

TEST REPORT

Reference No..... : WTX23X04090911W001
FCC ID : 2A457-RTDCCAM2
Applicant : ReTech Labs, Inc.
Address..... : 9820 Willow Creek Road, Suite#110, San Diego, CA, USA
Manufacturer : ShenZhen Wasintek Technology Ltd.
Address..... : 1F 211, Building B, GuoRen Building, No.5, KeJi ZhongSan Road, NanShan
ShenZhen
Product Name : Store Intelligence Camera
Model No..... : RT-DC-CAM 2.1
Standards : FCC Part 15.407
Date of Receipt sample : 2023-04-28
Date of Test..... : 2023-04-28 to 2023-05-17
Date of Issue : 2023-05-17
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.

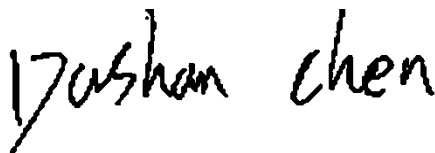
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Report version

Version No.	Date of issue	Description
Rev.00	2023-05-17	Original
/	/	/

1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

General Description of EUT	
Product Name:	Store Intelligence Camera
Trade Name:	/
Model No.:	RT-DC-CAM 2.1
Adding Model(s):	/
Rated Voltage:	DC9V
Battery Capacity:	/
Power Adapter:	/
<i>Note: The test data is gathered from a production sample, provided by the manufacturer.</i>	

Technical Characteristics of EUT	
Support Standards:	802.11a, 802.11n(HT20) , 802.11n-HT40, 802.11ac-VHT80
Frequency Range:	5470-5725MHz
RF Output Power:	12.86dBm (Conducted)
Type of Modulation:	QPSK, 16QAM, 64QAM
Type of Antenna:	Integral Antenna
Antenna Gain:	1.94dBi

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

Send instructions through serial port tool to enter fixed frequency engineering mode, 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	Test Frequency (MHz)		
	NCB: 20MHz		
	5500	5580	5700
802.11a 6Mbps	20	19	20
802.11n-HT20 MCS0	20	19	20
Mode	NCB: 40MHz		
	5510	5590	5670
802.11n-HT40 MCS0	18	18	18
Mode	NCB: 80MHz		
	5530	5610	/
802.11ac-VH80 MCS0/Nss2	18	18	/

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 maintained 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	5500MHz,5600MHz,5700MHz
TM2	802.11n-HT20	5500MHz,5600MHz,5700MHz,
TM3	802.11n-HT40	5510MHz,5590MHz,5670MHz
TM4	802.11ac-VH80	5530MHz,5610MHz
Note: 802.11ac-VHT20, 802.11ac-VHT40 covered by 802.11n-HT20 and 802.11n-HT40.		

Test Conditions	
Temperature:	22~25 °C
Relative Humidity:	45~55 %.
ATM Pressure:	1019 mbar

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

Special Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
USB Cable	0.8	Unshielded	Without Ferrite

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
Adapter	Mediacom	BOS050200-02A	/

1.8 Measurement Uncertainty

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

1.9 Test Equipment List and Details

Fixed asset Number	Description	Manufacturer	Model	Serial No.	Cal Date	Due. Date
WTXE1041A 1001	Communication Tester	Rohde & Schwarz	CMW500	148650	2023-02-25	2024-02-24
WTXE1022A 1002	GSM Tester	Rohde & Schwarz	CMU200	114403	2023-02-25	2024-02-24
WTXE1005A 1005	Spectrum Analyzer	Agilent	N9020A	US471401 02	2023-02-25	2024-02-24
WTXE1084A 1001	Spectrum Analyzer	Agilent	N9020A	MY543205 48	2023-02-25	2024-02-24
WTXE1044A 1001	Signal Generator	Agilent	83752A	3610A014 53	2023-02-25	2024-02-24
WTXE1045A 1001	Vector Signal Generator	Agilent	N5182A	MY470702 02	2023-02-25	2024-02-24
WTXE1018A 1001	Power Divider	Weinschel	1506A	PM204	2023-02-25	2024-02-24
WTXE1045A 1001	Power Divider	RF-Lambda	RFLT4W5M18G	14110400 027	2023-02-25	2024-02-24
☐ Chamber A: Below 1GHz						
WTXE1005A 1003	Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/03 5	2023-02-25	2024-02-24
WTXE1007A 1001	EMI Test Receiver	Rohde & Schwarz	ESVB	825471/00 5	2023-02-25	2024-02-24
WTXE1007A 1001	Amplifier	HP	8447F	2805A034 75	2023-02-25	2024-02-24
WTXE1010A 1007	Loop Antenna	Schwarz beck	FMZB 1516	9773	2021-03-20	2024-03-19
WTXE1010A 1006	Broadband Antenna	Schwarz beck	VULB9163	9163-333	2023-03-20	2026-03-19
☐ Chamber A: Above 1GHz						
WTXE1005A 1003	Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/03 5	2023-02-25	2024-02-24
WTXE1007A 1001	EMI Test Receiver	Rohde & Schwarz	ESVB	825471/00 5	2023-02-25	2024-02-24
WTXE1065A 1001	Amplifier	C&D	PAP-1G18	14918	2023-02-25	2024-02-24
WTXE1010A 1005	Horn Antenna	ETS	3117	00086197	2021-03-19	2024-03-18
WTXE1010A 1010	DRG Horn Antenna	A.H. SYSTEMS	SAS-574	571	2021-03-19	2024-03-18

WTXE1003A 1001	Pre-amplifier	Schwarzbeck	BBV 9721	9721-031	2023-02-25	2024-02-24
☐ Chamber B:Below 1GHz						
WTXE1010A 1006	Trilog Broadband Antenna	Schwarz beck	VULB9163(B)	9163-635	2021-04-09	2024-04-08
WTXE1038A 1001	Amplifier	Agilent	8447D	2944A101 79	2023-02-25	2024-02-24
WTXE1001A 1002	EMI Test Receiver	Rohde & Schwarz	ESPI	101391	2023-02-25	2024-02-24
☒ Chamber C:Below 1GHz						
WTXE1093A 1001	EMI Test Receiver	Rohde & Schwarz	ESIB 26	100401	2023-02-25	2024-02-24
WTXE1010A 1013-1	Trilog Broadband Antenna	Schwarz beck	VULB 9168	1194	2021-05-28	2024-05-27
WTXE1010A 1007	Loop Antenna	Schwarz beck	FMZB 1516	9773	2021-03-20	2024-03-19
WTXE1007A 1002	Amplifier	HP	8447F	2944A038 69	2023-02-25	2024-02-24
☒ Chamber C: Above 1GHz						
WTXE1093A 1001	EMI Test Receiver	Rohde & Schwarz	ESIB 26	100401	2023-02-25	2024-02-24
WTXE1103A 1005	Horn Antenna	POAM	RTF-11A	LP228060 221	2023-03-10	2026-03-09
WTXE1103A 1006	Amplifier	Tonscend	TAP01018050	AP22E806 235	2023-02-25	2024-02-24
☒ Conducted Room 1#						
WTXE1001A 1001	EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2023-02-25	2024-02-24
WTXE1002A 1001	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2023-02-25	2024-02-24
WTXE1003A 1001	AC LISN	Schwarz beck	NSLK8126	8126-224	2023-02-25	2024-02-24
☐ Conducted Room 2#						
WTXE1001A 1004	EMI Test Receiver	Rohde & Schwarz	ESPI	101259	2023-02-25	2024-02-24
WTXE1003A 1003	LISN	Rohde & Schwarz	ENV 216	100097	2023-02-25	2024-02-24

Software List			
Description	Manufacturer	Model	Version
EMI Test Software (Radiated Emission)*	Farad	EZ-EMC	RA-03A1
EMI Test Software (Conducted Emission)*	Farad	EZ-EMC	RA-03A1

*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 integral 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 $11 \text{ dBm} + 10 \log B$, 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 ($< 1\text{MHz}$, or $< 500\text{kHz}$) and integrated over 1 MHz, or 500kHz bandwidth, the following adjustments to the procedures apply:

- a) Set $\text{RBW} \geq 1/T$, where T is defined in section II.B.I.a).
- b) Set $\text{VBW} \geq 3 \text{ RBW}$.
- c) If measurement bandwidth of Maximum PSD is specified in 500kHz, add $10\log(500\text{kHz}/\text{RBW})$ to the measured result, whereas $\text{RBW} (< 500\text{kHz})$ 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 $10\log(1\text{MHz}/\text{RBW})$ to the measured result, whereas $\text{RBW} (< 1\text{MHz})$ 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 $\text{RBW}=100\text{kHz}$ 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 $11\text{dBm} + 10 \log B$, 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.

(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) $\geq 3 \times$ 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 $\geq 3 \times$ 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.

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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 $11\text{dBm} + 10 \log B$, 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.

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 $\geq$ 3MHz.
- (iv) Number of points in sweep $\geq$ 2 Span / RBW. (This ensures that bin-to-bin spacing is $\leq$ 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 $\geq$ 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:

$$\text{EIRP} = ((E \cdot d)^2) / 30$$

where:

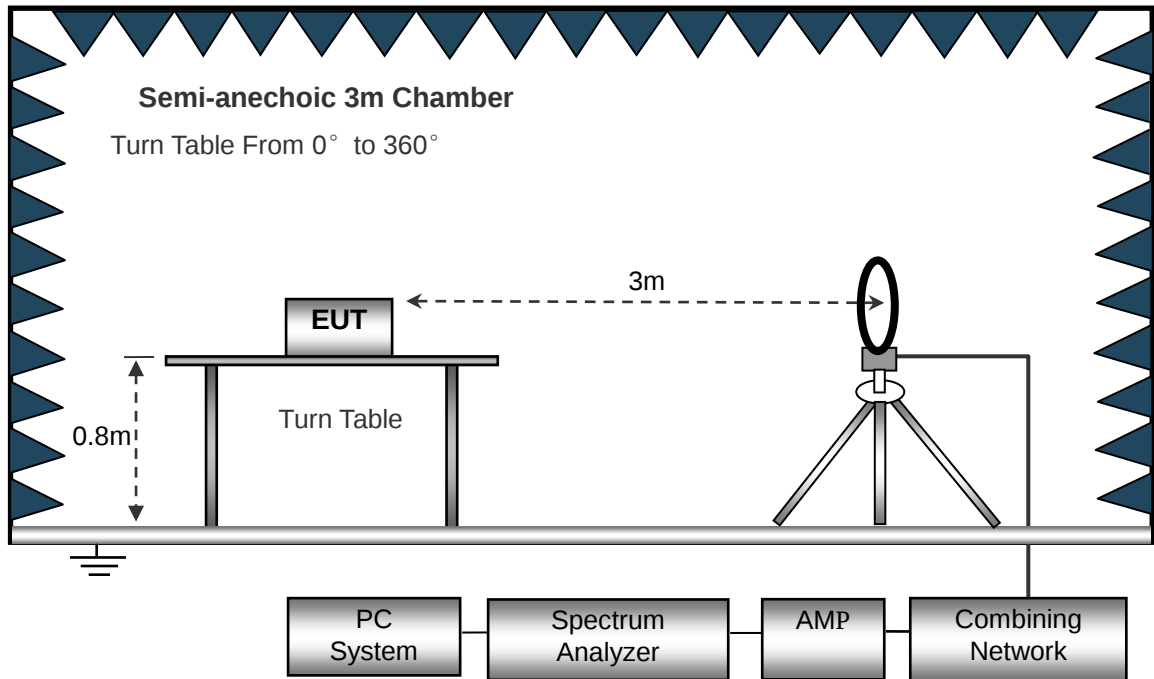
- E is the field strength in V/m;
- d is the measurement distance in meters;
- EIRP is the equivalent isotropically radiated power in watts.

8.2 Test Procedure

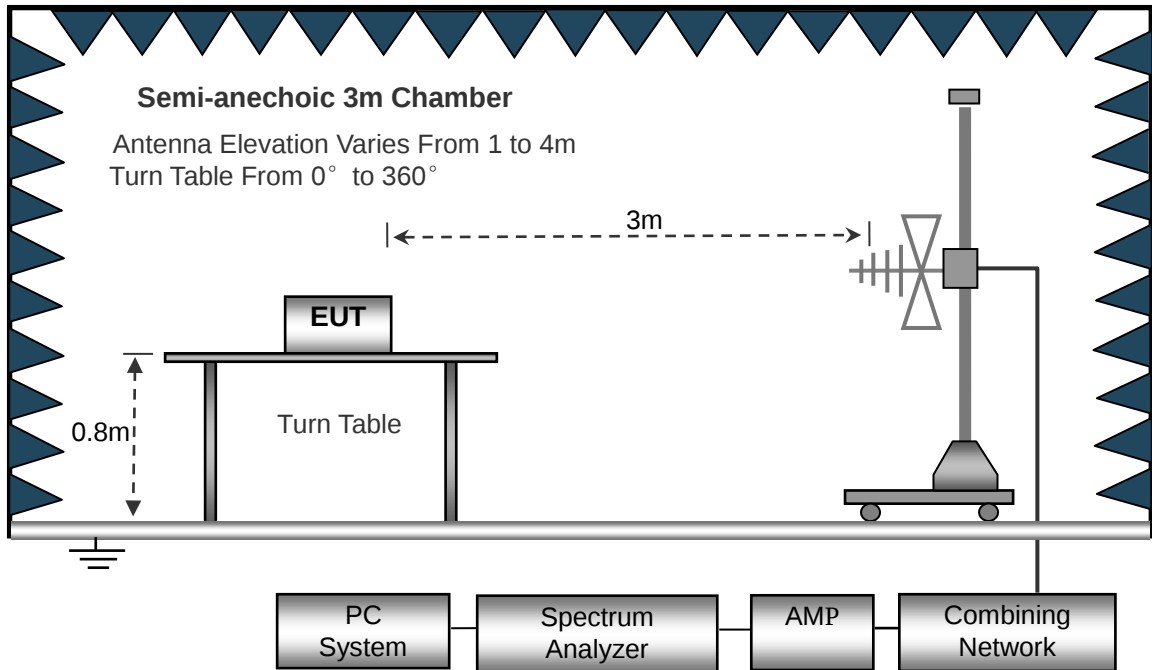
The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.205 15.407(b)(6) and FCC Part 15.209 Limit..

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.

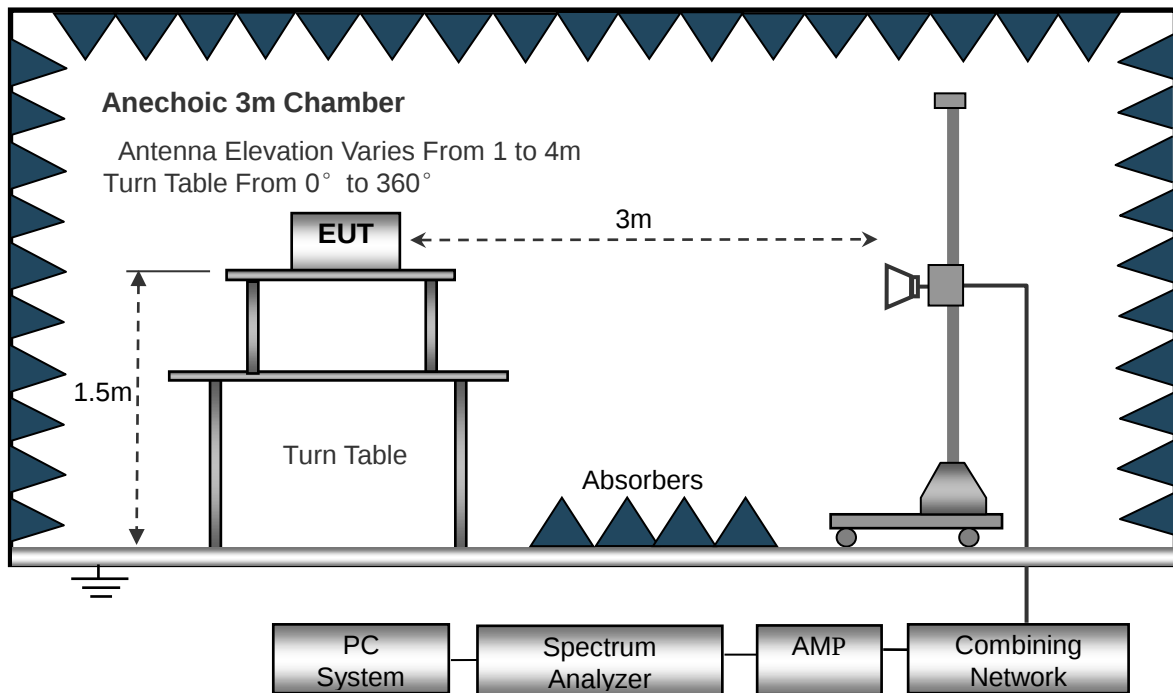
The test setup for emission measurement below 30MHz.



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:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Ant. Factor} + \text{Cable Loss} - \text{Ampl. Gain}$$

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:

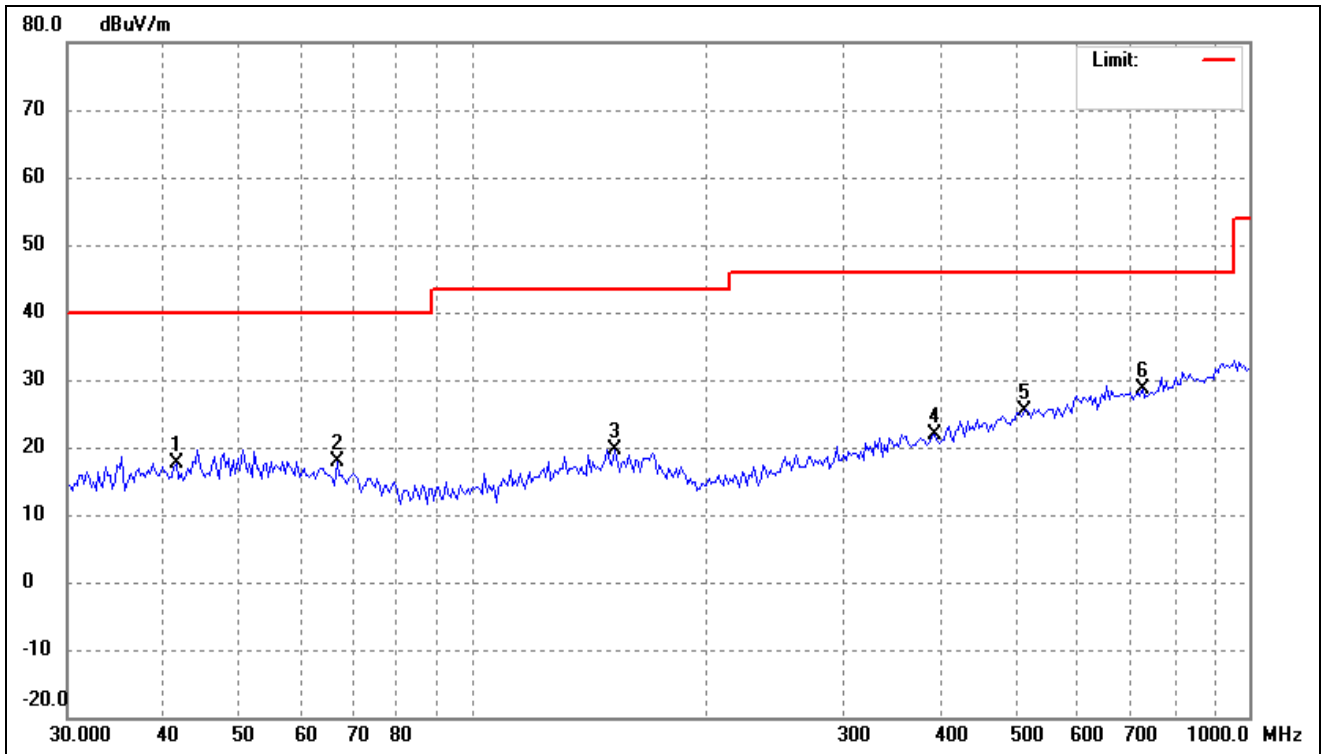
$$\text{Margin} = \text{Corr. Ampl.} - \text{FCC Part 15 Limit}$$

8.5 Summary of Test Results/Plots

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

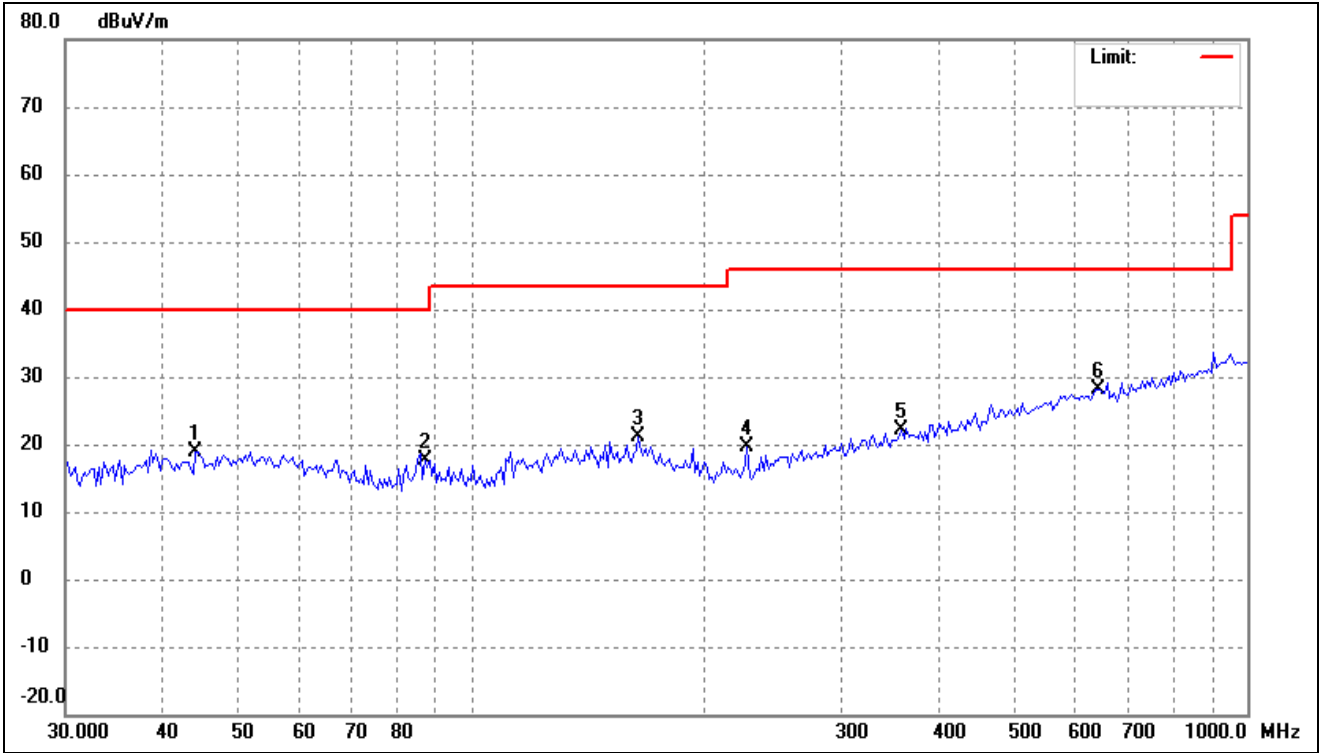
- Spurious Emission From 30MHz to 1GHz
- 5470-5725MHz

802.11a			
Test Channel	5500MHz(worst case)	Polarity:	Horizontal



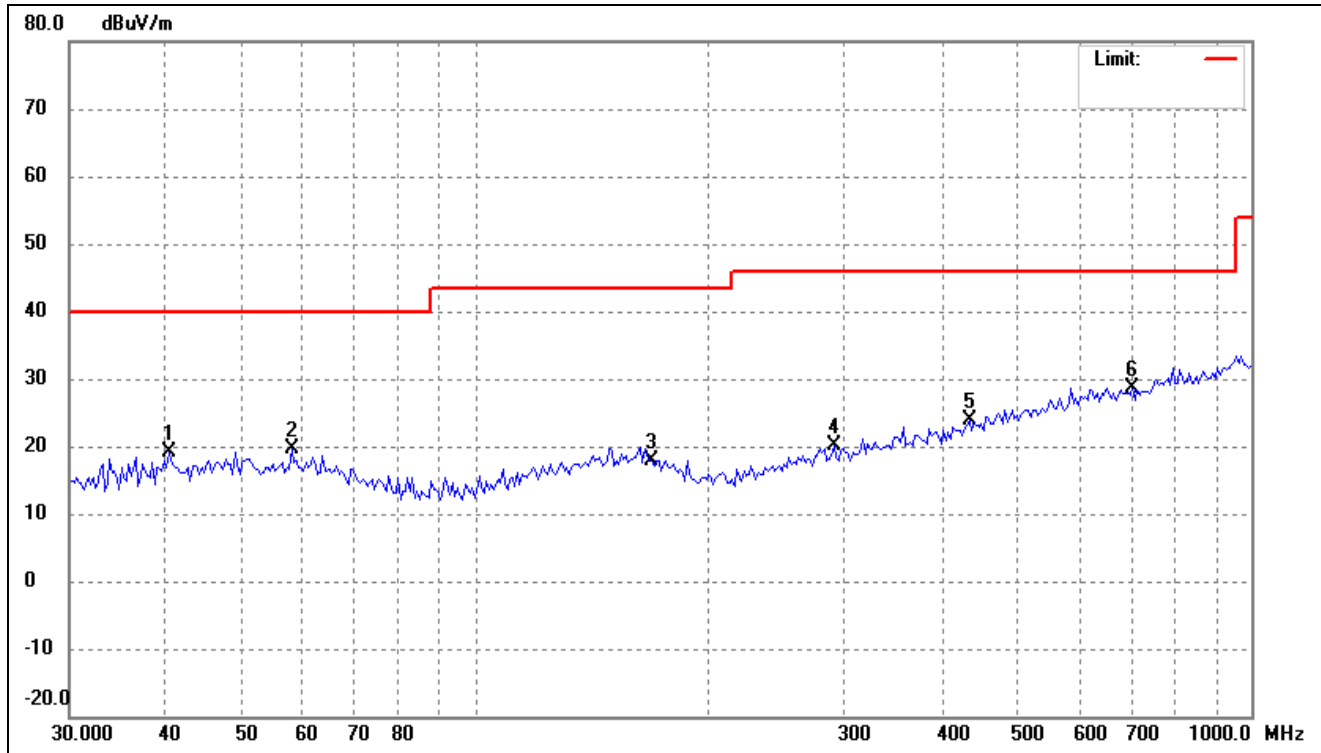
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	41.4483	26.05	-8.48	17.57	40.00	-22.43	-	-	peak
2	66.8395	28.01	-10.18	17.83	40.00	-22.17	-	-	peak
3	152.0902	28.19	-8.60	19.59	43.50	-23.91	-	-	peak
4	392.7376	27.96	-6.11	21.85	46.00	-24.15	-	-	peak
5	512.9478	29.10	-3.70	25.40	46.00	-20.60	-	-	peak
6	728.8971	29.20	-0.56	28.64	46.00	-17.36	-	-	peak

802.11a			
Test Channel	5500MHz(worst case)	Polarity:	Vertical



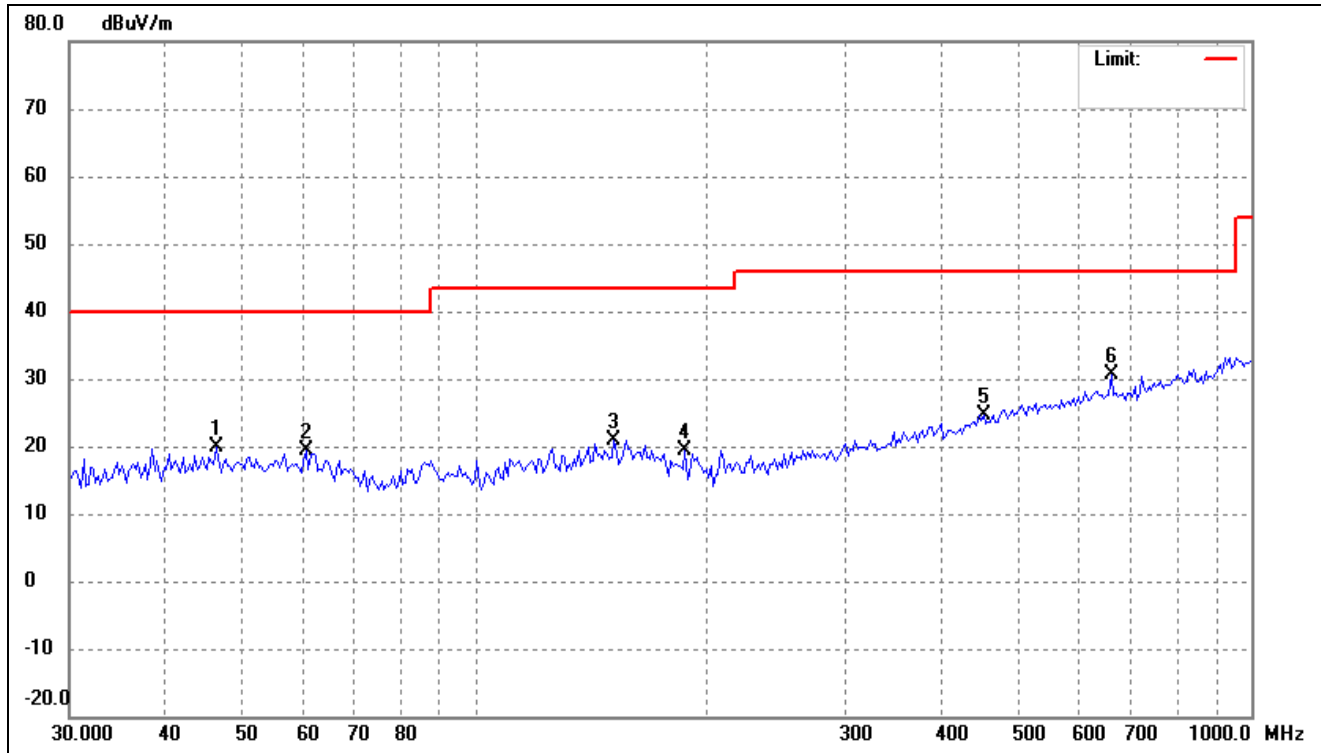
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	44.1544	27.25	-8.47	18.78	40.00	-21.22	-	-	peak
2	87.2980	30.61	-13.07	17.54	40.00	-22.46	-	-	peak
3	164.3129	29.83	-8.72	21.11	43.50	-22.39	-	-	peak
4	227.0164	31.47	-11.76	19.71	46.00	-26.29	-	-	peak
5	358.4497	28.95	-6.89	22.06	46.00	-23.94	-	-	peak
6	642.2923	29.38	-1.33	28.05	46.00	-17.95	-	-	peak

802.11n-HT20			
Test Channel	5500MHz(worst case)	Polarity:	Horizontal



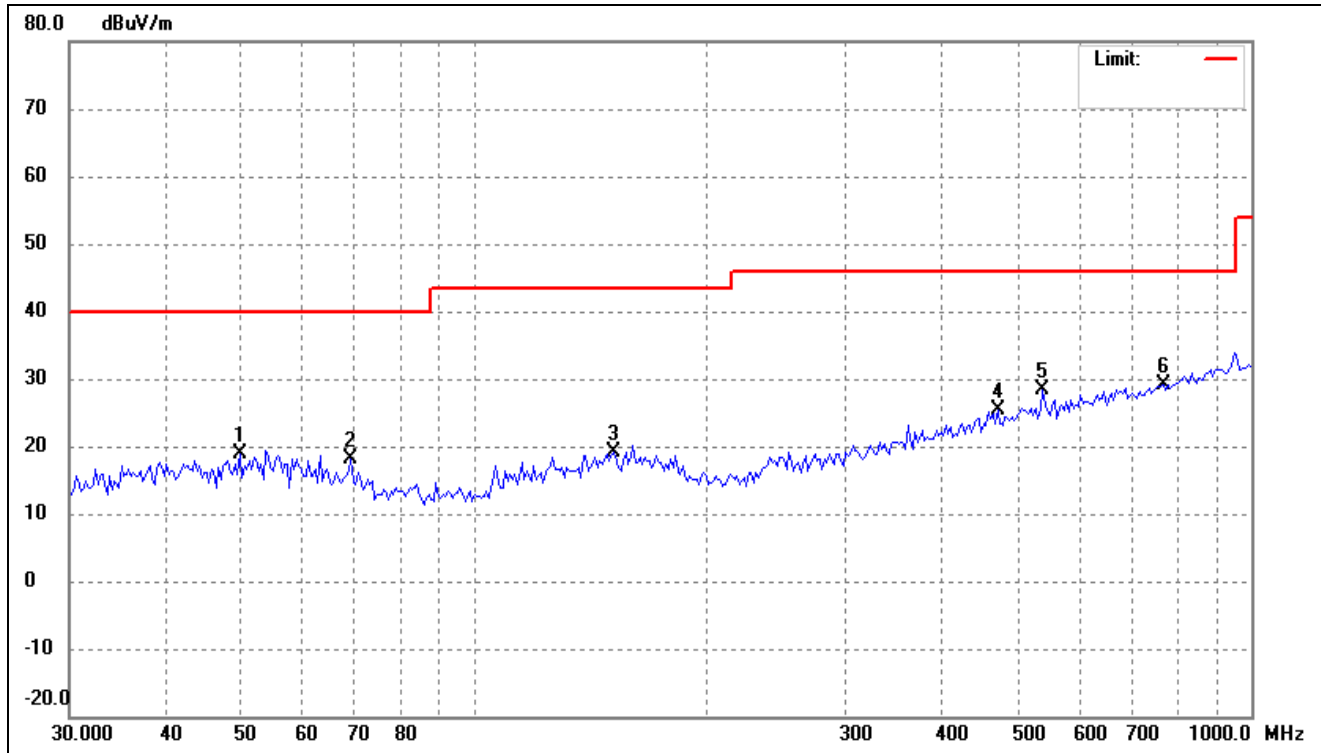
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	40.2995	27.68	-8.48	19.20	40.00	-20.80	-	-	peak
2	58.0759	28.39	-8.82	19.57	40.00	-20.43	-	-	peak
3	168.9970	26.84	-8.85	17.99	43.50	-25.51	-	-	peak
4	290.3170	28.81	-8.58	20.23	46.00	-25.77	-	-	peak
5	433.3397	28.88	-5.05	23.83	46.00	-22.17	-	-	peak
6	703.7314	29.57	-1.02	28.55	46.00	-17.45	-	-	peak

802.11n-HT20			
Test Channel	5500MHz(worst case)	Polarity:	Vertical



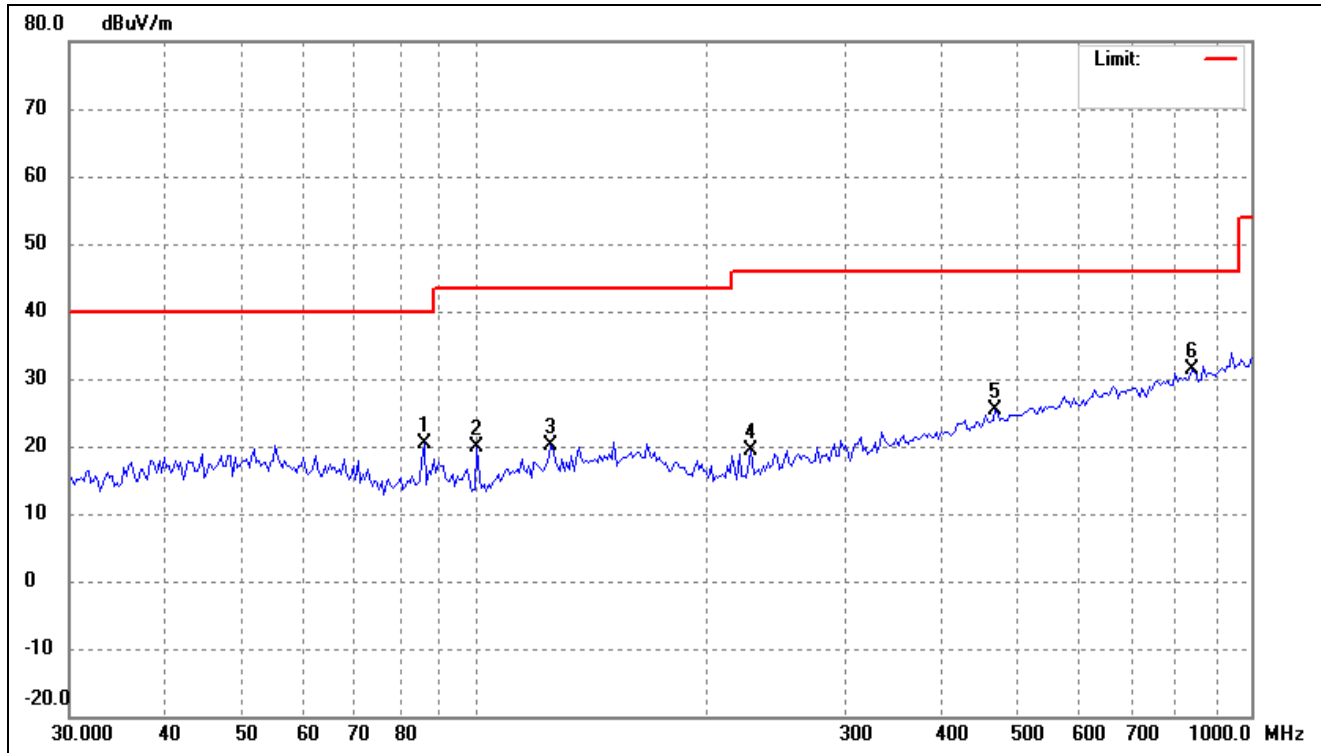
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	46.3806	28.17	-8.37	19.80	40.00	-20.20	-	-	peak
2	60.5769	28.52	-9.04	19.48	40.00	-20.52	-	-	peak
3	151.0252	29.56	-8.61	20.95	43.50	-22.55	-	-	peak
4	186.4684	30.38	-11.03	19.35	43.50	-24.15	-	-	peak
5	452.0013	29.22	-4.56	24.66	46.00	-21.34	-	-	peak
6	660.6025	31.80	-1.28	30.52	46.00	-15.48	-	-	peak

802.11n-HT40			
Test Channel	5510MHz(worst case)	Polarity:	Horizontal



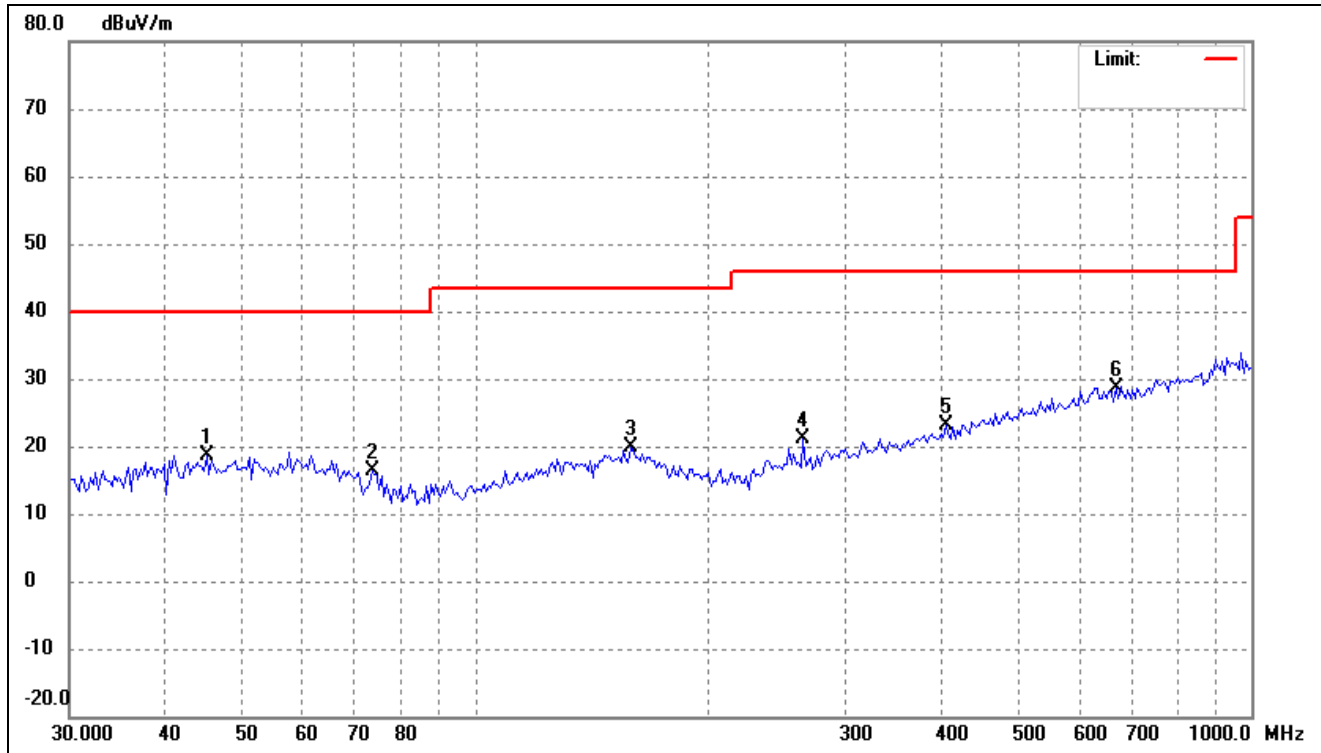
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	49.7571	27.07	-8.09	18.98	40.00	-21.02	-	-	peak
2	69.2297	28.70	-10.63	18.07	40.00	-21.93	-	-	peak
3	151.0252	27.85	-8.61	19.24	43.50	-24.26	-	-	peak
4	471.4665	29.73	-4.29	25.44	46.00	-20.56	-	-	peak
5	538.8107	31.58	-3.15	28.43	46.00	-17.57	-	-	peak
6	771.0475	29.13	0.03	29.16	46.00	-16.84	-	-	peak

802.11n-HT40			
Test Channel	5510MHz(worst case)	Polarity:	Vertical



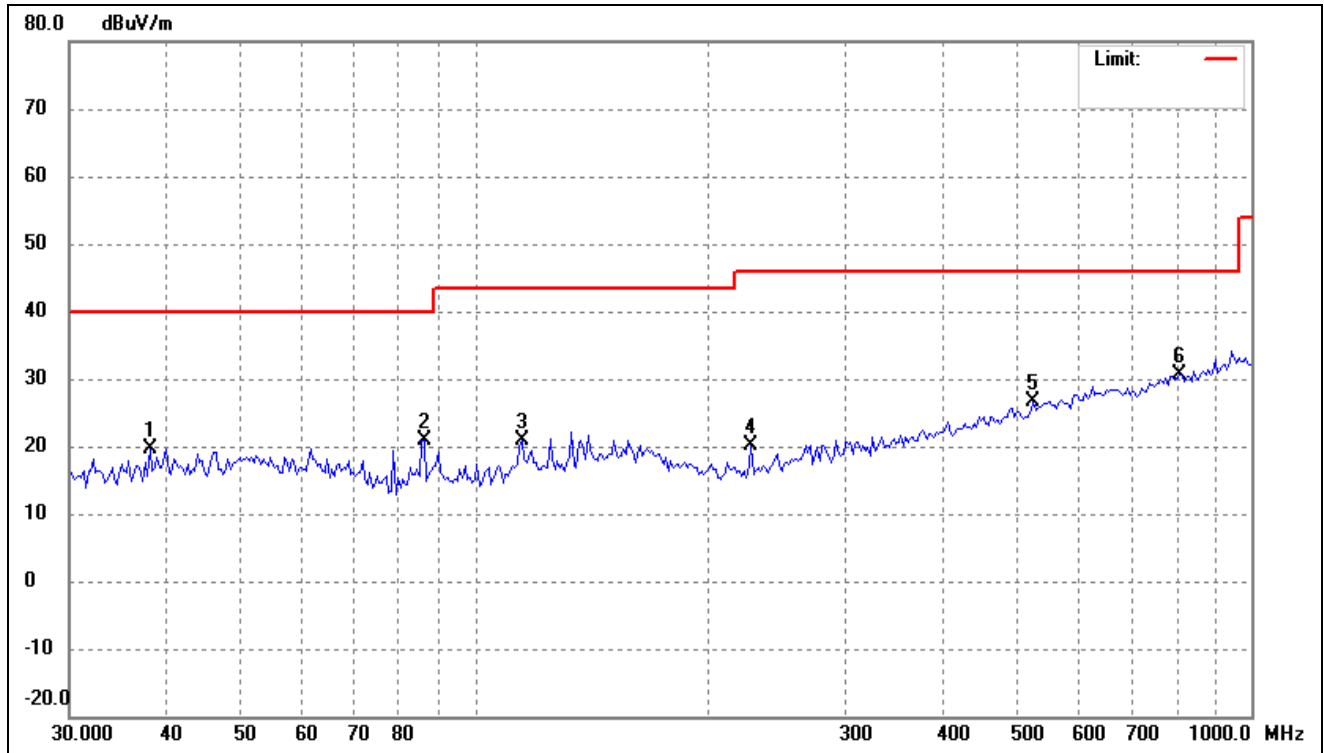
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	86.0796	33.53	-13.04	20.49	40.00	-19.51	-	-	peak
2	100.4712	32.43	-12.45	19.98	43.50	-23.52	-	-	peak
3	124.9249	30.35	-10.19	20.16	43.50	-23.34	-	-	peak
4	227.0164	31.05	-11.76	19.29	46.00	-26.71	-	-	peak
5	468.1651	29.65	-4.34	25.31	46.00	-20.69	-	-	peak
6	838.8870	30.77	0.64	31.41	46.00	-14.59	-	-	peak

802.11ac-HT80			
Test Channel	5530MHz(worst case)	Polarity:	Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	45.0951	26.98	-8.46	18.52	40.00	-21.48	-	-	peak
2	73.7496	28.05	-11.59	16.46	40.00	-23.54	-	-	peak
3	158.6399	28.39	-8.61	19.78	43.50	-23.72	-	-	peak
4	264.9709	30.60	-9.55	21.05	46.00	-24.95	-	-	peak
5	403.9335	29.09	-5.85	23.24	46.00	-22.76	-	-	peak
6	669.9523	29.94	-1.27	28.67	46.00	-17.33	-	-	peak

802.11ac-HT80			
Test Channel	5530MHz(worst case)	Polarity:	Vertical

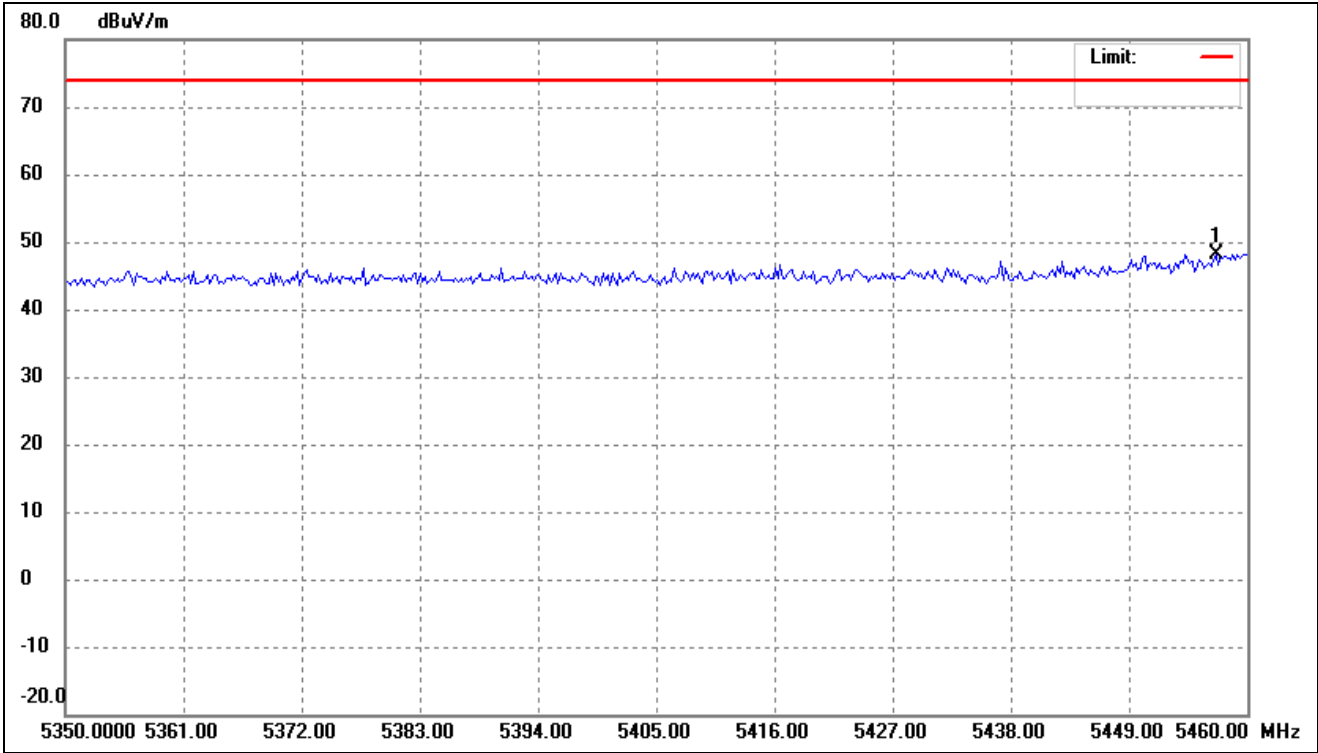


No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	38.0965	28.62	-8.89	19.73	40.00	-20.27	-	-	peak
2	86.0796	33.96	-13.04	20.92	40.00	-19.08	-	-	peak
3	114.8224	32.04	-11.07	20.97	43.50	-22.53	-	-	peak
4	227.0164	31.80	-11.76	20.04	46.00	-25.96	-	-	peak
5	523.8763	30.15	-3.53	26.62	46.00	-19.38	-	-	peak
6	809.9238	30.22	0.39	30.61	46.00	-15.39	-	-	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.

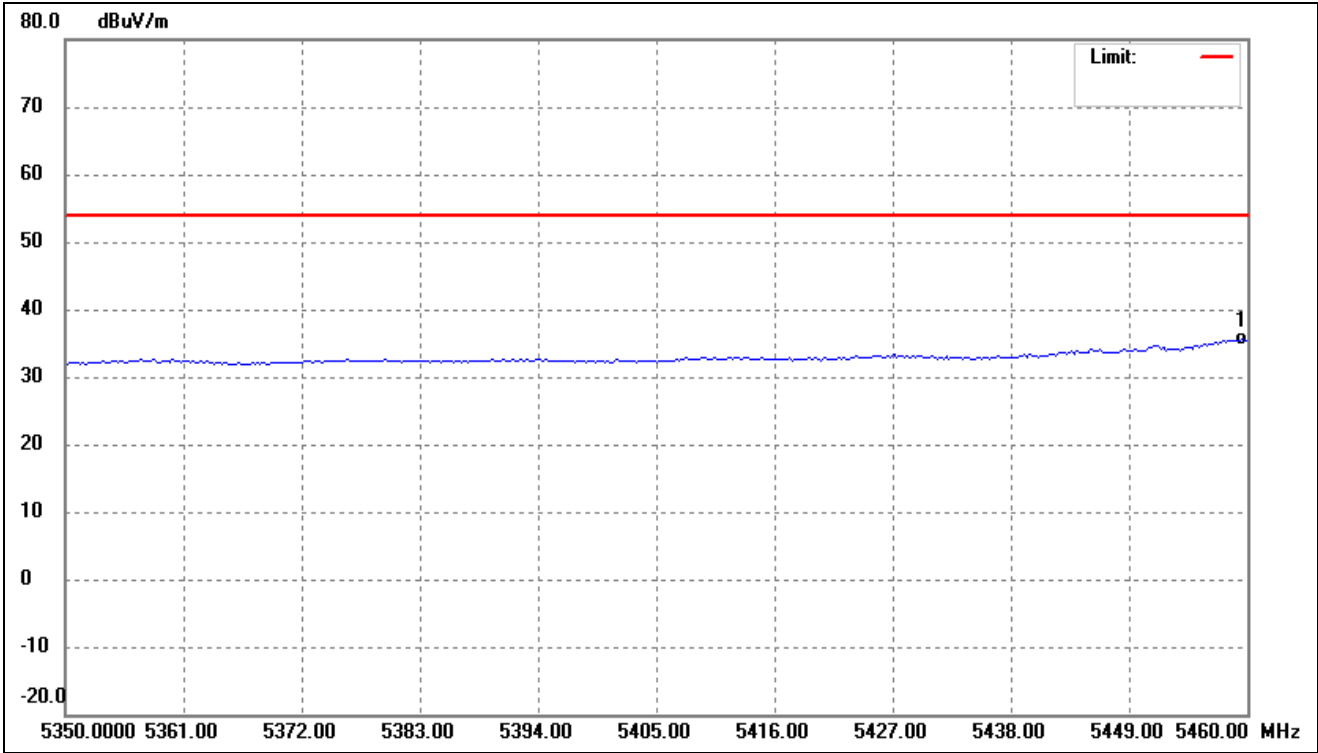
➤ Spurious Emission above 1GHz

802.11a- Restricted Bandedge			
Test Channel	band 5.50-5.53GHz	Polarity:	Horizontal(worst case)



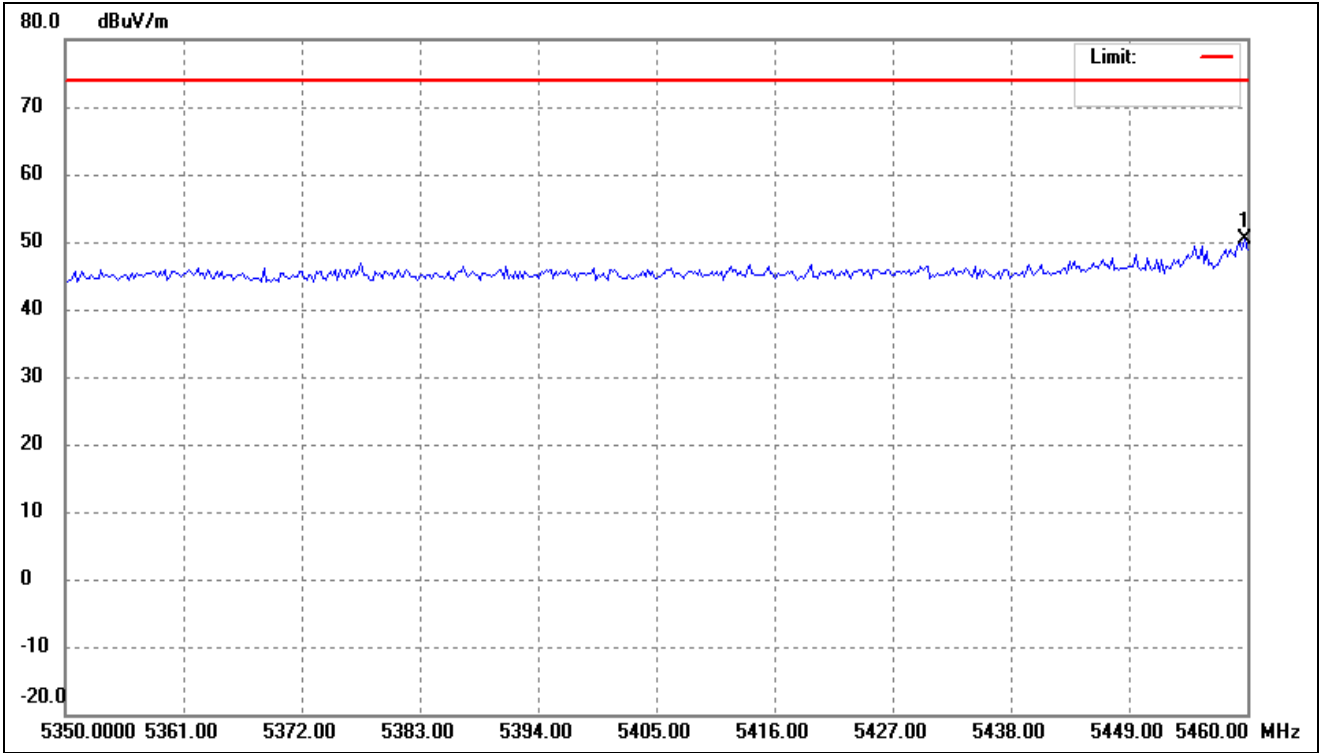
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	5457.134	58.31	-10.14	48.17	74.00	-25.83	-	-	peak

802.11a- Restricted Bandedge			
Test Channel	band 5.50-5.53GHz	Polarity:	Horizontal(worst case)



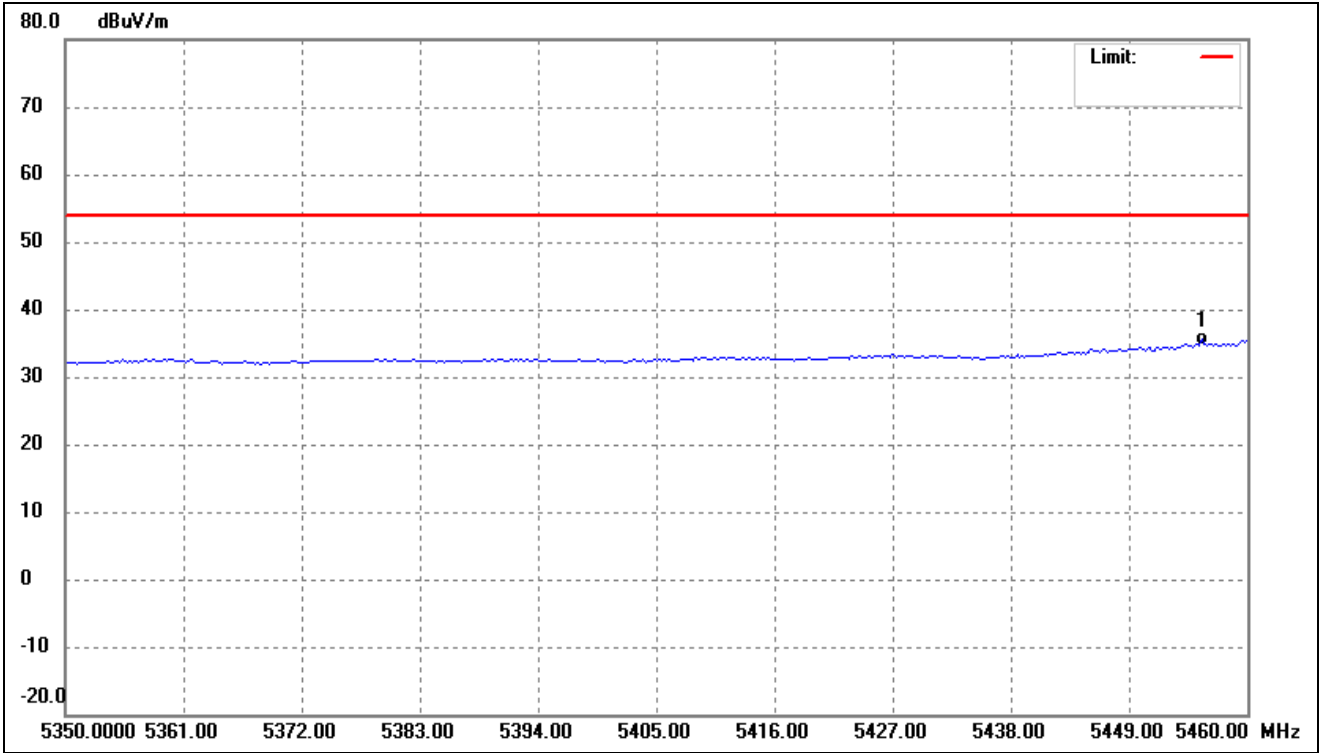
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	5459.559	45.80	-10.13	35.67	54.00	-18.33	-	-	AVG

802.11n-HT20- Restricted Bandedge			
Test Channel	band 5.50-5.53GHz	Polarity:	Horizontal(worst case)



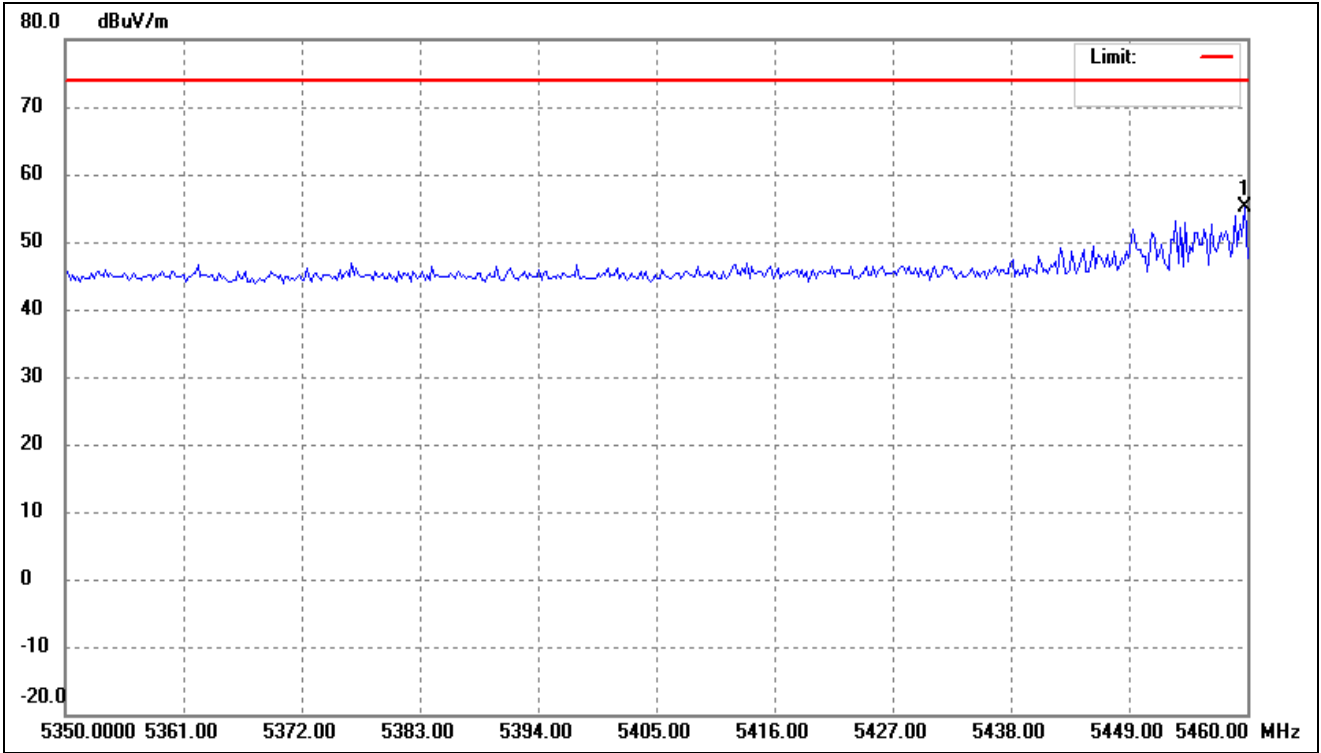
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	5459.780	60.44	-10.13	50.31	74.00	-23.69	-	-	peak

802.11n-HT20- Restricted Bandedge			
Test Channel	band 5.50-5.53GHz	Polarity:	Horizontal(worst case)



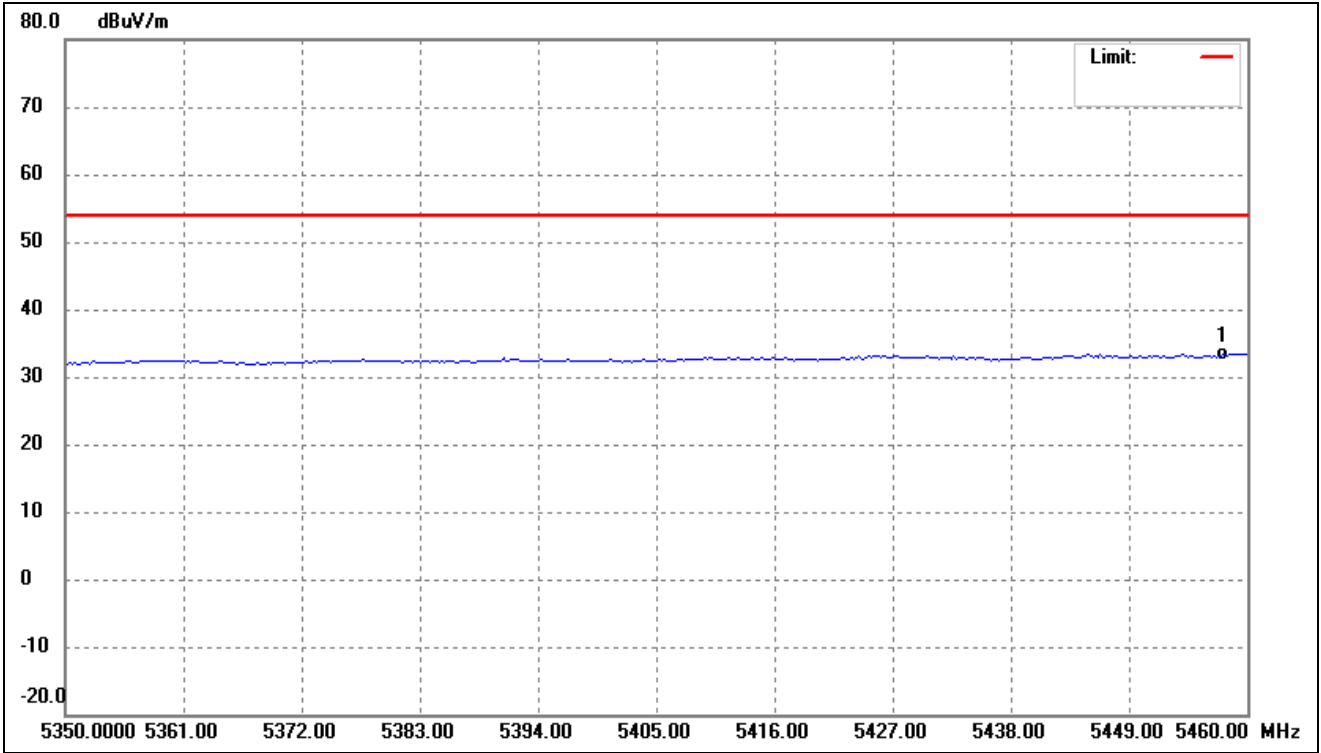
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	5455.812	45.84	-10.14	35.70	54.00	-18.30	-	-	AVG

802.11n-HT40- Restricted Bandedge			
Test Channel	band 5.50-5.53GHz	Polarity:	Horizontal(worst case)



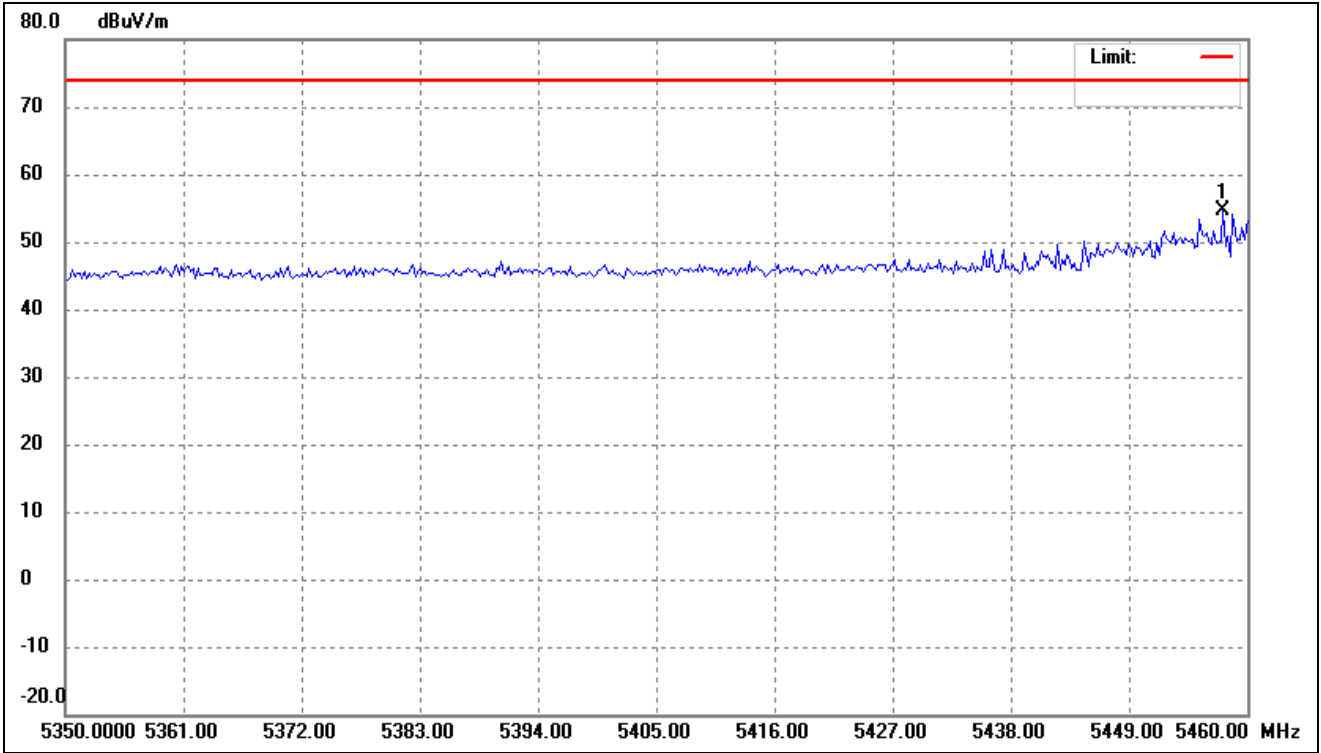
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	5459.780	65.23	-10.13	55.10	74.00	-18.90	-	-	peak

802.11n-HT40- Restricted Bandedge			
Test Channel	band 5.50-5.53GHz	Polarity:	Horizontal(worst case)



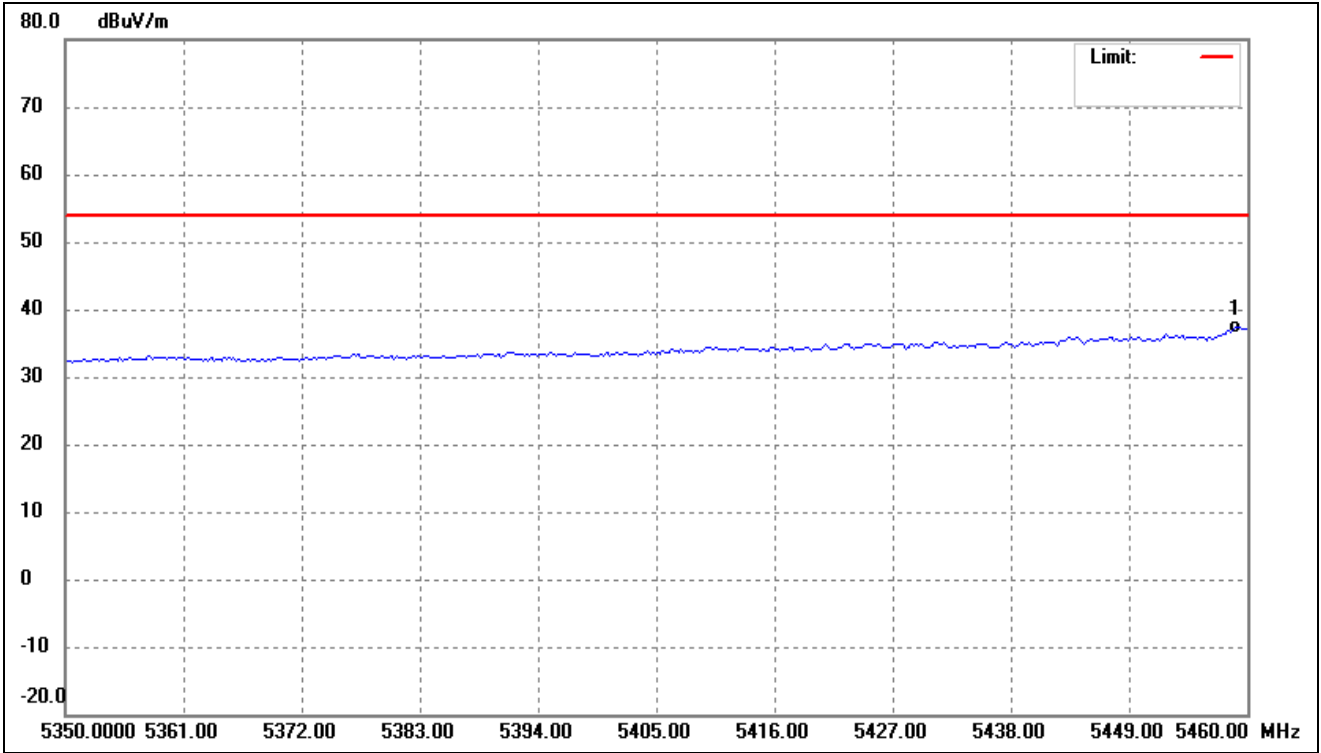
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	5457.796	43.63	-10.14	33.49	54.00	-20.51	-	-	AVG

802.11ac-HT80- Restricted Bandedge			
Test Channel	band 5.50-5.53GHz	Polarity:	Horizontal(worst case)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	5457.796	64.68	-10.14	54.54	74.00	-19.46	-	-	peak

802.11ac-HT80- Restricted Bandedge			
Test Channel	band 5.50-5.53GHz	Polarity:	Horizontal(worst case)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	5458.898	47.52	-10.13	37.39	54.00	-16.61	-	-	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.

- For the frequency band 5.470-5.725GHz (802.11a)
- 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 (5500MHz)							
11000	57.32	8.82	66.14	74	-7.86	H	PK
11000	39.42	8.82	48.24	54	-5.76	H	AV
11000	55.53	8.82	64.35	74	-9.65	V	PK
11000	41.28	8.82	50.1	54	-3.9	V	AV
Middle Channel (5600MHz)							
11200	55.19	8.92	64.11	74	-9.89	H	PK
11200	41.35	8.92	50.27	54	-3.73	H	AV
11200	56.49	8.92	65.41	74	-8.59	V	PK
11200	41.89	8.92	50.81	54	-3.19	V	AV
High Channel (5700MHz)							
11400	56.97	9.36	66.33	74	-7.67	H	PK
11400	38.41	9.36	47.77	54	-6.23	H	AV
11400	58.67	9.36	68.03	74	-5.97	V	PK
11400	40.90	9.36	50.26	54	-3.74	V	AV

- Out of Band edge for 5470-5725MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5470	-38.59	-27
Highest	Above 5725	-37.96	-27
Note: the data just list the worst cases			

- For the frequency band 5.470-5.725GHz (802.11n HT20)
- Harmonics And Spurious Emissions

Frequency (MHz)	Reading (dBuV/m)	Correct dB	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polar H/V	Detector
Low Channel (5500MHz)							
11000	57.85	8.82	66.67	74	-7.33	H	PK
11000	39.67	8.82	48.49	54	-5.51	H	AV
11000	56.23	8.82	65.05	74	-8.95	V	PK
11000	38.69	8.82	47.51	54	-6.49	V	AV
Middle Channel (5600MHz)							
11200	57.87	8.92	66.79	74	-7.21	H	PK
11200	40.84	8.92	49.76	54	-4.24	H	AV
11200	55.72	8.92	64.64	74	-9.36	V	PK
11200	40.5	8.92	49.42	54	-4.58	V	AV
High Channel (5700MHz)							
11400	58.71	9.84	68.55	74	-5.45	H	PK
11400	38.64	9.84	48.48	54	-5.52	H	AV
11400	58.43	9.84	68.27	74	-5.73	V	PK
11400	39.38	9.84	49.22	54	-4.78	V	AV

- Out of Band edge for 5470-5725MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5470	-38.92	-27
Highest	Above 5725	-39.67	-27
Note: the data just list the worst cases			

Note: this EUT was tested in the low, high channel and the worst case position data was reported.

- For the frequency band 5.470-5.725GHz (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 (5510MHz)							
11020	57.28	9.16	66.44	74	-7.56	H	PK
11020	41.08	9.16	50.24	54	-3.76	H	AV
11020	55.28	9.16	64.44	74	-9.56	V	PK
11020	39.65	9.16	48.81	54	-5.19	V	AV
Middle Channel (5590MHz)							
11180	57.27	9.29	66.56	74	-7.44	H	PK
11180	39.35	9.29	48.64	54	-5.36	H	AV
11180	58.95	9.29	68.24	74	-5.76	V	PK
11180	41.96	9.29	51.25	54	-2.75	V	AV
High Channel (5670MHz)							
11340	55.49	9.43	64.92	74	-9.08	H	PK
11340	41.45	9.43	50.88	54	-3.12	H	AV
11340	58.09	9.43	67.52	74	-6.48	V	PK
11340	38.23	9.43	47.66	54	-6.34	V	AV

- Out of Band edge for 5470-5725MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5470	-34.86	-27
Highest	Above 5725	-36.97	-27
Note: the data just list the worst cases			

- For the frequency band 5.470-5.725GHz (802.11ac VH80)
- Harmonics And Spurious Emissions

Frequency (MHz)	Reading (dBuV/m)	Correct dB	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polar H/V	Detector
Low Channel (5530MHz)							
11060	55.05	9.42	64.47	74	-9.53	H	PK
11060	38.92	9.42	48.34	54	-5.66	H	AV
11060	57.54	9.42	66.96	74	-7.04	V	PK
11060	39.97	9.42	49.39	54	-4.61	V	AV
High Channel (5610MHz)							
11220	57.82	9.69	67.51	74	-6.49	H	PK
11220	40.95	9.69	50.64	54	-3.36	H	AV
11220	58.81	9.69	68.5	74	-5.50	V	PK
11220	38.16	9.69	47.85	54	-6.15	V	AV

- Out of Band edge for 5470-5725MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5470	-35.24	-27
Highest	Above 5725	-36.63	-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

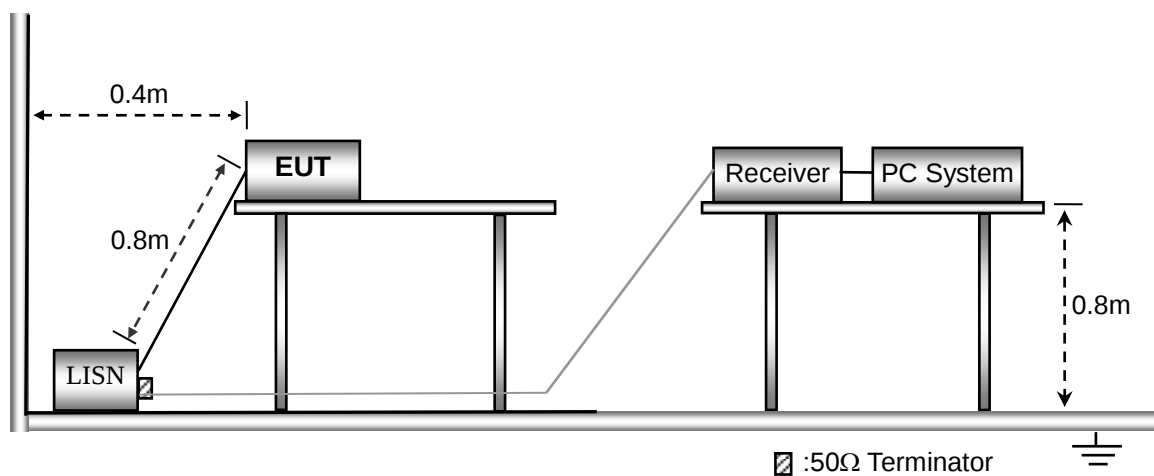
10. Conducted Emissions

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



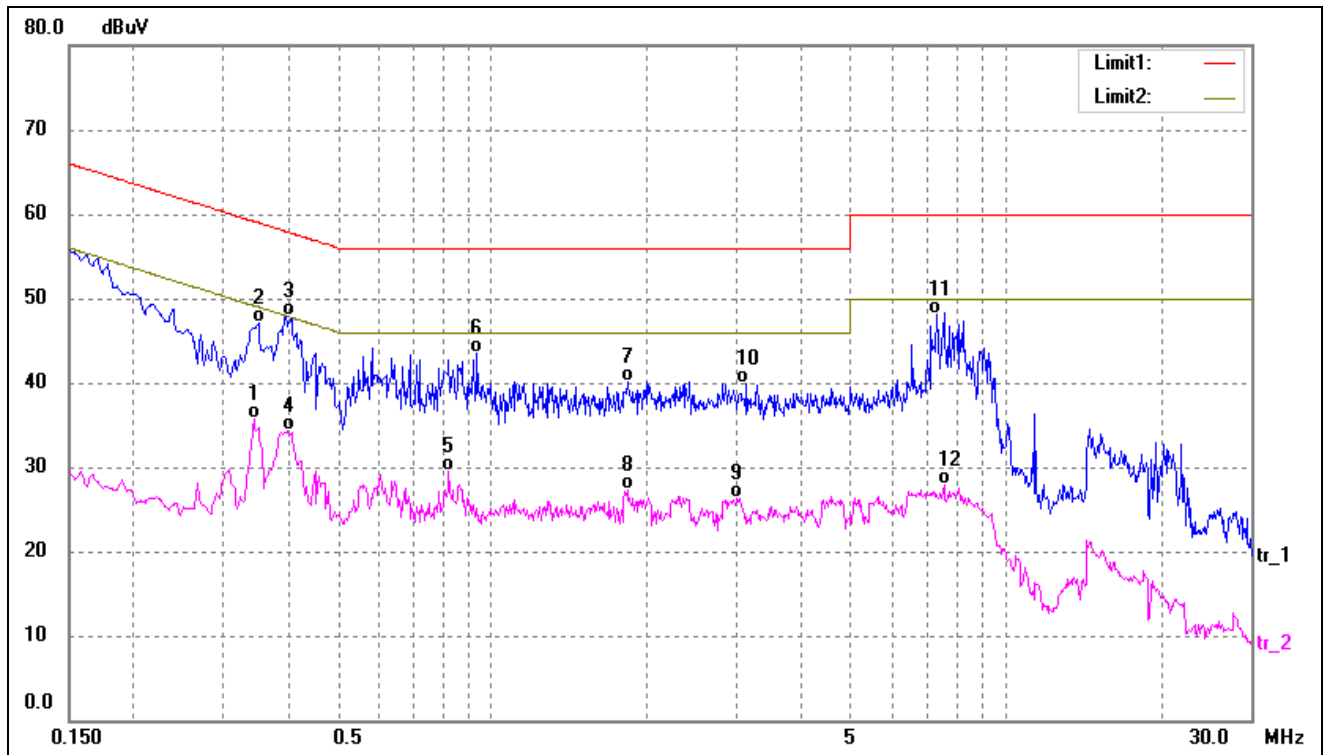
10.3 Test Receiver Setup

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

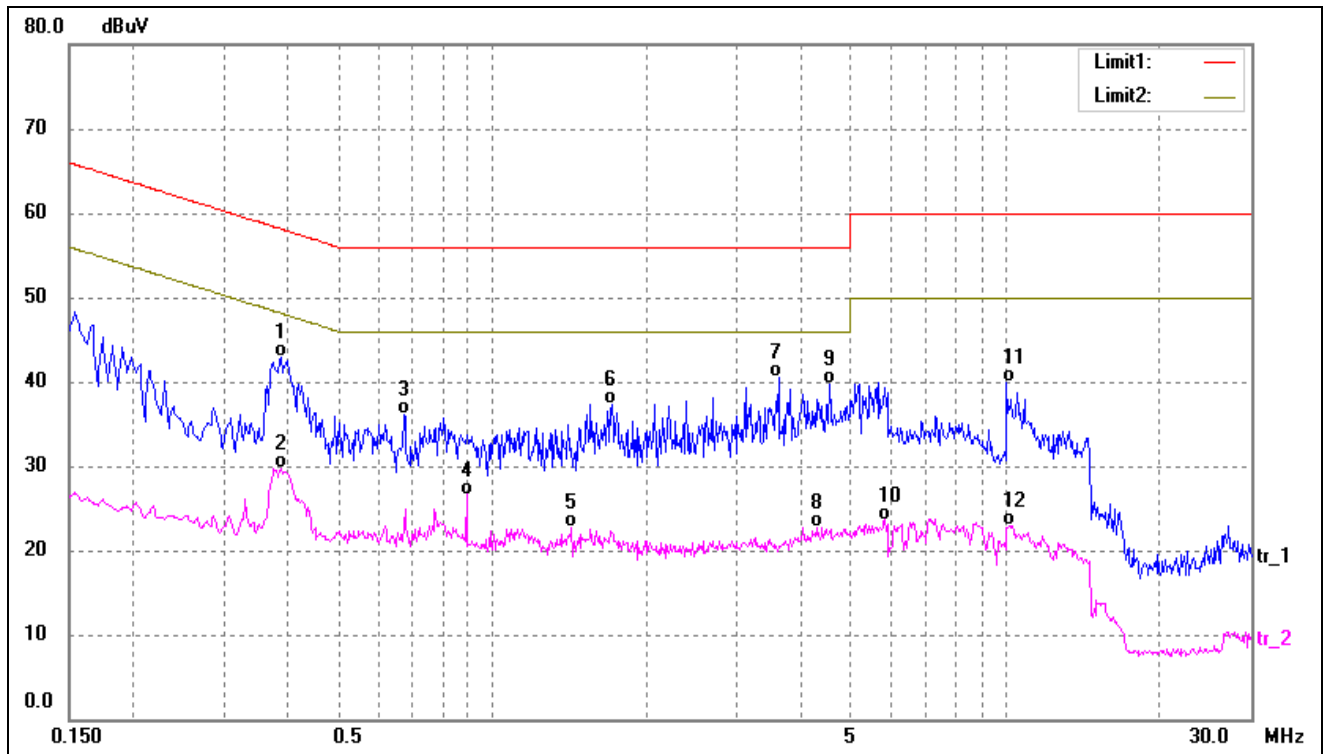
10.4 Summary of Test Results/Plots

Test Mode	Communication	AC120V 60Hz	Polarity:	Neutral
-----------	---------------	-------------	-----------	---------



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.3420	25.34	10.28	35.62	49.15	-13.53	AVG
2	0.3497	36.82	10.28	47.10	58.97	-11.87	QP
3*	0.3940	37.69	10.27	47.96	57.98	-10.02	QP
4	0.3980	23.97	10.27	34.24	47.89	-13.65	AVG
5	0.8256	19.39	10.17	29.56	46.00	-16.44	AVG
6	0.9340	33.39	10.15	43.54	56.00	-12.46	QP
7	1.8380	29.90	10.30	40.20	56.00	-15.80	QP
8	1.8380	17.09	10.30	27.39	46.00	-18.61	AVG
9	3.0019	16.05	10.35	26.40	46.00	-19.60	AVG
10	3.1299	29.55	10.35	39.90	56.00	-16.10	QP
11	7.3578	37.77	10.38	48.15	60.00	-11.85	QP
12	7.5739	17.49	10.38	27.87	50.00	-22.13	AVG

Test Mode	Communication	AC120V 60Hz	Polarity:	Line
-----------	---------------	-------------	-----------	------



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1*	0.3860	32.65	10.27	42.92	58.15	-15.23	QP
2	0.3860	19.50	10.27	29.77	48.15	-18.38	AVG
3	0.6740	25.94	10.20	36.14	56.00	-19.86	QP
4	0.8900	16.44	10.16	26.60	46.00	-19.40	AVG
5	1.4295	12.42	10.22	22.64	46.00	-23.36	AVG
6	1.7097	26.97	10.27	37.24	56.00	-18.76	QP
7	3.6059	30.15	10.36	40.51	56.00	-15.49	QP
8	4.2900	12.36	10.37	22.73	46.00	-23.27	AVG
9	4.5259	29.34	10.37	39.71	56.00	-16.29	QP
10	5.8338	13.22	10.38	23.60	50.00	-26.40	AVG
11	10.0617	29.47	10.38	39.85	60.00	-20.15	QP
12	10.1340	12.62	10.38	23.00	50.00	-27.00	AVG

APPENDIX SUMMARY

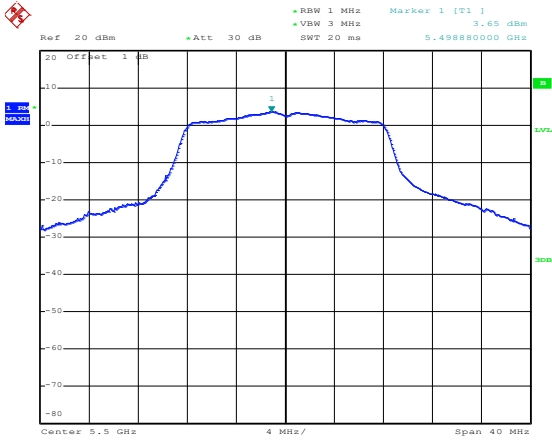
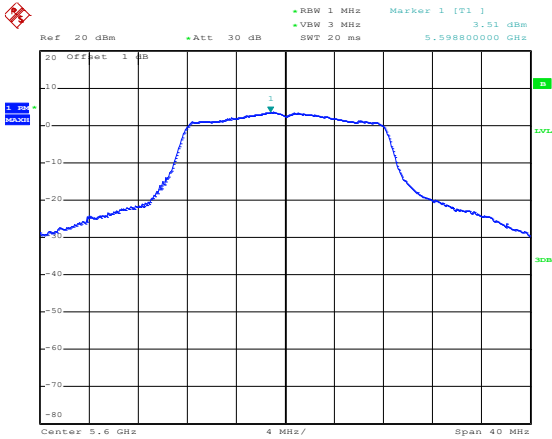
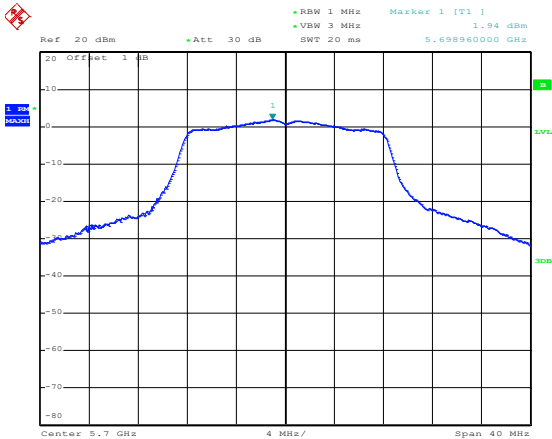
Project No.	WTX23X04090911W	Test Engineer	BAldi
Start date	2023/5/4	Finish date	2023/5/17
Temperature	23℃	Humidity	46%
RF specifications	U-NII		

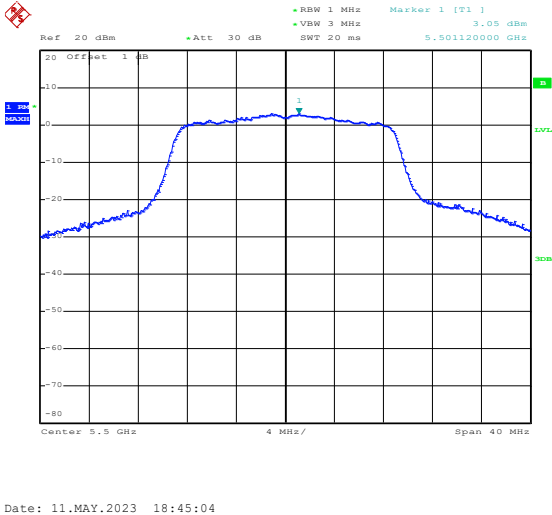
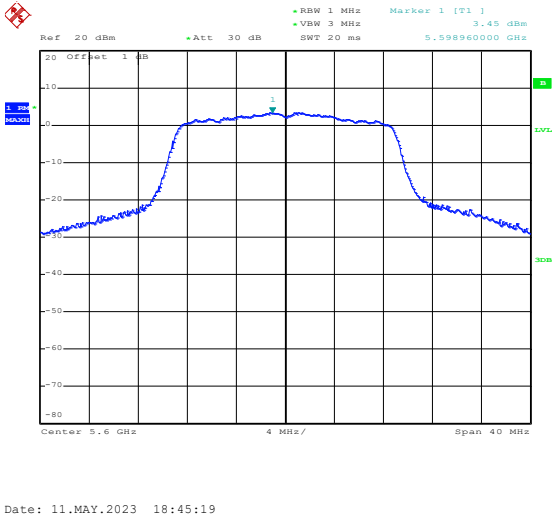
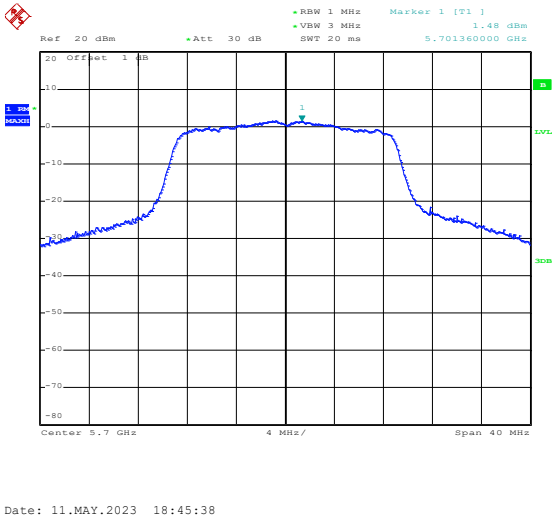
APPENDIX	Description of Test Item	Result
A	Power Spectral Density	Compliant
B	Emission Bandwidth and Occupied Bandwidth	Compliant
C	Maximum Conducted Output Power	Compliant
D	Frequency Stability	Compliant

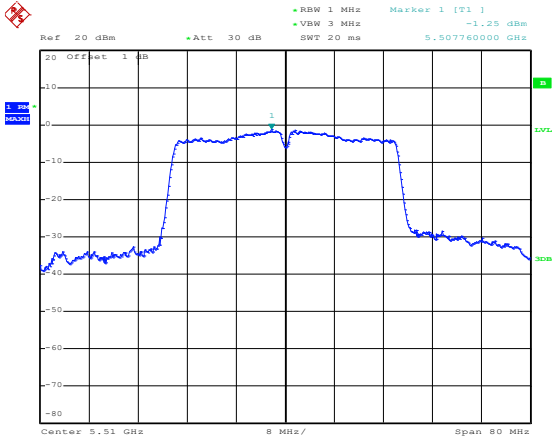
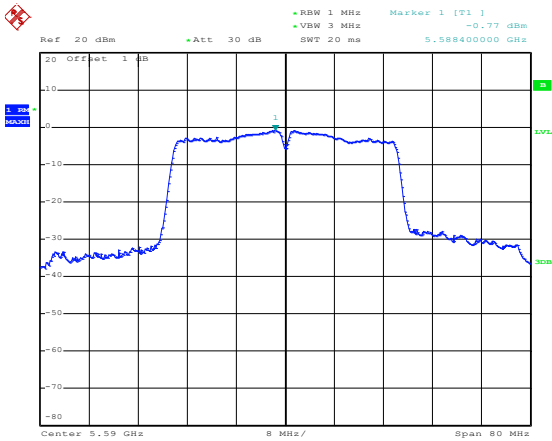
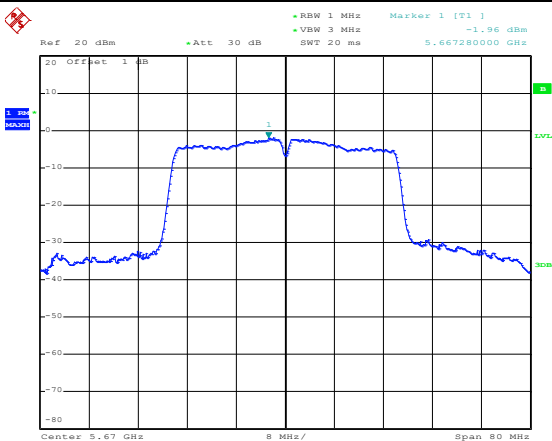
APPENDIX A

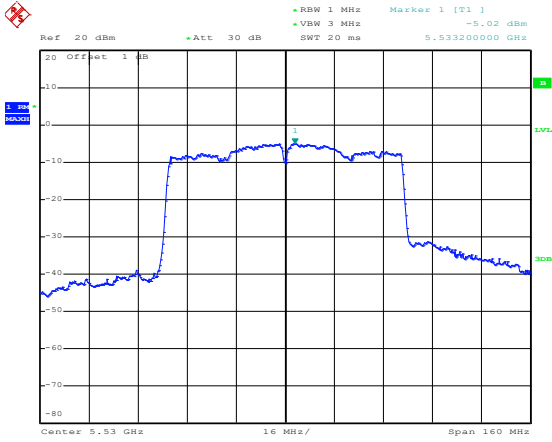
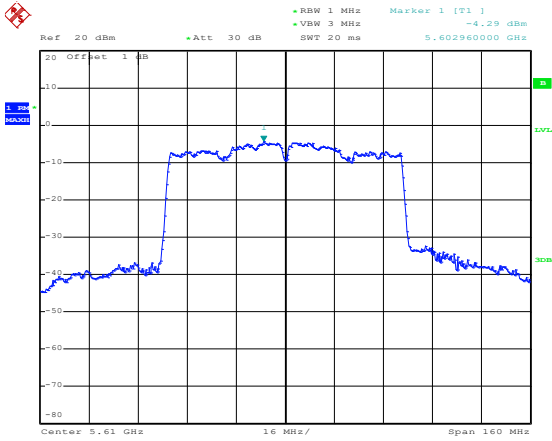
U-NII-2C: 5470-5725MHz			
Operating mode	Test Channel	Power Spectral Density dBm/MHz	Limit (dBm/MHz)
802.11a	5500	3.65	11
	5580	3.51	11
	5700	1.94	11
802.11n-HT20	5500	3.05	11
	5580	3.45	11
	5700	1.48	11
802.11n-HT40	5510	-1.25	11
	5550	-0.77	11
	5670	-1.96	11
802.11ac-HT80	5530	-5.02	11
	5610	-4.29	11

5470-5725MHz

802.11a-Low	 Ref: 20 dBm Att: 30 dB RBW: 1 MHz VBW: 3 MHz Marker 1 [T1]: 3.65 dBm Center: 5.5 GHz Span: 40 MHz 4 MHz/ Date: 11.MAY.2023 18:44:14
802.11a-Middle	 Ref: 20 dBm Att: 30 dB RBW: 1 MHz VBW: 3 MHz Marker 1 [T1]: 3.51 dBm Center: 5.6 GHz Span: 40 MHz 4 MHz/ Date: 11.MAY.2023 18:44:30
802.11a-High	 Ref: 20 dBm Att: 30 dB RBW: 1 MHz VBW: 3 MHz Marker 1 [T1]: 1.94 dBm Center: 5.7 GHz Span: 40 MHz 4 MHz/ Date: 11.MAY.2023 18:44:46

802.11n-HT20-Low	 Date: 11.MAY.2023 18:45:04
802.11n-HT20-Middle	 Date: 11.MAY.2023 18:45:19
802.11n-HT20-High	 Date: 11.MAY.2023 18:45:38

802.11n-HT40-Low	 Ref 20 dBm •Att 30 dB •RBW 1 MHz Marker 1 [T1] -1.25 dBm •VBW 3 MHz SWF 20 ms 5.507760000 GHz 20 Offset 1 dB Center 5.51 GHz 8 MHz/ Span 80 MHz Date: 11.MAY.2023 18:46:17
802.11n-HT40- Middle	 Ref 20 dBm •Att 30 dB •RBW 1 MHz Marker 1 [T1] -0.77 dBm •VBW 3 MHz SWF 20 ms 5.588400000 GHz 20 Offset 1 dB Center 5.59 GHz 8 MHz/ Span 80 MHz Date: 11.MAY.2023 18:46:36
802.11n-HT40-High	 Ref 20 dBm •Att 30 dB •RBW 1 MHz Marker 1 [T1] -1.96 dBm •VBW 3 MHz SWF 20 ms 5.667280000 GHz 20 Offset 1 dB Center 5.67 GHz 8 MHz/ Span 80 MHz Date: 11.MAY.2023 18:46:56

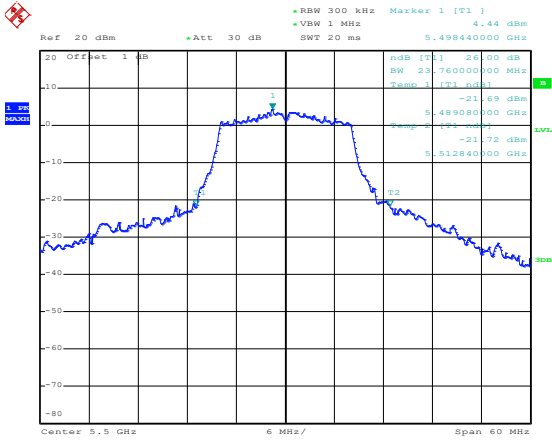
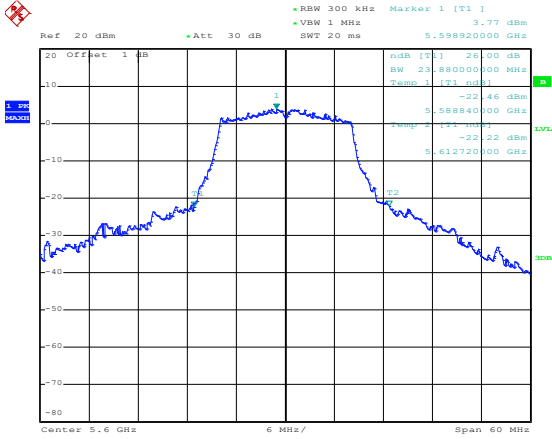
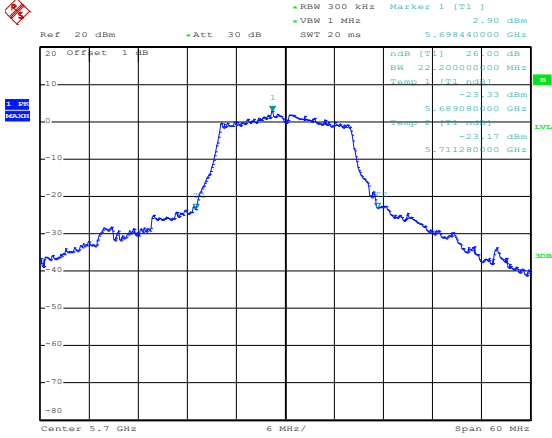
802.11ac-HT80-Low	 Ref 20 dBm +Att 30 dB RBW 1 MHz Marker 1 [T1] -5.02 dBm VBW 3 MHz SWT 20 ms 5.533200000 GHz 20 Offset 1 dB Center 5.53 GHz 16 MHz/ Span 160 MHz Date: 11.MAY.2023 18:48:17
802.11ac-HT80-High	 Ref 20 dBm +Att 30 dB RBW 1 MHz Marker 1 [T1] -4.29 dBm VBW 3 MHz SWT 20 ms 5.602960000 GHz 20 Offset 1 dB Center 5.61 GHz 16 MHz/ Span 160 MHz Date: 11.MAY.2023 18:48:36

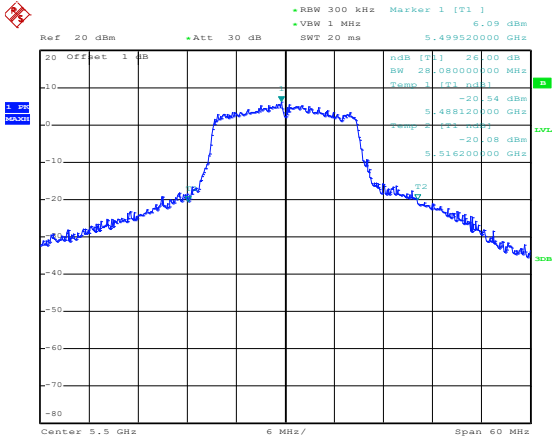
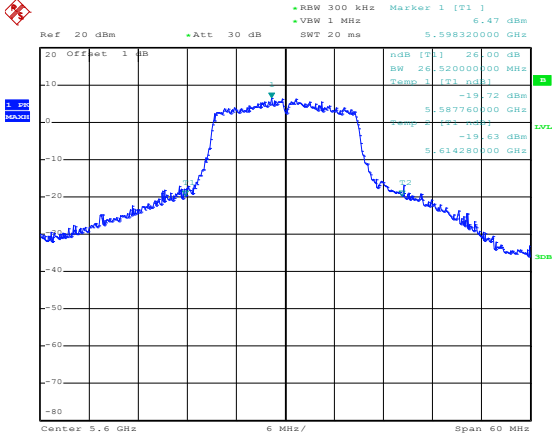
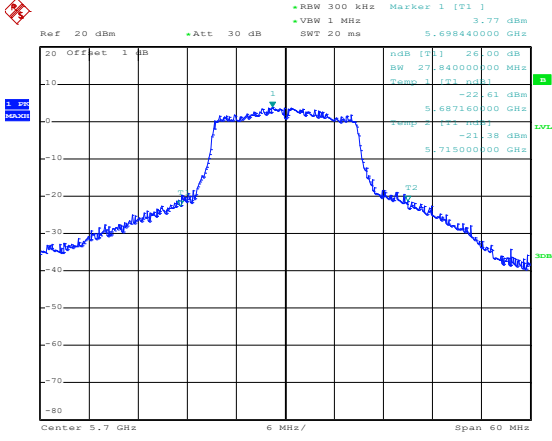
APPENDIX B

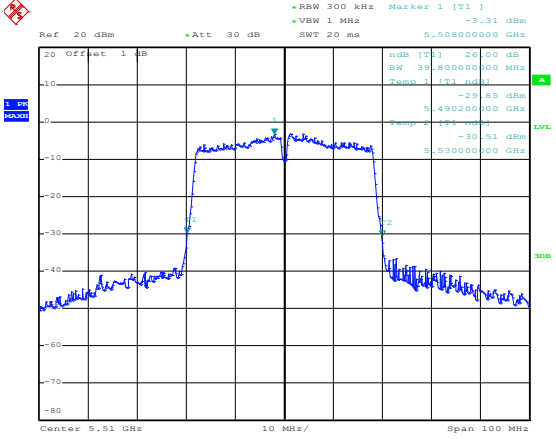
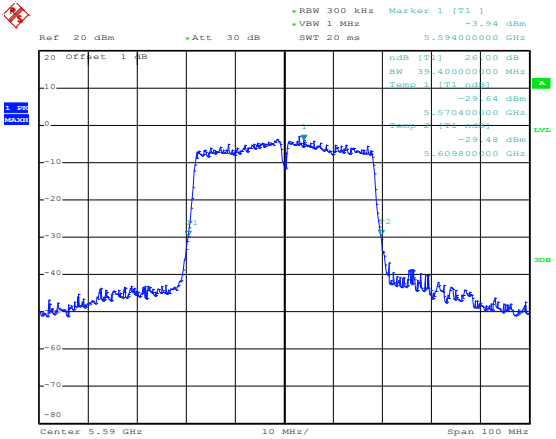
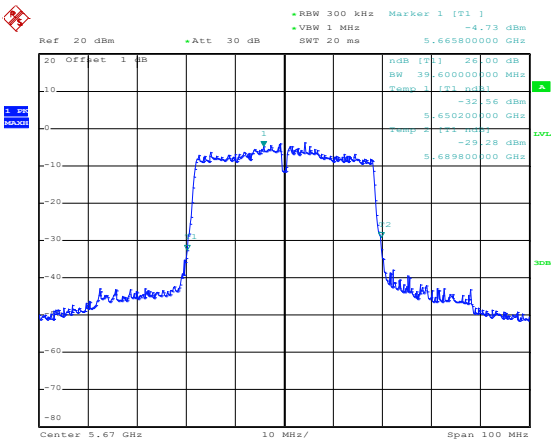
Emission Bandwidth and Occupied Bandwidth

U-NII-2C: 5470-5725MHz				
Test Mode	Test Channel MHz	26 dB Bandwidth MHz	99% Bandwidth MHz	Limit MHz
802.11a	5500	23.76	17.60	Pass
	5600	23.88	17.52	Pass
	5700	22.20	17.52	Pass
802.11n-HT20	5500	28.08	18.64	Pass
	5600	26.52	18.40	Pass
	5700	27.84	18.48	Pass
802.11n-HT40	5510	39.80	37.28	Pass
	5590	39.40	36.96	Pass
	5670	39.60	36.96	Pass
802.11ac-HT80	5530	83.16	76.16	Pass
	5610	81.36	76.16	Pass

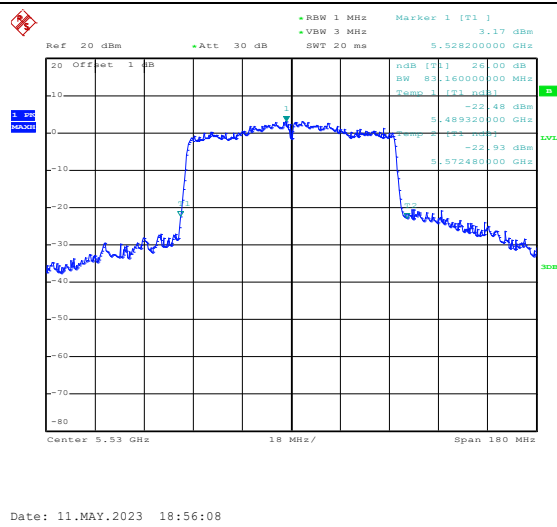
26 dB Bandwidth MHz
5470-5725MHz

802.11a-Low	 Date: 11.MAY.2023 18:58:59
802.11a-Middle	 Date: 11.MAY.2023 18:59:16
802.11a-High	 Date: 11.MAY.2023 18:59:33

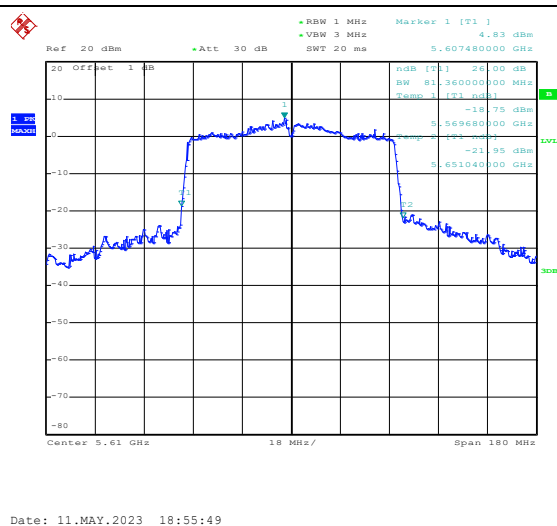
802.11n-HT20-Low	 Date: 11.MAY.2023 18:58:02
802.11n-HT20-Middle	 Date: 11.MAY.2023 18:58:21
802.11n-HT20-High	 Date: 11.MAY.2023 18:58:40

802.11n-HT40-Low	 Ref 20 dBm Att 30 dB RBW 300 kHz VSW 1 MHz SWT 20 ms Marker 1 [T1] -3.31 dBm Center 5.51 GHz 10 MHz/ Span 100 MHz Date: 17.MAY.2023 19:09:26
802.11n-HT40- Middle	 Ref 20 dBm Att 30 dB RBW 300 kHz VSW 1 MHz SWT 20 ms Marker 1 [T1] -3.94 dBm Center 5.59 GHz 10 MHz/ Span 100 MHz Date: 17.MAY.2023 19:30:18
802.11n-HT40-High	 Ref 20 dBm Att 30 dB RBW 300 kHz VSW 1 MHz SWT 20 ms Marker 1 [T1] -4.73 dBm Center 5.67 GHz 10 MHz/ Span 100 MHz Date: 17.MAY.2023 19:32:40

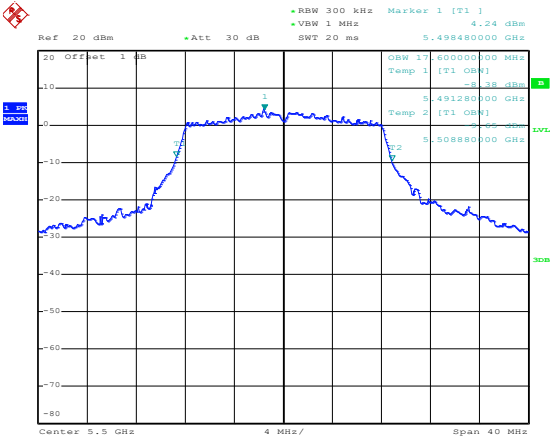
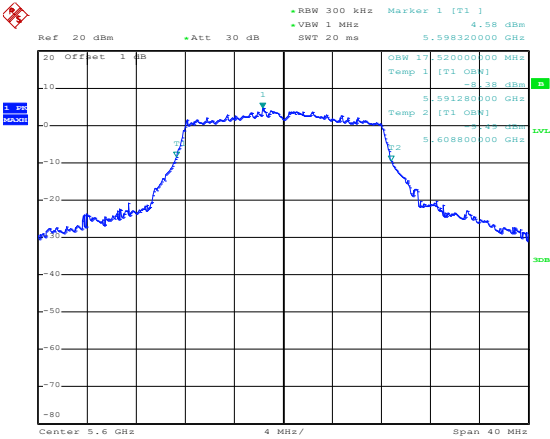
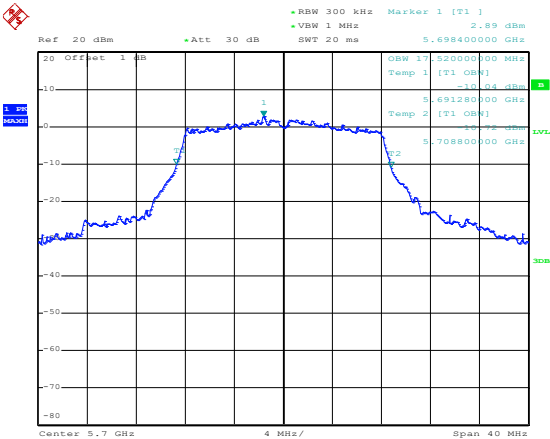
802.11ac-HT80-Low

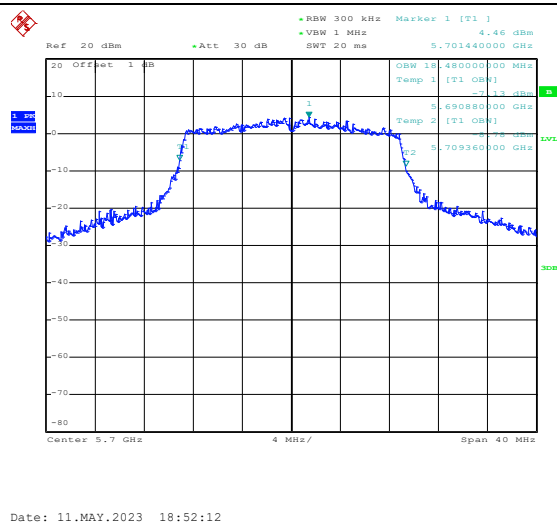
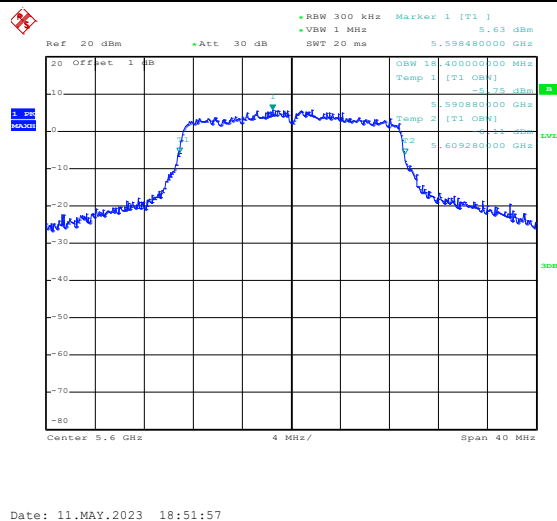
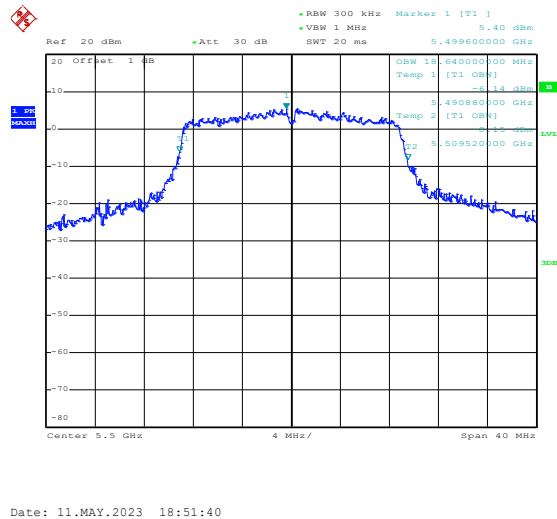


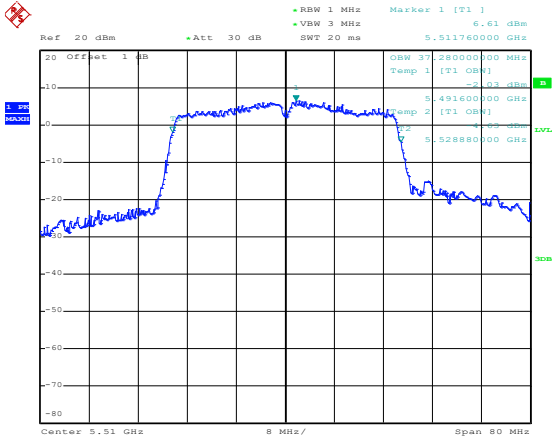
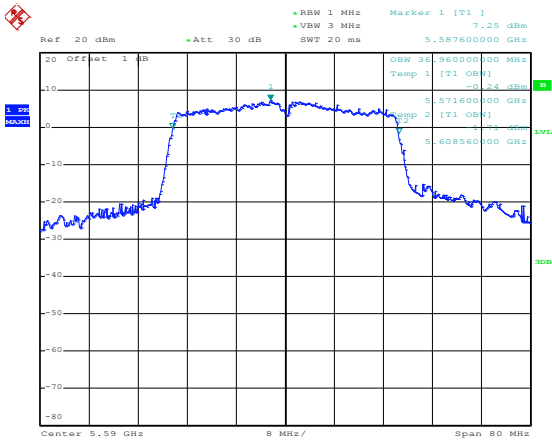
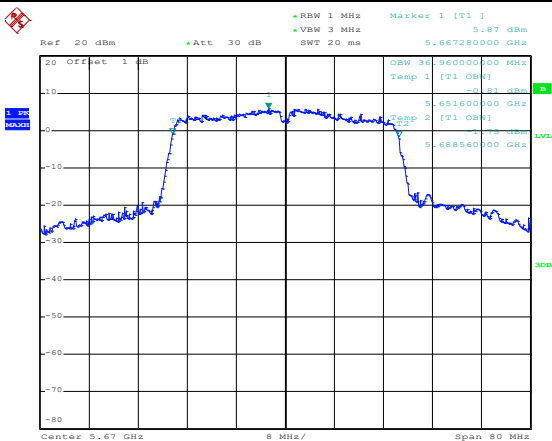
802.11ac-HT80-High

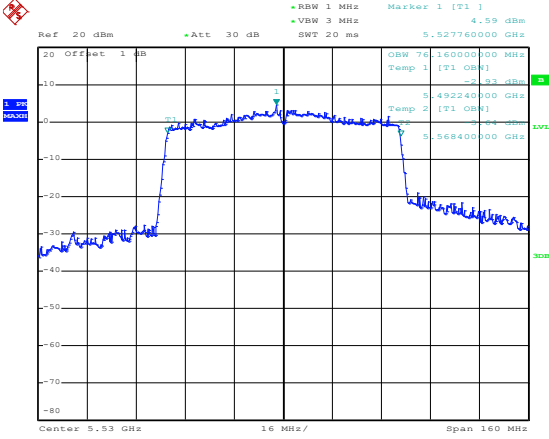
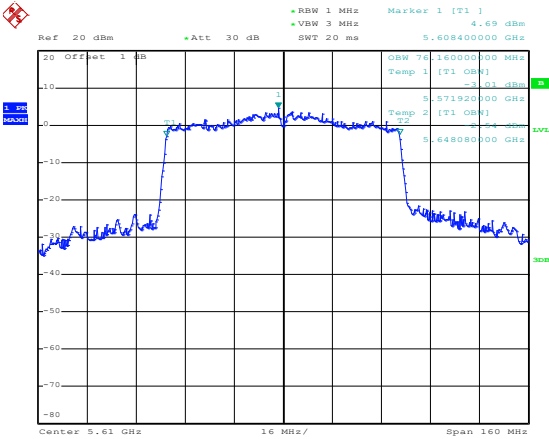


99% Bandwidth MHz
5470-5725MHz

802.11a-Low	 Date: 11.MAY.2023 18:50:50
802.11a-Middle	 Date: 11.MAY.2023 18:51:06
802.11a-High	 Date: 11.MAY.2023 18:51:24



802.11n-HT40-Low	 Ref 20 dBm +Att 30 dB SWT 20 ms Marker 1 [T1] 6.61 dBm 5.511760000 GHz OSW 37.28000000 MHz Temp 1 [T1 OSW] -2.03 dBm 5.491600000 GHz Temp 2 [T1 OSW] -2.03 dBm 5.528880000 GHz Center 5.51 GHz 8 MHz/ Span 80 MHz Date: 11.MAY.2023 18:52:35
802.11n-HT40- Middle	 Ref 20 dBm +Att 30 dB SWT 20 ms Marker 1 [T1] 7.25 dBm 5.587600000 GHz OSW 36.96000000 MHz Temp 1 [T1 OSW] -2.64 dBm 5.571600000 GHz Temp 2 [T1 OSW] -2.64 dBm 5.608560000 GHz Center 5.59 GHz 8 MHz/ Span 80 MHz Date: 11.MAY.2023 18:52:58
802.11n-HT40-High	 Ref 20 dBm +Att 30 dB SWT 20 ms Marker 1 [T1] 5.87 dBm 5.667280000 GHz OSW 36.96000000 MHz Temp 1 [T1 OSW] -2.81 dBm 5.651600000 GHz Temp 2 [T1 OSW] -2.81 dBm 5.688560000 GHz Center 5.67 GHz 8 MHz/ Span 80 MHz Date: 11.MAY.2023 18:53:18

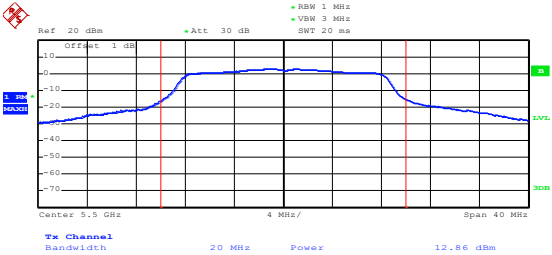
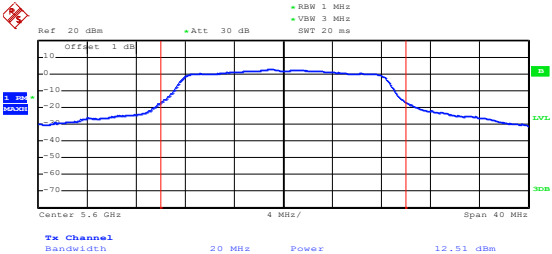
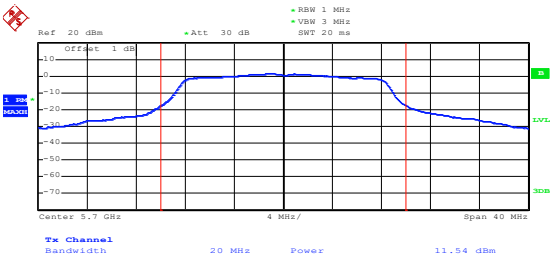
802.11ac-HT80-Low	 Ref 20 dBm Att 30 dB SWT 20 ms RBW 1 MHz VSW 3 MHz Marker 1 [T1] 4.59 dBm <table><tr><td>Temp 1 [T1] [dBm]</td><td>4.59</td></tr><tr><td>Temp 2 [T1] [dBm]</td><td>4.59</td></tr><tr><td>Temp 3 [T1] [dBm]</td><td>4.59</td></tr></table> Center 5.53 GHz 16 MHz/ Span 160 MHz Date: 11.MAY.2023 18:54:07	Temp 1 [T1] [dBm]	4.59	Temp 2 [T1] [dBm]	4.59	Temp 3 [T1] [dBm]	4.59
Temp 1 [T1] [dBm]	4.59						
Temp 2 [T1] [dBm]	4.59						
Temp 3 [T1] [dBm]	4.59						
802.11ac-HT80-High	 Ref 20 dBm Att 30 dB SWT 20 ms RBW 1 MHz VSW 3 MHz Marker 1 [T1] 4.69 dBm <table><tr><td>Temp 1 [T1] [dBm]</td><td>4.69</td></tr><tr><td>Temp 2 [T1] [dBm]</td><td>4.69</td></tr><tr><td>Temp 3 [T1] [dBm]</td><td>4.69</td></tr></table> Center 5.61 GHz 16 MHz/ Span 160 MHz Date: 11.MAY.2023 18:54:30	Temp 1 [T1] [dBm]	4.69	Temp 2 [T1] [dBm]	4.69	Temp 3 [T1] [dBm]	4.69
Temp 1 [T1] [dBm]	4.69						
Temp 2 [T1] [dBm]	4.69						
Temp 3 [T1] [dBm]	4.69						

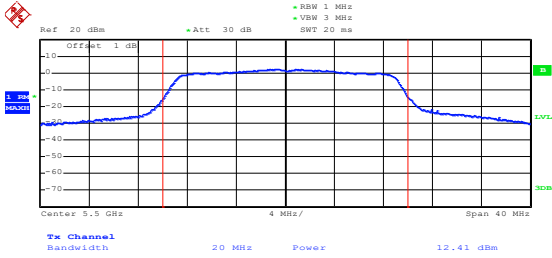
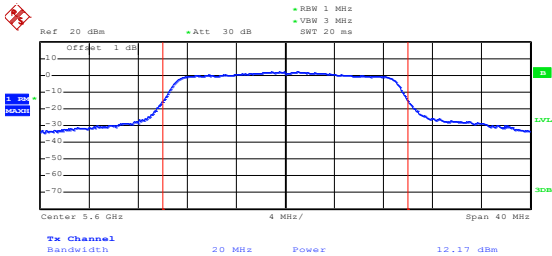
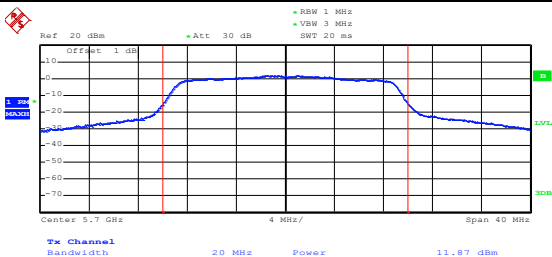
APPENDIX C

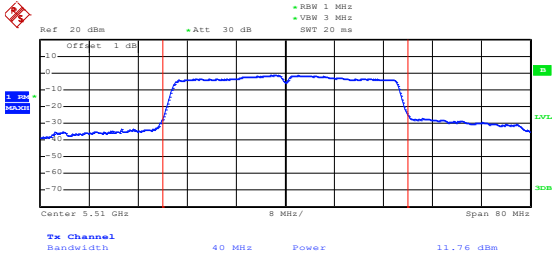
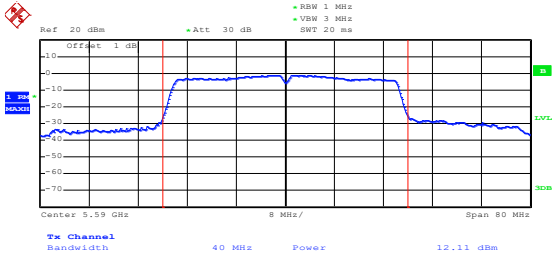
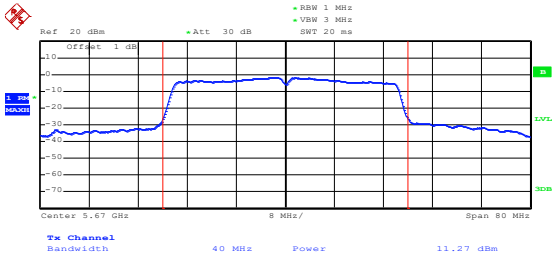
Maximum Conducted Output Power

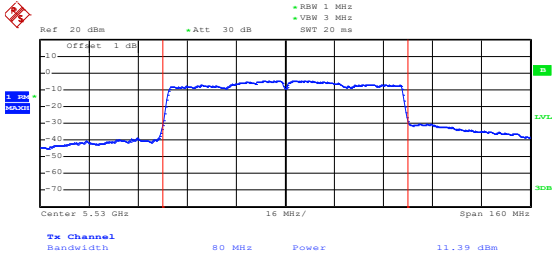
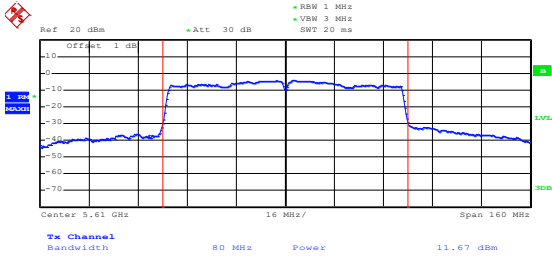
U-NII-2C: 5470-5725MHz			
Test mode	Frequency MHz	Output Power dBm	Limit dBm
802.11a	5500	12.86	23.98
	5580	12.51	23.98
	5700	11.54	23.98
802.11n-HT20	5500	12.41	23.98
	5580	12.17	23.98
	5700	11.87	23.98
802.11n-HT40	5510	11.76	23.98
	5550	12.11	23.98
	5670	11.27	23.98
802.11ac VH80	5530	11.39	23.98

5470-5725MHz

802.11a-Low	 Ref: 20 dBm • Att: 30 dB • RBW 1 MHz • VSW 3 MHz • SWT 20 ms Offset: 1 dB Center: 5.5 GHz 4 MHz/ Span: 40 MHz Ta Channel Bandwidth: 20 MHz Power: 12.86 dBm Date: 11.MAY.2023 17:54:57
802.11a-Middle	 Ref: 20 dBm • Att: 30 dB • RBW 1 MHz • VSW 3 MHz • SWT 20 ms Offset: 1 dB Center: 5.6 GHz 4 MHz/ Span: 40 MHz Ta Channel Bandwidth: 20 MHz Power: 12.51 dBm Date: 11.MAY.2023 17:56:02
802.11a-High	 Ref: 20 dBm • Att: 30 dB • RBW 1 MHz • VSW 3 MHz • SWT 20 ms Offset: 1 dB Center: 5.7 GHz 4 MHz/ Span: 40 MHz Ta Channel Bandwidth: 20 MHz Power: 11.54 dBm Date: 11.MAY.2023 17:56:56

802.11n-HT20-Low	 Date: 11.MAY.2023 17:58:15
802.11n-HT20-Middle	 Date: 11.MAY.2023 17:59:27
802.11n-HT20-High	 Date: 11.MAY.2023 18:00:41

802.11n-HT40-Low	 Date: 11.MAY.2023 18:01:43
802.11n-HT40- Middle	 Date: 11.MAY.2023 18:02:09
802.11n-HT40-High	 Date: 11.MAY.2023 18:08:34

802.11ac-HT80-Low	 Date: 11.MAY.2023 18:40:23
802.11ac-HT80-High	 Date: 11.MAY.2023 18:40:59

APPENDIX D

Frequency Stability

U-NII-1: 5470-5725MHz worst case at 802.11a middle channel				
Voltage(%)	Power(VDC)	TEMP(°C)	Freq.Dev(Hz)	Deviation
100%	9.0	-30	128	0.0229
100%		-20	138	0.0246
100%		-10	120	0.0214
100%		0	154	0.0275
100%		+10	130	0.0232
100%		+20	167	0.0298
100%		+30	119	0.0213
100%		+40	135	0.0241
100%		+50	115	0.0205
Low Battery power	7	+20	127	0.0227
High Battery power	11	+20	135	0.0241

APPENDIX PHOTOGRAPHS

Please refer to “ANNEX”

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