FCC CFR47 Part 15 Subpart C Certification Test Report

For the

Product	**: Folletto OP**
Model	**: FOLLETTO 2.0**
FCC ID	**: 2AQ2L-DYALP001M10**
Applicant	**: Daeyoung Information System CO.,LTD.**
FCC Rule	**: CFR 47 Part 15 Subpart C**

We hereby certify that the above product has been tested by us with the listed rules and found in compliance with the regulation. The test data and results are issued on the test report no. **TR-W1810-016**

Signature

Choi, Yeong-min / Technical Manager

Date: 2018-10-26

Test Laboratory: ENG Co., Ltd.

FCC CERTIFICATION
TEST REPORT

Project Number	**: EA1807C-005**
Test Report Number	**: TR-W1810-016**
Type of Equipment	**: Folletto OP**
Model Name	**: FOLLETTO 2.0**
FCC ID	**: 2AQ2L-DYALP001M10**
Multiple Model Name	**: N/A**
Applicant	**: Daeyoung Information System CO.,LTD.**
Address	**: 1F, 149 Jukdong-ro, Yuseong-gu, Daejeon, 34127 South Korea**
Manufacturer	**: Daeyoung Information System CO.,LTD.**
Address	**: 1F, 149 Jukdong-ro, Yuseong-gu, Daejeon, 34127 South Korea**
Regulation	**: FCC Part 15 Subpart C Section 15.247**
Total page of Report	**: 90 Pages**
Date of Receipt	**: 2018-06-25**
Date of Issue	**: 2018-10-26**
Test Result	**: PASS**

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.

Prepared by Song, In-young / Senior Engineer _____ 2018-10-26
Signature Date

Reviewed by Choi, Yeong-min / Technical Manager _____ 2018-10-26
Signature Date

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Release Control Record

Issue Report No.	Issued Date	Details/Revisions
TR-W1810-016	2018-10-26	Initial Release
-	-	-

ENG Co., Ltd. 135-60 Gyeongchung-daero, Gonjiam-eup, Gwangju-si, Gyeonggi-do, Korea 464-942 Report Form_01 (Rev.0)
TEL: +82-31-727-8300 FAX: +82-31-746-0800 http://www.the-eng.co.kr

1. TEST SUMMARY

1.1 Regulations and results

The sample submitted for evaluation (Hereafter refer to as EUT) has been tested in accordance with the following regulations or standards.

FCC Reference Section	Description	P	F	N.T.	Note
15.247(a)(2)	6 dB Bandwidth / Occupied Bandwidth	P		.	
15.247(b)(3)	Maximum peak output power	P			
15.247(e)	Power spectral density	P			
15.247(d)	Band Edge Conducted spurious emission	P			
15.205(a) 15.209(a)	Radiated spurious emissions	P			
15.207(a)	AC power line conducted emissions	P			

Remark:

P means Passed F means Failed N.T. means Not Tested

Note1. The EUT is powered by DC 5 V which is supplied from host device (Folletto Printer), so the test was not performed.

1.2 Test Methodology

The tests mentioned in clause 1.1 in this test report were performed according to FCC CFR 47 Part 2, CFR 47 Part 15 and ANSI C63.10-2013

KDB 558074 D01DTS Meas. Guidance v05: Measurement Procedure PK is used for power measurement.

1.3 Additions, deviations, exclusions from standards

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

1.4 Purpose of the test

The test was performed to determine whether the equipment under test fulfills the requirements of the regulation stated in FCC Part 15 Subpart C Section 15.247

1.5 Test Facility

The measurement facilities are located at 135-60 Gyeongchung-daero, Gonjiam-eup, Gwangju-si, Gyeonggi-do 12813, Korea. Description details of test facilities were submitted to the FCC and IC, designated by the RRA (Radio Research Agency), and accredited by Korea and accredited by KOLAS (Korea Laboratory Accreditation Scheme) in Korea according to the requirement of ISO 17025.

Laboratory Qualification	Registration No.	Mark
FCC	KR0160	
ISED(Canada)	IC 12721A	
RRA	KR0160	
Korean Agency for Technology and Standards	KT733	

2. EUT (Equipment Under Test) INFORMATION

2.1 General Description

The Daeyoung Information System CO.,LTD., Model FOLLETTO 2.0 (Hereafter referred to as EUT) is a Folletto OP, ***which is shall be embedded in Folletto Printer only***. The Folletto Printer is a machine that prints on various beverages by customer's Smartphone for images or texts providing enjoyable events. Main function of the Folletto printer is print images and/or text received from customer's Smartphone on customer's ordered beverages using WiFi technology between the EUT and a customer's Smartphone. The product specification described herein was obtained from product data sheet or user's manual.

Operating Frequency	802.11b/g/n HT20: 2 412 MHz – 2 462 MHz 802.11n HT40: 2 422 MHz – 2 452 MHz
Max. RF Output Power	14.37 dBm (Conducted Power)
Modulation Types	802.11b: DSSS (DBPSK/DQPSK/CCK) 802.11g/n HT20/HT40: OFDM (BPSK/QPSK/16QAM/64QAM)
Number of Channels	802.11b/g/n HT20: 11 CH 802.11n HT40: 7 CH
Channel spacing	5 MHz
Channel Bandwidth	802.11b/g/n HT20: 20 MHz 802.11n HT40: 40 MHz
Generated or used Freq. in EUT	32.768 kHz, 25 MHz, 40 MHz
Type of Antenna	☐ Integrated Type ■ Dedicated Type(FPCB antenna)
Antenna Gain	1.92 dBi
Normal Test Voltage	DC 5 V
Electrical Rating	DC 5 V
Test SW Version	REALTEK 11n 8723BS SDIO WLAN NIC Massproduction Kit (Ver 0.0000.02.20150622)

2.2 Available channel number and frequency

Operating Mode: 802.11 b/g/n HT20/HT40, 5 MHz Channel Spacing					
Channel	Frequency(MHz)	Channel	Frequency(MHz)	Channel	Frequency(MHz)
1	2 412	5	2 432	9	2 452
2	2 417	6	2 437	10	2 457
3	2 422	7	2 442	11	2 462
4	2 427	8	2 447		

2.3 RF power setting in TEST SW

Test Mode	RF power setting		
	Low Channel	Middle Channel	High Channel
802.11b	40	40	40
802.11g	48	52	48
802.11n HT20	46	52	46
802.11n HT40	46	52	46

2.4 Additional Model

Not Applicable

3. TEST CONDITION

3.1 Equipment Used During Test

The following peripheral devices and/or interface cables were connected during the measurement:

Description	Model No.	Serial No.	Manufacturer.
Folletto OP (EUT)	FOLLETTO 2.0	N/A	Daeyoung Information System CO.,LTD.

3.2 Mode of operation during the test

For finding worst case configuration and operating mode, preliminary testing was performed and radiated emission and conducted emission were performed with the EUT set to transmit at the channel with the highest output power as worst case scenario. The EUT shall be installed and operated in Folletto Printer only, so all spurious emission tests were performed in one axis direction. Based on preliminary testing, following operating modes were selected for the final test as listed below.

3.2.1 Conducted Emission Test Data

Operating Mode	Data rate(Mbps)	Measured Output Power(dBm)
802.11b	**1**	**13.05**
	2	13.03
	5.5	13.01
	11	12.97
802.11g	**6**	**14.37**
	9	14.17
	12	14.19
	18	14.24
	24	14.27
	36	14.21
	54	14.28
802.11n HT20	**6.5 (MCS0)**	**14.24**
	13 (MCS1)	14.19
	19.5 (MCS2)	14.12
	26 (MCS3)	14.17
	39 (MCS4)	14.10
	52 (MCS5)	14.13
	58.5 (MCS6)	14.10
	65 (MCS7)	14.10

Operating Mode	Data rate(Mbps)	Measured Output Power(dBm)
802.11n HT40	**13.5 (MCS0)**	**12.75**
	27 (MCS1)	12.71
	40.5 (MCS2)	12.72
	54 (MCS3)	12.62
	81 (MCS4)	12.61
	108 (MCS5)	12.58
	121.5 (MCS6)	12.59
	135 (MCS7)	12.59

Operating Mode	Channel	Frequency (MHz)	Data rate(Mbps)	Output Power(dBm)
802.11b	1	2 412	1	12.65
	6	2 437	1	13.05
	11	***2 462***	***1***	***13.35***
802.11g	1	2 412	6	11.94
	6	***2 437***	***6***	***14.37***
	11	2 462	6	12.77
802.11n HT20	1	2 412	6.5	10.84
	6	***2 437***	***6.5***	***14.24***
	11	2 462	6.5	11.65
802.11n HT40	3	2 422	13.5	9.67
	6	***2 437***	***13.5***	***12.75***
	9	2 452	13.5	10.21

3.2.2 Radiated Spurious Emission Test Mode

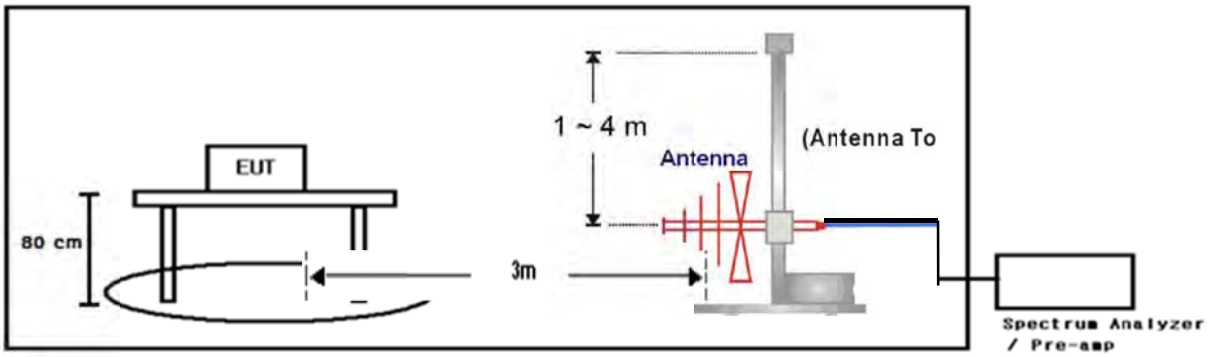
Operating Mode	Tested Channel	Data rate(Mbps)	Output Power(dBm)
802.11b	11	1	13.35
802.11g	6	6	14.37
802.11n HT20	6	6.5	14.24
802.11n HT40	6	13.5	12.75

3.2.3 AC Power-line Conducted Emission Test mode

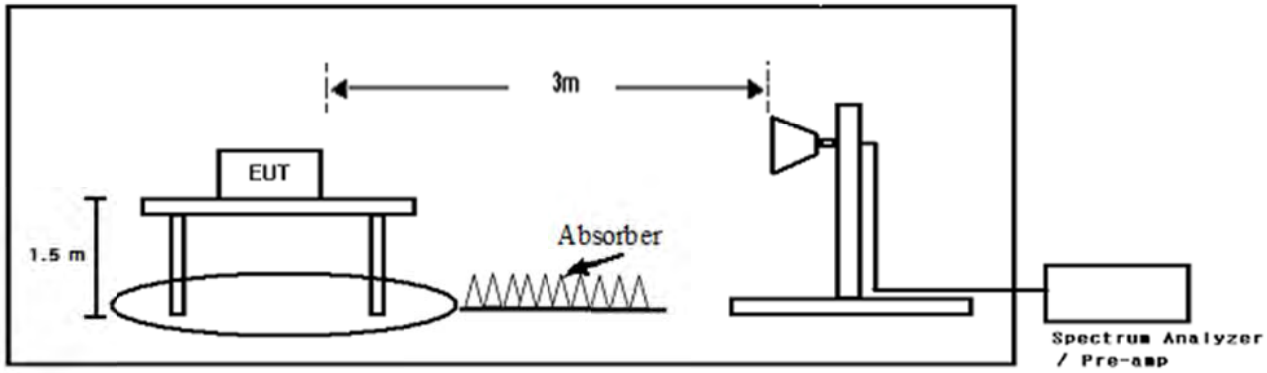
Operating Mode	Test Channel	Frequency
802.11g	Middle Channel	2 437 MHz

3.3 Test Setup Drawing

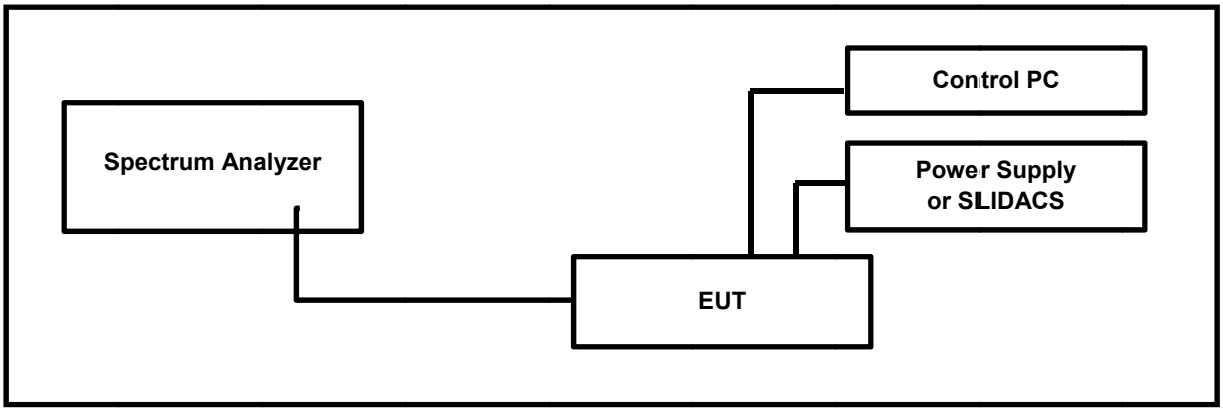
(Radiated Test below 1 GHz)



(Radiated Test above 1 GHz)



(Conducted Test)



3.4 EUT Modifications

- No EMC Relevant Modifications were performed by this test laboratory.

4. ANTENNA REQUIREMENT

According to FCC CFR 47 Part 15 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. 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 provision of this section.

4.1 Antenna Description

Frequency Band (GHz)	Antenna Type	Max Peak Gain (dBi)	Connector Type
2.4	Flexible PCB	1.92	-

4.2 Conclusion

The antenna type of the EUT is Flexible PCB Antenna, so the EUT met the requirement.

5. TEST RESULT

5.1 6 dB Bandwidth

5.1.1 Limit

The minimum 6 dB bandwidth shall be at least 500 kHz acc to Section 15.247 (a) (2).

5.1.2 Method of Measurement

Reference to KDB 558074 D01 DTS Meas Guidance v05: 8.2

The transmitter output is connected to a spectrum analyzer with the RBW set to 100 kHz, VBW ≥ 3 X RBW, peak detector and max hold.

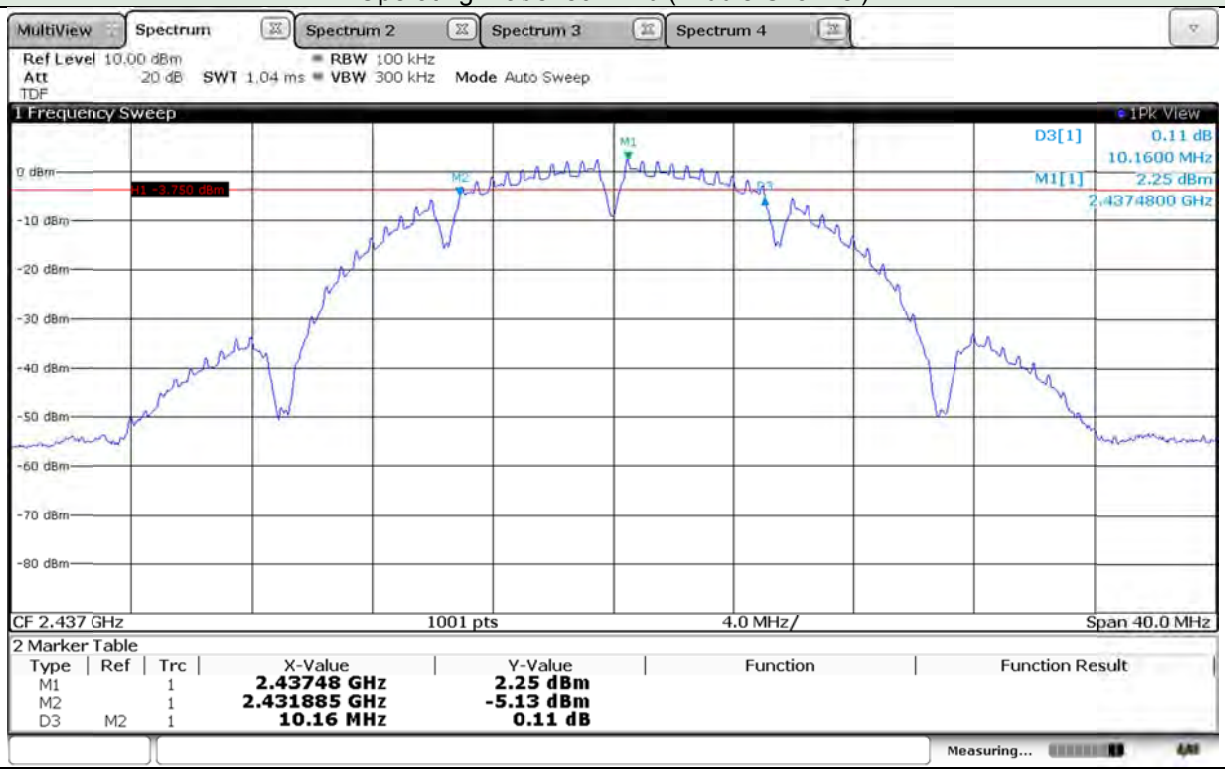
5.1.3 Test Data

Date of Test	2018-08-21	Temperature	(24.0 ± 1.0) °C
		Relative humidity	(56.0 ± 3.0) % R.H.
Test Result	***PASS***	Tested by	In-yong Song
Operating Mode: 802.11b			
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2 412	10.150	0.5
Middle	2 437	10.160	
High	2 462	10.158	
Operating Mode: 802.11g			
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2 412	16.604	0.5
Middle	2 437	16.605	
High	2 462	16.643	
Operating Mode: 802.11n HT20			
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2 412	17.862	0.5
Middle	2 437	17.891	
High	2 462	17.882	
Operating Mode: 802.11n HT40			
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2 422	36.548	0.5
Middle	2 437	36.522	
High	2 452	36.489	

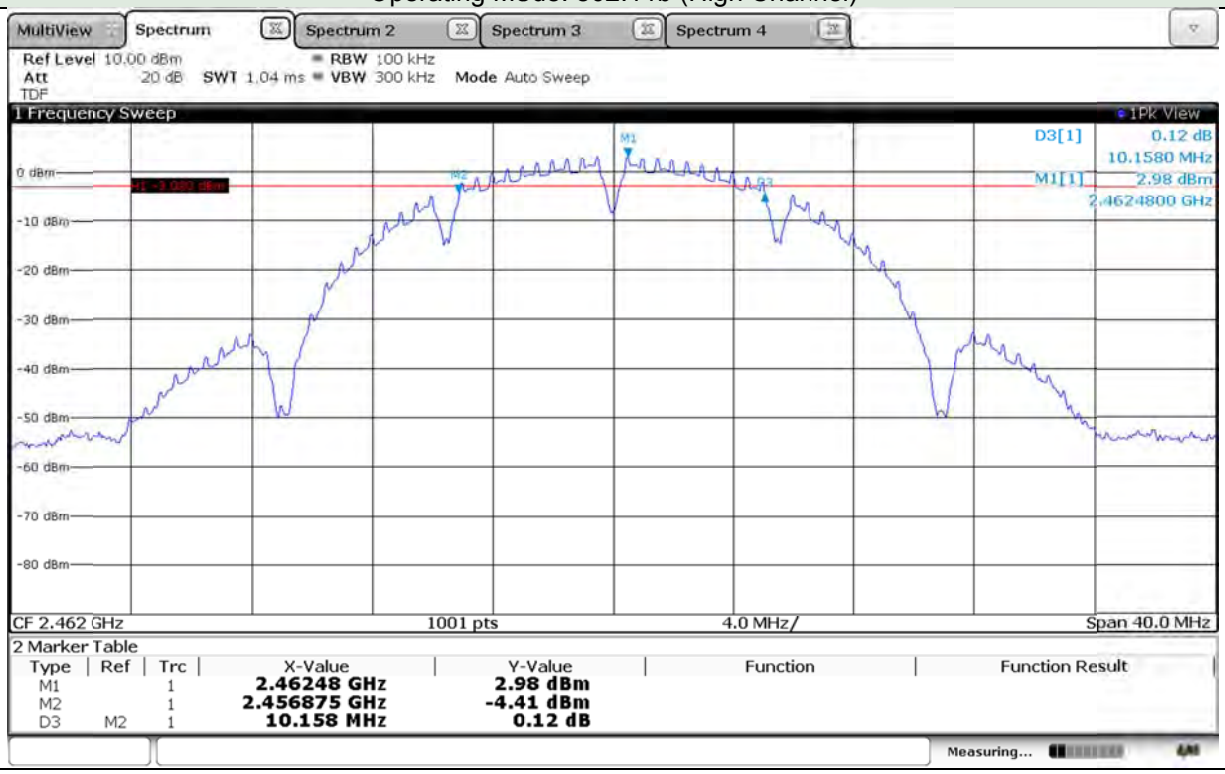
5.1.4 Test Plots

Operating Mode: 802.11b (Low Channel)

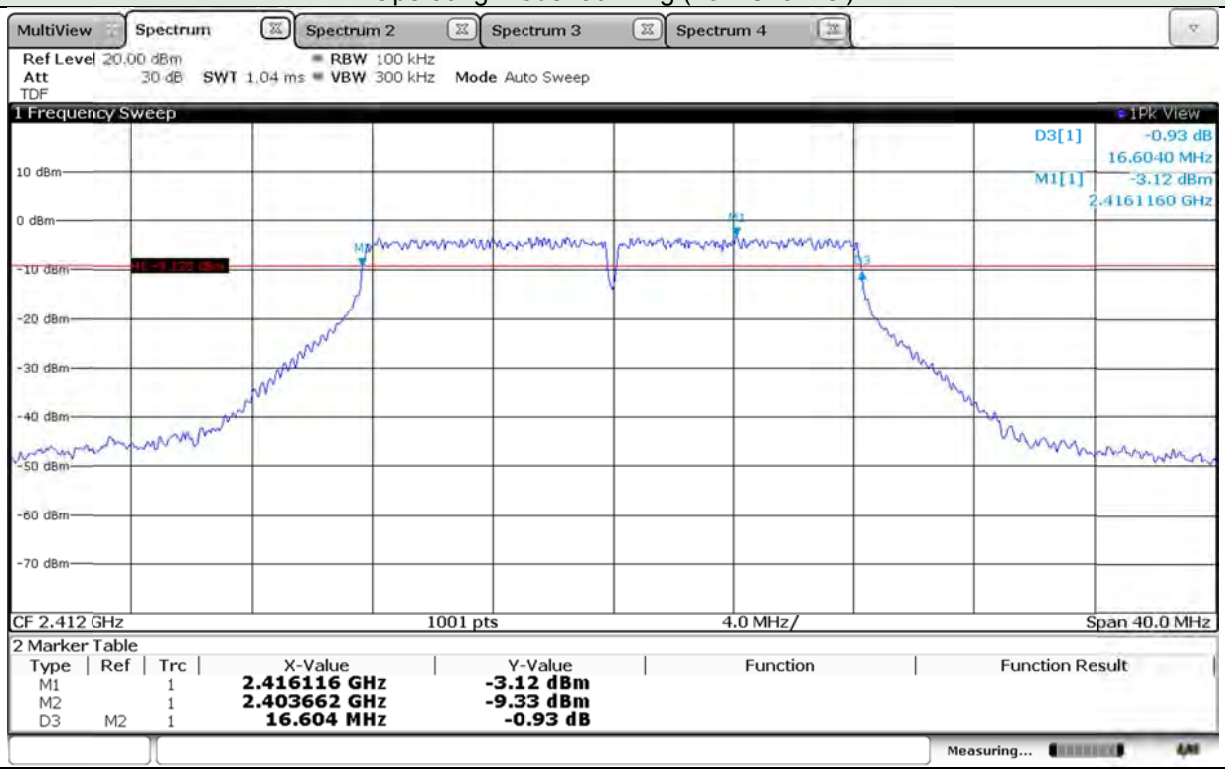
Operating Mode: 802.11b (Middle Channel)



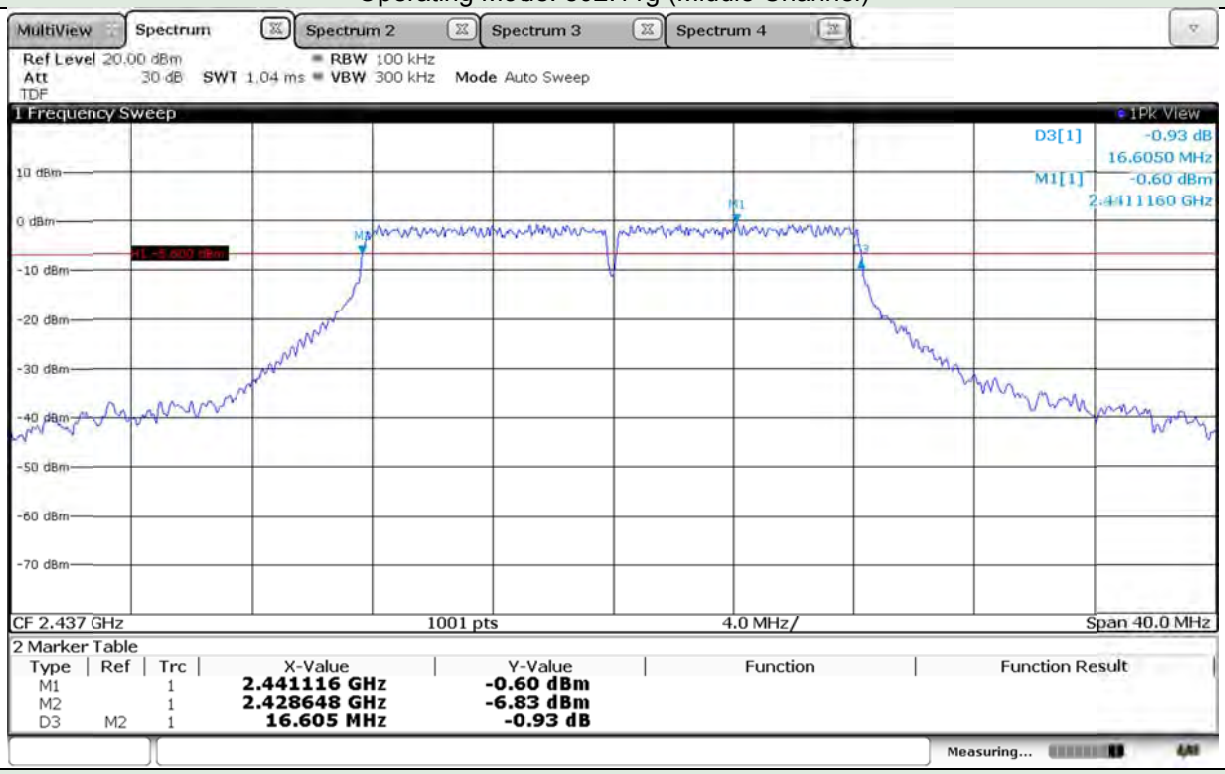
Operating Mode: 802.11b (High Channel)



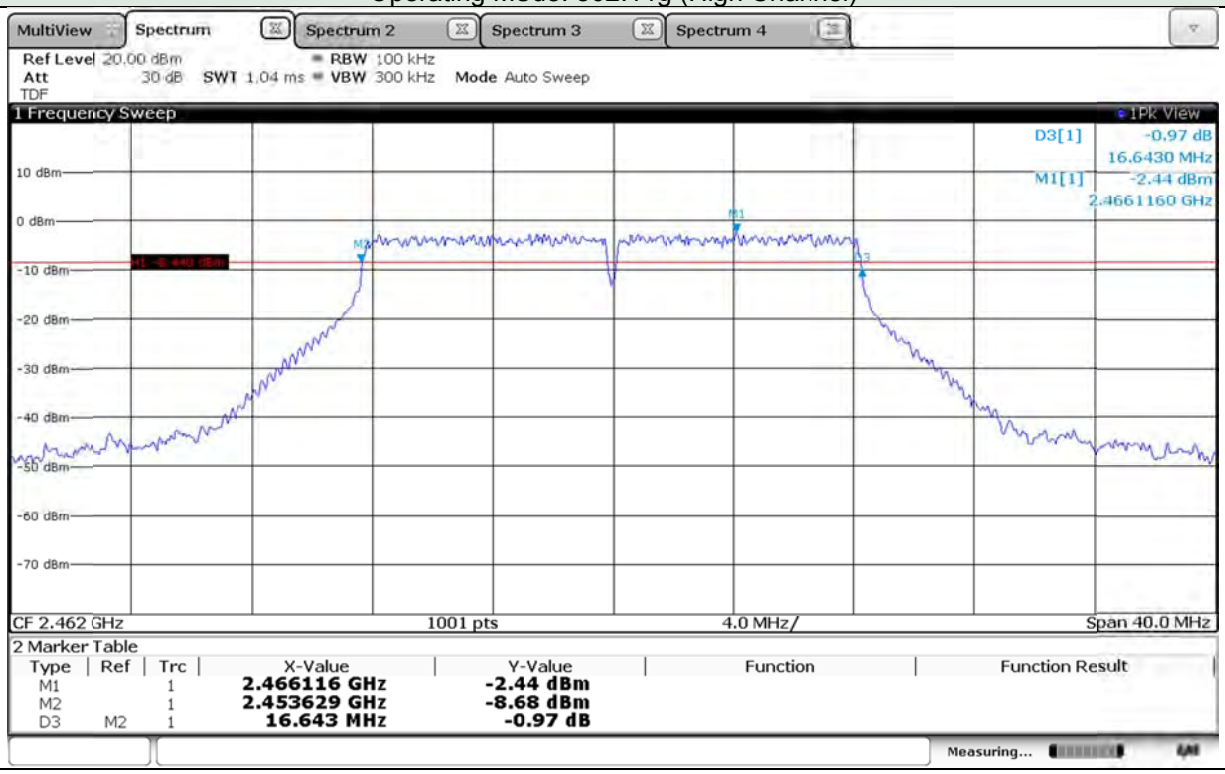
Operating Mode: 802.11g (Low Channel)



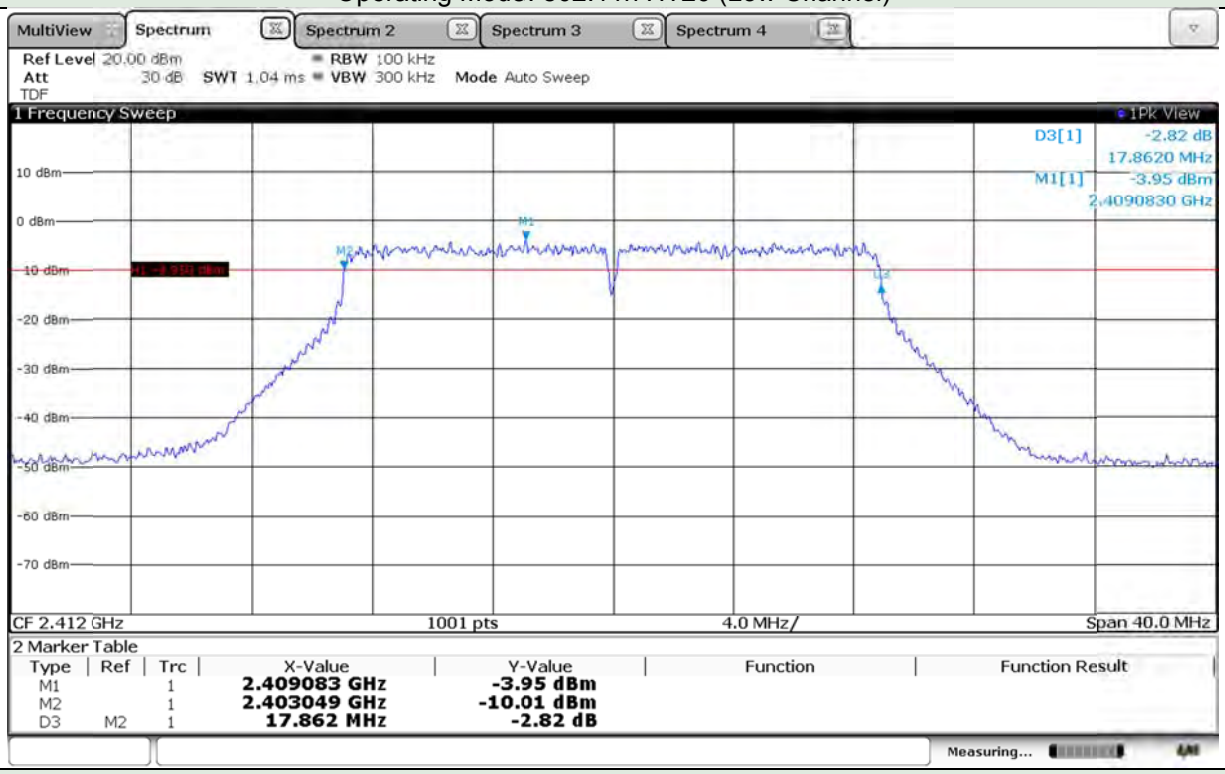
Operating Mode: 802.11g (Middle Channel)



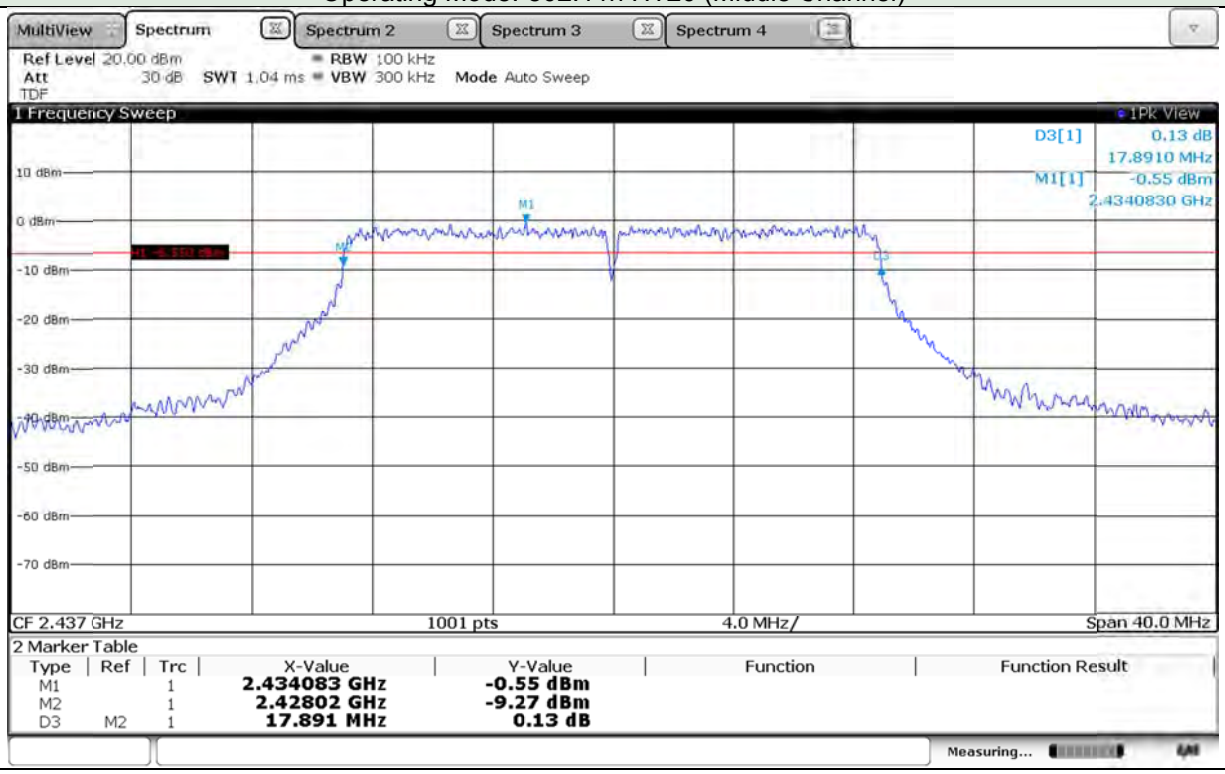
Operating Mode: 802.11g (High Channel)



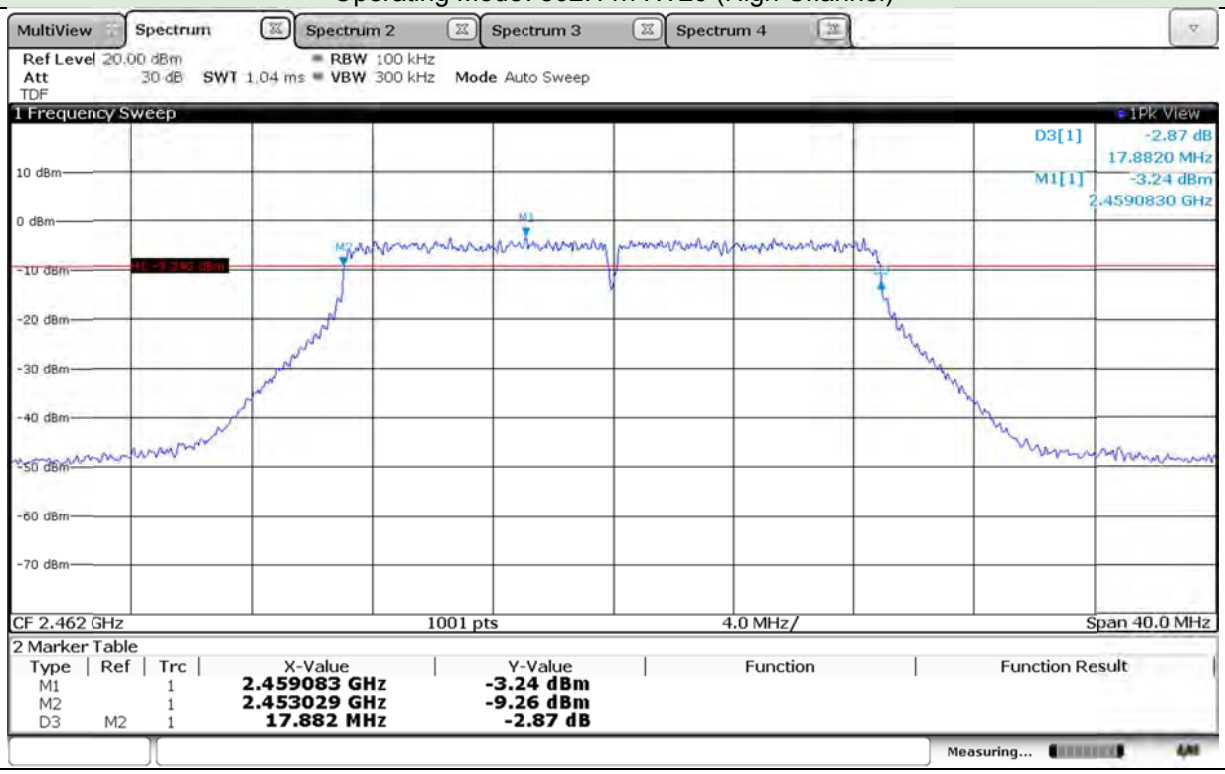
Operating Mode: 802.11n HT20 (Low Channel)



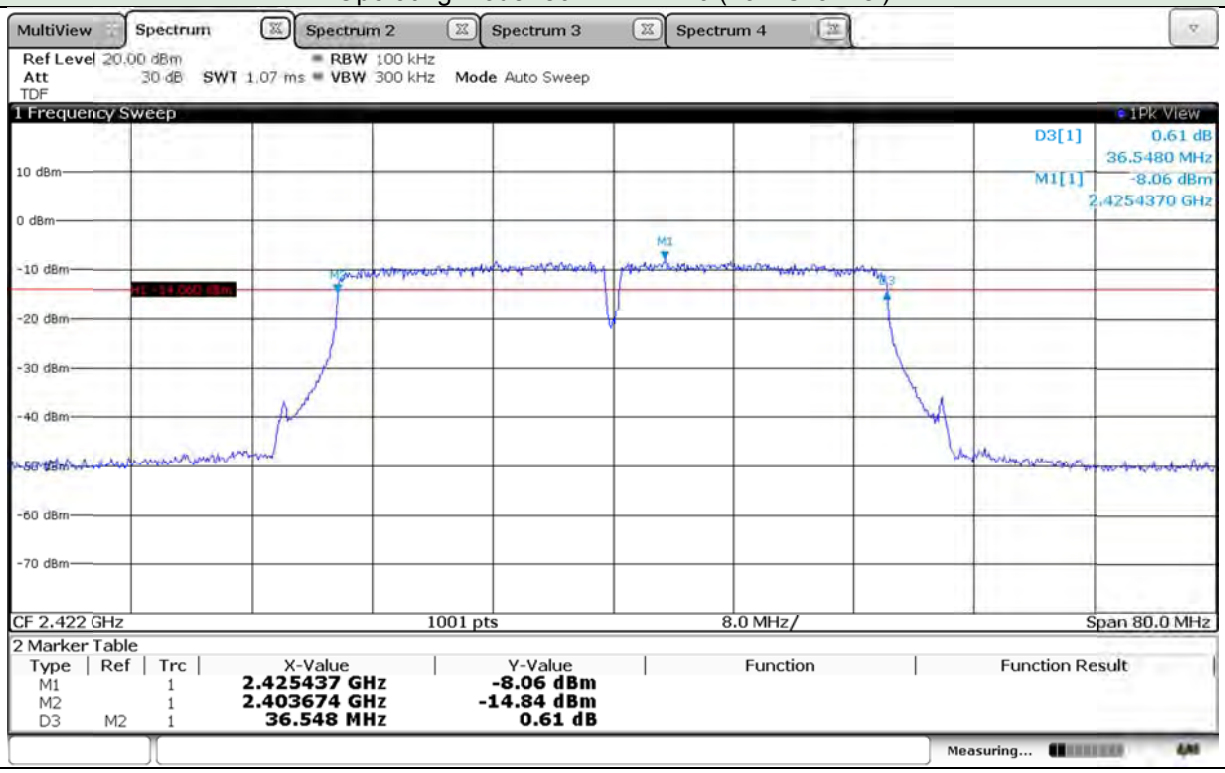
Operating Mode: 802.11n HT20 (Middle Channel)



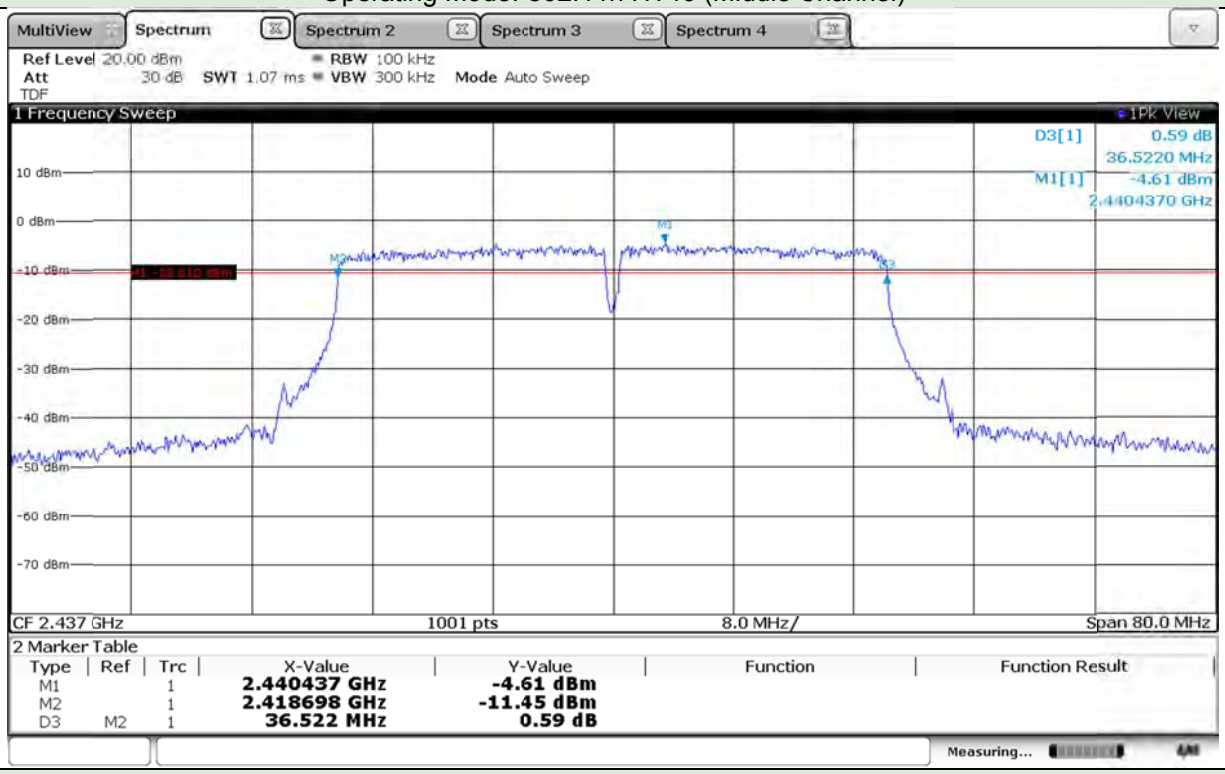
Operating Mode: 802.11n HT20 (High Channel)



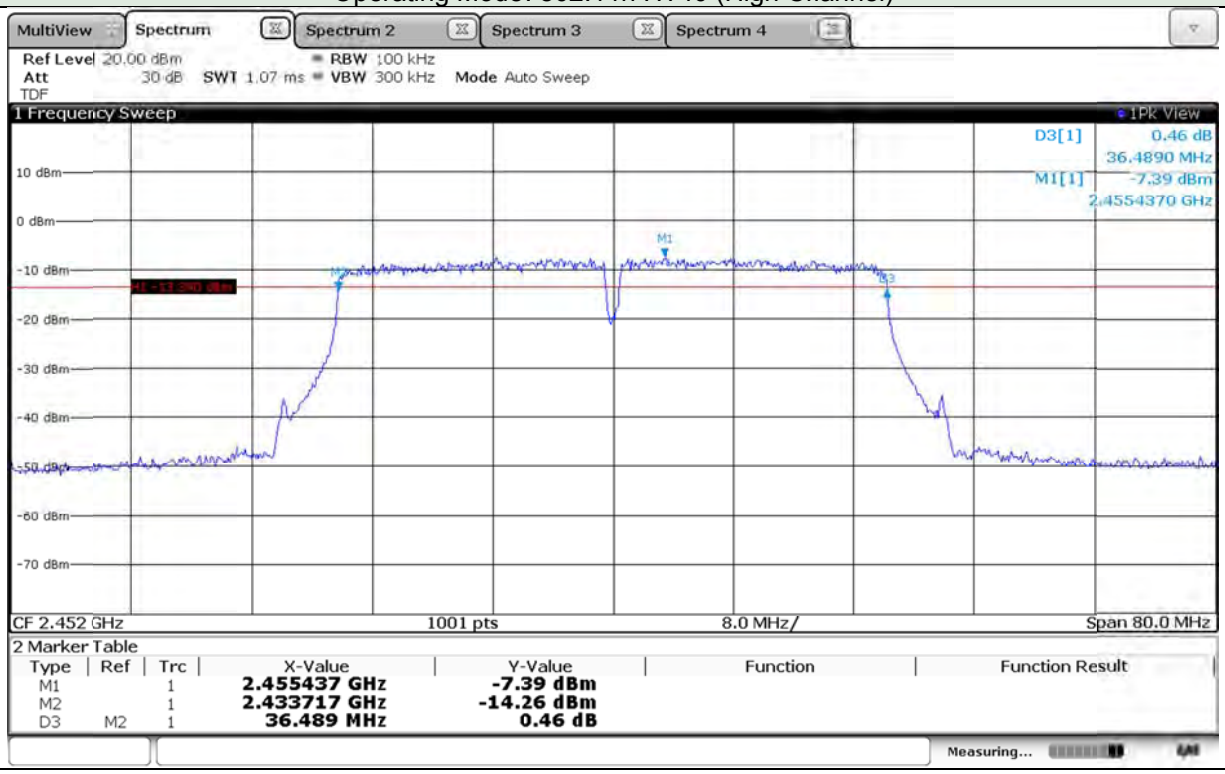
Operating Mode: 802.11n HT40 (Low Channel)



Operating Mode: 802.11n HT40 (Middle Channel)



Operating Mode: 802.11n HT40 (High Channel)



5.2 99 % Bandwidth

5.2.1 Limit

Not applicable. For reporting purpose only.

5.2.2 Method of Measurement

The transmitter output is connected to the spectrum analyzer. The RBW is set to 1 % to 5 % of the OBW.

The span is set to capture all products of the modulation process, including the emission skirts.

The VBW is set to 3 times the RBW. The sweep time is coupled and peak detection and max hold mode is used. The spectrum analyzer internal 99% bandwidth function is utilized.

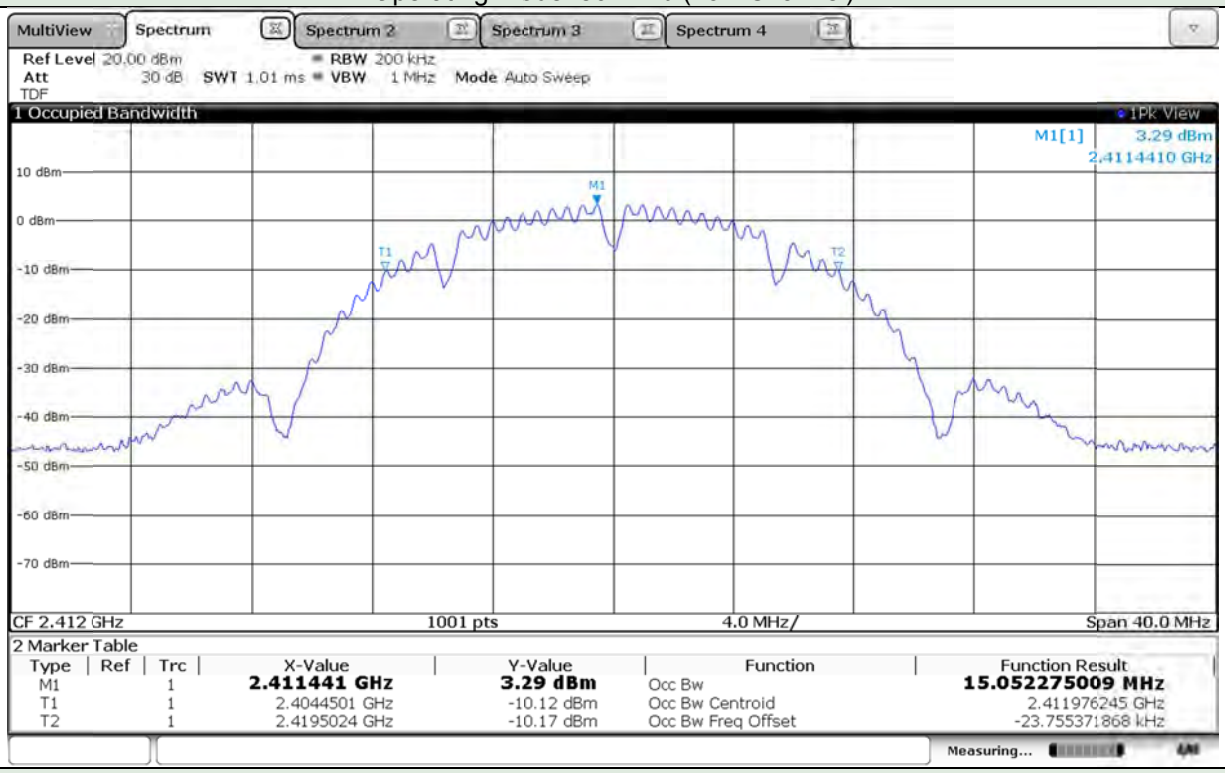
5.2.3 Test Data

Date of Test	2018-08-21	Temperature	(24.0 ± 1.0) °C
		Relative humidity	(56.0 ± 3.0) % R.H.
Test Result	***PASS***	Tested by	In-yong Song

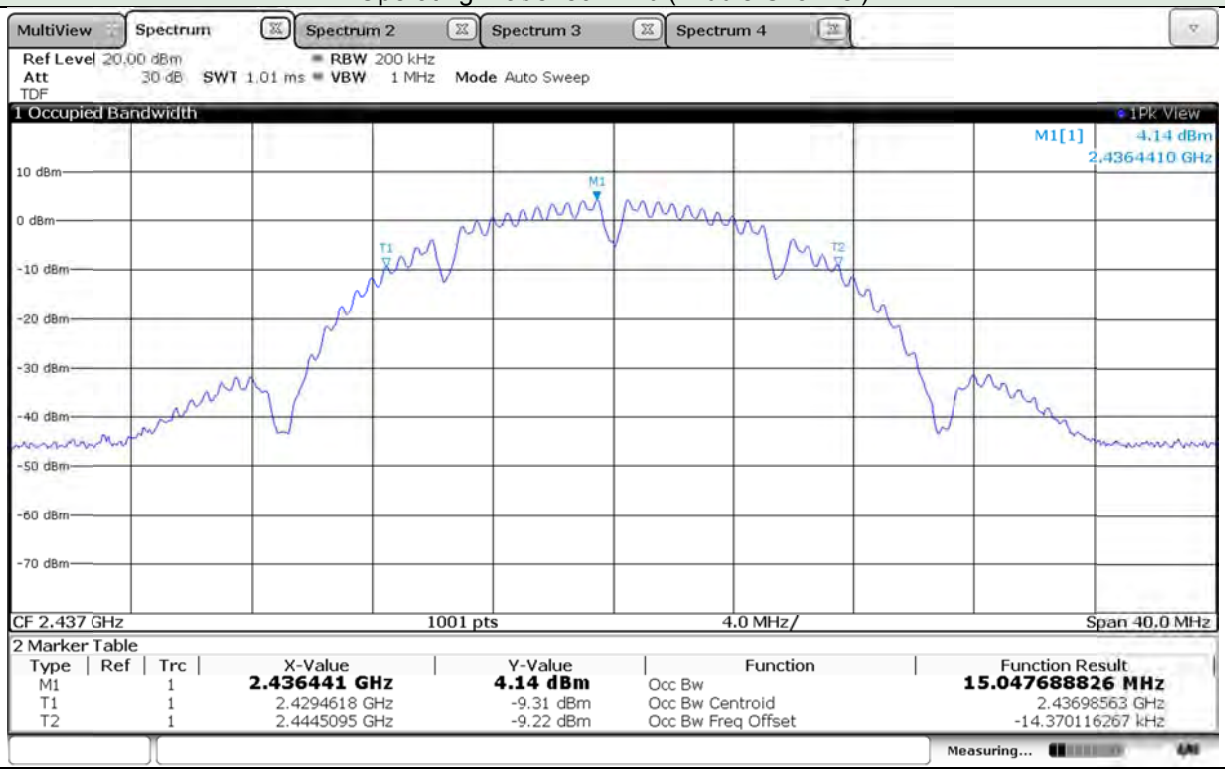
Operational Mode: 802.11b		
Channel	Frequency (MHz)	99 % Bandwidth (MHz)
Low	2 412	15.052
Middle	2 437	15.048
High	2 462	15.052
Operational Mode: 802.11g		
Channel	Frequency (MHz)	99 % Bandwidth (MHz)
Low	2 412	16.672
Middle	2 437	16.693
High	2 462	16.672
Operational Mode: 802.11n HT20		
Channel	Frequency (MHz)	99 % Bandwidth (MHz)
Low	2 412	17.800
Middle	2 437	17.833
High	2 462	17.799
Operational Mode: 802.11n HT40		
Channel	Frequency (MHz)	99 % Bandwidth (MHz)
Low	2 422	36.357
Middle	2 437	36.380
High	2 452	36.351

5.2.4 Test Plots

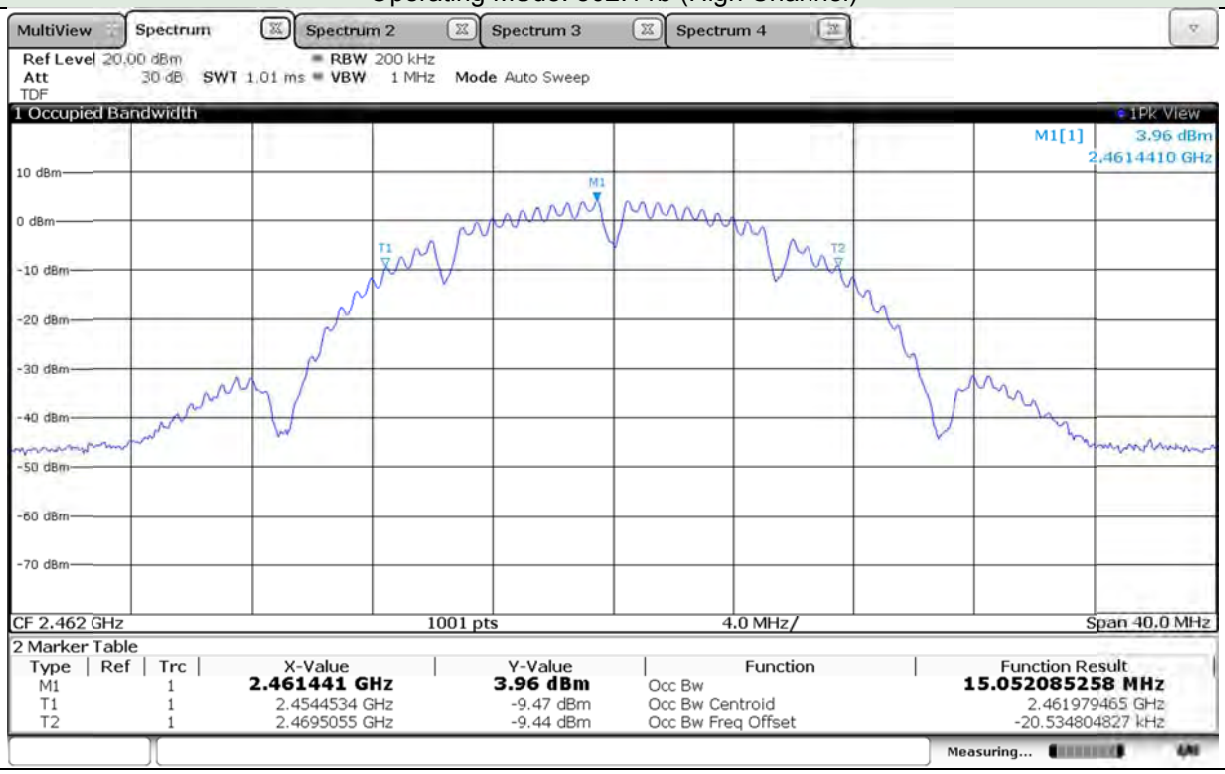
Operating Mode: 802.11b (Low Channel)



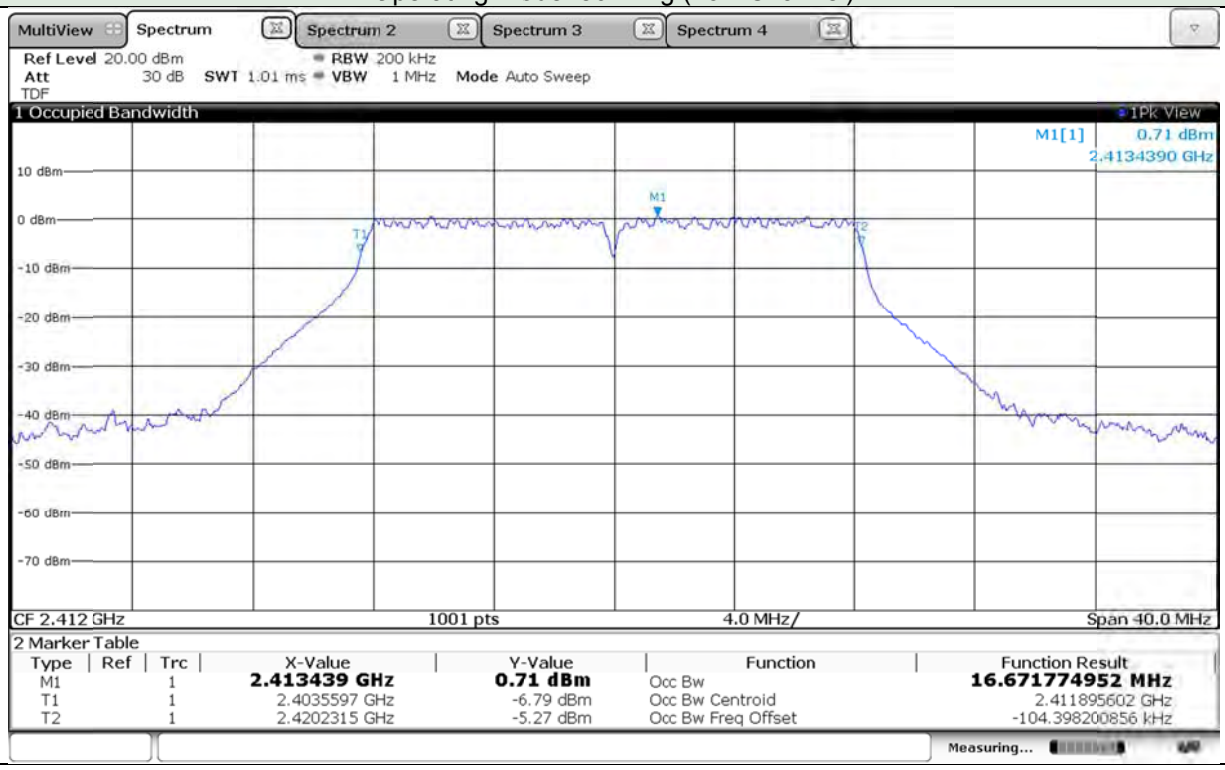
Operating Mode: 802.11b (Middle Channel)



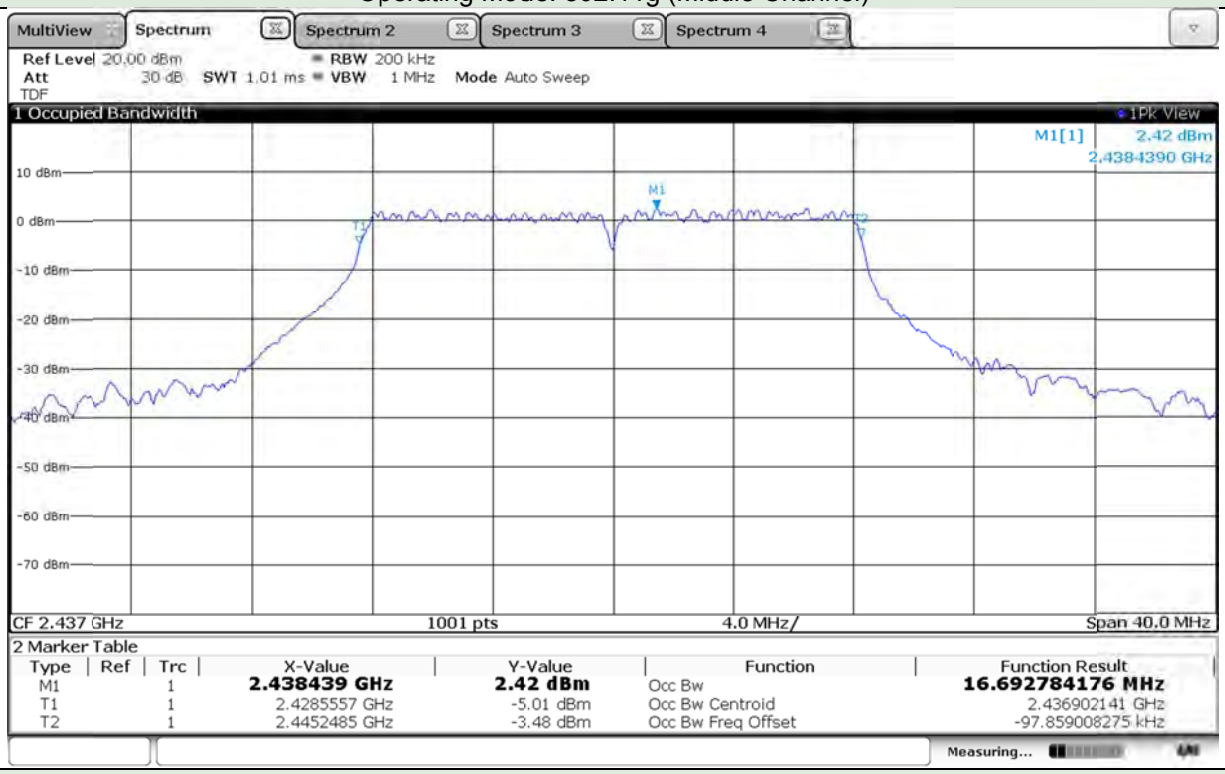
Operating Mode: 802.11b (High Channel)



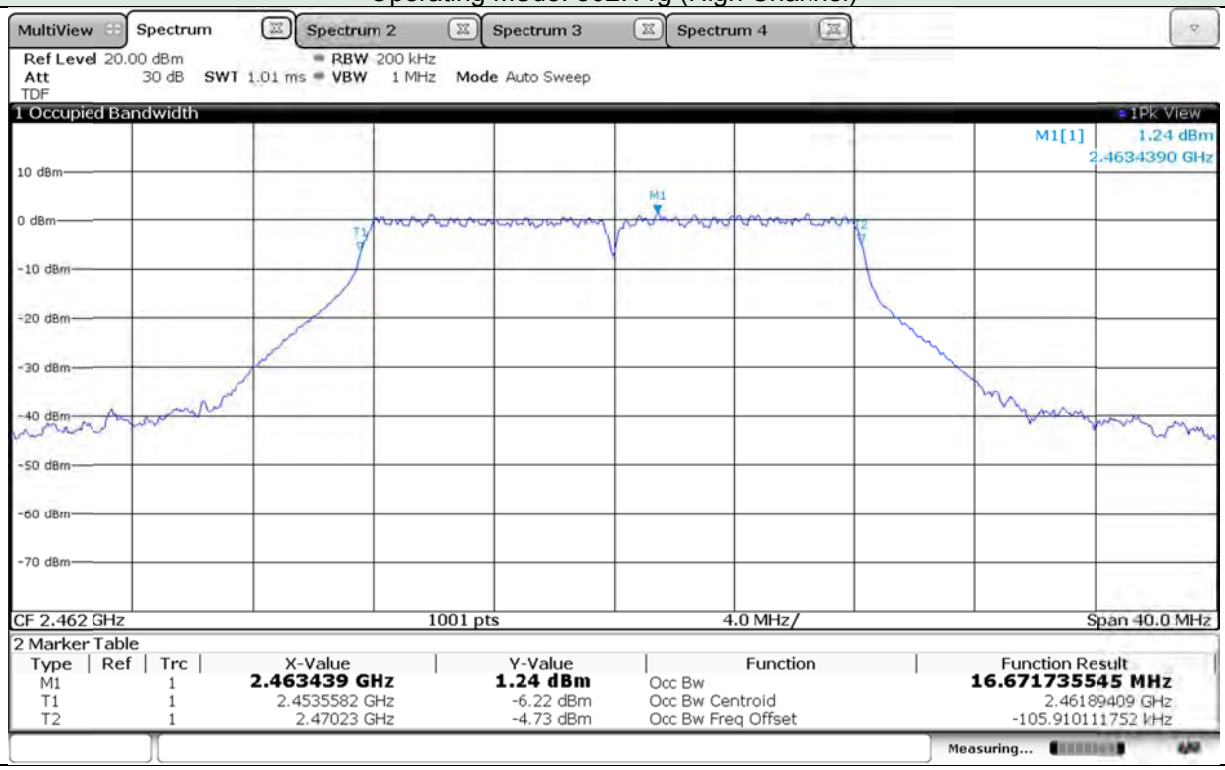
Operating Mode: 802.11g (Low Channel)



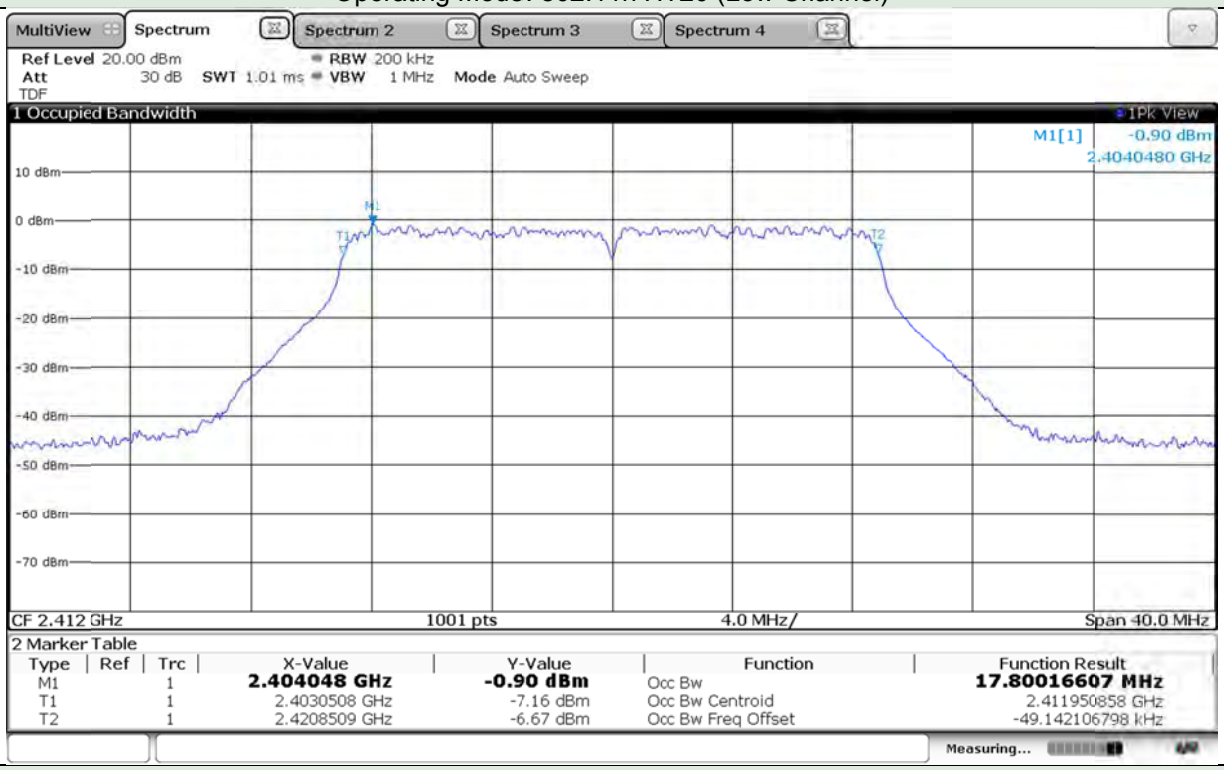
Operating Mode: 802.11g (Middle Channel)



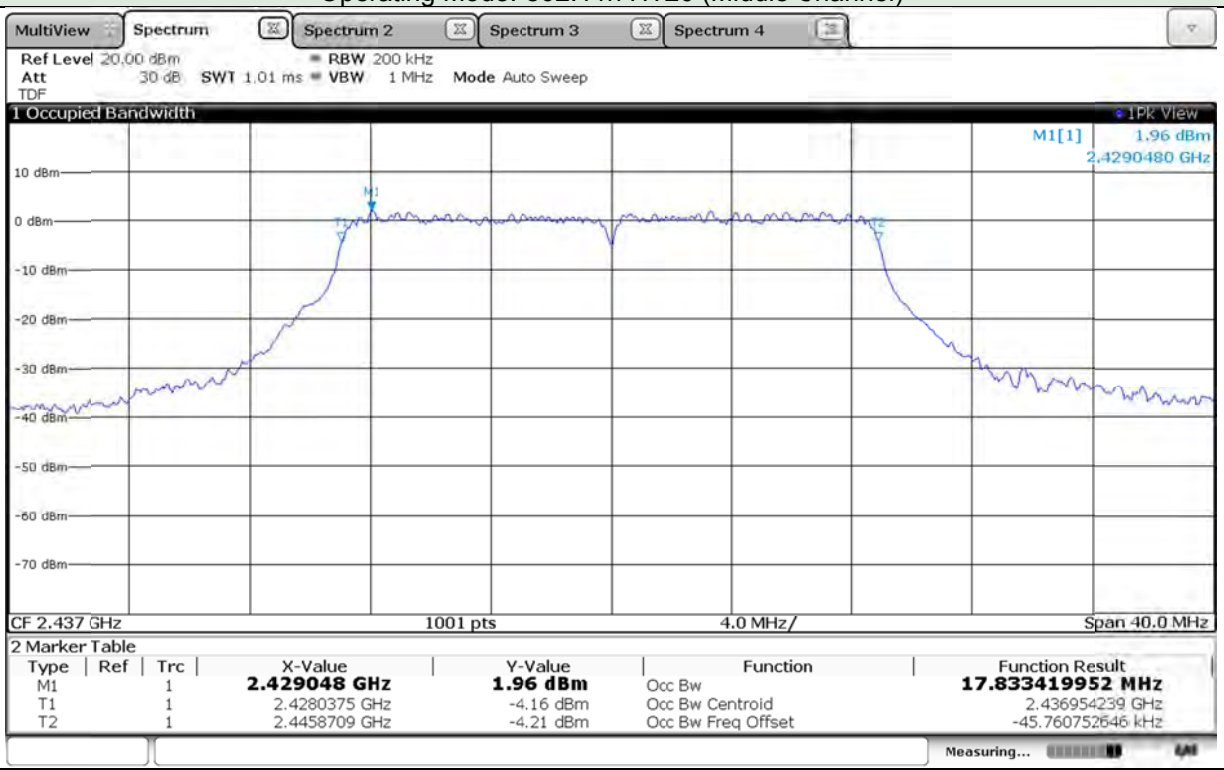
Operating Mode: 802.11g (High Channel)



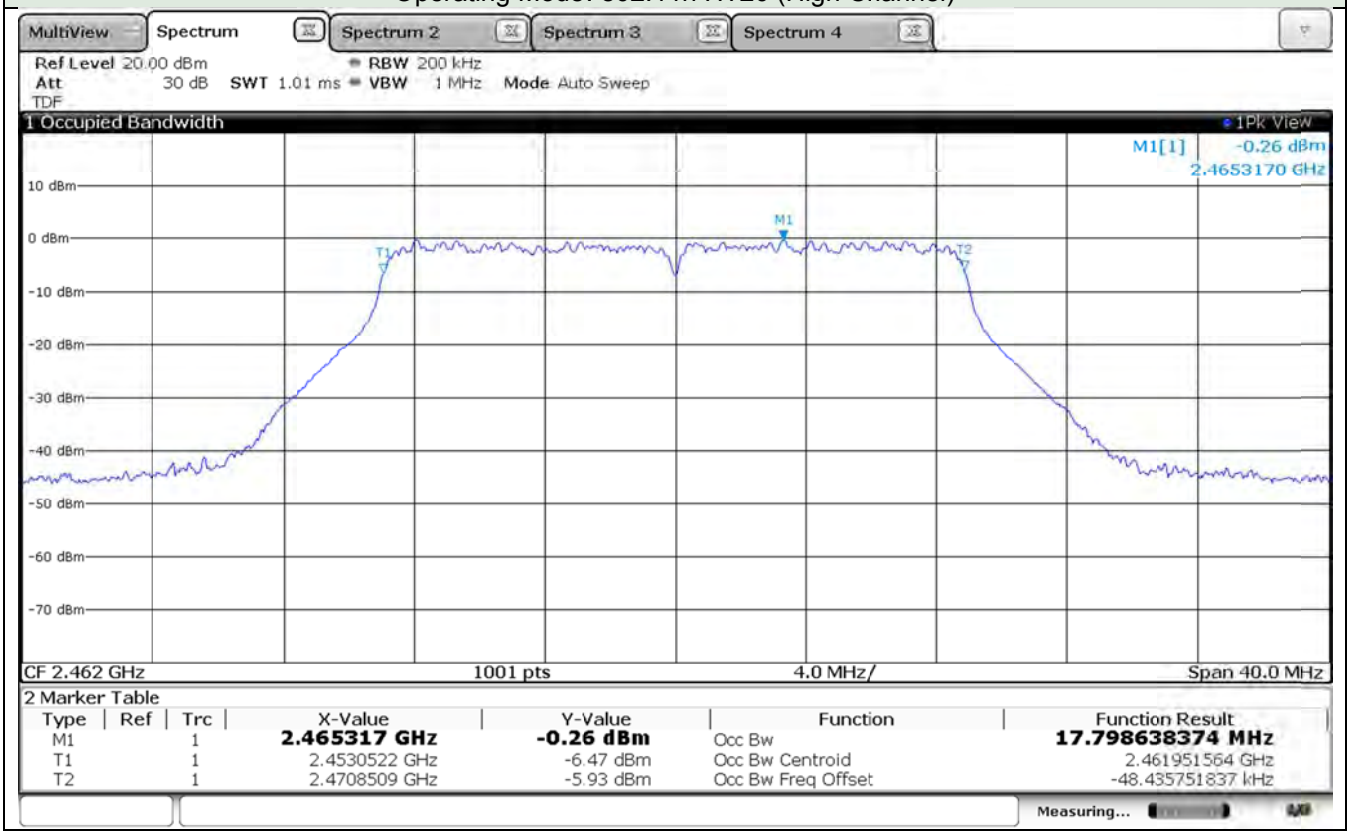
Operating Mode: 802.11n HT20 (Low Channel)



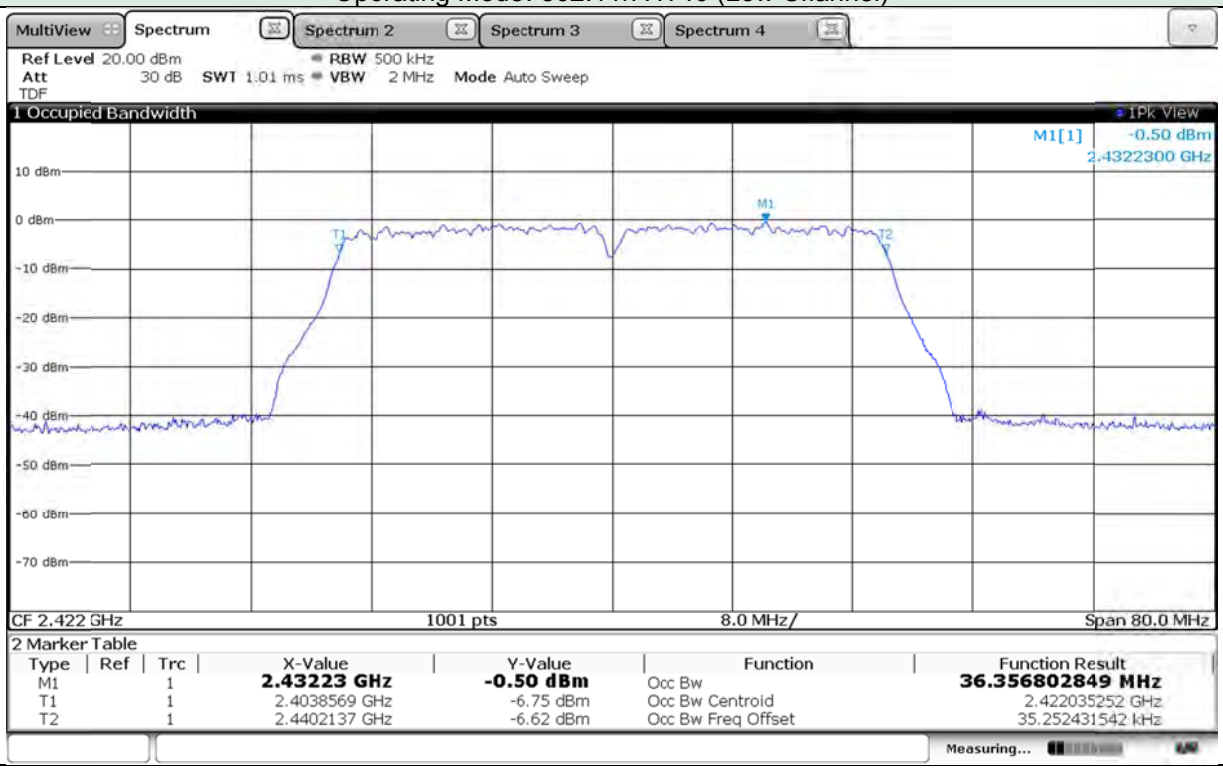
Operating Mode: 802.11n HT20 (Middle Channel)



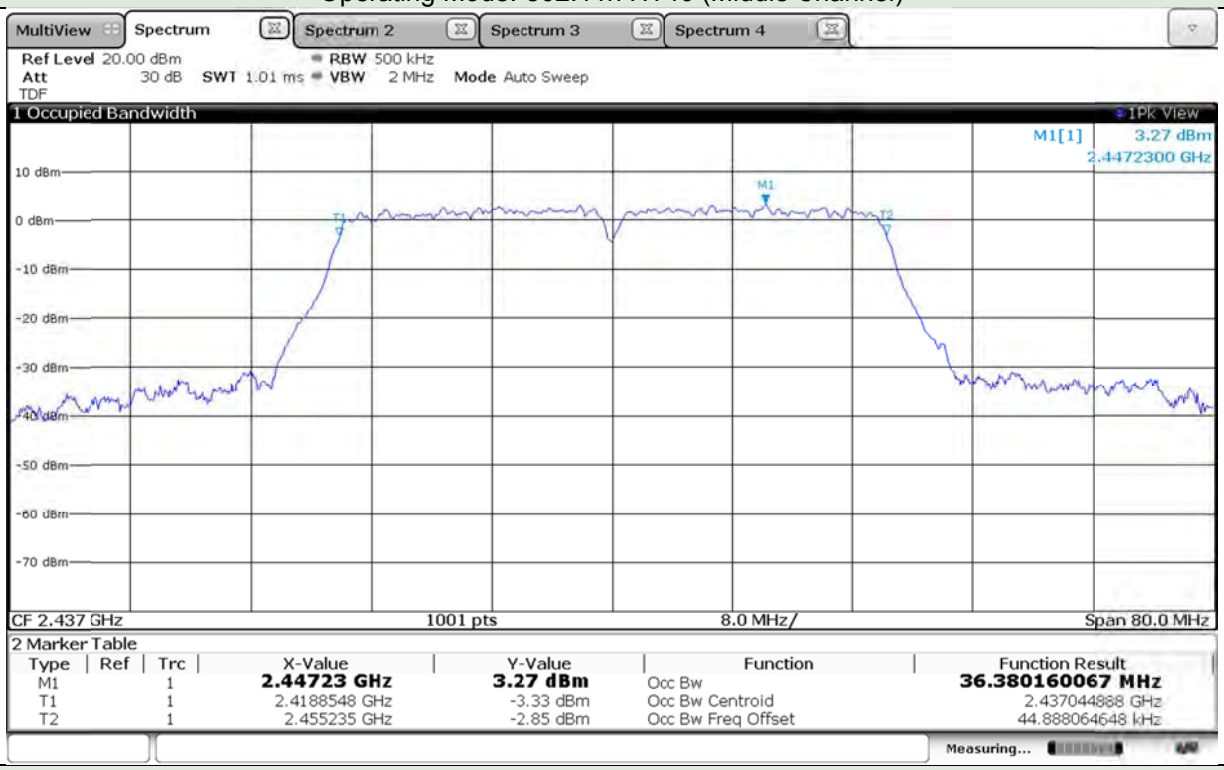
Operating Mode: 802.11n HT20 (High Channel)



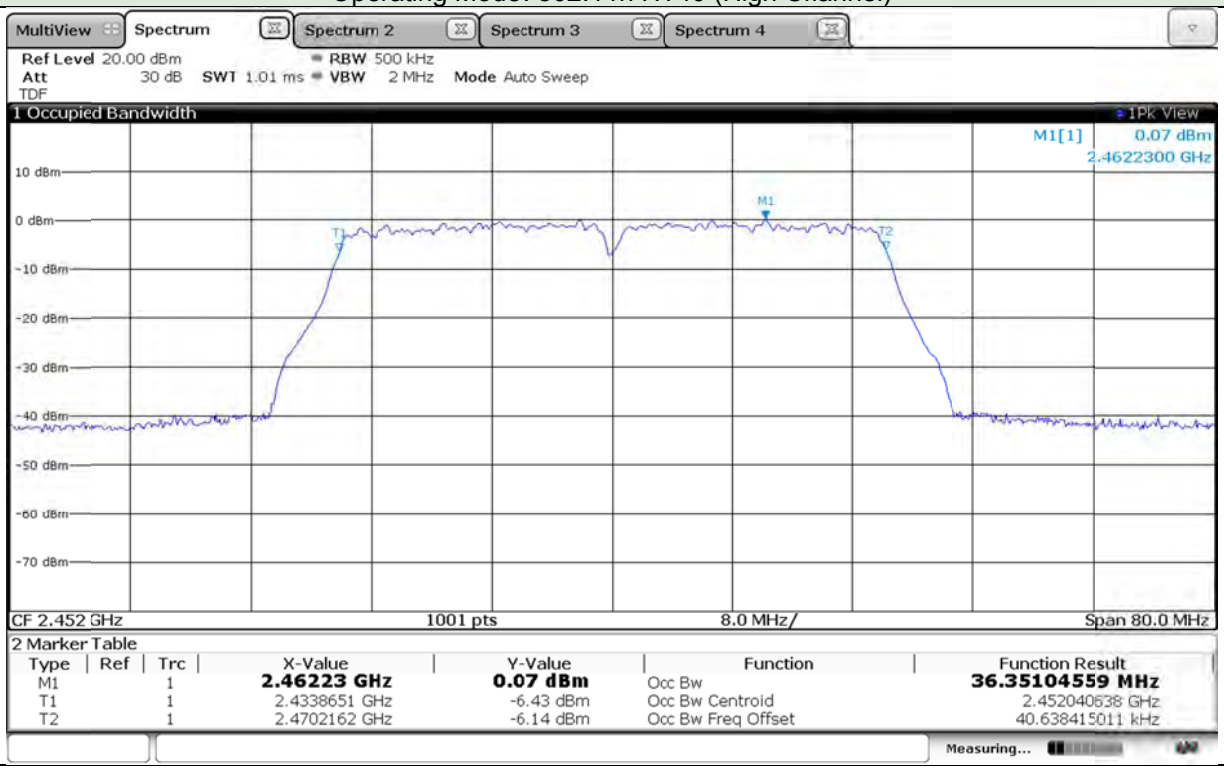
Operating Mode: 802.11n HT40 (Low Channel)



Operating Mode: 802.11n HT40 (Middle Channel)



Operating Mode: 802.11n HT40 (High Channel)



5.3 Maximum Peak Output Power

5.3.1 Limit

Acc. To section 15.247, For system using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt, based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

5.3.2 Method of Measurement

Reference to KDB 558074 D01 DTS Meas Guidance v05: 8.13.1.3 PKPM1 Peak-reading power meter method
The Antenna output of the EUT was connected to a power sensor. The cable assembly insertion loss was entered as an offset in the power meter to allow for direct reading of power.

5.3.3 Test Data for Output Power

Date of Test	2018-08-21	Temperature	(24.0 ± 1.0) °C
		Relative humidity	(56.0 ± 3.0) % R.H.
Test Result	***PASS***	Tested by	In-yong Song

Operating Mode: 802.11b				
Channel	Frequency (MHz)	Measured Value (dBm)	Limit (dBm)	Margin (dB)
Low	2 412	12.65	30	17.35
Middle	2 437	13.05		16.95
High	2 462	13.35		16.65
Operating Mode: 802.11g				
Channel	Frequency (MHz)	Measured Value (dBm)	Limit (dBm)	Margin (dB)
Low	2 412	11.94	30	18.06
Middle	2 437	14.37		15.63
High	2 462	12.77		17.23
Operating Mode: 802.11n HT20				
Channel	Frequency (MHz)	Measured Value (dBm)	Limit (dBm)	Margin (dB)
Low	2 412	10.84	30	19.16
Middle	2 437	14.24		15.76
High	2 462	11.65		18.35

Remark. Margin = Limit – Measured Value

Operating Mode: 802.11n HT40				
Channel	Frequency (MHz)	Measured Value (dBm)	Limit (dBm)	Margin (dB)
Low	2 422	9.67	30	20.33
Middle	2 437	12.75		17.25
High	2 452	10.21		19.79

Remark. Margin = Limit – Measured Value

5.3.4 Test Plots

Operating Mode: 802.11b (Low Channel)

Operating Mode: 802.11b (Middle Channel)

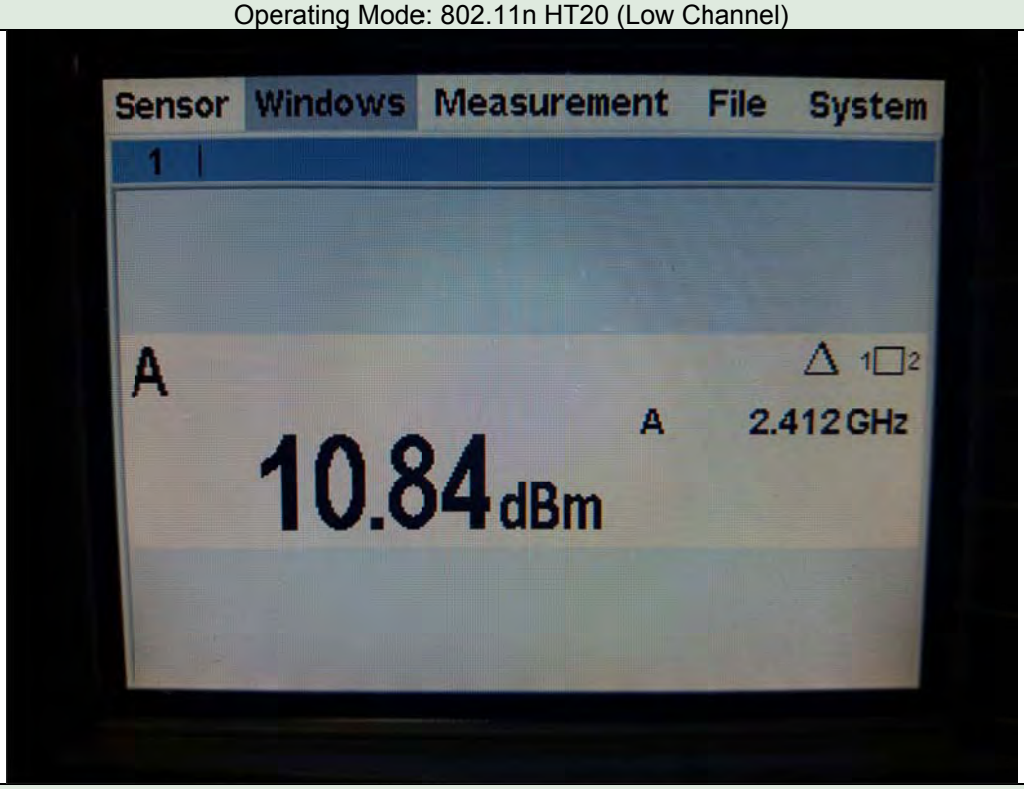
Operating Mode: 802.11b (High Channel)


Operating Mode: 802.11g (Low Channel)


Operating Mode: 802.11g (Middle Channel)

Operating Mode: 802.11g (High Channel)

Operating Mode: 802.11n HT20 (Low Channel)



Operating Mode: 802.11n HT20 (Middle Channel)

Operating Mode: 802.11n HT20 (High Channel)

Operating Mode: 802.11n HT40 (Low Channel)

Operating Mode: 802.11n HT40 (Middle Channel)

Operating Mode: 802.11n HT40 (High Channel)

5.4 Peak Power Spectral Density

5.4.1 Limit

Acc. To section 15.247, the power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

5.4.2 Method of Measurement

Reference to KDB 558074 D01 DTS Meas Guidance v05: 8.4 Method PKPSD (peak PSD) The transmitter output is connected to a spectrum analyzer with the RBW set from 3 kHz to 100 kHz,
VBW ≥ 3 X RBW, peak detector and max hold.

5.4.3 Test Data

Date of Test	2018-08-21	Temperature	(24.0 ± 1.0) °C
		Relative humidity	(56.0 ± 3.0) % R.H.
Test Result	***PASS***	Tested by	In-yong Song

Operating Mode: 802.11b				
Channel	Frequency (MHz)	Measured Value (dBm)	Limit (dBm)	Margin (dB)
Low	2 412	-18.56	8	26.56
Middle	2 437	-18.20		26.20
High	2 462	-17.83		25.83
Operating Mode: 802.11g				
Channel	Frequency (MHz)	Measured Value (dBm)	Limit (dBm)	Margin (dB)
Low	2 412	-17.85	8	25.85
Middle	2 437	-15.38		23.38
High	2 462	-17.07		25.07
Operating Mode: 802.11n HT20				
Channel	Frequency (MHz)	Measured Value (dBm)	Limit (dBm)	Margin (dB)
Low	2 412	-18.09	8	26.09
Middle	2 437	-14.61		22.61
High	2 462	-17.33		25.33

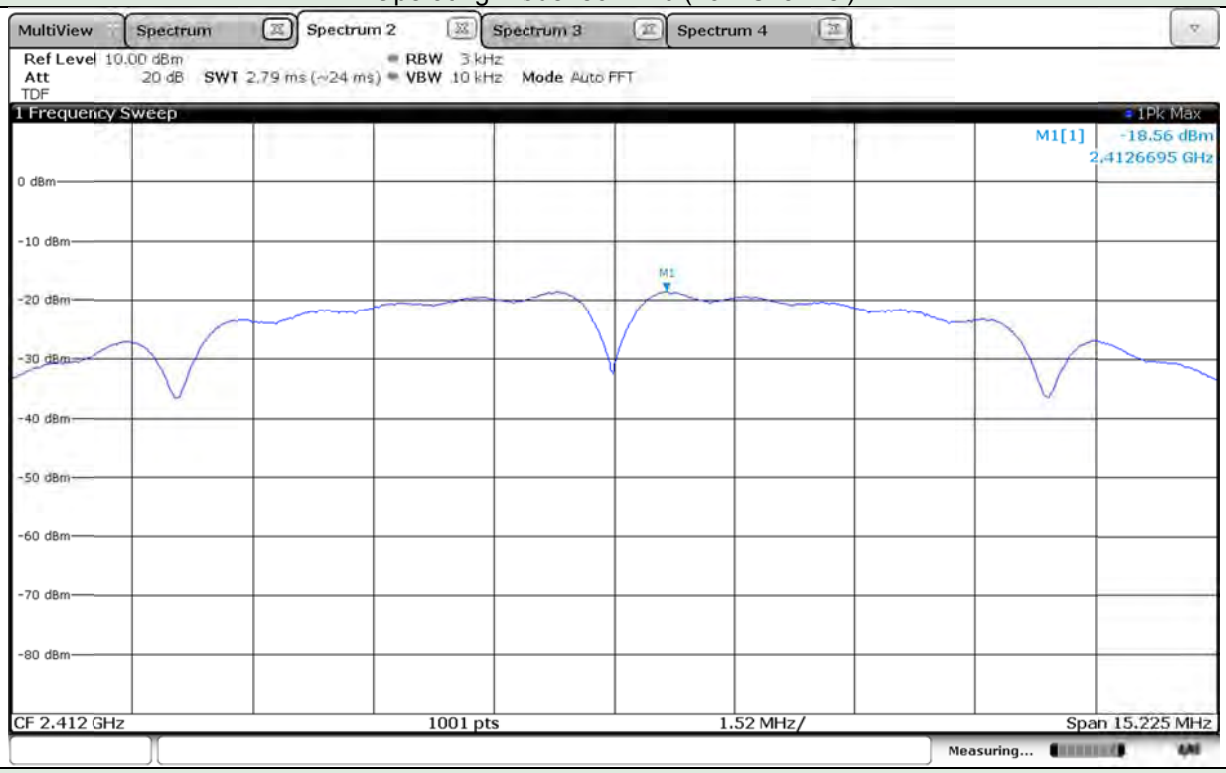
Remark. Margin = Limit – Measured Value

Operating Mode: 802.11n HT40				
Channel	Frequency (MHz)	Measured Value (dBm)	Limit (dBm)	Margin (dB)
Low	2 422	-19.09	8	26.09
Middle	2 437	-17.35		25.35
High	2 452	-19.03		27.03

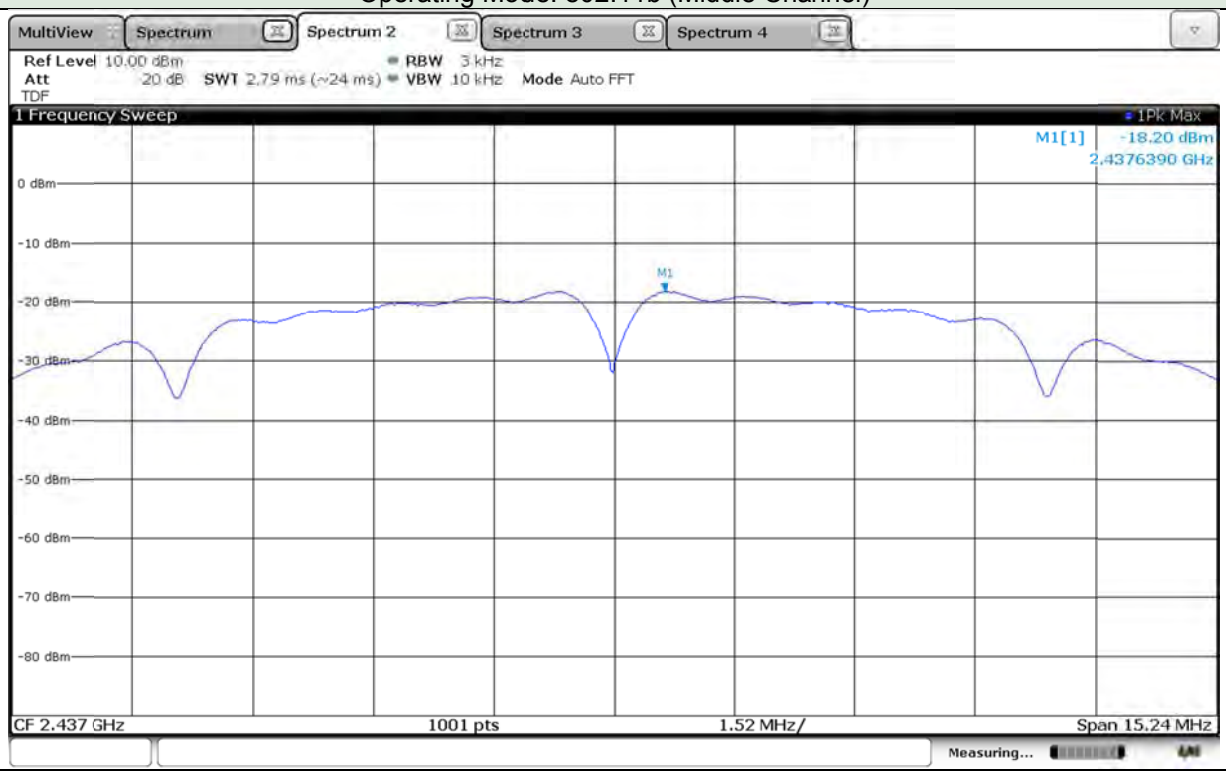
Remark. Margin = Limit – Measured Value

5.4.4 Test Plots

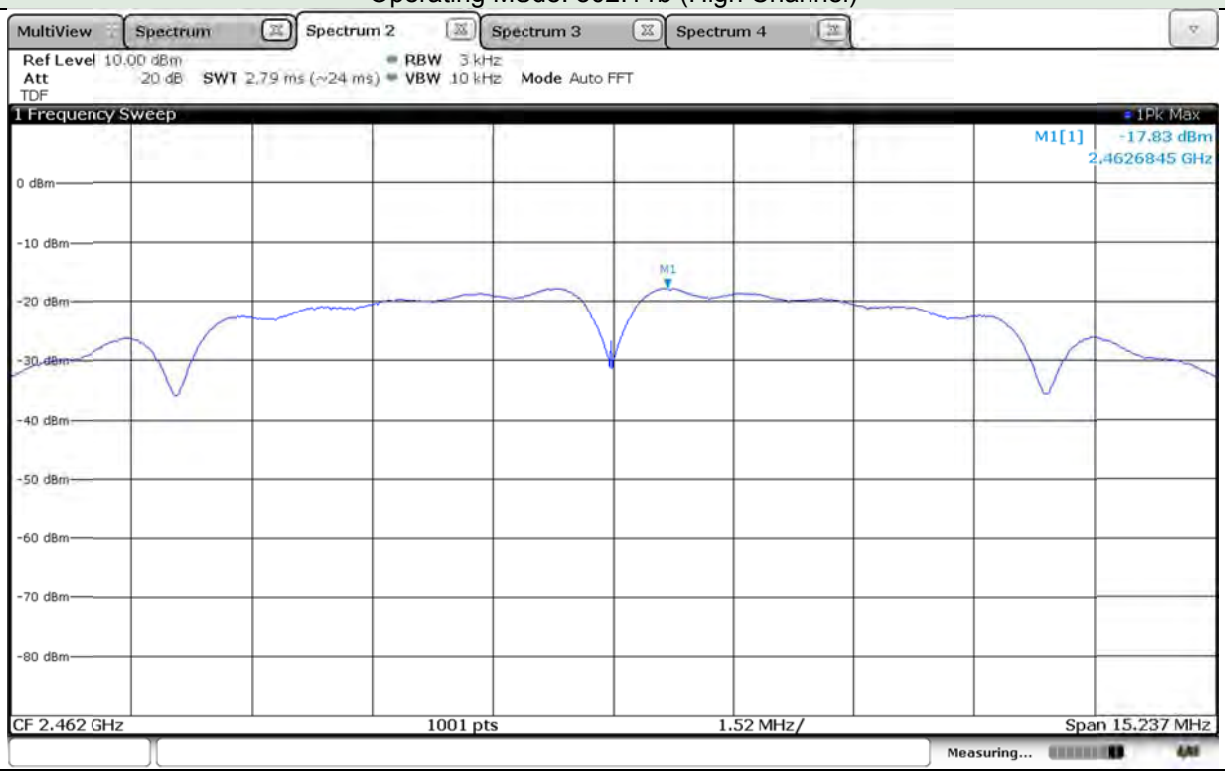
Operating Mode: 802.11b (Low Channel)



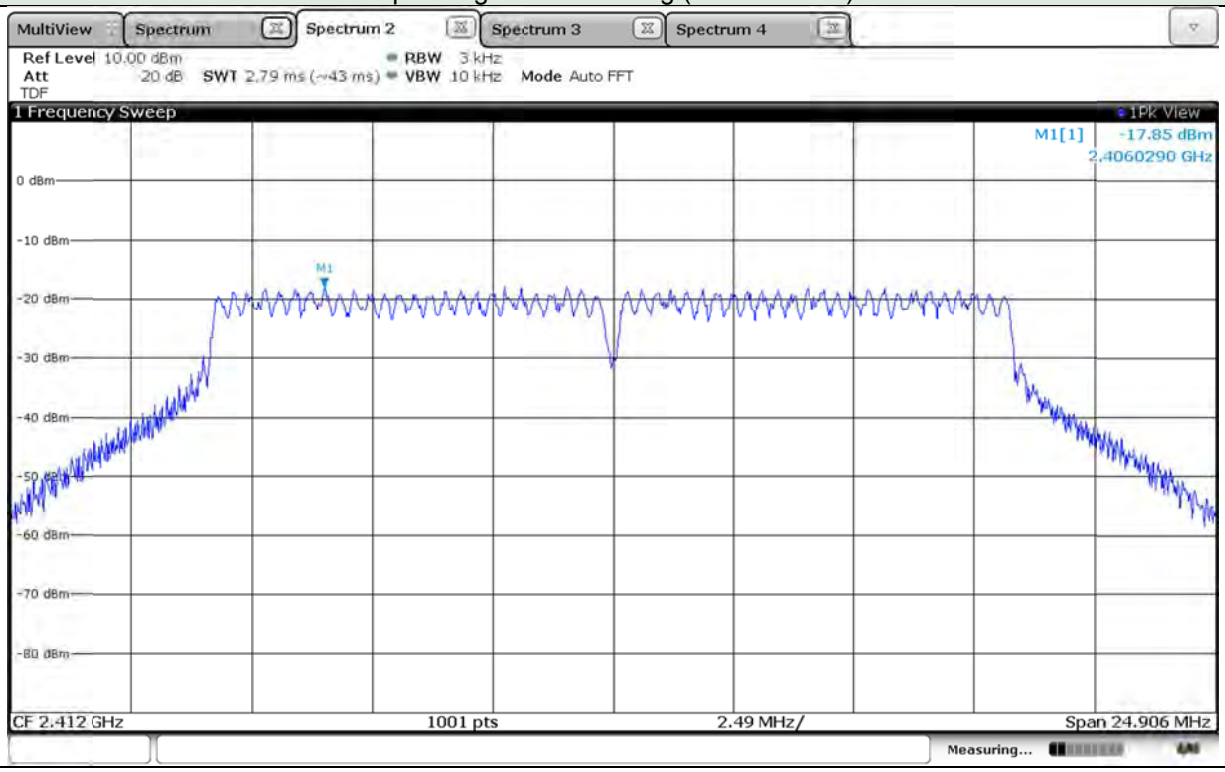
Operating Mode: 802.11b (Middle Channel)



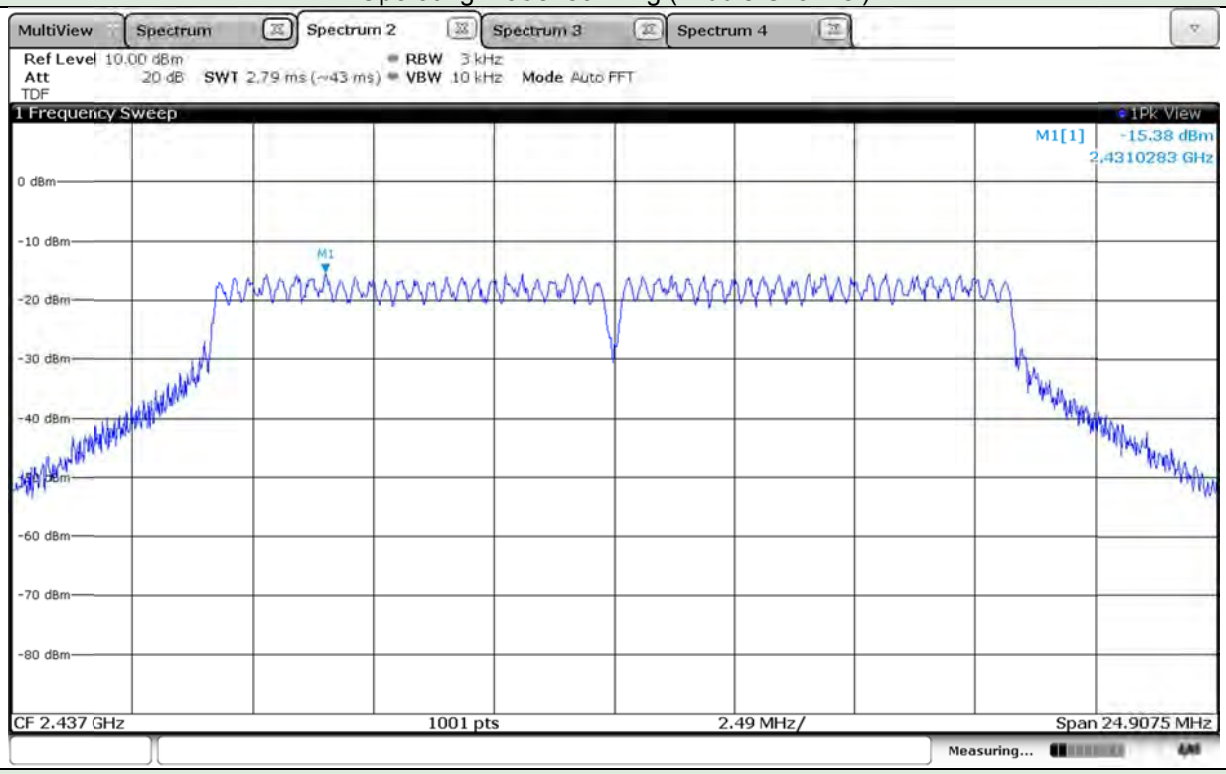
Operating Mode: 802.11b (High Channel)



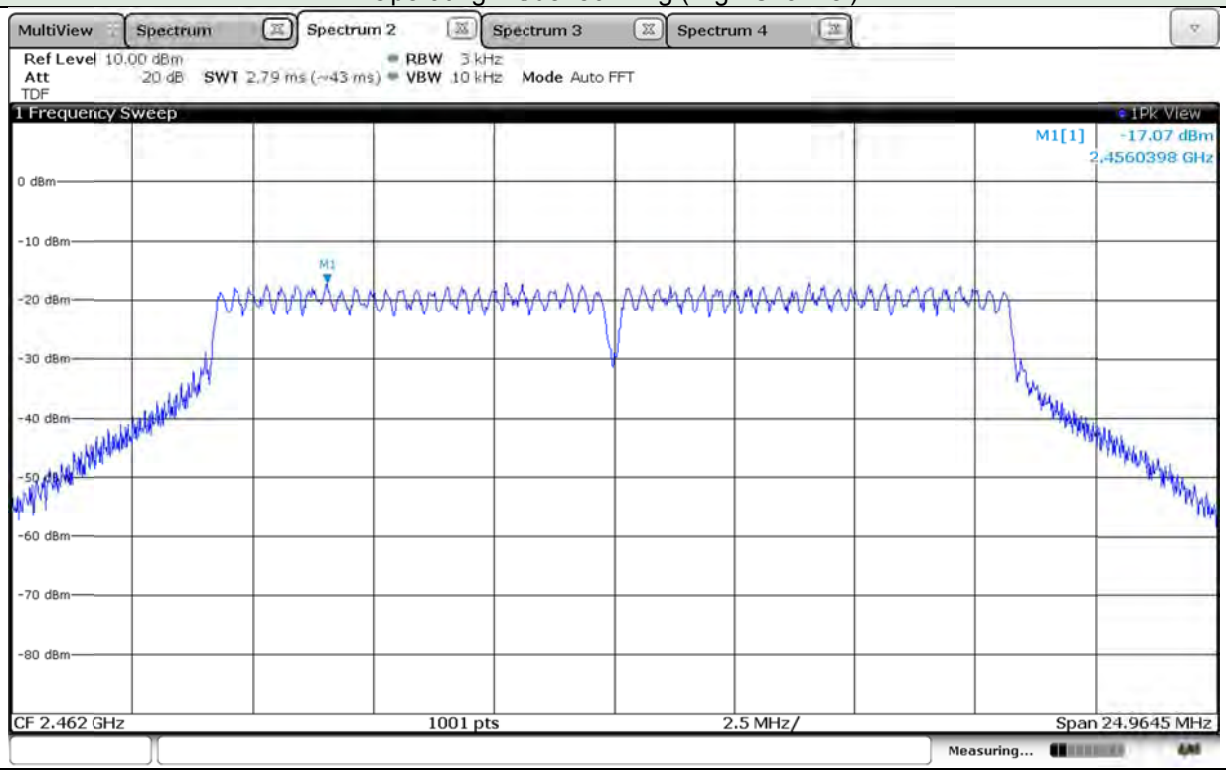
Operating Mode: 802.11g (Low Channel)



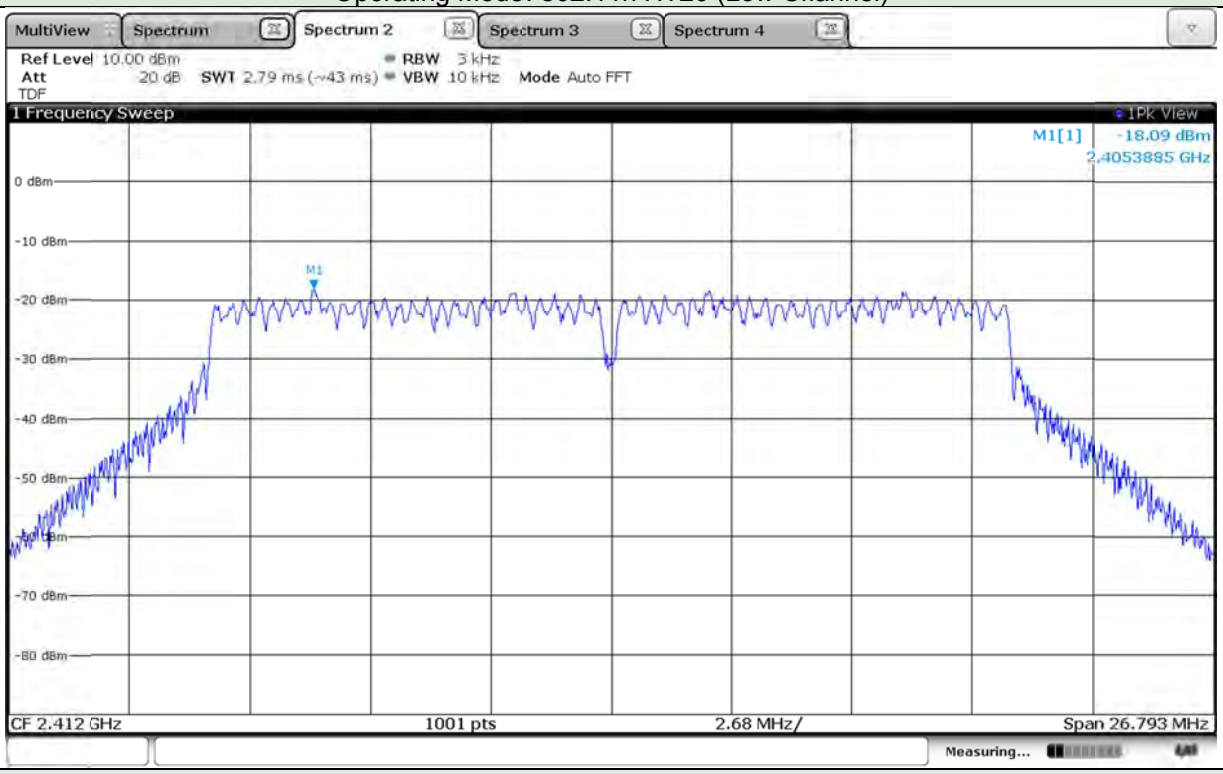
Operating Mode: 802.11g (Middle Channel)



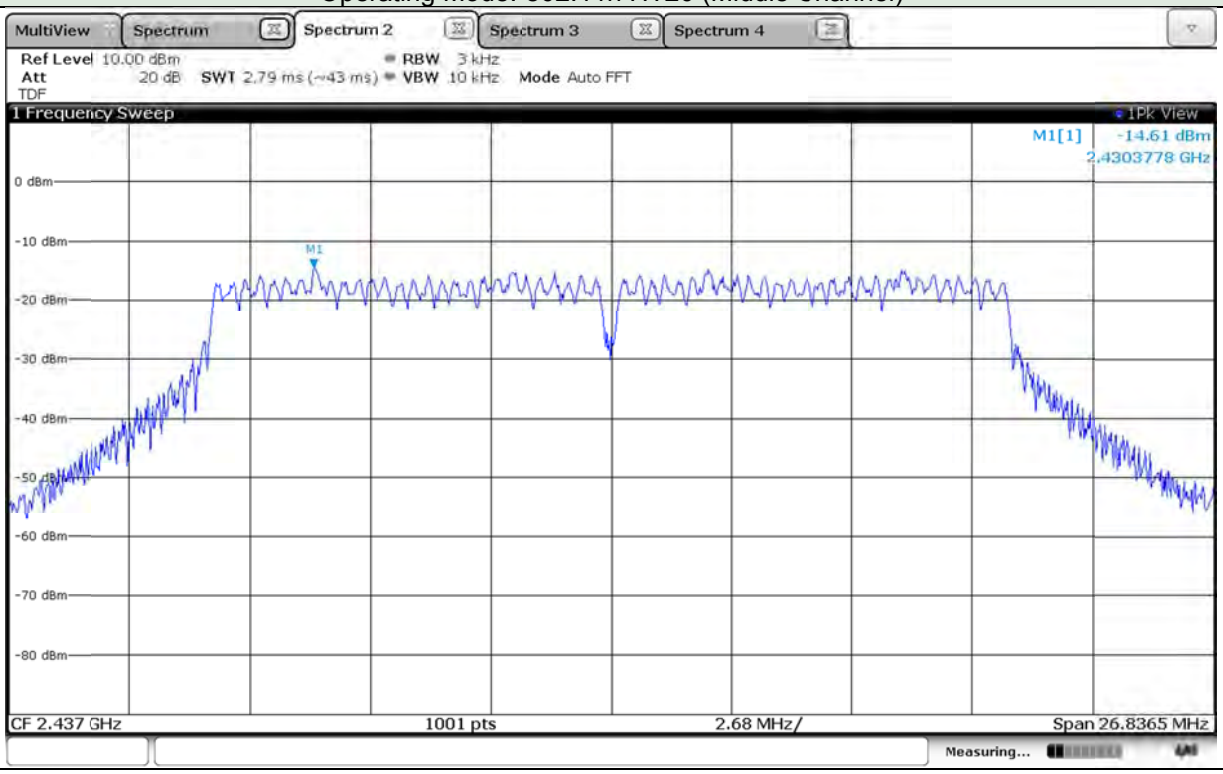
Operating Mode: 802.11g (High Channel)



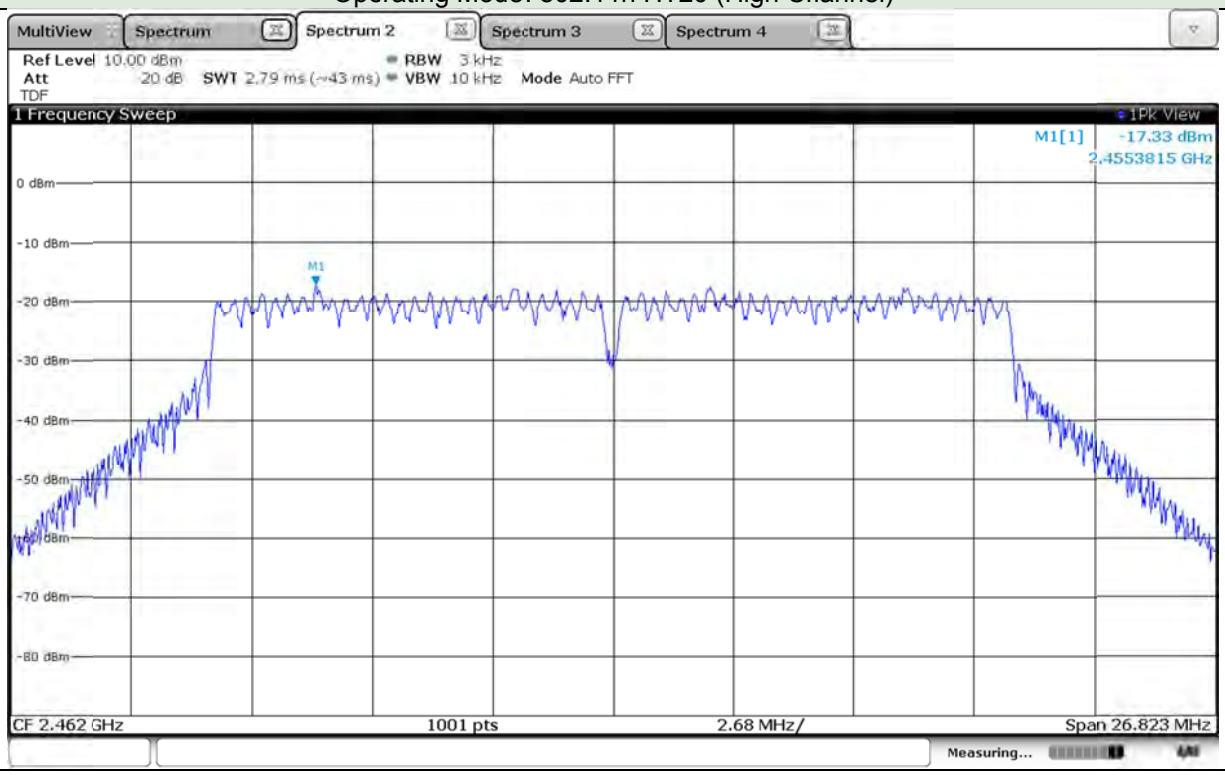
Operating Mode: 802.11n HT20 (Low Channel)



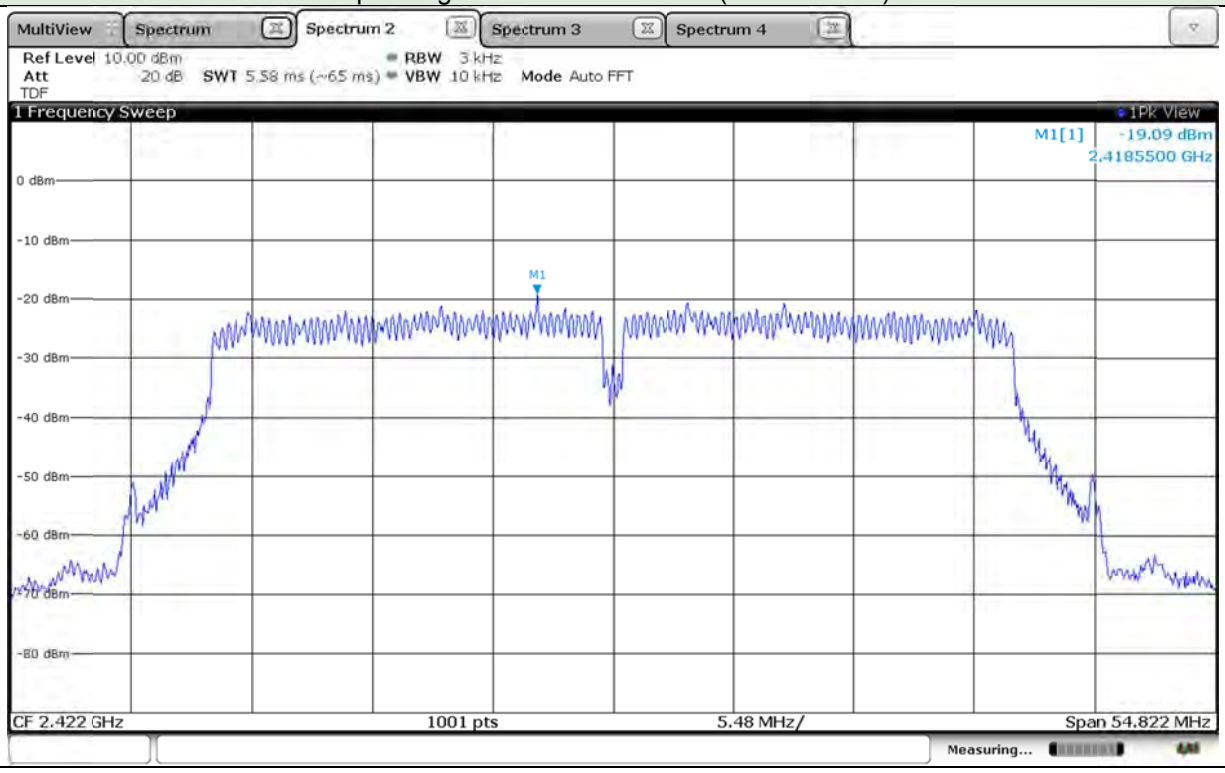
Operating Mode: 802.11n HT20 (Middle Channel)



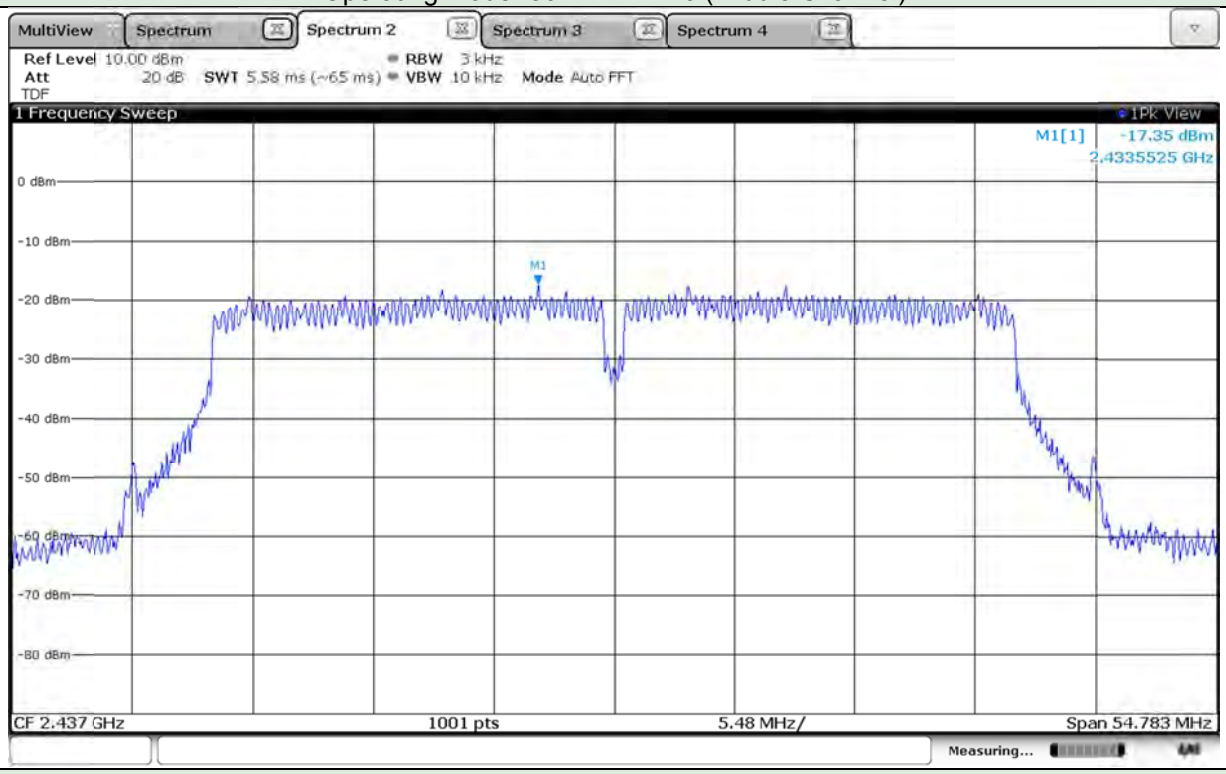
Operating Mode: 802.11n HT20 (High Channel)



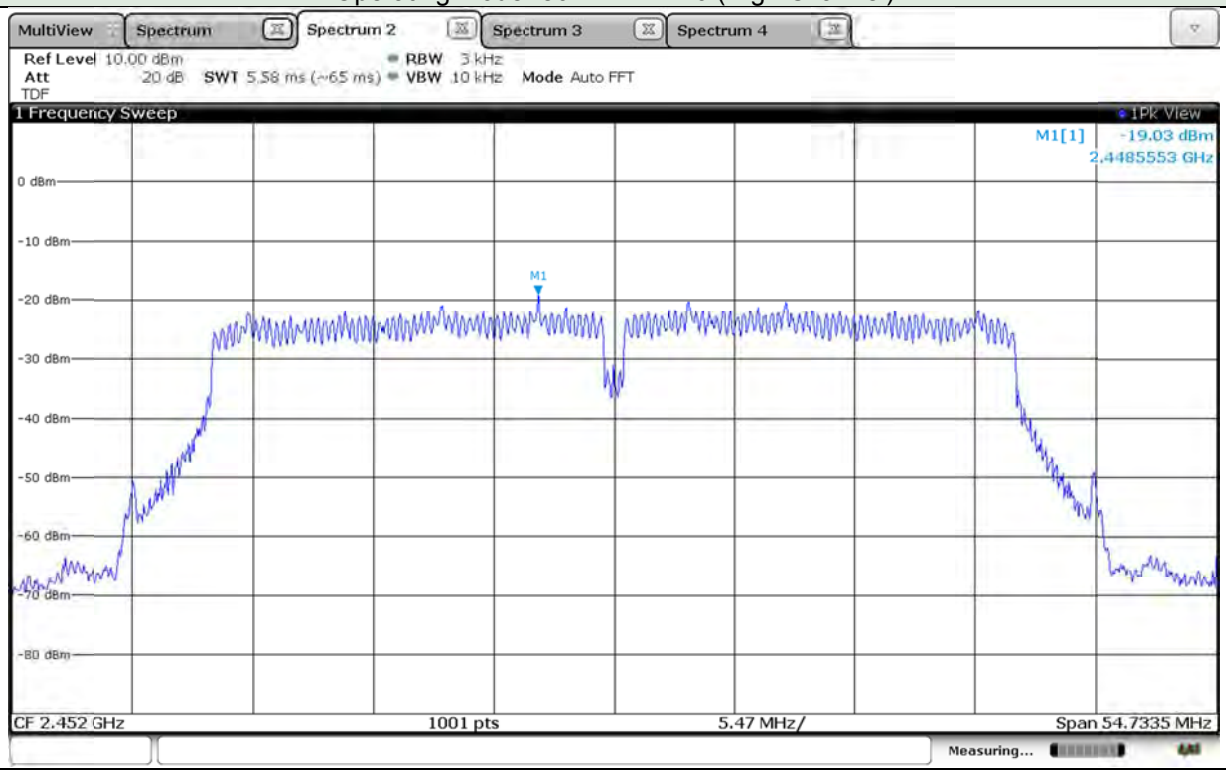
Operating Mode: 802.11n HT40 (Low Channel)



Operating Mode: 802.11n HT40 (Middle Channel)



Operating Mode: 802.11n HT40 (High Channel)



5.5 Out of Band Emission

5.5.1 Limit

Acc. To section 15.247(d), In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in 15.209(a) is not required. In addition, radiated emission which in the restricted band, as define in section §15.205(a), must also comply the radiated emission limits specified in section §15.209(a) (see section §15.205(c))

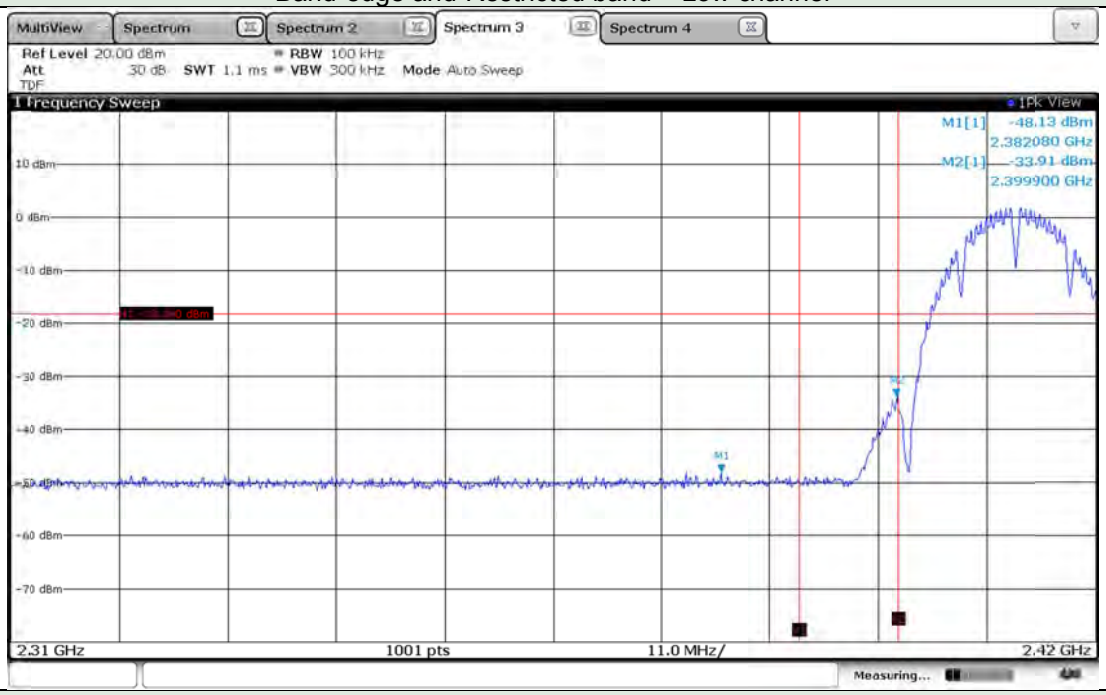
5.5.2 Method of Measurement

Reference to KDB 558074 D01 DTS Meas Guidance v05: 8.5 Emissions in non-restricted frequency bands.
The transmitter output is connected to a spectrum analyzer with the RBW set to 100 kHz, VBW ≥ 3 X RBW, peak detector and max hold. Measurements utilizing these settings are made of the in-band reference level, band-edge (where measurements to the general radiated limits will not be made) and out-of-band emissions.

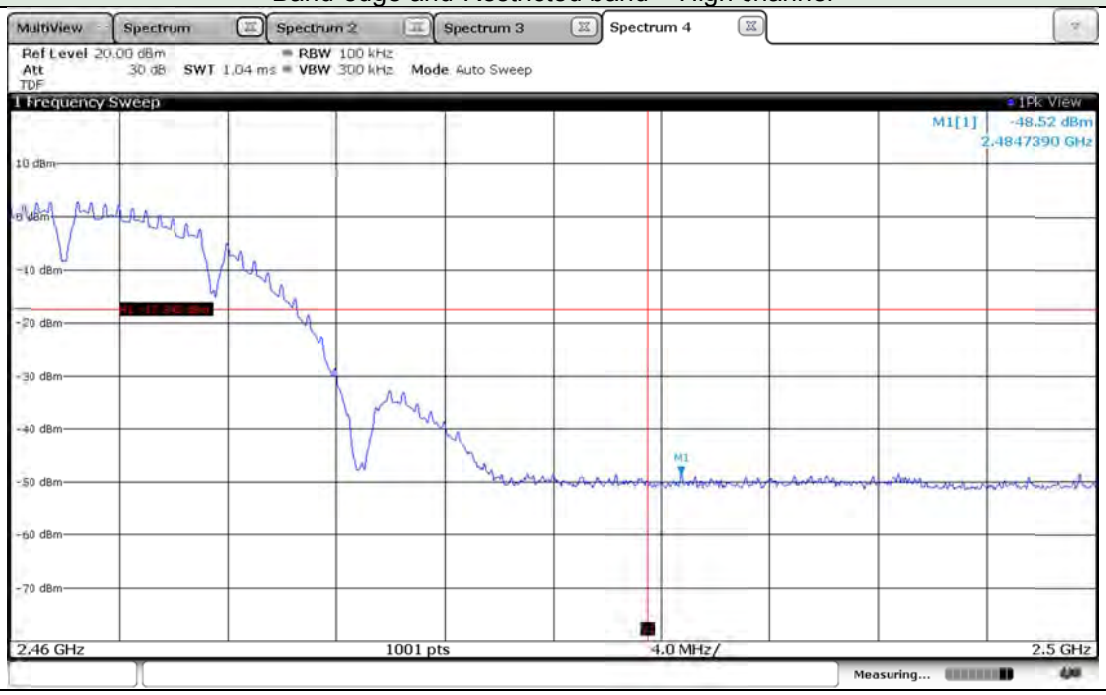
5.5.3 Test Data for Operating mode: 802.11b

Date of Test	2018-08-21	Temperature	(24.0 ± 1.0) °C
		Relative humidity	(56.0 ± 3.0) % R.H.
Test Result	***PASS***	Tested by	In-yong Song

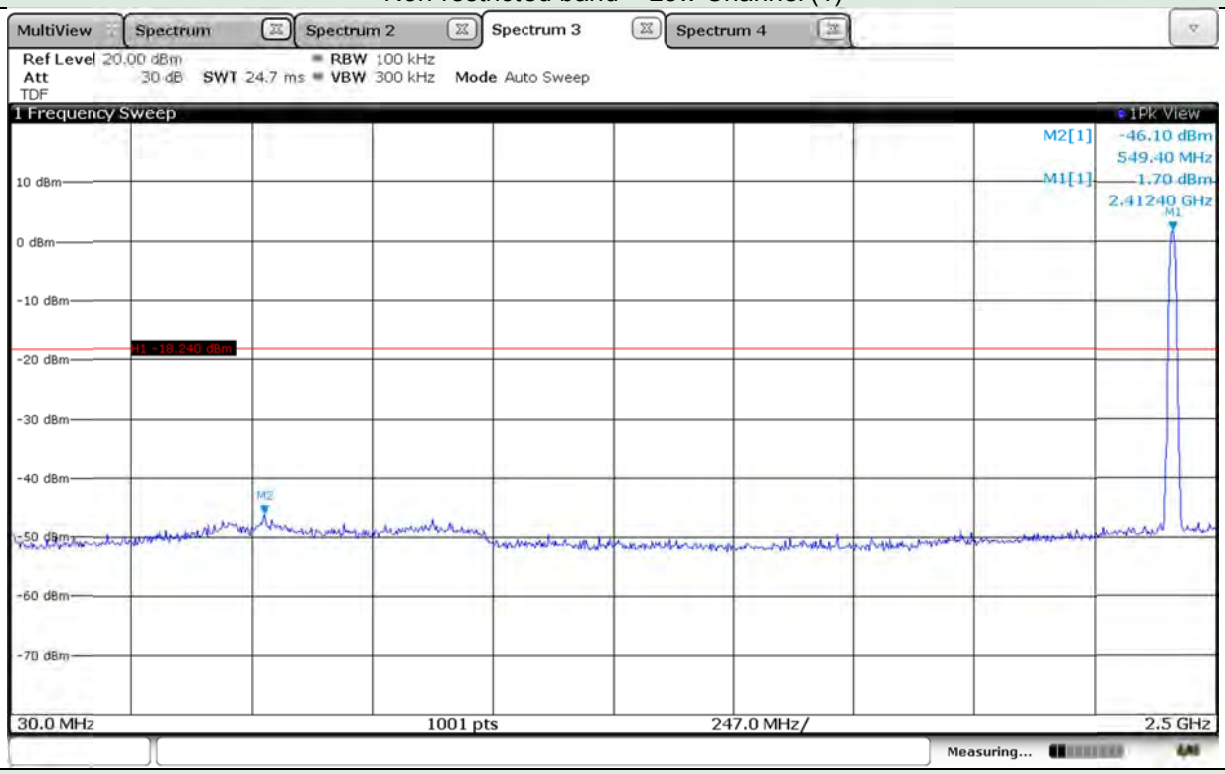
Band-edge and Restricted band – Low channel



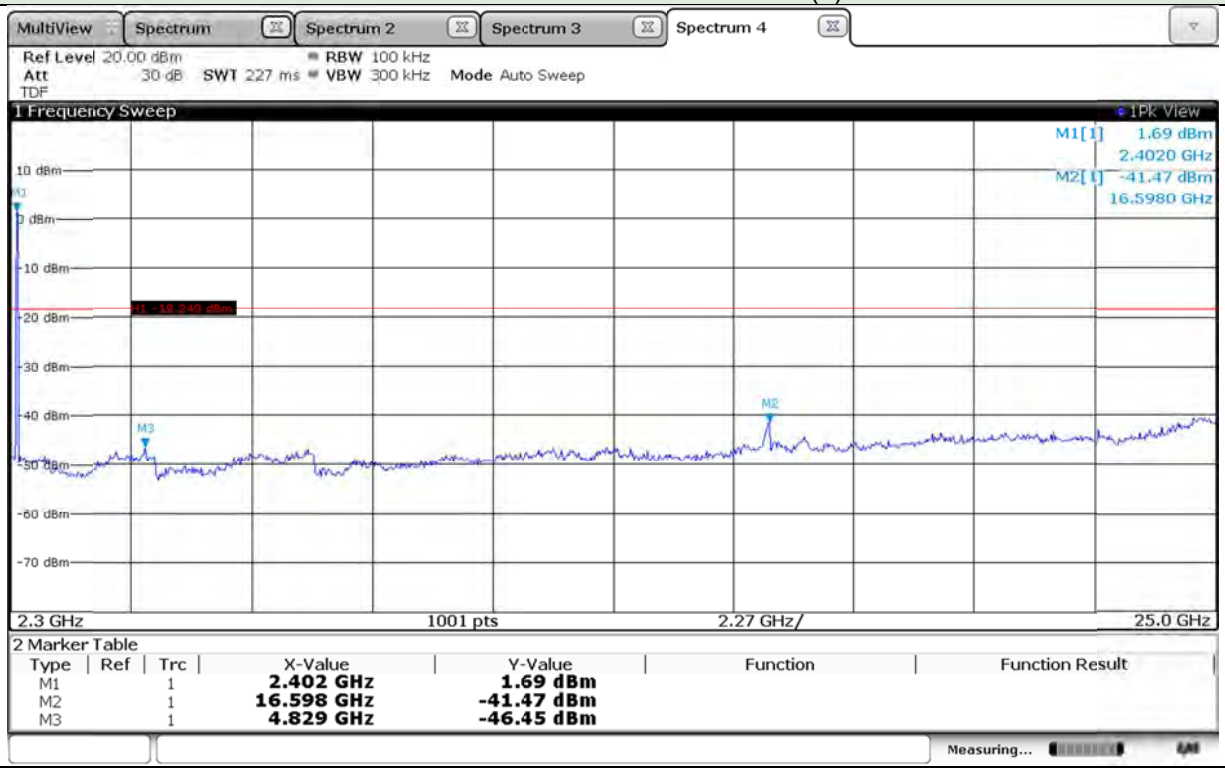
Band-edge and Restricted band – High channel



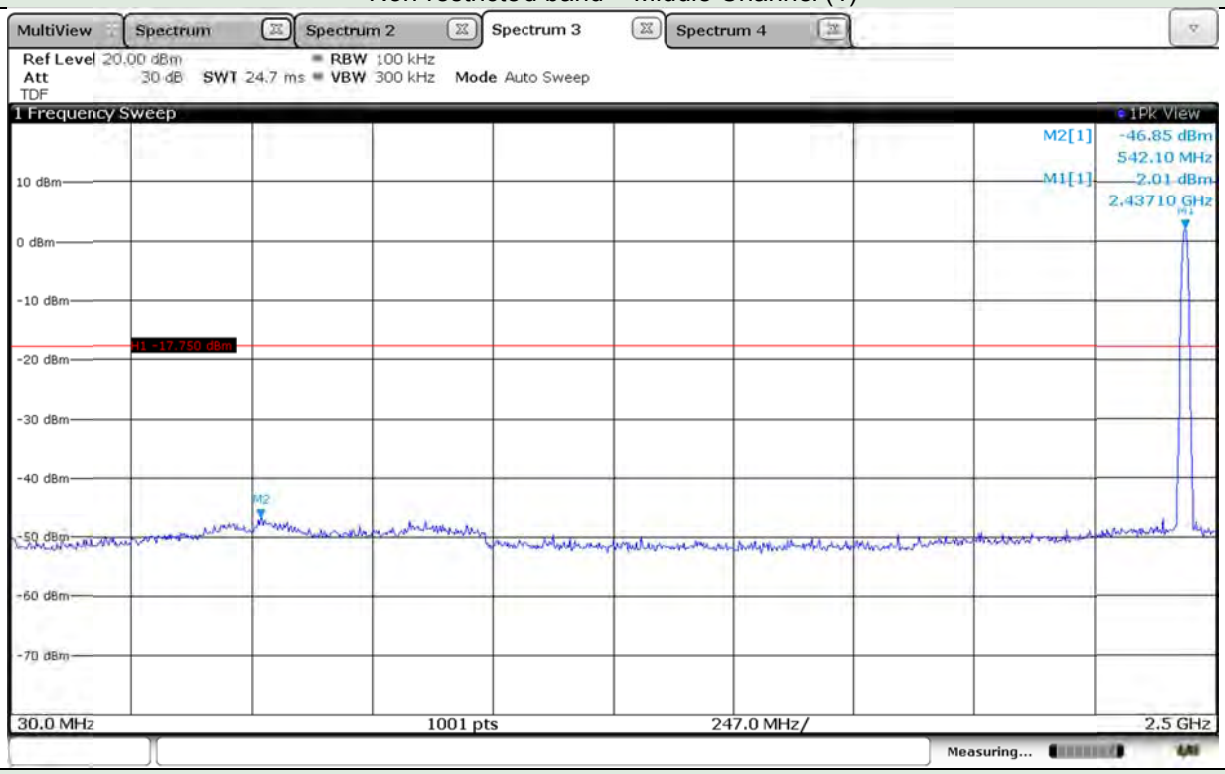
Non-restricted band – Low Channel (1)



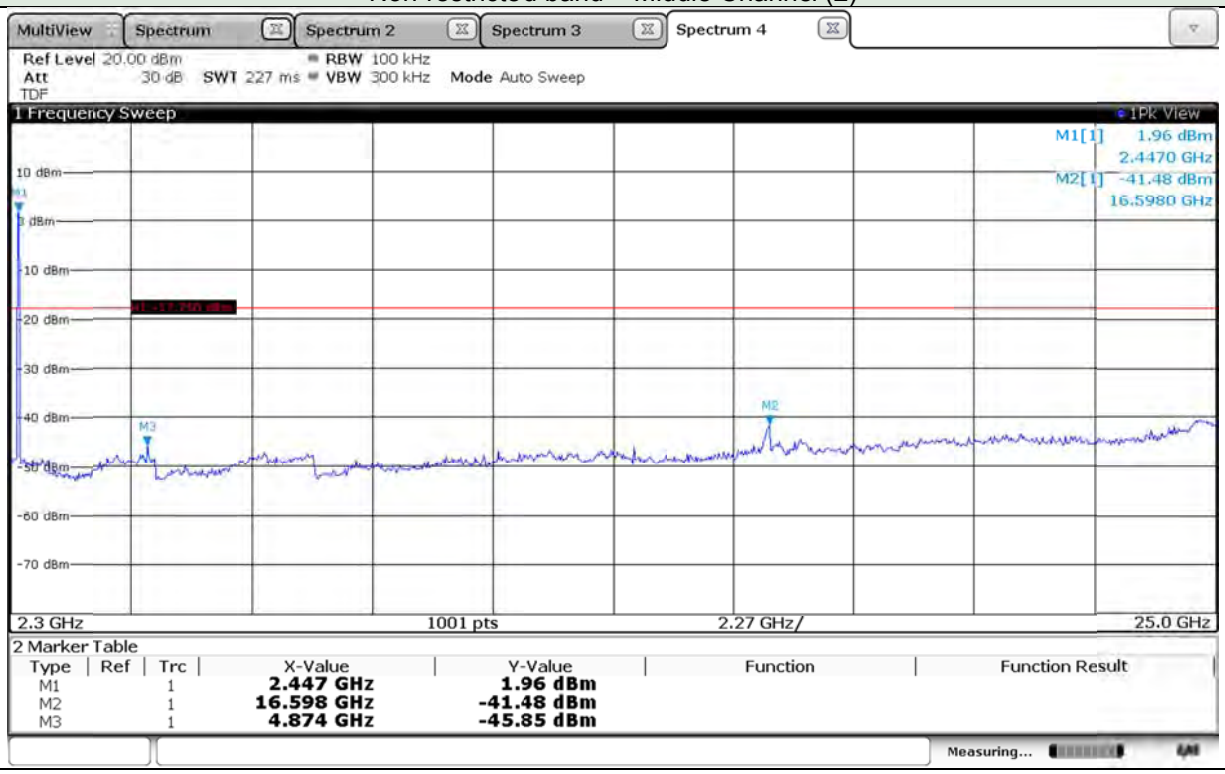
Non-restricted band – Low Channel (2)



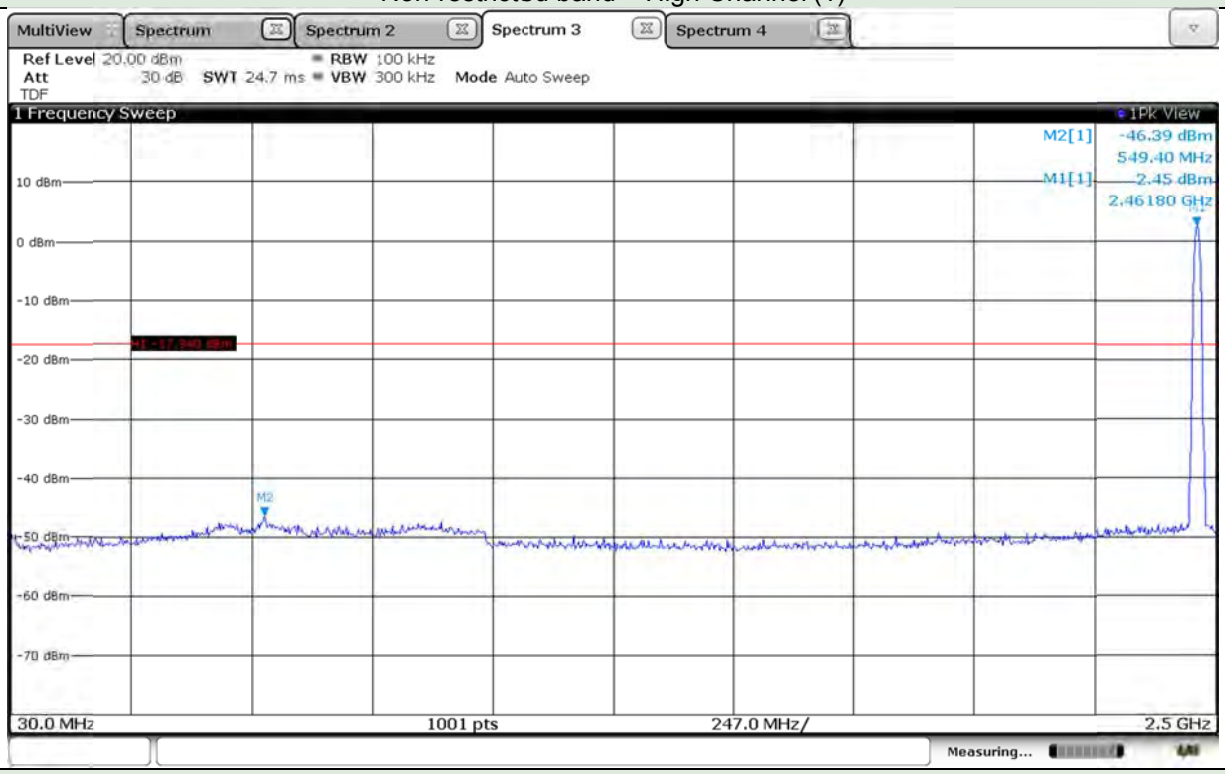
Non-restricted band – Middle Channel (1)



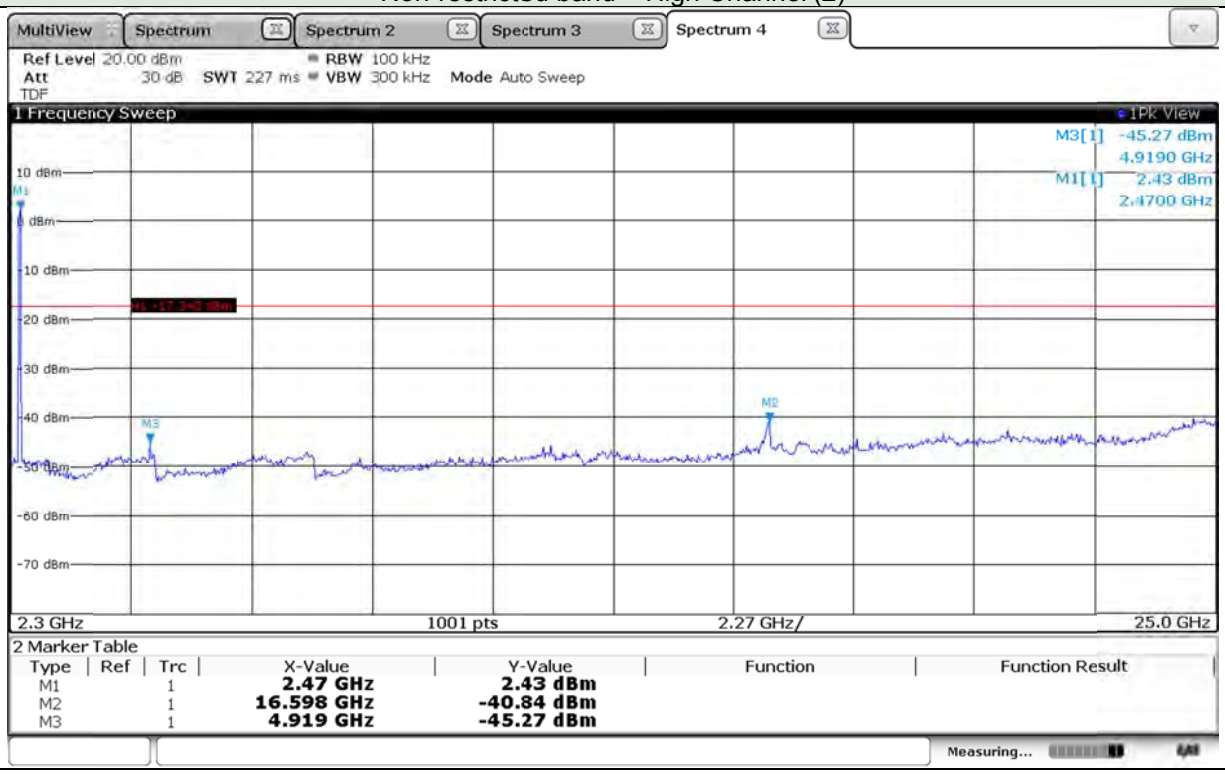
Non-restricted band – Middle Channel (2)



Non-restricted band – High Channel (1)



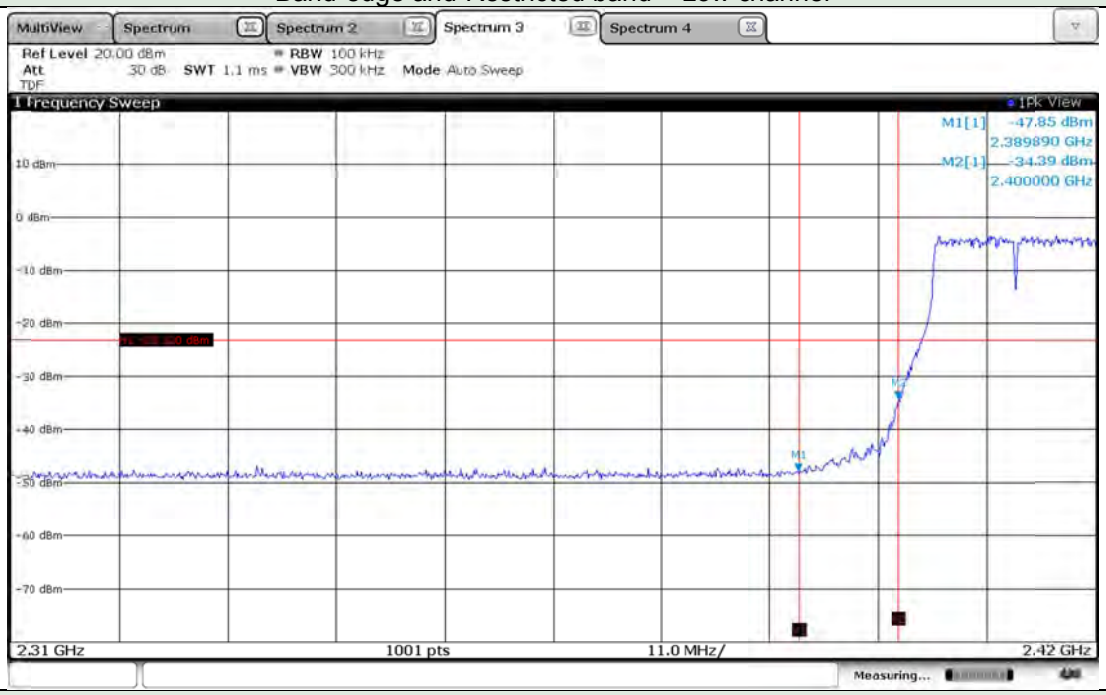
Non-restricted band – High Channel (2)



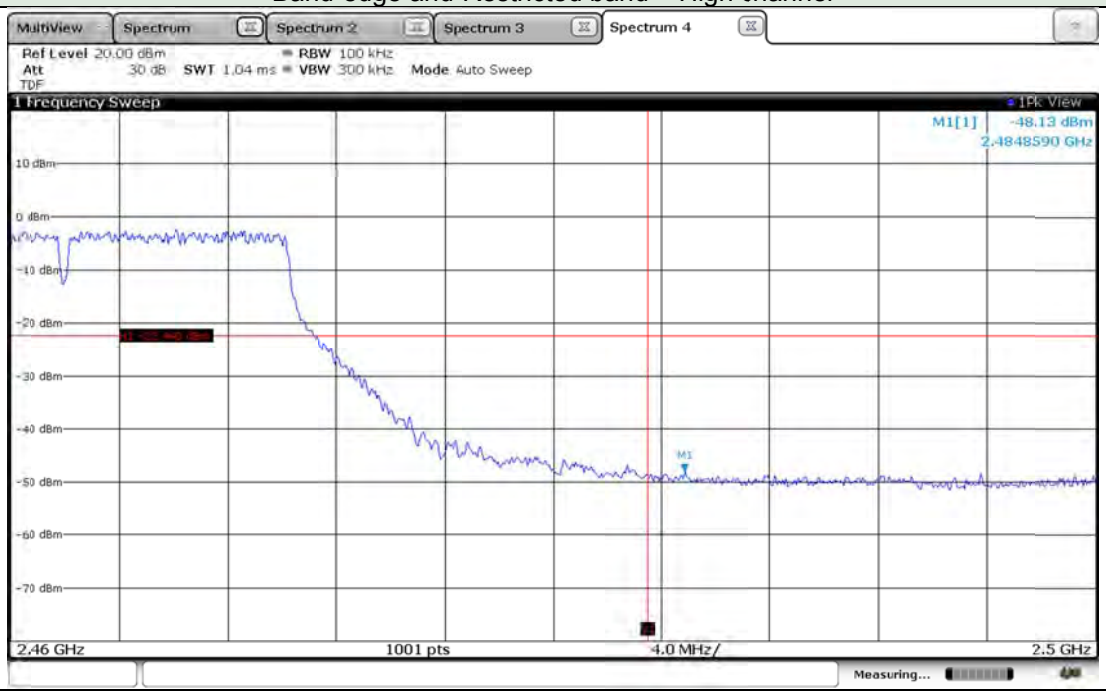
5.5.4 Test Data for Operating mode: 802.11g

Date of Test	2018-08-21	Temperature	(24.0 ± 1.0) °C
		Relative humidity	(56.0 ± 3.0) % R.H.
Test Result	***PASS***	Tested by	In-yong Song

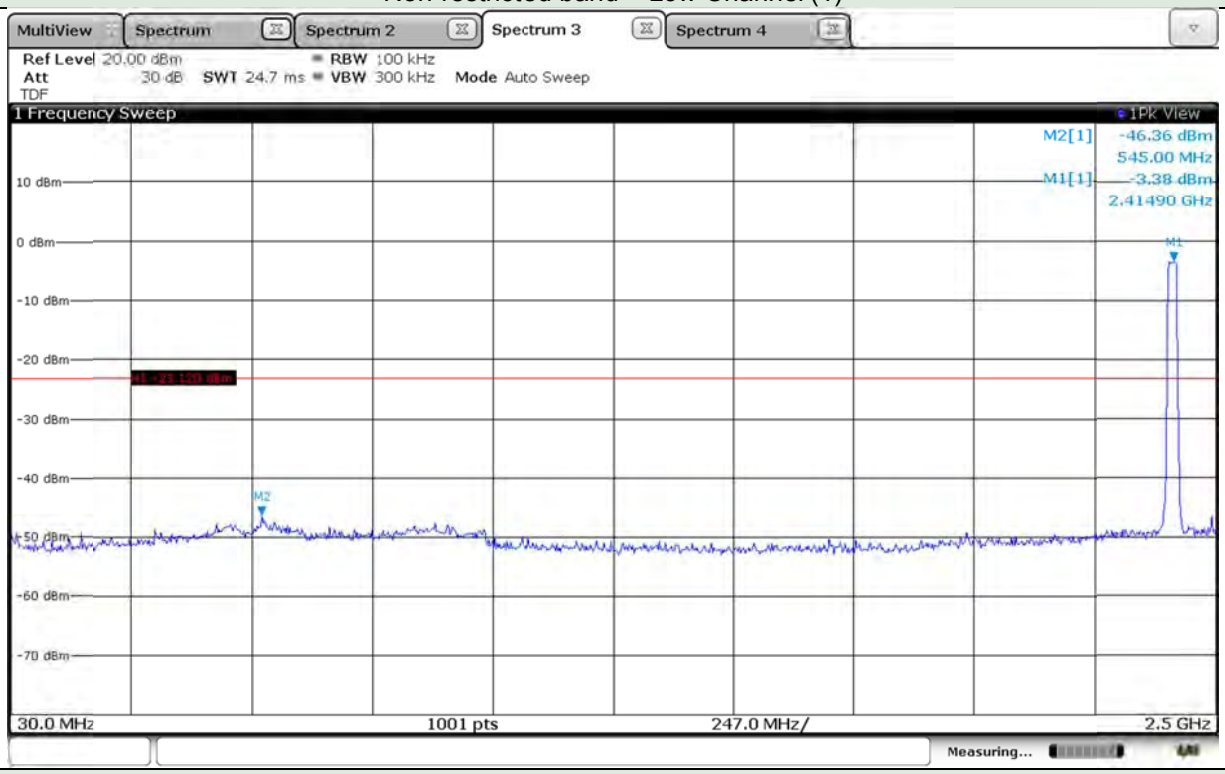
Band-edge and Restricted band – Low channel



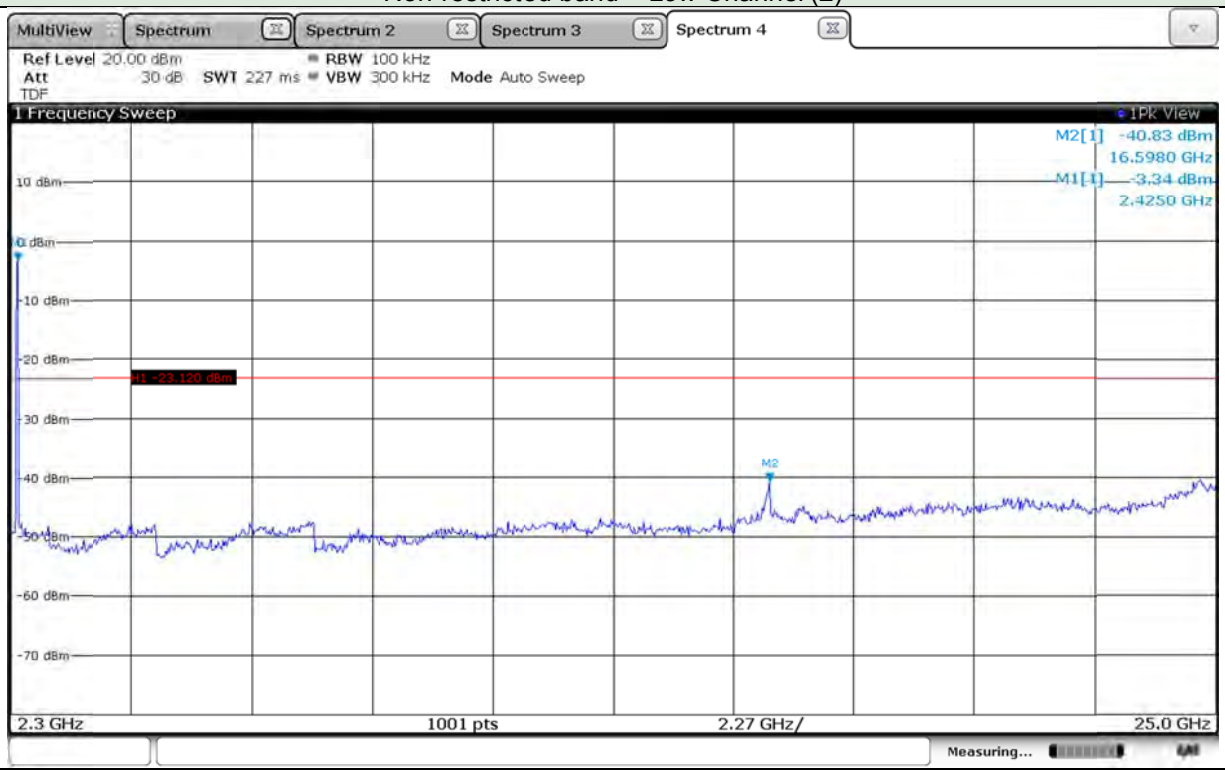
Band-edge and Restricted band – High channel



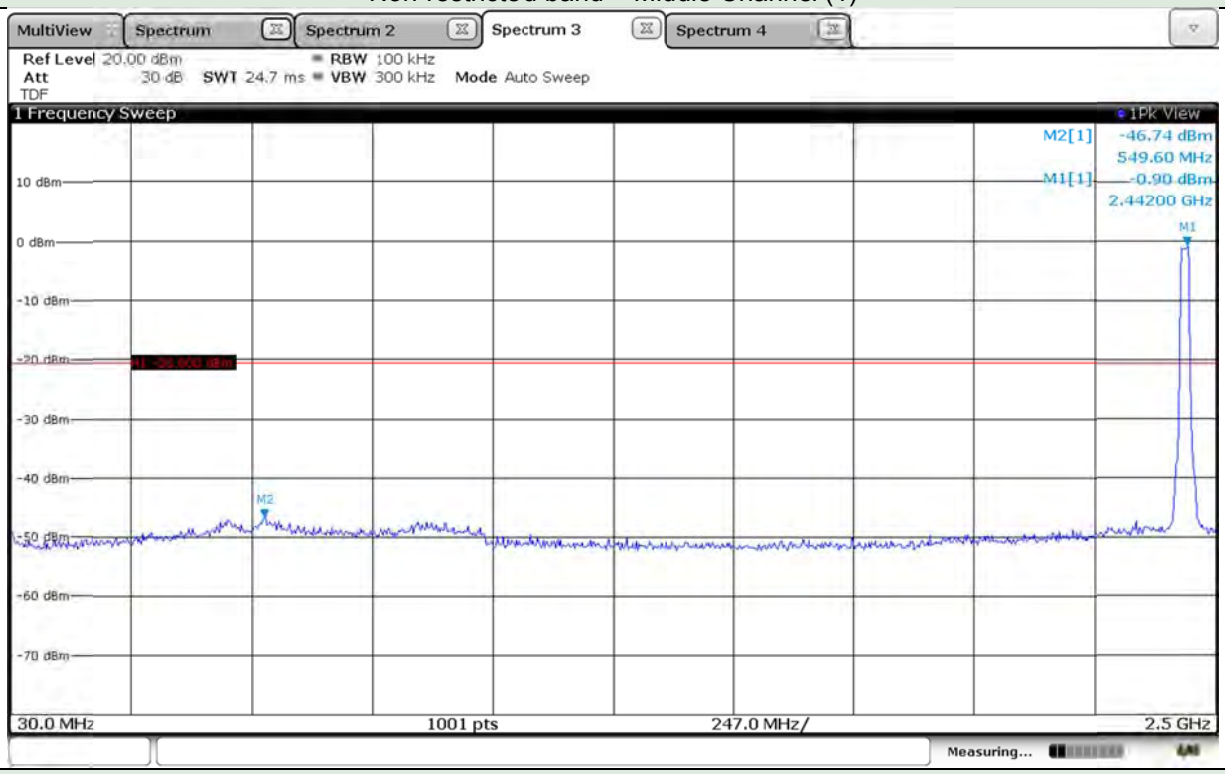
Non-restricted band – Low Channel (1)



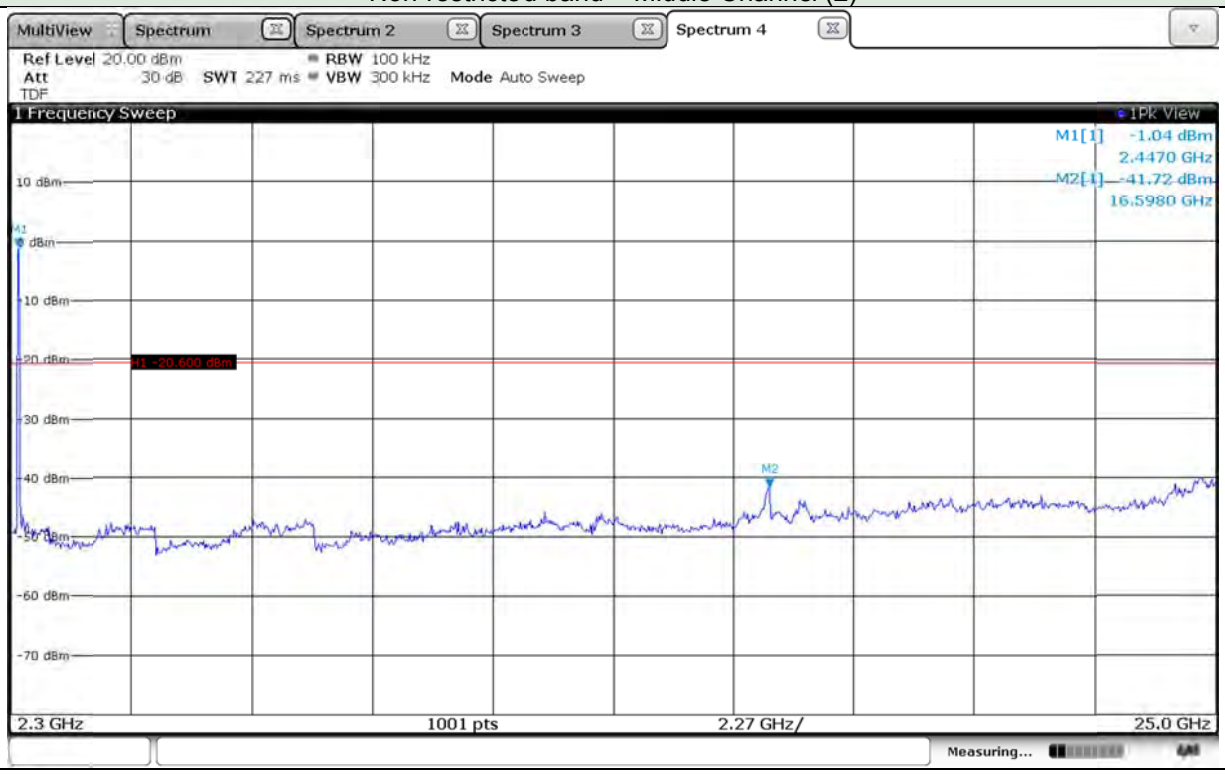
Non-restricted band – Low Channel (2)



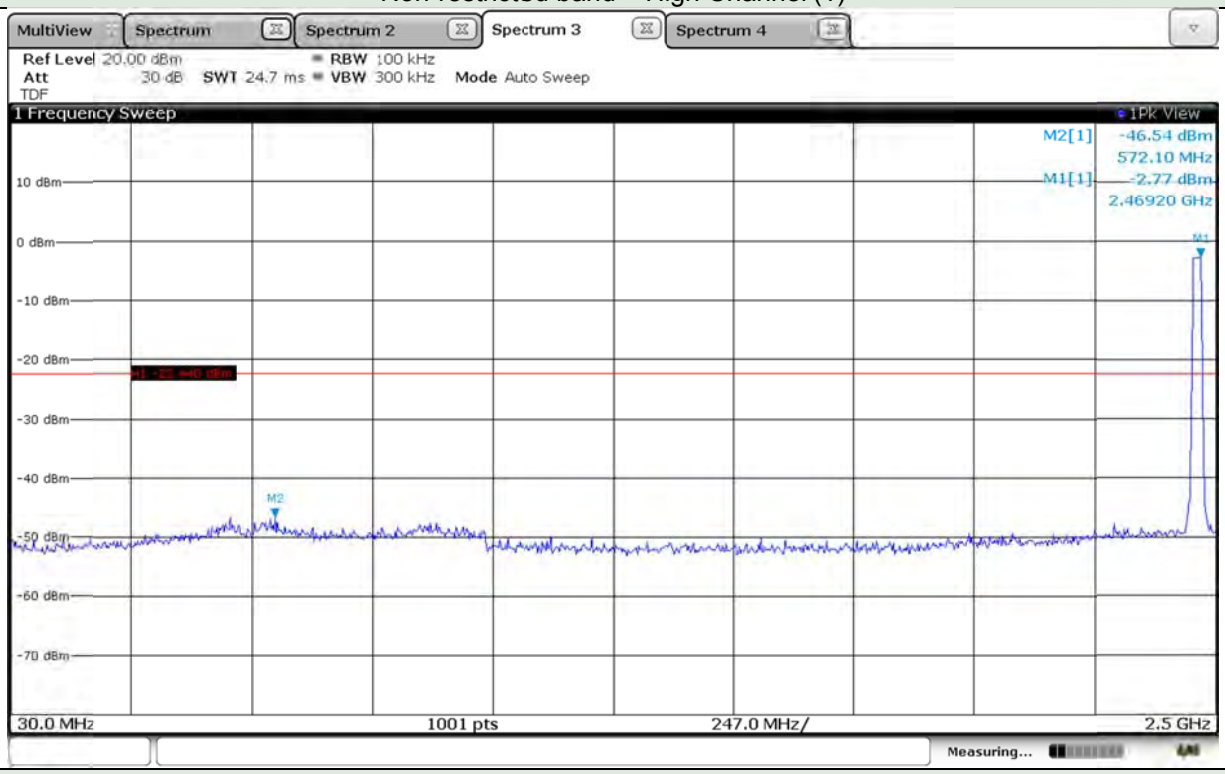
Non-restricted band – Middle Channel (1)



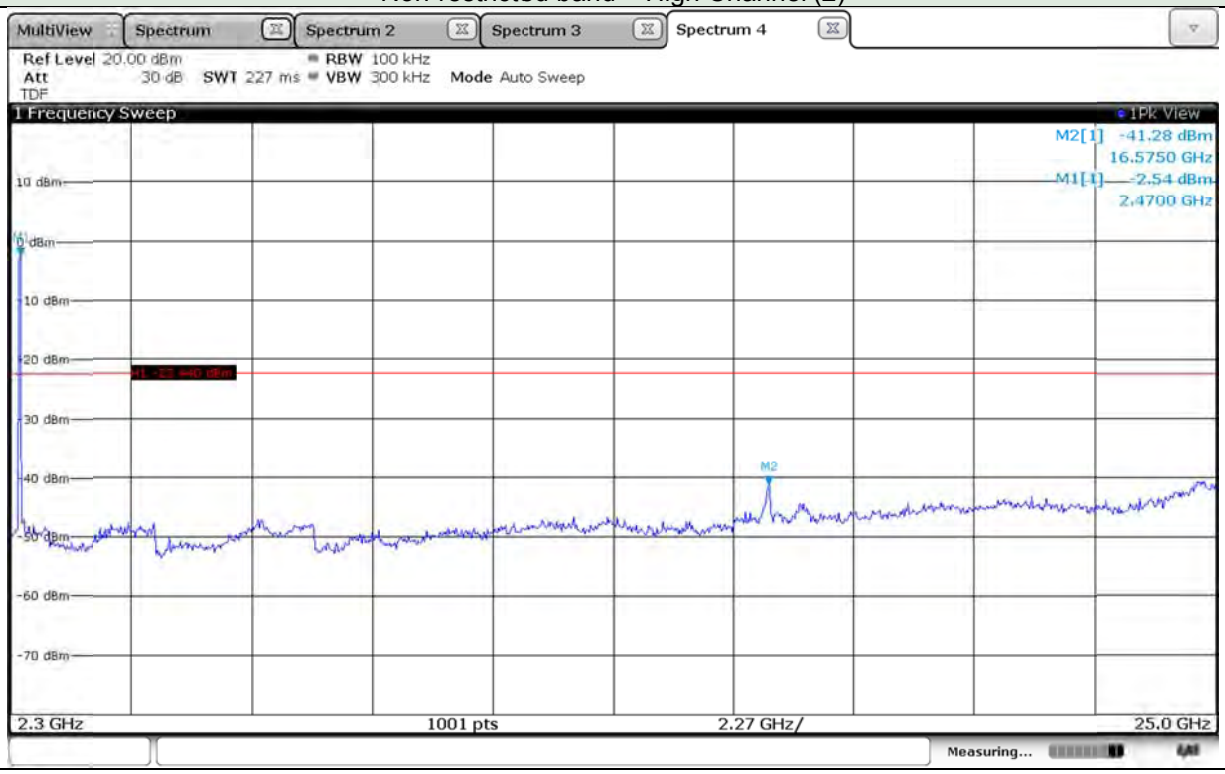
Non-restricted band – Middle Channel (2)



Non-restricted band – High Channel (1)



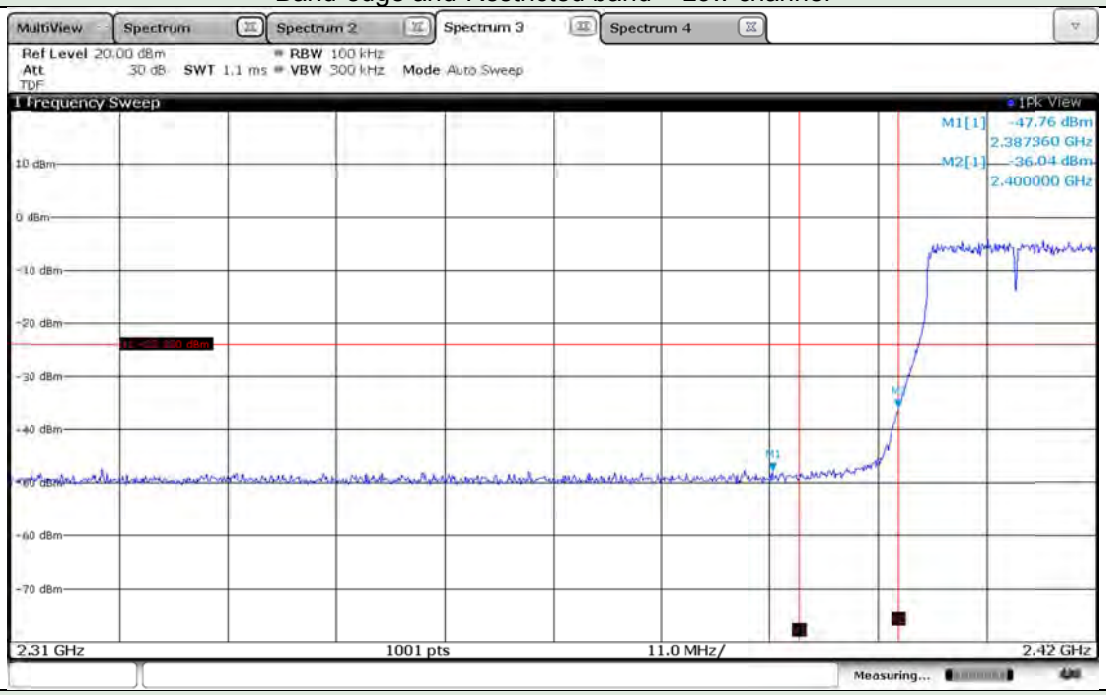
Non-restricted band – High Channel (2)



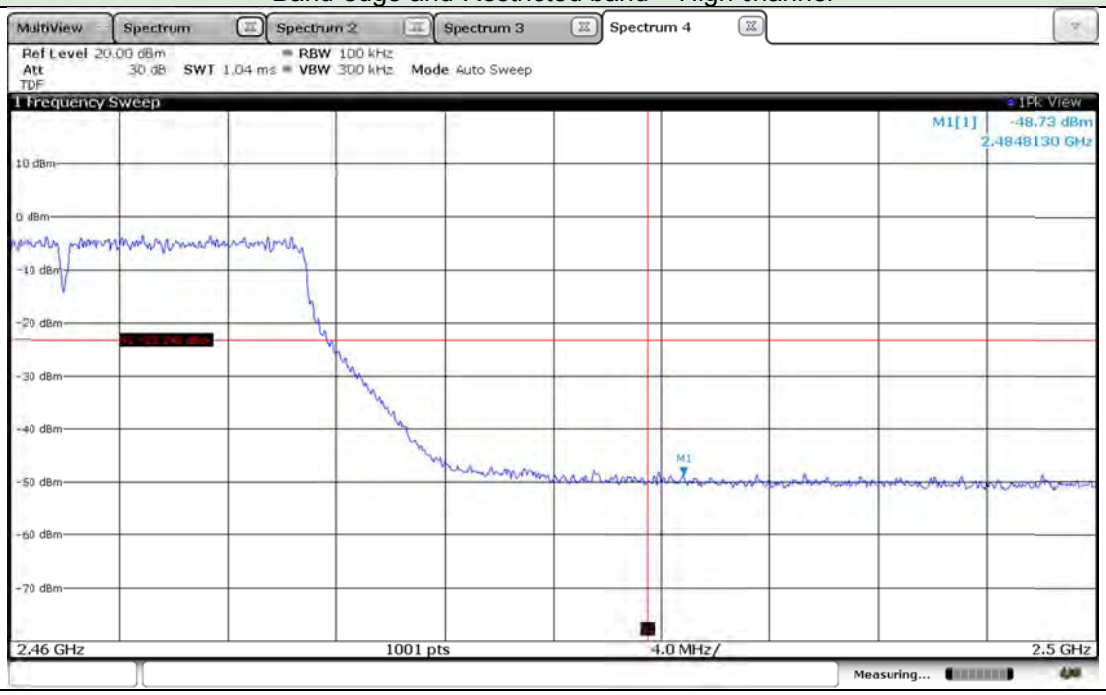
5.5.5 Test Data for Operating mode: 802.11n HT20

Date of Test	2018-08-21	Temperature	(24.0 ± 1.0) °C
		Relative humidity	(56.0 ± 3.0) % R.H.
Test Result	***PASS***	Tested by	In-yong Song

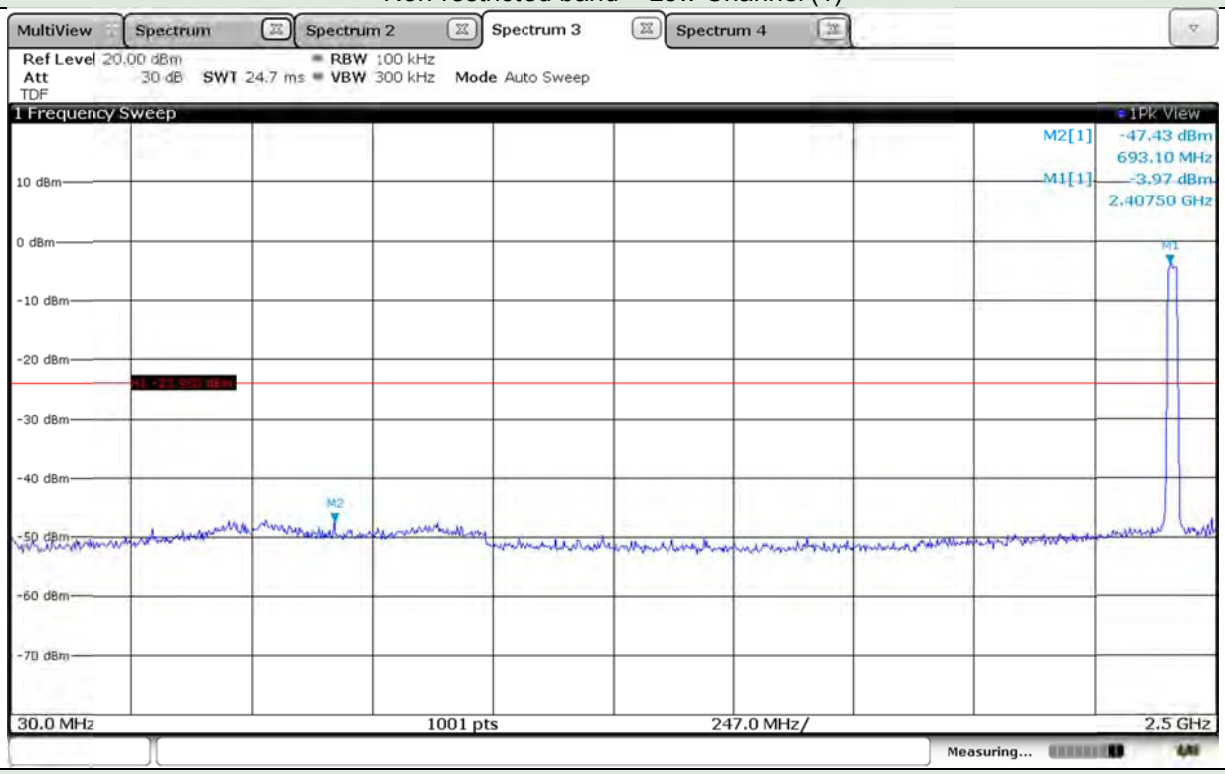
Band-edge and Restricted band – Low channel



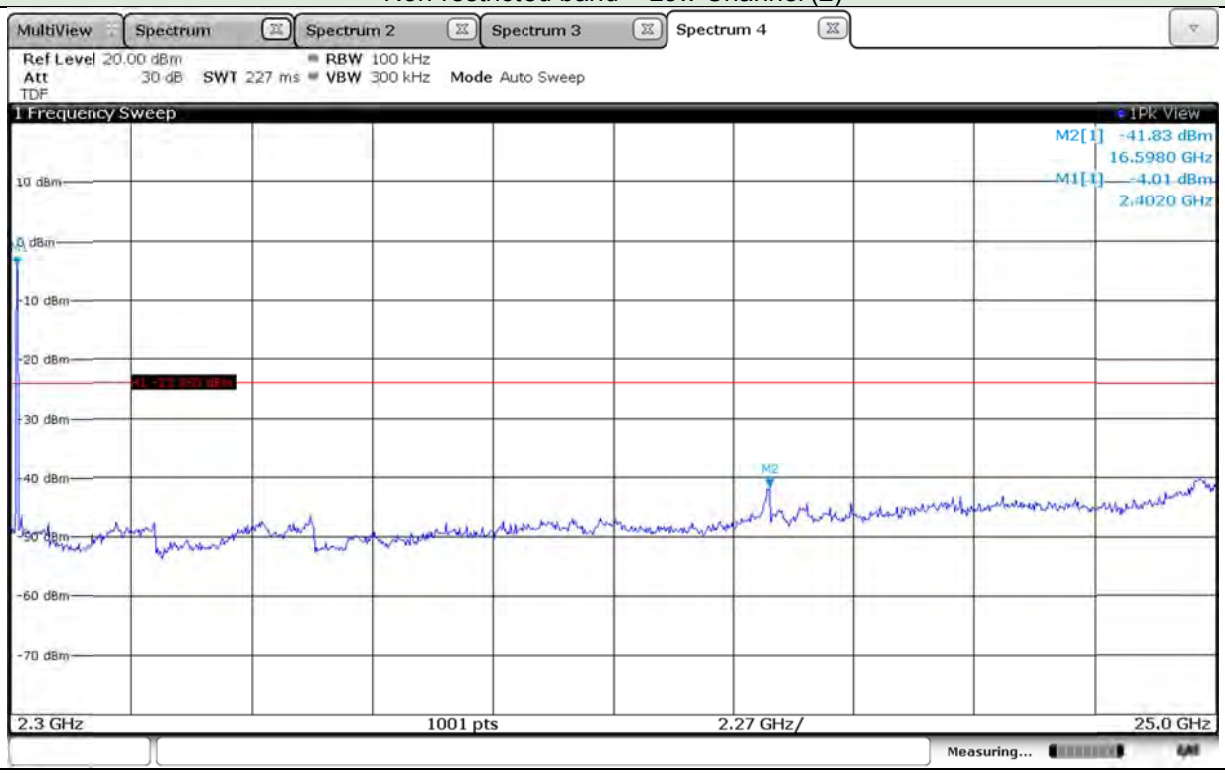
Band-edge and Restricted band – High channel



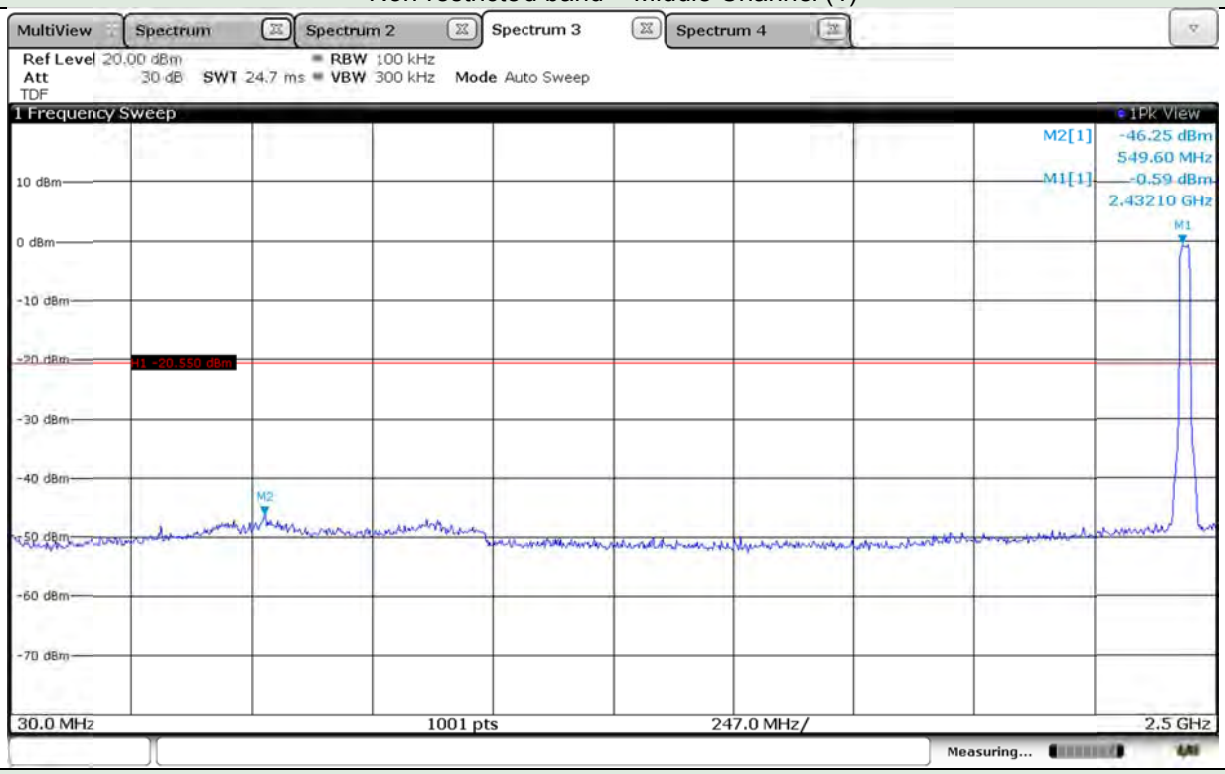
Non-restricted band – Low Channel (1)



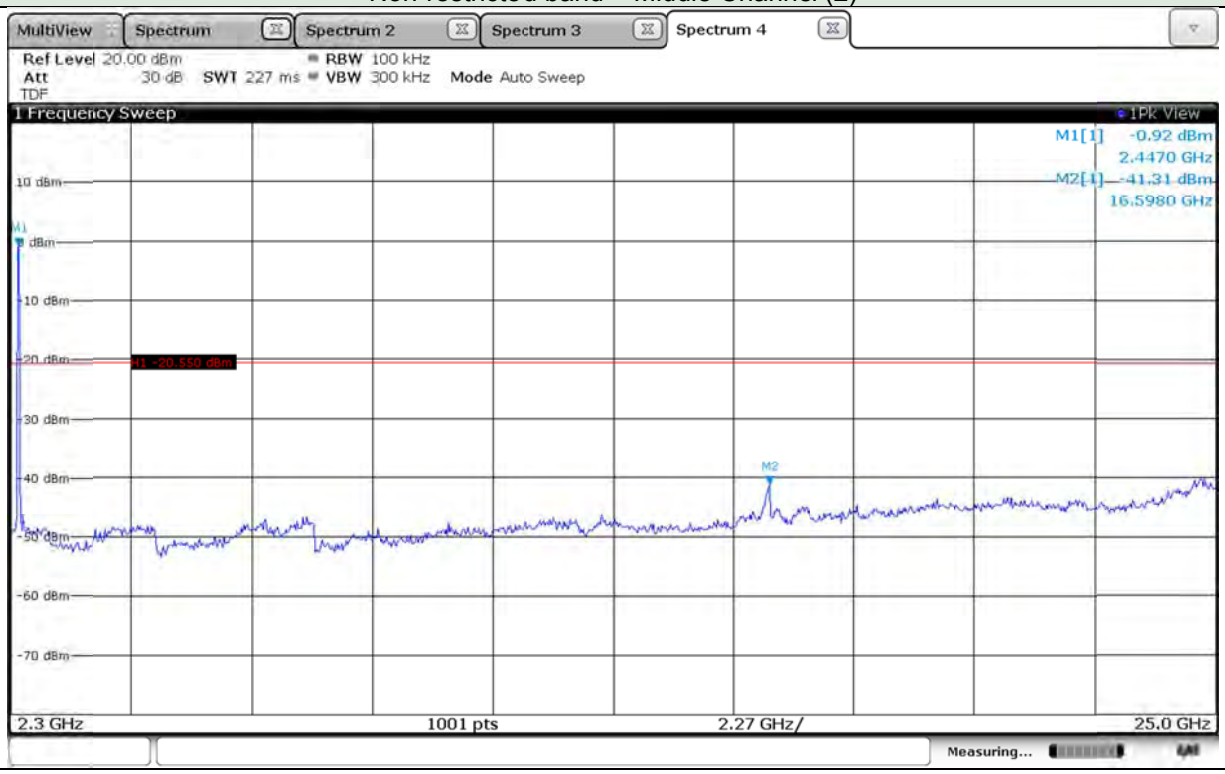
Non-restricted band – Low Channel (2)



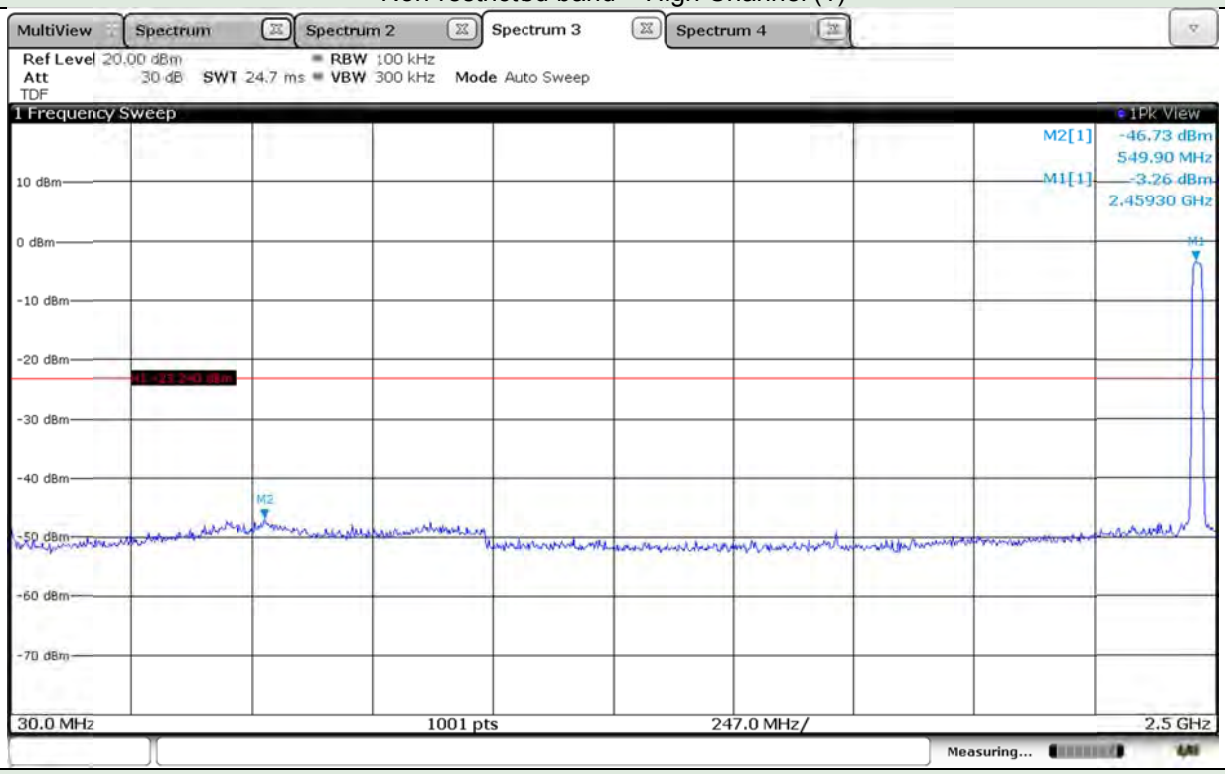
Non-restricted band – Middle Channel (1)



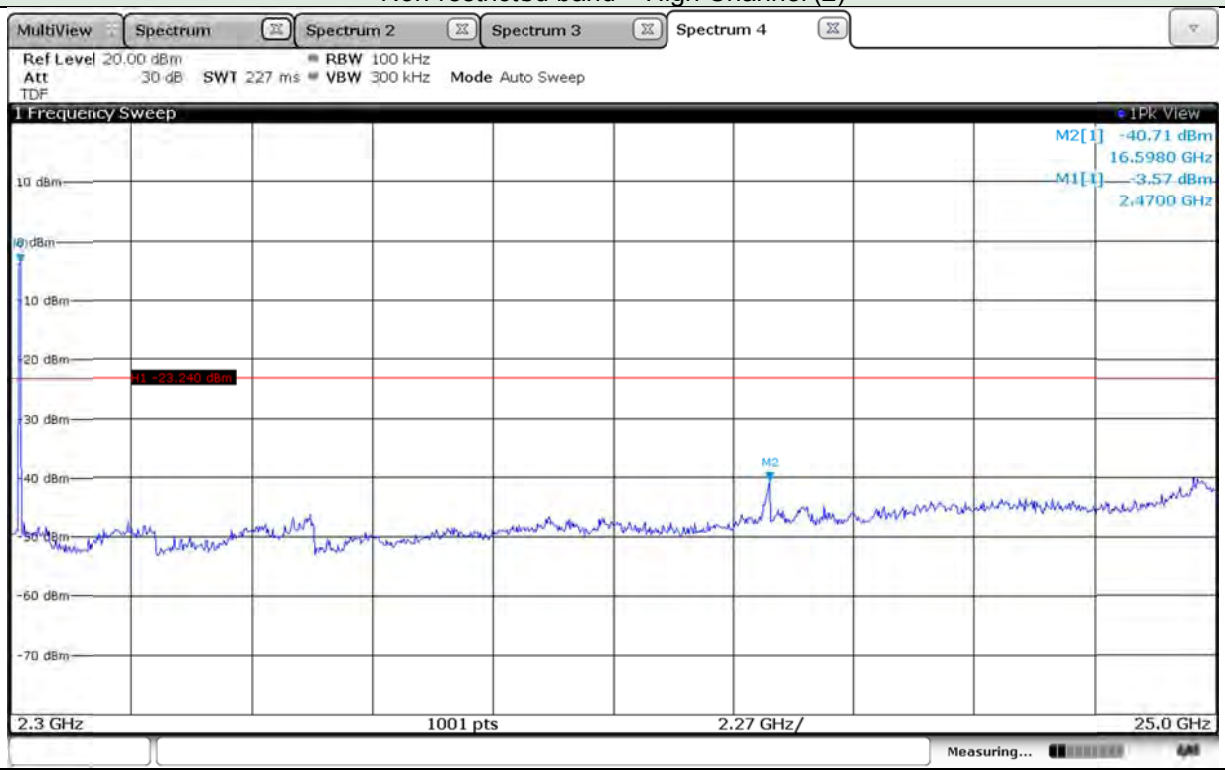
Non-restricted band – Middle Channel (2)



Non-restricted band – High Channel (1)



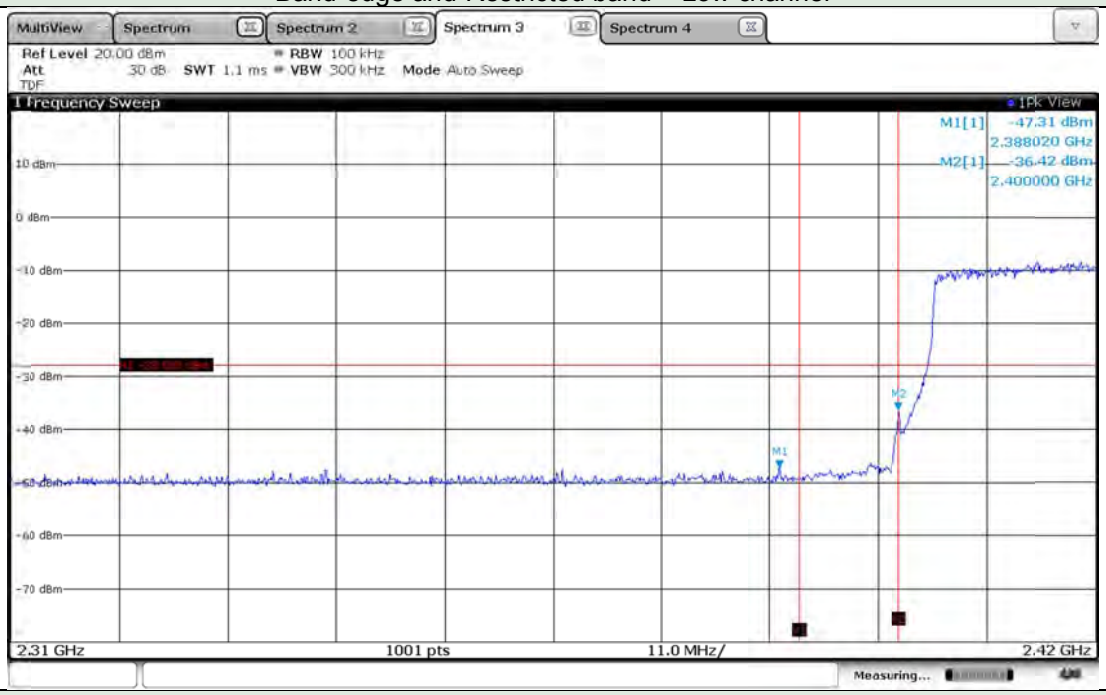
Non-restricted band – High Channel (2)



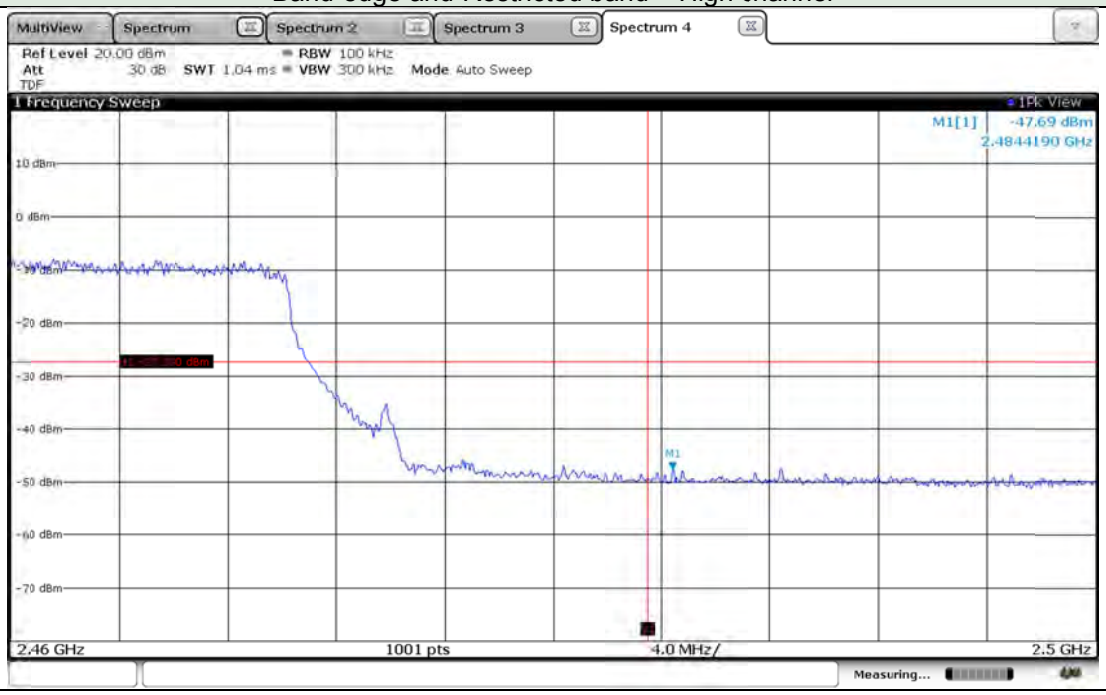
5.5.6 Test Data for Operating mode: 802.11n HT40

Date of Test	2018-08-21	Temperature	(24.0 ± 1.0) °C
		Relative humidity	(56.0 ± 3.0) % R.H.
Test Result	***PASS***	Tested by	In-yong Song

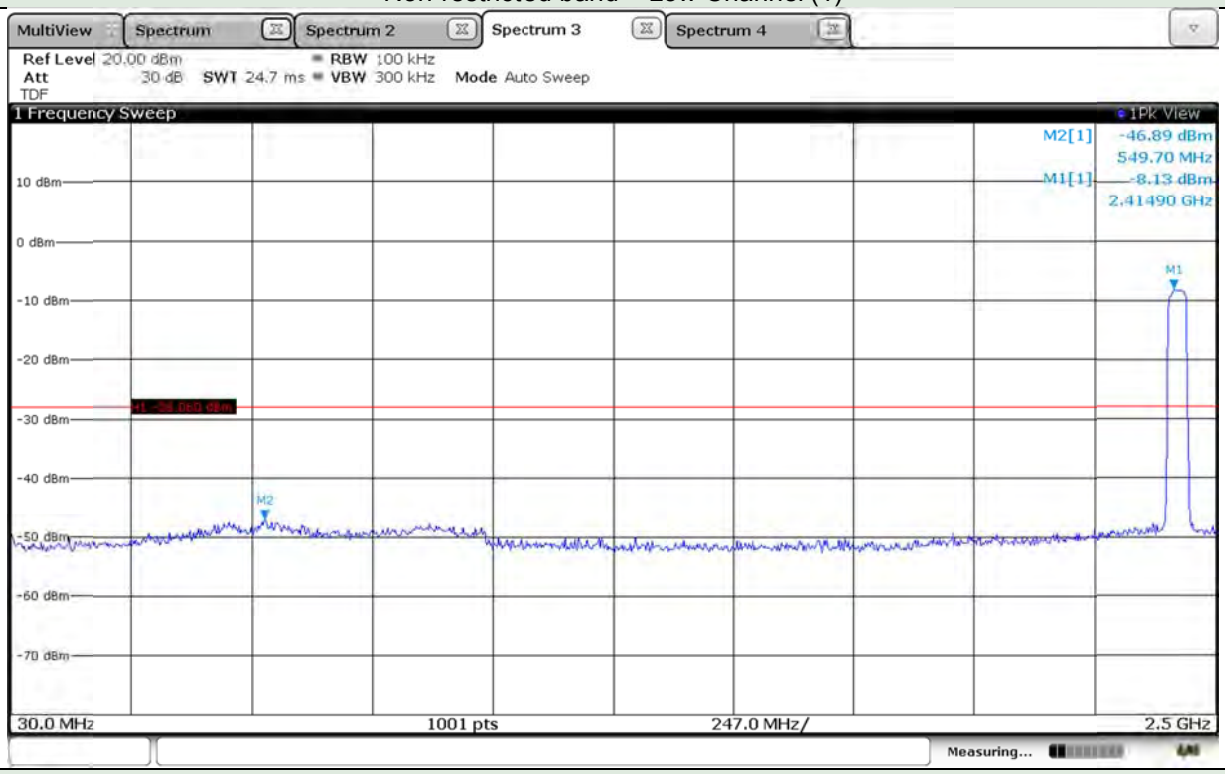
Band-edge and Restricted band – Low channel



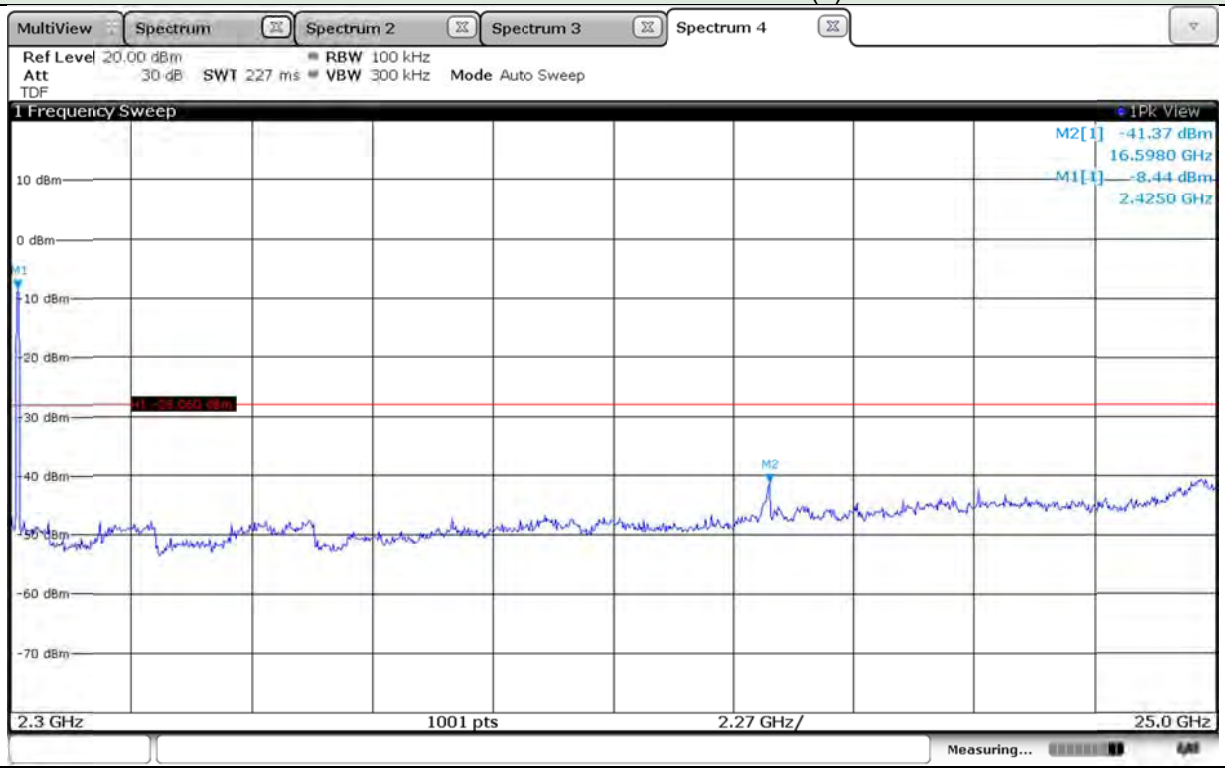
Band-edge and Restricted band – High channel



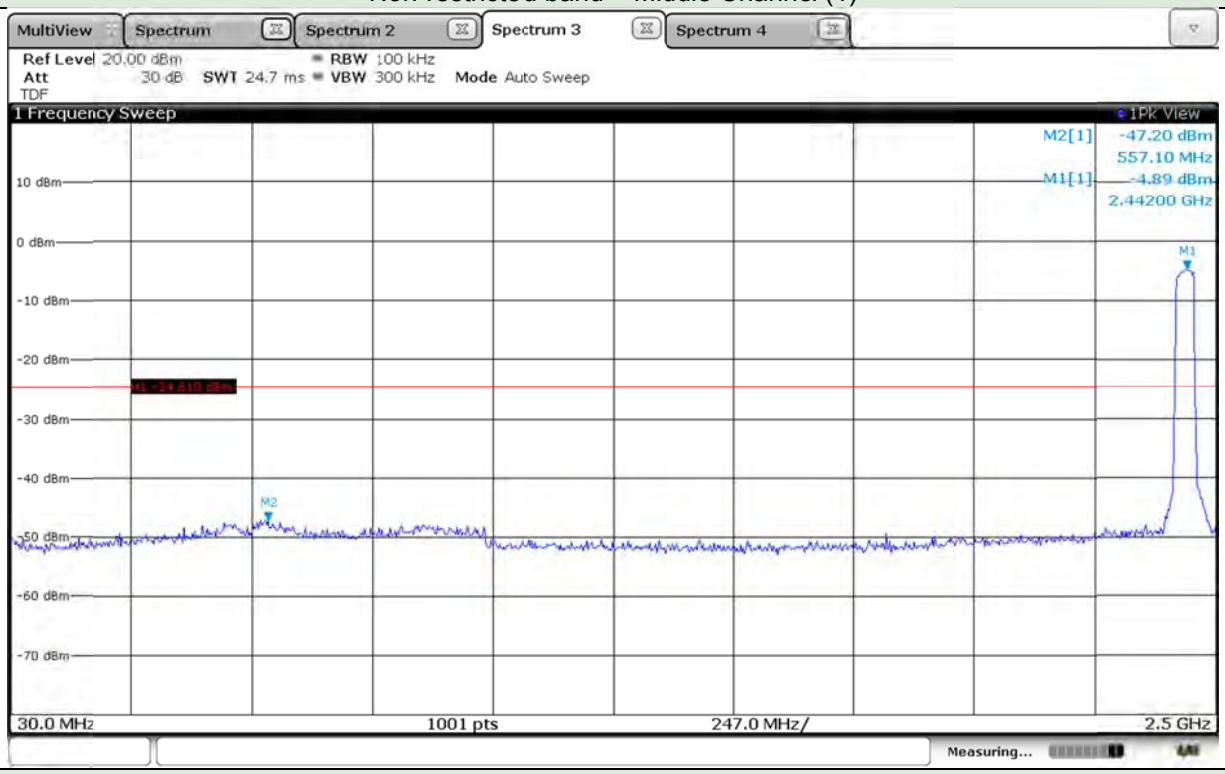
Non-restricted band – Low Channel (1)



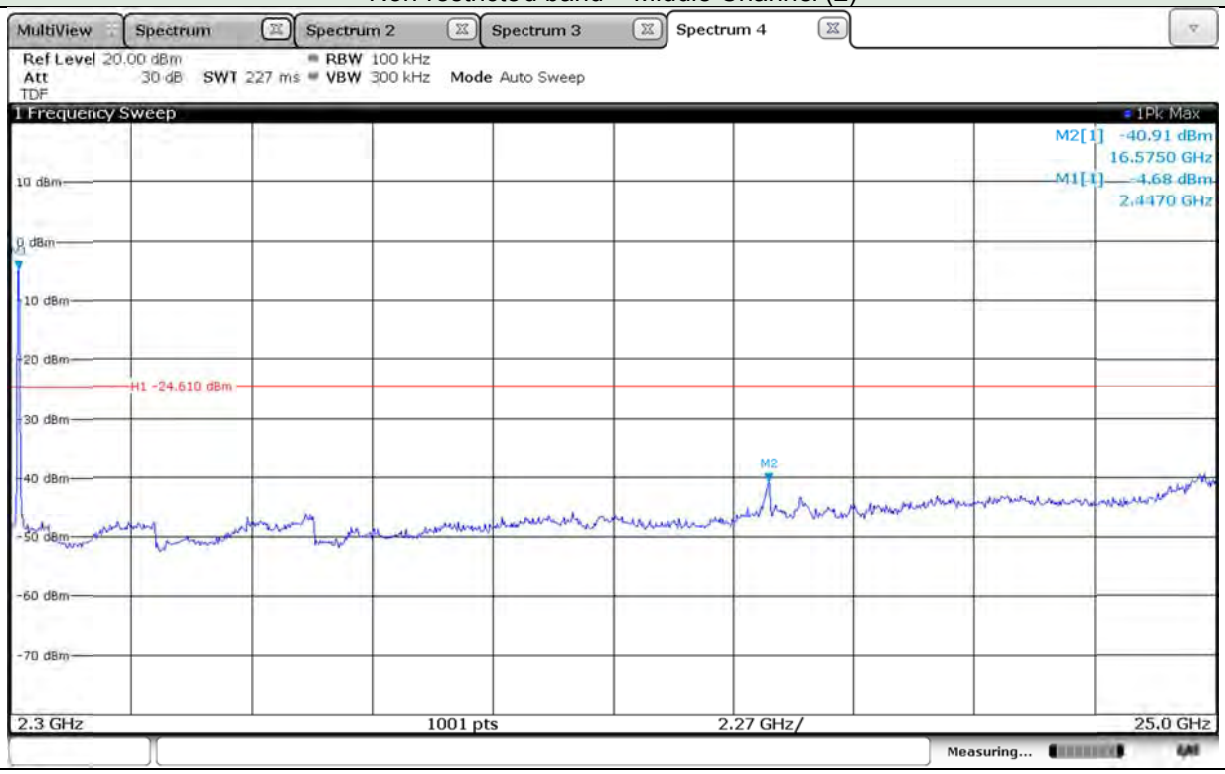
Non-restricted band – Low Channel (2)



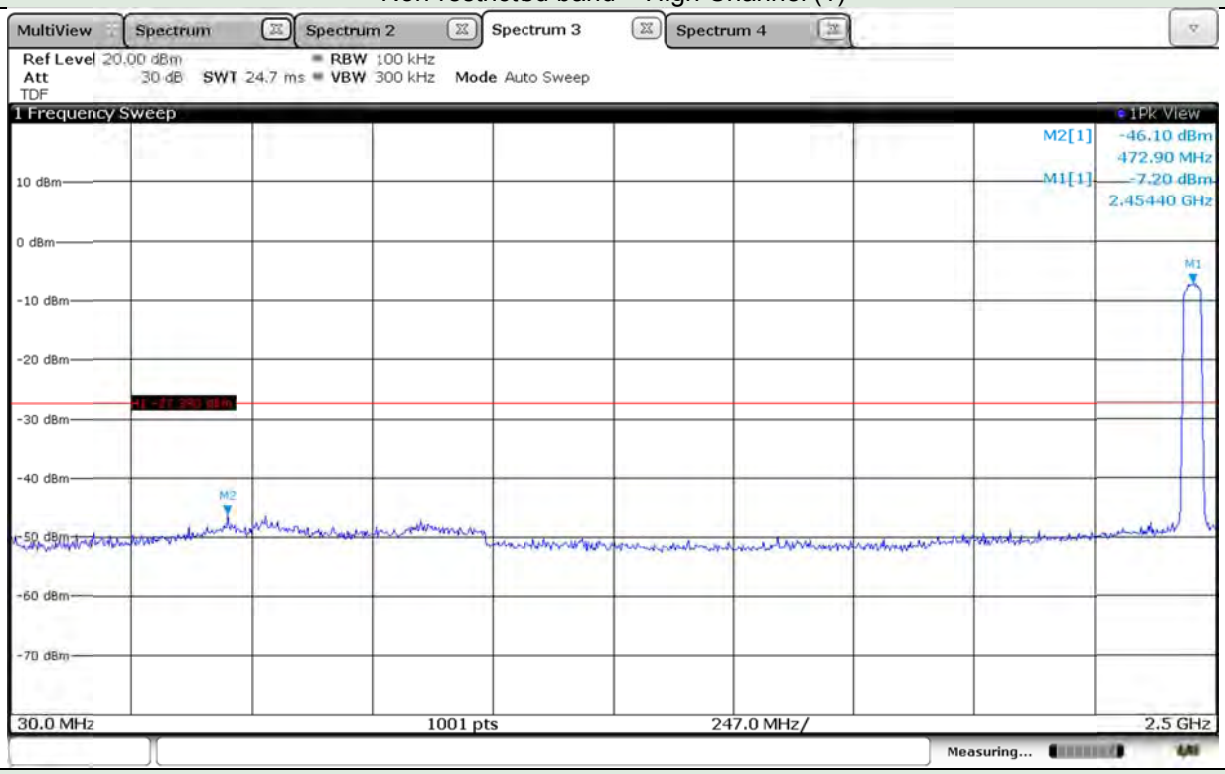
Non-restricted band – Middle Channel (1)



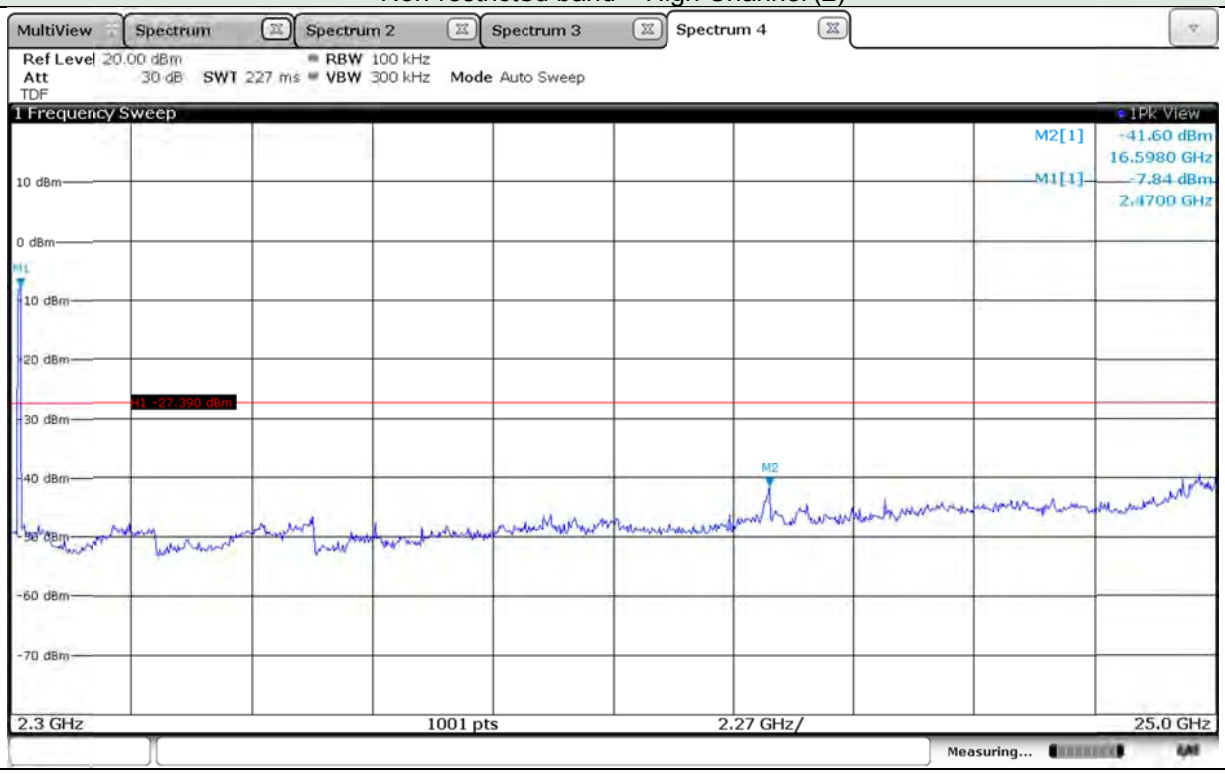
Non-restricted band – Middle Channel (2)



Non-restricted band – High Channel (1)



Non-restricted band – High Channel (2)



5.6 Radiated Emission

5.6.1 Limit

Acc. To section 15.205,15.209, following table shall be applied.

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
30 – 88	100	40
88 – 216	150	43.5
216 – 960	200	46
Above 960	500	24

5.6.2 Method of Measurement

Reference to KDB 558074 D01 DTS Meas Guidance v05: 8.5 Radiated emission measurements and sub-clause 11.12.1 of ANSI C63.10.
The radiated emissions measurements were on 3 m, semi-anechoic chamber. The EUT and other support equipment were placed on a non-conductive table 80 cm for below 1 GHz and 1.5 m for above 1 GHz 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 25 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.

For measurement below 1 GHz, the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For peak emission measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz and for average measurement, resolution bandwidth is set to 1 MHz; and the video bandwidth is set to 10 Hz, when duty cycle is more than 98 %. If duty cycle is less than 98 %, the video bandwidth is set to ≥ 1/T, where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

The spectrum from 30 MHz to 25 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

5.6.3 Test Site Requirement for KDB 414788 D01

Acc. to KDB 414788 D01 Radiated Test Site v01, Semi Anechoic Chamber (SAC) shall be verified test results below 30 MHz with Open Area Test Site (OATS), so we compared test results between the measurements from our SAC and an OATS and found test results almost same, so we ***declare test result for below 30 MHz from our SAC is valid and met the requirement acc. to KDB 414788 D01 Radiated Test Site v01***.

5.6.4 Measurement Uncertainty

Measurement uncertainties were not taken into account and following uncertainty levels have been estimated for tests performed on the apparatus. The measurement uncertainties are given with at least 95 % confidence.

Frequency Range	Uncertainty	Frequency Range	Uncertainty
9 kHz ~ 30 MHz	± 2.1 dB	30 MHz ~ 1 GHz	± 4.8 dB
1 GHz ~ 18 GHz	± 5.0 dB	18 GHz ~ 25 GHz	± 5.3 dB

5.6.5 Sample Calculated Example

At 80 MHz Limit = 40.0 dBuV/m

Result =Receiver reading value + Antenna Factor + Cable Loss – Pre-amplifier gain = 30 dBuV/m

Margin = Limit – Result = 40 – 30 = 10 so the EUT has 10.0 dB margin at 80 MHz

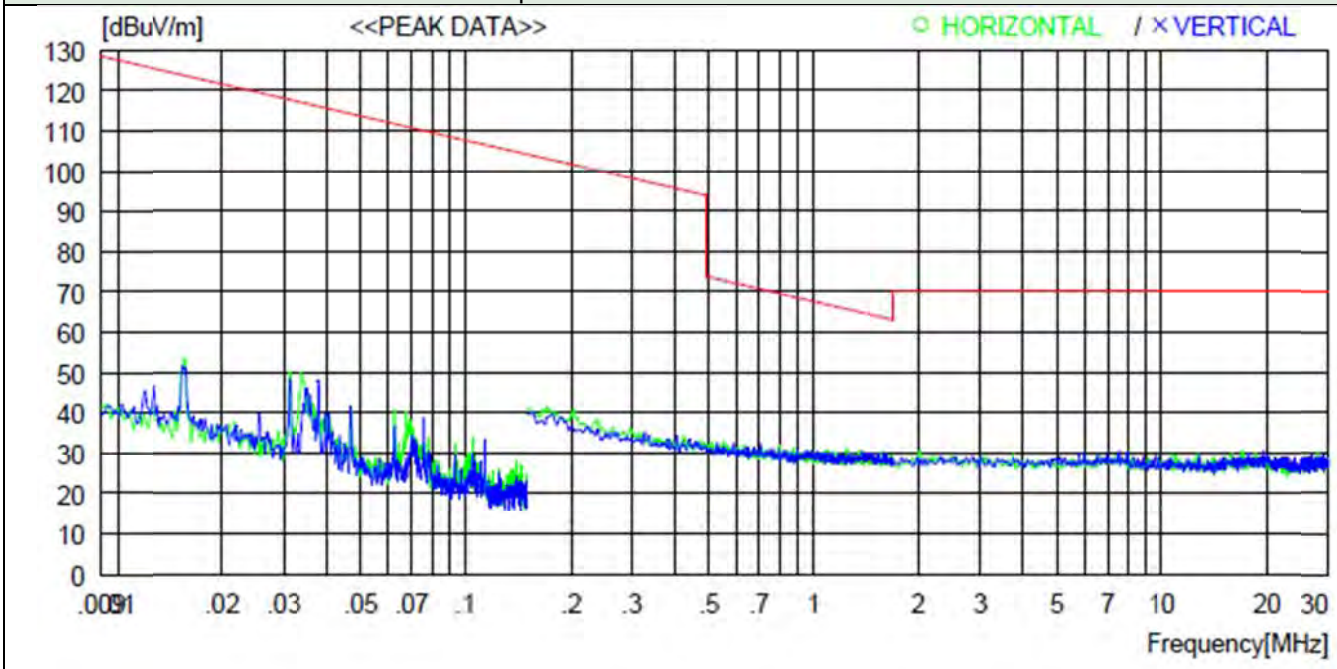
5.6.6 Test Data

Date of Test	2018-08-10	Temperature	(22 ± 2) °C
		Relative humidity	(50 ± 2) % R.H.
Measurement Frequency Range		9 kHz ~ 25 GHz	
Test Result	***PASS***	Tested By	In-yong Song

Frequency range	Detector Mode	Resolution BW	Video BW	Video Filtering	Measurement distance
Below 30 MHz	Peak or Q.P.	9 kHz	100 kHz	-	3 m
30 MHz ~ 1 000 MHz	Peak or Q.P.	100 kHz	300 kHz	-	3 m

5.6.6.1 Test Data below 30 MHz

Graphical Test Data – Below 30 MHz

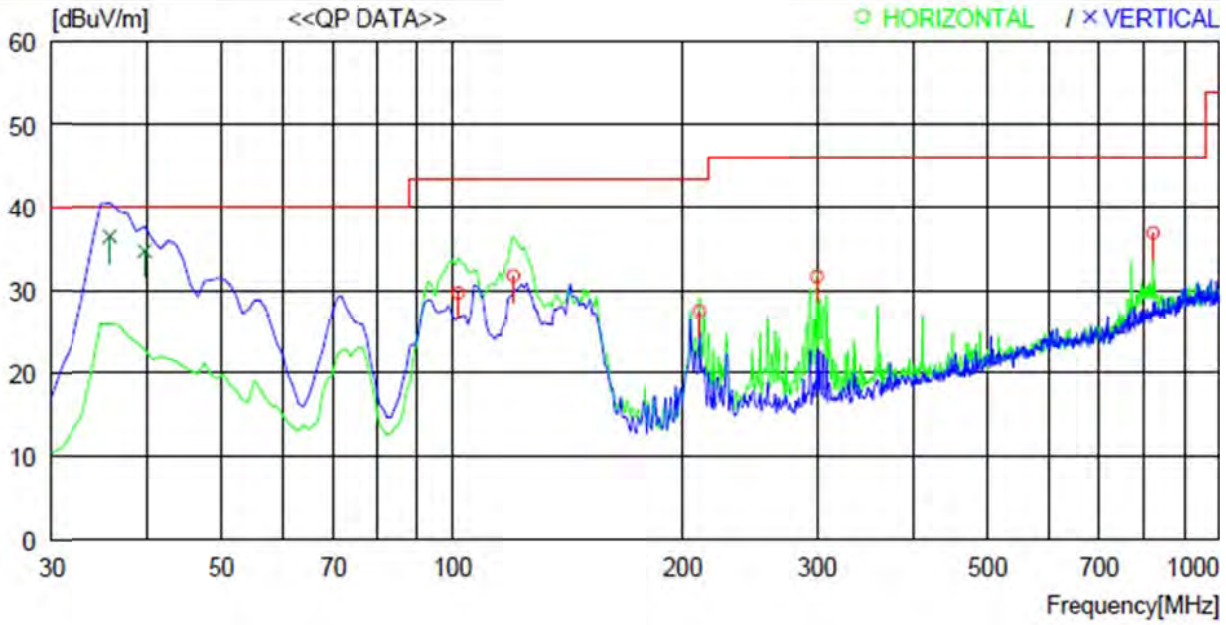


Tabulated Test Data – Low / Middle / High Channel

Frequency (MHz)	Receiver Reading (dBuV)	Detector Mode	Pol.	Ant. Factor (dB/m)	Corr. Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Azimuth (Degree)
* Spurious emissions that 20 dB below the limits didn't be recorded										

5.6.6.2 Test Data from 30 MHz to 1 GHz

Graphical Test Data – Below 1 GHz(802.11g, Middle channel)



Tabulated Test Data

Frequency (MHz)	Pol.	Detect Mode	Reading (dBμV)	Factor* (dB)	Loss* (dB)	Gain (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
35.82	V	QP	51.0	11.2	7.0	32.7	36.5	40.0	3.5
39.70	V	QP	47.7	12.7	7.1	32.7	34.8	40.0	5.2
101.78	H	QP	42.8	11.6	8.0	32.7	29.7	43.5	13.8
120.21	H	QP	47.4	8.9	8.2	32.7	31.8	43.5	11.7
210.42	H	QP	39.4	11.7	9.0	32.6	27.5	43.5	16.0
299.66	H	QP	41.4	13.4	9.6	32.7	31.7	46.0	14.3
820.54	H	QP	35.9	21.5	12.3	32.8	36.9	46.0	9.1

Note: “H” means Horizontal polarity, “V” means Vertical polarity.

Middle channel at 802.11g is worst case configuration.

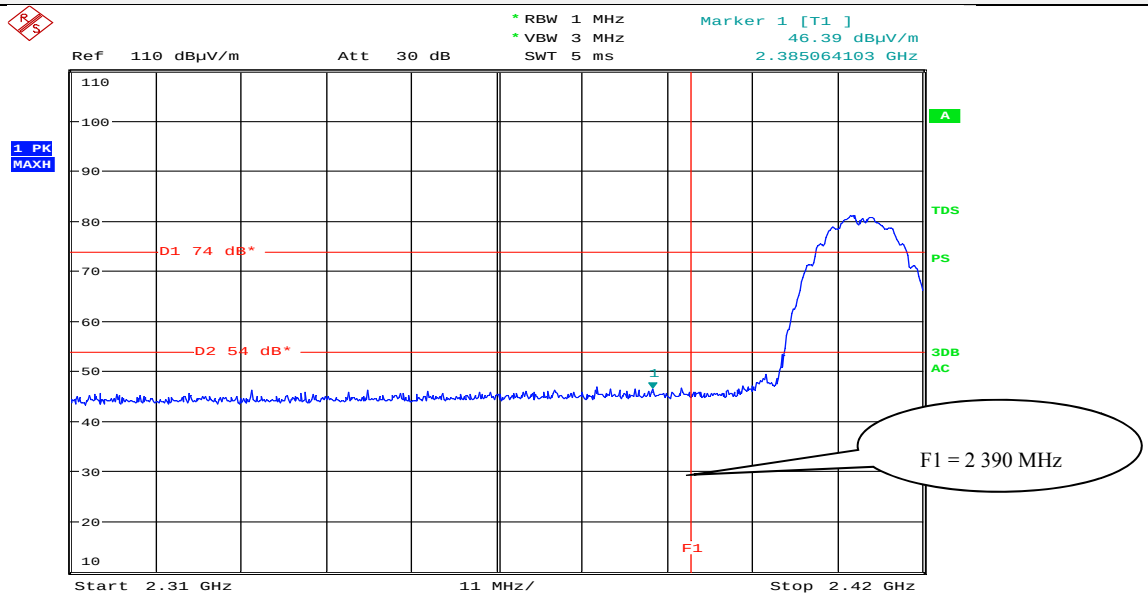
5.6.6.3 Test Data above 1 GHz

Detector Mode	Resolution BW	Video BW	Sweep Time	Measurement distance
PEAK	1 MHz	3 MHz	Auto	3 m
RMS	1 MHz	3 MHz	Auto	3 m

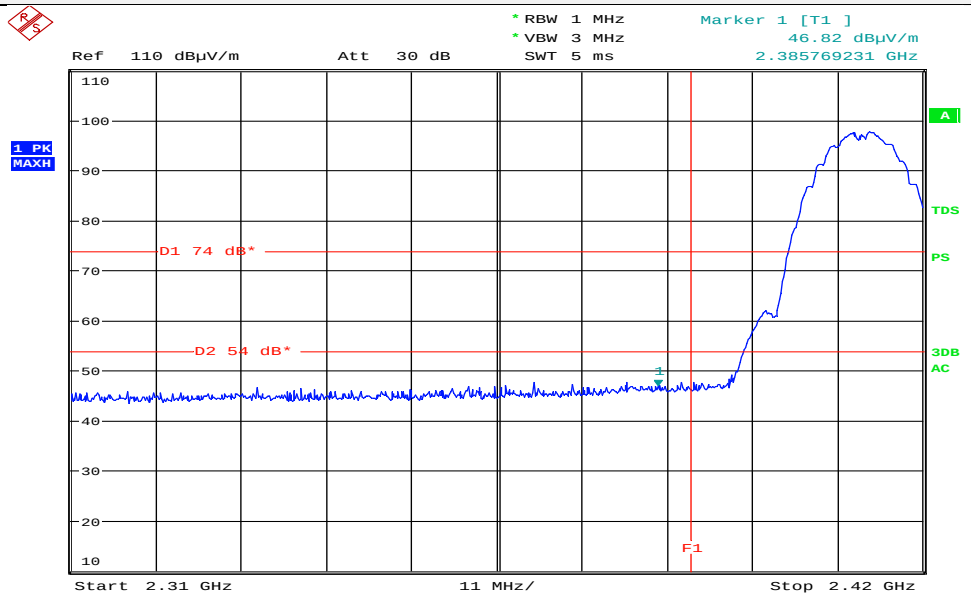
5.6.6.3.1 Test Data for Band edge (Restricted band) – 802.11b

Graphical Test Data – Low Channel (Peak)

Horizontal



Vertical



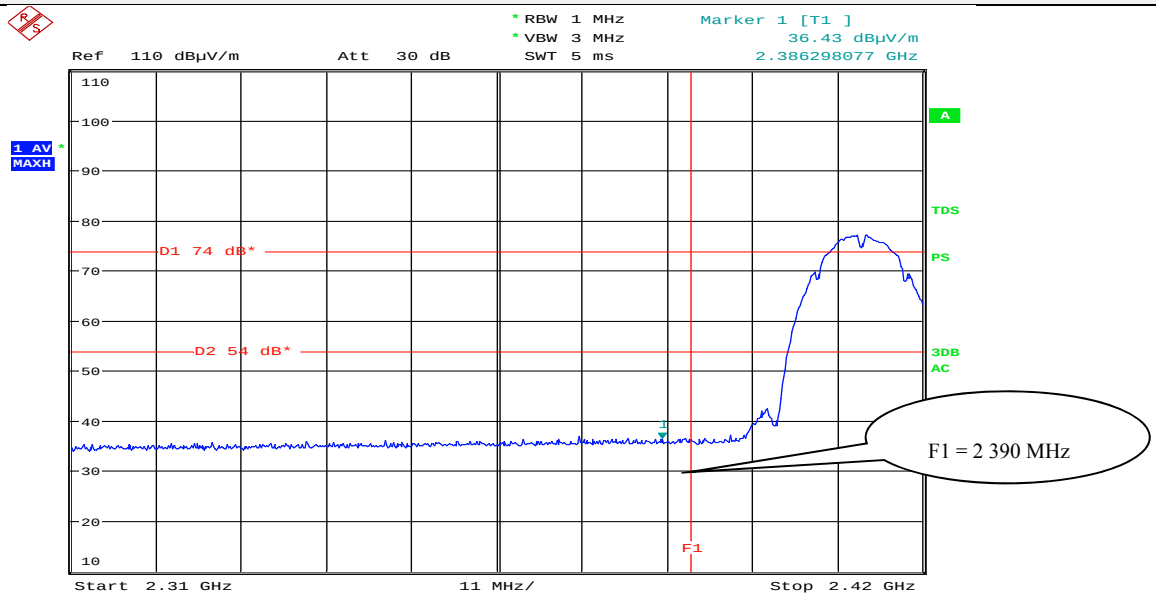
Tabulated Test Data – Low Channel

Freq. (MHz)	Detector Mode	Pol.	Receiver Reading (dBuV/m)	Duty Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Azimuth (Deg)
2 385.1	Peak	H	46.39	-	46.39	74.00	27.61	100	110
2 385.8	Peak	V	46.82	-	46.82	74.00	27.18	170	120

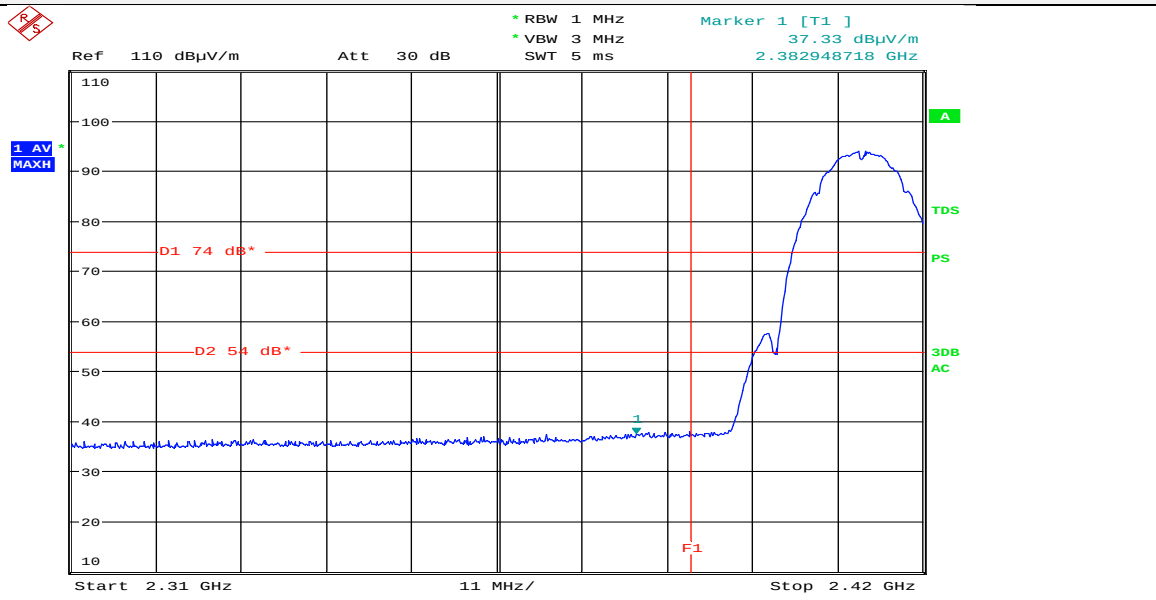
NOTE: "H" means Horizontal polarity, "V" means Vertical polarity.

Graphical Test Data – Low Channel (Average)

Horizontal



Vertical



Tabulated Test Data – Low Channel

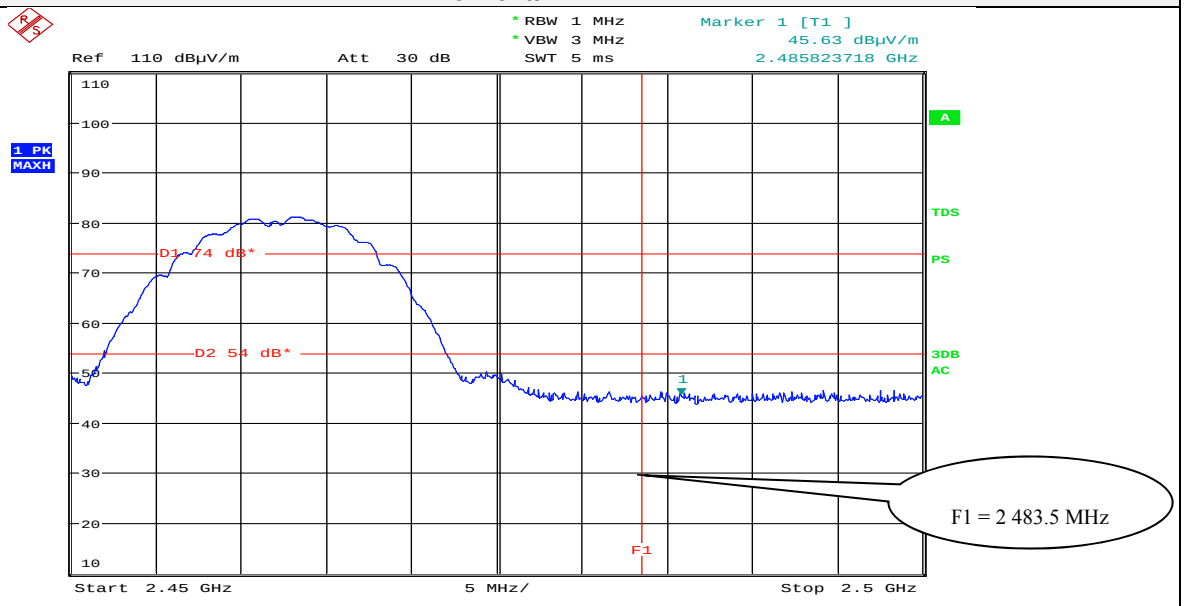
Freq. (MHz)	Detector Mode	Pol.	Receiver Reading (dBuV/m)	Duty Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Azimuth (Deg)
2 386.3	Average	H	36.43	-	36.43	54.00	17.57	100	110
2 383.0	Average	V	37.33	-	37.33	54.00	16.67	170	120

NOTE: "H" means Horizontal polarity, "V" means Vertical polarity.

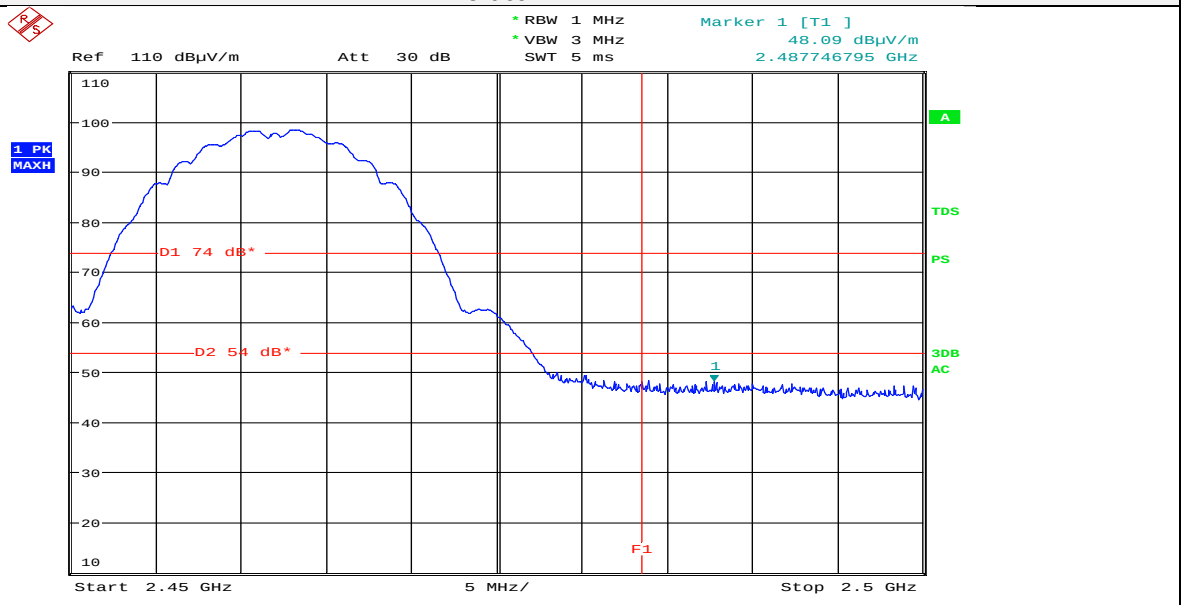
Result = Receiver Reading + Duty Factor

Graphical Test Data – High Channel (Peak)

Horizontal



Vertical



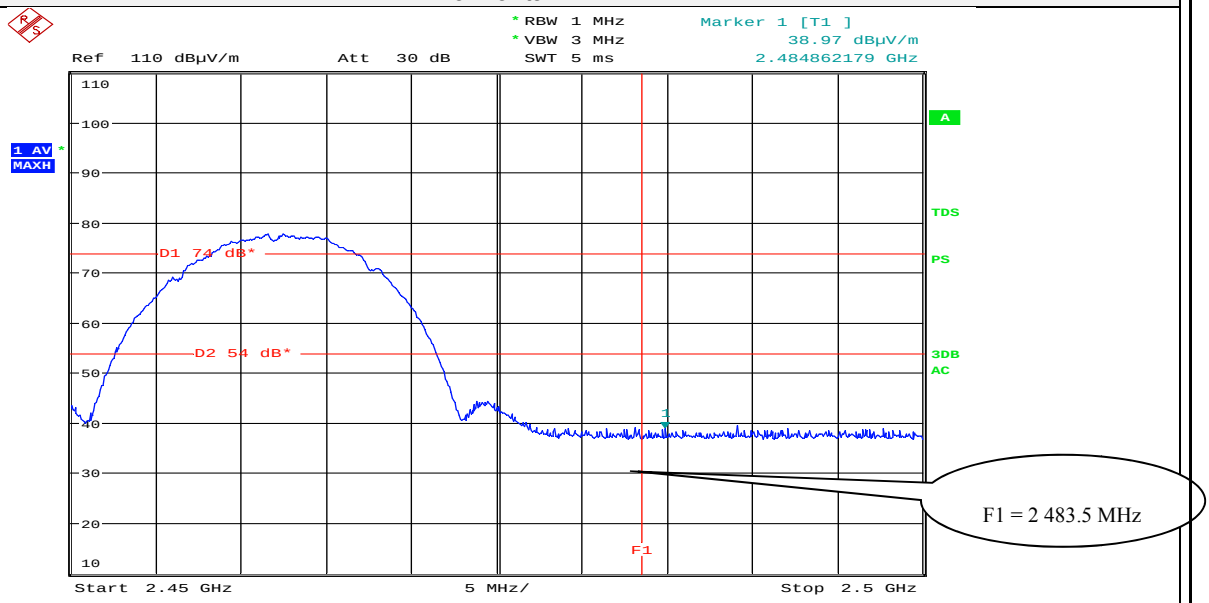
Tabulated Test Data – High Channel

Freq. (MHz)	Detector Mode	Pol.	Receiver Reading (dBuV/m)	Duty Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Azimuth (Deg)
2 485.8	Peak	H	45.63	-	45.63	74.00	28.37	100	120
2 487.8	Peak	V	48.09	-	48.09	74.00	25.91	150	120

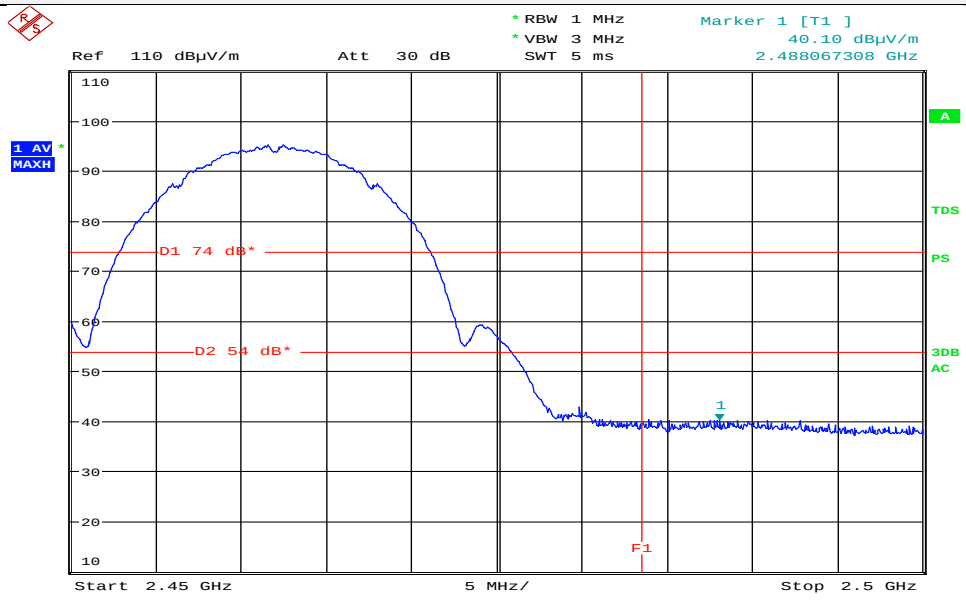
NOTE: "H" means Horizontal polarity, "V" means Vertical polarity.

Graphical Test Data – High Channel (Average)

Horizontal



Vertical



Tabulated Test Data – High Channel

Freq. (MHz)	Detector Mode	Pol.	Receiver Reading (dBuV/m)	Duty Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Azimuth (Deg)
2 484.9	Average	H	38.97	-	38.97	54.00	15.03	100	120
2 488.1	Average	V	40.10	-	40.10	54.00	13.90	150	120

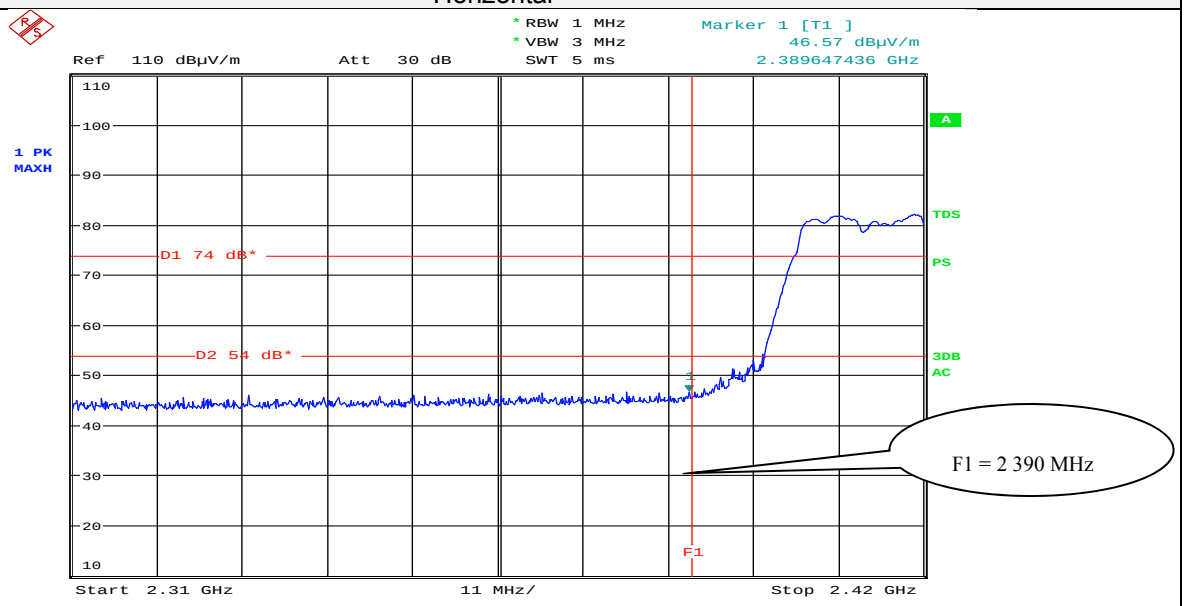
NOTE: "H" means Horizontal polarity, "V" means Vertical polarity.

Result = Receiver Reading + Duty Factor

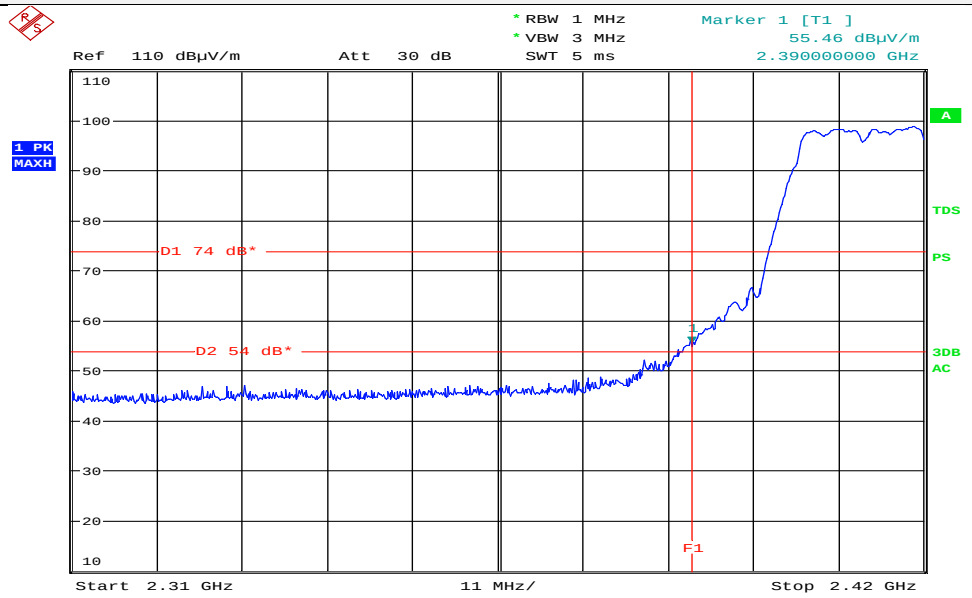
5.6.6.3.2 Test Data for Band edge (Restricted band) – 802.11g

Graphical Test Data – Low Channel (Peak)

Horizontal



Vertical



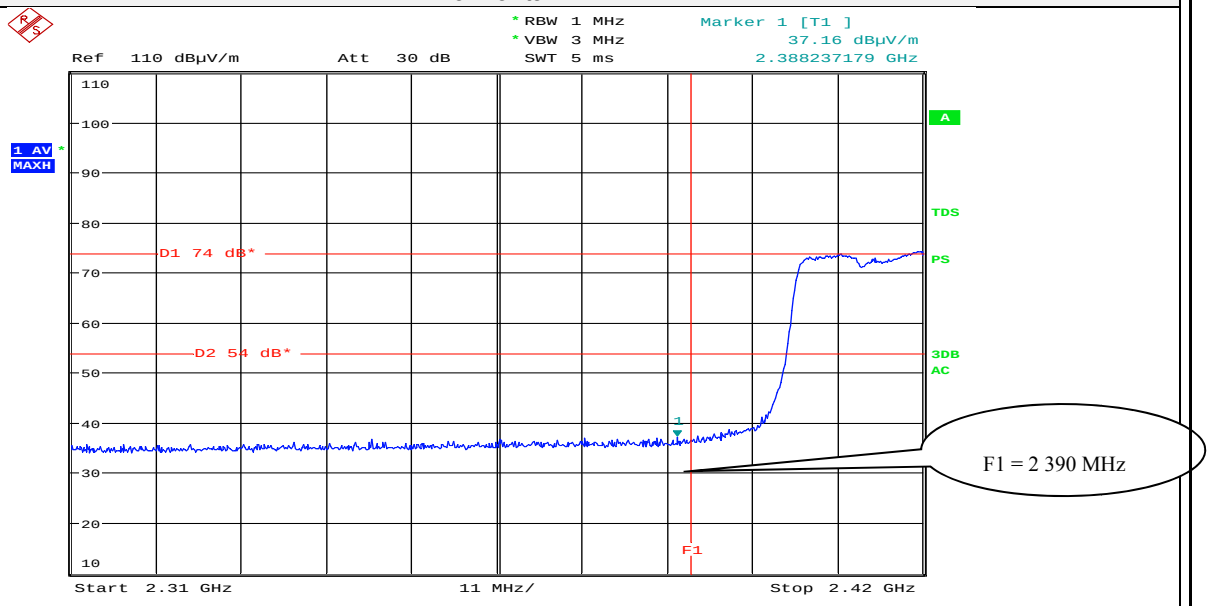
Tabulated Test Data – Low Channel

Freq. (MHz)	Detector Mode	Pol.	Receiver Reading (dBuV/m)	Duty Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Azimuth (Deg)
2 389.6	Peak	H	46.57	-	46.57	74.00	27.43	100	110
2 390.0	Peak	V	55.46	-	55.46	74.00	18.54	170	120

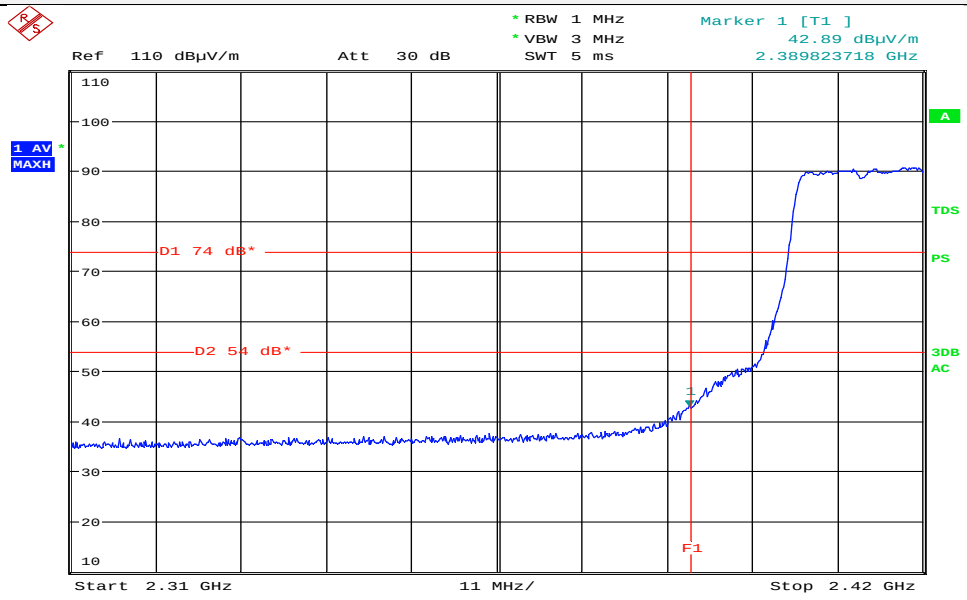
NOTE: "H" means Horizontal polarity, "V" means Vertical polarity.

Graphical Test Data – Low Channel (Average)

Horizontal



Vertical



Tabulated Test Data – Low Channel

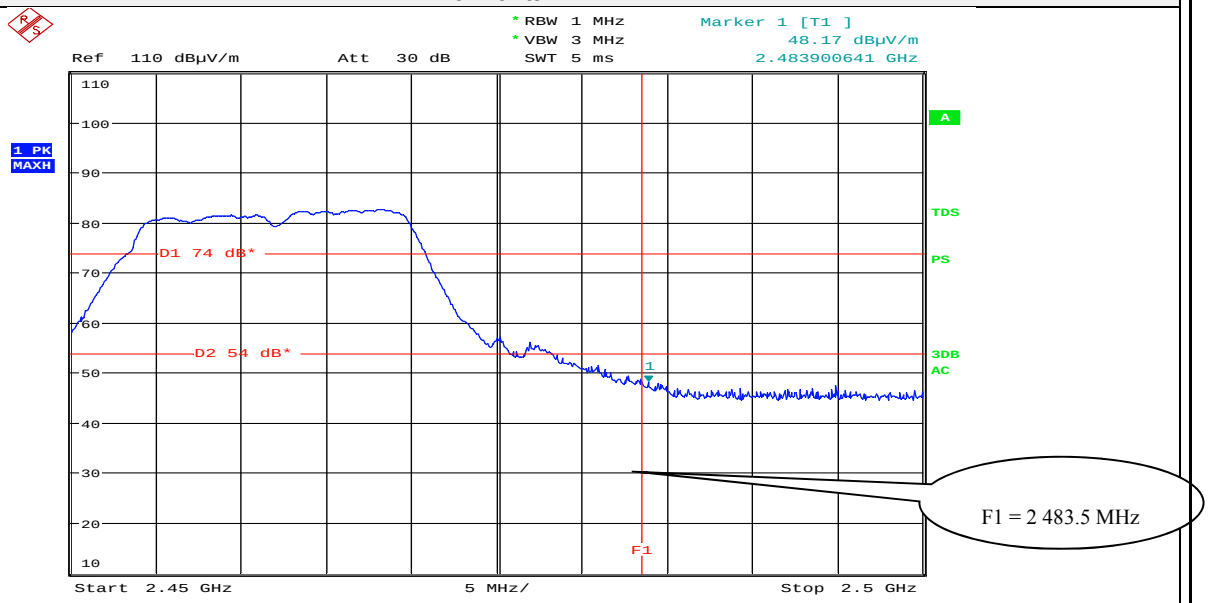
Freq. (MHz)	Detector Mode	Pol.	Receiver Reading (dBuV/m)	Duty Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Azimuth (Deg)
2 388.2	Average	H	37.16	-	37.16	54.00	16.84	100	110
2 389.8	Average	V	42.89	-	42.89	54.00	11.11	170	120

NOTE: "H" means Horizontal polarity, "V" means Vertical polarity.

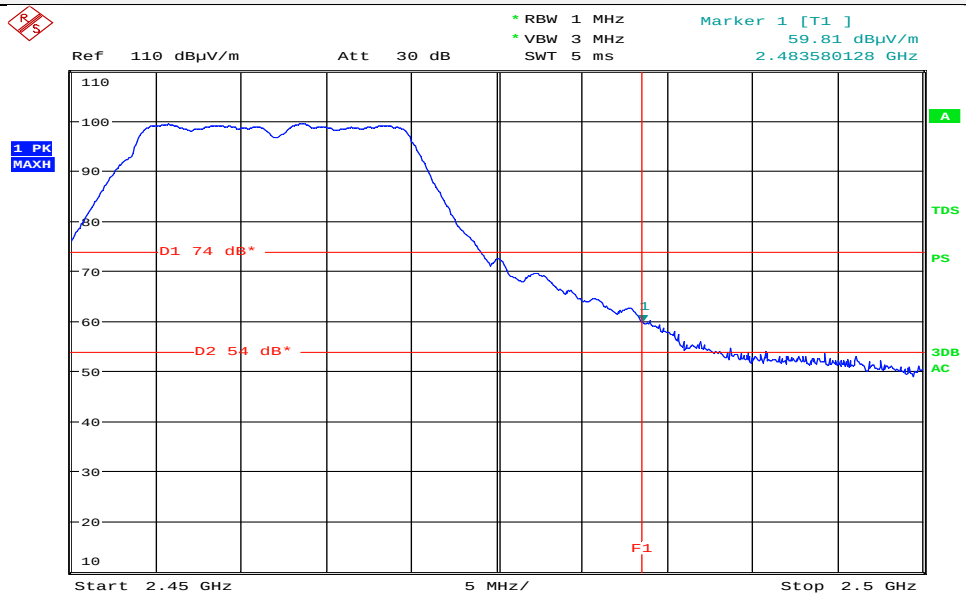
Result = Receiver Reading + Duty Factor

Graphical Test Data – High Channel (Peak)

Horizontal



Vertical



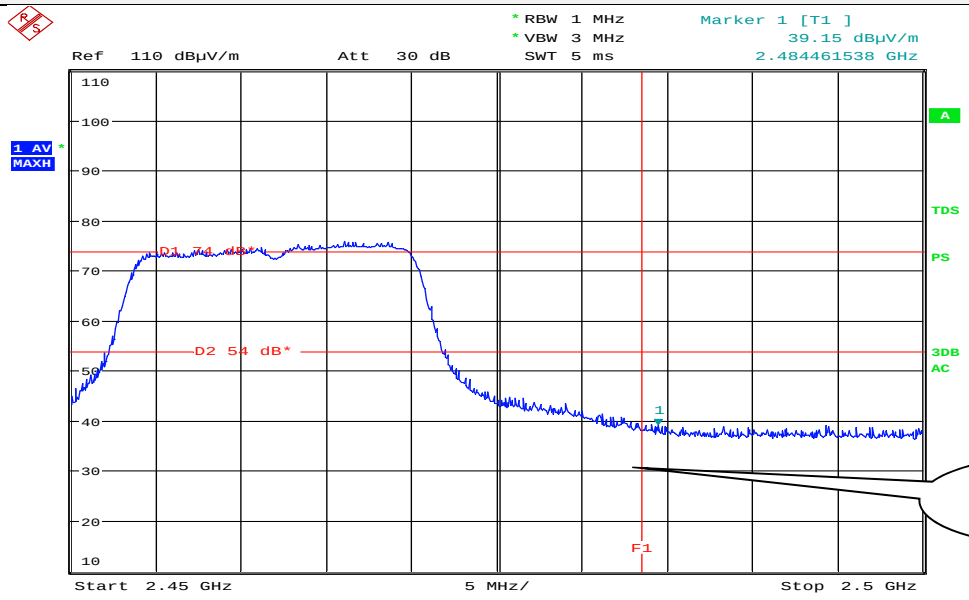
Tabulated Test Data – High Channel

Freq. (MHz)	Detector Mode	Pol.	Receiver Reading (dBuV/m)	Duty Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Azimuth (Deg)
2 483.9	Peak	H	48.17	-	48.17	74.00	25.83	100	110
2 483.6	Peak	V	59.81	-	59.81	74.00	14.19	160	120

NOTE: "H" means Horizontal polarity, "V" means Vertical polarity.

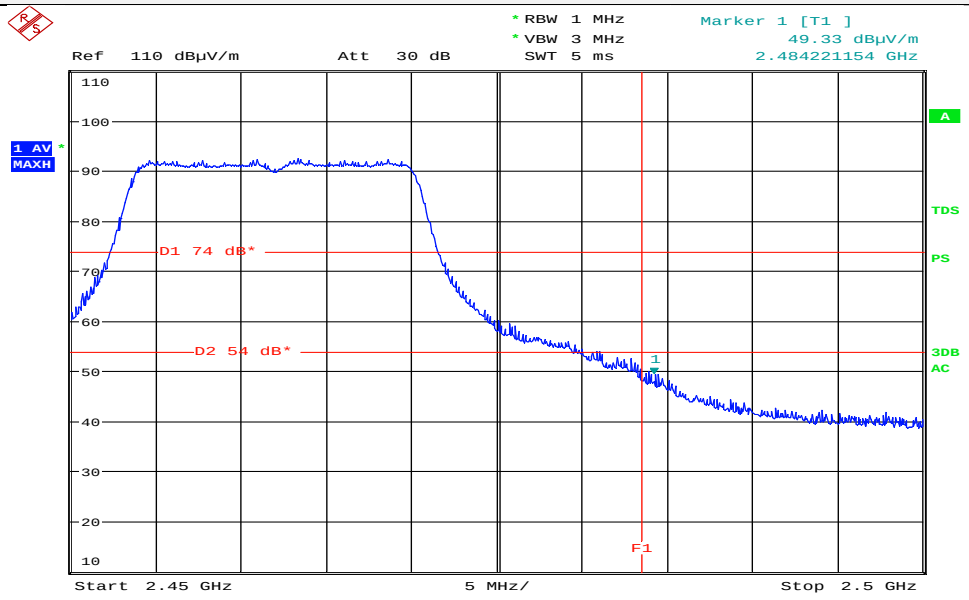
Graphical Test Data – High Channel (Average)

Horizontal



F1 = 2483.5 MHz

Vertical



Tabulated Test Data – High Channel

Freq. (MHz)	Detector Mode	Pol.	Receiver Reading (dBuV/m)	Duty Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Azimuth (Deg)
2 484.5	Average	H	39.15	-	39.15	54.00	14.85	100	110
2 484.2	Average	V	49.33	-	49.33	54.00	4.67	160	120

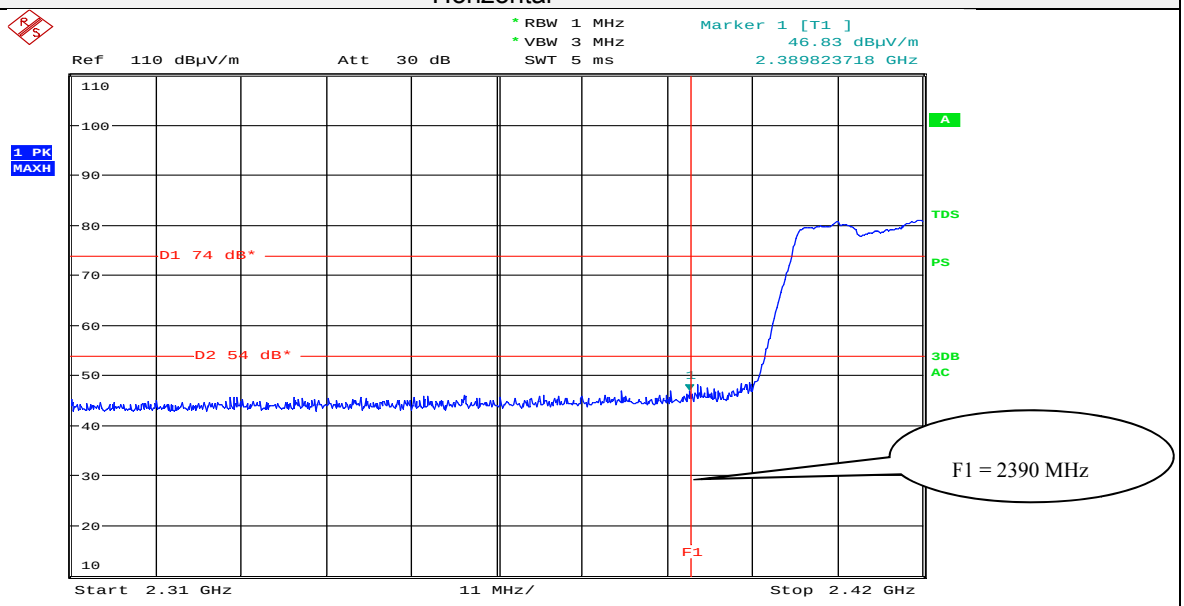
NOTE: "H" means Horizontal polarity, "V" means Vertical polarity.

Result = Receiver Reading + Duty Factor

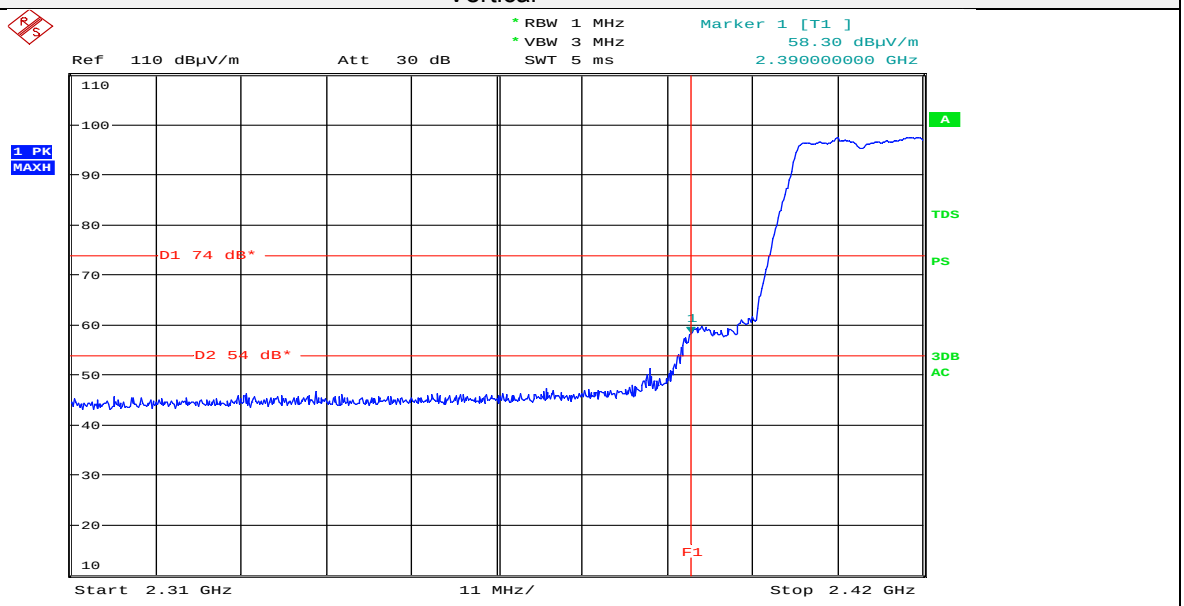
5.6.6.3.3 Test Data for Band edge (Restricted band) – 802.11n HT20

Graphical Test Data – Low Channel (Peak)

Horizontal



Vertical



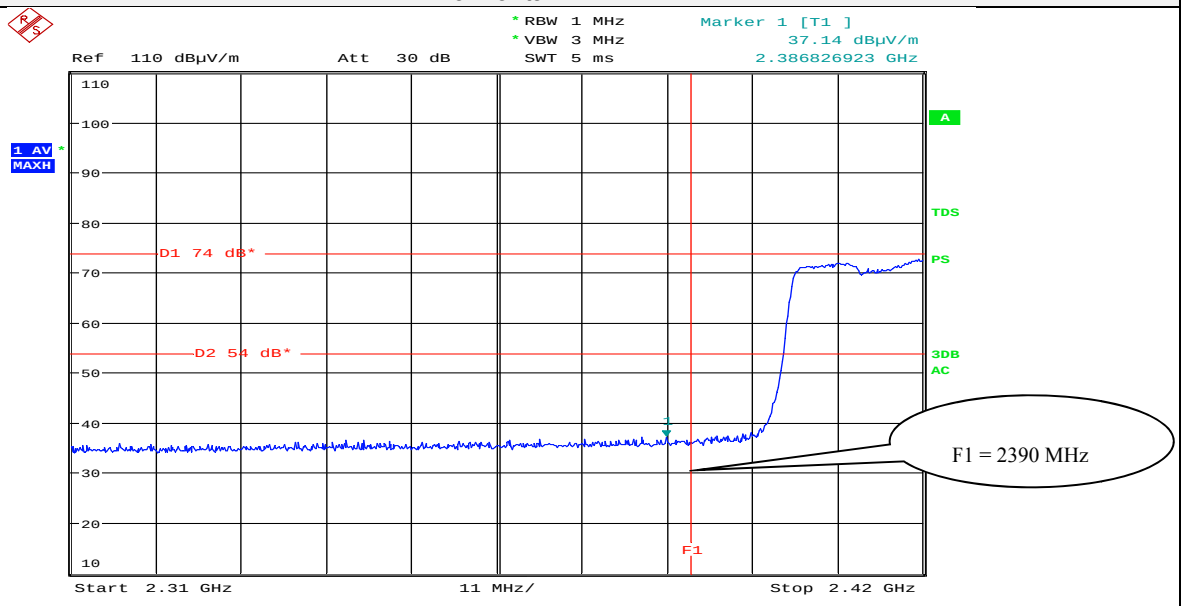
Tabulated Test Data – Low Channel

Freq. (MHz)	Detector Mode	Pol.	Receiver Reading (dBuV/m)	Duty Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Azimuth (Deg)
2 389.8	Peak	H	46.83	-	46.83	74.00	27.17	100	120
2 390.0	Peak	V	58.30	-	58.30	74.00	15.70	170	120

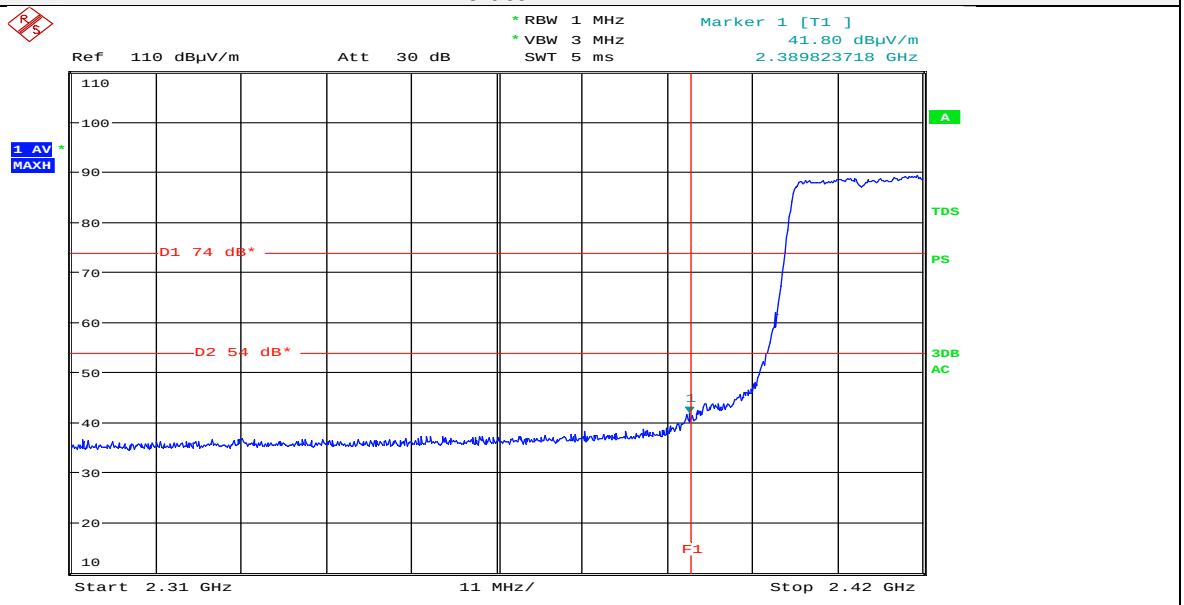
NOTE: "H" means Horizontal polarity, "V" means Vertical polarity.

Graphical Test Data – Low Channel (Average)

Horizontal



Vertical



Tabulated Test Data – Low Channel

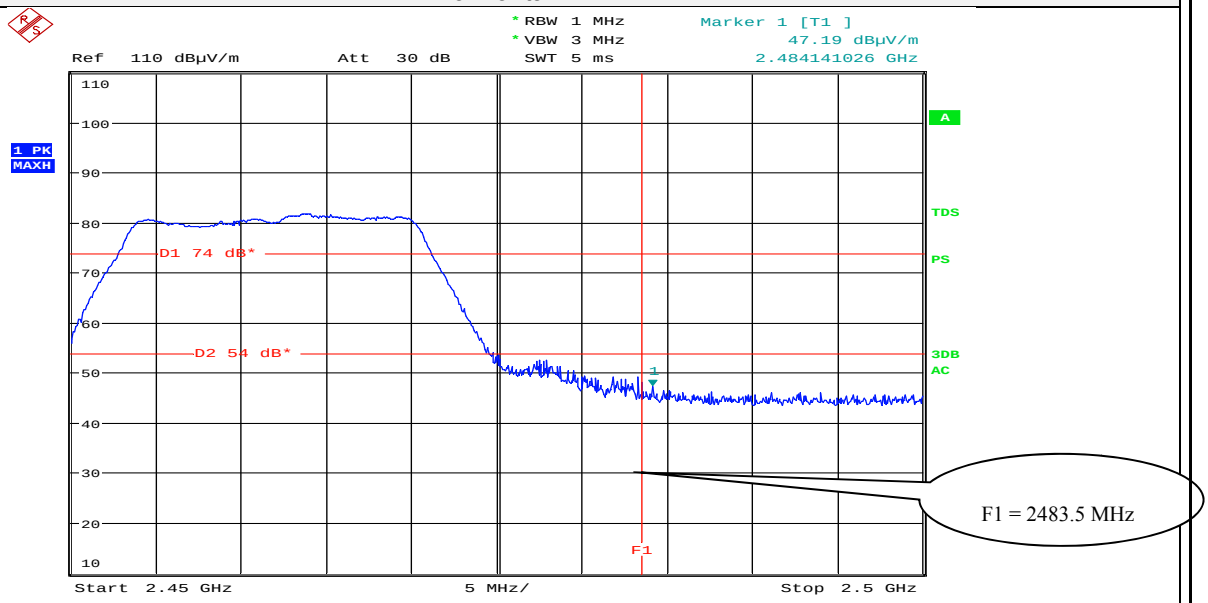
Freq. (MHz)	Detector Mode	Pol.	Receiver Reading (dBuV/m)	Duty Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Azimuth (Deg)
2 386.8	Average	H	37.14	-	37.14	54.00	16.86	100	120
2 389.8	Average	V	41.80	-	41.80	54.00	12.20	170	120

NOTE: "H" means Horizontal polarity, "V" means Vertical polarity.

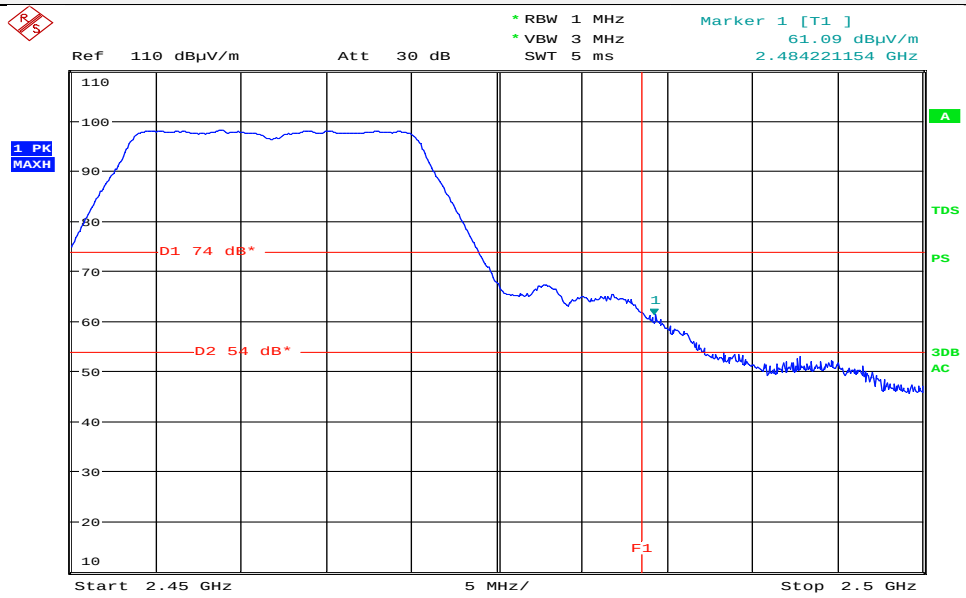
Result = Receiver Reading + Duty Factor

Graphical Test Data – High Channel (Peak)

Horizontal



Vertical



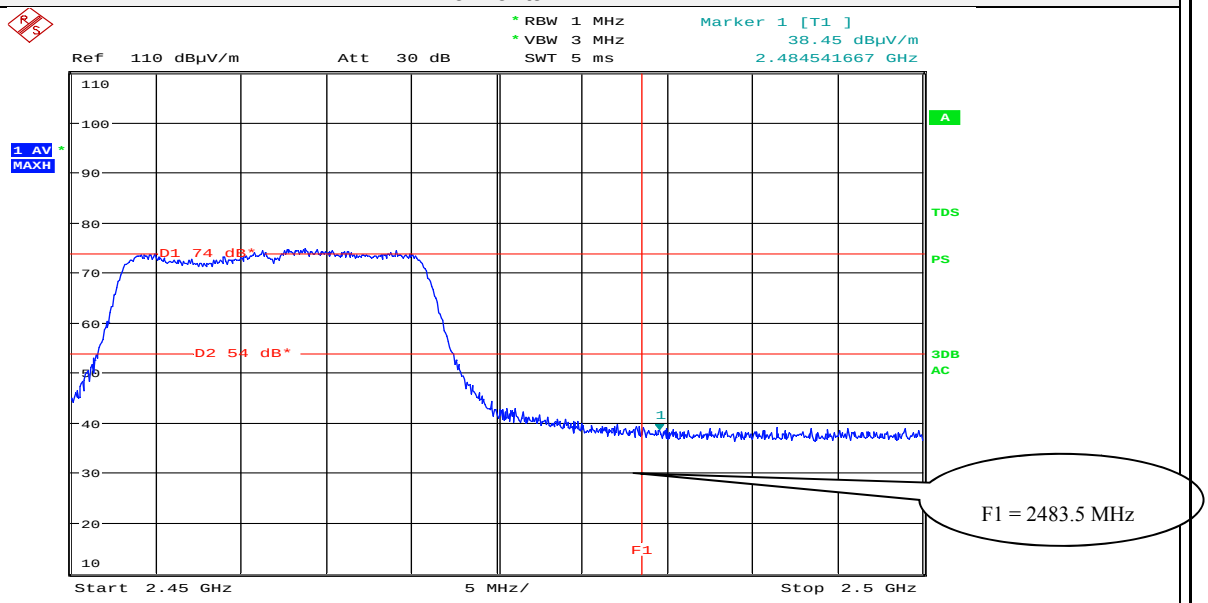
Tabulated Test Data – High Channel

Freq. (MHz)	Detector Mode	Pol.	Receiver Reading (dBuV/m)	Duty Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Azimuth (Deg)
2 484.1	Peak	H	47.19	-	47.19	74.00	26.81	100	120
2 484.2	Peak	V	61.09	-	61.09	74.00	12.91	160	120

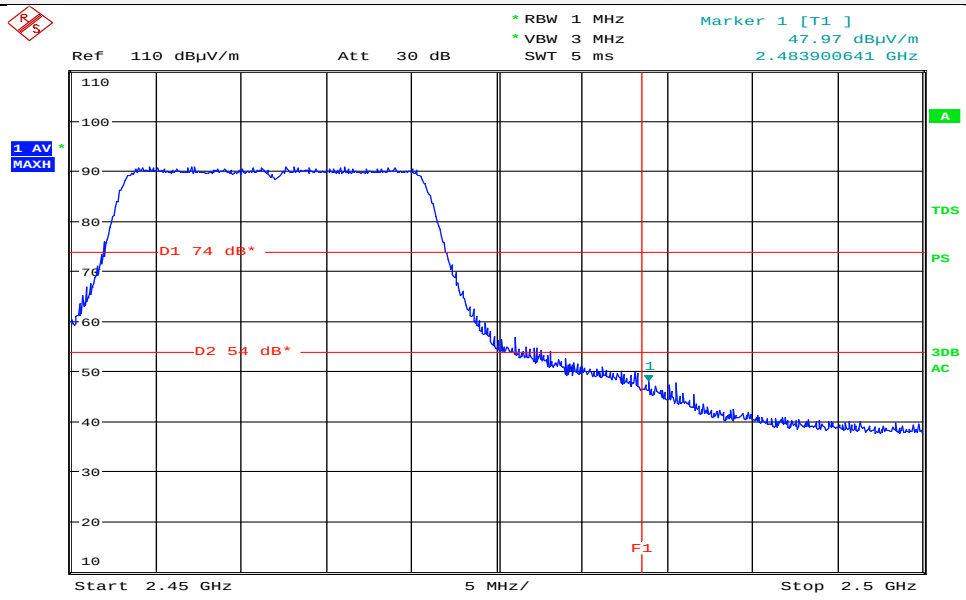
NOTE: "H" means Horizontal polarity, "V" means Vertical polarity.

Graphical Test Data – High Channel (Average)

Horizontal



Vertical



Tabulated Test Data – High Channel

Freq. (MHz)	Detector Mode	Pol.	Receiver Reading (dBuV/m)	Duty Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Azimuth (Deg)
2 484.5	Average	H	38.45	-	38.45	54.00	15.55	100	120
2 483.9	Average	V	47.97	-	47.97	54.00	6.03	160	120

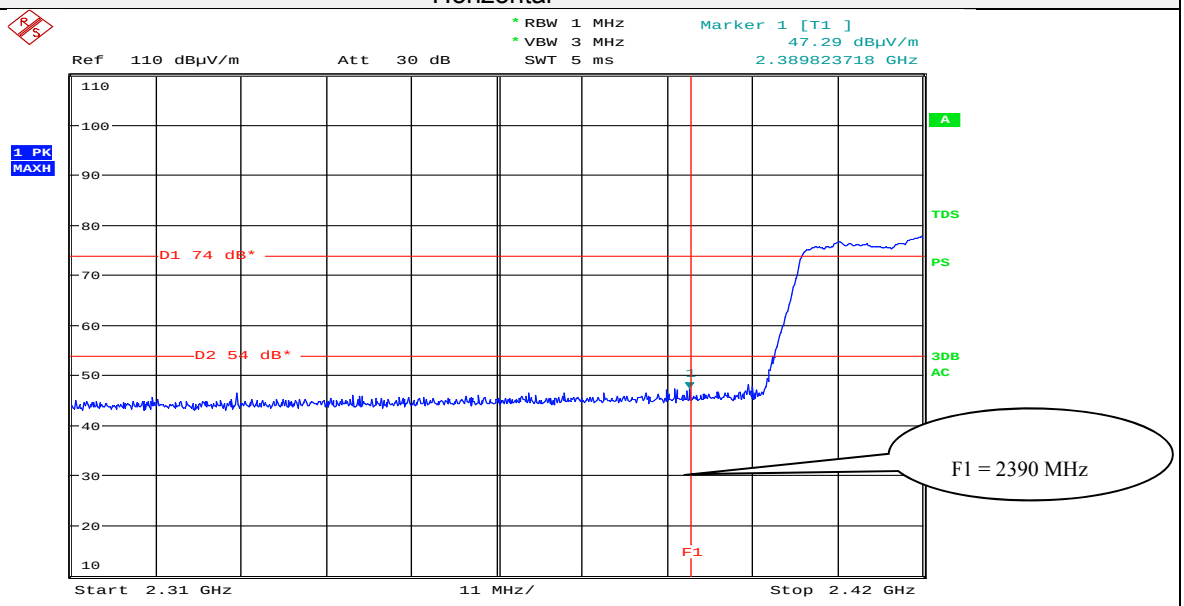
NOTE: "H" means Horizontal polarity, "V" means Vertical polarity.

Result = Receiver Reading + Duty Factor

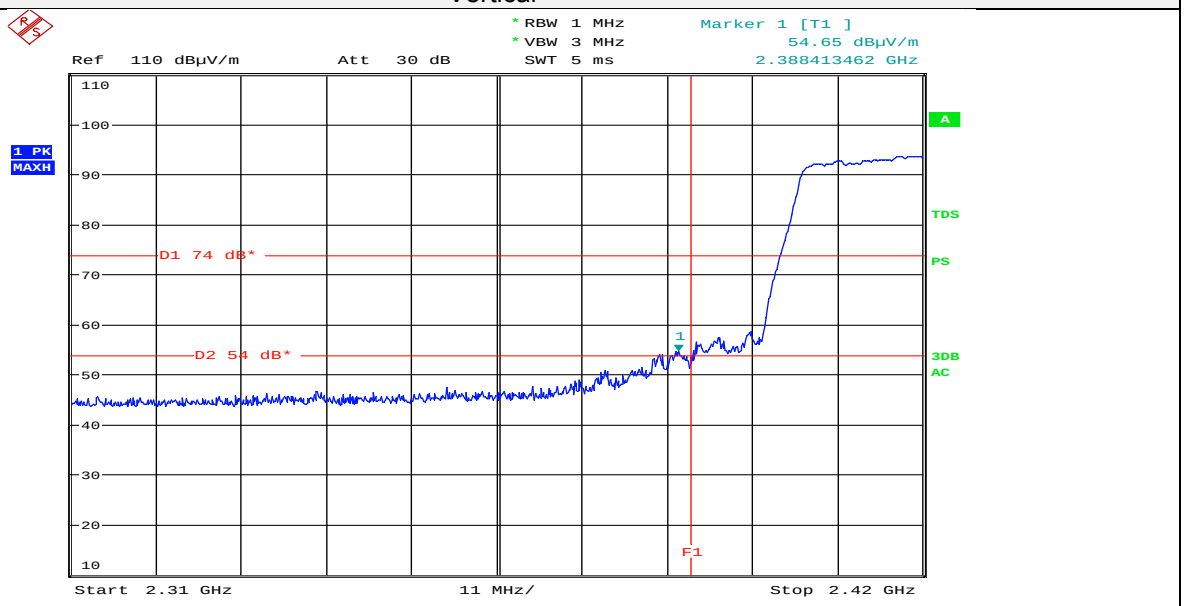
5.6.6.3.4 Test Data for Band edge (Restricted band) – 802.11n HT40

Graphical Test Data – Low Channel (Peak)

Horizontal



Vertical



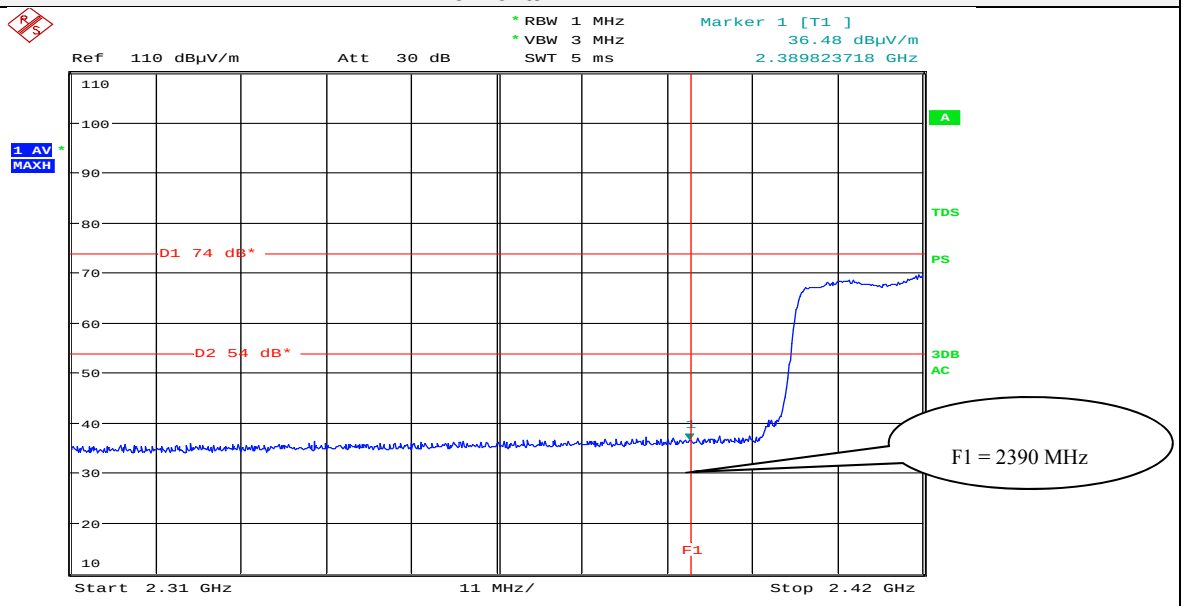
Tabulated Test Data – Low Channel

Freq. (MHz)	Detector Mode	Pol.	Receiver Reading (dBuV/m)	Duty Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Azimuth (Deg)
2 389.8	Peak	H	47.29	-	47.29	74.00	26.71	100	35
2 388.4	Peak	V	54.65	-	54.65	74.00	19.35	170	120

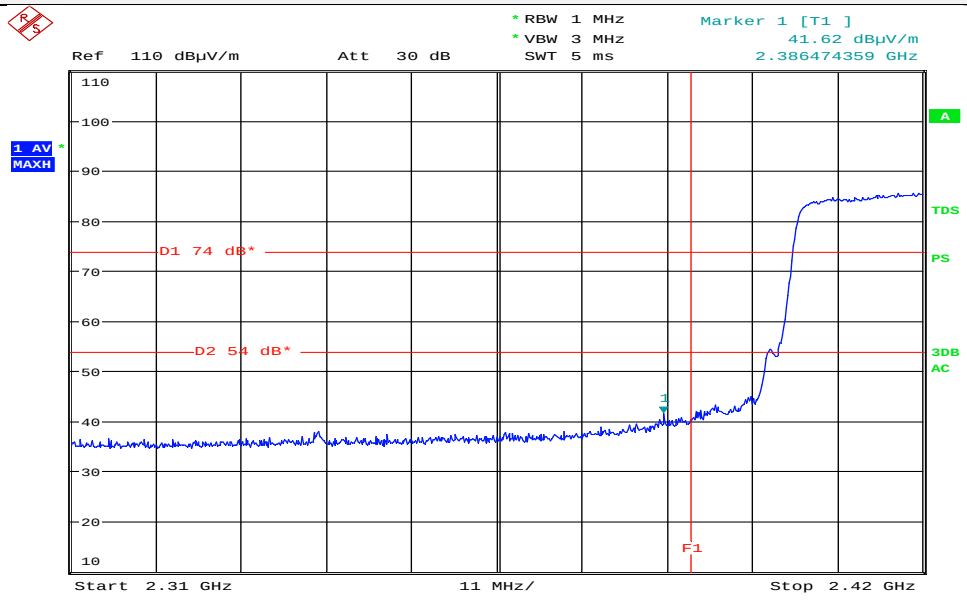
NOTE: "H" means Horizontal polarity, "V" means Vertical polarity.

Graphical Test Data – Low Channel (Average)

Horizontal



Vertical



Tabulated Test Data – Low Channel

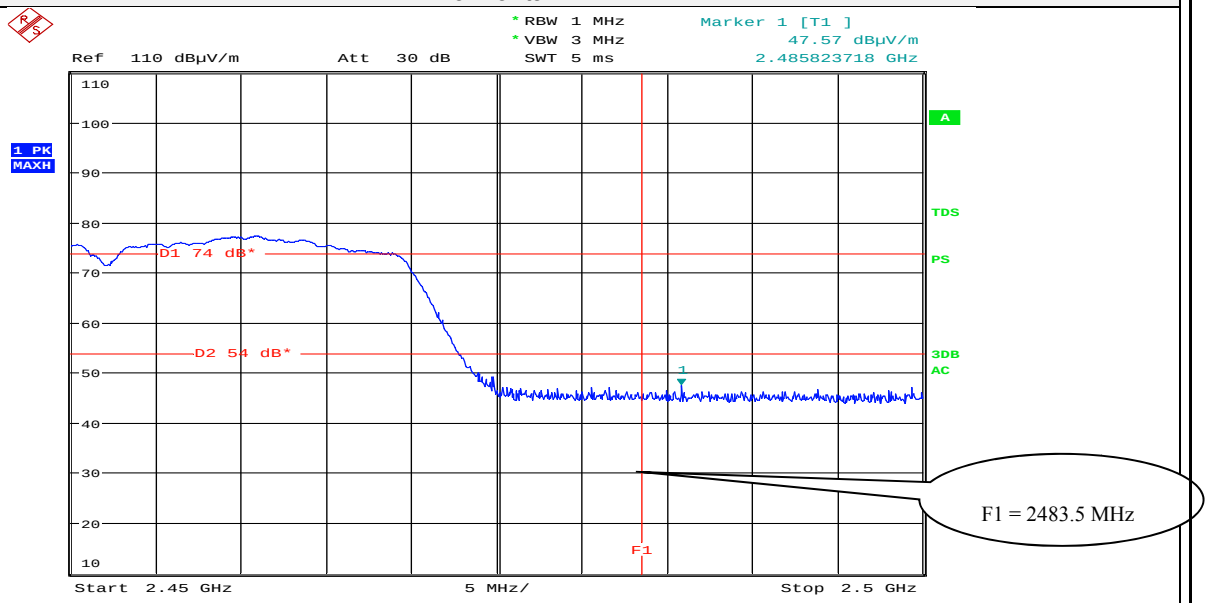
Freq. (MHz)	Detector Mode	Pol.	Receiver Reading (dBuV/m)	Duty Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Azimuth (Deg)
2 389.8	Average	H	36.48	-	36.48	54.00	17.52	100	35
2 386.5	Average	V	41.62	-	41.62	54.00	12.38	170	120

NOTE: "H" means Horizontal polarity, "V" means Vertical polarity.

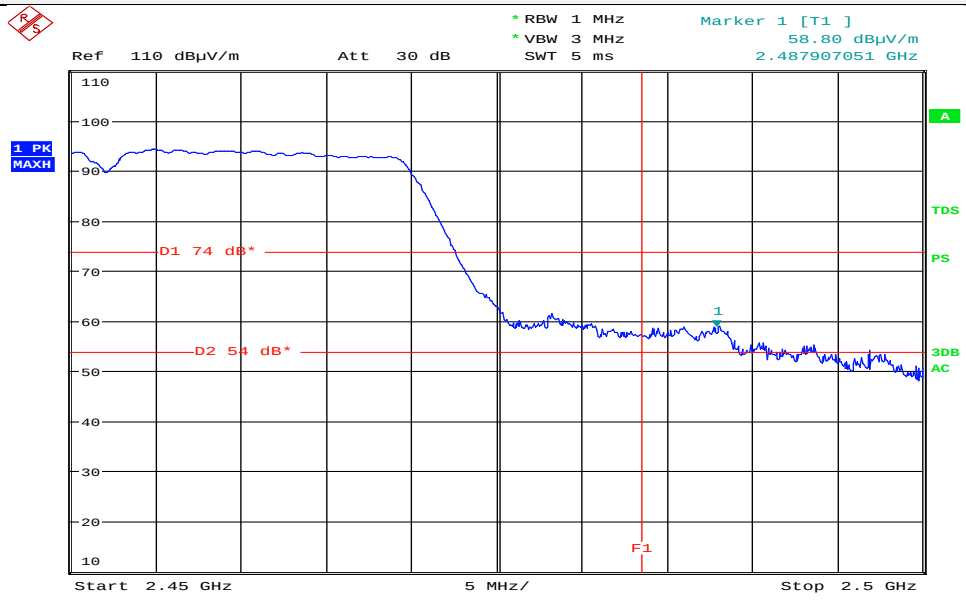
Result = Receiver Reading + Duty Factor

Graphical Test Data – High Channel (Peak)

Horizontal



Vertical



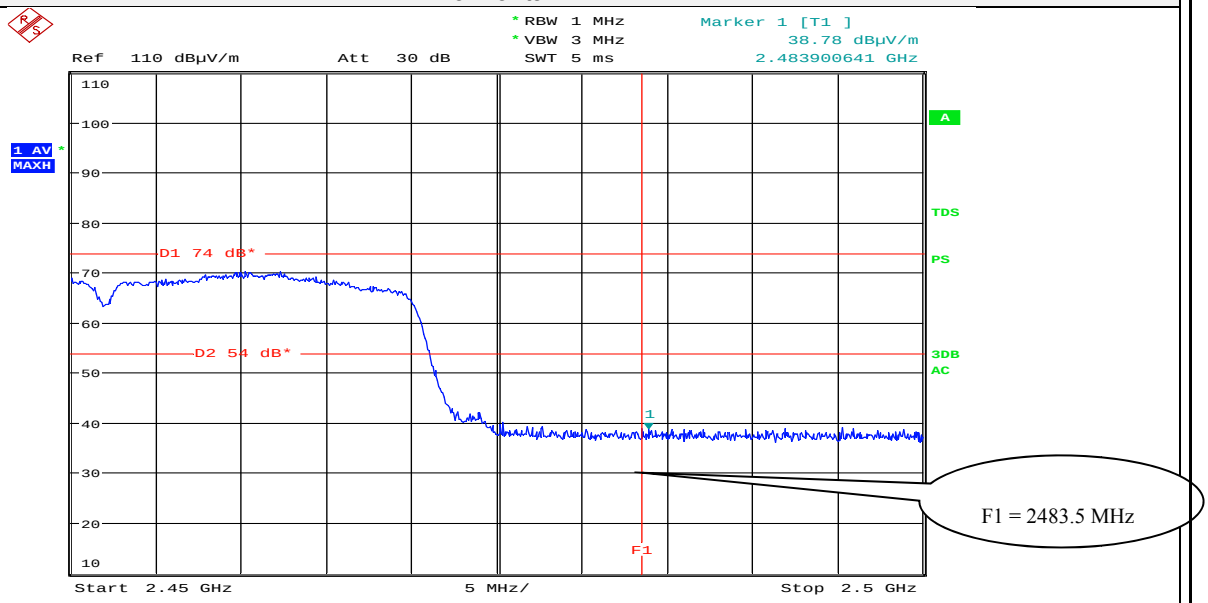
Tabulated Test Data – High Channel

Freq. (MHz)	Detector Mode	Pol.	Receiver Reading (dBuV/m)	Duty Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Azimuth (Deg)
2 485.8	Peak	H	47.57	-	47.57	74.00	26.43	100	120
2 487.9	Peak	V	58.80	-	58.80	74.00	15.20	160	120

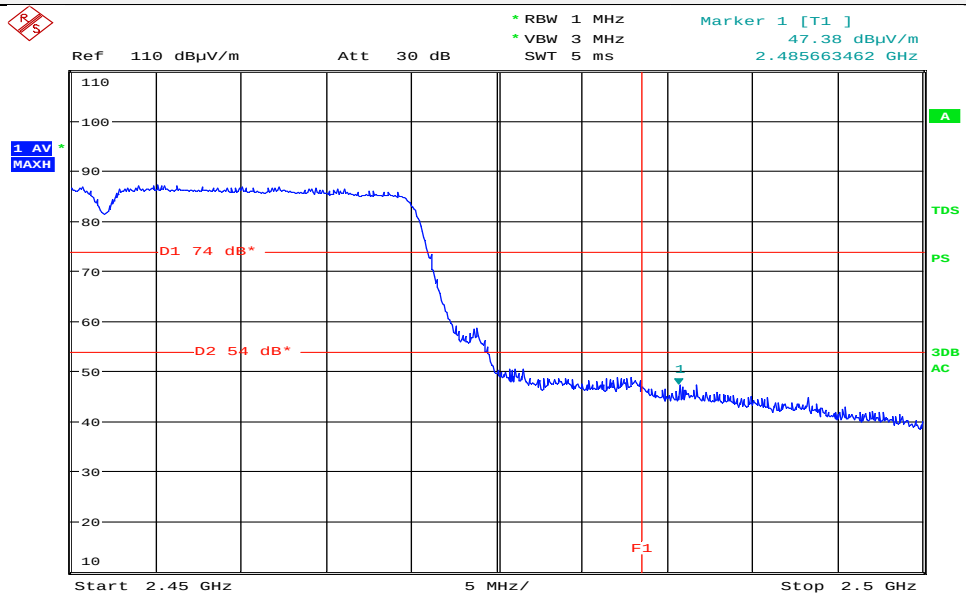
NOTE: "H" means Horizontal polarity, "V" means Vertical polarity.

Graphical Test Data – High Channel (Average)

Horizontal



Vertical



Tabulated Test Data – High Channel

Freq. (MHz)	Detector Mode	Pol.	Receiver Reading (dBuV/m)	Duty Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Azimuth (Deg)
2 483.9	Average	H	38.78	-	38.78	54.00	15.22	100	120
2 485.7	Average	V	47.38	-	47.38	54.00	6.62	160	120

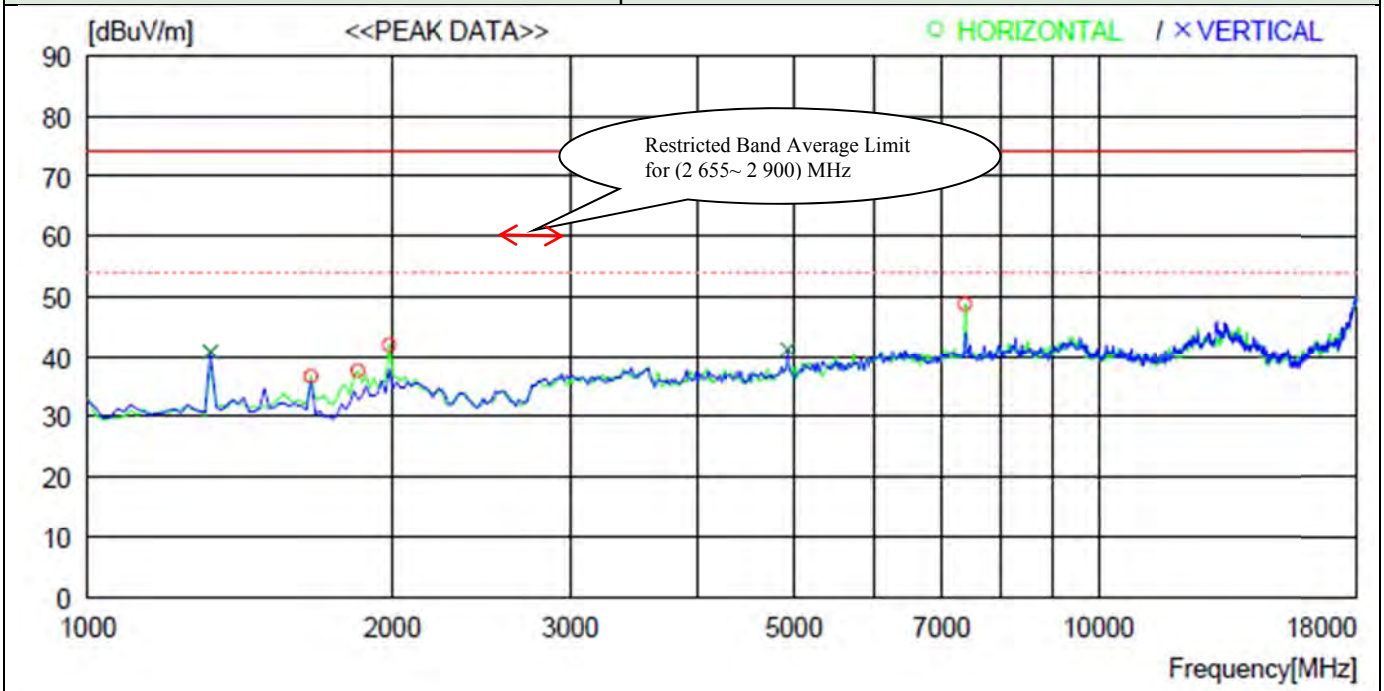
NOTE: "H" means Horizontal polarity, "V" means Vertical polarity.

Result = Receiver Reading + Duty Factor

5.6.6.4 Test Data for Harmonic & Spurious emission (1 GHz to 18 GHz)

5.6.6.4.1 Operating mode: 802.11b

Graphical Test Data



Freq. (MHz)	Detector Mode	Pol.	Ant. Factor (dB/m)	Corr. Factor (dB)	Receiver Reading (dBuV/m)	Duty Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Azimuth (Deg)
Low / Middle / High Channel											
* Spurious emissions that 20 dB below the limits didn't be recorded											

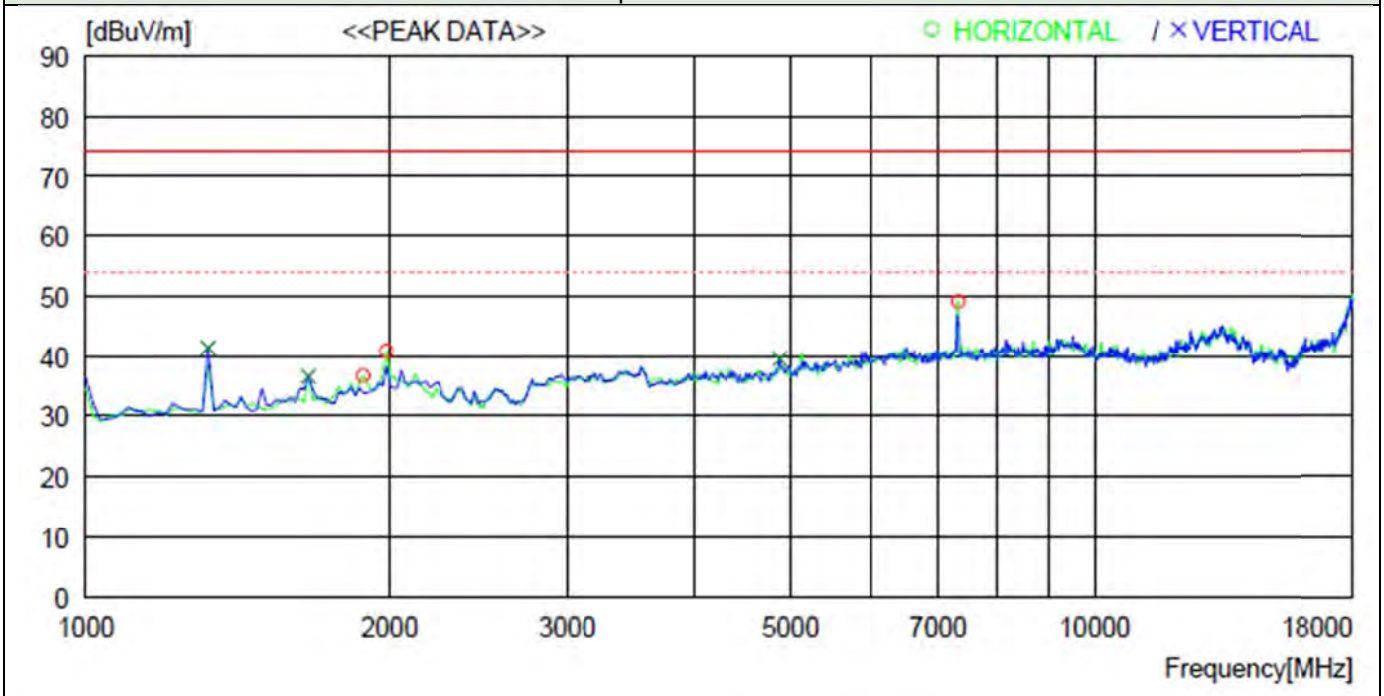
NOTE: Peak results are met average limit, so average measurement was not performed.

Note. "H" means Horizontal polarity, "V" means Vertical polarity.

High channel at 802.11b is worst case configuration.

5.6.6.4.2 Operating mode: 802.11g

Graphical Test Data



Freq. (MHz)	Detector Mode	Pol.	Ant. Factor (dB/m)	Corr. Factor (dB)	Receiver Reading (dBuV/m)	Duty Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Azimuth (Deg)
Low / Middle / High Channel											
* Spurious emissions that 20 dB below the limits didn't be recorded											

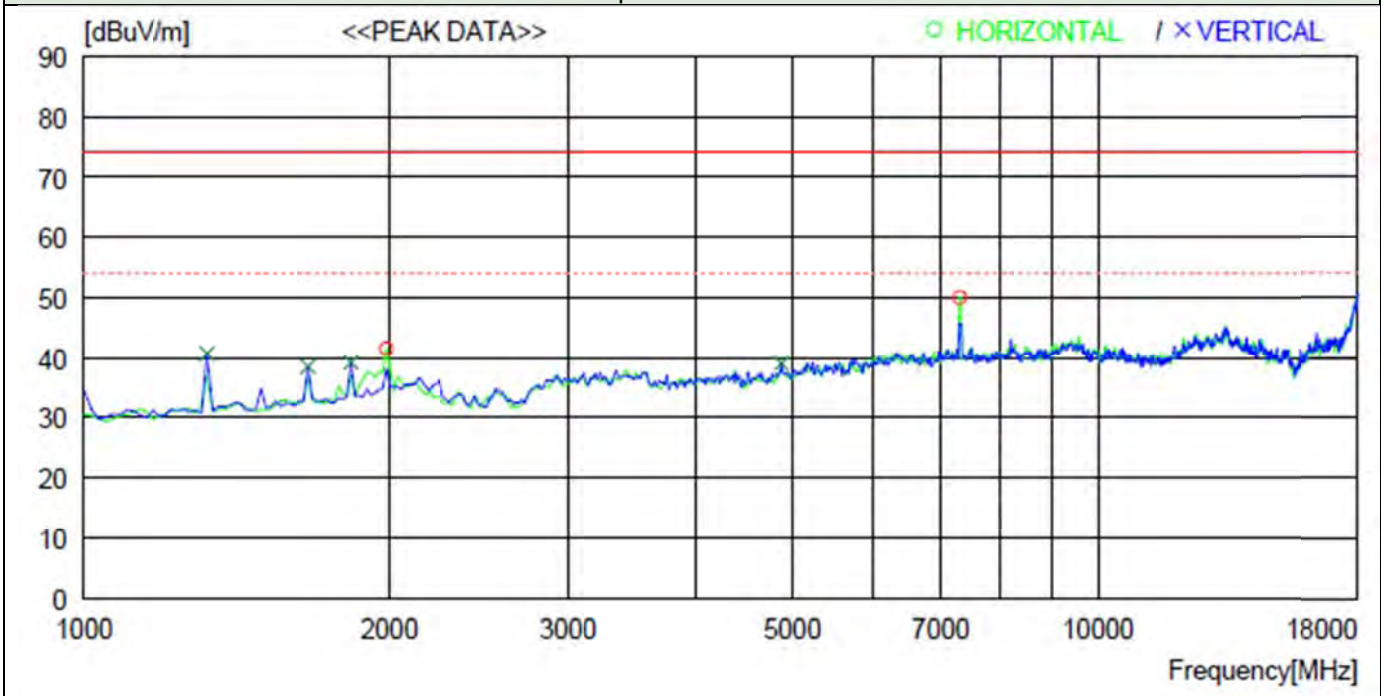
NOTE: Peak results are met average limit, so average measurement was not performed.

Note. "H" means Horizontal polarity, "V" means Vertical polarity.

Middle channel at 802.11g is worst case configuration.

5.6.6.4.3 Operating mode: 802.11n HT20

Graphical Test Data



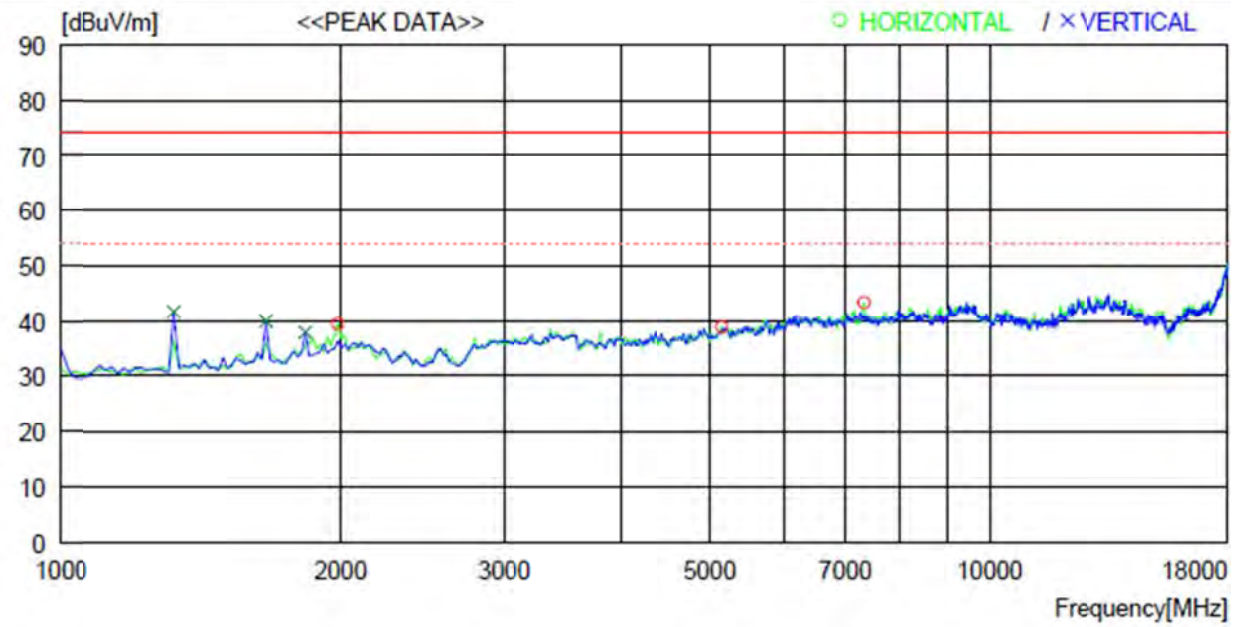
Freq. (MHz)	Detector Mode	Pol.	Ant. Factor (dB/m)	Corr. Factor (dB)	Receiver Reading (dBuV/m)	Duty Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Azimuth (Deg)
Low / Middle / High Channel											
* Spurious emissions that 20 dB below the limits didn't be recorded											
NOTE: Peak results are met average limit, so average measurement was not performed.											

Note. "H" means Horizontal polarity, "V" means Vertical polarity.

Middle channel at 802.11n HT20 is worst case configuration.

5.6.6.4.4 Operating mode: 802.11n HT40

Graphical Test Data



Freq. (MHz)	Detector Mode	Pol.	Ant. Factor (dB/m)	Corr. Factor (dB)	Receiver Reading (dBuV/m)	Duty Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Azimuth (Deg)
Low / Middle / High Channel											
* Spurious emissions that 20 dB below the limits didn't be recorded											

NOTE: Peak results are met average limit, so average measurement was not performed.

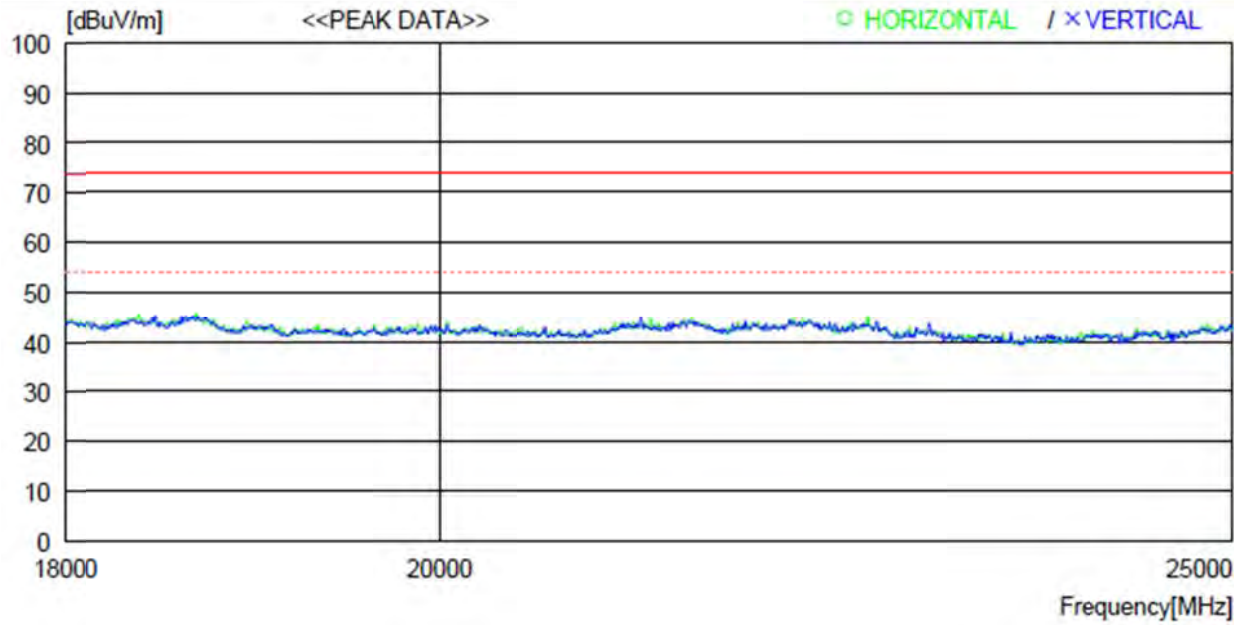
Note. "H" means Horizontal polarity, "V" means Vertical polarity.

Middle channel at 802.11n HT40 is worst case configuration.

5.6.6.5 Test Data for Harmonic & Spurious emission (18 GHz to 25 GHz)

5.6.6.5.1 Operating mode: 802.11b

Graphical Test Data



Freq. (MHz)	Detector Mode	Pol.	Ant. Factor (dB/m)	Corr. Factor (dB)	Receiver Reading (dBuV/m)	Duty Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Azimuth (Deg)
Low / Middle / High Channel											
* Spurious emissions that 20 dB below the limits didn't be recorded											

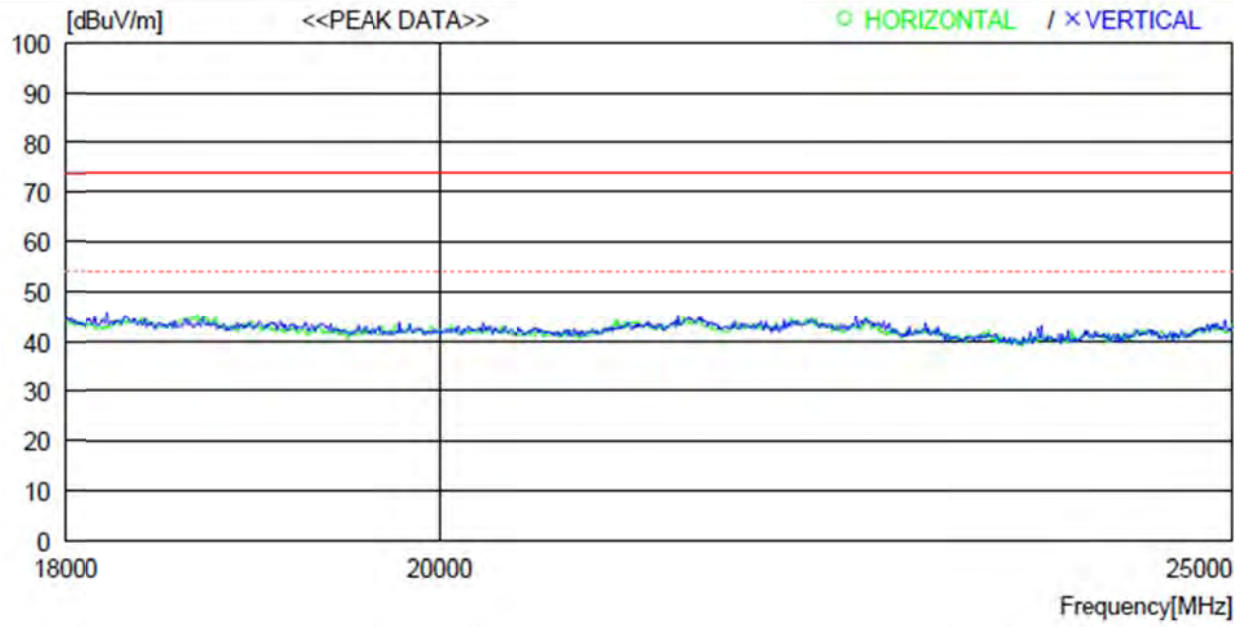
NOTE: Peak results are met average limit, so average measurement was not performed.

Note. "H" means Horizontal polarity, "V" means Vertical polarity.

High channel at 802.11b is worst case configuration.

5.6.6.5.2 Operating mode: 802.11g

Graphical Test Data



Freq. (MHz)	Detector Mode	Pol.	Ant. Factor (dB/m)	Corr. Factor (dB)	Receiver Reading (dBuV/m)	Duty Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Azimuth (Deg)
Low / Middle / High Channel											
* Spurious emissions that 20 dB below the limits didn't be recorded											

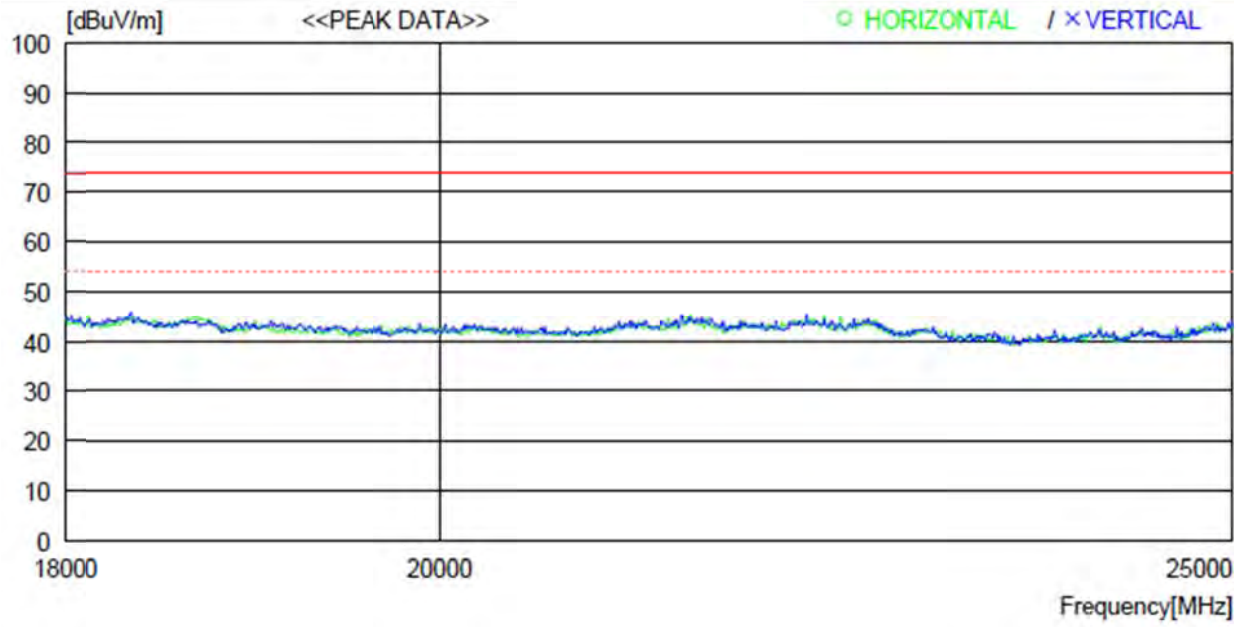
NOTE: Peak results are met average limit, so average measurement was not performed.

Note. "H" means Horizontal polarity, "V" means Vertical polarity.

Middle channel at 802.11g is worst case configuration.

5.6.6.5.3 Operating mode: 802.11n HT20

Graphical Test Data



Freq. (MHz)	Detector Mode	Pol.	Ant. Factor (dB/m)	Corr. Factor (dB)	Receiver Reading (dBuV/m)	Duty Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Azimuth (Deg)
Low / Middle / High Channel											
* Spurious emissions that 20 dB below the limits didn't be recorded											

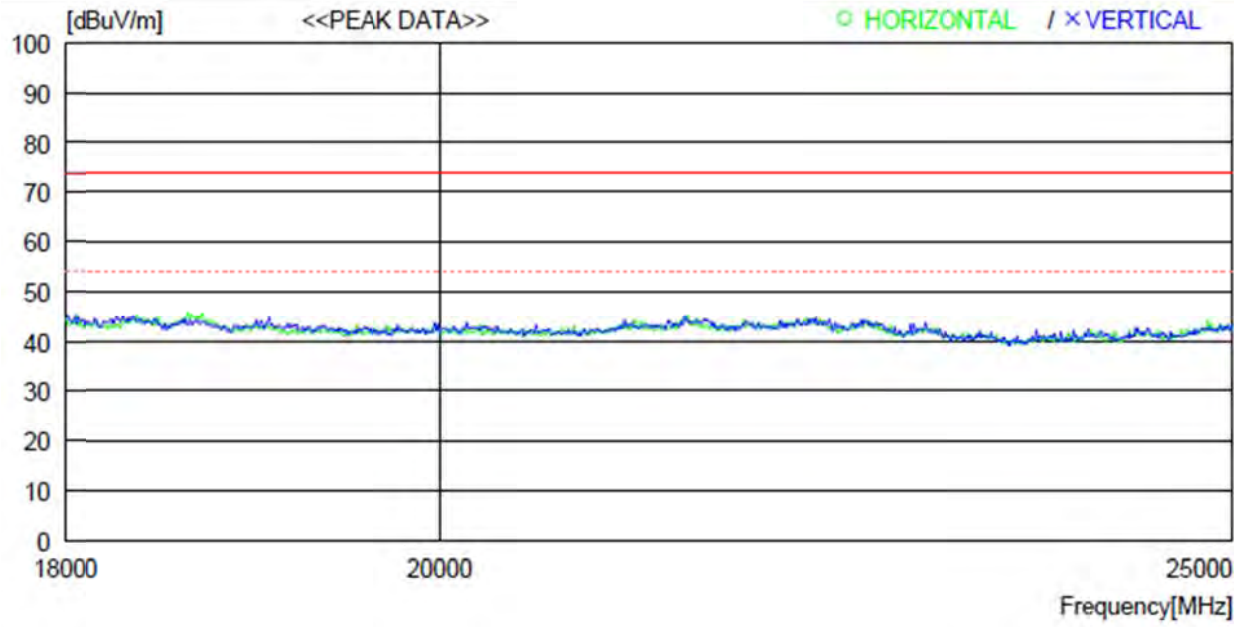
NOTE: Peak results are met average limit, so average measurement was not performed.

Note. "H" means Horizontal polarity, "V" means Vertical polarity.

Middle channel at 802.11n HT20 is worst case configuration.

5.6.6.5.4 Operating mode: 802.11n HT40

Graphical Test Data



Freq. (MHz)	Detector Mode	Pol.	Ant. Factor (dB/m)	Corr. Factor (dB)	Receiver Reading (dBuV/m)	Duty Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Azimuth (Deg)
Low / Middle / High Channel											
* Spurious emissions that 20 dB below the limits didn't be recorded											

NOTE: Peak results are met average limit, so average measurement was not performed.

Note. "H" means Horizontal polarity, "V" means Vertical polarity.

Middle channel at 802.11 HT40 is worst case configuration.

5.7 AC Power Line Conducted Emission

5.7.1 Limit

Acc. to section 15.207 (a), following table shall be applied.

Frequency Range (MHz)	Quasi-Peak (dBuV)	Average (dBuV)
0.15 - 0.5	66 to 56	56 to 46
0.5 - 5	56	46
5 -30	60	50

5.7.2 Method of Measurement

The EUT was placed on a wooden table, 0.8 m height above the horizontal ground plane and 40 cm from the vertical ground plane. 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.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

The test was performed for both Neutral and Hot lines.

5.7.3 Measurement Uncertainty

Measurement uncertainties were not taken into account and following uncertainty levels have been estimated for tests performed on the apparatus. The measurement uncertainties are given with at least 95 % confidence.

Frequency Range	Uncertainty	Frequency Range	Uncertainty
9 kHz ~ 150 kHz	± 2.03 dB	150 kHz ~ 30 MHz	± 2.03 dB

5.7.4 Sample Calculated Example

At 5.31 MHz QP Limit = 60.0 dBuV

Correction Factor (C. Factor) of LISN, Pulse Limiter and cable loss at 5.31 MHz = 9.7 dB

Q.P Reading from the Test receiver = 20.8 dBuV

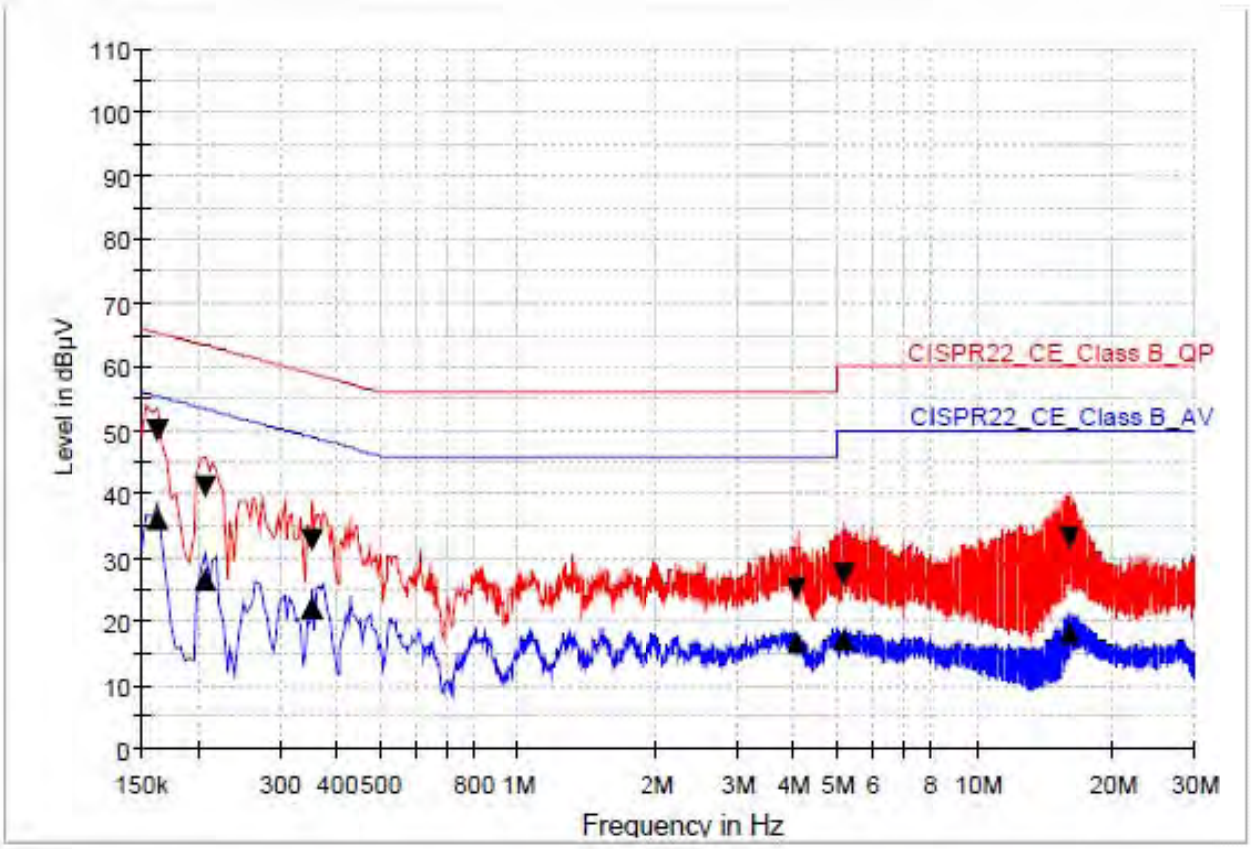
(Calculated value for system losses by software EMC32 manufactured by Rohde & Schwarz)

Therefore Q.P Margin = 60 - 20.8 = 39.2 so the EUT has 39.2 dB margin at 5.31 MHz

5.7.5 Worst Case Test Data

Date of Test	2018-08-27	Temperature	(22 ± 1.0) °C
		Relative humidity	(53 ± 2) % R.H.
Measurement Frequency Range		9 kHz ~ 30MHz	
Test Result	***PASS***	Tested By	In-yong Song

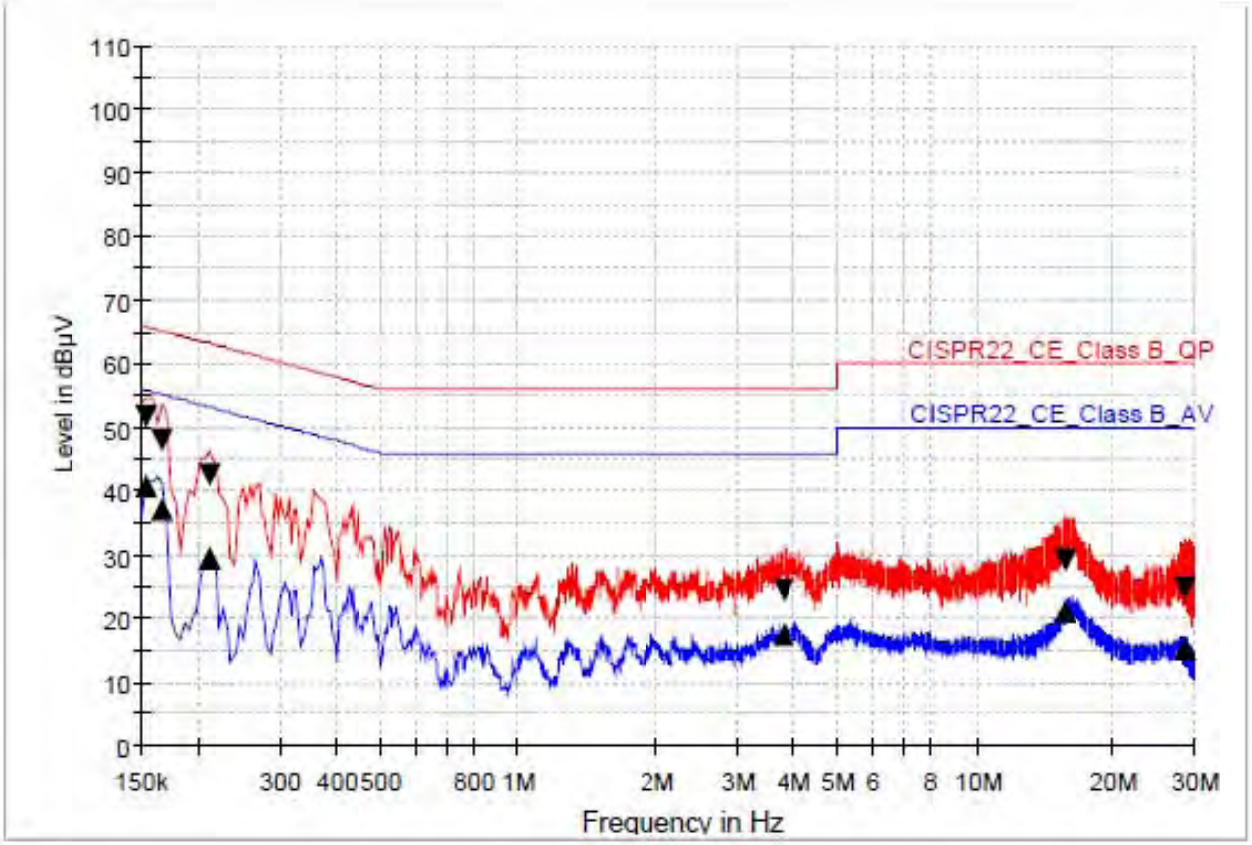
Hot Line



Limit and Margin1

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)	Margin - CAV (dB)	Limit - CAV (dBµV)
0.162000	49.9	36.1	9.000	L1	9.6	15.4	65.4	19.3	55.4
0.206000	41.2	26.7	9.000	L1	9.6	22.2	63.4	26.7	53.4
0.354000	32.7	22.4	9.000	L1	9.6	26.2	58.9	26.5	48.9
4.102000	25.3	16.7	9.000	L1	9.7	30.7	56.0	29.3	46.0
5.182000	27.3	17.0	9.000	L1	9.8	32.7	60.0	33.0	50.0
15.958000	33.1	18.3	9.000	L1	10.0	26.9	60.0	31.7	50.0

Neutral Line



Limit and Margin1

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)	Margin - CAV (dB)	Limit - CAV (dBµV)
0.154000	51.9	40.8	9.000	N	9.6	13.9	65.8	15.0	55.8
0.166000	48.1	37.3	9.000	N	9.6	17.1	65.2	17.9	55.2
0.210000	42.5	29.6	9.000	N	9.6	20.7	63.2	23.6	53.2
3.802000	24.5	17.4	9.000	N	9.7	31.5	56.0	28.6	46.0
15.670000	29.2	21.1	9.000	N	10.0	30.8	60.0	28.9	50.0
28.622000	24.7	15.1	9.000	N	10.2	35.3	60.0	34.9	50.0

Appendix I – Test Instrumentation

Description	Model No.	Serial No.	Manufacturer.	Due for Cal Date
Signal & Spectrum Analyzer	FSW 43	100578	Rohde & Schwarz	2019-04-26
Attenuator	56-10	58769	WEINSCHEL	2019-01-22
Power Meter	NRP2	104109	Rohde & Schwarz	2019-01-19
Power Sensor	NRP-Z81	101507	Rohde & Schwarz	2019-07-27
DC Power Supply	U8001A	MY52060004	Agilent	2019-07-27
Test Receiver	ESU 26	100303	Rohde & Schwarz	2019-01-18
Loop Antenna	HFH2-Z2	100341	Rohde & Schwarz	2019-04-21
TRILOG Broadband Antenna	VULB9163	9163.799	Schwarzbeck	2019-09-14
Notch Filter	BRM50702	G318	MICRO-TRONICS	2018-11-08
Horn Antenna	HF 907	102426	Rohde & Schwarz	2018-11-25
Horn Antenna	BBHA 9170	BBHA 9170 #783	Schwarzbeck	2018-11-28
Attenuator	6dB	272.4110.50	Rohde & Schwarz	2019-01-18
Pre-Amplifier	310N	344015	Sonoma Instrument	2019-01-18
Pre-Amplifier	SCU 18D	19006450	Rohde & Schwarz	2019-04-24
Pre-Amplifier	CBL18265035	28706	CERNEX	2019-03-29
Turn Table	DT3000-3t	1310814	INNCO SYSTEM	N/A
Antenna Master	MA4000-EP	4600814	INNCO SYSTEM	N/A
Antenna Master	MA4000-XP-ET	-	INNCO SYSTEM	N/A
Camera Controller	HDCon4102	6531445048	PONTIS	N/A
CO3000 Controller	Co3000-4Port	CO3000/806/ 34130814/L	INNCO SYSTEM	N/A
CO3000 Controller	Co3000-4Port	CO3000/807/ 34130814/L	INNCO SYSTEM	N/A
EMI Test Receiver	ESCI 7	100722	Rohde & Schwarz	2019-02-12
LISN	ENV216	100110	Rohde & Schwarz	2019-07-27

The measuring equipment utilized to perform the tests documented in this test report has been calibrated in accordance with manufacturer's recommendations, and is traceable to recognized national standards.