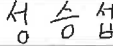


TEST REPORT

FCC Part 15 Subpart C § 15.247

FCC ID : 2BDEFYV-19C

Report Number :	EFC-2022-000023
Date of issue :	Mar.08.2024
Total number of pages :	69
Tested by (name + signature)	Seong Seungseop 
Approved by (name + signature) :	Lee Jaejun 
Testing Laboratory :	Korea Testing & Research institute (KTR)
Address :	98, Gyoyukwon-ro, Gwacheon-si, Gyeonggi-do, 13810, Korea
Applicant` s name :	YOUNGONE CORPORATION
Address :	25, Namdongseo-ro 362beon-gil, Namdong-gu, Incheon, Republic of Korea
Manufacturer` s name :	YOUNGONE CORPORATION
Address :	25, Namdongseo-ro 362beon-gil, Namdong-gu, Incheon, Republic of Korea
Test specification :	
Standard :	FCC Part 15 Subpart C § 15.247
Test procedure :	ANSI C63.10-2013, KDB 558074 D01 15.247 Meas Guidance v05r02, KDB 662911 v02r01
Non-standard test method:	N/A
Test Report Form No :	KTR-QI-Y10053-F19(00)
Test Reoprt Form(s) Originator :	Korea Testing & Research institute
Master TRF:	Dated 2012-06
General remarks : 1. The test results of this test report are only limited in to the samples and sample names provided by the client and do not guarantee the quality of all products of the client. You can check website (www.ktr.or.kr) or QR code to verify the authenticity of the certificate. 2. This test report shall be used only within the purpose of its defined usage and shall not be used for public relation, advertisement and lawsuit. 3. This test report is only valid when printed on KTR original report paper with hologram and when re-issued by KTR. The copy and the electronic file of the test report are only for reference.	
Test item description	
Manufacturer :	YOUNGONE CORPORATION
Model/Type reference :	YV-19C / IoT-based ice carbonated all-in one unmanned beverage machine
Ratings :	120 V~, 60 Hz



Revision History

The Revision history of this test report is shown below.

Revision	Report No.	Date of Issue	Description
0	EFC-2022-000023	2024.03.08	Initial

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1. General Information

1.1. Testing Laboratory

Laboratory	KOREA TESTING & RESEARCH INSTITUTE
Address	98, Gyoyukwon-ro, Gwacheon-si, Gyeonggi-do, 13810, Korea
Phone No	+ 82-2-2164-0011
Fax No.	+ 82-2-2634-1008
Accreditations	KOLAS : KT011, KC : J, VCCI Reg. : C-2363, R-2183 KCC & FCC : KR0030(Designation), FCC : 503434(Registration)

1.2. Applicant Information

Applicant(Company)	YOUNGONE CORPORATION
Address	25, Namdongseo-ro 362beon-gil, Namdong-gu, Incheon, Republic of Korea
Contact Person	Name : Jung, Sang Min // E-mail : sangmin.jung@aquadream.co.kr Phone No. : +82-32-813-2830

1.3. Manufacturer Information

Same as the application information

1.4. Other Information

Not Applicable

2. Equipment Under Test(EUT)

2.1. EUT Information

Equipment under test	IoT-based ice carbonated all-in one unmanned beverage machine
Model name	YV-19C
EUT Type	☐ Table Top Equipment ☒ Floor Standing Equipment
Frequency Range & Number of channels	2 412 MHz ~ 2 472 MHz(WiFi 802.11b/g/n HT20) : 13 CH 2 422 MHz ~ 2 462 MHz(WiFi 802.11n HT40) : 9 CH
Modulation technique	WiFi(802.11 b/g/n) : DSSS, OFDM, OFDMA
Antenna type	Chip Antenna(ANT1, ANT2)
Antenna gain	Peak Gain : 1.5 dBi(ANT1, ANT2)
Power source	120 V~, 60 Hz
Software Version	–
Hardware Version	–
Serial Number	–
Variant Model	N/A
Date of Test(s)	2023.11.13 ~ 2024.01.19
Notes :	1. The EUT only supports MIMO mode.(802.11 b/g/n HT20/n HT 40)

2.2. Supporting Equipment

Device	Manufacturer	Model	Serial No.
Laptop	Samsung Electronics Co., Ltd.	NT301E4C	–

3. Summary of Test Results

FCC Part 15 Subpart C § 15.247		
Section	Test Item	Result
§ 15.247(b)(3)	Maximum Peak Output Power	C
§ 15.247(e)	Peak Power Spectral Density	C
§ 15.247(a)(2)	6 dB Bandwidth	C
§ 15.205(a) § 15.209 § 15.247(d)	Spurious Emission Band Edge and Restricted Bands	C
§ 15.207(a)	AC Power Line Conducted Emissions	C

Notes :

- C = Comply N/C = Not Comply N/T = Not Tested N/A = Not Applicable
- The measurement procedures described in the American National Standard of Procedure for Compliance Testing of Unlicensed Wireless Devices(ANSI C63.10-2013) and the guidance provided in KDB 558074 D01 v05r02 & KDB 662911 v02r01 were used in the measurement of the EUT
- All modes of operation and data rates were investigated. The test result shown in the following sections represents the worst case emissions.
- The fundamental of the EUT was investigated in three axis X, Y and Z. It was determined that X axis was the worst in three axis. As a result, all final radiated testing was conducted with the EUT in X axis.
- The worst case data rate :
802.11 b : 1 Mbps, 802.11 g : 6 Mbps, 802.11 n HT20, 802.11 n HT40 : MCS0
- There are no any emission from 9 kHz to 30 MHz in pre-scans. Although these tests were performed other than open field site, adequate comparison measurements were confirmed against 30 m open field site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.

3.1. Measurement Uncertainty

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013.

All measurement uncertainty values are shown with a coverage factor of $k = 2$ to indicated a 95 % level of confidence. The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and thus, can be compared directly to specified limits to determined compliance.

Parameter	Expanded Uncertainty
Conducted Emissions(9 kHz ~ 150 kHz)	± 2.82 dB
Conducted Emissions(150 kHz ~ 30 MHz)	± 2.26 dB
Radiated Spurious Emissions(9 kHz ~ 30 MHz)	± 1.64 dB
Radiated Spurious Emissions(Below 1 GHz)	± 5.74 dB
Radiated Spurious Emissions(Above 1 GHz)	± 4.82 dB

3.2. Conducted Test for Offset Level

The offset level is set in the spectrum analyzer to compensate the RF Cable loss factor between EUT conducted output port and spectrum analyzer.

With the offset compensation, the spectrum analyser reading level is exactly the EUT RF output level.

Frequency(MHz)	Factor(dB)
30	19.94
100	19.96
200	19.96
300	19.95
400	19.94
500	19.90
600	20.02
700	20.11
800	20.10
900	20.13
1 000	20.12
2 000	20.93
3 000	20.80
4 000	23.17
5 000	23.33
6 000	22.95
7 000	23.18
8 000	22.76
9 000	23.42
10 000	22.91
11 000	23.15
12 000	23.01
13 000	23.08
14 000	22.75
15 000	23.03
16 000	22.62
17 000	23.25
18 000	23.35
19 000	23.16
20 000	23.25
21 000	24.08
22 000	25.26
23 000	25.94
24 000	23.66
25 000	23.43
26 000	24.03
26 500	23.90

3.3. Duty Cycle

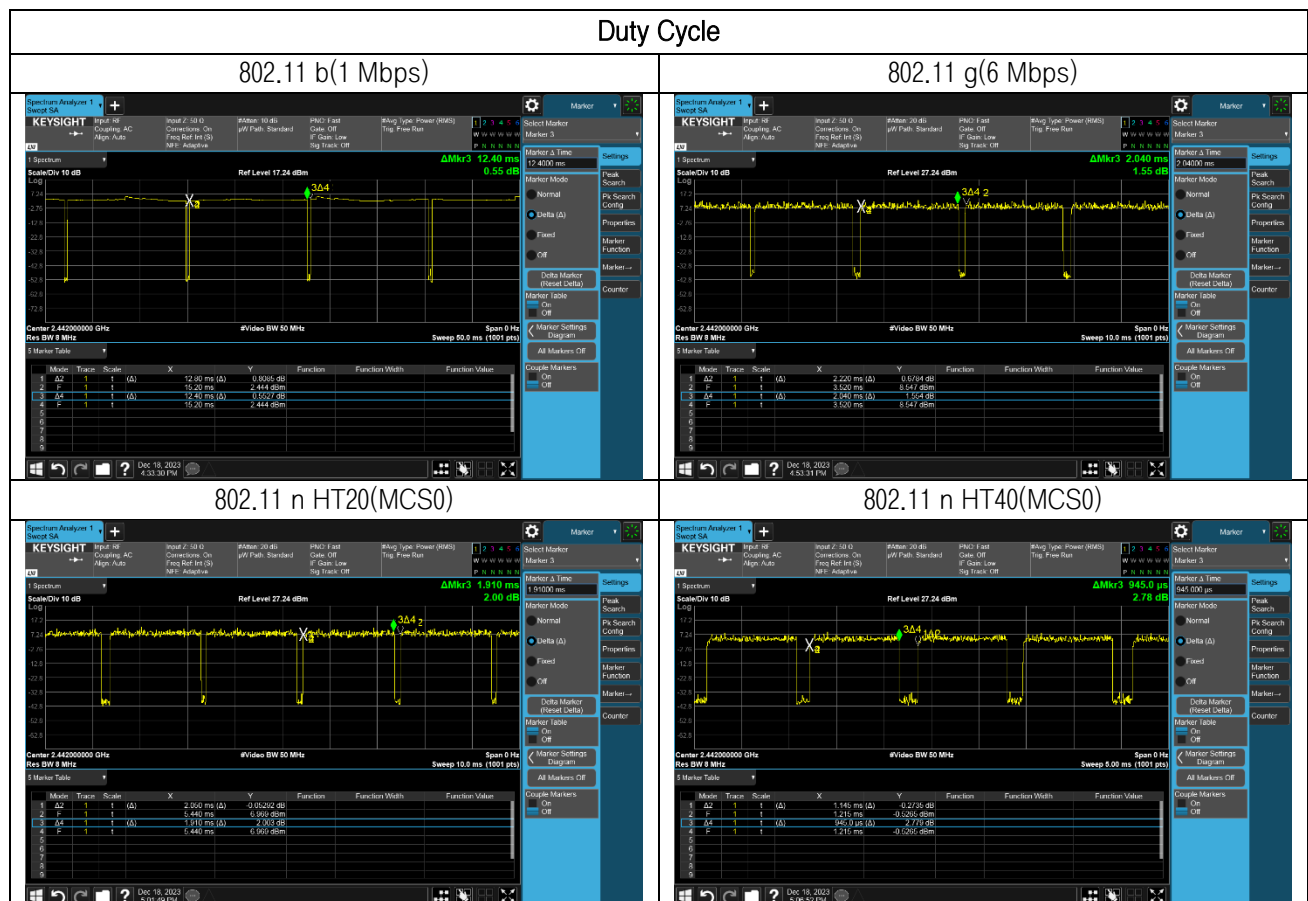
Regarding to KDB 558074 D01 15.247 Meas Guidance v05r02, 6, the maximum duty cycle was investigated and set the spectrum analyser as below;

Set RBW $\geq$ OBW if possible; set RBW to the largest available value. Set detector = peak or average. The zero-span measurement method shall not be used unless both RBW and VBW are $> 50/T$ and the number of sweep points across duration T exceeds 100.

Mode	Data Rate	Tx On(ms)	Tx On+Off(ms)	Duty Cycle(%)	D.C.F(dB)
802.11 b	1 Mbps	12.400	12.800	96.875	0.14
802.11 g	6 Mbps	2.040	2.220	91.891	0.37
802.11 n HT20	MCS0	1.910	2.050	93.170	0.31
802.11 n HT40	MCS0	0.945	1.145	82.532	0.83

Notes :

1. D.C.F : Duty Cycle Factor
2. Duty Cycle (%) = (Tx On Time / Tx On Time + Off Time) x 100
3. Correction Factor (dB) = 10 log (1 / Duty Cycle)
4. DCF is not Compensated to Average result if duty cycle is more than 98 %.



4. Test Methodology

FCC KDB 558074 D01 15.247 Meas Guidance v05r02

GUIDANCE FOR COMPLIANCE MEASUREMENTS ON DIGITAL TRANSMISSION SYSTEM, FREQUENCY HOPPING SPREAD SPECTRUM SYSTEM, AND HYBRID SYSTEM DEVICES OPERATING UNDER SECTION 15.247 OF THE FCC RULES

ANSI C63.10-2013

American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

4.1. EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

4.2. EUT Exercise

The EUT was operated in the test mode to fix the TX frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

4.3. General Test Procedures

– Conducted Emissions –

The EUT is placed on the wooden table, which is 0.1 m above ground plane and the conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-peak and Average detector.

– Radiated Emissions –

The EUT is placed on a non-conductive table. For emission measurements at or below 1 GHz, the table height is 0.1 m. For emission measurements above 1 GHz, the table height is 1.5 m. The turntable shall rotate 360 degrees to determine the position of maximum emission level. The EUT is set 3 m away from the receiving antenna, which varied from 1 m to 4 m to find out the highest emission. Also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

4.4. Description of Test Mode

The EUT has been tested with the operating condition for maximizing the emission characteristics. A test program is used to control the EUT for staying in continuous transmitting. The below low, middle, high channels were tested in WiFi mode and reported.

Test Condition	Test Mode	Data Rate	Frequency(MHz)		
			F1 / Low	F2 / Middle	F3 / High
	WiFi (802.11 b/g/n HT20)	1 Mbps / 6 Mbps / MCS0	2 412 (CH 01)	2 442 (CH 07)	2 472 (CH 13)
	WiFi (802.11 n HT40)	MCS0	2 422 (CH 03)	2 442 (CH 07)	2 462 (CH 13)

4.5. RF Power Setting in the Test Software

Mode	Frequency(MHz)	RF Power Setting Value	
		MIMO	
		ANT1	ANT2
802.11 b	2 412	74	60
	2 442	76	64
	2 472	77	66
802.11 g	2 412	73	63
	2 442	75	66
	2 472	73	64
802.11 n HT20	2 412	72	65
	2 442	74	69
	2 472	76	71
802.11 n HT40	2 422	72	65
	2 442	74	69
	2 462	76	71

5. Antenna Requirement

According to FCC 47 CFR § 15.203:

An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by responsible party can be used with the device.

The use of a permanently attached antenna or of an antenna that uses a unique coupling to intentional radiator shall be considered sufficient to comply the provision of this section.

And according to FCC 47 CFR Section § 15.247(b) if transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the gain of the antenna exceeds 6 dBi.

(1) The Transmitter has permanently attached Chip Antenna(Internal antenna) on board.

(2) Antenna Peak Gain : 1.5 dBi (ANT1, ANT2)

(3) The E.U.T complies with the requirement of § 15.203, § 15.247.

Note :

According to clause F), 2), e), i) of KDB 662911 D01 Multiple Transmitter Output, Directional gain may be calculated by using the formulas as below

If all antennas have the same gain, G_{ANT} :

Directional gain = $G_{ANT} + 10 \log(N_{ANT}/N_{SS})$ dBi, where N_{SS} = the number of independent spatial streams of data and G_{ANT} is the antenna gain in dBi. (This formula can also be applied when antennas have different gains if the highest antenna gain is substituted for G_{ANT} .)

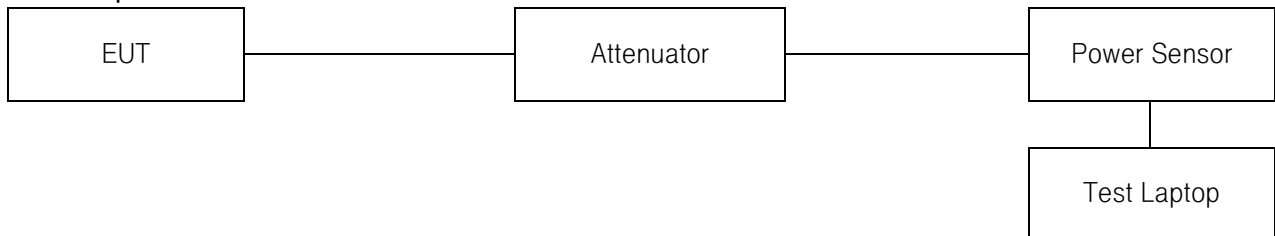
※ Directional gain = $1.5 + 10 \log(2/2) = 1.5$ dBi

5.1. Antenna Information

6. Test Result

6.1. Maximum Peak Output Power

▣ Test Setup



▣ Limit

According to § 15.247(b)(3), for systems using digital modulation in the 902–928 MHz, 2 400–2 483.5 MHz, and 5 725–5 850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

According to § 15.247(b)(4), the conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

▣ General

Section 15.247 permits the maximum conducted (average) output power to be measured as an alternative to the maximum peak conducted output power for demonstrating compliance to the limit. When this option is exercised, the measured power is to be referenced to the OBW rather than the DTS bandwidth (see ANSI C63.10 for measurement guidance).

When using a spectrum analyzer or EMI receiver to perform these measurements, it shall be capable of utilizing a number of measurement points in each sweep that is greater than or equal to twice the span/RBW to set a bin-to-bin spacing of $\leq \text{RBW}/2$ so that narrowband signals are not lost between frequency bins.

If possible, configure or modify the operation of the EUT so that it transmits continuously at its maximum power control level. The intent is to test at 100 % duty cycle; however a small reduction in duty cycle (to no lower than

98 %) is permitted, if required by the EUT for amplitude control purposes. Manufacturers are expected to provide software to the test lab to permit such continuous operation.

If continuous transmission (or at least 98 % duty cycle) cannot be achieved due to hardware limitations (e.g., overheating), the EUT shall be operated at its maximum power control level, with the transmit duration as long as possible, and the duty cycle as high as possible during which sweep triggering/signal gating techniques may be used to perform the measurement over the transmission duration.

■ Test procedure

ANSI C63.10 2013 Section 11.9

11.9.1.3 PKPM1 Peak power meter method

The maximum peak conducted output power may be measured using a broadband peak RF power meter.

The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall use a fast-responding diode detector.

11.9.2.3.1 Method AVGPM

Method AVGPM is a measurement using an RF average power meter, as follows:

- a) As an alternative to spectrum analyzer or EMI receiver measurements, measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the conditions listed below are satisfied:
 - 1) The EUT is configured to transmit continuously, or to transmit with a constant duty cycle.
 - 2) At all times when the EUT is transmitting, it shall be transmitting at its maximum power control level.
 - 3) The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.
- b) If the transmitter does not transmit continuously, measure the duty cycle, D, of the transmitter output signal as described in 11.6.
- c) Measure the average power of the transmitter. This measurement is an average over both the ON and OFF periods of the transmitter.
- d) Adjust the measurement in dBm by adding $[10 \log (1 / D)]$, where D is the duty cycle.

■ Test Result

Test Mode	Data Rate (Mbps)	Frequency (MHz)	Peak Power Result(dBm)			Average Power Result(dBm)					Limit (dBm)
			Reading		Final Sum	Reading		Final Sum	D.C.F (dB)	Final Result	
			ANT1	ANT2		Sum	ANT2				
802.11 b	1	2 412	10.87	-4.25	11.00	8.80	-6.21	8.93	0.14	9.07	
		2 442	11.76	-4.86	11.85	9.68	-6.89	9.77		9.91	
		2 472	11.90	-5.94	11.97	9.84	-8.01	9.91		10.05	
	2	2 412	10.72	-4.20	10.86	8.61	-6.26	8.75		8.89	
		2 442	11.51	-4.72	11.61	9.45	-6.92	9.55		9.69	
		2 472	11.69	-5.85	11.77	9.66	-7.94	9.73		9.87	
	5.5	2 412	10.65	-4.23	10.79	8.59	-6.28	8.73		8.87	
		2 442	11.39	-5.01	11.49	9.34	-7.04	9.44		9.58	
		2 472	11.60	-5.79	11.68	9.57	-8.08	9.64		9.78	
	11	2 412	10.63	-4.17	10.77	8.57	-6.36	8.71		8.85	
		2 442	11.67	-4.54	11.77	9.61	-6.79	9.71		9.85	
		2 472	11.79	-5.79	11.87	9.72	-7.87	9.79		9.93	
802.11 g	6	2 412	18.84	3.47	18.96	9.63	-5.31	9.77	0.37	10.14	30
		2 442	20.47	2.30	20.54	10.16	-5.95	10.27		10.64	
		2 472	19.64	2.83	19.73	10.12	-7.14	10.20		10.57	
	9	2 412	18.38	2.44	18.49	9.15	-6.32	9.27		9.64	
		2 442	19.13	2.06	19.21	9.74	-6.60	9.84		10.21	
		2 472	18.68	2.25	18.78	9.98	-7.32	10.06		10.43	
	12	2 412	18.82	3.32	18.94	8.52	-5.96	8.67		9.04	
		2 442	19.07	1.09	19.14	9.86	-6.55	9.96		10.33	
		2 472	19.56	2.14	19.64	9.91	-7.69	9.98		10.35	
	18	2 412	18.44	3.32	18.57	8.28	-6.01	8.44		8.81	
		2 442	20.14	2.08	20.21	9.01	-6.16	9.14		9.51	
		2 472	19.02	2.77	19.12	9.80	-8.06	9.87		10.24	
	24	2 412	17.57	3.07	17.72	8.78	-6.14	8.92		9.29	
		2 442	19.51	0.93	19.57	8.88	-6.53	9.00		9.37	
		2 472	19.27	1.94	19.35	9.74	-7.49	9.82		10.19	
	36	2 412	18.78	2.75	18.89	8.71	-5.82	8.86		9.23	
		2 442	19.89	1.50	19.95	9.70	-7.01	9.79		10.16	
		2 472	19.37	2.67	19.46	9.39	-8.38	9.46		9.83	
	48	2 412	18.03	3.22	18.17	8.31	-6.51	8.45		8.82	
		2 442	19.82	1.23	19.88	9.43	-6.82	9.53		9.90	
		2 472	19.14	1.71	19.22	9.49	-7.27	9.58		9.95	
	54	2 412	17.49	3.17	17.65	9.30	-6.22	9.42		9.79	
		2 442	19.15	2.07	19.23	8.71	-7.27	8.82		9.19	
		2 472	18.71	2.70	18.82	10.05	-7.82	10.12		10.49	

■ Test Result

Test Mode	Data Rate (Mbps)	Frequency (MHz)	Peak Power Result(dBm)			Average Power Result(dBm)					Limit (dBm)
			Reading		Final Sum	Reading		Final Sum	D.C.F (dB)	Final Result	
			ANT1	ANT2		ANT1	ANT2				
802.11 n HT20	MCS0	2 412	18.08	3.82	18.24	9.55	-5.35	9.69	0.31	10.00	30
		2 442	19.37	3.83	19.49	6.40	-6.56	6.61		6.92	
		2 472	20.42	3.05	20.50	11.08	-6.30	11.16		11.47	
	MCS1	2 412	17.32	3.19	17.48	8.91	-6.65	9.03		9.34	
		2 442	19.02	3.16	19.13	5.34	-6.89	5.59		5.90	
		2 472	18.92	2.98	19.03	9.77	-7.27	9.86		10.17	
	MCS2	2 412	17.97	2.91	18.10	8.21	-6.48	8.36		8.67	
		2 442	18.12	3.27	18.26	6.27	-7.73	6.44		6.75	
		2 472	19.38	2.12	19.46	10.70	-7.26	10.77		11.08	
	MCS3	2 412	16.64	2.66	16.81	8.24	-5.56	8.42		8.73	
		2 442	18.57	2.72	18.68	5.60	-7.33	5.82		6.13	
		2 472	20.33	1.92	20.39	10.74	-6.31	10.82		11.13	
	MCS4	2 412	17.82	2.51	17.95	9.33	-6.58	9.44		9.75	
		2 442	18.48	3.32	18.61	5.02	-7.22	5.27		5.58	
		2 472	19.49	1.56	19.56	9.84	-6.44	9.94		10.25	
	MCS5	2 412	17.02	2.69	17.18	8.92	-6.39	9.05		9.36	
		2 442	19.04	2.39	19.13	5.33	-8.05	5.52		5.83	
		2 472	19.40	2.70	19.49	10.41	-7.69	10.48		10.79	
	MCS6	2 412	16.81	3.77	17.02	8.07	-6.46	8.22		8.53	
		2 442	18.02	3.80	18.18	6.36	-7.35	6.54		6.85	
		2 472	20.35	2.51	20.42	10.89	-6.90	10.96		11.27	
	MCS7	2 412	16.82	2.48	16.98	8.21	-5.58	8.39		8.70	
		2 442	19.37	3.74	19.49	5.96	-6.73	6.19		6.50	
		2 472	20.28	2.77	20.36	10.14	-7.40	10.22		10.53	

■ Test Result

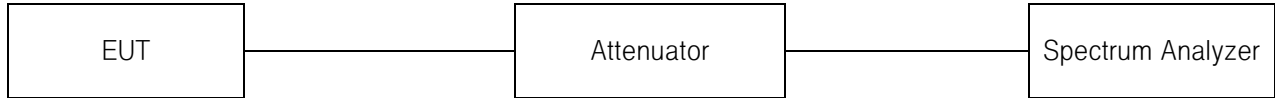
Test Mode	Data Rate (Mbps)	Frequency (MHz)	Peak Power Result(dBm)			Average Power Result(dBm)					Limit (dBm)
			Reading		Final Sum	Reading		Final Sum	D.C.F (dB)	Final Result	
			ANT1	ANT2		ANT1	ANT2				
802.11 n HT40	MCS0	2 422	19.68	3.83	19.79	9.05	-6.91	9.16	0.83	9.99	30
		2 442	19.74	3.39	19.84	9.43	-6.64	9.54		10.37	
		2 462	20.59	3.31	20.67	10.39	-6.65	10.48		11.31	
	MCS1	2 422	18.31	3.51	18.45	7.89	-7.83	8.00		8.83	
		2 442	18.60	2.35	18.70	8.02	-7.28	8.15		8.98	
		2 462	20.14	2.34	20.21	9.06	-7.05	9.17		10.00	
	MCS2	2 422	18.51	2.79	18.62	8.93	-7.05	9.04		9.87	
		2 442	18.45	2.77	18.57	9.05	-6.93	9.16		9.99	
		2 462	20.11	2.39	20.18	9.11	-7.97	9.19		10.02	
	MCS3	2 422	18.19	3.07	18.32	7.68	-7.75	7.80		8.63	
		2 442	18.95	3.25	19.07	9.11	-7.25	9.21		10.04	
		2 462	19.94	1.97	20.01	10.12	-7.46	10.20		11.03	
	MCS4	2 422	19.17	2.78	19.27	7.91	-7.15	8.04		8.87	
		2 442	18.45	3.20	18.58	8.28	-7.40	8.40		9.23	
		2 462	19.66	2.60	19.74	9.24	-7.27	9.34		10.17	
	MCS5	2 422	18.88	2.34	18.98	8.54	-7.60	8.64		9.47	
		2 442	19.56	2.65	19.65	8.08	-6.98	8.21		9.04	
		2 462	20.41	3.25	20.49	9.15	-6.86	9.26		10.09	
	MCS6	2 422	18.94	3.02	19.05	7.62	-6.93	7.77		8.60	
		2 442	18.43	2.37	18.54	9.30	-6.95	9.40		10.23	
		2 462	20.53	2.95	20.61	8.94	-8.05	9.03		9.86	
	MCS7	2 422	19.14	3.28	19.25	7.87	-7.63	7.99		8.82	
		2 442	18.73	2.07	18.82	8.70	-7.84	8.80		9.63	
		2 462	20.55	2.81	20.62	10.24	-7.41	10.31		11.14	

Note :

1. The offset value(Attenuator and RF Cable Loss) was compensated in test program(Keysight BenchVue : Ver. 3.5) before measuring.
2. Final Sum = Reading(ANT1) + Reading(ANT2), Sum(dBm) = $10\log(10^{(\text{ANT1}/10)} + 10^{(\text{ANT2}/10)})$ (dBm)
3. Final Result(Average Power Result(dBm)) = Final Sum + D.C.F(dB)

6.2. Peak Power Spectral Density

▣ Test Setup



▣ Limit

According to § 15.247(e), (e) for digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

▣ Test procedure

ANSI C63.10 2013 Section 11.10

11.10.2 Method PKPSD (peak PSD)

The following procedure shall be used if maximum peak conducted output power was used to determine compliance, and it is optional if the maximum conducted (average) output power was used to determine compliance:

- a) Set analyzer center frequency to DTS channel center frequency.
- b) Set the span to 1.5 times the DTS bandwidth.
- c) Set the RBW to $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- d) Set the VBW $\geq [3 \times \text{RBW}]$.
- e) Detector = peak.
- f) Sweep time = auto couple.
- g) Trace mode = max hold.
- h) Allow trace to fully stabilize.
- i) Use the peak marker function to determine the maximum amplitude level within the RBW.
- j) If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat.

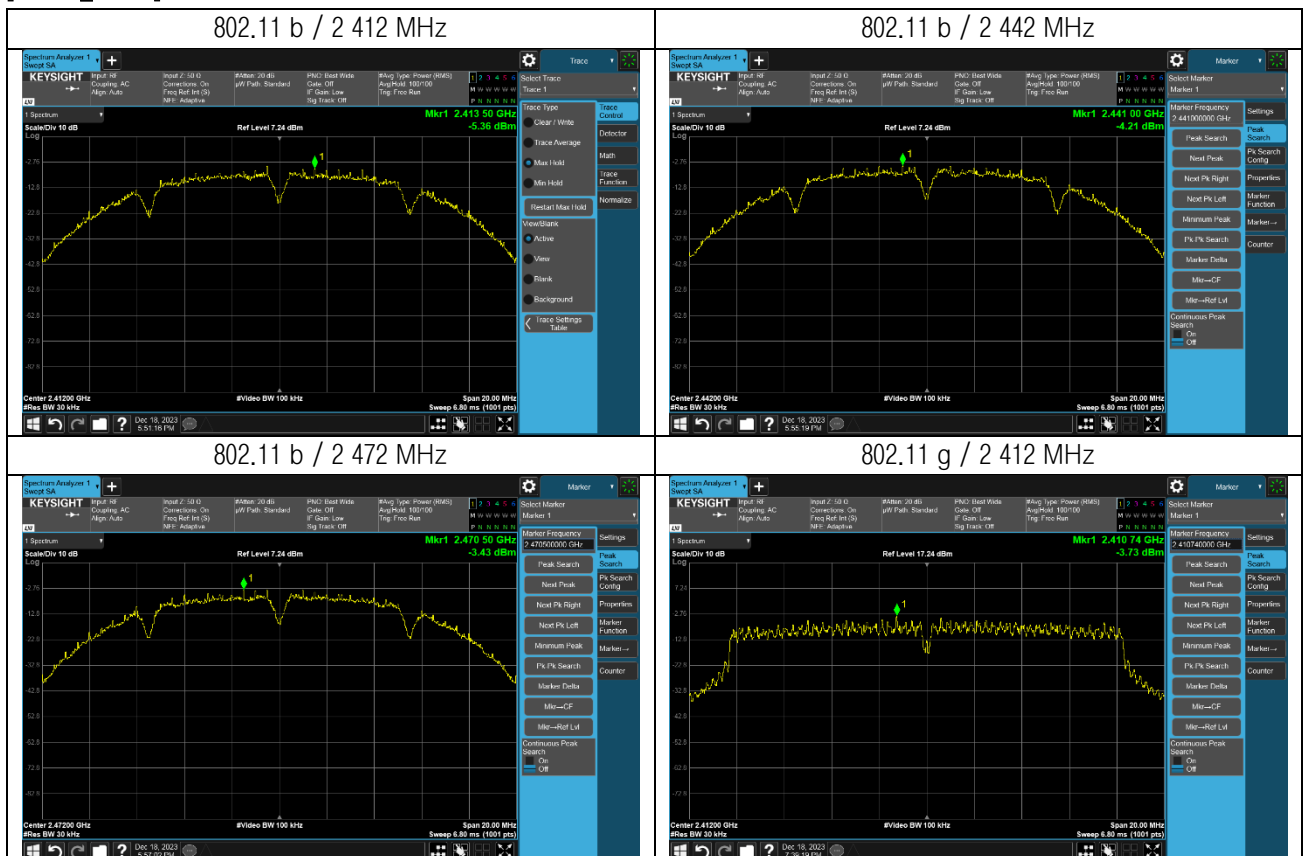
Test Result

Test Mode	Frequency (MHz)	Reading (dBm/3 kHz)		PSD Result (dBm/3 kHz)	Limit (dBm/3 kHz)
		ANT1	ANT2		
802.11 b	2 412	-5.36	-12.70	-4.62	8
	2 442	-4.21	-12.24	-3.58	
	2 472	-3.43	-14.50	-3.10	
802.11 g	2 412	-3.73	-11.85	-3.11	
	2 442	-2.52	-11.15	-1.96	
	2 472	-2.94	-12.99	-2.53	
802.11 n HT20	2 412	-4.05	-12.53	-3.47	
	2 442	-3.25	-11.65	-2.66	
	2 472	-2.66	-13.15	-2.29	
802.11 n HT40	2 422	-7.65	-15.96	-7.05	
	2 442	-7.29	-15.93	-6.73	
	2 462	-6.89	-16.68	-6.46	

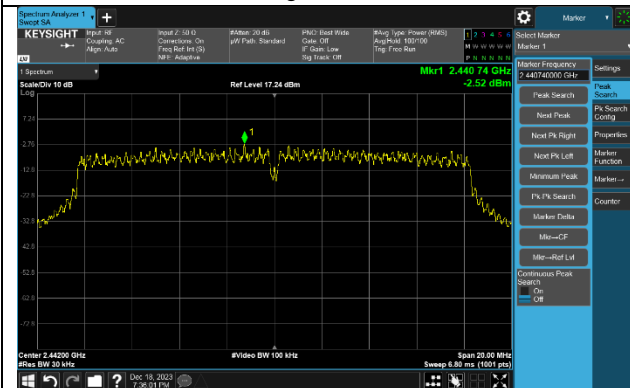
Note :

1. PSD Result(dBm/3 kHz) = $10\log(10^{(ANT1/10)} + 10^{(ANT2/10)})$ (dBm)

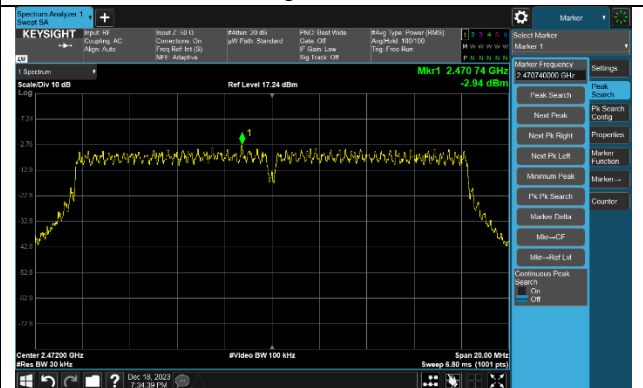
[MIMO_ANT1]



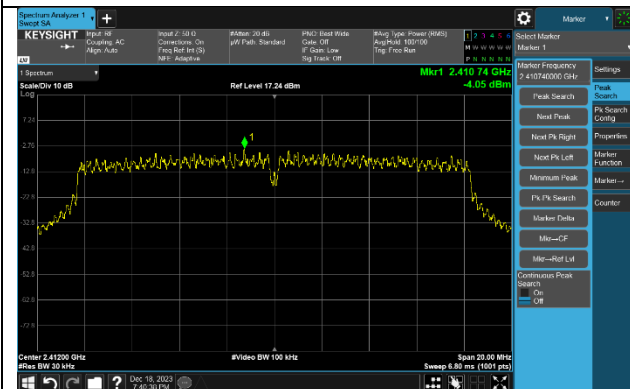
802.11 g / 2 442 MHz



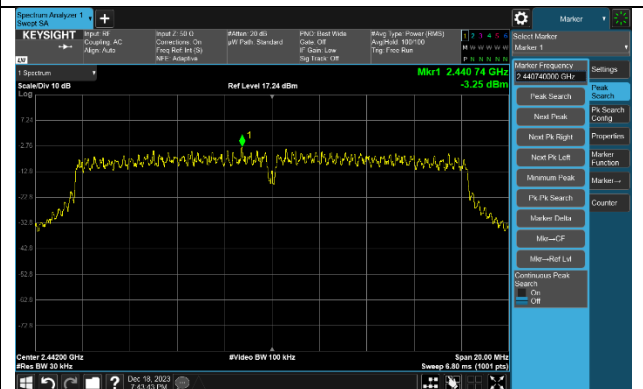
802.11 g / 2 472 MHz



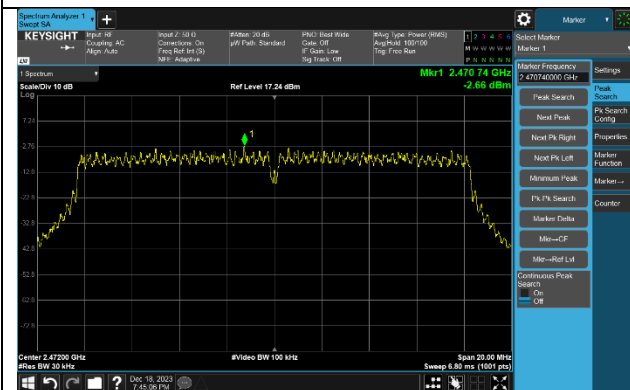
802.11 n HT20 / 2 412 MHz



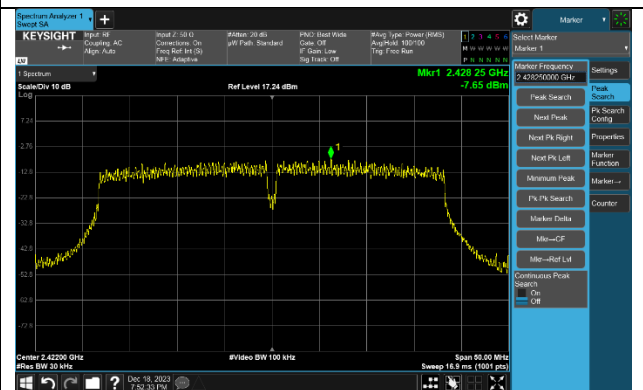
802.11 n HT20 / 2 442 MHz



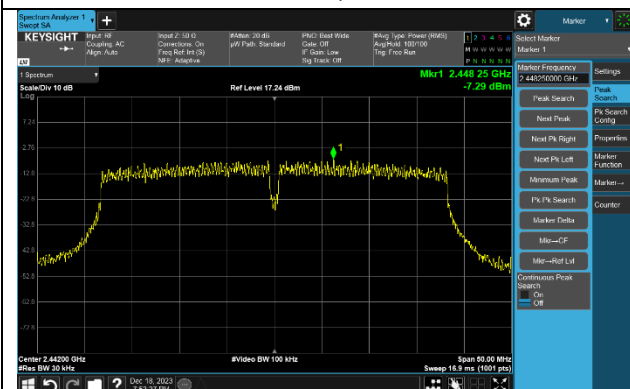
802.11 n HT20 / 2 472 MHz



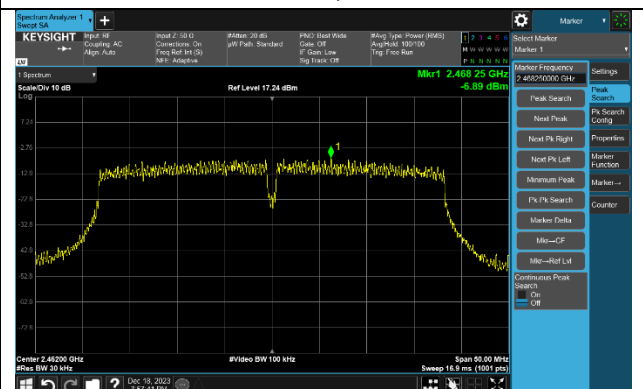
802.11 n HT40 / 2 422 MHz



802.11 n HT40 / 2 442 MHz

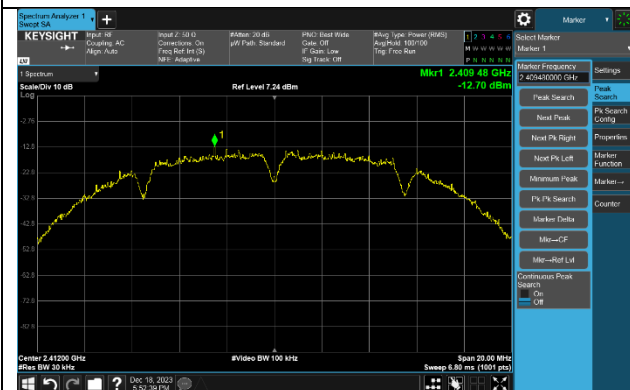


802.11 n HT40 / 2 462 MHz

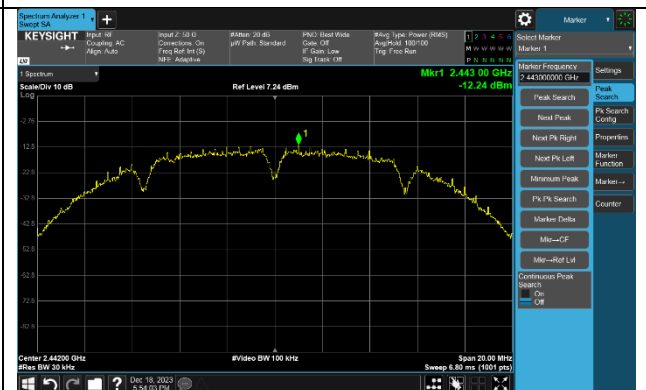


[MIMO_ANT2]

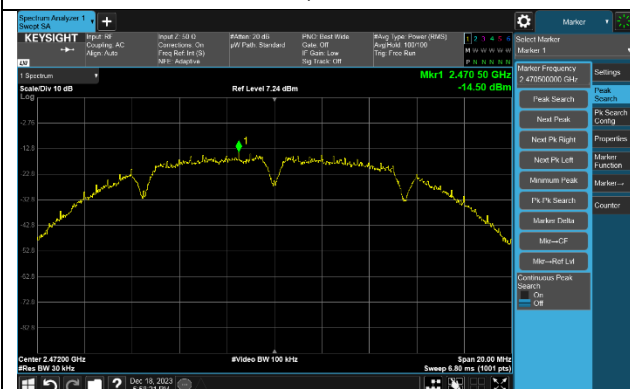
802.11 b / 2 412 MHz



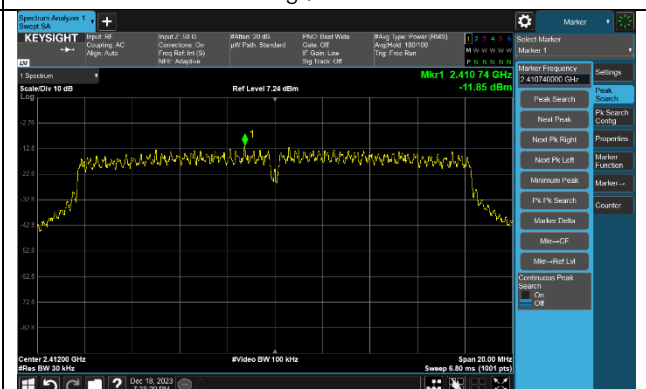
802.11 b / 2 442 MHz



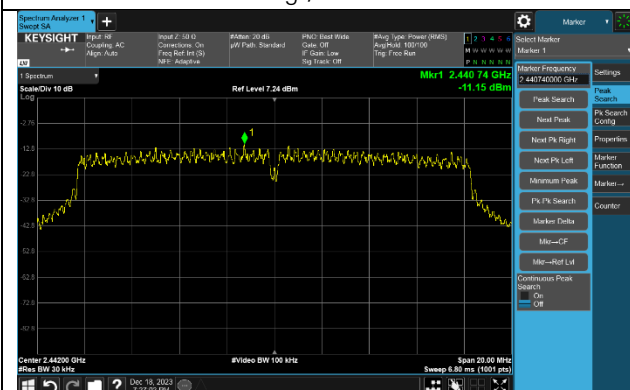
802.11 b / 2 472 MHz



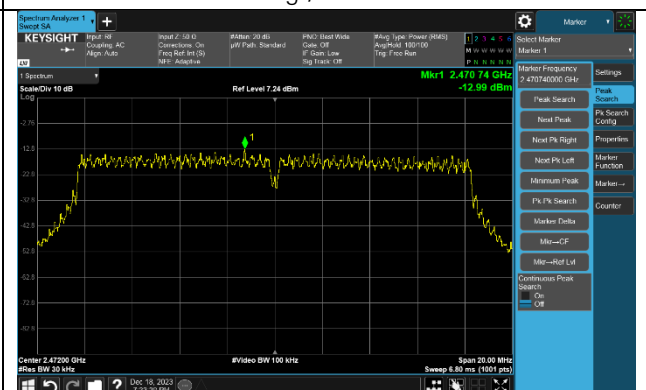
802.11 g / 2 412 MHz



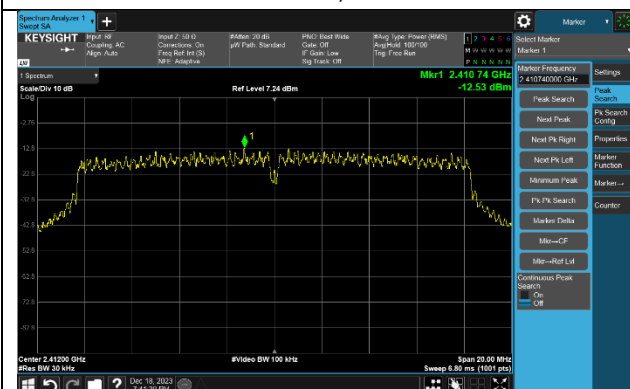
802.11 g / 2 442 MHz



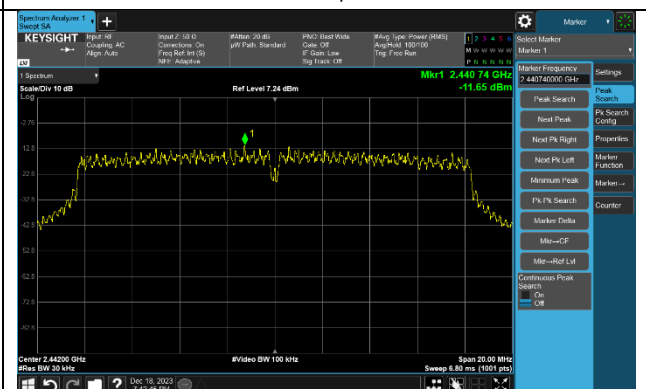
802.11 g / 2 472 MHz

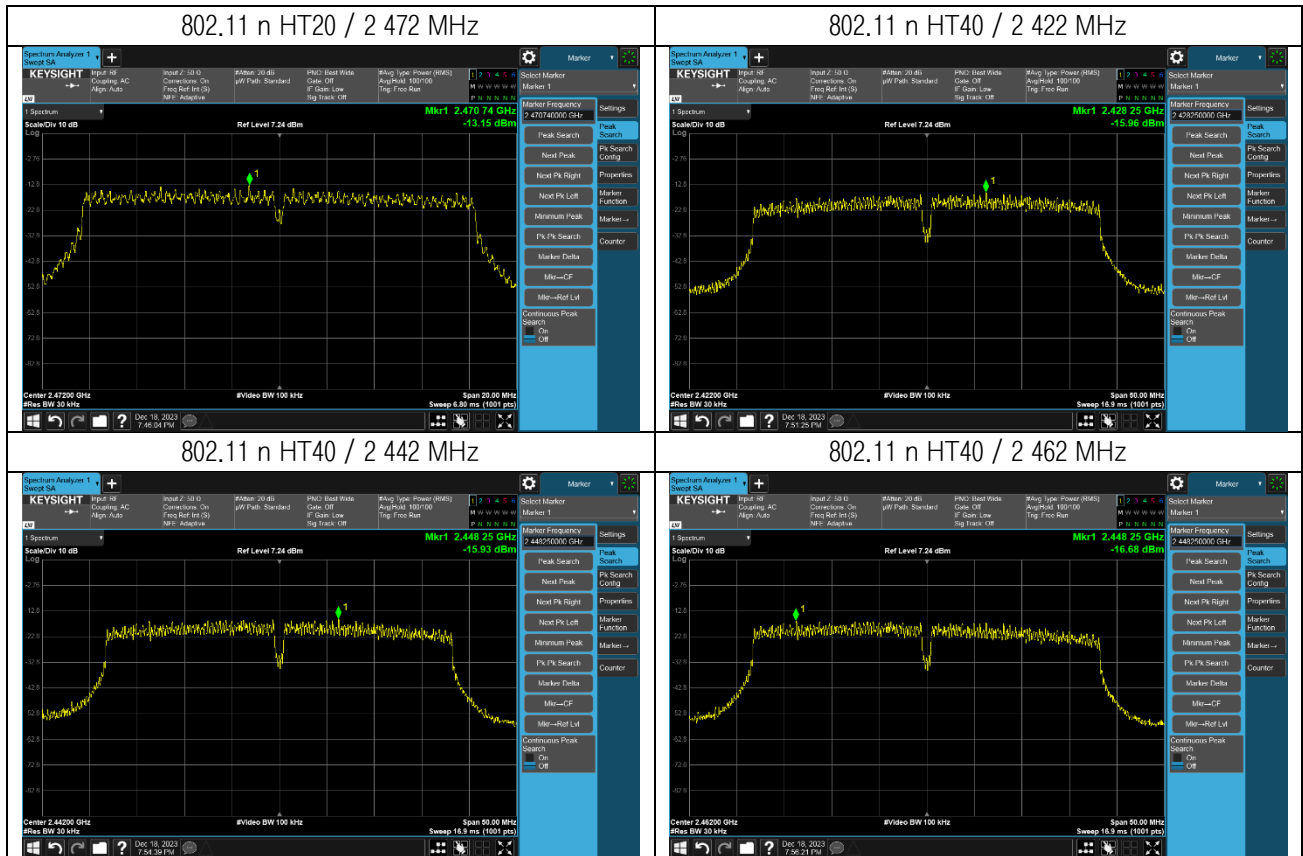


802.11 n HT20 / 2 412 MHz



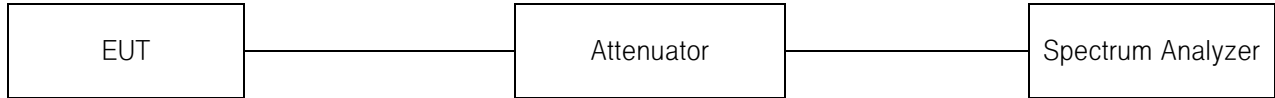
802.11 n HT20 / 2 442 MHz





6.3. 6 dB Bandwidth

▣ Test Setup



▣ Limit

According to § 15.247(a)(2), systems using digital modulation techniques may operate in the 902–928 MHz, 2 400–2 483.5 MHz, and 5 725–5 850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

▣ Test procedure

ANSI C63.10 2013 Section 11.8 DTS bandwidth

11.8.1 Option 1

The steps for the first option are as follows:

- a) Set RBW = 100 kHz.
- b) Set the VBW $\geq [3 \times \text{RBW}]$.
- c) Detector = peak.
- d) Trace mode = max hold.
- e) Sweep = auto couple.
- f) Allow the trace to stabilize.
- g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

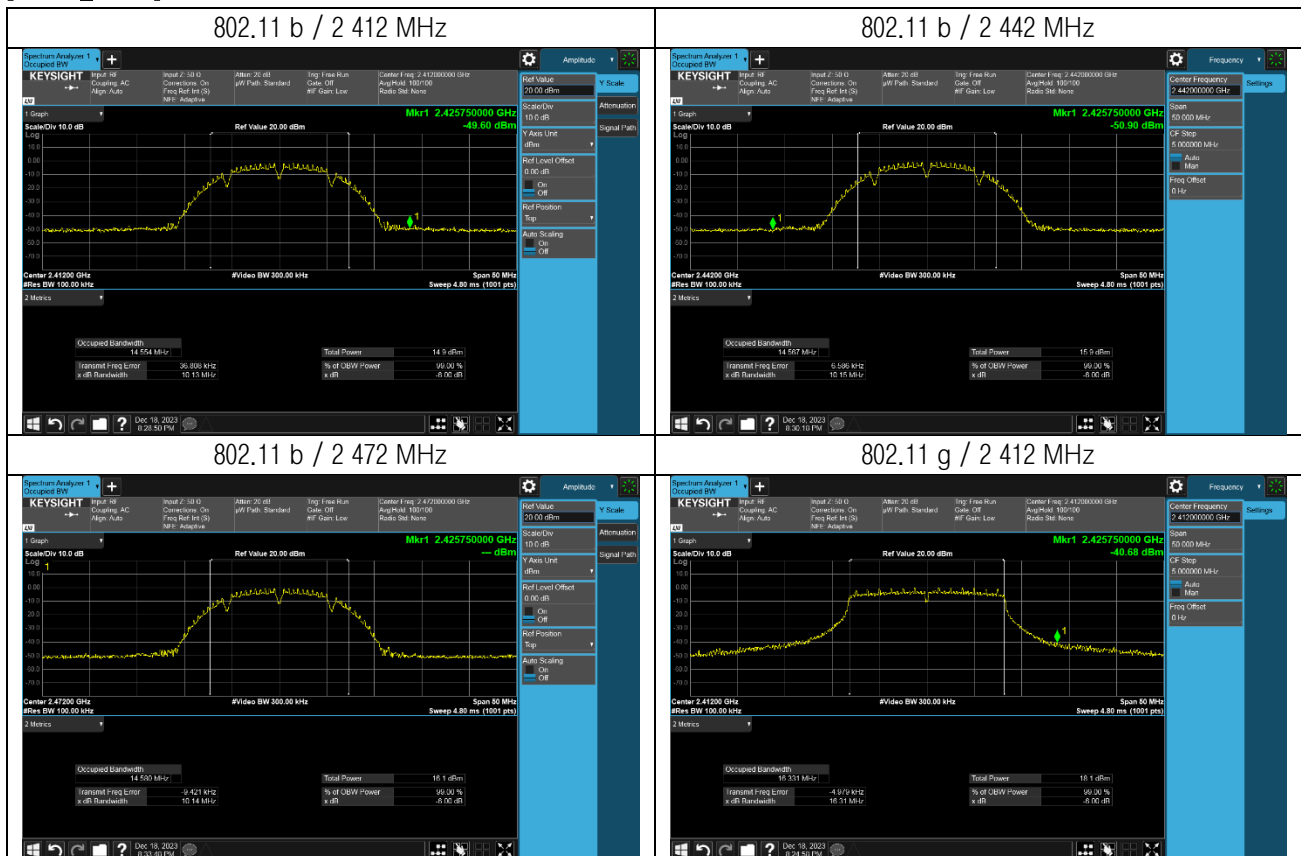
11.8.2 Option 2

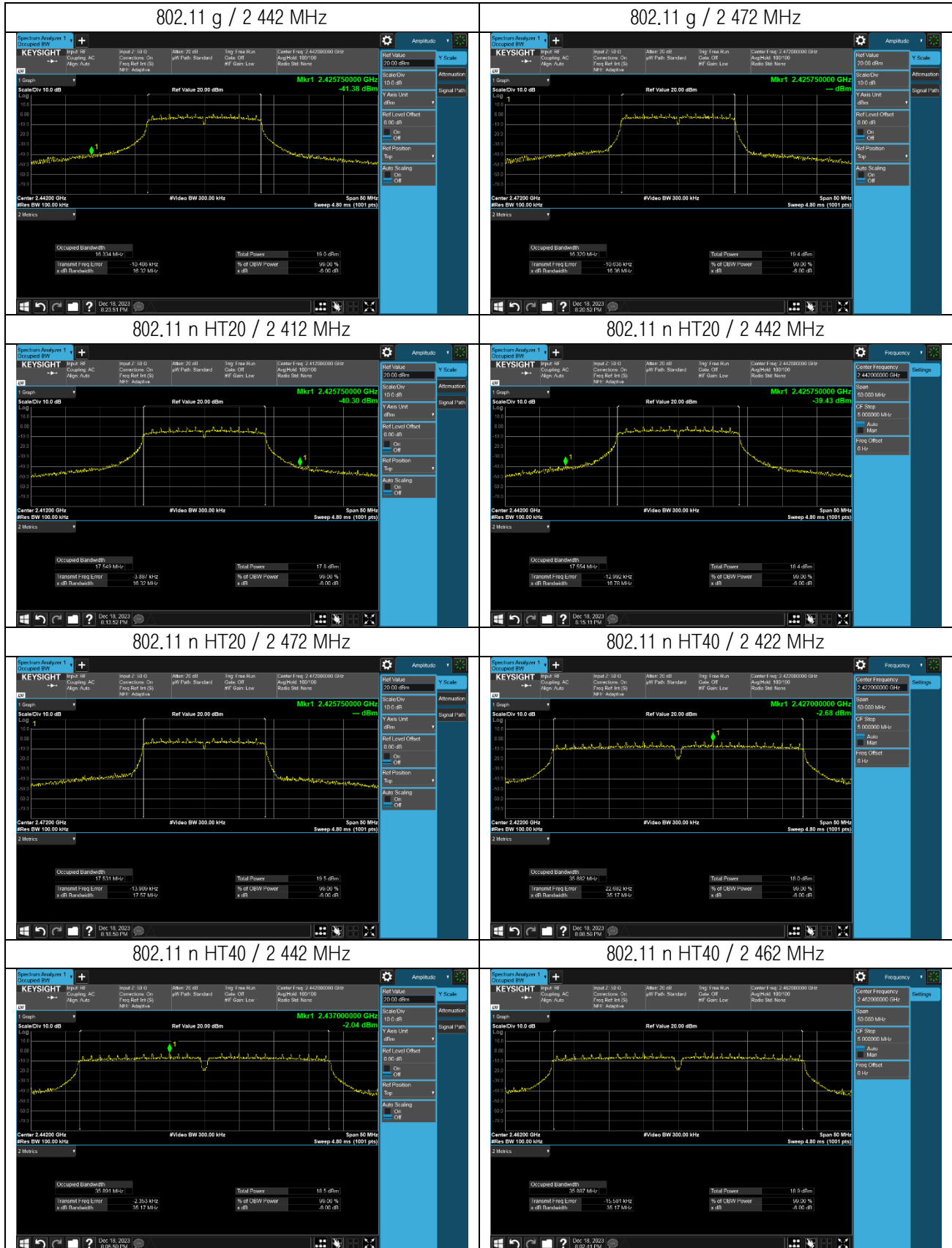
The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described in 11.8.1 (i.e., RBW = 100 kHz, VBW $\geq 3 \times \text{RBW}$, and peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be ≥ 6 dB

Test Result

Test Mode	Frequency(MHz)	6 dB Bandwidth Result(MHz)		Limit (MHz)
		ANT1	ANT2	
802.11 b	2 412	10.13	10.15	≥ 0.5
	2 442	10.15	10.13	
	2 472	10.14	10.14	
802.11 g	2 412	16.31	15.92	
	2 442	16.32	16.31	
	2 472	16.36	16.30	
802.11 n HT20	2 412	16.32	16.66	
	2 442	16.78	16.43	
	2 472	17.57	17.17	
802.11 n HT40	2 422	35.17	35.16	
	2 442	35.17	35.16	
	2 462	35.17	35.16	

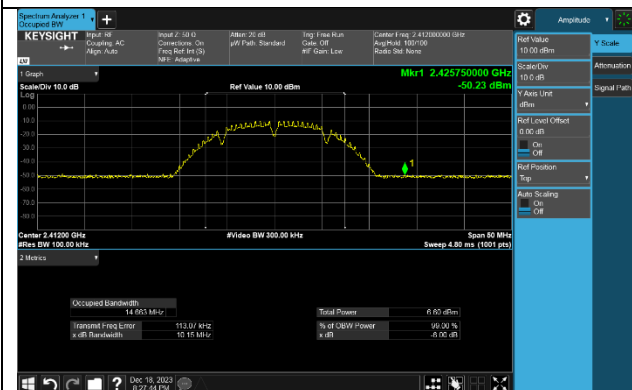
[MIMO_ANT1]



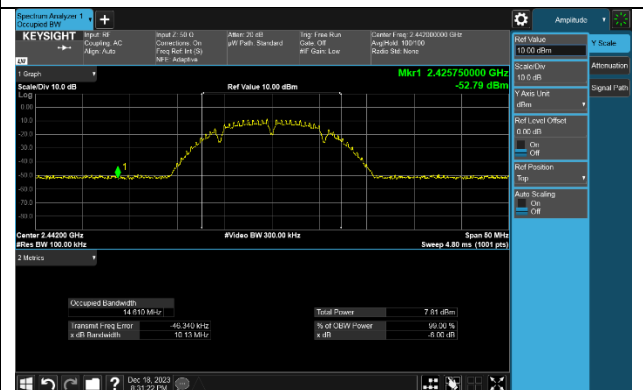


[MIMO_ANT2]

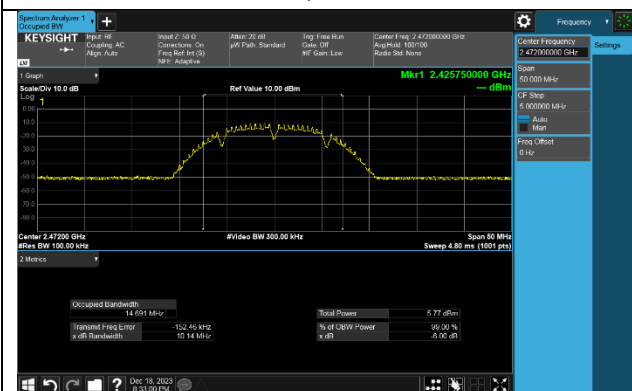
802.11 b / 2 412 MHz



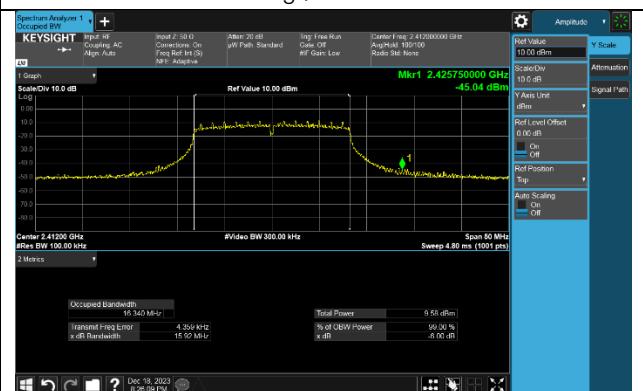
802.11 b / 2 442 MHz



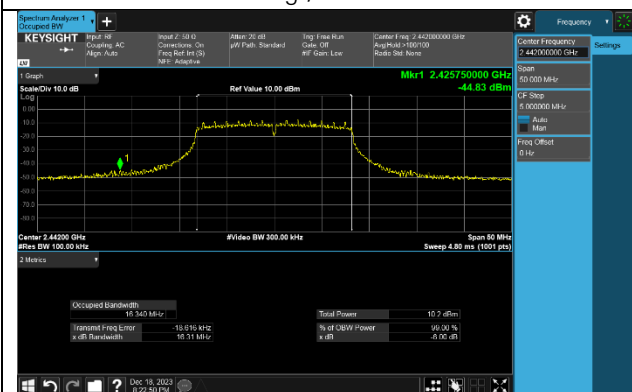
802.11 b / 2 472 MHz



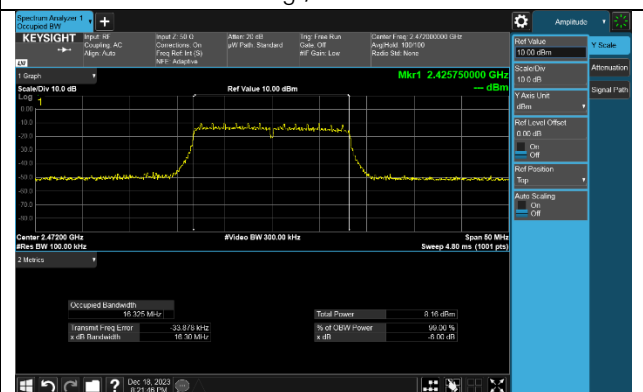
802.11 g / 2 412 MHz



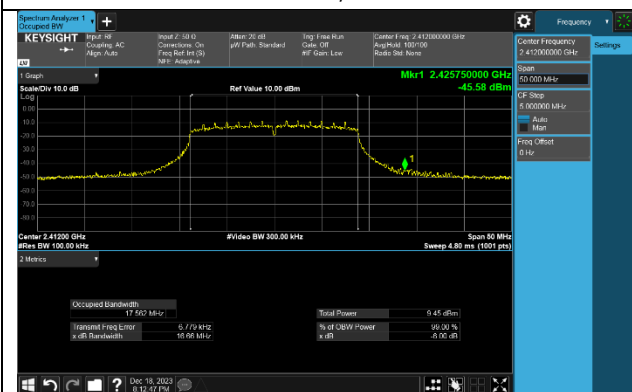
802.11 g / 2 442 MHz



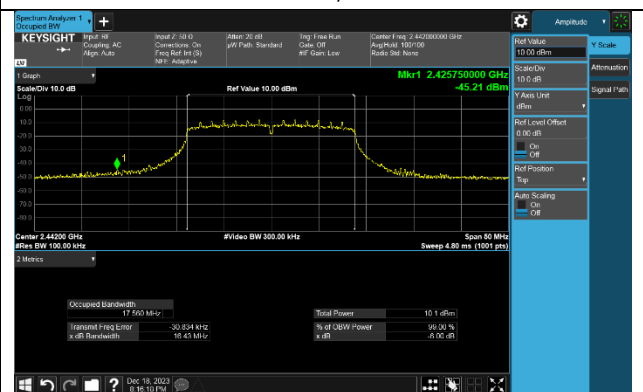
802.11 g / 2 472 MHz

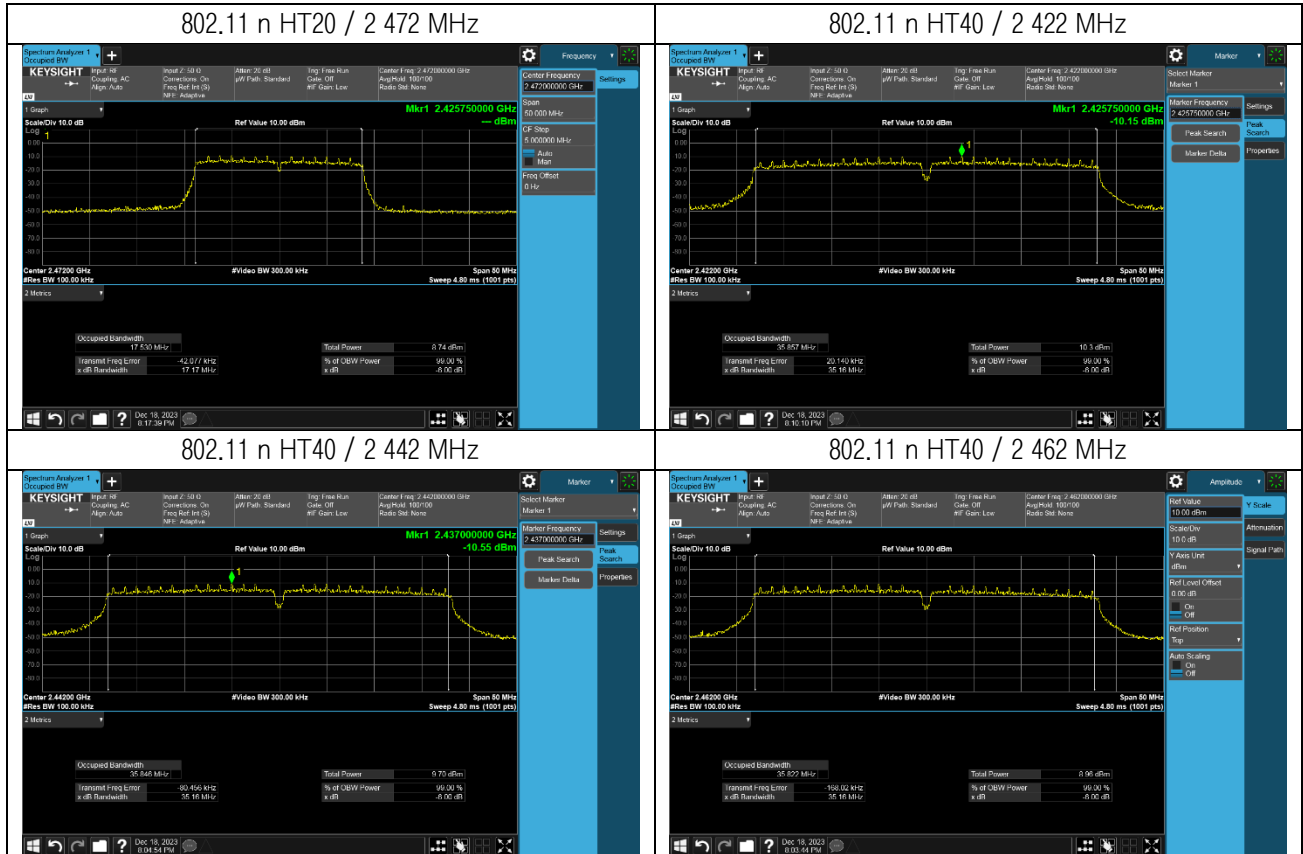


802.11 n HT20 / 2 412 MHz



802.11 n HT20 / 2 442 MHz

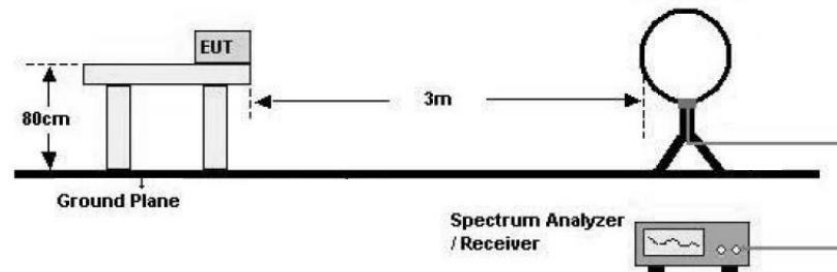




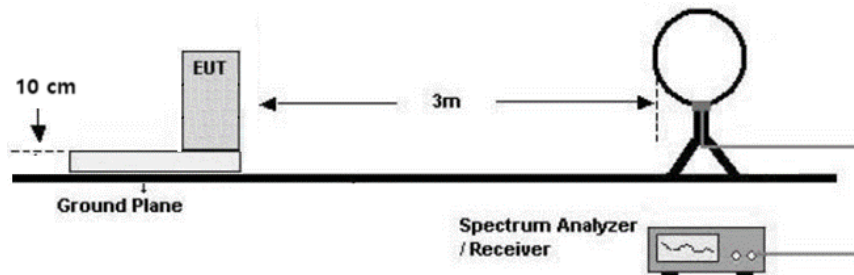
6.4. Radiated Spurious Emission, Band Edge and Restricted Bands

■ Test Setup

The diagram below shows the test setup that is utilized to make the measurement for emission from 9 kHz to 30 MHz Emissions.

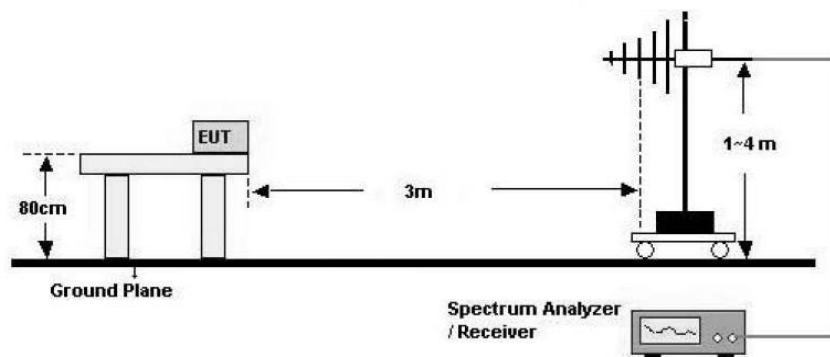


[Table Top Equipment]

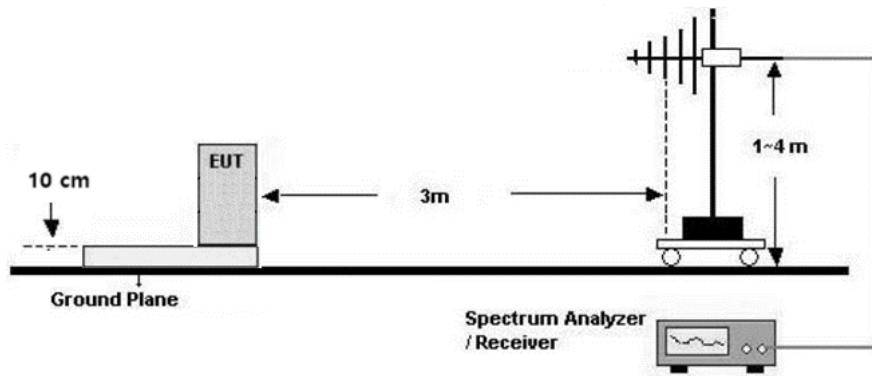


[Floor Standing Equipment]

The diagram below shows the test setup that is utilized to make the measurement for emission from 30 MHz to 1 GHz Emissions.

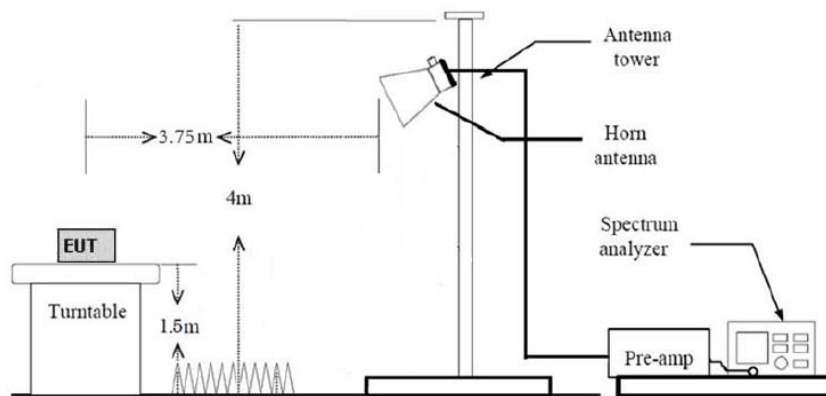


[Table Top Equipment]

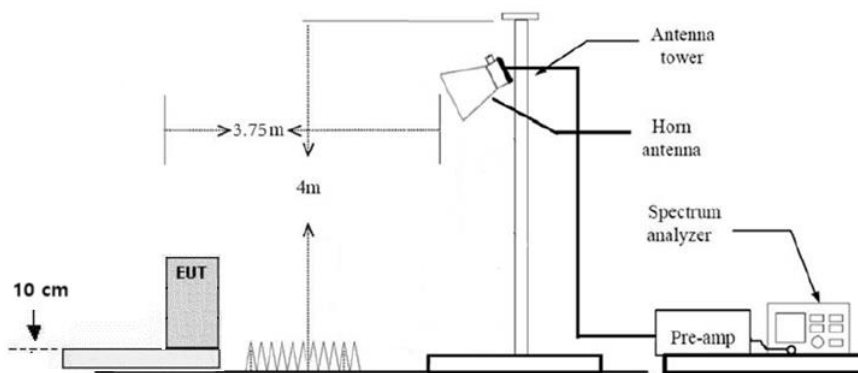


[Floor Standing Equipment]

The diagram below shows the test setup that is utilized to make the measurement for emission from 1 GHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz Emissions, whichever is lower



[Table Top Equipment]



[Floor Standing Equipment]

Limit

According to § 15.209(a), Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Radiated ($\mu\text{V/m}$)	Distance (m)
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
Above 960	500	3

**Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54 MHz – 72 MHz, 76 MHz – 88 MHz, 174 MHz – 216 MHz or 470 MHz – 806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections § 15.231 and § 15.241.

According to § 15.205(a), Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 – 0.110	16.42 – 16.423	399.9 – 410	4.5 – 5.15
0.495 – 0.505	16.694 75 – 16.695 25	608 – 614	5.35 – 5.46
2.1735 – 2.190 5	16.804 25 – 16.804 75	960 – 1 240	7.25 – 7.75
4.125 – 4.128	25.5 – 25.67	1300 – 1 427	8.025 – 8.5
4.177 25 – 4.177 75	37.5 – 38.25	1 435 – 1 626.5	9.0 – 9.2
4.207 25 – 4.207 75	73 – 74.6	1 645.5 – 1 646.5	9.3 – 9.5
6.215 – 6.218	74.8 – 75.2	1 660 – 1 710	10.6 – 12.7
6.267 75 – 6.268 25	108 – 121.94	1 718.8 – 1 722.2	13.25 – 13.4
6.311 75 – 6.312 25	123 – 138	2 200 – 2 300	14.47 – 14.5
8.291 – 8.294	149.9 – 150.05	2 310 – 2 390	15.35 – 16.2
8.362 – 8.366	156.524 75 – 156.525 25	2 483.5 – 2 500	17.7 – 21.4
8.376 25 – 8.386 75	156.7 – 156.9	2 690 – 2 900	22.01 – 23.12
8.414 25 – 8.414 75	162.012 5 – 167.17	3 260 – 3 267	23.6 – 24.0
12.29 – 12.293	167.72 – 173.2	3 332 – 3 339	31.2 – 31.8
12.519 75 – 12.520 25	240 – 285	3 345.8 – 3 358	36.43 – 36.5
12.576 75 – 12.577 25	322 – 335.4	3 600 – 4 400	Above 38.6
13.36 – 13.41			

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in § 15.209. At frequencies equal to or less than 1 000 MHz, compliance with the limits in § 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1 000 MHz, compliance with the emission limits in § 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in § 15.35 apply to these measurements.

■ Test procedure

ANSI C63.10 2013

■ Test procedure for radiated emission below 30 MHz

1. The EUT is placed on a non-conductive table 0.8 m (Table Top Equipment) or 0.1 m (Floor Standing Equipment) above the ground at a 3 m semi-anechoic chamber.
The table rotated 360 degrees to determine the position of the highest emission level.
2. The loop Antenna was placed at a location 3 m from the EUT and fixed at 1 m above the ground to determine the maximum value of the field strength.
3. The measurement performed X, Y, Z planes in EUT and horizontal, vertical polarization in the antenna.
4. The spectrum analyser or receiver was set to Peak or Quasi-peak function and specified bandwidth maximum hold mode.

■ Test procedure for radiated emission Above 30 MHz

1. The EUT is placed on a non-conductive table 0.8 m (Table Top Equipment) or 0.1 m (Floor Standing Equipment) above the ground at a 3 m semi-anechoic chamber for below 1 GHz and table 1.5 m above the ground at a 3 m semi-anechoic chamber for 1 GHz.
The table rotated 360 degrees to determine the position of the highest emission level.
2. During performing radiated emission below 1 GHz, the EUT was set 3 m distance from the interference receiving antenna, which was mounted on the top of variable-height antenna tower.
For radiated emission above 1 GHz, the EUT was set 3.75 m distance from the interference receiving Antenna
3. The tower height is varied from 1 m to 4 m above the ground to determine the maximum value of the field strength.
4. The Bi-log antenna is used for measuring emission below 1 GHz. The Horn antenna is used for measuring emission above 1 GHz
5. The measurement performed X, Y, Z axes in EUT and horizontal, vertical polarization in the antenna.
6. The spectrum analyser or receiver was set to Peak or Quasi-peak function and specified bandwidth maximum hold mode for below 1 GHz.
7. The spectrum analyser or receiver was set to Peak and Average function and specified bandwidth maximum hold mode for above 1 GHz.

■ Emissions in Non-Restricted Frequency Bands

ANSI C63.10 2013 Section 11.11.2 & Section 11.11.2

– Reference Level Measurement

- a) Set instrument center frequency to DTS channel center frequency.
 - b) Set the span to ≥ 1.5 times the DTS bandwidth.
 - c) Set the RBW = 100 kHz.
 - d) Set the VBW $\geq [3 \times \text{RBW}]$.
 - e) Detector = peak.
 - f) Sweep time = auto couple.
 - g) Trace mode = max hold.
 - h) Allow trace to fully stabilize.
 - i) Use the peak marker function to determine the maximum PSD level.
- Note that the channel found to contain the maximum PSD level can be used to establish the reference level.

– Level Measurement

- a) Set the center frequency and span to encompass frequency range to be measured.
- b) Set the RBW = 100 kHz
- c) Set the VBW $\geq [3 \times \text{RBW}]$.
- d) Detector = peak.
- e) Sweep time = auto couple.
- f) Trace mode = max hold.
- g) Allow trace to fully stabilize.
- h) Use the peak marker function to determine the maximum amplitude level.

■ Emissions in Restricted Frequency Bands

ANSI C63.10 2013 Section 11.12.2.4 & Section 11.12.2.5

– Peak Emission Measurement

- a) RBW = as specified in below table
- b) VBW $\geq [3 \times \text{RBW}]$.
- c) Detector = peak.
- d) Sweep time = auto.
- e) Trace mode = max hold.

Frequency	RBW
9 kHz to 150 kHz	200 Hz to 300 Hz
0.15 kHz to 30 MHz	9 kHz to 10 kHz
30 MHz to 1 000 MHz	100 kHz to 120 kHz
> 1 000 MHz	1 MHz

Table. RBW as a function of frequency

If the peak-detected amplitude can be shown to comply with the average limit, then it is not necessary to perform a separate average measurement.

– Average Emission Measurement

1. Trace averaging with continuous EUT transmission at full power

If the EUT can be configured or modified to transmit continuously ($D \geq 98\%$), then the average emission levels shall be measured using the following method (with EUT transmitting continuously):

- a) RBW = 1 MHz (unless otherwise specified).
- b) VBW $\geq [3 \times \text{RBW}]$.
- c) Detector = RMS (power averaging), if $[\text{span} / (\# \text{ of points in sweep})] \leq (\text{RBW} / 2)$. Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If this condition cannot be satisfied, then the detector mode shall be set to peak.
- d) Averaging type = power (i.e., rms):
 - 1) As an alternative, the detector and averaging type may be set for linear voltage averaging.
 - 2) Some instruments require linear display mode to use linear voltage averaging. Log or dB averaging shall not be used.
- e) Sweep time = auto.
- f) Perform a trace average of at least 100 traces.

2. Trace averaging across ON and OFF times of the EUT transmissions followed by duty cycle correction

If continuous transmission of the EUT ($D \geq 98\%$) cannot be achieved and the duty cycle is constant (duty cycle variations are less than $\pm 2\%$), then the following procedure shall be used:

- a) The EUT shall be configured to operate at the maximum achievable duty cycle.
- b) Measure the duty cycle D of the transmitter output signal as described in 11.6.
- c) RBW = 1 MHz (unless otherwise specified).
- d) VBW $\geq [3 \times \text{RBW}]$.
- e) Detector = RMS (power averaging), if span / (# of points in sweep) $\leq (\text{RBW} / 2)$. Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If this condition cannot be satisfied, then the detector mode shall be set to peak.
- f) Averaging type = power (i.e., rms):
 - 1) As an alternative, the detector and averaging type may be set for linear voltage averaging.
 - 2) Some instruments require linear display mode to use linear voltage averaging. Log or dB averaging shall not be used.
- g) Sweep time = auto.
- h) Perform a trace average of at least 100 traces.
- i) A correction factor shall be added to the measurement results prior to comparing with the emission limit to compute the emission level that would have been measured had the test been performed at 100% duty cycle. The correction factor is computed as follows:
 - 1) If power averaging (rms) mode was used in step f), then the applicable correction factor is $[10 \log (1 / D)]$, where D is the duty cycle.
 - 2) If linear voltage averaging mode was used in step f), then the applicable correction factor is $[20 \log (1 / D)]$, where D is the duty cycle.
 - 3) If a specific emission is demonstrated to be continuous ($D \geq 98\%$) rather than turning ON and OFF

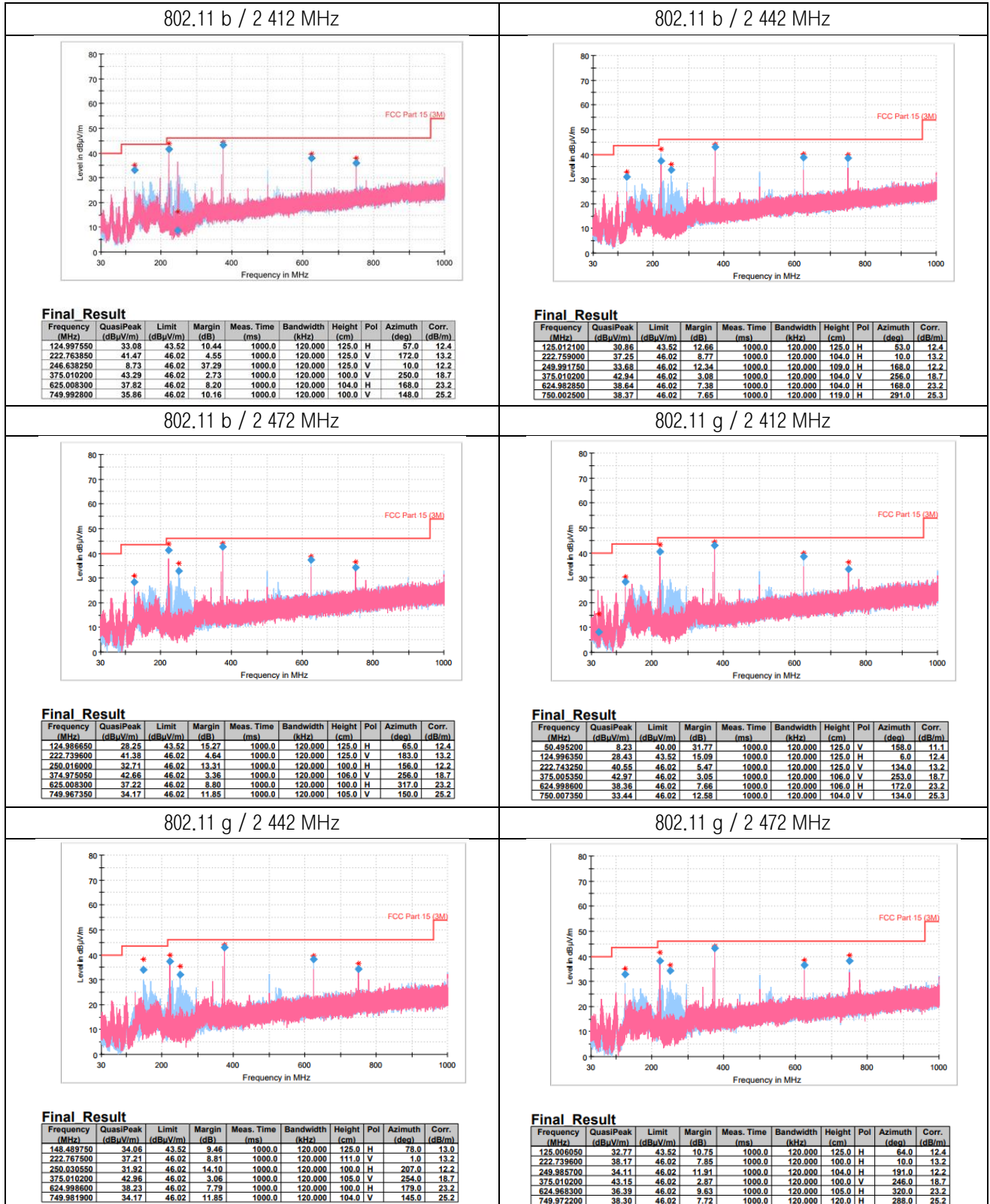
Note :

1. According to § 15.31(o), emissions level are not reported much lower than the limit by over 20 dB
2. Frequency < 30 MHz, extrapolation factor of 40 dB/decade of distance $F_d = 40 \log(D_m/D_s)$
 - * $0.009 \text{ MHz} - 0.490 \text{ MHz} : 40 \log(3 \text{ m}/300 \text{ m}) = -80 \text{ dB}$, $0.490 \text{ MHz} - 30 \text{ MHz} : 40 \log(3 \text{ m}/30 \text{ m}) = -40 \text{ dB}$
3. Frequency > 30 MHz, extrapolation factor of 20 dB/decade of distance $F_d = 20 \log(D_m/D_s)$
 - * Above 1 GHz : $20 \log(3.75 \text{ m}/3 \text{ m}) = 1.94 \text{ dB}$
 - * $F_d = \text{Distance Factor}$, $D_m = \text{Measurement Distance(m)}$, $D_s = \text{Specification Distance(m)}$
4. The worst case axis : X-Axis
5. $\text{Corr. (dB)} = \text{Antenna Factor (dB/m)} + \text{Cable Loss (dB)}$
6. $\text{Quasi Peak (dB}\mu\text{V/m)} = \text{Corr. (dB)} + \text{Reading (dB}\mu\text{V)}$
7. $\text{Margin (dB)} = \text{Limit (dB}\mu\text{V/m)} - \text{Quasi Peak (dB}\mu\text{V/m)}$
8. “*” means the restricted band.
9. If the peak-detected amplitude can be shown to comply with the average limit, then it is not necessary to perform a separate average measurement.
10. Detect : Detector, Pol : Polarization, AF : Antenna Factor, CL : Cable Loss, Amp : Preamp Gain
DF : Duty Cycle Factor
11. $\text{Final Result (dB}\mu\text{V/m)} = \text{Reading (dB}\mu\text{V)} + \text{AF (dB/m)} + \text{CL (dB)} - \text{Amp (dB)} + F_d \text{ (dB)} + \text{DF (dB)}$
12. Test plot data does not contain F_d and DF.
Test plot data = $\text{Reading (dB}\mu\text{V)} + \text{AF (dB/m)} + \text{CL (dB)} - \text{Amp (dB)}$

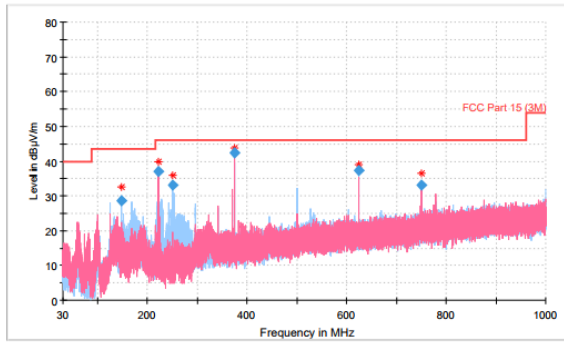
Test Result (Below 30 MHz)

- 9 kHz ~ 30 MHz : No spurious emissions were detected within 20 dB of the limit

Test Result (Below 1 GHz)



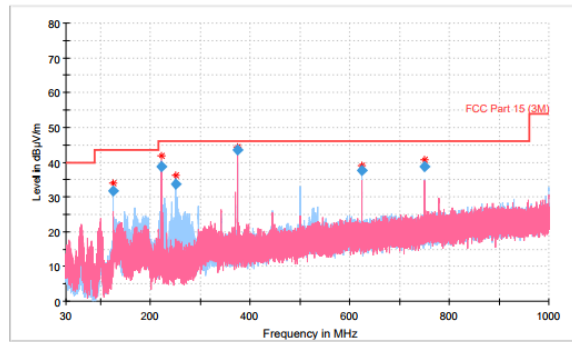
802.11 n HT20 / 2 412 MHz



Final Result

Frequency (MHz)	QuasiPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
148.489750	28.57	43.52	14.95	1000.0	120.000	125.0	H	26.0	13.0
222.738400	37.12	46.02	8.90	1000.0	120.000	125.0	V	3.0	13.2
249.987600	33.10	46.02	12.92	1000.0	120.000	100.0	H	155.0	12.2
375.010200	42.43	46.02	3.59	1000.0	120.000	104.0	V	265.0	18.7
625.003450	37.39	46.02	8.63	1000.0	120.000	100.0	H	317.0	23.2
750.007350	33.12	46.02	12.90	1000.0	120.000	106.0	V	130.0	25.3

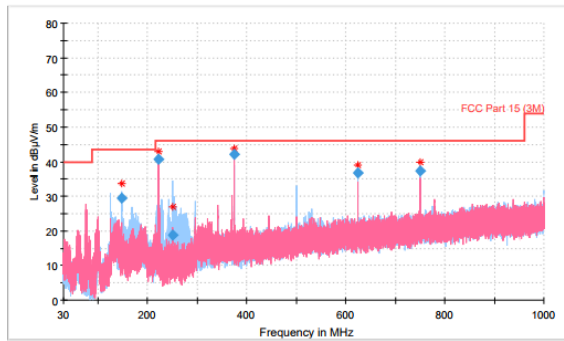
802.11 n HT20 / 2 442 MHz



Final Result

Frequency (MHz)	QuasiPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
125.012100	31.65	43.52	11.87	1000.0	120.000	125.0	H	67.0	12.4
222.738400	38.76	46.02	7.26	1000.0	120.000	100.0	H	119.0	13.2
249.987600	33.73	46.02	12.29	1000.0	120.000	105.0	H	192.0	12.2
375.010200	43.48	46.02	2.54	1000.0	120.000	100.0	V	283.0	18.7
624.983000	37.63	46.02	8.39	1000.0	120.000	100.0	H	158.0	23.2
749.986750	38.87	46.02	7.15	1000.0	120.000	120.0	H	288.0	25.2

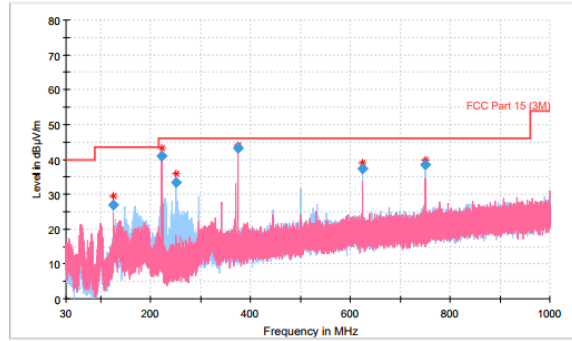
802.11 n HT20 / 2 472 MHz



Final Result

Frequency (MHz)	QuasiPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
148.520950	29.56	43.52	13.96	1000.0	120.000	125.0	H	79.0	13.0
222.738400	40.73	46.02	5.29	1000.0	120.000	125.0	V	177.0	13.2
251.456900	18.89	46.02	27.13	1000.0	120.000	122.0	H	186.0	12.3
375.010200	42.16	46.02	3.86	1000.0	120.000	105.0	V	265.0	18.7
624.978000	36.66	46.02	9.36	1000.0	120.000	106.0	H	320.0	23.2
750.002500	37.21	46.02	8.81	1000.0	120.000	125.0	H	289.0	25.3

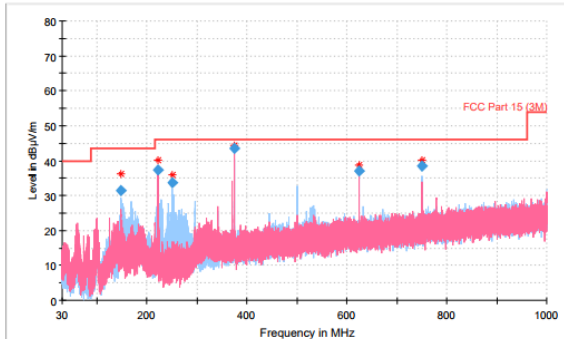
802.11 n HT40 / 2 422 MHz



Final Result

Frequency (MHz)	QuasiPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
124.998350	26.99	43.52	16.54	1000.0	120.000	125.0	H	121.0	12.4
222.738400	40.97	46.02	5.06	1000.0	120.000	125.0	V	156.0	13.2
249.986600	33.27	46.02	12.75	1000.0	120.000	105.0	H	213.0	12.2
374.975050	43.31	46.02	2.71	1000.0	120.000	100.0	V	249.0	18.7
624.973150	37.25	46.02	8.77	1000.0	120.000	100.0	H	286.0	23.2
750.002500	38.39	46.02	7.63	1000.0	120.000	112.0	H	289.0	25.3

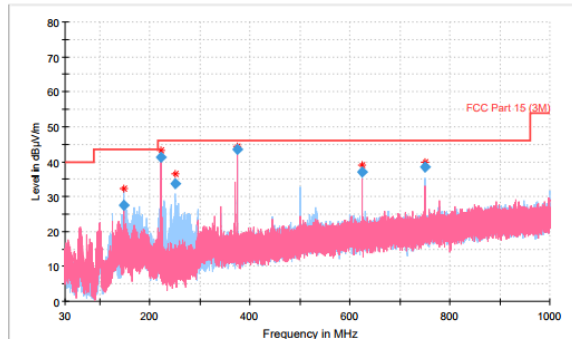
802.11 n HT40 / 2 442 MHz



Final Result

Frequency (MHz)	QuasiPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
148.516200	31.55	43.52	11.97	1000.0	120.000	125.0	H	64.0	13.0
222.739600	37.40	46.02	8.62	1000.0	120.000	105.0	V	1.0	13.2
250.016000	33.78	46.02	12.24	1000.0	120.000	100.0	H	191.0	12.2
375.010200	43.37	46.02	2.65	1000.0	120.000	100.0	V	253.0	18.7
624.973150	36.94	46.02	9.08	1000.0	120.000	105.0	H	285.0	23.2
749.997650	38.49	46.02	7.53	1000.0	120.000	120.0	H	289.0	25.2

802.11 n HT40 / 2 462 MHz



Final Result

Frequency (MHz)	QuasiPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
148.515200	27.44	43.52	16.08	1000.0	120.000	120.0	H	10.0	13.0
222.759000	41.12	46.02	4.90	1000.0	120.000	125.0	H	193.0	13.2
249.985700	33.78	46.02	12.24	1000.0	120.000	100.0	H	159.0	12.2
375.010200	43.43	46.02	2.59	1000.0	120.000	100.0	V	254.0	18.7
624.973150	36.98	46.02	9.04	1000.0	120.000	104.0	H	322.0	23.2
749.997650	38.36	46.02	7.66	1000.0	120.000	111.0	H	289.0	25.2

■ Test Result (Above 1 GHz)

[802.11 b / 2 412 MHz]

Radiated emissions			Ant.	Correction factors					Total	Limit	
Frequency	Reading	Detect	Pol.	AF	CL	Amp	F _d	DF	Final Result	Limit	Margin
MHz	dBμV	PK/AV	H/V	dB/m	dB	dB	dB	dB	dBμV/m	dBμV/m	dB
2 399.77	64.63	PK	H	32.50	2.63	45.30	1.94	–	56.40	74.00	17.60
2 399.77	36.67	AV	H	32.50	2.63	45.30		0.14	28.58	54.00	25.42
2 399.77	58.76	PK	V	32.50	2.63	45.30		–	50.53	74.00	23.47
*17 753.0	38.57	PK	V	42.20	8.53	38.90		–	52.34	74.00	21.66
*17 942.0	38.93	PK	H	42.00	8.75	38.90		–	52.72	74.00	21.28
25 624.50	42.44	PK	V	45.30	10.35	37.20		–	62.83	74.00	11.17
25 624.50	23.19	AV	V	45.30	10.35	37.20		0.14	43.72	54.00	10.28
25 905.00	42.67	PK	H	45.30	10.54	37.40		–	63.05	74.00	10.95
25 905.00	18.89	AV	H	45.30	10.54	37.40		0.14	39.41	54.00	14.59

[802.11 b / 2 442 MHz]

Radiated emissions			Ant.	Correction factors					Total	Limit	
Frequency	Reading	Detect	Pol.	AF	CL	Amp	F _d	DF	Final Result	Limit	Margin
MHz	dBμV	PK/AV	H/V	dB/m	dB	dB	dB	dB	dBμV/m	dBμV/m	dB
17 681.0	40.09	PK	V	42.20	8.58	38.90	1.94	–	53.91	74.00	20.09
*17 884.0	39.92	PK	H	42.00	8.58	39.10		–	53.34	74.00	20.66
25 658.50	43.18	PK	H	45.20	10.35	37.20		–	63.47	74.00	10.53
25 658.50	26.10	AV	H	45.20	10.35	37.20		0.14	46.53	54.00	7.47
26 466.00	43.96	PK	V	45.10	10.85	37.90		–	63.95	74.00	10.05
26 466.00	23.45	AV	V	45.10	10.85	37.90		0.14	43.58	54.00	10.42

[802.11 b / 2 472 MHz]

Radiated emissions			Ant.	Correction factors					Total	Limit	
Frequency	Reading	Detect	Pol.	AF	CL	Amp	F _d	DF	Final Result	Limit	Margin
MHz	dBμV	PK/AV	H/V	dB/m	dB	dB	dB	dB	dBμV/m	dBμV/m	dB
*2 483.53	63.44	PK	V	32.50	2.54	45.30	1.94	–	55.12	74.00	18.88
*2 483.56	68.59	PK	H	32.60	2.54	45.30		–	60.37	74.00	13.63
*2 483.56	42.51	AV	H	32.60	2.54	45.30		0.14	34.43	54.00	19.57
17 695.50	40.17	PK	H	42.20	8.58	39.10		–	53.79	74.00	20.21
*17 710.00	39.45	PK	V	42.20	8.58	39.10		–	53.07	74.00	20.93
25 658.50	42.48	PK	V	45.30	10.48	37.20		–	63.00	74.00	11.00
25 658.50	25.86	AV	V	45.30	10.48	37.20		0.14	46.52	54.00	7.48
25 879.50	43.32	PK	H	45.30	10.54	37.40		–	63.70	74.00	10.30
25 879.50	19.91	AV	H	45.30	10.54	37.40		0.14	40.43	54.00	13.57

[802.11 g / 2 412 MHz]

Radiated emissions			Ant.	Correction factors					Total	Limit	
Frequency	Reading	Detect	Pol.	AF	CL	Amp	F _d	DF	Final Result	Limit	Margin
MHz	dBμV	PK/AV	H/V	dB/m	dB	dB	dB	dB	dBμV/m	dBμV/m	dB
2 399.99	71.69	PK	H	32.50	2.63	44.90	1.94	–	63.86	74.00	10.14
2 399.99	55.76	AV	H	32.50	2.63	44.90		0.37	48.30	54.00	5.70
2 399.99	67.23	PK	V	32.50	2.63	44.90		–	59.40	74.00	14.60
2 399.99	51.24	AV	V	32.50	2.63	44.90		0.37	43.78	54.00	10.22
*17 710.00	38.76	PK	H	42.20	8.58	39.10		–	52.38	74.00	21.62
17 971.00	37.62	PK	V	42.30	8.73	39.10		–	51.49	74.00	22.51
25 412.00	43.14	PK	H	45.20	9.58	37.20		–	62.66	74.00	11.34
25 412.00	21.99	AV	H	45.20	9.58	37.20		0.37	41.88	54.00	12.12
25 667.00	42.47	PK	V	45.30	10.48	37.20		–	62.99	74.00	11.01
25 667.00	25.12	AV	V	45.30	10.48	37.20		0.37	46.01	54.00	7.99

[802.11 g / 2 442 MHz]

Radiated emissions			Ant.	Correction factors					Total	Limit	
Frequency	Reading	Detect	Pol.	AF	CL	Amp	F _d	DF	Final Result	Limit	Margin
MHz	dBμV	PK/AV	H/V	dB/m	dB	dB	dB	dB	dBμV/m	dBμV/m	dB
17 463.50	38.29	PK	H	41.90	8.42	38.90	1.94	–	51.65	74.00	22.35
*17 971.00	37.62	PK	V	42.30	8.73	39.10		–	51.49	74.00	22.51
24 868.00	42.65	PK	H	44.90	9.79	36.20		–	63.08	74.00	10.92
24 868.00	22.03	AV	H	44.90	9.79	36.20		0.37	42.83	54.00	11.17
25 174.00	42.49	PK	V	45.10	9.78	36.20		–	63.11	74.00	10.89
25 174.00	19.76	AV	V	45.10	9.78	36.20		0.37	40.75	54.00	13.25

[802.11 g / 2 472 MHz]

Radiated emissions			Ant.	Correction factors					Total	Limit	
Frequency	Reading	Detect	Pol.	AF	CL	Amp	F _d	DF	Final Result	Limit	Margin
MHz	dBμV	PK/AV	H/V	dB/m	dB	dB	dB	dB	dBμV/m	dBμV/m	dB
*2 483.53	66.94	PK	H	32.60	2.54	45.30	1.94	–	58.72	74.00	15.28
*2 483.53	52.55	AV	H	32.60	2.54	45.30		0.37	44.33	74.00	29.67
*2 483.56	62.57	PK	V	32.50	2.54	45.30		–	54.25	74.00	19.75
*2 487.10	65.40	PK	H	32.60	2.54	45.30		–	57.18	74.00	16.82
*2 487.10	50.73	AV	H	32.60	2.54	45.30		0.37	42.88	54.00	11.12
*2 489.59	64.75	PK	H	32.60	2.49	45.30		–	56.48	74.00	17.52
*2 489.59	48.50	AV	H	32.60	2.49	45.30		0.37	40.60	54.00	13.40
17 652.00	39.74	PK	V	42.20	8.58	38.90		–	53.56	74.00	20.44
*17 971.00	39.33	PK	H	42.00	8.73	39.10		–	52.90	74.00	21.10
25 692.50	44.00	PK	H	45.20	10.48	37.20		–	64.42	74.00	9.58
25 692.50	24.67	AV	V	45.20	10.48	37.20		0.37	45.46	54.00	8.54

[802.11 g / 2 472 MHz]

Radiated emissions			Ant.	Correction factors					Total	Limit	
Frequency	Reading	Detect	Pol.	AF	CL	Amp	F _d	DF	Final Result	Limit	Margin
MHz	dBμV	PK/AV	H/V	dB/m	dB	dB	dB	dB	dBμV/m	dBμV/m	dB
25 922.00	42.45	PK	V	45.30	10.54	37.40	1.94	–	62.83	74.00	11.17
25 922.00	22.18	AV	V	45.30	10.54	37.40		0.37	42.93	54.00	11.07

[802.11 n HT20 / 2 412 MHz]

Radiated emissions			Ant.	Correction factors					Total	Limit	
Frequency	Reading	Detect	Pol.	AF	CL	Amp	F _d	DF	Final Result	Limit	Margin
MHz	dBμV	PK/AV	H/V	dB/m	dB	dB	dB	dB	dBμV/m	dBμV/m	dB
2 399.99	75.39	PK	H	32.50	2.63	44.90	1.94	–	67.56	74.00	6.44
2 399.99	57.00	AV	H	32.50	2.63	44.90		0.31	49.48	54.00	4.52
2 399.99	70.38	PK	V	32.50	2.63	44.90		–	62.55	74.00	11.45
2 399.99	52.48	AV	V	32.50	2.63	44.90		0.31	44.96	54.00	9.04
17 695.50	39.17	PK	V	42.20	8.58	38.90		–	52.99	74.00	21.01
*17 985.50	38.74	PK	H	42.00	8.73	39.10		–	52.31	74.00	21.69
25 191.00	39.99	PK	H	45.10	9.78	36.20		–	60.61	74.00	13.39
25 191.00	14.04	AV	H	45.10	9.78	36.20		0.31	34.97	54.00	19.03
25 667.00	40.39	PK	V	45.30	10.48	37.20		–	60.91	74.00	13.09
25 667.00	17.03	AV	V	45.30	10.48	37.20		0.31	37.86	54.00	16.14

[802.11 n HT20 / 2 442 MHz]

Radiated emissions			Ant.	Correction factors					Total	Limit	
Frequency	Reading	Detect	Pol.	AF	CL	Amp	F _d	DF	Final Result	Limit	Margin
MHz	dBμV	PK/AV	H/V	dB/m	dB	dB	dB	dB	dBμV/m	dBμV/m	dB
*17 797.00	38.52	PK	H	42.20	8.53	39.10	1.94	–	52.09	74.00	21.91
*17 913.00	39.10	PK	V	42.20	8.75	39.10		–	52.89	74.00	21.11
25 692.50	40.41	PK	V	45.20	10.48	37.40		–	60.63	74.00	13.37
25 692.50	15.84	AV	V	45.20	10.48	37.40		0.31	36.37	54.00	17.63
25 930.50	41.26	PK	H	45.30	10.54	37.00		–	62.04	74.00	11.96
25 930.50	15.07	AV	H	45.30	10.54	37.40		0.31	35.76	54.00	18.24

[802.11 n HT20 / 2 472 MHz]

Radiated emissions			Ant.	Correction factors					Total	Limit	
Frequency	Reading	Detect	Pol.	AF	CL	Amp	F _d	DF	Final Result	Limit	Margin
MHz	dBμV	PK/AV	H/V	dB/m	dB	dB	dB	dB	dBμV/m	dBμV/m	dB
*2 483.53	65.01	PK	H	32.60	2.54	45.30	1.94	–	56.79	74.00	17.21
*2 483.53	53.73	AV	H	32.60	2.54	45.30		0.31	45.82	54.00	8.18
*2 483.53	60.04	PK	V	32.50	2.54	45.30		–	51.72	74.00	22.28

[802.11 n HT20 / 2 472 MHz]

Radiated emissions			Ant.	Correction factors					Total	Limit	
Frequency	Reading	Detect	Pol.	AF	CL	Amp	F _d	DF	Final Result	Limit	Margin
MHz	dBμV	PK/AV	H/V	dB/m	dB	dB	dB	dB	dBμV/m	dBμV/m	dB
*2 484.07	68.38	PK	H	32.60	2.54	45.30	1.94	–	60.16	74.00	13.84
*2 484.07	53.39	AV	H	32.60	2.54	45.30		0.31	45.48	54.00	8.52
*2 485.51	65.36	PK	H	32.60	2.54	45.30		–	57.14	74.00	16.86
*2 485.51	52.18	AV	H	32.60	2.54	45.30		0.31	44.27	54.00	9.73
*2 486.50	67.77	PK	H	32.60	2.54	45.30		–	59.55	74.00	14.45
*2 486.50	52.25	AV	H	32.60	2.54	45.30		0.31	44.34	54.00	9.66
25 650.00	40.57	PK	H	45.30	10.48	37.20		–	61.09	74.00	12.91
25 650.00	15.51	AV	H	45.30	10.48	37.20		0.31	36.34	54.00	17.66
26 398.00	40.84	PK	V	45.10	10.85	37.90		–	60.83	74.00	13.17
26 398.00	13.81	AV	V	45.10	10.85	37.90		0.31	34.11	54.00	19.89

[802.11 n HT40 / 2 422 MHz]

Radiated emissions			Ant.	Correction factors					Total	Limit	
Frequency	Reading	Detect	Pol.	AF	CL	Amp	F _d	DF	Final Result	Limit	Margin
MHz	dBμV	PK/AV	H/V	dB/m	dB	dB	dB	dB	dBμV/m	dBμV/m	dB
2 399.88	69.57	PK	H	32.50	2.63	44.90	1.94	–	61.74	74.00	12.26
2 399.88	52.52	AV	H	32.50	2.63	44.90		0.83	45.52	54.00	8.48
2 399.99	64.26	PK	V	32.50	2.63	44.90		–	56.43	74.00	17.57
2 399.99	47.63	AV	V	32.50	2.63	44.90		0.83	40.63	54.00	13.37
*17 985.50	38.50	PK	H	42.30	8.73	39.10		–	52.37	74.00	21.63
18 000.00	38.25	PK	V	42.30	8.73	39.10		–	52.12	74.00	21.88
25 684.00	40.22	PK	H	45.30	10.48	37.20		–	60.74	74.00	13.26
25 684.00	20.60	AV	H	45.30	10.48	37.20		0.83	41.95	54.00	12.05
26 160.00	40.88	PK	V	45.20	11.12	37.40		–	61.74	74.00	12.26
26 160.00	16.57	AV	V	45.20	11.12	37.40		0.83	38.26	54.00	15.74

[802.11 n HT40 / 2 442 MHz]

Radiated emissions			Ant.	Correction factors					Total	Limit	
Frequency	Reading	Detect	Pol.	AF	CL	Amp	F _d	DF	Final Result	Limit	Margin
MHz	dBμV	PK/AV	H/V	dB/m	dB	dB	dB	dB	dBμV/m	dBμV/m	dB
*17 739.00	38.09	PK	V	42.20	8.58	38.90	1.94	–	51.91	74.00	22.09
*17 971.00	38.80	PK	H	42.00	8.73	39.10		–	52.37	74.00	21.63
25 650.00	41.20	PK	H	45.30	10.48	37.20		–	61.72	74.00	12.28
25 650.00	20.34	AV	H	45.30	10.48	37.20		0.83	41.69	54.00	12.31
25 684.00	40.24	PK	V	45.20	10.48	37.20		–	60.66	74.00	13.34
25 684.00	18.72	AV	V	45.20	10.48	37.20		0.83	39.97	54.00	14.03

[802.11 n HT40 / 2 462 MHz]

Radiated emissions			Ant.	Correction factors					Total	Limit	
Frequency	Reading	Detect	Pol.	AF	CL	Amp	F _d	DF	Final Result	Limit	Margin
MHz	dBμV	PK/AV	H/V	dB/m	dB	dB	dB	dB	dBμV/m	dBμV/m	dB
*2 483.53	73.32	PK	H	32.60	2.54	45.30	1.94	–	65.10	74.00	8.90
*2 483.53	57.31	AV	H	32.60	2.54	45.30		0.83	49.92	54.00	4.08
*2 483.53	68.09	PK	V	32.50	2.54	45.30		–	59.77	74.00	14.23
*2 483.53	52.12	AV	V	32.50	2.54	45.30		0.83	44.63	54.00	9.37
*2 484.16	67.26	PK	V	32.50	2.54	45.30		–	58.94	74.00	15.06
*2 484.16	50.18	AV	V	32.50	2.54	45.30		0.83	42.69	54.00	11.31
*2 484.28	73.20	PK	H	32.60	2.54	45.30		–	64.98	74.00	9.02
*2 484.28	54.94	AV	H	32.60	2.54	45.30		0.83	47.55	54.00	6.45
*2 484.58	72.21	PK	H	32.60	2.54	45.30		–	63.99	74.00	10.01
*2 484.58	53.24	AV	H	32.60	2.54	45.30		0.83	45.85	54.00	8.15
*2 484.76	65.75	PK	V	32.50	2.54	45.30		–	57.43	74.00	16.57
*2 484.76	48.17	AV	V	32.50	2.54	45.30		0.83	40.68	54.00	13.32
*2 485.00	65.35	PK	V	32.50	2.54	45.30		–	57.03	74.00	16.97
*2 485.00	47.99	AV	V	32.50	2.54	45.30		0.83	40.50	54.00	13.50
*2 485.18	69.60	PK	H	32.60	2.54	45.30		–	61.38	74.00	12.62
*2 485.18	52.34	AV	H	32.60	2.54	45.30		0.83	44.95	54.00	9.05
*2 485.63	68.51	PK	H	32.60	2.54	45.30		–	60.29	74.00	13.71
*2 485.63	51.79	AV	H	32.60	2.54	45.30		0.83	44.40	54.00	9.60
*2 486.11	64.45	PK	V	32.50	2.54	45.30		–	56.13	74.00	17.87
*2 486.11	46.52	AV	V	32.50	2.54	45.30		0.83	39.03	54.00	14.97
*2 486.56	67.63	PK	H	32.60	2.54	45.30		–	59.41	74.00	14.59
*2 486.56	51.58	AV	H	32.60	2.54	45.30		0.83	44.19	54.00	9.81
*2 487.07	67.00	PK	H	32.60	2.54	45.30		–	58.78	74.00	15.22
*2 487.07	51.05	AV	H	32.60	2.54	45.30		0.83	43.66	54.00	10.34
25 667.00	40.67	PK	V	45.20	10.48	37.40		–	60.89	74.00	13.11
25 667.00	21.66	AV	V	45.20	10.48	37.40		0.83	42.71	54.00	11.29
25 684.00	39.87	PK	H	45.20	10.48	37.20		–	60.29	74.00	13.71
25 684.00	20.67	AV	H	45.20	10.48	37.20		0.83	41.92	54.00	12.08

