FCC Radio Test Report

FCC ID: KA2WL8630APA1

Report No.	:	BTL-FCCP-1-1909H044
Equipment	:	Unified AX Dual-Band PoE Access Point
Model Name	:	DWL-8630AP, DWL-8630APE, DWL-X8630AP, DWL-X8630APE
Brand Name	:	D-Link Corporation
Applicant	:	D-Link Corporation
Address	:	17595 Mt. Herrmann, Fountain Valley, California United State 92708
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	:	2019/9/30
Date of Test	:	2019/9/30 ~ 2020/3/16
Issued Date	:	2020/4/21

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

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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).

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BTL is not responsible for the sampling stage, so the results only apply to the sample as received.

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.	2020/4/21

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: 355421 and DN: TW1099.

☒ 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: 325517 and DN: TW1115.

☐ 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	20 °C, 58 %	Eric Lee
Radiated emissions below 1 GHz	23 °C, 61 %	Hunter Chiang
Radiated emissions above 1 GHz	23 °C, 59~65 %	Hunter Chiang
Bandwidth	25.4 °C, 54 %	Tim Lee
Output Power	25.4 °C, 54 %	Tim Lee
Power Spectral Density	25.4 °C, 54 %	Tim Lee
Antenna conducted Spurious Emission	25.4 °C, 54 %	Tim Lee

1.4 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING

Non-Beamforming mode				
Test Software	QRCT v4.0.00123			
Mode	2412 MHz	2437 MHz	2462 MHz	Data Rate
IEEE 802.11b	22.5	22.5	22	1 Mbps
IEEE 802.11g	17	18	17	6 Mbps
IEEE 802.11n (HT20)	17.5	18	15	MCS 0
IEEE 802.11ac (VHT20)	17.5	18	15	MCS 0
IEEE 802.11ax (HEW20)	17	17	16	MCS 0
Mode	2422 MHz	2437 MHz	2452 MHz	Data Rate
IEEE 802.11n (HT40)	15	18	14	MCS 0
IEEE 802.11ac (VHT40)	15	17.5	14	MCS 0
IEEE 802.11ax (HEW40)	14	17	14	MCS 0

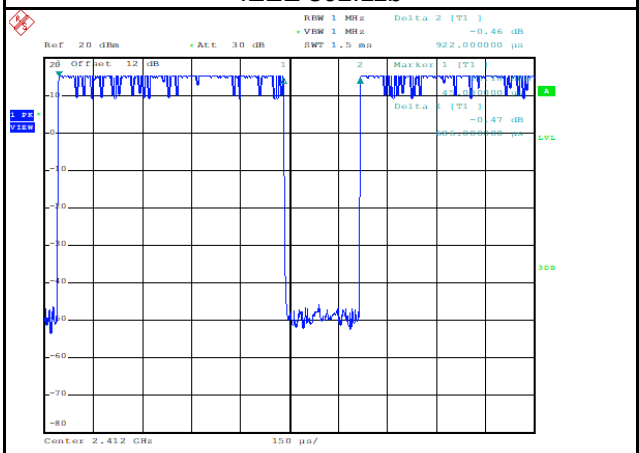
Beamforming mode				
Test Software	QRCT v4.0.00123			
Mode	2412 MHz	2437 MHz	2462 MHz	Data Rate
IEEE 802.11b	16.5	16.5	16	1 Mbps
IEEE 802.11g	11	12	11	6 Mbps
IEEE 802.11n (HT20)	11.5	12	9	MCS 0
IEEE 802.11ac (VHT20)	11.5	12	9	MCS 0
IEEE 802.11ax (HEW20)	11	11	10	MCS 0
Mode	2422 MHz	2437 MHz	2452 MHz	Data Rate
IEEE 802.11n (HT40)	9	12	8	MCS 0
IEEE 802.11ac (VHT40)	9	11.5	8	MCS 0
IEEE 802.11ax (HEW40)	8	11	8	MCS 0

1.5 DUTY CYCLE

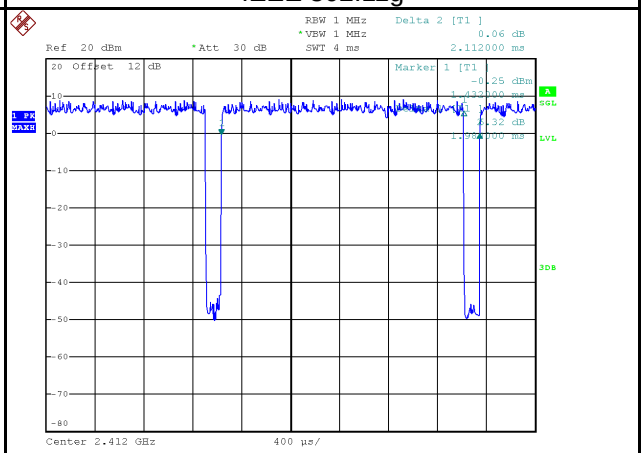
If duty cycle is ≥ 98 %, duty factor is not required.
If duty cycle is < 98 %, duty factor shall be considered.

Remark	Delta 1			Delta 2	On Time/Period	10 log(1/Duty Cycle)	1/On Time (B)
Mode	ON (ms)	Numbers (ON)	On Time (B) (ms)	Period (ON+OFF) (ms)	Duty Cycle (%)	Duty Factor (dB)	1/B Minimum VBW (kHz)
IEEE 802.11b	0.686	1	0.686	0.922	74.40%	1.28	1.458
IEEE 802.11g	1.984	1	1.984	2.112	93.94%	0.27	0.504
IEEE 802.11n (HT20)	5.440	1	5.440	5.720	95.10%	0.22	0.184
IEEE 802.11n (HT40)	5.406	1	5.406	5.763	93.81%	0.28	0.185
IEEE 802.11ax (HEW20)	5.446	1	5.446	5.698	95.58%	0.20	0.184
IEEE 802.11ax (HEW40)	5.428	1	5.428	5.681	95.55%	0.20	0.184

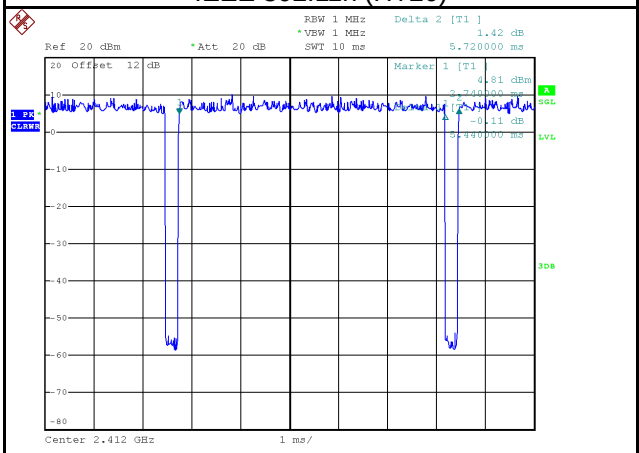
IEEE 802.11b



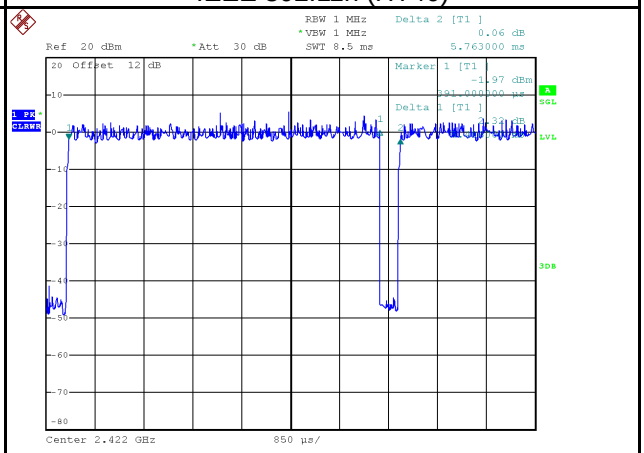
IEEE 802.11g

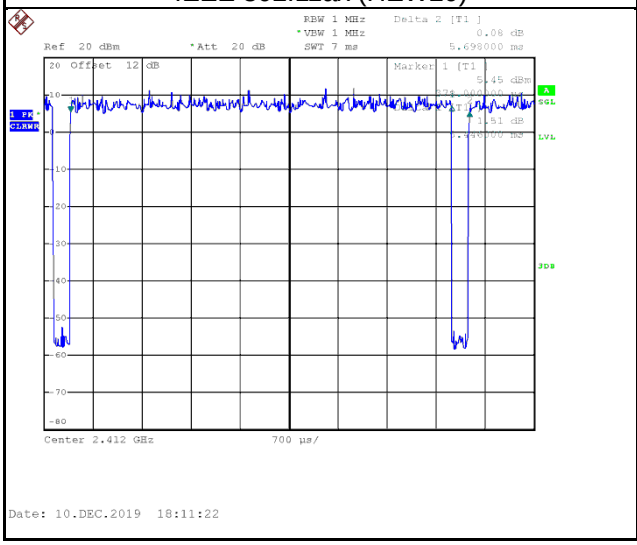
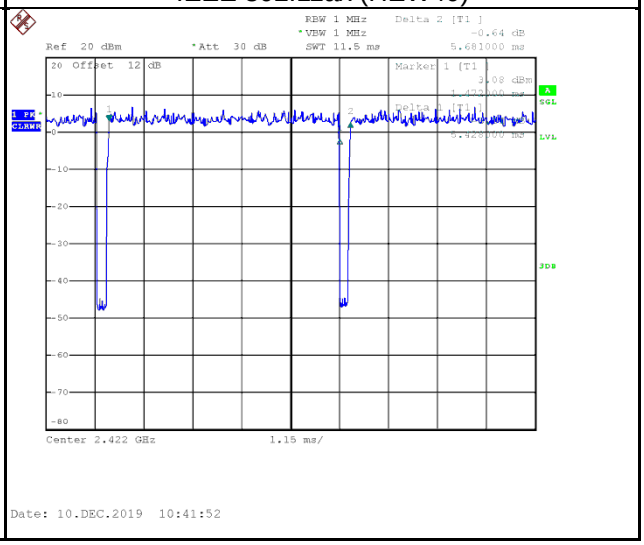


IEEE 802.11n (HT20)



IEEE 802.11n (HT40)



IEEE 802.11ax (HEW20)	IEEE 802.11ax (HEW40)
	

2 GENERAL INFORMATION

2.1 DESCRIPTION OF EUT

Equipment	Unified AX Dual-Band PoE Access Point
Model Name	DWL-8630AP, DWL-8630APE, DWL-X8630AP, DWL-X8630APE
Brand Name	D-Link Corporation
Model Difference	Model Name / Antenna type DWL-8630AP, DWL-X8630AP / Built-in antenna DWL-8630APE, DWL-X8630APE / External antenna
Power Source	DC voltage supplied from AC/DC Adapter or PoE (support unit).
Power Rating	Adapter: 12V ⎓ 2.5A PoE: 42.5-57V ⎓ 0.6A
Products Covered	2 * Aadapter: (1) CWT / 2ABL030F (2) APD / WA-30J12R
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/ac: OFDM IEEE 802.11ax: OFDMA
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 600 Mbps IEEE 802.11ac: up to 800 Mbps IEEE 802.11ax: up to 1147.1 Mbps
Output Power Max.	IEEE 802.11b: 29.72 dBm (0.9369 W) IEEE 802.11g: 29.85 dBm (0.9655 W) IEEE 802.11n (HT20): 29.91 dBm (0.9796 W) IEEE 802.11n (HT40): 29.89 dBm (0.9751 W) IEEE 802.11ac (VHT20): 29.77 dBm (0.9477 W) IEEE 802.11ac (VHT40): 29.52 dBm (0.8960 W) IEEE 802.11ax (HEW20): 29.88 dBm (0.9721 W) IEEE 802.11ax (HEW40): 29.45 dBm (0.8811 W)
Output Power Max. With Beamforming	IEEE 802.11b: 23.70 dBm (0.2343 W) IEEE 802.11g: 23.83 dBm (0.2414 W) IEEE 802.11n (HT20): 23.89 dBm (0.2449 W) IEEE 802.11n (HT40): 23.87 dBm (0.2438 W) IEEE 802.11ac (VHT20): 23.75 dBm (0.2370 W) IEEE 802.11ac (VHT40): 23.50 dBm (0.2240 W) IEEE 802.11ax (HEW20): 23.86 dBm (0.2431 W) IEEE 802.11ax (HEW40): 23.43 dBm (0.2203 W)
Test Model	DWL-8630AP (Built-in antenna), DWL-8630APE (External antenna)
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:

CH01 – CH11 for IEEE 802.11b/g/n (HT20)/ac (VHT20)/ax (HEW20) CH03 – CH09 for IEEE 802.11n (HT40)/ac (VHT40)/ax (HEW40)					
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:

Group I: Built-in antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	M.gear www.whayu.com	DWL-8630AP	PIFA	I-PEX	3.24
2	M.gear www.whayu.com	DWL-8630AP	PIFA	I-PEX	3.52
3	M.gear www.whayu.com	DWL-8630AP	PIFA	I-PEX	3.58
4	M.gear www.whayu.com	DWL-8630AP	PIFA	I-PEX	3.50

Group II: External antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	M.gear www.whayu.com	DWL-8630APE	Dipole	RP-SMA	3.10
2	M.gear www.whayu.com	DWL-8630APE	Dipole	RP-SMA	3.10
3	M.gear www.whayu.com	DWL-8630APE	Dipole	RP-SMA	3.10
4	M.gear www.whayu.com	DWL-8630APE	Dipole	RP-SMA	3.10

NOTE:

(a) The EUT incorporates a MIMO function. Physically, the EUT provides four completed transmitters and receivers (4T4R). 2.4 GHz and 5GHz can transmit simultaneously.

(b) For Power Spectral Density
Directional Gain = 10log $[(10^{G1/20} + 10^{G2/20} + \ldots + 10^{Gn/20})^2/N_{ANT}]$ = 9.48 dBi > 6dBi.
The reduced power spectral density limits (dBm/3 kHz) = 8 - (9.48 - 6) = 4.52.

(c) For Output Power
For N_{ANT} = 2 < 5,
Direction gain = G_{ANT} + 0 = 3.58 + 0 = 3.58 dBi .
The Direction gain is less than 6 dBi, so output power limits will not be reduced.

(d) For Beamforming mode
Directional Gain = 10log $[(10^{G1/20} + 10^{G2/20} + \ldots + 10^{Gn/20})^2/N_{ANT}]$ = 9.48 dBi > 6dBi.
The reduced power spectral density limits (dBm/3 kHz) = 8 - (9.48 - 6) = 4.52.
The reduced output power limits (dBm) = 30 - (9.48 - 6) = 26.52.
Beamforming gain is 5.10 dBi.

(4) Operating Mode and Antenna Configuration

Operating Mode / TX Mode	4TX
IEEE 802.11b	V (Ant. 1+Ant. 2+Ant. 3+Ant. 4)
IEEE 802.11g	V (Ant. 1+Ant. 2+Ant. 3+Ant. 4)
IEEE 802.11n (HT20)	V (Ant. 1+Ant. 2+Ant. 3+Ant. 4)
IEEE 802.11n (HT40)	V (Ant. 1+Ant. 2+Ant. 3+Ant. 4)
IEEE 802.11ac (VHT20)	V (Ant. 1+Ant. 2+Ant. 3+Ant. 4)
IEEE 802.11ac (VHT40)	V (Ant. 1+Ant. 2+Ant. 3+Ant. 4)
IEEE 802.11ax (HEW20)	V (Ant. 1+Ant. 2+Ant. 3+Ant. 4)
IEEE 802.11ax (HEW40)	V (Ant. 1+Ant. 2+Ant. 3+Ant. 4)

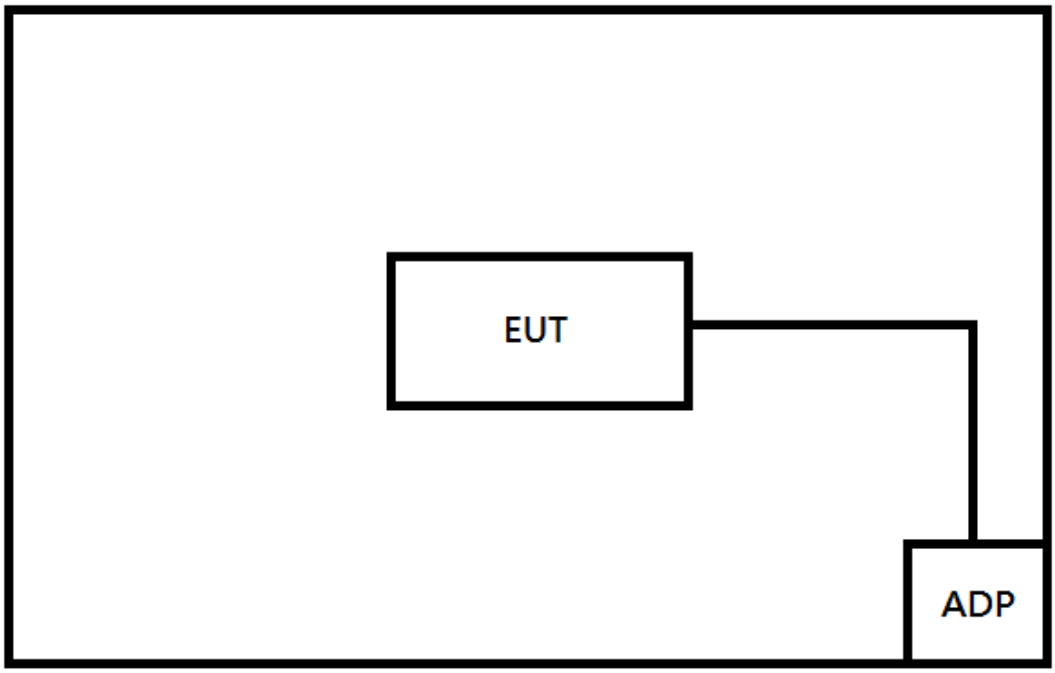
2.2 TEST MODES

Test Items	Test mode	Channel	Note
AC power line conducted emissions	Normal	-	-
Transmitter Radiated Emissions (below 1 GHz)	IEEE 802.11b	11	-
	IEEE 802.11g	11	-
Transmitter Radiated Emissions (above 1 GHz)	IEEE 802.11b	01/11	Bandedge
	IEEE 802.11g		
	IEEE 802.11n (HT20)		
	IEEE 802.11ax (HEW20)		
	IEEE 802.11n (HT40)	03/09	
	IEEE 802.11ax (HEW40)		
	IEEE 802.11b	01/06/11	Harmonic
	IEEE 802.11g		
	IEEE 802.11n (HT20)		
	IEEE 802.11ax (HEW20)		
	IEEE 802.11n (HT40)	03/06/09	
	IEEE 802.11ax (HEW40)		
Bandwidth	IEEE 802.11b	01/06/11	-
	IEEE 802.11g		
	IEEE 802.11n (HT20)		
	IEEE 802.11ax (HEW20)		
	IEEE 802.11n (HT40)	03/06/09	
	IEEE 802.11ax (HEW40)		
Output Power	IEEE 802.11b	01/06/11	-
	IEEE 802.11g		
	IEEE 802.11n (HT20)		
	IEEE 802.11ac (VHT20)		
	IEEE 802.11ax (HEW20)		
	IEEE 802.11n (HT40)	03/06/09	
	IEEE 802.11ac (VHT40)		
	IEEE 802.11ax (HEW40)		
Power Spectral Density	IEEE 802.11b	01/06/11	-
	IEEE 802.11g		
	IEEE 802.11n (HT20)		
	IEEE 802.11ax (HEW20)		
	IEEE 802.11n (HT40)	03/06/09	
	IEEE 802.11ax (HEW40)		
Antenna conducted Spurious Emission	IEEE 802.11b	01/06/11	-
	IEEE 802.11g		
	IEEE 802.11n (HT20)		
	IEEE 802.11ax (HEW20)		
	IEEE 802.11n (HT40)	03/06/09	
	IEEE 802.11ax (HEW40)		

NOTE:
(1) The EUT includes two adapters and both are evaluated. Only the worst case is used for final test.
(2) For radiated emission band edge test, both Vertical and Horizontal are evaluated, but only the worst case (Vertical) is recorded.
(3) The EUT includes two groups of antenna assemblies and beamforming mode, all are evaluated. For Transmitter Radiated Emissions, only the worst cases are recorded.
(4) All X, Y and Z axes are evaluated, but only the worst cases (Y axis (Built-in antenna), X axis (External antenna)) are recorded.
(5) There were no emissions found below 30 MHz within 20 dB of the limit.

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.



2.4 SUPPORT UNITS

Item	Equipment	Brand	Model No.	Series No.	Remarks
-	-	-	-	-	-

Item	Shielded	Ferrite Core	Length	Cable Type	Remarks
-	-	-	-	-	-

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

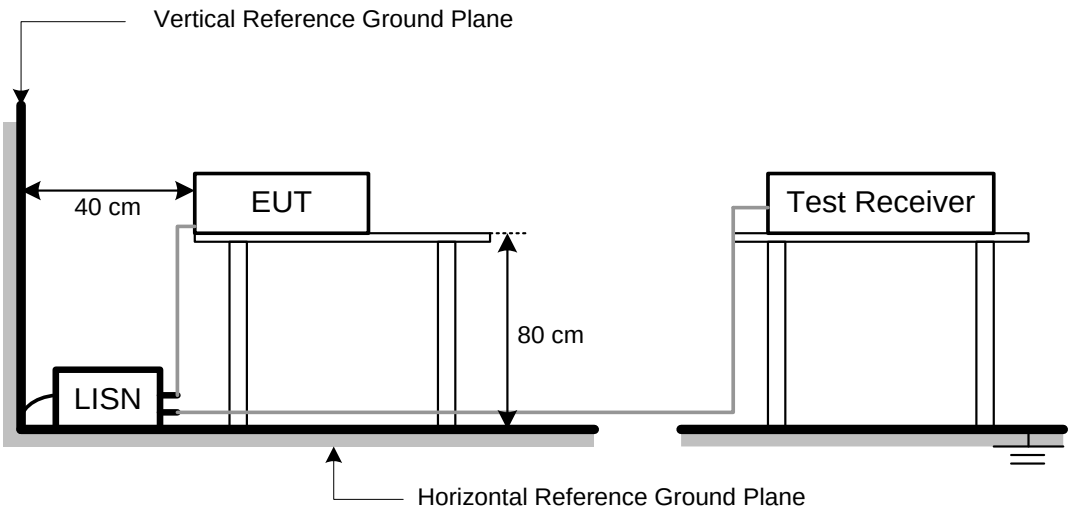
a. The EUT was placed 0.8 m above the horizontal ground plane with the EUT being connected to the power mains through a line impedance stabilization network (LISN).
All other support equipment were powered from an additional LISN(s).
The LISN provides 50 Ohm/50uH of impedance for the measuring instrument.
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
19.11	+	2.11	=	21.22

Measurement Value		Limit Value		Margin Level
21.22	-	54	=	-32.78

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

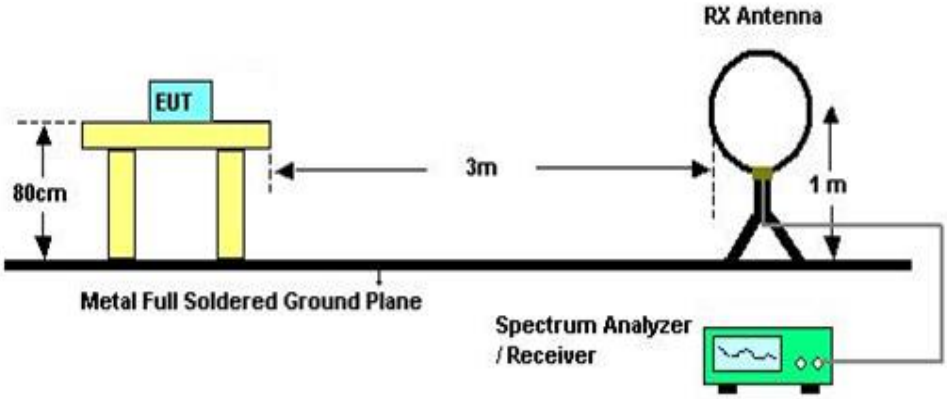
a. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
b. The measuring distance 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

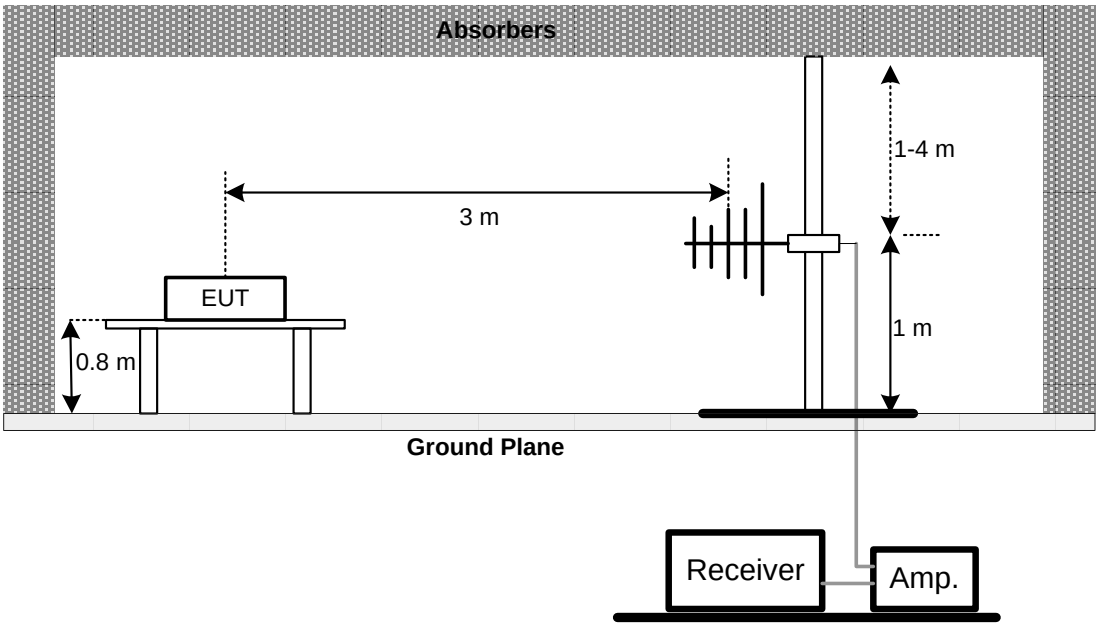
No deviation.

4.4 TEST SETUP

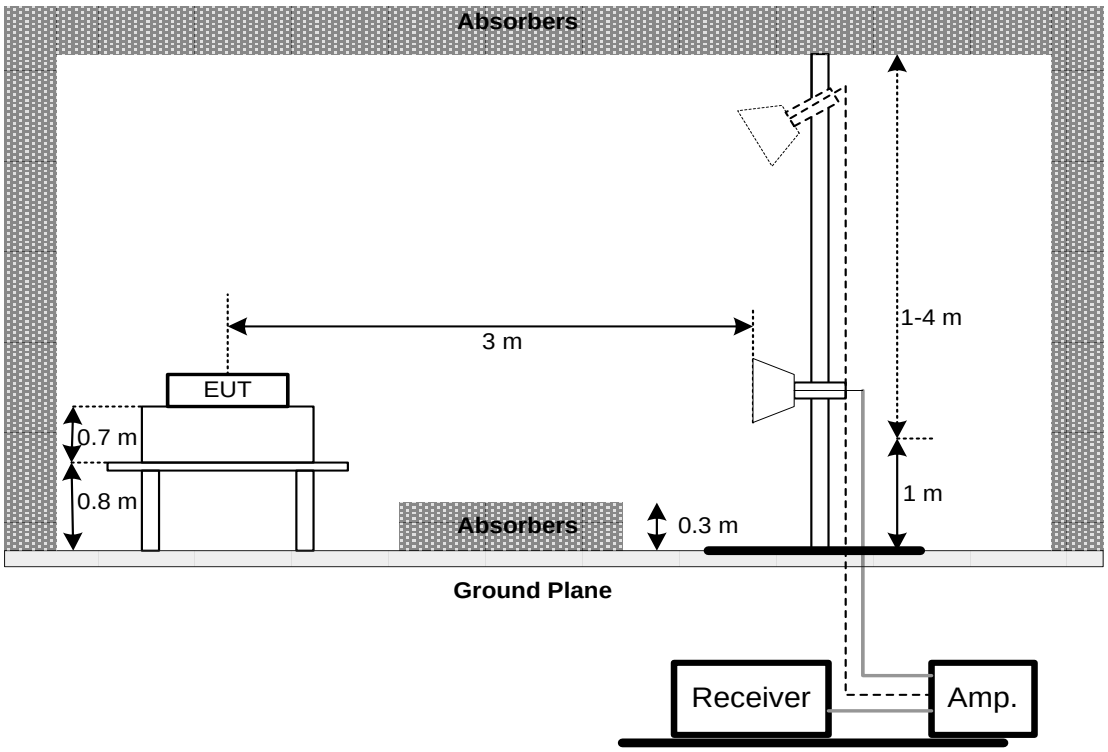
9 kHz to 30 MHz



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 – 9 KHZ TO 30 MHZ

There were no emissions found below 30 MHz within 20 dB of the limit..

4.7 TEST RESULT – 30 MHZ TO 1 GHZ

Please refer to the APPENDIX B.

4.8 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

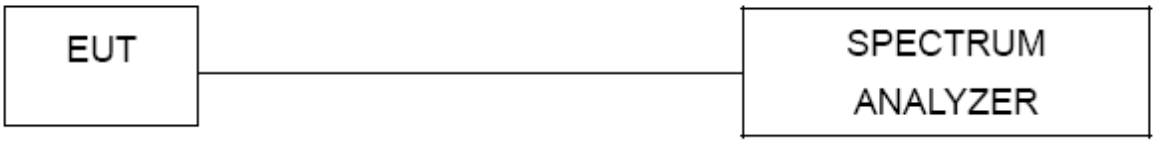
5.2 TEST PROCEDURE

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

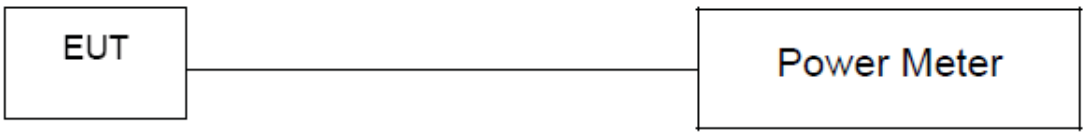
6.2 TEST PROCEDURE

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)

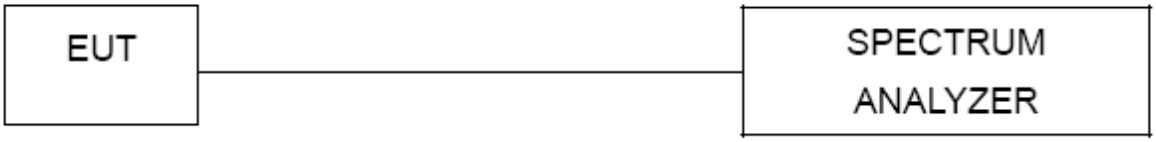
7.2 TEST PROCEDURE

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.

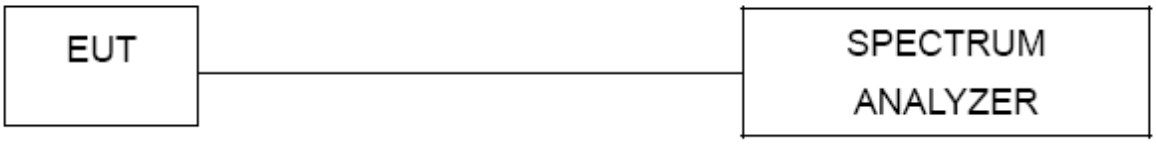
8.2 TEST PROCEDURE

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	2020/8/6
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	EMC001340	980555	2019/4/12	2020/4/11
2	Preamplifier	EMCI	EMC02325B	980217	2019/4/12	2020/4/11
3	Preamplifier	EMCI	EMC012645B	980267	2019/4/12	2020/4/11
4	Test Cable	EMCI	EMC104-SM-SM-800	150207	2019/4/12	2020/4/11
5	Test Cable	EMCI	EMC104-SM-SM-3000	151205	2019/4/12	2020/4/11
6	Test Cable	EMCI	EMC-SM-SM-700 0	180408	2019/4/12	2020/4/11
7	MXE EMI Receiver	Agilent	N9038A	MY55420127	2019/3/26	2020/3/25
8	Signal Analyzer	Agilent	N9010A	MY56480554	2019/6/6	2020/6/5
9	Loop Ant	EMCO	EMCI-LPA600	274	2019/5/31	2020/5/30
10	Horm Ant	SCHWARZBECK	BBHA 9120D	9120D-1342	2019/6/10	2020/6/9
11	Trilog-Broadband Antenna	Schwarzbeck	VULB 9168	000992	2019/5/29	2020/5/28
12	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	Power Meter	Anritsu	ML2487A	6K00004714	2019/6/20	2020/6/19
2	Power Sensor	Anritsu	MA2491A	1725282	2019/6/20	2020/6/19

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

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

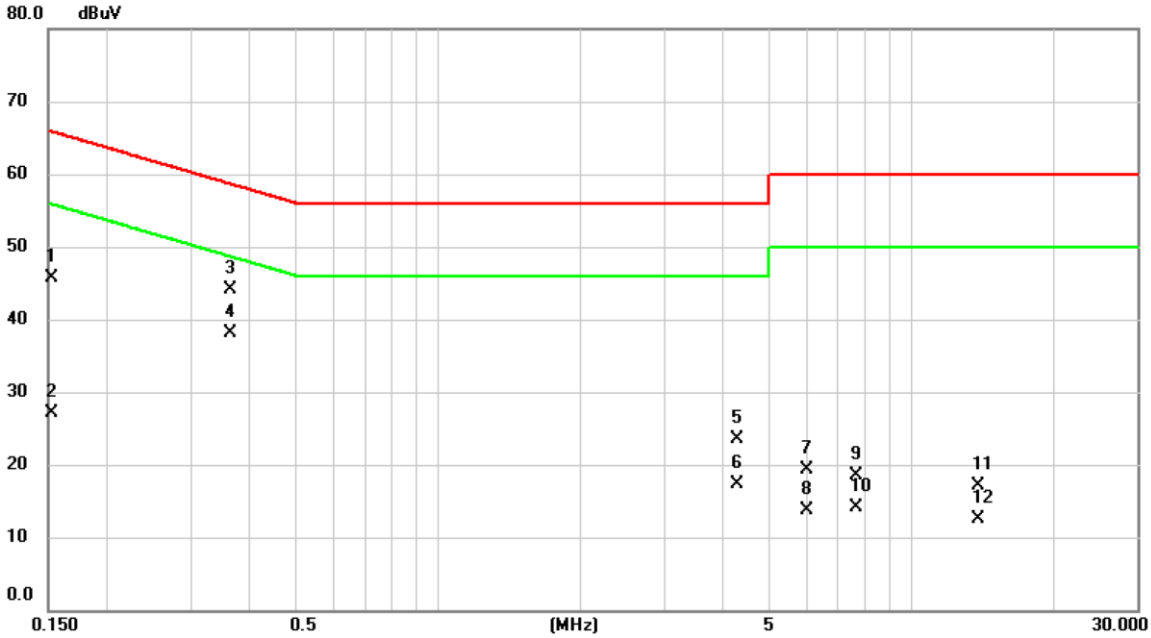
Please refer to document Appendix No.: TP-1909H044-FCCP-1 (APPENDIX-TEST PHOTOS).

11 EUT PHOTOS

Please refer to document Appendix No.: EP-1909H044-1 (APPENDIX-EUT PHOTOS).

APPENDIX A AC POWER LINE CONDUCTED EMISSIONS

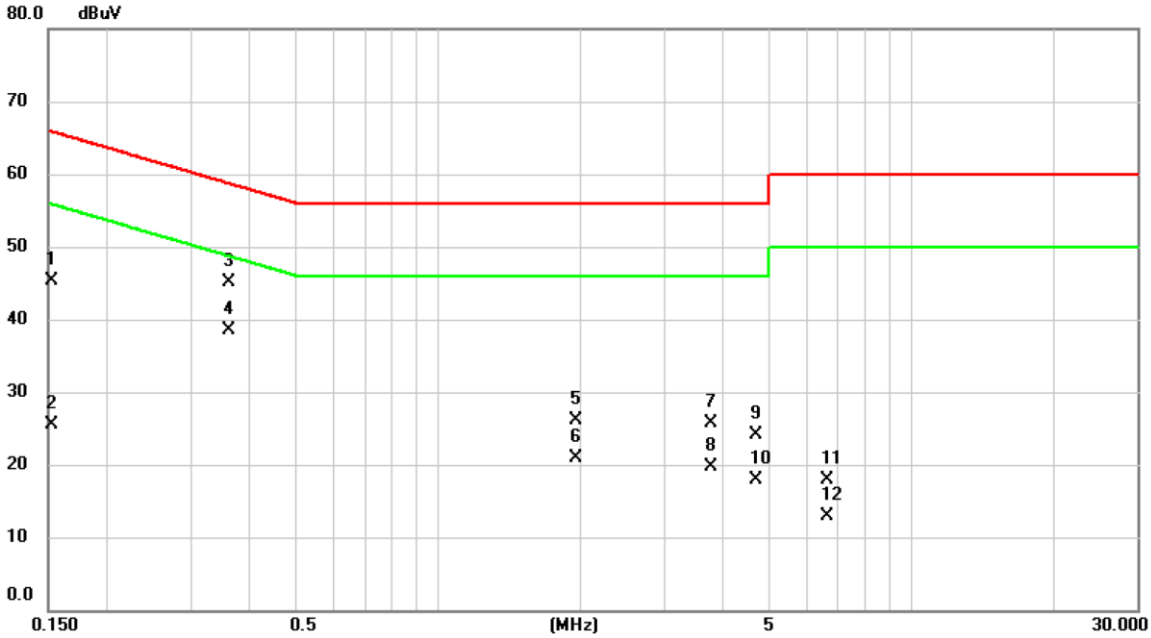
Test Mode	Normal_Internal Antenna	Tested Date	2020/1/21
Test Voltage	AC 120V/60Hz	Phase	Line



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1522	36.05	9.57	45.62	65.88	-20.26	QP	
2		0.1522	17.57	9.57	27.14	55.88	-28.74	AVG	
3		0.3636	34.47	9.62	44.09	58.65	-14.56	QP	
4	*	0.3636	28.46	9.62	38.08	48.65	-10.57	AVG	
5		4.2788	13.68	9.73	23.41	56.00	-32.59	QP	
6		4.2788	7.63	9.73	17.36	46.00	-28.64	AVG	
7		6.0113	9.46	9.78	19.24	60.00	-40.76	QP	
8		6.0113	4.00	9.78	13.78	50.00	-36.22	AVG	
9		7.6493	8.65	9.81	18.46	60.00	-41.54	QP	
10		7.6493	4.26	9.81	14.07	50.00	-35.93	AVG	
11		13.8458	7.28	9.91	17.19	60.00	-42.81	QP	
12		13.8458	2.64	9.91	12.55	50.00	-37.45	AVG	

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

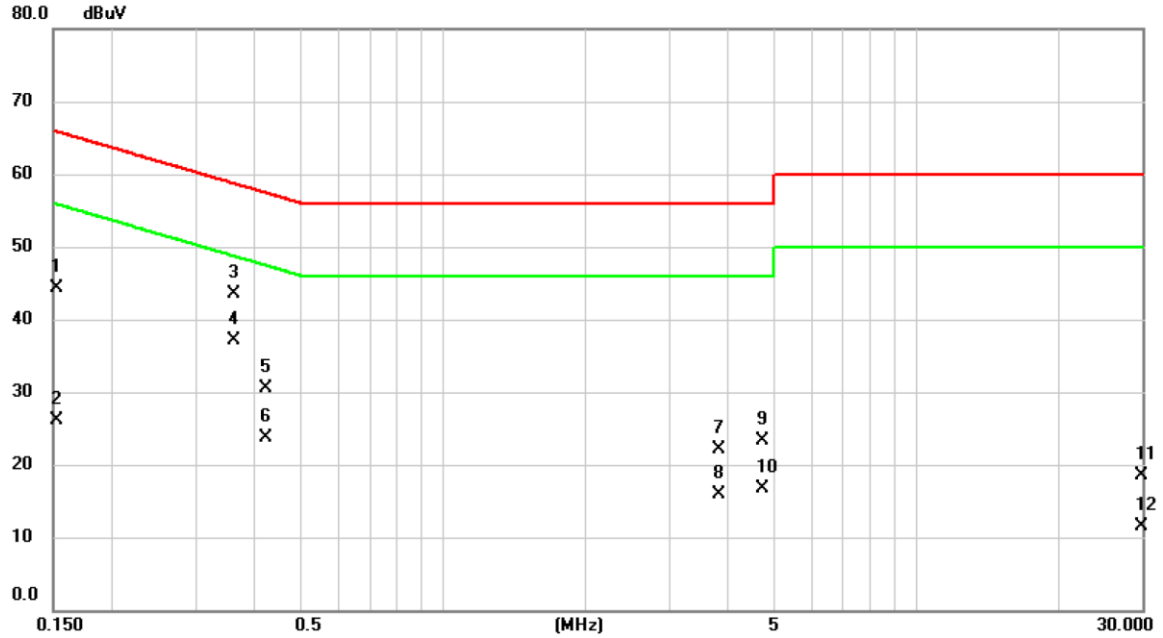
Test Mode	Normal_Internal Antenna	Tested Date	2020/1/21
Test Voltage	AC 120V/60Hz	Phase	Neutral



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1522	35.64	9.61	45.25	65.88	-20.63	QP	
2		0.1522	15.83	9.61	25.44	55.88	-30.44	AVG	
3		0.3615	35.38	9.67	45.05	58.69	-13.64	QP	
4	*	0.3615	28.91	9.67	38.58	48.69	-10.11	AVG	
5		1.9500	16.39	9.71	26.10	56.00	-29.90	QP	
6		1.9500	11.12	9.71	20.83	46.00	-25.17	AVG	
7		3.7725	15.91	9.76	25.67	56.00	-30.33	QP	
8		3.7725	10.04	9.76	19.80	46.00	-26.20	AVG	
9		4.6973	14.34	9.79	24.13	56.00	-31.87	QP	
10		4.6973	8.09	9.79	17.88	46.00	-28.12	AVG	
11		6.6300	8.02	9.84	17.86	60.00	-42.14	QP	
12		6.6300	2.98	9.84	12.82	50.00	-37.18	AVG	

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

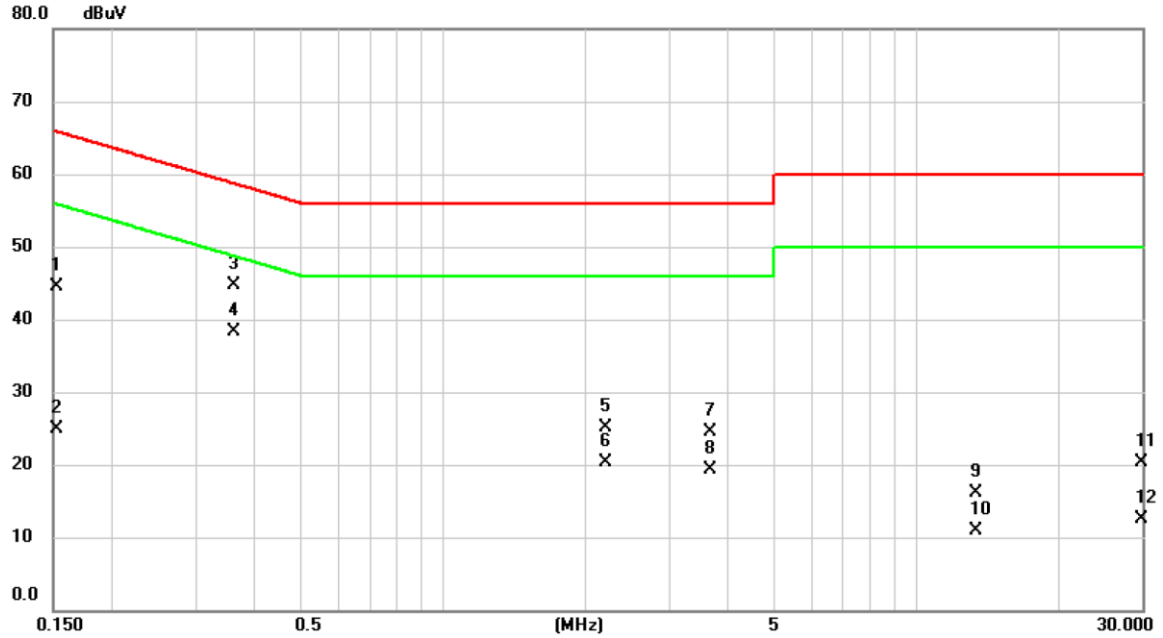
Test Mode	Normal_External Antenna	Tested Date	2020/1/21
Test Voltage	AC 120V/60Hz	Phase	Line



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1522	34.66	9.57	44.23	65.88	-21.65	QP	
2		0.1522	16.51	9.57	26.08	55.88	-29.80	AVG	
3		0.3615	33.91	9.62	43.53	58.69	-15.16	QP	
4	*	0.3615	27.42	9.62	37.04	48.69	-11.65	AVG	
5		0.4222	20.94	9.62	30.56	57.40	-26.84	QP	
6		0.4222	14.12	9.62	23.74	47.40	-23.66	AVG	
7		3.8175	12.47	9.72	22.19	56.00	-33.81	QP	
8		3.8175	6.26	9.72	15.98	46.00	-30.02	AVG	
9		4.7310	13.57	9.75	23.32	56.00	-32.68	QP	
10		4.7310	7.02	9.75	16.77	46.00	-29.23	AVG	
11		29.7938	8.53	10.00	18.53	60.00	-41.47	QP	
12		29.7938	1.57	10.00	11.57	50.00	-38.43	AVG	

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

Test Mode	Normal_External Antenna	Tested Date	2020/1/21
Test Voltage	AC 120V/60Hz	Phase	Neutral

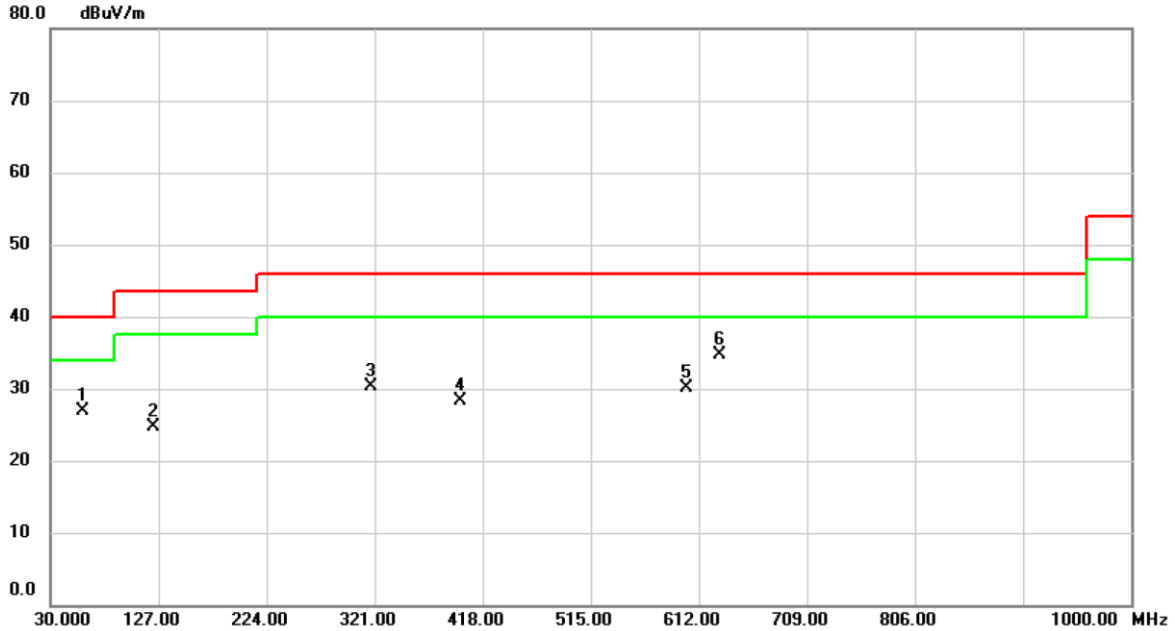


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1522	34.96	9.61	44.57	65.88	-21.31	QP	
2		0.1522	15.22	9.61	24.83	55.88	-31.05	AVG	
3		0.3614	34.98	9.67	44.65	58.70	-14.05	QP	
4	*	0.3614	28.59	9.67	38.26	48.70	-10.44	AVG	
5		2.2087	15.40	9.72	25.12	56.00	-30.88	QP	
6		2.2087	10.59	9.72	20.31	46.00	-25.69	AVG	
7		3.6802	14.79	9.76	24.55	56.00	-31.45	QP	
8		3.6802	9.48	9.76	19.24	46.00	-26.76	AVG	
9		13.3597	6.23	9.96	16.19	60.00	-43.81	QP	
10		13.3597	1.00	9.96	10.96	50.00	-39.04	AVG	
11		29.8455	10.21	10.11	20.32	60.00	-39.68	QP	
12		29.8455	2.47	10.11	12.58	50.00	-37.42	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

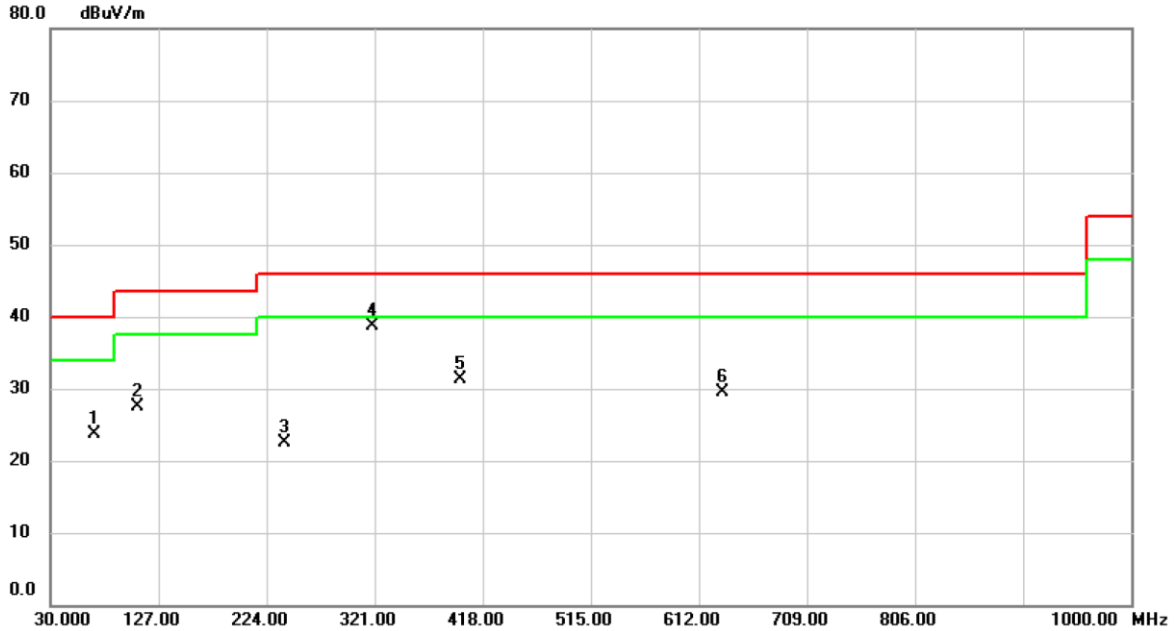
Test Mode	IEEE 802.11g_Internal Antenna	Test Date	2019/12/3
Test Frequency	CH11: 2462 MHz	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		59.1000	44.73	-17.75	26.98	40.00	-13.02	peak	
2		122.1500	42.32	-17.58	24.74	43.50	-18.76	peak	
3		317.1200	45.79	-15.42	30.37	46.00	-15.63	peak	
4		397.6300	41.49	-13.22	28.27	46.00	-17.73	peak	
5		600.3600	39.81	-9.72	30.09	46.00	-15.91	peak	
6	*	630.4300	44.12	-9.33	34.79	46.00	-11.21	peak	

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

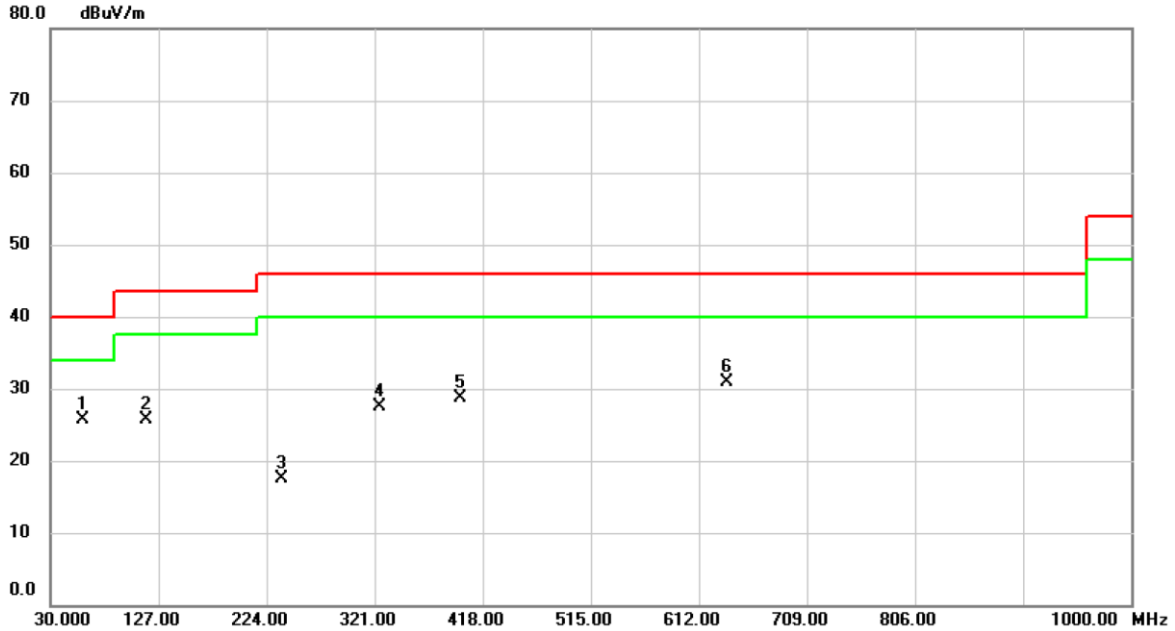
Test Mode	IEEE 802.11g_Internal Antenna	Test Date	2019/12/3
Test Frequency	CH11: 2462 MHz	Polarization	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		68.8000	43.84	-20.07	23.77	40.00	-16.23	peak	
2		107.6000	46.37	-18.79	27.58	43.50	-15.92	peak	
3		239.5200	39.74	-17.14	22.60	46.00	-23.40	peak	
4	*	319.0600	54.18	-15.42	38.76	46.00	-7.24	peak	
5		397.6300	44.57	-13.22	31.35	46.00	-14.65	peak	
6		633.3400	38.80	-9.22	29.58	46.00	-16.42	peak	

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

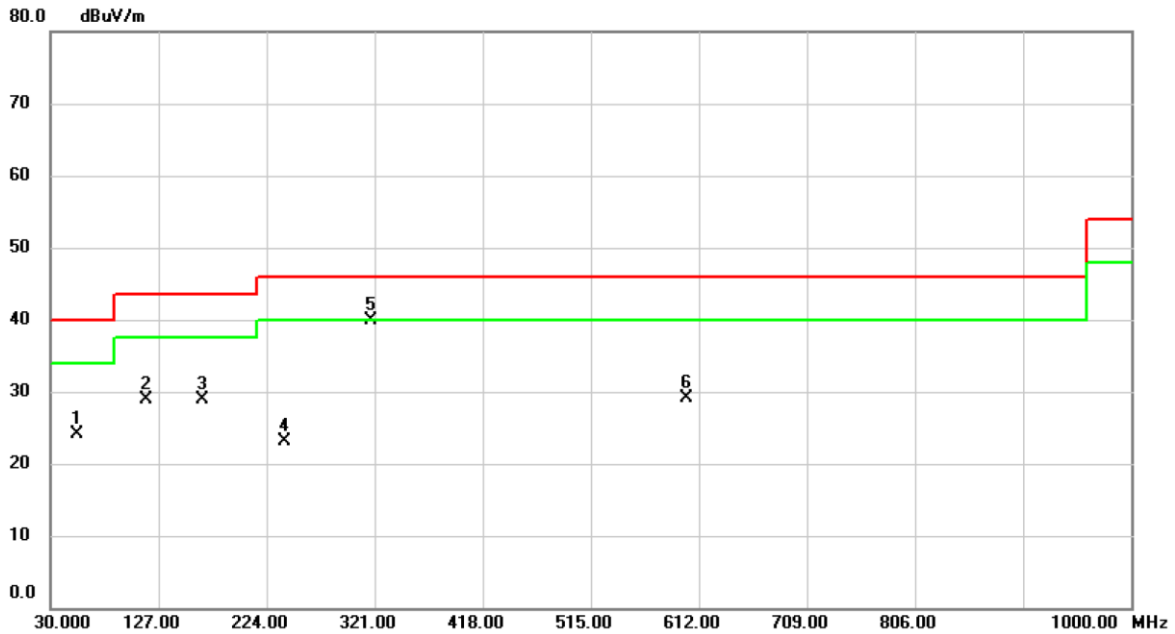
Test Mode	IEEE 802.11b_External Antenna	Test Date	2019/12/3
Test Frequency	CH11: 2462 MHz	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	59.1000	43.55	-17.75	25.80	40.00	-14.20	peak	
2		116.3300	43.45	-17.81	25.64	43.50	-17.86	peak	
3		237.5800	34.90	-17.32	17.58	46.00	-28.42	peak	
4		324.8800	42.63	-15.17	27.46	46.00	-18.54	peak	
5		397.6300	41.89	-13.22	28.67	46.00	-17.33	peak	
6		637.2200	39.97	-9.05	30.92	46.00	-15.08	peak	

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

Test Mode	IEEE 802.11b_External Antenna	Test Date	2019/12/3
Test Frequency	CH11: 2462 MHz	Polarization	Horizontal

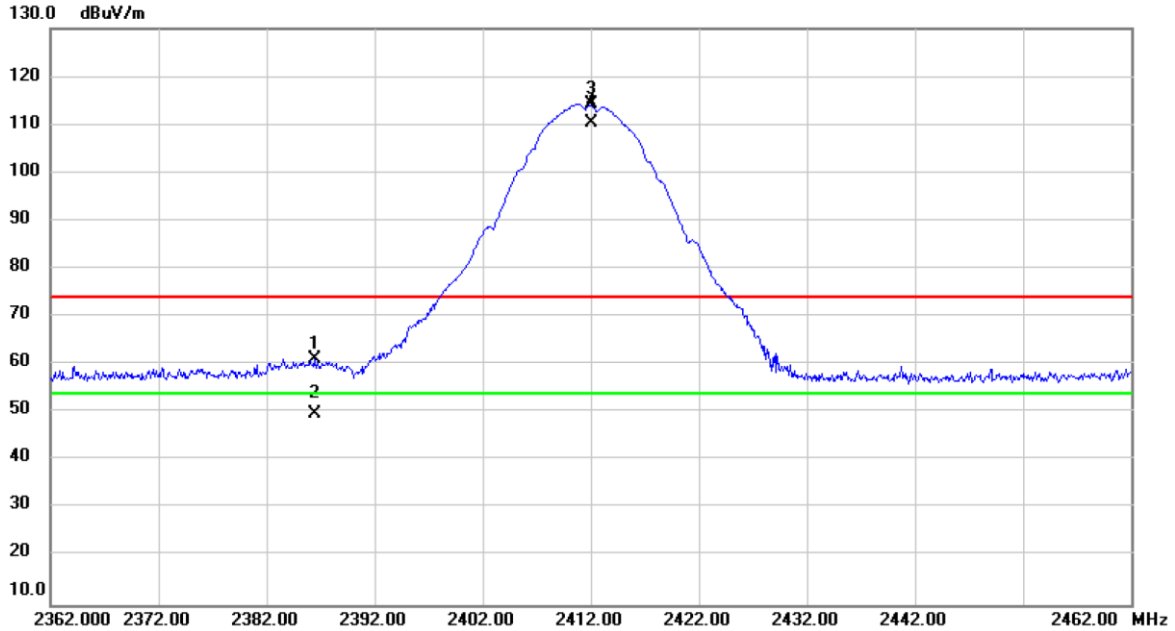


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		53.2800	41.63	-17.53	24.10	40.00	-15.90	peak	
2		116.3300	46.70	-17.81	28.89	43.50	-14.61	peak	
3		166.7700	45.38	-16.45	28.93	43.50	-14.57	peak	
4		239.5200	40.16	-17.14	23.02	46.00	-22.98	peak	
5	*	318.0900	55.29	-15.42	39.87	46.00	-6.13	peak	
6		600.3600	38.73	-9.72	29.01	46.00	-16.99	peak	

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

APPENDIX C RADIATED EMISSIONS - ABOVE 1 GHZ

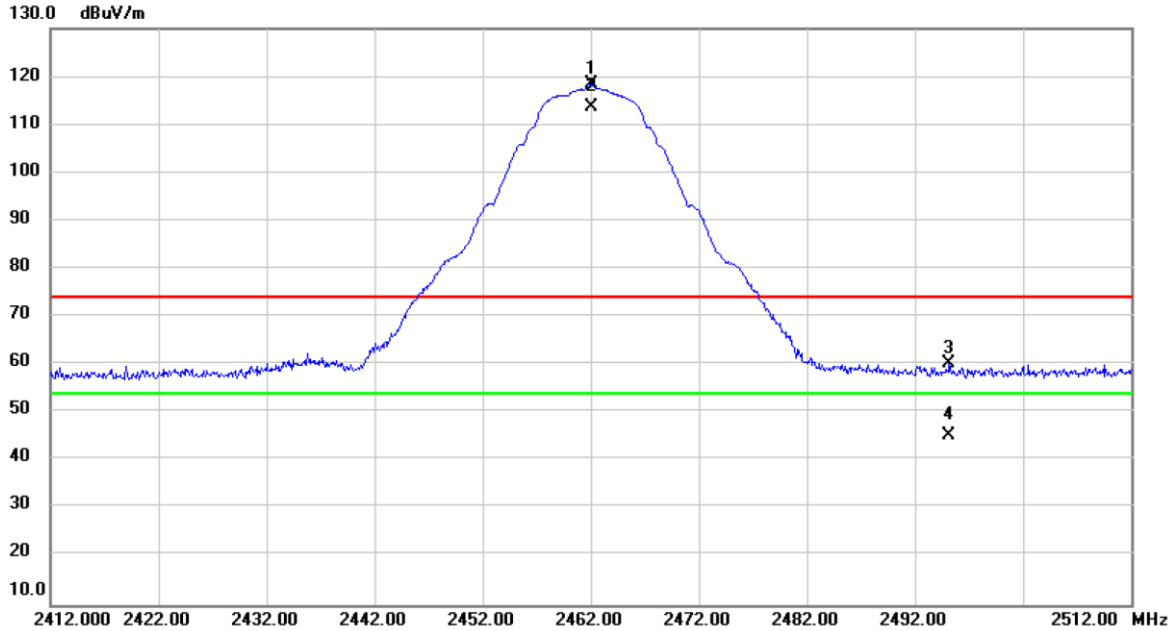
Test Mode	IEEE 802.11b_Internal Antenna	Test Date	2019/12/2
Test Frequency	CH01: 2412 MHz	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2386.400	30.00	31.23	61.23	74.00	-12.77	peak	
2		2386.400	18.43	31.23	49.66	54.00	-4.34	AVG	
3	X	2412.000	82.87	31.34	114.21	74.00	40.21	peak	No Limit
4	*	2412.000	79.05	31.34	110.39	54.00	56.39	AVG	No Limit

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

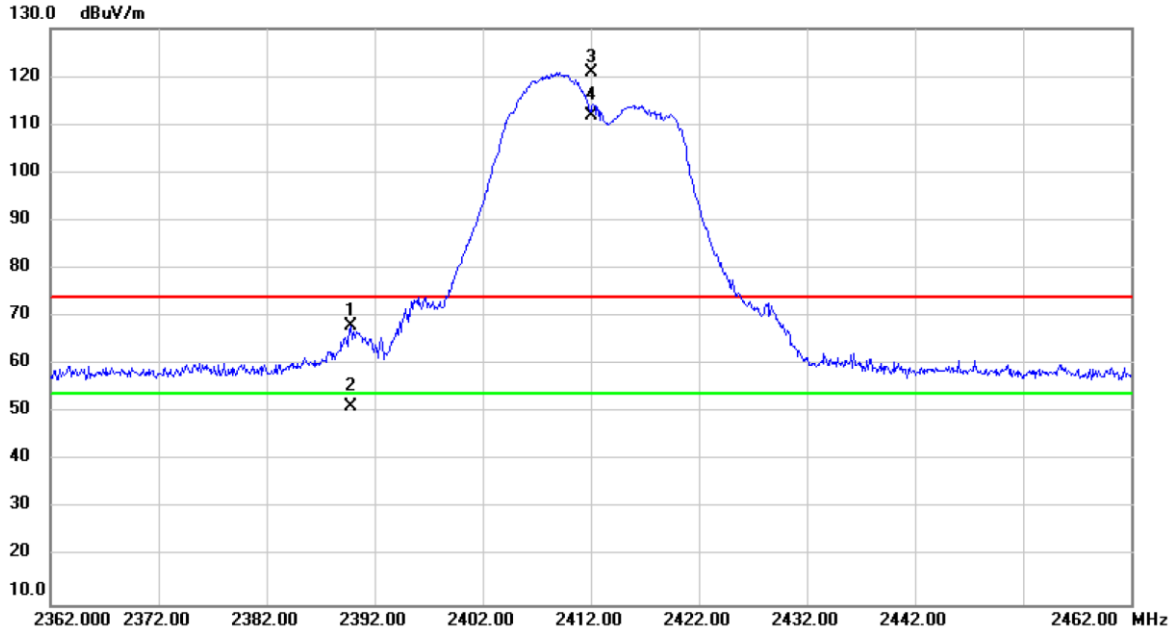
Test Mode	IEEE 802.11b_Internal Antenna	Test Date	2019/12/2
Test Frequency	CH11: 2462 MHz	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	X	2462.000	86.88	31.56	118.44	74.00	44.44	peak	No Limit
2	*	2462.000	81.96	31.56	113.52	54.00	59.52	AVG	No Limit
3		2495.200	28.57	31.70	60.27	74.00	-13.73	peak	
4		2495.200	13.62	31.70	45.32	54.00	-8.68	AVG	

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

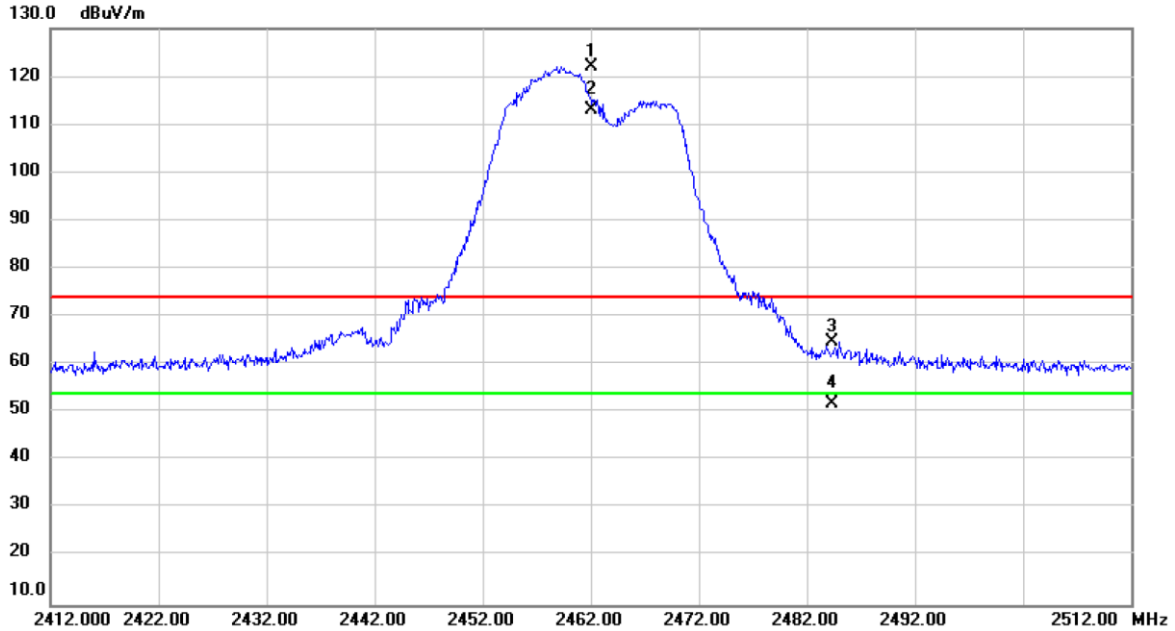
Test Mode	IEEE 802.11g_Internal Antenna	Test Date	2019/12/2
Test Frequency	CH01: 2412 MHz	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2389.800	36.66	31.25	67.91	74.00	-6.09	peak	
2		2389.800	19.86	31.25	51.11	54.00	-2.89	AVG	
3	X	2412.000	89.65	31.34	120.99	74.00	46.99	peak	No Limit
4	*	2412.000	80.60	31.34	111.94	54.00	57.94	AVG	No Limit

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

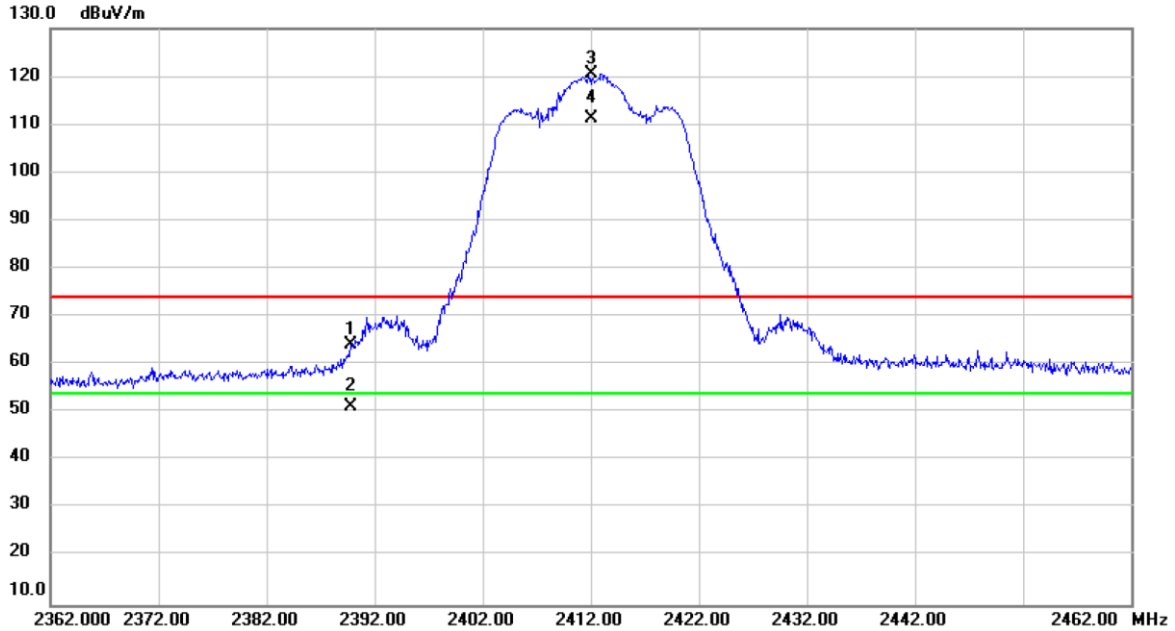
Test Mode	IEEE 802.11g_Internal Antenna	Test Date	2019/12/2
Test Frequency	CH11: 2462 MHz	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	X	2462.000	90.49	31.56	122.05	74.00	48.05	peak	No Limit
2	*	2462.000	81.48	31.56	113.04	54.00	59.04	AVG	No Limit
3		2484.298	33.19	31.66	64.85	74.00	-9.15	peak	
4		2484.298	20.29	31.66	51.95	54.00	-2.05	AVG	

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

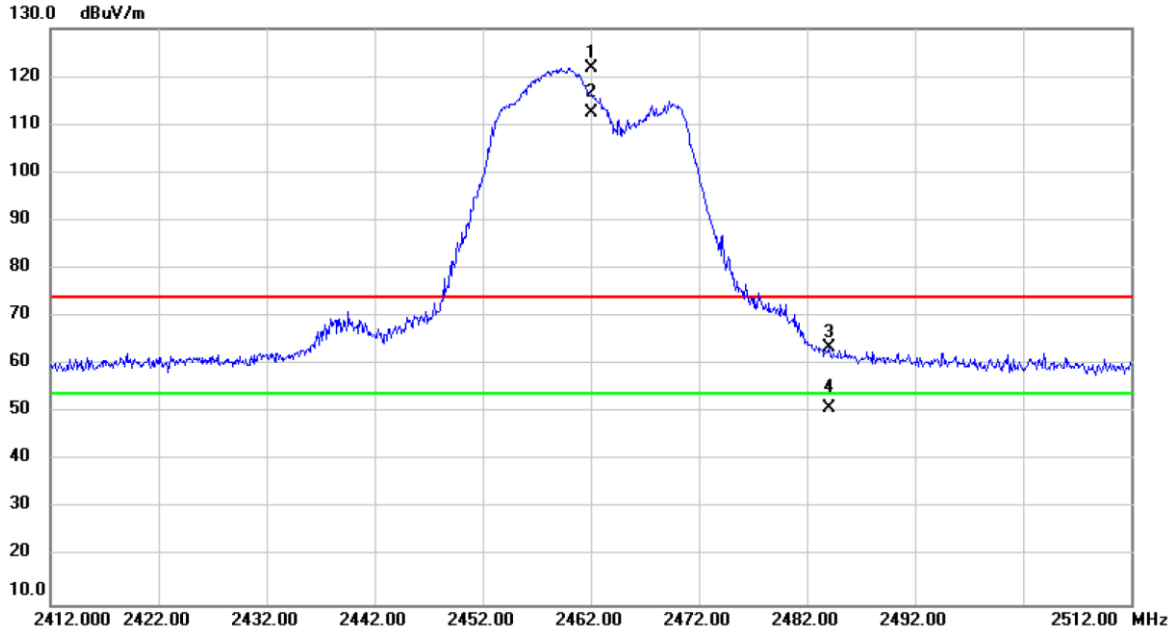
Test Mode	IEEE 802.11n (HT20)_Internal Antenna	Test Date	2019/12/2
Test Frequency	CH01: 2412 MHz	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2389.800	32.98	31.25	64.23	74.00	-9.77	peak	
2		2389.800	20.07	31.25	51.32	54.00	-2.68	AVG	
3	X	2412.000	89.13	31.34	120.47	74.00	46.47	peak	No Limit
4	*	2412.000	79.91	31.34	111.25	54.00	57.25	AVG	No Limit

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

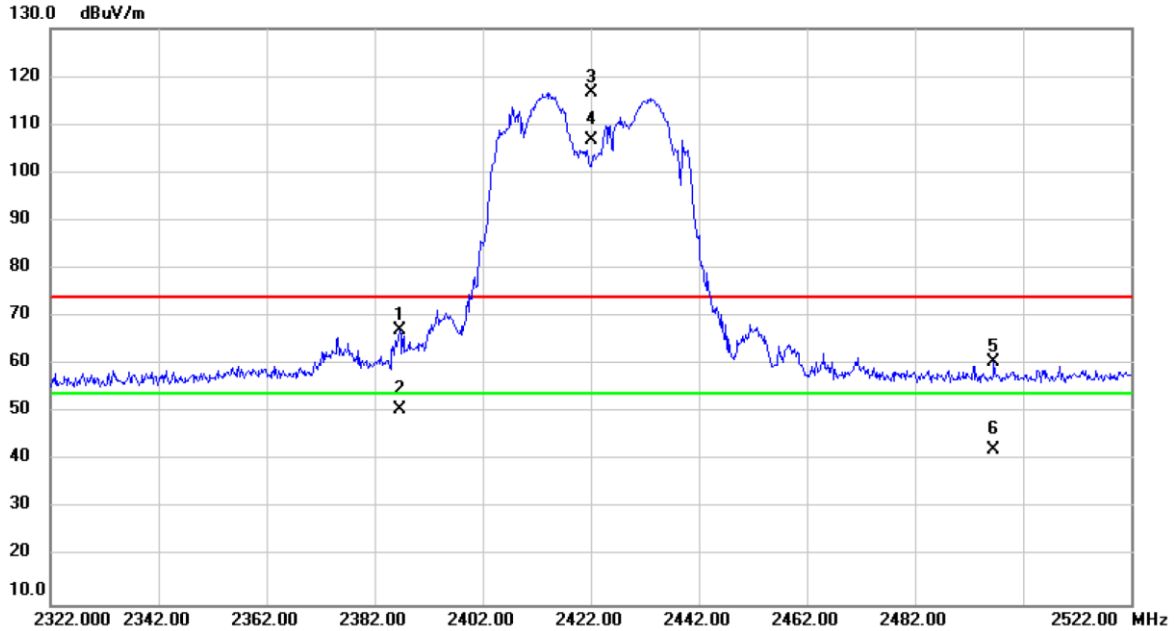
Test Mode	IEEE 802.11n (HT20)_Internal Antenna	Test Date	2019/12/2
Test Frequency	CH11: 2462 MHz	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	X	2462.000	90.15	31.56	121.71	74.00	47.71	peak	No Limit
2	*	2462.000	81.02	31.56	112.58	54.00	58.58	AVG	No Limit
3		2484.100	31.81	31.66	63.47	74.00	-10.53	peak	
4		2484.100	19.43	31.66	51.09	54.00	-2.91	AVG	

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

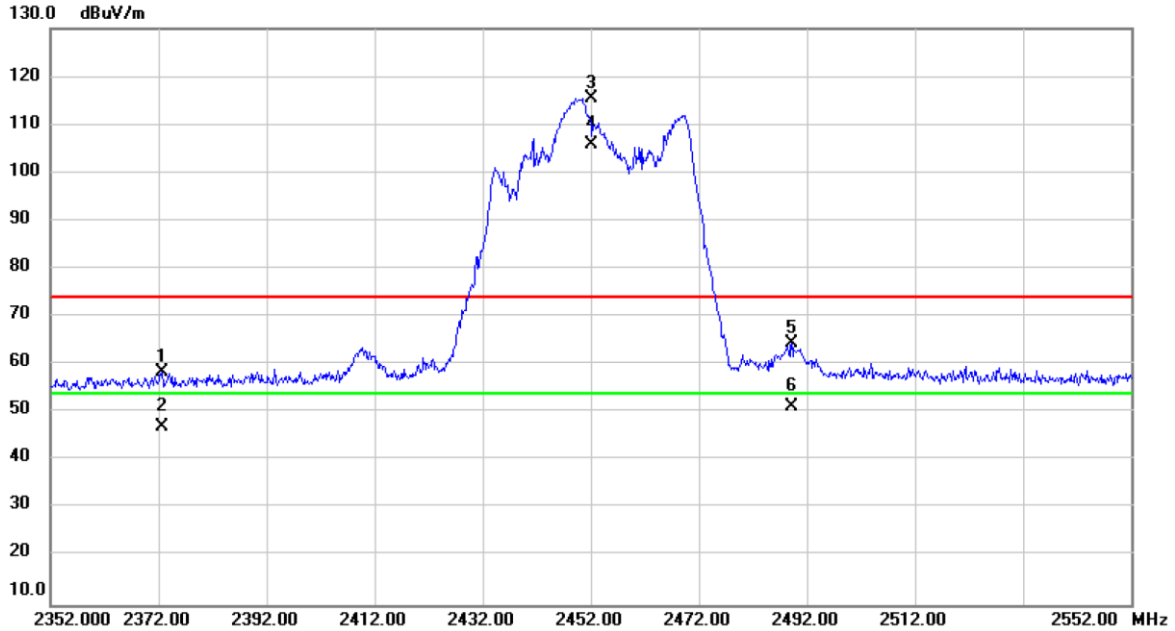
Test Mode	IEEE 802.11n (HT40)_Internal Antenna	Test Date	2019/12/2
Test Frequency	CH03: 2422 MHz	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2386.600	35.93	31.23	67.16	74.00	-6.84	peak	
2		2386.600	19.45	31.23	50.68	54.00	-3.32	AVG	
3	X	2422.000	85.14	31.39	116.53	74.00	42.53	peak	No Limit
4	*	2422.000	75.40	31.39	106.79	54.00	52.79	AVG	No Limit
5		2496.600	28.71	31.72	60.43	74.00	-13.57	peak	
6		2496.600	10.50	31.72	42.22	54.00	-11.78	AVG	

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

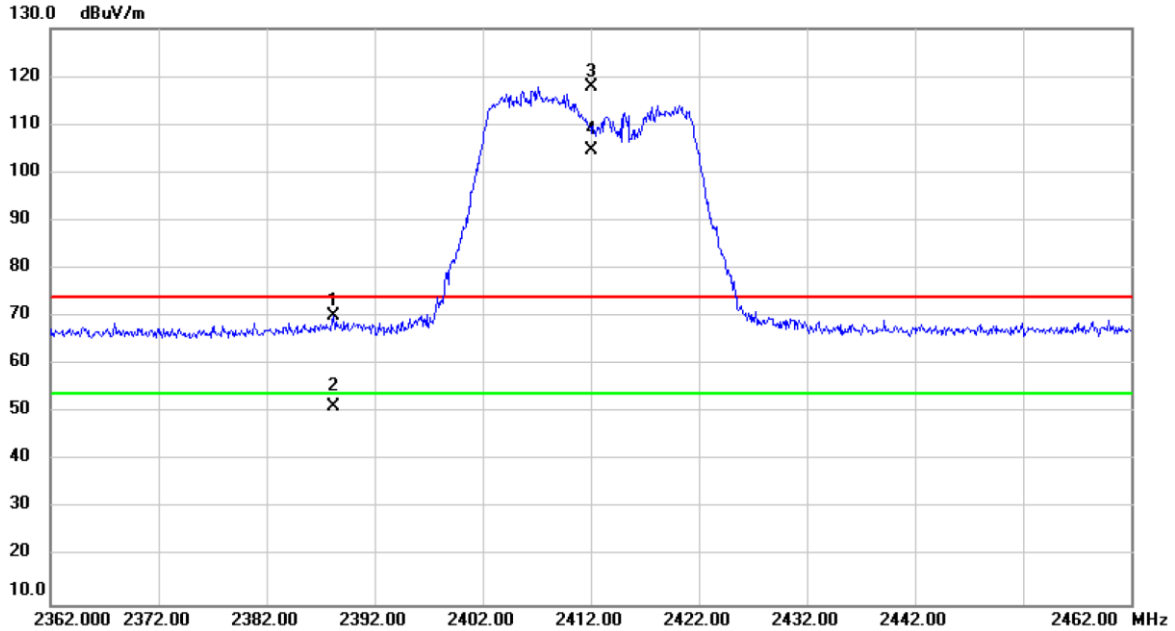
Test Mode	IEEE 802.11n (HT40)_Internal Antenna	Test Date	2019/12/2
Test Frequency	CH09: 2452 MHz	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2372.600	27.37	31.17	58.54	74.00	-15.46	peak	
2		2372.600	15.82	31.17	46.99	54.00	-7.01	AVG	
3	X	2452.000	83.91	31.52	115.43	74.00	41.43	peak	No Limit
4	*	2452.000	74.26	31.52	105.78	54.00	51.78	AVG	No Limit
5		2489.200	32.75	31.69	64.44	74.00	-9.56	peak	
6		2489.200	19.45	31.69	51.14	54.00	-2.86	AVG	

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

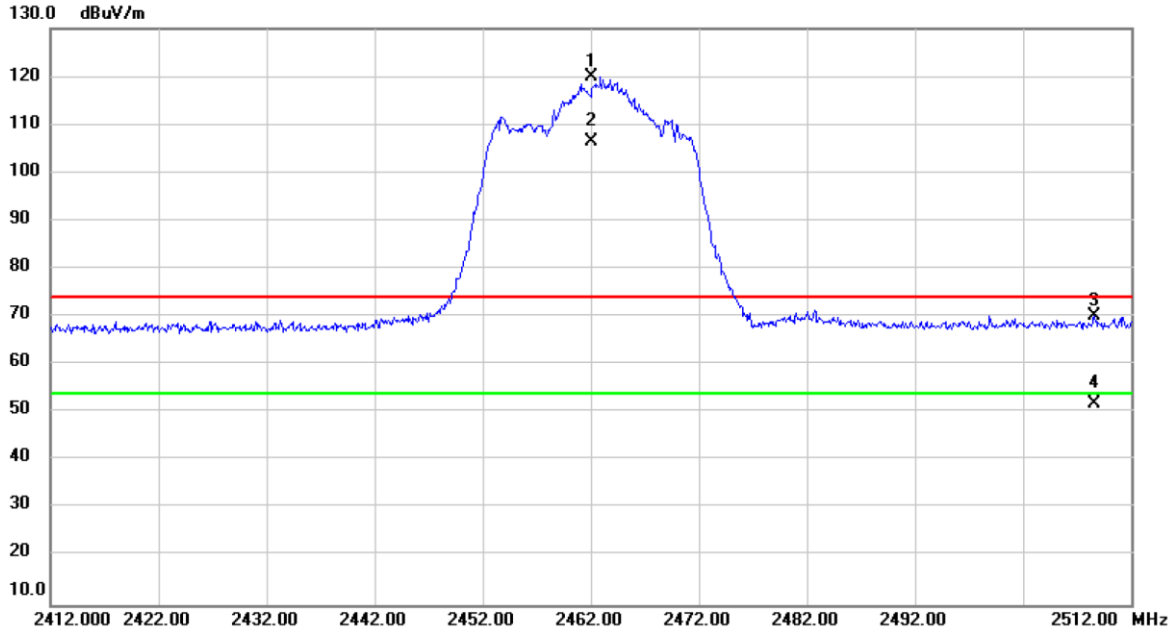
Test Mode	IEEE 802.11ax (HEW20)_Internal Antenna	Test Date	2019/12/11
Test Frequency	CH01: 2412 MHz	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2388.200	38.87	31.24	70.11	74.00	-3.89	peak	
2		2388.200	19.98	31.24	51.22	54.00	-2.78	AVG	
3	X	2412.000	86.53	31.34	117.87	74.00	43.87	peak	No Limit
4	*	2412.000	73.25	31.34	104.59	54.00	50.59	AVG	No Limit

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

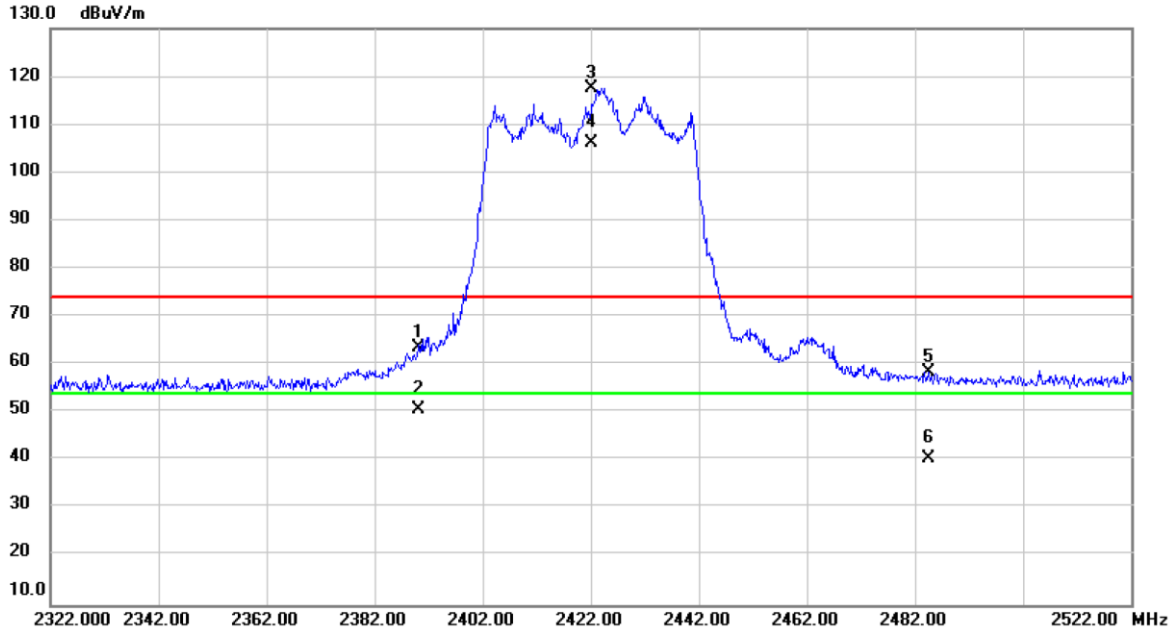
Test Mode	IEEE 802.11ax (HEW20)_Internal Antenna	Test Date	2019/12/11
Test Frequency	CH11: 2462 MHz	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	X	2462.000	88.47	31.56	120.03	74.00	46.03	peak	No Limit
2	*	2462.000	74.78	31.56	106.34	54.00	52.34	AVG	No Limit
3		2508.600	38.46	31.76	70.22	74.00	-3.78	peak	
4		2508.600	20.15	31.76	51.91	54.00	-2.09	AVG	

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

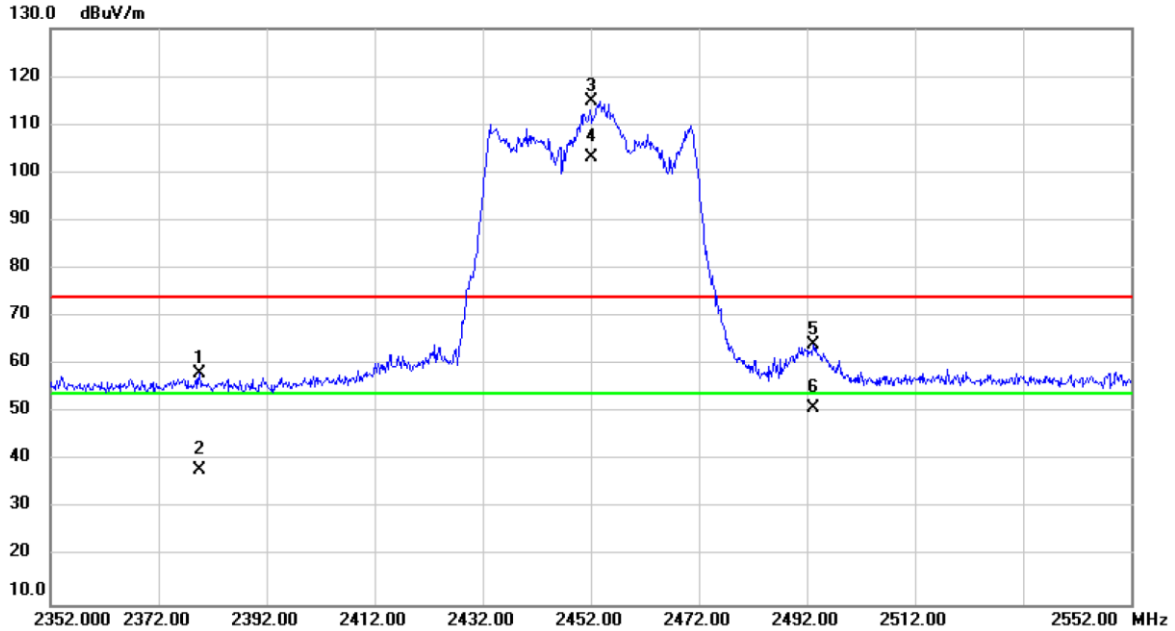
Test Mode	IEEE 802.11ax (HEW40)_Internal Antenna	Test Date	2019/12/12
Test Frequency	CH03: 2422 MHz	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2390.000	32.36	31.25	63.61	74.00	-10.39	peak	
2		2390.000	19.50	31.25	50.75	54.00	-3.25	AVG	
3	X	2422.000	86.18	31.39	117.57	74.00	43.57	peak	No Limit
4	*	2422.000	74.78	31.39	106.17	54.00	52.17	AVG	No Limit
5		2484.600	26.90	31.66	58.56	74.00	-15.44	peak	
6		2484.600	8.77	31.66	40.43	54.00	-13.57	AVG	

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

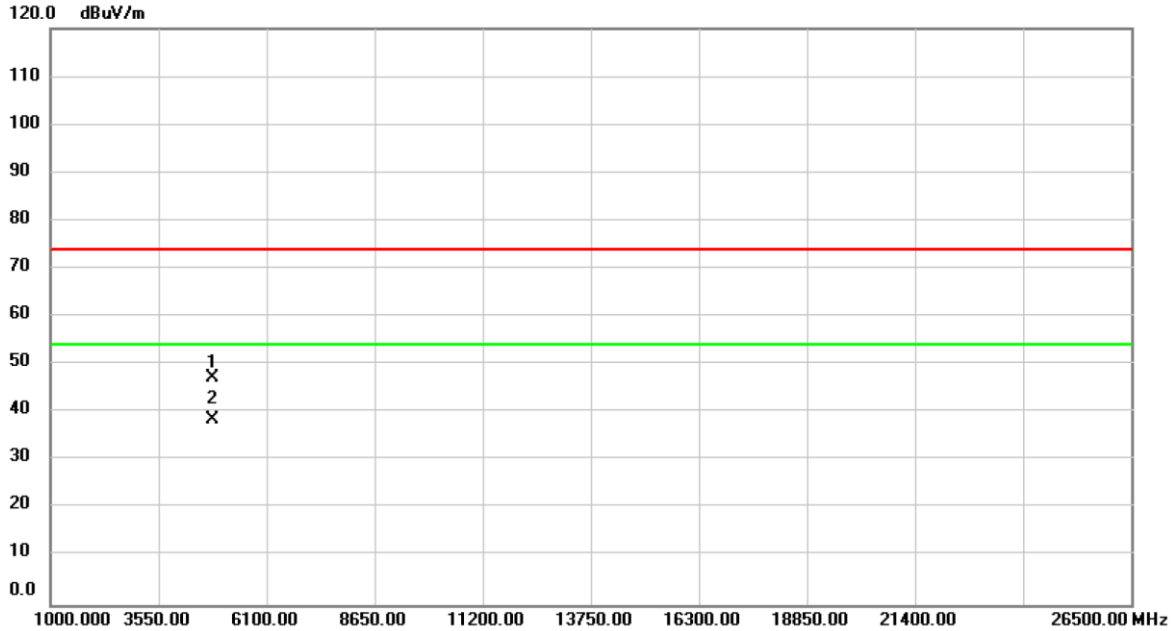
Test Mode	IEEE 802.11ax (HEW40)_Internal Antenna	Test Date	2019/12/12
Test Frequency	CH09: 2452 MHz	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2379.600	27.07	31.20	58.27	74.00	-15.73	peak	
2		2379.600	6.72	31.20	37.92	54.00	-16.08	AVG	
3	X	2452.000	83.46	31.52	114.98	74.00	40.98	peak	No Limit
4	*	2452.000	71.74	31.52	103.26	54.00	49.26	AVG	No Limit
5		2493.200	32.50	31.70	64.20	74.00	-9.80	peak	
6		2493.200	19.13	31.70	50.83	54.00	-3.17	AVG	

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

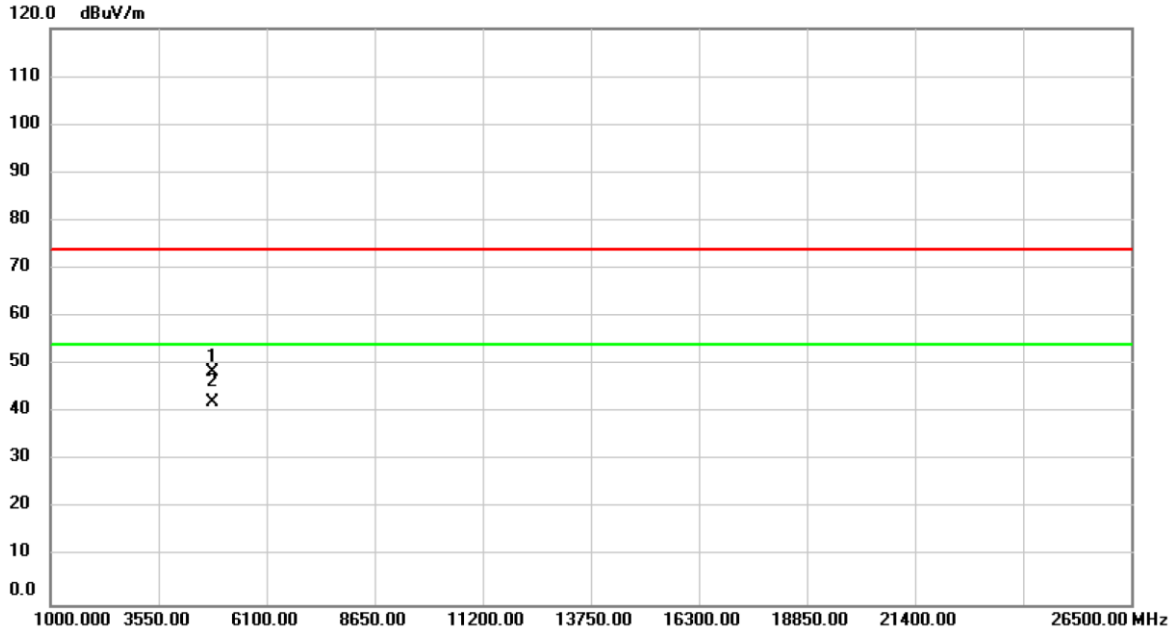
Test Mode	IEEE 802.11b_Internal Antenna	Test Date	2019/12/2
Test Frequency	CH01: 2412 MHz	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4824.000	57.73	-10.52	47.21	74.00	-26.79	peak	
2	*	4824.000	49.08	-10.52	38.56	54.00	-15.44	AVG	

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

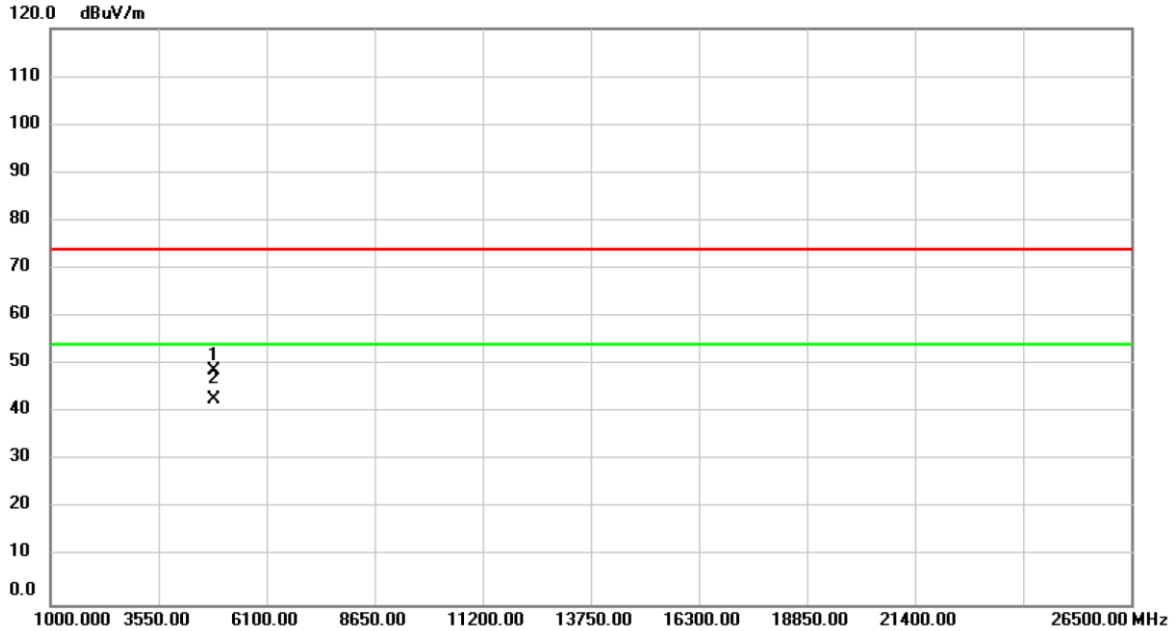
Test Mode	IEEE 802.11b_Internal Antenna	Test Date	2019/12/2
Test Frequency	CH01: 2412 MHz	Polarization	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4824.000	58.87	-10.52	48.35	74.00	-25.65	peak	
2	*	4824.000	52.58	-10.52	42.06	54.00	-11.94	AVG	

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

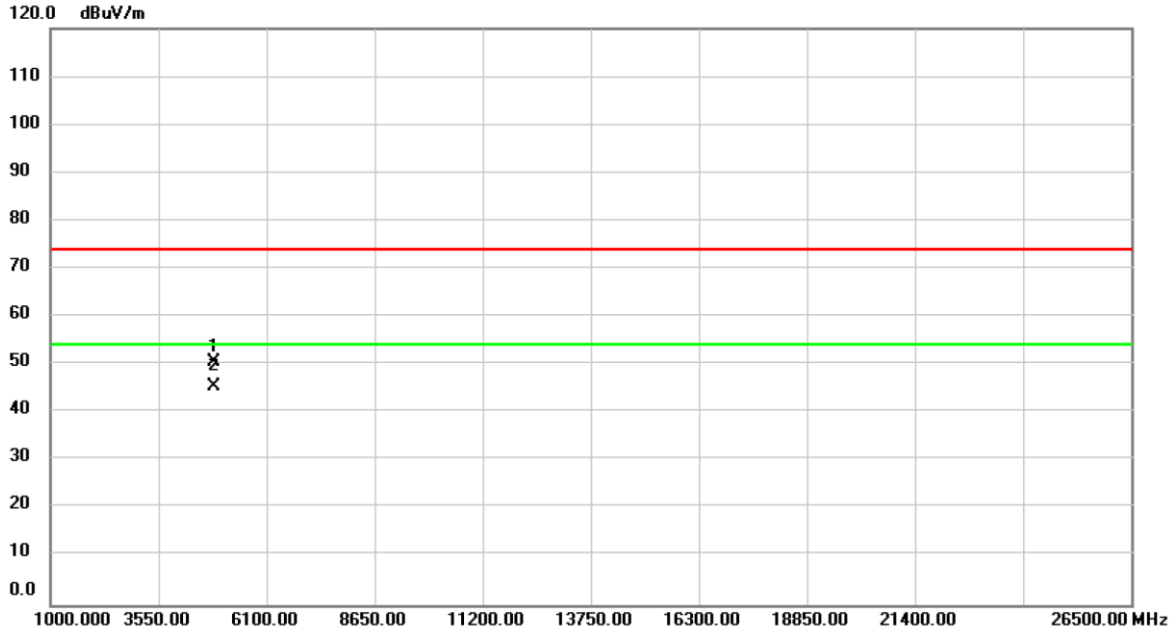
Test Mode	IEEE 802.11b_Internal Antenna	Test Date	2019/12/2
Test Frequency	CH06: 2437 MHz	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4874.000	59.20	-10.40	48.80	74.00	-25.20	peak	
2	*	4874.000	53.03	-10.40	42.63	54.00	-11.37	AVG	

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

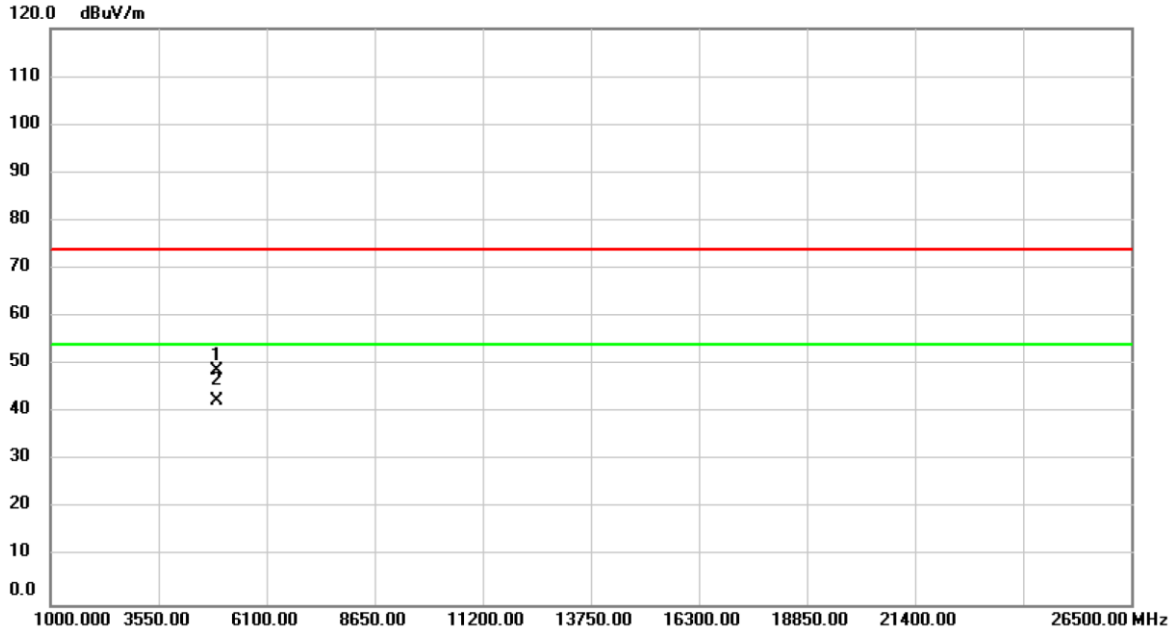
Test Mode	IEEE 802.11b_Internal Antenna	Test Date	2019/12/2
Test Frequency	CH06: 2437 MHz	Polarization	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4874.000	60.89	-10.40	50.49	74.00	-23.51	peak	
2	*	4874.000	55.74	-10.40	45.34	54.00	-8.66	AVG	

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

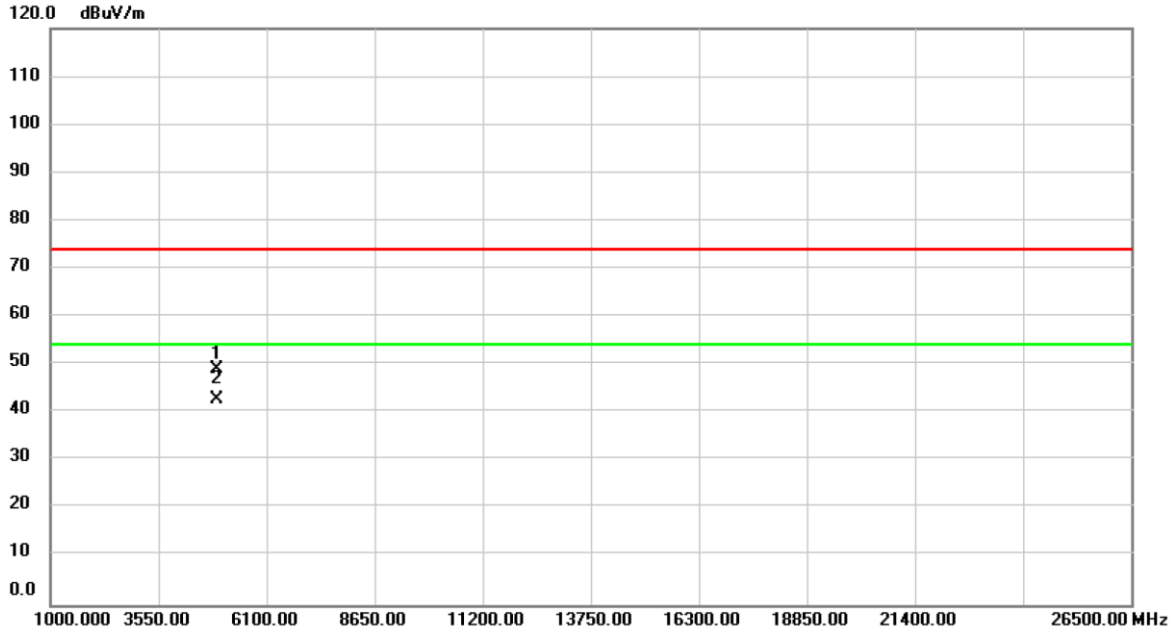
Test Mode	IEEE 802.11b_Internal Antenna	Test Date	2019/12/2
Test Frequency	CH11: 2462 MHz	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4924.000	59.17	-10.28	48.89	74.00	-25.11	peak	
2	*	4924.000	52.86	-10.28	42.58	54.00	-11.42	AVG	

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

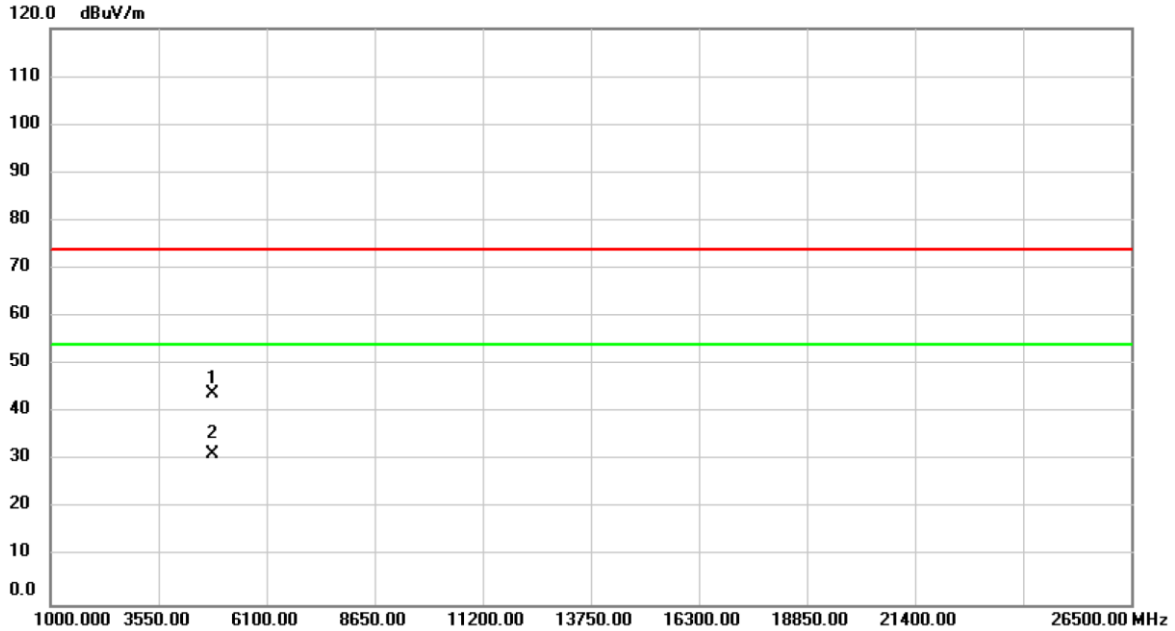
Test Mode	IEEE 802.11b_Internal Antenna	Test Date	2019/12/2
Test Frequency	CH11: 2462 MHz	Polarization	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4924.000	59.19	-10.28	48.91	74.00	-25.09	peak	
2	*	4924.000	52.96	-10.28	42.68	54.00	-11.32	AVG	

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

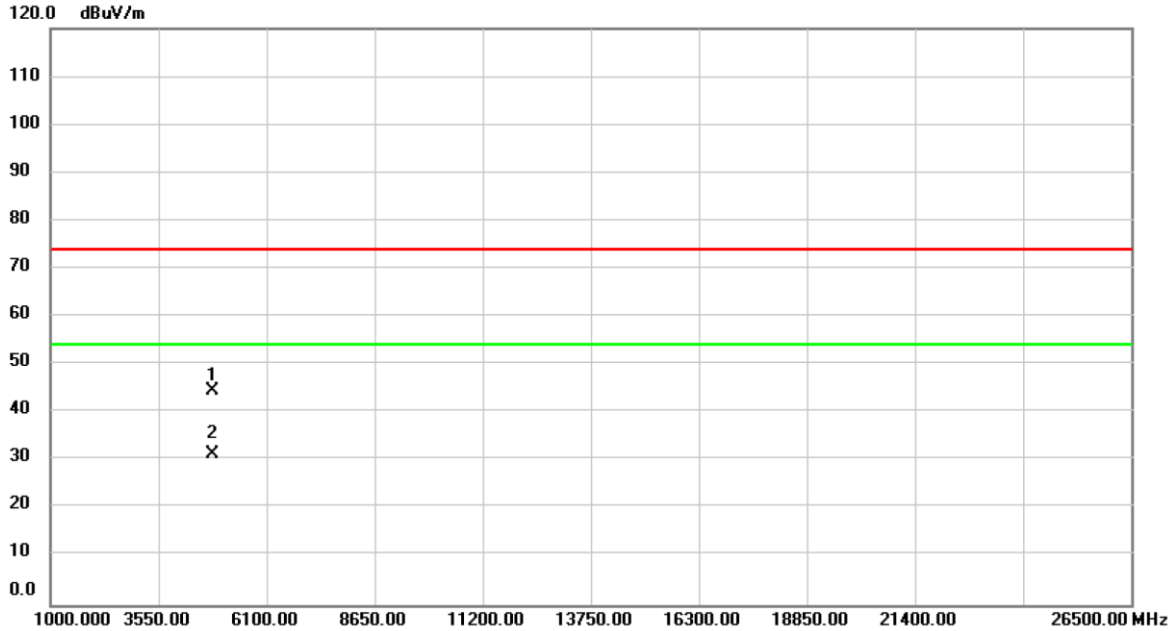
Test Mode	IEEE 802.11g_Internal Antenna	Test Date	2019/12/2
Test Frequency	CH01: 2412 MHz	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4824.000	54.53	-10.52	44.01	74.00	-29.99	peak	
2	*	4824.000	41.86	-10.52	31.34	54.00	-22.66	AVG	

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

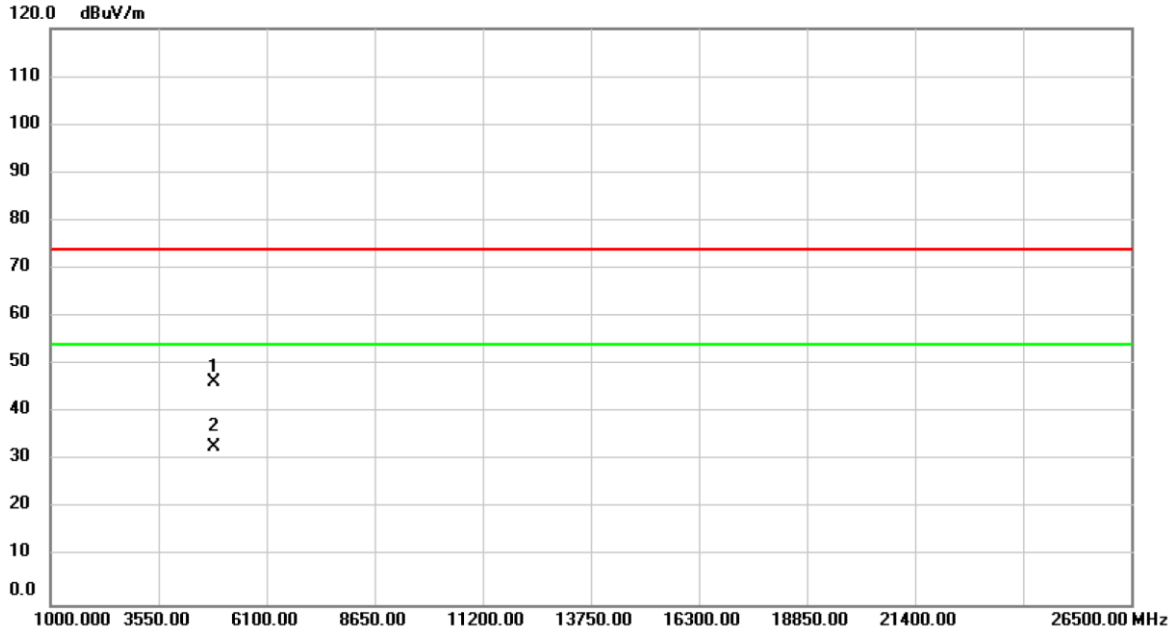
Test Mode	IEEE 802.11g_Internal Antenna	Test Date	2019/12/2
Test Frequency	CH01: 2412 MHz	Polarization	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4824.000	55.09	-10.52	44.57	74.00	-29.43	peak	
2	*	4824.000	41.90	-10.52	31.38	54.00	-22.62	AVG	

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

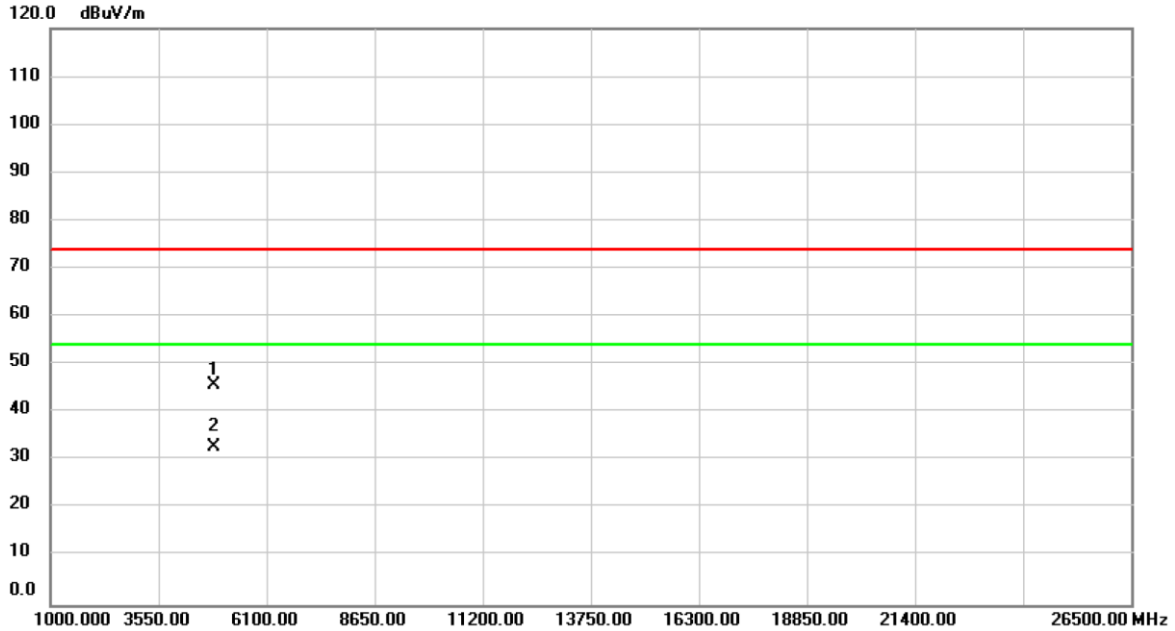
Test Mode	IEEE 802.11g_Internal Antenna	Test Date	2019/12/2
Test Frequency	CH06: 2437 MHz	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4874.000	56.69	-10.40	46.29	74.00	-27.71	peak	
2	*	4874.000	43.26	-10.40	32.86	54.00	-21.14	AVG	

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

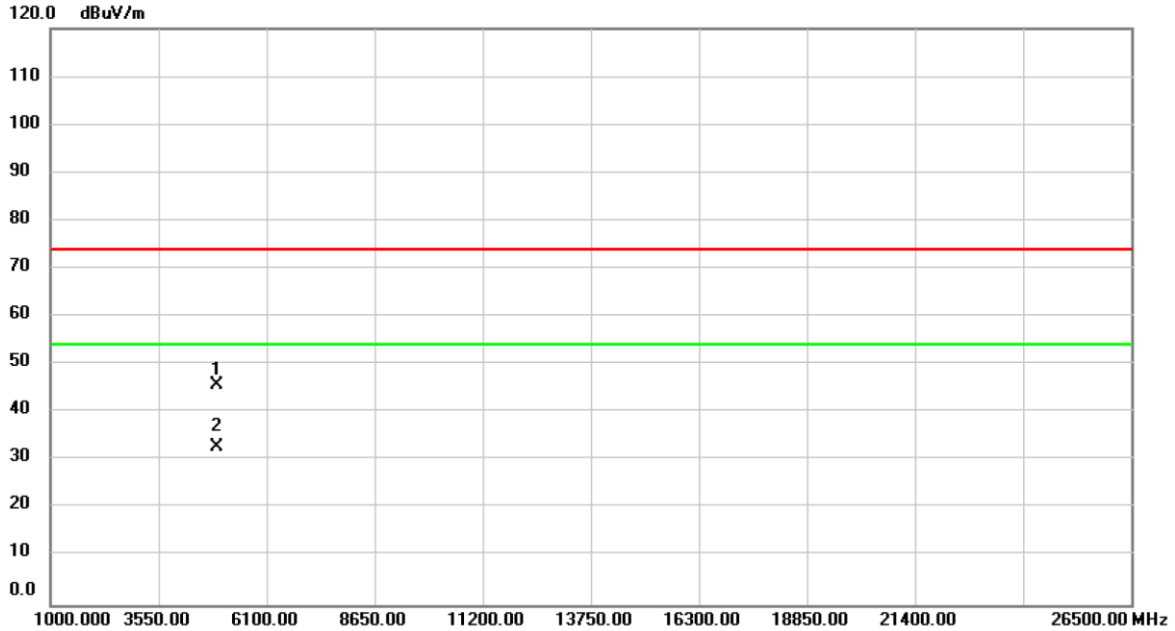
Test Mode	IEEE 802.11g_Internal Antenna	Test Date	2019/12/2
Test Frequency	CH06: 2437 MHz	Polarization	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4874.000	56.03	-10.40	45.63	74.00	-28.37	peak	
2	*	4874.000	43.36	-10.40	32.96	54.00	-21.04	AVG	

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

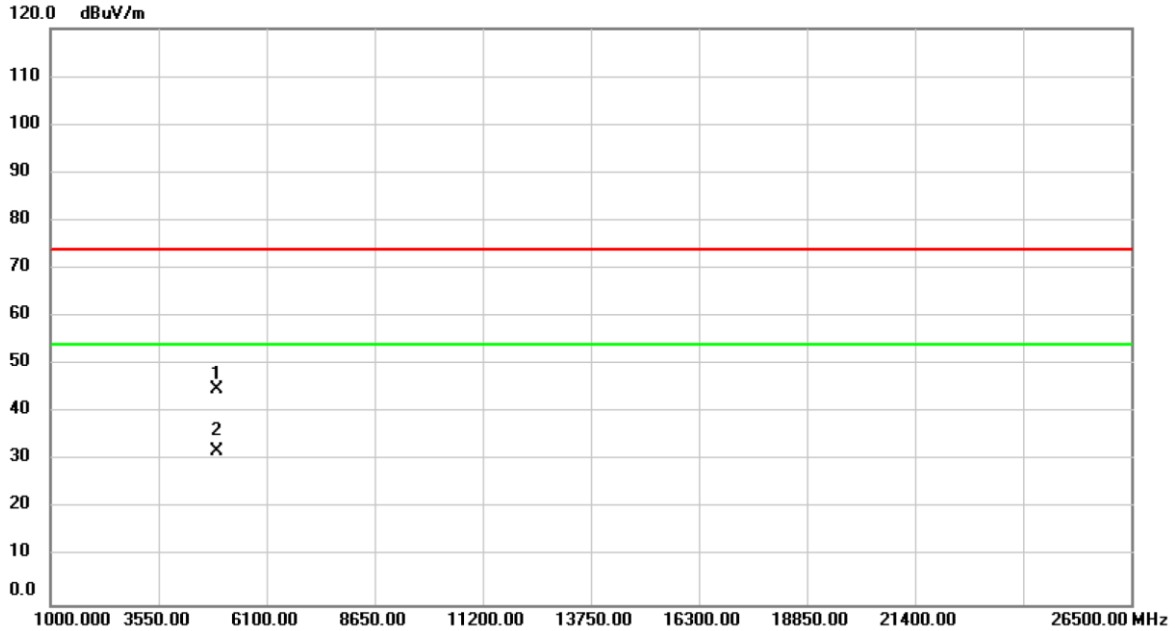
Test Mode	IEEE 802.11g_Internal Antenna	Test Date	2019/12/2
Test Frequency	CH11: 2462 MHz	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4924.000	56.08	-10.28	45.80	74.00	-28.20	peak	
2	*	4924.000	43.24	-10.28	32.96	54.00	-21.04	AVG	

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

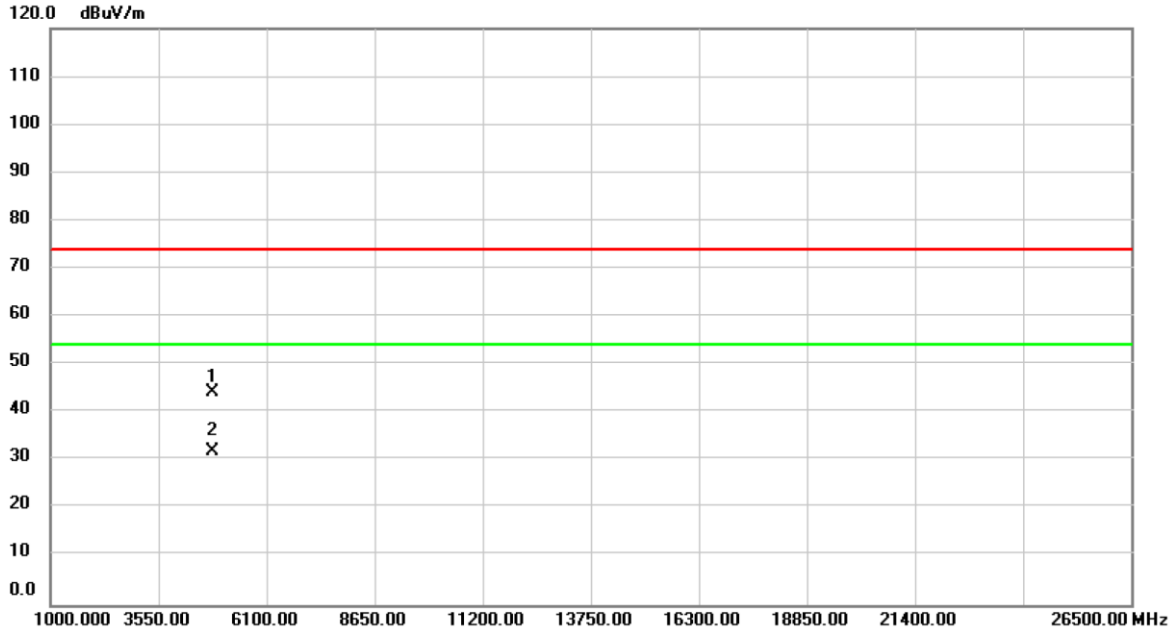
Test Mode	IEEE 802.11g_Internal Antenna	Test Date	2019/12/2
Test Frequency	CH11: 2462 MHz	Polarization	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4924.000	55.22	-10.28	44.94	74.00	-29.06	peak	
2	*	4924.000	42.33	-10.28	32.05	54.00	-21.95	AVG	

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

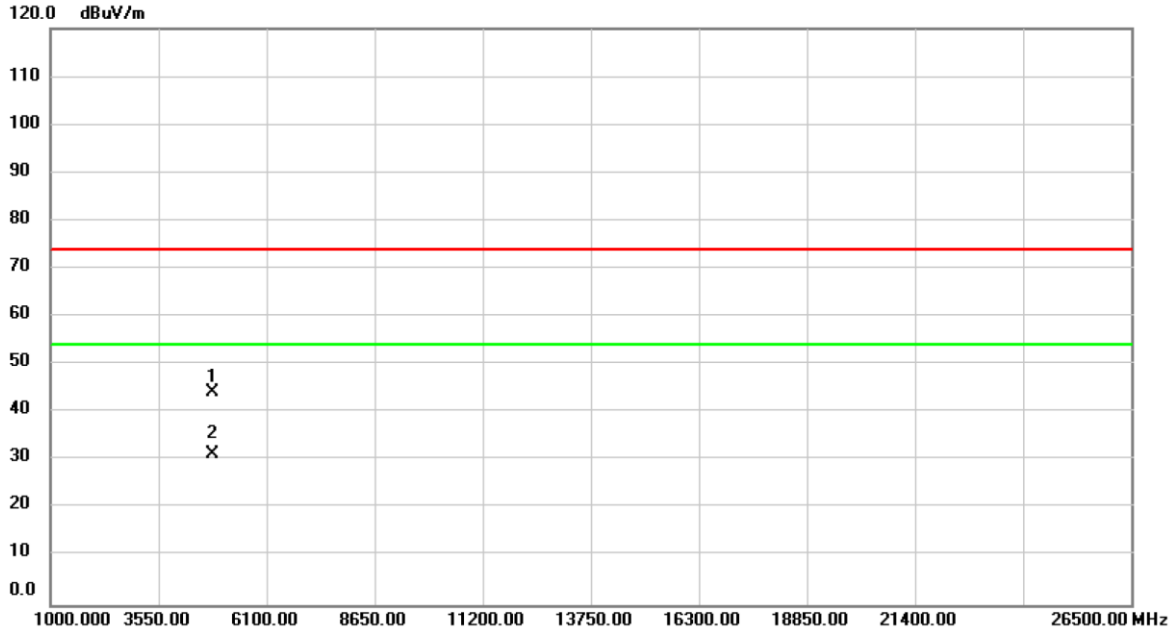
Test Mode	IEEE 802.11n (HT20)_Internal Antenna	Test Date	2019/12/2
Test Frequency	CH01: 2412 MHz	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4824.000	54.72	-10.52	44.20	74.00	-29.80	peak	
2	*	4824.000	42.34	-10.52	31.82	54.00	-22.18	AVG	

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

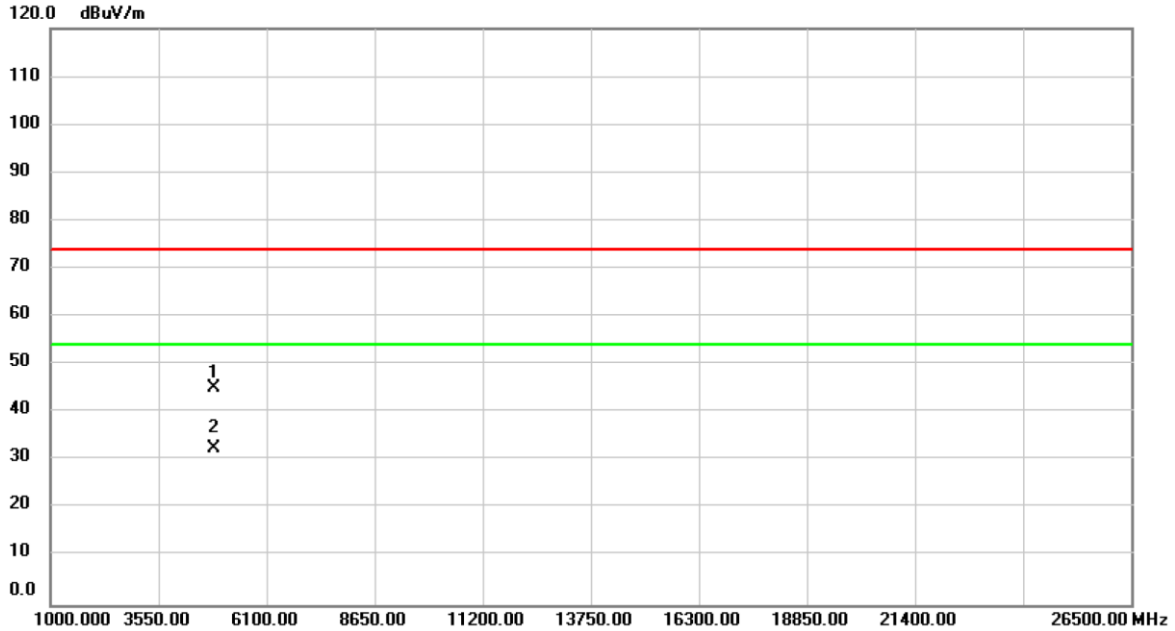
Test Mode	IEEE 802.11n (HT20)_Internal Antenna	Test Date	2019/12/2
Test Frequency	CH01: 2412 MHz	Polarization	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4824.000	54.83	-10.52	44.31	74.00	-29.69	peak	
2	*	4824.000	42.02	-10.52	31.50	54.00	-22.50	AVG	

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

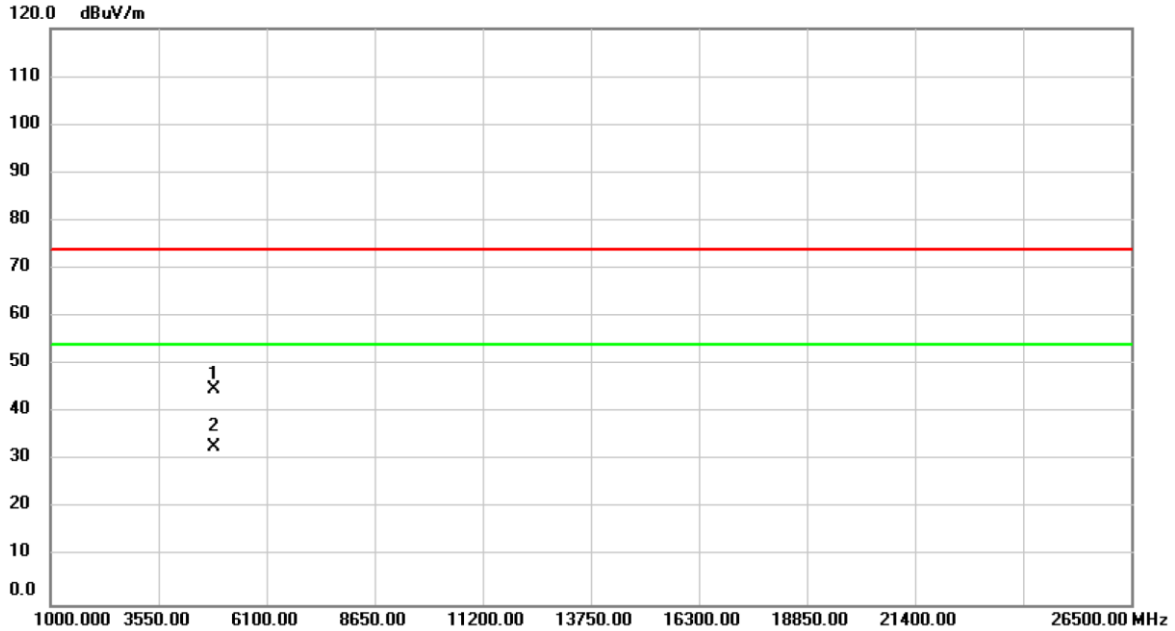
Test Mode	IEEE 802.11n (HT20)_Internal Antenna	Test Date	2019/12/2
Test Frequency	CH06: 2437 MHz	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4874.000	55.42	-10.40	45.02	74.00	-28.98	peak	
2	*	4874.000	42.91	-10.40	32.51	54.00	-21.49	AVG	

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

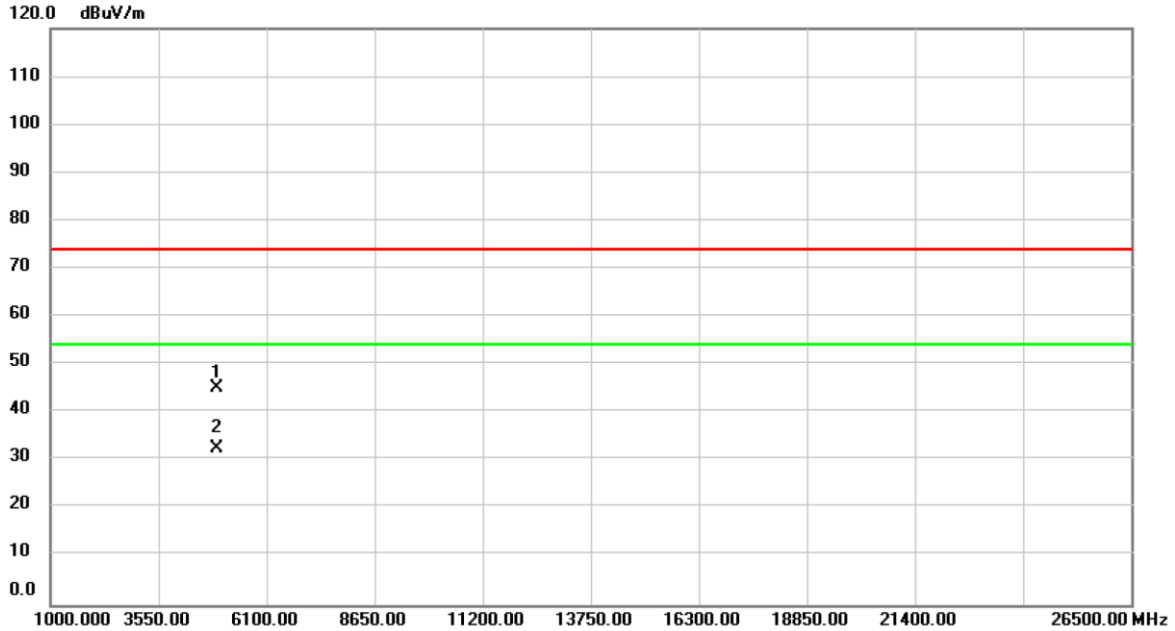
Test Mode	IEEE 802.11n (HT20)_Internal Antenna	Test Date	2019/12/2
Test Frequency	CH06: 2437 MHz	Polarization	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4874.000	55.32	-10.40	44.92	74.00	-29.08	peak	
2	*	4874.000	43.33	-10.40	32.93	54.00	-21.07	AVG	

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

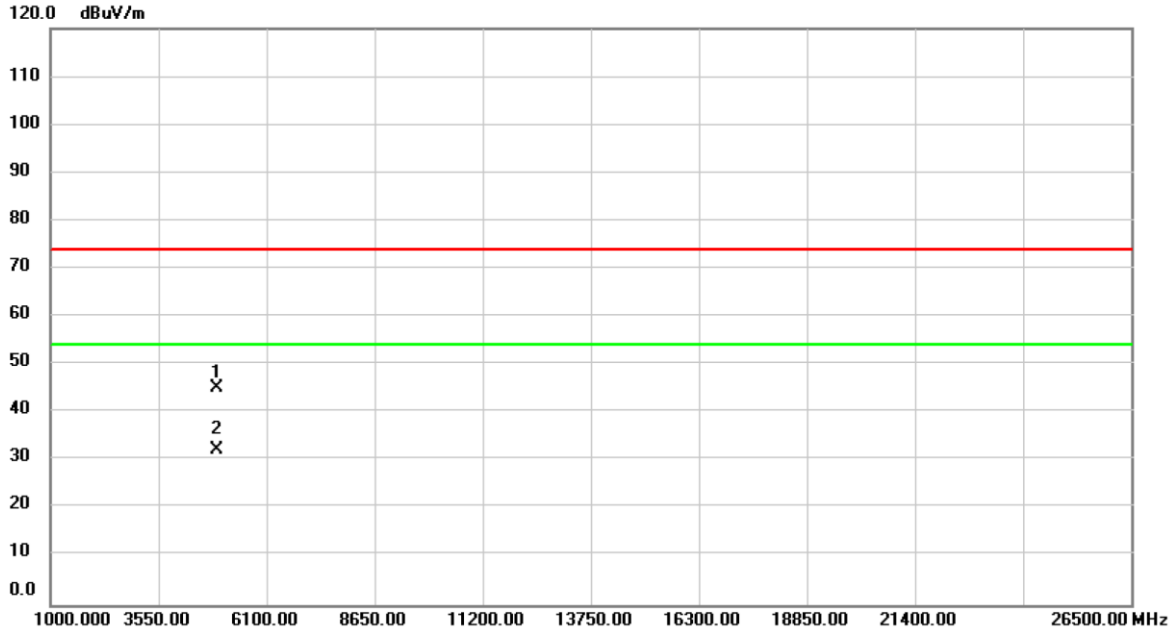
Test Mode	IEEE 802.11n (HT20)_Internal Antenna	Test Date	2019/12/2
Test Frequency	CH11: 2462 MHz	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4924.000	55.41	-10.28	45.13	74.00	-28.87	peak	
2	*	4924.000	42.71	-10.28	32.43	54.00	-21.57	AVG	

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

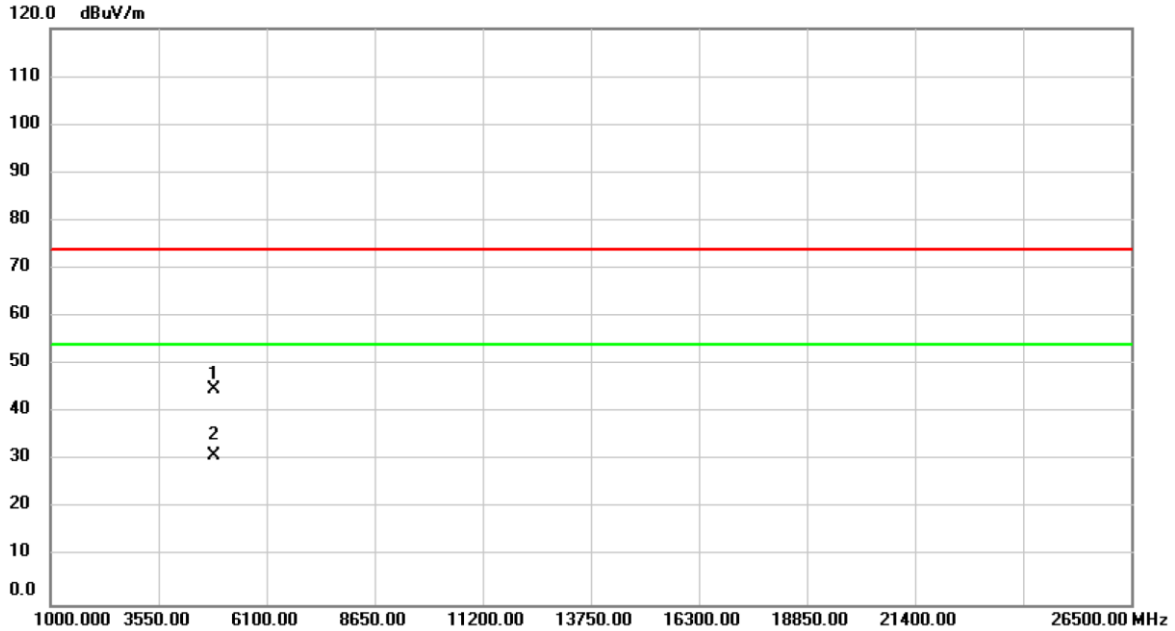
Test Mode	IEEE 802.11n (HT20)_Internal Antenna	Test Date	2019/12/2
Test Frequency	CH11: 2462 MHz	Polarization	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4924.000	55.46	-10.28	45.18	74.00	-28.82	peak	
2	*	4924.000	42.58	-10.28	32.30	54.00	-21.70	AVG	

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

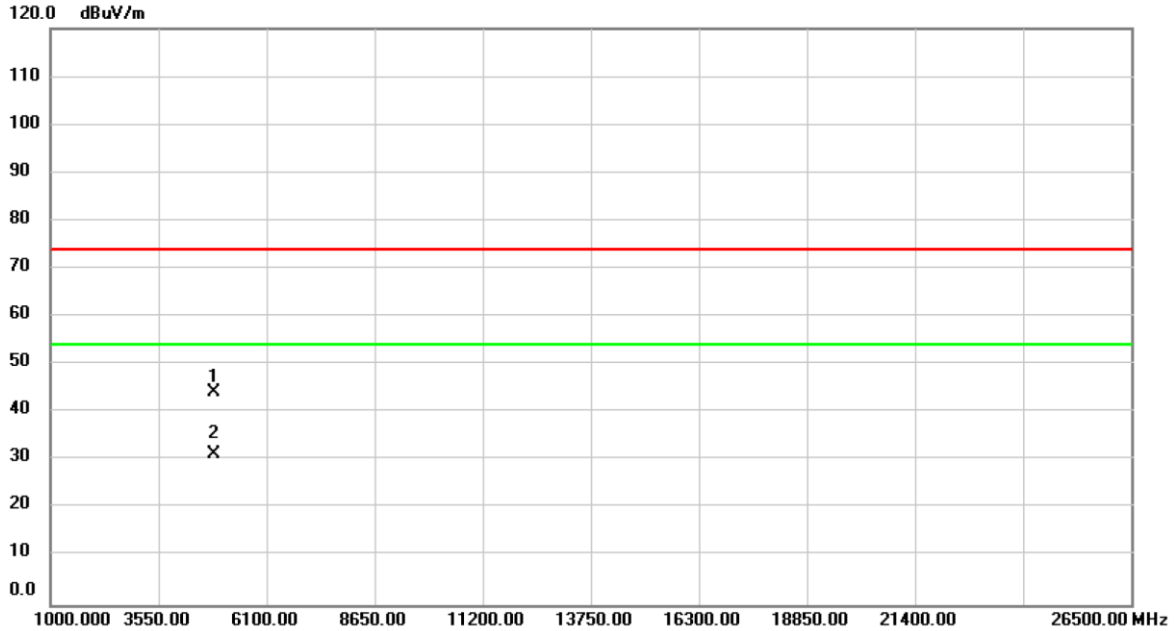
Test Mode	IEEE 802.11n (HT40)_Internal Antenna	Test Date	2019/12/2
Test Frequency	CH03: 2422 MHz	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4844.000	55.31	-10.47	44.84	74.00	-29.16	peak	
2	*	4844.000	41.65	-10.47	31.18	54.00	-22.82	AVG	

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

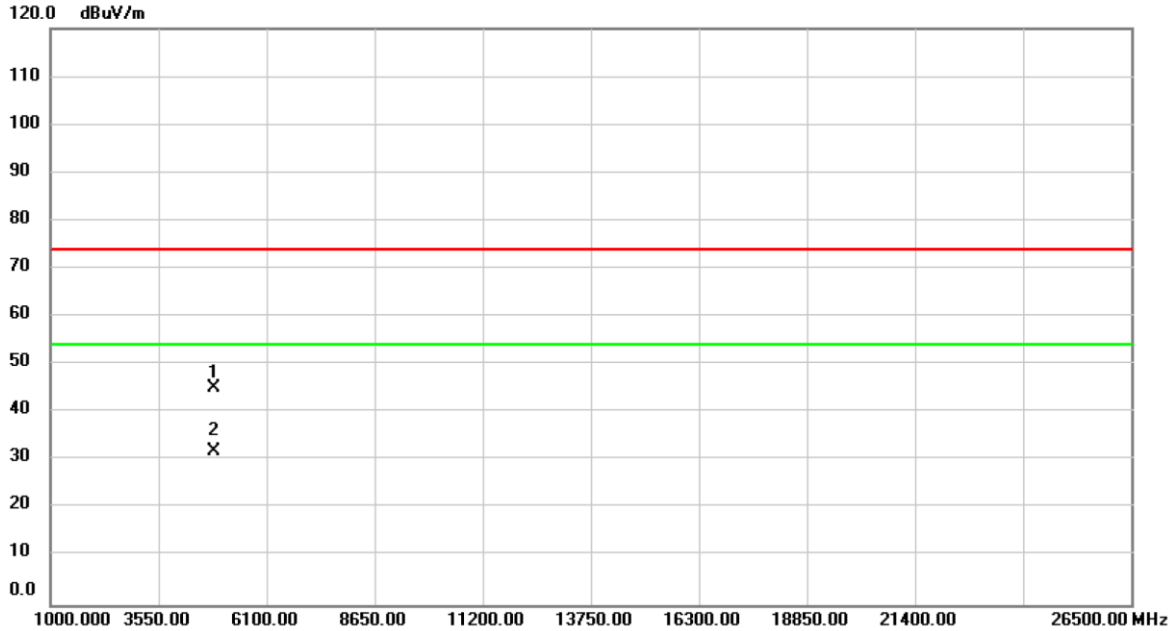
Test Mode	IEEE 802.11n (HT40)_Internal Antenna	Test Date	2019/12/2
Test Frequency	CH03: 2422 MHz	Polarization	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4844.000	54.83	-10.47	44.36	74.00	-29.64	peak	
2	*	4844.000	41.70	-10.47	31.23	54.00	-22.77	AVG	

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

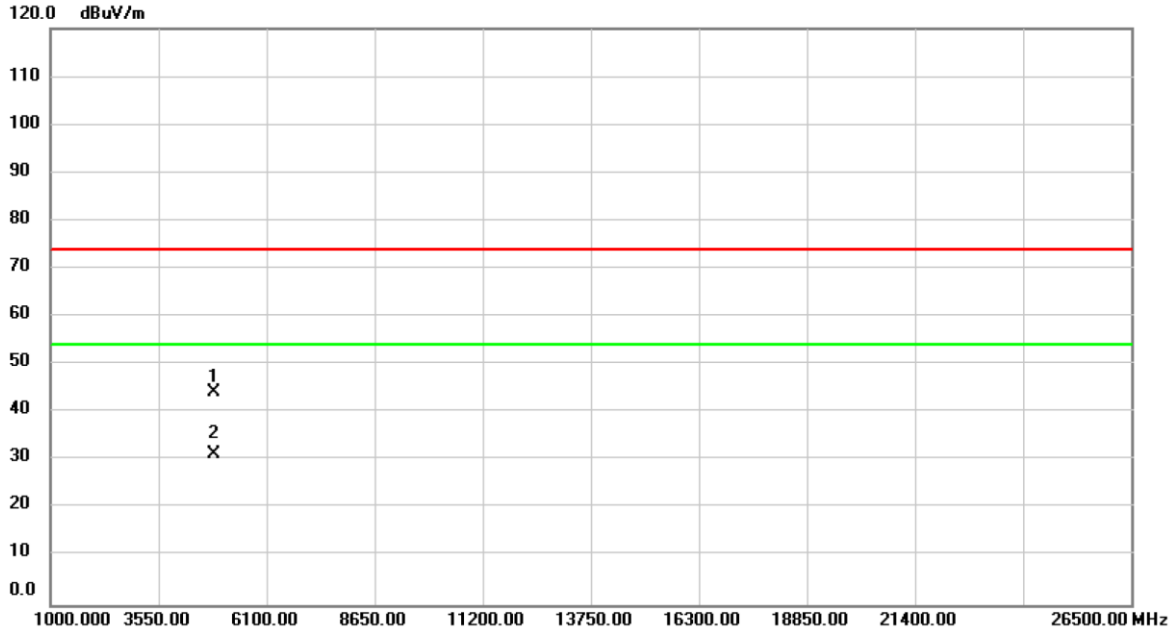
Test Mode	IEEE 802.11n (HT40)_Internal Antenna	Test Date	2019/12/2
Test Frequency	CH06: 2437 MHz	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4874.000	55.53	-10.40	45.13	74.00	-28.87	peak	
2	*	4874.000	42.40	-10.40	32.00	54.00	-22.00	AVG	

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

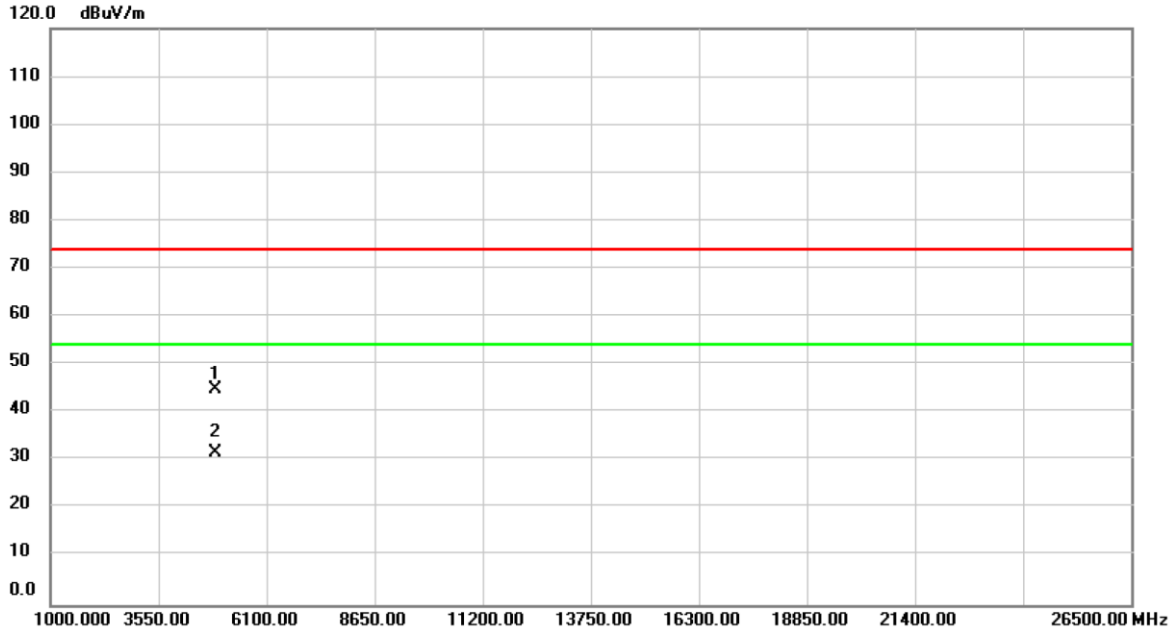
Test Mode	IEEE 802.11n (HT40)_Internal Antenna	Test Date	2019/12/2
Test Frequency	CH06: 2437 MHz	Polarization	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4874.000	54.66	-10.40	44.26	74.00	-29.74	peak	
2	*	4874.000	41.71	-10.40	31.31	54.00	-22.69	AVG	

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

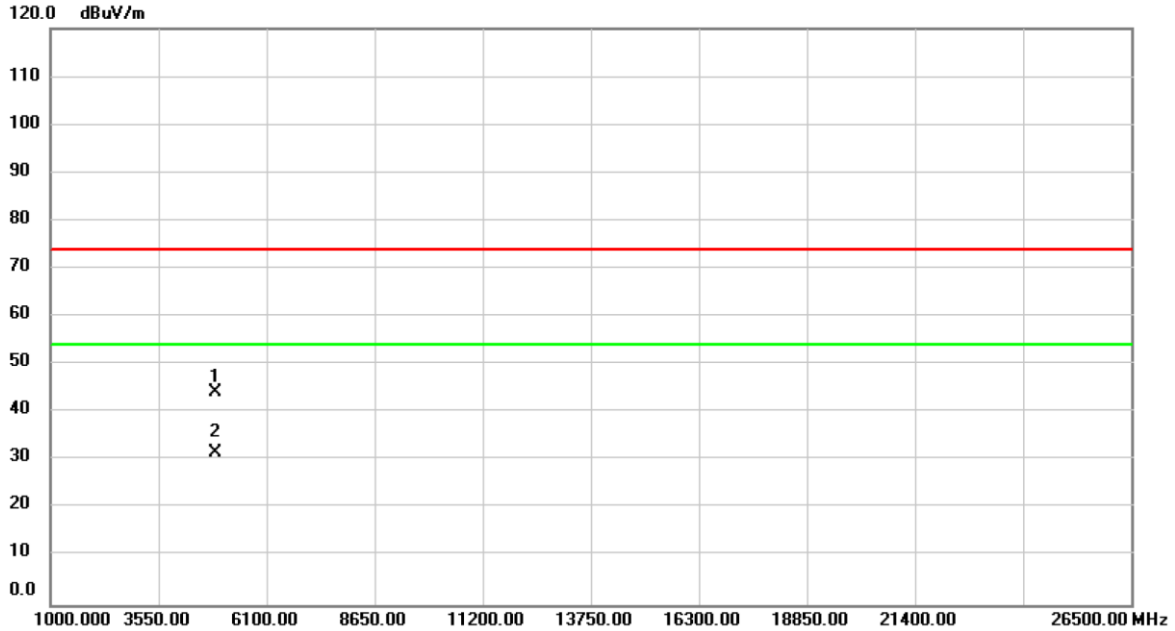
Test Mode	IEEE 802.11n (HT40)_Internal Antenna	Test Date	2019/12/2
Test Frequency	CH11: 2452 MHz	Polarization	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		4904.000	55.05	-10.32	44.73	74.00	-29.27	peak	
2	*	4904.000	42.07	-10.32	31.75	54.00	-22.25	AVG	

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

Test Mode	IEEE 802.11n (HT40)_Internal Antenna	Test Date	2019/12/2
Test Frequency	CH11: 2452 MHz	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	54.43	-10.32	44.11	74.00	-29.89	peak	
2		4904.000	42.05	-10.32	31.73	74.00	-42.27	QP	

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