FCC PART 15E TEST REPORT FOR CERTIFICATION
On Behalf of

CTOUCH Europe B.V.

WIFI MODULE

Model Number: 00WIMRA

FCC ID: 2APQQ-00WIMRA

Prepared for:	CTOUCH Europe B.V.
	Achtseweg Zuid 153R, 5651 GW Eindhoven, Netherlands
Prepared By:	EST Technology Co., Ltd.
	Chilingxiang, Qishantou, Santun, Houjie, Dongguan, Guangdong, China
Tel: 86-769-83081888-808	

Report Number:	ESTE-R2003053
Date of Test:	Dec. 23, 2019-Mar. 06, 2020
Date of Report:	Mar. 16, 2020

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EST Technology Co., Ltd.

Applicant: **Address:**	CTOUCH Europe B.V. Achtseweg Zuid 153R, 5651 GW Eindhoven, Netherlands
Manufacturer: **Address:**	CTOUCH Europe B.V. Achtseweg Zuid 153R, 5651 GW Eindhoven, Netherlands
E.U.T:	WIFI MODULE
Model Number:	00WIMRA
Power Supply:	DC 5V From PC
Trade Name:	CTOUCH Serial No.: ------
Date of Receipt:	Dec. 23, 2019 Date of Test: Dec. 23, 2019-Mar. 06, 2020
Test Specification:	FCC Part 15 Subpart E 15.407 ANSI C63.10:2013 FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01 FCC KDB 662911 D01 Multiple Transmitter Output v02r01
Test Result:	The device described above is tested by EST Technology Co., Ltd. The measurement results were contained in this test report and EST Technology Co., Ltd. was assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT to be technically compliance with the FCC Rules and Regulations Part 15 Subpart E requirements. This report applies to above tested sample only and shall not be reproduced in part without written approval of EST Technology Co., Ltd. **Date: Mar. 16, 2020**

Prepared by:	Reviewed by:	Approved by:
Ring	Seven	
Ring / Assistant	Seven / Engineer	Iceman Hu / Manager

Other Aspects:
None.

Abbreviations: OK/P=passed fail/F=failed n.a/N=not applicable E.U.T=equipment under tested

This test report is based on a single evaluation of one sample of above mentioned products ,It is not permitted to be duplicated in extracts without written approval of EST Technology Co., Ltd.

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

FCC ID	:	2APQQ-00WIMRA
Product Name	:	WIFI MODULE
Model Number	:	00WIMRA
Software Version	:	N/A
Hardware Version	:	N/A
Operation frequency	:	U-NII-1: 5150 MHz~5250 MHz U-NII-3: 5725 MHz~5850 MHz
Number of channel	:	U-NII-1: IEEE 802.11a / n HT20 / ac VHT20: 4 Channels; IEEE 802.11n HT40 / ac VHT40: 2 Channels; IEEE 802.11ac VHT80: 1 Channel. U-NII-3: IEEE 802.11a / n HT20 / ac VHT20: 5 Channels; IEEE 802.11n HT40 / ac VHT40: 2 Channels; IEEE 802.11ac VHT80: 1 Channel.
Modulation	:	OFDM(QPSK, BPSK, 16-QAM, 64-QAM,256-QAM)
Transmit Data Rate	:	IEEE 802.11a: 54, 48, 36, 24, 18, 12, 9, 6Mbps; IEEE 802.11n: up 150Mbps; IEEE 802.11ac: up to 433.3Mbps;
Channels Spacing	:	IEEE 802.11a: 20MHz; IEEE 802.11n HT20: 20MHz; IEEE 802.11n HT40: 40MHz; IEEE 802.11ac VHT20: 20MHz; IEEE 802.11ac VHT40: 40MHz; IEEE 802.11ac VHT80: 80MHz;

Transmit Power	:	U-NII-1	IEEE 802.11a: 12.10 IEEE 802.11n HT20: 13.56 IEEE 802.11n HT40: 12.94 IEEE 802.11ac VHT20: 13.06 IEEE 802.11ac VHT40: 12.85 IEEE 802.11ac VHT80: 13.35
		U-NII-3	IEEE 802.11a: 12.72 IEEE 802.11n HT20: 14.22 IEEE 802.11n HT40: 13.63 IEEE 802.11ac VHT20: 13.97 IEEE 802.11ac VHT40: 13.75 IEEE 802.11ac VHT80: 13.50
Sample Type	:	Prototype production	

Note:

For a more detailed features description, please refer to the manufacturer’s specifications or the user's manual.

1.2. The antenna information for EUT

Ant No.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	-	-	External antenna	-	2
2	-	-	External antenna	-	2

Remark:

(1) The EUT can work as CDD mode in IEEE 802.11n and IEEE 802.11ac,and can operate with one spatial stream.
According to KDB 662911 F 2) f) (i):
Directional gain=2dBi+10×log(2/1)dB=5.01dBi＜6dBi
So,the output power limit and power spectral density no need to be reduced.

(2) After pre-test all antenna configurations,the worst case configuration as list below.

ANT No. / TX Mode	SISO Configuration	MIMO Configuration
IEEE 802.11a	ANT1	/
IEEE 802.11n HT20	/	ANT1+ANT2
IEEE 802.11n HT40	/	ANT1+ANT2
IEEE 802.11ac VHT20	/	ANT1+ANT2
IEEE 802.11ac VHT40	/	ANT1+ANT2
IEEE 802.11ac VHT80	/	ANT1+ANT2

2. SUMMARY OF TEST

2.1. Summary of test result

Report Section	Description of Test Item	FCC Standard Section	Results
3	6dB Bandwidth &26dB Bandwidth & 99% Occupied Bandwidth	15.407(a) 15.407(e)	PASS
4	Maximum Conducted Output Power	15.407(a)	PASS
5	Peak Power Spectral Density	15.407(a)	PASS
6	Unwanted Emissions and Band Edge	15.205 15.209 15.407(b)	PASS
7	Frequency Stability	15.407(g)	PASS
8	AC Power Line Conducted Emissions	15.207 15.407(b)(6)	PASS
9	Antenna Requirement	15.203	PASS

Note:

(1) “N/A” denotes test is not applicable in this test report

2.2. Test Facilities

EMC Lab	:	Certificated by CNAS, CHINA Registration No.: L5288 Date of registration: November 13, 2017 Certificated by FCC, USA Designation Number: CN1215 Test Firm Registration Number: 722932 Date of registration: November 21, 2017 Certificated by A2LA, USA Registration No.: 4366.01 Date of registration: November 07, 2017 Certificated by Industry Canada CAB identifier No.: CN0035 Date of registration: January 04, 2019 Certificated by VCCI, Japan Registration No.: R-13663; C-14103 Date of registration: July 25, 2017 This Certificate is valid until: July 24, 2020 Certificated by TUV Rheinland, Germany Registration No.: UA 50413872 0001 Date of registration: July 31, 2018 Certificated by TUV/PS, Shenzhen Registration No.: SCN1017 Date of registration: January 27, 2011 Certificated by Intertek ETL SEMKO Registration No.: 2011-RTL-L2-64 Date of registration: April 28, 2011 Certificated by Nemko, Hong Kong Registration No.: 175193 Date of registration: May 4, 2011
Name of Firm	:	EST Technology Co., Ltd.
Site Location	:	Chilingxiang, Qishantou, Santun, Houjie, Dongguan, Guangdong, China

2.3. Measurement uncertainty for EST Technology Co., Ltd.

Test Item	Uncertainty
Uncertainty for Conduction emission test	2.54dB
Uncertainty for Radiation Emission test (30MHz-1GHz)	3.62
Uncertainty for Radiation Emission test (1GHz to 18GHz)	4.86
Uncertainty for spurious emissions test (18GHz to 40GHz)	4.67
Uncertainty for radio frequency	7×10-8
Uncertainty for conducted RF Power	0.20dB
Uncertainty for Power density test	0.26dB
Temperature	±0.6°C
Humidity	±4.0 %
Volatage DC	±1.0%
Volatage (AC, <10KHz)	±1.5%

Note:

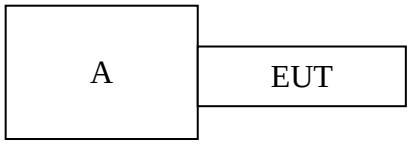
This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

2.4. Assistant equipment used for test

Item	Equipment	Brand	Model Name/Type No.	FCC ID	Series No.
A	PC	Lenovo	Thinkpad x250	-	-

2.5. Block Diagram

For radiated emissions test: EUT was placed on a turn table, which is 0.8 (or 1.5) meter high above ground.



DC 5V

(EUT: WIFI MODULE)

2.6. Test Mode

Pre-scan has been combined all possible modulations and date rates to determine the worst case test

mode,the worst case test mode was selected for the final test as listed below.

Test Item	Test Mode	Channel	Modulation	Data rate
6dB Bandwidth	IEEE 802.11a	149/157/165	OFDM	6Mbps
	IEEE 802.11n HT20	149/157/165	OFDM	MCS0
	IEEE 802.11n HT40	151/159	OFDM	MCS0
	IEEE 802.11ac VHT20	149/157/165	OFDM	MCS0
	IEEE 802.11ac VHT40	151/159	OFDM	MCS0
	IEEE 802.11ac VHT80	155	OFDM	MCS0
26dB Bandwidth	IEEE 802.11a	36/40/48	OFDM	6Mbps
	IEEE 802.11n HT20	36/40/48	OFDM	MCS0
	IEEE 802.11n HT40	38/46	OFDM	MCS0
	IEEE 802.11ac VHT20	36/40/48	OFDM	MCS0
	IEEE 802.11ac VHT40	38/46	OFDM	MCS0
	IEEE 802.11ac VHT80	42	OFDM	MCS0
99% Occupied Bandwidth	IEEE 802.11a	36/40/48/149/157/165	OFDM	6Mbps
	IEEE 802.11n HT20	36/40/48/149/157/165	OFDM	MCS0
	IEEE 802.11n HT40	38/46/151/159	OFDM	MCS0
	IEEE 802.11ac VHT20	36/40/48/149/157/165	OFDM	MCS0
	IEEE 802.11ac VHT40	38/46/151/159	OFDM	MCS0
	IEEE 802.11ac VHT80	42/155	OFDM	MCS0
Maximum Conducted Output Power	IEEE 802.11a	36/40/48/149/157/165	OFDM	6Mbps
	IEEE 802.11n HT20	36/40/48/149/157/165	OFDM	MCS0
	IEEE 802.11n HT40	38/46/151/159	OFDM	MCS0
	IEEE 802.11ac VHT20	36/40/48/149/157/165	OFDM	MCS0
	IEEE 802.11ac VHT40	38/46/151/159	OFDM	MCS0
	IEEE 802.11ac VHT80	42/155	OFDM	MCS0

Peak Power Spectral Density	IEEE 802.11a	36/40/48/149/157/165	OFDM	6Mbps
	IEEE 802.11n HT20	36/40/48/149/157/165	OFDM	MCS0
	IEEE 802.11n HT40	38/46/151/159	OFDM	MCS0
	IEEE 802.11ac VHT20	36/40/48/149/157/165	OFDM	MCS0
	IEEE 802.11ac VHT40	38/46/151/159	OFDM	MCS0
	IEEE 802.11ac VHT80	42/155	OFDM	MCS0
Unwanted Emissions and Band Edge(Above 1GHz)	IEEE 802.11a	36/40/48/149/157/165	OFDM	6Mbps
	IEEE 802.11n HT20	36/40/48/149/157/165	OFDM	MCS0
	IEEE 802.11n HT40	38/46/151/159	OFDM	MCS0
	IEEE 802.11ac VHT20	36/40/48/149/157/165	OFDM	MCS0
	IEEE 802.11ac VHT40	38/46/151/159	OFDM	MCS0
	IEEE 802.11ac VHT80	42/155	OFDM	MCS0
Unwanted Emissions Below 1GHz	IEEE 802.11a	36	OFDM	6Mbps
Frequency Stability	Unmodulation	36/149	N/A	N/A
AC Power Line Conducted Emissions	IEEE 802.11a	36	OFDM	6Mbps

Note:

1. In radiated measurement,the EUT had been pre-scan on the positioned of each 3 axis(X,Y,Z), the worst case was found when positioned on **X-plane.**

2.7. Channel List

Band	Mode	Channel	Frequency (MHz)
U-NII-1	IEEE 802.11a & n HT20 & ac VHT20	36	5180
		40	5200
		44	5220
		48	5240
	IEEE 802.11n HT40 & ac VHT40	38	5190
		46	5230
	IEEE 802.11ac VHT80	42	5210
U-NII-3	IEEE 802.11a & n HT20 & ac VHT20	149	5745
		153	5765
		157	5785
		161	5805
		165	5825
	IEEE 802.11n HT40 & ac VHT40	151	5755
		159	5795
	IEEE 802.11ac VHT80	155	5775

2.8. Power Setting of Test Software

Software Name	QATool_Dbg		
U-NII-1			
Frequency(MHz)	5180	5200	5240
IEEE 802.11a Setting	19	19	19
IEEE 802.11n HT20 Setting	19, 19	19, 19	19, 19
IEEE 802.11ac VHT20 Setting	19, 19	19, 19	19, 19
Frequency(MHz)	5190	5230	
IEEE 802.11n HT40 Setting	19, 19	19, 19	
IEEE 802.11ac VHT40 Setting	19, 19	19, 19	
Frequency(MHz)	5210		
IEEE 802.11ac VHT80 Setting	19, 19		
U-NII-3			
Frequency(MHz)	5745	5785	5825
IEEE 802.11a Setting	19	19	19
IEEE 802.11n HT20 Setting	19, 19	19, 19	19, 19
IEEE 802.11ac VHT20 Setting	19, 19	19, 19	19, 19
Frequency(MHz)	5755	5795	
IEEE 802.11n HT40 Setting	19, 19	19, 19	
IEEE 802.11ac VHT40 Setting	19, 19	19, 19	
Frequency(MHz)	5775		
IEEE 802.11ac VHT80 Setting	19, 19		

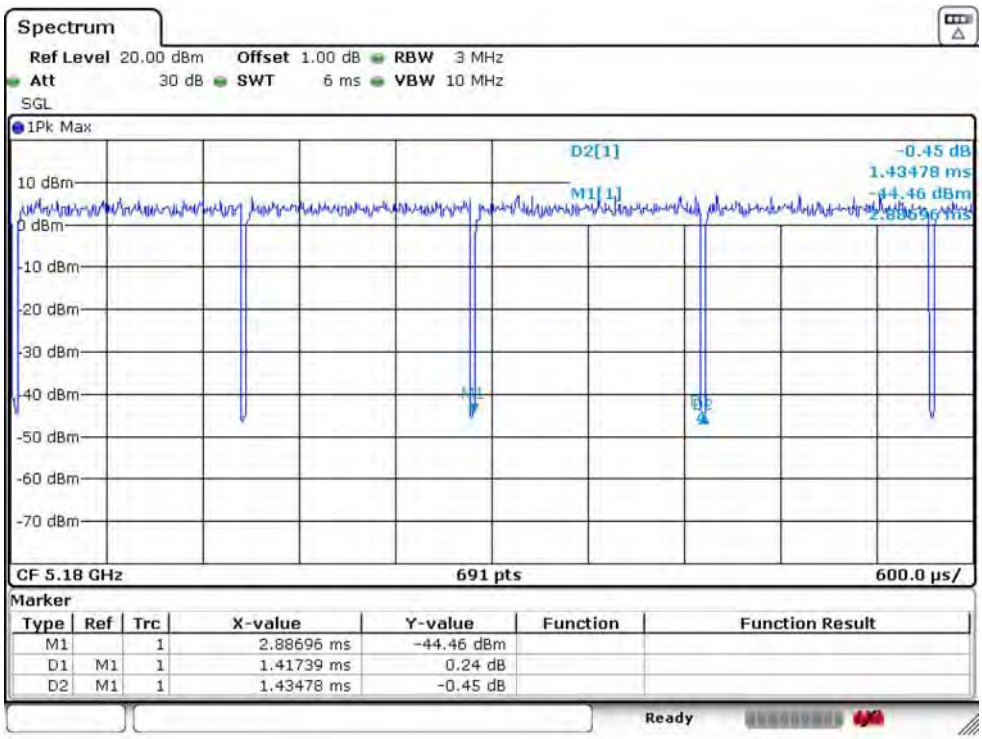
2.9. Duty Cycle of Test Signal

Temperature	25.3℃	Relative Humidity		56%	Test Voltage		DC 5V
Mode	Frequency (MHz)	On time (ms)	Total Time (ms)	Duty Cycle (%)	Duty Factor (dB)	1/T (Hz)	VBW Setting (dB)
IEEE 802.11a	5180	1.41739	1.43478	98.79	0.00	10	10
IEEE 802.11n HT20	5180	1.32174	1.33913	98.70	0.00	10	10
IEEE 802.11n HT40	5190	1.33043	1.34783	98.71	0.00	10	10
IEEE 802.11ac VHT20	5180	0.66957	0.68696	97.47	0.11	1493	1493
IEEE 802.11ac VHT40	5190	0.67826	0.69565	97.50	0.11	1474	1474
IEEE 802.11ac VHT80	5210	1.08695	1.59130	68.31	1.66	920	920

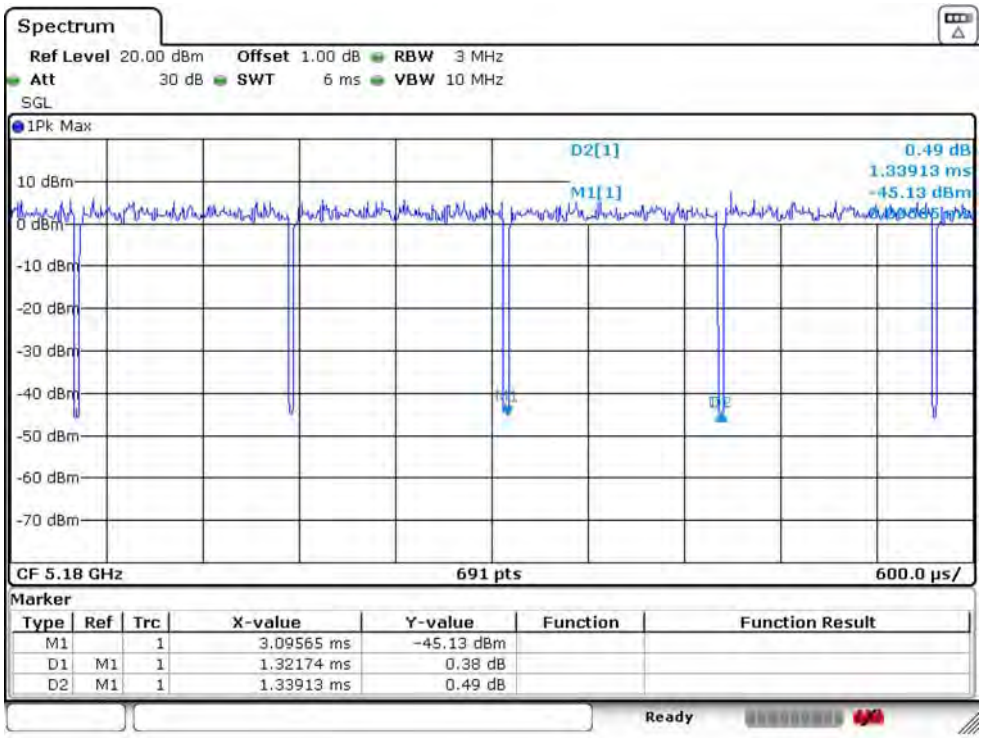
Note:

1. Duty Cycle=On Time/Total Time×100%.
2. Duty Factor=10×Log(1/Duty Cycle).
3. If duty cycle <98 %, the conducted average output power and average power spectral density should be add duty factor.
4. If duty cycle≥98 %,the EUT is consider to be transmitting continuously,the conducted average output power and average power spectral density no need to add duty factor.
5. The on-time time is transmission duration(T).
6. The VBW Setting is use for RMS measurement in unwanted emissions and band edge(Above 1GHz) test.

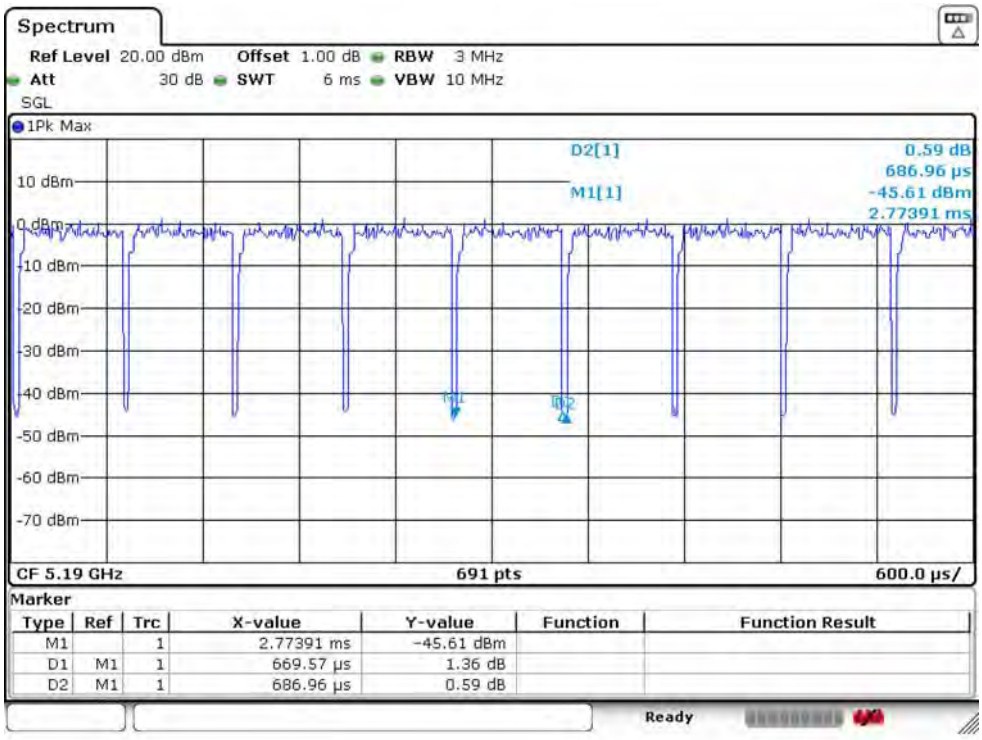
IEEE 802.11a 5180MHz



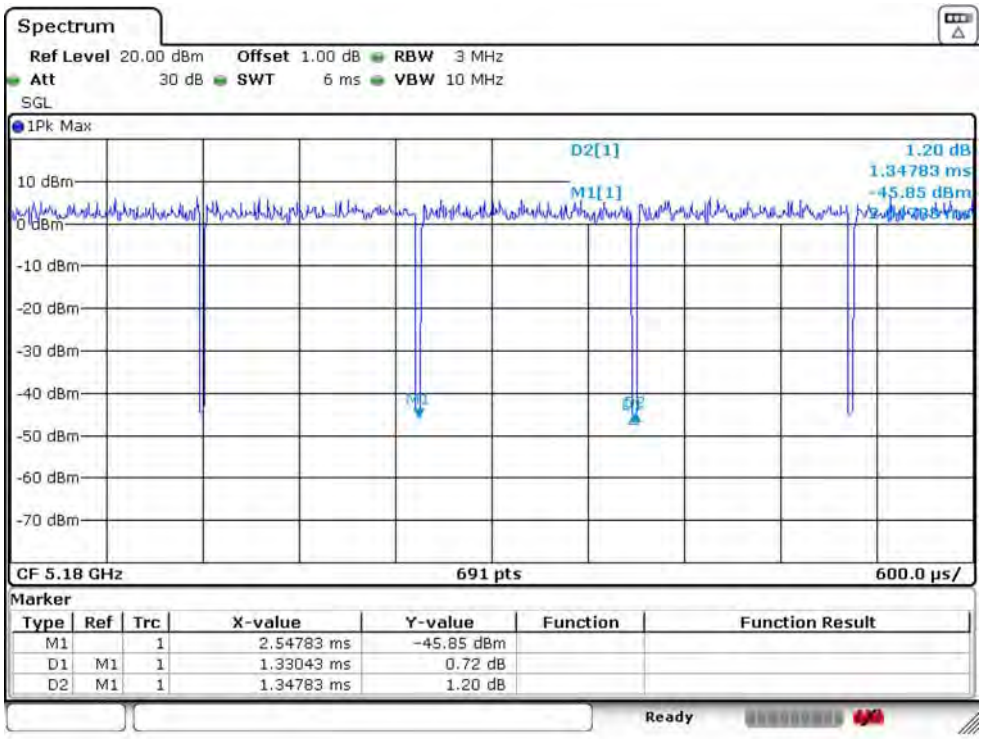
IEEE 802.11n HT20 5180MHz



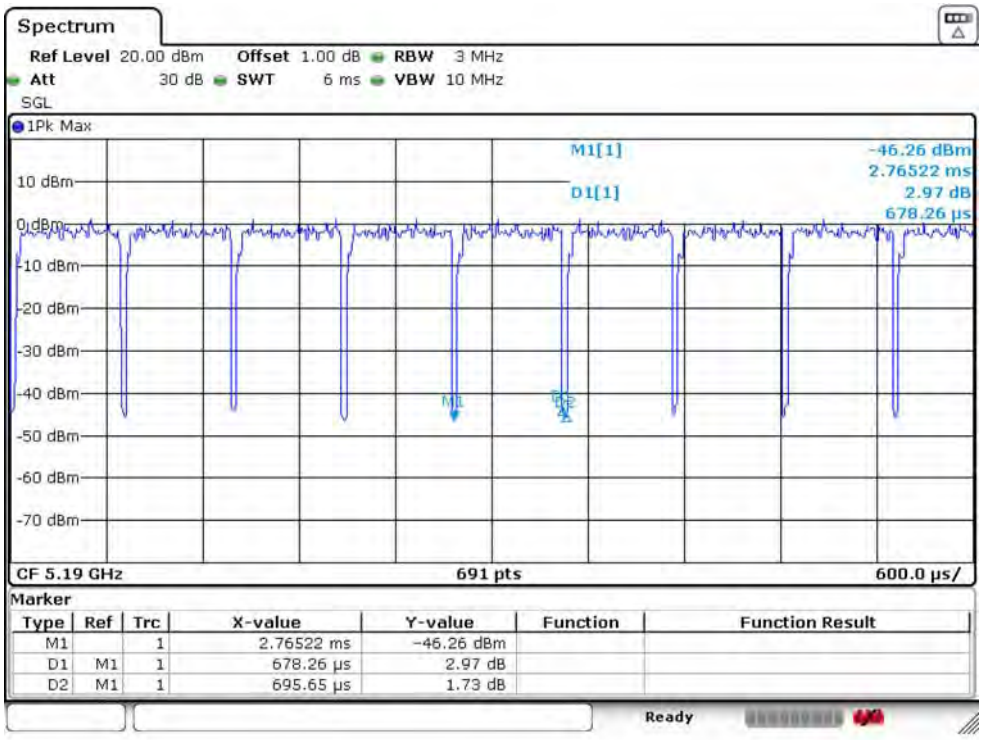
IEEE 802.11n HT40 5190MHz



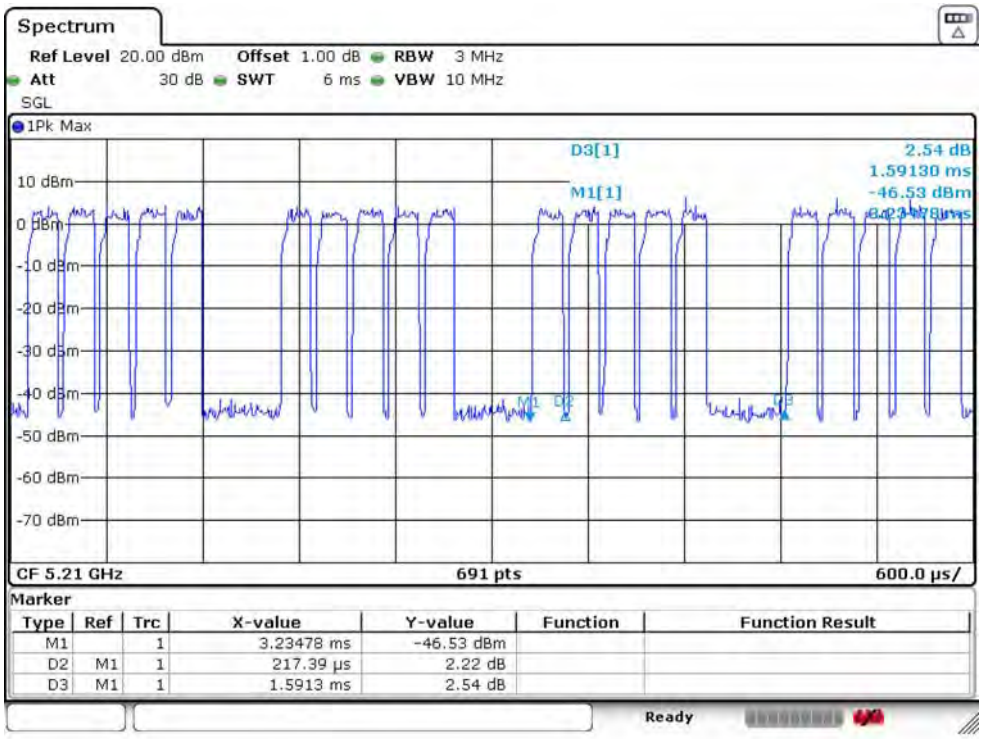
IEEE 802.11ac VHT20 5180MHz



IEEE 802.11ac VHT40 5190MHz



IEEE 802.11ac VHT80 5210MHz



2.10. Test Equipment List

For AC power conducted emissions test						
Equipment	Manufacturer	Model No.	Serial No.	Calibration Body	Last Cal.	Next Cal.
EMI Test Receiver	Rohde & Schwarz	ESHS30	EST-E001	LISAI	June 14,19	1 Year
Artificial Mains Network	Rohde & Schwarz	ENV216	EST-E002	LISAI	June 14,19	1 Year
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	EST-E078	LISAI	June 14,19	1 Year
Test Software	Audix	e3-6.111221a	N/A	N/A	N/A	N/A

For radiated emissions test(9KHz-30MHz)						
Equipment	Manufacturer	Model No.	Serial No.	Calibration Body	Last Cal.	Next Cal.
EMI Test Receiver	Rohde & Schwarz	ESR7	EST-E047	LISAI	June 14,19	1 Year
Active Loop Antenna	SCHWAREB ECK	FMZB 1519B	EST-E054	LISAI	June 14,19	1 Year
Test Software	Audix	e3-6.111221a	N/A	N/A	N/A	N/A
9kHz-30MHz Cable	N/A	EST-001	N/A	N/A	N/A	N/A

For radiated emissions test(30MHz-1000MHz)						
Equipment	Manufacturer	Model No.	Serial No.	Calibration Body	Last Cal.	Next Cal.
EMI Test Receiver	Rohde & Schwarz	ESR7	EST-E047	LISAI	June 14,19	1 Year
Bilog Antenna	Teseq	CBL 6111D	EST-E034	LISAI	June 14,19	1 Year
Test Software	Audix	e3-6.111221a	N/A	N/A	N/A	N/A
30-1000MHz Cable	N/A	EST-002	N/A	N/A	N/A	N/A

For radiated emissions test(Above 1000MHz)						
Equipment	Manufacturer	Model No.	Serial No.	Calibration Body	Last Cal.	Next Cal.
Horn Antenna	SCHWARZB ECK	BBHA 9120 D	EST-E031	LISAI	June 14,19	1 Year
Signal Amplifier	SCHWARZB ECK	BBV9718	EST-E032	LISAI	June 14,19	1 Year
Spectrum Analyzer	Rohde &Schwarz	FSV40	EST-E069	LISAI	June 14,19	1 Year
Test Software	Audix	e3-6.111221a	N/A	N/A	N/A	N/A
Above 1GHz Cable	N/A	EST-003	N/A	N/A	N/A	N/A

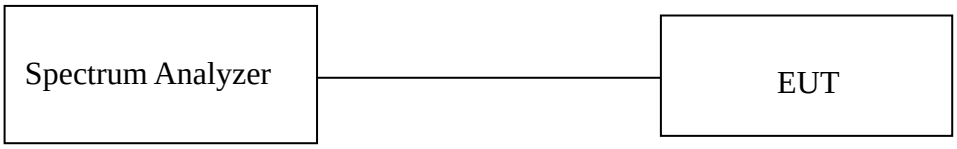
For connect EUT antenna terminal test						
Equipment	Manufacturer	Model No.	Serial No.	Calibration Body	Last Cal.	Next Cal.
TS 8997	Rohde &Schwarz	/	/	/	/	/
Open Switch and Control Unit	Rohde &Schwarz	OSP-B157WB	EST-E036	LISAI	June 14,19	1Year
Signal and Spectrum Analyzer	Rohde &Schwarz	FSV	EST-E037	LISAI	June 14,19	1 Year
Signal Generator	Rohde &Schwarz	SMB100A	EST-E038	LISAI	June 14,19	1 Year
Vector Signal Generator	Rohde &Schwarz	SMBV100A	EST-E039	LISAI	June 14,19	1Year
Test Software	Rohde &Schwarz	WMS32	V10.50.00	N/A	N/A	N/A
Temperature controller	Terchy	MHQ	EST-E101	LISAI	June 14,19	1 Year

3. 6dB Bandwidth &26dB Bandwidth & 99% Occupied Bandwidth

3.1. Limit

Band	Frequency (MHz)	Test Item	Limit
U-NII-1	5150-5250	26dB Bandwidth&99% Occupied Bandwidth	N/A
U-NII-2A	5250-5350	26dB Bandwidth&99% Occupied Bandwidth	N/A
U-NII-2C	5470-5725	26dB Bandwidth&99% Occupied Bandwidth	N/A
U-NII-3	5725-5850	6dB Bandwidth&99% Occupied Bandwidth	6dB Bandwidth≥500KHz

3.2. Test Setup



3.3. Spectrum Analyzer Setting

6dB Bandwidth	
Spectrum Parameters	Setting
RBW	100KHz
VBW	300KHz
Span	40MHz(20MHz Bandwidth mode) 60MHz(40MHz Bandwidth mode) 120MHz(80MHz Bandwidth mode)
Sweep Time	Auto
Detector	Peak
Trace Mode	Max Hold

26dB Bandwidth	
Spectrum Parameters	Setting
RBW	approximately 1% of the emission bandwidth
VBW	＞RBW
Span	40MHz(20MHz Bandwidth mode) 60MHz(40MHz Bandwidth mode) 120MHz(80MHz Bandwidth mode)
Sweep Time	Auto
Detector	Peak
Trace Mode	Max Hold

99% Occupied Bandwidth	
Spectrum Parameters	Setting
RBW	1% to 5% of the OBW
VBW	approximately three times the RBW
Span	between 1.5 times and 5.0 times the OBW
Sweep Time	Auto
Detector	Peak
Trace Mode	Max Hold

3.4. Test Procedure

For 26dB Bandwidth Measurement :

a. Connect EUT antenna terminal to the spectrum analyzer with RF cable.
b. Spectrum analyzer setting parameters in accordance with section 3.3.
c. Set the EUT transmit continuously with maximum output power.
d. Allow trace to stabilize, measure the maximum width of the emission that is 26 dB down from the peak of the emission.Compare this with the RBW setting of the instrument. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.
e. Repeat above procedures until all modes and channels were measured.
f. Record the results in the test report.

For 6dB Bandwidth Measurement :

a. Connect EUT antenna terminal to the spectrum analyzer with RF cable.
b. Spectrum analyzer setting parameters in accordance with section 3.3.
c. Set the EUT transmit continuously with maximum output power.
d. Allow trace to stabilize, 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.
e. Repeat above procedures until all modes and channels were measured.
f. Record the results in the test report.

For 99% Occupied Bandwidth Measurement :

a. Connect EUT antenna terminal to the spectrum analyzer with RF cable.
b. Spectrum analyzer setting parameters in accordance with section 3.3.
c. Set the EUT transmit continuously with maximum output power.
d. Allow trace to stabilize, use the 99% power bandwidth function to measure bandwidth.
e. Repeat above procedures until all modes and channels were measured.
f. Record the results in the test report.

3.5. Test Result

Temperature	25.3℃	Relative Humidity	56%	Test Voltage	DC 5V

26dB Bandwidth&99% Occupied Bandwidth

BAND	Test Mode	Fre (MHz)	26dB Bandwidth (MHz)		99% Occupied Bandwidth （MHz）		Calculate Power Limit (W)	Calculate Power Limit (dBm)
			Ant 1	Ant 2	Ant 1	Ant 2		
U-NII-1	IEEE 802.11a	5180	20.203	20.203	16.787	16.787		
		5200	20.260	20.029	16.787	16.845		
		5240	20.029	20.145	16.729	16.787		
	IEEE 802.11n HT20	5180	20.434	20.492	17.656	17.656		
		5200	20.376	20.434	17.656	17.656		
		5240	20.376	20.318	17.656	17.656		
	IEEE 802.11ac VHT20	5180	20.434	20.318	17.713	17.656		
		5200	20.376	20.376	17.656	17.598		
		5240	20.376	20.376	17.713	17.598		
	IEEE 802.11n HT40	5190	40.810	40.029	36.585	36.469		
		5230	40.897	40.810	36.585	36.585		
	IEEE 802.11ac VHT40	5190	40.637	40.029	36.585	36.469		
		5230	40.724	40.116	36.585	36.469		
	IEEE 802.11ac VHT80	5210	82.140	82.320	75.890	76.064		

Temperature	25.3℃	Relative Humidity	56%	Test Voltage	DC 5V

6dB Bandwidth&99% Occupied Bandwidth

BAND	Test Mode	Fre (MHz)	6dB Bandwidth (MHz)		99% Occupied Bandwidth（MHz）		6dB BW Min Limit (MHz)	Result
			Ant 1	Ant 2	Ant 1	Ant 2		
U-NII-3	IEEE 802.11a	5745	15.284	15.116	16.614	16.845	0.5	PASS
		5785	15.324	15.12	16.498	16.787	0.5	PASS
		5825	15.308	15.124	16.671	16.845	0.5	PASS
	IEEE 802.11n HT20	5745	15.116	15.120	17.656	17.713	0.5	PASS
		5785	15.120	15.116	17.713	17.713	0.5	PASS
		5825	15.316	15.124	17.656	17.656	0.5	PASS
	IEEE 802.11ac VHT20	5745	15.116	15.124	17.656	17.656	0.5	PASS
		5785	15.120	15.120	17.713	17.656	0.5	PASS
		5825	15.428	15.124	17.713	17.598	0.5	PASS
	IEEE 802.11n HT40	5755	35.305	35.115	36.585	36.469	0.5	PASS
		5795	35.120	35.295	36.585	36.585	0.5	PASS
	IEEE 802.11ac VHT40	5755	35.440	35.120	36.469	36.469	0.5	PASS
		5795	35.120	35.120	36.585	36.585	0.5	PASS
	IEEE 802.11ac VHT80	5775	76.280	76.220	75.890	75.890	0.5	PASS

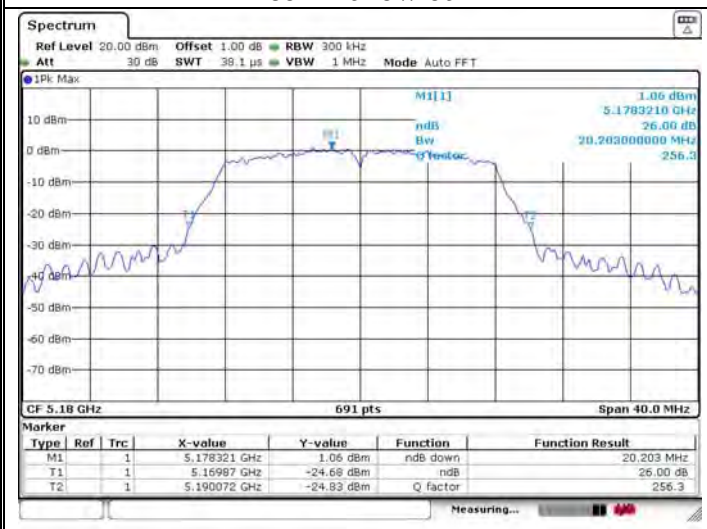
Note :

For Band U-NII-2A and U-NII-2C,the maximum conducted output power limit is 250mw or 11+10×Log B, which is lesser,where B is the 26dB Bandwidth in MHz.So in this section,the maximum conducted output power limit can calculate with 26dB Bandwidth.

3.6. Test Result

U-NII-1 IEEE 802.11a 5180MHz_Ant 1

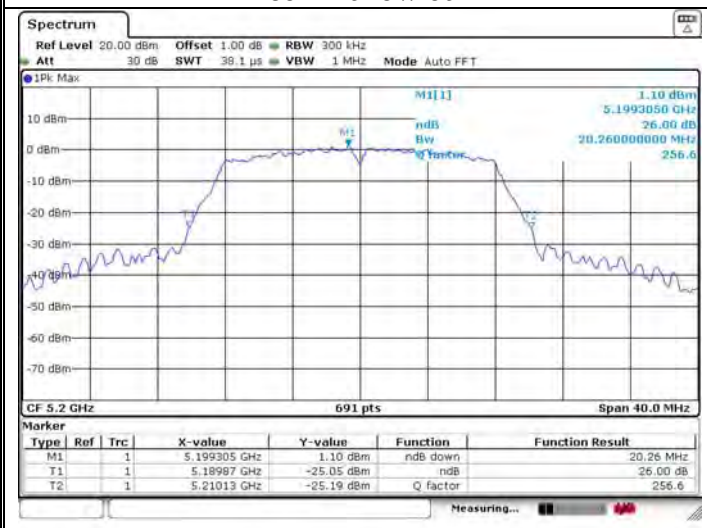
26dB Bandwidth



99% Occupied Bandwidth

U-NII-1 IEEE 802.11a 5200MHz_Ant 1

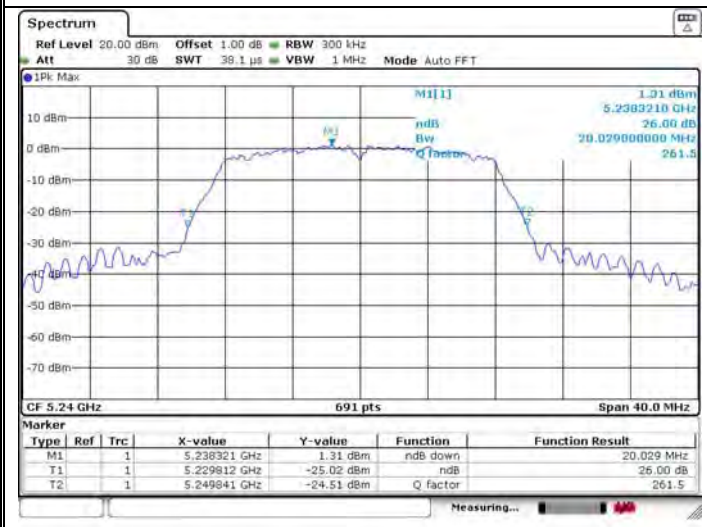
26dB Bandwidth



99% Occupied Bandwidth

U-NII-1 IEEE 802.11a 5240MHz_Ant 1

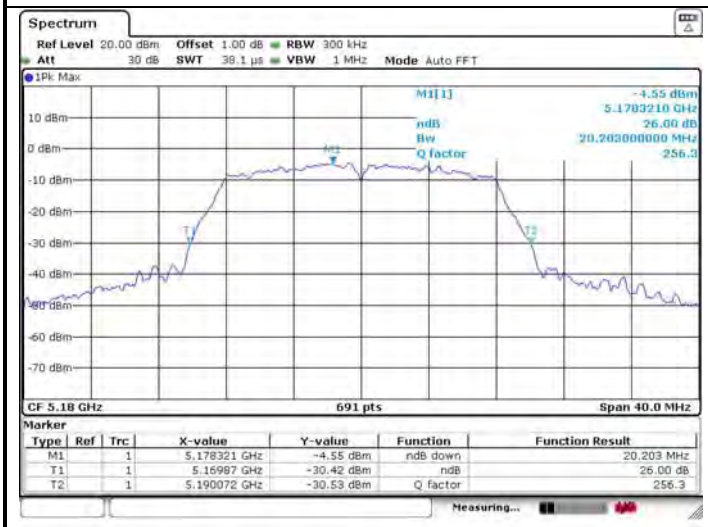
26dB Bandwidth



99% Occupied Bandwidth

U-NII-1 IEEE 802.11a 5180MHz_Ant 2

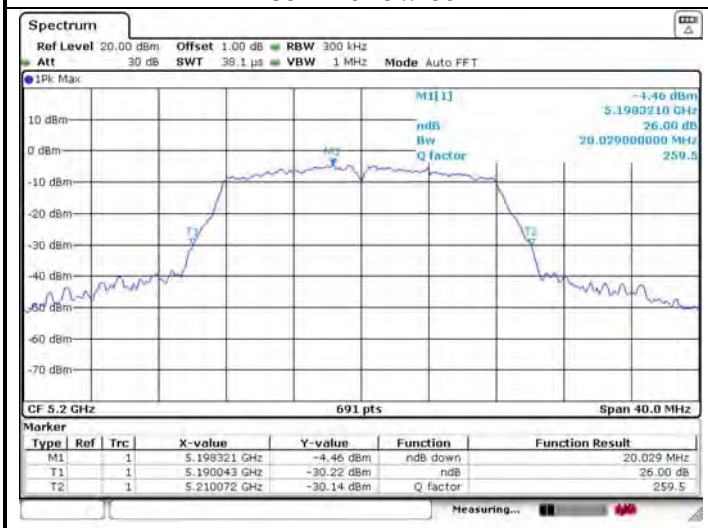
26dB Bandwidth



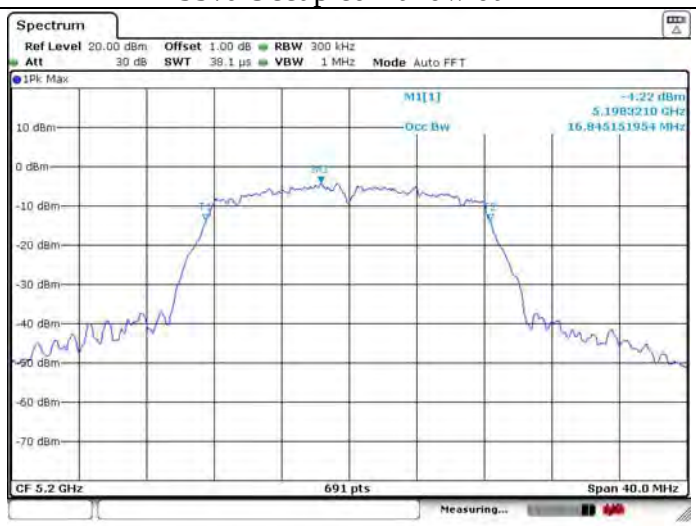
99% Occupied Bandwidth

U-NII-1 IEEE 802.11a 5200MHz_Ant 2

26dB Bandwidth

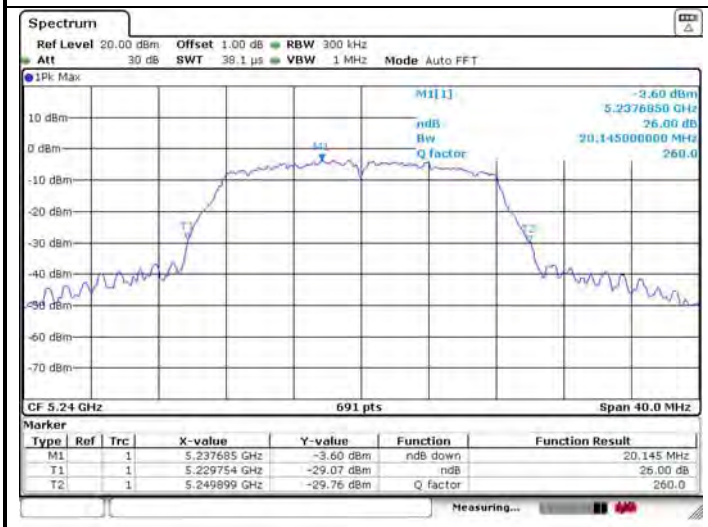


99% Occupied Bandwidth



U-NII-1 IEEE 802.11a 5240MHz_Ant 2

26dB Bandwidth



99% Occupied Bandwidth

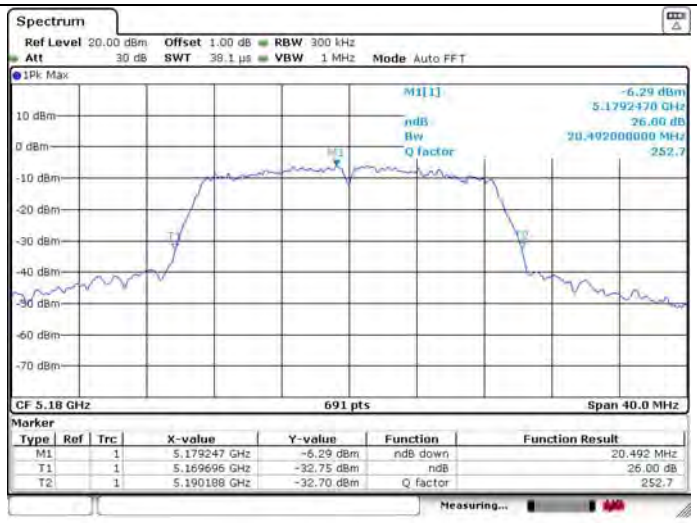
U-NII-1 IEEE 802.11n HT20 5180MHz_Ant 1

26dB Bandwidth

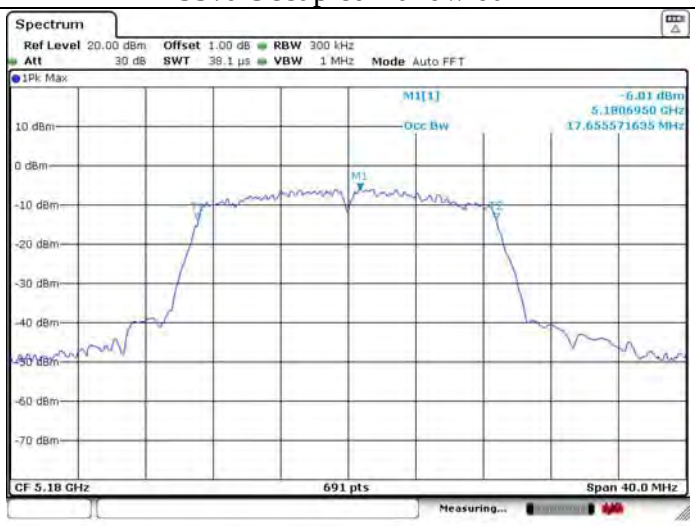
99% Occupied Bandwidth

U-NII-1 IEEE 802.11n HT20 5180MHz_Ant 2

26dB Bandwidth

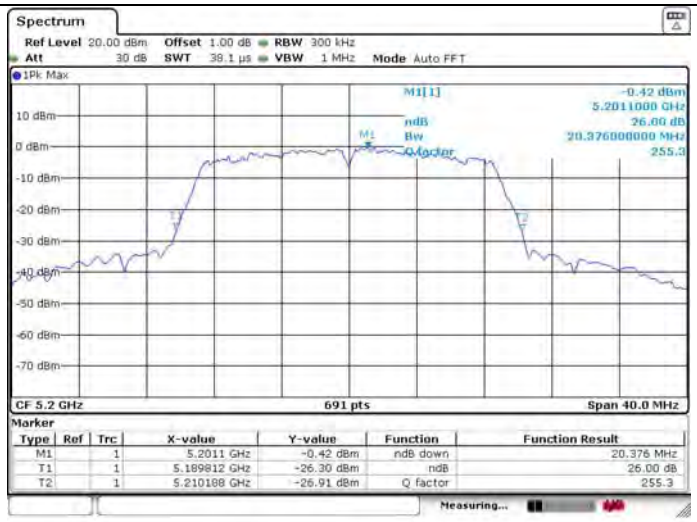


99% Occupied Bandwidth



U-NII-1 IEEE 802.11n HT20 5200MHz_Ant 1

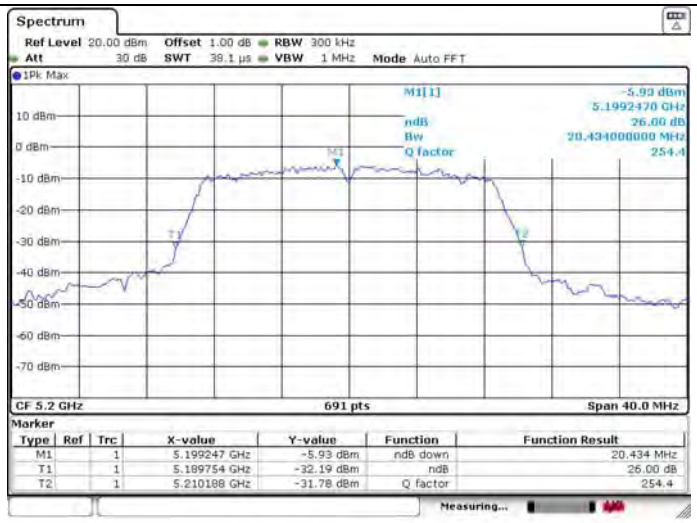
26dB Bandwidth



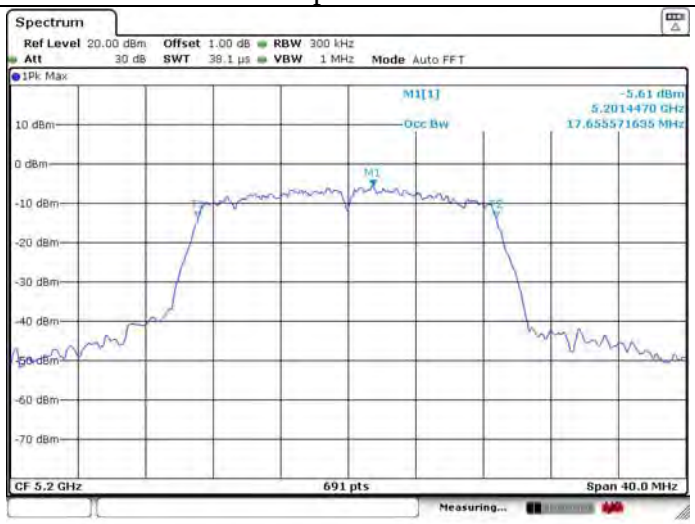
99% Occupied Bandwidth

U-NII-1 IEEE 802.11n HT20 5200MHz_Ant 2

26dB Bandwidth

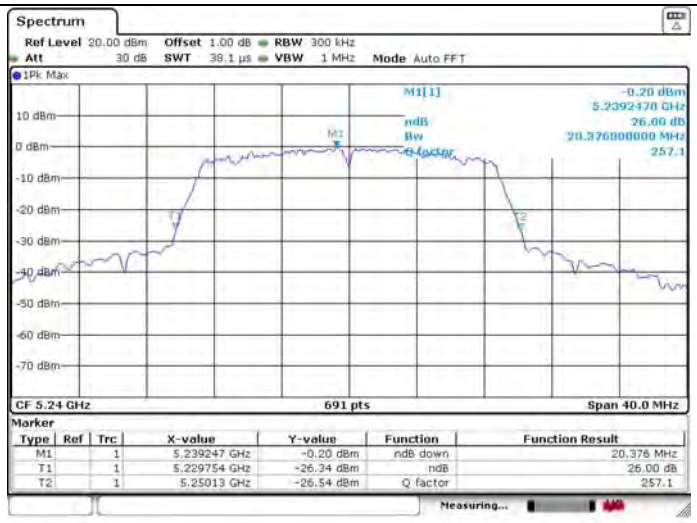


99% Occupied Bandwidth

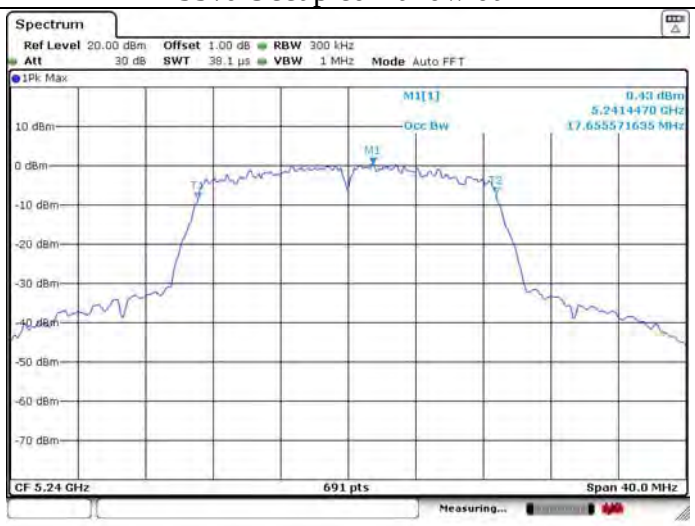


U-NII-1 IEEE 802.11n HT20 5240MHz_Ant 1

26dB Bandwidth

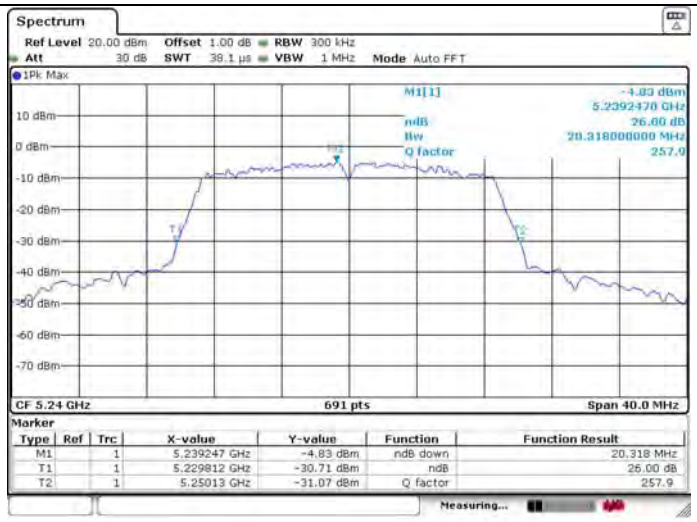


99% Occupied Bandwidth



U-NII-1 IEEE 802.11n HT20 5240MHz_Ant 2

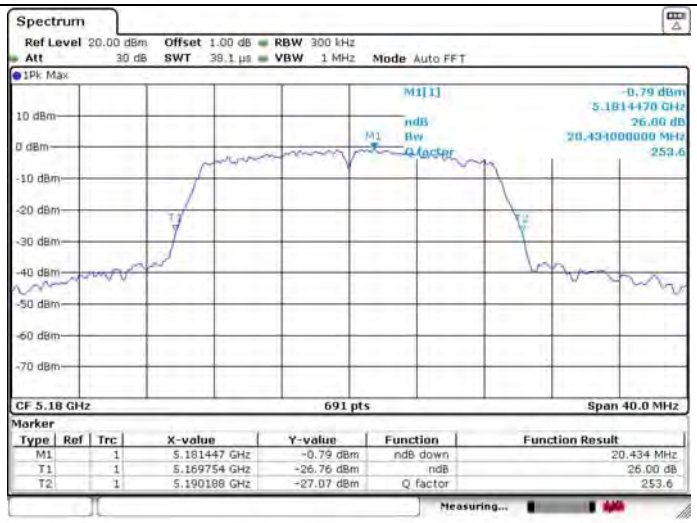
26dB Bandwidth



99% Occupied Bandwidth

U-NII-1 IEEE 802.11ac VHT20 5180MHz_Ant 1

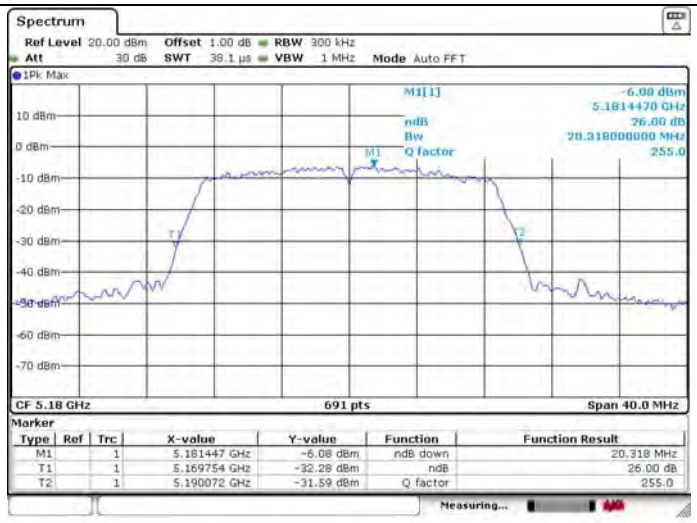
26dB Bandwidth



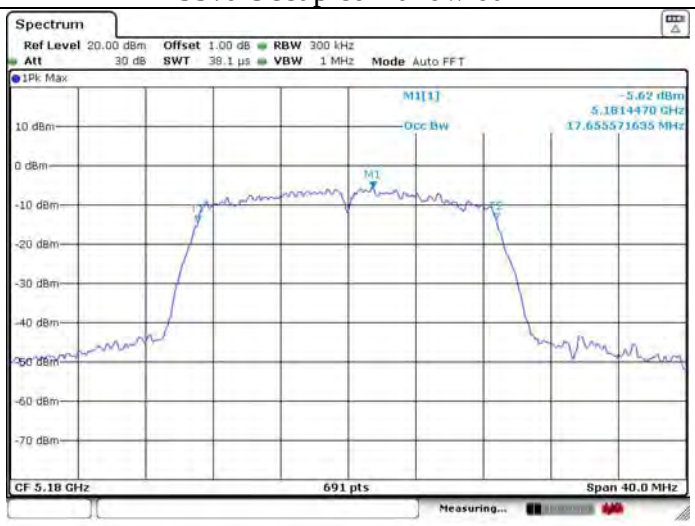
99% Occupied Bandwidth

U-NII-1 IEEE 802.11ac VHT20 5180MHz_Ant 2

26dB Bandwidth

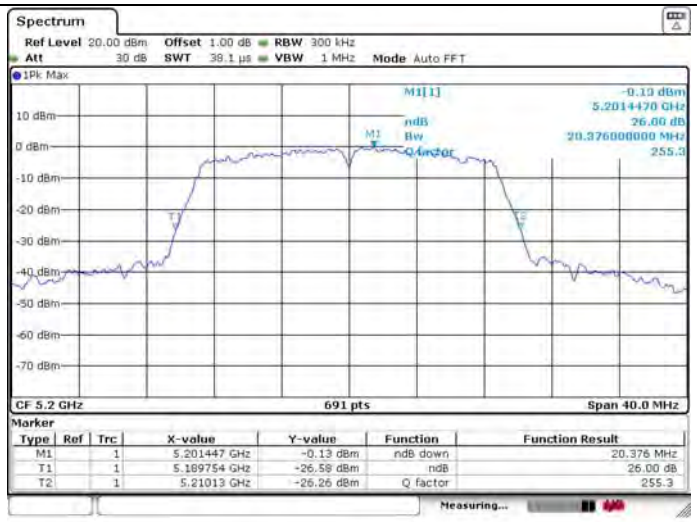


99% Occupied Bandwidth



U-NII-1 IEEE 802.11ac VHT20 5200MHz_Ant 1

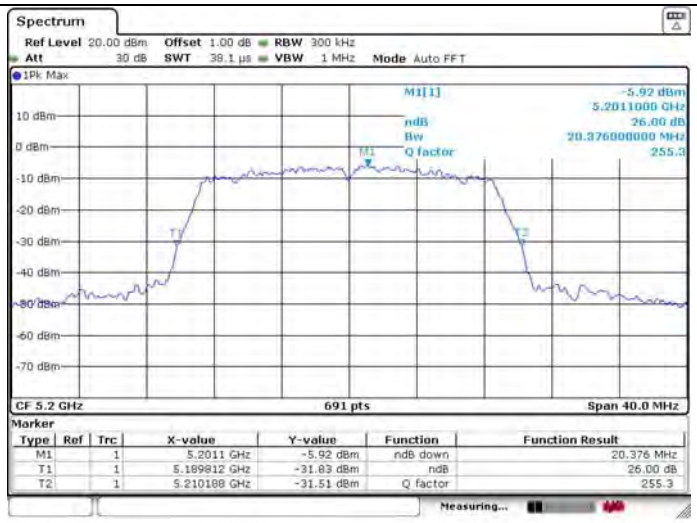
26dB Bandwidth



99% Occupied Bandwidth

U-NII-1 IEEE 802.11ac VHT20 5200MHz_Ant 2

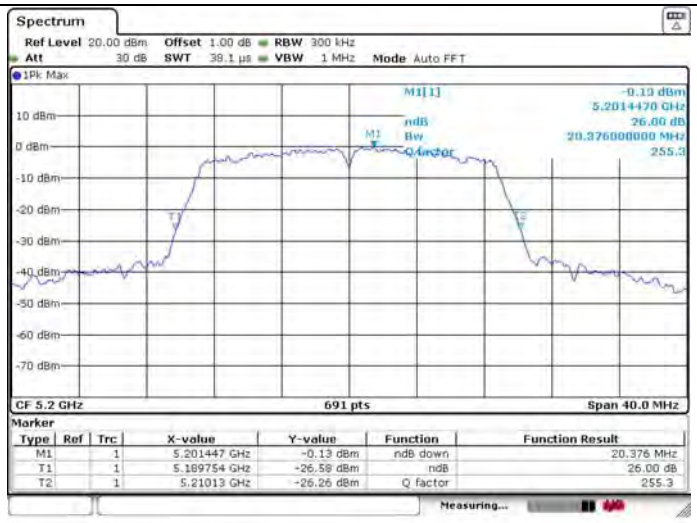
26dB Bandwidth



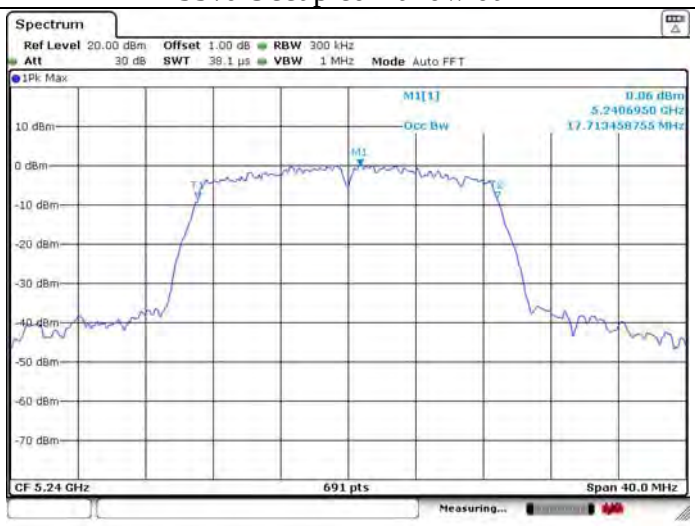
99% Occupied Bandwidth

U-NII-1 IEEE 802.11ac VHT20 5240MHz_Ant 1

26dB Bandwidth

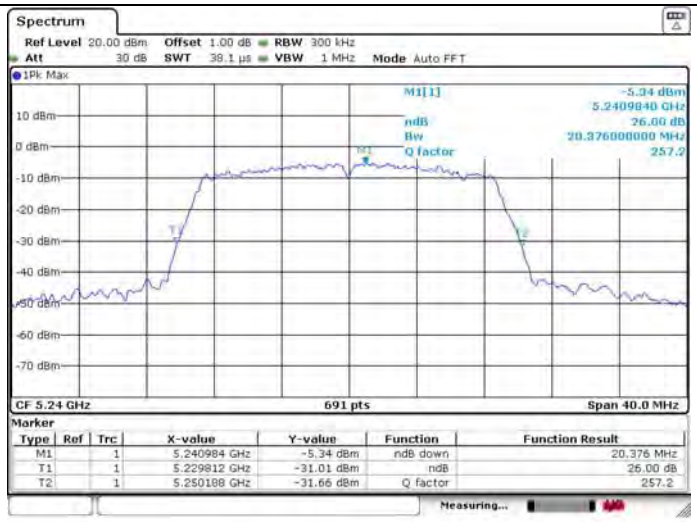


99% Occupied Bandwidth



U-NII-1 IEEE 802.11ac VHT20 5240MHz_Ant 2

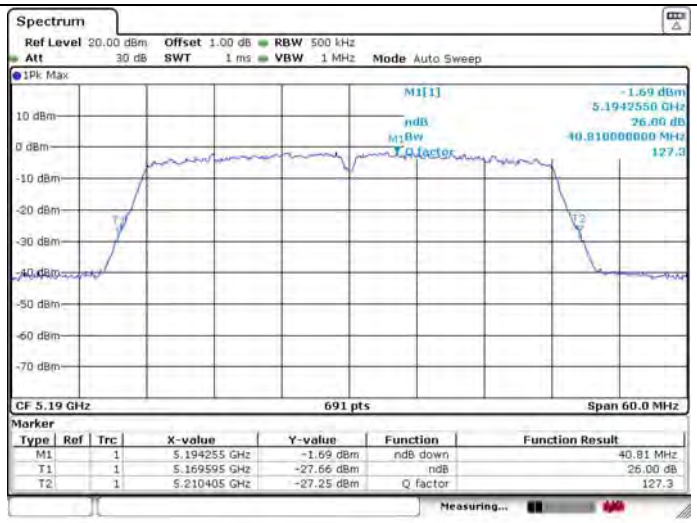
26dB Bandwidth



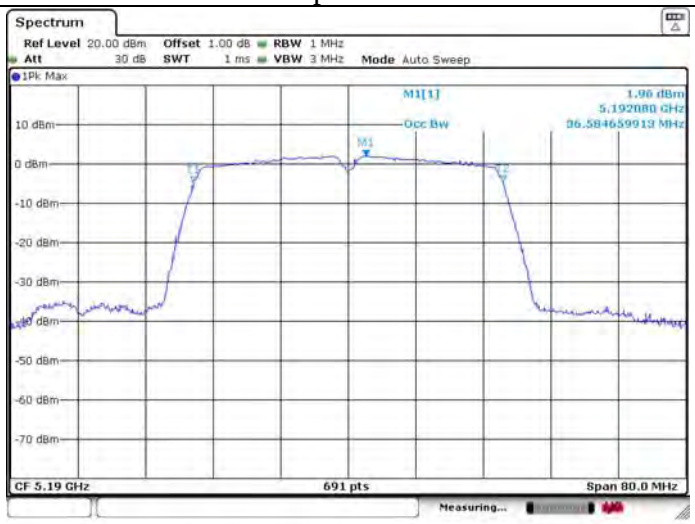
99% Occupied Bandwidth

U-NII-1 IEEE 802.11n HT40 5190MHz_Ant 1

26dB Bandwidth

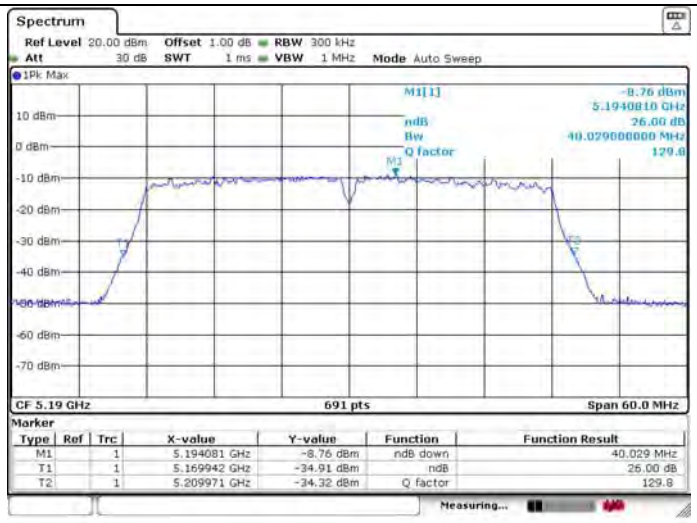


99% Occupied Bandwidth

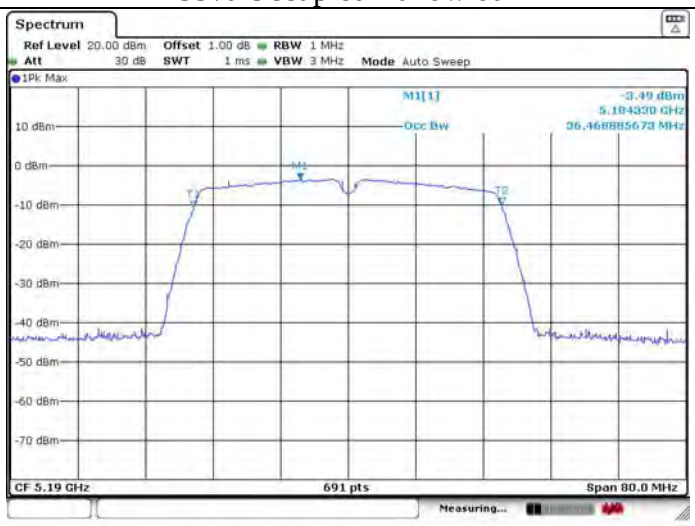


U-NII-1 IEEE 802.11n HT40 5190MHz_Ant 2

26dB Bandwidth

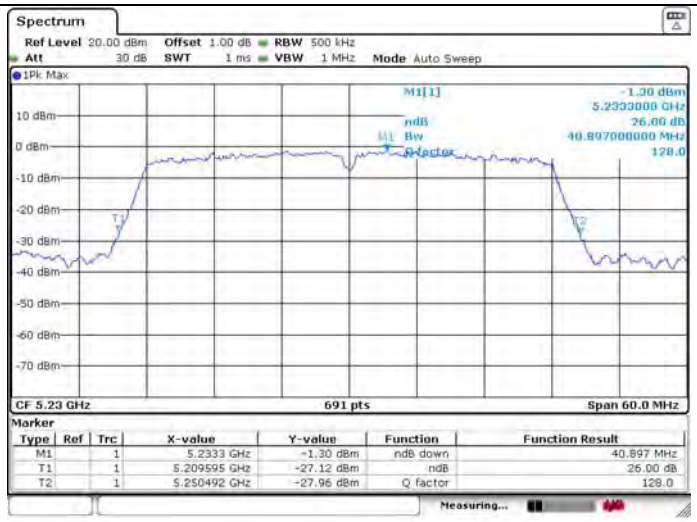


99% Occupied Bandwidth

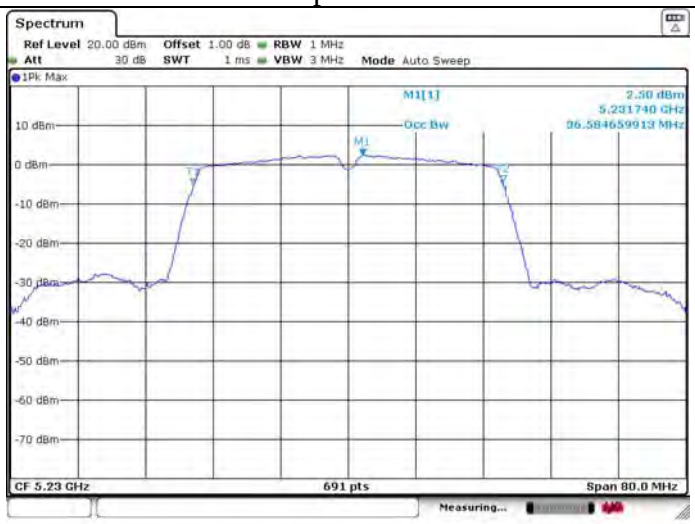


U-NII-1 IEEE 802.11n HT40 5230MHz_Ant 1

26dB Bandwidth

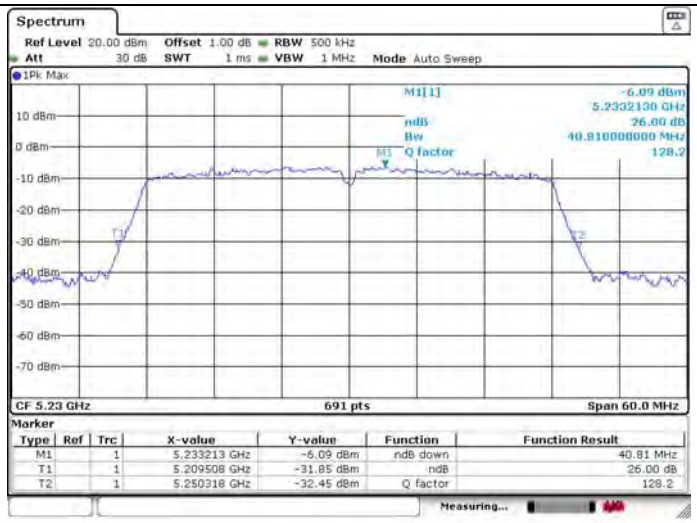


99% Occupied Bandwidth



U-NII-1 IEEE 802.11n HT40 5230MHz_Ant 2

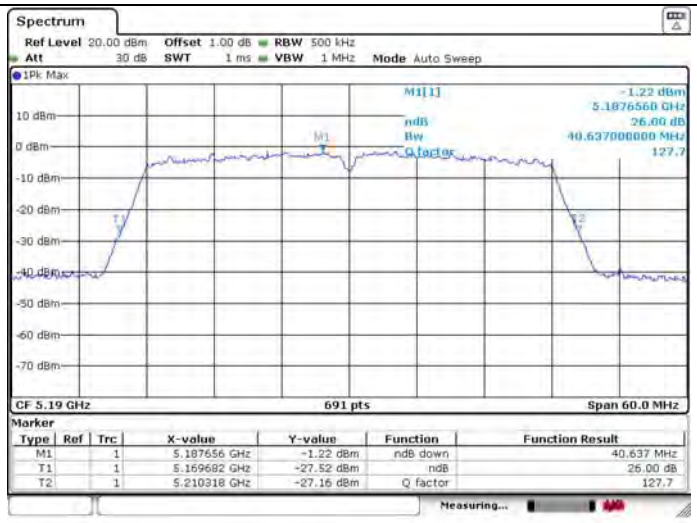
26dB Bandwidth



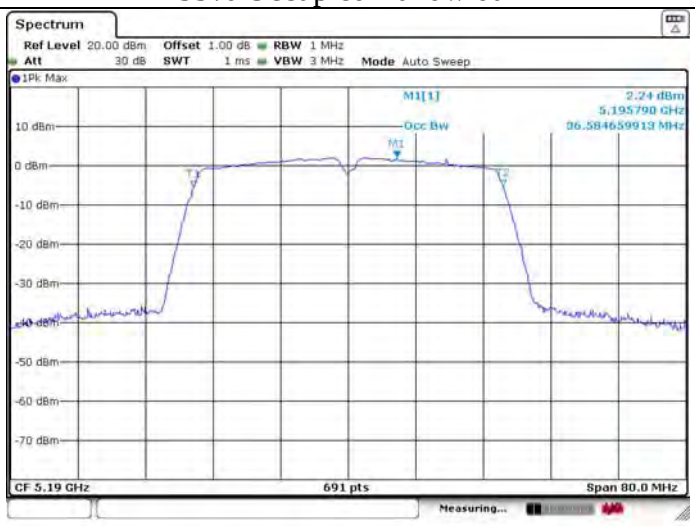
99% Occupied Bandwidth

U-NII-1 IEEE 802.11ac VHT40 5190MHz_Ant 1

26dB Bandwidth

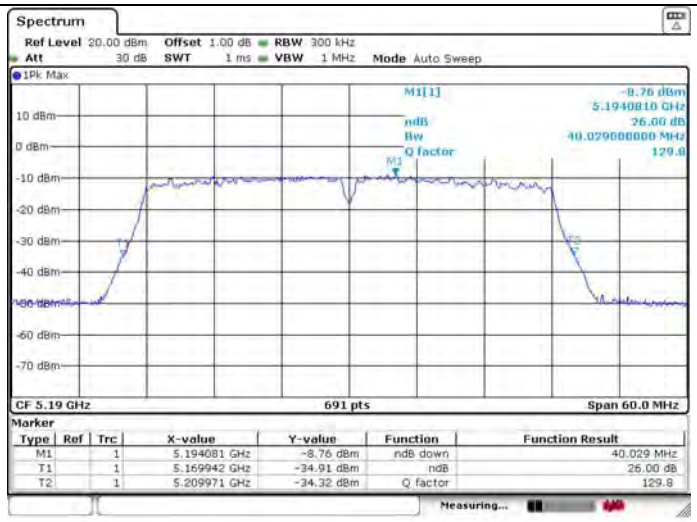


99% Occupied Bandwidth

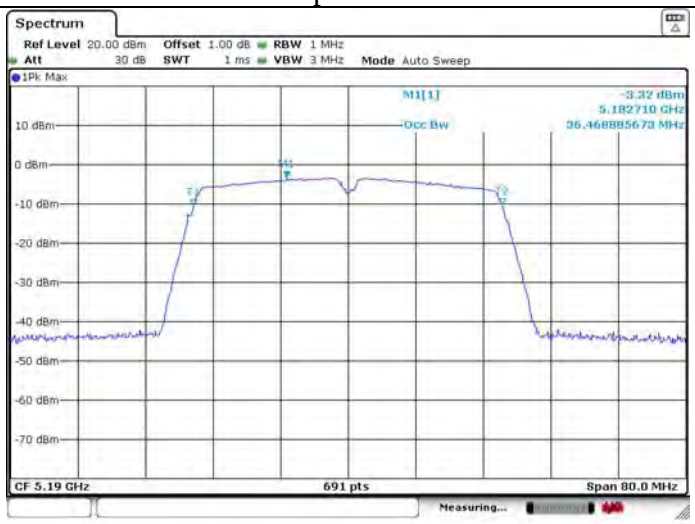


U-NII-1 IEEE 802.11ac VHT40 5190MHz_Ant 2

26dB Bandwidth

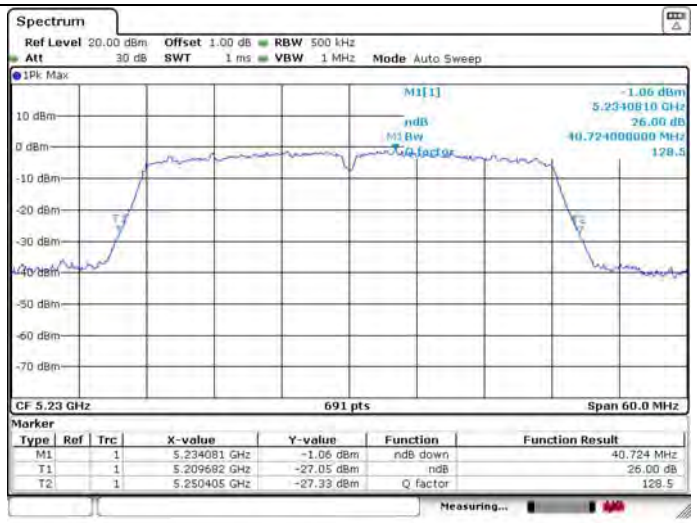


99% Occupied Bandwidth

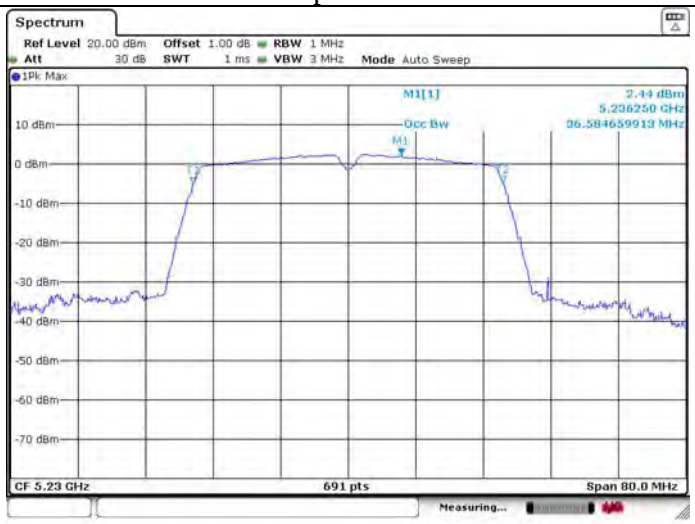


U-NII-1 IEEE 802.11ac VHT40 5230MHz_Ant 1

26dB Bandwidth

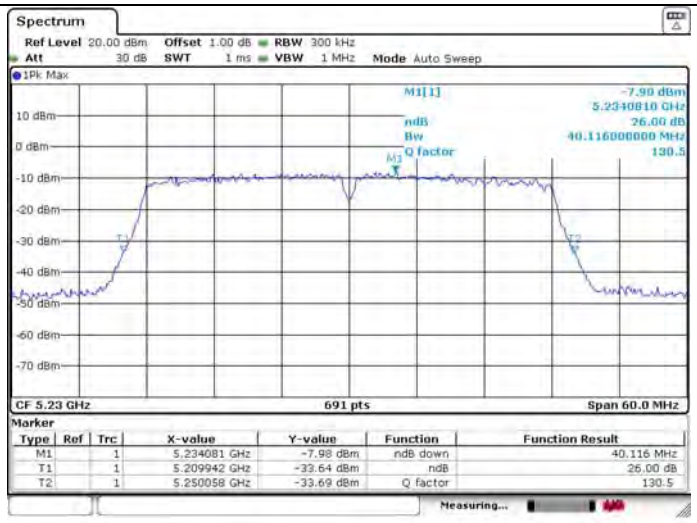


99% Occupied Bandwidth



U-NII-1 IEEE 802.11ac VHT40 5230MHz_Ant 2

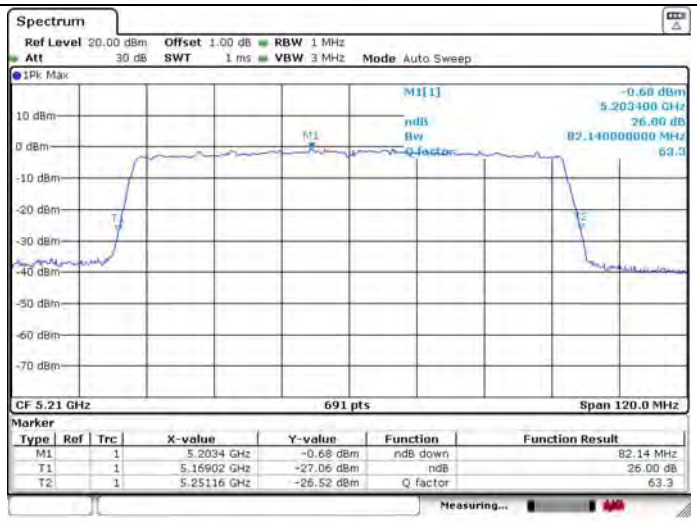
26dB Bandwidth



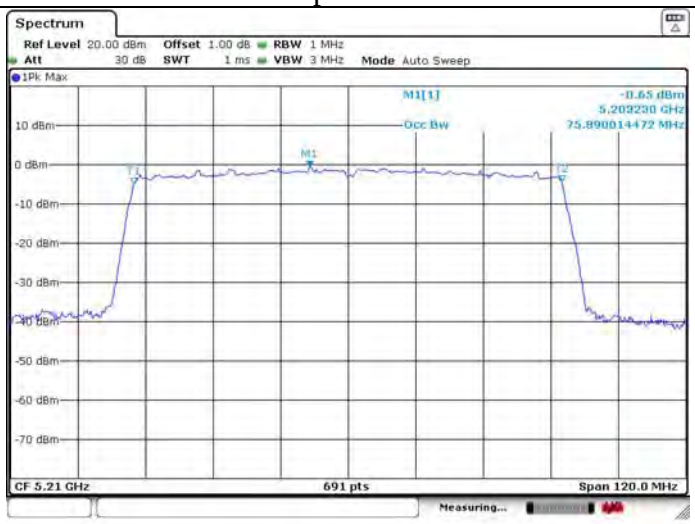
99% Occupied Bandwidth

U-NII-1 IEEE 802.11ac VHT80 5210MHz_Ant 1

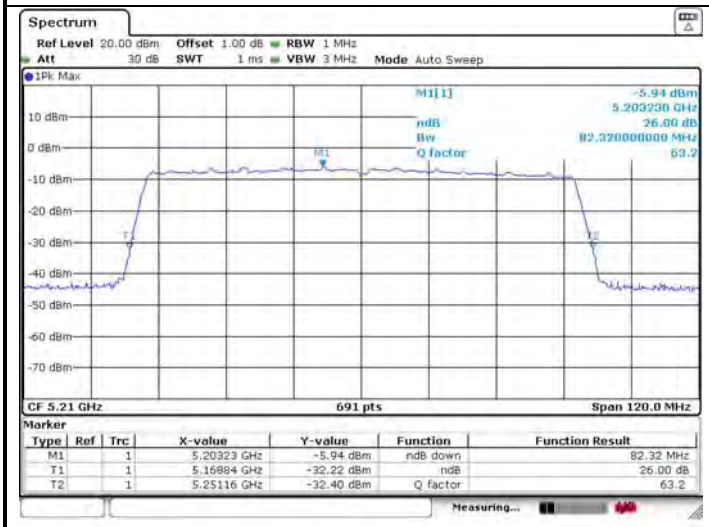
26dB Bandwidth

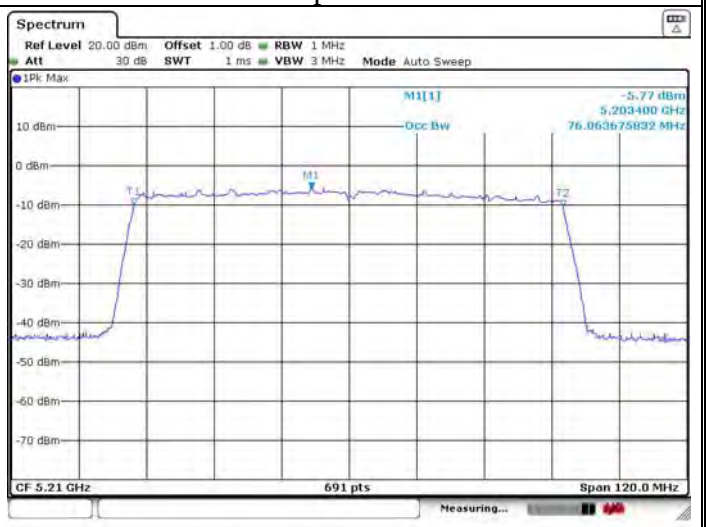


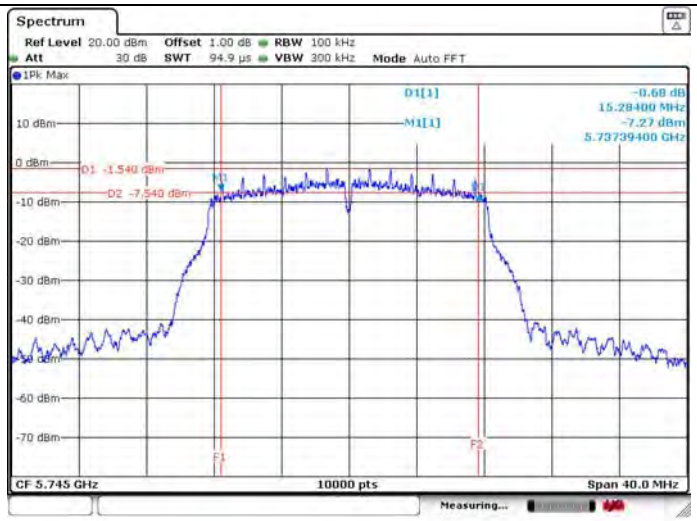
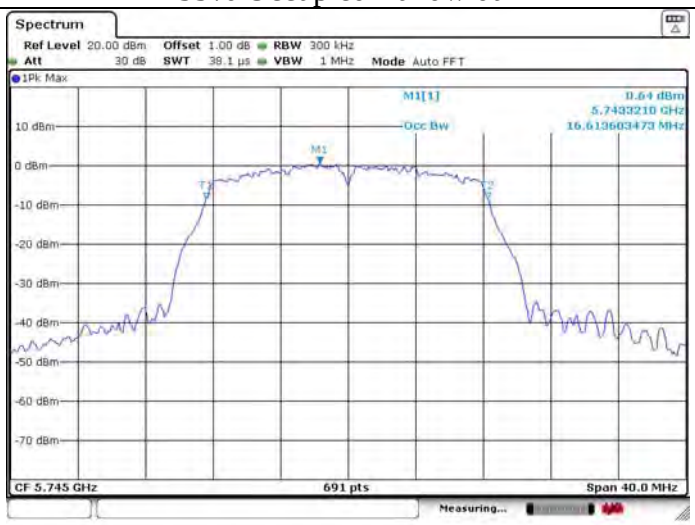
99% Occupied Bandwidth

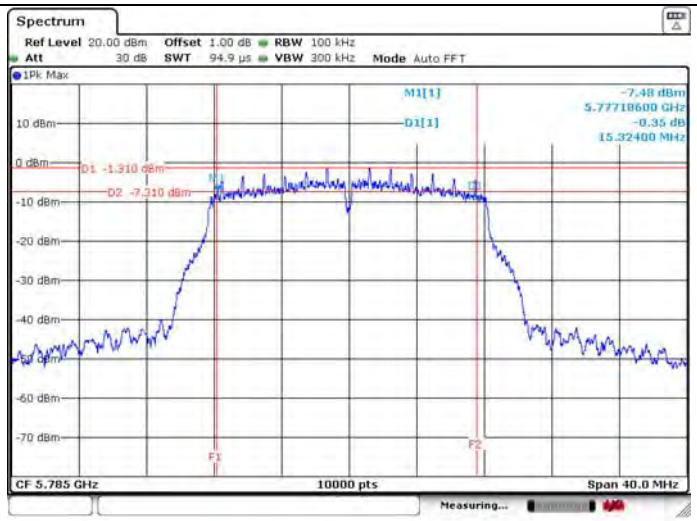


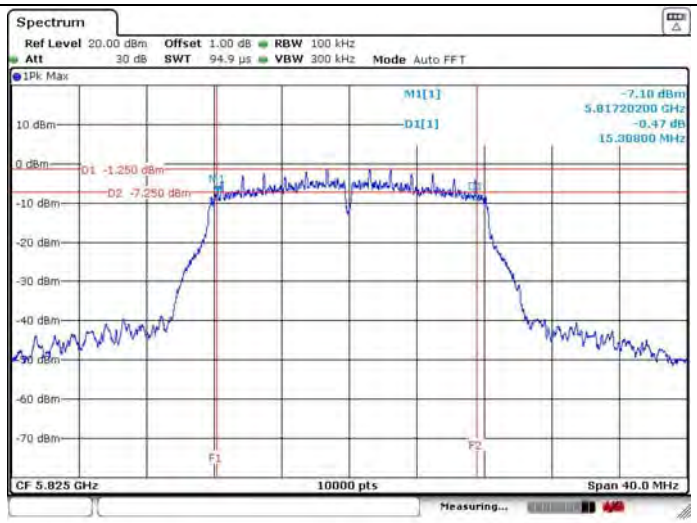
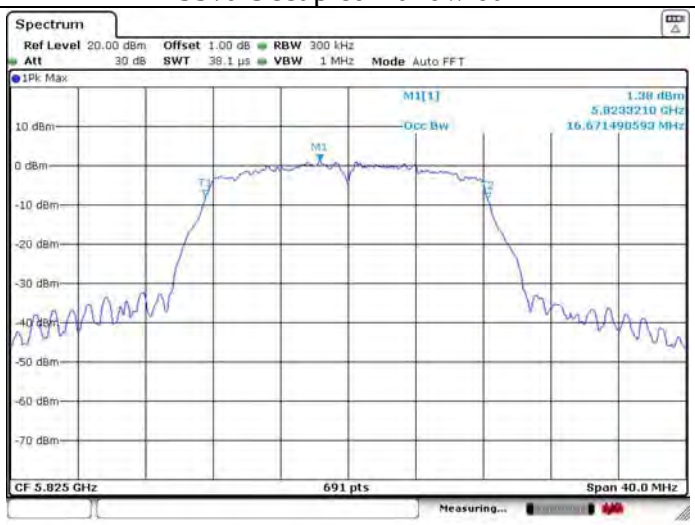
U-NII-1 IEEE 802.11ac VHT80 5210MHz_Ant 2	
26dB Bandwidth	99% Occupied Bandwidth





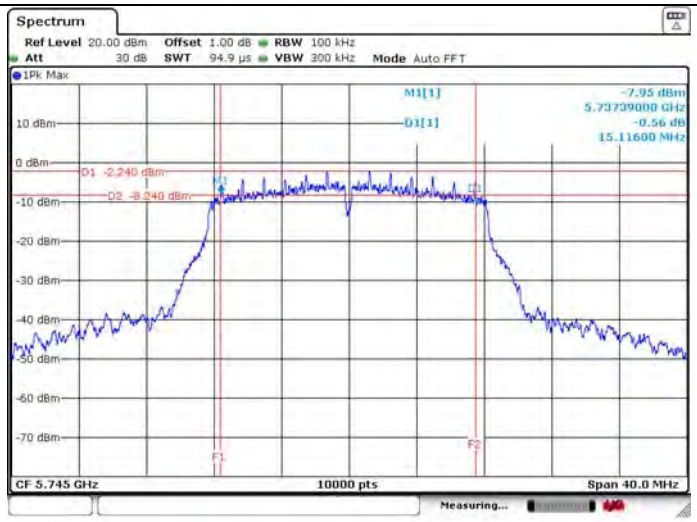
U-NII-3 IEEE 802.11a 5745MHz_Ant 1	
6dB Bandwidth	99% Occupied Bandwidth
	

U-NII-3 IEEE 802.11a 5785MHz_Ant 1	
6dB Bandwidth	99% Occupied Bandwidth
	

U-NII-3 IEEE 802.11a 5825MHz_Ant 1	
6dB Bandwidth	99% Occupied Bandwidth
	

U-NII-3 IEEE 802.11a 5745MHz_Ant 2

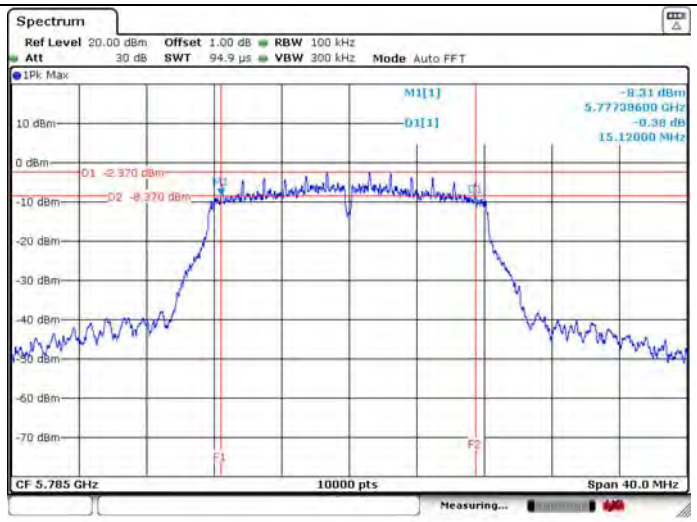
6dB Bandwidth



99% Occupied Bandwidth

U-NII-3 IEEE 802.11a 5785MHz_Ant 2

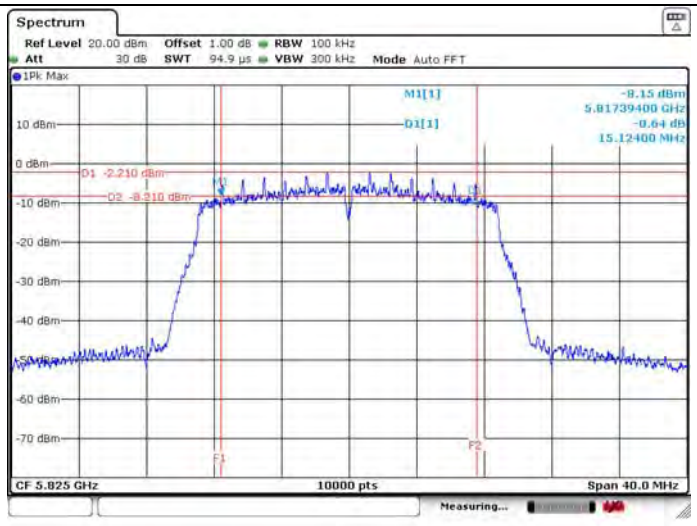
6dB Bandwidth



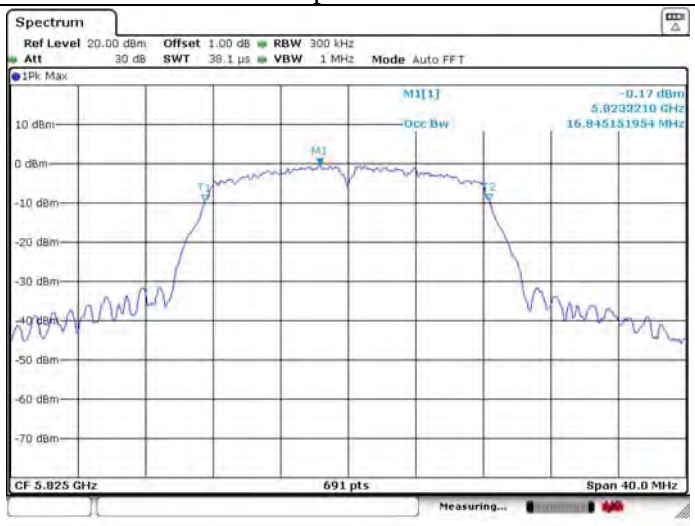
99% Occupied Bandwidth

U-NII-3 IEEE 802.11a 5825MHz_Ant 2

6dB Bandwidth

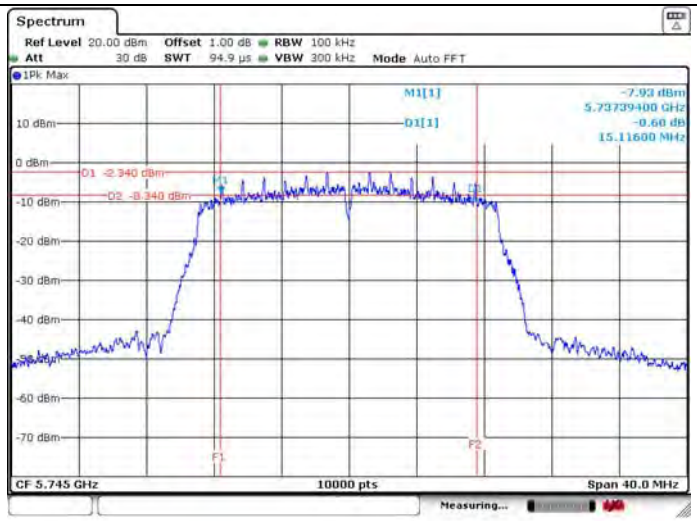


99% Occupied Bandwidth

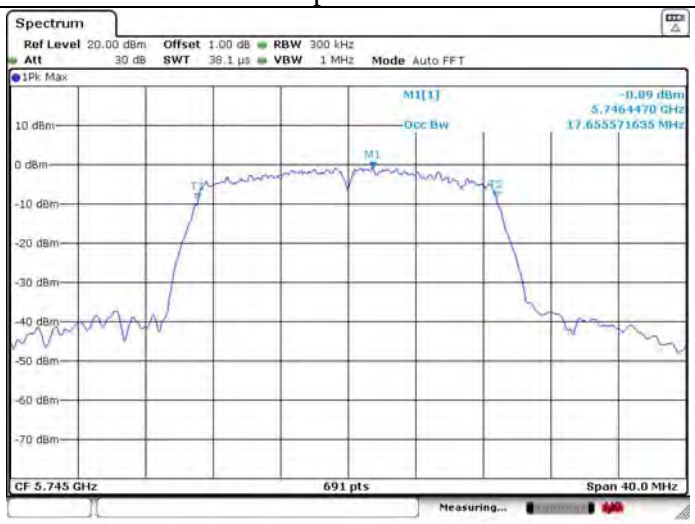


U-NII-3 IEEE 802.11n HT20 5745MHz_Ant 1

6dB Bandwidth

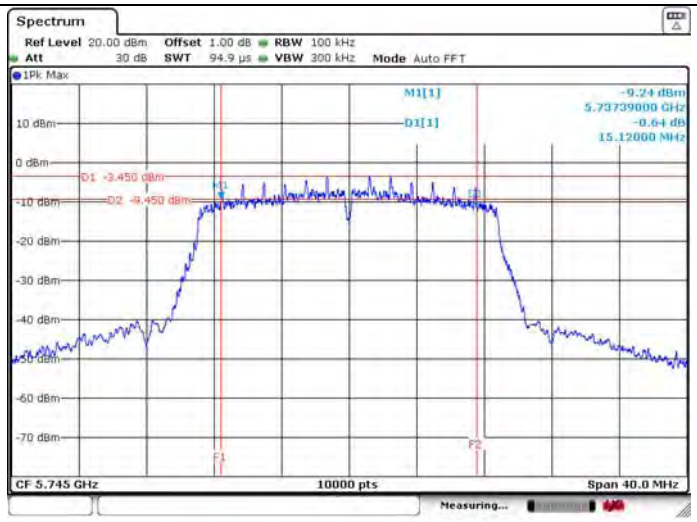


99% Occupied Bandwidth



U-NII-3 IEEE 802.11n HT20 5745MHz_Ant 2

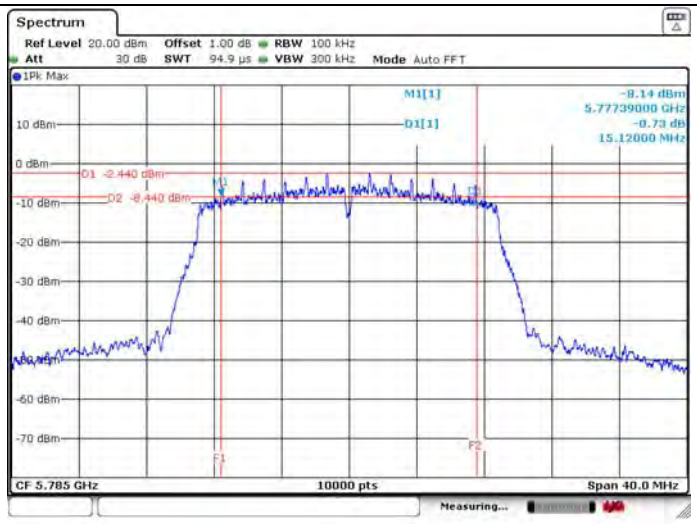
6dB Bandwidth



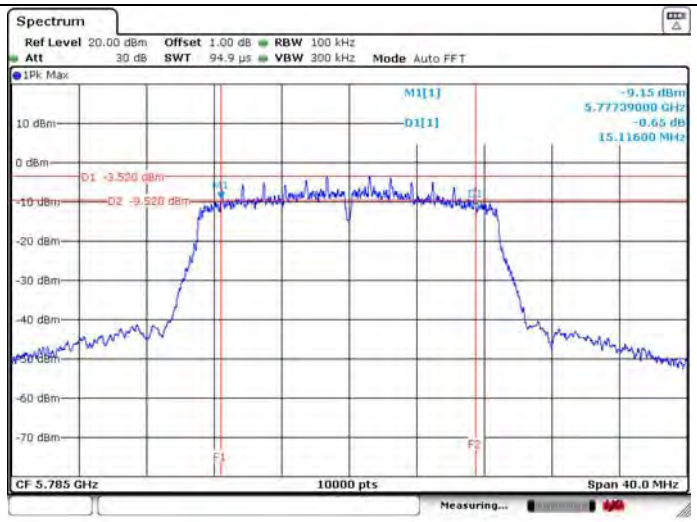
99% Occupied Bandwidth

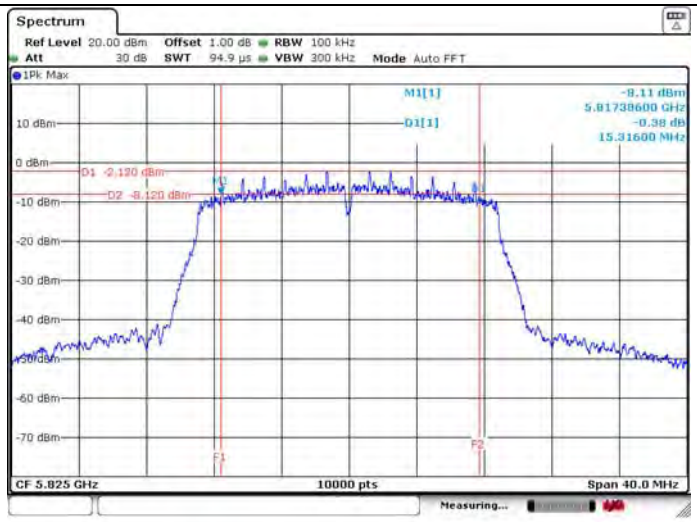
U-NII-3 IEEE 802.11n HT20 5785MHz_Ant 1

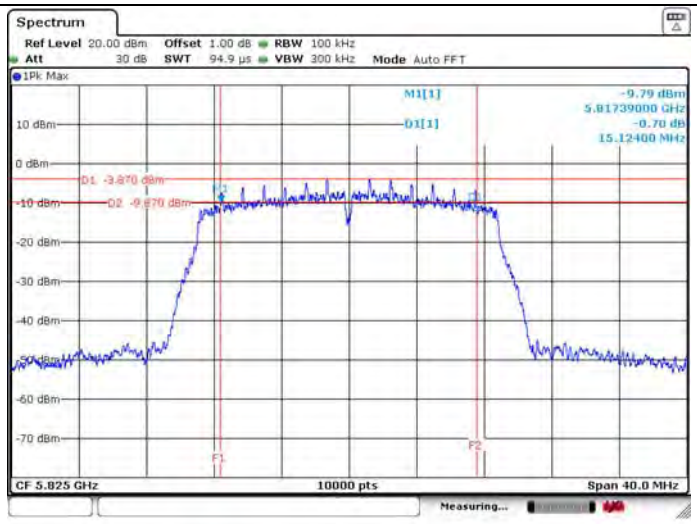
6dB Bandwidth

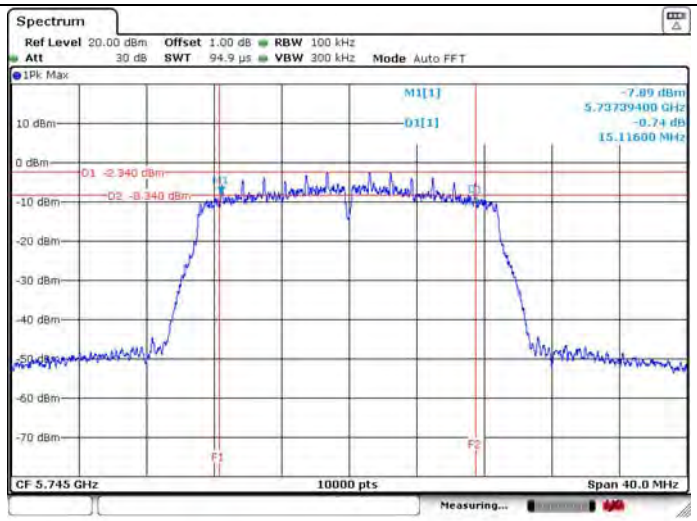


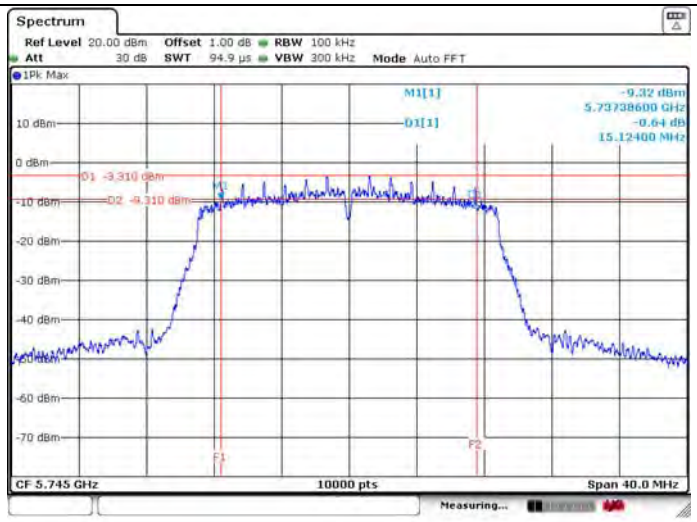
99% Occupied Bandwidth

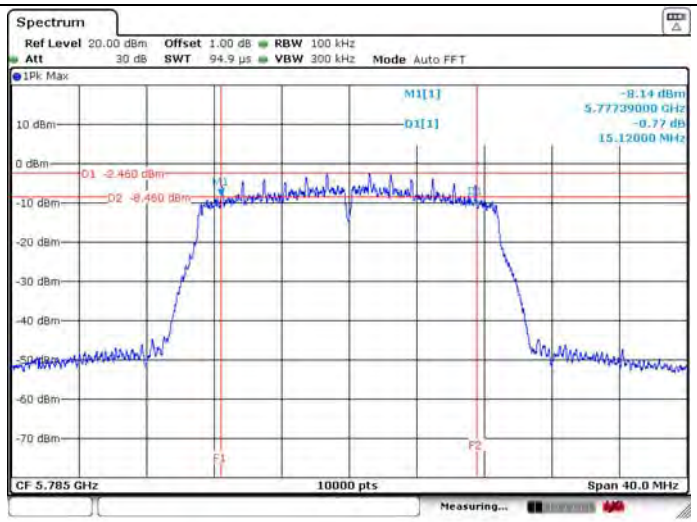
U-NII-3 IEEE 802.11n HT20 5785MHz_Ant 2	
6dB Bandwidth	99% Occupied Bandwidth
	

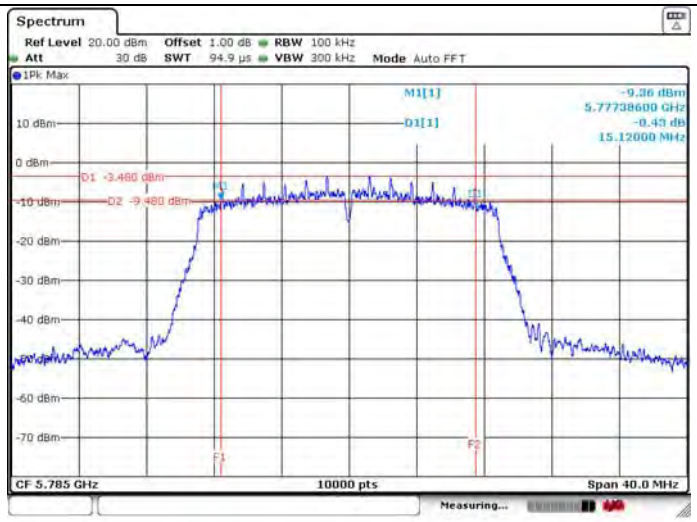
U-NII-3 IEEE 802.11n HT20 5825MHz_Ant 1	
6dB Bandwidth	99% Occupied Bandwidth
	

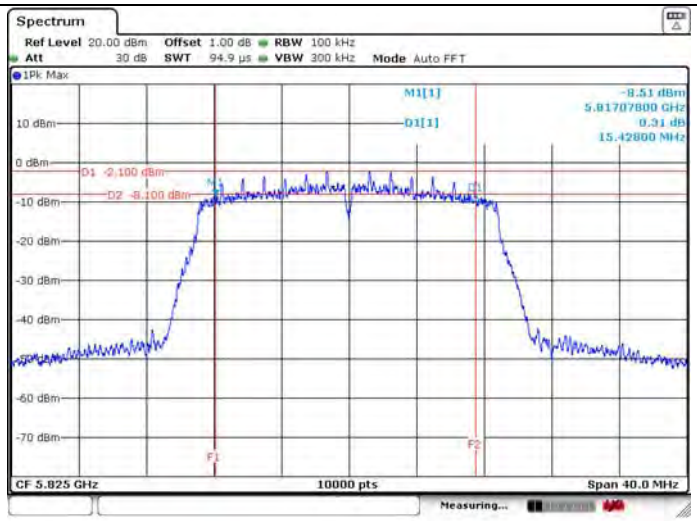
U-NII-3 IEEE 802.11n HT20 5825MHz_Ant 2	
6dB Bandwidth	99% Occupied Bandwidth
	

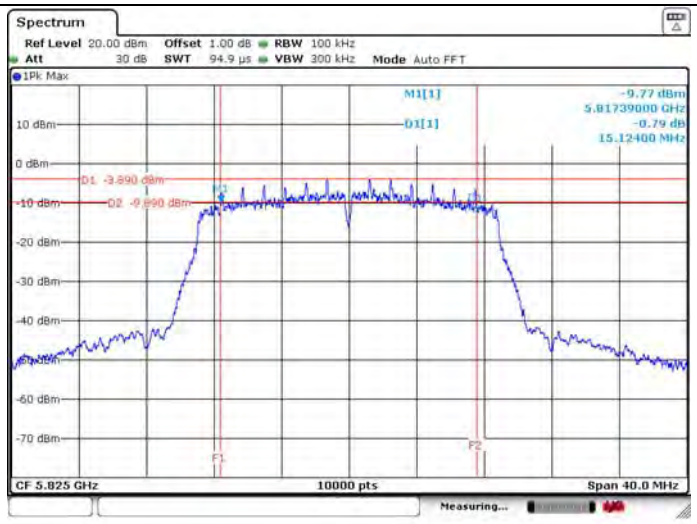
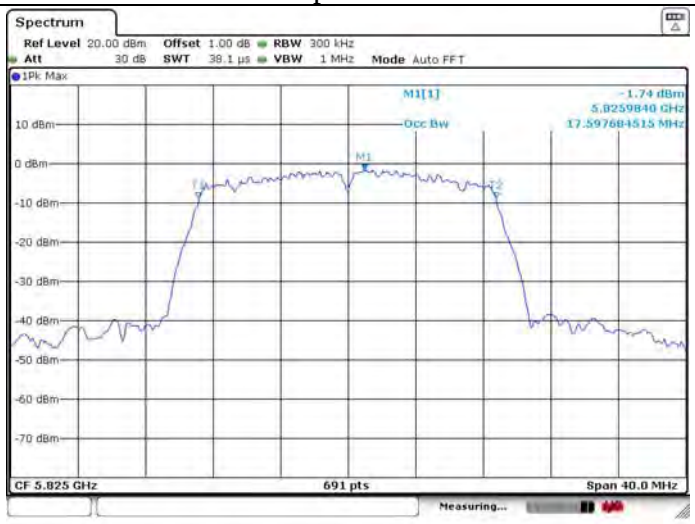
U-NII-3 IEEE 802.11ac VHT20 5745MHz_Ant 1	
6dB Bandwidth	99% Occupied Bandwidth
	

U-NII-3 IEEE 802.11ac VHT20 5745MHz_Ant 2	
6dB Bandwidth	99% Occupied Bandwidth
	

U-NII-3 IEEE 802.11ac VHT20 5785MHz_Ant 1	
6dB Bandwidth	99% Occupied Bandwidth
	

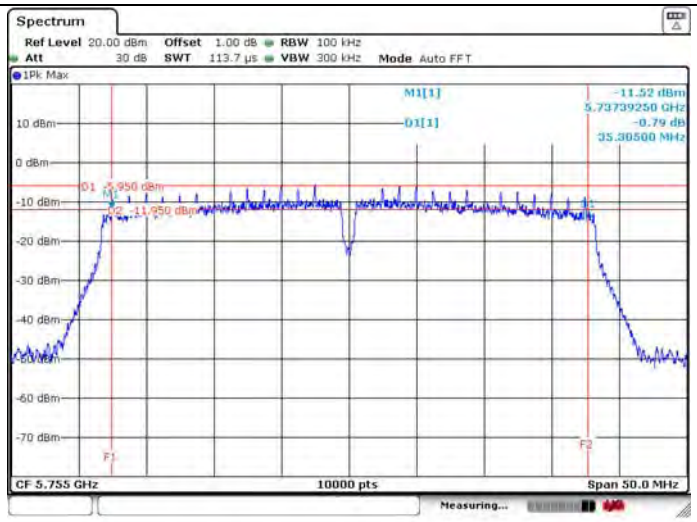
U-NII-3 IEEE 802.11ac VHT20 5785MHz_Ant 2	
6dB Bandwidth	99% Occupied Bandwidth
	

U-NII-3 IEEE 802.11ac VHT20 5825MHz_Ant 1	
6dB Bandwidth	99% Occupied Bandwidth
	

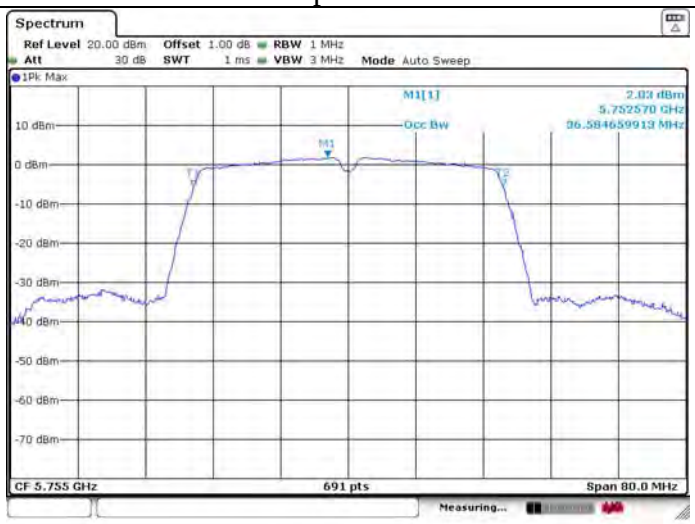
U-NII-3 IEEE 802.11ac VHT20 5825MHz_Ant 2	
6dB Bandwidth	99% Occupied Bandwidth
	

U-NII-3 IEEE 802.11n HT40 5755MHz_Ant 1

6dB Bandwidth

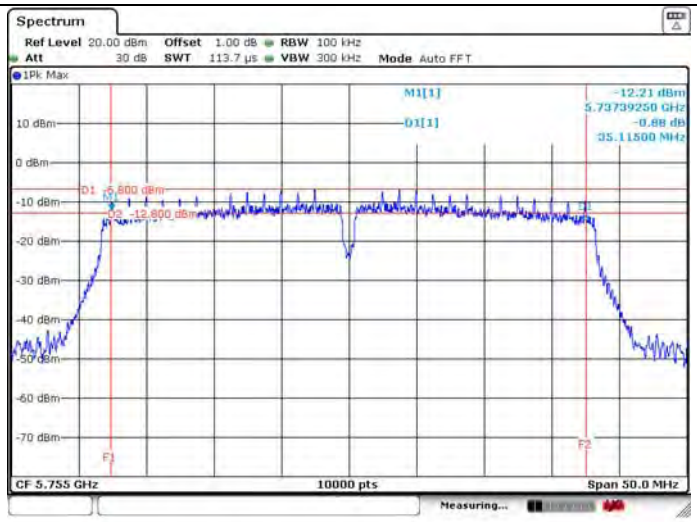


99% Occupied Bandwidth

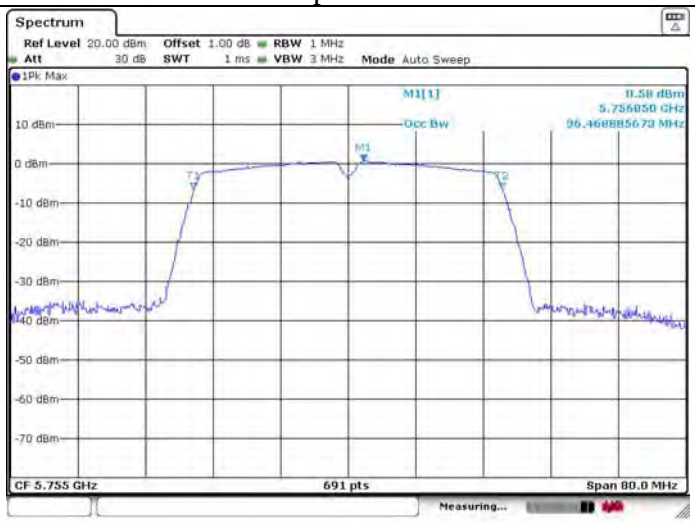


U-NII-3 IEEE 802.11n HT40 5755MHz_Ant 2

6dB Bandwidth

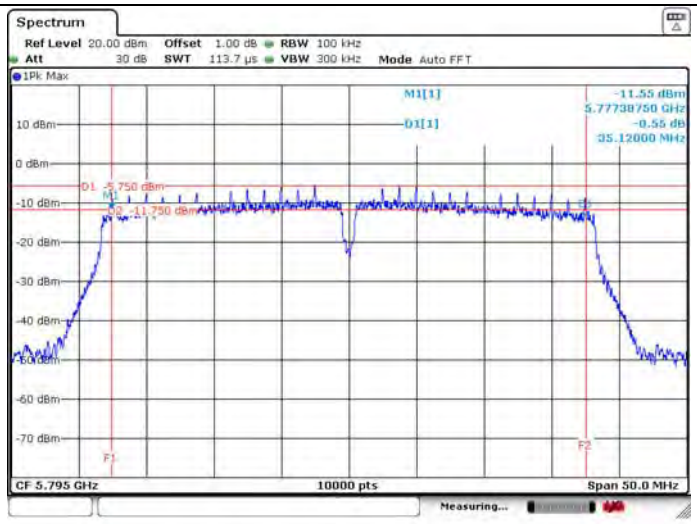


99% Occupied Bandwidth

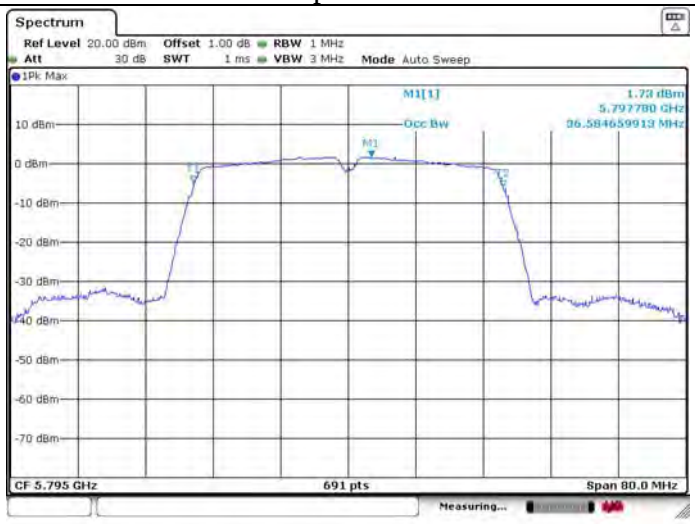


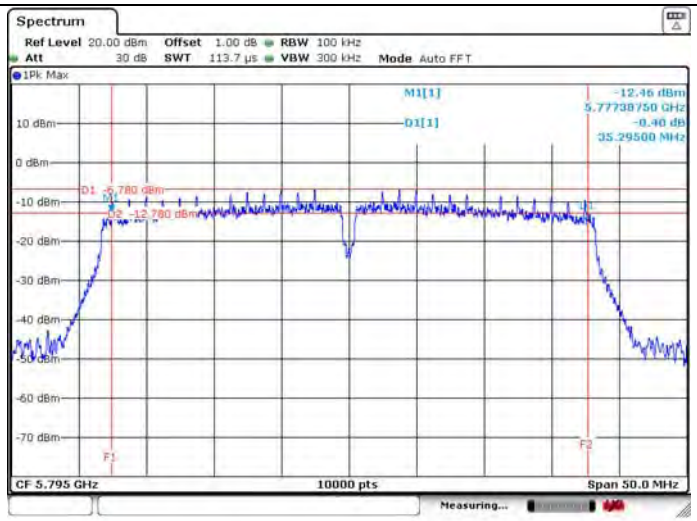
U-NII-3 IEEE 802.11n HT40 5795MHz_Ant 1

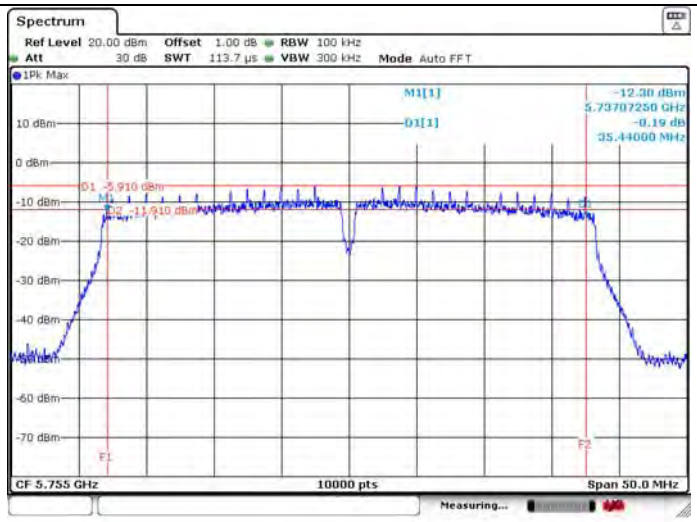
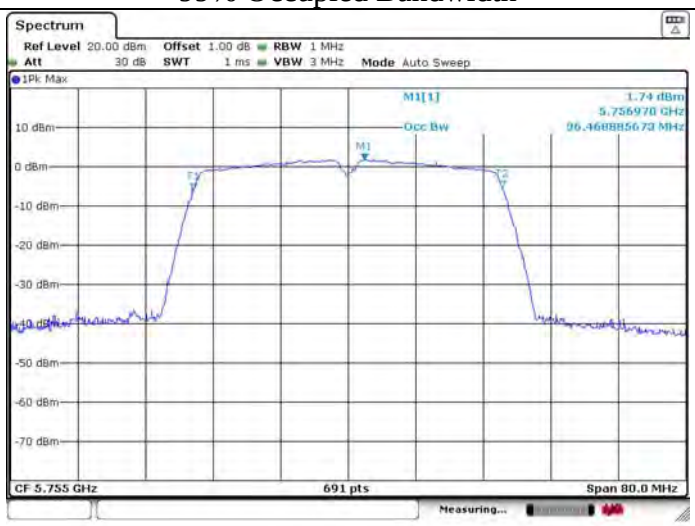
6dB Bandwidth

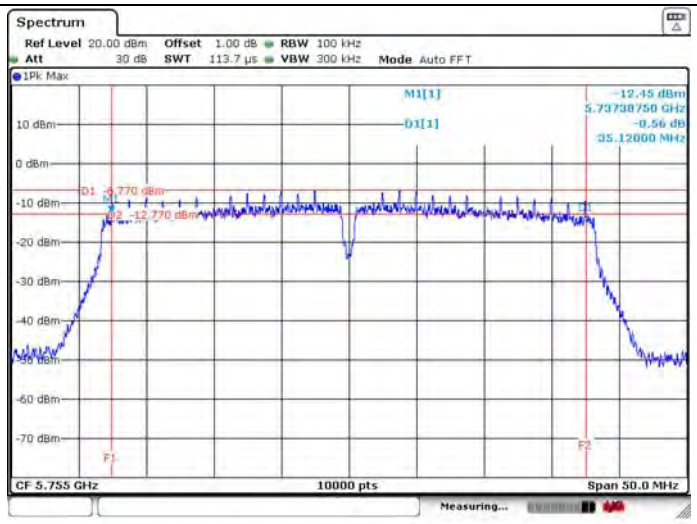
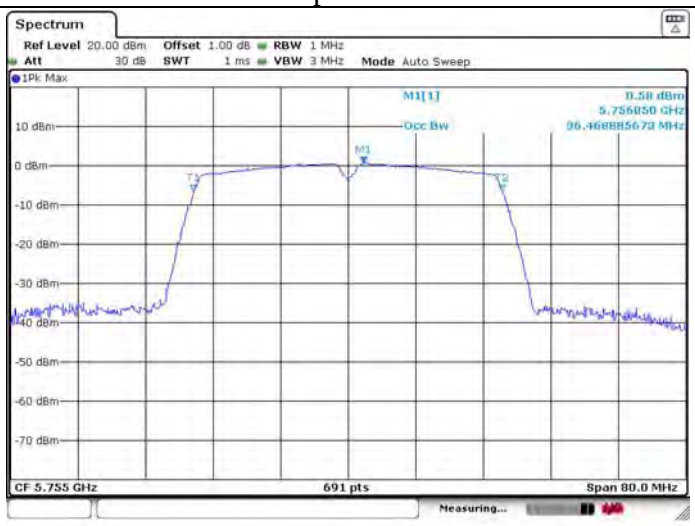


99% Occupied Bandwidth



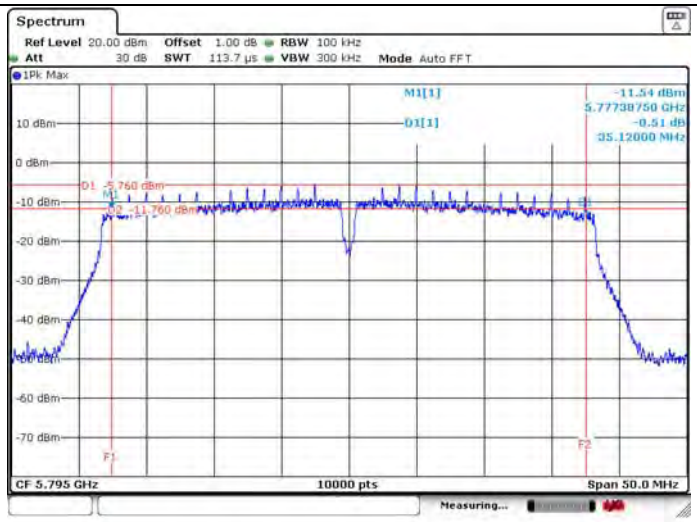
U-NII-3 IEEE 802.11n HT40 5795MHz_Ant 2	
6dB Bandwidth	99% Occupied Bandwidth
	

U-NII-3 IEEE 802.11ac VHT40 5755MHz_Ant 1	
6dB Bandwidth	99% Occupied Bandwidth
	

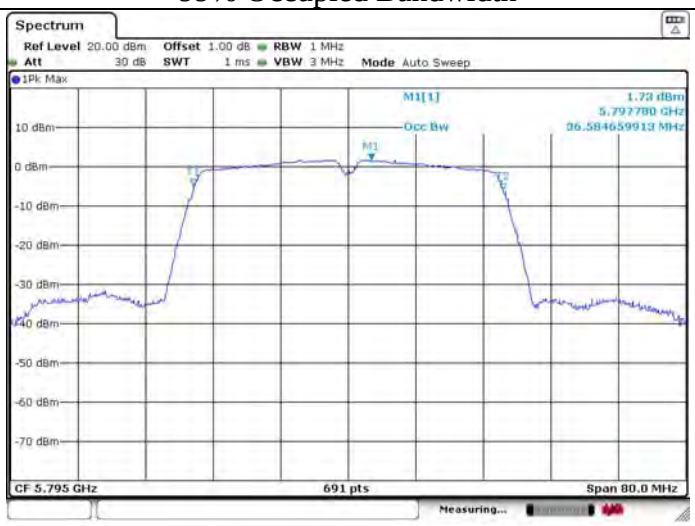
U-NII-3 IEEE 802.11ac VHT40 5755MHz_Ant 2	
6dB Bandwidth	99% Occupied Bandwidth
	

U-NII-3 IEEE 802.11ac VHT40 5795MHz_Ant 1

6dB Bandwidth

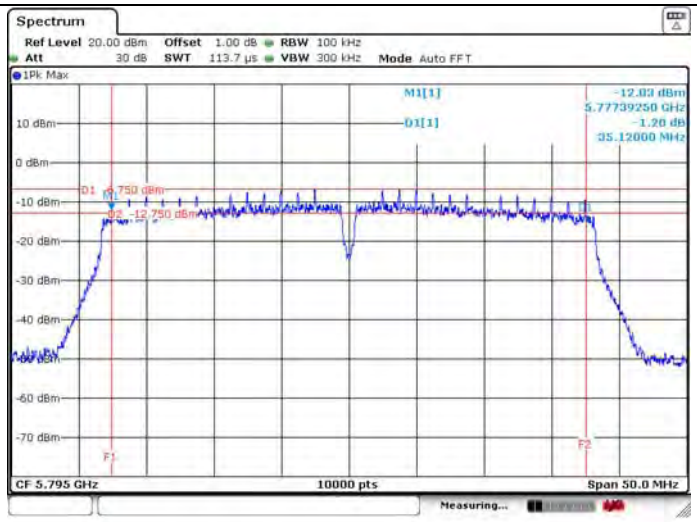


99% Occupied Bandwidth

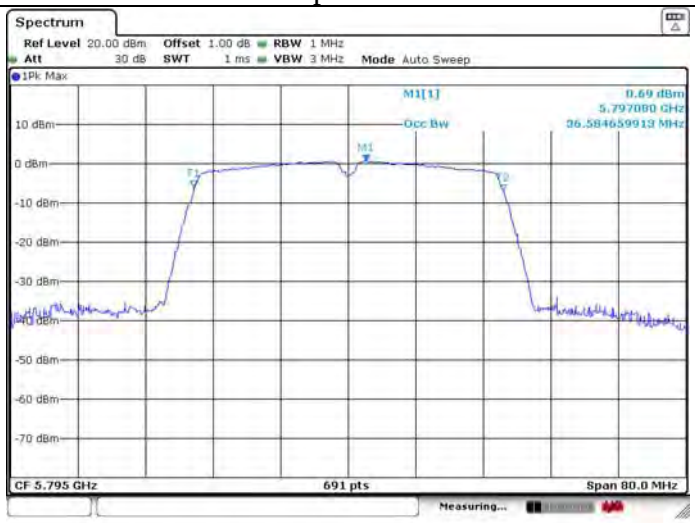


U-NII-3 IEEE 802.11ac VHT40 5795MHz_Ant 2

6dB Bandwidth

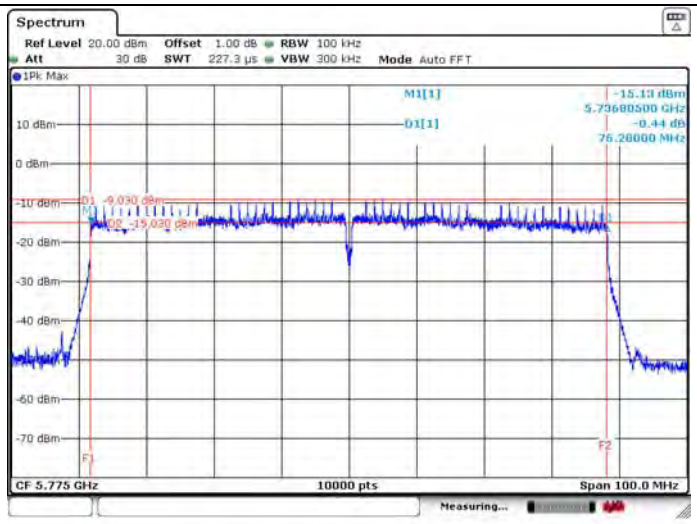


99% Occupied Bandwidth

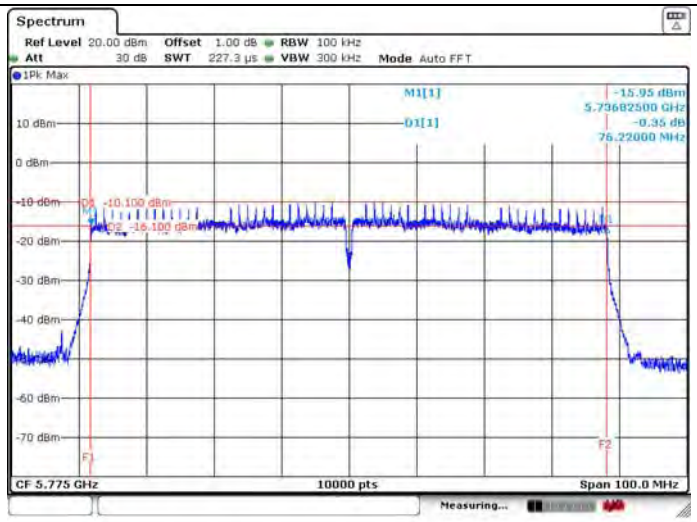


U-NII-3 IEEE 802.11ac VHT80 5775MHz_Ant 1

6dB Bandwidth



99% Occupied Bandwidth

U-NII-3 IEEE 802.11ac VHT80 5775MHz_Ant 2	
6dB Bandwidth	99% Occupied Bandwidth
	

4. MAXIMUM CONDUCTED OUTPUT POWER

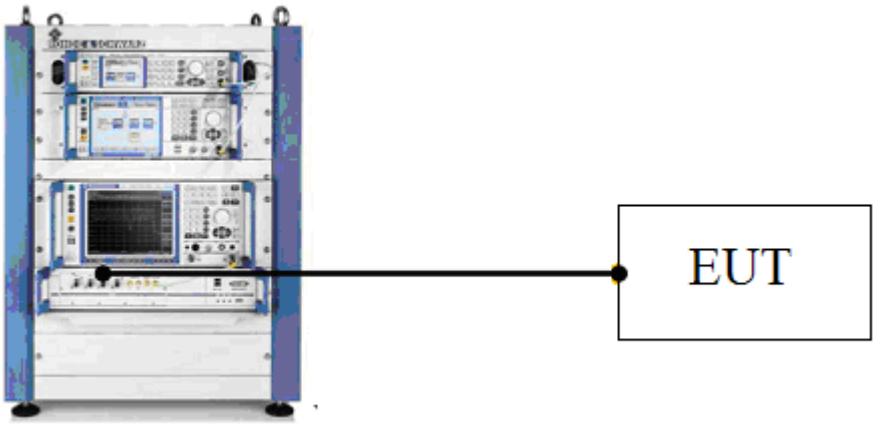
4.1. Limit

Band	EUT Type	Limit
U-NII-1	Outdoor Access Point	1W(30dBm) (Max. e.i.r.p≦125mW at any elevation angle above 30 degrees as measured from the horizon)
	Indoor Access Point	1W(30dBm)
	Fixed point-to-point Access Point	1W(30dBm)
	Mobile and Portable Client Device	250mW(23.98dBm)
U-NII-2A	All Device	250mW(23.98dBm) or 11dBm+10 log B,Which is lesser. (B is 26dB Bandwidth in MHz)
U-NII-2C	All Device	250mW(23.98dBm) or 11dBm+10 log B,Which is lesser. (B is 26dB Bandwidth in MHz)
U-NII-3	All Device	1W(30dBm)

Note:

For the Band U-NII-2A and U-NII-2C,the maximum conducted output power limit calculate result refer to section 3.5.

4.2. Test Setup



4.3. Test Procedure

a. Connect EUT antenna terminal to the OSP-B157WB with RF cable.
b. Set the EUT transmit continuously with maximum output power.
c. Through the test software in TS8897 to control a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Because the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.
d. Repeat above procedures until all modes and channels were measured.
e. Record the results in the test report.

4.4. Test Result

Temperature	25.3℃	Relative Humidity			56%	Test Voltage	DC 5V	
BAND	Test Mode	Fre (MHz)	Conducted AVG Output Power (dBm)		Total Conducted Output Power (W)	Total Conducted Output Power (dBm)	Limit (dBm)	Result
			Ant 1	Ant 2				
U-NII-1	IEEE 802.11a	5180	11.741	9.646	0.0149	11.74	23.98	PASS
		5200	12.097	9.932	0.0162	12.10	23.98	PASS
		5240	11.455	9.246	0.0140	11.46	23.98	PASS
	IEEE 802.11n HT20	5180	10.733	9.217	0.02074	13.17	23.98	PASS
		5200	11.322	9.609	0.02271	13.56	23.98	PASS
		5240	10.840	8.977	0.01973	12.95	23.98	PASS
	IEEE 802.11ac VHT20	5180	10.931	9.143	0.01998	13.01	23.98	PASS
		5200	11.325	9.518	0.02023	13.06	23.98	PASS
		5240	10.728	8.966	0.01937	12.87	23.98	PASS
	IEEE 802.11n HT40	5190	10.709	8.982	0.01968	12.94	23.98	PASS
		5230	10.524	9.099	0.01941	12.88	23.98	PASS
	IEEE 802.11ac VHT40	5190	10.603	8.921	0.01929	12.85	23.98	PASS
		5230	10.216	8.988	0.01843	12.66	23.98	PASS
	IEEE 802.11ac VHT80	5210	11.213	9.239	0.02161	13.35	23.98	PASS

BAND	Test Mode	Fre (MHz)	Conducted AVG Output Power (dBm)		Total Conducted Output Power (W)	Total Conducted Output Power (dBm)	Limit (dBm)	Result
			Ant 1	Ant 2				
U-NII-3	IEEE 802.11a	5745	12.019	9.560	0.01592	12.02	30.00	PASS
		5785	12.719	9.256	0.01870	12.72	30.00	PASS
		5825	12.570	10.210	0.01807	12.57	30.00	PASS
	IEEE 802.11n HT20	5745	11.664	9.611	0.02381	13.77	30.00	PASS
		5785	12.296	9.199	0.02528	14.03	30.00	PASS
		5825	12.053	10.150	0.02639	14.22	30.00	PASS
	IEEE 802.11ac VHT20	5745	11.738	9.580	0.02400	13.80	30.00	PASS
		5785	12.171	8.982	0.02440	13.87	30.00	PASS
		5825	11.828	9.874	0.02495	13.97	30.00	PASS
	IEEE 802.11n HT40	5755	11.272	9.551	0.02242	13.51	30.00	PASS
		5795	11.963	8.654	0.02305	13.63	30.00	PASS
	IEEE 802.11ac VHT40	5755	11.642	9.596	0.02371	13.75	30.00	PASS
		5795	11.749	8.408	0.02189	13.40	30.00	PASS
	IEEE 802.11ac VHT80	5775	11.231	9.595	0.02239	13.50	30.00	PASS

5. PEAK POWER SPECTRAL DENSITY

5.1. Limit

Band	EUT Type	Limit
U-NII-1	Outdoor Access Point	17dBm/MHz
	Indoor Access Point	17dBm/MHz
	Fixed point-to-point Access Point	17dBm/MHz
	Mobile and Portable Client Device	11dBm/MHz
U-NII-2A	All Device	11dBm/MHz
U-NII-2C	All Device	11dBm/MHz
U-NII-3	All Device	30dBm/500KHz

5.2. Test Setup

5.3. Spectrum Analyzer Setting

Spectrum Parameters	Setting
RBW	1MHz(For U-NII-1&U-NII-2A&U-NII-2C) 500KHz(For U-NII-3)
VBW	3MHz(For U-NII-1&U-NII-2A&U-NII-2C) 2MHz(For U-NII-3)
Span	encompass the entire 26 dB EBW or 99% OBW of the signal
Sweep Time	Auto
Number of Sweep Point	≥2×SPAN/RBW
Detector	RMS(power averaging)
Trace Average	≥100 traces

5.4. Test Procedure

a. Connect EUT antenna terminal to the spectrum analyzer with RF cable.
b. Spectrum analyzer setting parameters in accordance with section 5.3.
c. Set the EUT transmit continuously with maximum output power.
d. Allow trace to stabilize, use the marker-to-peak function to set the marker to the average of the emission.
e. If the duty cycle of test siganl＜98%,the result=max measured value+10×log(1/duty cycle);
   If the duty cycle of test siganl≥98%,the esult=max measured value.
f. Repeat above procedures until all modes and channels were measured.
g. Record the results in the test report.

5.5. Test Result

Temperature		25.3℃	Relative Humidity		56%	Test Voltage	DC 5V	
BAND	Test Mode	Fre (MHz)	Power Density (dBm/MHz)		Duty Factor (dB)	Total Power Density (dBm/MHz)	Limit (dBm/MHz)	Result
			Ant 1	Ant 2				
U-NII-1	IEEE 802.11a	5180	5.93	4.20	0.00	5.93	11.00	PASS
		5200	5.97	3.77	0.00	5.97	11.00	PASS
		5240	5.84	3.72	0.00	5.84	11.00	PASS
	IEEE 802.11n HT20	5180	5.38	3.48	0.00	7.54	11.00	PASS
		5200	5.62	3.23	0.00	7.60	11.00	PASS
		5240	5.79	2.83	0.00	7.57	11.00	PASS
	IEEE 802.11ac VHT20	5180	5.48	3.48	0.00	7.60	11.00	PASS
		5200	5.39	3.32	0.00	7.49	11.00	PASS
		5240	5.88	3.04	0.00	7.70	11.00	PASS
	IEEE 802.11n HT40	5190	1.94	0.04	0.11	4.21	11.00	PASS
		5230	2.41	-0.53	0.11	4.31	11.00	PASS
	IEEE 802.11ac VHT40	5190	2.06	-0.04	0.11	4.26	11.00	PASS
		5230	2.44	-0.66	0.11	4.28	11.00	PASS
	IEEE 802.11ac VHT80	5210	-0.80	-2.84	1.66	2.96	11.00	PASS

BAND	Test Mode	Fre (MHz)	Power Density (dBm/500KHz)		Duty Factor (dB)	Total Power Density (dBm/500KHz)	Limit (dBm/500KHz)	Result
			Ant 1	Ant 2				
U-NII-3	IEEE 802.11a	5745	4.68	2.01	0.00	4.68	30.00	PASS
		5785	4.66	2.44	0.00	4.66	30.00	PASS
		5825	4.85	3.39	0.00	4.85	30.00	PASS
	IEEE 802.11n HT20	5745	3.44	1.78	0.00	5.70	30.00	PASS
		5785	3.60	2.04	0.00	5.90	30.00	PASS
		5825	4.04	2.86	0.00	6.50	30.00	PASS
	IEEE 802.11ac VHT20	5745	3.51	1.90	0.00	5.79	30.00	PASS
		5785	3.47	2.01	0.00	5.81	30.00	PASS
		5825	4.11	2.66	0.00	6.46	30.00	PASS
	IEEE 802.11n HT40	5755	0.05	-1.49	0.11	2.47	30.00	PASS
		5795	0.18	-1.47	0.11	2.55	30.00	PASS
	IEEE 802.11ac VHT40	5755	0.33	-1.30	0.11	2.71	30.00	PASS
		5795	0.59	-1.01	0.11	2.98	30.00	PASS
	IEEE 802.11ac VHT80	5775	-3.22	-4.09	0.22	-0.41	30.00	PASS

U-NII-1 IEEE 802.11a 5180MHz	U-NII-1 IEEE 802.11a 5200MHz
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	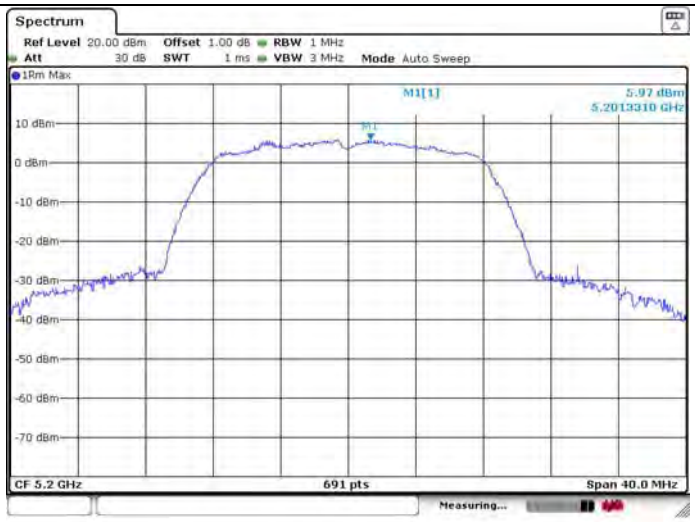
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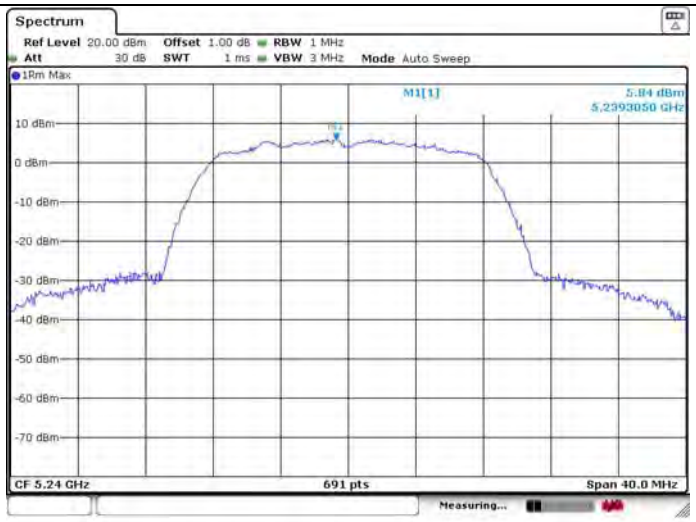	

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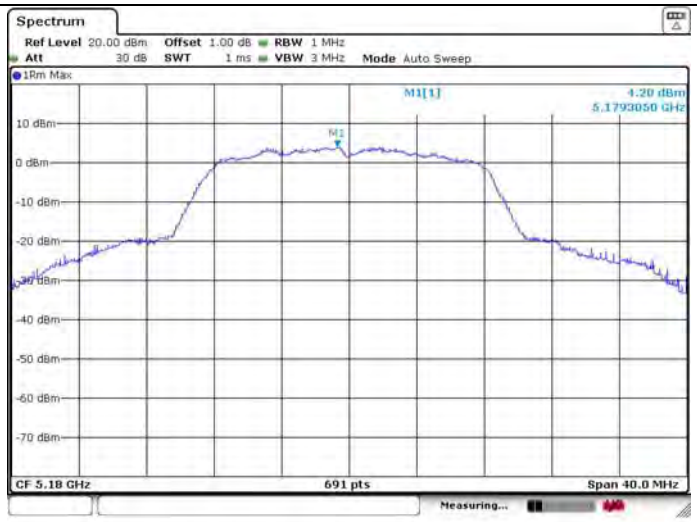	
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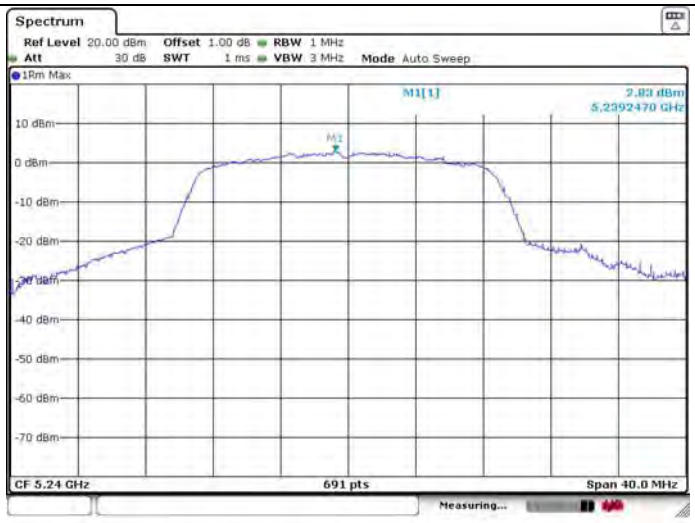
ANT 2	
U-NII-1 IEEE 802.11n HT20 5180MHz	
ANT 1	**ANT 2**

U-NII-1 IEEE 802.11n HT20 5200MHz

ANT 1	ANT 2

U-NII-1 IEEE 802.11n HT20 5240MHz

ANT 1	ANT 2
	

U-NII-1 IEEE 802.11ac VHT20 5180MHz

ANT 1	ANT 2

U-NII-1 IEEE 802.11ac VHT20 5200MHz	
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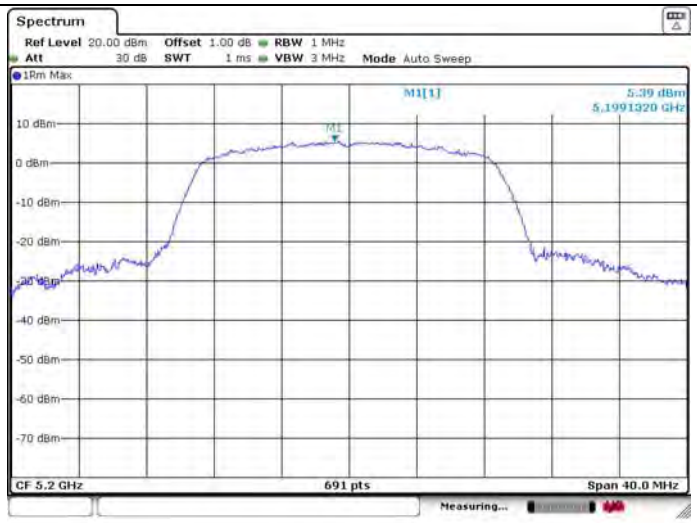
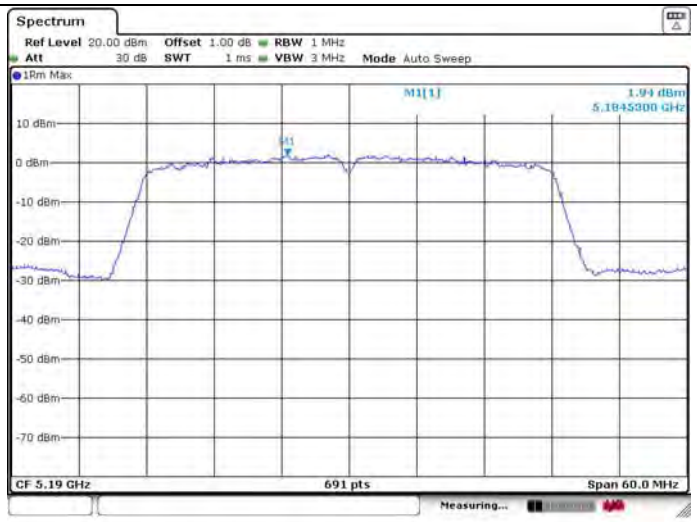
	
U-NII-1 IEEE 802.11ac VHT20 5240MHz	
ANT 1	**ANT 2**
U-NII-1 IEEE 802.11n HT40 5190MHz	
ANT 1	**ANT 2**
	

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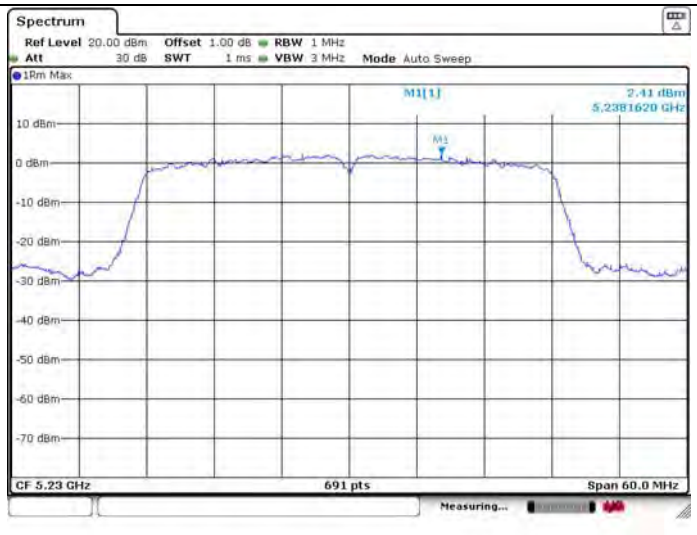

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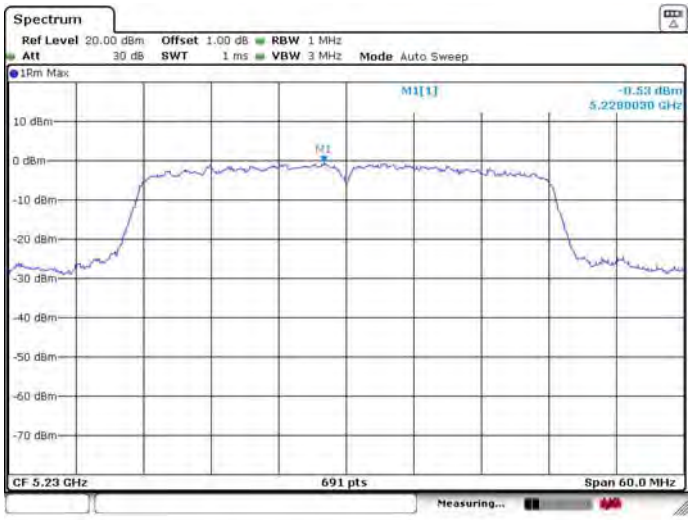
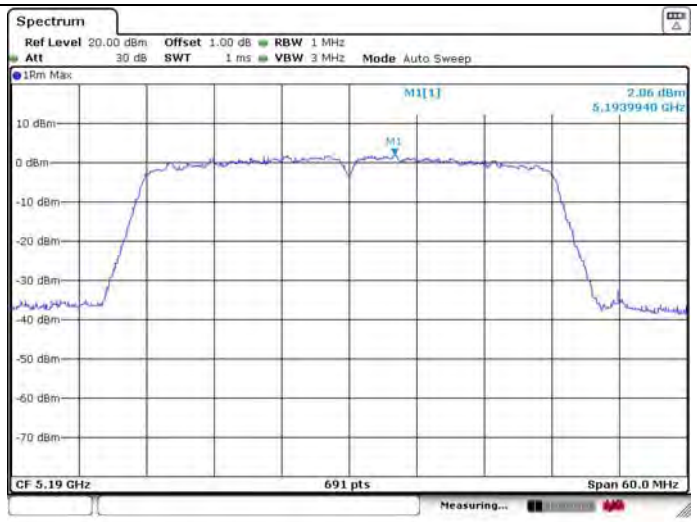


U-NII-1 IEEE 802.11ac VHT40 5190MHz

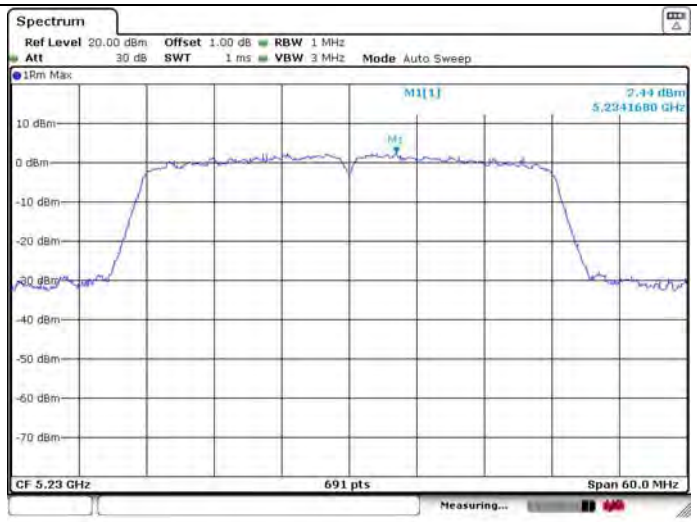
ANT 1



ANT 2

U-NII-1 IEEE 802.11ac VHT40 5230MHz

ANT 1



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U-NII-1 IEEE 802.11ac VHT80 5210MHz	
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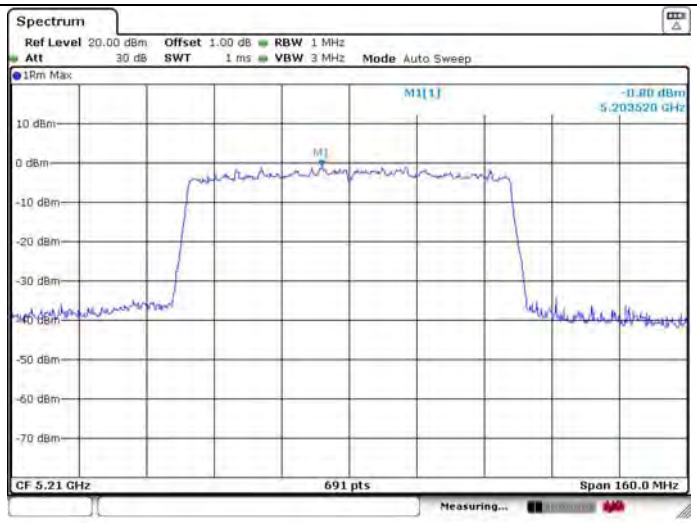	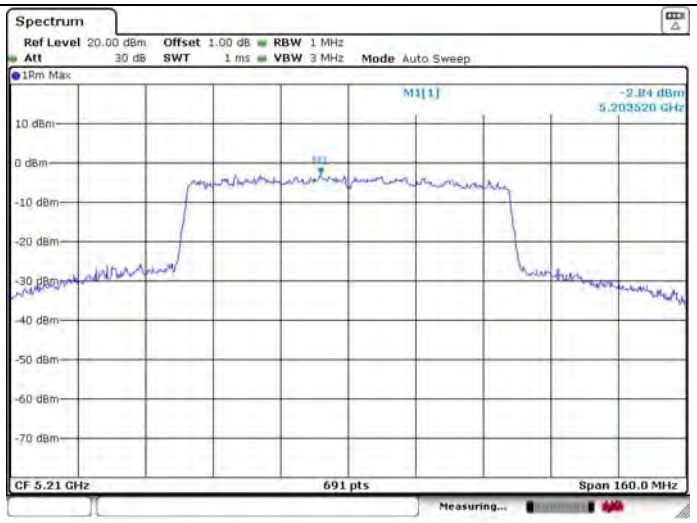

U-NII-3 IEEE 802.11a 5745MHz	U-NII-3 IEEE 802.11a 5785MHz
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	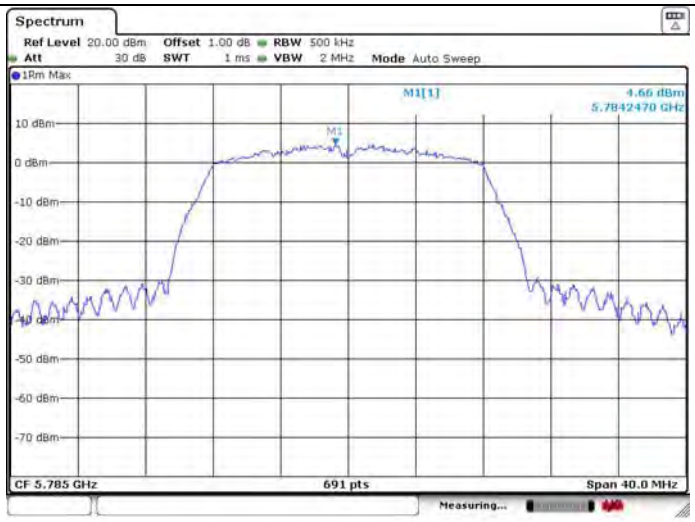
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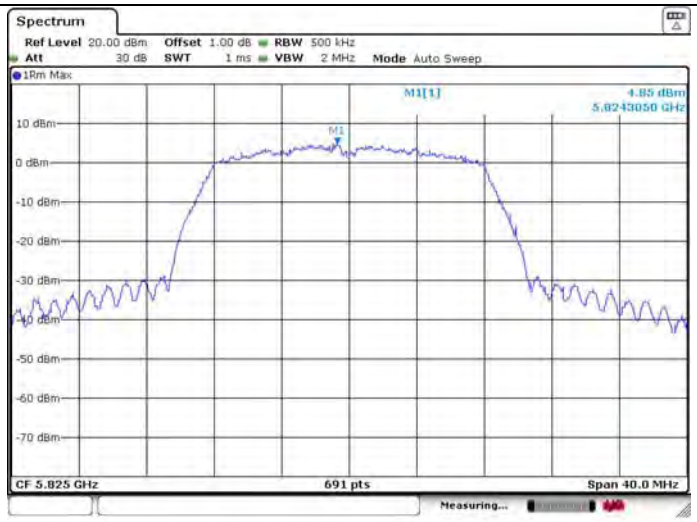
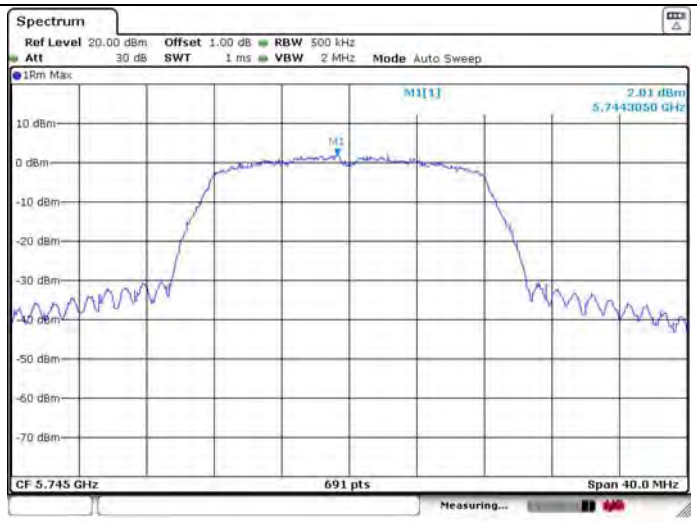
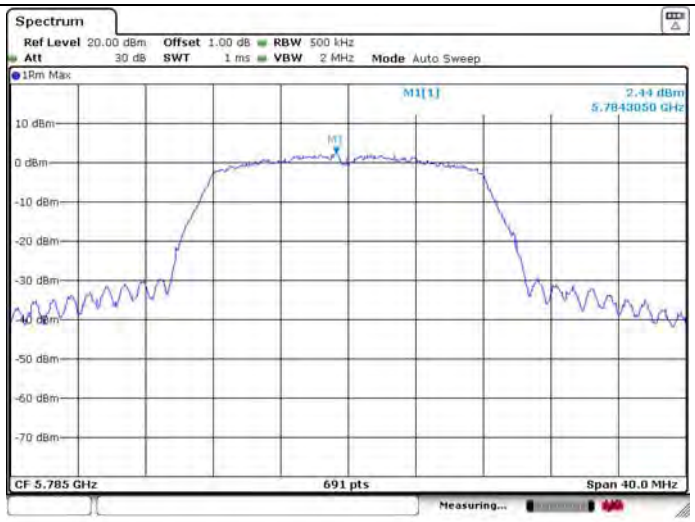
ANT 1	
	

U-NII-3 IEEE 802.11a 5745MHz	U-NII-3 IEEE 802.11a 5785MHz
ANT 2	ANT 2
	
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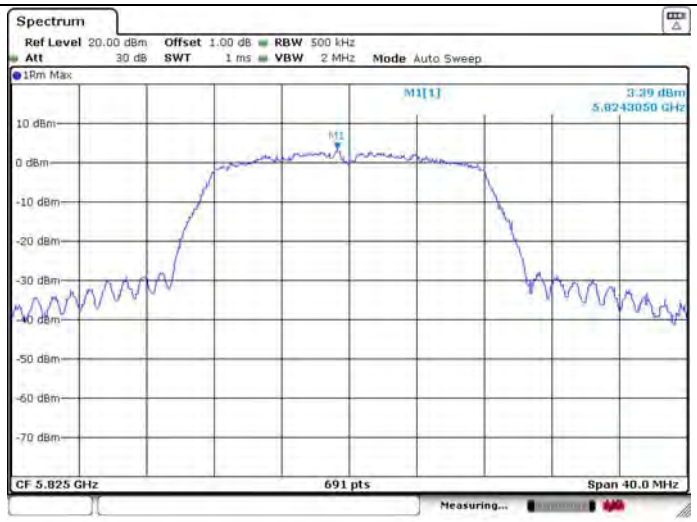
ANT 2	
	
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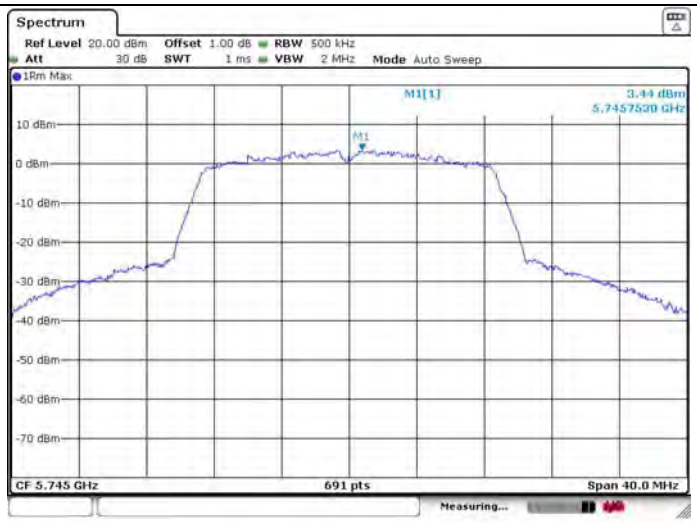
ANT 1	ANT 2
	

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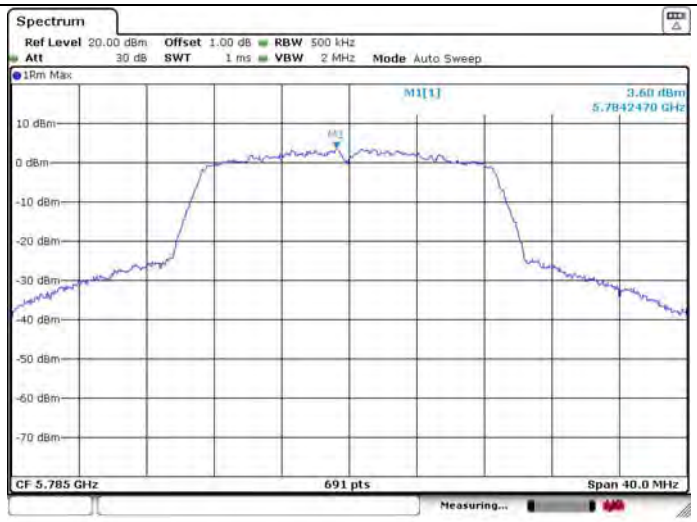	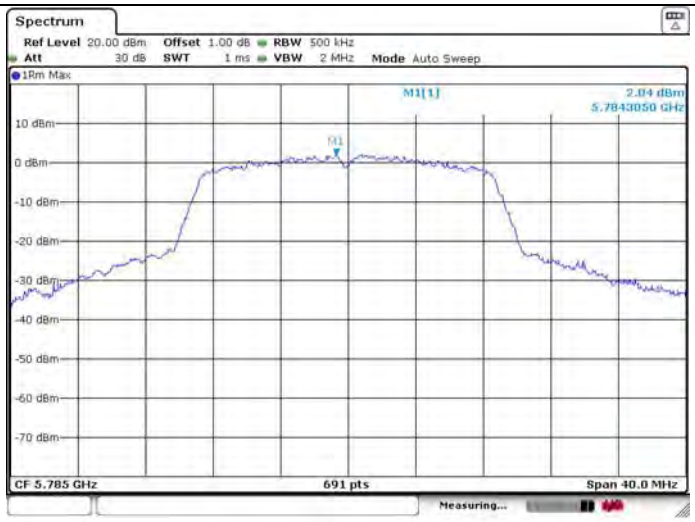

U-NII-3 IEEE 802.11n HT20 5825MHz	
ANT 1	**ANT 2**

U-NII-3 IEEE 802.11ac VHT20 5745MHz	
ANT 1	**ANT 2**

U-NII-3 IEEE 802.11ac VHT20 5785MHz	
ANT 1	**ANT 2**

U-NII-3 IEEE 802.11ac VHT20 5825MHz	
ANT 1	**ANT 2**

U-NII-3 IEEE 802.11n HT40 5755MHz	
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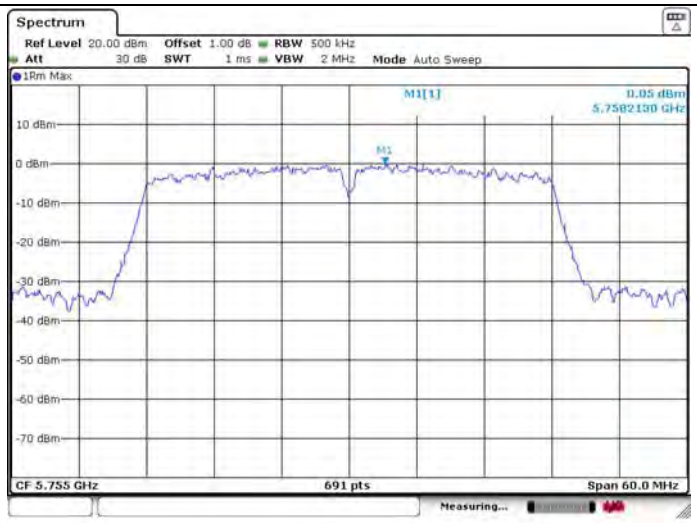	

U-NII-3 IEEE 802.11n HT40 5795MHz

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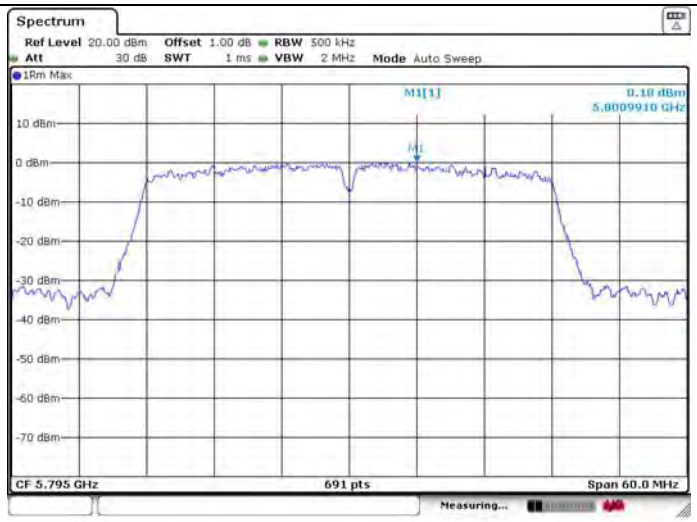

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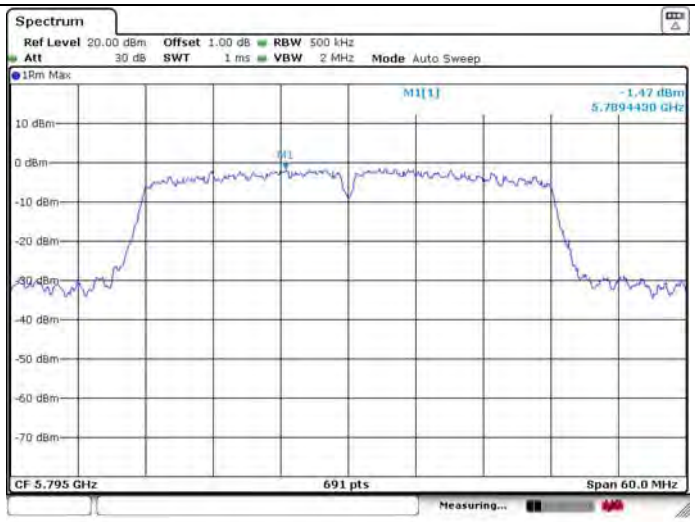
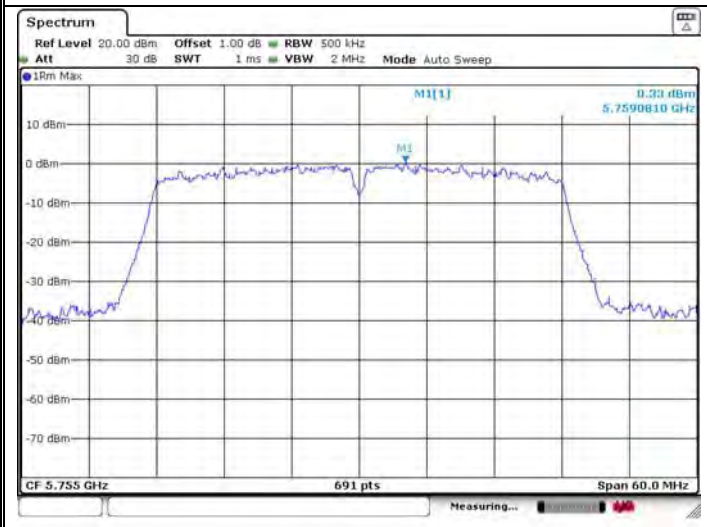


U-NII-3 IEEE 802.11ac VHT40 5755MHz

ANT 1



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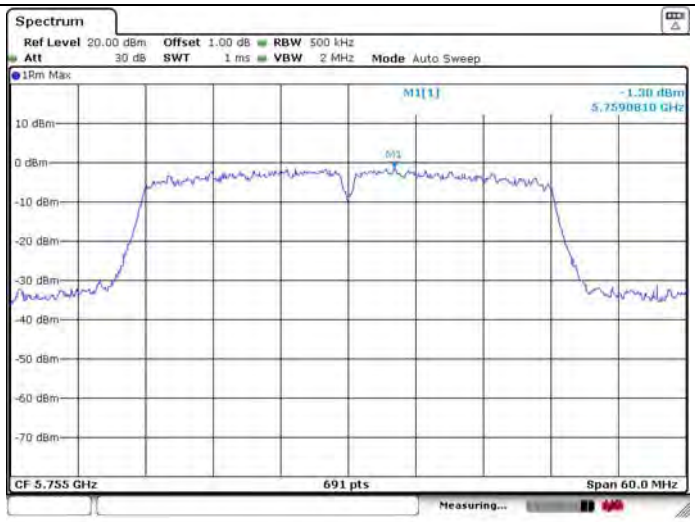
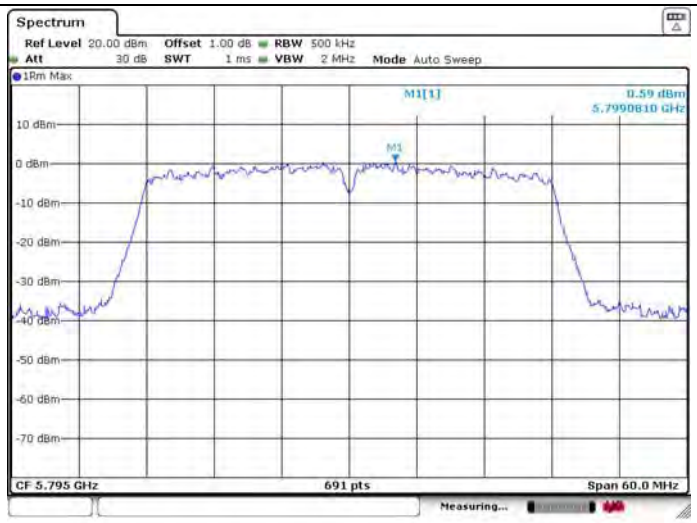
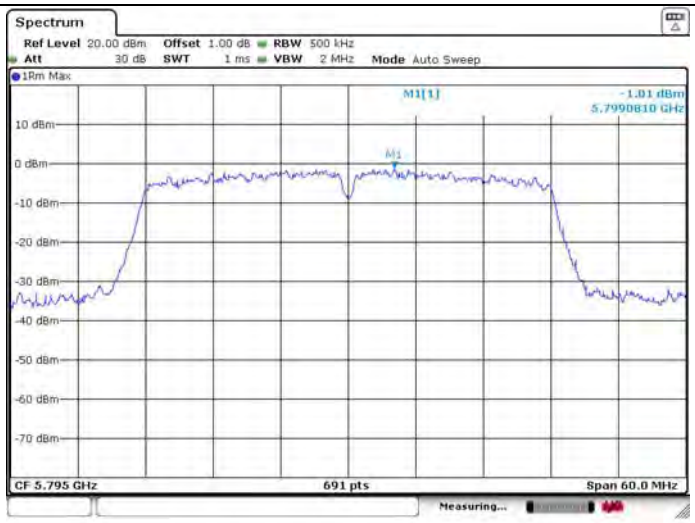


U-NII-3 IEEE 802.11ac VHT40 5795MHz

ANT 1



ANT 2



U-NII-3 IEEE 802.11ac VHT80 5775MHz	
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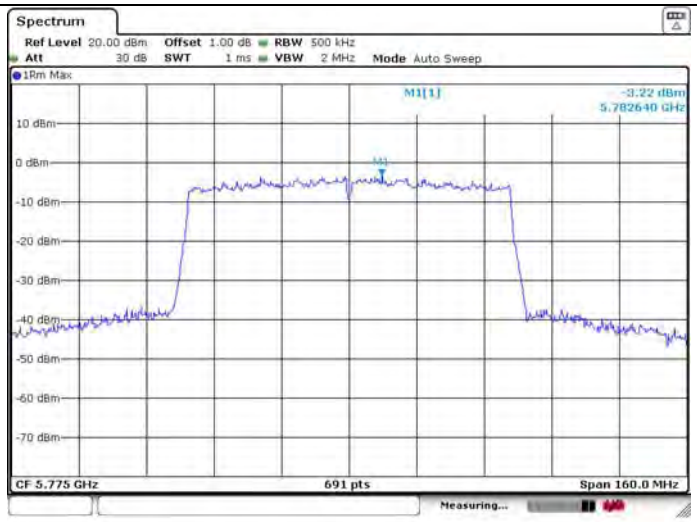
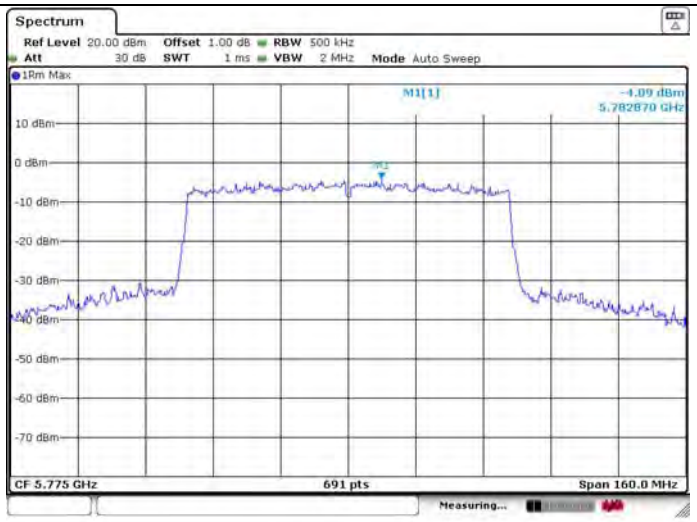
	

6. UNWANTED EMISSIONS AND BAND EDGE

6.1. Limit

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: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.

The unwanted emissions which fall in Restricted bands shall not exceed the field strength levels specified in the following table:

15.209 Radiated emission limits

Frequency (MHz)	Field Strength(μV/m)	Distance(m)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

15.205 Restricted frequency band

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	([2])

Note：

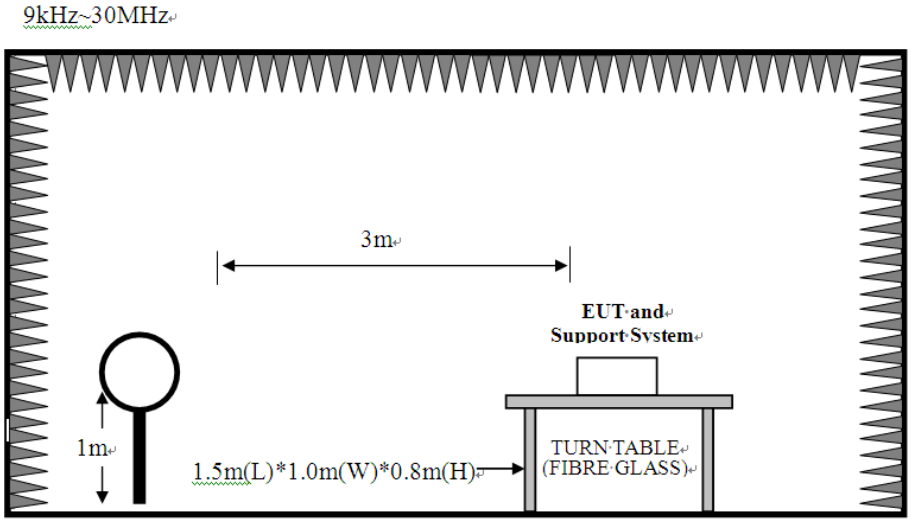
1. dBμV/m=20Log(μV/m)
2. Above 1GHz the formula is used to convert the EIRP to field strength

   E[dBμV/m] = EIRP[dBm] – 20 log (d[m]) + 104.77,

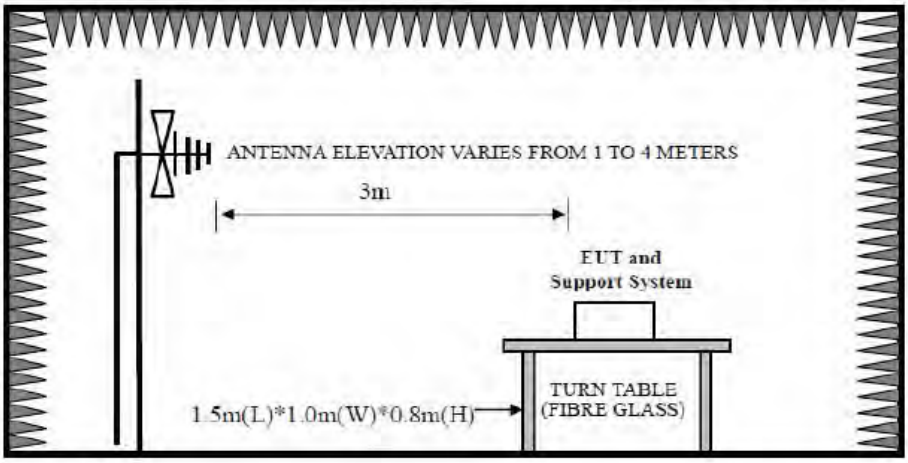
   where E is field strength and d is distance at which the field strength limit is specified in the applicable requirements.

   for example,3m field strength(dBμV/m)=EIRP-20log(3)+104.77=EIRP+95.2

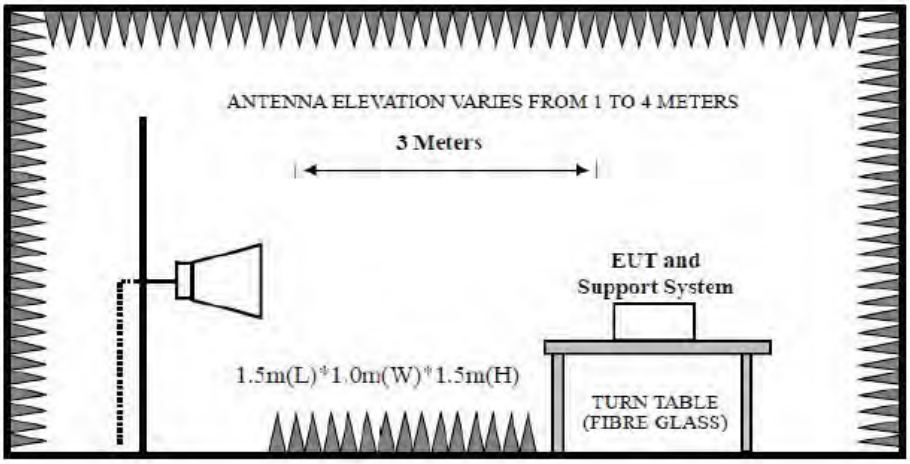
6.2. Test Setup



30~1000MHz



Above 1GHz



6.3. Spectrum Analyzer Setting

For 9KHz-150KHz

Spectrum Parameters	Setting
RBW	300Hz(for Peak&AVG)/CISPR 200Hz(for QP)
VBW	300Hz(for Peak&AVG)/CISPR 200Hz(for QP)
Start frequency	9KHz
Stop frequency	150KHz
Sweep Time	Auto
Detector	PEAK/QP/AVG
Trace Mode	Max Hold

Note : For 9KHz-90KHz&110KHz-150KHz,the detector is average,other frequency is CISPR QP detector.

For 150KHz-30MHz

Spectrum Parameters	Setting
RBW	9KHz
VBW	9KHz
Start frequency	150KHz
Stop frequency	30MHz
Sweep Time	Auto
Detector	QP
Trace Mode	Max Hold

Note : For 150KHz-490KHz,the detector is average,other frequency is CISPR QP detector.

For 30MHz-1GHz

Spectrum Parameters	Setting
RBW	120KHz
VBW	300KHz
Start frequency	30MHz
Stop frequency	1GHz
Sweep Time	Auto
Detector	QP
Trace Mode	Max Hold

For Above 1GHz

Spectrum Parameters	Setting	
RBW	1MHz	
VBW	PEAK Measurement	AVG Measurement
	3MHz	Duty cycle≥98%,VBW=10Hz Duty cycle＜98%,VBW≥1/T Video bandwidth mode=RMS (power averaging)
Start frequency	1GHz	
Stop frequency	40GHz	
Sweep Time	Auto	
Detector	PEAK	
Trace Mode	Max Hold	

Note : T is the on-time time of the duty cycle,when EUT transmit continuously with maximum output power,unit is seconds. reference section 2.7 for the on-time time.

6.4. Test Procedure

a. EUT was placed on a turn table, which is 0.8 meter high above ground for below 1GHz test, and which is 1.5 meter high above ground for above 1GHz test.
b. EUT is set 3 meters away from the receiving antenna, which is mounted on a antenna tower.
c. Set the EUT transmit continuously with maximum output power.
d. The turn table can rotate 360 degrees to determine the position of the maximum emission level.
e. The antenna can be moved up and down between 1 meter and 4 meters to find out the maximum emission level. Both horizontal and vertical polarization of the antenna are set on test.
f. Spectrum analyzer setting parameters in accordance with section 6.3.
g. Repeat above procedures until all channels were measured.
h. Record the results in the test report.

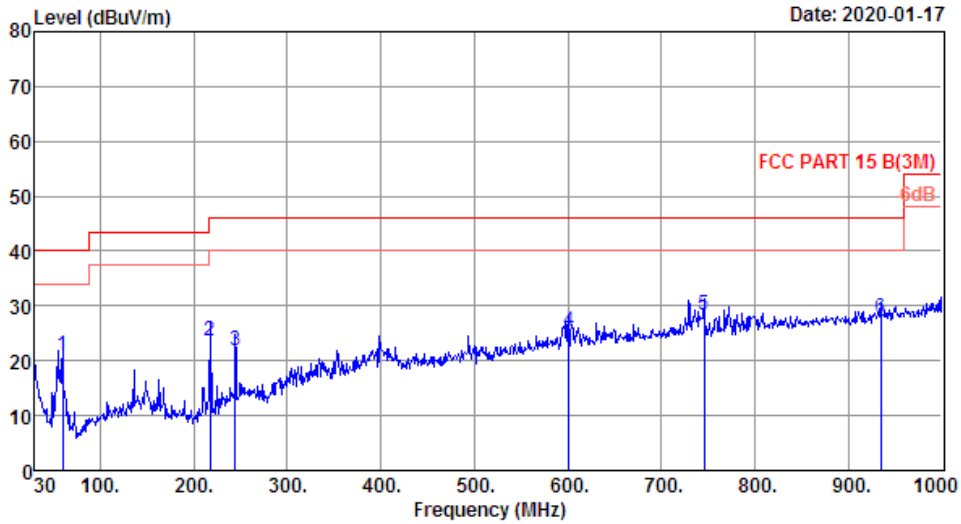
6.5. Test Result

Radiated Emissions Below 1GHz

EST Technology

Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878

Data: 37 File: \\Emc-966-1\test data\2020\RF\X\Wi-Fi Module.EM6 (54)



Site no. : 1# 966 Chamber Data no. : 37
Dis. / Ant. : 3m 37062 Ant. pol. : VERTICAL
Limit : FCC PART 15 B(3M)
Env. / Ins. : Temp:26.6';Humi:53.6%;Press:101.52kPa
Engineer : Boris
EUT : WIFI MODULE
Power : DC 5V From PC
M/N : 00WIMRA
Test Mode : TX Mode

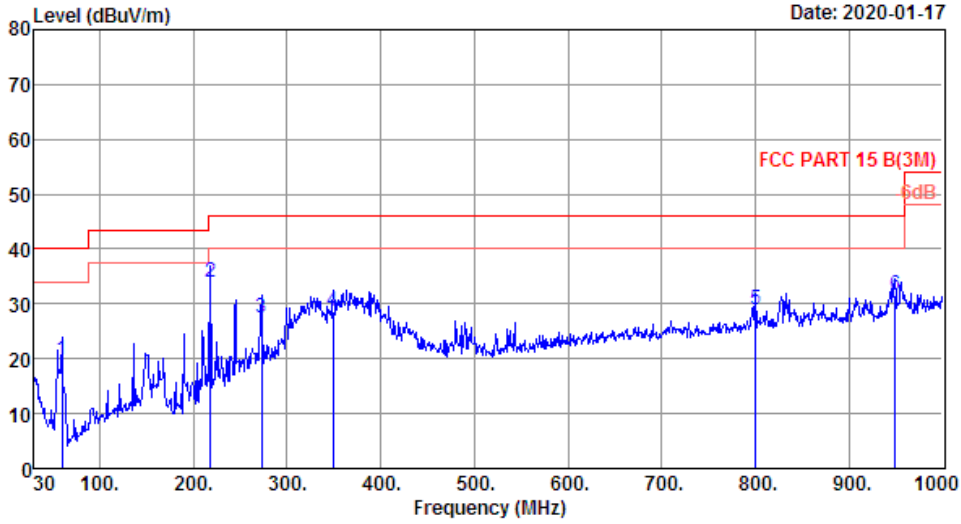
Freq. (MHz)	ANT Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
60.07	5.00	0.42	15.40	20.82	40.00	19.18	QP
217.21	9.48	1.42	12.86	23.76	46.00	22.24	QP
244.37	11.55	1.60	8.57	21.72	46.00	24.28	QP
601.33	20.42	2.99	1.94	25.35	46.00	20.65	QP
745.86	21.80	3.66	2.94	28.40	46.00	17.60	QP
935.01	24.25	4.27	-0.76	27.76	46.00	18.24	QP

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

EST Technology

Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878

Data: 38 File: \\Emc-966-1\test data\2020\RF\X\Wi-Fi Module.EM6 (54)



Site no. : 1# 966 Chamber Data no. : 38
Dis. / Ant. : 3m 37062 Ant. pol. : HORIZONTAL
Limit : FCC PART 15 B(3M)
Env. / Ins. : Temp:26.6';Humi:53.6%;Press:101.52kPa
Engineer : Boris
EUT : WIFI MODULE
Power : DC 5V From PC
M/N : 00WIMRA
Test Mode : TX Mode

Freq. (MHz)	ANT Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
60.07	5.00	0.42	14.38	19.80	40.00	20.20	QP
218.18	9.52	1.42	22.99	33.93	46.00	12.07	QP
272.50	12.65	1.75	13.18	27.58	46.00	18.42	QP
349.13	15.33	2.10	11.13	28.56	46.00	17.44	QP
800.18	22.90	3.58	2.53	29.01	46.00	16.99	QP
949.56	24.60	4.53	2.40	31.53	46.00	14.47	QP

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

Note:

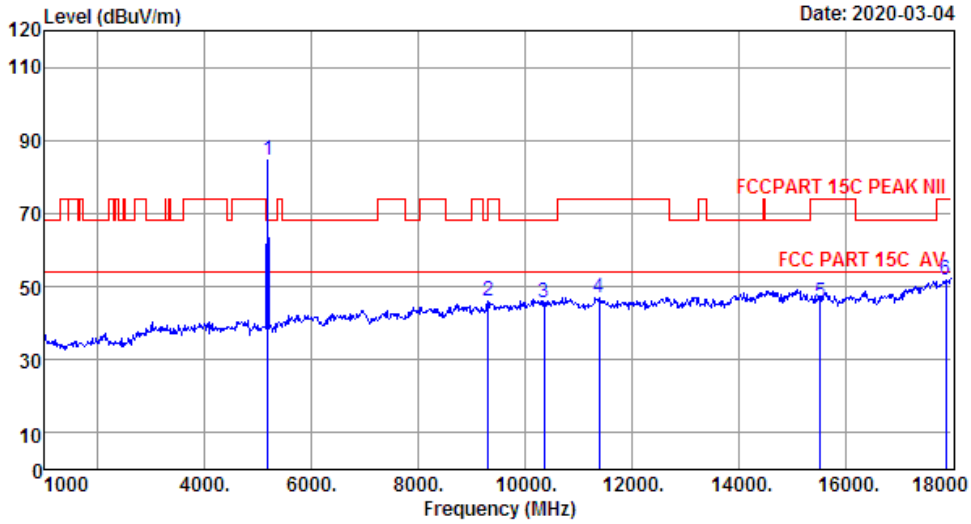
1. The amplitude of 9KHz to 30MHz spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.
2. All channels had been pre-test,only the worst case was reported.

Radiated Emissions Above 1G

EST Technology

Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878

Data: 39 File: \\Emc-966-1\test data\2020\RF\X\Wi-Fi Module.EM6 (54)



Site no. : 1# 966 Chamber Data no. : 39
Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : HORIZONTAL
Limit : FCCPART 15C PEAK NII
Env. / Ins. : Temp:26.6';Humi:53.6%;Press:101.52kPa
Engineer : Boris
EUT : WIFI MODULE
Power : DC 5V From PC
M/N : 00WIMRA
Test Mode : IEEE 802.11ac20 TX 5180MHz

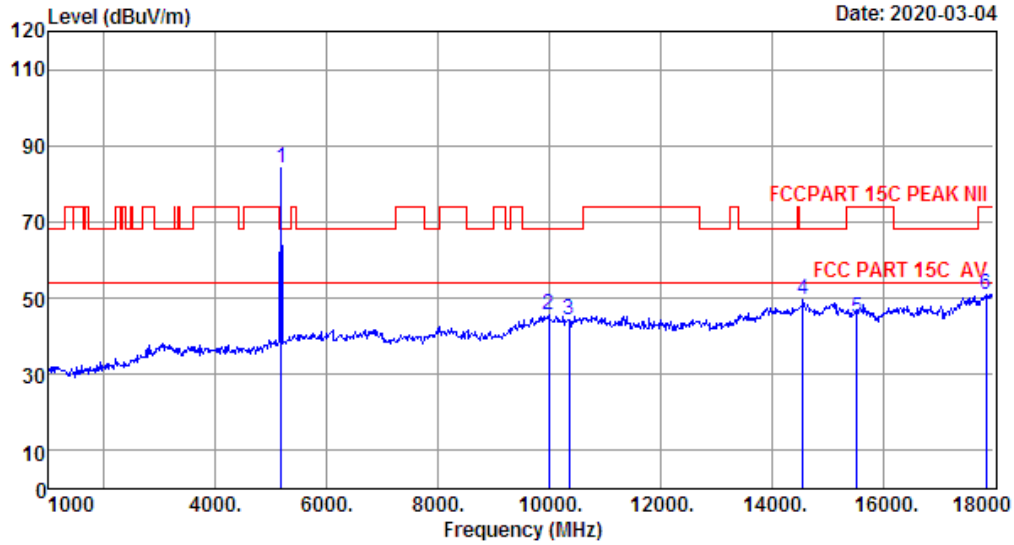
	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	5180.00	32.20	3.52	34.63	83.36	84.45	68.20	-16.25	Peak
2	9313.00	37.52	5.42	34.34	37.25	45.85	74.00	28.15	Peak
3	10360.00	39.27	5.99	34.31	34.71	45.66	68.20	22.54	Peak
4	11387.00	39.90	6.14	34.62	35.74	47.16	74.00	26.84	Peak
5	15540.00	40.31	6.46	34.39	33.29	45.67	74.00	28.33	Peak
6	17881.00	47.95	8.16	34.31	30.06	51.86	74.00	22.14	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

EST Technology

Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878

Data: 40 File: \\Emc-966-1\test data\2020\RF\X\Wi-Fi Module.EM6 (54)



Site no. : 1# 966 Chamber Data no. : 40
Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : VERTICAL
Limit : FCCPART 15C PEAK NII
Env. / Ins. : Temp:26.6';Humi:53.6%;Press:101.52kPa
Engineer : Boris
EUT : WIFI MODULE
Power : DC 5V From PC
M/N : 00WIMRA
Test Mode : IEEE 802.11ac20 TX 5180MHz

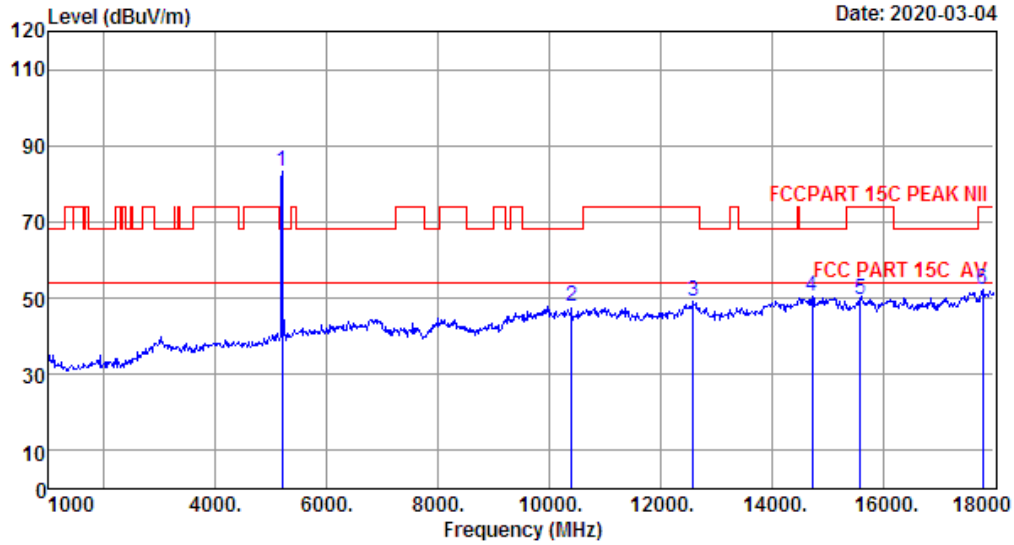
	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	5180.00	32.20	3.52	34.63	82.93	84.02	68.20	-15.82	Peak
2	9993.00	38.90	5.89	34.20	35.08	45.67	68.20	22.53	Peak
3	10360.00	39.27	5.99	34.31	33.20	44.15	68.20	24.05	Peak
4	14566.00	40.99	6.89	34.47	36.08	49.49	68.20	18.71	Peak
5	15540.00	40.31	6.46	34.39	32.56	44.94	74.00	29.06	Peak
6	17864.00	47.82	8.15	34.31	29.22	50.88	74.00	23.12	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

EST Technology

Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878

Data: 43 File: \\Emc-966-1\test data\2020\RF\X\Wi-Fi Module.EM6 (54)



Site no. : 1# 966 Chamber Data no. : 43
Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : HORIZONTAL
Limit : FCCPART 15C PEAK NII
Env. / Ins. : Temp:26.6';Humi:53.6%;Press:101.52kPa
Engineer : Boris
EUT : WIFI MODULE
Power : DC 5V From PC
M/N : 00WIMRA
Test Mode : IEEE 802.11ac20 TX 5200MHz

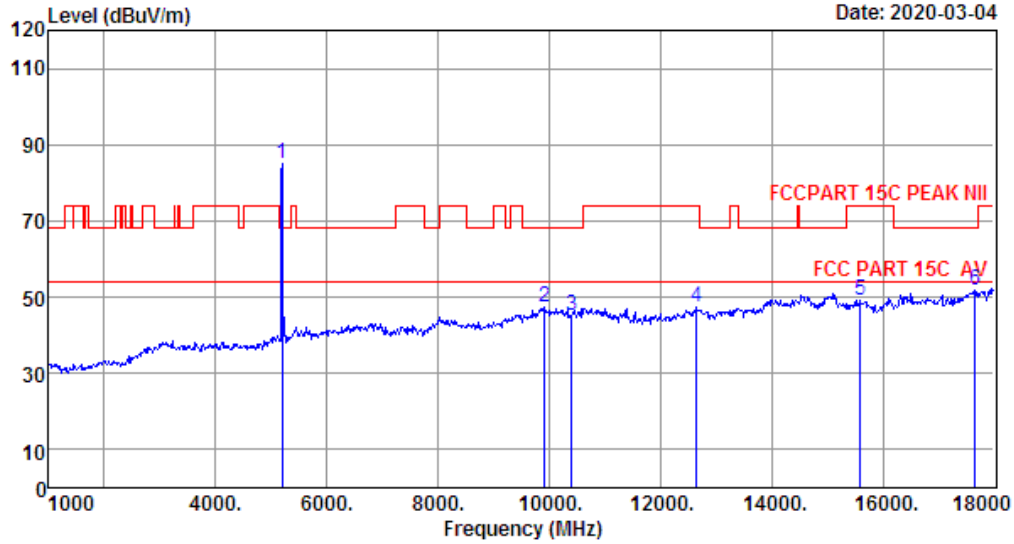
	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	5200.00	32.24	3.53	34.62	82.03	83.18	68.20	-14.98	Peak
2	10400.00	39.31	5.99	34.32	37.05	48.03	68.20	20.17	Peak
3	12594.00	39.60	6.22	34.56	37.69	48.95	74.00	25.05	Peak
4	14736.00	40.95	6.86	34.52	37.35	50.64	68.20	17.56	Peak
5	15600.00	40.24	6.53	34.36	37.08	49.49	74.00	24.51	Peak
6	17796.00	47.27	8.11	34.32	31.01	52.07	74.00	21.93	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

EST Technology

Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878

Data: 44 File: \\Emc-966-1\test data\2020\RF\X\Wi-Fi Module.EM6 (54)



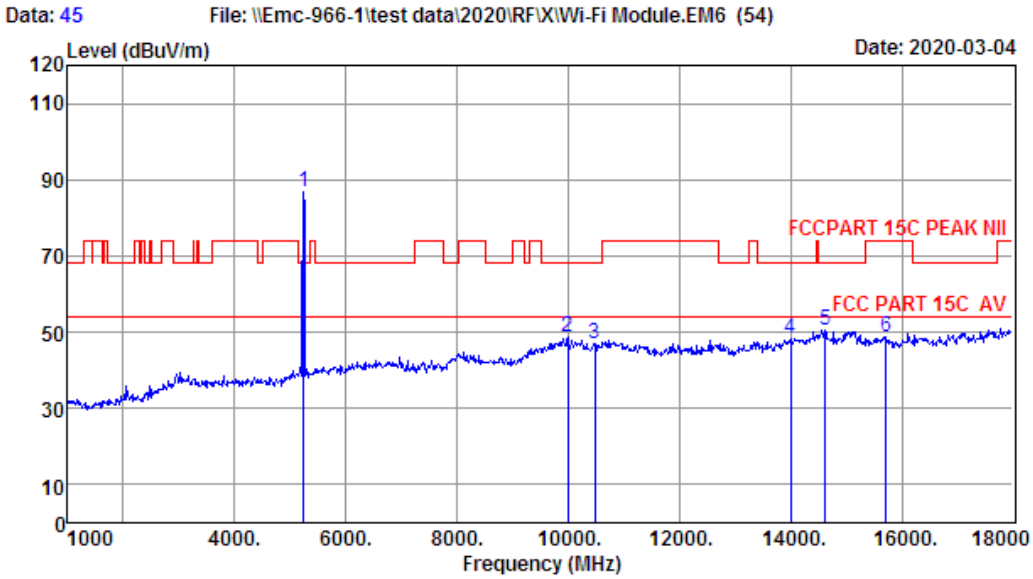
Site no. : 1# 966 Chamber Data no. : 44
Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : VERTICAL
Limit : FCCPART 15C PEAK NII
Env. / Ins. : Temp:26.6';Humi:53.6%;Press:101.52kPa
Engineer : Boris
EUT : WIFI MODULE
Power : DC 5V From PC
M/N : 00WIMRA
Test Mode : IEEE 802.11ac20 TX 5200MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	5200.00	32.24	3.53	34.62	83.67	84.82	68.20	-16.62	Peak
2	9925.00	38.76	5.84	34.21	36.86	47.25	68.20	20.95	Peak
3	10400.00	39.31	5.99	34.32	34.18	45.16	68.20	23.04	Peak
4	12645.00	39.58	6.23	34.54	36.33	47.60	74.00	26.40	Peak
5	15600.00	40.24	6.53	34.36	36.57	48.98	74.00	25.02	Peak
6	17660.00	46.19	8.02	34.33	31.91	51.79	68.20	16.41	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

EST Technology

Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878



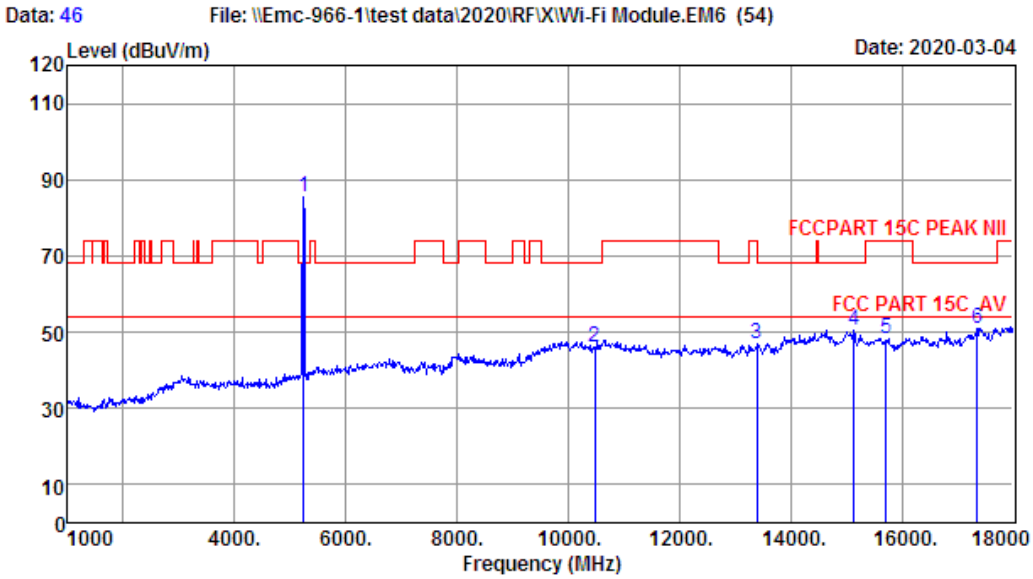
Site no. : 1# 966 Chamber Data no. : 45
Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : VERTICAL
Limit : FCCPART 15C PEAK NII
Env. / Ins. : Temp:26.6';Humi:53.6%;Press:101.52kPa
Engineer : Boris
EUT : WIFI MODULE
Power : DC 5V From PC
M/N : 00WIMRA
Test Mode : IEEE 802.11ac20 TX 5240MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	5240.00	32.31	3.55	34.61	85.52	86.77	68.20	-18.57	Peak
2	9993.00	38.90	5.89	34.20	37.96	48.55	68.20	19.65	Peak
3	10480.00	39.39	6.02	34.35	35.94	47.00	68.20	21.20	Peak
4	14005.00	41.10	6.53	34.30	35.08	48.41	68.20	19.79	Peak
5	14617.00	40.98	6.88	34.48	36.88	50.26	68.20	17.94	Peak
6	15720.00	40.10	6.65	34.31	36.49	48.93	74.00	25.07	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

EST Technology

Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878



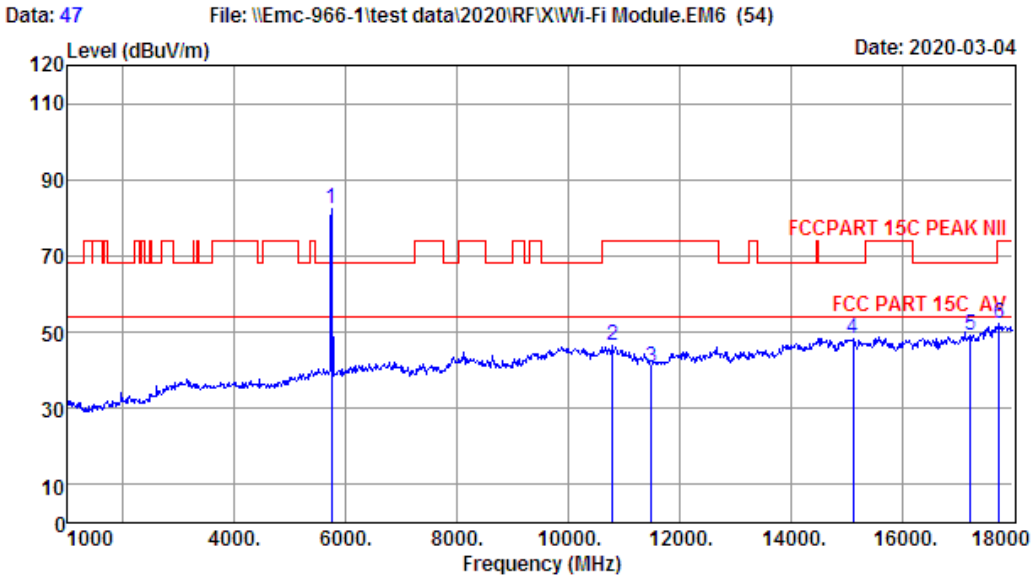
Site no. : 1# 966 Chamber Data no. : 46
Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : HORIZONTAL
Limit : FCCPART 15C PEAK NII
Env. / Ins. : Temp:26.6';Humi:53.6%;Press:101.52kPa
Engineer : Boris
EUT : WIFI MODULE
Power : DC 5V From PC
M/N : 00WIMRA
Test Mode : IEEE 802.11ac20 TX 5240MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	5240.00	32.31	3.55	34.61	84.06	85.31	68.20	-17.11	Peak
2	10480.00	39.39	6.02	34.35	35.10	46.16	68.20	22.04	Peak
3	13393.00	40.06	6.32	34.36	35.04	47.06	74.00	26.94	Peak
4	15144.00	40.75	6.71	34.54	37.42	50.34	68.20	17.86	Peak
5	15720.00	40.10	6.65	34.31	35.90	48.34	74.00	25.66	Peak
6	17354.00	43.75	7.77	34.36	33.96	51.12	68.20	17.08	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

EST Technology

Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878



Site no. : 1# 966 Chamber Data no. : 47
Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : VERTICAL
Limit : FCCPART 15C PEAK NII
Env. / Ins. : Temp:26.6';Humi:53.6%;Press:101.52kPa
Engineer : Boris
EUT : WIFI MODULE
Power : DC 5V From PC
M/N : 00WIMRA
Test Mode : IEEE 802.11ac20 TX 5745MHz

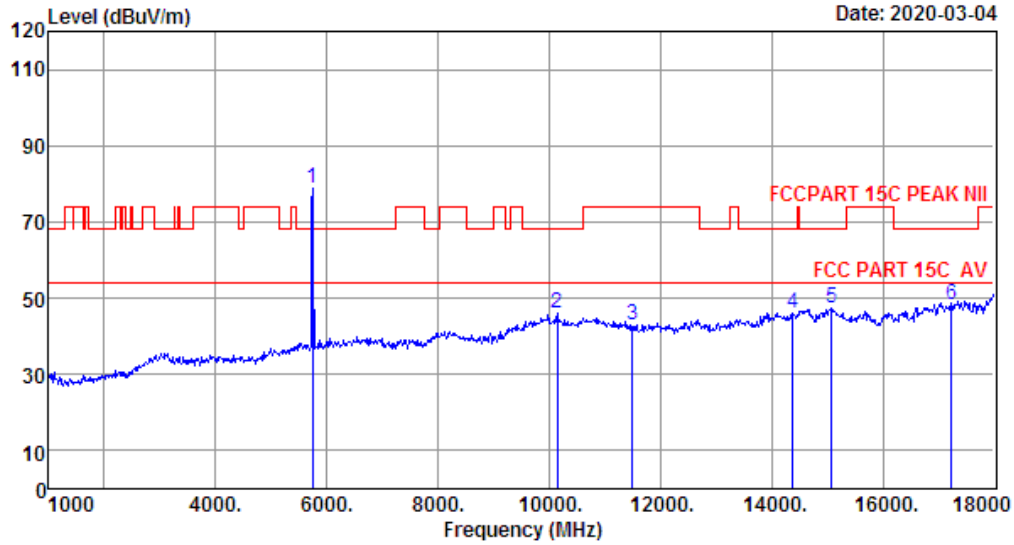
	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	5745.00	32.85	4.00	34.40	79.86	82.31	68.20	-14.11	Peak
2	10792.00	39.70	6.07	34.44	35.15	46.48	74.00	27.52	Peak
3	11490.00	39.90	6.15	34.65	29.49	40.89	74.00	33.11	Peak
4	15127.00	40.77	6.72	34.55	35.45	48.39	68.20	19.81	Peak
5	17235.00	42.80	7.65	34.38	32.91	48.98	68.20	19.22	Peak
6	17745.00	46.87	8.07	34.33	31.51	52.12	74.00	21.88	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

EST Technology

Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878

Data: 48 File: \\Emc-966-1\test data\2020\RF\X\Wi-Fi Module.EM6 (54)



Site no. : 1# 966 Chamber Data no. : 48
Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : HORIZONTAL
Limit : FCCPART 15C PEAK NII
Env. / Ins. : Temp:26.6';Humi:53.6%;Press:101.52kPa
Engineer : Boris
EUT : WIFI MODULE
Power : DC 5V From PC
M/N : 00WIMRA
Test Mode : IEEE 802.11ac20 TX 5745MHz

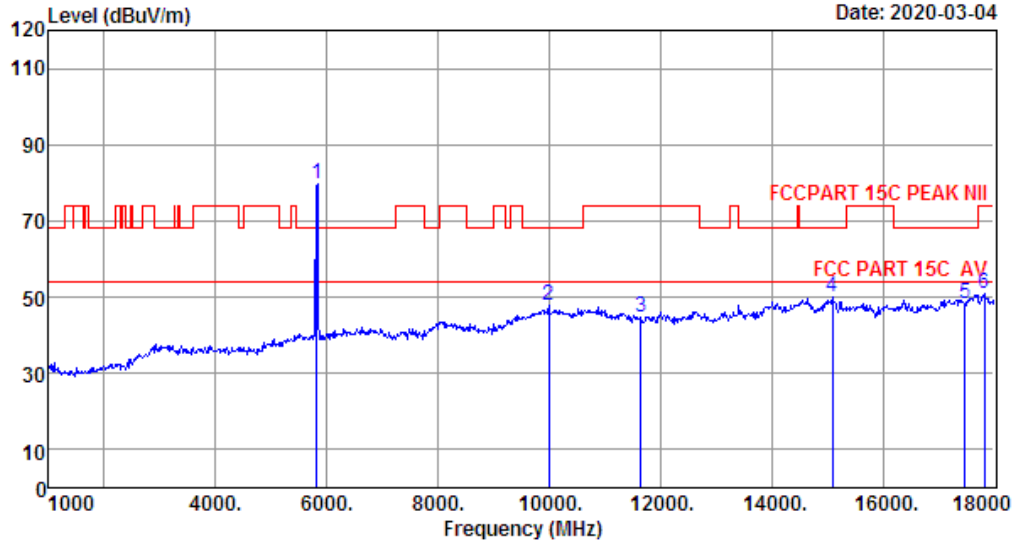
	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	5745.00	32.85	4.00	34.40	76.32	78.77	68.20	-10.57	Peak
2	10146.00	39.05	5.93	34.25	35.30	46.03	68.20	22.17	Peak
3	11490.00	39.90	6.15	34.65	31.63	43.03	74.00	30.97	Peak
4	14379.00	41.03	6.81	34.41	32.58	46.01	68.20	22.19	Peak
5	15076.00	40.82	6.76	34.57	34.36	47.37	68.20	20.83	Peak
6	17235.00	42.80	7.65	34.38	32.10	48.17	68.20	20.03	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

EST Technology

Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878

Data: 49 File: \\Emc-966-1\test data\2020\RF\X\Wi-Fi Module.EM6 (54)



Site no. : 1# 966 Chamber Data no. : 49
Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : HORIZONTAL
Limit : FCCPART 15C PEAK NII
Env. / Ins. : Temp:26.6';Humi:53.6%;Press:101.52kPa
Engineer : Boris
EUT : WIFI MODULE
Power : DC 5V From PC
M/N : 00WIMRA
Test Mode : IEEE 802.11ac20 TX 5825MHz

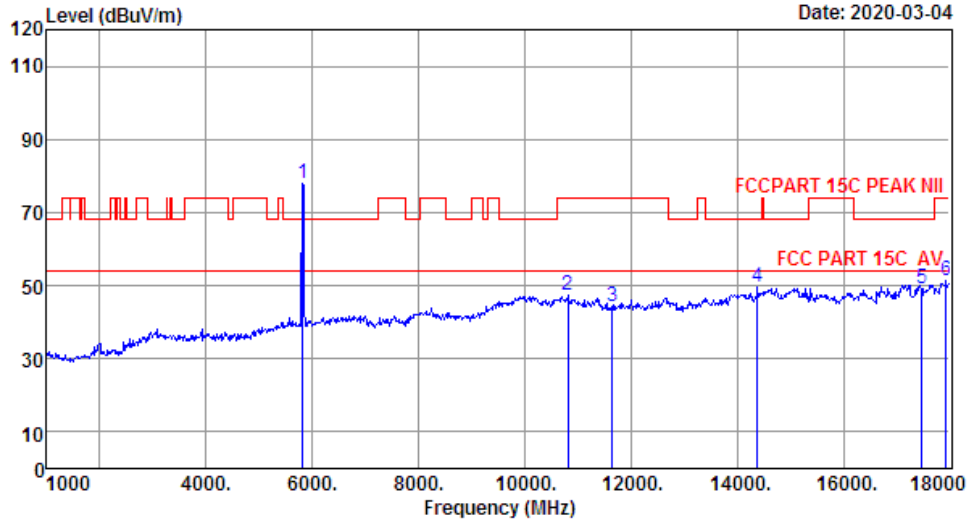
	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	5825.00	32.83	4.11	34.37	77.30	79.87	68.20	-11.67	Peak
2	9993.00	38.90	5.89	34.20	37.13	47.72	68.20	20.48	Peak
3	11650.00	39.90	6.08	34.69	33.29	44.58	74.00	29.42	Peak
4	15093.00	40.81	6.74	34.57	36.84	49.82	68.20	18.38	Peak
5	17475.00	44.70	7.89	34.35	30.11	48.35	68.20	19.85	Peak
6	17830.00	47.54	8.13	34.32	29.67	51.02	74.00	22.98	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

EST Technology

Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878

Data: 50 File: \\Emc-966-1\test data\2020\RF\X\Wi-Fi Module.EM6 (54)




```
Site no.      : 1# 966 Chamber              Data no.  : 50
Dis. / Ant.   : 3m   ANT9120D 1-18G         Ant. pol. : VERTICAL
Limit         : FCCPART 15C PEAK NII
Env. / Ins.   : Temp:26.6';Humi:53.6%;Press:101.52kPa
Engineer      : Boris
EUT           : WIFI MODULE
Power         : DC 5V From PC
M/N           : 00WIMRA
Test Mode     : IEEE 802.11ac20 TX 5825MHz
```

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	5825.00	32.83	4.11	34.37	75.38	77.95	68.20	-9.75	Peak
2	10809.00	39.71	6.08	34.44	36.11	47.46	74.00	26.54	Peak
3	11650.00	39.90	6.08	34.69	32.88	44.17	74.00	29.83	Peak
4	14379.00	41.03	6.81	34.41	35.98	49.41	68.20	18.79	Peak
5	17475.00	44.70	7.89	34.35	30.97	49.21	68.20	18.99	Peak
6	17932.00	48.36	8.20	34.31	29.13	51.38	74.00	22.62	Peak

```
Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
         2. Margin= Limit - Emission Level.
         3. The emission levels that are 20dB below the official
            limit are not reported.
```

Note:

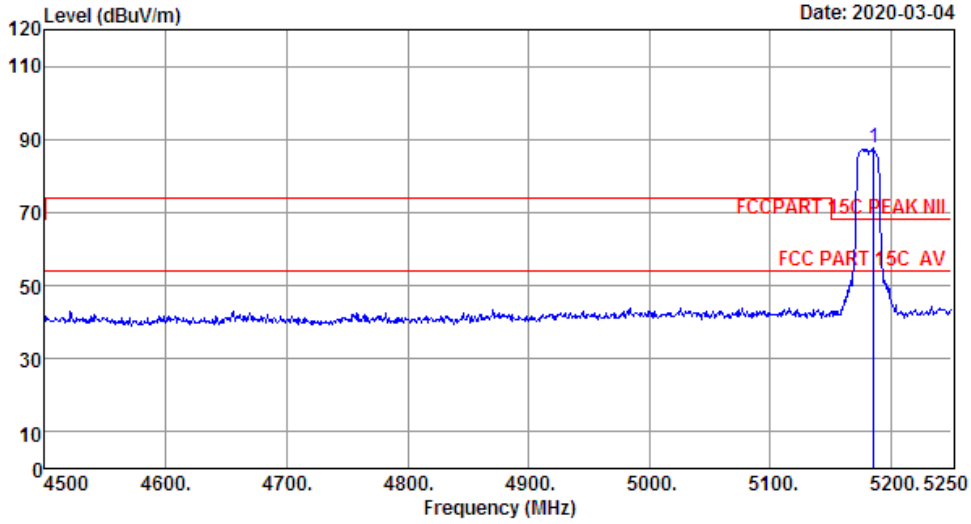
1. The amplitude of 18GHz to 25GHz spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.
2. All modulations are all tested ,only worse case is reported

Radiated Band Edge

EST Technology

Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878

Data: 41 File: \\Emc-966-1\test data\2020\RF\X\Wi-Fi Module.EM6 (54)




```
Site no.      : 1# 966 Chamber              Data no.  : 41
Dis. / Ant.   : 3m   ANT9120D 1-18G         Ant. pol. : VERTICAL
Limit         : FCCPART 15C PEAK NII
Env. / Ins.   : Temp:26.6';Humi:53.6%;Press:101.52kPa
Engineer      : Boris
EUT           : WIFI MODULE
Power         : DC 5V From PC
M/N           : 00WIMRA
Test Mode     : IEEE 802.11ac20 TX 5180MHz
```

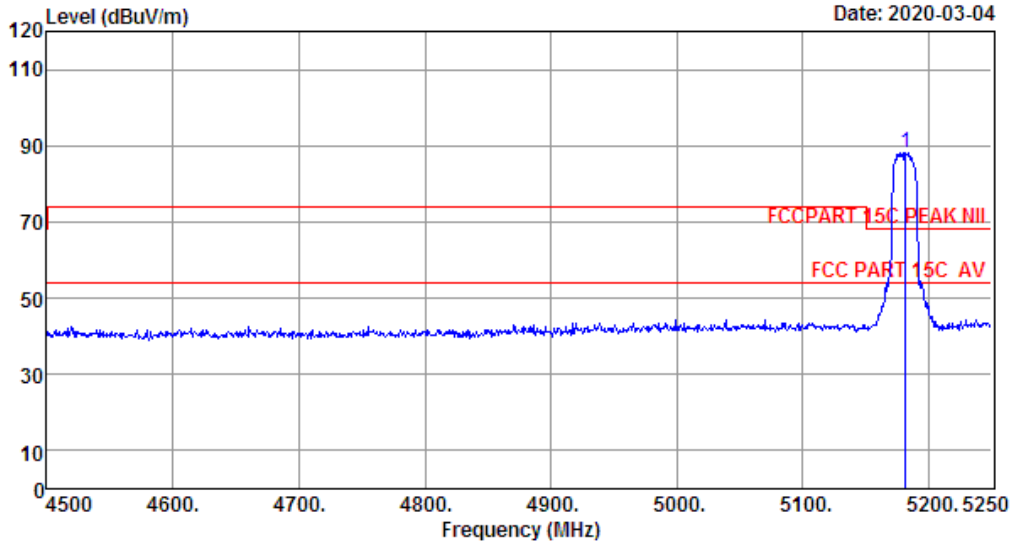
	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	5185.50	32.20	3.52	34.63	86.42	87.51	68.20	-19.31	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

EST Technology

Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878

Data: 42 File: \\Emc-966-1\test data\2020\RF\X\Wi-Fi Module.EM6 (54)



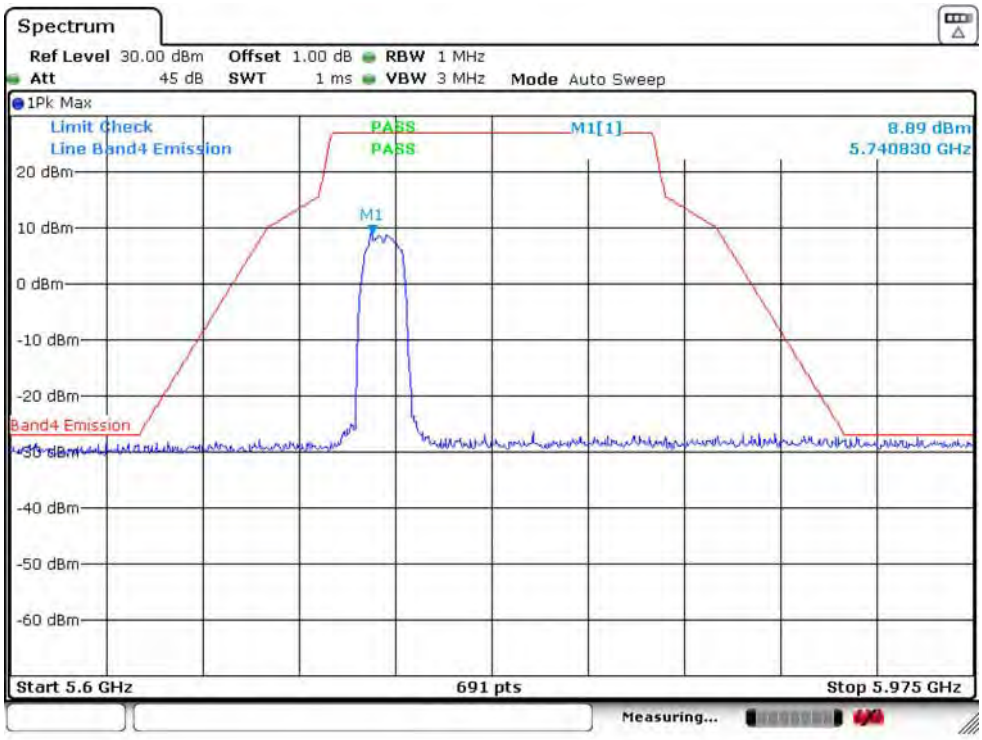
Site no. : 1# 966 Chamber Data no. : 42
Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : HORIZONTAL
Limit : FCCPART 15C PEAK NII
Env. / Ins. : Temp:26.6';Humi:53.6%;Press:101.52kPa
Engineer : Boris
EUT : WIFI MODULE
Power : DC 5V From PC
M/N : 00WIMRA
Test Mode : IEEE 802.11ac20 TX 5180MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	5181.75	32.20	3.52	34.63	87.15	88.24	68.20	-20.04	Peak

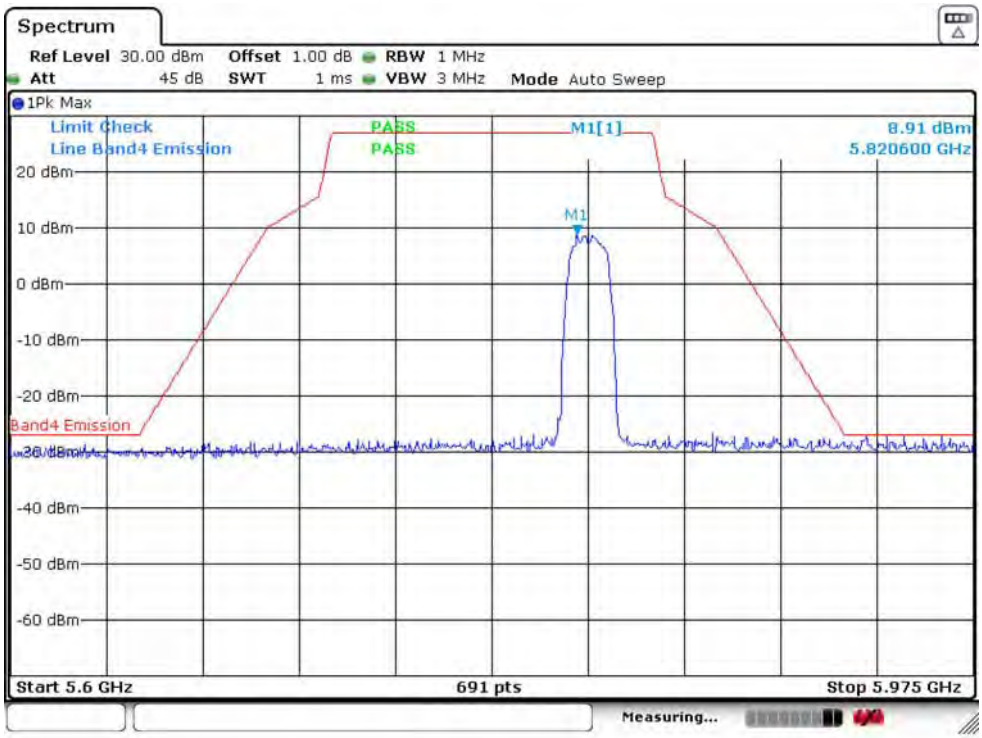
Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

All modulations are all tested ,only worse case is reported

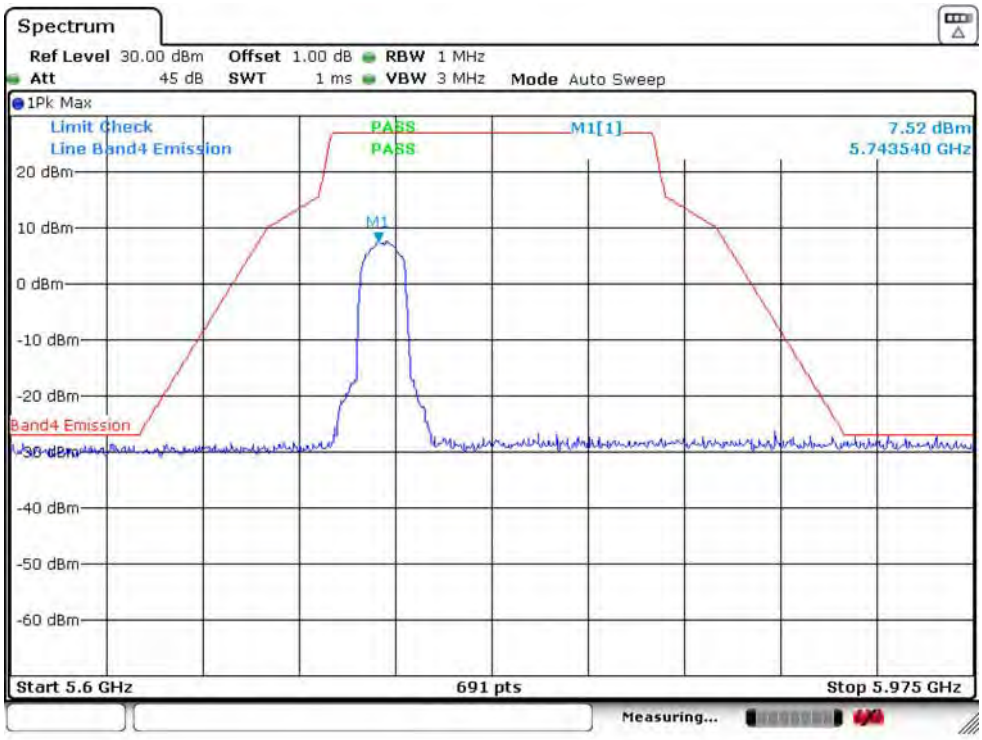
IEEE 802.11a 5745MHz



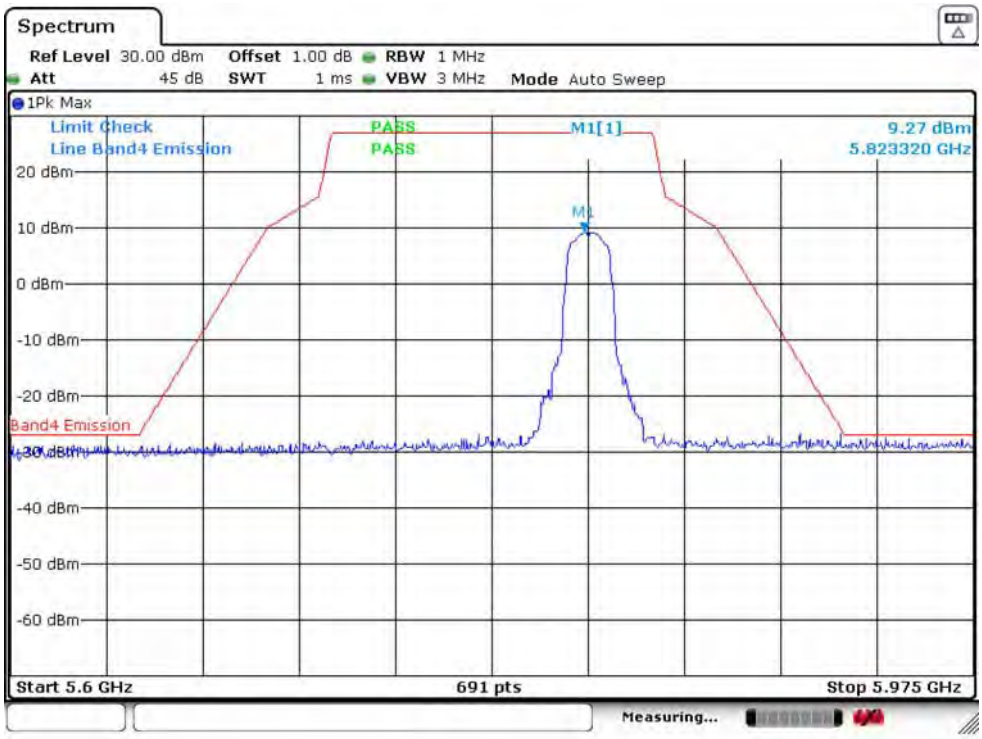
IEEE 802.11a 5825MHz



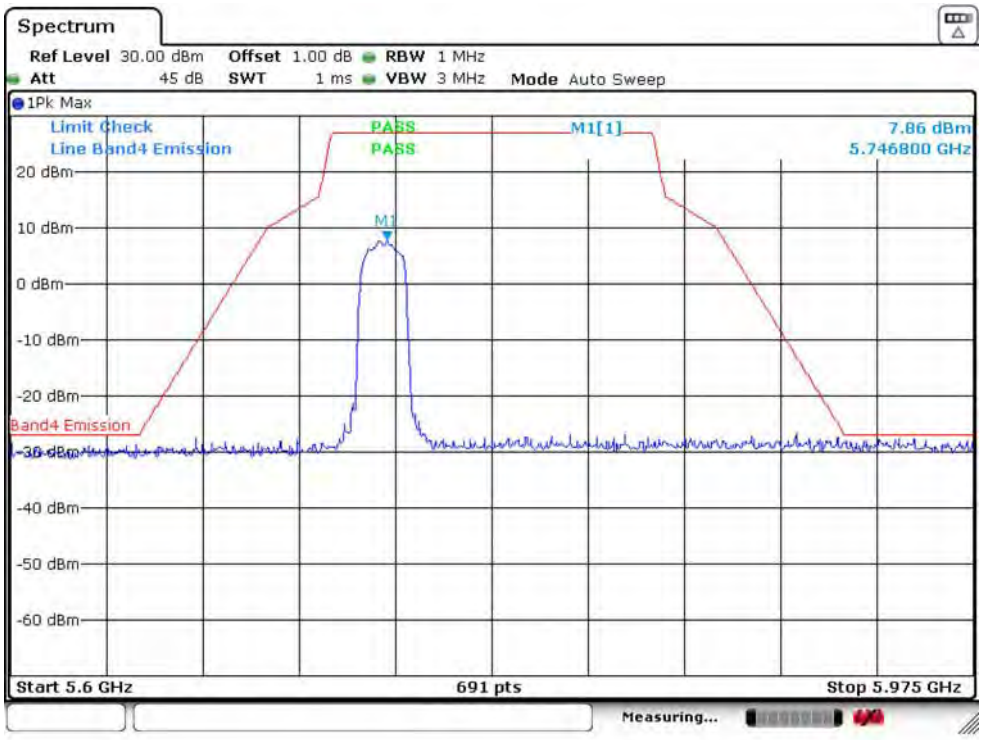
IEEE 802.11n HT20 5745MHz



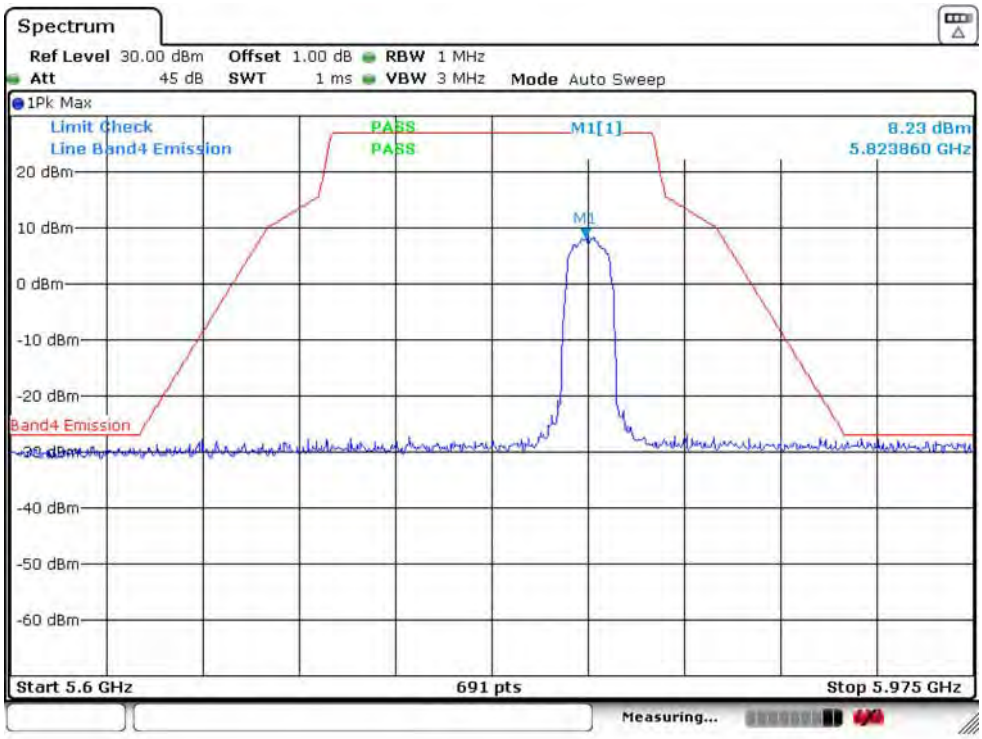
IEEE 802.11n HT20 5825MHz



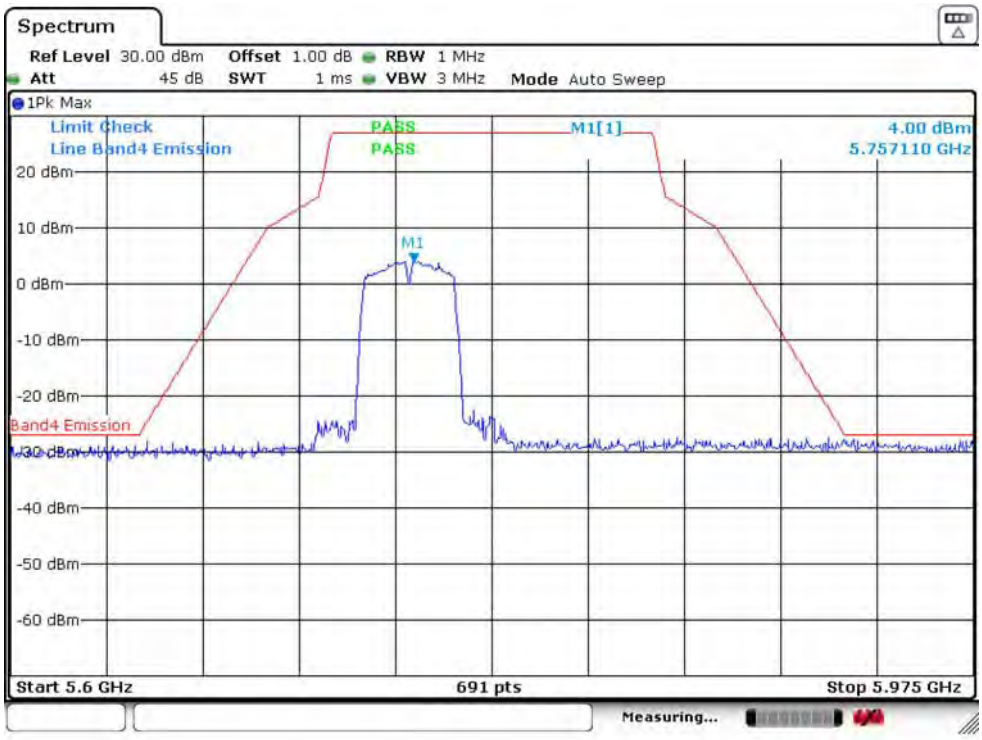
EEE 802.11ac VHT20 5745MHz



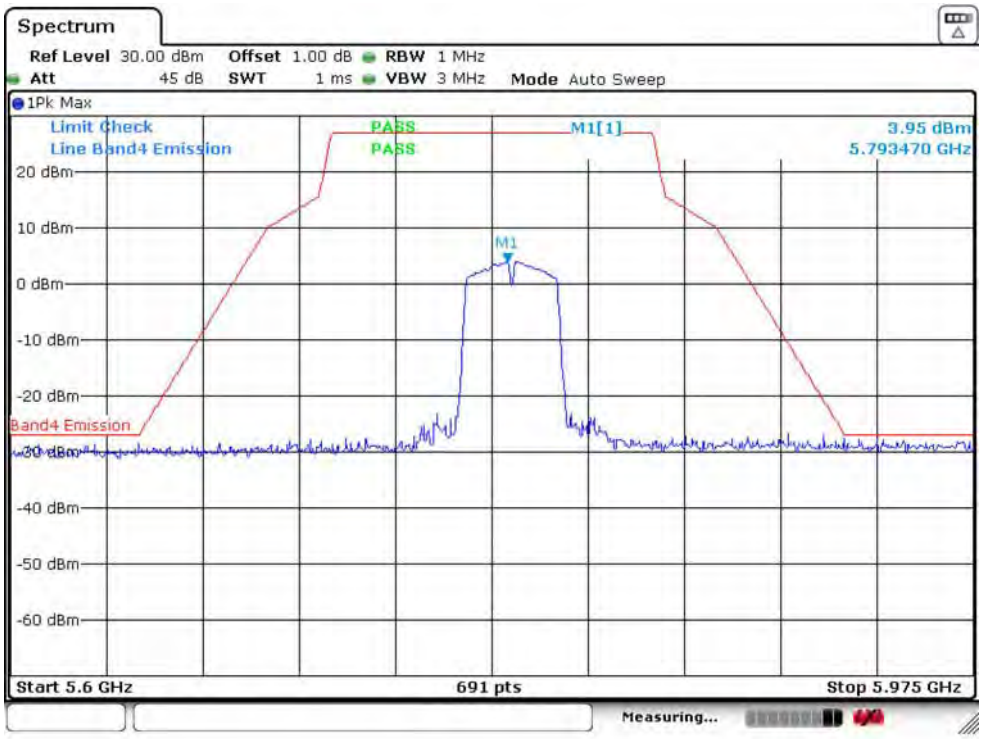
EEE 802.11ac VHT20 5825MHz



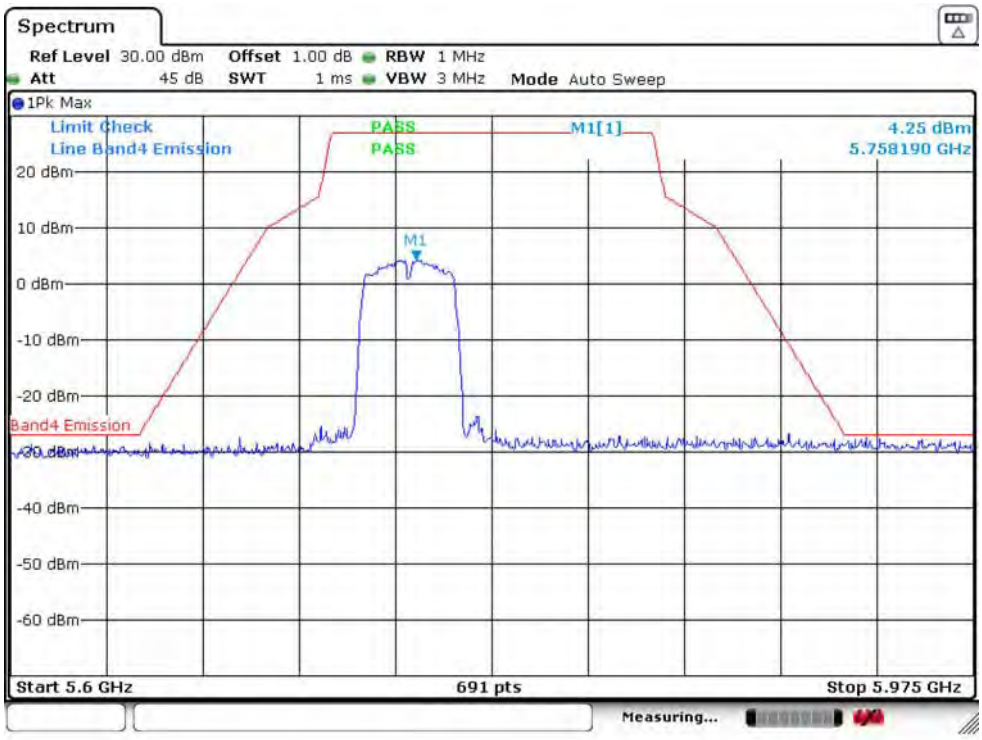
IEEE 802.11n HT40 5755MHz



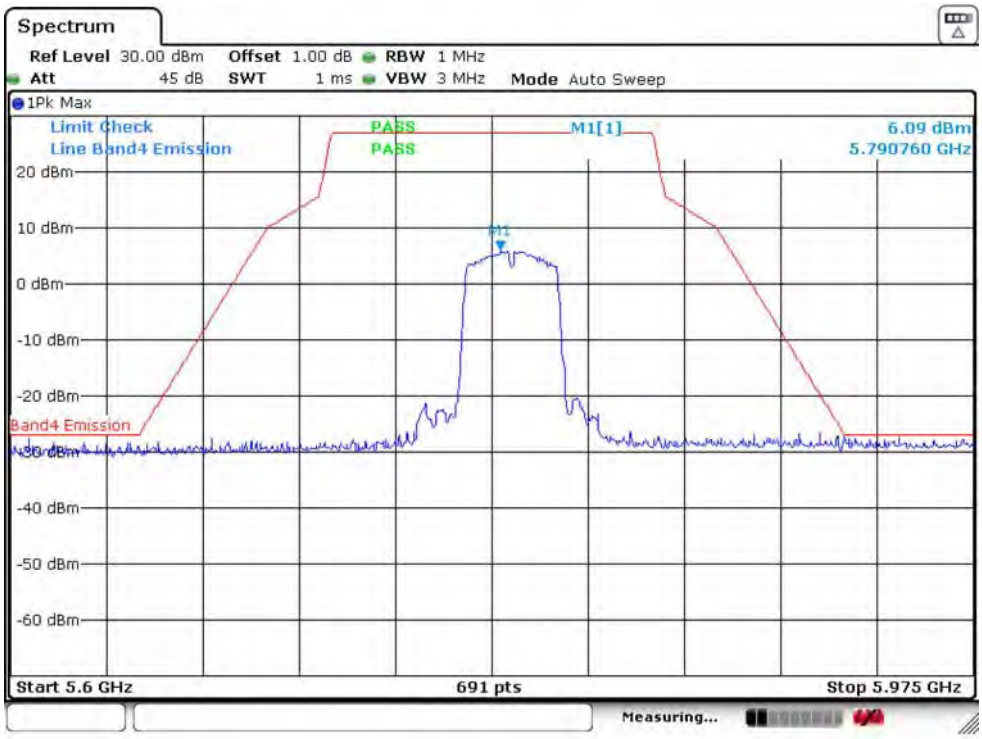
IEEE 802.11n HT40 5795MHz



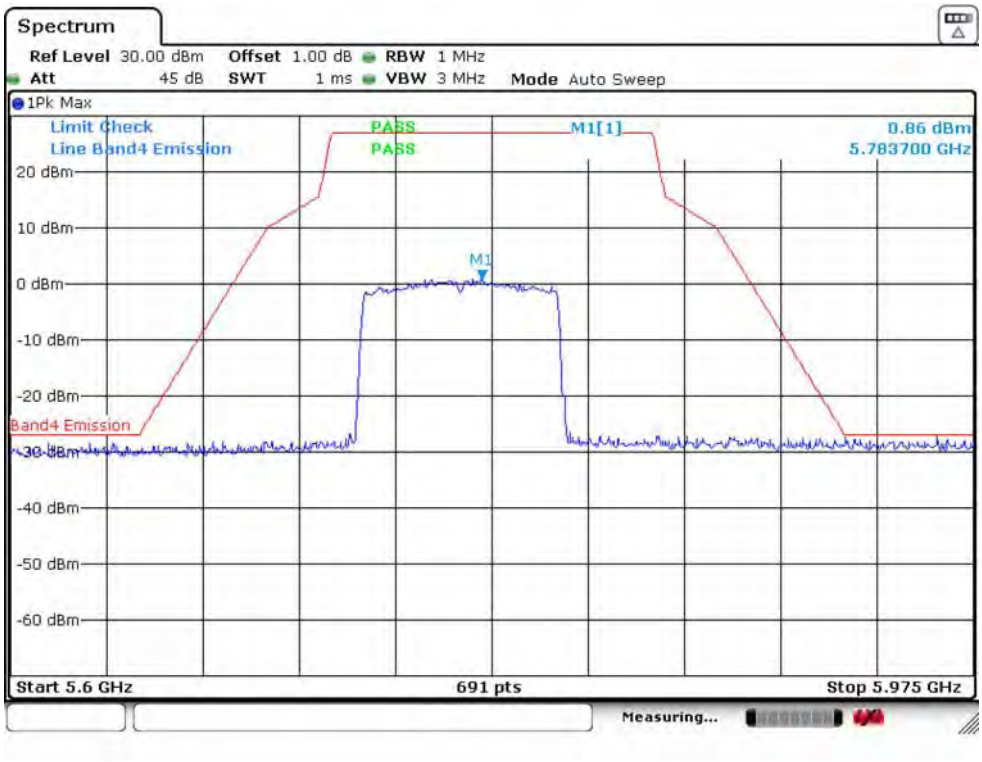
IEEE 802.11ac VHT40 5755MHz



IEEE 802.11ac VHT40 5795MHz



IEEE 802.11ac VHT80 5775MHz



All modulations are all tested ,only worse case is reported

18000MHz-40000MHz

Pass

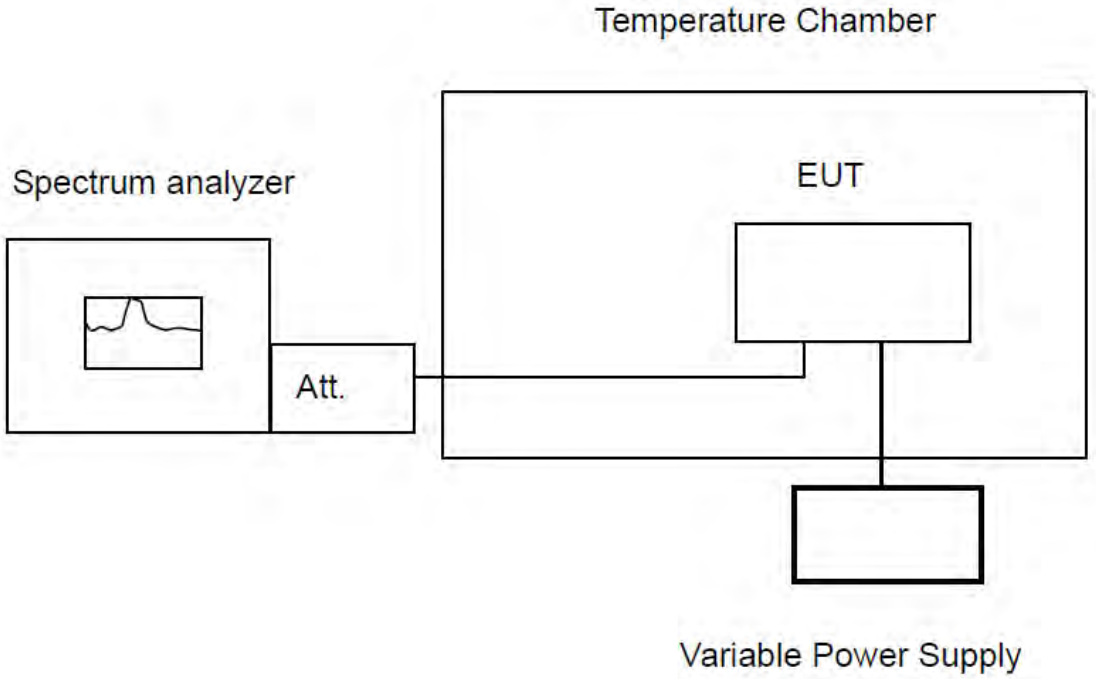
Note: The amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.

7. FREQUENCY STABILITY

7.1. Limit

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 operational description.

7.2. Test Setup



7.3. Spectrum Analyzer Setting

Spectrum Parameters	Setting
RBW	10KHz
VBW	10KHz
Span	200KHz
Sweep Time	Auto
Detector	PEAK
Trace Mode	Max Hold

7.4. Test Procedure

For measurement frequency stability under temperature variation :

a. Supply the EUT with a nominal ac voltage or install a new or fully charged battery in the EUT.
b. Turn the EUT OFF and place it inside the environmental temperature chamber.
c. Connect EUT antenna terminal to the spectrum analyzer with RF cable.
d. Spectrum analyzer setting parameters in accordance with section 7.3.
e. Set the temperature control on the chamber to the Specified temperature and allow the oscillator heater and the chamber temperature to stabilize.
f. Turn the EUT ON with the rated voltage, and the EUT transmit continuously with maximum output power.
g. Record the operating frequency at startup, and at 2 minutes, 5 minutes, and 10 minutes after the EUT is energized.
h. Repeat step d through step f to measured the temperature form -20℃ to +50℃ in 10℃ steps.

For frequency stability under voltage variation:

a. Supply the EUT with a nominal ac voltage or install a new or fully charged battery in the EUT.
b. Turn the EUT OFF and place it inside the environmental temperature chamber.
c. Connect EUT antenna terminal to the spectrum analyzer with RF cable.
d. Spectrum analyzer setting parameters in accordance with section 7.3.
e. Unless otherwise specified, set the temperature control on the chamber to the ambient room temperature (+15℃ to +25℃) and allow the oscillator heater and the chamber temperature to stabilize.
f. Turn the EUT ON with the rated voltage, and the EUT transmit continuously with maximum output power.
g. Record the operating frequency.
h. Repeat step d through step f to measured the varied from 85% to 115% of the rated voltage.

7.5. Test Result

Frequency (MHz)	Voltage (V)	Temperature (℃)	Time (minutes)	Measurement Value (MHz)	Frequency Error (ppm)
5180	4.5	50	0	5179.9284780	-13.81
			2	5179.9280070	-13.90
			5	5179.9274780	-14.00
			10	5179.9266310	-14.16
	4.5	40	0	5179.9264670	-14.20
			2	5179.9266230	-14.17
			5	5179.9271320	-14.07
			10	5179.9280340	-13.89
	4.5	30	0	5179.9277890	-13.94
			2	5179.9276410	-13.97
			5	5179.9268930	-14.11
			10	5179.9280630	-13.89
	4.5	20	0	5179.9283200	-13.84
			2	5179.9285390	-13.80
			5	5179.9273730	-14.02
			10	5179.9279460	-13.91
	4.5	10	0	5179.9284520	-13.81
			2	5179.9283560	-13.83
			5	5179.9285340	-13.80
			10	5179.9275234	-13.99
	4.5	0	0	5179.9277430	-13.95
			2	5179.9276530	-13.97
			5	5179.9283440	-13.83
			10	5179.9281430	-13.87
	4.5	-10	0	5179.9278320	-13.93
			2	5179.9265120	-14.19
			5	5179.9278320	-13.93
			10	5179.9284120	-13.82
	4.5	-20	0	5179.9283320	-13.84
			2	5179.9285432	-13.79
			5	5179.9273243	-14.03
			10	5179.9282370	-13.85
	4.5	20	/	5179.9282375	-13.85
	3.825	20	/	5179.9280000	-13.90
	5.175	20	/	5179.9280010	-13.90
	MAX Frquency Error(ppm)				**-13.79**

Frequency (MHz)	Voltage (V)	Temperature (℃)	Time (minutes)	Measurement Value (MHz)	Frequency Error (ppm)
5745	4.5	50	0	5744.9614750	-6.71
			2	5744.9710030	-5.05
			5	5744.9674740	-5.66
			10	5744.9750030	-4.35
	4.5	40	0	5744.9710030	-5.05
			2	5744.9618770	-6.64
			5	5744.9620010	-6.61
			10	5744.9755100	-4.26
	4.5	30	0	5744.9751000	-4.33
			2	5744.9628550	-6.47
			5	5744.9750040	-4.35
			10	5744.9750010	-4.35
	4.5	20	0	5744.9760030	-4.18
			2	5744.9750030	-4.35
			5	5744.9760080	-4.18
			10	5744.9759870	-4.18
	4.5	10	0	5744.9801000	-3.46
			2	5744.9810030	-3.31
			5	5744.9830020	-2.96
			10	5744.9840010	-2.78
	4.5	0	0	5744.9805200	-3.39
			2	5744.9880010	-2.09
			5	5744.9850040	-2.61
			10	5744.9800030	-3.48
	4.5	-10	0	5744.9810020	-3.31
			2	5744.9680020	-5.57
			5	5744.9650000	-6.09
			10	5744.9730000	-4.70
	4.5	-20	0	5744.9950000	-0.87
			2	5744.9890030	-1.91
			5	5744.9780010	-3.83
			10	5744.9870000	-2.26
	4.5	20	/	5744.9820050	-3.13
	3.825	20	/	5744.9880000	-2.09
	5.175	20	/	5744.9880030	-2.09
	MAX Frquency Error(ppm)				**-0.87**

8. AC POWER LINE CONDUCTED EMISSIONS

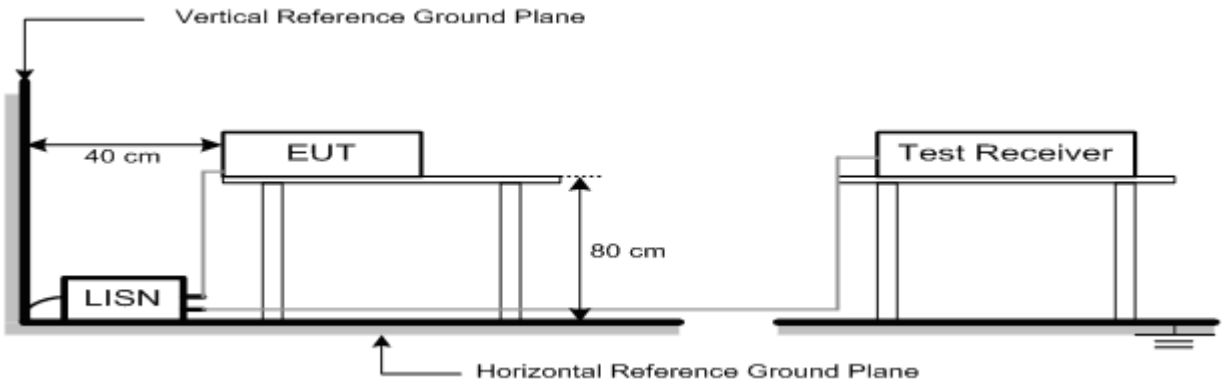
8.1. Limit

Frequency			Maximum RF Line Voltage	
			Quasi-Peak Level dB(μV)	Average Level dB(μV)
150kHz	~	500kHz	66 ~ 56*	56 ~ 46*
500kHz	~	5MHz	56	46
5MHz	~	30MHz	60	50

Notes:

1. * Decreasing linearly with logarithm of frequency.
2. The lower limit shall apply at the transition frequencies.

8.2. Test Setup



8.3. Spectrum Analyzer Setting

Spectrum Parameters	Setting
RBW	9KHz
VBW	9KHz
Start frequency	150KHz
Stop frequency	30MHz
Sweep Time	Auto
Detector	QP/AVG
Trace Mode	Max Hold

8.4. Test Procedure

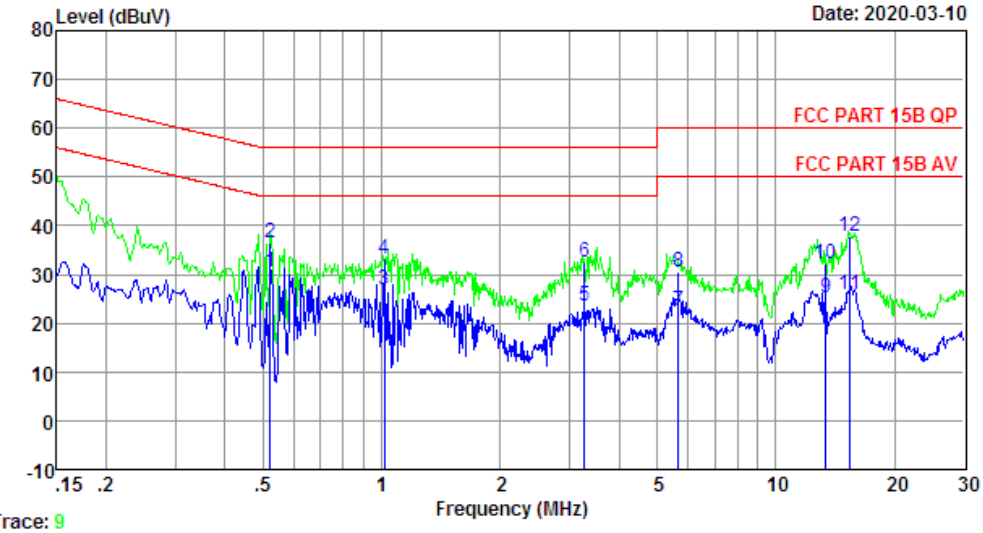
a. The EUT was placed on a non-metallic table, 80cm above the ground plane.
b. The EUT Power connected to the power mains through a line impedance stabilization network.
c. Provides a 50 ohm coupling impedance for the EUT (Please refer the block diagram of the test setup and photographs).
d. Set the EUT transmit continuously with maximum output power.
e. Spectrum analyzer setting parameters in accordance with section 8.3.
f. The AC line are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI C63.10: 2013 on Conducted Emission Test.
g. Record the results in the test report.

8.5. Test Result

EST Technology

Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878

Data: 10 File: \\Emc-ce-2\Test Data\2020\RF\P\Prima\00WIMRA.EM6 (32)



Trace: 9

Site no : 2# Conduction Shield Room Data no. : 10
Env. / Ins. : Temp:21.5℃ Humi:54% Press:101.50kPa LINE Phase : LINE
Limit : FCC PART 15B QP
Engineer : Pluto
EUT : WIFI MODULE
Power : DC 5V From PC From
: Adapter Input AC120V/60Hz
M/N : 00WIMRA
Test Mode : TX Mode

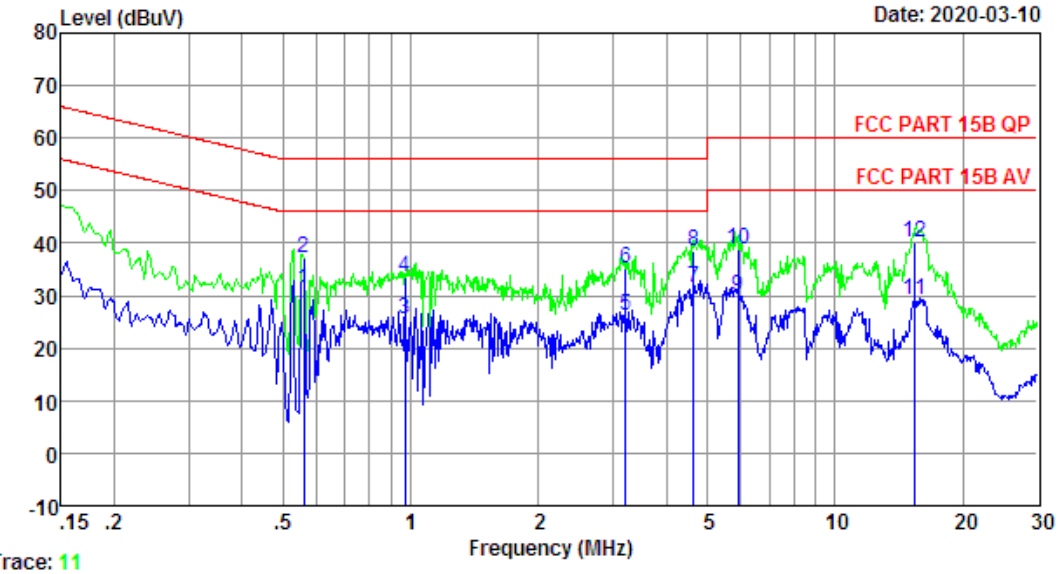
	Freq. (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuv)	Limits (dBuv)	Margin (dB)	Remark
1	0.521	9.79	0.05	20.63	30.47	56.00	25.53	Average
2	0.521	9.79	0.05	26.65	36.49	56.00	19.51	QP
3	1.016	9.89	0.06	17.05	27.00	56.00	29.00	Average
4	1.016	9.89	0.06	23.12	33.07	56.00	22.93	QP
5	3.276	9.90	0.07	13.54	23.51	56.00	32.49	Average
6	3.276	9.90	0.07	22.54	32.51	56.00	23.49	QP
7	5.653	10.19	0.07	12.22	22.48	60.00	37.52	Average
8	5.653	10.19	0.07	20.23	30.49	60.00	29.51	QP
9	13.408	9.86	0.08	15.26	25.20	60.00	34.80	Average
10	13.408	9.86	0.08	22.26	32.20	60.00	27.80	QP
11	15.470	9.98	0.08	15.79	25.85	60.00	34.15	Average
12	15.470	9.98	0.08	27.67	37.73	60.00	22.27	QP

Remarks: 1. Emission Level= LISN Factor + Cable Loss + Reading.
2. Margin=Limit - Emission Level.
3. If the average limit is met when using a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.

EST Technology

Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878

Data: 12 File: \\Emc-ce-2\Test Data\2020\RF\P\Prima\00WIMRA.EM6 (32)



Trace: 11

Site no : 2# Conduction Shield Room Data no. : 12
Env. / Ins. : Temp:21.5℃ Humi:54% Press:101.50kPa LINE Phase : NEUTRAL
Limit : FCC PART 15B QP
Engineer : Pluto
EUT : WIFI MODULE
Power : DC 5V From PC From
: Adapter Input AC120V/60Hz
M/N : 00WIMRA
Test Mode : TX Mode

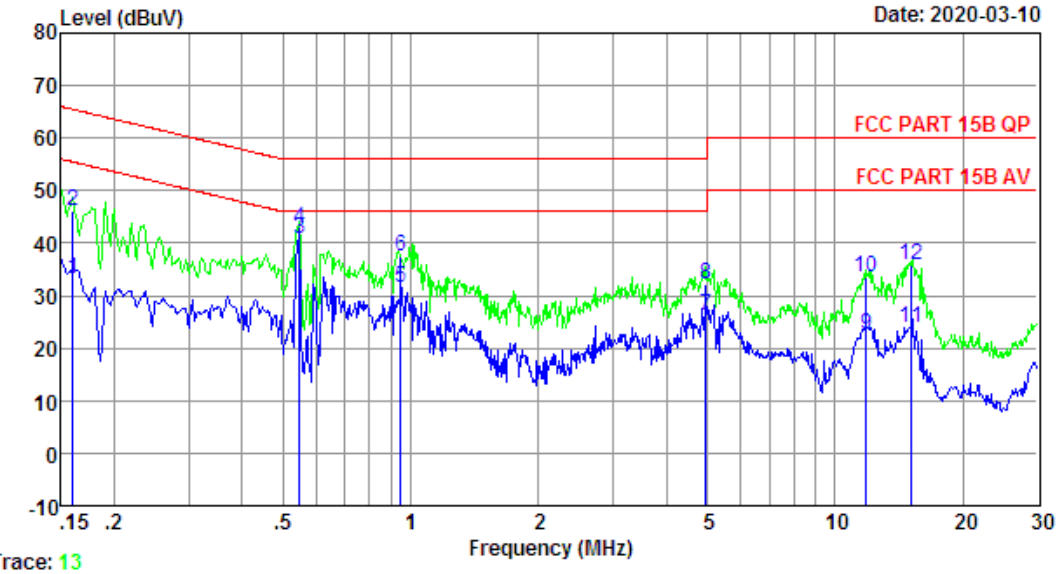
	Freq. (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuv)	Limits (dBuv)	Margin (dB)	Remark
1	0.561	9.70	0.05	21.37	31.12	56.00	24.88	Average
2	0.561	9.70	0.05	27.36	37.11	56.00	18.89	QP
3	0.968	9.76	0.06	15.82	25.64	56.00	30.36	Average
4	0.968	9.76	0.06	23.81	33.63	56.00	22.37	QP
5	3.207	9.91	0.07	16.09	26.07	56.00	29.93	Average
6	3.207	9.91	0.07	25.09	35.07	56.00	20.93	QP
7	4.647	9.93	0.07	21.54	31.54	56.00	24.46	Average
8	4.647	9.93	0.07	28.54	38.54	56.00	17.46	QP
9	5.898	9.76	0.07	20.07	29.90	60.00	30.10	Average
10	5.898	9.76	0.07	29.06	38.89	60.00	21.11	QP
11	15.470	10.10	0.08	19.04	29.22	60.00	30.78	Average
12	15.470	10.10	0.08	30.03	40.21	60.00	19.79	QP

Remarks: 1. Emission Level= LISN Factor + Cable Loss + Reading.
2. Margin=Limit - Emission Level.
3. If the average limit is met when using a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.

EST Technology

Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878

Data: 14 File: \\Emc-ce-2\Test Data\2020\RF\P\Prima\00WIMRA.EM6 (32)



Trace: 13

Site no : 2# Conduction Shield Room Data no. : 14
Env. / Ins. : Temp:21.5℃ Humi:54% Press:101.50kPa LINE Phase : LINE
Limit : FCC PART 15B QP
Engineer : Pluto
EUT : WIFI MODULE
Power : DC 5V From PC From
: Adapter Input AC240V/60Hz
M/N : 00WIMRA
Test Mode : TX Mode

	Freq. (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuv)	Limits (dBuv)	Margin (dB)	Remark
1	0.160	9.68	0.04	23.51	33.23	65.47	32.24	Average
2	0.160	9.68	0.04	36.52	46.24	65.47	19.23	QP
3	0.546	9.80	0.05	30.89	40.74	56.00	15.26	Average
4	0.546	9.80	0.05	32.97	42.82	56.00	13.18	QP
5	0.948	9.88	0.06	21.65	31.59	56.00	24.41	Average
6	0.948	9.88	0.06	27.66	37.60	56.00	18.40	QP
7	4.952	10.06	0.07	16.13	26.26	56.00	29.74	Average
8	4.952	10.06	0.07	22.13	32.26	56.00	23.74	QP
9	11.870	9.73	0.08	12.70	22.51	60.00	37.49	Average
10	11.870	9.73	0.08	23.70	33.51	60.00	26.49	QP
11	15.146	9.98	0.08	13.71	23.77	60.00	36.23	Average
12	15.146	9.98	0.08	25.70	35.76	60.00	24.24	QP

Remarks: 1. Emission Level= LISN Factor + Cable Loss + Reading.
2. Margin=Limit - Emission Level.
3. If the average limit is met when using a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.

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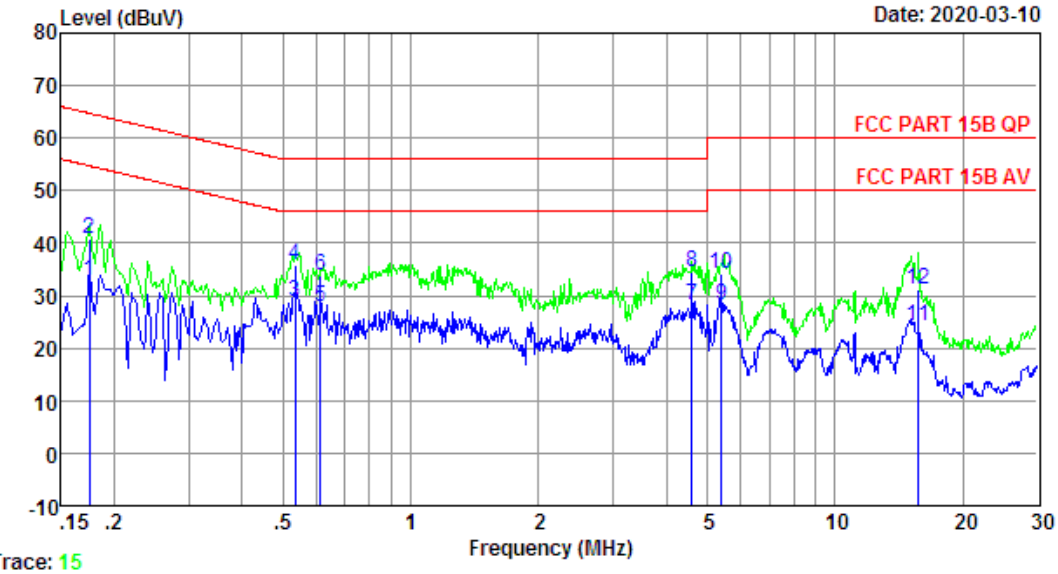
Chilingxiang, Qishantou, Santun,
Houjie, Dongguan,Guangdong,China
Tel:+86-769-83081888
Fax:+86-769-83081878

Data: 16 File: \\Emc-ce-2\Test Data\2020\RF\P\Prima\00WIMRA.EM6 (32)



Trace: 15

Site no : 2# Conduction Shield Room Data no. : 16
Env. / Ins. : Temp:21.5℃ Humi:54% Press:101.50kPa LINE Phase : NEUTRAL
Limit : FCC PART 15B QP
Engineer : Pluto
EUT : WIFI MODULE
Power : DC 5V From PC From
: Adapter Input AC240V/60Hz
M/N : 00WIMRA
Test Mode : TX Mode

	Freq. (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuv)	Limits (dBuv)	Margin (dB)	Remark
1	0.175	9.65	0.04	23.21	32.90	64.72	31.82	Average
2	0.175	9.65	0.04	31.21	40.90	64.72	23.82	QP
3	0.535	9.70	0.05	19.14	28.89	56.00	27.11	Average
4	0.535	9.70	0.05	26.13	35.88	56.00	20.12	QP
5	0.614	9.71	0.05	18.22	27.98	56.00	28.02	Average
6	0.614	9.71	0.05	24.22	33.98	56.00	22.02	QP
7	4.598	9.93	0.07	18.35	28.35	56.00	27.65	Average
8	4.598	9.93	0.07	24.35	34.35	56.00	21.65	QP
9	5.390	9.86	0.07	18.12	28.05	60.00	31.95	Average
10	5.390	9.86	0.07	24.11	34.04	60.00	25.96	QP
11	15.718	10.09	0.08	13.97	24.14	60.00	35.86	Average
12	15.718	10.09	0.08	20.96	31.13	60.00	28.87	QP

Remarks: 1. Emission Level= LISN Factor + Cable Loss + Reading.
2. Margin=Limit - Emission Level.
3. If the average limit is met when using a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.

9. ANTENNA REQUIREMENTS

9.1. Limit

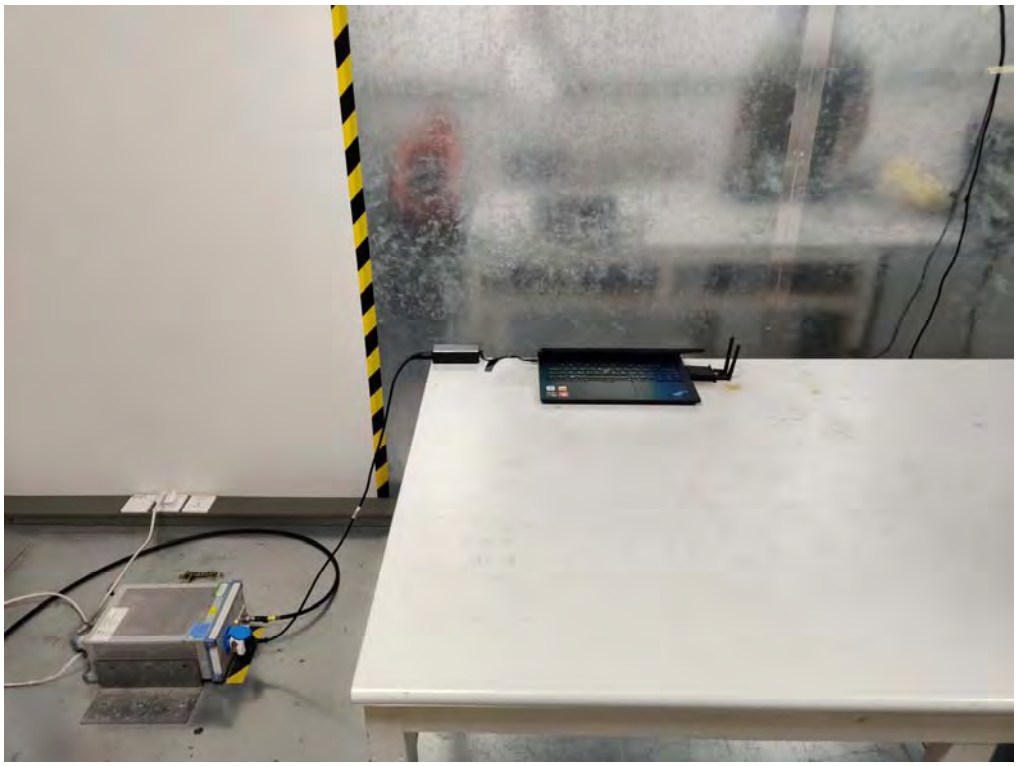
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §§15.211, 15.213, 15.217, 15.219, 15.221, or §15.236. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

9.2. Test Result

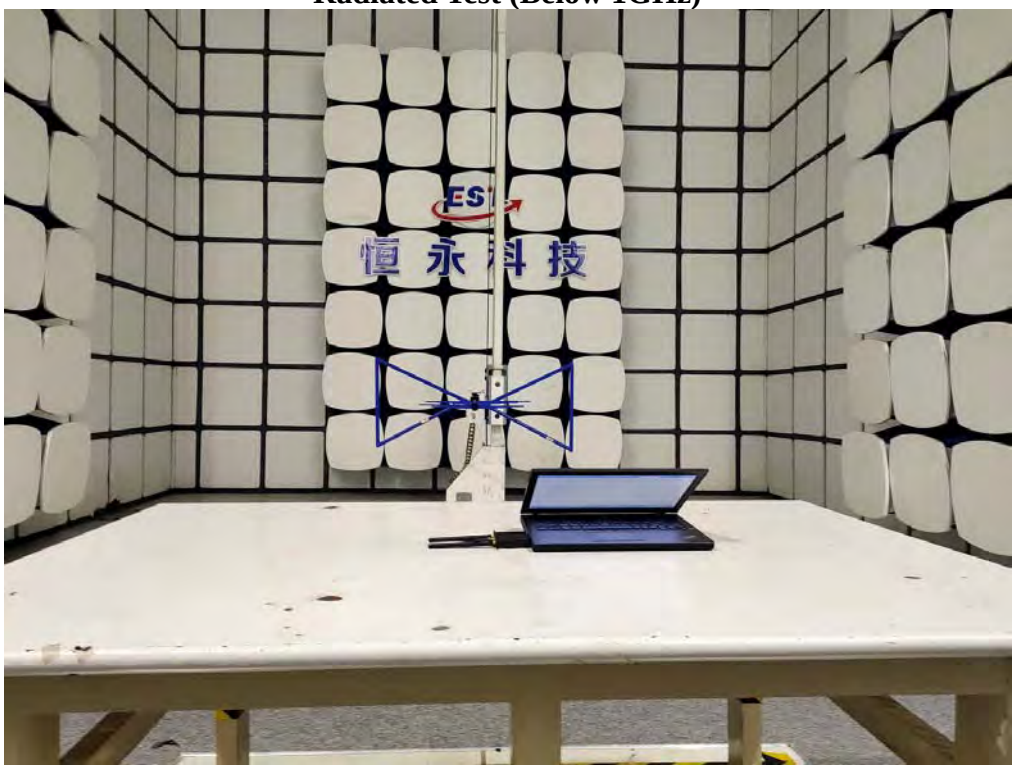
The antennas used for this product is External antenna, so compliance with antenna requirements.
(Please refer to the EUT photo for details)

10. TEST SETUP PHOTO

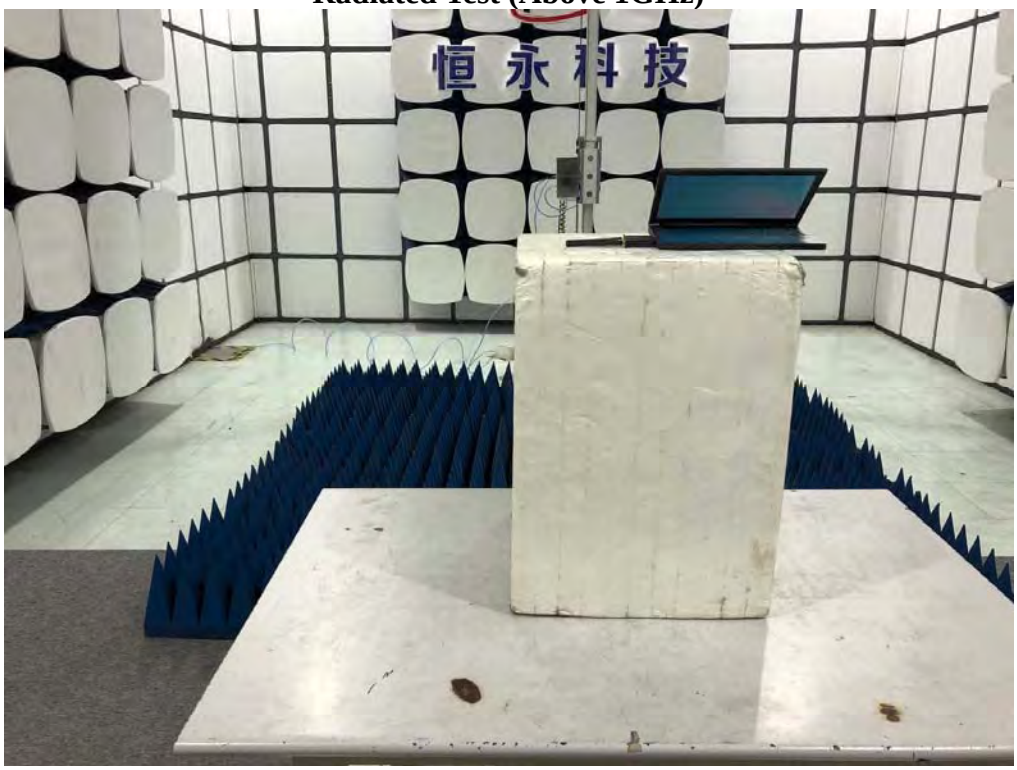
Conducted Test



Radiated Test (Below 1GHz)



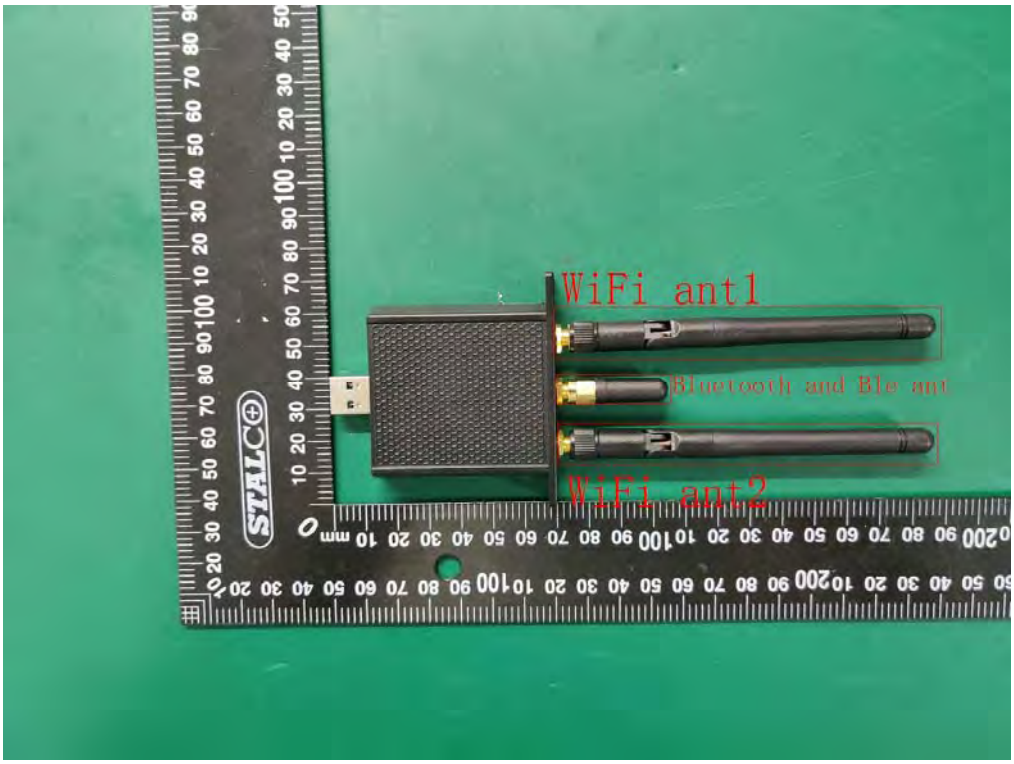
Radiated Test (Above 1GHz)



11.EUT PHOTO

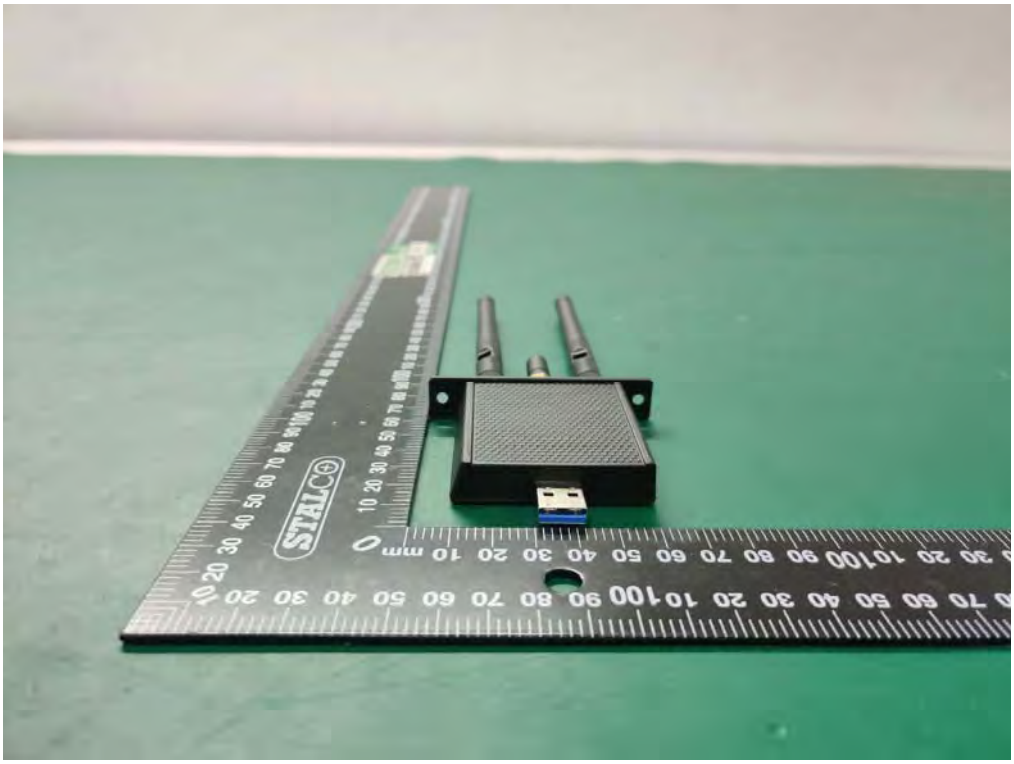
External Photos

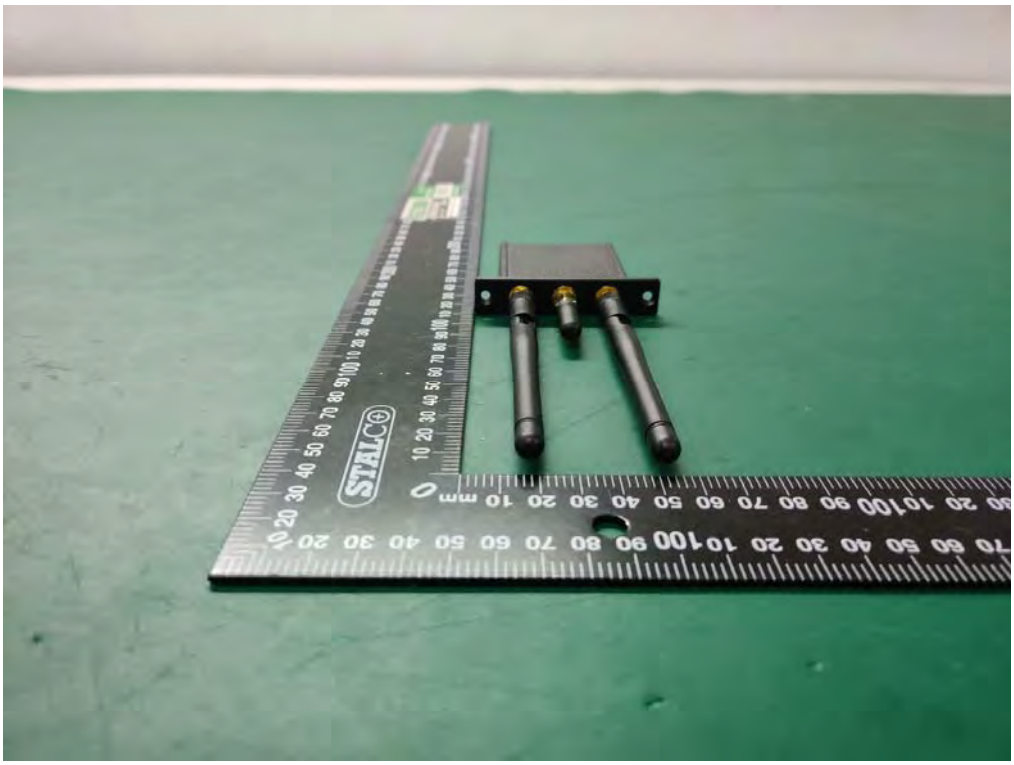
M/N: 00WIMRA



External Photos

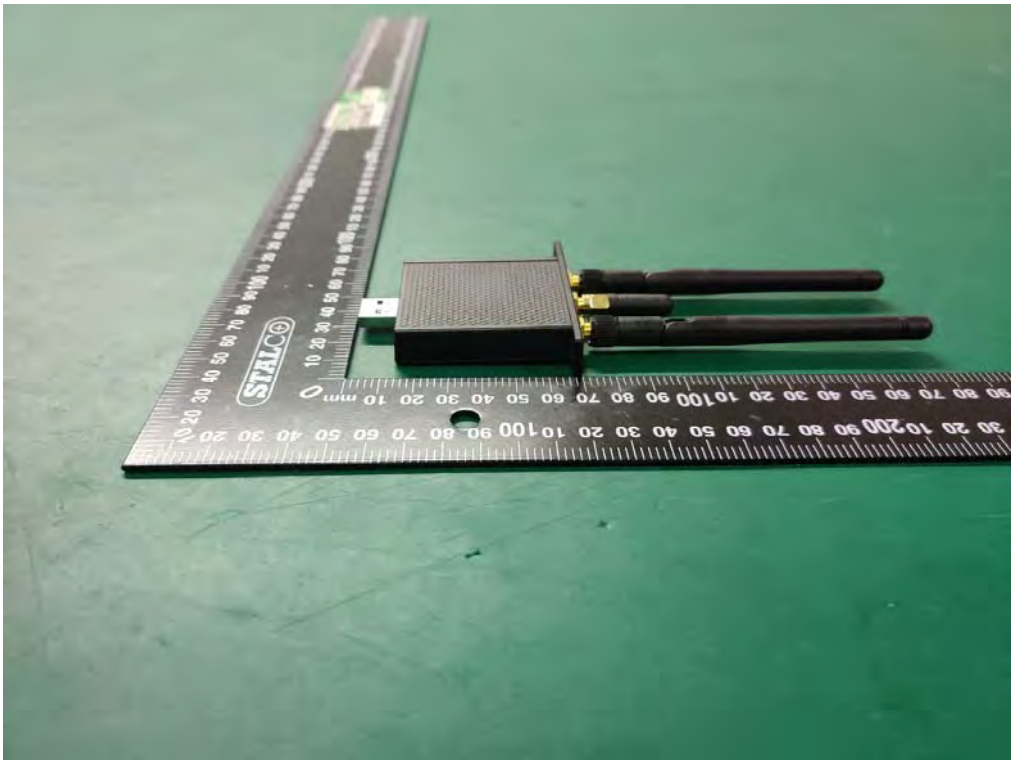
M/N: 00WIMRA

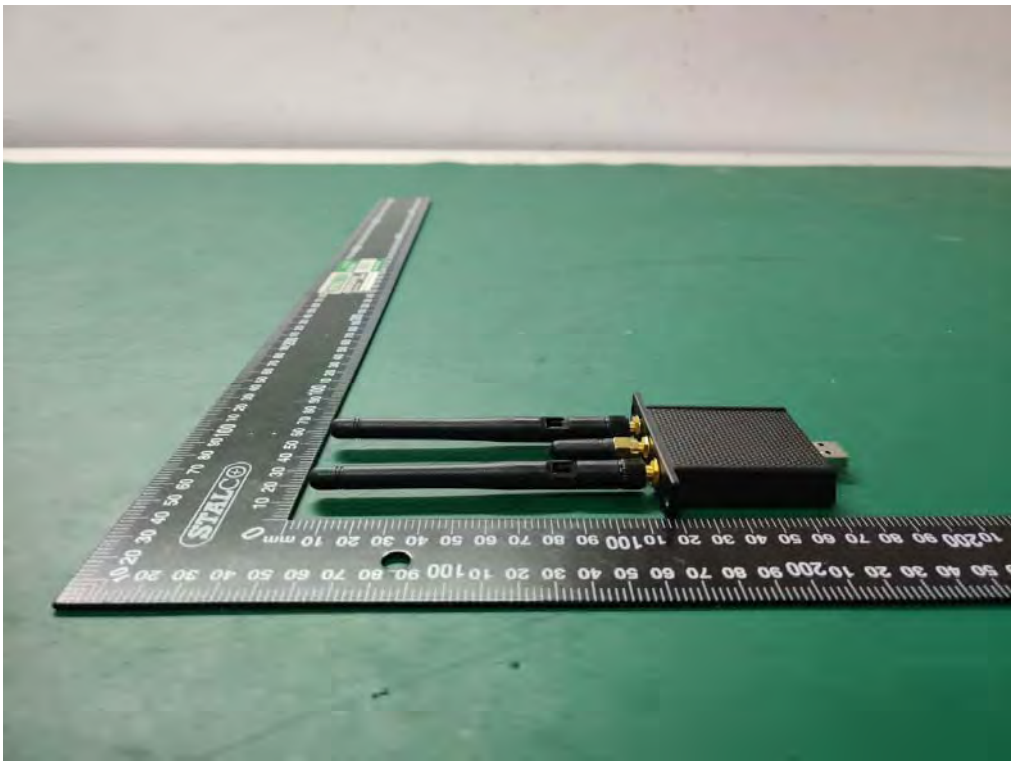




External Photos

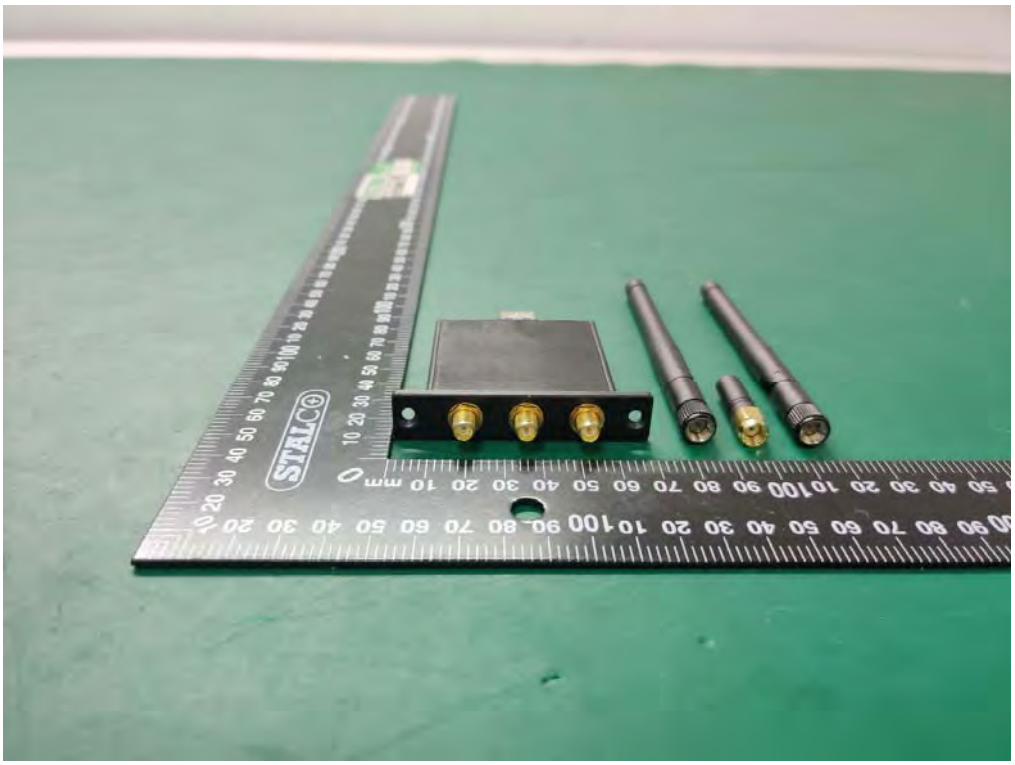
M/N: 00WIMRA





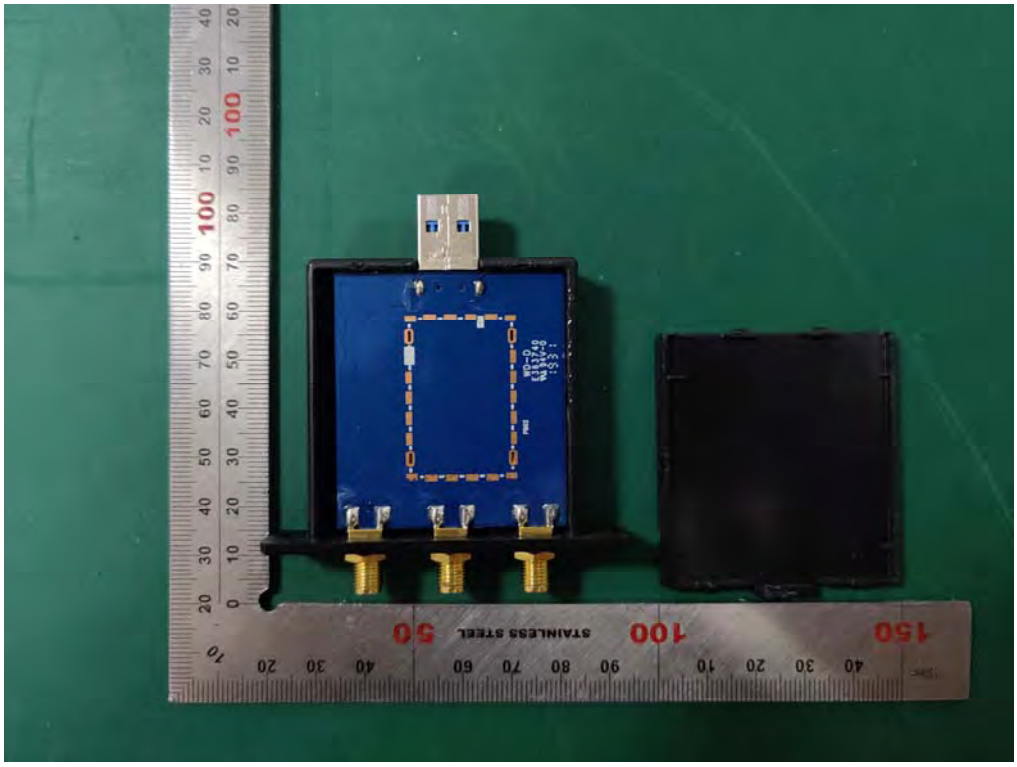
External Photos

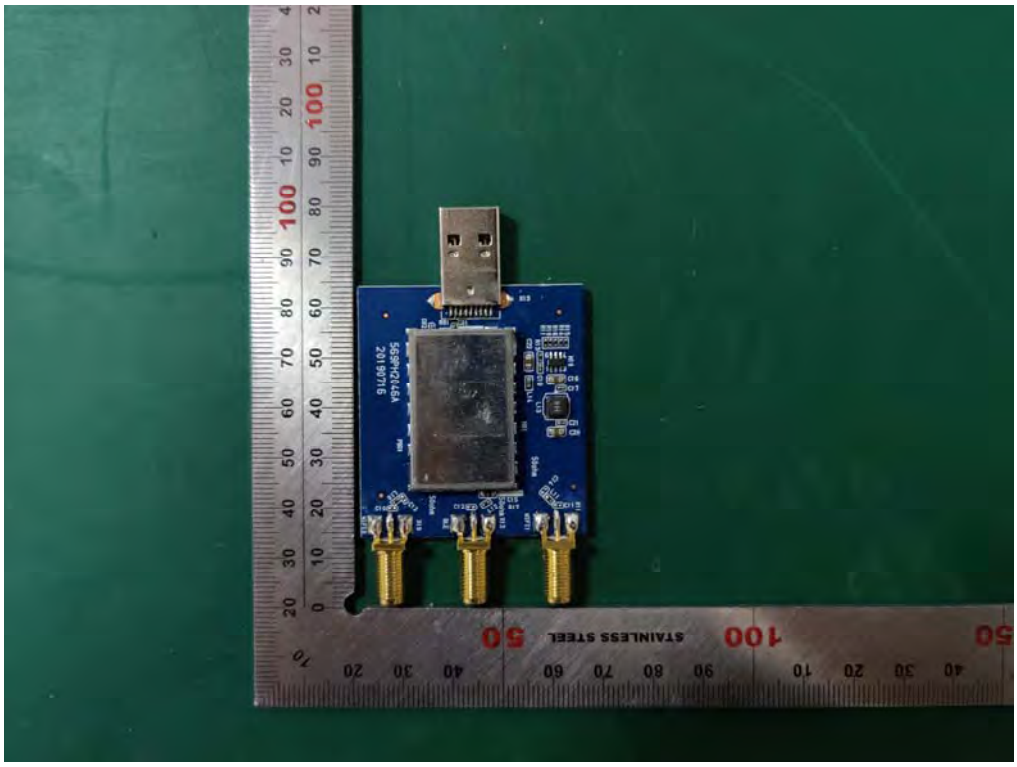
M/N: 00WIMRA



Internal Photos

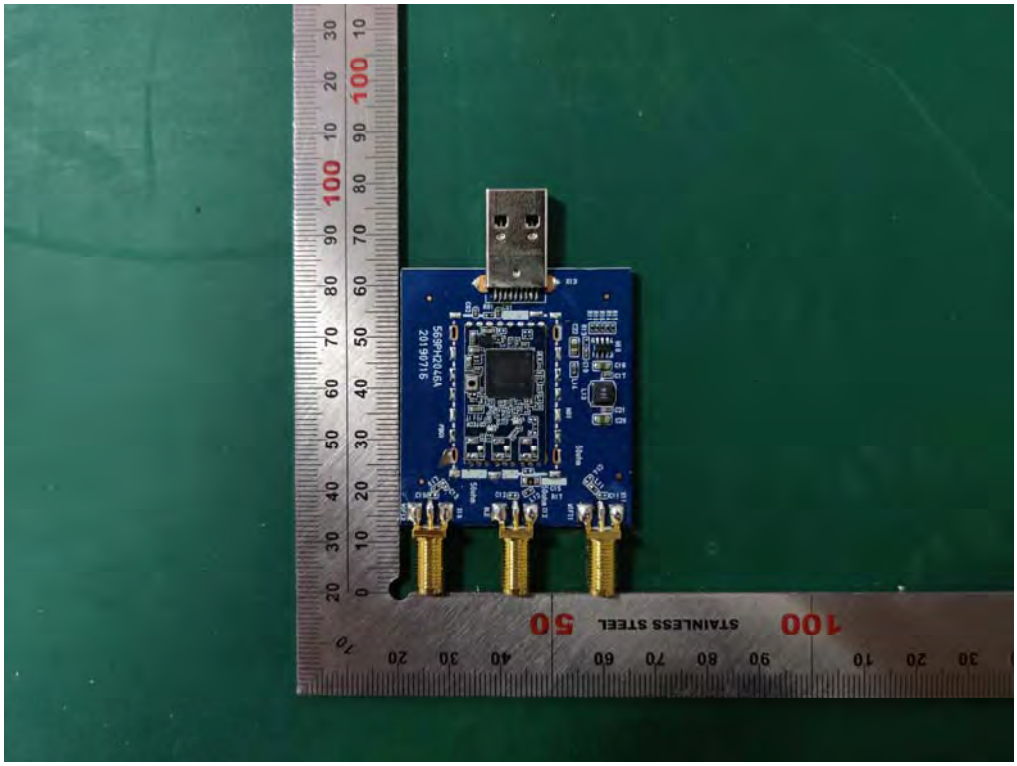
M/N: 00WIMRA

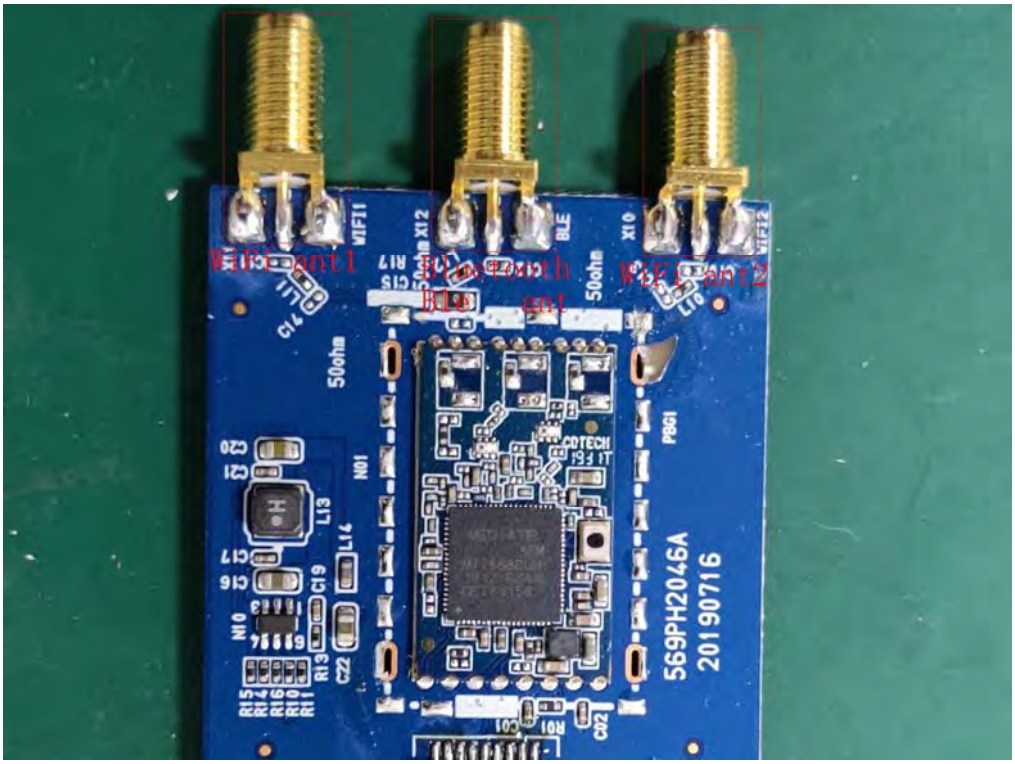




Internal Photos

M/N: 00WIMRA





End of Test Report