

TEST REPORT

Reference No..... : WTX21X03014671W-1
FCC ID : 2AY4V-AC8401
Applicant : Asiacom Technology Ltd.
Address..... : 1501-1503, Block A, Building 8, Shenzhen International Innovation Valley,
Dashi Road, Xili Community, Xili Street, Nanshan District, Shenzhen
Product Name : WIFI Module
Test Model. : AC8401
Standards : FCC Part 15.407
Date of Receipt sample : Mar. 02, 2021
Date of Test..... : Mar. 02, 2021 to Mar. 10, 2021
Date of Issue : Mar. 10, 2021
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 compiler and approver.

Prepared By:

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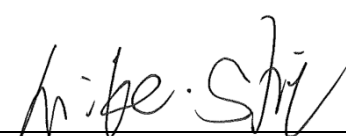
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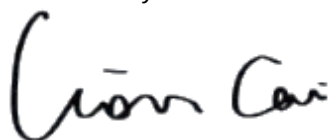
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Mike Shi / Project Engineer



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Report version

Version No.	Date of issue	Description
Rev.00	Mar. 10, 2021	Original
/	/	/

1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant: Asiacom Technology Ltd.
Address of applicant: 1501-1503, Block A, Building 8, Shenzhen International Innovation Valley, Dashi Road, Xili Community, Xili Street, Nanshan District, Shenzhen

Manufacturer: Asiacom Technology Ltd.
Address of manufacturer: 1501-1503, Block A, Building 8, Shenzhen International Innovation Valley, Dashi Road, Xili Community, Xili Street, Nanshan District, Shenzhen

General Description of EUT	
Product Name:	WIFI Module
Trade Name:	AsiaCom
Model No.:	AC8401
Adding Model(s):	/
Rated Voltage:	DC3.3V
Battery Capacity:	/
Power Adapter:	/
Software Version:	/
Hardware Version:	V1.0
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:	5150-5250MHz
RF Output Power:	13.15dBm (Conducted)
Type of Modulation:	BPSK, QPSK,16QAM,64QAM
Type of Antenna:	PCB Antenna
Antenna Gain:	0dBi

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

Enter “QATool” into the calculator to enter the engineer 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												
	5180	5200	5240	5260	5300	5320	5500	5580	5700	5720	5745	5785	5825
802.11a 6Mbps	5	5	5	/	/	/	/	/	/	/	/	/	/
802.11n-HT20 MCS0	5	5	5	/	/	/	/	/	/	/	/	/	/
Mode	NCB: 40MHz												
	5190	5230	5270	5310	5510	5550	5670	5710	5755	5795			
802.11n-HT40 MCS0	5	5	/	/	/	/	/	/	/	/	/	/	/

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.

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
TM2	802.11n-HT20	5180MHz,5200MHz,5240MHz
TM3	802.11n-HT40	5190MHz,5230MHz
Note: All test modes (different data rate and different modulation) are performed, but only the worst case is recorded in this report.		

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	1.05	Unshielded	Without Ferrite

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
Computer	Lenovo	ThinkPad Edge E445	/

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

No.	Description	Manufacturer	Model	Serial No.	Cal Date	Due Date
SEMT-1072	Spectrum Analyzer	Agilent	E4407B	MY41440400	2020-04-28	2021-04-27
SEMT-1031	Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/035	2020-04-28	2021-04-27
SEMT-1007	EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2020-04-28	2021-04-27
SEMT-1008	Amplifier	Agilent	8447F	3113A06717	2020-04-28	2021-04-27
SEMT-1043	Amplifier	C&D	PAP-1G18	2002	2020-04-28	2021-04-27
SEMT-1011	Broadband Antenna	Schwarz beck	VULB9163	9163-333	2019-05-05	2021-05-04
SEMT-1042	Horn Antenna	ETS	3117	00086197	2019-05-05	2021-05-04
SEMT-1121	Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170582	2019-05-05	2021-05-04
SEMT-1069	Loop Antenna	Schwarz beck	FMZB 1516	9773	2019-05-05	2021-05-04
SEMT-1001	EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2020-04-28	2021-04-27
SEMT-1003	L.I.S.N	Schwarz beck	NSLK8126	8126-224	2020-04-28	2021-04-27
SEMT-1002	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2020-04-28	2021-04-27
SEMT-1168	Pre-amplifier	Direction Systems Inc.	PAP-0126	14141-12838	2020-04-28	2021-04-27
SEMT-1169	Pre-amplifier	Direction Systems Inc.	PAP-2640	14145-14153	2020-04-28	2021-04-27
SEMT-1163	Spectrum Analyzer	Rohde & Schwarz	FSP40	100612	2020-04-28	2021-04-27
SEMT-1170	DRG Horn Antenna	A.H. SYSTEMS	SAS-574	571	2019-05-05	2021-05-04
SEMT-1166	Power Limiter	Agilent	N9356B	MY45450376	2020-04-28	2021-04-27
SEMT-1048	RF Limiter	ATTEN	AT-BSF-2400~2500	/	2020-04-28	2021-04-27
SEMT-1076	RF Switcher	Top Precision	RCS03-A2	/	2020-04-28	2021-04-27
SEMT-C001	Cable	Zheng DI	LL142-07-07-10M(A)	/	2020-03-17	2021-03-16
SEMT-C002	Cable	Zheng DI	ZT40-2.92J-2.92J-6M	/	2020-03-17	2021-03-16
SEMT-C003	Cable	Zheng DI	ZT40-2.92J-2.92J-2.5M	/	2020-03-17	2021-03-16
SEMT-C004	Cable	Zheng DI	2M0RFC	/	2020-03-17	2021-03-16
SEMT-C005	Cable	Zheng DI	1M0RFC	/	2020-03-17	2021-03-16
SEMT-C006	Cable	Zheng DI	1M0RFC	/	2020-03-17	2021-03-16

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 a PCB 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 5.15-5.25 GHz.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm 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 6 dBi.

(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm 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 6 dBi.

(3) For the band 5.725-5.85 GHz, 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 30 dBm in any 500-kHz 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 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi 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 5.15-5.25 GHz, 5.25-5.35 GHz, and 5.47-5.725 GHz, 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 5.725-5.85 GHz, the rules specify a measurement bandwidth of 500 kHz. Many spectrum analyzers do not have 500 kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of a RBWs less than 1 MHz, or 500 kHz, “provided that the measured power is integrated over the full reference bandwidth” to show the total power over the specified measurement bandwidth (i.e., 1 MHz, or 500

kHz). If measurements are performed using a reduced resolution bandwidth (< 1 MHz, or < 500 kHz) and integrated over 1 MHz, or 500kHz bandwidth, the following adjustments to the procedures apply:

- a) Set $RBW \geq 1/T$, where T is defined in section II.B.1.a).
- b) Set $VBW \geq 3 RBW$.
- c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add $10\log(500\text{kHz}/RBW)$ to the measured result, whereas $RBW (< 500 \text{ kHz})$ 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 $10\log(1\text{MHz}/RBW)$ to the measured result, whereas $RBW (< 1 \text{ MHz})$ 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 100 kHz for the sections 5.c) and 5.d) above, since $RBW=100 \text{ kHz}$ 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 5.15-5.25 GHz.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm 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 6 dBi.

(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm 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 6 dBi.

(3) For the band 5.725-5.85 GHz, 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 30 dBm in any 500-kHz 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 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi 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 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

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 26 dB 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 5.725-5.85 GHz

Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 KHz for the band 5.715-5.85 GHz. The following procedure shall be used for measuring this bandwidth:

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

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 $\geq 3 * \text{RBW}$
- 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 5.15-5.25 GHz.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm 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 6 dBi.

(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm 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 6 dBi.

(3) For the band 5.725-5.85 GHz, 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 30 dBm in any 500-kHz 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 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi 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 = 1 MHz.
- (iii) Set VBW $\geq$ 3 MHz.
- (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 1 MHz 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 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (4) For transmitters operating in the 5.725-5.85 GHz band:
 - (i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

According to §15.407(b)(6), Unwanted emissions below 1 GHz 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.
789033 D02 v02r01 General UNII Test Procedures New Rules v01

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.

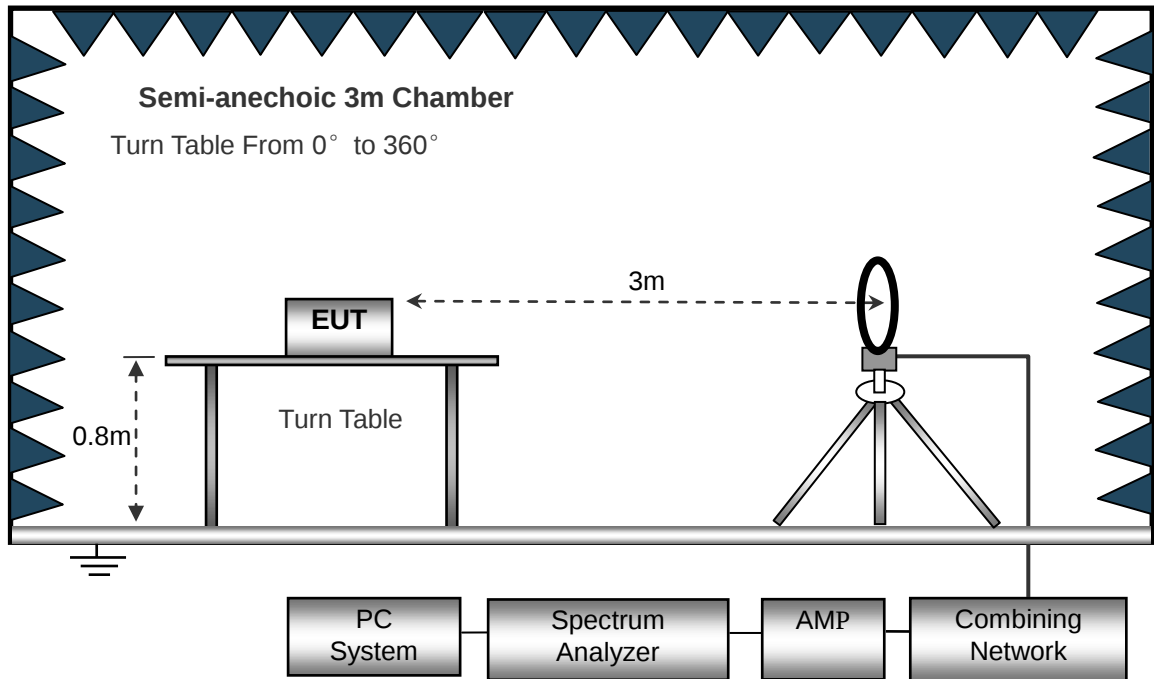
8.2 Test Procedure

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..

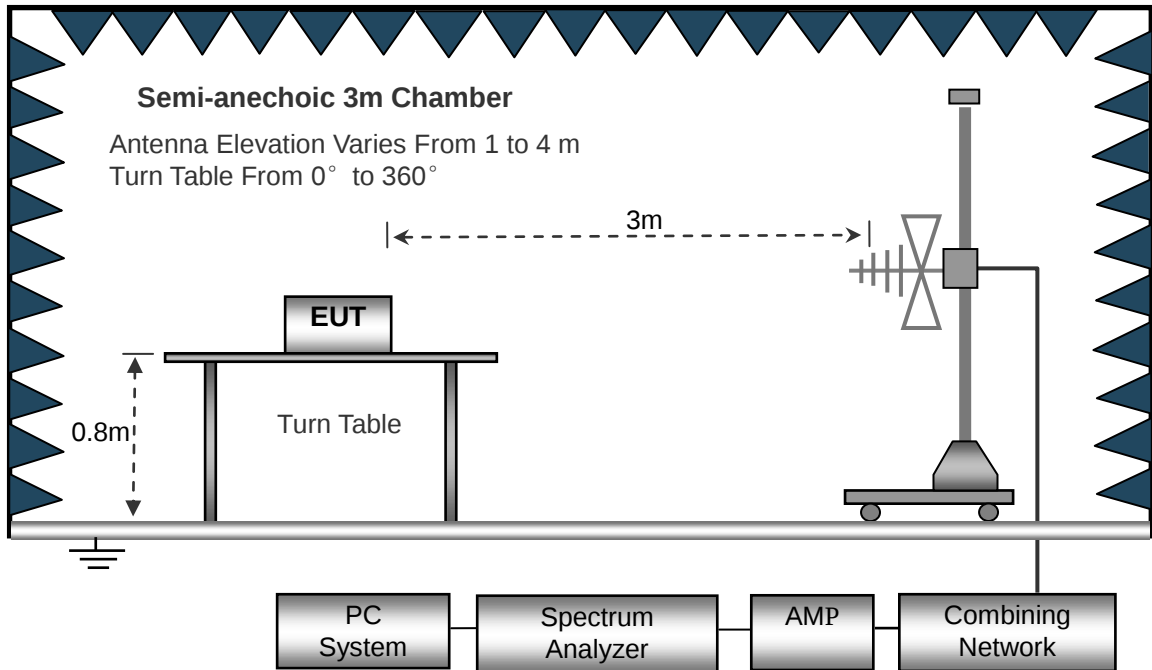
The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

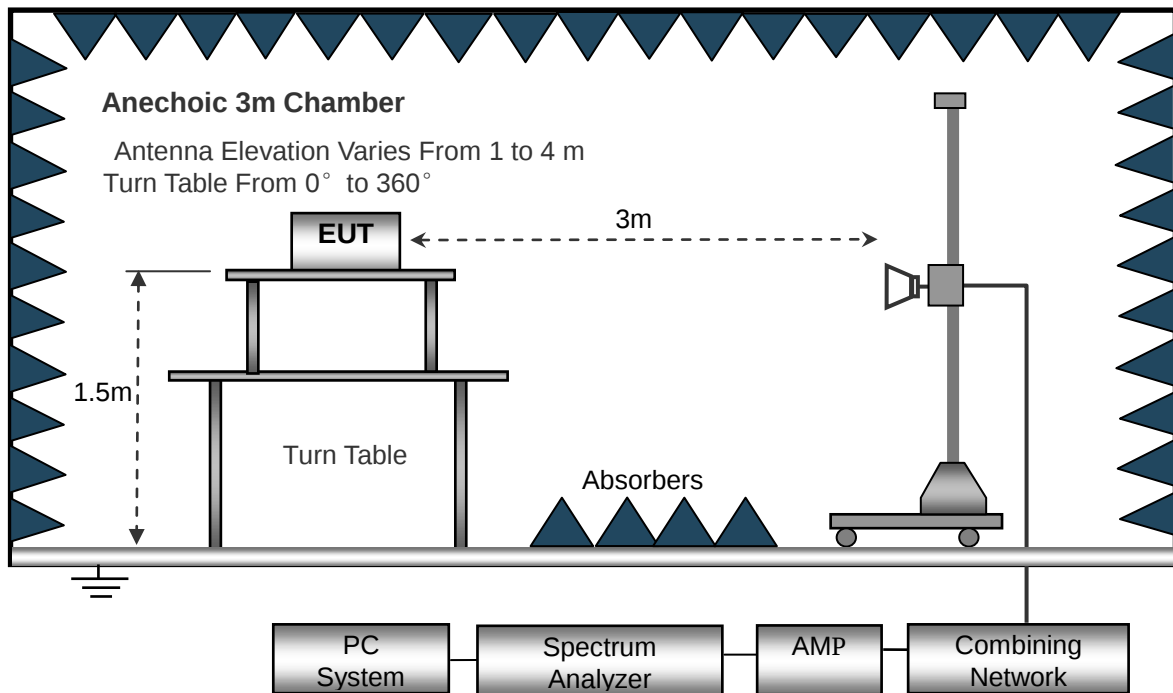
The test setup for emission measurement below 30MHz..



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



The test setup for emission measurement above 1 GHz..



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:

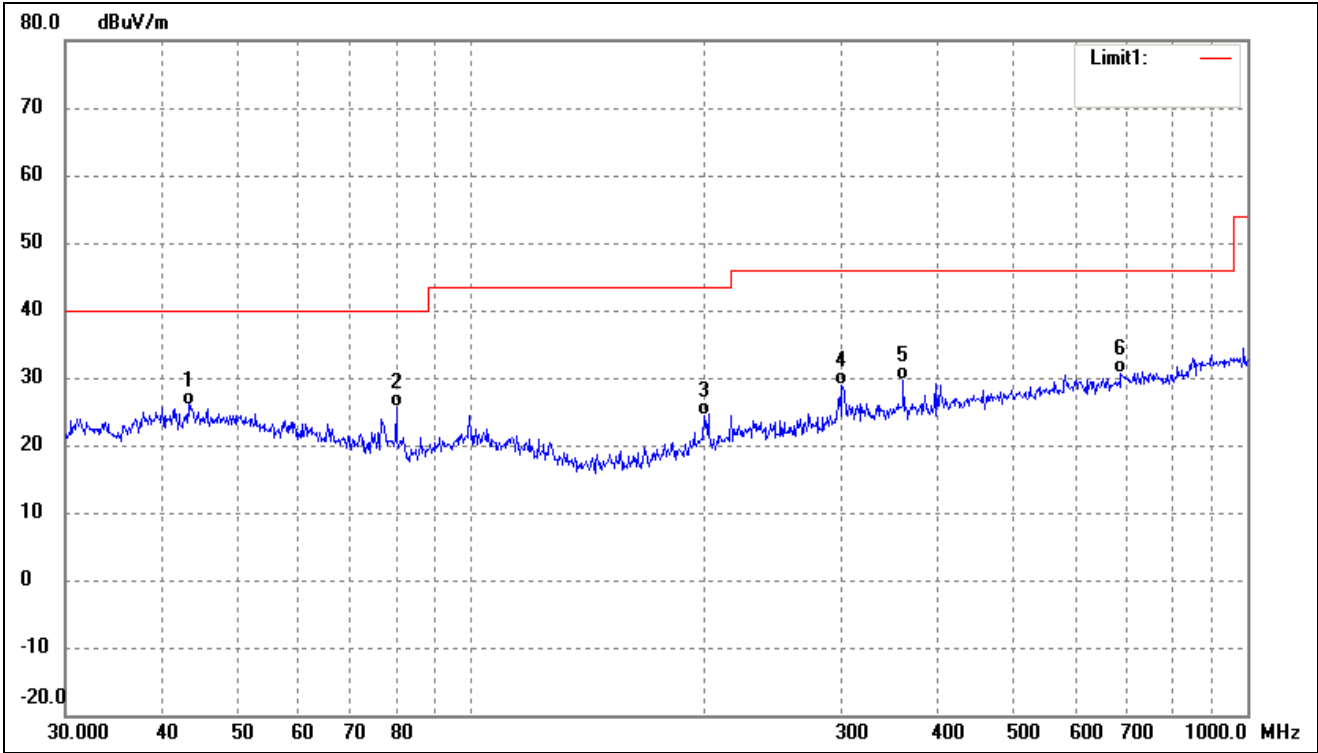
$$\text{Margin} = \text{Corr. Ampl.} - \text{FCC Part 15 Limit}$$

8.5 Summary of Test Results/Plots

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

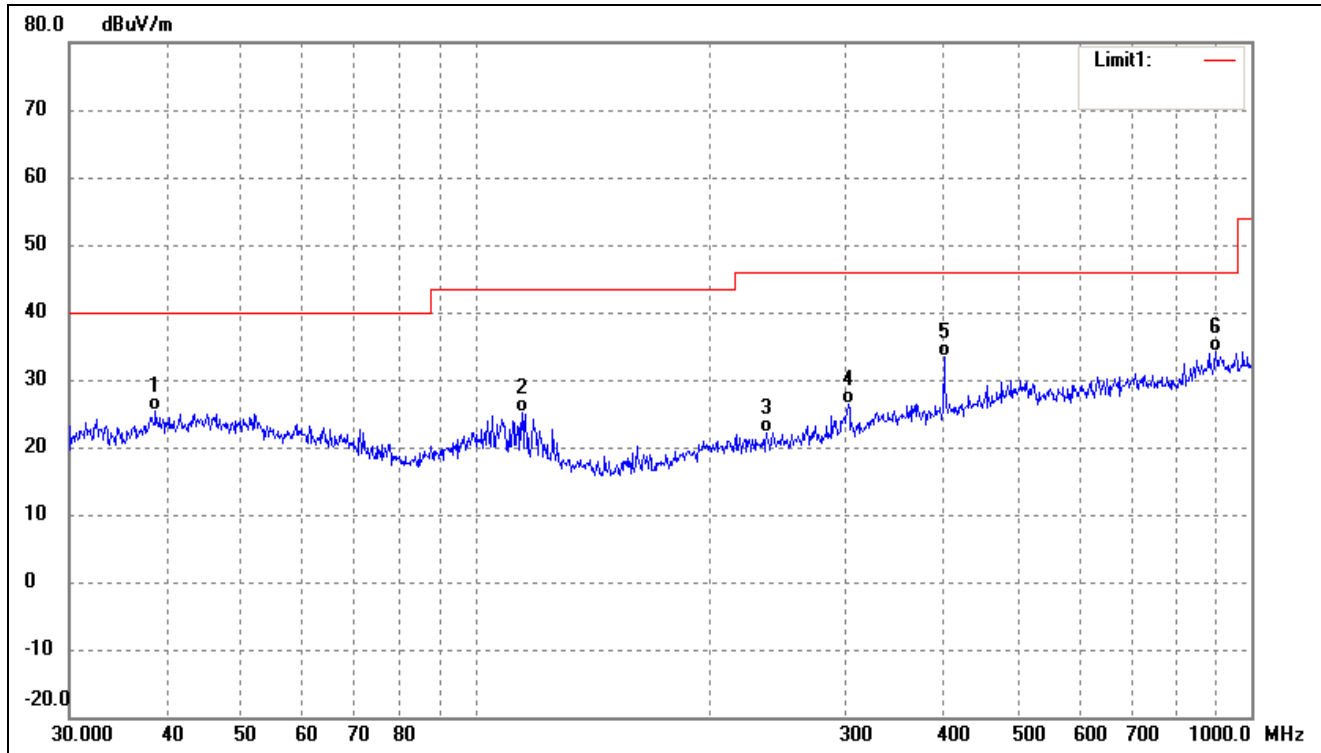
- Spurious Emission From 30 MHz to 1 GHz
- 5150-5250MHz

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



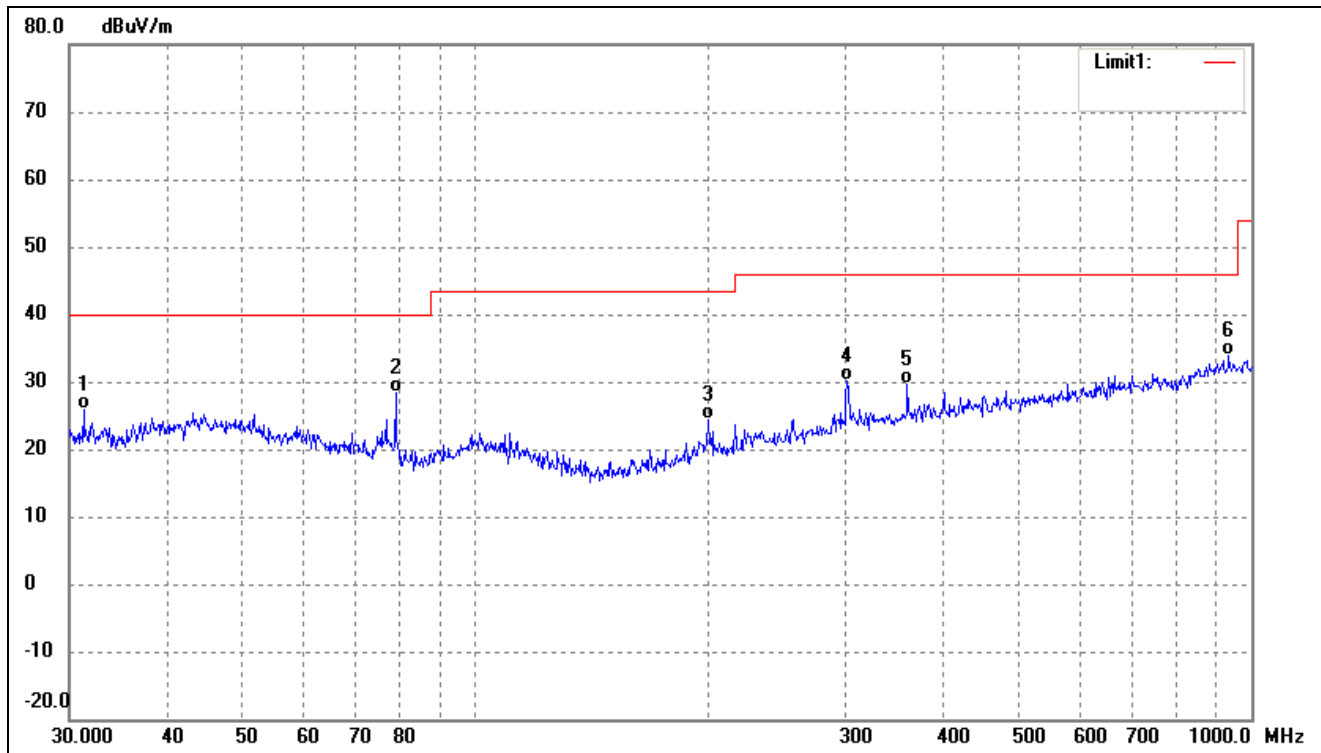
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	()	(cm)	
1	43.2017	37.86	-11.86	26.00	40.00	-14.00	-	-	QP
2	80.0806	42.36	-16.79	25.57	40.00	-14.43	-	-	QP
3	199.2855	36.96	-12.46	24.50	43.50	-19.00	-	-	QP
4	300.3673	37.69	-8.92	28.77	46.00	-17.23	-	-	QP
5	360.4477	36.98	-7.34	29.64	46.00	-16.36	-	-	QP
6	687.1507	32.41	-1.87	30.54	46.00	-15.46	-	-	QP

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



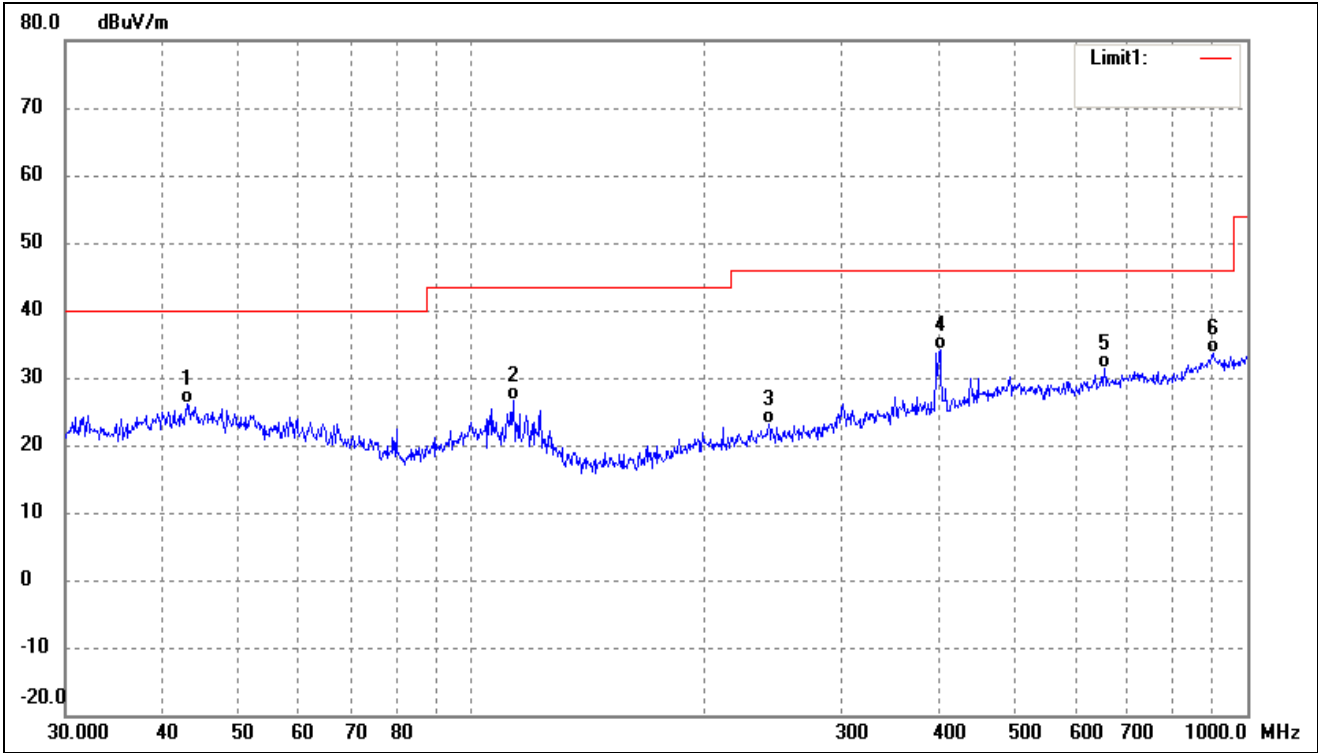
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	38.7518	37.83	-12.45	25.38	40.00	-14.62	-	-	QP
2	114.9169	38.86	-13.79	25.07	43.50	-18.43	-	-	QP
3	237.4760	33.68	-11.54	22.14	46.00	-23.86	-	-	QP
4	302.4812	35.43	-8.93	26.50	46.00	-19.50	-	-	QP
5	401.8385	39.75	-6.42	33.33	46.00	-12.67	-	-	QP
6	900.1474	32.63	1.55	34.18	46.00	-11.82	-	-	QP

802.11a (Worst case)			
Test Channel	5200MHz	Polarity:	Horizontal



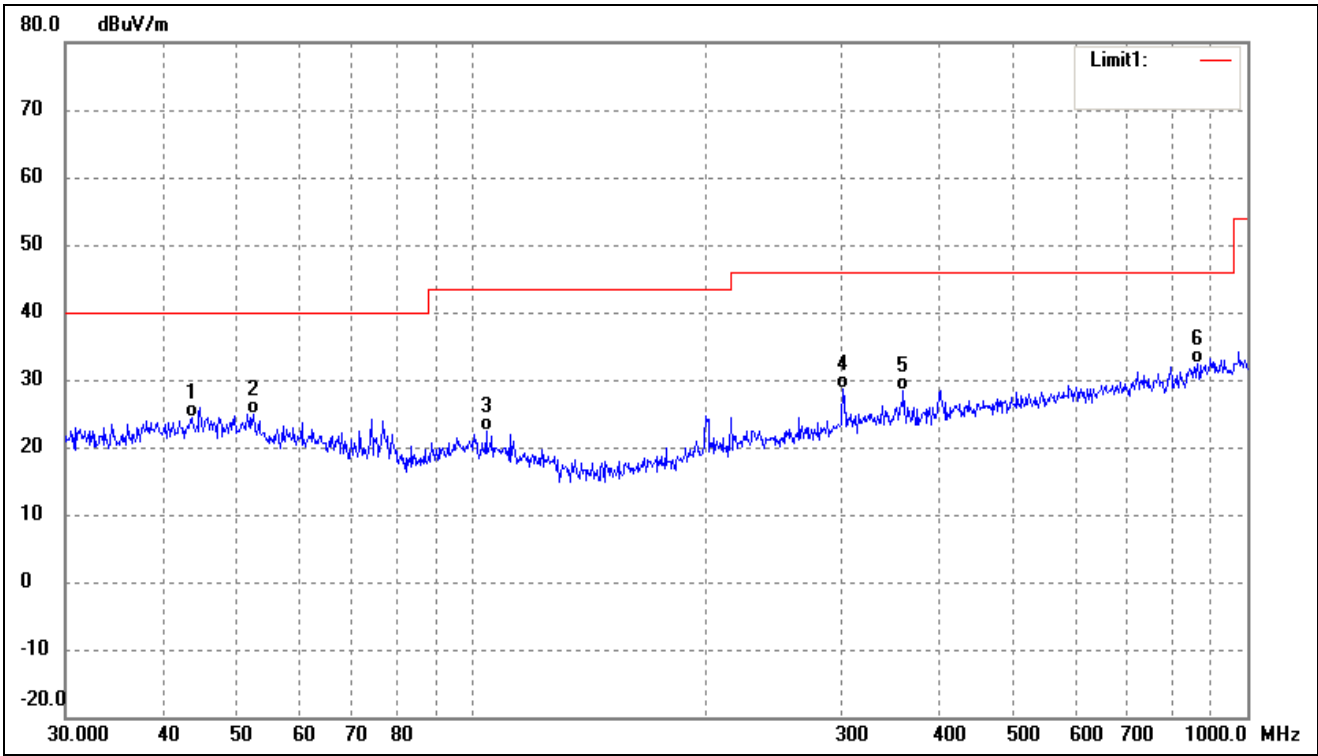
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	31.2893	39.93	-14.08	25.85	40.00	-14.15	-	-	QP
2	78.9652	45.11	-16.64	28.47	40.00	-11.53	-	-	QP
3	199.9856	36.88	-12.42	24.46	43.50	-19.04	-	-	QP
4	301.4224	39.09	-8.92	30.17	46.00	-15.83	-	-	QP
5	360.4477	36.92	-7.34	29.58	46.00	-16.42	-	-	QP
6	935.5463	32.25	1.65	33.90	46.00	-12.10	-	-	QP

802.11a(Worst case)			
Test Channel	5200MHz	Polarity:	Vertical



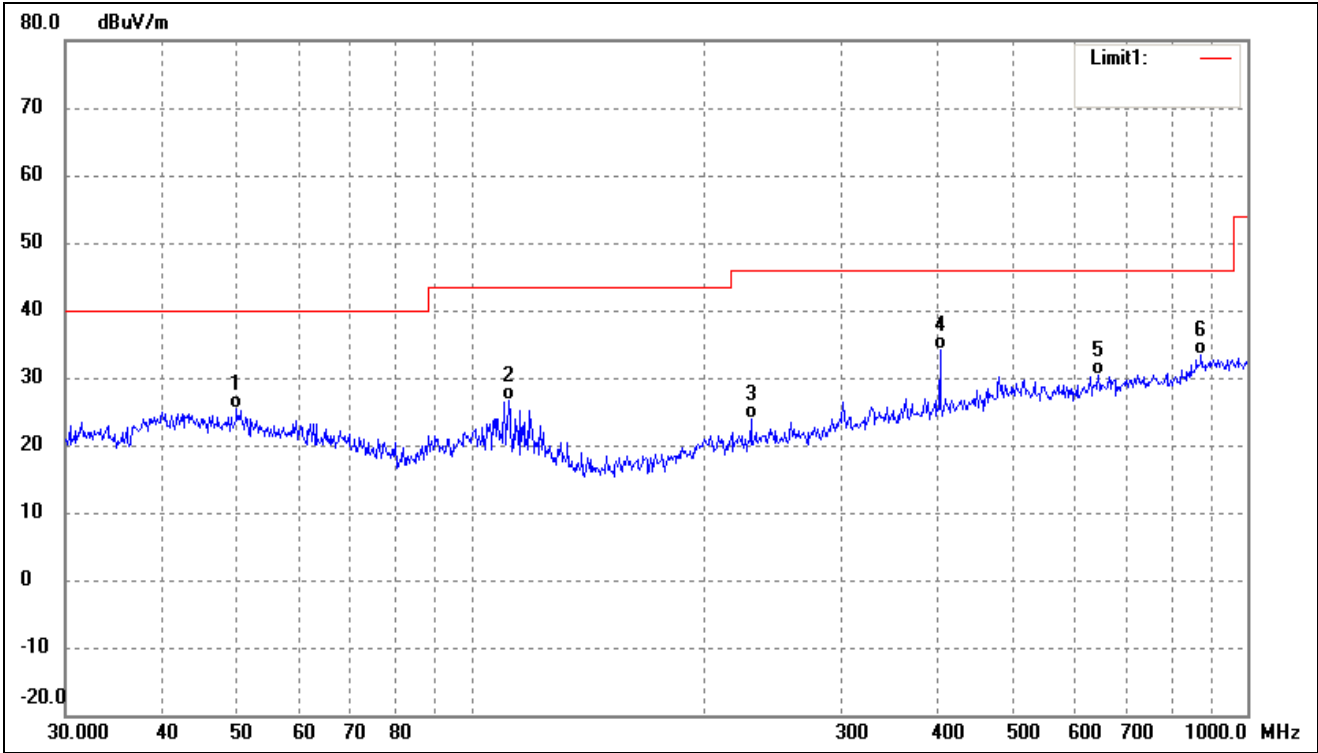
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	43.0505	37.99	-11.87	26.12	40.00	-13.88	-	-	QP
2	113.3163	40.28	-13.63	26.65	43.50	-16.85	-	-	QP
3	241.6763	34.59	-11.34	23.25	46.00	-22.75	-	-	QP
4	401.8385	40.48	-6.42	34.06	46.00	-11.94	-	-	QP
5	654.2318	33.70	-2.29	31.41	46.00	-14.59	-	-	QP
6	903.3094	31.95	1.60	33.55	46.00	-12.45	-	-	QP

802.11a(Worst case)			
Test Channel	5240MHz	Polarity:	Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	43.6585	36.10	-11.84	24.26	40.00	-15.74	-	-	QP
2	52.3913	37.05	-12.20	24.85	40.00	-15.15	-	-	QP
3	104.5361	35.65	-13.32	22.33	43.50	-21.17	-	-	QP
4	301.4224	37.49	-8.92	28.57	46.00	-17.43	-	-	QP
5	360.4477	35.79	-7.34	28.45	46.00	-17.55	-	-	QP
6	863.0562	31.90	0.43	32.33	46.00	-13.67	-	-	QP

802.11a(Worst case)			
Test Channel	5240MHz	Polarity:	Vertical

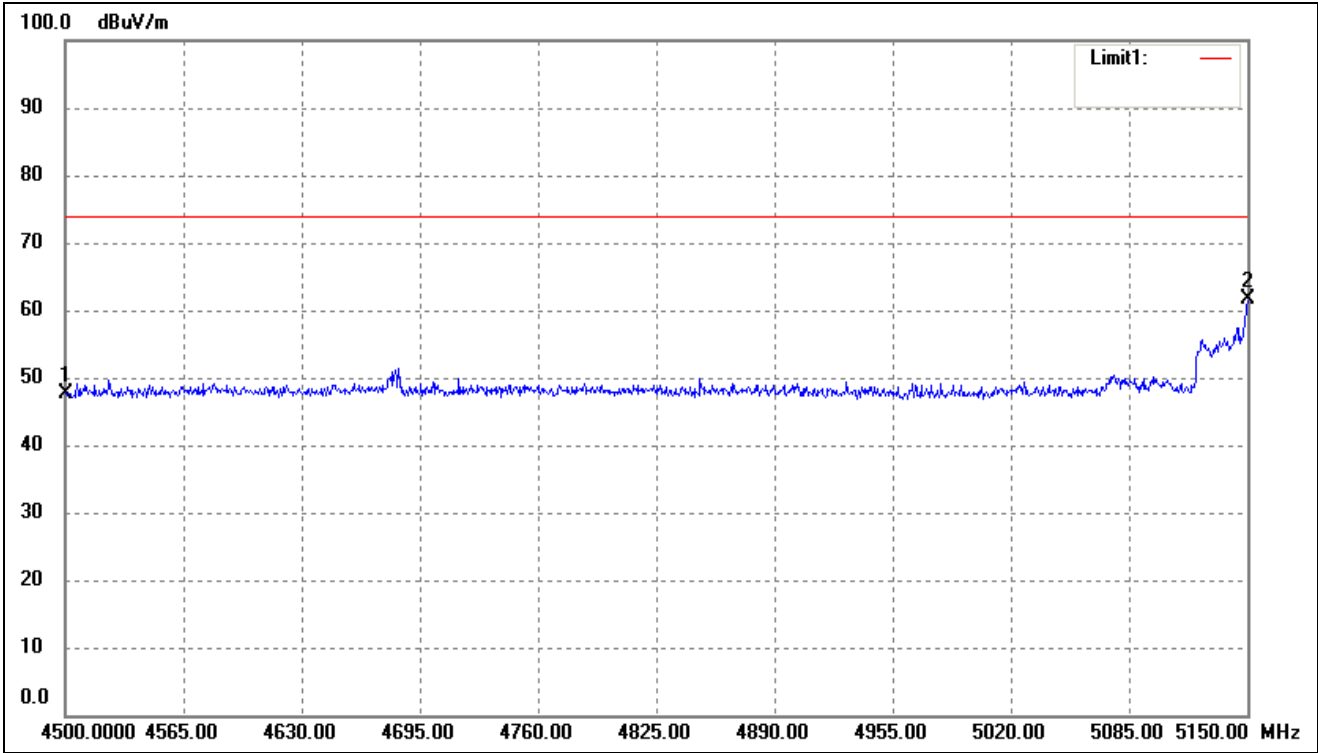


No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	49.8814	36.87	-11.54	25.33	40.00	-14.67	-	-	QP
2	111.7380	40.10	-13.48	26.62	43.50	-16.88	-	-	QP
3	229.2931	35.81	-11.93	23.88	46.00	-22.12	-	-	QP
4	401.8385	40.44	-6.42	34.02	46.00	-11.98	-	-	QP
5	642.8613	32.75	-2.31	30.44	46.00	-15.56	-	-	QP
6	872.1832	32.98	0.51	33.49	46.00	-12.51	-	-	QP

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

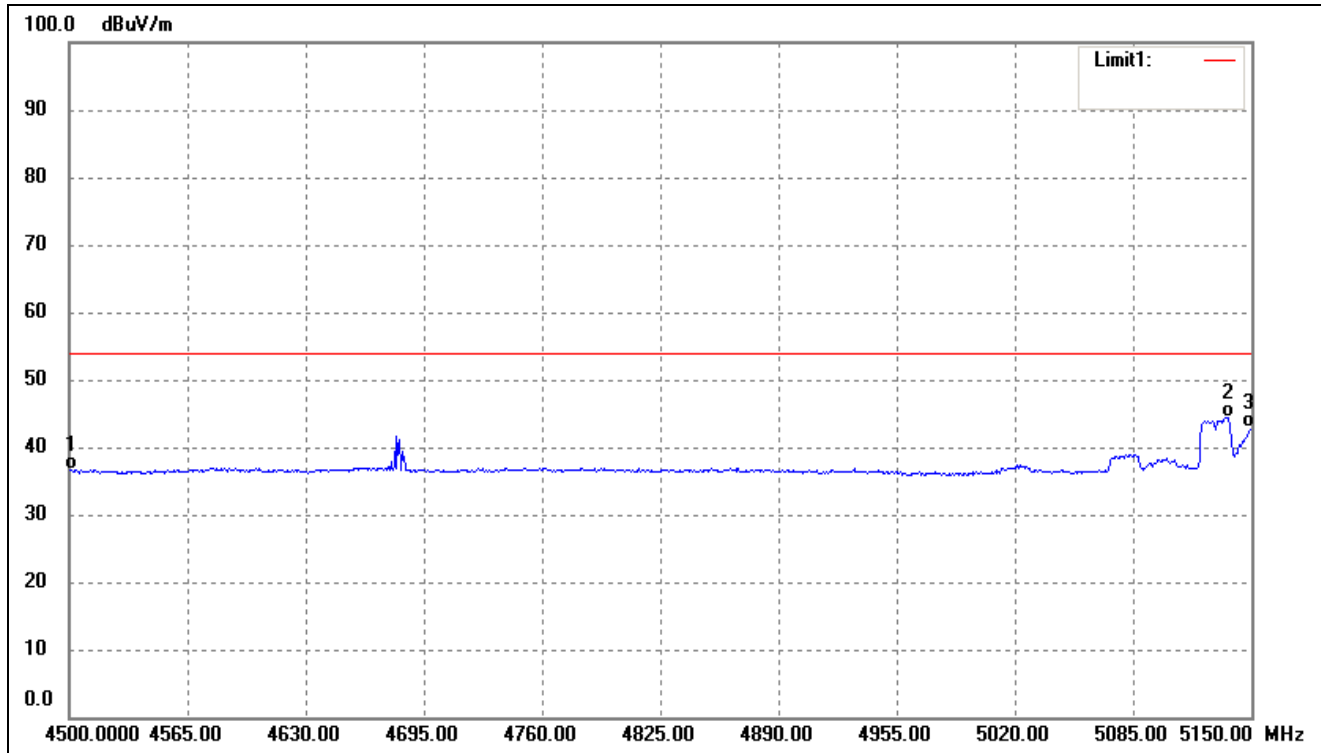
➤ Spurious Emission above 1GHz

802.11a- Restricted Bandedge (worst case)			
Test Channel	band 4.5-5.15GHz	Polarity:	Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	()	(cm)	
1	4500.000	52.43	-4.71	47.72	74.00	-26.28	-	-	peak
2	5150.000	66.01	-4.32	61.69	74.00	-12.31	-	-	peak

802.11a- Restricted Bandedge (worst case)			
Test Channel	band 4.5-5.15GHz	Polarity:	Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	4500.000	41.22	-4.71	36.51	54.00	-17.49	-	-	AVG
2	5137.650	48.77	-4.33	44.44	54.00	-9.56	-	-	AVG
3	5150.000	47.21	-4.32	42.89	54.00	-11.11	-	-	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 5.15-5.25GHz (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 (5180MHz)							
10360	57.51	7.11	64.62	74	-9.38	H	PK
15540	36.96	8.22	45.18	54	-8.82	H	AV
10360	57.41	7.11	64.52	74	-9.48	V	PK
15540	36.40	8.22	44.62	54	-9.38	V	AV
Middle Channel (5200MHz)							
10400	55.95	7.22	63.17	74	-10.83	H	PK
15600	34.70	8.67	43.37	54	-10.63	H	AV
10400	56.70	7.22	63.92	74	-10.08	V	PK
15600	38.26	8.67	46.93	54	-7.07	V	AV
High Channel (5240MHz)							
10480	55.78	7.69	63.47	74	-10.53	H	PK
15720	35.82	8.93	44.75	54	-9.25	H	AV
10480	55.73	7.69	63.42	74	-10.58	V	PK
15720	35.29	8.93	44.22	54	-9.78	V	AV

- Out of Band edge for 5150-5250MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5150	-36.85	-27
Highest	Above 5350	-43.13	-27
Note: the data just list the worst cases			

- For the frequency band 5.15-5.25GHz (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	57.47	7.11	64.58	74	-9.42	H	PK
15540	35.52	8.22	43.74	54	-10.26	H	AV
10360	55.05	7.11	62.16	74	-11.84	V	PK
15540	35.48	8.22	43.70	54	-10.30	V	AV
Middle Channel (5200MHz)							
10400	55.95	7.22	63.17	74	-10.83	H	PK
15600	35.69	8.67	44.36	54	-9.64	H	AV
10400	53.77	7.22	60.99	74	-13.01	V	PK
15600	34.23	8.67	42.90	54	-11.10	V	AV
High Channel (5240MHz)							
10480	53.45	7.69	61.14	74	-12.86	H	PK
15720	34.87	8.93	43.80	54	-10.20	H	AV
10480	56.45	7.69	64.14	74	-9.86	V	PK
15720	35.29	8.93	44.22	54	-9.78	V	AV

- Out of Band edge 5150-5250MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5150	-31.88	-27
Highest	Above 5350	-40.10	-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 5.15-5.25GHz (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	55.09	7.25	62.34	74	-11.66	H	PK
15570	33.27	8.33	41.60	54	-12.40	H	AV
10380	55.82	7.25	63.07	74	-10.93	V	PK
15570	35.31	8.33	43.64	54	-10.36	V	AV
High Channel (5230MHz)							
10460	57.15	7.54	64.69	74	-9.31	H	PK
15690	35.04	8.86	43.90	54	-10.10	H	AV
10460	53.72	7.54	61.26	74	-12.74	V	PK
15690	34.28	8.86	43.14	54	-10.86	V	AV

- Out of Band edge for 5150-5250MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5150	-39.23	-27
Highest	Above 5350	-40.66	-27
Note: the data just list the worst cases			

Note: Testing is carried out with frequency rang 9kHz to the tenth harmonics, 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

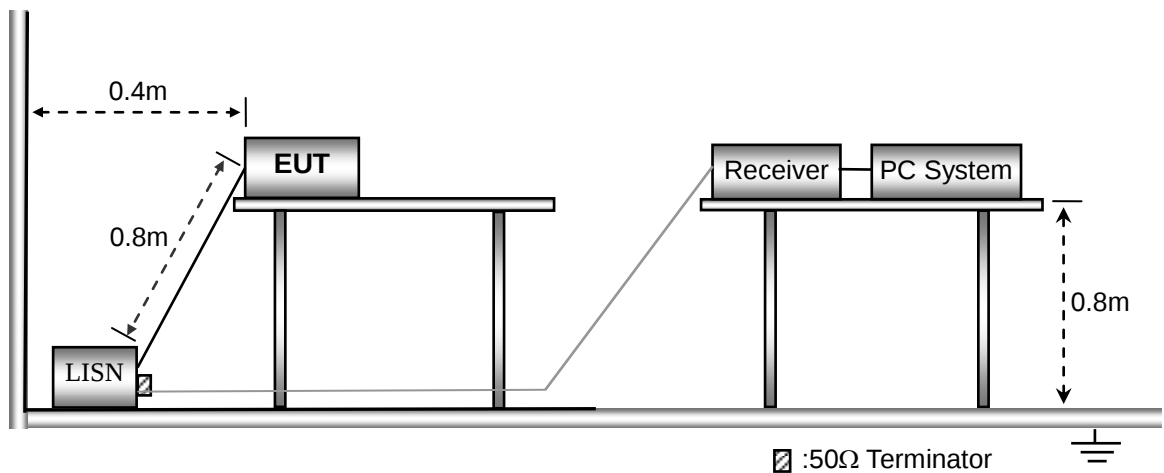
10.1 Test Procedure

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 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

10.2 Basic Test Setup Block Diagram



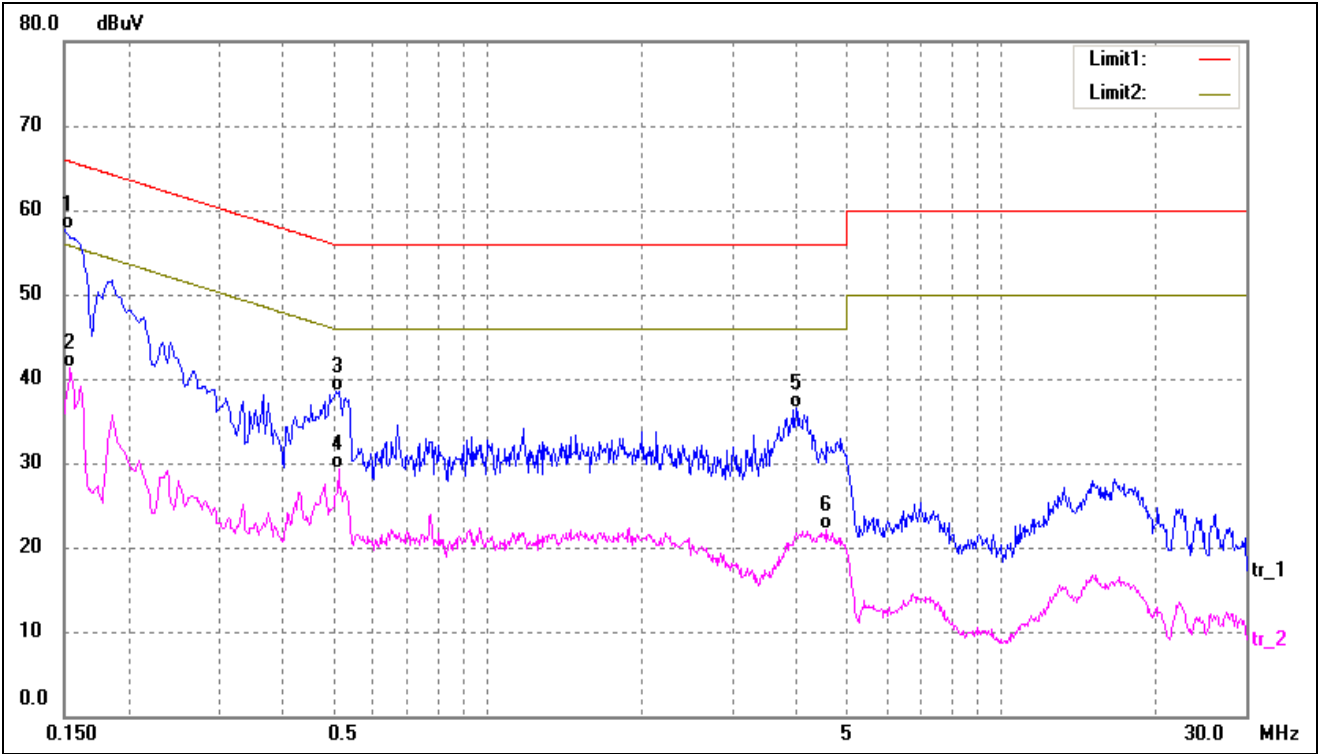
10.3 Test Receiver Setup

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

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

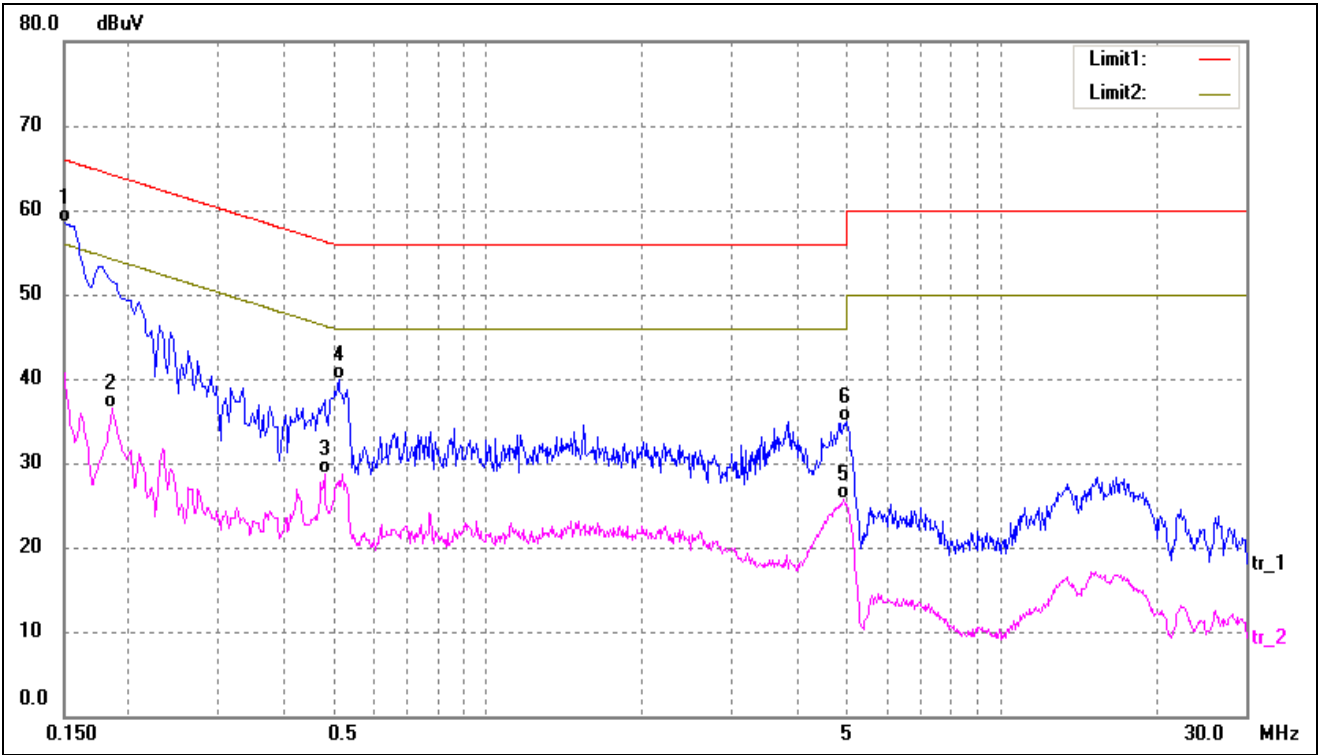
10.4 Summary of Test Results/Plots

Test Mode	Communication	AC120V 60Hz	Polarity:	Neutral
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No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1	0.1500	47.40	10.25	57.65	66.00	-8.35	QP
2	0.1540	31.03	10.25	41.28	55.78	-14.50	AVG
3	0.5100	28.37	10.22	38.59	56.00	-17.41	QP
4	0.5140	19.04	10.22	29.26	46.00	-16.74	AVG
5	4.0060	26.27	10.24	36.51	56.00	-19.49	QP
6	4.5780	11.80	10.23	22.03	46.00	-23.97	AVG

Test Mode	Communication	AC120V 60Hz	Polarity:	Line
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No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1	0.1500	48.23	10.25	58.48	66.00	-7.52	QP
2	0.1860	26.23	10.26	36.49	54.21	-17.72	AVG
3	0.4820	18.49	10.22	28.71	46.30	-17.59	AVG
4	0.5140	29.73	10.22	39.95	56.00	-16.05	QP
5	4.9420	15.48	10.22	25.70	46.00	-20.30	AVG
6	5.0180	24.66	10.22	34.88	60.00	-25.12	QP

APPENDIX SUMMARY

Project No.	WTX21X03014671W	Test Engineer	Moon
Start date	2021/03/08	Finish date	2021/03/08
Temperature	23.5℃	Humidity	48%
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	9.862	11
	5200	9.913	11
	5240	9.971	11
802.11n-HT20	5180	8.280	11
	5200	8.634	11
	5240	8.562	11
802.11n-HT40	5190	5.652	11
	5230	5.803	11

5150-5250MHz

802.11a-Low	Agilent R T Ref 20 dBm #Atten 30 dB Mkr1 5.17492 GHz 9.862 dBm #Avg Log 10 dB/ Offst 1 dB M1 S2 S3 FC AA Marker 5.174920000 GHz 9.862 dBm Center 5.18 GHz #Res BW 1 MHz #VBW 3 MHz Sweep 20 ms (1001 pts) Span 40 MHz Peak Search Meas Tools ▾ Next Peak Next Pk Right Next Pk Left Min Search Pk-Pk Search More 1 of 2
802.11a-Middle	Agilent R T Ref 20 dBm #Atten 30 dB Mkr1 5.19508 GHz 9.913 dBm #Avg Log 10 dB/ Offst 1 dB M1 S2 S3 FC AA Marker 5.195080000 GHz 9.913 dBm Center 5.2 GHz #Res BW 1 MHz #VBW 3 MHz Sweep 20 ms (1001 pts) Span 40 MHz Peak Search Meas Tools ▾ Next Peak Next Pk Right Next Pk Left Min Search Pk-Pk Search More 1 of 2
802.11a-High	Agilent R T Ref 20 dBm #Atten 30 dB Mkr1 5.23492 GHz 9.971 dBm #Avg Log 10 dB/ Offst 1 dB M1 S2 S3 FC AA Marker 5.234920000 GHz 9.971 dBm Center 5.24 GHz #Res BW 1 MHz #VBW 3 MHz Sweep 20 ms (1001 pts) Span 40 MHz Peak Search Meas Tools ▾ Next Peak Next Pk Right Next Pk Left Min Search Pk-Pk Search More 1 of 2

802.11n-HT20-Low	Agilent Ref 20 dBm #Atten 30 dB Mkr1 5.18412 GHz 8.28 dBm #Avg Log 10 dB/ Offset 1 dB M1 S2 S3 FC AA Marker 5.184120000 GHz 8.28 dBm Center 5.18 GHz #Res BW 1 MHz #VBW 3 MHz Sweep 20 ms (1001 pts) Span 40 MHz Peak Search Meas Tools ▶ Next Peak Next Pk Right Next Pk Left Min Search Pk-Pk Search More 1 of 2
802.11n-HT20-Middle	Agilent Ref 20 dBm #Atten 30 dB Mkr1 5.19560 GHz 8.634 dBm #Avg Log 10 dB/ Offset 1 dB M1 S2 S3 FC AA Marker 5.195600000 GHz 8.634 dBm Center 5.2 GHz #Res BW 1 MHz #VBW 3 MHz Sweep 20 ms (1001 pts) Span 40 MHz Peak Search Meas Tools ▶ Next Peak Next Pk Right Next Pk Left Min Search Pk-Pk Search More 1 of 2
802.11n-HT20-High	Agilent Ref 20 dBm #Atten 30 dB Mkr1 5.24172 GHz 8.562 dBm #Avg Log 10 dB/ Offset 1 dB M1 S2 S3 FC AA Marker 5.241720000 GHz 8.562 dBm Center 5.24 GHz #Res BW 1 MHz #VBW 3 MHz Sweep 20 ms (1001 pts) Span 40 MHz Peak Search Meas Tools ▶ Next Peak Next Pk Right Next Pk Left Min Search Pk-Pk Search More 1 of 2

802.11n-HT40-Low	Agilent Ref 20 dBm #Atten 30 dB Mkr1 5.18824 GHz 5.652 dBm #Avg Log 10 dB/ Offset 1 dB M1 S2 S3 FC AA Marker 5.188240000 GHz 5.652 dBm Center 5.19 GHz #Res BW 1 MHz #VBW 3 MHz Sweep 20 ms (1001 pts) Span 80 MHz Peak Search Meas Tools ▶ Next Peak Next Pk Right Next Pk Left Min Search Pk-Pk Search More 1 of 2
802.11n-HT40-High	Agilent Ref 20 dBm #Atten 30 dB Mkr1 5.22440 GHz 5.803 dBm #Avg Log 10 dB/ Offset 1 dB M1 S2 S3 FC AA Marker 5.224400000 GHz 5.803 dBm Center 5.23 GHz #Res BW 1 MHz #VBW 3 MHz Sweep 20 ms (1001 pts) Span 80 MHz Peak Search Meas Tools ▶ Next Peak Next Pk Right Next Pk Left Min Search Pk-Pk Search More 1 of 2

APPENDIX B

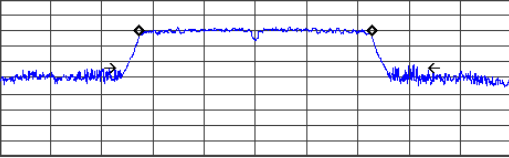
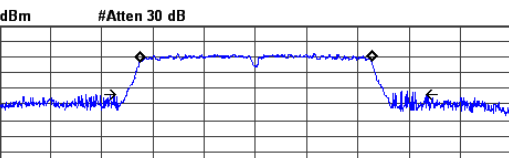
Emission Bandwidth and Occupied Bandwidth

U-NII-1:5150-5250MHz				
Test Mode	Test Channel MHz	26 dB Bandwidth MHz	99% Bandwidth MHz	Limit MHz
802.11a	5180	30.973	17.308	Pass
	5200	30.815	17.230	Pass
	5240	30.850	17.213	Pass
802.11n-HT20	5180	17.975	20.857	Pass
	5200	17.978	20.815	Pass
	5240	17.991	10.884	Pass
802.11n-HT40	5190	36.262	45.506	Pass
	5230	36.254	45.104	Pass

5150-5250MHz

802.11a-Low	Agilent Ch Freq 5.18 GHz Occupied Bandwidth VBW 1.00000000 MHz Ref 20 dBm #Peak Log 10 dB/ Offset 1 dB Center 5.18 GHz #Res BW 300 kHz #VBW 1 MHz Sweep 10 ms (1001 pts) Span 40 MHz Occupied Bandwidth 17.3077 MHz Occ BW % Pwr 99.00 % x dB -26.00 dB Transmit Freq Error -20.896 kHz x dB Bandwidth 30.973 MHz BW/Avg Res BW 300.000000 kHz Auto Man Video BW 1.00000000 MHz Auto Man VBW/RBW 10.000000 Auto Man Average 10 On Off Avg Type Video Auto Man EMI Res BW None
802.11a-Middle	Agilent Ch Freq 5.2 GHz Occupied Bandwidth Center 5.20000000 GHz Ref 20 dBm #Peak Log 10 dB/ Offset 1 dB Center 5.2 GHz #Res BW 300 kHz #VBW 1 MHz Sweep 10 ms (1001 pts) Span 40 MHz Occupied Bandwidth 17.2293 MHz Occ BW % Pwr 99.00 % x dB -26.00 dB Transmit Freq Error -20.869 kHz x dB Bandwidth 30.815 MHz Freq/Channel Center Freq 5.20000000 GHz Start Freq 5.18000000 GHz Stop Freq 5.22000000 GHz CF Step 4.00000000 MHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off Scale Type Log Lin
802.11a-High	Agilent Ch Freq 5.24 GHz Occupied Bandwidth Center 5.24000000 GHz Ref 20 dBm #Peak Log 10 dB/ Offset 1 dB Center 5.24 GHz #Res BW 300 kHz #VBW 1 MHz Sweep 10 ms (1001 pts) Span 40 MHz Occupied Bandwidth 17.2128 MHz Occ BW % Pwr 99.00 % x dB -26.00 dB Transmit Freq Error -27.819 kHz x dB Bandwidth 30.850 MHz Freq/Channel Center Freq 5.24000000 GHz Start Freq 5.22000000 GHz Stop Freq 5.26000000 GHz CF Step 4.00000000 MHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off Scale Type Log Lin

802.11n-HT20-Low	Agilent R T Ch Freq 5.18 GHz Trig Free Occupied Bandwidth Center 5.180000000 GHz Ref 20 dBm #Peak Log 10 dB/ Offset 1 dB #Atten 30 dB Center 5.18 GHz #Res BW 300 kHz #VBW 1 MHz Sweep 10 ms (1001 pts) Span 40 MHz Occupied Bandwidth 17.9753 MHz Occ BW % Pwr 99.00 % x dB -26.00 dB Transmit Freq Error -890.061 Hz x dB Bandwidth 20.857 MHz Freq/Channel Center Freq 5.18000000 GHz Start Freq 5.16000000 GHz Stop Freq 5.20000000 GHz CF Step 4.00000000 MHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off Scale Type Log Lin
802.11n-HT20-Middle	Agilent R T Ch Freq 5.2 GHz Trig Free Occupied Bandwidth Center 5.200000000 GHz Ref 20 dBm #Peak Log 10 dB/ Offset 1 dB #Atten 30 dB Center 5.2 GHz #Res BW 300 kHz #VBW 1 MHz Sweep 10 ms (1001 pts) Span 40 MHz Occupied Bandwidth 17.9782 MHz Occ BW % Pwr 99.00 % x dB -26.00 dB Transmit Freq Error 15.573 kHz x dB Bandwidth 20.815 MHz Freq/Channel Center Freq 5.20000000 GHz Start Freq 5.18000000 GHz Stop Freq 5.22000000 GHz CF Step 4.00000000 MHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off Scale Type Log Lin
802.11n-HT20-High	Agilent R T Ch Freq 5.24 GHz Trig Free Occupied Bandwidth Center 5.240000000 GHz Ref 20 dBm #Peak Log 10 dB/ Offset 1 dB #Atten 30 dB Center 5.24 GHz #Res BW 300 kHz #VBW 1 MHz Sweep 10 ms (1001 pts) Span 40 MHz Occupied Bandwidth 17.9907 MHz Occ BW % Pwr 99.00 % x dB -26.00 dB Transmit Freq Error -2.741 kHz x dB Bandwidth 20.884 MHz Freq/Channel Center Freq 5.24000000 GHz Start Freq 5.22000000 GHz Stop Freq 5.26000000 GHz CF Step 4.00000000 MHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off Scale Type Log Lin

802.11n-HT40-Low	Agilent R T Ch Freq 5.19 GHz Trig Free Occupied Bandwidth Span 80.00000000 MHz Ref 20 dBm #Peak Log 10 dB/ Offset 1 dB #Atten 30 dB  Center 5.19 GHz #Res BW 300 kHz #VBW 1 MHz Sweep 10 ms (1001 pts) Span 80 MHz Occupied Bandwidth 36.2619 MHz Occ BW % Pwr 99.00 % x dB -26.00 dB Transmit Freq Error 609.008 Hz x dB Bandwidth 45.506 MHz Span Span 80.00000000 MHz Span Zoom Full Span Zero Span Last Span Zone ▶
802.11n-HT40-High	Agilent R T Ch Freq 5.23 GHz Trig Free Occupied Bandwidth Center 5.230000000 GHz Ref 20 dBm #Peak Log 10 dB/ Offset 1 dB #Atten 30 dB  Center 5.23 GHz #Res BW 300 kHz #VBW 1 MHz Sweep 10 ms (1001 pts) Span 80 MHz Occupied Bandwidth 36.2541 MHz Occ BW % Pwr 99.00 % x dB -26.00 dB Transmit Freq Error 9.334 kHz x dB Bandwidth 45.104 MHz Trace/View 1 2 3 Trace Clear Write Max Hold Min Hold View Blank More 1 of 2

APPENDIX C

Maximum Conducted Output Power

U-NII-1:5150-5250MHz			
Test mode	Frequency MHz	Output Power dBm	Limit dBm
802.11a	5180	12.24	23.98
	5200	12.23	23.98
	5240	12.56	23.98
802.11n-HT20	5180	12.24	23.98
	5200	12.41	23.98
	5240	12.97	23.98
802.11n-HT40	5190	12.92	23.98
	5230	13.15	23.98

5150-5250MHz

802.11a-Low	Agilent Ch Freq 5.18 GHz Channel Power VBW 3.000000000 MHz Ref 20 dBm #Avg Log 10 dB/ Offset 1 dB Center 5.18 GHz #Res BW 1 MHz #VBW 3 MHz Sweep 20 ms (1001 pts) Span 40 MHz Channel Power 12.24 dBm / 20.0000 MHz Power Spectral Density -60.77 dBm/Hz Trace/View Trace 1 2 3 Clear Write Max Hold Min Hold View Blank More 1 of 2
802.11a-Middle	Agilent Ch Freq 5.2 GHz Channel Power Center 5.200000000 GHz Ref 20 dBm #Avg Log 10 dB/ Offset 1 dB Center 5.2 GHz #Res BW 1 MHz #VBW 3 MHz Sweep 20 ms (1001 pts) Span 40 MHz Channel Power 12.23 dBm / 20.0000 MHz Power Spectral Density -60.78 dBm/Hz Freq/Channel Center Freq 5.20000000 GHz Start Freq 5.18000000 GHz Stop Freq 5.22000000 GHz CF Step 4.00000000 MHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off Scale Type Log Lin
802.11a-High	Agilent Ch Freq 5.24 GHz Channel Power Ref 20 dBm #Avg Log 10 dB/ Offset 1 dB Center 5.24 GHz #Res BW 1 MHz #VBW 3 MHz Sweep 20 ms (1001 pts) Span 40 MHz Channel Power 12.56 dBm / 20.0000 MHz Power Spectral Density -60.45 dBm/Hz Freq/Channel Center Freq 5.24000000 GHz Start Freq 5.22000000 GHz Stop Freq 5.26000000 GHz CF Step 4.00000000 MHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off Scale Type Log Lin

802.11n-HT20-Low	Agilent Ch Freq 5.18 GHz Channel Power Trig Free Ref 20 dBm #Atten 30 dB #Avg Log 10 dB/Offset 1 dB Center 5.18 GHz #Res BW 1 MHz #VBW 3 MHz Sweep 20 ms (1001 pts) Span 40 MHz Channel Power Power Spectral Density 12.24 dBm / 20.0000 MHz -60.78 dBm/Hz Freq/Channel Center Freq 5.18000000 GHz Start Freq 5.16000000 GHz Stop Freq 5.20000000 GHz CF Step 4.00000000 MHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off Scale Type Log Lin
802.11n-HT20-Middle	Agilent Ch Freq 5.2 GHz Channel Power Trig Free Ref 20 dBm #Atten 30 dB #Avg Log 10 dB/Offset 1 dB Center 5.2 GHz #Res BW 1 MHz #VBW 3 MHz Sweep 20 ms (1001 pts) Span 40 MHz Channel Power Power Spectral Density 12.41 dBm / 20.0000 MHz -60.60 dBm/Hz Freq/Channel Center Freq 5.20000000 GHz Start Freq 5.18000000 GHz Stop Freq 5.22000000 GHz CF Step 4.00000000 MHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off Scale Type Log Lin
802.11n-HT20-High	Agilent Ch Freq 5.24 GHz Channel Power Trig Free Center 5.240000000 GHz Ref 20 dBm #Atten 30 dB #Avg Log 10 dB/Offset 1 dB Center 5.24 GHz #Res BW 1 MHz #VBW 3 MHz Sweep 20 ms (1001 pts) Span 40 MHz Channel Power Power Spectral Density 12.97 dBm / 20.0000 MHz -60.04 dBm/Hz Freq/Channel Center Freq 5.24000000 GHz Start Freq 5.22000000 GHz Stop Freq 5.26000000 GHz CF Step 4.00000000 MHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off Scale Type Log Lin

802.11n-HT40-Low	Agilent R T Ch Freq 5.19 GHz Trig Free Channel Power Center 5.190000000 GHz Ref 20 dBm #Atten 30 dB #Avg Log 10 dB/ Offset 1 dB Center 5.19 GHz #Res BW 1 MHz #VBW 3 MHz Sweep 20 ms (1001 pts) Span 80 MHz Channel Power Power Spectral Density 12.92 dBm / 40.0000 MHz -63.10 dBm/Hz Trace/View Trace 1 2 3 Clear Write Max Hold Min Hold View Blank More 1 of 2
802.11n-HT40-High	Agilent R T Ch Freq 5.23 GHz Trig Free Channel Power Center 5.230000000 GHz Ref 20 dBm #Atten 30 dB #Avg Log 10 dB/ Offset 1 dB Center 5.23 GHz #Res BW 1 MHz #VBW 3 MHz Sweep 20 ms (1001 pts) Span 80 MHz Channel Power Power Spectral Density 13.15 dBm / 40.0000 MHz -62.87 dBm/Hz Freq/Channel Center Freq 5.23000000 GHz Start Freq 5.19000000 GHz Stop Freq 5.27000000 GHz CF Step 8.00000000 MHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off Scale Type Log Lin

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%	3.3	-30	1598	0.3073
100%		-20	1592	0.3062
100%		-10	1586	0.3050
100%		0	1582	0.3043
100%		+10	1599	0.3074
100%		+20	1584	0.3046
100%		+30	1595	0.3068
100%		+40	1597	0.3072
100%		+50	1592	0.3061
Low Battery power	3.1	+20	1598	0.3073
High Battery power	3.6	+20	1592	0.3062

APPENDIX PHOTOGRAPHS

Please refer to “ANNEX”

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