FCC EVALUATION REPORT FOR CERTIFICATION

Manufacturer: Ohsung Electronics Co., Ltd.
#181 Gongdan-dong, Gumi-si, Gyeongsangbuk-Do
South Korea
Attn: Mr. Hak Ki, Kim / General Manager

Date of Issue: April 10, 2017
Order Number: GETEC-C1-17-117
Test Report Number: GETEC-E3-17-005
Test Site: GUMI UNIVERSITY EMC CENTER
(Test firm Registration Number: 269701)

FCC ID. :	**OZ5URCMXHPH500**
Applicant :	**Ohsung Electronics Co., Ltd.**

Rule Part(s)	**: FCC Part 15 Subpart C-Intentional Radiator § 15.247**
Test Method	**: ANSI C63.10 (2013)**
Equipment Class	**: Digital Transmission System(DTS)**
EUT Type	**: BASE STATION**
Type of Authority	**: Certification**
Model Name	**: MXHP-H500**
Trade Mark	**: URC**

This equipment has been shown to be in compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10 (2013)

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the vest of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Tested by,

Soon Hoon

Soon-Hoon Jeong, Senior Engineer
GUMI UNIVERSITY EMC CENTER

Reviewed by,

Jae-Hoon Jeong, Technical Manager
GUMI UNIVERSITY EMC CENTER

This test report only contains the result of a specific sample supplied for the examination.
It is not allowed to copy this report even partly without the approval of EMC center

GUMI UNIVERSITY
EMC CENTER

CONTENTS

1. GENERAL INFORMATION 4
2. INTRODUCTION 5
3. PRODUCT INFORMATION 6
3.1 DESCRIPTION OF EUT 6
3.2 DEFINITION OF MODELS 6
3.3 SUPPORT EQUIPMENT / CABLES USED 7
3.4 MODIFICATION ITEM(S) 7
4. ANTENNA REQUIREMENT - §15.203 8
4.1 DESCRIPTION OF ANTENNA 8
5. DESCRIPTION OF TESTS 8
5.1 TEST CONDITION 8
6. REFERENCES STANDARDS 8
7. SUMMARY OF TEST RESULTS 9
8. 6 DB BANDWIDTH MEASUREMENT 10
8.1 OPERATING ENVIRONMENT 10
8.2 TEST SET-UP (LAYOUT) 10
8.3 LIMIT 10
8.4 TEST EQUIPMENT USED 10
8.5 TEST TEST PROCEDURE 10
8.6 TEST RESULT 11
9. CONDUCTED MAXIMUM PEAK OUTPUT POWER MEASUREMENT 18
9.1 OPERATING ENVIRONMENT 18
9.2 TEST SET-UP (LAYOUT) 18
9.3 LIMIT 18
9.4 TEST EQUIPMENT USED 18
9.5 TEST PROCEDURE 18
9.6 TEST RESULT 19
10. POWER SPECTRAL DENSITY MEASUREMENT 20
10.1 OPERATING ENVIRONMENT 20
10.2 TEST SET-UP (LAYOUT) 20
10.3 LIMIT 20
10.4 TEST EQUIPMENT USED 20
10.5 TEST PROCEDURE 20
10.6 TEST RESULT 21
11. CONDUCTED SPURIOUS EMISSION & OUT OF BAND EMISSION 28
11.1 OPERATING ENVIRONMENT 28
11.2 TEST SET-UP (LAY-OUT) 28
11.3 LIMIT 28
11.4 TEST EQUIPMENT USED 28
11.5 TEST PROCEDURE 28
11.6 TEST RESULT 29

12. AC POWER LINE CONDUCTED EMISSION 38
12.1 OPERATING ENVIRONMENT 39
12.2 TEST SET-UP 39
12.3 MEASUREMENT UNCERTAINTY 39
12.4 LIMIT 40
12.5 TEST EQUIPMENT USED 40
12.6 TEST DATA FOR CONDUCTED EMISSION 40
12.7 TEST RESULT 41
13. RADIATED SPURIOUS & RESTRICTED BAND EDGE EMISSION 44
13.1 OPERATING ENVIRONMENT 45
13.2 TEST SET-UP 45
13.3 MEASUREMENT UNCERTAINTY 45
13.4 LIMIT 46
13.5 TEST EQUIPMENT USED 46
13.6 TEST DATA FOR RADIATED SPURIOUS EMISSION 47
13.7 TEST DATA FOR RADIATED RESTRICTED BAND EDGE EMISSION 51
14. SAMPLE CALCULATIONS 52
14.1 EXAMPLE 1 : 52
14.2 EXAMPLE 2 : 52
15. RECOMMENDATION & CONCLUSION 53

APPENDIX A – ATTESTATION STATEMENT
APPENDIX B – LABELLING
APPENDIX C – BLOCK DIAGRAM
APPENDIX D – SCHEMATIC DIAGRAM
APPENDIX E – TEST SETUP PHOTOGRAPH
APPENDIX F – EXTERNAL PHOTOGRAPH
APPENDIX G – INTERNAL PHOTOGRAPH
APPENDIX H – USER'S MANUAL
APPENDIX I – OPERATIONAL DESCRIPTION
APPENDIX J – ANTENNA SPECIFICATION
APPENDIX K – PART LIST
APPENDIX L – MAXIMUM PERMISIBLLE EXPOSURE
APPENDIX M – DECLARATION OF CONFORMITY

Scope: *Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and / or unintentional radiators for compliance with technical rules and regulations of the Federal Communications Commission.*

1. General Information

Applicant: Ohsung Electronics Co., Ltd.

Applicant Address: #141 Gongdan-dong, Gumi-si, Gyeongbuk, Republic of Korea

Manufacturer: Ohsung Electronics Co., Ltd.

Manufacturer Address: #141 Gongdan-dong, Gumi-si, Gyeongbuk, Republic of Korea

Contact Person: Hak Ki, Kim / General Manager

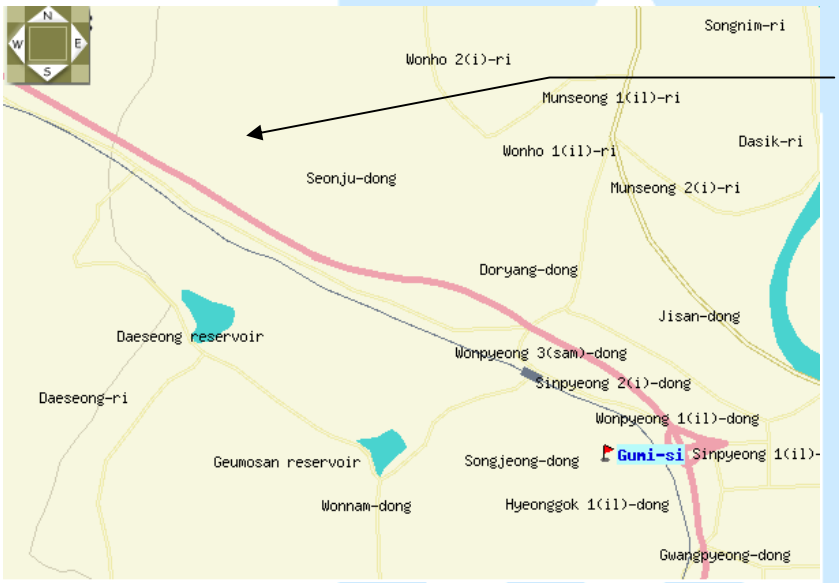
Telephone Number: +82-54-468-7281 **Fax Number: +82-54-461-8368**

- **FCC ID.** OZ5URCMXHPH500
- **Equipment Class** Digital Transmission System (DTS)
- **EUT Type** BASE STATION
- **Model Name** MXHP-H500
- **Rule Part(s)** FCC Part 15 Subpart C-Intentional Radiator § 15.247
- **Test Method** ANSI C63.10 (2013)
- **Type of Authority** Certification
- **Test Procedure(s)** ANSI C63.10 (2013), KDB558074 D01 DTS Meas Guidance v03r05(April 8,2016)
- **Dates of Test** February 21~ March 8, 2017
- **Place of Test** **GUMI UNIVERSITY EMC CENTER** (FCC Test firm Registration No.: 269701)
  37 Yaeun-ro, Gumi-si, Gyeongsangbuk-do, 730-711, Republic of Korea
- **Test Report Number** GETEC-E3-17-005
- **Dates of Issue** April 11, 2017

2. Introduction

The measurement procedure described in American National Standard for Methods of Measurement of Radio-Nose Emissions From Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (ANSI C63.4-2009) was used in determining radiated and conducted emissions emanating from **Ohsung Electronics Co., Ltd. BASE STATION (Model name: MXHP-H500)**

These measurement tests were conducted at **GUMI UNIVERSITY EMC CENTER**.
The site address is 37 Yaeun-ro, Gumi-si, Gyeongsangbuk-do, 730-711, Gyeongnam 641-713, Korea
This test site is one of the highest point of GUMI UNIVERSITY at about 200 kilometers away from Seoul city and 40 kilometers away from Daege city. It is located in the valley surrounded by mountains in all directions where ambient radio signal conditions are quiet and a favorable area to measure the radio frequency interference on open field test site for the computing and ISM devices manufactures. The detailed description of the measurement facility was found to be in compliance with the requirements of §2.948 according to ANSI C63.10 (2013)



GUMI UNIVERSITY EMC CENTER
37 Yaeun-ro, Gumi-si,
Gyeongsangbuk-do, 730-711,
Republic of Korea
Tel: +82-54-440-1195
Fax: +82-54-440-1199

Fig 1. The map above shows the Gumi University in vicinity area.

3. Product Information

3.1 Description of EUT

The Equipment under Test (EUT) is the **Ohsung Electronics Co., Ltd. BASE STATION (Model Name: MXHP-H500) FCC ID.: OZ5URCMXHPH500**

-. Equipment	: BASE STATION
-. Model name	: MXHP-H500
-. Brand name	: UNIVERSAL REMOTE CONTROLLER
-. Serial number	: Proto type
-. Electrical Rating	: DC 12 V
-. Size	: 1.18” H × 4.63” D × 4.63” W
-. Weight	: 5.19 oz
-. Memory	: 128Mbytes DDR
-. Manufacturer	: Ohsung electronics Co., Ltd.
-. Channel Separations	: 5 MHz
-. Type of Modulation	: DSSS, OFDM
-. Channel frequency	: 2 412 MHz ~ 2 462 MHz
-. Number of channel	: 11
-. Type of chain	: One
-. Antenna specification	: Manufacturer: Ohsung Electronics Co., Ltd. Antenna type : PCB pattern antenna Gain : 2.91 dBi
-. Hardware version	: V0.0.0.
-. Software version	: V1.4.9.1

3.2 Definition of models

-None.

3.3 Support Equipment / Cables used

3.3.1 Used Support Equipment

Description	Manufacturer	Model Name	S/N & FCC ID.
Notebook Computer [1)]	SAMSUNG	NT-Q45	S/N: CNBA4300168AI00682D5800 FCC ID.: N/A
Uart board	Ohsung Electronics Co., Ltd.	Proto type	S/N : None. FCC ID.: None.

Note)
1) The Support Equipment use only setting to the test mode.

3.3.2 System configuration

Description	Manufacturer	Model Name	S/N & FCC ID.
Wireless Remote Controller	Ohsung Electronics Co., Ltd.	TDC-7100	S/N : None. FCC ID.: None.
AC/DC Adaptor	MEILE GROUP LTD	MLF-B250502000UU	S/N: 160806001 FCC ID.: None.

3.3.3 Used Cable(s)

Cable Name	Condition	Description
Power cable	Connected between EUT and AC/DC Adaptor	1.0 m shielded with a ferrite core.

3.4 Modification Item(s)

-. None

4. Antenna Requirement - §15.203

An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the applicant can be used with the device. The use of permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with this requirement.

4.1 Description of Antenna

The **Ohsung Electronics Co., Ltd. BASE STATION.** comply with the requirement of §15.203 with a PCB printed antenna permanently attached to the transmitter.

5. Description of tests

5.1 Test Condition

The EUT was installed, arranged and operated in a manner that is most representative of equipment as typically used.

The measurements were carried out while varying operating modes and cable positions within typically arrangement to determine maximum emission level.

The representative and worst test mode(s) were noted in the test report.

- Test Voltage / Frequency: 12 V (Lithium Ion Battery) / DC

- Operating condition during the test(s) :
  -. Continuous RF transmitting mode with nominal maximum RF output power.
  -. Operating channel frequency and modulation technology

Mode	Available channel	Frequency	Modulation Technology
IEEE 802.11b	1 ~ 11	2412 ~ 2462 MHz	DSSS
IEEE 802.11g	1 ~ 11	2412 ~ 2462 MHz	OFDM
IEEE 802.11n	1 ~ 11	2412 ~ 2462 MHz	OFDM

-. EUT set condition (RF power setting value)

Test Software version	Channel	RF power setting value
Tera tum v4.8.9	1 ~ 11	4

6. References Standards

- FCC Part 15 (2009) Subpart C-Intentional Radiator §15.247
- ANSI C 63.10 (2013): American National Standard for Testing Unlicensed Wireless Devices
- KDB 558074 D01 DTS meas Guidance v03r05 (April 08, 2016): Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247

7. SUMMARY OF TEST RESULTS

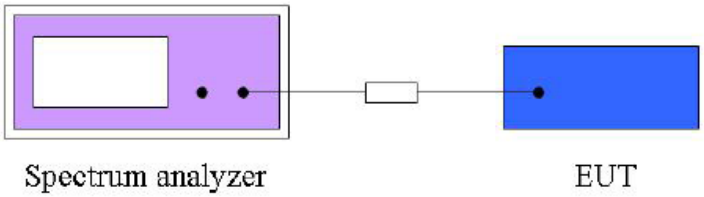
FCC Part Section(s)	Test Description	Test Result
§15.247(a)(2)	6 dB Bandwidth	Pass
§15.247(b)(3)	Conducted Maximum Peak Output Power	Pass
§15.247(e)	Power Spectral Density	Pass
§15.247(d)	Conducted Out of Band Emission Emissions	Pass
§15.207(a)	AC Power line Conducted Emissions	Pass
§15.205, 15.209	Radiated Spurious Emissions	Pass
§15.247(d), 15.205, 15.209	Radiated Restricted Band Edge	Pass

8. 6 dB Bandwidth Measurement

8.1 Operating environment

Temperature : 13.8 °C
Relative Humidity : 35.0 % R.H.

8.2 Test Set-up (Layout)



8.3 Limit

For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz

8.4 Test Equipment used

	Model Name	Manufacturer	Description	Serial Number	Due to Calibration
■ -	FSV	Rohde & Schwarz	Signal Analyzer	101552	May. 23, 2017
■ -	56-10	Weinschel	10 dB Attenuator	53184	Apr. 20. 2017

8.5 Test Test Procedure

a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ≥ 3 X RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

8.6 Test result

-. Test Date : February 27, 2017
-. Reference Standard : Part 15 Subpart C, Sec. 15.247(a)(2)
-. Test Procedure(s) : ANSI C63.10 (2013), KDB558074 D01 DTS Meas Guidance v03r05(April 8,2016)
-. Operating Condition : RF transmitting mode (1 ch: 2 412 MHz, 6 ch: 2 437 MHz, 11 ch: 2 462 MHz)
-. Power Source : DC 12 V

IEEE 802.11b

Frequency (MHz)	6 dB Bandwidth (MHz)	Min. Limit (MHz)	Result
2 412	8.98	0.50	Complies
2 437	8.56	0.50	Complies
2 462	8.98	0.50	Complies

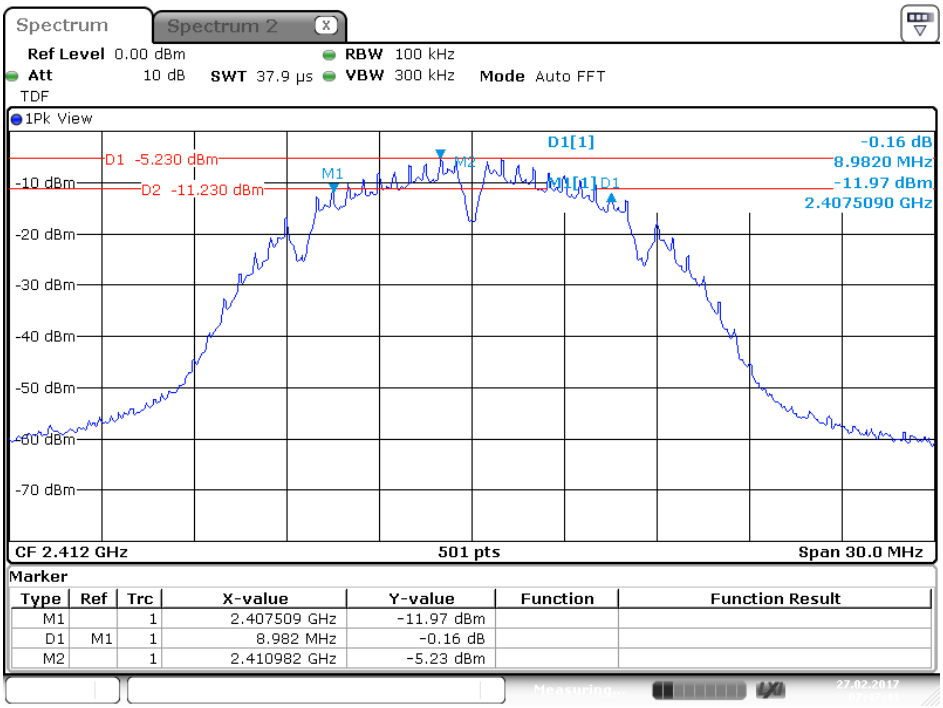
IEEE 802.11g

Frequency (MHz)	6 dB Bandwidth (MHz)	Min. Limit (MHz)	Result
2 412	15.21	0.50	Complies
2 437	15.15	0.50	Complies
2 462	15.32	0.50	Complies

IEEE 802.11n

Frequency (MHz)	6 dB Bandwidth (MHz)	Min. Limit (MHz)	Result
2 412	15.92	0.50	Complies
2 437	15.92	0.50	Complies
2 462	15.80	0.50	Complies

6 dB Bandwidth Plot on Configuration : IEEE 802.11b 1ch



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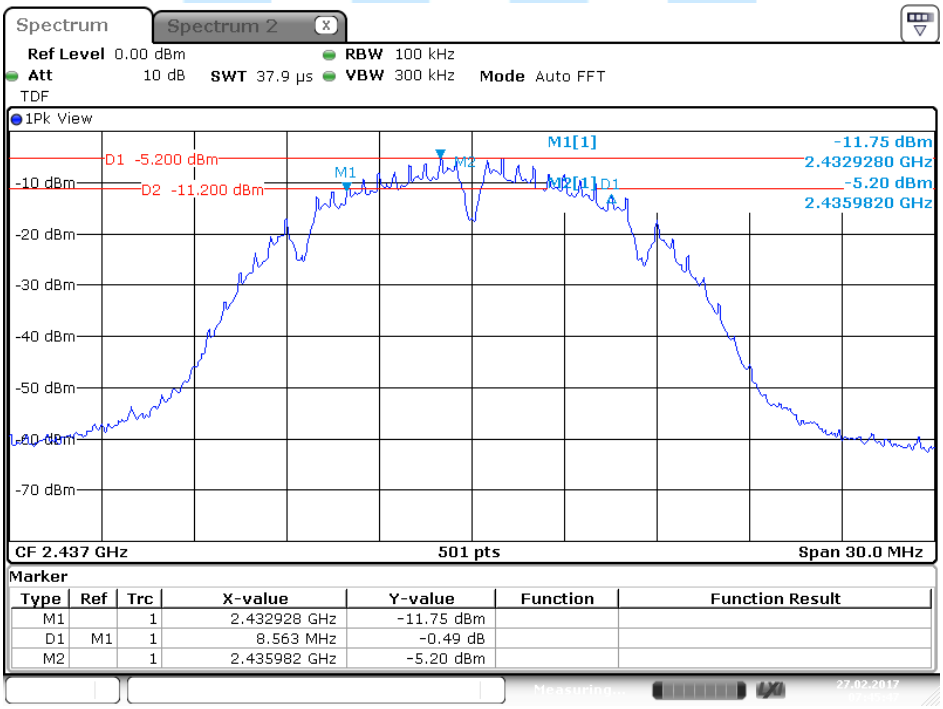
6 dB Bandwidth Plot on Configuration : IEEE 802.11b 6ch



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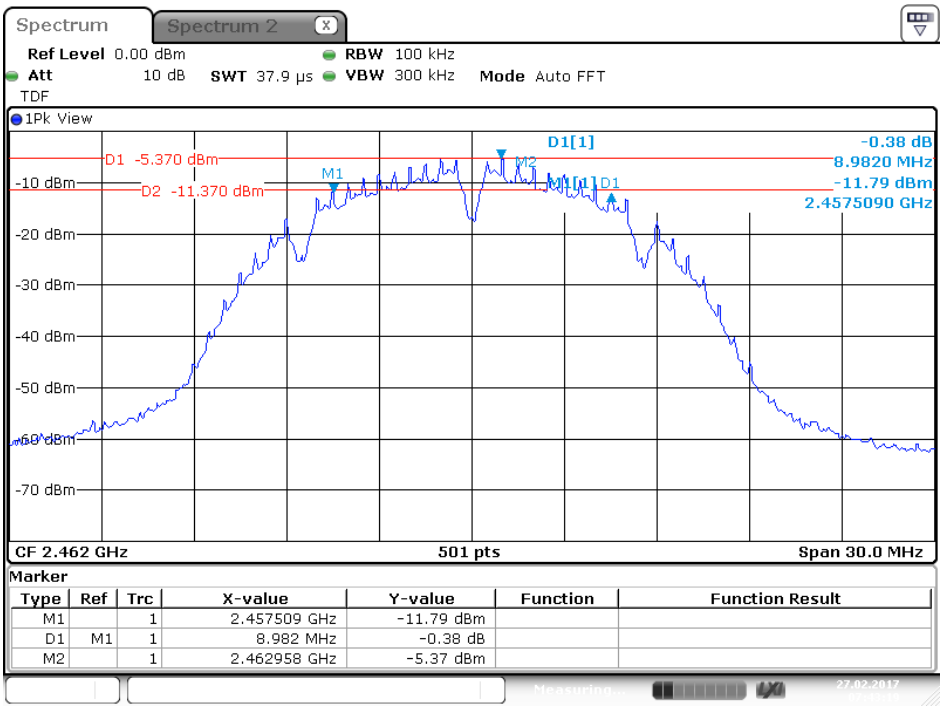
6 dB Bandwidth Plot on Configuration : IEEE 802.11b 11ch



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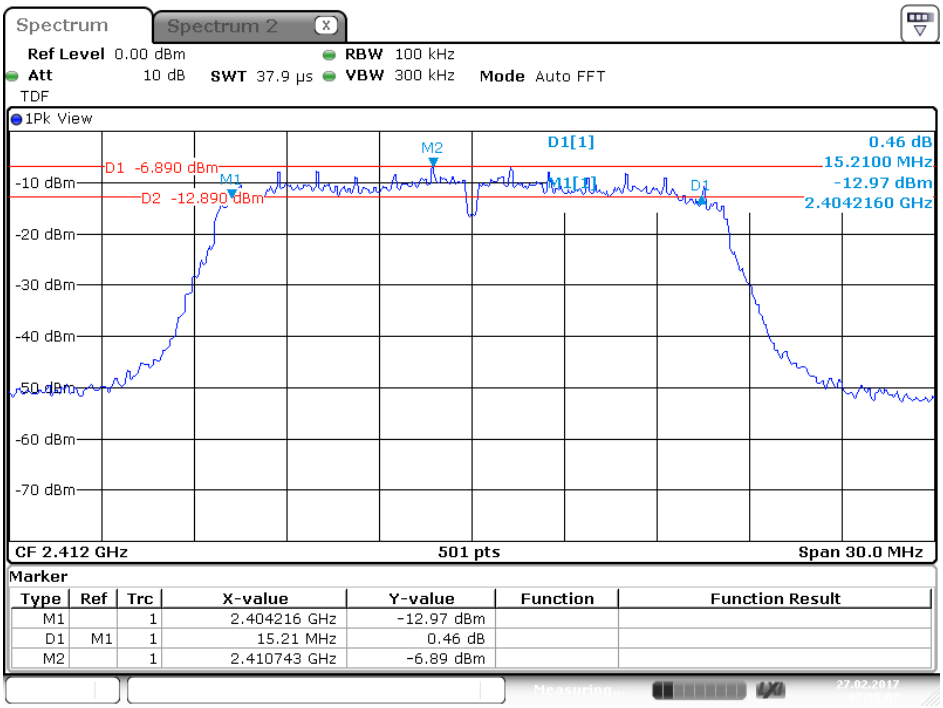
6 dB Bandwidth Plot on Configuration : IEEE 802.11g 1ch



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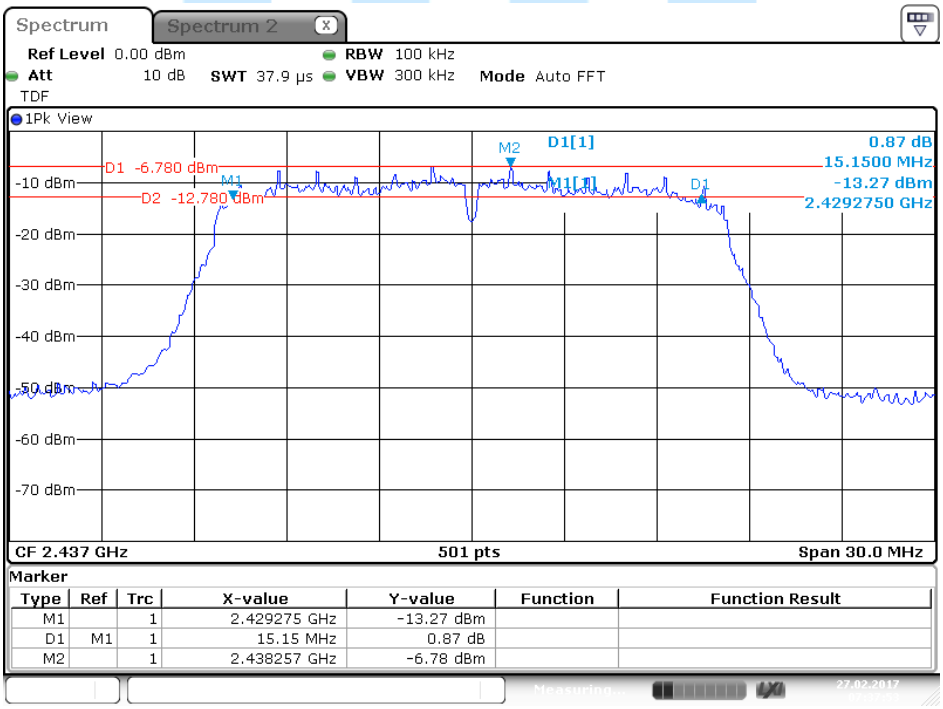
6 dB Bandwidth Plot on Configuration : IEEE 802.11g 6ch



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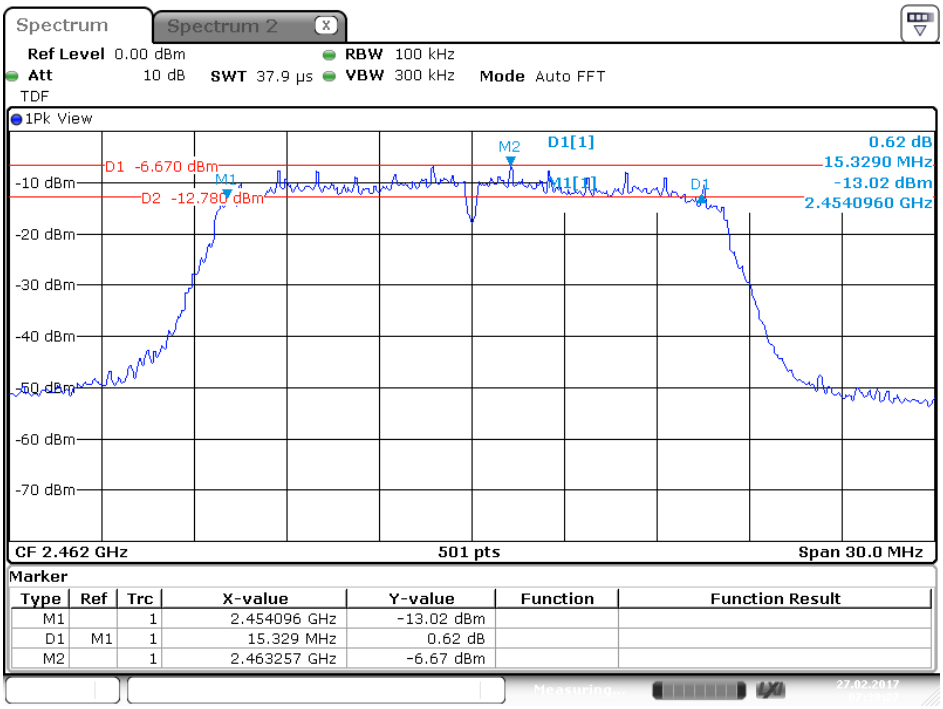
6 dB Bandwidth Plot on Configuration : IEEE 802.11g 11ch



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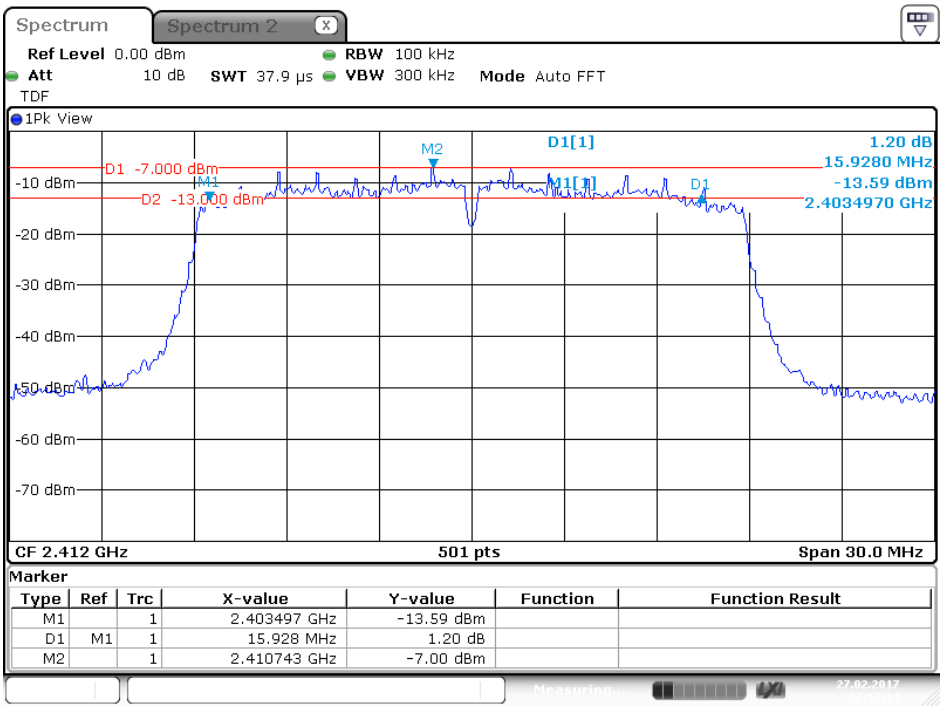
6 dB Bandwidth Plot on Configuration : IEEE 802.11n 1ch



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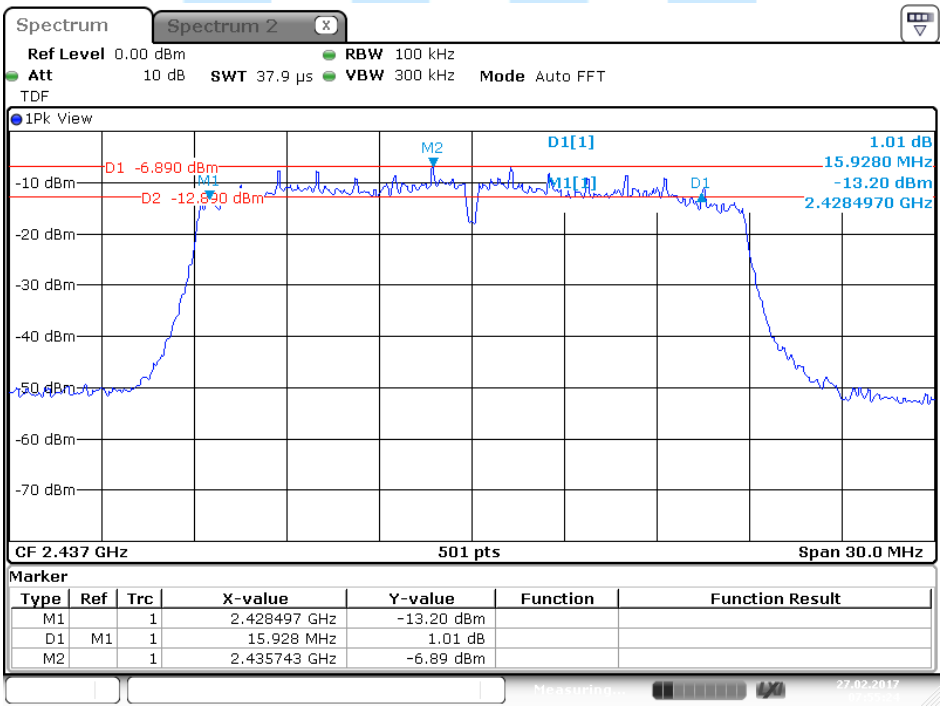
6 dB Bandwidth Plot on Configuration : IEEE 802.11n 6ch



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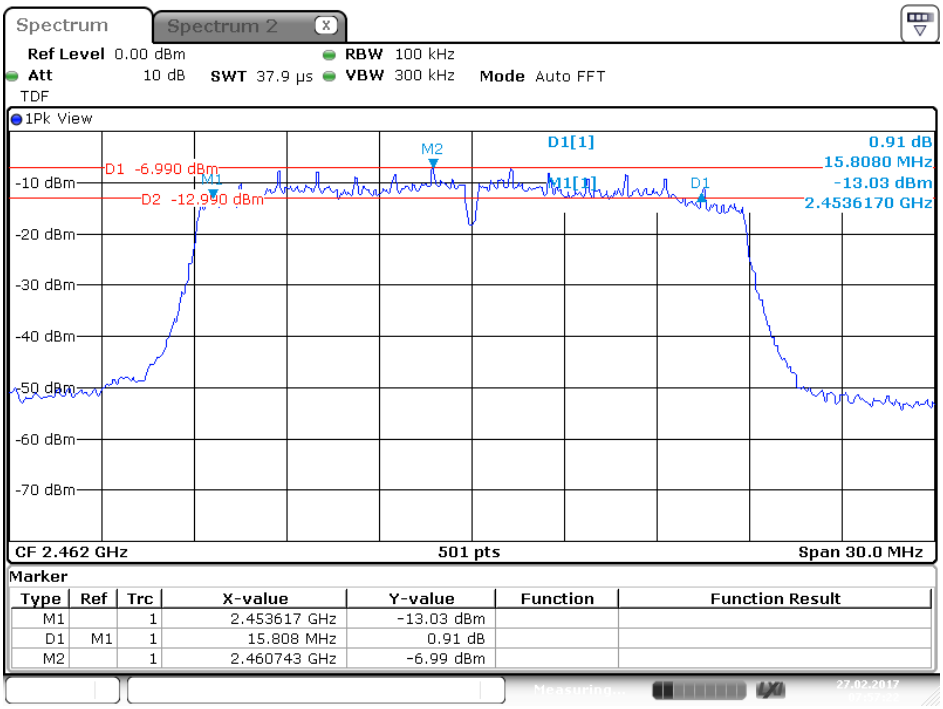
6 dB Bandwidth Plot on Configuration : IEEE 802.11n 11ch



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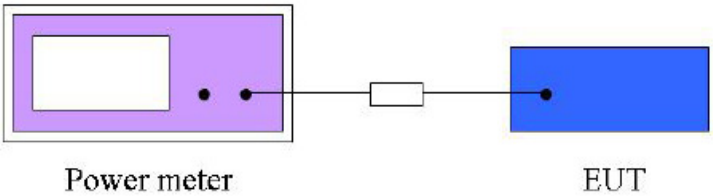
9. Conducted Maximum Peak Output Power Measurement

9.1 Operating environment

Temperature : 13.3 °C
Relative Humidity : 37.8 % R.H.

9.2 Test Set-up (Layout)



9.3 Limit

For systems using digital modulation in the (2 400~2 483.5) MHz, the limit for peak output power is 30 dBm The limited has to be reduced by the amount in dB that the gain of the antenna exceed 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

9.4 Test Equipment used

	Model Name	Manufacturer	Description	Serial Number	Due to Calibration
■ -	NRV-Z32	Rohde & Schwarz	Peak Power sensor	100049	Dec. 06, 2017
■ -	NRVS	Rohde & Schwarz	Single Channel Power Meter	101008	Apr 19, 2017
■ -	NRP-Z51	Rohde & Schwarz	Power sensor	1138.0005.02	Apr. 20, 2017
■ -	56-10	Weinschel	10 dB Attenuator	53184	Apr. 20. 2017

9.5 Test Procedure

A peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor. Record the power level.

9.6 Test Result

-. Test Date : February 28, 2017
-. Reference Standard : Part 15 Subpart C, Sec. 15.247(a)(2)
-. Test Procedure(s) : ANSI C63.10 (2013), KDB558074 D01 DTS Meas Guidance v03r05(April 8,2016)
-. Operating Condition : RF transmitting mode (1 ch: 2 412 MHz, 6 ch: 2 437 MHz, 11 ch: 2 462 MHz)
-. Power Source : DC 12 V

IEEE 802.11b

Frequency (MHz)	Average Conducted Power[1)] (dBm)	Peak Conducted Power (dBm)	Max. Limit (dBm)	Result
2 412	2.88	4.63	30.00	Complies
2 437	2.75	4.36	30.00	Complies
2 462	3.14	4.52	30.00	Complies

Note: 1) The Average output power is reference data for RF Exposure.

IEEE 802.11g

Frequency (MHz)	Average Conducted Power[1)] (dBm)	Peak Conducted Power (dBm)	Max. Limit (dBm)	Result
2 412	3.58	9.41	30.00	Complies
2 437	3.61	9.54	30.00	Complies
2 462	3.83	9.93	30.00	Complies

Note: 1) The Average output power is reference data for RF Exposure.

IEEE 802.11n

Frequency (MHz)	Average Conducted Power[1)] (dBm)	Peak Conducted Power (dBm)	Max. Limit (dBm)	Result
2 412	3.38	9.00	30.00	Complies
2 437	3.46	9.19	30.00	Complies
2 462	3.68	9.12	30.00	Complies

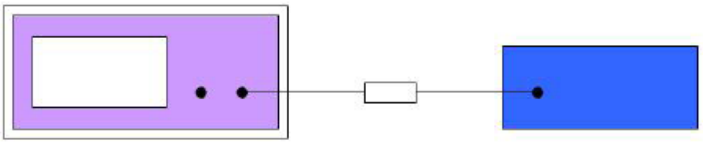
Note: 1) The Average output power is reference data for RF Exposure.

10. Power Spectral Density Measurement

10.1 Operating Environment

Temperature : 13.8 °C
Relative Humidity : 35.0 % R.H.

10.2 Test Set-up (Layout)



10.3 Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission

10.4 Test Equipment used

	Model Name	Manufacturer	Description	Serial Number	Due to Calibration
■ -	FSV	Rohde & Schwarz	Signal Analyzer	101552	May. 23, 2017
■ -	56-10	Weinschel	10 dB Attenuator	53184	Apr. 20. 2017

10.5 Test Procedure

a) Set analyzer center frequency to DTS channel center frequency.
b) Set the span to 1.5 times the DTS bandwidth.
c) Set the RBW to 3 kHz
d) Set the VBW to 10 kHz
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum amplitude level within the RBW.

10.6 Test Result

-. Test Date : February 27, 2017
-. Reference Standard : Part 15 Subpart C, Sec. 15.247(a)(2)
-. Test Procedure(s) : ANSI C63.10 (2013), KDB558074 D01 DTS Meas Guidance v03r05(April 8,2016)
-. Operating Condition : RF transmitting mode (1 ch: 2 412 MHz, 6 ch: 2 437 MHz, 11 ch: 2 462 MHz)
-. Power Source : DC 12 V

IEEE 802.11b

Frequency	PSD (dBm/3kHz)	Max. Limit (dBm/3kHz)	Result
2 412 MHz	-17.75	8.00	Complies
2 437 MHz	-17.77	8.00	Complies
2 462 MHz	-17.18	8.00	Complies

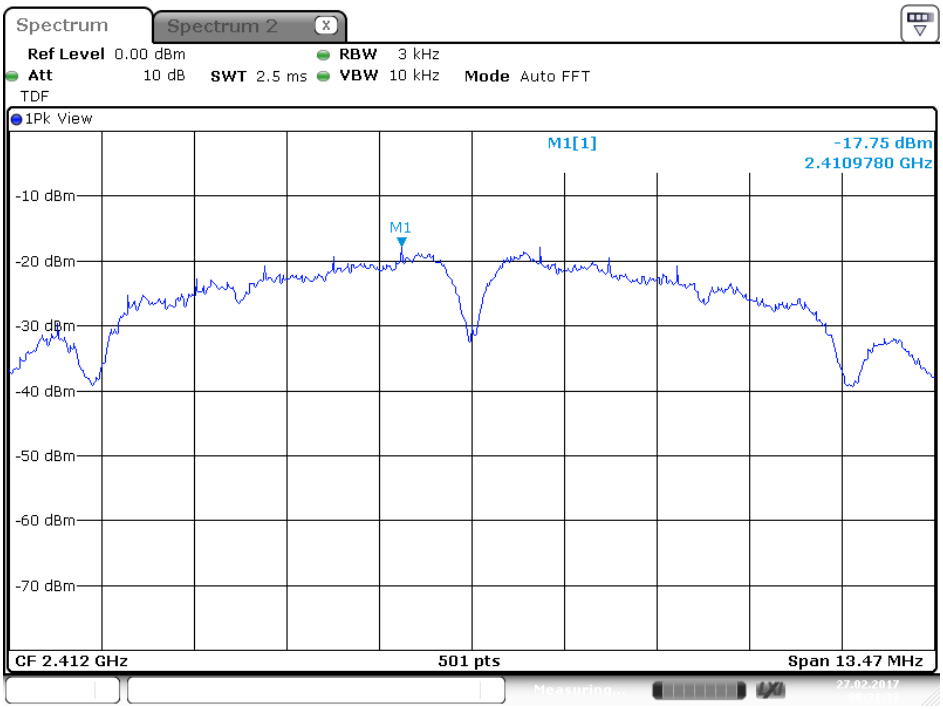
IEEE 802.11g

Frequency	PSD (dBm/3kHz)	Max. Limit (dBm/3kHz)	Result
2 412 MHz	-18.85	8.00	Complies
2 437 MHz	-18.82	8.00	Complies
2 462 MHz	-18.94	8.00	Complies

IEEE 802.11n

Frequency	PSD (dBm/3kHz)	Max. Limit (dBm/3kHz)	Result
2 412 MHz	-19.27	8.00	Complies
2 437 MHz	-19.42	8.00	Complies
2 462 MHz	-19.12	8.00	Complies

Power Density Plot on configuration : IEEE 802.11b 1ch



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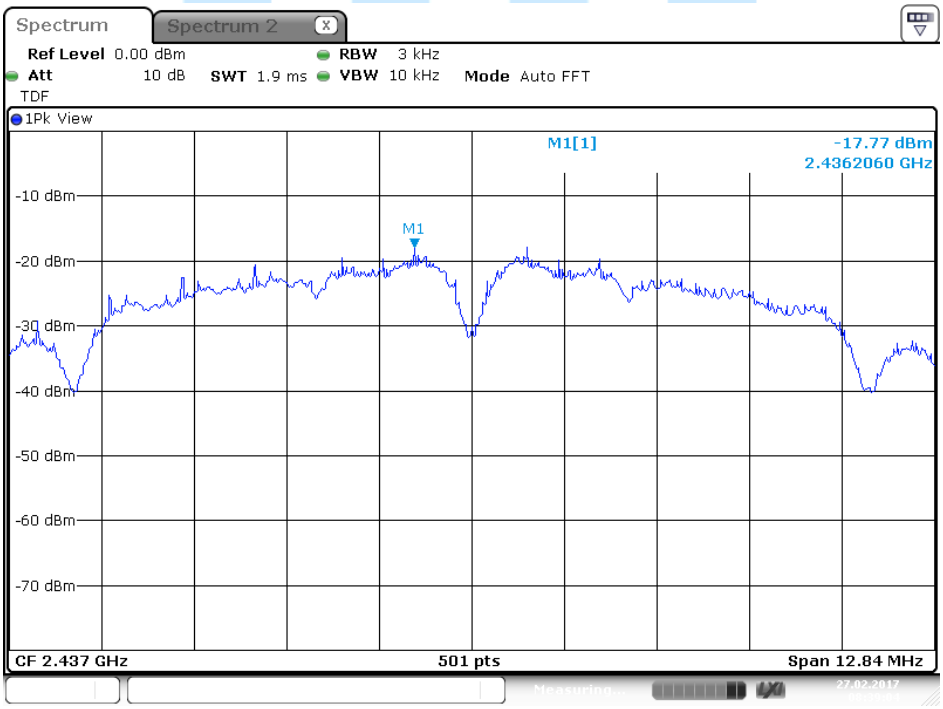
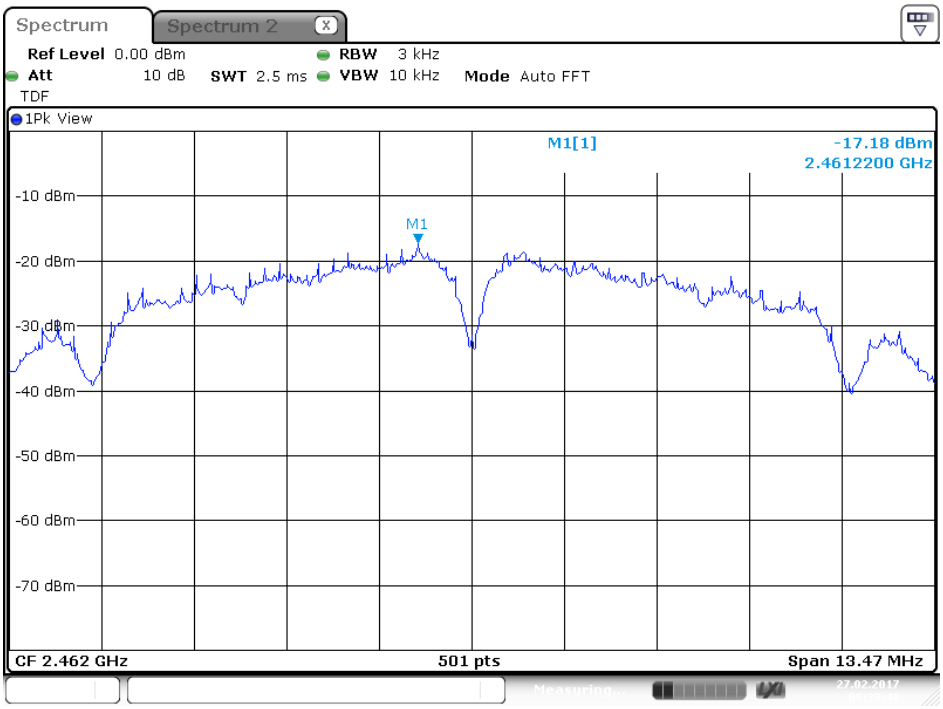
Power Density Plot on configuration : IEEE 802.11b 6ch

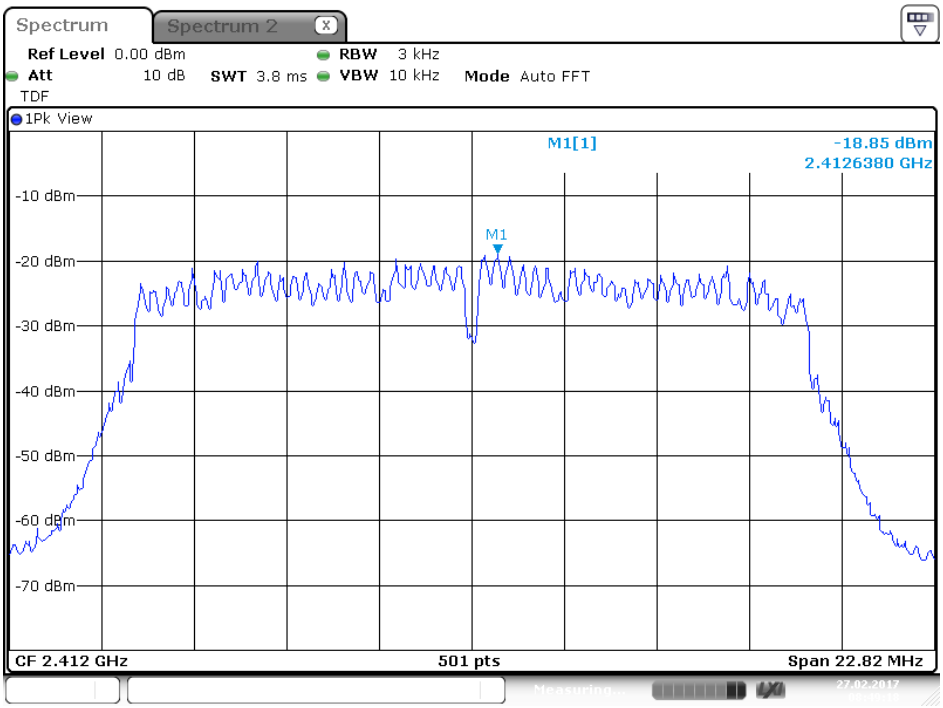


Date: 27.FEB.2017 08:39:04

Power Density Plot on configuration : IEEE 802.11b 11ch

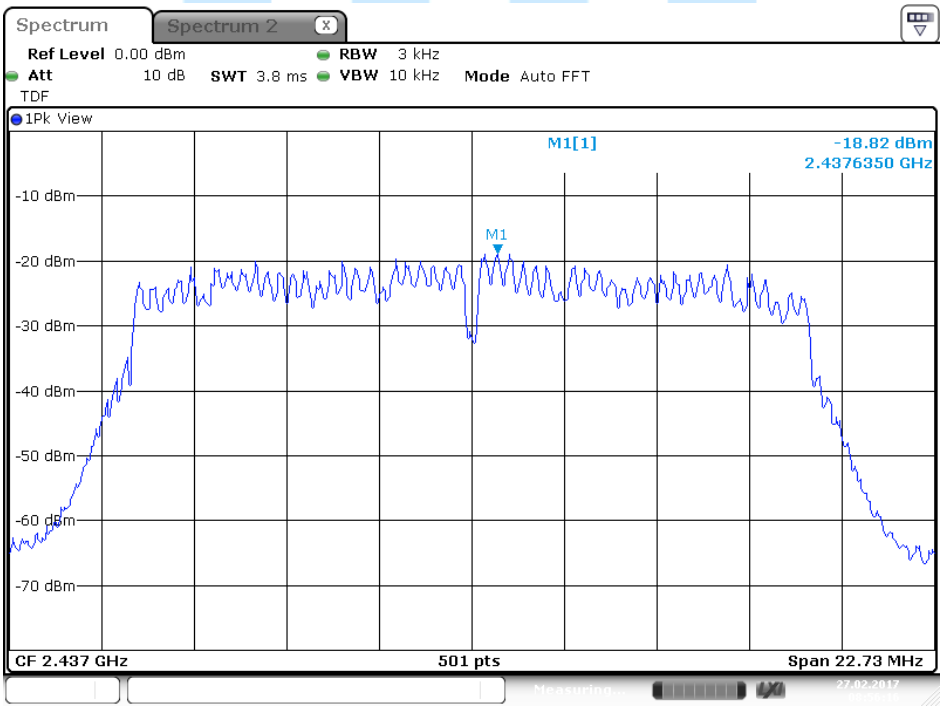


Power Density Plot on configuration : IEEE 802.11g 1ch



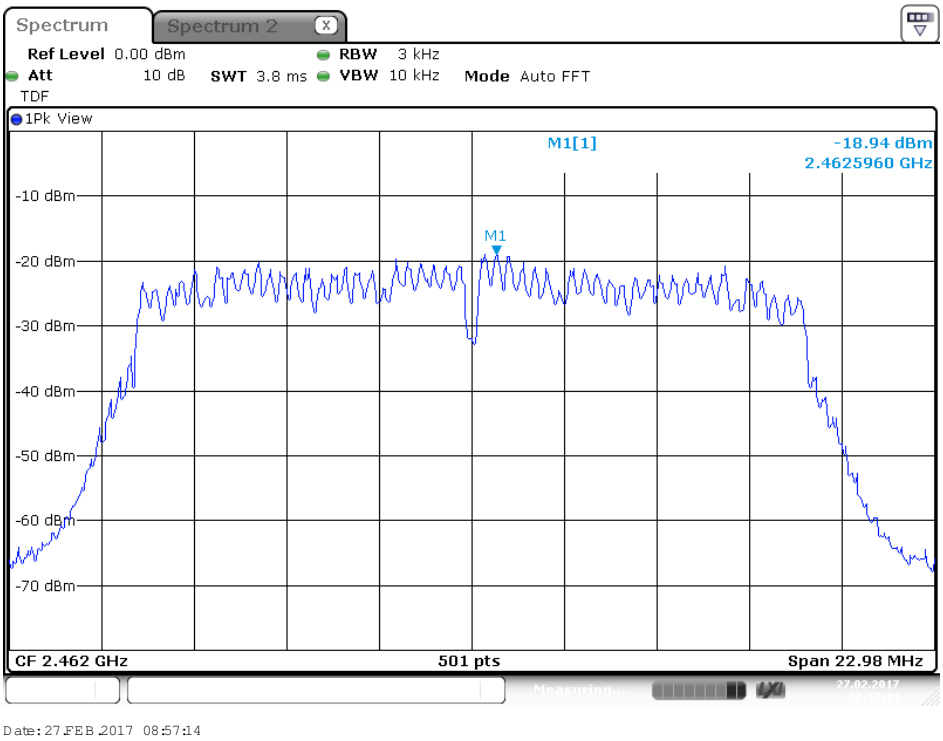
Date: 27.FEB.2017 08:49:18

Power Density Plot on configuration : IEEE 802.11g 6ch

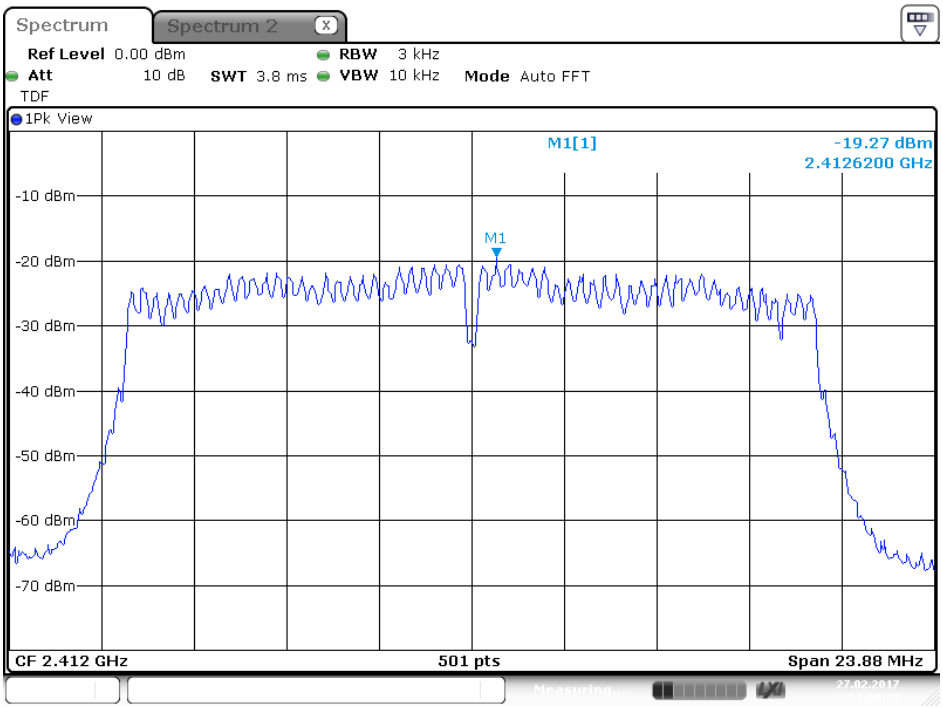


Date: 27.FEB.2017 08:56:16

Power Density Plot on configuration : IEEE 802.11g 11ch

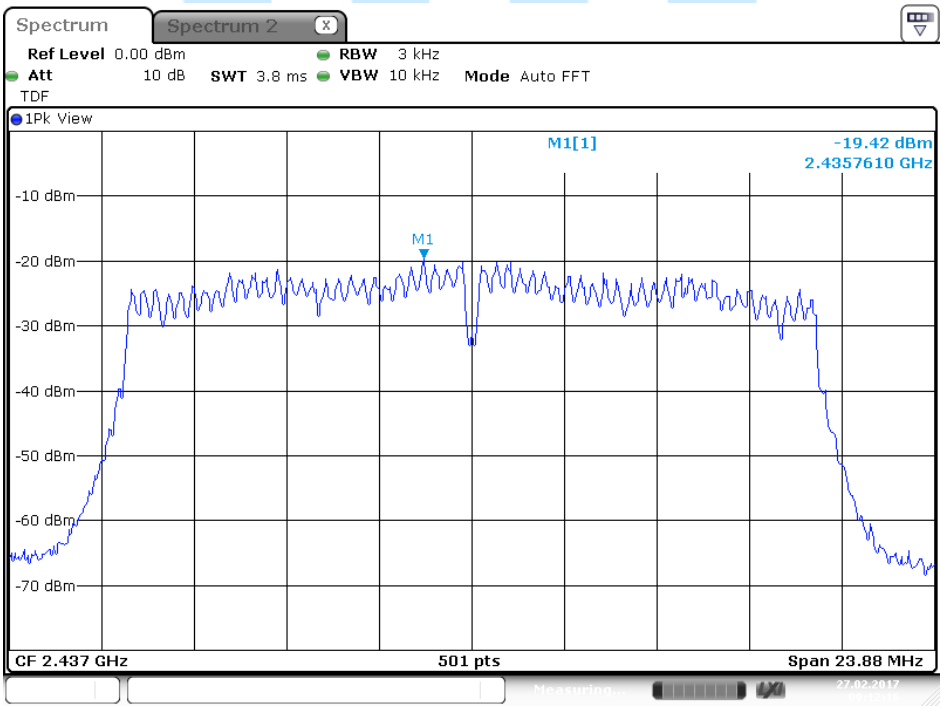


Power Density Plot on configuration : IEEE 802.11n 1ch



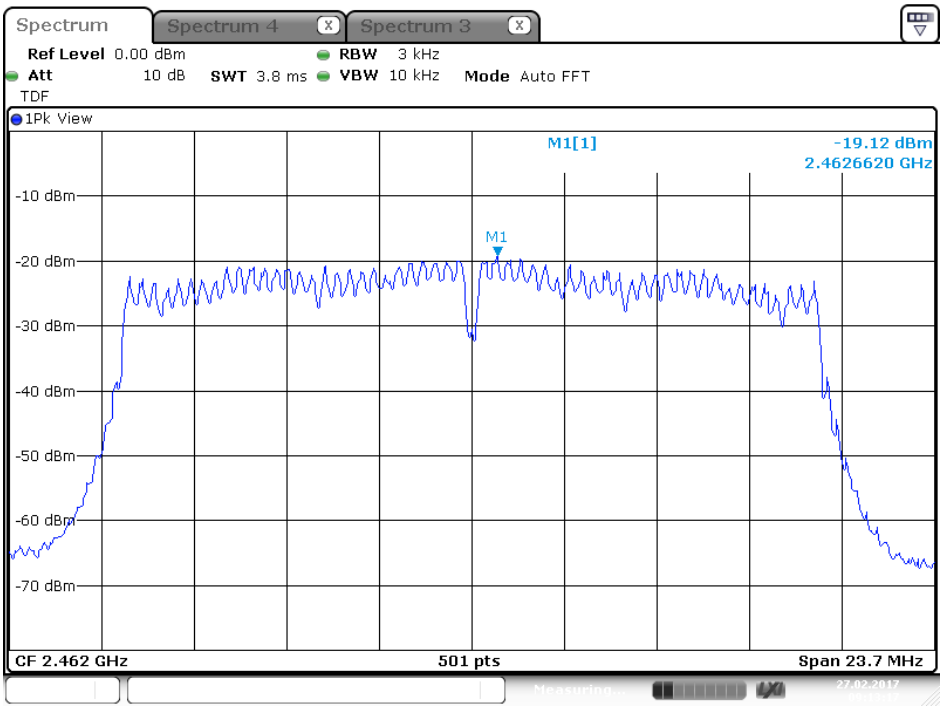
Date: 27.FEB.2017 09:00:38

Power Density Plot on configuration : IEEE 802.11n 6ch



Date: 27.FEB.2017 09:12:16

Power Density Plot on configuration : IEEE 802.11n 11ch



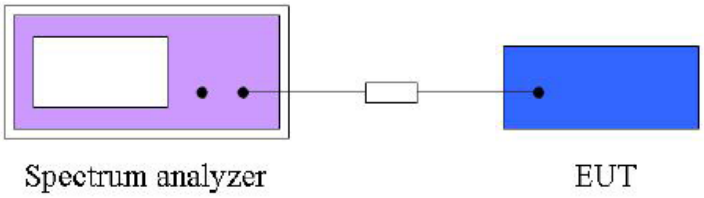
Date: 27.FEB.2017 09:13:17

11. Conducted Spurious Emission & Out of Band Emission

11.1 Operating environment

Temperature : 13.4 °C
Relative Humidity : 35.3 % R.H.

11.2 Test set-up (Lay-out)



11.3 Limit

Below -20 dB of the highest emission level of operating band (in 100 kHz resolution band width)

11.4 Test equipment used

	Model Name	Manufacturer	Description	Serial Number	Due to Calibration
■ -	FSV	Rohde & Schwarz	Signal Analyzer	101552	May. 23, 2017
■ -	56-10	Weinschel	10 dB Attenuator	53184	Apr. 20. 2017

11.5 Test Procedure

a) Set analyzer center frequency to DTS channel center frequency.
b) Set the span to 1.5 times the DTS bandwidth.
c) Set the RBW to 3 kHz
d) Set the VBW to 10 kHz
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum amplitude level within the RBW.

11.6 Test Result

-. Test Date : February 27, 2017
-. Reference standard : Part 15 Subpart C, Sec. 15.247(a)(2)
-. Test Procedure(s) : ANSI C63.10 (2013), KDB558074 D01 DTS Meas Guidance v03r05(April 8,2016)
-. Operating condition : RF transmitting mode (1 ch: 2 412 MHz, 6 ch: 2 437 MHz, 11 ch: 2 462 MHz)
-. Power Source : DC 12 V

Conducted Spurious Emission

IEEE 802.11b

Operating Frequency	100 kHz PSD (dBm)	Spurious Level (dBm)	Deviation (dBc)	Limits (dBc)	Result
2 412 MHz	-4.98	-59.95	-54.97	-20.00	Complies
2 437 MHz	-7.11	-59.19	-52.08		Complies
2 462 MHz	-7.08	-60.84	-53.73		Complies

IEEE 802.11g

Operating Frequency	100 kHz PSD (dBm)	Spurious Level (dBm)	Deviation (dBc)	Limits (dBc)	Result
2 412 MHz	-5.10	-62.06	-56.96	-20.00	Complies
2 437 MHz	-6.87	-62.07	-55.20		Complies
2 462 MHz	-6.93	-61.95	-55.02		Complies

IEEE 802.11n

Operating Frequency	100 kHz PSD (dBm)	Spurious Level (dBm)	Deviation (dBc)	Limits (dBc)	Result
2 412 MHz	-4.85	-61.73	-56.88	-20.00	Complies
2 437 MHz	-6.85	-61.13	-54.28		Complies
2 462 MHz	-6.95	-61.69	-54.74		Complies

Conducted Out of Band(Band Edge) Emission

IEEE 802.11b

Operating Frequency	100 kHz PSD (dBm)	Bandedge Level (dBm)	Deviation (dBc)	Limits (dBc)	Result
2 412 MHz	-4.98	-62.51	-57.53	-20.00	Complies
2 462 MHz	-4.85	-65.03	-60.18		Complies

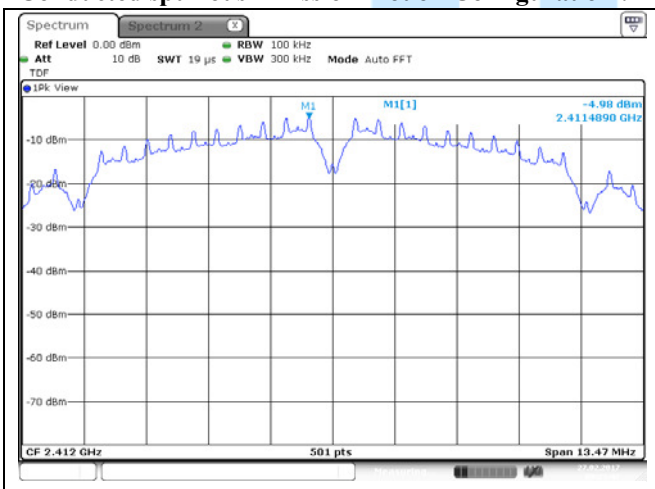
IEEE 802.11g

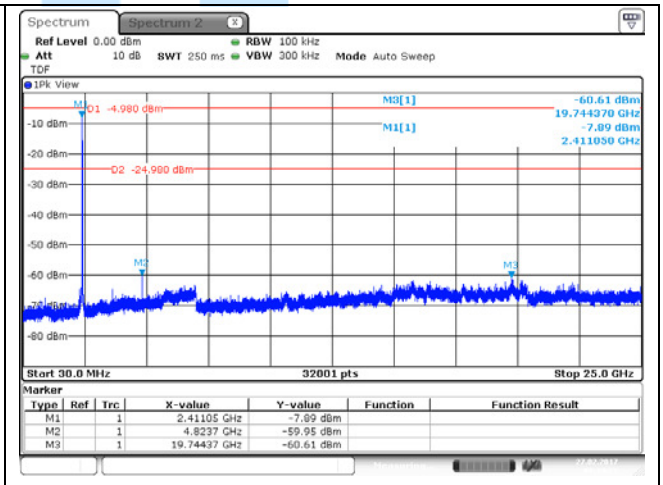
Operating Frequency	100 kHz PSD (dBm)	Bandedge Level (dBm)	Deviation (dBc)	Limits (dBc)	Result
2 412 MHz	-7.11	-50.97	-43.86	-20.00	Complies
2 462 MHz	-6.85	-51.89	-45.04		Complies

IEEE 802.11n

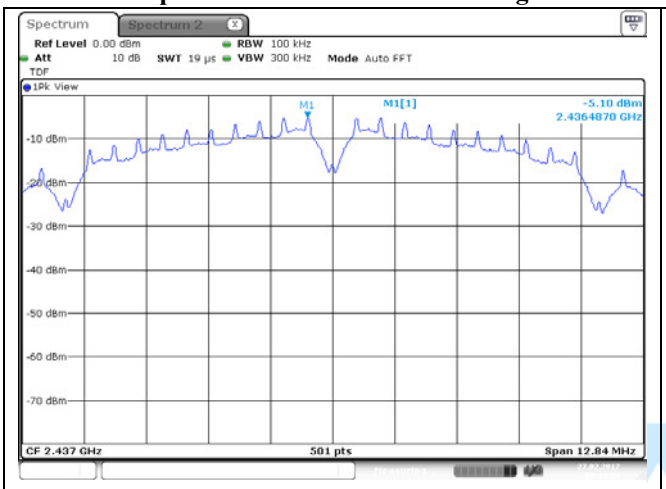
Operating Frequency	100 kHz PSD (dBm)	Bandedge Level (dBm)	Deviation (dBc)	Limits (dBc)	Result
2 412 MHz	-7.08	-49.33	-42.25	-20.00	Complies
2 462 MHz	-6.95	-52.45	-45.50		Complies

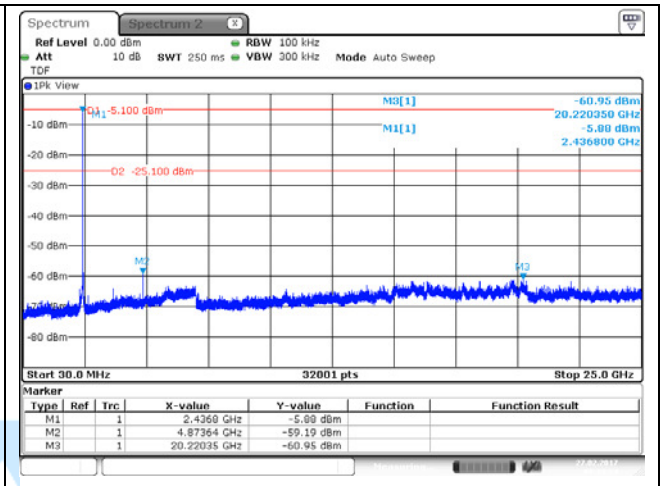
Conducted spurious Emission Plot on Configuration : IEEE 802.11b 1ch



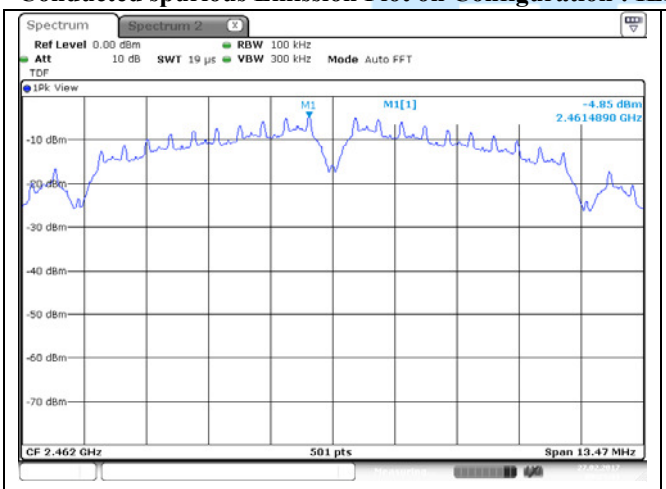


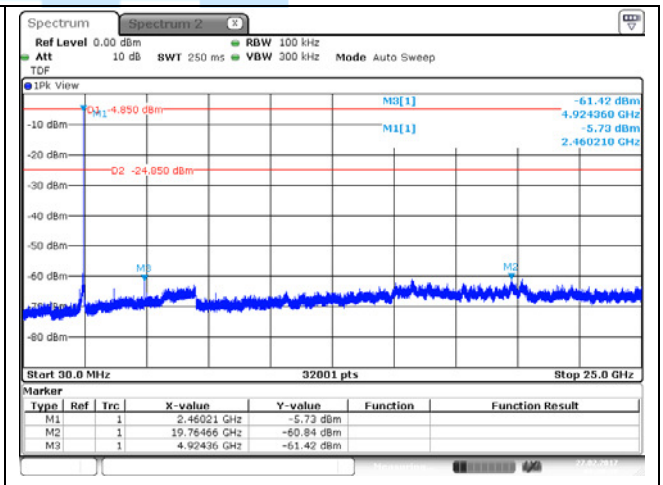
Conducted spurious Emission Plot on Configuration : IEEE 802.11b 6ch



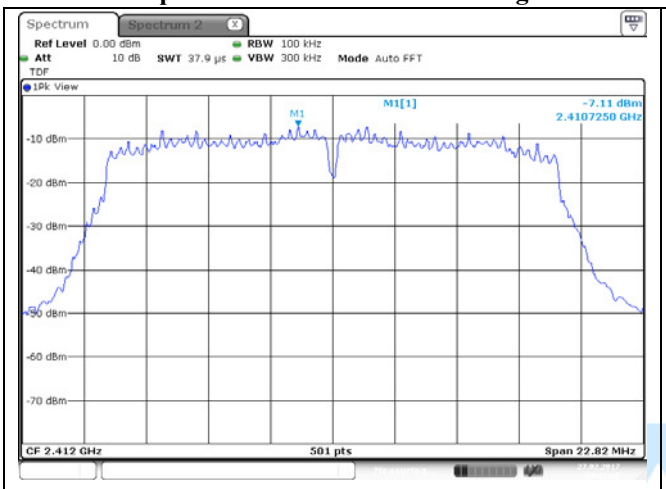


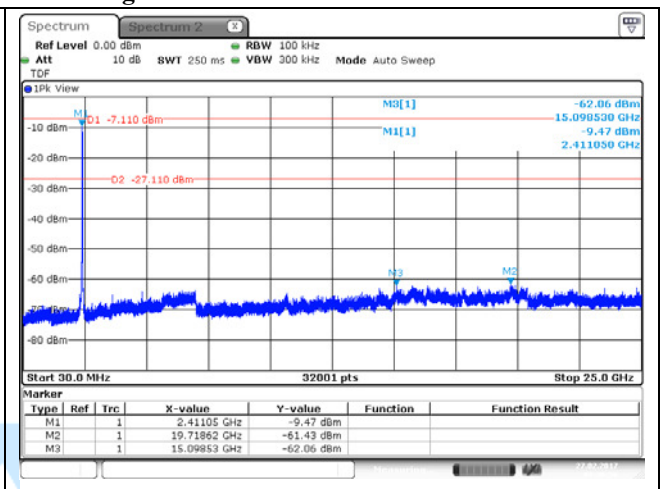
Conducted spurious Emission Plot on Configuration : IEEE 802.11b 11ch



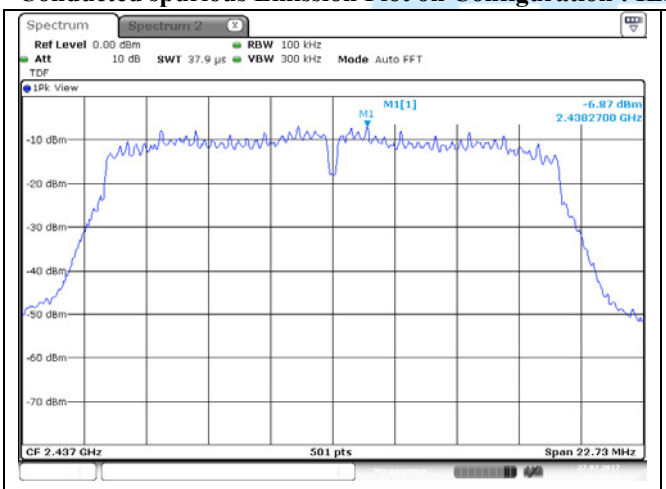


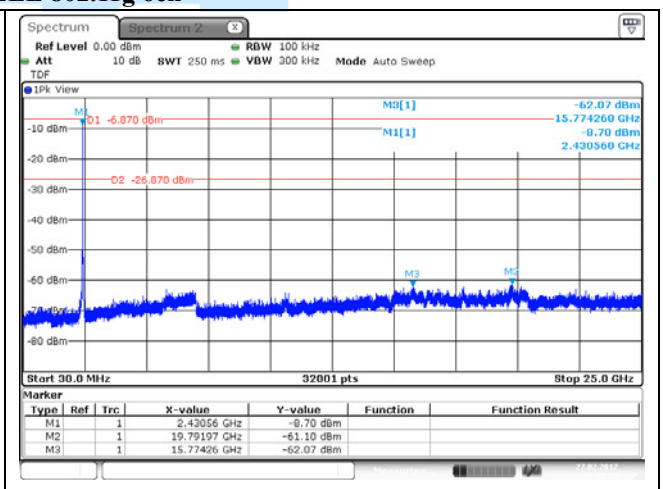
Conducted spurious Emission Plot on Configuration : IEEE 802.11g 1ch



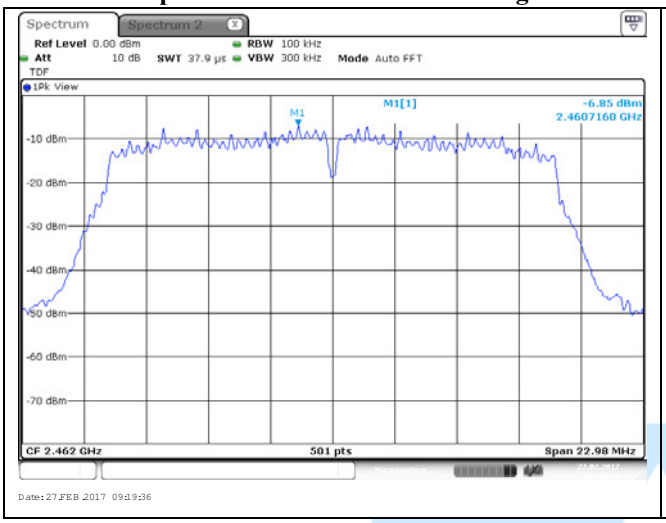


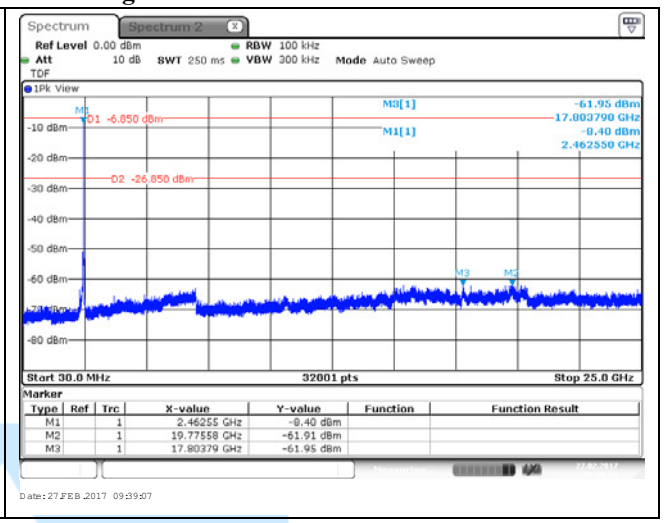
Conducted spurious Emission Plot on Configuration : IEEE 802.11g 6ch



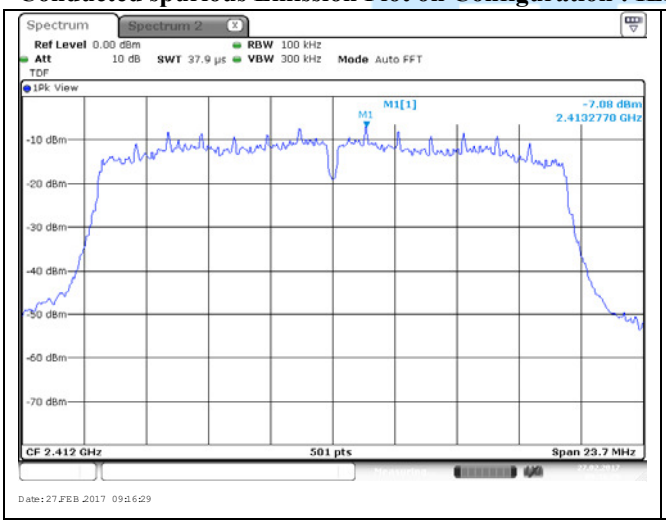


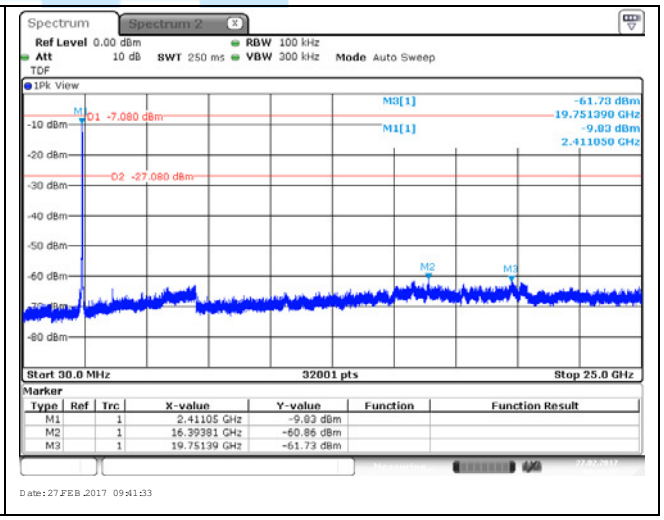
Conducted spurious Emission Plot on Configuration : IEEE 802.11g 11ch



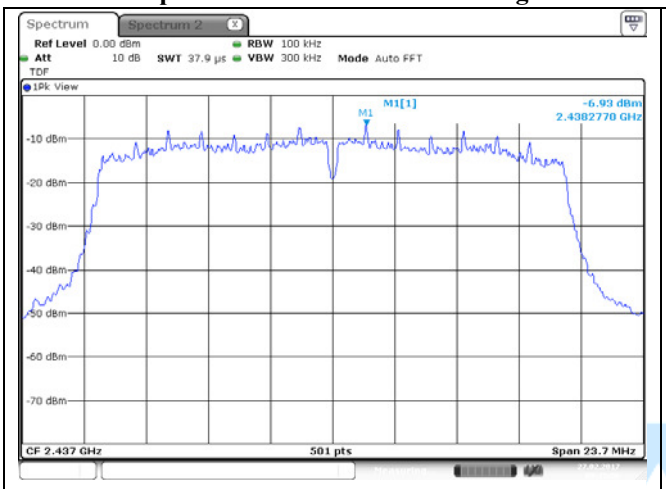


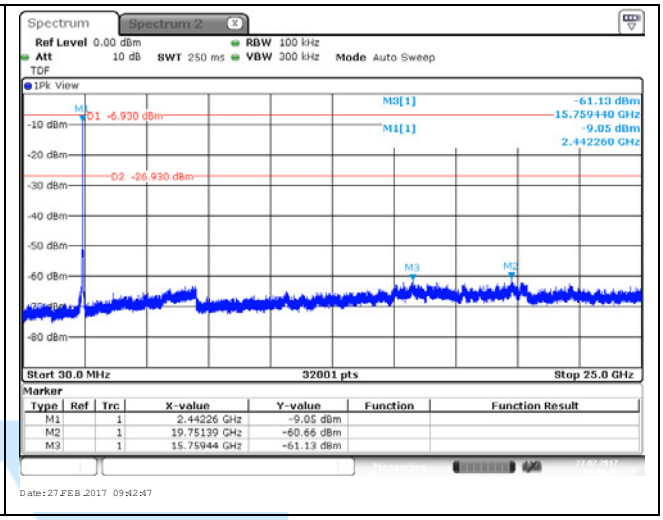
Conducted spurious Emission Plot on Configuration : IEEE 802.11n 1ch



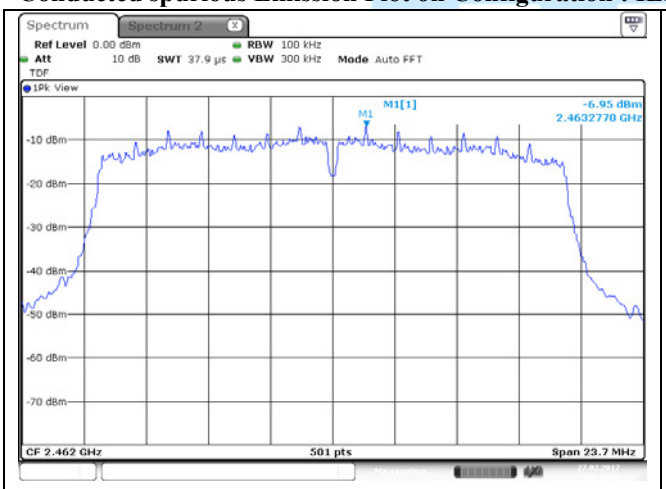


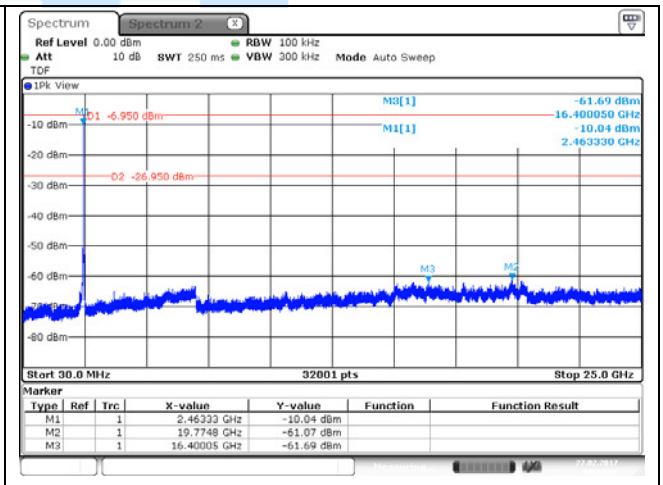
Conducted spurious Emission Plot on Configuration : IEEE 802.11b 6ch



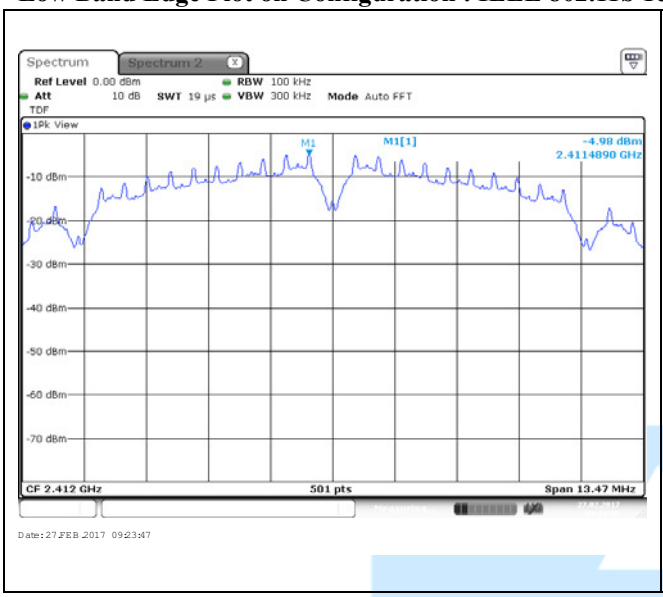


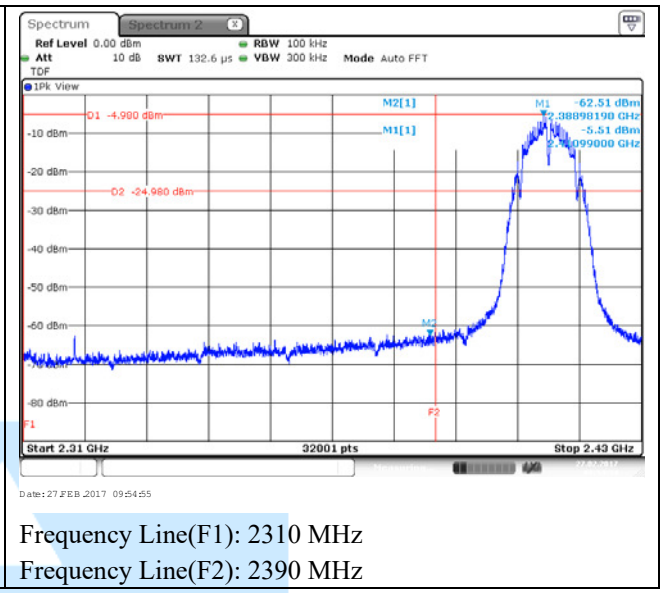
Conducted spurious Emission Plot on Configuration : IEEE 802.11b 11ch





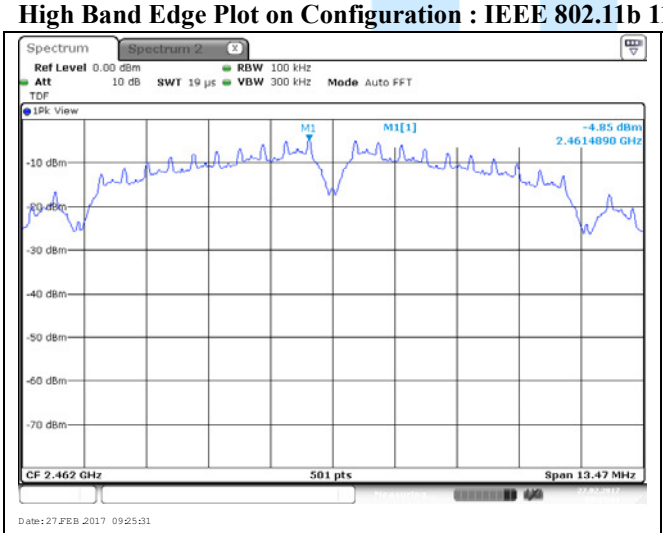
Low Band Edge Plot on Configuration : IEEE 802.11b 1ch

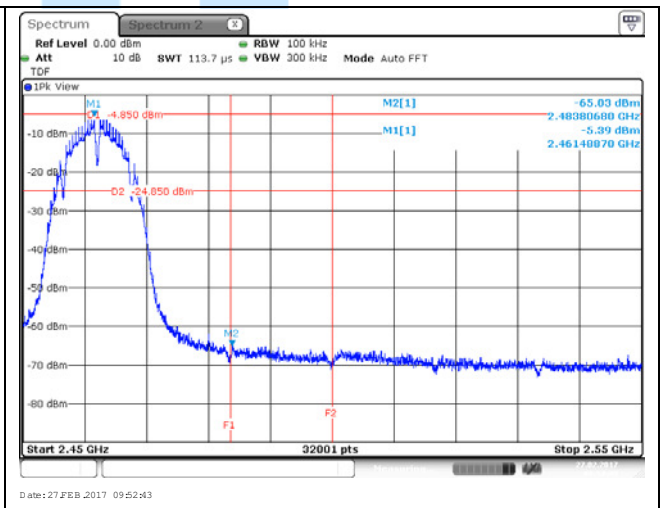




Frequency Line(F1): 2310 MHz
Frequency Line(F2): 2390 MHz

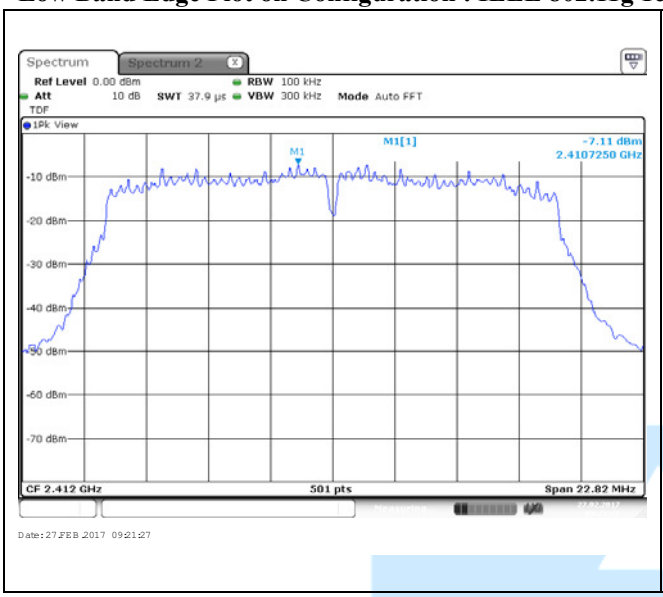
High Band Edge Plot on Configuration : IEEE 802.11b 11ch

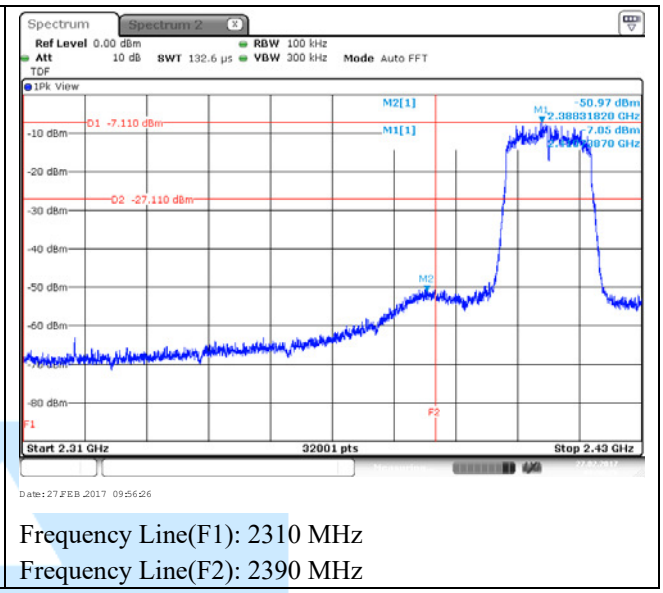




Frequency Line(F1): 2483.5 MHz
Frequency Line(F2): 2500 MHz

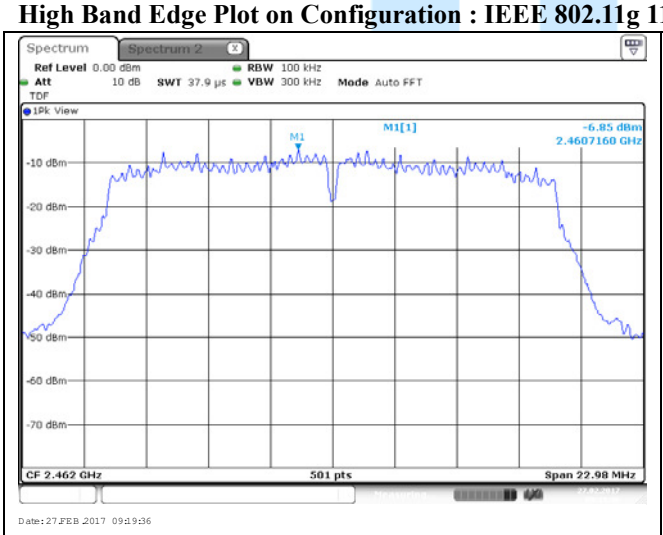
Low Band Edge Plot on Configuration : IEEE 802.11g 1ch

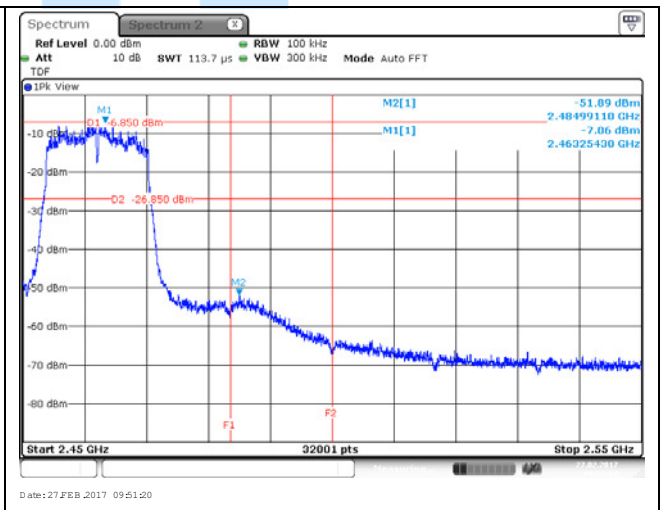




Frequency Line(F1): 2310 MHz
Frequency Line(F2): 2390 MHz

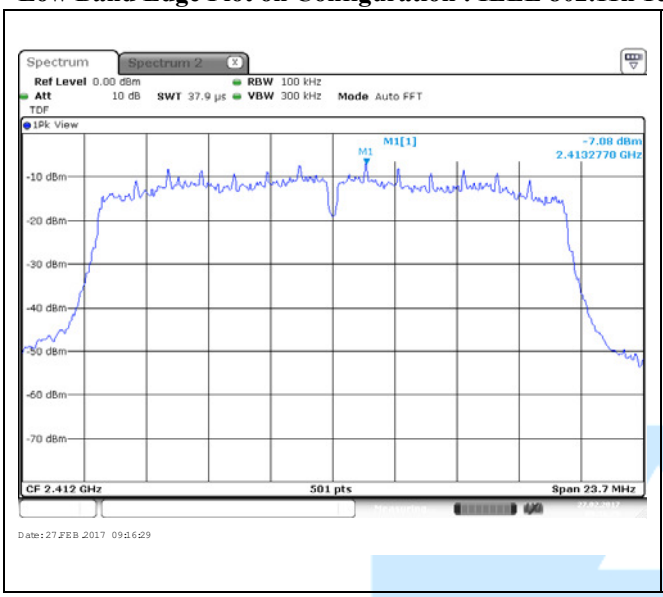
High Band Edge Plot on Configuration : IEEE 802.11g 11ch

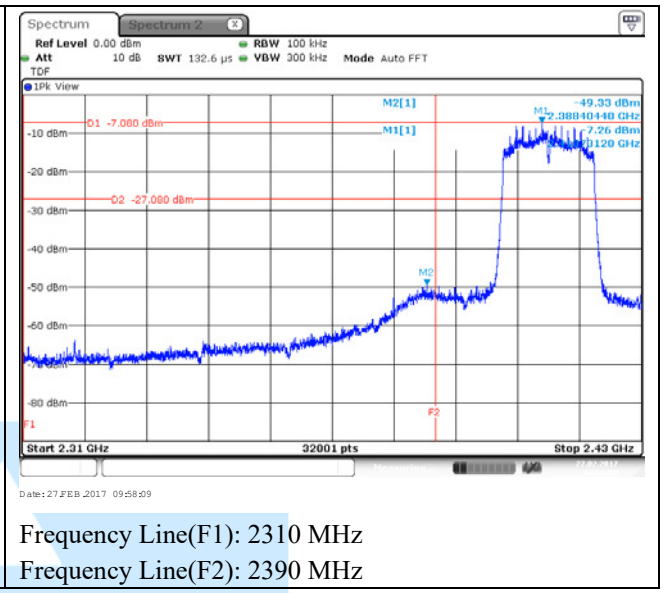




Frequency Line(F1): 2483.5 MHz
Frequency Line(F2): 2500 MHz

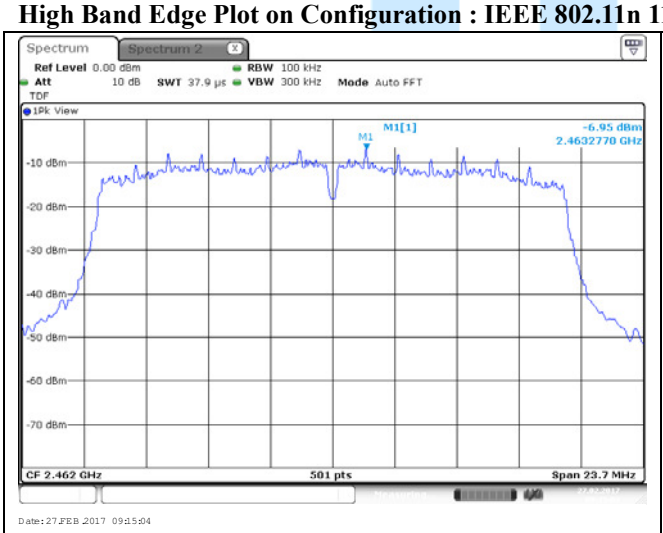
Low Band Edge Plot on Configuration : IEEE 802.11n 1ch

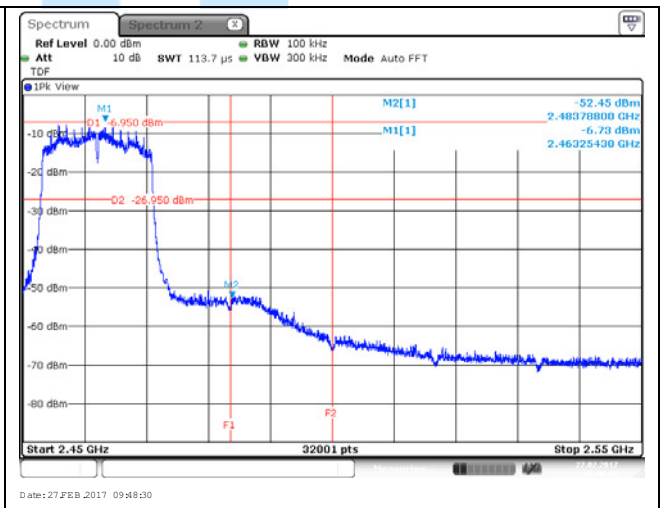




Frequency Line(F1): 2310 MHz
Frequency Line(F2): 2390 MHz

High Band Edge Plot on Configuration : IEEE 802.11n 11ch





Frequency Line(F1): 2483.5 MHz
Frequency Line(F2): 2500 MHz

12. AC Power line Conducted emission

-Test Description

The Line conducted emission test facility is inside a 4 m × 8 m × 2.5 m shielded enclosure. (Test firm Registration Number: 269701)

The EUT was placed on a non-conducting 1.0 m by 1.5 m table, which is 0.8 m in height and 0.4 m away from the vertical wall of the shielded enclosure.

The EUT is powered from the Rohde & Schwarz LISN (ENV216) and the support equipment is powered from the Rohde & Schwarz LISN (ENV216). Powers to the LISN are filtered by high-current high insertion loss power line filter.

Sufficient time for EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition.

The RF output of the LISN was connected to the EMI test receiver (Rohde & Schwarz, ESCI).

Exploratory measurements were conducted to identify the highest emission by operating the EUT in a range of typical modes of operation, cable positions, system configuration and arrangement.

Based on exploratory measurements, the final measurements were conducted at the worst test conditions.

Exploratory measurements were scanned using Peak mode of EMI Test receiver from 150 kHz to 30 MHz with 20 ms sweep time. The final measurements were measured with Quasi-Peak and Average mode.

The bandwidth of EMI Test Receiver was set to 9 kHz. Interface cables were connected to the available interface ports of the test unit. Excess cable lengths were bundled at center with 30 cm ~ 40 cm.

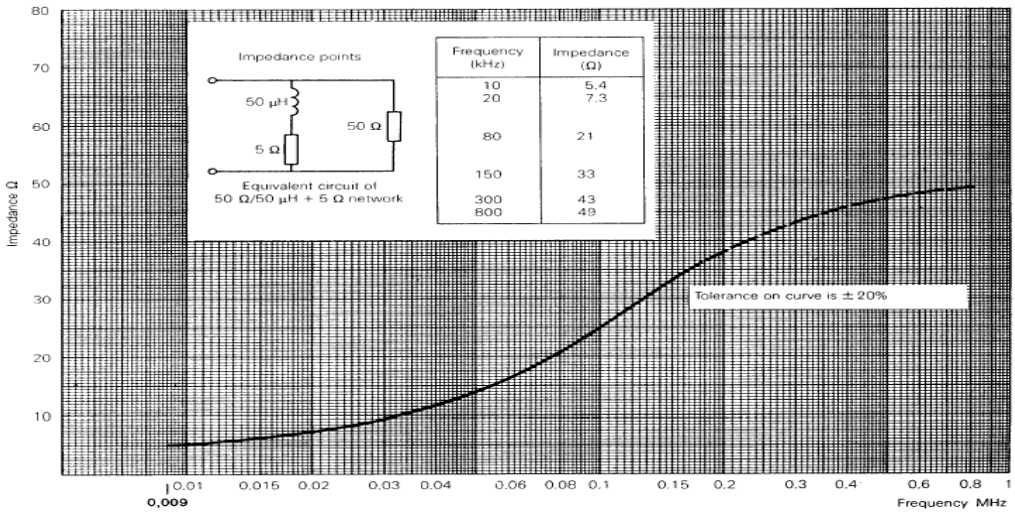


Fig 2. Impedance of LISN

12.1 Operating Environment

Temperature : 20.3 °C
Relative Humidity : 41.6 % R.H.

12.2 Test Set-up

The conducted emission measurements were performed in the shielded room.
The EUT was placed on wooden table, 0.8 m heights above the floor, 0.4 m from the reference ground plane (GRP) wall and 0.8 m from AMN & ISN.
AMN is bonded on horizontal reference ground plane.
The ground plane, which was electrically bonded to the shield room, ground system and all power lines entering the shield room, were filtered.

12.3 Measurement Uncertainty

The measurement uncertainty was calculated in accordance with ISO "Guide to the expression of uncertainty in measurement."
The measurement uncertainty was given with a confidence of 95 %.

Test Items	Uncertainty	Remark
Conducted emission (9 kHz ~ 150 kHz)	3.85 dB	Confidence level of approximately 95 % (k = 2)
Conducted emission (150 kHz ~ 30 MHz)	3.32 dB	Confidence level of approximately 95 % (k = 2)

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2.
The listed uncertainties are the worst case uncertainty for the entire range of measurement. please note that the uncertainty values are provided for informational purposes only are not used in determining the PASS/FAIL results

12.4 Limit

RFI Conducted	FCC Limit(dBμV/m) Class B	
Freq. Range	Quasi-Peak	Average
150 kHz ~ 0.5 MHz	66 ~ 56*	56 ~ 46*
0.5 MHz ~ 5 MHz	56	46
5 MHz ~ 30 MHz	60	50
*Limits decreases linearly with the logarithm of frequency.		

12.5 Test Equipment used

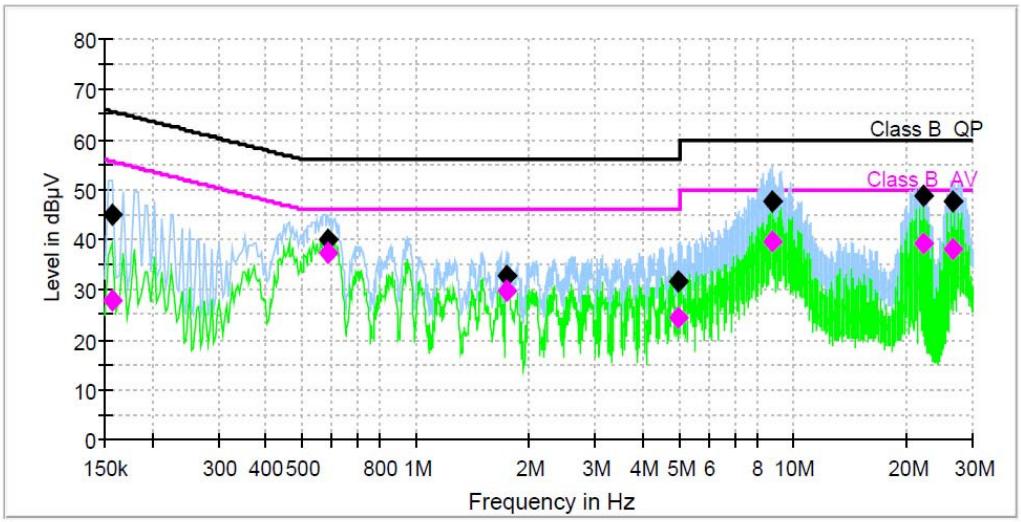
	Model Name	Manufacturer	Description	Serial Number	Due to Calibration
■-	ESCI	Rohde & Schwarz	EMI test receiver	100237	Apr 18. 2017
■-	ENV216	Rohde & Schwarz	LISN	100172	Apr 19. 2017
□-	ENV216	Rohde & Schwarz	LISN	100173	Apr 19. 2017
□ -	ISN T8	TESEQ. GmbH	ISN	24568	Apr 22. 2017
■-	EMC 32	Rohde & Schwarz	Testing Software	VER8.53	N/A

12.6 Test data for Conducted Emission

-. Test Date : March 08, 2017
-. Reference Standard : Part 15 Subpart C, Sec. 15.207
-. Test Procedure(s) : ANSI C63.10 (2013)
-. Operating Condition : RF transmitting mode
-. Power Source : AC 120 V / 60 Hz
-. Frequency rage : 0.15 MHz ~ 30 MHz
-. Line : AC Power line(Live with Neutral)
-. Comment : N/A

12.7 Test Result

Test Condition : IEEE 802.11b



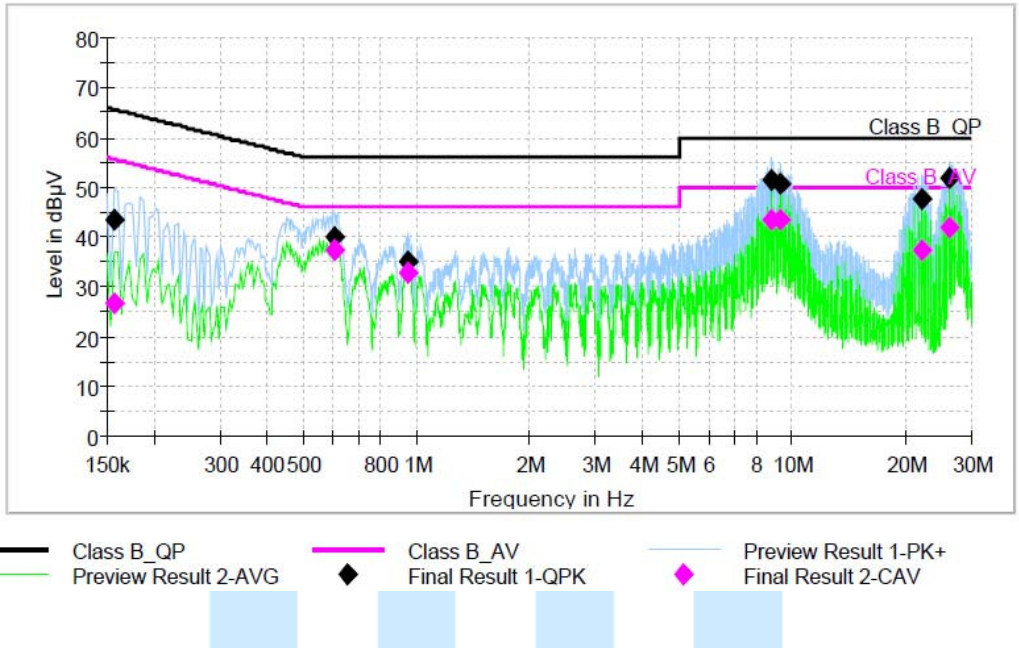
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.157463	44.9	200.0	9.000	Off	N	9.6	20.7	65.6	
0.582825	40.0	200.0	9.000	Off	L1	9.7	16.0	56.0	
1.746975	32.6	200.0	9.000	Off	L1	9.7	23.4	56.0	
4.963313	31.5	200.0	9.000	Off	L1	9.8	24.5	56.0	
8.776650	47.7	200.0	9.000	Off	L1	9.9	12.3	60.0	
22.239000	48.9	200.0	9.000	Off	L1	10.0	11.1	60.0	
26.641875	47.7	200.0	9.000	Off	N	10.2	12.3	60.0	

Final Result 2

Frequency (MHz)	CAverage (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.157463	27.8	200.0	9.000	Off	N	9.6	27.8	55.6	
0.582825	37.2	200.0	9.000	Off	L1	9.7	8.8	46.0	
1.746975	29.5	200.0	9.000	Off	L1	9.7	16.5	46.0	
4.963313	24.5	200.0	9.000	Off	L1	9.8	21.5	46.0	
8.776650	39.5	200.0	9.000	Off	L1	9.9	10.5	50.0	
22.239000	39.4	200.0	9.000	Off	L1	10.0	10.6	50.0	
26.641875	38.1	200.0	9.000	Off	N	10.2	11.9	50.0	

Test Condition : IEEE 802.11g



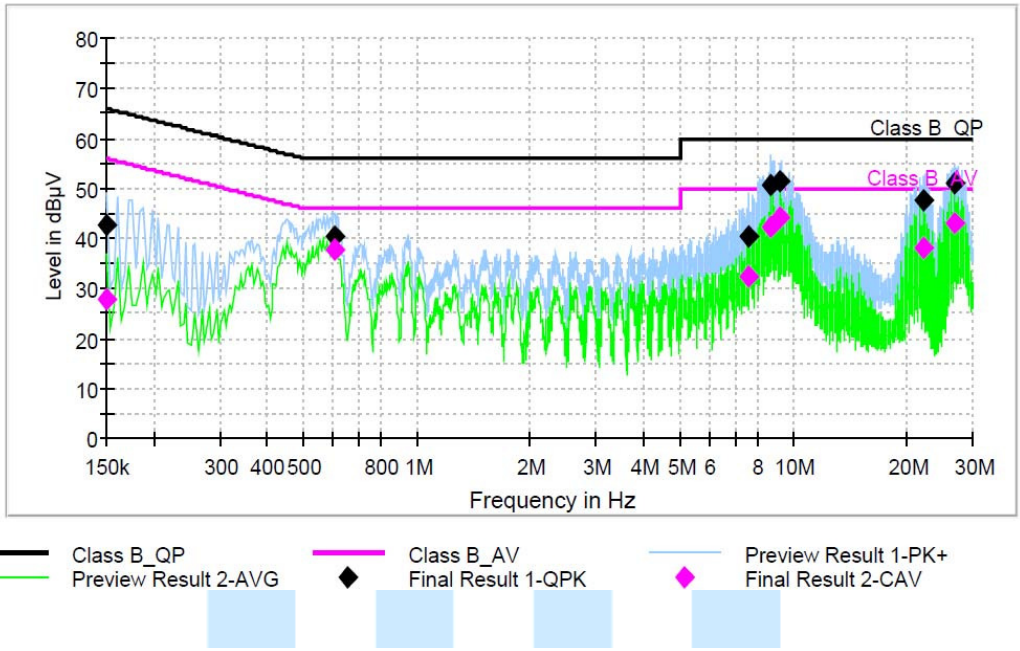
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.157463	43.6	200.0	9.000	Off	N	9.6	22.0	65.6	
0.605213	40.1	200.0	9.000	Off	L1	9.7	15.9	56.0	
0.944756	35.0	200.0	9.000	Off	L1	9.7	21.0	56.0	
8.769188	51.4	200.0	9.000	Off	L1	9.9	8.6	60.0	
9.354994	50.6	200.0	9.000	Off	L1	9.9	9.4	60.0	
22.242731	47.5	200.0	9.000	Off	L1	10.0	12.5	60.0	
26.347106	51.9	200.0	9.000	Off	N	10.2	8.1	60.0	

Final Result 2

Frequency (MHz)	CAverage (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.157463	26.6	200.0	9.000	Off	N	9.6	29.0	55.6	
0.605213	37.5	200.0	9.000	Off	L1	9.7	8.5	46.0	
0.944756	32.6	200.0	9.000	Off	L1	9.7	13.4	46.0	
8.769188	43.2	200.0	9.000	Off	L1	9.9	6.8	50.0	
9.354994	43.5	200.0	9.000	Off	L1	9.9	6.5	50.0	
22.242731	37.5	200.0	9.000	Off	L1	10.0	12.5	50.0	
26.347106	42.1	200.0	9.000	Off	N	10.2	7.9	50.0	

Test Condition : IEEE 802.11n



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.150000	42.7	200.0	9.000	Off	L1	9.6	23.3	66.0	
0.605213	40.3	200.0	9.000	Off	L1	9.7	15.7	56.0	
7.590113	40.4	200.0	9.000	Off	L1	9.8	19.6	60.0	
8.672175	50.6	200.0	9.000	Off	L1	9.9	9.4	60.0	
9.257981	51.6	200.0	9.000	Off	L1	9.9	8.4	60.0	
22.242731	47.7	200.0	9.000	Off	L1	10.0	12.3	60.0	
26.839631	51.2	200.0	9.000	Off	N	10.2	8.8	60.0	

Final Result 2

Frequency (MHz)	CAverage (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.150000	28.0	200.0	9.000	Off	L1	9.6	28.0	56.0	
0.605213	37.7	200.0	9.000	Off	L1	9.7	8.3	46.0	
7.590113	32.5	200.0	9.000	Off	L1	9.8	17.5	50.0	
8.672175	42.4	200.0	9.000	Off	L1	9.9	7.6	50.0	
9.257981	44.2	200.0	9.000	Off	L1	9.9	5.8	50.0	
22.242731	37.9	200.0	9.000	Off	L1	10.0	12.1	50.0	
26.839631	42.9	200.0	9.000	Off	N	10.2	7.1	50.0	

13. Radiated Spurious & Restricted Band Edge Emission

Exploratory Radiated measurements were conducted at the 3m semi anechoic chamber in order to identify the highest emission by operating the EUT in a range of typical modes of operation, cable positions, system configuration and arrangement.
Based on exploratory measurements, the final measurements were conducted at the worst test conditions.

Final measurements of below 1GHz were made at 3m or 10 m Chamber that complies with CISPR 16/ANSI C63.10.
Above 1GHz final measurements were conducted at the 3m Chamber only.

For measurements above 1GHz, the bottom side of 3m chamber was installed with absorbers in order to meet SVSWR Limit.
Exploratory measurements were scanned using Peak mode of EMI Test receiver and final measurements were measured with Quasi-Peak mode (Below 1GHz) and Peak & Average mode (Above 1GHz).

The measurements were performed by rotating the EUT 360° and adjusting the receive antenna height from 1.0 m to 4.0 m. All frequencies were investigated in both horizontal and vertical antenna polarity.

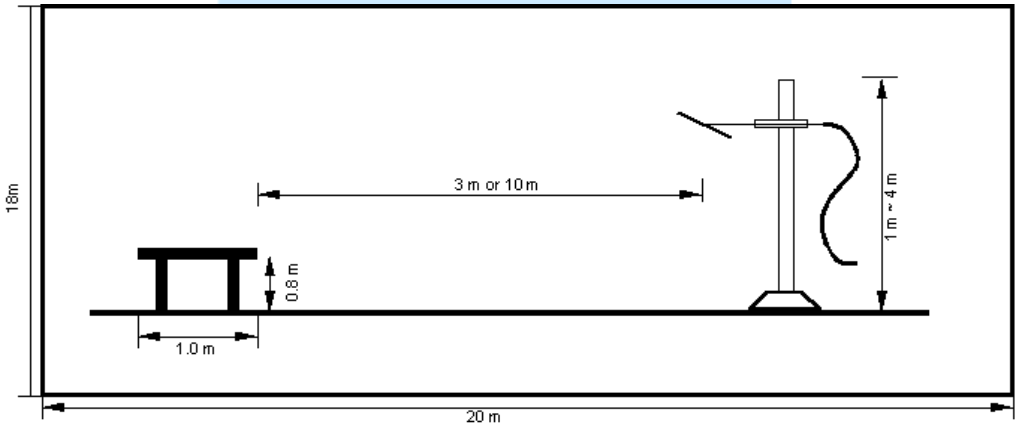


Fig 3. Dimensions of test site (Below 1GHz)

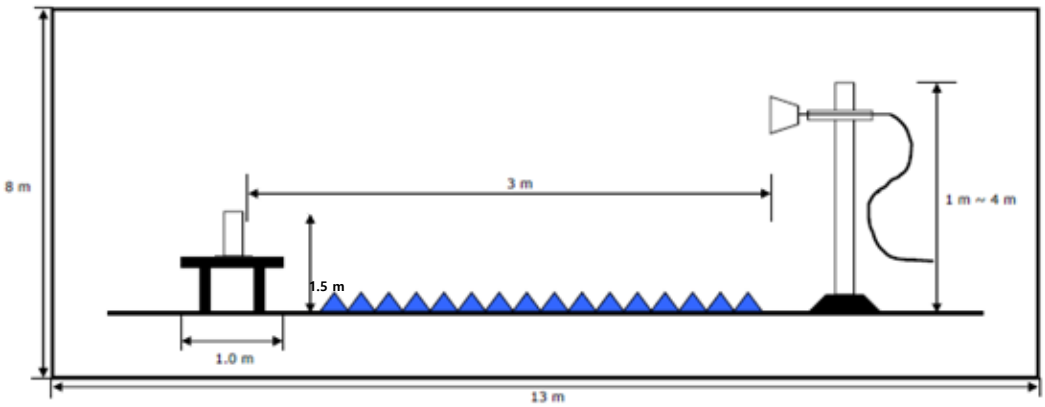


Fig 4. Dimensions of test site (Above 1GHz)

13.1 Operating environment

Temperature : 26.7 ℃
Relative humidity : 32.8 % R.H.

13.2 Test set-up

A preliminary and final measurement was at 3 m anechoic chamber.
The EUT was placed on a non-conducting table.
For emissions testing at or below 1 GHz, the table height is 80 cm above the reference ground plane.
For emission measurements above 1 GHz, the table height is 1.5 m above the reference ground plane.

The turntable with EUT 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.

13.3 Measurement uncertainty

The measurement uncertainty was calculated in accordance with ISO "Guide to the expression of uncertainty in measurement".
The measurement uncertainty was given with a confidence of 95 %.

Test items(Anechoic Chamber)	Uncertainty	Remark
Radiated emission (30 MHz ~ 300 MHz, 3 m, Vertical)	4.78 dB	Confidence level of approximately 95 % (k = 2)
Radiated emission (30 MHz ~ 300 MHz, 3 m, Horizontal)	4.77 dB	Confidence level of approximately 95 % (k = 2)
Radiated emission (300 MHz ~ 1 000 MHz, 3 m, Vertical)	5.06 dB	Confidence level of approximately 95 % (k = 2)
Radiated emission (300 MHz ~ 1 000 MHz, 3 m, Horizontal)	5.03 dB	Confidence level of approximately 95 % (k = 2)
Radiated emission (1 000 MHz ~ 6 000 MHz, 3 m, V/H)	5.42 dB	Confidence level of approximately 95 % (k = 2)
Radiated emission (6 000 MHz ~ 18 000 MHz, 3 m, V/H)	5.64 dB	Confidence level of approximately 95 % (k = 2)

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2.
The listed uncertainties are the worst case uncertainty for the entire range of measurement. please note that the uncertainty values are provided for informational purposes only are not used in determining the PASS/FAIL results

13.4 Limit

20 dB in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (microvolt/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2 400/F (kHz)	300
0.490 ~ 1.705	2 400/F (kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

13.5 Test Equipment used

Model Name	Manufacturer	Description	Serial Number	Due to Calibration
■ - ESU40	Rohde & Schwarz	EMI Test Receiver	100266	Jul. 20, 2017
■ - HFH2-Z2	Rohde & Schwarz	Loop Antenna	100041	Dec. 21, 2017
■ - VULB9160	Schwarzbeck	Broadband Test Antenna	3099	Aug. 03. 2017
■ - BBHA9120D	Schwarzbeck	Horn Antenna	207	Oct. 14. 2017
■ - 3160-09	Schwarzbeck	Horn Antenna	LM3981	Oct. 27. 2017
■ - MCU066	maturo GmbH	Position Controller	1390306	N/A
■ - TT2.5SI	maturo GmbH	Turntable	1390307	N/A
■ - AM 4.0	maturo GmbH	Antenna Mast	1390308	N/A
■ - AFS 44 00101800-25-10P-44	MITEQ	Preamplifier	1258943	Dec. 06. 2017
■ - SCU-F1826-G47-BZ42-CSS	BONN Elektronik	Preamplifier	10003	Dec. 09. 2017
■ - WHKX3.0/18G-10SS	WAINWRIGHT INSTRUMENTS	High pass filter	SN31	Apr. 19, 2017
■- EMC 32	Rohde & Schwarz	Testing Software	VER9.15	N/A

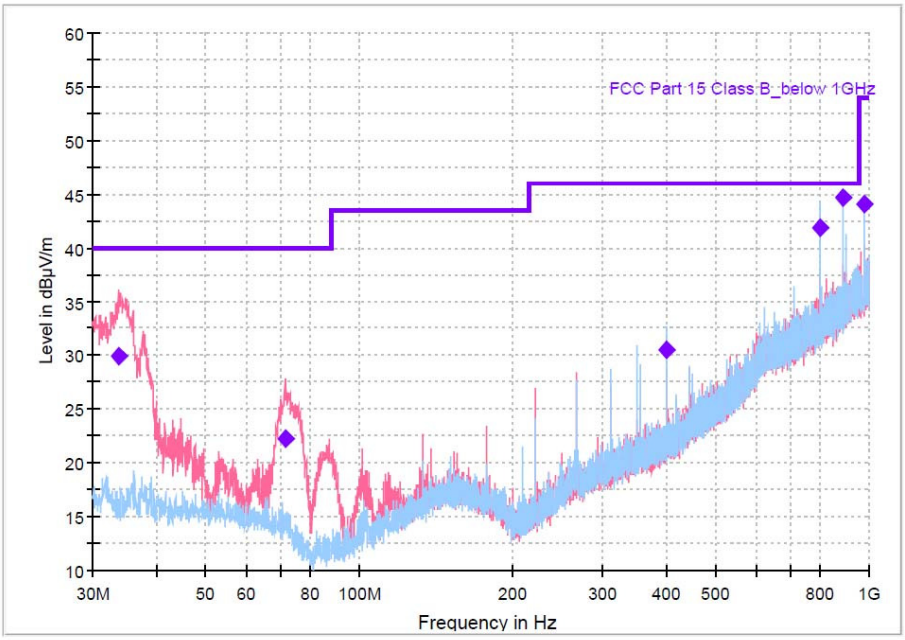
13.6 Test data for Radiated Spurious Emission

-. Test Date : February. 21 ~ March. 02, 2017
-. Reference Standard : Part 15 Subpart C, Sec. 15.247(d)
-. Measuring Distance : 3 m
-. Resolution Bandwidth : 200 Hz, 9 kHz(Below 30 MHz) / 120 kHz(30 MHz ~ 1GHz) / 1 MHz(Above 1GHz)
-. Detector mode : Quasi Peak detector mode / Peak detector mode / Average detector mode
-. Power Source : DC 12 V
-. Note :

Radiated Spurious Emission (9 kHz to 30 MHz)

※ The emission level was not found.

Radiated Spurious Emission (30 MHz to 1 000 MHz)



Preview Result 1V-PK+
FCC Part 15 Class B_below 1GHz
Preview Result 1H-PK+
Final_Result QPK

Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
33.848750	29.88	40.00	10.12	1000.0	120.000	106.0	V	344.0	12.5
71.627500	22.21	40.00	17.79	1000.0	120.000	107.0	V	260.0	11.3
399.954375	30.52	46.00	15.48	1000.0	120.000	106.0	H	15.0	20.2
799.978750	41.84	46.00	4.16	1000.0	120.000	100.0	H	20.0	29.5
888.834375	44.67	46.00	1.33	1000.0	120.000	100.0	H	333.0	31.5
977.710625	44.09	54.00	9.91	1000.0	120.000	100.0	H	322.0	32.7

Radiated Spurious Emission (1 GHz to 25 GHz): IEEE 802.11b 1ch

Frequency (MHz)	Measurement Level							Limit (dBμV/m)		Margin (dB)		Positioning System		
	Reading Value (dBμV/m)		AF	AMP / CL	Duty Cycle collection	Test Result (dBμV/m)						Pol.	Height	Angle
	Peak	Average	(dB/m)	(dB)	(dB)	Peak	Average	Peak	Average	Peak	Average	(H/V)	(cm)	(°)
1066.57	53.32	47.53	24.77	-38.49	-	39.60	33.81	74.00	54.00	34.40	20.19	H	175	297
1466.44	53.67	44.66	25.01	-37.72	-	40.96	31.95	74.00	54.00	33.04	22.05	H	146	310
1555.38	50.74	42.86	25.10	-37.53	-	38.31	30.43	74.00	54.00	35.69	23.57	H	146	132
2927.34	47.33	34.38	27.92	-36.59	-	38.66	25.71	74.00	54.00	35.34	28.29	V	100	320
14838.40	44.45	31.55	42.85	-34.10	-	53.20	40.30	74.00	54.00	20.80	13.70	H	100	261
17955.50	6.00	30.36	48.92	-34.10	-	59.00	45.18	74.00	54.00	15.00	8.82	V	125	261

Radiated Spurious Emission (1 GHz to 25 GHz): IEEE 802.11b 6ch

Frequency (MHz)	Measurement Level							Limit (dBμV/m)		Margin (dB)		Positioning System		
	Reading Value (dBμV/m)		AF	AMP / CL	Duty Cycle collection	Test Result (dBμV/m)						Pol.	Height	Angle
	Peak	Average	(dB/m)	(dB)	(dB)	Peak	Average	Peak	Average	Peak	Average	(H/V)	(cm)	(°)
1000.04	53.90	48.10	24.74	-38.49	-	40.15	34.35	74.00	54.00	33.85	19.65	H	125	311
1378.02	51.07	42.69	24.96	-37.75	-	38.28	29.90	74.00	54.00	35.72	24.10	H	155	357
1466.90	51.01	42.66	25.02	-37.72	-	38.31	29.96	74.00	54.00	35.69	24.04	H	146	2
2996.99	47.63	34.52	28.03	-36.59	-	39.07	25.96	74.00	54.00	34.93	28.04	V	171	86
14794.70	44.03	31.42	42.92	-34.10	-	52.85	40.24	74.00	54.00	21.15	13.76	H	225	348
17989.40	42.85	30.26	49.37	-34.10	-	58.12	45.53	74.00	54.00	15.88	8.47	V	158	-12

Radiated Spurious Emission (1 GHz to 25 GHz): IEEE 802.11b 11ch

Frequency (MHz)	Measurement Level							Limit (dBμV/m)		Margin (dB)		Positioning System		
	Reading Value (dBμV/m)		AF	AMP / CL	Duty Cycle collection	Test Result (dBμV/m)						Pol.	Height	Angle
	Peak	Average	(dB/m)	(dB)	(dB)	Peak	Average	Peak	Average	Peak	Average	(H/V)	(cm)	(°)
1066.36	53.10	46.53	24.77	-38.49	-	39.38	32.81	74.00	54.00	34.62	21.19	H	175	298
1466.40	51.70	44.55	25.01	-37.72	-	38.99	31.84	74.00	54.00	35.01	22.16	H	147	345
2669.07	48.14	34.92	27.53	-36.87	-	38.80	25.58	74.00	54.00	35.20	28.42	V	125	2
2973.34	47.85	34.52	27.99	-36.59	-	39.25	25.92	74.00	54.00	34.75	28.08	V	125	118
14862.70	45.64	31.75	42.81	-34.10	-	54.35	40.46	74.00	54.00	19.65	13.54	V	125	17
17983.80	43.06	30.21	49.30	-34.10	-	58.26	45.41	74.00	54.00	15.74	8.59	H	225	-13

Note:
If the maximized peak measured value complies with the average limit, then it is unnecessary to perform an average measurement.
Test result = Reading: + AF+AMP / CL
Where, AF : Antenna Collection Factor,
AMP / CL = Cable loss + Preamplifier gain + High Pass filter.
※ High Pass filter use to range of 3 GHz to 18 GHz
Pol.: H(Horizontal), V(Vertical)

Radiated Spurious Emission (1 GHz to 25 GHz): IEEE 802.11g 1ch

Frequency (MHz)	Measurement Level							Limit (dBμV/m)		Margin (dB)		Positioning System		
	Reading Value (dBμV/m)		AF	AMP / CL	Duty Cycle collection	Test Result (dBμV/m)						Pol.	Height	Angle
	Peak	Average	(dB/m)	(dB)	(dB)	Peak	Average	Peak	Average	Peak	Average	(H/V)	(cm)	(°)
1000.20	52.30	46.24	24.74	-38.49	-	38.55	32.49	74.00	54.00	35.45	21.51	H	168	282
1733.50	49.61	34.46	25.32	-37.46	-	37.47	22.32	74.00	54.00	36.53	31.68	H	152	115
2297.96	51.72	37.97	26.61	-37.11	-	41.22	27.47	74.00	54.00	32.78	26.53	H	112	136
2611.91	47.27	34.68	27.44	-36.87	-	37.84	25.25	74.00	54.00	36.16	28.75	V	125	111
14335.30	43.96	31.47	42.70	-34.10	-	52.56	40.07	74.00	54.00	21.44	13.93	V	218	221
17937.40	6.00	30.57	48.67	-34.10	-	57.71	45.14	74.00	54.00	16.29	8.86	V	221	306

Radiated Spurious Emission (1 GHz to 25 GHz): IEEE 802.11g 6ch

Frequency (MHz)	Measurement Level							Limit (dBμV/m)		Margin (dB)		Positioning System		
	Reading Value (dBμV/m)		AF	AMP / CL	Duty Cycle collection	Test Result (dBμV/m)						Pol.	Height	Angle
	Peak	Average	(dB/m)	(dB)	(dB)	Peak	Average	Peak	Average	Peak	Average	(H/V)	(cm)	(°)
1066.87	53.18	46.56	24.78	-38.49	-	39.47	32.85	74.00	54.00	34.53	21.15	H	151	294
1377.21	52.26	43.15	24.96	-37.75	-	39.47	30.36	74.00	54.00	34.53	23.64	H	166	331
2999.80	48.11	35.20	28.03	-36.59	-	39.55	26.64	74.00	54.00	34.45	27.36	H	106	123
2505.60	49.50	37.04	27.27	-36.97	-	39.80	27.34	74.00	54.00	34.20	26.66	H	175	127
14392.70	44.24	31.48	42.93	-34.10	-	53.07	40.31	74.00	54.00	20.93	13.69	V	125	18
17919.40	43.34	30.64	48.43	-34.10	-	57.67	44.97	74.00	54.00	16.33	9.03	V	175	69

Radiated Spurious Emission (1 GHz to 25 GHz): IEEE 802.11g 11ch

Frequency (MHz)	Measurement Level							Limit (dBμV/m)		Margin (dB)		Positioning System		
	Reading Value (dBμV/m)		AF	AMP / CL	Duty Cycle collection	Test Result (dBμV/m)						Pol.	Height	Angle
	Peak	Average	(dB/m)	(dB)	(dB)	Peak	Average	Peak	Average	Peak	Average	(H/V)	(cm)	(°)
1066.44	54.05	47.11	24.77	-38.49	-	40.33	33.39	74.00	54.00	33.67	20.61	H	120	313
2302.72	50.44	36.77	26.63	-36.94	-	40.13	26.46	74.00	54.00	33.87	27.54	H	120	158
2500.86	58.58	41.19	27.27	-36.97	-	48.88	31.49	74.00	54.00	25.12	22.51	H	149	135
2932.71	48.54	34.95	27.93	-36.59	-	39.88	26.29	74.00	54.00	34.12	27.71	V	106	210
14812.60	44.24	31.61	42.89	-34.10	-	53.03	40.40	74.00	54.00	20.97	13.60	V	168	167
17984.20	43.46	30.07	49.30	-34.10	-	58.66	45.27	74.00	54.00	15.34	8.73	V	106	256

Note:
If the maximized peak measured value complies with the average limit, then it is unnecessary to perform an average measurement.
Test result = Reading: + AF+AMP / CL
Where, AF : Antenna Collection Factor,
AMP / CL = Cable loss + Preamplifier gain + High Pass filter.
※ High Pass filter use to range of 3 GHz to 18 GHz
Pol.: H(Horizontal), V(Vertical)

Radiated Spurious Emission (1 GHz to 25 GHz): IEEE 802.11n 1ch

Frequency (MHz)	Measurement Level							Limit (dBμV/m)		Margin (dB)		Positioning System		
	Reading Value (dBμV/m)		AF	AMP / CL	Duty Cycle collection	Test Result (dBμV/m)						Pol.	Height	Angle
	Peak	Average	(dB/m)	(dB)	(dB)	Peak	Average	Peak	Average	Peak	Average	(H/V)	(cm)	(°)
1066.85	53.72	47.10	24.78	-38.49	-	40.01	33.39	74.00	54.00	33.99	20.61	H	125	313
1377.87	52.01	45.33	24.96	-37.75	-	39.22	32.54	74.00	54.00	34.78	21.46	H	162	313
1467.12	53.15	41.89	25.02	-37.72	-	40.45	29.19	74.00	54.00	33.55	24.81	H	147	314
2280.87	50.19	36.55	26.56	-37.11	-	39.64	26.00	74.00	54.00	34.36	28.00	H	154	136
14451.90	44.15	31.68	43.18	-34.10	-	53.23	40.76	74.00	54.00	20.77	13.24	V	205	161
17980.30	6.00	30.28	49.25	-34.10	-	58.30	45.43	74.00	54.00	15.70	8.57	H	106	63

Radiated Spurious Emission (1 GHz to 25 GHz): IEEE 802.11n 6ch

Frequency (MHz)	Measurement Level							Limit (dBμV/m)		Margin (dB)		Positioning System		
	Reading Value (dBμV/m)		AF	AMP / CL	Duty Cycle collection	Test Result (dBμV/m)						Pol.	Height	Angle
	Peak	Average	(dB/m)	(dB)	(dB)	Peak	Average	Peak	Average	Peak	Average	(H/V)	(cm)	(°)
1066.19	52.15	43.09	24.77	-38.49	-	38.43	29.37	74.00	54.00	35.57	24.63	H	146	111
1377.28	51.55	42.78	24.96	-37.75	-	38.76	29.99	74.00	54.00	35.24	24.01	H	149	238
2311.79	51.06	38.23	26.66	-36.94	-	40.78	27.95	74.00	54.00	33.22	26.05	H	113	132
2511.63	49.34	36.71	27.28	-37.00	-	39.62	26.99	74.00	54.00	34.38	27.01	H	175	146
14871.00	44.73	32.01	42.80	-34.10	-	53.43	40.71	74.00	54.00	20.57	13.29	V	201	259
17999.10	43.02	30.07	49.50	-34.10	-	58.42	45.47	74.00	54.00	15.58	8.53	V	125	15

Radiated Spurious Emission (1 GHz to 25 GHz): IEEE 802.11n 11ch

Frequency (MHz)	Measurement Level							Limit (dBμV/m)		Margin (dB)		Positioning System		
	Reading Value (dBμV/m)		AF	AMP / CL	Duty Cycle collection	Test Result (dBμV/m)						Pol.	Height	Angle
	Peak	Average	(dB/m)	(dB)	(dB)	Peak	Average	Peak	Average	Peak	Average	(H/V)	(cm)	(°)
1000.06	53.15	47.70	24.74	-38.49	-	39.40	33.95	74.00	54.00	34.60	20.05	H	163	287
1377.25	51.43	41.95	24.96	-37.75	-	38.64	29.16	74.00	54.00	35.36	24.84	H	155	227
1467.03	50.55	38.95	25.02	-37.72	-	37.85	26.25	74.00	54.00	36.15	27.75	H	125	320
2888.93	47.17	34.62	27.86	-36.65	-	38.38	25.83	74.00	54.00	35.62	28.17	V	114	214
14895.70	44.43	31.61	42.76	-34.10	-	53.09	40.27	74.00	54.00	20.91	13.73	H	175	83
17974.70	43.02	30.34	49.18	-34.10	-	58.10	45.42	74.00	54.00	15.90	8.58	V	225	210

Note:
If the maximized peak measured value complies with the average limit, then it is unnecessary to perform an average measurement.
Test result = Reading: + AF+AMP / CL
Where, AF : Antenna Collection Factor,
AMP / CL = Cable loss + Preamplifier gain + High Pass filter.
※ High Pass filter use to range of 3 GHz to 18 GHz
Pol.: H(Horizontal), V(Vertical)

13.7 Test data for Radiated Restricted Band Edge Emission

-. Test Date : December 16 ~ 29, 2017
-. Reference Standard : Part 15 Subpart C, Sec. 15.247(d)
-. Measuring Distance : 3 m
-. Resolution Bandwidth : 1 MHz
-. Detector mode : Peak detector mode / Average detector mode
-. Power Source : DC 12 V
-. Note : Through three orthogonal axes were investigated and the worst case is report

IEEE 802.11b (1ch, 11ch)

Frequency (MHz)	Measurement Level							Limit (dBμV/m)		Margin (dB)		Positioning System		
	Reading Value (dBμV/m)		AF	AMP / CL	Duty Cycle collection	Test Result (dBμV/m)						Pol.	Height	Angle
	Peak	Average	(dB/m)	(dB)	(dB)	Peak	Average	Peak	Average	Peak	Average	(H/V)	(cm)	(°)
2390.00	54.43	41.12	26.91	-36.99	-	44.35	31.04	74.00	54.00	29.65	22.96	H	200	138

Frequency (MHz)	Measurement Level							Limit (dBμV/m)		Margin (dB)		Positioning System		
	Reading Value (dBμV/m)		AF	AMP / CL	Duty Cycle collection	Test Result (dBμV/m)						Pol.	Height	Angle
	Peak	Average	(dB/m)	(dB)	(dB)	Peak	Average	Peak	Average	Peak	Average	(H/V)	(cm)	(°)
2488.22	52.37	39.95	27.23	-36.95	-	42.65	30.23	74.00	54.00	31.35	23.77	H	217	152

IEEE 802.11g(1ch, 11ch)

Frequency (MHz)	Measurement Level							Limit (dBμV/m)		Margin (dB)		Positioning System		
	Reading Value (dBμV/m)		AF	AMP / CL	Duty Cycle collection	Test Result (dBμV/m)						Pol.	Height	Angle
	Peak	Average	(dB/m)	(dB)	(dB)	Peak	Average	Peak	Average	Peak	Average	(H/V)	(cm)	(°)
2389.99	76.02	57.40	26.91	-36.99	-	65.94	47.32	74.00	54.00	8.06	6.68	H	100	140

Frequency (MHz)	Measurement Level							Limit (dBμV/m)		Margin (dB)		Positioning System		
	Reading Value (dBμV/m)		AF	AMP / CL	Duty Cycle collection	Test Result (dBμV/m)						Pol.	Height	Angle
	Peak	Average	(dB/m)	(dB)	(dB)	Peak	Average	Peak	Average	Peak	Average	(H/V)	(cm)	(°)
2483.51	75.06	56.80	27.21	-36.95	-	65.32	47.06	74.00	54.00	8.68	6.94	H	150	144

IEEE 802.11n(1ch, 11ch)

Frequency (MHz)	Measurement Level							Limit (dBμV/m)		Margin (dB)		Positioning System		
	Reading Value (dBμV/m)		AF	AMP / CL	Duty Cycle collection	Test Result (dBμV/m)						Pol.	Height	Angle
	Peak	Average	(dB/m)	(dB)	(dB)	Peak	Average	Peak	Average	Peak	Average	(H/V)	(cm)	(°)
2389.98	77.11	58.78	26.91	-36.99	-	67.03	48.70	74.00	54.00	6.97	5.30	H	126	143

Frequency (MHz)	Measurement Level							Limit (dBμV/m)		Margin (dB)		Positioning System		
	Reading Value (dBμV/m)		AF	AMP / CL	Duty Cycle collection	Test Result (dBμV/m)						Pol.	Height	Angle
	Peak	Average	(dB/m)	(dB)	(dB)	Peak	Average	Peak	Average	Peak	Average	(H/V)	(cm)	(°)
2483.69	76.59	57.71	27.21	-36.95	-	66.85	47.97	74.00	54.00	7.15	6.03	H	205	140

Note:
Test result = Reading: + Transducer Factor.
Where, ACF : Antenna Collection Factor,
CL = Cable loss + Preamplifier gain + High Pass filter
※ High Pass filter use to range of 3 GHz to 18 GHz
Pol.: H(Horizontal), V(Vertical)

14. Sample Calculations

$$dB\mu V = 20 \text{ Log}_{10}(\mu V/m)$$
$$dB\mu V = dBm + 107$$
$$\mu V = 10^{(dB\mu V/20)}$$

14.1 Example 1 :

■ 20.3 MHz

Class B Limit	= 250 µV = 48 dBµV
Reading	= 39.2 dBµV
$10^{(39.2dB\mu V/20)}$	= 91.2 µV
Margin	= 48 dBµV - 39.2 dBµV
	= 8.8 dB

14.2 Example 2 :

■ 66.7 MHz

Class B Limit	= 100 µV/m = 40.0 dBµV/m
Reading	= 31.0 dBµV
Antenna Factor + Cable Loss	= 5.8 dB
Total	= 36.8 dBµV/m
Margin	= 40.0 dBµV/m – 36.8 dBµV/m
	= 3.2 dB

15. Recommendation & Conclusion

The data collected shows that the **Ohsung Electronics Co., Ltd. BASE STATION (Model Name: MXHP-H500)** was complies with §15.247 of the FCC Rules.

- The end -