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

Test Report No.	**: OT-182-RWD-050**
AGR No.	**: A182A-203**
Applicant	**: Samsung Electronics Co Ltd**
Address	**: 19 Chapin Rd., Building D, Pine Brook, New Jersey, 07058, United States**
Manufacturer	**: Samsung Electronics Co., Ltd.**
Address	**: Maetan dong 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do 16677, Korea**
Type of Equipment	**: Wi-Fi Transceiver**
FCC ID.	**: A3LWDN221M**
Model Name	**: WDN221M**
Multiple Model Name	**: N/A**
Serial number	**: N/A**
Total page of Report	**: 168 pages (including this page)**
Date of Incoming	**: February 12, 2018**
Date of issue	**: February 26, 2018**

SUMMARY

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

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

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

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

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

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

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

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REVISION HISTORY

Issued Report No.	Issued Date	Revisions	Effect Section
OT-182-RWD-050	February 26, 2018	Initial Issue	All

1. VERIFICATION OF COMPLIANCE

Applicant	: Samsung Electronics Co Ltd
Address	: 19 Chapin Rd., Building D, Pine Brook, New Jersey, 07058, United States
Contact Person	: minhyung cho / Senior Engineer
Telephone No.	: +82-31-277-2688
FCC ID	: A3LWDN221M
Model Name	: WDN221M
Serial Number	: N/A
Date	: February 26, 2018

EQUIPMENT CLASS	DTS – DIGITAL TRNSMISSION SYSTEM
E.U.T. DESCRIPTION	Modular Transmitter, Wi-Fi Transceiver
THIS REPORT CONCERNS	Original Grant
MEASUREMENT PROCEDURES	ANSI C63.10: 2013
TYPE OF EQUIPMENT TESTED	Pre-Production
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	Certification
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC PART 15 SUBPART C Section 15.247 KDB 558074 D01 DTS Meas Guidance v04
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 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea

-. Site Filing:

VCCI (Voluntary Control Council for Interference) – Registration No. R-4112/ C-14617/ G-10666 / T-1842

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

-. Site Accreditation:

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

FCC (Federal Communications Commission) - Accreditation No. KR0013

RRA (Radio Research Agency) – Designation No. KR0013

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3. GENERAL INFORMATION

3.1 Product Description

The Samsung Electronics Co Ltd, Model WDN221M (referred to as the EUT in this report) is a Wi-Fi Transceiver. Product specification information described herein was obtained from product data sheet or user's manual.

DEVICE TYPE	Wi-Fi Transceiver	
Operating Frequency	2 412 MHz ~ 2 472 MHz (802.11b/g/n(HT20))	
	2 422 MHz ~ 2 462 MHz (802.11n(HT40))	
RF Output Power	Antenna 0	Wi-Fi 802.11b (18.56 dBm) Wi-Fi 802.11g (17.60 dBm) Wi-Fi 802.11n(HT20) (18.50 dBm) Wi-Fi 802.11n(HT40) (19.37 dBm)
	Antenna 1	Wi-Fi 802.11b (20.16 dBm) Wi-Fi 802.11g (18.99 dBm) Wi-Fi 802.11n(HT20) (19.12 dBm) Wi-Fi 802.11n(HT40) (18.36 dBm)
	Antenna 0 + Antenna 1	Wi-Fi 802.11n(HT20) (21.41 dBm) Wi-Fi 802.11n(HT40) (21.81 dBm)
Modulation Type	DSSS Modulation(DBPSK/DQPSK/CCK) OFDM Modulation(BPSK/QPSK/16QAM/64QAM)	
Antenna Type	Antenna 0	1.54 dBi
	Antenna 1	0.59 dBi
	Antenna 0 + Antenna 1	4.10 dBi
List of each Osc. or crystal Freq.(Freq. >= 1 MHz)	40 MHz	

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

-. None

4. EUT MODIFICATIONS

-. None

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5. SYSTEM TEST CONFIGURATION

5.1 Justification

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

DEVICE TYPE	MANUFACTURER	MODEL/PART NUMBER	FCC ID
Main Board	Samsung Electronics Co., Ltd.	SDWF-1803S BN59-000000	-

5.2 Peripheral equipment

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

Model	Manufacturer	Description	Connected to
WDN221M	Samsung Electronics Co., Ltd.	Wi-Fi Transceiver (EUT)	Notebook PC
Pavilion dv6	HP	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.

Modulation	DATA RATE	OUTPUT POWER[dBm]	
		Antenna 0	Antenna 1
802.11 b (Middle Channel)	1 Mbps	18.56	20.01
	2 Mbps	18.37	19.85
	5.5 Mbps	18.21	19.66
	11 Mbps	18.08	19.50
802.11g (Middle Channel)	6 Mbps	16.81	18.99
	9 Mbps	16.65	18.84
	12 Mbps	16.46	18.70
	18 Mbps	16.35	18.52
	24 Mbps	16.24	18.41
	36 Mbps	16.05	18.27
	48 Mbps	15.91	18.14
	54 Mbps	15.79	18.00
HT 20 (Middle Channel)	6.5 Mbps	17.57	18.88
	13 Mbps	17.39	18.69
	19.5 Mbps	17.26	18.52
	26 Mbps	17.12	18.39
	39 Mbps	16.95	18.25
	52 Mbps	16.76	18.10
	58.5 Mbps	16.61	17.97
	65 Mbps	16.50	17.85
HT 40 (Middle Channel)	13.5 Mbps	19.19	18.36
	27 Mbps	19.04	18.24
	40.5 Mbps	18.84	18.14
	54 Mbps	18.70	17.98
	81 Mbps	18.59	17.86
	108 Mbps	18.46	17.71
	121.5 Mbps	18.28	17.58
	135 Mbps	18.09	17.39

-. The worse case data rate for each modulation is determined 1 Mbps(Ant.0/Ant.1) for IEEE 802.11b, 6 Mbps(Ant.0/Ant.1) for IEEE 802.11g, 6.5 Mbps(Ant.0/Ant.1) for HT20, 13.5 Mbps(Ant.0/Ant.1) for HT40.

-. To get a maximum emission levels from the EUT, the EUT was moved throughout the XY, XZ, and YZ planes and the worst case is “XY” axis.

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5.4 Configuration of Test System

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

Radiated Emission Test: Preliminary radiated emissions test were conducted using the procedure in ANSI C63.10: 2013 to determine the worse operating conditions. Final radiated emission tests were conducted at 3 meter Semi Anechoic Chamber.

The turntable was rotated through 360 degrees and the EUT was tested by positioned three orthogonal planes to obtain the highest reading on the field strength meter. Once maximum reading was determined, the search antenna was raised and lowered in both vertical and horizontal polarization.

5.5 Antenna Requirement

For intentional device, according to section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

Antenna Construction:

The transmitter antenna of the EUT is Metal 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

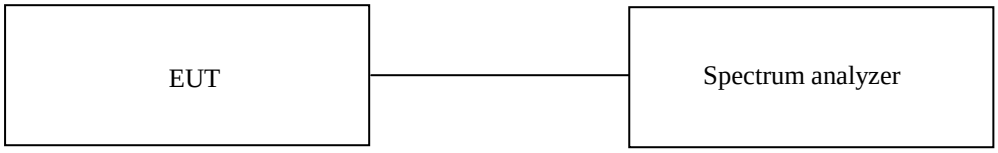
7.1 Operating environment

Temperature : 23 ℃

Relative humidity : 41 % 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	Apr. 05, 2017 (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

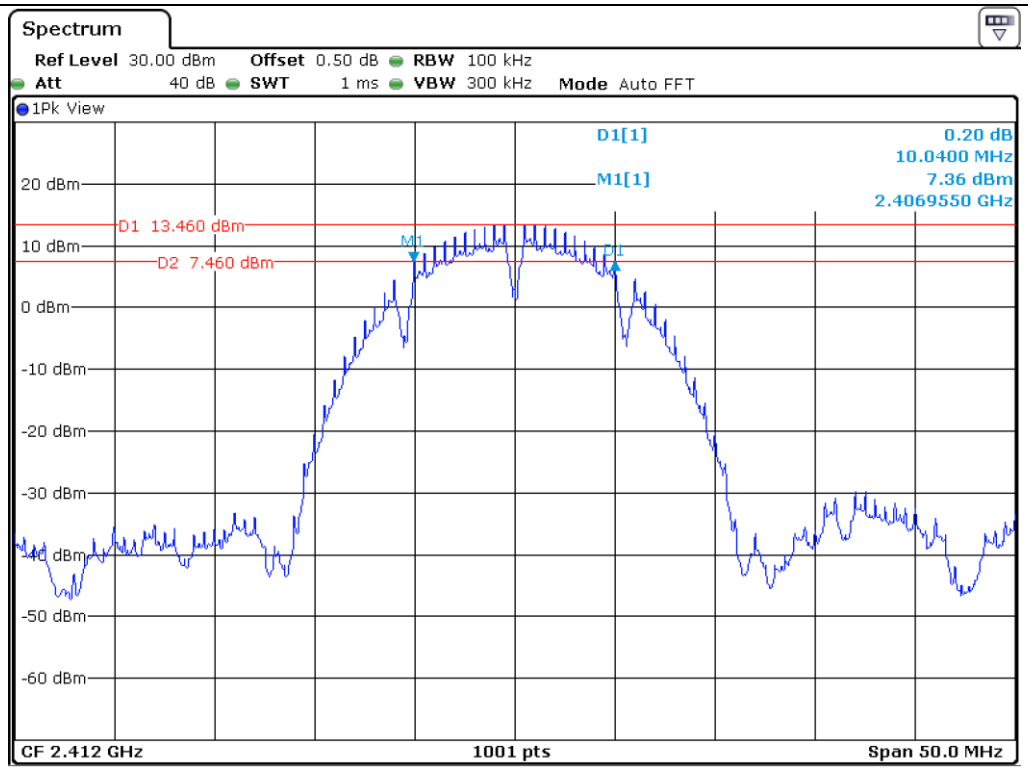
-. Test Date : February 13, 2018 ~ February 21, 2018

-. Test Result : Pass

CHANNEL	FREQUENCY (MHz)	6 dB Bandwidth (MHz)	LIMIT (MHz)	Margin (MHz)
Low	2 412.00	10.04	0.50	9.54
Middle	2 442.00	10.04	0.50	9.54
High(Channel 11)	2 462.00	10.04	0.50	9.54
High(Channel 12)	2 467.00	10.04	0.50	9.54
High(Channel 13)	2 472.00	10.04	0.50	9.54

Remark. Margin = Measured Value - Limit

Tested by: Hyung-Kwon, Oh / Assistant Manager



Low Channel

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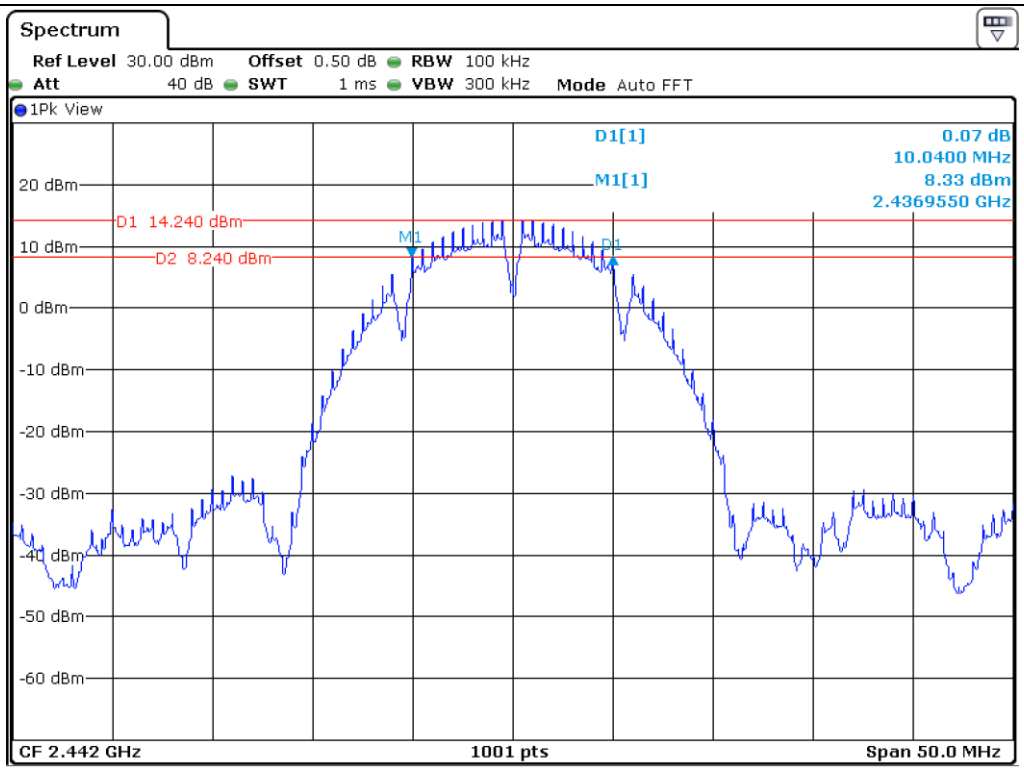
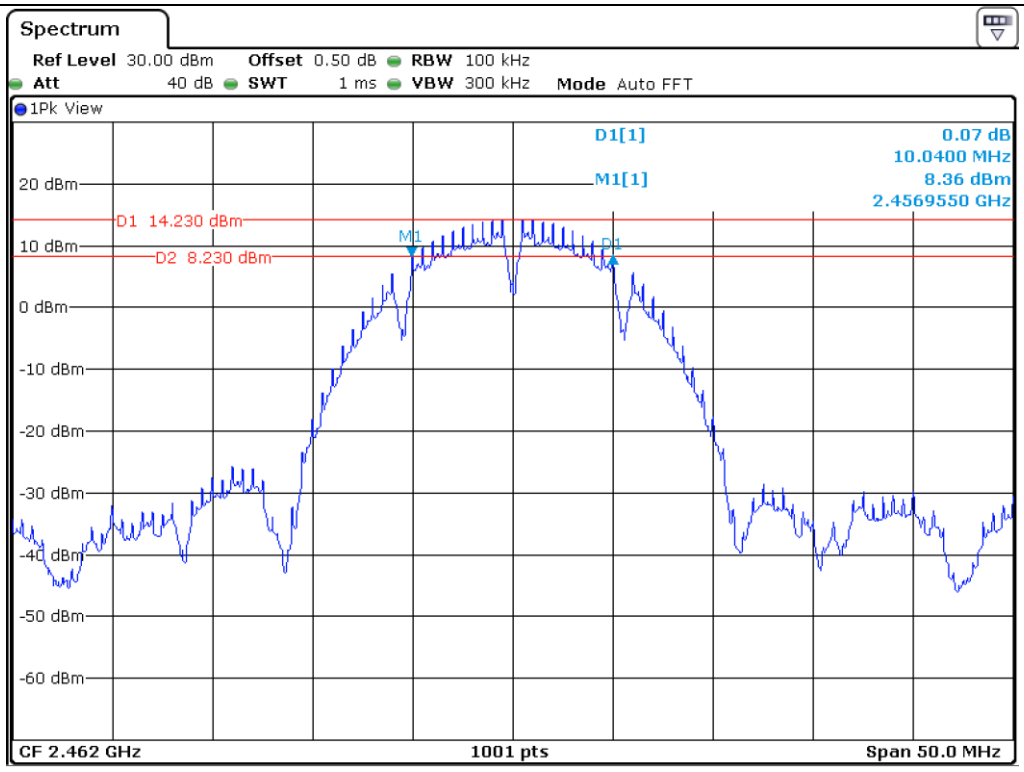


Middle Channel



High Channel(Channel 11)

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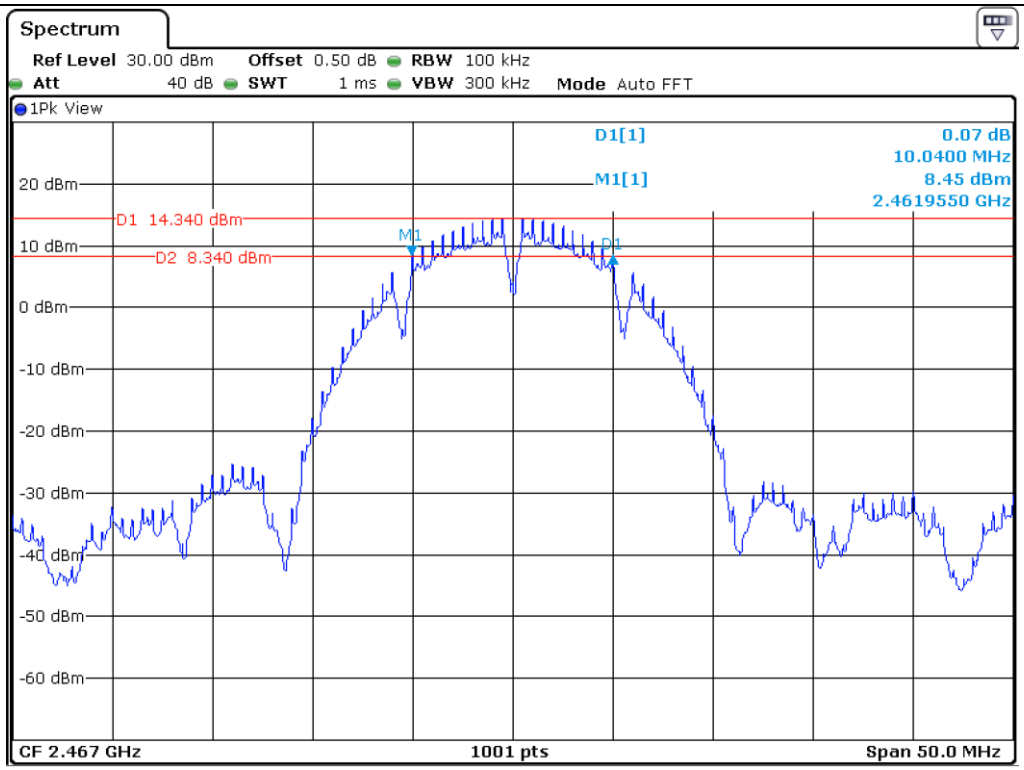
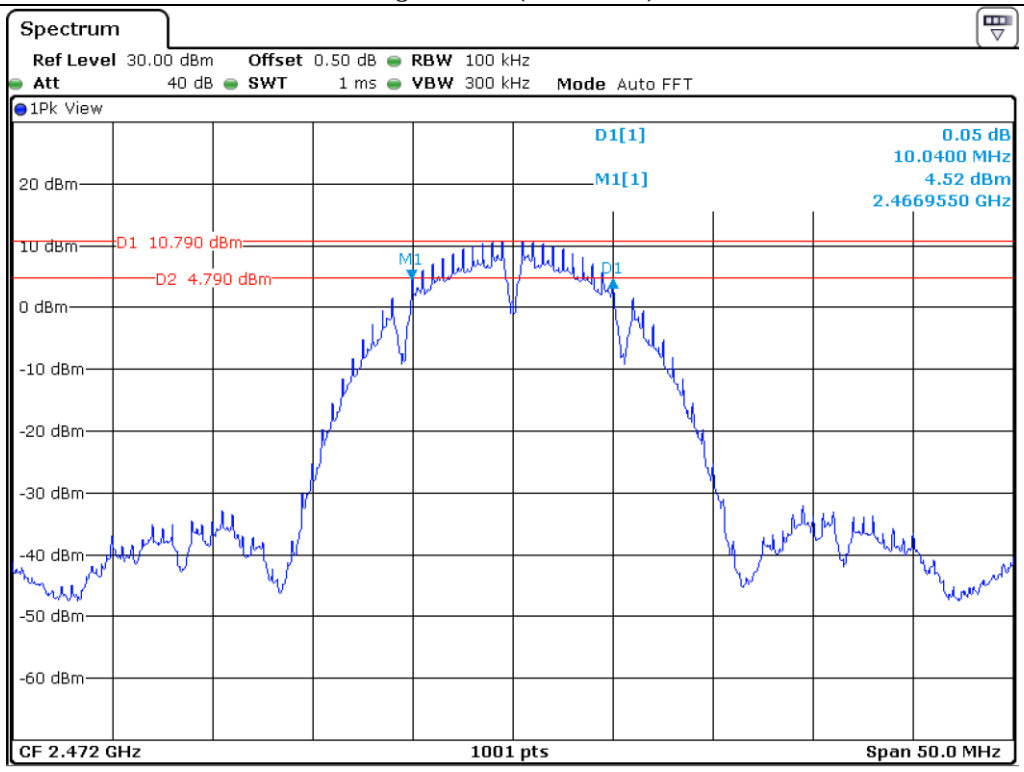


High Channel(Channel 12)



High Channel(Channel 13)

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7.4.2 Test data for Antenna 1

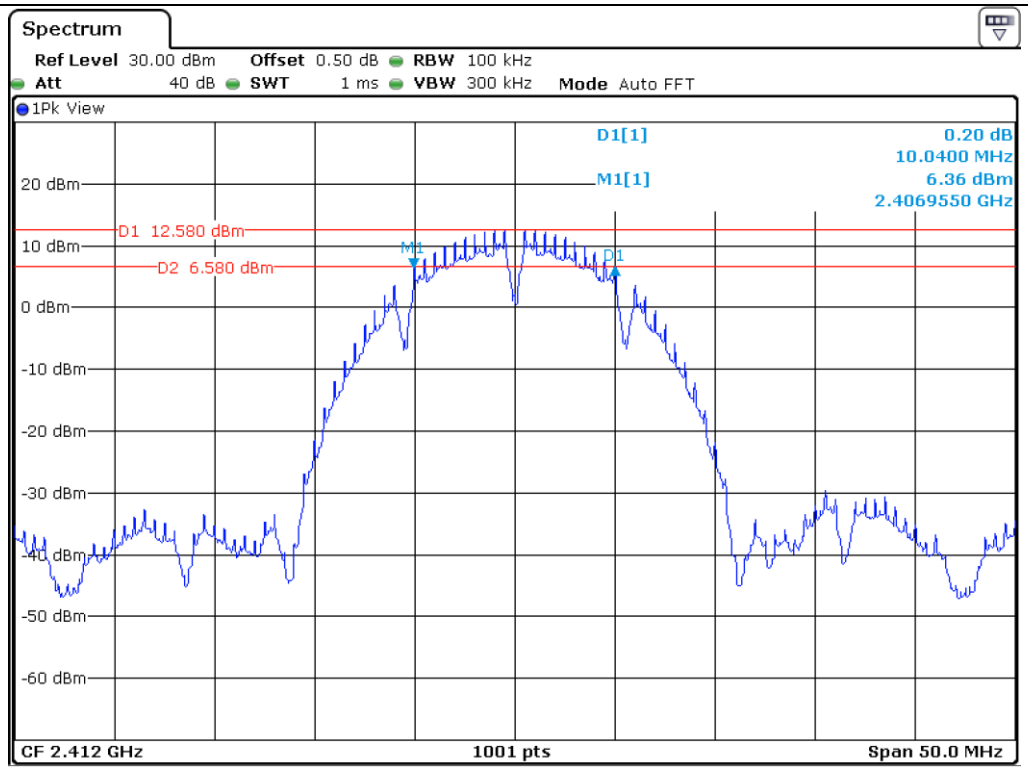
-. Test Date : February 13, 2018 ~ February 21, 2018

-. Test Result : Pass

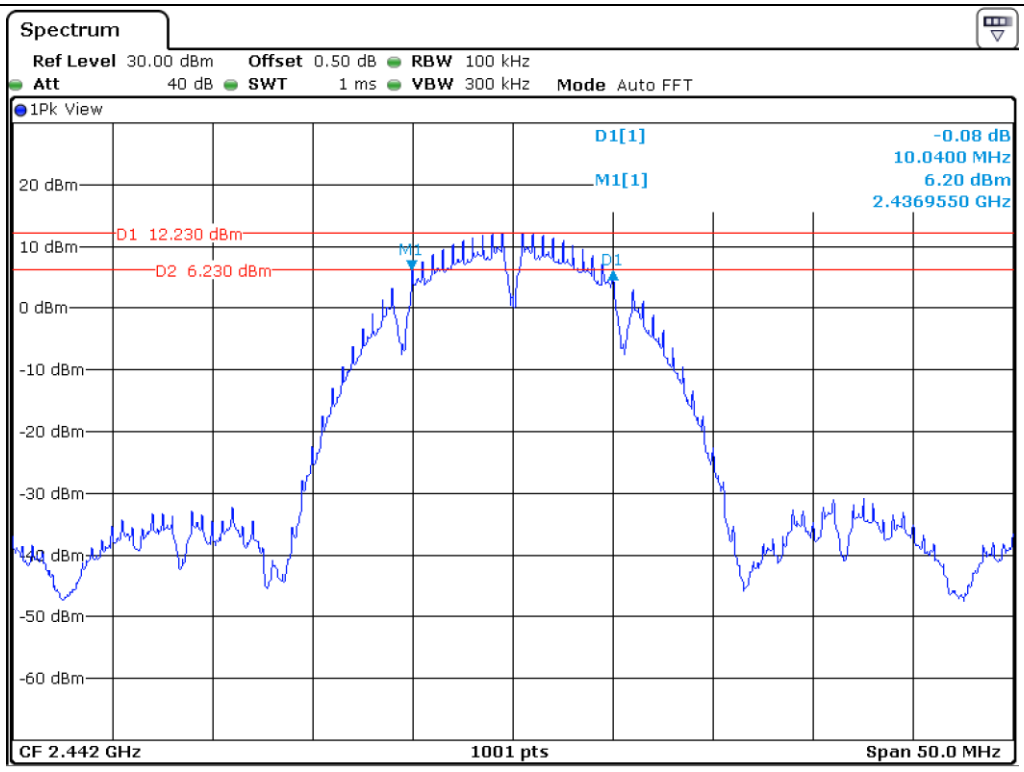
CHANNEL	FREQUENCY (MHz)	6 dB Bandwidth (MHz)	LIMIT (MHz)	Margin (MHz)
Low	2 412.00	10.04	0.50	9.54
Middle	2 442.00	10.04	0.50	9.54
High(Channel 11)	2 462.00	10.04	0.50	9.54
High(Channel 12)	2 467.00	10.04	0.50	9.54
High(Channel 13)	2 472.00	10.04	0.50	9.54

Remark. Margin = Measured Value - Limit

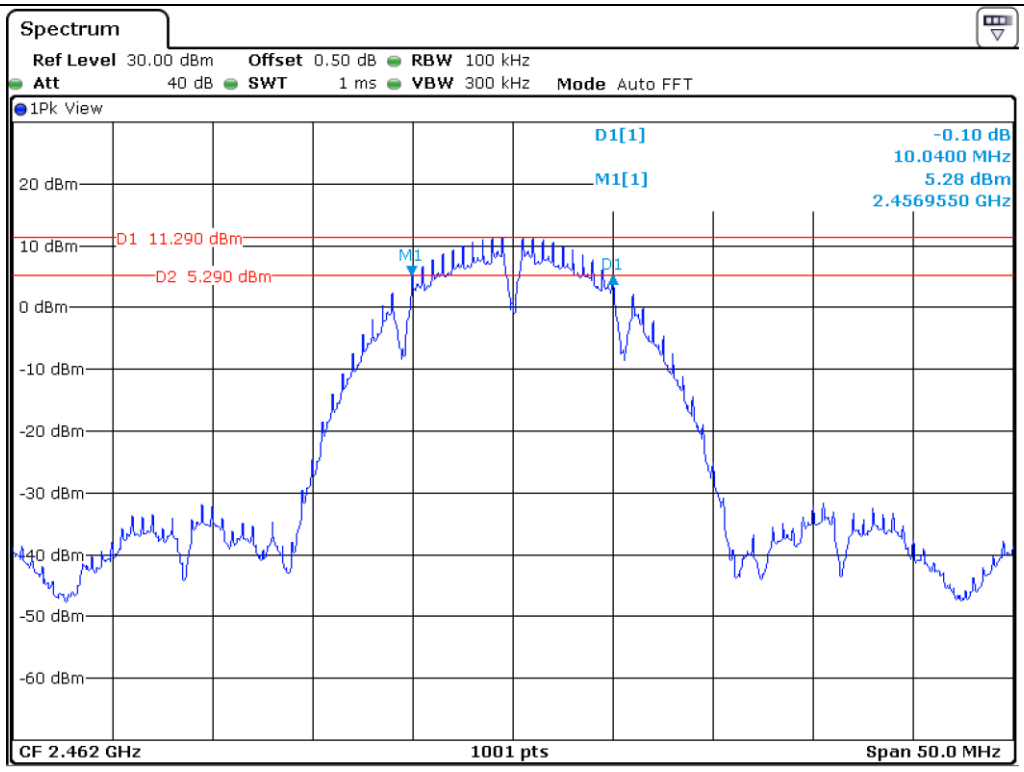
Tested by: Hyung-Kwon, Oh / Assistant Manager



Low Channel



Middle Channel



High Channel(Channel 11)

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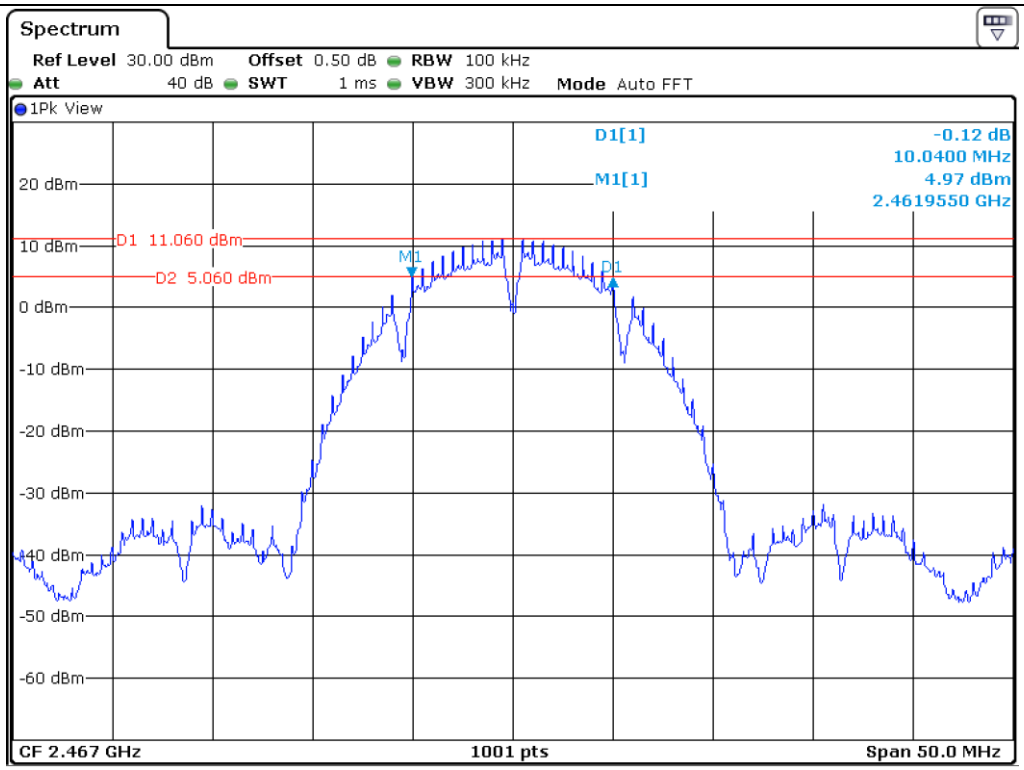
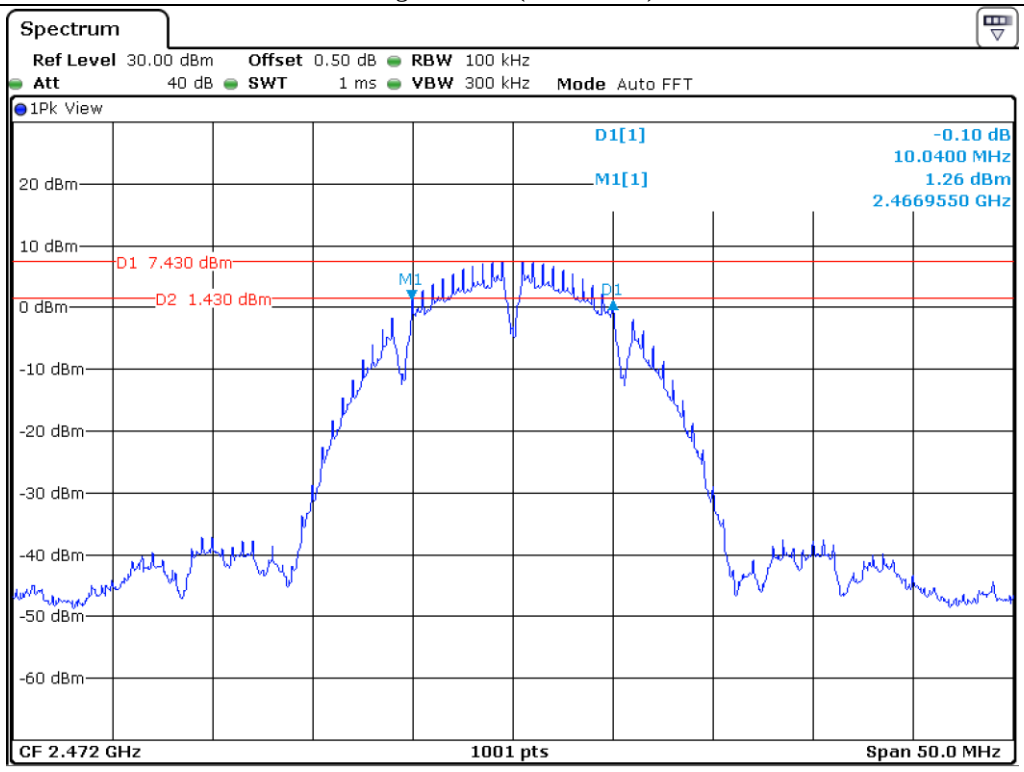


High Channel(Channel 12)



High Channel(Channel 13)

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7.5 Test data for 802.11g WLAN Mode

7.5.1 Test data for Antenna 0

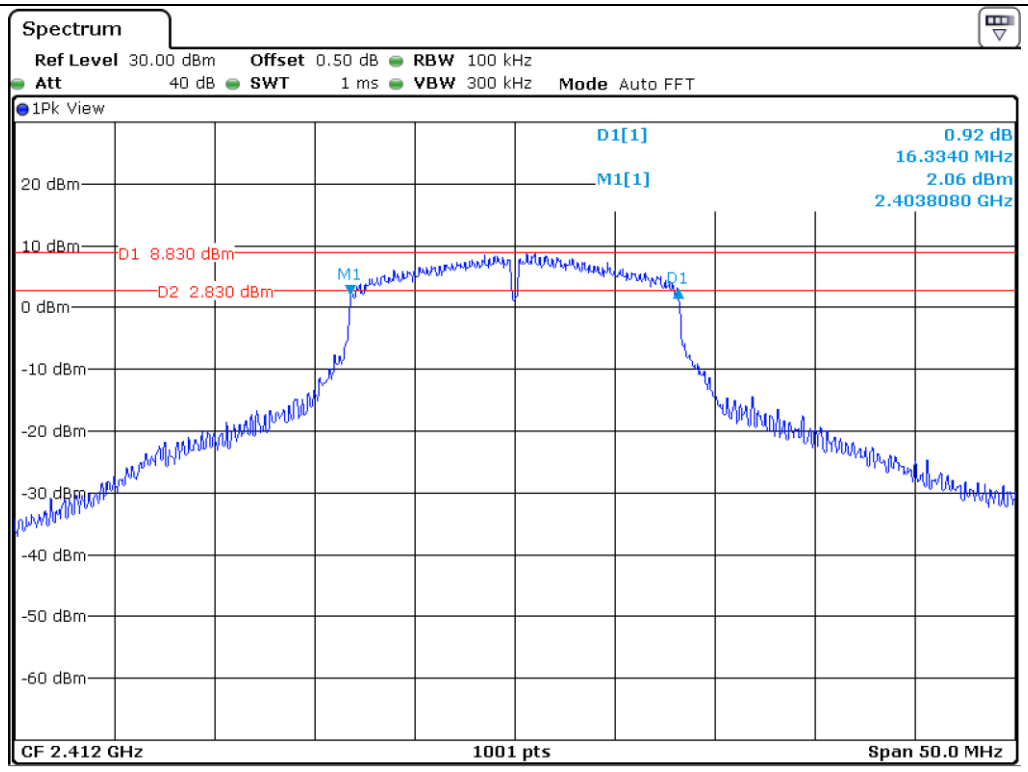
-. Test Date : February 13, 2018 ~ February 21, 2018

-. Test Result : Pass

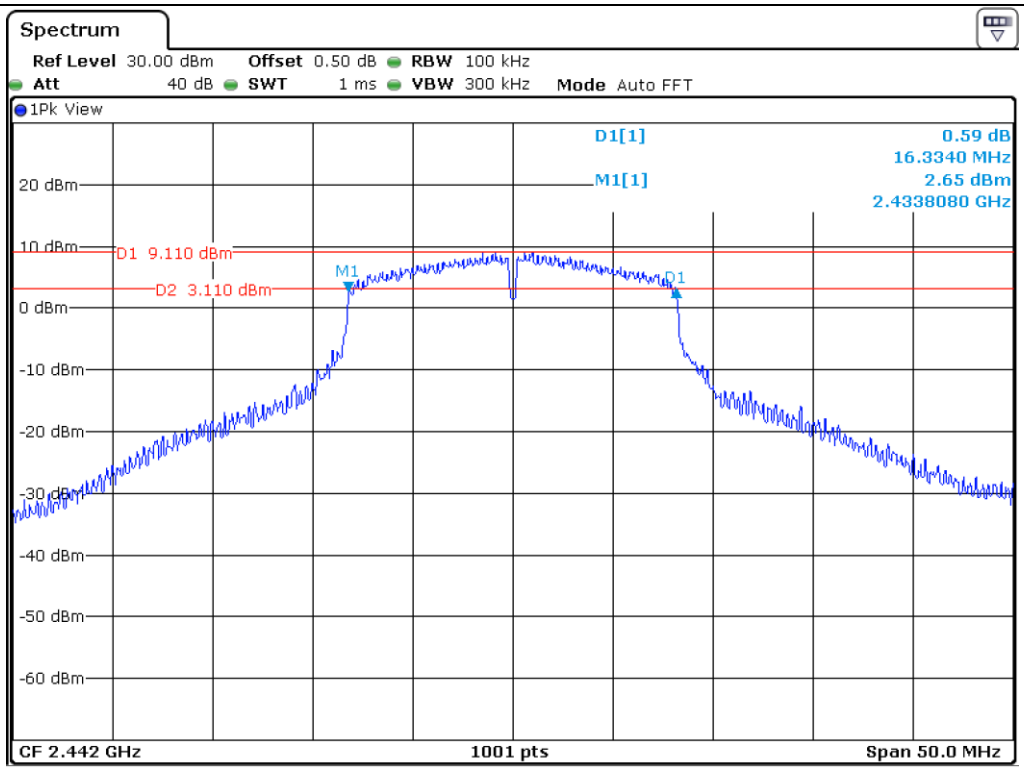
CHANNEL	FREQUENCY (MHz)	6 dB Bandwidth (MHz)	LIMIT (MHz)	Margin (MHz)
Low	2 412.00	16.33	0.50	15.83
Middle	2 442.00	16.33	0.50	15.83
High(Channel 11)	2 462.00	16.33	0.50	15.83
High(Channel 12)	2 467.00	16.33	0.50	15.83
High(Channel 13)	2 472.00	16.33	0.50	15.83

Remark. Margin = Measured Value - Limit

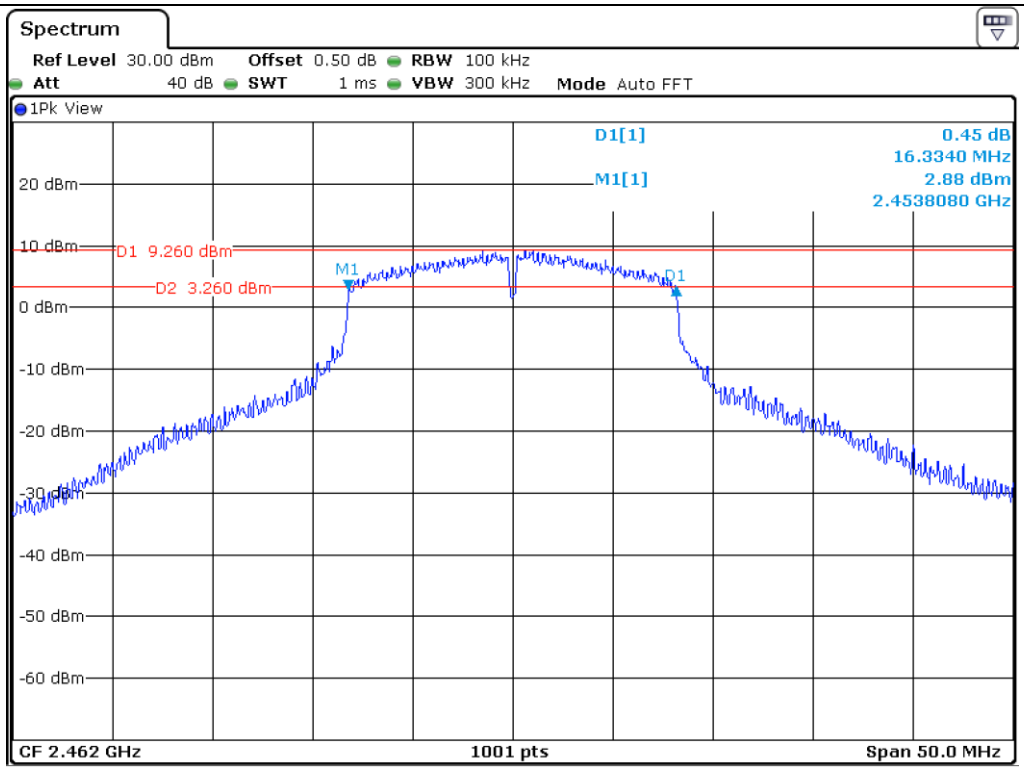
Tested by: Hyung-Kwon, Oh / Assistant Manager



Low Channel



Middle Channel



High Channel(Channel 11)

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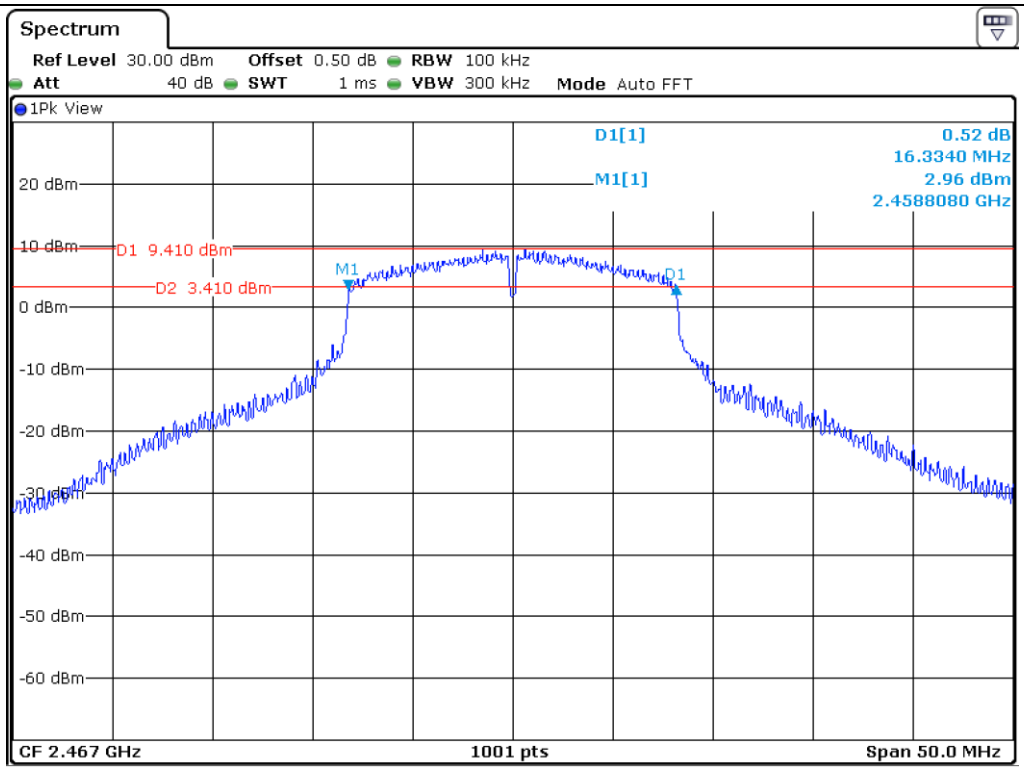
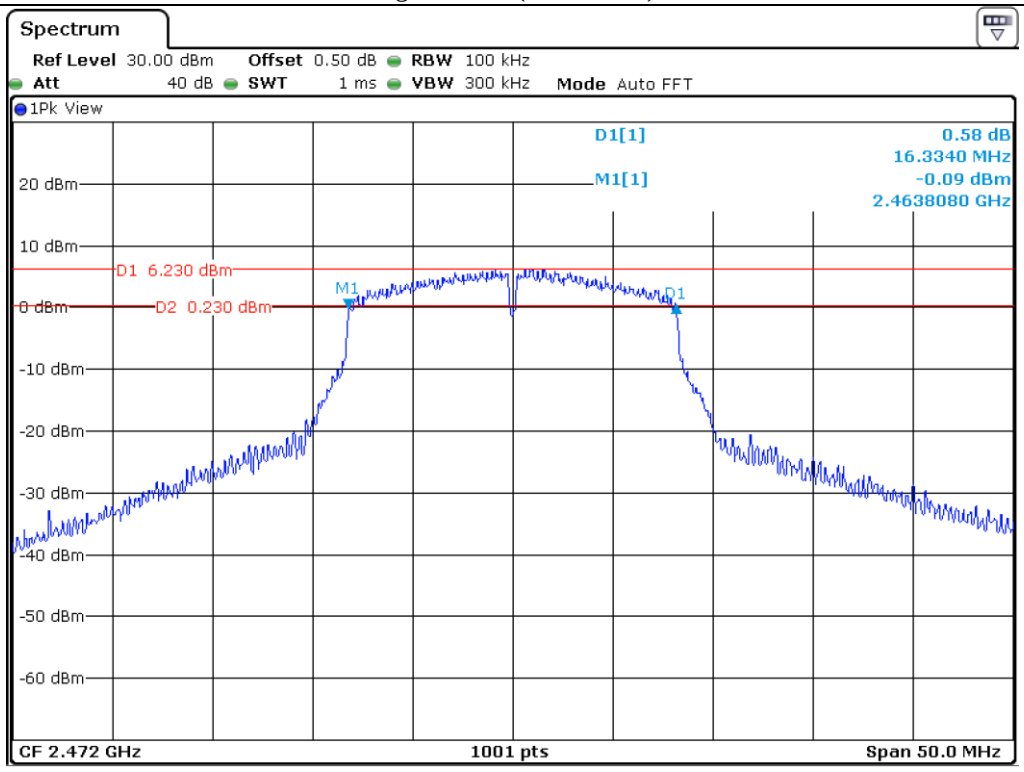


High Channel(Channel 12)



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7.5.2 Test data for Antenna 1

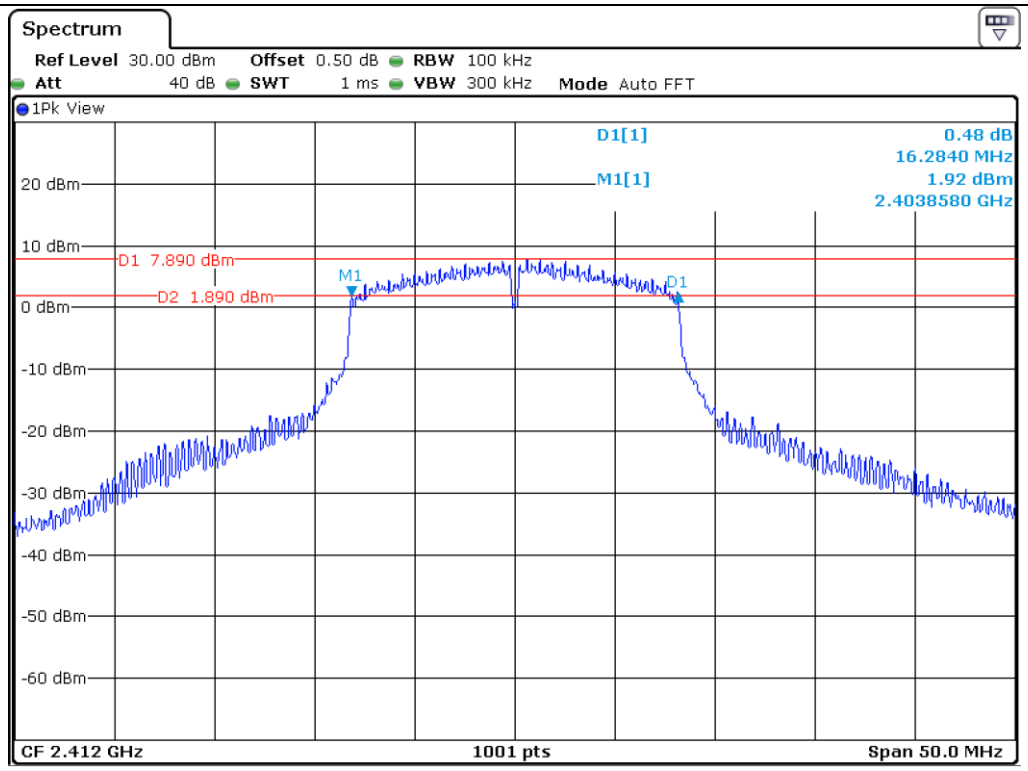
-. Test Date : February 13, 2018 ~ February 21, 2018

-. Test Result : Pass

CHANNEL	FREQUENCY (MHz)	6 dB Bandwidth (MHz)	LIMIT (MHz)	Margin (MHz)
Low	2 412.00	16.28	0.50	15.78
Middle	2 442.00	16.28	0.50	15.78
High(Channel 11)	2 462.00	16.28	0.50	15.78
High(Channel 12)	2 467.00	16.28	0.50	15.78
High(Channel 13)	2 472.00	16.28	0.50	15.78

Remark. Margin = Measured Value - Limit

Tested by: Hyung-Kwon, Oh / Assistant Manager



Low Channel

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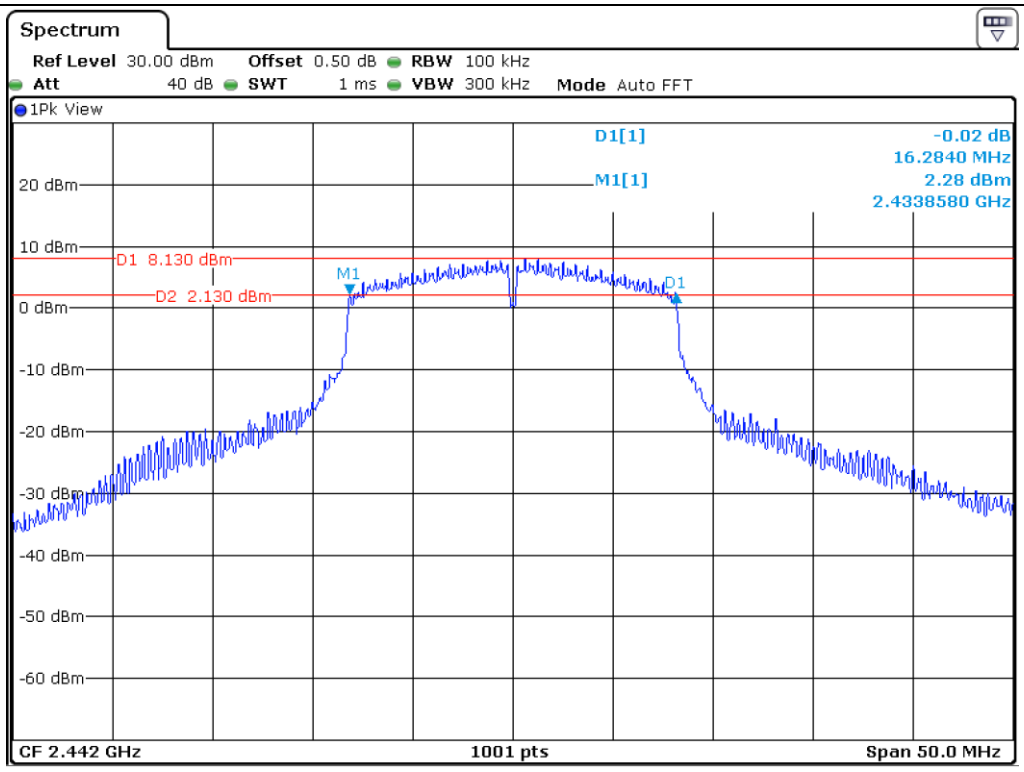
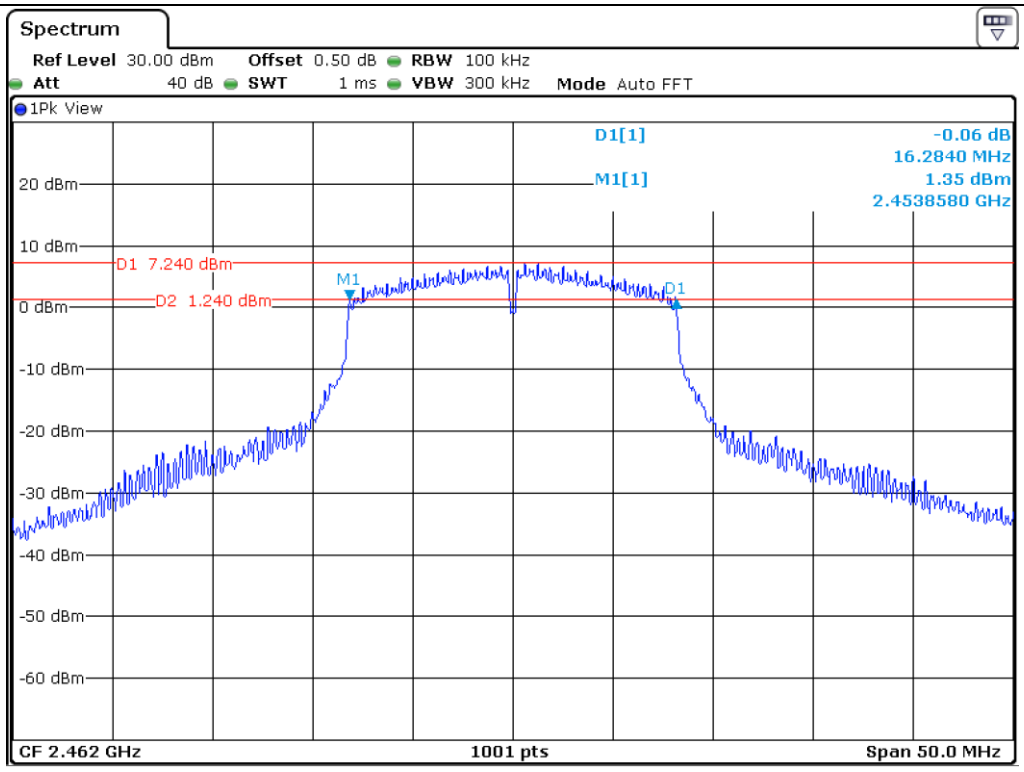


Middle Channel



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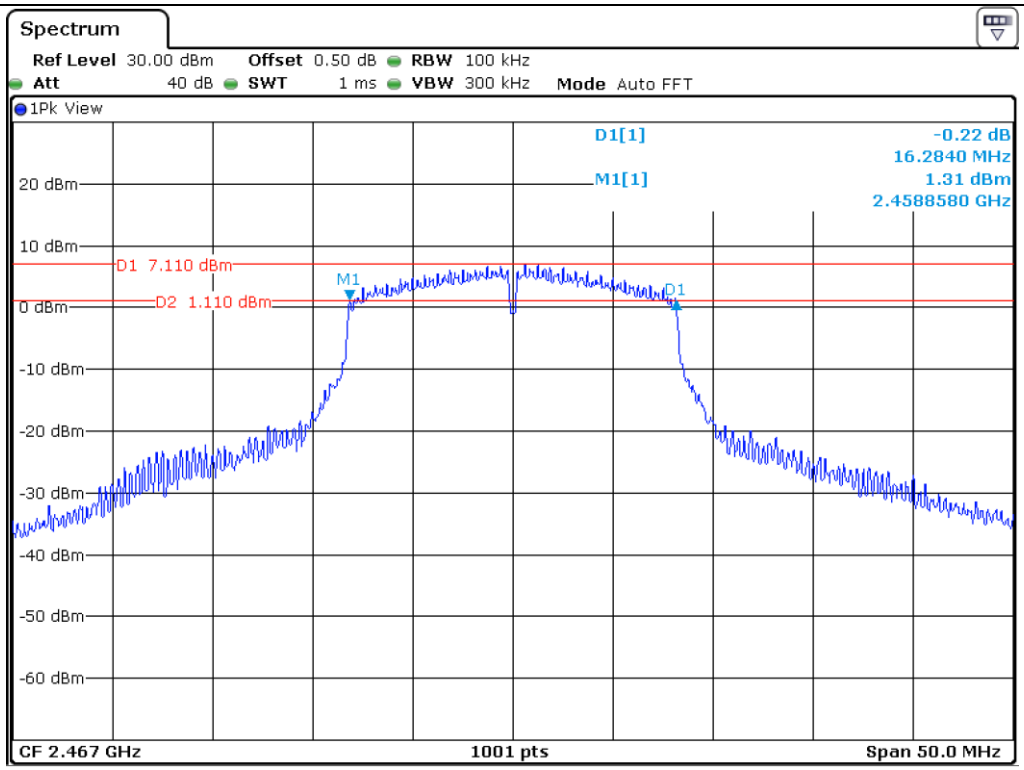
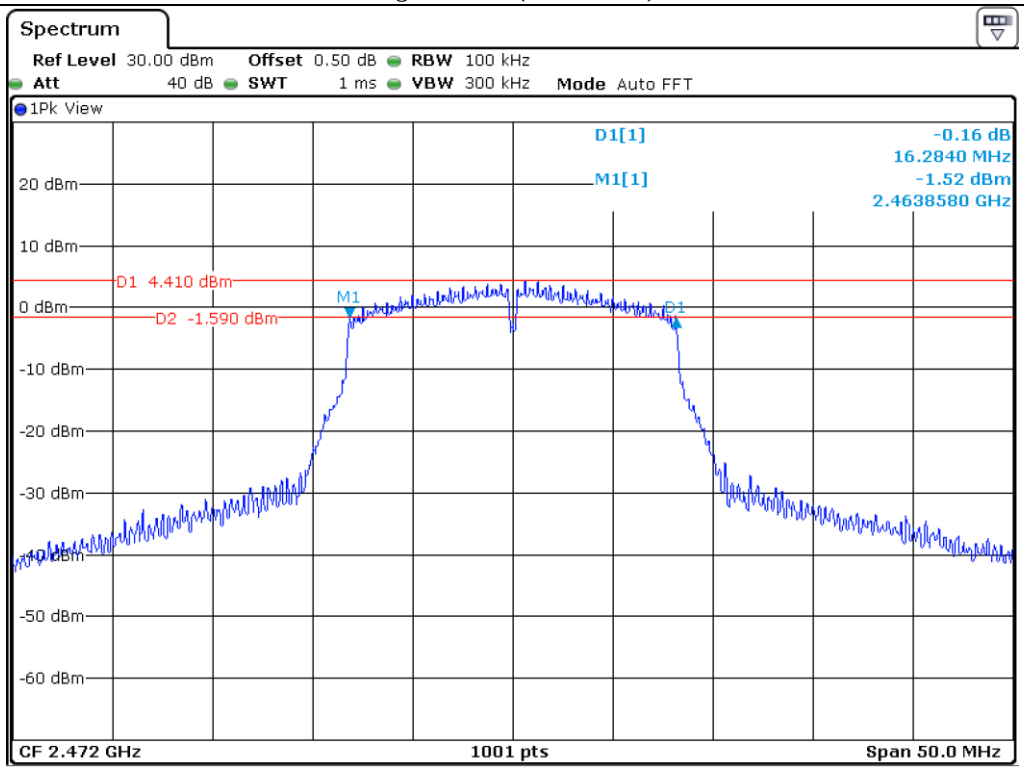


High Channel(Channel 12)



High Channel(Channel 13)

7.6 Test data for 802.11n_HT20 WLAN Mode

7.6.1 Test data for Antenna 0

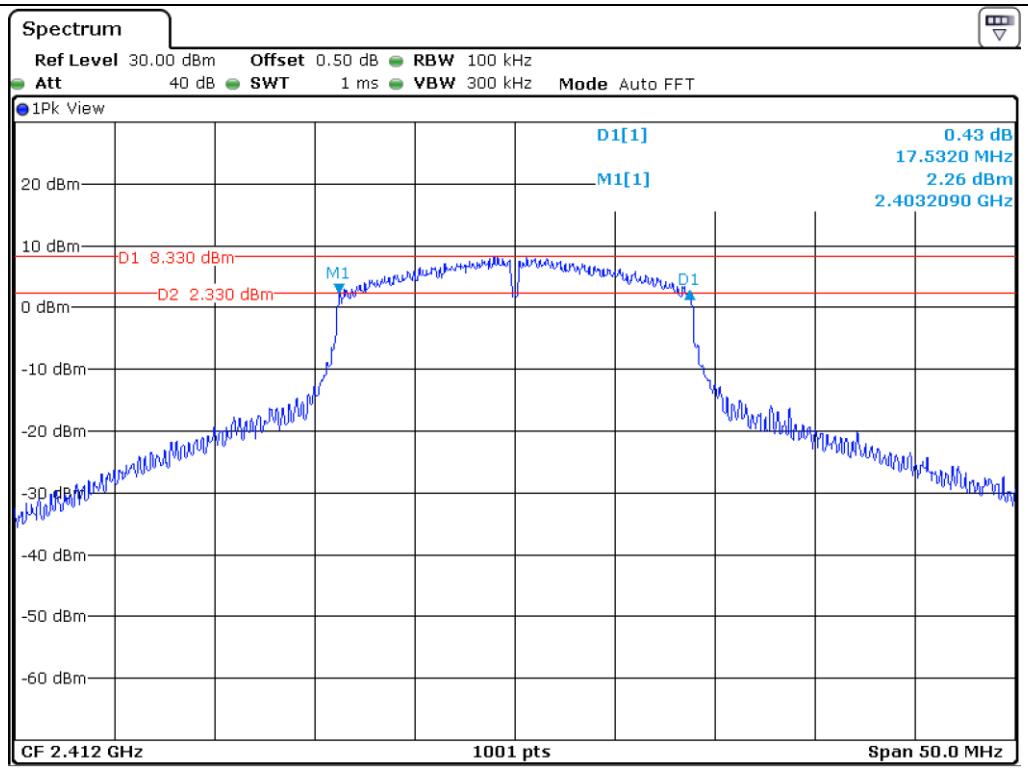
-. Test Date : February 13, 2018 ~ February 21, 2018

-. Test Result : Pass

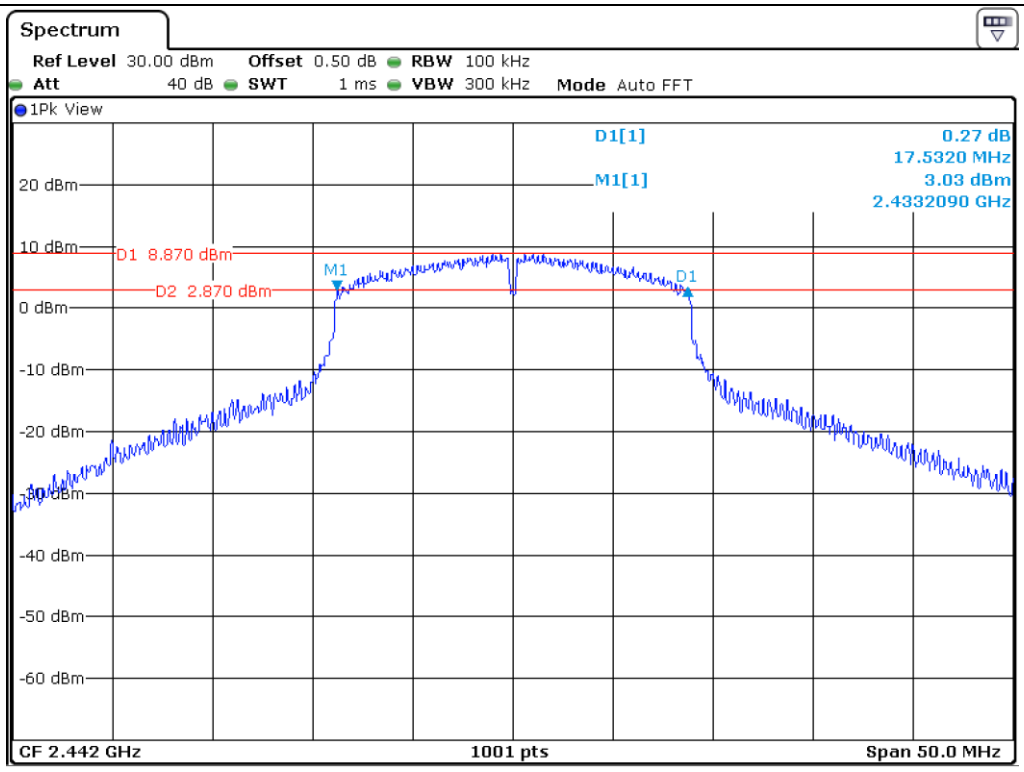
CHANNEL	FREQUENCY (MHz)	6 dB Bandwidth (MHz)	LIMIT (MHz)	Margin (MHz)
Low	2 412.00	17.53	0.50	17.03
Middle	2 442.00	17.53	0.50	17.03
High(Channel 11)	2 462.00	17.53	0.50	17.03
High(Channel 12)	2 467.00	17.53	0.50	17.03
High(Channel 13)	2 472.00	17.53	0.50	17.03

Remark. Margin = Measured Value - Limit

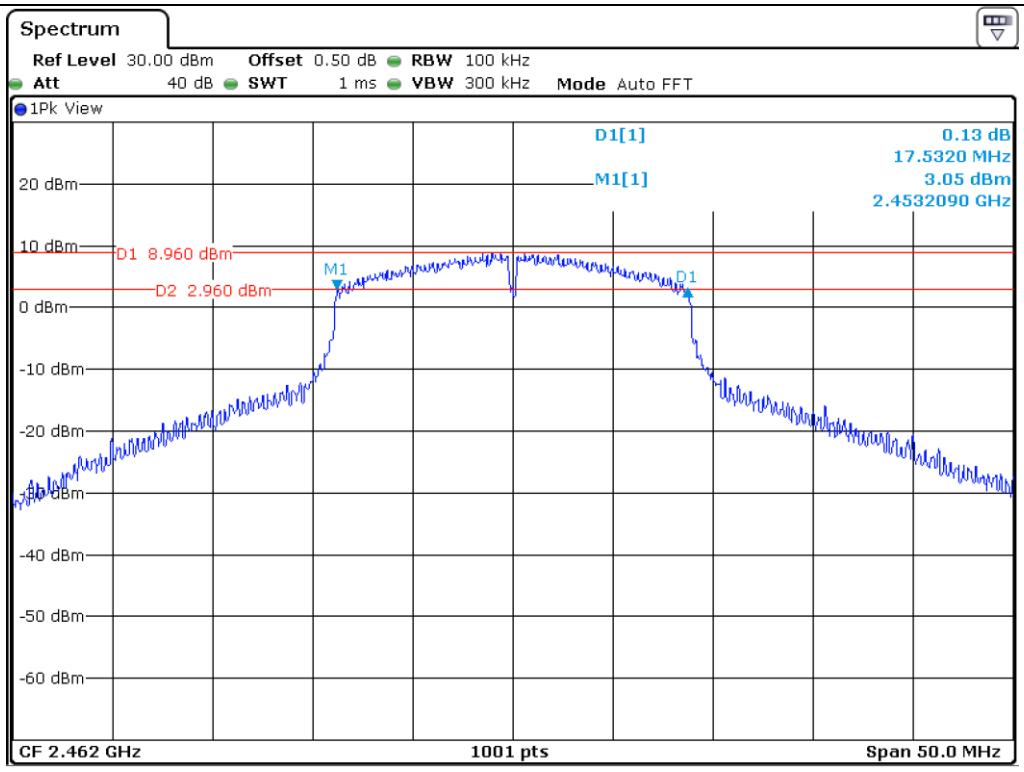
Tested by: Hyung-Kwon, Oh / Assistant Manager



Low Channel

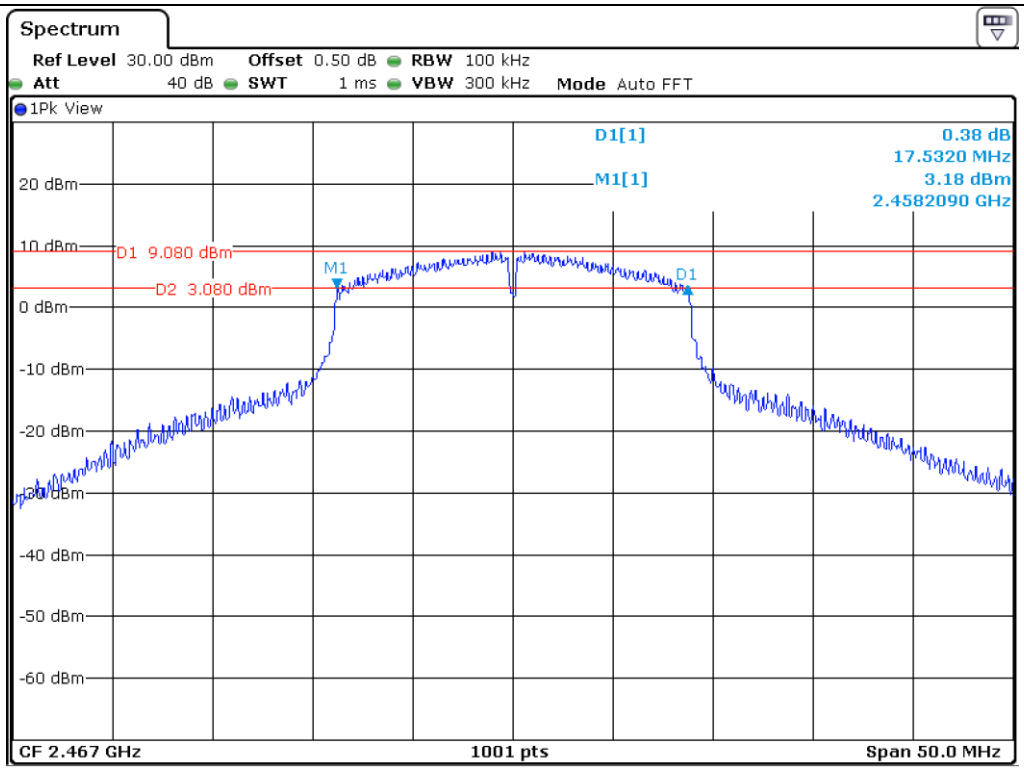


Middle Channel

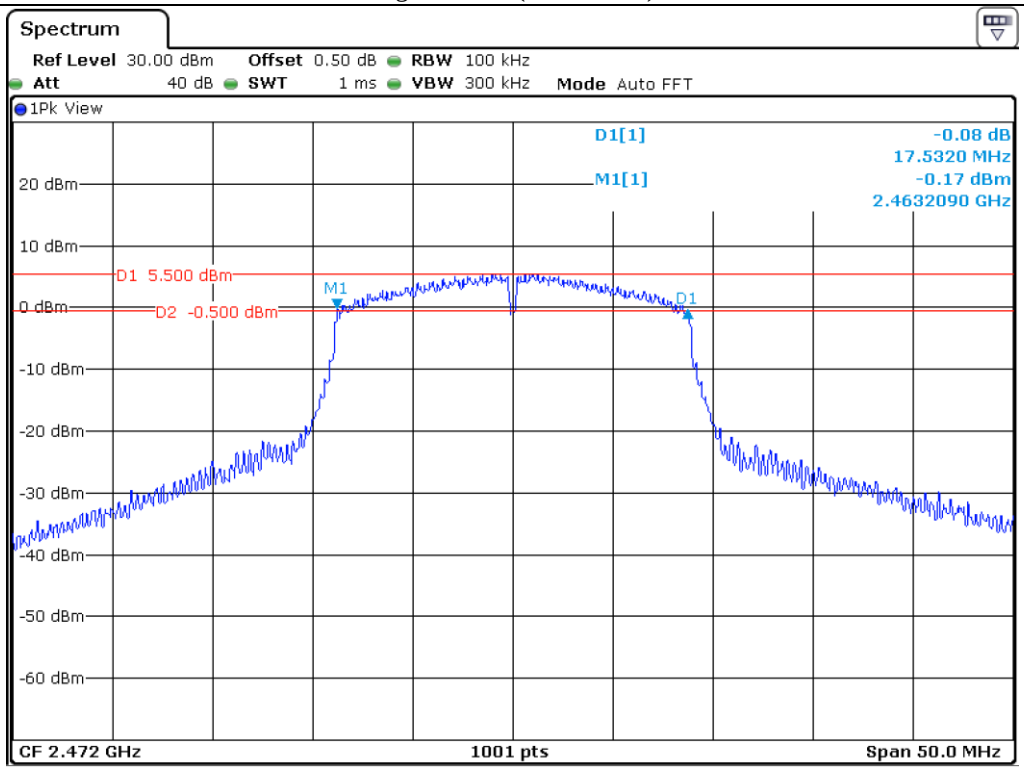


High Channel(Channel 11)

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



High Channel(Channel 12)



High Channel(Channel 13)

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

7.6.2 Test data for Antenna 1

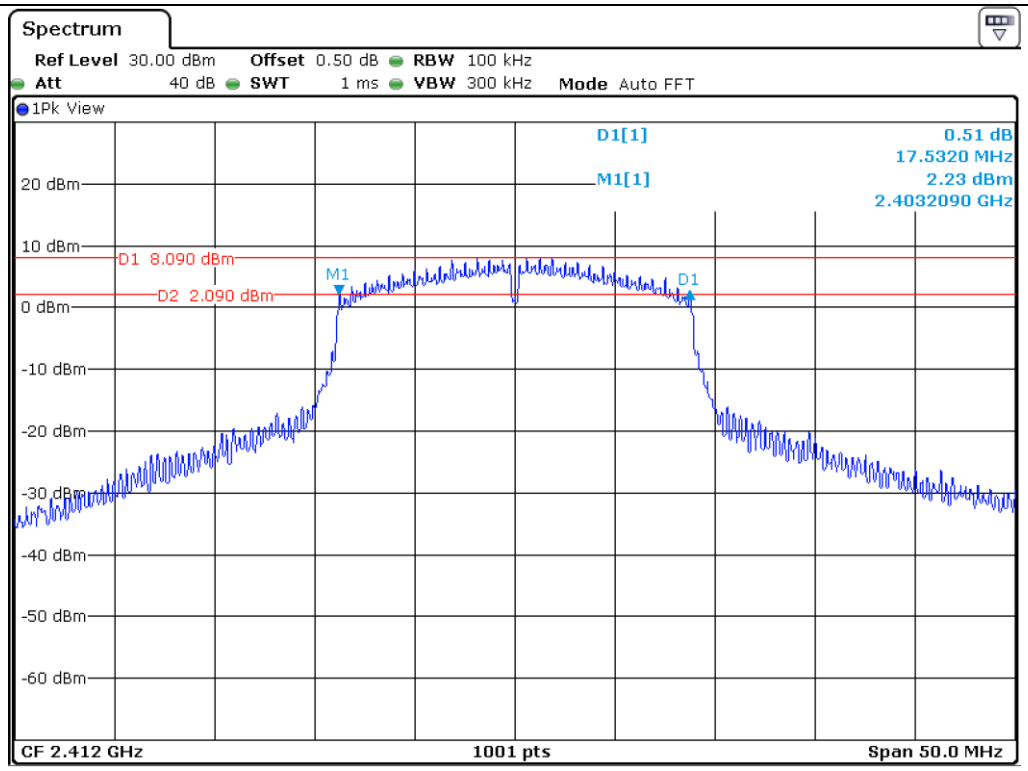
-. Test Date : February 13, 2018 ~ February 21, 2018

-. Test Result : Pass

CHANNEL	FREQUENCY (MHz)	6 dB Bandwidth (MHz)	LIMIT (MHz)	Margin (MHz)
Low	2 412.00	17.53	0.50	17.03
Middle	2 442.00	17.53	0.50	17.03
High(Channel 11)	2 462.00	17.48	0.50	16.98
High(Channel 12)	2 467.00	17.53	0.50	17.03
High(Channel 13)	2 472.00	17.53	0.50	17.03

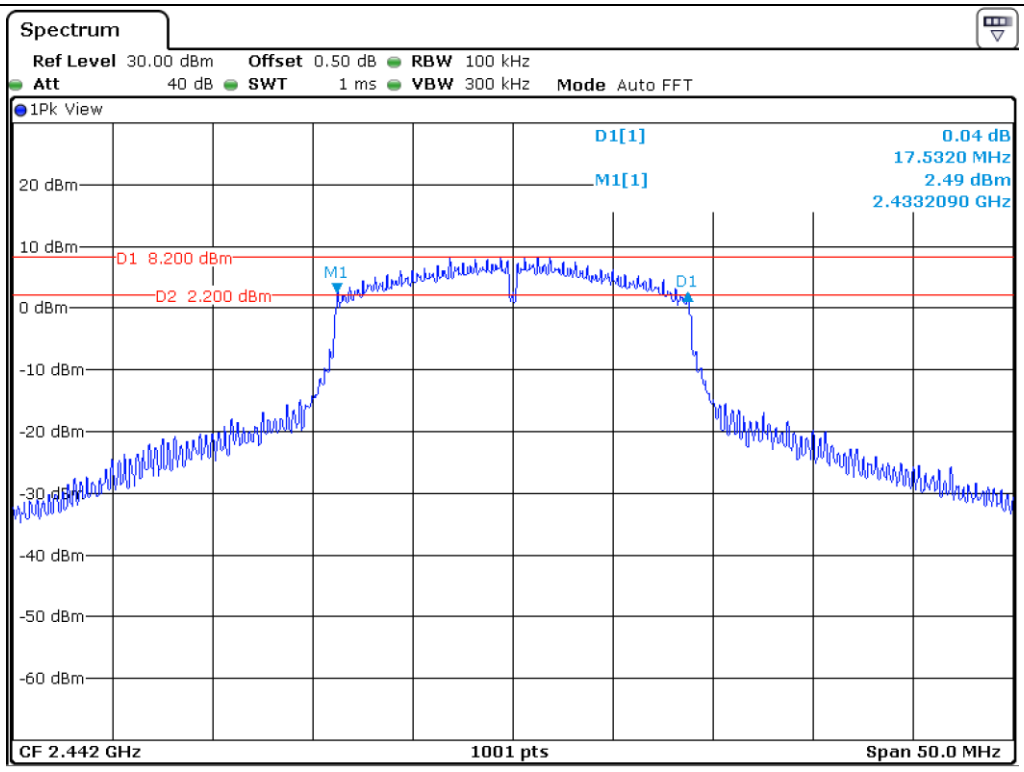
Remark. Margin = Measured Value - Limit

Tested by: Hyung-Kwon, Oh / Assistant Manager

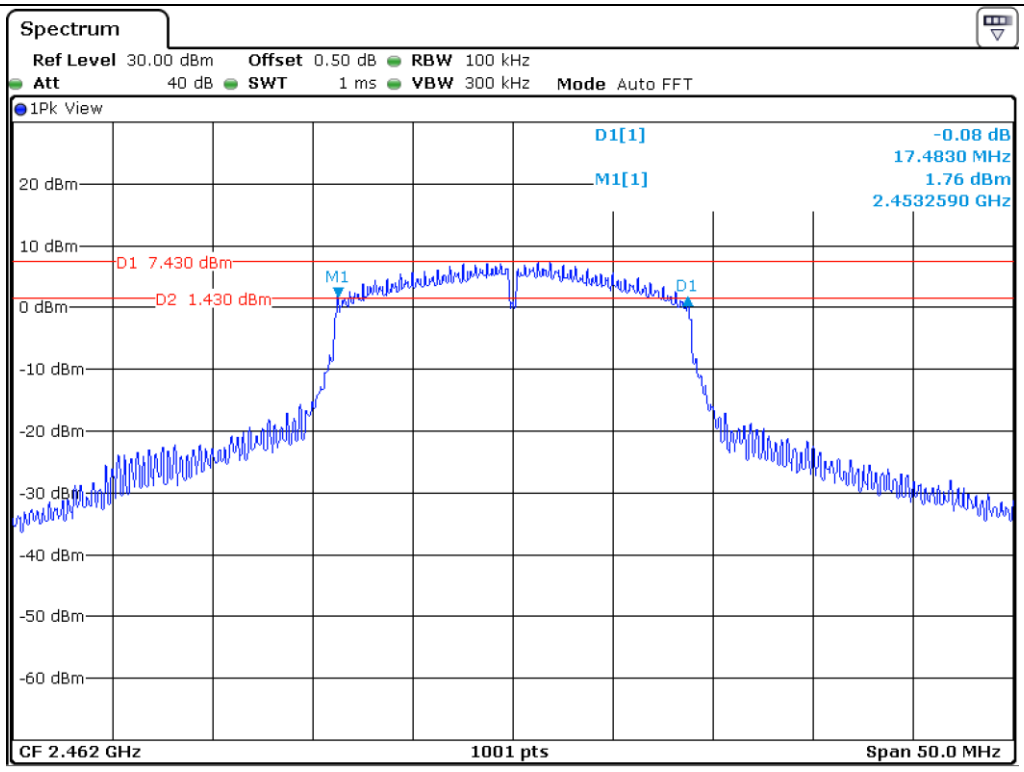


Low Channel

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

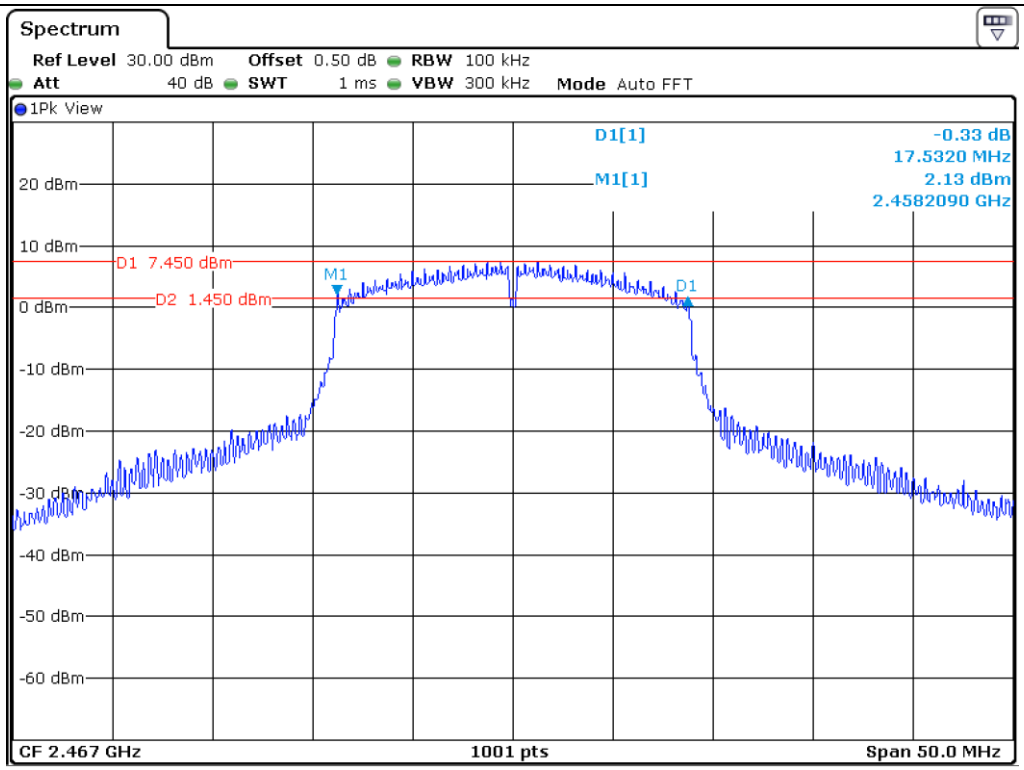


Middle Channel

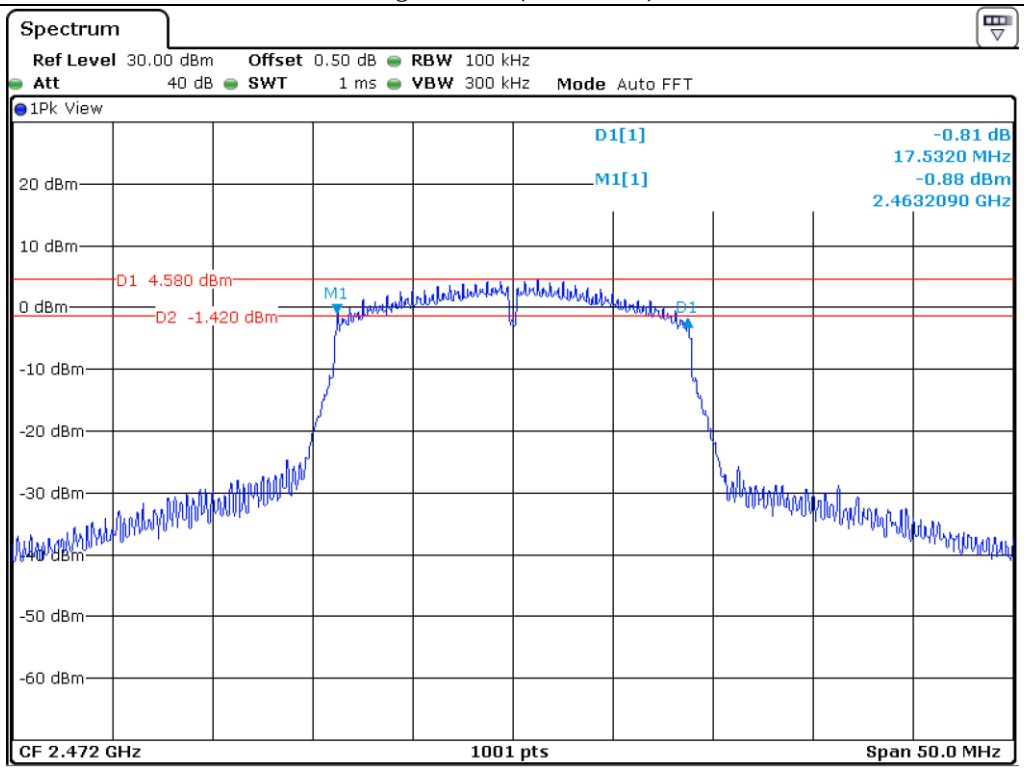


High Channel(Channel 11)

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



High Channel(Channel 12)



High Channel(Channel 13)

7.7 Test data for 802.11n_HT40 WLAN Mode

7.7.1 Test data for Antenna 0

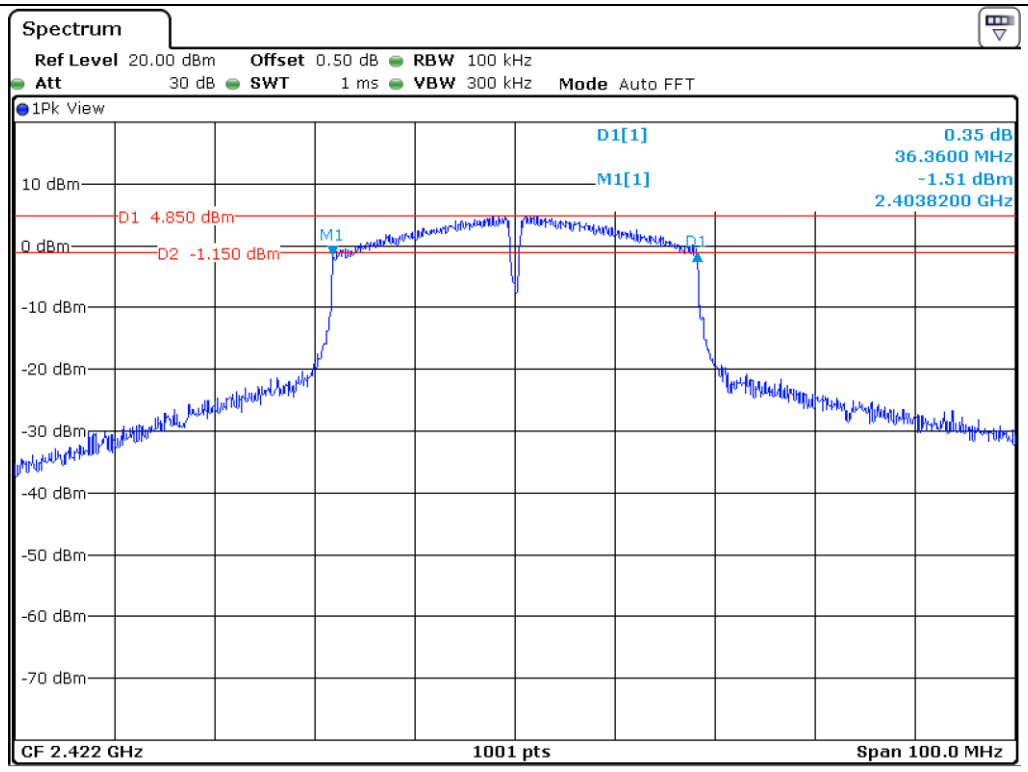
-. Test Date : February 13, 2018 ~ February 21, 2018

-. Test Result : Pass

CHANNEL	FREQUENCY (MHz)	6 dB Bandwidth (MHz)	LIMIT (MHz)	Margin (MHz)
Low	2 422.00	36.36	0.50	35.86
Middle	2 442.00	36.36	0.50	35.86
High(Channel 9)	2 452.00	36.26	0.50	35.76
High(Channel 10)	2 457.00	36.26	0.50	35.76
High(Channel 11)	2 462.00	36.26	0.50	35.76

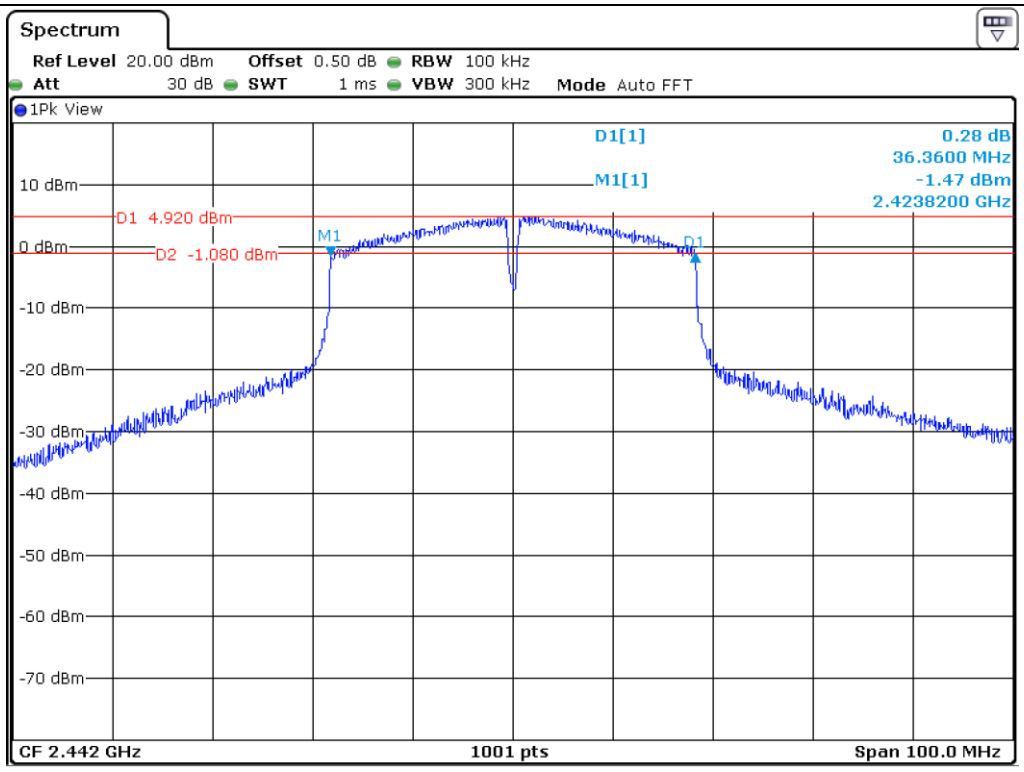
Remark. Margin = Measured Value - Limit

Tested by: Hyung-Kwon, Oh / Assistant Manager

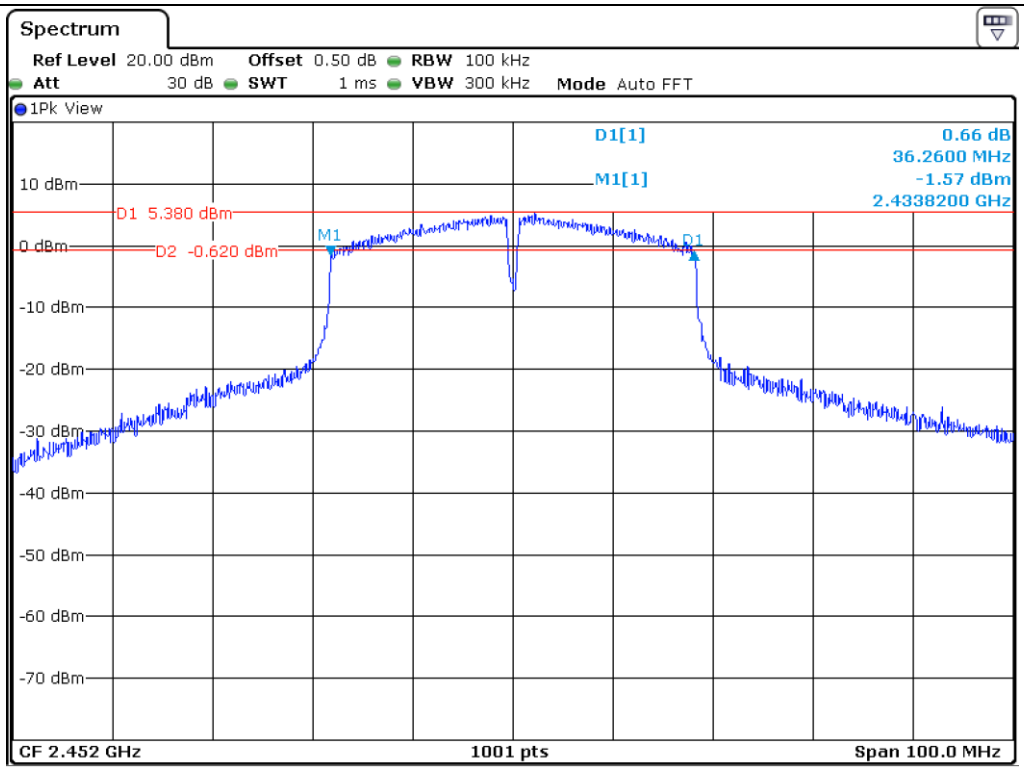


Low Channel

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

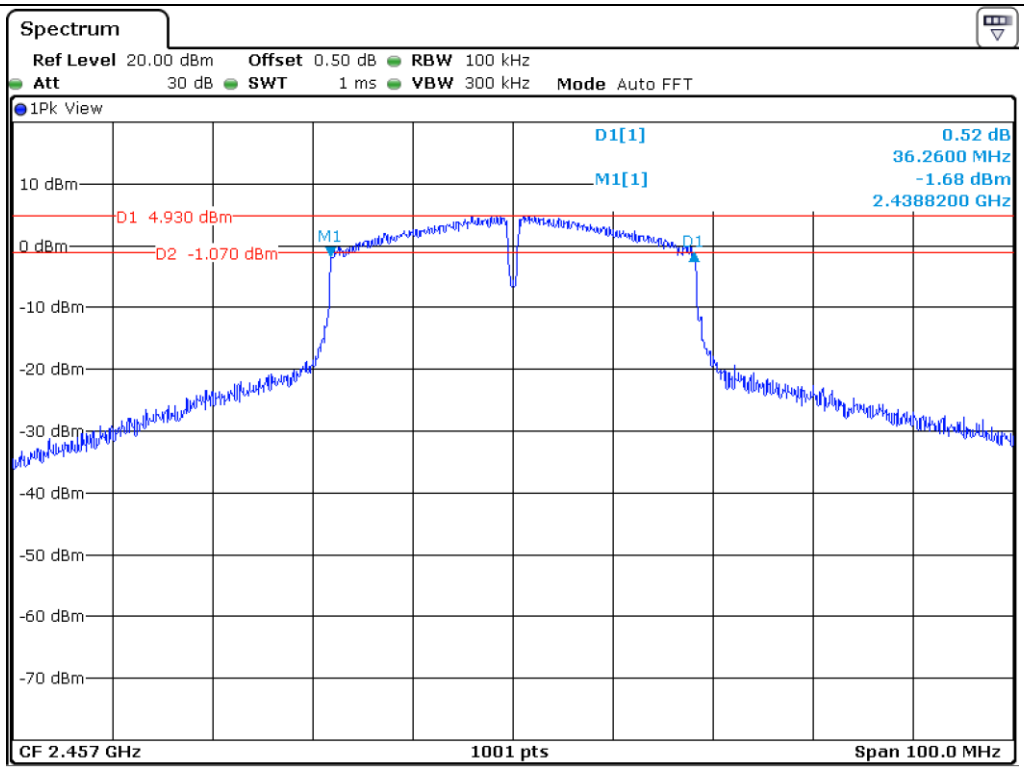


Middle Channel

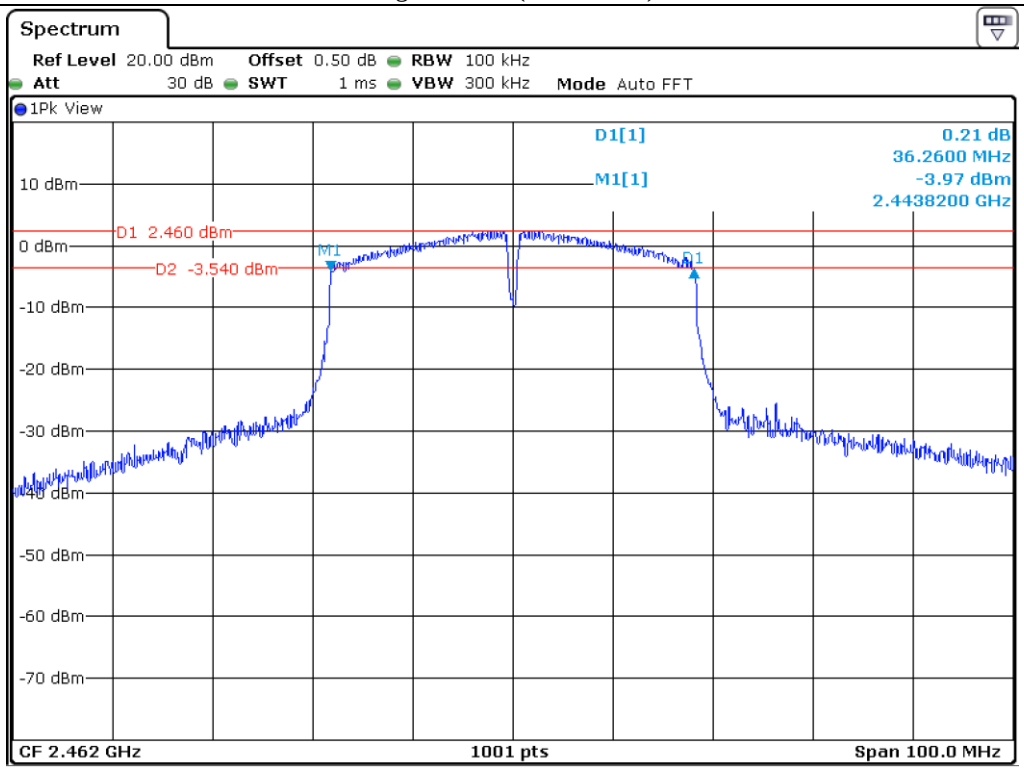


High Channel(Channel 9)

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



High Channel(Channel 10)



High Channel(Channel 11)

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

7.7.2 Test data for Antenna 1

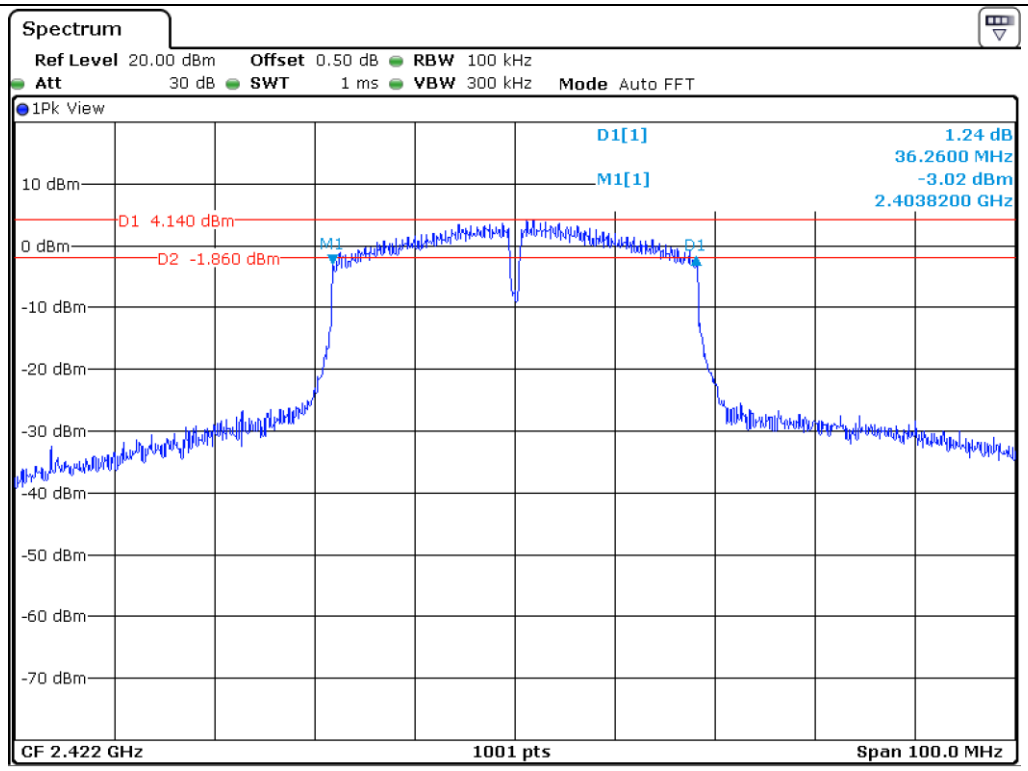
-. Test Date : February 13, 2018 ~ February 21, 2018

-. Test Result : Pass

CHANNEL	FREQUENCY (MHz)	6 dB Bandwidth (MHz)	LIMIT (MHz)	Margin (MHz)
Low	2 422.00	36.26	0.50	35.76
Middle	2 442.00	36.26	0.50	35.76
High(Channel 9)	2 452.00	35.86	0.50	35.36
High(Channel 10)	2 457.00	35.66	0.50	35.16
High(Channel 11)	2 462.00	35.26	0.50	34.76

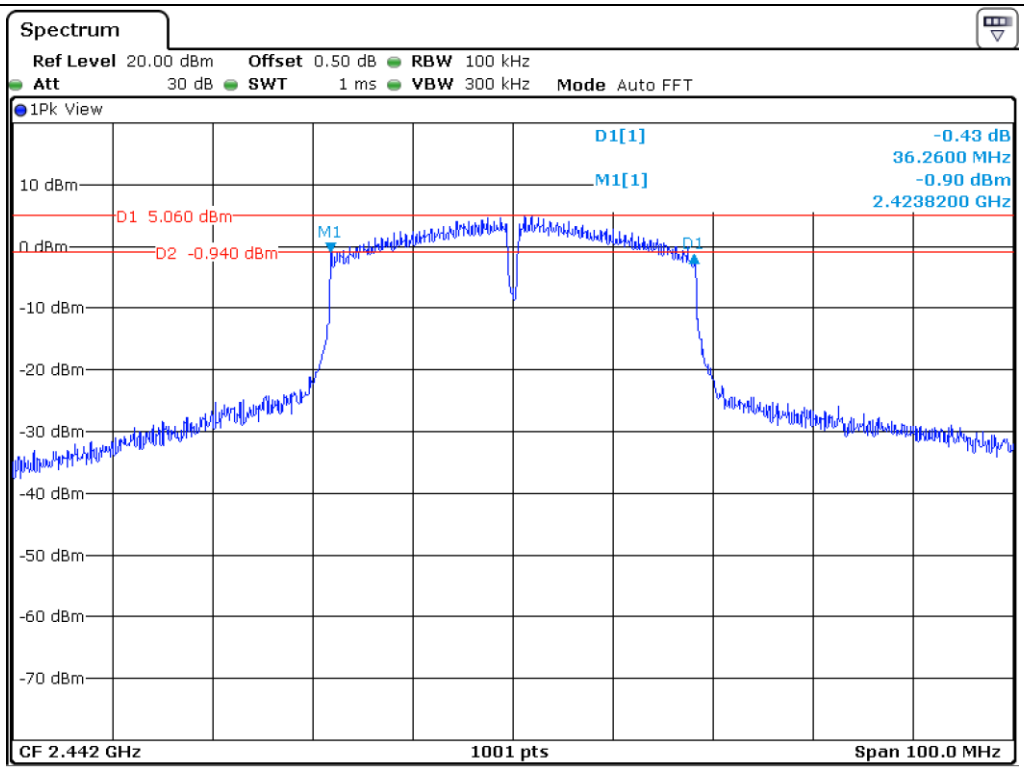
Remark. Margin = Measured Value - Limit

Tested by: Hyung-Kwon, Oh / Assistant Manager

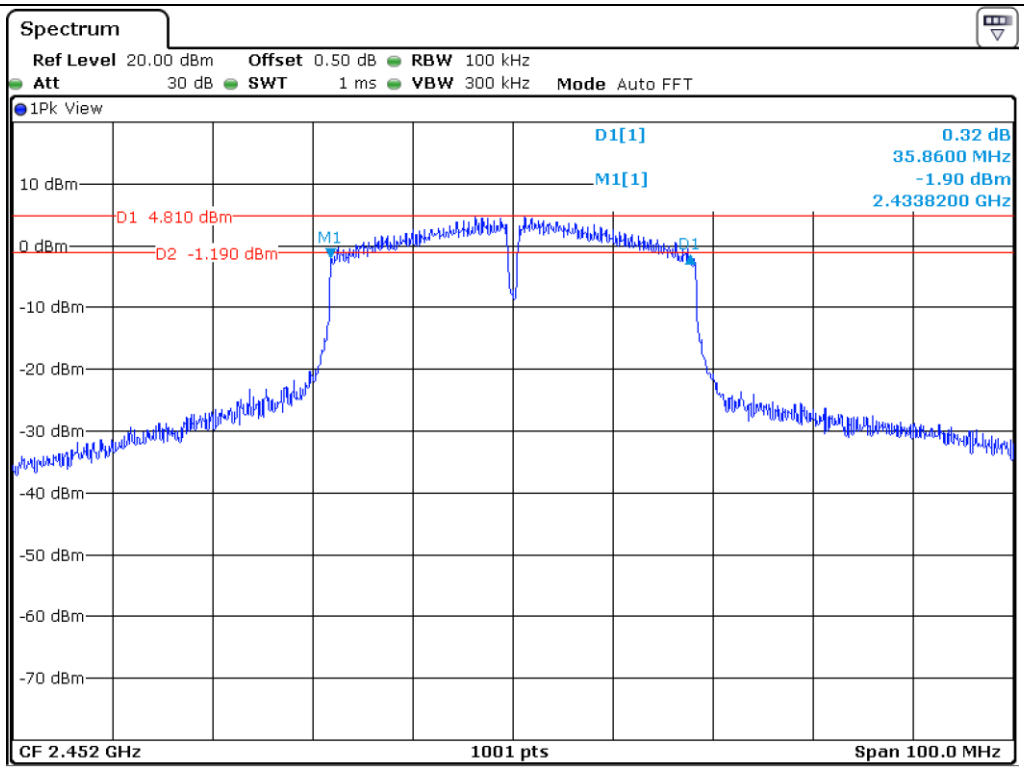


Low Channel

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

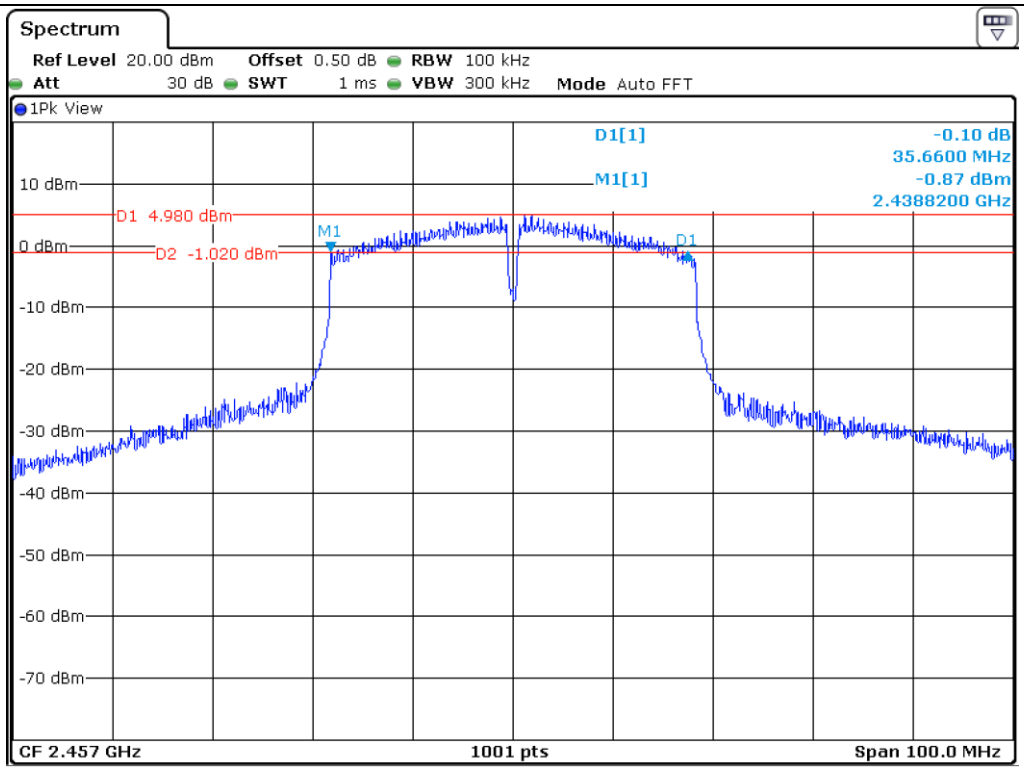


Middle Channel

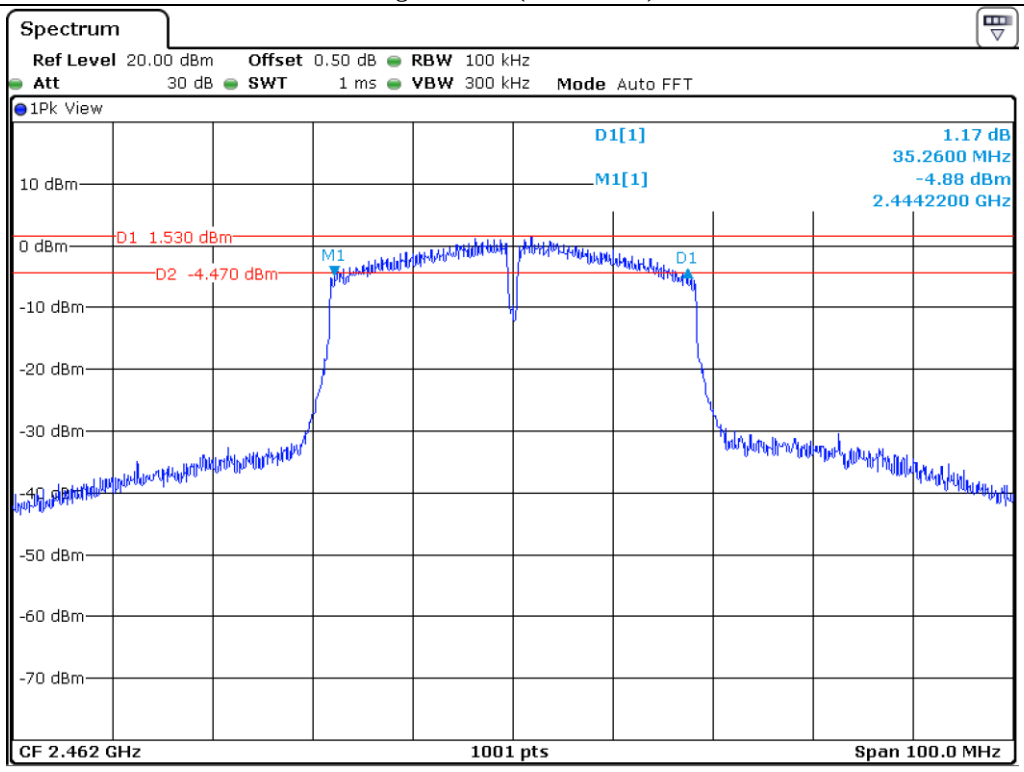


High Channel(Channel 9)

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



High Channel(Channel 10)



High Channel(Channel 11)

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

8. MAXIMUM PEAK OUTPUT POWER

8.1 Operating environment

Temperature : 23 ℃

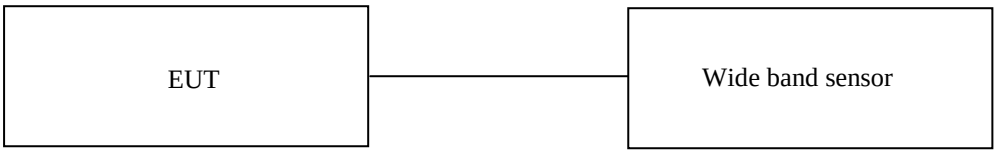
Relative humidity : 41 % R.H.

8.2 Test set-up

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

The Wide Band Sensor is measured when the EUT is transmitting at the appropriate center frequency its maximum power control level as described in Section 9.2.3(KDB 558074 D01 DTS Meas Guidance V04).

Since this measurement is made only during the ON time of the transmitter, no duty cycle correction is required.



8.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	NRP-Z81	Rohde & Schwarz	Wide band Sensor	101975	April 04, 2017 (1Y)

All test equipment used is calibrated on a regular basis.

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

8.4 Test data for 802.11b WLAN Mode

8.4.1 Test data for Antenna 0

-. Test Date : February 13, 2018 ~ February 21, 2018

-. Test Result : Pass

-. Duty Cycle : > 98 %

CHANNEL	FREQUENCY (MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412.00	17.99	30.00	12.01
Middle	2 442.00	18.56	30.00	11.44
High(Channel 11)	2 462.00	18.20	30.00	11.80
High(Channel 12)	2 467.00	18.54	30.00	11.46
High(Channel 13)	2 472.00	14.51	30.00	15.49

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

8.4.2 Test data for Antenna 1

-. Test Date : February 13, 2018 ~ February 21, 2018

-. Test Result : Pass

-. Duty Cycle : > 98 %

CHANNEL	FREQUENCY (MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412.00	20.16	30.00	9.84
Middle	2 442.00	20.01	30.00	9.99
High(Channel 11)	2 462.00	18.87	30.00	11.13
High(Channel 12)	2 467.00	18.75	30.00	11.25
High(Channel 13)	2 472.00	14.71	30.00	15.29

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

Tested by: Hyung-Kwon, Oh / Assistant Manager

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

8.5 Test data for 802.11g WLAN Mode

8.5.1 Test data for Antenna 0

-. Test Date : February 13, 2018 ~ February 21, 2018

-. Test Result : Pass

-. Duty Cycle : > 98 %

CHANNEL	FREQUENCY (MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412.00	17.14	30.00	12.86
Middle	2 442.00	16.81	30.00	13.19
High(Channel 11)	2 462.00	17.60	30.00	12.40
High(Channel 12)	2 467.00	17.60	30.00	12.40
High(Channel 13)	2 472.00	13.47	30.00	16.53

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

8.5.2 Test data for Antenna 1

-. Test Date : February 13, 2018 ~ February 21, 2018

-. Test Result : Pass

-. Duty Cycle : > 98 %

CHANNEL	FREQUENCY (MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412.00	17.09	30.00	12.91
Middle	2 442.00	18.99	30.00	11.01
High(Channel 11)	2 462.00	18.43	30.00	11.57
High(Channel 12)	2 467.00	18.52	30.00	11.48
High(Channel 13)	2 472.00	15.39	30.00	14.61

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

Tested by: Hyung-Kwon, Oh / Assistant Manager

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

8.6 Test data for 802.11n_HT20 WLAN Mode

8.6.1 Test data for Antenna 0

-. Test Date : February 13, 2018 ~ February 21, 2018

-. Test Result : Pass

-. Duty Cycle : > 98 %

CHANNEL	FREQUENCY (MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412.00	16.96	30.00	13.04
Middle	2 442.00	17.57	30.00	12.43
High(Channel 11)	2 462.00	18.16	30.00	11.84
High(Channel 12)	2 467.00	18.50	30.00	11.50
High(Channel 13)	2 472.00	16.06	30.00	13.94

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

8.6.2 Test data for Antenna 1

-. Test Date : February 13, 2018 ~ February 21, 2018

-. Test Result : Pass

-. Duty Cycle : > 98 %

CHANNEL	FREQUENCY (MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412.00	19.12	30.00	10.88
Middle	2 442.00	18.88	30.00	11.12
High(Channel 11)	2 462.00	18.26	30.00	11.74
High(Channel 12)	2 467.00	18.30	30.00	11.70
High(Channel 13)	2 472.00	15.49	30.00	14.51

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

Tested by: Hyung-Kwon, Oh / Assistant Manager

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

8.6.3 Test data for Multiple Antenna

-. Test Date : February 13, 2018 ~ February 21, 2018

-. Test Result : Pass

-. Duty Cycle : > 98 %

CHANNEL	FREQUENCY (MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 412.00	21.18	30.00	8.82
Middle	2 442.00	21.28	30.00	8.72
High(Channel 11)	2 462.00	21.22	30.00	8.78
High(Channel 12)	2 467.00	21.41	30.00	8.59
High(Channel 13)	2 472.00	18.79	30.00	11.21

Remark 1 : Margin = Limit – Measured Value (=Power Sensor Reading - Cable Loss)

Remark 2 : Calculated Output Power= $10\log(10^{(\text{Antenna0 Output Power}/10)}+10^{(\text{Antenna1 Output Power}/10)})$

Tested by: Hyung-Kwon, Oh / Assistant Manager

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

8.7 Test data for 802.11n_HT40 WLAN Mode

8.7.1 Test data for Antenna 0

-. Test Date : February 13, 2018 ~ February 21, 2018

-. Test Result : Pass

-. Duty Cycle : > 98 %

CHANNEL	FREQUENCY (MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 422.00	18.98	30.00	11.02
Middle	2 442.00	19.19	30.00	10.81
High(Channel 9)	2 452.00	19.10	30.00	10.90
High(Channel 10)	2 457.00	19.37	30.00	10.63
High(Channel 11)	2 462.00	14.35	30.00	15.65

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

8.7.2 Test data for Antenna 1

-. Test Date : February 13, 2018 ~ February 21, 2018

-. Test Result : Pass

-. Duty Cycle : > 98 %

CHANNEL	FREQUENCY (MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 422.00	18.34	30.00	11.66
Middle	2 442.00	18.36	30.00	11.64
High(Channel 9)	2 452.00	18.03	30.00	11.97
High(Channel 10)	2 457.00	18.03	30.00	11.97
High(Channel 11)	2 462.00	15.10	30.00	14.90

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

Tested by: Hyung-Kwon, Oh / Assistant Manager

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

8.7.3 Test data for Multiple Antenna

-. Test Date : February 13, 2018 ~ February 21, 2018

-. Test Result : Pass

-. Duty Cycle : > 98 %

CHANNEL	FREQUENCY (MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 422.00	21.68	30.00	8.32
Middle	2 442.00	21.81	30.00	8.19
High(Channel 9)	2 452.00	21.61	30.00	8.39
High(Channel 10)	2 457.00	21.76	30.00	8.24
High(Channel 11)	2 462.00	17.75	30.00	12.25

Remark 1 : Margin = Limit – Measured Value (=Power Sensor Reading - Cable Loss)

Remark 2 : Calculated Output Power= $10\log(10^{(\text{Antenna0 Output Power}/10)}+10^{(\text{Antenna1 Output Power}/10)})$

Tested by: Hyung-Kwon, Oh / Assistant Manager

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