



TEST REPORT

Report Reference No. : CHTEW19100133 Report verification: 

Project No. : SHT1909064404EW

FCC ID : 2AJZP-G450A1

Applicant's name : Mason America, Inc

Address : 2101 4th Avenue Suite 1550, Seattle WA, 98121

Manufacturer : Mason America, Inc

Address : 2101 4th Avenue Suite 1550, Seattle WA, 98121

Test item description : PAD

Trade Mark : MASON/yprime

Model/Type reference : G450A1

Listed Model(s) : -

Standard : FCC CFR Title 47 Part 15 Subpart E Section 15.407

Date of receipt of test sample : Sep 27, 2019

Date of testing : Sep 28, 2019- Oct 28, 2019

Date of issue : Oct 29, 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

Silvia Li

Aaron Fang

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

Shenzhen Huatongwei International Inspection Co., Ltd. All rights reserved.

This publication may be reproduced in whole or in part for non-commercial purposes as long as the Shenzhen Huatongwei International Inspection Co., Ltd. is acknowledged as copyright owner and source of the material. Shenzhen Huatongwei International Inspection Co., Ltd. takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.

The test report merely correspond to the test sample.

Contents

<u>1.</u>	<u>TEST STANDARDS AND REPORT VERSION</u>	<u>3</u>
1.1.	Test Standards	3
1.2.	Report Version	3
<u>2.</u>	<u>TEST DESCRIPTION</u>	<u>4</u>
<u>3.</u>	<u>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.</u>	<u>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.</u>	<u>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	18
5.5.	26dB bandwidth and 99% Occupy bandwidth	42
5.6.	6dB Bandwidth	61
5.7.	Band edge	68
5.8.	Radiated Spurious Emissions	72
5.9.	Frequency stability	79
<u>6.</u>	<u>TEST SETUP PHOTOS OF THE EUT</u>	<u>83</u>
<u>7.</u>	<u>EXTERNAL AND INTERNAL PHOTOS OF THE EUT</u>	<u>84</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	2019-10-29	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 bandwidth	15.407(a)	PASS	JiongSheng.Feng
6dB Bandwidth	15.407(a)	PASS	JiongSheng.Feng
Band edge	15.407(b)	PASS	Pan Xie
Radiated Spurious Emissions	15.209	PASS	Pan Xie
Frequency Stability	15.407(g)	PASS	JiongSheng.Feng

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

3. SUMMARY

3.1. Client Information

Applicant:	Mason America, Inc
Address:	2101 4th Avenue Suite 1550, Seattle WA, 98121
Manufacturer:	Mason America, Inc
Address:	2101 4th Avenue Suite 1550, Seattle WA, 98121

3.2. Product Description

Name of EUT	PAD		
Trade Mark:	MASON/yprime		
Model No.:	G450A1		
Listed Model(s):	-		
Power supply:	DC 3.8V		
Adapter information :	Model: A138A-120150U-US2 Input: 100-240Va.c., 50/60Hz, 0.5A Output: 5.0Vd.c., 2.5A/9.0Vd.c.,2.0A/12Vd.c.,1.5A		
5G WIFI			
Supported type:	☒ 802.11a ☒ 802.11ac(HT20)	☒ 802.11n(HT20) ☒ 802.11ac(HT40)	☒ 802.11n(HT40) ☒ 802.11ac(HT80)
Function:	☐ Outdoor AP ☒ Client	☐ Indoor AP	☐ Fixed P2P
DFS type:	☐ master devices	☐ Slave devices with radar detection	☒ Slave devices without radar detection
Modulation:	BPSK, QPSK, 16QAM, 64QAM		
Operation frequency:	☒ Band I:	5150MHz~5250MHz	
	☒ Band II:	5250MHz~5350MHz	
	☒ Band III:	5470MHz~5725MHz	
	☒ Band IV:	5725MHz~5850MHz	
Supported Bandwidth	20MHz:	802.11ac, 802.11n, 802.11a	
	40MHz:	802.11ac, 802.11n	
	80MHz:	802.11ac	
Antenna type:	FPC Antenna		
Antenna gain:	2.6dBi		

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		80MHz	
		Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
I	CH _L	36	5180	38	5190	-	-
	CH _M	44	5220	-	-	42	5210
	CH _H	48	5240	46	5230	-	-
II	CH _L	52	5260	54	5270	-	-
	CH _M	56	5280	-	-	58	5290
	CH _H	64	5320	62	5310	-	-
III	CH _L	100	5500	102	5510	106	5530
	CH _M	120	5600	118	5590	122	5610
	CH _H	140	5700	134	5670	138	5690
IV	CH _L	149	5745	151	5755	-	-
	CH _M	157	5785	-	-	155	5775
	CH _H	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)/ 802.11ac(HT20)	MCS0
802.11n(HT40)/ 802.11ac(HT40)	MCS0
802.11ac(HT80)	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)

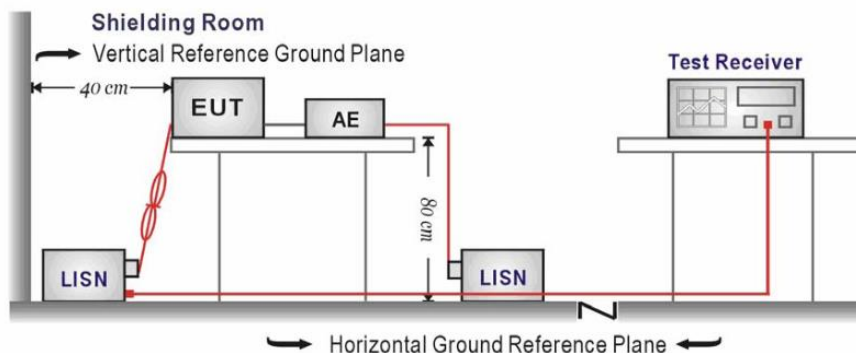
LIMIT

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

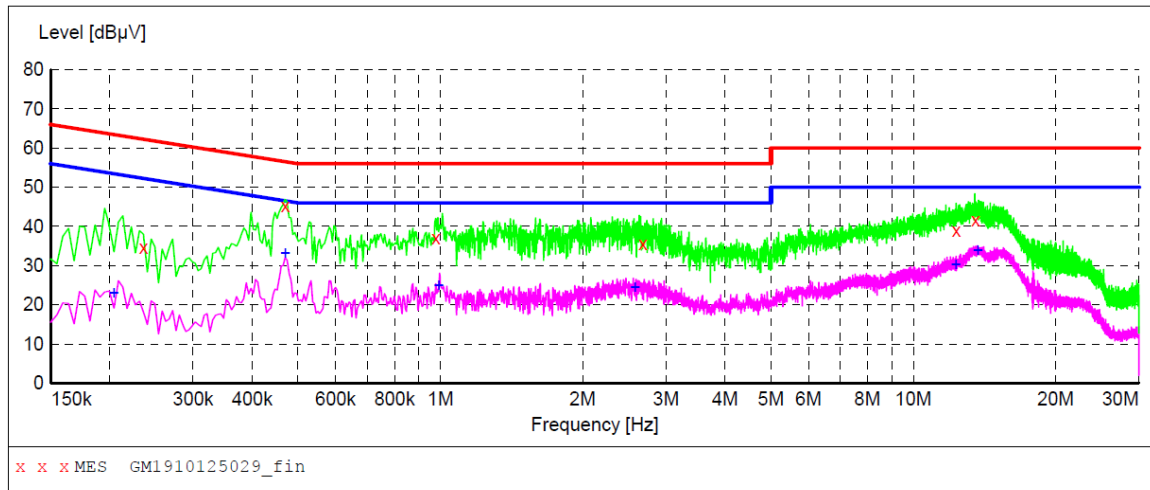
☒ Passed ☐ Not Applicable

Note:

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

Test Line:

L

**MEASUREMENT RESULT: "GM1910125029_fin"**

10/12/2019 9:32AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.235500	34.50	9.9	62	27.8	QP	L1	GND
0.469500	45.20	9.9	57	11.3	QP	L1	GND
0.978000	36.90	9.9	56	19.1	QP	L1	GND
2.679000	35.60	9.9	56	20.4	QP	L1	GND
12.313500	38.90	10.1	60	21.1	QP	L1	GND
13.528500	41.60	10.1	60	18.4	QP	L1	GND

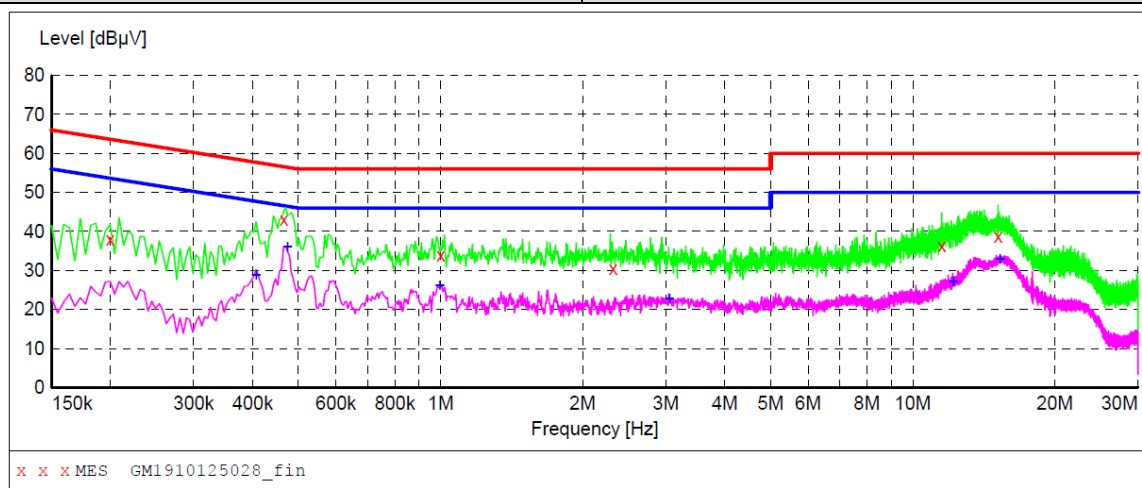
MEASUREMENT RESULT: "GM1910125029_fin2"

10/12/2019 9:32AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.204000	22.90	9.9	53	30.5	AV	L1	GND
0.469500	33.20	9.9	47	13.3	AV	L1	GND
0.991500	25.00	9.9	46	21.0	AV	L1	GND
2.580000	24.50	9.9	46	21.5	AV	L1	GND
12.295500	30.30	10.1	50	19.7	AV	L1	GND
13.681500	34.00	10.1	50	16.0	AV	L1	GND

Test Line:

N

**MEASUREMENT RESULT: "GM1910125028_fin"**

10/12/2019 9:29AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.199500	37.90	9.9	64	25.7	QP	N	GND
0.465000	43.10	9.9	57	13.5	QP	N	GND
1.000500	34.00	9.9	56	22.0	QP	N	GND
2.319000	30.50	9.9	56	25.5	QP	N	GND
11.526000	36.20	10.1	60	23.8	QP	N	GND
15.166500	38.80	10.2	60	21.2	QP	N	GND

MEASUREMENT RESULT: "GM1910125028_fin2"

10/12/2019 9:29AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.406500	28.80	9.9	48	18.9	AV	N	GND
0.474000	36.00	9.9	46	10.4	AV	N	GND
0.996000	26.20	9.9	46	19.8	AV	N	GND
3.052500	22.80	9.9	46	23.2	AV	N	GND
12.169500	27.00	10.1	50	23.0	AV	N	GND
15.301500	32.80	10.2	50	17.2	AV	N	GND

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 11dBm+10 log B, where B is the 26dB emission bandwidth in MHz.
if $G_{TX} > 6\text{dBi}$, then $P_{out} = 24 - (G_{TX} - 6)$.

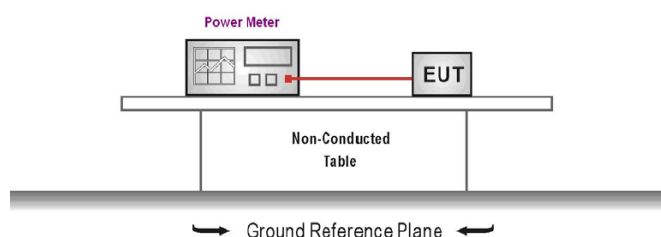
For the 5.47~5.725GHz band:

The maximum conducted output power (P_{out}) shall not exceed the lesser of 250mW (24dBm) or 11dBm+10 log B, where B is the 26dB emission bandwidth 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	802.11ac	CH _L	16.21	24.00	Pass
			CH _M	16.34		
			CH _H	16.36		
		802.11n	CH _L	16.67	24.00	Pass
			CH _M	16.47		
			CH _H	16.57		
		802.11a	CH _L	16.54	24.00	Pass
			CH _M	17.05		
			CH _H	16.48		
	40	802.11ac	CH _L	16.37	24.00	Pass
			CH _H	16.91		
		802.11n	CH _L	16.55	24.00	Pass
			CH _H	17.09		
	80	802.11ac	CH _M	11.69	24.00	Pass
II	20	802.11ac	CH _L	16.43	24.00	Pass
			CH _M	16.45		
			CH _H	16.45		
		802.11n	CH _L	17.11	24.00	Pass
			CH _M	17.02		
			CH _H	16.99		
		802.11a	CH _L	17.64	24.00	Pass
			CH _M	17.82		
			CH _H	17.13		
	40	802.11ac	CH _L	15.47	24.00	Pass
			CH _H	14.92		
		802.11n	CH _L	15.67	24.00	Pass
			CH _H	15.74		
	80	802.11ac	CH _M	10.55	24.00	Pass

Band	Bandwidth (MHz)	Type	Channel	Conducted Output Power (dBm)	Limit (dBm)	Result
III	20	802.11ac	CH _L	16.67	24.00	Pass
			CH _M	16.97		
			CH _H	15.58		
		802.11n	CH _L	17.53	24.00	Pass
			CH _M	17.54		
			CH _H	16.03		
		802.11a	CH _L	17.88	24.00	Pass
			CH _M	18.65		
			CH _H	16.41		
	40	802.11ac	CH _L	15.51	24.00	Pass
			CH _M	16.24		
			CH _H	14.68		
		802.11n	CH _L	15.47	24.00	Pass
			CH _M	16.10		
			CH _H	12.95		
	80	802.11ac	CH _L	11.04	24.00	Pass
			CH _M	14.22		
			CH _H	12.76		
IV	20	802.11ac	CH _L	16.57	30.00	Pass
			CH _M	16.64		
			CH _H	17.18		
		802.11n	CH _L	17.55	30.00	Pass
			CH _M	17.70		
			CH _H	17.32		
		802.11a	CH _L	17.46	30.00	Pass
			CH _M	17.52		
			CH _H	18.16		
	40	802.11ac	CH _L	14.65	30.00	Pass
			CH _H	15.14		
		802.11n	CH _L	15.97	30.00	Pass
			CH _H	15.80		
	80	802.11ac	CH _M	10.21	30.00	Pass

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 $\text{PSD} = 17 - (G_{TX} - 6)$.
- 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 5.25~5.35GHz band:

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

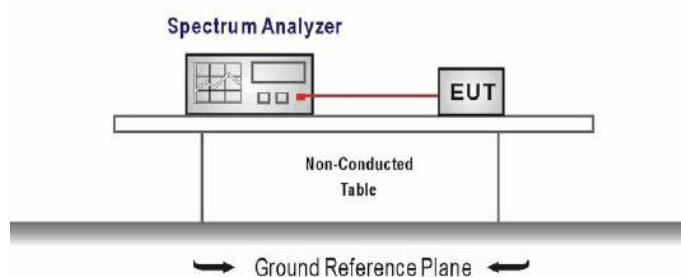
For the 5.47~5.725GHz band:

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

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 $\geq$ 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:

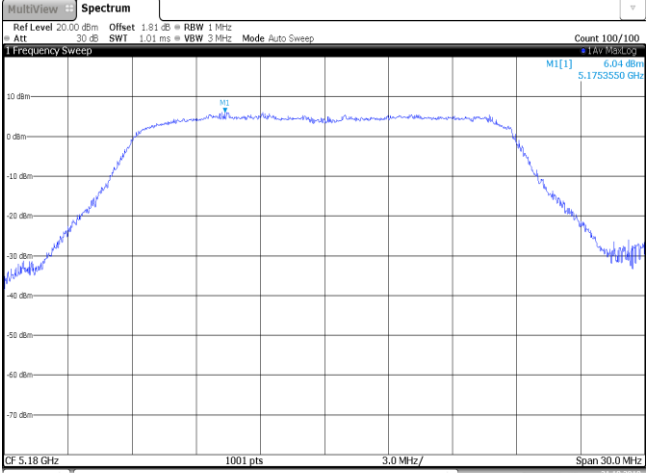
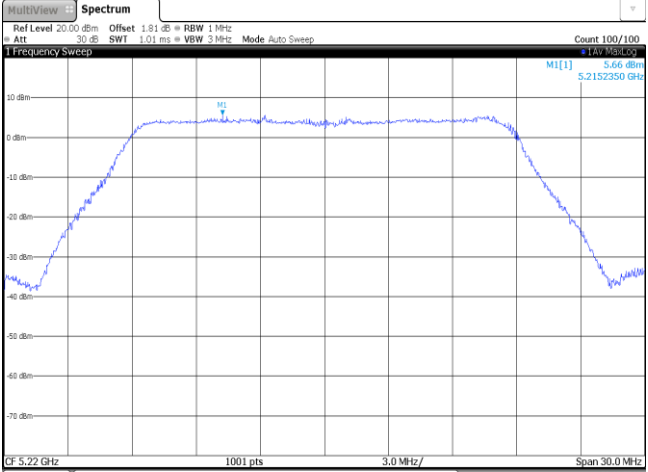
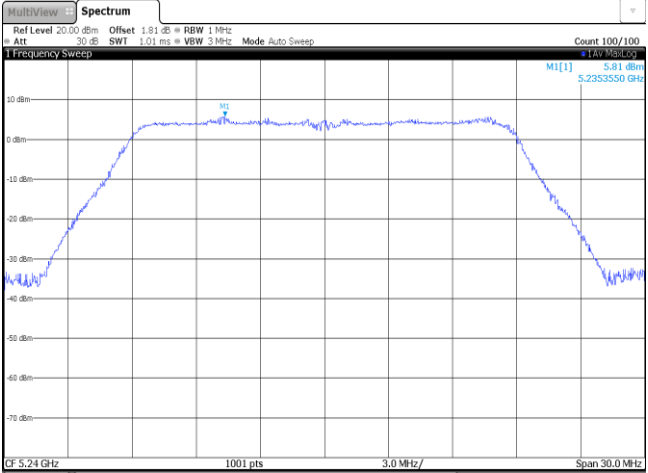
Please refer to the clause 3.3

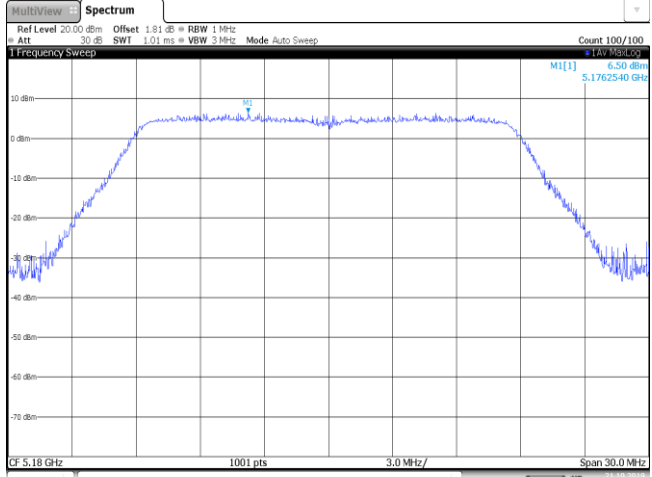
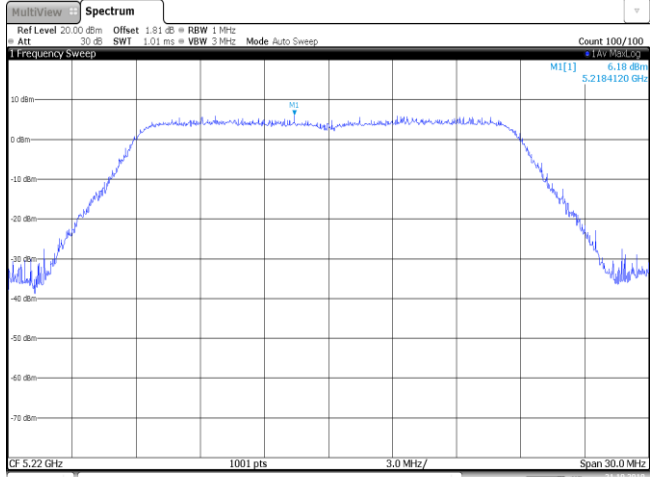
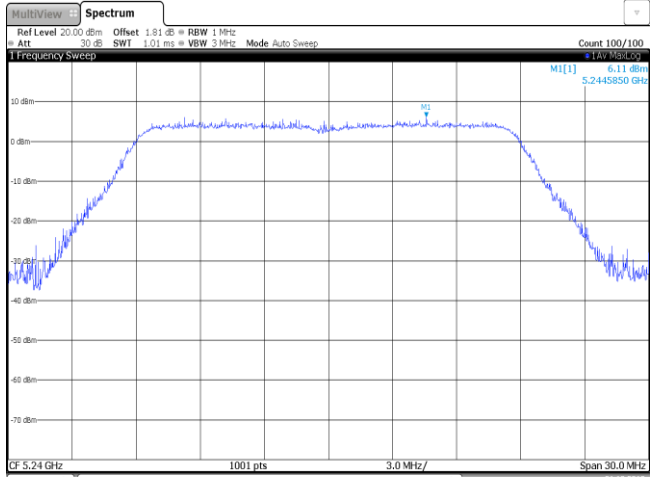
TEST RESULTS
☒ Passed
 ☐ Not Applicable

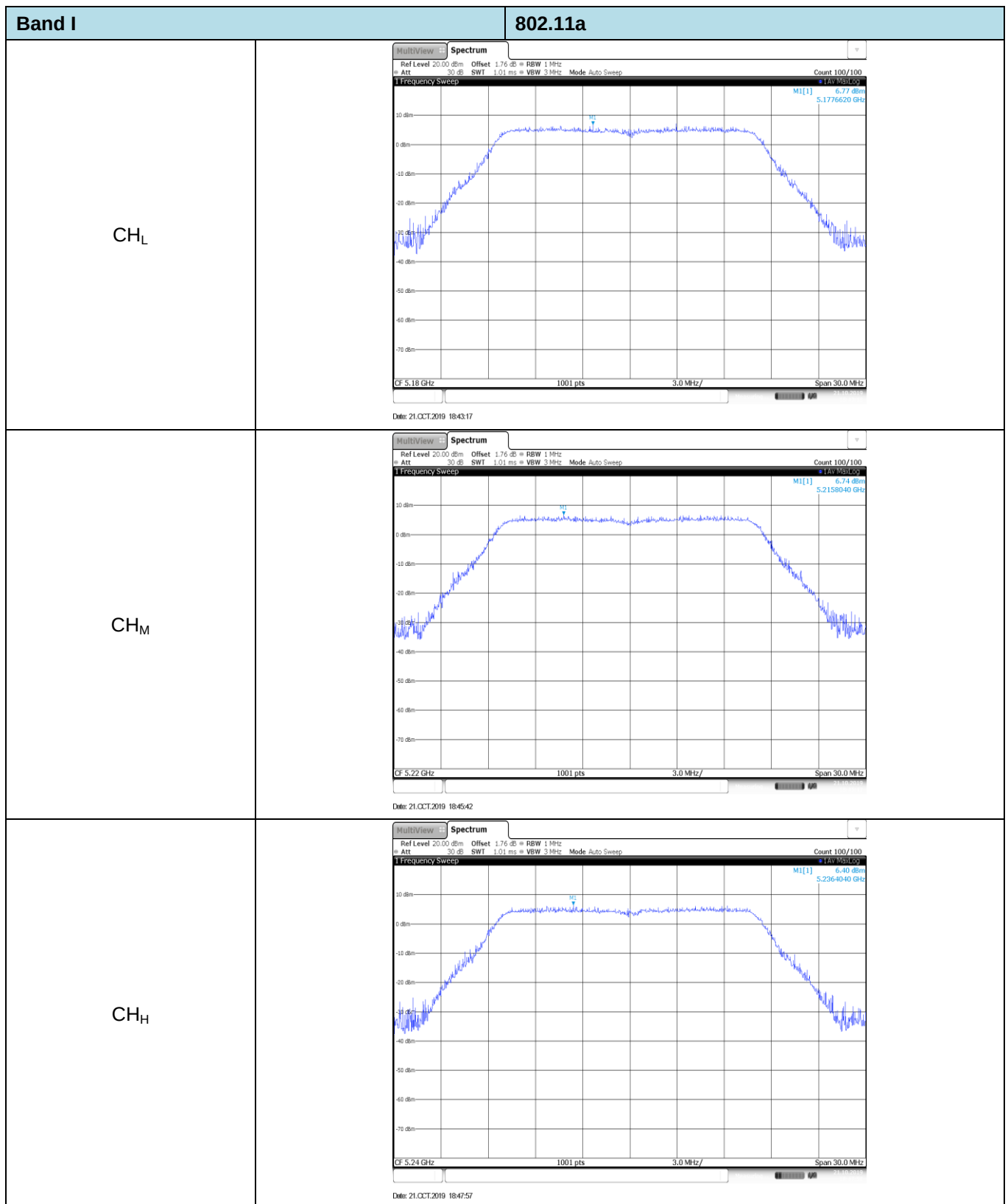
Band	Bandwidth (MHz)	Type	Channel	Power Spectral Density (dBm/MHz)	Limit (dBm/MHz)	Result
I	20	802.11ac	CH _L	6.04	11.00	Pass
			CH _M	5.66		
			CH _H	5.81		
		802.11n	CH _L	6.50	11.00	Pass
			CH _M	6.18		
			CH _H	6.11		
		802.11a	CH _L	6.77	11.00	Pass
			CH _M	6.74		
			CH _H	6.40		
	40	802.11ac	CH _L	3.98	11.00	Pass
			CH _H	3.53		
		802.11n	CH _L	3.85	11.00	Pass
			CH _H	4.23		
	80	802.11ac	CH _M	-4.12	11.00	Pass
II	20	802.11ac	CH _L	5.44	11.00	Pass
			CH _M	5.30		
			CH _H	5.74		
		802.11n	CH _L	5.86	11.00	Pass
			CH _M	5.91		
			CH _H	5.95		
		802.11a	CH _L	6.74	11.00	Pass
			CH _M	7.26		
			CH _H	6.54		
	40	802.11ac	CH _L	2.52	11.00	Pass
			CH _H	1.71		
		802.11n	CH _L	1.59	11.00	Pass
			CH _H	1.95		
	80	802.11ac	CH _M	-5.60	11.00	Pass

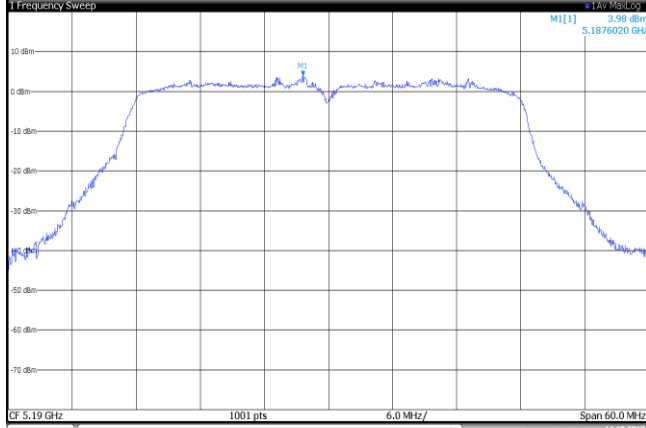
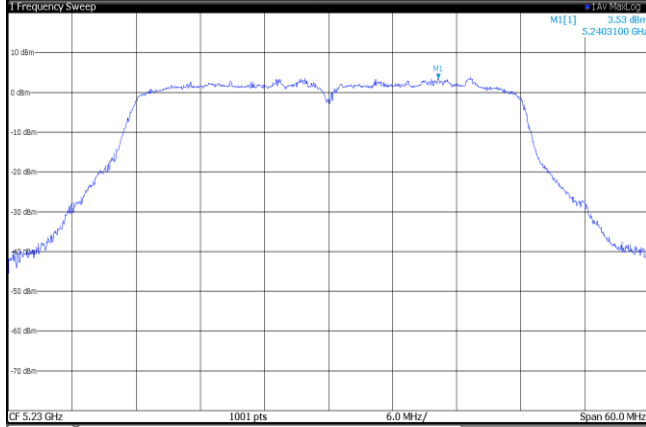
Band	Bandwidth (MHz)	Type	Channel	Power Spectral Density (dBm/MHz)	Limit (dBm/MHz)	Result
III	20	802.11ac	CH _L	5.80	11.00	Pass
			CH _M	6.61		
			CH _H	5.09		
		802.11n	CH _L	6.73	11.00	Pass
			CH _M	7.42		
			CH _H	5.85		
		802.11a	CH _L	6.81	11.00	Pass
			CH _M	8.85		
			CH _H	5.80		
	40	802.11ac	CH _L	2.58	11.00	Pass
			CH _M	3.79		
			CH _H	1.46		
		802.11n	CH _L	1.59	11.00	Pass
			CH _M	3.32		
			CH _H	0.15		
	80	802.11ac	CH _L	-5.27	11.00	Pass
			CH _M	-1.38		
			CH _H	-3.22		
Band	Bandwidth (MHz)	Type	Channel	Power Spectral Density (dBm/500kHz)	Limit (dBm/500kHz)	Result
IV	20	802.11ac	CH _L	4.52	30.00	Pass
			CH _M	4.84		
			CH _H	5.47		
		802.11n	CH _L	5.40	30.00	Pass
			CH _M	5.63		
			CH _H	5.01		
		802.11a	CH _L	5.37	30.00	Pass
			CH _M	5.77		
			CH _H	6.03		
	40	802.11ac	CH _L	0.33	30.00	Pass
			CH _H	0.57		
		802.11n	CH _L	1.15	30.00	Pass
			CH _H	1.22		
	80	802.11ac	CH _M	-7.80	30.00	Pass

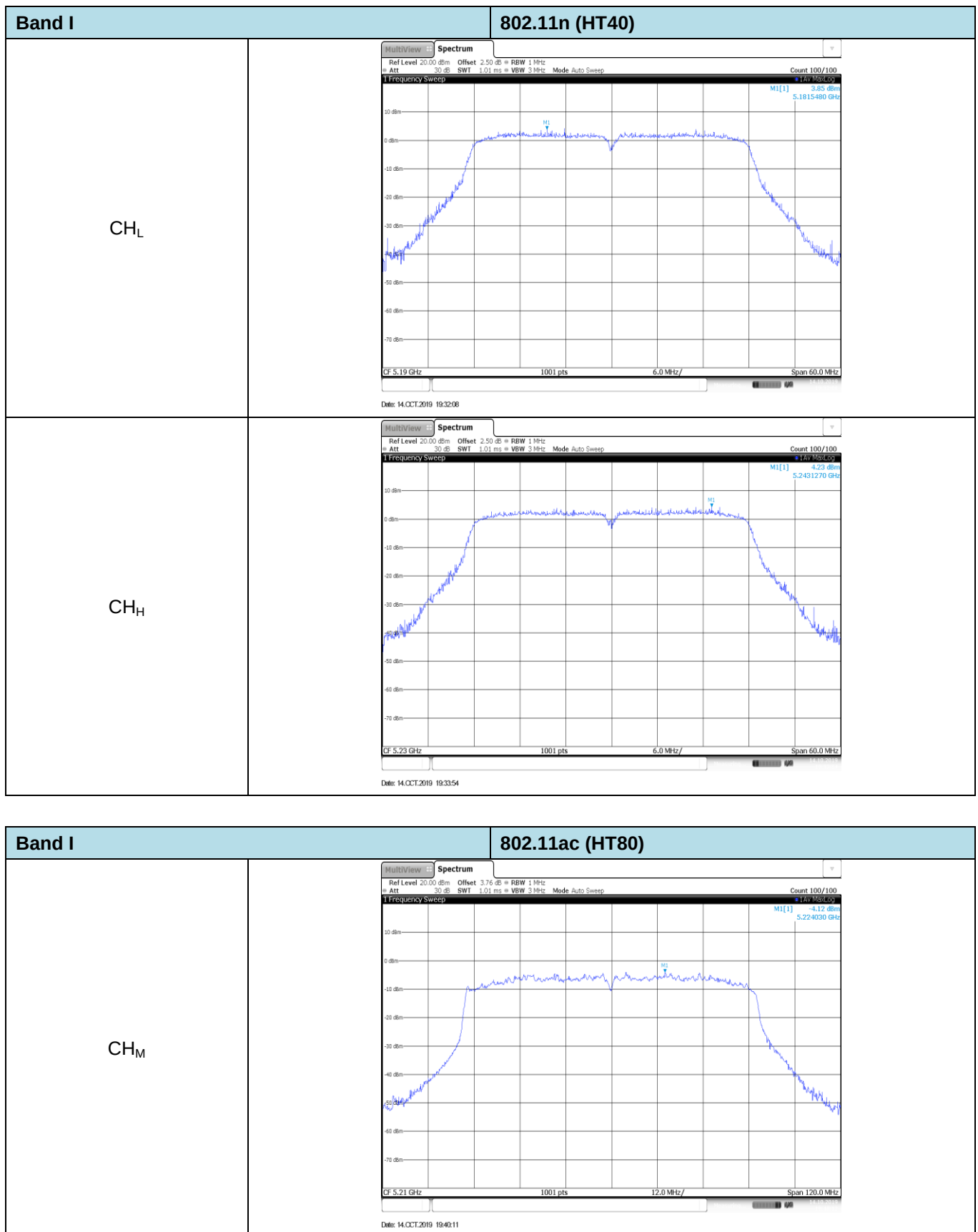
Test plot as follows:

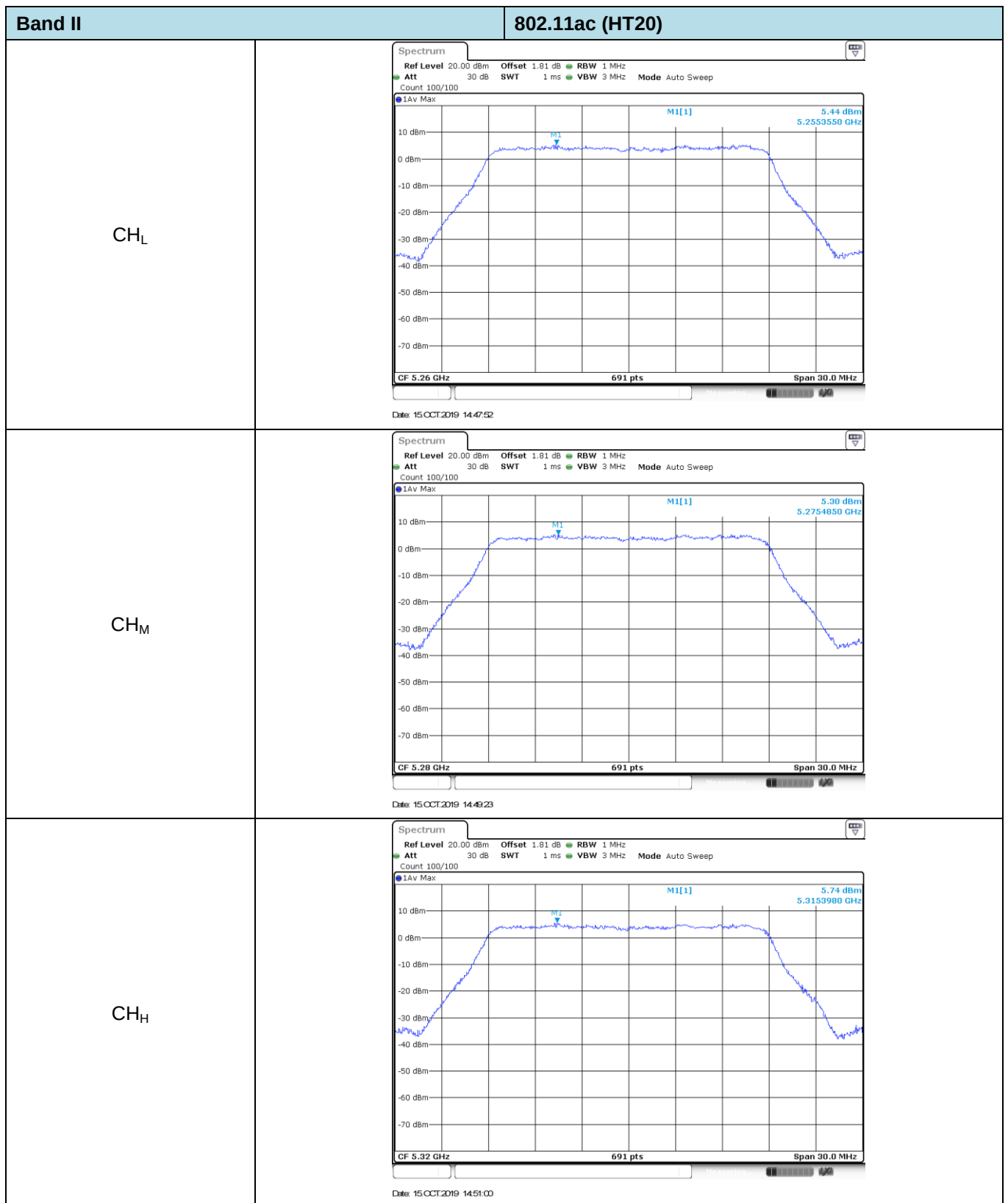
Band I	802.11ac (HT20)
CH _L	 21.OCT.2019 18:56:46
CH _M	 21.OCT.2019 18:57:27
CH _H	 21.OCT.2019 19:10:51

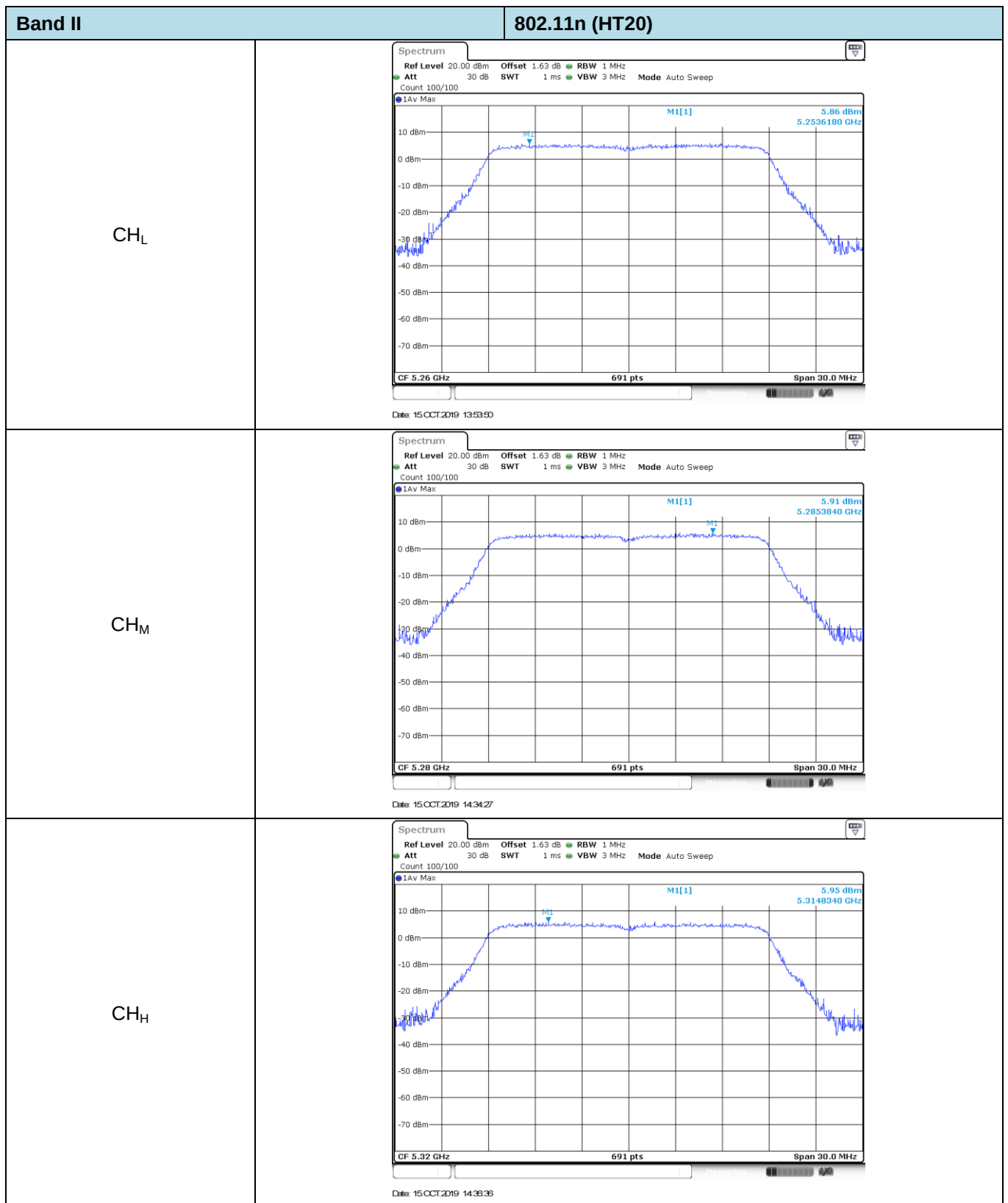
Band I	802.11n (HT20)
CH _L	 Ref Level 20.00 dBm Offset 1.81 dB RBW 1 MHz Att 30 dB SWF 1.01 ms VSW 3.14Hz Mode Auto Sweep Count 100/100 MI[1] 6.50 dBm 5.1762540 GHz 1 Frequency Sweep CF 5.18 GHz 1001 pts 3.0 MHz/ Span 30.0 MHz Date: 21.OCT.2019 18:49:13
CH _M	 Ref Level 20.00 dBm Offset 1.81 dB RBW 1 MHz Att 30 dB SWF 1.01 ms VSW 3.14Hz Mode Auto Sweep Count 100/100 MI[1] 6.18 dBm 5.2184120 GHz 1 Frequency Sweep CF 5.22 GHz 1001 pts 3.0 MHz/ Span 30.0 MHz Date: 21.OCT.2019 18:50:26
CH _H	 Ref Level 20.00 dBm Offset 1.81 dB RBW 1 MHz Att 30 dB SWF 1.01 ms VSW 3.14Hz Mode Auto Sweep Count 100/100 MI[1] 6.11 dBm 5.2445850 GHz 1 Frequency Sweep CF 5.24 GHz 1001 pts 3.0 MHz/ Span 30.0 MHz Date: 21.OCT.2019 18:51:19



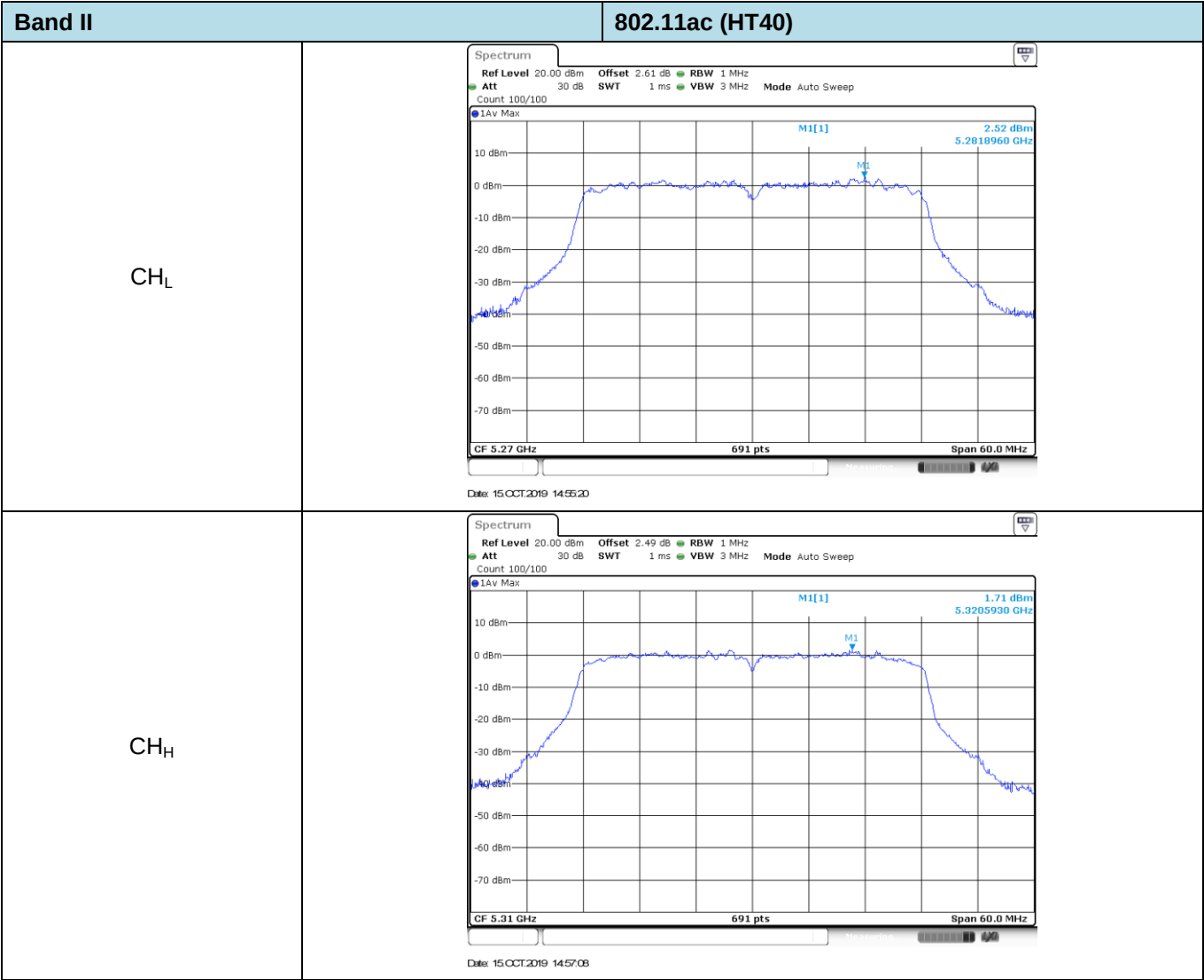
Band I		802.11ac (HT40)
CH _L	MultiView Spectrum Count 100/100 Ref Level 20.00 dBm Att 30 dB Offset 2.49 dB RBW 1 MHz SWT 1.01 ms VBW 3 MHz Mode Auto Sweep 1 Frequency Sweep MI[1] 3.98 dBm 5.1876020 GHz  CF 5.19 GHz 1001 pts 6.0 MHz/ Span 60.0 MHz Date: 14.OCT.2019 19:24:32	
CH _H	MultiView Spectrum Count 100/100 Ref Level 20.00 dBm Att 30 dB Offset 2.48 dB RBW 1 MHz SWT 1.01 ms VBW 3 MHz Mode Auto Sweep 1 Frequency Sweep MI[1] 3.53 dBm 5.2403100 GHz  CF 5.23 GHz 1001 pts 6.0 MHz/ Span 60.0 MHz Date: 14.OCT.2019 19:28:52	

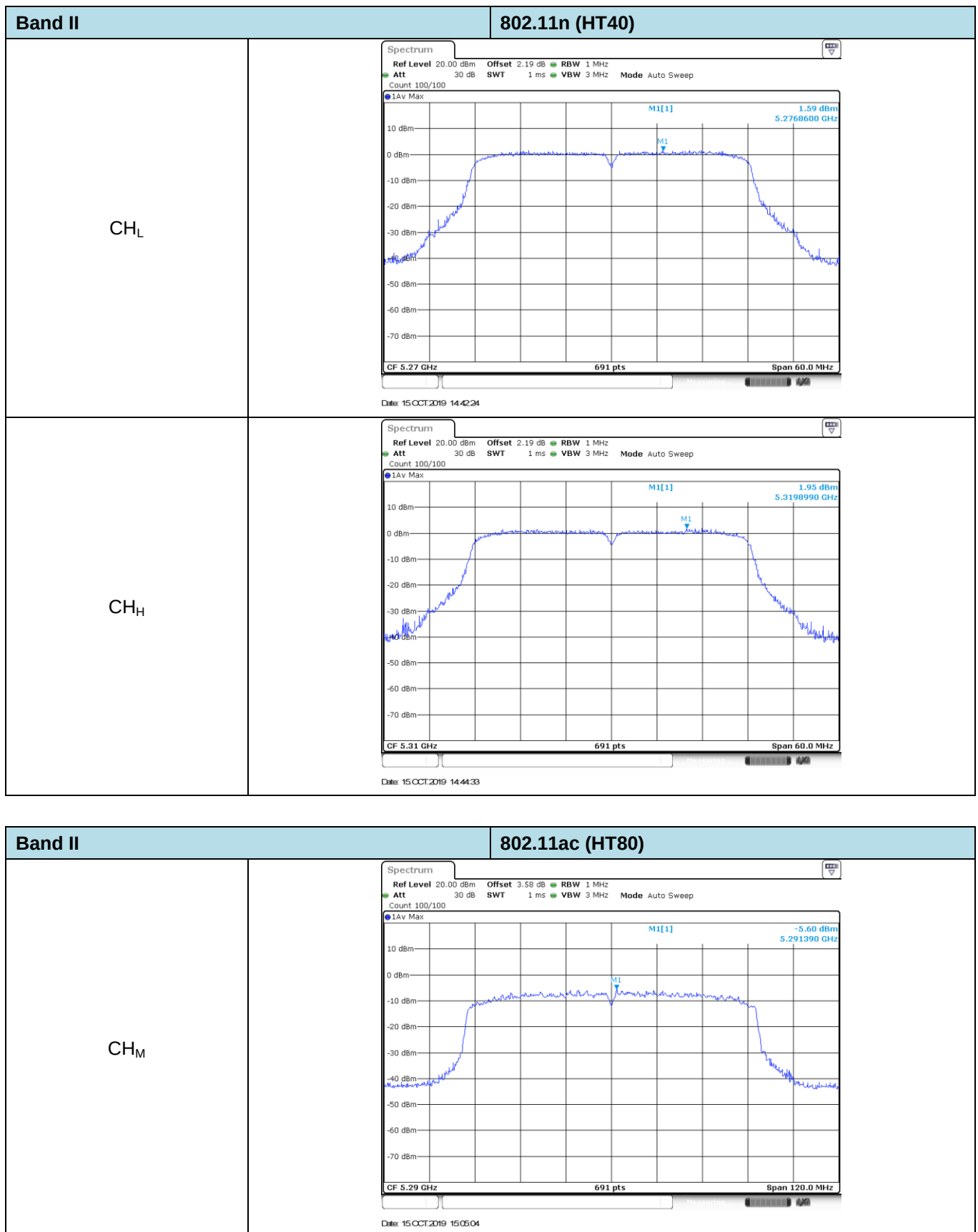


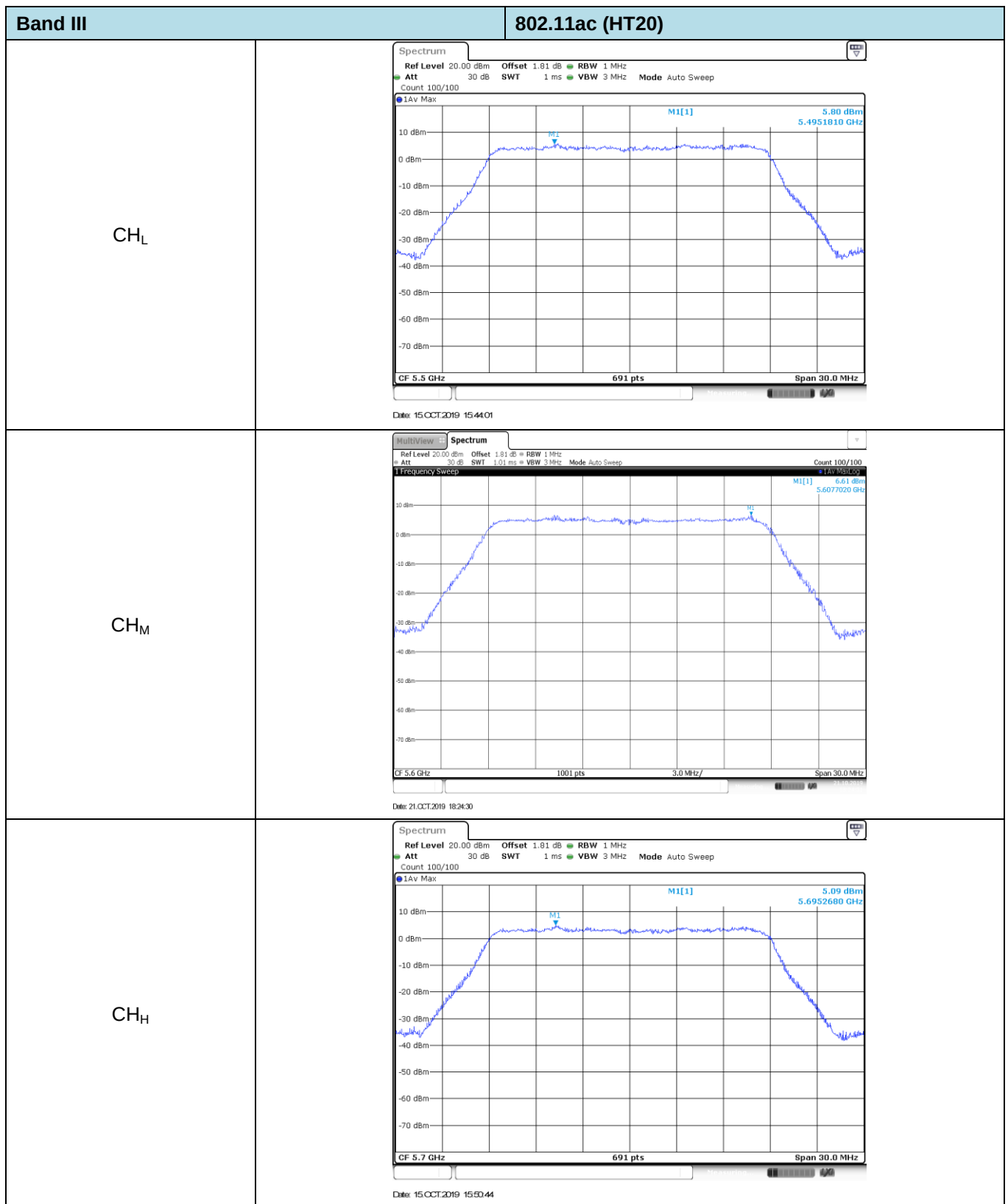




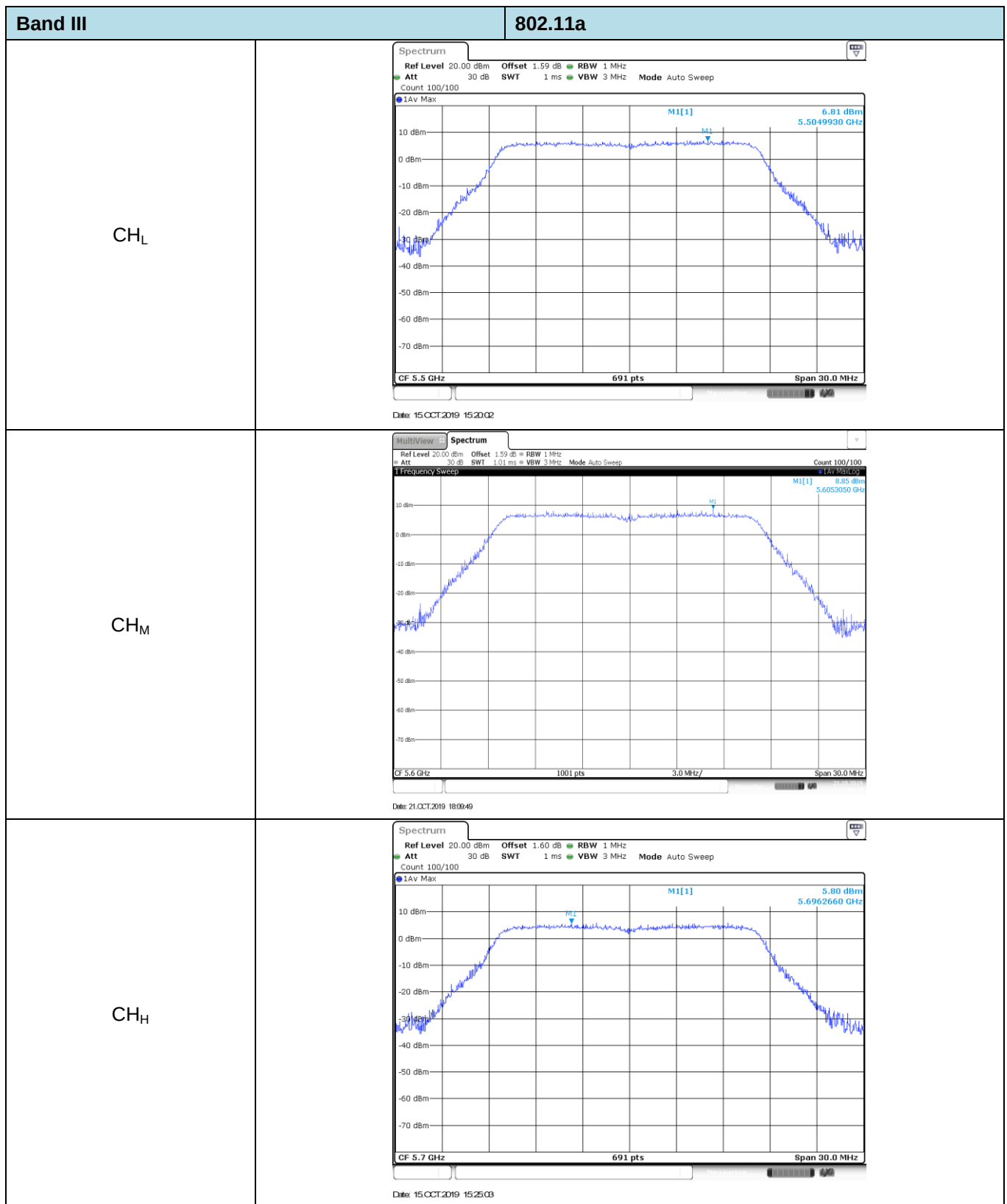
Band II		802.11a
CH _L	Spectrum Ref Level 20.00 dBm Att 30 dB Count 100/100 Offset 1.60 dB SWT 1 ms RBW 1 MHz VBW 3 MHz Mode Auto Sweep IAv Max CF 5.26 GHz691 ptsSpan 30.0 MHz Date: 15 OCT.2019 13:47:24	
CH _M	Spectrum Ref Level 20.00 dBm Att 30 dB Count 100/100 Offset 1.59 dB SWT 1 ms RBW 1 MHz VBW 3 MHz Mode Auto Sweep IAv Max CF 5.28 GHz691 ptsSpan 30.0 MHz Date: 15 OCT.2019 13:48:53	
CH _H	Spectrum Ref Level 20.00 dBm Att 30 dB Count 100/100 Offset 1.59 dB SWT 1 ms RBW 1 MHz VBW 3 MHz Mode Auto Sweep IAv Max CF 5.32 GHz691 ptsSpan 30.0 MHz Date: 15 OCT.2019 13:51:32	

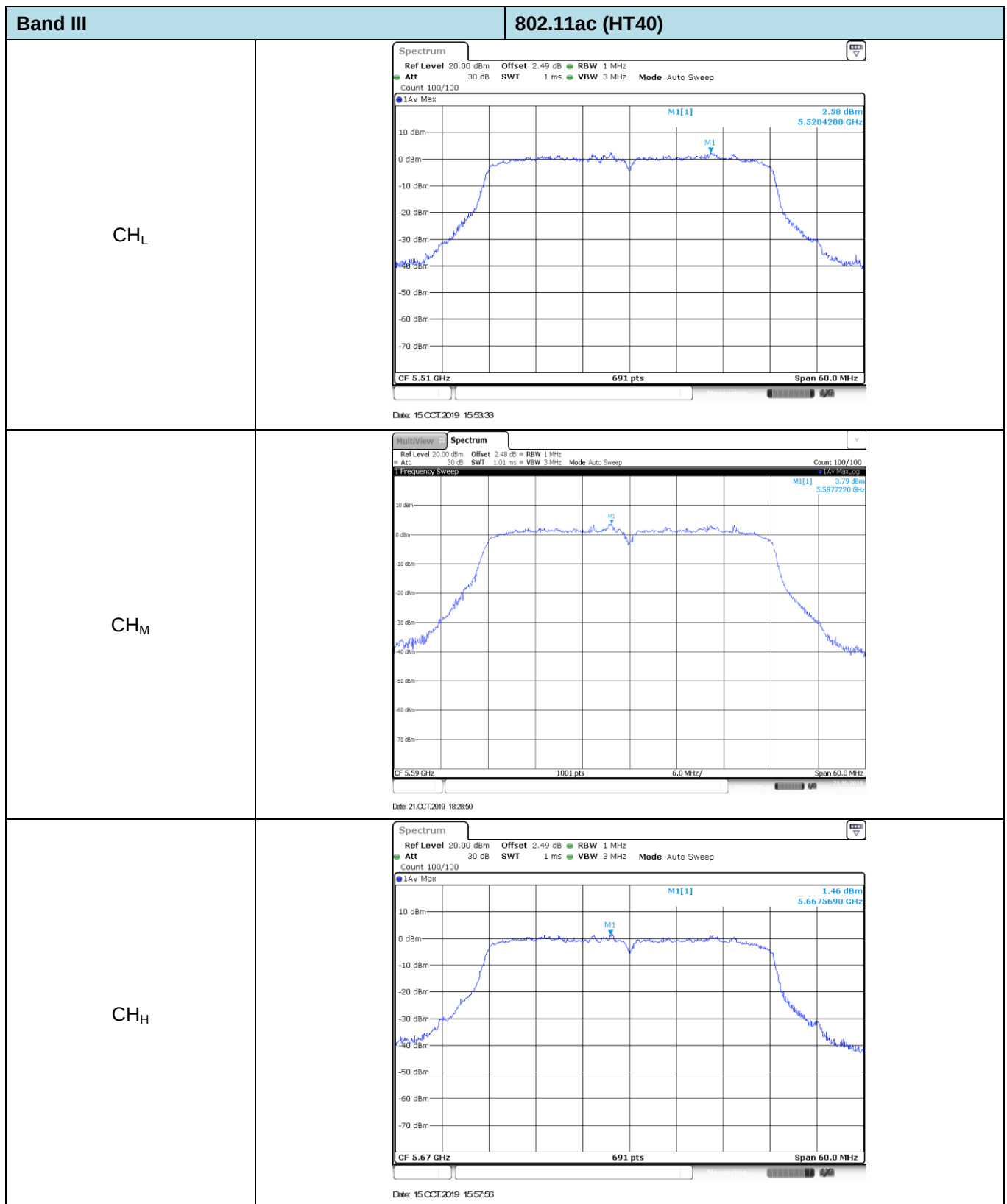


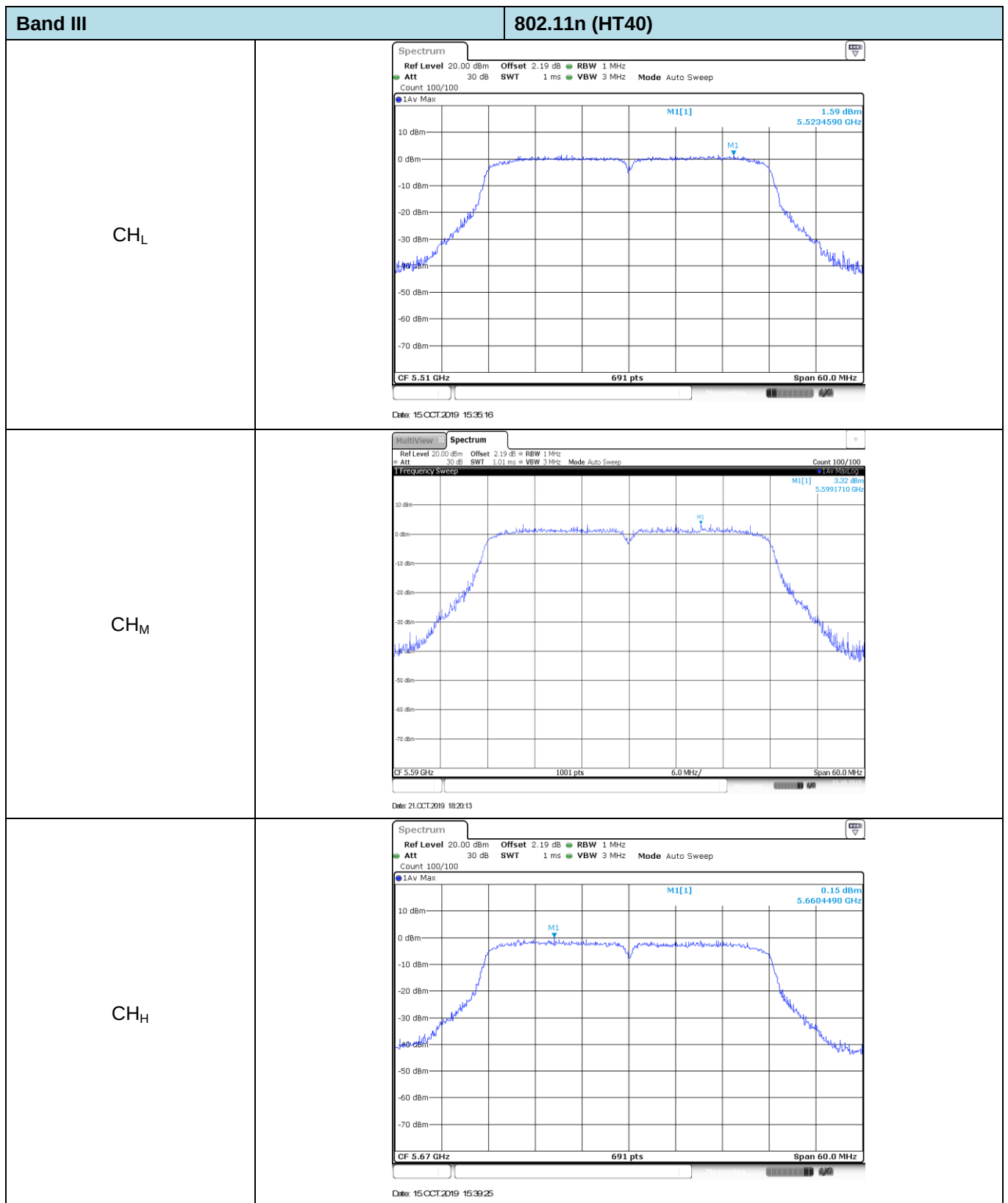


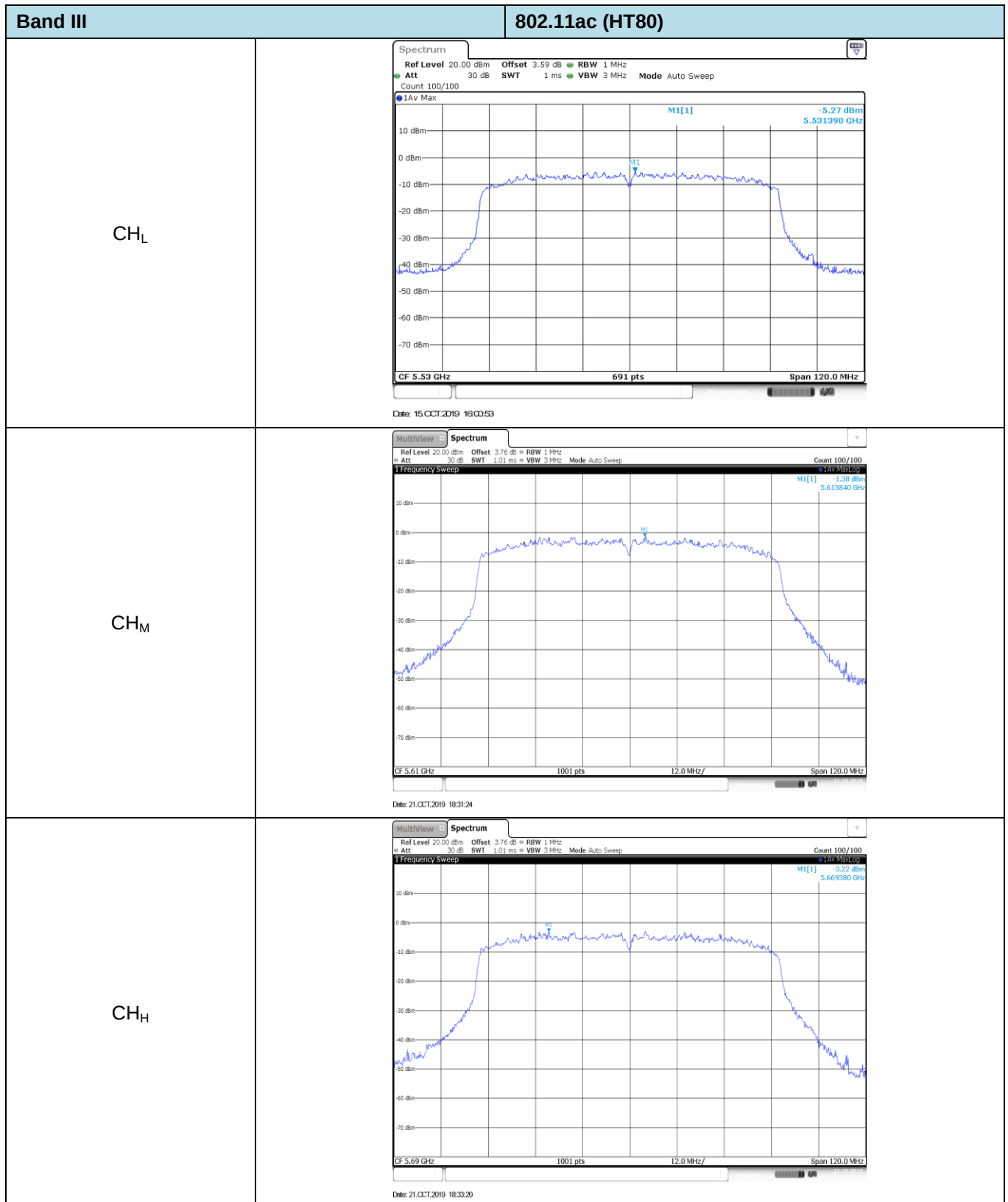


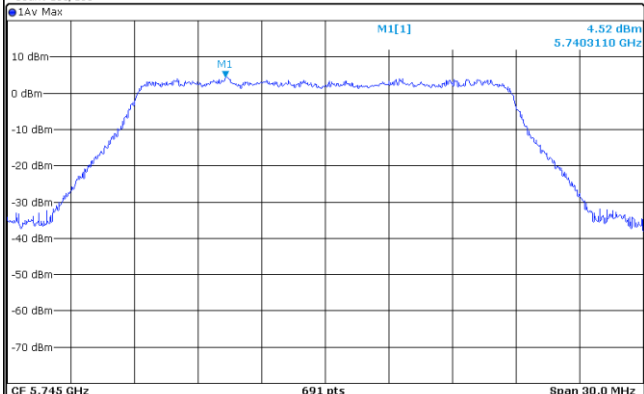
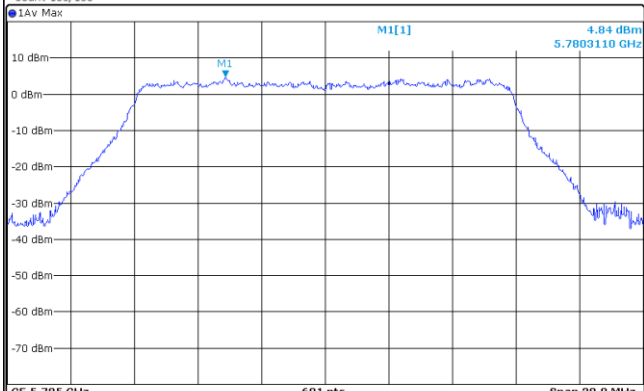
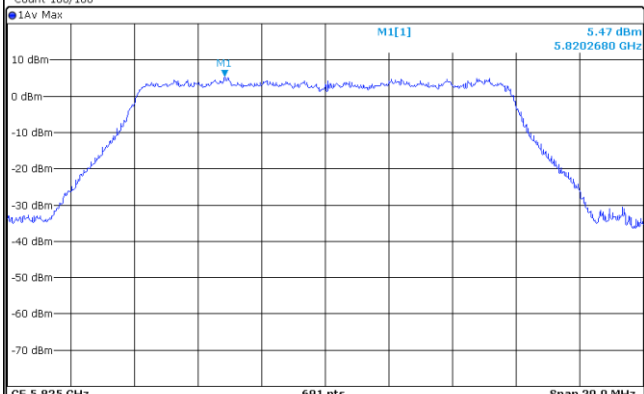
Band III		802.11n (HT20)	
CH _L	Spectrum Ref Level 20.00 dBm Offset 1.63 dB RBW 1 MHz Att 30 dB SWT 1 ms VBW 3 MHz Mode Auto Sweep Count 100/100 IAV Max M1[1] 6.73 dBm 5.5055140 GHz 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm CF 5.5 GHz 691 pts Span 30.0 MHz Date: 15.OCT.2019 15:28:50		
CH _M	MultiView Spectrum Ref Level 20.00 dBm Offset 1.63 dB RBW 1 MHz Att 30 dB SWT 1.01 ms VBW 3 MHz Mode Auto Sweep Count 100/100 1 Frequency Sweep IAV Max M1[1] 7.42 dBm 5.5972430 GHz 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm CF 5.6 GHz 1001 pts 3.0 MHz/ Span 30.0 MHz Date: 21.OCT.2019 18:12:35		
CH _H	Spectrum Ref Level 20.00 dBm Offset 1.63 dB RBW 1 MHz Att 30 dB SWT 1 ms VBW 3 MHz Mode Auto Sweep Count 100/100 IAV Max M1[1] 5.85 dBm 5.7064690 GHz 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm CF 5.7 GHz 691 pts Span 30.0 MHz Date: 15.OCT.2019 15:33:11		

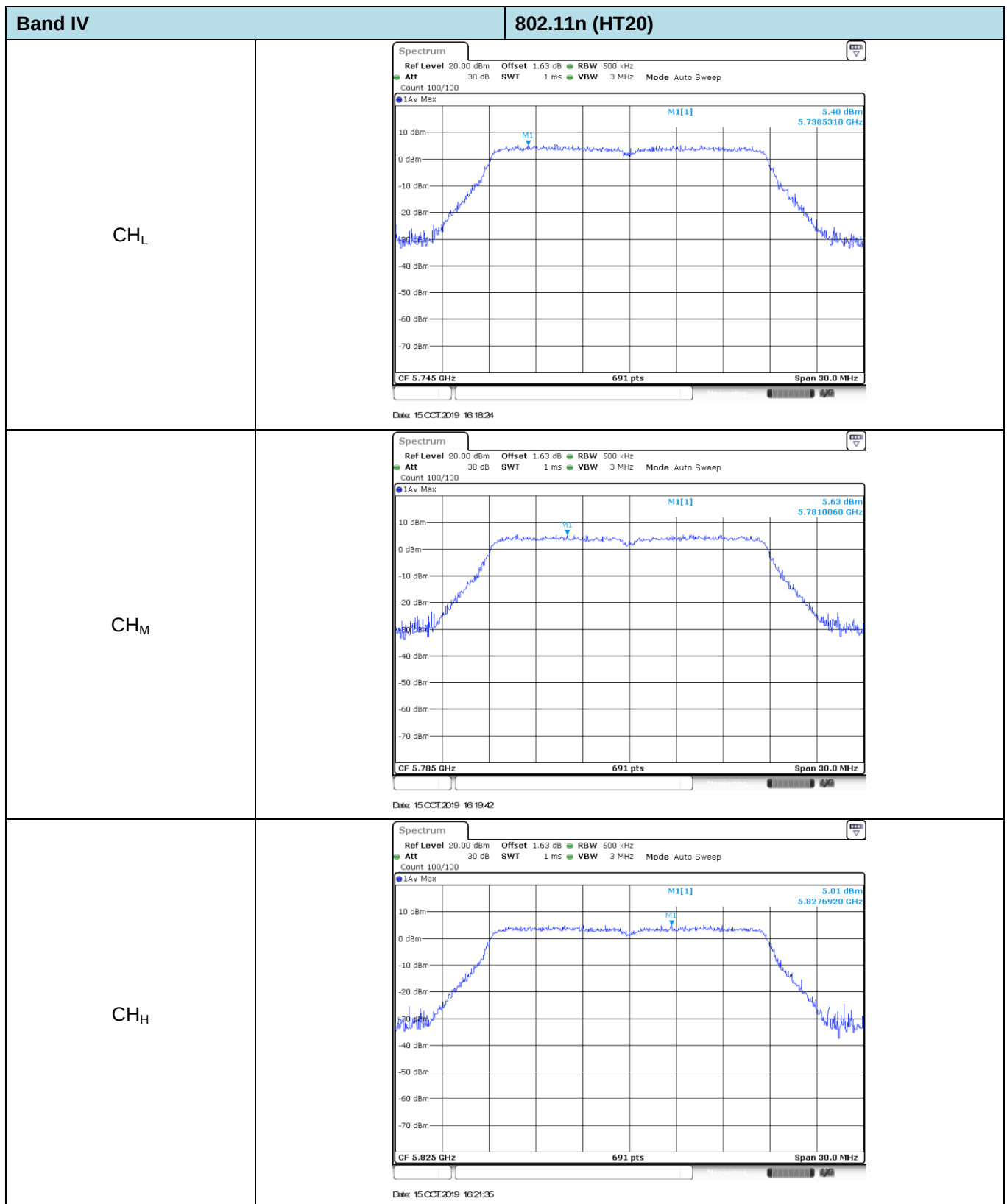


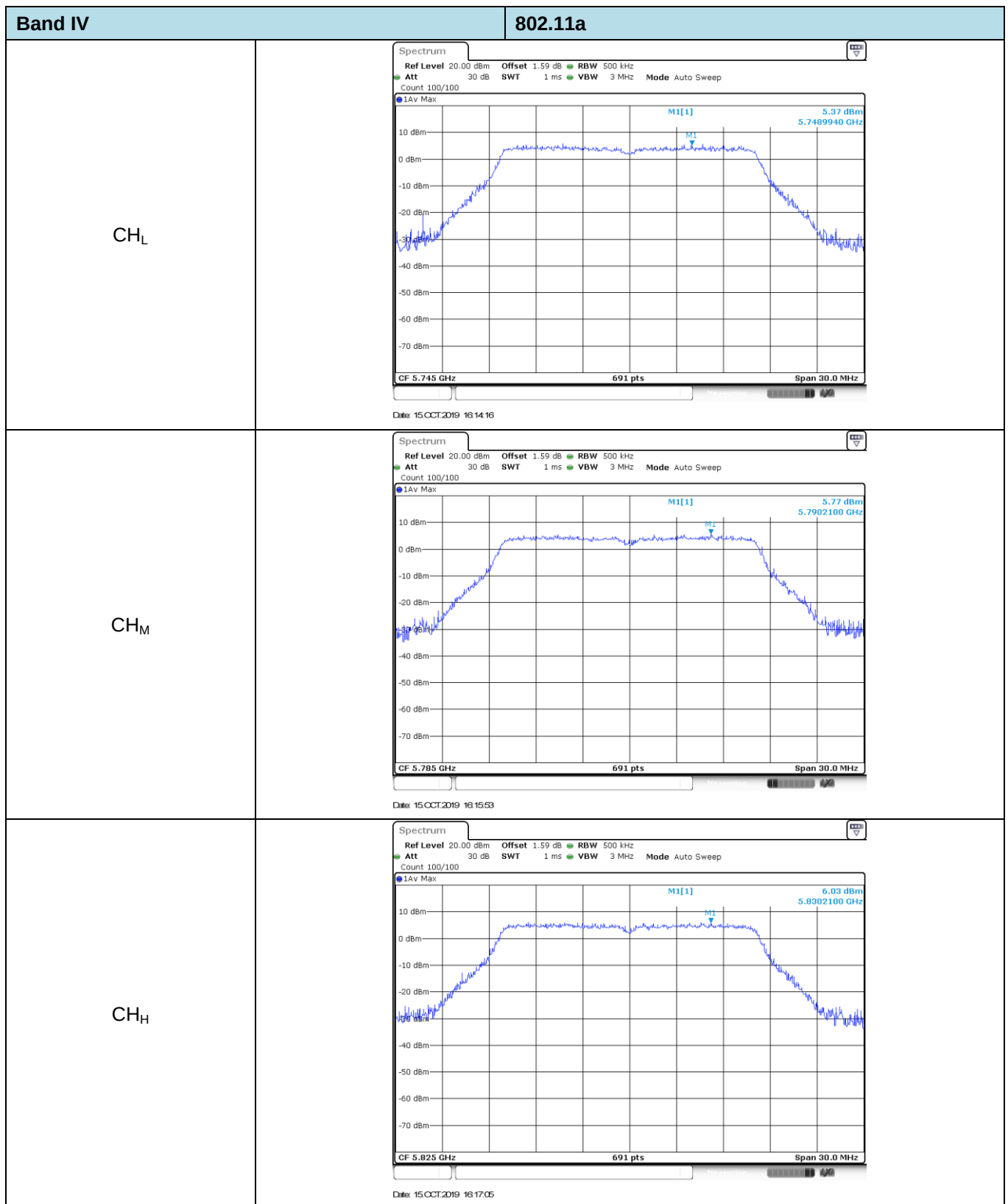


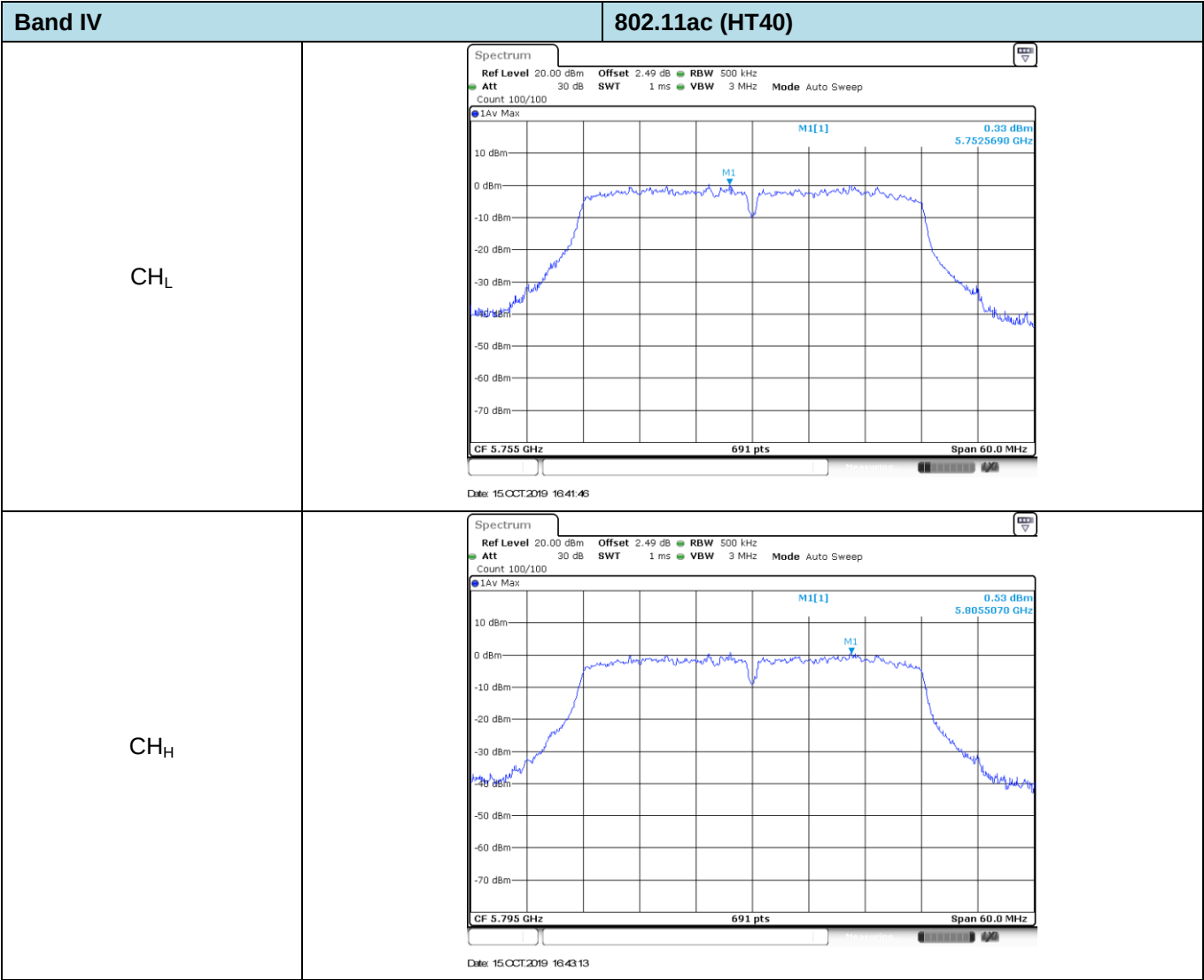


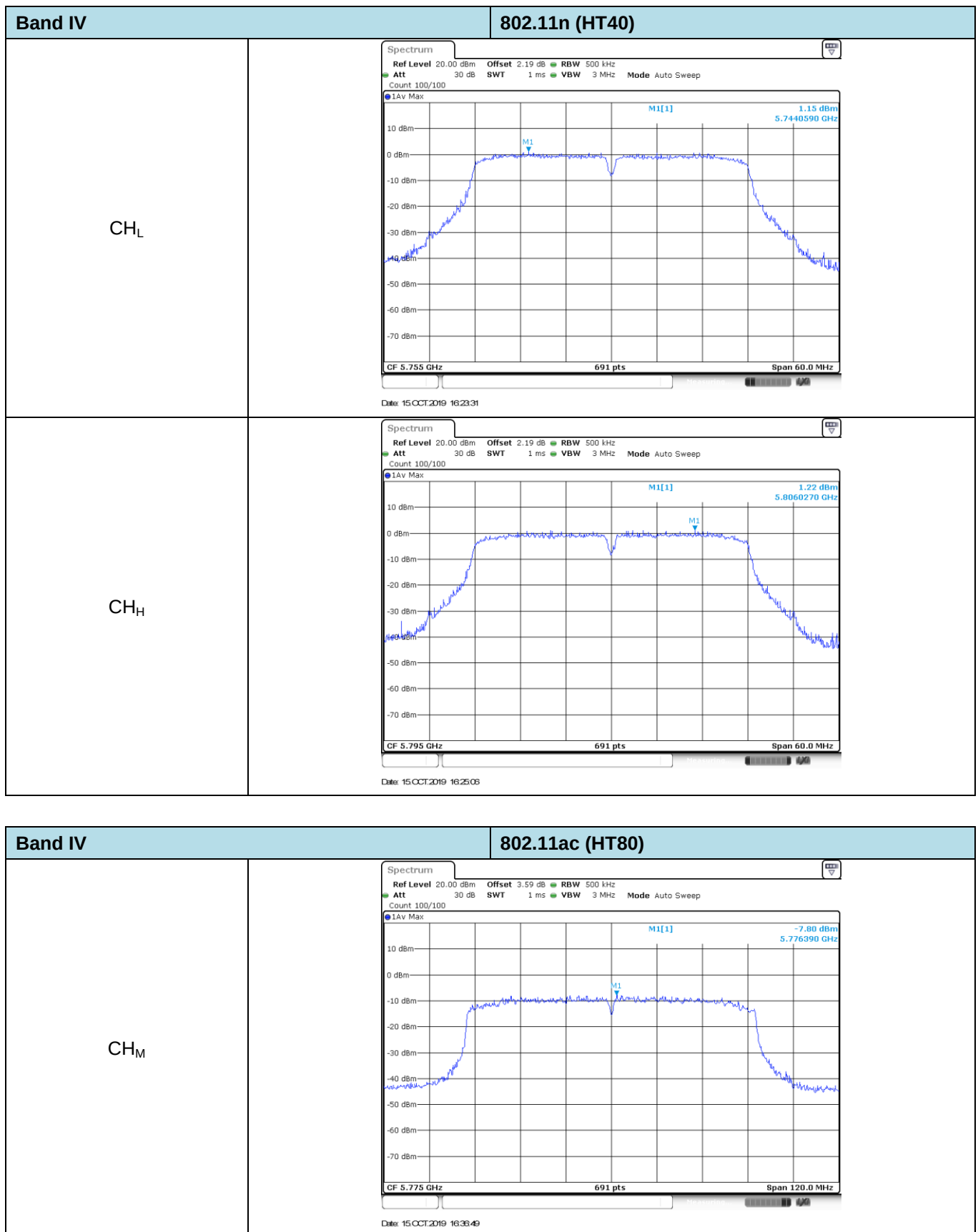


Band IV		802.11ac (HT20)
CH _L	Spectrum Ref Level 20.00 dBm Att 30 dB Offset 1.81 dB SWT 1 ms RBW 500 kHz VBW 3 MHz Mode Auto Sweep Count 100/100 IAV Max  CF 5.745 GHz691 ptsSpan 30.0 MHz Date: 15 OCT 2019 16:27:29	
CH _M	Spectrum Ref Level 20.00 dBm Att 30 dB Offset 1.81 dB SWT 1 ms RBW 500 kHz VBW 3 MHz Mode Auto Sweep Count 100/100 IAV Max  CF 5.785 GHz691 ptsSpan 30.0 MHz Date: 15 OCT 2019 16:28:51	
CH _H	Spectrum Ref Level 20.00 dBm Att 30 dB Offset 1.81 dB SWT 1 ms RBW 500 kHz VBW 3 MHz Mode Auto Sweep Count 100/100 IAV Max  CF 5.825 GHz691 ptsSpan 30.0 MHz Date: 15 OCT 2019 16:29:56	







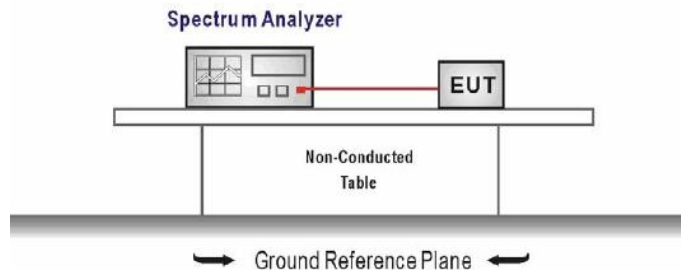


5.5. 26dB bandwidth and 99% Occupancy bandwidth

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:

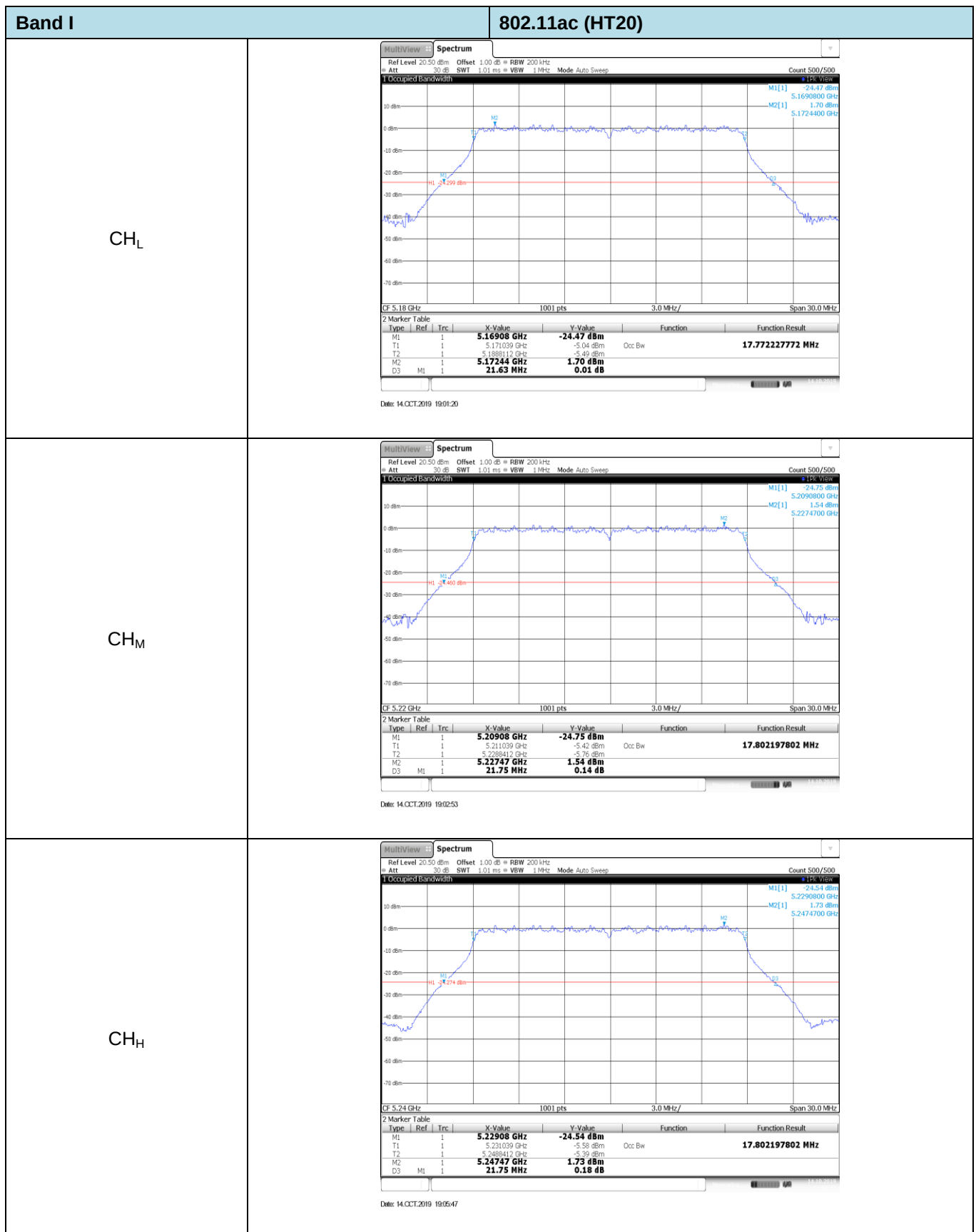
Please refer to the clause 3.3

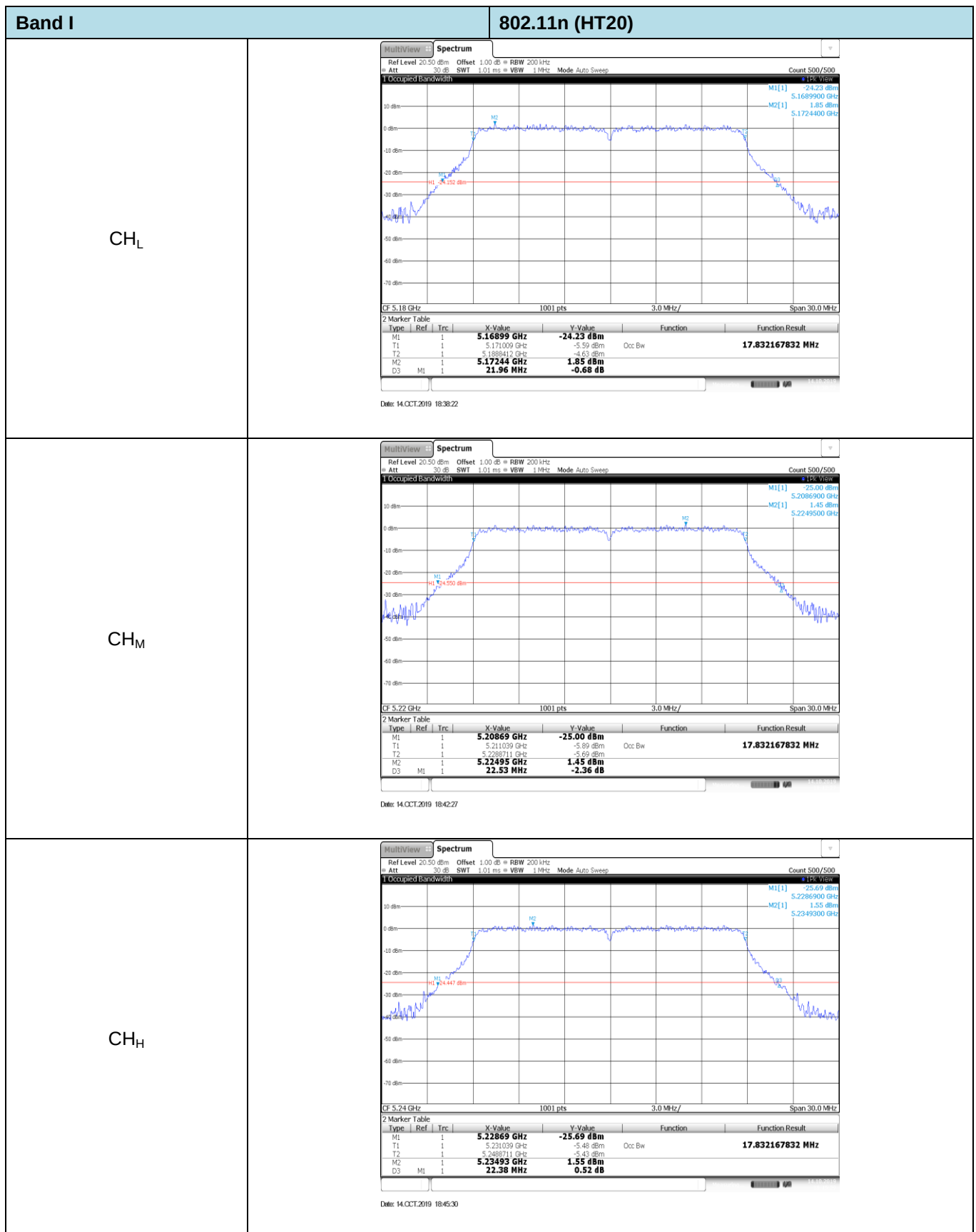
TEST RESULTS

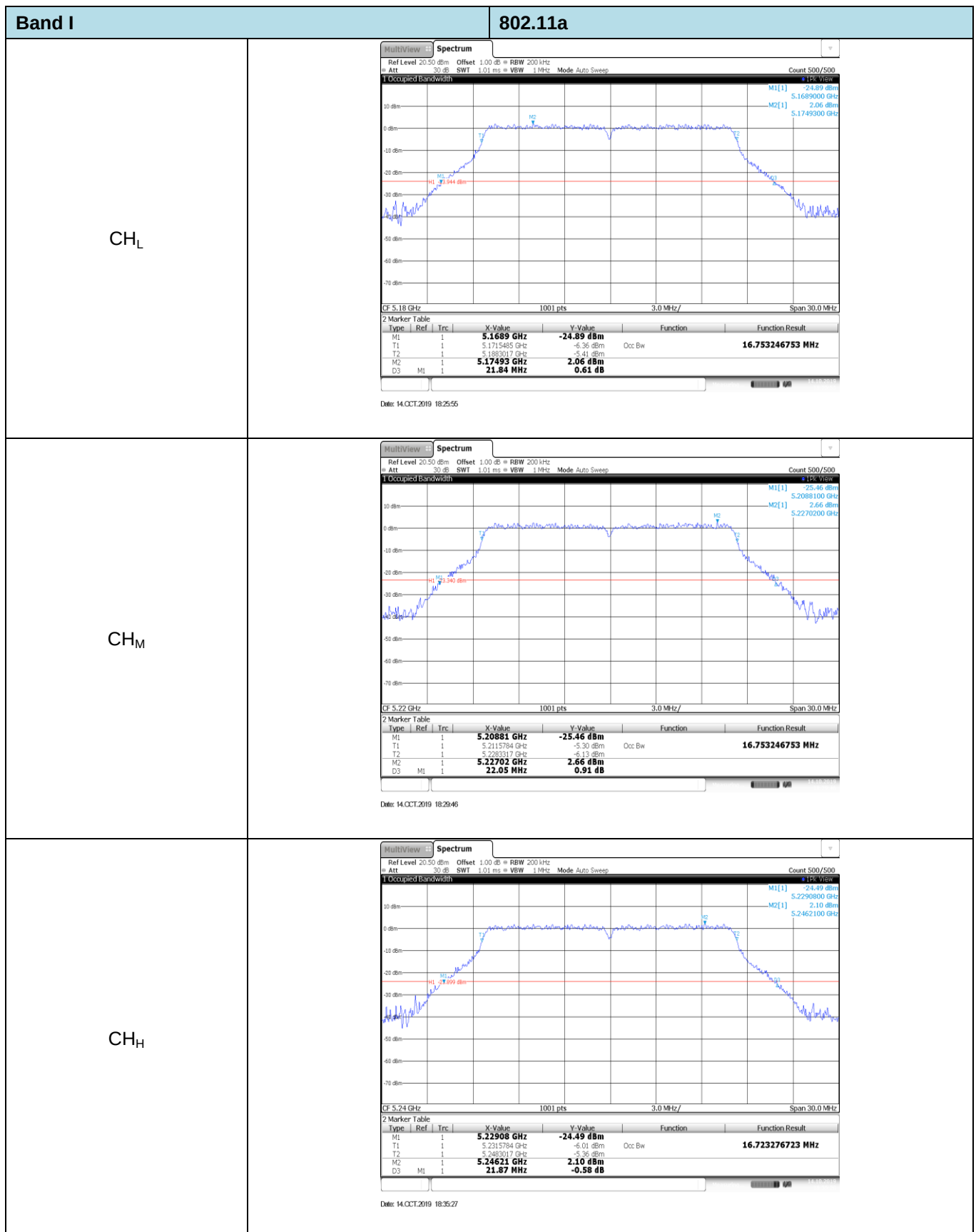
☒ Passed ☐ Not Applicable

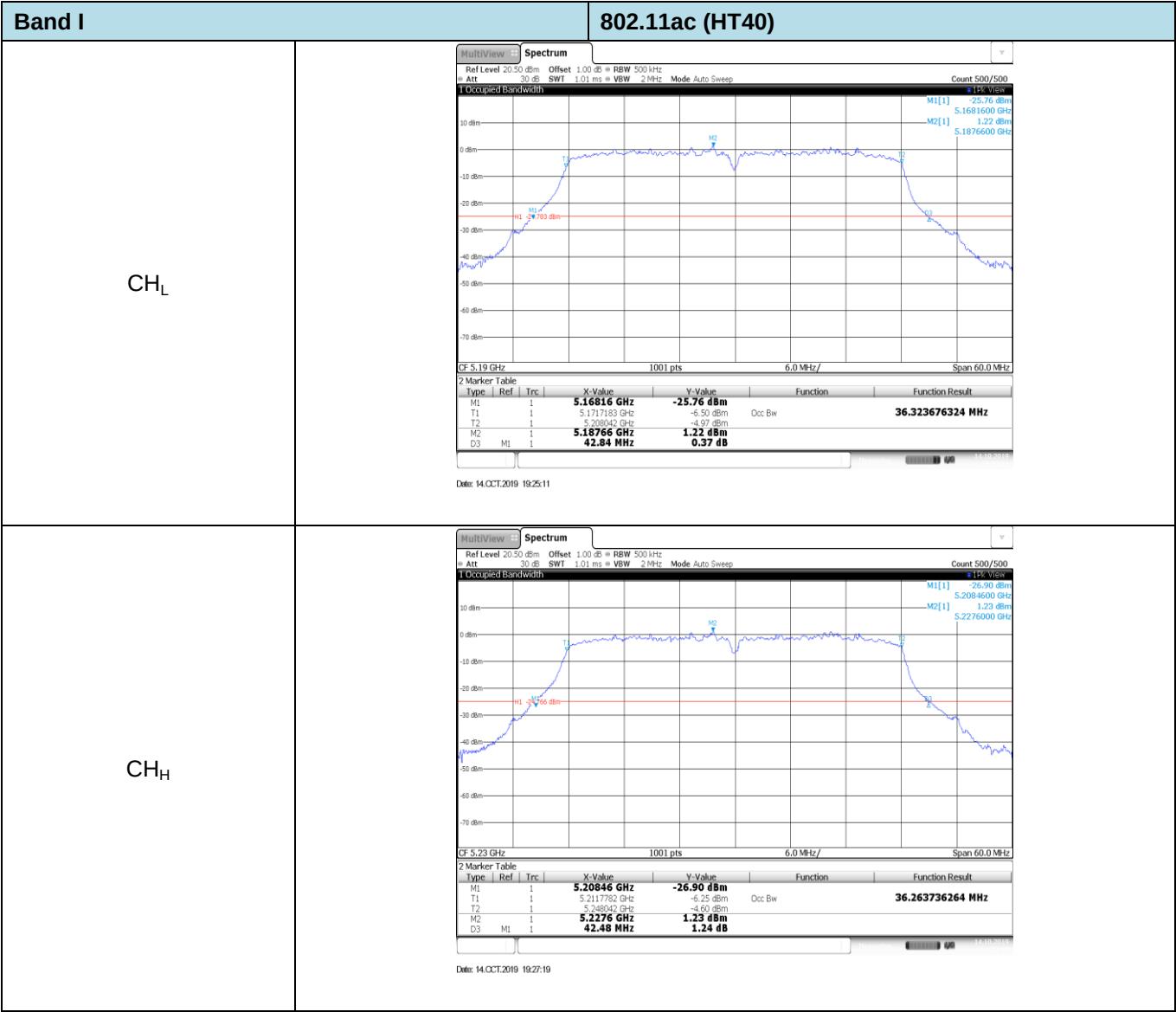
Band	Bandwidth (MHz)	Type	Channel	99% Occupy bandwidth (MHz)	26dB bandwidth (MHz)	Result
I	20	802.11ac	CH _L	17.77	21.63	Pass
			CH _M	17.80	21.75	
			CH _H	17.80	21.75	
		802.11n	CH _L	17.83	21.96	Pass
			CH _M	17.83	22.53	
			CH _H	17.83	22.38	
		802.11a	CH _L	16.75	21.84	Pass
			CH _M	16.75	22.05	
			CH _H	16.72	21.87	
	40	802.11ac	CH _L	36.32	42.84	Pass
			CH _H	36.26	42.48	
		802.11n	CH _L	36.32	44.76	Pass
			CH _H	36.26	44.16	
	80	802.11ac	CH _M	74.93	86.04	Pass
II	20	802.11ac	CH _L	17.80	21.57	Pass
			CH _M	17.77	21.48	
			CH _H	17.77	21.57	
		802.11n	CH _L	17.83	21.90	Pass
			CH _M	17.86	21.84	
			CH _H	17.77	21.57	
		802.11a	CH _L	16.66	21.27	Pass
			CH _M	16.69	21.42	
			CH _H	16.75	21.45	
	40	802.11ac	CH _L	36.26	42.42	Pass
			CH _H	36.32	42.48	
		802.11n	CH _L	36.38	45.36	Pass
			CH _H	36.26	44.22	
	80	802.11ac	CH _M	74.45	84.60	Pass

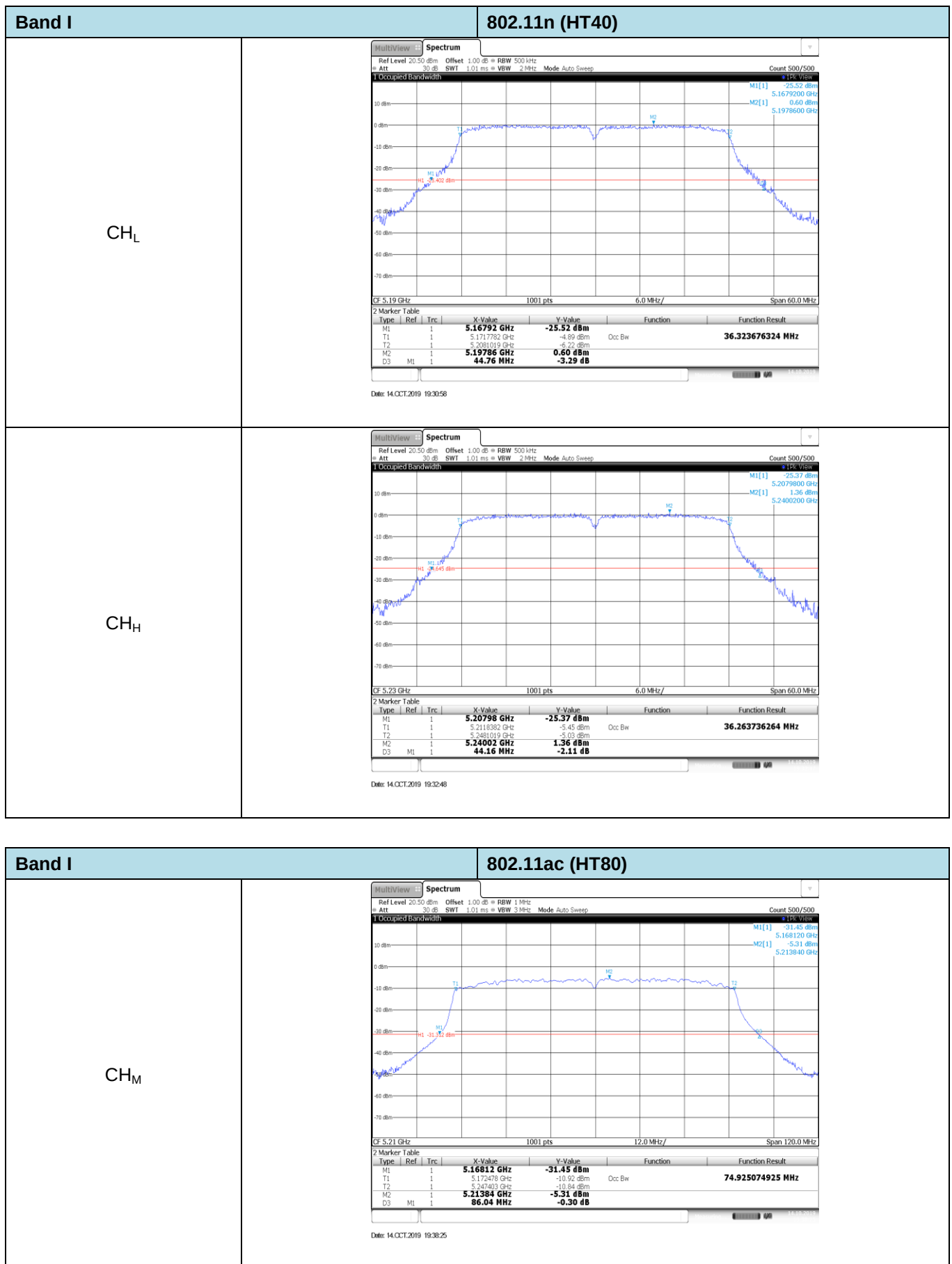
Band	Bandwidth (MHz)	Type	Channel	99% Occupy bandwidth (MHz)	26dB bandwidth (MHz)	Result
III	20	802.11ac	CH _L	17.74	21.51	Pass
			CH _M	17.83	21.96	
			CH _H	17.86	21.72	
		802.11n	CH _L	18.04	22.35	Pass
			CH _M	17.83	21.99	
			CH _H	17.83	21.81	
		802.11a	CH _L	16.84	21.30	Pass
			CH _M	16.75	22.02	
			CH _H	16.66	20.94	
	40	802.11ac	CH _L	36.26	43.02	Pass
			CH _M	36.36	43.17	
			CH _H	36.32	42.72	
		802.11n	CH _L	36.26	43.38	Pass
			CH _M	36.26	43.20	
			CH _H	36.26	44.16	
	80	802.11ac	CH _L	74.57	85.20	Pass
			CH _M	74.45	85.20	
			CH _H	74.69	85.68	

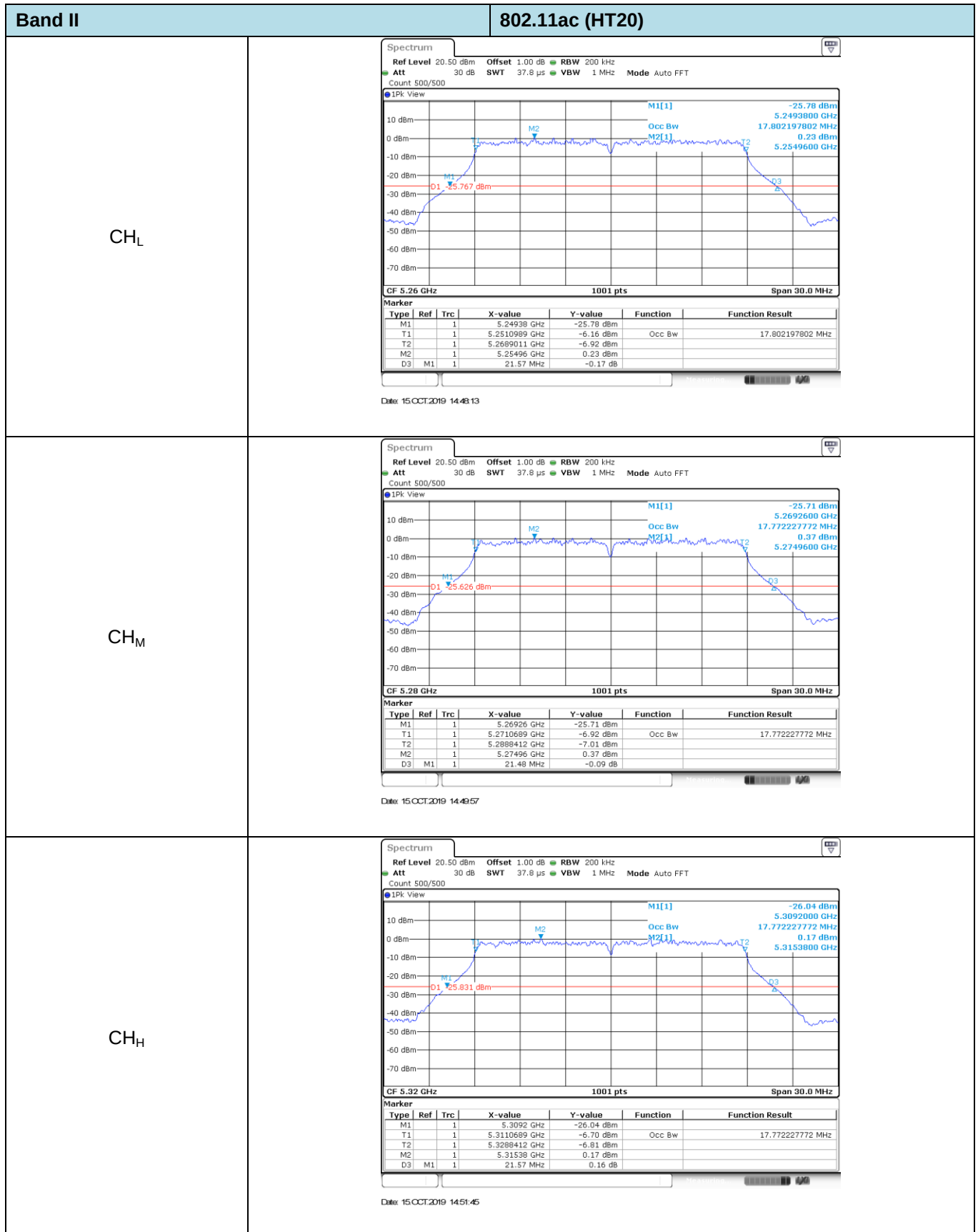


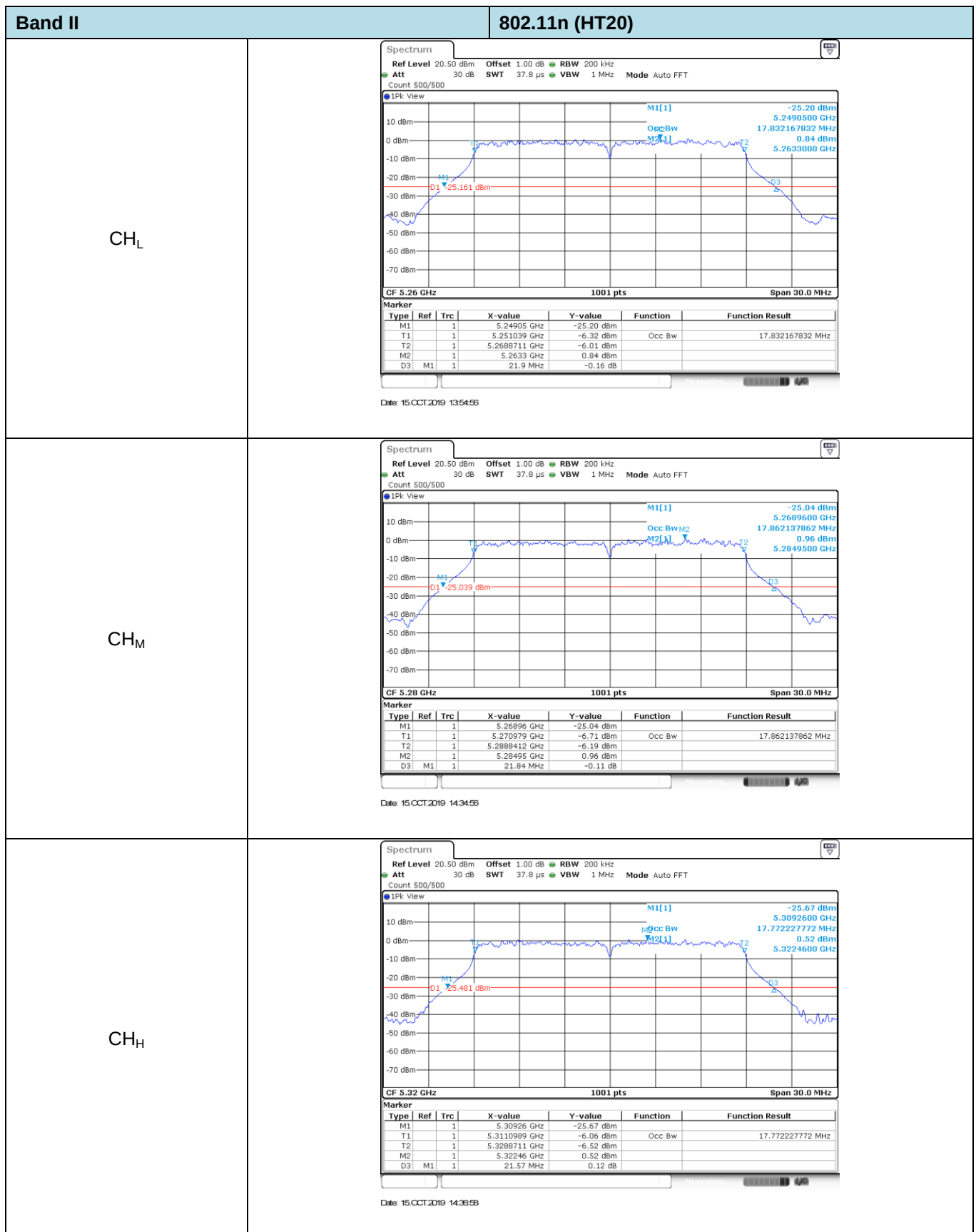


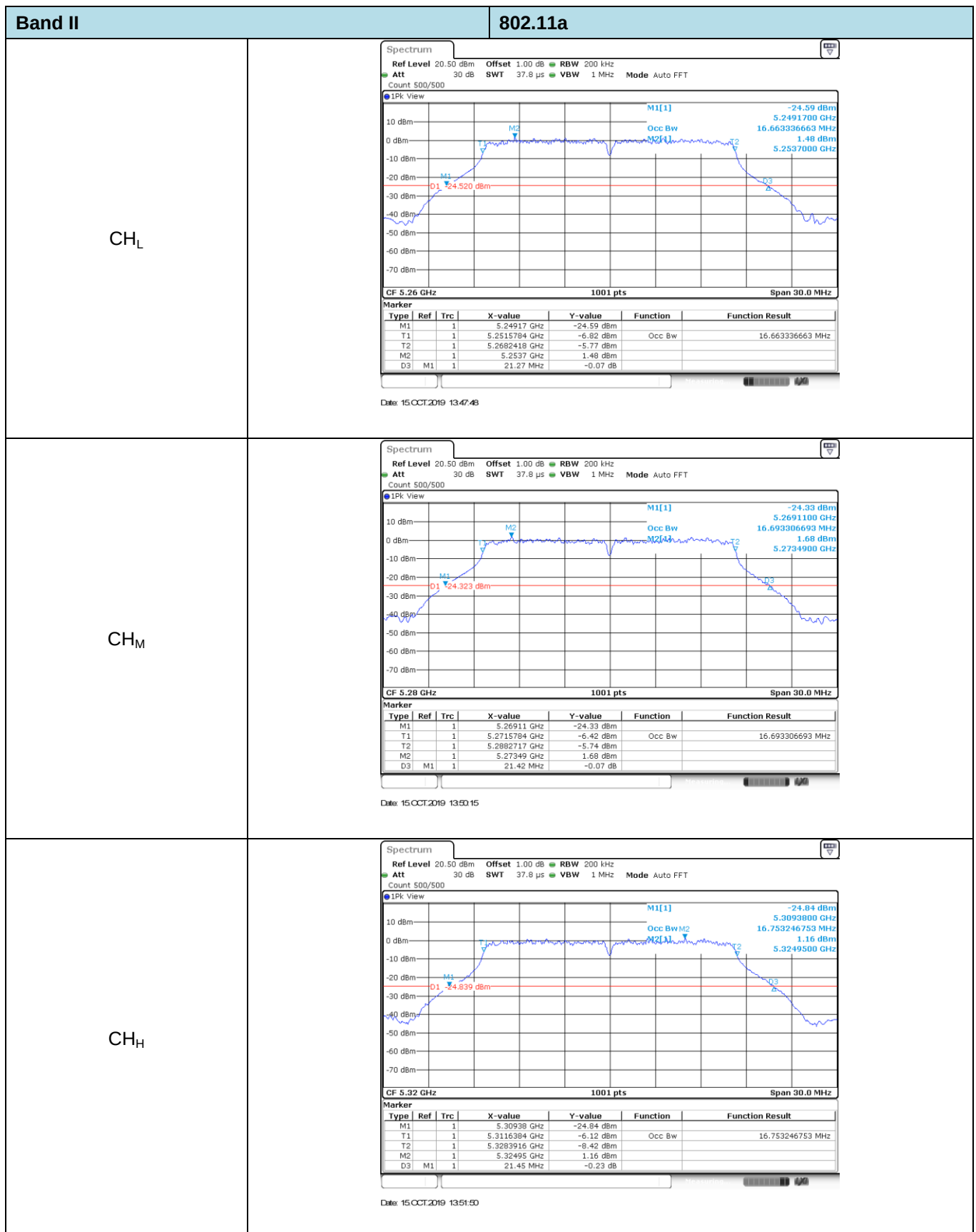


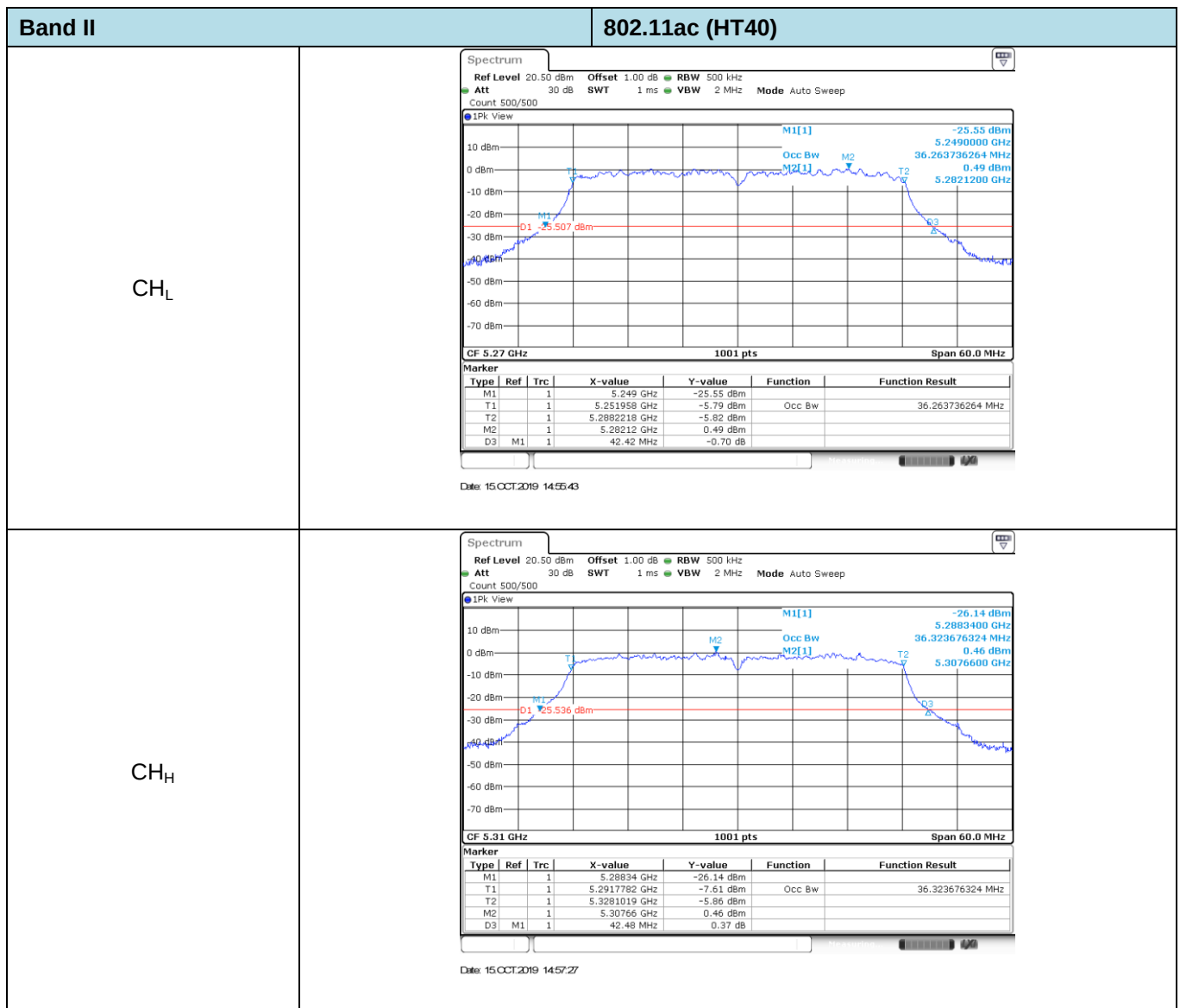






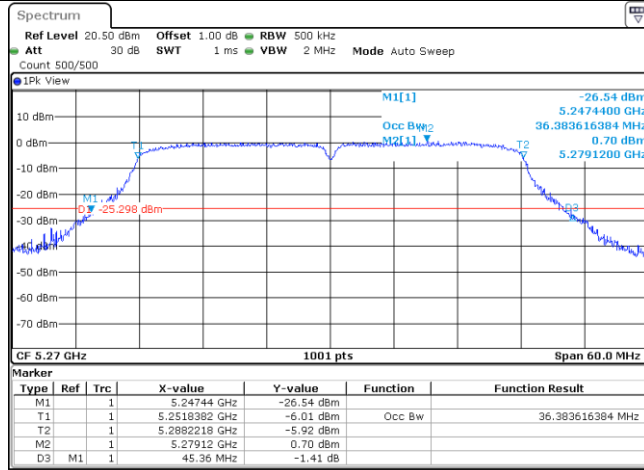
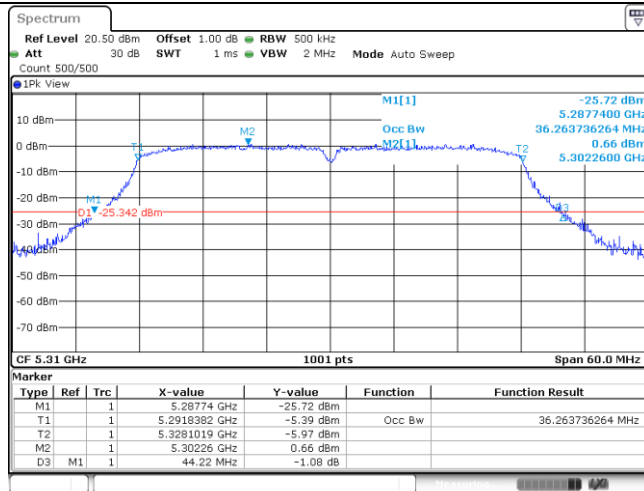






Band II

802.11n (HT40)

CH_LCH_H

Band II

802.11ac (HT80)

CH_M