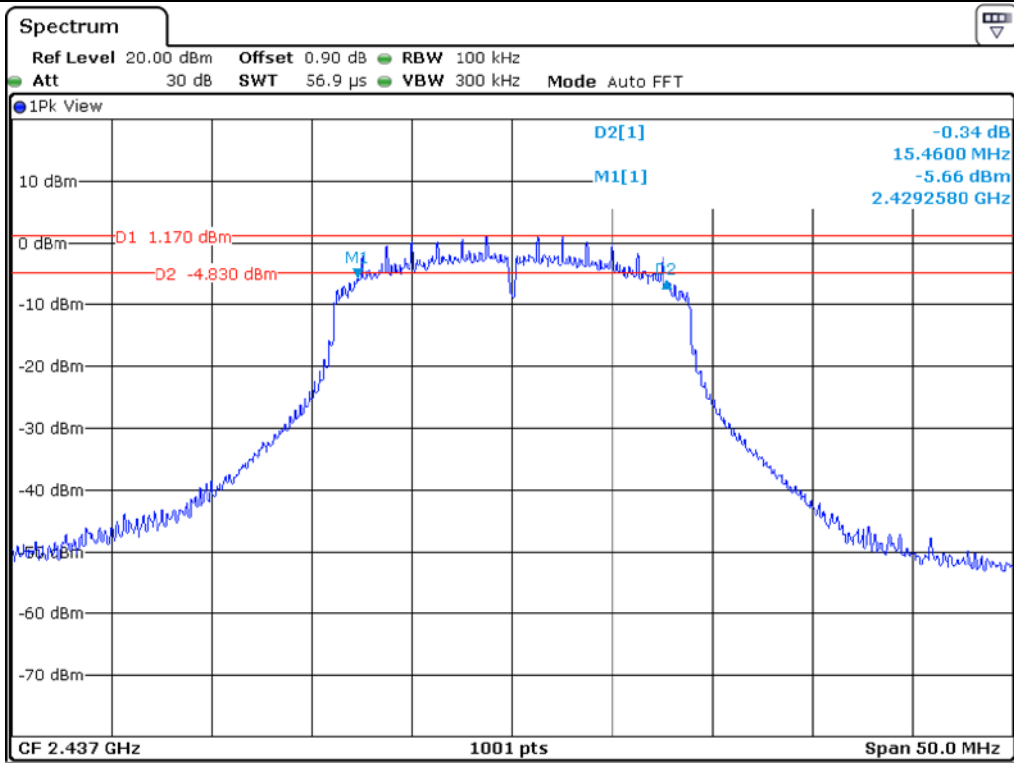
7.6 Test data for 802.11n_HT20 WLAN Mode

-. Test Result : Pass

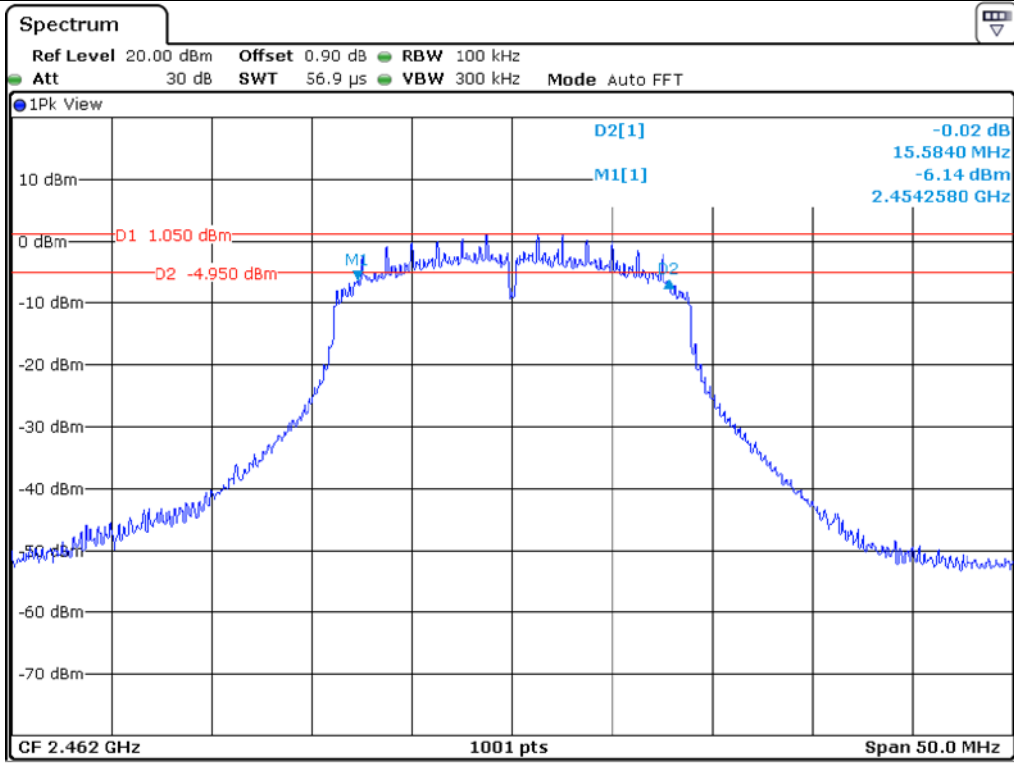
CHANNEL	FREQUENCY (MHz)	6 dB Bandwidth (MHz)	LIMIT (MHz)	Margin (MHz)
Low	2412.00	15.58	0.50	15.08
Middle	2437.00	15.46	0.50	14.96
High	2462.00	15.58	0.50	15.08

Remark. Margin = Measured Value - Limit





Middle Channel



High Channel

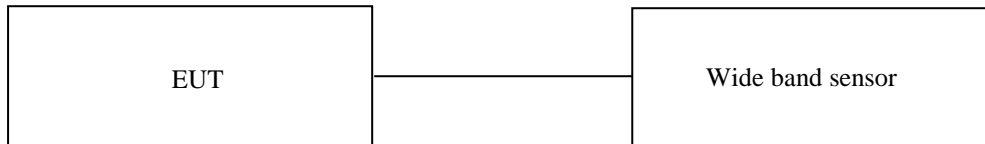
8. MAXIMUM CONDUCTED (AVERAGE) OUTPUT POWER

8.1 Operating environment

Temperature : 23 °C
 Relative humidity : 45 % R.H.

8.2 Test set-up

The maximum peak output power was measured with the wide band sensor connected to the antenna output 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.



8.3 Test Date

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8.4 Test data for 802.11b WLAN Mode

-. Test Result : Pass
 -. Duty Cycle : 99.60 %

CHANNEL	FREQUENCY (MHz)	MEASURED VALUE (dBm)	LIMIT (dBm)	MARGIN (dB)
LOW	2 412.00	12.80	30.00	17.20
MIDDLE	2 437.00	12.64	30.00	17.36
HIGH	2 462.00	12.57	30.00	17.43

Remark : Margin = Limit – Measured Value (=Power Sensor Reading + Cable Loss)

8.5 Test data for 802.11g WLAN Mode

-. Test Result : Pass
 -. Duty Cycle : 96.24 %

CHANNEL	FREQUENCY (MHz)	MEASURED VALUE (dBm)	LIMIT (dBm)	MARGIN (dB)
LOW	2 412.00	11.99	30.00	18.01
MIDDLE	2 437.00	11.89	30.00	18.11
HIGH	2 462.00	11.82	30.00	18.18

Remark : Margin = Limit – Measured Value (=Power Sensor Reading + Cable Loss)

8.6 Test data for 802.11n_HT20 WLAN Mode

-. Test Result : Pass
 -. Duty Cycle : 95.56 %

CHANNEL	FREQUENCY (MHz)	MEASURED VALUE (dBm)	LIMIT (dBm)	MARGIN (dB)
LOW	2 412.00	11.85	30.00	18.15
MIDDLE	2 437.00	11.72	30.00	18.28
HIGH	2 462.00	11.63	30.00	18.37

Remark : Margin = Limit – Measured Value (=Power Sensor Reading + Cable Loss)

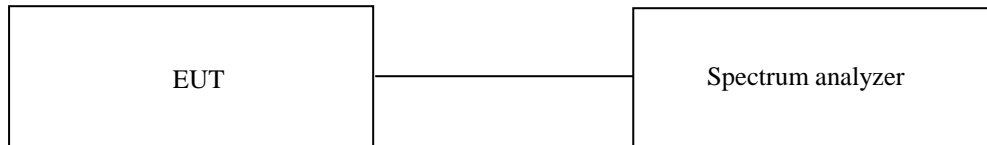
9. 100 kHz BANDWIDTH OUTSIDE THE FREQUENCY BAND

9.1 Operating environment

Temperature : 23 °C
 Relative humidity : 45 % R.H.

9.2 Test set-up for conducted measurement

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.



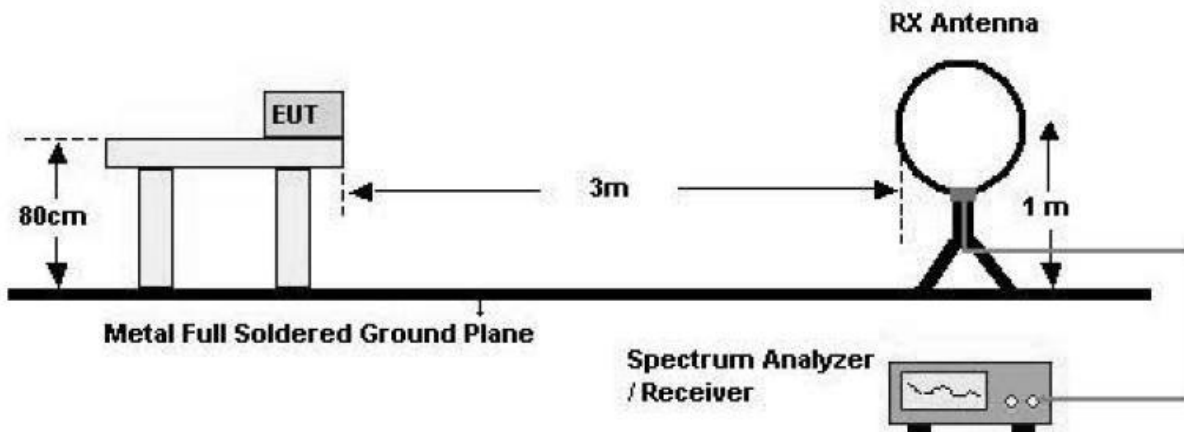
9.3 Test set-up for radiated measurement

The radiated emissions measurements were performed on the 3 m semi anechoic chamber. The EUT was placed on turntable approximately 1.5 m above the ground plane.

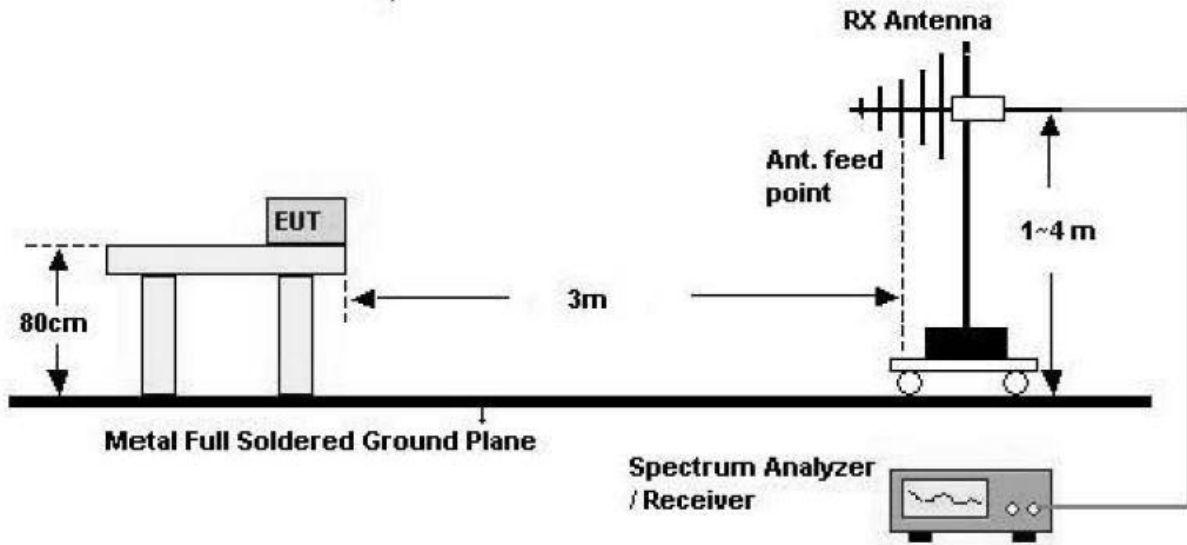
The frequency spectrum from 30 MHz to 26.5 GHz was scanned and maximum emission levels at each frequency recorded. The system was rotated 360°, and the antenna was varied in the height between 1.0 m and 4.0 m in order to determine the maximum emission levels. This procedure was performed for horizontal and vertical polarization of the receiving antenna.

- Test Configuration

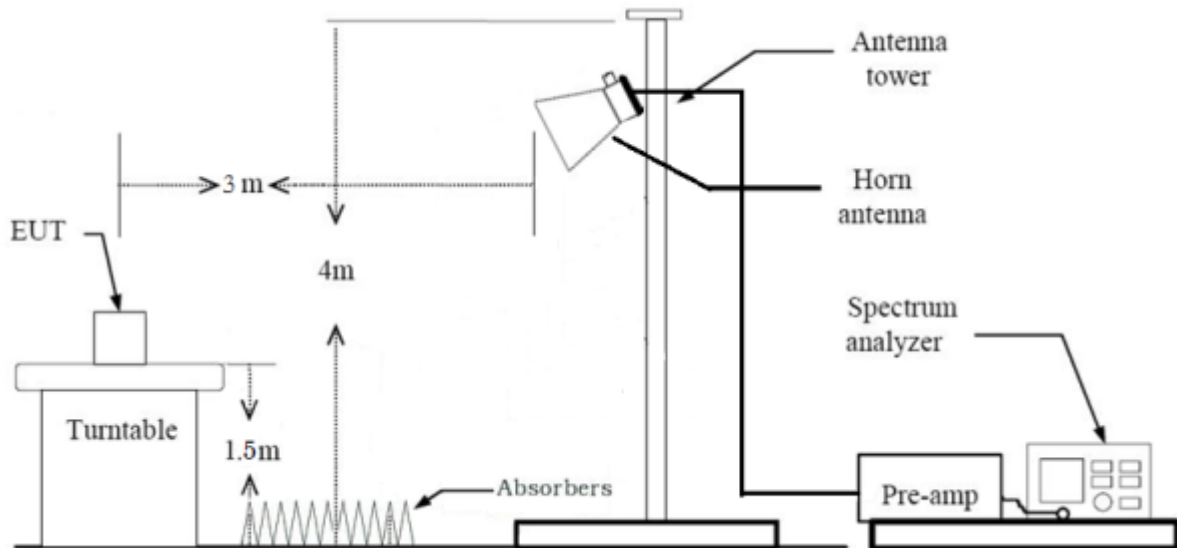
1. Below 30 MHz



2. 30 MHz - 1 GHz



3. Above 1 GHz

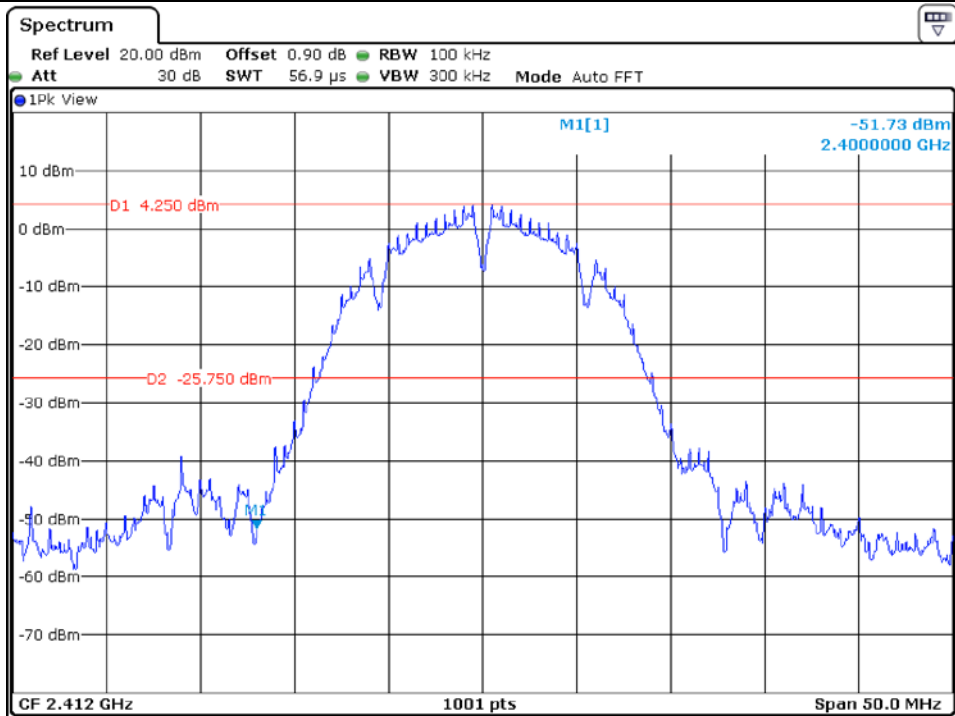


9.4 Test Date

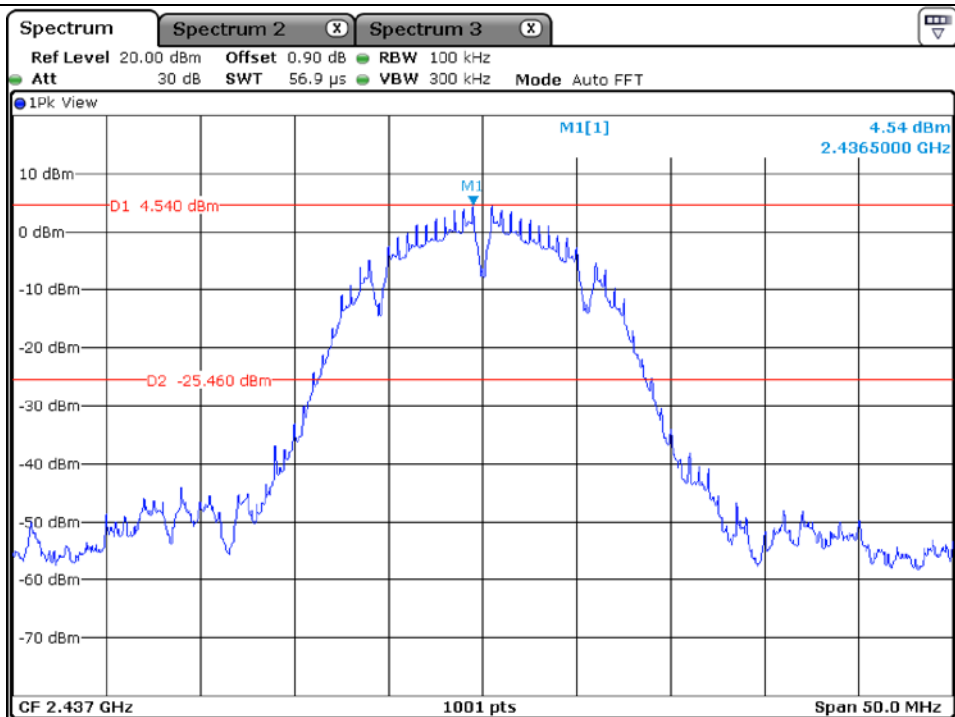
January 13, 2021 ~ January 14, 2021

9.5 Test data for conducted emission

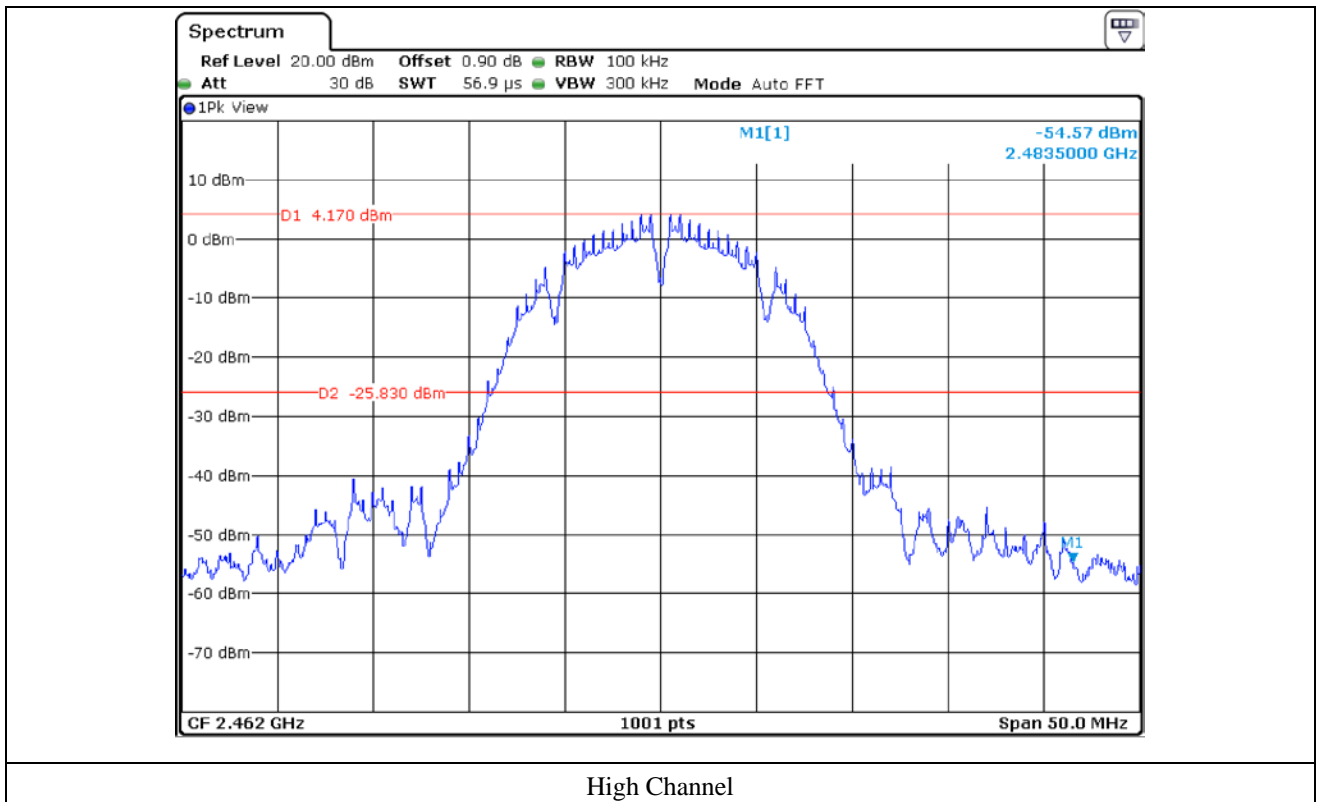
9.5.1 Test data for 802.11b WLAN Mode

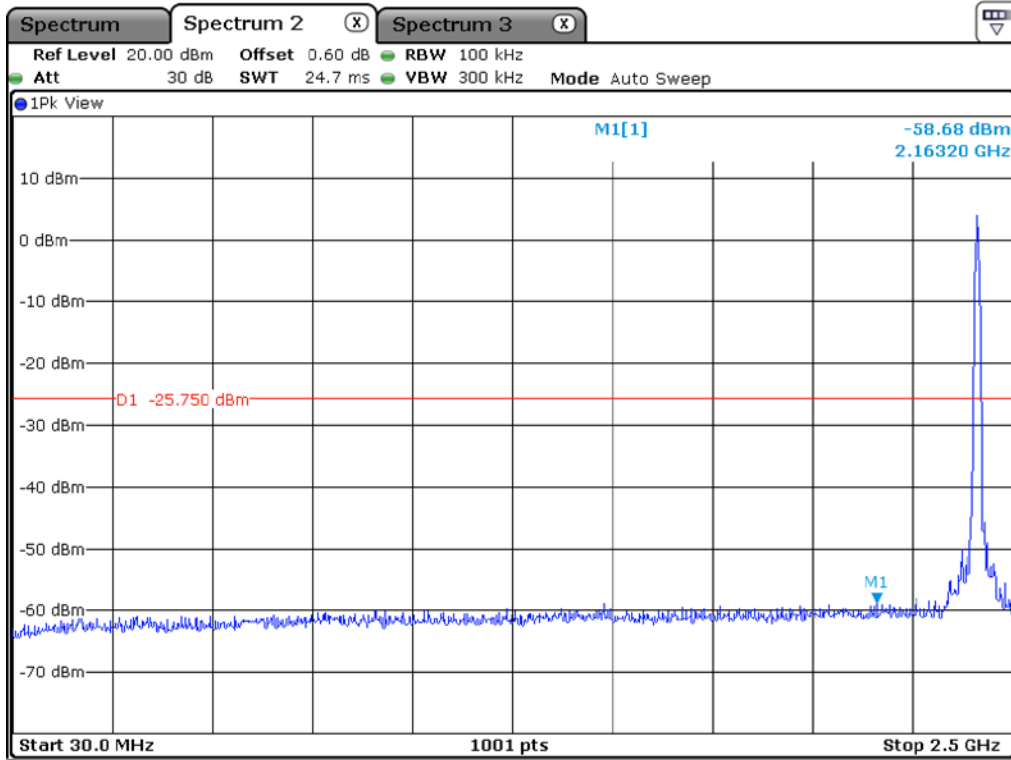


Low Channel

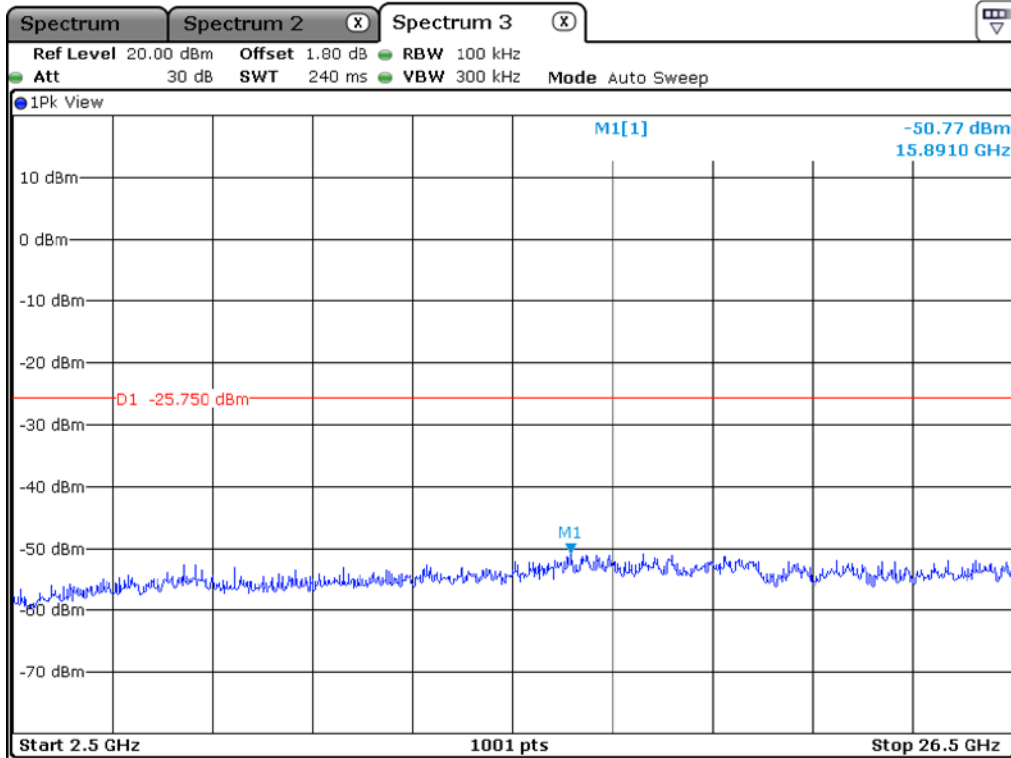


Middle Channel

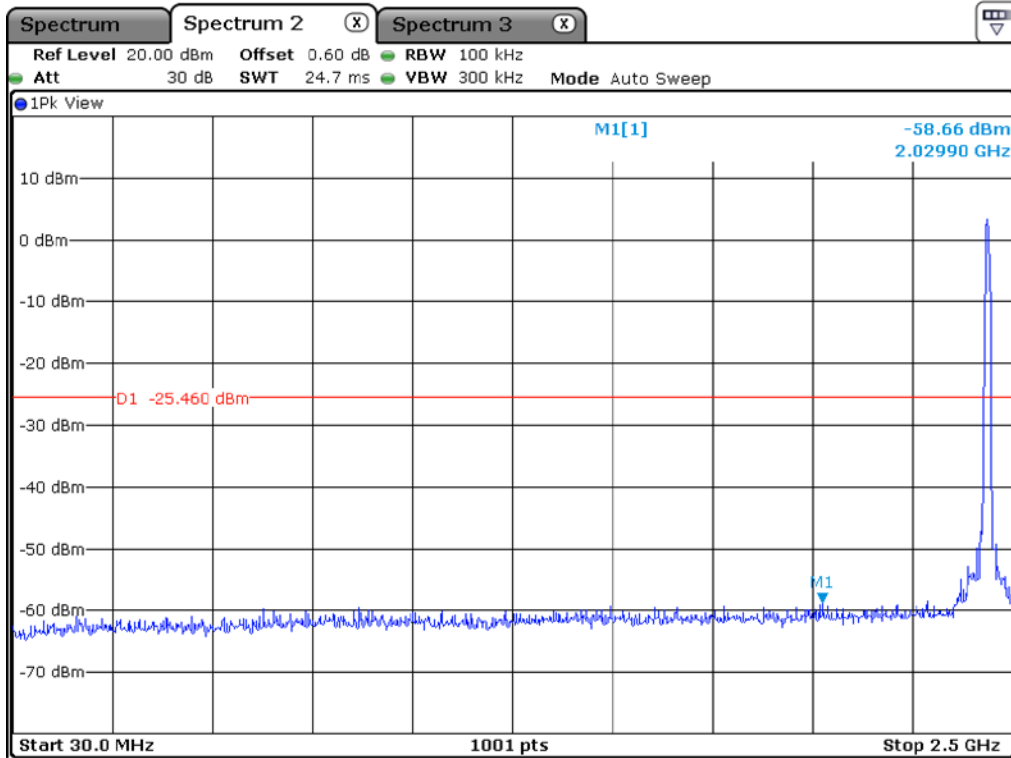




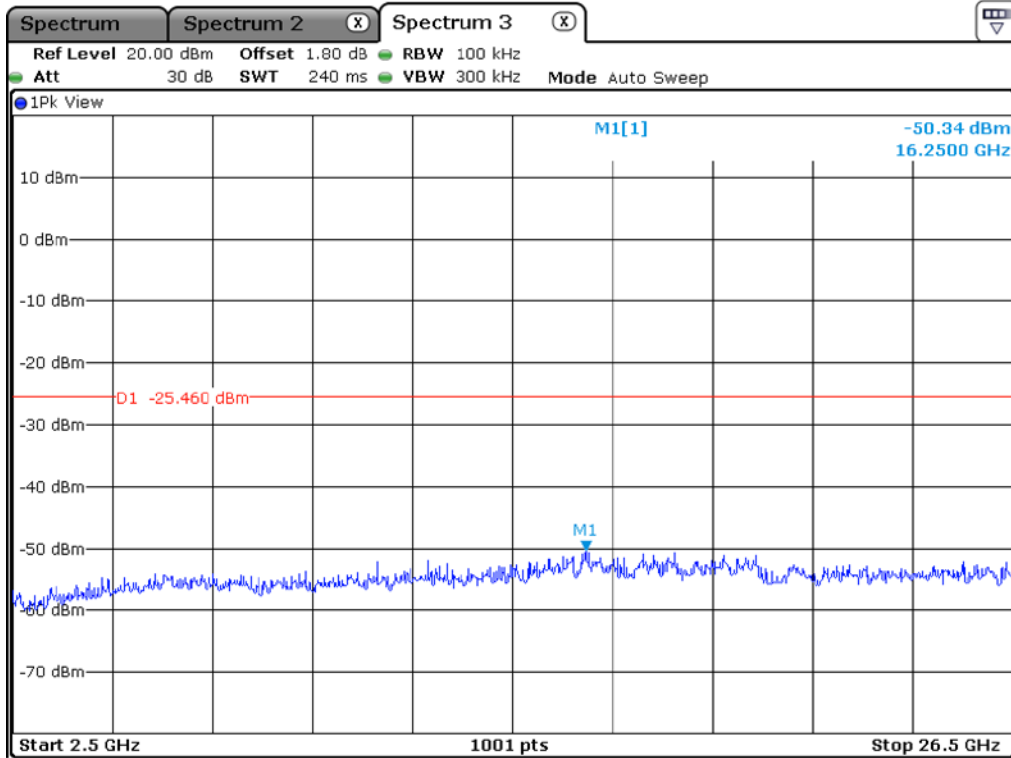
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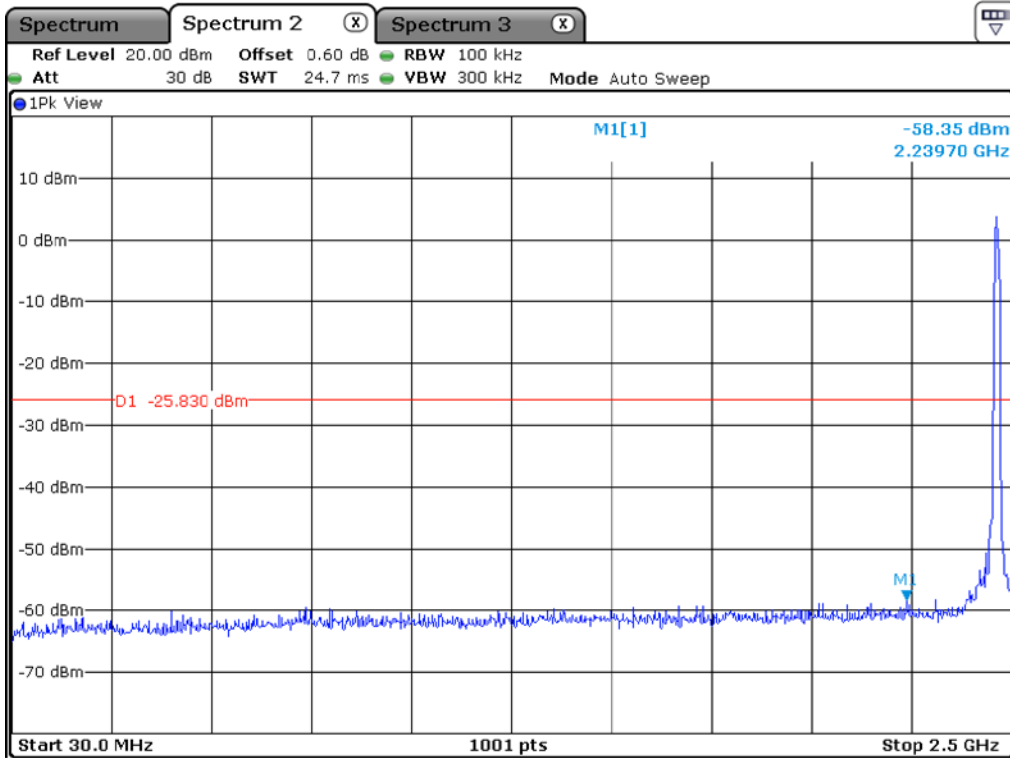
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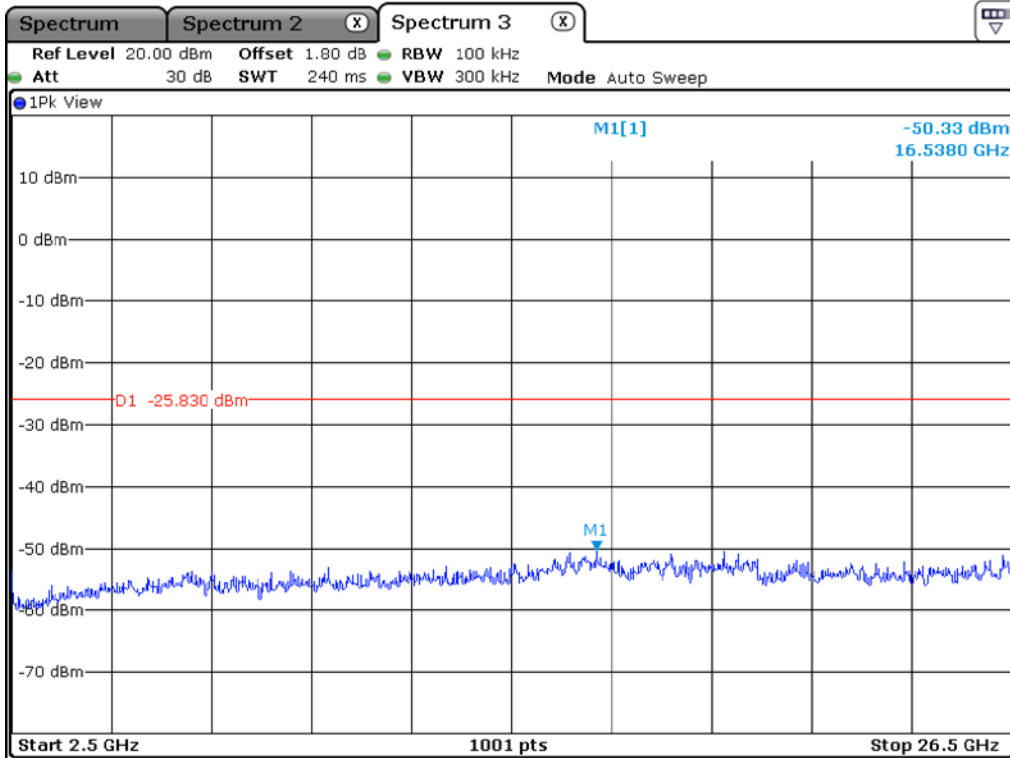
Middle Channel



Middle Channel

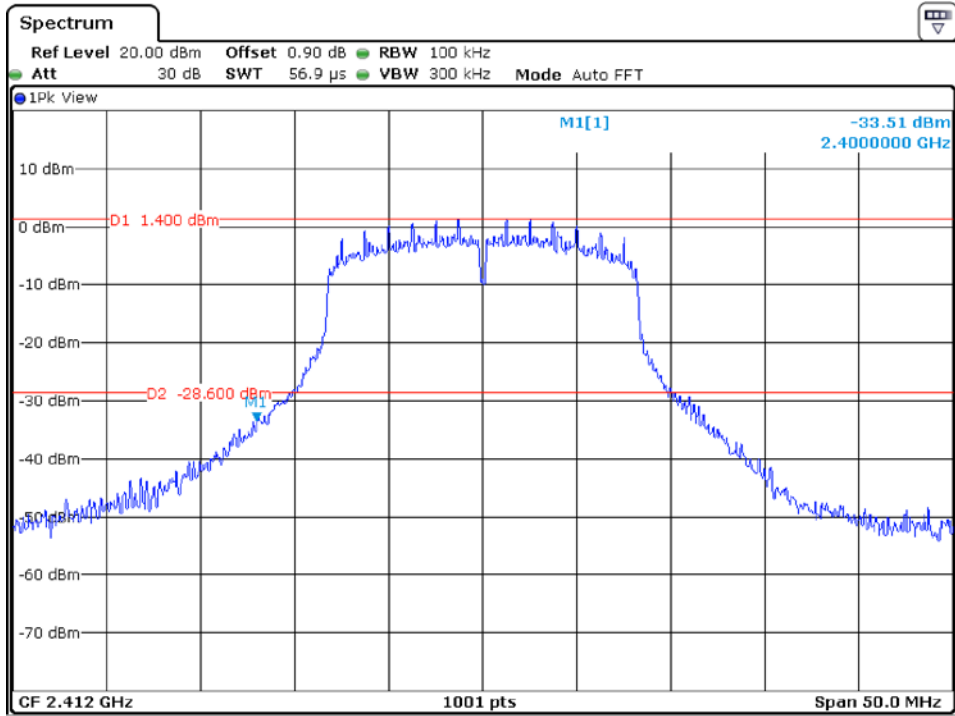


High Channel

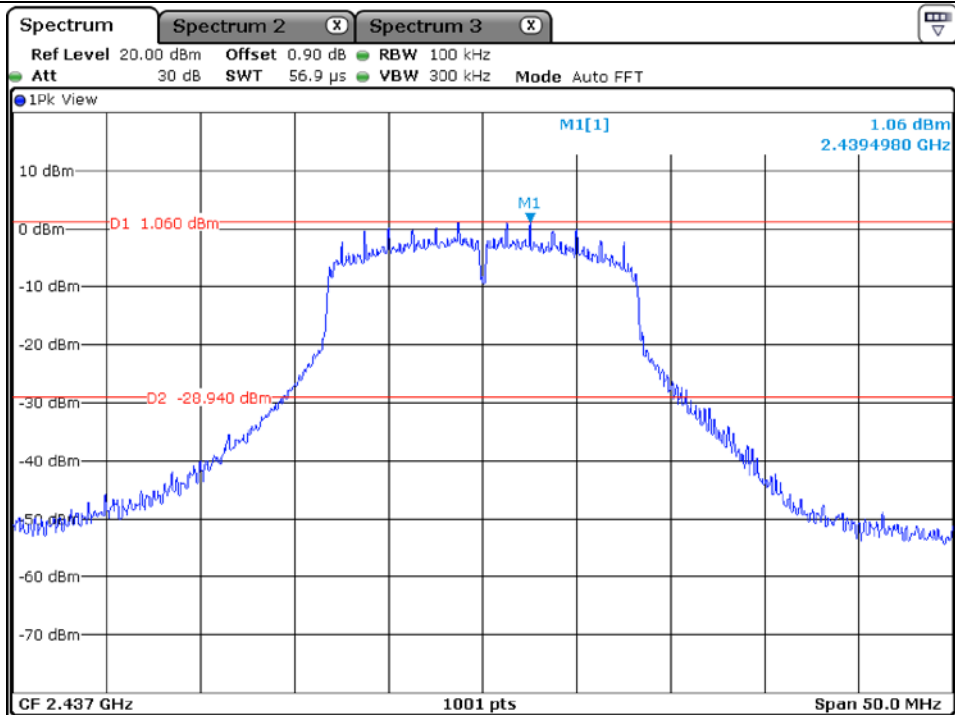


High Channel

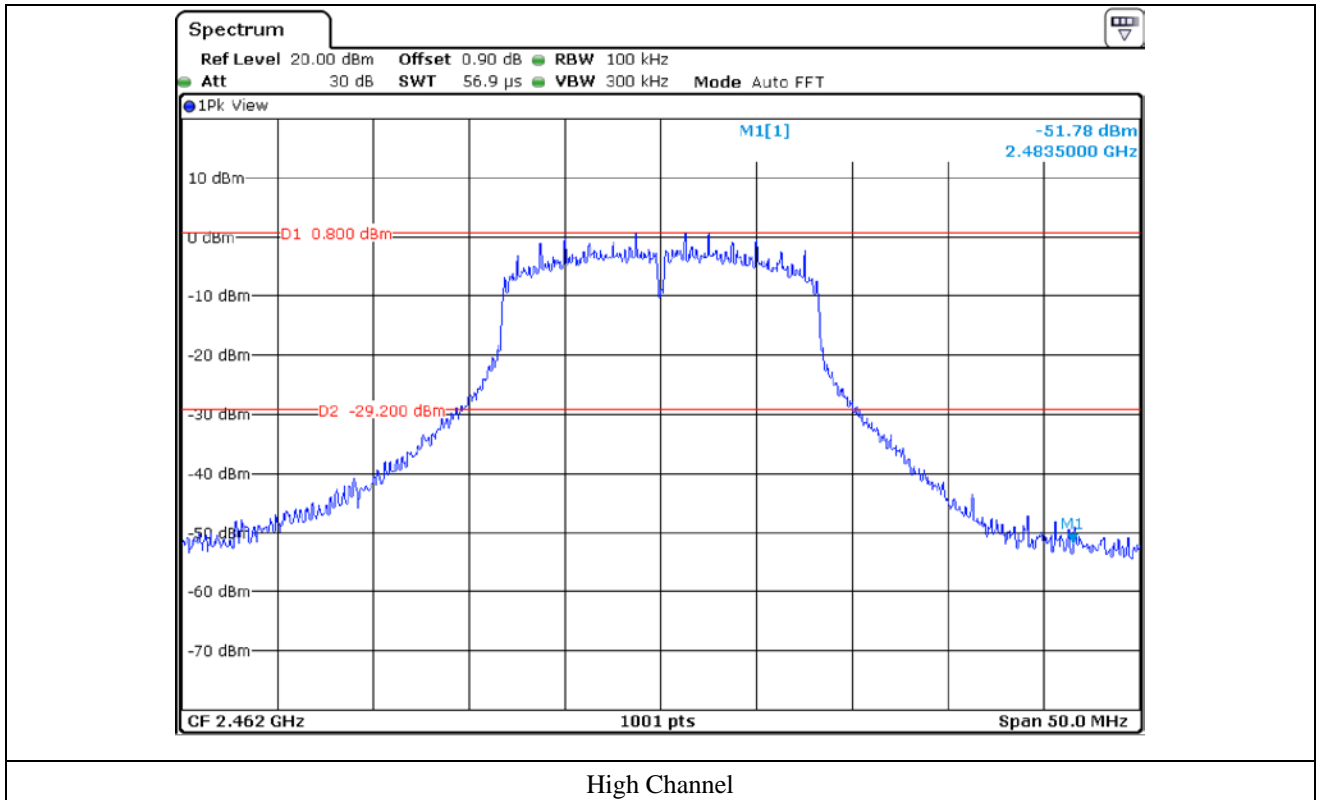
9.5.2 Test data for 802.11g WLAN Mode



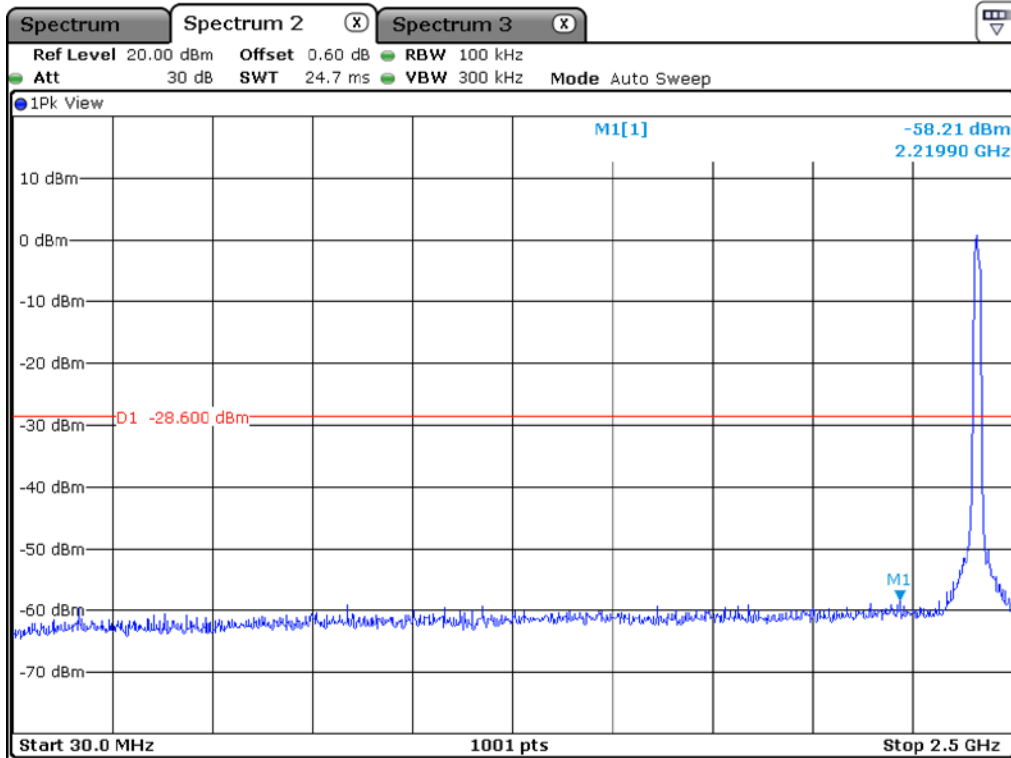
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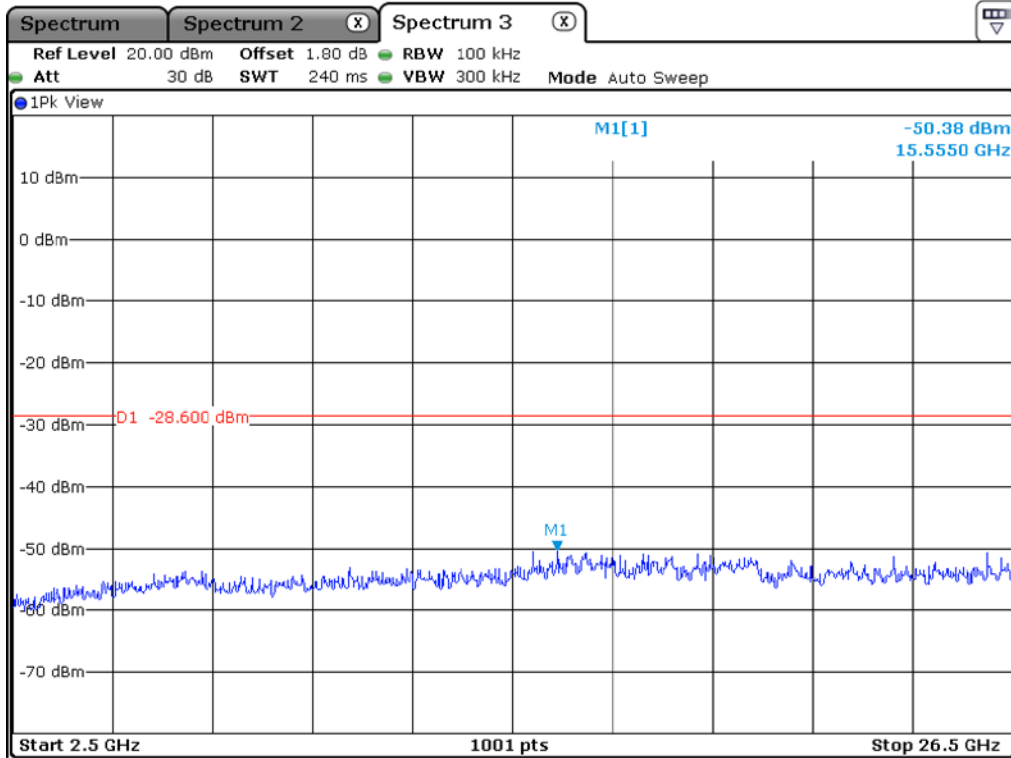
Middle Channel



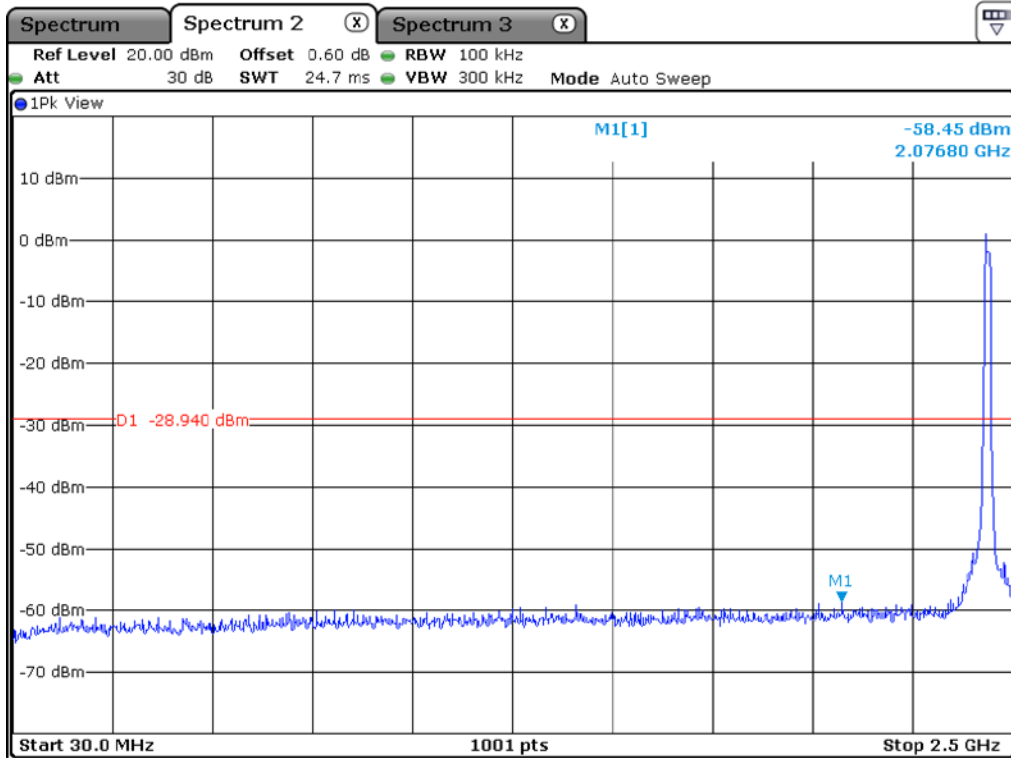
High Channel



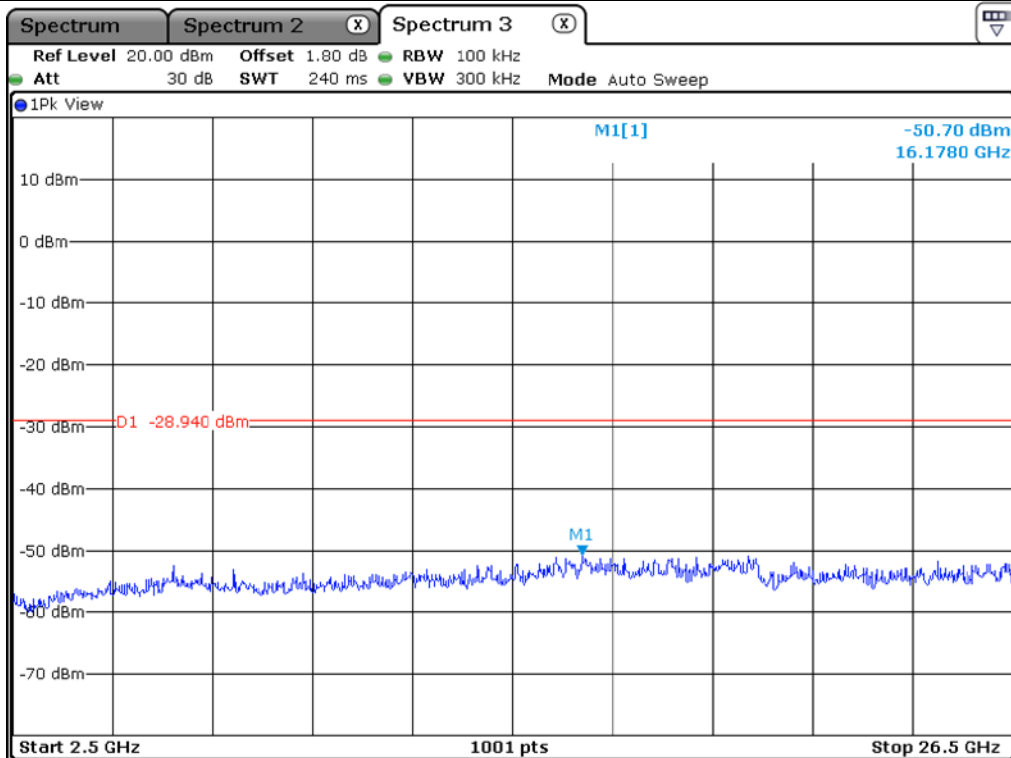
Low Channel



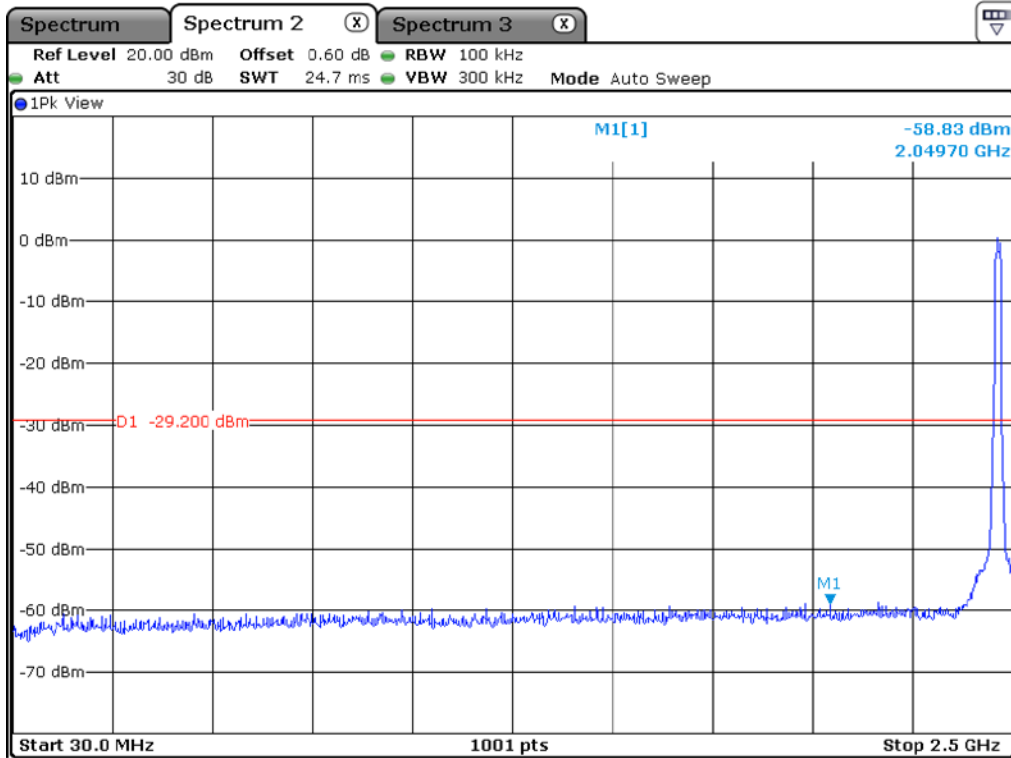
Low Channel



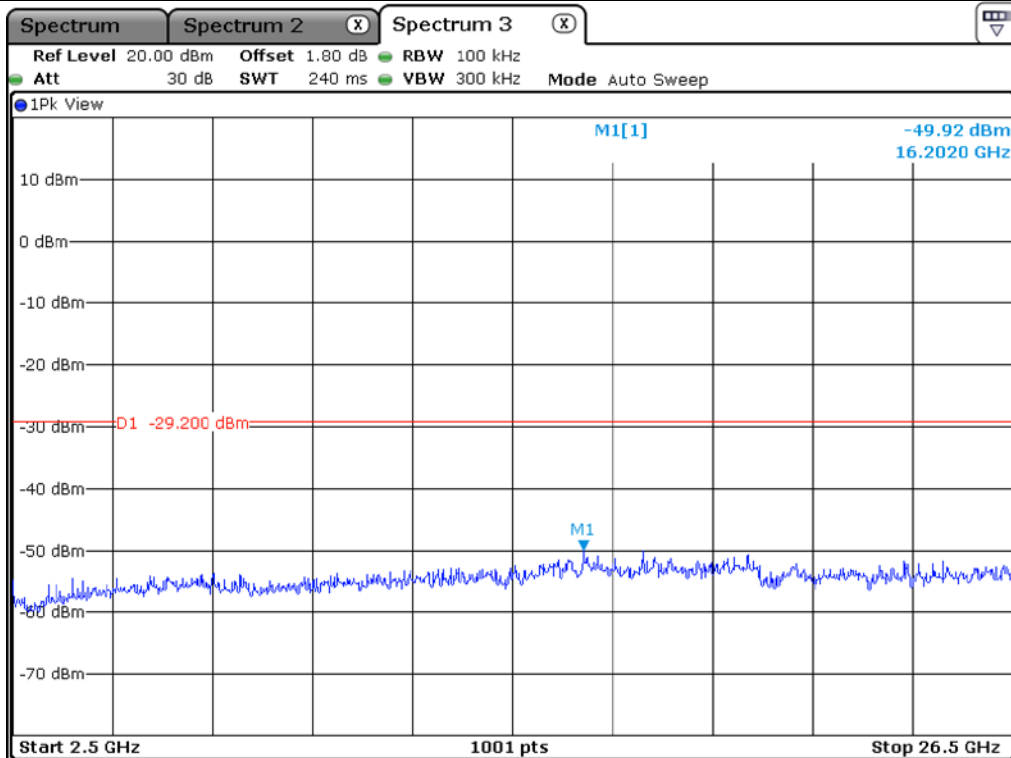
Middle Channel



Middle Channel

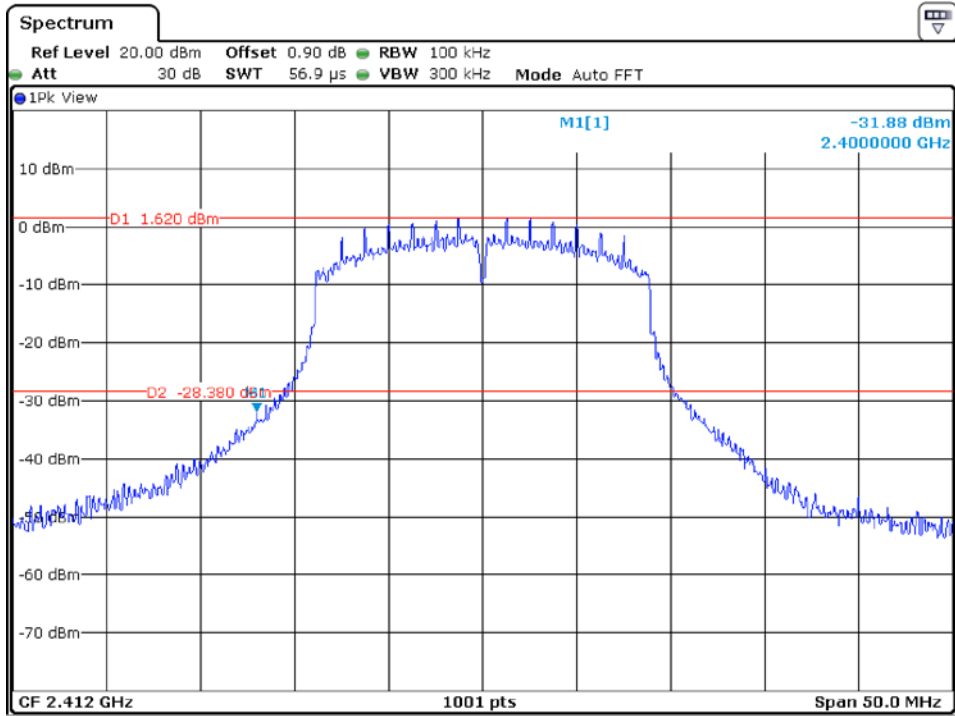


High Channel

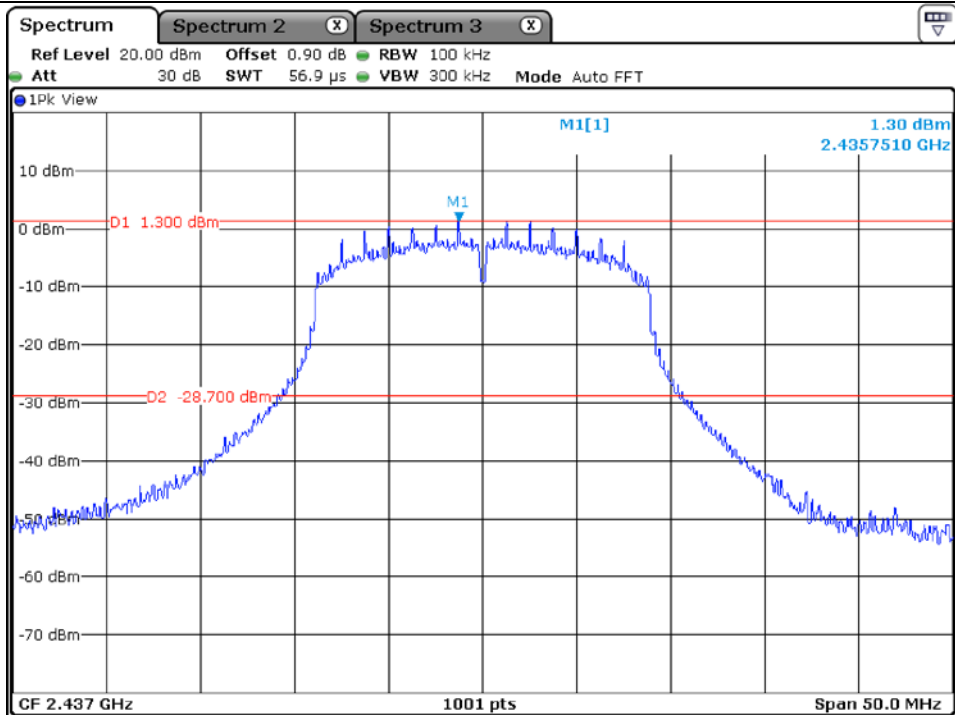


High Channel

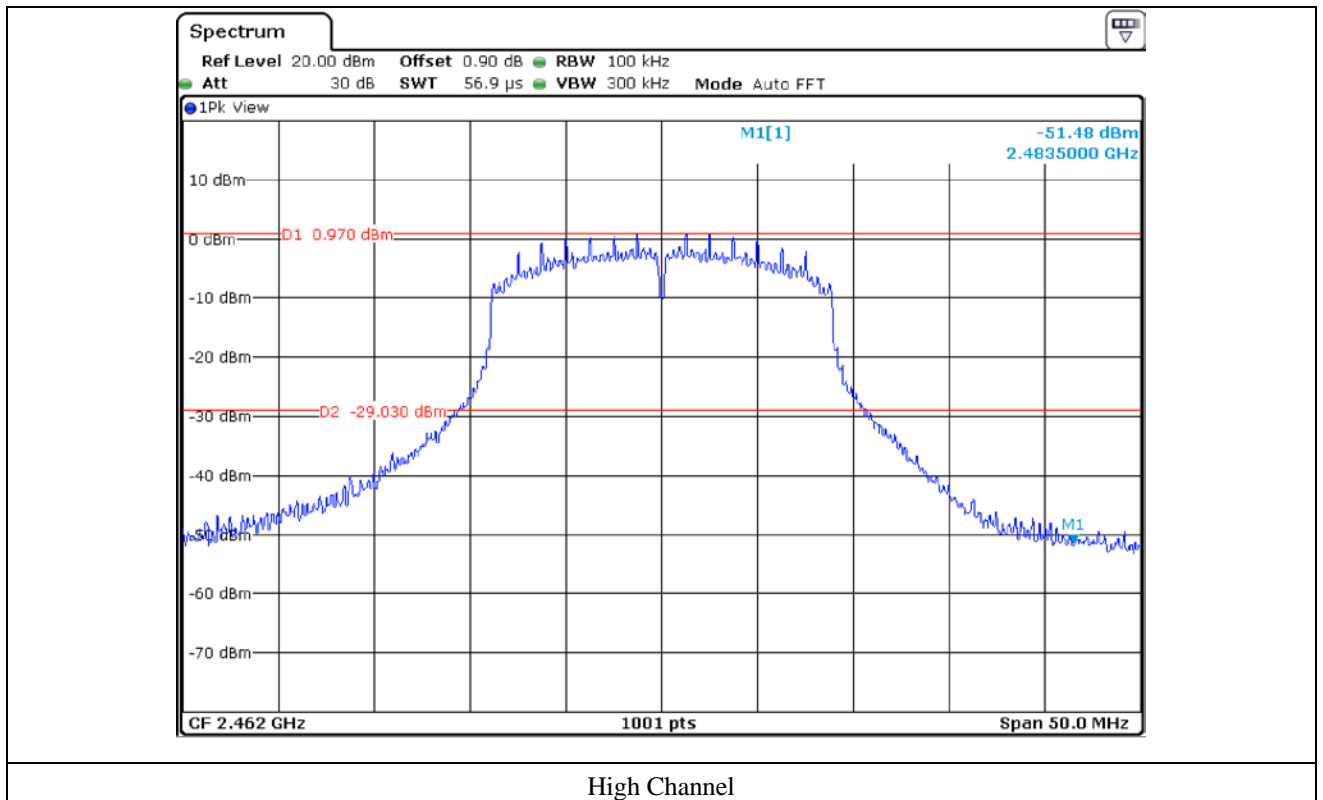
9.5.3 Test data for 802.11n_HT20 WLAN Mode

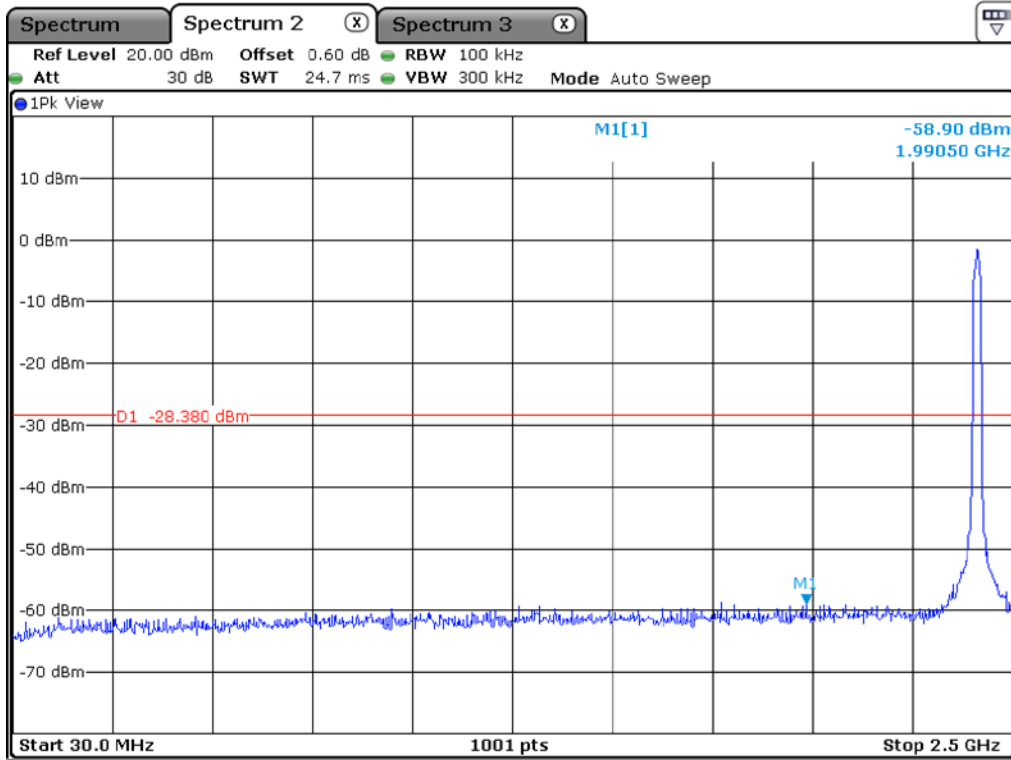


Low Channel

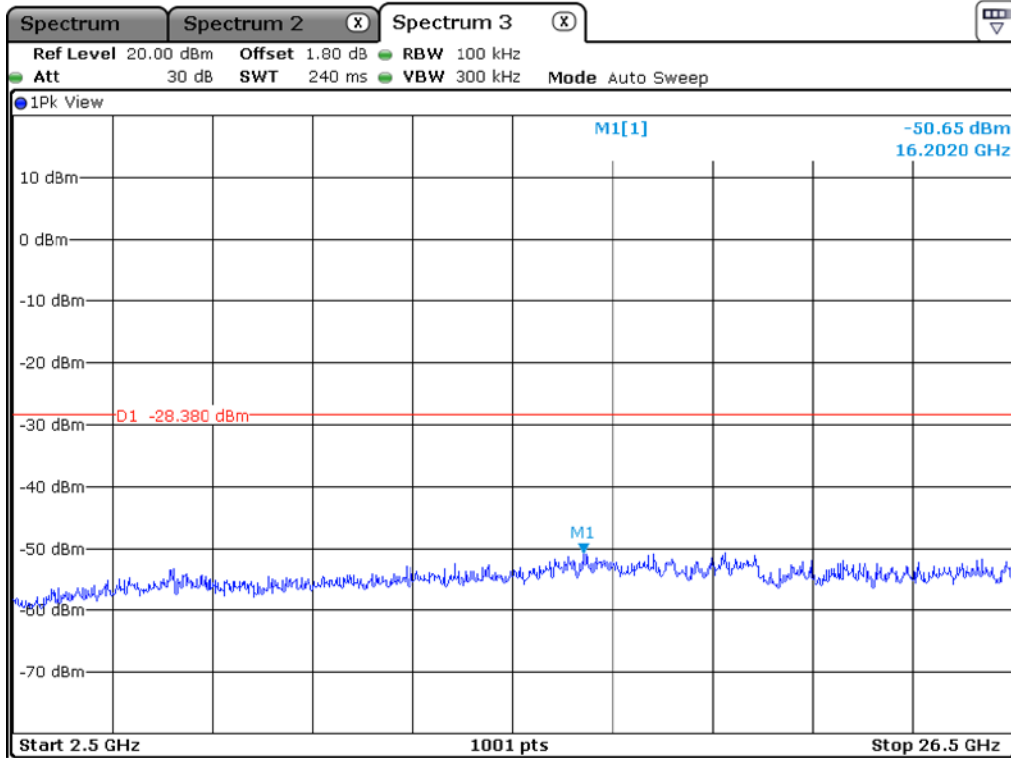


Middle Channel

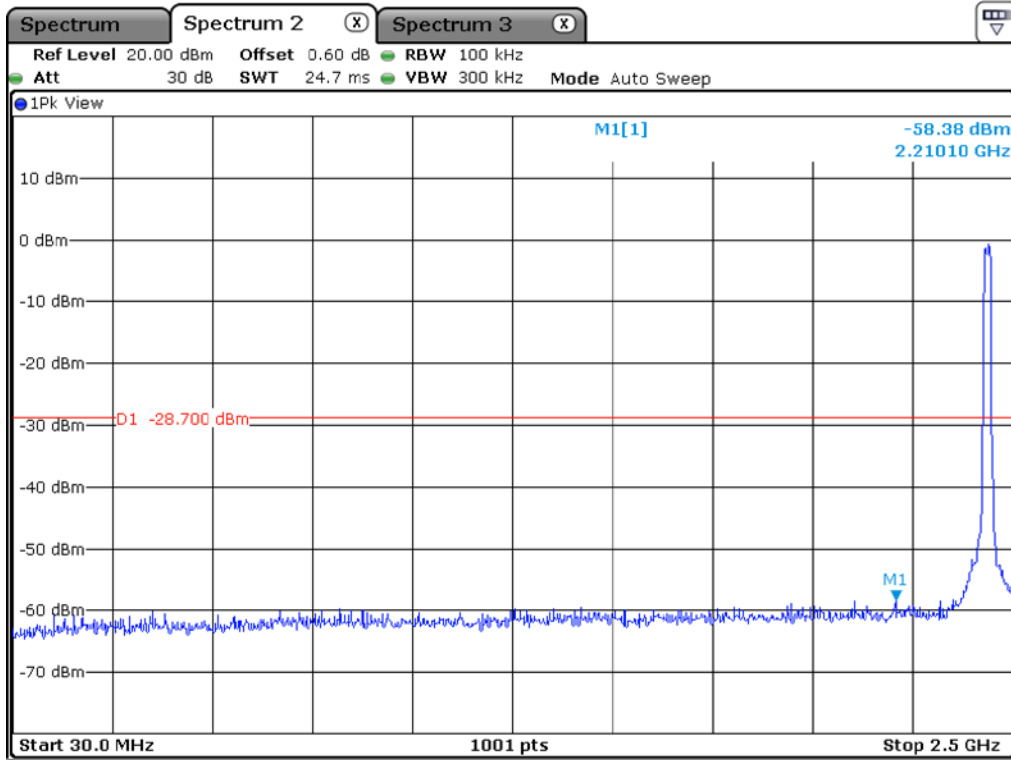




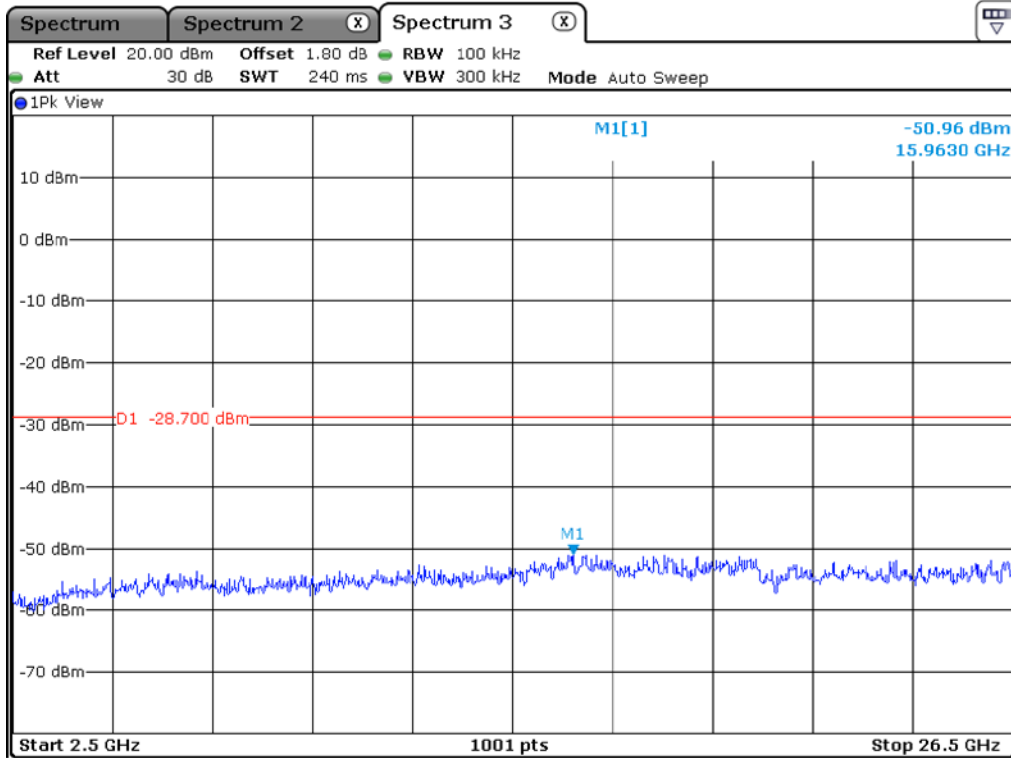
Low Channel



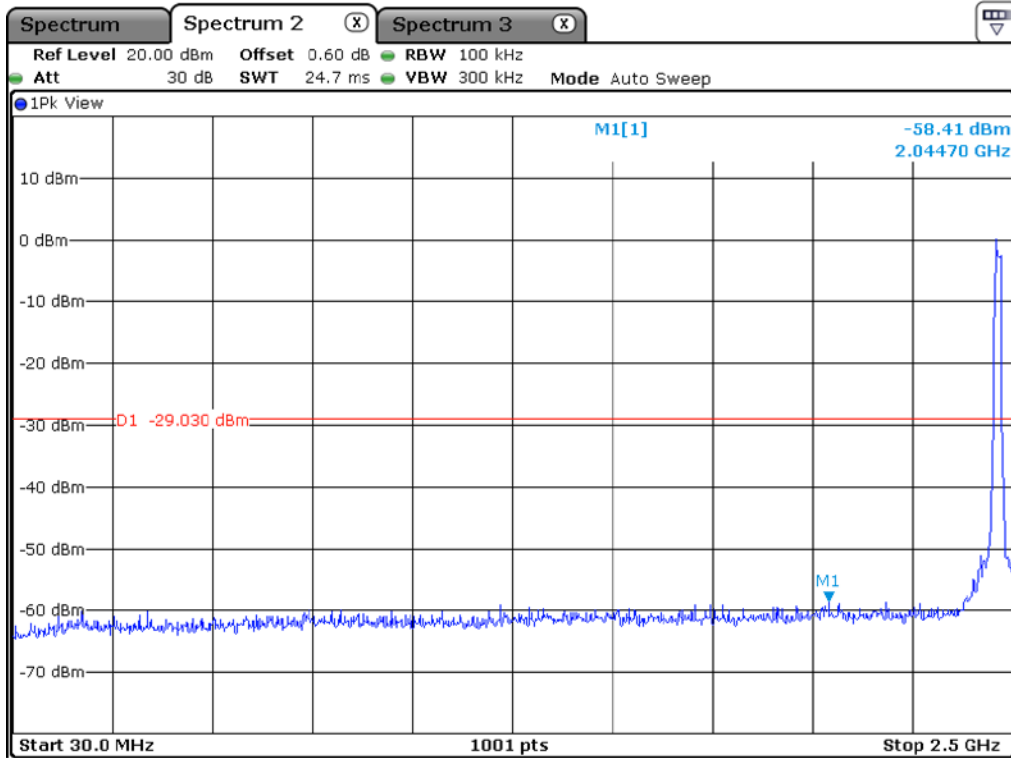
Low Channel



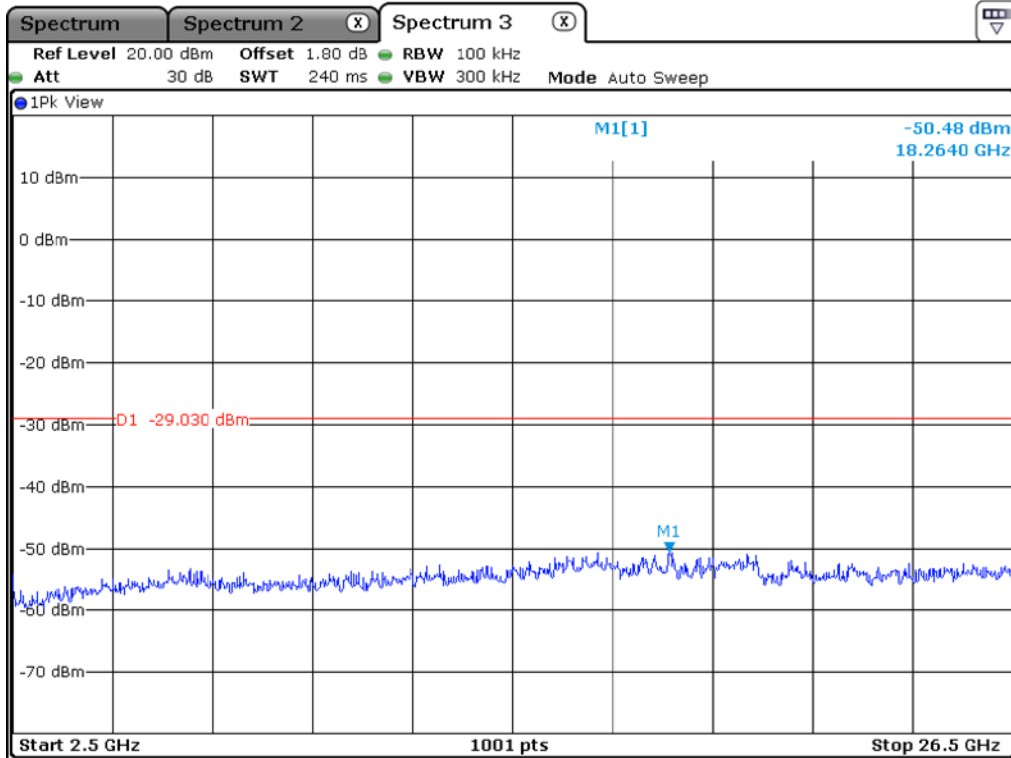
Middle Channel



Middle Channel



High Channel



High Channel

9.6 Test data for radiated emission

9.6.1 Radiated Emission which fall in the Restricted Band

9.6.1.1 Test data for 802.11b WLAN Mode

- 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
- Duty Cycle : 99.60 %
- Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	AMP Gain	Correction Factor	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel										
2 386.580	57.89	Peak	H	28.10	5.41	33.13	0.02	58.29	74.00	15.71
2 386.470	51.14	Average	H					51.54	54.00	2.46
2 388.090	52.45	Peak	V					52.85	74.00	21.15
2 388.210	44.14	Average	V					44.54	54.00	9.46
Test Data for High Channel										
2 488.049	52.18	Peak	H	27.50	5.50	33.13	0.02	52.07	74.00	21.93
2 485.422	43.57	Average	H					43.46	54.00	10.54
2 494.711	49.41	Peak	V					49.30	74.00	24.70
2 485.255	36.11	Average	V					36.00	54.00	18.00

Tabulated test data for Restricted Band

Remark: "H": Horizontal, "V": Vertical

$$\text{Margin (dB)} = \text{Limits (dB}\mu\text{V/m)} - \text{Total Level (dB}\mu\text{V/m)}$$

$$\text{Total Level} = \text{Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{AMP Factor} + \text{Correction Factor}$$

9.6.1.2 Test data for 802.11g WLAN Mode

- 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
- Duty Cycle : 96.24 %
- Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	AMP Gain	Correction Factor	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel										
2 387.160	62.03	Peak	H	28.10	5.41	33.13	0.17	62.58	74.00	11.42
2 389.480	51.22	Average	H					51.77	54.00	2.23
2 388.320	53.14	Peak	V					53.69	74.00	20.31
2 389.830	42.86	Average	V					43.41	54.00	10.59
Test Data for High Channel										
2 483.536	60.19	Peak	H	27.50	5.50	33.13	0.17	60.23	74.00	13.77
2 483.798	46.77	Average	H					46.81	54.00	7.19
2 483.846	50.38	Peak	V					50.42	74.00	23.58
2 483.775	37.59	Average	V					37.63	54.00	16.37

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical

$$\text{Margin (dB)} = \text{Limits (dB}\mu\text{V/m)} - \text{Total Level (dB}\mu\text{V/m)}$$

$$\text{Total Level} = \text{Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{AMP Factor} + \text{Correction Factor}$$

9.6.1.3 Test data for 802.11n_HT20 WLAN Mode

- 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
- Duty Cycle : 95.56 %
- Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	AMP Gain	Correction Factor	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel										
2 389.830	61.68	Peak	H	28.10	5.41	33.13	0.20	62.26	74.00	11.74
2 389.590	51.39	Average	H					51.97	54.00	2.03
2 385.430	52.74	Peak	V					53.32	74.00	20.68
2 389.940	43.02	Average	V					43.60	54.00	10.40
Test Data for High Channel										
2 484.252	61.74	Peak	H	27.50	5.50	33.13	0.20	61.81	74.00	12.19
2 483.512	47.70	Average	H					47.77	54.00	6.23
2 483.727	53.61	Peak	V					53.68	74.00	20.32
2 483.894	37.62	Average	V					37.69	54.00	16.31

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical

$$\text{Margin (dB)} = \text{Limits (dB}\mu\text{V/m)} - \text{Total Level (dB}\mu\text{V/m)}$$

$$\text{Total Level} = \text{Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{AMP Factor} + \text{Correction Factor}$$

9.6.2 Spurious & Harmonic Radiated Emission

9.6.2.1 Test data for 802.11b WLAN Mode

- Resolution bandwidth : 1 MHz and Peak Detector for Peak Mode for the emissions fall in restricted band,
1 MHz and RMS Detector for Average Mode for the emissions fall in restricted band
100 kHz for Peak Mode for the emissions outside restricted band
- Video bandwidth : 3 MHz for Peak and Average Mode
- Frequency range : 1 GHz ~ 26.5 GHz
- Measurement distance : 3 m
- Duty Cycle : 99.60 %
- Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	AMP Gain	Correction Factor	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel										
4 824.00	44.87	Peak	H	31.20	7.75	34.21	0.02	49.63	74.00	24.37
4 824.00	26.45	Average	H					31.21	54.00	22.79
4 824.00	51.39	Peak	V					56.15	74.00	17.85
4 824.00	31.70	Average	V					36.46	54.00	17.54
Test Data for Middle Channel										
4 874.00	44.09	Peak	H	31.10	7.75	34.21	0.02	48.75	74.00	25.25
4 874.00	25.87	Average	H					30.53	54.00	23.47
4 874.00	52.19	Peak	V					56.85	74.00	17.15
4 874.00	30.59	Average	V					35.25	54.00	18.75
Test Data for High Channel										
4 924.00	44.00	Peak	H	31.20	7.75	34.21	0.02	48.76	74.00	25.24
4 924.00	26.11	Average	H					30.87	54.00	23.13
4 924.00	51.98	Peak	V					56.74	74.00	17.26
4 924.00	32.00	Average	V					36.76	54.00	17.24

Remark: "H": Horizontal, "V": Vertical

$$\text{Margin (dB)} = \text{Limits (dB}\mu\text{V/m)} - \text{Total Level (dB}\mu\text{V/m)}$$

$$\text{Total Level} = \text{Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{AMP Factor} + \text{Correction Factor}$$

9.6.2.2 Test data for 802.11g WLAN Mode

- Resolution bandwidth : 1 MHz and Peak Detector for Peak Mode for the emissions fall in restricted band,
1 MHz and RMS Detector for Average Mode for the emissions fall in restricted band
100 kHz for Peak Mode for the emissions outside restricted band
- Video bandwidth : 3 MHz for Peak and Average Mode
- Frequency range : 1 GHz ~ 26.5 GHz
- Measurement distance : 3 m
- Duty Cycle : 96.24 %
- Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	AMP Gain	Correction Factor	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel										
4 824.00	44.46	Peak	H	31.20	7.75	34.21	0.17	49.37	74.00	24.63
4 824.00	26.21	Average	H					31.12	54.00	22.88
4 824.00	51.38	Peak	V					56.29	74.00	17.71
4 824.00	31.46	Average	V					36.37	54.00	17.63
Test Data for Middle Channel										
4 874.00	44.47	Peak	H	31.10	7.75	34.21	0.17	49.28	74.00	24.72
4 874.00	26.24	Average	H					31.05	54.00	22.95
4 874.00	52.13	Peak	V					56.94	74.00	17.06
4 874.00	30.54	Average	V					35.35	54.00	18.65
Test Data for High Channel										
4 924.00	44.15	Peak	H	31.20	7.75	34.21	0.17	49.06	74.00	24.94
4 924.00	26.33	Average	H					31.24	54.00	22.76
4 924.00	51.95	Peak	V					56.86	74.00	17.14
4 924.00	31.63	Average	V					36.54	54.00	17.46

Remark: “H”: Horizontal, “V”: Vertical

$$\text{Margin (dB)} = \text{Limits (dB}\mu\text{V/m)} - \text{Total Level (dB}\mu\text{V/m)}$$

$$\text{Total Level} = \text{Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{AMP Factor} + \text{Correction Factor}$$

9.6.2.3 Test data for 802.11n_HT20 WLAN Mode

- Resolution bandwidth : 1 MHz and Peak Detector for Peak Mode for the emissions fall in restricted band,
1 MHz and RMS Detector for Average Mode for the emissions fall in restricted band
100 kHz for Peak Mode for the emissions outside restricted band
- Video bandwidth : 3 MHz for Peak and Average Mode
- Frequency range : 1 GHz ~ 26.5 GHz
- Measurement distance : 3 m
- Duty Cycle : 95.56 %
- Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	AMP Gain	Correction Factor	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel										
4 824.00	44.38	Peak	H	31.20	7.75	34.21	0.20	49.32	74.00	24.68
4 824.00	26.61	Average	H					31.55	54.00	22.45
4 824.00	51.35	Peak	V					56.29	74.00	17.71
4 824.00	31.45	Average	V					36.39	54.00	17.61
Test Data for Middle Channel										
4 874.00	44.11	Peak	H	31.10	7.75	34.21	0.20	48.95	74.00	25.05
4 874.00	25.87	Average	H					30.71	54.00	23.29
4 874.00	52.42	Peak	V					57.26	74.00	16.74
4 874.00	31.35	Average	V					36.19	54.00	17.81
Test Data for High Channel										
4 924.00	43.81	Peak	H	31.20	7.75	34.21	0.20	48.75	74.00	25.25
4 924.00	25.94	Average	H					30.88	54.00	23.12
4 924.00	51.87	Peak	V					56.81	74.00	17.19
4 924.00	31.68	Average	V					36.62	54.00	17.38

Remark: "H": Horizontal, "V": Vertical

$$\text{Margin (dB)} = \text{Limits (dB}\mu\text{V/m)} - \text{Total Level (dB}\mu\text{V/m)}$$

$$\text{Total Level} = \text{Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{AMP Factor} + \text{Correction Factor}$$

10. PEAK POWER SPECTRUL DENSITY

10.1 Operating environment

Temperature : 23 °C
 Relative humidity : 45 % R.H.

10.2 Test set-up

The antenna output of the EUT was connected to the spectrum analyzer.

The resolution bandwidth is set to $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$, the video bandwidth is set to 3 times the resolution bandwidth.



10.3 Test Date

January 13, 2021 ~ January 14, 2021

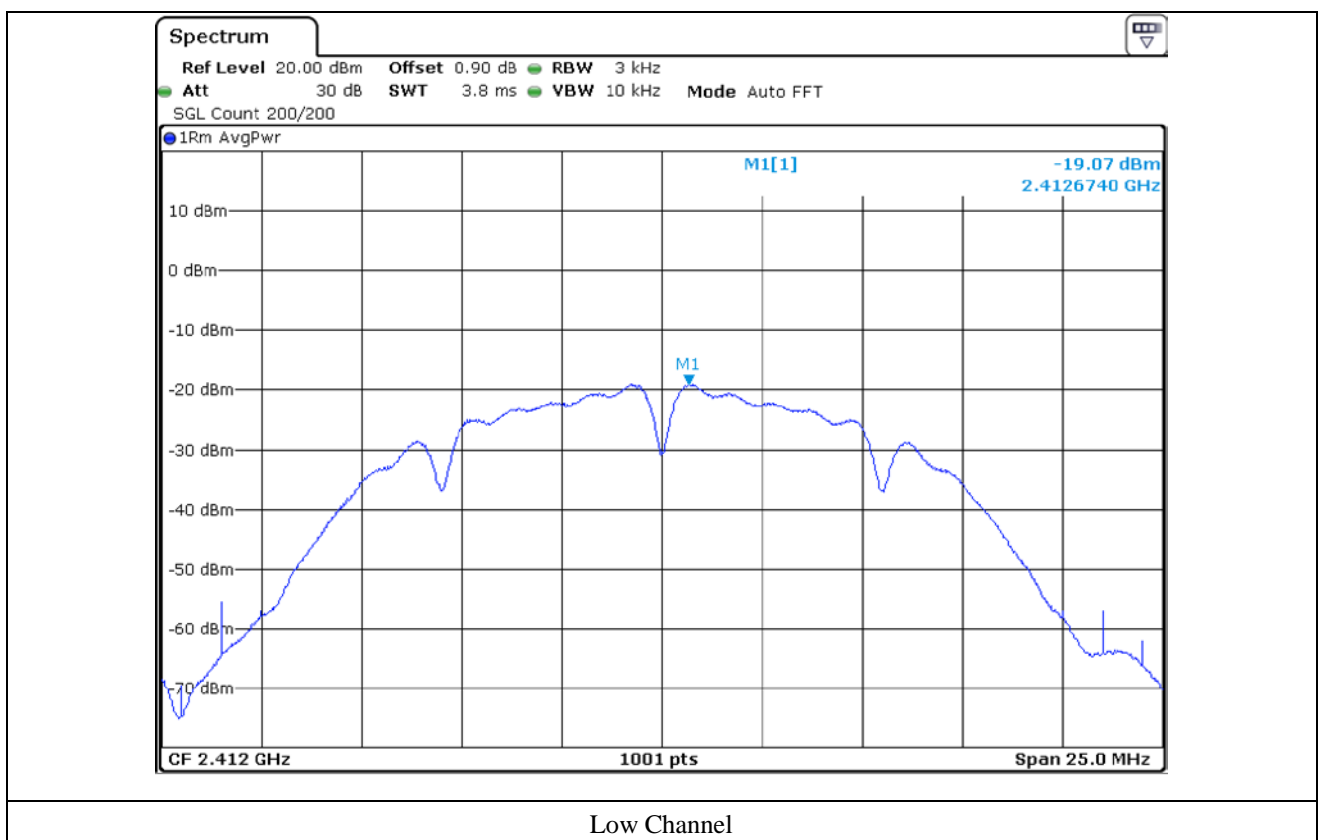
10.4 Test data for 802.11b WLAN Mode

- Test Result : Pass

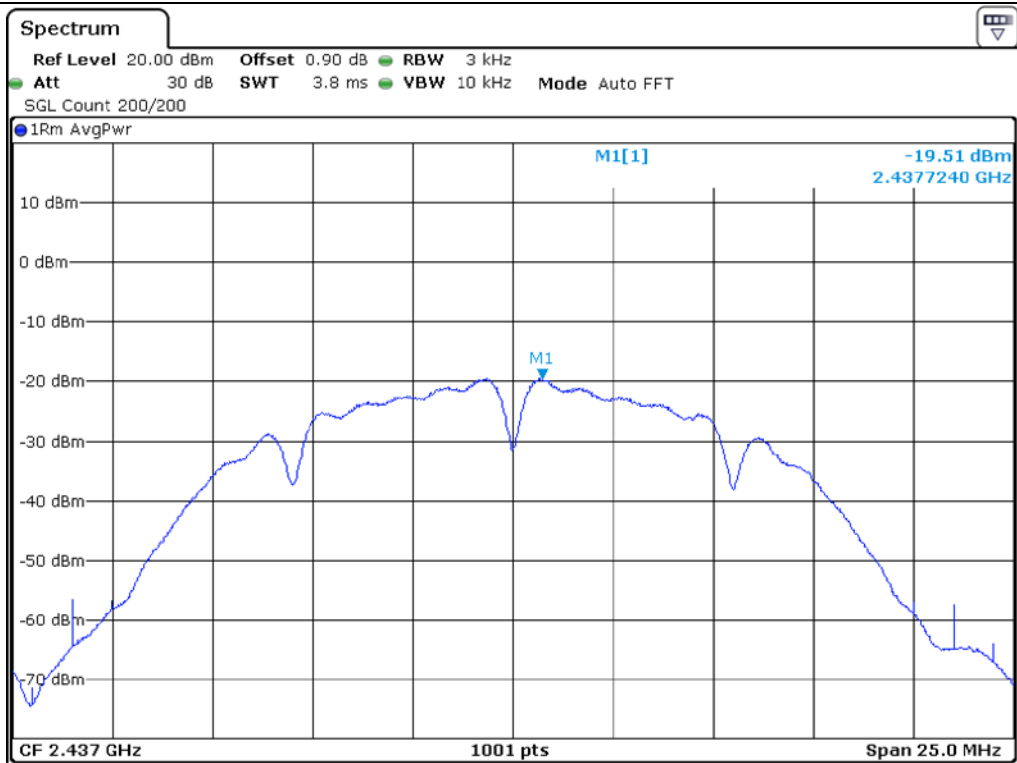
- Operating Condition : Continuous transmitting mode

CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412.00	-19.07	8.00	27.07
Middle	2 437.00	-19.51	8.00	27.51
High	2 462.00	-19.60	8.00	27.60

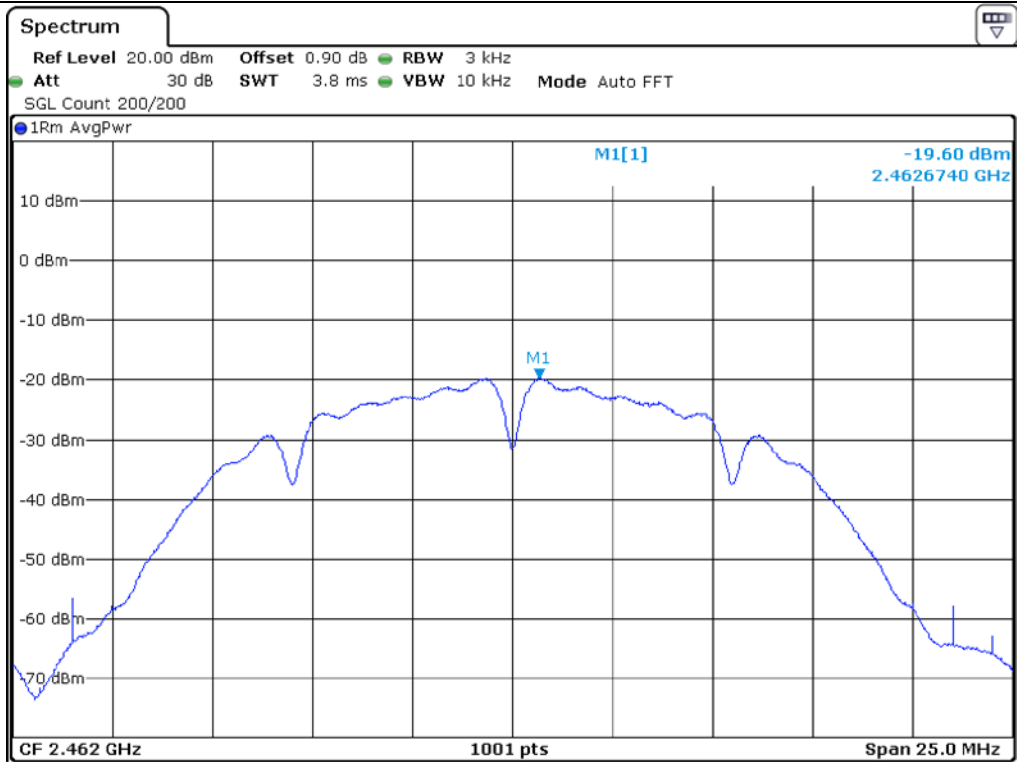
Remark. Margin = Limit – Measured value



Low Channel



Middle Channel



High Channel

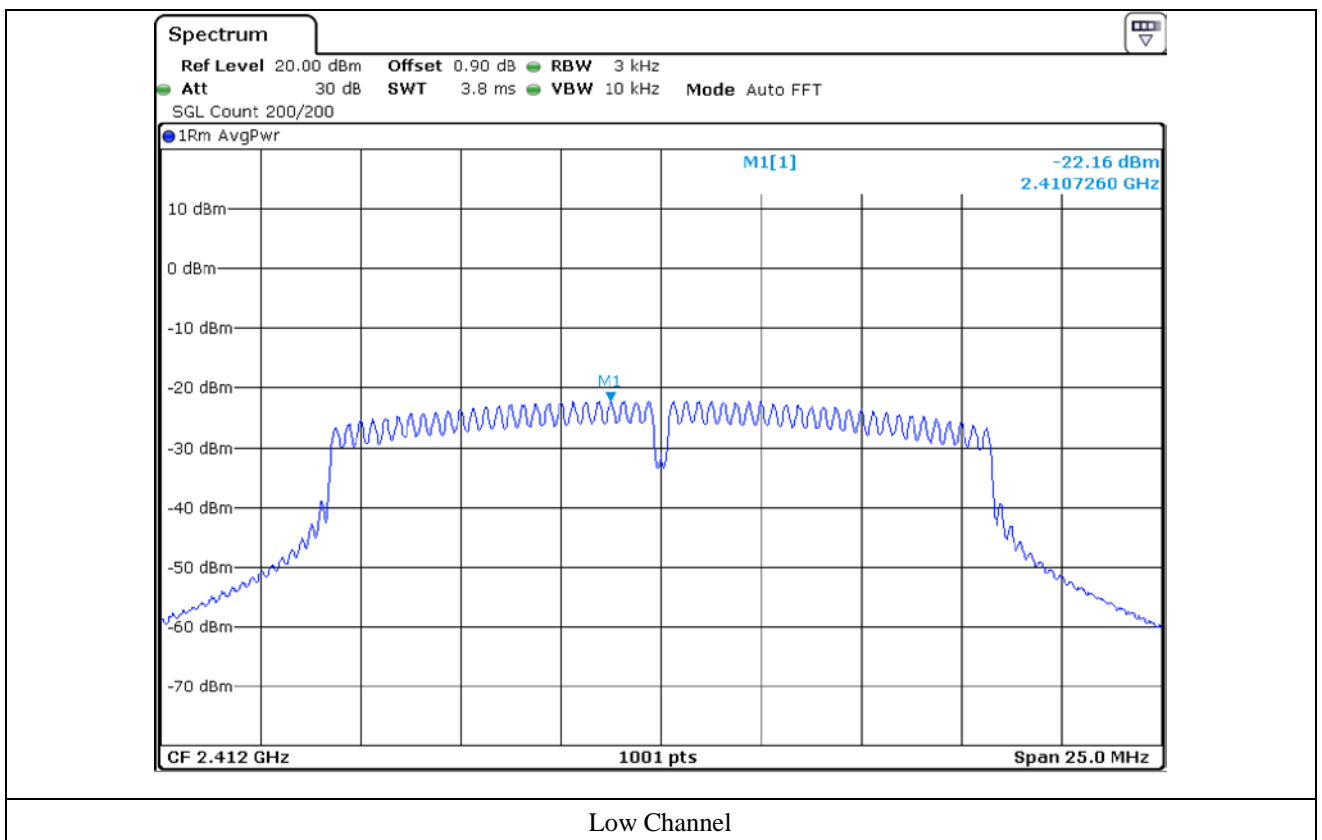
10.5 Test data for 802.11g WLAN Mode

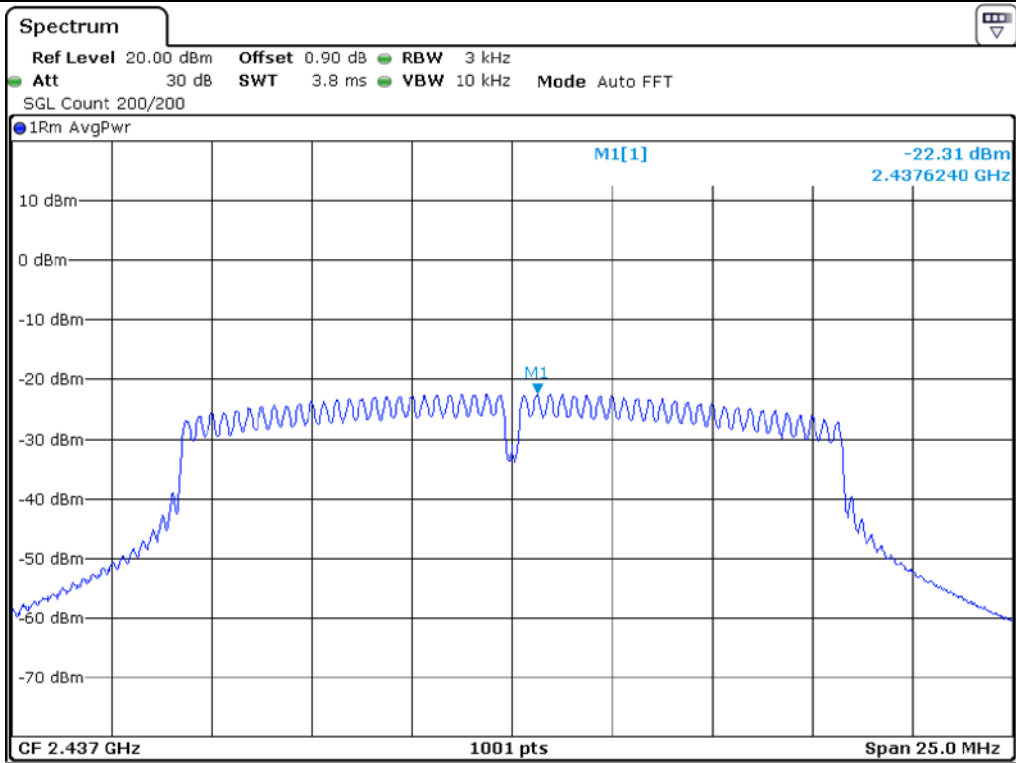
- Test Result : Pass

- Operating Condition : Continuous transmitting mode

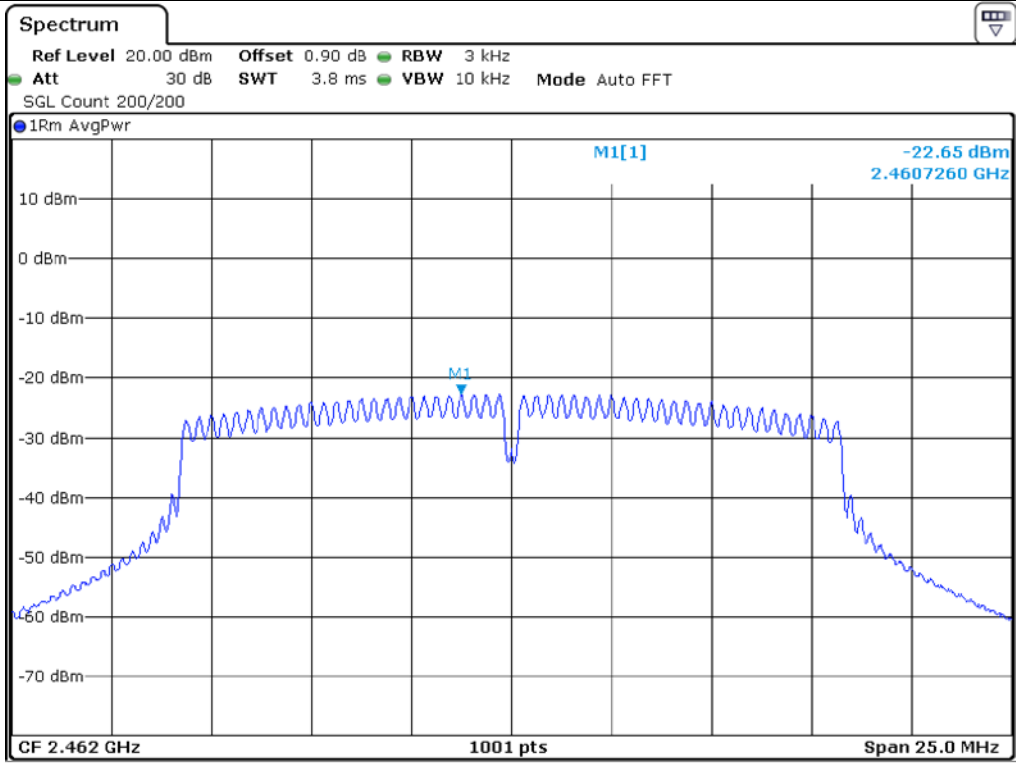
CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412.00	-22.16	8.00	30.16
Middle	2 437.00	-22.31	8.00	30.31
High	2 462.00	-22.65	8.00	30.65

Remark. Margin = Limit – Measured value





Middle Channel



High Channel

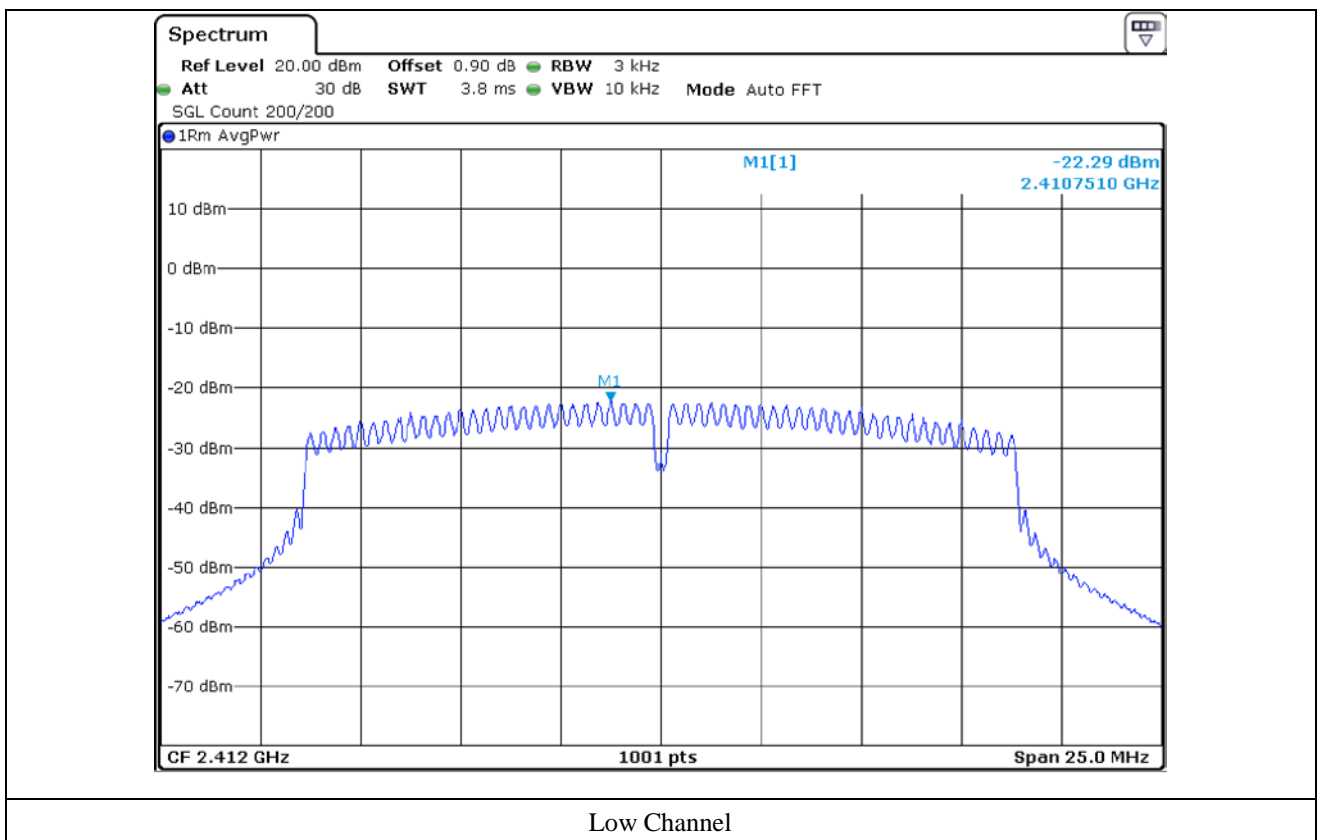
10.6 Test data for 802.11n_HT20 WLAN Mode

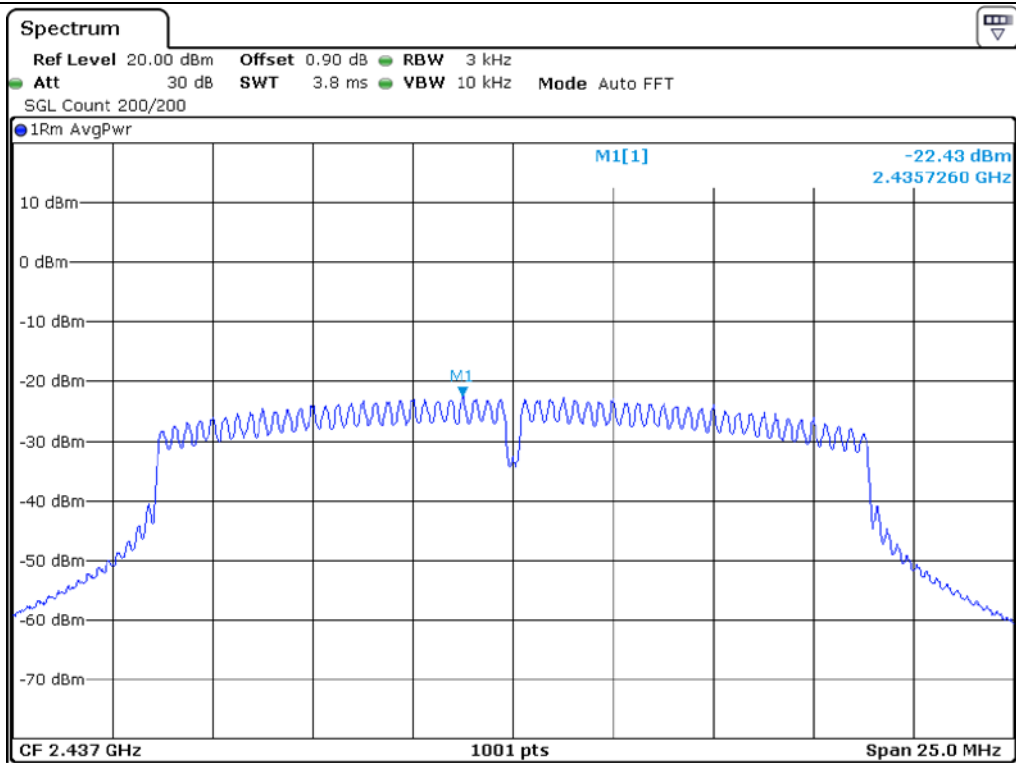
-. Test Result : Pass

-. Operating Condition : Continuous transmitting mode

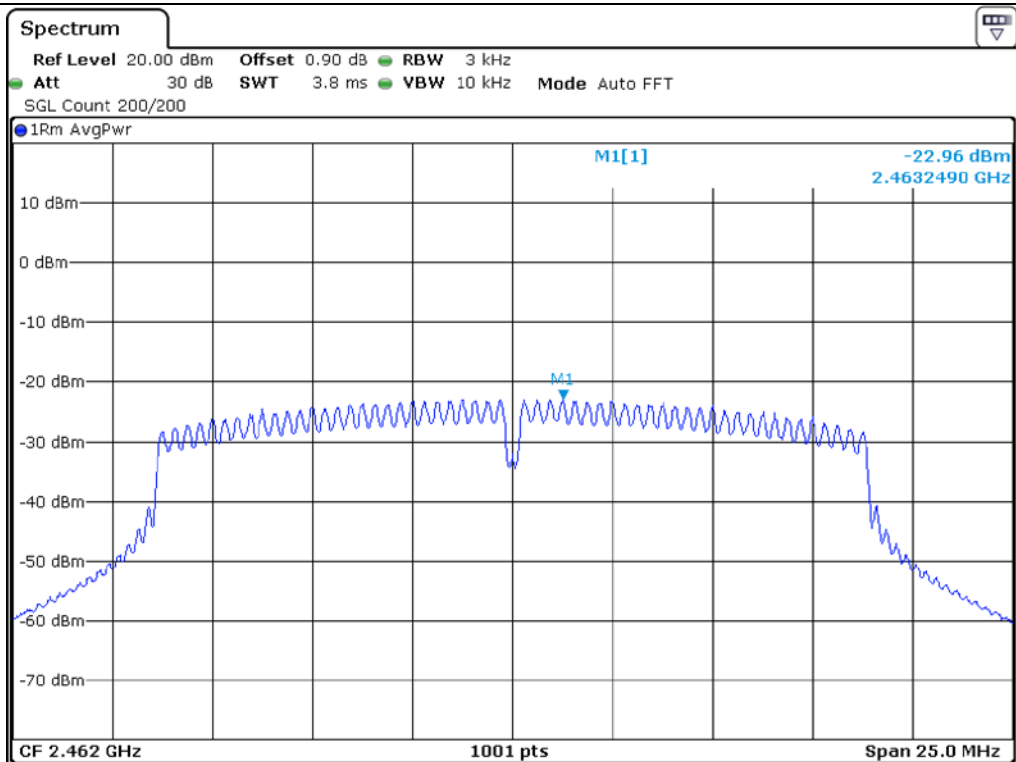
CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412.00	-22.29	8.00	30.29
Middle	2 437.00	-22.43	8.00	30.43
High	2 462.00	-22.96	8.00	30.96

Remark. Margin = Limit – Measured value





Middle Channel



High Channel

11. RADIATED EMISSION TEST

11.1 Operating environment

Temperature : 23 °C
 Relative humidity : 45 % R.H.

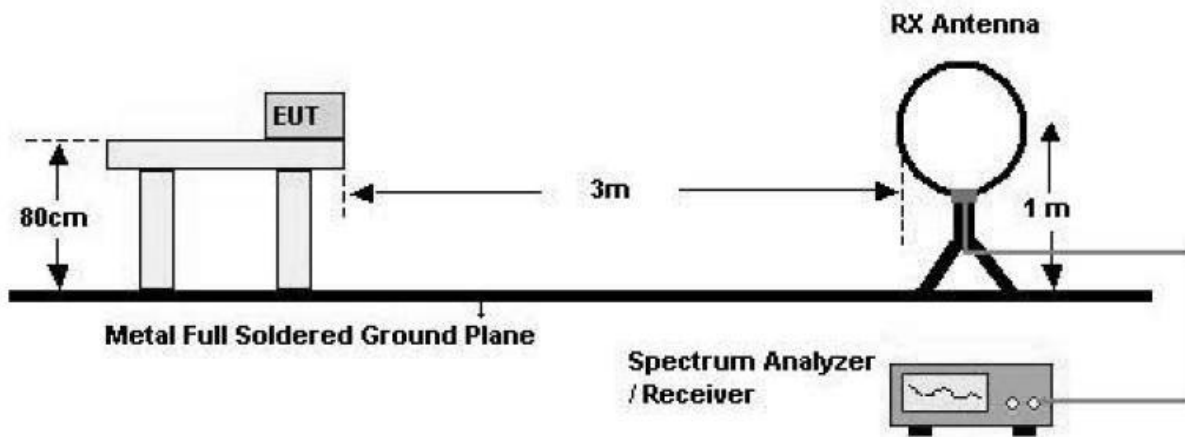
11.2 Test set-up

The radiated emissions measurements were on the 3 m semi anechoic chamber. The EUT and other support equipment were placed on 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.

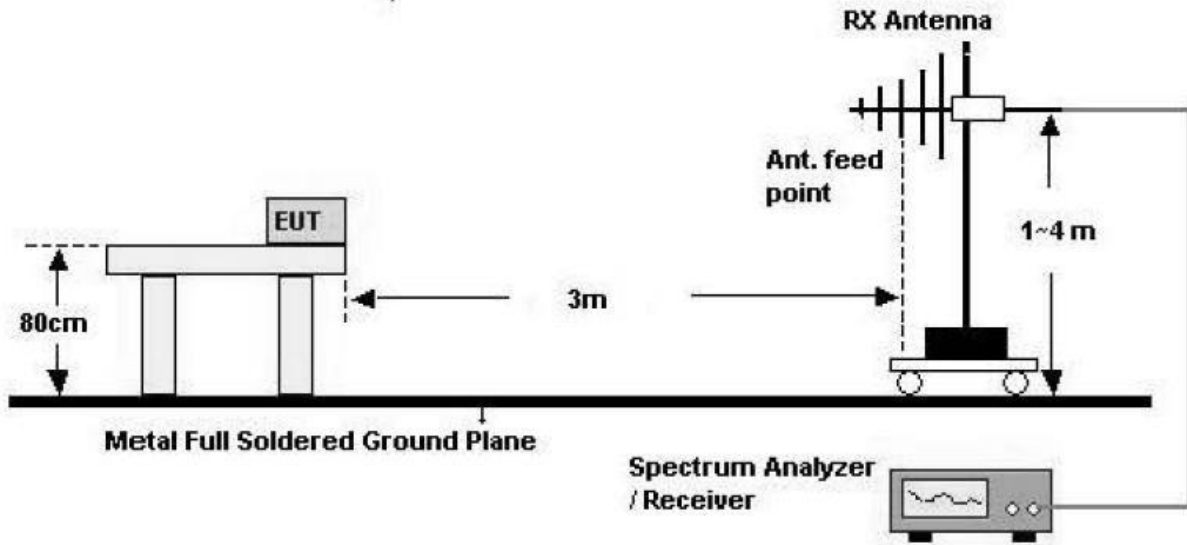
The frequency spectrum from 30 MHz to 26.5 GHz was scanned and emission levels maximized at each frequency recorded. The system was rotated 360°, and the antenna was varied in height between 1.0 m and 4.0 m in order to determine the maximum emission levels. This procedure was performed for both horizontal and vertical polarization of the receiving antenna.

- Test Configuration

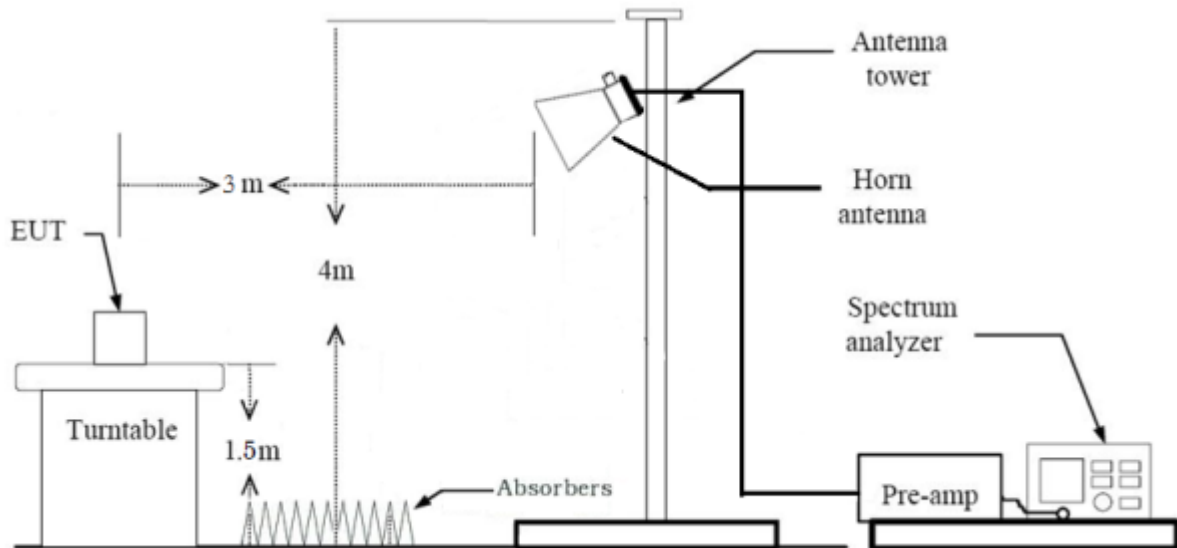
1. Below 30 MHz



2. 30 MHz - 1 GHz



3. Above 1 GHz



11.3 Test Date

January 13, 2021 ~ January 14, 2021

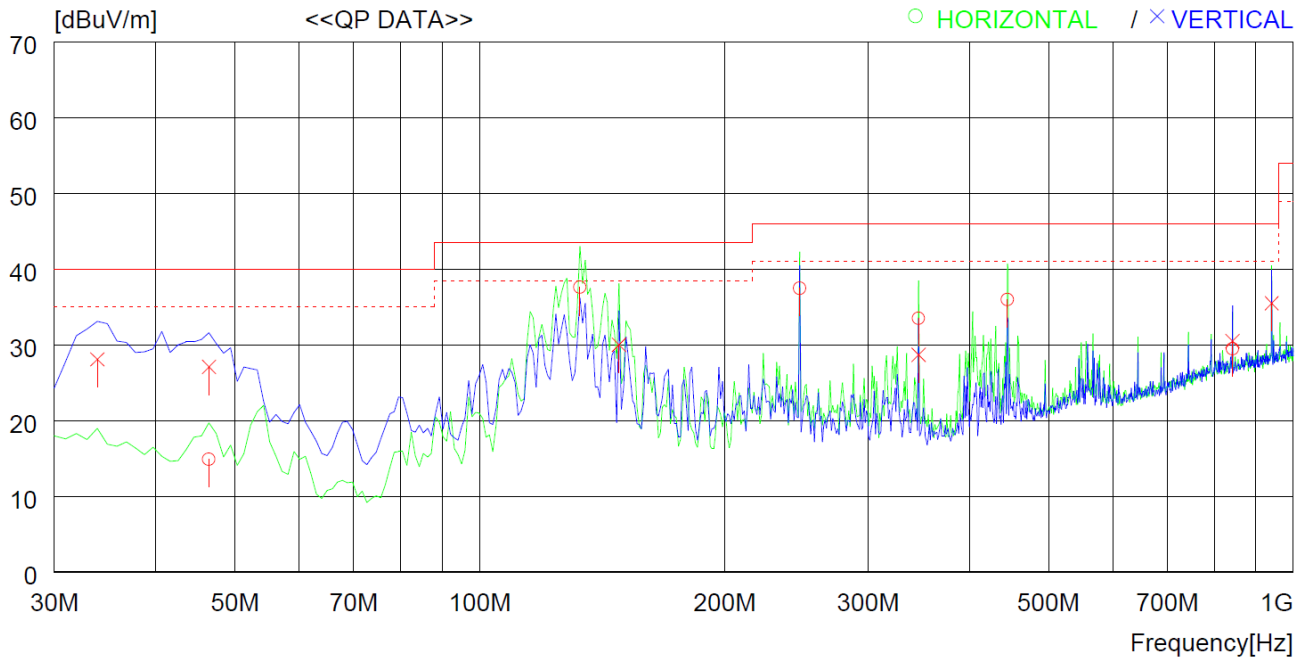
11.4 Test data for 30 MHz ~ 1 000 MHz

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.247

Result : PASSED

EUT : Residential Remote Controller

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	132.820	49.0	19.2	1.4	32.0	37.6	43.5	5.9	400	359
2	247.280	49.9	17.7	1.9	32.0	37.5	46.0	8.5	200	359
3	445.161	43.9	21.8	2.5	32.2	36.0	46.0	10.0	100	0
4	46.490	31.5	14.6	0.9	32.1	14.9	40.0	25.1	400	359
5	346.220	43.3	19.9	2.3	32.0	33.5	46.0	12.5	100	298
6	841.881	29.9	27.3	4.2	31.9	29.5	46.0	16.5	100	0
----- Vertical -----										
7	33.880	39.7	19.5	0.9	32.0	28.1	40.0	11.9	100	359
8	148.340	41.7	18.8	1.5	32.0	30.0	43.5	13.5	100	24
9	940.818	34.5	27.9	4.6	31.5	35.5	46.0	10.5	200	343
10	46.490	43.7	14.6	0.9	32.1	27.1	40.0	12.9	200	217
11	346.220	38.5	19.9	2.3	32.0	28.7	46.0	17.3	100	359
12	841.881	30.9	27.3	4.2	31.9	30.5	46.0	15.5	100	309

11.5 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
- Operating mode : Transmitting mode

Frequency (MHz)	Reading (dB μ V)	Ant. Pol. (H/V)	Ant. Height (m)	Angle (°)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dB μ V/m)	Limits (dB μ V/m)	Margin (dB)
Emission from the EUT more than 20 dB below the limit in each frequency range.									

11.6 Test data for above 1 GHz

- 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 ~ 26.5 GHz
- Measurement distance : 3 m
- Operating mode : Transmitting mode

Frequency (MHz)	Reading (dB μ V)	Ant. Pol. (H/V)	Ant. Height (m)	Angle (°)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dB μ V/m)	Limits (dB μ V/m)	Margin (dB)
Emission from the EUT more than 20 dB below the limit in each frequency range.									

12. LIST OF TEST EQUIPMENT

Model Number	Manufacturer	Description	Serial Number	Last Cal.(Interval)
FSV40-N	Rohde & Schwarz	Signal Analyzer	102177	Apr. 20, 2020 (1Y)
FSW43	Rohde & Schwarz	Signal Analyzer	104544	Jul. 15, 2020 (1Y)
ESW	Rohde & Schwarz	EMI Test Receiver	101851	Mar. 27, 2020 (1Y)
310N	Sonoma Instrument	Pre-Amplifier	392756	Oct. 16, 2020 (1Y)
PAM-118A	Com-Power	Pre-Amplifier	18040081	Oct. 12, 2020 (1Y)
PAM-840A	Com-Power	Pre-Amplifier	461339	Oct. 16, 2020 (1Y)
DT3000-3t	Innco System	Turn Table	DT3000/093	N/A
MA-4000XPET	Innco System	Antenna Master	MA4000/509	N/A
NRP-Z81	Rohde & Schwarz	Wide band Sensor	101975	Feb. 9, 2021 (1Y)
FMZB 1513	Schwarzbeck	Loop Antenna	1513-235	Mar. 24, 2020 (2Y)
HLP-2008	TDK	Hybrid Antenna	131316	Feb. 27, 2020 (2Y)
AH-118	Com-Power	Horn Antenna	10050061	Oct. 15, 2020 (1Y)
BBHA9170	Schwarzbeck	Horn Antenna	BBHA9170178	Jan. 07, 2020(1Y)