TEST REPORT

Reference No.	:	WTX24X11265506W002
FCC ID	:	2A3NS-LF01
Applicant	:	Sveaverken Svea Agri AB
Address	:	Högmossevägen 11, SE-641 39 Katrineholm Sweden
Manufacturer	:	The same as Applicant
Address	:	The same as Applicant
Product Name	:	RoboPusher Nimbo Plus
Model No.	:	LF01
Standards	:	FCC Part 15.407
Date of Receipt sample	:	2024-11-13
Date of Test	:	2024-11-13 to 2024-12-04
Date of Issue	:	2024-12-04
Test Report Form No.	:	WTX_Part 15_407W
Test Result	:	**Pass**

Remarks:
The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of approver.

Prepared By:

Waltek Testing Group (Shenzhen) Co., Ltd.

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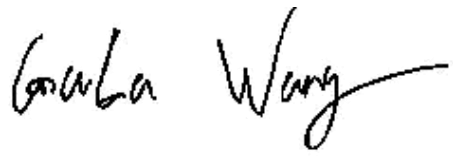
Tested by:



Gala Wang

Approved by:

Jason Su

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Report version

Version No.	Date of issue	Description
Rev.00	2024-12-04	Original
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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

General Description of EUT	
Product Name:	RoboPusher Nimbo Plus
Trade Name:	Sveaverken
Model No.:	LF01
Adding Model(s):	/
Rated Voltage:	AC 120V for Adapter power DC: 58.8V
Battery Capacity:	40000mAh
Power Adapter:	Model: H82-48V10A Input: 110-245VAC 45/65Hz Battery: Ternary litium battery 14celles Output voltage : 58.8VDC
Note: The test data is gathered from a production sample, provided by the manufacturer.	

Technical Characteristics of EUT	
Support Standards:	802.11a, 802.11n(HT20), 802.11n-HT40
Frequency Range:	5180-5240MHz, 5745-5825MHz
Max. RF Output Power:	5180-5240MHz:15.51dBm (Conducted) 5745-5825MHz:14.52dBm (Conducted)
Type of Modulation:	QPSK, 16QAM, 64QAM,256QAM
Type of Antenna:	Glue stick antenna
Antenna Gain:	5180-5240MHz:2.64dBi 5745-5825MHz:3.20dBi
Note The Antenna Gain is provided by the customer and can affect the validity of results.	

1.2 Test Standards

The tests were performed according to following standards:

FCC Rules Part 15.407: General technical requirements.
ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.
KDB789033 D02 v02r01: Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-Nii) Devices Part 15, Subparte.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which result in lowering the emission, should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, KDB789033 D02 v02r01
The equipment under test (EUT) was configured to measure its highest possible emission level. The test modes were adapted accordingly in reference to the Operating Instructions.

1.4 Table for parameters of Test Software setting

Run commands and follow the instructions given by the manufacturer, you can start to test. During testing, Channel and Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

Mode	Ant.	Test Frequency (MHz)												
		NCB: 20MHz												
		5180	5200	5240	5260	5280	5320	5500	5580	5700	5720	5745	5785	5825
802.11a 6Mbps	ANT 0	50	50	50	/	/	/	/	/	/	/	50	50	50
802.11n-HT20 MCS0	ANT 0	48	48	48	/	/	/	/	/	/	/	48	48	48
Mode	Ant.	NCB: 40MHz												
		5190	5230		5270	5310	5510		5550	5670		5710	5755	5795
802.11n-HT40 MCS0	ANT 0	45	45		/	/	/		/	/		/	45	45

1.5 EUT Operating during test

EUT was programmed to be in continuously transmitting mode. During the test, EUT operation to normal function and programs under Android were executed.

1.6 Test Facility

Address of the test laboratory

Laboratory: Waltek Testing Group (Shenzhen) Co., Ltd.

Address: 1/F., Room 101, Building 1, Hongwei Industrial Park, Liuxian 2nd Road, Block 70 Bao'an District, Shenzhen, Guangdong, China

FCC – Registration No.: 125990

Waltek Testing Group (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is mai ntained in our files. The Designation Number is CN5010, and Test Firm Registration Number is 125990.

Industry Canada (IC) Registration No.: 11464A

The 3m Semi-anechoic chamber of Waltek Testing Group (Shenzhen) Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 11464A and the CAB identifier is CN0057.

1.7 EUT Setup and Test Mode

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. All testing shall be performed under maximum output power condition, with a duty cycle equal to 100%, and to measure its highest possible emissions level, more detailed description as follows:

Test Mode List		
Test Mode	Description	Remark
TM1	802.11a	5180MHz,5200MHz,5240MHz,5745MHz, 5785MHz,5825MHz
TM2	802.11n-HT20	5180MHz,5200MHz,5240MHz,5745MHz, 5785MHz,5825MHz
TM3	802.11n-HT40	5190MHz,5230MHz,5755MHz,5795MHz

Test Conditions	
Temperature:	22~25 °C
Relative Humidity:	45~75 %
ATM Pressure:	1019 mbar

EUT Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
AC Cable	1.4	Unshielded	Without Ferrite
DC Cable	0.9	Unshielded	Without Ferrite

Special Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
/	/	/	/

1.8 Measurement Uncertainty

Measurement uncertainty		
Parameter	Conditions	Uncertainty
RF Output Power	Conducted	±0.42dB
Occupied Bandwidth	Conducted	±1.5%
Power Spectral Density	Conducted	±1.8dB
Conducted Spurious Emission	Conducted	±2.17dB
Conducted Emissions	Conducted	9-150kHz ±3.74dB
		0.15-30MHz ±3.34dB
Transmitter Spurious Emissions	Radiated	30-200MHz ±4.52dB
		0.2-1GHz ±5.56dB
		1-6GHz ±3.84dB
		6-18GHz ±3.92dB

1.9 Test Equipment List and Details

Fixed asset Number	Description	Manufacturer	Model	Serial No.	Cal Date	Due. Date
WTXE1041A1001	Communication Tester	Rohde & Schwarz	CMW500	148650	2024-02-24	2025-02-23
WTXE1005A1005	Spectrum Analyzer	Agilent	N9020A	US47140102	2024-03-19	2025-03-18
WTXE1084A1001	Spectrum Analyzer	Agilent	N9020A	MY54320548	2024-02-24	2025-02-23
WTXE1004A1-001	Spectrum Analyzer	Rohde & Schwarz	FSP40	100612	2024-02-27	2025-02-26
WTXE1103A1003	Attenuator	Pasternack	PE4007-4	/	2024-02-24	2025-02-23
WTXE1003A1-005	Coaxial Cable	/	0M4RFC	/	2024-07-03	2025-01-03
☒ Chamber A: Below 1GHz						
WTXE1005A1003	Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/035	2024-02-24	2025-02-23
WTXE1001A1001	EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2024-03-19	2025-03-18
WTXE1007A1001	Amplifier	HP	8447F	2805A03475	2024-02-24	2025-02-23
WTXE1010A1007	Loop Antenna	Schwarz beck	FMZB 1516	9773	2024-02-26	2025-02-25
WTXE1010A1006	Broadband Antenna	Schwarz beck	VULB9163	9163-333	2024-02-24	2025-02-23
WTXE1104A1032-1	Coaxial Cable	/	RC_6G-N-M	/	2024-03-15	2025-03-14
WTXE1104A1032-2	Coaxial Cable	/	RC_6G-N-M	/	2024-03-15	2025-03-14
WTXE1104A1032-3	Coaxial Cable	/	RC_6G-N-M	/	2024-03-15	2025-03-14
☒ Chamber A: Above 1GHz						
WTXE1005A1003	Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/035	2024-02-24	2025-02-23
WTXE1001A1001	EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2024-03-19	2025-03-18
WTXE1065A1001	Amplifier	C&D	PAP-1G18	2002	2024-02-27	2025-02-26
WTXE1010A1005	Horn Antenna	ETS	3117	00086197	2024-02-26	2025-02-25

WTXE1010A 1010	DRG Horn Antenna	A.H. SYSTEMS	SAS-574	571	2024-03-17	2025-03-16
WTXE1003A 1001	Pre-amplifier	Schwarzbeck	BBV 9721	9721-031	2024-02-29	2025-02-28
WTXE1104A 1033-1	Coaxial Cable	/	C16-07-07	/	2024-03-15	2025-03-14
WTXE1104A 1033-2	Coaxial Cable	/	C16-07-07	/	2024-03-15	2025-03-14
WTXE1104A 1033-3	Coaxial Cable	/	C16-07-07	/	2024-03-15	2025-03-14
☐ Chamber B:Below 1GHz						
WTXE1010A 1006	Trilog Broadband Antenna	Schwarz beck	VULB9163(B)	9163-635	2024-03-17	2027-03-16
WTXE1038A 1001	Amplifier	Agilent	8447D	2944A10457	2024-02-24	2025-02-23
WTXE1001A 1002	EMI Test Receiver	Rohde & Schwarz	ESPI	101391	2024-02-24	2025-02-23
WTXE1104A 1031-1	Coaxial Cable	/	1.5MRFC-LWB3	/	2024-07-03	2025-07-02
WTXE1104A 1031-2	Coaxial Cable	/	RG 316	/	2024-07-03	2025-07-02
WTXE1104A 1031-3	Coaxial Cable	/	RG 316	/	2024-07-03	2025-07-02
☐ Chamber C:Below 1GHz						
WTXE1093A 1001	EMI Test Receiver	Rohde & Schwarz	ESIB 26	100401	2024-02-27	2025-02-26
WTXE1010A 1013-1	Trilog Broadband Antenna	Schwarz beck	VULB 9168	1194	2024-04-18	2027-04-17
WTXE1007A 1002	Amplifier	HP	8447F	2944A03869	2024-02-24	2025-02-23
WTXE1010A 1007	Loop Antenna	Schwarz beck	FMZB 1516	9773	2024-02-26	2025-02-25
WTXE1104A 1034-1	Coaxial Cable	/	RC_6G-N-M	/	2024-07-03	2025-07-02
WTXE1104A 1034-2	Coaxial Cable	/	RC_6G-N-M	/	2024-07-03	2025-07-02
WTXE1104A 1034-3	Coaxial Cable	/	RC_6G-N-M	/	2024-07-03	2025-07-02
☐ Chamber C: Above 1GHz						
WTXE1093A	EMI Test	Rohde &	ESIB 26	100401	2024-02-27	2025-02-26

1001	Receiver	Schwarz				
WTXE1103A 1005	Horn Antenna	POAM	RTF-118A	1820	2023-03-10	2026-03-09
WTXE1103A 1006	Amplifier	Tonscend	TAP01018050	AP22E806 235	2024-02-27	2025-02-26
WTXE1010A 1010	DRG Horn Antenna	A.H. SYSTEMS	SAS-574	571	2024-03-17	2025-03-16
WTXE1003A 1001	Pre-amplifier	Schwarzbeck	BBV 9721	9721-031	2024-02-29	2025-02-28
WTXE1104A 1035-1	Coaxial Cable	/	RC-18G-N-M	/	2024-07-03	2025-07-02
WTXE1104A 1035-2	Coaxial Cable	/	RC-18G-N-M	/	2024-07-03	2025-07-02
WTXE1104A 1035-3	Coaxial Cable	/	RC-18G-N-M	/	2024-07-03	2025-07-02
☒ Conducted Room 1#						
WTXE1104A 1029	EMI Test Receiver	Rohde & Schwarz	ESCI	100525	2023-12-12	2024-12-11
WTXE1002A 1001	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2024-02-24	2025-02-23
WTXE1003A 1001	AC LISN	Schwarz beck	NSLK8126	8126-279	2024-02-24	2025-02-23
WTXE1104A 1036	Coaxial Cable	/	RG 316	/	2024-07-03	2025-07-02
WTXE1104A 1038	Coaxial Cable	/	6MRFC-DP	/	2024-07-03	2025-07-02
☐ Conducted Room 2#						
WTXE1001A 1004	EMI Test Receiver	Rohde & Schwarz	ESPI	101259	2024-02-24	2025-02-23
WTXE1003A 1003	LISN	Rohde & Schwarz	ENV 216	100097	2024-02-24	2025-02-23
WTXE1104A 1037	Coaxial Cable	/	RG 316	/	2024-07-03	2025-07-02

Software List			
Description	**Manufacturer**	**Model**	**Version**
EMI Test Software (Radiated Emission A)	Farad	EZ-EMC	RA-03A1 (1.1.4.2)
EMI Test Software (Radiated Emission B)	Farad	EZ-EMC	RA-03A1 (1.1.4.2)
EMI Test Software (Radiated Emission C)	Farad	EZ-EMC	RA-03A1-2 (1.1.4.2)
EMI Test Software (Conducted Emission Room 1#)	Farad	EZ-EMC	3A1*CE-RE 1.1.4.3
EMI Test Software (Conducted Emission Room 2#)	Farad	EZ-EMC	3A1*CE-RE 1.1.4.3

*Remark: indicates software version used in the compliance certification testing.

2. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test Item	Result
§15.203; §15.405	Antenna Requirement	Compliant
15.407 (c)	Automatically Discontinue Transmission	Compliant
§15.207; §15.407(b)(6)	Conducted Emission	Compliant
§15.407(a)(1),(2)	Power Spectral Density	Compliant
§15.407(e)	Emission Bandwidth and Occupied Bandwidth	Compliant
§15.407(a)(1),(2)	Maximum Conducted Output Power	Compliant
§15.407(b)(1),(2),(3),(4)	Undesirable emission	Compliant
§15.205; §15.407(b)(1),(2),(3)	Radiated Emission	Compliant
§15.407(g)	Frequency Stability	Compliant
§15.407(h)	Dynamic Frequency Selection (DFS)	Compliant

N/A: Not applicable.

3. Antenna Requirement

3.1 Standard Applicable

According to FCC Part 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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

3.2 Evaluation Information

This product has an Glue stick antenna, fulfill the requirement of this section.

4. Automatically Discontinue Transmission

4.1 Standard Applicable

According to FCC Part 15.407(c), the device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signaling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization to describe how this requirement is met.

4.2 Summary of Test Results

While the EUT is not transmitting any information, the EUT can automatically discontinue transmission and become standby mode for power saving. The EUT can detect the controlling signal of ACK message transmitting from remote device and verify whether it shall resend or discontinue transmission.

5. Power Spectral Density

5.1 Standard Applicable

Section 15.407(a) Power limits:

(1) For the band 5.15-5.25GHz.
(iv) For mobile and portable client devices in the 5.15-5.25GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250mW provided the maximum antenna gain does not exceed 6dBi. In addition, the maximum power spectral density shall not exceed 11dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

(2) For the 5.25-5.35GHz and 5.47-5.725GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250mW or 11 dBm + 10 log B, where B is the 26dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

(3) For the band 5.725-5.85GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30dBm in any 500kHz band. If transmitting antennas of directional gain greater than 6dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

5.2 Test Procedure

According to 789033 D02 v02r01 General UNII Test Procedures New Rules v02, the following is the measurement procedure.
For devices operating in the bands 5.15-5.25GHz, 5.25-5.35GHz, and 5.47-5.725GHz, the above procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth specified in § 15.407(a)(5). For devices operating in the band 5.725-5.85GHz, the rules specify a measurement bandwidth of 500kHz. Many spectrum analyzers do not have 500kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of a RBWs less than 1 MHz, or 500kHz, “provided that the measured power is integrated over the full

reference bandwidth" to show the total power over the specified measurement bandwidth (i.e., 1MHz, or 500kHz). If measurements are performed using a reduced resolution bandwidth (< 1MHz, or < 500kHz) and integrated over 1 MHz, or 500kHz bandwidth, the following adjustments to the procedures apply:

a) Set RBW ≥ 1/T, where T is defined in section II.B.I.a).
b) Set VBW ≥ 3 RBW.
c) If measurement bandwidth of Maximum PSD is specified in 500kHz, add 10log(500kHz/RBW) to the measured result, whereas RBW (< 500kHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.
d) If measurement bandwidth of Maximum PSD is specified in 1 MHz, add 10log(1MHz/RBW) to the measured result, whereas RBW (< 1MHz) is the reduced resolution bandwidth of spectrum analyzer set during measurement.
e) Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

Note: As a practical matter, it is recommended to use reduced RBW of 100kHz for the sections 5.c) and 5.d) above, since RBW=100kHZ is available on nearly all spectrum analyzers.

5.3 Summary of Test Results/Plots

Please refer to Appendix A

6. Emission Bandwidth and Occupied Bandwidth

6.1 Standard Applicable

According to 15.407(a) and (e):

(1) For the band 5.15-5.25GHz.
(iv) For mobile and portable client devices in the 5.15-5.25GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

(2) For the 5.25-5.35GHz and 5.47-5.725GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250mW or 11dBm + 10 log B, where B is the 26dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

(3) For the band 5.725-5.85GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30dBm in any 500kHz band. If transmitting antennas of directional gain greater than 6dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(e) Within the 5.725-5.85GHz band, the minimum 6dB bandwidth of U-NII devices shall be at least 500kHz.

6.2 Test Procedure

According to 789033 D02 v02r0r section C&D, the following is the measurement procedure.

1. Emission Bandwidth (EBW)
a) Set RBW = approximately 1% of the emission bandwidth.
b) Set the VBW > RBW.

c) Detector = Peak.
d) Trace mode = max hold.
e) Measure the maximum width of the emission that is 26dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

2. Minimum Emission Bandwidth for the band 5.725-5.85GHz Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500KHz for the band 5.715-5.85 GHz. The following procedure shall be used for measuring this bandwidth:
a) Set RBW = 100kHz.
b) Set the video bandwidth (VBW) ≥ 3 × RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6dB relative to the maximum level measured in the fundamental emission.
Note: The automatic bandwidth measurement capability of a spectrum analyzer or EMI receiver may be employed if it implements the functionality described above.

D. 99 Percent Occupied Bandwidth
The 99-percent occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5 % of the total mean power of the given emission. Measurement of the 99-percent occupied bandwidth is required only as a condition for using the optional band-edge measurement techniques described in section II.G.3.d). Measurements of 99-percent occupied bandwidth may also optionally be used in lieu of the EBW to 789033 D02 v02r01 General UNII Test Procedures New Rules v01 define the minimum frequency range over which the spectrum is integrated when measuring maximum conducted output power as described in section II.E. However, the EBW must be measured to determine bandwidth dependent limits on maximum conducted output power in accordance with 15.407(a).

The following procedure shall be used for measuring (99 %) power bandwidth:
1. Set center frequency to the nominal EUT channel center frequency.
2. Set span = 1.5 times to 5.0 times the OBW.
3. Set RBW = 1 % to 5 % of the OBW
4. Set VBW ≥ 3 * RBW
5. Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
6. Use the 99 % power bandwidth function of the instrument (if available).
7. If the instrument does not have a 99 % power bandwidth function, the trace data points are recovered and directly summed in power units. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached; that frequency is recorded as the lower frequency.

The process is repeated until 99.5 % of the total is reached; that frequency is recorded as the upper frequency. The 99% occupied bandwidth is the difference between these two frequencies.

6.3 Summary of Test Results/Plots

Please refer to Appendix B

7. Maximum Conducted Output Power

7.1 Standard Applicable

Section 15.407(a) Power limits:

(1) For the band 5.15-5.25GHz.
(iv) For mobile and portable client devices in the 5.15-5.25GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

(2) For the 5.25-5.35GHz and 5.47-5.725GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250mW or 11dBm + 10 log B, where B is the 26dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

(3) For the band 5.725-5.85GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30dBm in any 500kHz band. If transmitting antennas of directional gain greater than 6dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

7.2 Test Procedure

According to KDB789033 D02 v02r01 section E, the following is the measurement procedure.

(i) Set span to encompass the entire emission bandwidth (EBW) (or, alternatively, the entire 99% occupied bandwidth) of the signal.

(ii) Set RBW = 1MHz.

(iii) Set VBW ≥ 3MHz.

(iv) Number of points in sweep ≥ 2 Span / RBW. (This ensures that bin-to-bin spacing is ≤ RBW/2, so that

narrowband signals are not lost between frequency bins.)

(v) Sweep time = auto.

(vi) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.

(vii) If transmit duty cycle < 98 percent, use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle ≥ 98 percent, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to “free run”.

(viii) Trace average at least 100 traces in power averaging (i.e., RMS) mode.

(ix) Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument’s band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at 1MHz intervals extending across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the spectrum.

7.3 Summary of Test Results/Plots

Please refer to Appendix C

8. Radiated Spurious Emissions

8.1 Standard Applicable

According to §15.407(b), undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the 5.15-5.25GHz band: All emissions outside of the 5.15-5.35GHz band shall not exceed an e.i.r.p. of −27dBm/MHz.

(2) For transmitters operating in the 5.25-5.35GHz band: All emissions outside of the 5.15-5.35GHz band shall not exceed an e.i.r.p. of −27dBm/MHz.

(3) For transmitters operating in the 5.47-5.725GHz band: All emissions outside of the 5.47-5.725GHz band shall not exceed an e.i.r.p. of −27dBm/MHz.

(4) For transmitters operating in the 5.725-5.85GHz band:

(i) All emissions shall be limited to a level of −27dBm/MHz at 75MHz or more above or below the band edge increasing linearly to 10dBm/MHz at 25MHz above or below the band edge, and from 25MHz above or below the band edge increasing linearly to a level of 15.6dBm/MHz at 5MHz above or below the band edge, and from 5MHz above or below the band edge increasing linearly to a level of 27dBm/MHz at the band edge.

According to §15.407(b)(6), Unwanted emissions below 1GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.

According to §15.407(b)(7), The provisions of §15.205 apply to intentional radiators operating under this section.

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If radiated measurements are performed, field strength is then converted to EIRP as follows:

EIRP = ((E*d)^2) / 30

where:

• E is the field strength in V/m;

• d is the measurement distance in meters;

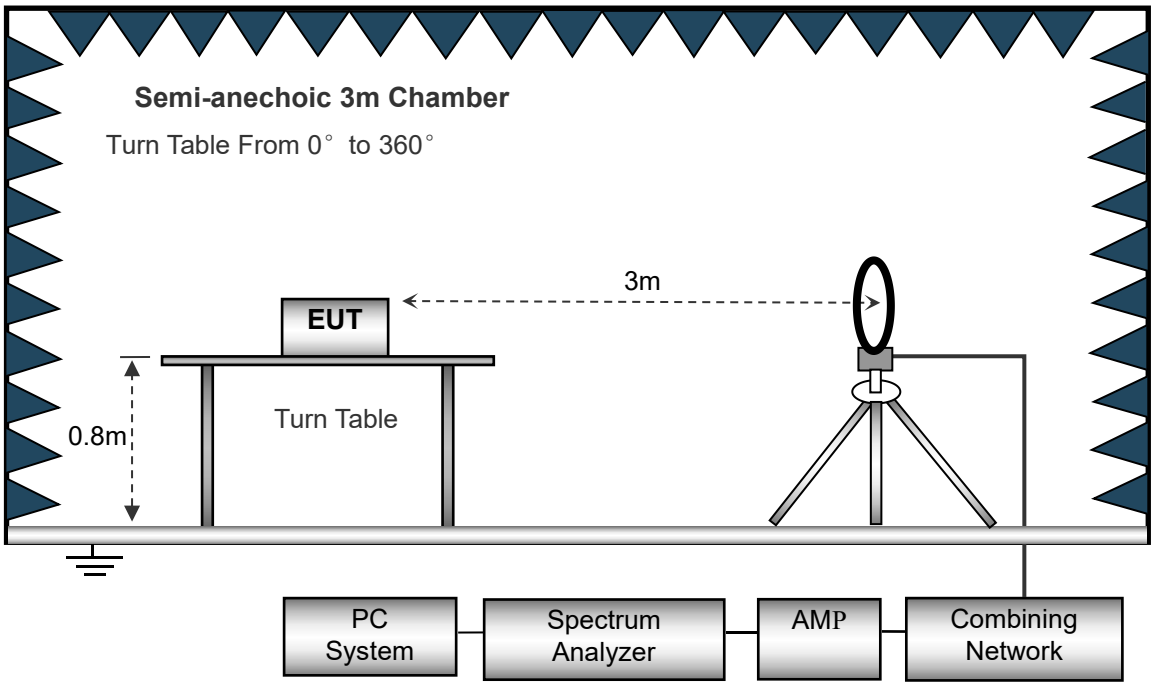
• EIRP is the equivalent isotropically radiated power in watts.

8.2 Test Procedure

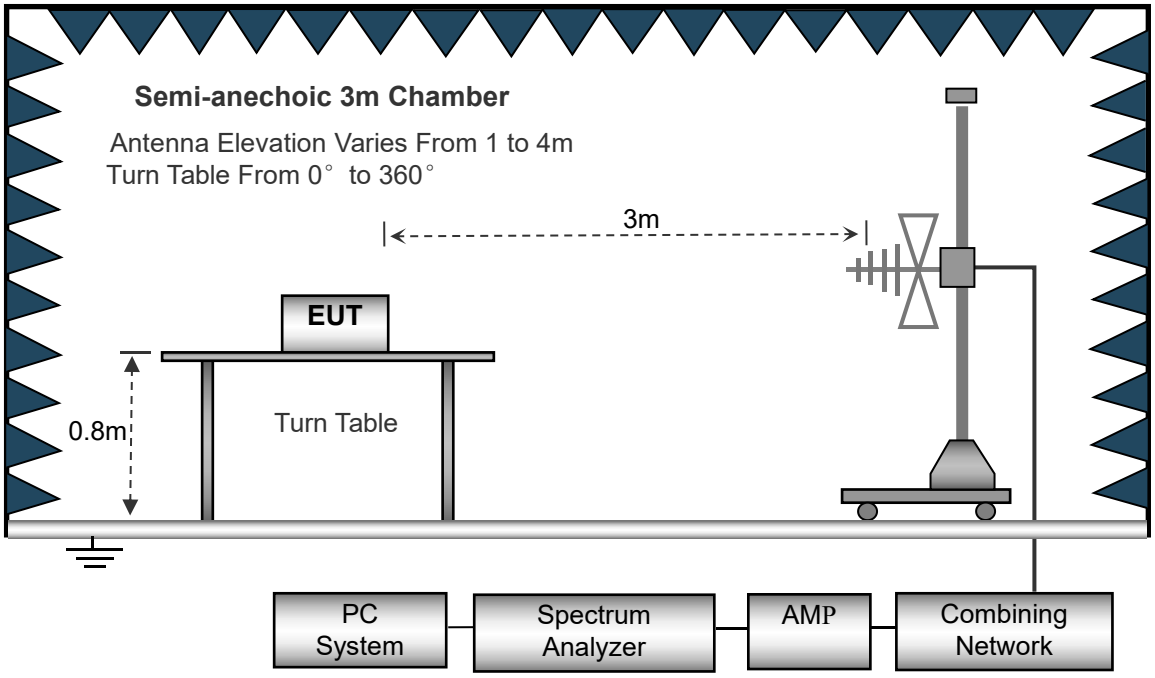
The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.205 15.407(b)(6) and FCC Part 15.209 Limit..

The external I/O cables were draped along the test table and formed a bundle 30 to 40cm long in the middle. The spacing between the peripherals was 10cm.

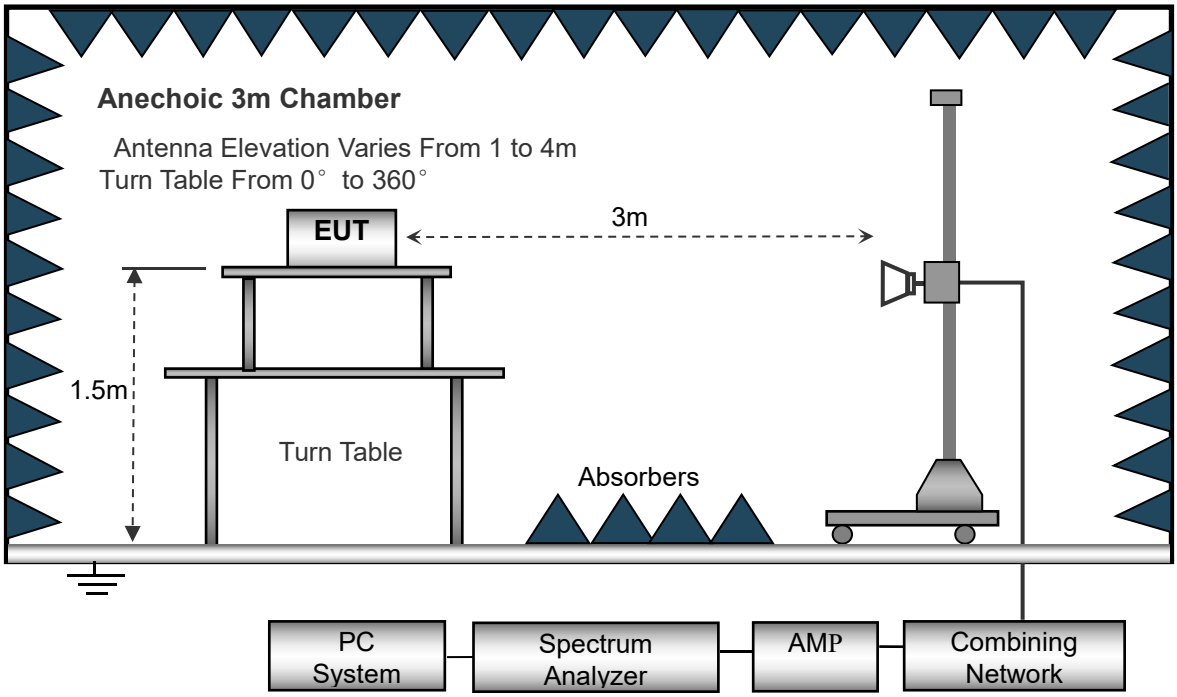
The test setup for emission measurement below 30MHz.



The test setup for emission measurement from 30MHz to 1GHz.



The test setup for emission measurement above 1GHz.



8.3 Test Receiver Setup

During the radiated emission test for above 1GHz, the test receiver was set with the following configurations:

For peak detector:
RBW = 1000kHz, VBW = 3000kHz, Sweep Time = Auto

For average detector:
RBW = 1000kHz, VBW = 10Hz, Sweep Time = Auto

8.4 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated adding the Antenna Factor and the Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Ant. Factor + Cable Loss – Ampl. Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dBμV means the emission is 6dBμV below the maximum limit for Class B. The equation for margin calculation is as follows:

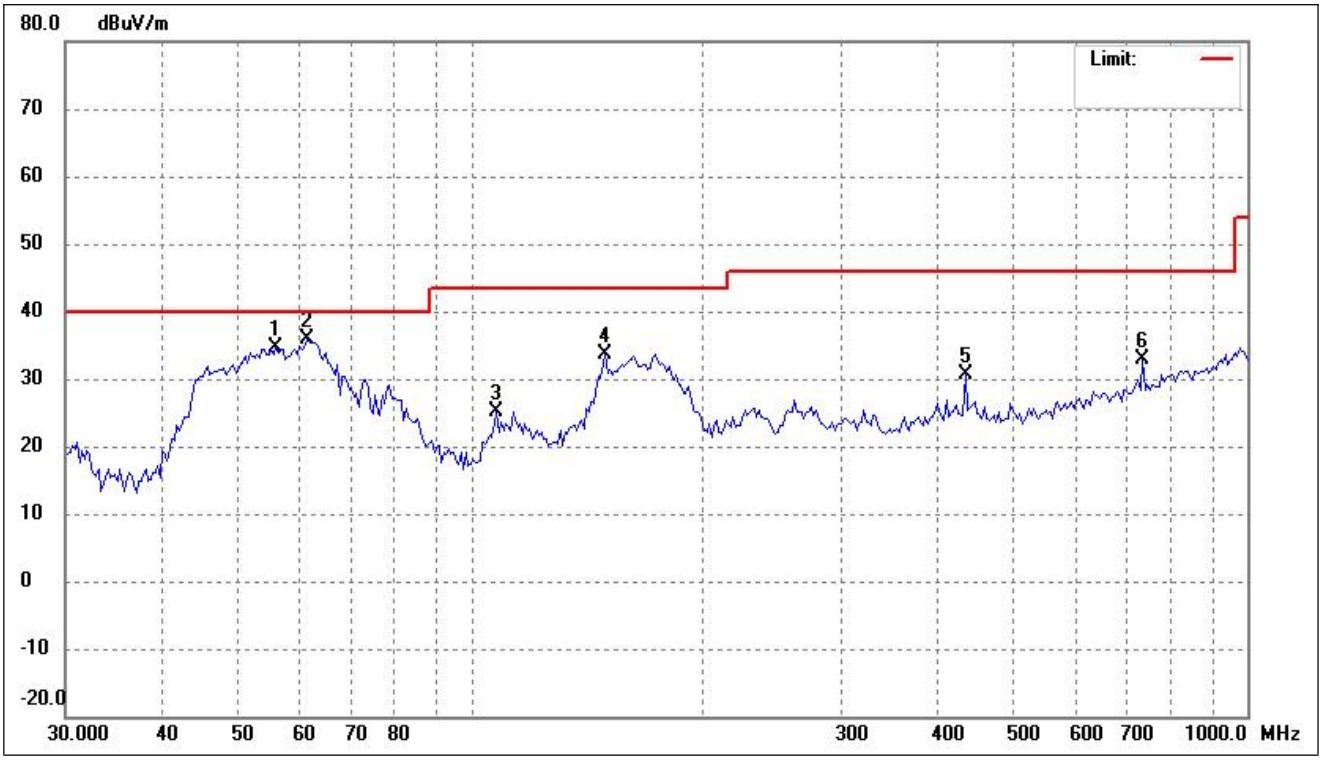
Margin = Corr. Ampl. – FCC Part 15 Limit

8.5 Summary of Test Results/Plots

Note: *this EUT was tested in 3 orthogonal positions and the worst case position data was reported.*

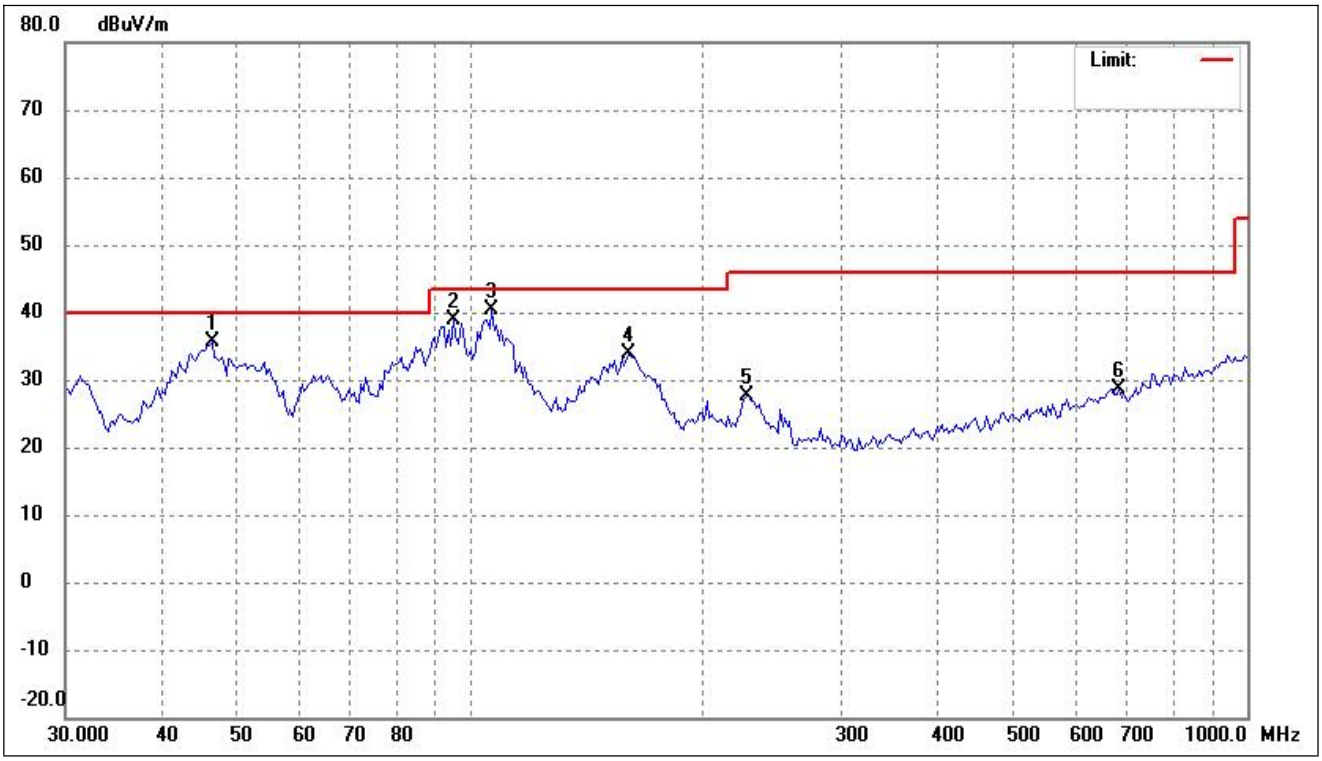
- Spurious Emission From 30MHz to 1GHz
- 5150-5250MHz

802.11a			
Test Channel	5180MHz(Worst case)	Polarity:	Horizontal



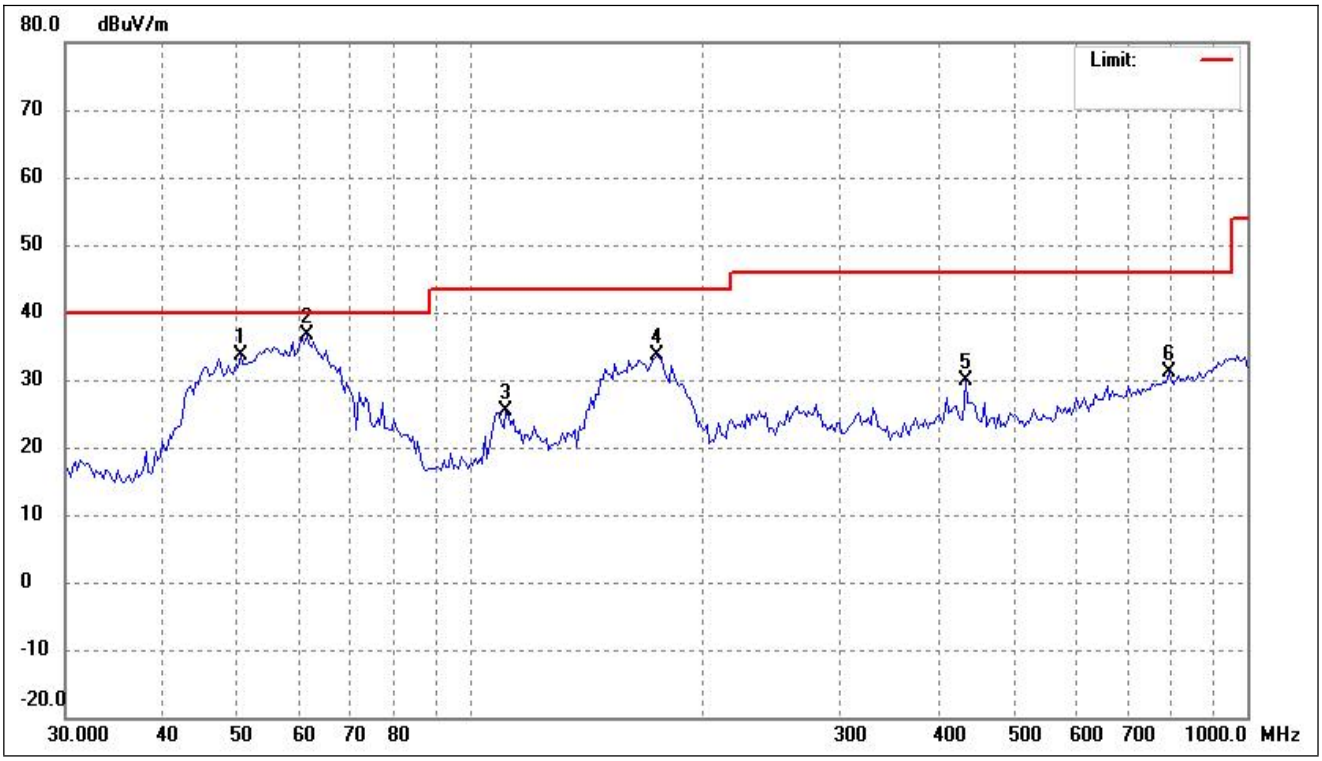
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	56.0708	42.82	-8.20	34.62	40.00	-5.38	-	-	peak
2	61.4343	44.64	-8.69	35.95	40.00	-4.05	-	-	peak
3	107.7854	36.51	-11.27	25.24	43.50	-18.26	-	-	peak
4	148.9175	41.74	-8.14	33.60	43.50	-9.90	-	-	peak
5	433.3397	36.24	-5.55	30.69	46.00	-15.31	-	-	peak
6	734.0373	33.11	-0.23	32.88	46.00	-13.12	-	-	peak

802.11a			
Test Channel	5180MHz(Worst case)	Polarity:	Vertical



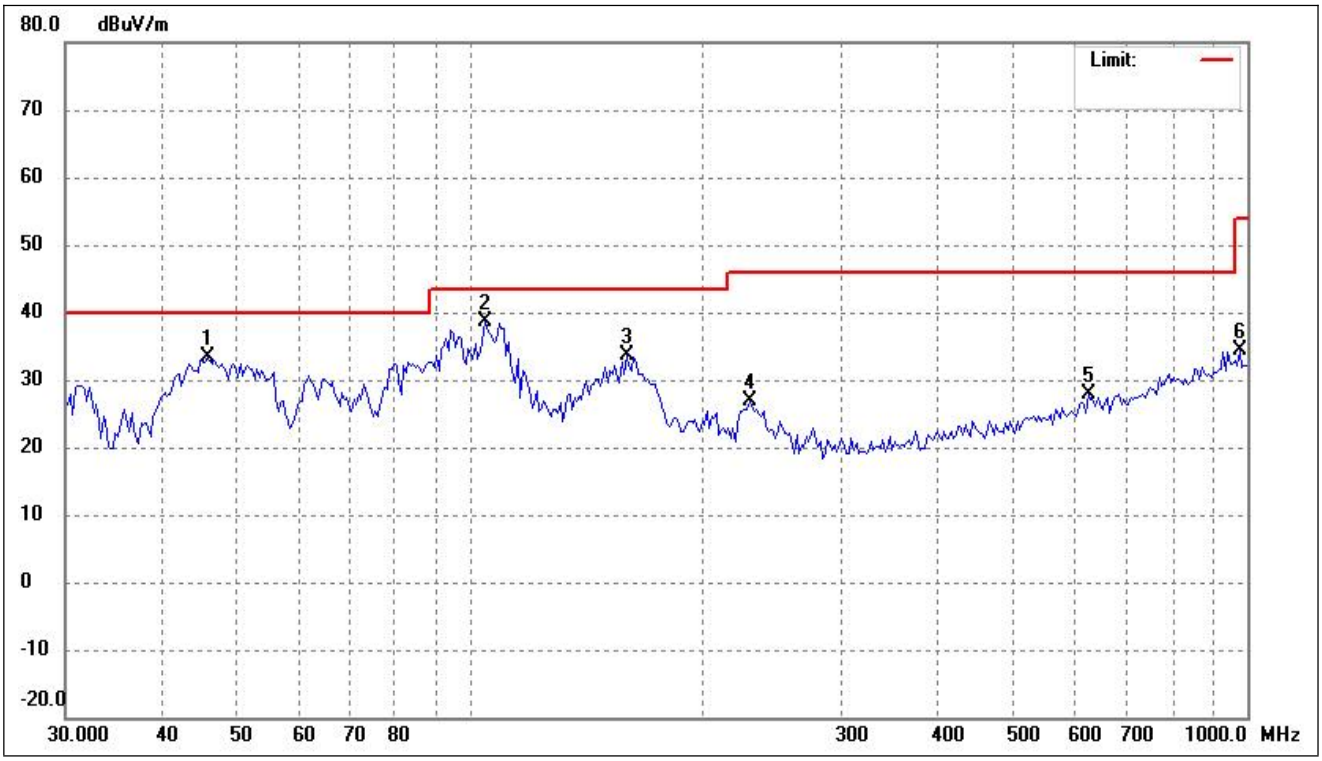
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	46.3806	43.45	-7.86	35.59	40.00	-4.41	-	-	peak
2	94.9788	51.20	-12.30	38.90	43.50	-4.60	-	-	peak
3	106.2812	51.88	-11.41	40.47	43.50	-3.03	-	-	peak
4	159.7586	41.85	-8.05	33.80	43.50	-9.70	-	-	peak
5	227.0164	38.94	-11.22	27.72	46.00	-18.28	-	-	peak
6	684.2259	29.87	-1.27	28.60	46.00	-17.40	-	-	peak

802.11n-HT20			
Test Channel	5180MHz(worst case)	Polarity:	Horizontal



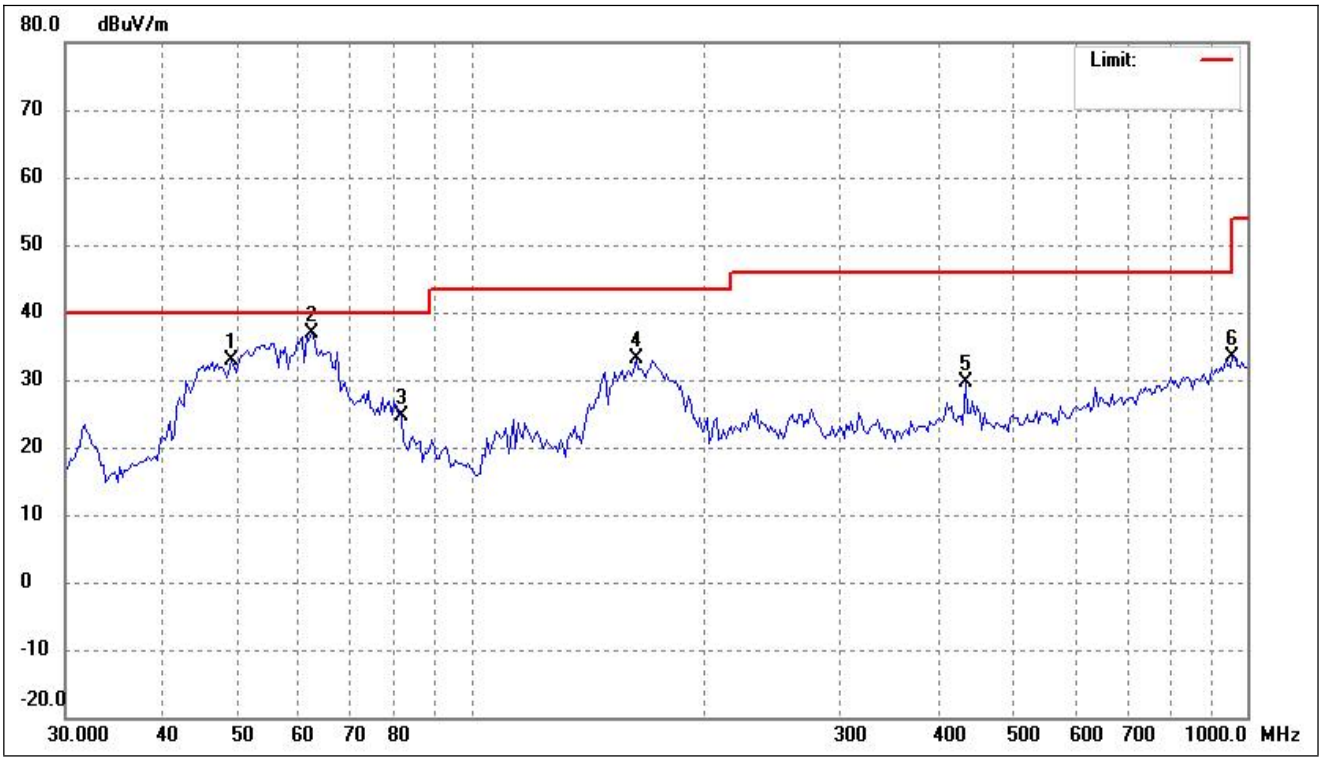
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	50.4614	41.39	-7.64	33.75	40.00	-6.25	-	-	peak
2	61.4343	45.39	-8.69	36.70	40.00	-3.30	-	-	peak
3	110.8581	36.36	-10.98	25.38	43.50	-18.12	-	-	peak
4	173.8147	42.43	-8.85	33.58	43.50	-9.92	-	-	peak
5	433.3397	35.44	-5.55	29.89	46.00	-16.11	-	-	peak
6	793.0281	30.25	0.88	31.13	46.00	-14.87	-	-	peak

802.11n-HT20			
Test Channel	5180MHz(worst case)	Polarity:	Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	45.7333	41.29	-7.90	33.39	40.00	-6.61	-	-	peak
2	104.0640	50.26	-11.62	38.64	43.50	-4.86	-	-	peak
3	158.6399	41.72	-8.05	33.67	43.50	-9.83	-	-	peak
4	228.6173	37.97	-11.15	26.82	46.00	-19.18	-	-	peak
5	624.4897	29.54	-1.78	27.76	46.00	-18.24	-	-	peak
6	979.1392	30.91	3.42	34.33	54.00	-19.67	-	-	peak

802.11n-HT40			
Test Channel	5190MHz(worst case)	Polarity:	Horizontal



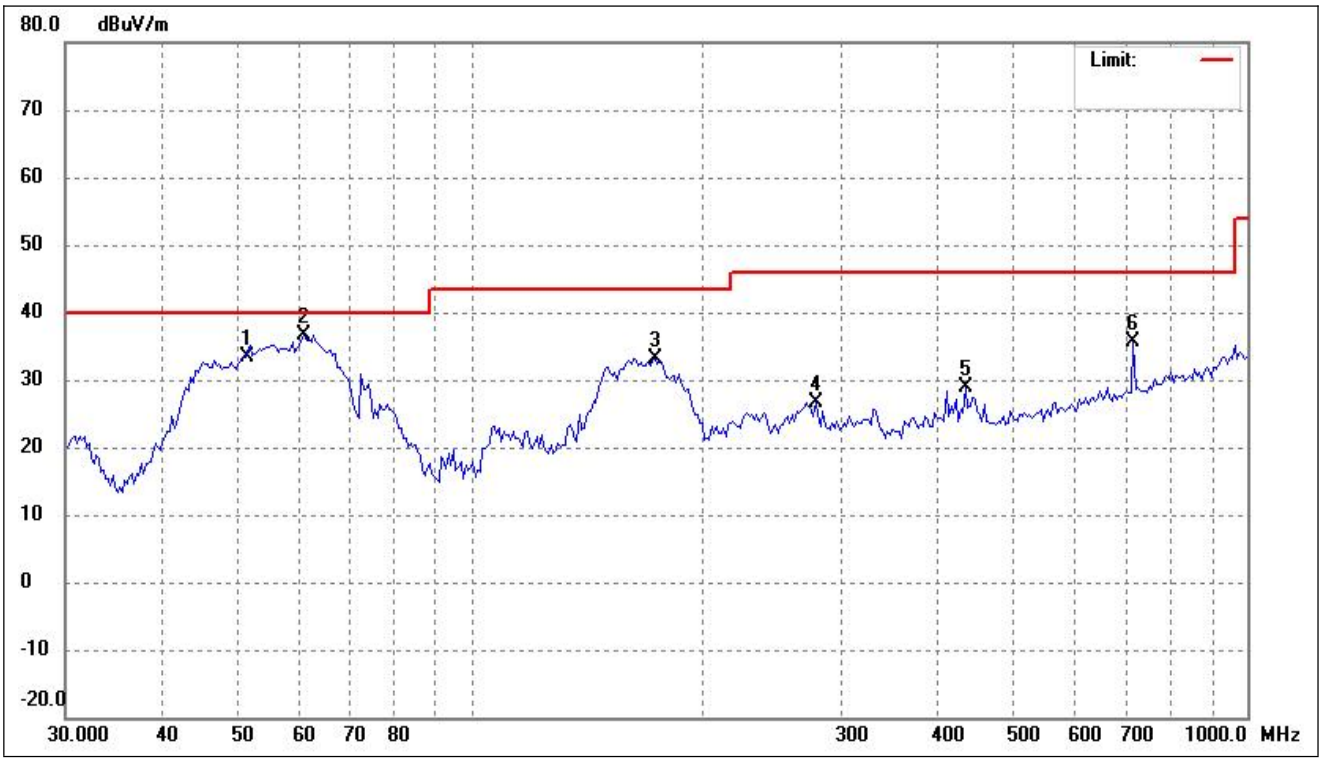
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	49.0627	40.48	-7.65	32.83	40.00	-7.17	-	-	peak
2	62.3038	45.67	-8.84	36.83	40.00	-3.17	-	-	peak
3	81.3740	37.02	-12.45	24.57	40.00	-15.43	-	-	peak
4	163.1623	41.18	-8.13	33.05	43.50	-10.45	-	-	peak
5	433.3397	35.26	-5.55	29.71	46.00	-16.29	-	-	peak
6	958.7135	30.13	3.34	33.47	46.00	-12.53	-	-	peak

802.11n-HT40			
Test Channel	5190MHz(worst case)	Polarity:	Vertical

No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	45.4131	42.91	-7.92	34.99	40.00	-5.01	-	-	peak
2	96.3230	49.01	-12.21	36.80	43.50	-6.70	-	-	peak
3	104.7979	49.16	-11.55	37.61	43.50	-5.89	-	-	peak
4	162.0197	41.46	-8.10	33.36	43.50	-10.14	-	-	peak
5	231.8531	36.99	-10.90	26.09	46.00	-19.91	-	-	peak
6	516.5651	29.23	-4.48	24.75	46.00	-21.25	-	-	peak

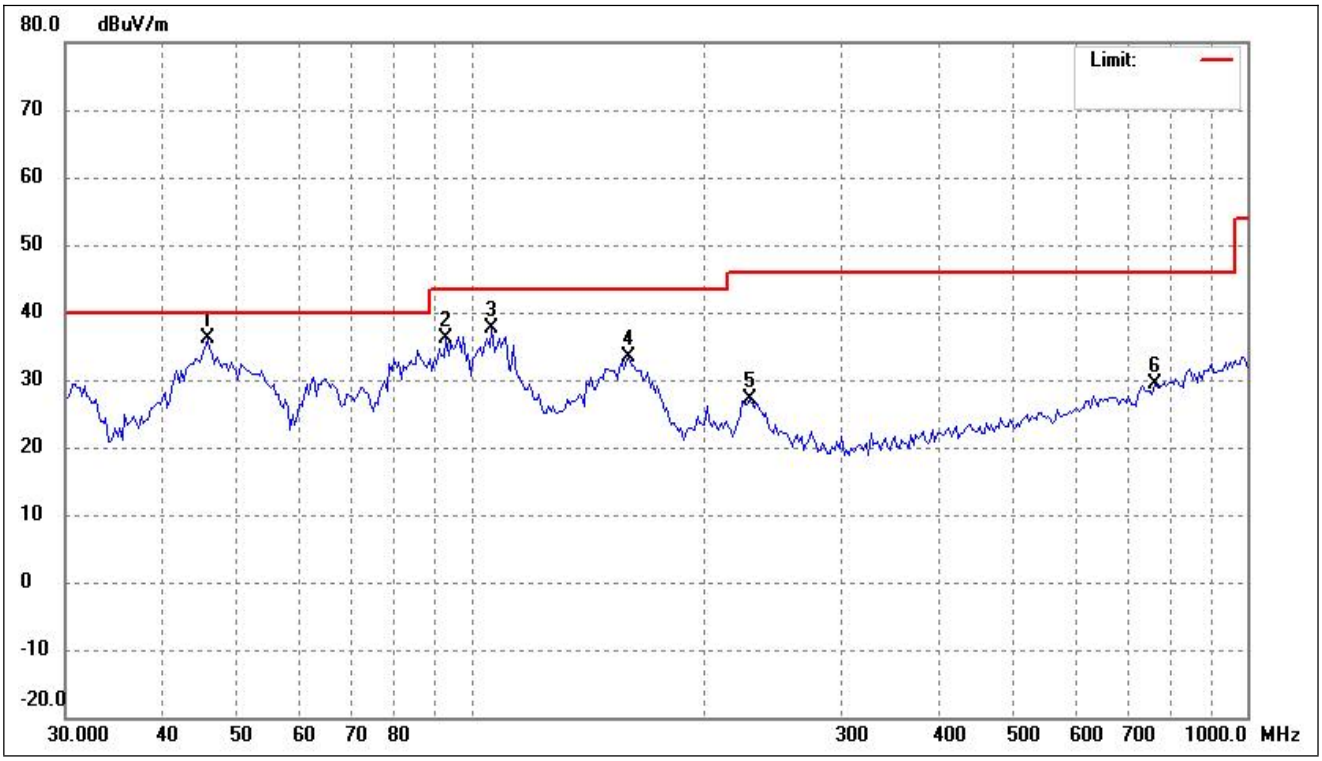
➢ 5725-5850MHz

802.11a			
Test Channel	5745MHz(worst case)	Polarity:	Horizontal



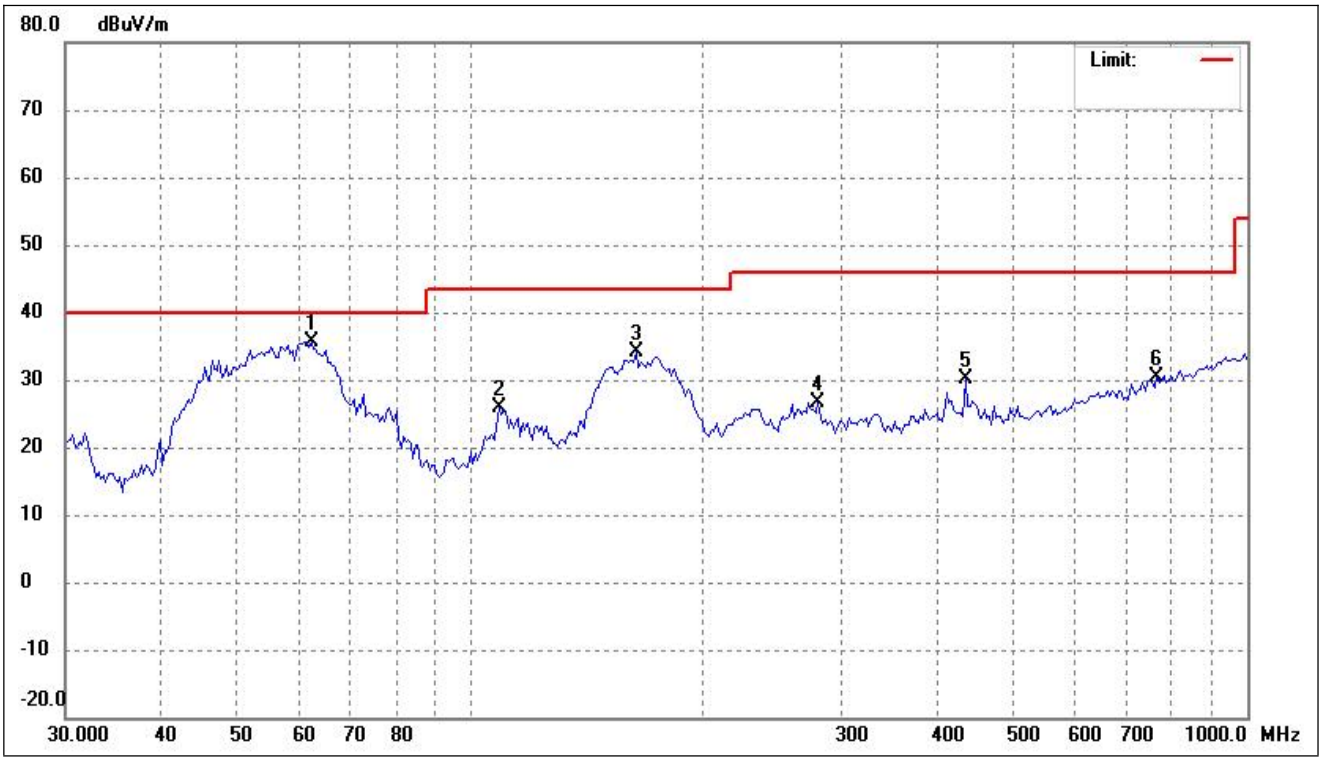
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	51.1756	41.16	-7.72	33.44	40.00	-6.56	-	-	peak
2	61.0041	45.30	-8.61	36.69	40.00	-3.31	-	-	peak
3	172.5976	41.91	-8.68	33.23	43.50	-10.27	-	-	peak
4	278.3308	35.10	-8.55	26.55	46.00	-19.45	-	-	peak
5	433.3397	34.51	-5.55	28.96	46.00	-17.04	-	-	peak
6	713.6917	36.36	-0.75	35.61	46.00	-10.39	-	-	peak

802.11a			
Test Channel	5745MHz(worst case)	Polarity:	Vertical



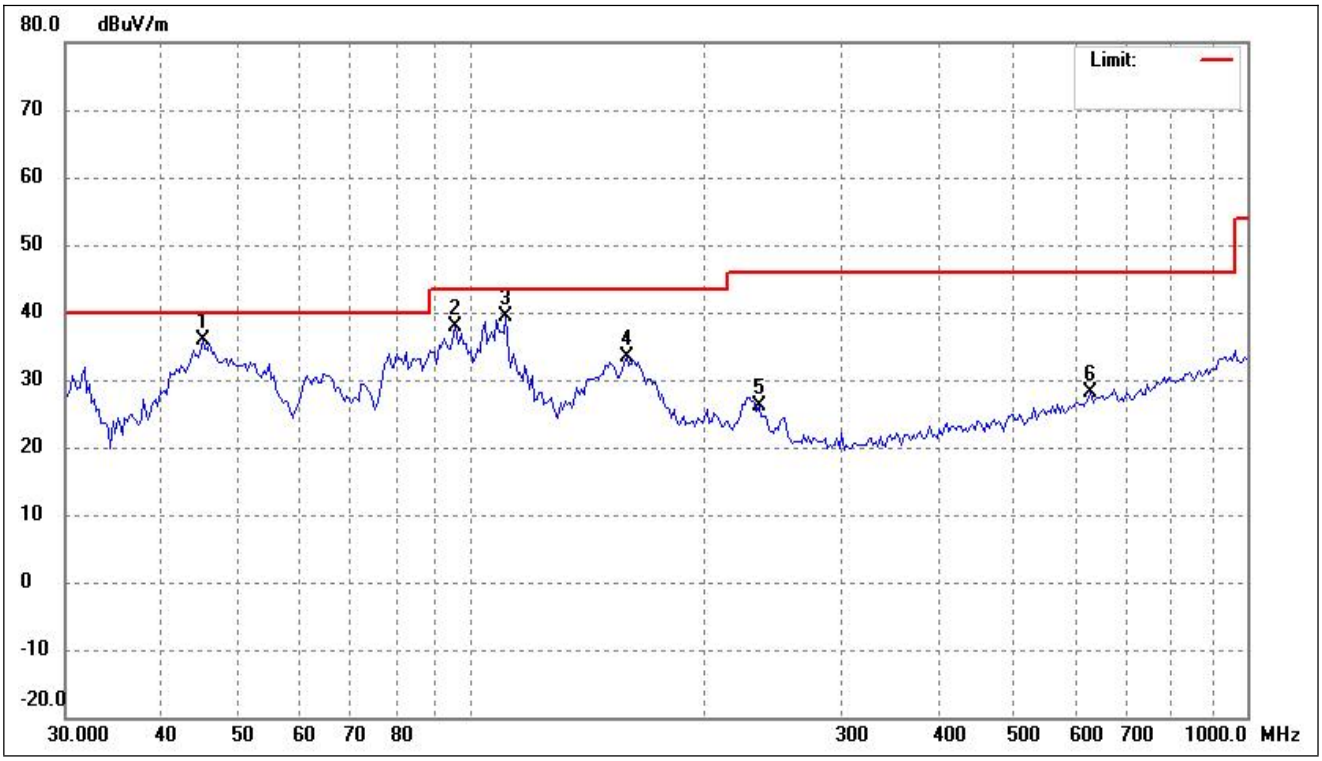
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	45.7333	44.01	-7.90	36.11	40.00	-3.89	-	-	peak
2	92.9974	48.49	-12.42	36.07	43.50	-7.43	-	-	peak
3	106.2812	49.06	-11.41	37.65	43.50	-5.85	-	-	peak
4	159.7586	41.47	-8.05	33.42	43.50	-10.08	-	-	peak
5	228.6173	38.26	-11.15	27.11	46.00	-18.89	-	-	peak
6	760.2867	28.99	0.35	29.34	46.00	-16.66	-	-	peak

802.11n-HT20			
Test Channel	5745MHz(worst case)	Polarity:	Horizontal



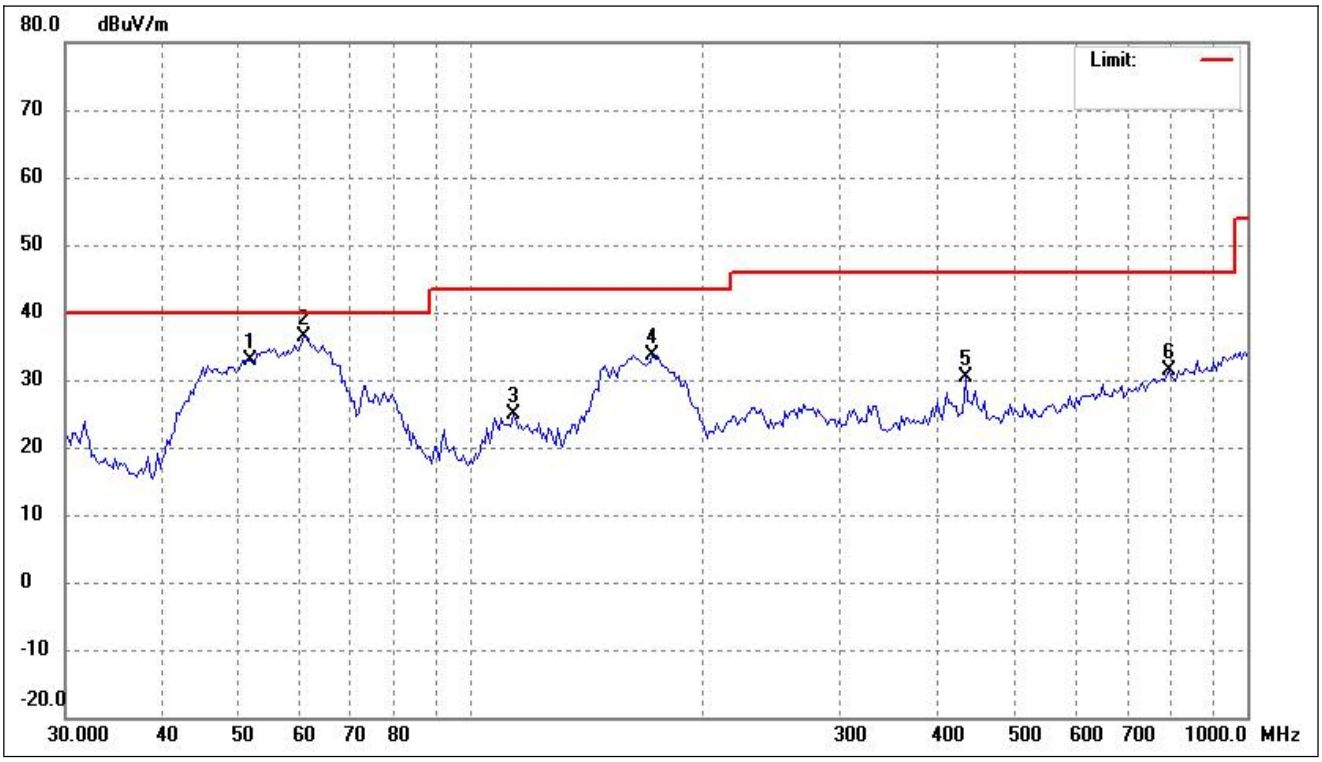
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	62.3038	44.48	-8.84	35.64	40.00	-4.36	-	-	peak
2	108.5455	37.08	-11.21	25.87	43.50	-17.63	-	-	peak
3	163.1623	42.19	-8.13	34.06	43.50	-9.44	-	-	peak
4	280.2936	35.03	-8.49	26.54	46.00	-19.46	-	-	peak
5	433.3397	35.74	-5.55	30.19	46.00	-15.81	-	-	peak
6	765.6482	29.94	0.45	30.39	46.00	-15.61	-	-	peak

802.11n-HT20			
Test Channel	5745MHz(worst case)	Polarity:	Vertical



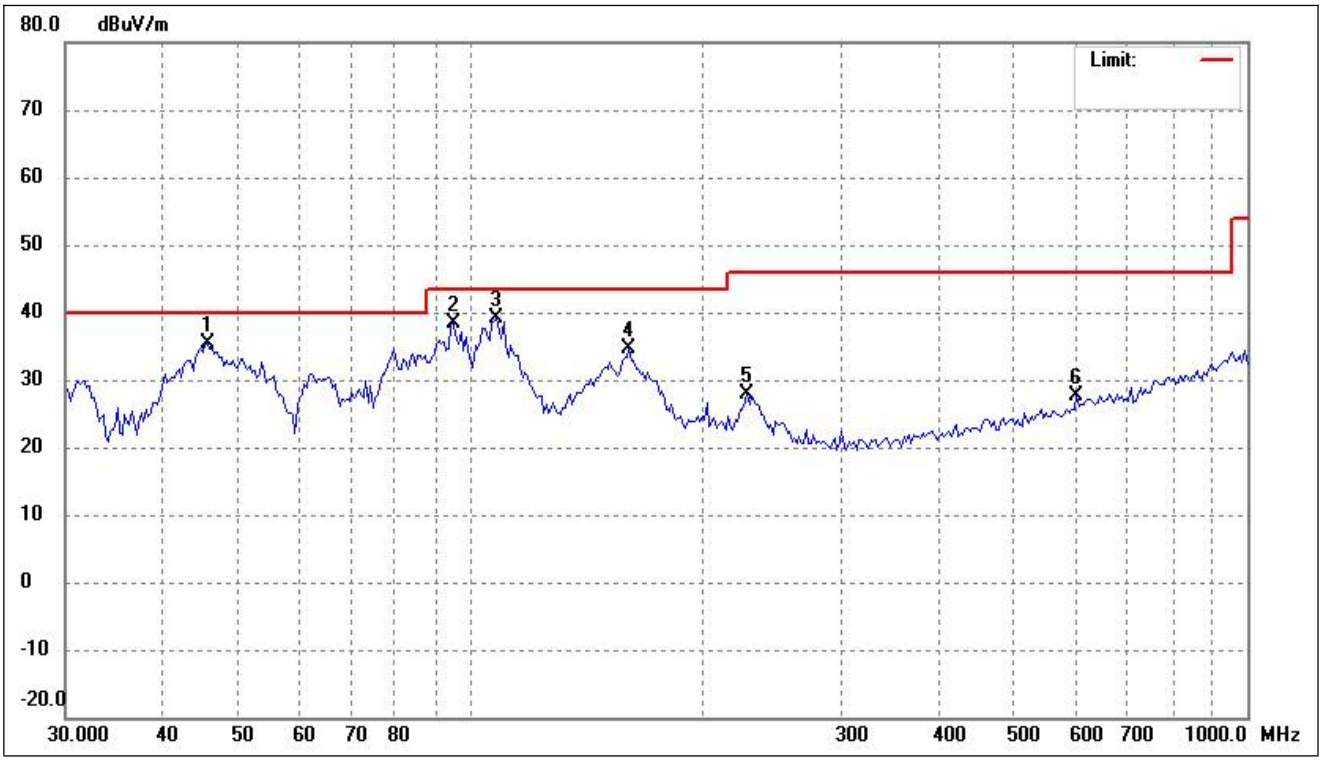
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	45.0951	43.85	-7.95	35.90	40.00	-4.10	-	-	peak
2	95.6485	50.10	-12.25	37.85	43.50	-5.65	-	-	peak
3	110.8581	50.33	-10.98	39.35	43.50	-4.15	-	-	peak
4	158.6399	41.32	-8.05	33.27	43.50	-10.23	-	-	peak
5	235.1346	36.59	-10.55	26.04	46.00	-19.96	-	-	peak
6	628.8936	29.90	-1.74	28.16	46.00	-17.84	-	-	peak

802.11n-HT40			
Test Channel	5755MHz(worst case)	Polarity:	Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	51.8999	40.77	-7.79	32.98	40.00	-7.02	-	-	peak
2	61.0041	45.08	-8.61	36.47	40.00	-3.53	-	-	peak
3	113.2200	35.71	-10.72	24.99	43.50	-18.51	-	-	peak
4	171.3890	42.13	-8.51	33.62	43.50	-9.88	-	-	peak
5	433.3397	36.02	-5.55	30.47	46.00	-15.53	-	-	peak
6	793.0281	30.60	0.88	31.48	46.00	-14.52	-	-	peak

802.11n-HT40			
Test Channel	5755MHz(worst case)	Polarity:	Vertical

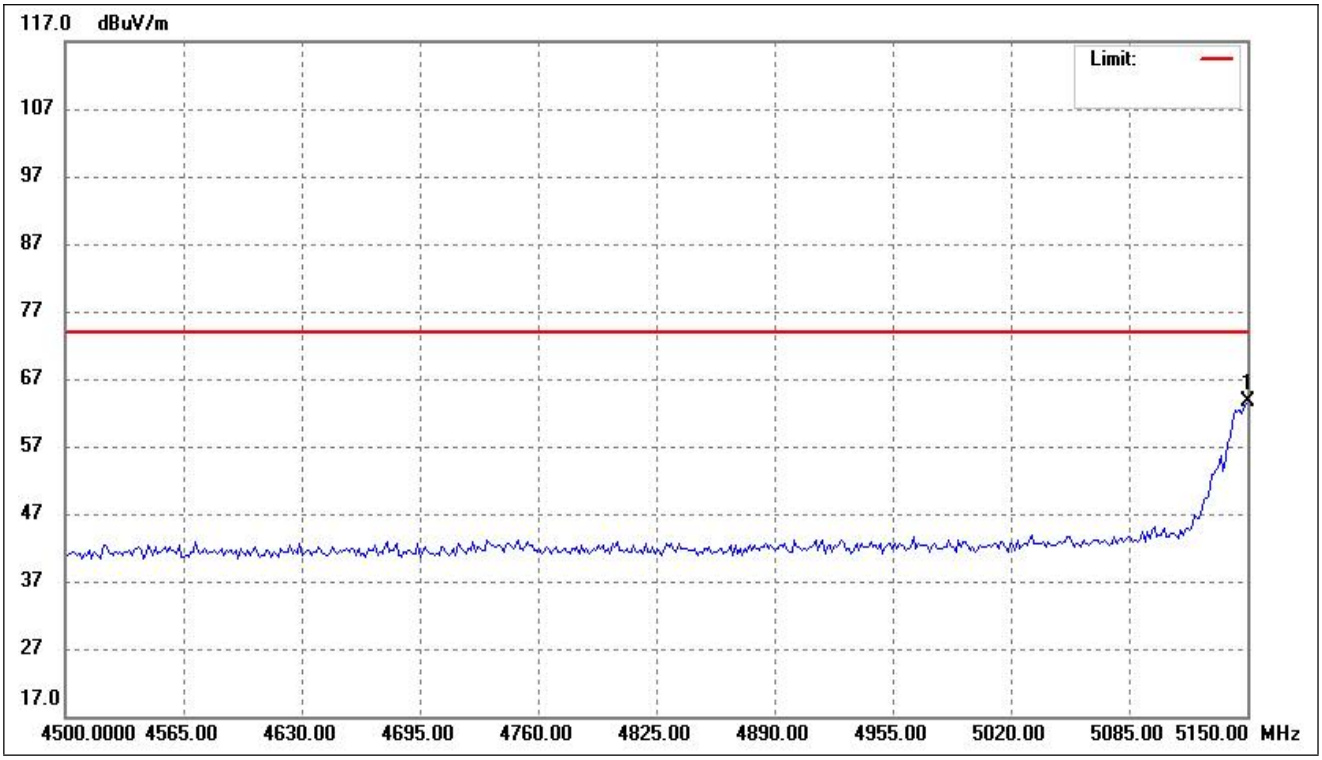


No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	45.7333	43.25	-7.90	35.35	40.00	-4.65	-	-	peak
2	94.9788	50.59	-12.30	38.29	43.50	-5.21	-	-	peak
3	107.7854	50.40	-11.27	39.13	43.50	-4.37	-	-	peak
4	159.7586	42.58	-8.05	34.53	43.50	-8.97	-	-	peak
5	227.0164	38.98	-11.22	27.76	46.00	-18.24	-	-	peak
6	602.9287	29.74	-2.19	27.55	46.00	-18.45	-	-	peak

Remark: '-'Means' the test Degree and Height are not recorded by the test software and only show the worst case in the test report.

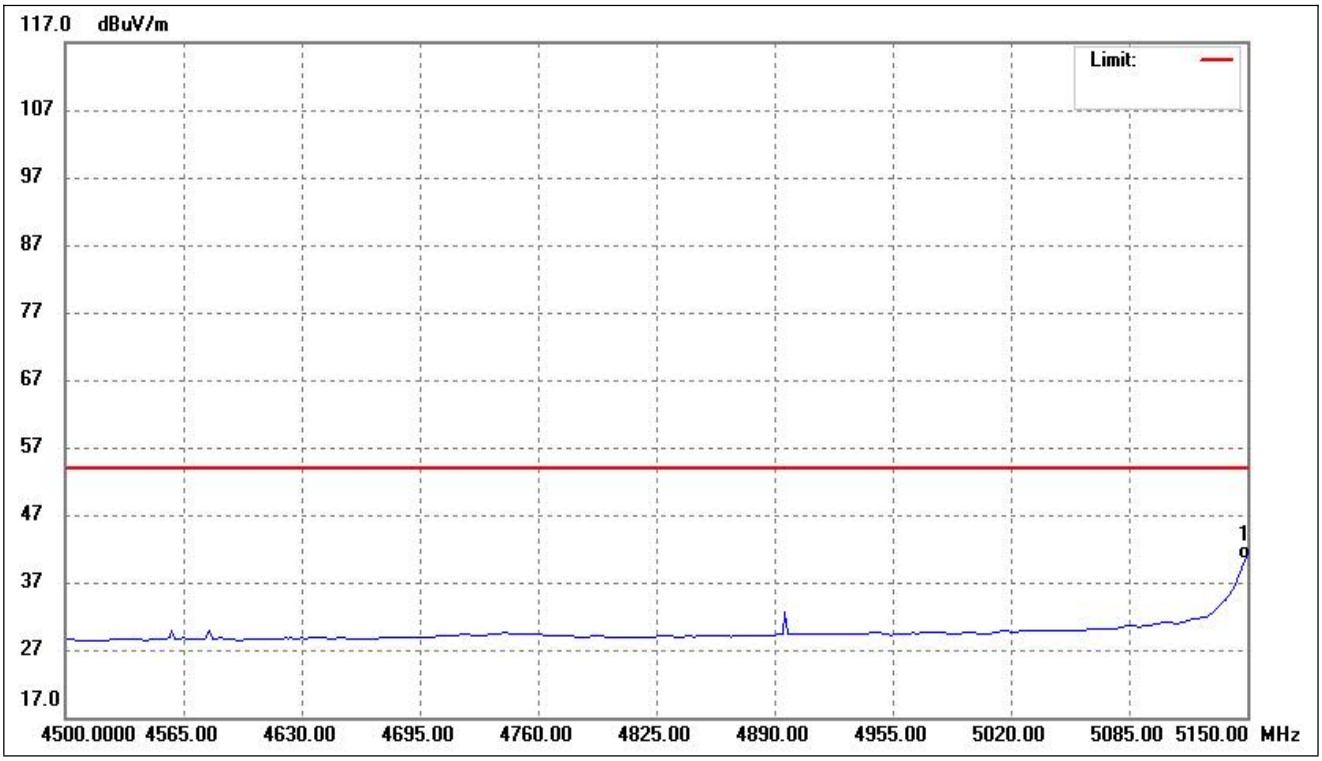
➢ Spurious Emission above 1GHz

802.11a- Restricted Bandedge			
Test Channel	band 5.15-5.25GHz	Polarity:	Horizontal(worst case)



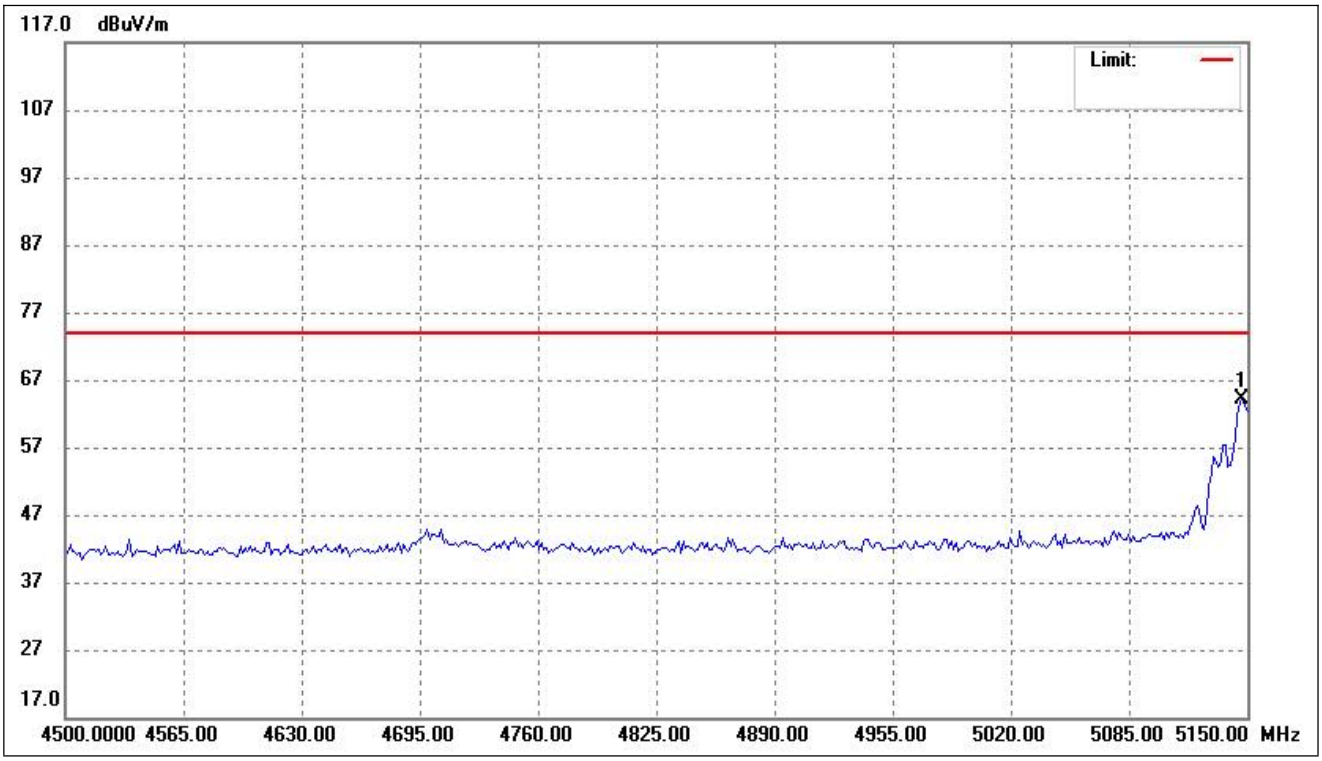
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	5150.000	76.13	-12.53	63.60	74.00	-10.40	-	-	peak

802.11a- Restricted Bandedge			
Test Channel	band 5.15-5.25GHz	Polarity:	Horizontal(worst case)



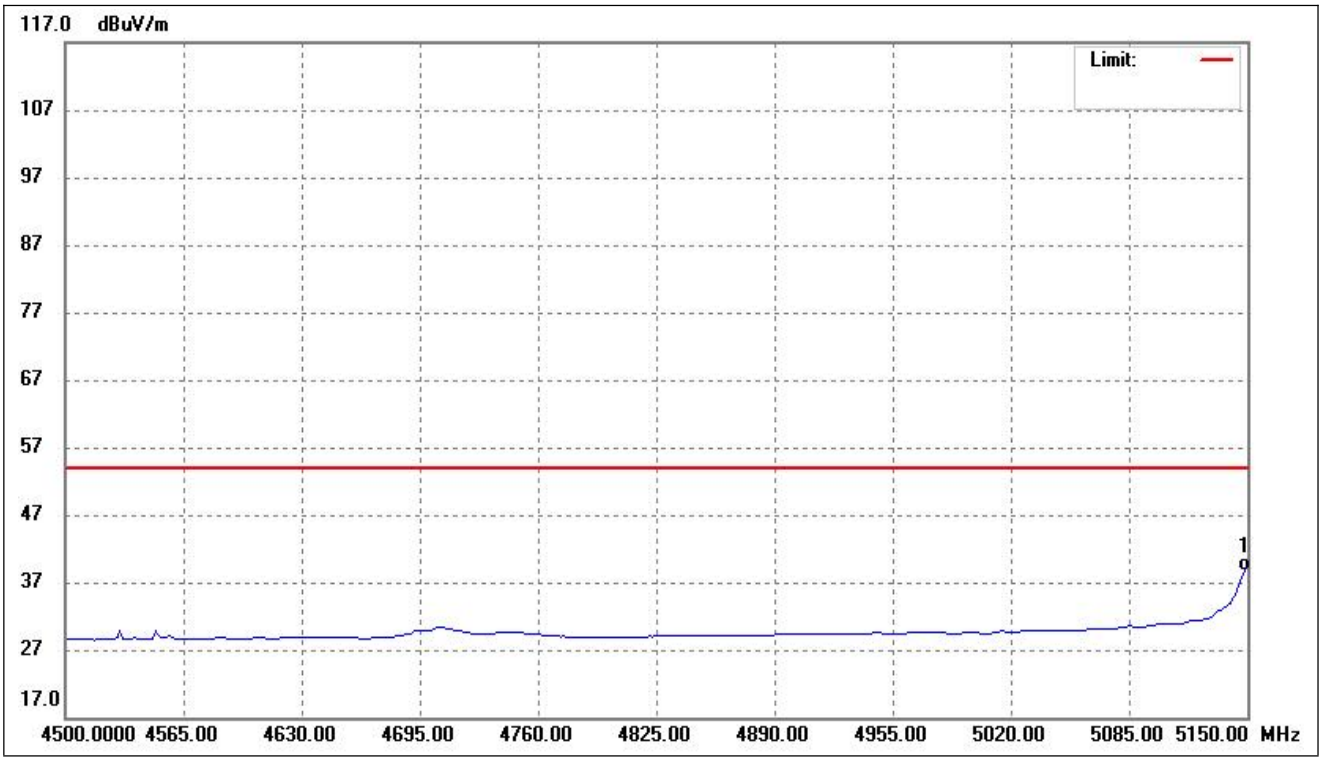
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	5150.000	53.99	-12.53	41.46	54.00	-12.54	-	-	AVG

802.11n-HT20- Restricted Bandedge			
Test Channel	band 5.15-5.25GHz	Polarity:	Horizontal(worst case)



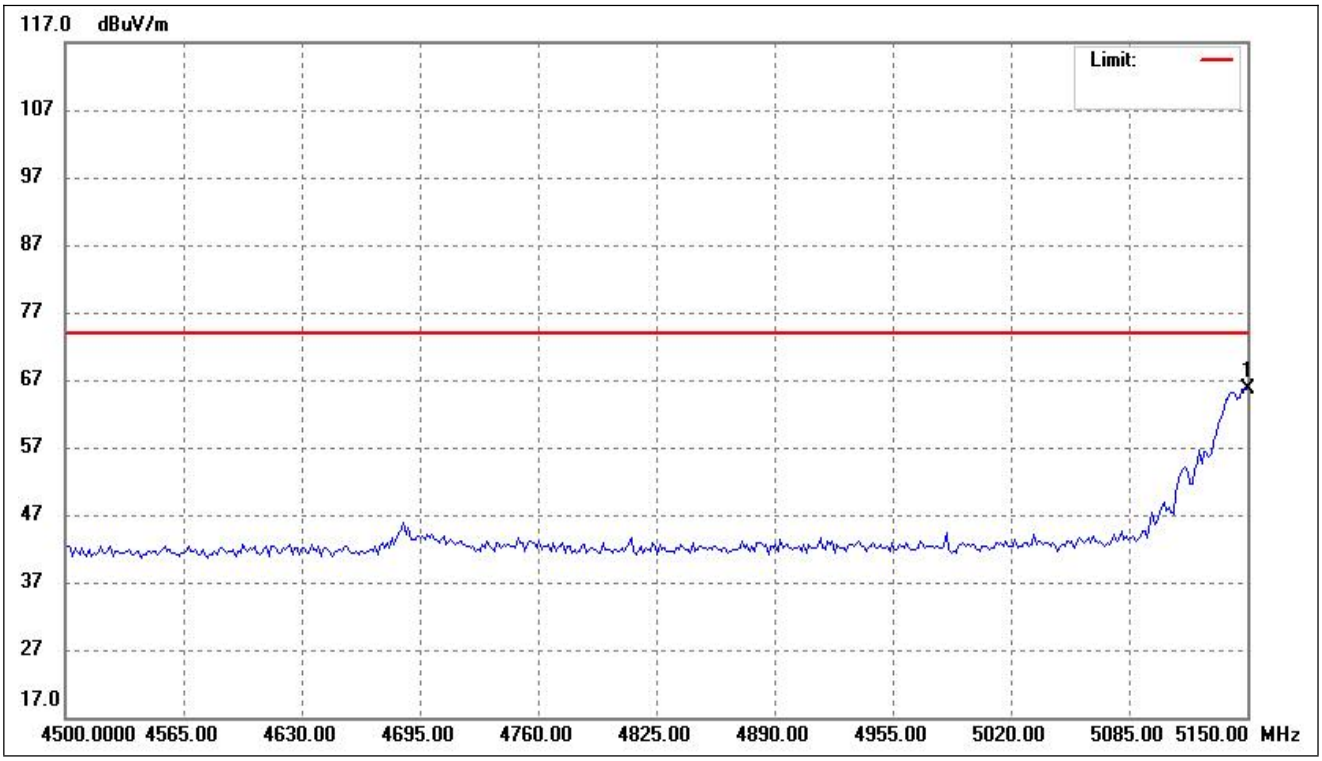
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	5147.395	76.74	-12.54	64.20	74.00	-9.80	-	-	peak

802.11n-HT20- Restricted Bandedge			
Test Channel	band 5.15-5.25GHz	Polarity:	Horizontal(worst case)



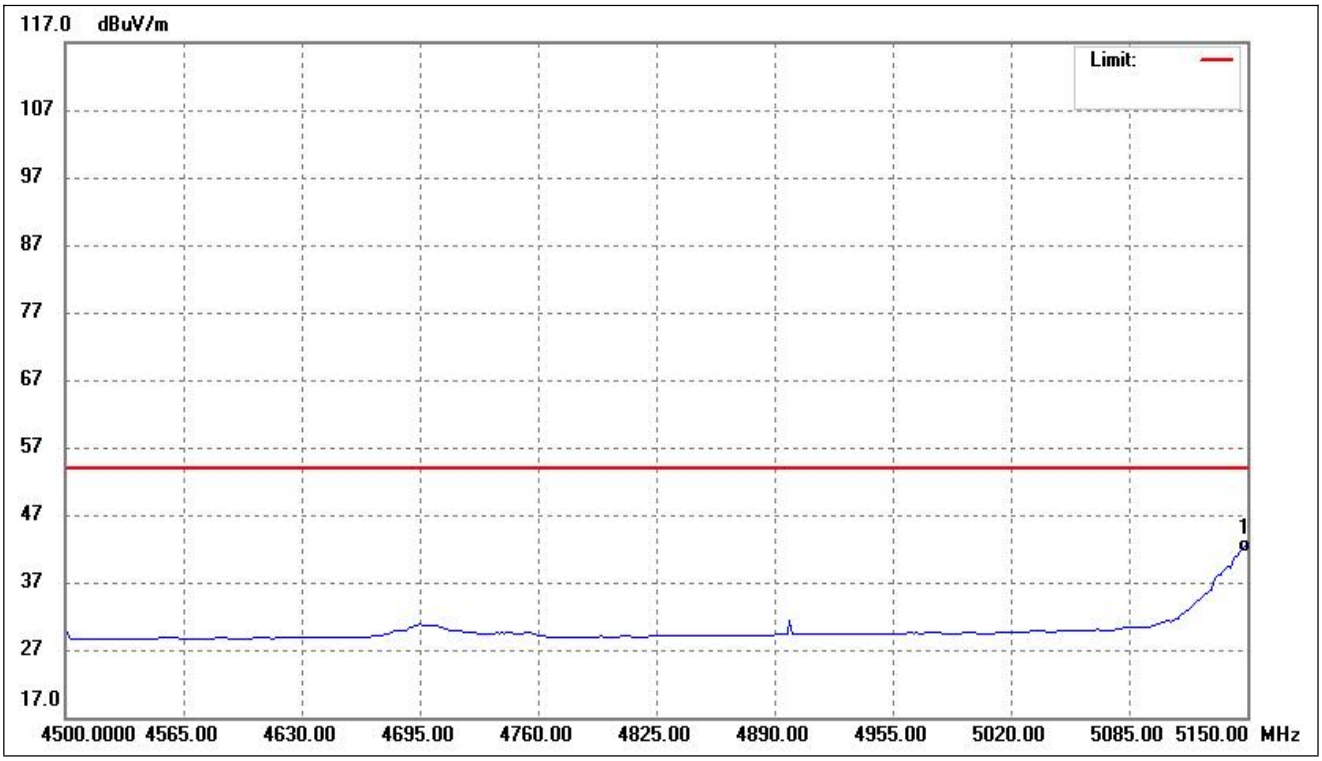
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	5150.000	52.28	-12.53	39.75	54.00	-14.25	-	-	AVG

802.11n-HT40- Restricted Bandedge			
Test Channel	band 5.15-5.25GHz	Polarity:	Horizontal(worst case)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	5150.000	78.27	-12.53	65.74	74.00	-8.26	-	-	peak

802.11n-HT40- Restricted Bandedge			
Test Channel	band 5.15-5.25GHz	Polarity:	Horizontal(worst case)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	5148.697	54.90	-12.53	42.37	54.00	-11.63	-	-	AVG

Note: The Restricted Bandedge was tested in Horizontal /Vertical and the worst case position data was reported.

Remark: '-'Means' the test Degree and Height is not recorded by the test software and only show the worst case in the test report.

- Harmonics And Spurious Emissions
- For the frequency band 5.150-5.250GHz, 5.725-5.850GHz (802.11a)

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB	(dBuV/m)	(dBuV/m)	(dB)	H/V	
Low Channel (5180MHz)							
10360	59.77	-6.13	53.64	74	-20.36	H	PK
10360	41.24	-6.13	35.11	54	-18.89	H	AV
15540	58.56	-1.64	56.92	74	-17.08	H	PK
15540	41.06	-1.64	39.42	54	-14.58	H	AV
10360	57.46	-6.13	51.33	74	-22.67	V	PK
10360	40.19	-6.13	34.06	54	-19.94	V	AV
15540	55.87	-1.64	54.23	74	-19.77	V	PK
15540	41.26	-1.64	39.62	54	-14.38	V	AV
Middle Channel (5200MHz)							
10400	58.06	-5.93	52.13	74	-21.87	H	PK
10400	38.21	-5.93	32.28	54	-21.72	H	AV
15600	60.52	-1.58	58.94	74	-15.06	H	PK
15600	41.33	-1.58	39.75	54	-14.25	H	AV
10400	61.75	-5.93	55.82	74	-18.18	V	PK
10400	38.82	-5.93	32.89	54	-21.11	V	AV
15600	61.26	-1.58	59.68	74	-14.32	V	PK
15600	38.34	-1.58	36.76	54	-17.24	V	AV
High Channel (5240MHz)							
10480	58.03	-5.71	52.32	74	-21.68	H	PK
10480	40.72	-5.71	35.01	54	-18.99	H	AV
15720	60.22	-1.52	58.7	74	-15.3	H	PK
15720	40.63	-1.52	39.11	54	-14.89	H	AV
10480	60.75	-5.71	55.04	74	-18.96	V	PK
10480	38.29	-5.71	32.58	54	-21.42	V	AV
15720	59.79	-1.52	58.27	74	-15.73	V	PK
15720	38.31	-1.52	36.79	54	-17.21	V	AV

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB	(dBuV/m)	(dBuV/m)	(dB)	H/V	
Low Channel (5745MHz)							
11490	60.61	-6.13	54.48	74	-19.52	H	PK
11490	41.82	-6.13	35.69	54	-18.31	H	AV
17235	57.44	-1.64	55.8	74	-18.2	H	PK
17235	40.54	-1.64	38.9	54	-15.1	H	AV
11490	58.31	-6.13	52.18	74	-21.82	V	PK
11490	38.24	-6.13	32.11	54	-21.89	V	AV
17235	58.52	-1.64	56.88	74	-17.12	V	PK
17235	41.2	-1.64	39.56	54	-14.44	V	AV
Middle Channel (5785MHz)							
11570	59.63	-5.93	53.7	74	-20.3	H	PK
11570	38.97	-5.93	33.04	54	-20.96	H	AV
17355	61.38	-1.58	59.8	74	-14.2	H	PK
17355	41.39	-1.58	39.81	54	-14.19	H	AV
11570	60.59	-5.93	54.66	74	-19.34	V	PK
11570	39.54	-5.93	33.61	54	-20.39	V	AV
17355	60.37	-1.58	58.79	74	-15.21	V	PK
17355	38.66	-1.58	37.08	54	-16.92	V	AV
High Channel (5825MHz)							
11650	60.75	-5.71	55.04	74	-18.96	H	PK
11650	41.79	-5.71	36.08	54	-17.92	H	AV
17475	59.34	-1.52	57.82	74	-16.18	H	PK
17475	38.65	-1.52	37.13	54	-16.87	H	AV
11650	61.72	-5.71	56.01	74	-17.99	V	PK
11650	38.47	-5.71	32.76	54	-21.24	V	AV
17475	60.39	-1.52	58.87	74	-15.13	V	PK
17475	41.64	-1.52	40.12	54	-13.88	V	AV

- Out of Band edge for 5150-5250MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5150	-28.21	-27
Highest	Above 5350	-34.36	-27
Note: the data just list the worst cases			

- Out of Band edge for 5725-5850MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5650	-38.66	-27
	5650 to 5700	-25.11	-27 to -17
	5700 to 5720	-26.83	-17 to 15.6
	5720 to 5725	-33.26	15.6 to 27
Highest	5850 to 5855	-39.70	27 to 15.6
	5855 to 5875	-30.25	15.6 to -17
	5875 to 5925	-27.79	-17 to -27
	Above 5925	-34.68	-27
Note: the data just list the worst cases			

- For the frequency band 5.150-5.250GHz, 5.725-5.850GHz (802.11n HT20)
- Harmonics And Spurious Emissions

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB	(dBuV/m)	(dBuV/m)	(dB)	H/V	
Low Channel (5180MHz)							
10360	60.21	-6.13	54.08	74	-19.92	H	PK
10360	42.51	-6.13	36.38	54	-17.62	H	AV
15540	55.12	-1.64	53.48	74	-20.52	H	PK
15540	38.13	-1.64	36.49	54	-17.51	H	AV
10360	56.81	-6.13	50.68	74	-23.32	V	PK
10360	40.81	-6.13	34.68	54	-19.32	V	AV
15540	55.26	-1.64	53.62	74	-20.38	V	PK
15540	38.62	-1.64	36.98	54	-17.02	V	AV
Middle Channel (5200MHz)							
10400	59.19	-5.93	53.26	74	-20.74	H	PK
10400	40.07	-5.93	34.14	54	-19.86	H	AV
15600	61.49	-1.58	59.91	74	-14.09	H	PK
15600	40.86	-1.58	39.28	54	-14.72	H	AV
10400	60.01	-5.93	54.08	74	-19.92	V	PK
10400	41.04	-5.93	35.11	54	-18.89	V	AV
15600	59.69	-1.58	58.11	74	-15.89	V	PK
15600	41.62	-1.58	40.04	54	-13.96	V	AV
High Channel (5240MHz)							
10480	61.63	-5.71	55.92	74	-18.08	H	PK
10480	39.86	-5.71	34.15	54	-19.85	H	AV
15720	61.99	-1.52	60.47	74	-13.53	H	PK
15720	39.7	-1.52	38.18	54	-15.82	H	AV
10480	61.3	-5.71	55.59	74	-18.41	V	PK
10480	39.03	-5.71	33.32	54	-20.68	V	AV
15720	61.36	-1.52	59.84	74	-14.16	V	PK
15720	40.01	-1.52	38.49	54	-15.51	V	AV

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB	(dBuV/m)	(dBuV/m)	(dB)	H/V	
Low Channel (5745MHz)							
11490	59.06	-6.13	52.93	74	-21.07	H	PK
11490	41.19	-6.13	35.06	54	-18.94	H	AV
17235	56.75	-1.64	55.11	74	-18.89	H	PK
17235	41.42	-1.64	39.78	54	-14.22	H	AV
11490	58.03	-6.13	51.9	74	-22.1	V	PK
11490	40.02	-6.13	33.89	54	-20.11	V	AV
17235	58.93	-1.64	57.29	74	-16.71	V	PK
17235	40.26	-1.64	38.62	54	-15.38	V	AV
Middle Channel (5785MHz)							
11570	58.25	-5.93	52.32	74	-21.68	H	PK
11570	38.15	-5.93	32.22	54	-21.78	H	AV
17355	60.14	-1.58	58.56	74	-15.44	H	PK
17355	38.92	-1.58	37.34	54	-16.66	H	AV
11570	59.5	-5.93	53.57	74	-20.43	V	PK
11570	39.14	-5.93	33.21	54	-20.79	V	AV
17355	59.91	-1.58	58.33	74	-15.67	V	PK
17355	40.04	-1.58	38.46	54	-15.54	V	AV
High Channel (5825MHz)							
11650	60.09	-5.71	54.38	74	-19.62	H	PK
11650	41.68	-5.71	35.97	54	-18.03	H	AV
17475	61.34	-1.52	59.82	74	-14.18	H	PK
17475	39.8	-1.52	38.28	54	-15.72	H	AV
11650	60.22	-5.71	54.51	74	-19.49	V	PK
11650	41.58	-5.71	35.87	54	-18.13	V	AV
17475	60.08	-1.52	58.56	74	-15.44	V	PK
17475	38.24	-1.52	36.72	54	-17.28	V	AV

- Out of Band edge 5150-5250MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5150	-27.57	-27
Highest	Above 5350	-34.31	-27
Note: the data just list the worst cases			

- Out of Band edge for 5725-5850MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5650	-39.70	-27
	5650 to 5700	-30.25	-27 to -17
	5700 to 5720	-27.79	-17 to 15.6
	5720 to 5725	-34.68	15.6 to 27
Highest	5850 to 5855	-40.40	27 to 15.6
	5855 to 5875	-27.93	15.6 to -17
	5875 to 5925	-25.76	-17 to -27
	Above 5925	-34.71	-27
Note: the data just list the worst cases			

- For the frequency band 5.150-5.250GHz, 5.725-5.850GHz (802.11n HT40)
- Harmonics And Spurious Emissions

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB	(dBuV/m)	(dBuV/m)	(dB)	H/V	
Low Channel (5190MHz)							
10380	58.45	-6.13	52.32	74	-21.68	H	PK
10380	43.57	-6.13	37.44	54	-16.56	H	AV
15570	56.31	-1.64	54.67	74	-19.33	H	PK
15570	39.84	-1.64	38.2	54	-15.8	H	AV
10380	55.83	-6.13	49.7	74	-24.3	V	PK
10380	40.98	-6.13	34.85	54	-19.15	V	AV
15570	55.97	-1.64	54.33	74	-19.67	V	PK
15570	41.56	-1.64	39.92	54	-14.08	V	PK
High Channel (5230MHz)							
10460	58.08	-5.93	52.15	74	-21.85	H	PK
10460	40.1	-5.93	34.17	54	-19.83	H	AV
15690	60.34	-1.58	58.76	74	-15.24	H	PK
15690	41.52	-1.58	39.94	54	-14.06	H	AV
10460	58.5	-5.93	52.57	74	-21.43	V	PK
10460	38.95	-5.93	33.02	54	-20.98	V	AV
15690	59.46	-1.58	57.88	74	-16.12	V	PK
15690	38.33	-1.58	36.75	54	-17.25	V	PK

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB	(dBuV/m)	(dBuV/m)	(dB)	H/V	
Low Channel (5755MHz)							
11510	58.34	-6.13	52.21	74	-21.79	H	PK
11510	42.82	-6.13	36.69	54	-17.31	H	AV
17265	58.02	-1.64	56.38	74	-17.62	H	PK
17265	41.96	-1.64	40.32	54	-13.68	H	AV
11510	56.45	-6.13	50.32	74	-23.68	V	PK
11510	39.24	-6.13	33.11	54	-20.89	V	AV
17265	56.43	-1.64	54.79	74	-19.21	V	PK
17265	39.89	-1.64	38.25	54	-15.75	V	AV
High Channel (5795MHz)							
11590	58.82	-5.93	52.89	74	-21.11	H	PK
11590	41.68	-5.93	35.75	54	-18.25	H	AV
17385	61.69	-1.58	60.11	74	-13.89	H	PK
17385	40.52	-1.58	38.94	54	-15.06	H	AV
11590	61.77	-5.93	55.84	74	-18.16	V	PK
11590	39.17	-5.93	33.24	54	-20.76	V	AV
17385	60.28	-1.58	58.7	74	-15.3	V	PK
17385	40.64	-1.58	39.06	54	-14.94	V	AV

- Out of Band edge for 5150-5250MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5150	-30.06	-27
Highest	Above 5350	-35.24	-27
Note: the data just list the worst cases			

- Out of Band edge for 5725-5850MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5650	-38.17	-27
	5650 to 5700	-27.76	-27 to -17
	5700 to 5720	-28.10	-17 to 15.6
	5720 to 5725	-33.88	15.6 to 27
Highest	5850 to 5855	-40.26	27 to 15.6
	5855 to 5875	-28.99	15.6 to -17
	5875 to 5925	-26.47	-17 to -27
	Above 5925	-34.61	-27
Note: the data just list the worst cases			

Note: Testing is carried out with frequency rang 9kHz to 40Ghz, other than listed in the table above are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

9. Frequency Stability

9.1 Standard Applicable

According to §15.407(g), manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the users manual.

9.2 Test Procedure

According to §2.1055, the following test procedure was performed.
The Frequency Stability is measured directly with a Frequency Domain Analyzer. Frequency Deviation in ppm is calculated from the measured peak to peak value.
The Carrier Frequency Stability over Power Supply Voltage and over Temperature is measured with a Frequency Domain Analyzer in histogram mode.

9.3 Summary of Test Results/Plots

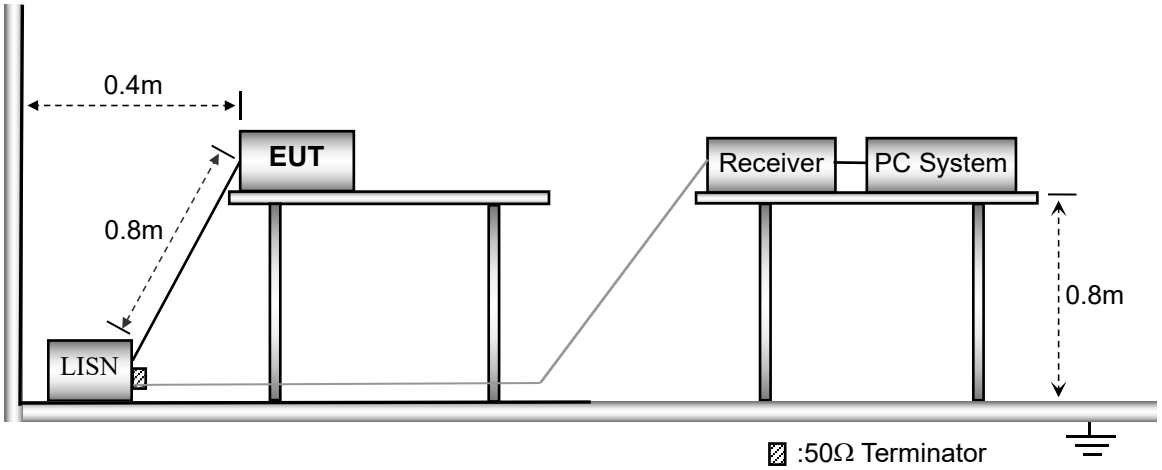
Please refer to Appendix D

10. Conducted Emissions

10.1 Test Procedure

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 Limit.
The external I/O cables were draped along the test table and formed a bundle 30 to 40cm long in the middle. The spacing between the peripherals was 10cm.

10.2 Basic Test Setup Block Diagram



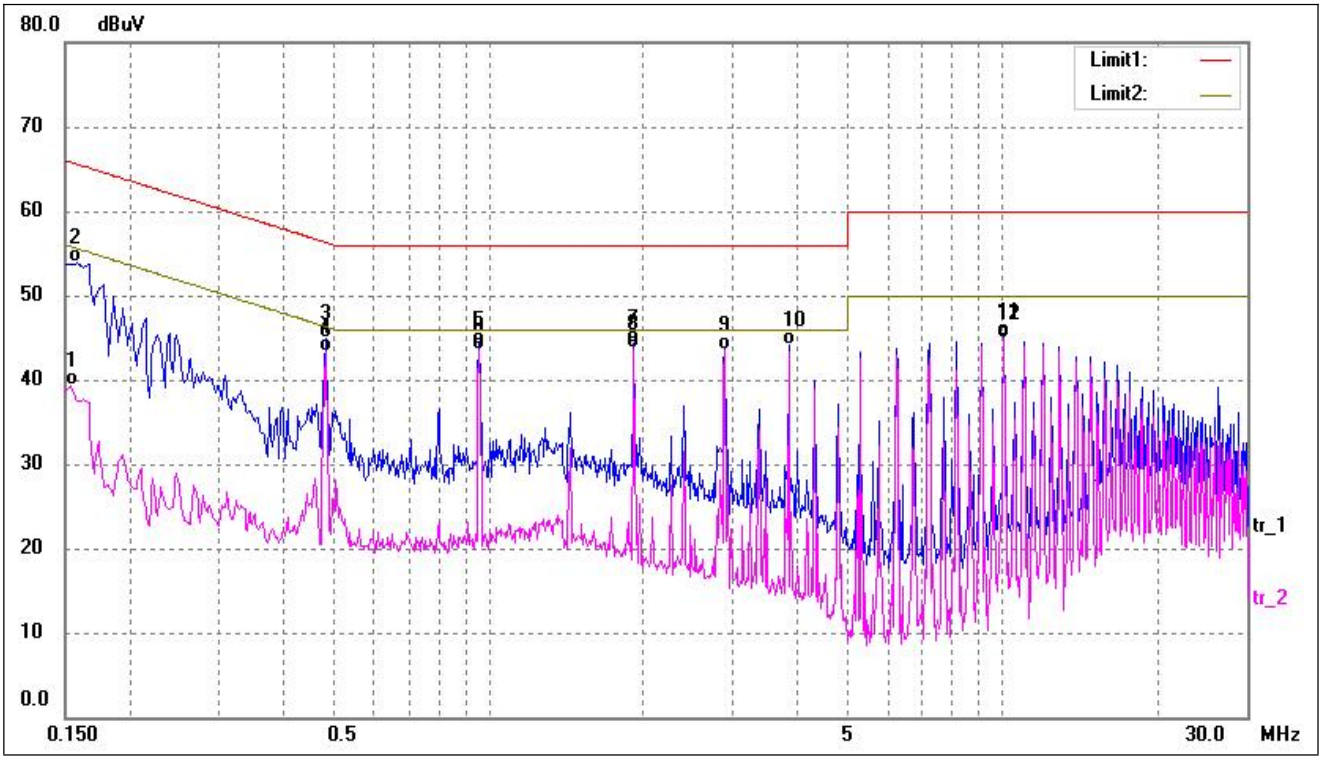
10.3 Test Receiver Setup

During the conducted emission test, the test receiver was set with the following configurations:

Start Frequency..... 150kHz
Stop Frequency..... 30MHz
Sweep Speed.....Auto
IF Bandwidth..... 10kHz
Quasi-Peak Adapter Bandwidth.....9kHz
Quasi-Peak Adapter Mode.....Normal

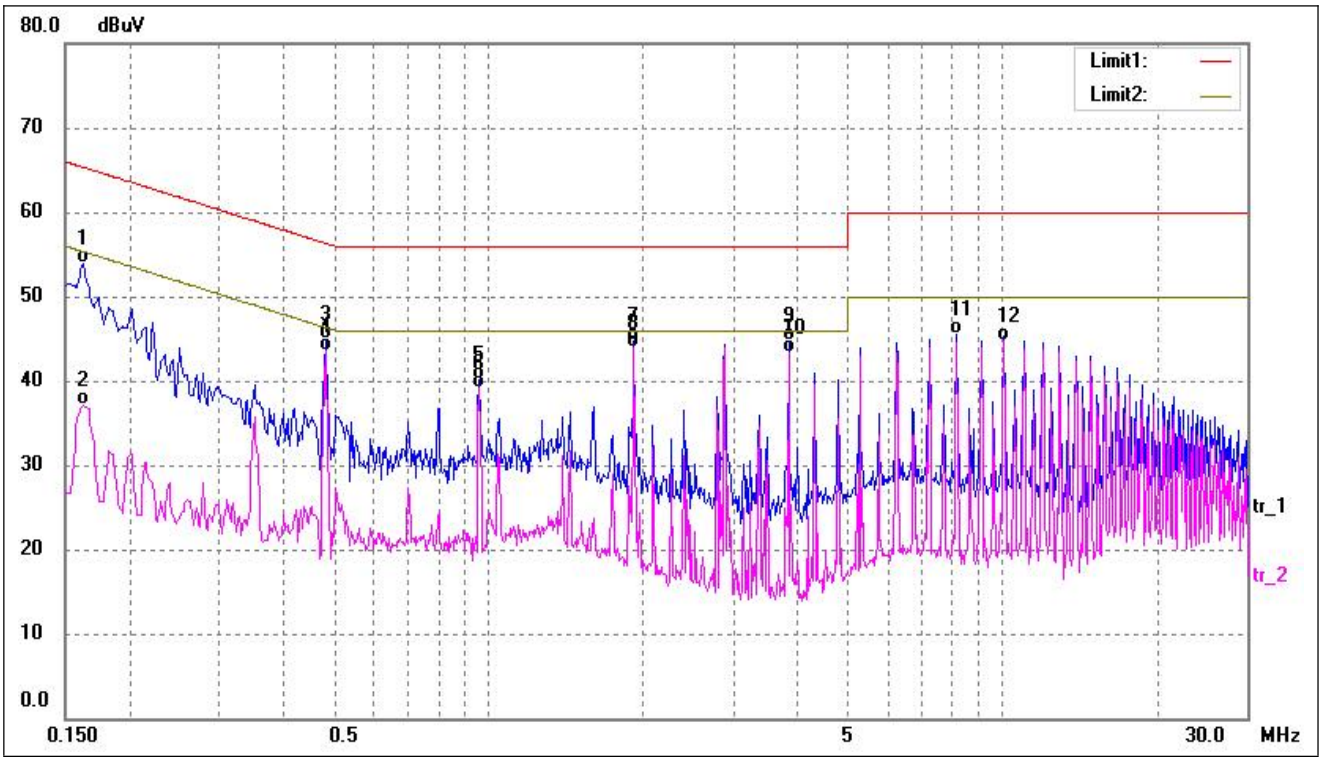
10.4 Summary of Test Results/Plots

Test Mode	Communication	AC120V 60Hz	Polarity:	Neutral



No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dB)	
1	0.1539	29.24	9.97	39.21	55.78	-16.57	AVG
2	0.1582	43.84	9.97	53.81	65.55	-11.74	QP
3	0.4812	35.03	9.95	44.98	56.32	-11.34	QP
4	0.4812	33.40	9.95	43.35	46.32	-2.97	AVG
5	0.9582	34.23	9.97	44.20	56.00	-11.80	QP
6	0.9582	33.50	9.97	43.47	46.00	-2.53	AVG
7	1.9181	34.26	10.00	44.26	56.00	-11.74	QP
8*	1.9181	33.68	10.00	43.68	46.00	-2.32	AVG
9	2.8845	33.40	10.04	43.44	46.00	-2.56	AVG
10	3.8399	34.10	10.07	44.17	56.00	-11.83	QP
11	10.0717	34.77	10.38	45.15	60.00	-14.85	QP
12	10.0717	34.47	10.38	44.85	50.00	-5.15	AVG

Test Mode	Communication	AC120V 60Hz	Polarity:	Line



No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dB)	
1	0.1621	43.96	9.97	53.93	65.35	-11.42	QP
2	0.1621	27.15	9.97	37.12	55.35	-18.23	AVG
3	0.4812	34.94	9.95	44.89	56.32	-11.43	QP
4	0.4812	33.62	9.95	43.57	46.32	-2.75	AVG
5	0.9582	30.14	9.97	40.11	56.00	-15.89	QP
6	0.9582	29.17	9.97	39.14	46.00	-6.86	AVG
7	1.9180	34.61	10.00	44.61	56.00	-11.39	QP
8*	1.9180	33.98	10.00	43.98	46.00	-2.02	AVG
9	3.8399	34.56	10.07	44.63	56.00	-11.37	QP
10	3.8399	33.28	10.07	43.35	46.00	-2.65	AVG
11	8.1483	35.16	10.26	45.42	60.00	-14.58	QP
12	10.0715	34.25	10.38	44.63	50.00	-5.37	AVG

APPENDIX SUMMARY

Project No.	WTX24X11265506W	Test Engineer	Timi Huang
Start date	2024/11/20	Finish date	2024/11/20
Temperature	23℃	Humidity	42%
RF specifications	U-NII		

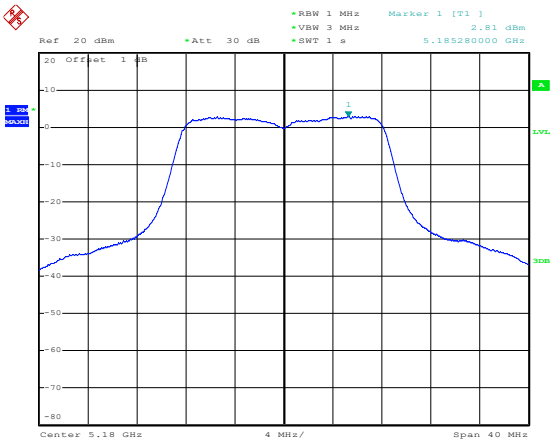
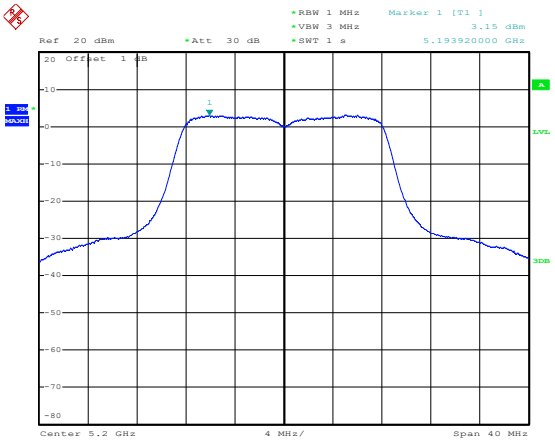
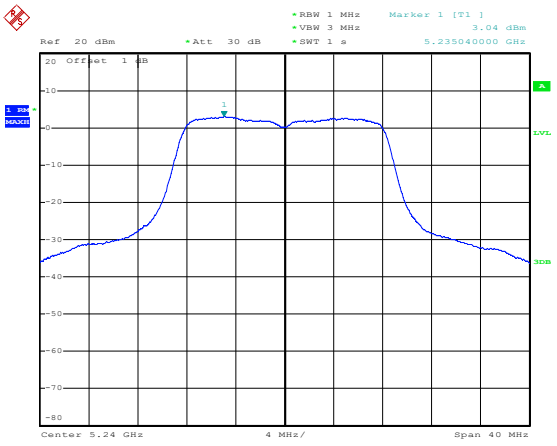
APPENDIX	Description of Test Item	Result
A	Power Spectral Density	Compliant
B	Emission Bandwidth and Occupied Bandwidth	Compliant
C	Maximum Conducted Output Power	Compliant
D	Frequency Stability	Compliant

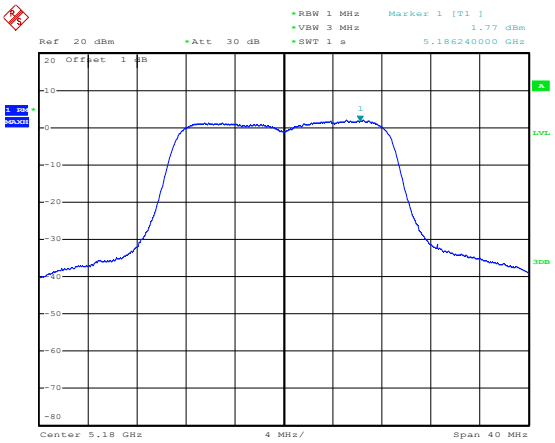
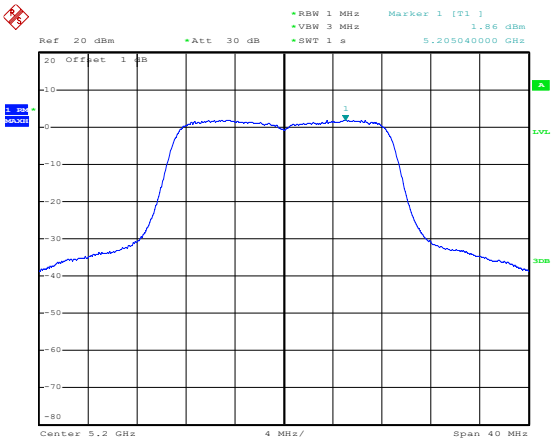
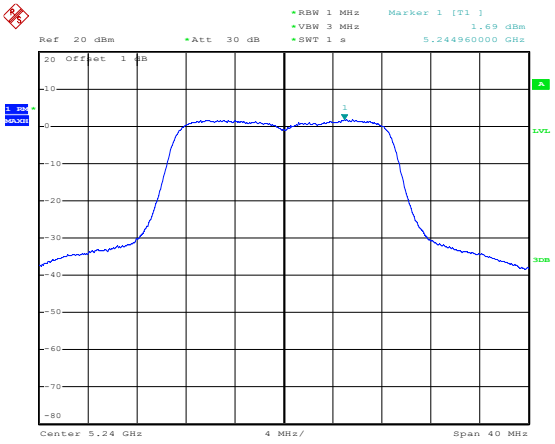
APPENDIX A

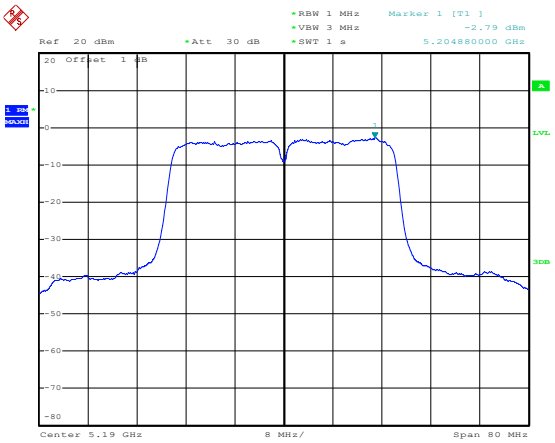
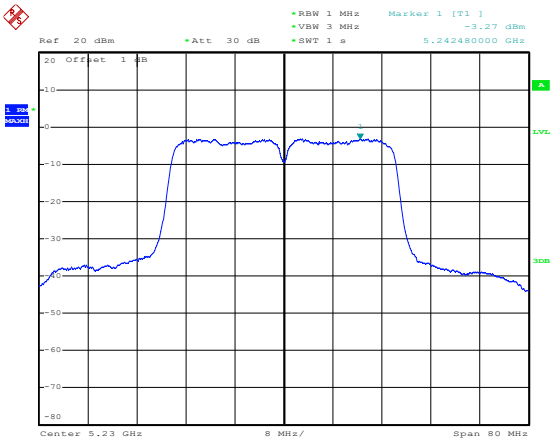
Power Spectral Density			
U-NII-1:5150-5250MHz			
Operating mode	Test Channel	Power Spectral Density dBm/MHz	Limit (dBm/MHz)
802.11a	5180	2.81	11
	5200	3.15	11
	5240	3.04	11
802.11n-HT20	5180	1.77	11
	5200	1.86	11
	5240	1.69	11
802.11n-HT40	5190	-2.79	11
	5230	-3.27	11

U-NII-4: 5725-5850MHz					
Operating mode	Test Channel	Power Spectral Density dBm/300kHz	Factor	Power Spectral Density* dBm/500kHz	Limit dBm/500kHz
802.11a	5745	-2.62	2.22	-0.4	30
	5785	-3.20	2.22	-0.98	30
	5825	-3.08	2.22	-0.86	30
802.11n-HT20	5745	-3.55	2.22	-1.33	30
	5785	-4.20	2.22	-1.98	30
	5825	-3.86	2.22	-1.64	30
802.11n HT40	5755	-8.30	2.22	-6.08	30
	5795	-8.55	2.22	-6.33	30
*Note: Maximum PSD=PSD(dBm/300kHz)+10log(500kHz/300kHz)=2.22					

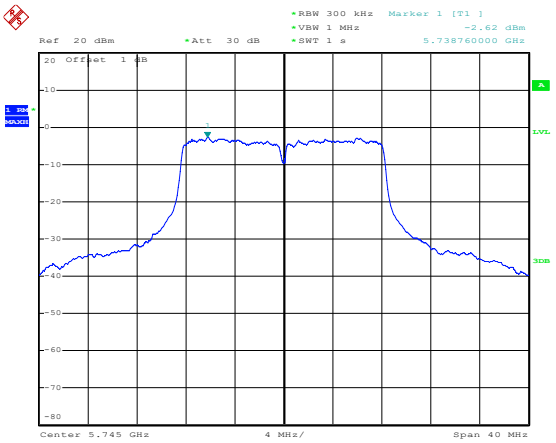
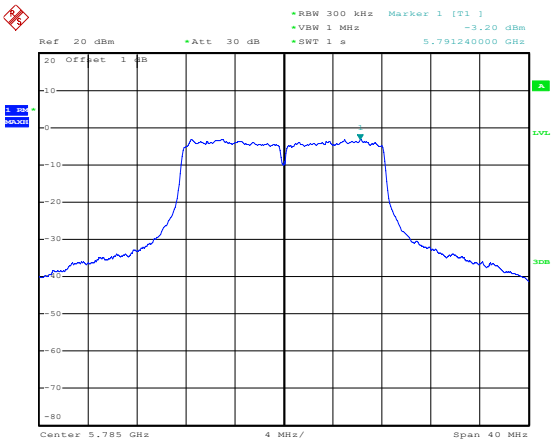
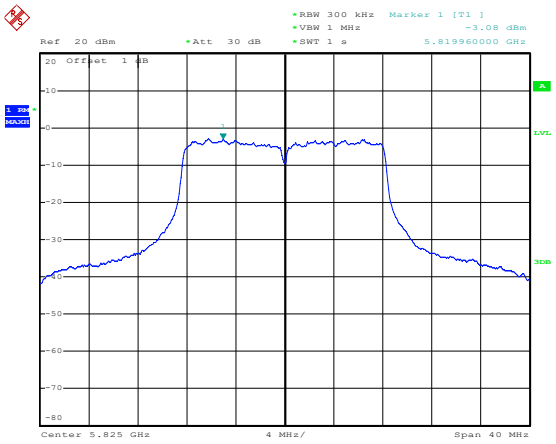
5150-5250MHz

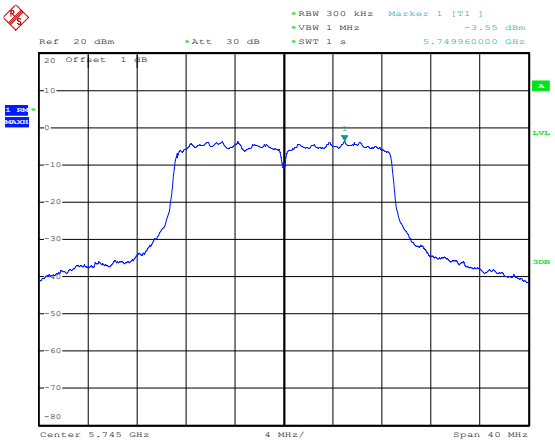
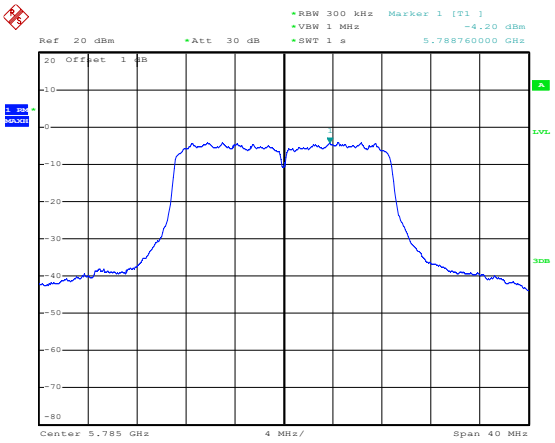
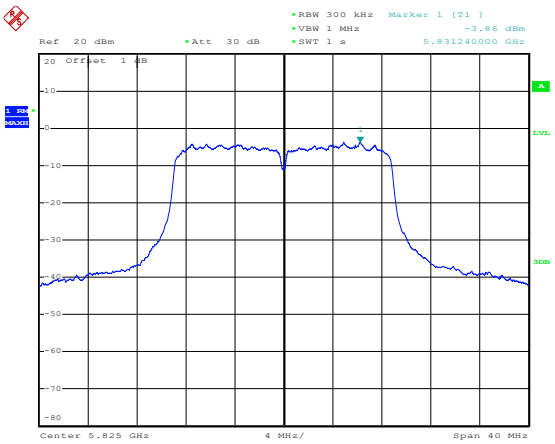
802.11a-Low	
802.11a-Middle	
802.11a-High	

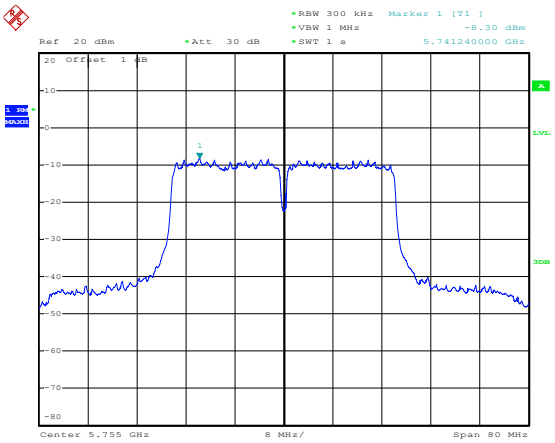
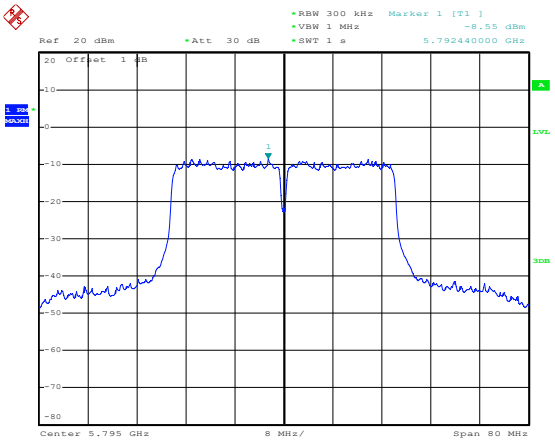
802.11n-HT20-Low	 Date: 20.NOV.2024 17:10:24
802.11n-HT20-Middle	 Date: 20.NOV.2024 17:10:49
802.11n-HT20-High	 Date: 20.NOV.2024 17:11:10

802.11n-HT40-Low	
802.11n-HT40-High	

5725-5850MHz

802.11a-Low	
802.11a-Middle	
802.11a-High	

802.11n-HT20-Low	
802.11n-HT20-Middle	
802.11n-HT20-High	

802.11n-HT40-Low	 Date: 20.NOV.2024 18:48:27
802.11n-HT40-High	 Date: 20.NOV.2024 18:48:51

APPENDIX B

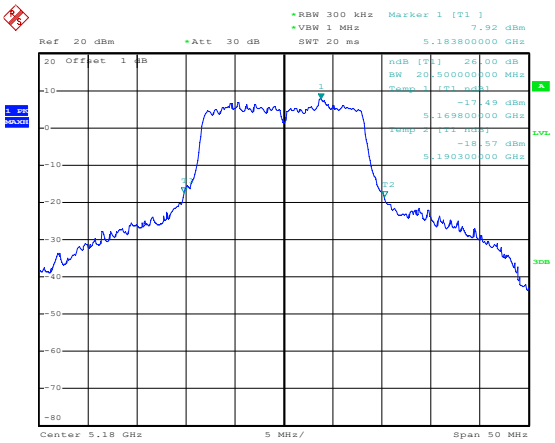
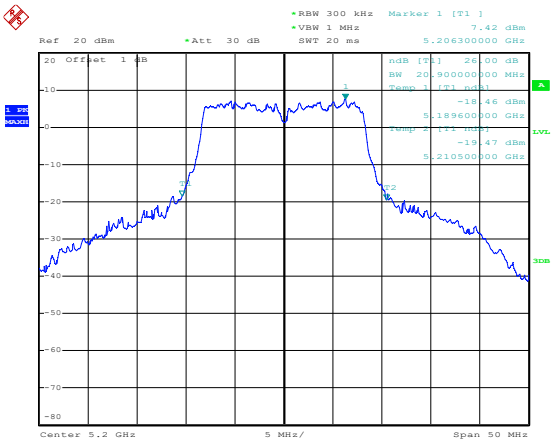
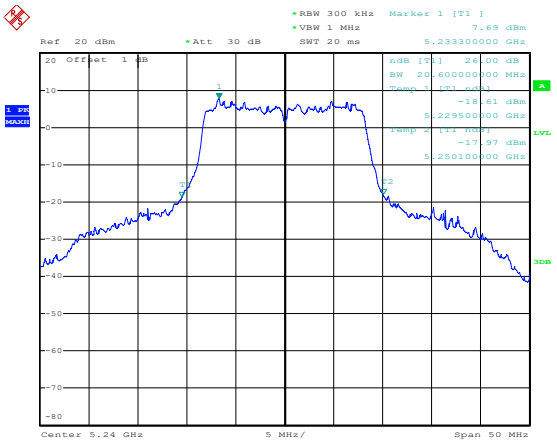
Emission Bandwidth and Occupied Bandwidth

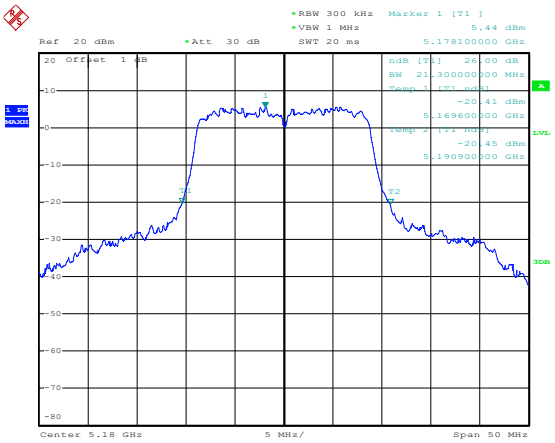
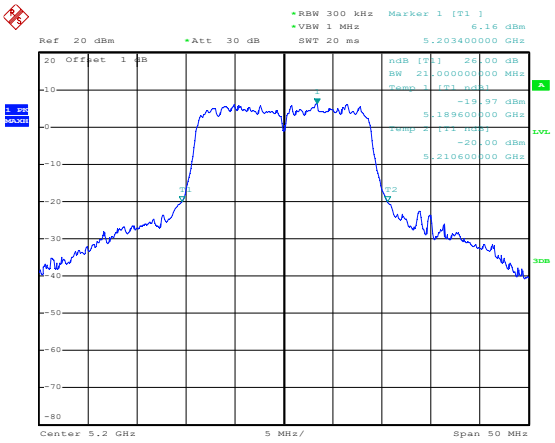
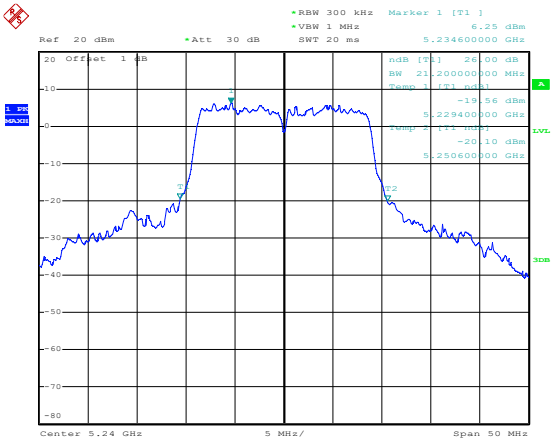
U-NII-1:5150-5250MHz				
Test Mode	**Test Channel MHz**	**26 dB Bandwidth MHz**	**99% Bandwidth MHz**	**Limit MHz**
802.11a	5180	20.50	16.80	Pass
	5200	20.90	16.96	Pass
	5240	20.60	16.88	Pass
802.11n-HT20	5180	21.30	18.08	Pass
	5200	21.00	17.84	Pass
	5240	21.20	17.84	Pass
802.11n-HT40	5190	40.60	36.64	Pass
	5230	39.80	36.80	Pass

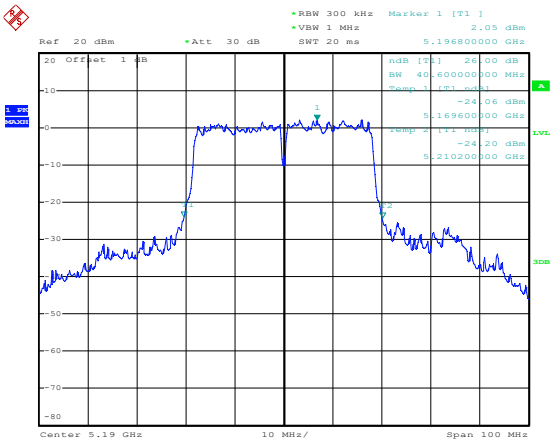
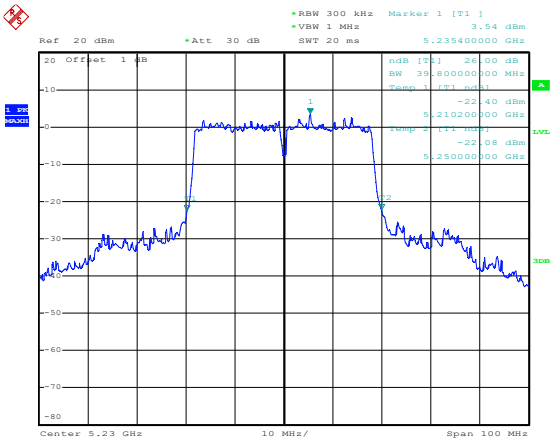
U-NII-4: 5725-5850MHz				
Test Mode	**Test Channel MHz**	**6 dB Bandwidth MHz**	**99% Bandwidth MHz**	**Limit MHz**
802.11a	5745	16.56	16.96	≥500
	5785	16.56	16.96	≥500
	5825	16.64	16.96	≥500
802.11n-HT20	5745	17.68	17.84	≥500
	5785	17.76	17.92	≥500
	5825	17.44	17.92	≥500
802.11n-HT40	5755	36.00	36.80	≥500
	5795	36..00	36.80	≥500

26 dB Bandwidth

5150-5250MHz

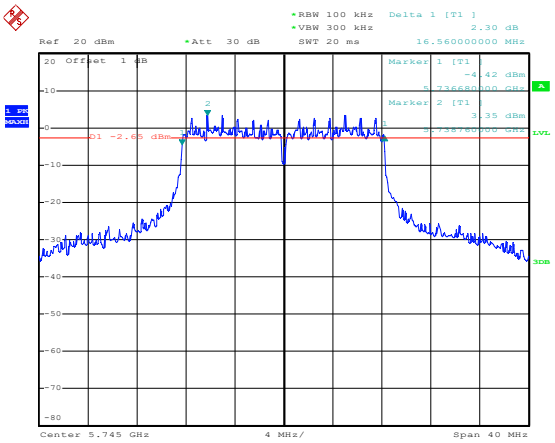
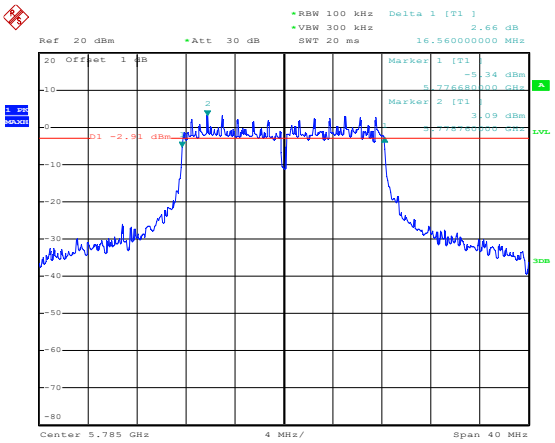
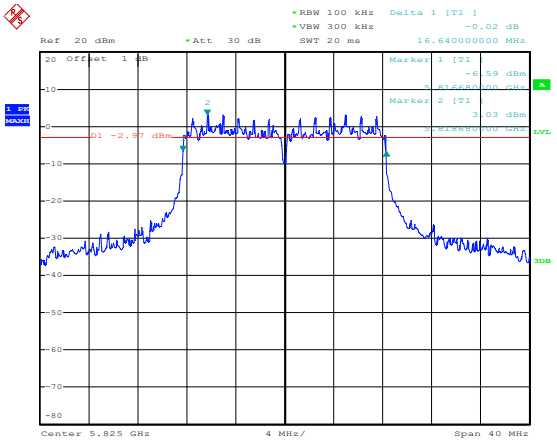
802.11a-Low	 Date: 20.NOV.2024 17:28:21
802.11a-Middle	 Date: 20.NOV.2024 17:27:53
802.11a-High	 Date: 20.NOV.2024 17:27:30

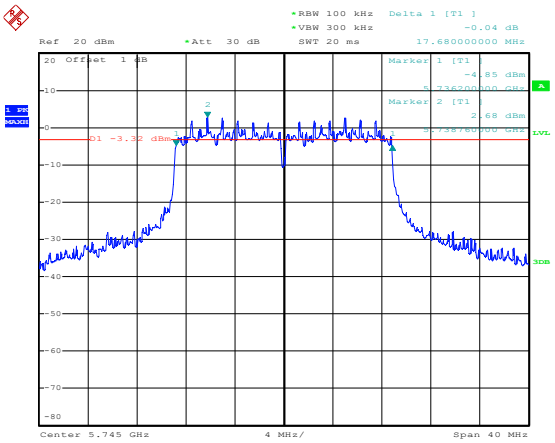
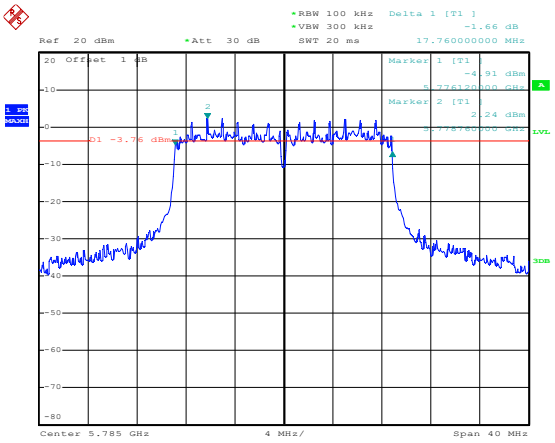
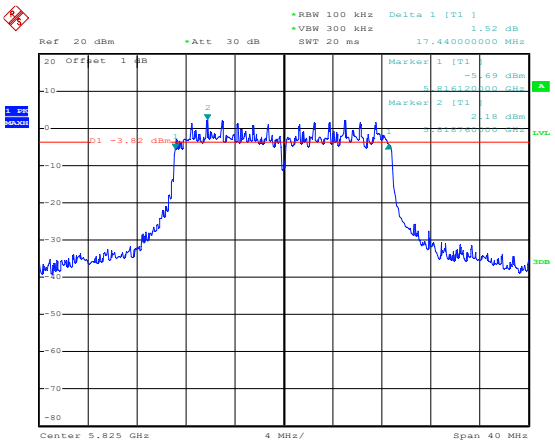
802.11n-HT20-Low	 Date: 20.NOV.2024 17:26:23
802.11n-HT20-Middle	 Date: 20.NOV.2024 17:26:48
802.11n-HT20-High	 Date: 20.NOV.2024 17:27:12

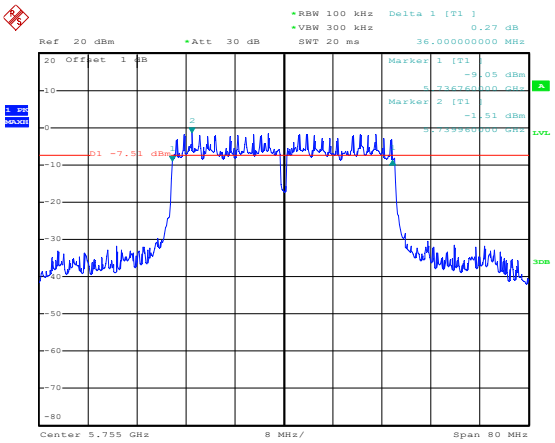
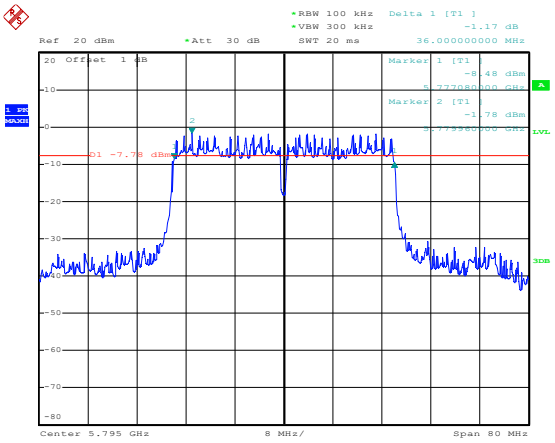
802.11n-HT40-Low	 Date: 20.NOV.2024 17:24:14
802.11n-HT40-High	 Date: 20.NOV.2024 17:24:44

6 dB Bandwidth

5725-5850MHz

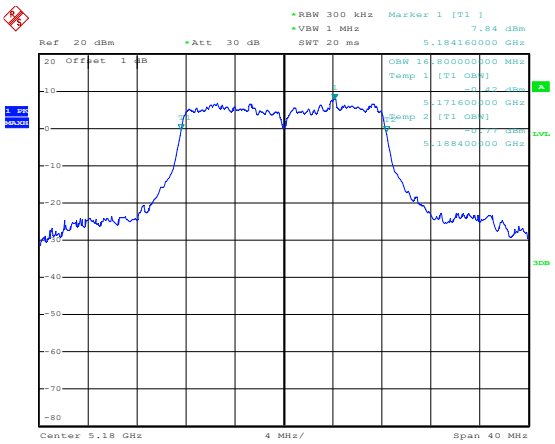
802.11a-Low	 Date: 20.NOV.2024 19:21:18
802.11a-Middle	 Date: 20.NOV.2024 19:20:34
802.11a-High	 Date: 20.NOV.2024 19:19:51

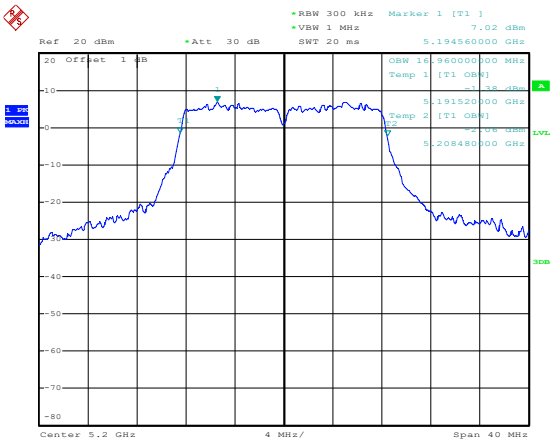
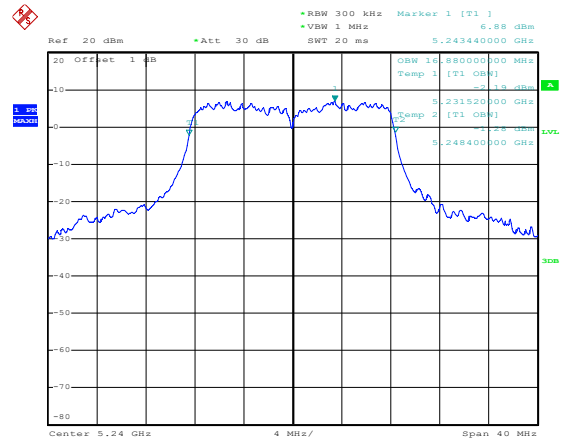
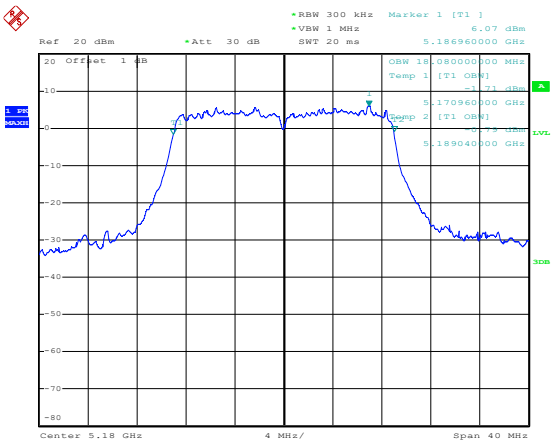
802.11n-HT20-Low	 Date: 20.NOV.2024 19:17:35
802.11n-HT20-Middle	 Date: 20.NOV.2024 19:18:22
802.11n-HT20-High	 Date: 20.NOV.2024 19:19:11

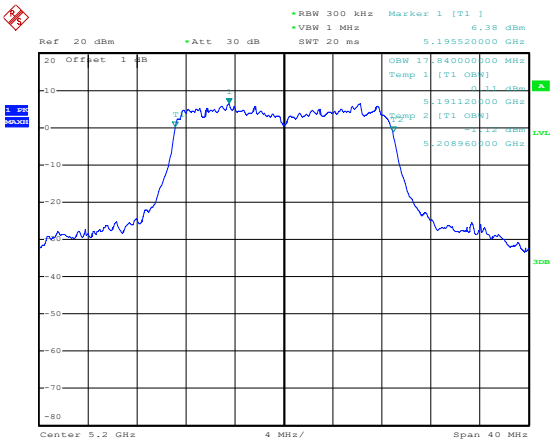
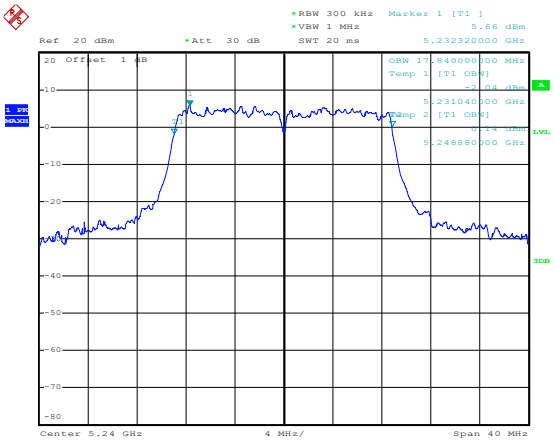
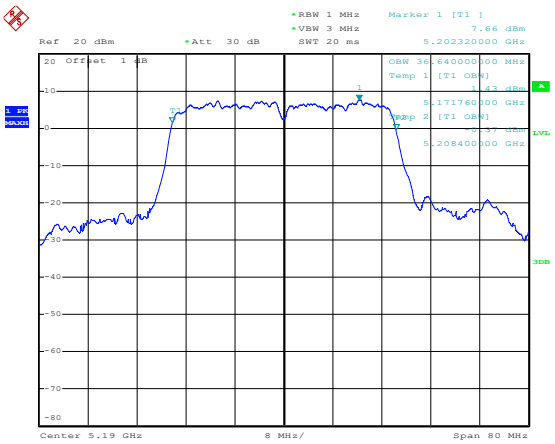
802.11n-HT40-Low	 Date: 20.NOV.2024 19:14:08
802.11n-HT40-High	 Date: 20.NOV.2024 19:13:26

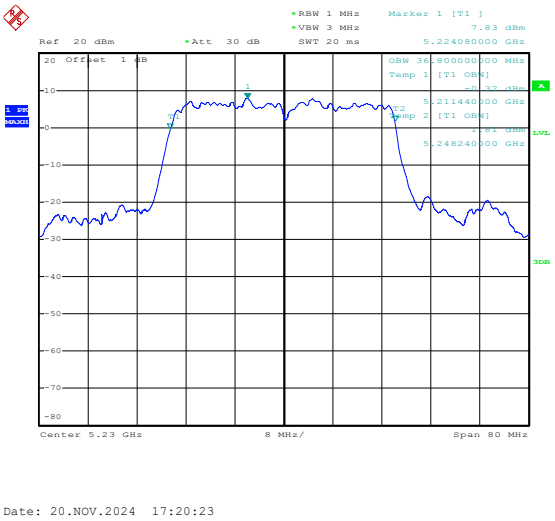
99% Bandwidth

5150-5250MHz

802.11a-Low	 Date: 20.NOV.2024 17:15:29

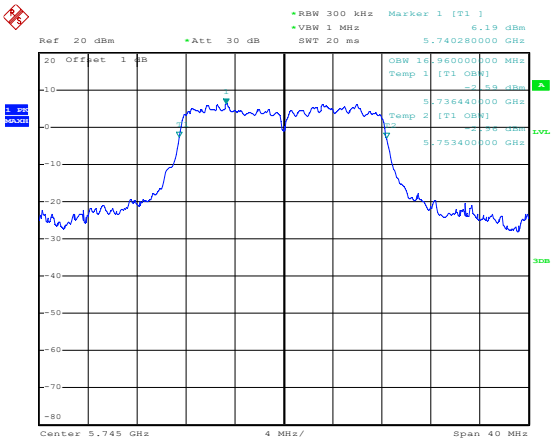
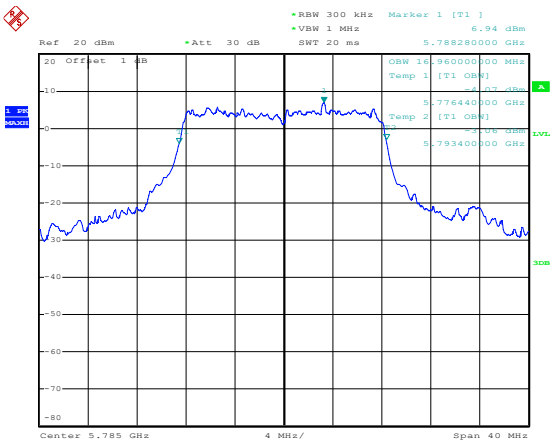
802.11a-Middle	
802.11a-High	
802.11n-HT20-Low	

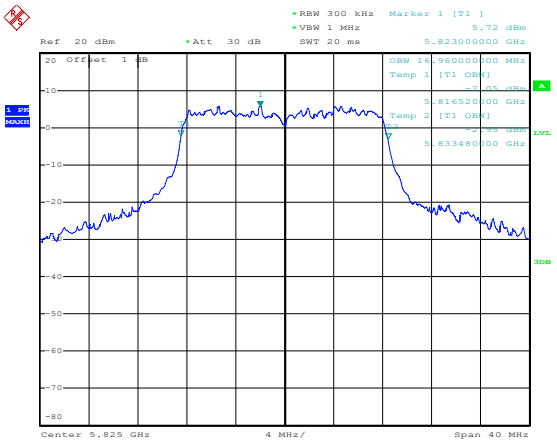
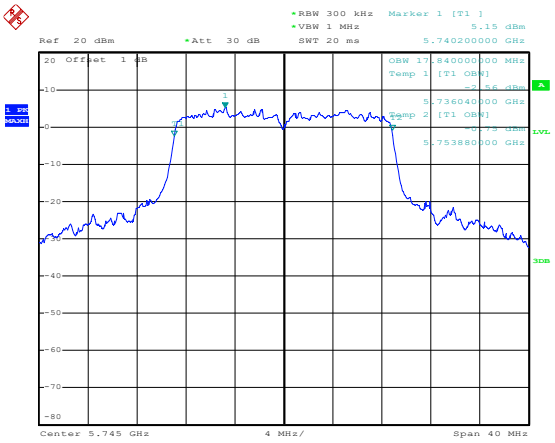
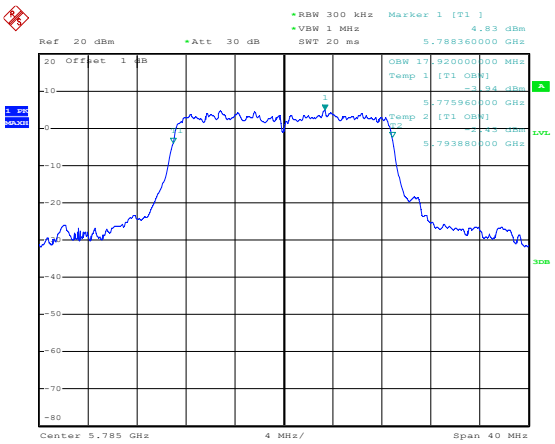
802.11n-HT20-Middle	 Date: 20.NOV.2024 17:17:45
802.11n-HT20-High	 Date: 20.NOV.2024 17:17:20
802.11n-HT40-Low	 Date: 20.NOV.2024 17:20:49

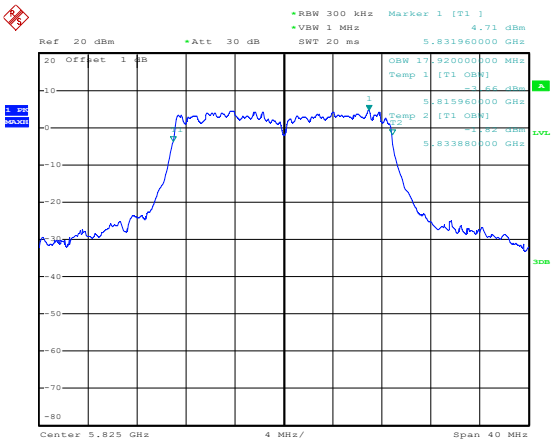
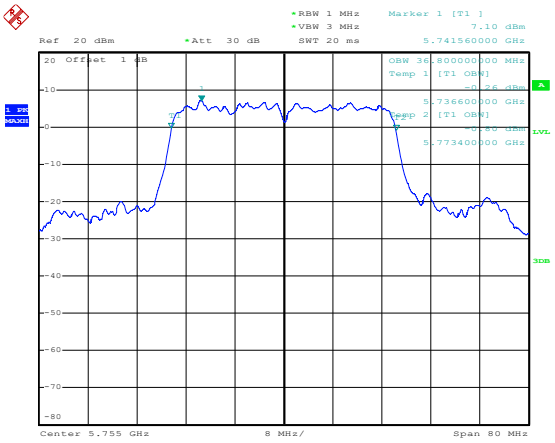
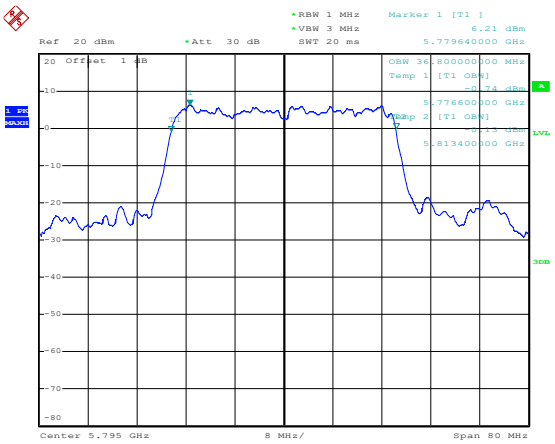
802.11n-HT40-High	

99% dB Bandwidth

5725-5850MHz

802.11a-Low	
802.11a-Middle	

802.11a-High	 Date: 20.NOV.2024 18:59:32
802.11n-HT20-Low	 Date: 20.NOV.2024 19:01:59
802.11n-HT20-Middle	 Date: 20.NOV.2024 19:01:32

802.11n-HT20-High	 Date: 20.NOV.2024 19:01:06
802.11n-HT40-Low	 Date: 20.NOV.2024 19:06:50
802.11n-HT40-High	 Date: 20.NOV.2024 19:07:16

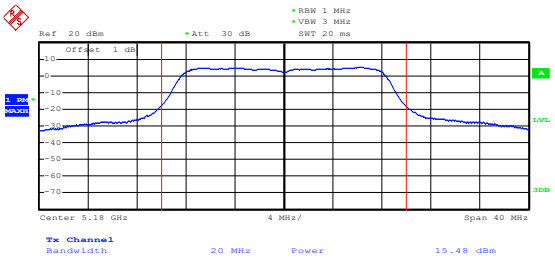
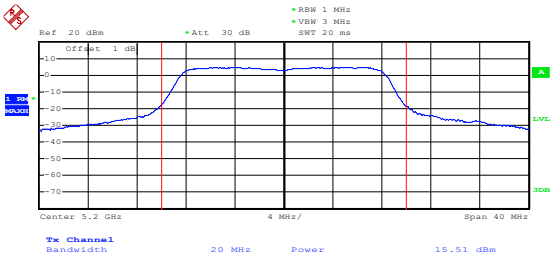
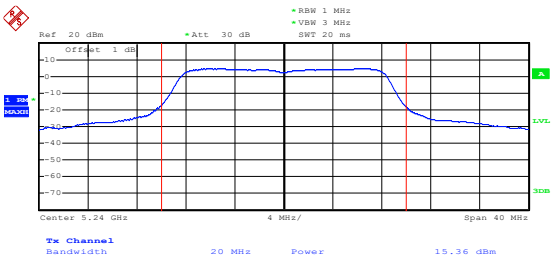
APPENDIX C

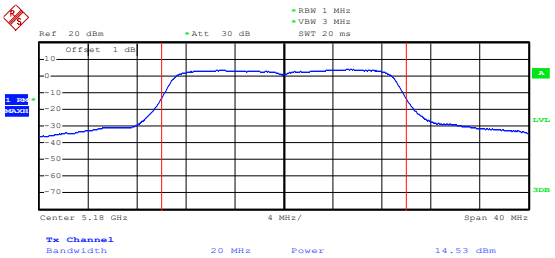
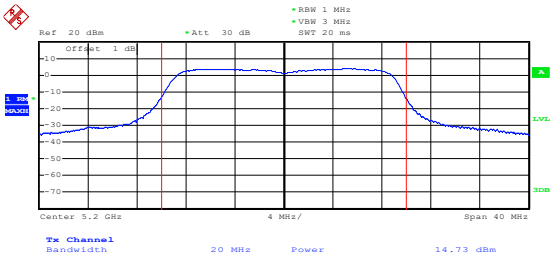
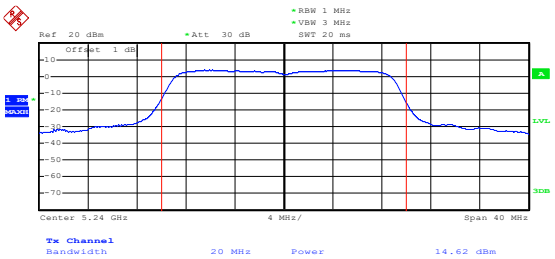
Maximum Conducted Output Power

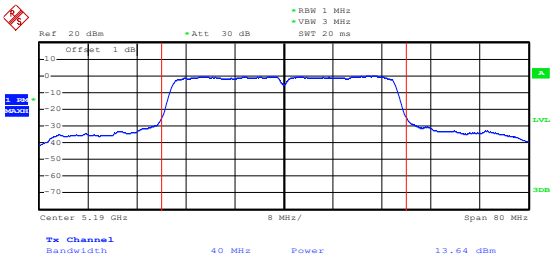
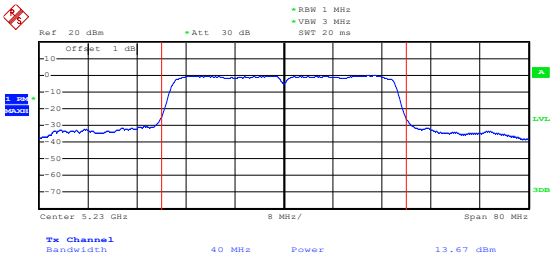
U-NII-1:5150-5250MHz			
Test mode	Frequency MHz	Output Power dBm	Limit dBm
802.11a	5180	15.48	23.98
	5200	15.51	23.98
	5240	15.36	23.98
802.11n-HT20	5180	14.53	23.98
	5200	14.73	23.98
	5240	14.62	23.98
802.11n-HT40	5190	13.64	23.98
	5230	13.67	23.98

U-NII-4: 5725-5850MHz			
Test mode	Frequency MHz	Output Power dBm	Limit dBm
802.11a	5745	14.52	30.00
	5785	14.10	30.00
	5825	14.10	30.00
802.11n-HT20	5745	13.63	30.00
	5785	13.37	30.00
	5825	13.45	30.00
802.11n-HT40	5755	12.59	30.00
	5795	12.36	30.00

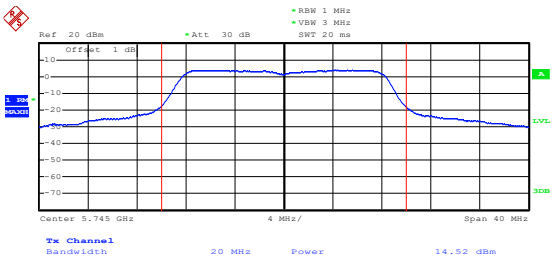
5150-5250MHz

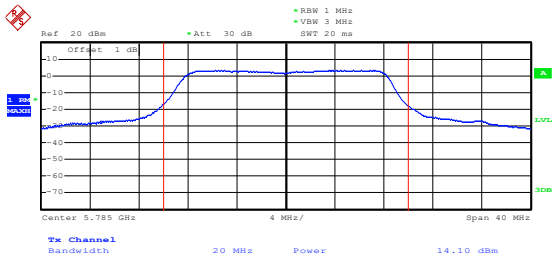
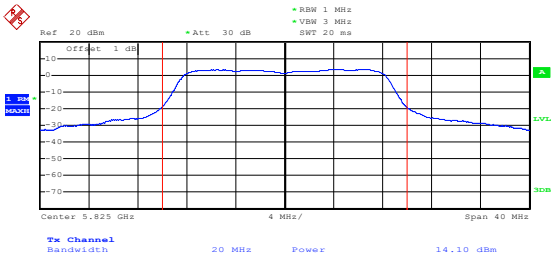
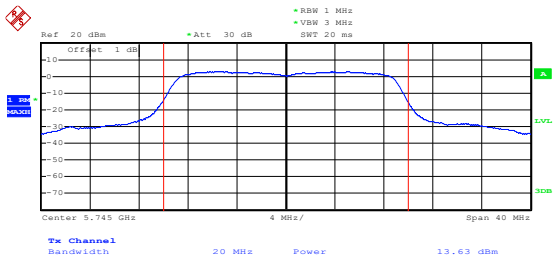
802.11a-Low	 Date: 20.NOV.2024 16:52:48
802.11a-Middle	 Date: 20.NOV.2024 16:53:18
802.11a-High	 Date: 20.NOV.2024 16:53:47

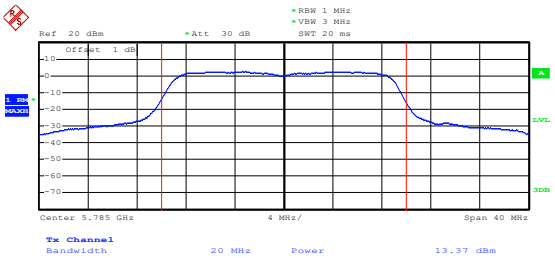
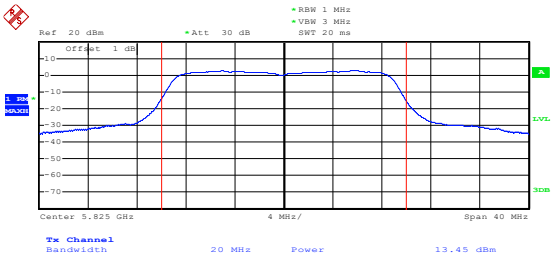
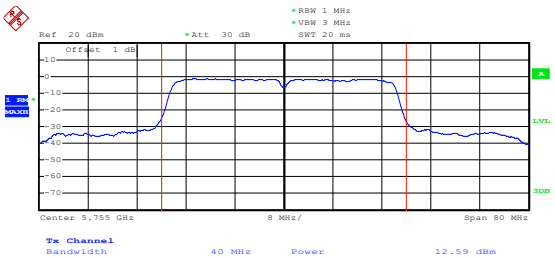
802.11n-HT20-Low	 Date: 20.NOV.2024 16:55:57
802.11n-HT20-Middle	 Date: 20.NOV.2024 16:56:28
802.11n-HT20-High	 Date: 20.NOV.2024 16:56:57

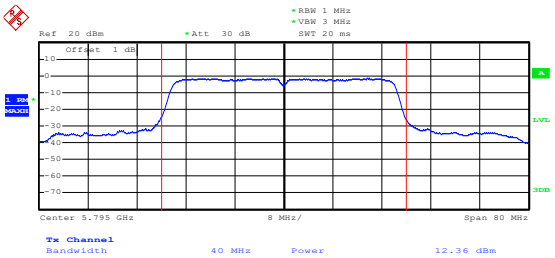
802.11n-HT40-Low	 Date: 20.NOV.2024 16:59:43
802.11n-HT40-High	 Date: 20.NOV.2024 17:00:18

5725-5850MHz

802.11a-Low	 Date: 20.NOV.2024 18:37:41

802.11a-Middle	 Date: 20.NOV.2024 18:38:14
802.11a-High	 Date: 20.NOV.2024 18:38:41
802.11n-HT20-Low	 Date: 20.NOV.2024 18:39:12

802.11n-HT20-Middle	 Date: 20.NOV.2024 18:39:43
802.11n-HT20-High	 Date: 20.NOV.2024 18:40:09
802.11n-HT40-Low	 Date: 20.NOV.2024 18:42:29

802.11n-HT40-High	 Date: 20.NOV.2024 18:42:52

APPENDIX D

Frequency Stability

U-NII-1:5150-5250MHz worst case at 802.11a middle channel				
Voltage(%)	Power(VDC)	TEMP(°C)	Freq.Dev(Hz)	Deviation
100%	58.8	-30	501	0.096
100%		-20	502	0.096
100%		-10	497	0.096
100%		0	505	0.097
100%		+10	500	0.096
100%		+20	500	0.096
100%		+30	503	0.097
100%		+40	498	0.096
100%		+50	502	0.097
Low Battery power	65	+20	501	0.096
High Battery power	53	+20	499	0.096

U-NII-4:5725-5850MHz worst case at 802.11a middle channel				
Voltage(%)	Power(VDC)	TEMP(°C)	Freq.Dev(Hz)	Deviation
100%	58.8	-30	497	0.086
100%		-20	497	0.086
100%		-10	503	0.087
100%		0	496	0.086
100%		+10	504	0.087
100%		+20	500	0.086
100%		+30	501	0.087
100%		+40	503	0.087
100%		+50	496	0.086
Low Battery power	65	+20	497	0.086
High Battery power	53	+20	504	0.087

APPENDIX PHOTOGRAPHS

Please refer to “ANNEX”

******* END OF REPORT *******