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

Test Report No. : **W153R-D005**

AGR No. : **A152A-125**

Applicant : **LG Innotek Co., Ltd.**

Address : **978-1, Jangduk-dong, Gwangsan-gu, Gwangju, 506-731 Korea**

Manufacturer : **LG Innotek Co., Ltd.**

Address : **978-1, Jangduk-dong, Gwangsan-gu, Gwangju, 506-731 Korea**

Type of Equipment : **Wi-Fi module**

FCC ID. : **YZP-TWFMK001D**

Model Name : **TWFM-K001D**

Multiple Model Name : **TWFM-K002D, TWFM-K003D**

Serial number : **N/A**

Total page of Report : **149 pages (including this page)**

Date of Incoming : **February 13, 2015**

Date of issue : **March 12, 2015**

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: Sung-Ik, Han/ Managing Director
ONETECH Corp.

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Revision History

Issued Report No.	Issued Date	Revisions	Effect Section
W153R-D005	March 12, 2015	Initial Issue	All

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1. VERIFICATION OF COMPLIANCE

Applicant	: LG Innotek Co., Ltd.
Address	: 978-1, Jangduk-dong, Gwangsan-gu, Gwangju, 506-731 Korea
Contact Person	: IC Jeong / Senior engineer
Telephone No.	: +82-62-950-0332
FCC ID	: YZP-TWFMK001D
Model Name	: TWFM-K001D
Serial Number	: N/A
Date	: March 12, 2015

EQUIPMENT CLASS	DTS – DIGITAL TRNSMISSION SYSTEM
E.U.T. DESCRIPTION	Modular Transmitter, Wi-Fi module
THIS REPORT CONCERNS	Original Grant
MEASUREMENT PROCEDURES	ANSI C63.10: 2013
TYPE OF EQUIPMENT TESTED	Pre-Production
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	Certification, Modular Approval
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.

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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 301-14, Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do, 464-862 Korea.

-. Site Filing:

VCCI (Voluntary Control Council for Interference) – Registration No. R-4112/ C-4617/ G-666/ T-1842 IC (Industry Canada) – Registration No. Site# 3736-3

-. Site Accreditation:

KOLAS (Korea Laboratory Accreditation Scheme) - Accreditation No. 85

FCC (Federal Communications Commission) - Accreditation No. KR0013

RRA (Radio Research Agency) – Designation No. KR0013

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3. GENERAL INFORMATION

3.1 Product Description

The LG Innotek Co., Ltd., Model TWFM-K001D (referred to as the EUT in this report) is a Wi-Fi module. Product specification information described herein was obtained from product data sheet or user's manual.

<table>
<tr><td>DEVICE TYPE</td><td colspan="3">Wi-Fi module</td></tr>
<tr><td rowspan="2">FREQUENCY RANGE</td><td colspan="3">2 412 MHz ~ 2 462 MHz_20 MHz BW</td></tr>
<tr><td colspan="3">2 422 MHz ~ 2 452 MHz_40 MHz BW</td></tr>
<tr><td rowspan="2">MAX. RF OUTPUT POWER</td><td rowspan="2">2 400 MHz ~
2 483.5 MHz Band</td><td>Antenna 0</td><td>Wi-Fi 802.11b(12.76 dBm)
Wi-Fi 802.11g (11.92 dBm)
Wi-Fi 802.11n_20 MHz (10.62 dBm)
Wi-Fi 802.11n_40 MHz (8.55 dBm)</td></tr>
<tr><td>Antenna 1</td><td>Wi-Fi 802.11b(13.15 dBm)
Wi-Fi 802.11g (11.85 dBm)
Wi-Fi 802.11n_20 MHz (10.92 dBm)
Wi-Fi 802.11n_40 MHz (8.22 dBm)</td></tr>
<tr><td>MODULATION TYPE</td><td colspan="3">802.11b: DSSS Modulation(DBPSK/DQPSK/CCK)
802.11a/g/n(HT20)/n(HT40): OFDM Modulation(BPSK/QPSK/16QAM/64QAM)</td></tr>
<tr><td rowspan="2">Antenna Gain</td><td colspan="3">Antenna0 : 1.03</td></tr>
<tr><td colspan="3">Antenna0 : 1.01</td></tr>
<tr><td>List of each Osc. or crystal Freq.(Freq. >= 1 MHz)</td><td colspan="3">40 MHz</td></tr>
</table>

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

-. The following lists consist of the added model and their differences.

Model Name	Differences	Tested
TWFM-K001D	Basic Model	☑
TWFM-K002D, TWFM-K003D	These models are identical to basic model except for the model name only.	☐

Note: 1. Applicant consigns only basic model to test. Therefore this test report just guarantees the units, which have been tested.

2. The Applicant/manufacturer is responsible for the compliance of all variants.

4. EUT MODIFICATIONS

-. None

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5. SYSTEM TEST CONFIGURATION

5.1 Justification

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

DEVICE TYPE	MANUFACTURER	MODEL/PART NUMBER	FCC ID
Main Board	LG Innotek Co., Ltd.	TWFM-K001D	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
TWFM-K001D	LG Innotek Co., Ltd.	Wi-Fi module (EUT)	Notebook PC
LGR51	LG Electronics	Notebook PC	EUT

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5.3 Mode of operation during the test

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

-2 GHz Band

The worse case data rate for each modulation is determined 1 Mbps(Ant.0) / 1 Mbps(Ant.1) for IEEE 802.11b, 6 Mbps(Ant.0) / 6 Mbps(Ant.1) for IEEE 802.11g, 6.5 Mbps(Ant.0) / 6.5 Mbps(Ant.1) for HT20, 13 Mbps(Ant.0)/ 13 Mbps(Ant1) for HT40.

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5.4 Configuration of Test System

Line Conducted Test: The EUT was connected to USB and the power of USB was connected to Notebook PC. 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 open area test site.

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 a PIFA antenna, so no consideration of replacement by the user.

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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

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7. MIMIMUM 6 dB BANDWIDTH

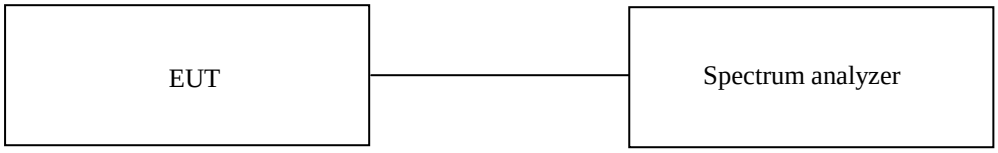
7.1 Operating environment

Temperature : 24 ℃

Relative humidity : 48 % 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	Jul. 30, 2014 (1Y)

All test equipment used is calibrated on a regular basis.

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7.4 Test data for 802.11b WLAN Mode

7.4.1 Test data for Antenna 0

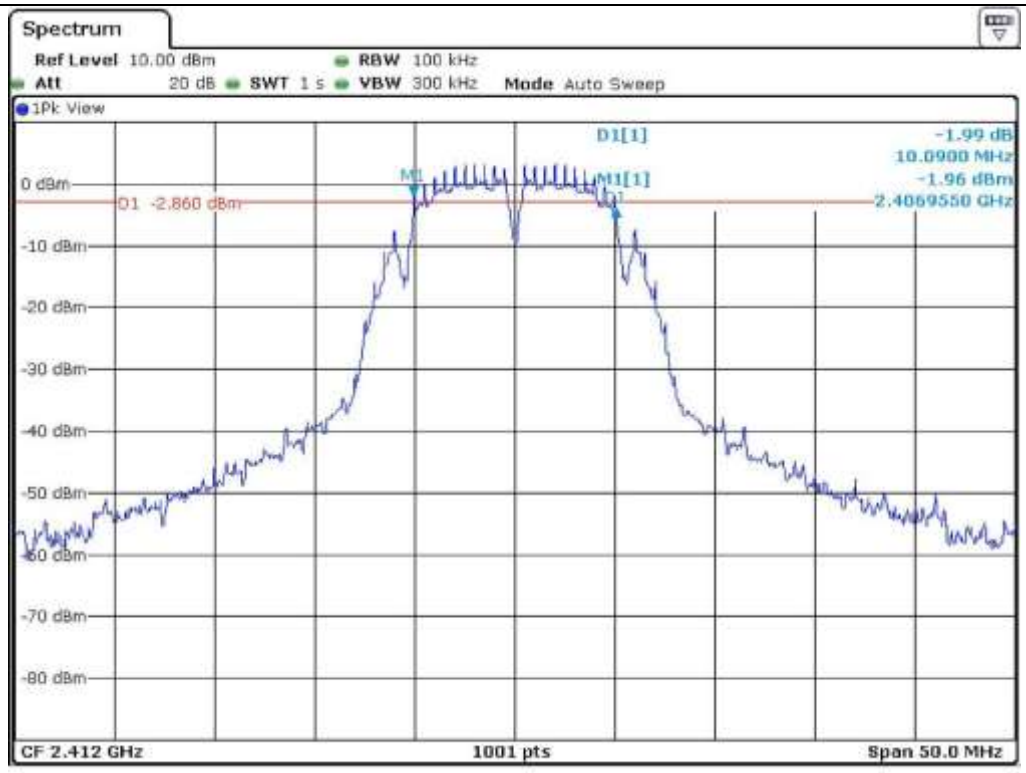
-. Test Date : March 11, 2015

-. Test Result : Pass

CHANNEL	FREQUENCY (MHz)	6 dB Bandwidth (MHz)	LIMIT (MHz)
Low	2 412	10.09	0.5
Middle	2 442	10.09	0.5
High	2 462	10.09	0.5

Remark. Margin = Measured Value - Limit

Tested by: Tae-Ho, Kim / Senior Engineer



Low Channel

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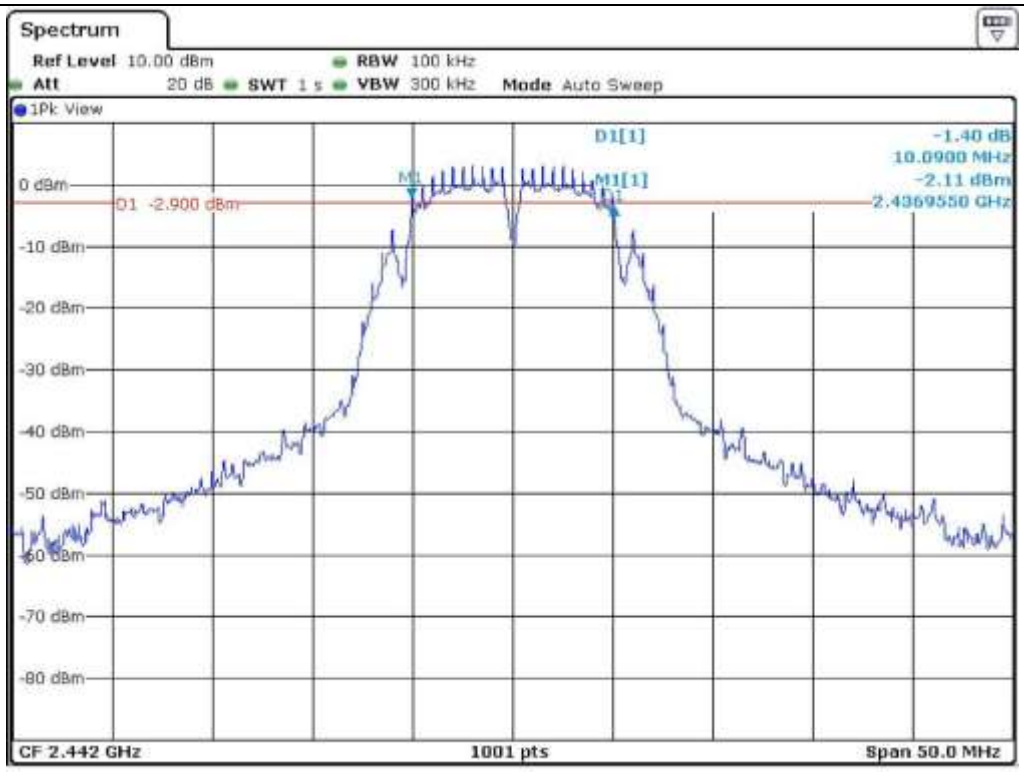
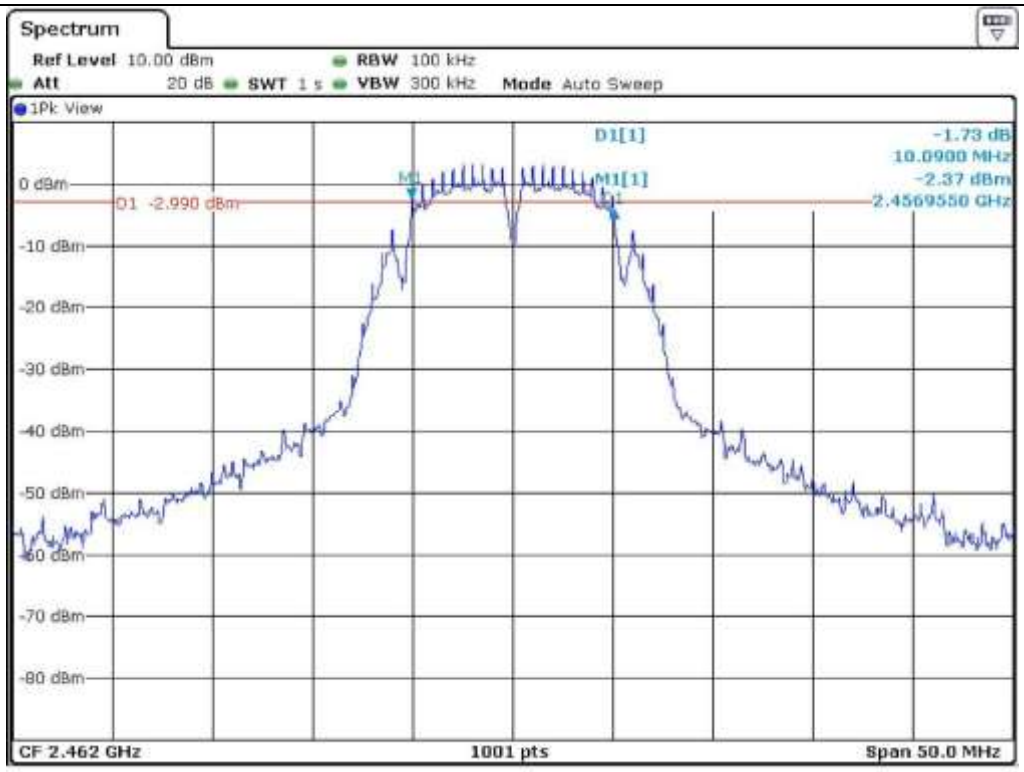


Middle Channel



High Channel

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7.4.2 Test data for Antenna 1

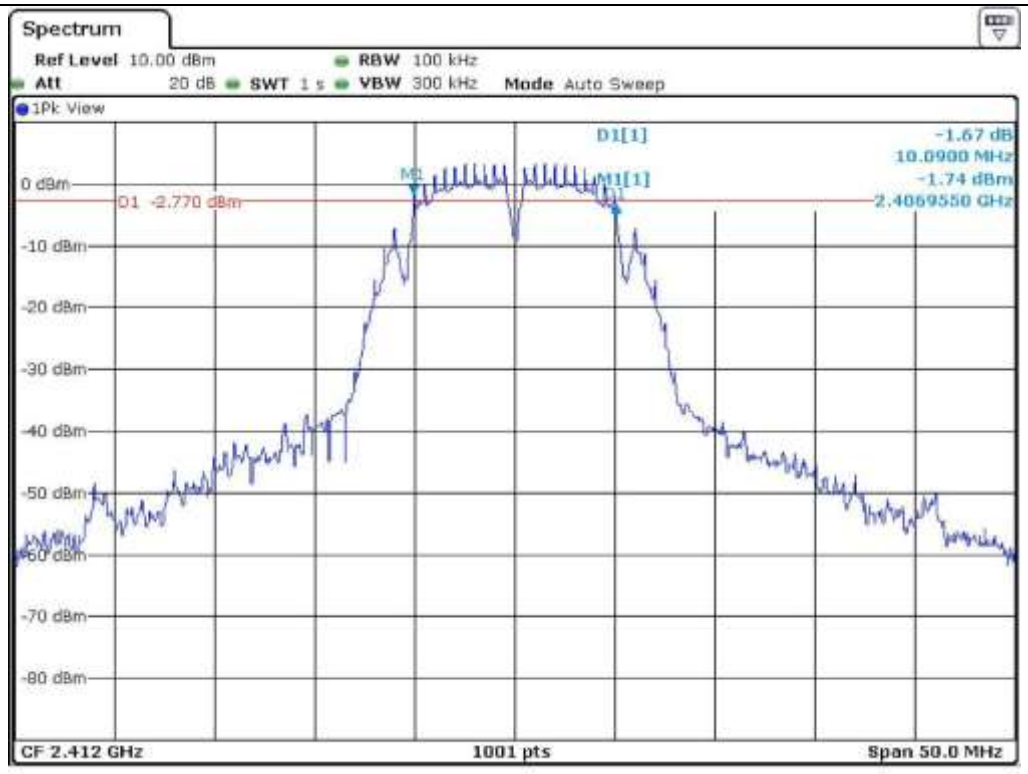
-. Test Date : March 11, 2015

-. Test Result : Pass

CHANNEL	FREQUENCY (MHz)	6 dB Bandwidth (MHz)	LIMIT (MHz)
Low	2 412	10.09	0.5
Middle	2 442	10.04	0.5
High	2 462	10.09	0.5

Remark. Margin = Measured Value - Limit

Tested by: Tae-Ho, Kim / Senior Engineer



Low Channel

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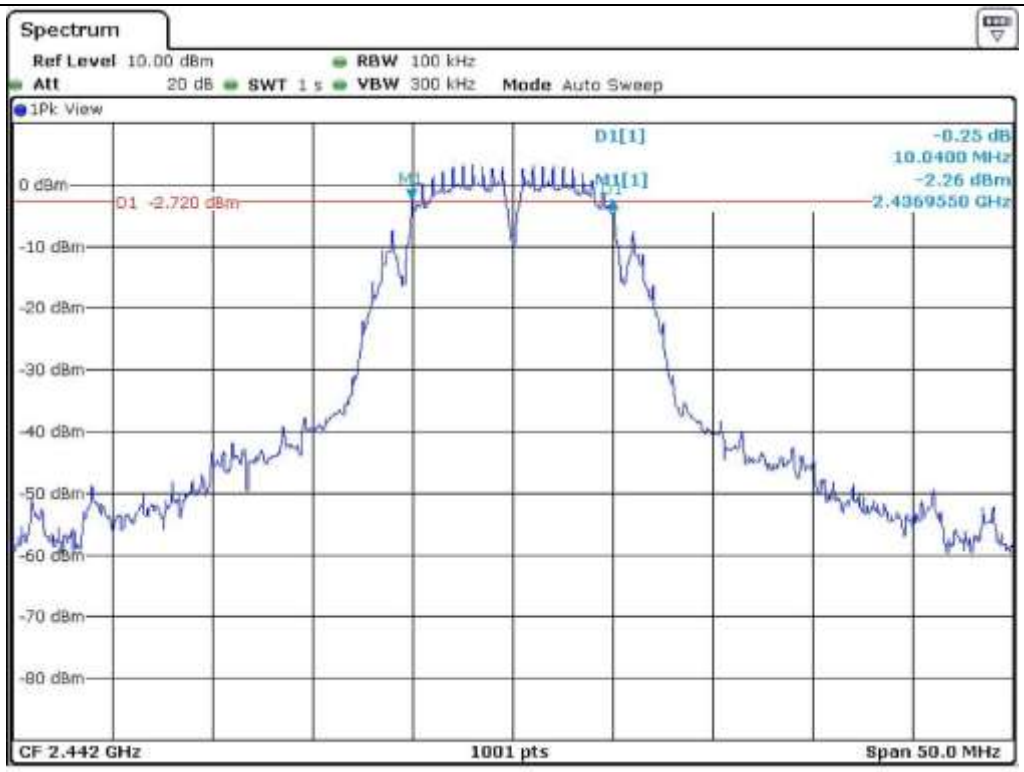

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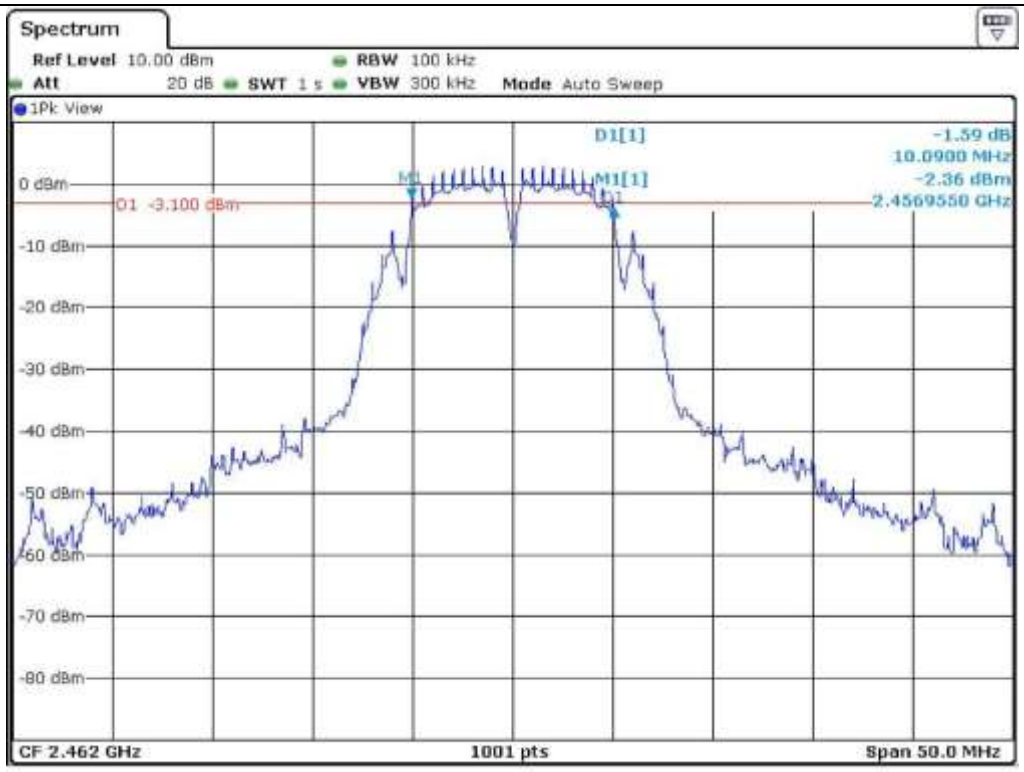

High Channel

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7.5 Test data for 802.11g WLAN Mode

7.5.1 Test data for Antenna 0

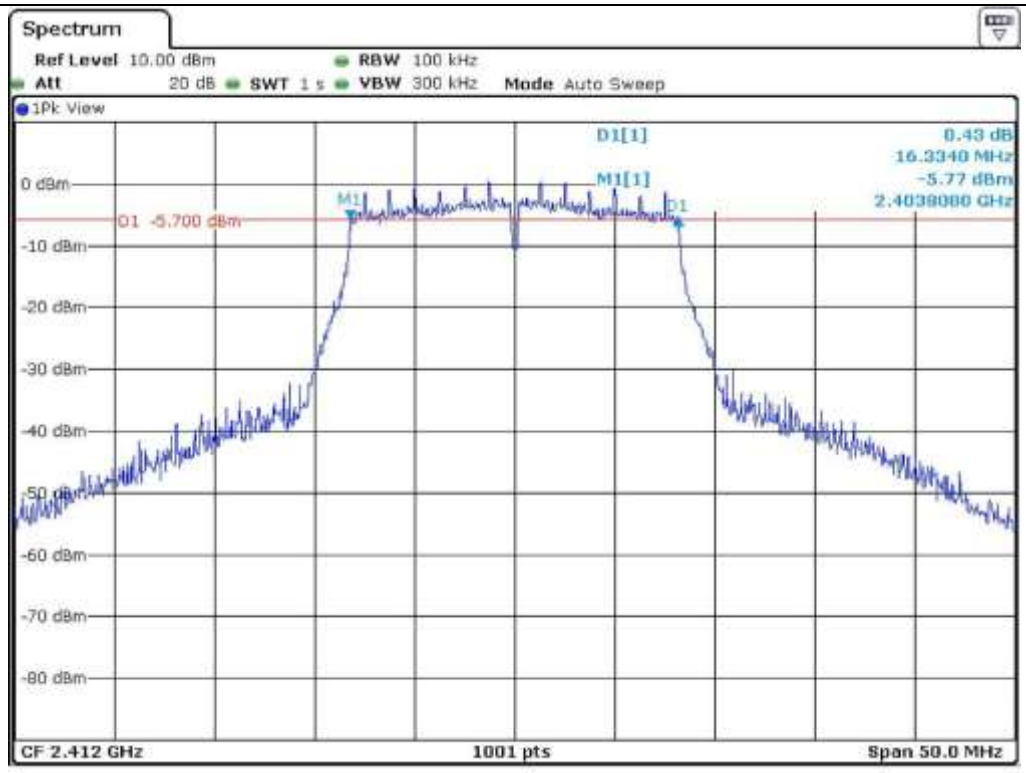
-. Test Date : March 11, 2015

-. Test Result : Pass

CHANNEL	FREQUENCY (MHz)	6 dB Bandwidth (MHz)	LIMIT (MHz)
Low	2 412	16.33	0.5
Middle	2 442	16.33	0.5
High	2 462	16.23	0.5

Remark. Margin = Measured Value - Limit

Tested by: Tae-Ho, Kim / Senior Engineer



Low Channel

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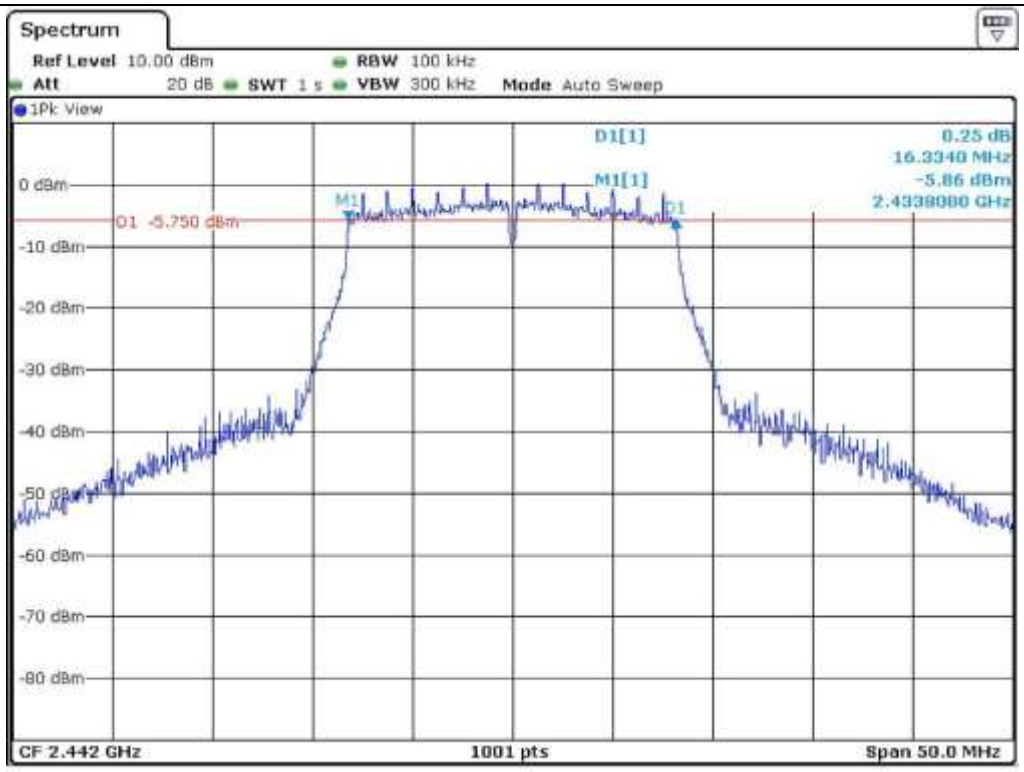
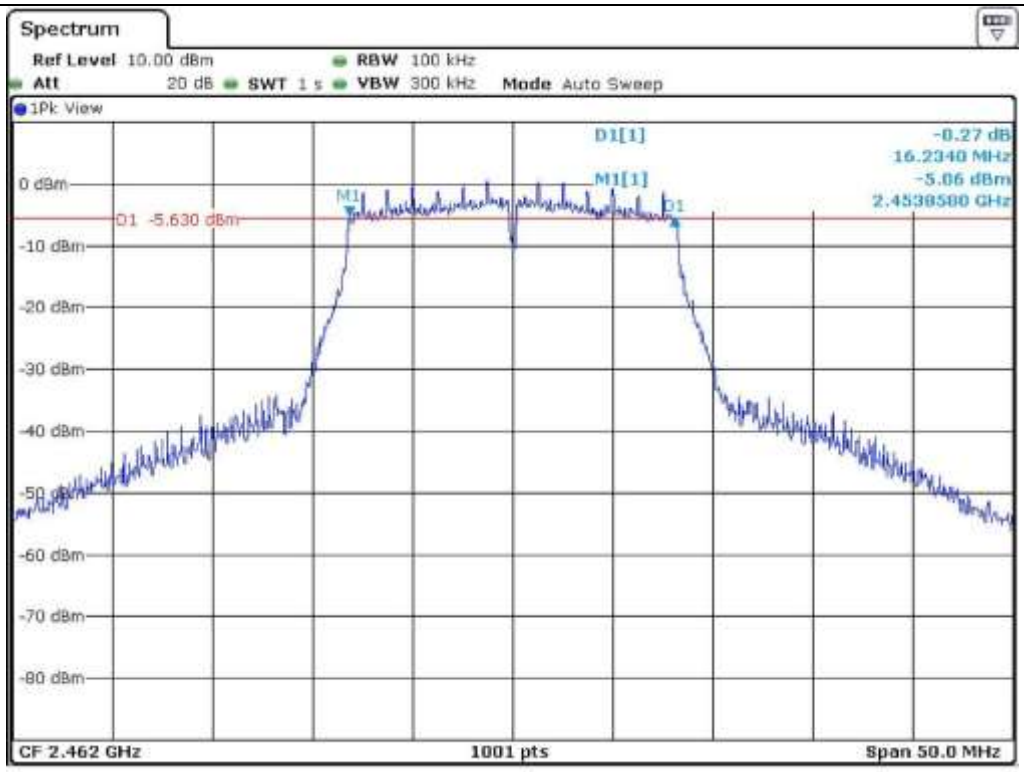


Middle Channel



High Channel

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7.5.2 Test data for Antenna 1

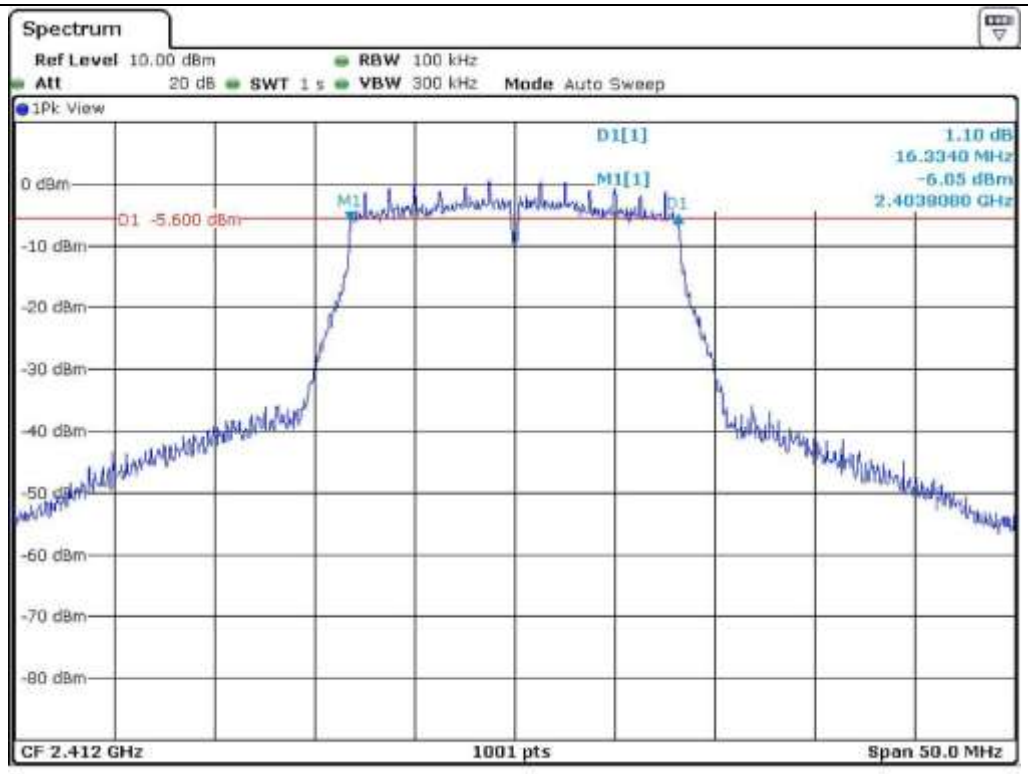
-. Test Date : March 11, 2015

-. Test Result : Pass

CHANNEL	FREQUENCY (MHz)	6 dB Bandwidth (MHz)	LIMIT (MHz)
Low	2 412	16.33	0.5
Middle	2 442	16.33	0.5
High	2 462	16.33	0.5

Remark. Margin = Measured Value - Limit

Tested by: Tae-Ho, Kim / Senior Engineer



Low Channel

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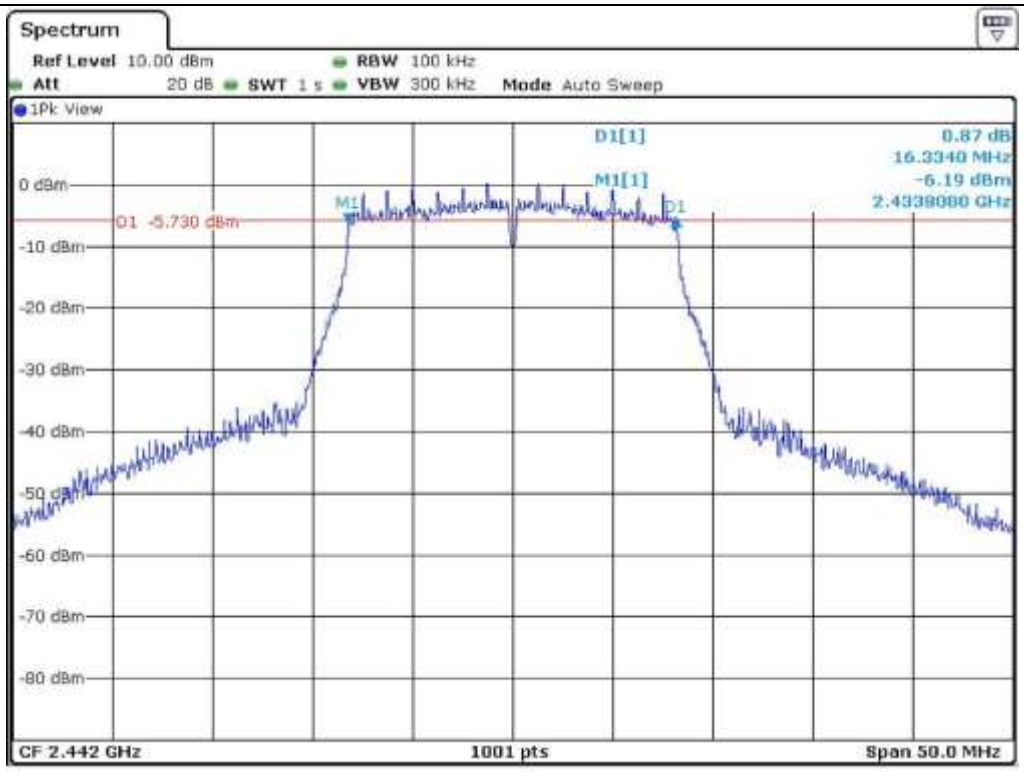
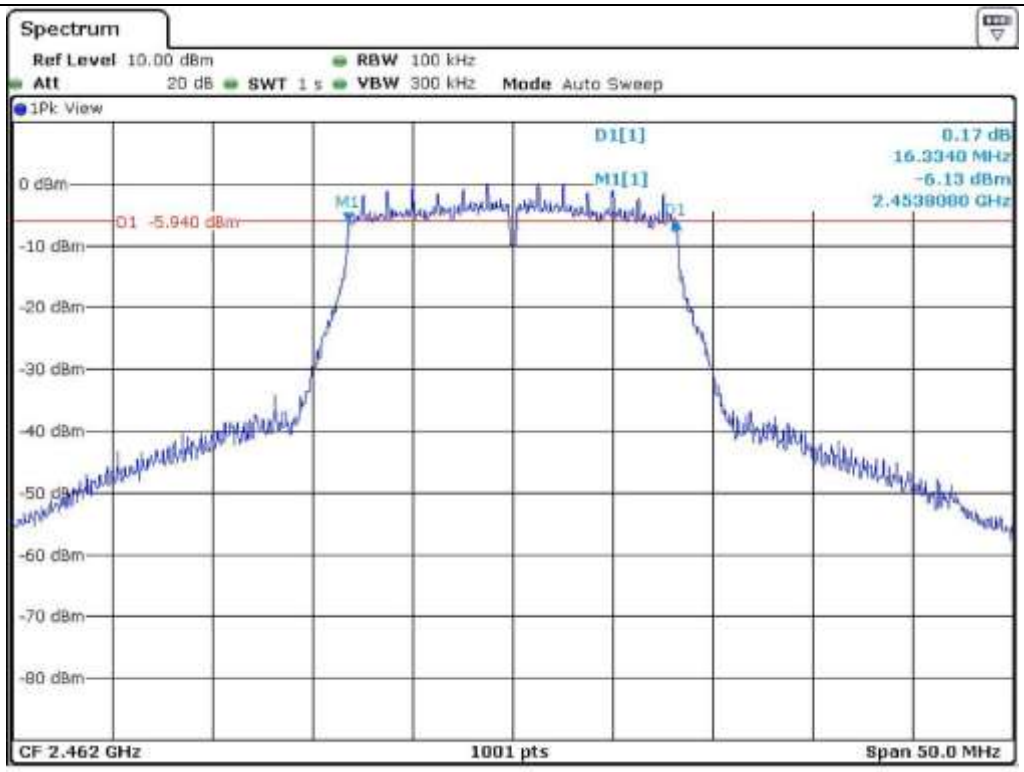


Middle Channel



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7.6 Test data for 802.11n_HT20 WLAN Mode

7.6.1 Test data for Antenna 0

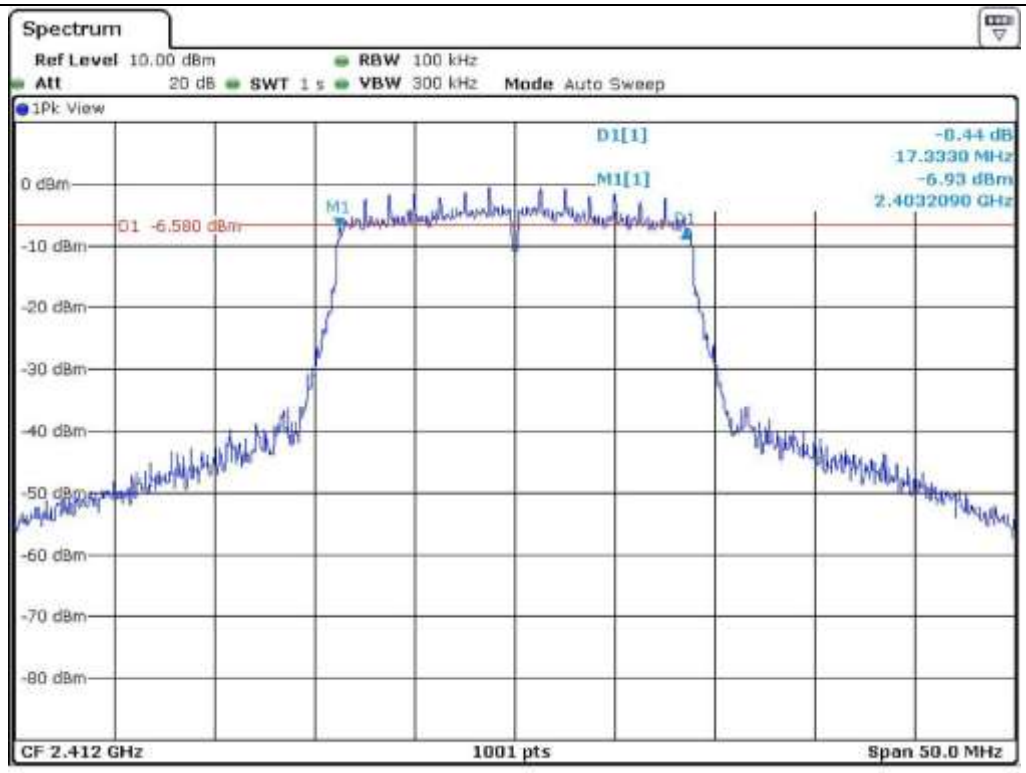
-. Test Date : March 11, 2015

-. Test Result : Pass

CHANNEL	FREQUENCY (MHz)	6 dB Bandwidth (MHz)	LIMIT (MHz)
Low	2 412	17.33	0.5
Middle	2 442	17.28	0.5
High	2 462	17.28	0.5

Remark. Margin = Measured Value - Limit

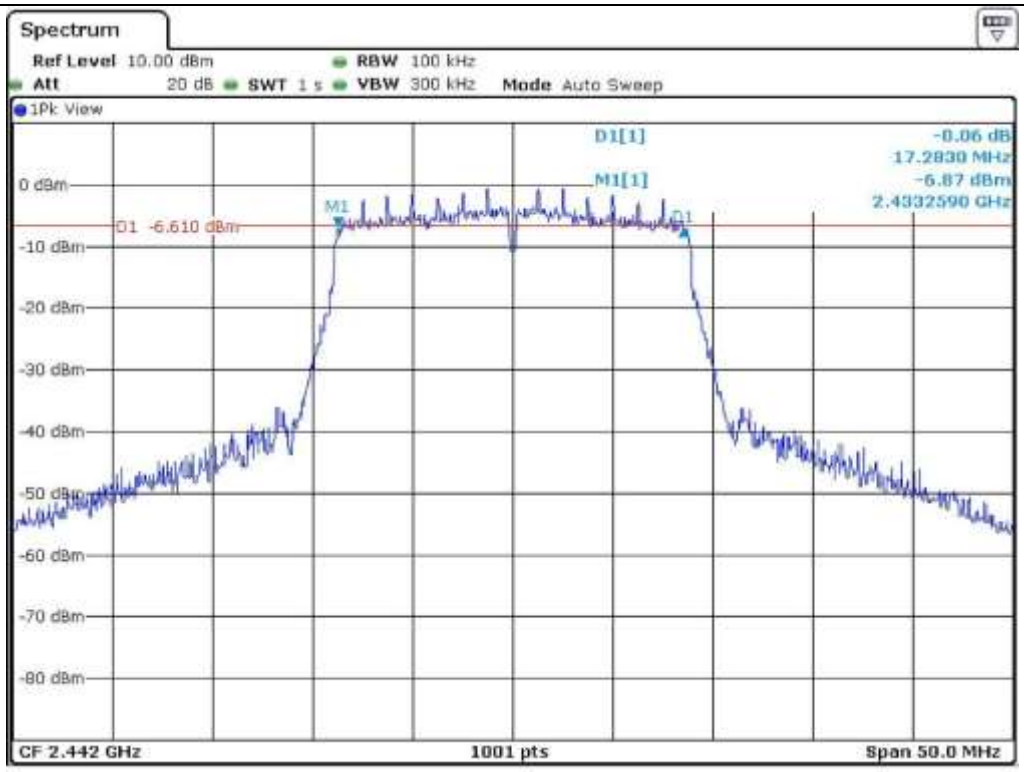
Tested by: Tae-Ho, Kim / Senior Engineer



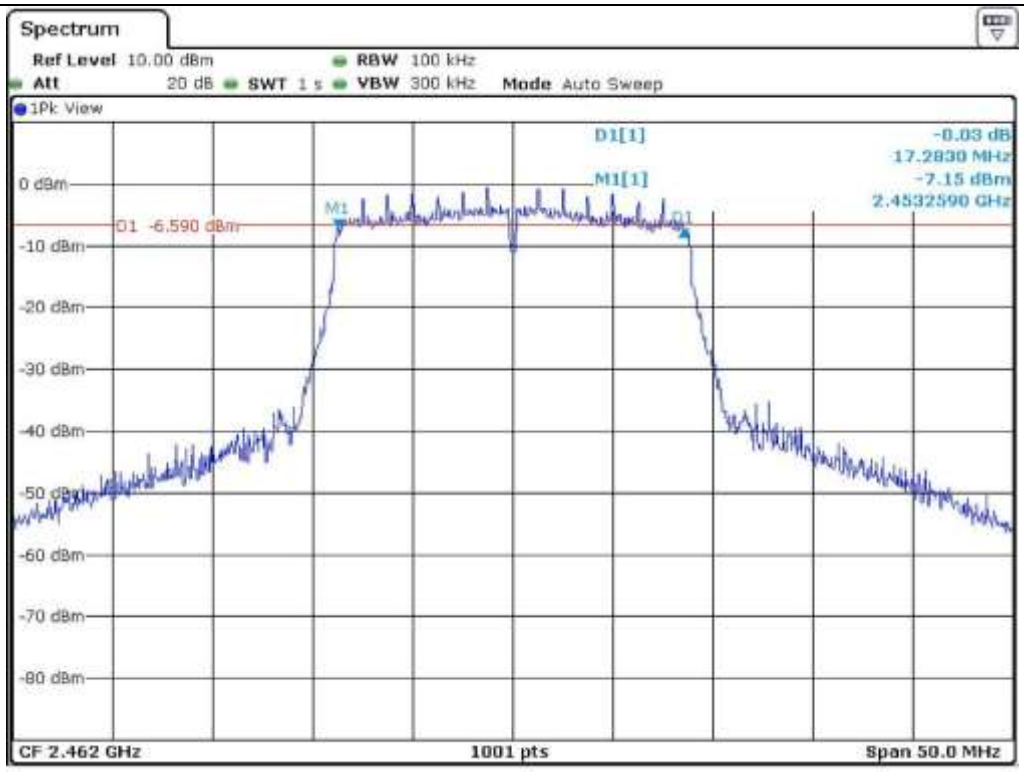
Low Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)



Middle Channel



High Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

7.6.2 Test data for Antenna 1

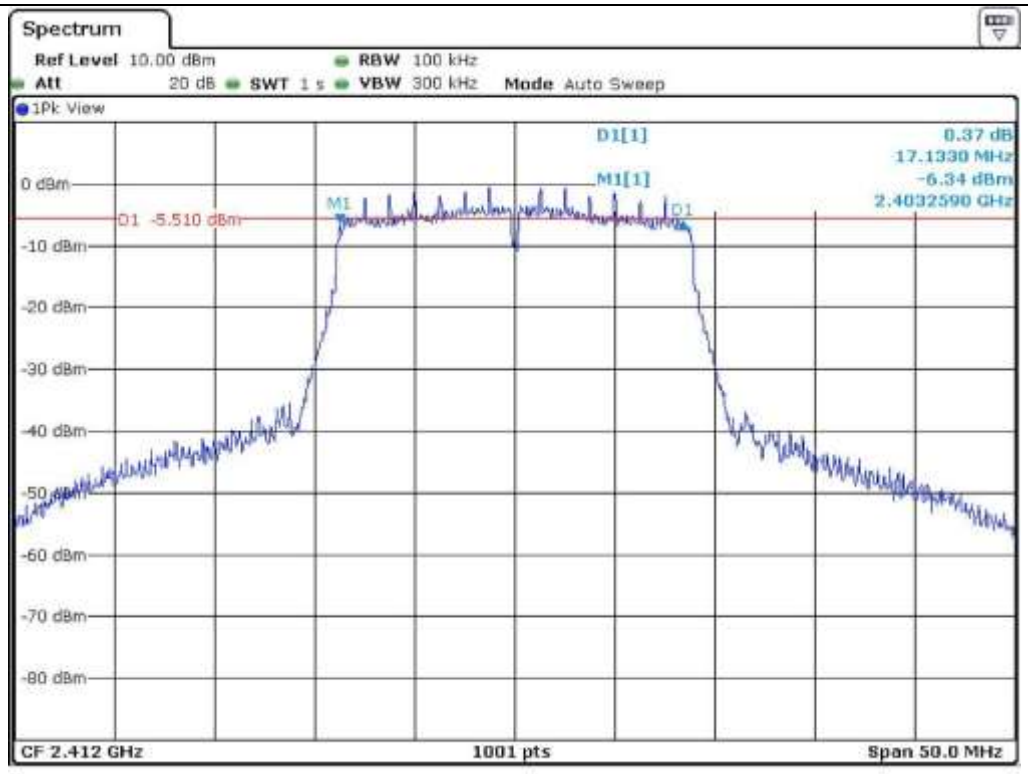
-. Test Date : March 11, 2015

-. Test Result : Pass

CHANNEL	FREQUENCY (MHz)	6 dB Bandwidth (MHz)	LIMIT (MHz)
Low	2 412	17.13	0.5
Middle	2 442	16.93	0.5
High	2 462	16.93	0.5

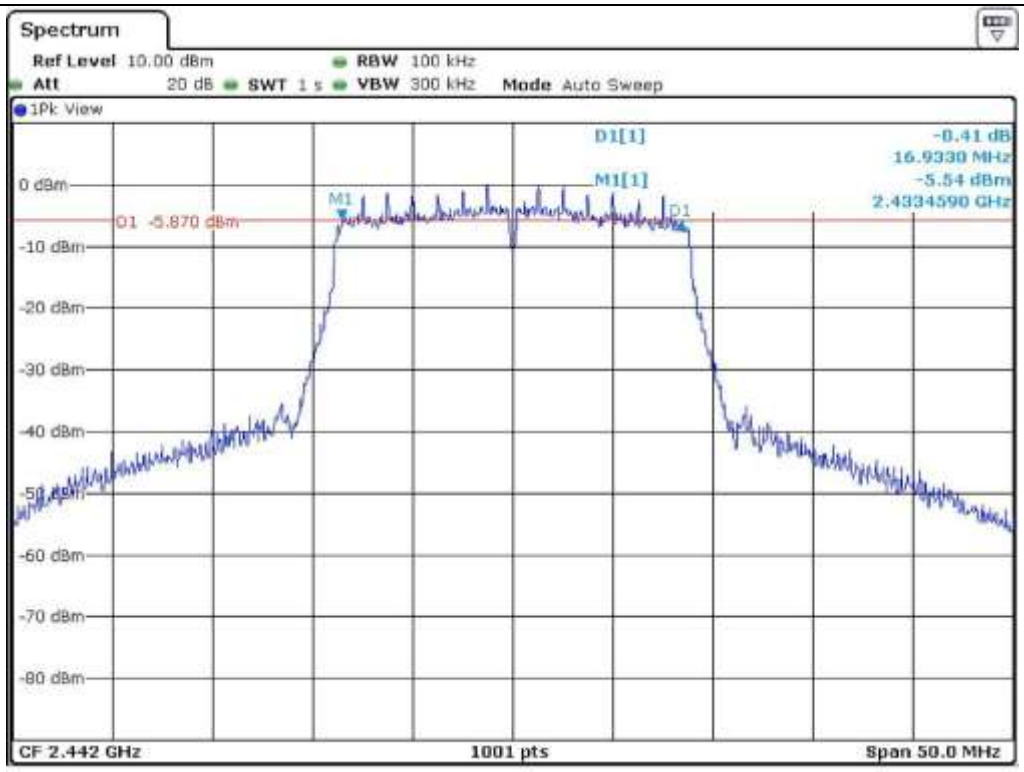
Remark. Margin = Measured Value - Limit

Tested by: Tae-Ho, Kim / Senior Engineer

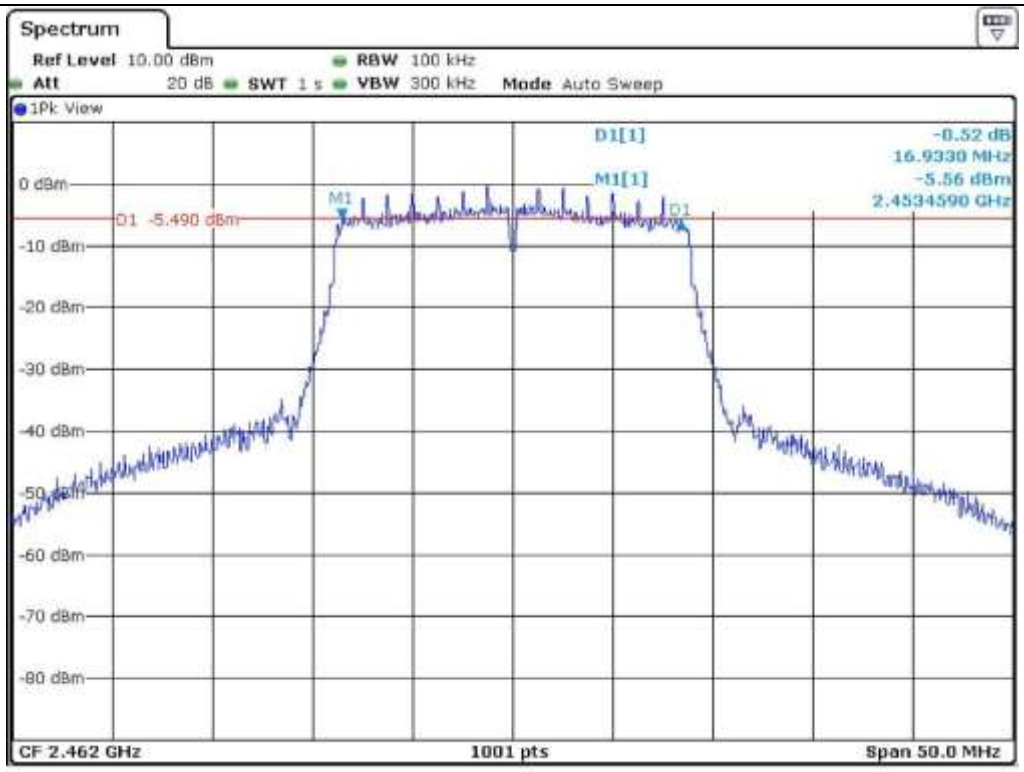


Low Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)



Middle Channel



High Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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7.7 Test data for 802.11n_HT40 WLAN Mode

7.7.1 Test data for Antenna 0

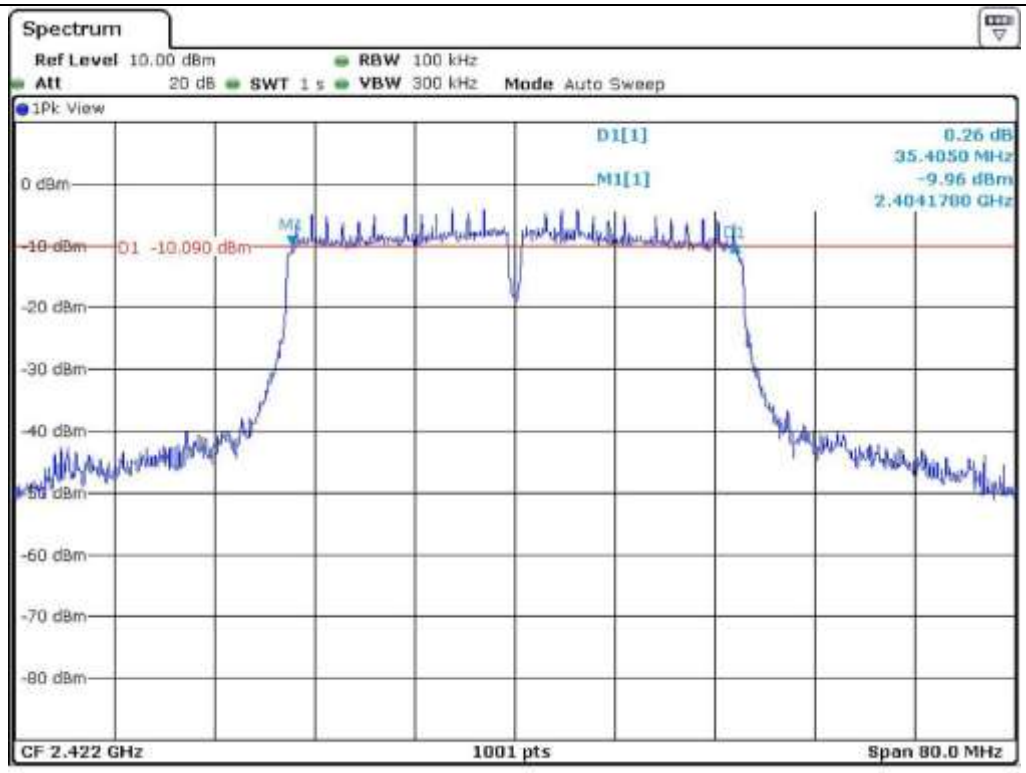
-. Test Date : March 11, 2015

-. Test Result : Pass

CHANNEL	FREQUENCY (MHz)	6 dB Bandwidth (MHz)	LIMIT (MHz)
Low	2 422	35.41	0.5
Middle	2 442	35.49	0.5
High	2 452	35.25	0.5

Remark. Margin = Measured Value - Limit

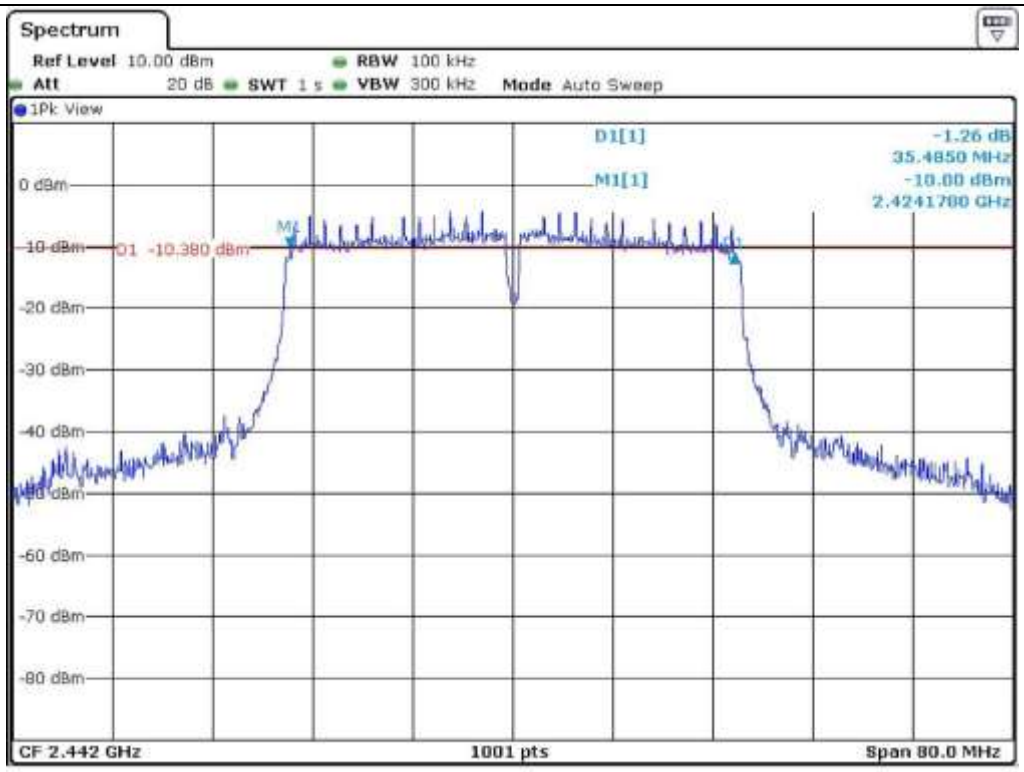
Tested by: Tae-Ho, Kim / Senior Engineer



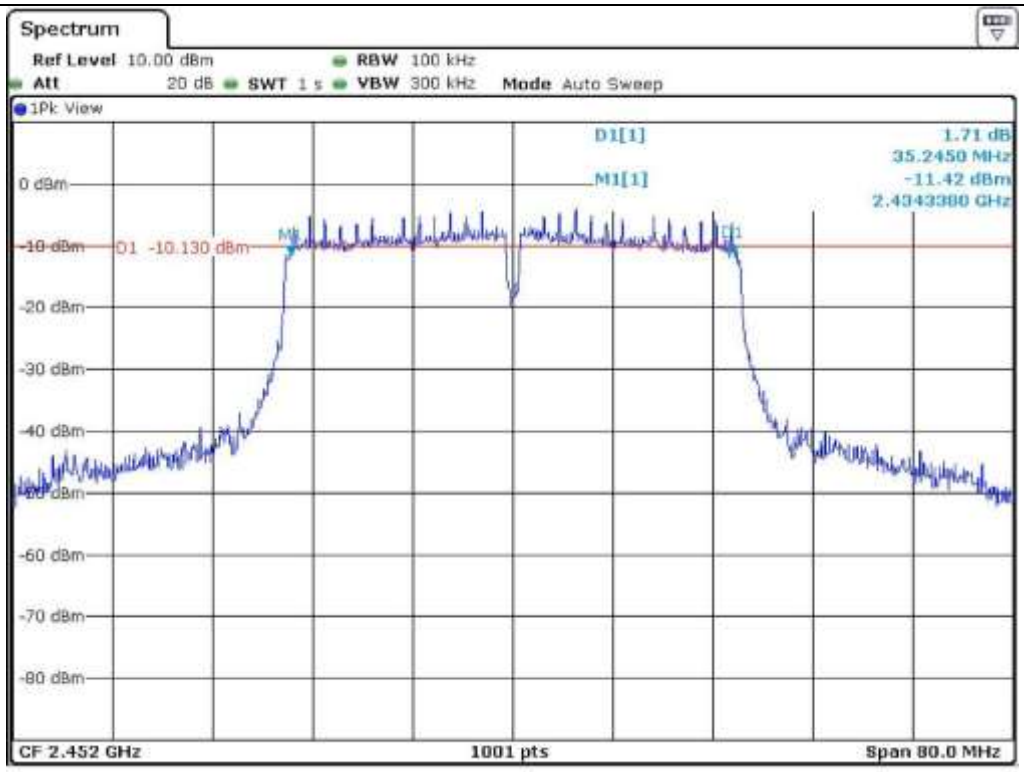
Low Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)



Middle Channel



High Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

7.7.2 Test data for Antenna 1

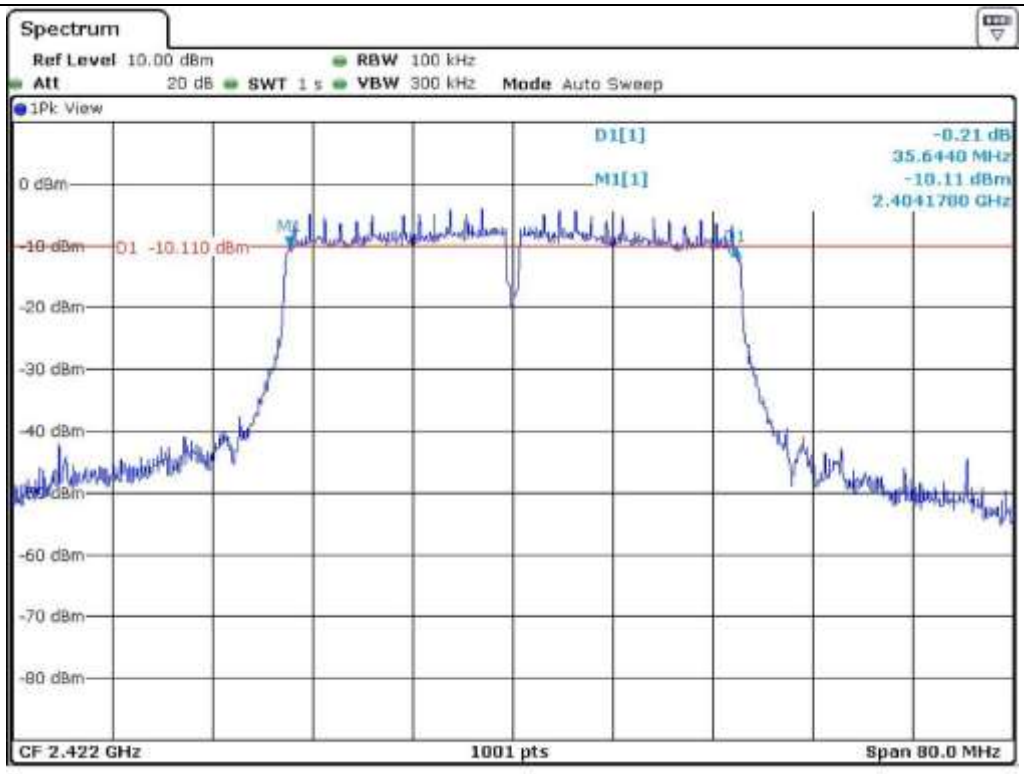
-. Test Date : March 11, 2015

-. Test Result : Pass

CHANNEL	FREQUENCY (MHz)	6 dB Bandwidth (MHz)	LIMIT (MHz)
Low	2 422	35.64	0.5
Middle	2 442	35.33	0.5
High	2 452	35.64	0.5

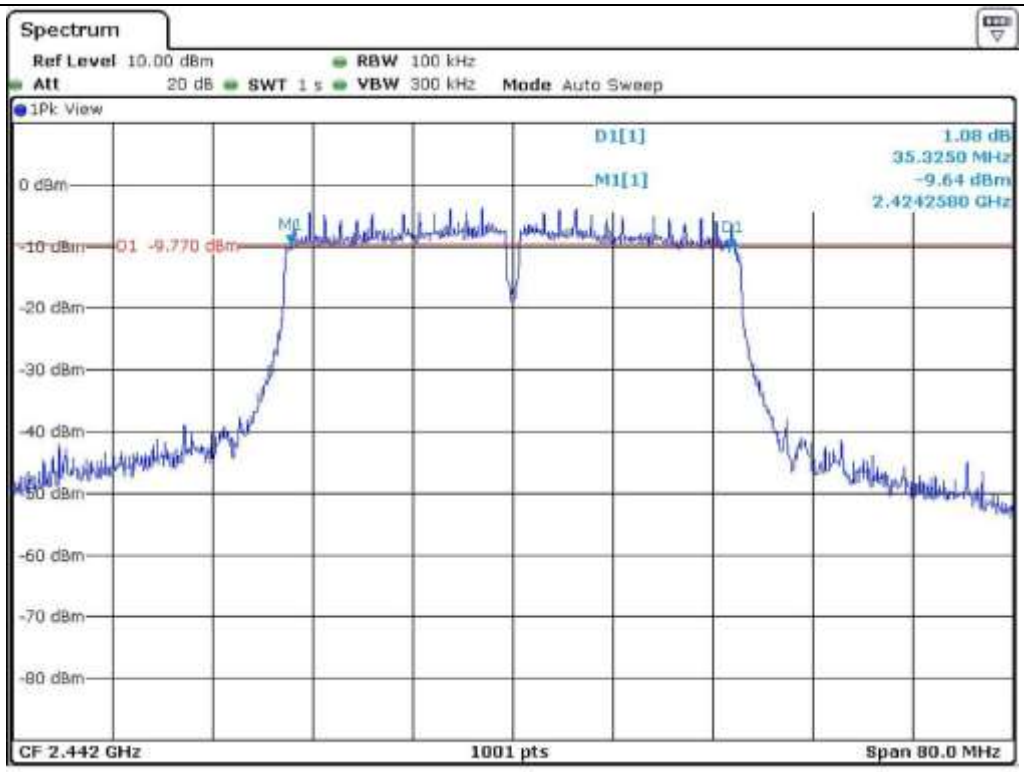
Remark. Margin = Measured Value - Limit

Tested by: Tae-Ho, Kim / Senior Engineer

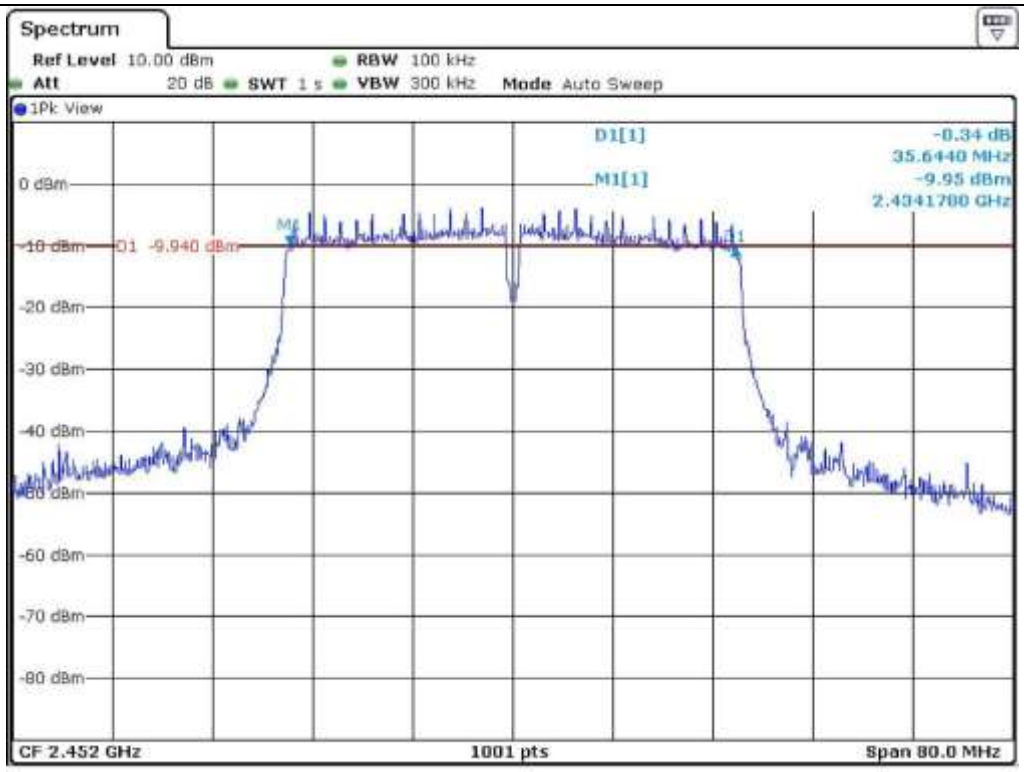


Low Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)



Middle Channel



High Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

8. MAXIMUM PEAK OUTPUT POWER

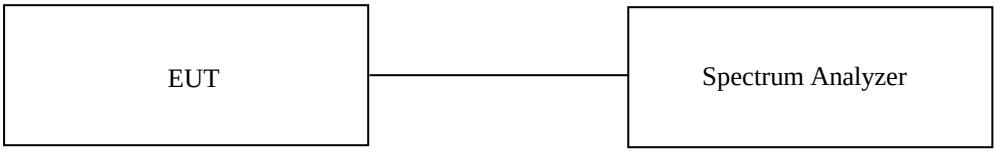
8.1 Operating environment

Temperature : 24 ℃

Relative humidity : 48 % R.H.

8.2 Test set-up

The maximum peak output power was measured with the spectrum analyzer connected to the antenna output of the EUT. The spectrum analyzer's internal channel power integration function is used to integrate the power over a bandwidth greater than or equal to the 99 % bandwidth. The EUT was operating in transmit mode at the appropriate center frequency.



8.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	FSV40	Rohde & Schwarz	Signal Analyzer	101009	Jul. 30, 2014 (1Y)

All test equipment used is calibrated on a regular basis.

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

8.4 Test data for 802.11b WLAN Mode

8.4.1 Test data for Antenna 0

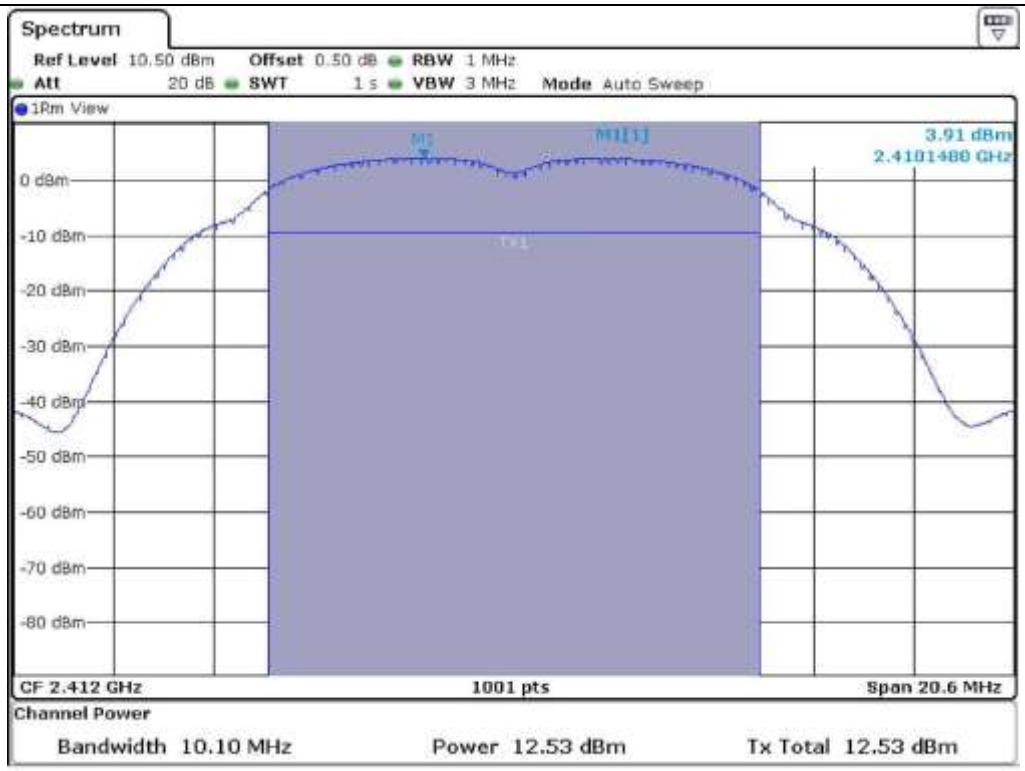
-. Test Date : March 11, 2015

-. Test Result : Pass

CHANNEL	FREQUENCY (MHz)	6 dB Bandwidth (MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
LOW	2 412	10.09	12.53	30	17.47
MIDDLE	2 442	10.09	12.61	30	17.39
HIGH	2 462	10.09	12.76	30	17.24

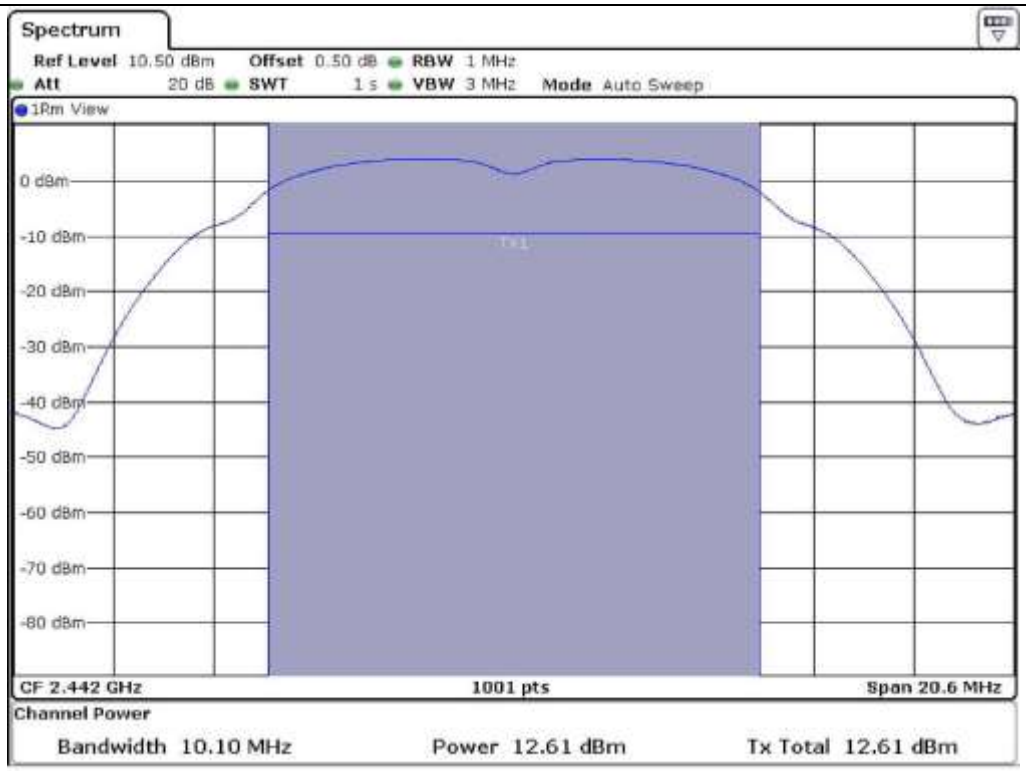
Remark. Margin = Limit – Measured Value (=Receiver Reading + Cable Loss)

Tested by: Tae-Ho, Kim / Senior Engineer

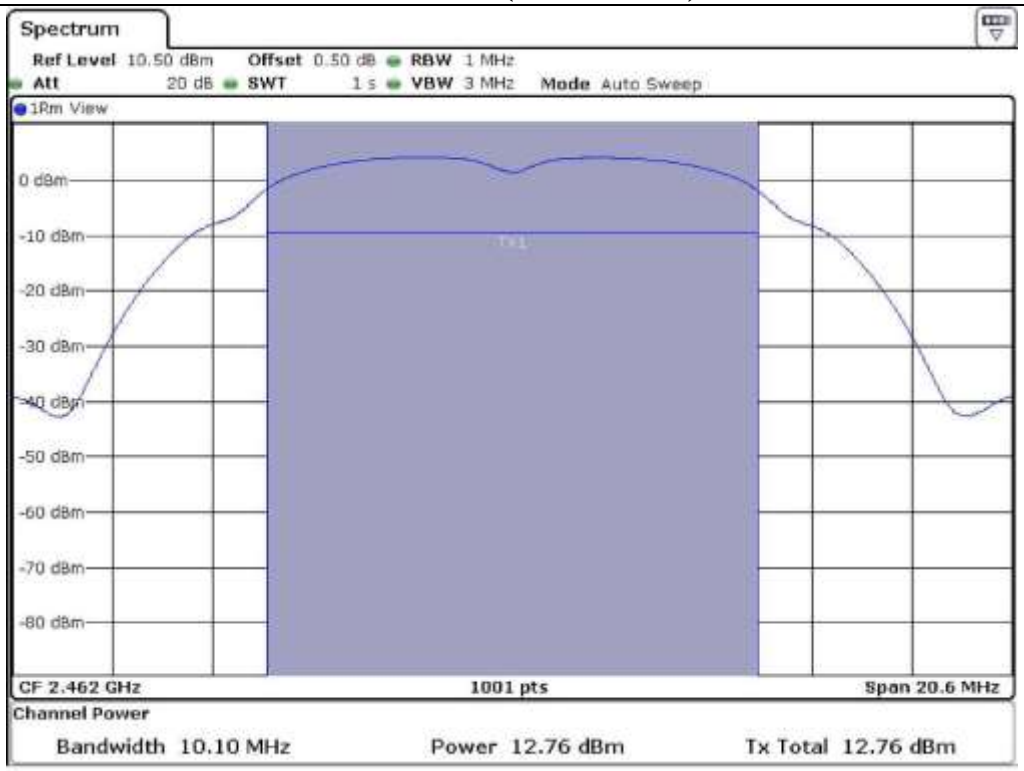


Low Channel (6 dB Bandwidth)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)



Middle Channel (6 dB Bandwidth)



High Channel (6 dB Bandwidth)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

8.4.2 Test data for Antenna 1

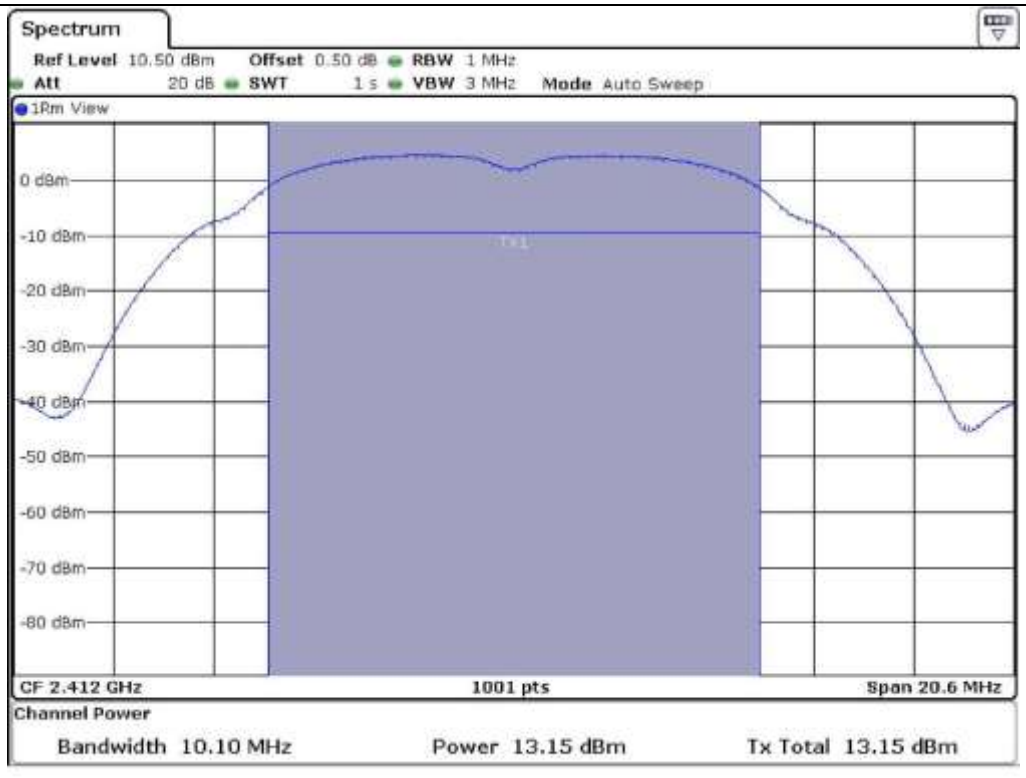
-. Test Date : March 11, 2015

-. Test Result : Pass

CHANNEL	FREQUENCY (MHz)	6 dB Bandwidth (MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
LOW	2 412	10.09	13.15	30	16.85
MIDDLE	2 442	10.04	13.03	30	16.97
HIGH	2 462	10.09	12.61	30	17.39

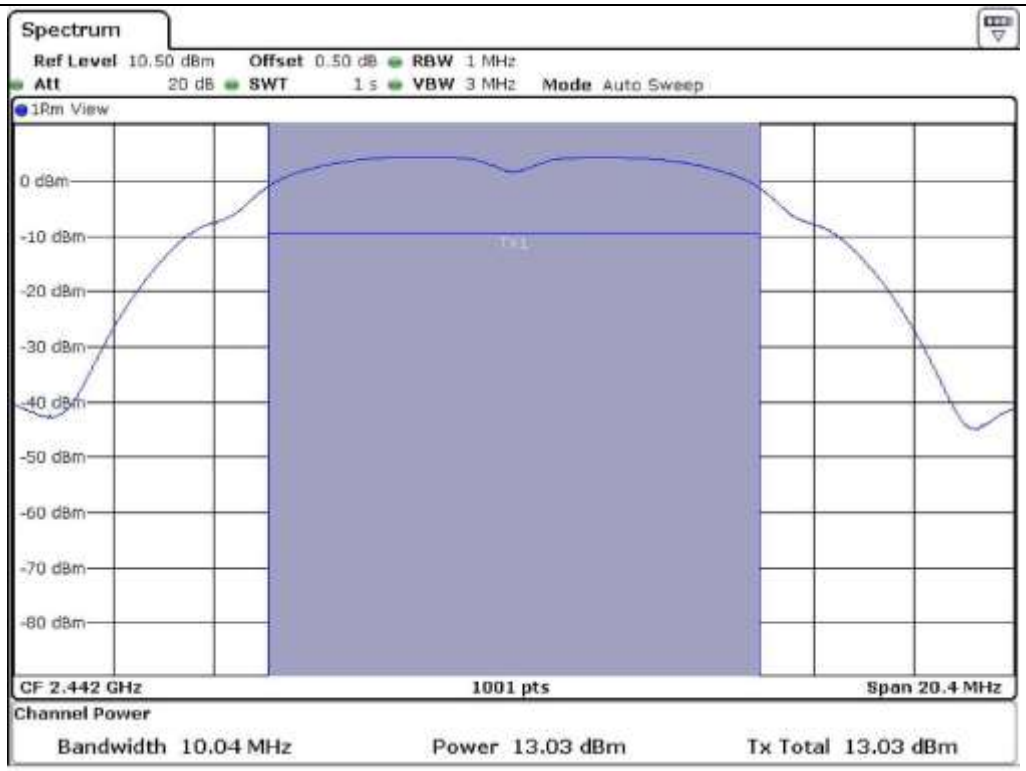
Remark. Margin = Limit – Measured Value (=Receiver Reading + Cable Loss)

Tested by: Tae-Ho, Kim / Senior Engineer

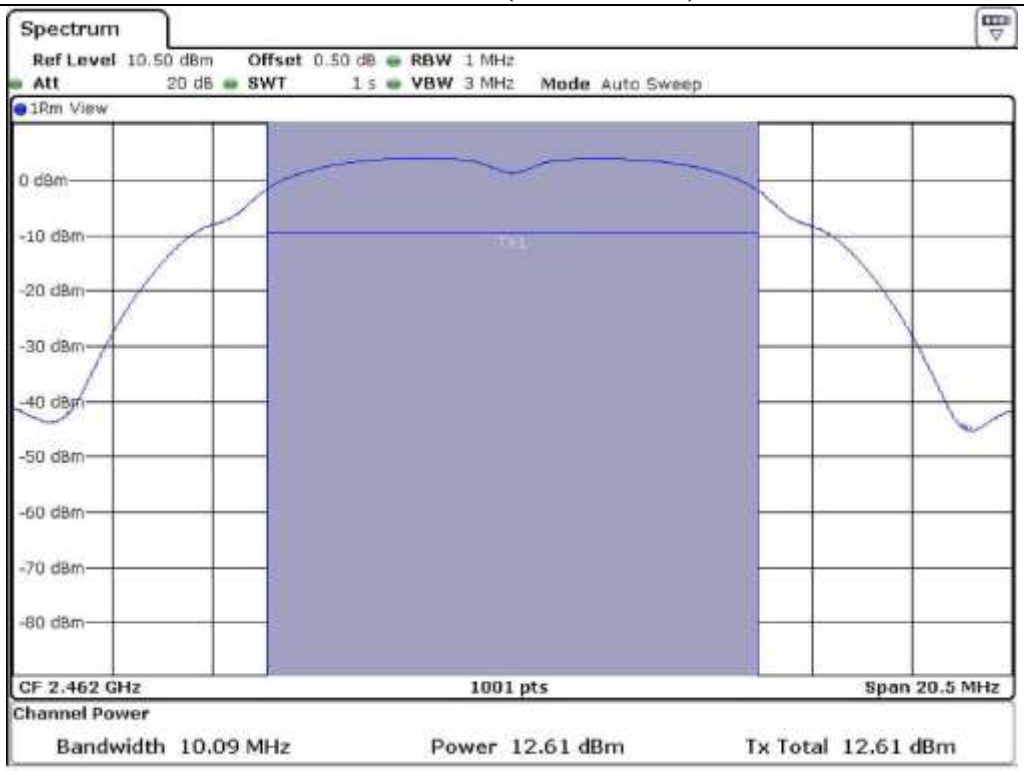


Low Channel (6 dB Bandwidth)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)



Middle Channel (6 dB Bandwidth)



High Channel (6 dB Bandwidth)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

8.4.3 Test data for Multiple transmit

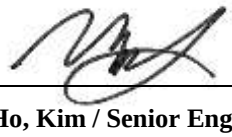
-. Test Date : March 11, 2015

-. Test Result : Pass

CHANNEL	FREQUENCY (MHz)	6 dB Bandwidth (MHz)	CALCULATED OUTPUT POWER (dBm)	LIMIT (dBm)	MARGIN (dB)
LOW	2 412	10.09	15.86	30	14.14
MIDDLE	2 442	10.09	15.84	30	14.16
HIGH	2 462	10.09	15.70	30	14.30

Remark 1 : Margin = Limit – Measured Value (=Receiver Reading + Cable Loss)

Remark 2 :Calculated Output Power= $10\log (10^{(\text{Antenna1 Output Power}/10)}+10^{(\text{Antenna2 Output Power}/10)})$



Tested by: Tae-Ho, Kim / Senior Engineer

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

8.5 Test data for 802.11g WLAN Mode

8.5.1 Test data for Antenna 0

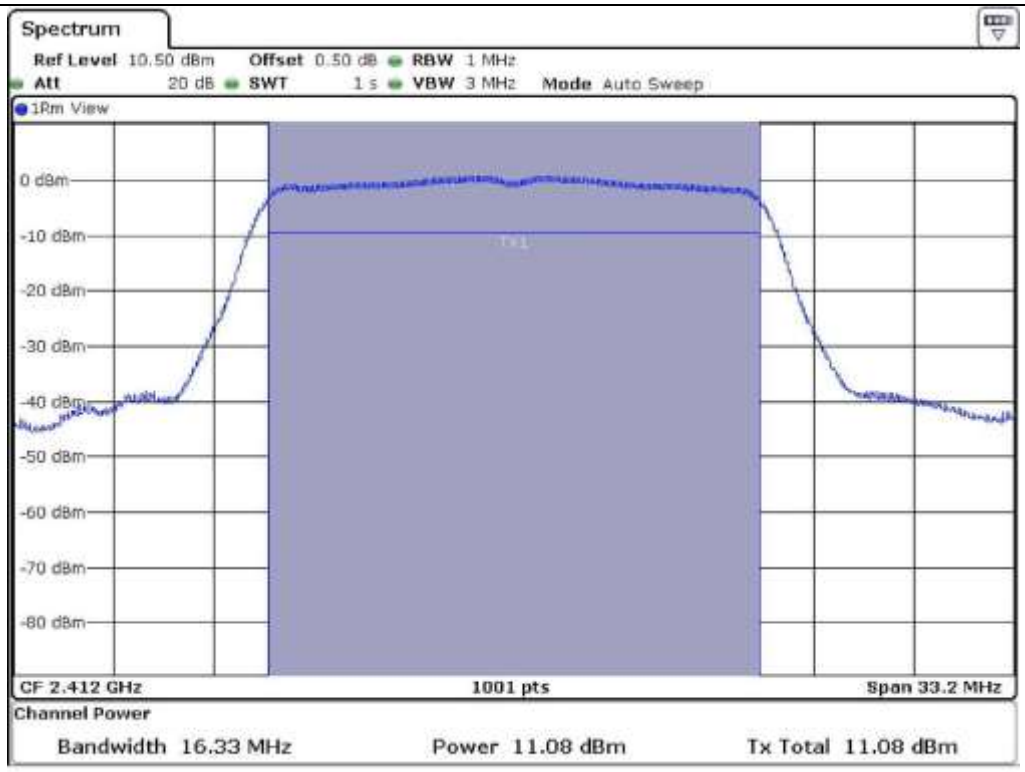
-. Test Date : March 11, 2015

-. Test Result : Pass

CHANNEL	FREQUENCY (MHz)	6 dB Bandwidth (MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
LOW	2 412	16.33	11.08	30	18.92
MIDDLE	2 442	16.33	11.92	30	18.08
HIGH	2 462	16.23	11.61	30	18.39

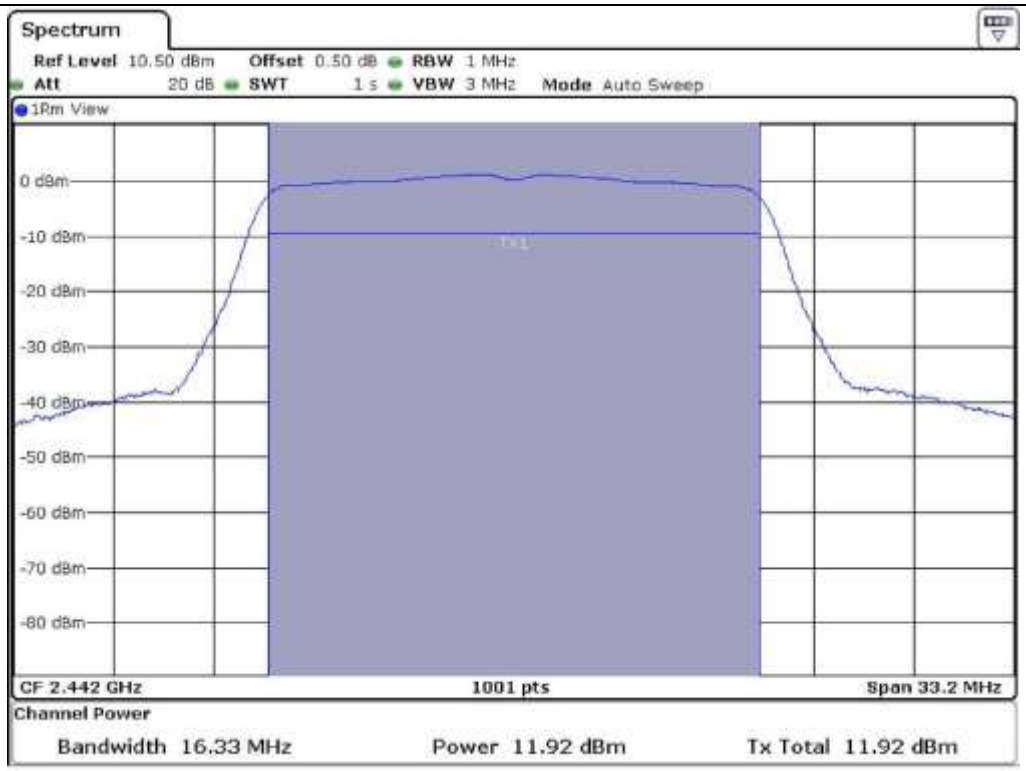
Remark. Margin = Limit – Measured Value (=Receiver Reading + Cable Loss)

Tested by: Tae-Ho, Kim / Senior Engineer

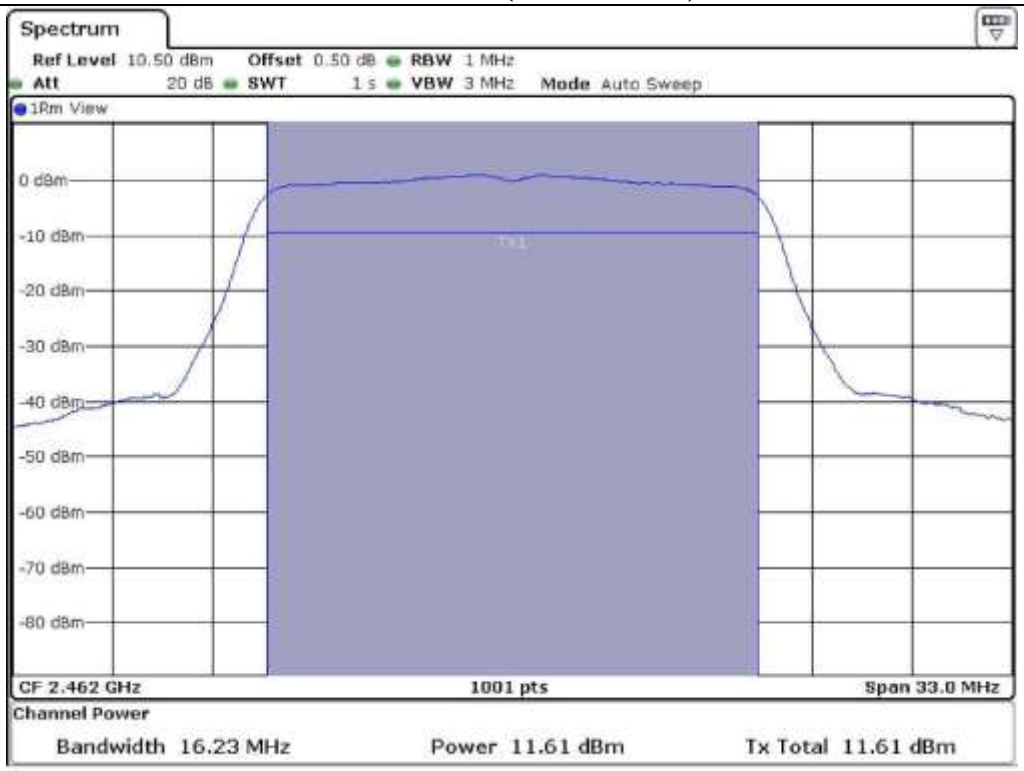


Low Channel (6 dB Bandwidth)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)



Middle Channel (6 dB Bandwidth)



High Channel (6 dB Bandwidth)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

8.5.2 Test data for Antenna 1

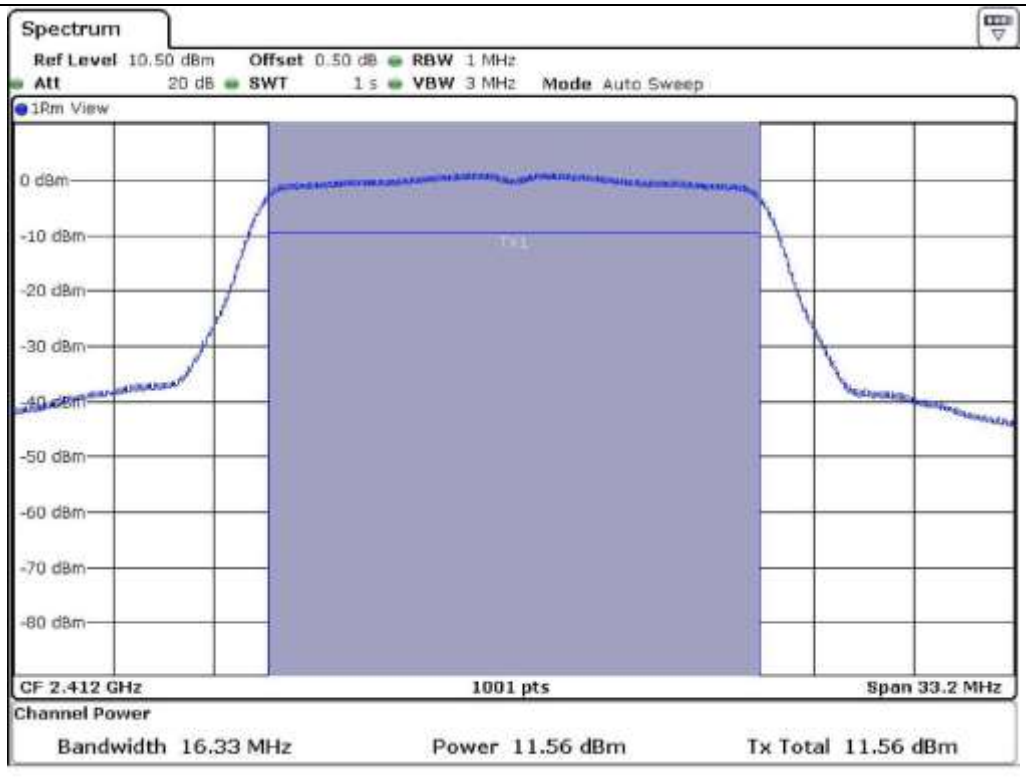
-. Test Date : March 11, 2015

-. Test Result : Pass

CHANNEL	FREQUENCY (MHz)	6 dB Bandwidth (MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
LOW	2 412	16.33	11.56	30	18.44
MIDDLE	2 442	16.33	11.85	30	18.15
HIGH	2 462	16.33	11.50	30	18.50

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

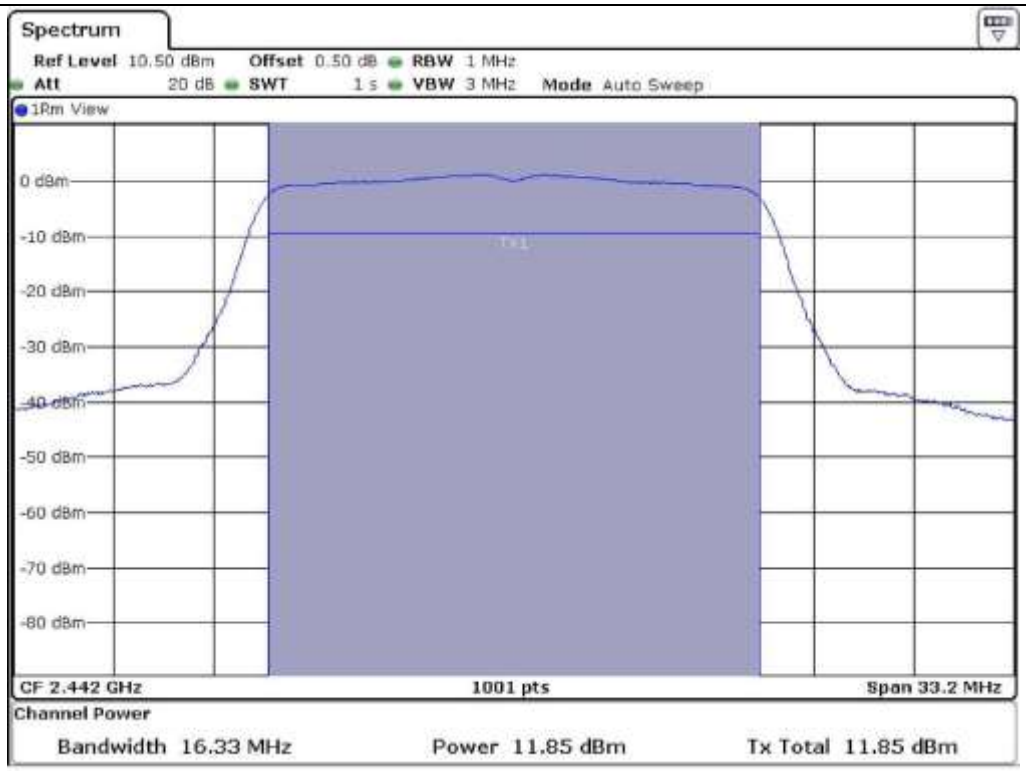
Tested by: Tae-Ho, Kim / Senior Engineer



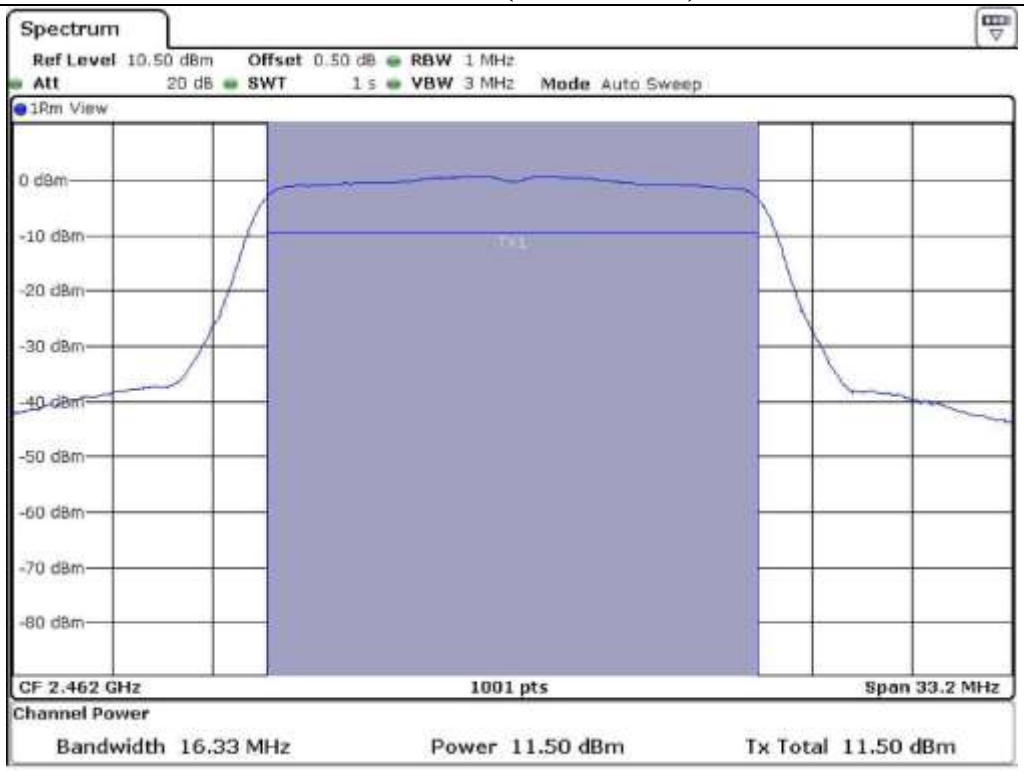
Low Channel (6 dB Bandwidth)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)



Middle Channel (6 dB Bandwidth)



High Channel (6 dB Bandwidth)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

8.5.3 Test data for Multiple transmit

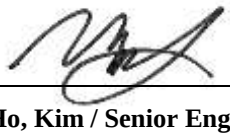
-. Test Date : March 11, 2015

-. Test Result : Pass

CHANNEL	FREQUENCY (MHz)	6 dB Bandwidth (MHz)	CALCULATED OUTPUT POWER (dBm)	LIMIT (dBm)	MARGIN (dB)
LOW	2 412	16.33	14.34	30	15.66
MIDDLE	2 442	16.33	14.90	30	15.10
HIGH	2 462	16.23	14.57	30	15.43

Remark 1 : Margin = Limit – Measured Value (=Receiver Reading + Cable Loss)

Remark 2 :Calculated Output Power= $10\log (10^{(\text{Antenna1 Output Power}/10)}+10^{(\text{Antenna2 Output Power}/10)})$



Tested by: Tae-Ho, Kim / Senior Engineer

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

8.6 Test data for 802.11n_HT20 WLAN Mode

8.6.1 Test data for Antenna 0

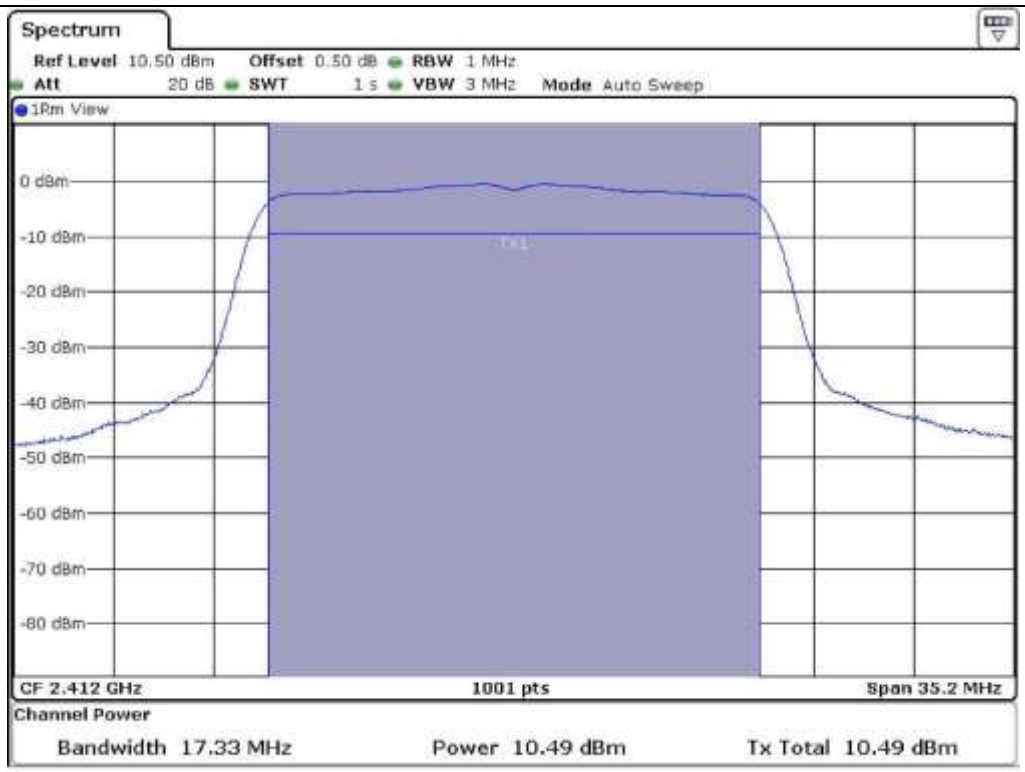
-. Test Date : March 11, 2015

-. Test Result : Pass

CHANNEL	FREQUENCY (MHz)	6 dB Bandwidth (MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
LOW	2 412	17.33	10.49	30	19.51
MIDDLE	2 442	17.28	10.44	30	19.56
HIGH	2 462	17.28	10.62	30	19.38

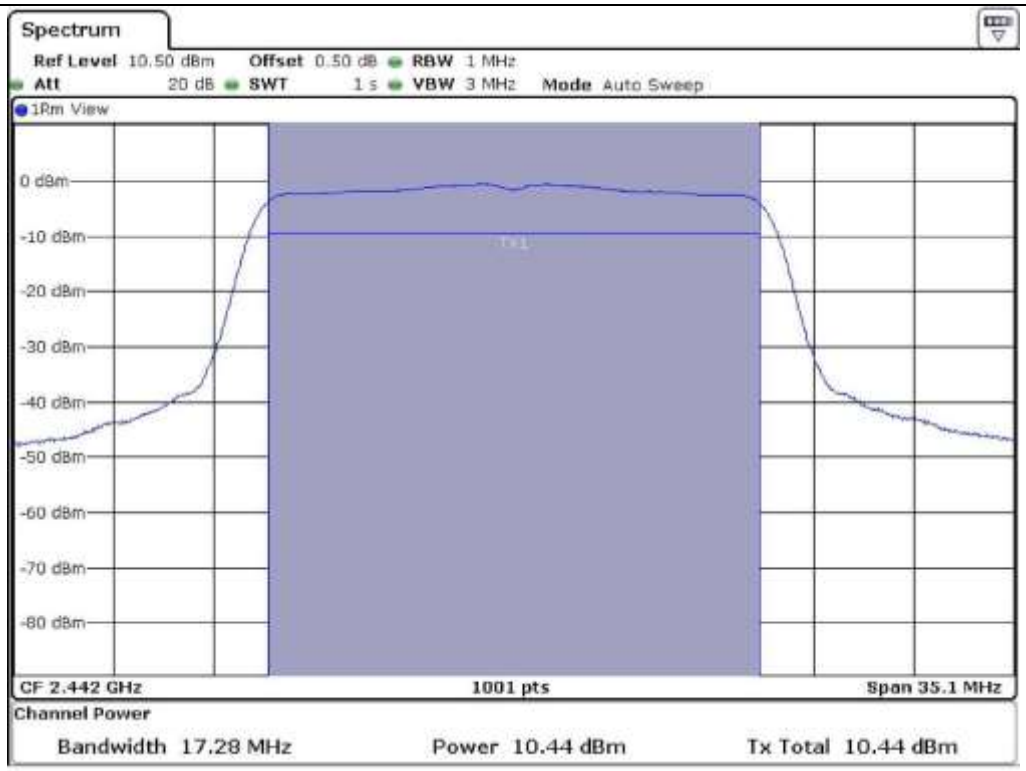
Remark. Margin = Limit – Measured Value (=Receiver Reading + Cable Loss)

Tested by: Tae-Ho, Kim / Senior Engineer

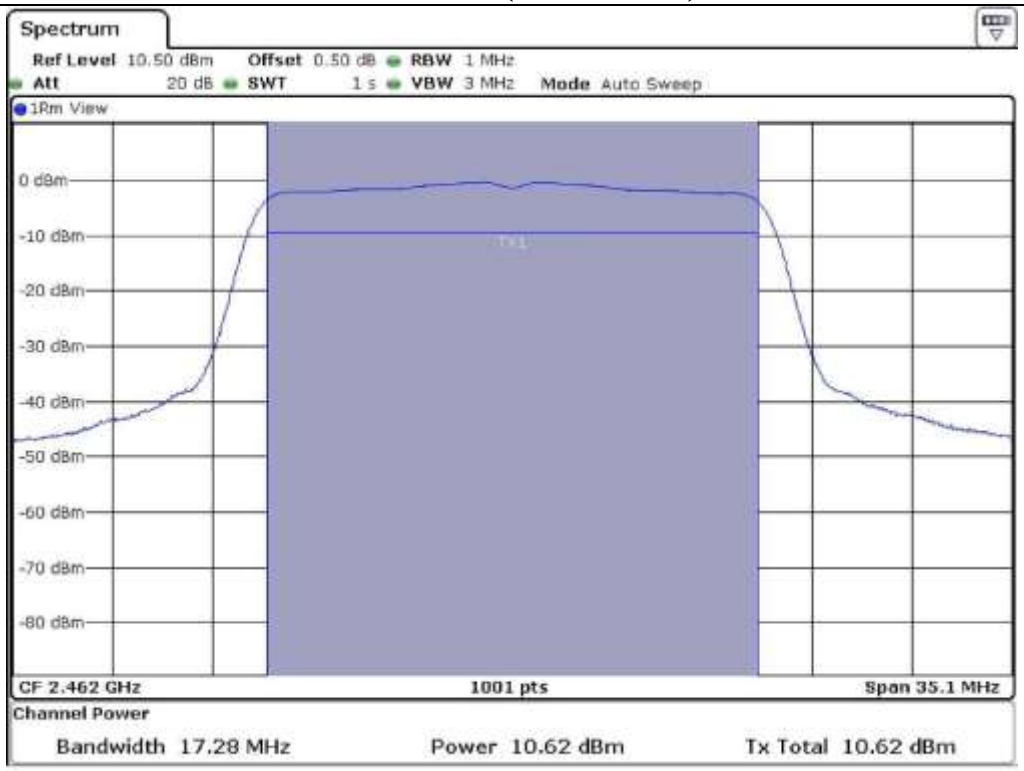


Low Channel (6 dB Bandwidth)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)



Middle Channel (6 dB Bandwidth)



High Channel (6 dB Bandwidth)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

8.6.2 Test data for Antenna 1

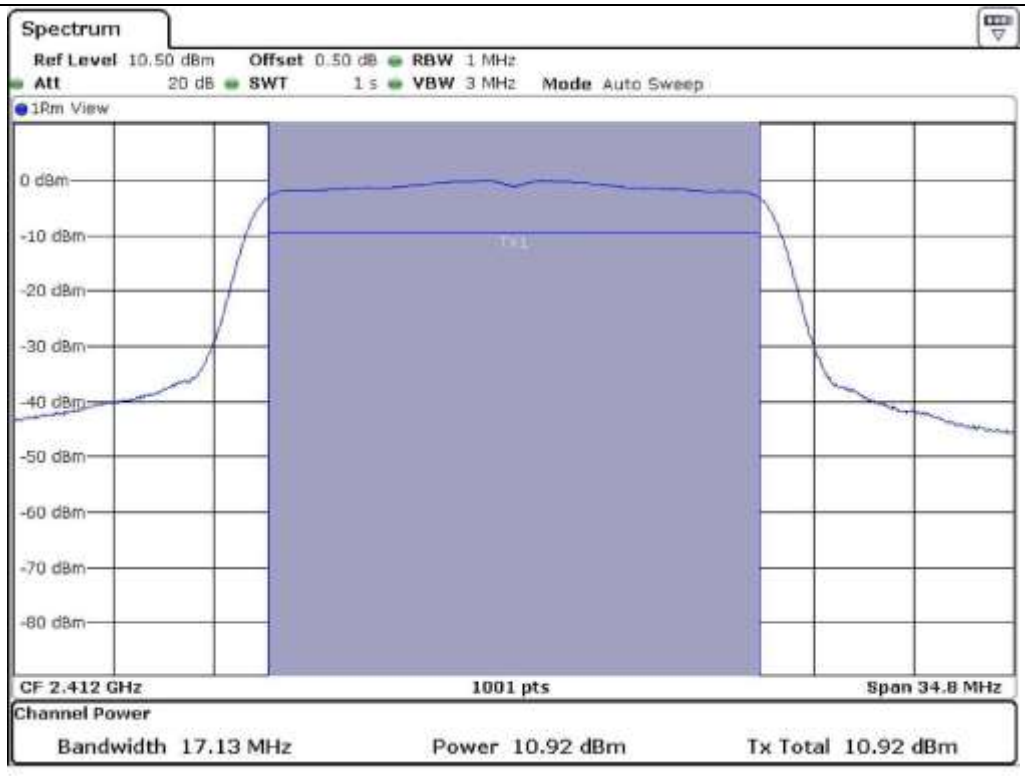
-. Test Date : March 11, 2015

-. Test Result : Pass

CHANNEL	FREQUENCY (MHz)	6 dB Bandwidth (MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
LOW	2 412	17.13	10.92	30	19.08
MIDDLE	2 442	16.93	10.39	30	19.61
HIGH	2 462	16.93	10.61	30	19.39

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

Tested by: Tae-Ho, Kim / Senior Engineer



Low Channel (6 dB Bandwidth)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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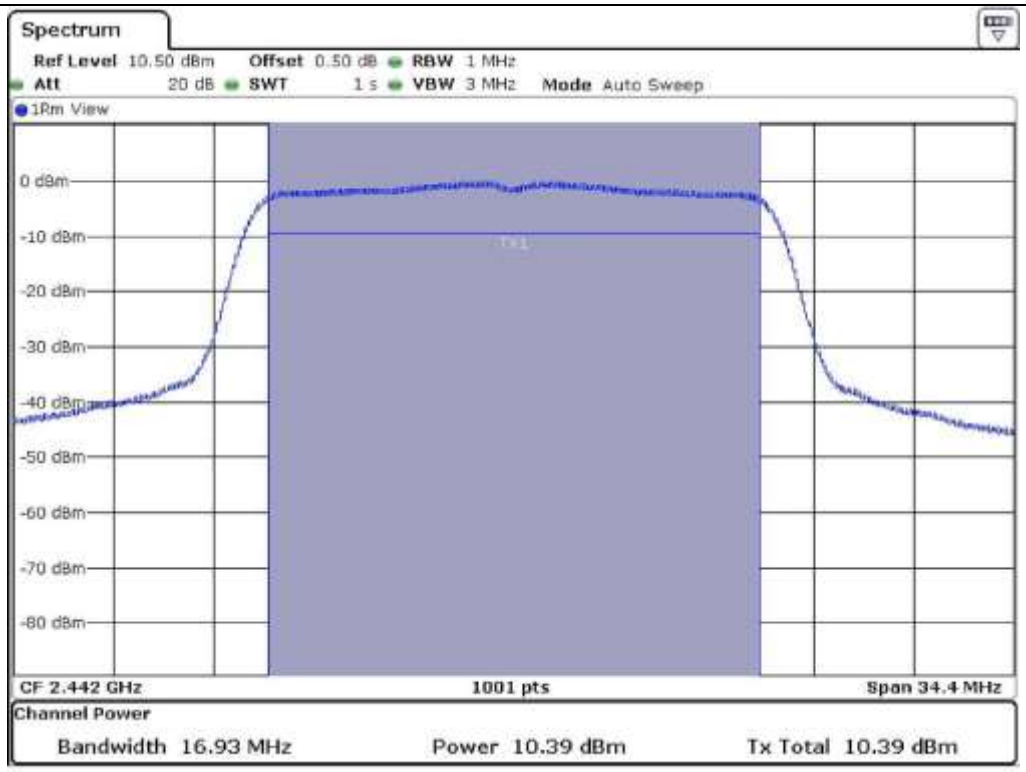
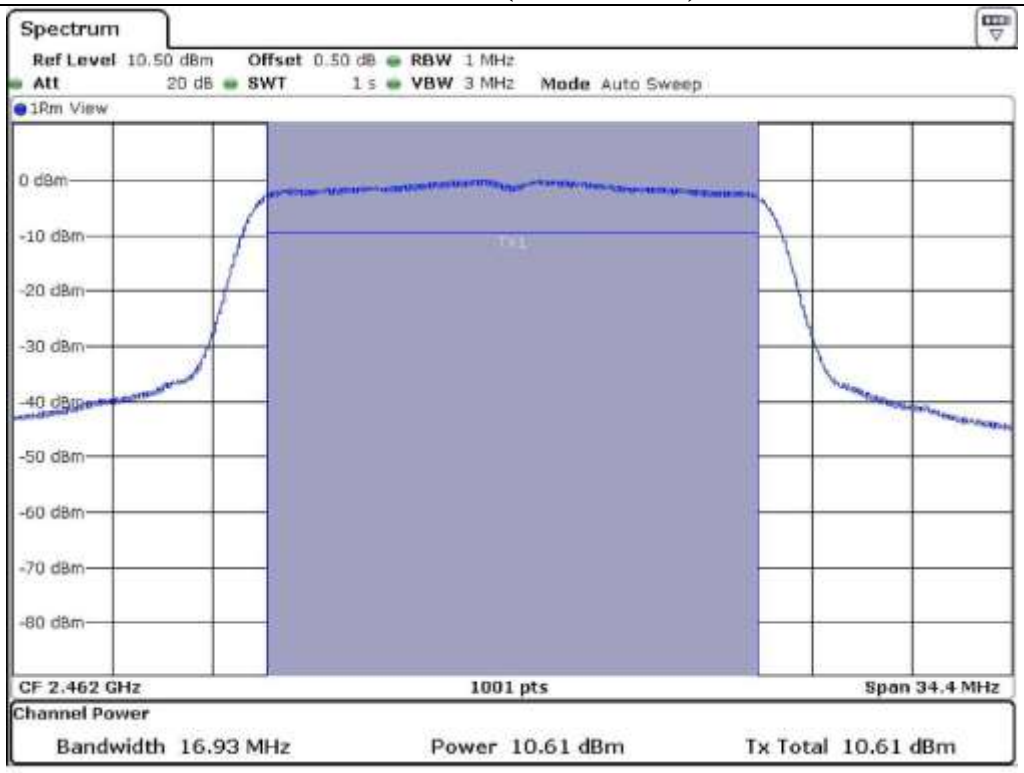


Middle Channel (6 dB Bandwidth)



High Channel (6 dB Bandwidth)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

8.6.3 Test data for Multiple transmit

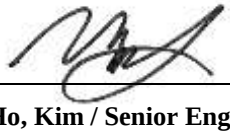
-. Test Date : March 11, 2015

-. Test Result : Pass

CHANNEL	FREQUENCY (MHz)	6 dB Bandwidth (MHz)	CALCULATED OUTPUT POWER (dBm)	LIMIT (dBm)	MARGIN (dB)
LOW	2 412	17.33	13.72	30	16.28
MIDDLE	2 442	17.28	13.43	30	16.57
HIGH	2 462	17.28	13.63	30	16.37

Remark 1 : Margin = Limit – Measured Value (=Receiver Reading + Cable Loss)

Remark 2 :Calculated Output Power= $10\log (10^{(\text{Antenna1 Output Power}/10)}+10^{(\text{Antenna2 Output Power}/10)})$



Tested by: Tae-Ho, Kim / Senior Engineer

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

8.7 Test data for 802.11n_HT40 WLAN Mode

8.7.1 Test data for Antenna 0

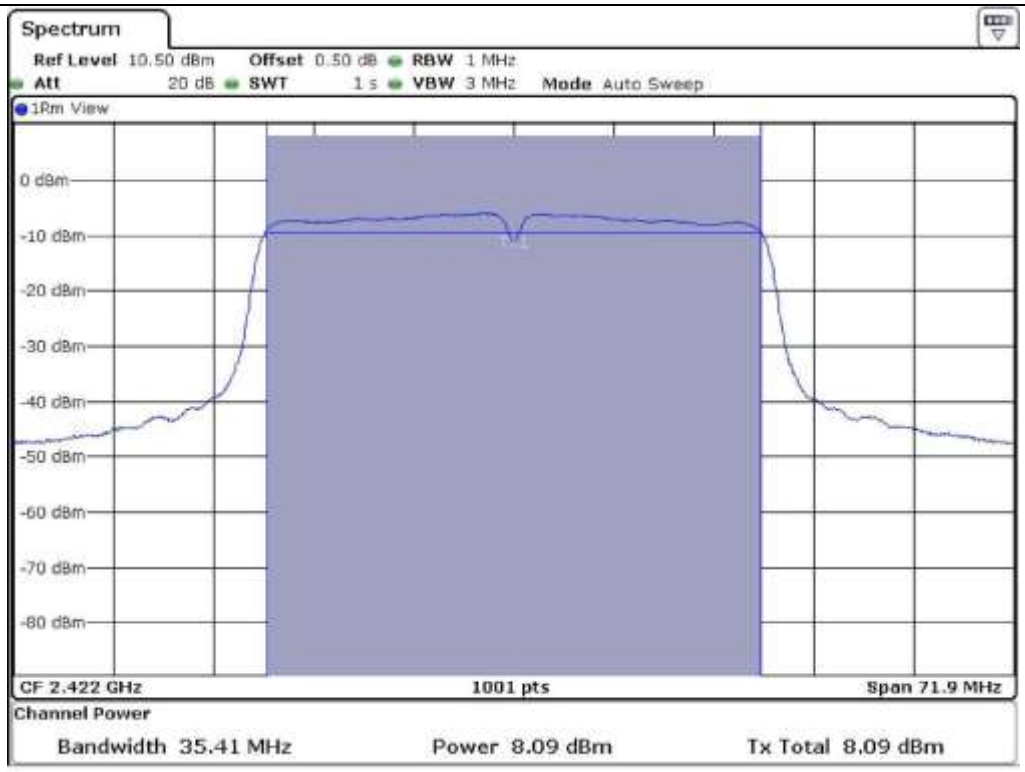
-. Test Date : March 11, 2015

-. Test Result : Pass

CHANNEL	FREQUENCY (MHz)	6 dB Bandwidth (MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
LOW	2 422	35.41	8.09	30	21.91
MIDDLE	2 442	35.49	8.32	30	21.68
HIGH	2 452	35.25	8.55	30	21.45

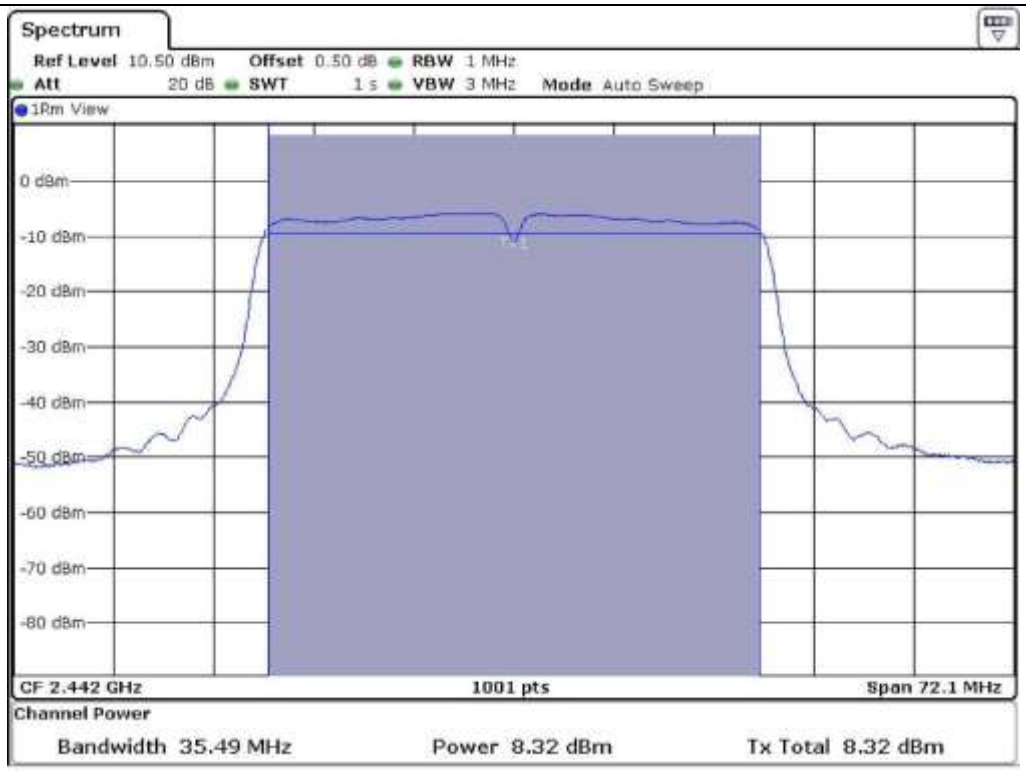
Remark. Margin = Limit – Measured Value (=Receiver Reading + Cable Loss)

Tested by: Tae-Ho, Kim / Senior Engineer

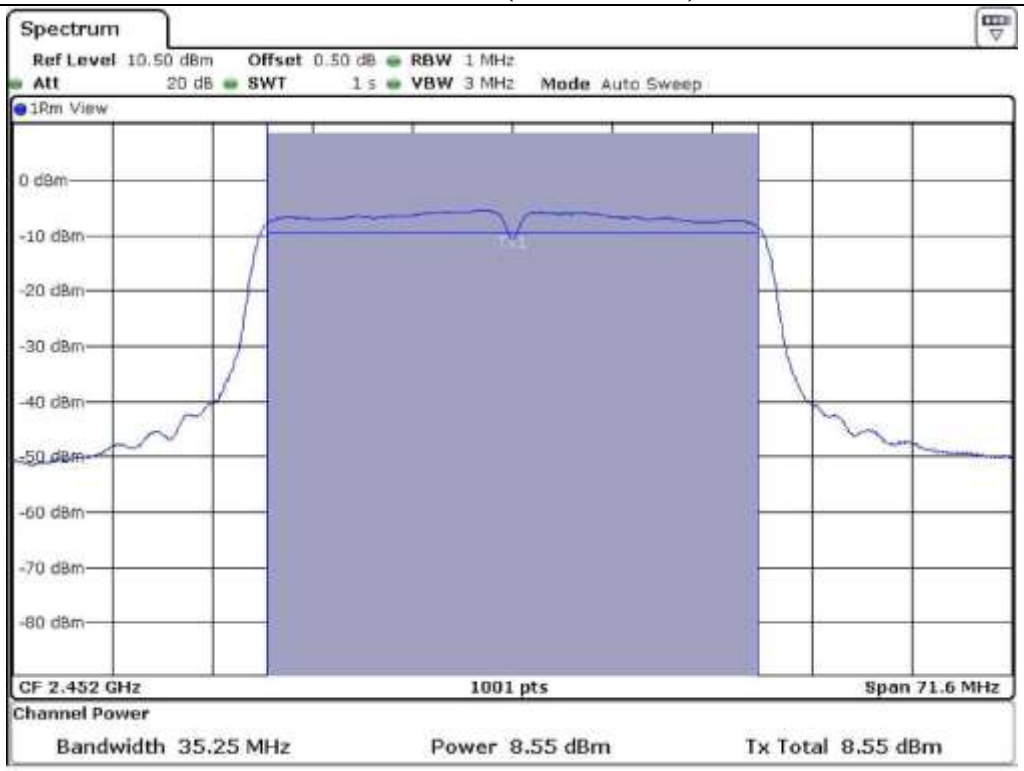


Low Channel (6 dB Bandwidth)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)



Middle Channel (6 dB Bandwidth)



High Channel (6 dB Bandwidth)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

8.7.2 Test data for Antenna 1

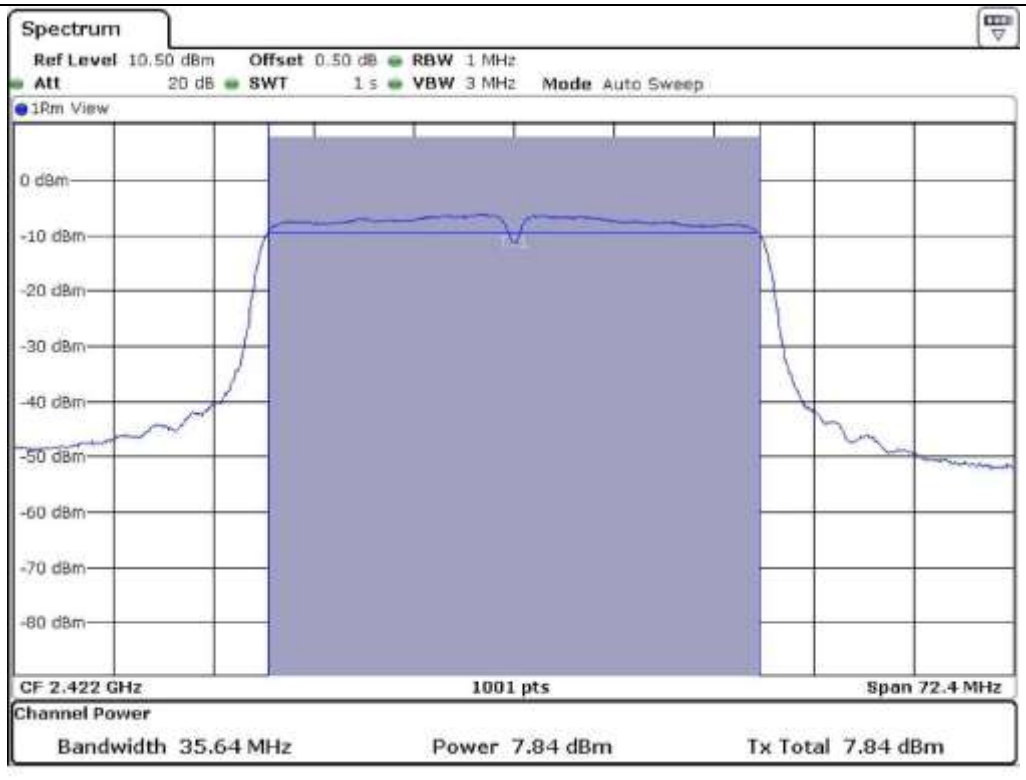
-. Test Date : March 11, 2015

-. Test Result : Pass

CHANNEL	FREQUENCY (MHz)	6 dB Bandwidth (MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
LOW	2 422	35.64	7.84	30	22.16
MIDDLE	2 442	35.33	8.22	30	21.78
HIGH	2 452	35.64	8.06	30	21.94

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

Tested by: Tae-Ho, Kim / Senior Engineer



Low Channel (6 dB Bandwidth)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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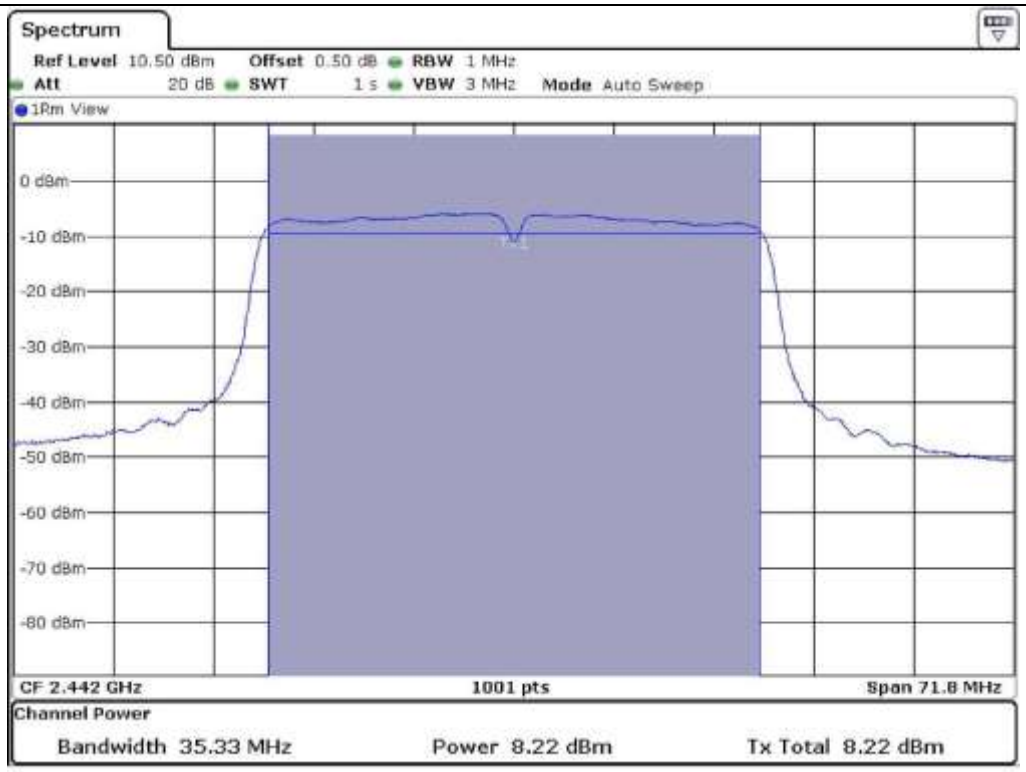
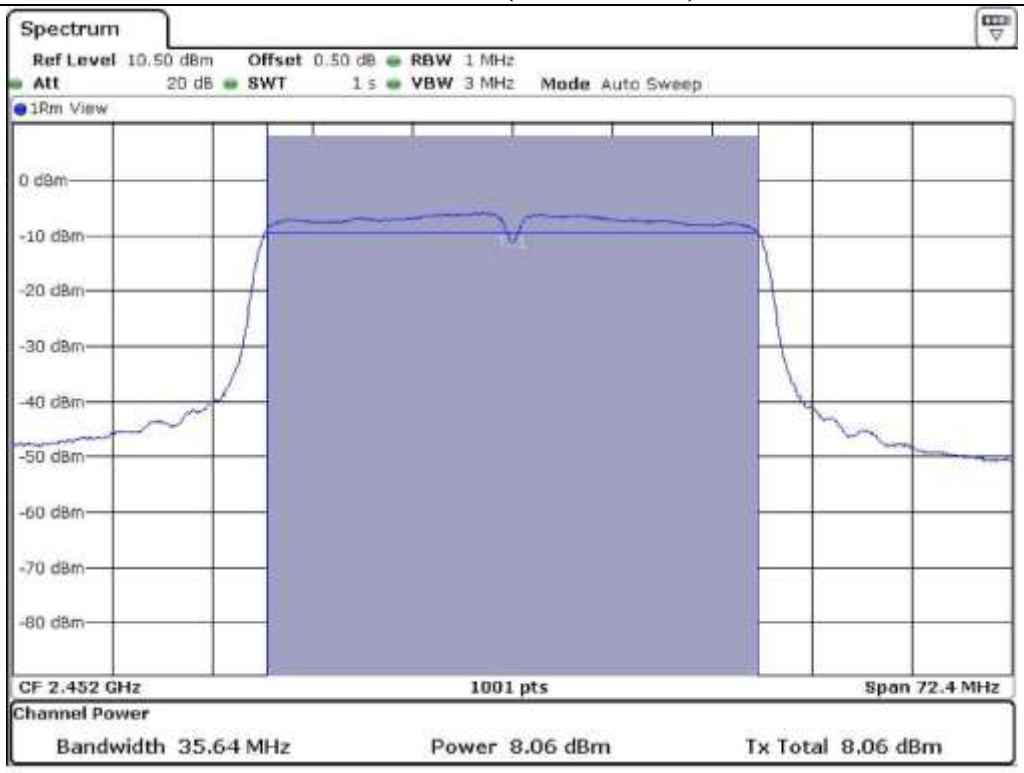


Middle Channel (6 dB Bandwidth)



High Channel (6 dB Bandwidth)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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8.7.3 Test data for Multiple transmit

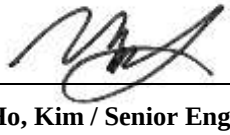
-. Test Date : March 11, 2015

-. Test Result : Pass

CHANNEL	FREQUENCY (MHz)	6 dB Bandwidth (MHz)	CALCULATED OUTPUT POWER (dBm)	LIMIT (dBm)	MARGIN (dB)
LOW	2 422	35.41	10.98	30	19.02
MIDDLE	2 442	35.49	11.28	30	18.72
HIGH	2 452	35.25	11.32	30	18.68

Remark 1 : Margin = Limit – Measured Value (=Receiver Reading + Cable Loss)

Remark 2 :Calculated Output Power= $10\log (10^{(\text{Antenna1 Output Power}/10)}+10^{(\text{Antenna2 Output Power}/10)})$



Tested by: Tae-Ho, Kim / Senior Engineer

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

9. 100 kHz BANDWIDTH OUTSIDE THE FREQUENCY BAND

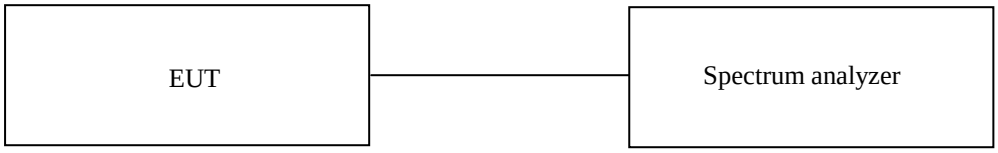
9.1 Operating environment

Temperature : 22 ℃

Relative humidity : 48 % 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, open-field test site. The EUT was placed on a non-conductive turntable above the ground plane.

The frequency spectrum from 30 MHz to 40 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.(Interval)
■ -	FSV40	Rohde & Schwarz	Signal Analyzer	101009	Jul. 30, 2014 (1Y)
■ -	ESCI	Rohde & Schwarz	Test Receiver	101012	Nov. 03, 2014 (1Y)
■ -	310N	Sonoma Instrument	Pre-Amplifier	312544	Apr. 28, 2014 (1Y)
■ -	SCU-18	Rohde & Schwarz	Pre-Amplifier	10041	Nov. 25, 2014 (1Y)
■ -	DT3000	Innco System	Turn Table	930611	N/A
■ -	MA4000-EP	Innco System	Antenna Master	3320611	N/A
■ -	VULB9163	Schwarzbeck	TRILOG Broadband Antenna	9163-421	Jul. 10, 2014 (2Y)
■ -	BBHA9120D	Schwarzbeck	Horn Antenna	BBHA9120D294	Sep. 05, 2013 (2Y)
■ -	BBHA9170	Schwarzbeck	Horn Antenna	BBHA9170178	Sep. 05, 2013 (2Y)

All test equipment used is calibrated on a regular basis.

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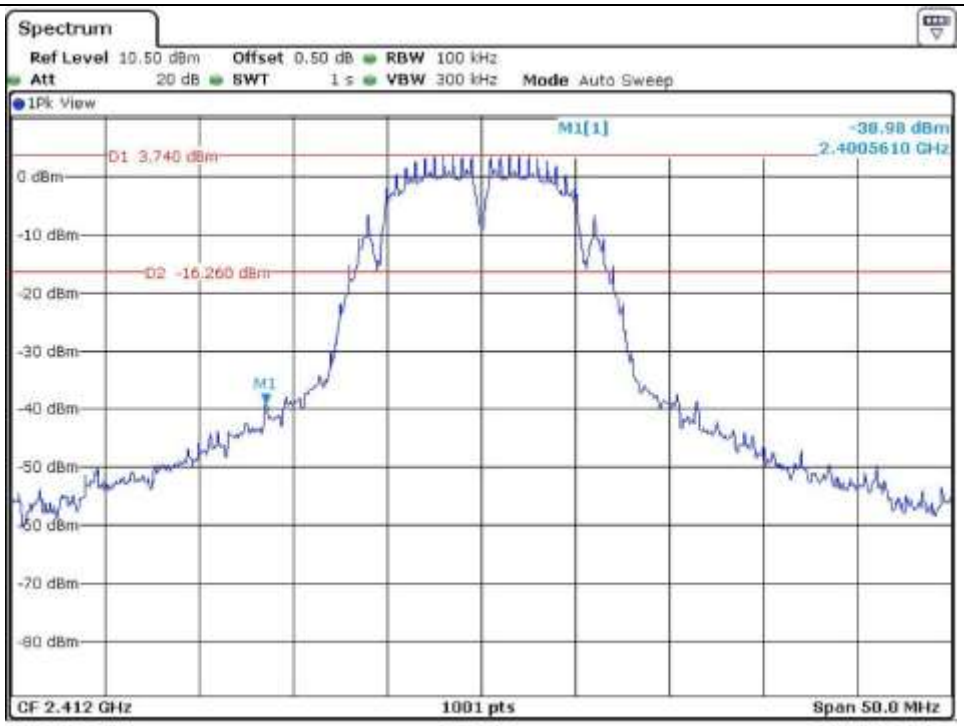
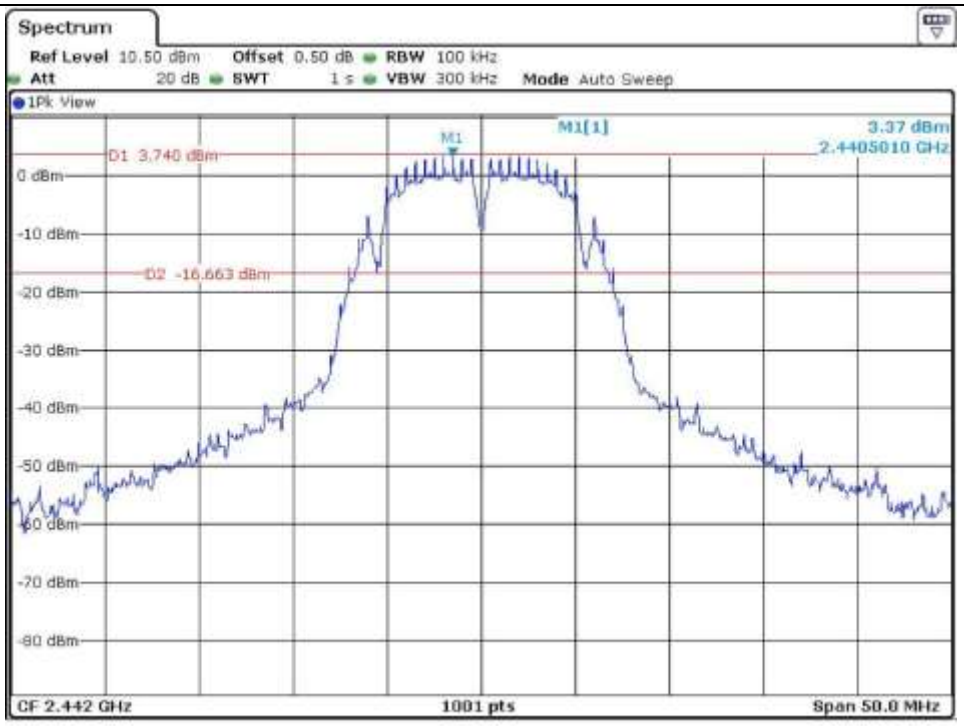
9.5 Test data for conducted emission

9.5.1 Test data for 802.11b WLAN Mode

9.5.1.1 Test data for Antenna 0



Low Channel



Middle Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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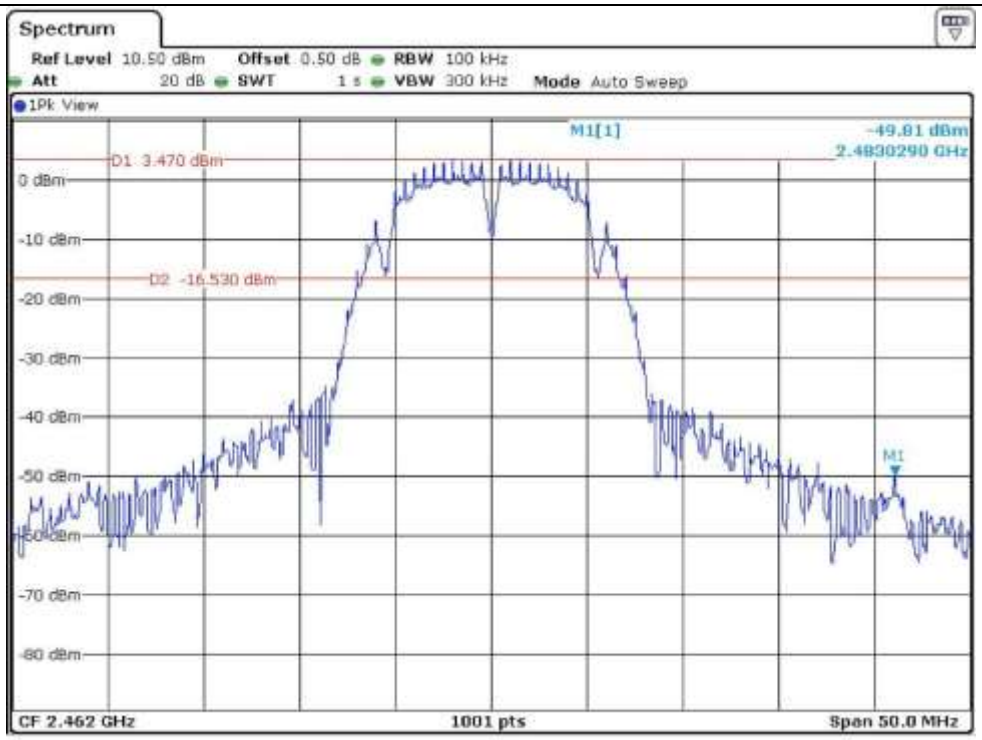

High Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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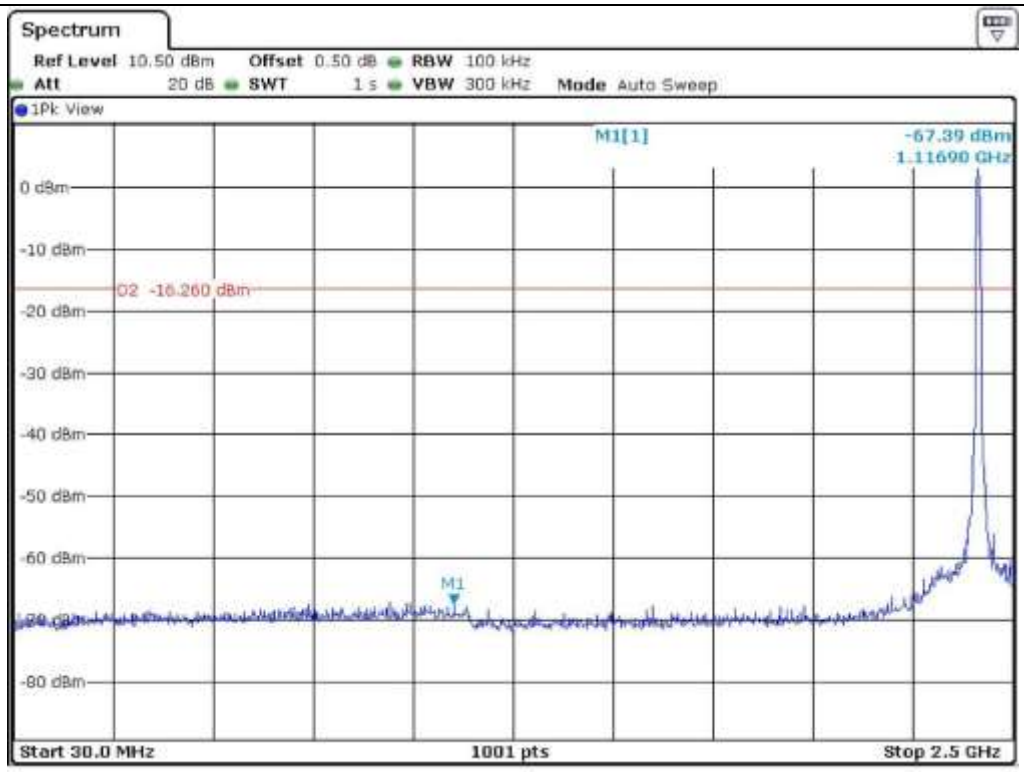
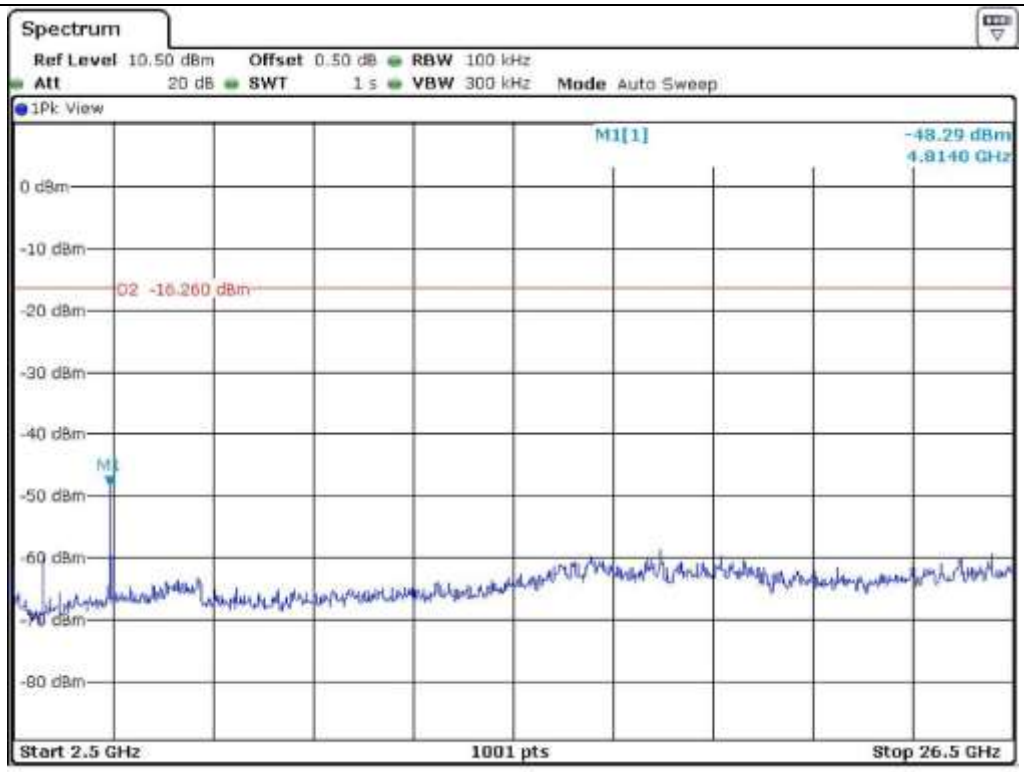


Low Channel



Low Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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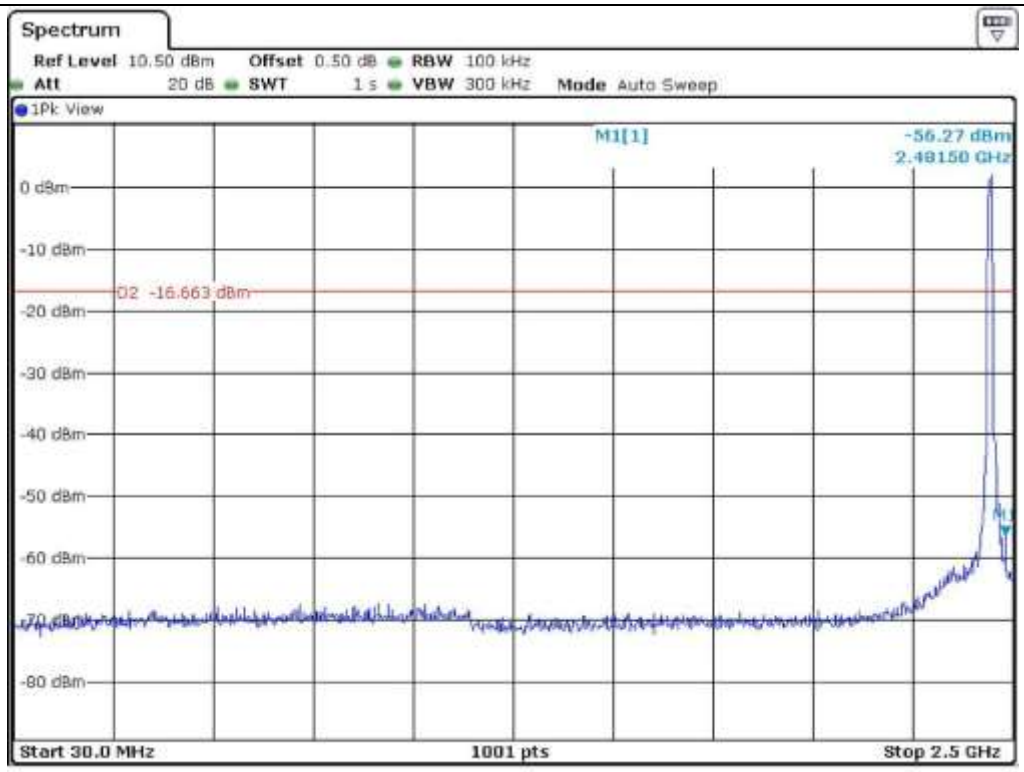
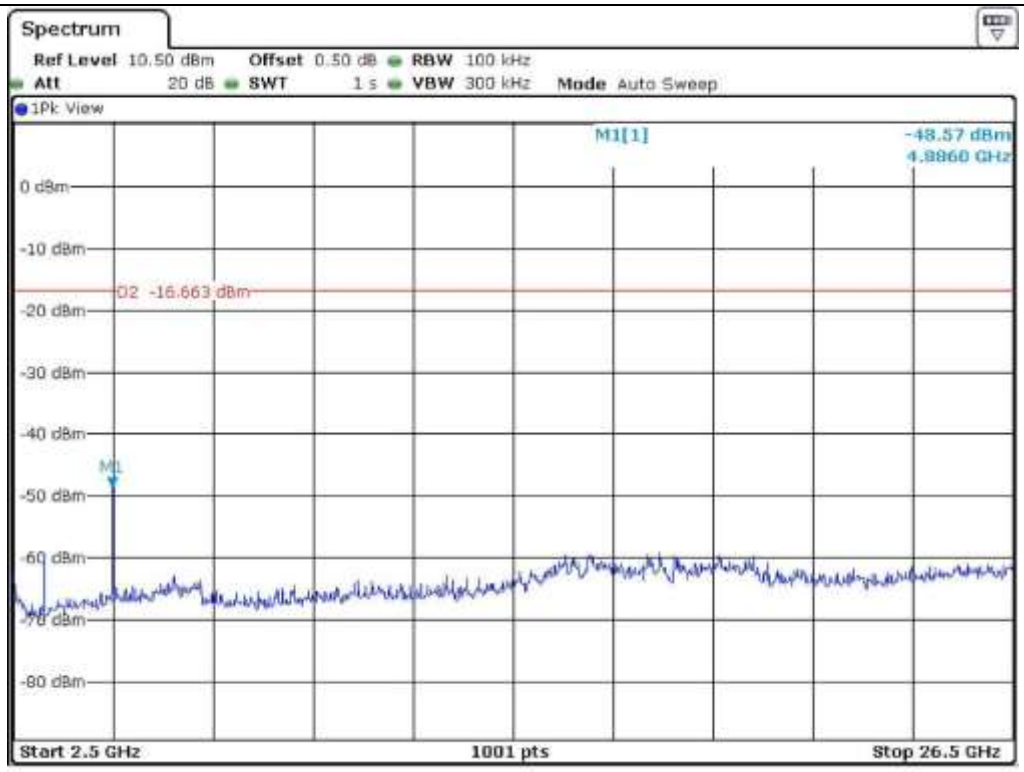


Middle Channel



Middle Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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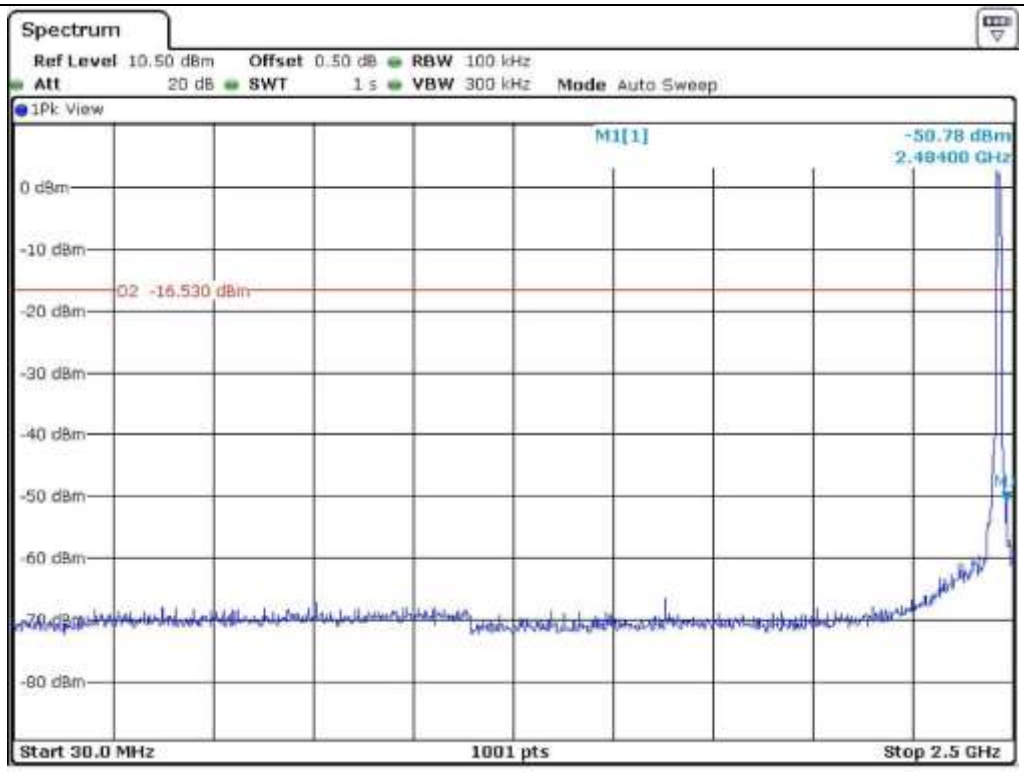
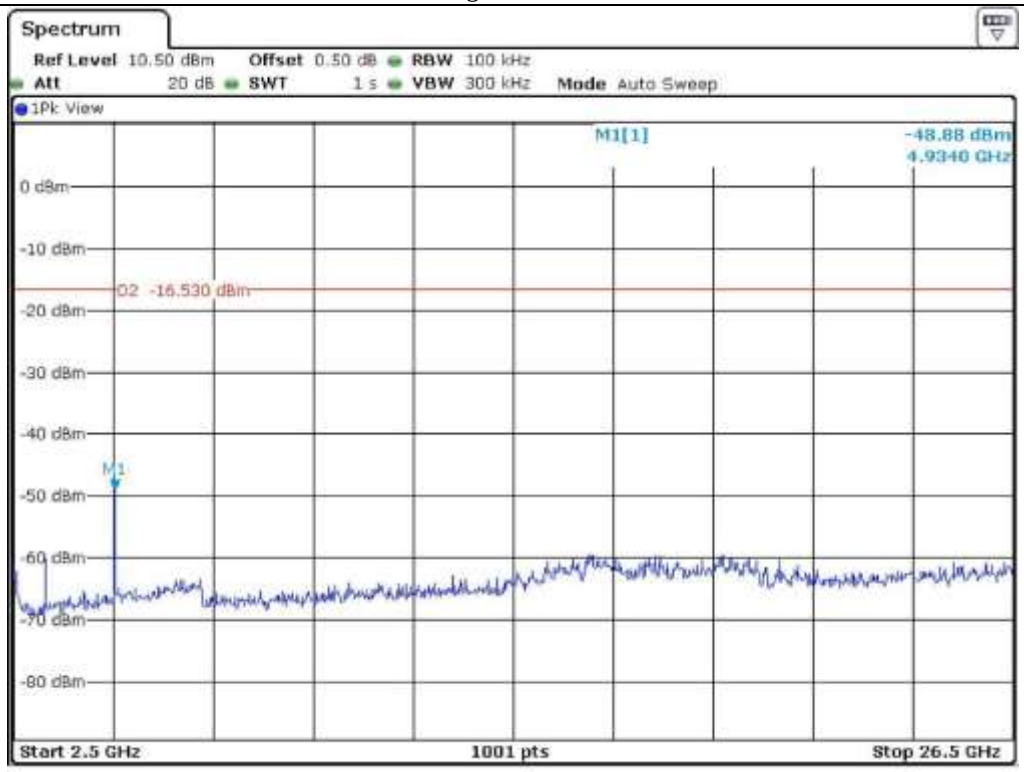


High Channel



High Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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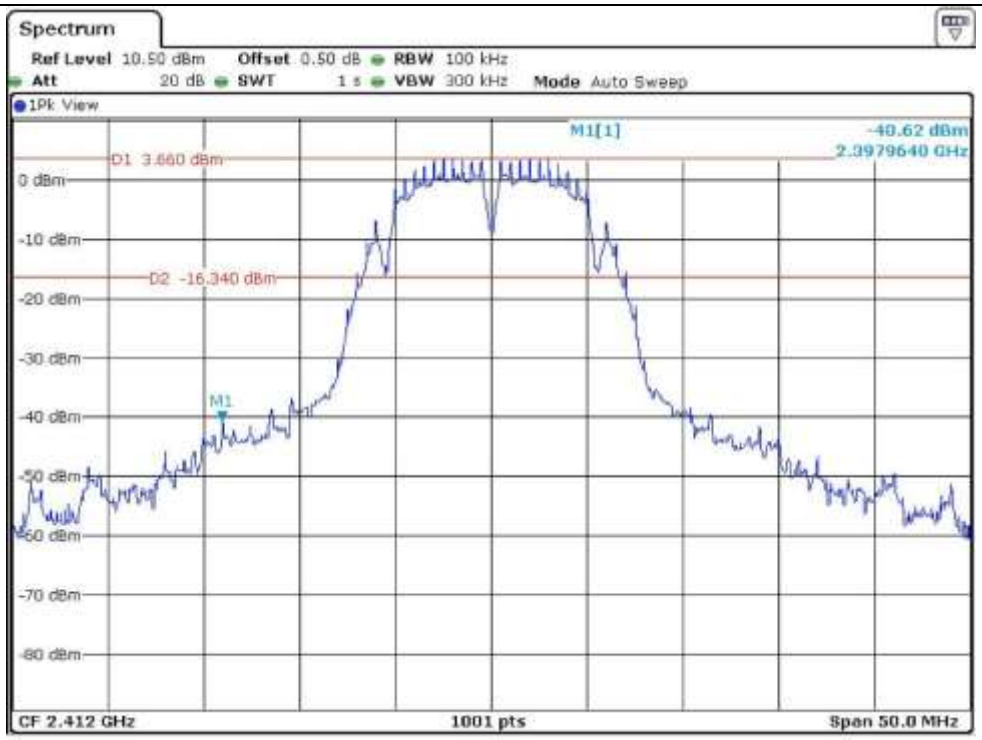
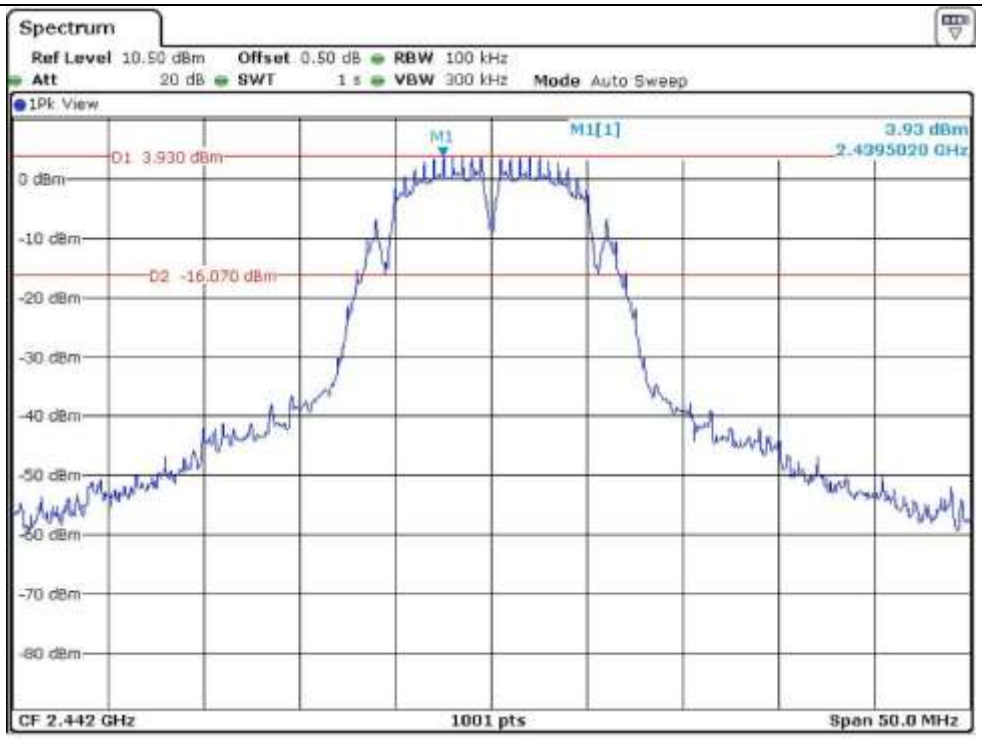
9.5.1.2 Test data for Antenna 1

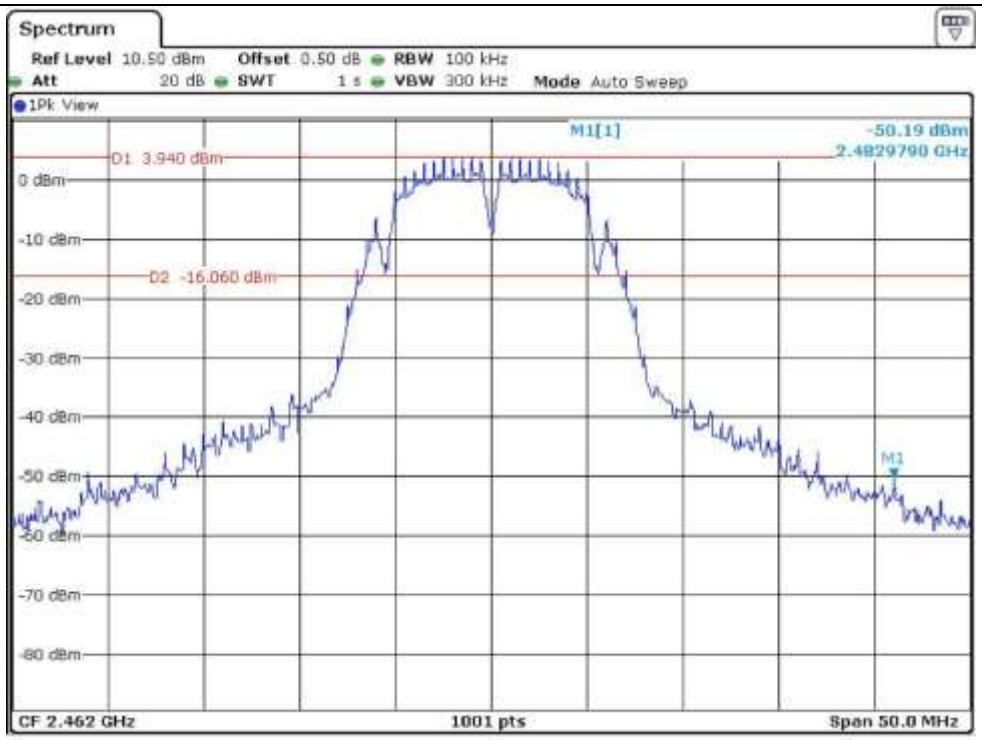


Low Channel



Middle Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)



High Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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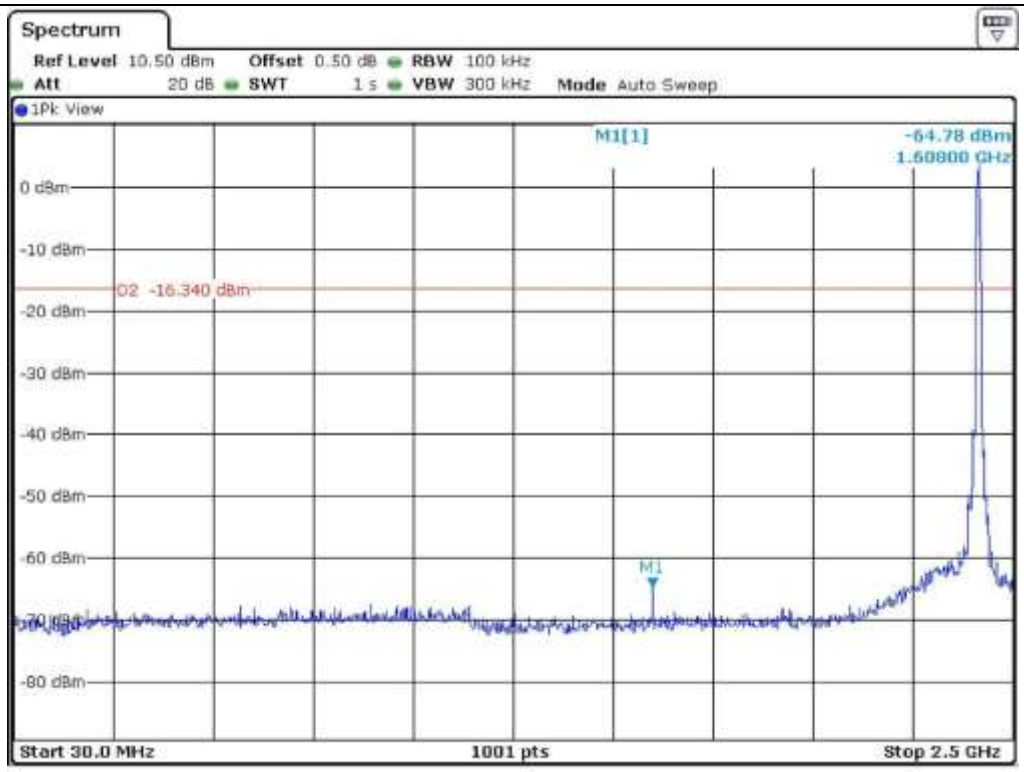
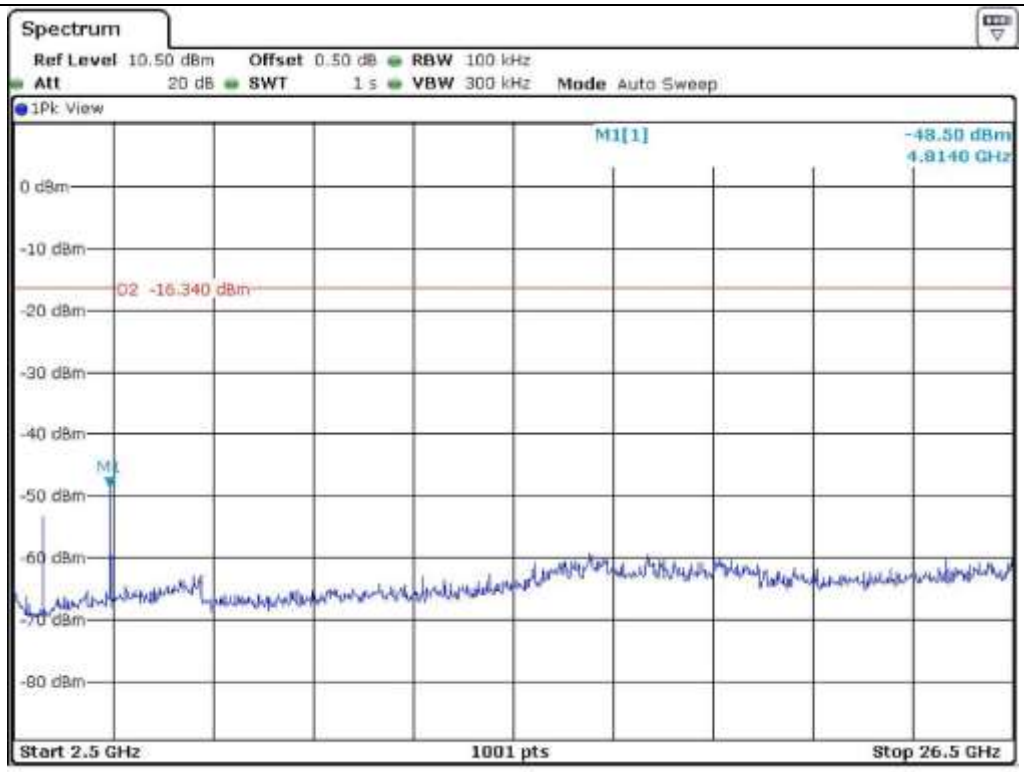
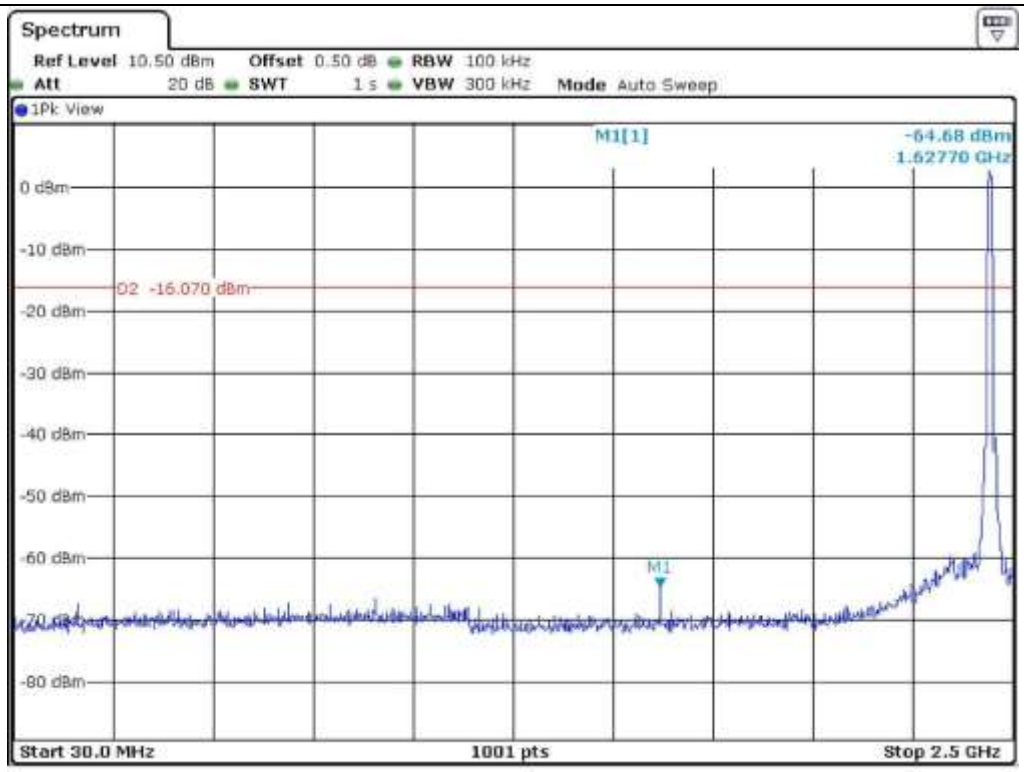


Low Channel

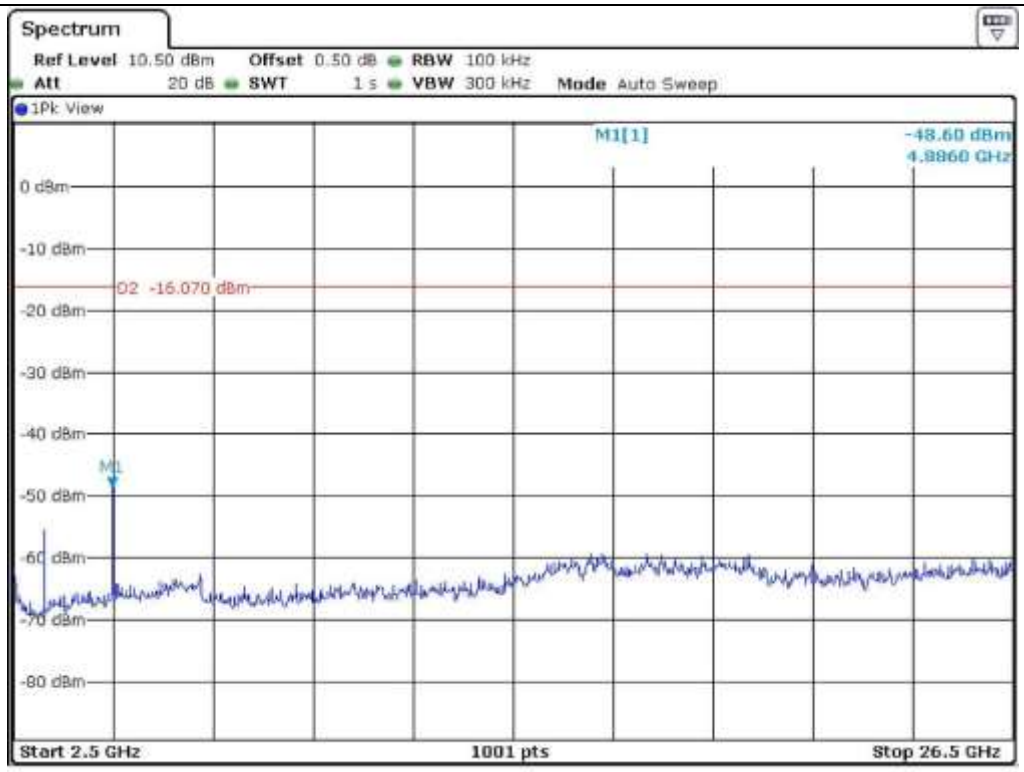


Low Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

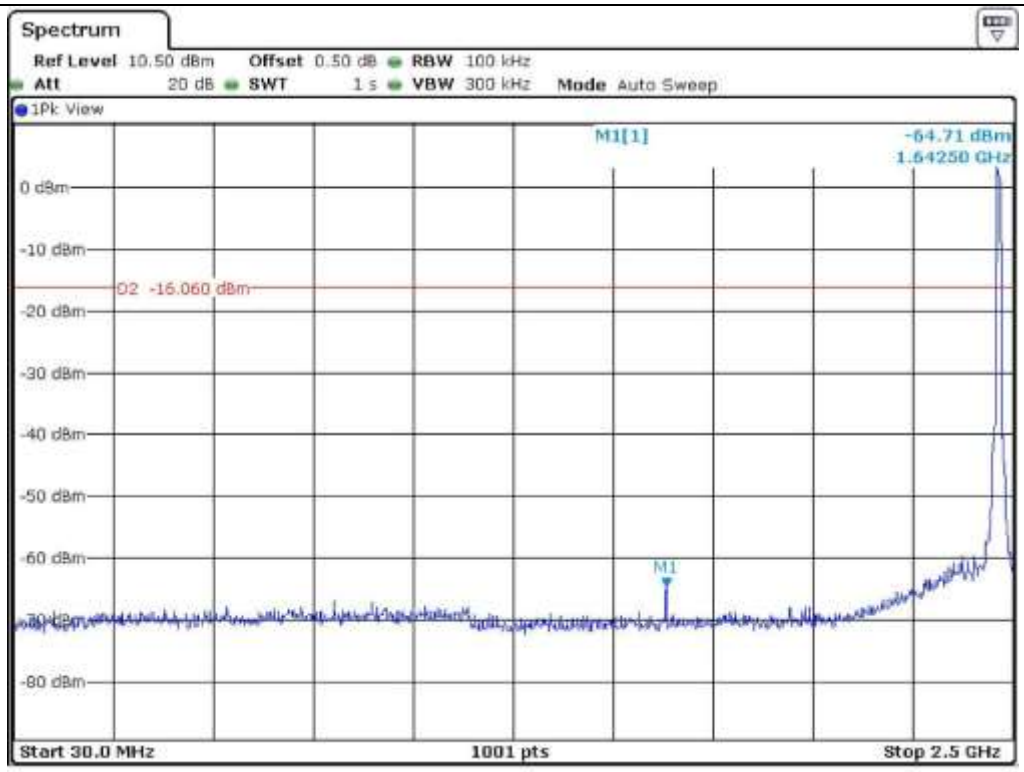


Middle Channel

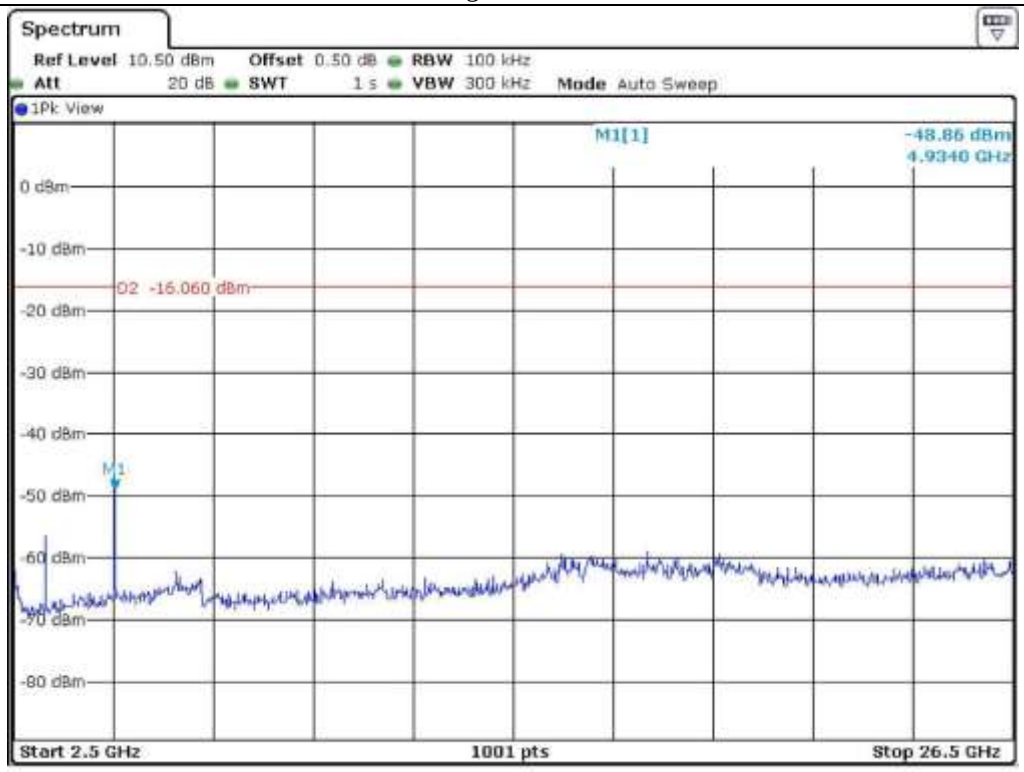


Middle Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)



High Channel

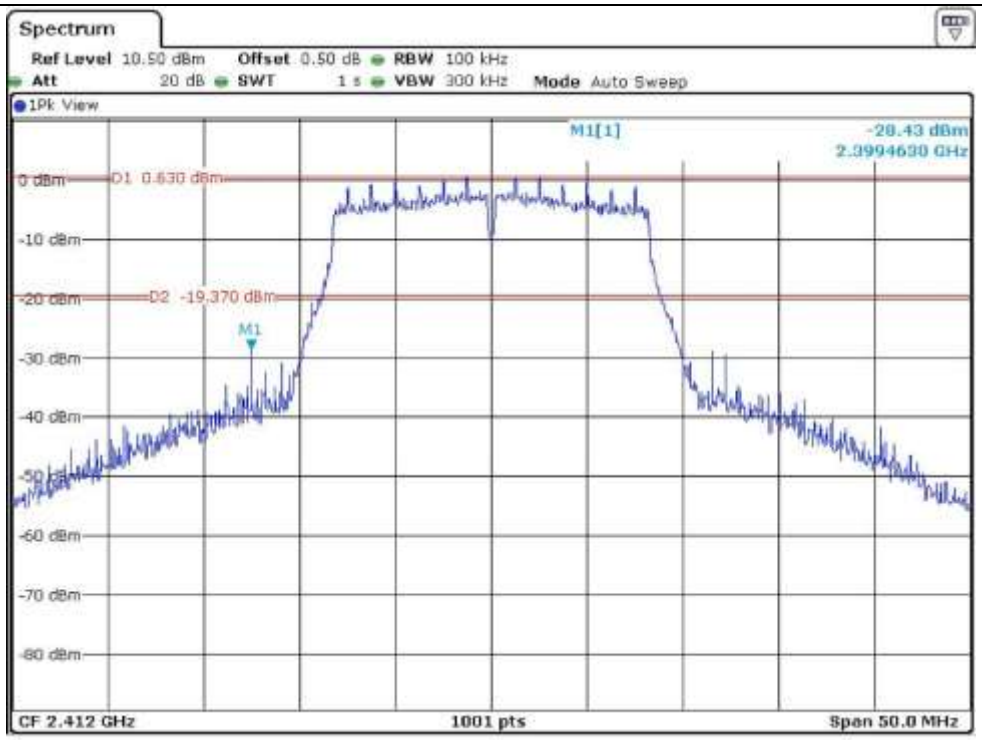


High Channel

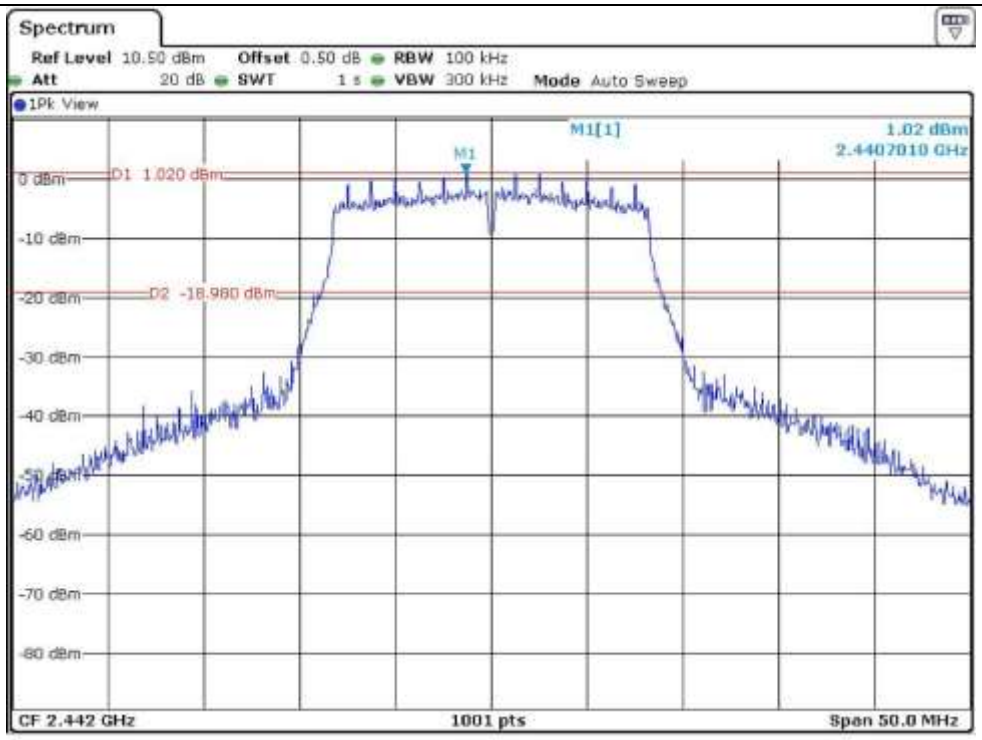
HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

9.5.2 Test data for 802.11g WLAN Mode

9.5.2.1 Test data for Antenna 0

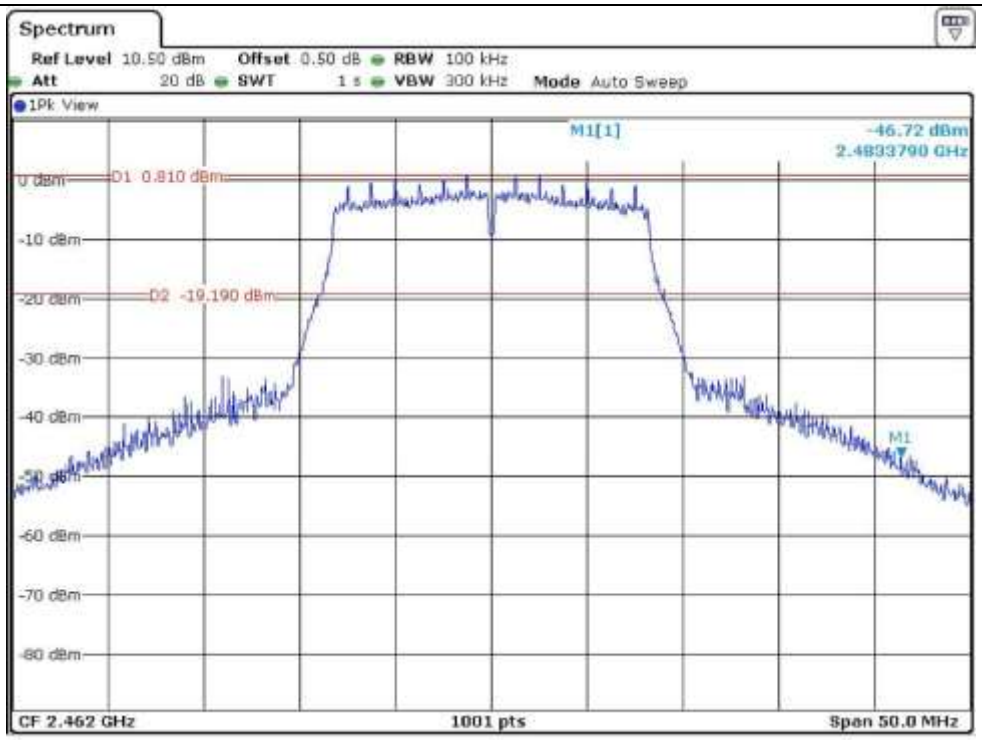


Low Channel



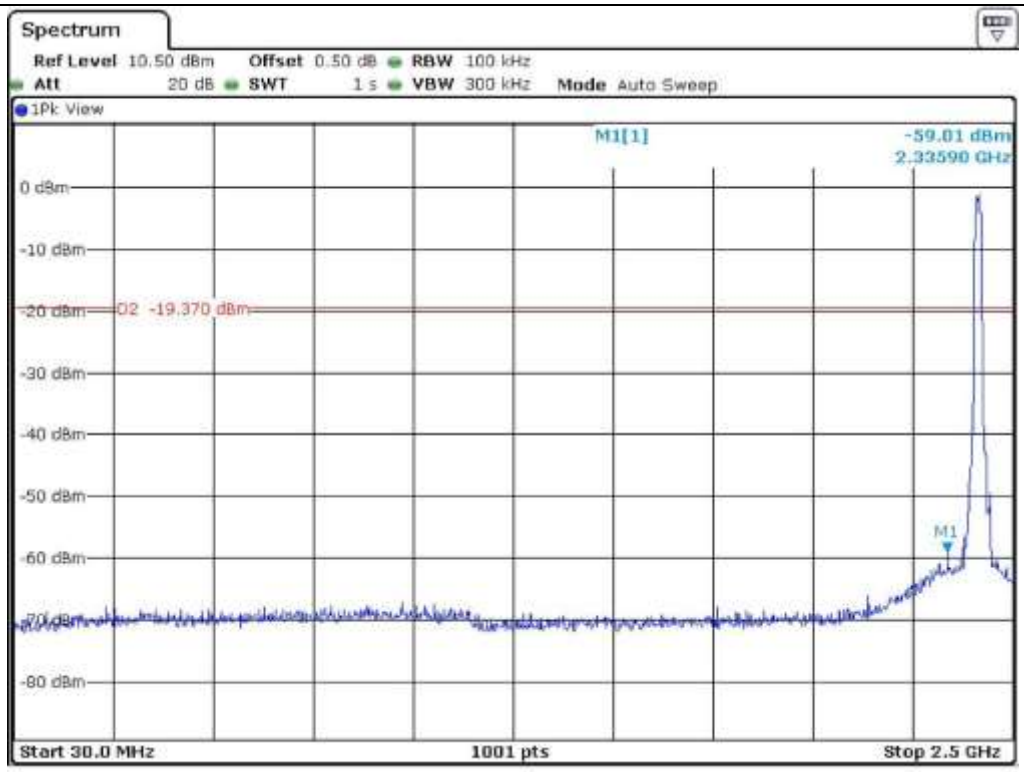
Middle Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

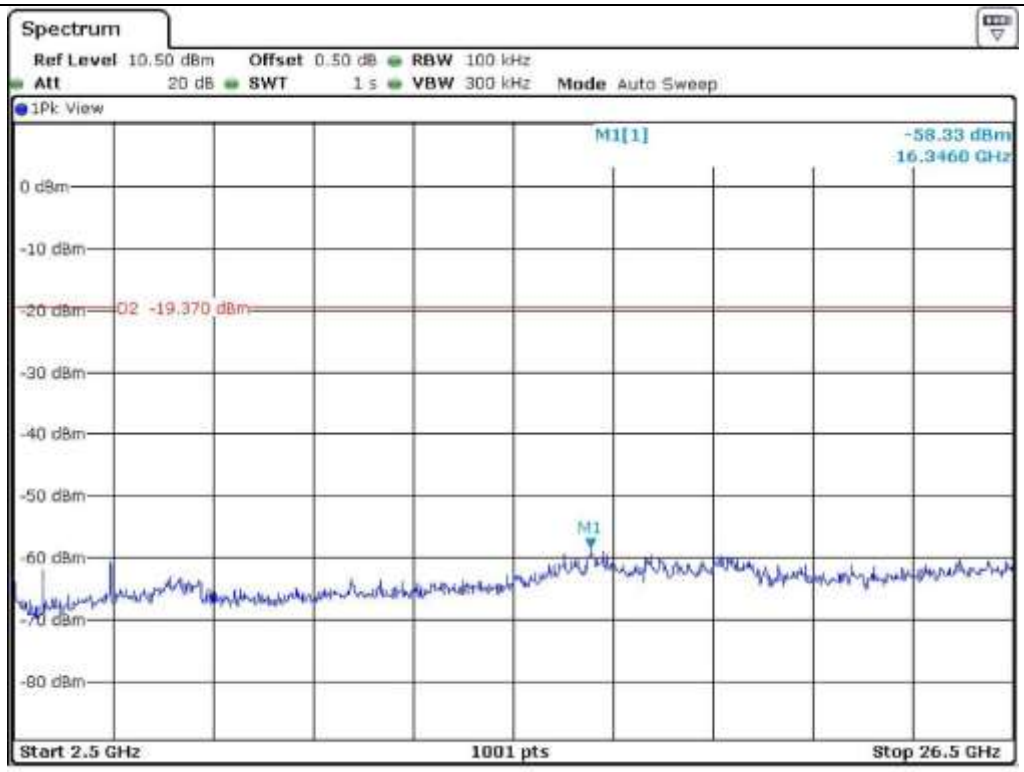


High Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

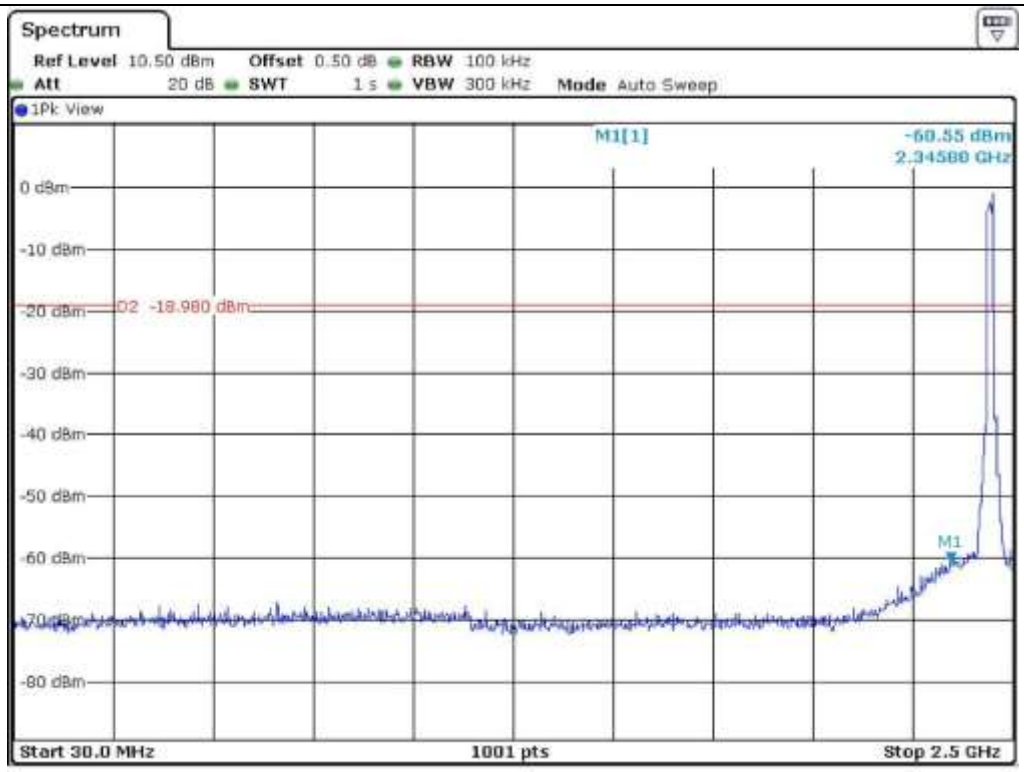


Low Channel

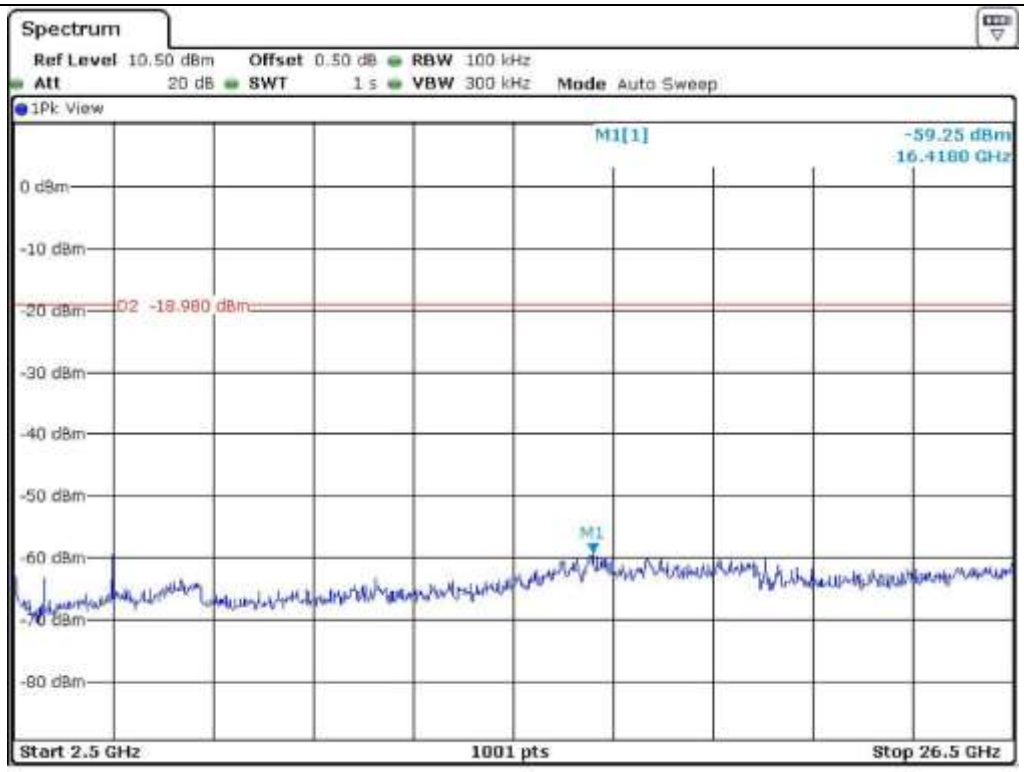


Low Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

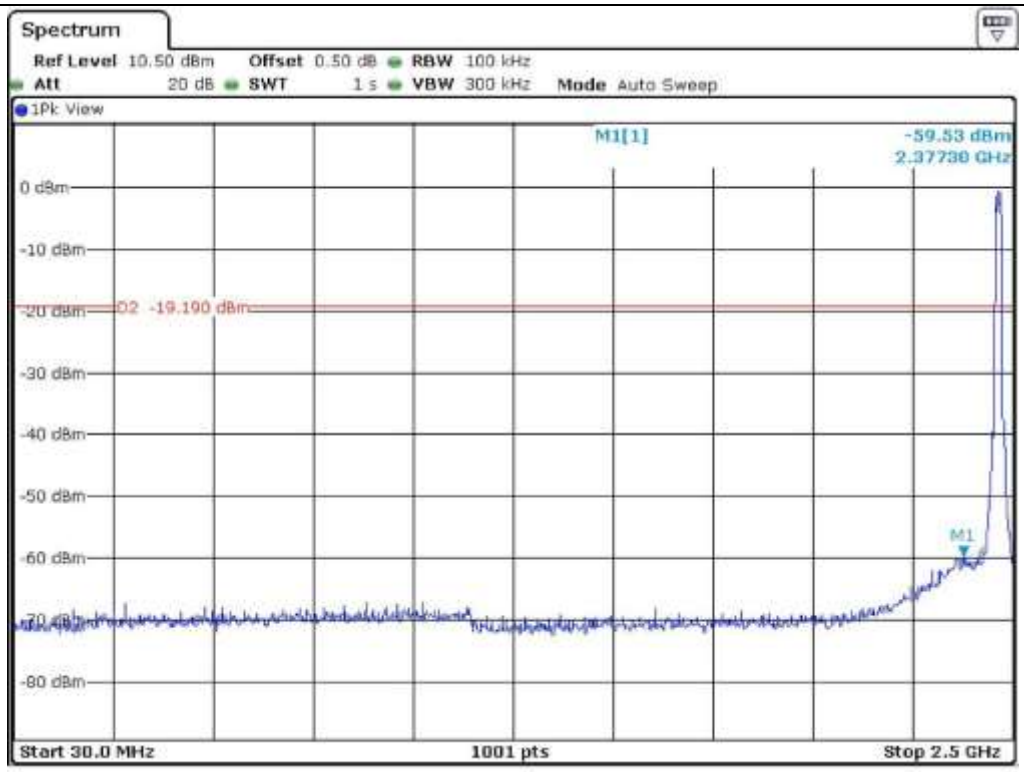


Middle Channel

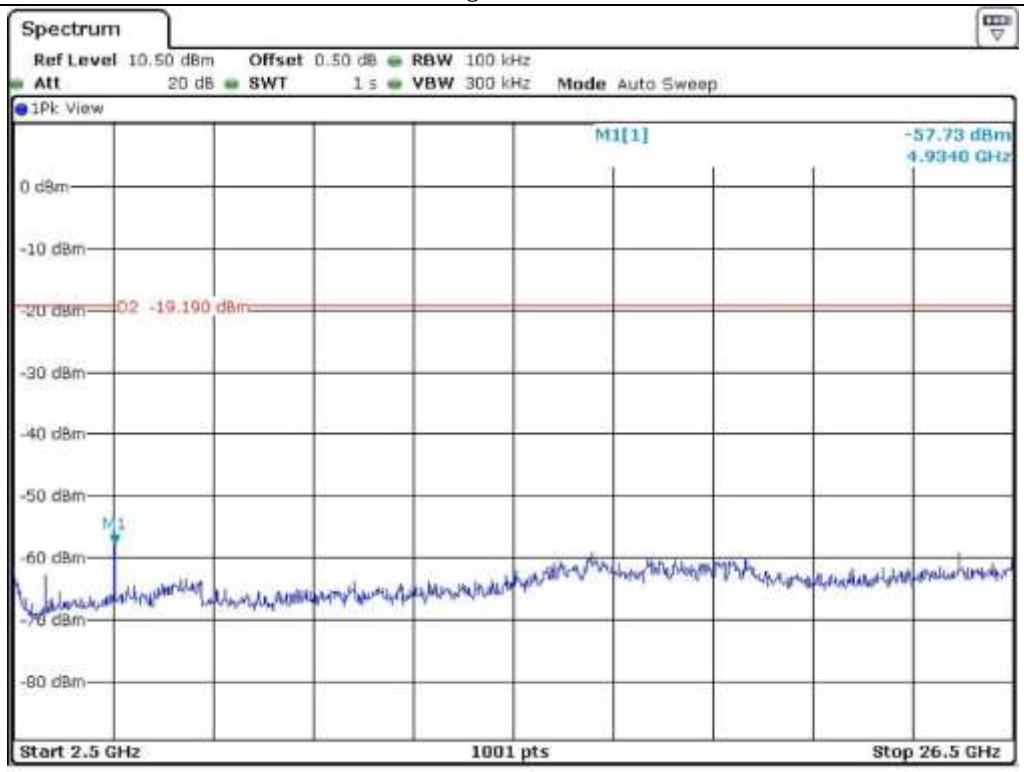


Middle Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)



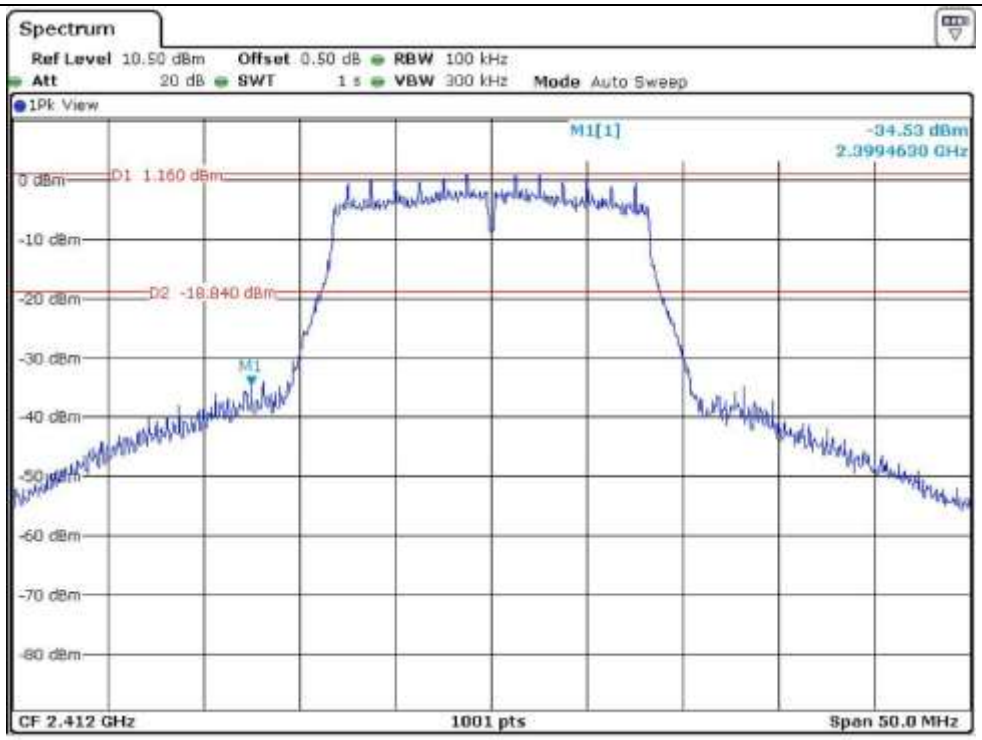
High Channel



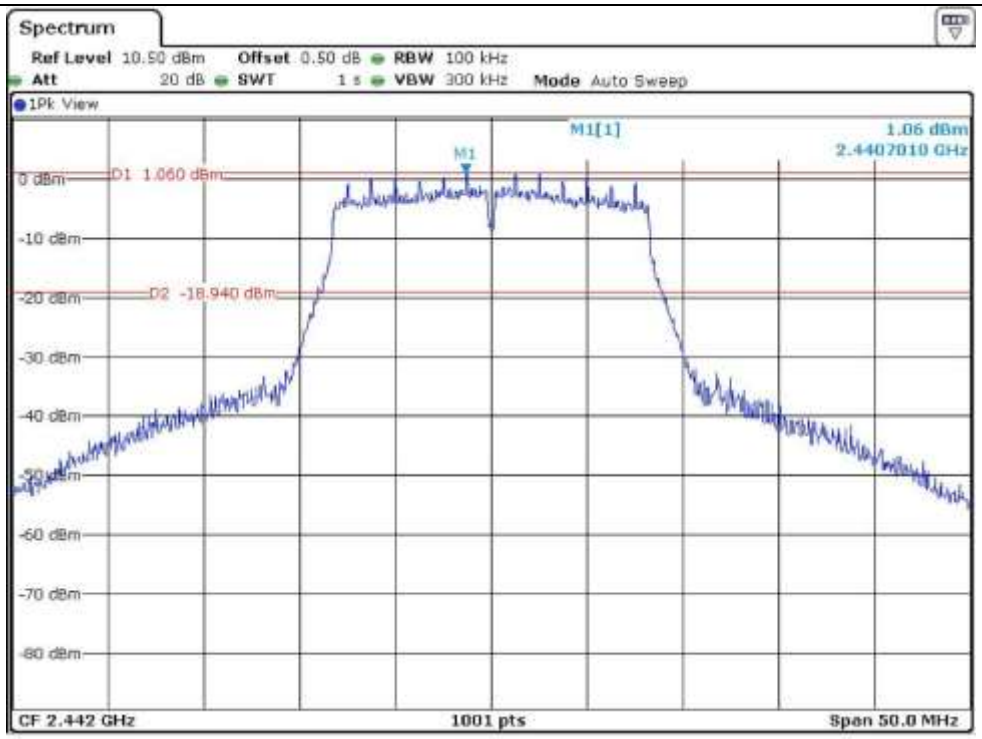
High Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

9.5.2.2 Test data for Antenna 1

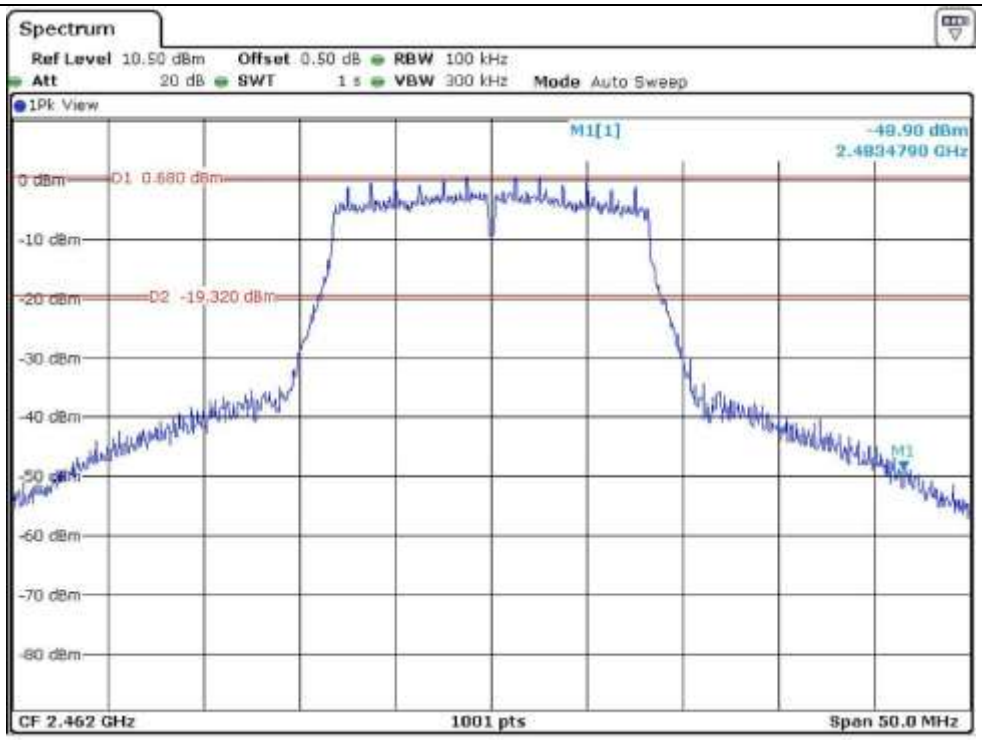


Low Channel



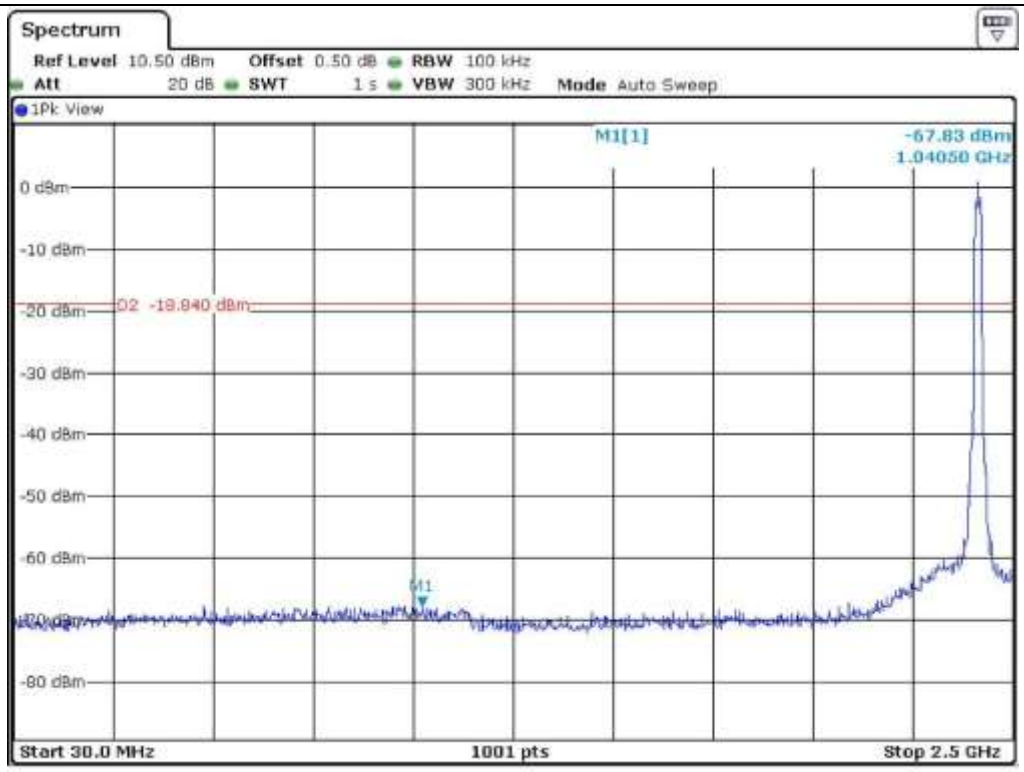
Middle Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

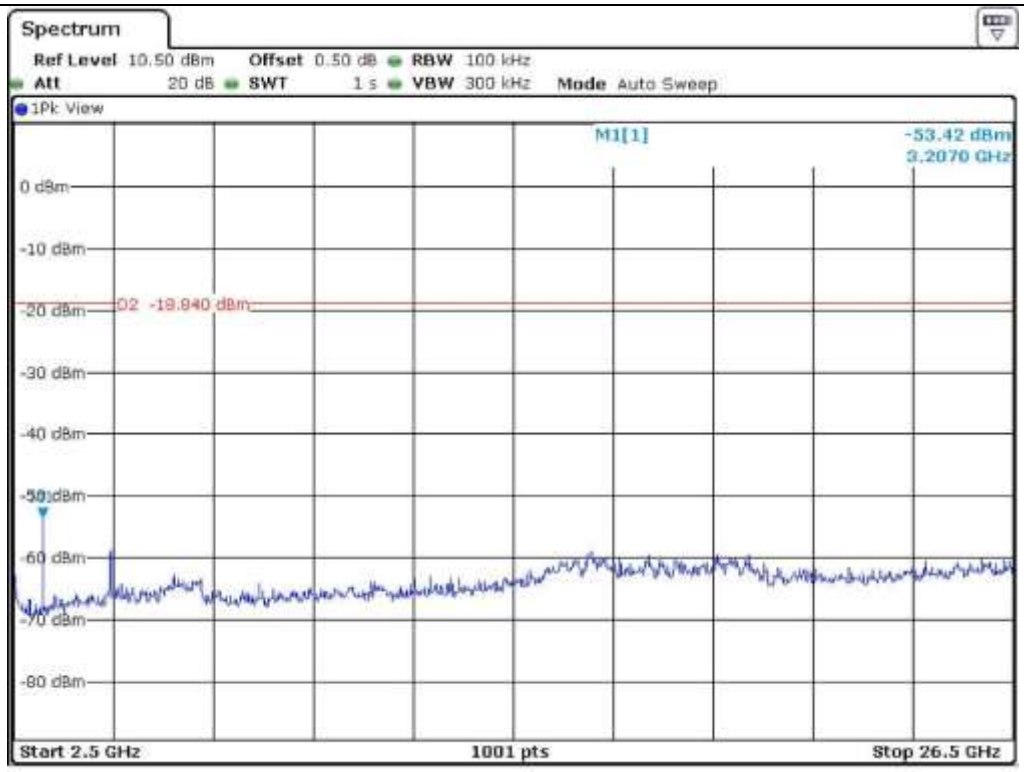


High Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

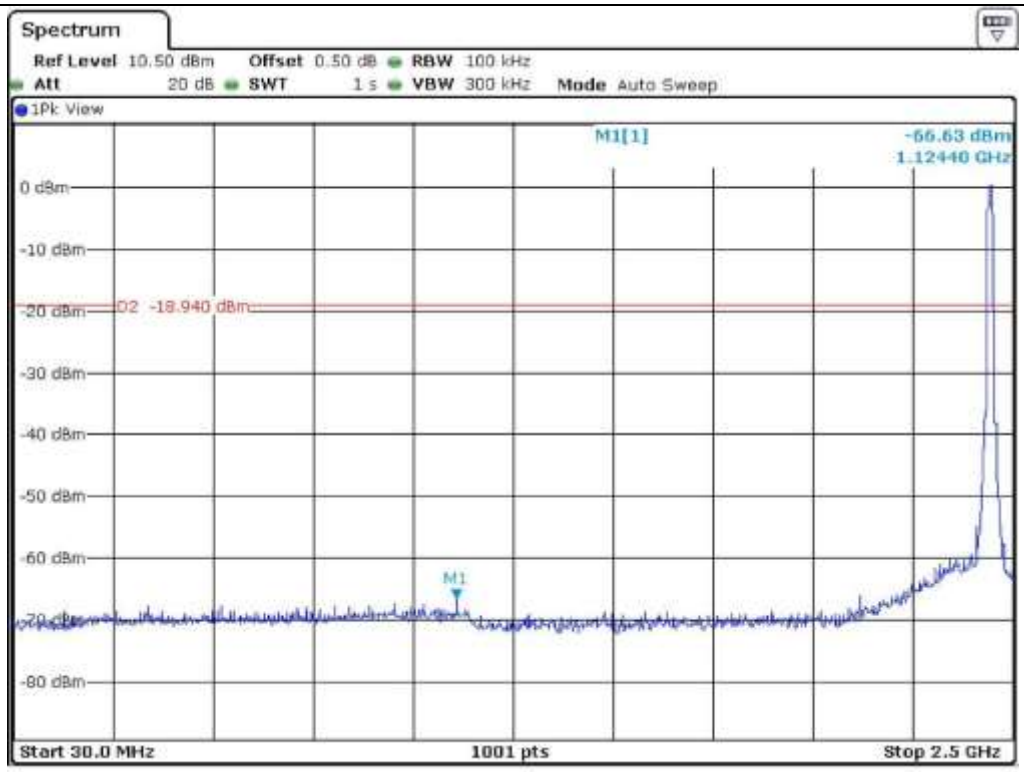


Low Channel

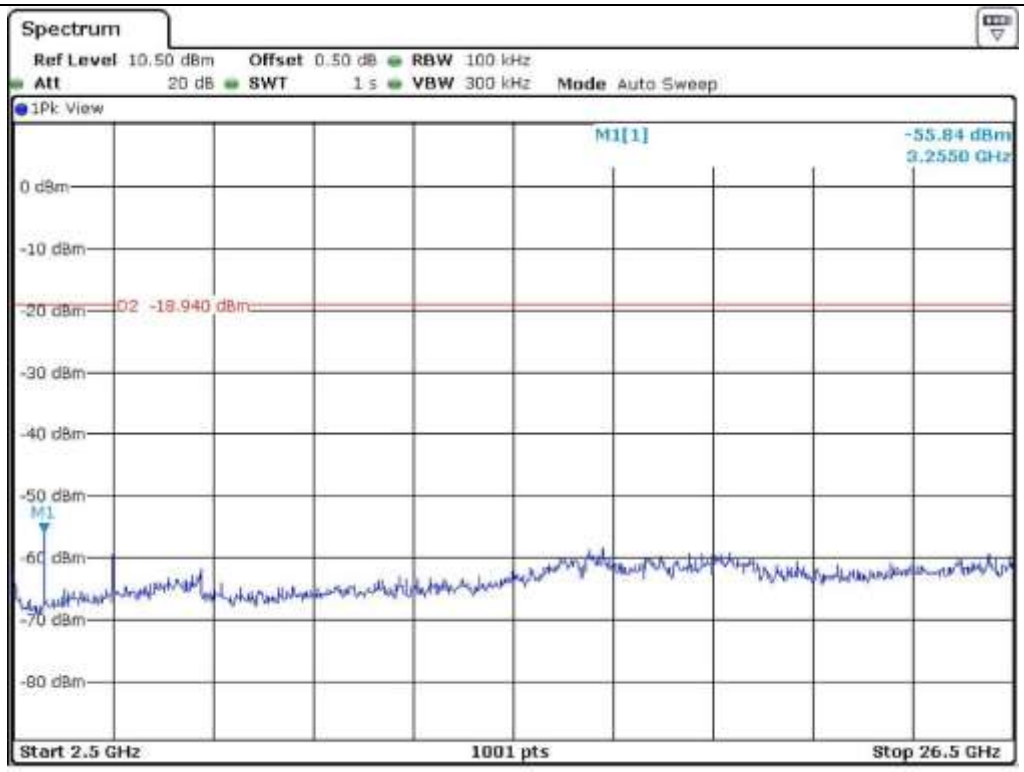


Low Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

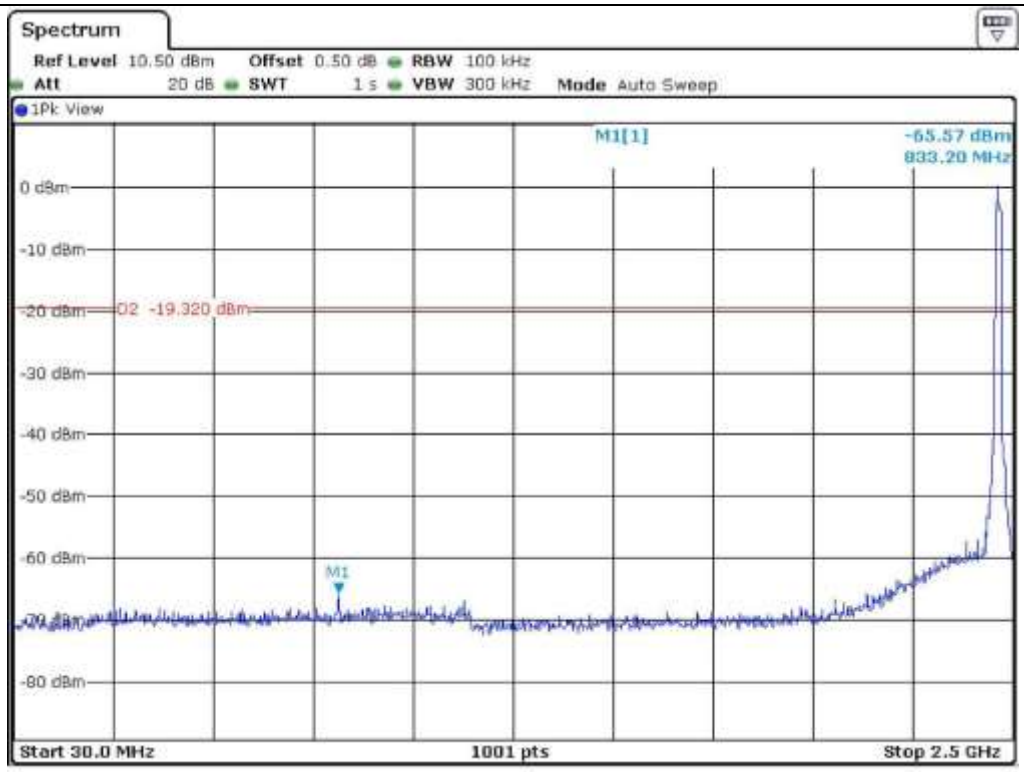


Middle Channel

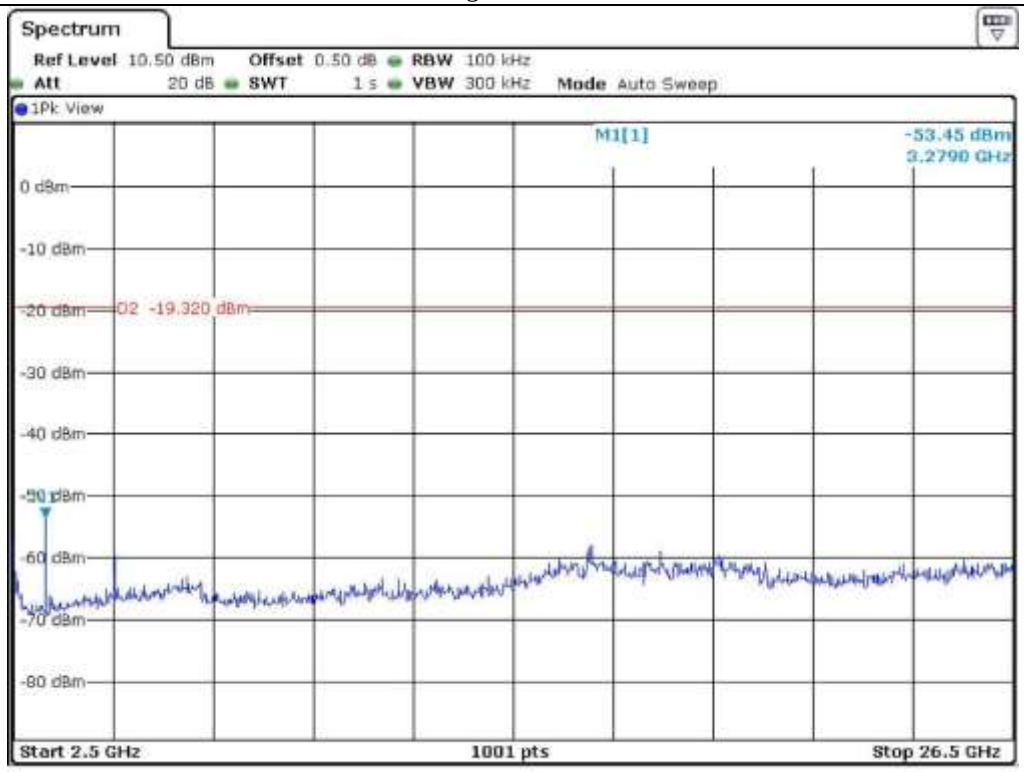


Middle Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)



High Channel

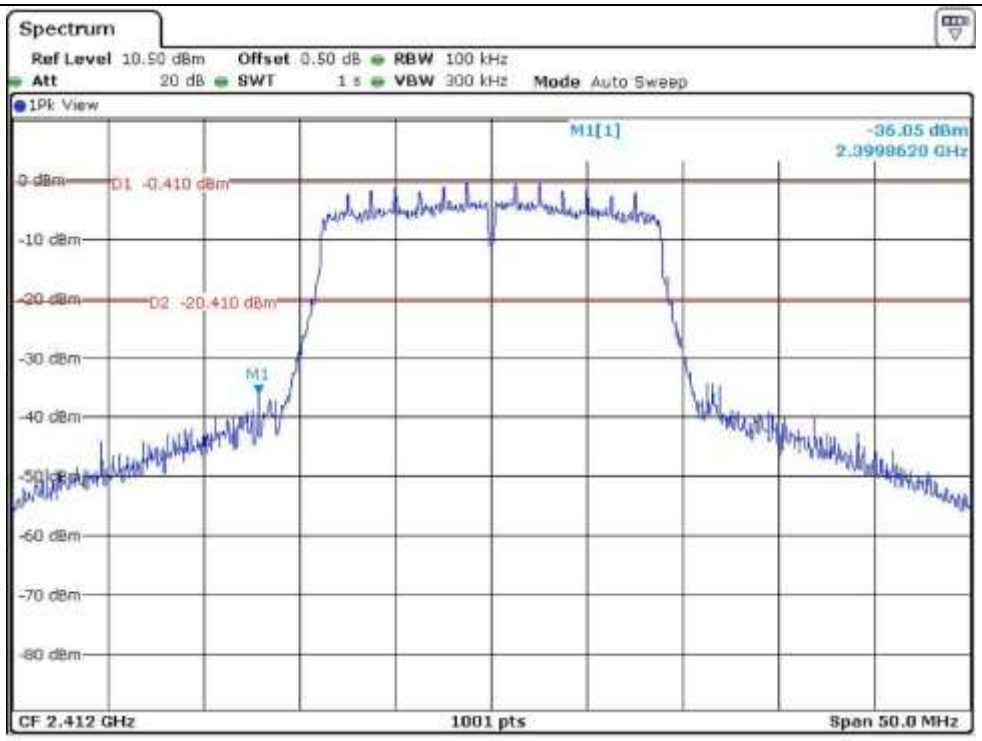


High Channel

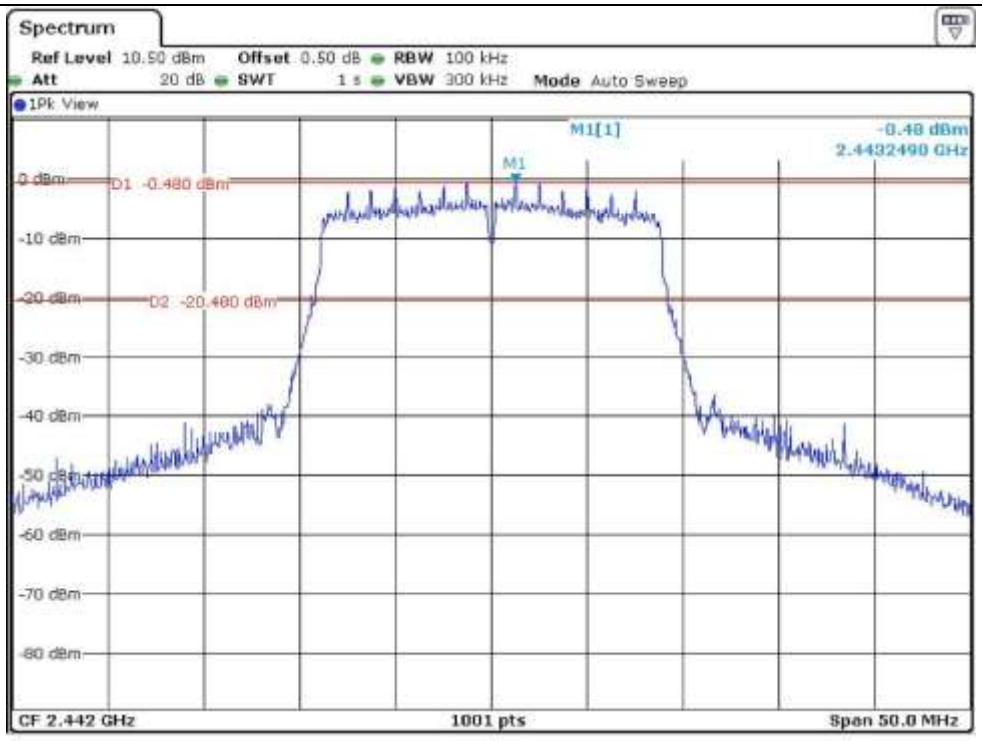
HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

9.5.3 Test data for 802.11n_HT20 WLAN Mode

9.5.3.1 Test data for Antenna 0

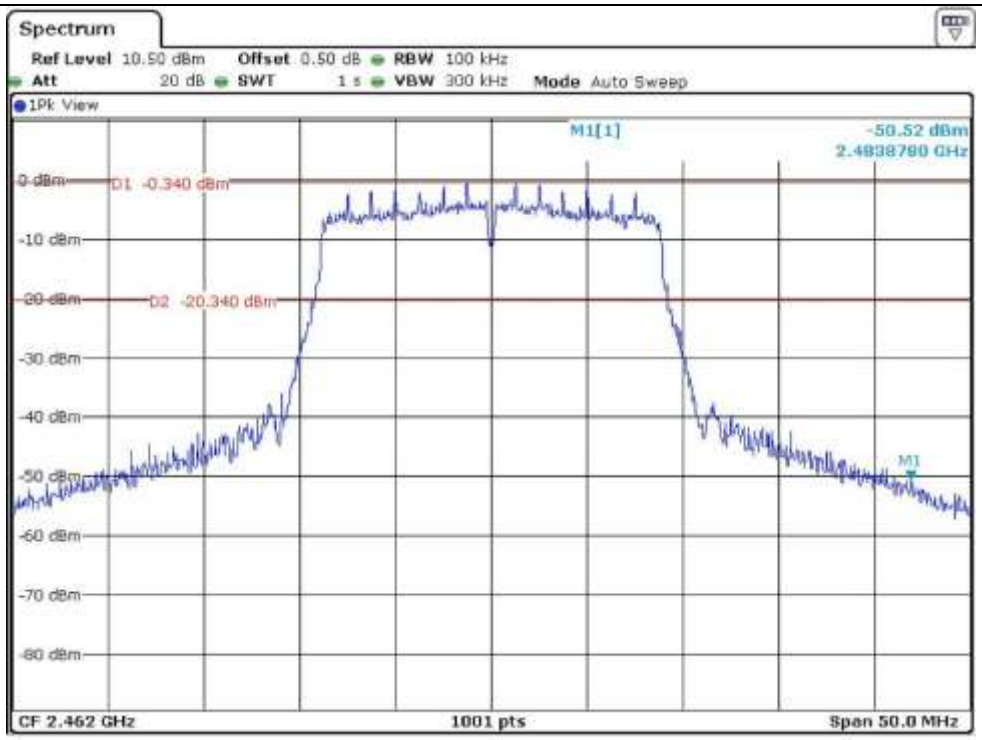


Low Channel



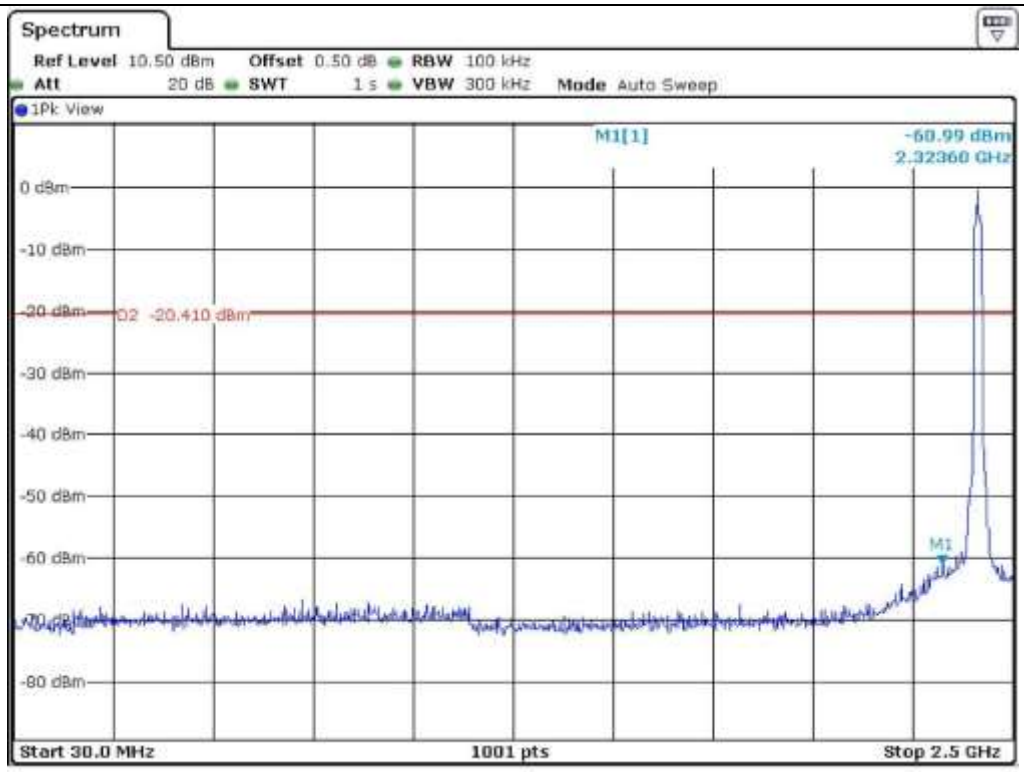
Middle Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

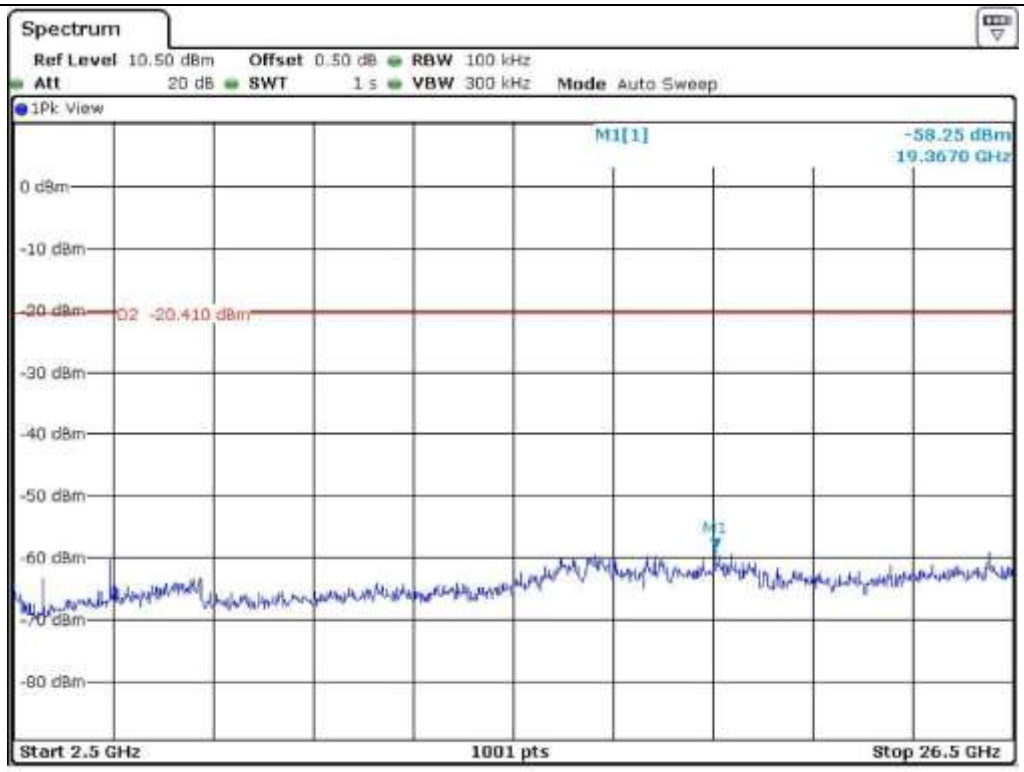


High Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

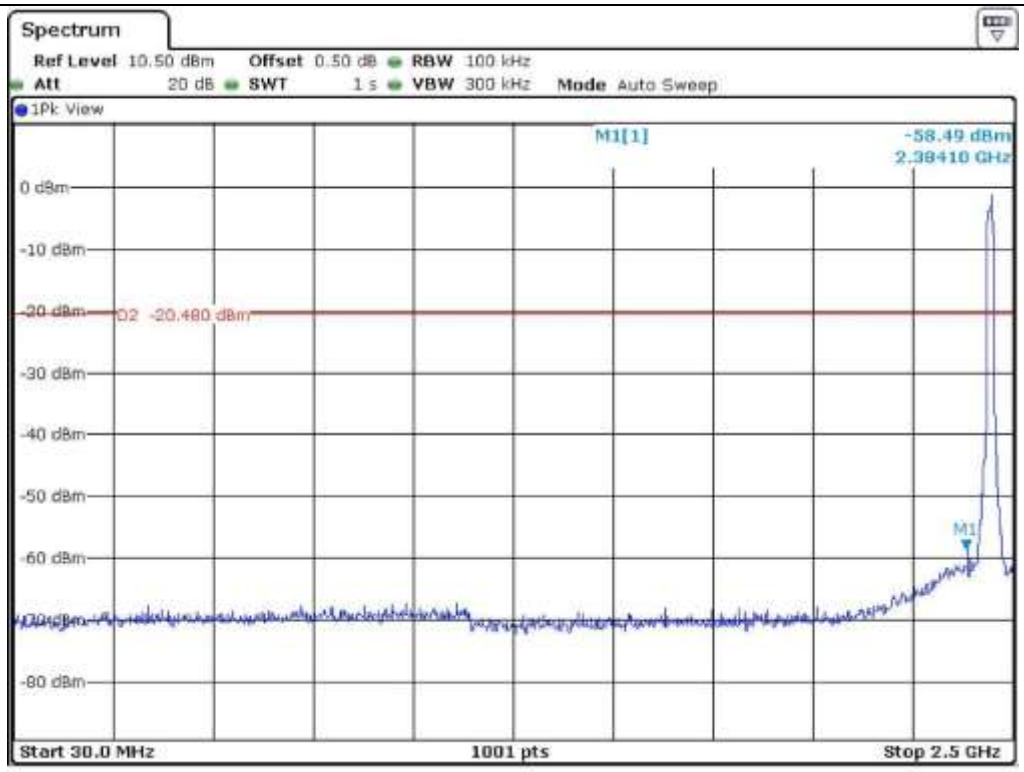


Low Channel

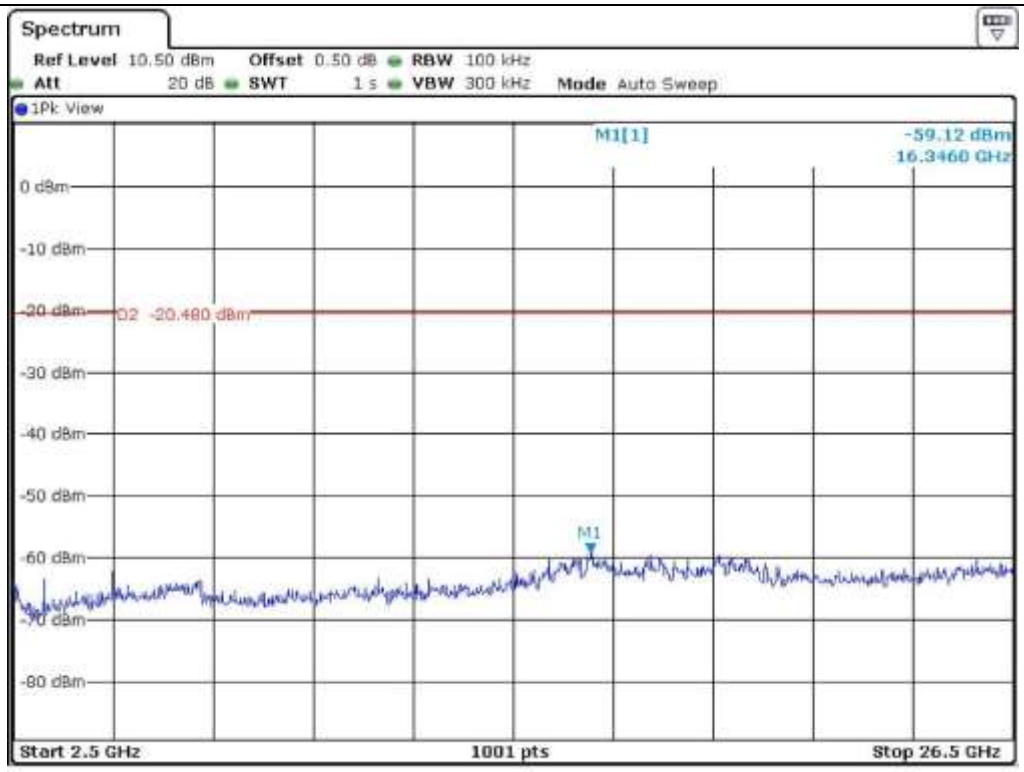


Low Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

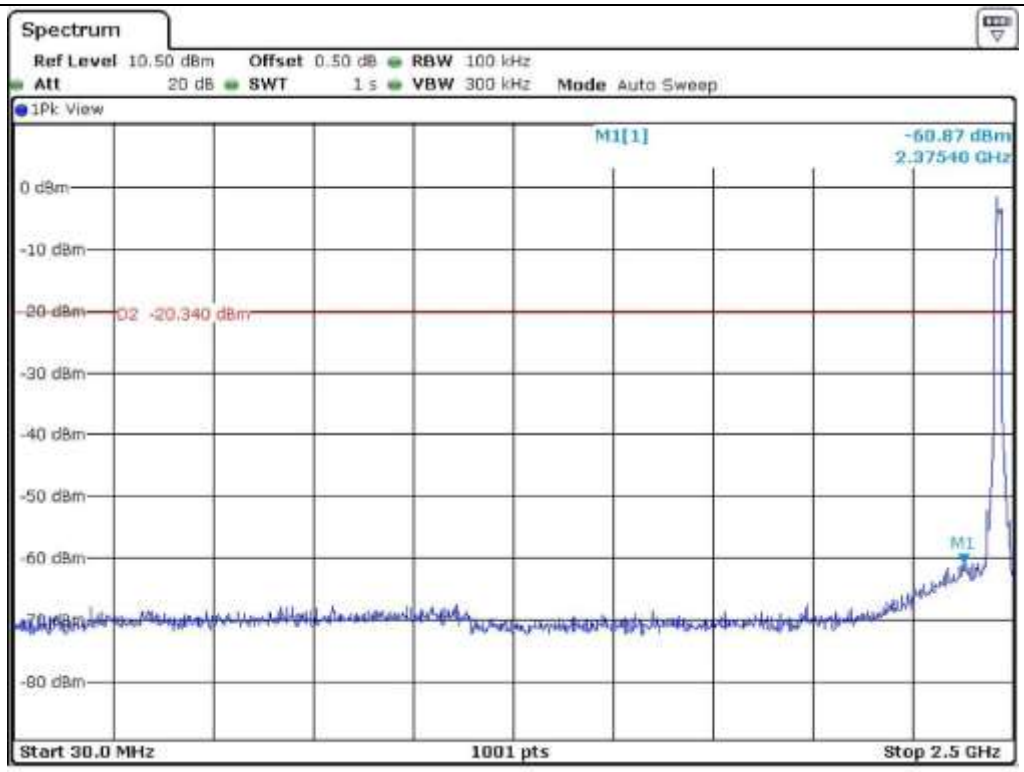


Middle Channel

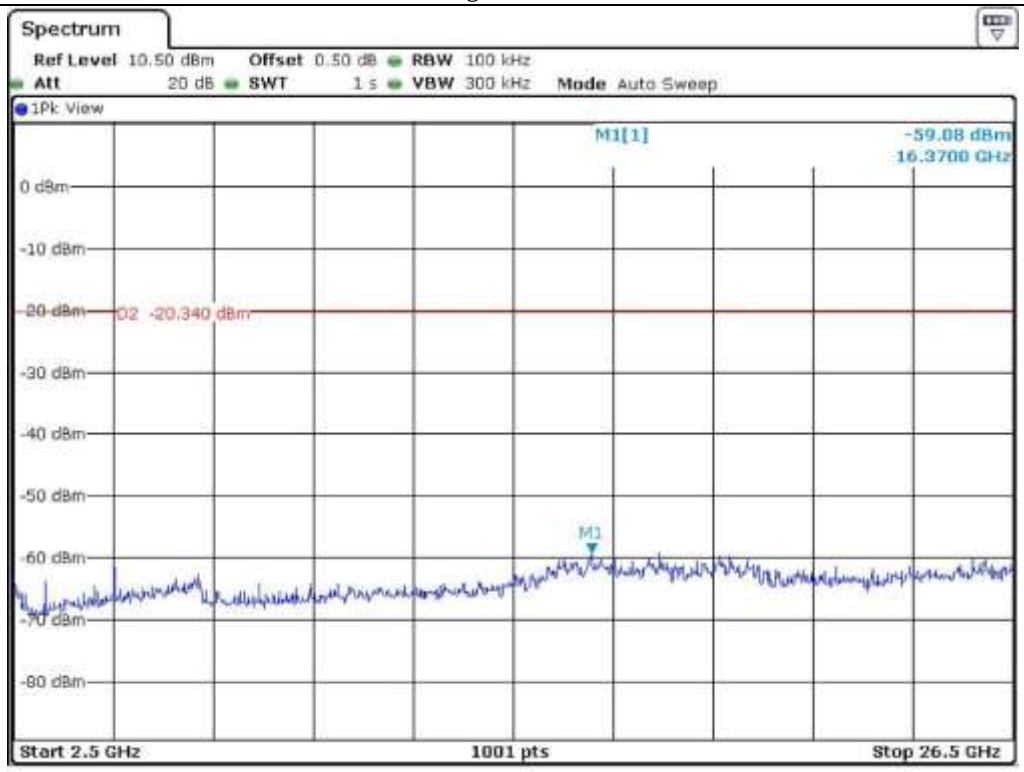


Middle Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)



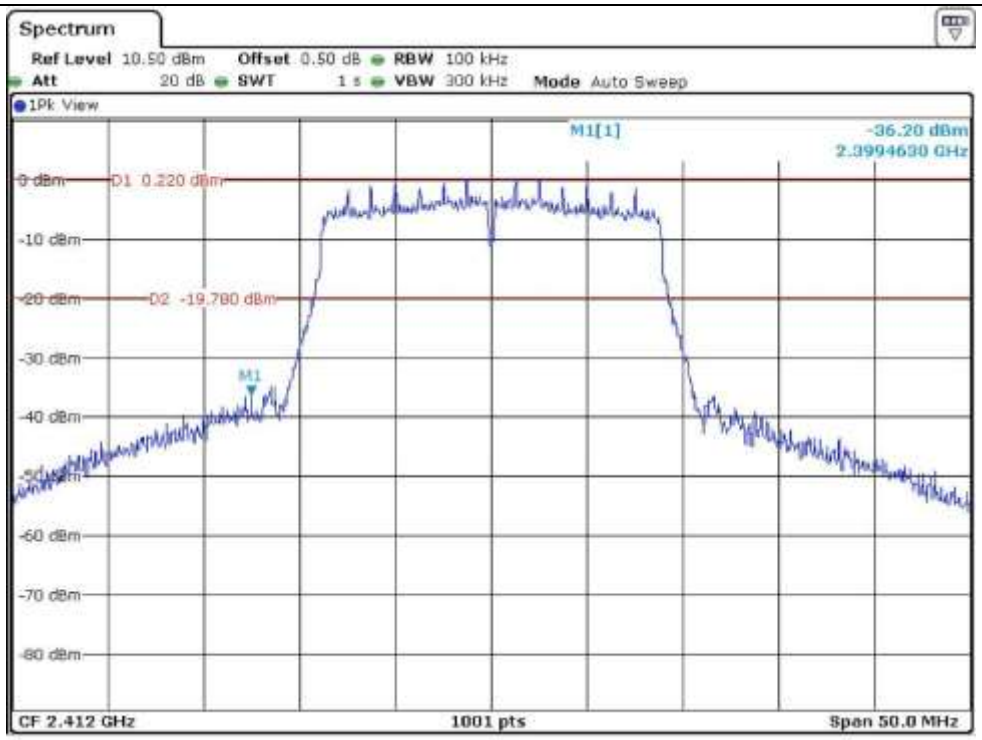
High Channel



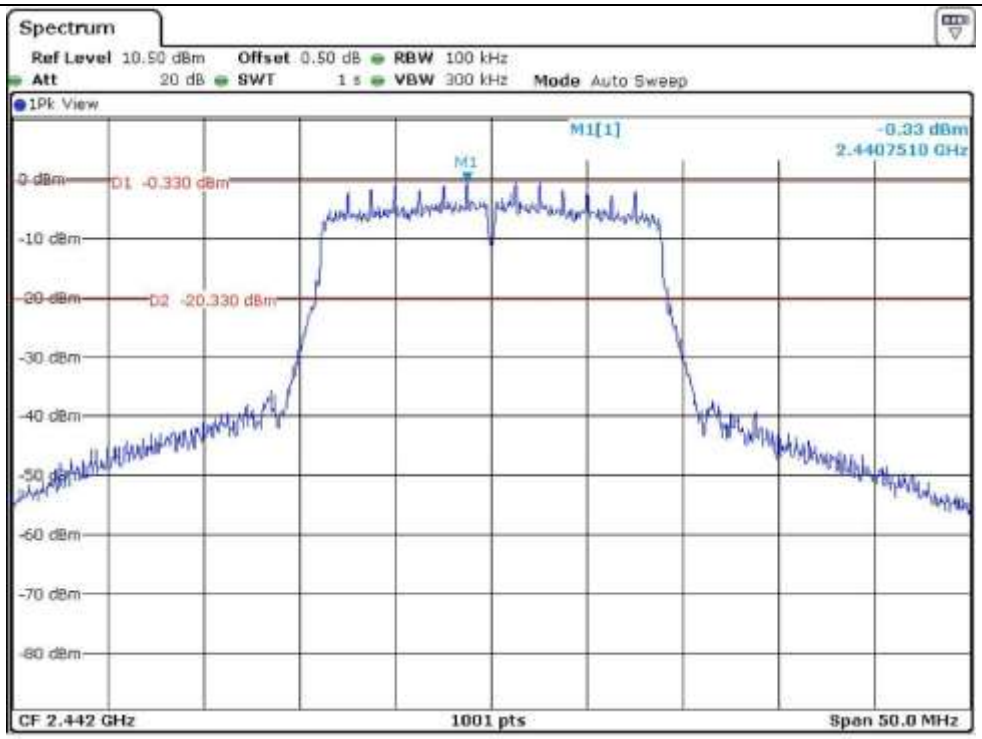
High Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

9.5.3.2 Test data for Antenna 1

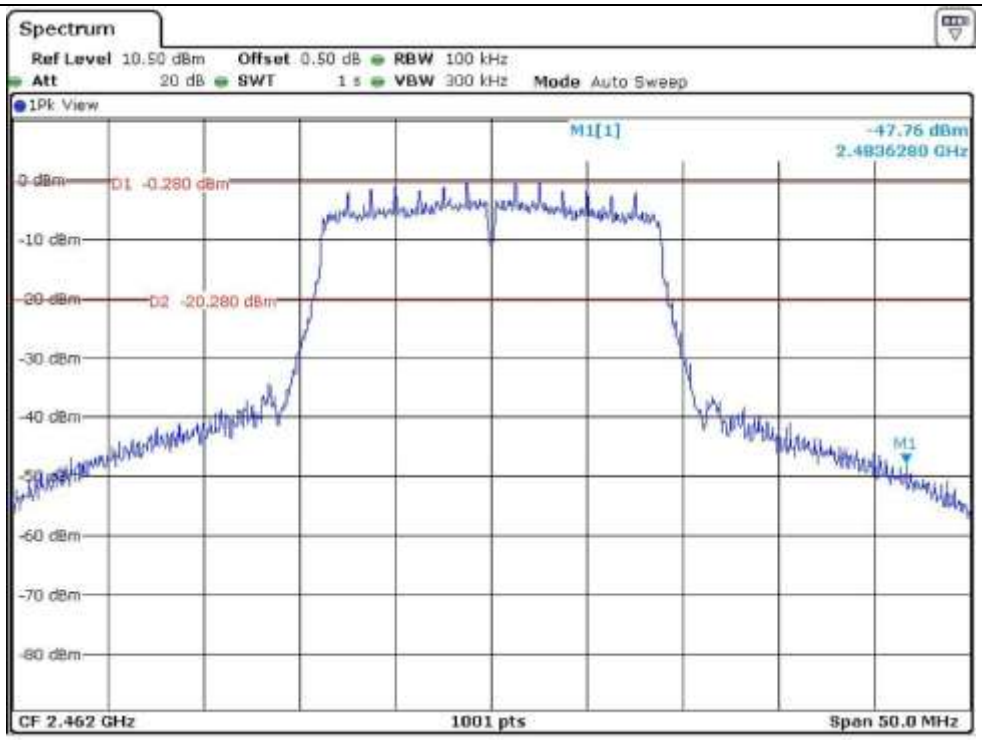


Low Channel



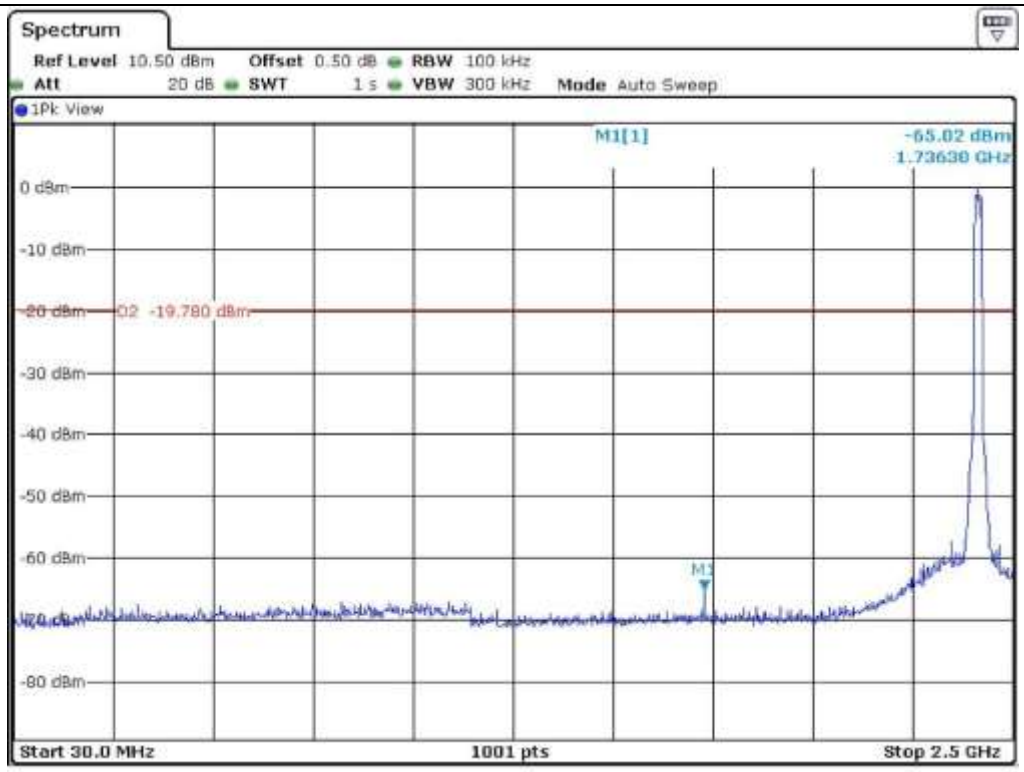
Middle Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

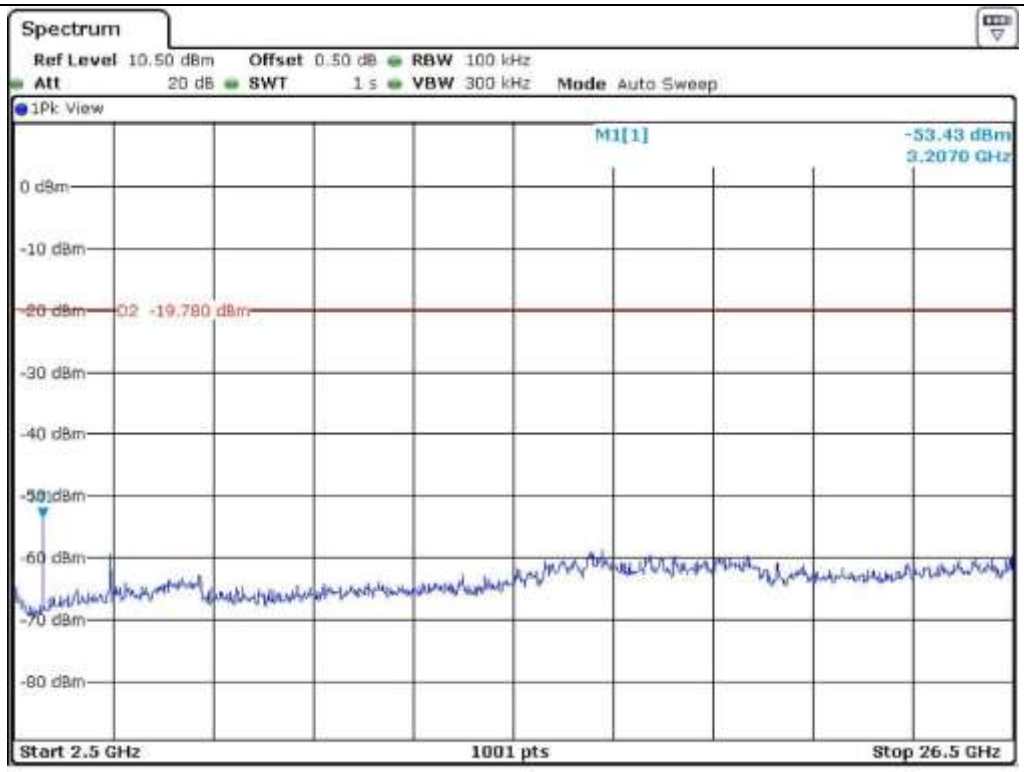


High Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

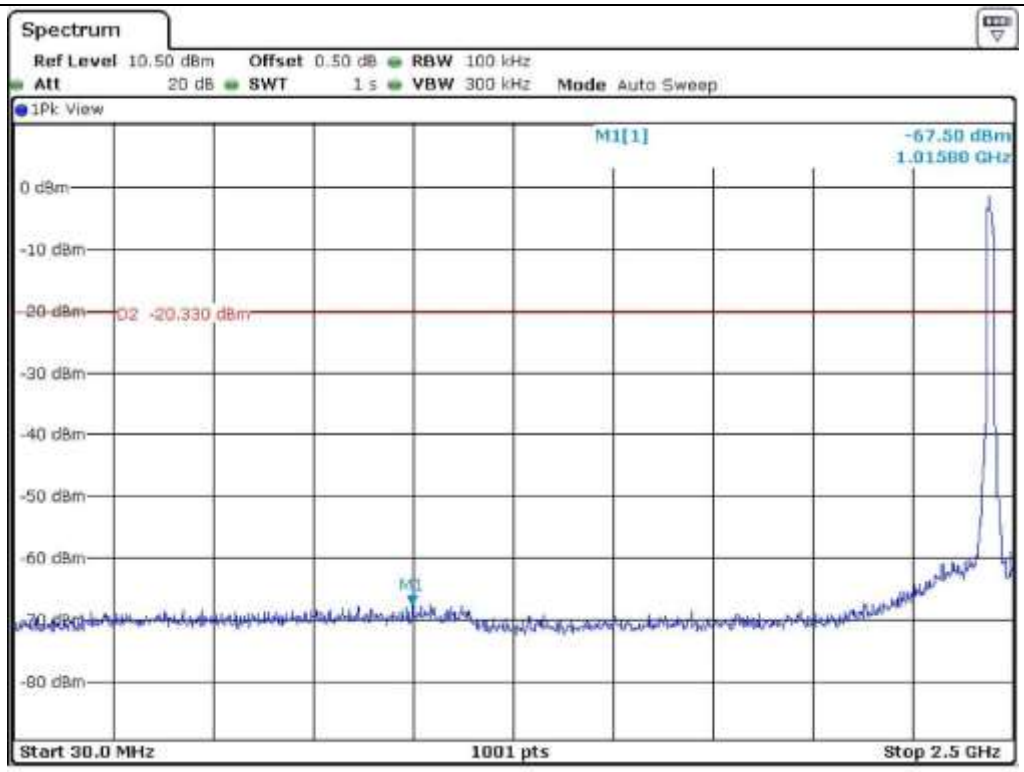


Low Channel

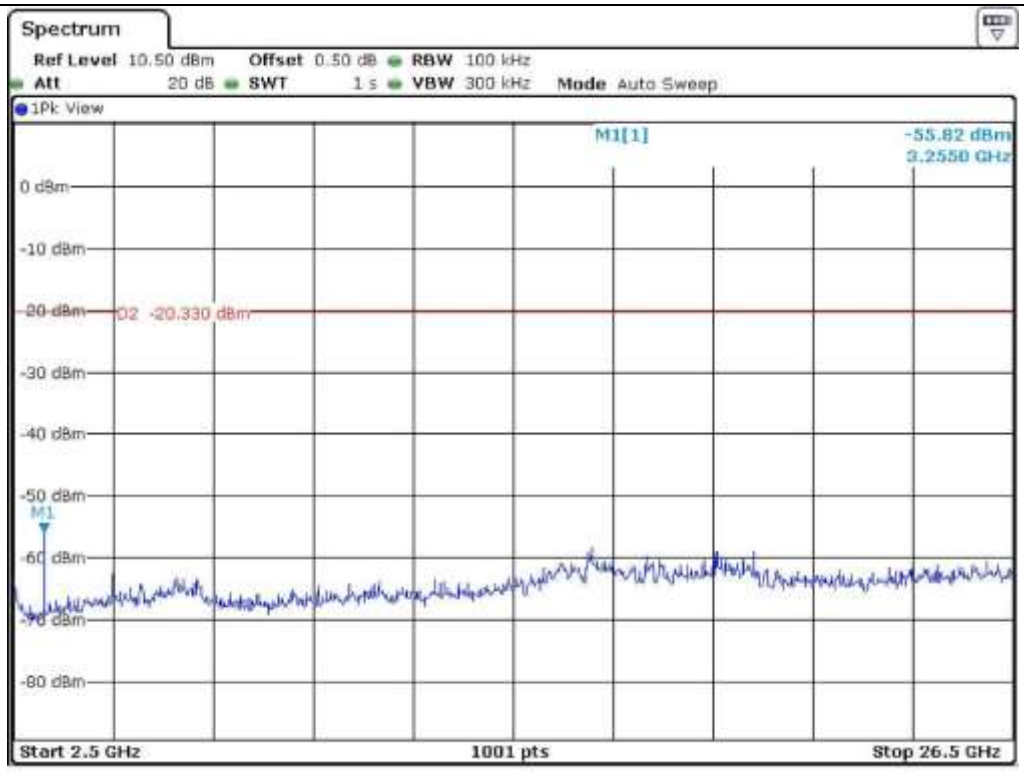


Low Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)



Middle Channel



Middle Channel

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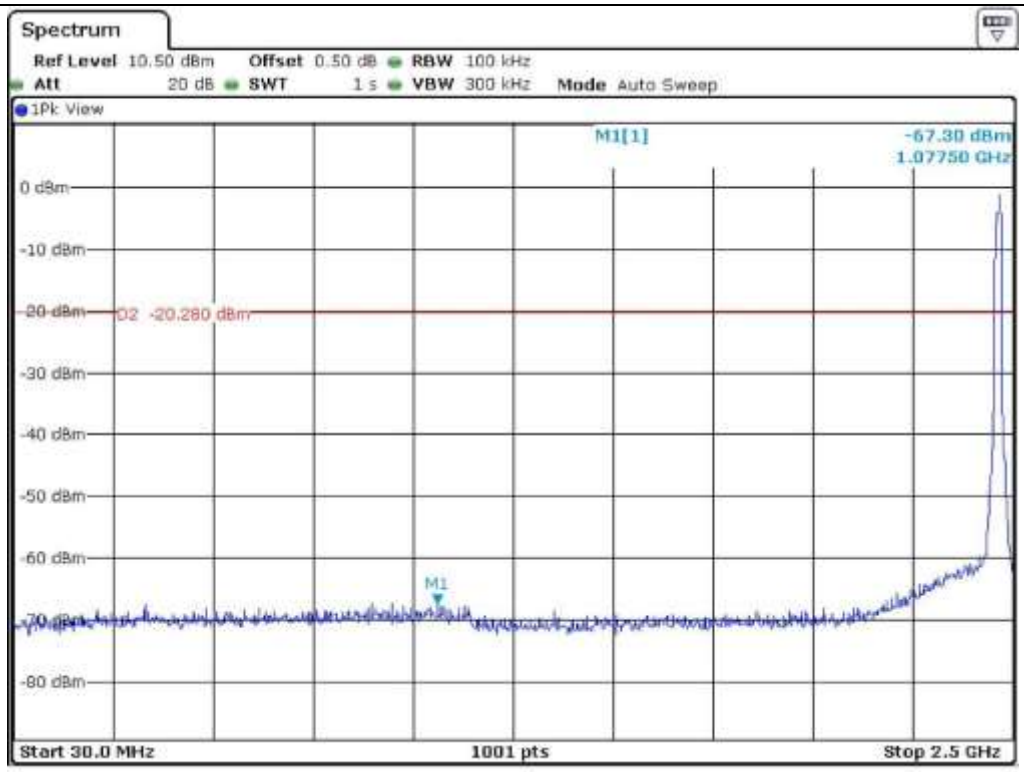
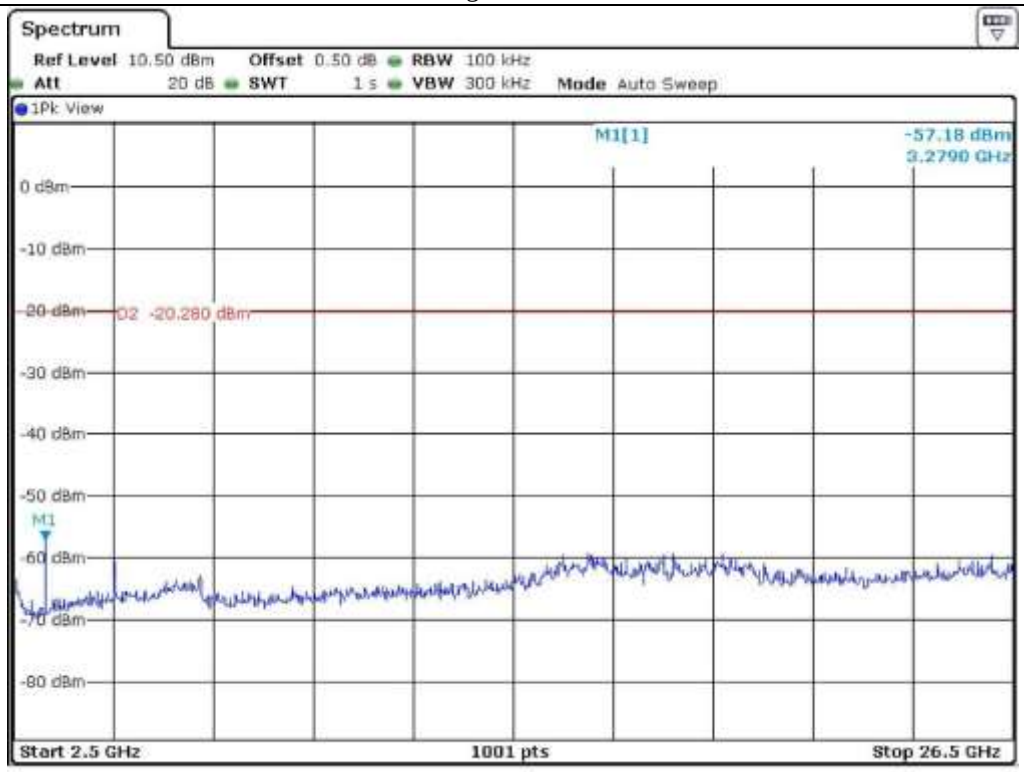


High Channel



High Channel

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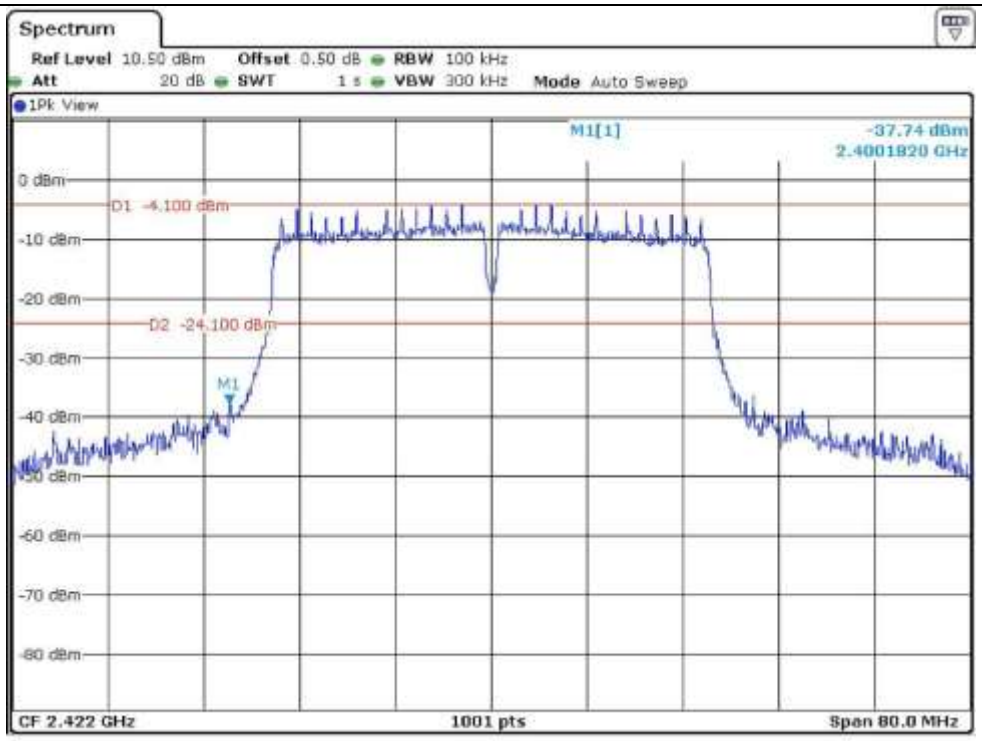
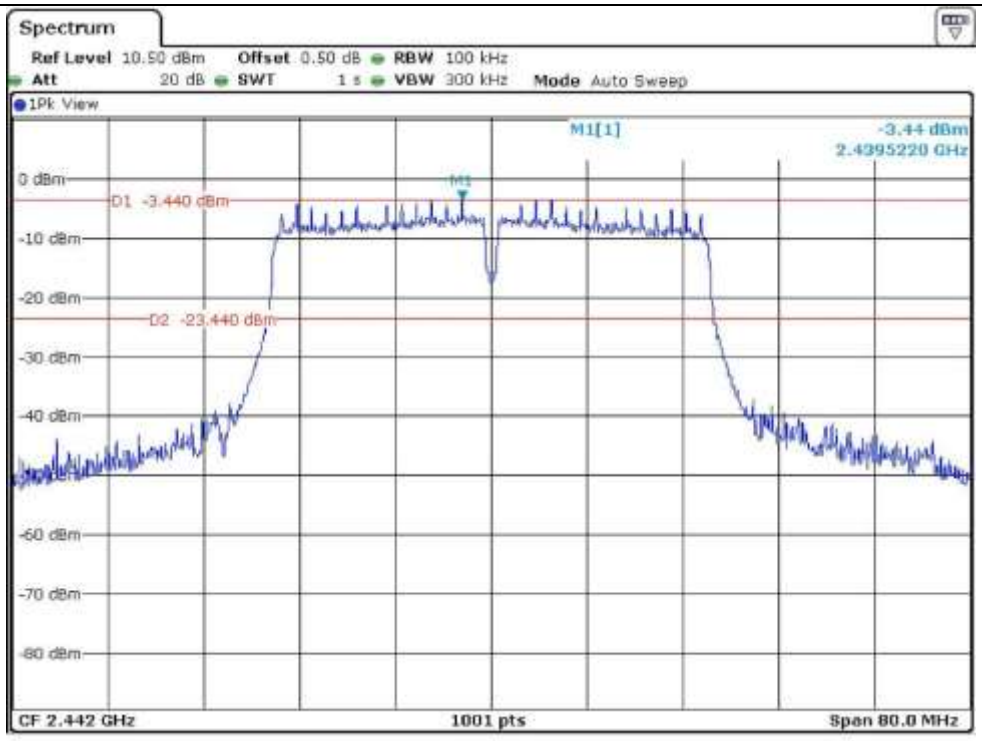
9.5.4 Test data for 802.11n_HT40 WLAN Mode

9.5.4.1 Test data for Antenna 0



Low Channel



Middle Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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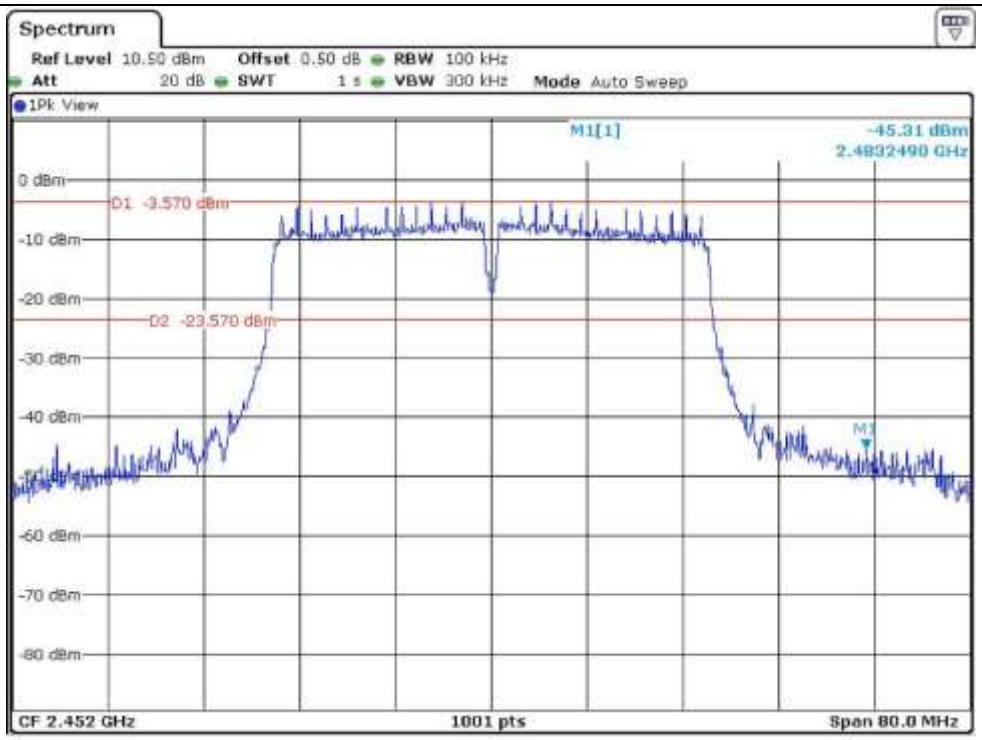

High Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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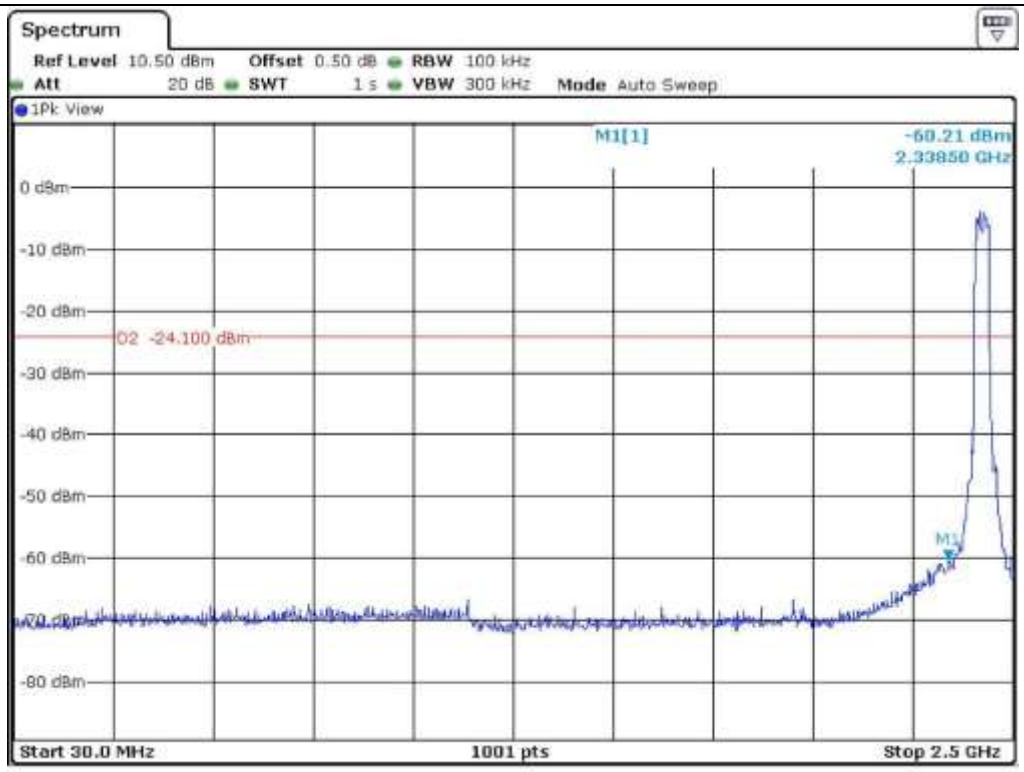
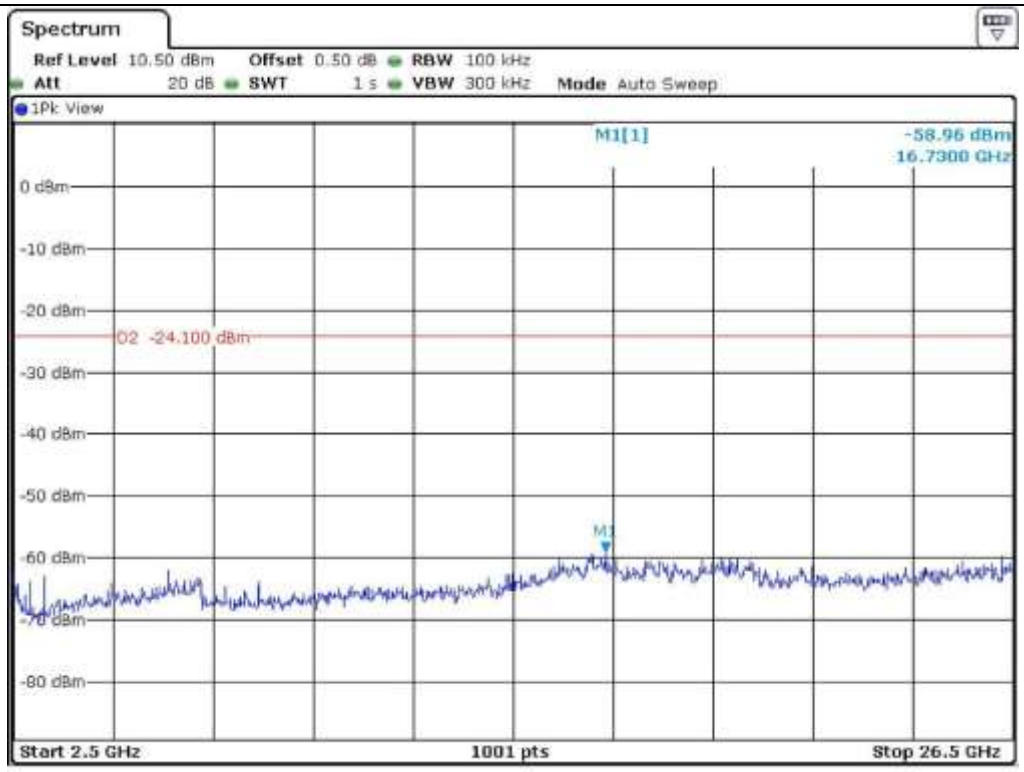


Low Channel



Low Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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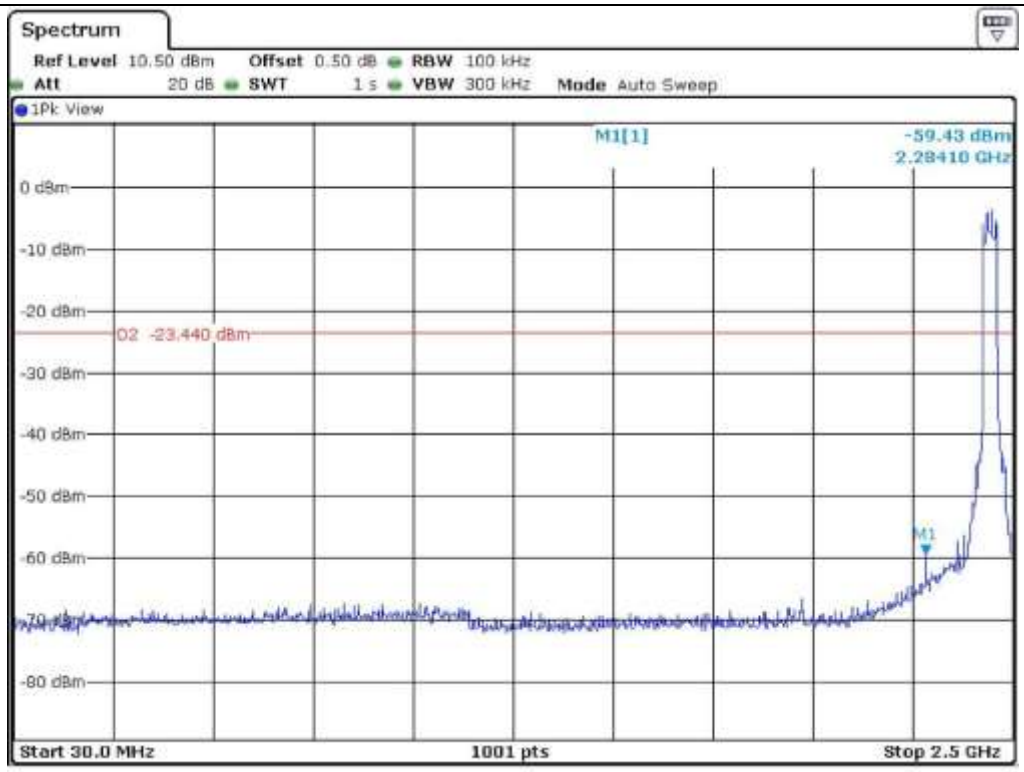
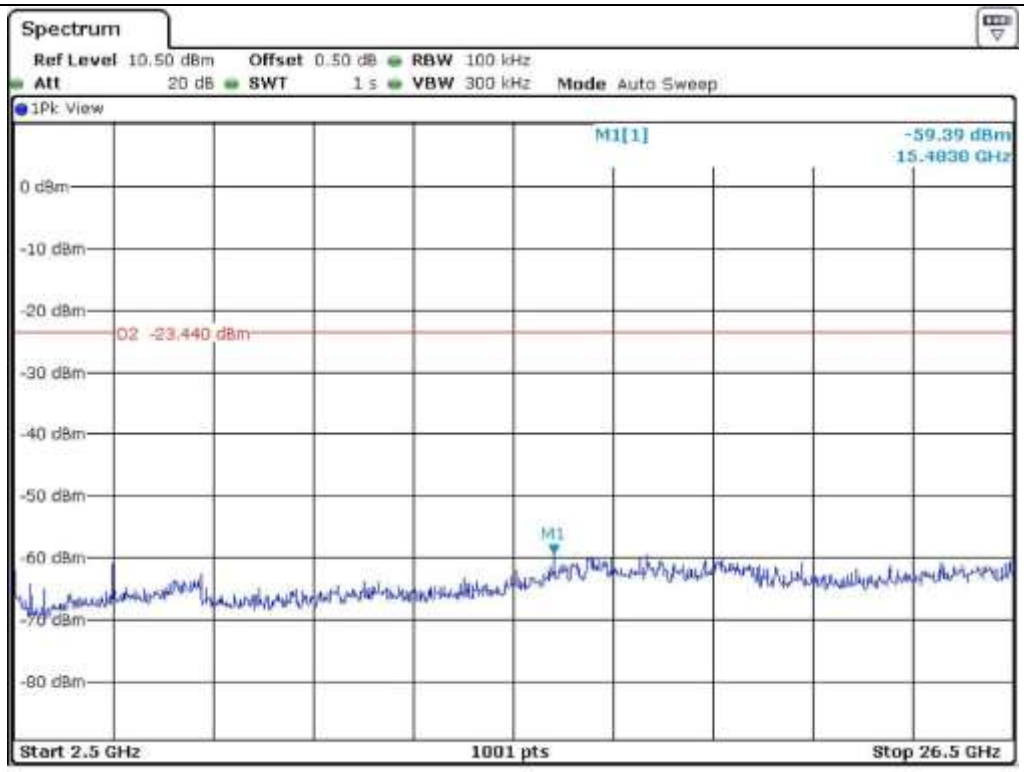


Middle Channel



Middle Channel

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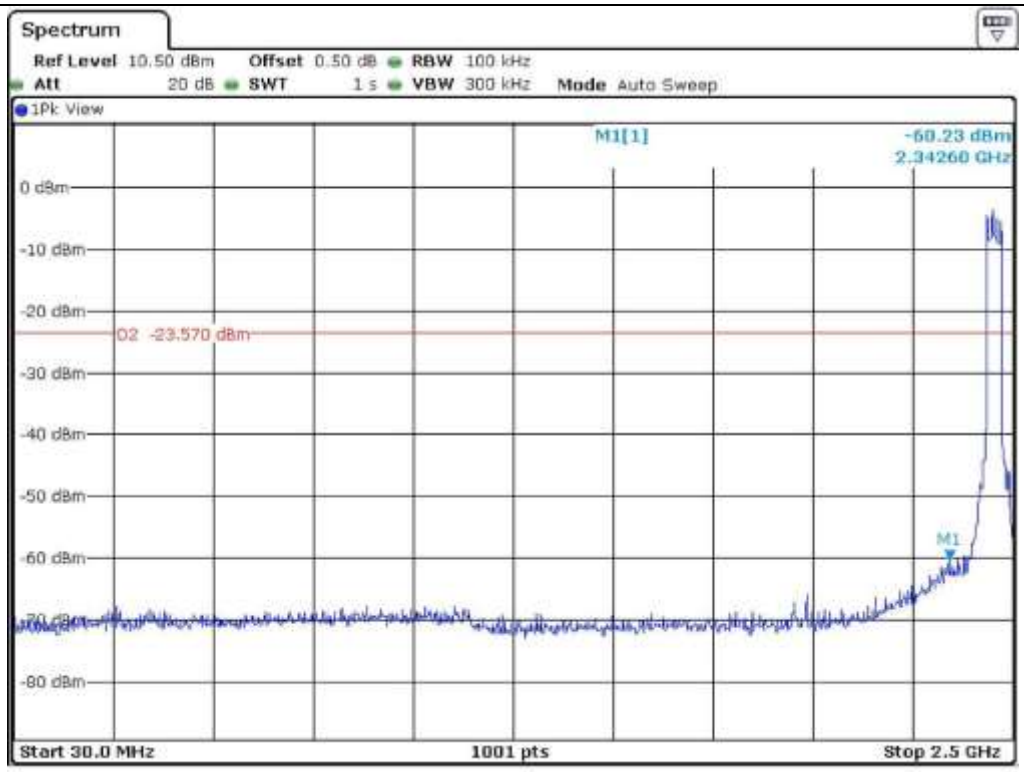
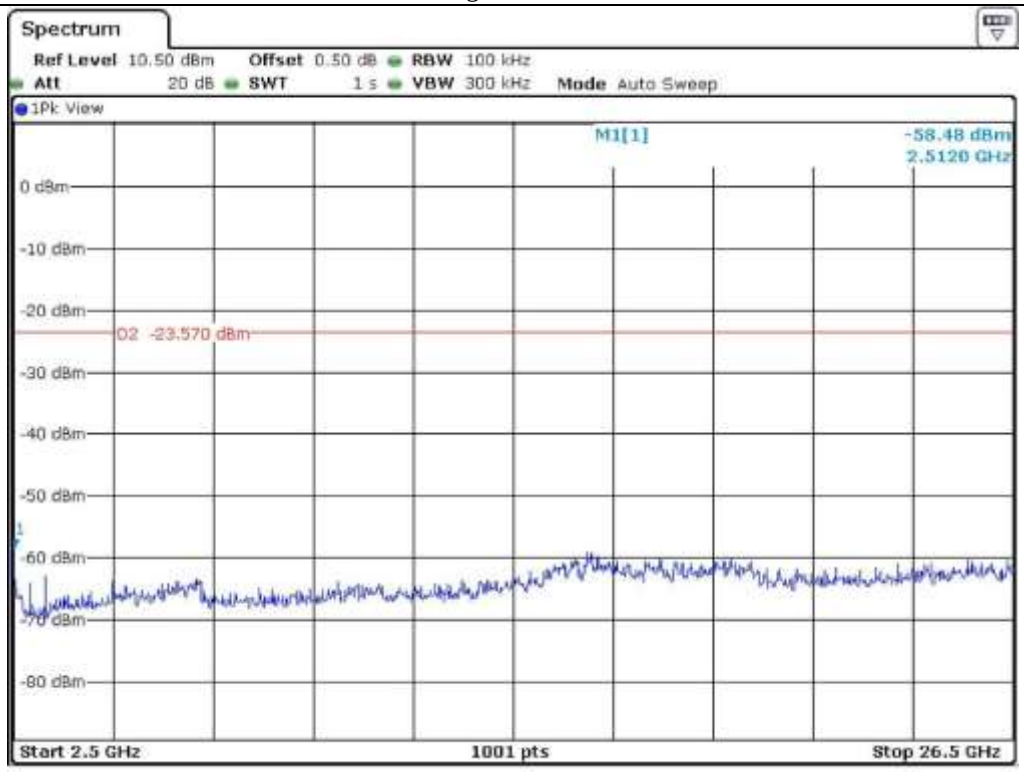


High Channel



High Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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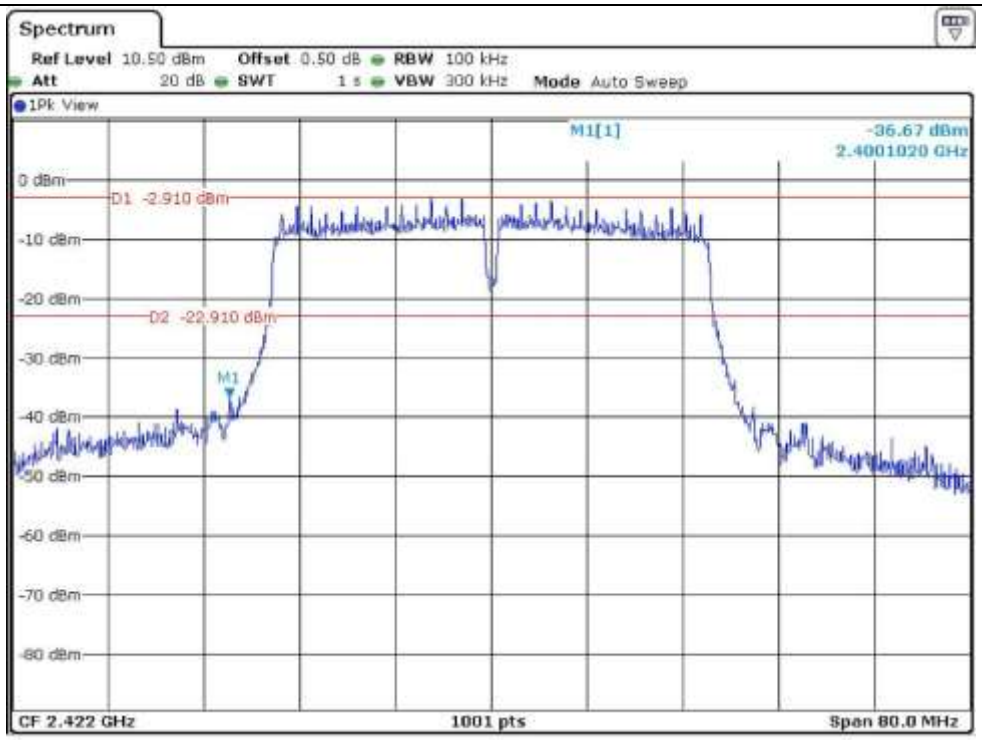
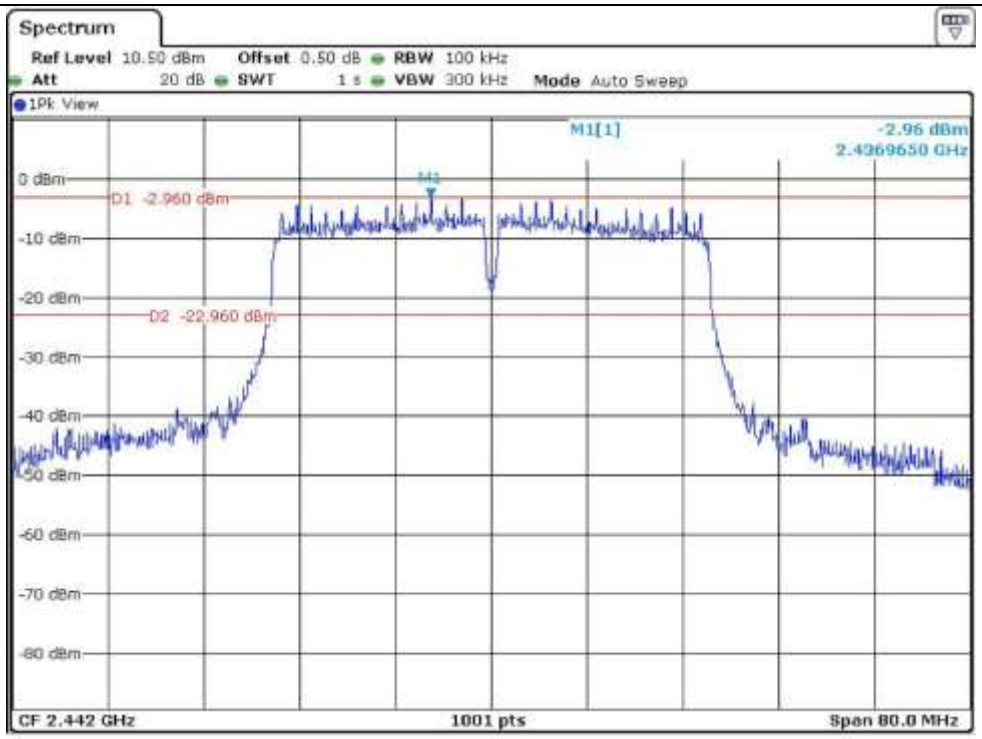
9.5.4.2 Test data for Antenna 1



Low Channel



Middle Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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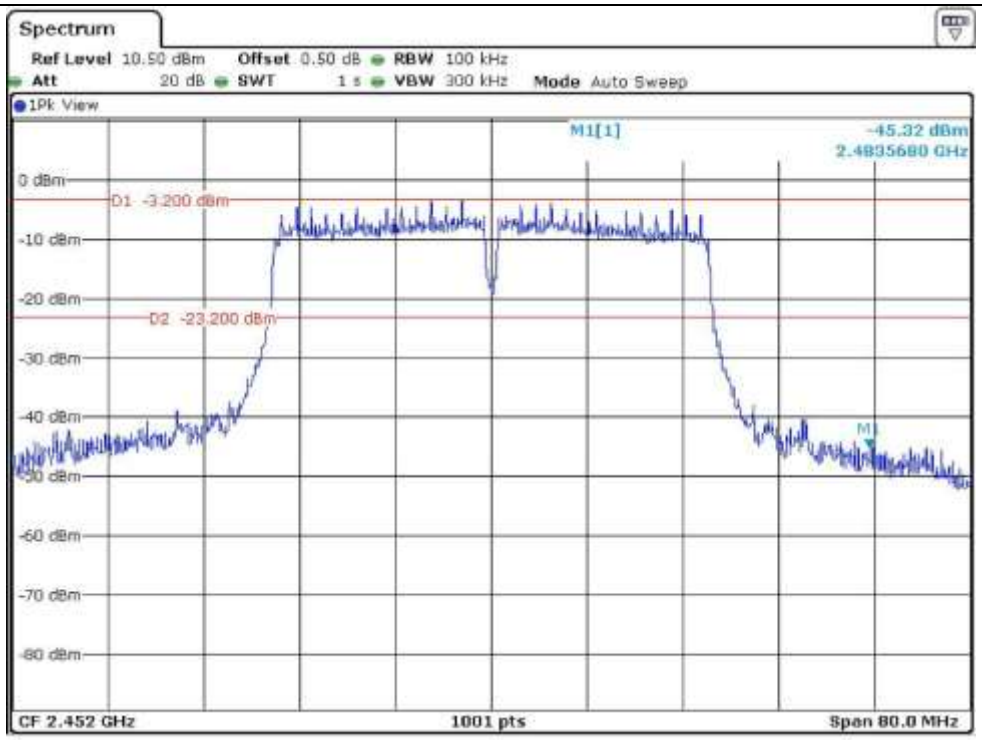

High Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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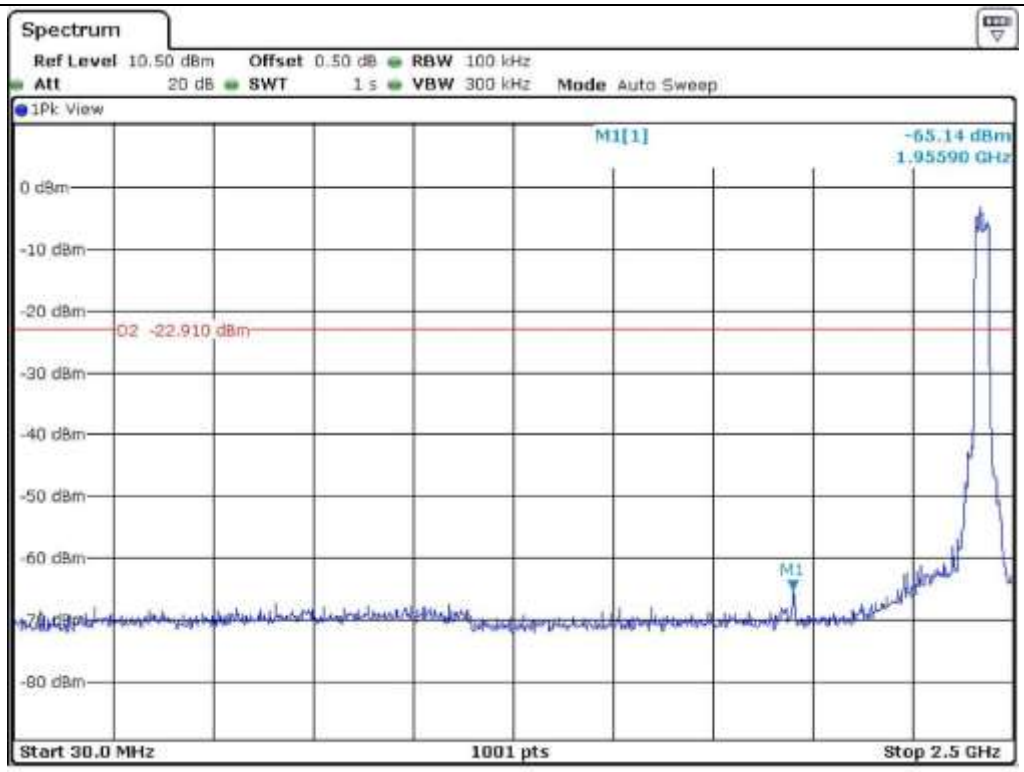
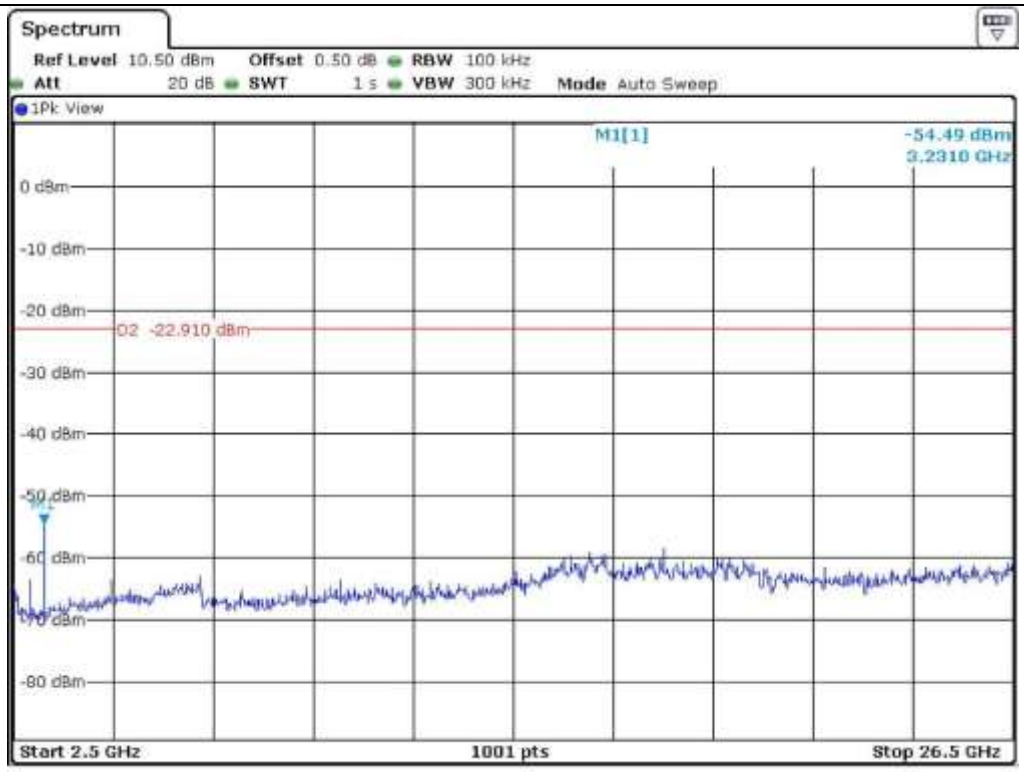
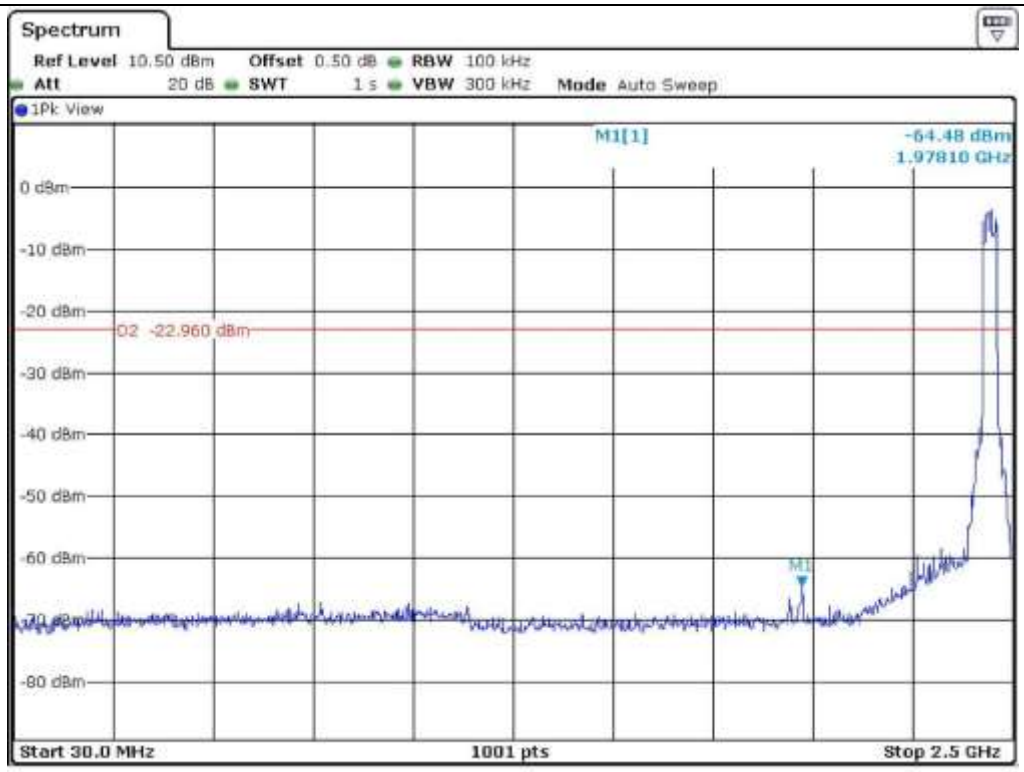


Low Channel

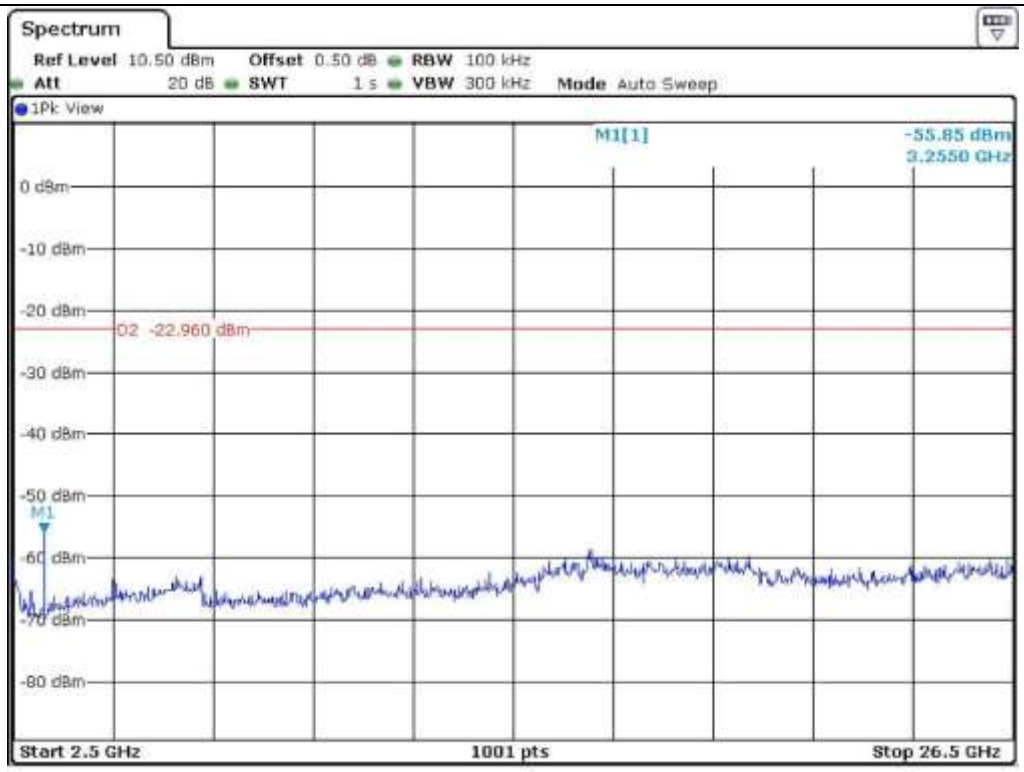


Low Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

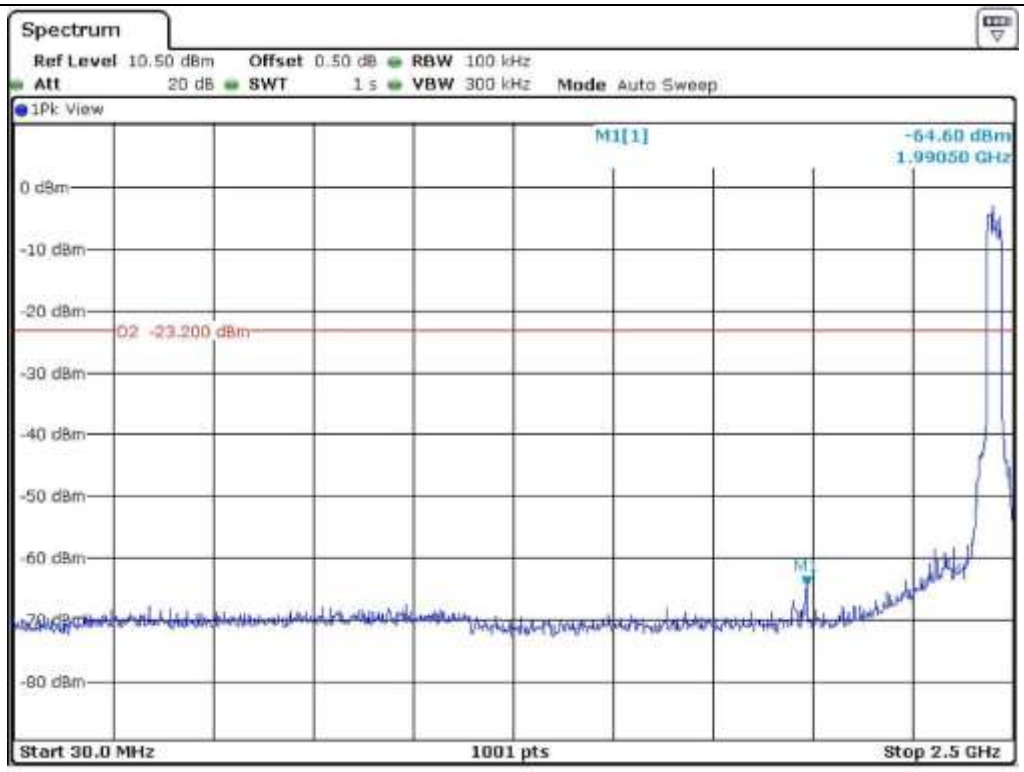


Middle Channel

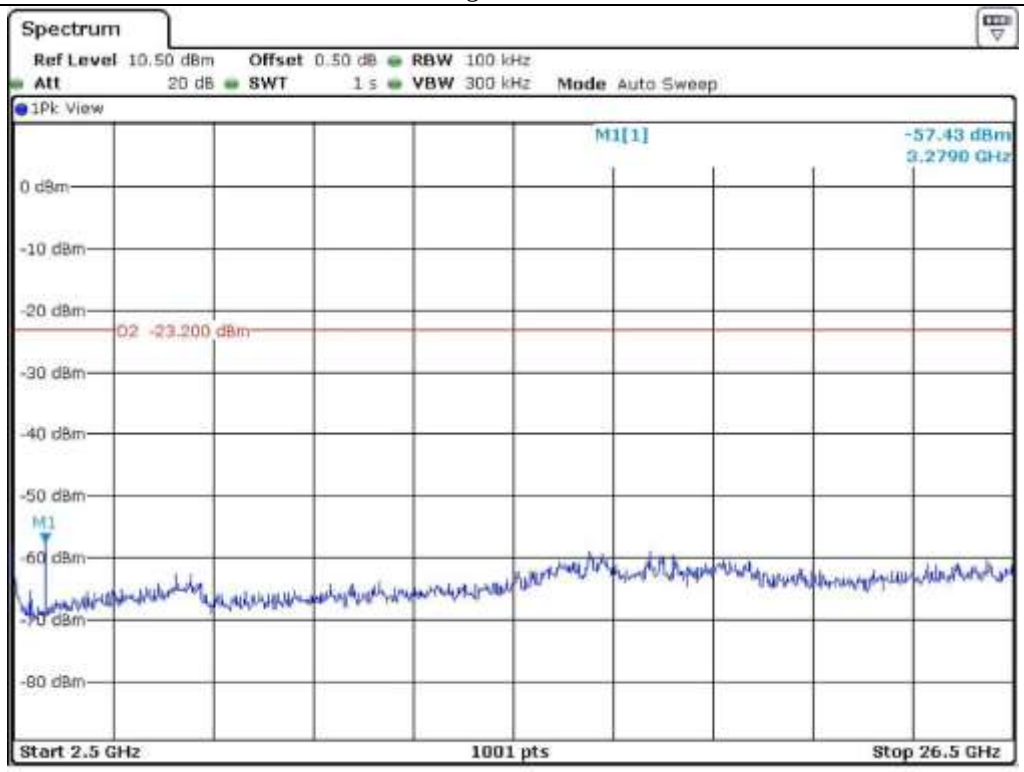


Middle Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)



High Channel



High Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

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

9.6.1.1.1 Test data for Antenna 0

-. Test Date : March 11, 2015

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

-. Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode

-. Frequency range : 30 MHz ~ 26.5 GHz

-. Measurement distance : 3 m

-. 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)
Test Data for Low Channel									
2 387.95	58.69	Peak	H	27.10	7.50	43.00	50.29	74.00	23.71
	49.97	Average	H				41.57	54.00	12.43
2 389.41	55.78	Peak	V				47.38	74.00	26.62
	47.68	Average	V				39.28	54.00	14.72
Test Data for High Channel									
2 486.77	57.65	Peak	H	27.10	7.50	43.00	49.25	74.00	24.75
	49.25	Average	H				40.85	54.00	13.15
2 483.89	53.99	Peak	V				45.59	74.00	28.41
	46.59	Average	V				38.19	54.00	15.81

Tabulated test data for Restricted Band

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

Margin (dB) = Limits (dBμV/m) - Total Level (dBμV/m)

Total Level = Reading + Antenna Factor + Cable Loss – Pre-Amplifier Gain

Tested by: Tae-Ho, Kim / Senior Engineer

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EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

9.6.1.1.2 Test data for Antenna 1

-. Test Date : March 11, 2015

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

-. Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode

-. Frequency range : 30 MHz ~ 26.5 GHz

-. Measurement distance : 3 m

-. 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)
Test Data for Low Channel									
2 388.56	57.69	Peak	H	27.10	7.50	43.00	49.29	74.00	24.71
	49.03	Average	H				40.63	54.00	13.37
2 389.86	53.97	Peak	V				45.57	74.00	28.43
	45.33	Average	V				36.93	54.00	17.07
Test Data for High Channel									
2 485.16	58.36	Peak	H	27.10	7.50	43.00	49.96	74.00	24.04
	48.37	Average	H				39.97	54.00	14.03
2 484.23	53.08	Peak	V				44.68	74.00	29.32
	44.76	Average	V				36.36	54.00	17.64

Tabulated test data for Restricted Band

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

Margin (dB) = Limits (dBµV/m) - Total Level (dBµV/m)

Total Level = Reading + Antenna Factor + Cable Loss – Pre-Amplifier Gain

Tested by: Tae-Ho, Kim / Senior Engineer

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9.6.1.1.3 Test data for Multiple transmit

-. Test Date : March 11, 2015

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

-. Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode

-. Frequency range : 30 MHz ~ 26.5 GHz

-. Measurement distance : 3 m

-. 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)
Test Data for Low Channel									
2 389.06	58.56	Peak	H	27.00	7.50	43.00	50.16	74.00	23.84
	50.75	Average	H				42.35	54.00	11.65
2 389.80	54.52	Peak	V				46.12	74.00	27.88
	47.52	Average	V				39.12	54.00	14.88
Test Data for High Channel									
2 485.96	56.30	Peak	H	27.40	7.70	43.00	47.90	74.00	26.10
	48.00	Average	H				39.60	54.00	14.40
2 486.27	52.14	Peak	V				43.74	74.00	30.26
	44.74	Average	V				36.34	54.00	17.66

Tabulated test data for Restricted Band

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

Margin (dB) = Limits (dBµV/m) - Total Level (dBµV/m)

Total Level = Reading + Antenna Factor + Cable Loss – Pre-Amplifier Gain

Tested by: Tae-Ho, Kim / Senior Engineer

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

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9.6.1.2 Test data for 802.11g WLAN Mode

9.6.1.2.1 Test data for Antenna 0

-. Test Date : March 11, 2015

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

-. Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode

-. Frequency range : 30 MHz ~ 26.5 GHz

-. Measurement distance : 3 m

-. 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)
Test Data for Low Channel									
2 389.84	54.94	Peak	H	27.00	7.50	43.00	46.44	74.00	27.56
	43.16	Average	H				34.66	54.00	19.34
2 389.99	52.11	Peak	V				43.61	74.00	30.39
	41.98	Average	V				33.48	54.00	20.52
Test Data for High Channel									
2 483.74	56.98	Peak	H	27.40	7.70	43.00	49.08	74.00	24.92
	44.84	Average	H				36.94	54.00	17.06
2 483.56	52.17	Peak	V				44.27	74.00	29.73
	41.26	Average	V				33.36	54.00	20.64

Tabulated test data for Restricted Band

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

Margin (dB) = Limits (dBµV/m) - Total Level (dBµV/m)

Total Level = Reading + Antenna Factor + Cable Loss – Pre-Amplifier Gain

Tested by: Tae-Ho, Kim / Senior Engineer

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EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

9.6.1.2.2 Test data for Antenna 1

-. Test Date : March 11, 2015

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

-. Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode

-. Frequency range : 30 MHz ~ 26.5 GHz

-. Measurement distance : 3 m

-. Result : PASSED

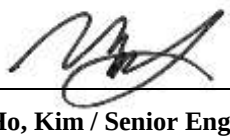
Frequency (MHz)	Reading (dBµV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBµV/m)	Limits (dBµV/m)	Margin (dB)
Test Data for Low Channel									
2 389.99	54.01	Peak	H	27.00	7.50	43.00	45.51	74.00	28.49
	42.67	Average	H				34.17	54.00	19.83
2 389.99	50.47	Peak	V				41.97	74.00	32.03
	40.23	Average	V				31.73	54.00	22.27
Test Data for High Channel									
2 484.11	56.23	Peak	H	27.40	7.70	43.00	48.33	74.00	25.67
	43.77	Average	H				35.87	54.00	18.13
2 483.75	51.23	Peak	V				43.33	74.00	30.67
	40.74	Average	V				32.84	54.00	21.16

Tabulated test data for Restricted Band

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

Margin (dB) = Limits (dBµV/m) - Total Level (dBµV/m)

Total Level = Reading + Antenna Factor + Cable Loss – Pre-Amplifier Gain



Tested by: Tae-Ho, Kim / Senior Engineer

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9.6.1.2.3 Test data for Multiple transmit

-. Test Date : March 11, 2015

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

-. Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode

-. Frequency range : 30 MHz ~ 26.5 GHz

-. Measurement distance : 3 m

-. 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)
Test Data for Low Channel									
2 389.87	53.47	Peak	H	27.00	7.50	43.00	44.97	74.00	29.03
	41.58	Average	H				33.08	54.00	20.92
2 389.99	49.79	Peak	V				41.29	74.00	32.71
	39.86	Average	V				31.36	54.00	22.64
Test Data for High Channel									
2 484.85	55.76	Peak	H	27.40	7.70	43.00	47.86	74.00	26.14
	43.08	Average	H				35.18	54.00	18.82
2 483.94	50.67	Peak	V				42.77	74.00	31.23
	41.03	Average	V				33.13	54.00	20.87

Tabulated test data for Restricted Band

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

Margin (dB) = Limits (dBµV/m) - Total Level (dBµV/m)

Total Level = Reading + Antenna Factor + Cable Loss – Pre-Amplifier Gain

Tested by: Tae-Ho, Kim / Senior Engineer

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EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

9.6.1.3 Test data for 802.11n_HT20 WLAN Mode

9.6.1.3.1 Test data for Antenna 0

-. Test Date : March 11, 2015

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

-. Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode

-. Frequency range : 30 MHz ~ 26.5 GHz

-. Measurement distance : 3 m

-. 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)
Test Data for Low Channel									
2 387.68	55.79	Peak	H	27.00	7.50	43.00	47.29	74.00	26.71
	45.96	Average	H				37.46	54.00	16.54
2 389.51	53.73	Peak	V				45.23	74.00	28.77
	44.10	Average	V				35.60	54.00	18.40
Test Data for High Channel									
2 487.41	56.02	Peak	H	27.40	7.70	43.00	48.12	74.00	25.88
	46.10	Average	H				38.20	54.00	15.80
2 486.47	52.96	Peak	V				45.06	74.00	28.94
	43.74	Average	V				35.84	54.00	18.16

Tabulated test data for Restricted Band

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

Margin (dB) = Limits (dBµV/m) - Total Level (dBµV/m)

Total Level = Reading + Antenna Factor + Cable Loss – Pre-Amplifier Gain

Tested by: Tae-Ho, Kim / Senior Engineer

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

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9.6.1.3.2 Test data for Antenna 1

-. Test Date : March 11, 2015

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

-. Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode

-. Frequency range : 30 MHz ~ 26.5 GHz

-. Measurement distance : 3 m

-. Result : PASSED

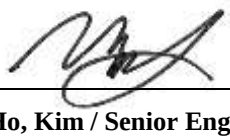
Frequency (MHz)	Reading (dBµV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBµV/m)	Limits (dBµV/m)	Margin (dB)
Test Data for Low Channel									
2 389.61	54.18	Peak	H	27.00	7.50	43.00	45.68	74.00	28.32
	44.73	Average	H				36.23	54.00	17.77
2 389.89	52.36	Peak	V				43.86	74.00	30.14
	43.05	Average	V				34.55	54.00	19.45
Test Data for High Channel									
2 484.45	53.94	Peak	H	27.40	7.70	43.00	46.04	74.00	27.96
	43.01	Average	H				35.11	54.00	18.89
2 484.11	51.88	Peak	V				43.98	74.00	30.02
	41.36	Average	V				33.46	54.00	20.54

Tabulated test data for Restricted Band

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

Margin (dB) = Limits (dBµV/m) - Total Level (dBµV/m)

Total Level = Reading + Antenna Factor + Cable Loss – Pre-Amplifier Gain



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9.6.1.3.3 Test data for Multiple transmit

-. Test Date : March 11, 2015

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

-. Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode

-. Frequency range : 30 MHz ~ 26.5 GHz

-. Measurement distance : 3 m

-. 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)
Test Data for Low Channel									
2 388.69	55.94	Peak	H	27.00	7.50	43.00	47.44	74.00	26.56
	44.39	Average	H				35.89	54.00	18.11
2 389.94	52.84	Peak	V				44.34	74.00	29.66
	43.55	Average	V				35.05	54.00	18.95
Test Data for High Channel									
2 485.54	54.32	Peak	H	27.40	7.70	43.00	46.42	74.00	27.58
	44.23	Average	H				36.33	54.00	17.67
2 484.69	52.09	Peak	V				44.19	74.00	29.81
	42.88	Average	V				34.98	54.00	19.02

Tabulated test data for Restricted Band

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

Margin (dB) = Limits (dBµV/m) - Total Level (dBµV/m)

Total Level = Reading + Antenna Factor + Cable Loss – Pre-Amplifier Gain

Tested by: Tae-Ho, Kim / Senior Engineer

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9.6.1.4 Test data for 802.11n_HT40 WLAN Mode

9.6.1.4.1 Test data for Antenna 0

-. Test Date : March 11, 2015

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

-. Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode

-. Frequency range : 30 MHz ~ 26.5 GHz

-. Measurement distance : 3 m

-. 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)
Test Data for Low Channel									
2 386.64	71.50	Peak	H	27.00	7.50	43.00	63.00	74.00	11.00
	54.05	Average	H				45.55	54.00	8.45
2 386.96	65.14	Peak	V				56.64	74.00	17.36
	47.85	Average	V				39.35	54.00	14.65
Test Data for High Channel									
2 485.67	68.57	Peak	H	27.40	7.70	43.00	60.67	74.00	13.33
	50.42	Average	H				42.52	54.00	11.48
2 484.80	64.55	Peak	V				56.65	74.00	17.35
	46.94	Average	V				39.04	54.00	14.96

Tabulated test data for Restricted Band

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

Margin (dB) = Limits (dBµV/m) - Total Level (dBµV/m)

Total Level = Reading + Antenna Factor + Cable Loss – Pre-Amplifier Gain

Tested by: Tae-Ho, Kim / Senior Engineer

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9.6.1.4.2 Test data for Antenna 1

-. Test Date : March 11, 2015

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

-. Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode

-. Frequency range : 30 MHz ~ 26.5 GHz

-. Measurement distance : 3 m

-. Result : PASSED

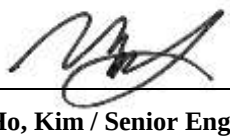
Frequency (MHz)	Reading (dBµV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBµV/m)	Limits (dBµV/m)	Margin (dB)
Test Data for Low Channel									
2 386.42	71.00	Peak	H	27.00	7.50	43.00	62.50	74.00	11.50
	53.66	Average	H				45.16	54.00	8.84
2 386.17	64.52	Peak	V				56.02	74.00	17.98
	48.44	Average	V				39.94	54.00	14.06
Test Data for High Channel									
2 485.17	68.15	Peak	H	27.40	7.70	43.00	60.25	74.00	13.75
	49.62	Average	H				41.72	54.00	12.28
2 484.96	64.96	Peak	V				57.06	74.00	16.94
	47.11	Average	V				39.21	54.00	14.79

Tabulated test data for Restricted Band

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

Margin (dB) = Limits (dBµV/m) - Total Level (dBµV/m)

Total Level = Reading + Antenna Factor + Cable Loss – Pre-Amplifier Gain



Tested by: Tae-Ho, Kim / Senior Engineer

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9.6.1.4.3 Test data for Multiple transmit

-. Test Date : March 11, 2015

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

-. Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode

-. Frequency range : 30 MHz ~ 26.5 GHz

-. Measurement distance : 3 m

-. Result : PASSED

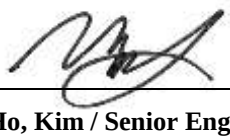
Frequency (MHz)	Reading (dBµV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBµV/m)	Limits (dBµV/m)	Margin (dB)
Test Data for Low Channel									
2 387.62	70.59	Peak	H	27.00	7.50	43.00	62.09	74.00	11.91
	53.04	Average	H				44.54	54.00	9.46
2 386.95	64.07	Peak	V				55.57	74.00	18.43
	48.16	Average	V				39.66	54.00	14.34
Test Data for High Channel									
2 485.01	67.98	Peak	H	27.40	7.70	43.00	60.08	74.00	13.92
	48.58	Average	H				40.68	54.00	13.32
2 484.69	64.23	Peak	V				56.33	74.00	17.67
	46.29	Average	V				38.39	54.00	15.61

Tabulated test data for Restricted Band

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

Margin (dB) = Limits (dBµV/m) - Total Level (dBµV/m)

Total Level = Reading + Antenna Factor + Cable Loss – Pre-Amplifier Gain



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9.6.2 Spurious & Harmonic Radiated Emission

9.6.2.1 Test data for 802.11b WLAN Mode

9.6.2.1.1 Test data for Antenna 0

-. Test Date : March 11, 2015

-. Resolution bandwidth : 1 MHz for Peak and Average Mode for the emissions fall in restricted band,
100 kHz for Peak Mode for the emissions outside restricted band

-. Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode

-. Frequency range : 1 GHz ~ 26.5 GHz

-. Measurement distance : 3 m

-. Result : PASSED

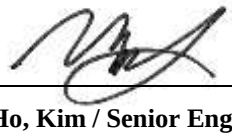
Frequency (GHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel									
4 824.00	42.74	Peak	H	30.70	11.10	42.50	42.04	73.98	31.94
	34.92	Average	H				34.22	53.98	19.76
	43.73	Peak	V				43.03	73.98	30.95
	34.23	Average	V				33.53	53.98	20.45
Test Data for Middle Channel									
4 884.00	43.85	Peak	H	30.70	11.20	42.40	43.35	73.98	30.63
	34.53	Average	H				34.03	53.98	19.95
	41.85	Peak	V				41.35	73.98	32.63
	33.76	Average	V				33.26	53.98	20.72
Test Data for High Channel									
4 924.00	42.87	Peak	H	30.80	11.80	42.30	43.17	73.98	30.81
	34.07	Average	H				34.37	53.98	19.61
	41.87	Peak	V				42.17	73.98	31.81
	33.21	Average	V				33.51	53.98	20.47

Tabulated test data for Restricted Band

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

Margin (dB) = Limits (dBμV/m) - Total Level (dBμV/m)

Total Level = Reading + Antenna Factor + Cable Loss – Pre-Amplifier Gain



Tested by: Tae-Ho, Kim / Senior Engineer

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9.6.2.1.2 Test data for Antenna 1

-. Test Date : March 11, 2015

-. Resolution bandwidth : 1 MHz for Peak and Average Mode for the emissions fall in restricted band,
100 kHz for Peak Mode for the emissions outside restricted band

-. Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode

-. Frequency range : 1 GHz ~ 26.5 GHz

-. Measurement distance : 3 m

-. Result : PASSED

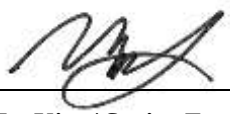
Frequency (GHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel									
4 824.00	43.09	Peak	H	30.70	11.10	42.50	42.39	73.98	31.59
	34.15	Average	H				33.45	53.98	20.53
	42.36	Peak	V				41.66	73.98	32.32
	33.17	Average	V				32.47	53.98	21.51
Test Data for Middle Channel									
4 884.00	43.99	Peak	H	30.70	11.20	42.40	43.49	73.98	30.49
	34.92	Average	H				34.42	53.98	19.56
	43.29	Peak	V				42.79	73.98	31.19
	34.47	Average	V				33.97	53.98	20.01
Test Data for High Channel									
4 924.00	42.62	Peak	H	30.80	11.80	42.30	42.92	73.98	31.06
	34.46	Average	H				34.76	53.98	19.22
	42.83	Peak	V				43.13	73.98	30.85
	34.14	Average	V				34.44	53.98	19.54

Tabulated test data for Restricted Band

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

Margin (dB) = Limits (dBμV/m) - Total Level (dBμV/m)

Total Level = Reading + Antenna Factor + Cable Loss – Pre-Amplifier Gain



Tested by: Tae-Ho, Kim / Senior Engineer

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9.6.2.1.3 Test data for Multiple transmit

-. Test Date : March 11, 2015

-. Resolution bandwidth : 1 MHz for Peak and Average Mode for the emissions fall in restricted band,
100 kHz for Peak Mode for the emissions outside restricted band

-. Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode

-. Frequency range : 1 GHz ~ 26.5 GHz

-. Measurement distance : 3 m

-. 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)
Test Data for Low Channel									
4 824.00	42.63	Peak	H	31.10	11.80	42.50	41.93	73.98	32.05
	35.78	Average	H				35.08	53.98	18.90
	42.82	Peak	V				42.12	73.98	31.86
	34.31	Average	V				33.61	53.98	20.37
Test Data for Middle Channel									
4 884.00	43.08	Peak	H	31.20	11.70	42.50	42.58	73.98	31.40
	34.05	Average	H				33.55	53.98	20.43
	43.11	Peak	V				42.61	73.98	31.37
	33.98	Average	V				33.48	53.98	20.50
Test Data for High Channel									
4 924.00	43.62	Peak	H	31.30	11.80	42.50	43.92	73.98	30.06
	35.84	Average	H				36.14	53.98	17.84
	43.48	Peak	V				43.78	73.98	30.20
	33.45	Average	V				33.75	53.98	20.23

Tabulated test data for Restricted Band

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

Margin (dB) = Limits (dBμV/m) - Total Level (dBμV/m)

Total Level = Reading + Antenna Factor + Cable Loss – Pre-Amplifier Gain

Tested by: Tae-Ho, Kim / Senior Engineer

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9.6.2.2 Test data for 802.11g WLAN Mode

9.6.2.2.1 Test data for Antenna 0

-. Test Date : March 11, 2015

-. Resolution bandwidth : 1 MHz for Peak and Average Mode for the emissions fall in restricted band,
100 kHz for Peak Mode for the emissions outside restricted band

-. Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode

-. Frequency range : 1 GHz ~ 26.5 GHz

-. Measurement distance : 3 m

-. 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)
Test Data for Low Channel									
4 824.00	42.19	Peak	H	30.70	11.10	42.50	41.49	73.98	32.49
	34.52	Average	H				33.82	53.98	20.16
	42.27	Peak	V				41.57	73.98	32.41
	33.37	Average	V				32.67	53.98	21.31
Test Data for Middle Channel									
4 884.00	43.46	Peak	H	30.70	11.20	42.50	42.86	73.98	31.12
	35.10	Average	H				34.50	53.98	19.48
	42.50	Peak	V				41.90	73.98	32.08
	34.43	Average	V				33.83	53.98	20.15
Test Data for High Channel									
4 924.00	43.43	Peak	H	30.80	11.80	42.50	43.53	73.98	30.45
	34.97	Average	H				35.07	53.98	18.91
	42.75	Peak	V				42.85	73.98	31.13
	33.80	Average	V				33.90	53.98	20.08

Tabulated test data for Restricted Band

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

Margin (dB) = Limits (dBμV/m) - Total Level (dBμV/m)

Total Level = Reading + Antenna Factor + Cable Loss – Pre-Amplifier Gain

Tested by: Tae-Ho, Kim / Senior Engineer

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9.6.2.2.2 Test data for Antenna 1

-. Test Date : March 11, 2015

-. Resolution bandwidth : 1 MHz for Peak and Average Mode for the emissions fall in restricted band,
100 kHz for Peak Mode for the emissions outside restricted band

-. Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode

-. Frequency range : 1 GHz ~ 26.5 GHz

-. Measurement distance : 3 m

-. Result : PASSED

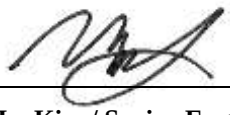
Frequency (GHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel									
4 824.00	42.68	Peak	H	30.70	11.10	42.50	41.98	73.98	32.00
	33.97	Average	H				33.27	53.98	20.71
	43.05	Peak	V				42.35	73.98	31.63
	33.94	Average	V				33.24	53.98	20.74
Test Data for Middle Channel									
4 884.00	43.21	Peak	H	30.70	11.20	42.50	42.61	73.98	31.37
	35.71	Average	H				35.11	53.98	18.87
	42.75	Peak	V				42.15	73.98	31.83
	33.59	Average	V				32.99	53.98	20.99
Test Data for High Channel									
4 924.00	43.15	Peak	H	30.80	11.80	42.50	43.25	73.98	30.73
	34.58	Average	H				34.68	53.98	19.30
	43.58	Peak	V				43.68	73.98	30.30
	33.38	Average	V				33.48	53.98	20.50

Tabulated test data for Restricted Band

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

Margin (dB) = Limits (dBμV/m) - Total Level (dBμV/m)

Total Level = Reading + Antenna Factor + Cable Loss – Pre-Amplifier Gain



Tested by: Tae-Ho, Kim / Senior Engineer

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

9.6.2.2.3 Test data for Multiple transmit

-. Test Date : March 11, 2015

-. Resolution bandwidth : 1 MHz for Peak and Average Mode for the emissions fall in restricted band,
100 kHz for Peak Mode for the emissions outside restricted band

-. Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode

-. Frequency range : 1 GHz ~ 26.5 GHz

-. Measurement distance : 3 m

-. Result : PASSED

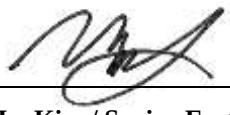
Frequency (GHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel									
4 824.00	43.16	Peak	H	31.10	11.80	42.50	42.46	73.98	31.52
	34.73	Average	H				34.03	53.98	19.95
	42.67	Peak	V				41.97	73.98	32.01
	33.19	Average	V				32.49	53.98	21.49
Test Data for Middle Channel									
4 884.00	43.38	Peak	H	31.20	11.70	42.50	42.78	73.98	31.20
	34.17	Average	H				33.57	53.98	20.41
	42.02	Peak	V				41.42	73.98	32.56
	34.43	Average	V				33.83	53.98	20.15
Test Data for High Channel									
4 924.00	42.84	Peak	H	31.30	11.80	42.50	42.94	73.98	31.04
	35.64	Average	H				35.74	53.98	18.24
	43.72	Peak	V				43.82	73.98	30.16
	33.40	Average	V				33.50	53.98	20.48

Tabulated test data for Restricted Band

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

Margin (dB) = Limits (dBμV/m) - Total Level (dBμV/m)

Total Level = Reading + Antenna Factor + Cable Loss – Pre-Amplifier Gain



Tested by: Tae-Ho, Kim / Senior Engineer

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EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

9.6.2.3 Test data for 802.11n_HT20 WLAN Mode

9.6.2.3.1 Test data for Antenna 0

-. Test Date : March 11, 2015

-. Resolution bandwidth : 1 MHz for Peak and Average Mode for the emissions fall in restricted band,
100 kHz for Peak Mode for the emissions outside restricted band

-. Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode

-. Frequency range : 1 GHz ~ 26.5 GHz

-. Measurement distance : 3 m

-. Result : PASSED

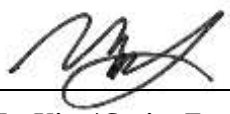
Frequency (GHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel									
4 824.00	42.49	Peak	H	31.10	11.80	42.50	42.89	73.98	31.09
	34.37	Average	H				34.77	53.98	19.21
	43.51	Peak	V				43.91	73.98	30.07
	33.50	Average	V				33.90	53.98	20.08
Test Data for Middle Channel									
4 884.00	43.50	Peak	H	31.20	11.70	42.50	43.90	73.98	30.08
	35.48	Average	H				35.88	53.98	18.10
	43.54	Peak	V				43.94	73.98	30.04
	34.82	Average	V				35.22	53.98	18.76
Test Data for High Channel									
4 924.00	43.61	Peak	H	31.30	11.80	42.50	44.21	73.98	29.77
	35.28	Average	H				35.88	53.98	18.10
	42.29	Peak	V				42.89	73.98	31.09
	34.25	Average	V				34.85	53.98	19.13

Tabulated test data for Restricted Band

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

Margin (dB) = Limits (dBμV/m) - Total Level (dBμV/m)

Total Level = Reading + Antenna Factor + Cable Loss – Pre-Amplifier Gain



Tested by: Tae-Ho, Kim / Senior Engineer

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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9.6.2.3.2 Test data for Antenna 1

-. Test Date : March 11, 2015

-. Resolution bandwidth : 1 MHz for Peak and Average Mode for the emissions fall in restricted band,
100 kHz for Peak Mode for the emissions outside restricted band

-. Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode

-. Frequency range : 1 GHz ~ 26.5 GHz

-. Measurement distance : 3 m

-. Result : PASSED

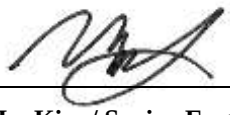
Frequency (GHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel									
4 824.00	44.02	Peak	H	31.10	11.80	42.50	44.42	73.98	29.56
	34.00	Average	H				34.40	53.98	19.58
	43.18	Peak	V				43.58	73.98	30.40
	34.94	Average	V				35.34	53.98	18.64
Test Data for Middle Channel									
4 884.00	43.78	Peak	H	31.20	11.70	42.50	44.18	73.98	29.80
	34.46	Average	H				34.86	53.98	19.12
	42.19	Peak	V				42.59	73.98	31.39
	33.71	Average	V				34.11	53.98	19.87
Test Data for High Channel									
4 924.00	43.56	Peak	H	31.30	11.80	42.50	44.16	73.98	29.82
	34.13	Average	H				34.73	53.98	19.25
	42.54	Peak	V				43.14	73.98	30.84
	33.42	Average	V				34.02	53.98	19.96

Tabulated test data for Restricted Band

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

Margin (dB) = Limits (dBμV/m) - Total Level (dBμV/m)

Total Level = Reading + Antenna Factor + Cable Loss – Pre-Amplifier Gain



Tested by: Tae-Ho, Kim / Senior Engineer

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9.6.2.3.3 Test data for Multiple transmit

-. Test Date : March 11, 2015

-. Resolution bandwidth : 1 MHz for Peak and Average Mode for the emissions fall in restricted band,
100 kHz for Peak Mode for the emissions outside restricted band

-. Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode

-. Frequency range : 1 GHz ~ 26.5 GHz

-. Measurement distance : 3 m

-. Result : PASSED

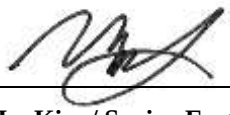
Frequency (GHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel									
4 824.00	43.36	Peak	H	31.10	11.80	42.50	43.76	73.98	30.22
	33.97	Average	H				34.37	53.98	19.61
	43.27	Peak	V				43.67	73.98	30.31
	34.92	Average	V				35.32	53.98	18.66
Test Data for Middle Channel									
4 884.00	42.91	Peak	H	31.20	11.70	42.50	43.31	73.98	30.67
	35.63	Average	H				36.03	53.98	17.95
	42.96	Peak	V				43.36	73.98	30.62
	34.69	Average	V				35.09	53.98	18.89
Test Data for High Channel									
4 924.00	44.08	Peak	H	31.30	11.80	42.50	44.68	73.98	29.30
	34.74	Average	H				35.34	53.98	18.64
	42.86	Peak	V				43.46	73.98	30.52
	34.77	Average	V				35.37	53.98	18.61

Tabulated test data for Restricted Band

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

Margin (dB) = Limits (dBμV/m) - Total Level (dBμV/m)

Total Level = Reading + Antenna Factor + Cable Loss – Pre-Amplifier Gain



Tested by: Tae-Ho, Kim / Senior Engineer

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9.6.2.4 Test data for 802.11n_HT40 WLAN Mode

9.6.2.4.1 Test data for Antenna 0

-. Test Date : March 11, 2015

-. Resolution bandwidth : 1 MHz for Peak and Average Mode for the emissions fall in restricted band,
100 kHz for Peak Mode for the emissions outside restricted band

-. Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode

-. Frequency range : 1 GHz ~ 26.5 GHz

-. Measurement distance : 3 m

-. 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)
Test Data for Low Channel									
4 844.00	42.39	Peak	H	31.10	11.80	42.50	42.79	73.98	31.19
	35.61	Average	H				36.01	53.98	17.97
	42.89	Peak	V				43.29	73.98	30.69
	33.91	Average	V				34.31	53.98	19.67
Test Data for Middle Channel									
4 884.00	42.31	Peak	H	31.20	11.70	42.50	42.71	73.98	31.27
	34.80	Average	H				35.20	53.98	18.78
	42.25	Peak	V				42.65	73.98	31.33
	33.36	Average	V				33.76	53.98	20.22
Test Data for High Channel									
4 904.00	42.71	Peak	H	31.30	11.80	42.50	43.31	73.98	30.67
	35.39	Average	H				35.99	53.98	17.99
	43.61	Peak	V				44.21	73.98	29.77
	34.73	Average	V				35.33	53.98	18.65

Tabulated test data for Restricted Band

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

Margin (dB) = Limits (dBμV/m) - Total Level (dBμV/m)

Total Level = Reading + Antenna Factor + Cable Loss – Pre-Amplifier Gain

Tested by: Tae-Ho, Kim / Senior Engineer

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

9.6.2.4.2 Test data for Antenna 1

-. Test Date : March 11, 2015

-. Resolution bandwidth : 1 MHz for Peak and Average Mode for the emissions fall in restricted band,
100 kHz for Peak Mode for the emissions outside restricted band

-. Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode

-. Frequency range : 1 GHz ~ 26.5 GHz

-. Measurement distance : 3 m

-. Result : PASSED

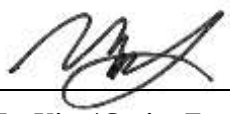
Frequency (GHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel									
4 844.00	44.13	Peak	H	31.10	11.80	42.50	44.53	73.98	29.45
	35.40	Average	H				35.80	53.98	18.18
	43.57	Peak	V				43.97	73.98	30.01
	34.17	Average	V				34.57	53.98	19.41
Test Data for Middle Channel									
4 884.00	43.90	Peak	H	31.20	11.70	42.50	44.30	73.98	29.68
	34.25	Average	H				34.65	53.98	19.33
	42.51	Peak	V				42.91	73.98	31.07
	34.75	Average	V				35.15	53.98	18.83
Test Data for High Channel									
4 904.00	43.10	Peak	H	31.30	11.80	42.50	43.70	73.98	30.28
	34.06	Average	H				34.66	53.98	19.32
	43.11	Peak	V				43.71	73.98	30.27
	33.25	Average	V				33.85	53.98	20.13

Tabulated test data for Restricted Band

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

Margin (dB) = Limits (dBμV/m) - Total Level (dBμV/m)

Total Level = Reading + Antenna Factor + Cable Loss – Pre-Amplifier Gain



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9.6.2.4.3 Test data for Multiple transmit

-. Test Date : March 11, 2015

-. Resolution bandwidth : 1 MHz for Peak and Average Mode for the emissions fall in restricted band,
100 kHz for Peak Mode for the emissions outside restricted band

-. Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode

-. Frequency range : 1 GHz ~ 26.5 GHz

-. Measurement distance : 3 m

-. Result : PASSED

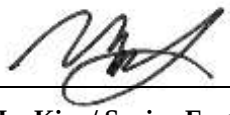
Frequency (GHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel									
4 844.00	43.52	Peak	H	31.10	11.80	42.50	43.92	73.98	30.06
	34.42	Average	H				34.82	53.98	19.16
	41.92	Peak	V				42.32	73.98	31.66
	33.67	Average	V				34.07	53.98	19.91
Test Data for Middle Channel									
4 884.00	43.05	Peak	H	31.20	11.70	42.50	43.45	73.98	30.53
	33.89	Average	H				34.29	53.98	19.69
	43.37	Peak	V				43.77	73.98	30.21
	33.53	Average	V				33.93	53.98	20.05
Test Data for High Channel									
4 904.00	43.94	Peak	H	31.30	11.80	42.50	44.54	73.98	29.44
	35.54	Average	H				36.14	53.98	17.84
	43.44	Peak	V				44.04	73.98	29.94
	33.56	Average	V				34.16	53.98	19.82

Tabulated test data for Restricted Band

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

Margin (dB) = Limits (dBμV/m) - Total Level (dBμV/m)

Total Level = Reading + Antenna Factor + Cable Loss – Pre-Amplifier Gain



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11. PEAK POWER SPECTRUL DENSITY

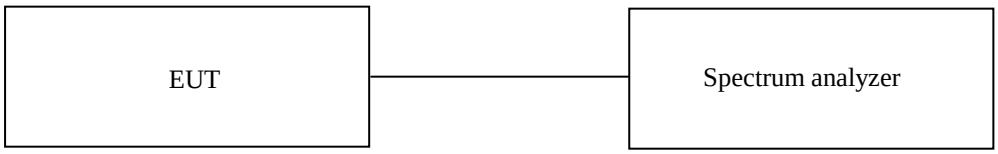
11.1 Operating environment

Temperature : 24 ℃

Relative humidity : 48 % R.H.

11.2 Test set-up

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



11.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	FSV40	Rohde & Schwarz	Signal Analyzer	101009	Jul. 30, 2014 (1Y)

All test equipment used is calibrated on a regular basis.

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11.4 Test data for 802.11b WLAN Mode

11.4.1 Test data for Antenna 0

-. Test Date : March 11, 2015

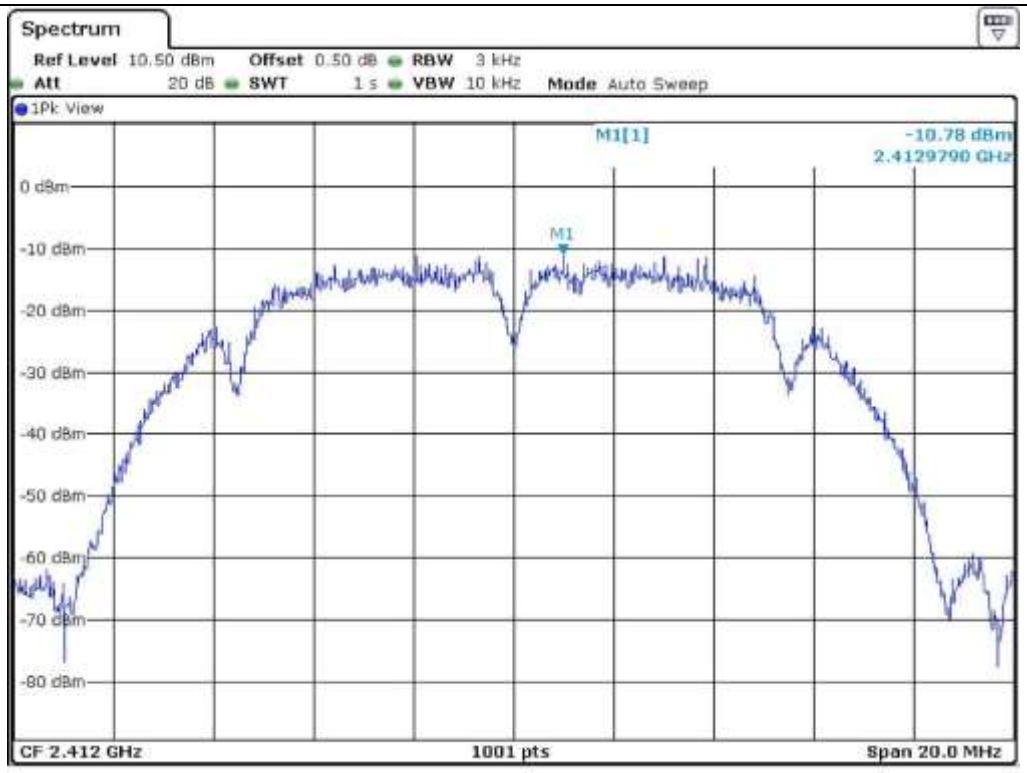
-. Test Result : Pass

-. Operating Condition : Continuous transmitting mode

CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412	-10.78	8.00	18.78
Middle	2 442	-11.36	8.00	19.36
High	2 462	-10.59	8.00	18.59

Remark. Margin = Limit – Measured value

Tested by: Tae-Ho, Kim / Senior Engineer



Low Channel

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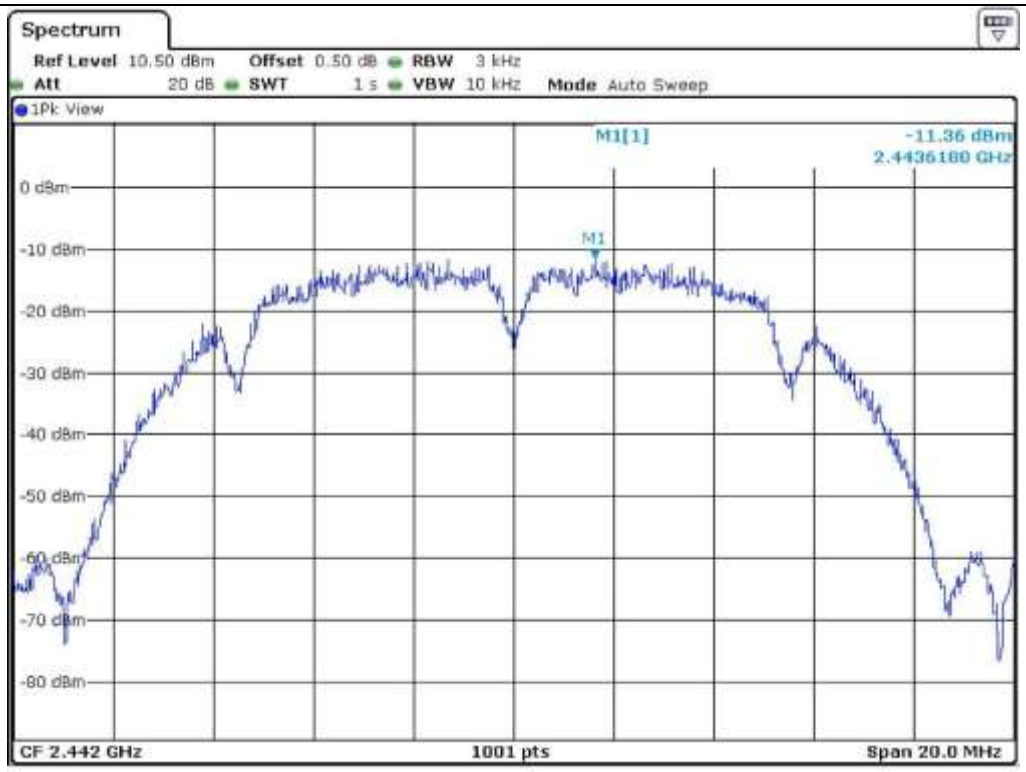
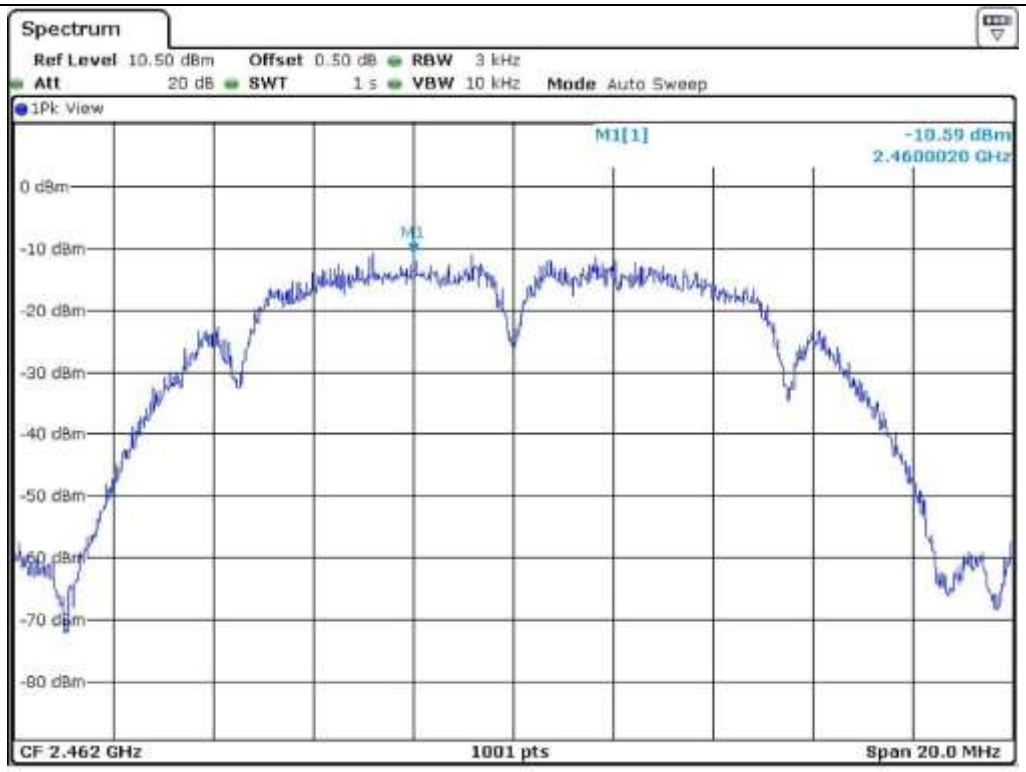


Middle Channel



High Channel

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11.4.2 Test data for Antenna 1

-. Test Date : March 11, 2015

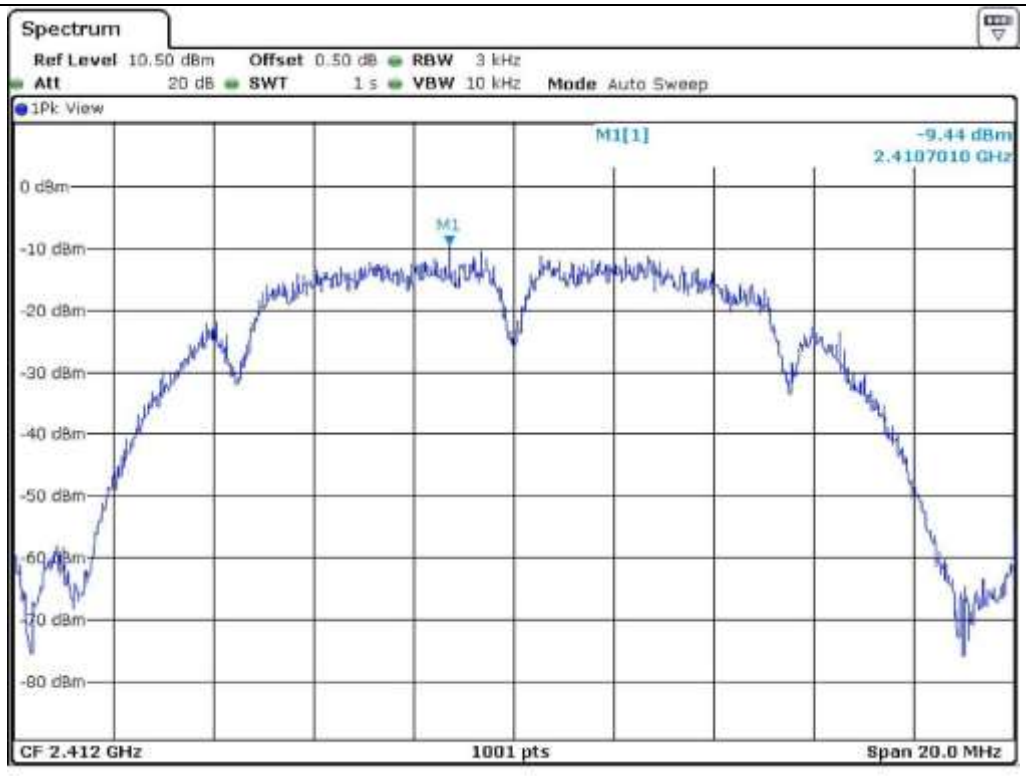
-. Test Result : Pass

-. Operating Condition : Continuous transmitting mode

CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412	-9.44	8.00	17.44
Middle	2 442	-11.00	8.00	19.00
High	2 462	-11.41	8.00	19.41

Remark. Margin = Limit – Measured value

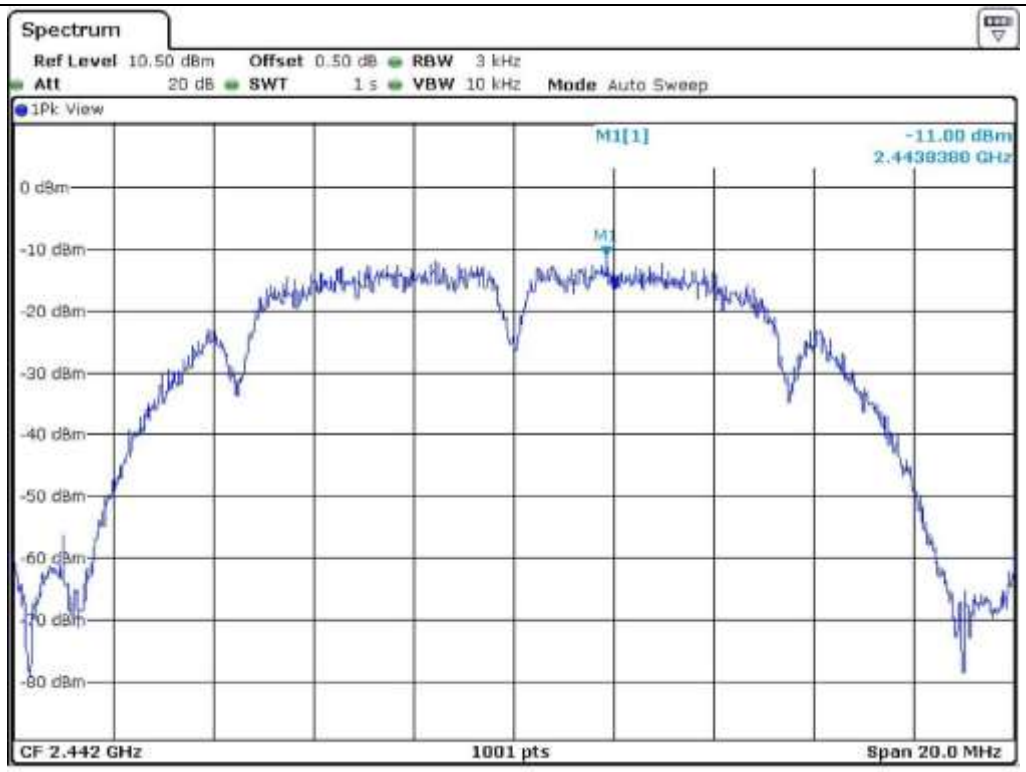
Tested by: Tae-Ho, Kim / Senior Engineer



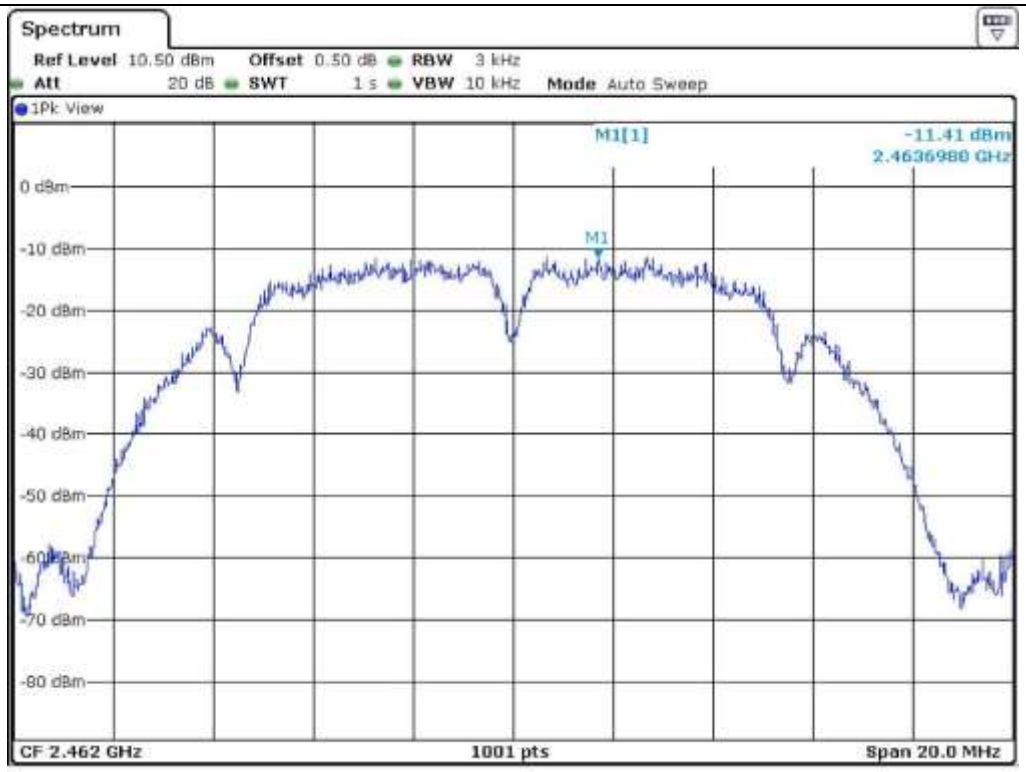
Low Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)



Middle Channel



High Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

11.4.3 Test data for Multiple transmit

-. Test Date : March 11, 2015

-. Test Result : Pass

-. Operating Condition : Continuous transmitting mode

CHANNEL	FREQUENCY(MHz)	CALCULATED POWER (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412	-7.05	8.00	15.05
Middle	2 442	-8.17	8.00	16.17
High	2 462	-7.97	8.00	15.97

Remark 1 : Margin = Limit – Measured value

Remark 2 : Calculated Power Density = $10\log(10^{(\text{Antenna1 Power Density}/10)}+10^{(\text{Antenna2 Power Density}/10)})$

Tested by: Tae-Ho, Kim / Senior Engineer

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

11.5 Test data for 802.11g WLAN Mode

11.5.1 Test data for Antenna 0

-. Test Date : March 11, 2015

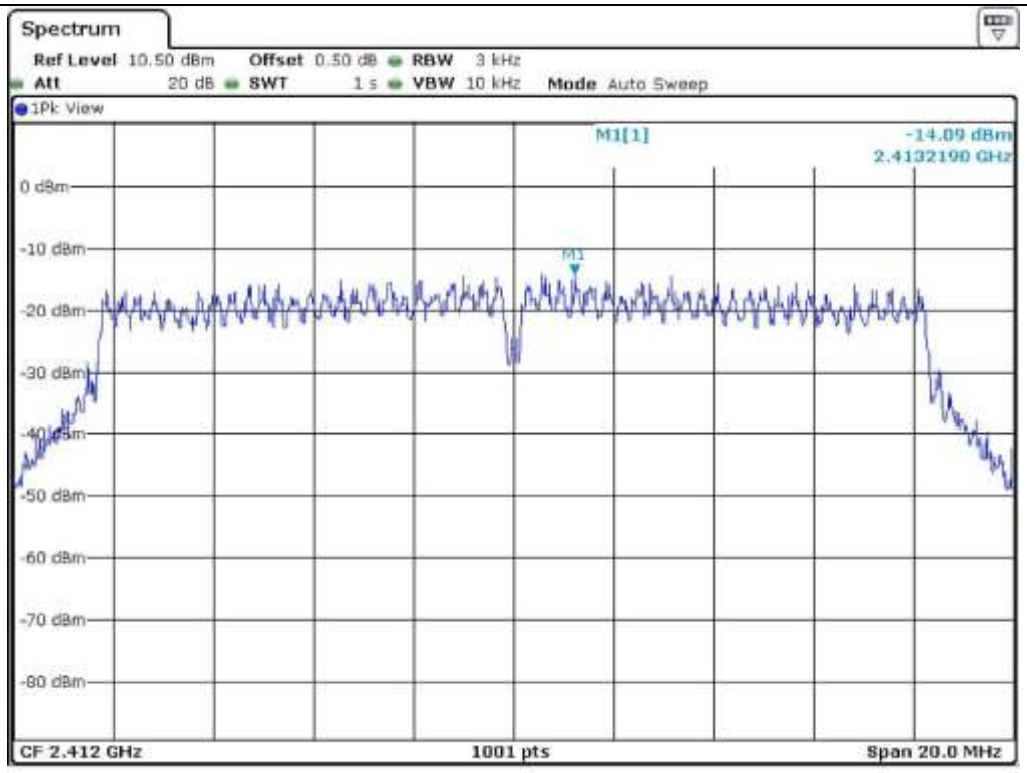
-. Test Result : Pass

-. Operating Condition : Continuous transmitting mode

CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412	-14.09	8.00	22.09
Middle	2 442	-13.18	8.00	21.18
High	2 462	-14.03	8.00	22.03

Remark. Margin = Limit – Measured value

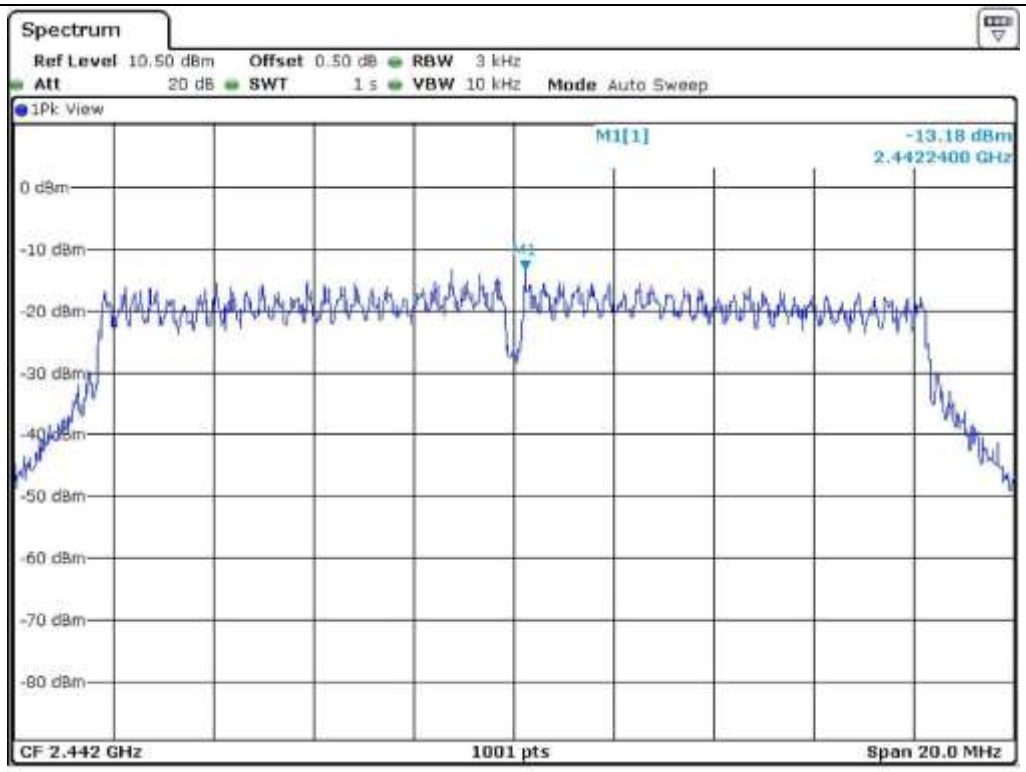
Tested by: Tae-Ho, Kim / Senior Engineer



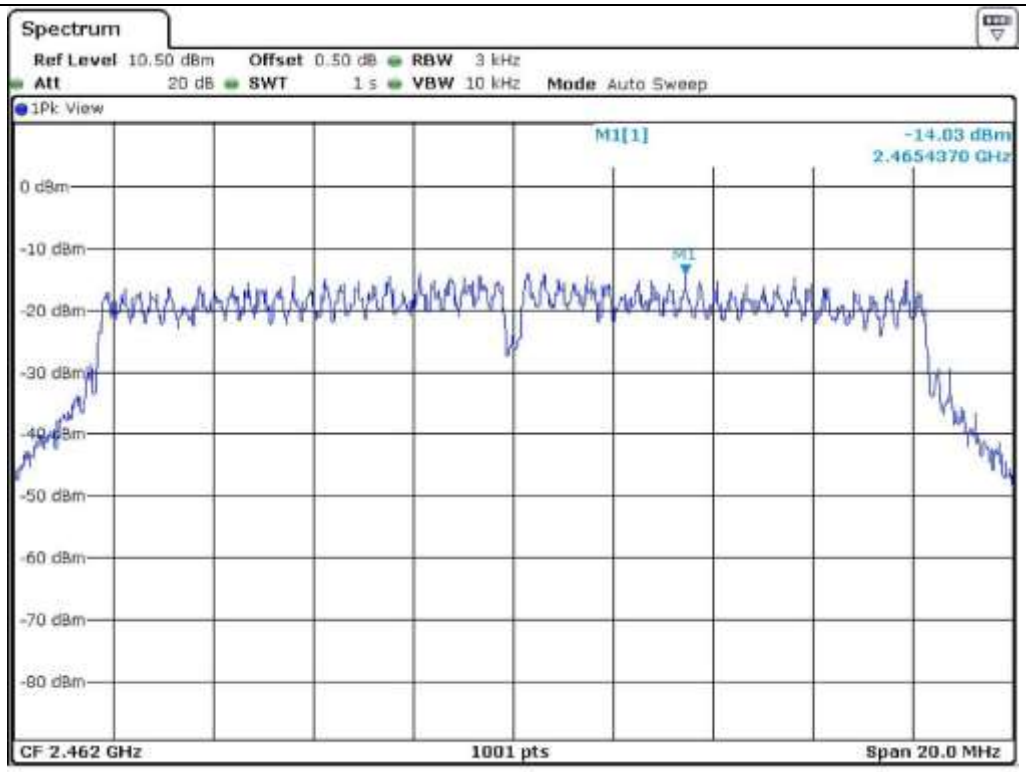
Low Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)



Middle Channel



High Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

11.5.2 Test data for Antenna 1

-. Test Date : March 11, 2015

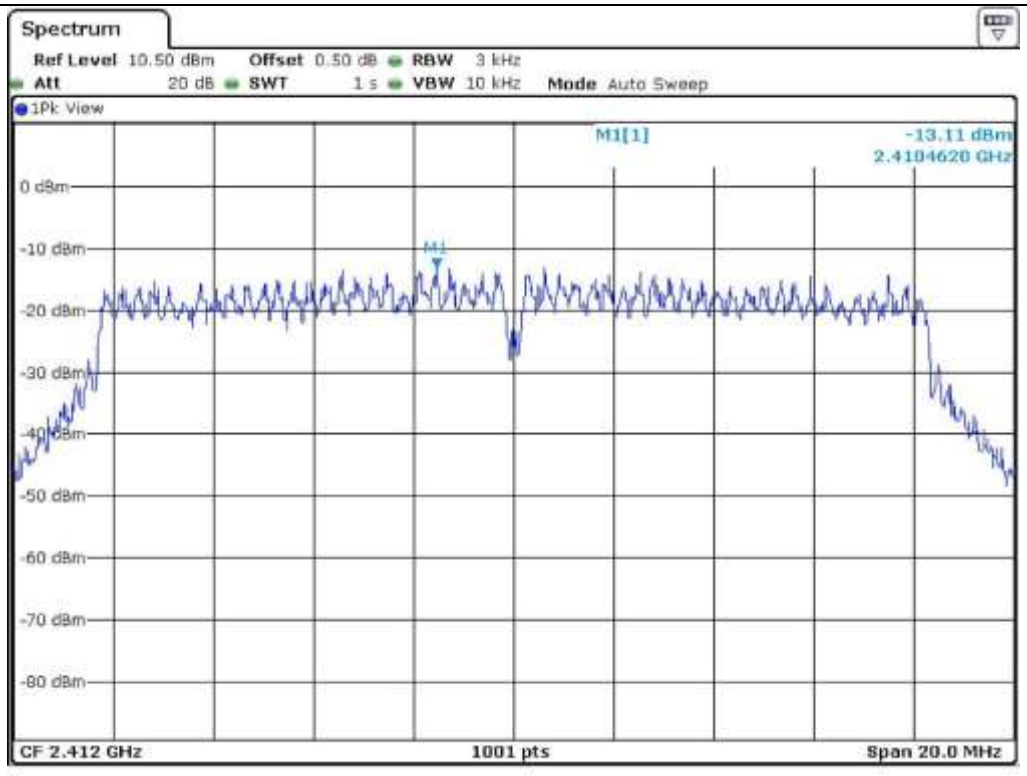
-. Test Result : Pass

-. Operating Condition : Continuous transmitting mode

CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412	-13.11	8.00	21.11
Middle	2 442	-13.86	8.00	21.86
High	2 462	-13.03	8.00	21.03

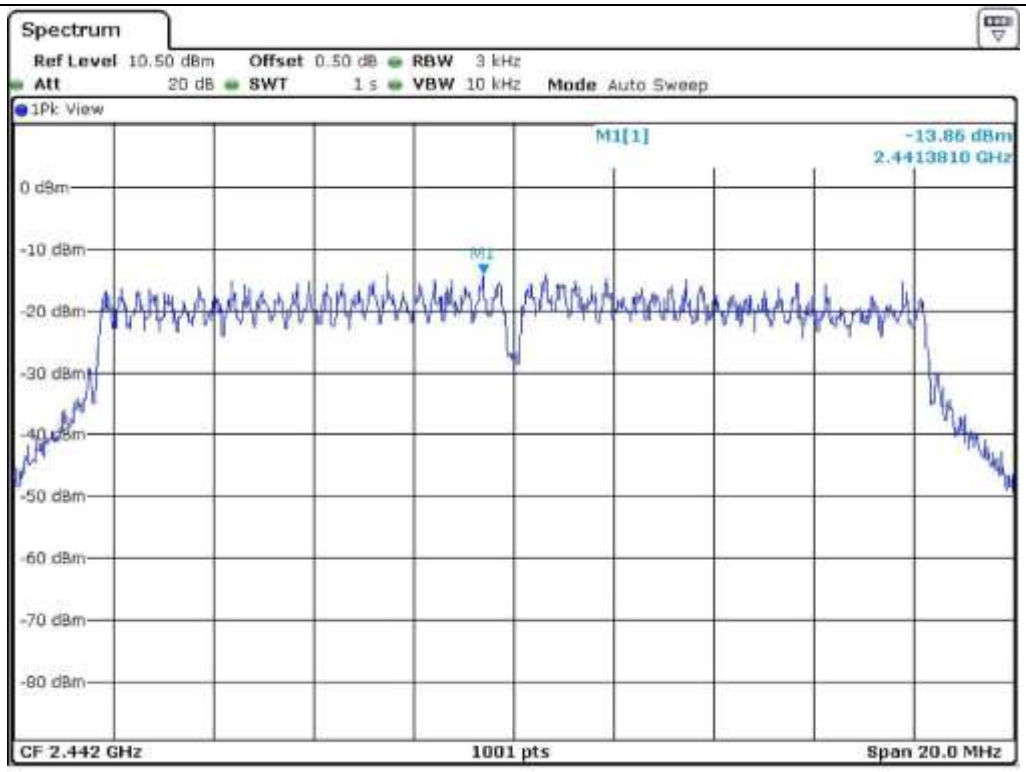
Remark. Margin = Limit – Measured value

Tested by: Tae-Ho, Kim / Senior Engineer

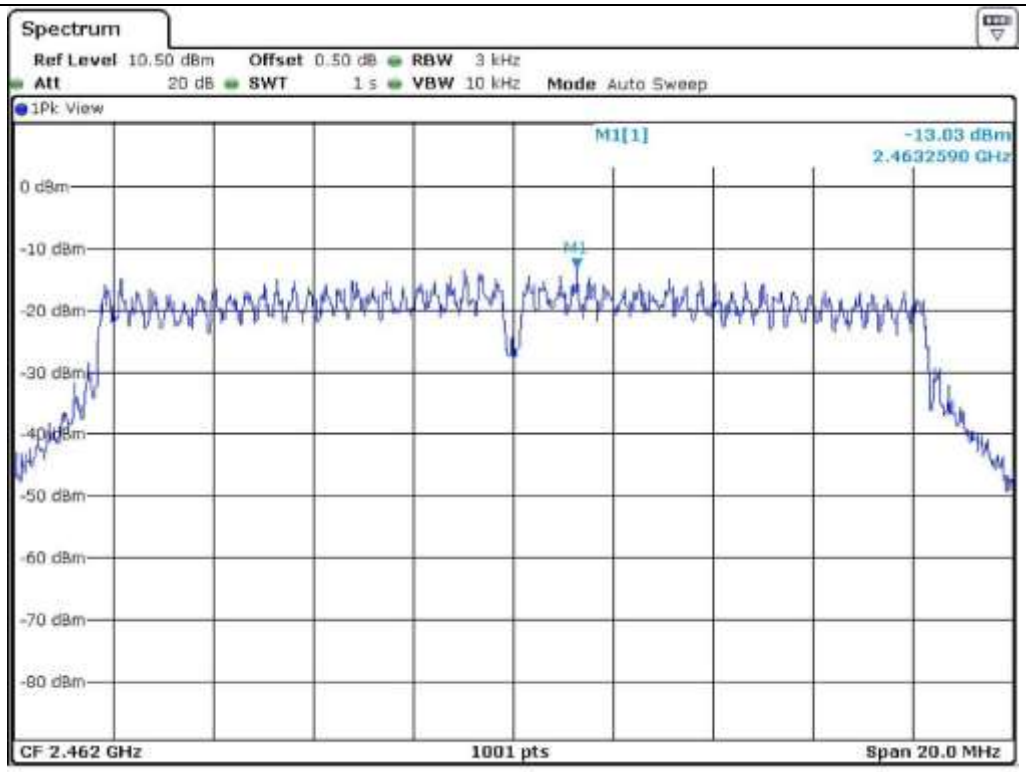


Low Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)



Middle Channel



High Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

11.5.3 Test data for Multiple transmit

-. Test Date : March 11, 2015

-. Test Result : Pass

-. Operating Condition : Continuous transmitting mode

CHANNEL	FREQUENCY(MHz)	CALCULATED POWER (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412	-10.56	8.00	18.56
Middle	2 442	-10.50	8.00	18.50
High	2 462	-10.49	8.00	18.49

Remark 1 : Margin = Limit – Measured value

Remark 2 : Calculated Power Density = 10log ($10^{(\text{Antenna1 Power Density}/10)}+10^{(\text{Antenna2 Power Density}/10)}$)

Tested by: Tae-Ho, Kim / Senior Engineer

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

11.6 Test data for 802.11n_HT20 WLAN Mode

11.6.1 Test data for Antenna 0

-. Test Date : March 11, 2015

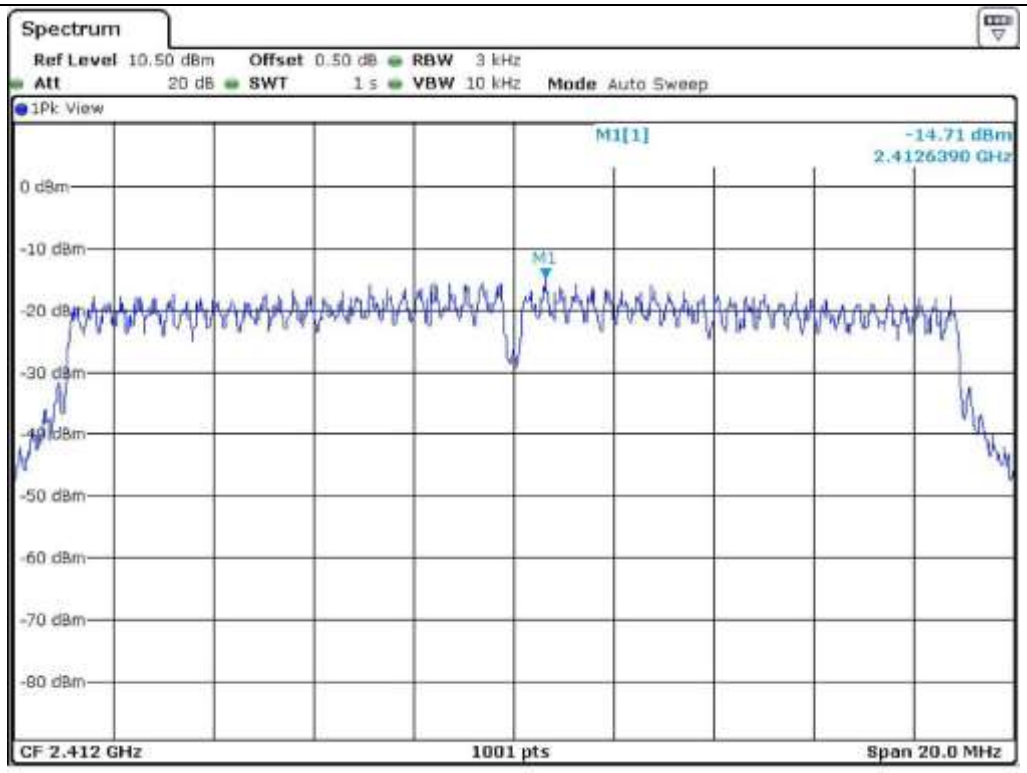
-. Test Result : Pass

-. Operating Condition : Continuous transmitting mode

CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412	-14.71	8.00	22.71
Middle	2 442	-15.31	8.00	23.31
High	2 462	-14.49	8.00	22.49

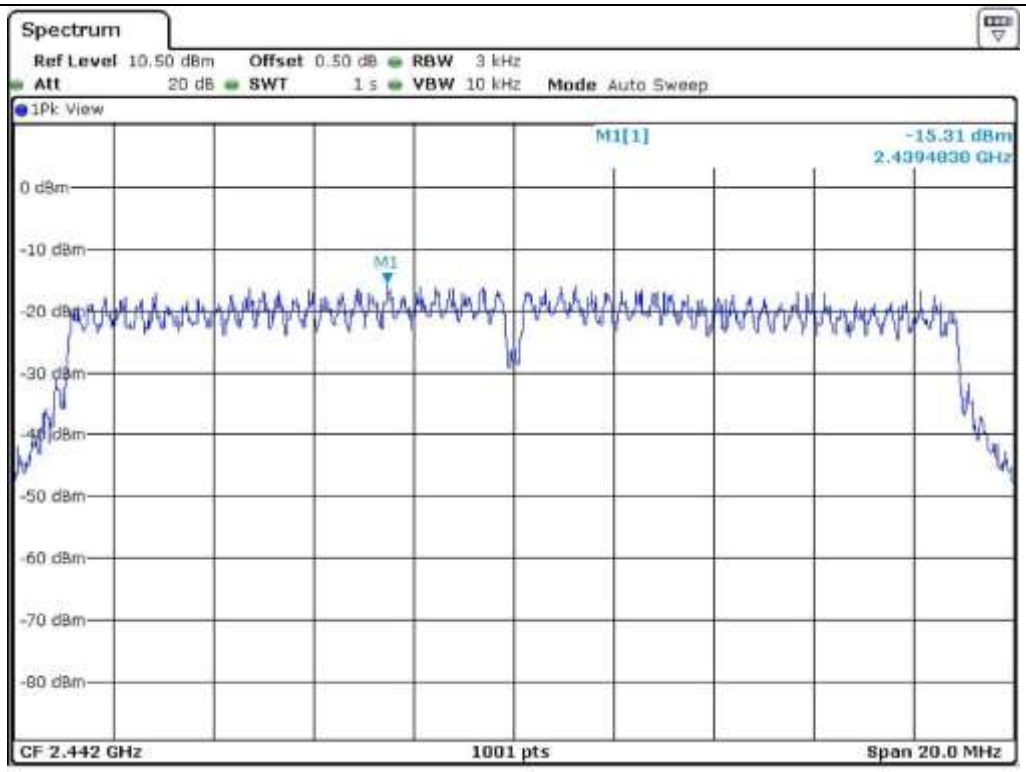
Remark. Margin = Limit – Measured value

Tested by: Tae-Ho, Kim / Senior Engineer

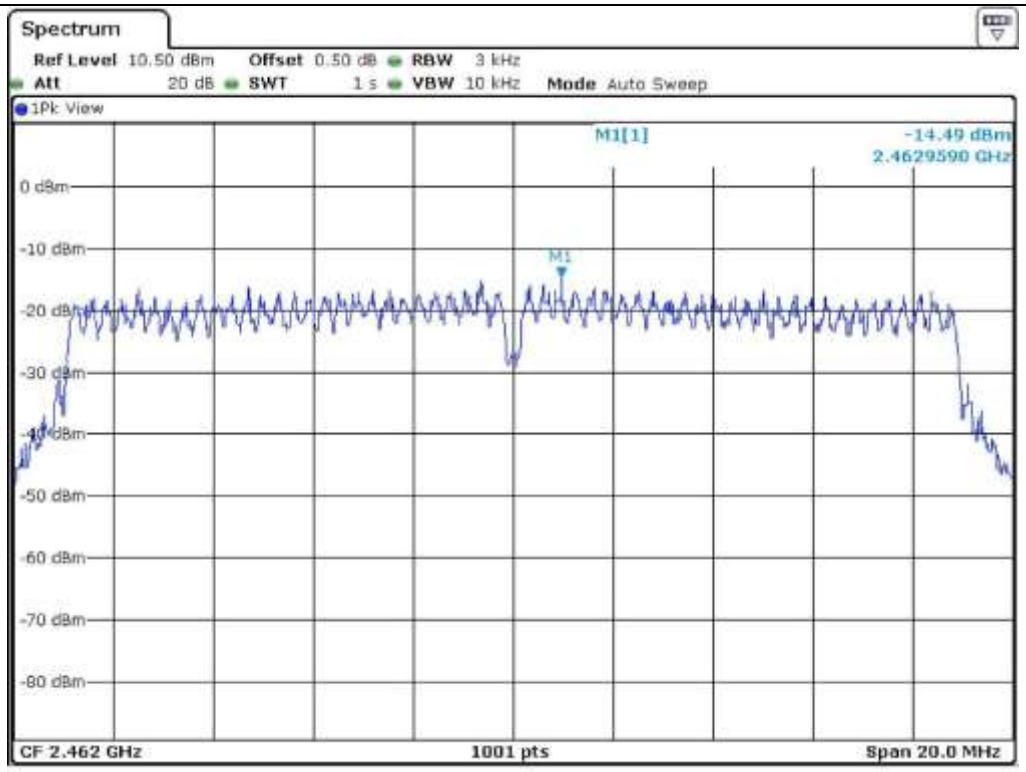


Low Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)



Middle Channel



High Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

11.6.2 Test data for Antenna 1

-. Test Date : March 11, 2015

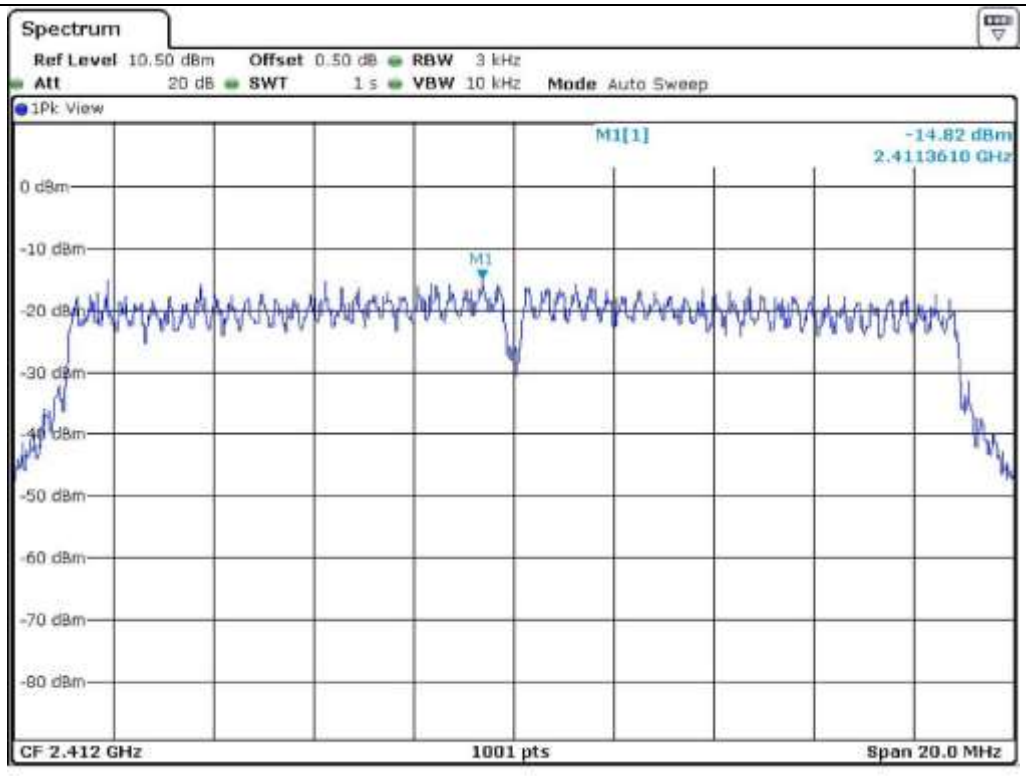
-. Test Result : Pass

-. Operating Condition : Continuous transmitting mode

CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412	-14.82	8.00	22.82
Middle	2 442	-14.15	8.00	22.15
High	2 462	-14.59	8.00	22.59

Remark. Margin = Limit – Measured value

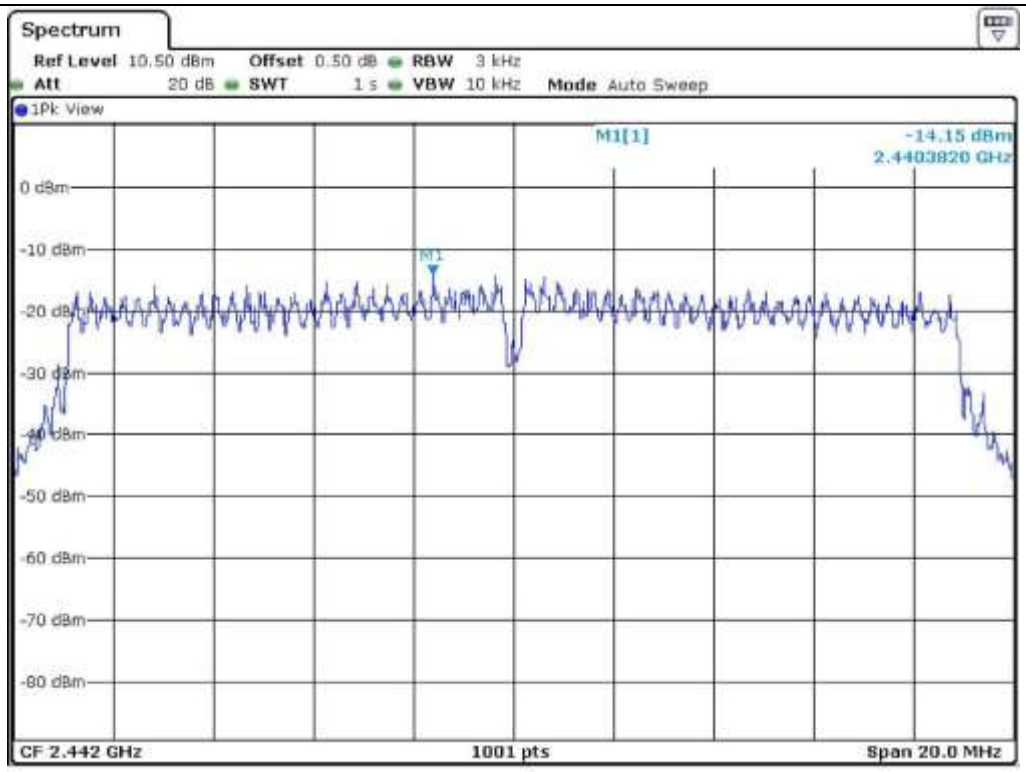
Tested by: Tae-Ho, Kim / Senior Engineer



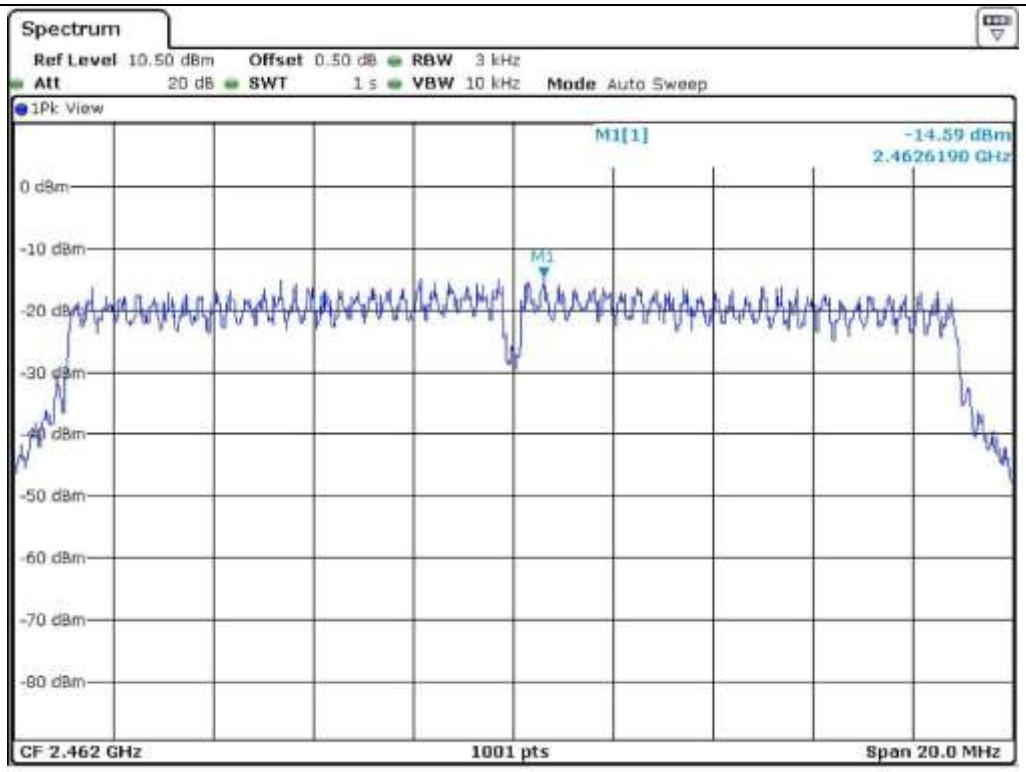
Low Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)



Middle Channel



High Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

11.6.3 Test data for Multiple transmit

-. Test Date : March 11, 2015

-. Test Result : Pass

-. Operating Condition : Continuous transmitting mode

CHANNEL	FREQUENCY(MHz)	CALCULATED POWER (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412	-11.75	8.00	19.75
Middle	2 442	-11.68	8.00	19.68
High	2 462	-11.53	8.00	19.53

Remark 1 : Margin = Limit – Measured value

Remark 2 : Calculated Power Density = $10\log(10^{(\text{Antenna1 Power Density}/10)}+10^{(\text{Antenna2 Power Density}/10)})$

Tested by: Tae-Ho, Kim / Senior Engineer

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

11.7 Test data for 802.11n_HT40 WLAN Mode

11.7.1 Test data for Antenna 0

-. Test Date : March 11, 2015

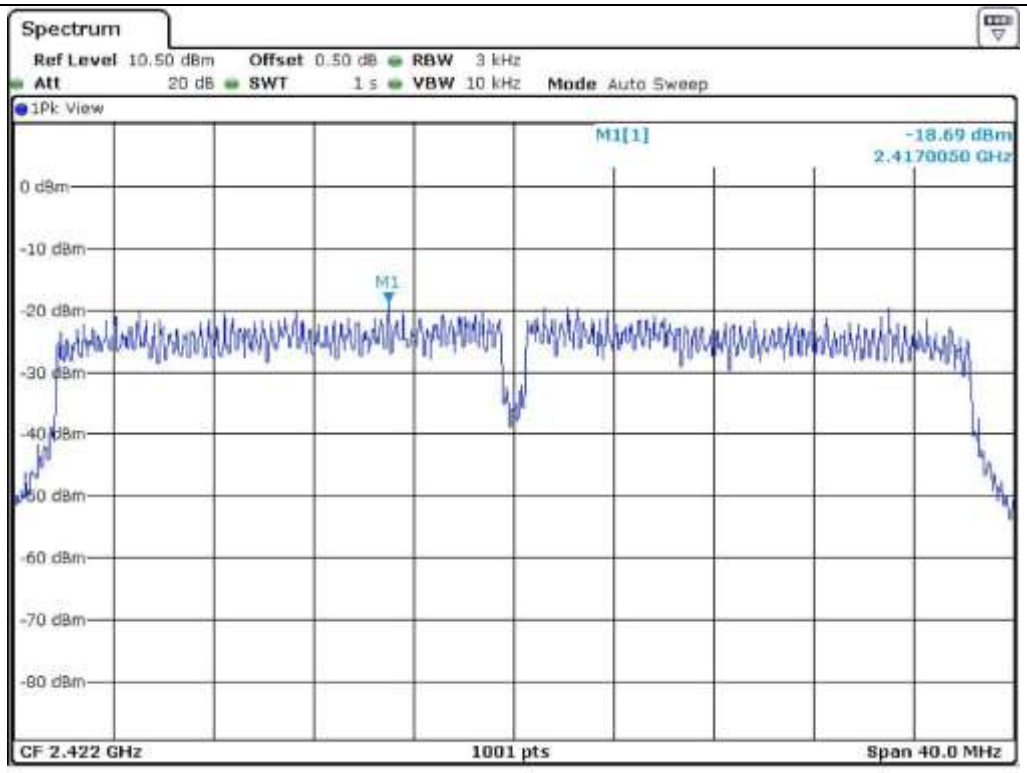
-. Test Result : Pass

-. Operating Condition : Continuous transmitting mode

CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 422	-18.69	8.00	26.69
Middle	2 442	-18.25	8.00	26.25
High	2 452	-18.10	8.00	26.10

Remark. Margin = Limit – Measured value

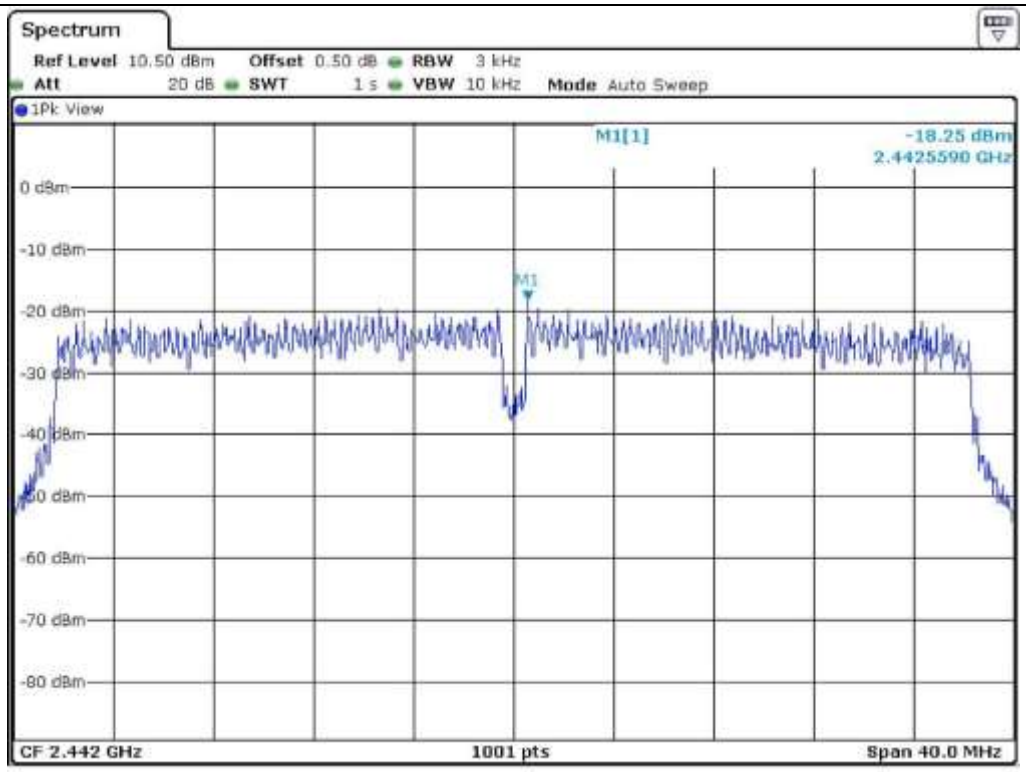
Tested by: Tae-Ho, Kim / Senior Engineer



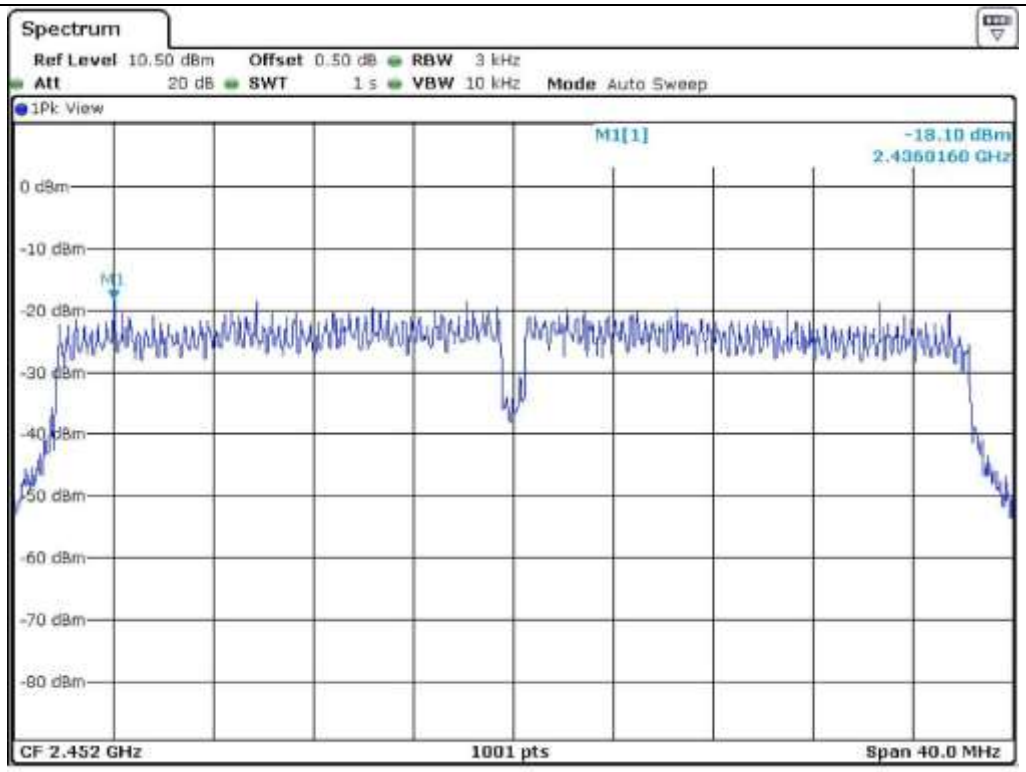
Low Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)



Middle Channel



High Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

11.7.2 Test data for Antenna 1

-. Test Date : March 11, 2015

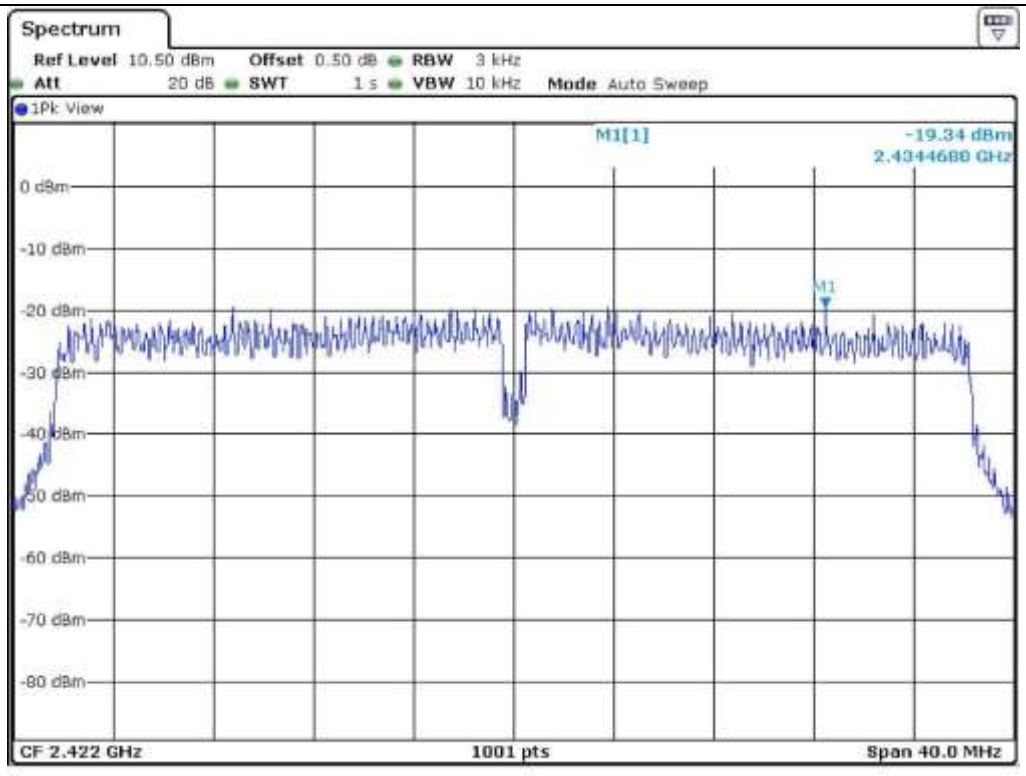
-. Test Result : Pass

-. Operating Condition : Continuous transmitting mode

CHANNEL	FREQUENCY(MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 422	-19.34	8.00	27.34
Middle	2 442	-19.43	8.00	27.43
High	2 452	-18.78	8.00	26.78

Remark. Margin = Limit – Measured value

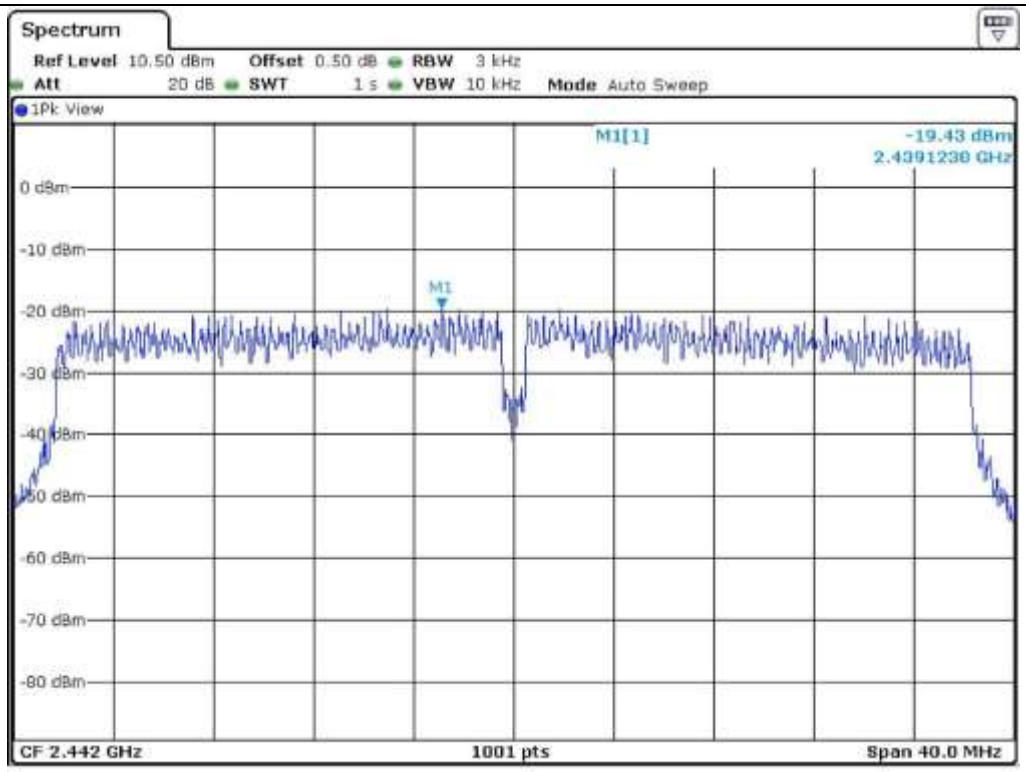
Tested by: Tae-Ho, Kim / Senior Engineer



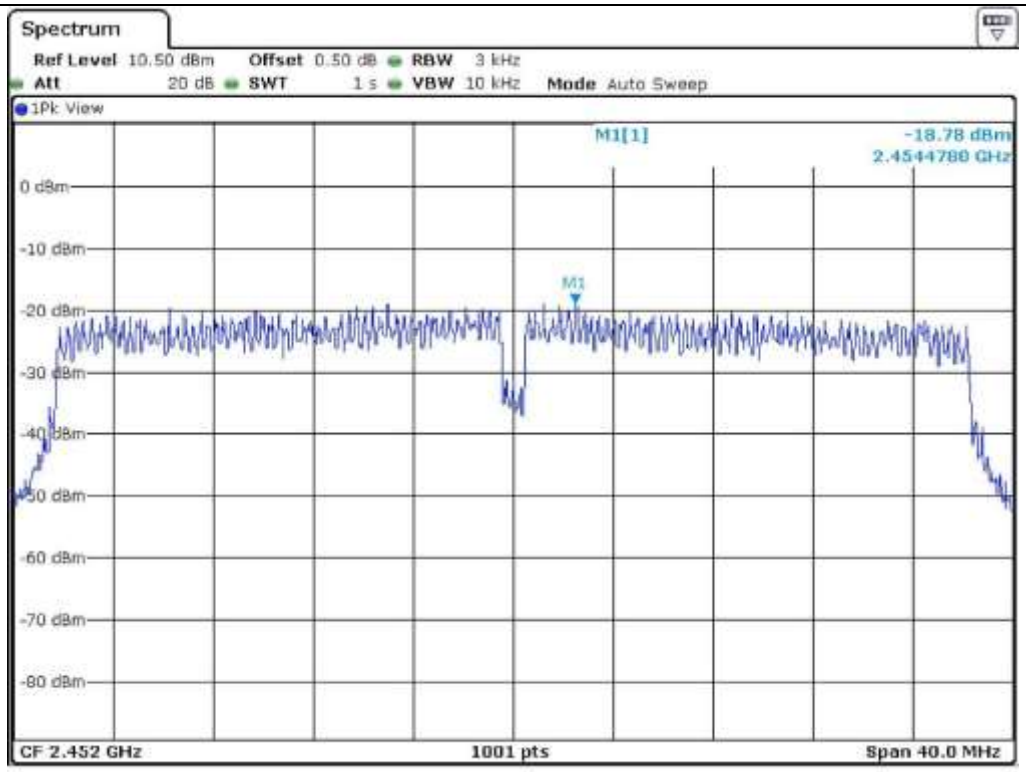
Low Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)



Middle Channel



High Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

11.7.3 Test data for Multiple transmit

-. Test Date : March 11, 2015

-. Test Result : Pass

-. Operating Condition : Continuous transmitting mode

CHANNEL	FREQUENCY(MHz)	CALCULATED POWER (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 422	-15.99	8.00	23.99
Middle	2 442	-15.79	8.00	23.79
High	2 452	-15.42	8.00	23.42

Remark 1 : Margin = Limit – Measured value

Remark 2 : Calculated Power Density = 10log ($10^{(\text{Antenna1 Power Density}/10)}+10^{(\text{Antenna2 Power Density}/10)}$)

Tested by: Tae-Ho, Kim / Senior Engineer

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

12. RADIATED EMISSION TEST

12.1 Operating environment

Temperature : 20 ℃

Relative humidity : 45 % R.H.

12.2 Test set-up

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

The frequency spectrum from 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.

12.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.(Interval)
■ -	FSV40	Rohde & Schwarz	Signal Analyzer	101009	Jul. 30, 2014 (1Y)
■ -	ESCI	Rohde & Schwarz	Test Receiver	101012	Nov. 03, 2014 (1Y)
■ -	310N	Sonoma Instrument	Pre-Amplifier	312544	Apr. 28, 2014 (1Y)
■ -	SCU-18	Rohde & Schwarz	Pre-Amplifier	10041	Nov. 25, 2014 (1Y)
■ -	DT3000	Innco System	Turn Table	930611	N/A
■ -	MA4000-EP	Innco System	Antenna Master	3320611	N/A
■ -	VULB9163	Schwarzbeck	TRILOG Broadband Antenna	9163-421	Jul. 10, 2014 (2Y)
■ -	BBHA9120D	Schwarzbeck	Horn Antenna	BBHA9120D294	Sep. 05, 2013 (2Y)
■ -	BBHA9170	Schwarzbeck	Horn Antenna	BBHA9170178	Sep. 05, 2013 (2Y)

All test equipment used is calibrated on a regular basis.

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EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

12.4 Test data for 802.11b WLAN Mode

12.4.1 Test data

12.4.1.1 Test data for 30 MHz ~ 1 000 MHz

Humidity Level : 42.2 % R.H. Temperature: 22.0 ℃

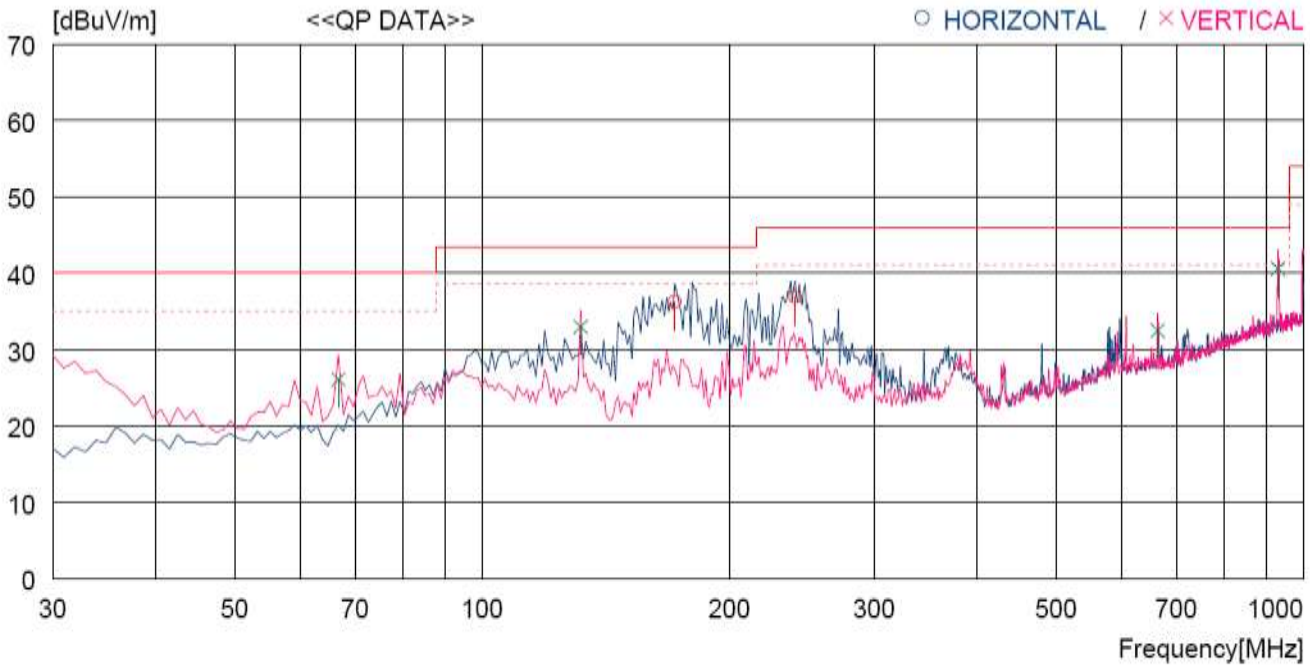
Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.247

Result : PASSED

EUT : Wi-Fi module Date: March 11, 2015

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

-.Ant0, Ant1 and Multiple transmit with Low, Middle and High Channels were tested, but the worst data were recorded.



No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	171.620	51.1	9.6	8.6	33.0	36.3	43.5	7.2	200	359
2	240.490	47.5	13.3	9.1	33.0	36.9	46.0	9.1	100	8
----- Vertical ------										
3	66.860	40.2	11.4	7.6	33.1	26.1	40.0	13.9	100	359
4	131.850	47.8	10.1	8.2	33.1	33.0	43.5	10.5	200	300
5	664.376	33.8	20.6	11.4	33.3	32.5	46.0	13.5	100	359
6	931.118	36.7	23.6	12.5	32.2	40.6	46.0	5.4	100	359

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EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

12.4.1.2 Test data for Below 30 MHz

-. Test Date : March 11, 2015

-. 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.									

12.4.1.3 Test data for above 1 GHz

-. Test Date : March 11, 2015

-. 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 / Project Engineer

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

12.5 Test data for 802.11g WLAN Mode

12.5.1Test data

12.5.1.1 Test data for 30 MHz ~ 1 000 MHz

Humidity Level : 42.2 % R.H. Temperature: 22.0 ℃

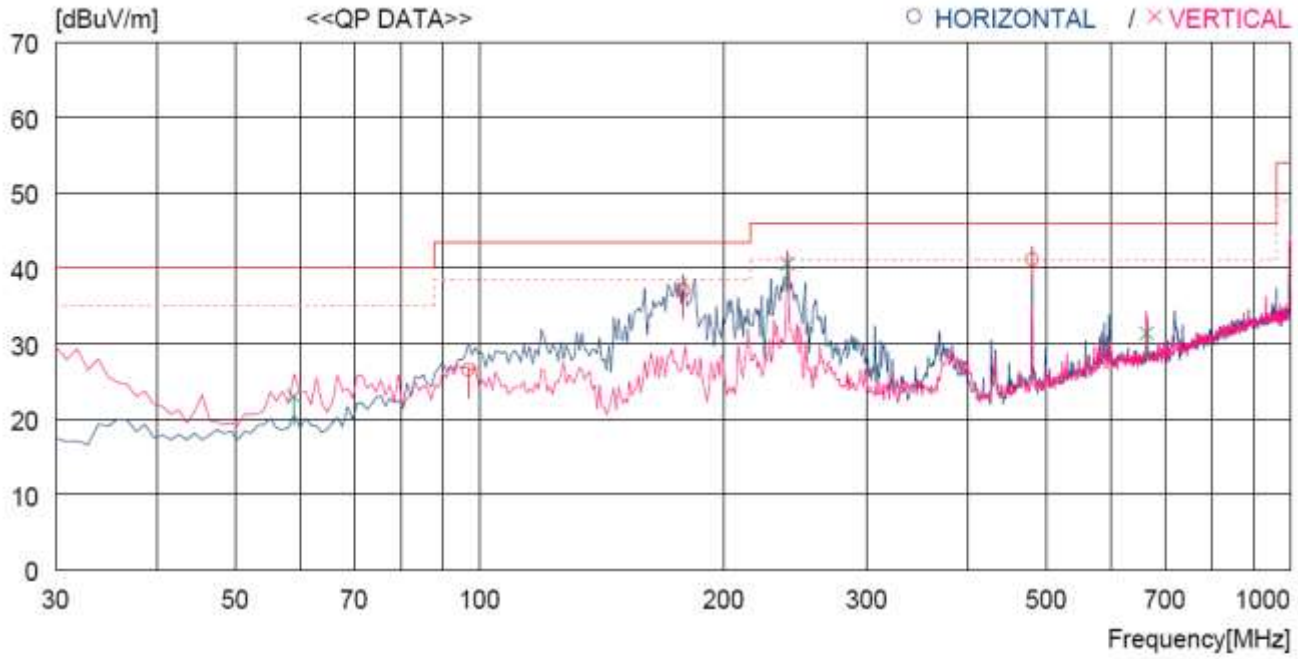
Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.247

Result : PASSED

EUT : Wi-Fi module Date: March 11, 2015

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

-.Ant0, Ant1 and Multiple transmit with Low, Middle and High Channels were tested, but the worst data were recorded.



No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	96.930	38.9	12.9	7.9	33.1	26.6	43.5	16.9	200	0
2	178.410	51.7	9.7	8.7	33.0	37.1	43.5	6.4	100	359
3	480.081	45.7	18.1	10.5	33.1	41.2	46.0	4.8	200	0
----- Vertical ------										
4	59.100	34.4	14.2	7.5	33.1	23.0	40.0	17.0	100	0
5	239.520	51.2	13.3	9.1	33.0	40.6	46.0	5.4	200	357
6	664.376	32.7	20.6	11.4	33.3	31.4	46.0	14.6	100	101

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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12.5.1.2 Test data for Below 30 MHz

-. Test Date : March 11, 2015

-. 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.									

12.4.1.3 Test data for above 1 GHz

-. Test Date : March 11, 2015

-. 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 / Project Engineer

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

12.6 Test data for 802.11n_HT20 WLAN Mode

12.6.1Test data for Antenna 0

12.6.1.1 Test data for 30 MHz ~ 1 000 MHz

Humidity Level : 42.2 % R.H. Temperature: 22.0 ℃

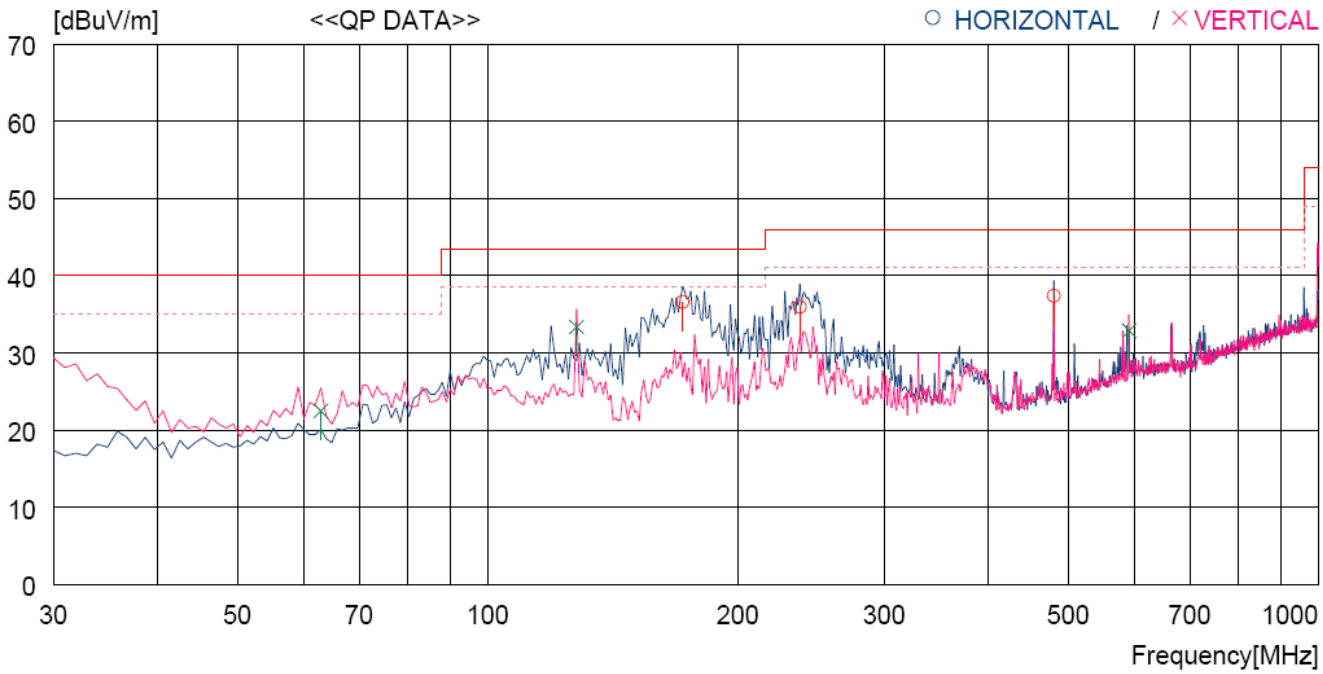
Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.247

Result : PASSED

EUT : Wi-Fi module Date: March 11, 2015

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

-.Ant0, Ant1 and Multiple transmit with Low, Middle and High Channels were tested, but the worst data were recorded.



No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	171.620	51.4	9.6	8.6	33.0	36.6	43.5	6.9	100	6
2	237.580	46.7	13.2	9.1	33.0	36.0	46.0	10.0	100	359
3	480.081	41.9	18.1	10.5	33.1	37.4	46.0	8.6	100	359
----- Vertical ------										
4	62.980	35.1	12.9	7.6	33.1	22.5	40.0	17.5	100	53
5	127.970	47.8	10.5	8.2	33.1	33.4	43.5	10.1	100	0
6	591.628	34.9	20.2	11.1	33.3	32.9	46.0	13.1	100	342

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EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

12.6.1.2 Test data for Below 30 MHz

-. Test Date : March 11, 2015

-. 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.									

12.4.1.3 Test data for above 1 GHz

-. Test Date : March 11, 2015

-. 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 / Project Engineer

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

12.7 Test data for 802.11n_HT40 WLAN Mode

12.7.1Test data for Antenna 0

12.7.1.1 Test data for 30 MHz ~ 1 000 MHz

Humidity Level : 42.2 % R.H. Temperature: 22.0 ℃

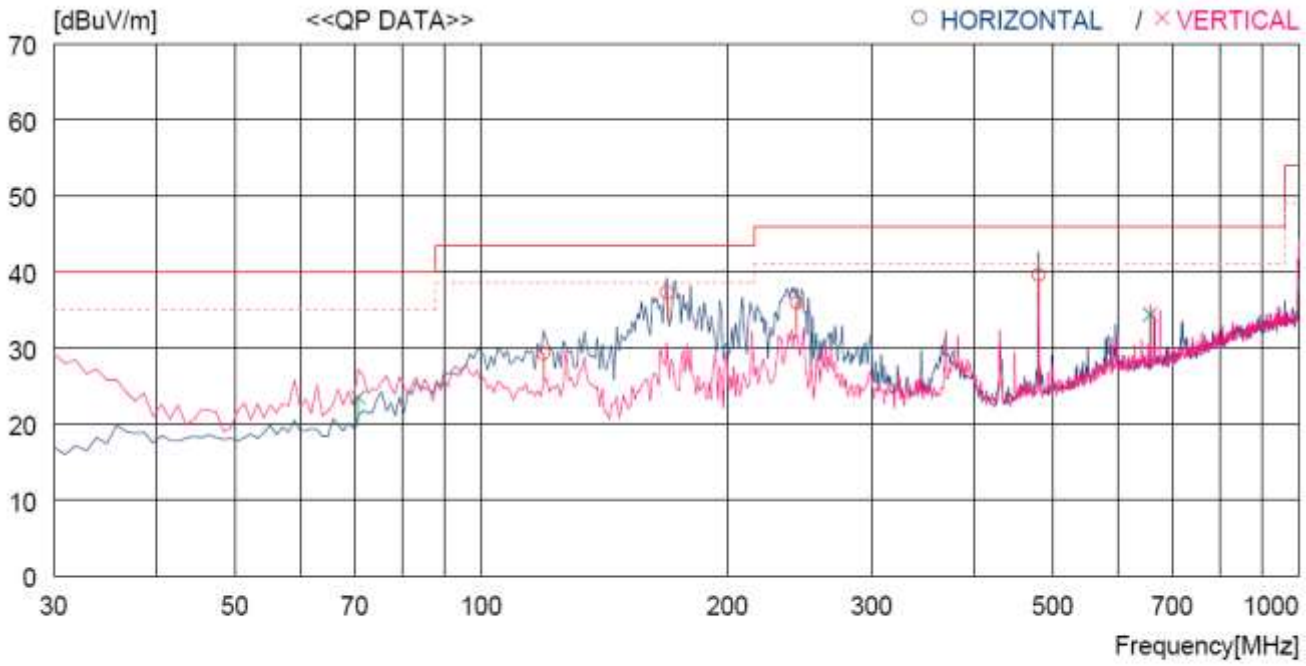
Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.247

Result : PASSED

EUT : Wi-Fi module Date: March 11, 2015

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

-.Ant0, Ant1 and Multiple transmit with Low, Middle and High Channels were tested, but the worst data were recorded.



No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	119.240	42.8	11.5	8.1	33.1	29.3	43.5	14.2	200	0
2	168.710	52.1	9.6	8.6	33.0	37.3	43.5	6.2	200	0
3	243.400	46.4	13.4	9.1	33.0	35.9	46.0	10.1	100	359
4	480.081	44.1	18.1	10.5	33.1	39.6	46.0	6.4	200	14
----- Vertical ------										
5	70.740	38.9	10.1	7.6	33.1	23.5	40.0	16.5	100	66
6	657.586	35.7	20.6	11.4	33.3	34.4	46.0	11.6	100	0

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EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

12.7.1.2 Test data for Below 30 MHz

-. Test Date : March 11, 2015

-. 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.									

12.4.1.3 Test data for above 1 GHz

-. Test Date : March 11, 2015

-. 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 / Project Engineer

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

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13. CONDUCTED EMISSION TEST

13.1 Operating environment

Temperature : 27 ℃

Relative humidity : 46 % R.H.

13.2 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.

13.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
■ -	ESPI	Rohde & Schwarz	EMI Test Receiver	101278	Nov. 03, 2014 (1Y)
□ -	ESHS10	Rohde & Schwarz	EMI Test Receiver	834467/007	Jul. 15, 2014 (1Y)
□	NSLK8128	Schwarzbeck	AMN	8128-216	Apr. 11, 2014 (1Y)
■ -	NSLK8126	Schwarzbeck	AMN	8126-404	Jul. 11, 2014 (1Y)
□ -	3825/2	EMCO	AMN	9109-1869	Apr. 29, 2014 (1Y)
■ --	3825/2	EMCO	AMN	9109-1867	Apr. 29, 2014 (1Y)

All test equipment used is calibrated on a regular basis.

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

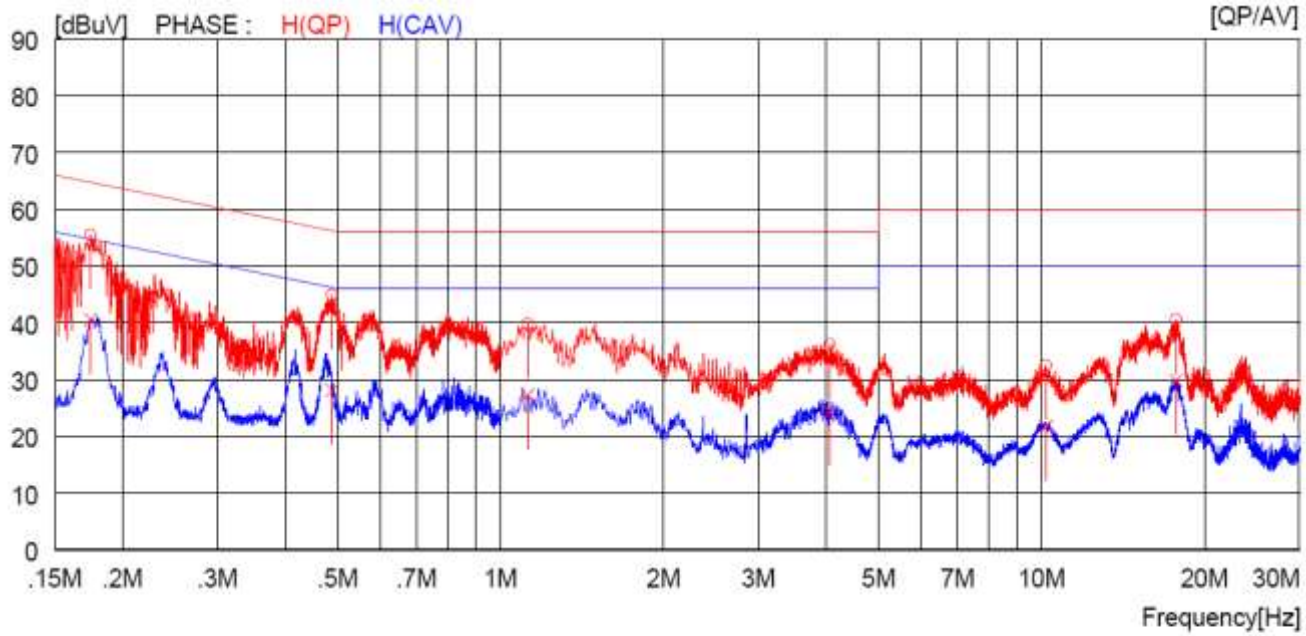
13.4 Test data

-. Test Date : March 11, 2015

-. Resolution bandwidth : 9 kHz

-. Frequency range : 0.15 MHz ~ 30 MHz

-. Tested Line : HOT LINE



NO	FREQ	READING QP [dBuV]	READING AV [dBuV]	C.FACTOR QP [dB]	C.FACTOR AV [dBuV]	RESULT QP [dBuV]	RESULT AV [dBuV]	LIMIT QP [dBuV]	LIMIT AV [dBuV]	MARGIN QP [dBuV]	MARGIN AV [dBuV]	PHASE
1	0.17500	45.6	----	9.9		55.5	----	64.7	----	9.2	----	H(QP)
2	0.48900	35.0	----	9.9		44.9	----	56.2	----	11.3	----	H(QP)
3	1.12400	29.8	----	10.0		39.8	----	56.0	----	16.2	----	H(QP)
4	4.06400	26.1	----	10.0		36.1	----	56.0	----	19.9	----	H(QP)
5	10.21000	22.3	----	10.2		32.5	----	60.0	----	27.5	----	H(QP)
6	17.73000	30.0	----	10.6		40.6	----	60.0	----	19.4	----	H(QP)
7	0.17500	----	30.6	9.9		----	40.5	----	54.7	----	14.2	H(CAV)
8	0.48900	----	18.2	9.9		----	28.1	----	46.2	----	18.1	H(CAV)
9	1.12400	----	17.2	10.0		----	27.2	----	46.0	----	18.8	H(CAV)
10	4.06400	----	14.4	10.0		----	24.4	----	46.0	----	21.6	H(CAV)
11	10.21000	----	11.6	10.2		----	21.8	----	50.0	----	28.2	H(CAV)
12	17.73000	----	19.2	10.6		----	29.8	----	50.0	----	20.2	H(CAV)

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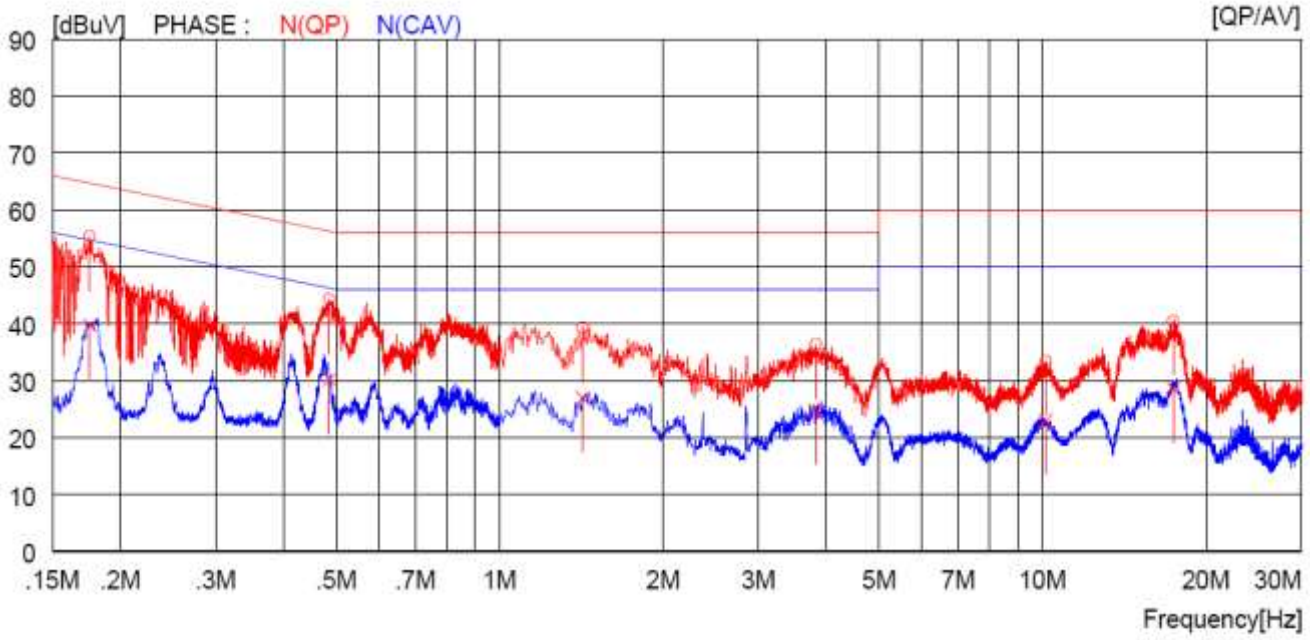
-. Tested Line : NEUTRAL LINE



NO	FREQ [MHz]	READING QP [dBuV]	READING AV [dBuV]	C.FACTOR QP [dB]	C.FACTOR AV [dBuV]	RESULT QP [dBuV]	RESULT AV [dBuV]	LIMIT QP [dBuV]	LIMIT AV [dBuV]	MARGIN QP [dBuV]	MARGIN AV [dBuV]	PHASE
1	0.17600	45.4	----	9.9		55.3	----	64.7	----	9.4	----	N(QP)
2	0.48600	34.4	----	9.9		44.3	----	56.2	----	11.9	----	N(QP)
3	1.42400	29.3	----	10.0		39.3	----	56.0	----	16.7	----	N(QP)
4	3.82800	26.4	----	10.0		36.4	----	56.0	----	19.6	----	N(QP)
5	10.17000	23.2	----	10.2		33.4	----	60.0	----	26.6	----	N(QP)
6	17.44000	29.9	----	10.6		40.5	----	60.0	----	19.5	----	N(QP)
7	0.17600	----	29.9	9.9		----	39.8	----	54.7	----	14.9	N(CAV)
8	0.48600	----	20.3	9.9		----	30.2	----	46.2	----	16.0	N(CAV)
9	1.42400	----	17.0	10.0		----	27.0	----	46.0	----	19.0	N(CAV)
10	3.82800	----	14.8	10.0		----	24.8	----	46.0	----	21.2	N(CAV)
11	10.17000	----	12.8	10.2		----	23.0	----	50.0	----	27.0	N(CAV)
12	17.44000	----	18.0	10.6		----	28.6	----	50.0	----	21.4	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 / Project Engineer

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