TEST REPORT

Application No.:	HKEM2007000653AT
Applicant:	Pricer AB
Address of Applicant:	Pricer AB, Box 215, SE-101 24 Stockholm, Sweden
Manufacturer:	Pricer AB
Address of Manufacturer:	Västra Järnvägsgatan 7, SE-111 64 Stockholm, Sweden
Equipment Under Test (EUT):	
EUT Name:	Pricer Shelf Controller
Model No.:	66170-10
Additional model:	Please refer to section 2 of this report which indicates which item was actually tested and which were electrically identical.
FCC ID:	2ACC86617010
Standard(s) :	47 CFR FCC Part 15, Subpart C, 2019
Date of Receipt:	2020-07-03
Date of Test:	2020-07-03 to 2020-07-27
Date of Issue:	2020-07-28
Test Result:	Pass*

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

Law Man Kit
EMC Manager

Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
01		*2020-07-28*		*Original*

Authorized for issue by:				
				
		Leo Xu /Project Engineer		Date: 2020-07-28
				
		Law Man Kit /Reviewer		Date: 2020-07-28

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**
Conducted Disturbance at AC Power Line(150kHz-30MHz)	47 CFR Part 15, Subpart C 15.207	ANSI C63.10: 2013 Section 6.2	47 CFR Part 15, Subpart C 15.207	Pass
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

4 General Information

4.1 Details of E.U.T.

Power supply:	Adaptor Model: IEC 005 Input: AC 100V-240V, 50/60Hz, 0.75A Output: DC 5V, 1A
Test voltage:	AC 120V
Cable:	100cm unshielded 2wires USB cable
Antenna Gain:	1.5dBi
Antenna Type:	PCB Antenna
Channel Spacing:	5MHz
Modulation Type:	802.11b: DSSS (CCK, DQPSK, DBPSK) 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK) 802.11n (HT20; HT40): 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):11 802.11n(HT40): 7
Operation Frequency:	802.11b/g/n(HT20): 2412MHz to 2462MHz 802.11n(HT40):2422MHz to 2452MHz
Tested Channels:	802.11b/g/n(HT20): 2412MHz, 2442MHz, 2462MHz 802.11n(HT40): 2422MHz, 2442MHz, 2452MHz
Series Number	A1
Hardware Version:	57771 D
Software Version:	1.00 (ff04c764)

Frequency List

802.11b/g/n(HT20):

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	**2412**	5	2432	9	2452
2	2417	6	2437	10	2457
3	2422	**7**	**2442**	**11**	**2462**
4	2427	8	2447		

802.11n(HT40):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	**2422**	**5**	**2442**
2	2427	6	2447
3	2432	**7**	**2452**
4	2437		

Remark: 1. Testing Channels are highlighted in **bold**.

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
UART Test board	N/A	N/A	N/A
Test Software (espRFTool)	ESPRESSIF	Version 2.4	N/A

Supplied by SGS:

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

4.3 Measurement Uncertainty

RF

No.	Item	Measurement Uncertainty
1	Radio Frequency	± 7.25 x 10^{-8}
2	Duty cycle	± 0.37%
3	Occupied Bandwidth	± 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	± 1℃
10	Humidity test	± 3%
11	Supply voltages	± 1.5%
12	Time	± 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.

According to decision rule based on Clause 4.2 of CISPR 16-4-2, the EUT complied with the standards specified above.

4.4 Test Location

All tests were performed at:

SGS Hong Kong Limited

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: 009)**

SGS HONG KONGLimited 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 17025:2017 an it has been accredited for performing specific test as listed in the scope of accreditation within the test category of Electrical and Electronic Products.

- **IAS Accreditation (Lab Code: TL-187)**

SGS HONG KONGLimited has met the requirements of AC89, IAS Accreditation Criteria for Testing Laboratories, and has demonstrated compliance with ISO/IEC Standard 17025:2017, General requirements for the competence of testing and calibration laboratories. This organization is accredited to provide the services specified in the scope of accreditation maintained on the IAS website (www.iasonline.org).

The report must not be used by the client to claim product certification, approval, or endorsement by IAS, NIST, or any agency of the Federal Government.

- **FCC Recognized Accredited Test Firm(CAB Registration No.: 514599)**

SGS HONG KONG 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: HK0015, Test Firm Registration Number: 514599.

- **Industry Canada (Site Registration No.: 26103; CAB Identifier No.: HK0015)**

SGS HONG KONG 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: HK0015, Site Registration Number: 26103.

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	2020/5/11	2021/5/10
Artificial Mains Network (LISN)	Schwarzbeck	NSLK 8127 / 8127312	TE10	2020/5/11	2021/5/10
Impulse Limiter	Rohde & Schwarz	ESH-3-Z2 / 357881052	TE36	2020/5/11	2021/5/10
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	2020/7/20	2021/7/19
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	2020/7/20	2021/7/19
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	2020/5/11	2021/5/10

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	2020/4/14	2021/4/12
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	WHNX3.5/26.5G-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	2020/04/23	2021/04/22
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:

FCC Part 15 Subpart C Section 15.247 & 15.203

6.1.2 Conclusion

Standard Requirement:

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.

EUT Antenna:

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 1.5dBi.

Photo of antenna refer to Appendix – Internal photo.

7 Radio Spectrum Matter Test Results

7.1 Conducted Emissions at AC Power Line (150kHz-30MHz)

Test Requirement 47 CFR Part 15, Subpart C 15.207
Test Method: ANSI C63.10 (2013) Section 6.2
Limit:

Frequency of emission(MHz)	Conducted limit(dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50
*Decreases with the logarithm of the frequency.		

7.1.1 E.U.T. Operation

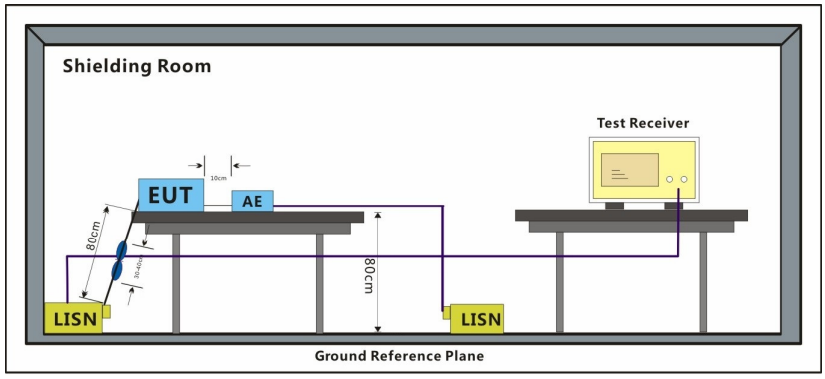
Operating Environment:

Temperature: 22.5 °C Humidity: 51.2 % RH :

Test mode a :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)..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

1) The mains terminal disturbance voltage test was conducted in a shielded room.

2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50ohm/50μH + 5ohm linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.

3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,

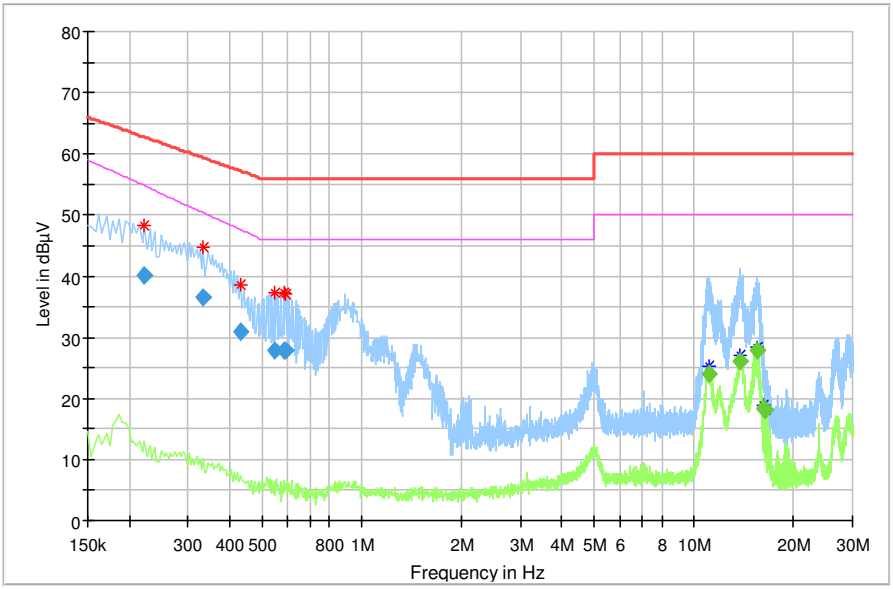
4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.

5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

Remark: LISN=Read Level+ Cable Loss+ LISN Factor

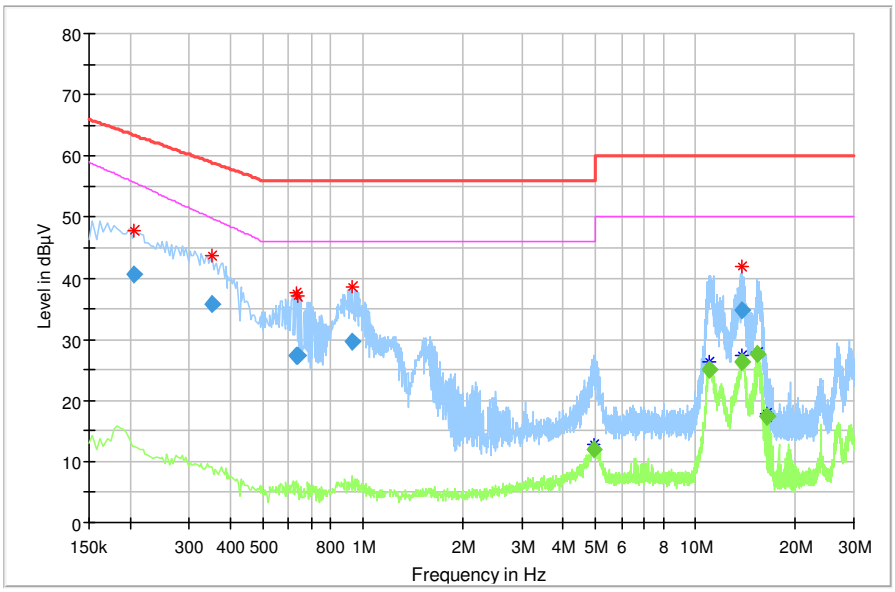
Mode: a
Line: Live Line

Full Spectrum



Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Corr. (dB)	Result
0.222000	40.1	---	62.7	22.6	10.1	Pass
0.334000	36.5	---	59.4	22.8	10.1	Pass
0.434000	30.9	---	57.2	26.3	10.1	Pass
0.546000	27.9	---	56.0	28.1	10.1	Pass
0.582000	27.9	---	56.0	28.1	10.1	Pass
0.590000	27.9	---	56.0	28.1	10.1	Pass
11.078000	---	24.0	50.0	26.0	10.7	Pass
13.858000	---	26.0	50.0	24.0	10.9	Pass
15.526000	---	28.0	50.0	22.0	11.0	Pass
16.250000	---	18.4	50.0	31.6	10.9	Pass
16.354000	---	18.3	50.0	31.7	10.9	Pass
16.458000	---	18.2	50.0	31.8	10.9	Pass

Line: Neutral Line



Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Corr. (dB)	Result
0.206000	40.7	---	63.4	22.7	10.1	Pass
0.350000	35.9	---	59.0	23.1	10	Pass
0.630000	27.3	---	56.0	28.7	10.1	Pass
0.638000	27.4	---	56.0	28.6	10.1	Pass
0.926000	29.6	---	56.0	26.4	10.2	Pass
4.946000	---	12.1	46.0	33.9	10.6	Pass
10.998000	---	25.2	50.0	24.8	11.0	Pass
13.846000	34.7	---	60.0	25.3	11.3	Pass
13.862000	---	26.2	50.0	23.8	11.3	Pass
15.422000	---	27.6	50.0	22.4	11.4	Pass
16.354000	---	17.4	50.0	32.6	11.3	Pass
16.458000	---	17.3	50.0	32.7	11.3	Pass

7.2 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

7.2.1 E.U.T. Operation

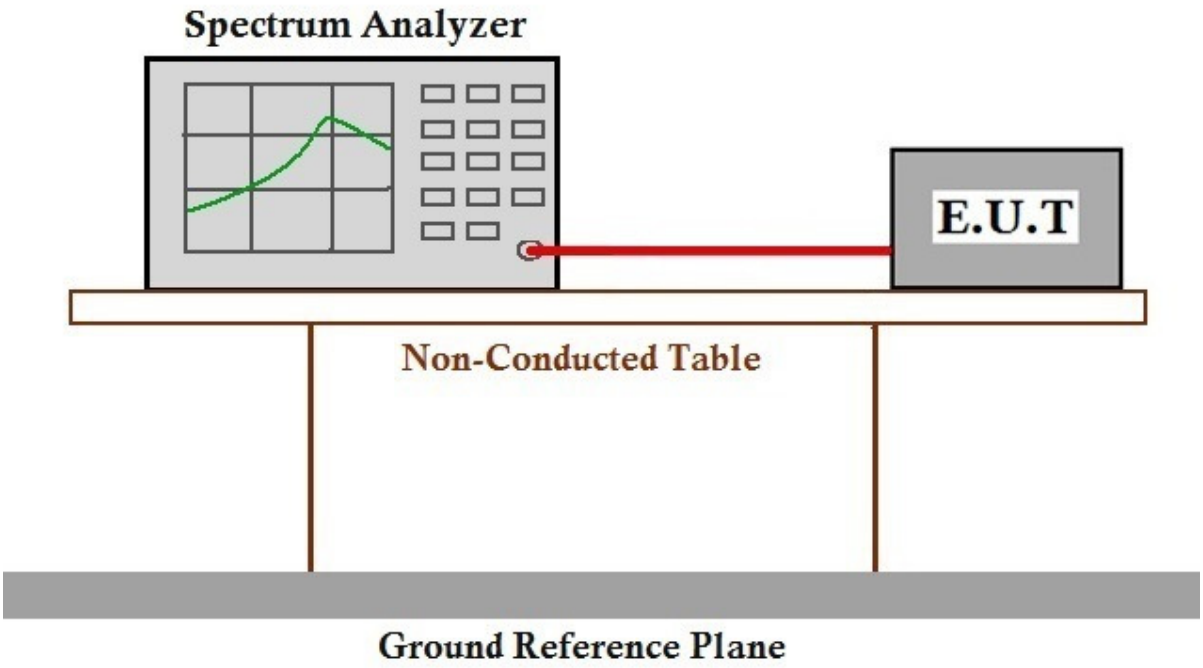
Operating Environment:

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)..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 section 9: Appendix

7.3 Conducted Peak Output Power

Test Requirement 47 CFR Part 15, Subpart C 15.247:2019(b)(1) & 15.247(b)(3)

Test Method: ANSI C63.10 (2013) Section 7.8.5

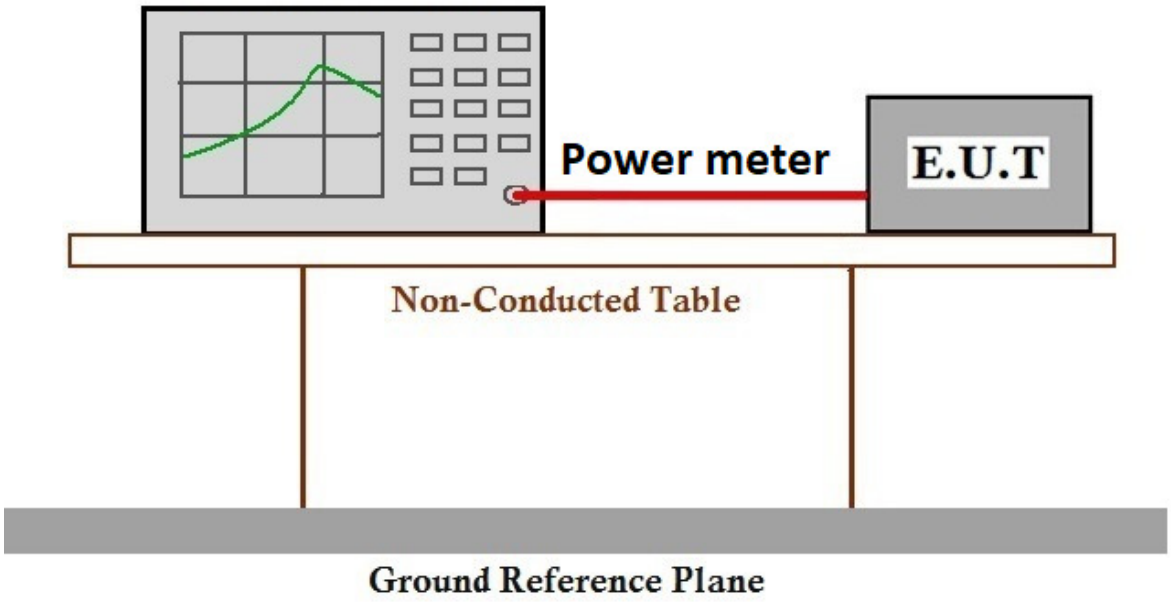
7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 22.5 °C Humidity: 51.2 % RH :

Test mode a: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).

7.3.2 Test Setup Diagram



7.3.3 Measurement Procedure and Data

The detailed test data see section 9: Appendix

7.4 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:	≤8dBm in any 3 kHz band during any time interval of continuous transmission

7.4.1 E.U.T. Operation

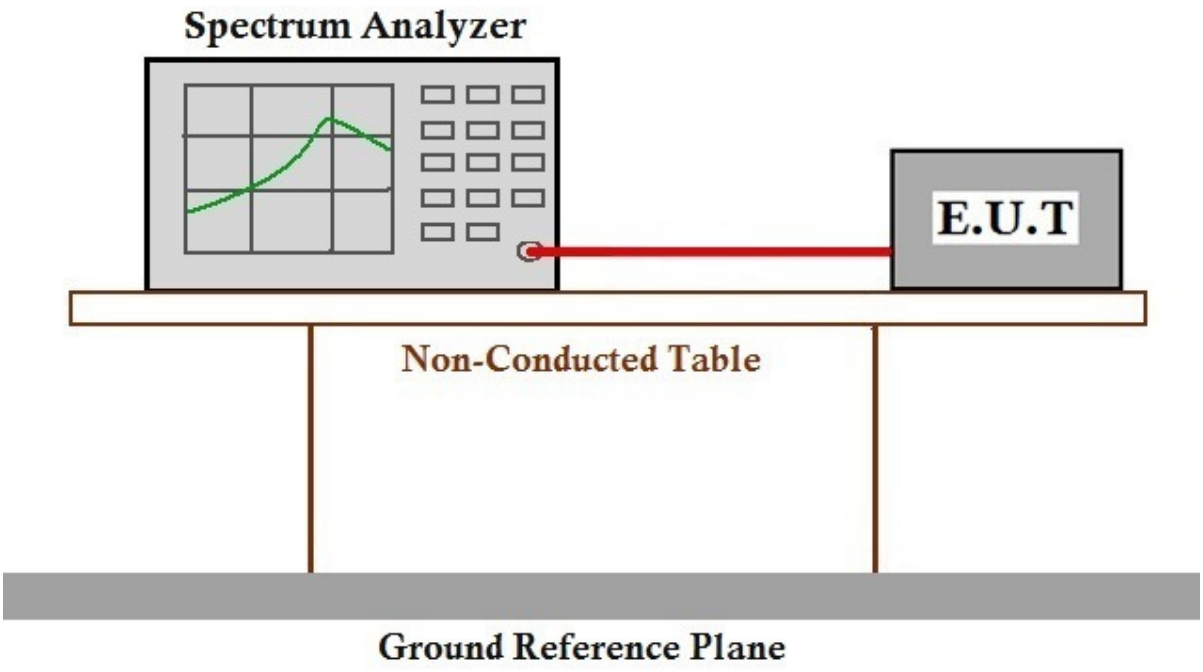
Operating Environment:

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 section 9: Appendix

7.5 Conducted Band Edges Measurement

Test Requirement	47 CFR Part 15, Subpart C 15.247:2019(d)
Test Method:	ANSI C63.10 (2013) Section7.8.6
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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 that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required. 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)

FCC Part15 C Section 15.205 Restricted bands of operation.

(a) Except as shown in paragraph (d) of this section. only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	
13.36 - 13.41			

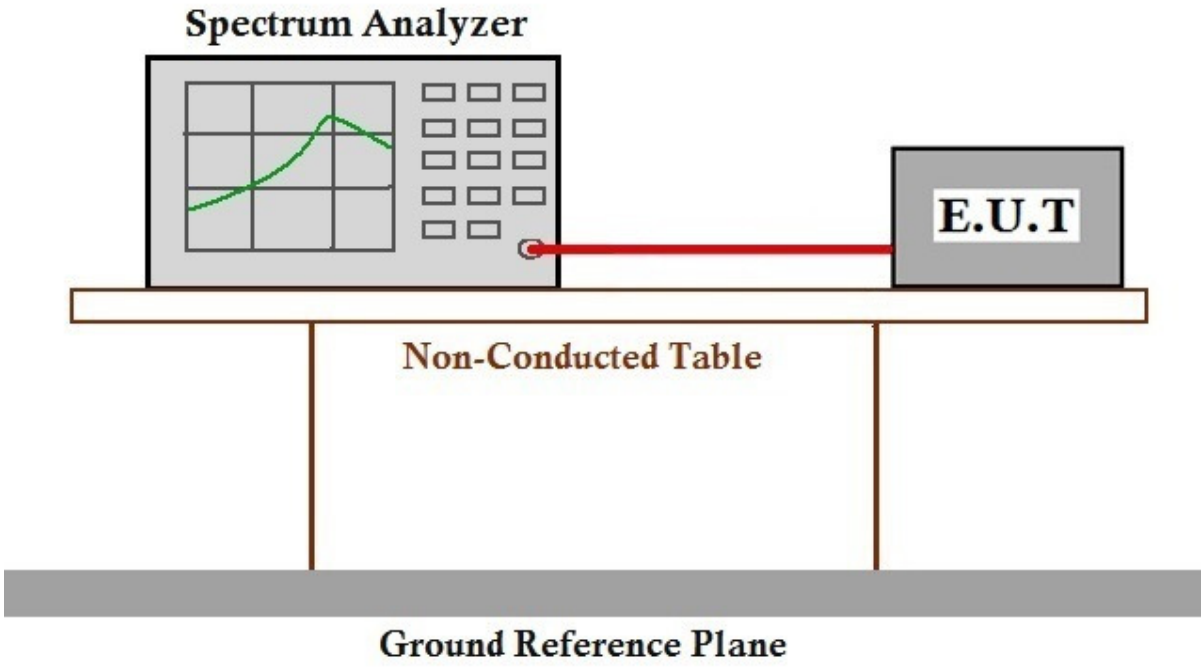
7.5.1 E.U.T. Operation

Operating Environment:

Temperature: 22.5 °C Humidity: 51.1 % RH :

Test mode a: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).

7.5.2 Test Setup Diagram



7.5.3 Measurement Procedure and Data

The detailed test data see section 9: Appendix

7.6 Conducted Spurious Emissions

Test Requirement	47 CFR Part 15, Subpart C 15.247:2019(d)
Test Method:	ANSI C63.10 (2013) Section 7.8.8
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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 that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

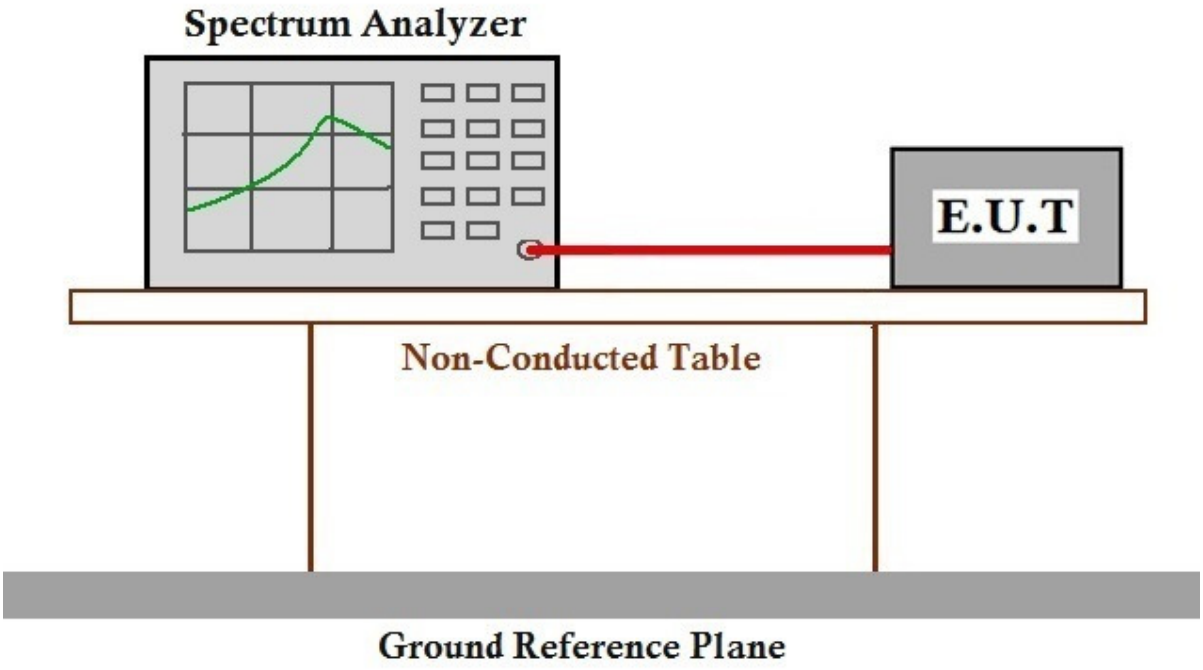
7.6.1 E.U.T. Operation

Operating Environment:

Temperature: 22.5 °C Humidity: 51.2 % RH :

Test mode a: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).

7.6.2 Test Setup Diagram



7.6.3 Measurement Procedure and Data

The detailed test data see section 9: Appendix

7.7 Radiated Emissions which fall in the restricted bands

Test Requirement 47 CFR Part 15, Subpart C 15.209 & 15.247(d), Section 3.3
Test Method: ANSI C63.10 (2013) Section 6.10.5
Limit:

Table 5 – General field strength limits at frequencies above 30 MHz

Frequency (MHz)	Field strength (μ V/m at 3 m)
30 – 88	100 (40 dBμV/m)
88 – 216	150 (43.5 dBμV/m)
216 – 960	200 (46 dBμV/m)
Above 960	500 (54 dBμV/m)

Table 6 – General field strength limits at frequencies below 30 MHz

Frequency	Magnetic field strength (H-Field) (μ A/m)	Measurement distance (m)
9 - 490 kHz 1	6.37/F (F in kHz)	300
490 - 1705 kHz	63.7/F (F in kHz)	30
1.705 - 30 MHz	0.08	30

Note 1: The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.

7.7.1 E.U.T. Operation

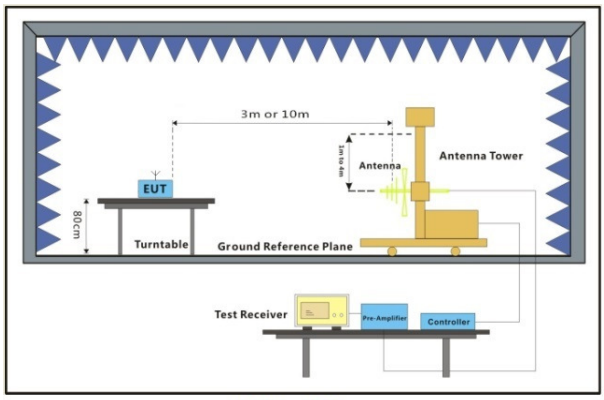
Operating Environment:

Temperature: 23.1 °C Humidity: 51.4 % RH :

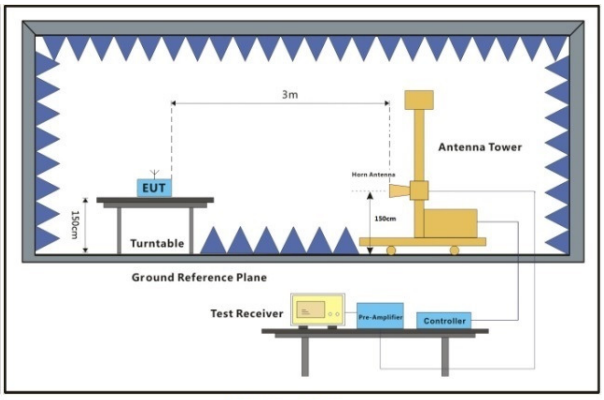
Test mode a:TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst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

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

7.7.2 Test Setup Diagram



30MHz-1GHz



Above 1GHz

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: Level= Read Level+ Cable Loss+ Antenna Factor- 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.

Mode: 802.11b

Frequency (MHz)	Antenna Polarization	Emission Level (dBμV/m)		Limit (dBμV/m)		Remark
		Peak	Average	Peak	Average	
2389.750	V	47.8	/	74.0	54.0	Pass
2487.750	V	51.3	/	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	49.3	/	74.0	54.0	Pass
2483.500	V	53.3	/	74.0	54.0	Pass

Mode: 802.11n (HT20)

Frequency (MHz)	Antenna Polarization	Emission Level (dBμV/m)		Limit (dBμV/m)		Remark
		Peak	Average	Peak	Average	
2389.750	V	49.6	/	74.0	54.0	Pass
2484.250	V	49.8	/	74.0	54.0	Pass

Mode: 802.11n (HT40)

Frequency (MHz)	Antenna Polarization	Emission Level (dBμV/m)		Limit (dBμV/m)		Remark
		Peak	Average	Peak	Average	
2389.750	V	49.7	/	74.0	54.0	Pass
2484.250	V	50.6	/	74.0	54.0	Pass

7.8 Radiated Spurious Emissions

Test Requirement 47 CFR Part 15, Subpart C 15.209 & 15.247(d), Section 3.3

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

Limit:

Table 5 – General field strength limits at frequencies above 30 MHz

Frequency (MHz)	Field strength (μ V/m at 3 m)
30 – 88	100 (40 dBμV/m)
88 – 216	150 (43.5 dBμV/m)
216 – 960	200 (46 dBμV/m)
Above 960	500 (54 dBμV/m)

Table 6 – General field strength limits at frequencies below 30 MHz

Frequency	Magnetic field strength (H-Field) (μ A/m)	Measurement distance (m)
9 - 490 kHz 1	6.37/F (F in kHz)	300
490 - 1705 kHz	63.7/F (F in kHz)	30
1.705 - 30 MHz	0.08	30

Note 1: The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.

7.8.1 E.U.T. Operation

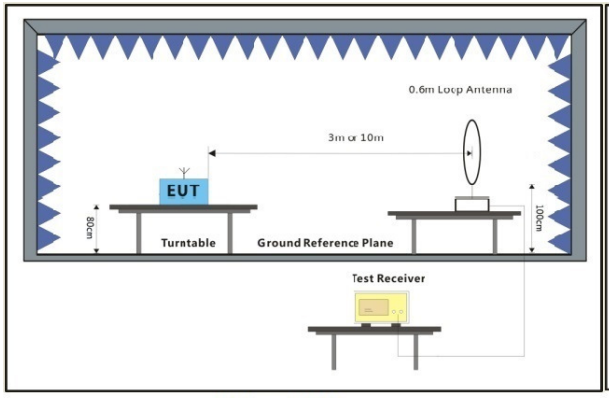
Operating Environment:

Temperature: 22.3 °C Humidity: 52.3 % RH :

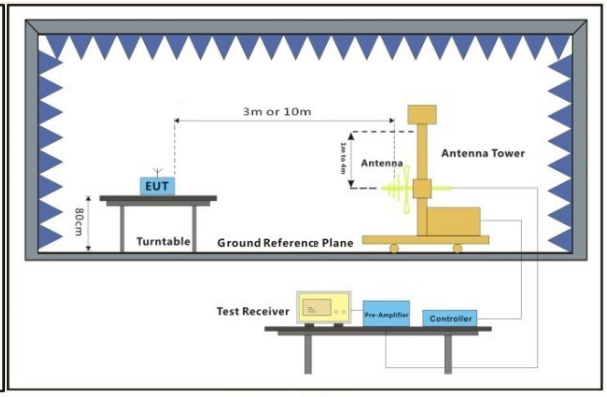
Test mode a:TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst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

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

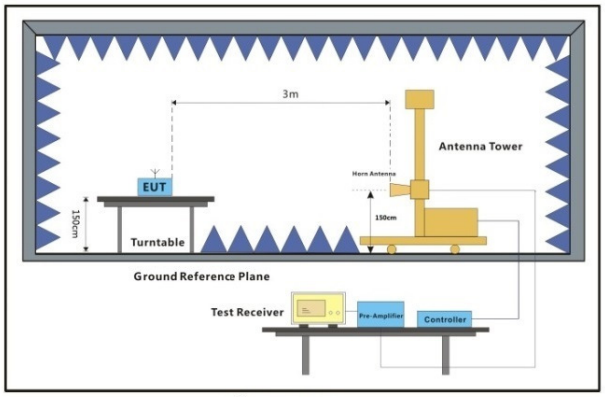
7.8.2 Test Setup Diagram



Below 30MHz



30MHz-1GHz



Above 1GHz

7.8.3 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

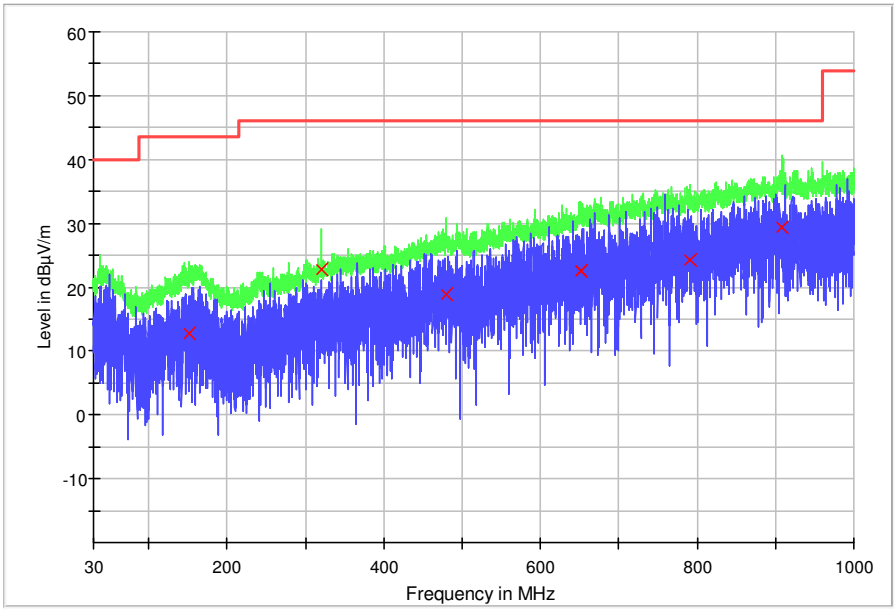
3) Scan from 9kHz to 25GHz, the disturbance above 18GHz and below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB 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.

802.11b

Radiated emission below 1GHz

Horizontal (worse plots was shown as below)

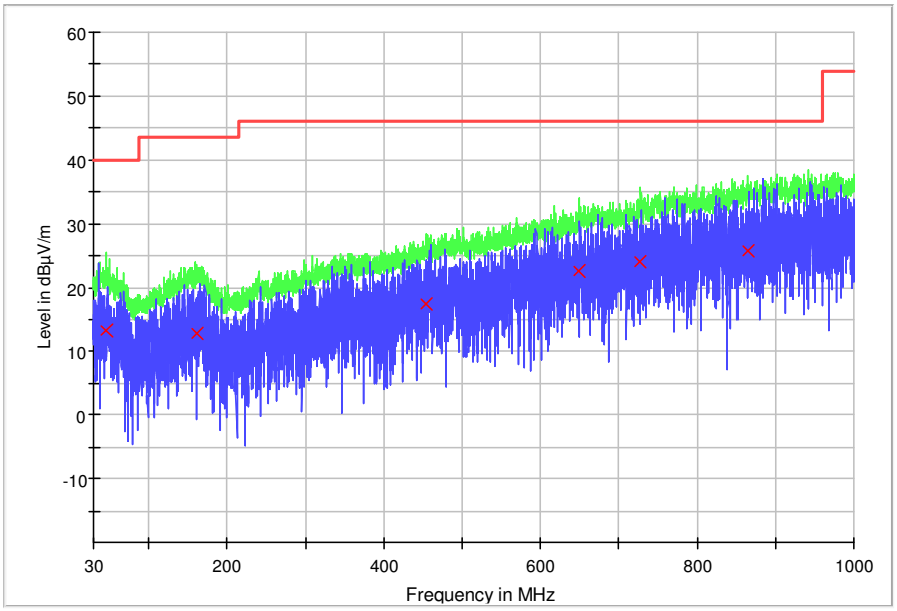


Frequency (MHz)	QuasiPeak (dBµV/m)	Pol.	Corr. (dB/m)	Margin (dB)	Limit (dBµV/m)	Result
152.432500	12.8	H	14.6	30.7	43.5	Pass
319.937500	22.8	H	14.9	23.2	46.0	Pass
479.935000	19	H	19	27.0	46.0	Pass
652.315000	22.6	H	22.9	23.4	46.0	Pass
790.667500	24.3	H	24.7	21.7	46.0	Pass
907.862500	29.4	H	26.6	16.6	46.0	Pass

Remark:

1. All readings are Quasi-Peak values.
2. Correction Factor = Antenna Factor + Cable Loss.
3. Pol. = antenna polarization

Vertical (worse plots was shown as below)



Frequency (MHz)	QuasiPeak (dBµV/m)	Pol.	Corr. (dB/m)	Margin (dB)	Limit (dBµV/m)	Result
45.280000	13.2	V	14.5	26.8	40.0	Pass
161.987500	12.9	V	14.5	30.7	43.5	Pass
454.682500	17.4	V	18.4	28.7	46.0	Pass
649.877500	22.5	V	22.8	23.5	46.0	Pass
728.072500	24	V	23.8	22.0	46.0	Pass
863.890000	25.7	V	26	20.3	46.0	Pass

Remark:
1. All readings are Quasi-Peak values.
2. Correction Factor = Antenna Factor + Cable Loss.
3. Pol. = antenna polarization

Above 1GHz

Channel:Low

Frequency (MHz)	Antenna Polarization	Emission Level (dBμV/m)		Limit (dBμV/m)		Remark
		Peak	Average	Peak	Average	
1826.173	V	34.7	/	74.0	54.0	Pass
2924.027	H	39.7	/	74.0	54.0	Pass
4297.000	H	44.6	/	74.0	54.0	Pass
5930.017	H	48.9	/	74.0	54.0	Pass
8138.269	H	51.6	/	74.0	54.0	Pass
9955.037	H	60.2	43.5	74.0	54.0	Pass

Channel:Middle

Frequency (MHz)	Antenna Polarization	Emission Level (dBμV/m)		Limit (dBμV/m)		Remark
		Peak	Average	Peak	Average	
2704.126	H	42.7	/	74.0	54.0	Pass
3839.002	H	44.2	/	74.0	54.0	Pass
4975.018	H	58.6	46.0	74.0	54.0	Pass
7645.030	H	52.9	/	74.0	54.0	Pass
8716.306	V	56.8	45.4	74.0	54.0	Pass
12281.762	H	60.2	42.2	74.0	54.0	Pass

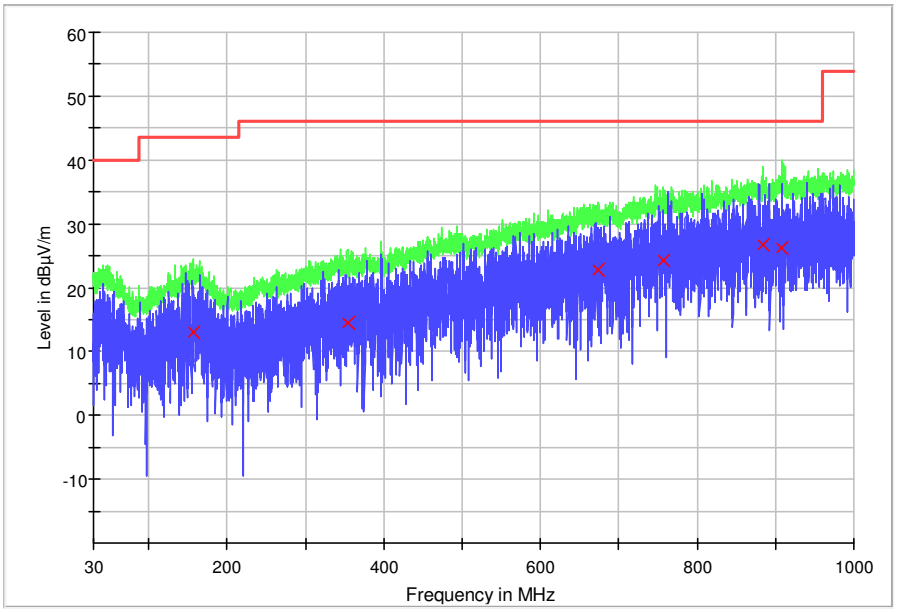
Channel: High

Frequency (MHz)	Antenna Polarization	Emission Level (dBμV/m)		Limit (dBμV/m)		Remark
		Peak	Average	Peak	Average	
1599.283	H	45.7	/	74.0	54.0	Pass
2625.222	H	48.6	/	74.0	54.0	Pass
4791.0178	H	53.7	/	74.0	54.0	Pass
7873.5334	H	59.5	46.3	74.0	54.0	Pass
9951.0722	H	59.9	45.7	74.0	54.0	Pass
14677.881	H	61.6	47.3	74.0	54.0	Pass

802.11g

Radiated emission below 1GHz

Horizontal (worse plots was shown as below)

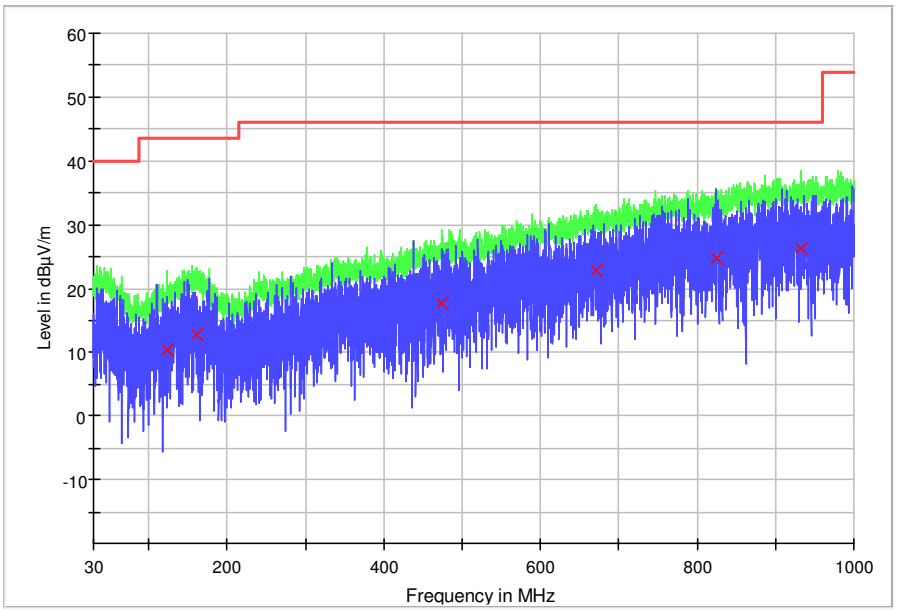


Frequency (MHz)	QuasiPeak (dBµV/m)	Pol.	Corr. (dB/m)	Margin (dB)	Limit (dBµV/m)	Result
152.432500	12.8	H	14.6	30.7	43.5	Pass
319.937500	22.8	H	14.9	23.2	46.0	Pass
479.935000	19	H	19	27.0	46.0	Pass
652.315000	22.6	H	22.9	23.4	46.0	Pass
790.667500	24.3	H	24.7	21.7	46.0	Pass
907.862500	29.4	H	26.6	16.6	46.0	Pass

Remark:

1. All readings are Quasi-Peak values.
2. Correction Factor = Antenna Factor + Cable Loss.
3. Pol. = antenna polarization

Vertical (worse plots was shown as below)



Frequency (MHz)	QuasiPeak (dBµV/m)	Pol.	Corr. (dB/m)	Margin (dB)	Limit (dBµV/m)	Result
123.962500	10.4	V	12.2	33.1	43.5	Pass
161.792500	12.8	V	14.5	30.7	43.5	Pass
473.890000	17.8	V	18.8	28.2	46.0	Pass
670.742500	22.9	V	23.3	23.2	46.0	Pass
824.207500	24.7	V	25.2	21.3	46.0	Pass
932.042500	26.2	V	26.7	19.8	46.0	Pass

Remark:
1. All readings are Quasi-Peak values.
2. Correction Factor = Antenna Factor + Cable Loss.
3. Pol. = antenna polarization

Above 1GHz

Channel:Low

Frequency (MHz)	Antenna Polarization	Emission Level (dBμV/m)		Limit (dBμV/m)		Remark
		Peak	Average	Peak	Average	
1579.448	H	40.2	/	74.0	54.0	Pass
2686.118	H	45.7	/	74.0	54.0	Pass
4721.644	H	46.2	/	74.0	54.0	Pass
7883.248	H	47.1	/	74.0	54.0	Pass
8979.039	H	52.5	/	74.0	54.0	Pass
14270.040	H	62.9	49.2	74.0	54.0	Pass

Channel:Middle

Frequency (MHz)	Antenna Polarization	Emission Level (dBμV/m)		Limit (dBμV/m)		Remark
		Peak	Average	Peak	Average	
2570.049	V	50.8	/	74.0	54.0	Pass
3603.223	V	51.4	/	74.0	54.0	Pass
4772.028	H	53.9	/	74.0	54.0	Pass
6800.069	H	57.9	47.8	74.0	54.0	Pass
7998.387	H	58.6	45.9	74.0	54.0	Pass
12461.157	H	59.5	48.6	74.0	54.0	Pass

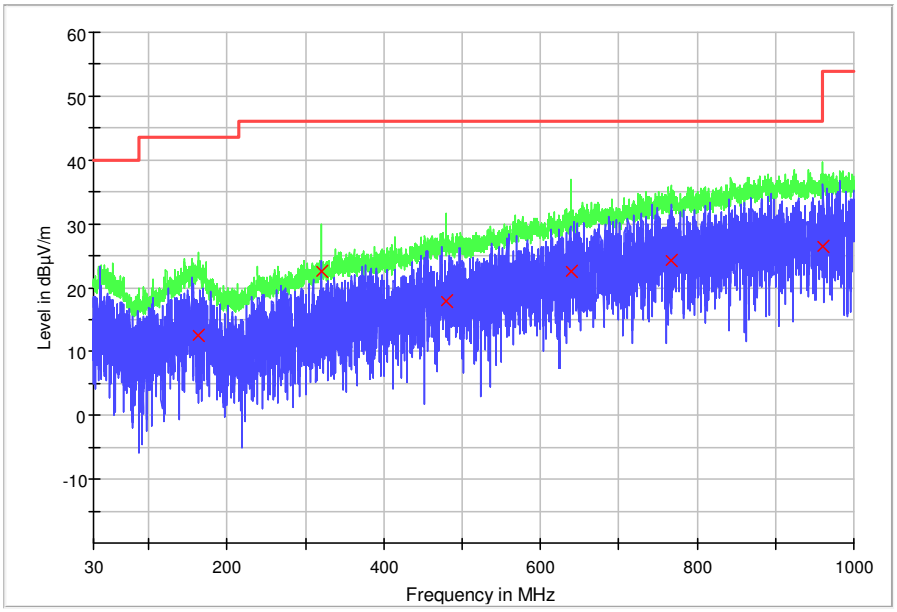
Channel: High

Frequency (MHz)	Antenna Polarization	Emission Level (dBμV/m)		Limit (dBμV/m)		Remark
		Peak	Average	Peak	Average	
2565.077	H	49.0	/	74.0	54.0	Pass
3608.394	H	49.3	/	74.0	54.0	Pass
4774.184	V	57.9	43.7	74.0	54.0	Pass
6847.372	H	49.6	/	74.0	54.0	Pass
8904.057	H	51.3	/	74.0	54.0	Pass
14233.07449	H	56.2	46.6	74.0	54.0	Pass

802.11n (HT20)

Radiated emission below 1GHz

Horizontal (worse plots was shown as below)

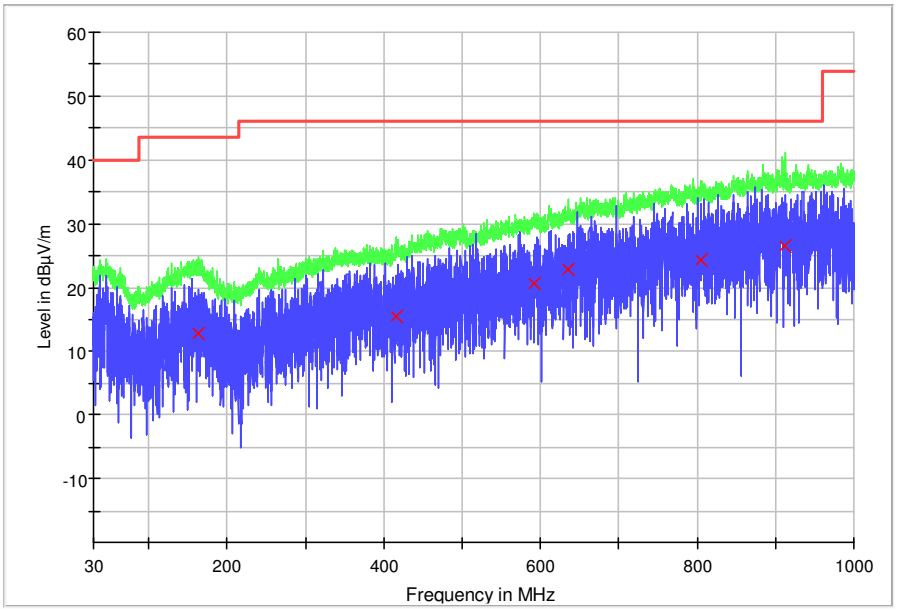


Frequency (MHz)	QuasiPeak (dBµV/m)	Pol.	Corr. (dB/m)	Margin (dB)	Limit (dBµV/m)	Result
163.840000	12.6	H	14.3	30.9	43.5	Pass
319.937500	22.7	H	14.9	23.3	46.0	Pass
480.032500	18.0	H	19	28.0	46.0	Pass
639.932500	22.5	H	22.3	23.5	46.0	Pass
766.000000	24.2	H	24.8	21.8	46.0	Pass
960.025000	26.4	H	26.6	19.8	54.0	Pass

Remark:

1. All readings are Quasi-Peak values.
2. Correction Factor = Antenna Factor + Cable Loss.
3. Pol. = antenna polarization

Vertical (worse plots was shown as below)



Frequency (MHz)	QuasiPeak (dBµV/m)	Pol.	Corr. (dB/m)	Margin (dB)	Limit (dBµV/m)	Result
162.572500	12.7	V	14.4	30.8	43.5	Pass
416.560000	15.5	V	16.8	30.5	46.0	Pass
590.987500	20.7	V	21.2	25.3	46.0	Pass
634.765000	22.9	V	22.1	23.1	46.0	Pass
805.195000	24.3	V	24.8	21.7	46.0	Pass
912.152500	26.4	V	26.6	19.6	46.0	Pass

Remark:

1. All readings are Quasi-Peak values.
2. Correction Factor = Antenna Factor + Cable Loss.
3. Pol. = antenna polarization

Above 1GHz

Channel:Low

Frequency (MHz)	Antenna Polarization	Emission Level (dBμV/m)		Limit (dBμV/m)		Remark
		Peak	Average	Peak	Average	
1610.439	H	39.4	/	74.0	54.0	Pass
2565.611	H	43.2	/	74.0	54.0	Pass
4719.045	H	50.6	/	74.0	54.0	Pass
7213.142	H	49.6	/	74.0	54.0	Pass
8910.151	V	52.1	/	74.0	54.0	Pass
14142.284	H	57.1	48.7	74.0	54.0	Pass

Channel:Middle

Frequency (MHz)	Antenna Polarization	Emission Level (dBμV/m)		Limit (dBμV/m)		Remark
		Peak	Average	Peak	Average	
2528.072	V	41.2	/	74.0	54.0	Pass
3617.559	H	42.6	/	74.0	54.0	Pass
4790.177	V	56.6	48.3	74.0	54.0	Pass
7281.019	H	57.3	47.6	74.0	54.0	Pass
9917.061	V	53.2	45.8	74.0	54.0	Pass
14689.284	H	53.1	42.5	74.0	54.0	Pass

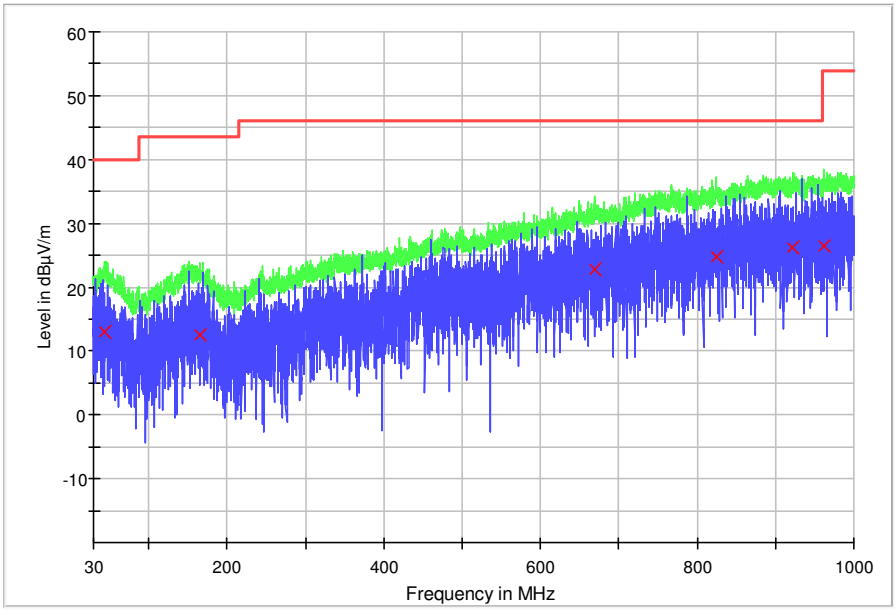
Channel: High

Frequency (MHz)	Antenna Polarization	Emission Level (dBμV/m)		Limit (dBμV/m)		Remark
		Peak	Average	Peak	Average	
2580.737	H	44.7	/	74.0	54.0	Pass
4627.040	V	45.3	/	74.0	54.0	Pass
4739.388	H	49.1	/	74.0	54.0	Pass
6814.228	H	51.6	/	74.0	54.0	Pass
7291.437	H	55.8	43.6	74.0	54.0	Pass
13072.179	V	58.8	44.7	74.0	54.0	Pass

802.11n (HT40)

Radiated emission below 1GHz

Horizontal (worse plots was shown as below)

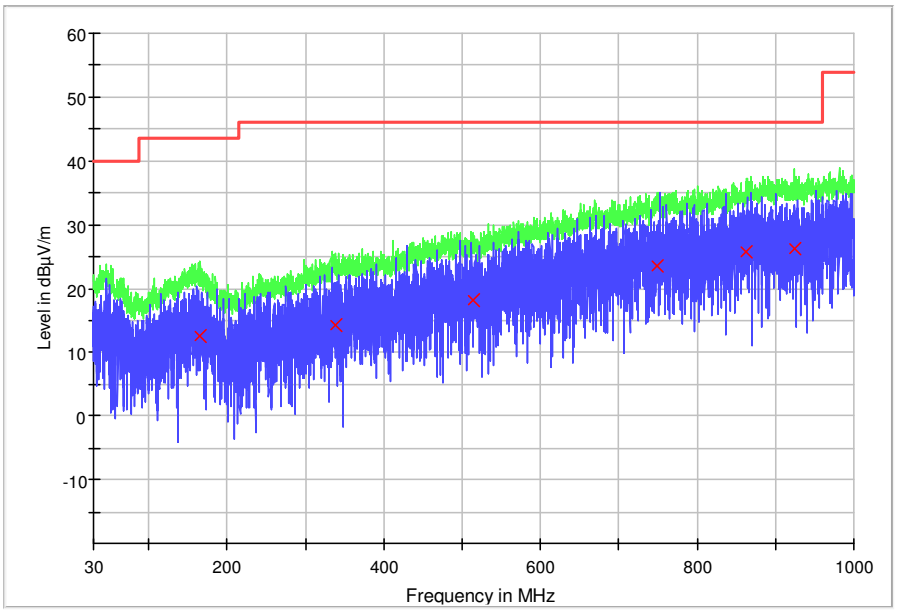


Frequency (MHz)	QuasiPeak (dBµV/m)	Pol.	Corr. (dB/m)	Margin (dB)	Limit (dBµV/m)	Result
44.890000	13.0	H	14.5	27.0	40.0	Pass
165.400000	12.4	H	14.2	31.1	43.5	Pass
669.670000	22.9	H	23.3	23.1	46.0	Pass
824.987500	24.7	H	25.2	21.3	46.0	Pass
923.170000	26.3	H	26.5	19.8	46.0	Pass
963.047500	26.6	H	26.7	27.4	54.0	Pass

Remark:

1. All readings are Quasi-Peak values.
2. Correction Factor = Antenna Factor + Cable Loss.
3. Pol. = antenna polarization

Vertical (worse plots was shown as below)



Frequency (MHz)	QuasiPeak (dBµV/m)	Pol.	Corr. (dB/m)	Margin (dB)	Limit (dBµV/m)	Result
166.375000	12.5	V	14.2	31.0	43.5	Pass
338.950000	14.2	V	15.7	31.8	46.0	Pass
513.572500	18.2	V	19.1	27.8	46.0	Pass
748.645000	23.6	V	24.3	22.4	46.0	Pass
863.500000	25.8	V	26.0	20.2	46.0	Pass
923.755000	26.2	V	26.6	19.8	46.0	Pass

Remark:
1. All readings are Quasi-Peak values.
2. Correction Factor = Antenna Factor + Cable Loss.
3. Pol. = antenna polarization

Above 1GHz

Channel:Low

Frequency (MHz)	Antenna Polarization	Emission Level (dBμV/m)		Limit (dBμV/m)		Remark
		Peak	Average	Peak	Average	
2522.018	H	39.1	/	74.0	54.0	Pass
3694.100	V	41.5	/	74.0	54.0	Pass
4751.047	V	41.9	/	74.0	54.0	Pass
6843.220	V	48.4	/	74.0	54.0	Pass
9904.050	H	50.5	/	74.0	54.0	Pass
14840.201	H	61.3	48.2	74.0	54.0	Pass

Channel:Middle

Frequency (MHz)	Antenna Polarization	Emission Level (dBμV/m)		Limit (dBμV/m)		Remark
		Peak	Average	Peak	Average	
2562.242	H	41.2	/	74.0	54.0	Pass
3679.170	V	43.3	/	74.0	54.0	Pass
4791.008	H	49.7	/	74.0	54.0	Pass
7289.051	H	51.2	/	74.0	54.0	Pass
10902.253	H	55.4	46.6	74.0	54.0	Pass
14555.281	V	60.8	47.7	74.0	54.0	Pass

Channel: High

Frequency (MHz)	Antenna Polarization	Emission Level (dBμV/m)		Limit (dBμV/m)		Remark
		Peak	Average	Peak	Average	
1676.122	H	40.9	/	74.0	54.0	Pass
2744.209	H	42.7	/	74.0	54.0	Pass
4807.299	H	47.9	/	74.0	54.0	Pass
7269.201	H	57.1	46.3	74.0	54.0	Pass
9913.084	H	56.8	48.2	74.0	54.0	Pass
15552.188	H	58.1	49.2	74.0	54.0	Pass

8 Photographs

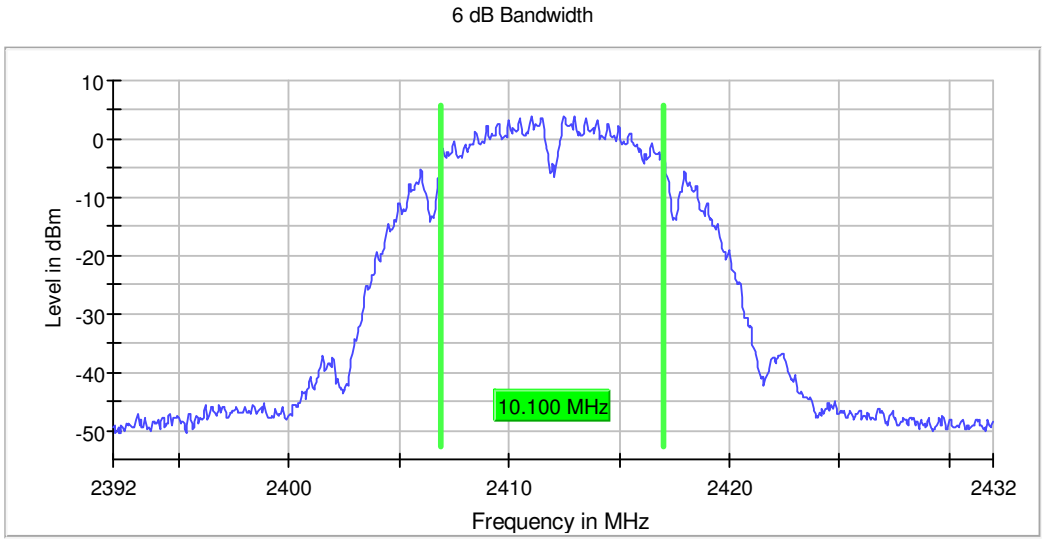
Remark: Photos refer to Appendix: External Photo, Internal Phot, and Setup Photo

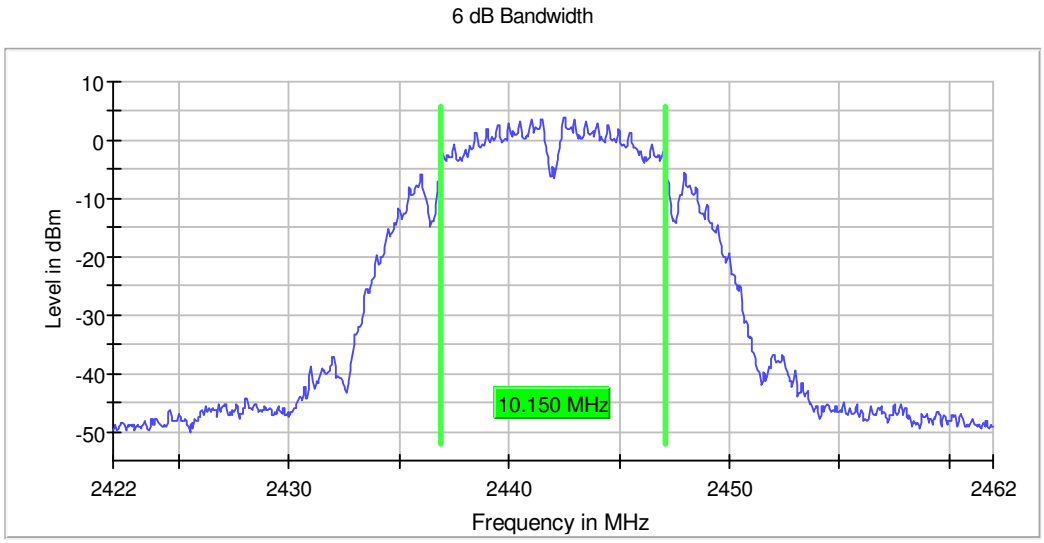
9 Appendix

9.1 Minimum Emission Bandwidth 6 dB

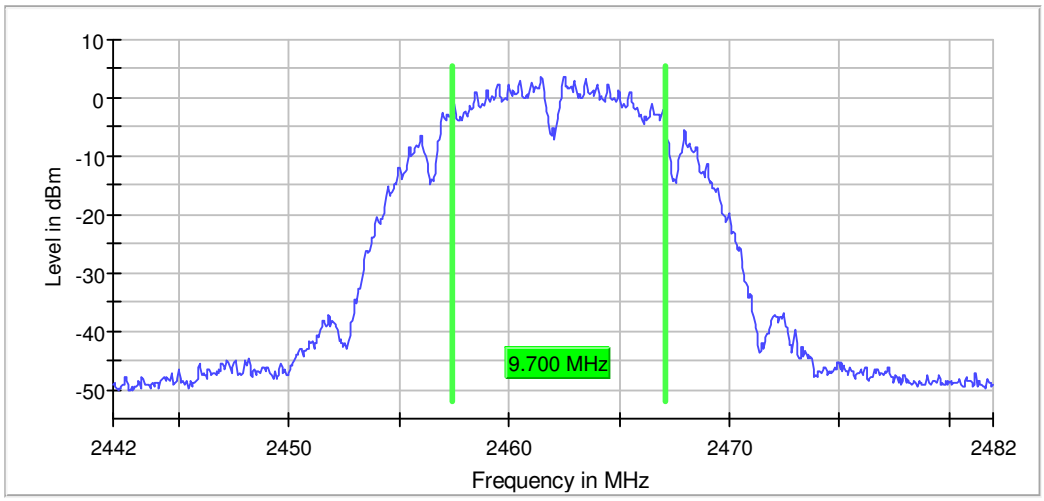
802.11b:

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2412.000000	10.100000	0.500000	---	2406.925000	2417.025000
2442.000000	10.150000	0.500000	---	2436.925000	2447.075000
2462.000000	9.700000	0.500000	---	2457.375000	2467.075000





6 dB Bandwidth



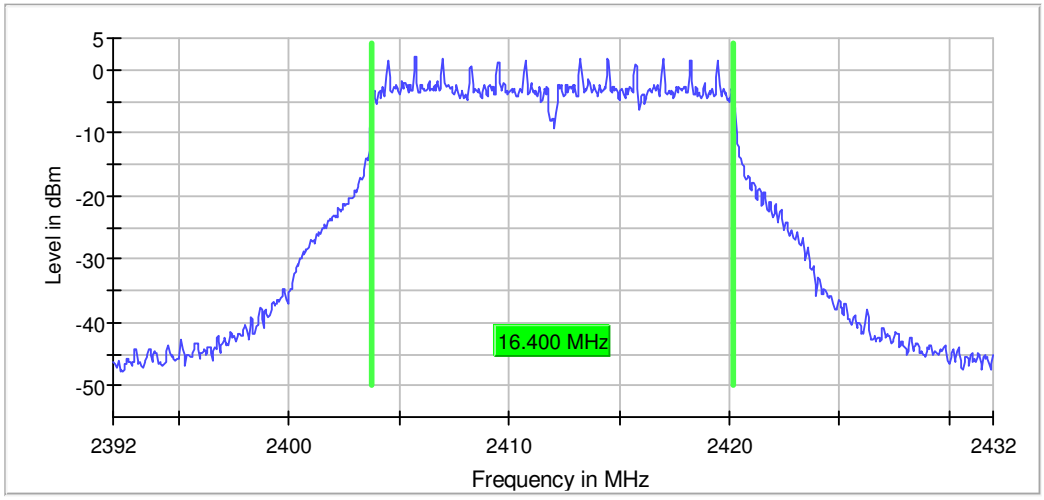
Measurement setting:

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 µs	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

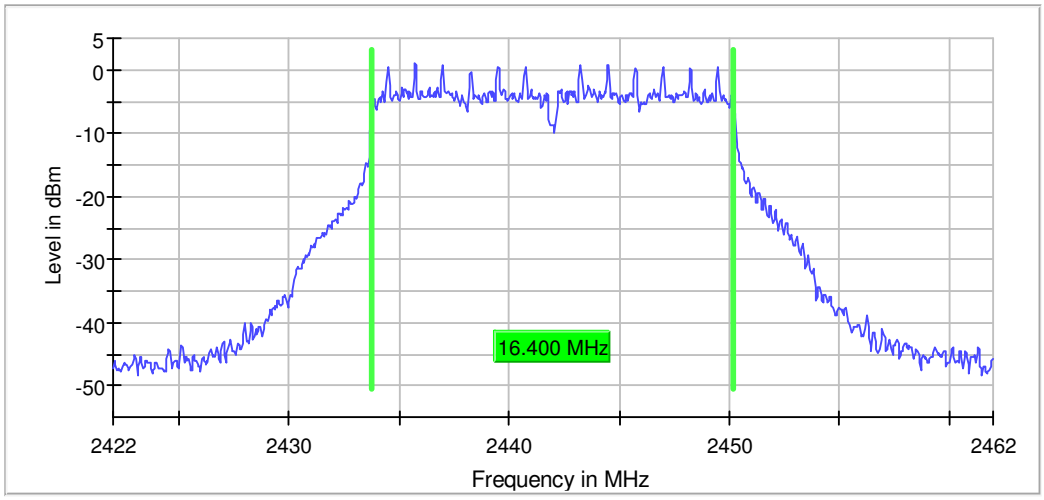
802.11g:

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2412.000000	16.400000	0.500000	---	2403.775000	2420.175000
2442.000000	16.400000	0.500000	---	2433.775000	2450.175000
2462.000000	16.400000	0.500000	---	2453.775000	2470.175000

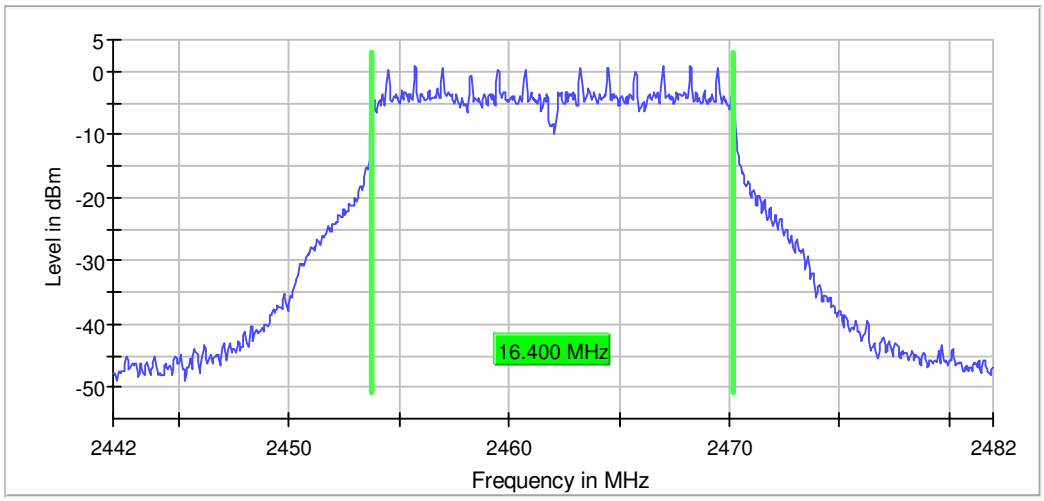
6 dB Bandwidth



6 dB Bandwidth



6 dB Bandwidth



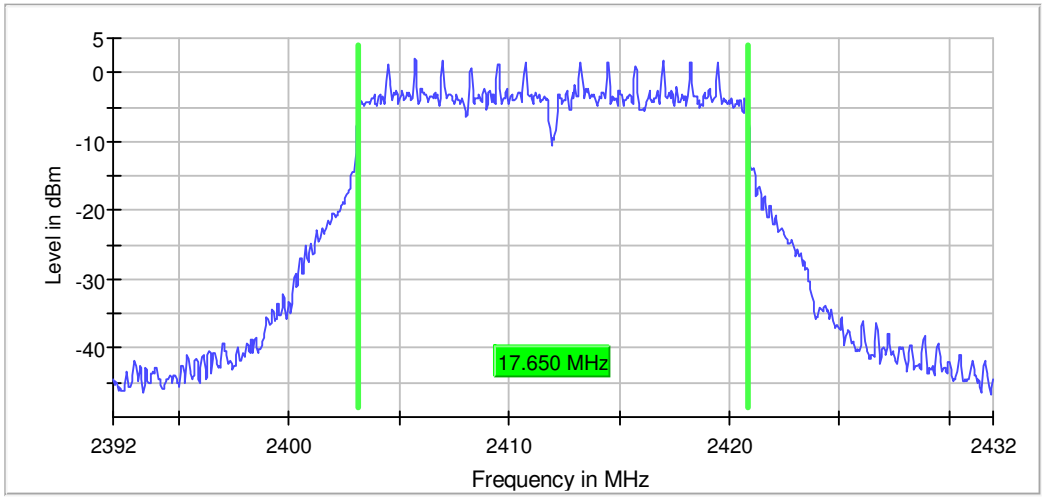
Measurement setting:

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	37 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.25 dB	0.50 dB

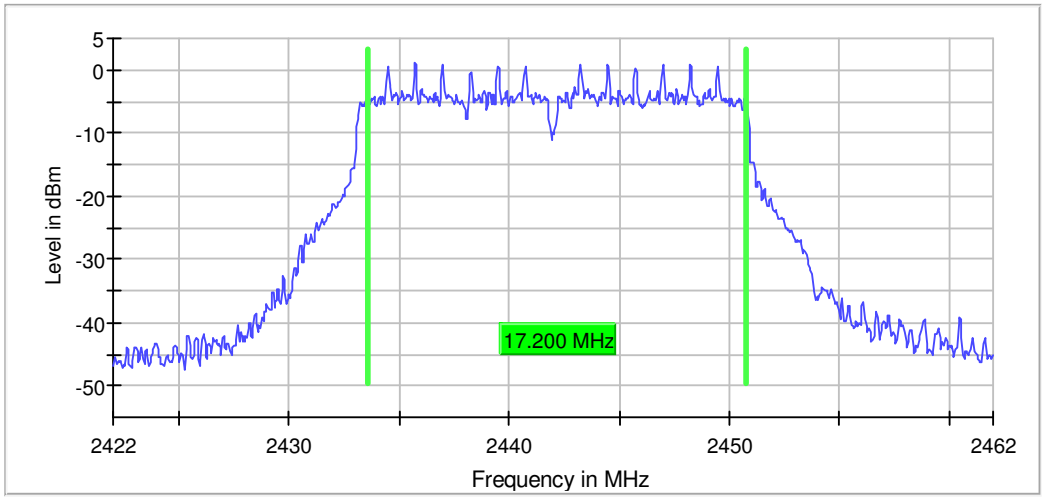
802.11n20:

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2412.000000	17.650000	0.500000	---	2403.175000	2420.825000
2442.000000	17.200000	0.500000	---	2433.575000	2450.775000
2462.000000	17.150000	0.500000	---	2453.675000	2470.825000

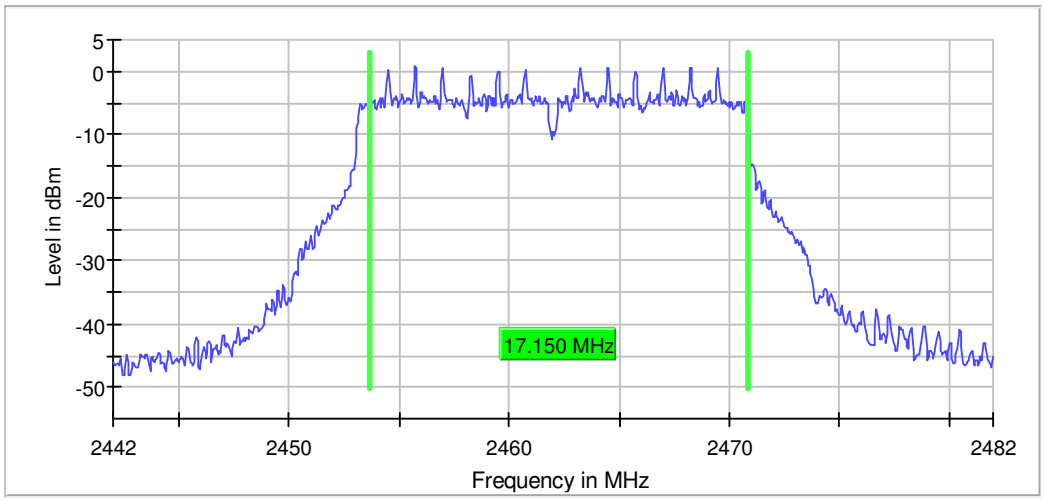
6 dB Bandwidth



6 dB Bandwidth



6 dB Bandwidth



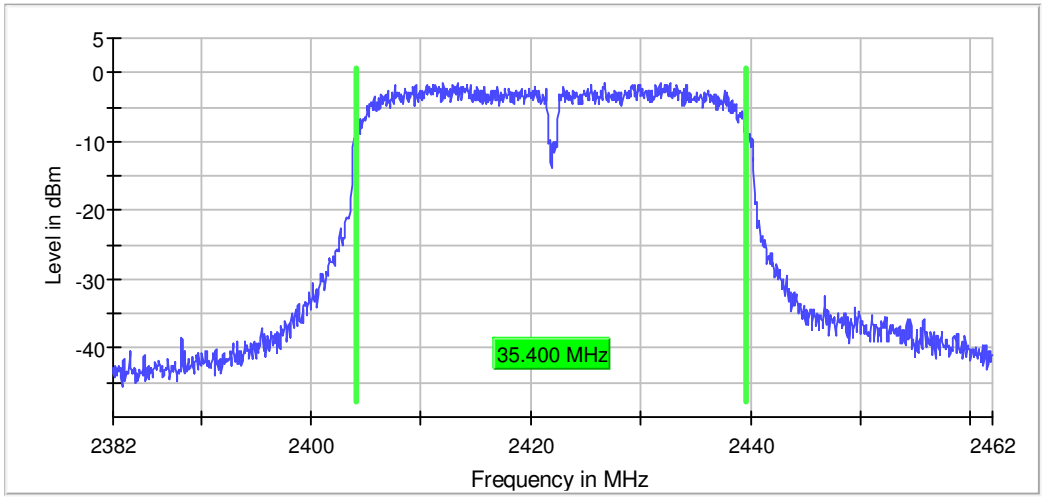
Measurement Setting:

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 µs	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	19 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.11 dB	0.50 dB

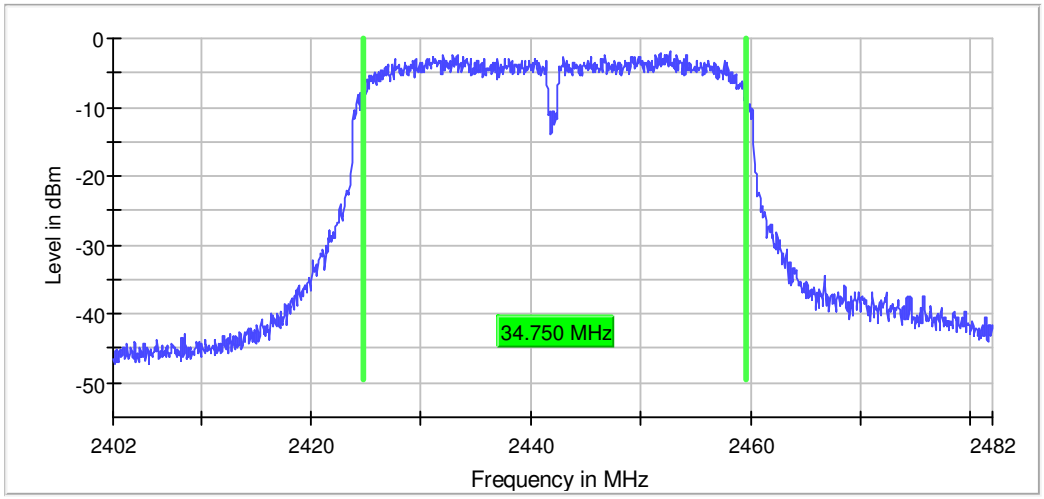
802.11n40:

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2422.000000	35.400000	0.500000	---	2404.175000	2439.575000
2442.000000	34.750000	0.500000	---	2424.825000	2459.575000
2452.000000	34.850000	0.500000	---	2444.725000	2479.575000

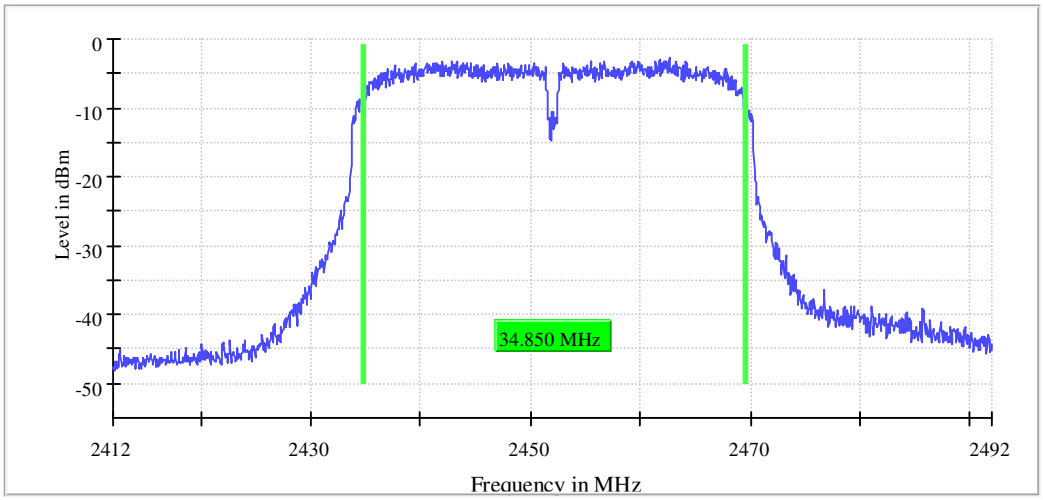
6 dB Bandwidth



6 dB Bandwidth



6 dB Bandwidth



Measurement Setting:

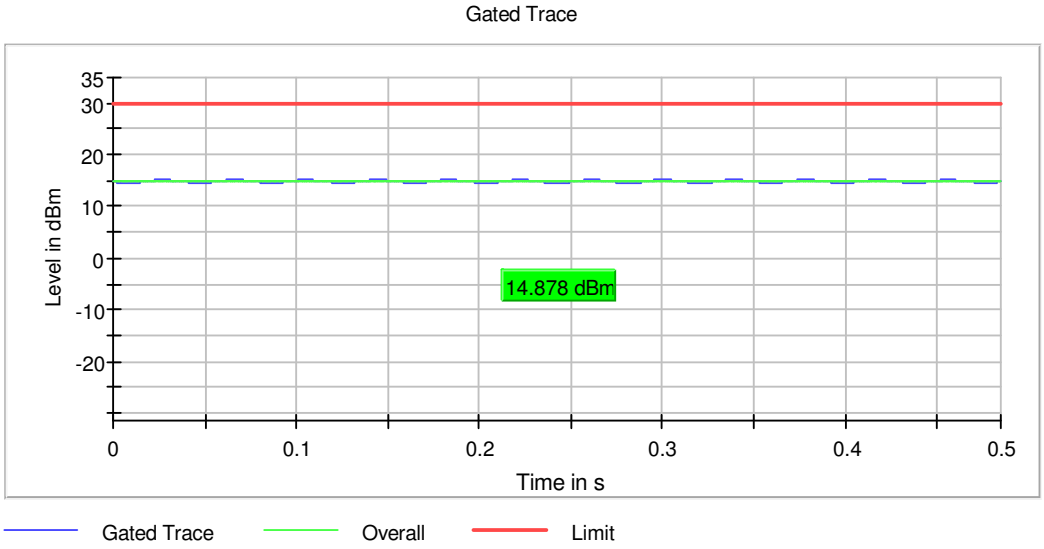
Setting	Instrument Value	Target Value
Span	40.000 MHz	40.000 MHz
RBW	100.000 kHz	~ 100.000 kHz
VBW	300.000 kHz	~ 300.000 kHz
SweepPoints	800	~ 800
Sweeptime	94.922 µs	AUTO
Reference Level	10.000 dBm	10.000 dBm
Attenuation	30.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	32 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.09 dB	0.50 dB

9.2 RF output power

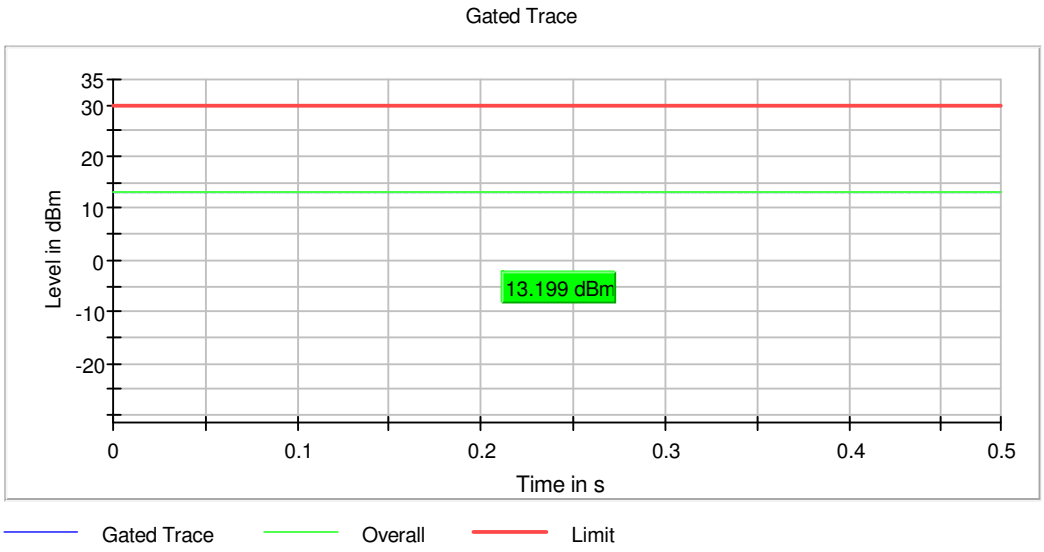
Operation Mode	DUT Frequency (MHz)	Limit Max (dBm)	Gated Level (dBm)	Result
802.11b	2412.000000	30.0	14.9	PASS
802.11b	2442.000000	30.0	14.5	PASS
802.11b	2462.000000	30.0	14.3	PASS
802.11g	2412.000000	30.0	13.2	PASS
802.11g	2442.000000	30.0	12.5	PASS
802.11g	2462.000000	30.0	12.3	PASS
802.11n20	2412.000000	30.0	13.2	PASS
802.11n20	2442.000000	30.0	12.5	PASS
802.11n20	2462.000000	30.0	12.3	PASS
802.11n40	2422.000000	30.0	15.6	PASS
802.11n40	2442.000000	30.0	14.8	PASS
802.11n40	2452.000000	30.0	14.1	PASS

Remark: Antenna gain: 1.5dBi
(only worst case shown)
Remark: Cable loss 0.9dB was considered and set in system configuration.

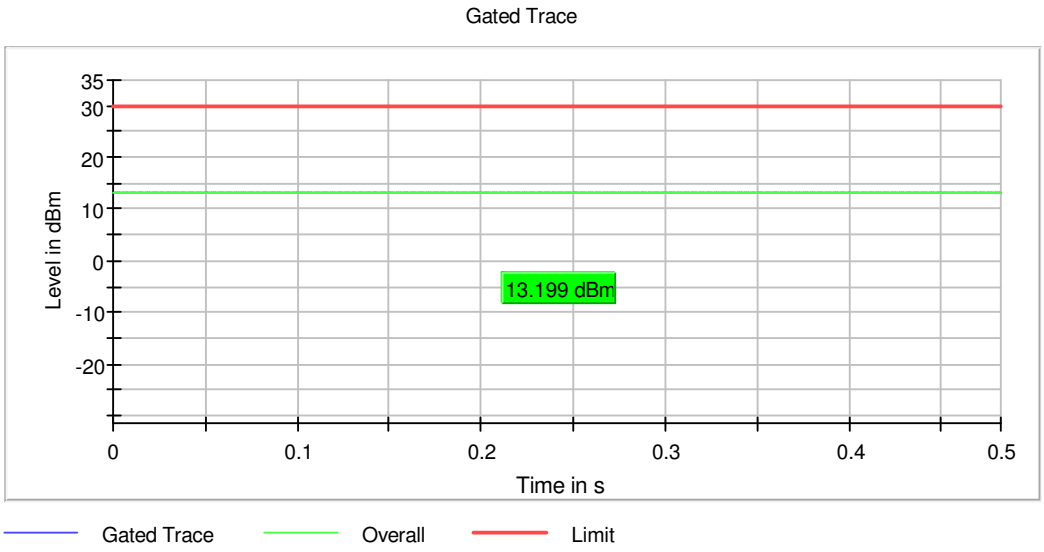
802.11b:



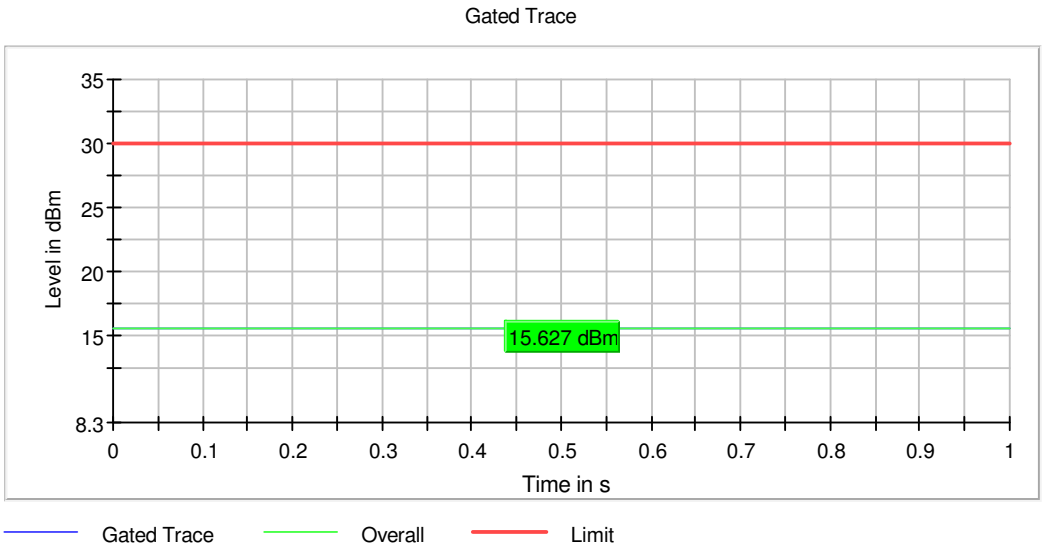
802.11g:



802.11n20:



802.11n40:

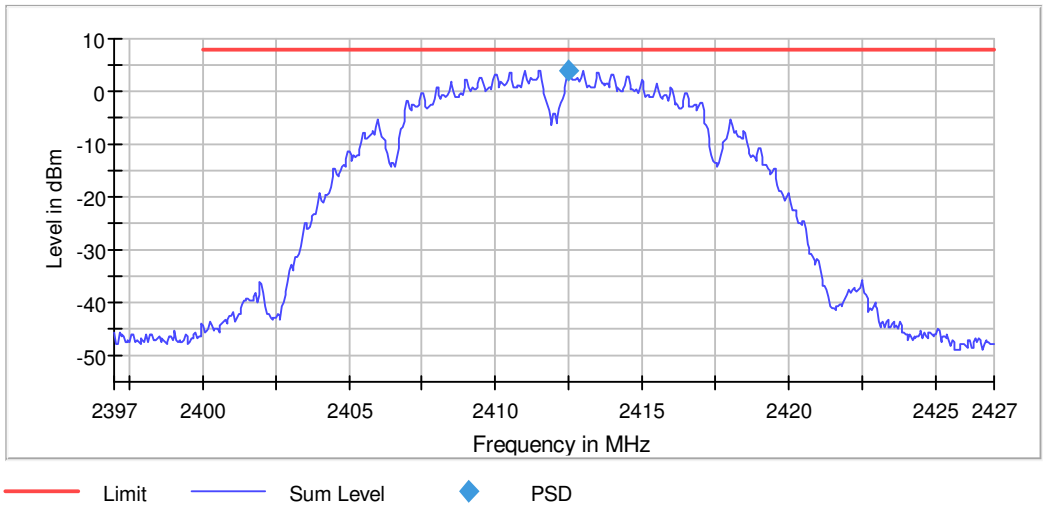

Gated Trace
35
30
25
20
15
8.3
Level in dBm
15.627 dBm
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Time in s
Gated Trace
Overall
Limit

Power Spectral Density

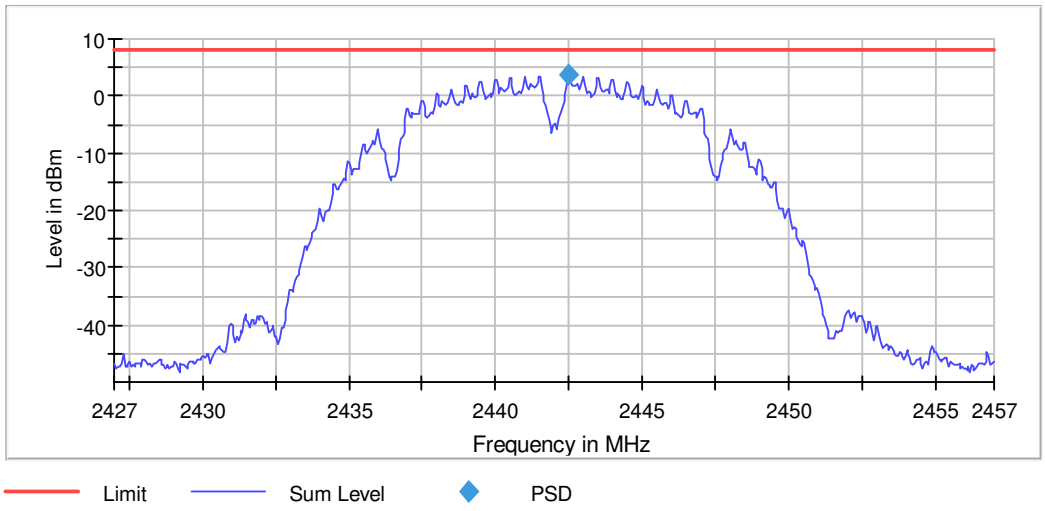
802.11b:

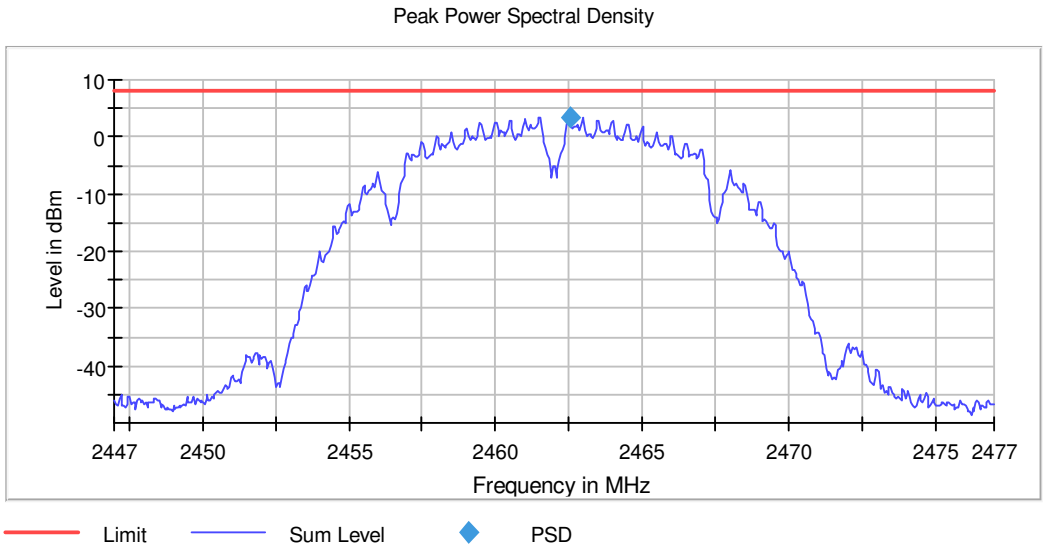
DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2412.000000	2412.475000	4.097	8.0	PASS
2442.000000	2442.475000	3.595	8.0	PASS
2462.000000	2462.525000	3.467	8.0	PASS

Peak Power Spectral Density



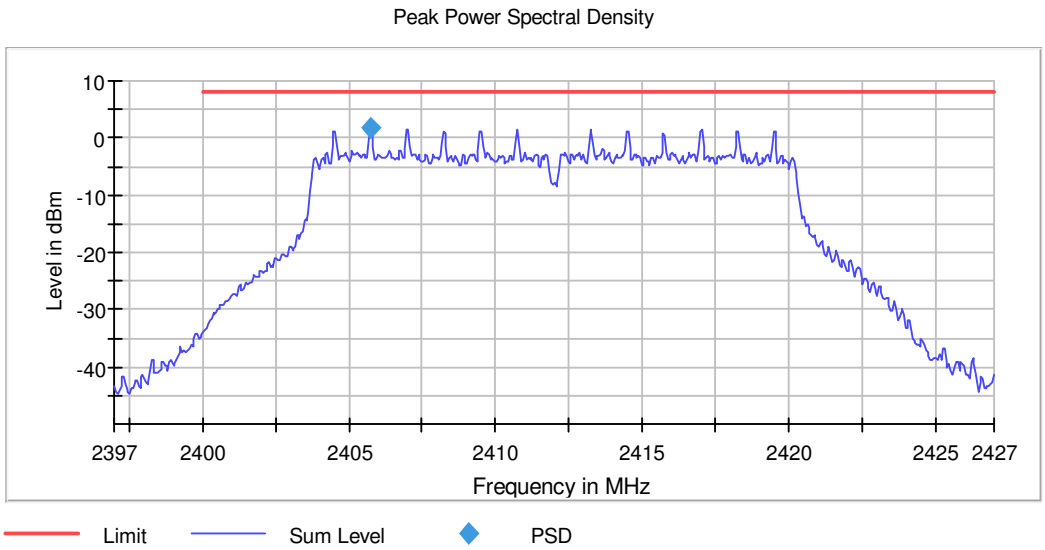
Peak Power Spectral Density



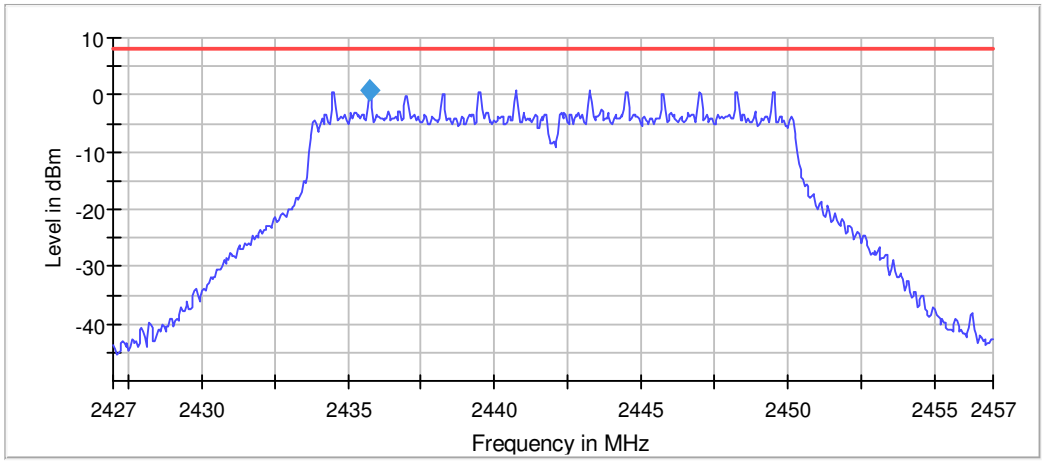


802.11g:

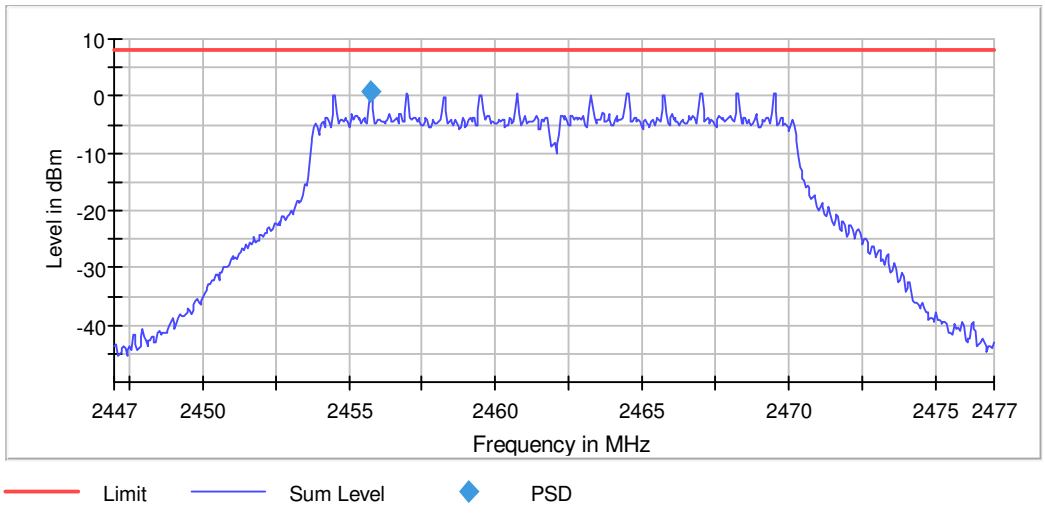
DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2412.000000	2405.725000	1.684	8.0	PASS
2442.000000	2435.725000	0.927	8.0	PASS
2462.000000	2455.725000	0.672	8.0	PASS



Peak Power Spectral Density

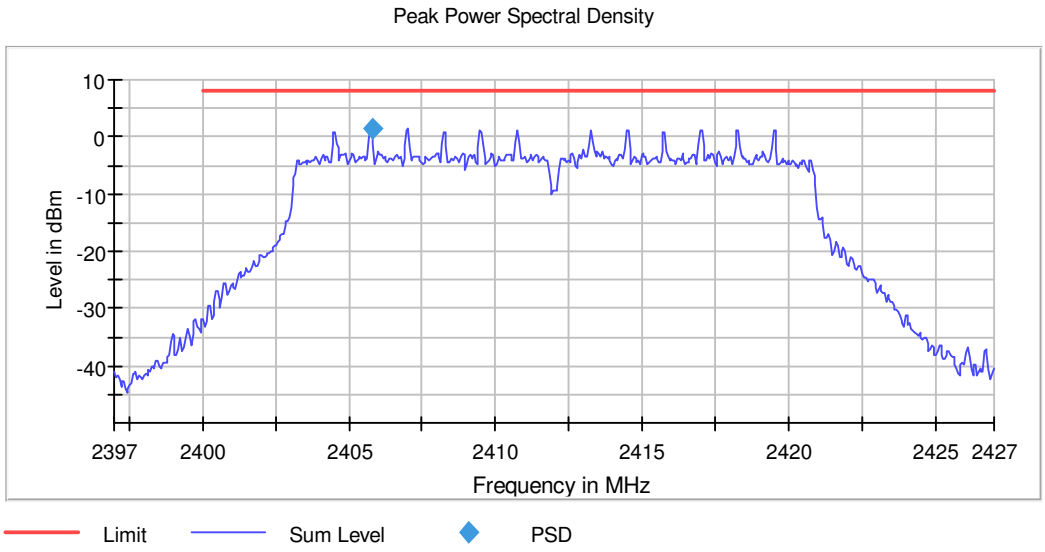


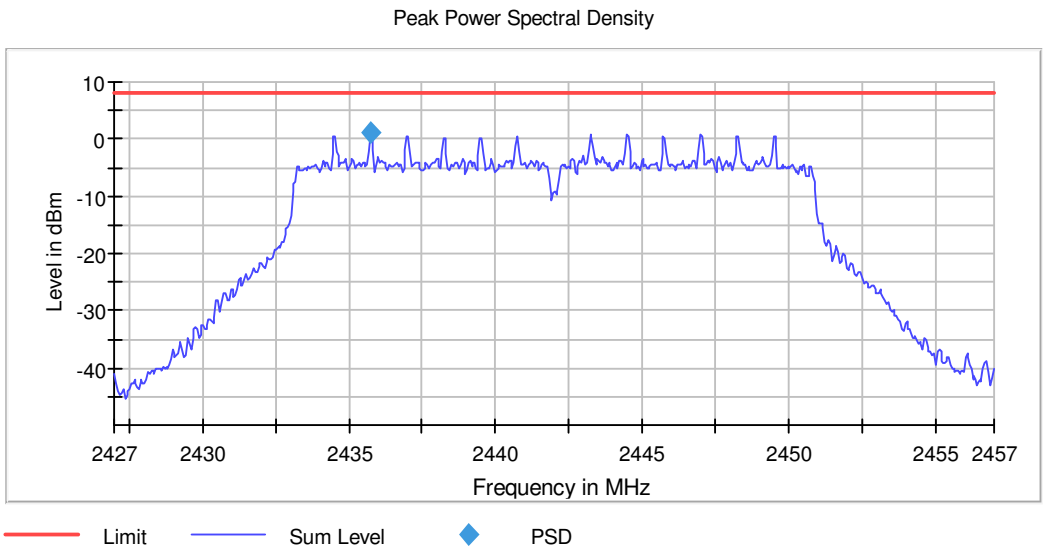
Peak Power Spectral Density

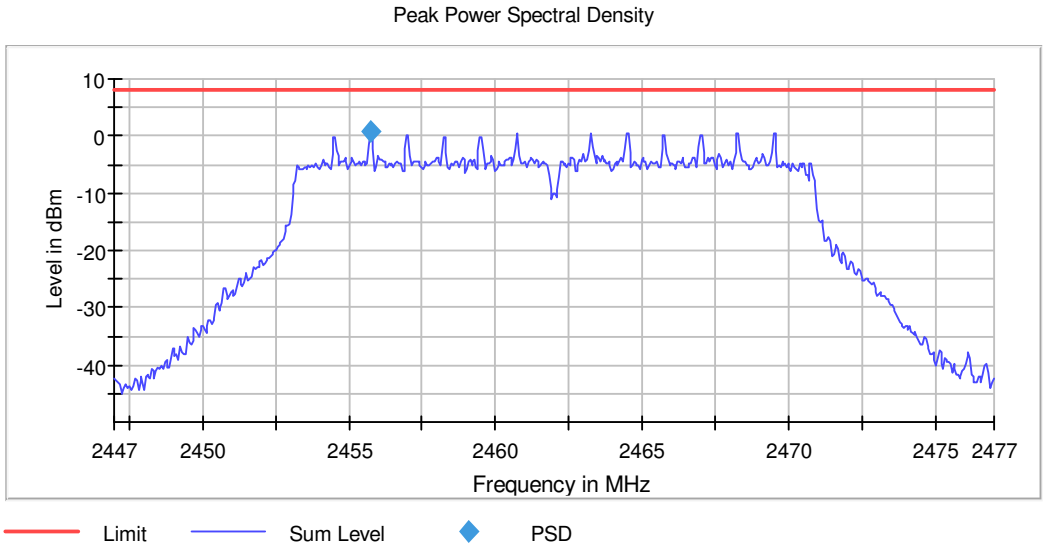


802.11n20:

DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2412.000000	2405.775000	1.477	8.0	PASS
2442.000000	2435.725000	0.956	8.0	PASS
2462.000000	2455.725000	0.626	8.0	PASS

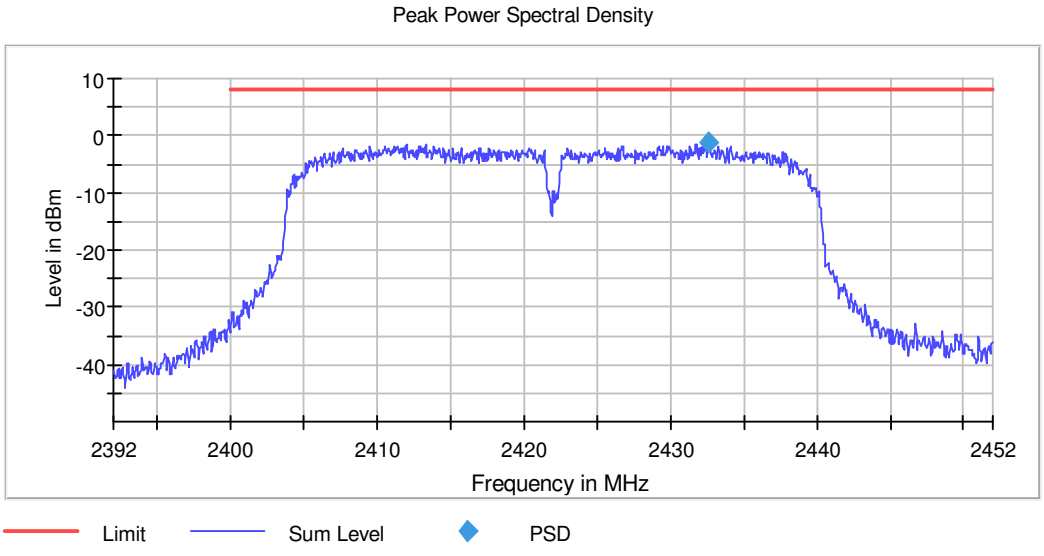




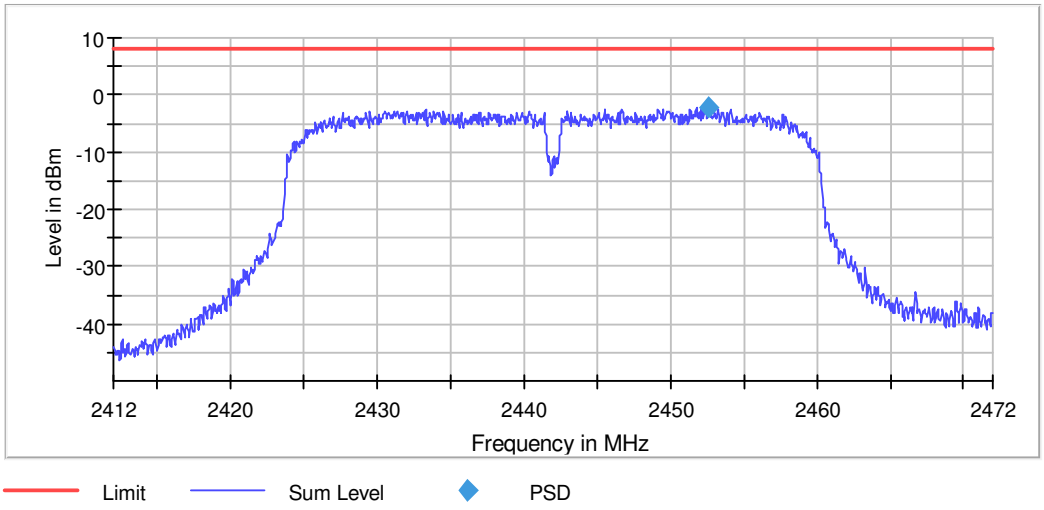


802.11n40:

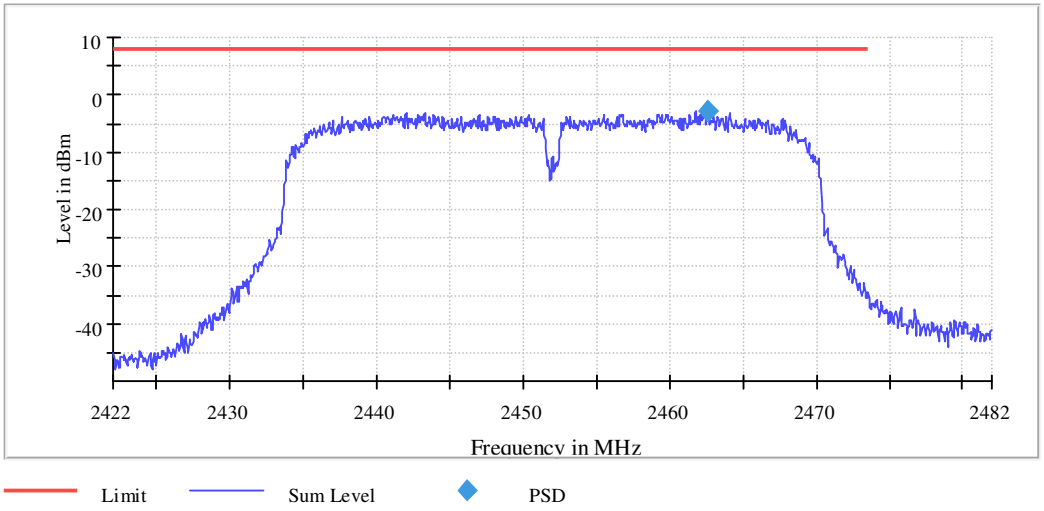
DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2422.000000	2432.625000	-1.373	8.0	PASS
2442.000000	2452.625000	-2.061	8.0	PASS
2452.000000	2462.625000	-2.836	8.0	PASS



Peak Power Spectral Density



Peak Power Spectral Density



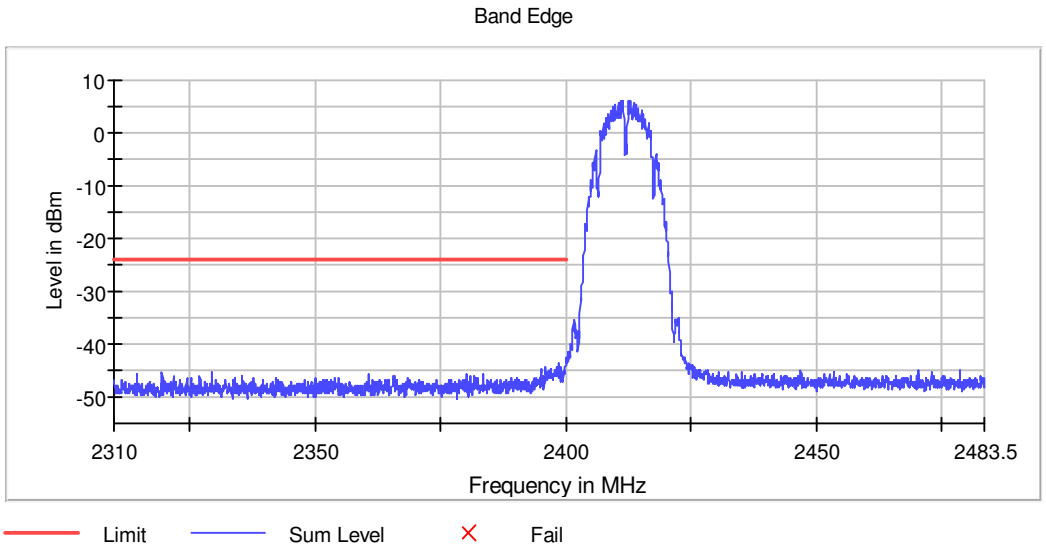
Measurement Setting:

Setting	Instrument Value	Target Value
Span	30.000 MHz	30.000 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 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	76 / max. 150	max. 150

Remark: Cable loss 0.9dB was considered and set in system configuration.

9.3 Band Edge

802.11b Band Edge Low



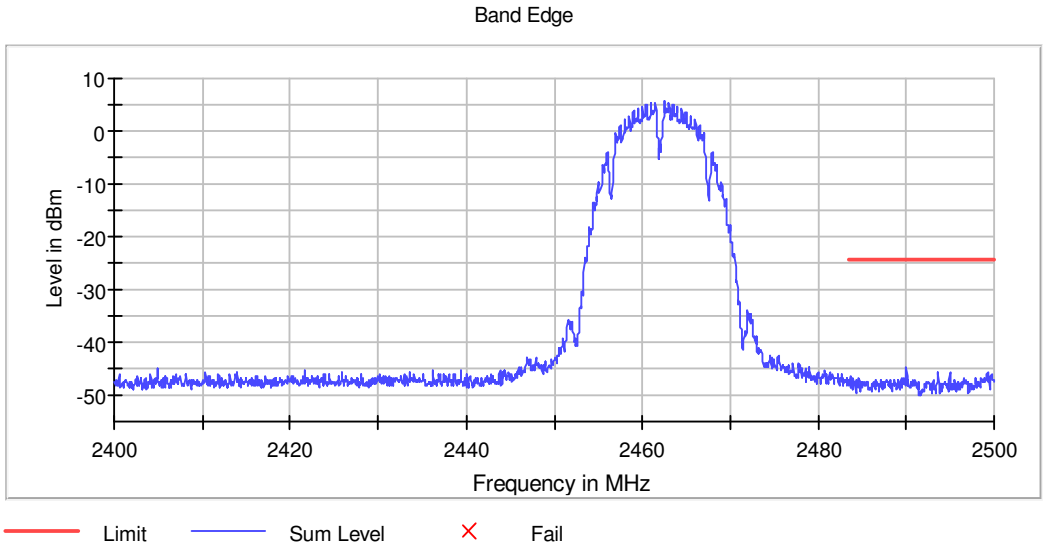
Inband Peak

Frequency (MHz)	Level (dBm)
2411.475000	6.1

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2398.625000	-43.4	19.5	-23.9	PASS
2399.975000	-43.8	19.9	-23.9	PASS
2398.675000	-43.9	20.0	-23.9	PASS
2399.925000	-44.1	20.2	-23.9	PASS
2398.925000	-44.3	20.3	-23.9	PASS
2395.975000	-44.3	20.4	-23.9	PASS

802.11b Band Edge High



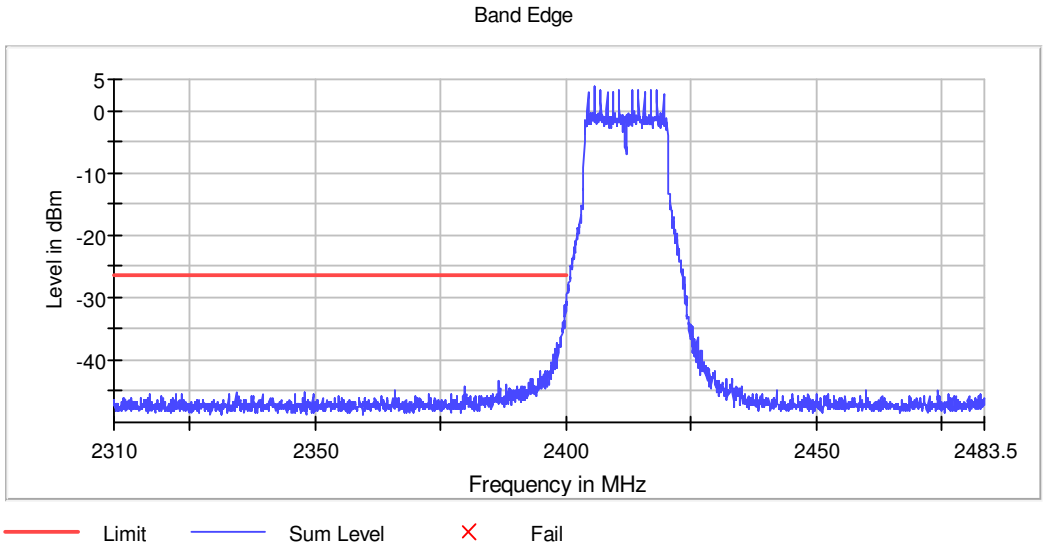
Inband Peak

Frequency (MHz)	Level (dBm)
2462.525000	5.6

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2490.025000	-44.6	20.2	-24.4	PASS
2489.975000	-44.8	20.4	-24.4	PASS
2499.275000	-45.8	21.4	-24.4	PASS
2494.975000	-45.9	21.4	-24.4	PASS
2493.625000	-45.9	21.4	-24.4	PASS
2493.675000	-45.9	21.5	-24.4	PASS

802.11g Band Edge Low



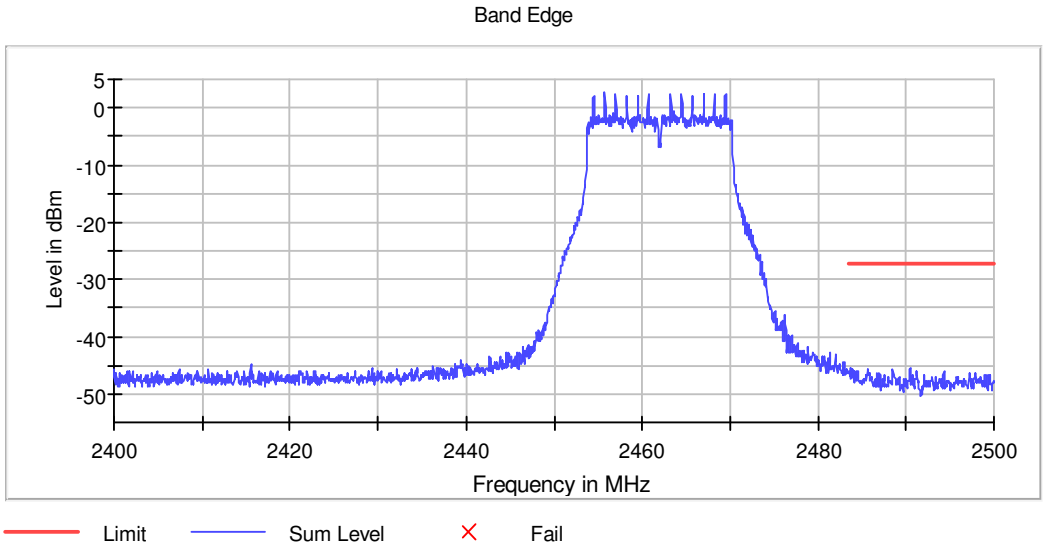
Inband Peak

Frequency (MHz)	Level (dBm)
2405.775000	3.7

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2399.775000	-31.3	5.0	-26.3	PASS
2399.825000	-32.2	5.9	-26.3	PASS
2399.975000	-32.3	6.0	-26.3	PASS
2399.725000	-32.3	6.0	-26.3	PASS
2399.875000	-32.3	6.0	-26.3	PASS
2399.925000	-33.1	6.8	-26.3	PASS

802.11g Band Edge High



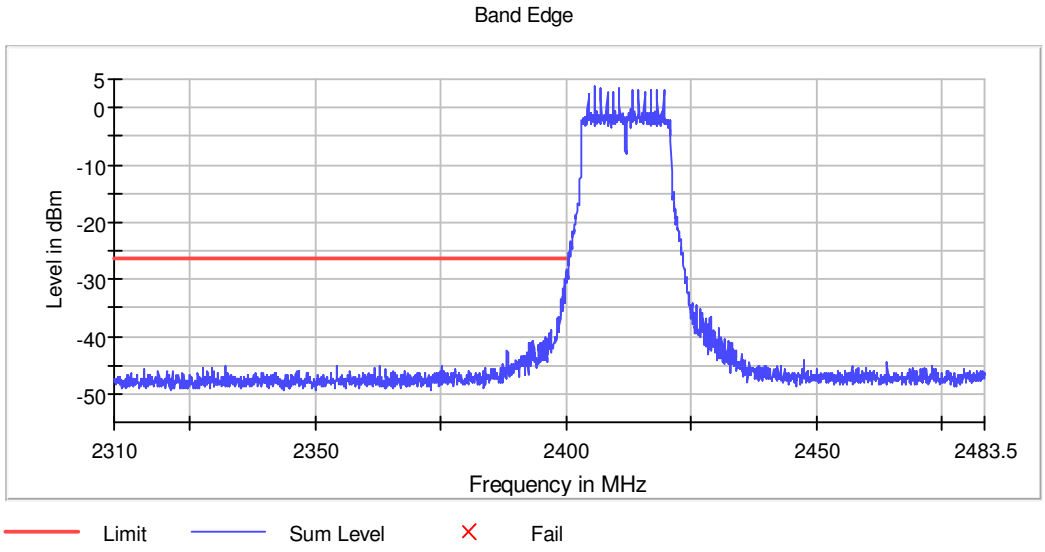
Inband Peak

Frequency (MHz)	Level (dBm)
2455.775000	2.7

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2490.475000	-45.6	18.3	-27.3	PASS
2483.725000	-45.6	18.3	-27.3	PASS
2490.425000	-45.6	18.4	-27.3	PASS
2485.625000	-45.6	18.4	-27.3	PASS
2483.975000	-45.9	18.6	-27.3	PASS
2488.525000	-45.9	18.6	-27.3	PASS

802.11n20 Band Edge Low



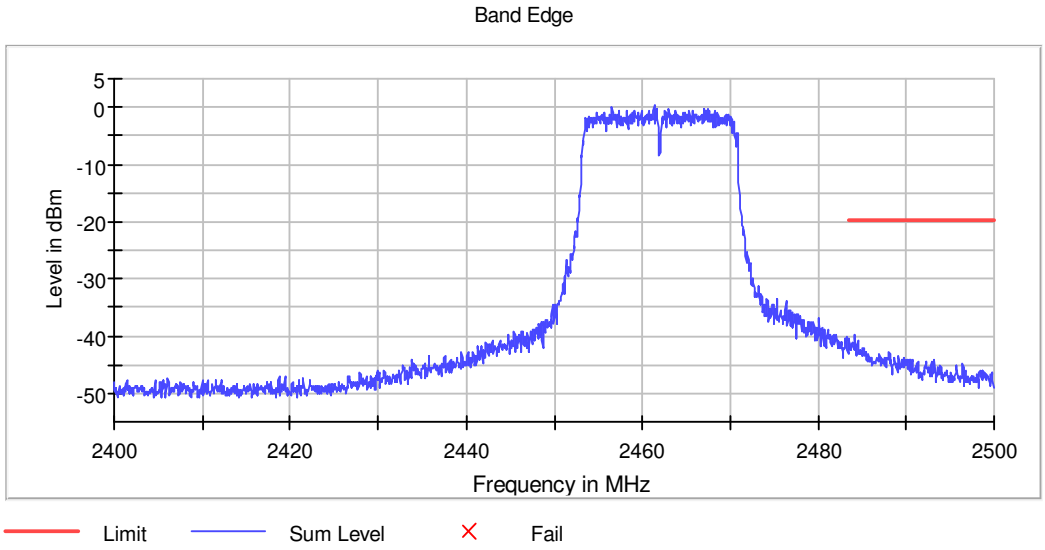
Inband Peak

Frequency (MHz)	Level (dBm)
2405.775000	3.6

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2399.975000	-28.5	2.1	-26.4	PASS
2399.775000	-30.1	3.7	-26.4	PASS
2399.725000	-30.7	4.3	-26.4	PASS
2399.825000	-30.8	4.4	-26.4	PASS
2399.925000	-31.1	4.7	-26.4	PASS
2399.525000	-31.7	5.3	-26.4	PASS

802.11n20 Band Edge High



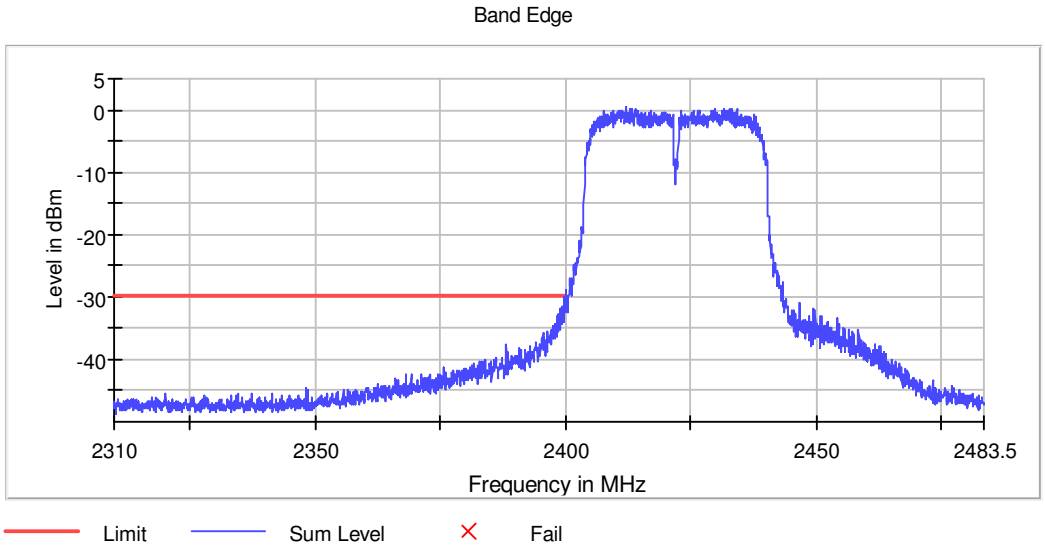
Inband Peak

Frequency (MHz)	Level (dBm)
2461.375000	0.2

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2484.175000	-39.7	9.9	-29.8	PASS
2484.125000	-40.2	10.4	-29.8	PASS
2484.225000	-40.6	10.8	-29.8	PASS
2483.525000	-40.6	10.8	-29.8	PASS
2484.525000	-40.9	11.1	-29.8	PASS
2483.575000	-41.0	11.2	-29.8	PASS

802.11n40 Band Edge Low



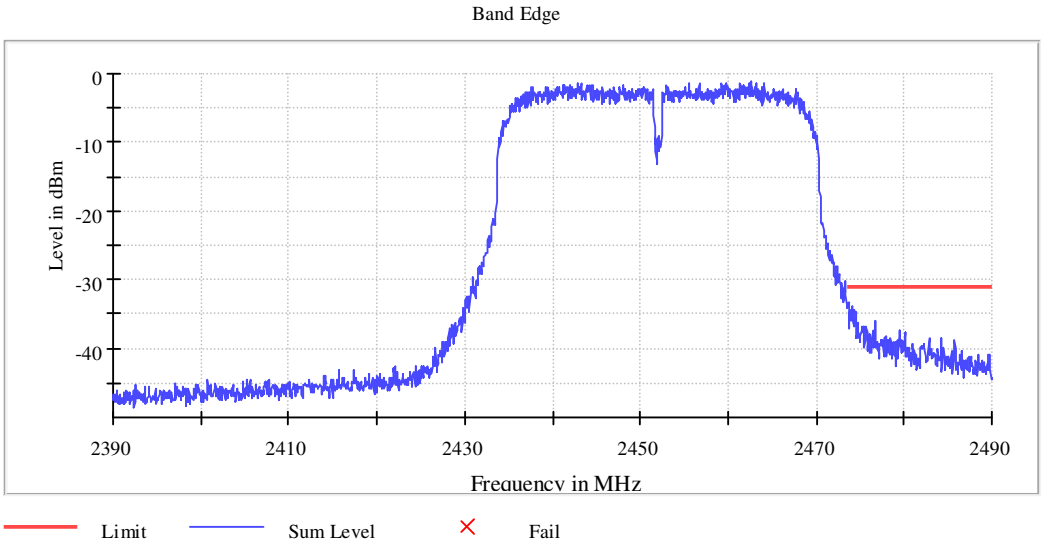
Inband Peak

Frequency (MHz)	Level (dBm)
2412.025000	0.3

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2399.875000	-30.0	0.3	-29.7	PASS
2399.825000	-30.1	0.5	-29.7	PASS
2399.775000	-31.4	1.7	-29.7	PASS
2399.475000	-31.7	2.0	-29.7	PASS
2399.425000	-31.7	2.0	-29.7	PASS
2399.575000	-31.7	2.0	-29.7	PASS

802.11n40 Band Edge High



Inband Peak

Frequency (MHz)	Level (dBm)
2462.625000	-1.1

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2483.625000	-33.3	2.2	-31.1	PASS
2483.575000	-33.5	2.4	-31.1	PASS
2484.125000	-33.8	2.7	-31.1	PASS
2484.075000	-33.9	2.8	-31.1	PASS
2483.525000	-34.0	2.9	-31.1	PASS
2484.425000	-34.3	3.2	-31.1	PASS

Measurement Setting:

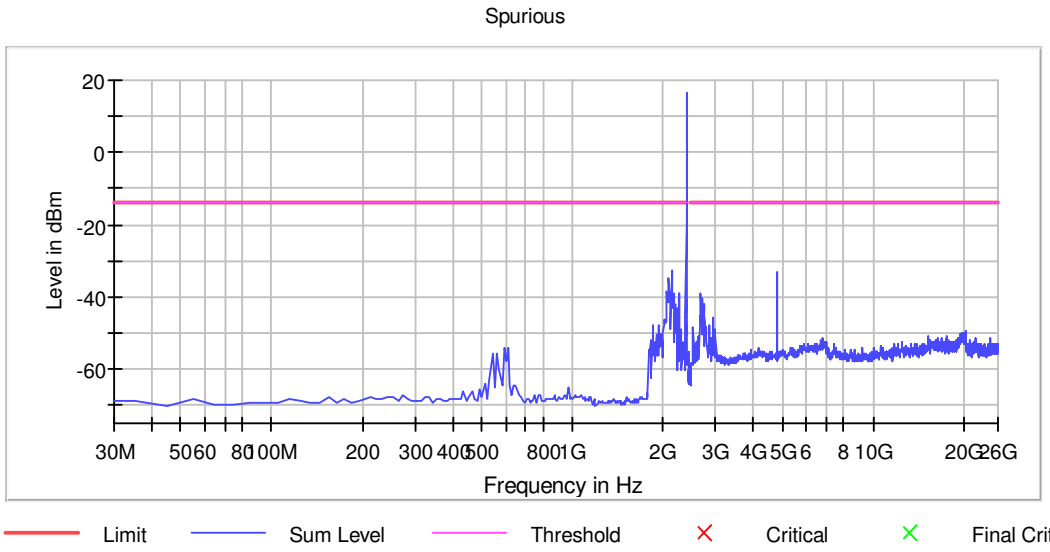
Setting	Instrument Value	Target Value
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	1670	~ 1670
Sweeptime	1.670 ms	AUTO
Reference Level	10.000 dBm	10.000 dBm
Attenuation	30.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
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

Remark: Cable loss 0.9dB was considered and set in system configuration.

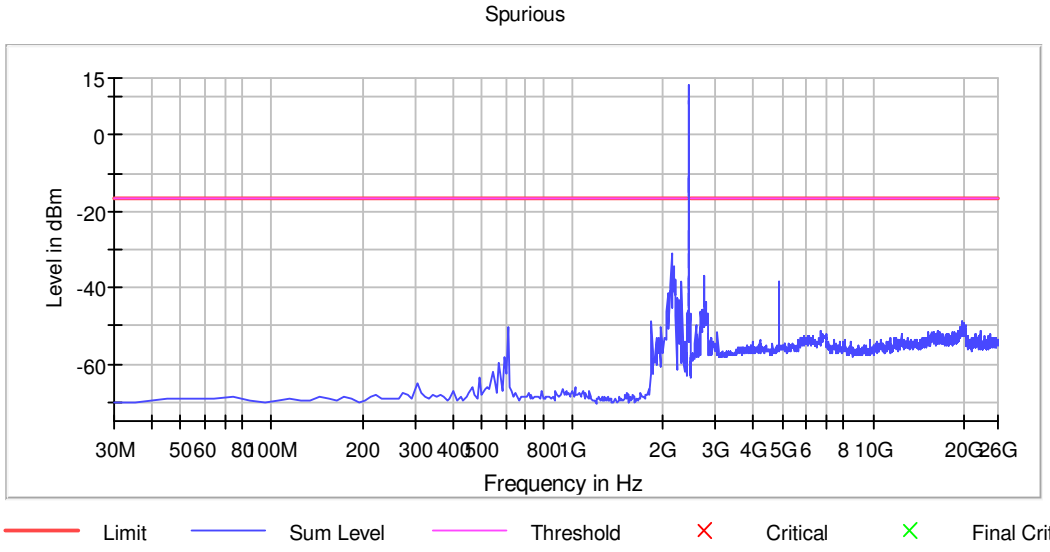
9.1 Conducted spurious emission

Remark: only worst case shown

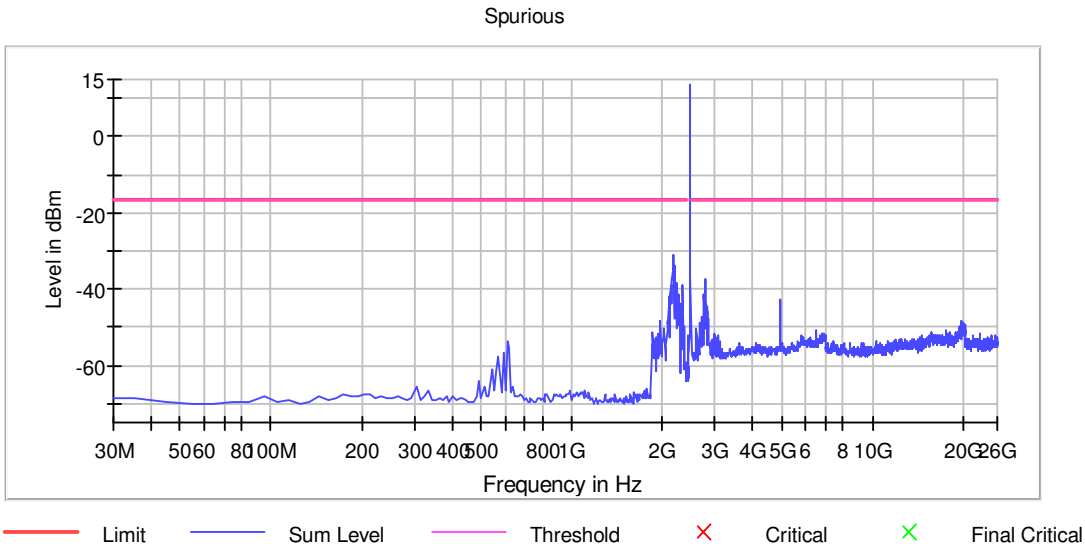
802.11b



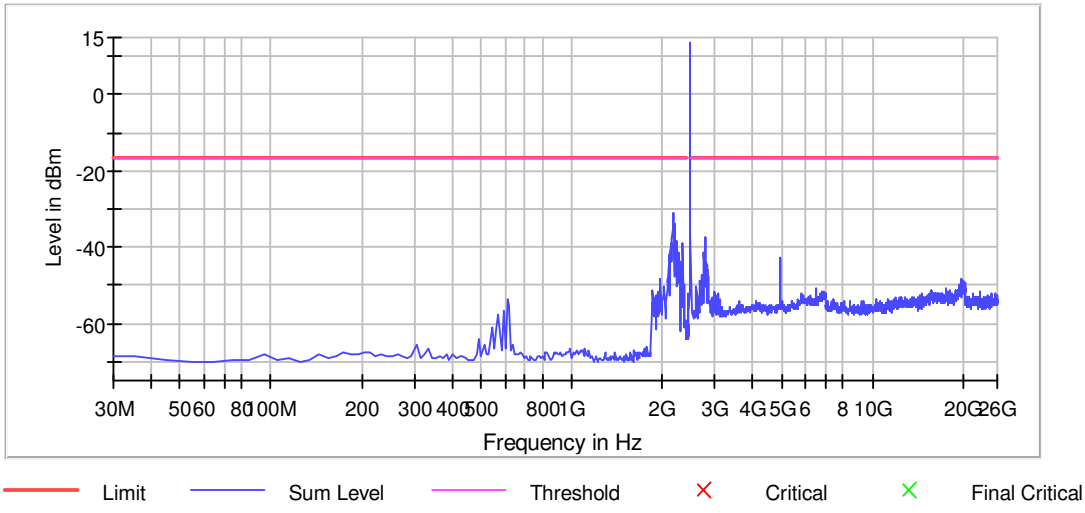
802.11g



802.11n20



802.11n40



Measurement Setting

Setting	Instrument Value	Target Value
RBW	100.000 kHz	<= 100.000
VBW	300.000 kHz	>= 300.000
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	14 / max. 40	max. 40
Stable	3 / 3	3
Max Stable Difference	0.00 dB	0.50 dB

Remark: Cable loss 0.9dB was considered and set in system configuration.

- End of the Report -