



TEST REPORT

Report Reference No. : CHTEW19070099 Report verification: 

Project No. : SHT1904073004EW

FCC ID. : GVQS018

Applicant's name : Skyroam Technology Co., Ltd.

Address : BLK F, Room 710-717 Xihaimingzhu Building, Taoyuan, Guangdong

Manufacturer : Skyroam Technology Co., Ltd.

Address : BLK F, Room 710-717 Xihaimingzhu Building, Taoyuan, Guangdong

Test item description : SOLIS X

Trade Mark : SKYROAM

Model/Type reference : S018

Listed Model(s) : -

Standard : FCC CFR Title 47 Part 15 Subpart C Section 15.247

Date of receipt of test sample : Apr 29, 2019

Date of testing : Apr 30, 2019- Jul 18, 2019

Date of issue : Jul 19, 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	6
3.5.	Modifications	6
<u>4.</u>	<u>TEST ENVIRONMENT</u>	<u>7</u>
4.1.	Address of the test laboratory	7
4.2.	Test Facility	7
4.3.	Environmental conditions	8
4.4.	Statement of the measurement uncertainty	8
4.5.	Equipments Used during the Test	9
<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.	Conducted Peak Output Power	15
5.4.	Power Spectral Density	16
5.5.	6dB bandwidth	22
5.6.	Restricted band	28
5.7.	Band edge and Spurious Emissions (conducted)	33
5.8.	Spurious Emissions (radiated)	50
<u>6.</u>	<u>TEST SETUP PHOTOS</u>	<u>57</u>
<u>7.</u>	<u>EXTERANAL AND INTERNAL PHOTOS</u>	<u>58</u>

1. TEST STANDARDS AND REPORT VERSION

1.1. Test Standards

The tests were performed according to following standards:

[FCC Rules Part 15.247](#): Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.

[ANSI C63.10:2013](#): American National Standard for Testing Unlicensed Wireless Devices

[KDB 558074 D01 15.247 Meas Guidance v05](#): Guidance for Compliance Measurements on Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid System Devices Operating under Section 15.247 of The FCC Rules

1.2. Report version

Revision No.	Date of issue	Description
N/A	2019-07-19	Original

2. TEST DESCRIPTION

Test Item	FCC Rule	Result	Test Engineer
Antenna requirement	15.203/15.247(c)	PASS	Kang Yang
Line Conducted Emissions (AC Main)	15.207	PASS	Kang Yang
Conducted Peak Output Power	15.247(b)(3)	PASS	JiongSheng.Feng
Power Spectral Density	15.247(e)	PASS	JiongSheng.Feng
6dB Bandwidth	15.247(a)(2)	PASS	JiongSheng.Feng
Restricted band	15.247(d)/15.205	PASS	Tong Duan
Spurious Emissions	15.247(d)/15.209	PASS	Tong Duan

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

3. SUMMARY

3.1. Client Information

Applicant:	Skyroam Technology Co., Ltd.
Address:	BLK F, Room 710-717 Xihaimingzhu Building, Taoyuan, Guangdong
Manufacturer:	Skyroam Technology Co., Ltd.
Address:	BLK F, Room 710-717 Xihaimingzhu Building, Taoyuan, Guangdong

3.2. Product Description

Name of EUT:	SOLIS X
Trade Mark:	SKYROAM
Model No.:	S018
Listed Model(s):	-
Power supply:	DC 3.7V
Hardware version:	Y3919A-V1.1
Software version:	6.4.16
WIFI	
Supported type:	802.11b/802.11g/802.11n(HT20)/802.11n(HT40)
Modulation:	DSSS for 802.11b OFDM for 802.11g/802.11n(HT20)/802.11n(HT40)
Operation frequency:	2412MHz~2462MHz for 802.11b/802.11g/802.11n(HT20) 2422MHz~2452MHz for 802.11n(HT40)
Channel number:	11 for 802.11b/802.11g/802.11n(HT20) 7 for 802.11n(HT40)
Channel separation:	5MHz
Antenna type:	Integral permanent Antenna
Antenna gain:	1.2dBi

3.3. Operation state

➤ Test 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.

802.11b/g/n(HT20)		802.11n(HT40)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2412	01	-
02	2417	02	-
03	2422	03	2422
04	2427	04	2427
05	2432	05	2432
06	2437	06	2437
07	2442	07	2442
08	2447	08	2447
09	2452	09	2452
10	2457	10	-
11	2462	11	-

➤ 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

○	Adapter	Manufacturer:	Azumi S.A
		Model No.:	K5QL
○	/	Manufacturer:	/
		Model No.:	/

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

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)

- (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	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Shielded Room	Albatross projects	N/A	N/A	2018/09/28	2023/09/27
●	EMI Test Receiver	R&S	ESCI	101247	2018/10/27	2019/10/26
●	Artificial Mains	SCHWARZBECK	NNLK 8121	573	2018/10/27	2019/10/26
●	Pulse Limiter	R&S	ESH3-Z2	100499	2018/10/27	2019/10/26
●	RF Connection Cable	HUBER+SUHNER	EF400	N/A	2018/11/15	2019/11/14
●	Test Software	R&S	ES-K1	N/A	N/A	N/A
○	Single Balanced Telecom Pair ISN	FCC	FCC-TLISN-T2-02	20371	2018/10/28	2019/10/27
○	Two Balanced Telecom Pairs ISN	FCC	FCC-TLISN-T4-02	20373	2018/10/28	2019/10/27
○	Four Balanced Telecom Pairs ISN	FCC	FCC-TLISN-T8-02	20375	2018/10/28	2019/10/27
○	V-Network	R&S	ESH3-Z6	100211	2018/10/27	2019/10/26
○	V-Network	R&S	ESH3-Z6	100210	2018/10/27	2019/10/26
○	2-Line V-Network	R&S	ESH3-Z5	100049	2018/10/27	2019/10/26

● Radiated Emission-6th test site						
Used	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Semi-Anechoic Chamber	Albatross projects	SAC-3m-02	N/A	2018/09/30	2021/09/29
●	EMI Test Receiver	R&S	ESCI	100900	2018/10/28	2019/10/27
●	Loop Antenna	R&S	HFH2-Z2	100020	2017/11/20	2020/11/19
●	Ultra-Broadband Antenna	SCHWARZBECK	VULB9163	546	2017/04/05	2020/04/04
●	Pre-Amplifier	SCHWARZBECK	BBV 9742	N/A	2018/11/15	2019/11/14
●	RF Connection Cable	HUBER+SUHNER	N/A	N/A	2018/09/28	2019/09/27
●	RF Connection Cable	HUBER+SUHNER	SUCOFLEX104	501184/4	2018/09/28	2019/09/27
●	Test Software	R&S	ES-K1	N/A	N/A	N/A
●	Turntable	Maturo Germany	TT2.0-1T	N/A	N/A	N/A
●	Antenna Mast	Maturo Germany	CAM-4.0-P-12	N/A	N/A	N/A

● Radiated emission-7th test site						
Used	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Semi-Anechoic Chamber	Albatross projects	SAC-3m-01	N/A	2018/09/30	2021/09/29
●	Spectrum Analyzer	R&S	FSP40	100597	2018/10/27	2019/10/26
●	Horn Antenna	SCHWARZBECK	9120D	1011	2017/03/27	2020/03/26
●	Pre-amplifier	BONN	BLWA0160-2M	1811887	2018/11/14	2019/11/13
●	Pre-amplifier	CD	PAP-0102	12004	2018/11/14	2019/11/13
●	Broadband Pre-amplifier	SCHWARZBECK	BBV 9718	9718-248	2019/04/26	2020/04/25
●	RF Connection Cable	HUBER+SUHNER	RE-7-FH	N/A	2018/11/15	2019/11/14
●	RF Connection Cable	HUBER+SUHNER	RE-7-FL	N/A	2018/11/15	2019/11/14
●	Test Software	Audix	E3	N/A	N/A	N/A

●	Turntable	Maturo Germany	TT2.0-1T	N/A	N/A	N/A
●	Antenna Mast	Maturo Germany	CAM-4.0-P-12	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	2018/10/28	2019/10/27
●	Spectrum Analyzer	Agilent	N9020A	MY50510187	2018/09/29	2019/09/28
●	OSP	R&S	OSP120	101317	N/A	N/A
○	Radio communication tester	R&S	CMW500	137688-Lv	2018/09/29	2019/09/28
○	Test software	Tonscend	JS1120-1(LTE)	N/A	N/A	N/A
○	Test software	Tonscend	JS1120-2(WIFI)	N/A	N/A	N/A
○	Test software	Tonscend	JS1120-3(WCDMA)	N/A	N/A	N/A
○	Test software	Tonscend	JS1120-4(GSM)	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.

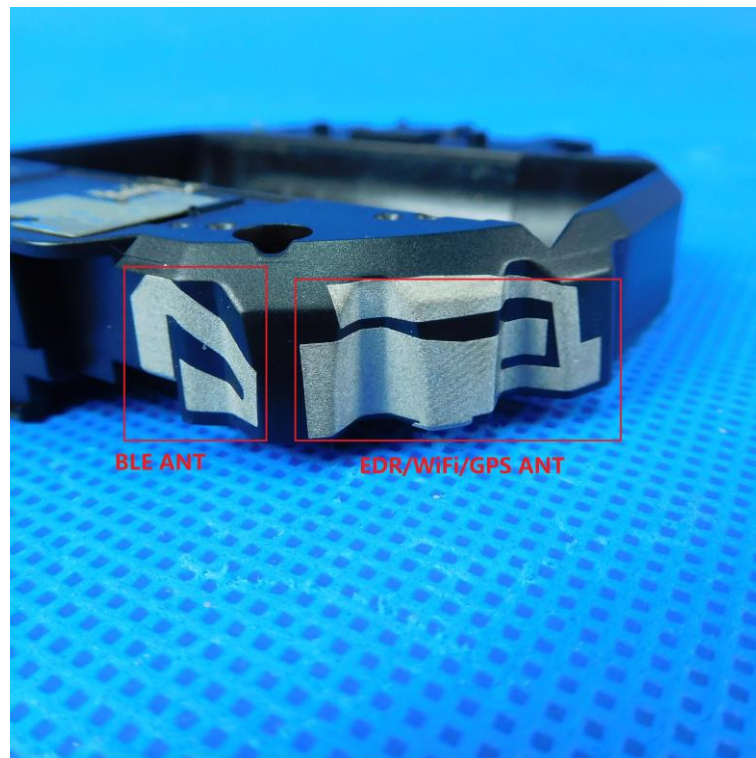
FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1)(i):

(i) Systems operating in the 2400~2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

TEST RESULTS

☒ **Passed** ☐ **Not Applicable**

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



5.2. Conducted Emissions (AC Main)

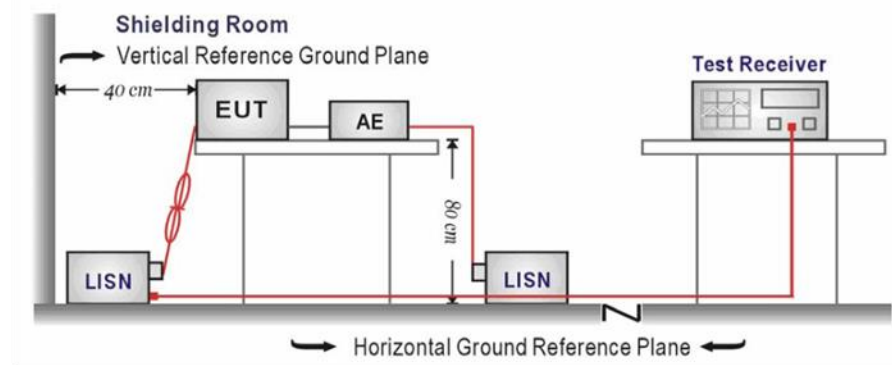
LIMIT

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

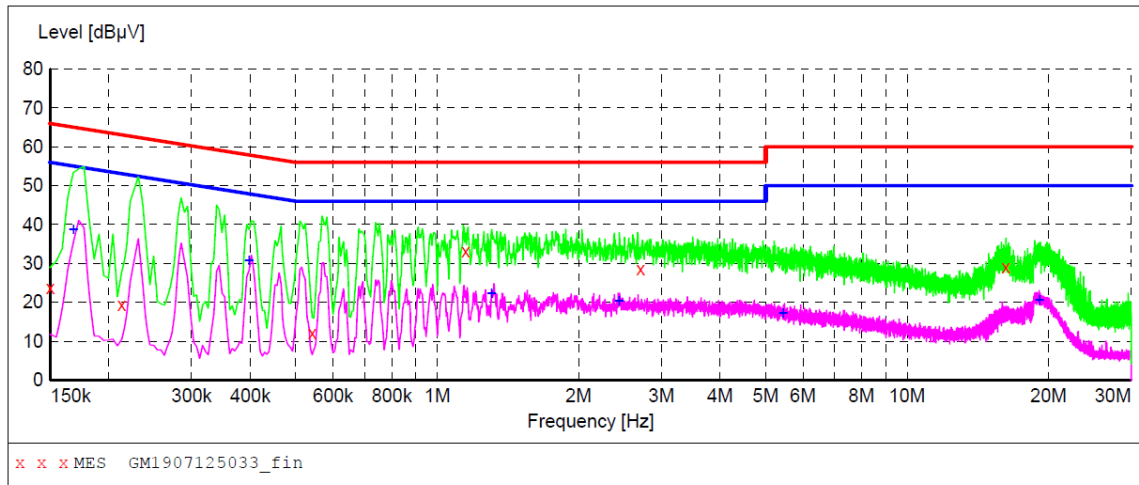
☒ Passed ☐ Not Applicable

Note:

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

Test Line:

L

**MEASUREMENT RESULT: "GM1907125033_fin"**

7/12/2019 2:02PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.150000	23.80	9.9	66	42.2	QP	L1	GND
0.213000	19.40	9.9	63	43.7	QP	L1	GND
0.541500	12.00	9.9	56	44.0	QP	L1	GND
1.149000	33.20	9.9	56	22.8	QP	L1	GND
2.710500	28.60	9.9	56	27.4	QP	L1	GND
16.224000	29.10	10.2	60	30.9	QP	L1	GND

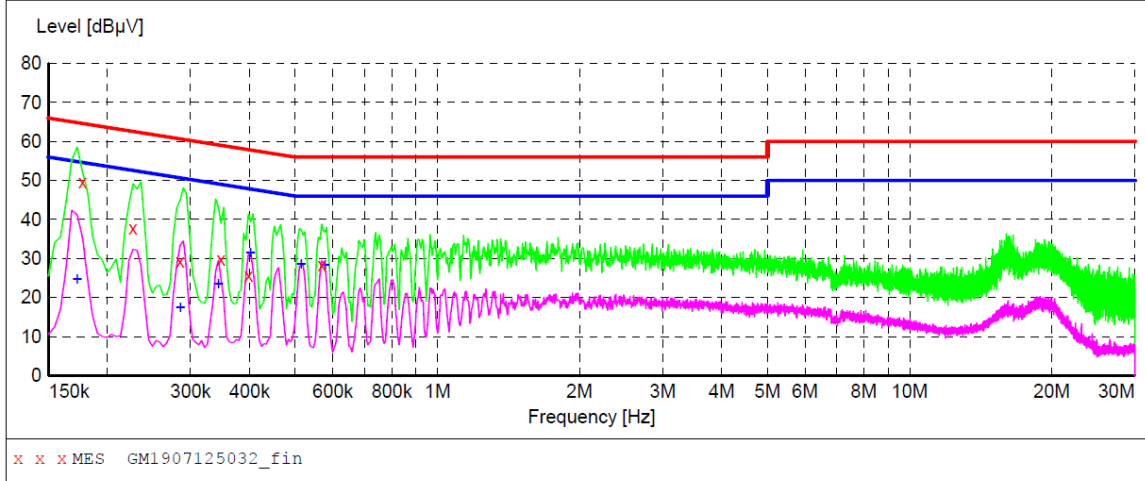
MEASUREMENT RESULT: "GM1907125033_fin2"

7/12/2019 2:02PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.168000	38.70	9.9	55	16.4	AV	L1	GND
0.397500	30.70	9.9	48	17.2	AV	L1	GND
1.306500	22.20	9.9	46	23.8	AV	L1	GND
2.436000	20.40	9.9	46	25.6	AV	L1	GND
5.442000	17.10	10.0	50	32.9	AV	L1	GND
19.122000	20.70	10.2	50	29.3	AV	L1	GND

Test Line:

N

**MEASUREMENT RESULT: "GM1907125032_fin"**

7/12/2019 2:00PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.177000	49.50	9.9	65	15.1	QP	N	GND
0.226500	37.80	9.9	63	24.8	QP	N	GND
0.285000	29.40	9.9	61	31.3	QP	N	GND
0.348000	29.80	9.9	59	29.2	QP	N	GND
0.397500	25.70	9.9	58	32.2	QP	N	GND
0.568500	28.40	9.9	56	27.6	QP	N	GND

MEASUREMENT RESULT: "GM1907125032_fin2"

7/12/2019 2:00PM

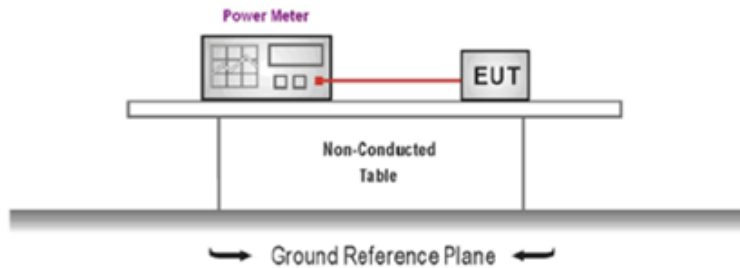
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.172500	24.80	9.9	55	30.0	AV	N	GND
0.285000	17.40	9.9	51	33.3	AV	N	GND
0.343500	23.40	9.9	49	25.7	AV	N	GND
0.402000	31.40	9.9	48	16.4	AV	N	GND
0.514500	28.60	9.9	46	17.4	AV	N	GND
0.577500	28.30	9.9	46	17.7	AV	N	GND

5.3. Conducted Peak Output Power

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (b)(3): 30dBm

TEST CONFIGURATION



TEST PROCEDURE

1. The EUT was tested according to ANSI C63.10: 2013 and KDB 558074 D01 for compliance to FCC 47 CFR 15.247 requirements.
2. The maximum peak conducted output power may be measured using a broadband peak RF power meter.
3. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector
4. Record the measurement data.

TEST MODE:

Please refer to the clause 3.3

TEST RESULTS

☒ Passed ☐ Not Applicable

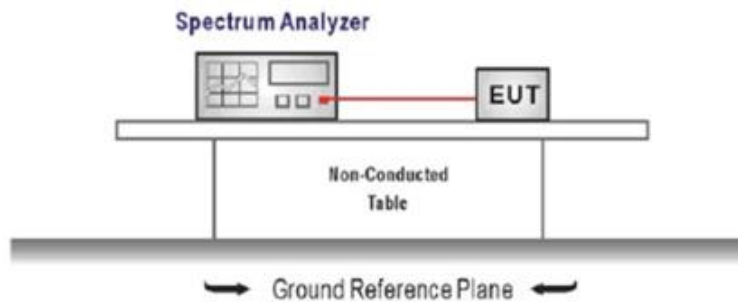
Type	Channel	Peak Output power (dBm)	Average Output power (dBm)	Limit (dBm)	Result
802.11b	01	12.79	10.35	≤30.00	Pass
	06	11.07	8.56		
	11	12.55	10.00		
802.11g	01	16.21	13.33	≤30.00	Pass
	06	14.92	11.94		
	11	15.75	12.51		
802.11n(HT20)	01	16.39	13.52	≤30.00	Pass
	06	15.02	11.98		
	11	15.57	12.36		
802.11n(HT40)	03	15.97	12.51	≤30.00	Pass
	06	15.36	12.28		
	09	15.71	12.56		

5.4. Power Spectral Density

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (e):For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

TEST CONFIGURATION



TEST PROCEDURE

1. Connect the antenna port(s) to the spectrum analyzer input,
2. Configure the spectrum analyzer as shown below:
Center frequency=DTS channel center frequency
Span =1.5 times the DTS bandwidth
 $RBW = 3 \text{ kHz} \leq RBW \leq 100 \text{ kHz}$, $VBW \geq 3 \times RBW$
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. Use the peak marker function to determine the maximum amplitude level within the RBW.
5. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

TEST MODE:

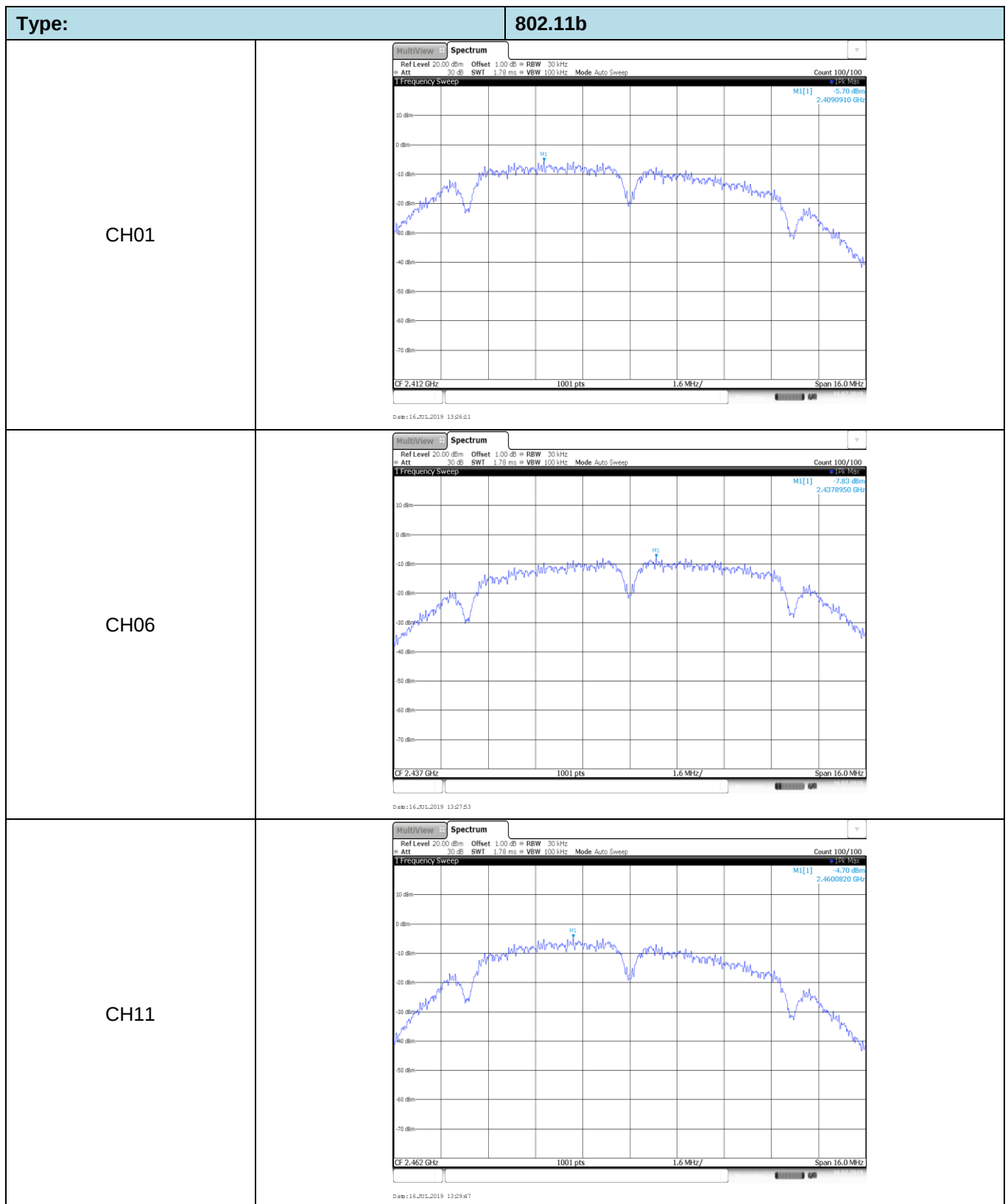
Please refer to the clause 3.3

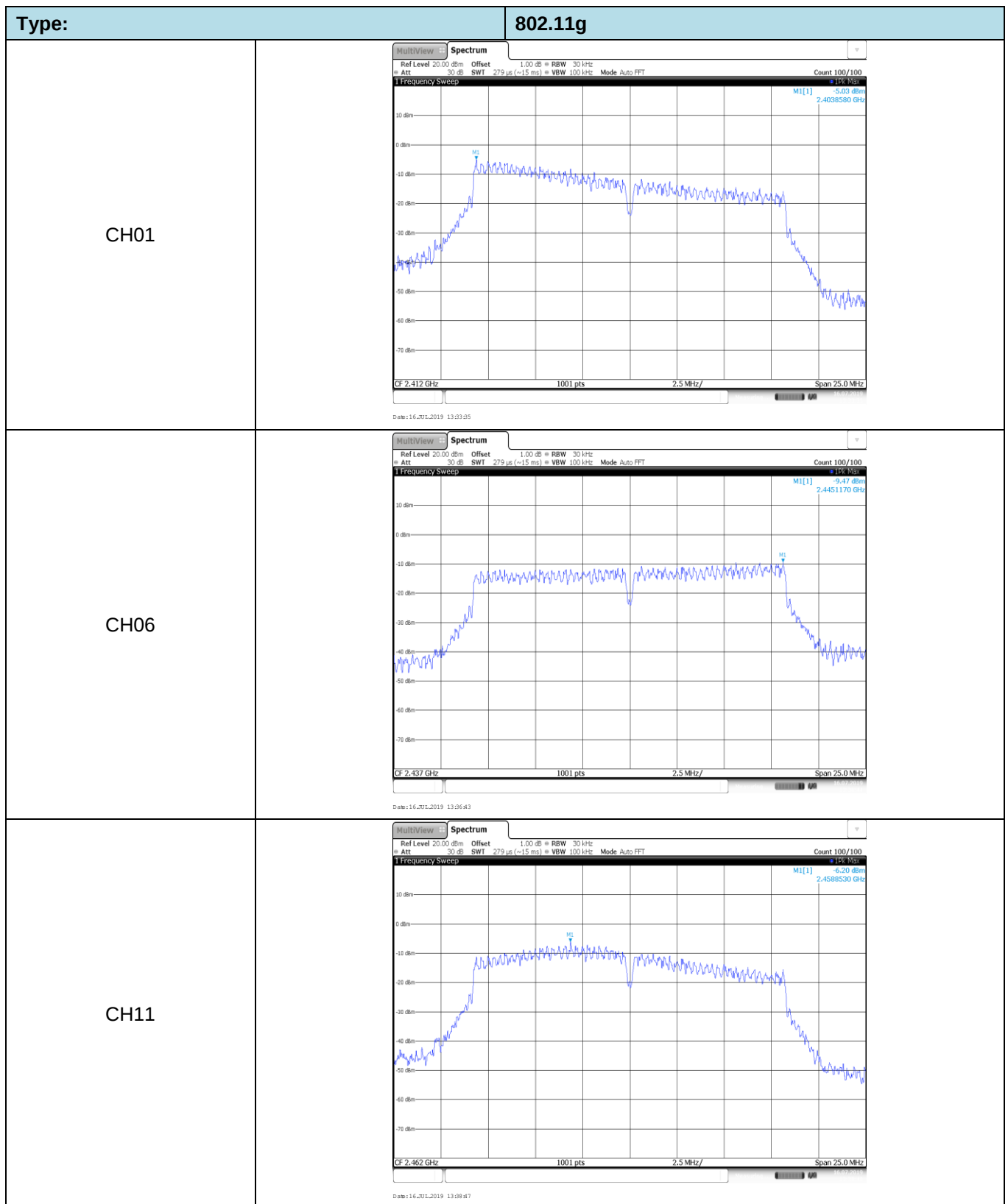
TEST RESULTS

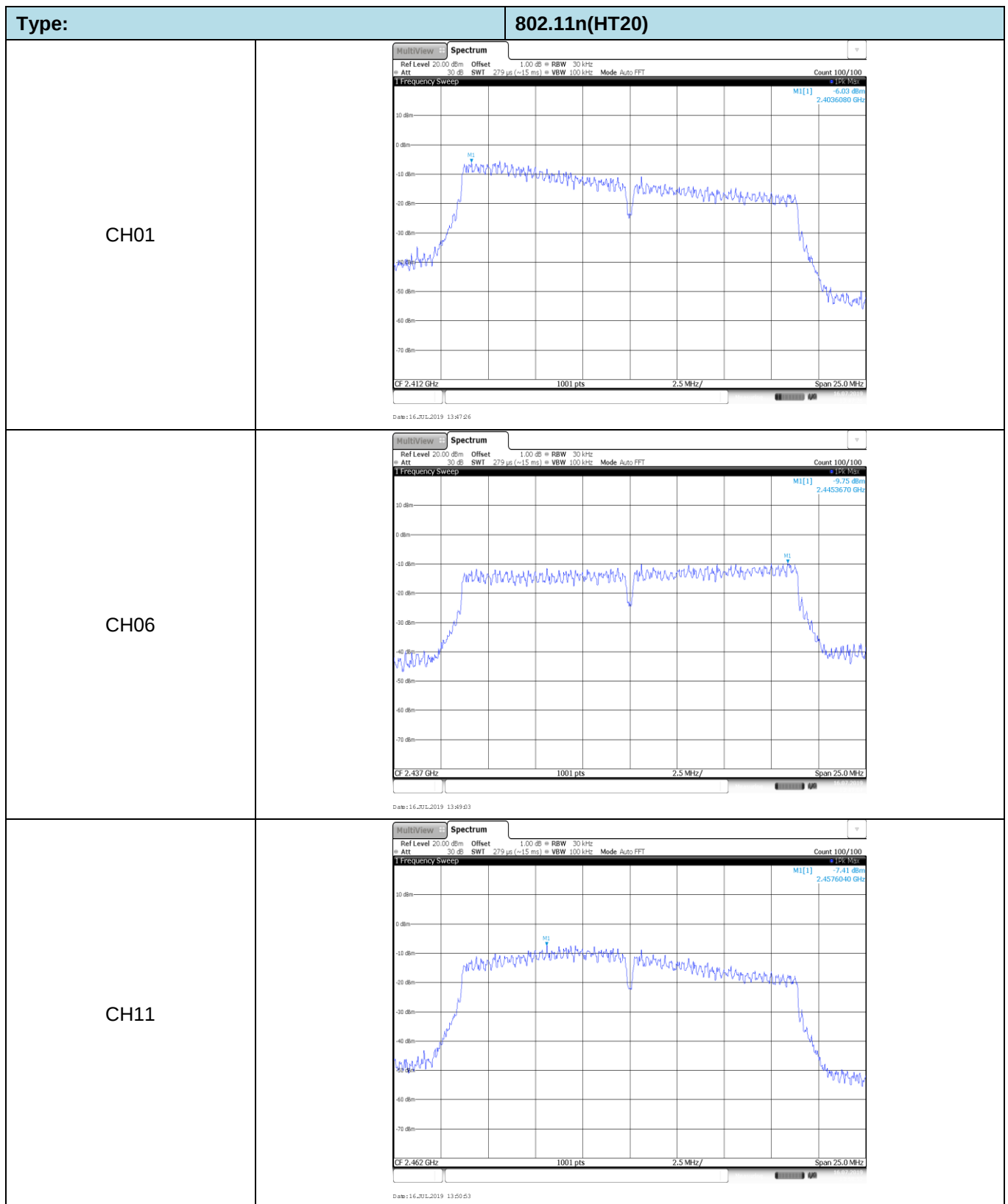
☒ Passed ☐ Not Applicable

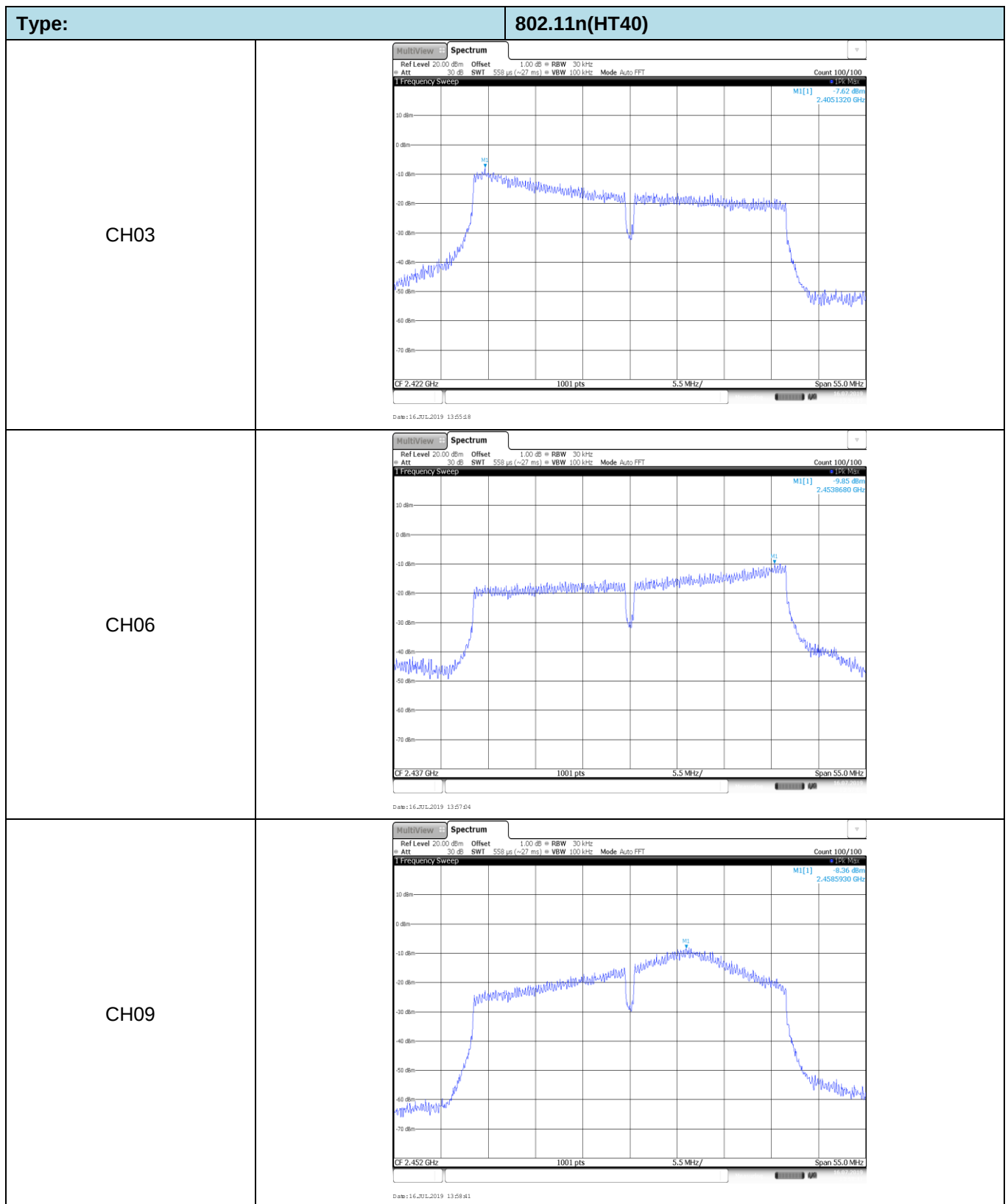
Type	Channel	Power Spectral Density (dBm/30KHz)	Limit (dBm/3KHz)	Result
802.11b	01	-5.70	≤8.00	Pass
	06	-7.83		
	11	-4.70		
802.11g	01	-5.03	≤8.00	Pass
	06	-9.47		
	11	-6.20		
802.11n(HT20)	01	-6.03	≤8.00	Pass
	06	-9.75		
	11	-7.41		
802.11n(HT40)	03	-7.62	≤8.00	Pass
	06	-9.85		
	09	-8.36		

Test plot as follows:









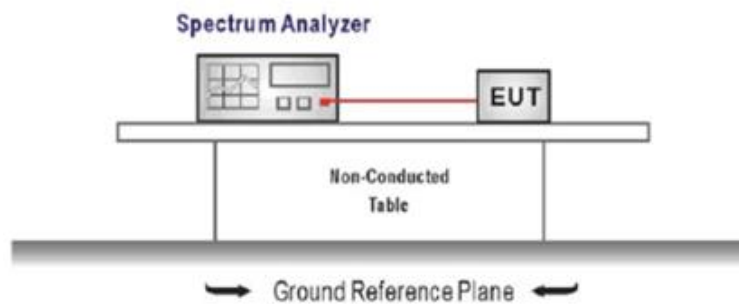
5.5. 6dB bandwidth

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(2):

For digital modulation systems, the minimum 6 dB bandwidth 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 = DTS channel center frequency
Span = 2 x DTS bandwidth
RBW = 100 kHz, VBW $\geq$ 3 x 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:

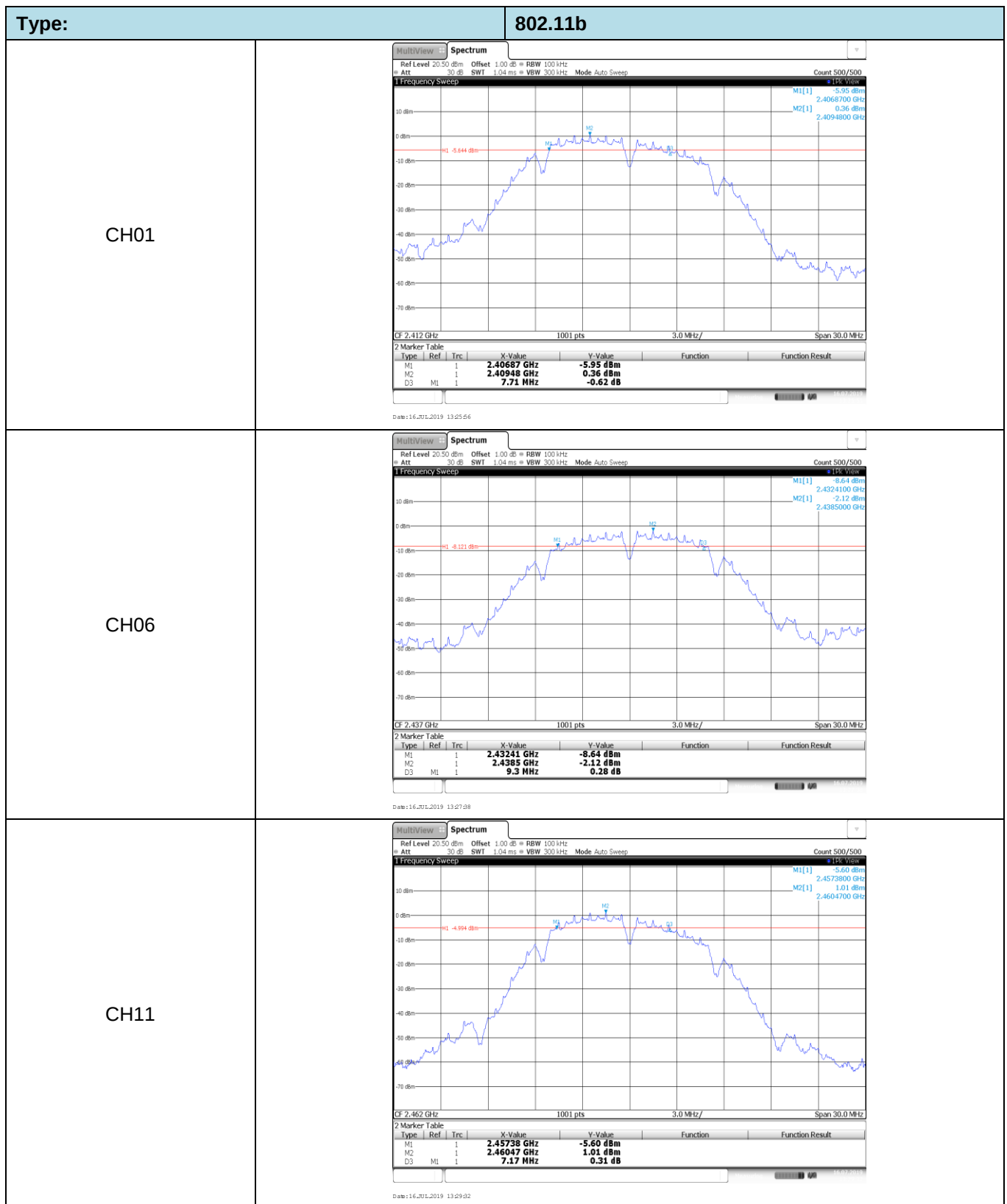
Please refer to the clause 3.3

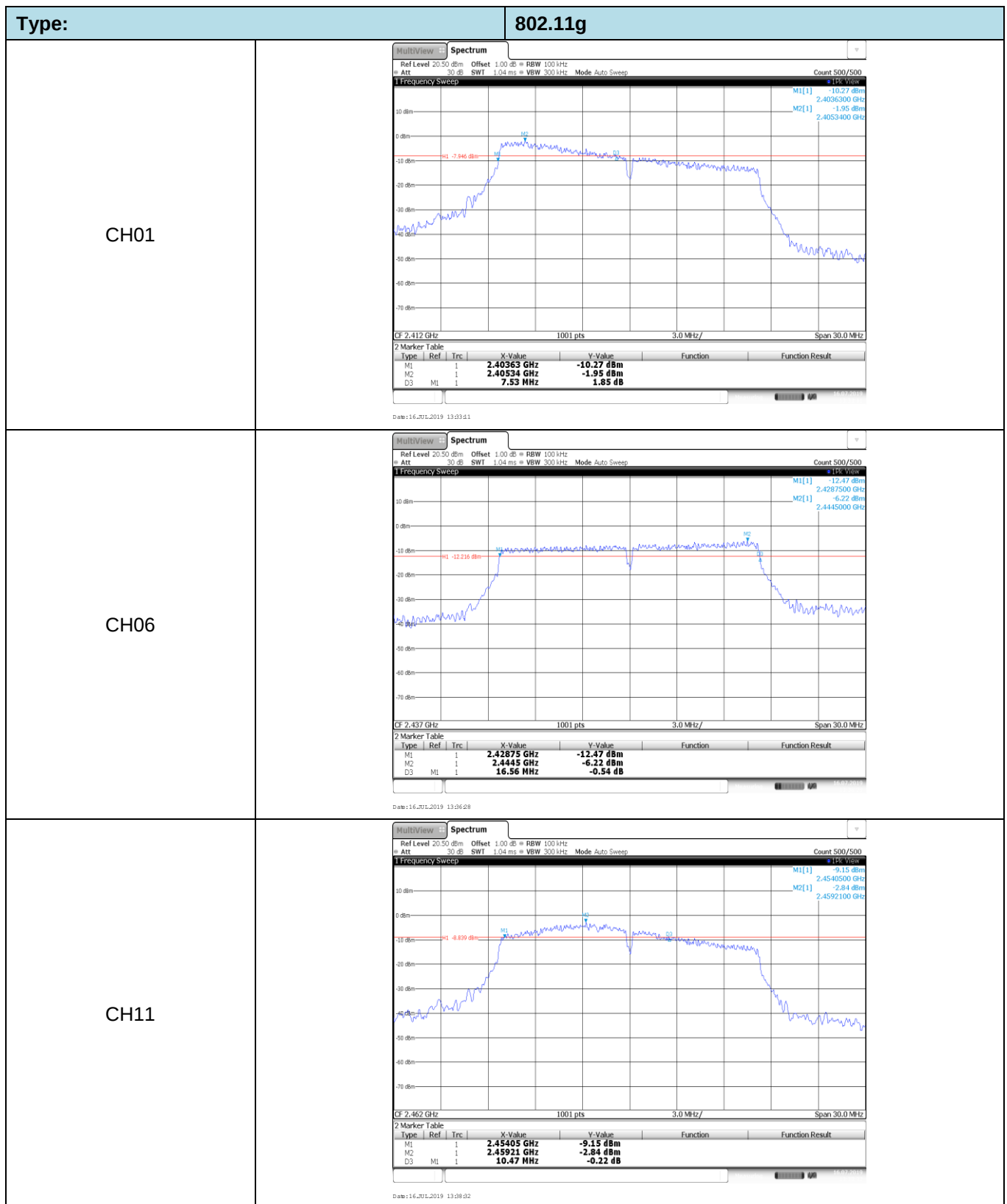
TEST RESULTS

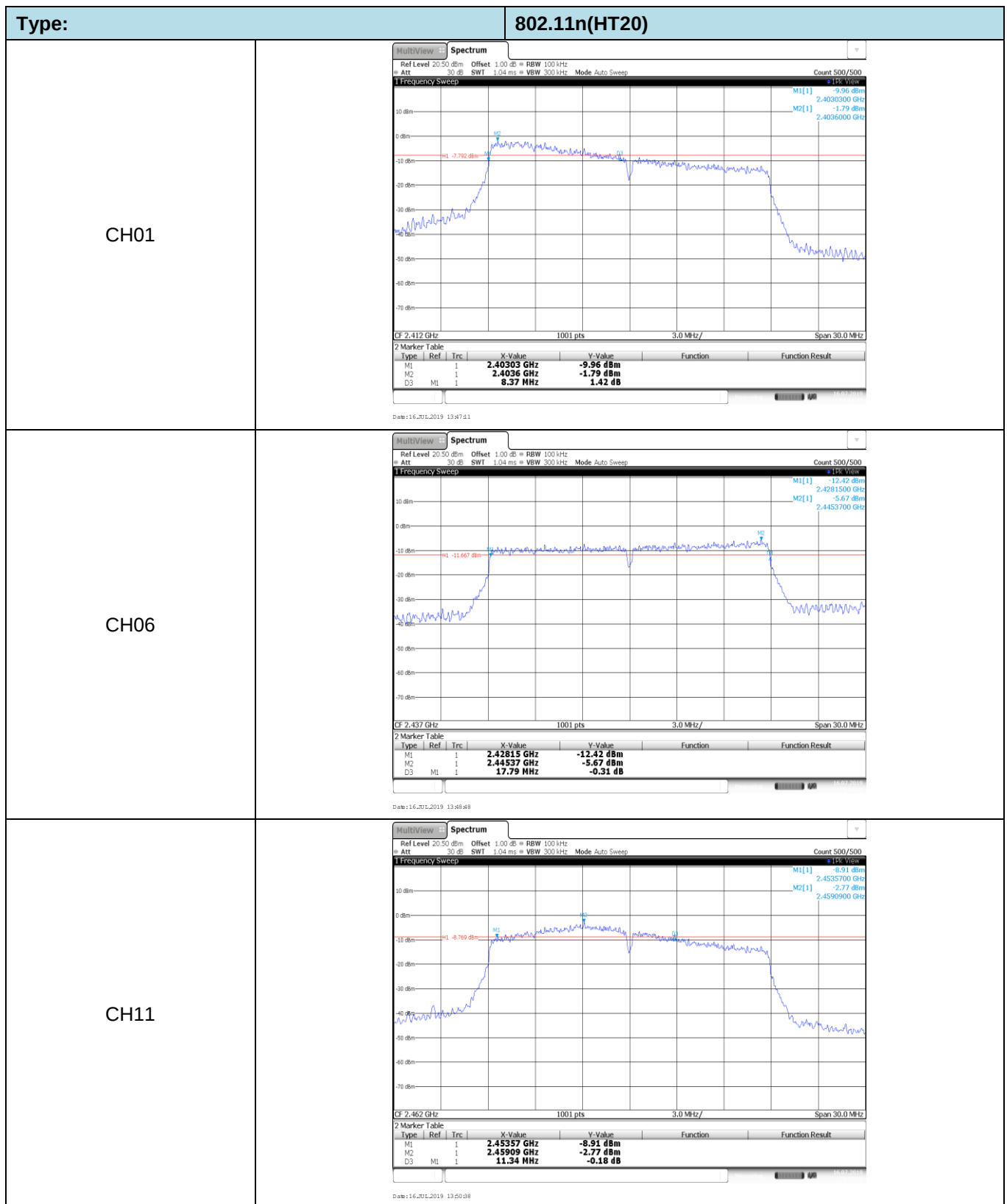
☒ Passed ☐ Not Applicable

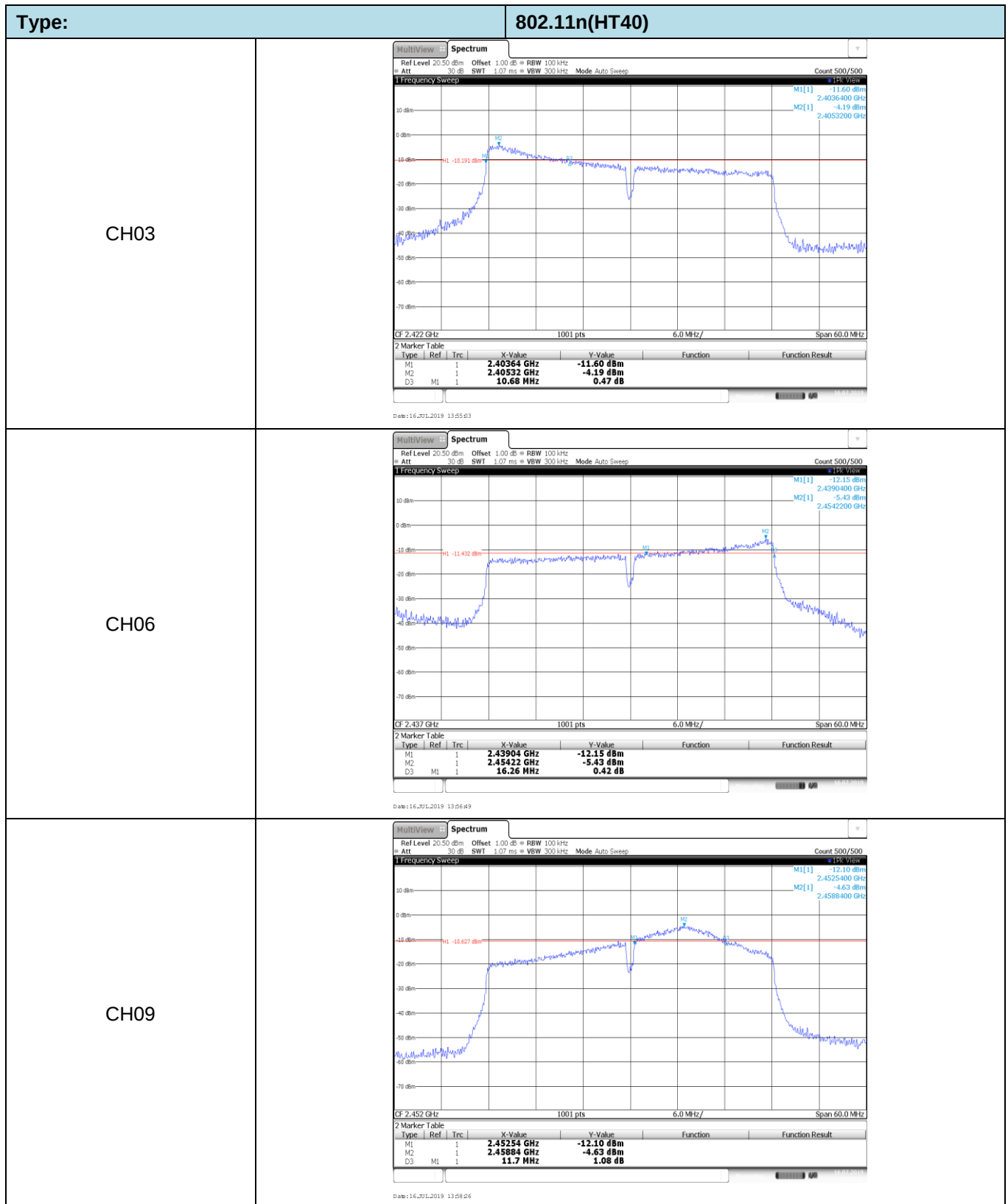
Type	Channel	6dB Bandwidth (MHz)	Limit (kHz)	Result
802.11b	01	7.71	≥500	Pass
	06	9.30		
	11	7.17		
802.11g	01	7.53	≥500	Pass
	06	16.56		
	11	10.47		
802.11n(HT20)	01	8.37	≥500	Pass
	06	17.79		
	11	11.34		
802.11n(HT40)	03	10.68	≥500	Pass
	06	16.26		
	09	11.70		

Test plot as follows:









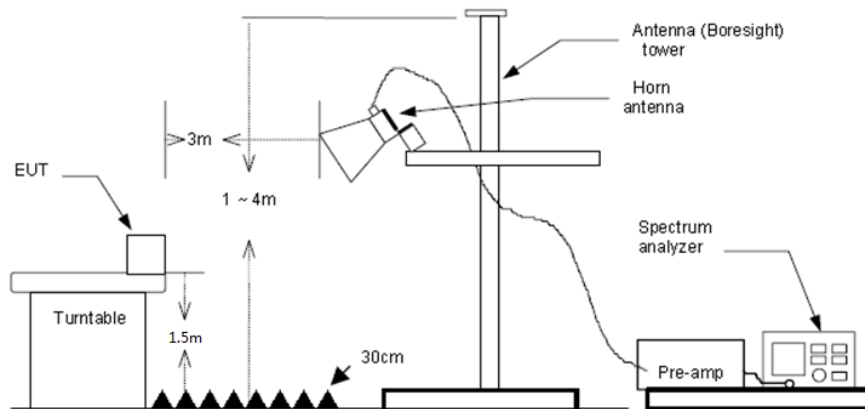
5.6. Restricted band

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (d):

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, Radiated Emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the Radiated Emissions limits specified in §15.209(a) (see §15.205(c)).

TEST CONFIGURATION



TEST PROCEDURE

- 1) The EUT was setup and tested according to ANSI C63.10:2013 for compliance to FCC 47CFR 15.247 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

Note:

- 1) Final level= Read level + Antenna Factor+ Cable Loss- Preamp Factor

802.11b			CH01				
Frequency (MHz)	Read Level (dBuV/m)	Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Polarization	Test value
2310.00	15.23	35.78	51.01	74.00	22.99	Vertical	Peak
2390.00	15.30	35.50	50.80	74.00	23.20	Vertical	Peak
2310.00	13.77	35.78	49.55	74.00	24.45	Horizontal	Peak
2390.00	14.52	35.50	50.02	74.00	23.98	Horizontal	Peak
2310.00	13.61	35.78	49.39	54.00	4.61	Vertical	Average
2390.00	15.04	35.50	50.54	54.00	3.46	Vertical	Average
2310.00	13.60	35.78	49.38	54.00	4.62	Horizontal	Average
2390.00	14.30	35.50	49.80	54.00	4.20	Horizontal	Average

802.11b			CH11				
Frequency (MHz)	Read Level (dBuV/m)	Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Polarization	Test value
2483.50	14.35	35.31	49.66	74.00	24.34	Vertical	Peak
2500.00	18.32	35.28	53.60	74.00	20.40	Vertical	Peak
2483.50	16.25	35.31	51.56	74.00	22.44	Horizontal	Peak
2500.00	14.50	35.28	49.78	74.00	24.22	Horizontal	Peak
2483.50	13.55	35.31	48.86	54.00	5.14	Vertical	Average
2500.00	15.66	35.28	50.94	54.00	3.06	Vertical	Average
2483.50	14.37	35.31	49.68	54.00	4.32	Horizontal	Average
2500.00	13.06	35.28	48.34	54.00	5.66	Horizontal	Average

802.11g			CH01				
Frequency (MHz)	Read Level (dBuV/m)	Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Polarization	Test value
2310.00	16.27	35.78	52.05	74.00	21.95	Vertical	Peak
2390.00	16.15	35.50	51.65	74.00	22.35	Vertical	Peak
2310.00	15.95	35.78	51.73	74.00	22.27	Horizontal	Peak
2390.00	14.95	35.50	50.45	74.00	23.55	Horizontal	Peak
2310.00	15.09	35.78	50.87	54.00	3.13	Vertical	Average
2390.00	15.98	35.50	51.48	54.00	2.52	Vertical	Average
2310.00	15.22	35.78	51.00	54.00	3.00	Horizontal	Average
2390.00	14.41	35.50	49.91	54.00	4.09	Horizontal	Average

802.11g			CH11				
Frequency (MHz)	Read Level (dBuV/m)	Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Polarization	Test value
2483.50	14.15	35.31	49.46	74.00	24.54	Vertical	Peak
2500.00	14.99	35.28	50.27	74.00	23.73	Vertical	Peak
2483.50	14.31	35.31	49.62	74.00	24.38	Horizontal	Peak
2500.00	13.24	35.28	48.52	74.00	25.48	Horizontal	Peak
2483.50	13.49	35.31	48.80	54.00	5.20	Vertical	Average
2500.00	13.67	35.28	48.95	54.00	5.05	Vertical	Average
2483.50	15.75	35.31	51.06	54.00	2.94	Horizontal	Average
2500.00	11.66	35.28	46.94	54.00	7.06	Horizontal	Average

802.11n(HT20)			CH01				
Frequency (MHz)	Read Level (dBuV)	Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Polarization	Test value
2310.00	15.18	35.78	50.96	74.00	23.04	Vertical	Peak
2390.00	16.61	35.50	52.11	74.00	21.89	Vertical	Peak
2310.00	14.11	35.78	49.89	74.00	24.11	Horizontal	Peak
2390.00	15.66	35.50	51.16	74.00	22.84	Horizontal	Peak
2310.00	14.77	35.78	50.55	54.00	3.45	Vertical	Average
2390.00	14.40	35.50	49.90	54.00	4.10	Vertical	Average
2310.00	13.87	35.78	49.65	54.00	4.35	Horizontal	Average
2390.00	14.97	35.50	50.47	54.00	3.53	Horizontal	Average

802.11n(HT20)			CH11				
Frequency (MHz)	Read Level (dBuV)	Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Polarization	Test value
2483.50	17.35	35.31	52.66	74.00	21.34	Vertical	Peak
2500.00	14.87	35.28	50.15	74.00	23.85	Vertical	Peak
2483.50	16.96	35.31	52.27	74.00	21.73	Horizontal	Peak
2500.00	15.22	35.28	50.50	74.00	23.50	Horizontal	Peak
2483.50	14.35	35.31	49.66	54.00	4.34	Vertical	Average
2500.00	12.42	35.28	47.70	54.00	6.30	Vertical	Average
2483.50	15.39	35.31	50.70	54.00	3.30	Horizontal	Average
2500.00	13.83	35.28	49.11	54.00	4.89	Horizontal	Average

802.11n(HT40)			CH01				
Frequency (MHz)	Read Level (dBuV)	Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Polarization	Test value
2310.00	15.35	35.78	51.13	74.00	22.87	Vertical	Peak
2390.00	17.71	35.50	53.21	74.00	20.79	Vertical	Peak
2310.00	16.69	35.78	52.47	74.00	21.53	Horizontal	Peak
2390.00	14.76	35.50	50.26	74.00	23.74	Horizontal	Peak
2310.00	14.52	35.78	50.30	54.00	3.70	Vertical	Average
2390.00	15.97	35.50	51.47	54.00	2.53	Vertical	Average
2310.00	15.29	35.78	51.07	54.00	2.93	Horizontal	Average
2390.00	11.31	35.50	46.81	54.00	7.19	Horizontal	Average

802.11n(HT40)			CH11				
Frequency (MHz)	Read Level (dBuV)	Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Polarization	Test value
2483.50	17.59	35.31	52.90	74.00	21.10	Vertical	Peak
2500.00	16.12	35.28	51.40	74.00	22.60	Vertical	Peak
2483.50	15.60	35.31	50.91	74.00	23.09	Horizontal	Peak
2500.00	16.29	35.28	51.57	74.00	22.43	Horizontal	Peak
2483.50	15.88	35.31	51.19	54.00	2.81	Vertical	Average
2500.00	14.51	35.28	49.79	54.00	4.21	Vertical	Average
2483.50	14.92	35.31	50.23	54.00	3.77	Horizontal	Average
2500.00	15.36	35.28	50.64	54.00	3.36	Horizontal	Average

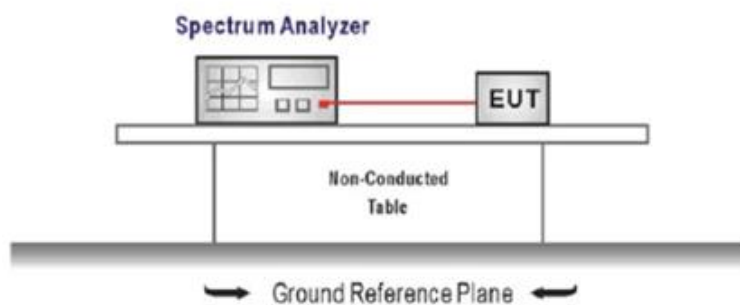
5.7. Band edge and Spurious Emissions (conducted)

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (d):

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

TEST CONFIGURATION



TEST PROCEDURE

1. Connect the antenna port(s) to the spectrum analyzer input.
2. Establish a reference level by using the following procedure
Center frequency=DTS channel center frequency
The span = 1.5 times the DTS bandwidth.
RBW = 100 kHz, VBW $\geq 3 \times$ RBW
Detector = peak, Sweep time = auto couple, Trace mode = max hold
Allow trace to fully stabilize
Use the peak marker function to determine the maximum PSD level

Note: the channel found to contain the maximum PSD level can be used to establish the reference level.
3. Emission level measurement
Set the center frequency and span to encompass frequency range to be measured
RBW = 100 kHz, VBW $\geq 3 \times$ RBW
Detector = peak, Sweep time = auto couple, Trace mode = max hold
Allow trace to fully stabilize
Use the peak marker function to determine the maximum amplitude level.
4. Place the radio in continuous transmit mode, allow the trace to stabilize, view the transmitter waveform on the spectrum analyzer.
5. Ensure that the amplitude of all unwanted emission outside of the authorized frequency band excluding restricted frequency bands) are attenuated by at least the minimum requirements specified (at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz). Report the three highest emission relative to the limit.

TEST MODE:

Please refer to the clause 3.3

TEST RESULTS

☒ Passed ☐ Not Applicable

Test Item:

Bandedge

Type:

802.11b

CH01

MultiView Spectrum

Ref Level 20.00 dBm Offset 1.00 dB BW 100 kHz
Att 30 dB SWI 1.12 ms VBW 300 kHz Mode Auto Sweep Count 300/300

1 Frequency Sweep

2.31 GHz 1001 pts 11.2 MHz/ 2.422 GHz

2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1	1		2.40941 GHz	-0.04 dBm		
M2	1		2.4 GHz	-43.77 dBm		
M3	1		2.39 GHz	-63.73 dBm		
M4	1		2.31 GHz	-64.23 dBm		
M5	1		2.399488 GHz	-42.09 dBm		

Date:16_JUL_2019 13:26:22

CH11

MultiView Spectrum

Ref Level 20.00 dBm Offset 1.00 dB BW 100 kHz
Att 30 dB SWI 1.03 ms VBW 300 kHz Mode Auto Sweep Count 300/300

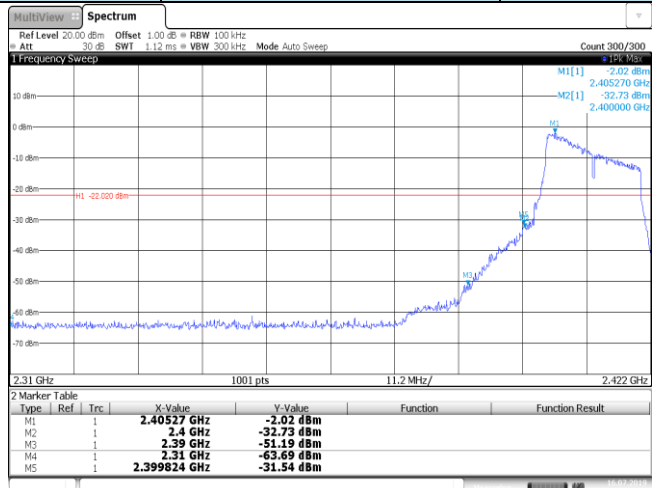
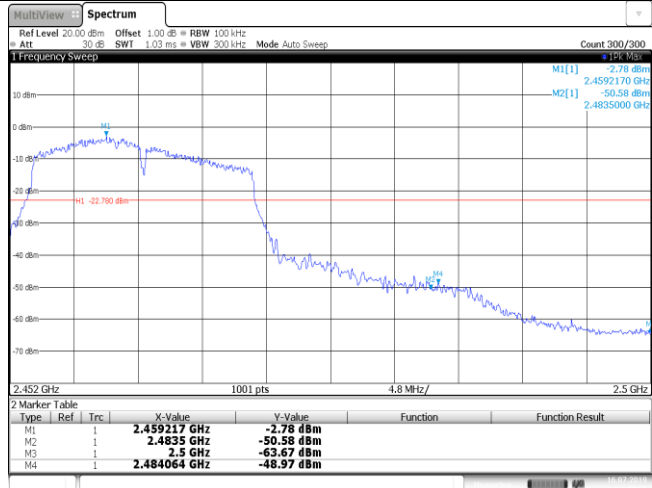
1 Frequency Sweep

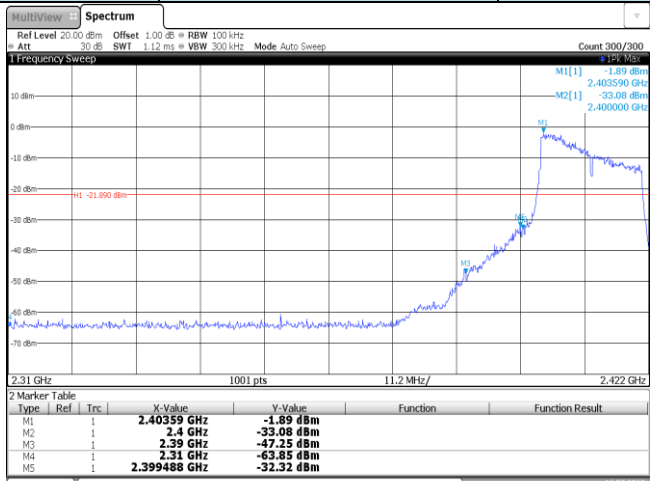
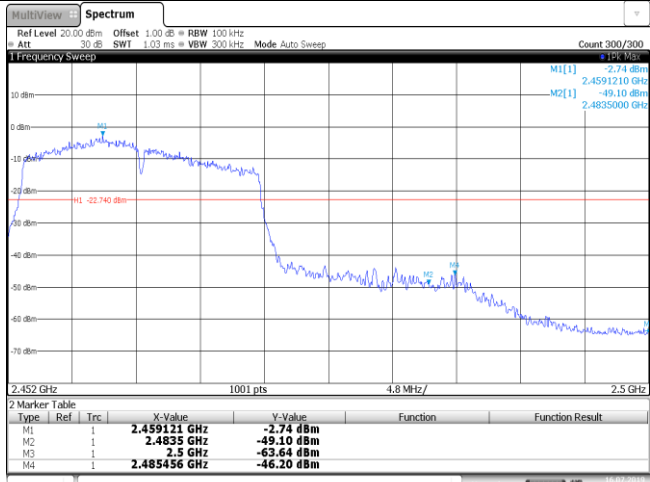
2.452 GHz 1001 pts 4.8 MHz/ 2.5 GHz

2 Marker Table

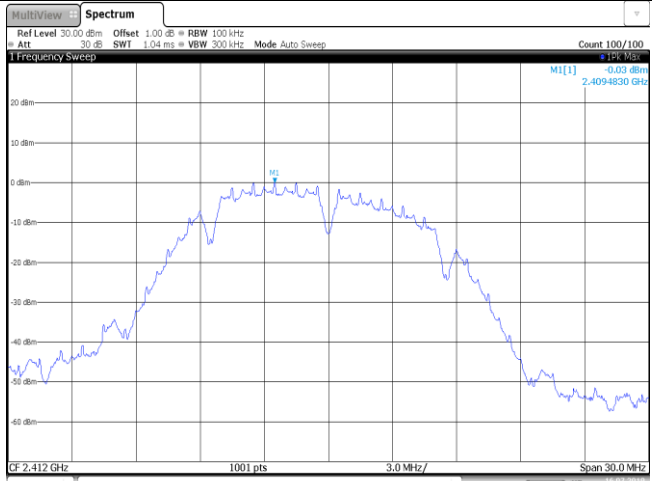
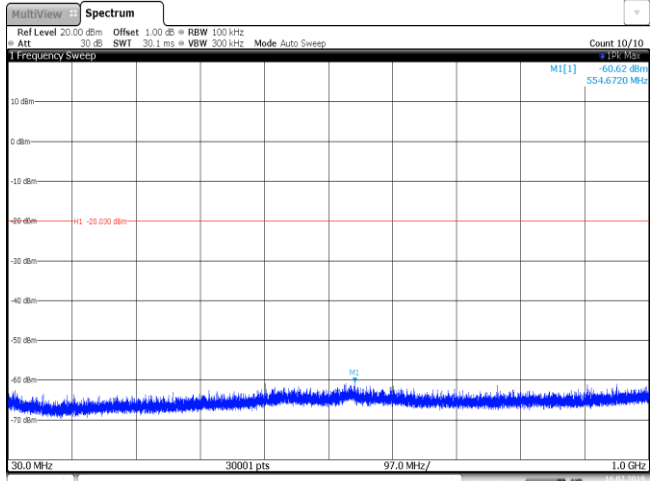
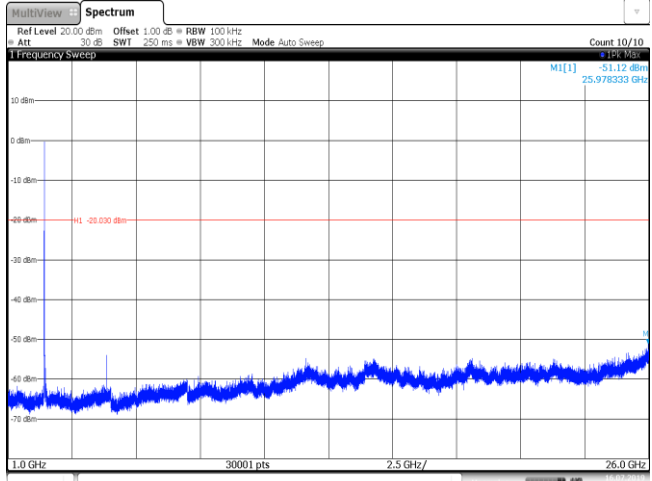
Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1	1		2.460464 GHz	0.98 dBm		
M2	1		2.4835 GHz	-62.71 dBm		
M3	1		2.5 GHz	-64.53 dBm		
M4	1		2.486032 GHz	-59.76 dBm		

Date:16_JUL_2019 13:29:58

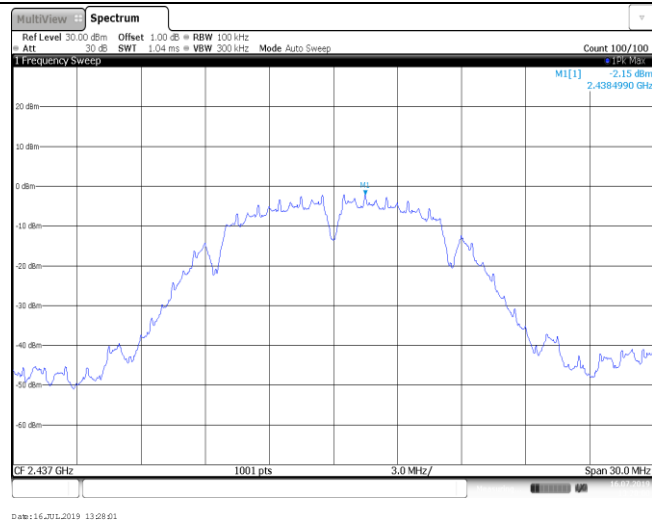
Test Item:	Bandedge	Type:	802.11g																																										
CH01	MultViewSpectrum Ref Level 20.00 dBm Offset 1.00 dB BW 100 kHz Att 30 dB SW 1.12 ms VBW 300 kHz Mode Auto Sweep Count 300/300 Frequency Sweep  <table><thead><tr><th>Type</th><th>Ref</th><th>Trc</th><th>X-Value</th><th>Y-Value</th><th>Function</th><th>Function Result</th></tr></thead><tbody><tr><td>M1</td><td>1</td><td></td><td>2.40527 GHz</td><td>-2.02 dBm</td><td></td><td></td></tr><tr><td>M2</td><td>1</td><td></td><td>2.4 GHz</td><td>-32.73 dBm</td><td></td><td></td></tr><tr><td>M3</td><td>1</td><td></td><td>2.39 GHz</td><td>-51.19 dBm</td><td></td><td></td></tr><tr><td>M4</td><td>1</td><td></td><td>2.31 GHz</td><td>-63.69 dBm</td><td></td><td></td></tr><tr><td>M5</td><td>1</td><td></td><td>2.399824 GHz</td><td>-31.54 dBm</td><td></td><td></td></tr></tbody></table> Date: 16-Jul-2019 13:33:46			Type	Ref	Trc	X-Value	Y-Value	Function	Function Result	M1	1		2.40527 GHz	-2.02 dBm			M2	1		2.4 GHz	-32.73 dBm			M3	1		2.39 GHz	-51.19 dBm			M4	1		2.31 GHz	-63.69 dBm			M5	1		2.399824 GHz	-31.54 dBm		
Type	Ref	Trc	X-Value	Y-Value	Function	Function Result																																							
M1	1		2.40527 GHz	-2.02 dBm																																									
M2	1		2.4 GHz	-32.73 dBm																																									
M3	1		2.39 GHz	-51.19 dBm																																									
M4	1		2.31 GHz	-63.69 dBm																																									
M5	1		2.399824 GHz	-31.54 dBm																																									
CH11	MultViewSpectrum Ref Level 20.00 dBm Offset 1.00 dB BW 100 kHz Att 30 dB SW 1.03 ms VBW 300 kHz Mode Auto Sweep Count 300/300 Frequency Sweep  <table><thead><tr><th>Type</th><th>Ref</th><th>Trc</th><th>X-Value</th><th>Y-Value</th><th>Function</th><th>Function Result</th></tr></thead><tbody><tr><td>M1</td><td>1</td><td></td><td>2.459217 GHz</td><td>-2.78 dBm</td><td></td><td></td></tr><tr><td>M2</td><td>1</td><td></td><td>2.4835 GHz</td><td>-50.58 dBm</td><td></td><td></td></tr><tr><td>M3</td><td>1</td><td></td><td>2.5 GHz</td><td>-63.67 dBm</td><td></td><td></td></tr><tr><td>M4</td><td>1</td><td></td><td>2.484064 GHz</td><td>-48.97 dBm</td><td></td><td></td></tr></tbody></table> Date: 16-Jul-2019 13:38:58			Type	Ref	Trc	X-Value	Y-Value	Function	Function Result	M1	1		2.459217 GHz	-2.78 dBm			M2	1		2.4835 GHz	-50.58 dBm			M3	1		2.5 GHz	-63.67 dBm			M4	1		2.484064 GHz	-48.97 dBm									
Type	Ref	Trc	X-Value	Y-Value	Function	Function Result																																							
M1	1		2.459217 GHz	-2.78 dBm																																									
M2	1		2.4835 GHz	-50.58 dBm																																									
M3	1		2.5 GHz	-63.67 dBm																																									
M4	1		2.484064 GHz	-48.97 dBm																																									

Test Item:	Bandedge	Type:	802.11n(HT20)																																										
CH01	MultViewSpectrum Ref Level 20.00 dBm Offset 1.00 dB BW 100 kHz Att 30 dB SW 1.12 ms VBW 300 kHz Mode Auto Sweep Count 300/300 1 Frequency Sweep  2 Marker Table <table><thead><tr><th>Type</th><th>Ref</th><th>Trc</th><th>X-Value</th><th>Y-Value</th><th>Function</th><th>Function Result</th></tr></thead><tbody><tr><td>M1</td><td>1</td><td></td><td>2.40359 GHz</td><td>-1.89 dBm</td><td></td><td></td></tr><tr><td>M2</td><td>1</td><td></td><td>2.4 GHz</td><td>-33.08 dBm</td><td></td><td></td></tr><tr><td>M3</td><td>1</td><td></td><td>2.39 GHz</td><td>-47.25 dBm</td><td></td><td></td></tr><tr><td>M4</td><td>1</td><td></td><td>2.31 GHz</td><td>-63.85 dBm</td><td></td><td></td></tr><tr><td>M5</td><td>1</td><td></td><td>2.399488 GHz</td><td>-32.32 dBm</td><td></td><td></td></tr></tbody></table> Date: 16 Jul 2019 14:27:32			Type	Ref	Trc	X-Value	Y-Value	Function	Function Result	M1	1		2.40359 GHz	-1.89 dBm			M2	1		2.4 GHz	-33.08 dBm			M3	1		2.39 GHz	-47.25 dBm			M4	1		2.31 GHz	-63.85 dBm			M5	1		2.399488 GHz	-32.32 dBm		
Type	Ref	Trc	X-Value	Y-Value	Function	Function Result																																							
M1	1		2.40359 GHz	-1.89 dBm																																									
M2	1		2.4 GHz	-33.08 dBm																																									
M3	1		2.39 GHz	-47.25 dBm																																									
M4	1		2.31 GHz	-63.85 dBm																																									
M5	1		2.399488 GHz	-32.32 dBm																																									
CH11	MultViewSpectrum Ref Level 20.00 dBm Offset 1.00 dB BW 100 kHz Att 30 dB SW 1.03 ms VBW 300 kHz Mode Auto Sweep Count 300/300 1 Frequency Sweep  2 Marker Table <table><thead><tr><th>Type</th><th>Ref</th><th>Trc</th><th>X-Value</th><th>Y-Value</th><th>Function</th><th>Function Result</th></tr></thead><tbody><tr><td>M1</td><td>1</td><td></td><td>2.459121 GHz</td><td>-2.74 dBm</td><td></td><td></td></tr><tr><td>M2</td><td>1</td><td></td><td>2.4835 GHz</td><td>-49.10 dBm</td><td></td><td></td></tr><tr><td>M3</td><td>1</td><td></td><td>2.5 GHz</td><td>-63.64 dBm</td><td></td><td></td></tr><tr><td>M4</td><td>1</td><td></td><td>2.485456 GHz</td><td>-46.20 dBm</td><td></td><td></td></tr></tbody></table> Date: 16 Jul 2019 13:51:04			Type	Ref	Trc	X-Value	Y-Value	Function	Function Result	M1	1		2.459121 GHz	-2.74 dBm			M2	1		2.4835 GHz	-49.10 dBm			M3	1		2.5 GHz	-63.64 dBm			M4	1		2.485456 GHz	-46.20 dBm									
Type	Ref	Trc	X-Value	Y-Value	Function	Function Result																																							
M1	1		2.459121 GHz	-2.74 dBm																																									
M2	1		2.4835 GHz	-49.10 dBm																																									
M3	1		2.5 GHz	-63.64 dBm																																									
M4	1		2.485456 GHz	-46.20 dBm																																									

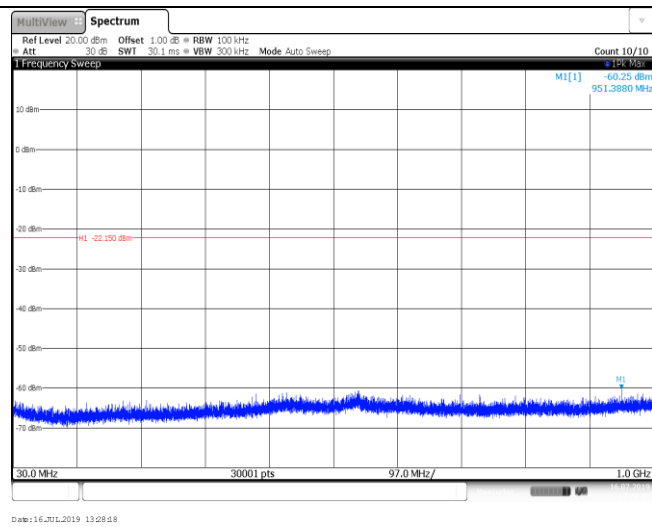
Test Item:	Bandedge	Type:	802.11n(HT40)
CH03	MultiView Spectrum Ref Level 20.00 dBm Offset 1.00 dB BW 100 kHz Att 30 dB SW 1.52 ms VBW 300 kHz Mode Auto Sweep Count 300/300 1 Frequency Sweep 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] -3.71 dBm 2.405270 GHz M2[1] -33.91 dBm 2.400000 GHz		

Test Item:	SE	Type:	802.11b
CH01 Reference level	 Ref Level 30.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SWI 1.04 ms VBW 300 kHz Mode Auto Sweep Count 100/100 MI[1] -0.03 dBm 2.4094830 GHz CF 2.412 GHz 1001 pts 3.0 MHz/ Span 30.0 MHz Date: 16-Jul-2019 13:26:30		
CH01 30MHz~1000MHz	 Ref Level 20.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SWI 30.1 ms VBW 300 kHz Mode Auto Sweep Count 10/10 MI[1] -60.62 dBm 554.6720 MHz 30.0 MHz 30001 pts 97.0 MHz/ 1.0 GHz Date: 16-Jul-2019 13:26:47		
CH01 1GHz~26GHz	 Ref Level 20.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SWI 250 ms VBW 300 kHz Mode Auto Sweep Count 10/10 MI[1] -51.12 dBm 25.978333 GHz 1.0 GHz 30001 pts 2.5 GHz/ 26.0 GHz Date: 16-Jul-2019 13:27:04		

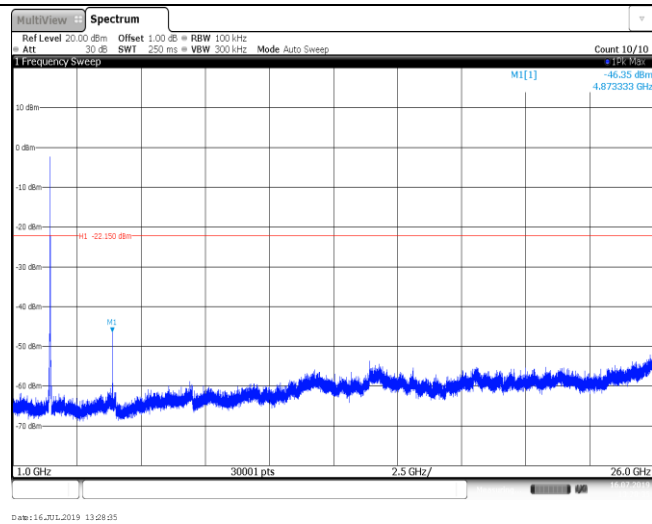
CH06
Reference level



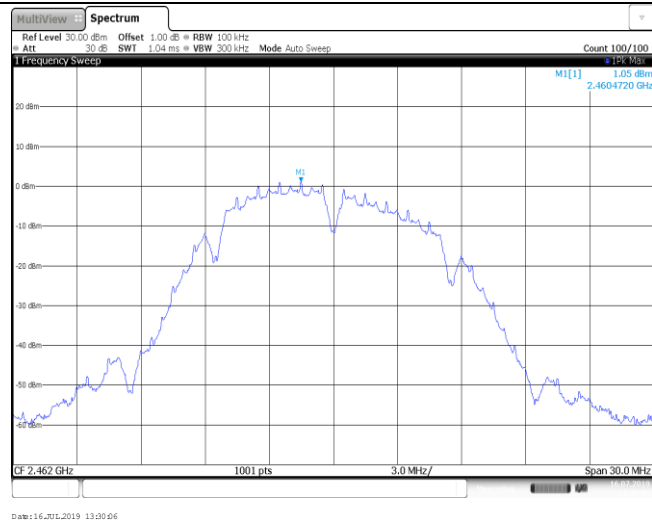
CH06
30MHz~1000MHz



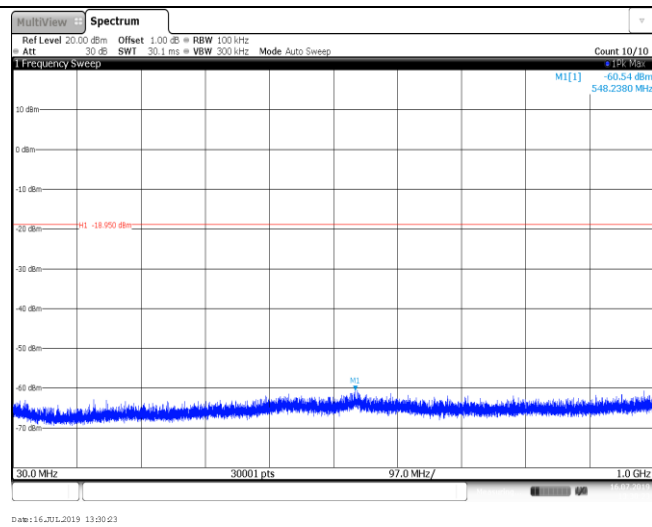
CH06
1GHz~26GHz



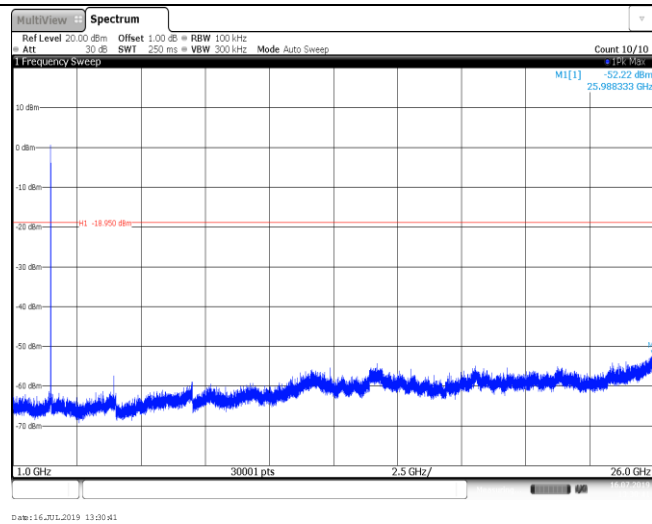
CH11
Reference level

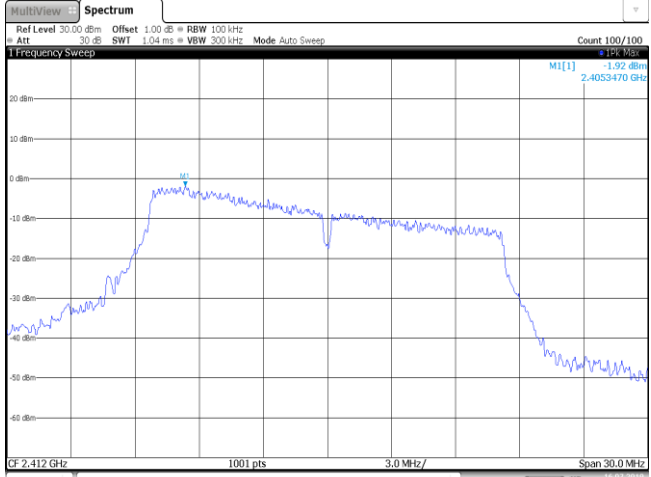
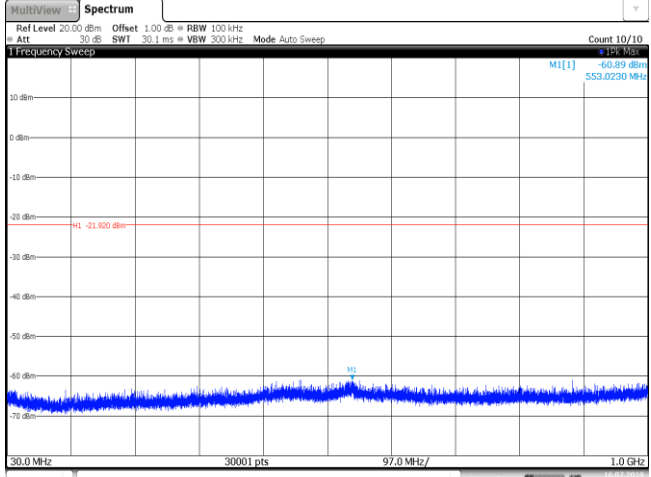
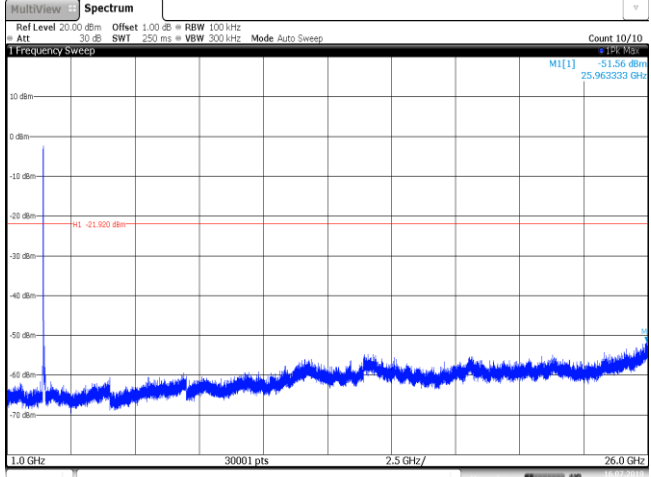


CH11
30MHz~1000MHz

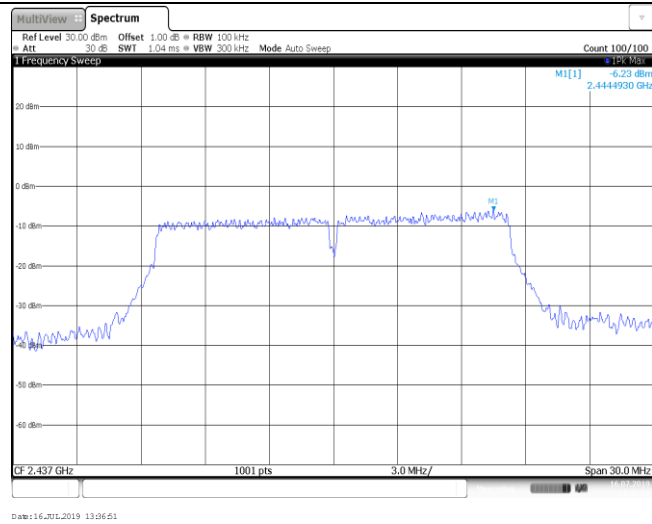


CH11
1GHz~26GHz

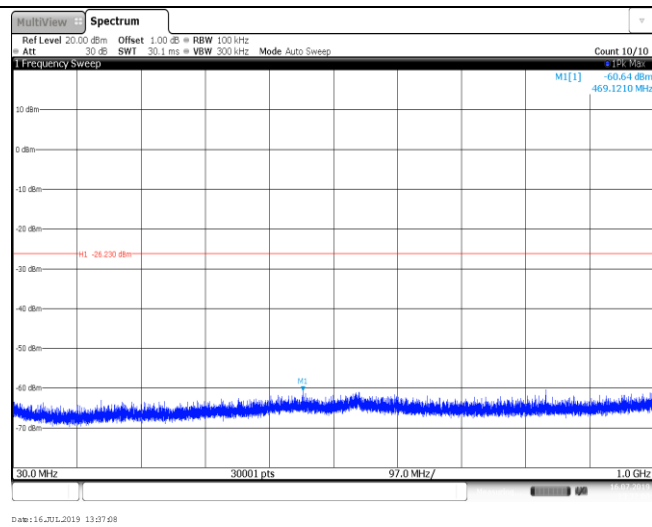


Test Item:	SE	Type:	802.11g
CH01 Reference level	 Ref Level 30.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SWI 1.04 ms VBW 300 kHz Mode Auto Sweep Count 100/100 MI[1] -1.92 dBm 2.4053470 GHz CF 2.412 GHz 1001 pts 3.0 MHz/ Span 30.0 MHz Date: 16-Jul-2019 13:33:54		
CH01 30MHz~1000MHz	 Ref Level 20.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SWI 30.1 ms VBW 300 kHz Mode Auto Sweep Count 10/10 MI[1] -60.89 dBm 553.0230 MHz 30.0 MHz 30001 pts 97.0 MHz/ 1.0 GHz Date: 16-Jul-2019 13:34:11		
CH01 1GHz~26GHz	 Ref Level 20.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SWI 250 ms VBW 300 kHz Mode Auto Sweep Count 10/10 MI[1] -51.56 dBm 25.963333 GHz 1.0 GHz 30001 pts 2.5 GHz/ 26.0 GHz Date: 16-Jul-2019 13:34:42		

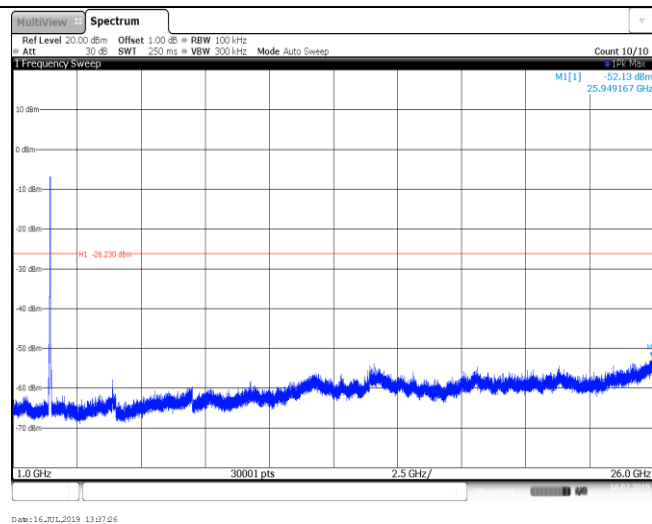
CH06
Reference level



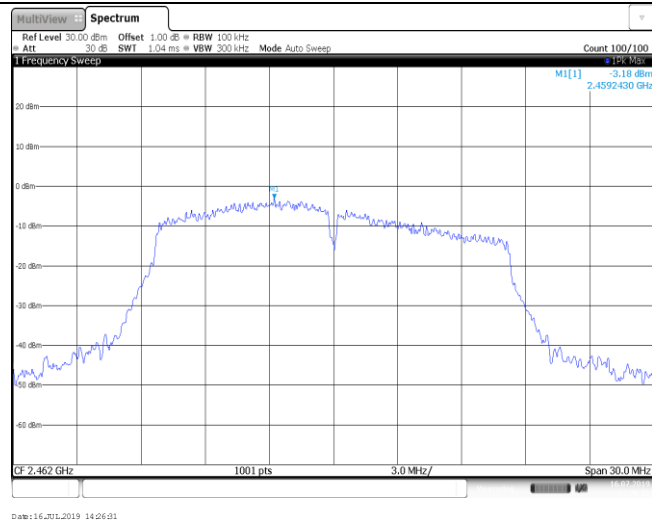
CH06
30MHz~1000MHz



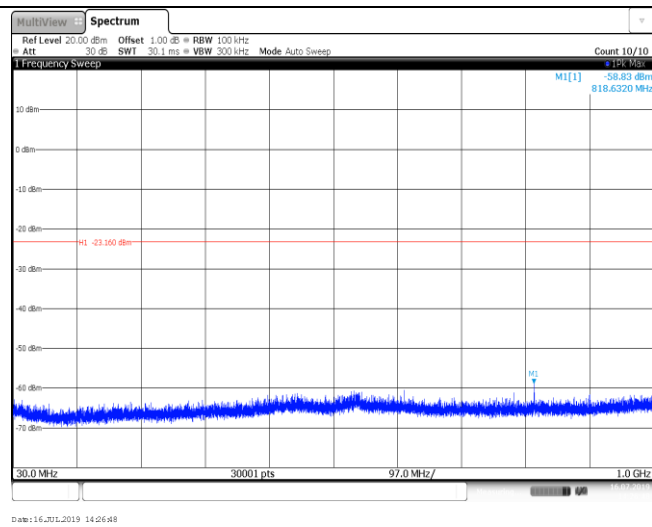
CH06
1GHz~26GHz



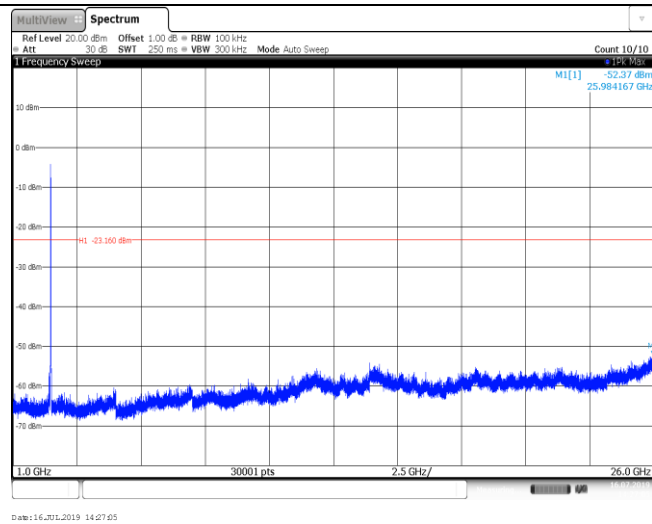
CH11
Reference level



CH11
30MHz~1000MHz

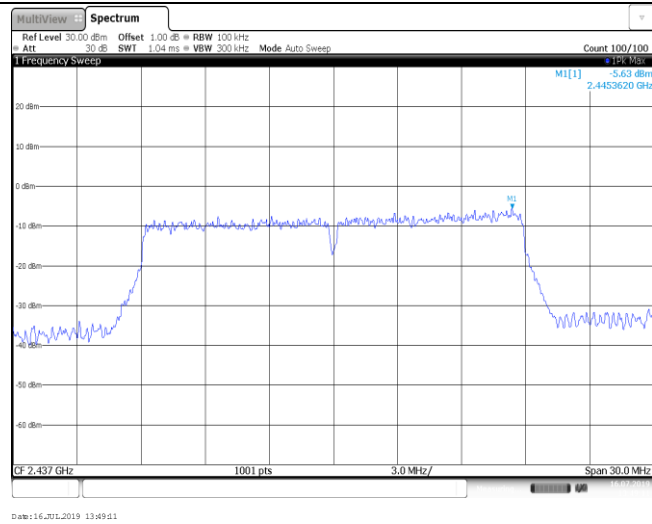


CH11
1GHz~26GHz

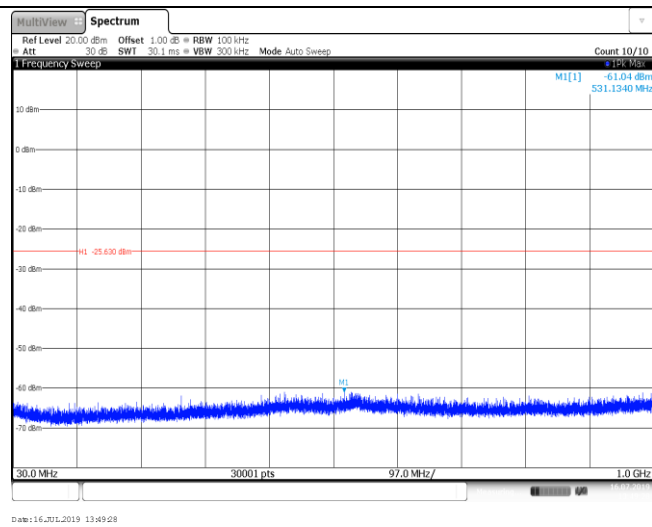


Test Item:	SE	Type:	802.11n(HT20)
CH01 Reference level	MultiviewSpectrum Ref Level 30.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SWI 1.04 ms VBW 300 kHz Mode Auto Sweep Count 100/100 MI[1] -1.80 dBm 2.4036080 GHz Frequency Sweep 20 dBm 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm CF 2.412 GHz 1001 pts 3.0 MHz/ Span 30.0 MHz Date:16-Jul-2019 14:29:02		
CH01 30MHz~1000MHz	MultiviewSpectrum Ref Level 20.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SWI 30.1 ms VBW 300 kHz Mode Auto Sweep Count 10/10 MI[1] -60.46 dBm 548.0760 MHz Frequency Sweep 20 dBm 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm 30.0 MHz 30001 pts 97.0 MHz/ 1.0 GHz Date:16-Jul-2019 14:29:19		
CH01 1GHz~26GHz	MultiviewSpectrum Ref Level 20.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SWI 250 ms VBW 300 kHz Mode Auto Sweep Count 10/10 MI[1] -51.33 dBm 25.867500 GHz Frequency Sweep 20 dBm 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm 1.0 GHz 30001 pts 2.5 GHz/ 26.0 GHz Date:16-Jul-2019 14:29:27		

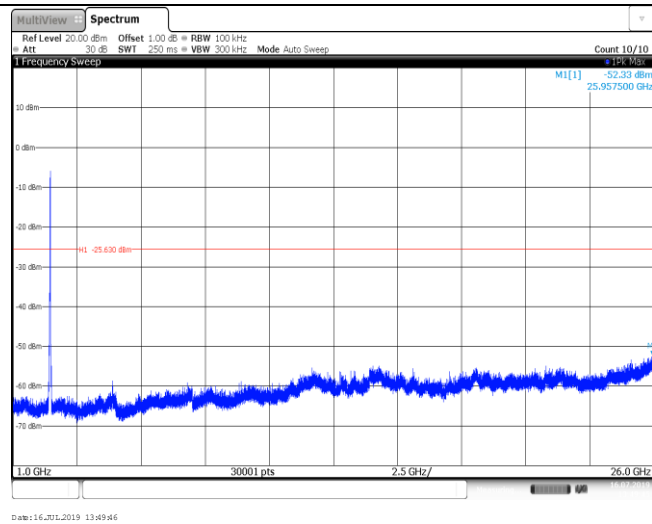
CH06
Reference level



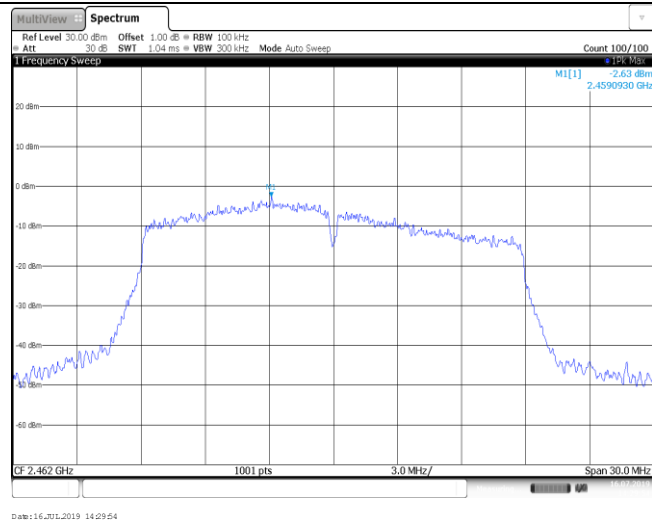
CH06
30MHz~1000MHz



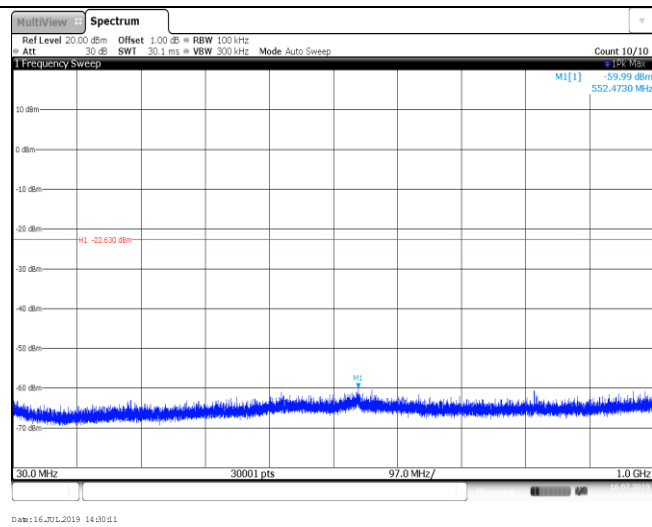
CH06
1GHz~26GHz



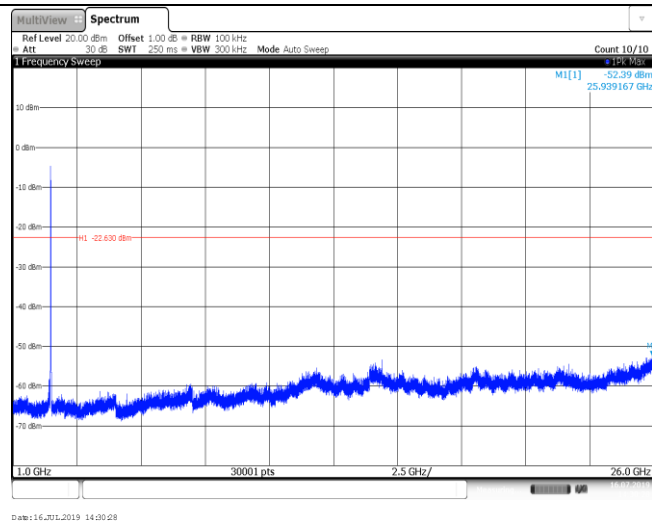
CH11
Reference level

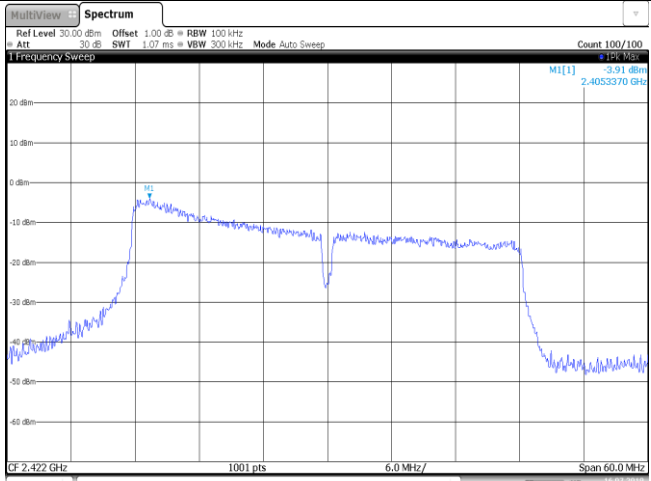
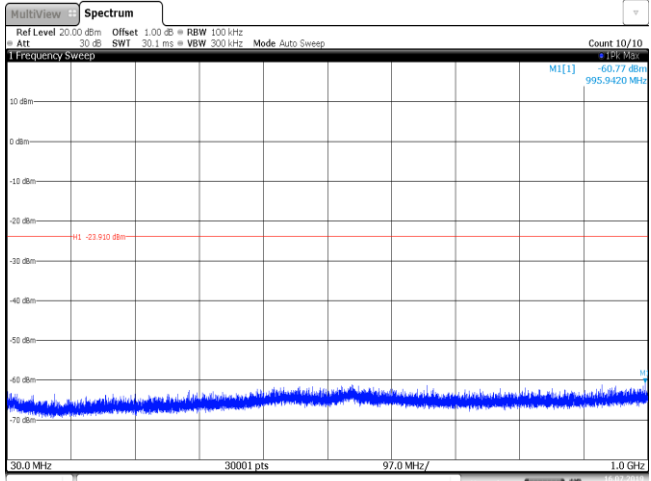
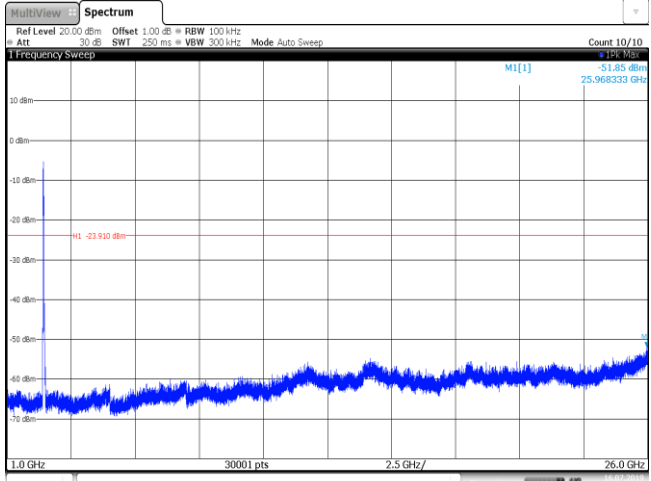


CH11
30MHz~1000MHz

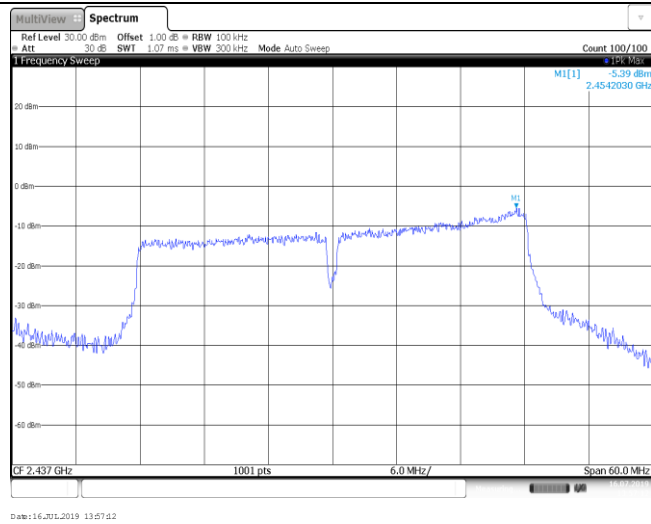


CH11
1GHz~26GHz

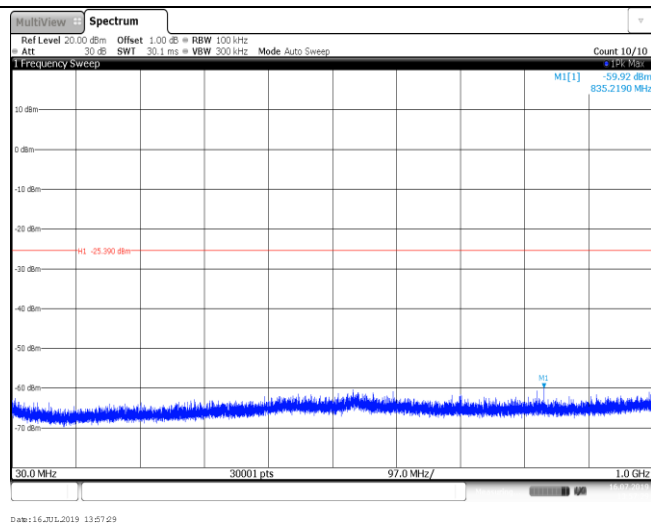


Test Item:	SE	Type:	802.11n(HT40)
CH03 Reference level	 Ref Level 30.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SWI 1.07 ms VBW 300 kHz Mode Auto Sweep Count 100/100 M1[1] -3.91 dBm 2.4053370 GHz CF 2.422 GHz 1001 pts 6.0 MHz/ Span 60.0 MHz Date: 16-Jul-2019 13:55:37		
CH03 30MHz~1000MHz	 Ref Level 20.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SWI 30.1 ms VBW 300 kHz Mode Auto Sweep Count 10/10 M1[1] -60.77 dBm 995.9420 MHz 30.0 MHz 30001 pts 97.0 MHz/ 1.0 GHz Date: 16-Jul-2019 13:55:55		
CH03 1GHz~26GHz	 Ref Level 20.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SWI 250 ms VBW 300 kHz Mode Auto Sweep Count 10/10 M1[1] -51.85 dBm 25.968333 GHz 1.0 GHz 30001 pts 2.5 GHz/ 26.0 GHz Date: 16-Jul-2019 13:56:28		

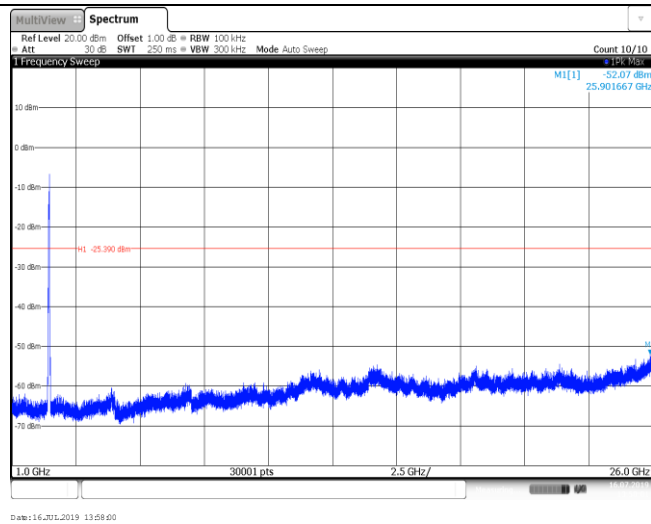
CH06
Reference level



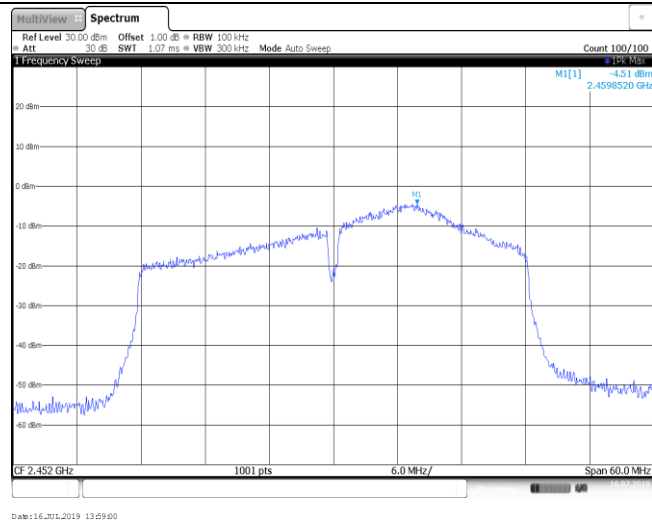
CH06
30MHz~1000MHz



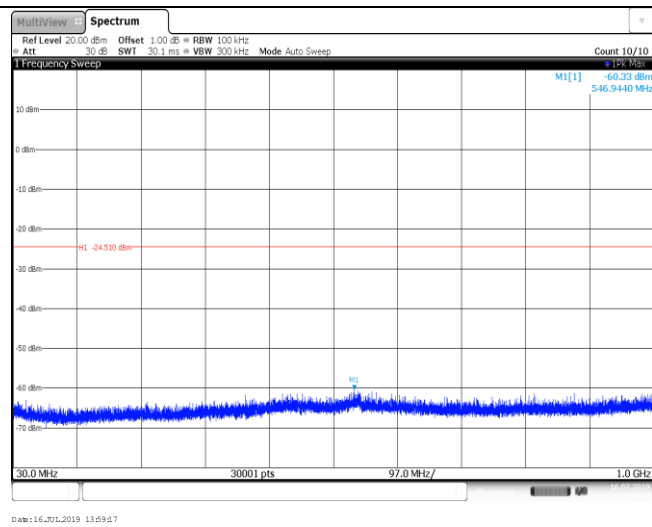
CH06
1GHz~26GHz



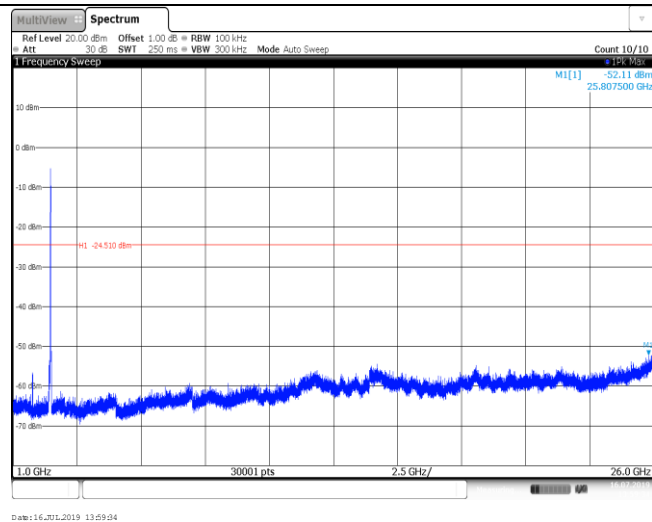
CH09
Reference level



CH09
30MHz~1000MHz



CH09
1GHz~26GHz



5.8. Spurious Emissions (radiated)

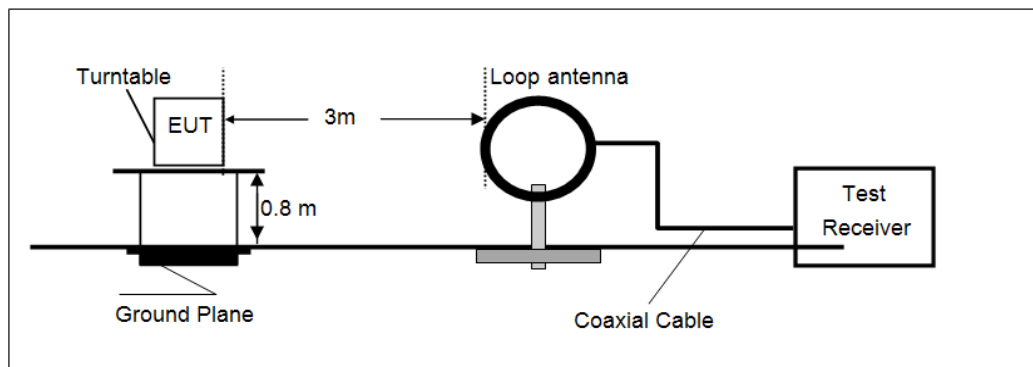
LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.209

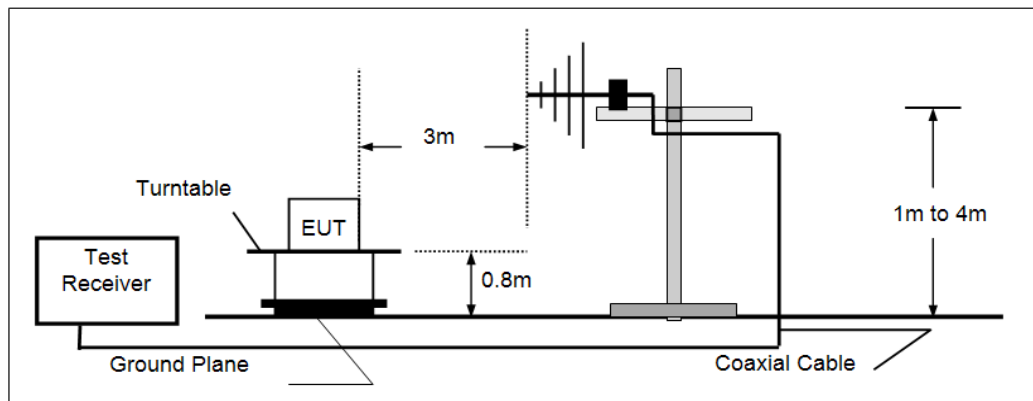
Frequency	Limit (dBuV/m @3m)	Value
30MHz-88MHz	40.00	Quasi-peak
88MHz-216MHz	43.50	Quasi-peak
216MHz-960MHz	46.00	Quasi-peak
960MHz-1GHz	54.00	Quasi-peak
Above 1GHz	54.00	Average
	74.00	Peak

TEST CONFIGURATION

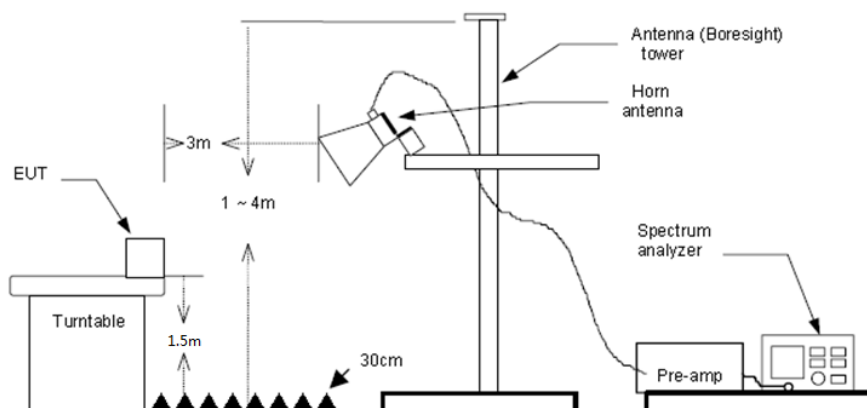
➤ 9kHz ~30MHz



➤ 30MHz ~ 1GHz



➤ Above 1GHz



TEST PROCEDURE

1. The EUT was setup and tested according to ANSI C63.10:2013 for compliance to FCC 47CFR 15.247 requirements.
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 10th harmonic:
RBW=1MHz, VBW=3MHz Peak detector for Peak value.
RBW=1MHz, VBW=3MHz RMS detector for Average value.

TEST MODE:

Please refer to the clause 3.3

TEST RESULTS

☒ **Passed** ☐ **Not Applicable**

Note:

- 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.

➤ **9kHz ~ 30MHz**

The EUT was pre-scanned the frequency band (9kHz~30MHz), found the radiated level lower than the limit, so don't show on the report.

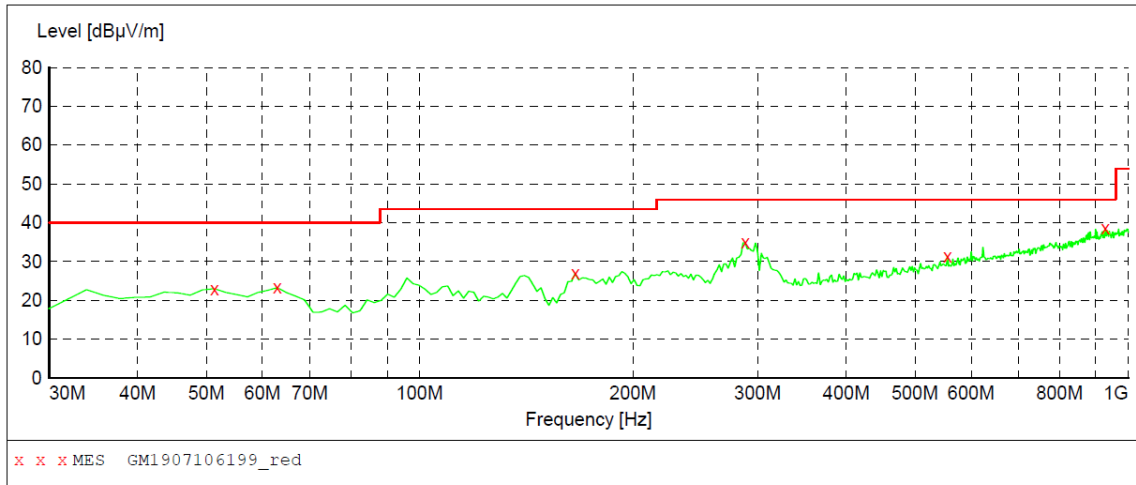
➤ **30MHz ~1000MHz**

Have pre-scan all modulation mode, found the 802.11b mode CH01 which it was worst case, so only the worst case's data on the test report.

➤ 30MHz ~ 1GHz

Polarization:

Vertical

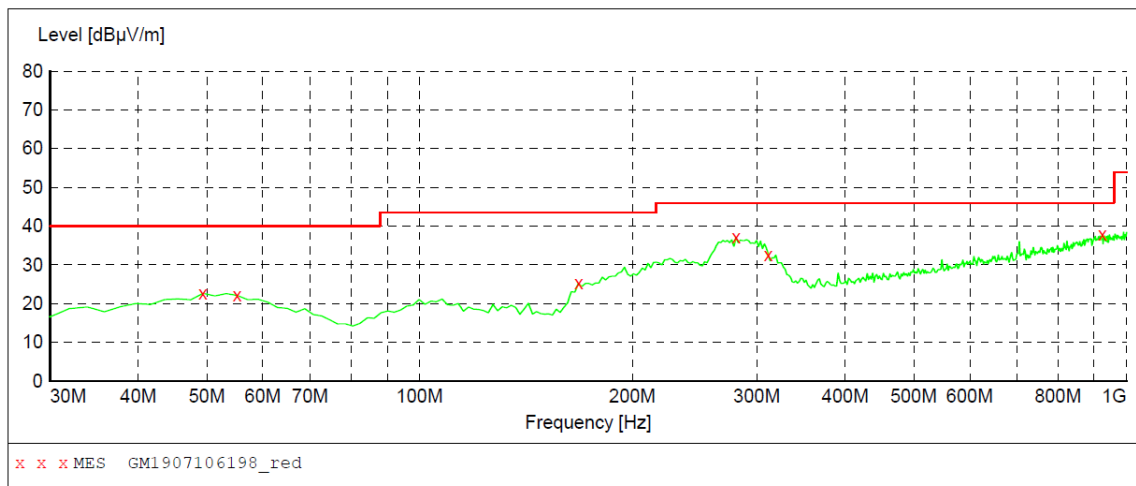
**MEASUREMENT RESULT: "GM1907106199_red"**

7/10/2019 8:58PM

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
51.340000	23.00	-4.9	40.0	17.0	QP	100.0	281.00	VERTICAL
62.980000	23.30	-6.9	40.0	16.7	QP	100.0	7.00	VERTICAL
165.800000	26.90	-9.3	43.5	16.6	QP	100.0	358.00	VERTICAL
288.020000	34.90	-3.7	46.0	11.1	QP	100.0	136.00	VERTICAL
555.740000	31.30	3.1	46.0	14.7	QP	100.0	213.00	VERTICAL
928.220000	38.50	10.7	46.0	7.5	QP	100.0	201.00	VERTICAL

Polarization:

Horizontal

**MEASUREMENT RESULT: "GM1907106198_red"**

7/10/2019 8:56PM

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
49.400000	22.60	-4.8	40.0	17.4	QP	100.0	41.00	HORIZONTAL
55.220000	22.10	-5.3	40.0	17.9	QP	100.0	293.00	HORIZONTAL
167.740000	25.20	-9.3	43.5	18.3	QP	100.0	268.00	HORIZONTAL
280.260000	37.10	-4.0	46.0	8.9	QP	100.0	108.00	HORIZONTAL
311.300000	32.60	-3.3	46.0	13.4	QP	100.0	212.00	HORIZONTAL
924.340000	37.90	10.7	46.0	8.1	QP	100.0	5.00	HORIZONTAL

➤ 1 GHz ~ 25 GHz

802.11b				CH01			
Frequency (MHz)	Read Level (dBuV/m)	Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Polarization	Test value
1189.4688	33.25	-5.94	27.31	74.00	46.69	Vertical	Peak
2261.6563	29.13	-2.58	26.55	74.00	47.45	Vertical	Peak
3135.5625	32.75	0.50	33.25	74.00	40.75	Vertical	Peak
6640.0000	30.75	13.28	44.03	74.00	29.97	Vertical	Peak
1182.1250	33.71	-6.02	27.69	74.00	46.31	Horizontal	Peak
1810.7500	31.42	-5.80	25.62	74.00	48.38	Horizontal	Peak
3103.2500	32.83	0.34	33.17	74.00	40.83	Horizontal	Peak
5230.0000	31.32	8.82	40.14	74.00	33.86	Horizontal	Peak

802.11b				CH06			
Frequency (MHz)	Read Level (dBuV/m)	Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Polarization	Test value
1207.0938	33.33	-5.81	27.52	74.00	46.48	Vertical	Peak
2202.9063	29.62	-2.95	26.67	74.00	47.33	Vertical	Peak
3156.1250	32.21	0.61	32.82	74.00	41.18	Vertical	Peak
5200.6250	30.63	8.98	39.61	74.00	34.39	Vertical	Peak
1233.5313	33.75	-5.74	28.01	74.00	45.99	Horizontal	Peak
2085.4063	29.64	-4.11	25.53	74.00	48.47	Horizontal	Peak
3181.0938	32.12	0.74	32.86	74.00	41.14	Horizontal	Peak
5250.5625	30.16	8.71	38.87	74.00	35.13	Horizontal	Peak

802.11b				CH11			
Frequency (MHz)	Read Level (dBuV/m)	Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Polarization	Test value
1193.8750	34.13	-5.89	28.24	74.00	45.76	Vertical	Peak
2252.8438	29.19	-2.63	26.56	74.00	47.44	Vertical	Peak
3134.0938	32.39	0.50	32.89	74.00	41.11	Vertical	Peak
5279.9375	30.64	8.56	39.20	74.00	34.80	Vertical	Peak
1183.5938	33.94	-6.00	27.94	74.00	46.06	Horizontal	Peak
2289.5625	30.03	-2.40	27.63	74.00	46.37	Horizontal	Peak
3148.7813	33.89	0.57	34.46	74.00	39.54	Horizontal	Peak
5156.5625	30.09	8.90	38.99	74.00	35.01	Horizontal	Peak

Remark:

1. Final Level = Receiver Read level + Factor
2. The peak level is lower than average limit(54 dBuV/m), this data is the too weak instrument of signal is unable to test.
3. The emission levels of other frequencies(test frequency band is 1GHz to 25GHz) are very lower than the limit and not show in test report.

802.11g				CH01			
Frequency (MHz)	Read Level (dBuV/m)	Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Polarization	Test value
1235.0000	33.66	-5.74	27.92	74.00	46.08	Vertical	Peak
2151.5000	30.34	-3.47	26.87	74.00	47.13	Vertical	Peak
3150.2500	32.29	0.58	32.87	74.00	41.13	Vertical	Peak
5143.3438	30.12	8.88	39.00	74.00	35.00	Vertical	Peak
1220.3125	34.67	-5.78	28.89	74.00	45.11	Horizontal	Peak
2246.9688	29.18	-2.67	26.51	74.00	47.49	Horizontal	Peak
3184.0313	32.17	0.76	32.93	74.00	41.07	Horizontal	Peak
5118.3750	31.05	8.83	39.88	74.00	34.12	Horizontal	Peak

802.11g				CH06			
Frequency (MHz)	Read Level (dBuV/m)	Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Polarization	Test value
1133.6563	35.60	-6.53	29.07	74.00	44.93	Vertical	Peak
2192.6250	30.09	-3.05	27.04	74.00	46.96	Vertical	Peak
3167.8750	32.49	0.67	33.16	74.00	40.84	Vertical	Peak
5282.8750	31.19	8.54	39.73	74.00	34.27	Vertical	Peak
1186.5313	34.64	-5.97	28.67	74.00	45.33	Horizontal	Peak
2264.5938	29.13	-2.56	26.57	74.00	47.43	Horizontal	Peak
3167.8750	32.68	0.67	33.35	74.00	40.65	Horizontal	Peak
5257.9063	30.29	8.67	38.96	74.00	35.04	Horizontal	Peak

802.11g				CH11			
Frequency (MHz)	Read Level (dBuV/m)	Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Polarization	Test value
1207.0938	34.37	-5.81	28.56	74.00	45.44	Vertical	Peak
2220.5313	29.86	-2.84	27.02	74.00	46.98	Vertical	Peak
3142.9063	32.36	0.54	32.90	74.00	41.10	Vertical	Peak
5124.2500	30.40	8.84	39.24	74.00	34.76	Vertical	Peak
1205.6250	35.14	-5.82	29.32	74.00	44.68	Horizontal	Peak
2217.5938	29.29	-2.86	26.43	74.00	47.57	Horizontal	Peak
3141.4375	32.43	0.54	32.97	74.00	41.03	Horizontal	Peak
6130.3438	30.90	10.77	41.67	74.00	32.33	Horizontal	Peak

Remark:

1. Final Level = Receiver Read level + Factor
2. The peak level is lower than average limit(54 dBuV/m), this data is the too weak instrument of signal is unable to test.
3. The emission levels of other frequencies(test frequency band is 1GHz to 25GHz) are very lower than the limit and not show in test report.

802.11n(HT20)				CH01			
Frequency (MHz)	Read Level (dBuV/m)	Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Polarization	Test value
1139.5313	35.18	-6.47	28.71	74.00	45.29	Vertical	Peak
2220.5313	29.16	-2.84	26.32	74.00	47.68	Vertical	Peak
3176.6875	32.46	0.72	33.18	74.00	40.82	Vertical	Peak
5260.8438	30.47	8.66	39.13	74.00	34.87	Vertical	Peak
1214.4375	35.00	-5.79	29.21	74.00	44.79	Horizontal	Peak
2305.7188	28.84	-2.34	26.50	74.00	47.50	Horizontal	Peak
3220.7500	32.69	0.59	33.28	74.00	40.72	Horizontal	Peak
5155.0938	31.55	8.90	40.45	74.00	33.55	Horizontal	Peak

802.11n(HT20)				CH06			
Frequency (MHz)	Read Level (dBuV/m)	Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Polarization	Test value
1149.8125	34.27	-6.36	27.91	74.00	46.09	Vertical	Peak
2208.7813	29.50	-2.91	26.59	74.00	47.41	Vertical	Peak
3192.8438	32.00	0.80	32.80	74.00	41.20	Vertical	Peak
5191.8125	30.05	8.97	39.02	74.00	34.98	Vertical	Peak
1174.7813	34.15	-6.10	28.05	74.00	45.95	Horizontal	Peak
2222.0000	28.96	-2.83	26.13	74.00	47.87	Horizontal	Peak
3148.7813	32.31	0.57	32.88	74.00	41.12	Horizontal	Peak
5096.3438	30.43	8.77	39.20	74.00	34.80	Horizontal	Peak

802.11n(HT20)				CH11			
Frequency (MHz)	Read Level (dBuV/m)	Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Polarization	Test value
3573.2500	31.86	1.34	33.20	74.00	40.80	Vertical	Peak
4764.4063	30.13	6.81	36.94	74.00	37.06	Vertical	Peak
6259.5938	29.84	10.95	40.79	74.00	33.21	Vertical	Peak
7040.9688	29.77	15.28	45.05	74.00	28.95	Vertical	Peak
1146.8750	34.99	-6.39	28.60	74.00	45.40	Horizontal	Peak
1906.2188	33.26	-5.76	27.50	74.00	46.50	Horizontal	Peak
3232.5000	32.21	0.45	32.66	74.00	41.34	Horizontal	Peak
5188.8750	29.82	8.96	38.78	74.00	35.22	Horizontal	Peak

Remark:

1. Final Level = Receiver Read level + Factor
2. The peak level is lower than average limit(54 dBuV/m), this data is the too weak instrument of signal is unable to test.
3. The emission levels of other frequencies(test frequency band is 1GHz to 25GHz) are very lower than the limit and not show in test report.

802.11n(HT40)				CH01			
Frequency (MHz)	Read Level (dBuV/m)	Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Polarization	Test value
1167.4375	34.30	-6.18	28.12	74.00	45.88	Vertical	Peak
2220.5313	29.38	-2.84	26.54	74.00	47.46	Vertical	Peak
3145.8438	32.26	0.56	32.82	74.00	41.18	Vertical	Peak
5081.6563	30.67	8.63	39.30	74.00	34.70	Vertical	Peak
1189.4688	34.48	-5.94	28.54	74.00	45.46	Horizontal	Peak
2270.4688	28.30	-2.52	25.78	74.00	48.22	Horizontal	Peak
3166.4063	32.55	0.67	33.22	74.00	40.78	Horizontal	Peak
5147.7500	30.59	8.89	39.48	74.00	34.52	Horizontal	Peak

802.11n(HT40)				CH06			
Frequency (MHz)	Read Level (dBuV/m)	Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Polarization	Test value
1255.5625	34.48	-5.69	28.79	74.00	45.21	Vertical	Peak
2210.2500	29.32	-2.90	26.42	74.00	47.58	Vertical	Peak
3147.3125	32.46	0.57	33.03	74.00	40.97	Vertical	Peak
5447.3750	30.21	8.87	39.08	74.00	34.92	Vertical	Peak
1230.5938	34.22	-5.75	28.47	74.00	45.53	Horizontal	Peak
2279.2813	27.87	-2.46	25.41	74.00	48.59	Horizontal	Peak
3192.8438	32.05	0.80	32.85	74.00	41.15	Horizontal	Peak
5160.9688	30.47	8.91	39.38	74.00	34.62	Horizontal	Peak

802.11n(HT40)				CH11			
Frequency (MHz)	Read Level (dBuV/m)	Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Polarization	Test value
1249.6875	34.41	-5.70	28.71	74.00	45.29	Vertical	Peak
2175.0000	29.21	-3.23	25.98	74.00	48.02	Vertical	Peak
3217.8125	31.83	0.63	32.46	74.00	41.54	Vertical	Peak
5230.0000	31.08	8.82	39.90	74.00	34.10	Vertical	Peak
1212.9688	34.17	-5.80	28.37	74.00	45.63	Horizontal	Peak
2214.6563	28.52	-2.88	25.64	74.00	48.36	Horizontal	Peak
3151.7188	32.19	0.59	32.78	74.00	41.22	Horizontal	Peak
5178.5938	29.85	8.94	38.79	74.00	35.21	Horizontal	Peak

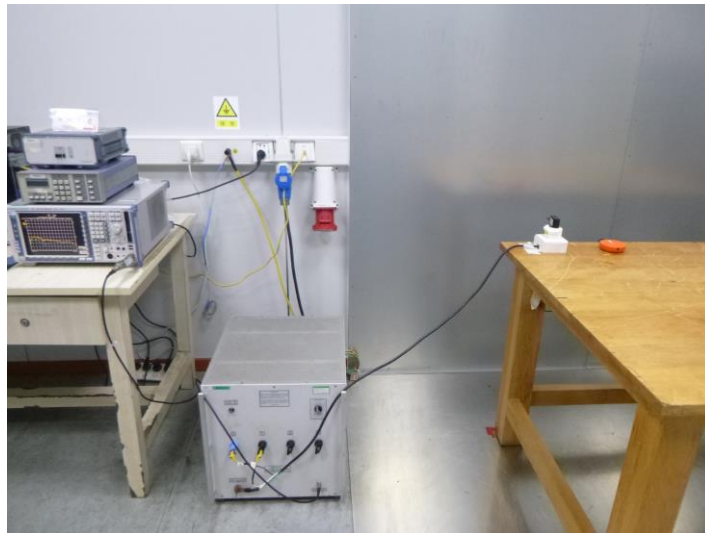
Remark:

4. Final Level = Receiver Read level + Factor

5. The peak level is lower than average limit(54 dBuV/m), this data is the too weak instrument of signal is unable to test. The emission levels of other frequencies(test frequency band is 1GHz to 25GHz) are very lower than the limit and not show in test report.

6. TEST SETUP PHOTOS

Conducted Emissions



Radiated Emissions





7. EXTERANAL AND INTERNAL PHOTOS

Reference to the test report No.: CHTEW19070094

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