TEST REPORT

Applicant	:	Toast, Inc.
Address of Applicant	:	401 Park Drive, Suite 801, Boston, MA 02215, USA
Product Name	:	Data Processing machine
Model No.	:	TT200/TK200
Sample No.	:	E19110012-02#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 (Jennifer Zhou) Reviewed by: Adrian Shi (Adrian Shi) Approved by: Guoyou Chi (Authorized signatory: Guoyou Chi)

TEST REPORT

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

Contents

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.	TT200/TK200
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 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.
4. The model TK200 is the same as TT200 except the attached base support, detail please refer to clause 5.1. So only tested model was TT200.

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.

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

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

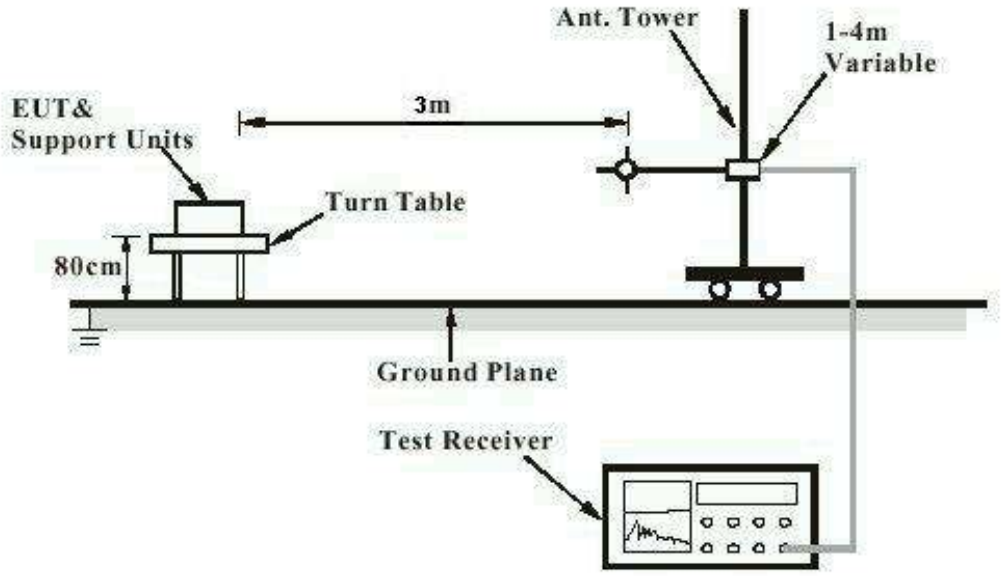
Description	Manufacturer	Model No.	Serial No.
Laptop	Lenovo	TP00083A	N/A

3.3 Support Software

Description	Manufacturer	Software Name
Software	/	RF Test Tool

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.

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 SHE19110012-02JE".

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.

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

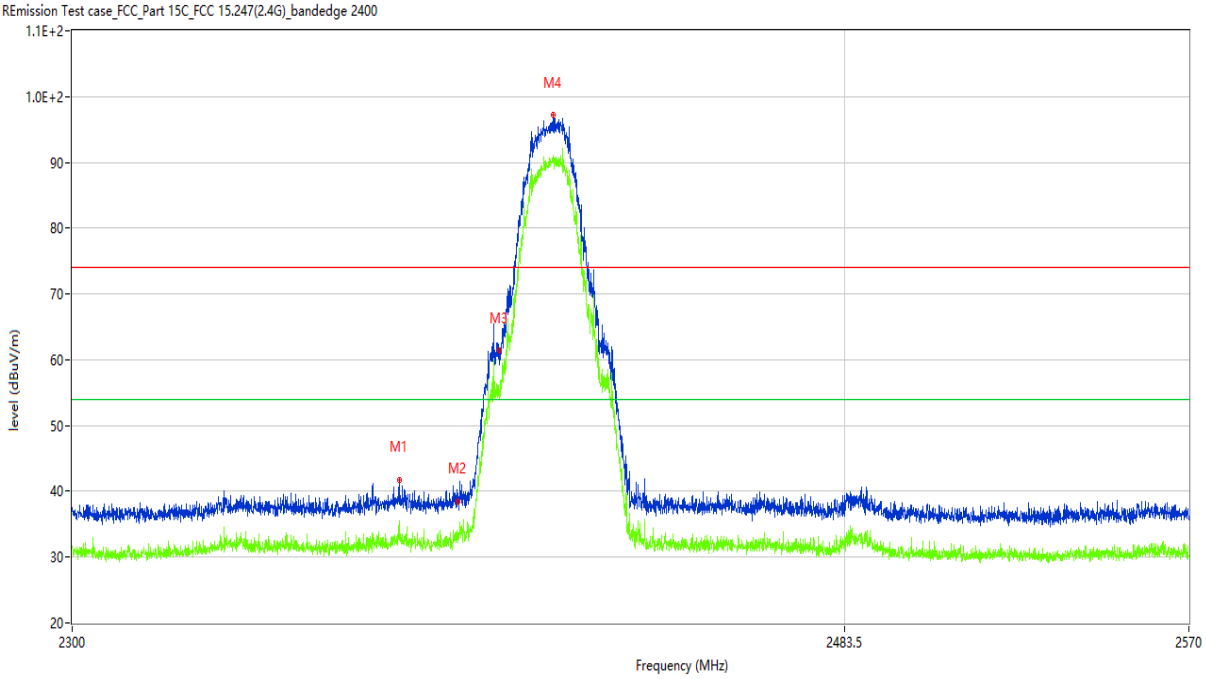
Test setup

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

For details refer to following test plot.

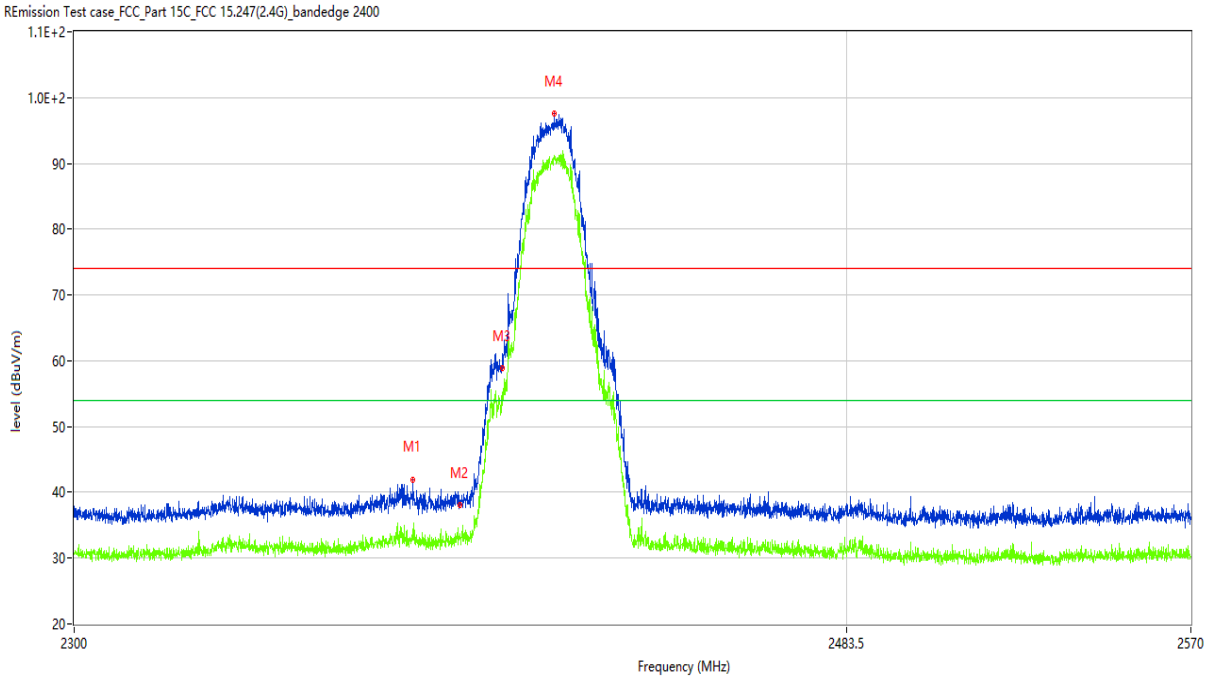
Figure 1: Band Edge (Restricted-band band-edge), 802.11b, 2412MHz

Horizontal



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2375.986	41.81	-3.88	74.0	-32.19	Peak	192.10	100	Horizontal	Pass
1**	2375.986	35.60	-3.88	54.0	-18.40	AV	192.10	100	Horizontal	Pass
2	2390.000	38.85	-3.76	74.0	-35.15	Peak	108.31	100	H	Pass
2**	2390.000	32.86	-3.76	54.0	-21.14	AV	108.31	100	H	Pass
3	2400.000	61.46	-4.18	74.0	-12.54	Peak	145.28	100	H	Pass
3**	2400.000	56.13	-4.18	54.0	2.13	AV	145.28	100	H	N/A
4	2412.562	97.15	-4.15	74.0	23.15	Peak	36.10	100	Horizontal	N/A
4**	2412.562	90.36	-4.15	54.0	36.36	AV	36.10	100	Horizontal	N/A

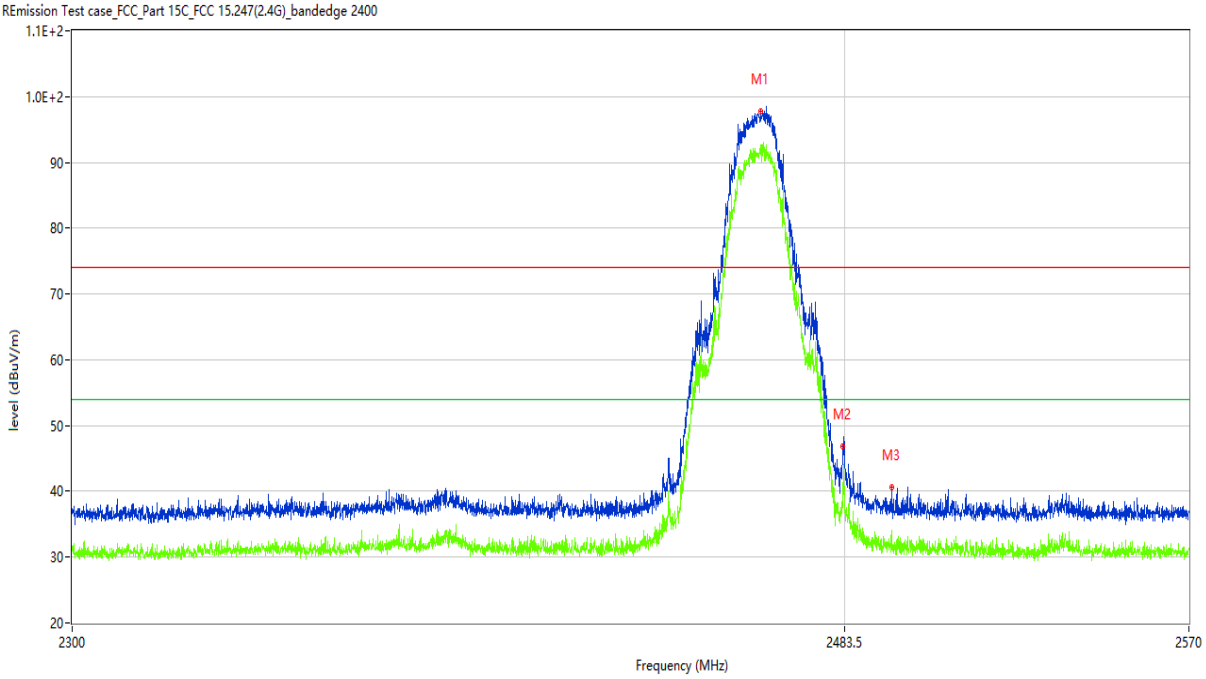
Vertical



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2378.685	41.96	-3.83	74.0	-32.04	Peak	140.50	100	Vertical	Pass
1**	2378.685	33.91	-3.83	54.0	-20.09	AV	140.50	100	Vertical	Pass
2	2390.000	38.02	-3.76	74.0	-35.98	Peak	188.36	100	V	Pass
2**	2390.000	31.76	-3.76	54.0	-22.24	AV	188.36	100	V	Pass
3	2400.000	58.63	-4.18	74.0	-15.37	Peak	148.29	100	V	Pass
3**	2400.000	52.91	-4.18	54.0	-1.09	AV	148.29	100	V	Pass
4	2412.427	97.50	-4.15	74.0	23.50	Peak	276.00	100	Vertical	N/A
4**	2412.427	89.94	-4.15	54.0	35.94	AV	276.00	100	Vertical	N/A

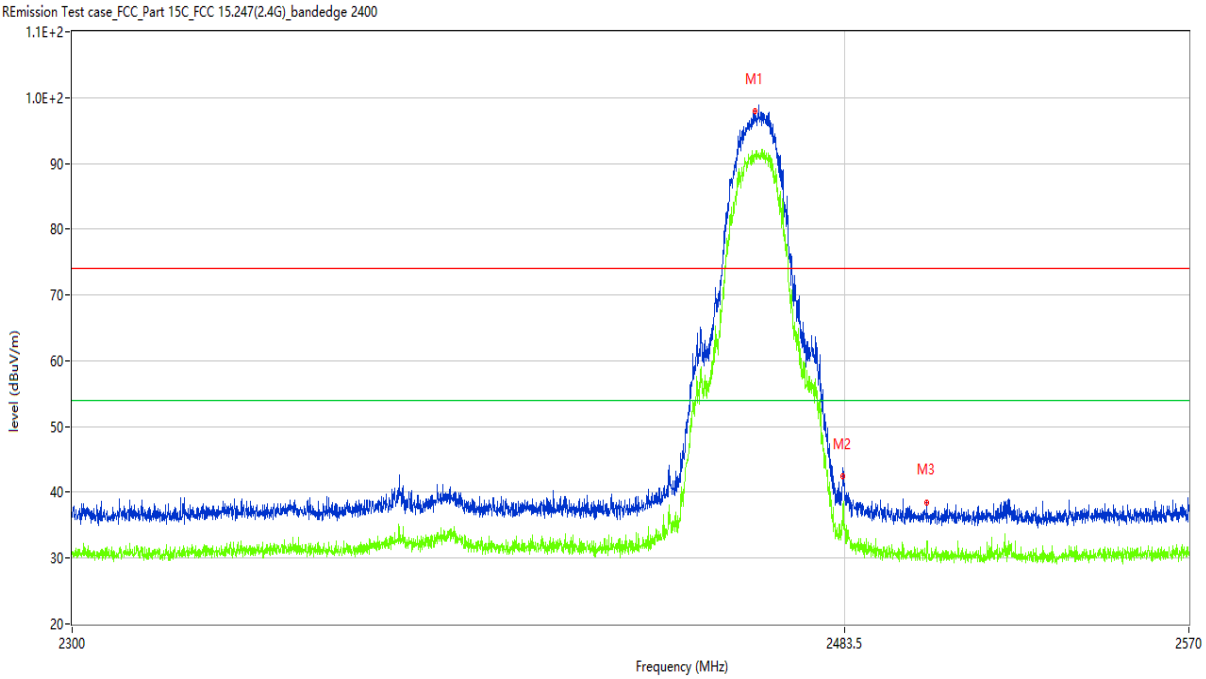
Figure 2: Band Edge (Restricted-band band-edge), 802.11b, 2462MHz

Horizontal



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2462.904	97.76	-3.65	74.0	23.76	Peak	61.50	100	Horizontal	N/A
1**	2462.904	90.64	-3.65	54.0	36.64	AV	61.50	100	Horizontal	N/A
2	2483.500	46.60	-3.87	74.0	-27.40	Peak	154.10	100	H	Pass
2**	2483.500	39.49	-3.87	54.0	-14.51	AV	154.10	100	H	Pass
3	2495.161	40.61	-4.26	74.0	-33.39	Peak	158.60	100	Horizontal	Pass
3**	2495.161	34.12	-4.26	54.0	-19.88	AV	158.60	100	Horizontal	Pass

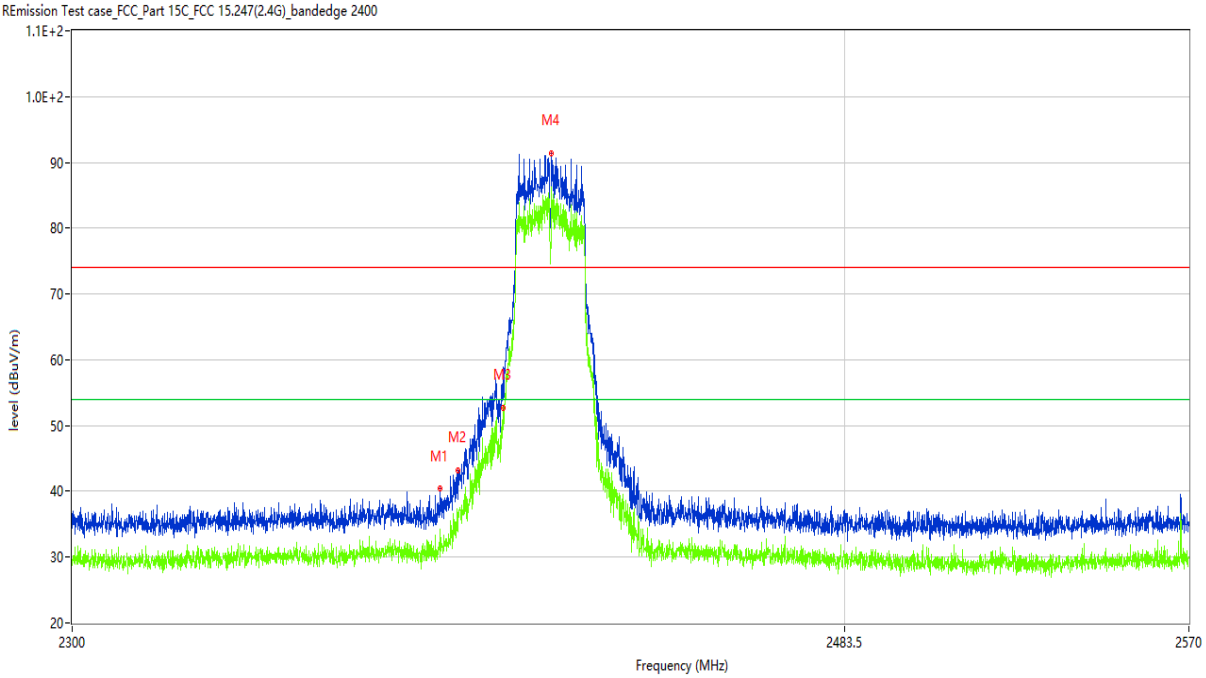
Vertical



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2461.555	97.88	-3.67	74.0	23.88	Peak	255.80	100	Vertical	N/A
1**	2461.555	91.27	-3.67	54.0	37.27	AV	255.80	100	Vertical	N/A
2	2483.500	38.91	-3.87	74.0	-35.09	Peak	253.90	100	V	Pass
2**	2483.500	33.29	-3.87	54.0	-20.71	AV	253.90	100	V	Pass
3	2503.934	38.47	-4.42	74.0	-35.53	Peak	216.00	100	Vertical	Pass
3**	2503.934	32.53	-4.42	54.0	-21.47	AV	216.00	100	Vertical	Pass

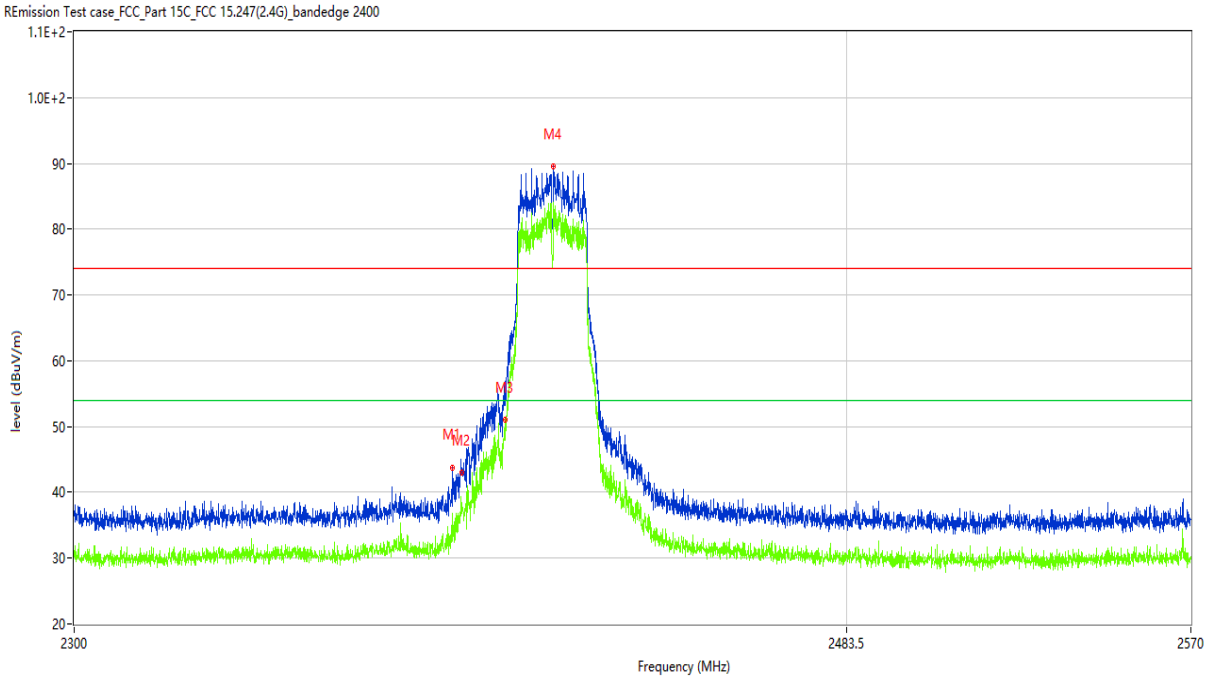
Figure 3: Band Edge (Restricted-band band-edge), 802.11g, 2412MHz

Horizontal



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2385.704	40.39	-3.78	74.0	-33.61	Peak	1.30	100	Horizontal	Pass
1**	2385.704	34.19	-3.78	54.0	-19.81	AV	1.30	100	Horizontal	Pass
2	2390.000	43.06	-3.76	74.0	-30.94	Peak	7.39	100	H	Pass
2**	2390.000	36.88	-3.76	54.0	-17.12	AV	7.39	100	H	Pass
3	2400.000	52.57	-4.18	74.0	-21.43	Peak	4.36	100	H	Pass
3**	2400.000	44.89	-4.18	54.0	-9.11	AV	4.36	100	H	Pass
4	2412.224	91.43	-4.15	74.0	17.43	Peak	8.60	100	Horizontal	N/A
4**	2412.224	86.18	-4.15	54.0	32.18	AV	8.60	100	Horizontal	N/A

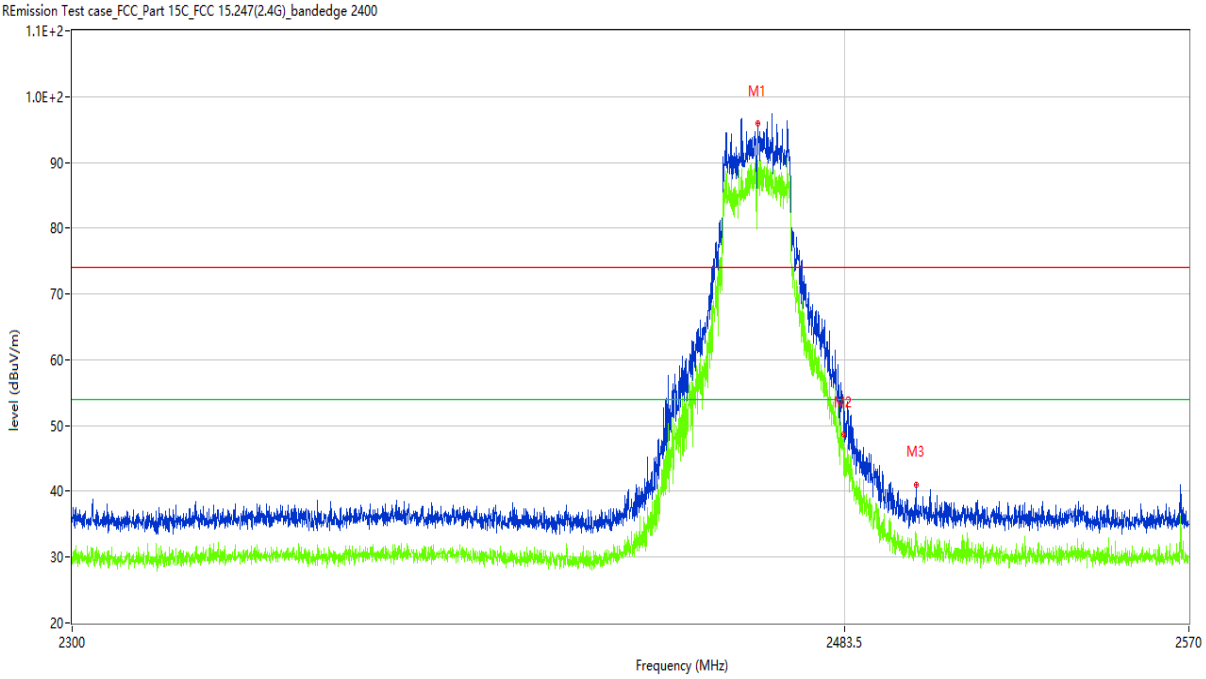
Vertical



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2388.200	43.77	-3.77	74.0	-30.23	Peak	312.30	100	Vertical	Pass
1**	2388.200	36.86	-3.77	54.0	-17.14	AV	312.30	100	Vertical	Pass
2	2390.000	43.13	-3.76	74.0	-30.87	Peak	312.13	100	V	Pass
2**	2390.000	36.40	-3.76	54.0	-17.60	AV	312.13	100	V	Pass
3	2400.000	51.50	-4.18	74.0	-22.50	Peak	311.58	100	V	Pass
3**	2400.000	44.45	-4.18	54.0	-9.55	AV	311.58	100	V	Pass
4	2412.224	89.49	-4.15	74.0	15.49	Peak	298.90	100	Vertical	N/A
4**	2412.224	84.02	-4.15	54.0	30.02	AV	298.90	100	Vertical	N/A

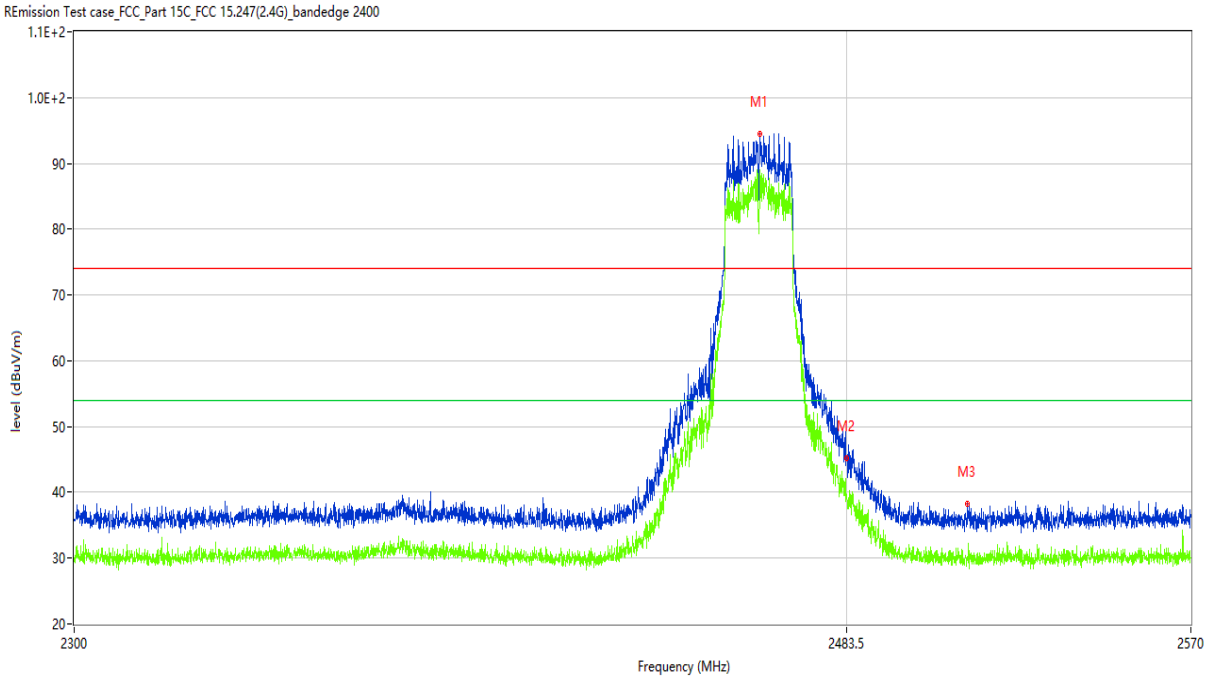
Figure 4: Band Edge (Restricted-band band-edge), 802.11g, 2462MHz

Horizontal



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2462.229	95.95	-3.66	74.0	21.95	Peak	320.10	100	Horizontal	N/A
1**	2462.229	89.59	-3.66	54.0	35.59	AV	320.10	100	Horizontal	N/A
2	2483.500	48.46	-3.87	74.0	-25.54	Peak	319.25	100	H	Pass
2**	2483.500	43.47	-3.87	54.0	-10.53	AV	319.25	100	H	Pass
3	2501.235	41.07	-4.43	74.0	-32.93	Peak	315.70	100	Horizontal	Pass
3**	2501.235	33.26	-4.43	54.0	-20.74	AV	315.70	100	Horizontal	Pass

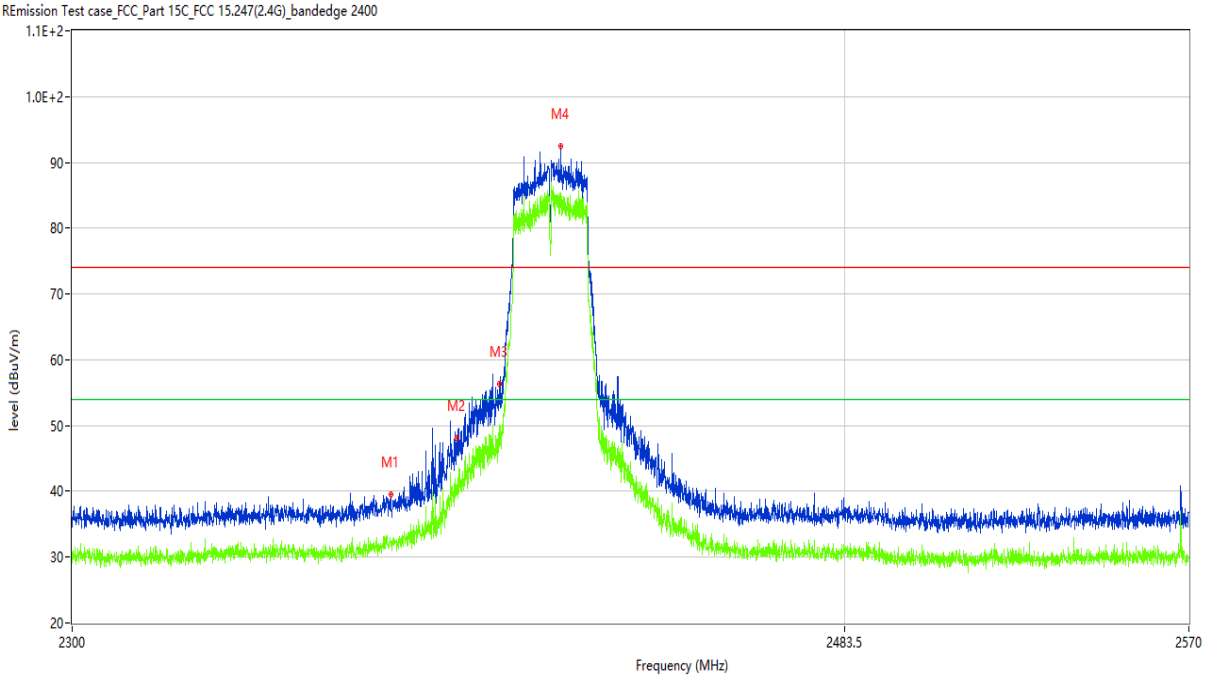
Vertical



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2462.229	96.58	-3.66	74.0	22.58	Peak	145.20	100	Vertical	N/A
1**	2462.229	91.42	-3.66	54.0	37.42	AV	145.20	100	Vertical	N/A
2	2483.500	45.21	-3.87	74.0	-28.79	Peak	80.56	100	V	Pass
2**	2483.500	39.35	-3.87	54.0	-14.65	AV	80.56	100	V	Pass
3	2513.517	38.23	-4.36	74.0	-35.77	Peak	56.30	100	Vertical	Pass
3**	2513.517	30.29	-4.36	54.0	-23.71	AV	56.30	100	Vertical	Pass

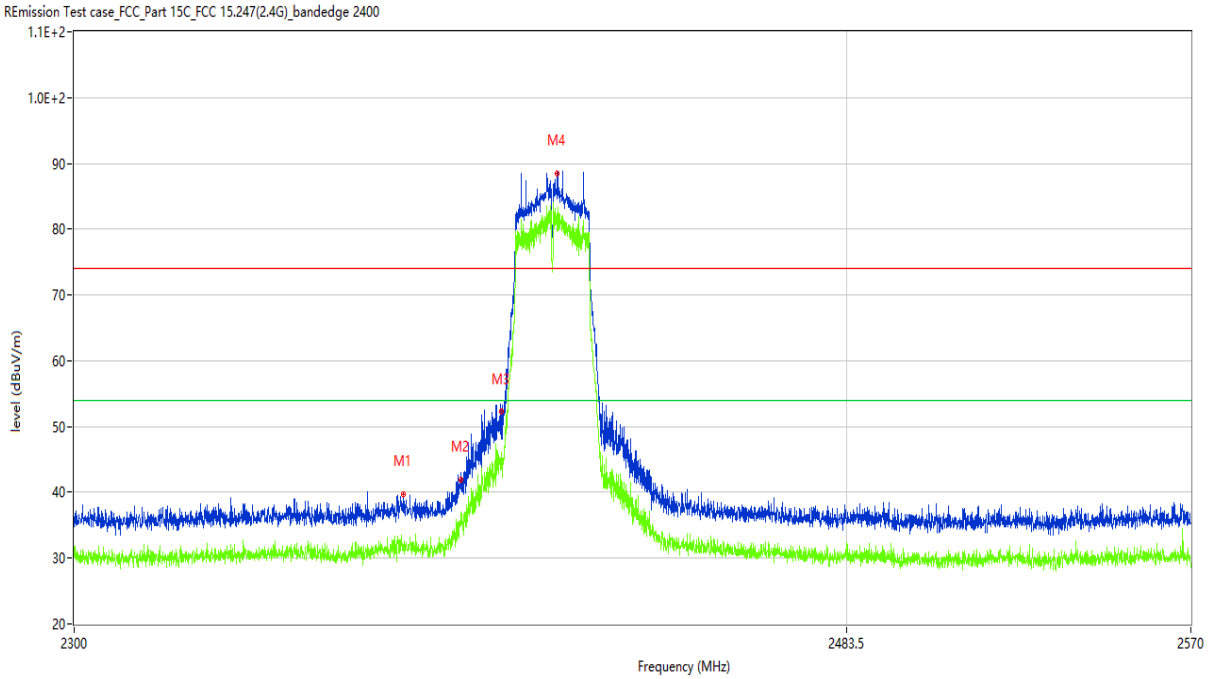
Figure 5: Band Edge (Restricted-band band-edge), 802.11n(HT20), 2412MHz

Horizontal



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2373.962	39.46	-3.91	74.0	-34.54	Peak	67.10	100	Horizontal	Pass
1**	2373.962	32.18	-3.91	54.0	-21.82	AV	67.10	100	Horizontal	Pass
2	2390.000	48.26	-3.76	74.0	-25.74	Peak	52.16	100	H	Pass
2**	2390.000	42.58	-3.76	54.0	-11.42	AV	52.16	100	H	Pass
3	2399.808	56.25	-4.17	74.0	-17.75	Peak	54.10	100	Horizontal	Pass
3**	2399.808	48.20	-4.17	54.0	-5.80	AV	54.10	100	Horizontal	Pass
4	2414.451	92.46	-4.15	74.0	18.46	Peak	71.60	100	Horizontal	N/A
4**	2414.451	85.43	-4.15	54.0	31.43	AV	71.60	100	Horizontal	N/A

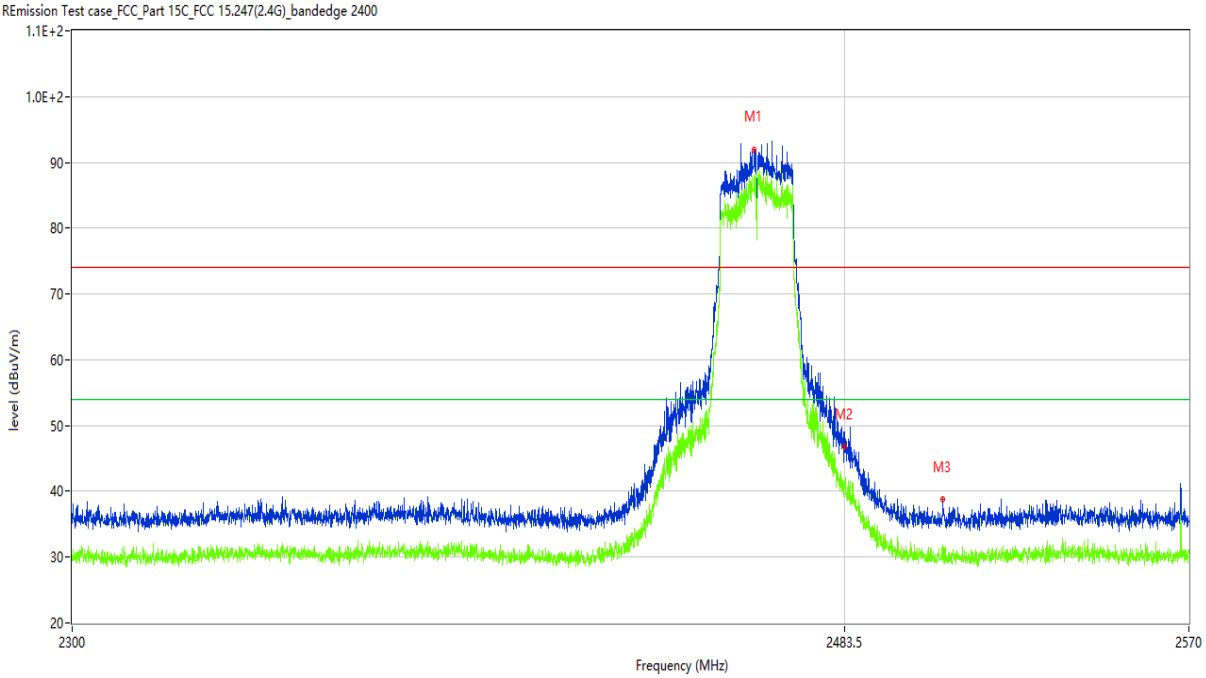
Vertical



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2376.458	39.74	-3.87	74.0	-34.26	Peak	321.20	100	Vertical	Pass
1**	2376.458	32.09	-3.87	54.0	-21.91	AV	321.20	100	Vertical	Pass
2	2390.000	42.17	-3.76	74.0	-31.83	Peak	309.48	100	V	Pass
2**	2390.000	35.79	-3.76	54.0	-18.21	AV	309.48	100	V	Pass
3	2400.000	52.49	-4.18	74.0	-21.51	Peak	323.05	100	V	Pass
3**	2400.000	44.73	-4.18	54.0	-9.27	AV	323.05	100	V	Pass
4	2413.169	88.54	-4.15	74.0	14.54	Peak	312.30	100	Vertical	N/A
4**	2413.169	81.57	-4.15	54.0	27.57	AV	312.30	100	Vertical	N/A

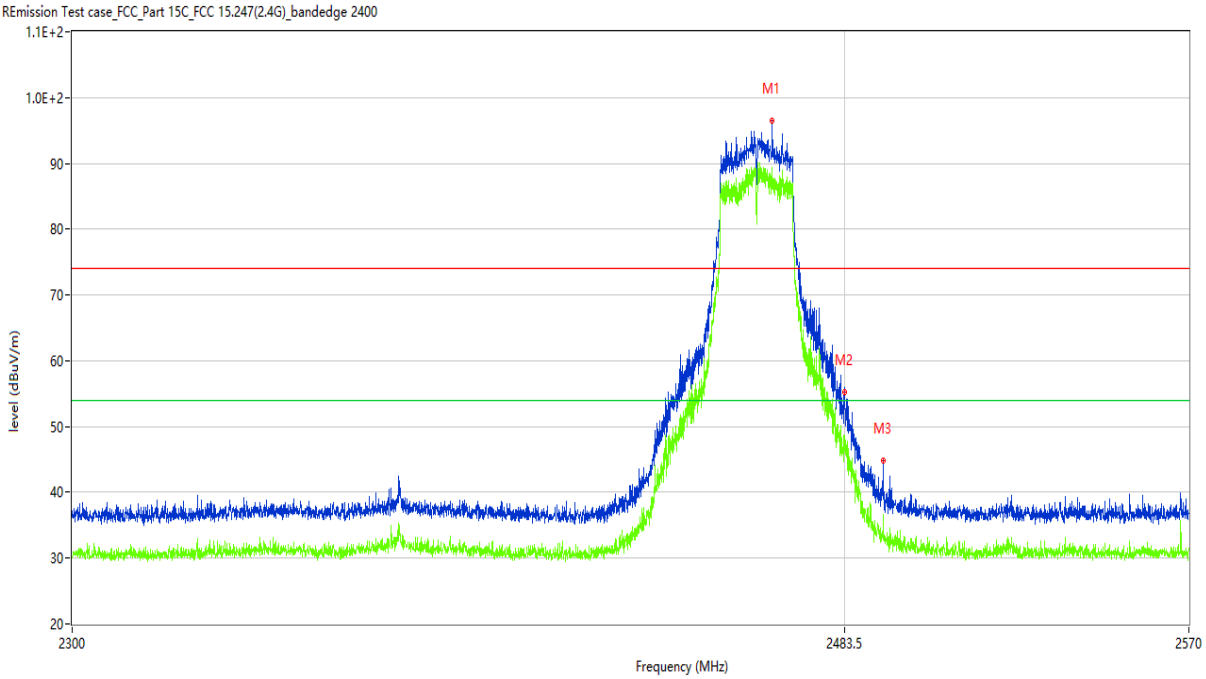
Figure 6: Band Edge (Restricted-band band-edge), 802.11n(HT20), 2462MHz

Horizontal



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2461.352	91.86	-3.67	74.0	17.86	Peak	12.70	100	Horizontal	N/A
1**	2461.352	87.37	-3.67	54.0	33.37	AV	12.70	100	Horizontal	N/A
2	2483.500	46.63	-3.87	74.0	-27.37	Peak	60.30	100	H	Pass
2**	2483.500	41.01	-3.87	54.0	-12.99	AV	60.30	100	H	Pass
3	2507.848	38.74	-4.41	74.0	-35.26	Peak	79.00	100	Horizontal	Pass
3**	2507.848	31.29	-4.41	54.0	-22.71	AV	79.00	100	Horizontal	Pass

Vertical



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2465.739	96.49	-3.60	74.0	22.49	Peak	150.00	100	Vertical	N/A
1**	2465.739	89.30	-3.60	54.0	35.30	AV	150.00	100	Vertical	N/A
2	2483.500	55.23	-3.87	74.0	-18.77	Peak	154.50	100	V	Pass
2**	2483.500	47.78	-3.87	54.0	-6.22	AV	154.50	100	V	Pass
3	2493.137	44.91	-4.19	74.0	-29.09	Peak	154.50	100	Vertical	Pass
3**	2493.137	36.57	-4.19	54.0	-17.43	AV	154.50	100	Vertical	Pass

End of the report