

TEST REPORT

Application No.: HKEM2001000024HS

Applicant: Kingtronics International Trading Co., Ltd

Address of Applicant: Units 1203, 05, 07 & Penthouse, Century Centre, 44-46 Hung To Road, Kwun Tong, Kowloon, HongKong

Manufacturer: CELIOS CORPORATION

Address of Manufacturer: 401 Edgewater Pl, Suite 190, Wakefield, MA, 01880, USA

Factory: KINGTRONICS CORPORATION OF ELEC.&MECH. TECHNOLOGY (ZHANGZHOU)CO., LTD

Address of Factory: NO.20 Longchi Road, Longchi Industrial Park, Zhangzhou Taiwanese Investment Zone

Equipment Under Test (EUT):

EUT Name: G200 Advanced Air Purifier

Model No.: G200[®]

FCC ID 2AVYPG200-CR-01

Trade Mark: 

Standard(s) : 47 CFR Part 15, Subpart C 15.247

Date of Receipt: 2020-03-20

Date of Test: 2020-03-24 to 2020-04-05

Date of Issue: 2020-04-11

Test Result:	Pass*
---------------------	--------------

* In the configuration tested, the EUT complied with the standards specified above.



Law Man Kit
EMC Manager

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request and accessible at <http://www.sgs.com/en/Terms-and-conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-conditions.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. The document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2020-04-11		Original

Authorized for issue by:			
			
		Leo Xu /Project Engineer	Date: 2020-04-11
			
		Law Man Kit /Reviewer	Date: 2020-04-11

2 Test Summary

Radio Spectrum Technical Requirement				
Item	Standard	Method	Requirement	Result
Antenna Requirement	47 CFR Part 15, Subpart C 15.247	N/A	47 CFR Part 15, Subpart C 15.203 & 15.247(b)(4)	Pass

Radio Spectrum Matter Part				
Item	Standard	Method	Requirement	Result
Minimum 6dB Bandwidth	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.8.1	47 CFR Part 15, Subpart C 15.247a(2)	Pass
Conducted Peak Output Power	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.9.2.3	47 CFR Part 15, Subpart C 15.247(b)(3)	Pass
Power Spectrum Density	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.10.2	47 CFR Part 15, Subpart C 15.247(e)	Pass
Conducted Band Edges Measurement	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.13.3.2	47 CFR Part 15, Subpart C 15.247(d)	Pass
Conducted Spurious Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.11	47 CFR Part 15, Subpart C 15.247(d)	Pass
Radiated Emissions which fall in the restricted bands	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.10.5	47 CFR Part 15, Subpart C 15.209 & 15.247(d)	Pass
Radiated Spurious Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.4,6.5,6.6	47 CFR Part 15, Subpart C 15.209 & 15.247(d)	Pass

Declaration of EUT Family Grouping:

None

Abbreviation:

- Tx: In this whole report Tx (or tx) means Transmitter.
- Rx: In this whole report Rx (or rx) means Receiver.
- RF: In this whole report RF means Radiated Frequency.
- CH: In this whole report CH means channel.
- Volt: In this whole report Volt means Voltage.
- Temp: In this whole report Temp means Temperature.
- Humid: In this whole report Humid means humidity.
- Press: In this whole report Press means Pressure.
- N/A: In this whole report not application.

3 Contents

	Page
1 COVER PAGE	1
2 TEST SUMMARY	3
3 CONTENTS	4
4 GENERAL INFORMATION	6
4.1 DETAILS OF E.U.T.	6
4.2 DESCRIPTION OF SUPPORT UNITS.....	6
4.3 MEASUREMENT UNCERTAINTY	7
4.4 TEST LOCATION	8
4.5 TEST FACILITY	8
4.6 DEVIATION FROM STANDARDS	8
4.7 ABNORMALITIES FROM STANDARD CONDITIONS	8
5 EQUIPMENT LIST	9
6 RADIO SPECTRUM TECHNICAL REQUIREMENT	12
6.1 ANTENNA REQUIREMENT.....	12
6.1.1 Test Requirement:	12
6.1.2 Conclusion.....	12
7 RADIO SPECTRUM MATTER TEST RESULTS	13
7.1 MINIMUM 6dB BANDWIDTH	13
7.1.1 E.U.T. Operation.....	13
7.1.2 Test Setup Diagram.....	13
7.1.3 Measurement Procedure and Data.....	13
7.2 CONDUCTED PEAK OUTPUT POWER.....	14
7.2.1 E.U.T. Operation.....	14
7.2.2 Test Setup Diagram.....	14
7.2.3 Measurement Procedure and Data.....	14
7.3 POWER SPECTRUM DENSITY	15
7.3.1 E.U.T. Operation.....	15
7.3.2 Test Setup Diagram.....	15
7.3.3 Measurement Procedure and Data.....	15
7.4 CONDUCTED BAND EDGES MEASUREMENT	16
7.4.1 E.U.T. Operation.....	16
7.4.2 Test Setup Diagram.....	16
7.4.3 Measurement Procedure and Data.....	16
7.5 CONDUCTED SPURIOUS EMISSIONS.....	17
7.5.1 E.U.T. Operation.....	17
7.5.2 Test Setup Diagram.....	17
7.5.3 Measurement Procedure and Data.....	17
7.6 RADIATED EMISSIONS WHICH FALL IN THE RESTRICTED BANDS	18
7.6.1 E.U.T. Operation.....	18
7.6.2 Test Setup Diagram.....	18
7.6.3 Measurement Procedure and Data.....	19
7.7 RADIATED SPURIOUS EMISSIONS	20
7.7.1 E.U.T. Operation.....	21
7.7.2 Test Setup Diagram.....	21
7.7.3 Measurement Procedure and Data.....	22
8 PHOTOGRAPHS	32

9	APPENDIX_15.247	33
9.1	MINIMUM EMISSION BANDWIDTH 6 dB	33
9.2	RF OUTPUT POWER	39
9.3	BAND EDGE	46
9.4	SPURIOUS EMISSIONS.....	52
9.5	RADIATED EMISSIONS WHICH FALL IN THE RESTRICTED BANDS	58

4 General Information

4.1 Details of E.U.T.

Power supply:	Adaptor model: YHY-15004000 Input: 100-240VAC, 50/60Hz, 1.5A Max Output: 15V, 4.0A
Battery:	Model: CB3200 Rated capacity: 3180mAh, 34.34Wh Voltage: 10.8VDC
Test voltage:	110VAC
Cable:	100cm 3pin unscreened AC cable
Antenna Gain:	0.5dBi
Antenna Type:	Chip Antenna
Channel Spacing:	5MHz
Modulation Type:	802.11b: DSSS (CCK, DQPSK, DBPSK) 802.11g/n: OFDM (64QAM, 16QAM, QPSK, BPSK)
Data rate:	802.11b: 1Mbps, 2Mbps, 5.5Mbps, 11 Mbps 802.11g: 6Mbps, 9Mbps, 12Mbps, 18Mbps, 24Mbps, 36Mbps, 48Mbps, 54 802.11n: 6.5Mbps, 13Mbps, 19.5Mbps, 26Mbps, 39Mbps, 52Mbps, 58.5Mbps, 65Mbps
Number of Channels:	802.11b/g/n(HT20):11
Operation Frequency:	802.11b/g/n(HT20): 2412MHz to 2462MHz
Tested Channels:	2412MHz, 2442MHz, 2462MHz

4.2 Description of Support Units

The EUT has been tested with corresponding accessories as below:

Supplied by client

Description	Manufacturer	Model No.	SN/Certificate NO
I2C/SPI Test Interface	TOTAL PHASE	N/A	N/A
MCHPRT 2 Test Software	N/A	Version 1.0	N/A

Supplied by SGS:

Description	Manufacturer	Model No.	SN/Certificate NO
NoteBook (EMC4)	Dell	P75F	N/A

4.3 Measurement Uncertainty

EMI

No.	Item	Measurement Uncertainty
1	Conduction emission	2.5dB (9kHz to 150kHz)
		2.6dB (150kHz to 30MHz)
2	Radiated emission	5.1dB (30MHz-1GHz)
		4.9dB (1GHz-6GHz)

RF

No.	Item	Measurement Uncertainty
1	Radio Frequency	$\pm 7.25 \times 10^{-8}$
2	Duty cycle	$\pm 0.37\%$
3	Occupied Bandwidth	$\pm 3\%$
4	RF conducted power (30MHz-40GHz)	1.5dB
5	RF power density	1.5dB
6	Conducted Spurious emissions	1.5dB
7	RF Radiated power	5.1dB (below 1GHz)
		5.3dB (above 1GHz)
8	Radiated Spurious emission test	5.1dB (below 1GHz)
		5.3dB (above 1GHz)
9	Temperature test	$\pm 1^{\circ}\text{C}$
10	Humidity test	$\pm 3\%$
11	Supply voltages	$\pm 1.5\%$
12	Time	$\pm 3\%$

Remark:

The U_{lab} (lab Uncertainty) is less than U_{cispr} (CISPR Uncertainty), so the test results

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

4.4 Test Location

All tests were performed at:

SGS IECC Limited (Member of the SGS Group (SGS SA))
Unit 2 and 3, G/F, Block A, Po Lung Centre,
11 Wang Chiu Road, Kowloon Bay, Kowloon, Hong Kong
Tel: +852 2305 2570 Fax: +852 2756 4480

No tests were sub-contracted.

4.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

• **HOKLAS (Lab Code: 125)**

SGS IECC Limited has been accepted by HKAS Executive, on the recommendation of the Accreditation Advisory Board, as a HOKLAS Accredited Laboratory, this laboratory meets the requirements of ISO/IEC 17025:2005 and it has been accredited for performing specific test as listed in the scope of accreditation within the test category of Electrical and Electronic Products.

• **FCC Recognized Accredited Test Firm (CAB Registration No.: 446297)**

SGS IECC Limited has been accredited and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Designation Number: HK0010, Test Firm Registration Number: 446297.

• **Industry Canada (Site Registration No.: 5193A; CAB Identifier No.: HK0010)**

SGS IECC Limited has been recognized by Department of Innovation, Science and Economic Development (ISED) Canada as a wireless testing laboratory. The acceptance letter from the ISED is maintained in our files. CAB Identifier No: HK0010, Site Registration Number: 5193A-2.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None

5 Equipment List

Minimum 6dB Bandwidth					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
SMBV100A VECTOR SIGNAL GENERATOR	Rohde & Schwarz	SMBV100A	E234	2019/8/21	2020/8/20
FSV40 SIGNAL ANALYZER 40GHz	Rohde & Schwarz	FSV40	E235	2019/8/21	2020/8/20
Wireless Conn. Tester (CMW)	Rohde & Schwarz	CMW270	E240	2019/8/21	2020/8/20
OSP	Rohde & Schwarz	OSP-B157W8	E242	2019/8/21	2020/8/20
Cable	Rohde & Schwarz	J12J103539-00-2	E239	2019/9/23	2020/9/22
WMS32 Test Software	R&S	Version 10	N/A	--	--

Conducted Peak Output Power					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
SMBV100A VECTOR SIGNAL GENERATOR	Rohde & Schwarz	SMBV100A	E234	2019/8/21	2020/8/20
FSV40 SIGNAL ANALYZER 40GHz	Rohde & Schwarz	FSV40	E235	2019/8/21	2020/8/20
Wireless Conn. Tester (CMW)	Rohde & Schwarz	CMW270	E240	2019/8/21	2020/8/20
OSP	Rohde & Schwarz	OSP-B157W8	E242	2019/8/21	2020/8/20
Cable	Rohde & Schwarz	J12J103539-00-2	E239	2019/9/23	2020/9/22
WMS32 Test Software	R&S	Version 10	N/A	--	--

Power Spectrum Density					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
SMBV100A VECTOR SIGNAL GENERATOR	Rohde & Schwarz	SMBV100A	E234	2019/8/21	2020/8/20
FSV40 SIGNAL ANALYZER 40GHz	Rohde & Schwarz	FSV40	E235	2019/8/21	2020/8/20
Wireless Conn. Tester (CMW)	Rohde & Schwarz	CMW270	E240	2019/8/21	2020/8/20
OSP	Rohde & Schwarz	OSP-B157W8	E242	2019/8/21	2020/8/20
Cable	Rohde & Schwarz	J12J103539-00-2	E239	2019/9/23	2020/9/22
WMS32 Test Software	R&S	Version 10	N/A	--	--

Conducted Band Edges Measurement					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
SMBV100A VECTOR SIGNAL GENERATOR	Rohde & Schwarz	SMBV100A	E234	2019/8/21	2020/8/20
FSV40 SIGNAL ANALYZER 40GHz	Rohde & Schwarz	FSV40	E235	2019/8/21	2020/8/20

Wireless Conn. Tester (CMW)	Rohde & Schwarz	CMW270	E240	2019/8/21	2020/8/20
OSP	Rohde & Schwarz	OSP-B157W8	E242	2019/8/21	2020/8/20
Cable	Rohde & Schwarz	J12J103539-00-2	E239	2019/9/23	2020/9/22
WMS32 Test Software	R&S	Version 10	N/A	--	--

Conducted Emissions at Mains Terminals (150kHz-30MHz)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Test Receiver	Rohde & Schwarz	ESHS 30 / 839667/002	TE279D	2019/8/21	2020/8/20
Signal Generator	Rohde & Schwarz	SMT03	E177	2019/4/23	2020/4/22
Artificial Mains Network (LISN)	Schwarzbeck	NSLK 8127 / 8127312	TE10	2019/4/23	2020/4/22
Impulse Limiter	Rohde & Schwarz	ESH-3-Z2 / 357881052	TE36	2019/10/23	2020/10/22
EMC32 Test Software	R&S	Version 10	N/A	--	--

Radiated Spurious Emissions (30MHz-1GHz)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
3m Semi-Anechoic Chamber	ChamPro	N/A	E229	2019/8/9	2020/8/8
Coaxial Cable	SGS	N/A	E167	2019/7/22	2020/7/21
EMI Test Receiver 9kHz to 3.6GHz	Rohde & Schwarz	ESR3 / 102326	E231	2019/9/2	2020/9/1
TRILOG Super Broadb. Test Antenna, (25) 30-1000 (2)	Schwarzbeck	VULB 9168	E264	2018/10/20	2020/10/19
Boresight Mast Controller	ChamPro	AM-BS-4500-E	E237	--	--
Turntable with Controller	ChamPro	EM1000	E238	--	--
EMC32 Test Software	R&S	Version 10	N/A	--	--

Radiated Spurious Emissions (above 1GHz)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
3m Semi-Anechoic Chamber	ChamPro	N/A	E229	2019/8/9	2020/8/8
Coaxial Cable	SGS	N/A	E167	2019/7/22	2020/7/21
EMI Test Receiver 9kHz to 3.6GHz	Rohde & Schwarz	ESR3 / 102326	E231	2019/9/2	2020/9/1
Signal and Spectrum Analyzer 2Hz - 26.5GHz	Rohde & Schwarz	FSW26	E296	2019/10/29	2020/10/28
Spectrum Analyzer 9kHz - 30GHz	Rohde & Schwarz	FSP30	E204	2019/4/23	2020/4/22
Horn Antenna 1 - 18GHz	Schwarzbeck	BBHA9120D	E211	2020/1/29	2022/1/29
Horn Antenna 15 - 40GHz	Schwarzbeck	BBHA9170	E212	2017/10/17	2020/10/16

Preamplifier 33dB, 1 - 18GHz	Schwarzbeck	BBV9718	E214	2019/4/24	2020/4/23
Preamplifier 33dB, 18 - 26.5GHz	Schwarzbeck	BBV9719	E215	2019/4/24	2021/4/23
Broadband Coaxial Preamplifier typ. 30 dB, 18-40 G	Schwarzbeck	BBV 9721	E266	2019/8/22	2020/8/21
Highpass Filter 3.5-26.5GHz	Wainwright	WHNX3.5/26.5 G-6SS	E205	2019/4/24	2021/4/23
Band Reject Filter 2.4-2.5GHz	Wainwright	WRCJV 2400/2500-2100	E206	2019/4/24	2021/4/23
RF cable SMA to SMA 10000mm	HUBER+SUHNER	SF104-26.5/2*11SMA 45	E207-1	2019/9/26	2020/9/25
Boresight Mast Controller	ChamPro	AM-BS-4500-E	E237	--	--
Turntable with Controller	ChamPro	EM1000	E238	--	--
EMC32 Test Software	R&S	Version 10	N/A	--	--

Conducted Spurious Emissions					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
SMBV100A VECTOR SIGNAL GENERATOR	Rohde & Schwarz	SMBV100A	E234	2019/8/21	2020/8/20
FSV40 SIGNAL ANALYZER 40GHz	Rohde & Schwarz	FSV40	E235	2019/8/21	2020/8/20
Wireless Conn. Tester (CMW)	Rohde & Schwarz	CMW270	E240	2019/8/21	2020/8/20
OSP	Rohde & Schwarz	OSP-B157W8	E242	2019/8/21	2020/8/20
Cable	Rohde & Schwarz	J12J103539-00-2	E239	2019/9/23	2020/9/22
WMS32 Test Software	R&S	Version 10	N/A	--	--

General used equipment					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Digital temperature & humidity data logger	SATO	SK-L200TH II	E232	2019/10/28	2020/10/27
Electronic Digital Thermometer with Hygrometer	nil	2074/2075	E159	2019/10/28	2020/10/27
Barometer with digital thermometer	SATO	7612-00	E218	2019/05/19	2020/05/18
Conditional Chamber	Zhong Zhi Testing Instruments	CZ-E-608D	E216	2019/08/22	2020/08/21

6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203 & 15.247(b)(4)

6.1.2 Conclusion

Standard Requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Testing shall be performed using the highest gain antenna of each combination of licence-exempt transmitter and antenna type, with the transmitter output power set at the maximum level. When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna manufacturer.

15.203 requirement:

For intentional device. According to 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.

15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna:

The antenna uses a unique coupling to the intentional radiator and no consideration of replacement.

The best case gain of the antenna: 0.5 dBi.



7 Radio Spectrum Matter Test Results

7.1 Minimum 6dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.247a(2)
 Test Method: ANSI C63.10 (2013) Section 11.8.1
 Limit: ≥ 500 kHz

7.1.1 E.U.T. Operation

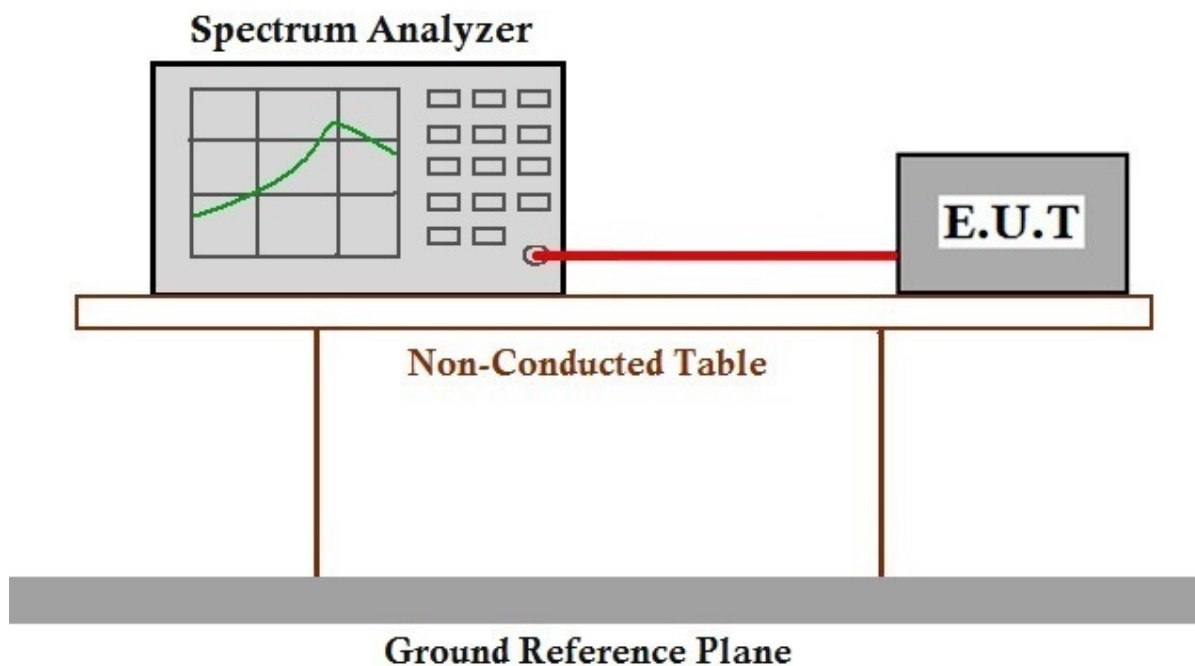
Operating Environment:

Temperature: 22.5 °C Humidity: 49.1 % RH :

Test mode b:TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20).

Only the data of worst case is recorded in the report.

7.1.2 Test Setup Diagram



7.1.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247

7.2 Conducted Peak Output Power

Test Requirement 47 CFR Part 15, Subpart C 15.247(b)(3)

Test Method: ANSI C63.10 (2013) Section 11.9.2.3

Limit:

Frequency range(MHz)	Output power of the intentional radiator(watt)
902-928	1 for ≥ 50 hopping channels
	0.25 for $25 \leq$ hopping channels < 50
	1 for digital modulation
2400-2483.5	1 for ≥ 75 non-overlapping hopping channels
	0.125 for all other frequency hopping systems
	1 for digital modulation
5725-5850	1 for frequency hopping systems and digital modulation

7.2.1 E.U.T. Operation

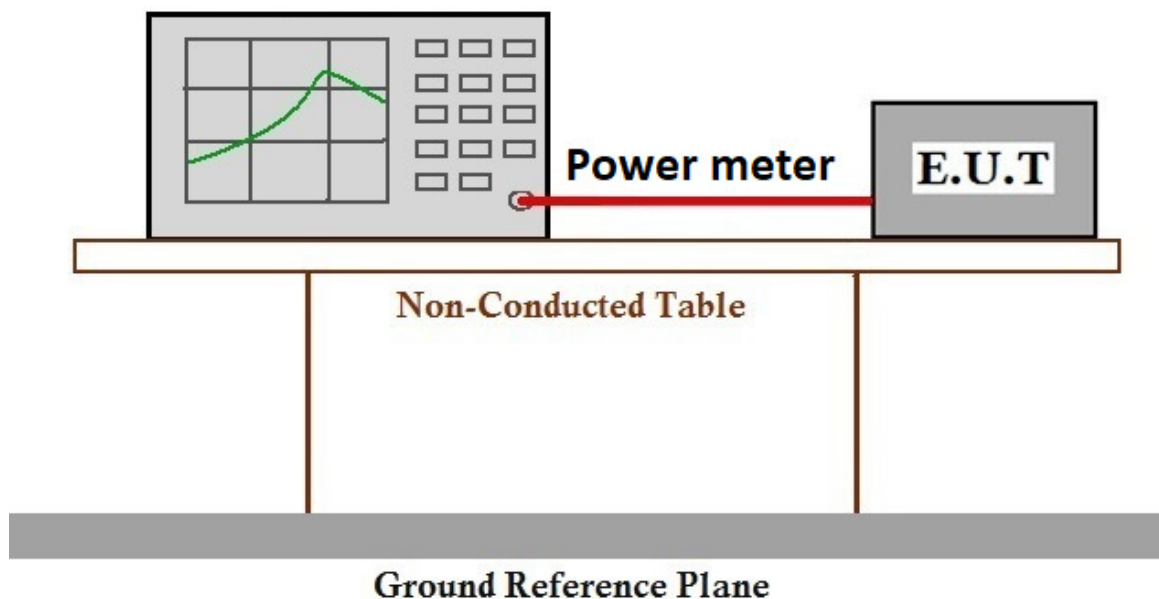
Operating Environment:

Temperature: 22.5 °C Humidity: 49.1 % RH :

Test mode b:TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20).

Only the data of worst case is recorded in the report.

7.2.2 Test Setup Diagram



7.2.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247

7.3 Power Spectrum Density

Test Requirement 47 CFR Part 15, Subpart C 15.247(e)
 Test Method: ANSI C63.10 (2013) Section 11.10.2
 Limit: $\leq 8\text{dBm}$ in any 3 kHz band during any time interval of continuous transmission

7.3.1 E.U.T. Operation

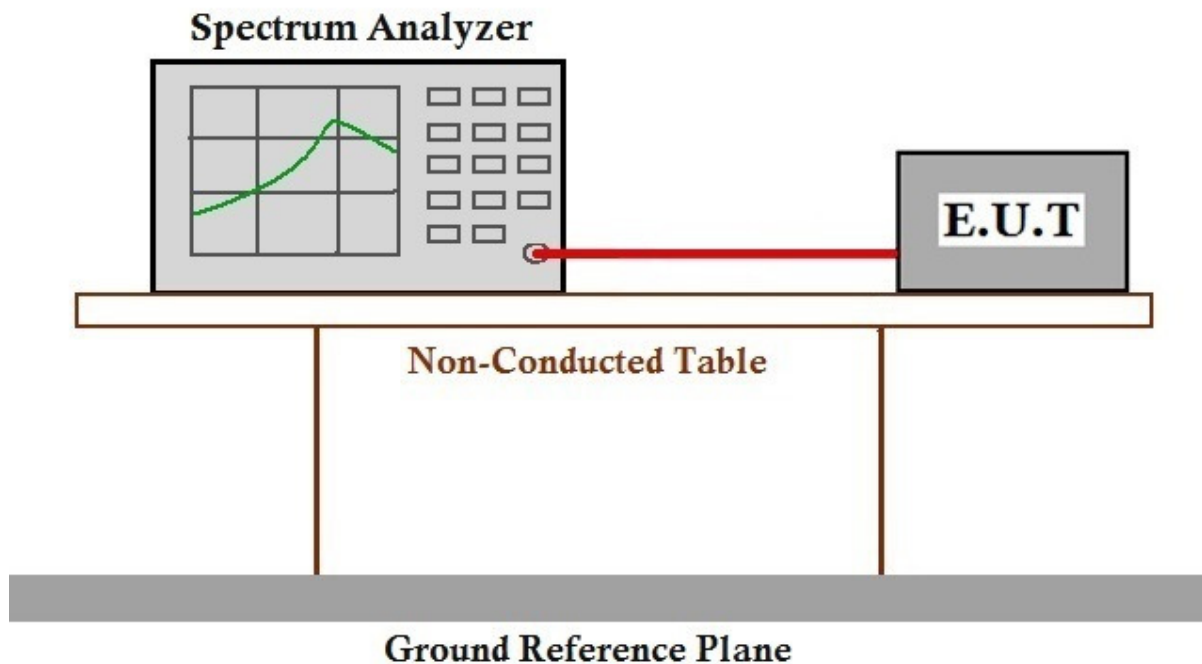
Operating Environment:

Temperature: 22.5 °C Humidity: 49.1 % RH :

Test mode b:TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20).

Only the data of worst case is recorded in the report.

7.3.2 Test Setup Diagram



7.3.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247

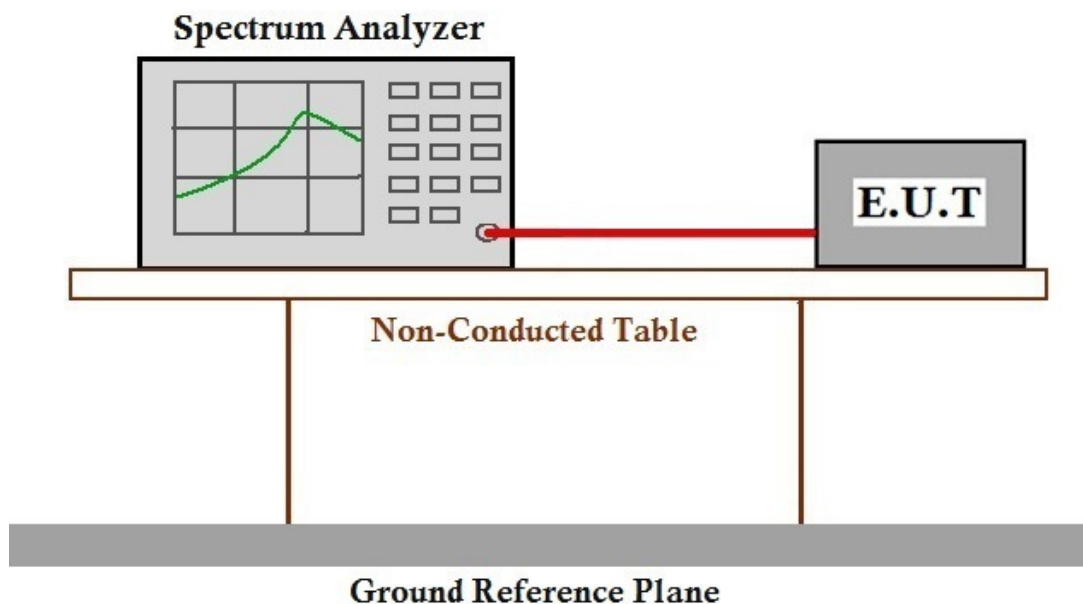
7.4 Conducted Band Edges Measurement

Test Requirement	47 CFR Part 15, Subpart C 15.247(d)
Test Method:	ANSI C63.10 (2013) Section 11.13.3.2
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c))

7.4.1 E.U.T. Operation

Operating Environment:	
Temperature:	22.5 °C
Humidity:	49.1 % RH
Test mode	b:TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20). Only the data of worst case is recorded in the report.

7.4.2 Test Setup Diagram



7.4.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247

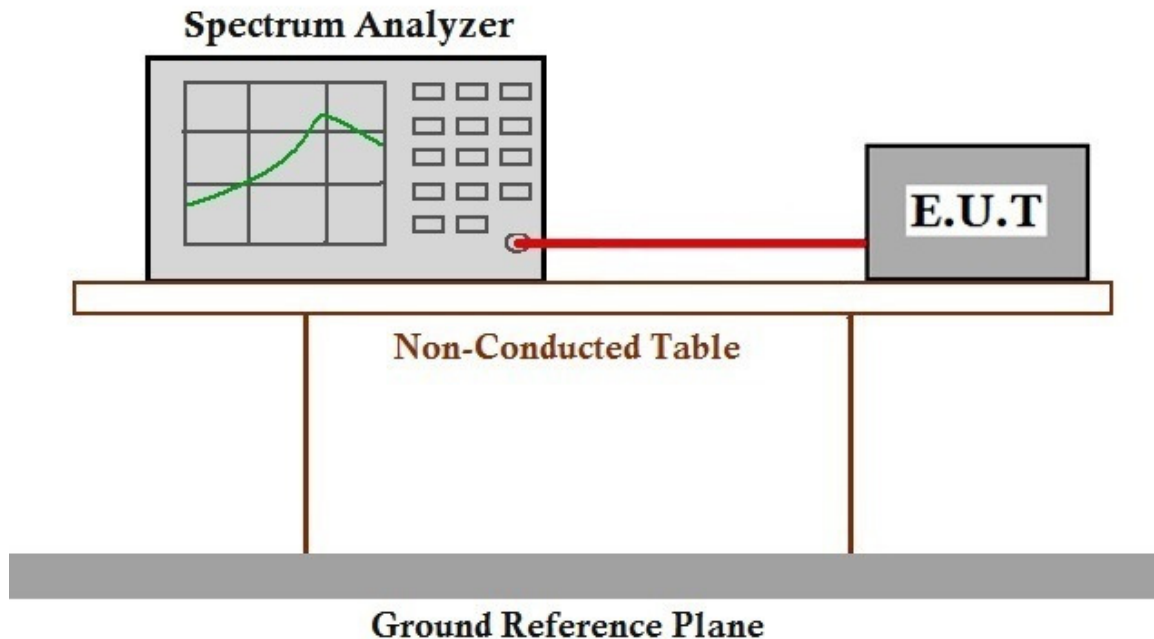
7.5 Conducted Spurious Emissions

Test Requirement	47 CFR Part 15, Subpart C 15.247(d)
Test Method:	ANSI C63.10 (2013) Section 11.11
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c))

7.5.1 E.U.T. Operation

Operating Environment:			
Temperature:	22.5 °C	Humidity:	49.1 % RH :
Test mode	b:TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20). Only the data of worst case is recorded in the report.		

7.5.2 Test Setup Diagram



7.5.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247

7.6 Radiated Emissions which fall in the restricted bands

Test Requirement 47 CFR Part 15, Subpart C 15.209 & 15.247(d)

Test Method: ANSI C63.10 (2013) Section 6.10.5

Measurement Distance: 3m

Limit:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/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

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

7.6.1 E.U.T. Operation

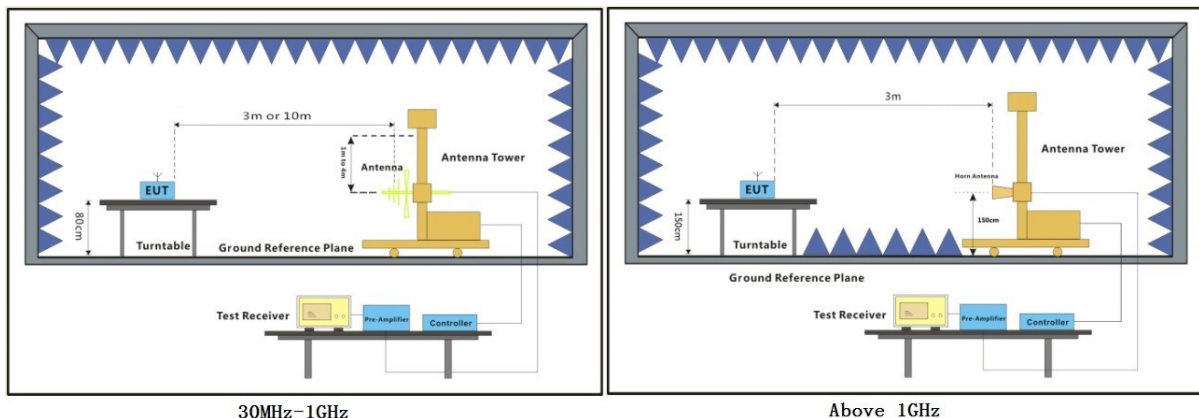
Operating Environment:

Temperature: 22.5 °C Humidity: 49.1 % RH :

Test mode b:TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20).

Only the data of worst case is recorded in the report.

7.6.2 Test Setup Diagram



7.6.3 Measurement Procedure and Data

- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- h. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- j. Repeat above procedures until all frequencies measured was complete.

Remark 1: $\text{Level} = \text{Read Level} + \text{Cable Loss} + \text{Antenna Factor} - \text{Preamp Factor}$

Remark 2: For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

Remark:

1. For radiated emission test: $\text{Correction Factor} = \text{Antenna Factor} + \text{Cable Loss}$.
2. For conducted emission test: $\text{Correction Factor} = \text{LISN Factor} + \text{Cable Loss}$.
3. $\text{Margin} = \text{Limit} - \text{Reading}$
4. Pol = Polarization

7.7 Radiated Spurious Emissions

Test Requirement 47 CFR Part 15, Subpart C 15.209 & 15.247(d)

Test Method: ANSI C63.10 (2013) Section 6.4,6.5,6.6

Measurement Distance: 3m

Limit:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/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

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

7.7.1 E.U.T. Operation

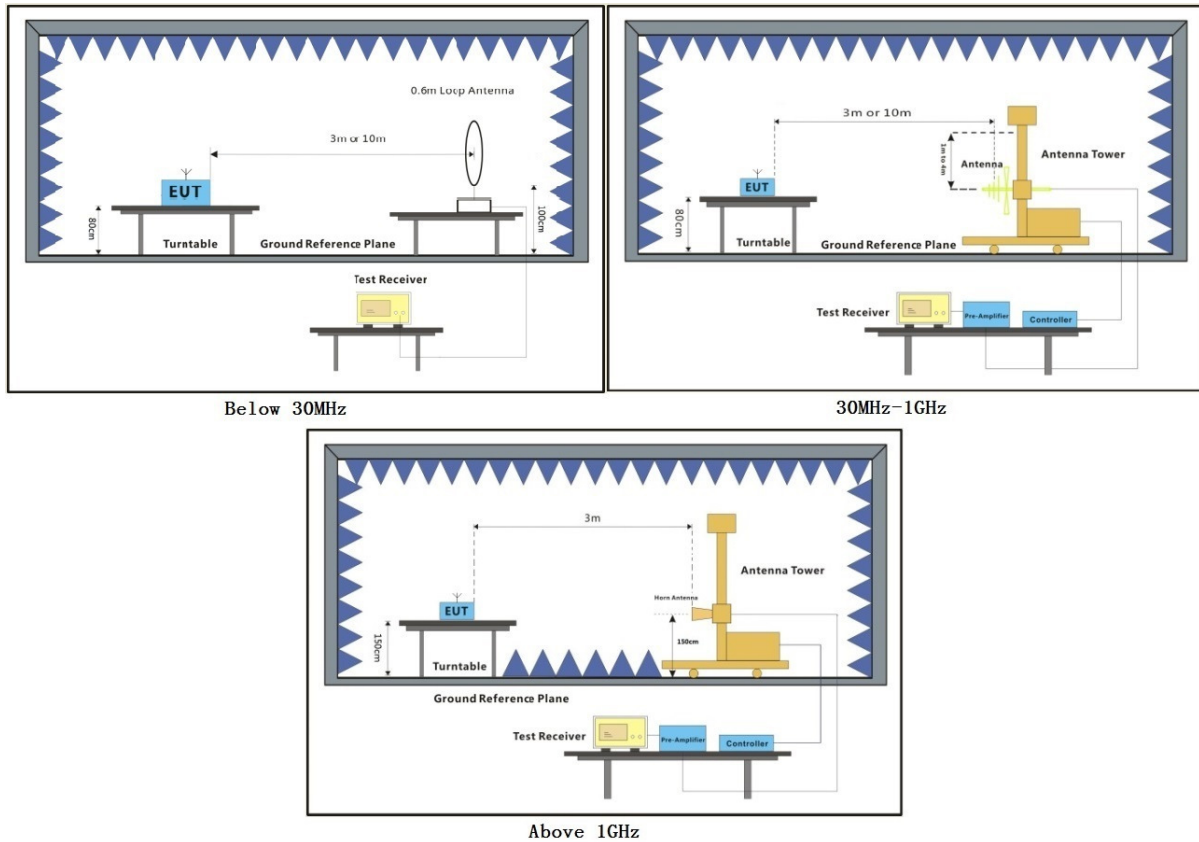
Operating Environment:

Temperature: 22.5 °C Humidity: 49.1 % RH :

Test mode b:TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20).

Only the data of worst case is recorded in the report.

7.7.2 Test Setup Diagram



7.7.3 Measurement Procedure and Data

- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- h. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- j. Repeat above procedures until all frequencies measured was complete.

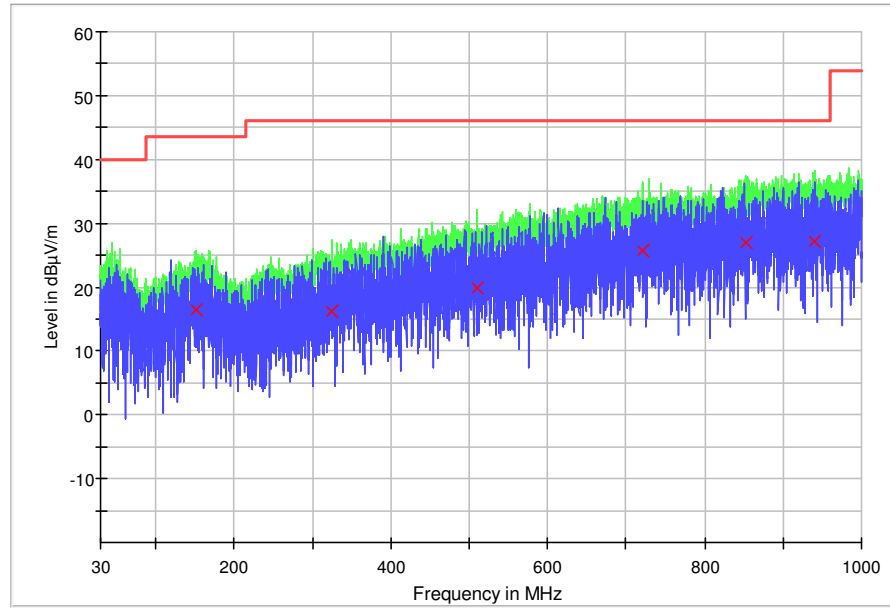
Remark:

- 1) For emission below 1GHz, through pre-scan found the worst case is the lowest channel. Only the worst case is recorded in the report.
- 2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
Final Test Level = Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor
- 3) Scan from 9kHz to 25GHz, the disturbance above 18GHz and below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
- 4) For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

Radiated emission below 1GHz

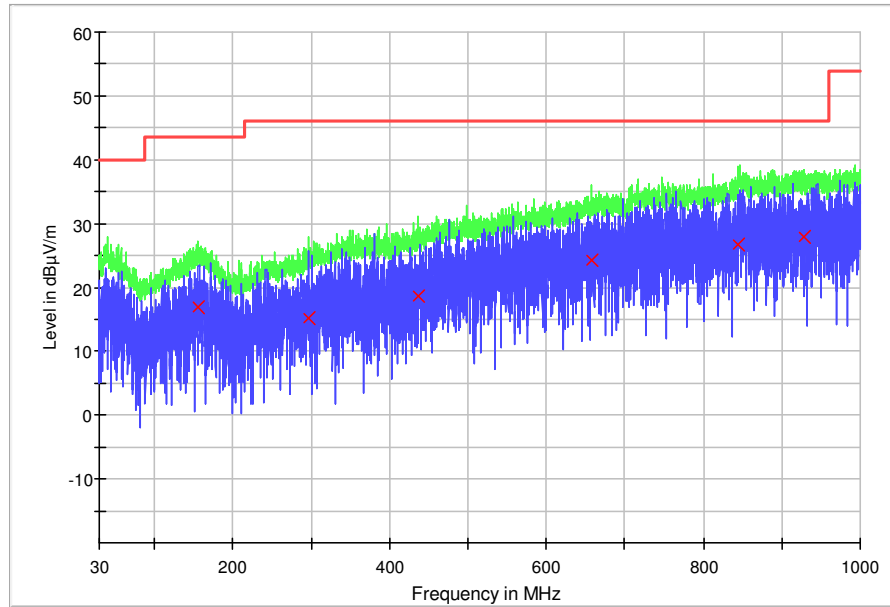
802.11b

Horizontal (worst plot was shown as below)



Frequency (MHz)	QuasiPeak (dBμV/m)	Pol.	Corr. (dB/m)	Margin (dB)	Limit (dBμV/m)	Result
151.929000	16.4	H	14.5	27.1	43.5	Pass
324.783000	16.2	H	15.1	29.9	46.0	Pass
509.471000	19.9	H	19	26.1	46.0	Pass
720.737000	25.8	H	23.9	20.3	46.0	Pass
853.142000	27.0	H	25.9	19.0	46.0	Pass
940.927000	27.3	H	26.6	18.7	46.0	Pass

Vertical (worst plot was shown as below)



Frequency (MHz)	QuasiPeak (dBμV/m)	Pol.	Corr. (dB/m)	Margin (dB)	Limit (dBμV/m)	Result
155.033000	16.9	V	14.8	26.6	43.5	Pass
296.653000	15.2	V	14.1	30.8	46.0	Pass
436.527000	18.8	V	17.4	27.2	46.0	Pass
657.105000	24.3	V	23.1	21.7	46.0	Pass
844.994000	26.7	V	25.6	19.3	46.0	Pass
928.899000	27.9	V	26.7	18.1	46.0	Pass

Above 1GHz

Channel:Low

Frequency (MHz)	Antenna Polarization	Emission Level (dB μ V/m)		Limit (dB μ V/m)		Remark
		Peak	Average	Peak	Average	
1005.640	H	39.7	/	74.0	54.0	Pass
3741.890	H	42.3	/	74.0	54.0	Pass
5491.560	V	50.7	/	74.0	54.0	Pass
7390.160	V	56.3	48.5	74.0	54.0	Pass
8282.820	H	58.2	47.3	74.0	54.0	Pass
9027.380	H	56.1	47.1	74.0	54.0	Pass

Channel:Middle

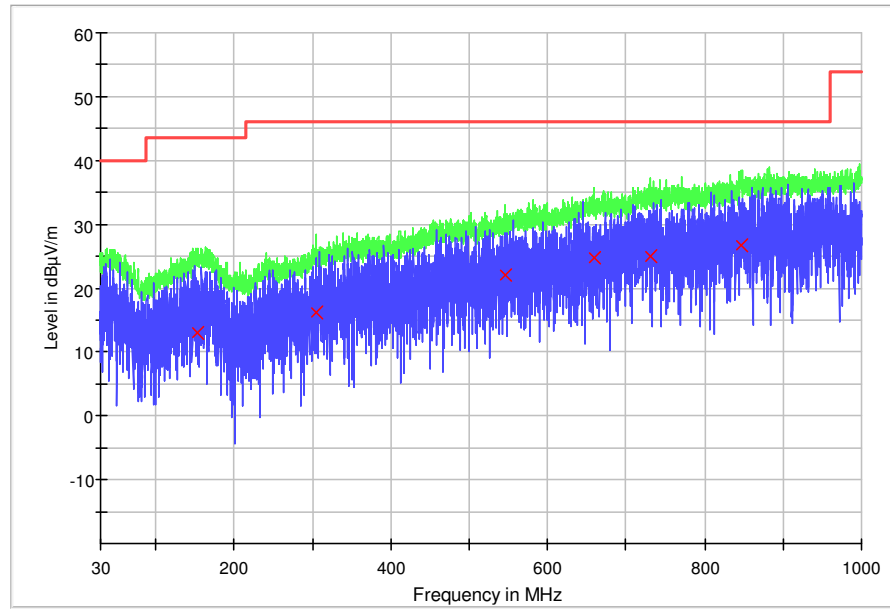
Frequency (MHz)	Antenna Polarization	Emission Level (dB μ V/m)		Limit (dB μ V/m)		Remark
		Peak	Average	Peak	Average	
1206.740	H	38.6	/	74.0	54.0	Pass
3255.190	H	39.7	/	74.0	54.0	Pass
6316.310	V	53.1	/	74.0	54.0	Pass
7149.790	V	52.8	/	74.0	54.0	Pass
8584.420	V	50.4	49.9	74.0	54.0	Pass
9615.030	H	59.5	48.2	74.0	54.0	Pass

Channel: High

Frequency (MHz)	Antenna Polarization	Emission Level (dB μ V/m)		Limit (dB μ V/m)		Remark
		Peak	Average	Peak	Average	
1209.680	H	41.3	/	74.0	54.0	Pass
3053.400	H	48.4	/	74.0	54.0	Pass
5588.780	V	49.8	/	74.0	54.0	Pass
7229.520	V	53.8	/	74.0	54.0	Pass
8591.360	V	61.2	49.8	74.0	54.0	Pass
9769.370	H	59.6	49.3	74.0	54.0	Pass

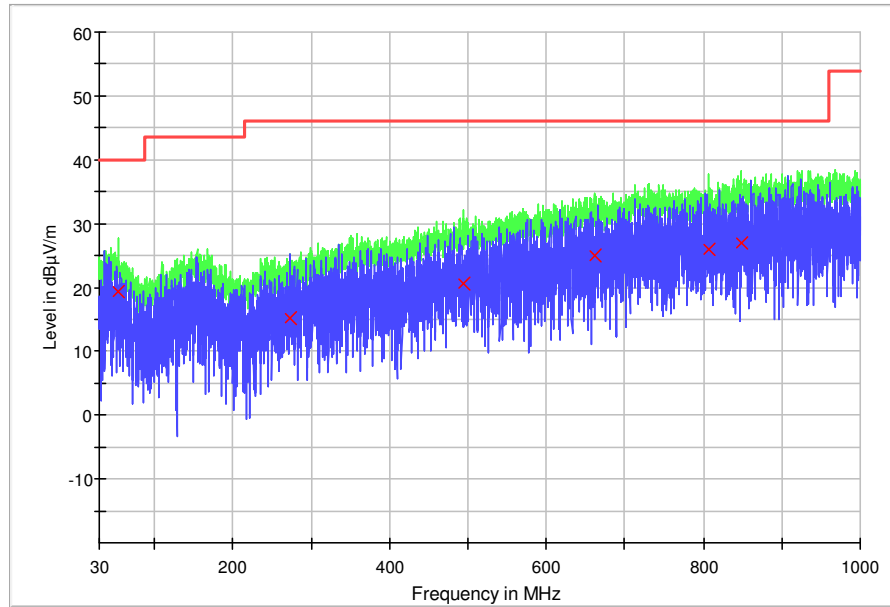
802.11g

Horizontal (worst plot was shown as below)



Frequency (MHz)	QuasiPeak (dBμV/m)	Pol.	Corr. (dB/m)	Margin (dB)	Limit (dBμV/m)	Result
153.578000	12.9	H	14.7	30.6	43.5	Pass
305.286000	16.1	H	14.6	29.9	46.0	Pass
545.943000	22.1	H	20.2	23.9	46.0	Pass
659.045000	24.9	H	23.1	21.1	46.0	Pass
730.340000	25.1	H	23.8	20.9	46.0	Pass
846.934000	26.7	H	25.7	19.3	46.0	Pass

Vertical (worst plot was shown as below)



Frequency (MHz)	QuasiPeak (dBμV/m)	Pol.	Corr. (dB/m)	Margin (dB)	Limit (dBμV/m)	Result
53.959000	19.4	V	13.5	20.6	40.0	Pass
272.306000	15.2	V	13.1	30.8	46.0	Pass
494.533000	20.5	V	19.2	25.5	46.0	Pass
661.955000	25.0	V	23.2	21.0	46.0	Pass
806.194000	26.0	V	24.8	20.0	46.0	Pass
848.486000	27.0	V	25.8	19.0	46.0	Pass

Above 1GHz

Channel:Low

Frequency (MHz)	Antenna Polarization	Emission Level (dB μ V/m)		Limit (dB μ V/m)		Remark
		Peak	Average	Peak	Average	
1356.630	H	48.3	/	74.0	54.0	Pass
3197.550	H	47.1	/	74.0	54.0	Pass
6000.760	V	51.8	/	74.0	54.0	Pass
7328.100	V	52.0	/	74.0	54.0	Pass
8148.650	V	55.7	49.7	74.0	54.0	Pass
9241.820	H	58.7	50.5	74.0	54.0	Pass

Channel:Middle

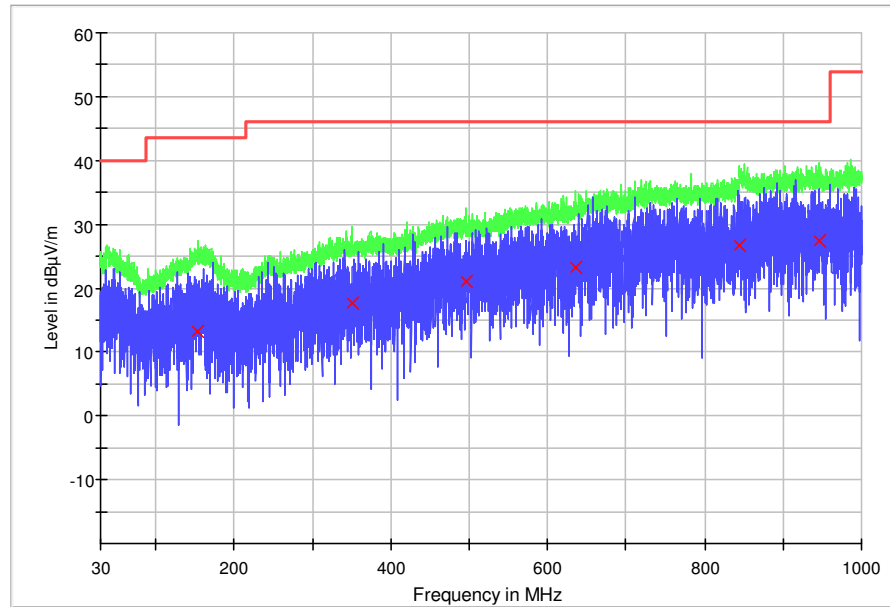
Frequency (MHz)	Antenna Polarization	Emission Level (dB μ V/m)		Limit (dB μ V/m)		Remark
		Peak	Average	Peak	Average	
1349.55	H	43.6	/	74.0	54.0	Pass
3936.91	H	46.9	/	74.0	54.0	Pass
5943.82	V	51.3	/	74.0	54.0	Pass
7154.01	H	56.7	49.2	74.0	54.0	Pass
8042.45	V	54.4	49.6	74.0	54.0	Pass
9367.85	H	62.7	49.8	74.0	54.0	Pass

Channel: High

Frequency (MHz)	Antenna Polarization	Emission Level (dB μ V/m)		Limit (dB μ V/m)		Remark
		Peak	Average	Peak	Average	
1355.550	H	46.5	/	74.0	54.0	Pass
3655.808	H	51.2	/	74.0	54.0	Pass
5435.780	V	56.0	50.8	74.0	54.0	Pass
7649.200	V	57.0	48.3	74.0	54.0	Pass
8979.830	V	59.8	49.8	74.0	54.0	Pass
9594.170	H	54.8	47.3	74.0	54.0	Pass

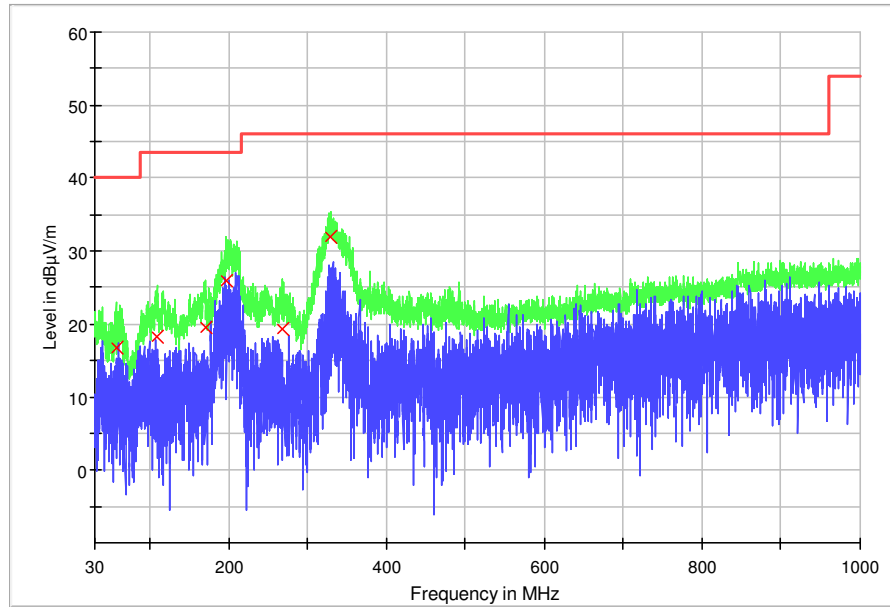
802.11n20

Horizontal (worst plot was shown as below)



Frequency (MHz)	QuasiPeak (dBμV/m)	Pol.	Corr. (dB/m)	Margin (dB)	Limit (dBμV/m)	Result
155.906000	19.1	H	14.8	24.4	43.5	Pass
364.456000	18.2	H	16	27.8	46.0	Pass
555.449000	22.1	H	20.6	24.0	46.0	Pass
649.539000	24.0	H	22.8	22.0	46.0	Pass
767.394000	25.7	H	24.7	20.3	46.0	Pass
938.599000	27.5	H	26.5	18.5	46.0	Pass

Vertical (worst plot was shown as below)



Frequency (MHz)	QuasiPeak (dBµV/m)	Pol.	Corr. (dB/m)	Margin (dB)	Limit (dBµV/m)	Result
56.772000	16.9	V	13.1	23.1	40.0	Pass
108.376000	18.4	V	11.0	25.2	43.5	Pass
169.971000	19.5	V	14.0	24.0	43.5	Pass
196.549000	25.9	V	10.7	17.6	43.5	Pass
266.777000	19.4	V	12.8	26.6	46.0	Pass
328.566000	31.9	V	15.3	14.1	46.0	Pass

Above 1GHz

Channel:Low

Frequency (MHz)	Antenna Polarization	Emission Level (dB μ V/m)		Limit (dB μ V/m)		Remark
		Peak	Average	Peak	Average	
1450.020	H	49.0	/	74.0	54.0	Pass
3580.980	H	56.3	48.7	74.0	54.0	Pass
5927.400	V	54.4	49.8	74.0	54.0	Pass
7184.870	V	55.2	48.7	74.0	54.0	Pass
8522.370	V	56.8	49.7	74.0	54.0	Pass
9987.050	H	59.1	47.5	74.0	54.0	Pass

Channel:Middle

Frequency (MHz)	Antenna Polarization	Emission Level (dB μ V/m)		Limit (dB μ V/m)		Remark
		Peak	Average	Peak	Average	
1450.790	H	48.4	/	74.0	54.0	Pass
3131.560	H	53.6	/	74.0	54.0	Pass
6325.600	V	57.9	/	74.0	54.0	Pass
7508.430	H	58.2	/	74.0	54.0	Pass
8211.880	V	58.0	49.8	74.0	54.0	Pass
9089.440	H	61.9	49.2	74.0	54.0	Pass

Channel: High

Frequency (MHz)	Antenna Polarization	Emission Level (dB μ V/m)		Limit (dB μ V/m)		Remark
		Peak	Average	Peak	Average	
1585.840	H	49.3	/	74.0	54.0	Pass
3218.680	H	48.8	/	74.0	54.0	Pass
6376.070	V	47.9	/	74.0	54.0	Pass
7410.320	V	53.8	/	74.0	54.0	Pass
8962.340	V	59.2	50.8	74.0	54.0	Pass
9784.360	H	59.9	49.3	74.0	54.0	Pass

8 Photographs

Remark: Photos refer to Appendix A, Appendix B and Appendix C of HKEM200100002402.

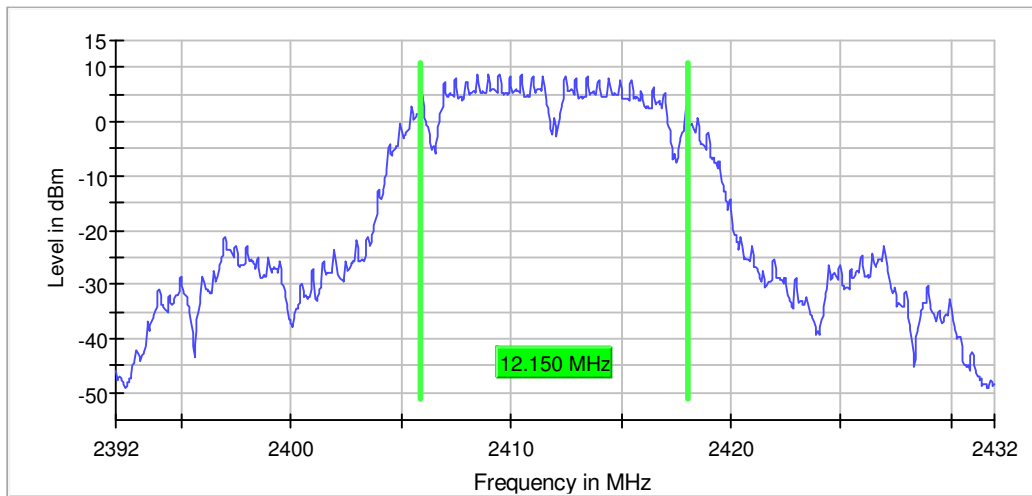
9 Appendix_15.247

9.1 Minimum Emission Bandwidth 6 dB

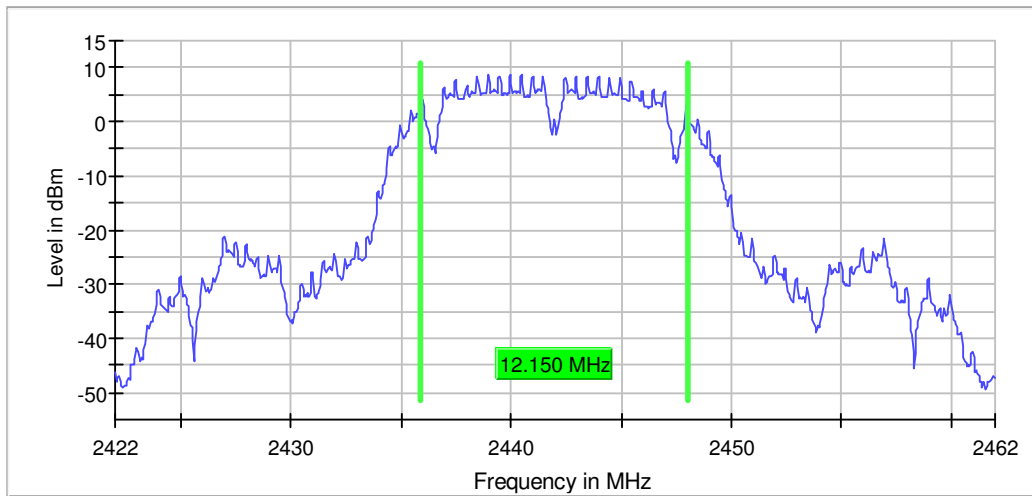
802.11b:

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2412.000000	12.150000	0.500000	---	2405.875000	2418.025000
2442.000000	12.150000	0.500000	---	2435.875000	2448.025000
2462.000000	11.200000	0.500000	---	2455.875000	2467.075000

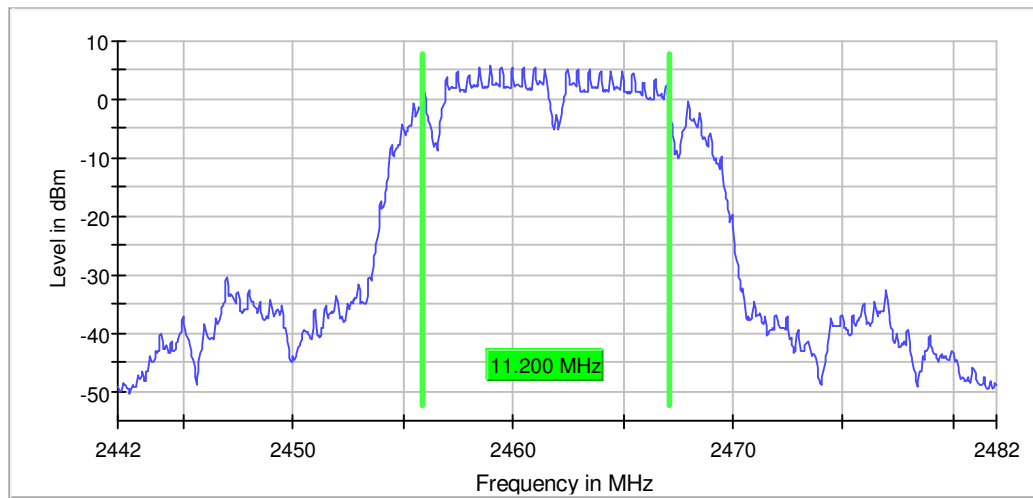
6 dB Bandwidth



6 dB Bandwidth



6 dB Bandwidth



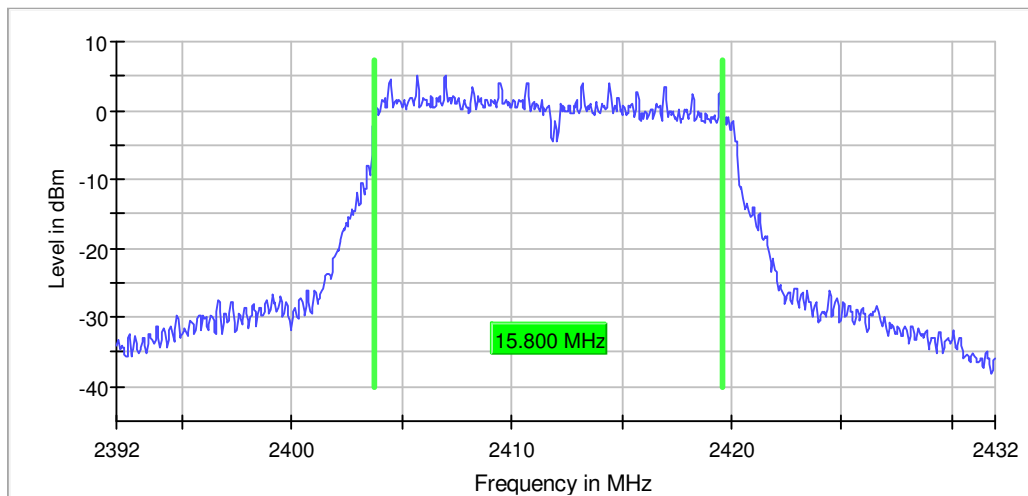
Measurement setting:

Setting	Instrument Value	Target Value
Span	40.000 MHz	40.000 MHz
RBW	100.000 kHz	~ 100.000 kHz
VBW	300.000 kHz	~ 300.000 kHz
SweepPoints	800	~ 800
SweepTime	94.922 us	AUTO
Reference Level	10.000 dBm	10.000 dBm
Attenuation	30.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	18 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.38 dB	0.50 dB

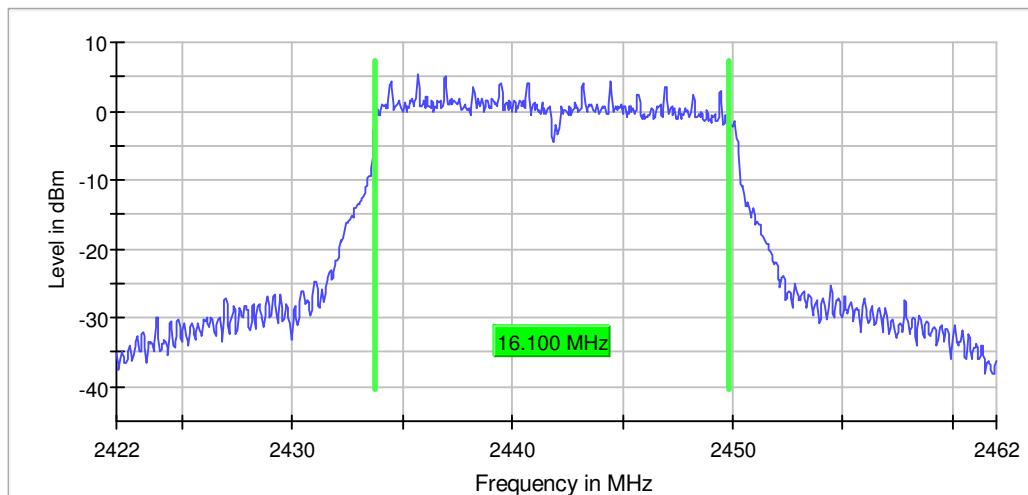
802.11g:

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2412.000000	15.800000	0.500000	---	2403.775000	2419.575000
2442.000000	16.100000	0.500000	---	2433.775000	2449.875000
2462.000000	15.850000	0.500000	---	2453.725000	2469.575000

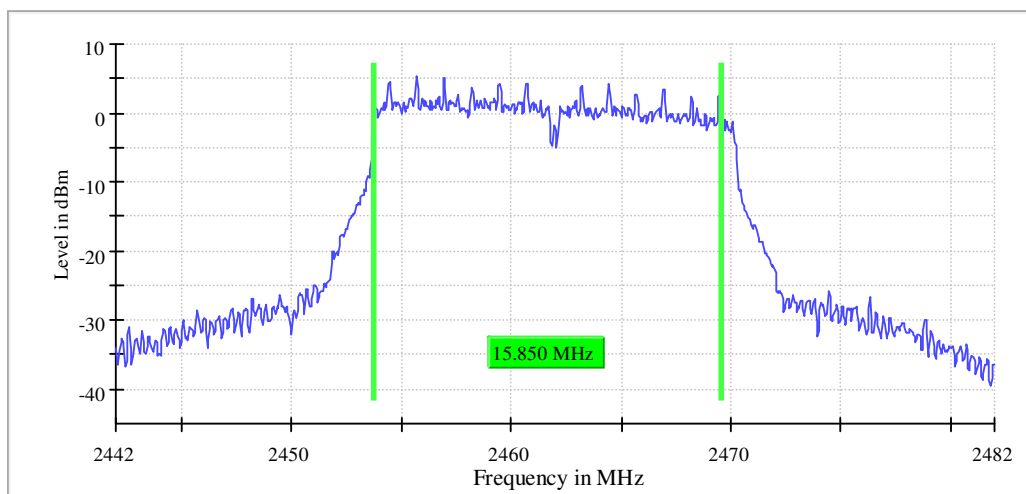
6 dB Bandwidth



6 dB Bandwidth



6 dB Bandwidth



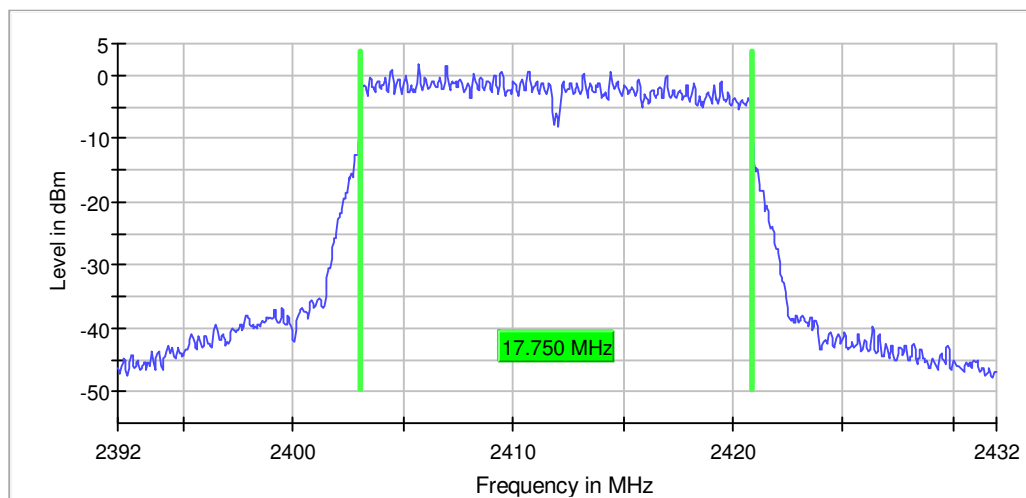
Measurement setting:

Setting	Instrument Value	Target Value
Span	40.000 MHz	40.000 MHz
RBW	100.000 kHz	~ 100.000 kHz
VBW	300.000 kHz	~ 300.000 kHz
SweepPoints	800	~ 800
SweepTime	94.922 μ s	AUTO
Reference Level	10.000 dBm	10.000 dBm
Attenuation	30.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepTime	FET	AUTO
Preamplifier	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	37 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.25 dB	0.50 dB

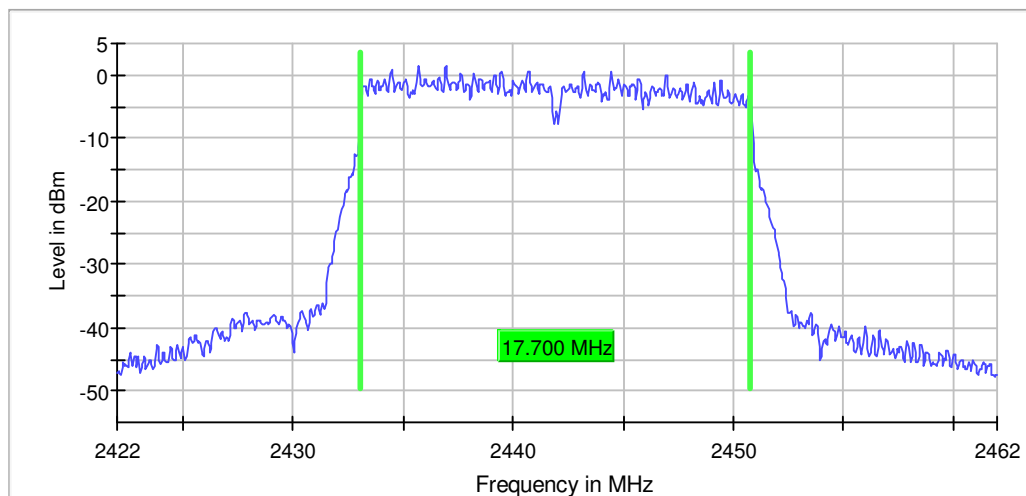
802.11n20:

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2412.000000	17.750000	0.500000	---	2403.075000	2420.825000
2442.000000	17.700000	0.500000	---	2433.075000	2450.775000
2462.000000	16.750000	0.500000	---	2458.125000	2474.875000

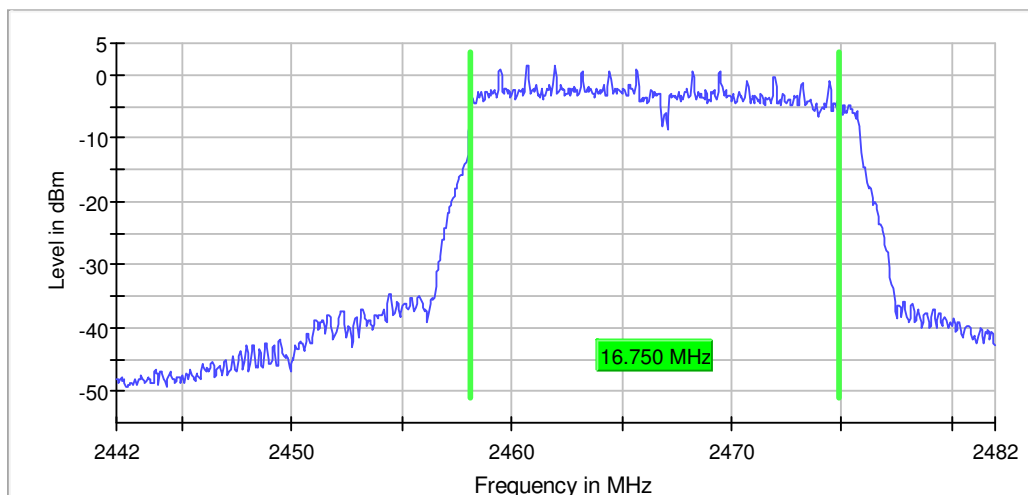
6 dB Bandwidth



6 dB Bandwidth



6 dB Bandwidth



Measurement Setting:

Setting	Instrument Value	Target Value
Span	40.000 MHz	40.000 MHz
RBW	100.000 kHz	~ 100.000 kHz
VBW	300.000 kHz	~ 300.000 kHz
SweepPoints	800	~ 800
SweepTime	94.922 us	AUTO
Reference Level	10.000 dBm	10.000 dBm
Attenuation	30.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamplifier	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	92 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.00 dB	0.50 dB

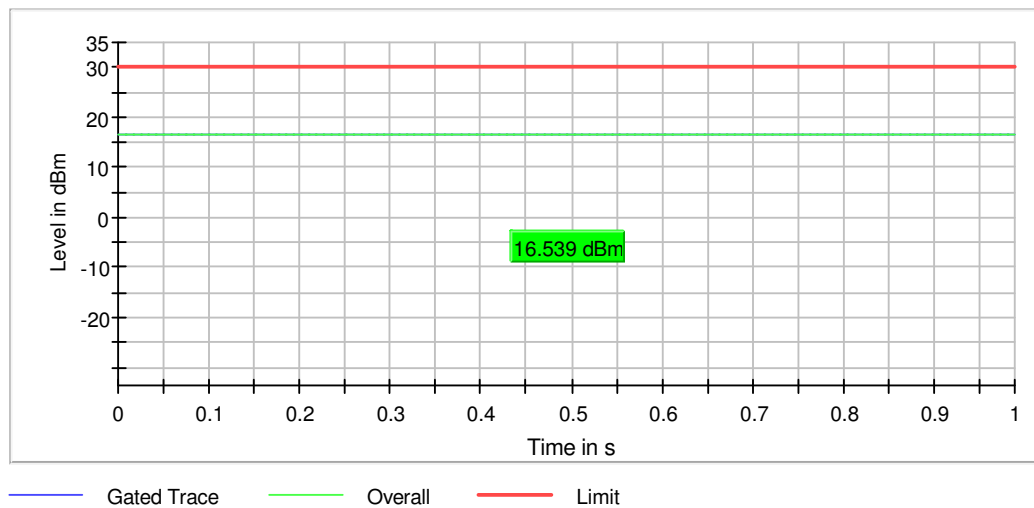
9.2 RF output power

Operation Mode	DUT Frequency (MHz)	Limit Max (dBm)	Gated Level (dBm)	Result
802.11b	2412.000000	30.0	16.5	PASS
802.11b	2442.000000	30.0	16.1	PASS
802.11b	2462.000000	30.0	16.3	PASS
802.11g	2412.000000	30.0	12.9	PASS
802.11g	2442.000000	30.0	12.5	PASS
802.11g	2462.000000	30.0	12.9	PASS
802.11n20	2412.000000	30.0	13.1	PASS
802.11n20	2442.000000	30.0	12.6	PASS
802.11n20	2462.000000	30.0	12.8	PASS

Remark: Antenna gain: 0.5dBi
(only worst case shown)

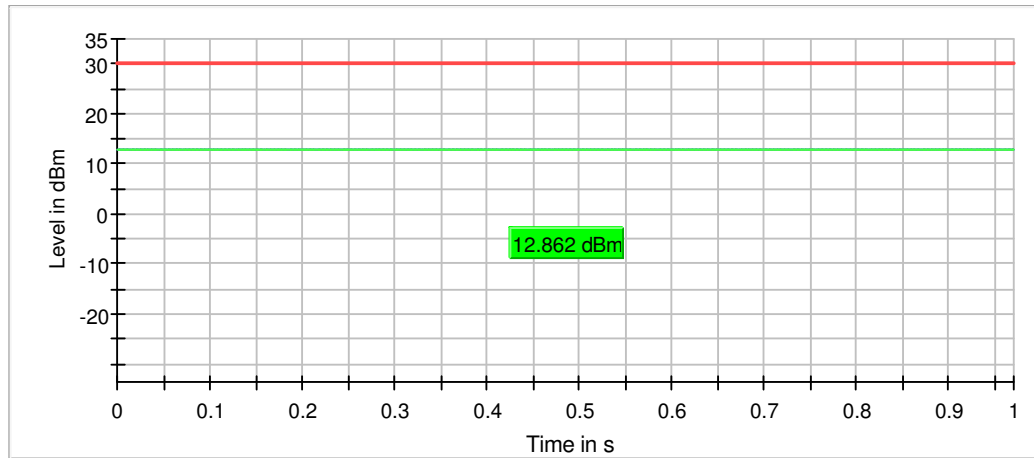
802.11b:

Gated Trace



802.11g:

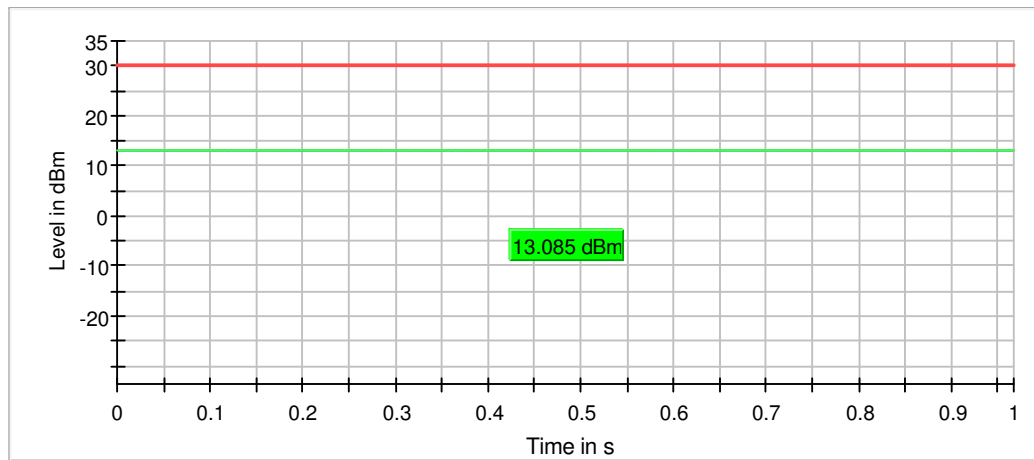
Gated Trace



— Gated Trace — Overall — Limit

802.11n20:

Gated Trace



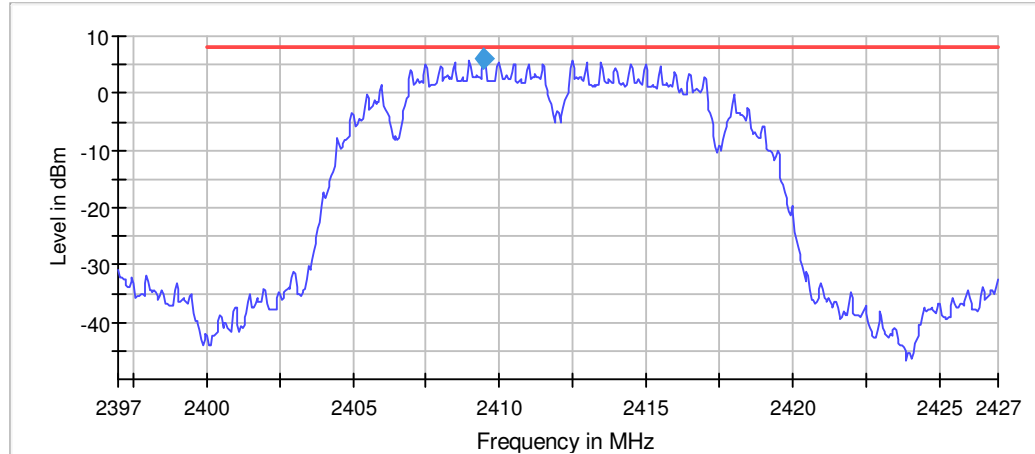
— Gated Trace — Overall — Limit

Power Spectral Density

802.11b:

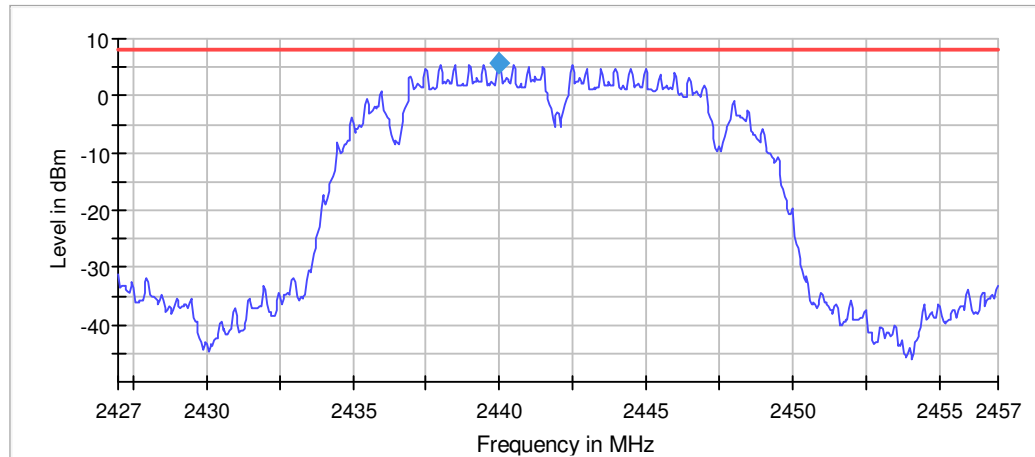
DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2412.000000	2409.475000	5.949	8.0	PASS
2442.000000	2439.975000	5.609	8.0	PASS
2462.000000	2460.475000	5.527	8.0	PASS

Peak Power Spectral Density



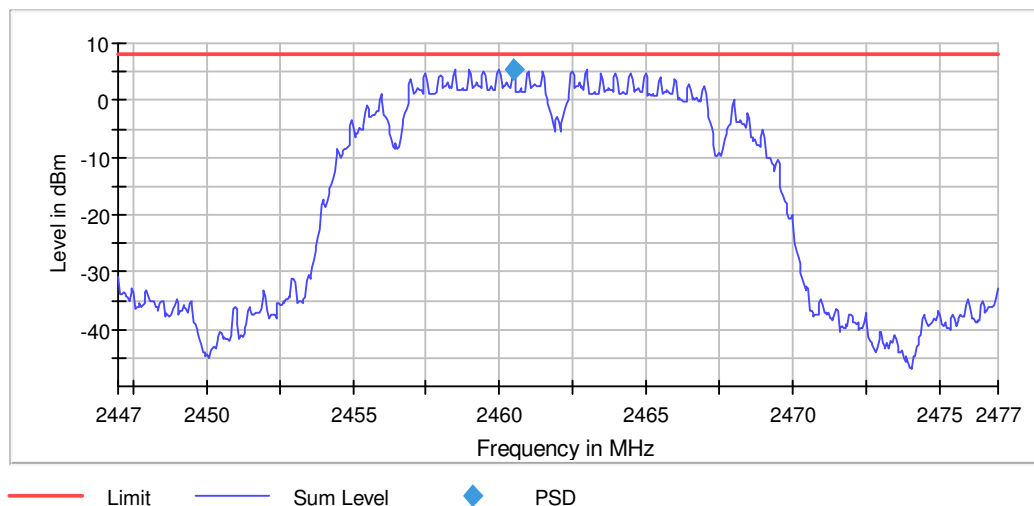
— Limit — Sum Level ◆ PSD

Peak Power Spectral Density



— Limit — Sum Level ◆ PSD

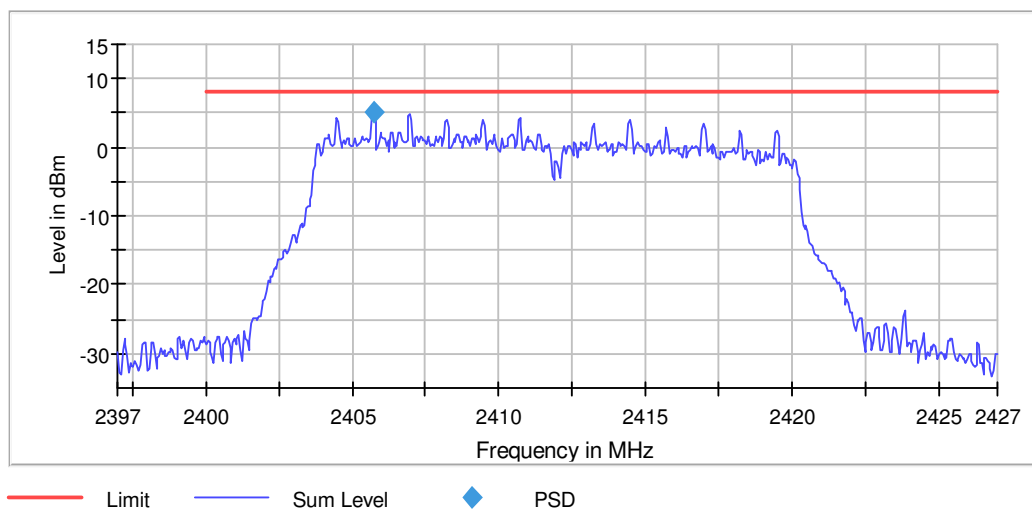
Peak Power Spectral Density



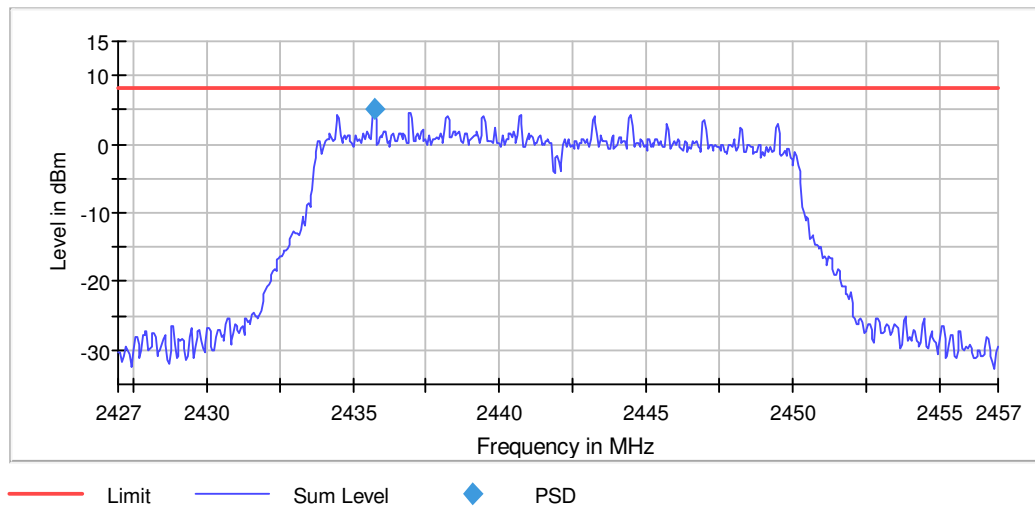
802.11g:

DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2412.000000	2405.725000	5.169	8.0	PASS
2442.000000	2435.725000	5.051	8.0	PASS
2462.000000	2465.725000	5.296	8.0	PASS

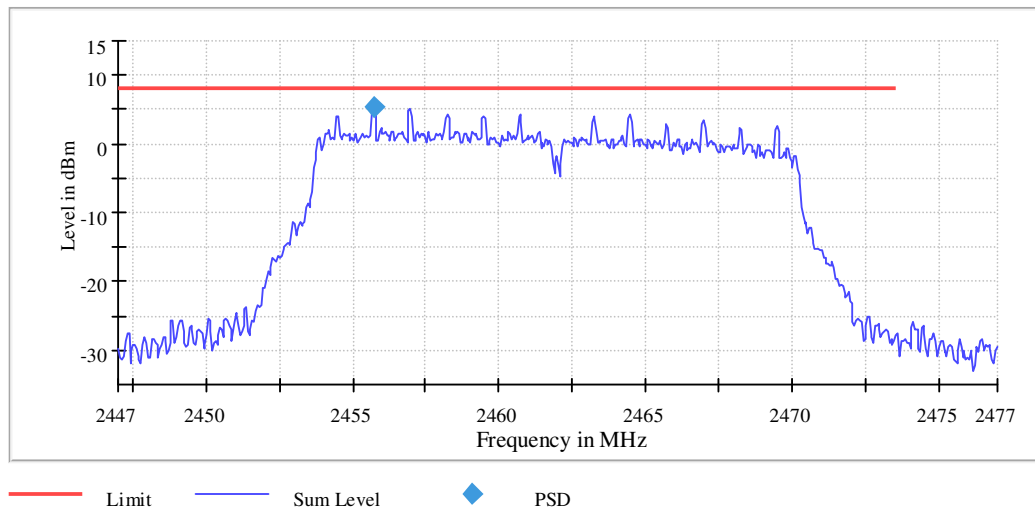
Peak Power Spectral Density



Peak Power Spectral Density



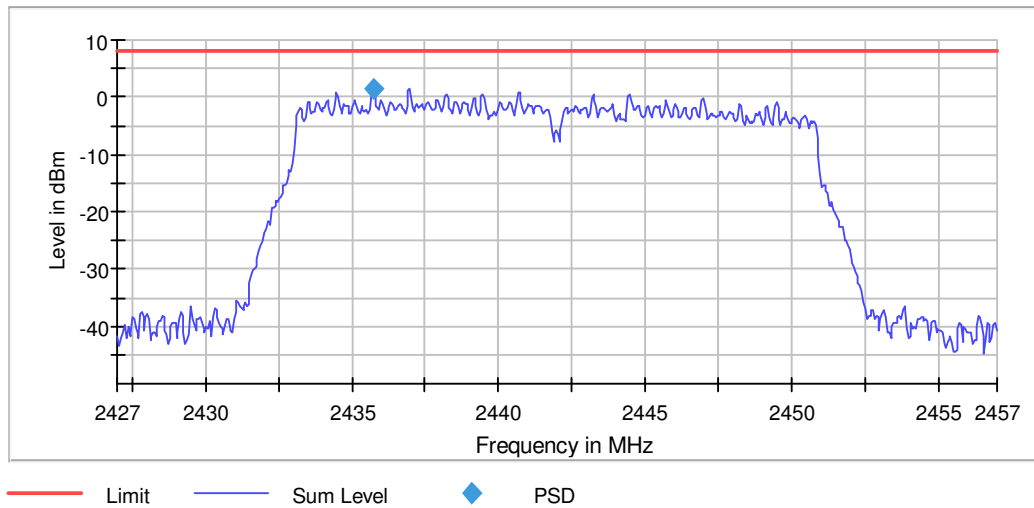
Peak Power Spectral Density



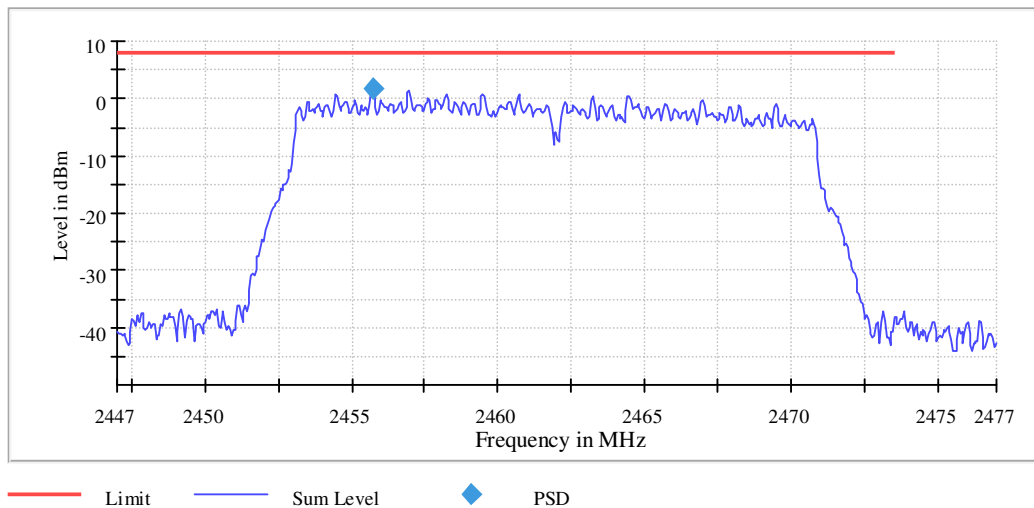
802.11n20:

DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2412.000000	2405.725000	1.571	8.0	PASS
2442.000000	2435.725000	1.419	8.0	PASS
2462.000000	2465.725000	1.717	8.0	PASS

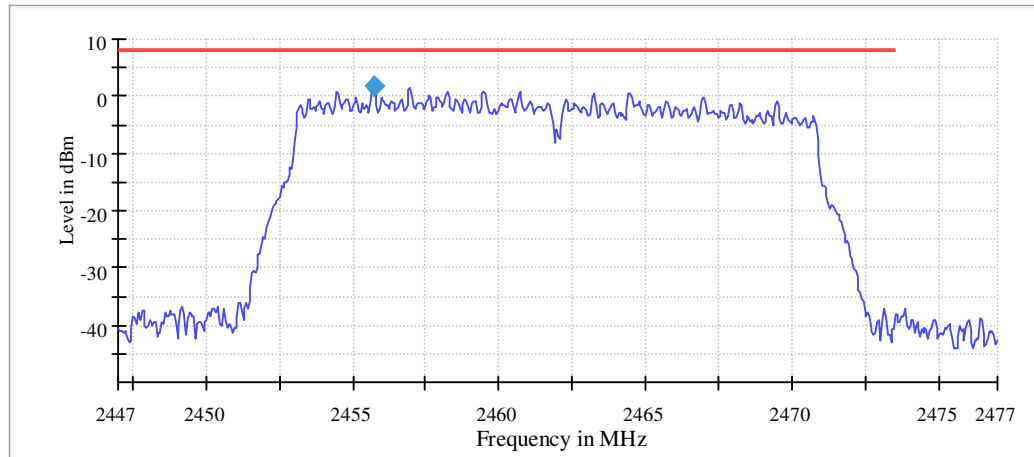
Peak Power Spectral Density



Peak Power Spectral Density



Peak Power Spectral Density



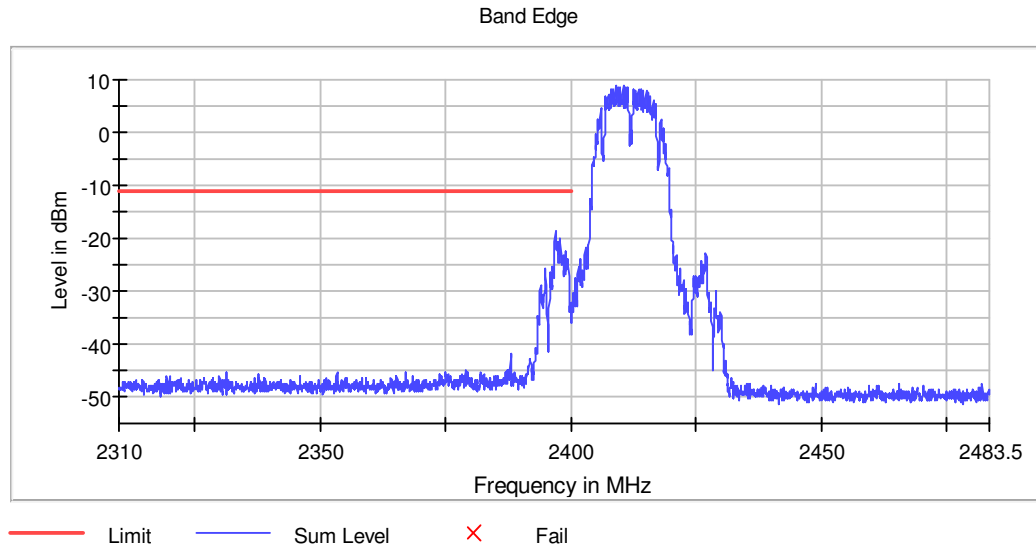
— Limit — Sum Level ◆ PSD

Measurement Setting:

Setting	Instrument Value	Target Value
Span	30.000 MHz	30.000 MHz
RBW	3.000 kHz- 100.000 kHz	3.000 kHz- 100.000 kHz
VBW	10.000 kHz- 300.000 kHz	10.000 kHz- 300.000 kHz
SweepPoints	600	~ 600
SweepTime	12.000 ms	12.000 ms
Reference Level	10.000 dBm	10.000 dBm
Attenuation	30.000 dB	AUTO
Detector	RMS	RMS
SweepCount	1	1
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	Sweep	Sweep
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	33 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.36 dB	0.50 dB

9.3 Band Edge

802.11b Band Edge Low



Inband Peak

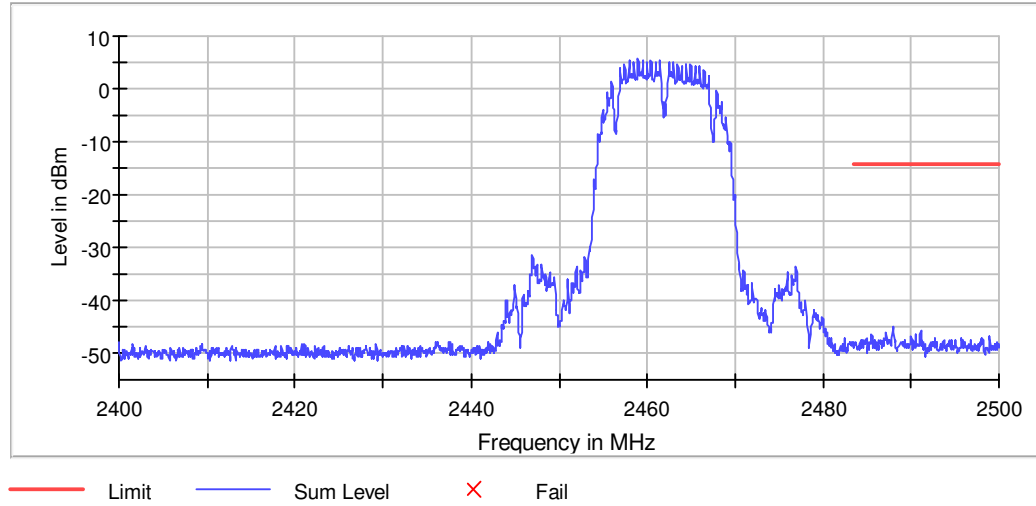
Frequency (MHz)	Level (dBm)
2408.975000	8.9

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2396.975000	-18.5	7.4	-11.1	PASS
2397.025000	-19.0	7.9	-11.1	PASS
2397.975000	-20.1	8.9	-11.1	PASS
2396.925000	-20.6	9.4	-11.1	PASS
2397.475000	-20.6	9.4	-11.1	PASS
2398.025000	-20.7	9.5	-11.1	PASS

802.11b Band Edge High

Band Edge



Inband Peak

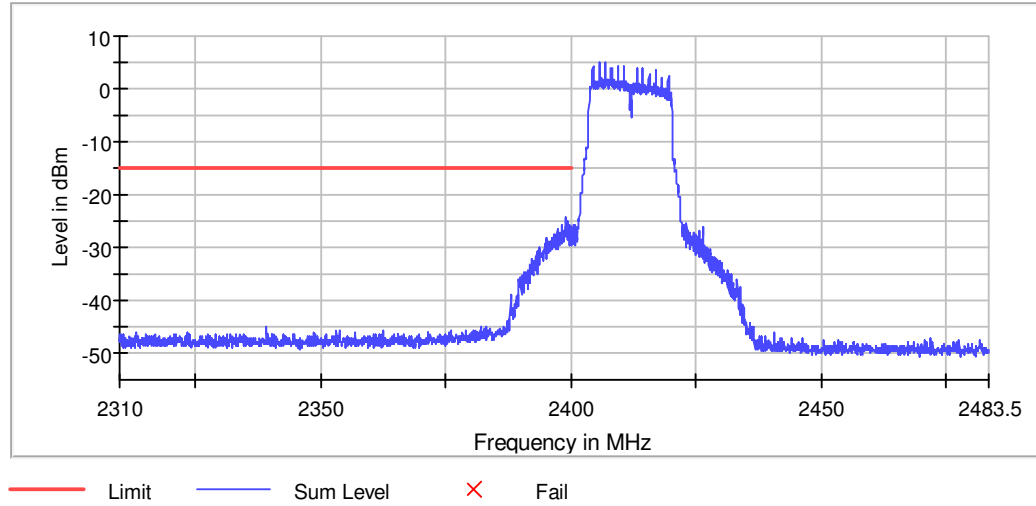
Frequency (MHz)	Level (dBm)
2458.975000	5.7

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2487.975000	-44.9	30.6	-14.3	PASS
2488.025000	-44.9	30.6	-14.3	PASS
2487.925000	-45.4	31.1	-14.3	PASS
2491.125000	-45.7	31.4	-14.3	PASS
2487.175000	-45.9	31.6	-14.3	PASS
2487.125000	-46.0	31.7	-14.3	PASS

802.11g Band Edge Low

Band Edge



Inband Peak

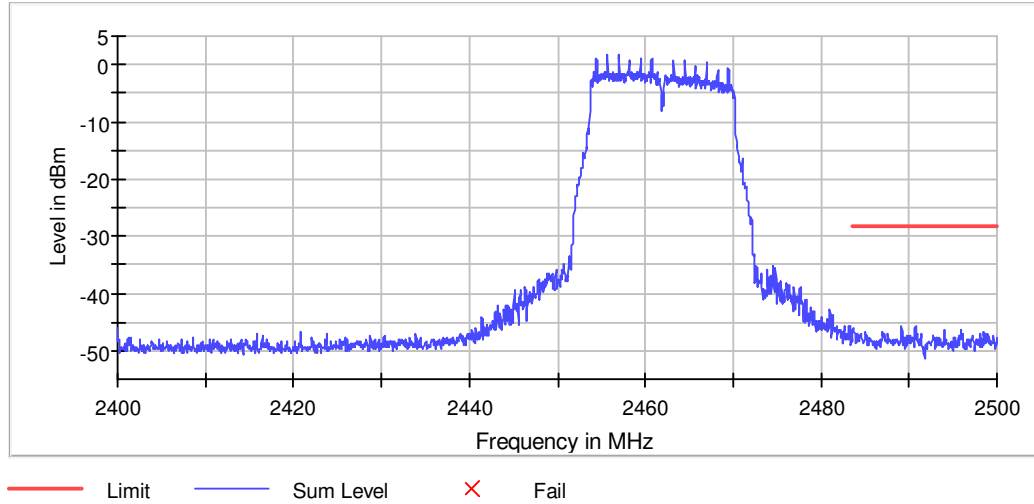
Frequency (MHz)	Level (dBm)
2405.725000	5.1

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2399.125000	-24.3	9.4	-14.9	PASS
2399.075000	-24.6	9.7	-14.9	PASS
2399.475000	-24.9	10.1	-14.9	PASS
2399.525000	-25.4	10.5	-14.9	PASS
2399.925000	-25.8	10.9	-14.9	PASS
2398.225000	-25.8	11.0	-14.9	PASS

802.11g Band Edge High

Band Edge



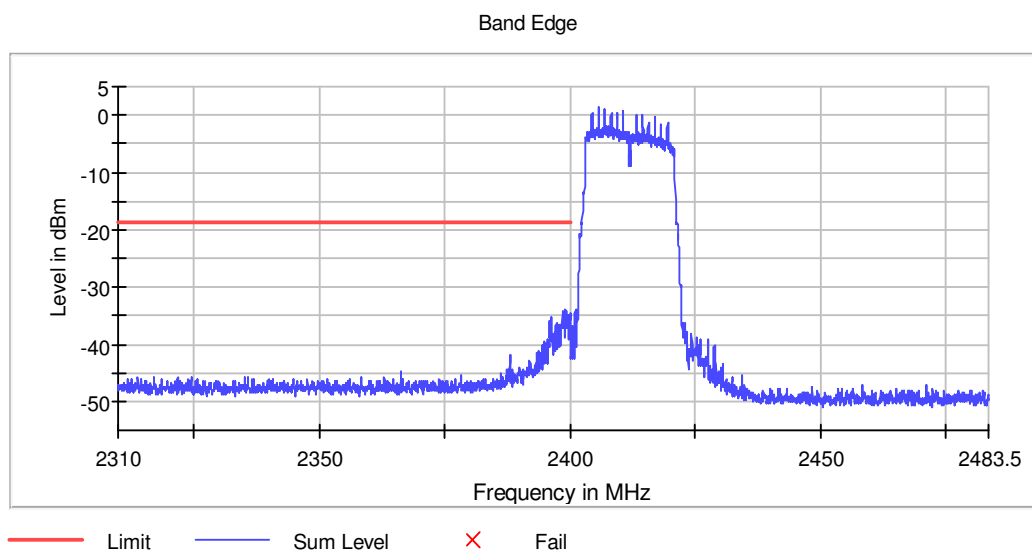
Inband Peak

Frequency (MHz)	Level (dBm)
2456.975000	1.8

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2489.175000	-45.8	17.6	-28.2	PASS
2490.725000	-45.8	17.7	-28.2	PASS
2489.125000	-45.8	17.7	-28.2	PASS
2490.675000	-46.0	17.8	-28.2	PASS
2483.625000	-46.1	18.0	-28.2	PASS
2483.575000	-46.3	18.1	-28.2	PASS

802.11n20 Band Edge Low



Inband Peak

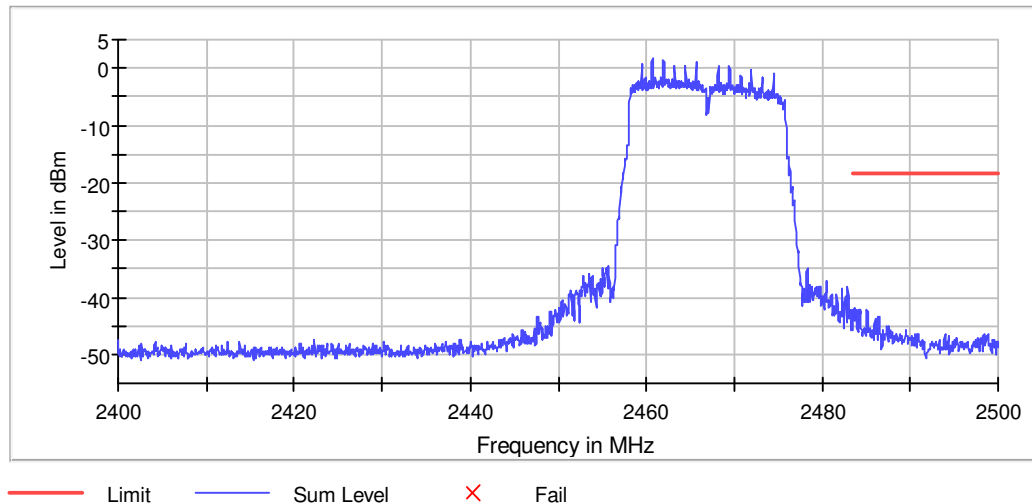
Frequency (MHz)	Level (dBm)
2405.725000	1.4

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2399.175000	-33.8	15.2	-18.6	PASS
2398.525000	-34.2	15.6	-18.6	PASS
2398.575000	-34.4	15.7	-18.6	PASS
2399.225000	-34.4	15.8	-18.6	PASS
2398.475000	-34.5	15.9	-18.6	PASS
2399.125000	-34.5	15.9	-18.6	PASS

802.11n20 Band Edge High

Band Edge



Inband Peak

Frequency (MHz)	Level (dBm)
2460.725000	1.6

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2483.625000	-41.9	23.5	-18.4	PASS
2483.675000	-41.9	23.6	-18.4	PASS
2484.225000	-42.0	23.6	-18.4	PASS
2483.525000	-42.1	23.7	-18.4	PASS
2484.275000	-42.1	23.7	-18.4	PASS
2483.875000	-42.1	23.8	-18.4	PASS

Measurement Setting:

Setting	Instrument Value	Target Value
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	1670	~ 1670
Sweptime	1.670 ms	AUTO
Reference Level	10.000 dBm	10.000 dBm
Attenuation	30.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	Sweep	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	95 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.33 dB	0.50 dB

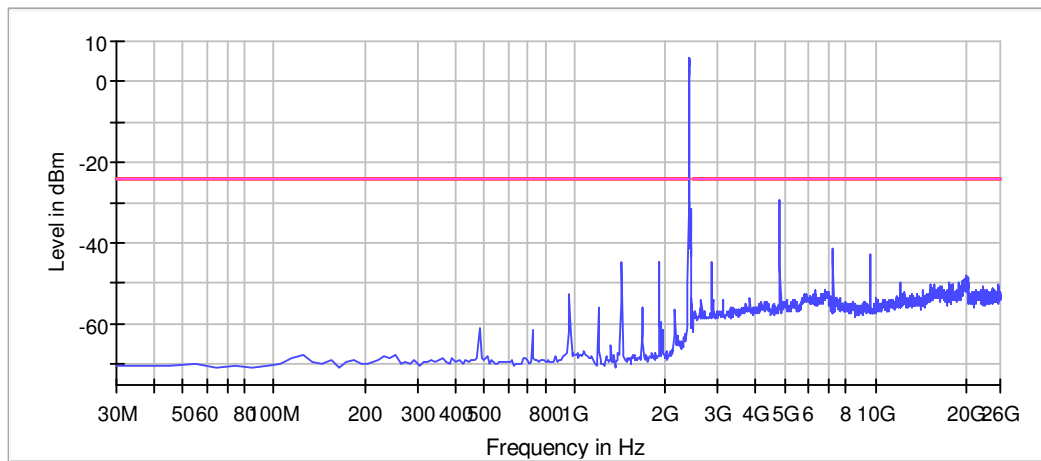
9.4 Spurious Emissions

802.11b

Lowest Channel

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
4827.154590	-29.1	5.1	-24.1
2395.021008	-29.8	5.8	-24.1
4817.160327	-38.8	14.7	-24.1
7235.771887	-41.3	17.3	-24.1
9644.389184	-42.6	18.6	-24.1
1439.054622	-44.4	20.4	-24.1

Spurious

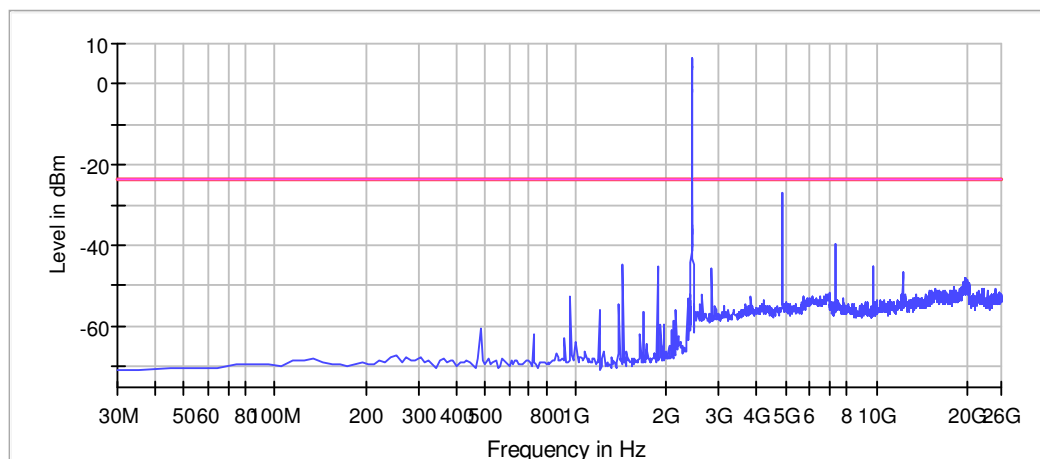


— Limit — Sum Level — Threshold × Critical × Final Critical

Middle Channel

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
4887.120166	-27.0	3.5	-23.5
4877.125903	-35.9	12.3	-23.5
7325.720251	-39.3	15.8	-23.5
7335.714513	-42.2	18.7	-23.5
1439.054622	-44.6	21.0	-23.5
9764.320336	-44.9	21.4	-23.5

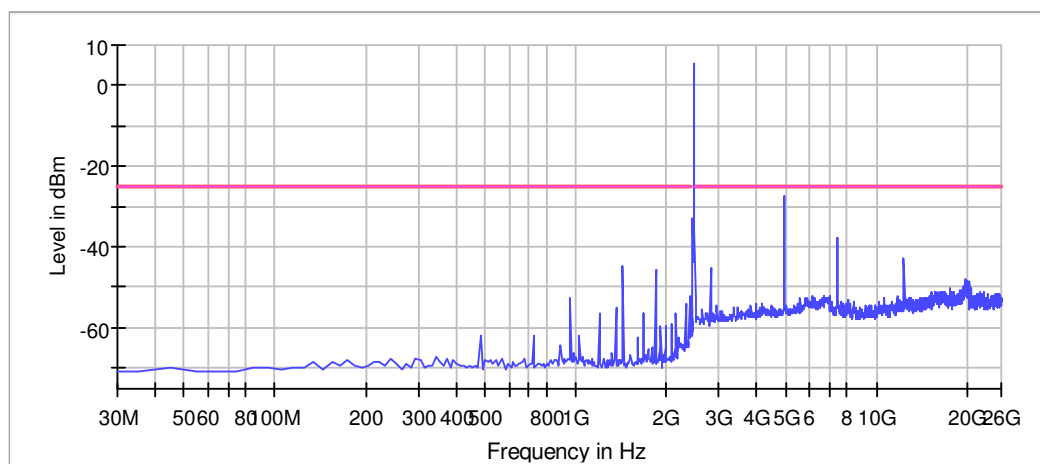
Spurious



Highest Channel

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
4947.085742	-27.2	2.4	-24.8
2488.497131	-35.8	11.0	-24.8
7415.668615	-37.4	12.6	-24.8
4937.091479	-38.6	13.8	-24.8
7425.662877	-42.5	17.7	-24.8
12362.828623	-42.9	18.1	-24.8

Spurious

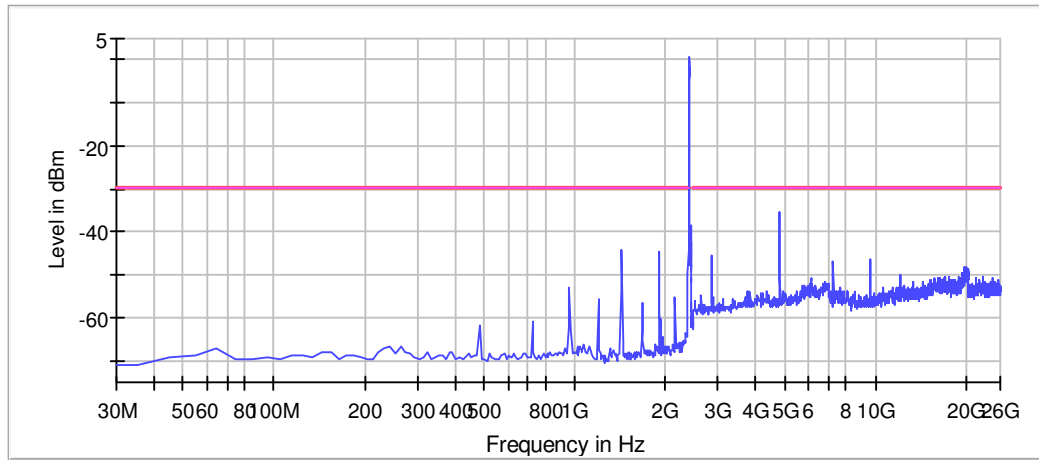


802.11g

Lowest Channel

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
4827.154590	-35.4	5.8	-29.6
2395.021008	-43.3	13.7	-29.6
1439.054622	-44.4	14.8	-29.6
1907.079832	-44.6	15.0	-29.6
2868.279112	-45.6	16.0	-29.6
9644.389184	-46.2	16.6	-29.6

Spurious

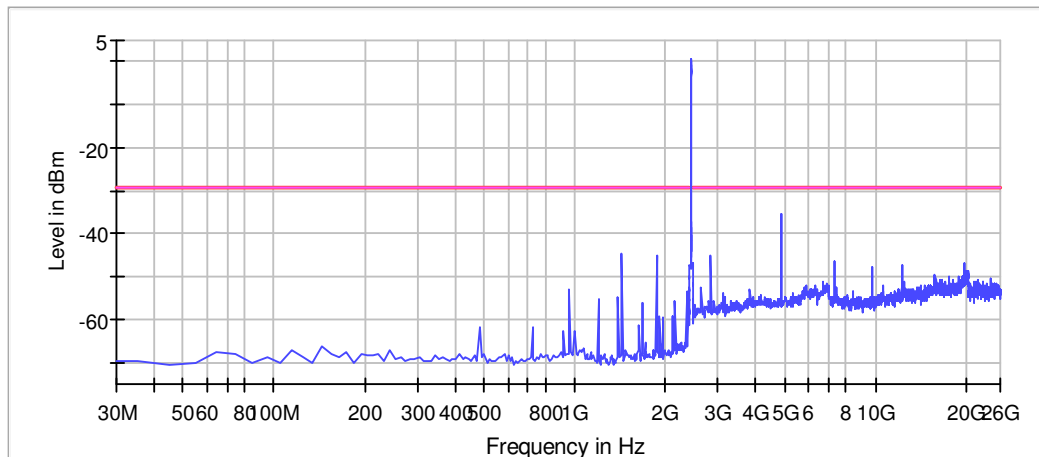


— Limit — Sum Level — Threshold × Critical × Final Critical

Middle Channel

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
4887.120166	-35.6	6.2	-29.4
1439.054622	-44.5	15.1	-29.4
4877.125903	-45.1	15.8	-29.4
2838.296324	-45.1	15.8	-29.4
1877.205882	-45.2	15.8	-29.4
7325.720251	-46.5	17.1	-29.4

Spurious

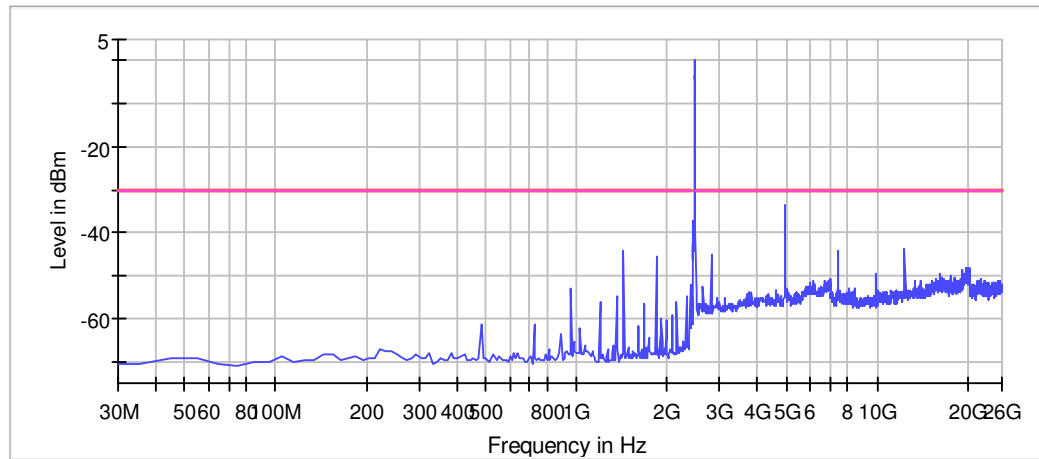


— Limit — Sum Level — Threshold × Critical × Final Critical

Highest Channel

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
4947.085742	-33.8	3.8	-30.0
2488.497131	-36.9	6.9	-30.0
12362.828623	-43.6	13.6	-30.0
1439.054622	-44.3	14.3	-30.0
7425.662877	-44.3	14.3	-30.0
2808.313536	-45.1	15.1	-30.0

Spurious



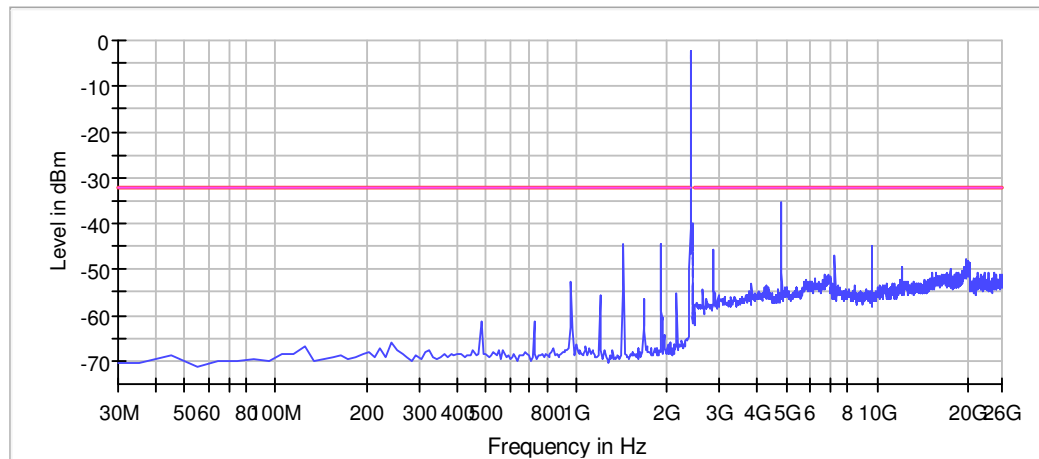
— Limit — Sum Level — Threshold × Critical × Final Critical

802.11n20

Lowest Channel

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
4827.154590	-35.6	3.3	-32.3
2395.021008	-41.0	8.7	-32.3
1439.054622	-44.5	12.2	-32.3
1907.079832	-44.7	12.4	-32.3
9644.389184	-44.8	12.5	-32.3
2868.279112	-45.6	13.2	-32.3

Spurious

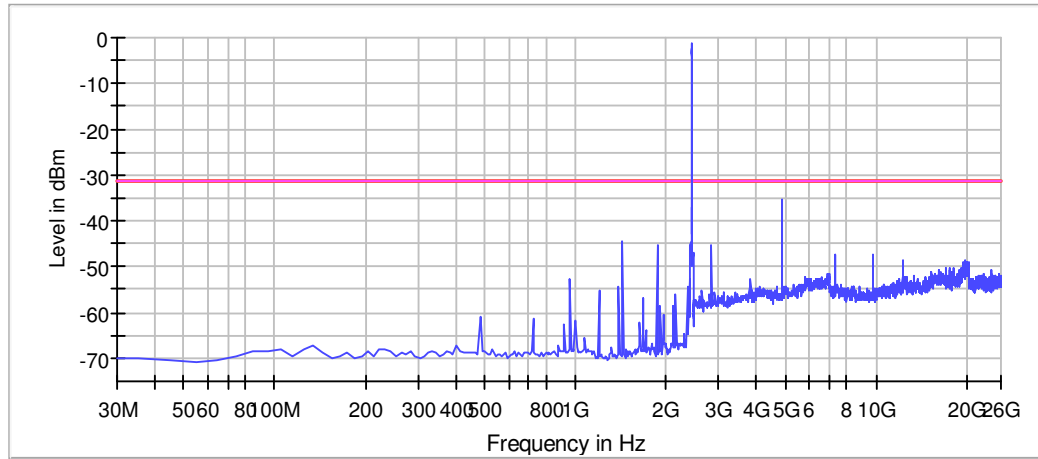


— Limit — Sum Level — Threshold × Critical × Final Critical

Middle Channel

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
4887.120166	-35.3	4.0	-31.3
1439.054622	-44.6	13.3	-31.3
1877.205882	-45.3	14.0	-31.3
2838.296324	-45.5	14.2	-31.3
7325.720251	-47.2	15.9	-31.3
4877.125903	-47.2	15.9	-31.3

Spurious

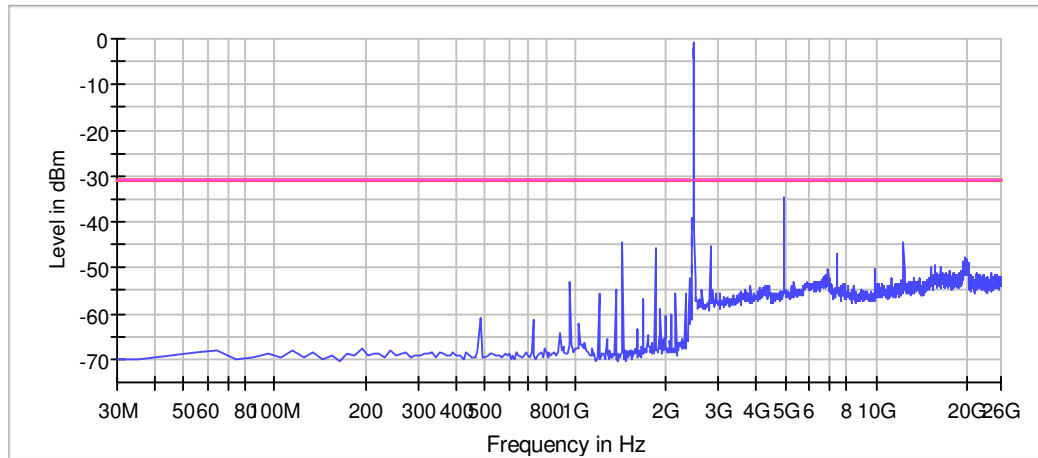


— Limit — Sum Level — Threshold × Critical × Final Critical

Highest Channel

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
4947.085742	-34.5	3.6	-30.9
2488.497131	-40.4	9.5	-30.9
12362.828623	-44.3	13.4	-30.9
1439.054622	-44.4	13.5	-30.9
2808.313536	-45.5	14.6	-30.9
1847.331933	-45.7	14.8	-30.9

Spurious



— Limit — Sum Level — Threshold × Critical × Final Critical

Measurement Setting:

Setting	Instrument Value	Target Value
RBW	100.000 kHz	≤ 100.000 kHz
VBW	300.000 kHz	≥ 300.000 kHz
SweepPoints	238	~ 238
SweepTime	23.700 ms	AUTO
Reference Level	-10.000 dBm	-30.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	3	3
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	Sweep	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	7 / max. 40	max. 40
Stable	3 / 3	3
Max Stable Difference	0.00 dB	0.50 dB

9.5 Radiated Emissions which fall in the restricted bands

Mode: 802.11b

Frequency (MHz)	Antenna Polarization	Emission Level (dBμV/m)		Limit (dBμV/m)		Remark
		Peak	Average	Peak	Average	
2389.750	V	52.5	/	74.0	54.0	Pass
2487.750	V	50.3	/	74.0	54.0	Pass

Mode: 802.11g

Frequency (MHz)	Antenna Polarization	Emission Level (dBμV/m)		Limit (dBμV/m)		Remark
		Peak	Average	Peak	Average	
2389.750	V	57.1	41.0	74.0	54.0	Pass
2483.500	V	61.3	42.7	74.0	54.0	Pass

Mode: 802.11n20

Frequency (MHz)	Antenna Polarization	Emission Level (dBμV/m)		Limit (dBμV/m)		Remark
		Peak	Average	Peak	Average	
2389.750	V	63.3	41.7	74.0	54.0	Pass
2484.250	V	66.4	43.5	74.0	54.0	Pass

- End of the Report -