



TEST REPORT

Report No.	CHTEW20010180	Report Verification:	
Project No.	SHT1912069305EW		
FCC ID	2AVIMA102		
Applicant's name	CHINA HAINERGY NEW ENERGY CORP.,LIMITED		
Address.....	Unit 1908,19/F,Harbour Centre,25 Harbour Road,Wan Chai,HongKong		
Manufacturer.....	CHINA HAINERGY NEW ENERGY CORP.,LIMITED		
Address.....	Unit 1908,19/F,Harbour Centre,25 Harbour Road,Wan Chai,HongKong		
Test item description	Tablet PC		
Trade Mark	Plan Ceibal		
Model/Type reference.....	ACRUX		
Listed Model(s)	A102		
Standard	FCC CFR Title 47 Part 15 Subpart E Section 15.407		
Date of receipt of test sample.....	Dec.27,2019		
Date of testing.....	Dec.27,2019 ~ Jan.17,2020		
Date of issue.....	Jan.19,2020		
Result.....	PASS		

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Approved by
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Testing Laboratory Name **Shenzhen Huatongwei International Inspection Co., Ltd.**

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The test report merely correspond to the test sample.

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1. TEST STANDARDS AND REPORT VERSION

1.1. Test Standards

The tests were performed according to following standards:

- [FCC Rules Part 15.407](#): General technical requirements.
- [ANSI C63.10:2013](#): American National Standard for Testing Unlicensed Wireless Devices
- [KDB789033 D02 v02r01](#): GUIDELINES FOR COMPLIANCE TESTING OF UNLICENSED NATIONAL INFORMATION INFRASTRUCTURE (U-NII) DEVICES PART 15, SUBPART E

1.2. Report version

Revision No.	Date of issue	Description
N/A	2020-01-19	Original

2. TEST DESCRIPTION

Report clause	Test Items	Standard Requirement	Result
5.1	Antenna Requirement	15.203/15.247(c)	PASS
5.2	AC Conducted Emission	15.207	PASS
5.3	Maximum Conducted Output Power	15.407(a)	PASS
5.4	Maximum Power Spectral Density	15.407(a)	PASS
5.5	26dB Bandwidth and 99% Occupied bandwidth	15.407(a)	PASS
5.6	6dB Bandwidth	15.407(a)	PASS
5.7	Band edge	15.407(b)	PASS
5.8	Radiated Spurious Emissions	15.209	PASS
5.9	Frequency Stability	15.407(g)	PASS

Note:

- The measurement uncertainty is not included in the test result.

3. **SUMMARY**

3.1. Client Information

Applicant:	CHINA HAINERGY NEW ENERGY CORP.,LIMITED
Address:	Unit 1908,19/F,Harbour Centre,25 Harbour Road,Wan Chai,HongKong
Manufacturer:	CHINA HAINERGY NEW ENERGY CORP.,LIMITED
Address:	Unit 1908,19/F,Harbour Centre,25 Harbour Road,Wan Chai,HongKong

3.2. Product Description

Name of EUT:	Tablet PC
Trade Mark:	Plan Ceibal
Model No.:	ACRUX
Listed Model(s):	A102
Power supply:	DC 3.7V
Adapter information:	Model:BSY015A050200V U USB Input:AC100-240Va.c.50/60Hz 0.3AMAX Output:5.0Vd.c.2.0A
Hardware version:	EM_T8611B-V6.0
Software version:	Ceibal_ACRUX_20200106_SV2.0

3.3. Radio Specification Description

Support type ^{*1}	<input checked="" type="checkbox"/> 802.11a <input type="checkbox"/> 802.11ac(HT20)	<input checked="" type="checkbox"/> 802.11n(HT20) <input type="checkbox"/> 802.11ac(HT40)	<input checked="" type="checkbox"/> 802.11n(HT40) <input type="checkbox"/> 802.11ac(HT80)		
Function:	<input type="checkbox"/> Outdoor AP <input checked="" type="checkbox"/> Client	<input type="checkbox"/> Indoor AP	<input type="checkbox"/> Fixed P2P		
Modulation:	BPSK, QPSK, 16QAM, 64QAM				
Operation frequency:	<input checked="" type="checkbox"/> Band I: 5150MHz~5250MHz <input checked="" type="checkbox"/> Band IV: 5725MHz~5850MHz				
Channel number:	6 for 802.11a/802.11n(HT20) 2 for 802.11n(HT40)				
Supported Bandwidth	20MHz:	802.11n, 802.11a			
	40MHz:	802.11n			
Antenna type:	FPC Antenna				
Antenna gain:	1.85dBi				

Note:

*1: only show the RF function associated with this report.

3.4. Testing Laboratory Information

Laboratory Name	Shenzhen Huatongwei International Inspection Co., Ltd.	
Laboratory Location	1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China	
Qualifications	Type	Accreditation Number
	CNAS	L1225
	A2LA	3902.01
	FCC	762235
	Canada	5377A

4. TEST CONFIGURATION

4.1. Test frequency list

According to section 15.31(m), regards to the operating frequency range over 10 MHz, must select three channels which were tested. The Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, please see the below blue front.

Band	Test Channel	20MHz		40MHz	
		Channel	Frequency (MHz)	Channel	Frequency (MHz)
I	CH _L	36	5180	38	5190
	CH _M	44	5220	-	-
	CH _H	48	5240	46	5230
IV	CH _L	149	5745	151	5755
	CH _M	157	5785	-	-
	CH _H	165	5825	159	5795

4.2. Descriptions of Test mode

Preliminary tests were performed in different data rates, final test modes are considering the modulation and worse data rates as below table.

Modulation	Data rate
802.11a	6Mbps
802.11n(HT20)	MCS0
802.11n(HT40)	MCS0

4.3. Test mode

For RF test items
The engineering test program was provided and enabled to make EUT continuous transmit.
For AC power line conducted emissions:
The EUT was set to connect with the WLAN AP under large package sizes transmission.
For Radiated spurious emissions test item:
The engineering test program was provided and enabled to make EUT continuous transmit. The EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data Recorded in the report.

4.4. Support unit used in test configuration and system

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

The following peripheral devices and interface cables were connected during the measurement:

Whether support unit is used?					
<input checked="" type="checkbox"/> No					
Item	Equipement	Trade Name	Model No.	FCC ID	Power cord
1					
2					

4.5. Testing environmental condition

Type	Requirement	Actual
Temperature:	15~35°C	25°C
Relative Humidity:	25~75%	50%
Air Pressure:	860~1060mbar	1000mbar

4.6. Measurement uncertainty

Test Item	Measurement Uncertainty
AC Conducted Emission (150kHz~30MHz)	3.02 dB
Radiated Emission (30MHz~1000MHz)	4.90 dB
Radiated Emissions (1GHz~25GHz)	4.96 dB
Peak Output Power	0.51 dB
Power Spectral Density	0.51 dB
Conducted Spurious Emission	0.51 dB
6dB Bandwidth	70 Hz
Frequency error	70 Hz

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=1.96$.

4.7. Equipment Used during the Test

● Conducted Emission							
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Shielded Room	Albatross projects	HTWE0114	N/A	N/A	2018/09/28	2023/09/27
●	EMI Test Receiver	R&S	HTWE0111	ESCI	101247	2019/10/26	2020/10/25
●	Artificial Mains	SCHWARZBECK	HTWE0113	NNLK 8121	573	2019/10/23	2020/10/22
●	Pulse Limiter	R&S	HTWE0033	ESH3-Z2	100499	2019/10/23	2020/10/22
●	RF Connection Cable	HUBER+SUHNER	HTWE0113-02	ENVIROFLE_X_142	EF-NM-BNCM-2M	2019/10/23	2020/10/22
●	Test Software	R&S	N/A	ES-K1	N/A	N/A	N/A

● Radiated emission-6th test site							
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Semi-Anechoic Chamber	Albatross projects	HTWE0127	SAC-3m-02	C11121	2018/09/30	2021/09/29
●	EMI Test Receiver	R&S	HTWE0099	ESCI	100900	2019/10/26	2020/10/25
●	Loop Antenna	R&S	HTWE0170	HFH2-Z2	100020	2018/04/02	2021/04/01
●	Ultra-Broadband Antenna	SCHWARZBECK	HTWE0119	VULB9163	546	2017/04/05	2020/04/04
●	Pre-Amplifier	SCHWARZBECK	HTWE0295	BBV 9742	N/A	2019/11/14	2020/11/13
●	RF Connection Cable	HUBER+SUHNER	HTWE0062-01	N/A	N/A	2019/08/21	2020/08/20
●	RF Connection Cable	HUBER+SUHNER	HTWE0062-02	SUCOFLEX 104	501184/4	2019/05/27	2020/05/26
●	Test Software	R&S	N/A	ES-K1	N/A	N/A	N/A

● Radiated emission-7th test site							
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Semi-Anechoic Chamber	Albatross projects	HTWE0122	SAC-3m-01	N/A	2018/09/27	2021/09/26
●	Spectrum Analyzer	R&S	HTWE0098	FSP40	100597	2019/10/26	2020/10/25
●	Horn Antenna	SCHWARZBECK	HTWE0126	9120D	1011	2017/04/01	2020/03/31
●	Horn Antenna	SCHWARZBECK	HTWE0103	BBHA9170	25841	2017/03/27	2020/03/26
●	Broadband Horn Antenna	SCHWARZBECK	HTWE0103	BBHA9170	BBHA9170472	2018/10/11	2021/10/10
●	Pre-amplifier	CD	HTWE0071	PAP-0102	12004	2019/11/14	2020/11/13
●	Broadband Pre-amplifier	SCHWARZBECK	HTWE0201	BBV 9718	9718-248	2019/05/23	2020/05/22
●	RF Connection Cable	HUBER+SUHNER	HTWE0120-01	6m 18GHz S Serisa	N/A	2019/05/10	2020/05/09
●	RF Connection Cable	HUBER+SUHNER	HTWE0120-02	6m 3GHz RG Serisa	N/A	2019/05/10	2020/05/09
●	RF Connection Cable	HUBER+SUHNER	HTWE0120-03	6m 3GHz RG Serisa	N/A	2019/05/10	2020/05/09
●	RF Connection Cable	HUBER+SUHNER	HTWE0120-04	6m 3GHz RG Serisa	N/A	2019/05/10	2020/05/09
●	RF Connection Cable	HUBER+SUHNER	HTWE0121-01	6m 18GHz S Serisa	N/A	2019/05/10	2020/05/09
●	Test Software	Audix	N/A	E3	N/A	N/A	N/A

● RF Conducted Method						
Used	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Signal and spectrum Analyzer	R&S	FSV40	100048	2019/10/26	2020/10/25
●	Spectrum Analyzer	Agilent	N9020A	MY50510187	2019/10/26	2020/10/25
●	Power Meter	Anritsu	ML249A	N/A	2019/10/26	2020/10/25
○	Radio communication tester	R&S	CMW500	137688-Lv	2019/10/26	2020/10/25

5. TEST CONDITIONS AND RESULTS

5.1. Antenna Requirement

Requirement

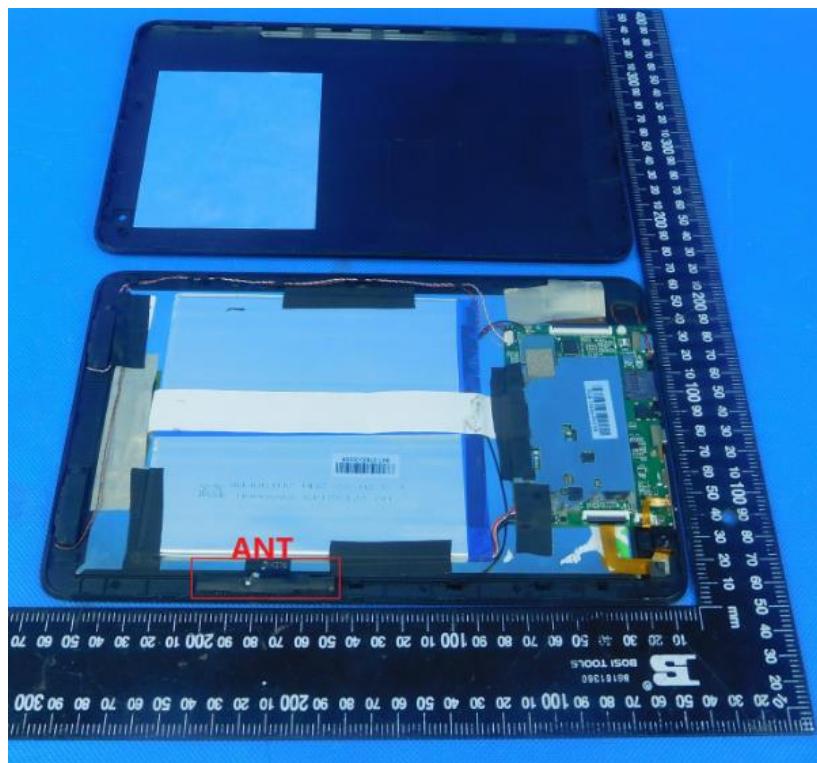
FCC CFR Title 47 Part 15 Subpart C Section 15.203:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, 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.

TEST RESULT

Passed Not Applicable

The antenna type is a FPC antenna, the directional gain of the antenna less than 6 dBi, please refer to the below antenna photo.



5.2. AC Conducted Emission

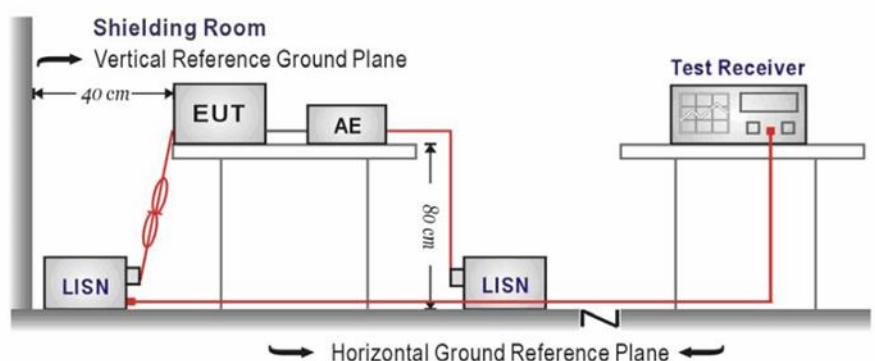
LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.207

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST CONFIGURATION



TEST PROCEDURE

1. The EUT was setup according to ANSI C63.10 requirements.
2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface.
3. The EUT and simulators are connected to the main power through a line impedances stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment.
4. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs)
5. Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.
6. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
7. Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.
8. During the above scans, the emissions were maximized by cable manipulation.

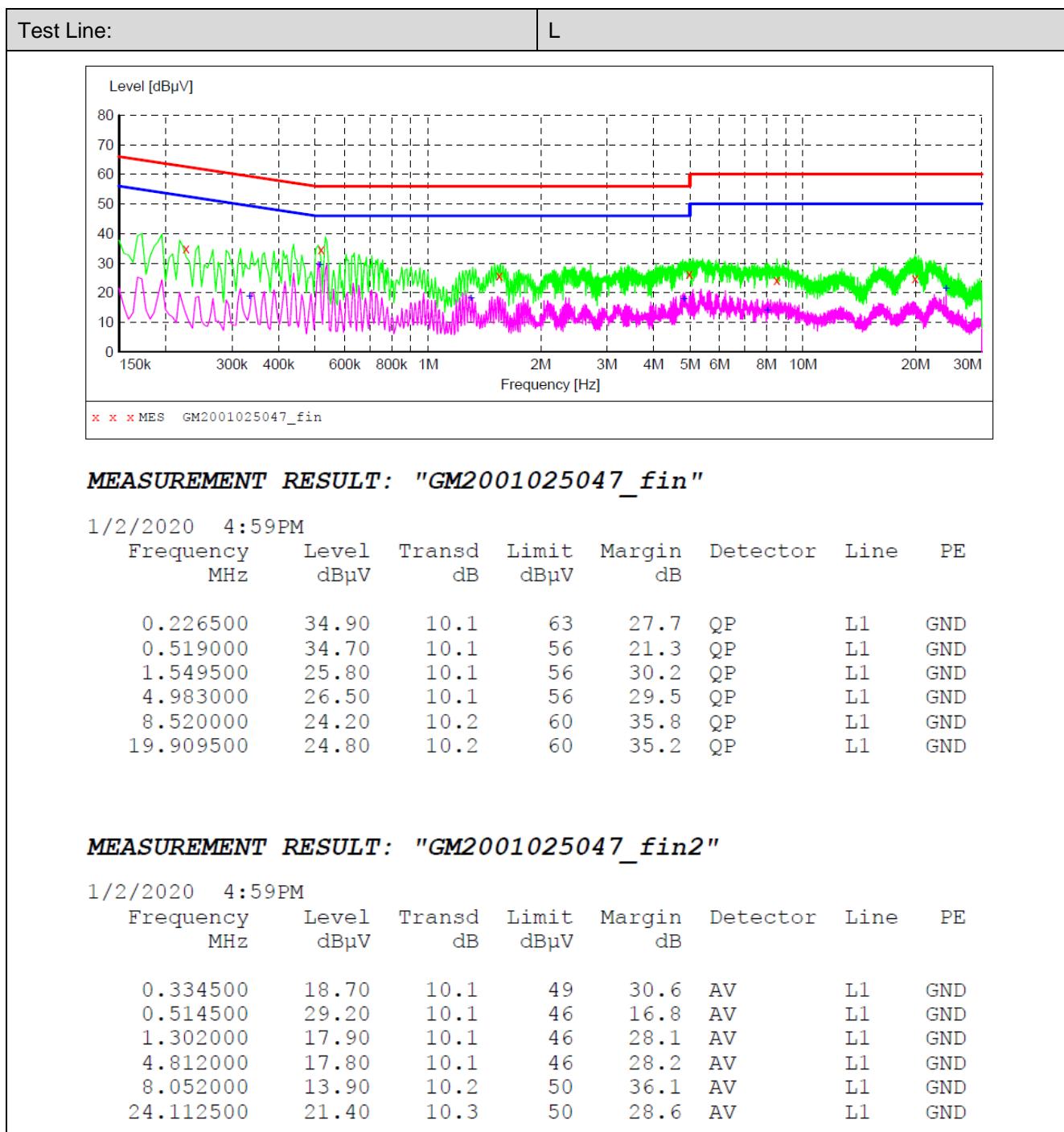
TEST MODE:

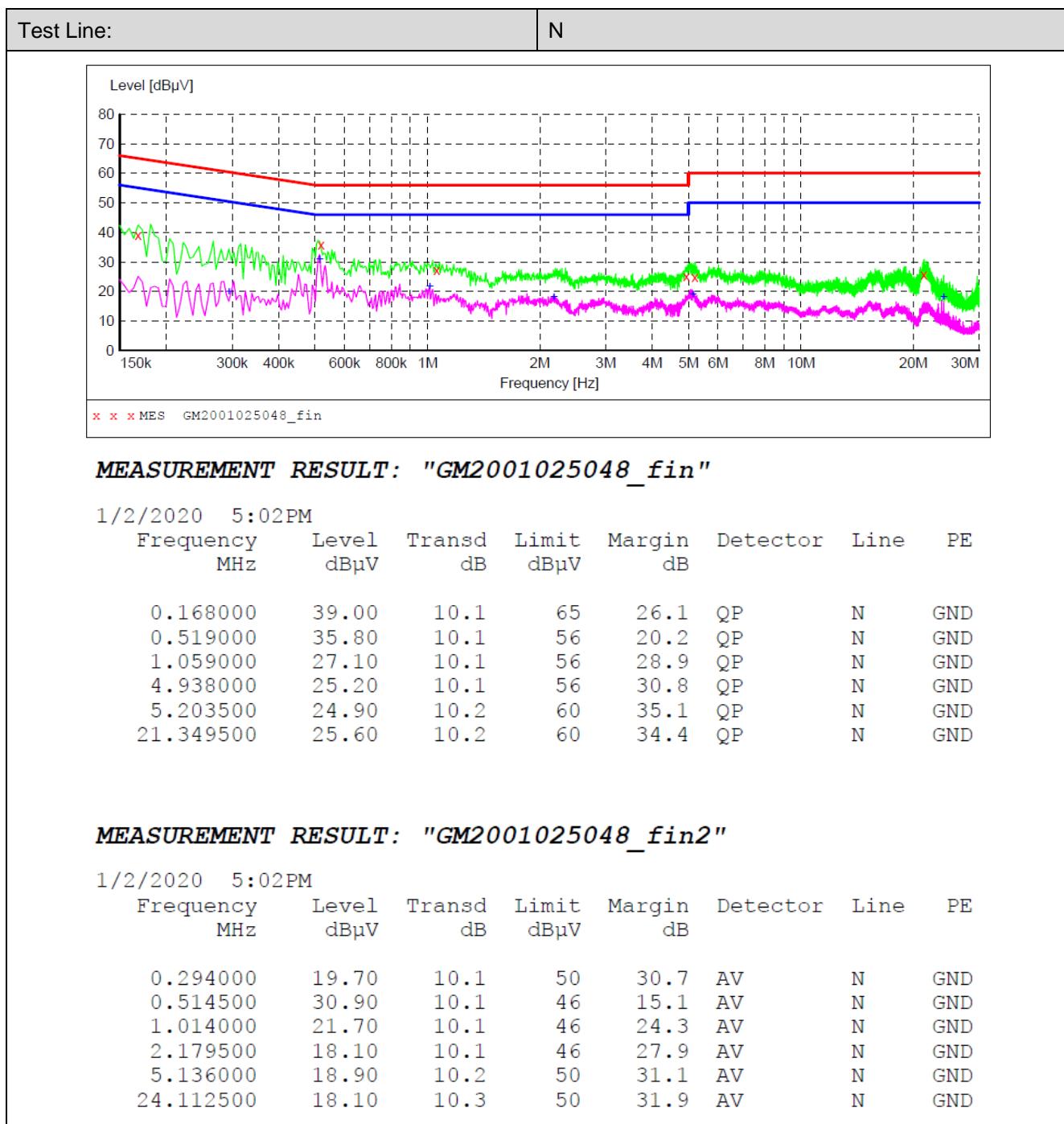
Please refer to the clause 4.3

TEST RESULT

Passed

Not Applicable





5.3. Maximum Conducted Output Power

LIMIT

FCC CFR Title 47 Part 15 Subpart E Section 15.407(a):

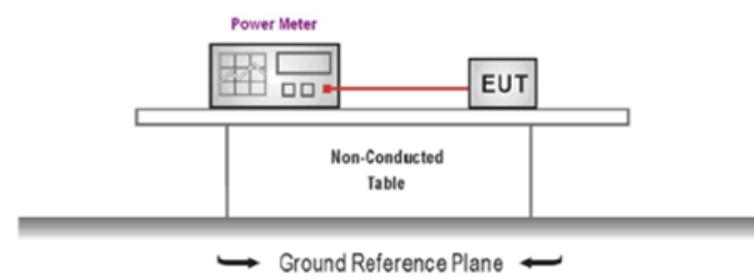
For the 5.15~5.25GHz band:

- Outdoor AP
The maximum conducted output power (P_{out}) shall not exceed the lesser of 1W (30dBm). if $G_{Tx} > 6\text{dBi}$, then $P_{out} = 30 - (G_{Tx} - 6)$. e.i.r.p. at any elevation angle above 30 degrees $\leq 125\text{mW}$ (21dBm)
- Indoor AP
The maximum conducted output power (P_{out}) shall not exceed the lesser of 1W (30dBm). if $G_{Tx} > 6\text{dBi}$, then $P_{out} = 30 - (G_{Tx} - 6)$.
- Point-to-point AP
The maximum conducted output power (P_{out}) shall not exceed the lesser of 1W (30dBm). if $G_{Tx} > 23\text{dBi}$, then $P_{out} = 30 - (G_{Tx} - 23)$.
- Client devices
The maximum conducted output power (P_{out}) shall not exceed the lesser of 250W (24dBm). if $G_{Tx} > 6\text{dBi}$, then $P_{out} = 24 - (G_{Tx} - 6)$.

For the 5.725~5.85GHz band:

- Point-to-multipoint systems (P2M)
The maximum conducted output power (P_{out}) shall not exceed the lesser of 1W (30dBm). if $G_{Tx} > 6\text{dBi}$, then $P_{out} = 30 - (G_{Tx} - 6)$.
- Point-to-point systems (P2P)
The maximum conducted output power (P_{out}) shall not exceed the lesser of 1W (30dBm).

TEST CONFIGURATION



TEST PROCEDURE

1. The EUT was tested according to KDB789033 Section E-3-b)
2. The maximum conducted output power may be measured using a broadband AVG RF power meter.
3. Average power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor.
4. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter.
5. Record the measurement data.

6. TEST MODE:

Please refer to the clause 4.3

TEST RESULT

Passed Not Applicable

TEST Data

Please refer to appendix A on the appendix report

5.4. Power Spectral Density

LIMIT

FCC CFR Title 47 Part 15 Subpart E Section 15.407(a):

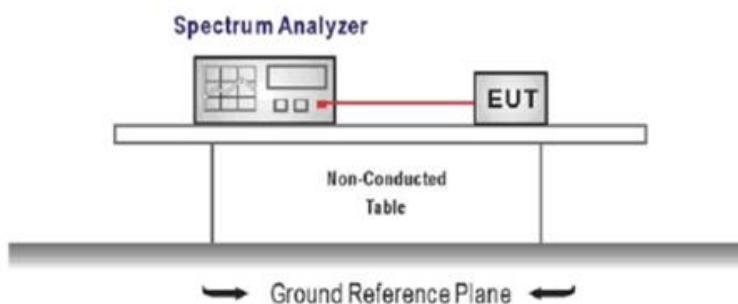
For the 5.15~5.25GHz band:

- Outdoor AP
The peak power spectral density (PSD) shall not exceed the lesser of 17dBm/MHz.
if $G_{Tx} > 6\text{dBi}$, then $\text{PSD} = 17 - (G_{Tx} - 6)$.
- Indoor AP
The peak power spectral density (PSD) shall not exceed the lesser of 17dBm/MHz.
if $G_{Tx} > 6\text{dBi}$, then $\text{PSD} = 17 - (G_{Tx} - 6)$.
- Point-to-point AP
The peak power spectral density (PSD) shall not exceed the lesser of 17dBm/MHz.
if $G_{Tx} > 23\text{dBi}$, then $\text{PSD} = 17 - (G_{Tx} - 23)$.
- Client devices
The peak power spectral density (PSD) shall not exceed the lesser of 11dBm/MHz.
if $G_{Tx} > 6\text{dBi}$, then $\text{PSD} = 11 - (G_{Tx} - 6)$.

For the 5.725~5.85GHz band:

- Point-to-multipoint systems (P2M)
The peak power spectral density (PSD) shall not exceed the lesser of 30dBm/500kHz.
if $G_{Tx} > 6\text{dBi}$, then $\text{PSD} = 30 - (G_{Tx} - 6)$.
- Point-to-point systems (P2P)
The peak power spectral density (PSD) shall not exceed the lesser of 30dBm/500kHz.

TEST CONFIGURATION



TEST PROCEDURE

1. According KDB 789033 D02 – Section F
2. Analyzer was setting as follow:
Center frequency: test channel
Span was set to encompass the entire emission bandwidth of the signal
RBW=1MHz for devices operating in the bands 5.15-5.25 GHz, 5.25-5.35 GHz, and 5.47-5.725 GHz
RBW=500kHz for devices operating in the band 5.725-5.85 GHz
VBW ≥ 3 RBW
Number of sweep points $> 2 \times (\text{span}/\text{RBW})$
Sweep time = auto
Detector = Peak
Trigger was set to free run for all modes, trace was averaged over 100 sweeps
3. The peak search function of the spectrum analyzer was used to find the peak of the spectrum.

TEST MODE:

Please refer to the clause 4.3

TEST RESULT

Passed **Not Applicable**

TEST Data

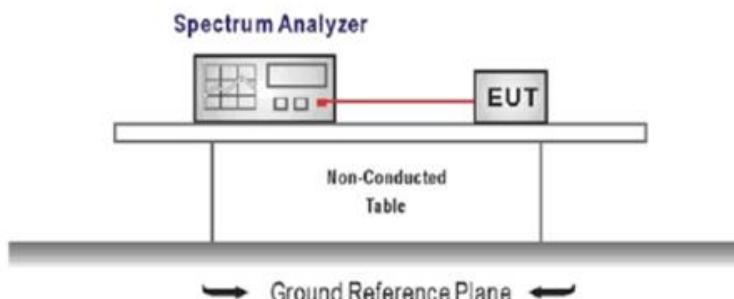
Please refer to appendix B on the appendix report

5.5. 26dB bandwidth and 99% Occupy bandwidth

LIMIT

The bandwidth at 26dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating at its maximum duty cycle, at its maximum power control level, as defined in KDB 789033 D02, and at the appropriate frequencies. The spectrum analyzer's bandwidth measurement function is configured to measure the 26dB bandwidth.

TEST CONFIGURATION



TEST PROCEDURE

1. According KDB 789033 D02 – Section C
2. Connect the antenna port(s) to the spectrum analyzer input.
3. Configure the spectrum analyzer as shown below (enter all losses between the transmitter output and the spectrum analyzer).
Center Frequency = Channel center frequency
Span=2 x emission bandwidth
RBW = 1% to 5% of the emission bandwidth
VBW>3 x RBW
Sweep time= auto couple
Detector = Peak
Trace mode = max hold
4. Place the radio in continuous transmit mode, allow the trace to stabilize, view the transmitter wave form on the spectrum analyzer.
5. Measure the maximum width of the emission that is 26 dB down from the maximum of the emission, and use the 99 % power bandwidth function of the instrument

TEST MODE:

Please refer to the clause 4.3

TEST RESULT

Passed Not Applicable

TEST Data

Please refer to appendix C and D on the appendix report

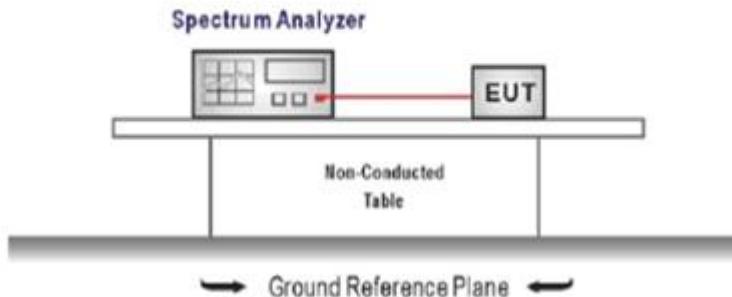
5.6. 6dB Bandwidth

LIMIT

FCC CFR Title 47 Part 15 Subpart E Section 15.407(e)

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

TEST CONFIGURATION



TEST PROCEDURE

1. Connect the antenna port(s) to the spectrum analyzer input.
2. Configure the spectrum analyzer as shown below (enter all losses between the transmitter output and the spectrum analyzer).
Center Frequency = test channel center frequency
Span=2 x emission bandwidth
RBW = 100 kHz, VBW $\geq 3 \times$ RBW
Sweep time= auto couple
Detector = Peak
Trace mode = max hold
3. Place the radio in continuous transmit mode, allow the trace to stabilize, view the transmitter wave form on the spectrum analyzer.
4. 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, and record the pertinent measurements.

TEST MODE:

Please refer to the clause 4.3

TEST RESULT

Passed Not Applicable

TEST Data

Please refer to appendix E on the appendix report

5.7. Band edge

LIMIT

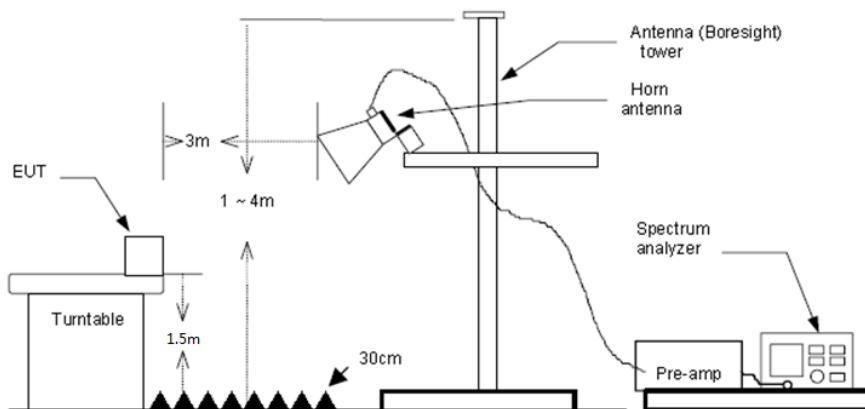
FCC CFR Title 47 Part 15 Subpart E Section 15.407(b)

Un-restricted band emissions above 1GHz			
Operating Band	Frequency	EIRP Limit	Value
5150-5250MHz	Above 1GHz	-27dBm/MHz(68.2dB _u V/m)@3m	Peak
5250-5350MHz	Above 1GHz	-27dBm/MHz(68.2dB _u V/m)@3m	Peak
5470-5725MHz	Above 1GHz	-27dBm/MHz(68.2dB _u V/m)@3m	Peak
5725-5850 MHz	1GHz-5.65GHz	-27 dBm/MHz(68.2dB _u V/m)@3m	Peak
	5.65GHz-5.7GHz	-27* dBm/MHz to 10dBm/MHz (68.2* dB _u V/m to 105.6dB _u V/m)	Peak
	5.7GHz-5.72GHz	10* dBm/MHz to 15.6dBm/MHz (105.6* dB _u V/m to 110.8dB _u V/m)	Peak
	5.72GHz-5.725GHz	15.6* dBm/MHz to 27dBm/MHz (110.8dB _u V/m to* 122.2dB _u V/m)	Peak
	5.85GHz-5.855GHz	27dBm/MHz to 15.6* dBm/MHz (122.2dB _u V/m to110.8* dB _u V/m)	Peak
	5.855GHz-5.875GHz	15.6dBm/MHz to 10* dBm/MHz (110.8dB _u V/m to 105.6* dB _u V/m)	Peak
	5.875GHz-5.925GHz	10dBm/MHz to -27* dBm/MHz (105.6dB _u V/m to 68.2* dB _u V/m)	Peak
	Above 5.925GHz	-27 dBm/MHz(68.2dB _u V/m)@3m	Peak

* Increase/Decreases with the linearity of the frequency.

For emission above 1GHz and in restricted band, according to FCC KDB 789033 D02 General UNII Test Procedure, all emission that complies with both the average and peak limits of Section 15.209 is not required to satisfy the -27 dBm/MHz peak emission limit. $E[\text{dB}\mu\text{V}/\text{m}] = \text{EIRP}[\text{dBm}] + 95.2$, for d = 3 meters.

TEST CONFIGURATION



TEST PROCEDURE

1. The EUT was setup and tested according to ANSI C63.10:2013 requirements.
2. The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
4. The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10:2013 on radiated measurement.
5. The receiver set as follow:
RBW=1MHz, VBW=3MHz PEAK detector for Peak value.
RBW=1MHz, VBW=3MHz RMS detector for Average value.

TEST MODE:

Please refer to the clause 4.3

TEST RESULTS

Passed Not Applicable

TEST Data

Band: I		Worst mode: 802.11a			Test channel: CH _L		
Frequency (MHz)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Factor (dB)	Test value	Polarization
5150.00	18.65	27.54	54.00	26.46	8.89	Vertical	Average
5150.00	23.69	32.58	68.20	35.62	8.89	Vertical	Peak
5150.00	16.73	25.62	54.00	28.38	8.89	Horizontal	Average
5150.00	23.75	32.64	68.20	35.56	8.89	Horizontal	Peak

Band: I		Worst mode: 802.11a			Test channel: CH _H		
Frequency (MHz)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Factor (dB)	Test value	Polarization
5350.00	18.48	27.02	54.00	26.98	8.54	Vertical	Average
5350.00	23.72	32.26	68.20	35.94	8.54	Vertical	Peak
5350.00	17.27	25.81	54.00	28.19	8.54	Horizontal	Average
5350.00	23.12	31.66	68.20	36.54	8.54	Horizontal	Peak

Band: IV		Worst mode: 802.11a			Test channel: CH _L		
Frequency (MHz)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Factor (dB)	Test value	Polarization
5725.00	17.23	26.23	54.00	27.77	9.00	Vertical	Average
5725.00	25.29	34.29	68.20	33.91	9.00	Vertical	Peak
5725.00	17.86	26.86	54.00	27.14	9.00	Horizontal	Average
5725.00	24.94	33.94	68.20	34.26	9.00	Horizontal	Peak

Band: IV		Worst mode: 802.11a			Test channel: CH _H		
Frequency (MHz)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Factor (dB)	Test value	Polarization
5850.00	17.42	27.19	54.00	26.81	9.77	Vertical	Average
5850.00	24.07	33.84	68.20	34.36	9.77	Vertical	Peak
5850.00	16.36	26.13	54.00	27.87	9.77	Horizontal	Average
5850.00	22.92	32.69	68.20	35.51	9.77	Horizontal	Peak

Remark:

1. Final Level = Receiver Read level + Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.
3. Test 802.11a, 802.11n mode, all modulations have been tested, only worst case is reported

5.8. Radiated Spurious Emissions

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.209 and Part 15 Subpart E Section 15.407

Frequency	Limit (dBuV/m)	Value
0.009 MHz ~0.49 MHz	2400/F(kHz) @300m	Quasi-peak
0.49 MHz ~ 1.705 MHz	24000/F(kHz) @30m	Quasi-peak
1.705 MHz ~30 MHz	30 @30m	Quasi-peak

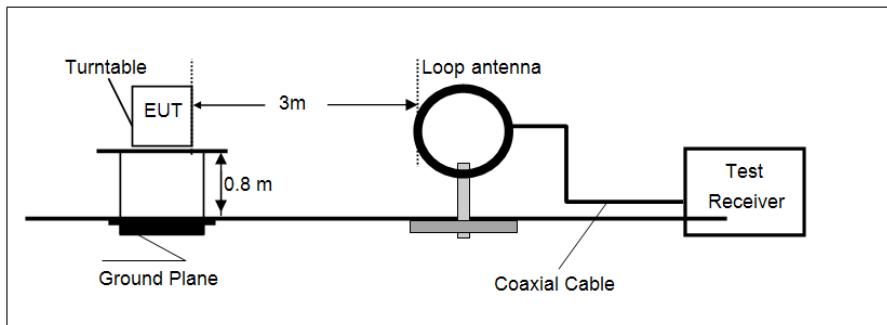
Note: Limit dBuV/m @3m = Limit dBuV/m @300m + 40*log(300/3)= Limit dBuV/m @300m +80,

Limit dBuV/m @3m = Limit dBuV/m @30m +40*log(30/3)= Limit dBuV/m @30m + 40.

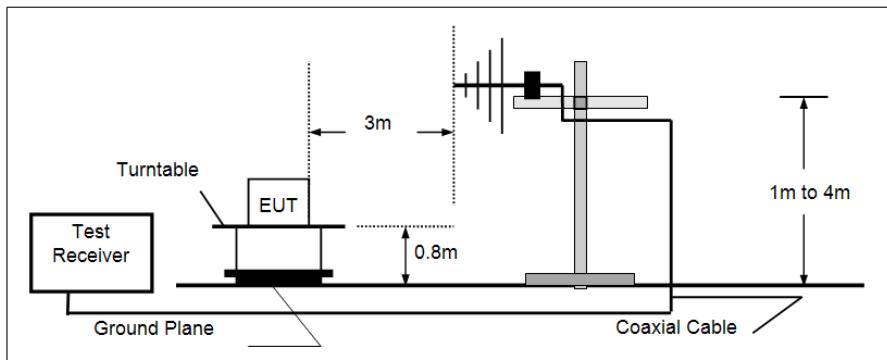
Unwanted emissions below 1GHz and Restricted band emissions above 1GHz		
Frequency	Limit (dBuV/m @3m)	Value
30MHz-88MHz	40.00	Quasi-peak
88MHz-216MHz	43.50	Quasi-peak
216MHz-960MHz	46.00	Quasi-peak
960MHz-1GHz	54.00	Quasi-peak
Above 1GHz	54.00	Average
	74.00	Peak

TEST CONFIGURATION

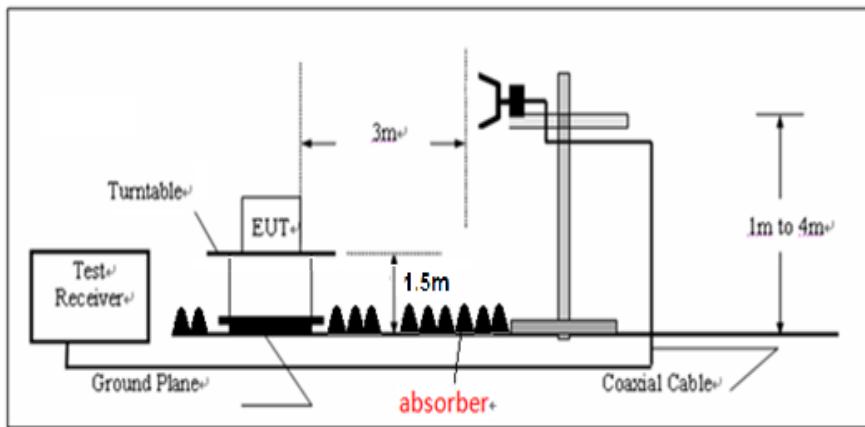
➤ 9KHz ~30MHz



➤ 30MHz ~ 1GHz



- Above 1GHz



TEST PROCEDURE

1. The EUT was setup and tested according to ANSI C63.10:2013
2. The EUT is placed on a turn table which is 0.8 meter above ground for below 1 GHz, and 1.5 m for above 1 GHz. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower.
4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
5. Set to the maximum power setting and enable the EUT transmit continuously.
6. Use the following spectrum analyzer settings
 - a) Span shall wide enough to fully capture the emission being measured;
 - b) Below 1 GHz:
RBW=120 kHz, VBW=300 kHz, Sweep=auto, Detector function=peak, Trace=max hold;
If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
 - c) From 1 GHz to 10th harmonic:
RBW=1MHz, VBW=3MHz Peak detector for Peak value.
RBW=1MHz, VBW=3MHz RMS detector for Average value.

TEST MODE:

Please refer to the clause 4.3

TEST RESULT

Passed Not Applicable

TEST Data

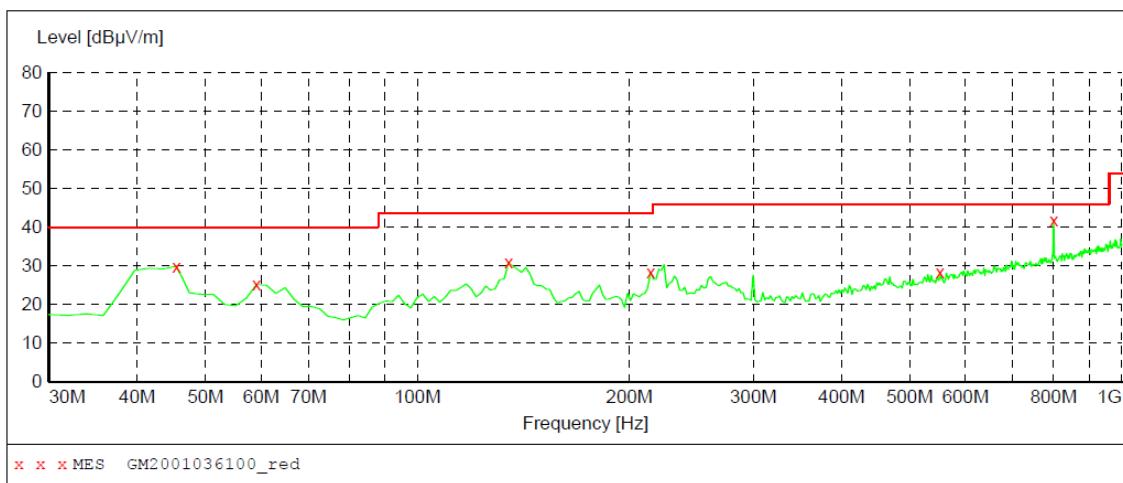
TEST DATA FOR 9 kHz ~ 30 MHz

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

TEST DATA FOR 30MHz-1GHz

Polarization:

Horizontal

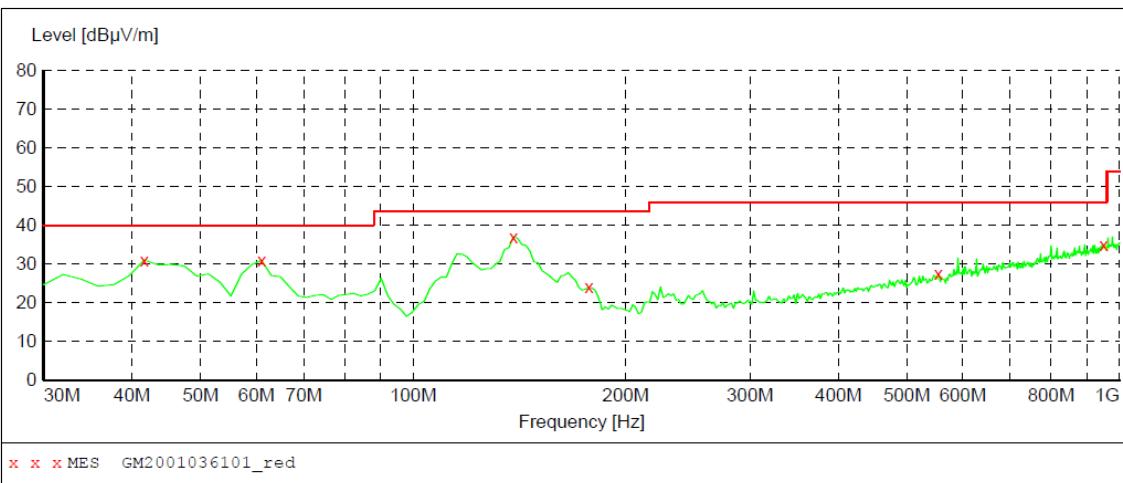
**MEASUREMENT RESULT: "GM2001036100_red"**

1/3/2020 7:44PM

Frequency MHz	Level dB μ V/m	Transd dB	Limit dB μ V/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
45.520000	29.90	-8.4	40.0	10.1	QP	300.0	146.00	HORIZONTAL
59.100000	25.20	-9.1	40.0	14.8	QP	300.0	206.00	HORIZONTAL
134.760000	30.90	-13.3	43.5	12.6	QP	300.0	360.00	HORIZONTAL
214.300000	28.40	-9.7	43.5	15.1	QP	100.0	305.00	HORIZONTAL
551.860000	28.30	0.2	46.0	17.7	QP	300.0	219.00	HORIZONTAL
800.180000	41.80	5.7	46.0	4.2	QP	100.0	148.00	HORIZONTAL

Polarization:

Vertical

**MEASUREMENT RESULT: "GM2001036101_red"**

1/3/2020 7:47PM

Frequency MHz	Level dB μ V/m	Transd dB	Limit dB μ V/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
41.640000	31.00	-9.2	40.0	9.0	QP	100.0	108.00	VERTICAL
61.040000	30.90	-9.7	40.0	9.1	QP	100.0	318.00	VERTICAL
138.640000	37.00	-13.5	43.5	6.5	QP	100.0	119.00	VERTICAL
177.440000	24.00	-12.2	43.5	19.5	QP	100.0	305.00	VERTICAL
553.800000	27.40	0.2	46.0	18.6	QP	100.0	197.00	VERTICAL
949.560000	35.00	8.1	46.0	11.0	QP	100.0	119.00	VERTICAL

Remark:

Transd=Cable loss+ Antenna factor- Pre-amplifier; Margin=Limit -Level

TEST DATA FOR Above 1GHz

Band: I		Worst mode: 802.11a			Test channel: CH _L		
Frequency (MHz)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Factor (dB)	Test value	Polarization
1230.59	22.04	16.29	74.00	57.71	-5.75	Vertical	Peak
3207.53	28.70	29.45	74.00	44.55	0.75	Vertical	Peak
5090.47	27.13	35.84	74.00	38.16	8.71	Vertical	Peak
7419.91	27.50	42.88	74.00	31.12	15.38	Vertical	Peak
1249.69	22.24	16.54	74.00	57.46	-5.70	Horizontal	Peak
3167.88	30.42	31.09	74.00	42.91	0.67	Horizontal	Peak
5017.03	25.79	33.80	74.00	40.20	8.01	Horizontal	Peak
6587.13	28.19	41.26	74.00	32.74	13.07	Horizontal	Peak

Band: I		Worst mode: 802.11a			Test channel: CH _M		
Frequency (MHz)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Factor (dB)	Test value	Polarization
1342.22	23.59	18.02	74.00	55.98	-5.57	Vertical	Peak
3159.06	29.42	30.05	74.00	43.95	0.63	Vertical	Peak
5152.16	26.82	35.71	74.00	38.29	8.89	Vertical	Peak
7242.19	27.57	42.59	74.00	31.41	15.02	Vertical	Peak
1227.66	21.67	15.91	74.00	58.09	-5.76	Horizontal	Peak
3029.81	28.59	28.60	74.00	45.40	0.01	Horizontal	Peak
5108.09	26.62	35.43	74.00	38.57	8.81	Horizontal	Peak
6816.25	29.16	42.51	74.00	31.49	13.35	Horizontal	Peak

Band: I		Worst mode: 802.11a			Test channel: CH _H		
Frequency (MHz)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Factor (dB)	Test value	Polarization
1212.97	22.72	16.92	74.00	57.08	-5.80	Vertical	Peak
3216.34	29.90	30.55	74.00	43.45	0.65	Vertical	Peak
5191.81	26.69	35.66	74.00	38.34	8.97	Vertical	Peak
7922.22	27.71	43.99	74.00	30.01	16.28	Vertical	Peak
1302.56	22.74	17.17	74.00	56.83	-5.57	Horizontal	Peak
3142.91	29.07	29.61	74.00	44.39	0.54	Horizontal	Peak
5773.44	28.22	37.58	74.00	36.42	9.36	Horizontal	Peak
7499.22	28.01	43.42	74.00	30.58	15.41	Horizontal	Peak

Remark:

- Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
- The emission levels of other frequencies are very lower than the limit and not show in test report.
- Measuring frequencies from 1 GHz to 40GHz.
- Test 802.11a, 802.11n mode, all modulations have been tested, only worst case is reported

Band: IV		Worst mode: 802.11a			Test channel: CH _L		
Frequency (MHz)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Factor (dB)	Test value	Polarization
1190.94	22.12	16.19	74.00	57.81	-5.93	Vertical	Peak
3167.88	29.01	29.68	74.00	44.32	0.67	Vertical	Peak
5269.66	28.10	36.71	74.00	37.29	8.61	Vertical	Peak
8039.72	30.52	46.77	74.00	27.23	16.25	Vertical	Peak
1352.50	23.54	17.96	74.00	56.04	-5.58	Horizontal	Peak
3142.91	29.87	30.41	74.00	43.59	0.54	Horizontal	Peak
4787.91	26.16	33.13	74.00	40.87	6.97	Horizontal	Peak
6944.03	27.12	41.25	74.00	32.75	14.13	Horizontal	Peak

Band: IV		Worst mode: 802.11a			Test channel: CH _M		
Frequency (MHz)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Factor (dB)	Test value	Polarization
1242.34	22.02	16.30	74.00	57.70	-5.72	Vertical	Peak
3162.00	28.95	29.59	74.00	44.41	0.64	Vertical	Peak
5191.81	27.68	36.65	74.00	37.35	8.97	Vertical	Peak
7142.31	28.19	42.86	74.00	31.14	14.67	Vertical	Peak
1237.94	22.57	16.84	74.00	57.16	-5.73	Horizontal	Peak
3172.28	28.66	29.36	74.00	44.64	0.70	Horizontal	Peak
5162.44	26.98	35.89	74.00	38.11	8.91	Horizontal	Peak
7353.81	28.40	43.62	74.00	30.38	15.22	Horizontal	Peak

Band: IV		Worst mode: 802.11a			Test channel: CH _H		
Frequency (MHz)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Factor (dB)	Test value	Polarization
1233.53	22.28	16.54	74.00	57.46	-5.74	Vertical	Peak
3170.81	28.97	29.66	74.00	44.34	0.69	Vertical	Peak
5108.09	27.96	36.77	74.00	37.23	8.81	Vertical	Peak
7610.84	28.30	44.12	74.00	29.88	15.82	Vertical	Peak
1237.94	21.38	15.65	74.00	58.35	-5.73	Horizontal	Peak
3189.91	28.84	29.63	74.00	44.37	0.79	Horizontal	Peak
4959.75	26.41	33.99	74.00	40.01	7.58	Horizontal	Peak
8055.88	28.84	45.11	74.00	28.89	16.27	Horizontal	Peak

Remark:

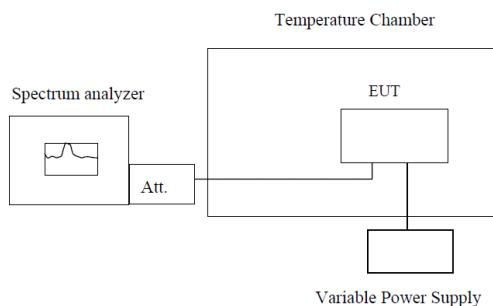
- Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
- The emission levels of other frequencies are very lower than the limit and not show in test report.
- Measuring frequencies from 1 GHz to 40GHz.
- Test 802.11a, 802.11n mode, all modulations have been tested, only worst case is reported

5.9. Frequency stability

LIMIT

Within Operation Band

TEST CONFIGURATION



Note : Measurement setup for testing on Antenna connector

TEST PROCEDURE

1. The equipment under test was connected to an external power supply.
2. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators.
3. The EUT was placed inside the temperature chamber.
4. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 25°C operating frequency as reference frequency.
5. Turn EUT off and set the chamber temperature to -20°C. After the temperature stabilized for approximately 30 minutes recorded the frequency.
6. Repeat step measure with 10°C increased per stage until the highest temperature of +50°C reached..

TEST MODE:

Please refer to the clause 4.3

TEST RESULT

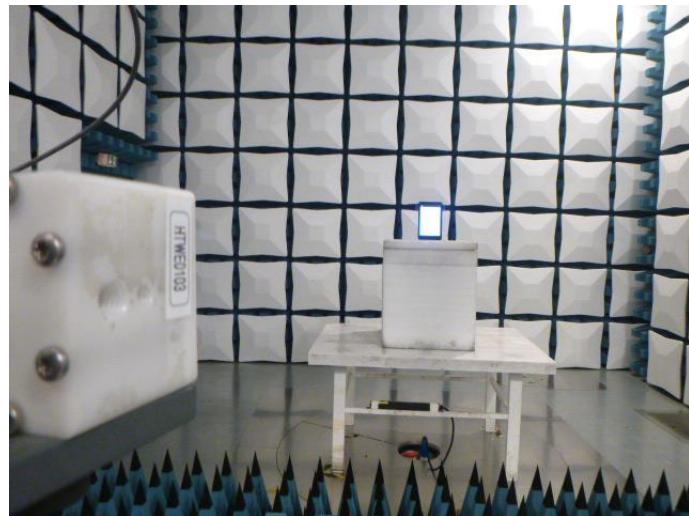
Passed Not Applicable

Please refer to appendix F on the appendix report

6. TEST SETUP PHOTOS

Radiated Emission



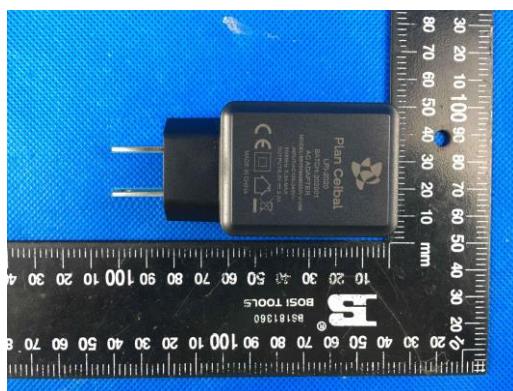
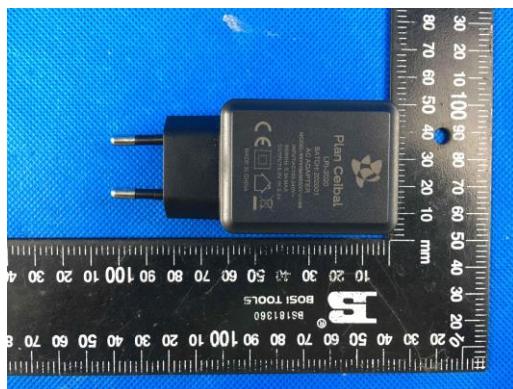


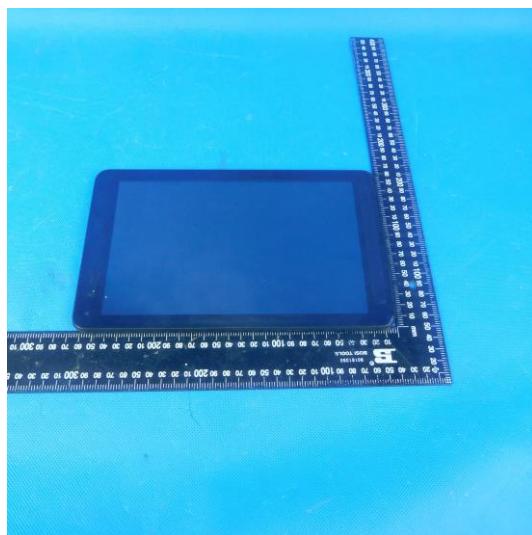
AC Conducted Emission

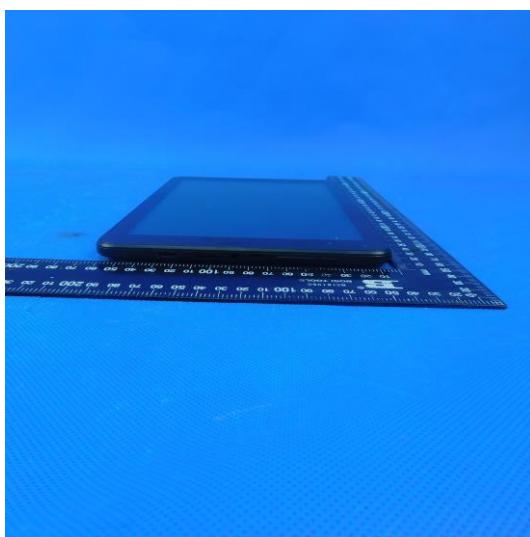
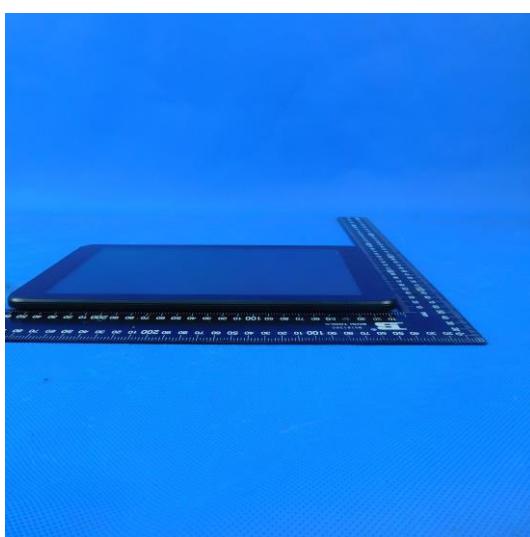
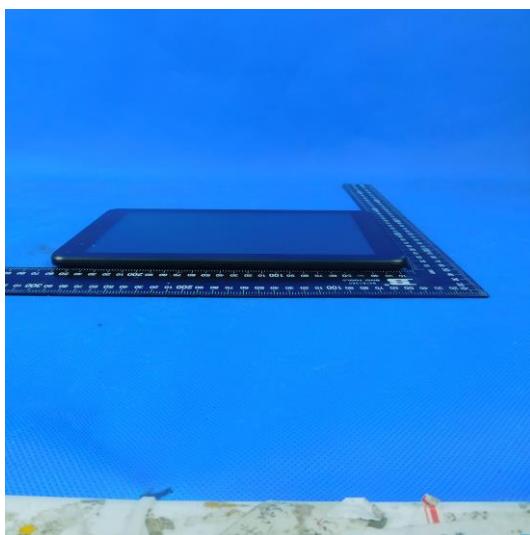


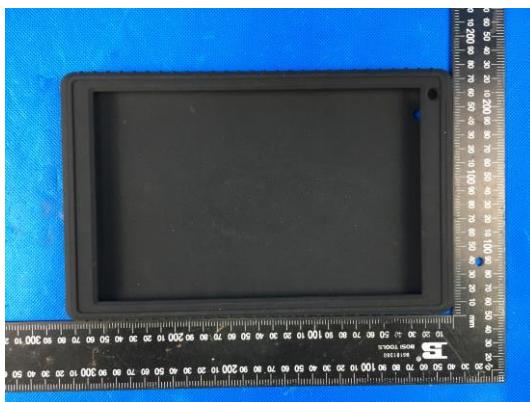
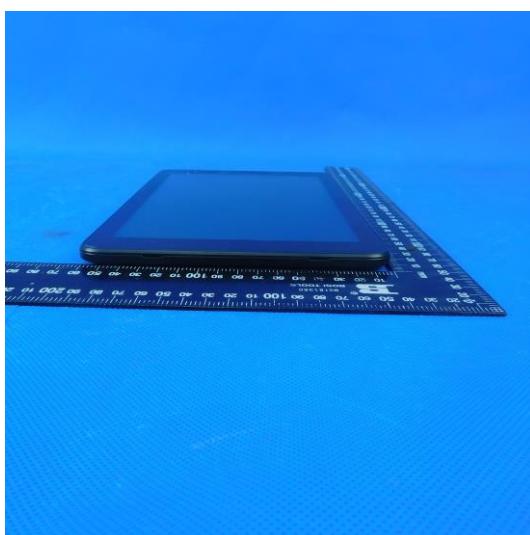
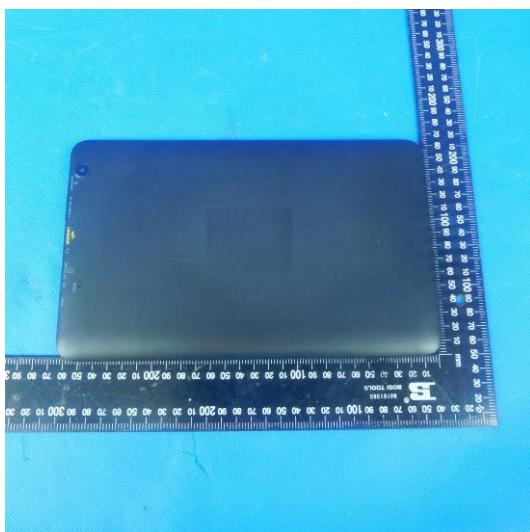
7. EXTERANAL AND INTERNAL PHOTOS

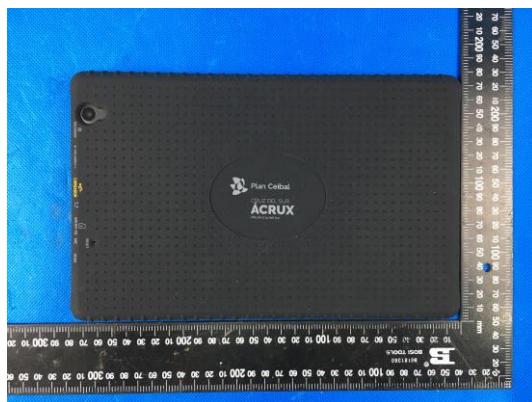
External Photo



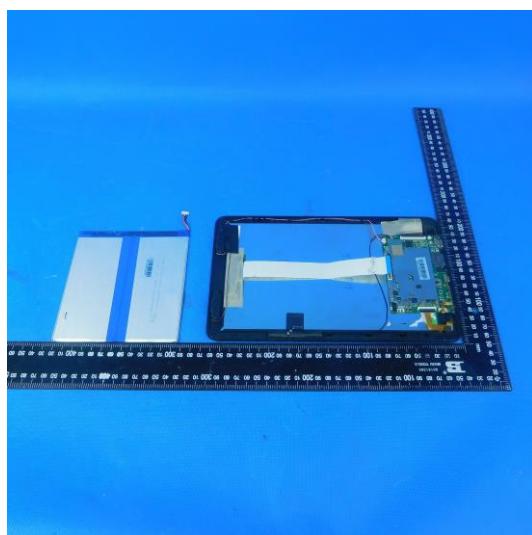
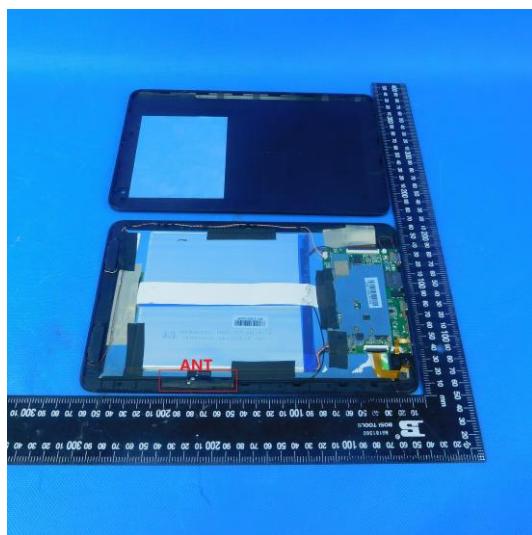


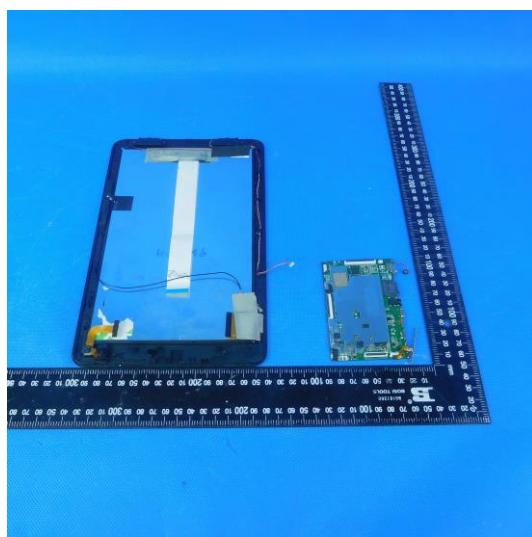
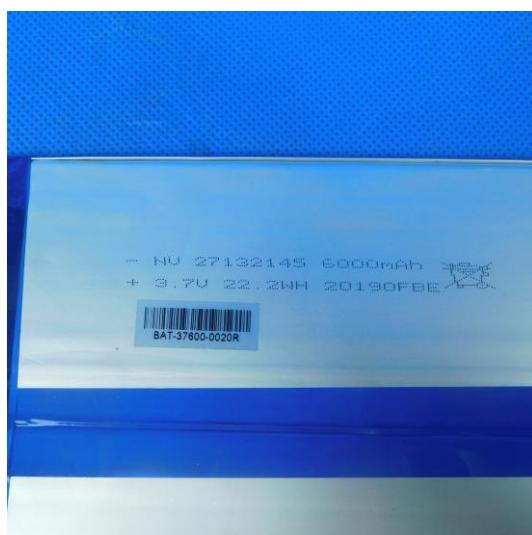
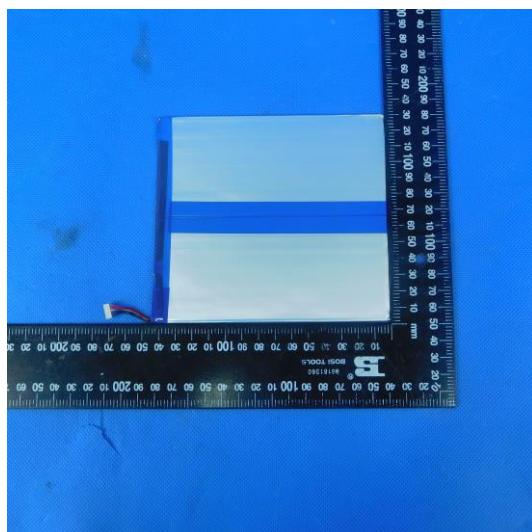


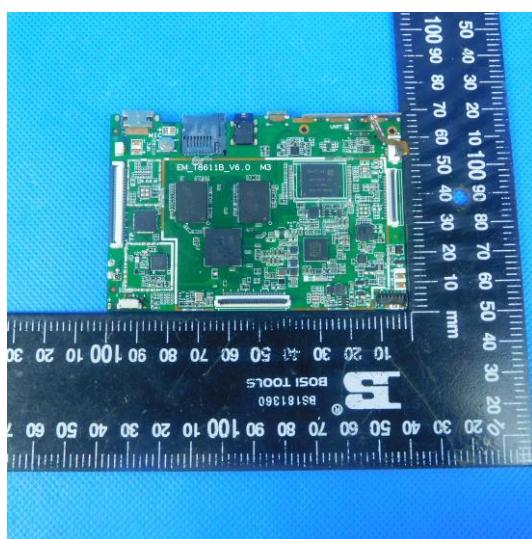
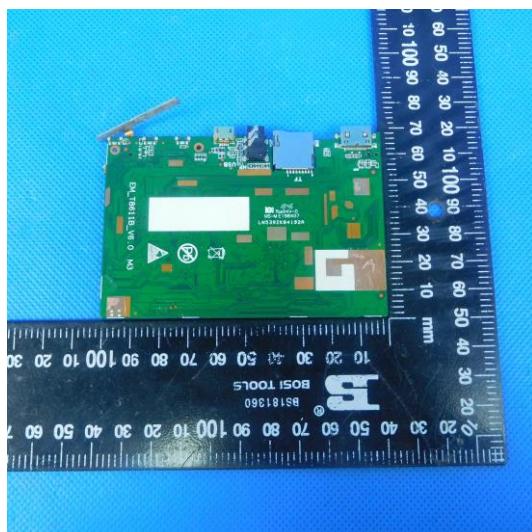


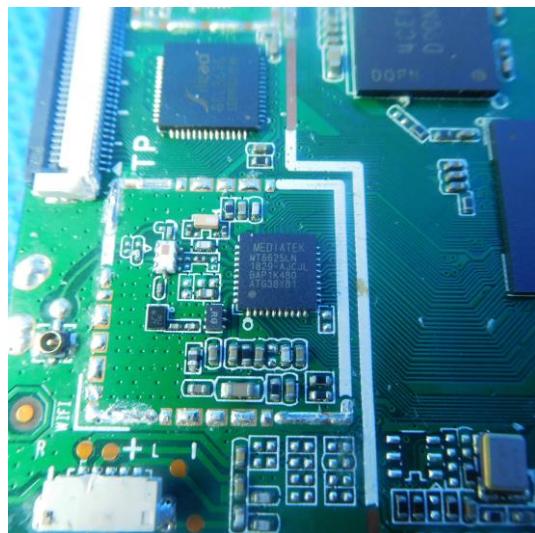


Internal Photo









8. APPENDIX REPORT

APPENDIX REPORT

Project No.	SHT1912069305EW	Radio Specification	WIFI 5G
Test sample No.	YPHT19120693012	Model No.	ACRUX
Start test date	2020/1/7	Finish date	2020/1/7
Temperature	25°C	Humidity	50%
Test Engineer	Ximing Huang	Auditor	<i>William. wang</i>

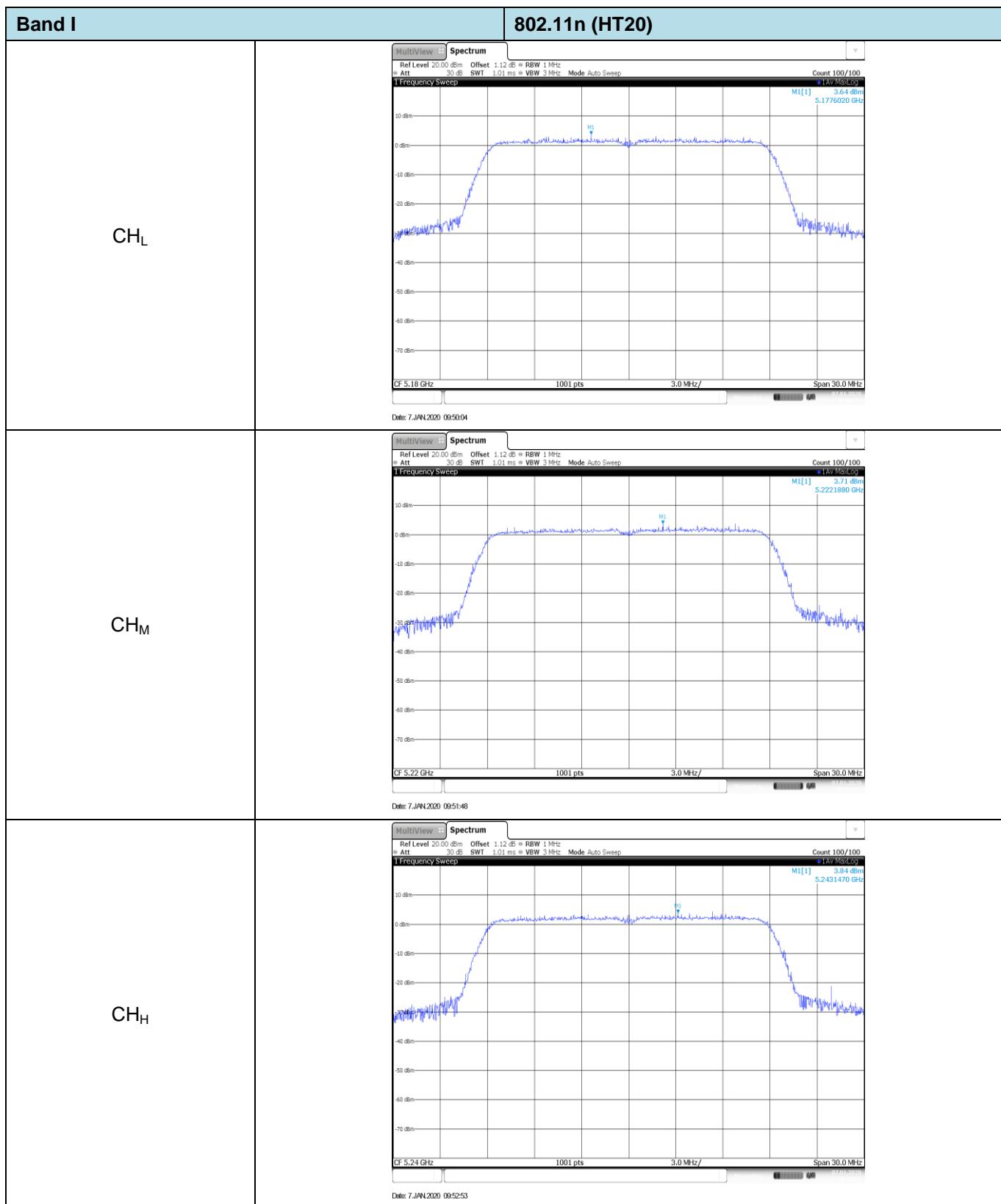
Appendix clause	Test item	Result
A	Maximum Conducted Output Power	PASS
B	Maximum Power Spectral Density	PASS
C	26 dB Bandwidth	PASS
D	99% Occupy bandwidth	PASS
E	6 dB Bandwidth	PASS
F	Frequency stability	PASS

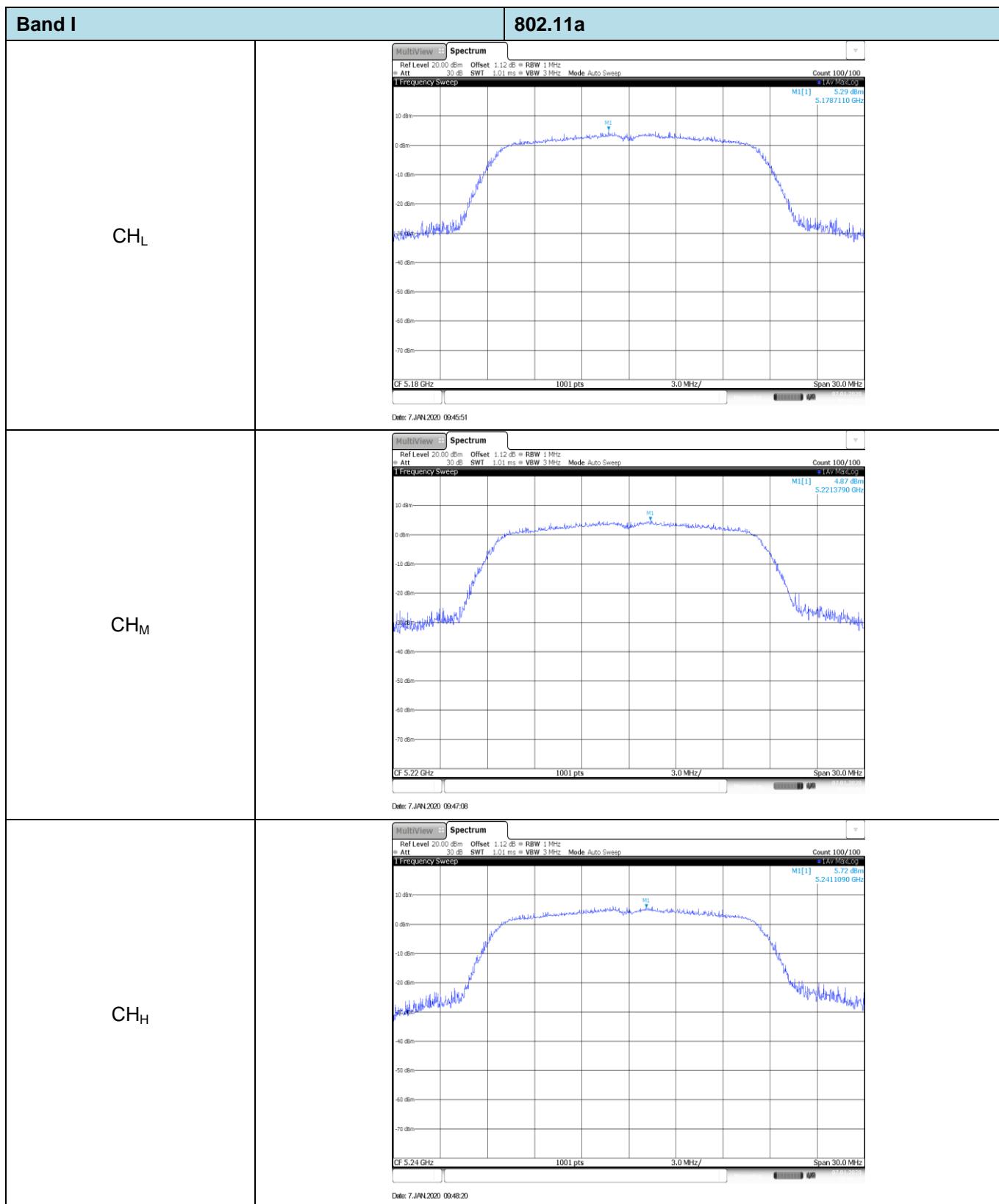
Appendix A: Maximum Conducted Output Power

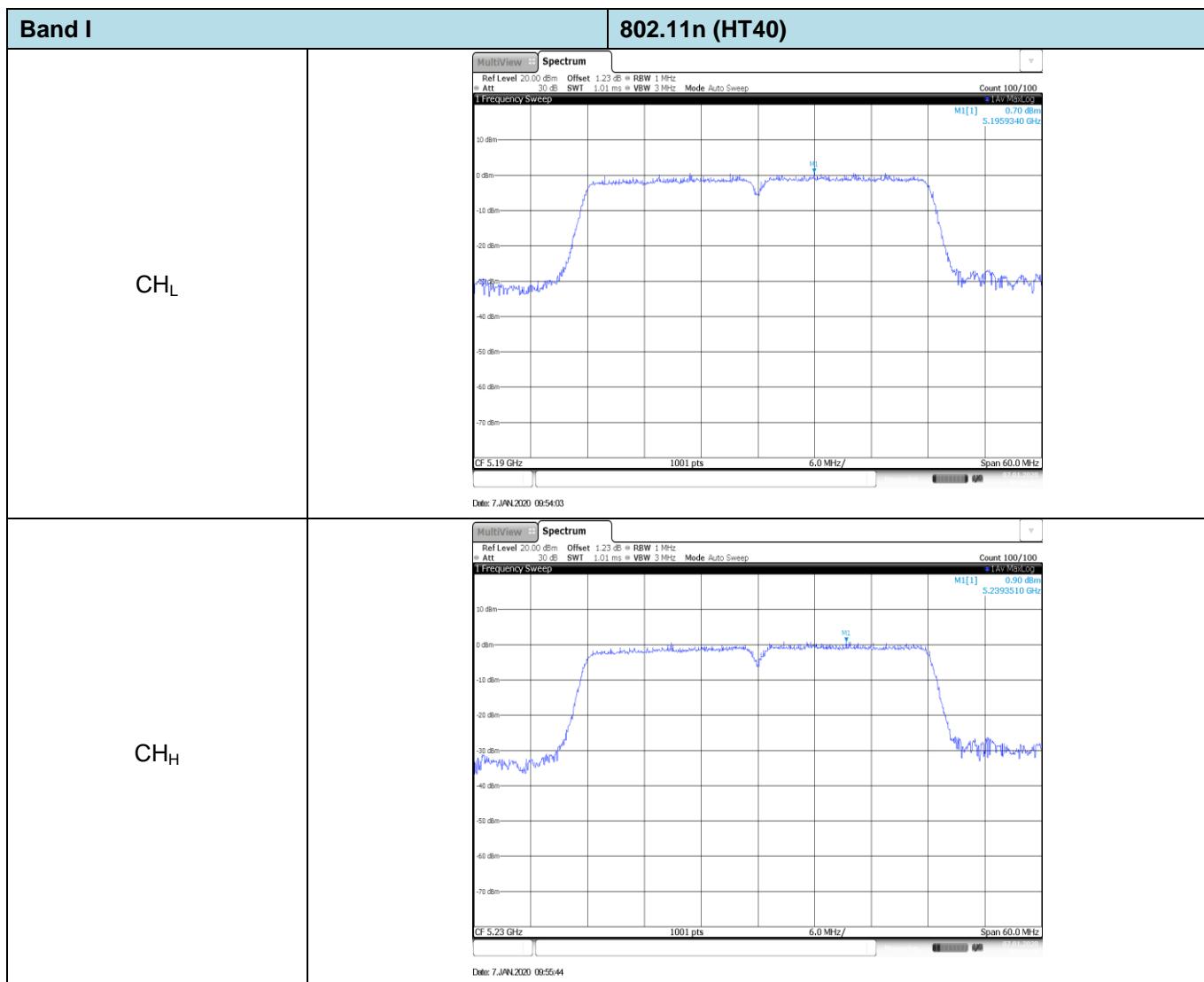
Band	Bandwidth (MHz)	Type	Channel	Conducted Output Power (dBm)	Limit (dBm)	Result
I	20	802.11n	CH _L	13.27	23.00	Pass
			CH _M	13.79		
			CH _H	14.20		
	40	802.11a	CH _L	13.73	23.00	Pass
			CH _M	14.73		
			CH _H	15.72		
	802.11n	802.11n	CH _L	13.79	23.00	Pass
			CH _H	14.25		
Band	Bandwidth (MHz)	Type	Channel	Conducted Output Power (dBm)	Limit (dBm)	Result
IV	20	802.11n	CH _L	12.35	30.00	Pass
			CH _M	11.91		
			CH _H	11.62		
	40	802.11a	CH _L	13.99	30.00	Pass
			CH _M	13.02		
			CH _H	12.61		
	802.11n	802.11n	CH _L	12.69	30.00	Pass
			CH _H	12.36		

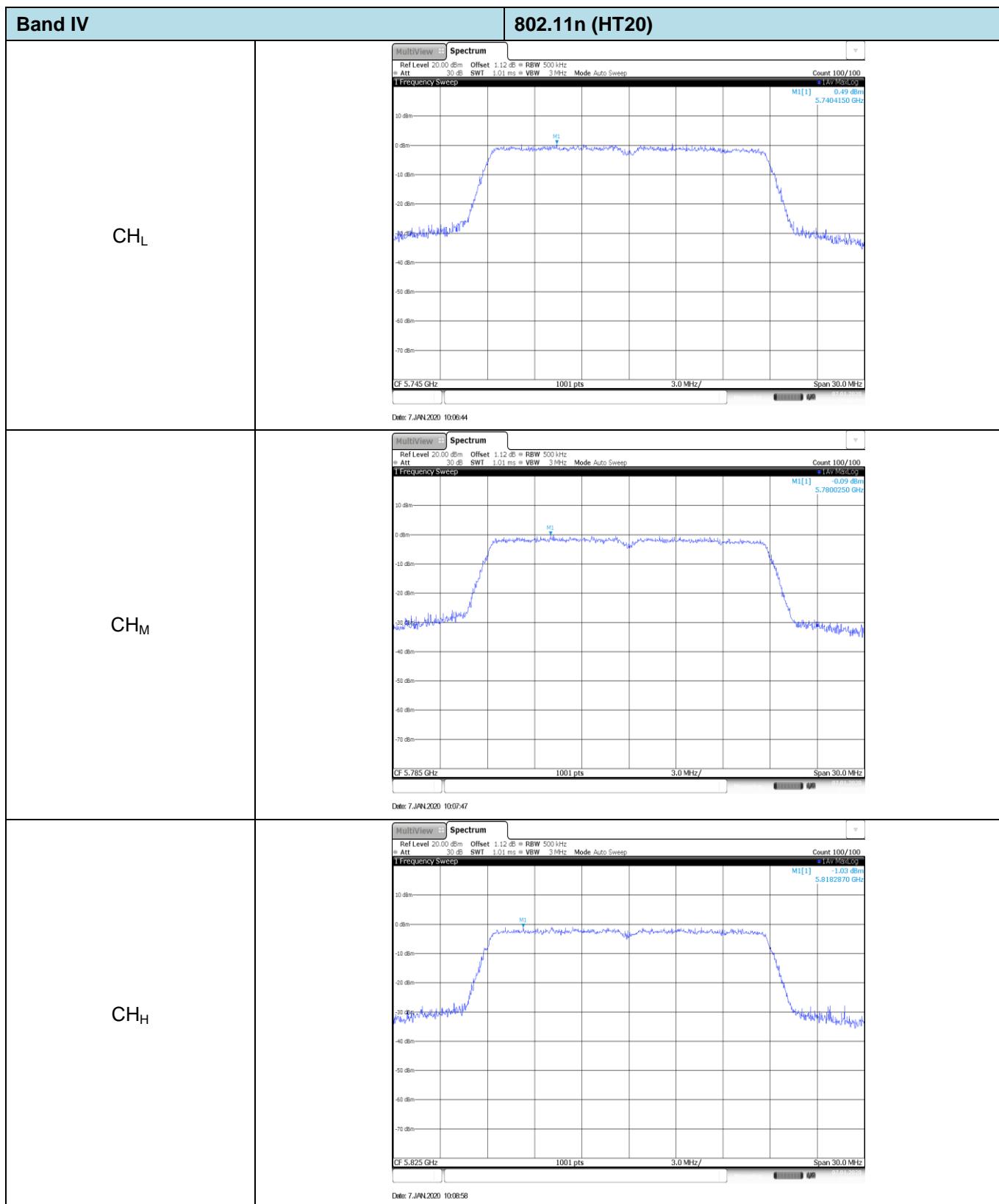
Appendix B: Maximum Power Spectral Density

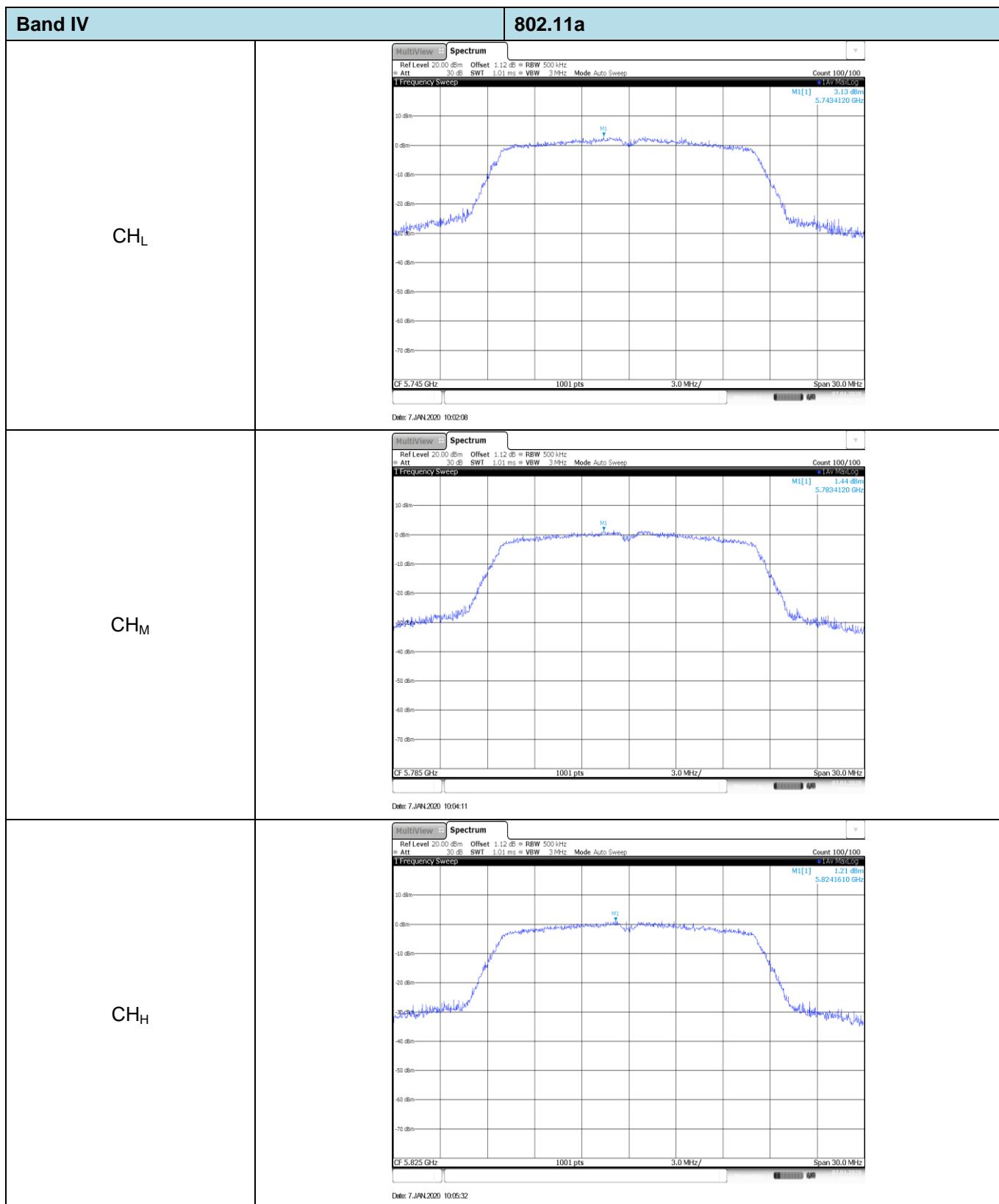
Band	Bandwidth (MHz)	Type	Channel	Power Spectral Density (dBm/MHz)	Limit (dBm/MHz)	Result
I	20	802.11n	CH _L	3.64	10.00	Pass
			CH _M	3.71		
			CH _H	3.84		
	20	802.11a	CH _L	5.29	10.00	Pass
			CH _M	4.87		
			CH _H	5.72		
	40	802.11n	CH _L	0.70	10.00	Pass
			CH _H	0.90		
Band	Bandwidth (MHz)	Type	Channel	Power Spectral Density (dBm/500kHz)	Limit (dBm/500kHz)	Result
IV	20	802.11n	CH _L	0.49	30.00	Pass
			CH _M	-0.09		
			CH _H	-1.03		
	20	802.11a	CH _L	3.13	30.00	Pass
			CH _M	1.44		
			CH _H	1.21		
	40	802.11n	CH _L	-2.17	30.00	Pass
			CH _H	-3.36		

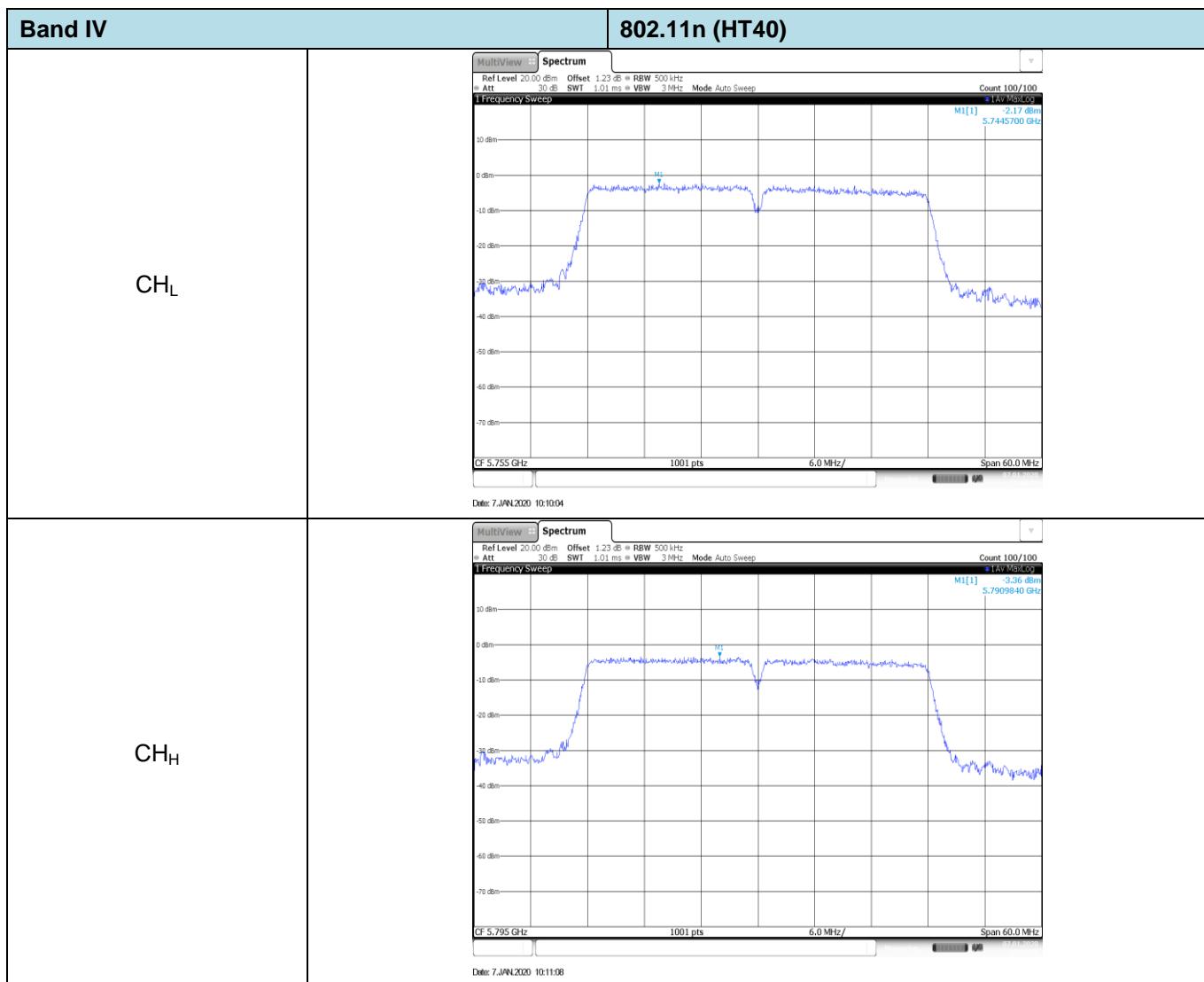






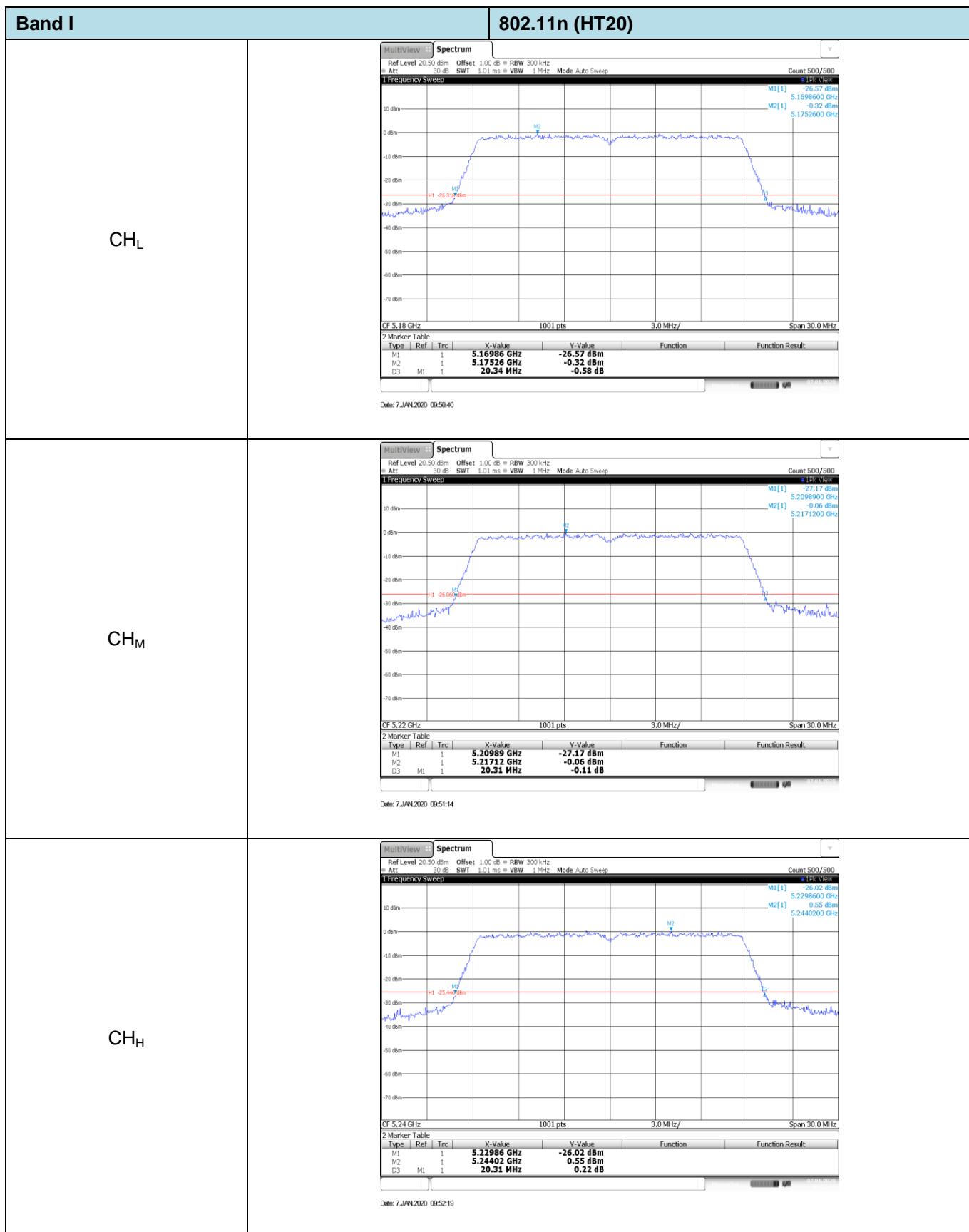


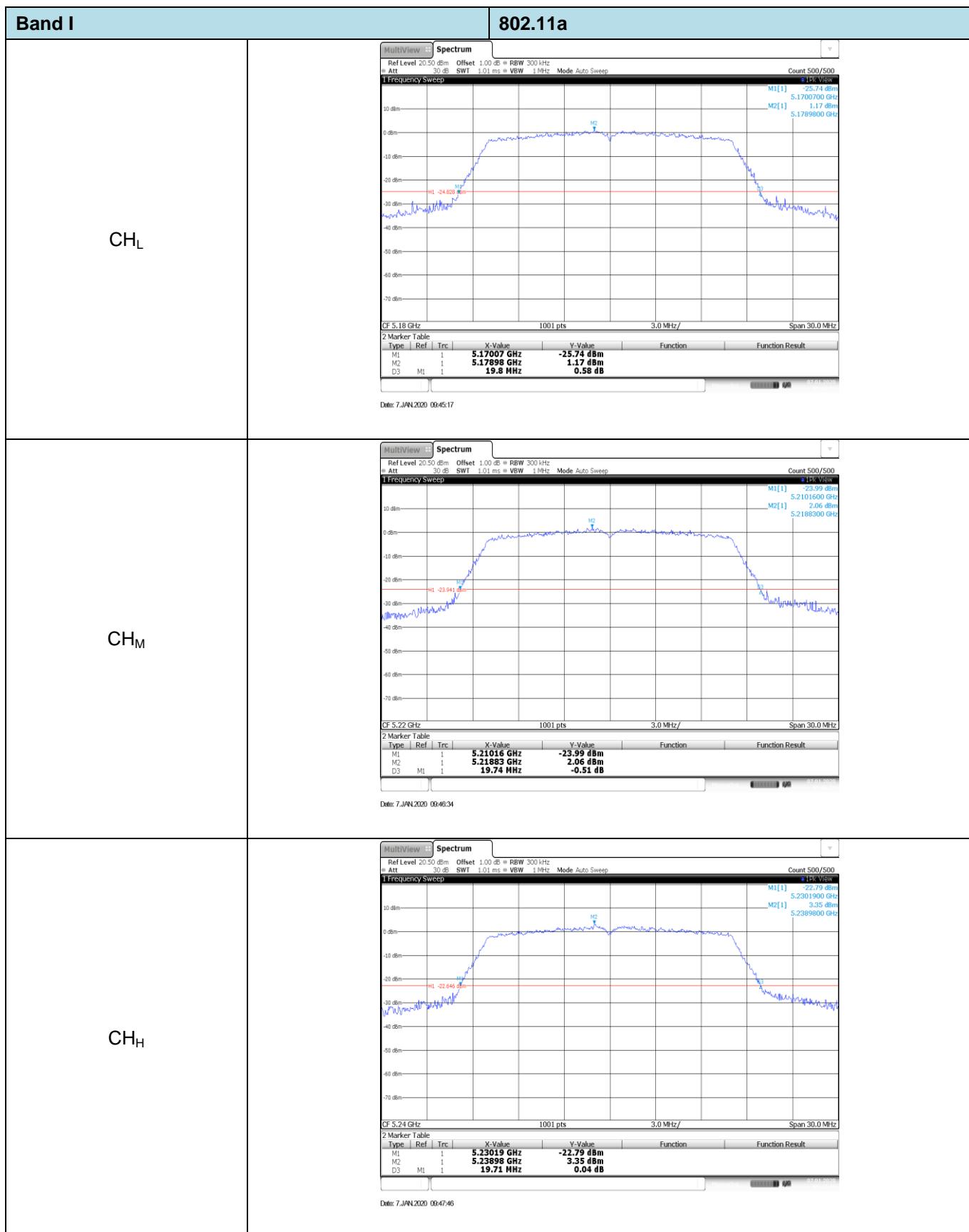


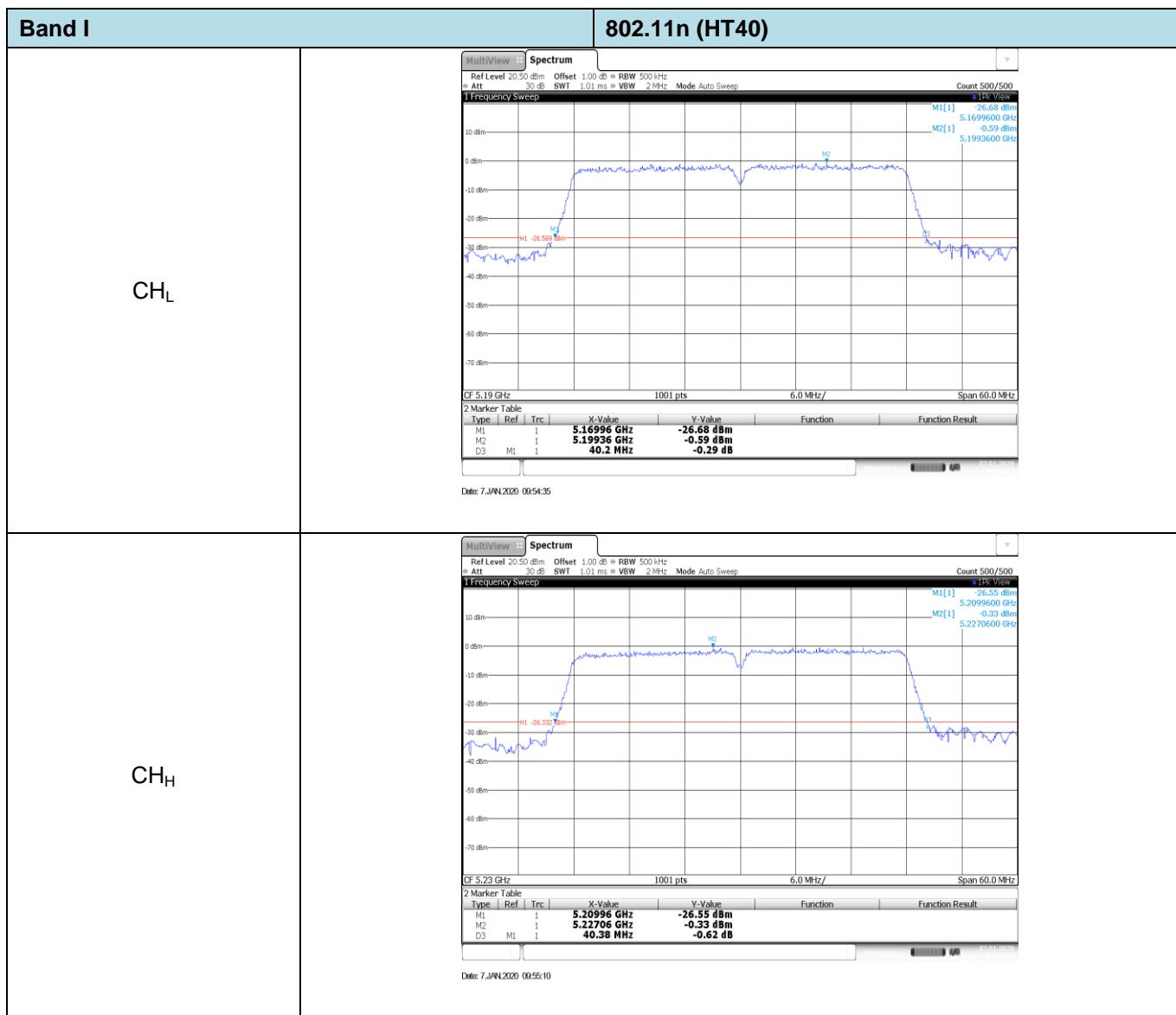


Appendix C: 26dB bandwidth

Band	Bandwidth (MHz)	Type	Channel	26dB bandwidth (MHz)	Result
I	20	802.11n	CH _L	20.34	Pass
			CH _M	20.31	
			CH _H	20.31	
	802.11a	802.11a	CH _L	19.80	Pass
			CH _M	19.74	
			CH _H	19.71	
	40	802.11n	CH _L	40.20	Pass
			CH _H	40.38	

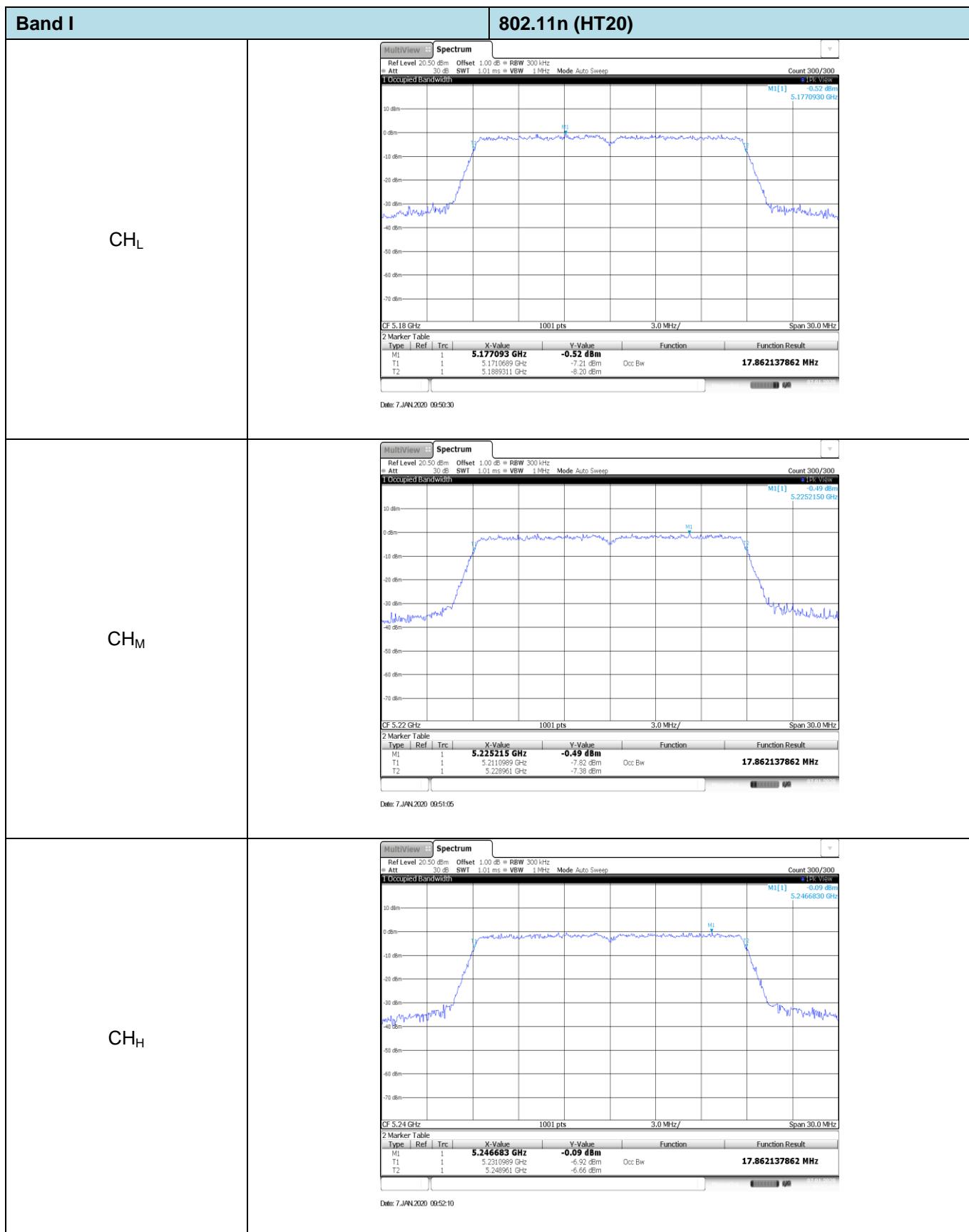


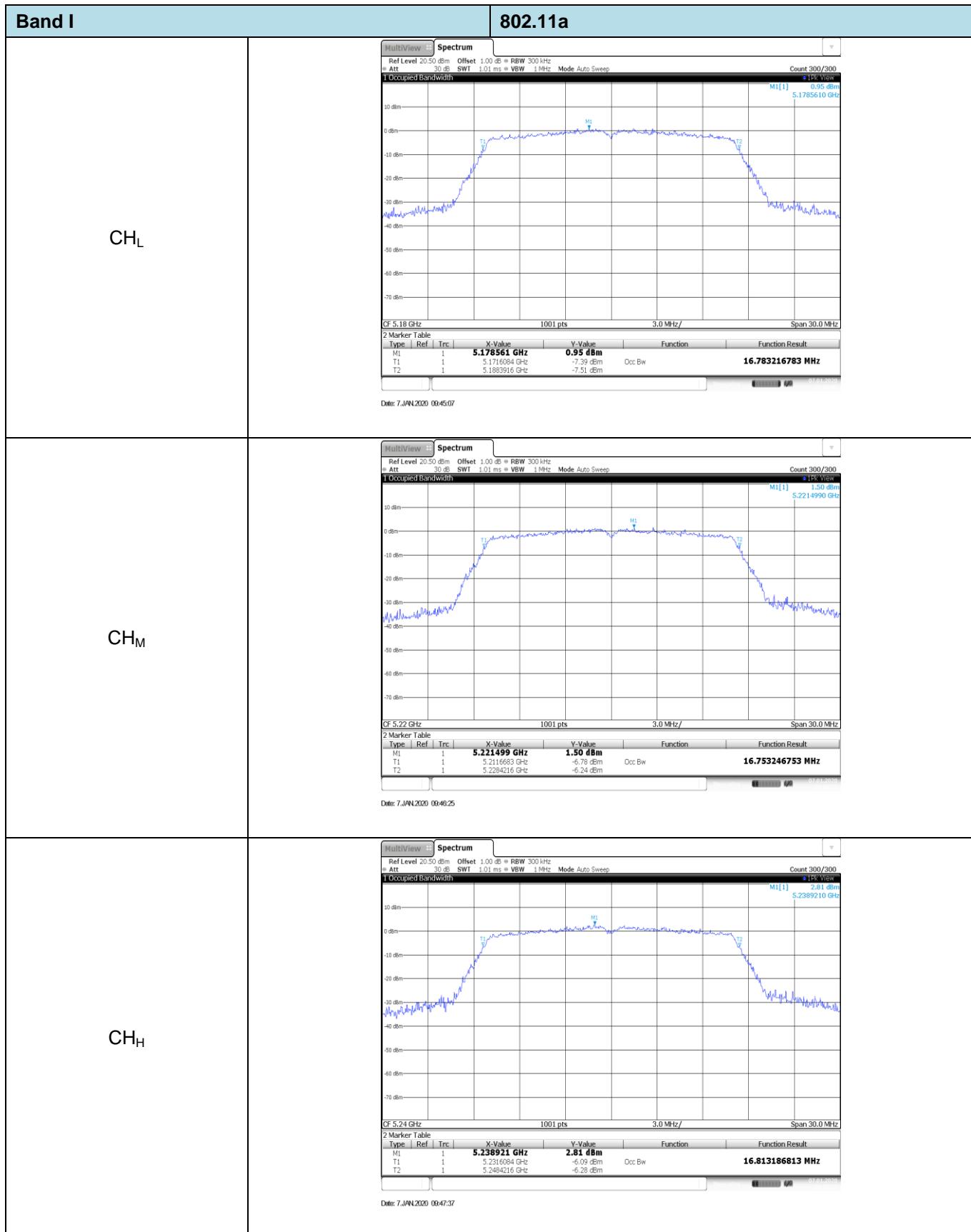


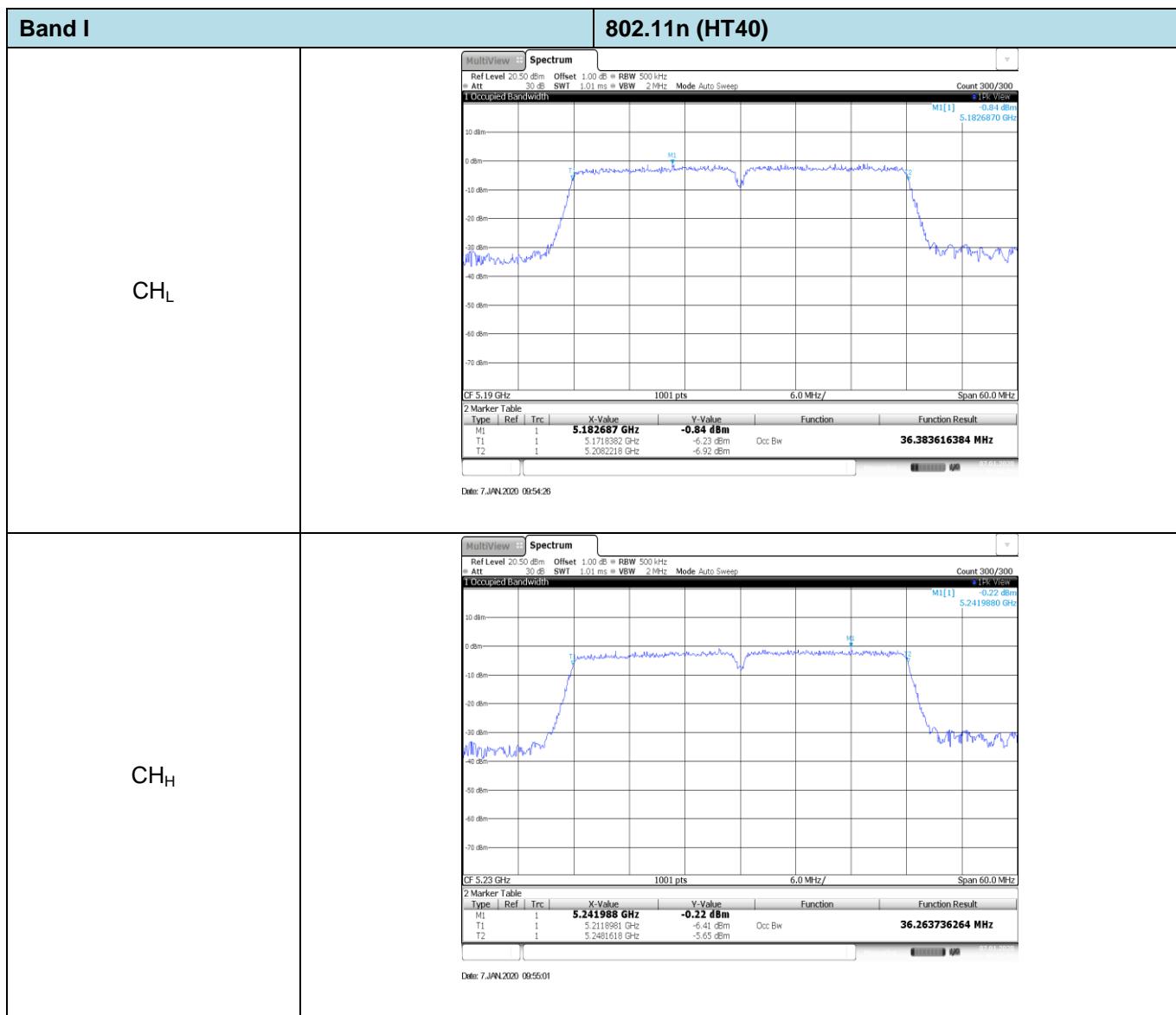


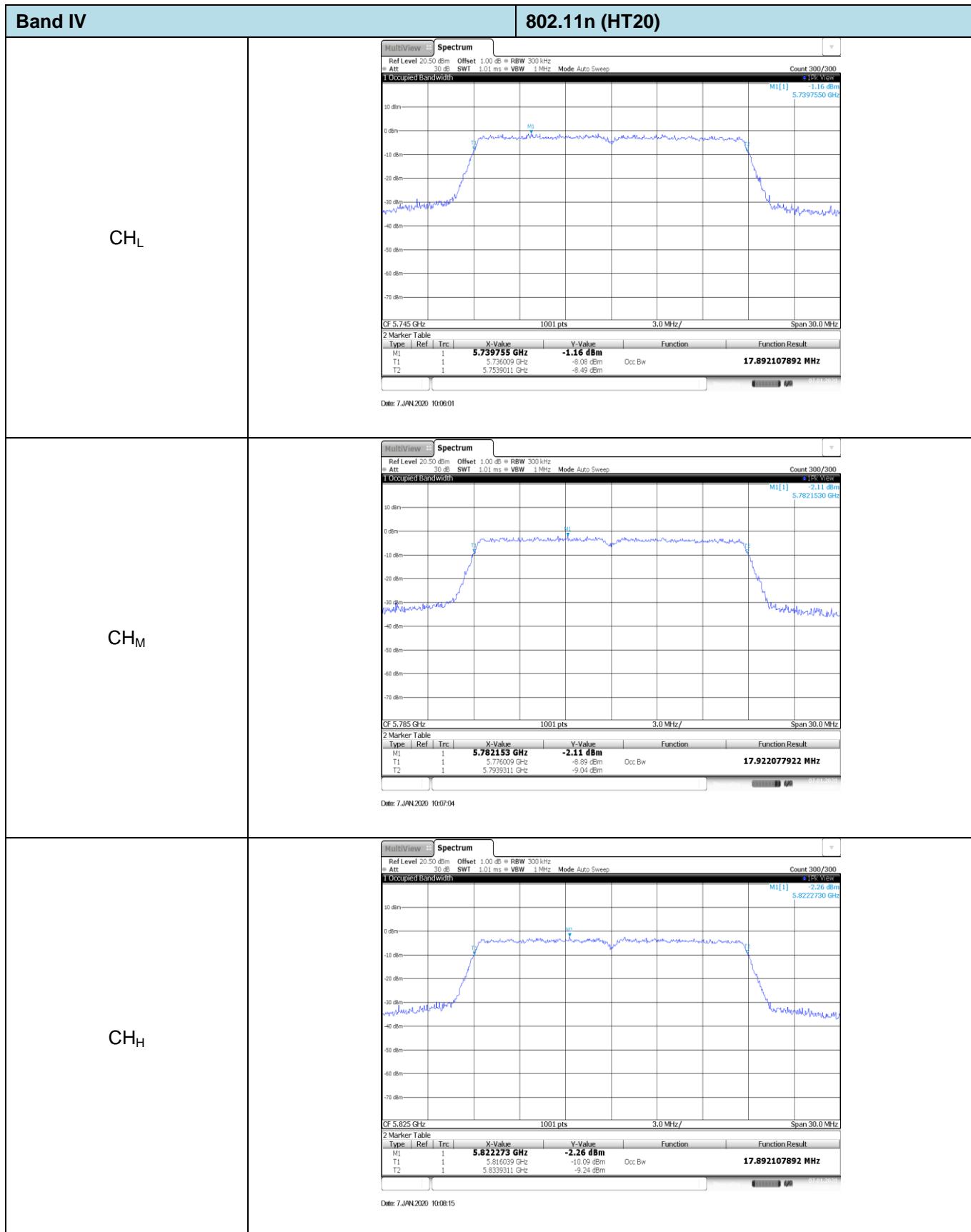
Appendix D: 99% Occupy bandwidth

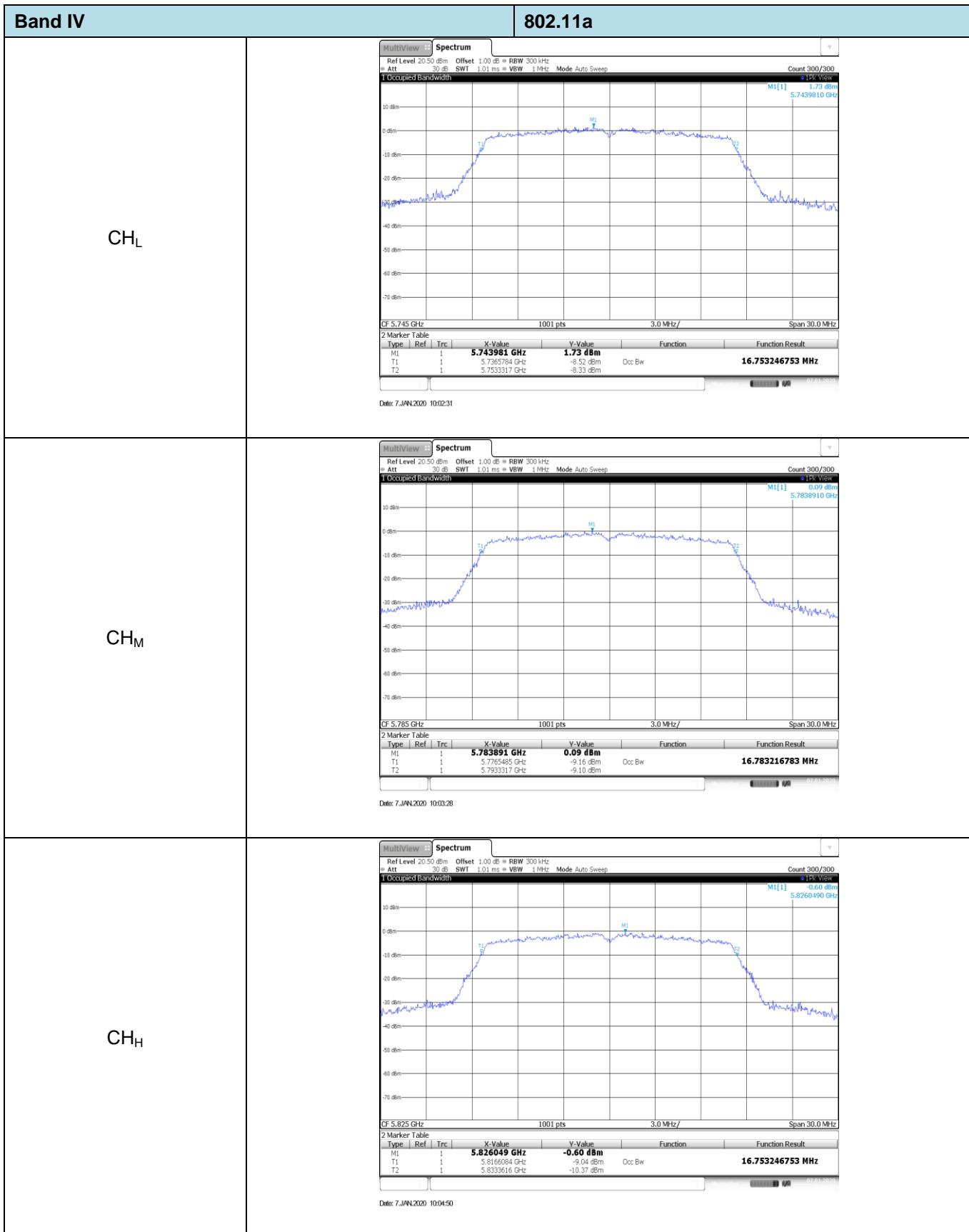
Band	Bandwidth (MHz)	Type	Channel	99% Occupy bandwidth (MHz)	Result
I	20	802.11n	CH _L	17.86	Pass
			CH _M	17.86	
			CH _H	17.86	
	20	802.11a	CH _L	16.78	Pass
			CH _M	16.75	
			CH _H	16.81	
	40	802.11n	CH _L	36.38	Pass
			CH _H	36.26	
IV	20	802.11n	CH _L	17.89	Pass
			CH _M	17.92	
			CH _H	17.89	
	20	802.11a	CH _L	16.75	Pass
			CH _M	16.78	
			CH _H	16.75	
	40	802.11n	CH _L	36.38	Pass
			CH _H	36.38	

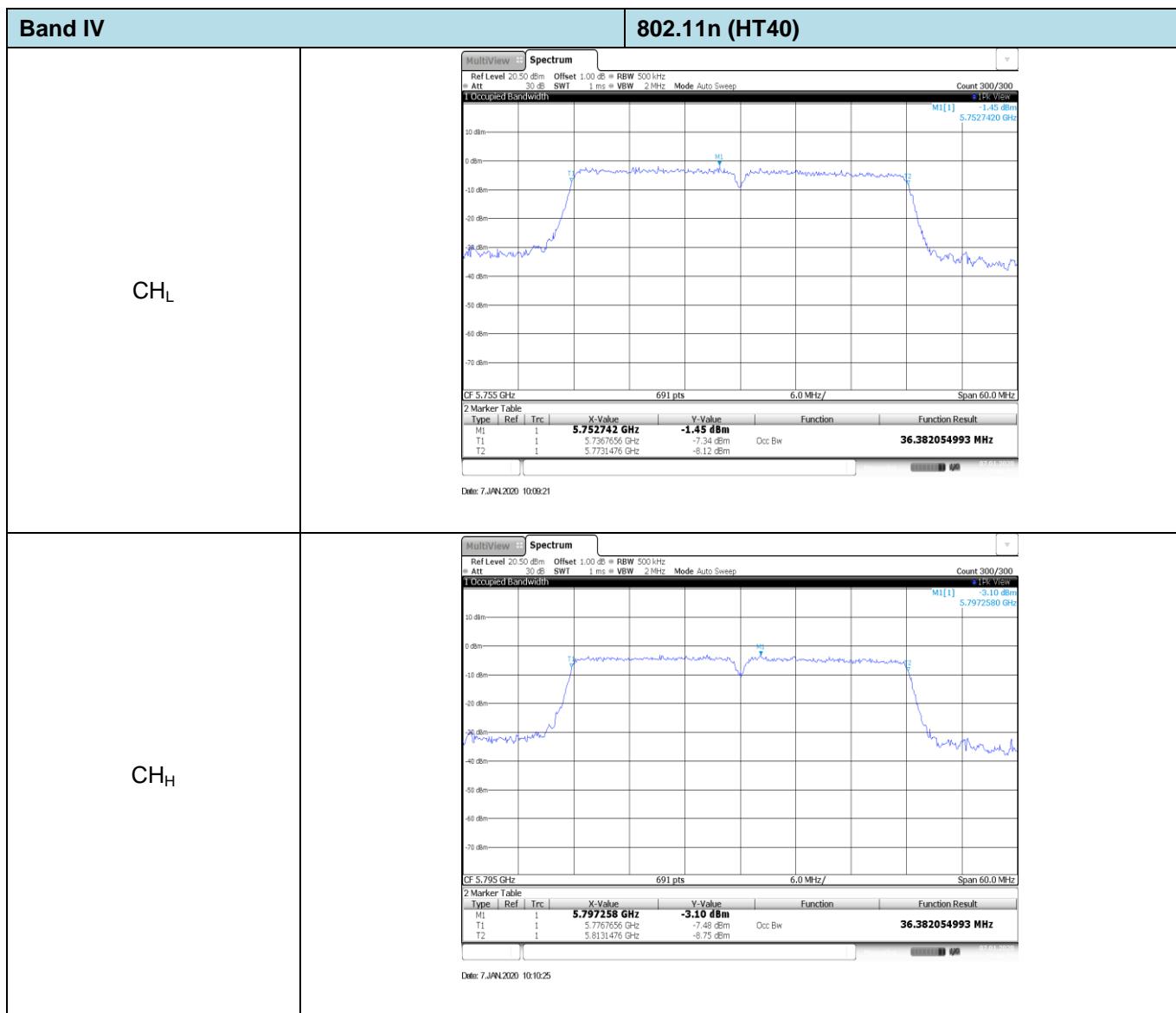






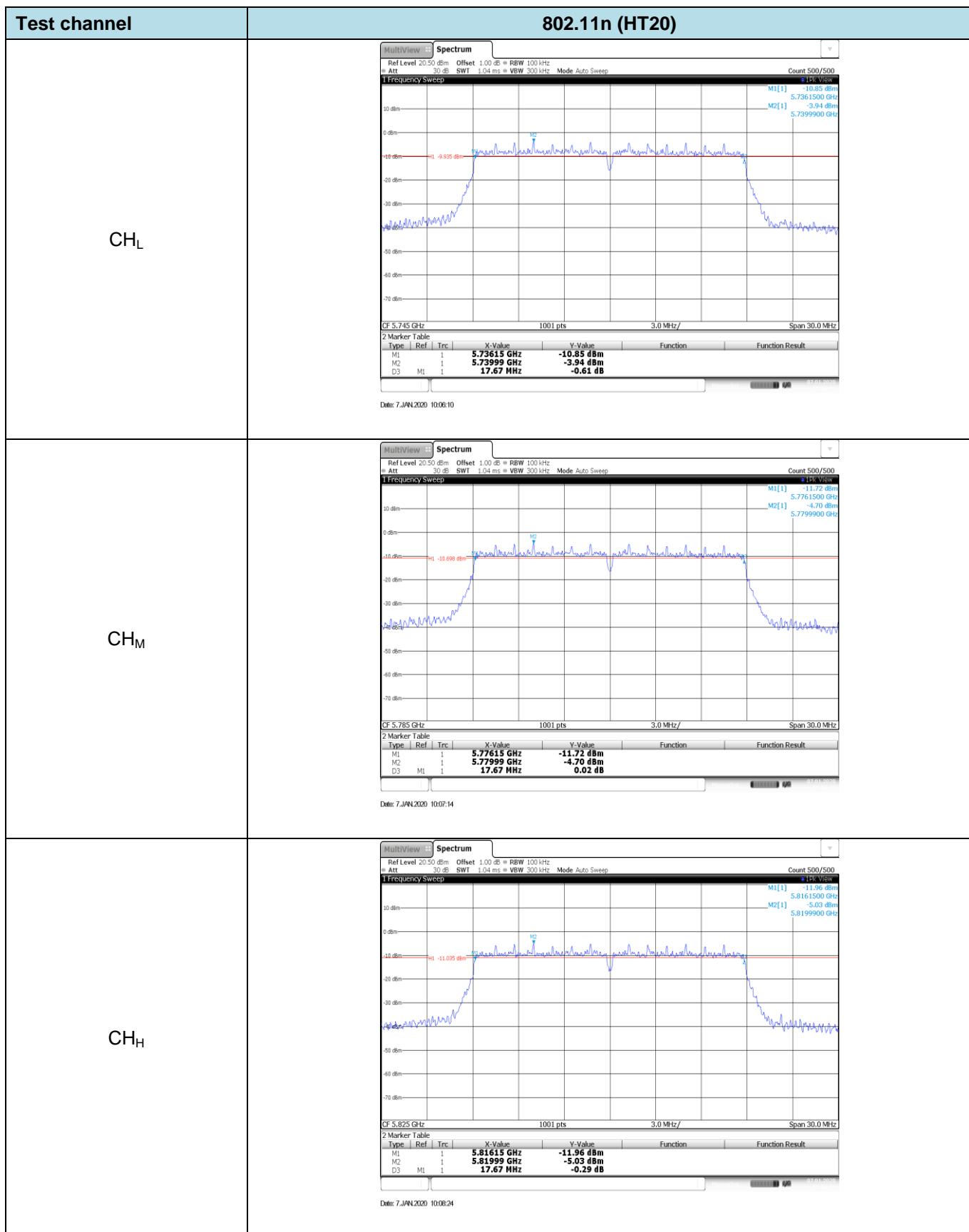


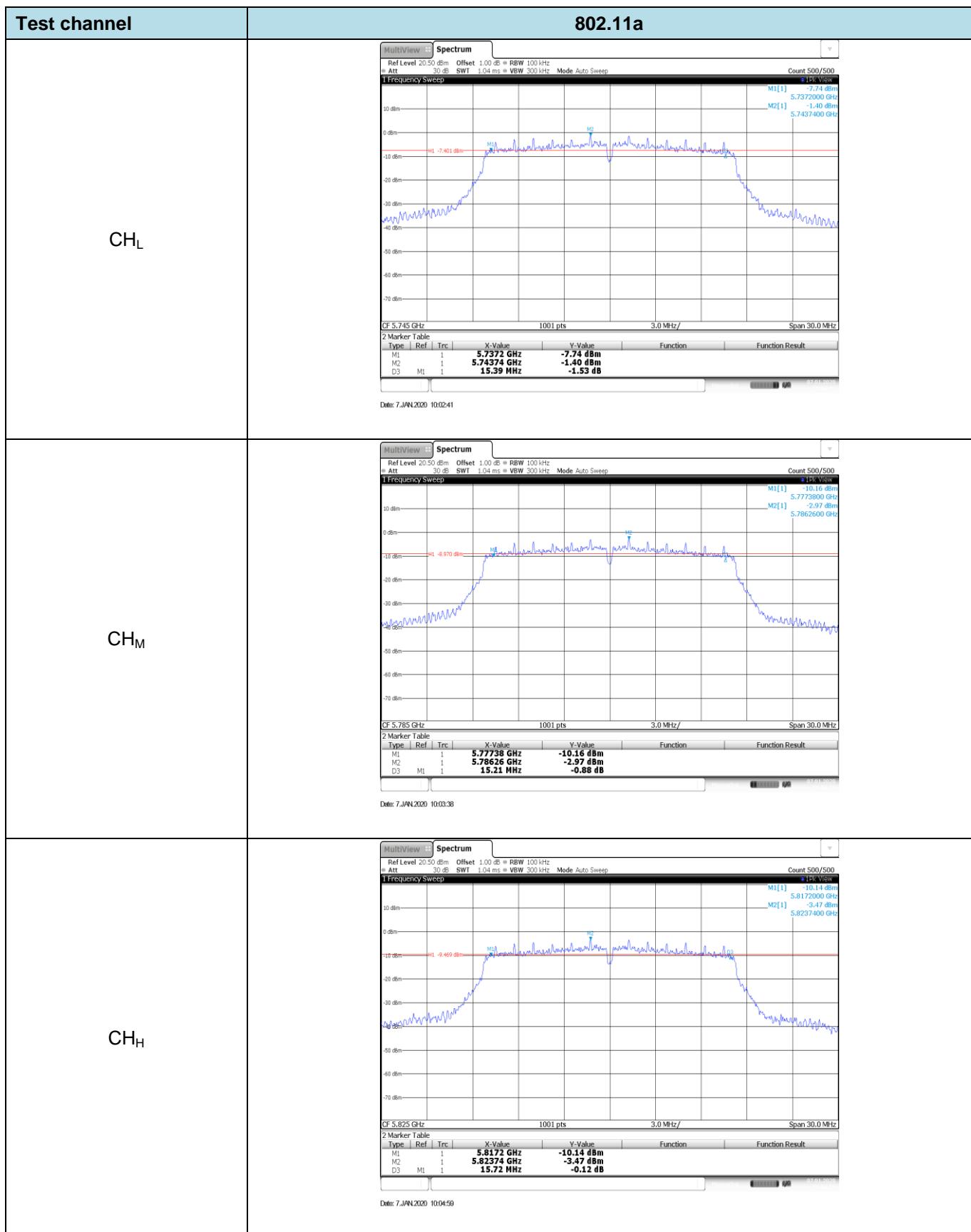


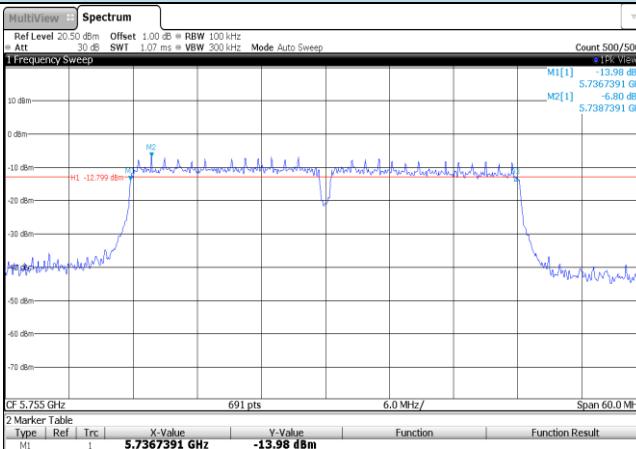
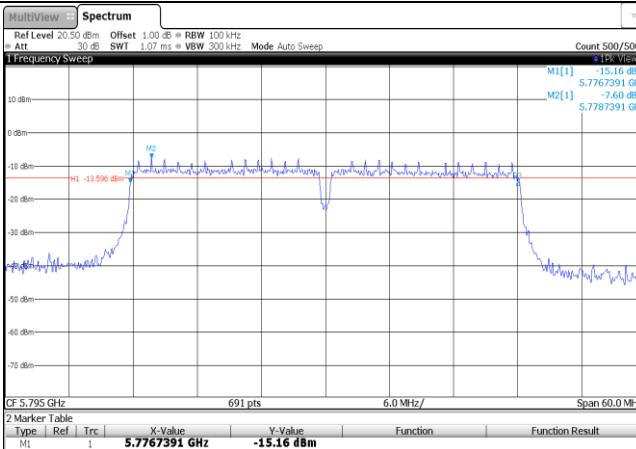


Appendix E: 6dB Bandwidth

Band	Bandwidth (MHz)	Type	Channel	6dB bandwith (MHz)	Result
IV	20	802.11n	CH _L	17.67	Pass
			CH _M	17.67	
			CH _H	17.67	
	40	802.11a	CH _L	15.39	Pass
			CH _M	15.21	
			CH _H	15.72	
		802.11n	CH _L	36.09	Pass
		CH _H	36.26		





Test channel	802.11n (HT40)																												
CH _L	 <p>CF 5.755 GHz 691 pts 6.0 MHz/ Span 60.0 MHz</p> <p>2 Marker Table</p> <table border="1"> <thead> <tr> <th>Type</th> <th>Ref</th> <th>Trc</th> <th>X-Value</th> <th>Y-Value</th> <th>Function</th> <th>Function Result</th> </tr> </thead> <tbody> <tr> <td>M1</td> <td>1</td> <td></td> <td>5.7367391 GHz</td> <td>-13.98 dBm</td> <td></td> <td></td> </tr> <tr> <td>M2</td> <td>1</td> <td></td> <td>5.7387391 GHz</td> <td>-6.80 dBm</td> <td></td> <td></td> </tr> <tr> <td>D3</td> <td>M1</td> <td>1</td> <td>36.087 MHz</td> <td>1.16 dB</td> <td></td> <td></td> </tr> </tbody> </table> <p>Date: 7.JAN.2020 10:09:30</p>	Type	Ref	Trc	X-Value	Y-Value	Function	Function Result	M1	1		5.7367391 GHz	-13.98 dBm			M2	1		5.7387391 GHz	-6.80 dBm			D3	M1	1	36.087 MHz	1.16 dB		
Type	Ref	Trc	X-Value	Y-Value	Function	Function Result																							
M1	1		5.7367391 GHz	-13.98 dBm																									
M2	1		5.7387391 GHz	-6.80 dBm																									
D3	M1	1	36.087 MHz	1.16 dB																									
CH _H	 <p>CF 5.755 GHz 691 pts 6.0 MHz/ Span 60.0 MHz</p> <p>2 Marker Table</p> <table border="1"> <thead> <tr> <th>Type</th> <th>Ref</th> <th>Trc</th> <th>X-Value</th> <th>Y-Value</th> <th>Function</th> <th>Function Result</th> </tr> </thead> <tbody> <tr> <td>M1</td> <td>1</td> <td></td> <td>5.7767391 GHz</td> <td>-15.16 dBm</td> <td></td> <td></td> </tr> <tr> <td>M2</td> <td>1</td> <td></td> <td>5.7787391 GHz</td> <td>-7.60 dBm</td> <td></td> <td></td> </tr> <tr> <td>D3</td> <td>M1</td> <td>1</td> <td>36.2609 MHz</td> <td>0.67 dB</td> <td></td> <td></td> </tr> </tbody> </table> <p>Date: 7.JAN.2020 10:10:35</p>	Type	Ref	Trc	X-Value	Y-Value	Function	Function Result	M1	1		5.7767391 GHz	-15.16 dBm			M2	1		5.7787391 GHz	-7.60 dBm			D3	M1	1	36.2609 MHz	0.67 dB		
Type	Ref	Trc	X-Value	Y-Value	Function	Function Result																							
M1	1		5.7767391 GHz	-15.16 dBm																									
M2	1		5.7787391 GHz	-7.60 dBm																									
D3	M1	1	36.2609 MHz	0.67 dB																									

Appendix F: Frequency stability

Voltage VS Frequency stability

Band: I			Test Frequency: 5180.00MHz	
Temperature (°C)	Voltage (V)	Frequency Deviation (Hz)	Frequency Deviation (ppm)	Result
25	V _L	-3000.00	-0.57915	PASS
25	V _N	-3000.00	-0.57915	PASS
25	V _H	-3000.00	-0.57915	PASS

Band: IV			Test Frequency: 5745.00MHz	
Temperature (°C)	Voltage (V)	Frequency Deviation (Hz)	Frequency Deviation (ppm)	Result
25	V _L	-3000.00	-0.52219	PASS
25	V _N	-3000.00	-0.52219	PASS
25	V _H	-3000.00	-0.52219	PASS

Temperature VS Frequency stability

Band: I			Test Frequency: 5180.00MHz	
Voltage (V)	Temperature (°C)	Frequency Deviation (Hz)	Frequency Deviation (ppm)	Result
V _N	-20	-3000.00	-0.57915	PASS
V _N	-10	-3000.00	-0.57915	PASS
V _N	0	-3000.00	-0.57915	PASS
V _N	10	-3000.00	-0.57915	PASS
V _N	20	-3000.00	-0.57915	PASS
V _N	30	-3000.00	-0.57915	PASS
V _N	40	-3000.00	-0.57915	PASS
V _N	50	-3000.00	-0.57915	PASS

Band: IV			Test Frequency: 5745.00MHz	
Voltage (V)	Temperature (°C)	Frequency Deviation (Hz)	Frequency Deviation (ppm)	Result
V _N	-20	-3000.00	-0.52219	PASS
V _N	-10	-3000.00	-0.52219	PASS
V _N	0	-3000.00	-0.52219	PASS
V _N	10	-4000.00	-0.69626	PASS
V _N	20	-4000.00	-0.69626	PASS
V _N	30	-4000.00	-0.69626	PASS
V _N	40	-3000.00	-0.52219	PASS
V _N	50	-3000.00	-0.52219	PASS

-----End of Report-----