FCC Radio Test Report

FCC ID: 2AVWQ79X

Report No.	:	BTL-FCCP-1-1911T154A
Equipment	:	Vbot Robotic Vacuum Cleaner
Model Name	:	M790, RM790, M792, M793, M795, SCOUT, VG700
Brand Name	:	Vbot
Applicant	:	Matsutek Enterprises Co., Ltd.
Address	:	2F., No. 2, Ln. 15, Ziqiang St., New Taipei City 23678, Taiwan
Radio Function	:	WLAN 2.4 GHz
FCC Rule Part(s)	:	FCC Part15, Subpart C (15.247)
Measurement Procedure(s)	:	ANSI C63.10-2013
Date of Receipt	:	2019/12/16
Date of Test	:	2019/12/16 ~ 2020/5/27
Issued Date	:	2020/6/1

The above equipment has been tested and found in compliance with the requirement of the above standards by BTL Inc.

Prepared by : _____
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Approved by : _____
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Testing Laboratory
0659

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Declaration

BTL represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with standards traceable to international standard(s) and/or national standard(s).

BTL's reports apply only to the specific samples tested under conditions. It is manufacture's responsibility to ensure that additional production units of this model are manufactured with the identical electrical and mechanical components. **BTL** shall have no liability for any declarations, inferences or generalizations drawn by the client or others from **BTL** issued reports.

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The information, data and test plan are provided by manufacturer which may affect the validity of results, so it is manufacturer's responsibility to ensure that the apparatus meets the essential requirements of applied standards and in all the possible configurations as representative of its intended use.

Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

Please note that the measurement uncertainty is provided for informational purpose only and are not use in determining the Pass/Fail results.

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REPORT ISSUED HISTORY

Report Version	Description	Issued Date
R00	Original Issue.	2020/4/29
R01	Revised report to address TCB's comments.	2020/5/20
R02	Added five series models of two buttons.	2020/6/1
R03	Revised Typo.	2020/6/1

1 SUMMARY OF TEST RESULTS

Test procedures according to the technical standards.

FCC Part 15, Subpart C (15.247)				
Standard(s) Section	**Description**	**Test Result**	**Judgement**	**Remark**
15.207	AC Power Line Conducted Emissions	APPENDIX A	Pass	------
15.205 15.209 15.247(d)	Radiated Emissions	APPENDIX B APPENDIX C	Pass	------
15.247(a)	Bandwidth	APPENDIX D	Pass	------
15.247(b)	Output Power	APPENDIX E	Pass	------
15.247(e)	Power Spectral Density	APPENDIX F	Pass	------
15.247(d)	Antenna conducted Spurious Emission	APPENDIX G	Pass	------
15.203	Antenna Requirement	------	Pass	------

NOTE:
(1) ”N/A” denotes test is not applicable in this Test Report.
(2) The report format version is TP.1.1.1.

1.1 TEST FACILITY

The test facilities used to collect the test data in this report:

No. 68-1, Ln. 169, Sec. 2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan
The test sites and facilities are covered under FCC RN: 674415 and DN: TW0659.

☒ C05 ☐ CB08 ☐ CB11 ☐ CB15 ☐ CB16
☒ SR06

No.18, Ln. 171, Sec. 2, Jiuzong Rd., Neihu Dist., Taipei City 114, Taiwan
The test sites and facilities are covered under FCC RN: 674415 and DN: TW0659.

☐ C03 ☒ CB18 ☐ CB19

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement **y** ± **U**, where expanded uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k = 2**, providing a level of confidence of approximately **95 %**. The measurement instrumentation uncertainty considerations contained in CISPR 16-4-2. The BTL measurement uncertainty is less than the CISPR 16-4-2 U_{cispr} requirement.

A. AC power line conducted emissions test:

Test Site	Method	Measurement Frequency Range	U (dB)
C05	CISPR	150 kHz ~ 30MHz	3.44

B. Radiated emissions test

Test Site	Measurement Frequency Range	U,(dB)
CB18	0.03 GHz ~ 0.2 GHz	4.17
	0.2 GHz ~ 1 GHz	4.72
	1 GHz ~ 6 GHz	5.21
	6 GHz ~ 18 GHz	5.51
	18 GHz ~ 26 GHz	3.69
	26 GHz ~ 40 GHz	4.23

C. Conducted test :

Test Item	U,(dB)
Bandwidth	1.13
Output power	1.06
Power Spectral Density	1.20
Conducted Spurious emissions	1.14
Conducted Band edges	1.13

NOTE:
Unless specifically mentioned, the uncertainty of measurement has not been taken into account to declare the compliance or non-compliance to the specification.

1.3 TEST ENVIRONMENT CONDITIONS

Test Item	Environment Condition	Tested by
AC Power Line Conducted Emissions	23 °C, 66 %	Jay Kao
Radiated emissions below 1 GHz	23 °C, 65 %	Hunter Chiang
Radiated emissions above 1 GHz	23 °C, 65 %	Hunter Chiang
Bandwidth	24.5 °C, 56.5 %	Jay Kao
Output Power	24.5 °C, 56.5 %	Jay Kao
Power Spectral Density	24.5 °C, 56.5 %	Jay Kao
Antenna conducted Spurious Emission	24.5 °C, 56.5 %	Jay Kao

For two buttons model:

Test Item	Environment Condition	Tested by
AC Power Line Conducted Emissions	25 °C, 57 %	William Wei
Radiated emissions below 1 GHz	22 °C, 65 %	Hunter Chiang

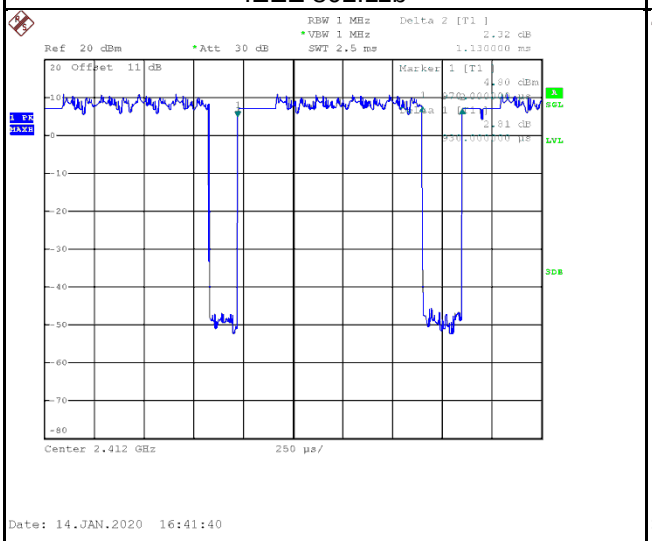
1.4 TABLE OF PARAMETERS OF TEST SOFTWARE SETTING

Test Software	custom software			
Mode	2412 MHz	2437 MHz	2462 MHz	Data Rate
IEEE 802.11b	25	24	24	1 Mbps
IEEE 802.11g	31	30	30	6 Mbps
IEEE 802.11n (HT20)	31	30	30	MCS 0
Mode	2422 MHz	2437 MHz	2452 MHz	Data Rate
IEEE 802.11n (HT40)	33	32	32	MCS 0

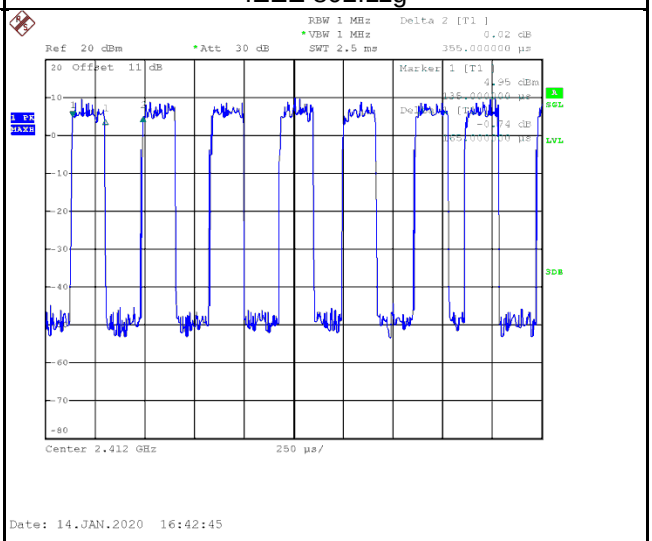
1.5 DUTY CYCLE

If duty cycle is ≥ 98 %, duty factor is not required.
If duty cycle is < 98 %, duty factor shall be considered.

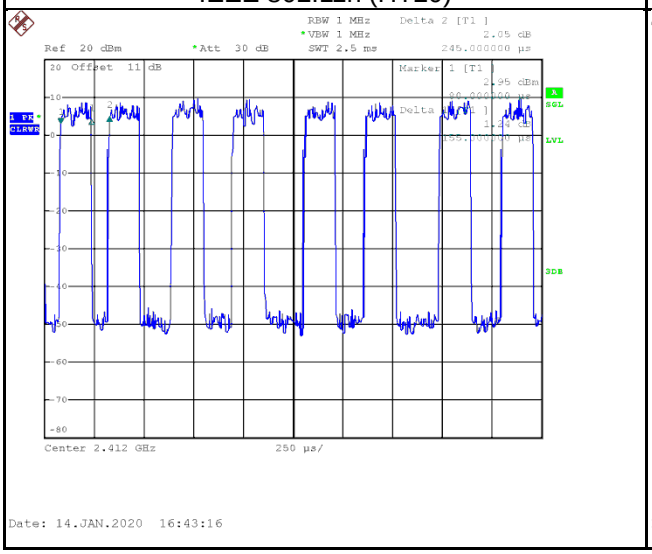
IEEE 802.11b



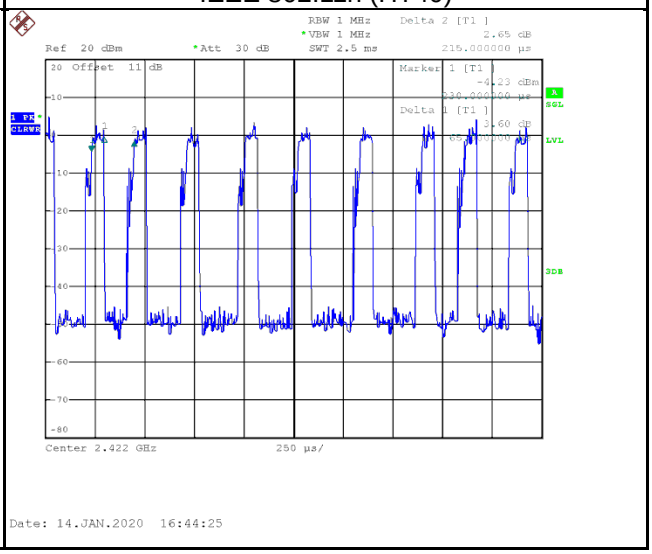
IEEE 802.11g



IEEE 802.11n (HT20)



IEEE 802.11n (HT40)



Remark	Delta 1			Delta 2	On Time/Period	10 log(1/Duty Cycle)
Mode	ON (ms)	Numbers (ON)	On Time (B) (ms)	Period (ON+OFF) (ms)	Duty Cycle (%)	Duty Factor (dB)
IEEE 802.11b	0.930	1	0.930	1.130	82.30%	0.85
IEEE 802.11g	0.165	1	0.165	0.355	46.48%	3.33
IEEE 802.11n (HT20)	0.155	1	0.155	0.245	63.27%	1.99
IEEE 802.11n (HT40)	0.065	1	0.065	0.215	30.23%	5.20

2 GENERAL INFORMATION

2.1 DESCRIPTION OF EUT

Equipment	Vbot Robotic Vacuum Cleaner
Model Name	M790, RM790, M792, M793, M795, SCOUT, VG700
Brand Name	Vbot
Model Difference	Differ in model names and number of buttons. Model Name: Number of buttons M790, RM790: three M792, M793, M795, SCOUT, VG700: two
Power Source	Host: Supplied from battery. Docking: DC voltage supplied from External Power Supply.
Power Rating	Host: I/P: 10.95V⎓5200mAh Docking: I/P: 100-240Vac~ 50-60Hz, 1.0A O/P: 20V⎓1.2A
Products Covered	1 * Adapter: LITEON / PA-1240-18VN 1 * Docking
Frequency Range	2400 MHz ~ 2483.5 MHz
Operation Frequency	2412 MHz ~ 2462 MHz
Modulation Technology	IEEE 802.11b: DSSS IEEE 802.11g: OFDM IEEE 802.11n: OFDM
Transfer Rate	IEEE 802.11b: 11/5.5/2/1 Mbps IEEE 802.11g: 54/48/36/24/18/12/9/6 Mbps IEEE 802.11n: up to 150 Mbps
Output Power Max.	IEEE 802.11b: 16.61 dBm (0.0458 W) IEEE 802.11g: 23.46 dBm (0.2218 W) IEEE 802.11n (HT20): 22.92 dBm (0.1959 W) IEEE 802.11n (HT40): 23.91 dBm (0.2460 W)
Test Model	M790, M792
Sample Status	Engineering Sample
EUT Modification(s)	N/A

NOTE:
(1) For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
(2) Channel List:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2412	05	2432	09	2452
02	2417	06	2437	10	2457
03	2422	07	2442	11	2462
04	2427	08	2447		

(3) Table for Filed Antenna:

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	Dongguan Qiyuan Electronic Technology Co.,LTD	QY074-11S0001A	PCB	I-PEX	2.85

2.2 TEST MODES

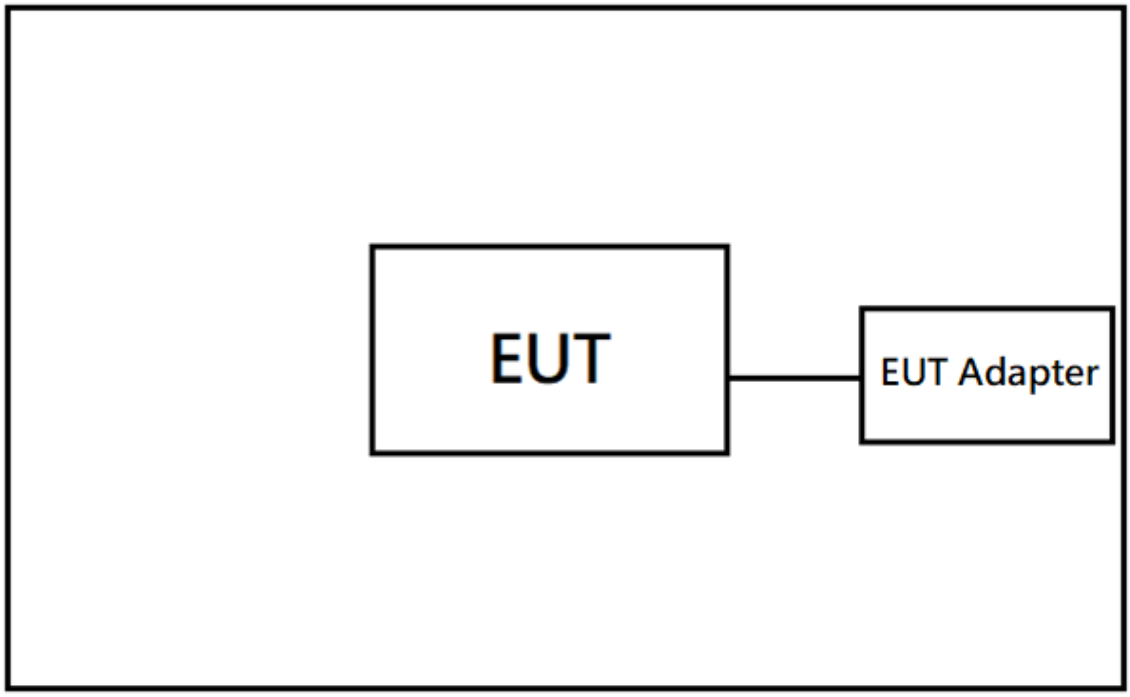
Test Items	Test mode	Channel	Note
AC power line conducted emissions	2.4G_Normal	-	-
Transmitter Radiated Emissions (below 1GHz)	TX Mode_IEEE 802.11b	01	-
Transmitter Radiated Emissions (above 1GHz)	TX Mode_IEEE 802.11b	01/06/11	-
	TX Mode_IEEE 802.11g		
	TX Mode_IEEE 802.11n (HT20)		
	TX Mode_IEEE 802.11n (HT40)	03/06/09	-
Bandwidth	TX Mode_IEEE 802.11b	01/06/11	-
	TX Mode_IEEE 802.11g		
	TX Mode_IEEE 802.11n (HT20)		
	TX Mode_IEEE 802.11n (HT40)	03/06/09	-
Output Power	TX Mode_IEEE 802.11b	01/06/11	-
	TX Mode_IEEE 802.11g		
	TX Mode_IEEE 802.11n (HT20)		
	TX Mode_IEEE 802.11n (HT40)	03/06/09	-
Power Spectral Density	TX Mode_IEEE 802.11b	01/06/11	-
	TX Mode_IEEE 802.11g		
	TX Mode_IEEE 802.11n (HT20)		
	TX Mode_IEEE 802.11n (HT40)	03/06/09	-
Antenna conducted Spurious Emission	TX Mode_IEEE 802.11b	01/06/11	-
	TX Mode_IEEE 802.11g		
	TX Mode_IEEE 802.11n (HT20)		
	TX Mode_IEEE 802.11n (HT40)	03/06/09	-

NOTE:
(1) The Radiated emissions test was verified based on the worst conducted power and Bandwidth test results reported in the original report.
(2) For radiated emission band edge test, both Vertical and Horizontal are evaluated, but only the worst case (IEEE 802.11b/g: Horizontal, IEEE 802.11n: Vertical)) is recorded.
(3) All X, Y and Z axes are evaluated, but only the worst case (X axis) is recorded.
(4) There were no emissions found below 30 MHz within 20 dB of the limit.
(5) For AC Power Line Conducted Emissions and Radiation below 1 GHz, M792 (two buttons model) and M790 (three buttons model) are found to be the worst case and used for final test.
(6) For Conducted test and Radiation above 1 GHz M790 (three buttons model) is found to be the worst case and used for final test.

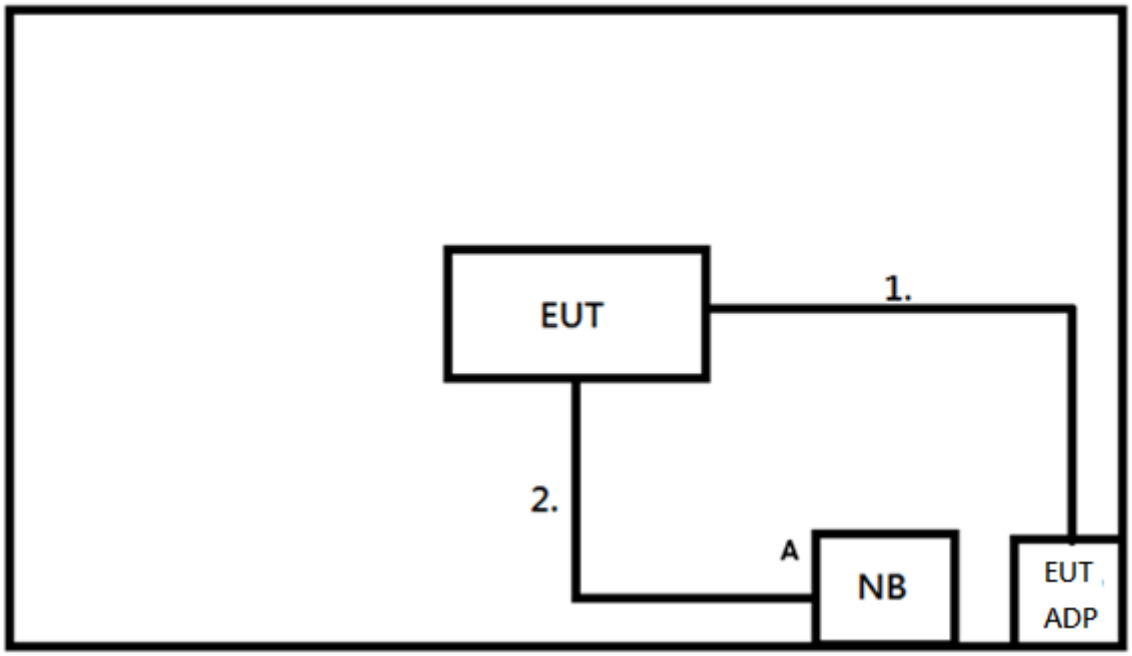
2.3 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Equipment letters and Cable numbers refer to item numbers described in the tables of clause 2.4.

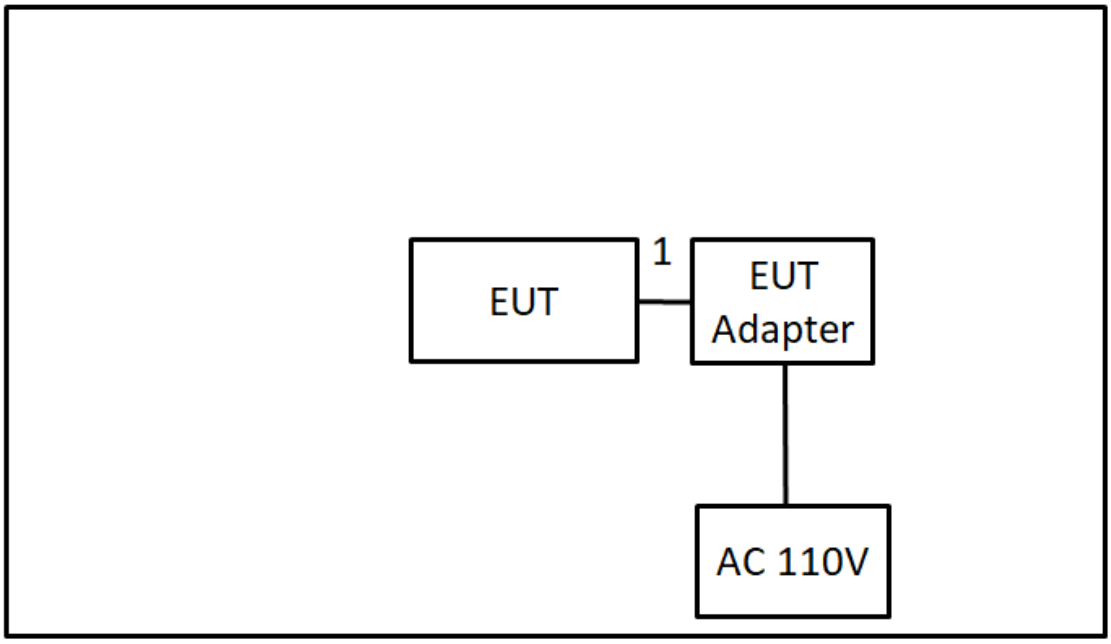
AC power line conducted emissions test



Radiated emissions test



Radiated emissions test (two buttons model: M792)



2.4 SUPPORT UNITS

Item	Equipment	Brand	Model No.	Series No.	Remarks
A	NB	HP	TPN-1119	NA	Furnished by test lab.

Item	Shielded	Ferrite Core	Length	Cable Type	Remarks
1	N/A	N/A	1M	Power Cable	Supplied by test requester.
2	N/A	N/A	30CM	USB To Fixture	Furnished by test lab.

3 AC POWER LINE CONDUCTED EMISSIONS TEST

3.1 LIMIT

Frequency (MHz)	Limit (dBµV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56 *	56 - 46 *
0.50 - 5.0	56	46
5.0 - 30.0	60	50

NOTE:
(1) The tighter limit applies at the band edges.
(2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.
(3) The test result calculated as following:
Measurement Value = Reading Level + Correct Factor
Correct Factor = Insertion Loss + Cable Loss + Attenuator Factor (if use)
Margin Level = Measurement Value – Limit Value
Calculation example:

Reading Level		Correct Factor		Measurement Value
38.22	+	3.45	=	41.67

Measurement Value		Limit Value		Margin Level
41.67	-	60	=	-18.33

The following table is the setting of the receiver.

Receiver Parameter	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 KHz

3.2 TEST PROCEDURE

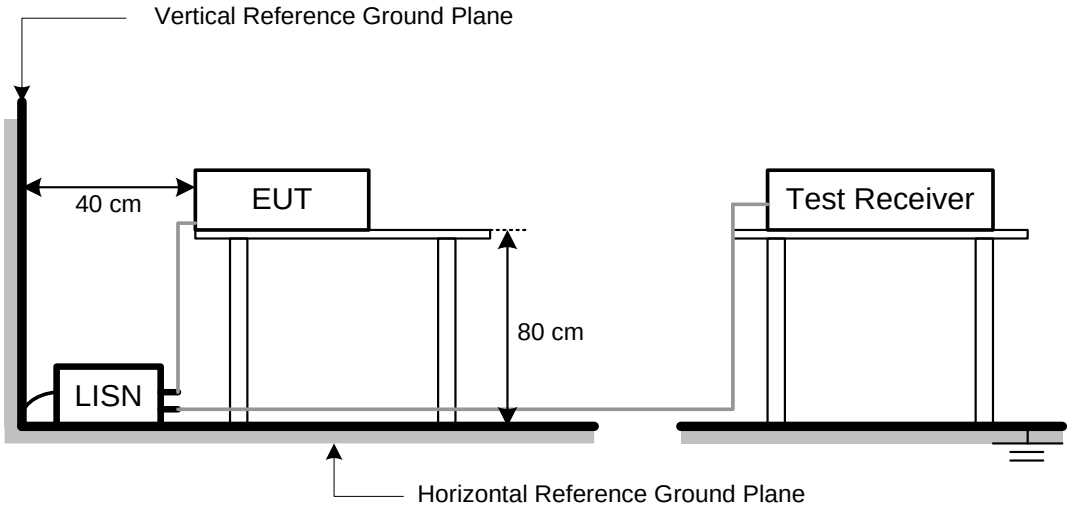
a. The EUT was placed 0.8 m above the horizontal ground plane with the EUT being connected to the power mains through a line impedance stabilization network (LISN).
All other support equipment were powered from an additional LISN(s).
The LISN provides 50 Ohm/50uH of impedance for the measuring instrument.
b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle to keep the cable above 40 cm.
c. Excess I/O cables that are not connected to a peripheral shall be bundled in the center.
The end of the cable will be terminated, using the correct terminating impedance.
The overall length shall not exceed 1 m.
d. The LISN is spaced at least 80 cm from the nearest part of the EUT chassis.
e. For the actual test configuration, please refer to the related Item - EUT TEST PHOTO.

NOTE:
(1) In the results, each reading is marked as Peak, QP or AVG per the detector used.
BW=9 kHz (6 dB Bandwidth)
(2) All readings are Peak unless otherwise stated QP or AVG in column of Note. Both the QP and the AVG readings must be less than the limit for compliance.

3.3 DEVIATION FROM TEST STANDARD

No deviation.

3.4 TEST SETUP



3.5 TEST RESULT

Please refer to the APPENDIX A.

4 RADIATED EMISSIONS TEST

4.1 LIMIT

In case the emission fall within the restricted band specified on 15.205, then the 15.209 limit in the table below has to be followed.

LIMITS OF RADIATED EMISSIONS MEASUREMENT (9 kHz to 1000 MHz)

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
960~1000	500	3

LIMITS OF RADIATED EMISSIONS MEASUREMENT (Above 1000 MHz)

Frequency (MHz)	Radiated Emissions (dBuV/m)		Measurement Distance (meters)
	Peak	Average	
Above 1000	74	54	3

NOTE:
(1) The limit for radiated test was performed according to FCC Part 15, Subpart C.
(2) The tighter limit applies at the band edges.
(3) Emission level (dBuV/m)=20log Emission level (uV/m).
(4) The test result calculated as following:
Measurement Value = Reading Level + Correct Factor
Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain(if use)
Margin Level = Measurement Value - Limit Value
Calculation example:

Reading Level		Correct Factor		Measurement Value
37.40	+	-12.18	=	25.22

Measurement Value		Limit Value		Margin Level
25.22	-	40	=	-14.78

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RBW / VBW (Emission in restricted band)	1MHz / 3MHz for Peak, 1MHz / 1/T for Average

Spectrum Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9KHz~90KHz for PK/AVG detector
Start ~ Stop Frequency	90KHz~110KHz for QP detector
Start ~ Stop Frequency	110KHz~490KHz for PK/AVG detector
Start ~ Stop Frequency	490KHz~30MHz for QP detector
Start ~ Stop Frequency	30MHz~1000MHz for QP detector

4.2 TEST PROCEDURE

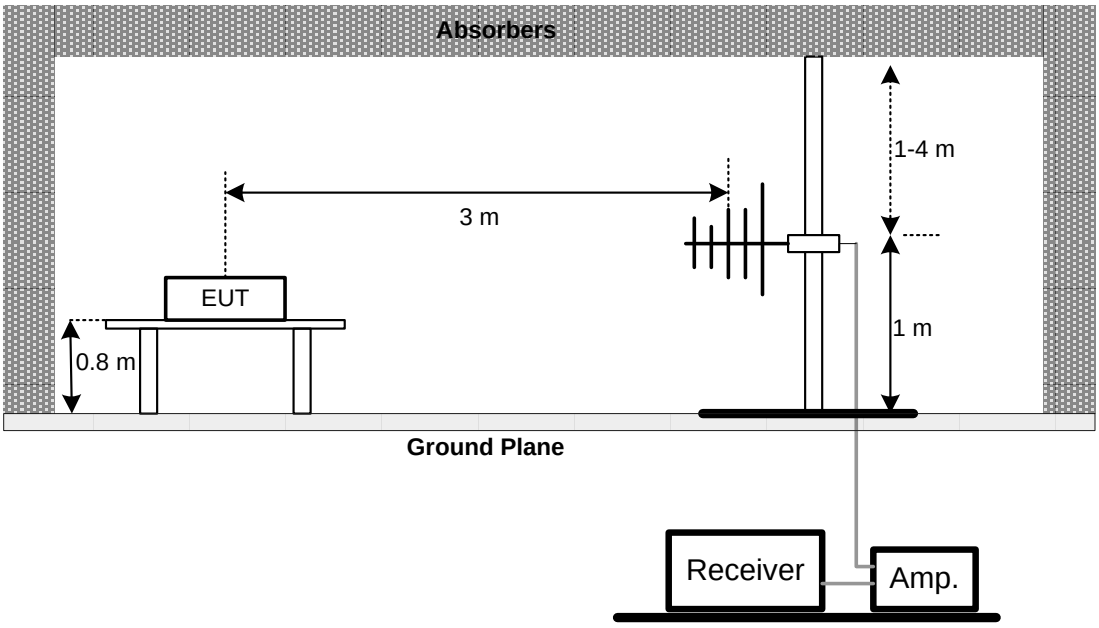
a. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
b. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 1.5 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(above 1GHz)
c. The height of the equipment or of the substitution antenna shall be 0.8 m or 1.5 m, the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights find the maximum reading (used Bore sight function).
e. The receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1GHz.
f. The initial step in collecting radiated emission data is a receiver peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
g. All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn‘t perform. (below 1GHz)
h. All readings are Peak Mode value unless otherwise stated AVG in column of Note. If the Peak Mode Measured value compliance with the Peak Limits and lower than AVG Limits, the EUT shall be deemed to meet both Peak & AVG Limits and then only Peak Mode was measured, but AVG Mode didn‘t perform. (above 1GHz)
i. For the actual test configuration, please refer to the related Item – EUT TEST PHOTO.

4.3 DEVIATION FROM TEST STANDARD

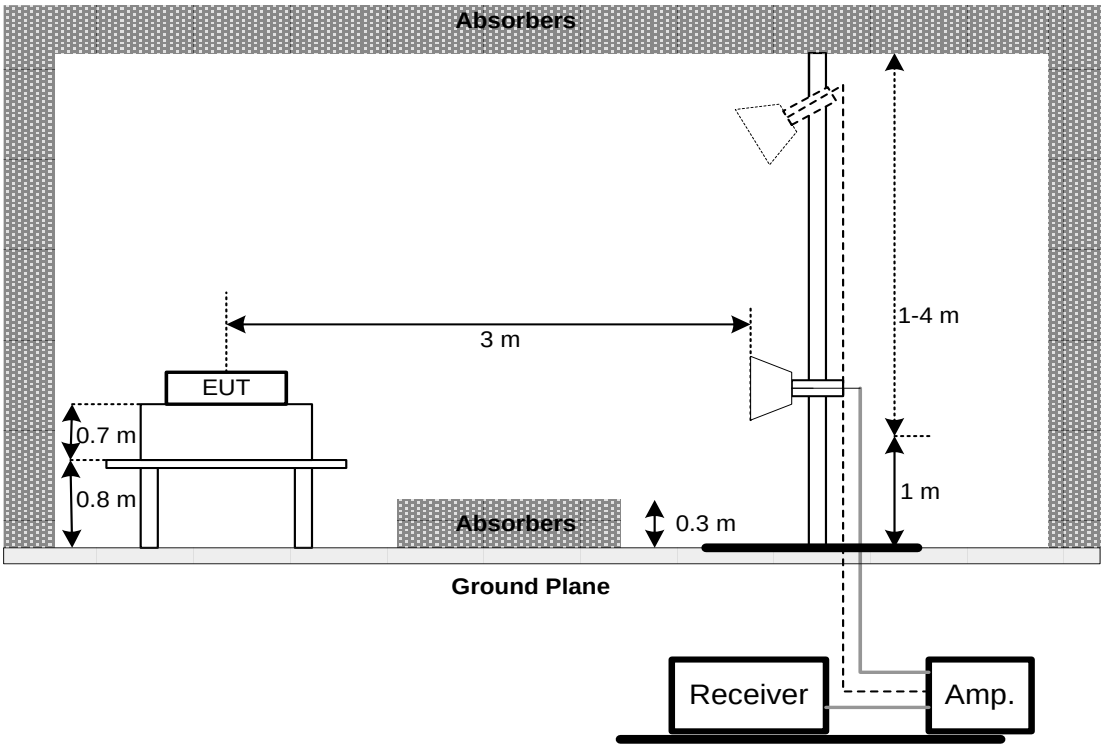
No deviation.

4.4 TEST SETUP

30 MHz to 1 GHz



Above 1 GHz



4.5 EUT OPERATING CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

4.6 TEST RESULT – 30 MHZ TO 1 GHZ

Please refer to the APPENDIX B

4.7 TEST RESULT – ABOVE 1 GHZ

Please refer to the APPENDIX C.

NOTE:

(1) No limit: This is fundamental signal, the judgment is not applicable.
For fundamental signal judgment was referred to Peak output test.

5 BANDWIDTH TEST

5.1 LIMIT

FCC Part15, Subpart C (15.247)		
Section	Test Item	Limit
15.247(a)	6 dB Bandwidth	500 kHz

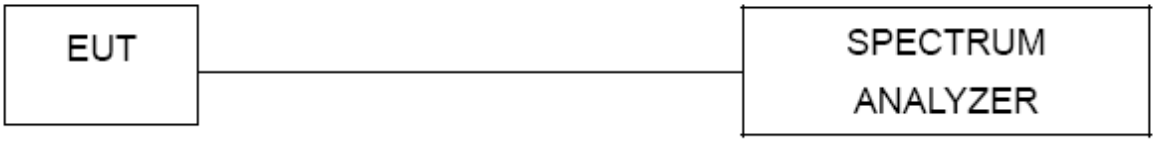
5.2 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
b. Spectrum Setting: RBW= 100KHz, VBW=300KHz, Sweep time = 2.5 ms.

5.3 DEVIATION FROM TEST STANDARD

No deviation.

5.4 TEST SETUP



5.5 EUT OPERATING CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

5.6 TEST RESULT

Please refer to the APPENDIX D.

6 OUTPUT POWER TEST

6.1 LIMIT

FCC Part15, Subpart C (15.247)		
Section	Test Item	Limit
15.247(b)	Maximum Output Power	1 Watt or 30dBm

6.2 TEST PROCEDURE

a. The EUT was directly connected to the power meter and antenna output port as show in the block diagram below.
b. The maximum peak conducted output power was performed in accordance with method 9.1.2 of FCC KDB 558074 D01 DTS Meas Guidance.

6.3 DEVIATION FROM TEST STANDARD

No deviation.

6.4 TEST SETUP

6.5 EUT OPERATING CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

6.6 TEST RESULT

Please refer to the APPENDIX E.

7 POWER SPECTRAL DENSITY

7.1 LIMIT

FCC Part15, Subpart C (15.247)		
Section	Test Item	Limit
15.247(e)	Power Spectral Density	8 dBm (in any 3 kHz)

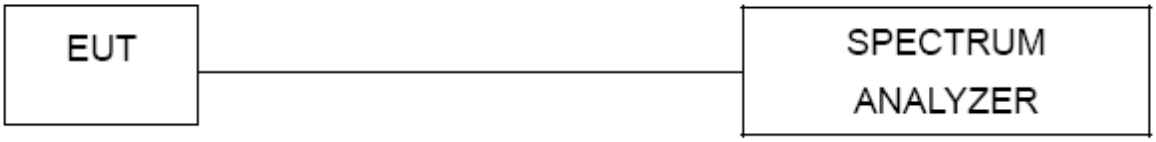
7.2 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
b. Spectrum Setting: RBW = 3 kHz, VBW = 10 kHz, Sweep time = Auto.

7.3 DEVIATION FROM TEST STANDARD

No deviation.

7.4 TEST SETUP



7.5 EUT OPERATING CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

7.6 TEST RESULT

Please refer to the APPENDIX F.

8 ANTENNA CONDUCTED SPURIOUS EMISSIONS TEST

8.1 LIMIT

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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, provided that the transmitter demonstrates compliance with the peak conducted power limits.

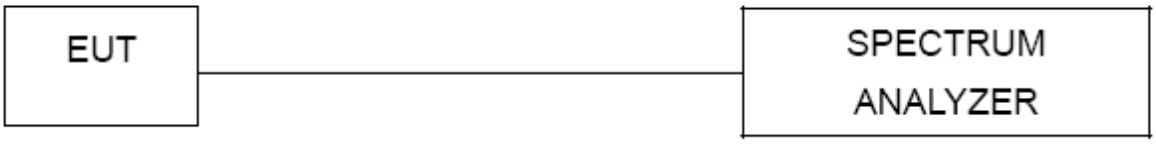
8.2 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
b. Spectrum Setting: RBW = 100 kHz, VBW=300 kHz, Sweep time = Auto.
c. Offset = antenna gain + cable loss.

8.3 DEVIATION FROM TEST STANDARD

No deviation.

8.4 TEST SETUP



8.5 EUT OPERATING CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

8.6 TEST RESULT

Please refer to the APPENDIX G.

9 LIST OF MEASURING EQUIPMENTS

AC Power Line Conducted Emissions						
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Date	Calibrated Until
1	TWO-LINE V-NETWORK	R&S	ENV216	101050	2019/3/18	2020/3/17
2	Test Cable	EMCI	EMCCFD300-BM -BMR-6000	170715	2019/8/7	2020/8/5
3	EMI Test Receiver	R&S	ESR7	101433	2019/12/13	2020/12/12
4	Measurement Software	EZ	EZ_EMC (Version NB-03A)	N/A	N/A	N/A

Radiated Emissions						
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Date	Calibrated Until
1	Preamplifier	EMCI	EMC02325B	980217	2019/4/12	2020/4/11
2	Preamplifier	EMCI	EMC012645B	980267	2019/4/12	2020/4/11
3	Test Cable	EMCI	EMC104-SM-SM-800	150207	2019/4/12	2020/4/11
4	Test Cable	EMCI	EMC104-SM-SM-3000	151205	2019/4/12	2020/4/11
5	Test Cable	EMCI	EMC-SM-SM-7000	180408	2019/4/12	2020/4/11
6	MXE EMI Receiver	Agilent	N9038A	MY55420127	2019/3/26	2020/3/25
7	Signal Analyzer	Agilent	N9010A	MY56480554	2019/6/6	2020/6/5
8	Horm Ant	SCHWARZBECK	BBHA 9120D	9120D-1342	2019/6/10	2020/6/9
9	Trilog-Broadband Antenna	Schwarzbeck	VULB 9168	000992	2019/5/29	2020/5/28
10	5dB Attenuator	EMCI	EMCI-N-6-05	AT-N0508	2019/5/29	2020/5/28

Bandwidth						
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Date	Calibrated Until
1	Spectrum Analyzer	R&S	FSP40	100129	2019/5/23	2020/5/22

Output Power						
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Date	Calibrated Until
1	Spectrum Analyzer	R&S	FSP40	100129	2019/5/23	2020/5/22
2	Power Meter	Anritsu	ML2487A	6K00004714	2019/6/20	2020/6/18

Power Spectral Density						
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Date	Calibrated Until
1	Spectrum Analyzer	R&S	FSP40	100129	2019/5/23	2020/5/22

Antenna conducted Spurious Emission						
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Date	Calibrated Until
1	Spectrum Analyzer	R&S	FSP40	100129	2019/5/23	2020/5/22

For two buttons model:

AC Power Line Conducted Emissions						
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Date	Calibrated Until
1	TWO-LINE V-NETWORK	R&S	ENV216	101050	2019/6/21	2020/6/20
2	Test Cable	EMCI	EMCCFD300-BM -BMR-6000	170715	2019/8/7	2020/8/6
3	EMI Test Receiver	R&S	ESR7	101433	2019/12/11	2020/12/9
4	Measurement Software	EZ	EZ_EMC (Version NB-03A)	N/A	N/A	N/A

Radiated Emissions						
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Date	Calibrated Until
1	Preamplifier	EMCI	EMC02325B	980217	2020/4/10	2021/4/9
2	Test Cable	EMCI	EMC104-SM-SM-800	150207	2020/4/10	2021/4/9
3	Test Cable	EMCI	EMC104-SM-SM-3000	151205	2020/4/10	2021/4/9
4	Test Cable	EMCI	EMC-SM-SM-7000	180408	2020/4/10	2021/4/9
5	MXE EMI Receiver	Agilent	N9038A	MY55420127	2020/3/24	2021/3/23
6	Signal Analyzer	Agilent	N9010A	MY56480554	2019/6/6	2020/6/5
7	Trilog-Broadband Antenna	Schwarzbeck	VULB 9168	000992	2019/5/29	2020/5/28
8	5dB Attenuator	EMCI	EMCI-N-6-05	AT-N0508	2019/5/29	2020/5/28

Remark: “N/A” denotes no model name, no serial no. or no calibration specified.
All calibration period of equipment list is one year.

10 EUT TEST PHOTO

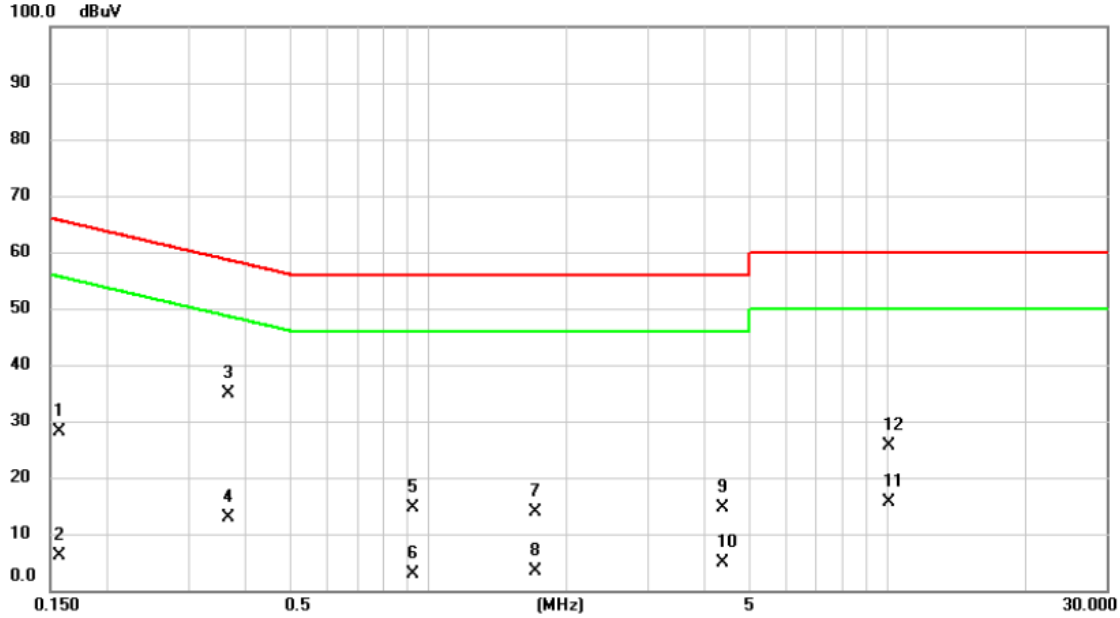
Please refer to document Appendix No.: TP-1911T154A-FCCP-1 (APPENDIX-TEST PHOTOS).

11 EUT PHOTOS

Please refer to document Appendix No.: EP-1911T154A-1 (APPENDIX-EUT PHOTOS).

APPENDIX A AC POWER LINE CONDUCTED EMISSIONS

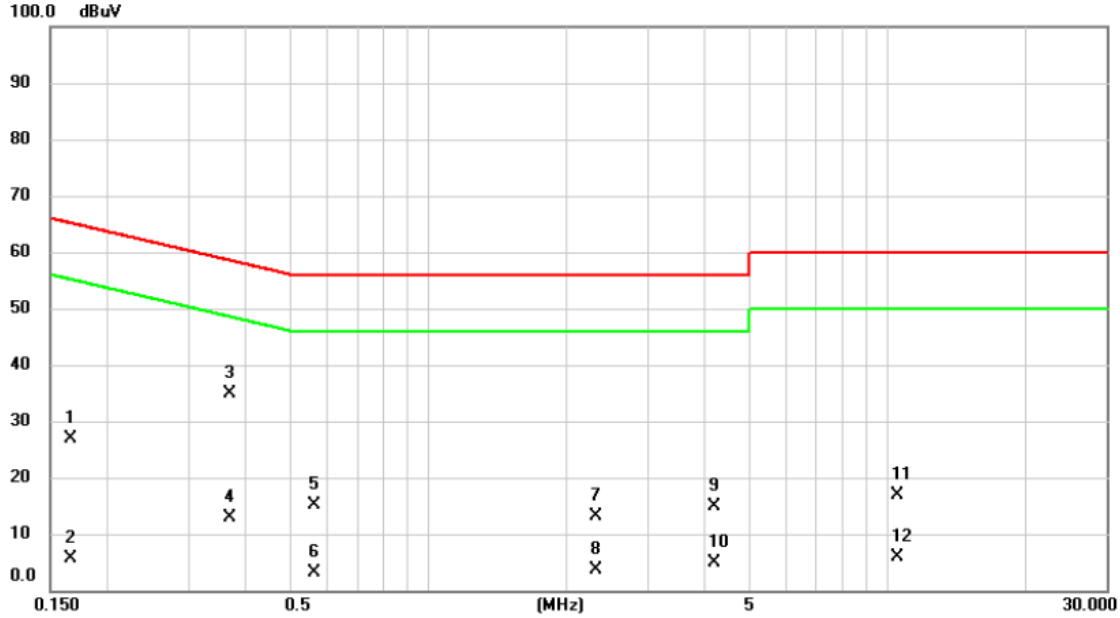
Test Mode	2.4G_Normal	Tested Date	2020/1/14
Test Voltage	AC 120V/60Hz	Phase	Line



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1568	18.59	9.57	28.16	65.63	-37.47	QP	
2		0.1568	-3.36	9.57	6.21	55.63	-49.42	AVG	
3	*	0.3660	25.33	9.62	34.95	58.59	-23.64	QP	
4		0.3660	3.18	9.62	12.80	48.59	-35.79	AVG	
5		0.9217	5.03	9.62	14.65	56.00	-41.35	QP	
6		0.9217	-6.62	9.62	3.00	46.00	-43.00	AVG	
7		1.7138	4.19	9.67	13.86	56.00	-42.14	QP	
8		1.7138	-6.40	9.67	3.27	46.00	-42.73	AVG	
9		4.3868	4.78	9.74	14.52	56.00	-41.48	QP	
10		4.3868	-4.98	9.74	4.76	46.00	-41.24	AVG	
11		10.0995	5.82	9.86	15.68	60.00	-44.32	QP	
12		10.0995	15.73	9.86	25.59	50.00	-24.41	AVG	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

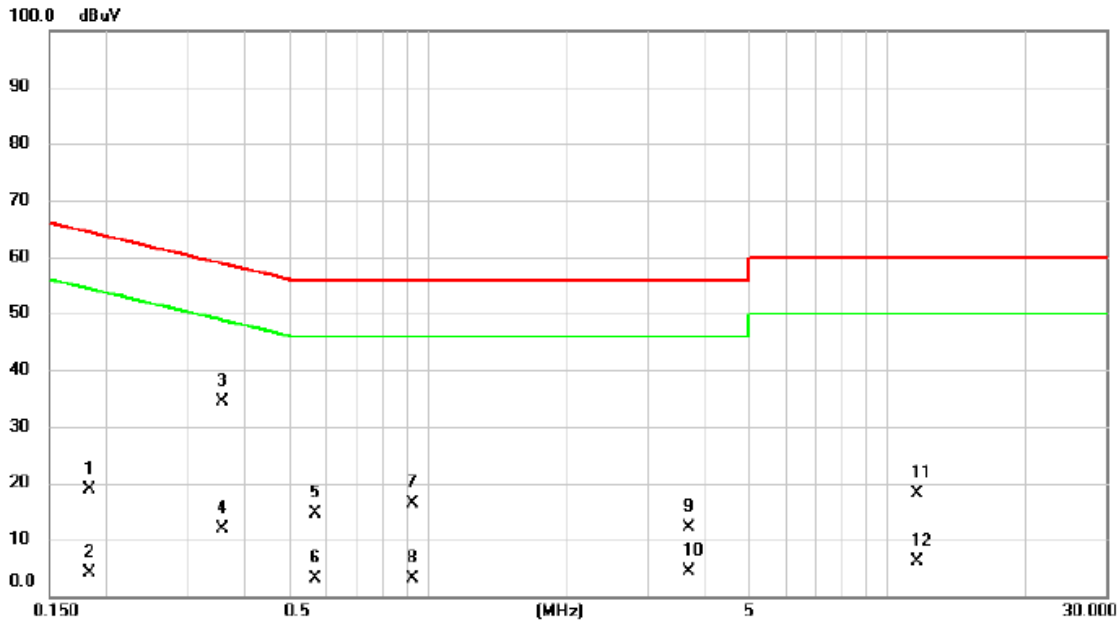
Test Mode	2.4G_Normal	Tested Date	2020/1/14
Test Voltage	AC 120V/60Hz	Phase	Neutral



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1658	17.38	9.61	26.99	65.17	-38.18	QP	
2		0.1658	-4.05	9.61	5.56	55.17	-49.61	AVG	
3	*	0.3682	25.18	9.67	34.85	58.54	-23.69	QP	
4		0.3682	3.26	9.67	12.93	48.54	-35.61	AVG	
5		0.5640	5.35	9.67	15.02	56.00	-40.98	QP	
6		0.5640	-6.57	9.67	3.10	46.00	-42.90	AVG	
7		2.3235	3.50	9.72	13.22	56.00	-42.78	QP	
8		2.3235	-6.01	9.72	3.71	46.00	-42.29	AVG	
9		4.2000	4.99	9.77	14.76	56.00	-41.24	QP	
10		4.2000	-4.89	9.77	4.88	46.00	-41.12	AVG	
11		10.4933	6.97	9.92	16.89	60.00	-43.11	QP	
12		10.4933	-4.01	9.92	5.91	50.00	-44.09	AVG	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

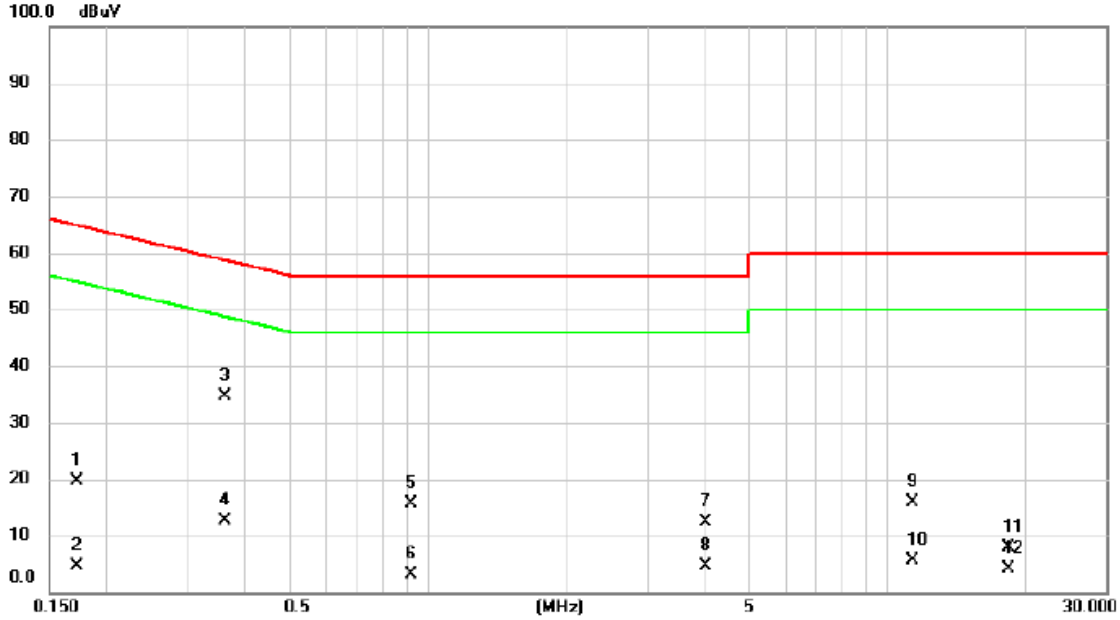
Test Mode	2.4G_Normal_ two buttons	Tested Date	2020/5/23
Test Voltage	AC 120V/60Hz	Phase	Line



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1838	9.30	9.61	18.91	64.31	-45.40	QP	
2		0.1838	-5.41	9.61	4.20	54.31	-50.11	AVG	
3	*	0.3570	24.67	9.67	34.34	58.80	-24.46	QP	
4		0.3570	2.10	9.67	11.77	48.80	-37.03	AVG	
5		0.5685	5.02	9.67	14.69	56.00	-41.31	QP	
6		0.5685	-6.64	9.67	3.03	46.00	-42.97	AVG	
7		0.9217	6.63	9.66	16.29	56.00	-39.71	QP	
8		0.9217	-6.42	9.66	3.24	46.00	-42.76	AVG	
9		3.6848	2.29	9.76	12.05	56.00	-43.95	QP	
10		3.6848	-5.46	9.76	4.30	46.00	-41.70	AVG	
11		11.6295	8.22	9.94	18.16	60.00	-41.84	QP	
12		11.6295	-3.70	9.94	6.24	50.00	-43.76	AVG	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

Test Mode	2.4G_Normal_ two buttons	Tested Date	2020/5/23
Test Voltage	AC 120V/60Hz	Phase	Neutral

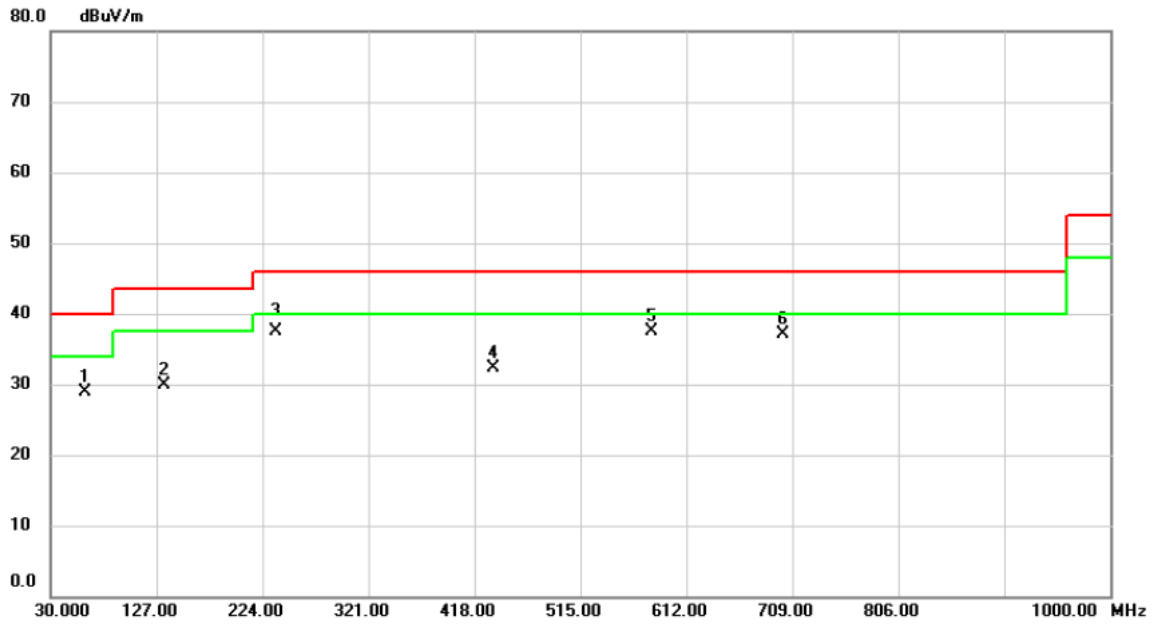


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1725	10.00	9.61	19.61	64.84	-45.23	QP	
2		0.1725	-5.04	9.61	4.57	54.84	-50.27	AVG	
3	*	0.3615	24.97	9.67	34.64	58.69	-24.05	QP	
4		0.3615	2.89	9.67	12.56	48.69	-36.13	AVG	
5		0.9195	6.03	9.66	15.69	56.00	-40.31	QP	
6		0.9195	-6.48	9.66	3.18	46.00	-42.82	AVG	
7		4.0290	2.60	9.77	12.37	56.00	-43.63	QP	
8		4.0290	-5.14	9.77	4.63	46.00	-41.37	AVG	
9		11.3955	5.91	9.94	15.85	60.00	-44.15	QP	
10		11.3955	-4.24	9.94	5.70	50.00	-44.30	AVG	
11		18.3953	-2.22	10.02	7.80	60.00	-52.20	QP	
12		18.3953	-5.87	10.02	4.15	50.00	-45.85	AVG	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

APPENDIX B RADIATED EMISSIONS - 30 MHZ TO 1 GHZ

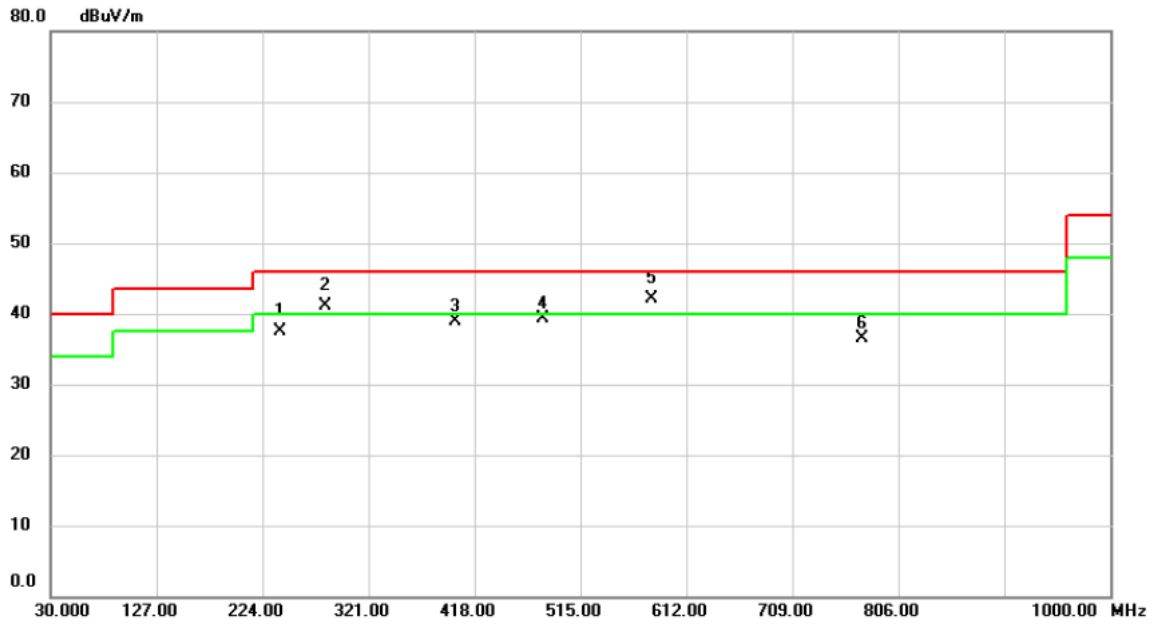
Test Mode	TX Mode_IEEE 802.11b_2412MHz	Tested Date	2020/1/14
Test Voltage	AC 120V/60Hz	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		61.0400	41.40	-12.43	28.97	40.00	-11.03	peak	
2		133.7900	42.57	-12.70	29.87	43.50	-13.63	peak	
3		236.6100	51.09	-13.57	37.52	46.00	-8.48	QP	
4		435.4600	39.75	-7.51	32.24	46.00	-13.76	peak	
5	*	579.9900	42.04	-4.51	37.53	46.00	-8.47	peak	
6		700.2700	39.81	-2.77	37.04	46.00	-8.96	peak	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

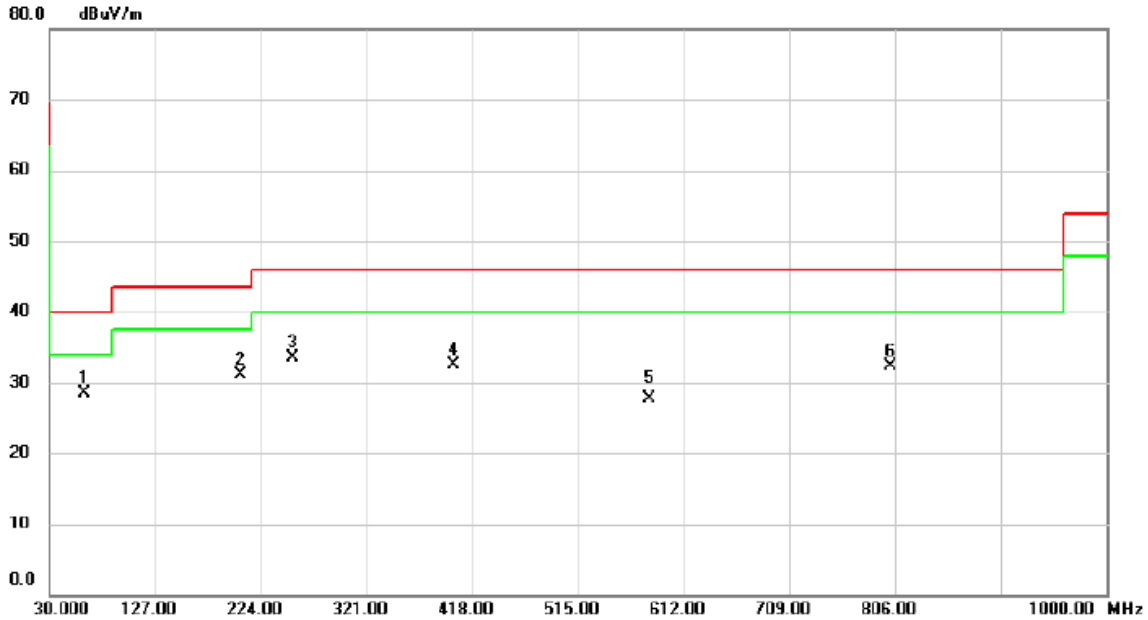
Test Mode	TX Mode_IEEE 802.11b_2412MHz	Tested Date	2020/1/14
Test Voltage	AC 120V/60Hz	Polarization	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		240.4900	50.61	-13.19	37.42	46.00	-8.58	QP	
2	!	281.2300	51.99	-10.94	41.05	46.00	-4.95	QP	
3		400.5400	47.22	-8.35	38.87	46.00	-7.13	peak	
4		480.0800	45.90	-6.66	39.24	46.00	-6.76	peak	
5	*	579.9900	46.57	-4.51	42.06	46.00	-3.94	QP	
6		773.0200	37.33	-0.84	36.49	46.00	-9.51	peak	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

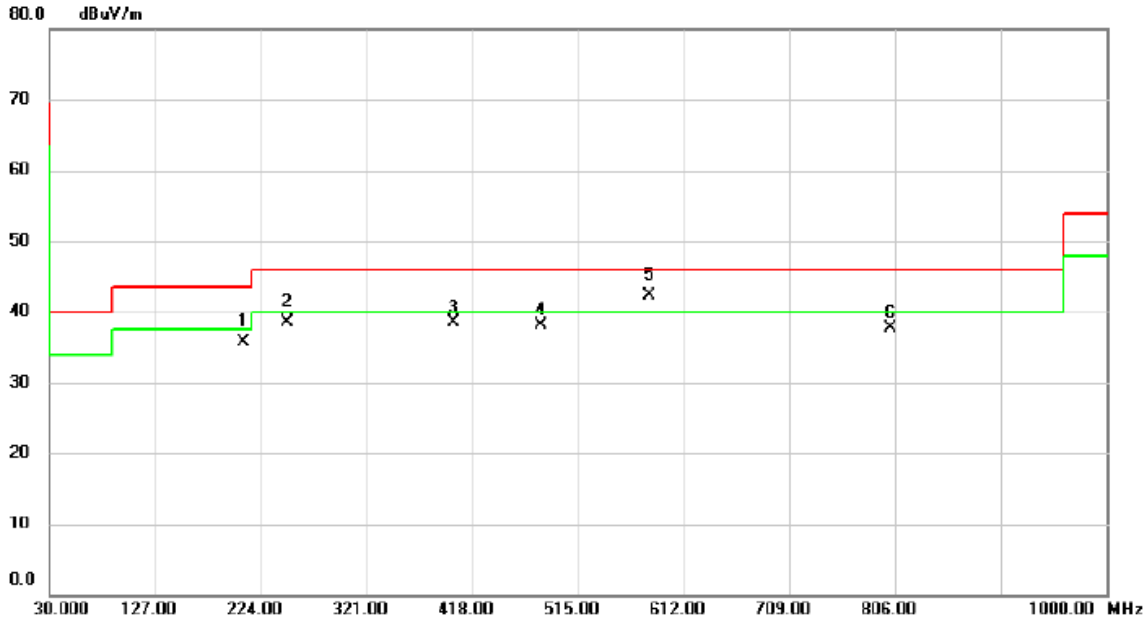
Test Mode	TX Mode_IEEE 802.11b_2412MHz_ two buttons	Tested Date	2020/5/27
Test Voltage	AC 120V/60Hz	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	62.0100	37.71	-9.21	28.50	40.00	-11.50	peak	
2		205.5700	41.68	-10.64	31.04	43.50	-12.46	peak	
3		253.1000	42.19	-8.74	33.45	46.00	-12.55	peak	
4		400.5400	37.01	-4.60	32.41	46.00	-13.59	peak	
5		579.9900	28.22	-0.45	27.77	46.00	-18.23	QP	
6		801.1500	29.36	2.97	32.33	46.00	-13.67	peak	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

Test Mode	TX Mode_IEEE 802.11b_2412MHz_ two buttons	Tested Date	2020/5/27
Test Voltage	AC 120V/60Hz	Polarization	Horizontal

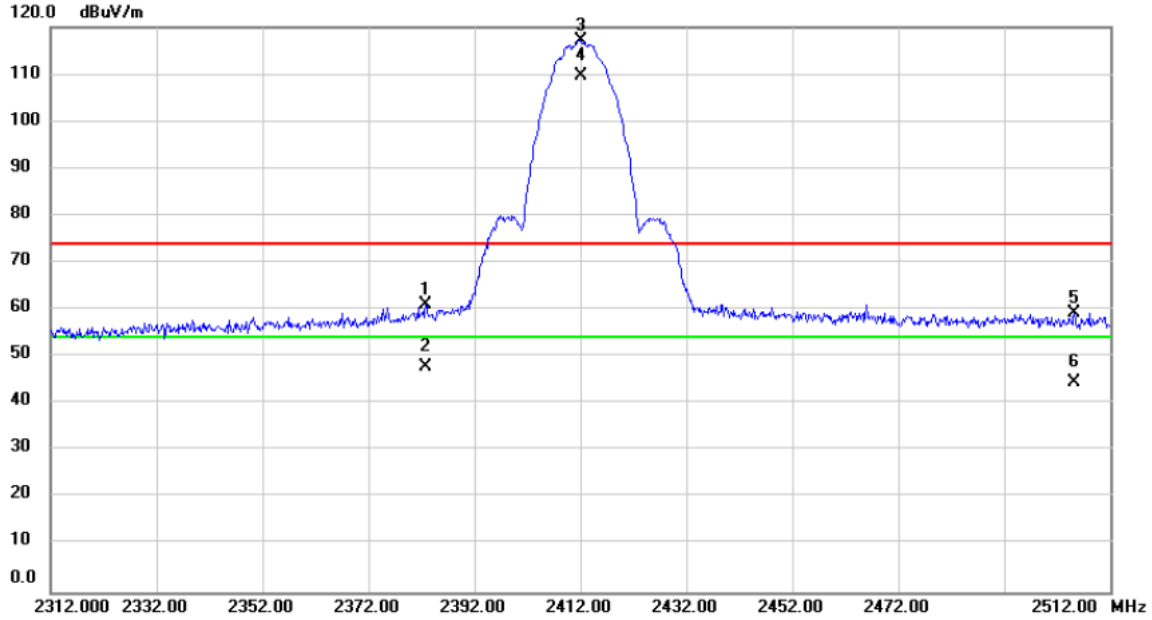


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		207.5100	46.31	-10.61	35.70	43.50	-7.80	QP	
2		248.2500	47.40	-8.84	38.56	46.00	-7.44	QP	
3		400.5400	43.20	-4.60	38.60	46.00	-7.40	peak	
4		480.0800	41.09	-2.95	38.14	46.00	-7.86	peak	
5	*	579.9900	42.73	-0.45	42.28	46.00	-3.72	QP	
6		801.1500	34.81	2.97	37.78	46.00	-8.22	peak	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

APPENDIX C RADIATED EMISSIONS - ABOVE 1 GHZ

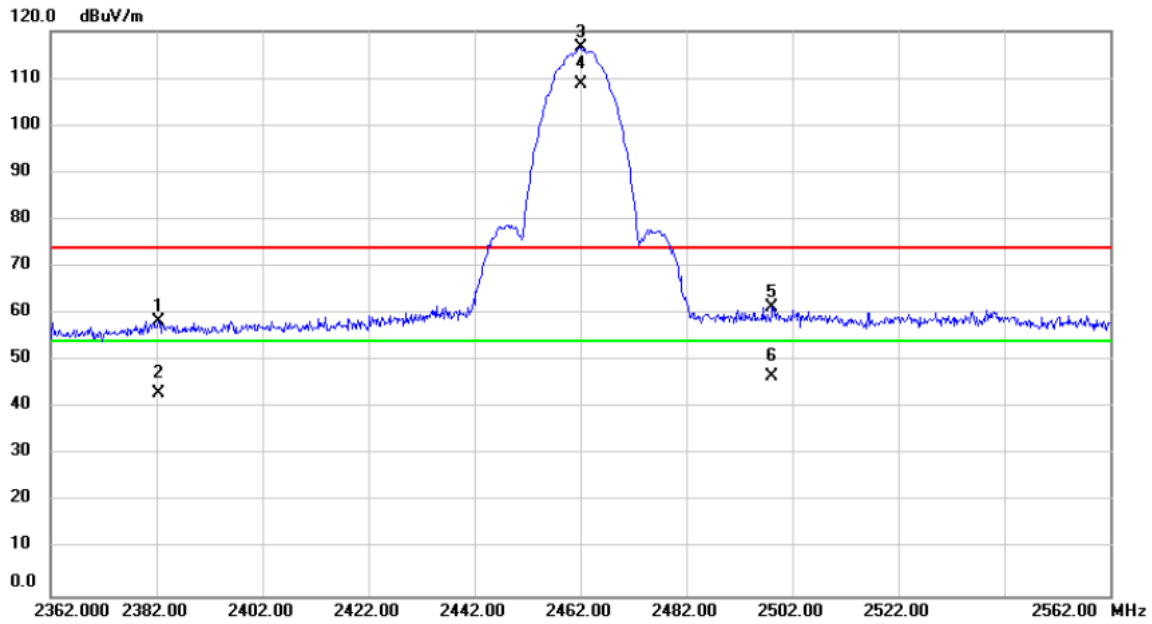
Test Mode	TX Mode_IEEE 802.11b_2412 MHz	Tested Date	2020/1/13
Test Voltage	AC 120V/60Hz	Polarization	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2382.800	29.94	31.21	61.15	74.00	-12.85	peak	
2		2382.800	16.67	31.21	47.88	54.00	-6.12	AVG	
3	X	2412.000	85.90	31.34	117.24	74.00	43.24	peak	No Limit
4	*	2412.000	78.26	31.34	109.60	54.00	55.60	AVG	No Limit
5		2505.200	27.62	31.75	59.37	74.00	-14.63	peak	
6		2505.200	12.81	31.75	44.56	54.00	-9.44	AVG	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

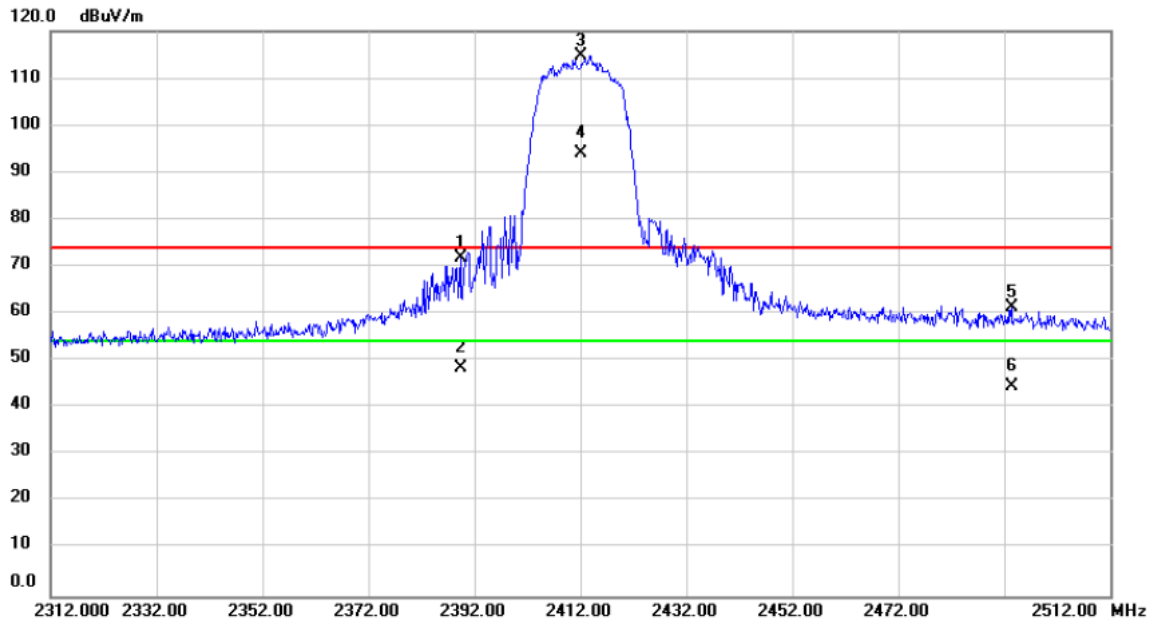
Test Mode	TX Mode_IEEE 802.11b_2462 MHz	Tested Date	2020/1/13
Test Voltage	AC 120V/60Hz	Polarization	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2382.400	27.25	31.21	58.46	74.00	-15.54	peak	
2		2382.400	11.77	31.21	42.98	54.00	-11.02	AVG	
3	X	2462.000	84.96	31.56	116.52	74.00	42.52	peak	No Limit
4	*	2462.000	77.19	31.56	108.75	54.00	54.75	AVG	No Limit
5		2498.200	29.69	31.72	61.41	74.00	-12.59	peak	
6		2498.200	15.03	31.72	46.75	54.00	-7.25	AVG	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

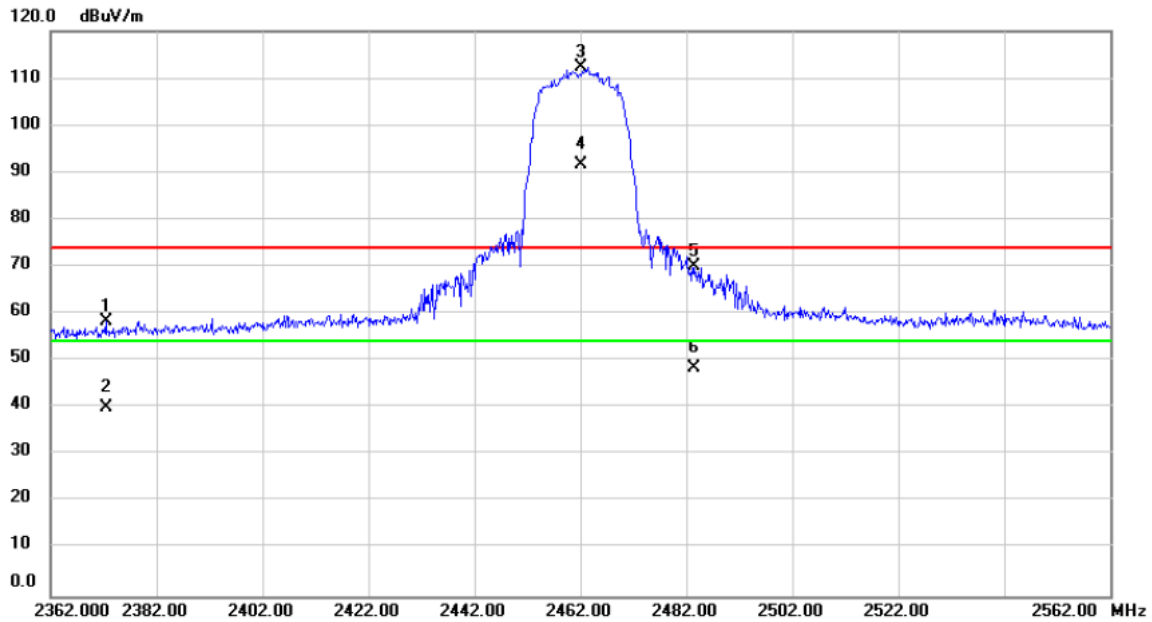
Test Mode	TX Mode_IEEE 802.11g_2412 MHz	Tested Date	2020/1/13
Test Voltage	AC 120V/60Hz	Polarization	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2389.400	40.56	31.25	71.81	74.00	-2.19	peak	
2		2389.400	17.08	31.25	48.33	54.00	-5.67	AVG	
3	*	2412.000	83.31	31.34	114.65	74.00	40.65	peak	No Limit
4	X	2412.000	62.75	31.34	94.09	54.00	40.09	AVG	No Limit
5		2493.400	29.66	31.70	61.36	74.00	-12.64	peak	
6		2493.400	12.93	31.70	44.63	54.00	-9.37	AVG	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

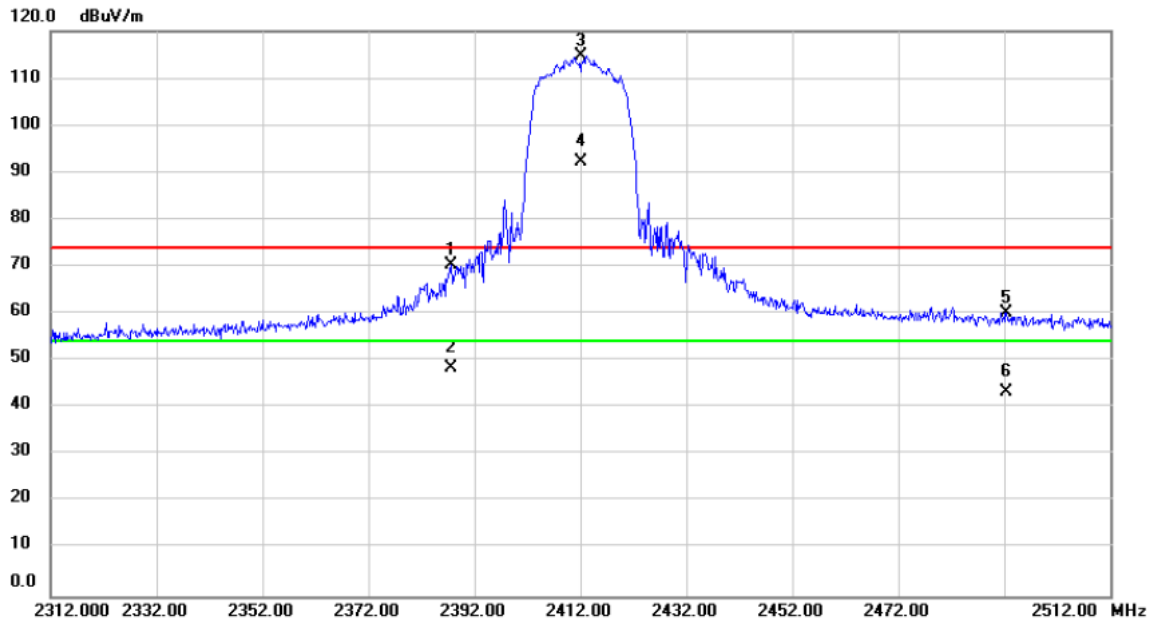
Test Mode	TX Mode_IEEE 802.11g_2462 MHz	Tested Date	2020/1/13
Test Voltage	AC 120V/60Hz	Polarization	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2372.400	27.28	31.17	58.45	74.00	-15.55	peak	
2		2372.400	8.99	31.17	40.16	54.00	-13.84	AVG	
3	*	2462.000	80.85	31.56	112.41	74.00	38.41	peak	No Limit
4	X	2462.000	60.13	31.56	91.69	54.00	37.69	AVG	No Limit
5		2483.600	38.24	31.66	69.90	74.00	-4.10	peak	
6		2483.600	16.70	31.66	48.36	54.00	-5.64	AVG	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

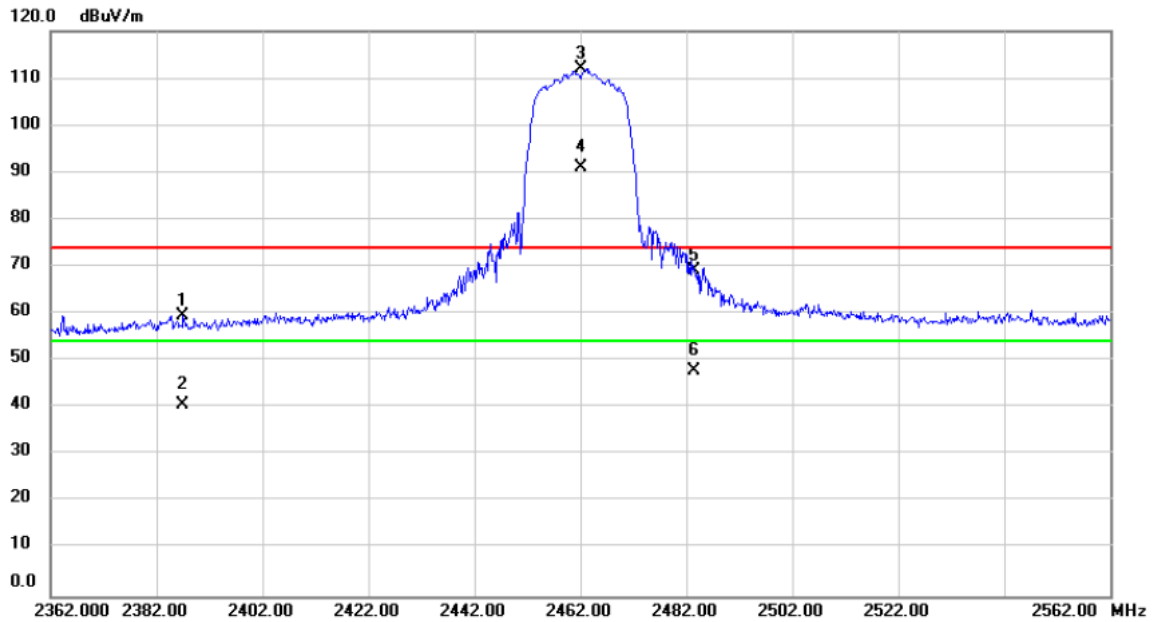
Test Mode	TX Mode_IEEE 802.11n (HT20)_2412 MHz	Tested Date	2020/1/13
Test Voltage	AC 120V/60Hz	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2387.600	39.16	31.24	70.40	74.00	-3.60	peak	
2		2387.600	17.11	31.24	48.35	54.00	-5.65	AVG	
3	*	2412.000	83.41	31.34	114.75	74.00	40.75	peak	No Limit
4	X	2412.000	60.99	31.34	92.33	54.00	38.33	AVG	No Limit
5		2492.400	28.59	31.70	60.29	74.00	-13.71	peak	
6		2492.400	11.68	31.70	43.38	54.00	-10.62	AVG	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

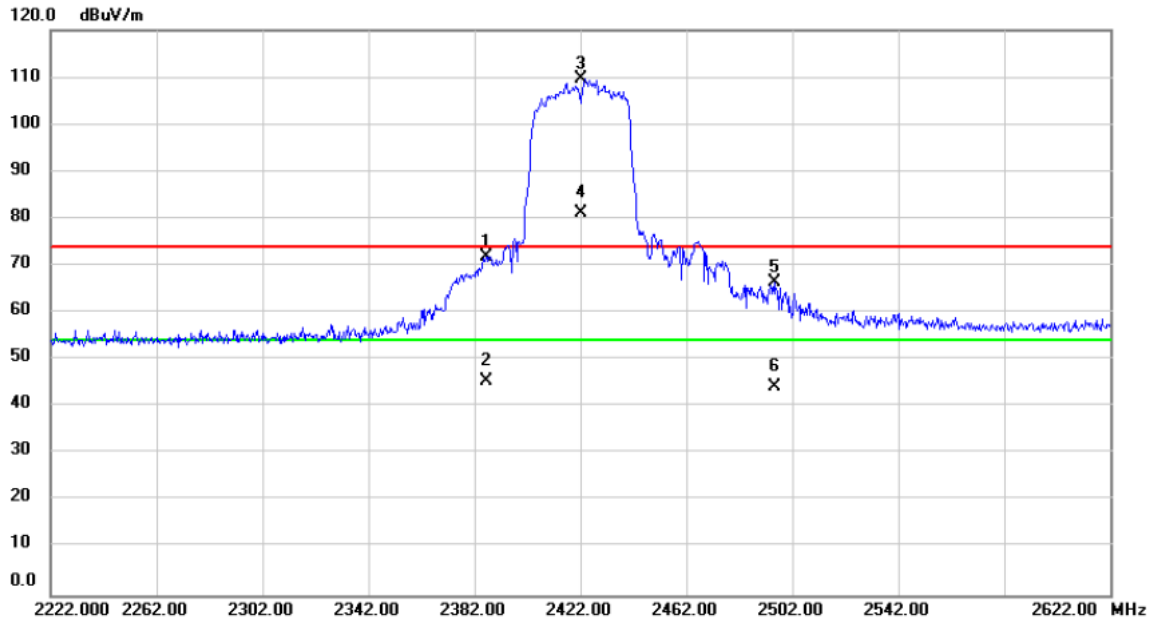
Test Mode	TX Mode_IEEE 802.11n (HT20)_2462 MHz	Tested Date	2020/1/13
Test Voltage	AC 120V/60Hz	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2387.000	28.32	31.23	59.55	74.00	-14.45	peak	
2		2387.000	9.44	31.23	40.67	54.00	-13.33	AVG	
3	*	2462.000	80.61	31.56	112.17	74.00	38.17	peak	No Limit
4	X	2462.000	59.51	31.56	91.07	54.00	37.07	AVG	No Limit
5		2483.500	37.56	31.66	69.22	74.00	-4.78	peak	
6		2483.500	16.13	31.66	47.79	54.00	-6.21	AVG	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

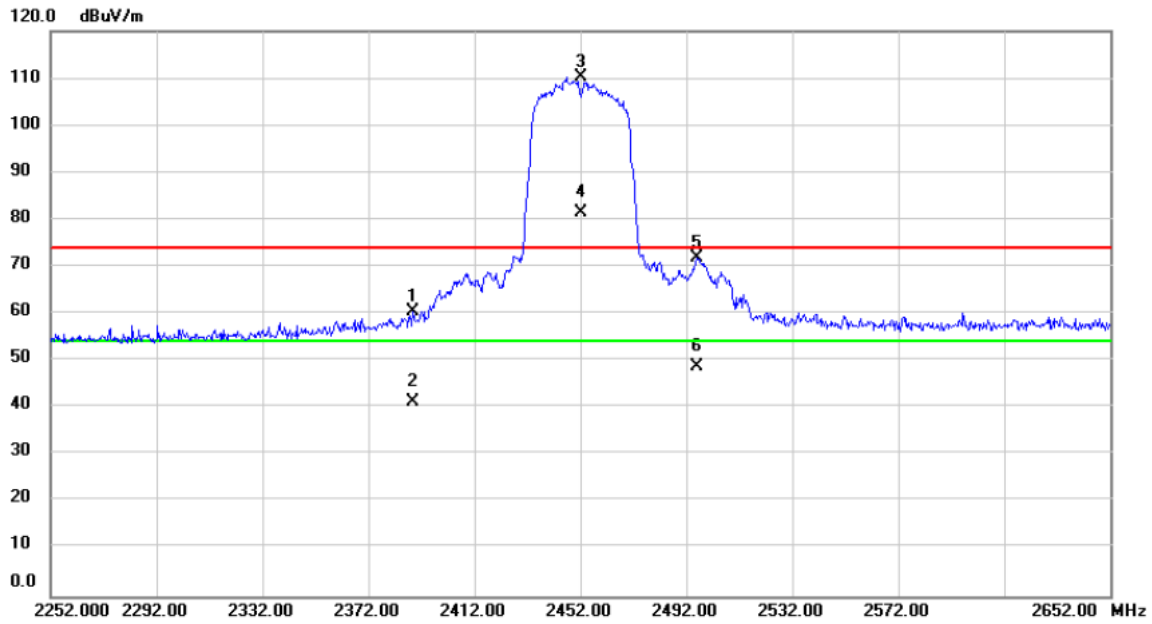
Test Mode	TX Mode_IEEE 802.11n (HT40)_2422 MHz	Tested Date	2020/1/13
Test Voltage	AC 120V/60Hz	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2386.400	40.76	31.23	71.99	74.00	-2.01	peak	
2		2386.400	14.35	31.23	45.58	54.00	-8.42	AVG	
3	*	2422.000	78.38	31.39	109.77	74.00	35.77	peak	No Limit
4	X	2422.000	49.85	31.39	81.24	54.00	27.24	AVG	No Limit
5		2495.200	34.75	31.70	66.45	74.00	-7.55	peak	
6		2495.200	12.60	31.70	44.30	54.00	-9.70	AVG	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

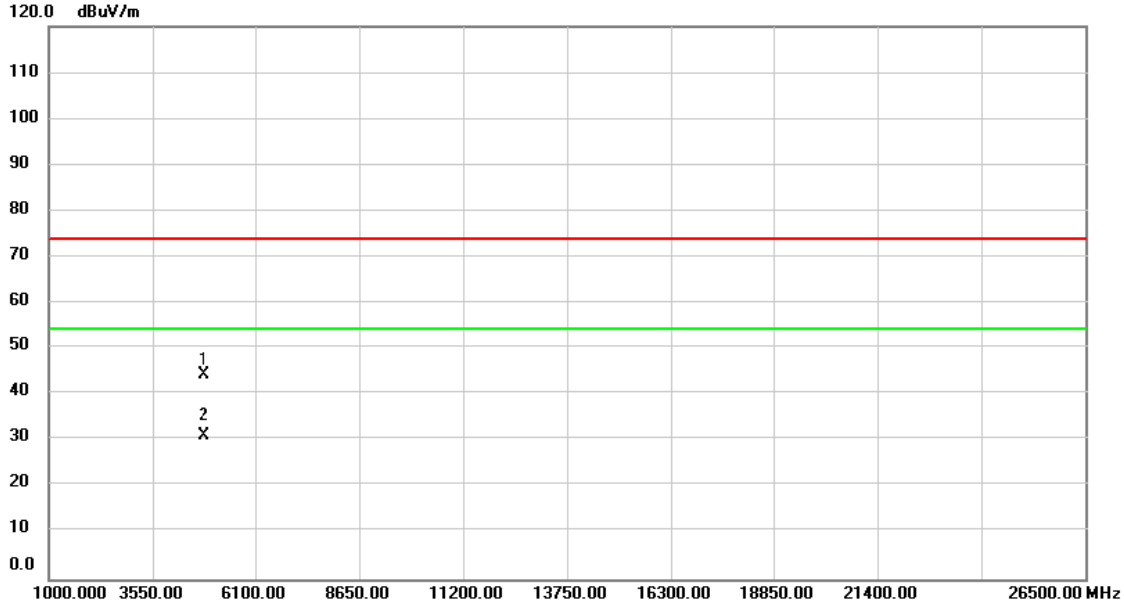
Test Mode	TX Mode_IEEE 802.11n (HT40)_2452 MHz	Tested Date	2020/1/13
Test Voltage	AC 120V/60Hz	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2388.800	29.18	31.24	60.42	74.00	-13.58	peak	
2		2388.800	9.90	31.24	41.14	54.00	-12.86	AVG	
3	*	2452.000	78.59	31.52	110.11	74.00	36.11	peak	No Limit
4	X	2452.000	50.00	31.52	81.52	54.00	27.52	AVG	No Limit
5		2496.000	39.98	31.72	71.70	74.00	-2.30	peak	
6		2496.000	17.10	31.72	48.82	54.00	-5.18	AVG	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

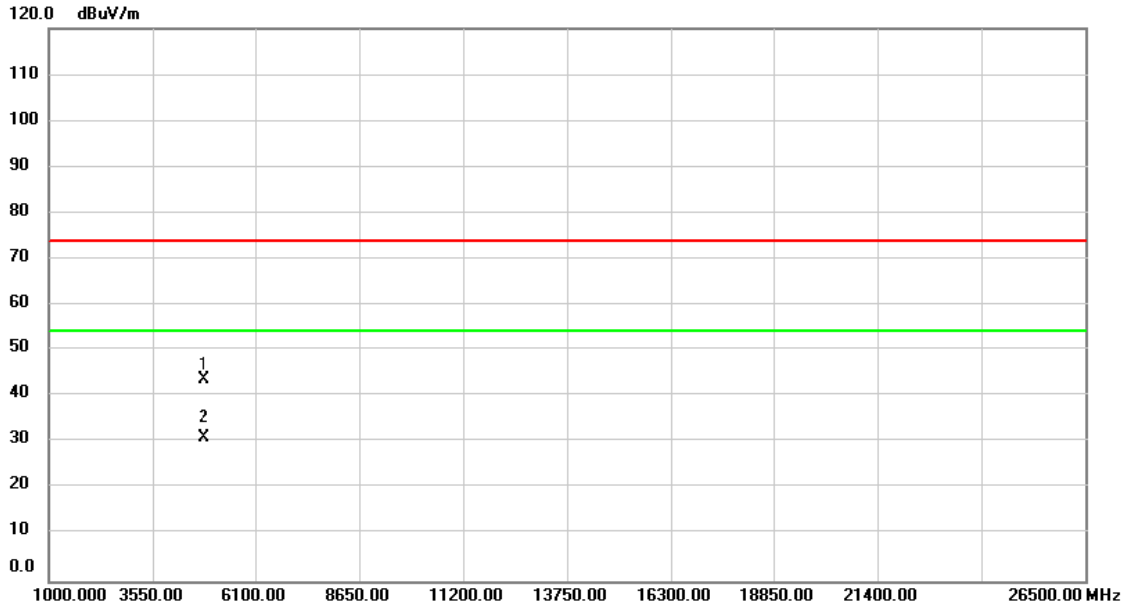
Test Mode	TX Mode_IEEE 802.11b_2412 MHz	Tested Date	2020/1/13
Test Voltage	AC 120V/60Hz	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4824.000	54.91	-10.52	44.39	74.00	-29.61	peak	
2	*	4824.000	41.53	-10.52	31.01	54.00	-22.99	AVG	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

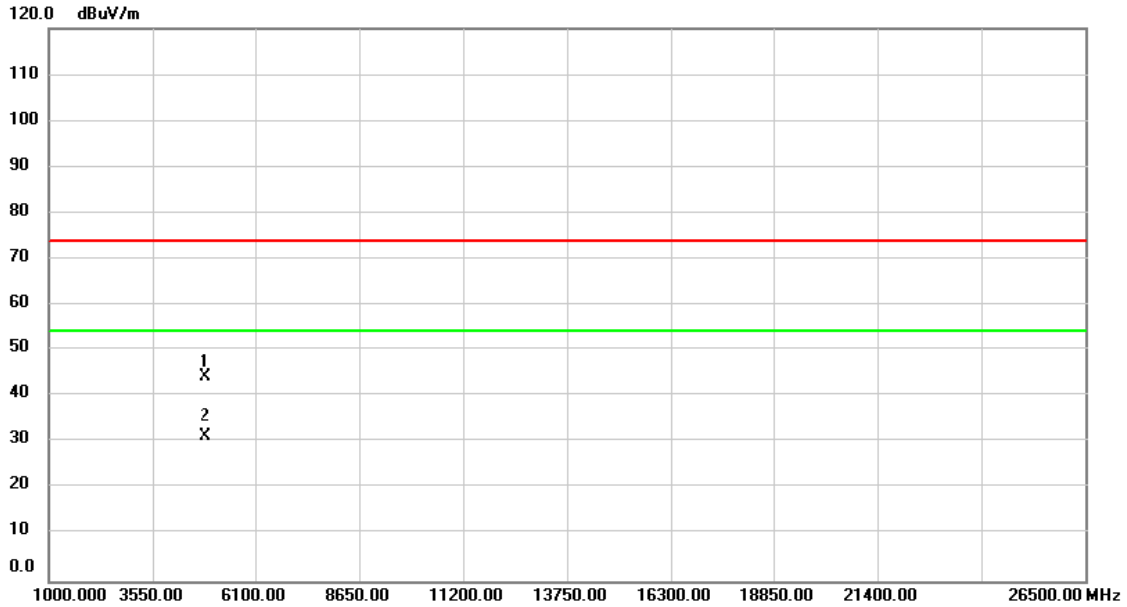
Test Mode	TX Mode_IEEE 802.11b_2412 MHz	Tested Date	2020/1/13
Test Voltage	AC 120V/60Hz	Polarization	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4824.000	54.21	-10.52	43.69	74.00	-30.31	peak	
2	*	4824.000	41.45	-10.52	30.93	54.00	-23.07	AVG	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

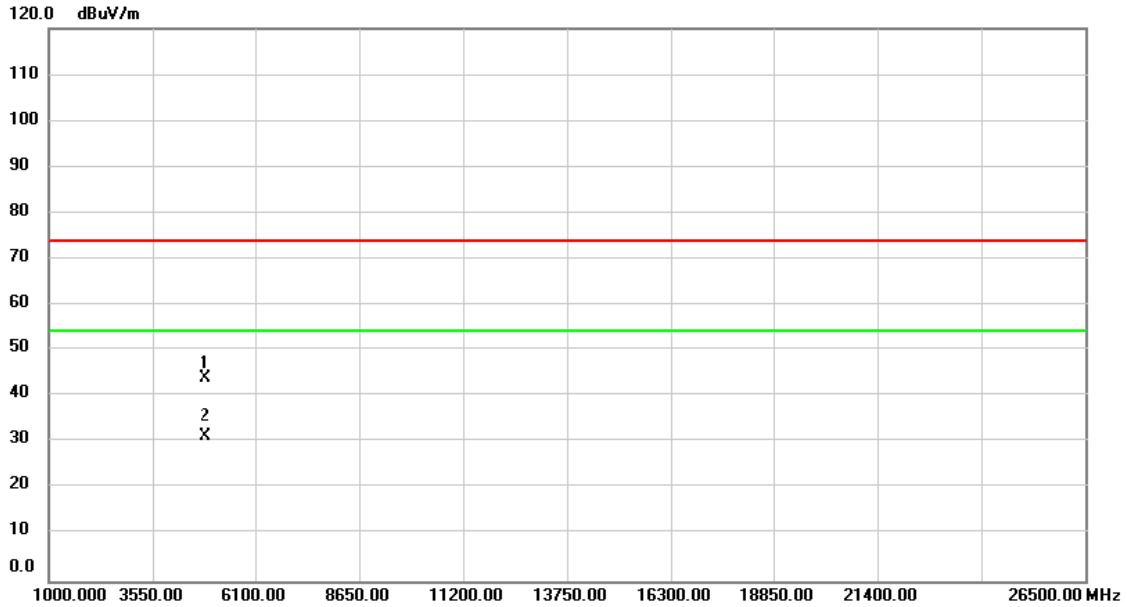
Test Mode	TX Mode_IEEE 802.11b_2437 MHz	Tested Date	2020/1/13
Test Voltage	AC 120V/60Hz	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4874.000	54.66	-10.40	44.26	74.00	-29.74	peak	
2	*	4874.000	41.72	-10.40	31.32	54.00	-22.68	AVG	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

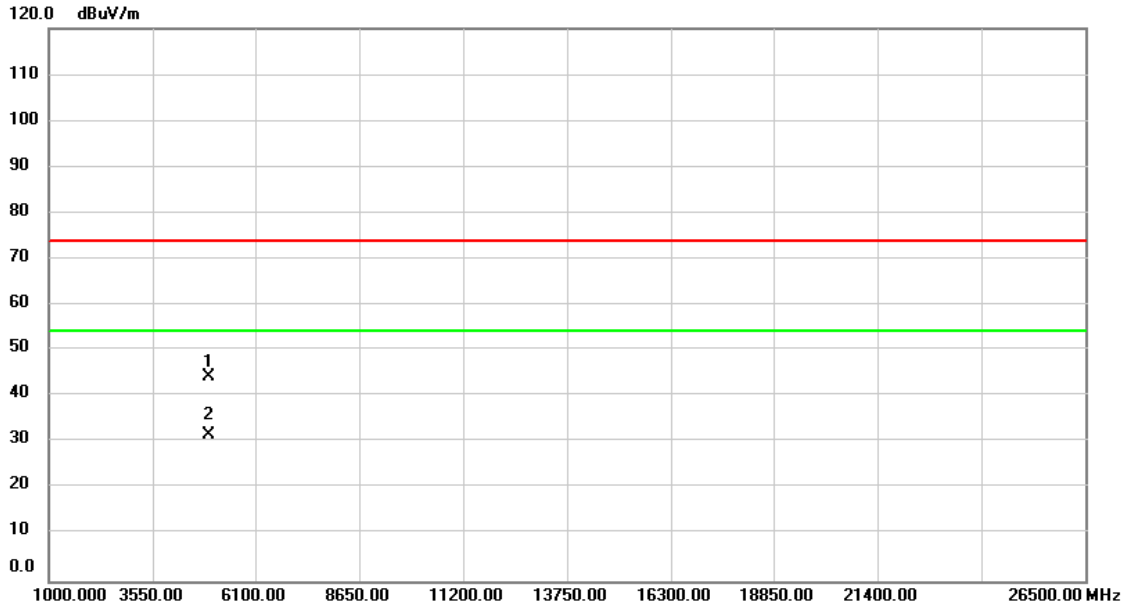
Test Mode	TX Mode_IEEE 802.11b_2437 MHz	Tested Date	2020/1/13
Test Voltage	AC 120V/60Hz	Polarization	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4874.000	54.42	-10.40	44.02	74.00	-29.98	peak	
2	*	4874.000	41.65	-10.40	31.25	54.00	-22.75	AVG	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

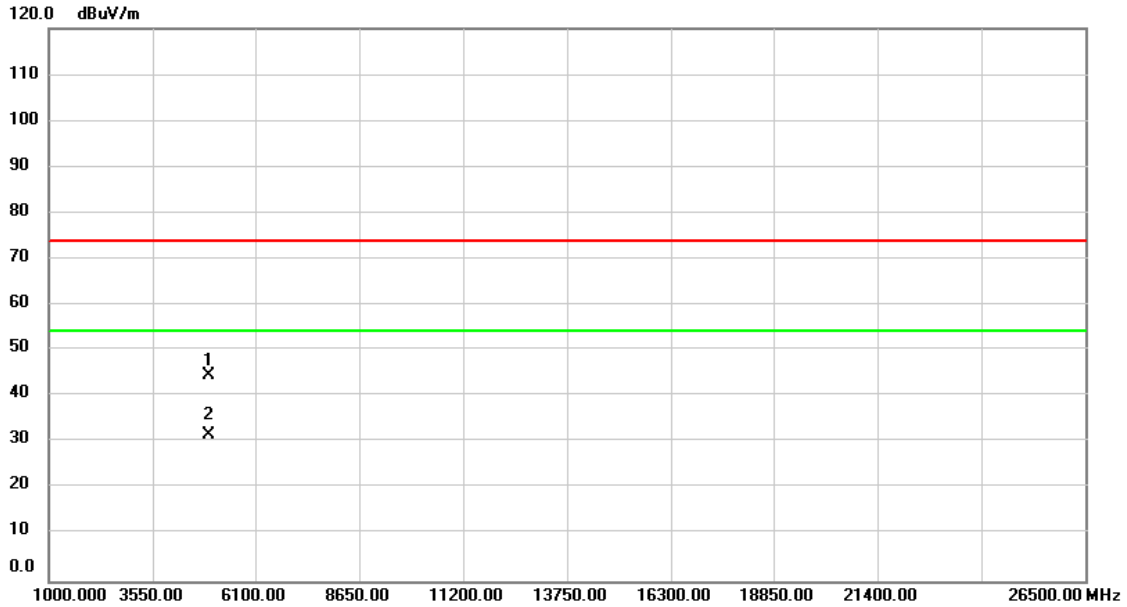
Test Mode	TX Mode_IEEE 802.11b_2462 MHz	Tested Date	2020/1/13
Test Voltage	AC 120V/60Hz	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4944.000	54.58	-10.22	44.36	74.00	-29.64	peak	
2	*	4944.000	41.97	-10.22	31.75	54.00	-22.25	AVG	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

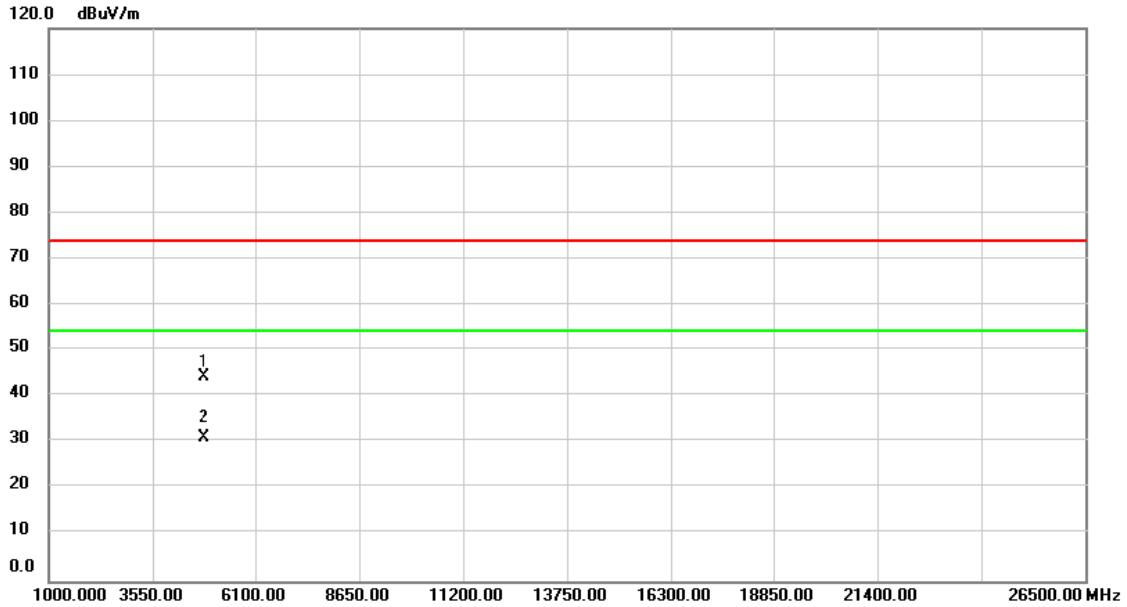
Test Mode	TX Mode_IEEE 802.11b_2462 MHz	Tested Date	2020/1/13
Test Voltage	AC 120V/60Hz	Polarization	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4944.000	54.71	-10.22	44.49	74.00	-29.51	peak	
2	*	4944.000	41.89	-10.22	31.67	54.00	-22.33	AVG	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

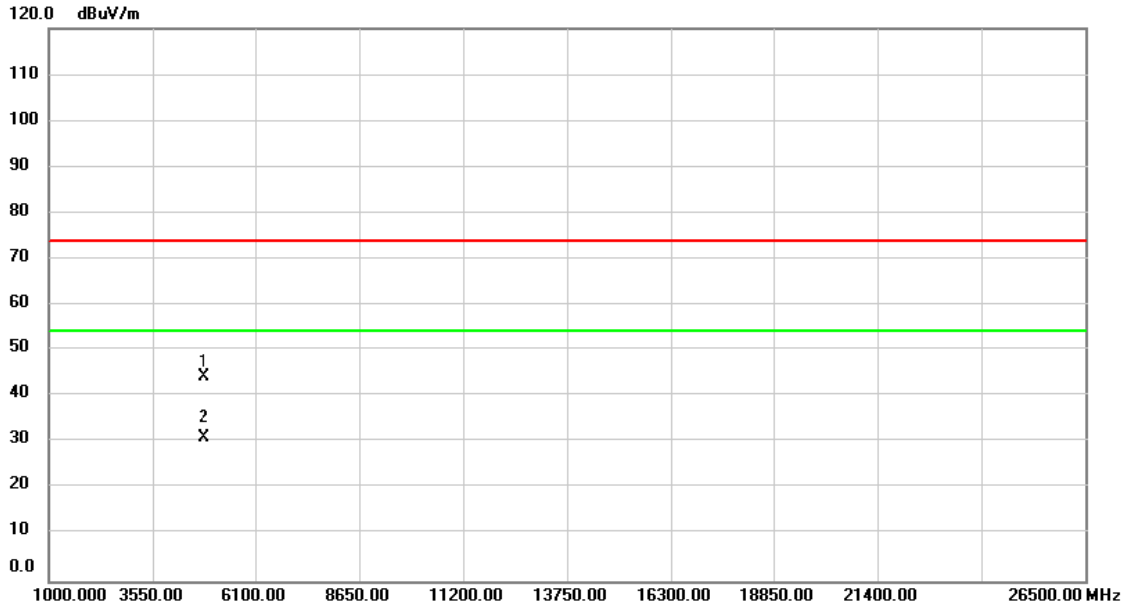
Test Mode	TX Mode_IEEE 802.11g_2412 MHz	Tested Date	2020/1/13
Test Voltage	AC 120V/60Hz	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4824.000	54.79	-10.52	44.27	74.00	-29.73	peak	
2	*	4824.000	41.50	-10.52	30.98	54.00	-23.02	AVG	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

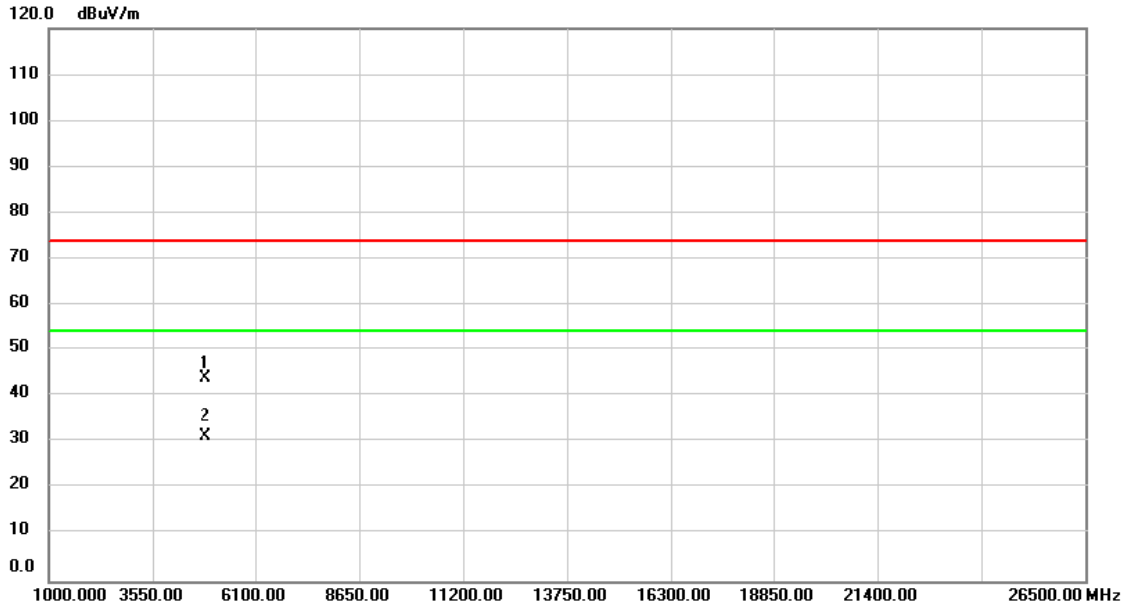
Test Mode	TX Mode_IEEE 802.11g_2412 MHz	Tested Date	2020/1/13
Test Voltage	AC 120V/60Hz	Polarization	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4824.000	54.90	-10.52	44.38	74.00	-29.62	peak	
2	*	4824.000	41.58	-10.52	31.06	54.00	-22.94	AVG	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

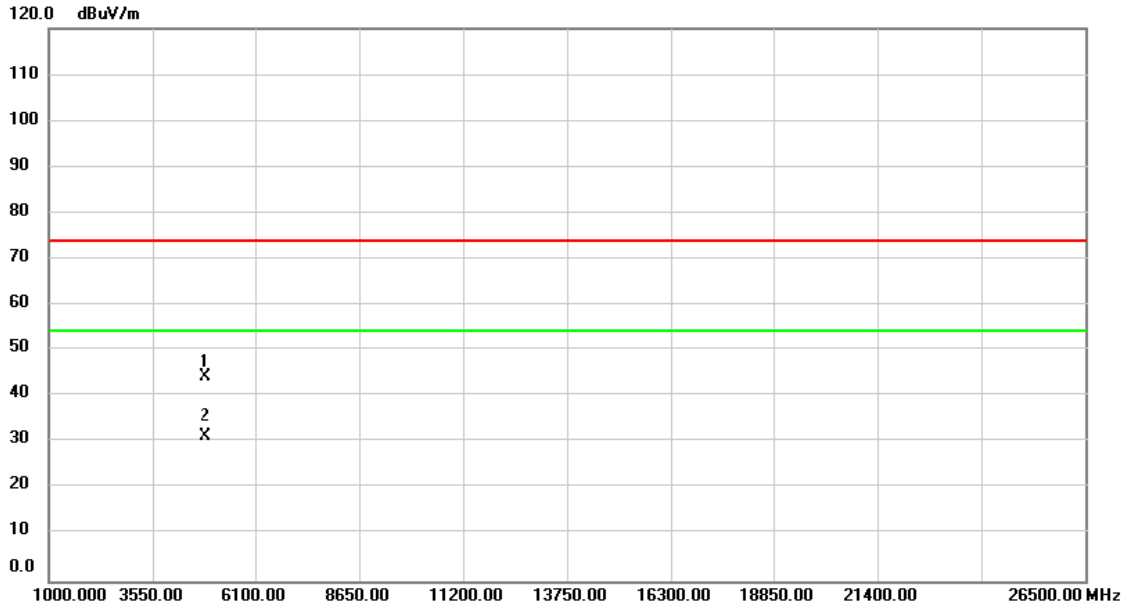
Test Mode	TX Mode_IEEE 802.11g_2437 MHz	Tested Date	2020/1/13
Test Voltage	AC 120V/60Hz	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4874.000	54.39	-10.40	43.99	74.00	-30.01	peak	
2	*	4874.000	41.72	-10.40	31.32	54.00	-22.68	AVG	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

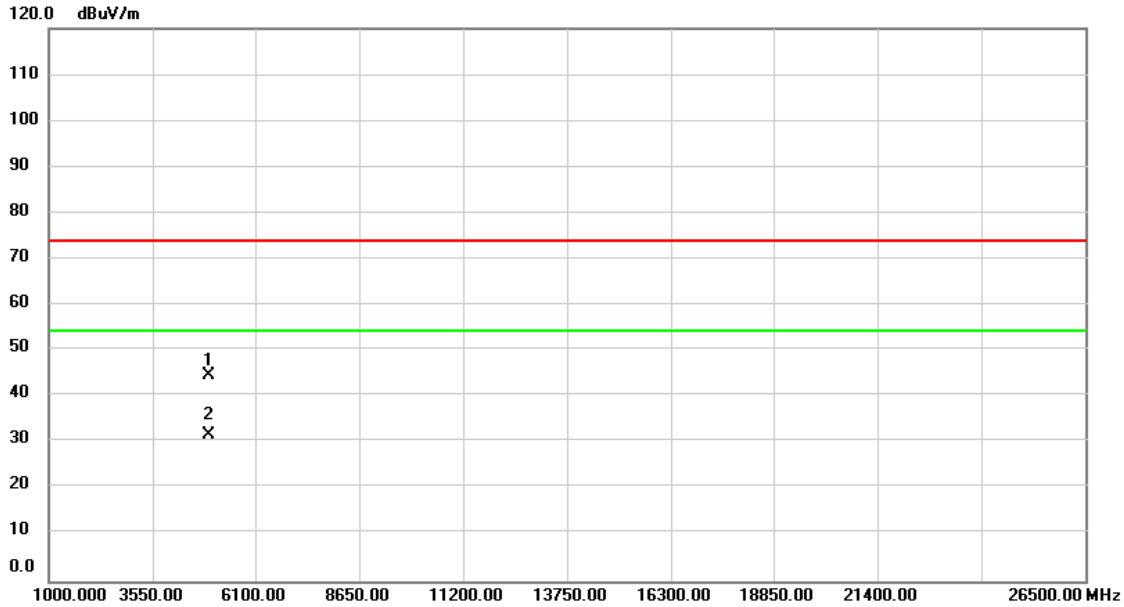
Test Mode	TX Mode_IEEE 802.11g_2437 MHz	Tested Date	2020/1/13
Test Voltage	AC 120V/60Hz	Polarization	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4874.000	54.78	-10.40	44.38	74.00	-29.62	peak	
2	*	4874.000	41.78	-10.40	31.38	54.00	-22.62	AVG	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

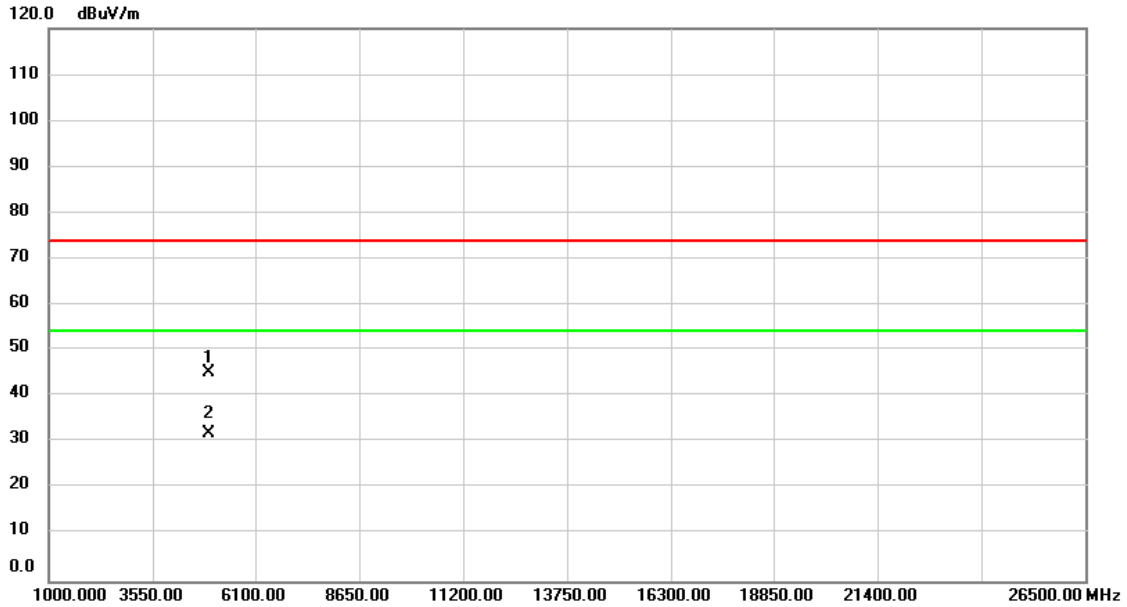
Test Mode	TX Mode_IEEE 802.11g_2462 MHz	Tested Date	2020/1/13
Test Voltage	AC 120V/60Hz	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4944.000	54.72	-10.22	44.50	74.00	-29.50	peak	
2	*	4944.000	42.02	-10.22	31.80	54.00	-22.20	AVG	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

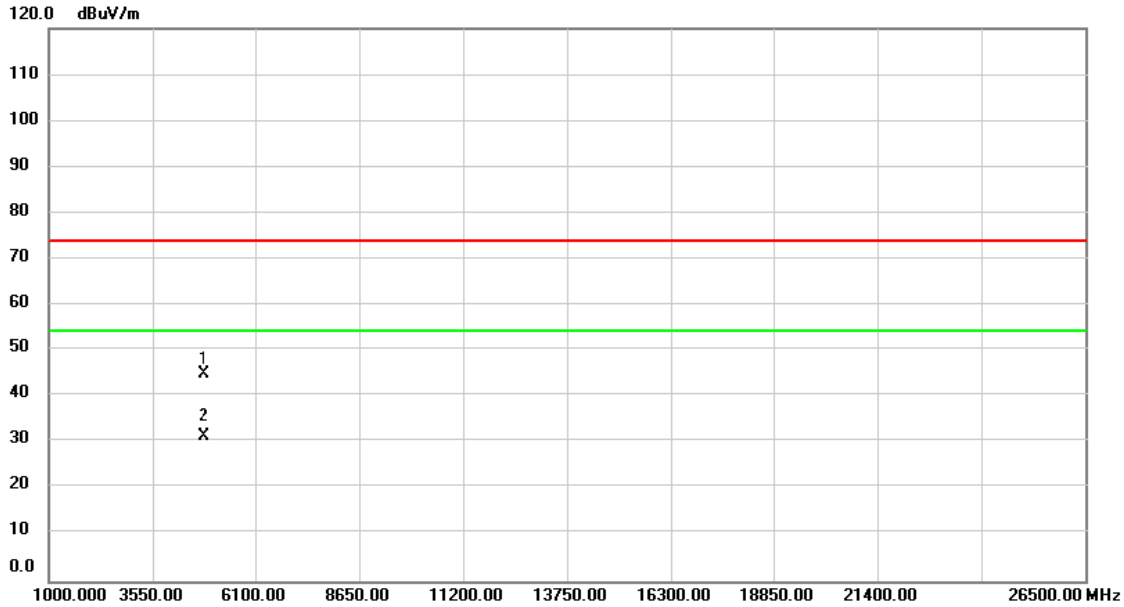
Test Mode	TX Mode_IEEE 802.11g_2462 MHz	Tested Date	2020/1/13
Test Voltage	AC 120V/60Hz	Polarization	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4944.000	55.37	-10.22	45.15	74.00	-28.85	peak	
2	*	4944.000	42.28	-10.22	32.06	54.00	-21.94	AVG	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

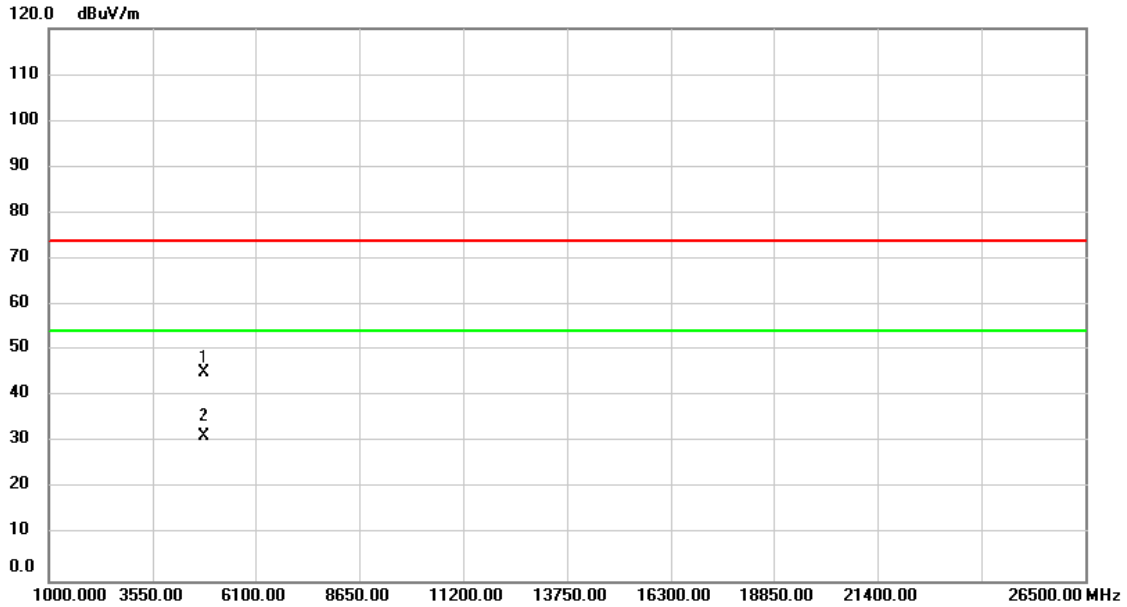
Test Mode	TX Mode_IEEE 802.11n (HT20)_2412 MHz	Tested Date	2020/1/13
Test Voltage	AC 120V/60Hz	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4824.000	55.32	-10.52	44.80	74.00	-29.20	peak	
2	*	4824.000	41.84	-10.52	31.32	54.00	-22.68	AVG	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

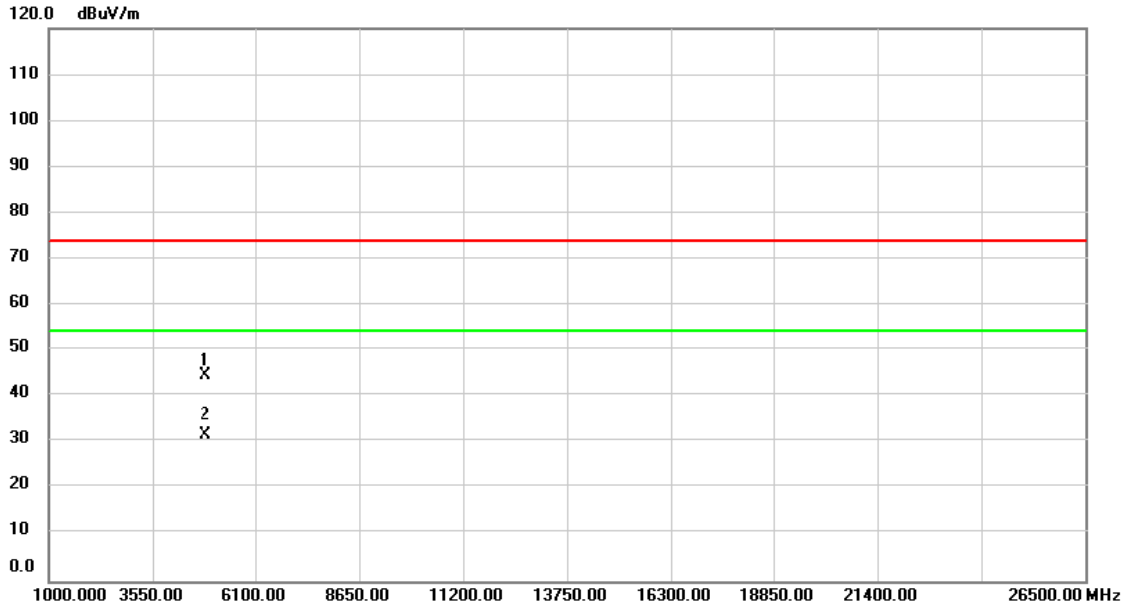
Test Mode	TX Mode_IEEE 802.11n (HT20)_2412 MHz	Tested Date	2020/1/13
Test Voltage	AC 120V/60Hz	Polarization	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4824.000	55.65	-10.52	45.13	74.00	-28.87	peak	
2	*	4824.000	41.87	-10.52	31.35	54.00	-22.65	AVG	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

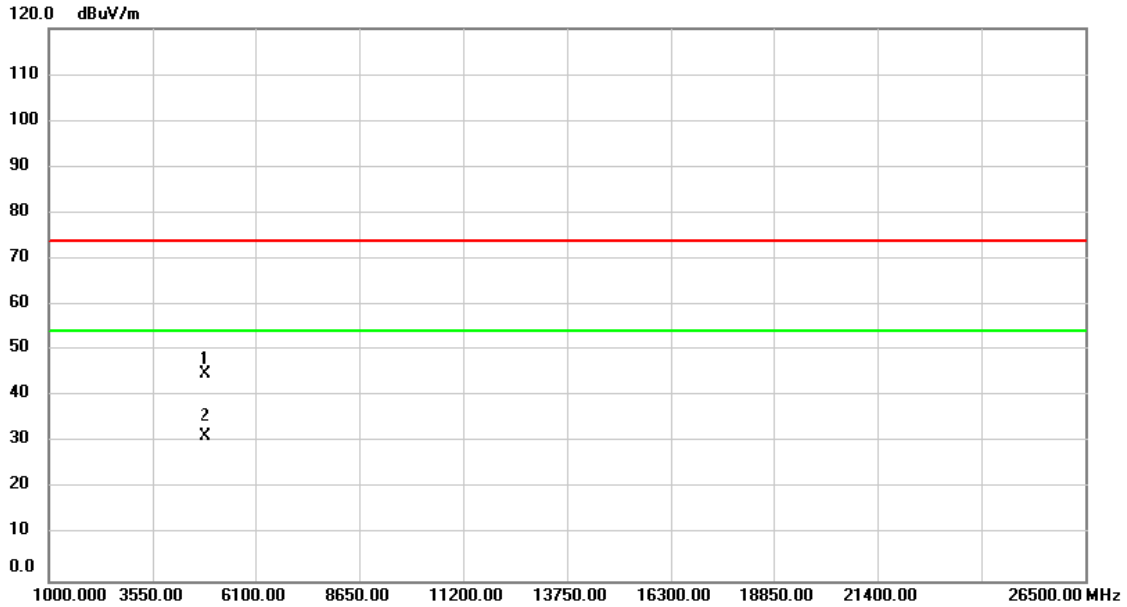
Test Mode	TX Mode_IEEE 802.11n (HT20)_2437 MHz	Tested Date	2020/1/13
Test Voltage	AC 120V/60Hz	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4874.000	54.99	-10.40	44.59	74.00	-29.41	peak	
2	*	4874.000	42.13	-10.40	31.73	54.00	-22.27	AVG	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

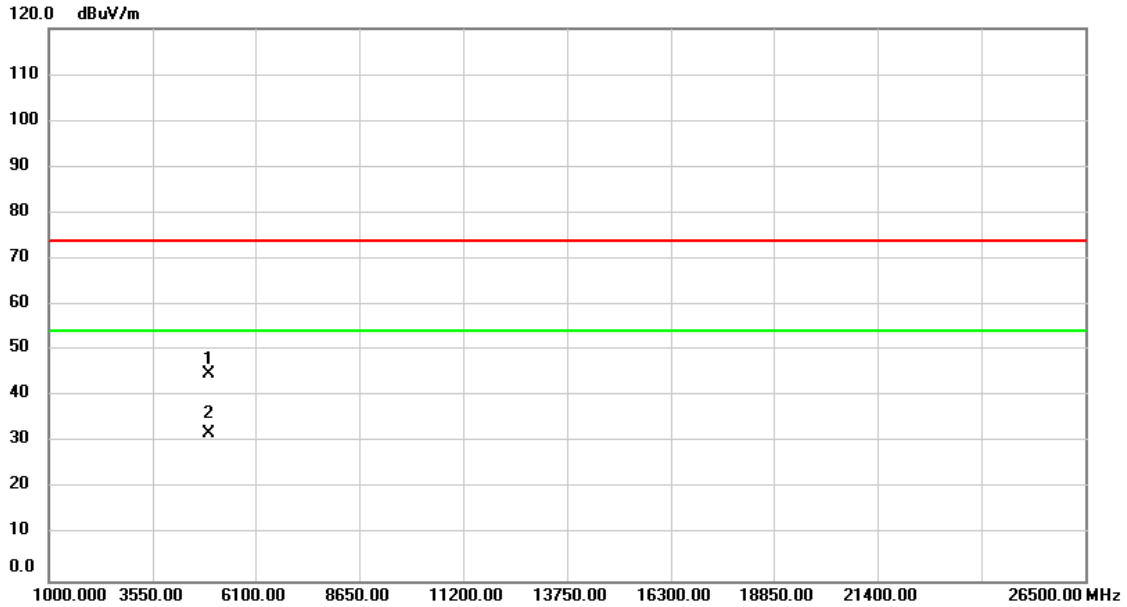
Test Mode	TX Mode_IEEE 802.11n (HT20)_2437 MHz	Tested Date	2020/1/13
Test Voltage	AC 120V/60Hz	Polarization	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4874.000	55.28	-10.40	44.88	74.00	-29.12	peak	
2	*	4874.000	41.80	-10.40	31.40	54.00	-22.60	AVG	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

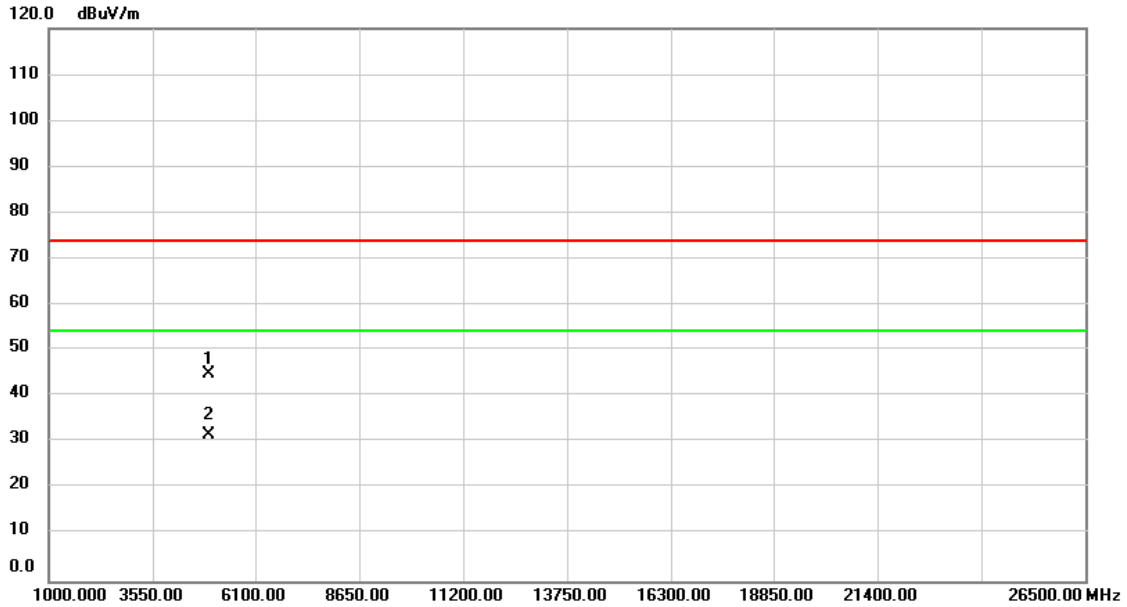
Test Mode	TX Mode_IEEE 802.11n (HT20)_2462 MHz	Tested Date	2020/1/13
Test Voltage	AC 120V/60Hz	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4944.000	54.94	-10.22	44.72	74.00	-29.28	peak	
2	*	4944.000	42.03	-10.22	31.81	54.00	-22.19	AVG	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

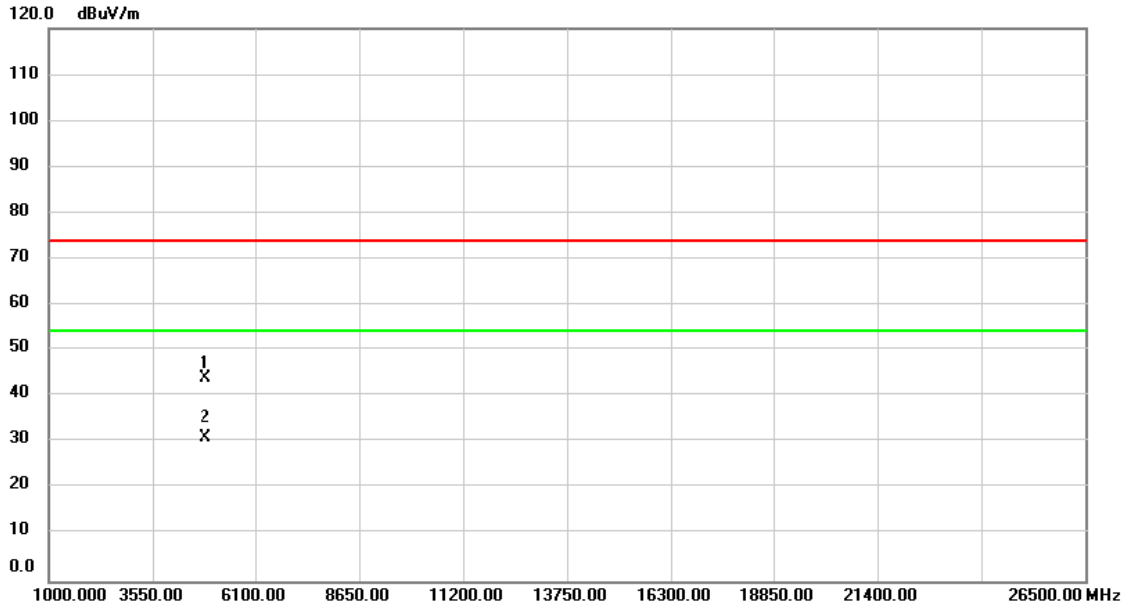
Test Mode	TX Mode_IEEE 802.11n (HT20)_2462 MHz	Tested Date	2020/1/13
Test Voltage	AC 120V/60Hz	Polarization	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4944.000	54.99	-10.22	44.77	74.00	-29.23	peak	
2	*	4944.000	41.97	-10.22	31.75	54.00	-22.25	AVG	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

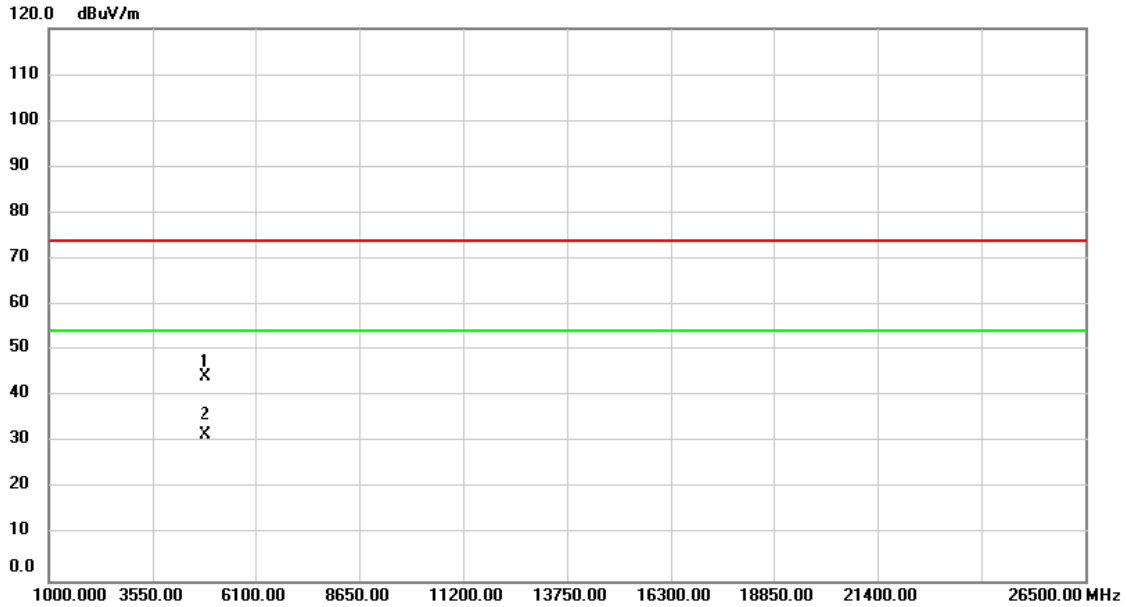
Test Mode	TX Mode_IEEE 802.11n (HT40)_2422 MHz	Tested Date	2020/1/13
Test Voltage	AC 120V/60Hz	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4844.000	54.35	-10.47	43.88	74.00	-30.12	peak	
2	*	4844.000	41.48	-10.47	31.01	54.00	-22.99	AVG	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

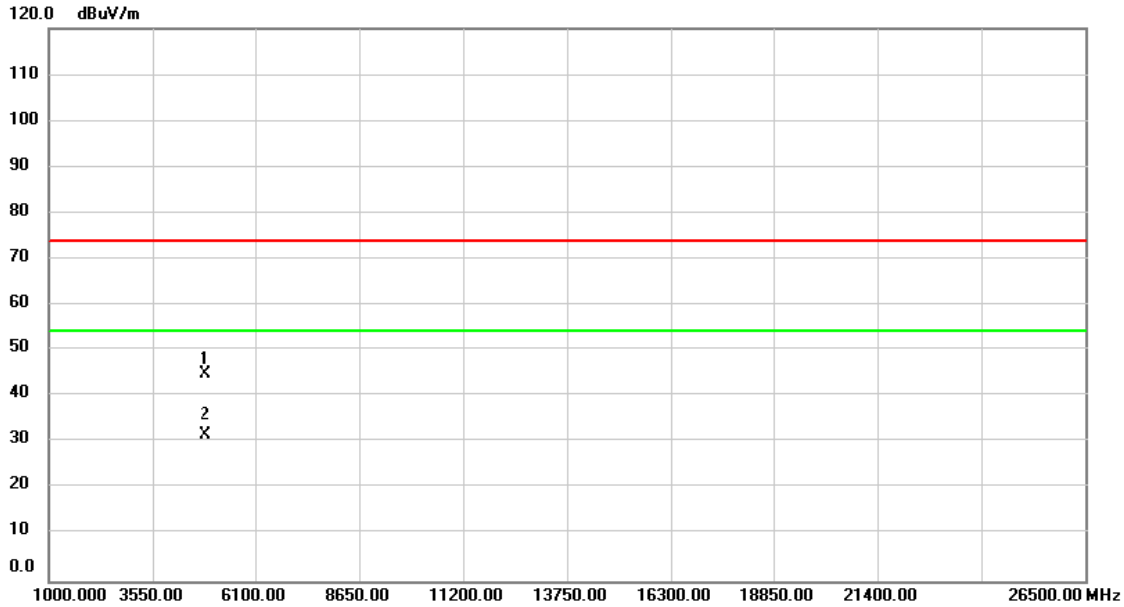
Test Mode	TX Mode_IEEE 802.11n (HT40)_2422 MHz	Tested Date	2020/1/13
Test Voltage	AC 120V/60Hz	Polarization	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4844.000	54.66	-10.47	44.19	74.00	-29.81	peak	
2	*	4844.000	41.98	-10.47	31.51	54.00	-22.49	AVG	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

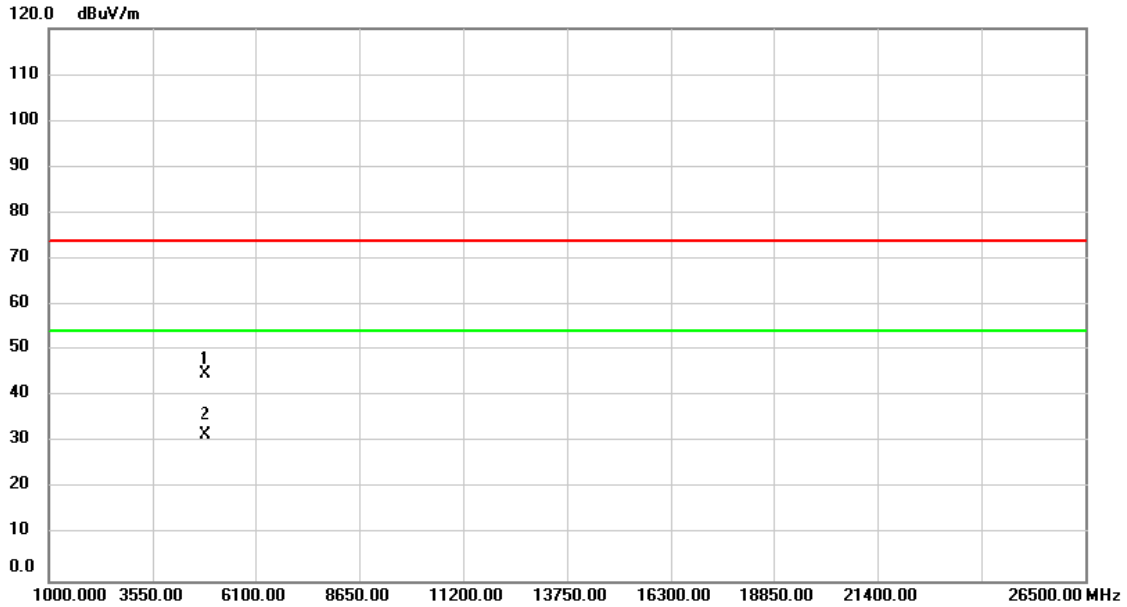
Test Mode	TX Mode_IEEE 802.11n (HT40)_2437 MHz	Tested Date	2020/1/13
Test Voltage	AC 120V/60Hz	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4874.000	55.25	-10.40	44.85	74.00	-29.15	peak	
2	*	4874.000	41.97	-10.40	31.57	54.00	-22.43	AVG	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

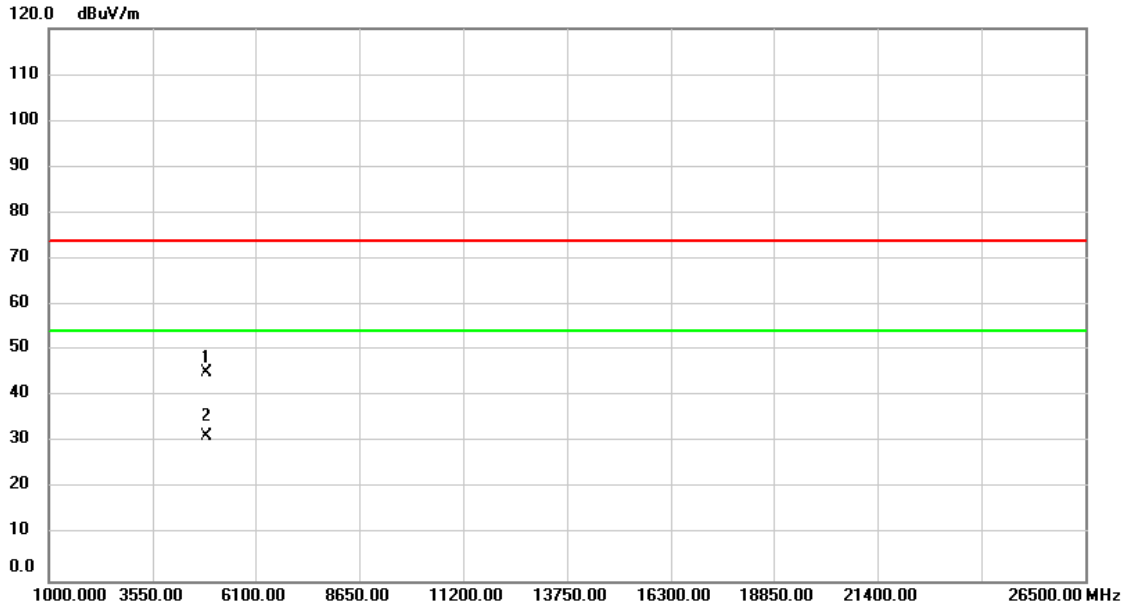
Test Mode	TX Mode_IEEE 802.11n (HT40)_2437 MHz	Tested Date	2020/1/13
Test Voltage	AC 120V/60Hz	Polarization	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4874.000	55.34	-10.40	44.94	74.00	-29.06	peak	
2	*	4874.000	42.07	-10.40	31.67	54.00	-22.33	AVG	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

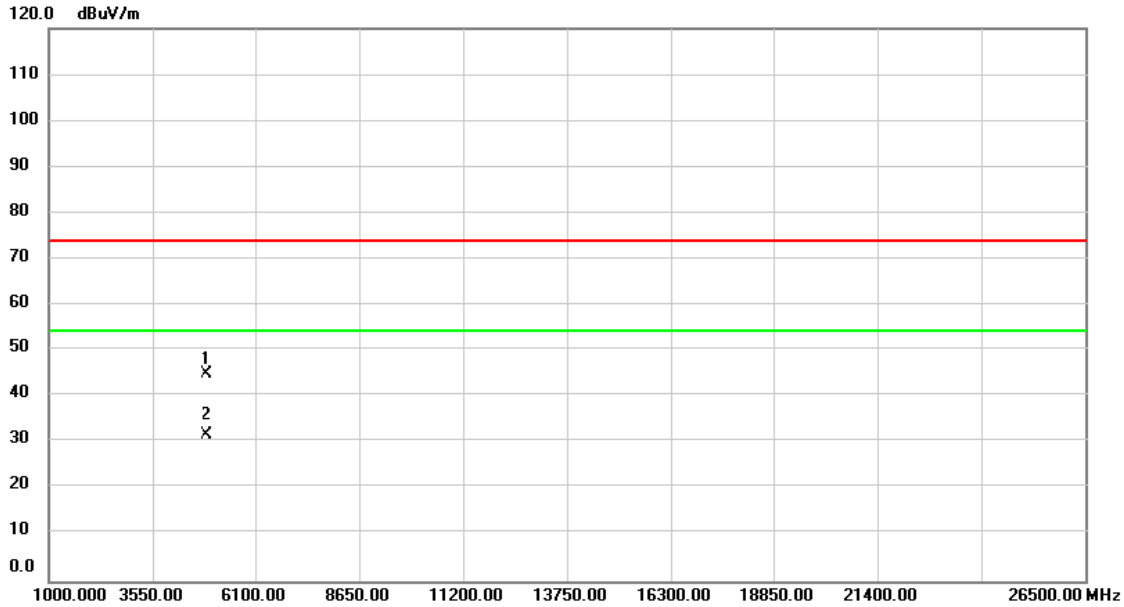
Test Mode	TX Mode_IEEE 802.11n (HT40)_2452 MHz	Tested Date	2020/1/13
Test Voltage	AC 120V/60Hz	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4904.000	55.34	-10.32	45.02	74.00	-28.98	peak	
2	*	4904.000	41.75	-10.32	31.43	54.00	-22.57	AVG	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

Test Mode	TX Mode_IEEE 802.11n (HT40)_2452 MHz	Tested Date	2020/1/13
Test Voltage	AC 120V/60Hz	Polarization	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4904.000	55.12	-10.32	44.80	74.00	-29.20	peak	
2	*	4904.000	41.83	-10.32	31.51	54.00	-22.49	AVG	

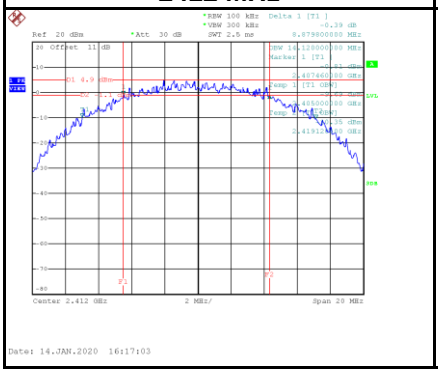
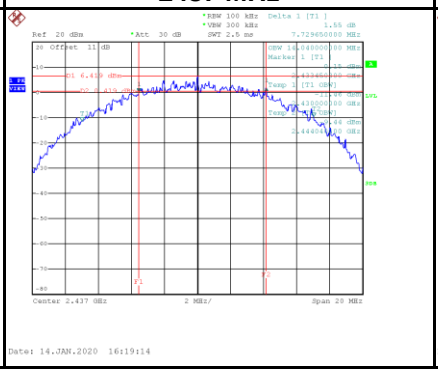
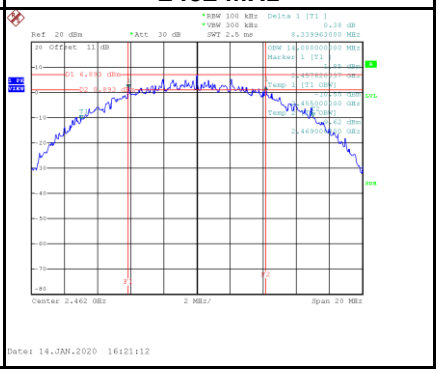
REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

APPENDIX D BANDWIDTH

Test Mode	IEEE 802.11b
Test Voltage	AC 120V/60Hz

Frequency (MHz)	6dB Bandwidth (MHz)	6 dB Bandwidth Limit (kHz)	Result
2412	8.88	500	Complies
2437	7.73	500	Complies
2462	8.34	500	Complies

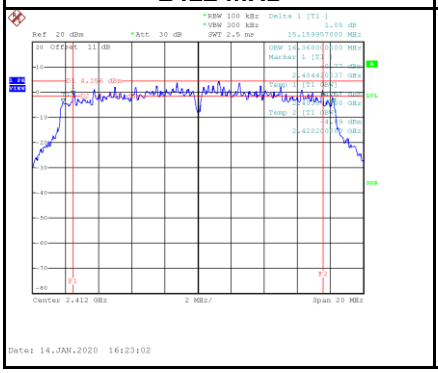
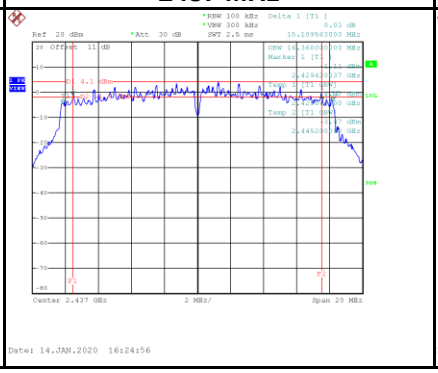
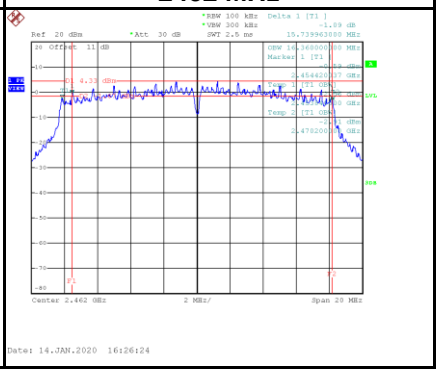
6 dB Bandwidth

2412 MHz	2437 MHz	2462 MHz
		

Test Mode	IEEE 802.11g
Test Voltage	AC 120V/60Hz

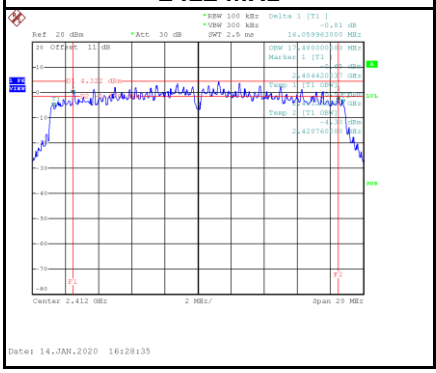
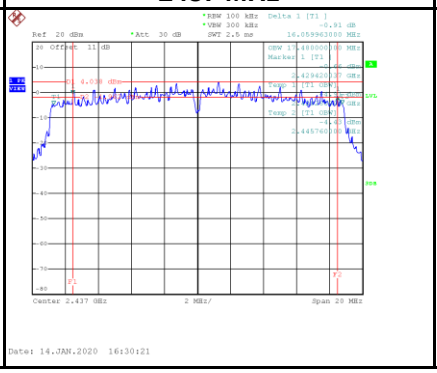
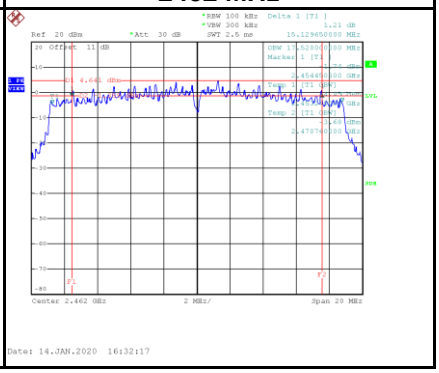
Frequency (MHz)	6dB Bandwidth (MHz)	6 dB Bandwidth Limit (kHz)	Result
2412	15.16	500	Complies
2437	15.11	500	Complies
2462	15.74	500	Complies

6 dB Bandwidth

2412 MHz	2437 MHz	2462 MHz
		

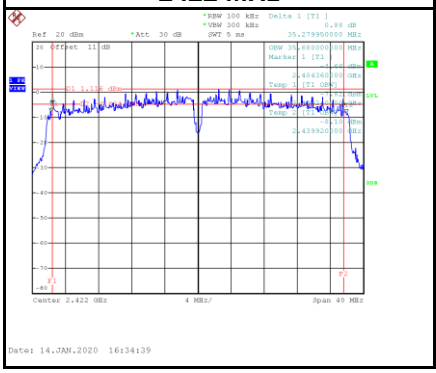
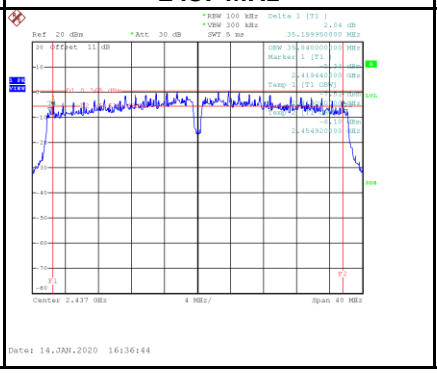
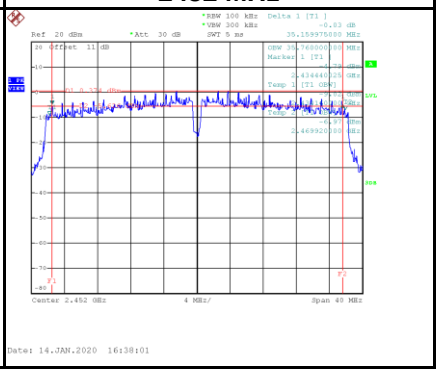
Test Mode	IEEE 802.11n (HT20)
Test Voltage	AC 120V/60Hz

Frequency (MHz)	6dB Bandwidth (MHz)	6 dB Bandwidth Limit (kHz)	Result
2412	16.06	500	Complies
2437	16.06	500	Complies
2462	15.13	500	Complies

6 dB Bandwidth		
2412 MHz	**2437 MHz**	**2462 MHz**
		

Test Mode	IEEE 802.11n (HT40)
Test Voltage	AC 120V/60Hz

Frequency (MHz)	6dB Bandwidth (MHz)	6 dB Bandwidth Limit (kHz)	Result
2422	35.28	500	Complies
2437	35.20	500	Complies
2452	35.16	500	Complies

6 dB Bandwidth		
2422 MHz	**2437 MHz**	**2452 MHz**
		

APPENDIX E OUTPUT POWER

Test Mode	IEEE 802.11b	Tested Date	2020/1/14
Test Voltage	AC 120V/60Hz		

Frequency (MHz)	Conducted Power (dBm)	Conducted Power (W)	Limit (dBm)	Limit (W)	Result
2412	16.41	0.0438	30.00	1.0000	Complies
2437	16.46	0.0443	30.00	1.0000	Complies
2462	16.61	0.0458	30.00	1.0000	Complies

Test Mode	IEEE 802.11g	Tested Date	2020/1/14
Test Voltage	AC 120V/60Hz		

Frequency (MHz)	Conducted Power (dBm)	Conducted Power (W)	Limit (dBm)	Limit (W)	Result
2412	23.46	0.2218	30.00	1.0000	Complies
2437	23.16	0.2070	30.00	1.0000	Complies
2462	23.35	0.2163	30.00	1.0000	Complies

Test Mode	IEEE 802.11n (HT20)	Tested Date	2020/1/14
Test Voltage	AC 120V/60Hz		

Frequency (MHz)	Conducted Power (dBm)	Conducted Power (W)	Limit (dBm)	Limit (W)	Result
2412	22.61	0.1824	30.00	1.0000	Complies
2437	22.52	0.1786	30.00	1.0000	Complies
2462	22.92	0.1959	30.00	1.0000	Complies

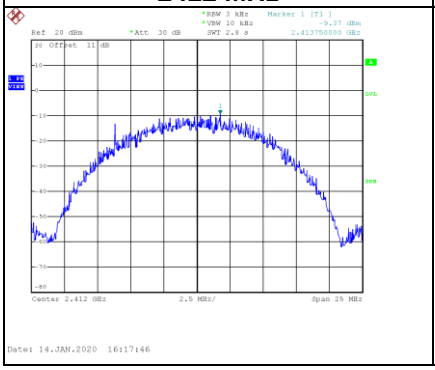
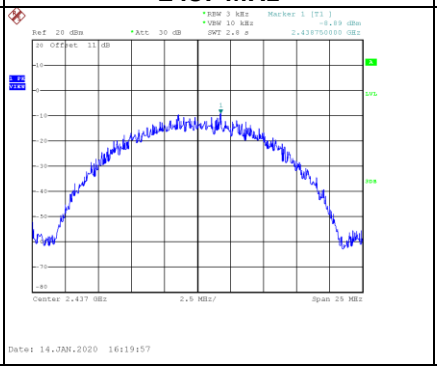
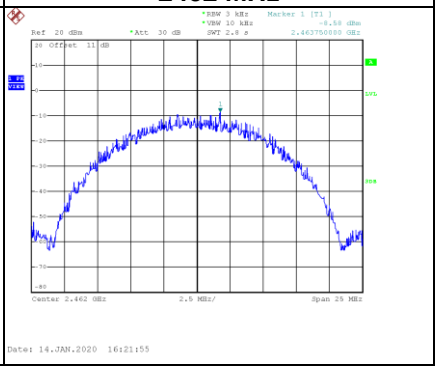
Test Mode	IEEE 802.11n (HT40)	Tested Date	2020/1/14
Test Voltage	AC 120V/60Hz		

Frequency (MHz)	Conducted Power (dBm)	Conducted Power (W)	Limit (dBm)	Limit (W)	Result
2422	23.91	0.2460	30.00	1.0000	Complies
2437	23.27	0.2123	30.00	1.0000	Complies
2452	23.46	0.2218	30.00	1.0000	Complies

APPENDIX F POWER SPECTRAL DENSITY

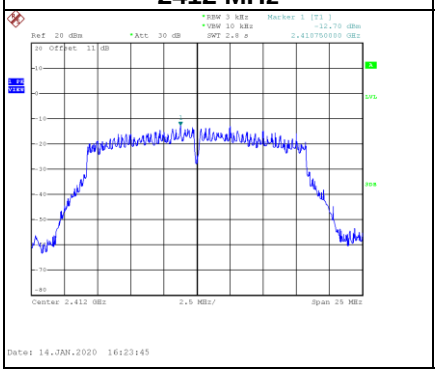
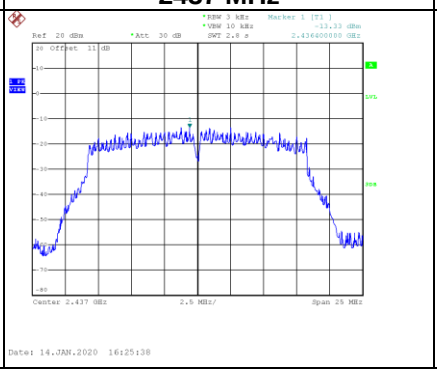
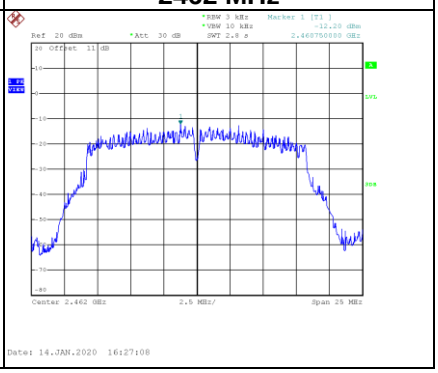
Test Mode	IEEE 802.11b
Test Voltage	AC 120V/60Hz

Frequency (MHz)	Power Density (dBm/3kHz)	Limit (dBm)	Result
2412	-9.37	8.00	Complies
2437	-8.89	8.00	Complies
2462	-8.58	8.00	Complies

2412 MHz	2437 MHz	2462 MHz
		

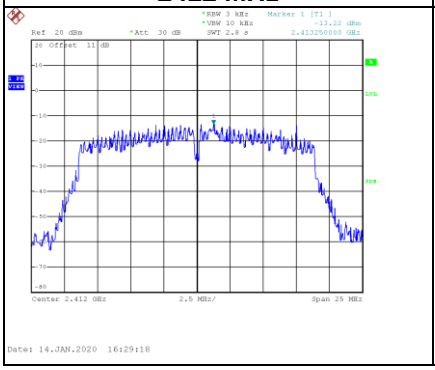
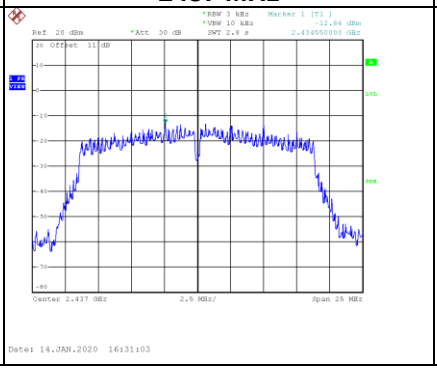
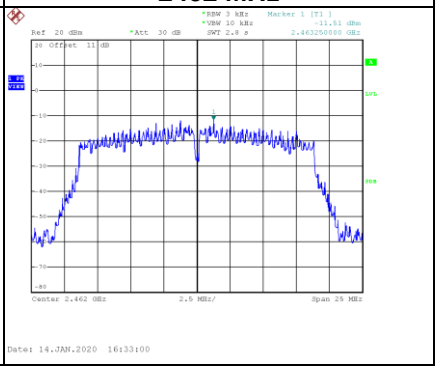
Test Mode	IEEE 802.11g
Test Voltage	AC 120V/60Hz

Frequency (MHz)	Power Density (dBm/3kHz)	Limit (dBm)	Result
2412	-12.70	8.00	Complies
2437	-13.33	8.00	Complies
2462	-12.20	8.00	Complies

2412 MHz	2437 MHz	2462 MHz
		

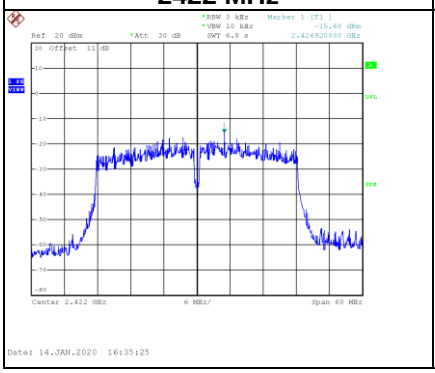
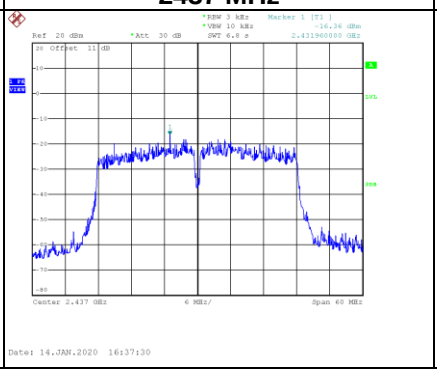
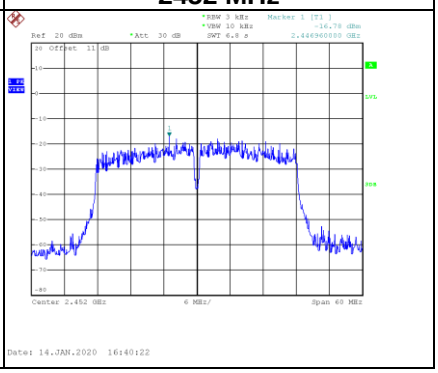
Test Mode	IEEE 802.11n (HT20)
Test Voltage	AC 120V/60Hz

Frequency (MHz)	Power Density (dBm/3kHz)	Limit (dBm)	Result
2412	-13.22	8.00	Complies
2437	-12.86	8.00	Complies
2462	-11.51	8.00	Complies

2412 MHz	2437 MHz	2462 MHz
		

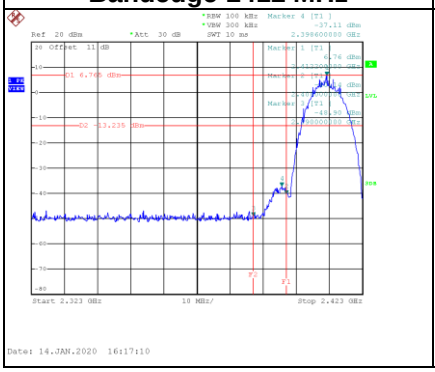
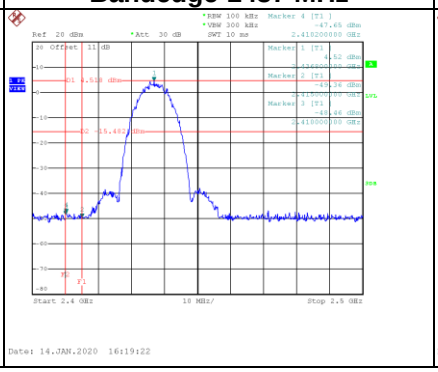
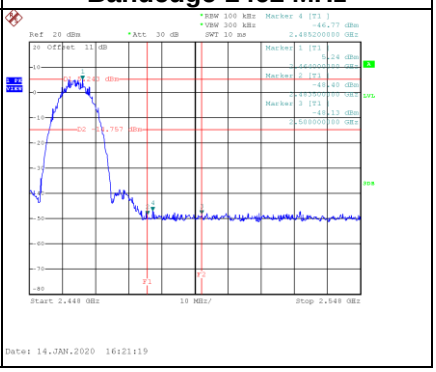
Test Mode	IEEE 802.11n (HT40)
Test Voltage	AC 120V/60Hz

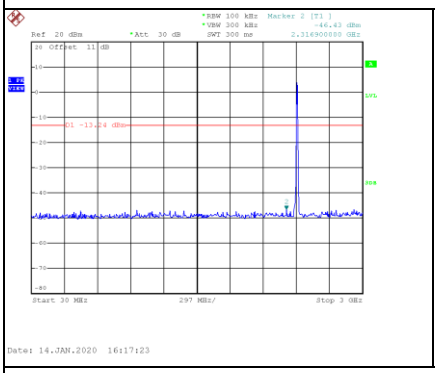
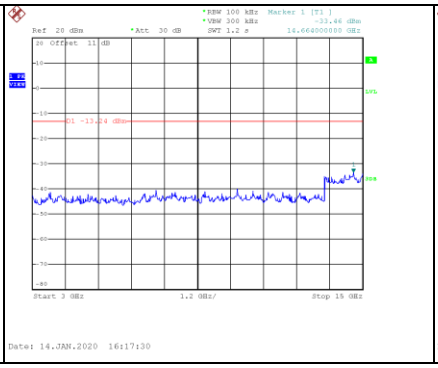
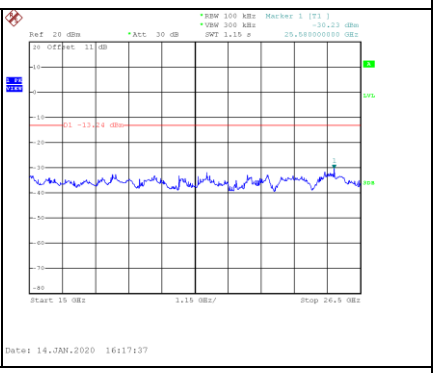
Frequency (MHz)	Power Density (dBm/3kHz)	Limit (dBm)	Result
2422	-15.60	8.00	Complies
2437	-16.36	8.00	Complies
2452	-16.78	8.00	Complies

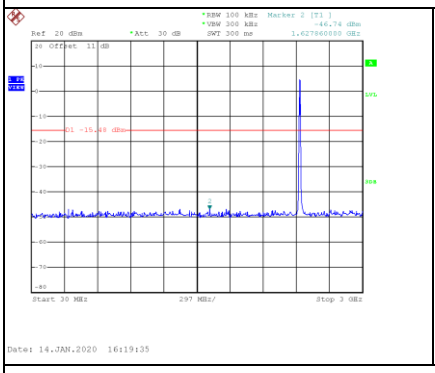
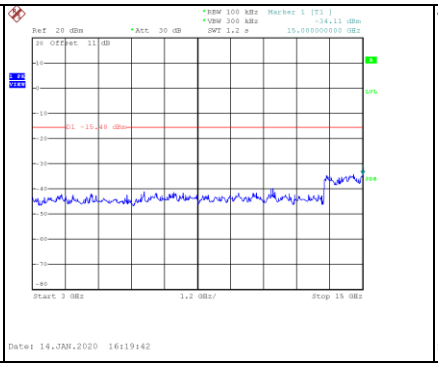
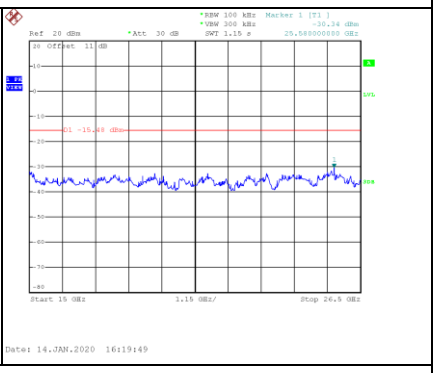
2422 MHz	2437 MHz	2452 MHz
		

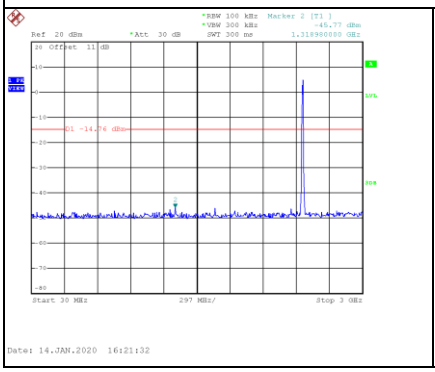
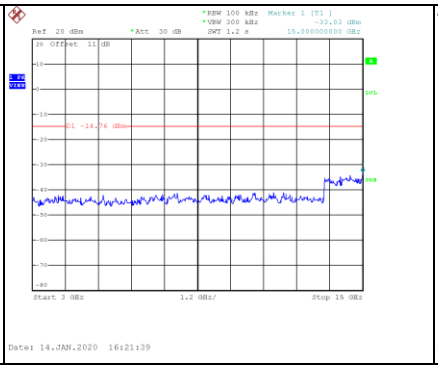
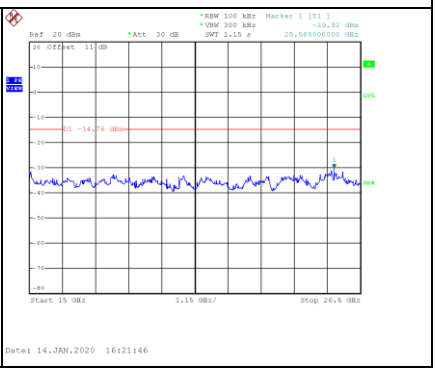
APPENDIX G ANTENNA CONDUCTED SPURIOUS EMISSIONS

Test Mode	IEEE 802.11b
Test Voltage	AC 120V/60Hz

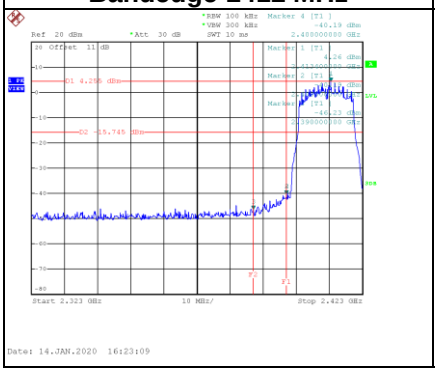
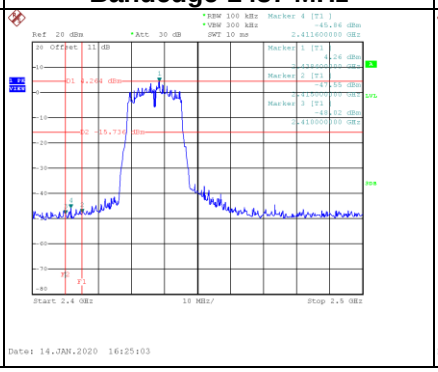
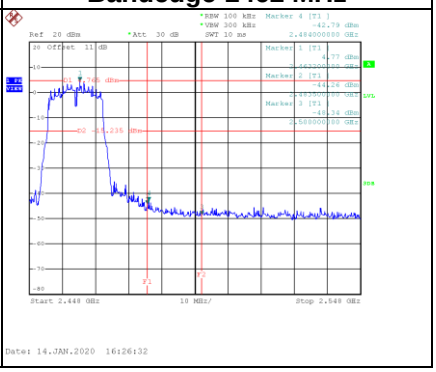
Bandedge-2412 MHz	Bandedge-2437 MHz	Bandedge-2462 MHz
		

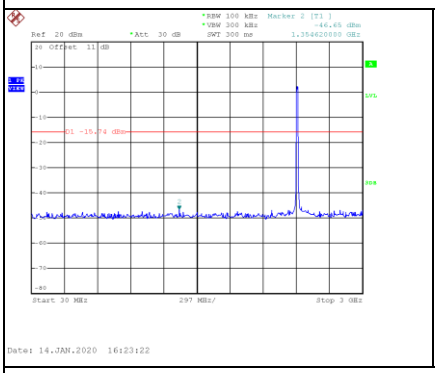
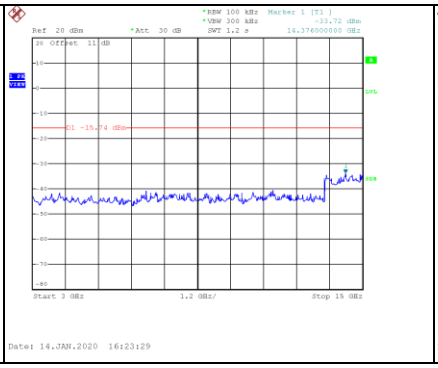
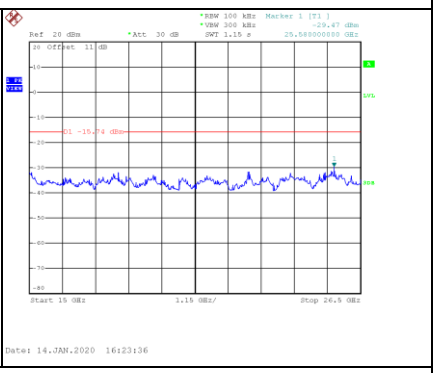
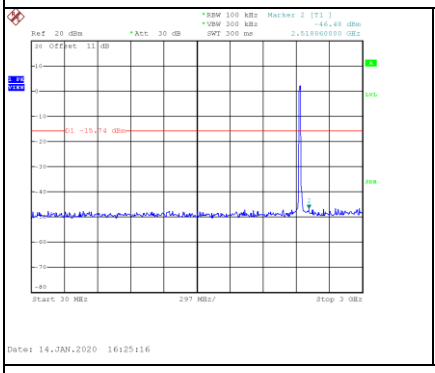
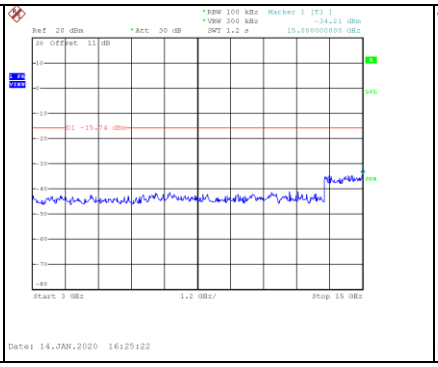
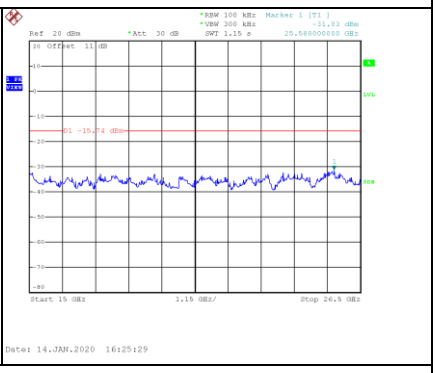
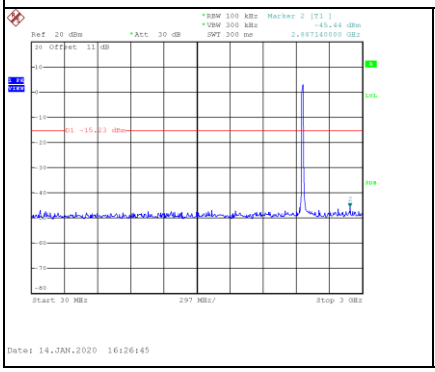
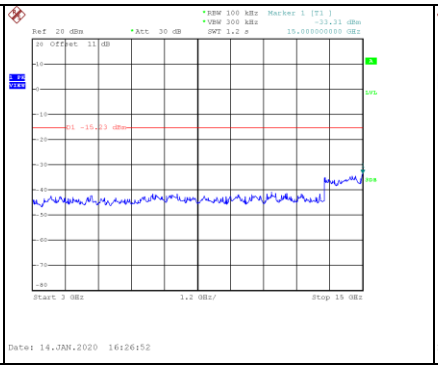
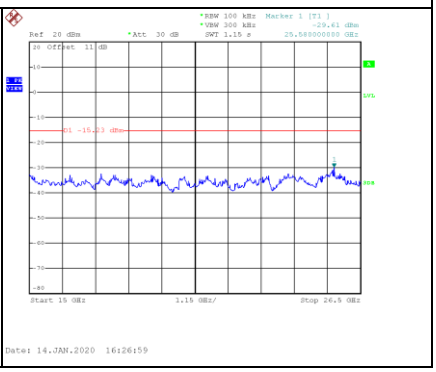
2412 MHz – 10th Harmonics		
		

2437 MHz – 10th Harmonics		
		

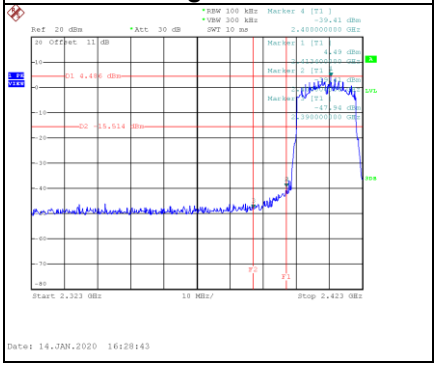
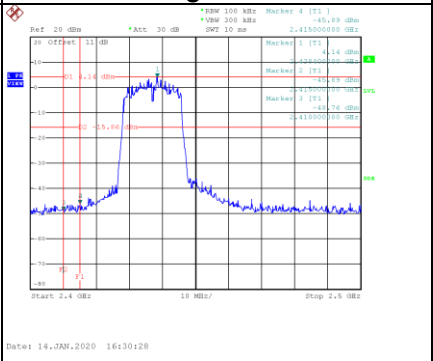
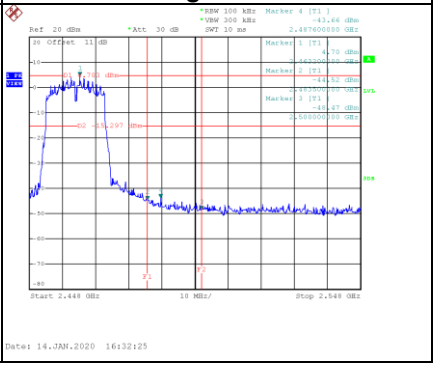
2462 MHz – 10th Harmonics		
		

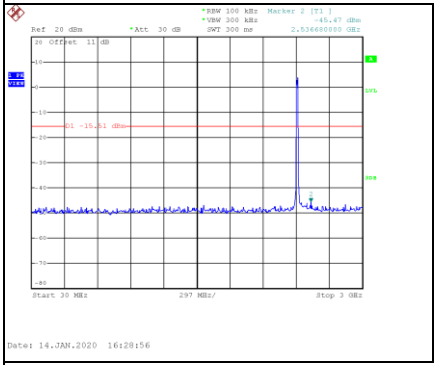
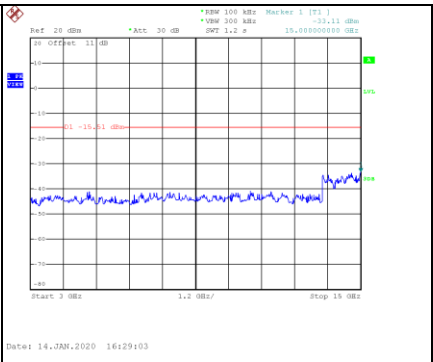
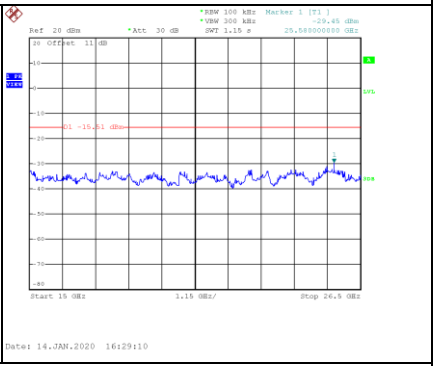
Test Mode	IEEE 802.11g
Test Voltage	AC 120V/60Hz

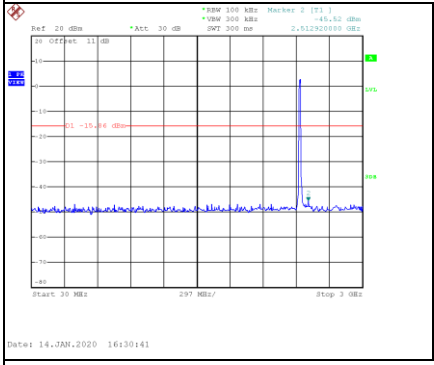
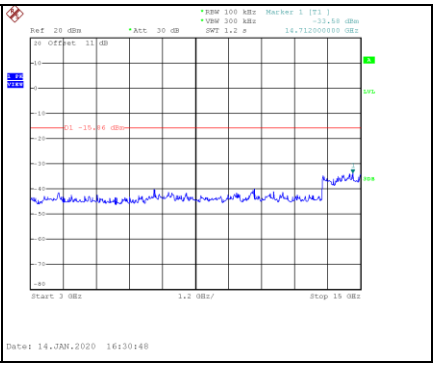
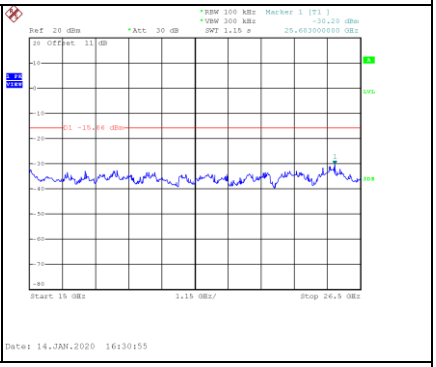
Bandedge-2412 MHz	Bandedge-2437 MHz	Bandedge-2462 MHz
		

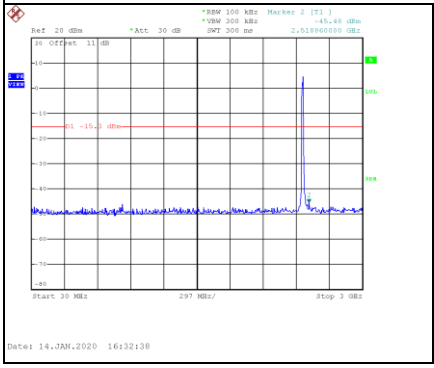
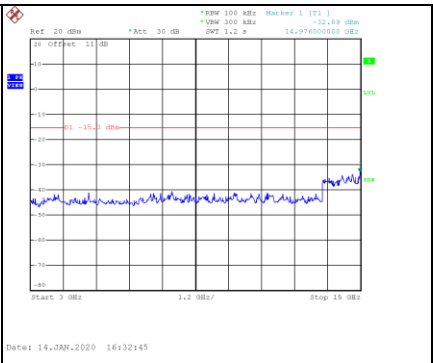
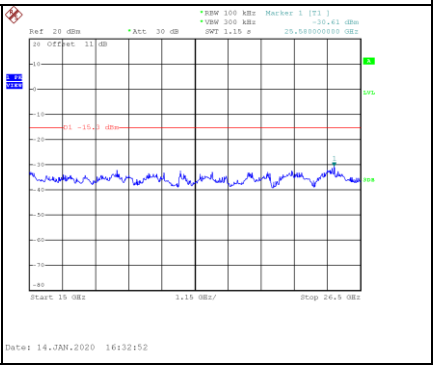
2412 MHz – 10th Harmonics		
		
2437 MHz – 10th Harmonics		
		
2462 MHz – 10th Harmonics		
		

Test Mode	IEEE 802.11n (HT20)
Test Voltage	AC 120V/60Hz

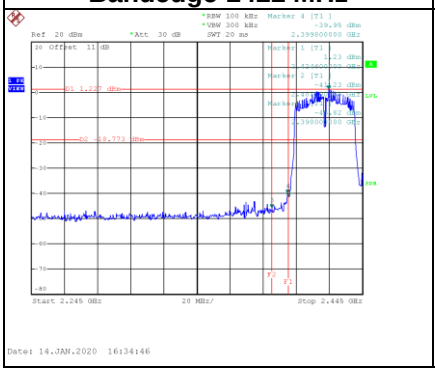
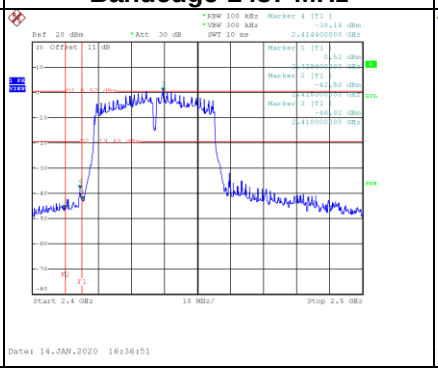
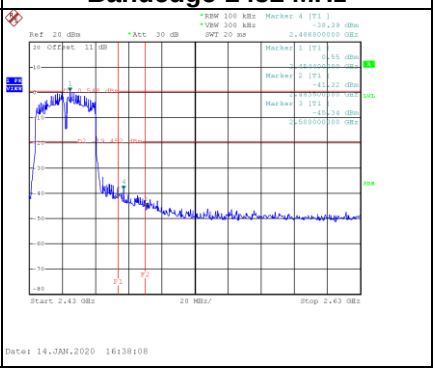
Bandedge-2412 MHz	Bandedge-2437 MHz	Bandedge-2462 MHz
		

2412 MHz – 10th Harmonics		
		

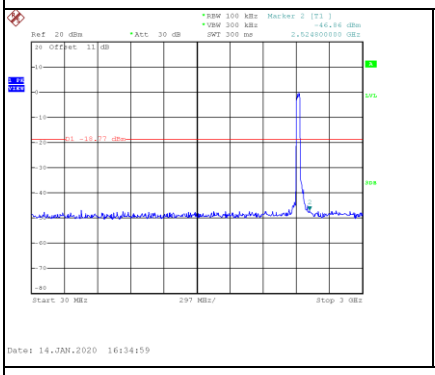
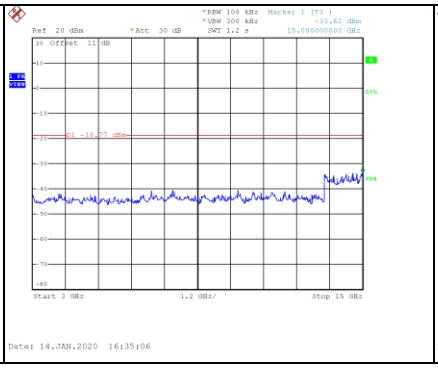
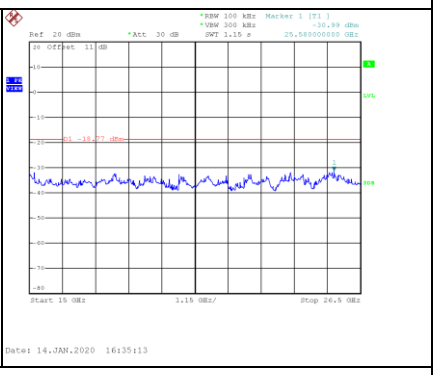
2437 MHz – 10th Harmonics		
		

2462 MHz – 10th Harmonics		
		

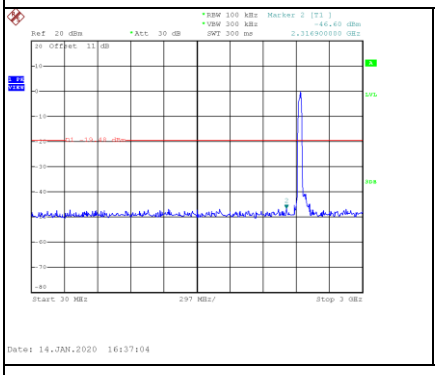
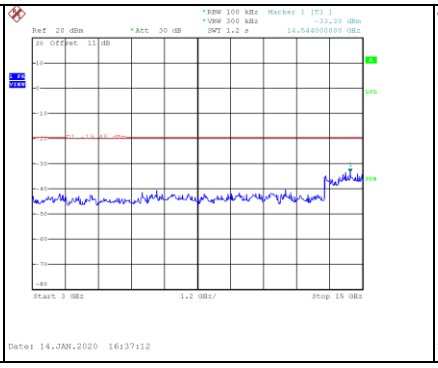
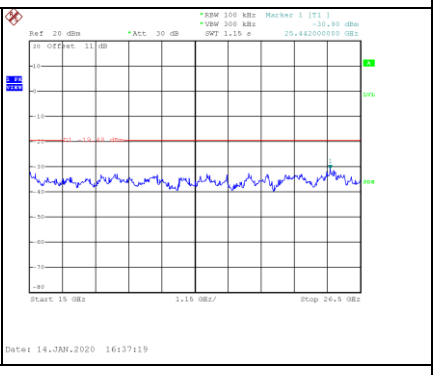
Test Mode	IEEE 802.11n (HT40)
Test Voltage	AC 120V/60Hz

Bandedge-2422 MHz	Bandedge-2437 MHz	Bandedge-2452 MHz
		

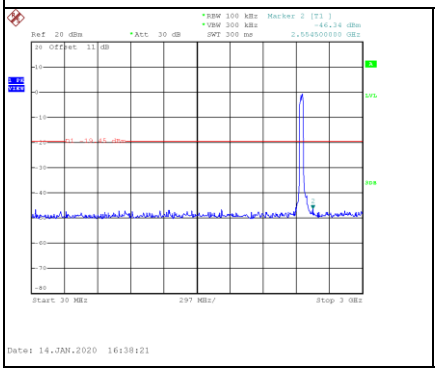
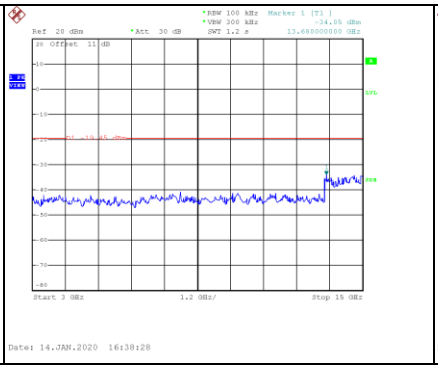
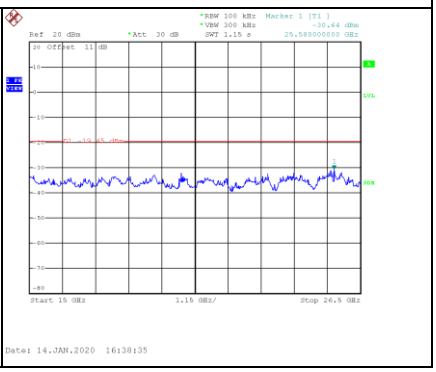
2422 MHz – 10th Harmonics

2437 MHz – 10th Harmonics

2452 MHz – 10th Harmonics

End of Test Report