



# TEST REPORT

Report Reference No.....	CHTEW19110026	Report verification:	
Project No.....	SHT1908014005EW		
FCC ID .....	2ATTZ-SUNBEAM-F1		
Applicant's name .....	Basic,Inc.		
Address.....	17688 County Road 558,Memphis,Missouri,United States		
Manufacturer.....	Basic,Inc.		
Address.....	17688 County Road 558,Memphis,Missouri,United States		
Test item description .....	Basic Feature Phone		
Trade Mark .....	Sunbeam		
Model/Type reference.....	F1		
Listed Model(s) .....	-		
Standard .....	FCC CFR Title 47 Part 15 Subpart E Section 15.407		
Date of receipt of test sample.....	Oct 11, 2019		
Date of testing.....	Oct 12, 2019- Nov 04, 2019		
Date of issue.....	Nov 05, 2019		
Result.....	PASS		
Compiled by ( position+printedname+signature)....	File administrators Silvia Li		
Supervised by (position+printedname+signature)....	Project Engineer Aaron Fang		
Approved by (position+printedname+signature)....	RF Manager Hans Hu		
Testing Laboratory Name .....	Shenzhen Huatongwei International Inspection Co., Ltd		
Address.....	1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China		

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*The test report merely correspond to the test sample.*

## Contents

<u>1. TEST STANDARDS AND REPORT VERSION</u>	<u>3</u>
1.1. Test Standards	3
1.2. Report Version	3
<u>2. TEST DESCRIPTION</u>	<u>4</u>
<u>3. SUMMARY</u>	<u>5</u>
3.1. Client Information	5
3.2. Product Description	5
3.3. Operation state	6
3.4. EUT configuration	7
3.5. Modifications	7
<u>4. TEST ENVIRONMENT</u>	<u>8</u>
4.1. Address of the test laboratory	8
4.2. Test Facility	8
4.3. Environmental conditions	9
4.4. Statement of the measurement uncertainty	9
4.5. Equipments Used during the Test	10
<u>5. TEST CONDITIONS AND RESULTS</u>	<u>11</u>
5.1. Antenna requirement	11
5.2. Conducted Emissions (AC Main)	12
5.3. Maximum Conducted Output Power	15
5.4. Maximum Power Spectral Density	17
5.5. 26dB bandwidth and 99% Occupy bandwidth	31
5.6. 6dB Bandwidth	43
5.7. Band edge	48
5.8. Radiated Spurious Emissions	52
5.9. Frequency stability	59
<u>6. TEST SETUP PHOTOS OF THE EUT</u>	<u>63</u>
<u>7. EXTERNAL AND INTERNAL PHOTOS OF THE EUT</u>	<u>64</u>

## 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	2019-11-05	Original

## 2. TEST DESCRIPTION

Test Item	FCC Rule	Result	Test Engineer
Antenna Requirement	15.203	PASS	Kang Yang
Line Conducted Emissions (AC Main)	15.207	PASS	Kang Yang
Maximum Conducted Output Power	15.407(a)	PASS	JiongSheng.Feng
Maximum Power Spectral Density	15.407(a)	PASS	JiongSheng.Feng
26dB Bandwidth and 99% Occupy bandwith	15.407(a)	PASS	JiongSheng.Feng
6dB Bandwidth	15.407(a)	PASS	JiongSheng.Feng
Band edge	15.407(b)	PASS	JiongSheng.Feng
Radiated Spurious Emissions	15.209	PASS	Quanhai Deng
Frequency Stability	15.407(g)	PASS	Quanhai Deng

Remark: The measurement uncertainty is not included in the test result.

### 3. SUMMARY

#### 3.1. Client Information

Applicant:	Basic,Inc.
Address:	17688 County Road 558,Memphis,Missouri,United States
Manufacturer:	Basic,Inc.
Address:	17688 County Road 558,Memphis,Missouri,United States

#### 3.2. Product Description

Name of EUT	Basic Feature Phone
Trade Mark:	Sunbeam
Model No.:	F1
Listed Model(s):	-
Power supply:	DC 3.7V
Adapter information :	Model:XH005W050100USCD Input: 100-240V a.c., 50/60Hz, 0.2A Output: 5.0V d.c., 1.0A
Hardware version:	QS3912_MAINPCB_V1.0
Software version:	Sunbeam_F1V_V1.0

#### 5G WIFI

Supported type:	<input checked="" type="checkbox"/> 802.11a	<input checked="" type="checkbox"/> 802.11n(HT20)	<input checked="" type="checkbox"/> 802.11n(HT40)		
Function:	<input type="checkbox"/> Outdoor AP	<input type="checkbox"/> Indoor AP	<input type="checkbox"/> Fixed P2P		
	<input checked="" type="checkbox"/> Client				
DFS type:	<input type="checkbox"/> master devices	<input type="checkbox"/> Slave devices with radar detection	<input checked="" type="checkbox"/> Slave devices without radar detection		
Modulation:	BPSK, QPSK, 16QAM, 64QAM				
Operation frequency:	<input checked="" type="checkbox"/> Band I: 5150MHz~5250MHz <input checked="" type="checkbox"/> Band II: 5250MHz~5350MHz <input checked="" type="checkbox"/> Band III: 5470MHz~5725MHz <input checked="" type="checkbox"/> Band IV: 5725MHz~5850MHz				
Supported Bandwidth	20MHz:	802.11n, 802.11a			
	40MHz:	802.11n			
Antenna type:	FPC Antenna				
Antenna gain:	-0.98dBi				

### 3.3. Operation state

#### ➤ Frequency list

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

Band	Test Channel	20MHz		40MHz	
		Channel	Frequency (MHz)	Channel	Frequency (MHz)
I	CH <sub>L</sub>	36	5180	38	5190
	CH <sub>M</sub>	44	5220	-	-
	CH <sub>H</sub>	48	5240	46	5230
II	CH <sub>L</sub>	52	5260	54	5270
	CH <sub>M</sub>	56	5280	-	-
	CH <sub>H</sub>	64	5320	62	5310
III	CH <sub>L</sub>	100	5500	102	5510
	CH <sub>M</sub>	120	5600	118	5590
	CH <sub>H</sub>	140	5700	134	5670
IV	CH <sub>L</sub>	149	5745	151	5755
	CH <sub>M</sub>	157	5785	-	-
	CH <sub>H</sub>	165	5825	159	5795

#### ➤ Data Rated

Preliminary tests were performed in different data rate, and found which the below bit rate is worst case mode, so only show data which it is a worst case mode.

Mode	Data rate (worst mode)
802.11a	6Mbps
802.11n(HT20)	MCS0
802.11n(HT40)	MCS0

#### ➤ Test mode

For RF test items
The engineering test program was provided and enabled to make EUT continuous transmit (duty cycle>98%).
For AC power line conducted emissions:
The EUT was set to connect with the WLAN AP under large package sizes transmission.
For Radiated suprious emissions test item:
The engineering test program was provided and enabled to make EUT continuous transmit(duty cycle>98%). The EUT in each of three orthogonal axis emissions had been tested ,but only the worst case (X axis) data Recorded in the report.

### 3.4. EUT configuration

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

- - supplied by the manufacturer
- - supplied by the lab

○	N/A	Manufacturer :	N/A
		Model No. :	N/A
○	N/A	Manufacturer :	N/A
		Model No. :	N/A

### 3.5. Modifications

No modifications were implemented to meet testing criteria.

## **4. TEST ENVIRONMENT**

### **4.1. Address of the test laboratory**

Laboratory: Shenzhen Huatongwei International Inspection Co., Ltd.

Address: 1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China

Phone: 86-755-26748019 Fax: 86-755-26748089

### **4.2. Test Facility**

#### **CNAS-Lab Code: L1225**

Shenzhen Huatongwei International Inspection Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories.

#### **A2LA-Lab Cert. No.: 3902.01**

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

#### **FCC-Registration No.: 762235**

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files.

#### **IC-Registration No.: 5377A**

Two 3m Alternate Test Site of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No.: 5377A.

#### **ACA**

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our A2LA accreditation.

### 4.3. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15~35°C
Relative Humidity:	30~60 %
Air Pressure:	950~1050mba

### 4.4. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors in calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report according to TR-100028-01 "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 2" and is documented in the Shenzhen Huatongwei International Inspection Co., Ltd. quality system according to ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Here after the best measurement capability for Shenzhen Huatongwei International Inspection Co., Ltd. is reported:

Test Items	Measurement Uncertainty	Notes
Transmitter power conducted	0.51 dB	(1)
Conducted spurious emissions 9kHz~40GHz	0.51 dB	(1)
Conducted Disturbance 150kHz~30MHz	3.02 dB	(1)
Radiated Emissions below 1GHz	4.90 dB	(1)
Radiated Emissions above 1GHz	4.96 dB	(1)
Occupied Bandwidth	70 Hz	(1)
Frequency error	70 Hz	(1)

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

#### 4.5. Equipments 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	ENVIROFLEX_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
●	Ultra-Broadband Antenna	SCHWARZBECK	HTWE0119	VULB9163	546	2017/04/05	2020/04/04
●	Pre-Amplifier	SCHWARZBECK	HTWE0295	BBV 9742	N/A	2018/11/14	2019/11/13
●	RF Connection Cable	HUBER+SUHNER	HTWE0062-01	N/A	N/A	2019/8/21	2020/8/20
●	RF Connection Cable	HUBER+SUHNER	HTWE0062-02	SUCOFLEX104	501184/4	2019/5/27	2020/5/26
●	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	2018/09/30	2021/09/29
●	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
●	Broadband Pre-amplifier	SCHWARZBECK	HTWE0201	BBV 9718	9718-248	2019/05/23	2020/05/22
●	RF Connection Cable	HUBER+SUHNER	HTWE0121-01	RE-7-FH	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	
●	Test software	Tonscend	JS1120-2(WIFI)	N/A	N/A	N/A	

## 5. **TEST CONDITIONS AND RESULTS**

### 5.1. Antenna requirement

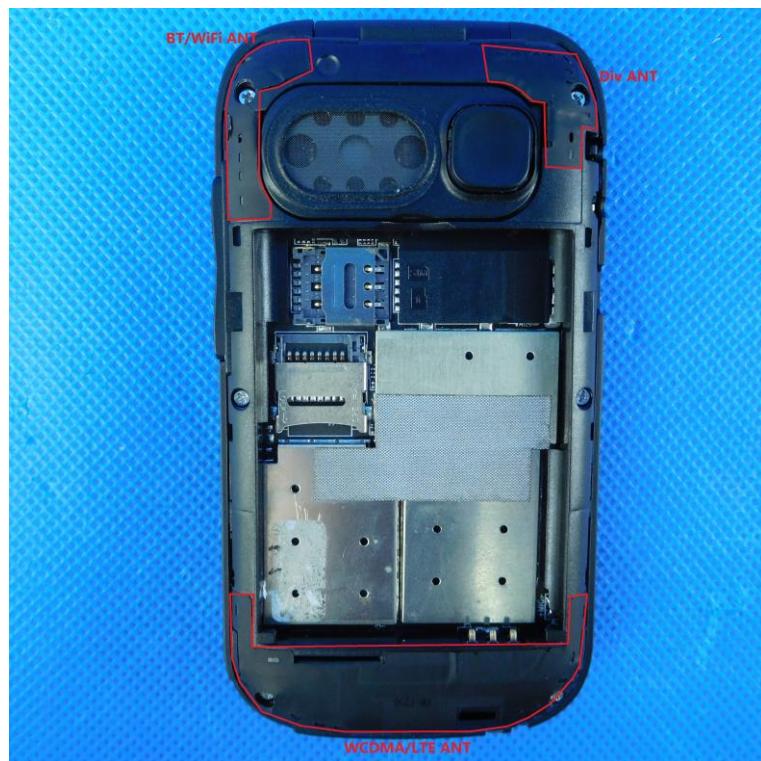
#### Requirement

##### **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:

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



## 5.2. Conducted Emissions (AC Main)

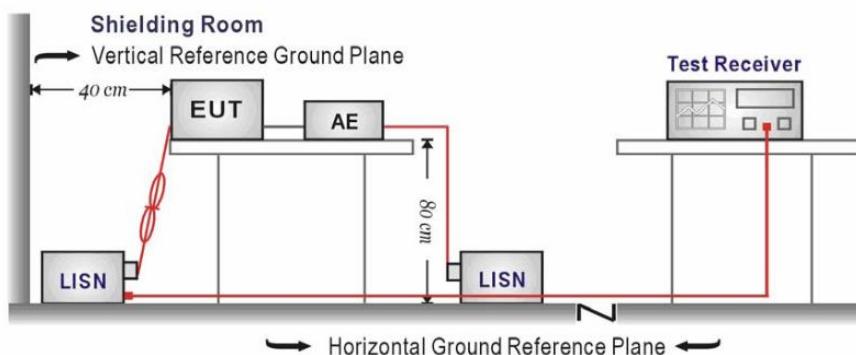
### LIMIT

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 C63.10:2013 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:

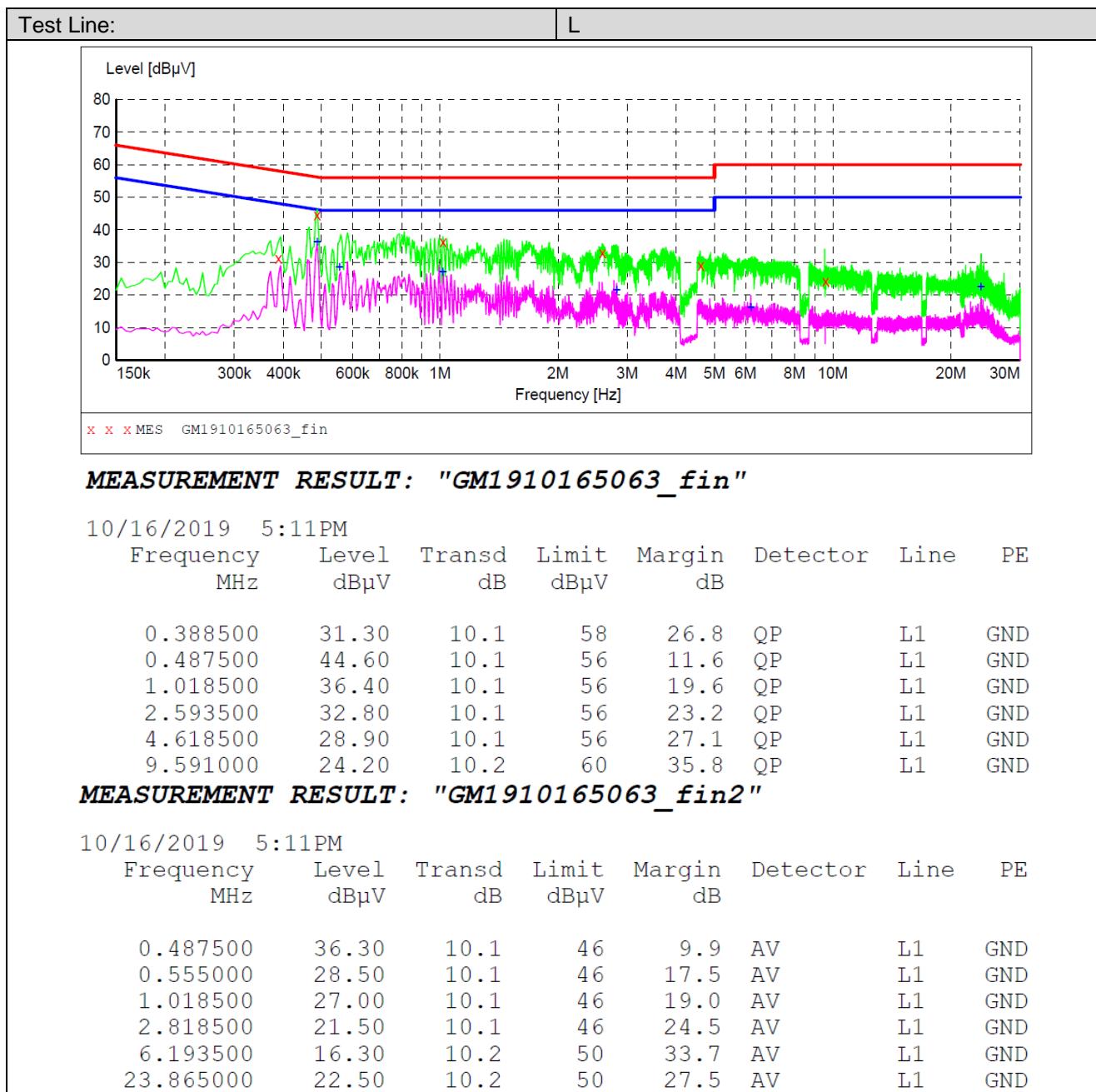
Please refer to the clause 3.3

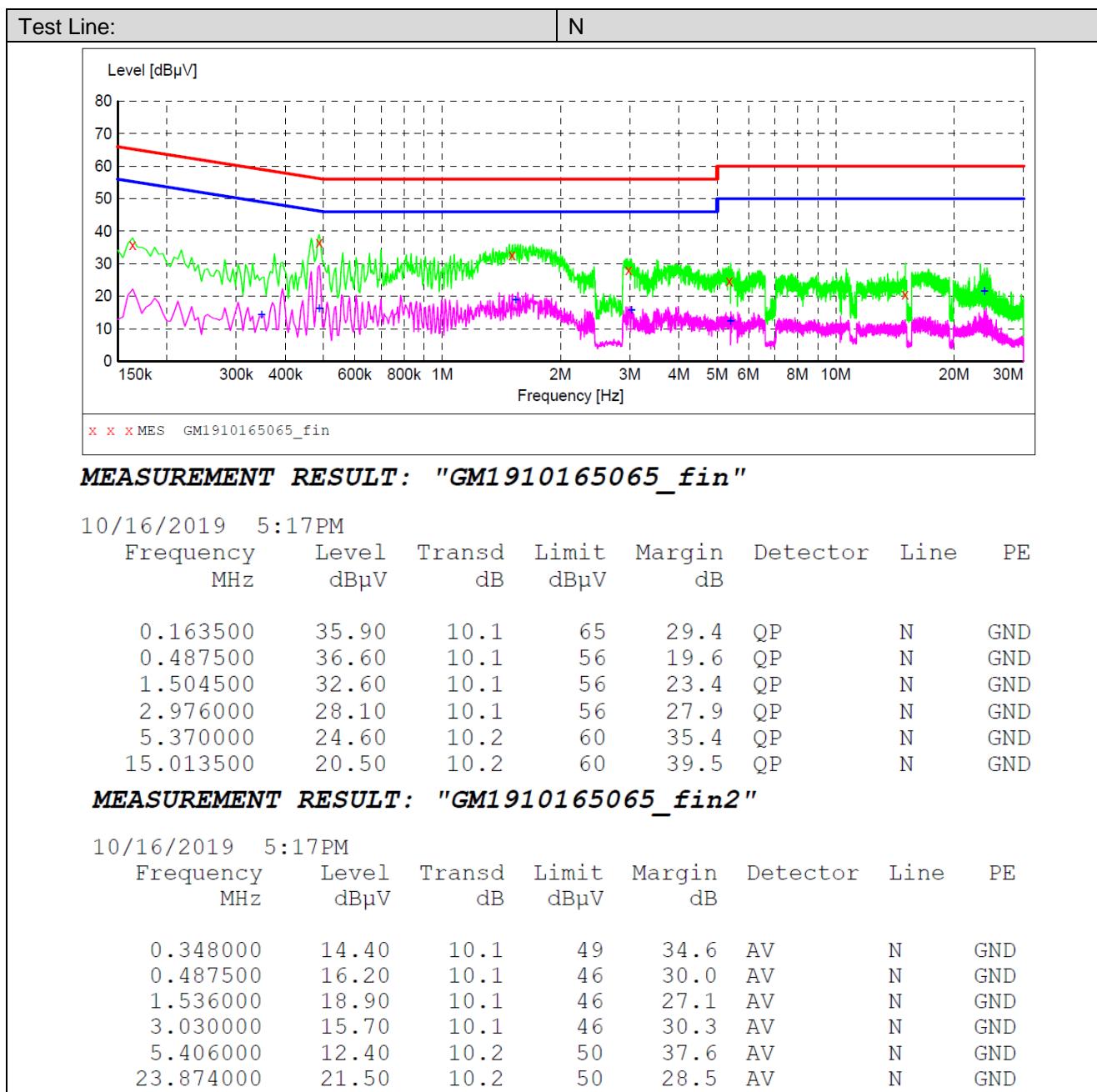
### TEST RESULTS

Passed       Not Applicable

Note:

- 1) Transd=Cable loss+ Pulse Limiter Factor + Artificial Mains Factor
- 2) Margin= Limit -Level





### 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 5.25~5.35GHz band:

The maximum conducted output power ( $P_{out}$ ) shall not exceed the lesser of 250mW (24dBm) or  $11\text{dBm} + 10 \log B$ , where B is the 26dB emission bandwith in MHz.  
if  $G_{Tx} > 6\text{dBi}$ , then  $P_{out} = 24 - (G_{Tx} - 6)$ .

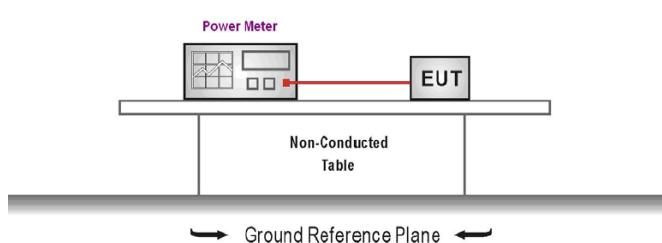
For the 5.47~5.725GHz band:

The maximum conducted output power ( $P_{out}$ ) shall not exceed the lesser of 250mW (24dBm) or  $11\text{dBm} + 10 \log B$ , where B is the 26dB emission bandwith in MHz.  
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.

#### TEST MODE:

Please refer to the clause 3.3

#### TEST RESULTS

Passed Not Applicable

Band	Bandwidth (MHz)	Type	Channel	Conducted Output Power (dBm)	Limit (dBm)	Result
I	20	802.11n	CH <sub>L</sub>	12.78	24.00	Pass
			CH <sub>M</sub>	13.95		
			CH <sub>H</sub>	14.19		
	20	802.11a	CH <sub>L</sub>	13.78	24.00	Pass
			CH <sub>M</sub>	13.86		
			CH <sub>H</sub>	13.87		
	40	802.11n	CH <sub>L</sub>	12.24	24.00	Pass
			CH <sub>H</sub>	13.01		
II	20	802.11n	CH <sub>L</sub>	15.03	24.00	Pass
			CH <sub>M</sub>	14.91		
			CH <sub>H</sub>	15.86		
	20	802.11a	CH <sub>L</sub>	14.46	24.00	Pass
			CH <sub>M</sub>	14.81		
			CH <sub>H</sub>	15.95		
	40	802.11n	CH <sub>L</sub>	14.37	24.00	Pass
			CH <sub>H</sub>	14.54		

Band	Bandwidth (MHz)	Type	Channel	Conducted Output Power (dBm)	Limit (dBm)	Result
III	20	802.11n	CH <sub>L</sub>	13.08	24.00	Pass
			CH <sub>M</sub>	12.93		
			CH <sub>H</sub>	11.39		
	20	802.11a	CH <sub>L</sub>	14.34	24.00	Pass
			CH <sub>M</sub>	12.88		
			CH <sub>H</sub>	12.58		
	40	802.11n	CH <sub>L</sub>	12.69	24.00	Pass
			CH <sub>M</sub>	12.62		
			CH <sub>H</sub>	11.36		
IV	20	802.11n	CH <sub>L</sub>	12.92	30.00	Pass
			CH <sub>M</sub>	12.37		
			CH <sub>H</sub>	12.77		
	20	802.11a	CH <sub>L</sub>	12.50	30.00	Pass
			CH <sub>M</sub>	12.35		
			CH <sub>H</sub>	12.77		
	40	802.11n	CH <sub>L</sub>	12.90	30.00	Pass
			CH <sub>H</sub>	13.09		

## 5.4. Maximum 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 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 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 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 PSD =  $11 - (G_{Tx} - 6)$ .

For the 5.25~5.35GHz band:

The peak power spectral density (PSD) shall not exceed the lesser of 11dBm/MHz.  
if  $G_{Tx} > 6\text{dBi}$ , then PSD =  $11 - (G_{Tx} - 6)$ .

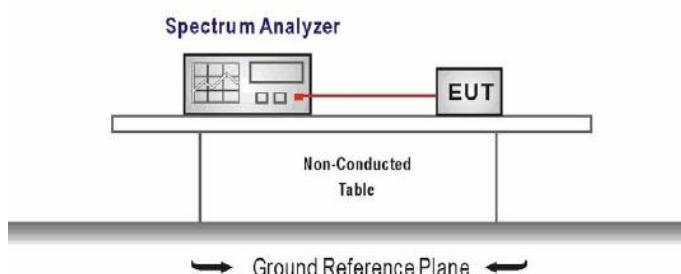
For the 5.47~5.725GHz band:

The peak power spectral density (PSD) shall not exceed the lesser of 11dBm/MHz.  
if  $G_{Tx} > 6\text{dBi}$ , then 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 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  $\geq 3$  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 3.3

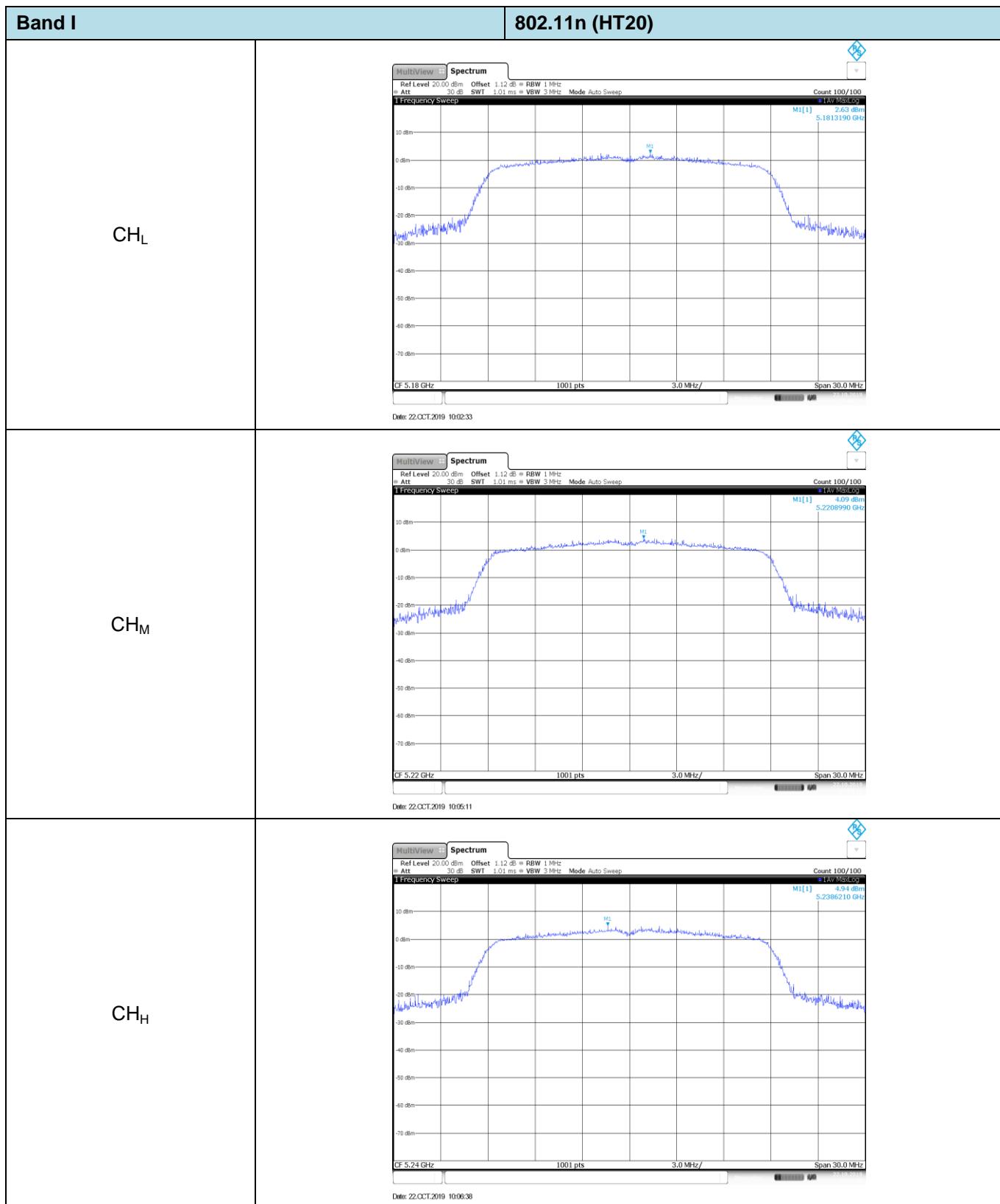
**TEST RESULTS**

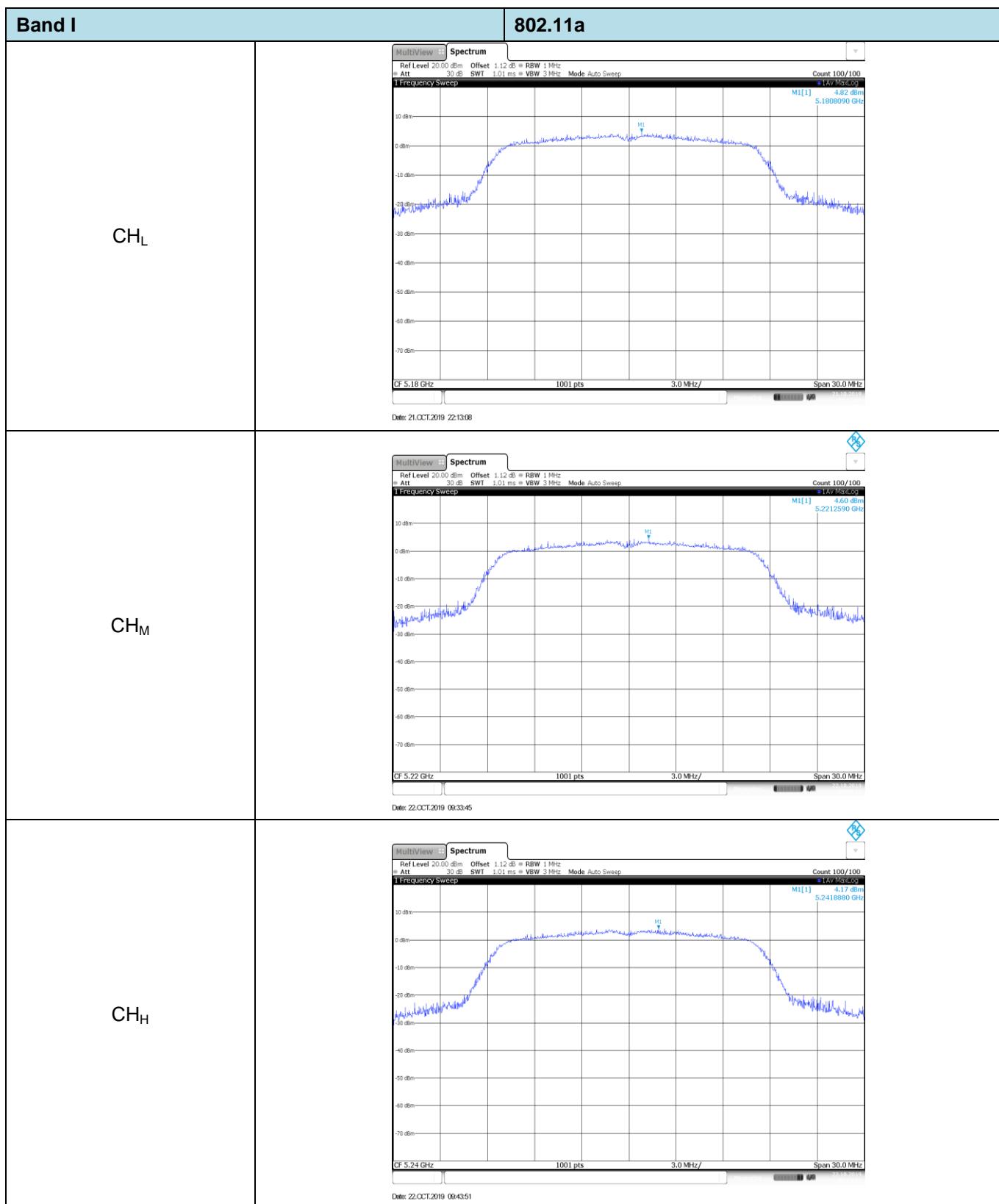
Passed       Not Applicable

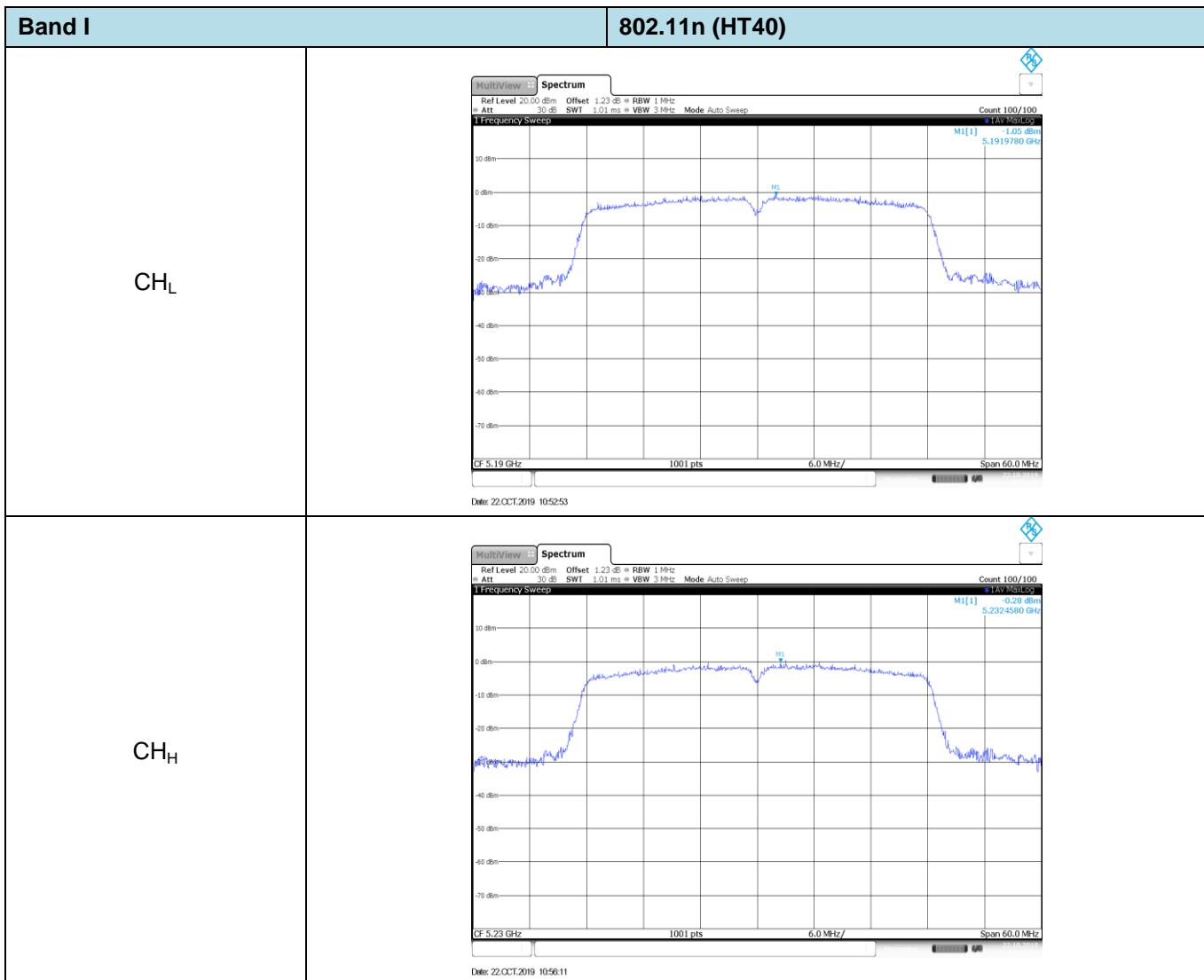
Band	Bandwidth (MHz)	Type	Channel	Power Spectral Density (dBm/MHz)	Limit (dBm/MHz)	Result
I	20	802.11n	CH <sub>L</sub>	2.63	11.00	Pass
			CH <sub>M</sub>	4.09		
			CH <sub>H</sub>	4.94		
		802.11a	CH <sub>L</sub>	4.82	11.00	Pass
			CH <sub>M</sub>	4.60		
			CH <sub>H</sub>	4.17		
	40	802.11n	CH <sub>L</sub>	-1.05	11.00	Pass
			CH <sub>H</sub>	-0.28		
II	20	802.11n	CH <sub>L</sub>	5.44	11.00	Pass
			CH <sub>M</sub>	5.50		
			CH <sub>H</sub>	5.90		
		802.11a	CH <sub>L</sub>	5.41	11.00	Pass
			CH <sub>M</sub>	5.28		
			CH <sub>H</sub>	6.59		
	40	802.11n	CH <sub>L</sub>	1.61	11.00	Pass
			CH <sub>H</sub>	1.32		

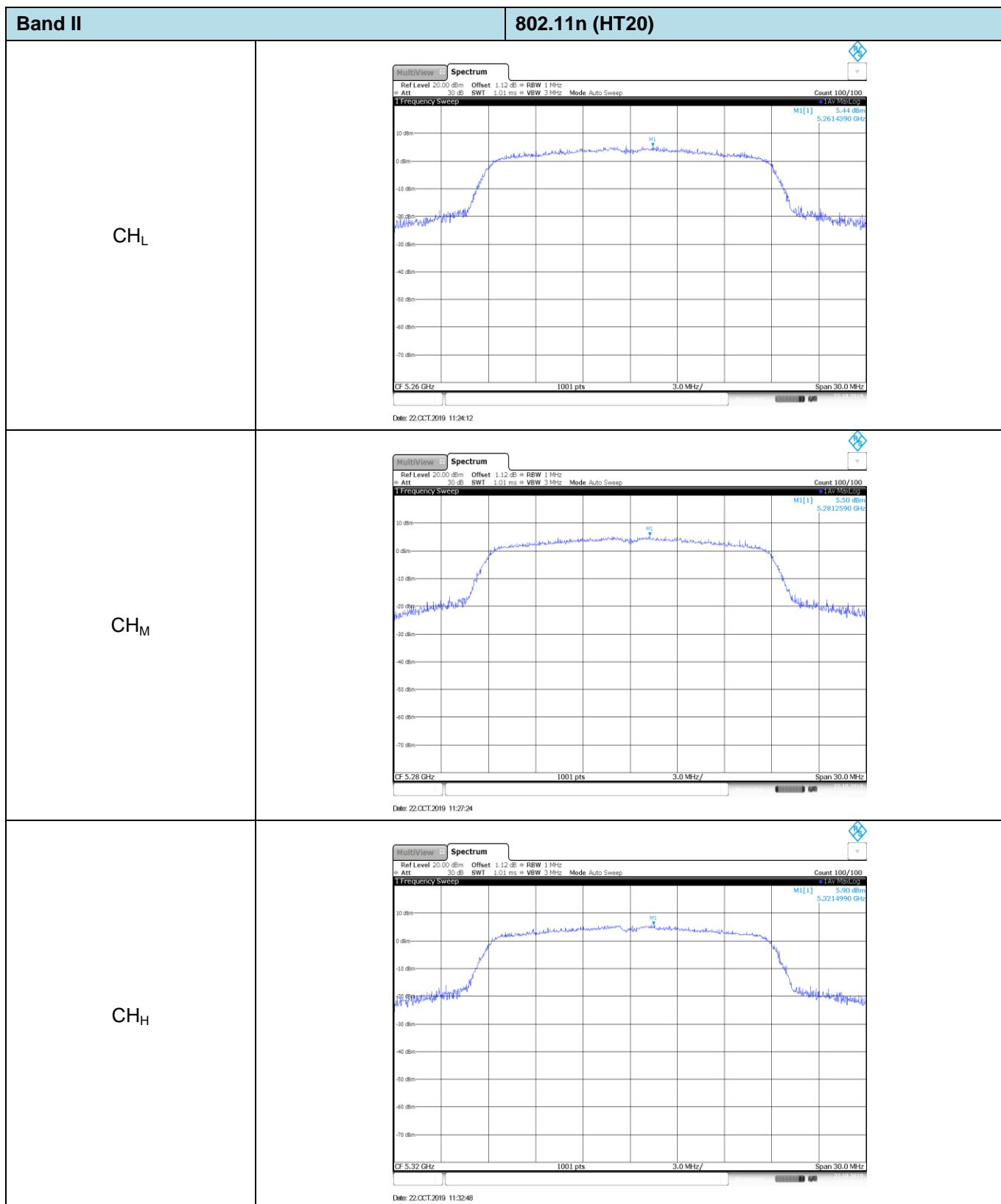
Band	Bandwidth (MHz)	Type	Channel	Power Spectral Density (dBm/MHz)	Limit (dBm/MHz)	Result
III	20	802.11n	CH <sub>L</sub>	3.82	11.00	Pass
			CH <sub>M</sub>	3.53		
			CH <sub>H</sub>	1.33		
		802.11a	CH <sub>L</sub>	5.23	11.00	Pass
			CH <sub>M</sub>	3.72		
			CH <sub>H</sub>	2.68		
	40	802.11n	CH <sub>L</sub>	0.05	11.00	Pass
			CH <sub>M</sub>	-0.50		
			CH <sub>H</sub>	-2.44		
Band	Bandwidth (MHz)	Type	Channel	Power Spectral Density (dBm/500kHz)	Limit (dBm/500kHz)	Result
IV	20	802.11n	CH <sub>L</sub>	1.89	30.00	Pass
			CH <sub>M</sub>	0.34		
			CH <sub>H</sub>	1.00		
		802.11a	CH <sub>L</sub>	1.53	30.00	Pass
			CH <sub>M</sub>	0.72		
			CH <sub>H</sub>	1.23		
	40	802.11n	CH <sub>L</sub>	-1.78	30.00	Pass
			CH <sub>H</sub>	-2.28		

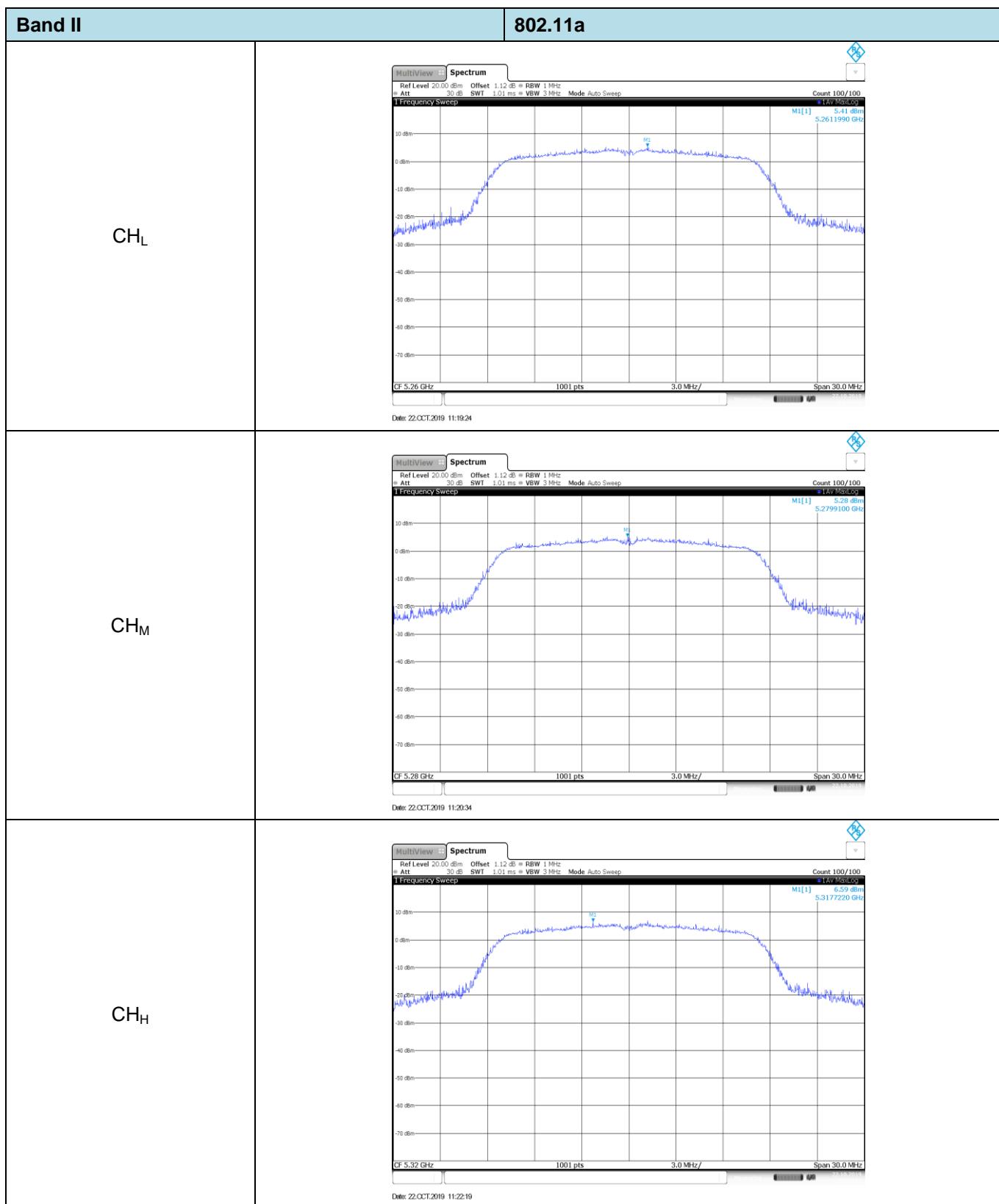
Test plot as follows:

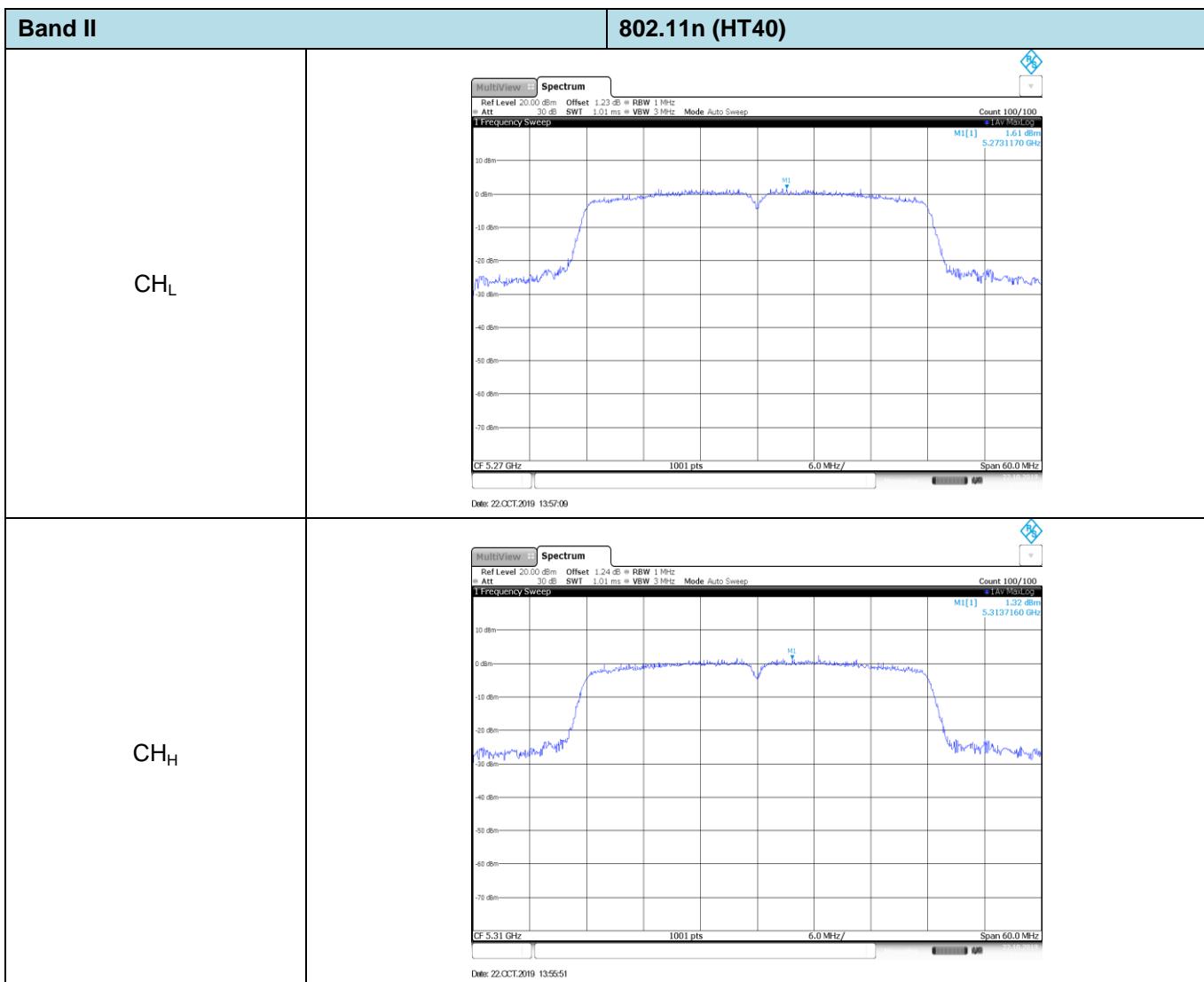


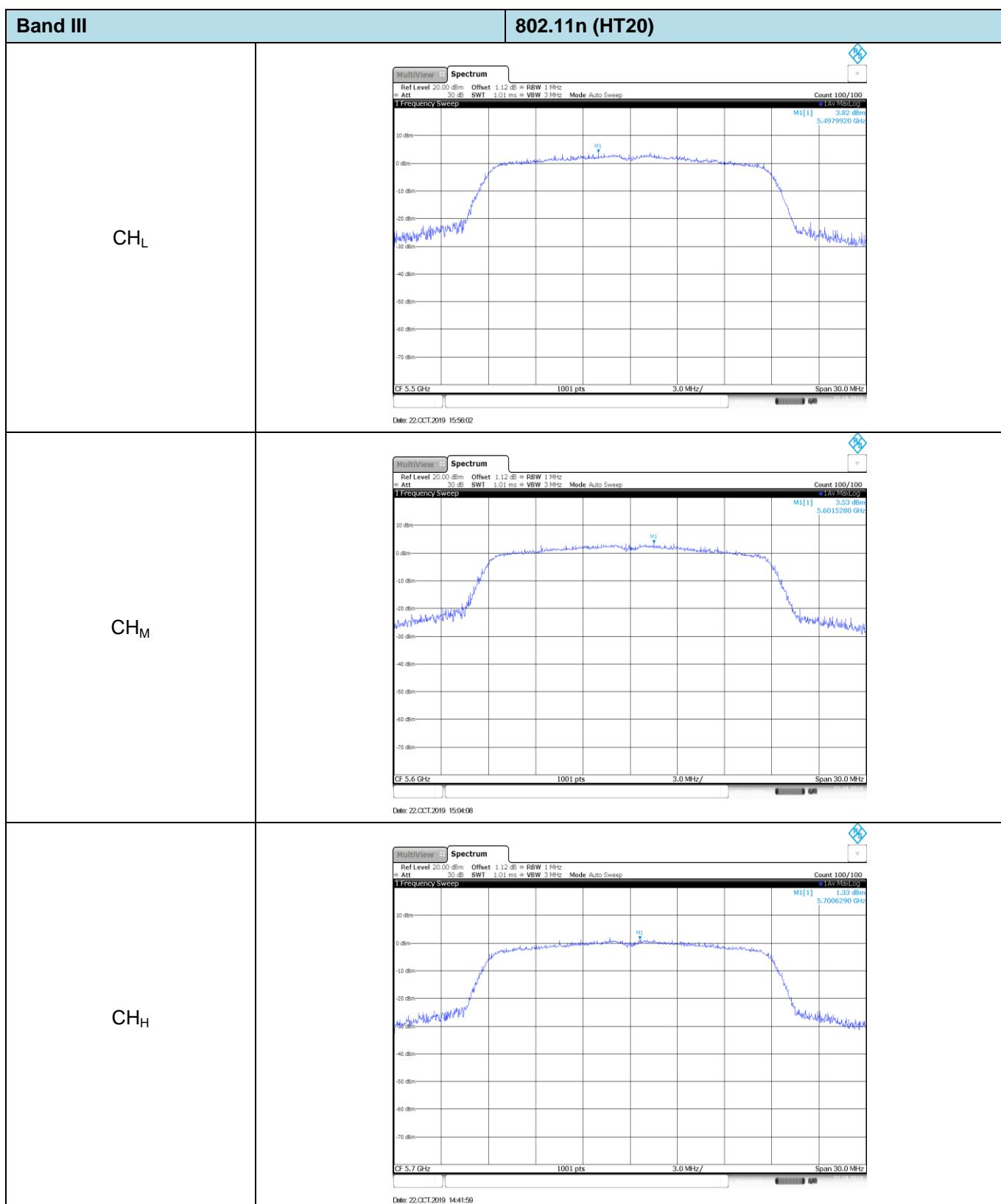


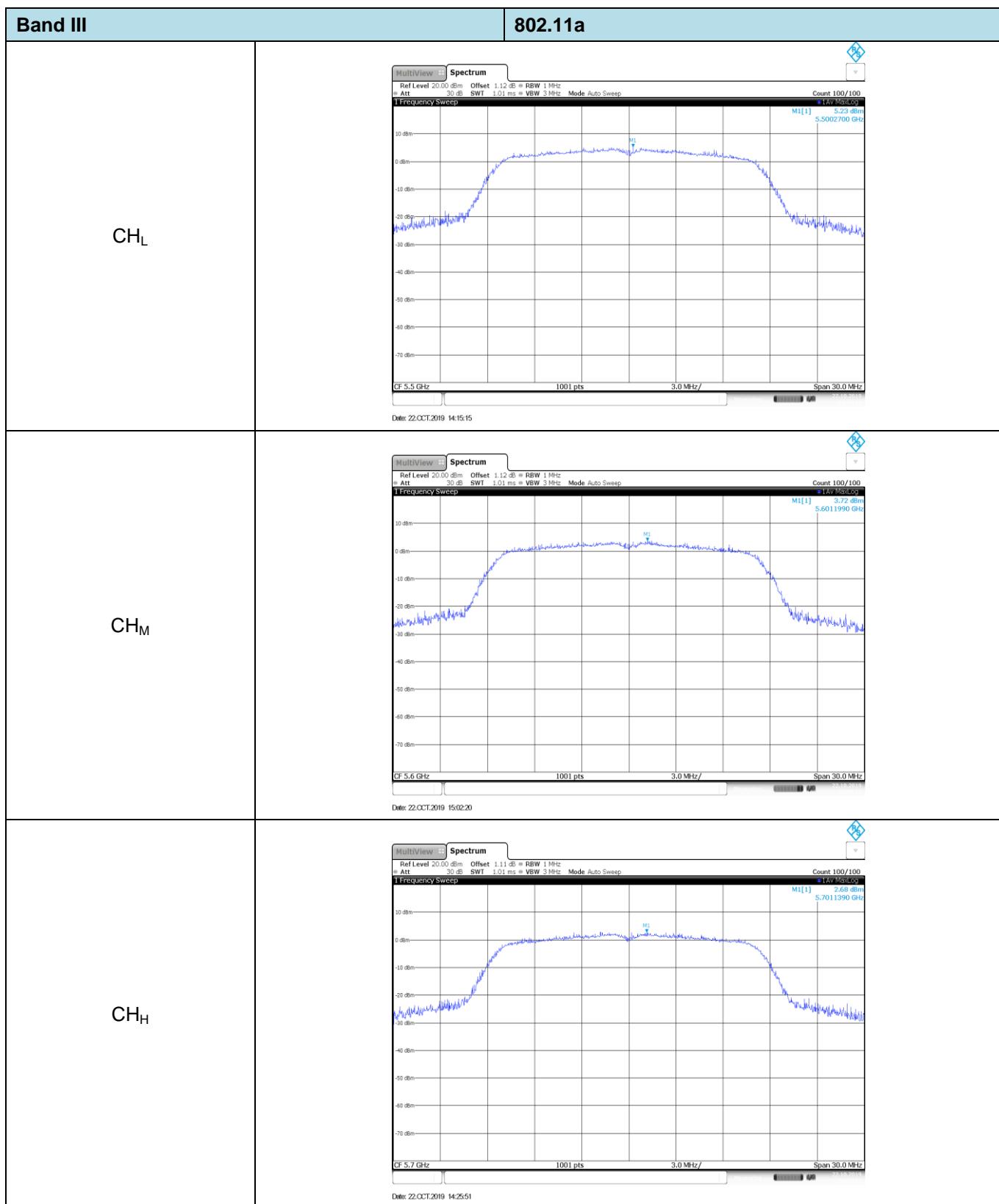


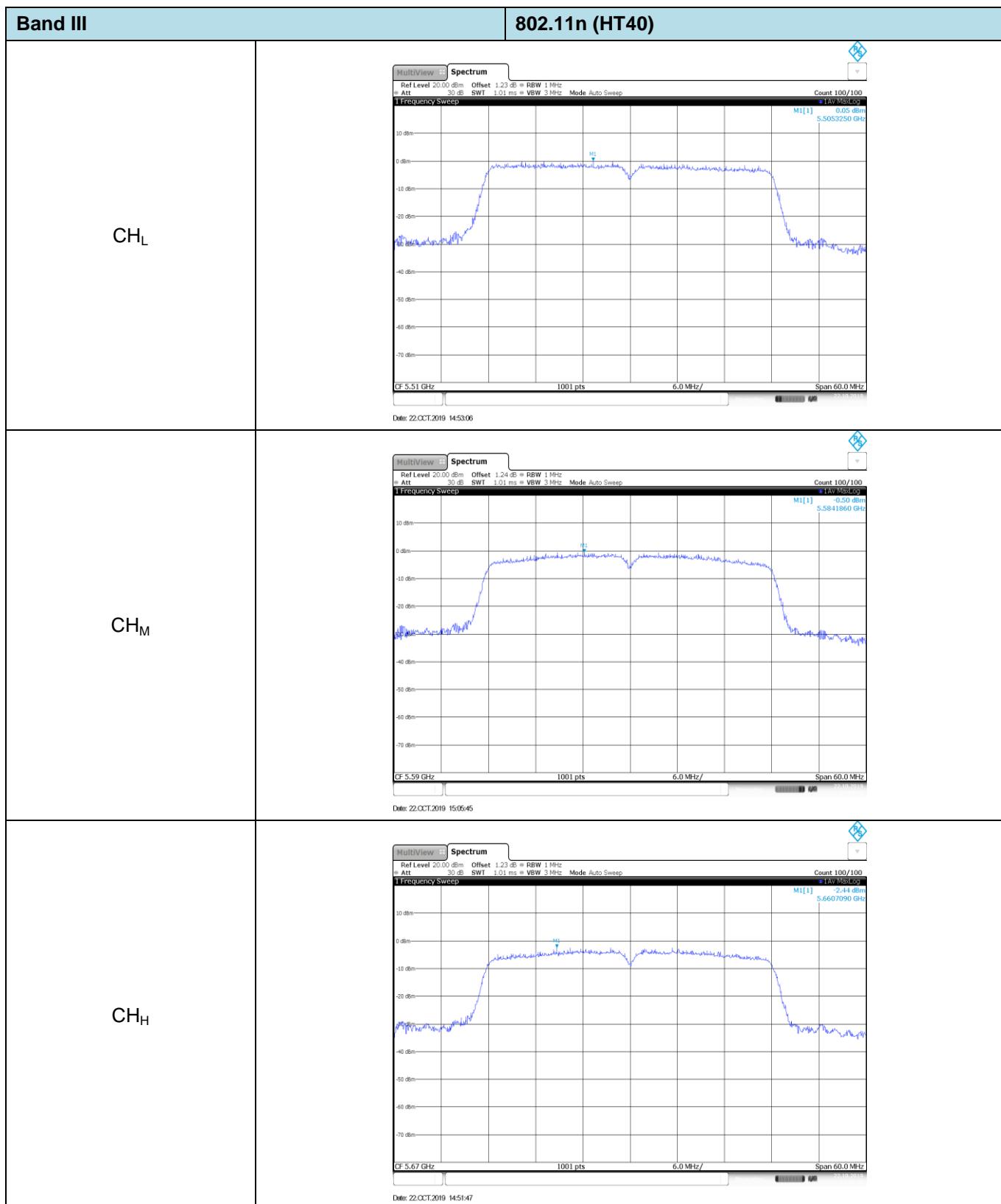


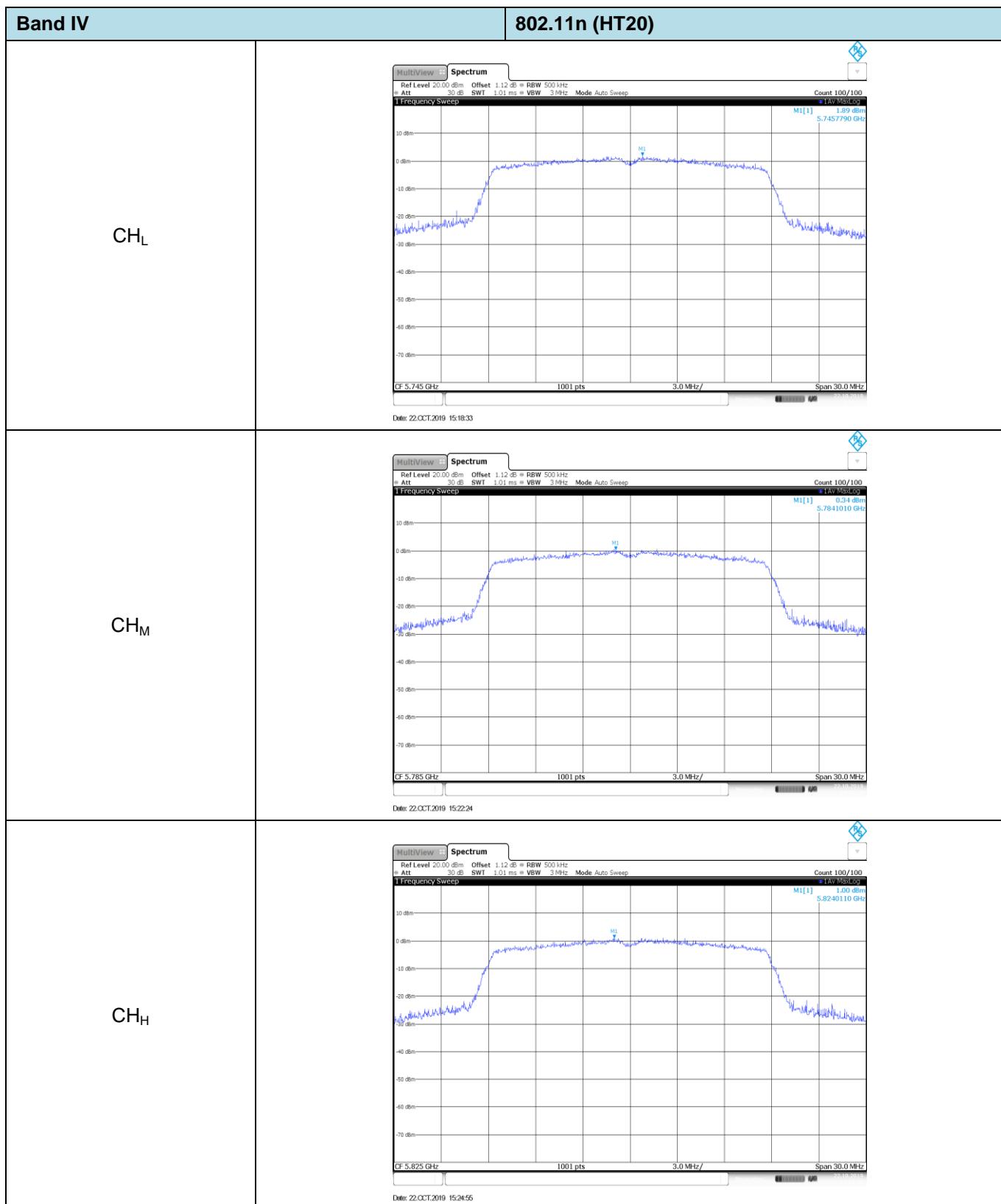


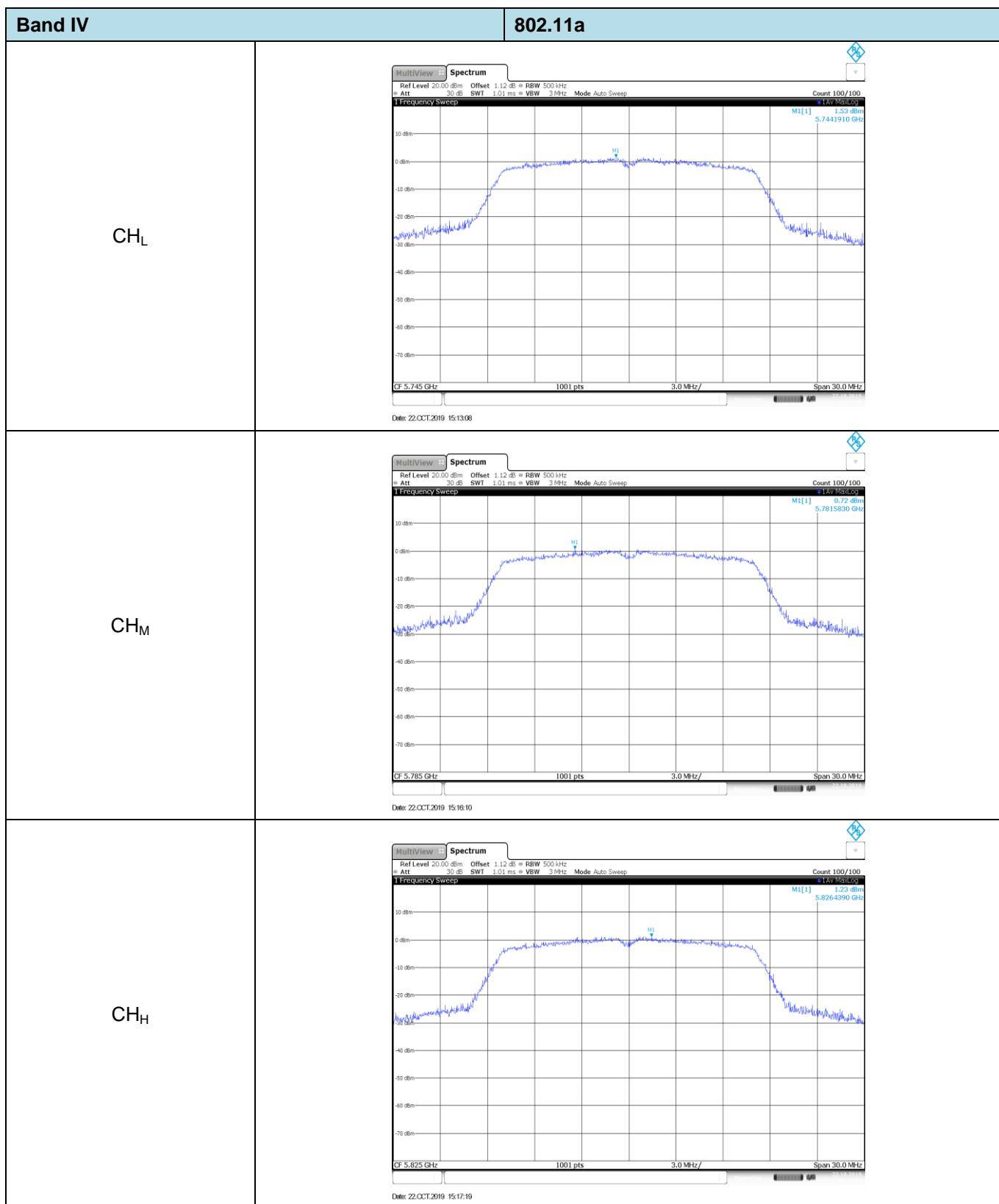


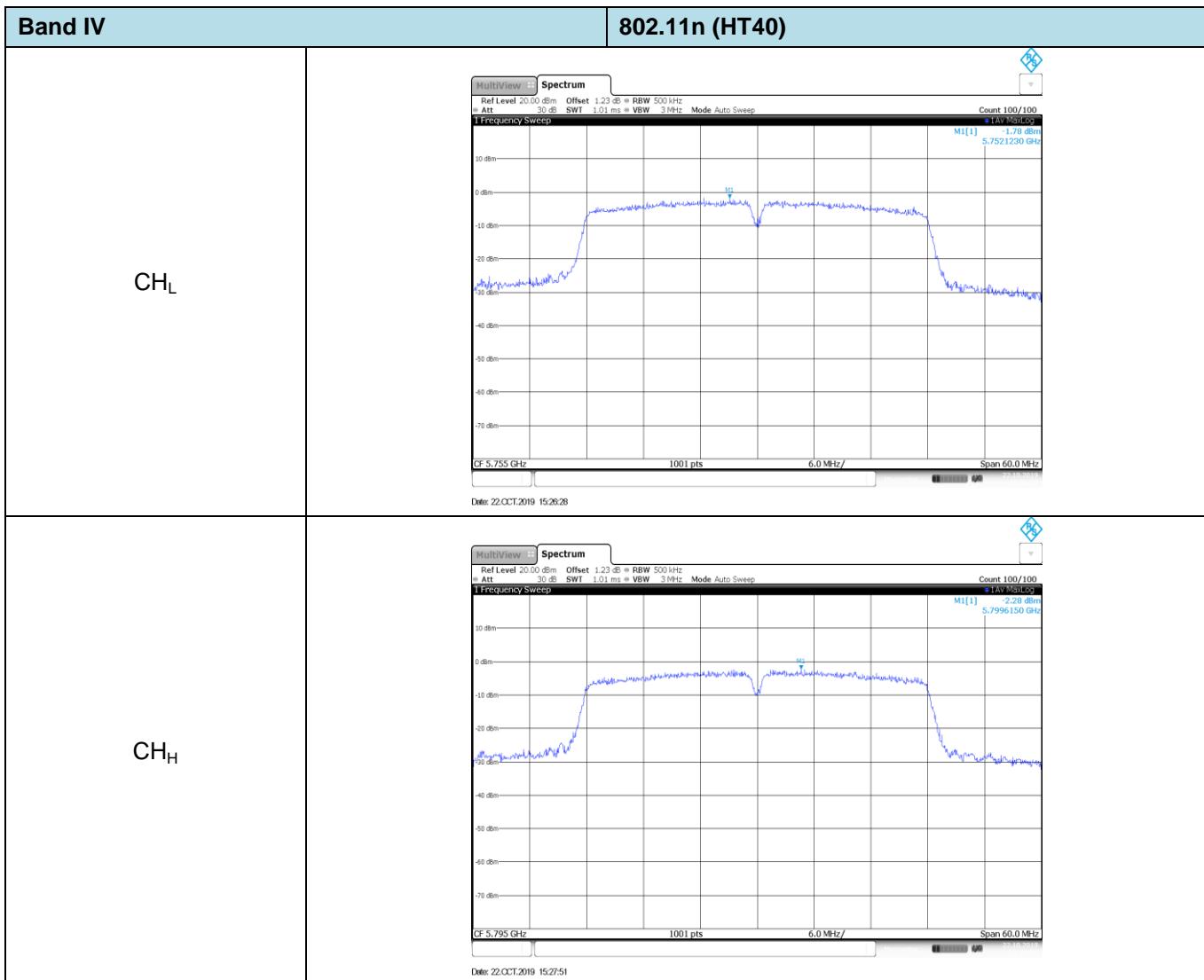










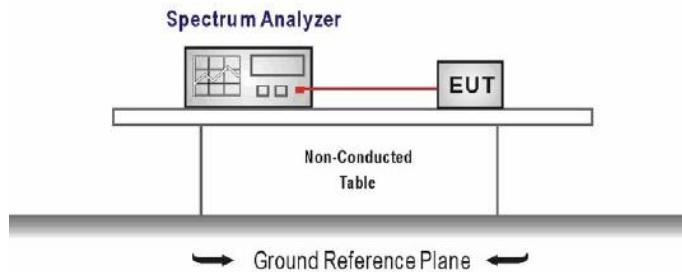


## 5.5. 26dB bandwidth and 99% Occupy bandwidth

### 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:

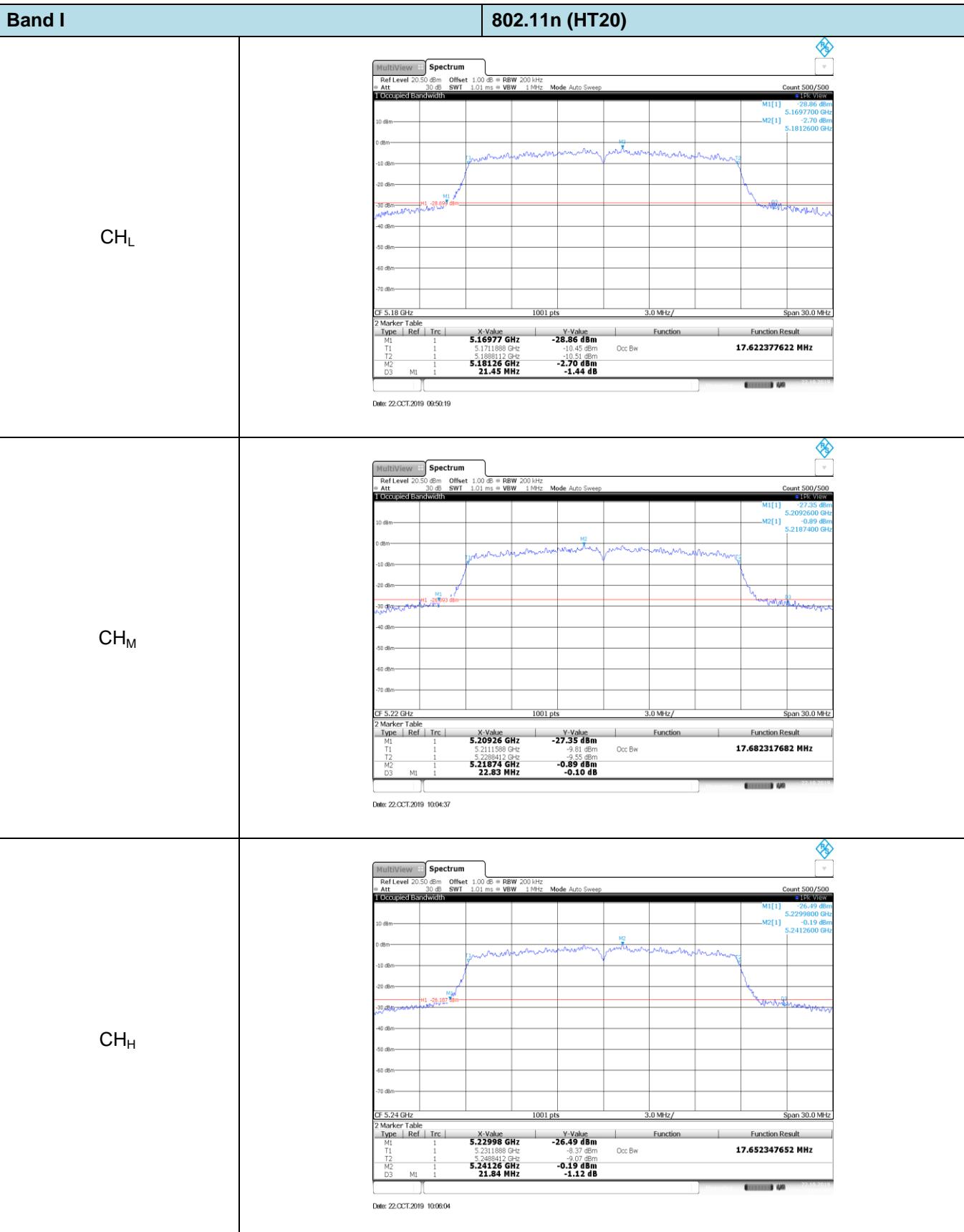
Please refer to the clause 3.3

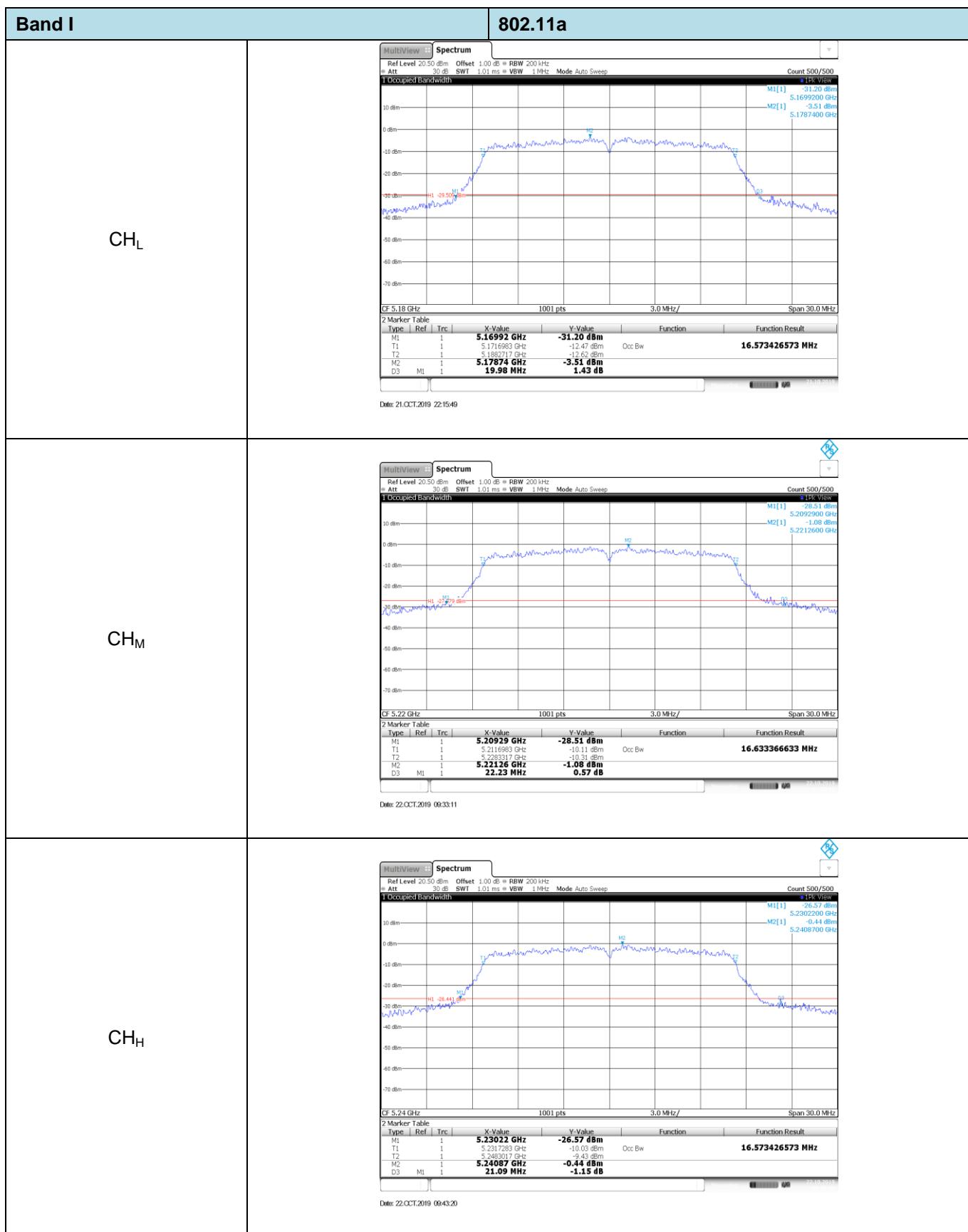
### TEST RESULTS

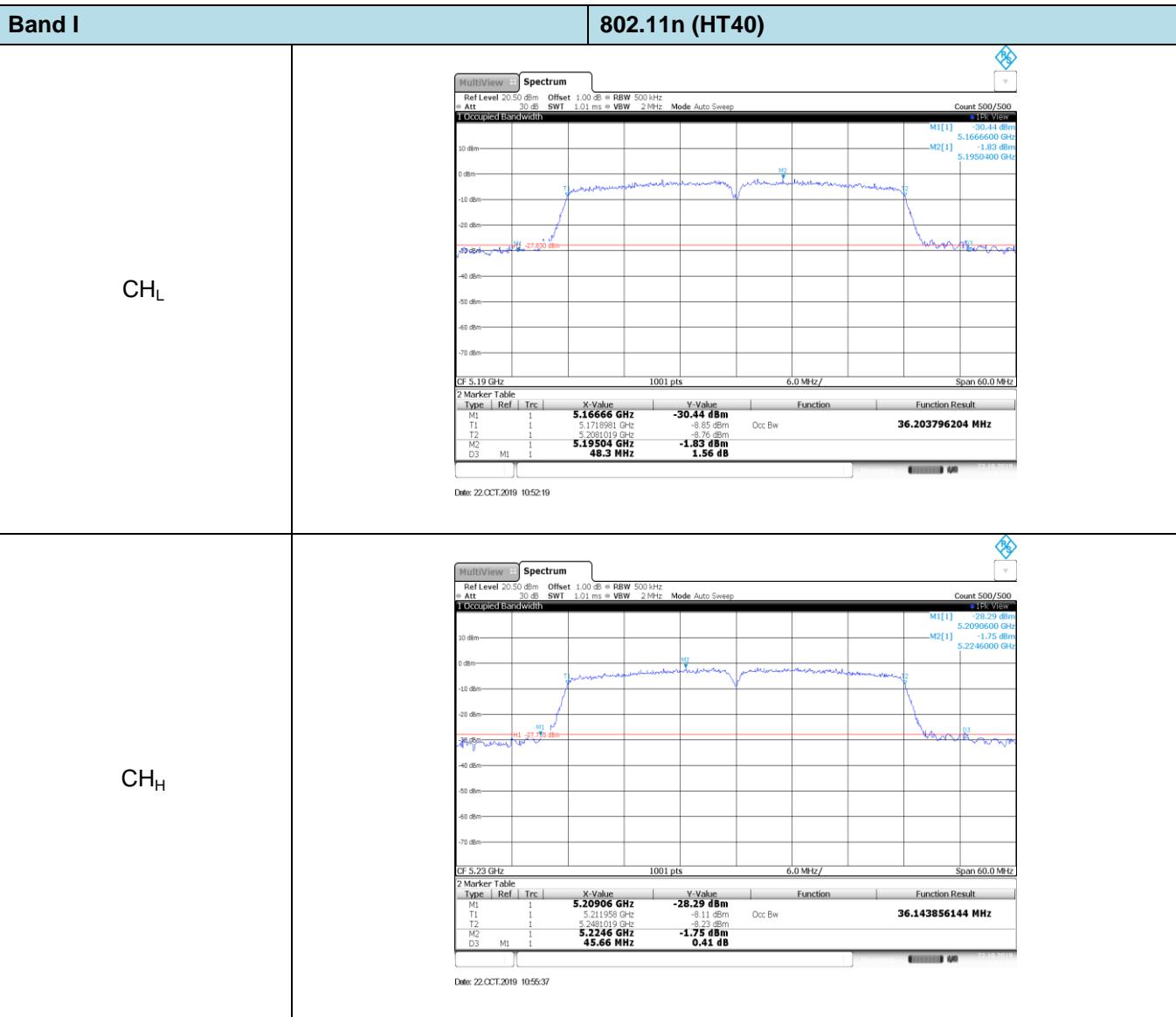
Passed       Not Applicable

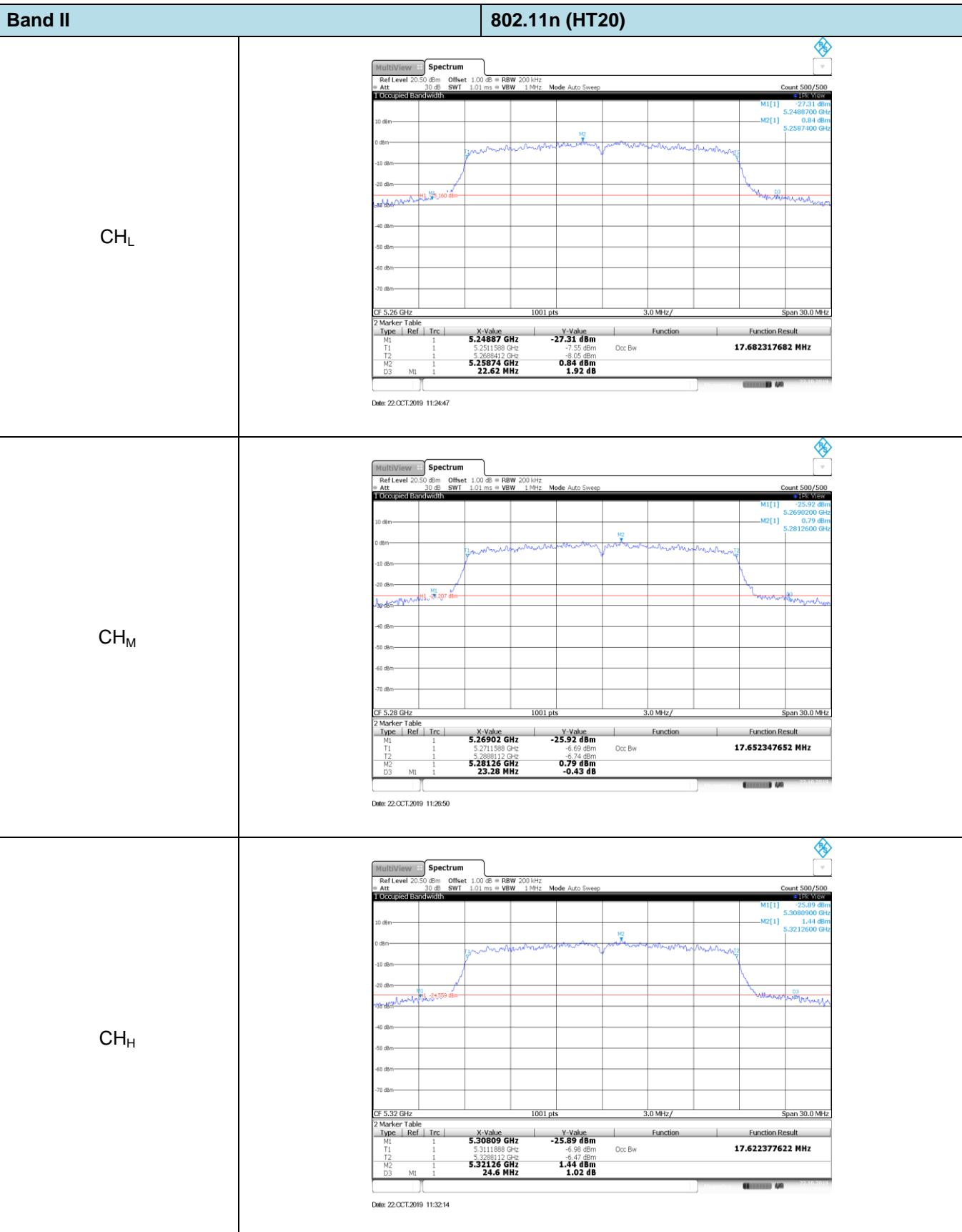
Band	Bandwidth (MHz)	Type	Channel	99% Occupy bandwith (MHz)	26dB bandwidth (MHz)	Result
I	20	802.11n	CH <sub>L</sub>	17.62	21.45	Pass
			CH <sub>M</sub>	17.68	22.83	
			CH <sub>H</sub>	17.65	21.84	
	20	802.11a	CH <sub>L</sub>	16.57	19.98	Pass
			CH <sub>M</sub>	16.63	22.23	
			CH <sub>H</sub>	16.57	21.09	
	40	802.11n	CH <sub>L</sub>	36.20	48.30	Pass
			CH <sub>H</sub>	36.14	45.66	
II	20	802.11n	CH <sub>L</sub>	17.68	22.62	Pass
			CH <sub>M</sub>	17.65	23.28	
			CH <sub>H</sub>	17.62	24.60	
	20	802.11a	CH <sub>L</sub>	16.57	20.37	Pass
			CH <sub>M</sub>	16.60	22.38	
			CH <sub>H</sub>	16.63	22.98	
	40	802.11n	CH <sub>L</sub>	36.20	49.08	Pass
			CH <sub>H</sub>	36.20	47.16	

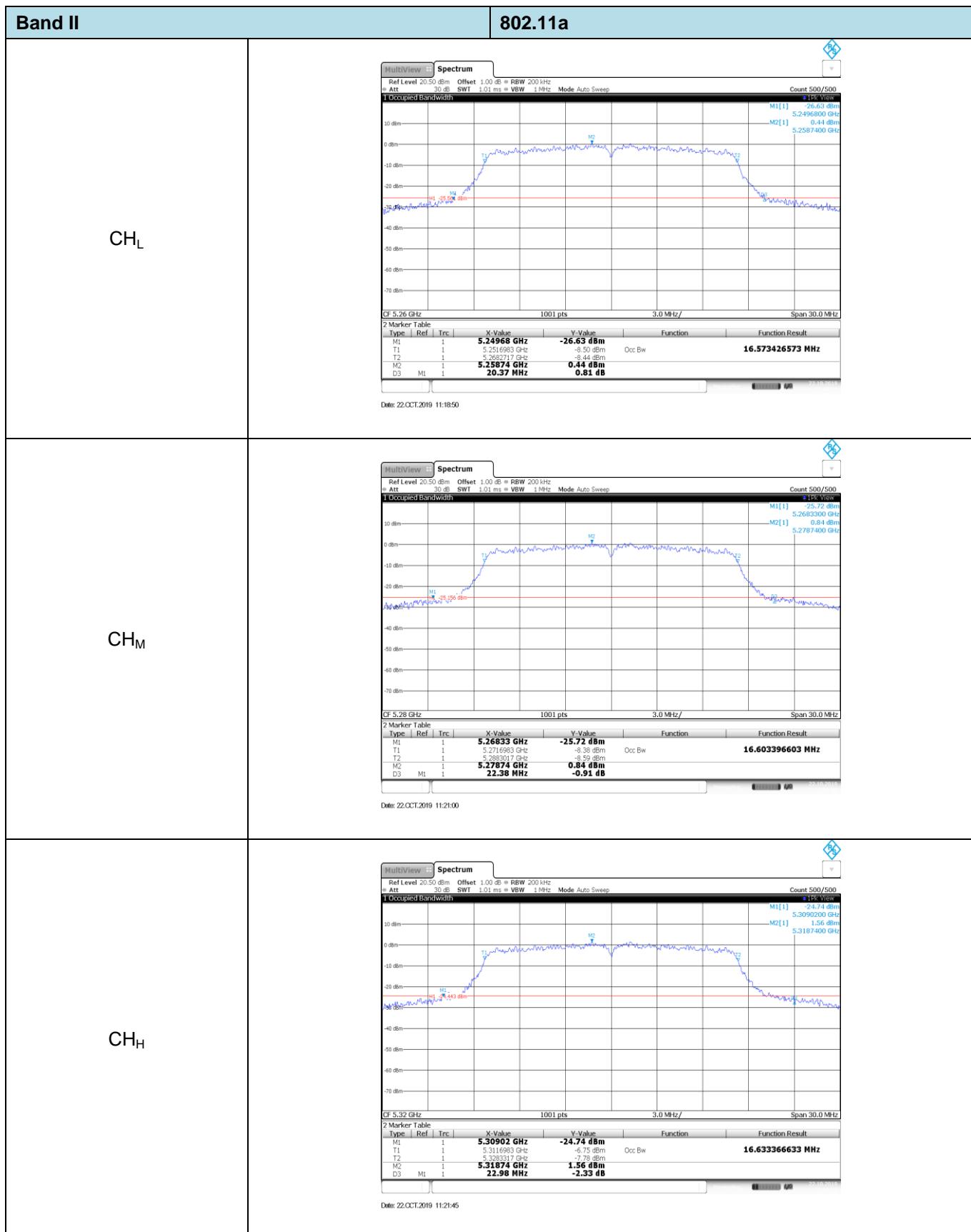
Band	Bandwidth (MHz)	Type	Channel	99% Occupy bandwith (MHz)	26dB bandwidth (MHz)	Result
III	20	802.11n	CH <sub>L</sub>	17.56	19.95	Pass
			CH <sub>M</sub>	17.62	19.98	
			CH <sub>H</sub>	17.56	19.92	
	40	802.11a	CH <sub>L</sub>	16.60	20.31	Pass
			CH <sub>M</sub>	16.60	20.04	
			CH <sub>H</sub>	16.57	20.43	
	802.11n		CH <sub>L</sub>	36.38	40.92	Pass
			CH <sub>M</sub>	36.08	41.10	
			CH <sub>H</sub>	36.14	41.04	

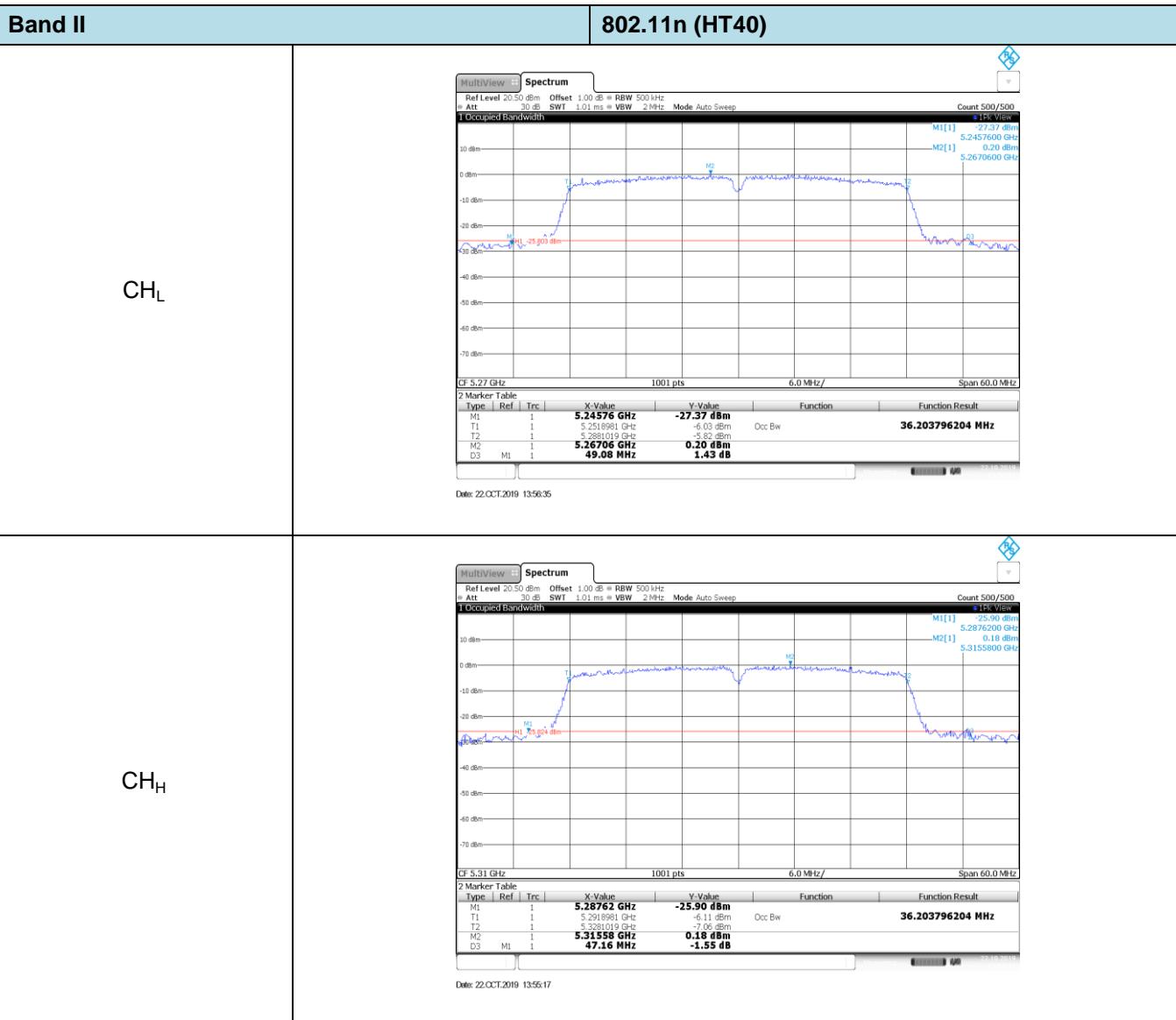


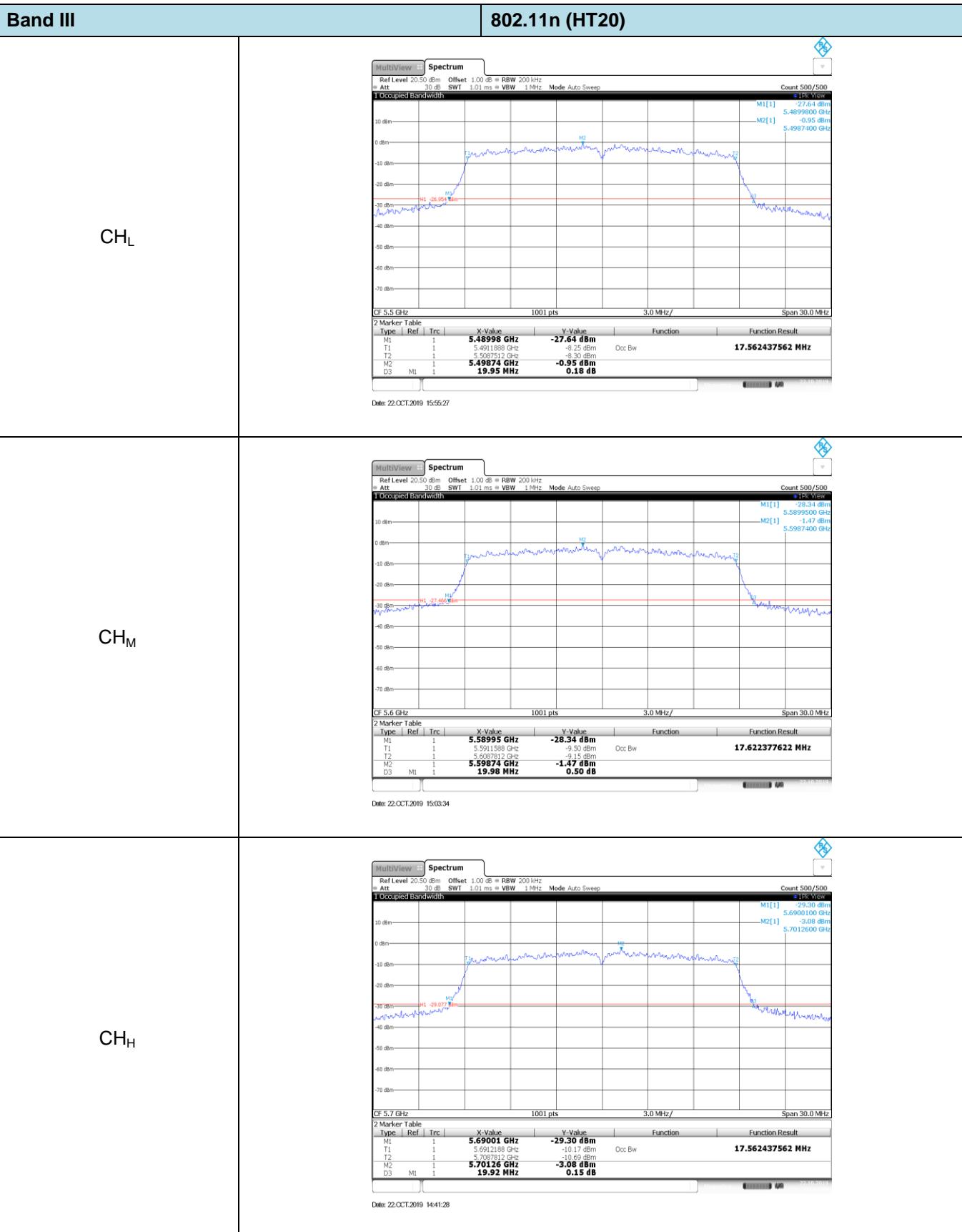


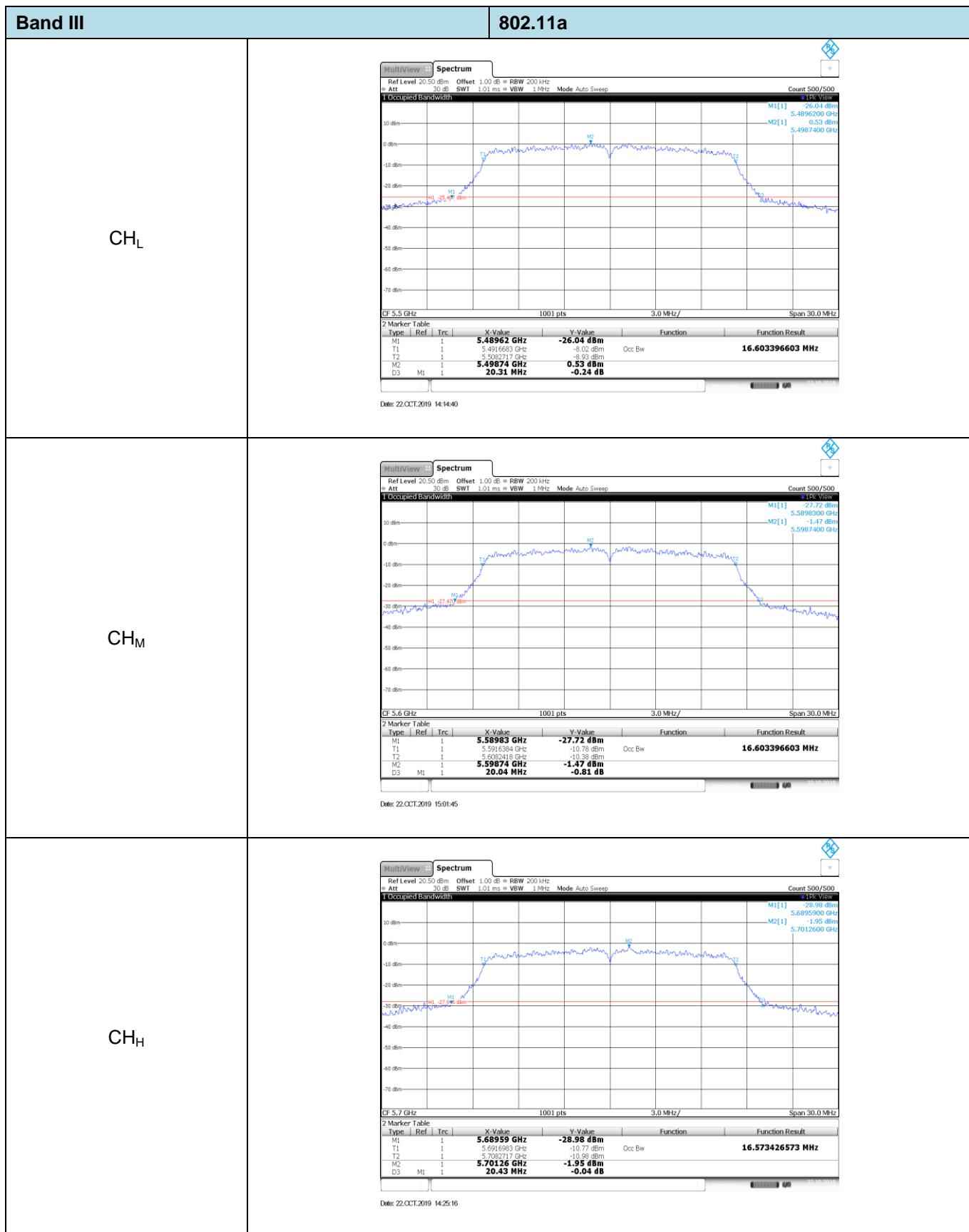






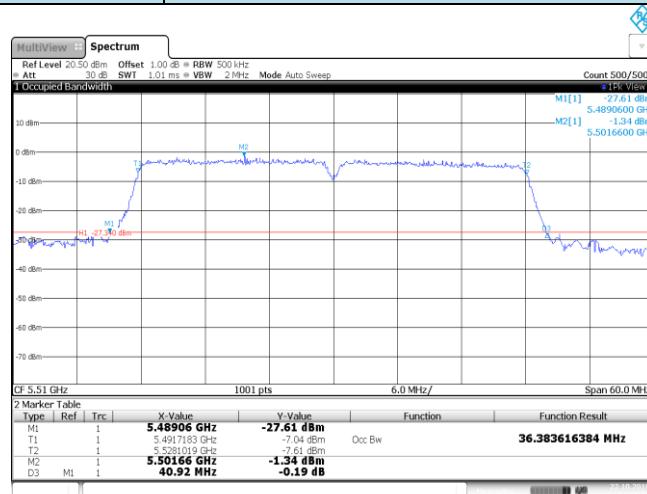
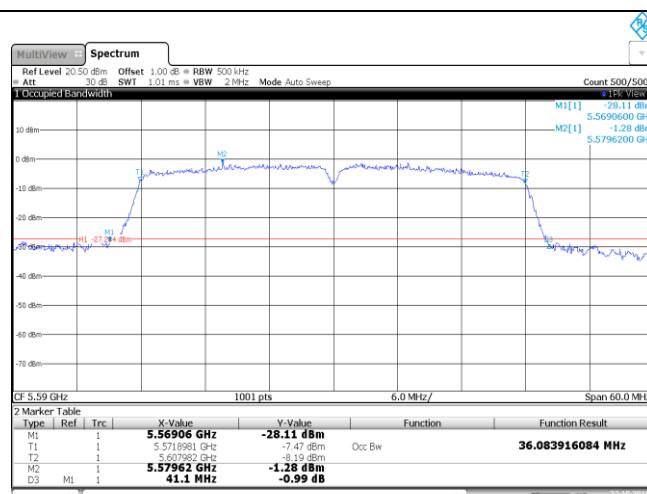
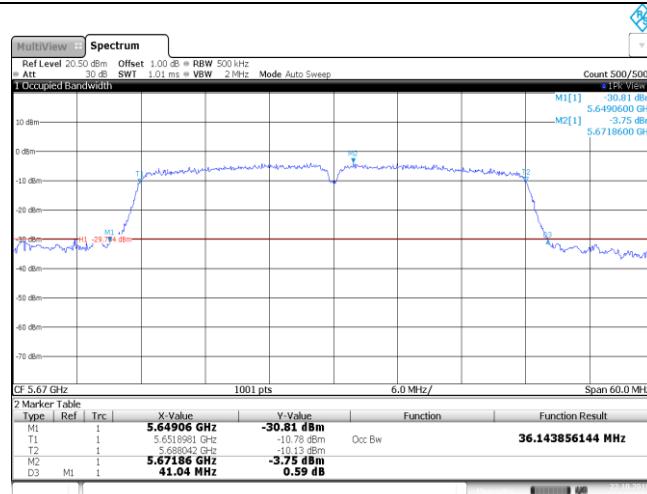






## Band III

## 802.11n (HT40)

CH<sub>L</sub>CH<sub>M</sub>CH<sub>H</sub>

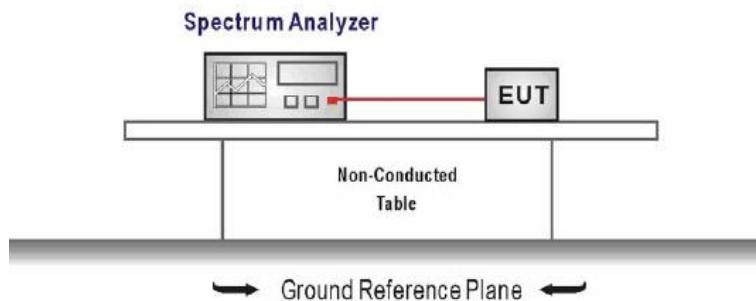
## 5.6. 6dB Bandwidth

### 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 3.3

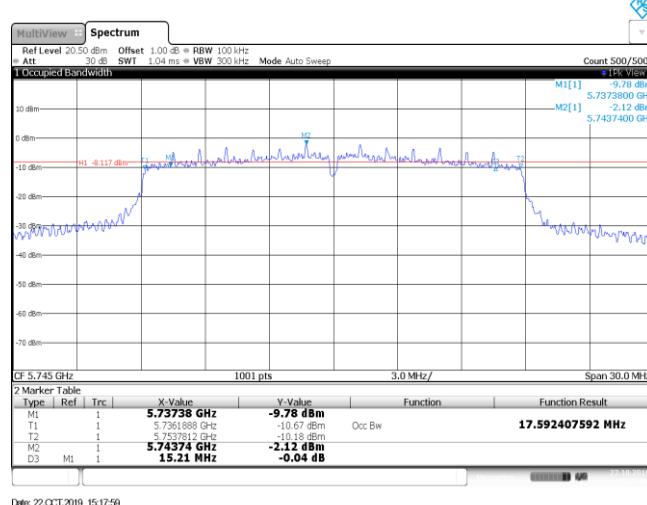
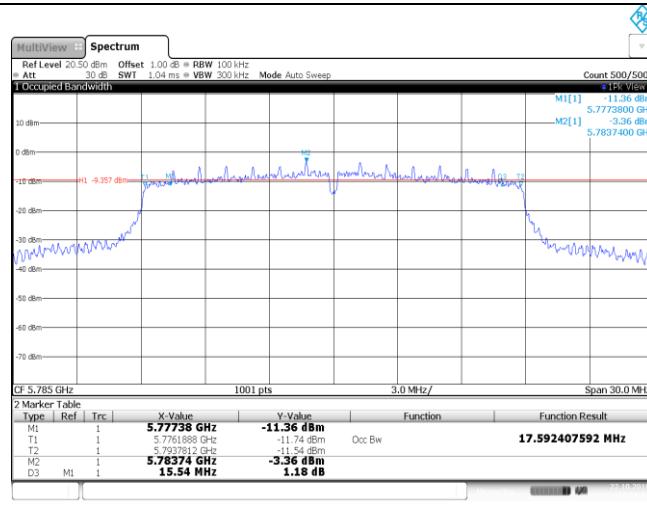
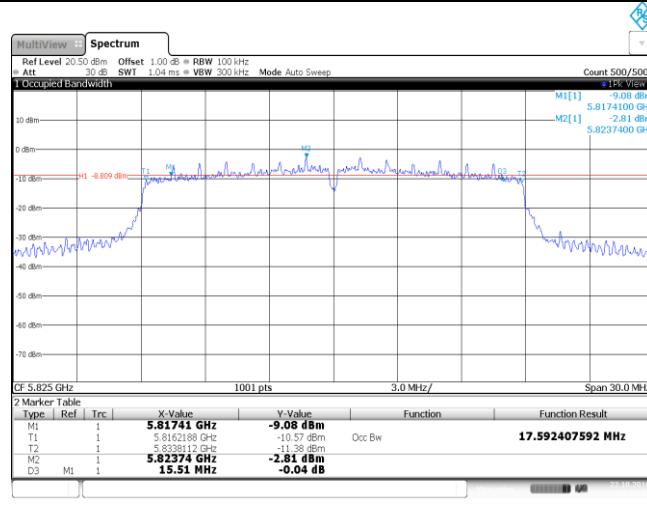
### TEST RESULTS

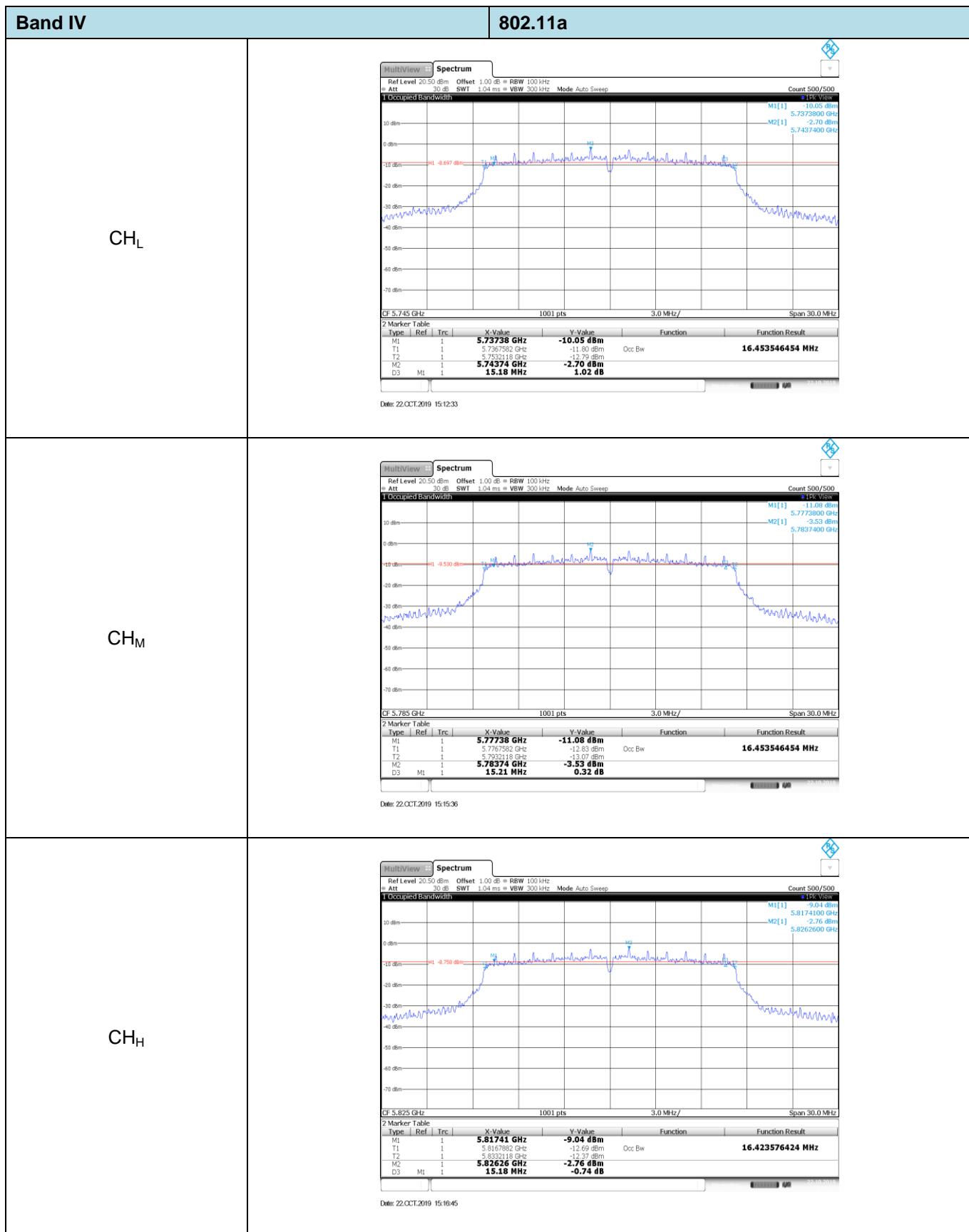
Passed       Not Applicable

Band	Bandwidth (MHz)	Type	Channel	6dB bandwith (MHz)	99% Occupy bandwith (MHz)	Result
IV	20	802.11n	CH <sub>L</sub>	15.21	17.59	Pass
			CH <sub>M</sub>	15.54	17.59	
			CH <sub>H</sub>	15.51	17.59	
		802.11a	CH <sub>L</sub>	15.18	16.45	Pass
			CH <sub>M</sub>	15.21	16.45	
			CH <sub>H</sub>	15.18	16.42	
	40	802.11n	CH <sub>L</sub>	35.39	35.95	Pass
			CH <sub>H</sub>	35.30	35.95	

## Band IV

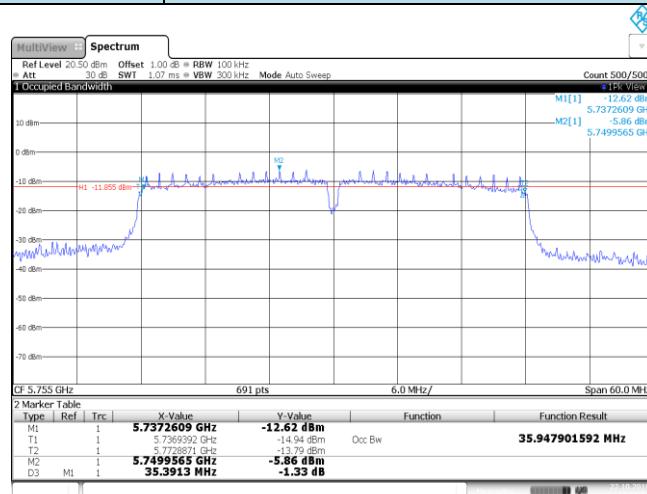
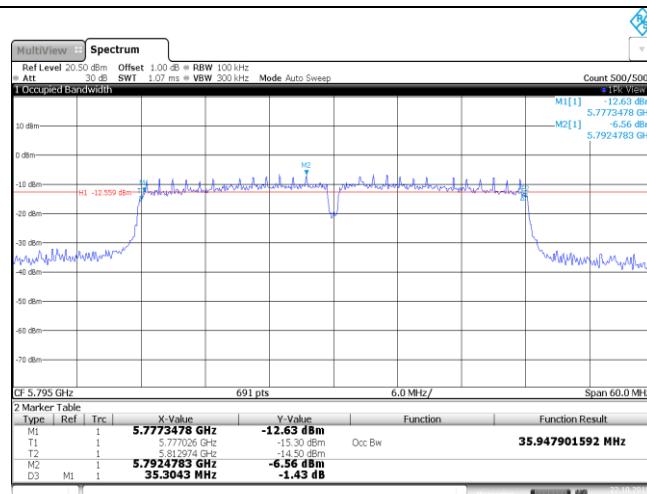
## 802.11n (HT20)

CH<sub>L</sub>CH<sub>M</sub>CH<sub>H</sub>



## Band IV

## 802.11n (HT40)

CH<sub>L</sub>CH<sub>H</sub>

## 5.7. Band edge

### LIMIT

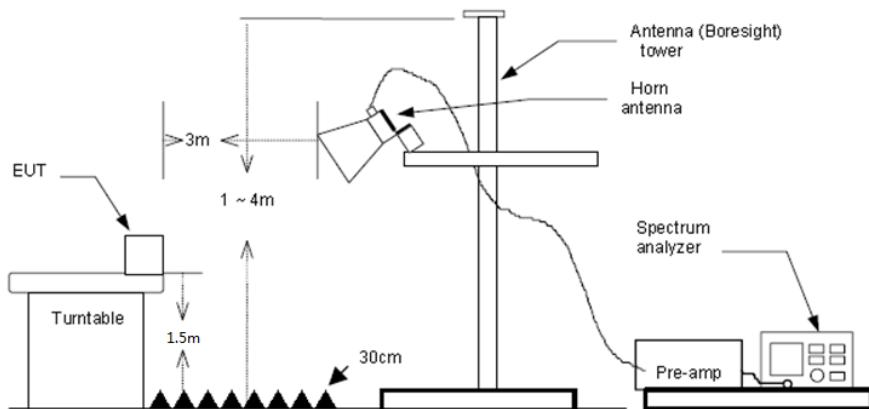
FCC CFR Title 47 Part 15 Subpart E Section 15.407(b)

Un-restricted band emissions above 1GHz			
Operating Band	Frequency	EIRP Limit	Value
5150-5250MHz	Above 1GHz	-27dBm/MHz (68.2dB <sub>UV</sub> /m@3m)	Peak
5250-5350MHz	Above 1GHz	-27dBm/MHz (68.2dB <sub>UV</sub> /m@3m)	Peak
5470-5725MHz	Above 1GHz	-27dBm/MHz (68.2dB <sub>UV</sub> /m@3m)	Peak
5725-5850 MHz	1GHz-5.65GHz	-27dBm/MHz (68.2dB <sub>UV</sub> /m@3m)	Peak
	5.65GHz-5.7GHz	-27*dBm/MHz to 10dBm/MHz (68.2* dB <sub>UV</sub> /m to 105.6dB <sub>UV</sub> /m@3m)	Peak
	5.7GHz-5.72GHz	10*dBm/MHz to 15.6dBm/MHz (105.6* dB <sub>UV</sub> /m to 110.8dB <sub>UV</sub> /m@3m)	Peak
	5.72GHz-5.725GHz	15.6*dBm/MHz to 27dBm/MHz (110.8dB <sub>UV</sub> /m to 122.2dB <sub>UV</sub> /m@3m)	Peak
	5.85GHz-5.855GHz	27dBm/MHz to 15.6*dBm/MHz (122.2dB <sub>UV</sub> /m to 110.8* dB <sub>UV</sub> /m@3m)	Peak
	5.855GHz-5.875GHz	15.6dBm/MHz to 10*dBm/MHz (110.8dB <sub>UV</sub> /m to 105.6* dB <sub>UV</sub> /m@3m)	Peak
	5.875GHz-5.925GHz	10dBm/MHz to -27*dBm/MHz (105.6dB <sub>UV</sub> /m to 68.2* dB <sub>UV</sub> /m@3m)	Peak
	Above 5.925GHz	-27dBm/MHz (68.2dB <sub>UV</sub> /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 3.3

**TEST RESULTS**

Passed       Not Applicable

Band: I&II		Worst mode: 802.11a			Test channel: CH <sub>L</sub>		
Frequency (MHz)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Factor (dB)	Test value	Polarization
5150.00	19.78	28.67	54.00	25.33	8.89	Vertical	Average
5150.00	25.39	34.28	68.20	33.92	8.89	Vertical	Peak
5150.00	20.39	29.28	54.00	24.72	8.89	Horizontal	Average
5150.00	27.24	36.13	68.20	32.07	8.89	Horizontal	Peak

Band: I&II		Worst mode: 802.11a			Test channel: CH <sub>H</sub>		
Frequency (MHz)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Factor (dB)	Test value	Polarization
5350.00	17.89	26.43	54.00	27.57	8.54	Vertical	Average
5350.00	23.05	31.59	68.20	36.61	8.54	Vertical	Peak
5350.00	18.90	27.44	54.00	26.56	8.54	Horizontal	Average
5350.00	24.50	33.04	68.20	35.16	8.54	Horizontal	Peak

Band: III		Worst mode: 802.11a			Test channel: CH <sub>L</sub>		
Frequency (MHz)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Factor (dB)	Test value	Polarization
5470.00	18.46	27.45	54.00	26.55	8.99	Vertical	Average
5470.00	24.87	33.86	68.20	34.34	8.99	Vertical	Peak
5470.00	20.01	29.00	54.00	25.00	8.99	Horizontal	Average
5470.00	25.17	34.16	68.20	34.04	8.99	Horizontal	Peak

Band: III		Worst mode: 802.11a			Test channel: CH <sub>H</sub>		
Frequency (MHz)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Factor (dB)	Test value	Polarization
5725.00	19.36	28.36	54.00	25.64	9.00	Vertical	Average
5725.00	25.85	34.85	68.20	33.35	9.00	Vertical	Peak
5725.00	18.77	27.77	54.00	26.23	9.00	Horizontal	Average
5725.00	25.06	34.06	68.20	34.14	9.00	Horizontal	Peak

Band: IV		Worst mode: 802.11a			Test channel: CH <sub>L</sub>		
Frequency (MHz)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Factor (dB)	Test value	Polarization
5725.00	18.80	27.80	54.00	26.20	9.00	Vertical	Average
5725.00	24.92	33.92	68.20	34.28	9.00	Vertical	Peak
5725.00	18.21	27.21	54.00	26.79	9.00	Horizontal	Average
5725.00	24.06	33.06	68.20	35.14	9.00	Horizontal	Peak

Band: IV		Worst mode: 802.11a			Test channel: CH <sub>H</sub>		
Frequency (MHz)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Factor (dB)	Test value	Polarization
5850.00	17.74	27.51	54.00	26.49	9.77	Vertical	Average
5850.00	24.00	33.77	68.20	34.43	9.77	Vertical	Peak
5850.00	18.24	28.01	54.00	25.99	9.77	Horizontal	Average
5850.00	23.91	33.68	68.20	34.52	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, 802.11ac mode, all modulations have been tested, only worst case is reported

## 5.8. Radiated Spurious Emissions

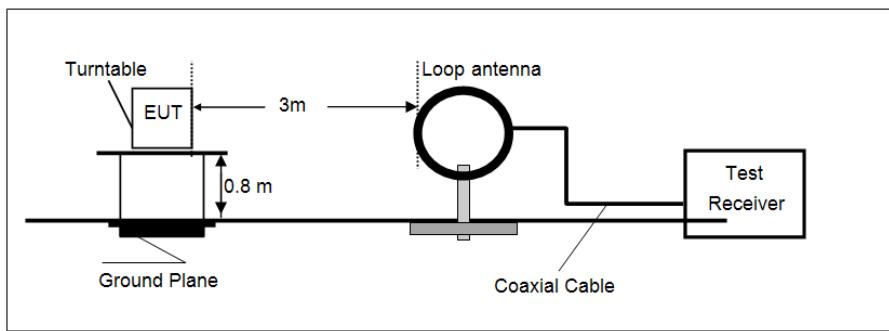
### LIMIT

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

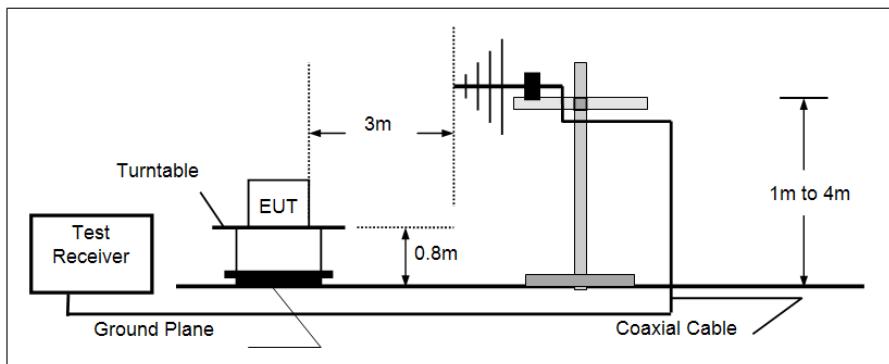
Unwanted emissions below 1GHz and Restricted band emissions above 1GHz		
Frequency	Limit (dBuV/m @3m)	Value
30MHz-88MHz	40.00	Quasi-peak
88MHz-216MHz	43.50	Quasi-peak
216MHz-960MHz	46.00	Quasi-peak
960MHz-1GHz	54.00	Quasi-peak
Above 1GHz	54.00	Average
	74.00	Peak

### TEST CONFIGURATION

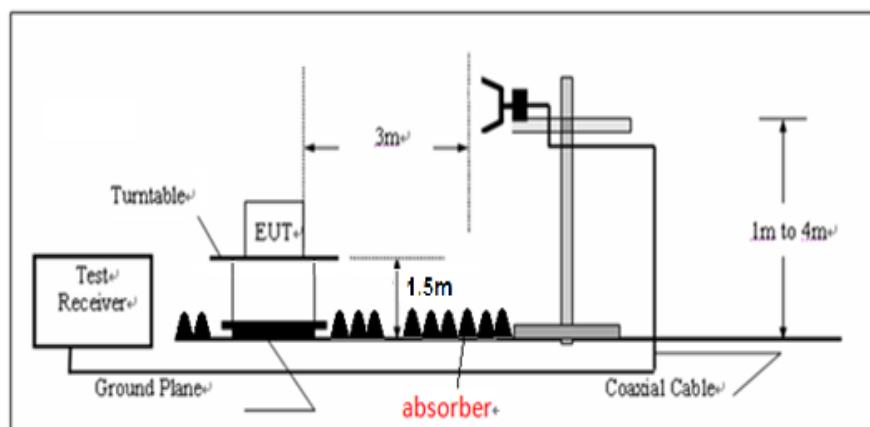
- 9KHz ~30MHz



- 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
  - (1) Span shall wide enough to fully capture the emission being measured;
  - (2) 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.
  - (3) From 1 GHz to 10<sup>th</sup> harmonic:  
RBW=1MHz, VBW=3MHz Peak detector for Peak value.  
RBW=1MHz, VBW=3MHz RMS detector for Average value.

**TEST MODE:**

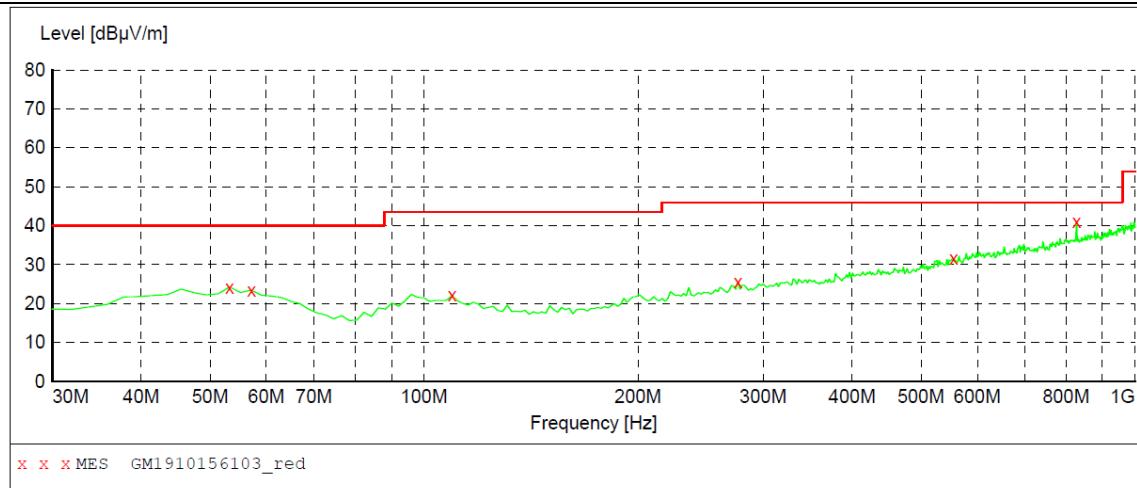
Please refer to the clause 3.3

**TEST RESULTS**

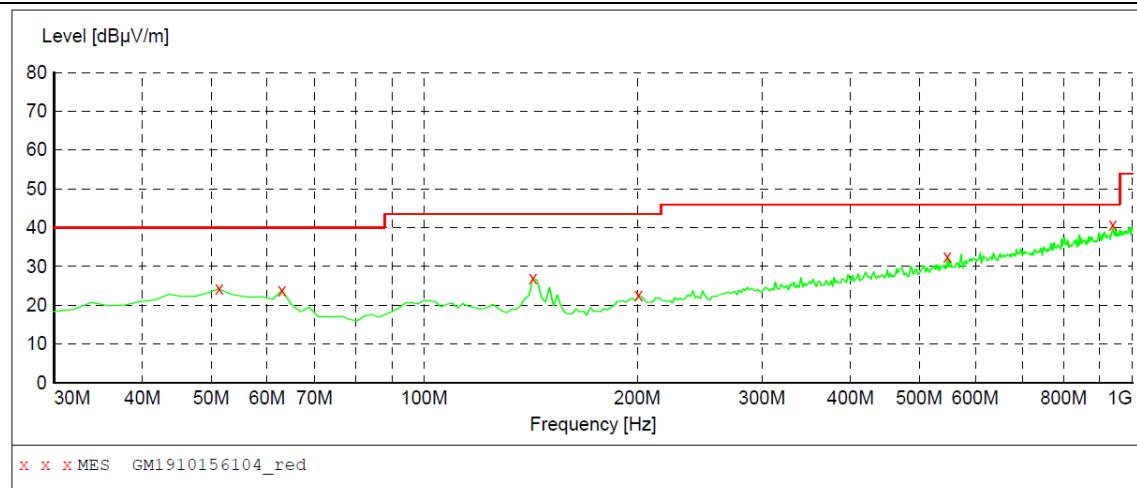
Passed       Not Applicable

**Measurement data:****■ 9kHz ~ 30MHz**

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.

**■ 30MHz ~ 1GHz****MEASUREMENT RESULT: "GM1910156103\_red"**

10/15/2019 11:02PM	Frequency	Level	Transd	Limit	Margin	Det.	Height	Azimuth	Polarization
	MHz	dB $\mu$ V/m	dB	dB $\mu$ V/m	dB		cm	deg	
	53.280000	24.20	-4.6	40.0	15.8	QP	100.0	92.00	HORIZONTAL
	57.160000	23.40	-4.7	40.0	16.6	QP	300.0	360.00	HORIZONTAL
	109.540000	22.10	-6.6	43.5	21.4	QP	300.0	44.00	HORIZONTAL
	276.380000	25.50	-3.2	46.0	20.5	QP	300.0	169.00	HORIZONTAL
	555.740000	31.50	4.3	46.0	14.5	QP	100.0	280.00	HORIZONTAL
	827.340000	41.10	9.9	46.0	4.9	QP	300.0	124.00	HORIZONTAL

**MEASUREMENT RESULT: "GM1910156104\_red"**

10/15/2019 11:04PM	Frequency	Level	Transd	Limit	Margin	Det.	Height	Azimuth	Polarization
	MHz	dB $\mu$ V/m	dB	dB $\mu$ V/m	dB		cm	deg	
	51.340000	24.30	-4.8	40.0	15.7	QP	100.0	23.00	VERTICAL
	62.980000	23.90	-6.3	40.0	16.1	QP	100.0	274.00	VERTICAL
	142.520000	27.10	-9.6	43.5	16.4	QP	100.0	239.00	VERTICAL
	200.720000	22.60	-5.2	43.5	20.9	QP	100.0	88.00	VERTICAL
	547.980000	32.50	4.1	46.0	13.5	QP	100.0	250.00	VERTICAL
	937.920000	40.70	11.9	46.0	5.3	QP	100.0	169.00	VERTICAL

**Remark:**

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

## ■ Above 1GHz

Band: I		Worst mode: 802.11a			Test channel: CH <sub>L</sub>		
Frequency (MHz)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Factor (dB)	Test value	Polarization
1838.66	22.11	16.30	74.00	57.70	-5.81	Vertical	Peak
4492.69	26.74	32.06	74.00	41.94	5.32	Vertical	Peak
7372.91	28.22	43.50	74.00	30.50	15.28	Vertical	Peak
10886.16	28.46	46.21	74.00	27.79	17.75	Vertical	Peak
1860.69	23.69	17.87	74.00	56.13	-5.82	Horizontal	Peak
3164.94	29.62	30.28	74.00	43.72	0.66	Horizontal	Peak
5218.25	28.39	37.27	74.00	36.73	8.88	Horizontal	Peak
7283.31	27.62	42.66	74.00	31.34	15.04	Horizontal	Peak

Band: I		Worst mode: 802.11a			Test channel: CH <sub>M</sub>		
Frequency (MHz)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Factor (dB)	Test value	Polarization
1913.56	22.34	16.66	74.00	57.34	-5.68	Vertical	Peak
4560.25	26.97	32.57	74.00	41.43	5.60	Vertical	Peak
6196.44	28.12	38.99	74.00	35.01	10.87	Vertical	Peak
8575.81	29.84	45.56	74.00	28.44	15.72	Vertical	Peak
1499.38	21.84	16.21	74.00	57.79	-5.63	Horizontal	Peak
2139.75	22.43	18.83	74.00	55.17	-3.60	Horizontal	Peak
3533.59	29.20	30.38	74.00	43.62	1.18	Horizontal	Peak
4395.75	27.34	32.21	74.00	41.79	4.87	Horizontal	Peak

Band: I		Worst mode: 802.11a			Test channel: CH <sub>H</sub>		
Frequency (MHz)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Factor (dB)	Test value	Polarization
1674.16	22.90	16.75	74.00	57.25	-6.15	Vertical	Peak
3167.88	29.93	30.60	74.00	43.40	0.67	Vertical	Peak
3498.34	28.36	29.39	74.00	44.61	1.03	Vertical	Peak
4326.72	27.56	31.64	74.00	42.36	4.08	Vertical	Peak
1603.66	22.24	15.97	74.00	58.03	-6.27	Horizontal	Peak
3861.13	28.09	30.50	74.00	43.50	2.41	Horizontal	Peak
5215.31	28.71	37.61	74.00	36.39	8.90	Horizontal	Peak
6641.47	28.68	41.96	74.00	32.04	13.28	Horizontal	Peak

Band: II		Worst mode: 802.11a			Test channel: CH <sub>L</sub>		
Frequency (MHz)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Factor (dB)	Test value	Polarization
1841.59	23.11	17.30	74.00	56.70	-5.81	Vertical	Peak
3792.09	28.59	30.55	74.00	43.45	1.96	Vertical	Peak
6991.03	27.58	41.74	74.00	32.26	14.16	Vertical	Peak
9241.16	29.07	46.27	74.00	27.73	17.20	Vertical	Peak
1503.78	22.53	16.88	74.00	57.12	-5.65	Horizontal	Peak
3608.50	29.38	30.84	74.00	43.16	1.46	Horizontal	Peak
6068.66	27.82	38.46	74.00	35.54	10.64	Horizontal	Peak
8004.47	29.68	45.88	74.00	28.12	16.20	Horizontal	Peak

Band: II		Worst mode: 802.11a			Test channel: CH <sub>M</sub>		
Frequency (MHz)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Factor (dB)	Test value	Polarization
1514.06	22.67	16.95	74.00	57.05	-5.72	Vertical	Peak
3220.75	29.86	30.45	74.00	43.55	0.59	Vertical	Peak
6628.25	28.11	41.35	74.00	32.65	13.24	Vertical	Peak
8167.50	28.56	44.68	74.00	29.32	16.12	Vertical	Peak
1851.88	23.16	17.34	74.00	56.66	-5.82	Horizontal	Peak
4168.09	28.06	31.70	74.00	42.30	3.64	Horizontal	Peak
6343.31	27.89	39.01	74.00	34.99	11.12	Horizontal	Peak
7320.03	29.57	44.68	74.00	29.32	15.11	Horizontal	Peak

Band: II		Worst mode: 802.11a			Test channel: CH <sub>H</sub>		
Frequency (MHz)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Factor (dB)	Test value	Polarization
1818.09	22.93	17.12	74.00	56.88	-5.81	Vertical	Peak
4044.72	28.12	31.24	74.00	42.76	3.12	Vertical	Peak
6731.06	27.97	41.36	74.00	32.64	13.39	Vertical	Peak
8146.94	29.41	45.60	74.00	28.40	16.19	Vertical	Peak
1562.53	22.69	16.65	74.00	57.35	-6.04	Horizontal	Peak
3872.88	29.69	32.18	74.00	41.82	2.49	Horizontal	Peak
5959.97	27.86	38.13	74.00	35.87	10.27	Horizontal	Peak
7173.16	28.98	43.82	74.00	30.18	14.84	Horizontal	Peak

Band: III		Worst mode: 802.11a			Test channel: CH <sub>L</sub>		
Frequency (MHz)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Factor (dB)	Test value	Polarization
1276.13	22.42	16.79	74.00	57.21	-5.63	Vertical	Peak
2733.13	23.81	24.90	74.00	49.10	1.09	Vertical	Peak
4616.06	26.98	32.85	74.00	41.15	5.87	Vertical	Peak
7240.72	28.19	43.20	74.00	30.80	15.01	Vertical	Peak
1458.25	22.31	16.70	74.00	57.30	-5.61	Horizontal	Peak
3056.25	29.02	29.15	74.00	44.85	0.13	Horizontal	Peak
5686.78	28.05	36.87	74.00	37.13	8.82	Horizontal	Peak
7976.56	29.08	45.30	74.00	28.70	16.22	Horizontal	Peak

Band: III		Worst mode: 802.11a			Test channel: CH <sub>M</sub>		
Frequency (MHz)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Factor (dB)	Test value	Polarization
1393.63	22.46	16.88	74.00	57.12	-5.58	Vertical	Peak
2812.44	23.25	25.14	74.00	48.86	1.89	Vertical	Peak
5742.59	28.12	37.25	74.00	36.75	9.13	Vertical	Peak
7982.44	29.19	45.40	74.00	28.60	16.21	Vertical	Peak
1769.63	22.53	16.64	74.00	57.36	-5.89	Horizontal	Peak
3529.19	28.66	29.83	74.00	44.17	1.17	Horizontal	Peak
6904.38	27.19	41.29	74.00	32.71	14.10	Horizontal	Peak
8484.75	30.23	45.71	74.00	28.29	15.48	Horizontal	Peak

Band: III		Worst mode: 802.11a			Test channel: CH <sub>H</sub>		
Frequency (MHz)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Factor (dB)	Test value	Polarization
1727.03	22.21	16.19	74.00	57.81	-6.02	Vertical	Peak
3633.47	29.42	30.92	74.00	43.08	1.50	Vertical	Peak
6620.91	27.90	41.12	74.00	32.88	13.22	Vertical	Peak
7945.72	28.51	44.77	74.00	29.23	16.26	Vertical	Peak
2282.22	22.67	20.23	74.00	53.77	-2.44	Horizontal	Peak
4949.47	26.82	34.33	74.00	39.67	7.51	Horizontal	Peak
5792.53	28.15	37.65	74.00	36.35	9.50	Horizontal	Peak
10811.25	28.81	46.53	74.00	27.47	17.72	Horizontal	Peak

Band: IV		Worst mode: 802.11a			Test channel: CH <sub>L</sub>		
Frequency (MHz)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Factor (dB)	Test value	Polarization
1732.91	23.35	17.35	74.00	56.65	-6.00	Vertical	Peak
3624.66	30.26	31.74	74.00	42.26	1.48	Vertical	Peak
5717.63	28.08	37.03	74.00	36.97	8.95	Vertical	Peak
7123.22	27.97	42.53	74.00	31.47	14.56	Vertical	Peak
1364.25	23.58	18.00	74.00	56.00	-5.58	Horizontal	Peak
3188.44	29.78	30.56	74.00	43.44	0.78	Horizontal	Peak
5751.41	27.81	37.01	74.00	36.99	9.20	Horizontal	Peak
7738.63	28.82	44.20	74.00	29.80	15.38	Horizontal	Peak

Band: IV		Worst mode: 802.11a			Test channel: CH <sub>M</sub>		
Frequency (MHz)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Factor (dB)	Test value	Polarization
1912.09	22.55	16.86	74.00	57.14	-5.69	Vertical	Peak
4103.47	28.18	31.45	74.00	42.55	3.27	Vertical	Peak
6830.94	28.79	42.27	74.00	31.73	13.48	Vertical	Peak
7884.03	28.93	45.08	74.00	28.92	16.15	Vertical	Peak
1593.38	23.02	16.78	74.00	57.22	-6.24	Horizontal	Peak
2808.03	23.64	25.60	74.00	48.40	1.96	Horizontal	Peak
4764.41	27.31	34.12	74.00	39.88	6.81	Horizontal	Peak
6217.00	27.52	38.42	74.00	35.58	10.90	Horizontal	Peak

Band: IV		Worst mode: 802.11a			Test channel: CH <sub>H</sub>		
Frequency (MHz)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Factor (dB)	Test value	Polarization
1781.38	23.64	17.78	74.00	56.22	-5.86	Vertical	Peak
4930.38	27.32	34.70	74.00	39.30	7.38	Vertical	Peak
7625.53	28.50	44.26	74.00	29.74	15.76	Vertical	Peak
9596.59	29.60	46.73	74.00	27.27	17.13	Vertical	Peak
1496.44	21.84	16.21	74.00	57.79	-5.63	Horizontal	Peak
4193.06	28.77	32.55	74.00	41.45	3.78	Horizontal	Peak
5788.13	27.89	37.35	74.00	36.65	9.46	Horizontal	Peak
7904.59	29.35	45.65	74.00	28.35	16.30	Horizontal	Peak

## Remark:

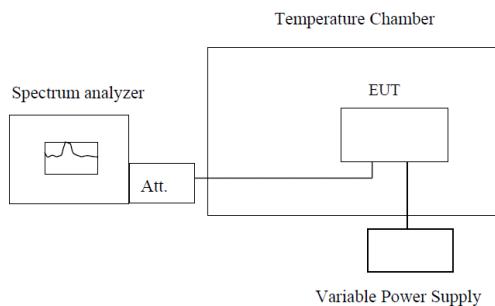
1. Final Level = Receiver Read level + Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.
3. Measuring frequencies from 1 GHz to 40GHz.
4. Test 802.11a, 802.11n, 802.11ac mode, all modulations have been tested, only worst case is reported

## 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:

Transmitting with unmodulation

### TEST RESULTS

Passed       Not Applicable

**Voltage VS Frequency stability**

Band: I			Test Frequency: 5180.00MHz	
Temperature (°C)	Voltage (V)	Frequency Deviation (Hz)	Frequency Deviation (ppm)	Result
25	3.60	-1000.00	-0.19305	PASS
25	3.70	-1000.00	-0.19305	PASS
25	4.20	-1000.00	-0.19305	PASS

Band: II			Test Frequency: 5260.00MHz	
Temperature (°C)	Voltage (V)	Frequency Deviation (Hz)	Frequency Deviation (ppm)	Result
25	3.60	-1000.00	-0.19011	PASS
25	3.70	-1000.00	-0.19011	PASS
25	4.20	-1000.00	-0.19011	PASS

Band: III			Test Frequency: 5500.00MHz	
Temperature (°C)	Voltage (V)	Frequency Deviation (Hz)	Frequency Deviation (ppm)	Result
25	3.60	-1000.00	-0.18182	PASS
25	3.70	-1000.00	-0.18182	PASS
25	4.20	-1000.00	-0.18182	PASS

Band: IV			Test Frequency: 5745.00MHz	
Temperature (°C)	Voltage (V)	Frequency Deviation (Hz)	Frequency Deviation (ppm)	Result
25	3.60	-1000.00	-0.17406	PASS
25	3.70	-1000.00	-0.17406	PASS
25	4.20	-1000.00	-0.17406	PASS

**Temperature VS Frequency stability**

Band: I			Test Frequency: 5180.00MHz	
Voltage (V)	Temperature (°C)	Frequency Deviation (Hz)	Frequency Deviation (ppm)	Result
3.70	-20	-1000.00	-0.19305	PASS
3.70	-10	-1000.00	-0.19305	PASS
3.70	0	-1000.00	-0.19305	PASS
3.70	10	-1000.00	-0.19305	PASS
3.70	20	-1000.00	-0.19305	PASS
3.70	30	-1000.00	-0.19305	PASS
3.70	40	-1000.00	-0.19305	PASS
3.70	50	-1000.00	-0.19305	PASS

Band: II			Test Frequency: 5260.00MHz	
Voltage (V)	Temperature (°C)	Frequency Deviation (Hz)	Frequency Deviation (ppm)	Result
3.70	-20	0.00	0.00000	PASS
3.70	-10	0.00	0.00000	PASS
3.70	0	0.00	0.00000	PASS
3.70	10	0.00	0.00000	PASS
3.70	20	-1000.00	-0.19011	PASS
3.70	30	0.00	0.00000	PASS
3.70	40	0.00	0.00000	PASS
3.70	50	-1000.00	-0.19011	PASS

Band: III			Test Frequency: 5500.00MHz	
Voltage (V)	Temperature (°C)	Frequency Deviation (Hz)	Frequency Deviation (ppm)	Result
3.70	-20	-1000.00	-0.18182	PASS
3.70	-10	-1000.00	-0.18182	PASS
3.70	0	-1000.00	-0.18182	PASS
3.70	10	-1000.00	-0.18182	PASS
3.70	20	-1000.00	-0.18182	PASS
3.70	30	-1000.00	-0.18182	PASS
3.70	40	-1000.00	-0.18182	PASS
3.70	50	0.00	0.00000	PASS

Band: IV			Test Frequency: 5745.00MHz	
Voltage (V)	Temperature (°C)	Frequency Deviation (Hz)	Frequency Deviation (ppm)	Result
3.70	-20	-1000.00	-0.17406	PASS
3.70	-10	-1000.00	-0.17406	PASS
3.70	0	-1000.00	-0.17406	PASS
3.70	10	-1000.00	-0.17406	PASS
3.70	20	-1000.00	-0.17406	PASS
3.70	30	-1000.00	-0.17406	PASS
3.70	40	-1000.00	-0.17406	PASS
3.70	50	-1000.00	-0.17406	PASS

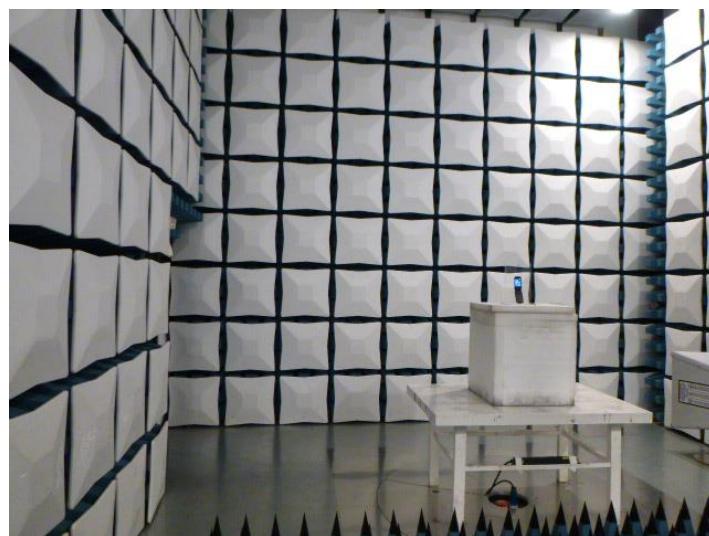
## 6. Test Setup Photos of the EUT

Conducted Emissions (AC Mains)



Radiated Emissions





## **7. External and Internal Photos of the EUT**

Reference to the test report No. CHTEW19110021

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