

TEST REPORT

Report No.: SHE19110012-03KE

Date: 2019-11-19

Page 1 of 23

Applicant : Toast, Inc.
Address of Applicant : 401 Park Drive, Suite 801, Boston, MA 02215, USA

Product Name : Data Processing machine
Model No. : TT201
Sample No. : E19110012-03#01
FCC ID : 2AMNG-TT200
ISED Number : 23177-TT200

Standards : FCC CFR47 Part 15, Subpart C
RSS-Gen (Issue 5, March 2019)
RSS-247 (Issue 2, February 2017)

Date of Receipt : 2019-11-12
Date of Test : 2019-11-12 ~ 2019-11-18
Date of Issue : 2019-11-19

Remark:

This report details the results of the testing carried out on one sample, the results contained in this report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

Prepared by: Jennifer Zhou Reviewed by: Adrian Shi Approved by: Guoyou Chi
(Jennifer Zhou) (Adrian Shi) (Authorized signatory: Guoyou Chi)

TEST REPORT

Report No.: SHE19110012-03KE

Date: 2019-11-19

Page 2 of 23

Revision Record			
Version	Date	Revisions	Revised By
1.0	2019-11-19	Original	--

TEST REPORT

Report No.: SHE19110012-03KE

Date: 2019-11-19

Page 3 of 23

Contents

1	GENERAL INFORMATION	4
1.1	TESTING LABORATORY	4
1.2	DETAILS OF APPLICATION	4
1.3	DETAILS OF EUT	4
1.4	TEST METHODOLOGY.....	5
2	TEST CONDITION	6
2.1	TEST FACILITY	6
2.2	ENVIRONMENTAL CONDITIONS	6
2.3	EQUIPMENT LIST	6
2.4	MEASUREMENT UNCERTAINTY.....	6
3	TEST SET-UP AND OPERATION MODES	7
3.1	DETAILS OF TEST MODE	7
3.2	SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT	7
3.3	SUPPORT SOFTWARE.....	7
3.4	TEST SETUP DIAGRAM	9
4	TEST RESULTS	10
4.1	TRANSMITTER REQUIREMENT & TEST SUITES	10
4.1.1	<i>Spurious Emission</i>	10
4.1.2	<i>Band Edge (Restricted-band band-edge)</i>	11

TEST REPORT

Report No.: SHE19110012-03KE

Date: 2019-11-19

Page 4 of 23

1 General Information

1.1 Testing Laboratory

Company Name	ICAS Testing Technology Services (Shanghai) Co., Ltd.
Address	155 Pingbei Rd, Minhang District, Shanghai, China
Telephone	0086 21-51682999
Fax	0086 21-54711112
Homepage	www.icasiso.com

1.2 Details of Application

Company Name	Toast, Inc.
Address	401 Park Drive, Suite 801, Boston, MA 02215, USA
Contact Person	Mr James H Barber
Telephone	(562) 546-2272
Email	jbarber@toasttab.com

1.3 Details of EUT

Product Name	Data Processing machine
Brand Name	Toast
Model No.	TT201
FCC ID	2AMNG-TT200
ISED Number	23177-TT200
Mode of Operation	WLAN 802.11b/g/n(HT20)
Frequency Range	2400MHz ~ 2483.5MHz
Channel Separation	5 MHz
Modulation Type	DSSS, OFDM
Antenna Type	PIFA Antenna
Antenna Gain	1.92 dBi
Extreme Temperature Range	0℃ ~ +55℃
Test Voltage	AC 24V

Note(s):

1. This test report is for approval of PCB, LCD and speaker change based on the original test report No. I19D00071-SRD03.
2. The details product change please refer to the document 'Product Change Description'.
3. Only additional test required in the product change list in this report.

TEST REPORT

Report No.: SHE19110012-03KE

Date: 2019-11-19

Page 5 of 23

1.4 Test Methodology

47 CFR Part 15, Subpart C (10-1-16 Edition)	Miscellaneous Wireless Communications Services
KDB Publication 558074 D01 v05r02	15.247 Meas Guidance.
KDB Publication 662911 D01 v02r01	Emissions Testing of Transmitters with Multiple Outputs in the Same Band (e.g., MIMO, Smart Antenna, etc)
RSS-Gen (Issue 5, March 2019)	General Requirements for Compliance of Radio Apparatus
RSS-247 (Issue 2, February 2017)	Digital Transmission Systems (DTSS), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices
ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices

Note(s):

All test items were verified and recorded according to the standards and without any addition/deviation/exclusion during the test.

TEST REPORT

Report No.: SHE19110012-03KE

Date: 2019-11-19

Page 6 of 23

2 Test Condition

2.1 Test Facility

2.2 Environmental conditions

Temperature (°C)	18-25
Humidity (%RH)	40-65
Barometric Pressure (mbar)	960-1060

2.3 Equipment List

Name of Equipment	Manufacturer	Model	Serial No.	Cal. Due Date
Spectrum Analyzer	Keysight	N9020B	MY59260184	2020-07-28
Spectrum Analyzer	Rohde & Schwarz	FSV40N	101450	2020-06-24
EMI Test Receiver	Rohde & Schwarz	ESPI3	100173	2020-06-19
EMI Test Receiver	Rohde & Schwarz	ESR 7	101911	2020-06-19
V-network	SCHWARZBECK	NSLK 8127	8127-902	2020-02-20
Wideband Radio Communication Tester	Rohde & Schwarz	CMW 500	100687	2020-08-22
Broadband Antenna	SCHWARZBECK	VULB9163	9163-1037	2020-06-06
Horn Antenna-18G	SCHWARZBECK	BBHA9120D	9120D-1775	2020-06-06
Loop Antenna	SCHWARZBECK	FMZB 1513	N/A	2021-03-19
Horn Antenna-40G	YINGLIAN	LB-180400-KF	N/A	2020-07-26
EMC chamber 9*6*6 (L*W*H)	CHANGNING	966	N/A	2020-06-26
Shielded Enclosure 8*5*4 (L*W*H)	CHANGNING	854	N/A	2020-08-28
Test Software	BL	BL410_E	N/A	N/A

2.4 Measurement Uncertainty

Parameter	Frequency	Uncertainty
Antenna Port Conducted Emission	< 1GHz	± 1.5 dB
	> 1GHz	± 1.5 dB
Radiated Emission	30 MHz – 1 GHz	± 3 dB
	> 1GHz	± 3 dB

TEST REPORT

Report No.: SHE19110012-03KE

Date: 2019-11-19

Page 7 of 23

3 Test Set-up and Operation Modes

3.1 Details of Test Mode

Using test software was control EUT work in continuous transmitter and receiver mode. Select test channel as below:
For 802.11b/g/n (HT20)

Channel	Frequency
The lowest channel(CH1)	2412MHz
The middle channel(CH6)	2437MHz
The Highest channel(CH11)	2462MHz

Through Pre-scan under all rate at lowest channel, the data rate as below table described is the worst case, so we choose these data rate for test.

Type	Data rate
802.11b	11Mbps
802.11g	54Mbps
802.11n(20M)	MCS7

The basic operation modes are:

- A. On
 - 1. WLAN mode
 - a. Transmitting
 - i. Low Channel
 - ii. Middle Channel
 - iii. High Channel
 - b. Receiving
- B. Standby
- C. Off

3.2 Special Accessories and Auxiliary Equipment

Description	Manufacturer	Model No.	Serial No.
Laptop	Lenovo	TP00083A	N/A

3.3 Support Software

Description	Manufacturer	Software Name
Software	/	RF Test Tool

TEST REPORT

Report No.: SHE19110012-03KE

Date: 2019-11-19

Page 8 of 23

TEST REPORT

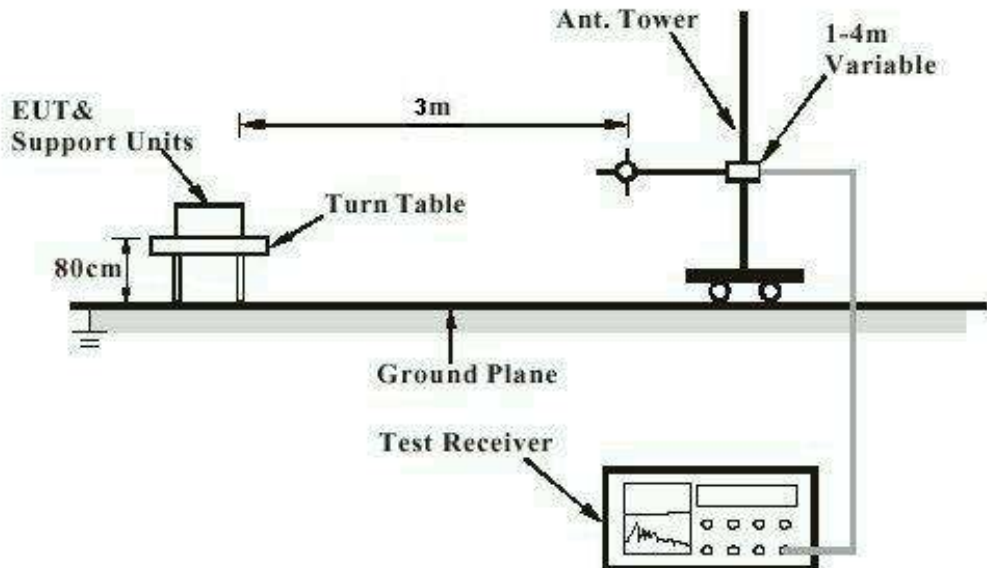
Report No.: SHE19110012-03KE

Date: 2019-11-19

Page 9 of 23

3.4 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test



Note: Measurements above 1GHz are done with a table height of 1.5m. In addition, there is RF absorbing material on the floor of the test site for above 1GHz measurement.

TEST REPORT

Report No.: SHE19110012-03KE

Date: 2019-11-19

Page 10 of 23

4 Test Results

4.1 Transmitter Requirement & Test Suites

4.1.1 Spurious Emission

RESULT:

PASS

Test standard	: FCC Part 15.247(d), 15.205, 15.209 RSS-247 5.5
Requirement	: ANSI C63.10-2013, KDB 558074
Kind of test site	: 3m Semi-Anechoic Chamber

Test setup

Test Channel	: Low/Middle/High
Operation Mode	: A
Ambient temperature	: 25°C
Relative humidity	: 52%

Notes:

1. Test plots please refer to the annex document "EXHIBIT A of SHE19110012-03KE".
2. For 9 kHz ~ 30 MHz, the amplitude of spurious emissions that are attenuated by more than 20dB below the permissible. The value has no need to be reported.
3. The spurious above 18GHz is noise only and 20dB below the limit. The value has no need to be reported.
4. The EUT is working in the Normal link mode below 1 GHz.

TEST REPORT

Report No.: SHE19110012-03KE

Date: 2019-11-19

Page 11 of 23

4.1.2 Band Edge (Restricted-band band-edge)

RESULT:

PASS

Test standard	: FCC Part 15.247(d), 15.205, 15.209 RSS-247 5.5
Requirement	: ANSI C63.10-2013, KDB 558074
Kind of test site	: 3m Semi-Anechoic Chamber

Test setup

Test Channel	: Low/Middle/High
Operation Mode	: A.1
Ambient temperature	: 25°C
Relative humidity	: 52%

For details refer to following test plot.

TEST REPORT

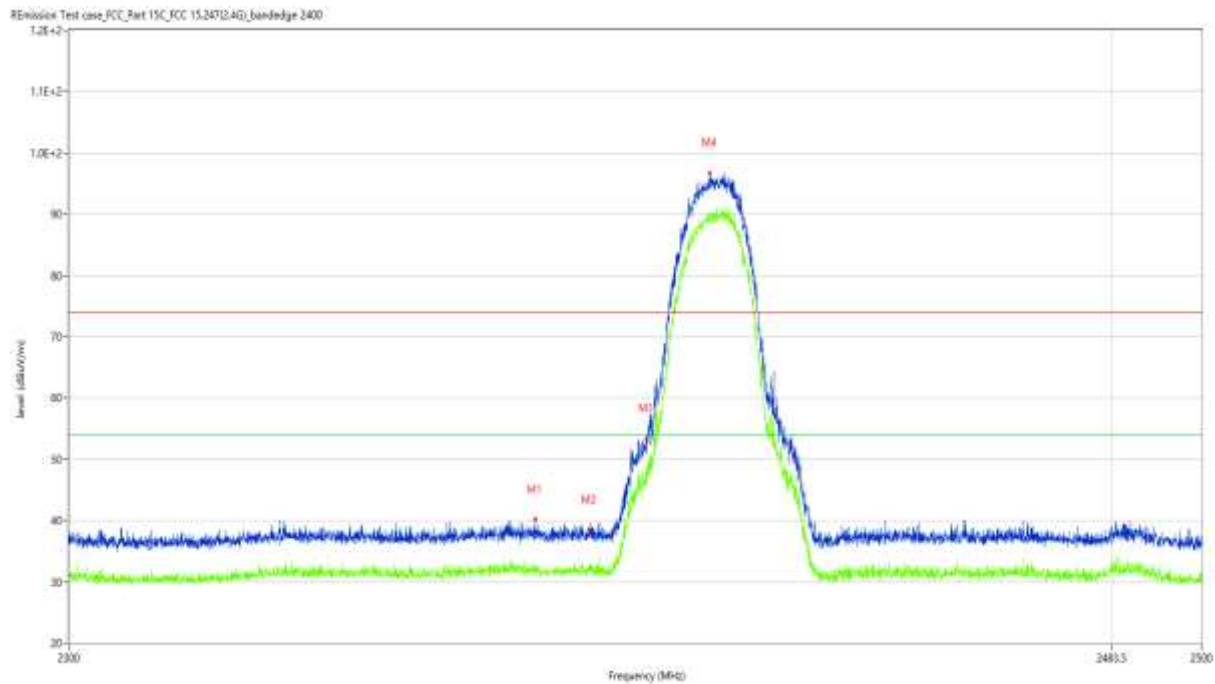
Report No.: SHE19110012-03KE

Date: 2019-11-19

Page 12 of 23

Figure 1: Band Edge (Restricted-band band-edge), 802.11b, 2412MHz

Horizontal



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2380.280	40.21	-3.81	74.0	-33.79	Peak	181.60	100	Horizontal	Pass
1**	2380.280	32.83	-3.81	54.0	-21.17	AV	181.60	100	Horizontal	Pass
2	2390.000	38.57	-3.76	74.0	-35.43	Peak	164.44	100	Horizontal	Pass
2**	2390.000	31.77	-3.76	54.0	-22.23	AV	164.44	100	Horizontal	Pass
3	2400.000	53.63	-4.18	74.0	-20.37	Peak	151.30	100	Horizontal	Pass
3**	2400.000	47.49	-4.18	54.0	-6.51	AV	151.30	100	Horizontal	Pass
4	2411.022	96.61	-4.15	74.0	22.61	Peak	254.40	100	Horizontal	N/A
4**	2411.022	89.24	-4.15	54.0	35.24	AV	254.40	100	Horizontal	N/A

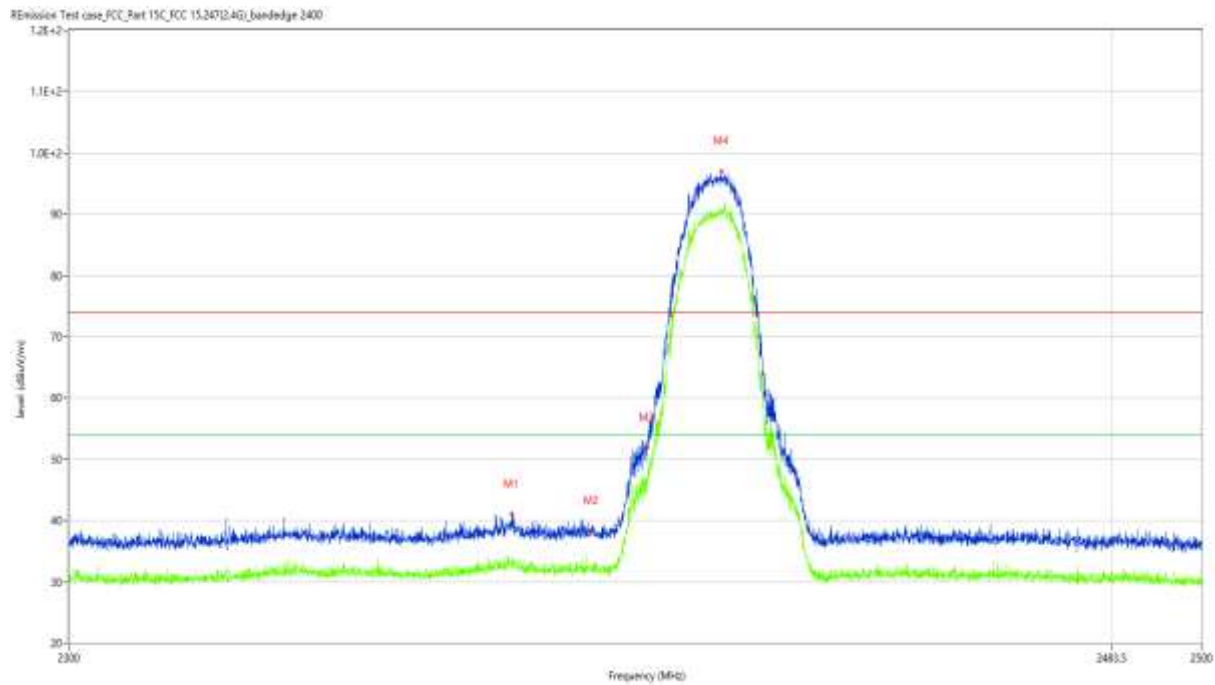
TEST REPORT

Report No.: SHE19110012-03KE

Date: 2019-11-19

Page 13 of 23

Vertical



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2376.181	41.04	-3.87	74.0	-32.96	Peak	197.10	100	Vertical	Pass
1**	2376.181	33.47	-3.87	54.0	-20.53	AV	197.10	100	Vertical	Pass
2	2390.000	38.33	-3.76	74.0	-35.67	Peak	157.48	100	V	Pass
2**	2390.000	32.10	-3.76	54.0	-21.90	AV	157.48	100	V	Pass
3	2400.000	52.27	-4.18	74.0	-21.73	Peak	120.20	100	V	Pass
3**	2400.000	46.23	-4.18	54.0	-7.77	AV	120.20	100	V	Pass
4	2413.172	97.03	-4.15	74.0	23.03	Peak	185.30	100	Vertical	N/A
4**	2413.172	90.27	-4.15	54.0	36.27	AV	185.30	100	Vertical	N/A

TEST REPORT

Report No.: SHE19110012-03KE

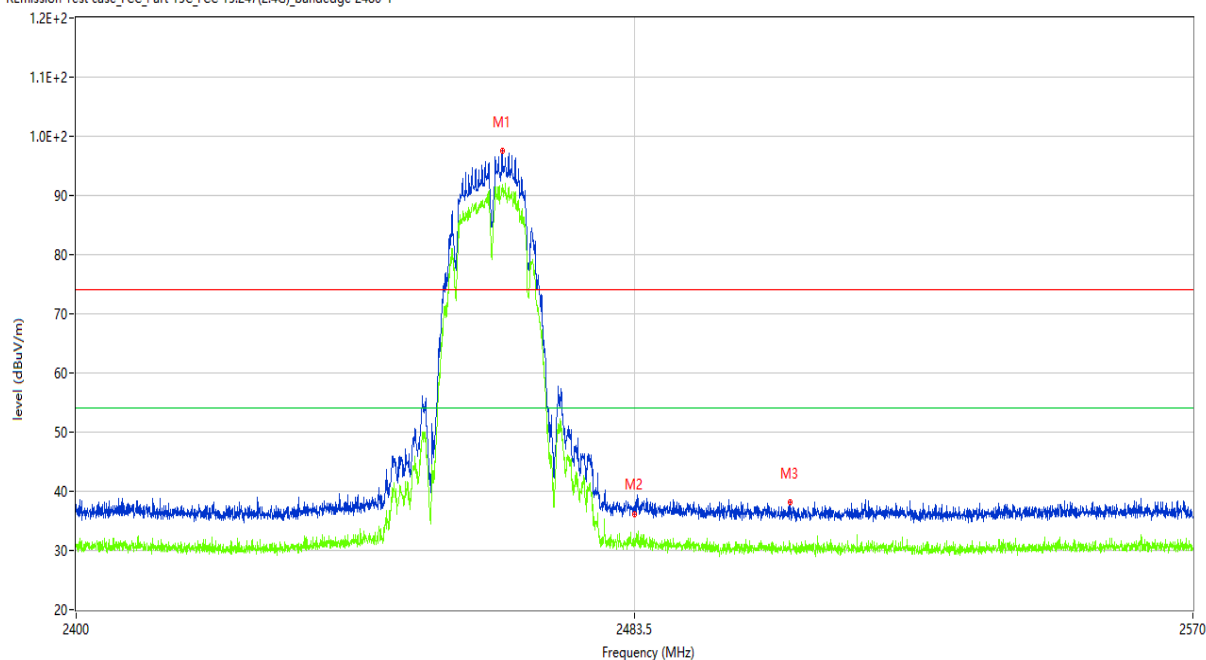
Date: 2019-11-19

Page 14 of 23

Figure 2: Band Edge (Restricted-band band-edge), 802.11b, 2462MHz

Horizontal

REmission Test case_FCC_Part 15C_FCC 15.247(2.4G)_bandedge 2480-1



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2463.479	97.47	-3.64	74.0	23.47	Peak	151.20	100	Horizontal	N/A
1**	2463.479	91.93	-3.64	54.0	37.93	AV	151.20	100	Horizontal	N/A
2	2483.500	36.41	-3.87	74.0	-37.59	Peak	172.46	100	Horizontal	Pass
2**	2483.500	31.41	-3.87	54.0	-22.59	AV	172.46	100	Horizontal	Pass
3	2507.413	38.14	-4.41	74.0	-35.86	Peak	226.50	100	Horizontal	Pass
3**	2507.413	31.29	-4.41	54.0	-22.71	AV	226.50	100	Horizontal	Pass

TEST REPORT

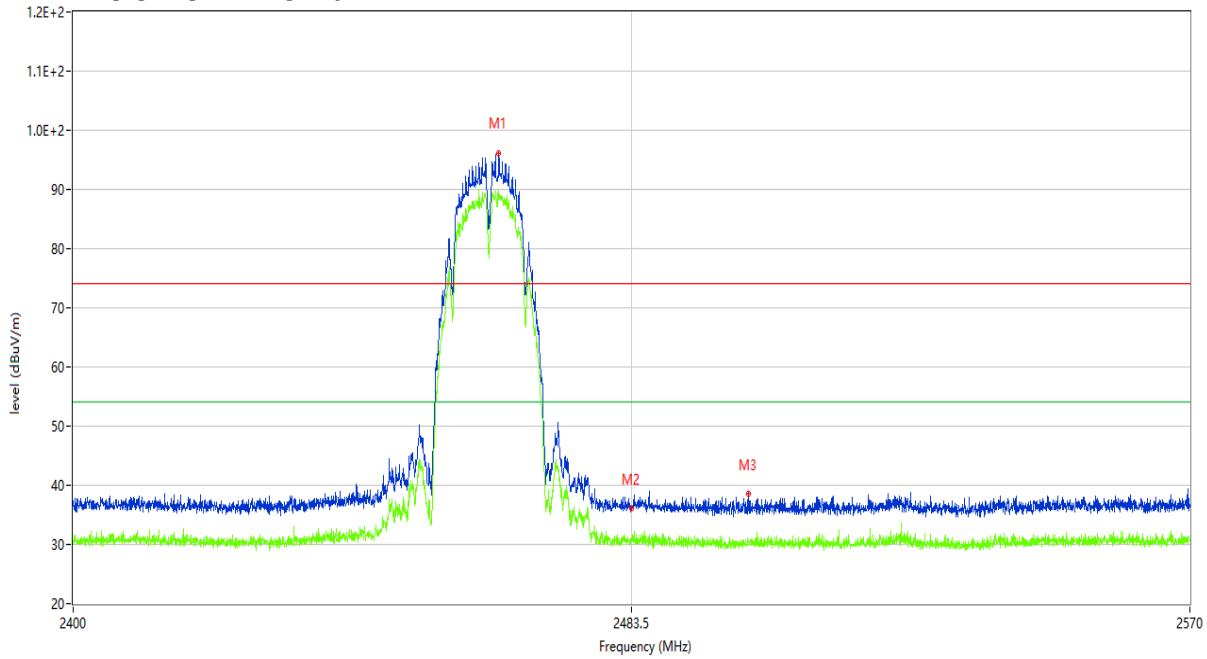
Report No.: SHE19110012-03KE

Date: 2019-11-19

Page 15 of 23

Vertical

REmission Test case_FCC_Part 15C_FCC 15.247(2.4G)_bandedge 2480-1



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2463.437	96.16	-3.64	74.0	22.16	Peak	47.60	100	Vertical	N/A
1**	2463.437	89.73	-3.64	54.0	35.73	AV	47.60	100	Vertical	N/A
2	2483.500	36.02	-3.87	74.0	-37.98	Peak	7.56	100	V	Pass
2**	2483.500	30.89	-3.87	54.0	-23.11	AV	7.56	100	V	Pass
3	2501.380	38.52	-4.43	74.0	-35.48	Peak	33.30	100	Vertical	Pass
3**	2501.380	30.36	-4.43	54.0	-23.64	AV	33.30	100	Vertical	Pass

TEST REPORT

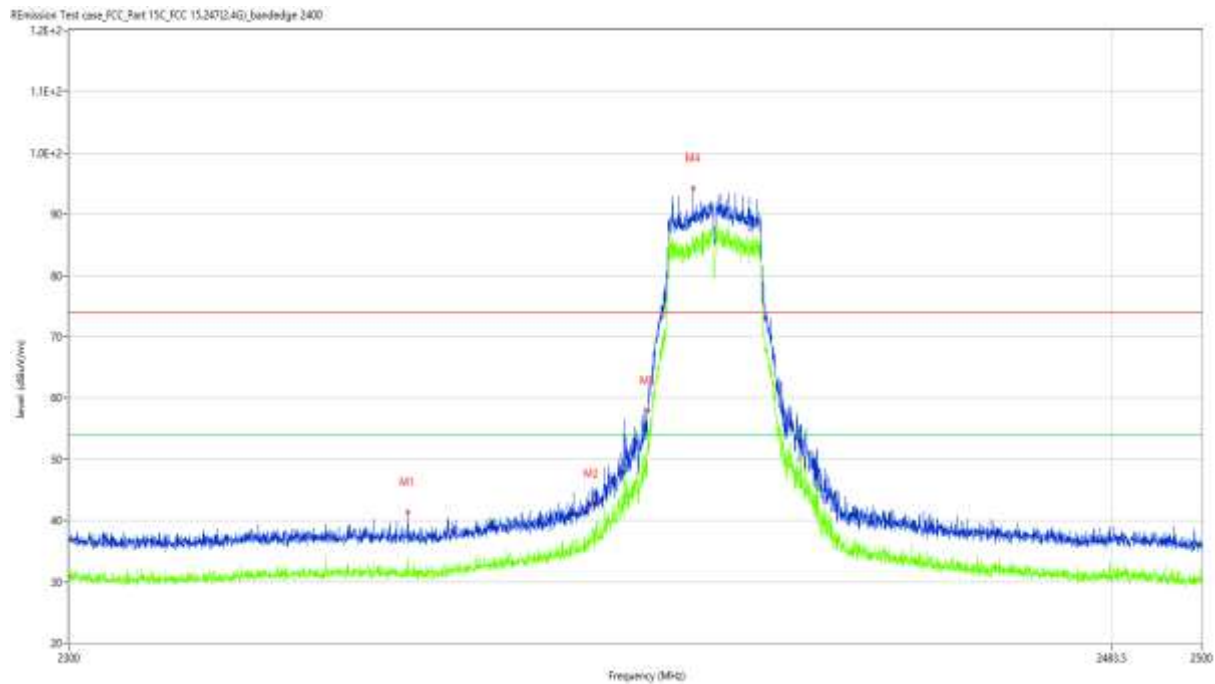
Report No.: SHE19110012-03KE

Date: 2019-11-19

Page 16 of 23

Figure 3: Band Edge (Restricted-band band-edge), 802.11g, 2412MHz

Horizontal



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2358.135	41.35	-4.25	74.0	-32.65	Peak	266.50	100	Horizontal	Pass
1**	2358.135	34.04	-4.25	54.0	-19.96	AV	266.50	100	Horizontal	Pass
2	2390.000	42.74	-3.76	74.0	-31.26	Peak	217.41	100	Horizontal	Pass
2**	2390.000	36.81	-3.76	54.0	-17.19	AV	217.41	100	Horizontal	Pass
3	2400.000	57.77	-4.18	74.0	-16.23	Peak	146.85	100	Horizontal	Pass
3**	2400.000	51.38	-4.18	54.0	-2.62	AV	146.85	100	Horizontal	Pass
4	2408.173	94.22	-4.16	74.0	20.22	Peak	145.50	100	Horizontal	N/A
4**	2408.173	85.74	-4.16	54.0	31.74	AV	145.50	100	Horizontal	N/A

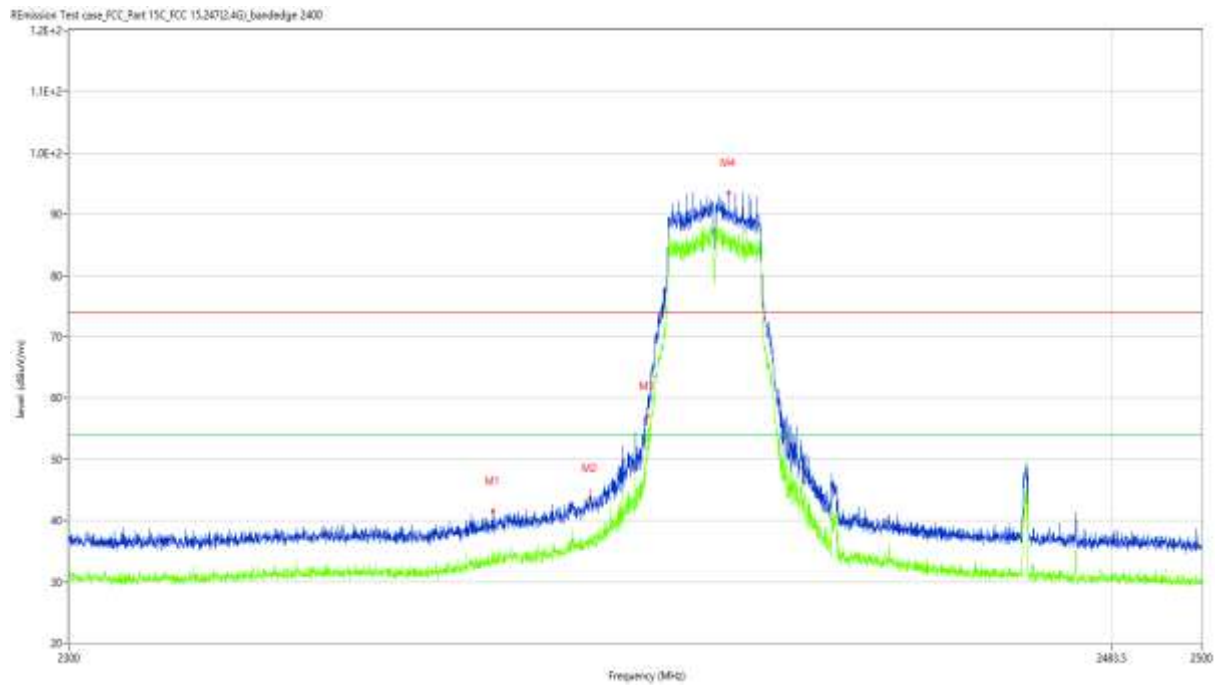
TEST REPORT

Report No.: SHE19110012-03KE

Date: 2019-11-19

Page 17 of 23

Vertical



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2372.882	41.58	-3.93	74.0	-32.42	Peak	200.60	100	Vertical	Pass
1**	2372.882	35.16	-3.93	54.0	-18.84	AV	200.60	100	Vertical	Pass
2	2390.000	43.73	-3.76	74.0	-30.27	Peak	59.16	100	V	Pass
2**	2390.000	36.91	-3.76	54.0	-17.09	AV	59.16	100	V	Pass
3	2400.000	57.09	-4.18	74.0	-16.91	Peak	123.70	100	V	Pass
3**	2400.000	51.66	-4.18	54.0	-2.34	AV	123.70	100	V	Pass
4	2414.421	93.47	-4.15	74.0	19.47	Peak	197.70	100	Vertical	N/A
4**	2414.421	87.15	-4.15	54.0	33.15	AV	197.70	100	Vertical	N/A

TEST REPORT

Report No.: SHE19110012-03KE

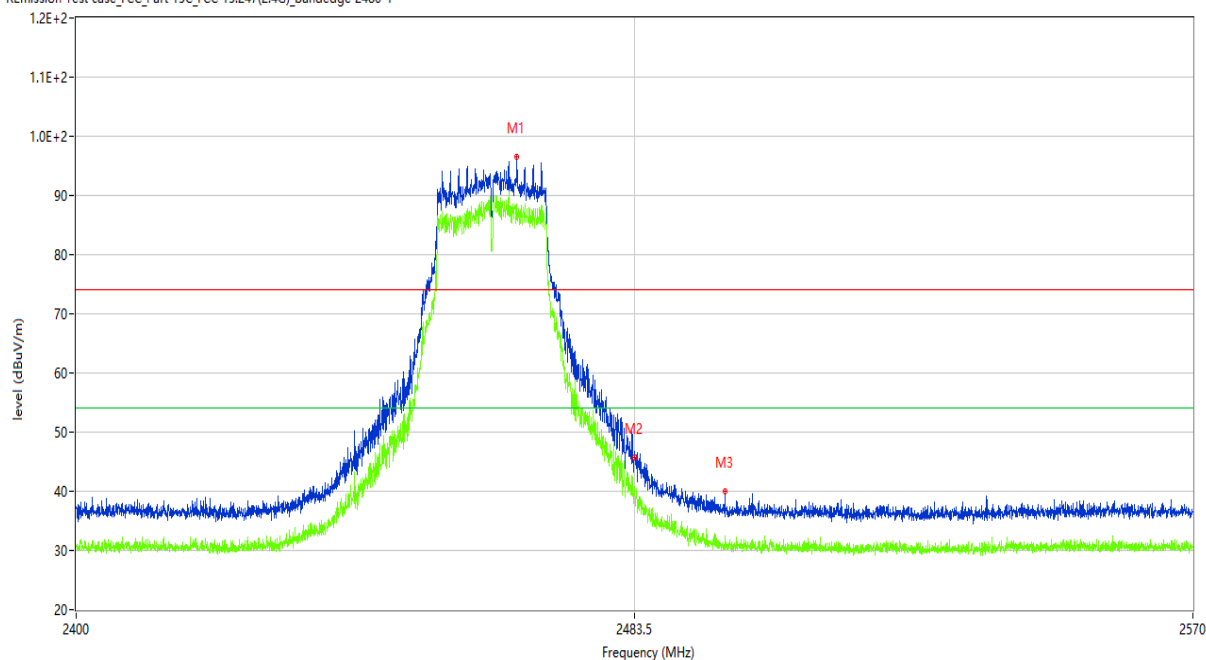
Date: 2019-11-19

Page 18 of 23

Figure 4: Band Edge (Restricted-band band-edge), 802.11g, 2462MHz

Horizontal

REmission Test case_FCC_Part 15C_FCC 15.247(2.4G)_bandedge 2480-1



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2465.731	96.51	-3.60	74.0	22.51	Peak	144.20	100	Horizontal	N/A
1**	2465.731	87.81	-3.60	54.0	33.81	AV	144.20	100	Horizontal	N/A
2	2483.500	45.88	-3.87	74.0	-28.12	Peak	144.20	100	Horizontal	Pass
2**	2483.500	40.09	-3.87	54.0	-13.91	AV	144.20	100	Horizontal	Pass
3	2497.343	39.94	-4.34	74.0	-34.06	Peak	129.90	100	Horizontal	Pass
3**	2497.343	32.36	-4.34	54.0	-21.64	AV	129.90	100	Horizontal	Pass

TEST REPORT

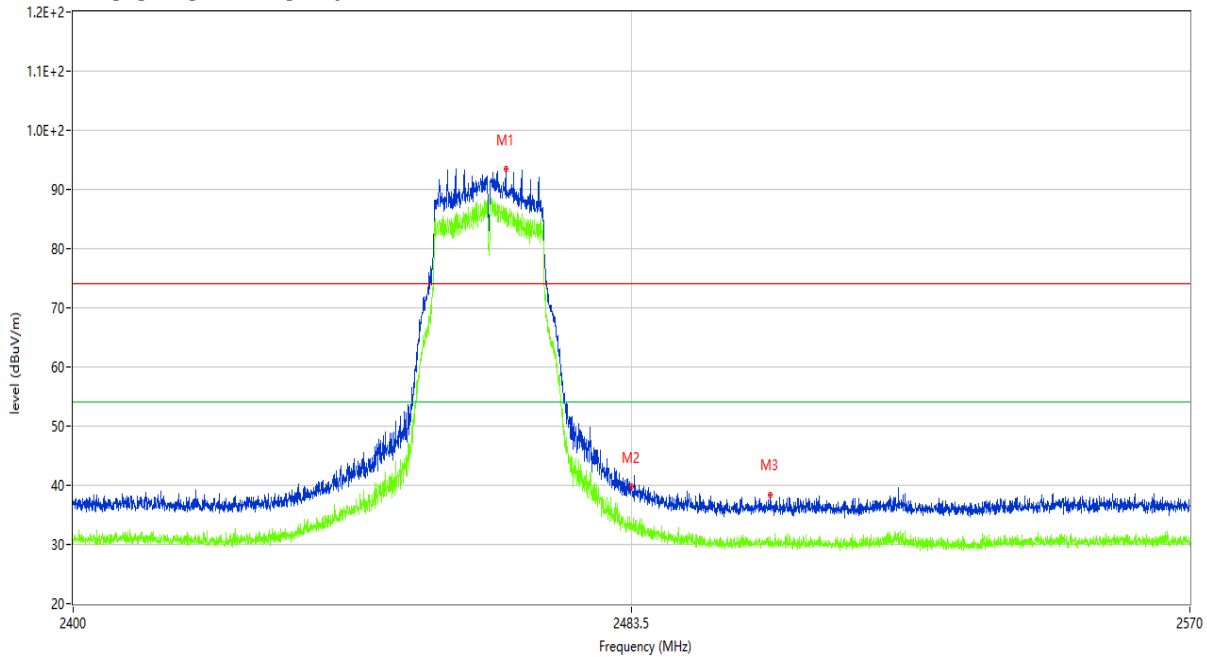
Report No.: SHE19110012-03KE

Date: 2019-11-19

Page 19 of 23

Vertical

REmission Test case_FCC_Part 15C_FCC 15.247(2.4G)_bandedge 2480-1



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2464.456	93.41	-3.62	74.0	19.41	Peak	40.50	100	Vertical	N/A
1**	2464.456	86.83	-3.62	54.0	32.83	AV	40.50	100	Vertical	N/A
2	2483.500	39.79	-3.87	74.0	-34.21	Peak	56.44	100	V	Pass
2**	2483.500	33.13	-3.87	54.0	-20.87	AV	56.44	100	V	Pass
3	2504.779	38.38	-4.42	74.0	-35.62	Peak	272.00	100	Vertical	Pass
3**	2504.779	31.15	-4.42	54.0	-22.85	AV	272.00	100	Vertical	Pass

TEST REPORT

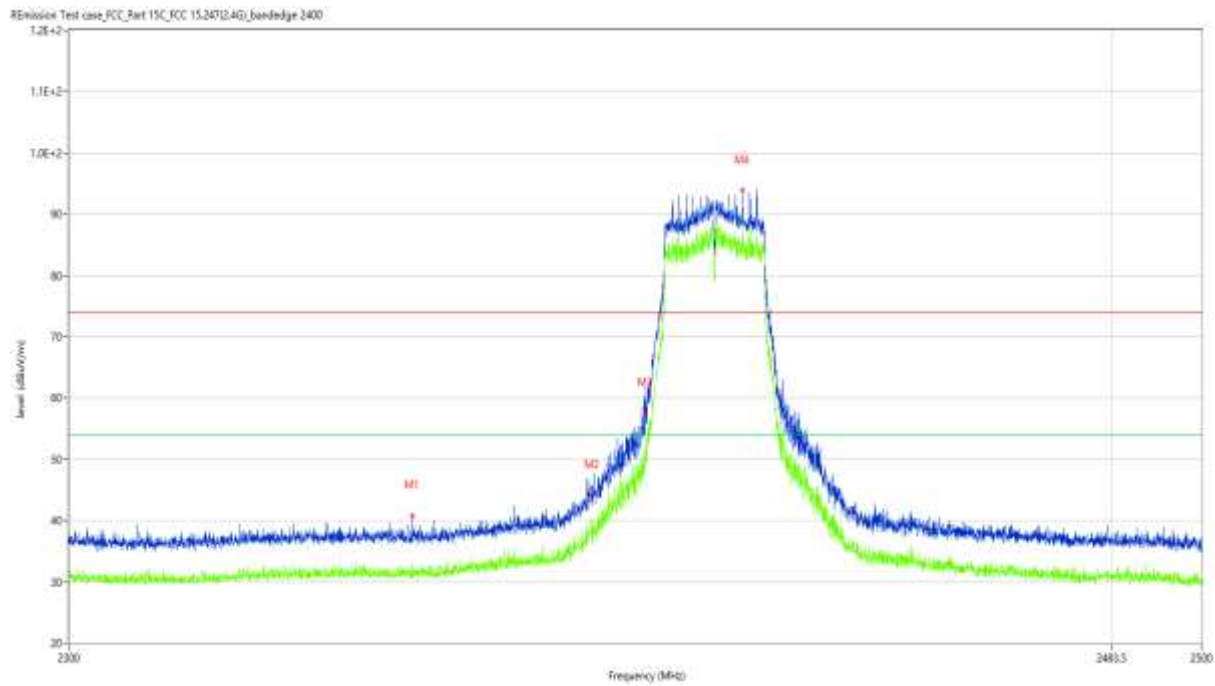
Report No.: SHE19110012-03KE

Date: 2019-11-19

Page 20 of 23

Figure 5: Band Edge (Restricted-band band-edge), 802.11n(HT20), 2412MHz

Horizontal



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2358.935	40.83	-4.26	74.0	-33.17	Peak	137.90	100	Horizontal	Pass
1**	2358.935	33.04	-4.26	54.0	-20.96	AV	137.90	100	Horizontal	Pass
2	2390.000	44.21	-3.76	74.0	-29.79	Peak	142.64	100	Horizontal	Pass
2**	2390.000	38.31	-3.76	54.0	-15.69	AV	142.64	100	Horizontal	Pass
3	2400.000	57.57	-4.18	74.0	-16.43	Peak	143.80	100	Horizontal	Pass
3**	2400.000	51.18	-4.18	54.0	-2.82	AV	143.80	100	Horizontal	Pass
4	2416.971	93.89	-4.14	74.0	19.89	Peak	137.90	100	Horizontal	N/A
4**	2416.971	88.60	-4.14	54.0	34.60	AV	137.90	100	Horizontal	N/A

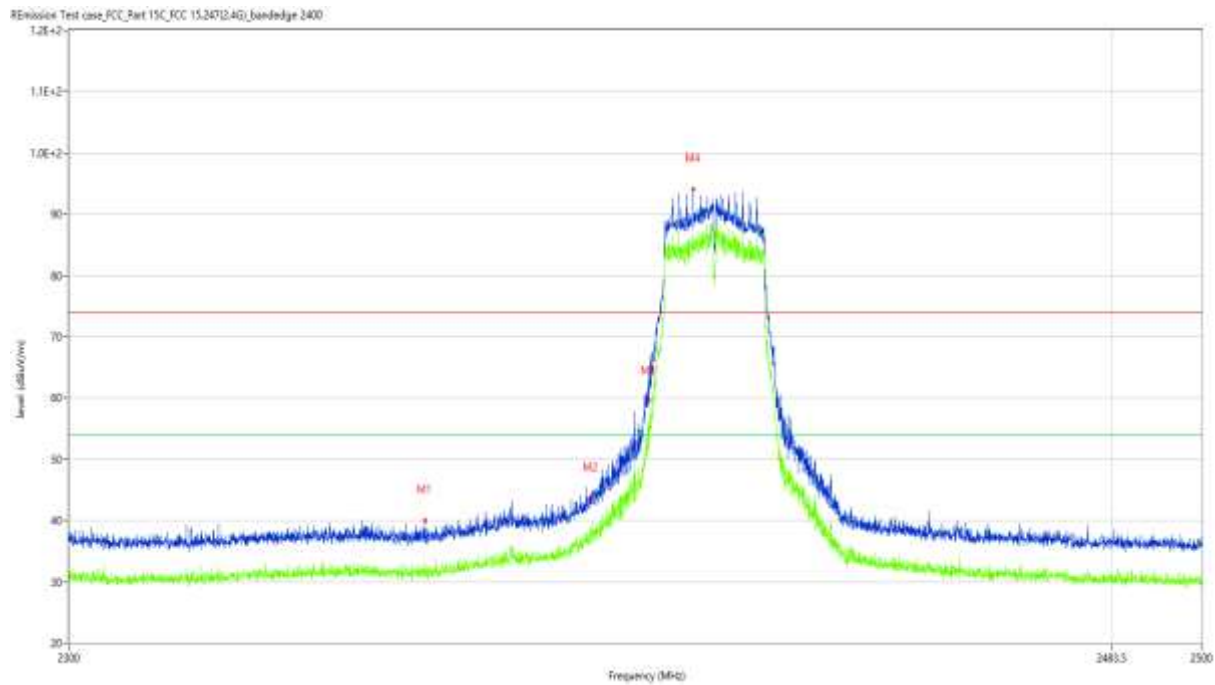
TEST REPORT

Report No.: SHE19110012-03KE

Date: 2019-11-19

Page 21 of 23

Vertical



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2361.035	40.09	-4.25	74.0	-33.91	Peak	235.20	100	Vertical	Pass
1**	2361.035	31.45	-4.25	54.0	-22.55	AV	235.20	100	Vertical	Pass
2	2390.000	44.11	-3.76	74.0	-29.89	Peak	64.40	100	V	Pass
2**	2390.000	38.02	-3.76	54.0	-15.98	AV	64.40	100	V	Pass
3	2400.000	59.65	-4.18	74.0	-14.35	Peak	55.70	100	V	Pass
3**	2400.000	51.96	-4.18	54.0	-2.04	AV	55.70	100	V	Pass
4	2408.173	94.16	-4.16	74.0	20.16	Peak	203.10	100	Vertical	N/A
4**	2408.173	86.83	-4.16	54.0	32.83	AV	203.10	100	Vertical	N/A

TEST REPORT

Report No.: SHE19110012-03KE

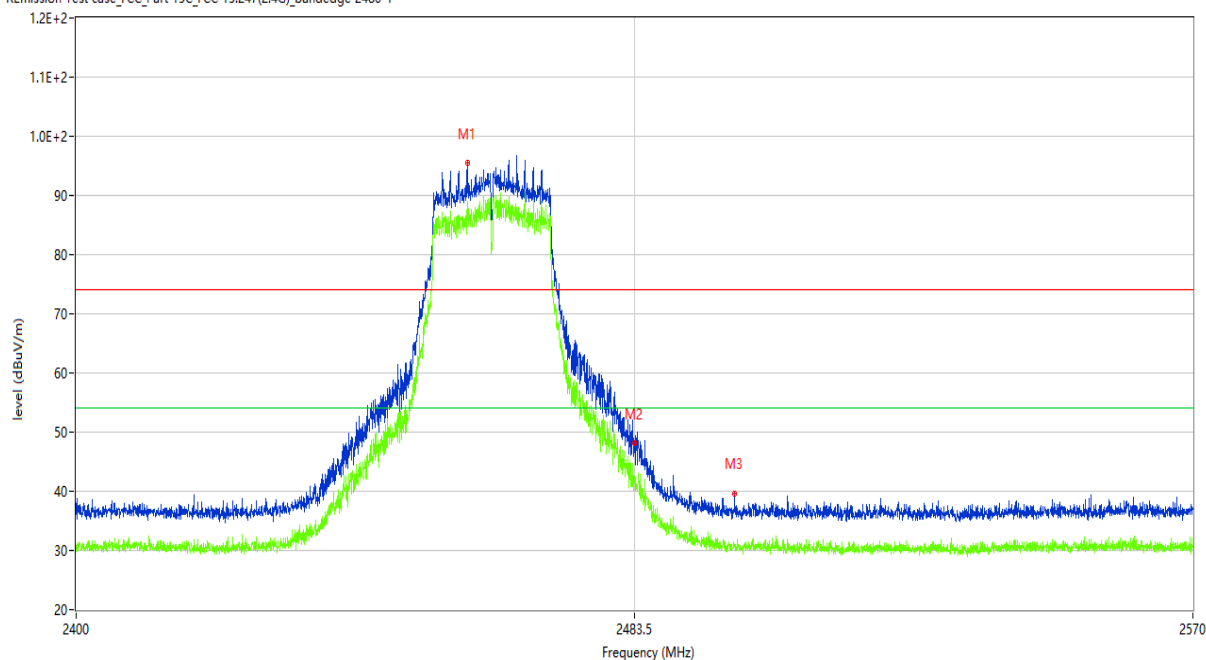
Date: 2019-11-19

Page 22 of 23

Figure 6: Band Edge (Restricted-band band-edge), 802.11n(HT20), 2462MHz

Horizontal

REmission Test case_FCC_Part 15C_FCC 15.247(2.4G)_bandedge 2480-1



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2458.210	95.44	-3.73	74.0	21.44	Peak	144.60	100	Horizontal	N/A
1**	2458.210	88.96	-3.73	54.0	34.96	AV	144.60	100	Horizontal	N/A
2	2483.500	47.89	-3.87	74.0	-26.11	Peak	145.17	100	Horizontal	Pass
2**	2483.500	41.61	-3.87	54.0	-12.39	AV	145.17	100	Horizontal	Pass
3	2498.788	39.62	-4.39	74.0	-34.38	Peak	269.10	100	Horizontal	Pass
3**	2498.788	31.06	-4.39	54.0	-22.94	AV	269.10	100	Horizontal	Pass

TEST REPORT

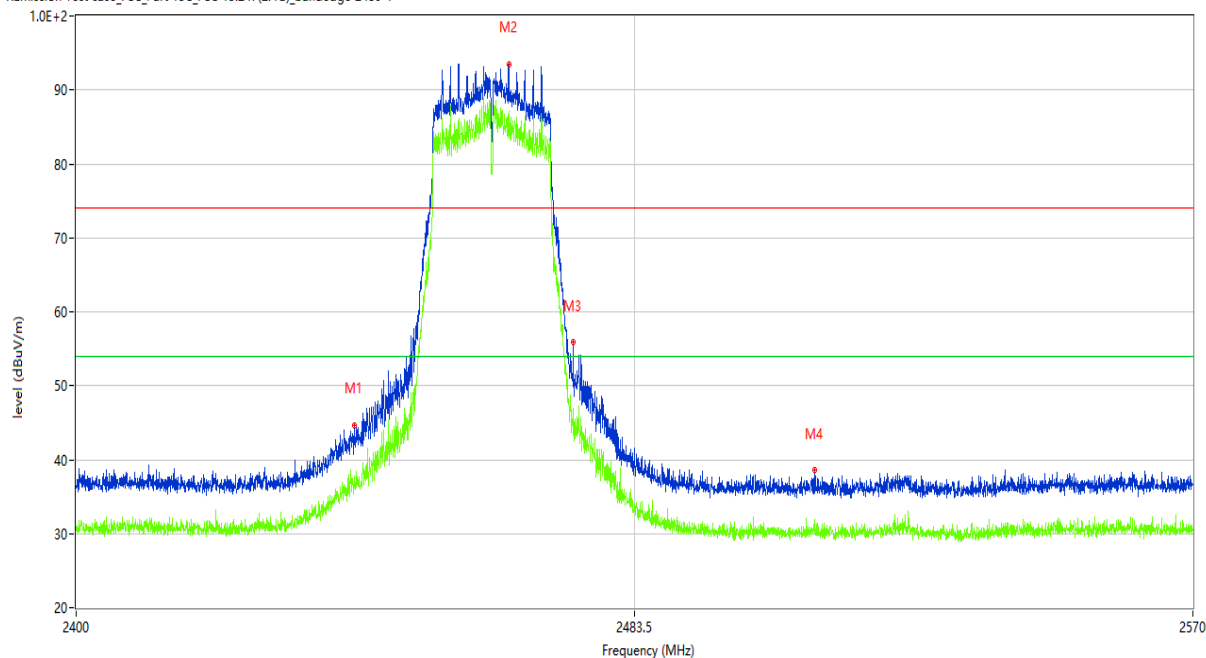
Report No.: SHE19110012-03KE

Date: 2019-11-19

Page 23 of 23

Vertical

REmission Test case_FCC_Part 15C_FCC 15.247(2.4G)_bandedge 2480-1



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2441.215	44.65	-4.07	74.0	-29.35	Peak	39.00	100	Vertical	Pass
1**	2441.215	37.73	-4.07	54.0	-16.27	AV	39.00	100	Vertical	Pass
2	2464.456	93.50	-3.62	74.0	19.50	Peak	36.00	100	Vertical	N/A
2**	2464.456	87.04	-3.62	54.0	33.04	AV	36.00	100	Vertical	N/A
3	2474.229	55.85	-3.63	74.0	-18.15	Peak	39.00	100	Vertical	Pass
3**	2474.229	46.91	-3.63	54.0	-7.09	AV	39.00	100	Vertical	Pass
4	2511.110	38.65	-4.39	74.0	-35.35	Peak	100.00	100	Vertical	Pass
4**	2511.110	31.85	-4.39	54.0	-22.15	AV	100.00	100	Vertical	Pass

End of the report