


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

**Test Report No.** : W174R-D002  
**AGR No.** : A172A-372  
**Applicant** : LG Innotek Co., Ltd.  
**Address** : 26, Hanamsandan 5beon-ro Gwangsan-gu, Gwangju, 506-731, South Korea  
**Manufacturer** : LG Innotek Co., Ltd.  
**Address** : 26, Hanamsandan 5beon-ro Gwangsan-gu, Gwangju, 506-731, South Korea  
**Type of Equipment** : BT(V4.2) + WLAN(802.11a/b/g/n/ac) 2x2 MIMO Module  
**FCC ID.** : YZP-RBHP-B216C  
**Model Name** : RBHP-B216C  
**Serial number** : N/A  
**Total page of Report** : 66 pages (including this page)  
**Date of Incoming** : March 21, 2017  
**Date of issue** : April 05, 2017

## 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.

Reviewed by:   
 \_\_\_\_\_  
 Ki-Hong, Nam / Asst, Chief Engineer  
 ONETECH Corp.

Approved by:   
 \_\_\_\_\_  
 Keun-Young, Choi / Vice President  
 ONETECH Corp.

## CONTENTS

	PAGE
<b>1. VERIFICATION OF COMPLIANCE .....</b>	<b>5</b>
<b>2. TEST SUMMARY .....</b>	<b>6</b>
<b>2.1 TEST ITEMS AND RESULTS .....</b>	<b>6</b>
<b>2.2 ADDITIONS, DEVIATIONS, EXCLUSIONS FROM STANDARDS .....</b>	<b>6</b>
<b>2.3 RELATED SUBMITTAL(S) / GRANT(S) .....</b>	<b>6</b>
<b>2.4 PURPOSE OF THE TEST .....</b>	<b>6</b>
<b>2.5 TEST METHODOLOGY .....</b>	<b>6</b>
<b>2.6 TEST FACILITY .....</b>	<b>6</b>
<b>3. GENERAL INFORMATION .....</b>	<b>7</b>
<b>3.1 PRODUCT DESCRIPTION .....</b>	<b>7</b>
<b>3.2 ALTERNATIVE TYPE(S)/MODEL(S); ALSO COVERED BY THIS TEST REPORT .....</b>	<b>10</b>
<b>4. EUT MODIFICATIONS .....</b>	<b>10</b>
<b>5. SYSTEM TEST CONFIGURATION .....</b>	<b>11</b>
<b>5.1 JUSTIFICATION .....</b>	<b>11</b>
<b>5.2 PERIPHERAL EQUIPMENT .....</b>	<b>11</b>
<b>5.3 MODE OF OPERATION DURING THE TEST .....</b>	<b>12</b>
<b>5.4 CONFIGURATION OF TEST SYSTEM .....</b>	<b>13</b>
<b>5.5 ANTENNA REQUIREMENT .....</b>	<b>13</b>
<b>6. PRELIMINARY TEST .....</b>	<b>14</b>
<b>6.1 AC POWER LINE CONDUCTED EMISSIONS TESTS .....</b>	<b>14</b>
<b>6.2 GENERAL RADIATED EMISSIONS TESTS .....</b>	<b>14</b>
<b>7. MIMIMUM 6 DB BANDWIDTH .....</b>	<b>15</b>
<b>7.1 OPERATING ENVIRONMENT .....</b>	<b>15</b>
<b>7.2 TEST SET-UP .....</b>	<b>15</b>
<b>7.3 TEST EQUIPMENT USED .....</b>	<b>15</b>
<b>7.4 TEST DATA FOR 802.11B WLAN MODE .....</b>	<b>16</b>
<b>7.5 TEST DATA FOR 802.11G WLAN MODE .....</b>	<b>18</b>
<b>7.6 TEST DATA FOR 802.11N_HT20 WLAN MODE .....</b>	<b>20</b>
<b>8. MAXIMUM PEAK OUTPUT POWER .....</b>	<b>22</b>
<b>8.1 OPERATING ENVIRONMENT .....</b>	<b>22</b>
<b>8.2 TEST SET-UP .....</b>	<b>22</b>

8.3 TEST EQUIPMENT USED.....	22
8.4 TEST DATA FOR 802.11B WLAN MODE.....	23
8.5 TEST DATA FOR 802.11G WLAN MODE .....	25
8.6 TEST DATA FOR 802.11N_HT20 WLAN MODE.....	27
<b>9. 100 KHZ BANDWIDTH OUTSIDE THE FREQUENCY BAND.....</b>	<b>29</b>
9.1 OPERATING ENVIRONMENT .....	29
9.2 TEST SET-UP FOR CONDUCTED MEASUREMENT .....	29
9.3 TEST SET-UP FOR RADIATED MEASUREMENT.....	29
9.4 TEST EQUIPMENT USED.....	29
9.5 TEST DATA FOR CONDUCTED EMISSION .....	30
9.5.1 Test data for 802.11b WLAN Mode.....	30
9.5.2 Test data for 802.11g WLAN Mode.....	35
9.5.3 Test data for 802.11n_HT20 WLAN Mode.....	40
9.6 TEST DATA FOR RADIATED EMISSION.....	45
9.6.1 Radiated Emission which fall in the Restricted Band.....	45
9.6.2 Radiated Emission which fall in the Band Edge .....	48
9.6.3 Spurious & Harmonic Radiated Emission.....	51
<b>10. PEAK POWER SPECTRUL DENSITY .....</b>	<b>54</b>
10.1 OPERATING ENVIRONMENT .....	54
10.2 TEST SET-UP .....	54
10.3 TEST EQUIPMENT USED.....	54
10.4 TEST DATA FOR 802.11B WLAN MODE.....	55
10.5 TEST DATA FOR 802.11G WLAN MODE .....	57
10.6 TEST DATA FOR 802.11N_HT20 WLAN MODE.....	59
<b>11. RADIATED EMISSION TEST .....</b>	<b>61</b>
11.1 OPERATING ENVIRONMENT .....	61
11.2 TEST SET-UP .....	61
11.3 TEST EQUIPMENT USED.....	61
11.4 TEST DATA FOR 30 MHZ ~ 1 000 MHZ .....	62
11.5 TEST DATA FOR BELOW 30 MHZ .....	63
11.6 TEST DATA FOR ABOVE 1 GHZ .....	63
<b>12. CONDUCTED EMISSION TEST.....</b>	<b>64</b>
12.1 OPERATING ENVIRONMENT .....	64
12.2 TEST SET-UP .....	64
12.3 TEST EQUIPMENT USED.....	64
12.4 TEST DATA.....	65

### REVISION HISTORY

Issued Report No.	Issued Date	Revisions	Effect Section
W174R-D002	April 05, 2017	Initial Issue	All

### DOCUMENT HISTORY

Revision No.	Issued Date	Revisions	Effect Section
Original	April 05, 2017	Initial Issue	-
Revision 01	April 11, 2017	The add FCC ID/IC information and DFS function.	10 Page
Revision 02	April 12, 2017	The add information for master device.	11 Page
Revision 03		The modify information for master device.	11 Page
Revision 04	April 13, 2017	Delete for the FCC ID/IC information.	10 Page

## 1. VERIFICATION OF COMPLIANCE

Applicant : LG Innotek Co., Ltd.  
 Address : 26, Hanamsandan 5beon-ro Gwangsan-gu, Gwangju, 506-731, South Korea  
 Contact Person : Inchang Jeong  
 Telephone No. : +82-62-950-0332  
 FCC ID : YZP-RBHP-B216C  
 Model Name : RBHP-B216C  
 Serial Number : N/A  
 Date : April 05, 2017

EQUIPMENT CLASS	DTS – DIGITAL TRNSMISSION SYSTEM
E.U.T. DESCRIPTION	Modular Transmitter, BT(V4.2) + WLAN(802.11a/b/g/n/ac) 2x2 MIMO Module
THIS REPORT CONCERNS	Original Grant
MEASUREMENT PROCEDURES	ANSI C63.10: 2013
TYPE OF EQUIPMENT TESTED	Pre-Production
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	Certification
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC PART 15 SUBPART C Section 15.247
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 Peak Conducted 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	Met the Limit / PASS
15.203	Antenna Requirement	Met requirement / PASS

### 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: 2013. 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-4112/ C-4617/ G-10666 / T-1842

IC (Industry Canada) – Registration No. Site# 3736A-3

-. Site Accreditation:

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 Innotek Co., Ltd., Model RBHP-B216C (referred to as the EUT in this report) is a BT(V4.2) + WLAN(802.11a/b/g/n/ac) 2x2 MIMO Module. Product specification information described herein was obtained from product data sheet or user’s manual.

DEVICE TYPE	BT(V4.2) + WLAN(802.11a/b/g/n/ac) 2x2 MIMO Module		
FREQUENCY RANGE	Bluetooth	2 402 MHz ~ 2 480 MHz	
	WLAN 2.4 GHz Band	2 412 MHz ~ 2 462 MHz (802.11b/g/n(HT20))	
	WLAN 5 GHz Band	5 150 MHz ~ 5 250 MHz Band	5 180 MHz ~ 5 240 MHz (802.11a/n(HT20)/ac(VHT20))
			5 190 MHz ~ 5 230 MHz (802.11n(HT40)/ac(VHT40))
			5 210 MHz (802.11ac(VHT80))
		5 250 MHz ~ 5 350 MHz Band	5 260 MHz ~ 5 320 MHz (802.11a/n(HT20)/ac(VHT20))
			5 270 MHz ~ 5 310 MHz (802.11n(HT40)/ac(VHT40))
			5 290 MHz (802.11ac(VHT80))
		5 470 MHz ~ 5 725 MHz Band	5 500 MHz ~ 5 720 MHz (802.11a/n(HT20)/ac(VHT20))
			5 510 MHz ~ 5 710 MHz (802.11n(HT40)/ac(VHT40))
5 530 MHz (802.11ac(VHT80))			
5 725 MHz ~ 5 850 MHz Band		5 745 MHz ~ 5 825 MHz (802.11a/n(HT20)/ac(VHT20))	
		5 755 MHz ~ 5 795 MHz (802.11n(HT40)/ac(VHT40))	
		5 775 MHz (802.11ac(VHT80))	

MAX. RF OUTPUT POWER	Bluetooth	1 Mbps	0.97 dBm	
		2 Mbps	-1.67 dBm	
		3 Mbps	-1.24 dBm	
	WLAN 2.4 GHz Band	Wi-Fi 802.11b (16.40 dBm)		
		Wi-Fi 802.11g (15.84 dBm)		
		Wi-Fi 802.11n(HT20) (15.05 dBm)		
	WLAN 5 GHz Band	5 150 MHz ~ 5 250 MHz Band	Antenna 0	Wi-Fi 802.11a (13.96 dBm) Wi-Fi 802.11n(HT20) (11.80 dBm) Wi-Fi 802.11n(HT40) (10.14 dBm) Wi-Fi 802.11ac(HT80) (12.61 dBm)
			Antenna 1	Wi-Fi 802.11a (13.92 dBm) Wi-Fi 802.11n(HT20) (10.62 dBm) Wi-Fi 802.11n(HT40) (10.54 dBm) Wi-Fi 802.11ac(HT80) (12.66 dBm)
			Antenna 0 + Antenna 1	Wi-Fi 802.11n(HT20) (14.24 dBm) Wi-Fi 802.11n(HT40) (13.29 dBm) Wi-Fi 802.11ac(HT80) (12.96 dBm)
		5 250 MHz ~ 5 350 MHz Band	Antenna 0	Wi-Fi 802.11a (14.42 dBm) Wi-Fi 802.11n(HT20) (14.61 dBm) Wi-Fi 802.11n(HT40) (14.10 dBm) Wi-Fi 802.11ac(HT80) (12.51 dBm)
Antenna 1			Wi-Fi 802.11a (14.41 dBm) Wi-Fi 802.11n(HT20) (14.54 dBm) Wi-Fi 802.11n(HT40) (13.56 dBm) Wi-Fi 802.11ac(HT80) (13.21 dBm)	
Antenna 0 + Antenna 1			Wi-Fi 802.11n(HT20) (17.59 dBm) Wi-Fi 802.11n(HT40) (16.85 dBm) Wi-Fi 802.11ac(HT80) (15.88 dBm)	



MAX. RF OUTPUT POWER	WLAN 5 GHz Band	5 470 MHz ~ 5 725 MHz Band	Antenna 0	Wi-Fi 802.11a (14.91 dBm) Wi-Fi 802.11n(HT20) (14.94 dBm) Wi-Fi 802.11n(HT40) (14.81 dBm) Wi-Fi 802.11ac(HT80) (12.99 dBm)
			Antenna 1	Wi-Fi 802.11a (14.62 dBm) Wi-Fi 802.11n(HT20) (14.97 dBm) Wi-Fi 802.11n(HT40) (14.32 dBm) Wi-Fi 802.11ac(HT80) (13.44dBm)
			Antenna 0 + Antenna 1	Wi-Fi 802.11n(HT20) (17.88 dBm) Wi-Fi 802.11n(HT40) (17.58 dBm) Wi-Fi 802.11ac(HT80) (16.23 dBm)
		5 725 MHz ~ 5 850 MHz Band	Antenna 0	Wi-Fi 802.11a (14.58 dBm) Wi-Fi 802.11n(HT20) (14.27 dBm) Wi-Fi 802.11n(HT40) (13.88 dBm) Wi-Fi 802.11ac(HT80) (12.80 dBm)
			Antenna 1	Wi-Fi 802.11a (14.74 dBm) Wi-Fi 802.11n(HT20) (14.84 dBm) Wi-Fi 802.11n(HT40) (14.69 dBm) Wi-Fi 802.11ac(HT80) (13.88 dBm)
			Antenna 0 + Antenna 1	Wi-Fi 802.11n(HT20) (17.57 dBm) Wi-Fi 802.11n(HT40) (17.31 dBm) Wi-Fi 802.11ac(HT80) (16.38 dBm)
MODULATION TYPE	Bluetooth	GFSK for 1 Mbps, $\pi/4$ -DQPSK for 2 Mbps, 8-DPSK for 3 Mbps		
	WLAN 2.4 GHz Band	DSSS Modulation(DBPSK/DQPSK/CCK)		
	WLAN 5 GHz Band	OFDM Modulation(BPSK/QPSK/16QAM/64QAM)		

ANTENNA TYPE & GAIN	Bluetooth (BDR/EDR)	2.2 dBi		
	WLAN 2.4 GHz Band (802.11b/g/n(HT20))	4.8 dBi		
	5 150 MHz ~ 5 250 MHz Band	Antenna 0	5.4 dBi	
		Antenna 1	5.7 dBi	
		Antenna 0 + Antenna 1	8.56 dBi	
	5 250 MHz ~ 5 350 MHz Band	Antenna 0	5.6 dBi	
		Antenna 1	4.8 dBi	
		Antenna 0 + Antenna 1	8.23 dBi	
	5 470 MHz ~ 5 725 MHz Band	Antenna 0	5.7 dBi	
		Antenna 1	5.3 dBi	
		Antenna 0 + Antenna 1	8.51 dBi	
	5 725 MHz ~ 5 850 MHz Band	Antenna 0	5.2 dBi	
		Antenna 1	5.4 dBi	
		Antenna 0 + Antenna 1	8.31 dBi	
	List of each Osc. or crystal Freq.(Freq. >= 1 MHz)	37.4 MHz		
DFS FUNCTION	Slave without radar detection			

**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 Innotek Co., Ltd.	RBHA-B2168_RDK_Rev0.1	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
RBHP-B216C	LG Innotek Co., Ltd.	BT(V4.2) + WLAN(802.11a/b/g/n/ac) 2x2 MIMO Module (EUT)	Notebook PC
PP11L	DELL	Notebook PC	EUT
WEA504i	Samsung Electronics Co Ltd	WLAN Access Point (FCC ID.: A3LWEA504I)	EUT

**5.3 Mode of operation during the test**

Modulation	DATA RATE	OUTPUT POWER[dBm]
802.11 b (Middle Channel)	1 Mbps	16.40
	2 Mbps	16.27
	5.5 Mbps	15.88
	11 Mbps	15.65
802.11 g (Middle Channel)	6 Mbps	15.84
	9 Mbps	15.49
	12 Mbps	15.29
	18 Mbps	14.90
	24 Mbps	14.51
	36 Mbps	14.39
	48 Mbps	14.02
	54 Mbps	13.92
HT 20 (Middle Channel)	6.5 Mbps	15.05
	13 Mbps	14.81
	19.5 Mbps	14.45
	26 Mbps	14.28
	39 Mbps	13.99
	52 Mbps	13.72
	58.5 Mbps	13.59
	65 Mbps	13.22

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

## 5.4 Configuration of Test System

**Line Conducted Test:** The jig board of the EUT was connected to LISN. All supporting equipments were connected to another LISN. Preliminary Power line Conducted Emission test was performed by using the procedure in ANSI C63.10: 2013 to determine the worse operating conditions.

**Radiated Emission Test:** Preliminary radiated emissions test were conducted using the procedure in ANSI C63.10: 2013 to determine the worse operating conditions. 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 transmitter antenna of the EUT is WLAN 2.4 GHz Band & WLAN 5 GHz Band is PCB antenna and Bluetooth & WLAN 5 GHz Band is PIFA antenna so no consideration of replacement by the user.

## 6. PRELIMINARY TEST

### 6.1 AC Power line Conducted Emissions Tests

During Preliminary Test, the following operating mode was investigated.

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

### 6.2 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

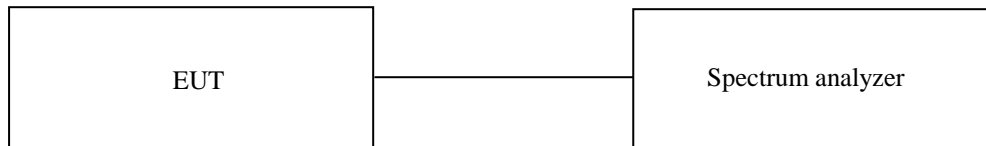
## 7. MIMIMUM 6 dB BANDWIDTH

### 7.1 Operating environment

Temperature : 21 °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 equipment used

Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ - FSV40	Rohde & Schwarz	Signal Analyzer	101009	April 05, 2017 (1Y)

All test equipment used is calibrated on a regular basis.

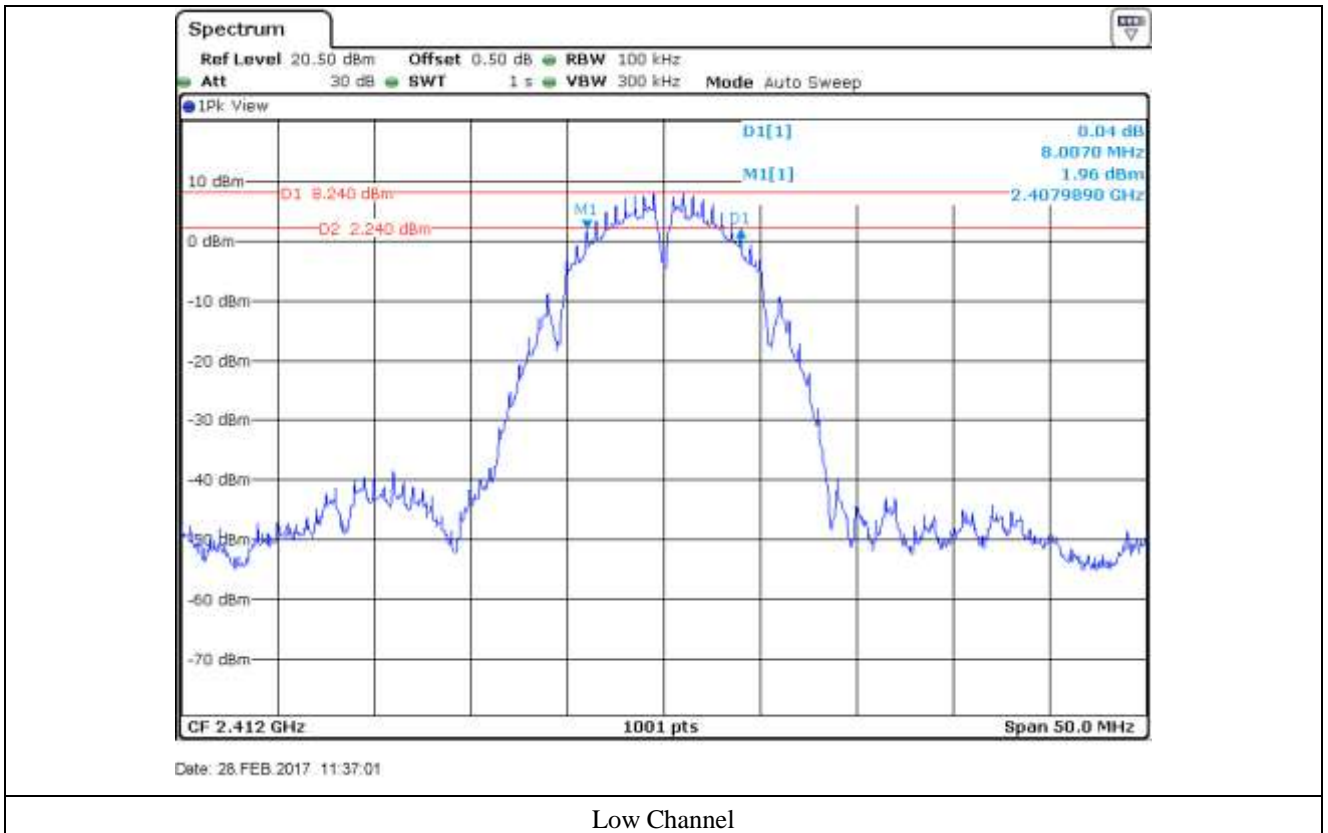
**7.4 Test data for 802.11b WLAN Mode**

- Test Date : March 24, 2017
- Test Result : Pass

CHANNEL	FREQUENCY (MHz)	6 dB Bandwidth (MHz)	LIMIT (MHz)	Margin (MHz)
Low	2 412	8.00	0.5	7.50
Middle	2 442	8.00	0.5	7.50
High	2 462	8.00	0.5	7.50

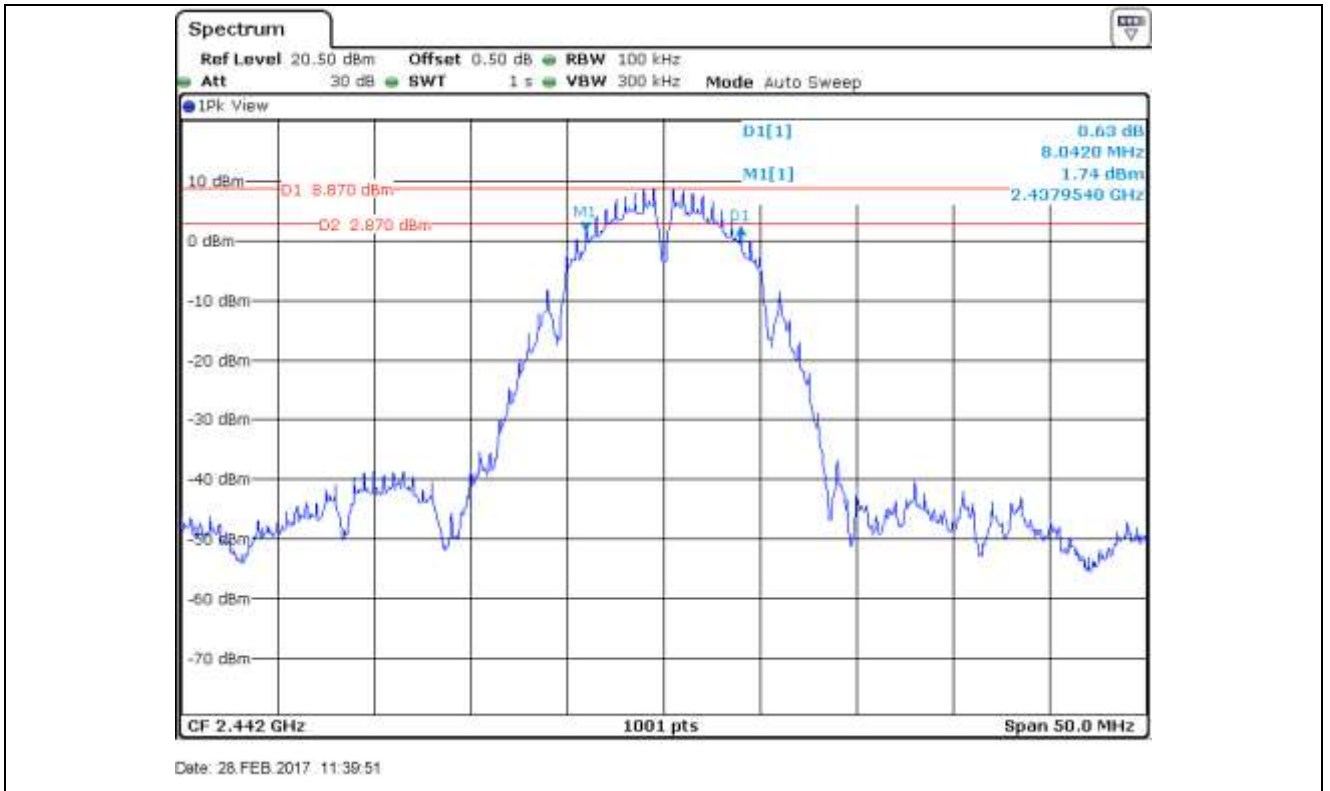
Remark. Margin = Measured Value - Limit

**Tested by: Tae-Ho, Kim / Senior Engineer**

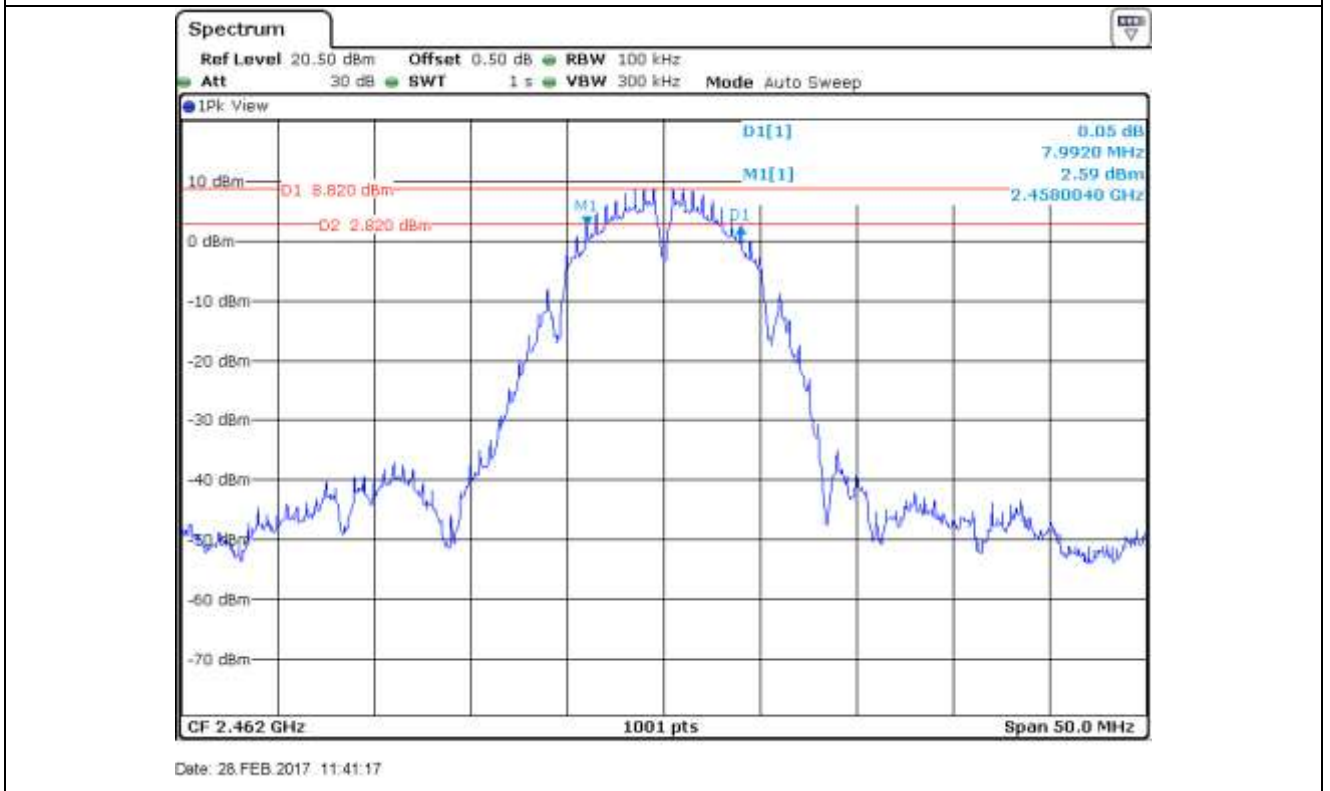


Low Channel





Middle Channel



High Channel

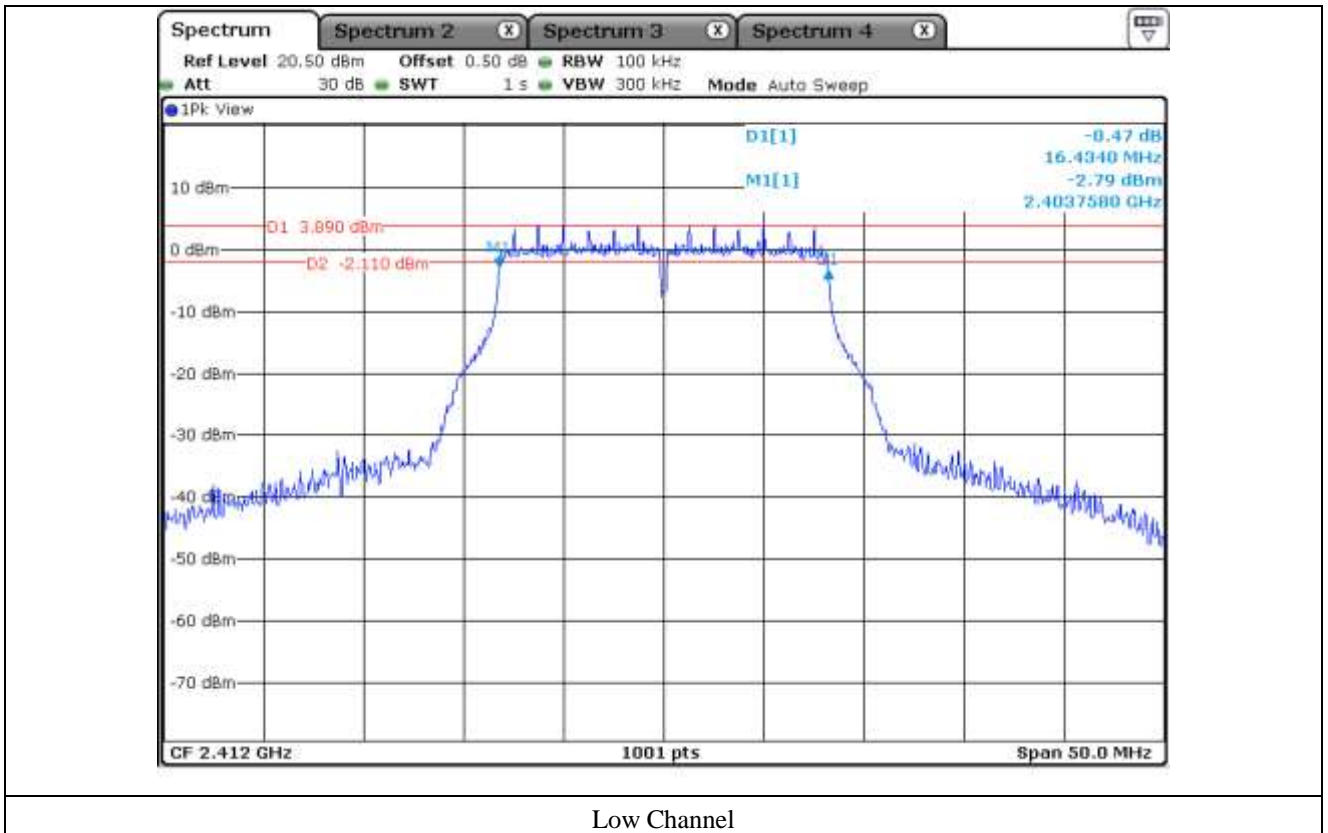
### 7.5 Test data for 802.11g WLAN Mode

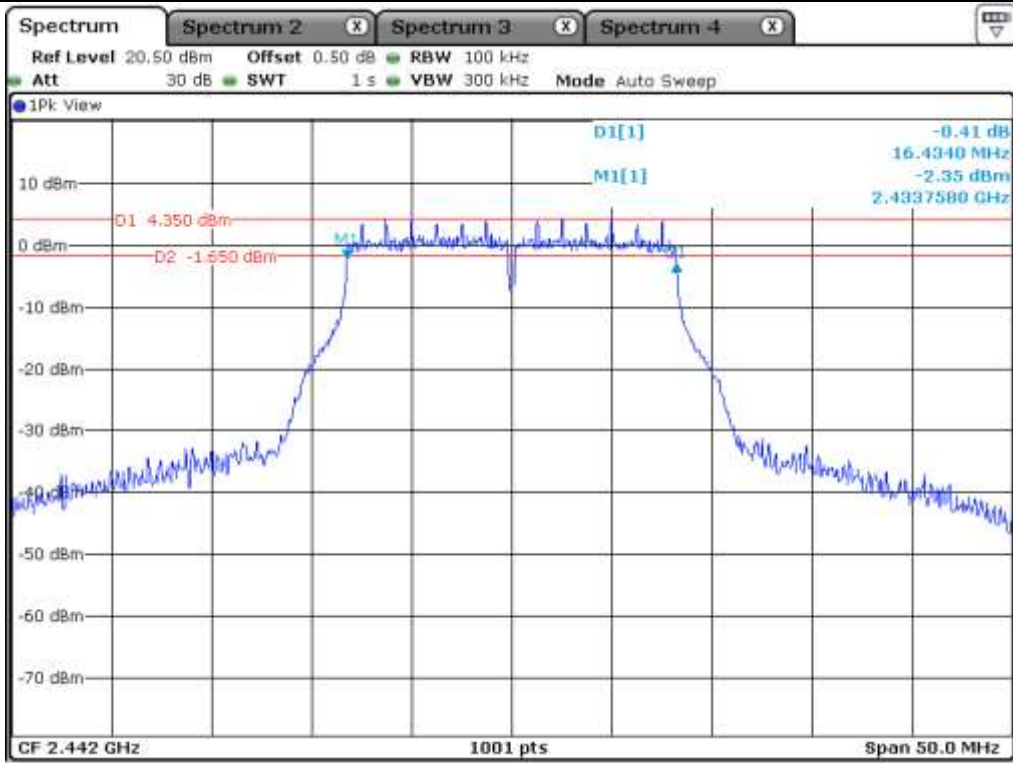
- Test Date : March 24, 2017
- Test Result : Pass

CHANNEL	FREQUENCY (MHz)	6 dB Bandwidth (MHz)	LIMIT (MHz)	Margin (MHz)
Low	2 412	16.43	0.5	15.93
Middle	2 442	16.43	0.5	15.93
High	2 462	16.43	0.5	15.93

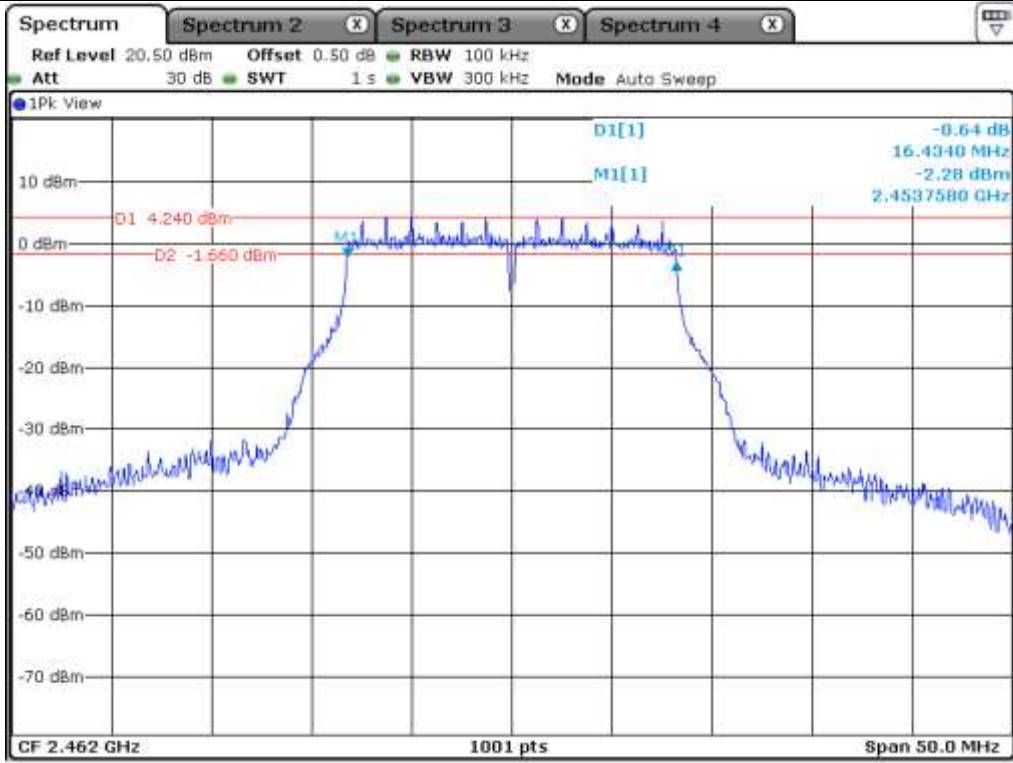
Remark. Margin = Measured Value - Limit

Tested by: Tae-Ho, Kim / Senior Engineer





Middle Channel



High Channel

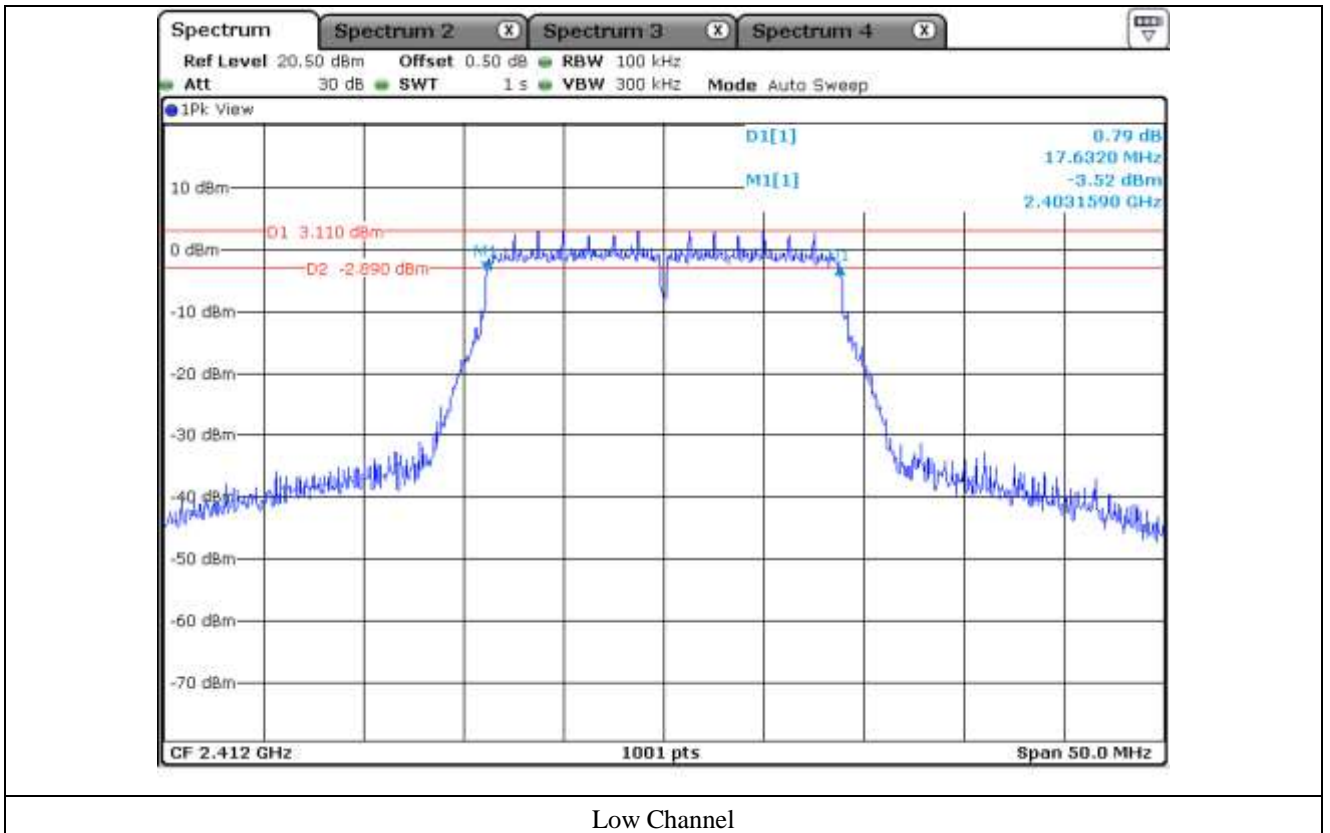
### 7.6 Test data for 802.11n\_HT20 WLAN Mode

- Test Date : March 24, 2017
- Test Result : Pass

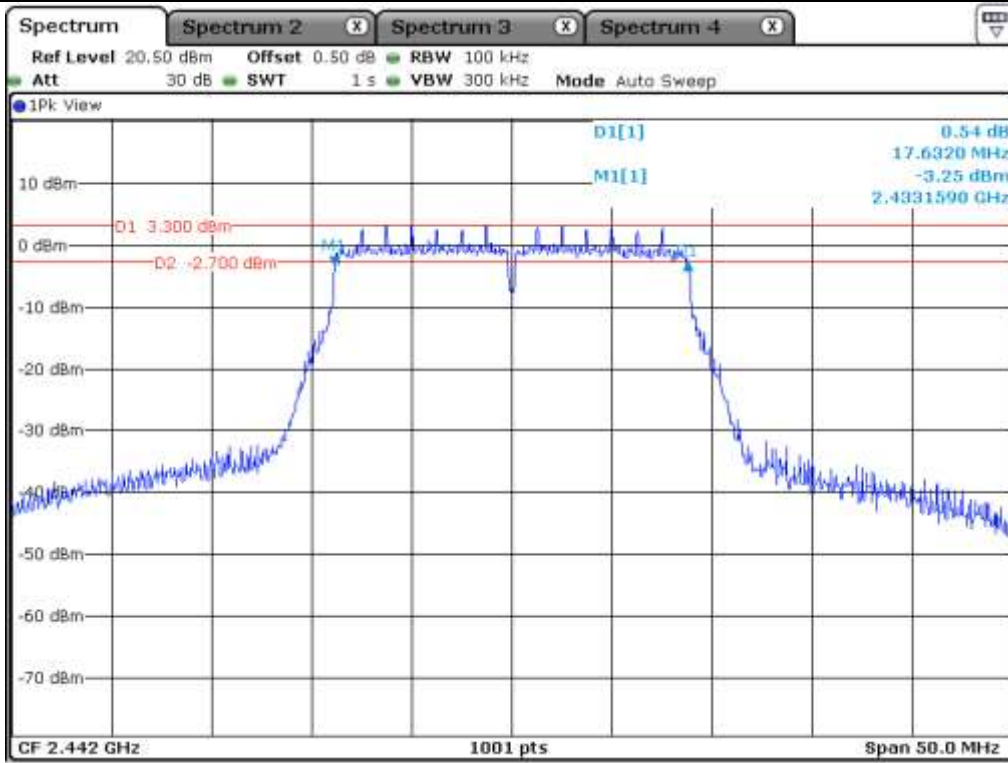
CHANNEL	FREQUENCY (MHz)	6 dB Bandwidth (MHz)	LIMIT (MHz)	Margin (MHz)
Low	2 412	17.63	0.5	17.13
Middle	2 442	17.63	0.5	17.13
High	2 462	17.63	0.5	17.13

Remark. Margin = Measured Value - Limit

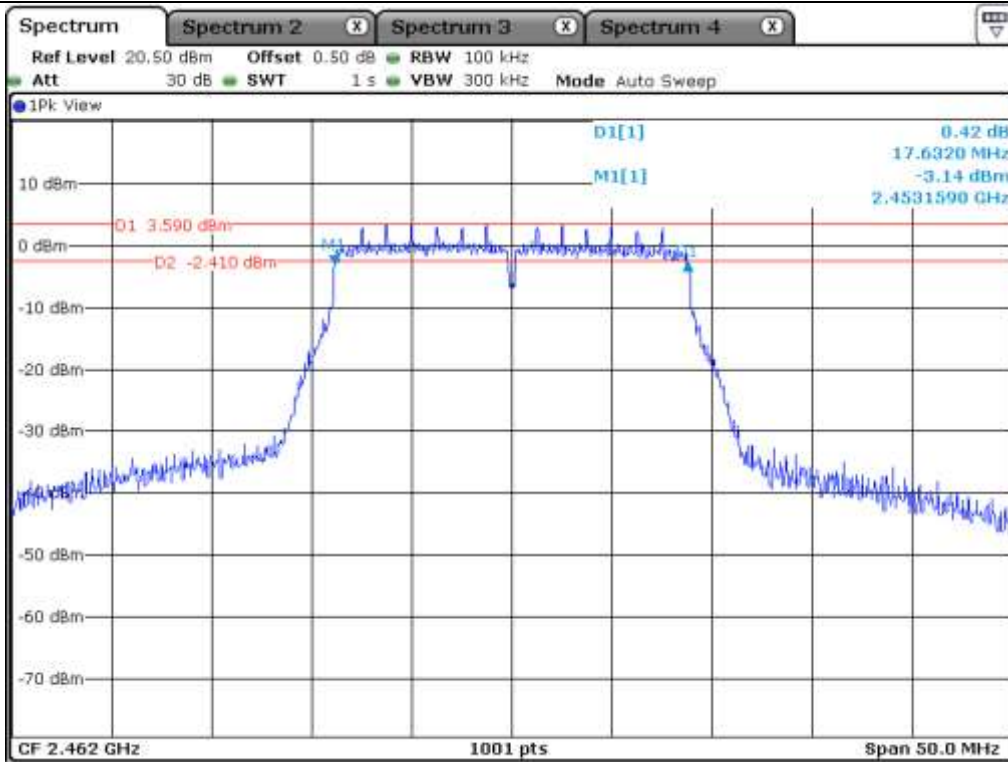
Tested by: Tae-Ho, Kim / Senior Engineer



Low Channel



Middle Channel



High Channel

## 8. MAXIMUM PEAK OUTPUT POWER

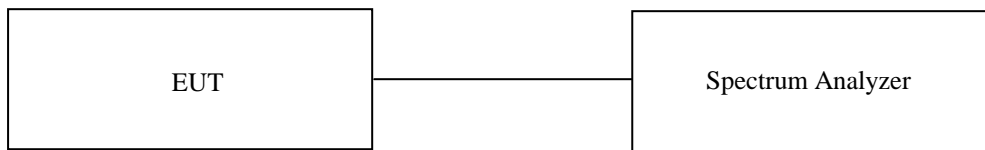
### 8.1 Operating environment

Temperature : 21 °C  
 Relative humidity : 45 % R.H.

### 8.2 Test set-up

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

The resolution bandwidth is set to  $\geq$  DTS Bandwidth, the video bandwidth is set to 3 times the resolution bandwidth.



### 8.3 Test equipment used

Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ - FSV40	Rohde & Schwarz	Signal Analyzer	101009	April 05, 2017 (1Y)

All test equipment used is calibrated on a regular basis.

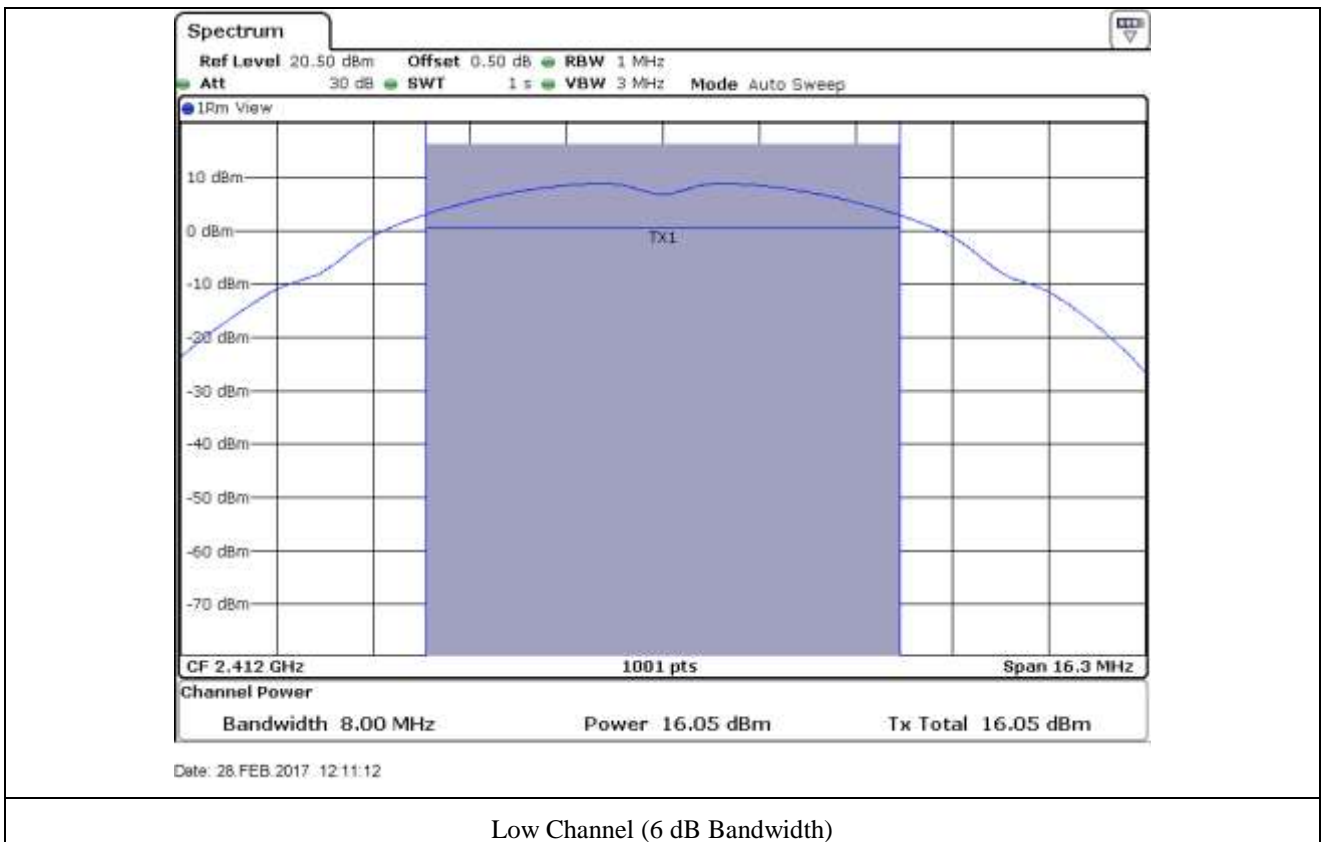
### 8.4 Test data for 802.11b WLAN Mode

- Test Date : March 24, 2017
- Test Result : Pass

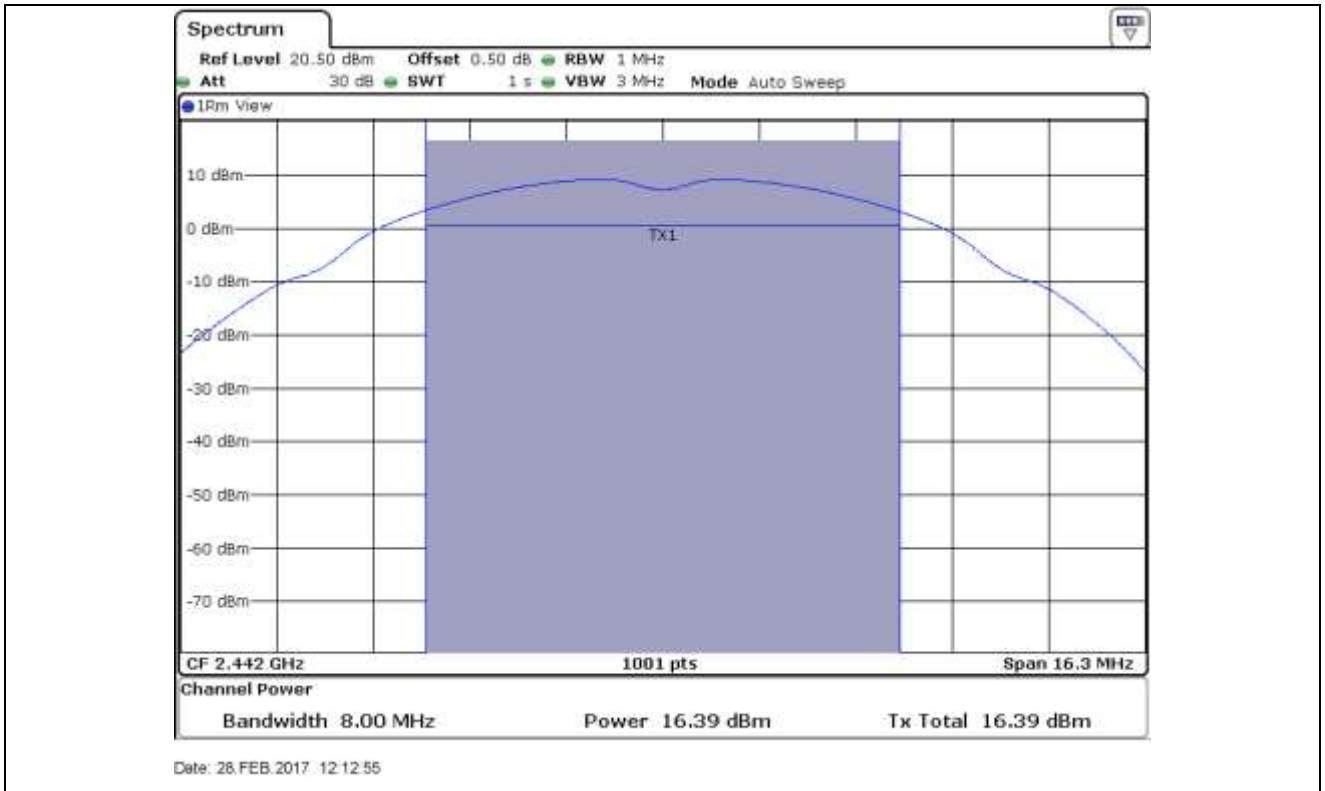
CHANNEL	FREQUENCY (MHz)	6 dB Bandwidth (MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
LOW	2 412	8.00	16.05	30	13.95
MIDDLE	2 442	8.00	16.39	30	13.61
HIGH	2 462	8.00	16.40	30	13.60

Remark. Margin = Limit – Measured Value (=Receiver Reading + Cable Loss)

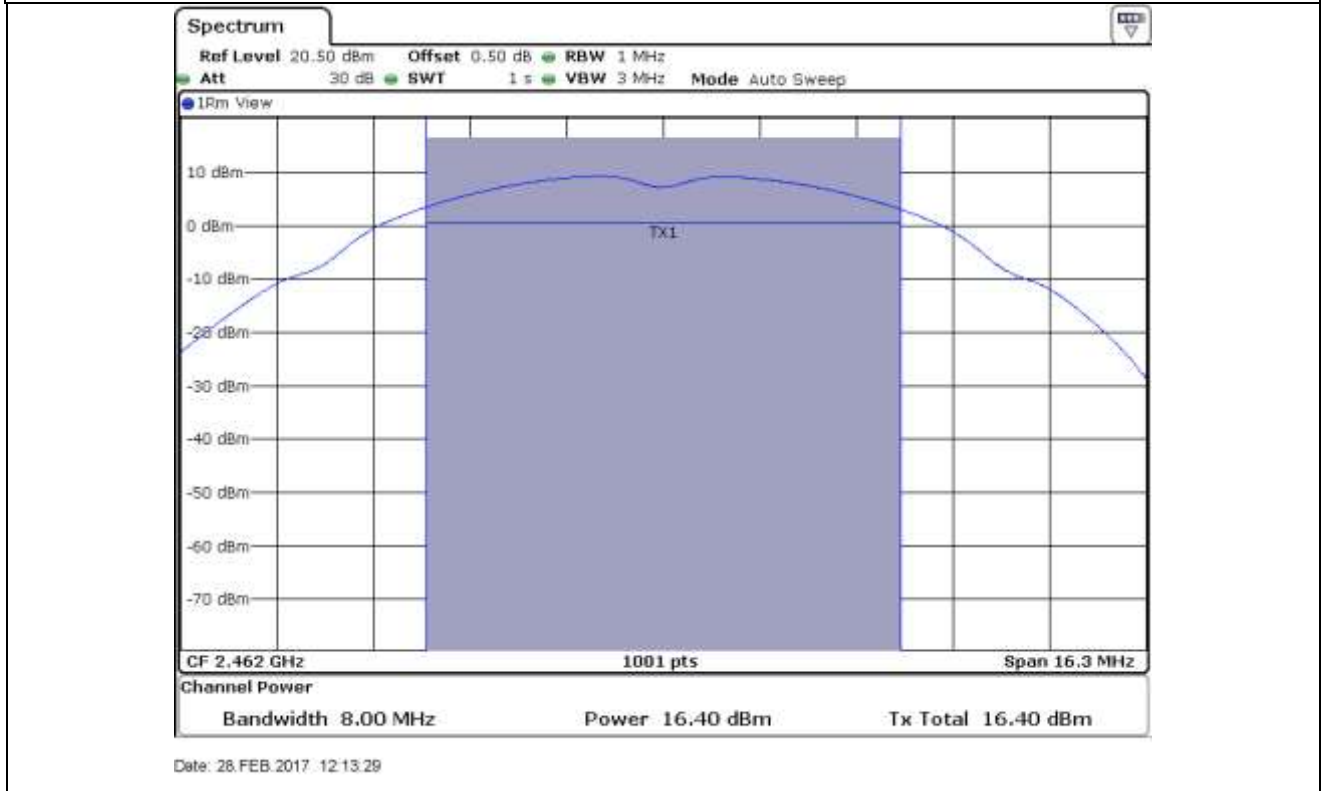
Tested by: Tae-Ho, Kim / Senior Engineer



Low Channel (6 dB Bandwidth)



Middle Channel (6 dB Bandwidth)



High Channel (6 dB Bandwidth)



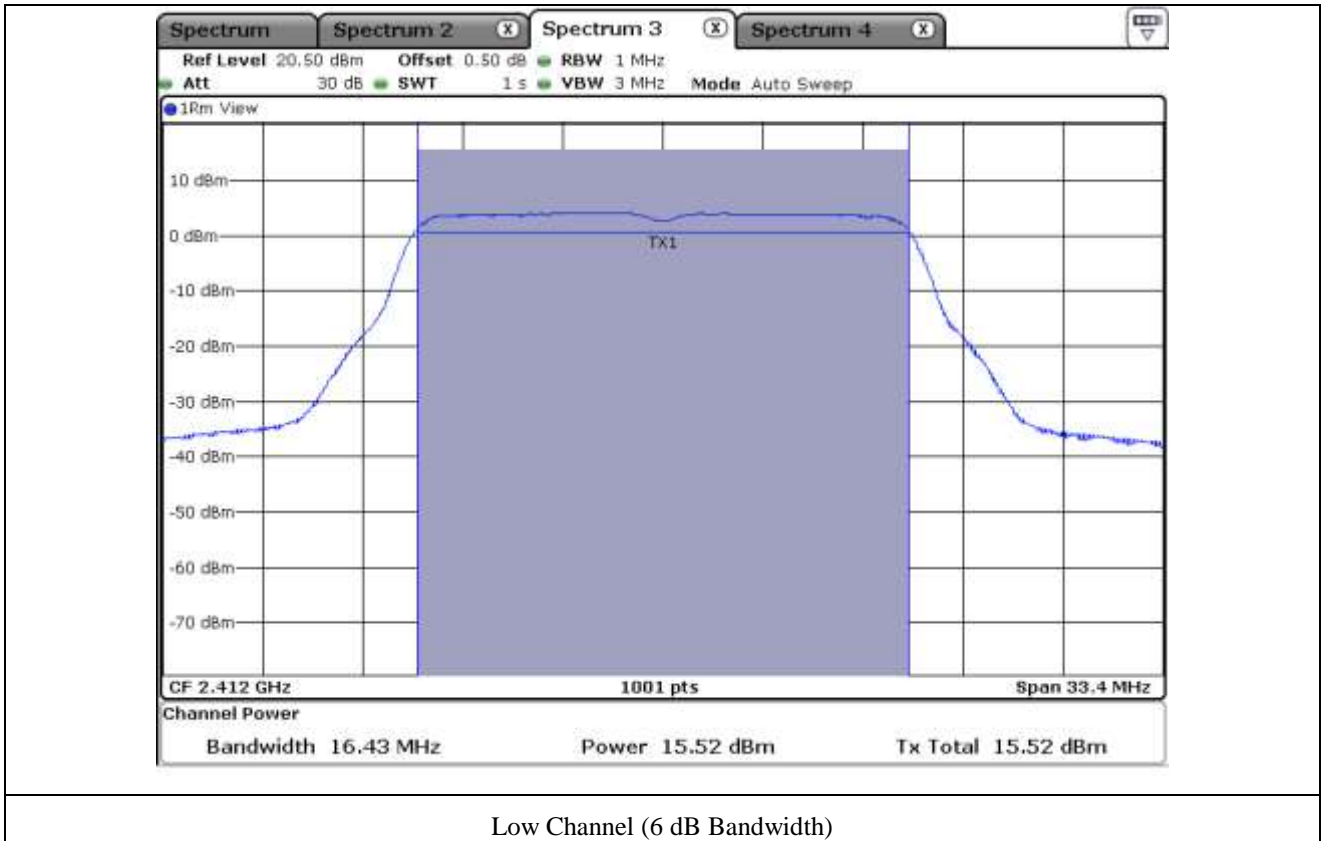
### 8.5 Test data for 802.11g WLAN Mode

- Test Date : March 24, 2017
- Test Result : Pass

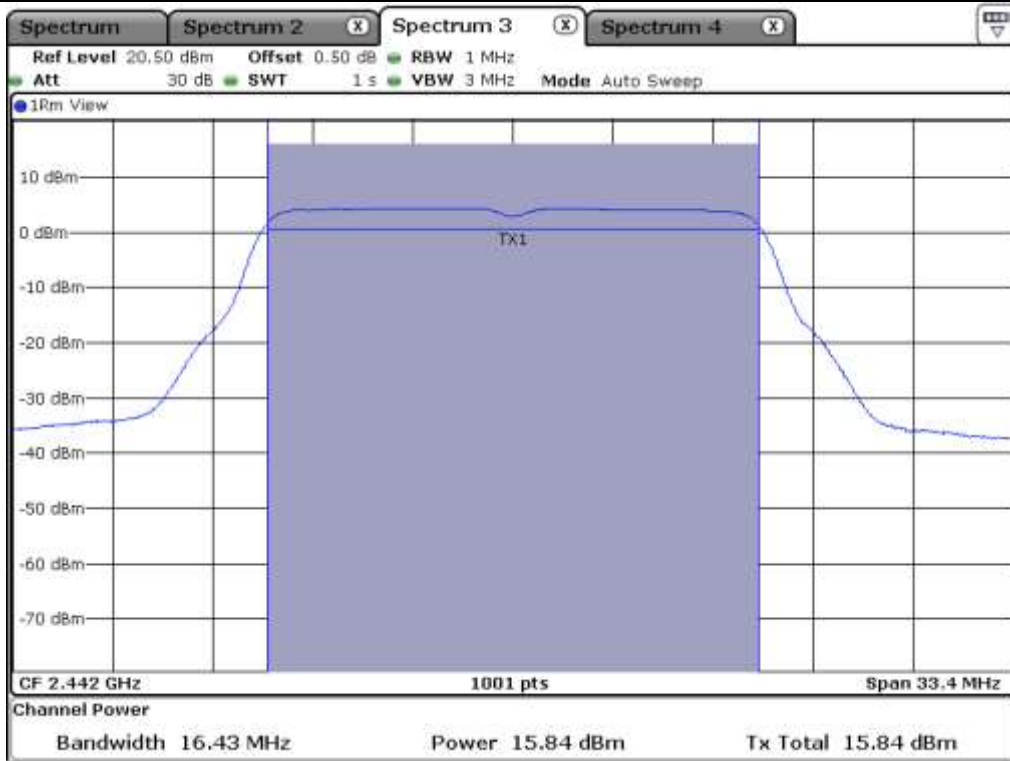
CHANNEL	FREQUENCY (MHz)	6 dB Bandwidth (MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
LOW	2 412	16.43	15.52	30	14.48
MIDDLE	2 442	16.43	15.84	30	14.16
HIGH	2 462	16.43	15.78	30	14.22

Remark. Margin = Limit – Measured Value (=Receiver Reading + Cable Loss)

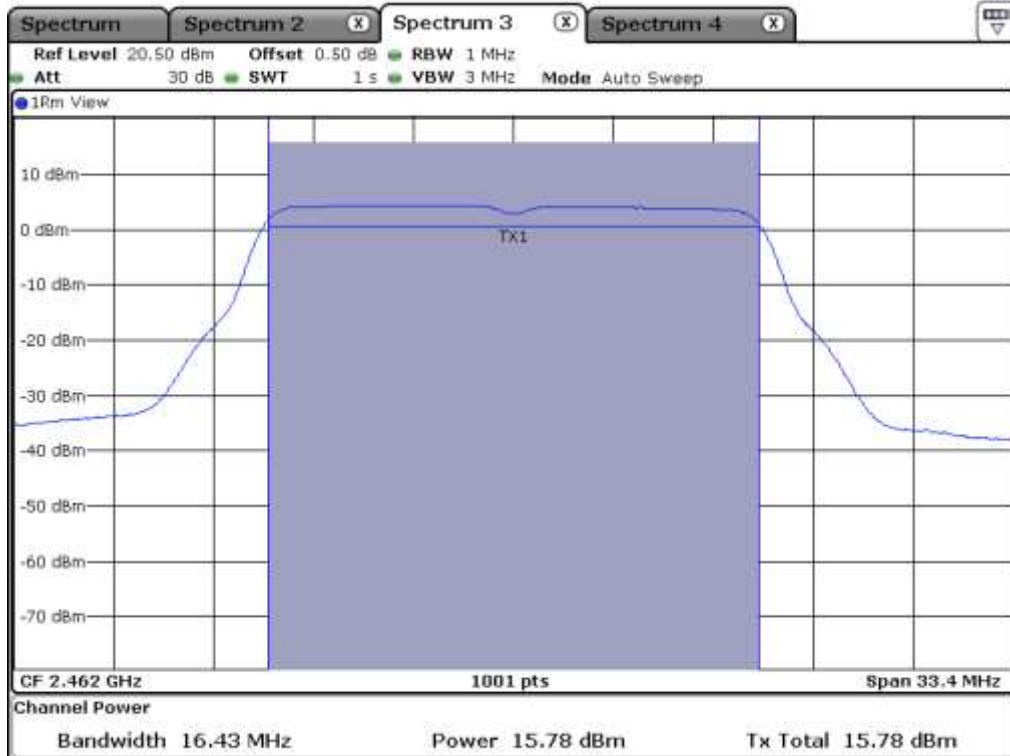
Tested by: Tae-Ho, Kim / Senior Engineer



Low Channel (6 dB Bandwidth)



Middle Channel (6 dB Bandwidth)



High Channel (6 dB Bandwidth)

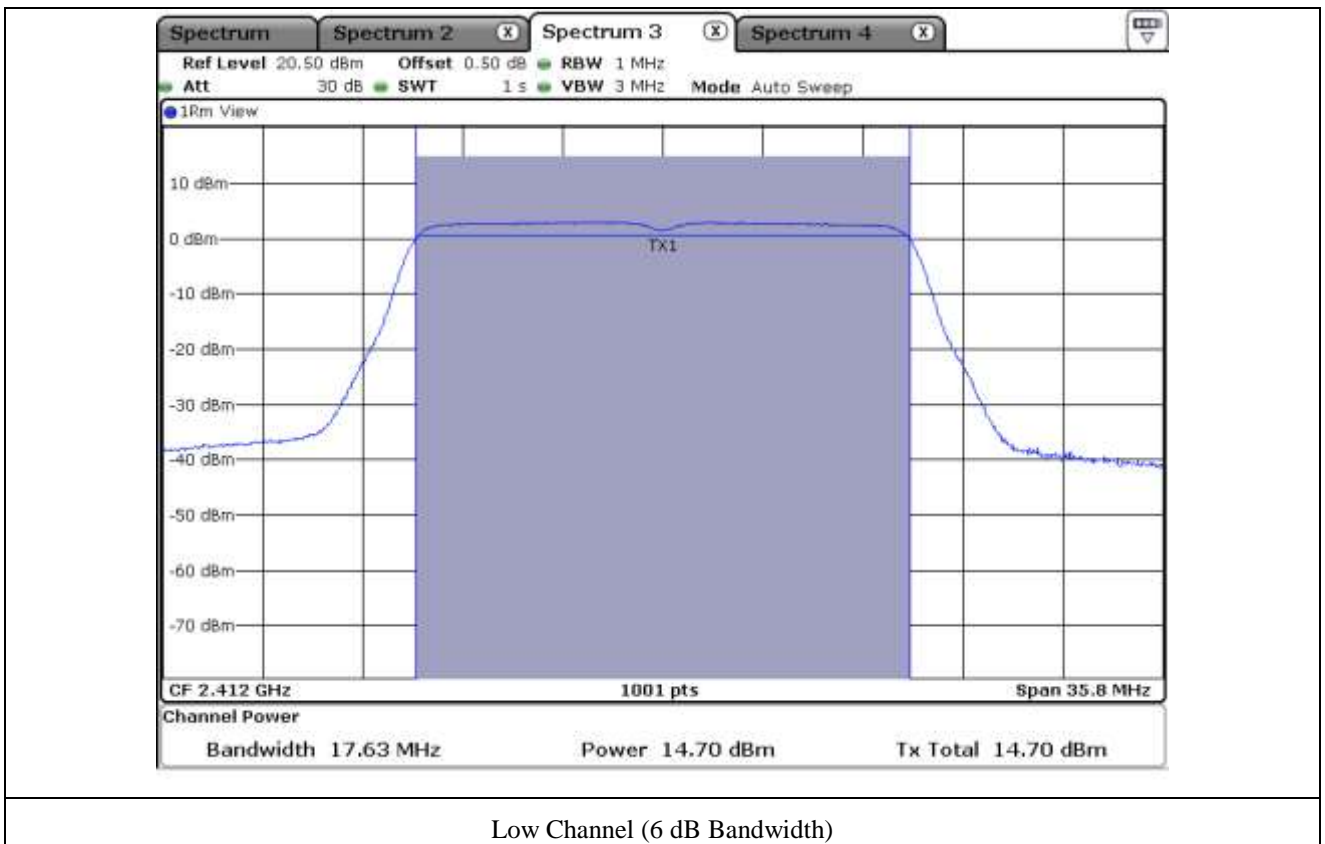
### 8.6 Test data for 802.11n\_HT20 WLAN Mode

- Test Date : March 24, 2017
- Test Result : Pass

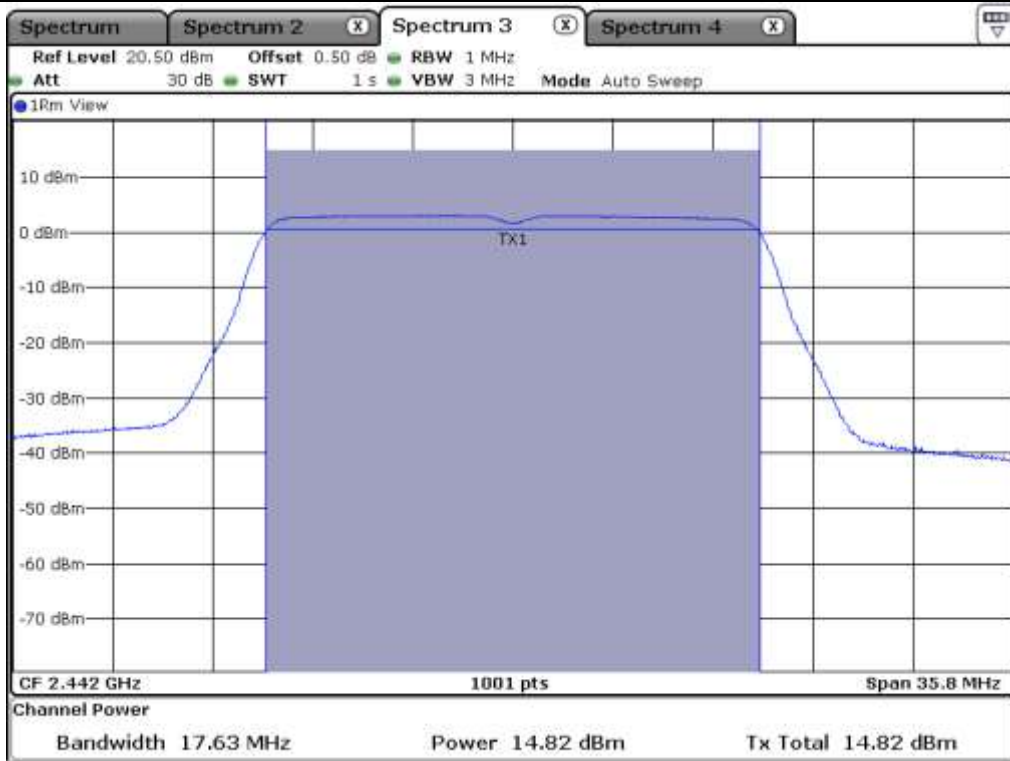
CHANNEL	FREQUENCY (MHz)	6 dB Bandwidth (MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
LOW	2 412	17.63	14.70	30	15.30
MIDDLE	2 442	17.63	14.82	30	15.18
HIGH	2 462	17.63	15.05	30	14.95

Remark. Margin = Limit – Measured Value (=Receiver Reading + Cable Loss)

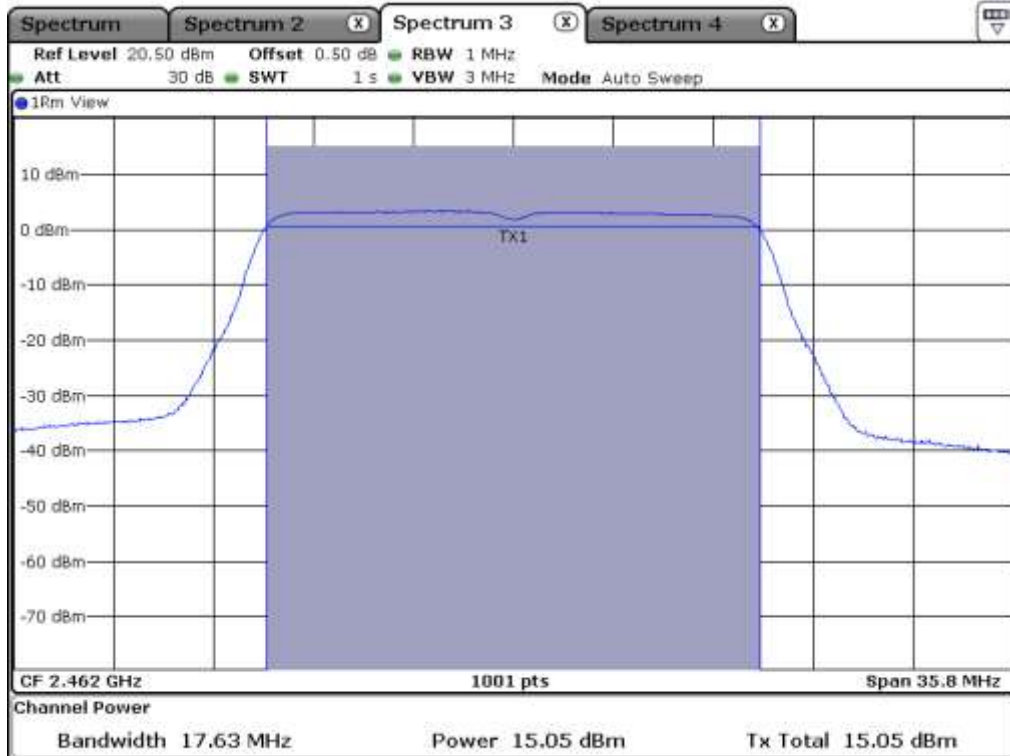
Tested by: Tae-Ho, Kim / Senior Engineer



Low Channel (6 dB Bandwidth)



Middle Channel (6 dB Bandwidth)



High Channel (6 dB Bandwidth)

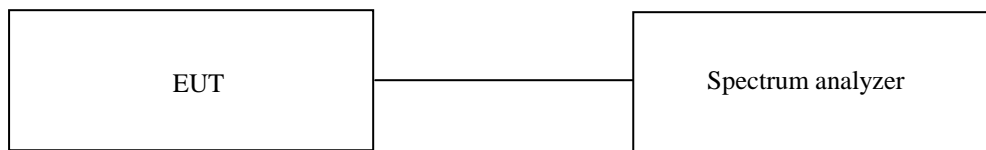
## 9. 100 kHz BANDWIDTH OUTSIDE THE FREQUENCY BAND

### 9.1 Operating environment

Temperature : 21 °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.

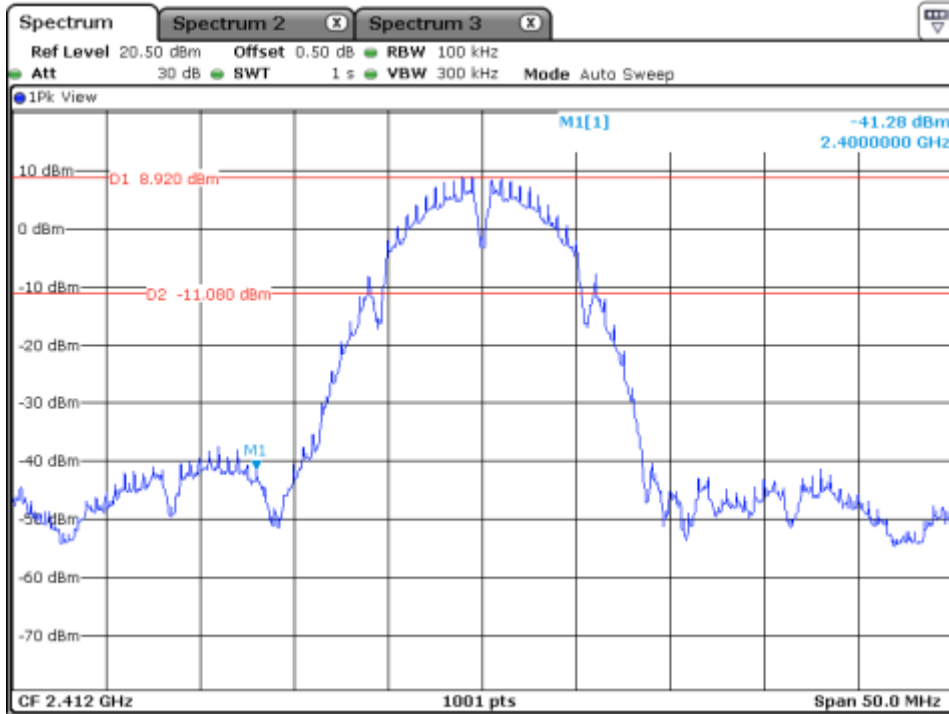
### 9.4 Test equipment used

Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ - FSV40	Rohde & Schwarz	Signal Analyzer	101009	April 05, 2017 (1Y)
■ - ESU	Rohde & Schwarz	EMI Test Receiver	100261	Apr. 06, 2017 (1Y)
■ - 310N	Sonoma Instrument	Pre-Amplifier	312544	Apr. 05, 2017 (1Y)
■ - SCU-18	Rohde & Schwarz	Pre-Amplifier	102209	May 31, 2016 (1Y)
■ - SCU40A	Rohde & Schwarz	Signal Conditioning unit	100436	May 31, 2016 (1Y)
■ - DT3000-3t	Innco System	Turn Table	DT3000/093	N/A
■ - MA-4000XPET	Innco System	Antenna Master	MA4000/509	N/A
■ - VULB9163	Schwarzbeck	TRILOG Broadband Antenna	9163-421	Apr. 15, 2016 (1Y)
■ - BBHA9120D	Schwarzbeck	Horn Antenna	BBHA9120D295	Aug. 31, 2015 (2Y)
■ - BBHA9170	Schwarzbeck	Horn Antenna	BBHA9170178	Aug. 31, 2015 (2Y)

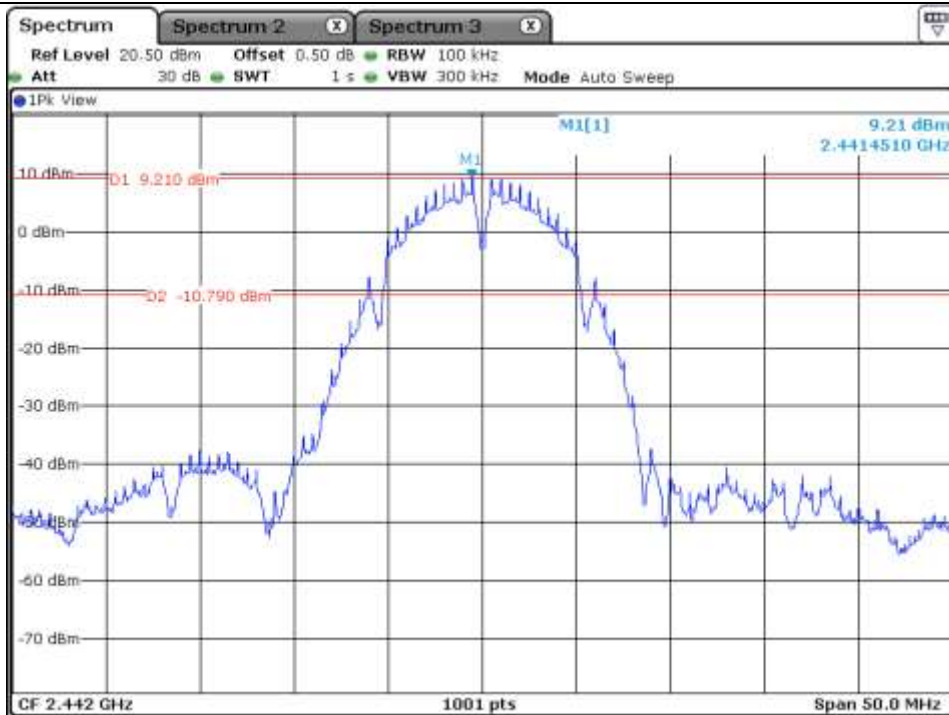
All test equipment used is calibrated on a regular basis.

9.5 Test data for conducted emission

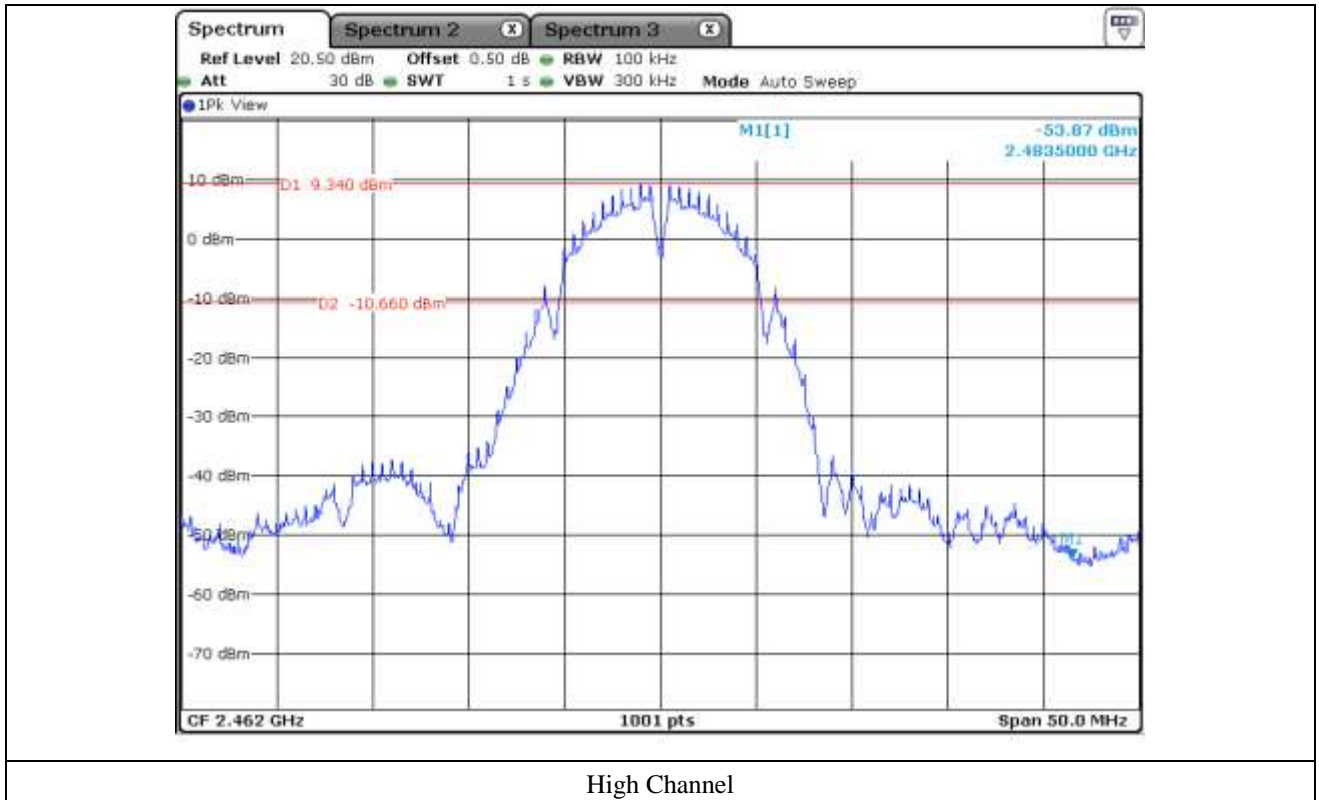
9.5.1 Test data for 802.11b WLAN Mode

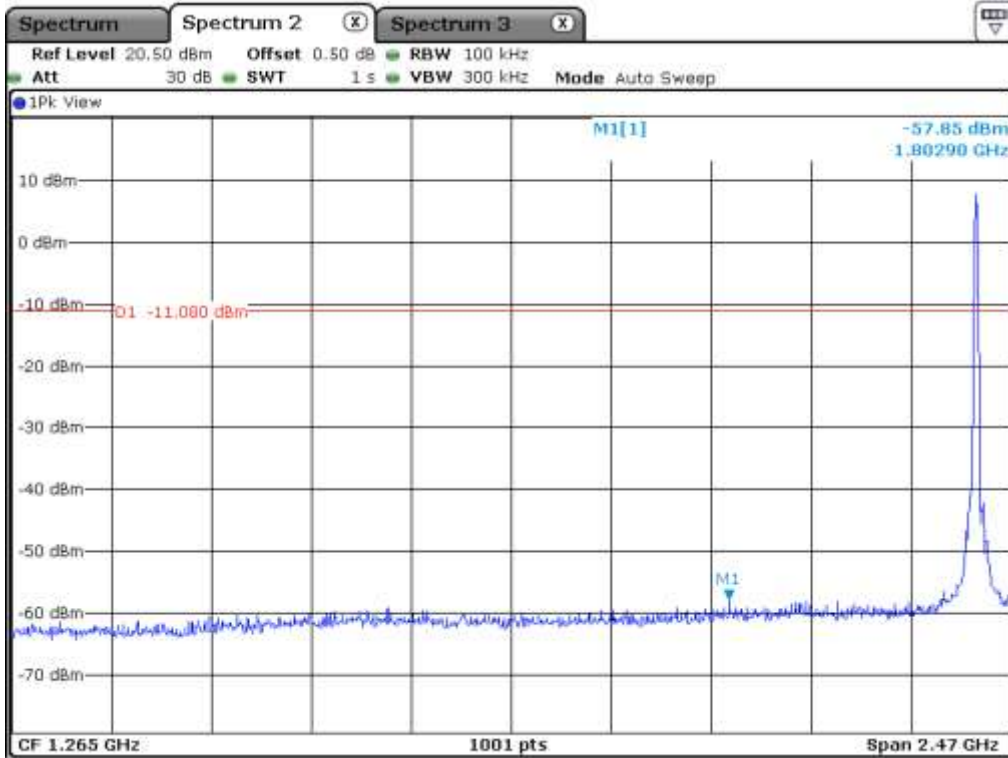


Low Channel

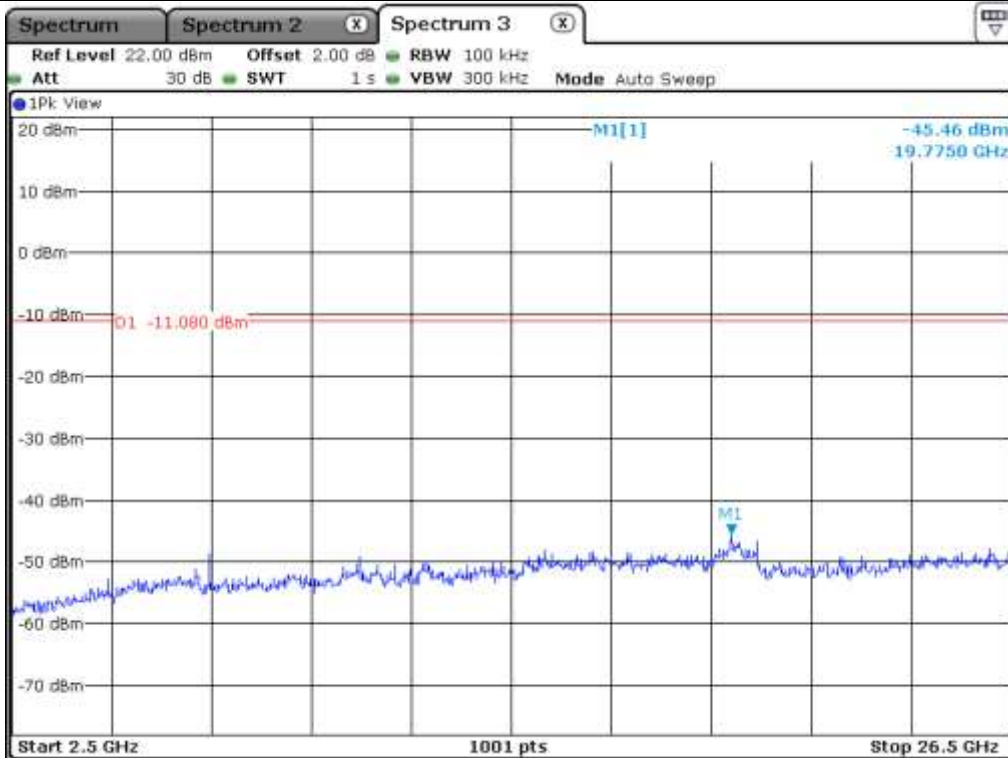


Middle Channel



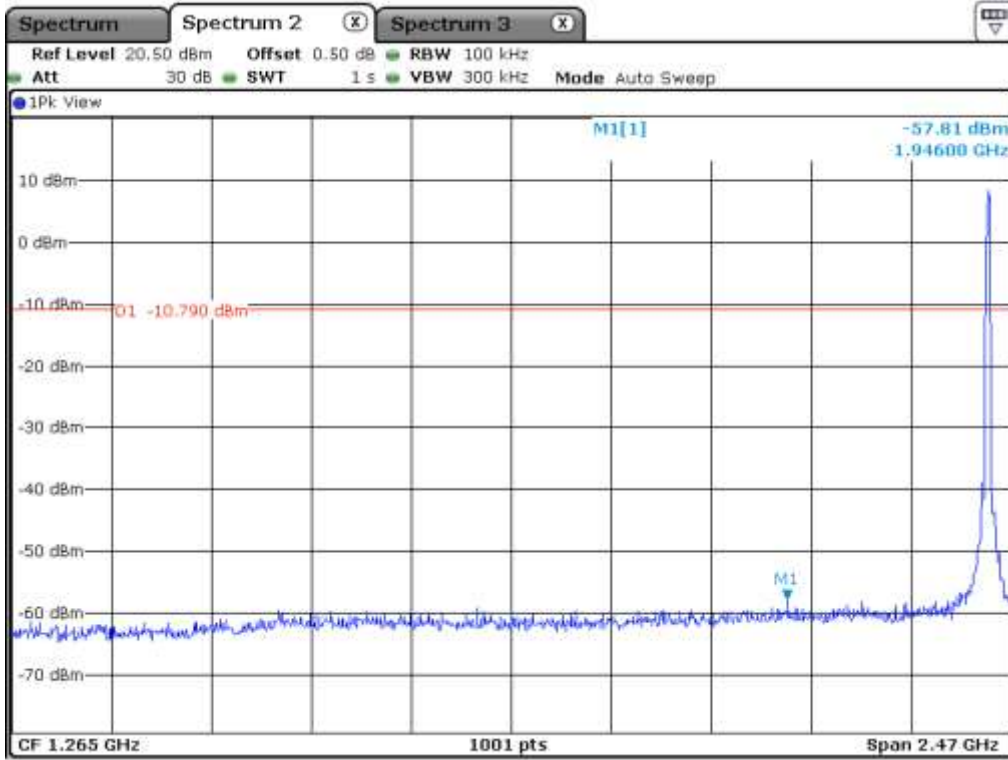


Low Channel

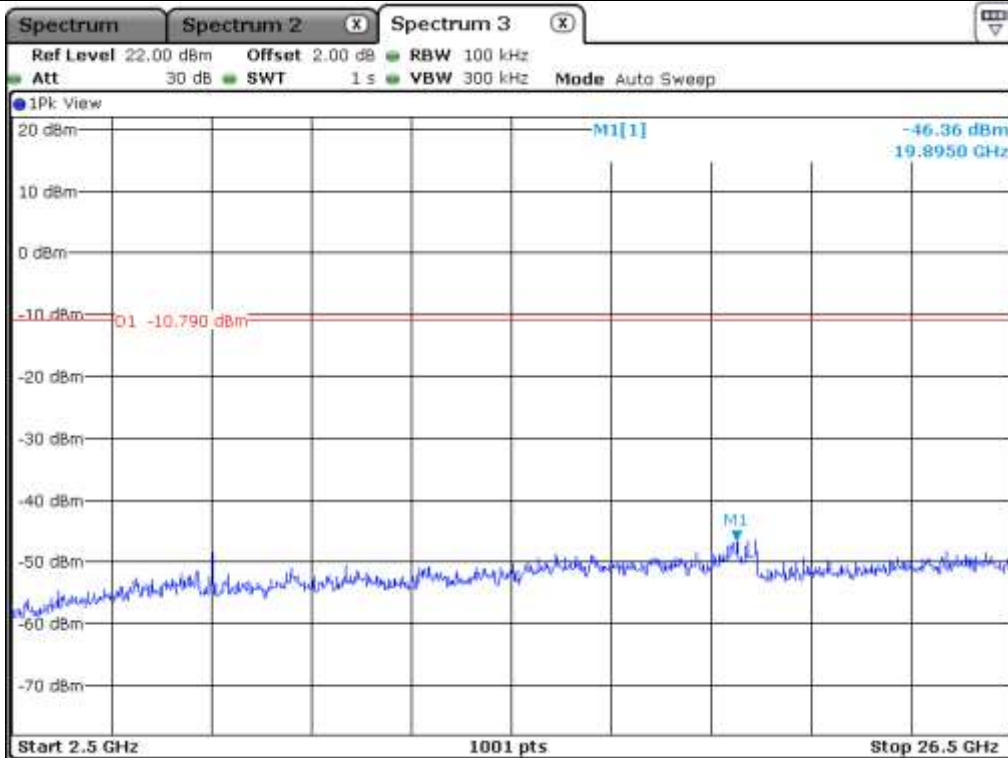


Low Channel

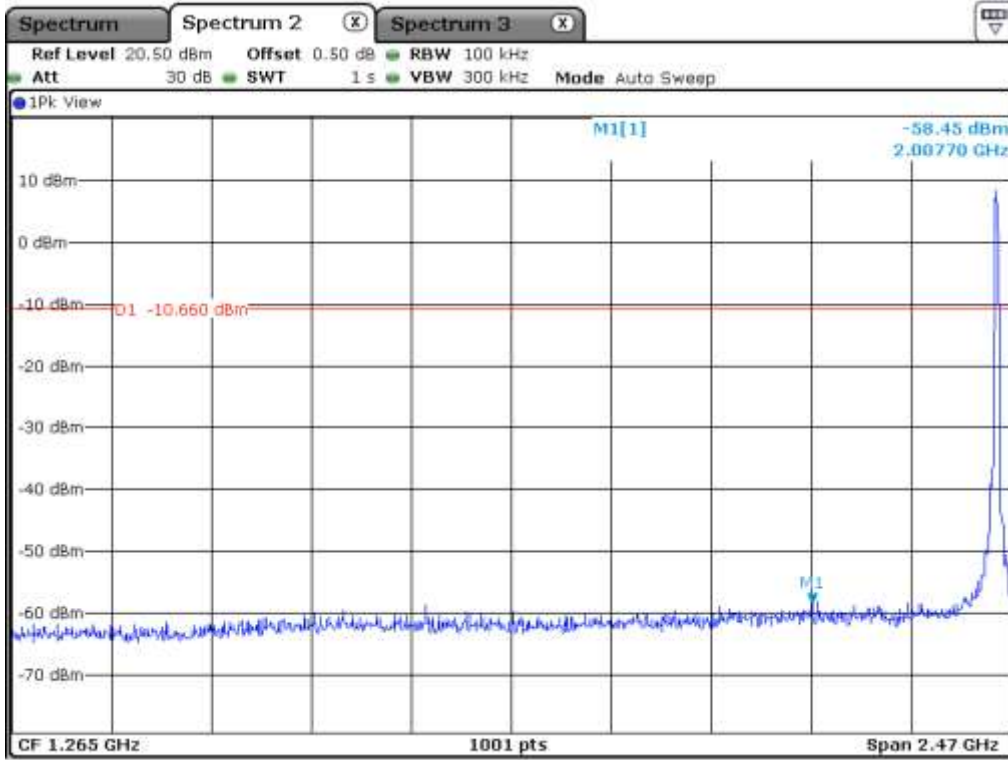




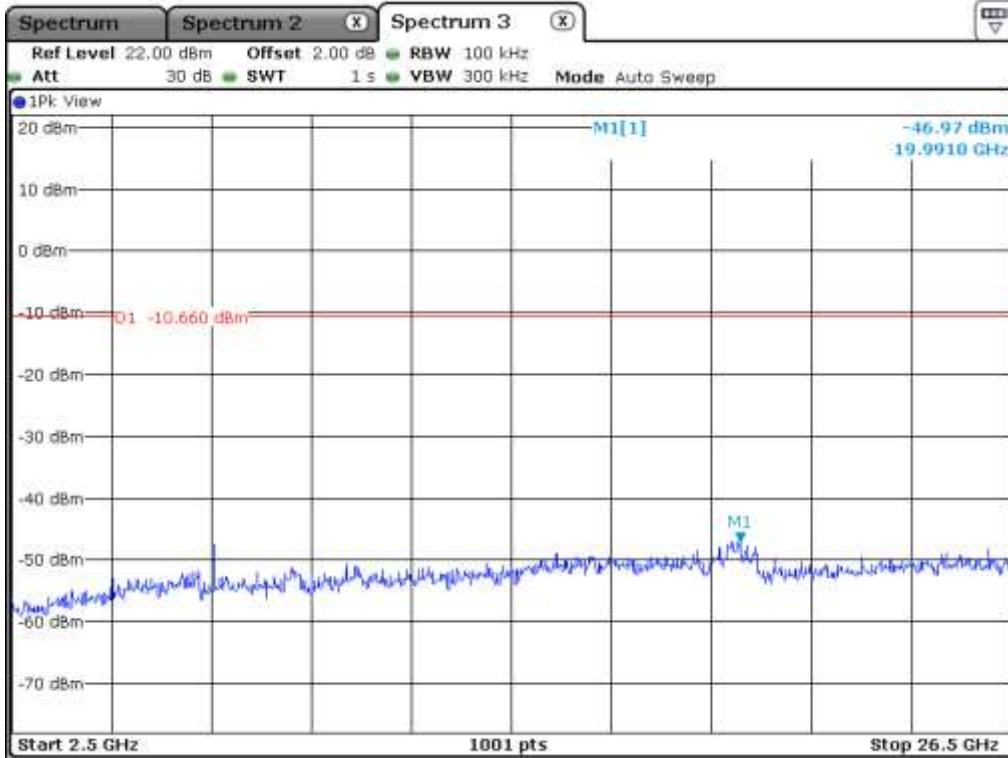
Middle Channel



Middle Channel

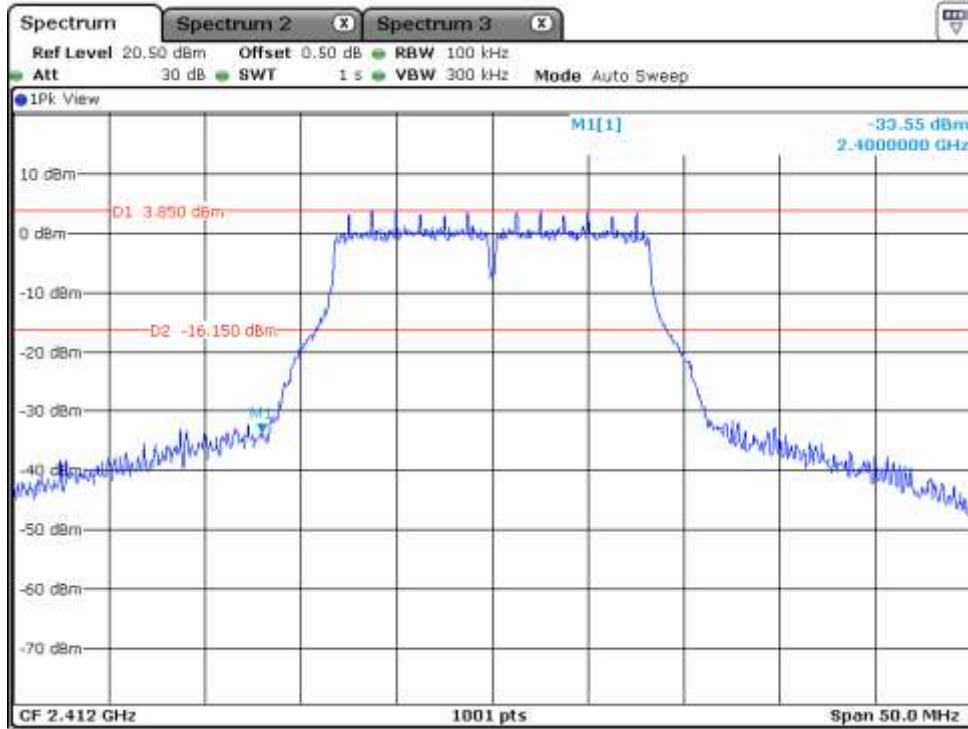


High Channel

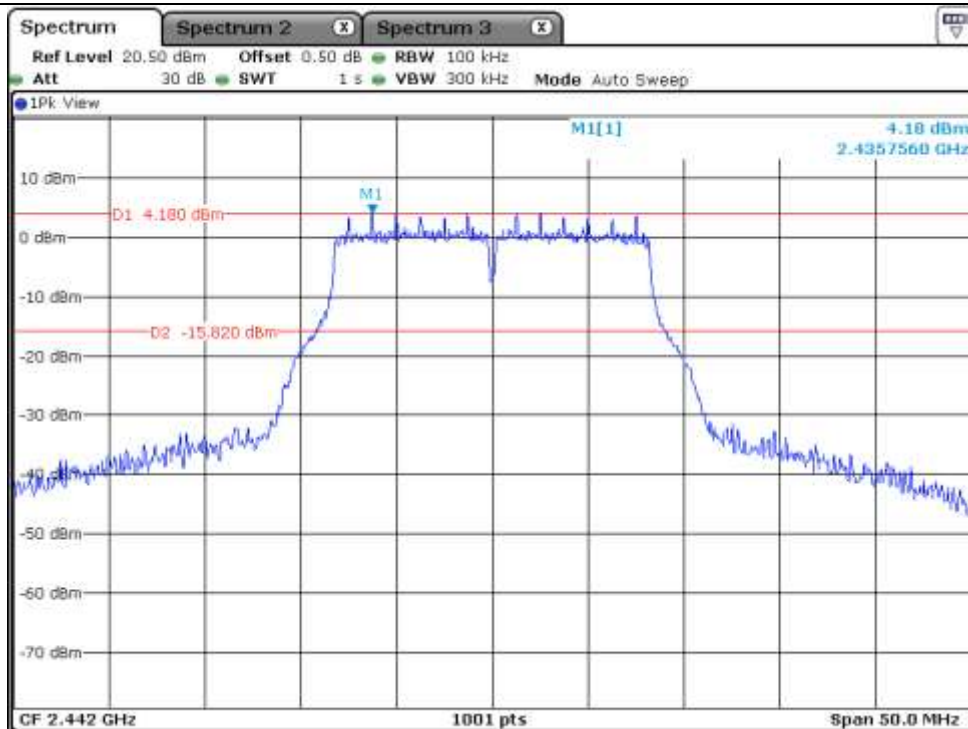


High Channel

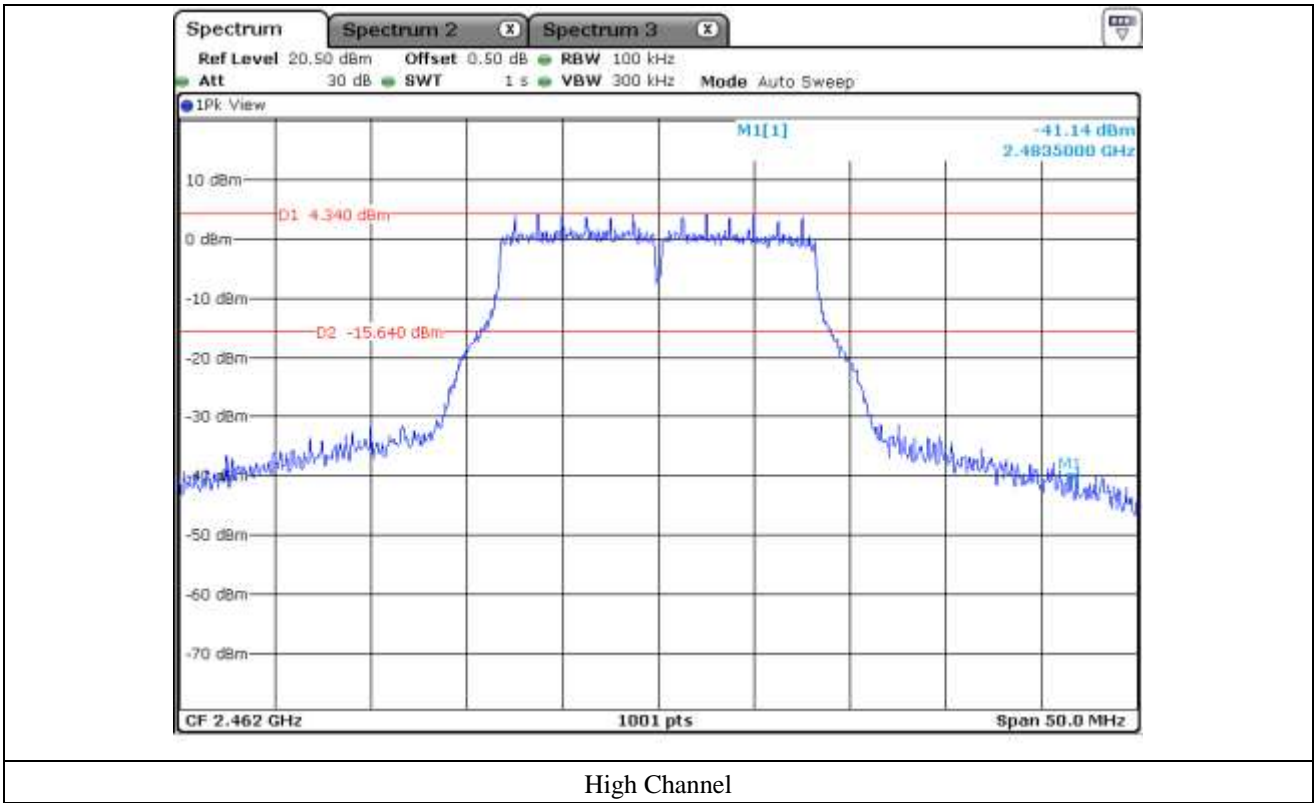
9.5.2 Test data for 802.11g WLAN Mode

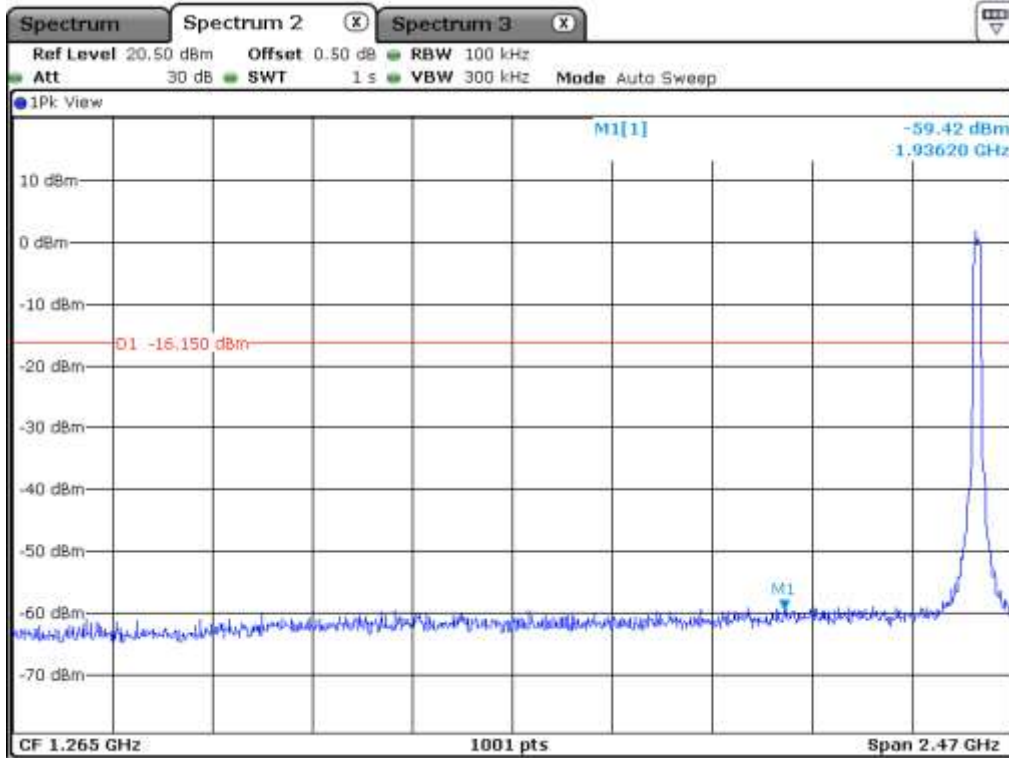


Low Channel

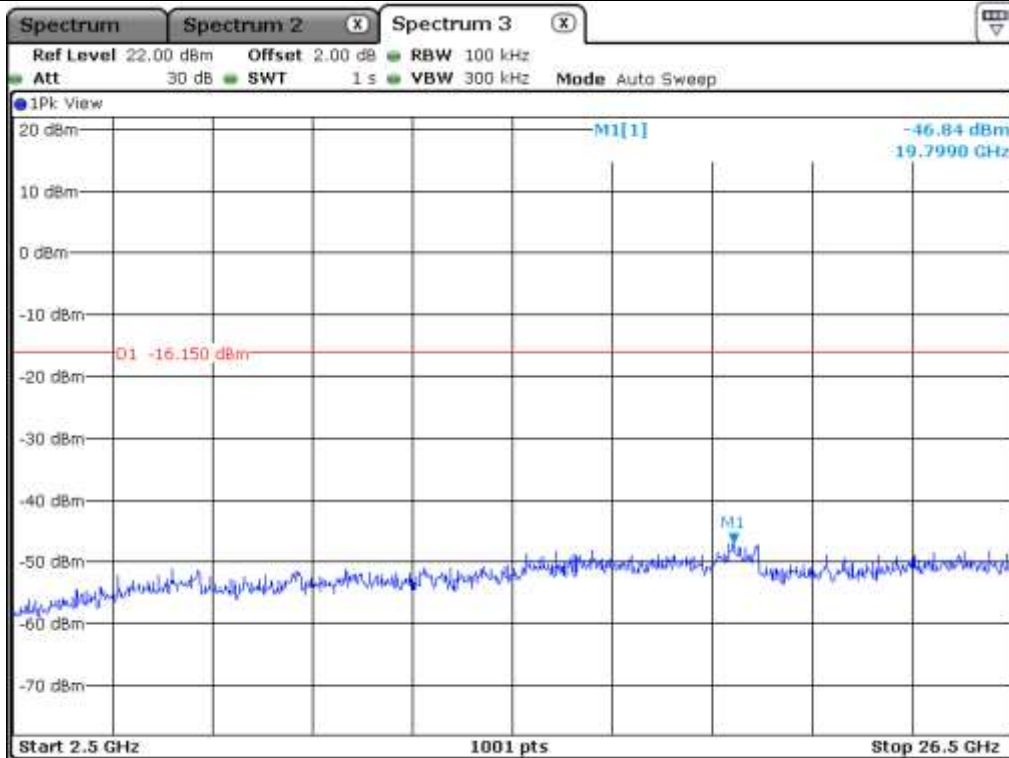


Middle Channel

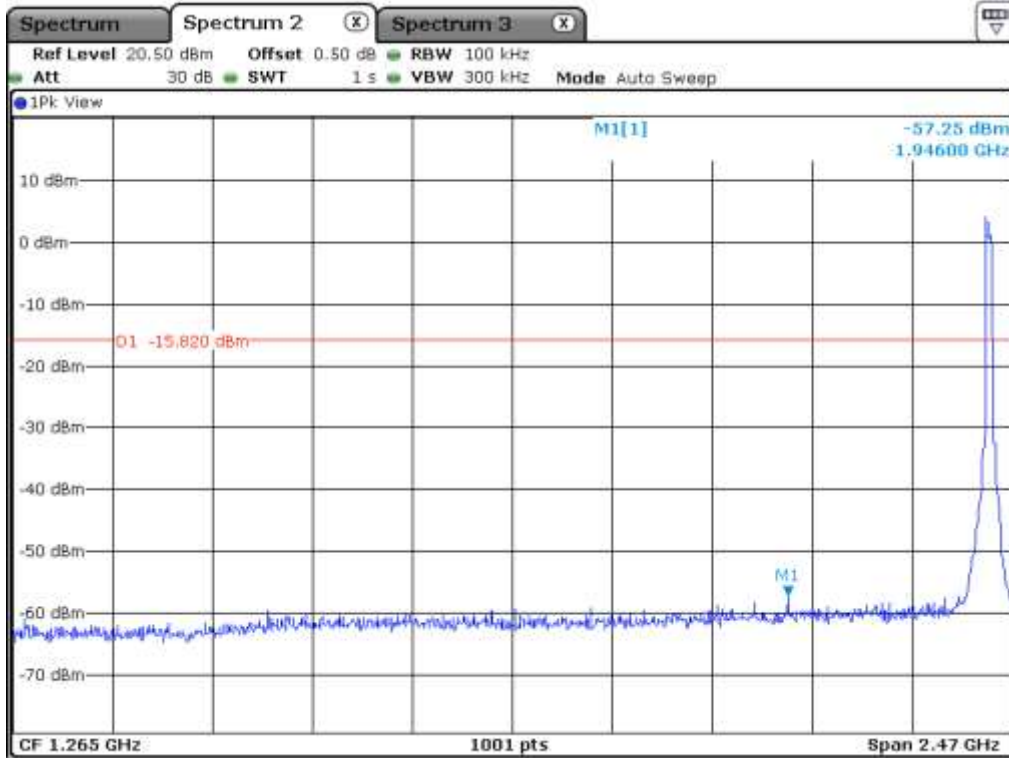




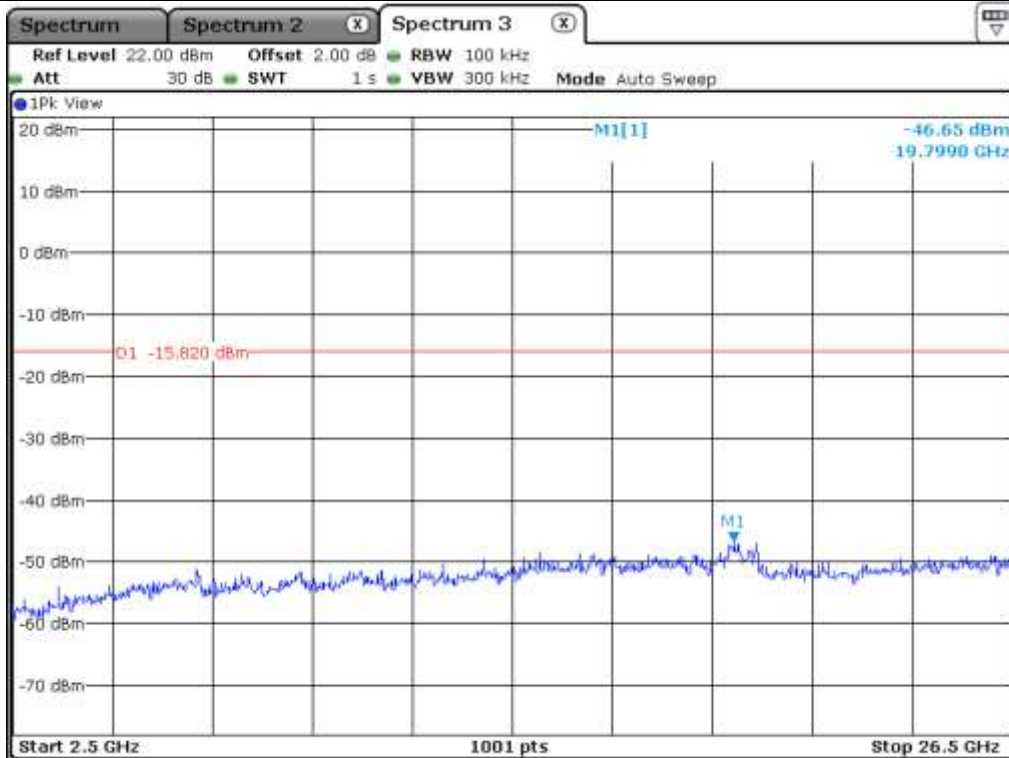
Low Channel



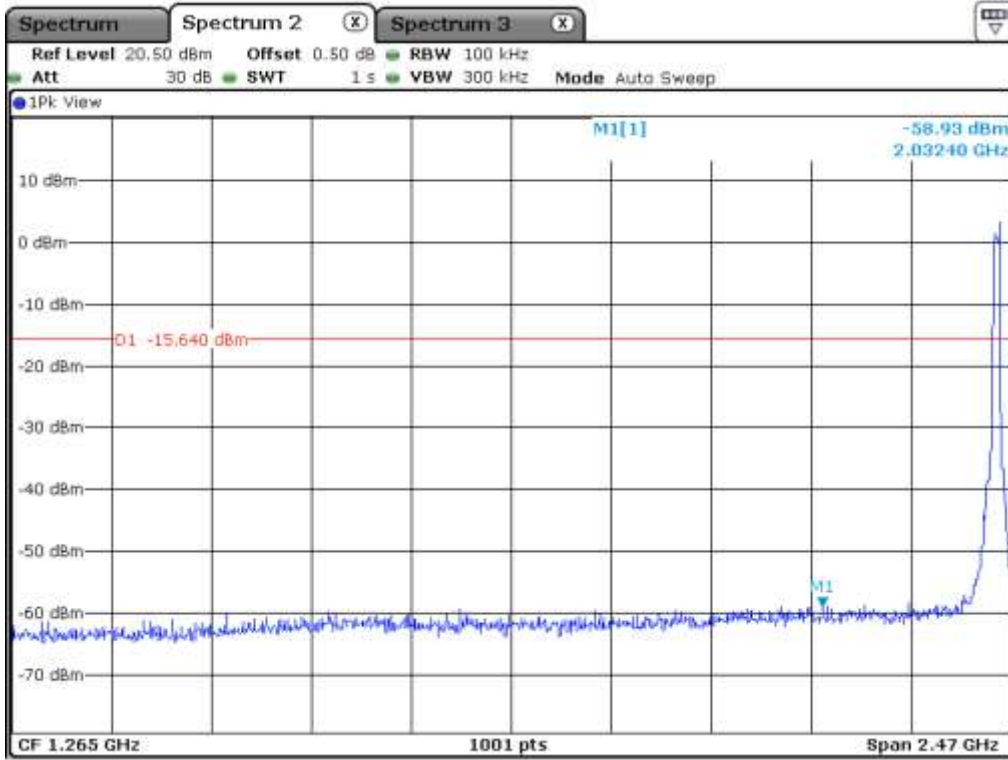
Low Channel



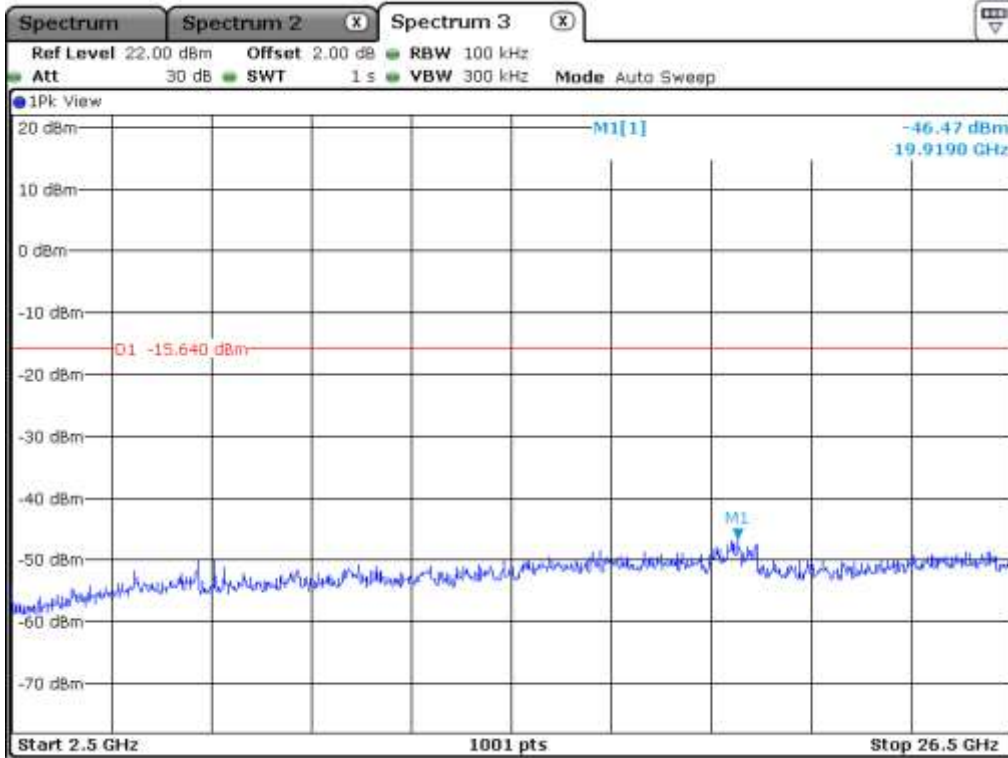
Middle Channel



Middle Channel

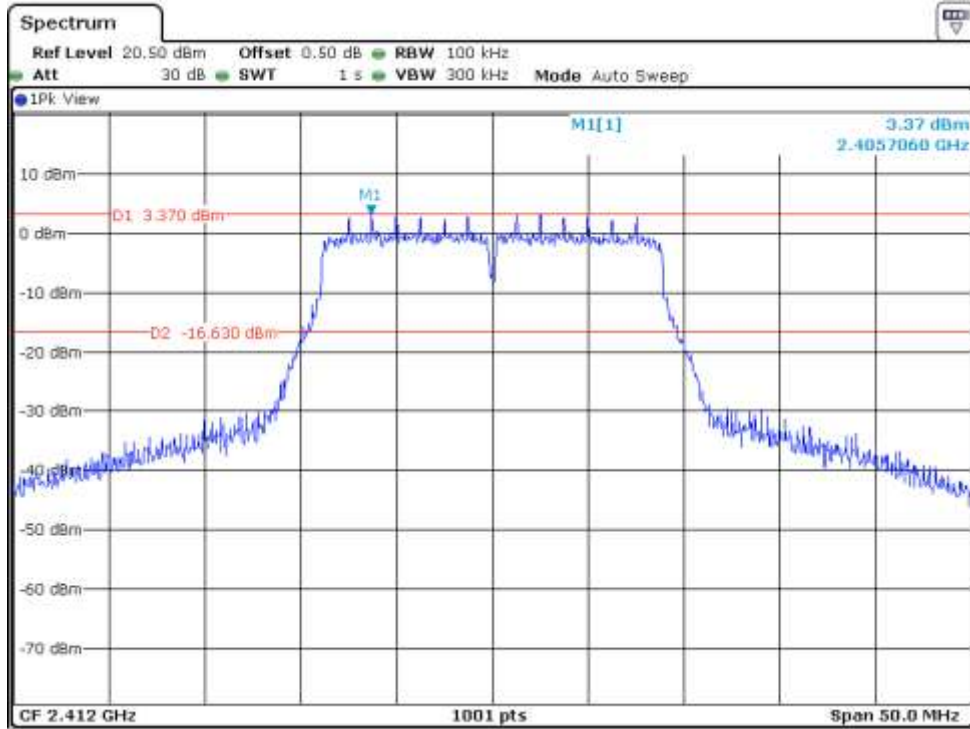


High Channel

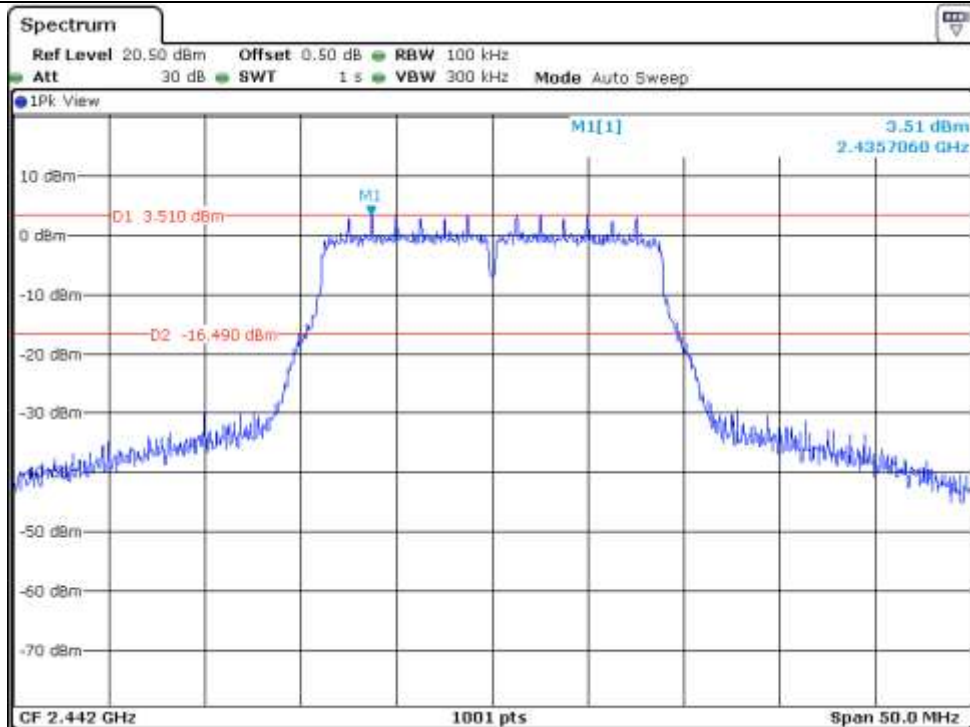


High Channel

9.5.3 Test data for 802.11n\_HT20 WLAN Mode

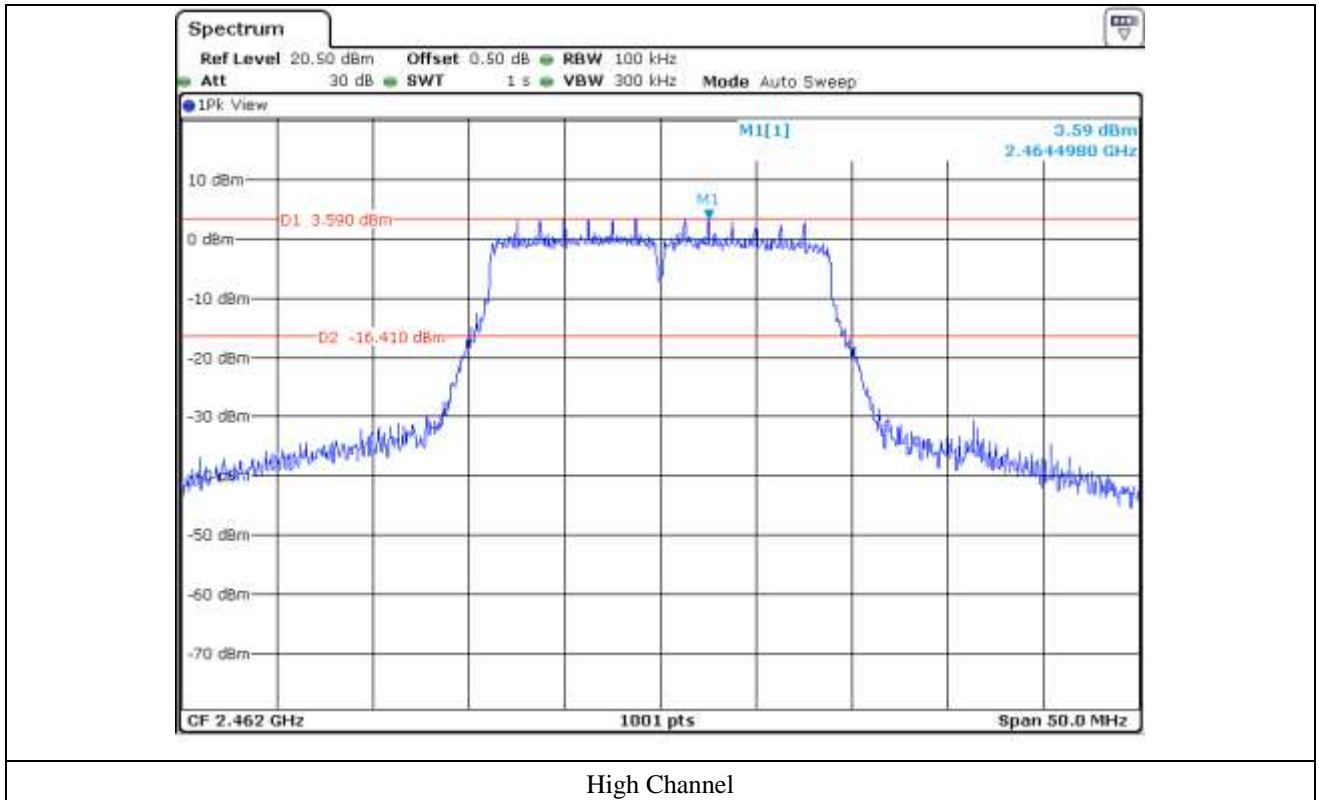


Low Channel

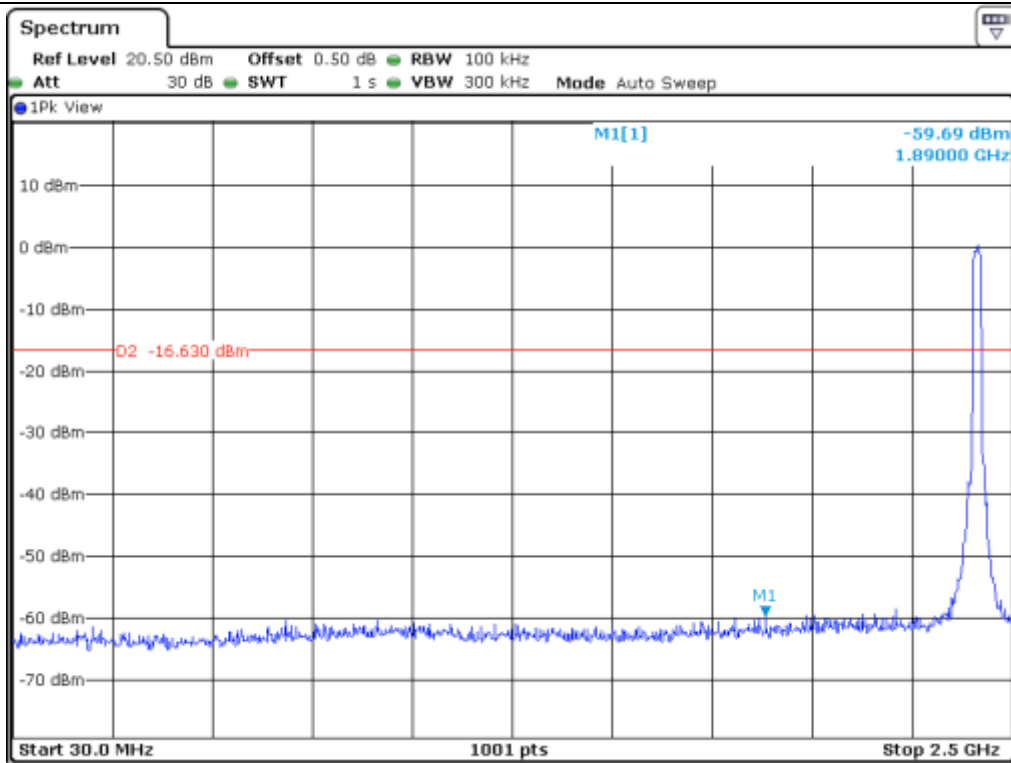


Middle Channel

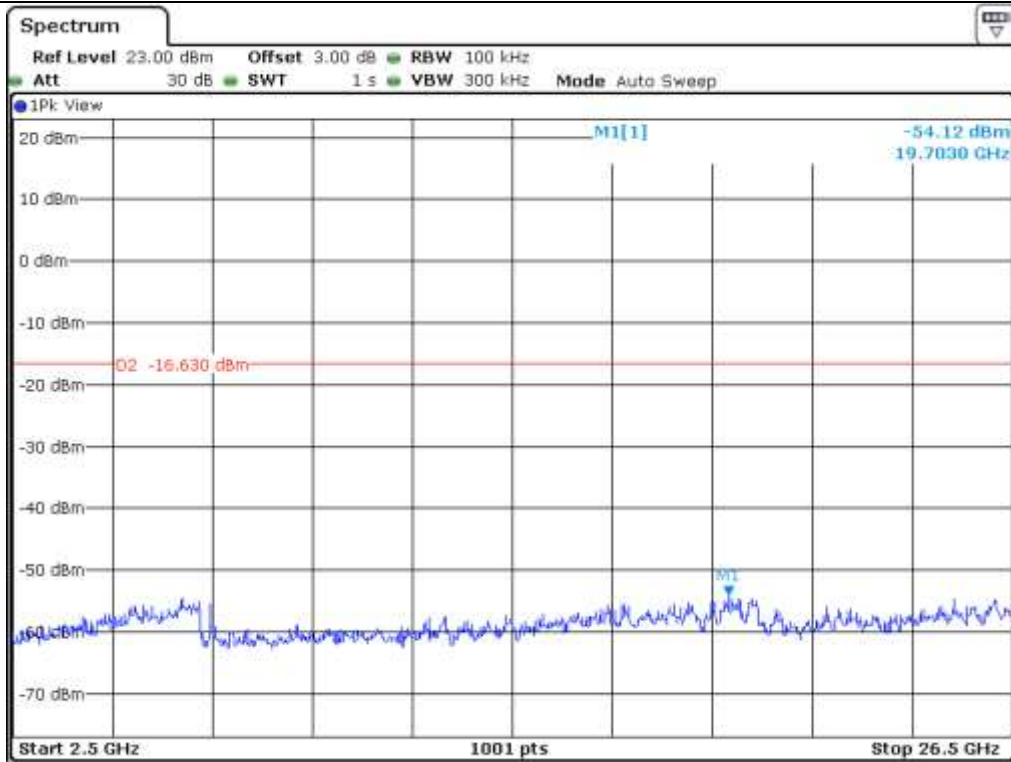




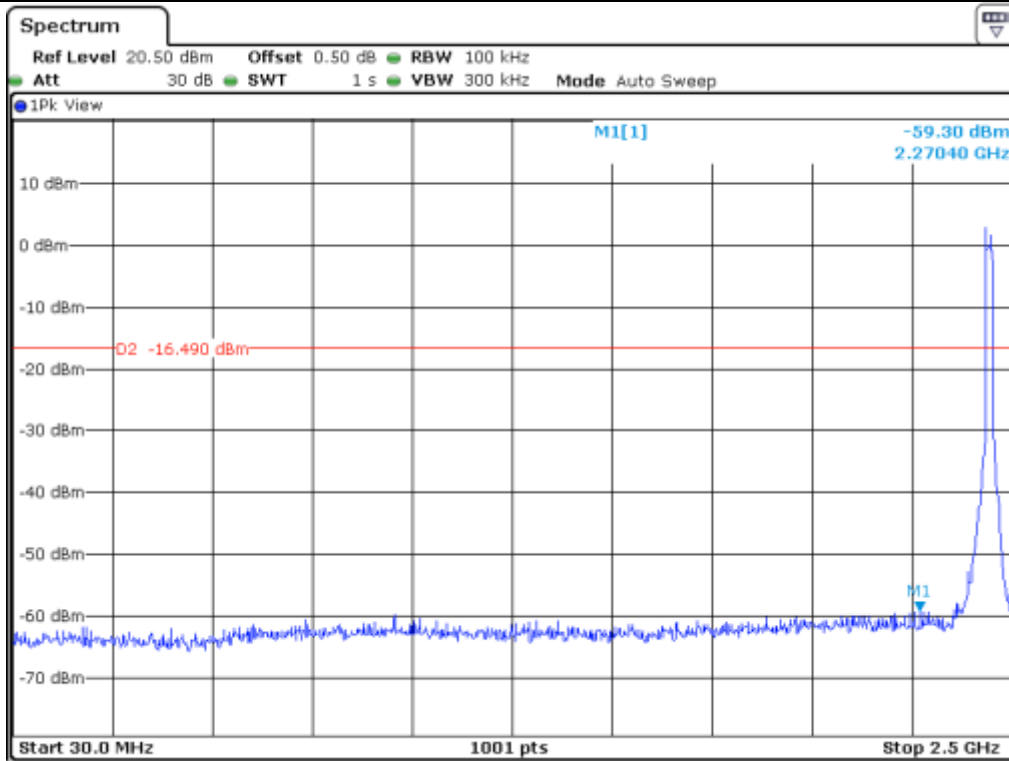
High Channel



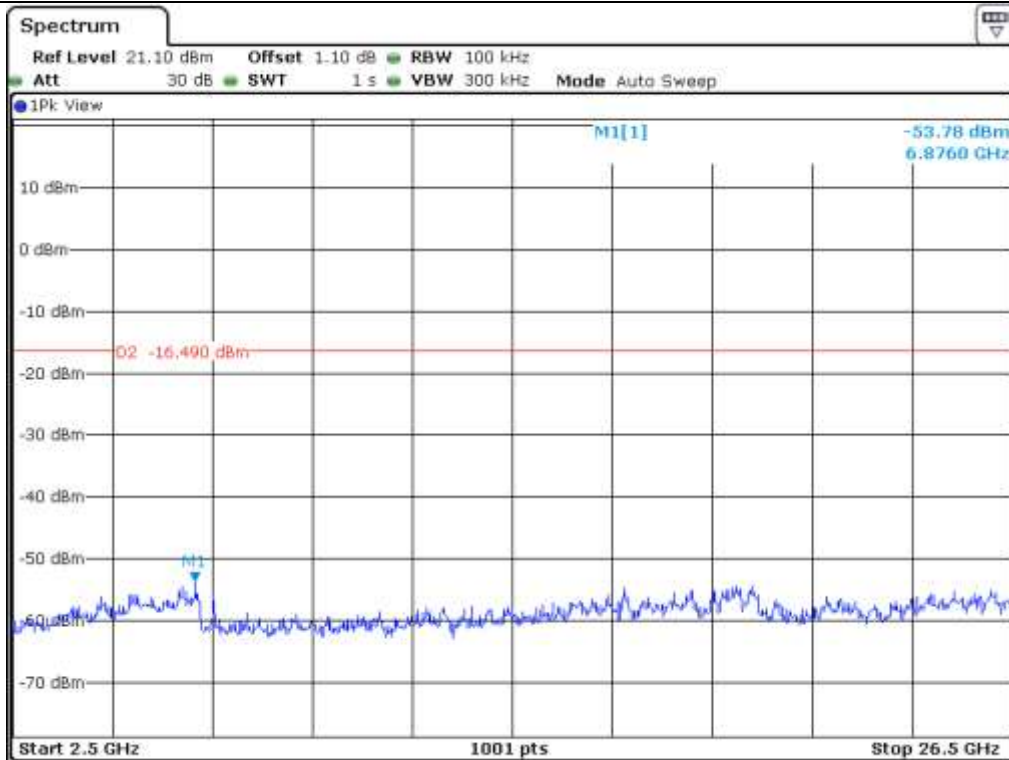
Low Channel



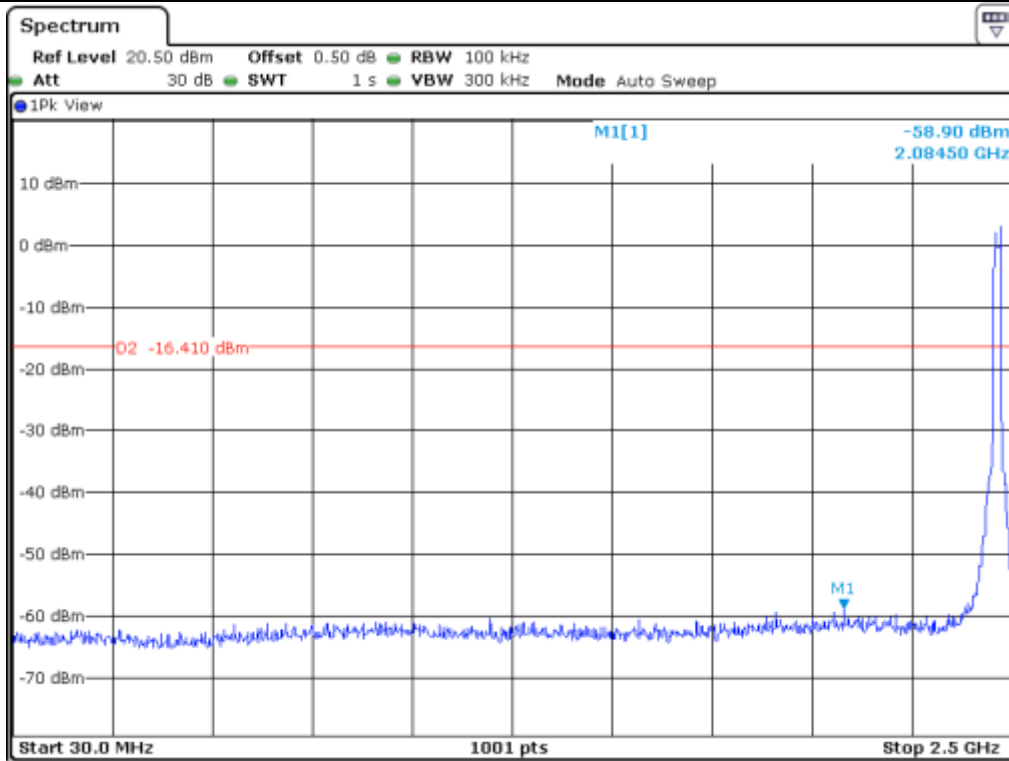
Low Channel



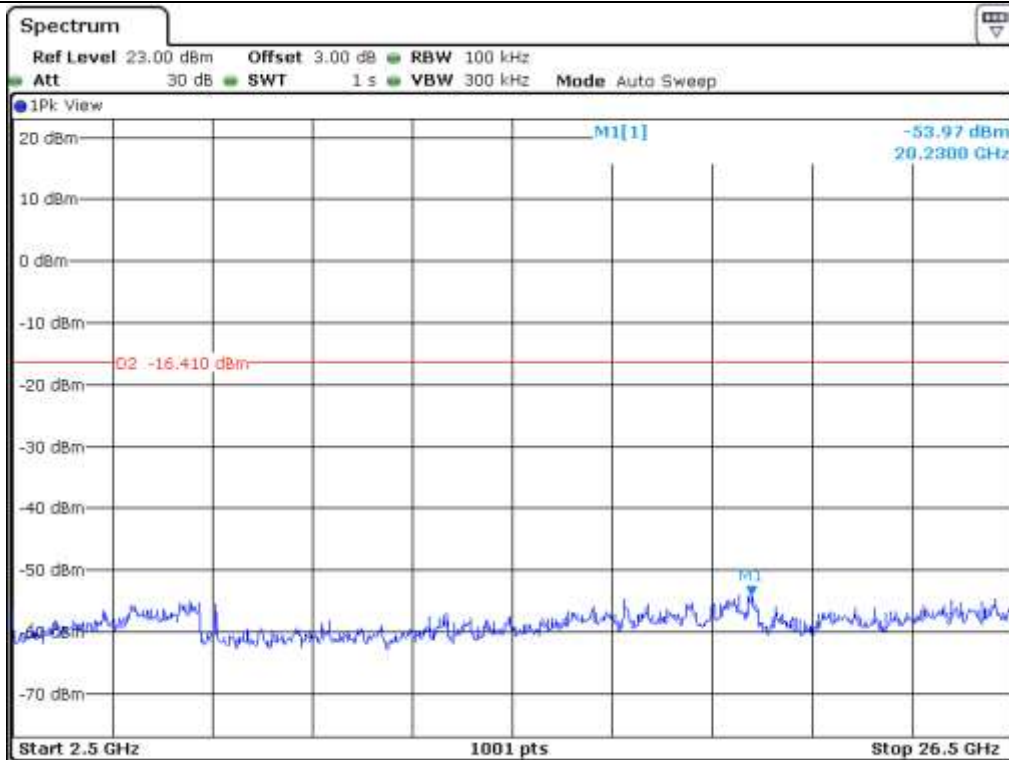
Middle Channel



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**

- Test Date : March 22, 2017
- 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 : 98 %
- Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
<b>Test Data for Low Channel</b>									
2 390.00	57.41	Peak	H	26.94	9.20	40.21	53.34	74.00	20.66
	51.71	Average	H				47.64	54.00	6.36
	49.72	Peak	V				45.65	74.00	28.35
	43.94	Average	V				39.87	54.00	14.13
<b>Test Data for High Channel</b>									
2 483.50	51.11	Peak	H	27.47	9.49	40.16	47.91	74.00	26.09
	47.14	Average	H				43.94	54.00	10.06
	43.53	Peak	V				40.33	74.00	33.67
	36.74	Average	V				33.54	54.00	20.46

Tabulated test data for Restricted Band

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

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

$$\text{Total Level} = \text{Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Pre-Amplifier Gain}$$



**Tested by: Tae-Ho, Kim / Senior Engineer**

**9.6.1.2 Test data for 802.11g WLAN Mode**

- Test Date : March 22, 2017
- 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 : 98 %
- Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
<b>Test Data for Low Channel</b>									
2 390.00	66.61	Peak	H	26.94	9.20	40.21	62.54	74.00	11.46
	52.16	Average	H				48.09	54.00	5.91
	60.11	Peak	V				56.04	74.00	17.96
	49.21	Average	V				45.14	54.00	8.86
<b>Test Data for High Channel</b>									
2 483.50	67.57	Peak	H	27.47	9.49	40.16	64.37	74.00	9.63
	53.36	Average	H				50.16	54.00	3.84
	61.20	Peak	V				58.00	74.00	16.00
	51.66	Average	V				48.46	54.00	5.54

Tabulated test data for Restricted Band

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

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

$$\text{Total Level} = \text{Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Pre-Amplifier Gain}$$



**Tested by: Tae-Ho, Kim / Senior Engineer**

**9.6.1.3 Test data for 802.11n\_HT20 WLAN Mode**

- Test Date : March 22, 2017
- 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 : 98 %
- Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
<b>Test Data for Low Channel</b>									
2 390.00	70.54	Peak	H	26.94	9.20	40.21	66.47	74.00	7.53
	53.30	Average	H				49.23	54.00	4.77
	62.14	Peak	V				58.07	74.00	15.93
	50.30	Average	V				46.23	54.00	7.77
<b>Test Data for High Channel</b>									
2 483.50	67.35	Peak	H	27.47	9.49	40.16	64.15	74.00	9.85
	54.27	Average	H				51.07	54.00	2.93
	61.02	Peak	V				57.82	74.00	16.18
	52.15	Average	V				48.95	54.00	5.05

Tabulated test data for Restricted Band

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

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

$$\text{Total Level} = \text{Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Pre-Amplifier Gain}$$



**Tested by: Tae-Ho, Kim / Senior Engineer**

**9.6.2 Radiated Emission which fall in the Band Edge**

**9.6.2.2 Test data for 802.11b WLAN Mode**

- . Test Date : March 23, 2017
- . Resolution bandwidth : 100 kHz and Peak Detector for Peak Mode  
100 kHz and RMS Detector for Average Mode
- . Video bandwidth : 300 kHz for Peak and Average Mode
- . Measurement distance : 3 m
- . Duty Cycle : 98 %
- . Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
<b>Test Data for Low Channel</b>									
2 400.00	74.97	Peak	H	27.20	9.35	40.18	71.34	81.01	9.67
	72.39	Average	H				68.76	78.93	10.17
	57.94	Peak	V				54.31	79.25	24.94
	55.37	Average	V				51.74	77.35	25.61

Tabulated test data for Restricted Band

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

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

$$\text{Total Level} = \text{Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Pre-Amplifier Gain}$$



**Tested by: Tae-Ho, Kim / Senior Engineer**



**9.6.2.2 Test data for 802.11g WLAN Mode**

- Test Date : March 23, 2017
- Resolution bandwidth : 100 kHz and Peak Detector for Peak Mode  
100 kHz and RMS Detector for Average Mode
- Video bandwidth : 300 kHz for Peak and Average Mode
- Measurement distance : 3 m
- Duty Cycle : 98 %
- Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
<b>Test Data for Low Channel</b>									
2 400.00	74.61	Peak	H	27.20	9.35	40.18	70.98	76.77	5.79
	63.15	Average	H				59.52	68.75	9.23
	62.12	Peak	V				58.49	73.25	14.76
	53.15	Average	V				49.52	67.12	17.60

Tabulated test data for Restricted Band

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

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

$$\text{Total Level} = \text{Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Pre-Amplifier Gain}$$



**Tested by: Tae-Ho, Kim / Senior Engineer**

**9.6.2.3 Test data for 802.11n\_HT20 WLAN Mode**

- Test Date : March 23, 2017
- Resolution bandwidth : 100 kHz and Peak Detector for Peak Mode  
100 kHz and RMS Detector for Average Mode
- Video bandwidth : 300 kHz for Peak and Average Mode
- Measurement distance : 3 m
- Duty Cycle : 98 %
- Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
<b>Test Data for Low Channel</b>									
2 400.00	76.45	Peak	H	27.20	9.35	40.18	72.82	76.51	3.69
	62.61	Average	H				58.98	66.12	7.14
	61.55	Peak	V				57.92	74.22	16.30
	50.25	Average	V				46.62	62.84	16.22

Tabulated test data for Restricted Band

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

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

$$\text{Total Level} = \text{Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Pre-Amplifier Gain}$$



**Tested by: Tae-Ho, Kim / Senior Engineer**

### 9.6.3 Spurious & Harmonic Radiated Emission

#### 9.6.3.1 Test data for 802.11b WLAN Mode

- Test Date : March 23, 2017
- 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 : 98 %
- Result : PASSED

Frequency (GHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
<b>Test Data for Low Channel</b>									
4 824.00	50.10	Peak	H	30.84	12.31	40.69	52.56	74.00	21.44
	38.80	Average	H				41.26	54.00	12.74
	48.80	Peak	V				51.26	74.00	22.74
	40.90	Average	V				43.36	54.00	10.64
<b>Test Data for Middle Channel</b>									
4 884.00	48.60	Peak	H	30.01	12.43	40.65	50.39	74.00	23.61
	38.00	Average	H				39.79	54.00	14.21
	48.40	Peak	V				50.19	74.00	23.81
	40.20	Average	V				41.99	54.00	12.01
<b>Test Data for High Channel</b>									
4 924.00	51.00	Peak	H	31.15	12.81	40.61	54.35	74.00	19.65
	38.00	Average	H				41.35	54.00	12.65
	49.30	Peak	V				52.65	74.00	21.35
	40.40	Average	V				43.75	54.00	10.25

Tabulated test data for Restricted Band

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

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

$$\text{Total Level} = \text{Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Pre-Amplifier Gain}$$



**Tested by: Tae-Ho, Kim / Senior Engineer**

**9.6.3.2 Test data for 802.11g WLAN Mode**

- Test Date : March 23, 2017
- 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 : 98 %
- Result : PASSED

Frequency (GHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
<b>Test Data for Low Channel</b>									
4 824.00	47.70	Peak	H	30.84	12.31	40.69	50.16	74.00	23.84
	40.20	Average	H				42.66	54.00	11.34
	48.10	Peak	V				50.56	74.00	23.44
	39.60	Average	V				42.06	54.00	11.94
<b>Test Data for Middle Channel</b>									
4 884.00	47.80	Peak	H	30.01	12.43	40.65	49.59	74.00	24.41
	38.10	Average	H				39.89	54.00	14.11
	48.30	Peak	V				50.09	74.00	23.91
	39.90	Average	V				41.69	54.00	12.31
<b>Test Data for High Channel</b>									
4 924.00	50.90	Peak	H	31.15	12.81	40.61	54.25	74.00	19.75
	38.80	Average	H				42.15	54.00	11.85
	48.10	Peak	V				51.45	74.00	22.55
	39.30	Average	V				42.65	54.00	11.35

Tabulated test data for Restricted Band

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

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

$$\text{Total Level} = \text{Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Pre-Amplifier Gain}$$



**Tested by: Tae-Ho, Kim / Senior Engineer**

**9.6.3.3 Test data for 802.11n\_HT20 WLAN Mode**

- Test Date : March 23, 2017
- 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 : 98 %
- Result : PASSED

Frequency (GHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
<b>Test Data for Low Channel</b>									
4 824.00	48.40	Peak	H	30.84	12.31	40.69	50.86	74.00	23.14
	39.50	Average	H				41.96	54.00	12.04
	47.60	Peak	V				50.06	74.00	23.94
	40.10	Average	V				42.56	54.00	11.44
<b>Test Data for Middle Channel</b>									
4 884.00	48.00	Peak	H	30.01	12.43	40.65	49.79	74.00	24.21
	38.90	Average	H				40.69	54.00	13.31
	50.20	Peak	V				51.99	74.00	22.01
	39.70	Average	V				41.49	54.00	12.51
<b>Test Data for High Channel</b>									
4 924.00	49.80	Peak	H	31.15	12.81	40.61	53.15	74.00	20.85
	40.60	Average	H				43.95	54.00	10.05
	48.80	Peak	V				52.15	74.00	21.85
	38.80	Average	V				42.15	54.00	11.85

Tabulated test data for Restricted Band

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

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

$$\text{Total Level} = \text{Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Pre-Amplifier Gain}$$



**Tested by: Tae-Ho, Kim / Senior Engineer**

## 10. PEAK POWER SPECTRUL DENSITY

### 10.1 Operating environment

Temperature : 21 °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 equipment used

Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ - FSV40	Rohde & Schwarz	Signal Analyzer	101009	April 05, 2017 (1Y)

All test equipment used is calibrated on a regular basis.

**10.4 Test data for 802.11b WLAN Mode**

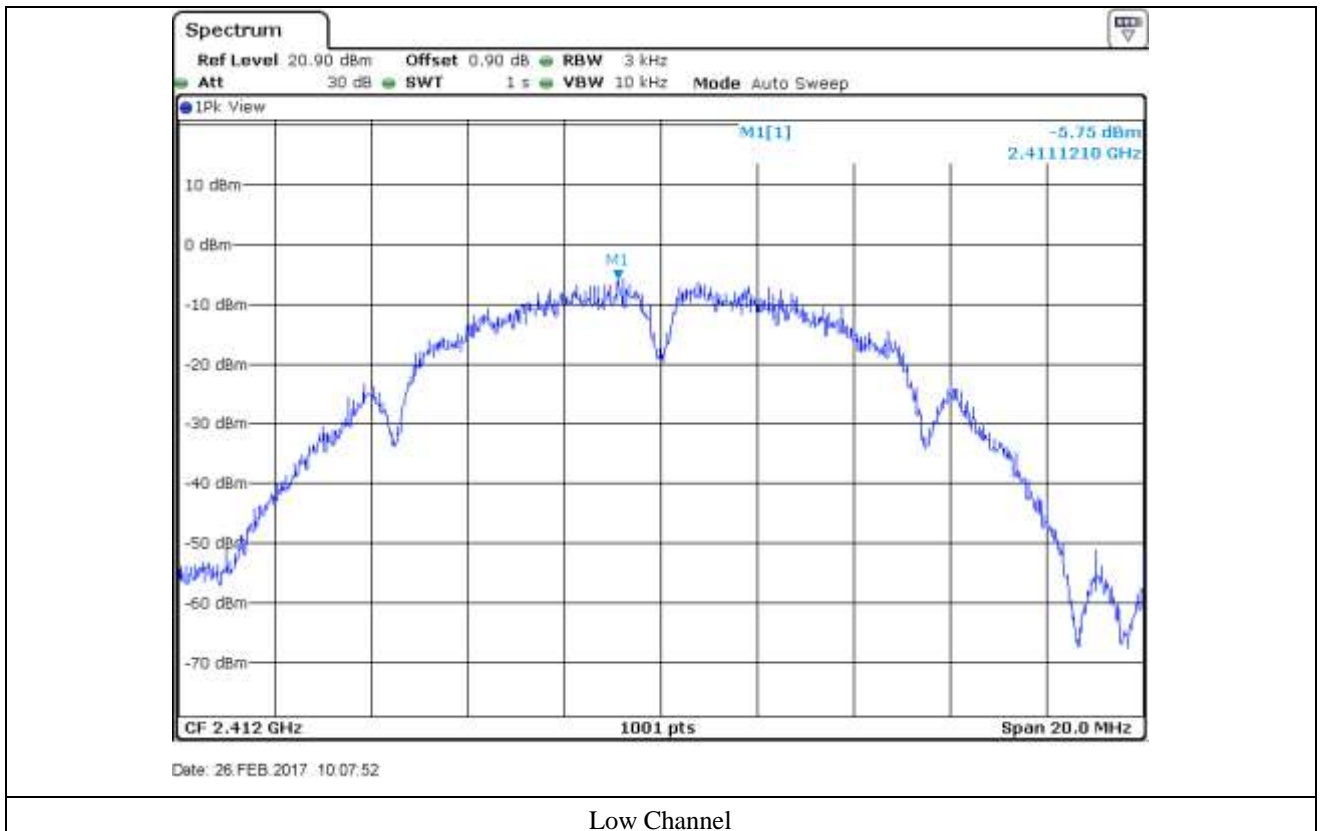
- Test Date : March 24, 2017
- Test Result : Pass
- Operating Condition : Continuous transmitting mode

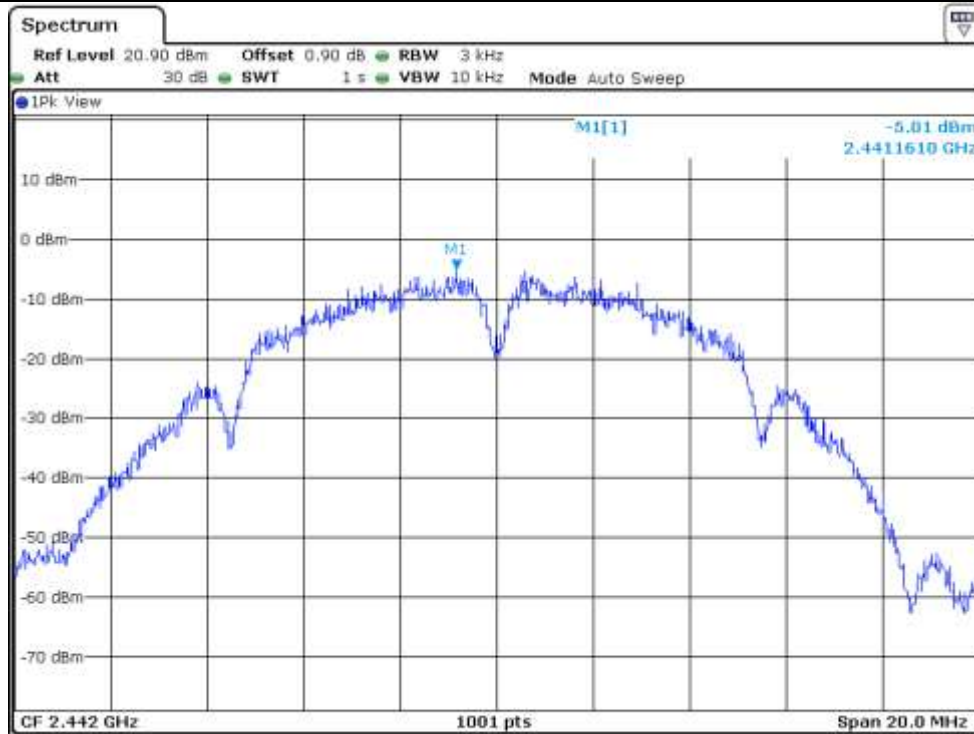
CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412	-5.75	8.00	13.75
Middle	2 442	-5.01	8.00	13.01
High	2 462	-4.45	8.00	12.45

Remark. Margin = Limit – Measured value



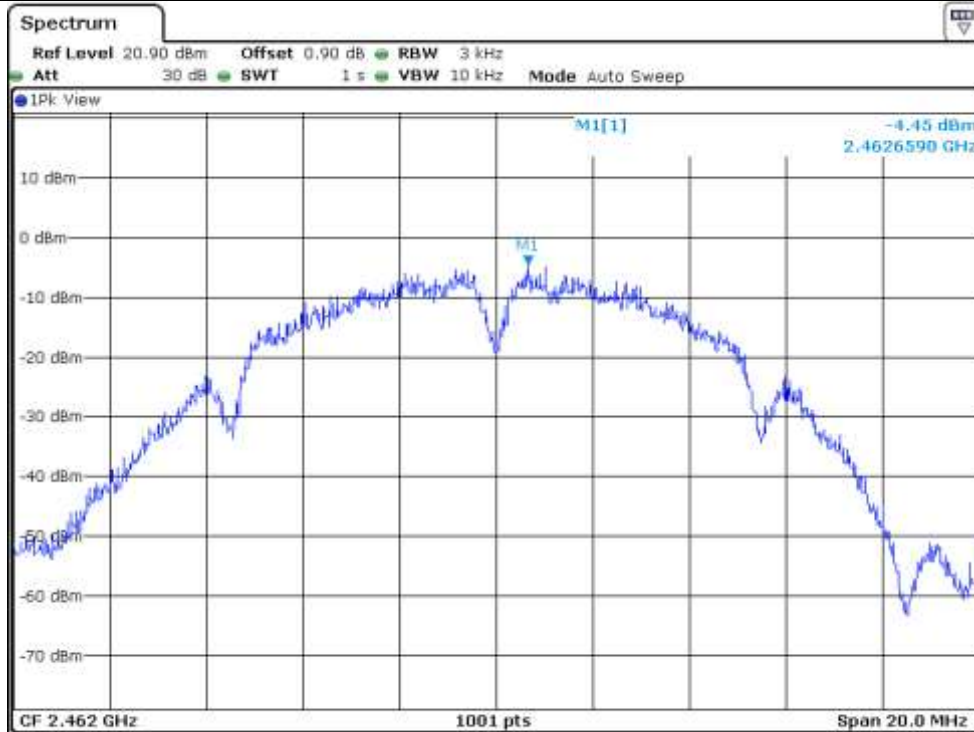
Tested by: Tae-Ho, Kim / Senior Engineer





Date: 26.FEB.2017 10:09:22

Middle Channel



Date: 26.FEB.2017 10:11:11

High Channel



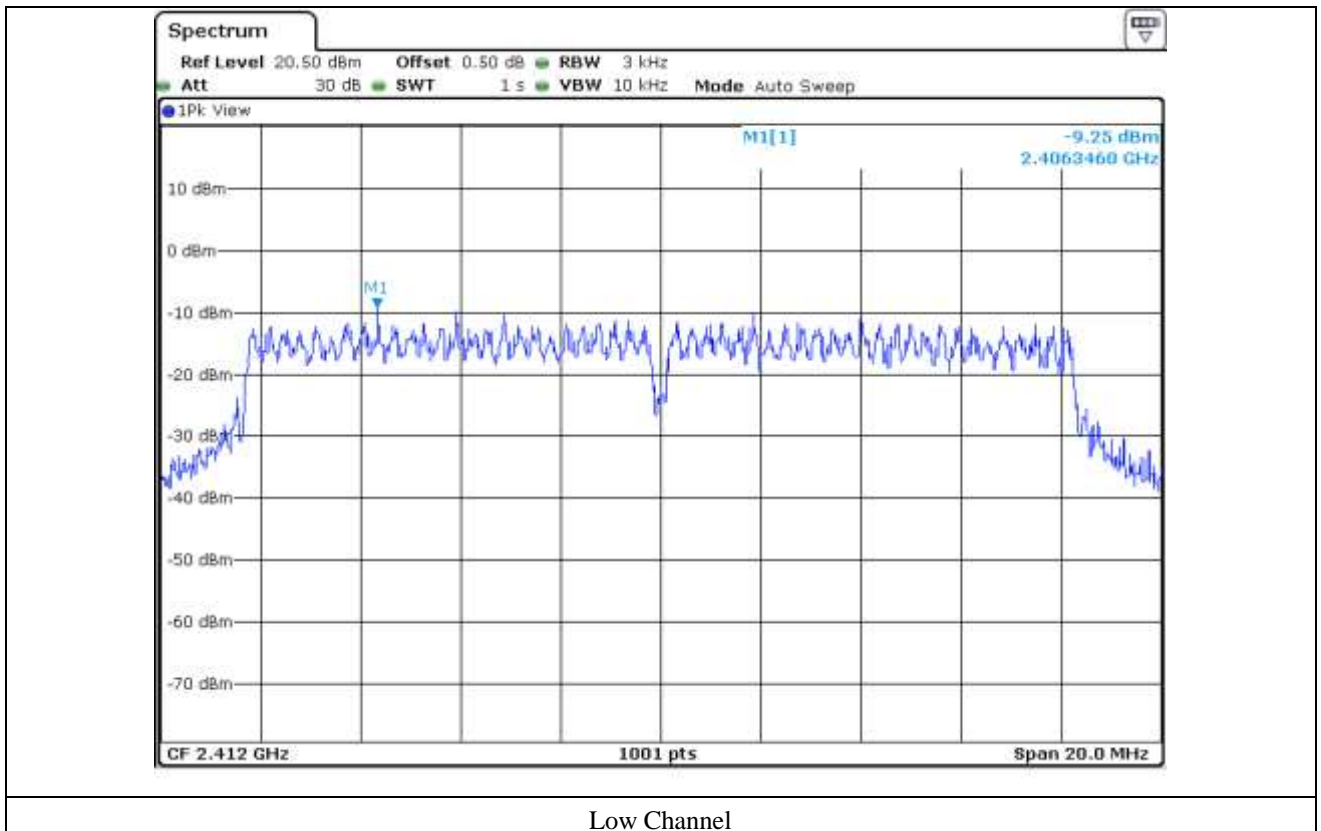
### 10.5 Test data for 802.11g WLAN Mode

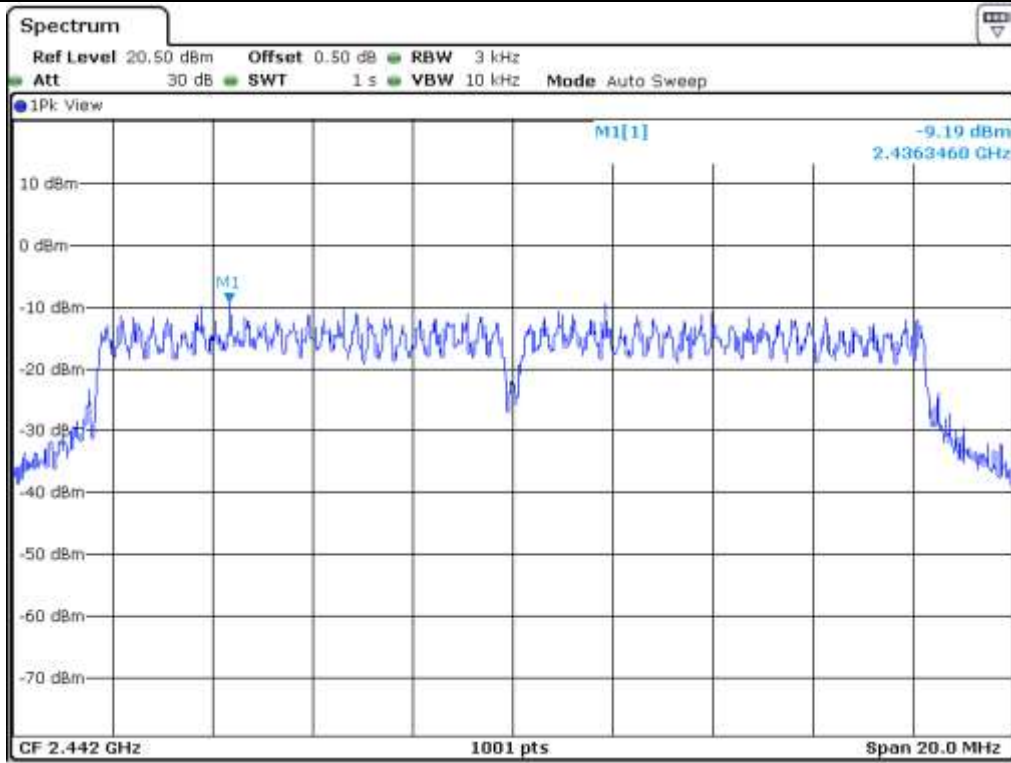
- Test Date : March 24, 2017
- Test Result : Pass
- Operating Condition : Continuous transmitting mode

CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412	-9.25	8.00	17.25
Middle	2 442	-9.19	8.00	17.19
High	2 462	-8.62	8.00	16.62

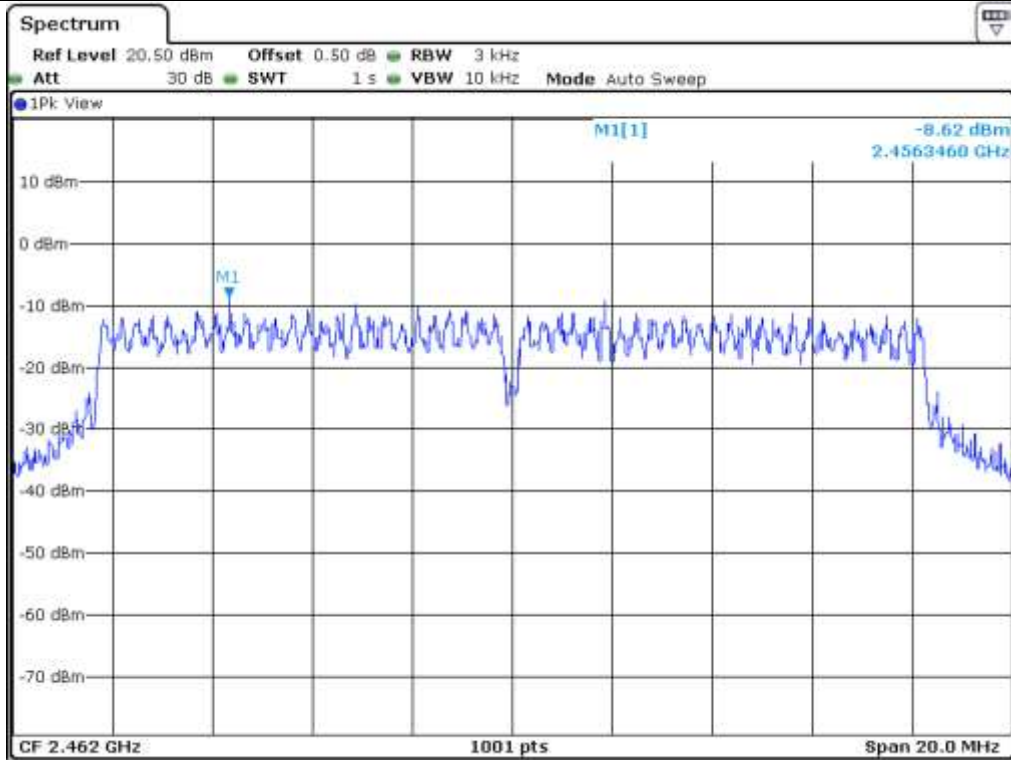
Remark. Margin = Limit – Measured value

Tested by: Tae-Ho, Kim / Senior Engineer





Middle Channel



High Channel

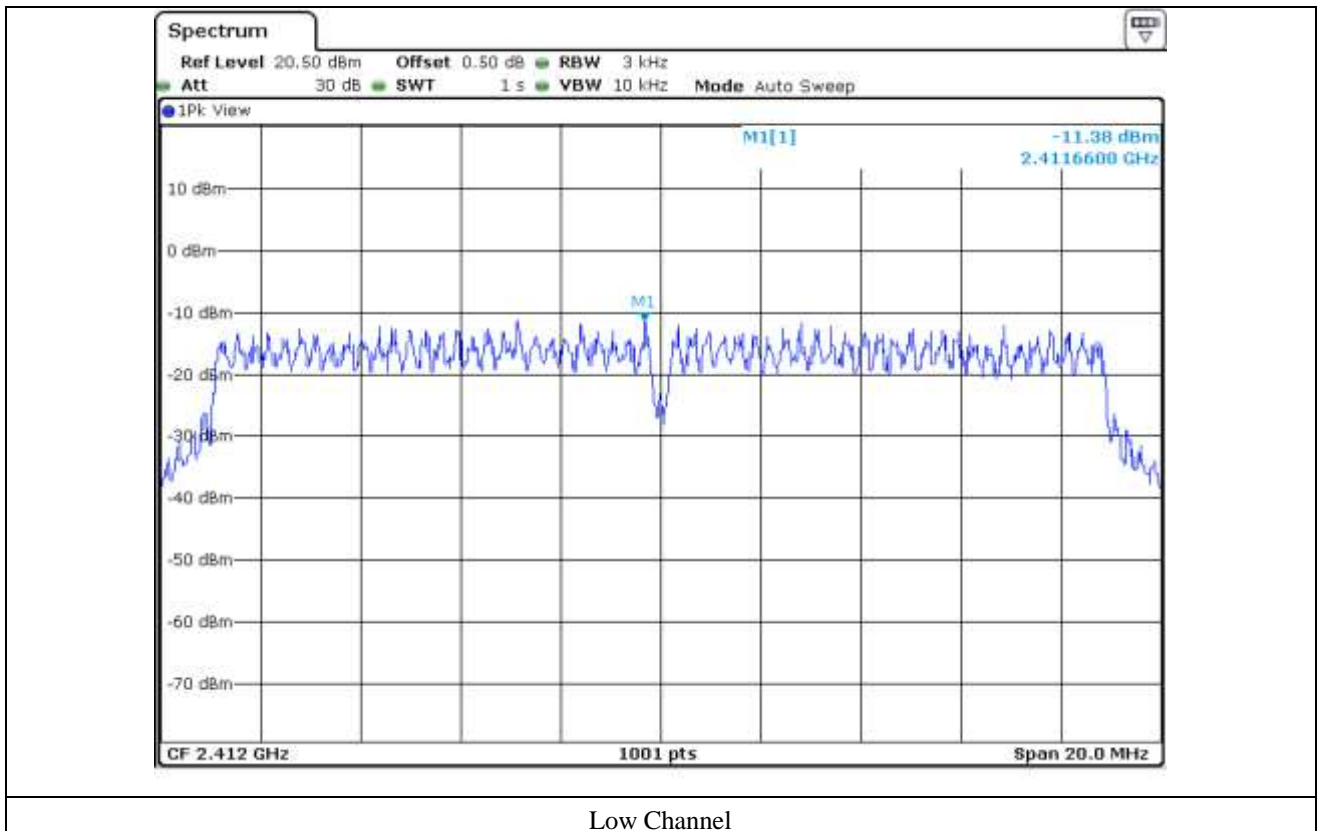
**10.6 Test data for 802.11n\_HT20 WLAN Mode**

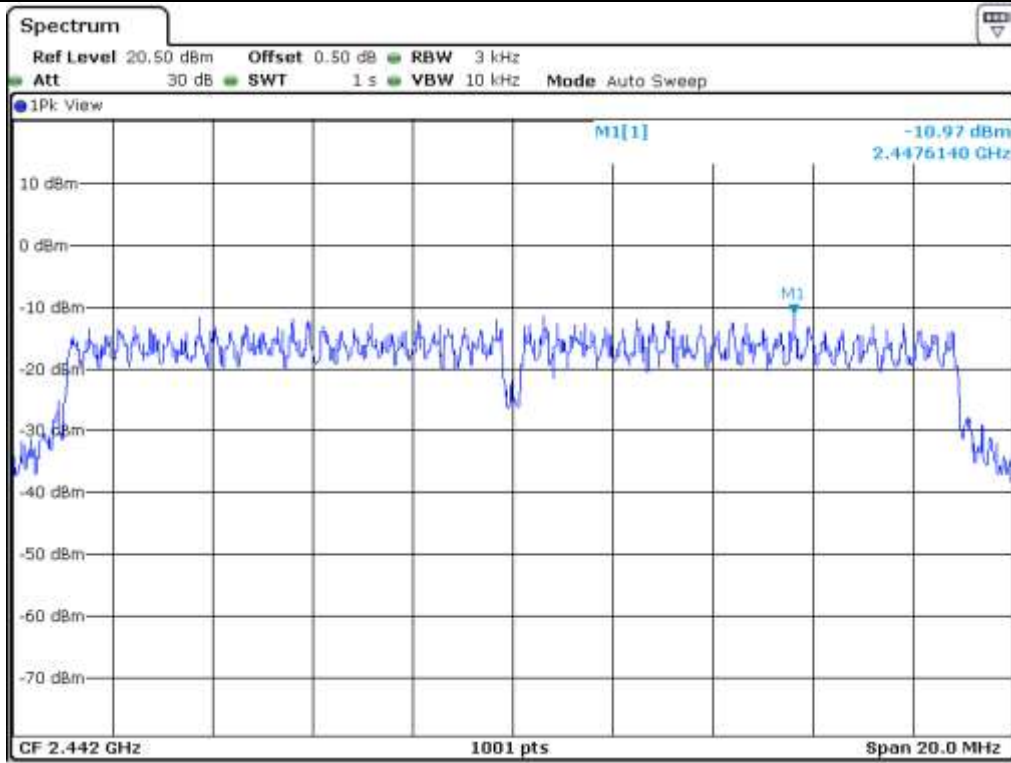
- Test Date : March 24, 2017
- Test Result : Pass
- Operating Condition : Continuous transmitting mode

CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412	-11.38	8.00	19.38
Middle	2 442	-10.97	8.00	18.97
High	2 462	-10.96	8.00	18.96

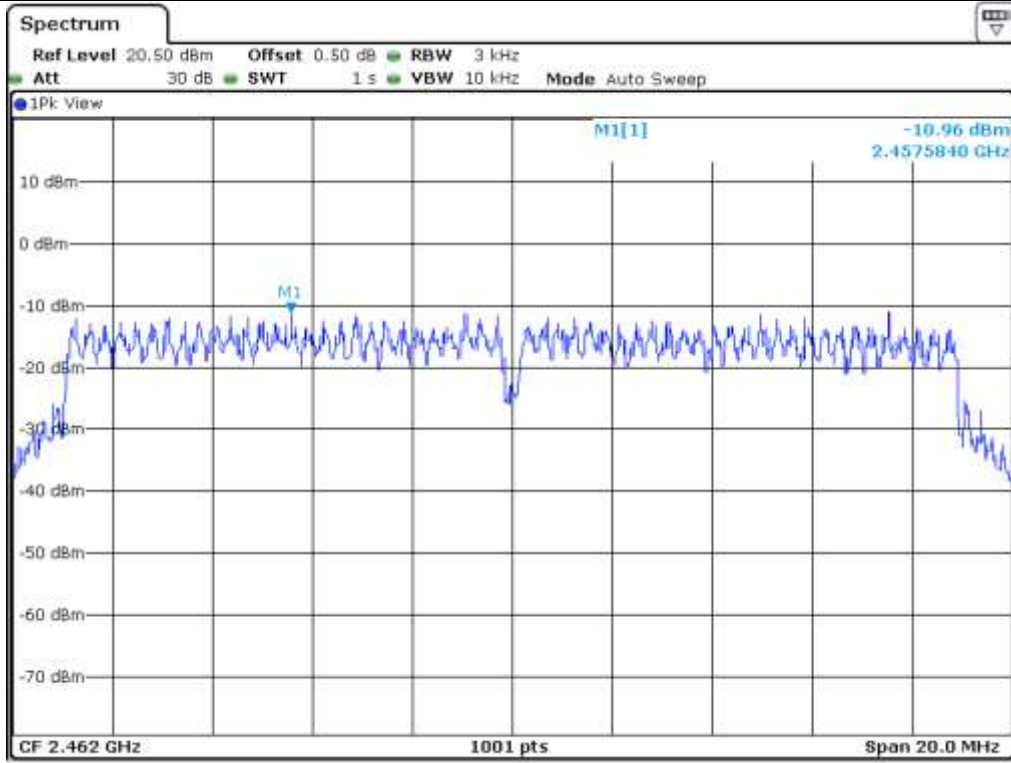
Remark. Margin = Limit – Measured value

Tested by: Tae-Ho, Kim / Senior Engineer





Middle Channel



High Channel

## 11. RADIATED EMISSION TEST

### 11.1 Operating environment

Temperature : 21 °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.

### 11.3 Test equipment used

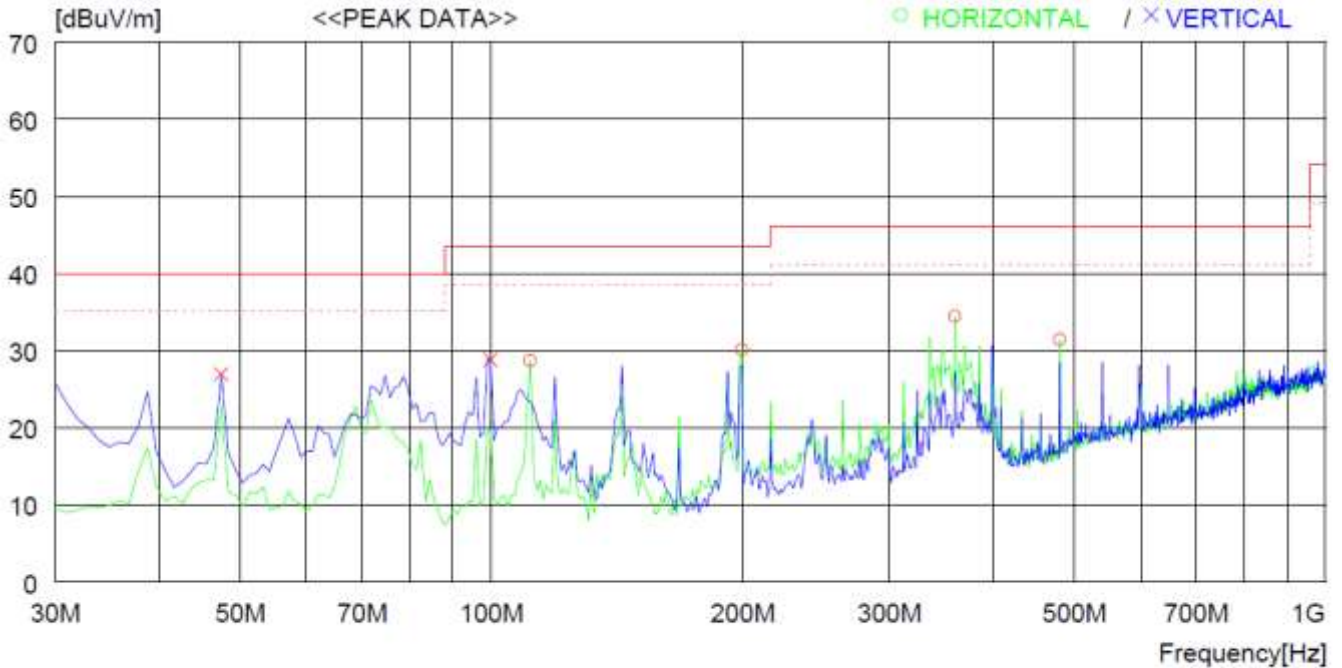
Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ - FSV40	Rohde & Schwarz	Signal Analyzer	101009	April 05, 2017 (1Y)
■ - ESU	Rohde & Schwarz	EMI Test Receiver	100261	Apr. 06, 2017 (1Y)
■ - 310N	Sonoma Instrument	Pre-Amplifier	312544	Apr. 05, 2017 (1Y)
■ - SCU-18	Rohde & Schwarz	Pre-Amplifier	102209	May 31, 2016 (1Y)
■ - DT3000-3t	Innco System	Turn Table	DT3000/093	N/A
■ - MA-4000XPET	Innco System	Antenna Master	MA4000/509	N/A
■ - VULB9163	Schwarzbeck	TRILOG Broadband Antenna	9163-421	Apr. 15, 2016 (1Y)
■ - BBHA9120D	Schwarzbeck	Horn Antenna	BBHA9120D295	Aug. 31, 2015 (2Y)
■ - BBHA9170	Schwarzbeck	Horn Antenna	BBHA9170178	Aug. 31, 2015 (2Y)

All test equipment used is calibrated on a regular basis.

**11.4 Test data for 30 MHz ~ 1 000 MHz**

Humidity Level : 45 % R.H. Temperature: 21 °C  
 Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.247  
 Result : PASSED

EUT : BT(V4.2) + WLAN(802.11a/b/g/n/ac) 2x2 MIMO Module Date: March 23, 2017  
 Detector : CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)



No.	FREQ [MHz]	READING PEAK [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal -----										
1	111.480	47.5	11.3	2.9	33.1	28.6	43.5	14.9	100	0
2	199.750	48.7	10.7	3.7	33.0	30.1	43.5	13.4	100	0
3	359.800	47.4	15.0	5.1	33.1	34.4	46.0	11.6	100	0
4	480.081	42.1	16.6	5.9	33.2	31.4	46.0	14.6	100	198
----- Vertical -----										
5	47.460	43.6	14.3	2.0	33.0	26.9	40.0	13.1	100	276
6	99.840	46.8	12.4	2.7	33.1	28.8	43.5	14.7	100	276

**Tested by: Tae-Ho, Kim / Senior Engineer**

**11.5 Test data for Below 30 MHz**

- . Test Date : March 23, 2017
- . 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 (dBμV)	Ant. Pol. (H/V)	Ant. Height (m)	Angle (°)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dBμV/m)	Limits (dBμV/m)	Margin (dB)
It was not observed any emissions from the EUT.									

**11.6 Test data for above 1 GHz**

- . Test Date : March 23, 2017
- . Resolution bandwidth : 1 MHz for Peak and Average Mode
- . Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- . Frequency range : 1 GHz ~ 26.5 GHz
- . Measurement distance : 3 m
- . Operating mode : Transmitting mode

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



Tested by: Tae-Ho, Kim / Senior Engineer

## 12. CONDUCTED EMISSION TEST

### 12.1 Operating environment

Temperature : (23 ~ 24) °C  
 Relative humidity : (46 ~ 47) % R.H.

### 12.2 Test set-up

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

### 12.3 Test equipment used

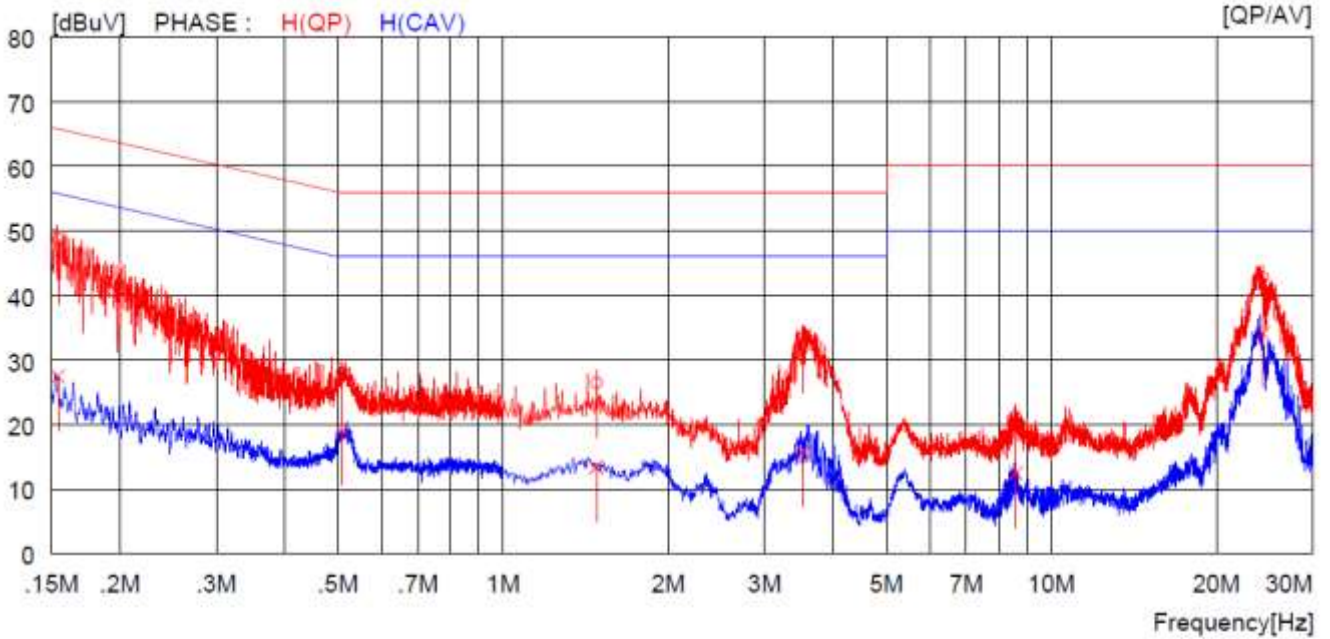
Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
■ - ESPI	Rohde & Schwarz	Test Receiver	101012	Nov. 01, 2016 (1Y)
□ - ESHS10	Rohde & Schwarz	Test Receiver	834467/007	Apr. 05, 2017 (1Y)
□ - NSLK8128	Schwarzbeck	AMN	8128-216	Apr. 06, 2017 (1Y)
■ - NSLK8126	Schwarzbeck	AMN	8126-404	Apr. 05, 2017 (1Y)
□ - 3825/2	EMCO	AMN	9109-1869	Apr. 06, 2017 (1Y)
■ - 3825/2	EMCO	AMN	9109-1867	Apr. 06, 2017 (1Y)

All test equipment used is calibrated on a regular basis.



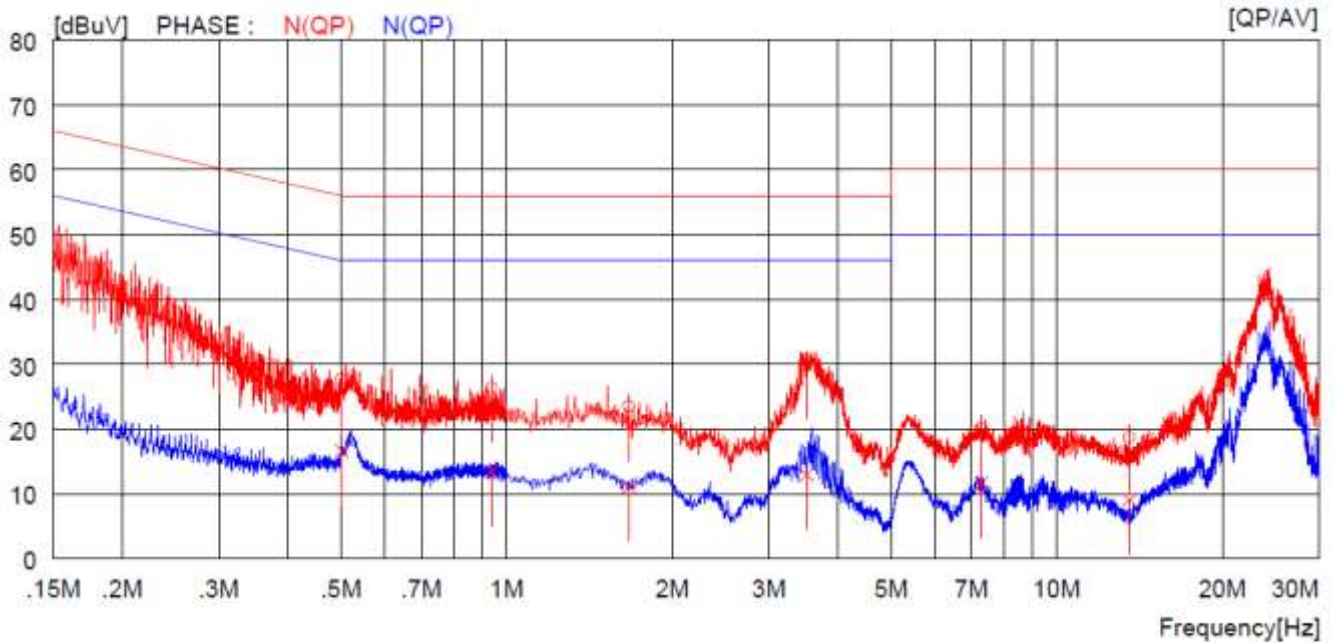
12.4 Test data

- Test Date : March 27, 2017
- Resolution bandwidth : 9 kHz
- Frequency range : 0.15 MHz ~ 30 MHz
- Tested Line : HOT LINE



NO	FREQ [MHz]	READING		C.FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	
1	0.15400	48.6	----	0.1	48.7	----	65.8	----	17.1	----	H(QP)
2	0.50700	27.9	----	0.1	28.0	----	56.0	----	28.0	----	H(QP)
3	1.48000	26.4	----	0.1	26.5	----	56.0	----	29.5	----	H(QP)
4	3.52000	33.3	----	0.1	33.4	----	56.0	----	22.6	----	H(QP)
5	8.60500	21.0	----	0.2	21.2	----	60.0	----	38.8	----	H(QP)
6	24.32000	42.2	----	0.5	42.7	----	60.0	----	17.3	----	H(QP)
7	0.15400	----	27.3	0.1	----	27.4	----	55.8	----	28.4	H(CAV)
8	0.50700	----	19.0	0.1	----	19.1	----	46.0	----	26.9	H(CAV)
9	1.48000	----	13.3	0.1	----	13.4	----	46.0	----	32.6	H(CAV)
10	3.52000	----	15.7	0.1	----	15.8	----	46.0	----	30.2	H(CAV)
11	8.60500	----	12.3	0.2	----	12.5	----	50.0	----	37.5	H(CAV)
12	24.32000	----	33.6	0.5	----	34.1	----	50.0	----	15.9	H(CAV)

- Test Line : NEUTRAL LINE



NO	FREQ [MHz]	READING		C.FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	
1	0.50100	27.6	----	0.1	27.7	----	56.0	----	28.3	----	N (QP)
2	0.93800	26.3	----	0.1	26.4	----	56.0	----	29.6	----	N (QP)
3	1.66800	23.4	----	0.1	23.5	----	56.0	----	32.5	----	N (QP)
4	3.50800	29.8	----	0.1	29.9	----	56.0	----	26.1	----	N (QP)
5	7.29000	19.9	----	0.2	20.1	----	60.0	----	39.9	----	N (QP)
6	13.56000	18.3	----	0.4	18.7	----	60.0	----	41.3	----	N (QP)
7	0.50100	----	16.5	0.1	----	16.6	----	46.0	----	29.4	N (CAV)
8	0.93800	----	13.4	0.1	----	13.5	----	46.0	----	32.5	N (CAV)
9	1.66800	----	11.1	0.1	----	11.2	----	46.0	----	34.8	N (CAV)
10	3.50800	----	12.9	0.1	----	13.0	----	46.0	----	33.0	N (CAV)
11	7.29000	----	11.4	0.2	----	11.6	----	50.0	----	38.4	N (CAV)
12	13.56000	----	8.7	0.4	----	9.1	----	50.0	----	40.9	N (CAV)

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

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

Tested by: Tae-Ho, Kim / Senior Engineer