



Test report No. : 4789558386-US-R0-V0
Page : 1 of 141
Issued date : Jan. 8, 2021
FCC ID : RYK-WPEB265AXIBT

RADIO TEST REPORT

Product : IEEE 802.11ax/ac/a/b/g/n 2x2 WiFi with Bluetooth5.0 Combo Module

Model Name : WPEB-265AXI(BT) [R33]

Series Model : WPEB-265AXI(BT) [B18], WPEB-265AXI(BT) [B33],
WPEB-265AXI(BT) [R18],
AP12275_PB18, AP12275_PB33, AP12275_PR18,
AP12275_PR33

FCC ID : RYK-WPEB265AXIBT

Test Regulation : FCC 47 CFR Part 15 Subpart C (Section 15.247)

Received Date : Aug. 3, 2020

Test Date : Aug. 3, 2020 ~ Dec. 15, 2020

Issued Date : Jan. 8, 2021

Applicant : SparkLAN Communications, Inc.
8F., No.257, Sec. 2, Tiding Blvd., Neihu District, Taipei City
11493, Taiwan (R.O.C.)

Issued By : Underwriters Laboratories Taiwan Co., Ltd.
Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd.,
Zhudong Township, Hsinchu County, Taiwan



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REVISION HISTORY

Original Test Report No.: 4789558386-US-R0-V0

[illegible]

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1. Attestation of Test Results

APPLICANT: SparkLAN Communications, Inc.
8F., No.257, Sec. 2, Tiding Blvd., Neihu District, Taipei City 11493,
Taiwan (R.O.C.)

MANUFACTURER SparkLAN Communications, Inc.
8F., No.257, Sec. 2, Tiding Blvd., Neihu District, Taipei City
11493, Taiwan (R.O.C.)

EUT DESCRIPTION: IEEE 802.11ax/ac/a/b/g/n 2x2 WiFi with Bluetooth5.0 Combo Module

MODEL: WPEB-265AXI(BT) [R33]

SERIES MODEL: WPEB-265AXI(BT) [B18], WPEB-265AXI(BT) [B33],
WPEB-265AXI(BT) [R18],
AP12275_PB18, AP12275_PB33, AP12275_PR18, AP12275_PR33

SAMPLE STAGE: Identical Prototype

DATE of TESTED: Aug. 3, 2020 ~ Dec. 15, 2020

APPLICABLE STANDARDS	
STANDARD	Test Results
FCC 47 CFR PART 15 Subpart C (Section 15.247)	PASS

Underwriters Laboratories Taiwan Co., Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by Underwriters Laboratories Taiwan Co., Ltd. based on interpretations and/or observations of test results. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by Underwriters Laboratories Taiwan Co., Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Underwriters Laboratories Taiwan Co., Ltd. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Prepared By:

Sally Lu
Project Handler

Date : Jan. 8, 2021

Approved and Authorized By:

Waternil Guan
Engineer

Date : Jan. 8, 2021

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2. Summary of Test Results

Summary of Test Results		
FCC Clause	Test Items	Result
15.247(a)(2)	6dB Bandwidth	PASS
15.247(b)	Conducted Output Power	PASS
15.247(e)	Power Spectral Density	PASS
15.247(d)	Antenna Port Emission	PASS
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	PASS
15.207	AC Power Conducted Emission	PASS
15.203	Antenna Requirement	PASS

Note:

1. For the Radiated Band Edge test plots were recorded in Appendix I, the Radiated Emissions test plots were recorded in Appendix II.

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3. Test Methodology and Reference Procedures

The tests documented in this report were performed in accordance with 47 CFR FCC Part 2, KDB558074 D01 Meas Guidance v05r02, KDB414788 D01 Radiated Test Site v01r01, ANSI C63.10-2013 and KDB 662911 D01 Multiple Transmitter Output v02r01.

4. Facilities and Accreditation

Test Location	Underwriters Laboratories Taiwan Co., Ltd.
Address	Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan
Accreditation Certificate	Underwriters Laboratories Taiwan Co., Ltd. is accredited by TAF, Laboratory Code 3398. The full scope of accreditation can be viewed at http://accreditation.taftw.org.tw/taf/public/basic/viewApplyItems.action?unitNo=3398

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5. Measurement Uncertainty

For statement of conformity, accuracy method (Section 8.2.4 and 8.2.5 of ISO Guide 98-4) was applied as decision rule for measurement in this test report.

The following uncertainties have been calculated to provide a confidence level of 95 % using a coverage factor $k=2$.

Test Item	Measurement Frequency Range	K	U(dB)
Conducted disturbance at mains terminals ports	0.15MHz ~ 30MHz	2	1.5
RF Conducted	9 kHz - 40GHz	2	1.0
Radiated disturbance below 30MHz	9 kHz - 30 MHz	2	1.9
Radiated disturbance below 1 GHz	30MHz ~ 1GHz	2	5.4
Radiated disturbance above 1GHz	1GHz ~ 40GHz	2	4.7

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6. Equipment under Test

6.1. Description of EUT

Product	IEEE 802.11ax/ac/a/b/g/n 2x2 WiFi with Bluetooth5.0 Combo Module
Model Name	WPEB-265AXI(BT) [R33]
Series Model	WPEB-265AXI(BT) [B18], WPEB-265AXI(BT) [B33], WPEB-265AXI(BT) [R18], AP12275_PB18, AP12275_PB33, AP12275_PR18, AP12275_PR33
Operating Frequency	2412MHz ~ 2462MHz
Modulation	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 1024QAM, 256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDMA
Transfer Rate	802.11b: up to 11 Mbps 802.11g: up to 54 Mbps 802.11n: up to MCS15 802.11ax: up to HE11
Number of Channel	11 for 802.11b, 802.11g, 802.11n (HT20), 802.11ax (HE20)
Maximum Output Power	Non-Beamforming mode: 802.11b: 21.38 dBm 802.11g: 28.15 dBm 802.11ax (HE20)_OFDM: 27.65 dBm 802.11ax (HE20)_OFDMA: 27.44 dBm Beamforming mode: 802.11ax (HE20)_OFDM: 27.59 dBm 802.11ax (HE20)_OFDMA: 27.29 dBm
Normal Voltage	3.3Vdc
S/N	20B65C2100002
Software Version	N/A

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Note:

1. All model PCB layout and RF Module are the same, but some ICs and resistors are different. The configuration of all related components are shown in the table below.

Main Model Name		
Brand	Model	Components
SparkLAN	WPEB-265AXI(BT) [R33]	U3,U4: MULTI-VOLTAGE LEVEL TRANSLATOR R4,R17,R22,R23,R24,R25: 33K ohm R26,R27,R28,R29,R30,R31: 33K ohm R1,R13,R15,R16,R20,R21: 0 ohm
Series Model Name		
Brand	Model	Components
SparkLAN	WPEB-265AXI(BT) [B33]	U4: MULTI-VOLTAGE LEVEL TRANSLATOR R4,R17,R26,R27,R28,R29,R30,R31: 33K ohm R1,R13,R15,R16,R20,R21: 0 ohm U5: USB-TO-UART DATA TRANSFER
	WPEB-265AXI(BT) [B18]	R4,R17,R30,R31: 33K ohm R1,R13,R15,R16,R20,R21,R5,R7,R9,R11: 0 ohm U5: USB-TO-UART DATA TRANSFER
	WPEB-265AXI(BT) [R18]	R4,R17,R30,R31: 33K ohm R1,R13,R15,R16,R20,R21,R5:50m ohm R6,R7,R8,R9,R10,R11,R12: 50m ohm
Ampak	AP12275_PB33	Same as WPEB-265AXI(BT) [B33], marketing purpose only.
	AP12275_PB18	Same as WPEB-265AXI(BT) [B18], marketing purpose only.
	AP12275_PR33	Same as WPEB-265AXI(BT) [R33], marketing purpose only.
	AP12275_PR18	Same as WPEB-265AXI(BT) [R18], marketing purpose only.

2. The EUT incorporates a MIMO function. Physically, the EUT provides two completed transmitters and two receivers.

Modulation Mode	Tx,Rx Function
802.11b	1TX,1RX
802.11g	2TX,2RX
802.11n (HT20)	2TX,2RX
802.11ax (HE20)	2TX,2RX

* The modulation and bandwidth are similar for 802.11n mode for HT20 and 802.11ax mode for HE20, therefore investigated worst case to representative mode in test report.

3. Since the OFDM (HE) is the worst case, so the peak output power of HT20 will quote the value of OFDM (HE).

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4. The EUT contains following accessory devices.

Product	Brand	Model	Description
Dipole Antenna 1	SparkLAN	AD-103AG	2.4GHz: 2.02dBi 5GHz: 2.03dBi RP-SMA
Dipole Antenna 2	SparkLAN	AD-302N	2.4GHz: 3.14dBi 5GHz: 2.73dBi RP-SMA
Dipole Antenna 3	SparkLAN	AD-303N	2.4GHz: 3.14dBi 5GHz: 3.24dBi RP-SMA

5. The above EUT information is declared by manufacturer and for more detailed features description, please refer the manufacturer's or user's manual.

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6.2. Channel List

11 channels are provided for 802.11b, 802.11g and 802.11n (HT20), 802.11ax (HE20):

Channel	Frequency	Channel	Frequency
1	2412MHz	7	2442MHz
2	2417MHz	8	2447MHz
3	2422MHz	9	2452MHz
4	2427MHz	10	2457MHz
5	2432MHz	11	2462MHz
6	2437MHz	-	-

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6.3. Test Condition

Test Item	Test Site No.	Environmental Condition	Input Power	Test Date	Tested by
Antenna Port Conducted Measurement	SR4	23~26°C / 63~68%RH	120Vac / 60 Hz	Aug. 3, 2020 ~ Nov. 26, 2020	Mike Cai
Radiated Spurious Emission	966-2	22~26°C / 62~68%RH	120Vac / 60 Hz	Aug. 3, 2020 ~ Dec. 15, 2020	Carlos Chen
AC power Line Conducted Emission	SR1	23~25°C / 63~68%RH	120Vac / 60 Hz	Nov. 12, 2020 ~ Nov. 13, 2020	Carlos Chen

FCC Test Firm Registration Number: 498077

6.4. Description Of Available Antennas

Ant. No.	Brand Name	Model Name	Ant. Type	Ant. Gain (dBi)	Remark
0	SparkLAN	AD-103AG	Dipole	2.02	Length of RF Cable:150mm Connector type of RF cable: I-PEX/MHF1 to RP-SMA(F)
1	SparkLAN	AD-302N	Dipole	3.14	
2	SparkLAN	AD-303N	Dipole	3.14	

Note: The above antenna information was provided from customer and for more detailed features description, please refer the manufacturer's specification or user's manual.

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6.5. Test Mode Applicability and Tested Channel Detail

- The antenna AD-303N has the highest gain, the following tests are all carried out using this antenna
- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- For below 1 GHz radiated emission and AC power line conducted emission have performed all modes of operation were investigated and the worst-case emissions are reported.
- For Antenna Port Conducted Measurement, this item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- The fundamental of the EUT was investigated in three orthogonal axes X/Y/Z, it was determined that Z axis was worst-case. Therefore, all final radiated testing was performed with the EUT in Z axis.
- For below 30MHz testing, investigation was done on three antenna orientations (parallel, perpendicular, and ground-parallel), parallel and perpendicular are the worst orientations, therefore testing was performed on these two orientations only.
- For AC power line conducted emissions, the pre-scan has been determined by AC power 120Vac/60Hz (worst case)

Non-Beamforming mode:

Test item	Mode	Modulation Technology	Modulation Type	Available Channel	Test Channel	Data Rate
Radiated Emissions (Above 1GHz)	802.11b	DSSS	DBPSK	1 to 11	1,6,11	1Mbps
	802.11g	OFDM	BPSK	1 to 11	1,6,11	6Mbps
	802.11ax20	OFDM/ OFDMA	BPSK	1 to 11	1,6,11	HE0
			BPSK	1 to 11	1,6,11	HE0
Radiated Emissions (Below 1GHz)	802.11b	DSSS	DBPSK	1 to 11	1	1Mbps
AC Power Line Conducted Emission	802.11b	DSSS	DBPSK	1 to 11	1	1Mbps
Antenna Port Conducted Measurement	802.11b	DSSS	DBPSK	1 to 11	1,6,11	1Mbps
	802.11g	OFDM	BPSK	1 to 11	1,6,11	6Mbps
	802.11ax20	OFDM/ OFDMA	BPSK	1 to 11	1,6,11	HE0
			BPSK	1 to 11	1,6,11	HE0

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Beamforming mode:

Test item	Mode	Modulation Technology	Modulation Type	Available Channel	Test Channel	Data Rate
Radiated Emissions (Above 1GHz)	802.11ax20	OFDM/ OFDMA	BPSK	1 to 11	1,6,11	HE0
			BPSK	1 to 11	1,6,11	HE0
Radiated Emissions (Below 1GHz)	802.11ax20	OFDM	BPSK	1 to 11	6	HE0
AC Power Line Conducted Emission	802.11ax20	OFDM	BPSK	1 to 11	6	HE0
Antenna Port Conducted Measurement	802.11ax20	OFDM/ OFDMA	BPSK	1 to 11	1,6,11	HE0
			BPSK	1 to 11	1,6,11	HE0

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6.6. Duty cycle

Non-Beamforming mode

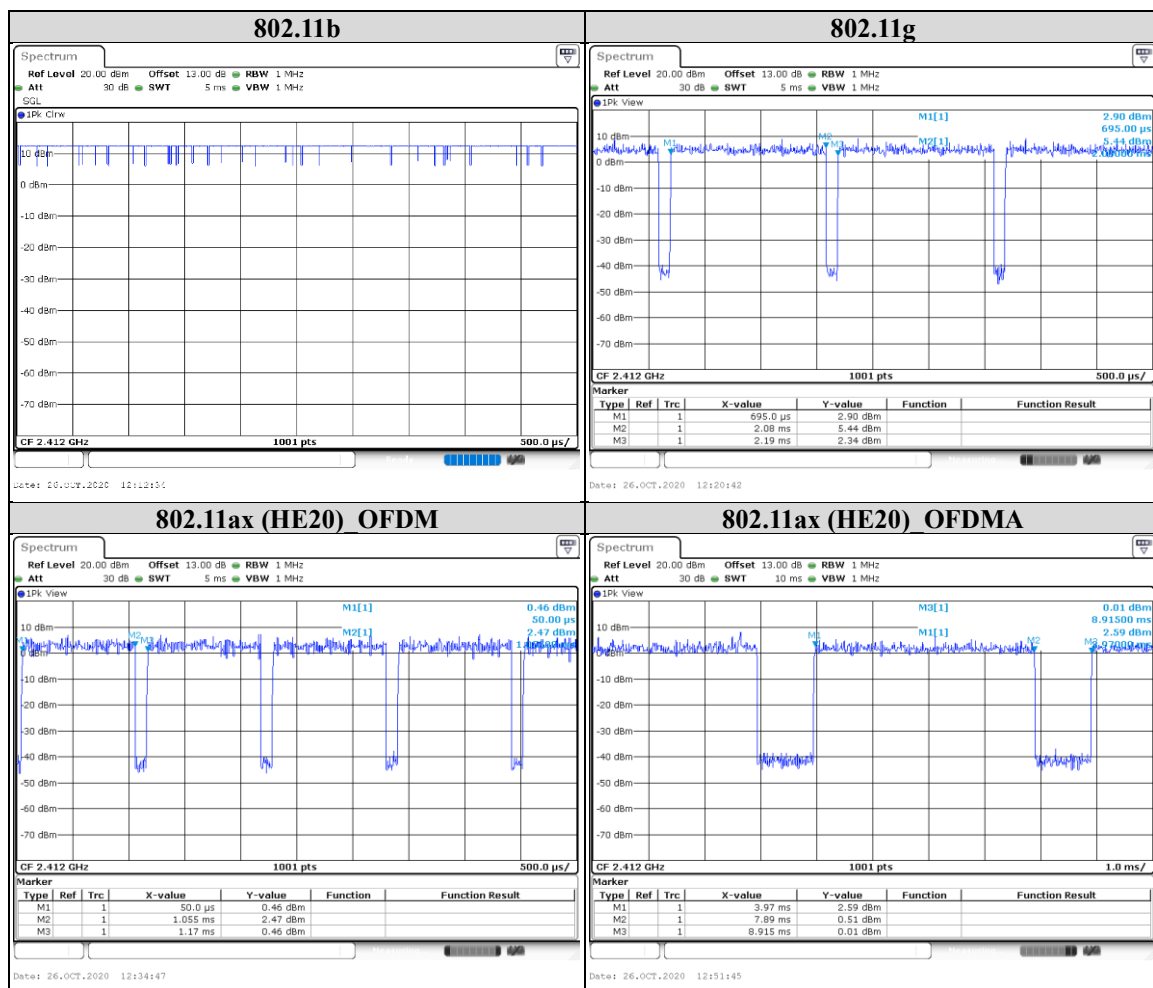
802.11b: Duty cycle of test signal is $\geq 98\%$, duty factor is not required.

802.11g: Duty cycle = $1.385/1.495 = 0.926$, Duty factor = $10 * \log(1/0.926) = 0.33$

802.11ax (HE20):

OFDM : Duty cycle = $1.005/1.12 = 0.897$, Duty factor = $10 * \log(1/0.897) = 0.47$

OFDMA: Duty cycle = $3.92/4.945 = 0.793$, Duty factor = $10 * \log(1/0.793) = 1.01$



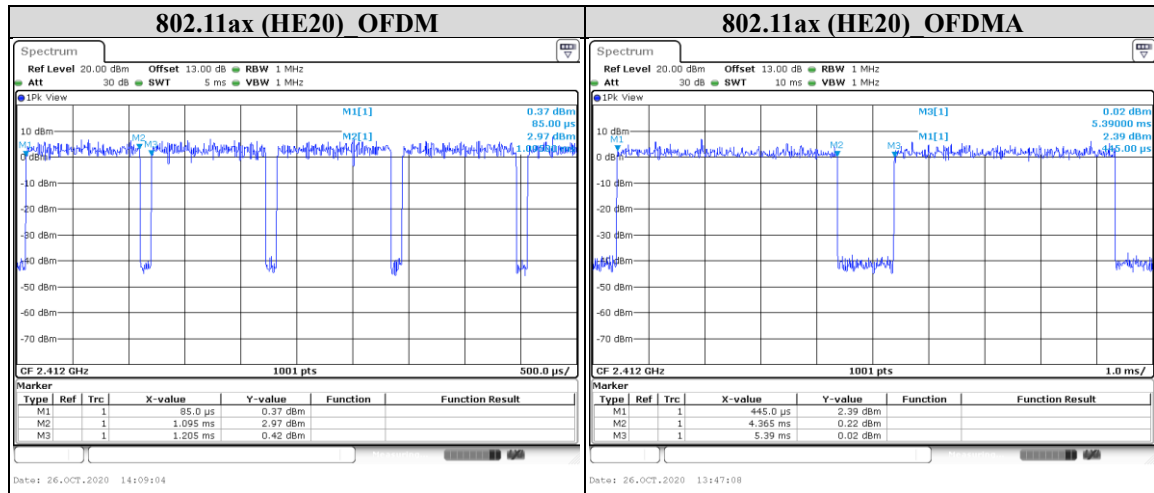


Beamforming mode

802.11ax (HE20):

OFDM: Duty cycle = $1.01/1.12 = 0.902$, Duty factor = $10 * \log(1/0.902) = 0.45$

OFDMA: Duty cycle = $3.92/4.945 = 0.793$, Duty factor = $10 * \log(1/0.793) = 1.01$



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7. Test Equipment

Test Equipment List					
Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
Radiated Spurious Emission					
Spectrum Analyzer	Keysight	N9010A	MY56070827	Nov. 13, 2019 Nov. 11, 2020	1 year
EMI Test Receiver	Rohde & Schwarz	ESR7	101754	Dec. 17, 2019	1 year
Loop Antenna	ETS lindgren	6502	00213440	Dec. 19, 2019	1 year
Trilog-Broadband Antenna with 5dB Attenuator	Schwarzbeck & EMCI	VULB 9168 & N-6-05	774 & AT-N0538	Jan. 3, 2020	1 year
Horn Antenna (1-18 GHz)	Schwarzbeck	BBHA 9120 D	01690	Jan. 3, 2020	1 year
Horn Antenna (18-40 GHz)	Schwarzbeck	BBHA 9170	781	Dec. 27, 2019	1 year
Preamplifier (30-1000 MHz)	EMCI	EMC330E	980405	Jun. 9, 2020	1 year
Preamplifier (1-18 GHz)	EMCI	EMC051835BE	980406	Feb. 4, 2020	1 year
Preamplifier (18-40GHz)	EMCI	EMC184040SEE	980426	May 19, 2020	1 year
Cables	Hanyitek	K1K50-UP0264-K1K50-2500	170214-4 & 170425-2	Jul. 2, 2020	1 year
Cables	Hanyitek	K1K50-UP0264-K1K50-2500	170214-1 & 170214-2	Jan. 8, 2020	1 year

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Test Equipment List					
Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
Antenna Port Conducted Measurement					
Spectrum Analyzer	Keysight	N9010A	MY56070834	Nov. 6, 2019	1 year
				Nov. 6, 2020	
Pulse Power Sensor	Anritsu	MA2411B	1531202	Dec. 23, 2019	1 year
Power Meter	Anritsu	ML2495A	1645002	Dec. 23, 2019	1 year
AC power Line Conducted Emission					
EMI Test Receiver	Rohde & Schwarz	ESR7	101753	Nov. 19, 2019	1 year
Two-Line V-Network	Rohde & Schwarz	ENV216	102136	Aug. 19, 2020	1 year
Impuls-Begrenzer Pulse Limiter	Rohde & Schwarz	ESH3-Z2	102219-Qt	Aug. 12, 2020	1 year
Cables	HARBOUR INDUSTRIES	LL142	170205-5000-1	Feb. 5, 2020	1 year

UL Software		
Description	Name	Version
Radiated measurement	EZ EMC	1.1.4.2
Conducted measurement	Keysight.TestSystem	1.0.0.0
AC power Line Conducted Emission	EZ EMC	1.1.4.2

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8. Description of Test Setup

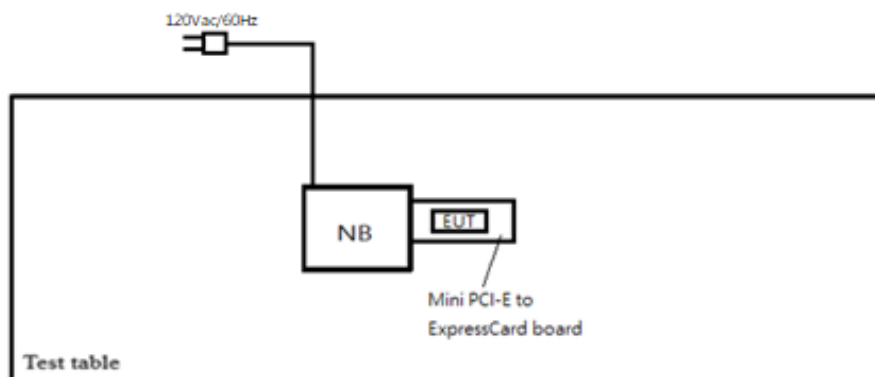
Support Equipment

Equipment	Brand Name	Model Name	S/N	Remark
Notebook	Lenovo	T430	PBE38AK	N/A
Mini PCI-E to ExpressCard board	N/A	N/A	N/A	N/A

Test Setup

The EUT was worked in engineering mode to transmit signal.

Setup Diagram for Test



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9. Test Results

9.1. 6dB Bandwidth

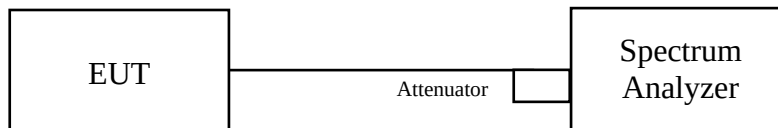
Requirements

The minimum 6 dB bandwidth shall be at least 500 kHz.

Test procedure

- Set resolution bandwidth (RBW) = 100kHz
- Set the video bandwidth (VBW) $\geq 3 \times$ RBW, Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

Test Setup



The loss between RF output port of the EUT and the input port of the Spectrum Analyzer has been taken into consideration.

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Test Data

Non-Beamforming mode

802.11b

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	7.073	0.5	Pass
6	2437	7.073	0.5	Pass
11	2462	7.073	0.5	Pass

802.11g

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	16.304	16.304	0.5	Pass
6	2437	16.264	16.304	0.5	Pass
11	2462	16.344	16.344	0.5	Pass

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802.11ax (HE20)

OFDM

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	18.901	18.661	0.5	Pass
6	2437	17.982	18.342	0.5	Pass
11	2462	18.621	18.901	0.5	Pass

OFDMA

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2422	19.061	19.101	0.5	Pass
6	2437	18.981	19.061	0.5	Pass
11	2452	19.181	19.061	0.5	Pass

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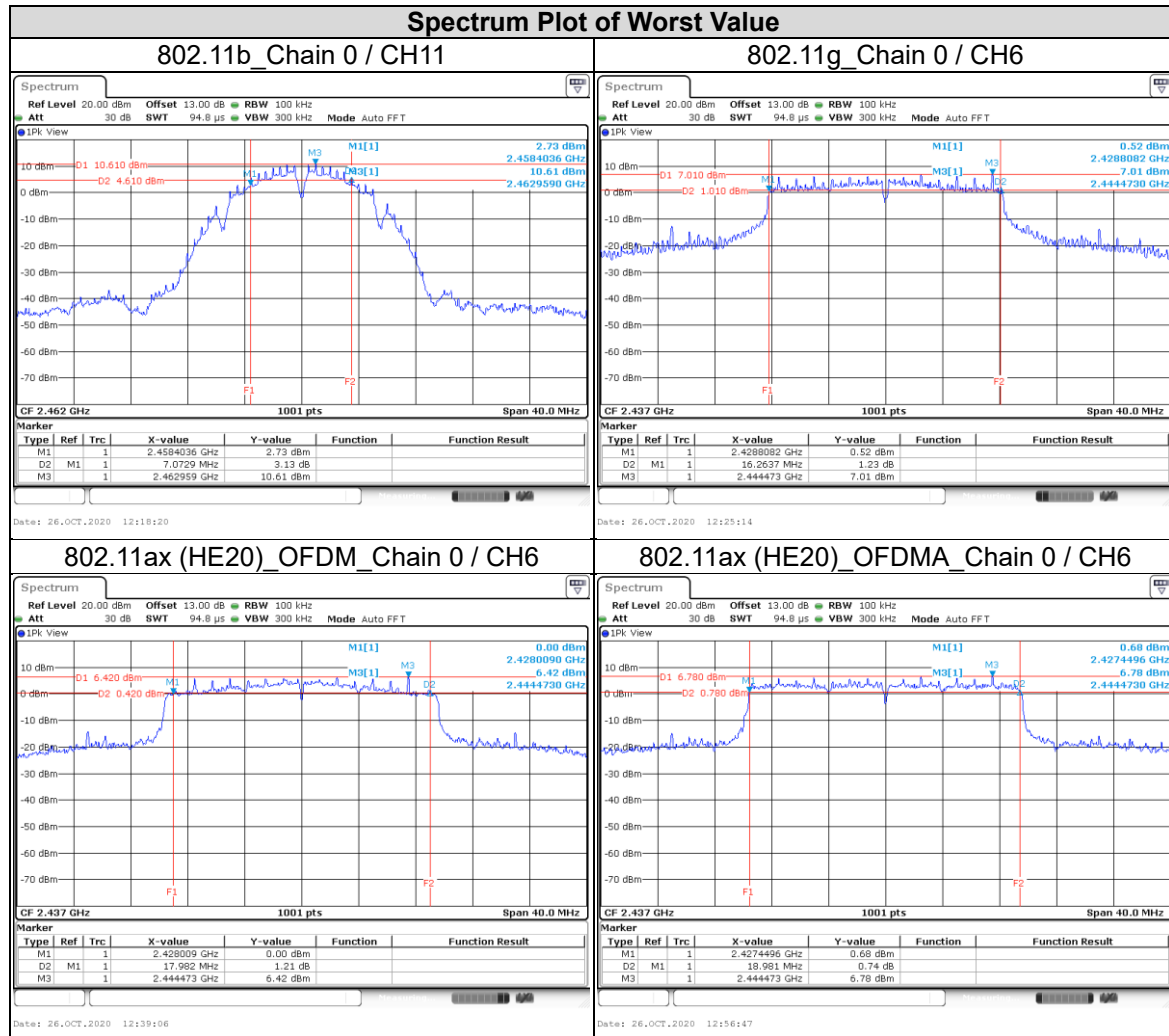
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Beamforming mode

802.11ax (HE20)

OFDM

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	18.382	18.661	0.5	Pass
6	2437	18.102	18.502	0.5	Pass
11	2462	18.422	18.781	0.5	Pass

OFDMA

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2422	19.061	19.141	0.5	Pass
6	2437	19.061	19.021	0.5	Pass
11	2452	19.061	19.101	0.5	Pass

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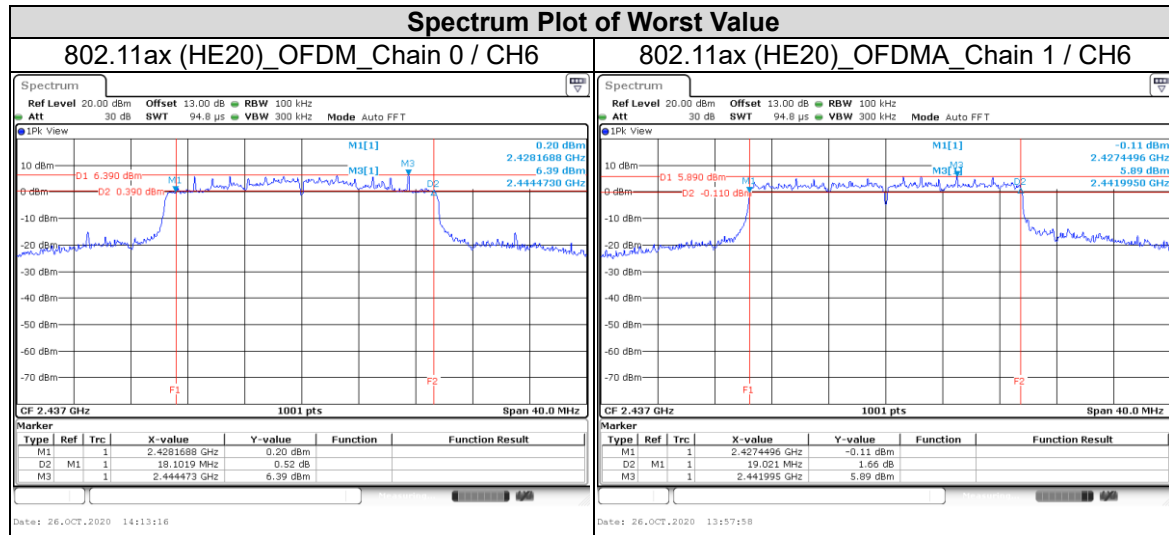
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9.2. Conducted output power

Requirements

For systems using digital modulation in the 2400-2483.5 MHz bands: 1 Watt.

Per KDB 662911 D01 Multiple Transmitter Output Method of conducted output power measurement on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;

Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT} ;

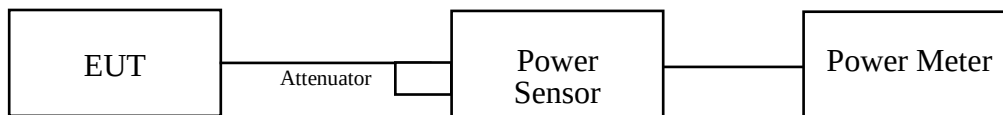
Array Gain = $5 \log(N_{ANT}/N_{SS})$ dB or 3 dB, whichever is less for 20-MHz channel widths with $N_{ANT} \geq 5$.

For power measurements on all other devices: Array Gain = $10 \log(N_{ANT}/N_{SS})$ dB.

Test Procedure

A peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor. Record the power level.

Test Setup



The loss between RF output port of the EUT and the input port of the Power Meter has been taken into consideration.

The loss between RF output port of the EUT and the input port of the Spectrum Analyzer has been taken into consideration.

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Test Data

Non-Beamforming mode

Peak Power

802.11b

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	135.831	21.33	30	Pass
6	2437	136.458	21.35	30	Pass
11	2462	137.404	21.38	30	Pass

802.11g

Channel	Frequency (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	21.02	21.16	257.091	24.10	30	Pass
2	2417	23.95	24.07	503.583	27.02	30	Pass
6	2437	25.01	25.26	652.695	28.15	30	Pass
10	2457	23.56	23.99	477.597	26.79	30	Pass
11	2462	19.67	21.63	238.229	23.77	30	Pass

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802.11ax (HE20)

OFDM

Channel	Frequency (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	18.61	18.67	146.232	21.65	30	Pass
2	2417	22.13	22.35	335.096	25.25	30	Pass
6	2437	24.51	24.76	581.714	27.65	30	Pass
10	2457	22.10	22.22	328.906	25.17	30	Pass
11	2462	19.67	20.03	193.376	22.86	30	Pass

OFDMA

Channel	Frequency (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	19.25	18.21	150.362	21.77	30	Pass
2	2417	22.31	22.12	333.146	25.23	30	Pass
6	2437	24.50	24.36	554.736	27.44	30	Pass
10	2457	22.25	22.28	336.924	25.28	30	Pass
11	2462	18.69	18.52	145.082	21.62	30	Pass

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Average Power (Reference Only)

802.11b

Channel	Frequency (MHz)	Total Power (mW)	Total Power (dBm)
1	2412	68.549	18.36
6	2437	67.764	18.31
11	2462	68.707	18.37

802.11g

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	12.07	12.37	33.364	15.23
2	2417	14.85	15.33	64.668	18.11
6	2437	17.2	18.25	119.315	20.77
10	2457	14.15	14.84	56.481	17.52
11	2462	9.81	10.45	20.664	13.15

802.11ax (HE20)

OFDM

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	10.08	10.17	20.585	13.14
2	2417	14.04	14.37	52.704	17.22
6	2437	17.60	18.33	125.621	20.99
10	2457	13.50	14.00	47.506	16.77
11	2462	9.71	10.01	19.377	12.87

OFDMA

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	9.99	8.78	17.528	12.44
2	2417	13.87	13.38	46.155	16.64
6	2437	17.93	17.69	120.836	20.82
10	2457	12.95	12.90	39.222	15.94
11	2462	8.80	8.64	14.897	11.73

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Beamforming mode

Peak Power

802.11ax (HE20)

OFDM

Channel	Frequency (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	18.51	18.47	141.265	21.50	29.85	Pass
2	2417	21.95	22.31	326.891	25.14	29.85	Pass
6	2437	24.49	24.66	573.605	27.59	29.85	Pass
10	2457	21.85	21.97	310.507	24.92	29.85	Pass
11	2462	19.50	19.94	187.753	22.74	29.85	Pass

Note: The directional gain = 6.15 dBi > 6 dBi, so the power limit shall be reduced.

OFDMA

Channel	Frequency (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	19.15	18.09	146.641	21.66	29.85	Pass
2	2417	22.21	22.02	325.562	25.13	29.85	Pass
6	2437	24.41	24.15	536.074	27.29	29.85	Pass
10	2457	22.09	22.08	323.244	25.10	29.85	Pass
11	2462	18.50	18.49	141.427	21.51	29.85	Pass

Note: The directional gain = 6.15 dBi > 6 dBi, so the power limit shall be reduced.

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Average Power (Reference Only)

802.11ax (HE20)

OFDM

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	9.86	9.98	19.637	12.93
2	2417	14.00	14.37	52.472	17.20
6	2437	17.46	18.10	120.284	20.80
10	2457	13.47	13.87	46.611	16.68
11	2462	9.53	9.78	18.48	12.67

OFDMA

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	9.98	8.63	17.249	12.37
2	2417	13.82	13.22	45.088	16.54
6	2437	17.91	17.56	118.818	20.75
10	2457	12.71	12.90	38.162	15.82
11	2462	8.69	8.61	14.657	11.66

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9.3. Power Spectral Density

Requirements

The Maximum of Power Spectral Density Measurement is 8dBm in any 3 kHz (If $G_{TX} > 6$ dBi, then $PSD = 8 - (G_{TX} - 6)$).

Note:

1. PSD = power spectral density that the same method as used to determine the conducted output power shall be used to determine the power spectral density. And power spectral density in dBm/MHz.
2. G_{TX} = the maximum transmitting antenna directional gain in dBi.
3. Directional Gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{Gn/20})^2 / Nant]$ dBi.

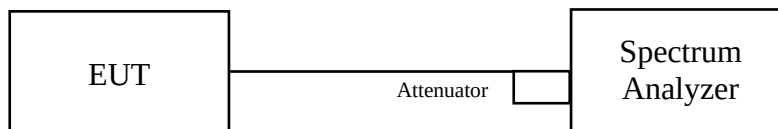
Nant: Number of Transmit Antennas

G1, G2,..., Gn: Gain of Individual Antennas

Test procedure

- 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.

Test Setup



The loss between RF output port of the EUT and the input port of the Spectrum Analyzer has been taken into consideration.

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Test Data

Non-Beamforming mode

802.11b

Channel	Frequency (MHz)	PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
1	2412	-1.83	8	Pass
6	2437	-1.88	8	Pass
11	2462	-1.34	8	Pass

802.11g

TX Chain	Channel	Freq. (MHz)	PSD (dBm/3 kHz)	10 log (N=2) dB	Total PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
0	1	2412	-11.32	3.01	-8.31	7.85	Pass
	6	2437	-5.36	3.01	-2.35	7.85	Pass
	11	2462	-13.51	3.01	-10.50	7.85	Pass
1	1	2412	-11.12	3.01	-8.11	7.85	Pass
	6	2437	-4.99	3.01	-1.98	7.85	Pass
	11	2462	-13.03	3.01	-10.02	7.85	Pass

NOTE: Directional gain = 6.15 dBi > 6 dBi , so the limit shall be reduced.

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802.11ax (HE20)

OFDM

TX Chain	Channel	Freq. (MHz)	PSD (dBm/3 kHz)	10 log (N=2) dB	Total PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
0	1	2412	-13.15	3.01	-10.14	7.85	Pass
	6	2437	-5.10	3.01	-2.09	7.85	Pass
	11	2462	-14.14	3.01	-11.13	7.85	Pass
1	1	2412	-13.71	3.01	-10.70	7.85	Pass
	6	2437	-5.24	3.01	-2.23	7.85	Pass
	11	2462	-13.87	3.01	-10.86	7.85	Pass

NOTE: Directional gain = 6.15 dBi > 6 dBi , so the limit shall be reduced.

OFDMA

TX Chain	Channel	Freq. (MHz)	PSD (dBm/3 kHz)	10 log (N=2) dB	Total PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
0	1	2412	-14.59	3.01	-11.58	7.85	Pass
	6	2437	-6.78	3.01	-3.77	7.85	Pass
	11	2462	-15.51	3.01	-12.50	7.85	Pass
1	1	2412	-15.70	3.01	-12.69	7.85	Pass
	6	2437	-7.03	3.01	-4.02	7.85	Pass
	11	2462	-15.92	3.01	-12.91	7.85	Pass

NOTE: Directional gain = 6.15 dBi > 6 dBi , so the limit shall be reduced.

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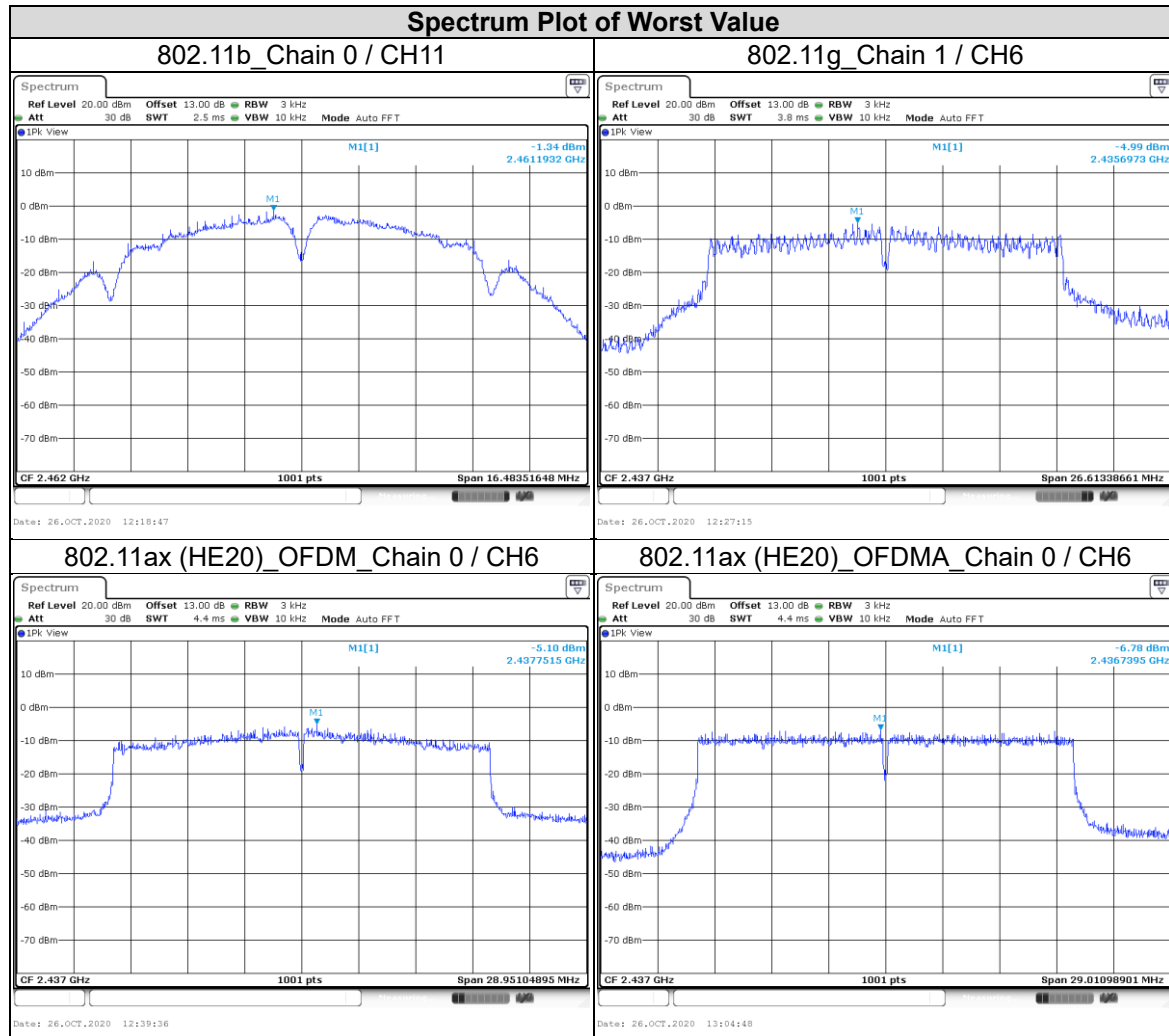
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Beamforming mode

802.11ax (HE20)

OFDM

TX Chain	Channel	Freq. (MHz)	PSD (dBm/3 kHz)	10 log (N=2) dB	Total PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
0	1	2412	-13.34	3.01	-10.33	7.85	Pass
	6	2437	-5.60	3.01	-2.59	7.85	Pass
	11	2462	-14.14	3.01	-11.13	7.85	Pass
1	1	2412	-13.49	3.01	-10.48	7.85	Pass
	6	2437	-5.35	3.01	-2.34	7.85	Pass
	11	2462	-13.65	3.01	-10.64	7.85	Pass

NOTE: Directional gain = 6.15 dBi > 6 dBi , so the limit shall be reduced.

OFDMA

TX Chain	Channel	Freq. (MHz)	PSD (dBm/3 kHz)	10 log (N=2) dB	Total PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
0	1	2412	-14.73	3.01	-11.72	7.85	Pass
	6	2437	-6.46	3.01	-3.45	7.85	Pass
	11	2462	-15.46	3.01	-12.45	7.85	Pass
1	1	2412	-16.02	3.01	-13.01	7.85	Pass
	6	2437	-7.45	3.01	-4.44	7.85	Pass
	11	2462	-16.32	3.01	-13.31	7.85	Pass

NOTE: Directional gain = 6.15 dBi > 6 dBi , so the limit shall be reduced.

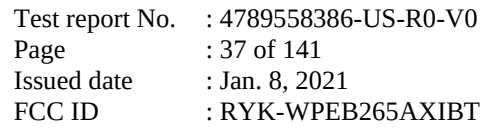
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9.4. Conducted Out of Band Emission

Requirements

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator 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 the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b) (3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209 (a) is not required.

Test procedure

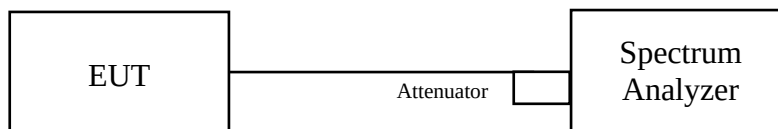
Measurement Procedure REF

1. Set the RBW = 100 kHz.
2. Set the VBW $\geq$ 300 kHz.
3. Set the span to 1.5 times the DTS bandwidth.
4. Detector = peak.
5. Sweep time = auto couple.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

Measurement Procedure OOBE

1. Set RBW = 100 kHz.
2. Set VBW $\geq$ 300 kHz.
3. Detector = peak.
4. Sweep = auto couple.
5. Trace Mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum amplitude level.

Test Setup



The loss between RF output port of the EUT and the input port of the Spectrum Analyzer has been taken into consideration.

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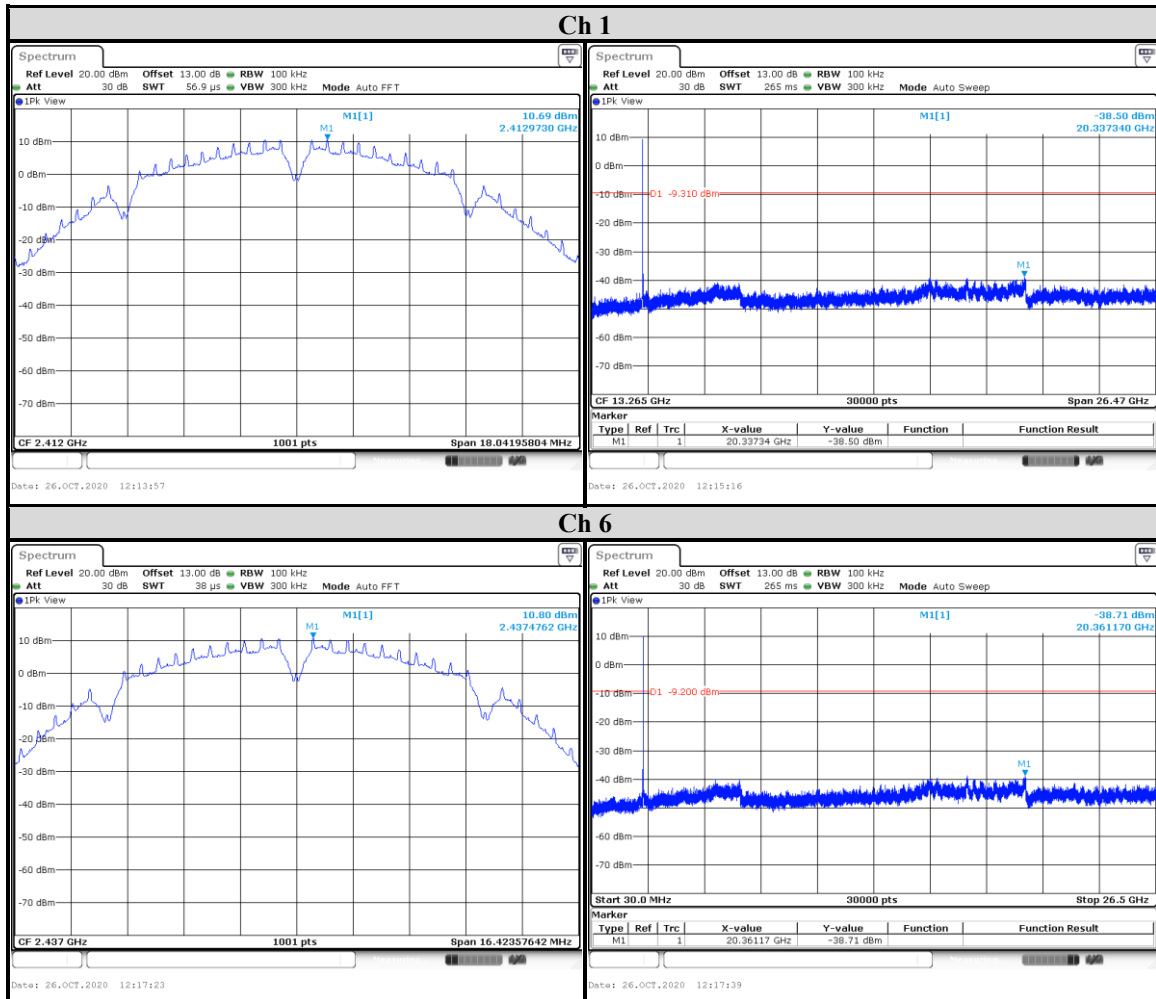


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Test Data

Non-Beamforming mode

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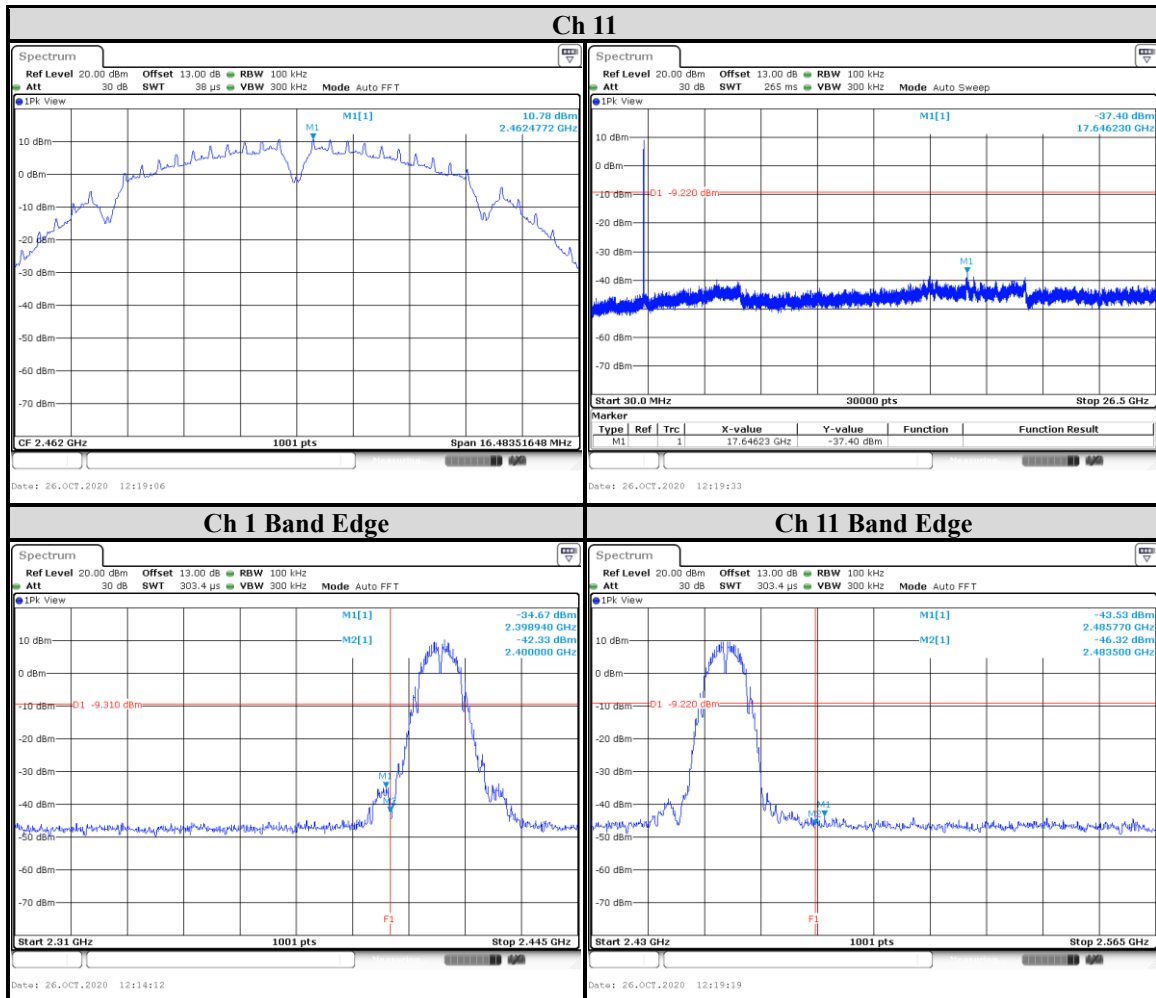
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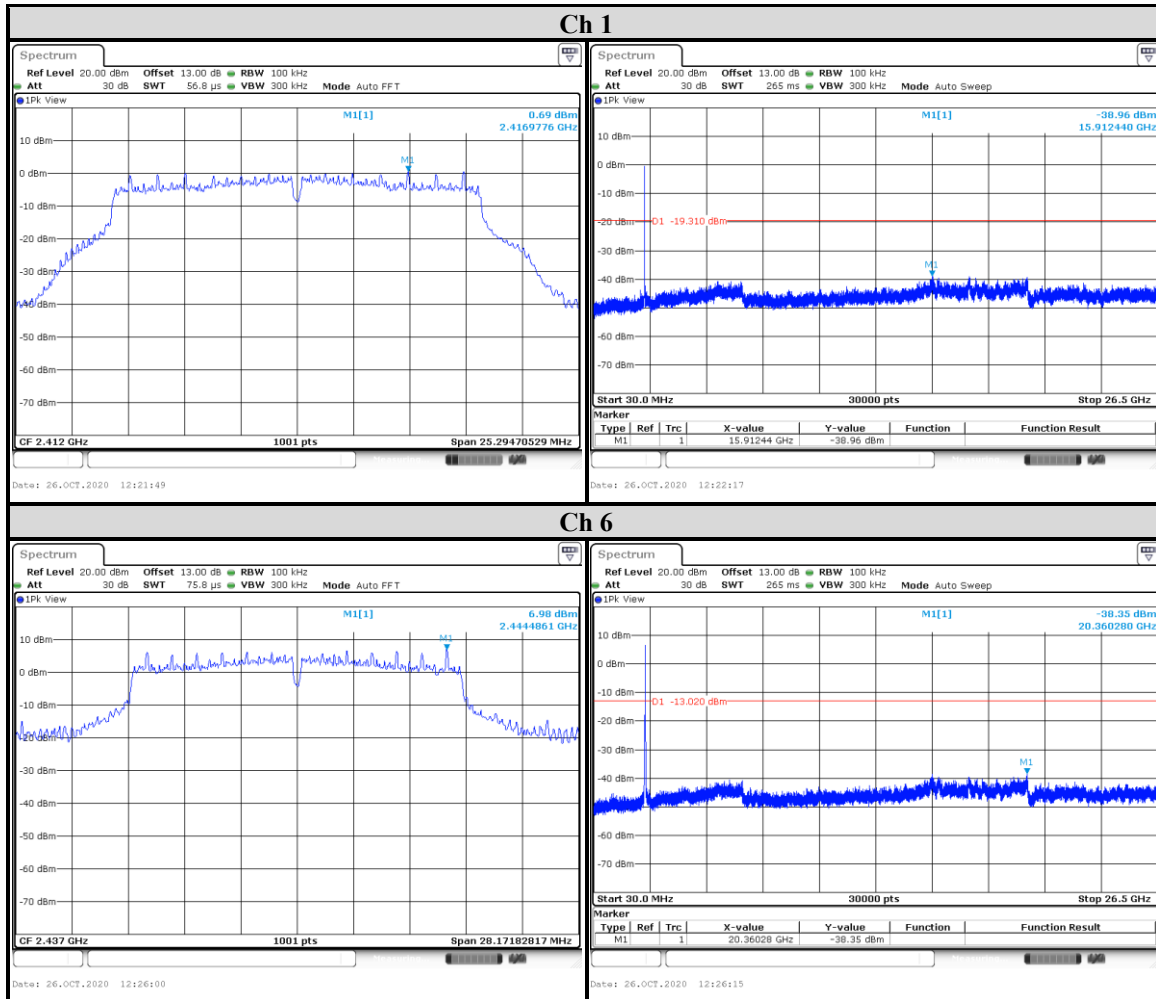
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802.11g

CHAIN 0



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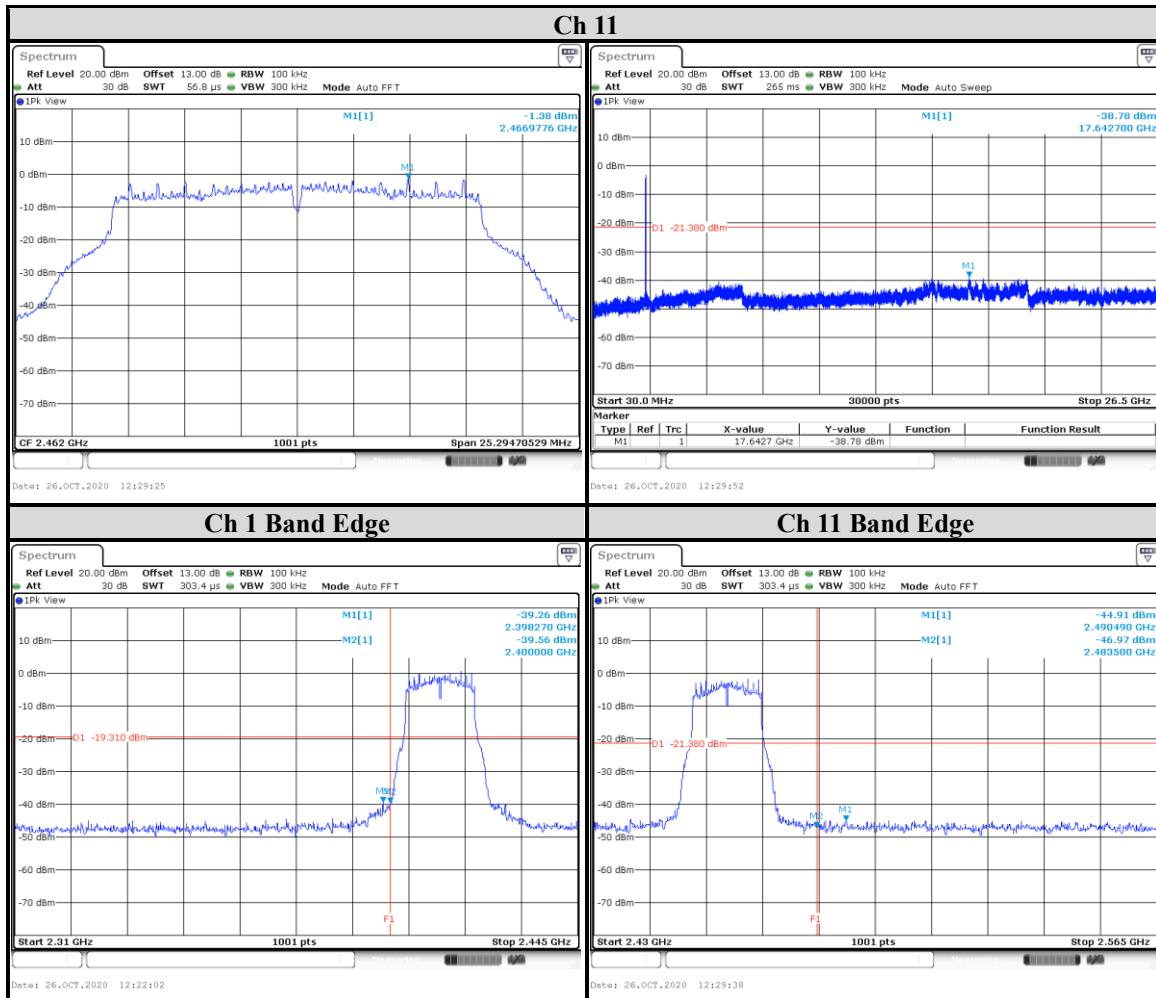
Telephone : +886-2-7737-3000

Facsimile (FAX) : +886-3-583-7948

Doc No: 17-EM-F0876 / 5.0



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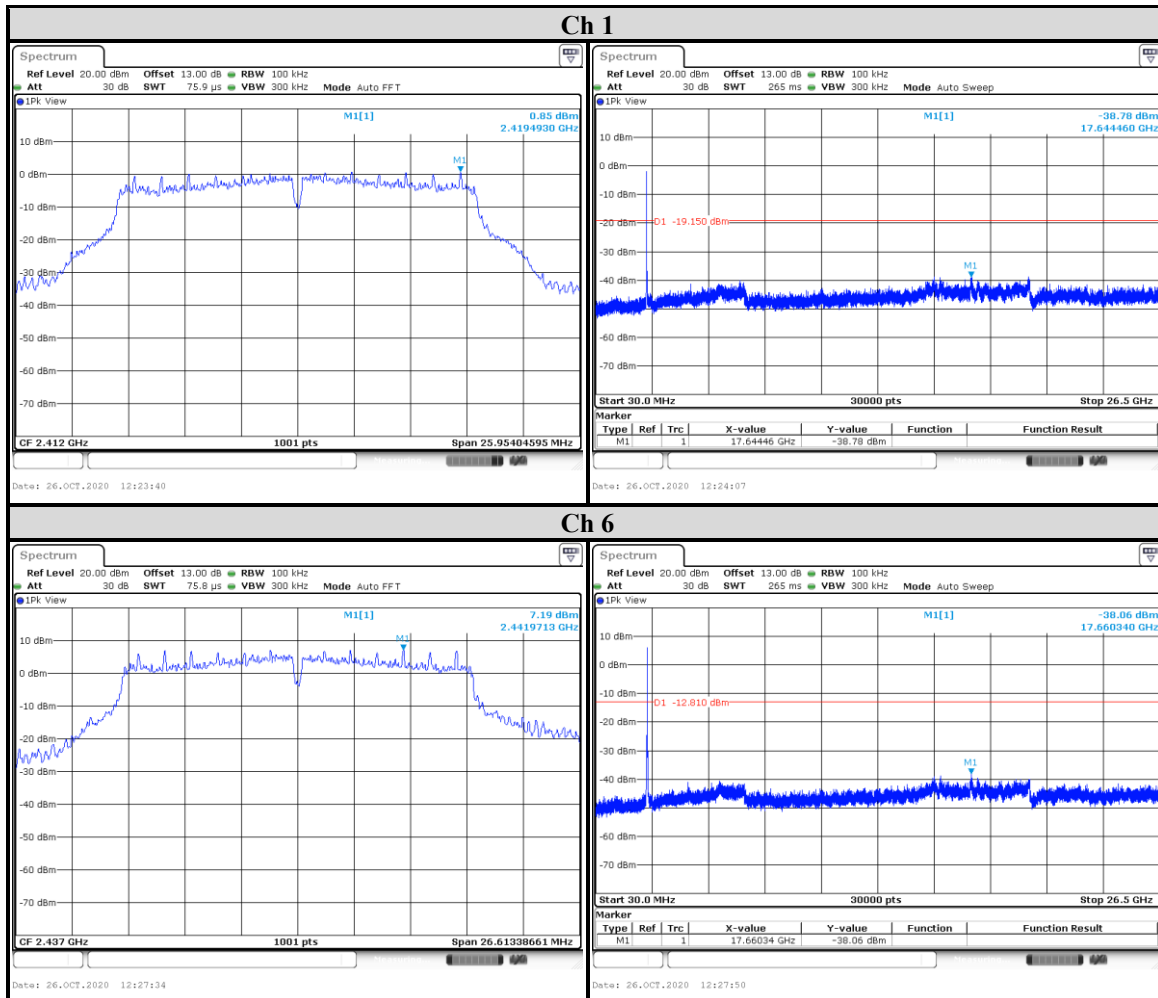
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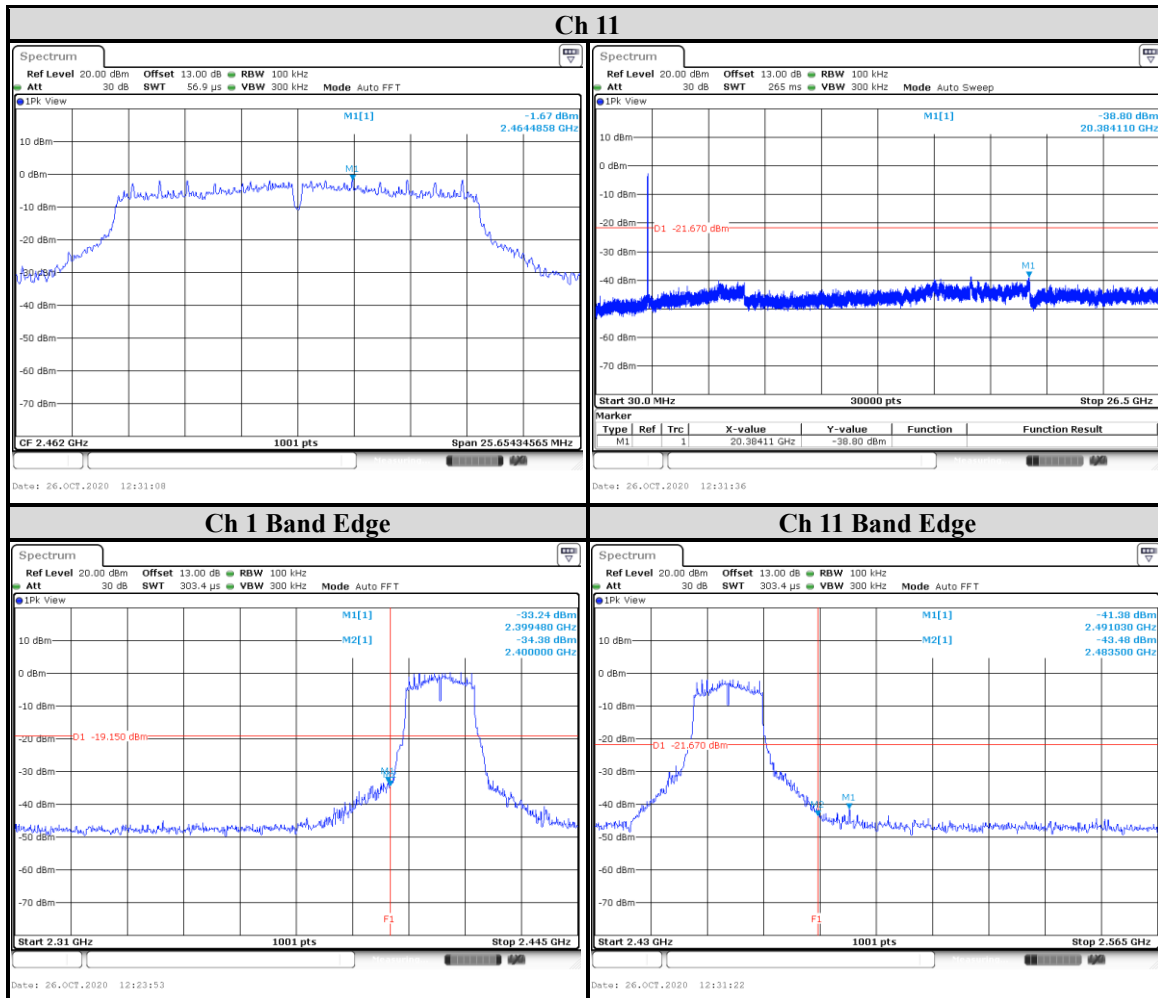
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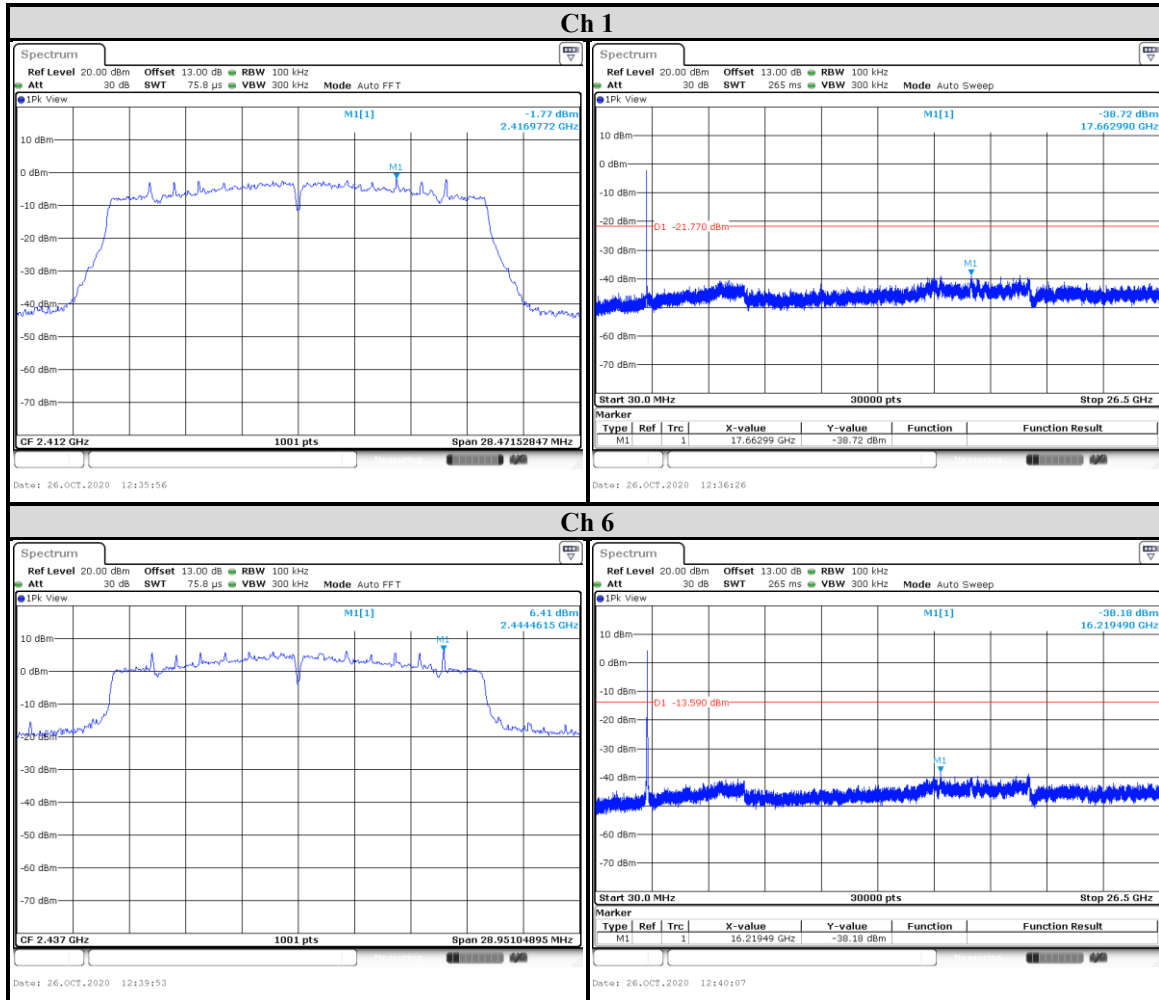
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802.11ax (HE20)

OFDM
CHAIN 0



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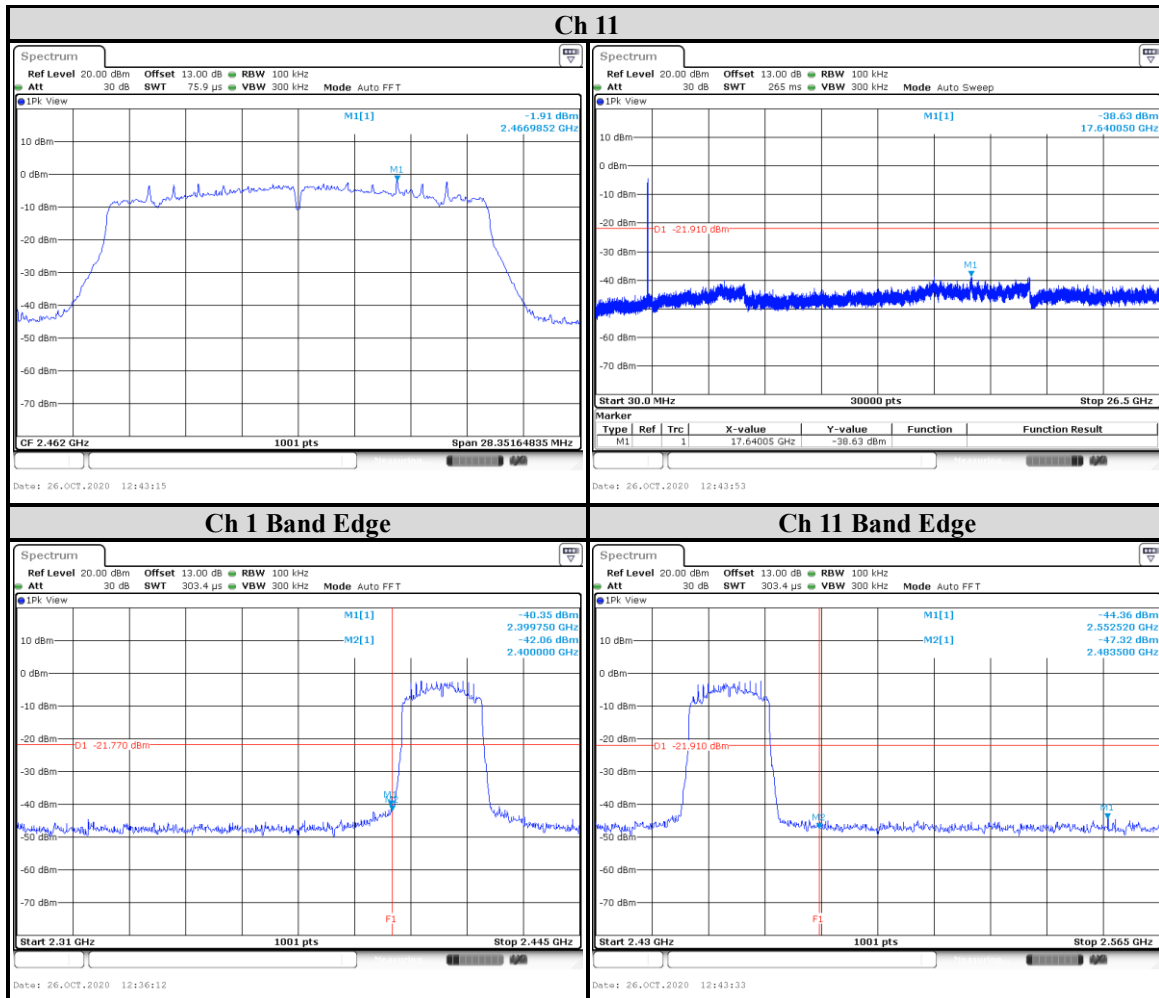
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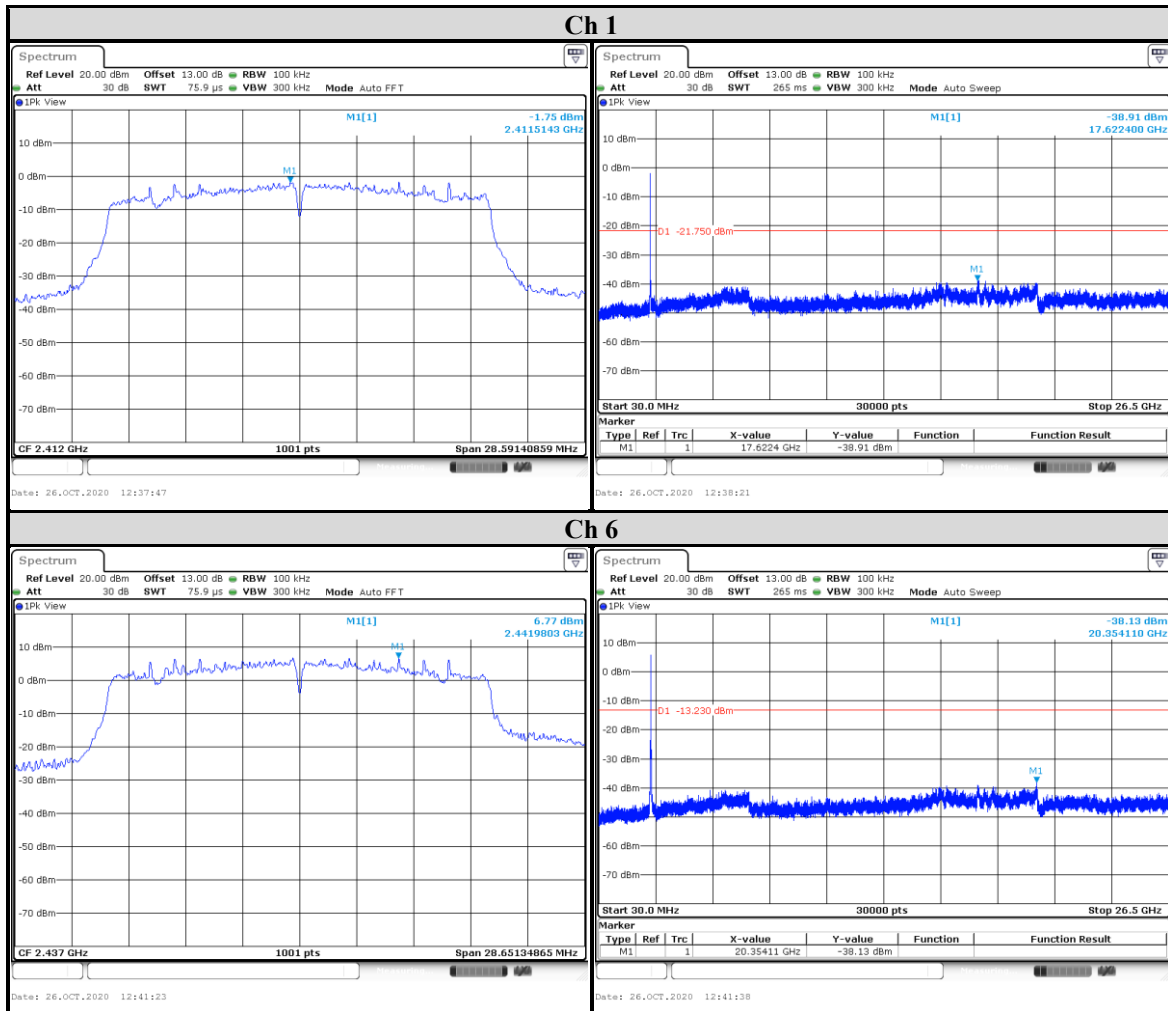
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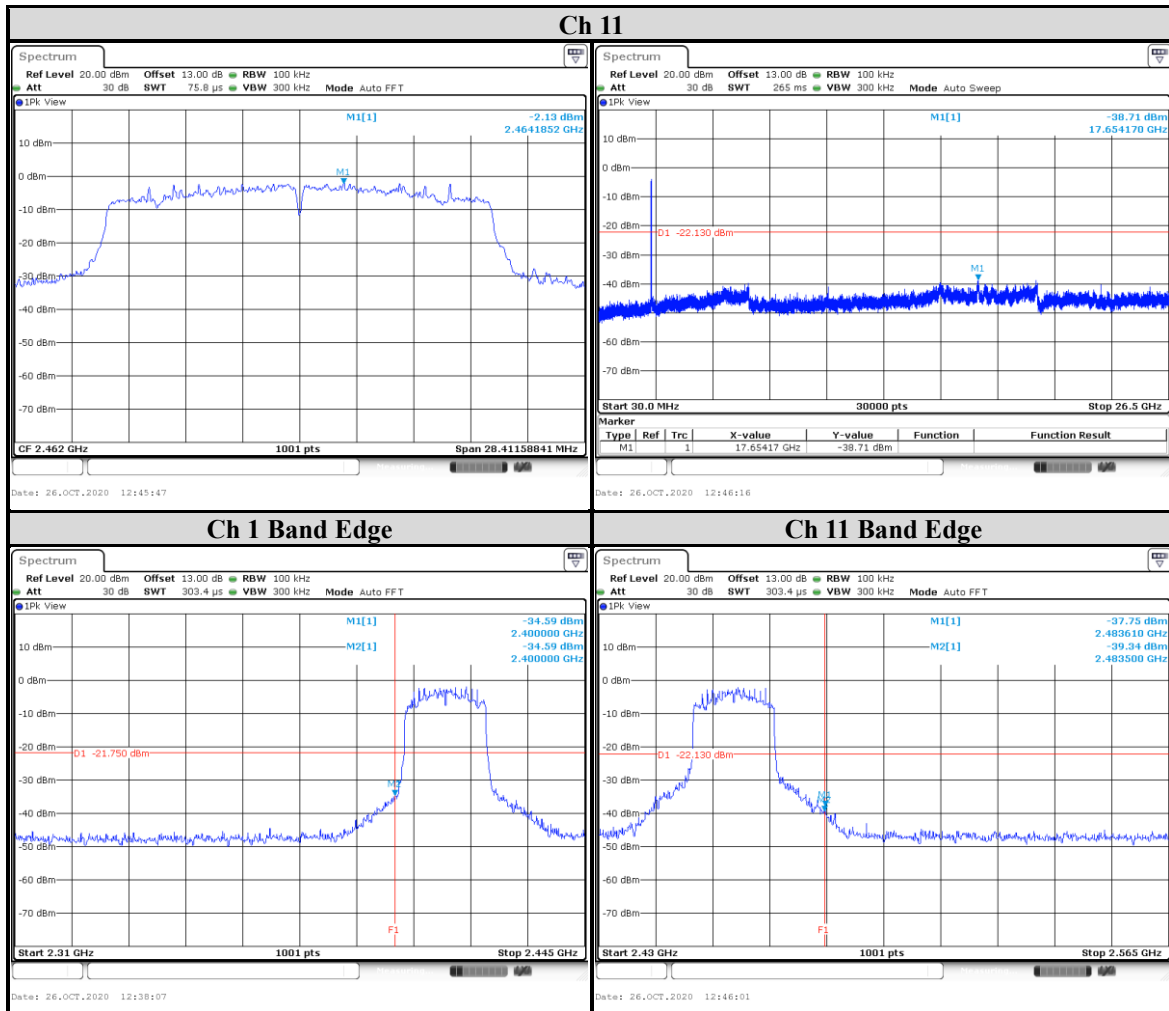
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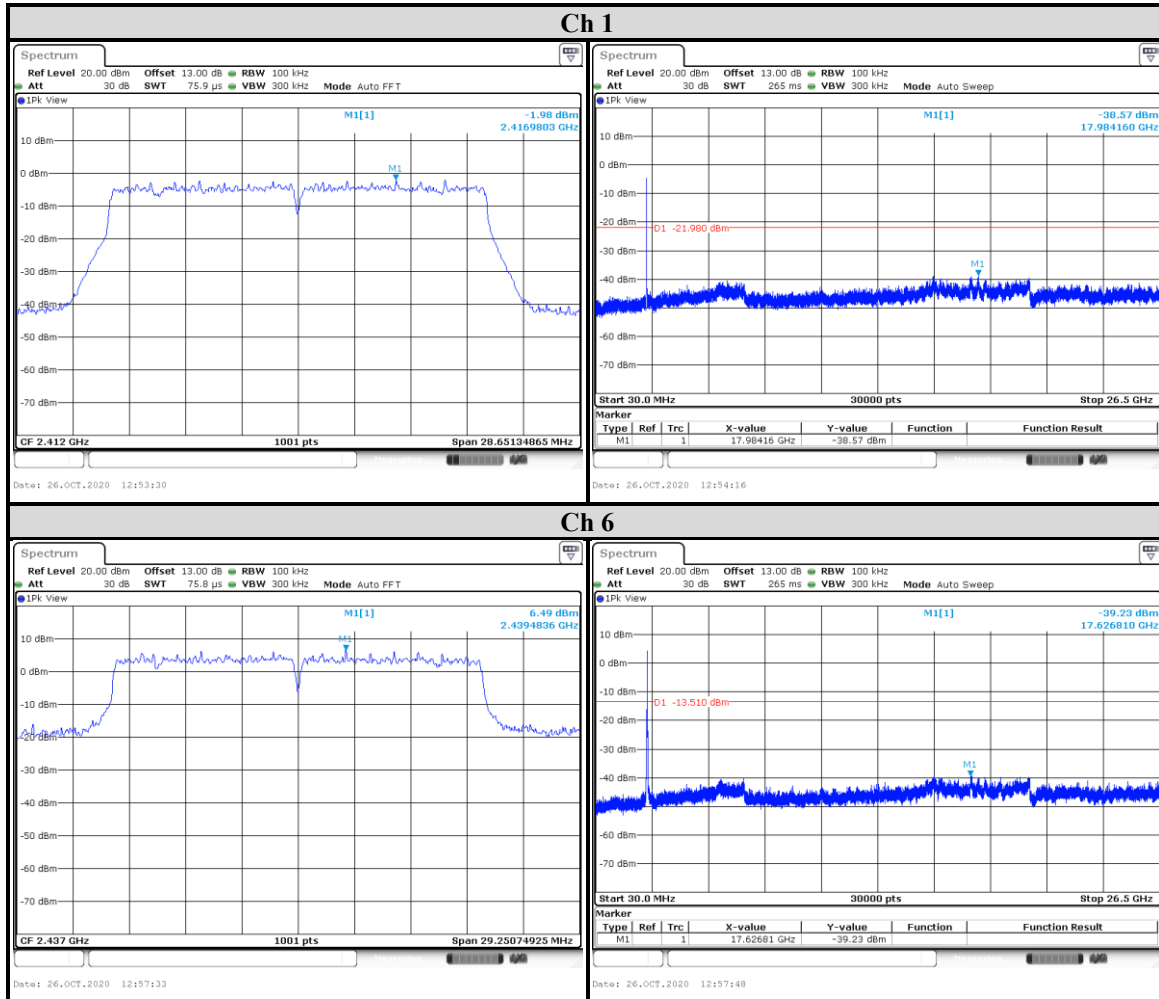
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OFDMA
CHAIN 0



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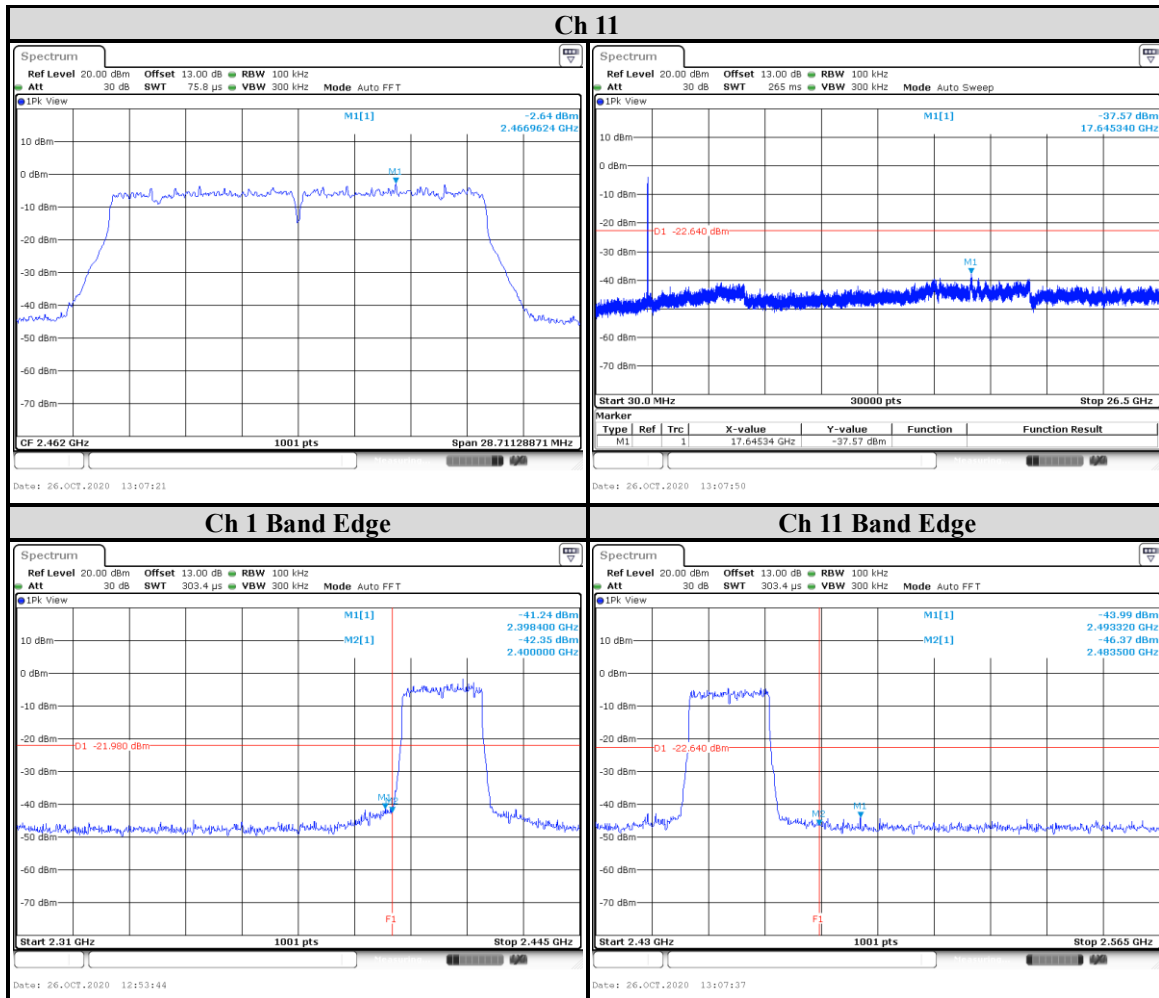
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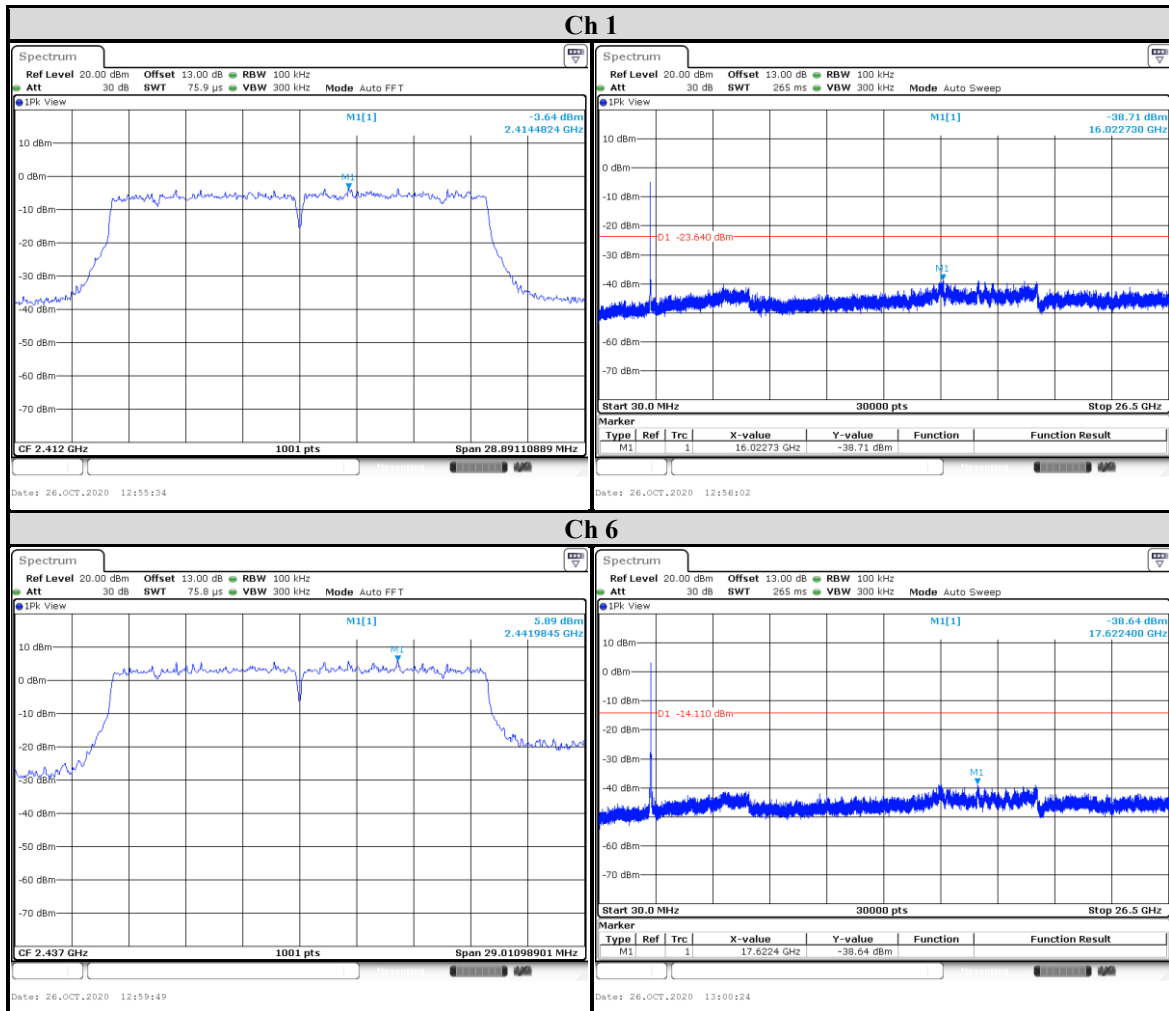
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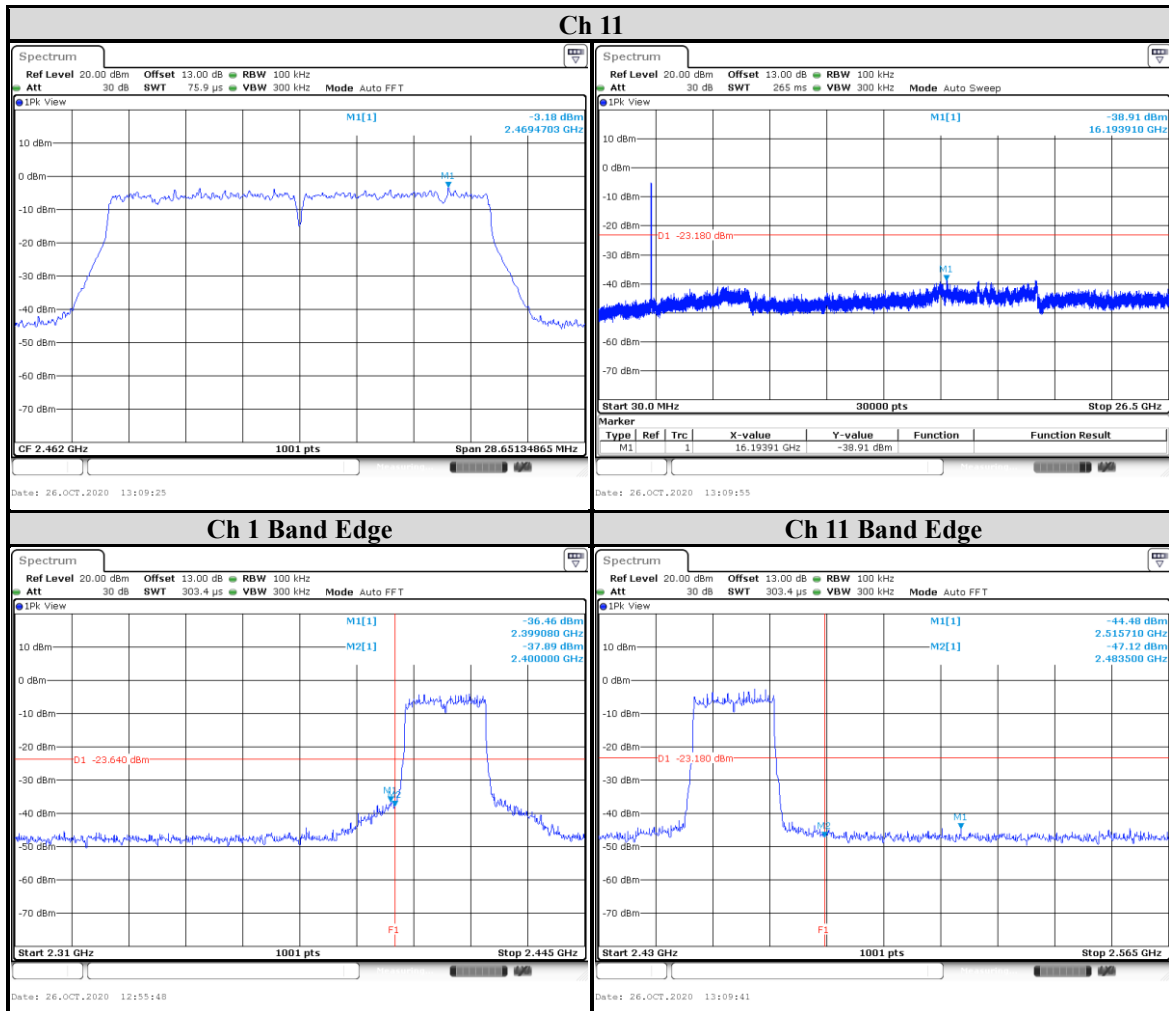
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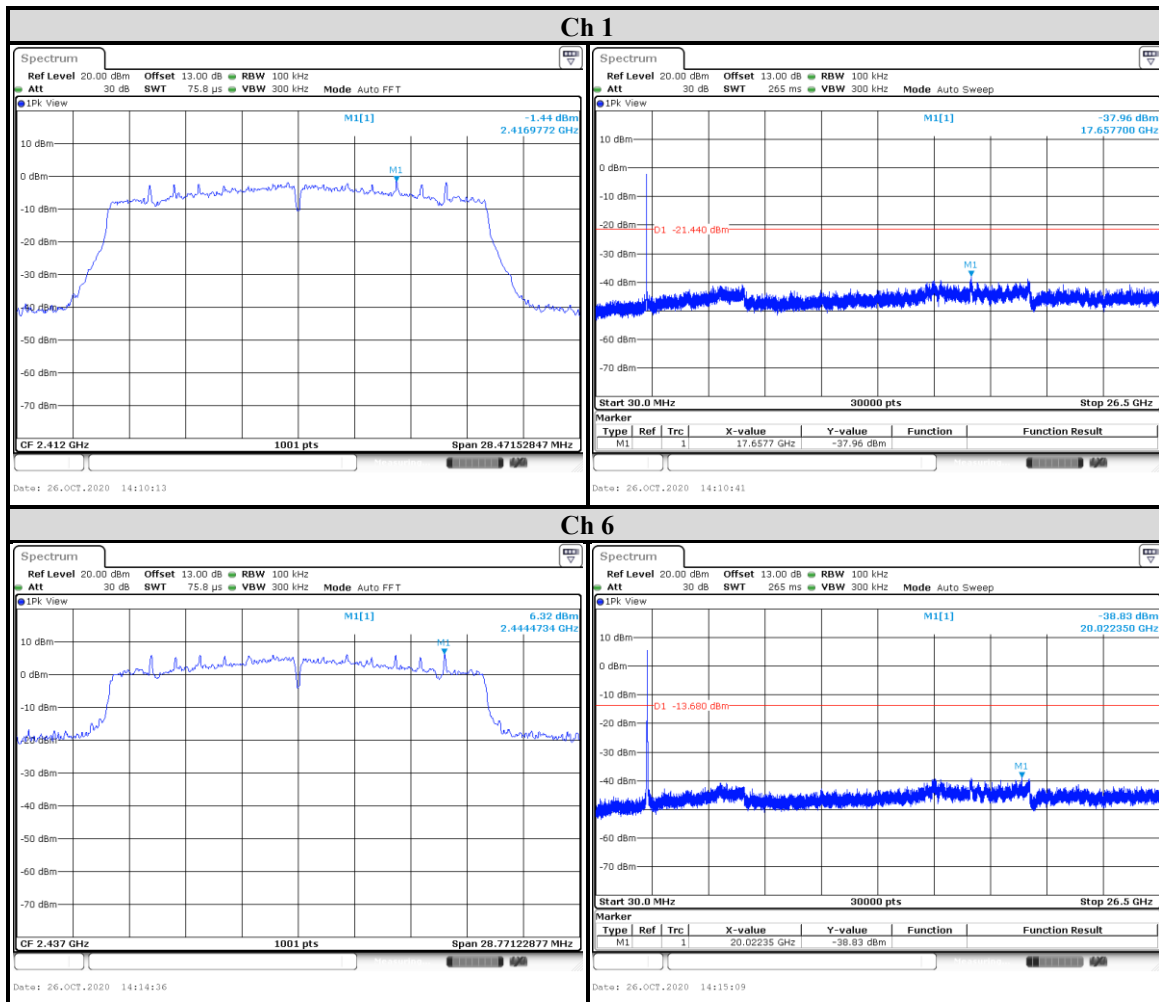


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Beamforming mode

802.11ax (HE20)

OFDM CHAIN 0



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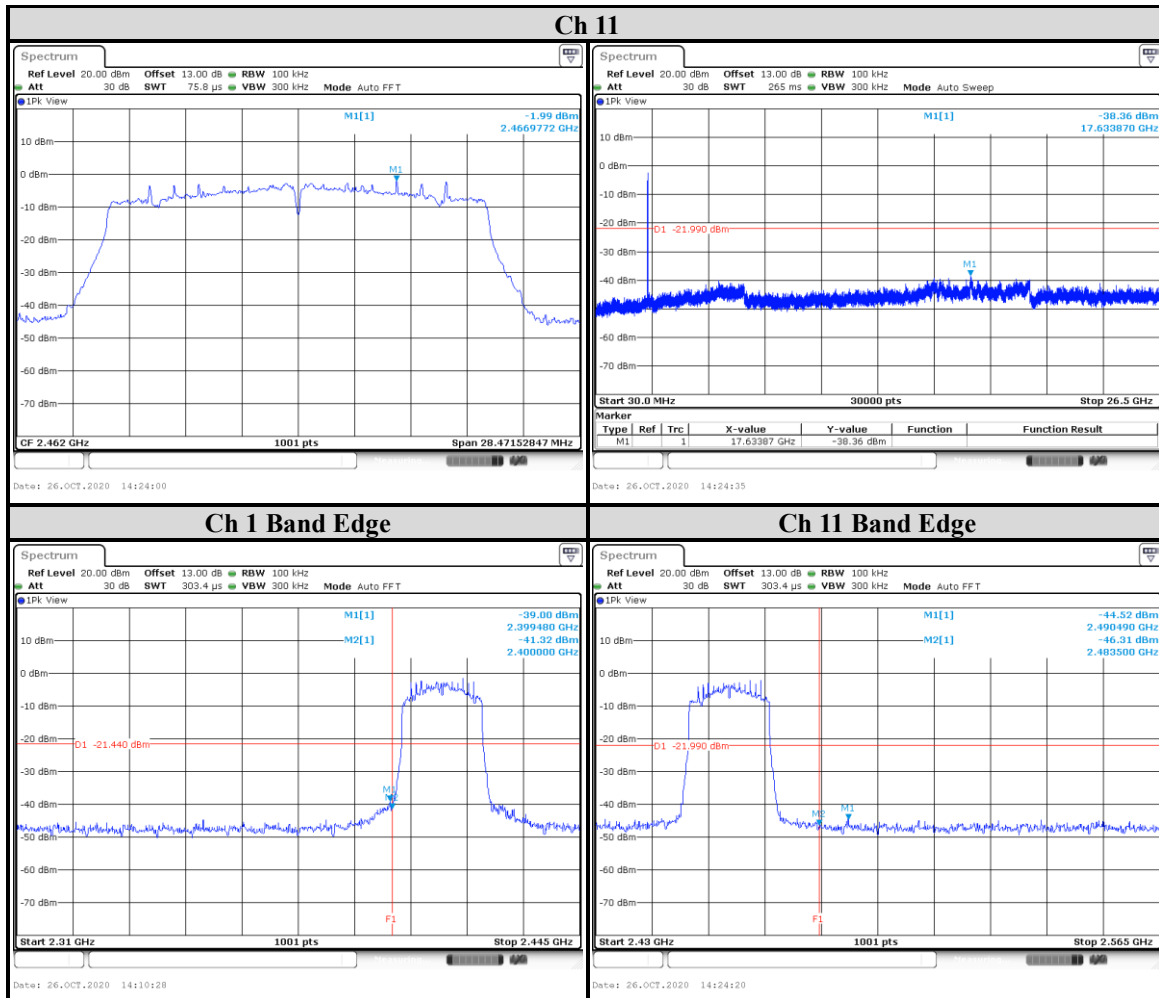
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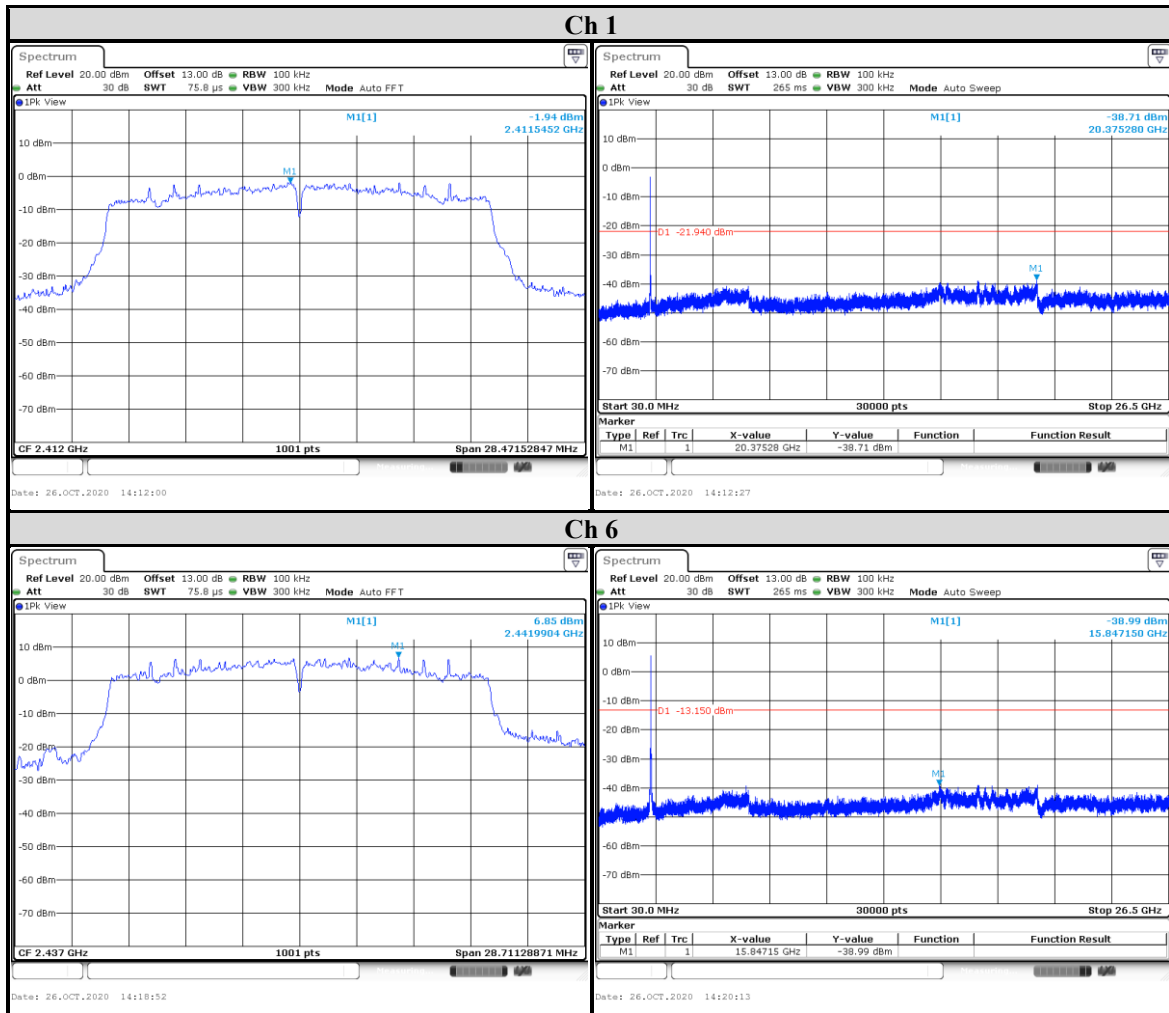
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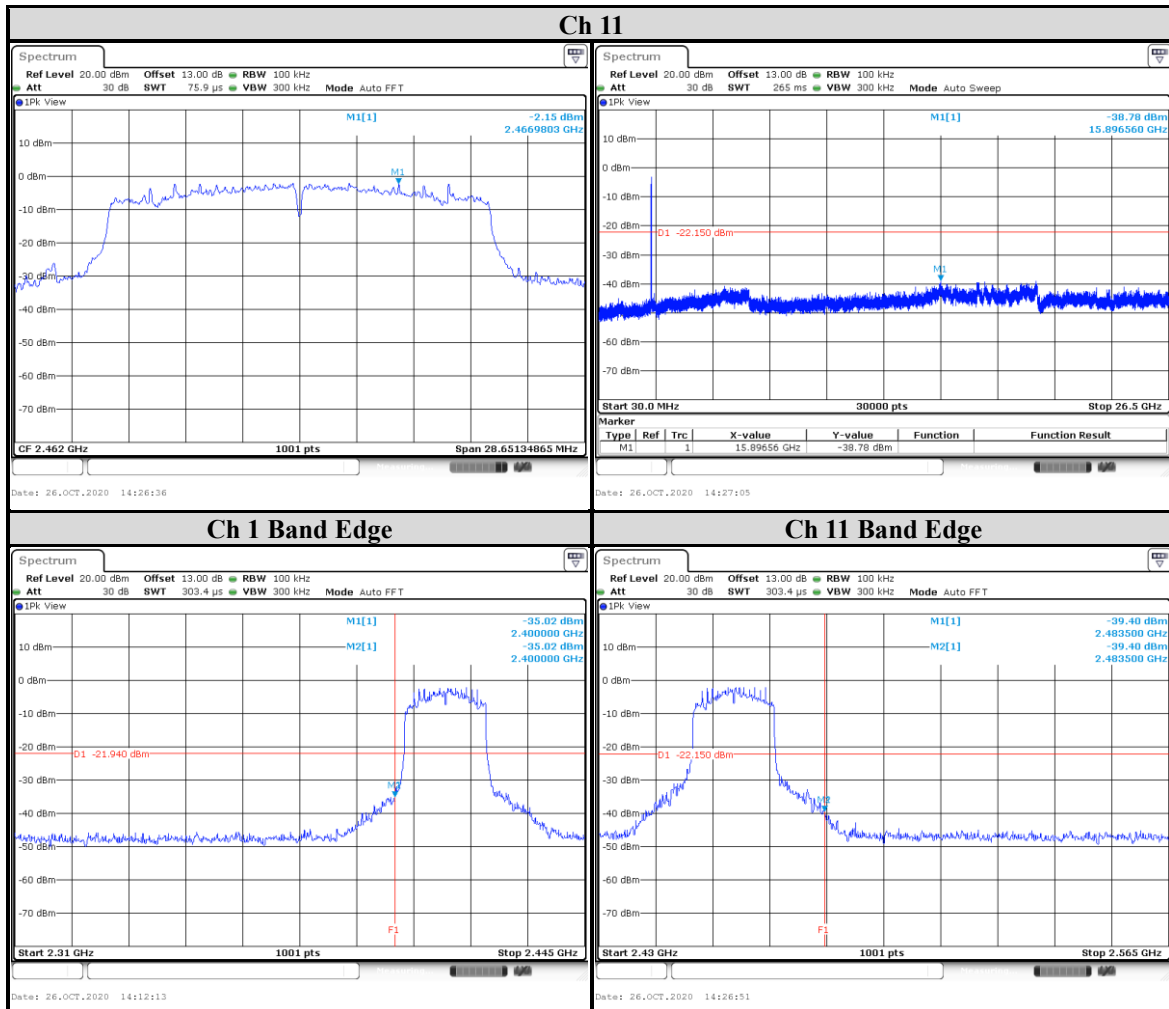
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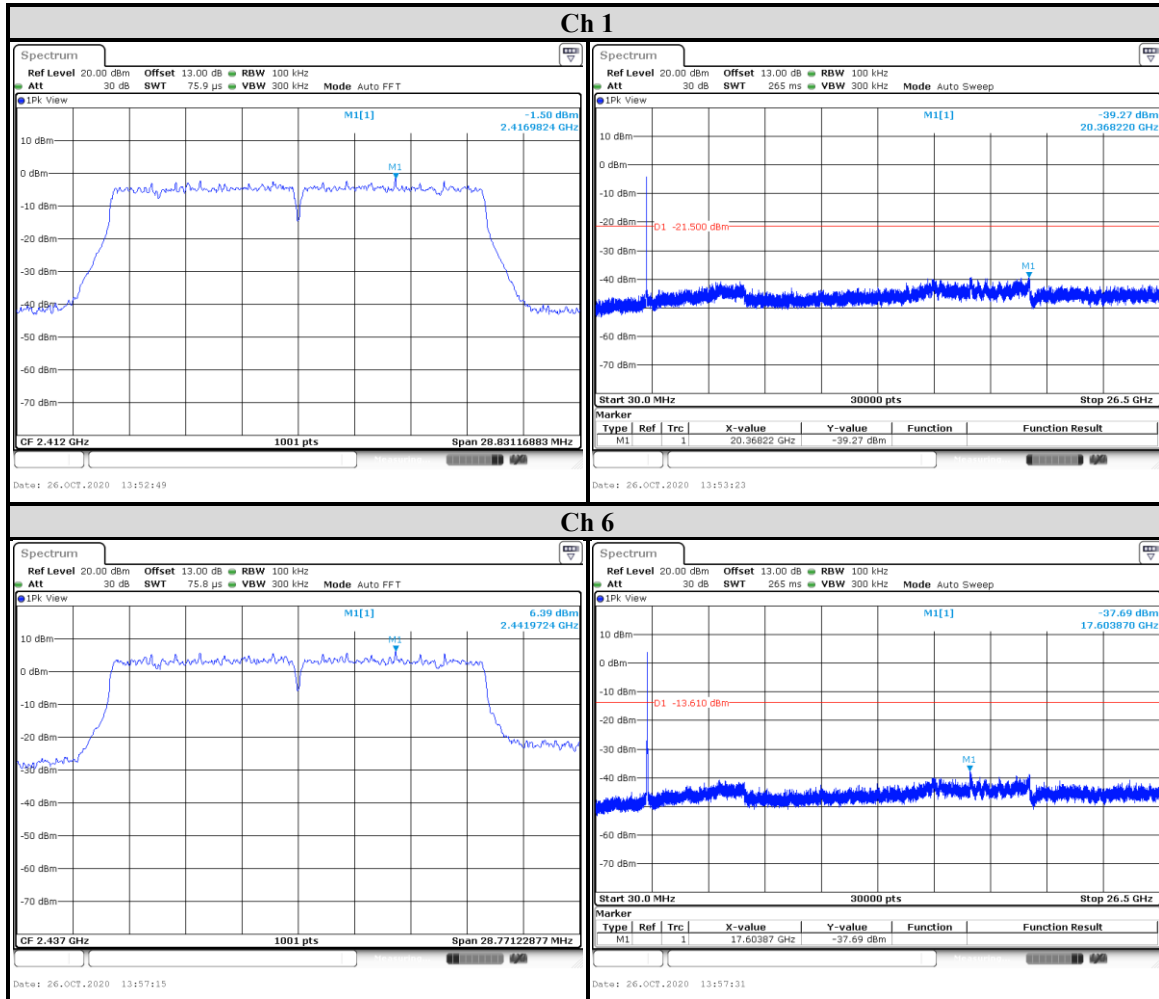
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OFDMA
CHAIN 0



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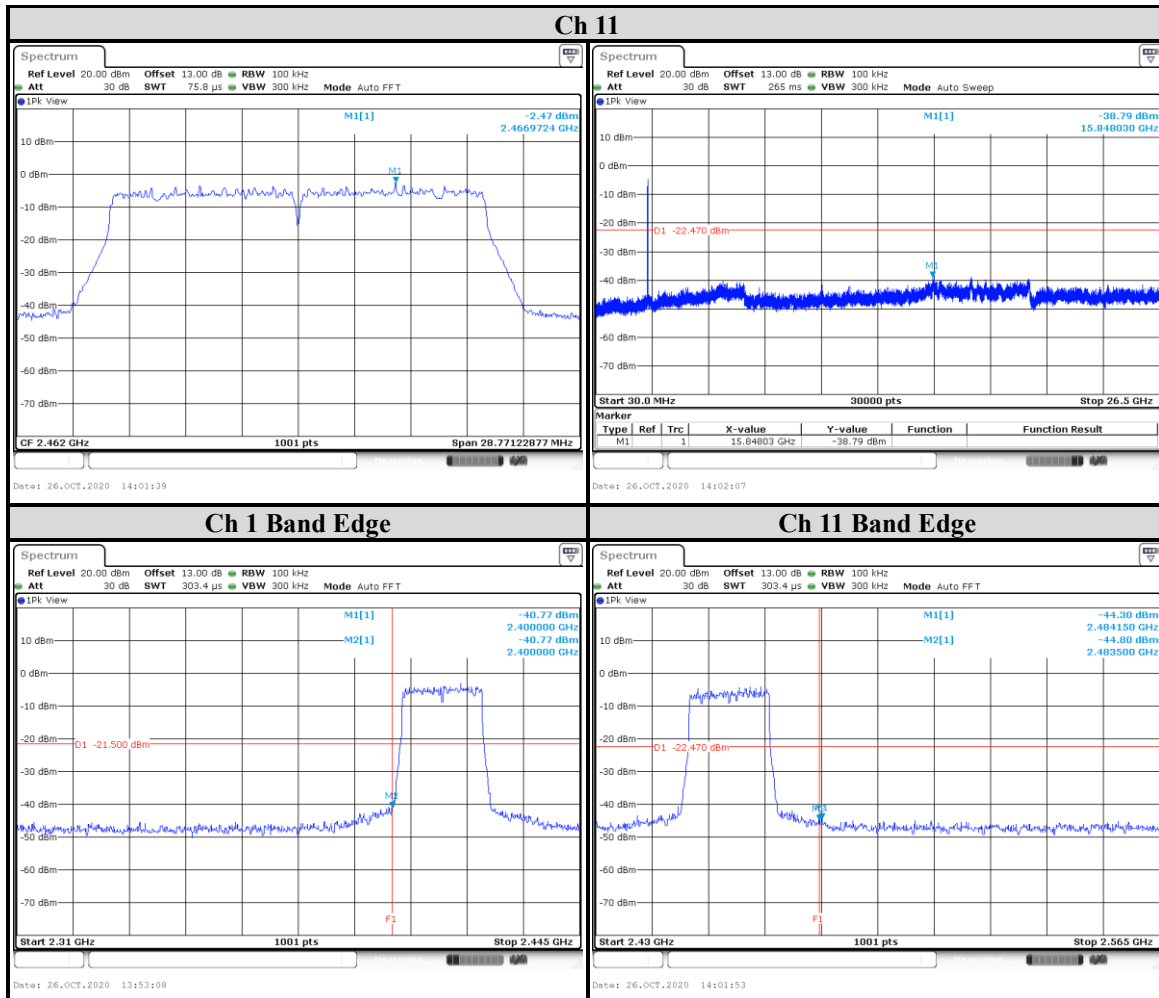
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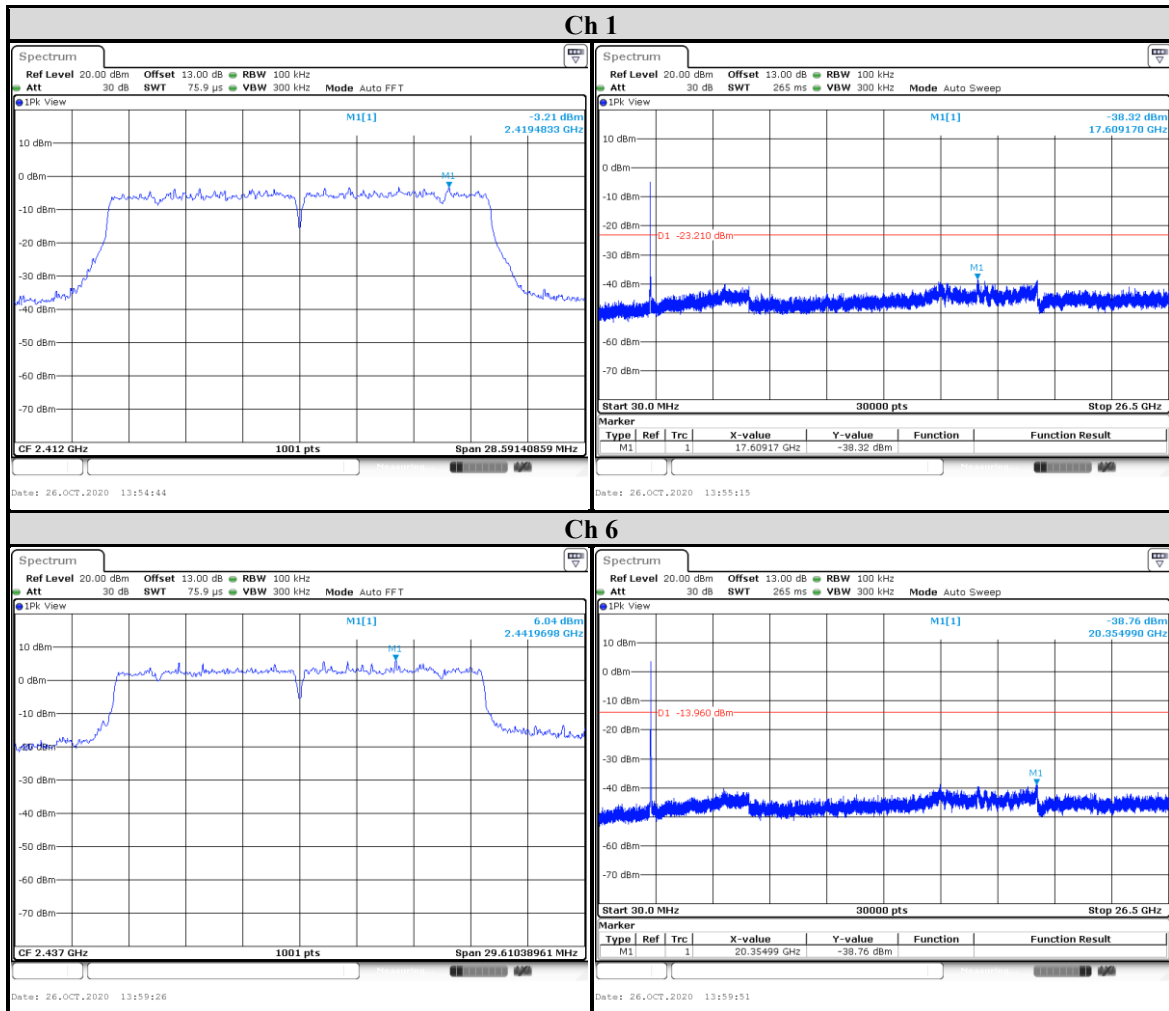
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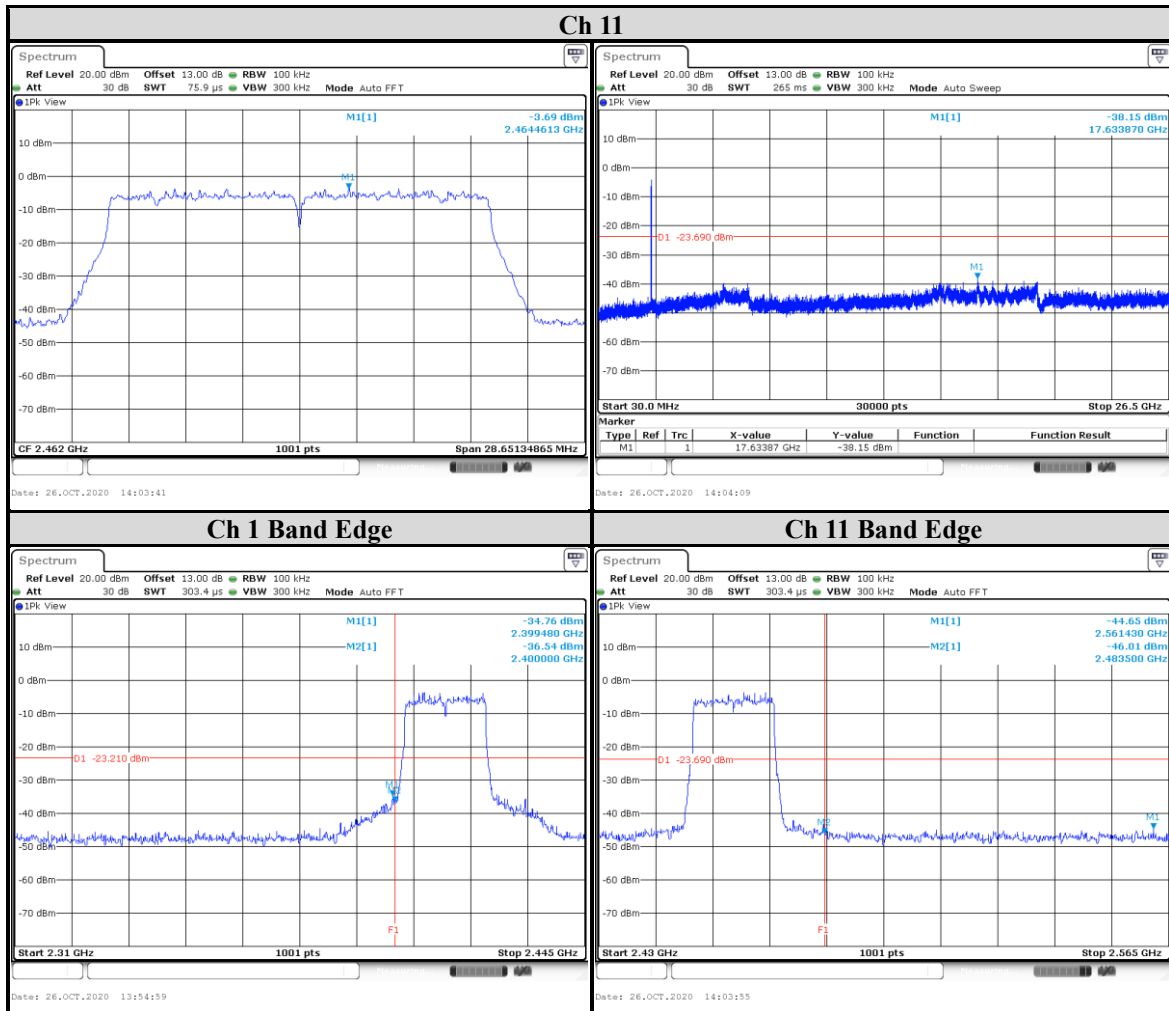
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9.5. Radiated Spurious Emission

Requirements

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

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
Above 960	500	3

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

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Test Procedures

[For 9 kHz ~ 30 MHz]

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. For measurement below 30MHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

[For above 30 MHz]

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. 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 from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
- f. The test-receiver system was set to peak and average detects function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

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Note:

- The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
- The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
- The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is $\geq 1/T$ (Duty cycle $< 98\%$) or 10Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1GHz.

Configuration	Non-Beamforming mode		Beamforming mode	
	Average		Average	
	RBW	RBW	RBW	VBW
802.11b	1MHz	10 Hz	-	-
802.11g		1 kHz	-	-
802.11ax (HE20)_OFDM		1 kHz	1MHz	1 kHz
802.11ax (HE20)_OFDMA		1 kHz		1 kHz

Note: Refer to section 6.6 for duty cycle.

- All modes of operation were investigated (includes all external accessories) and the worst-case emissions are reported.

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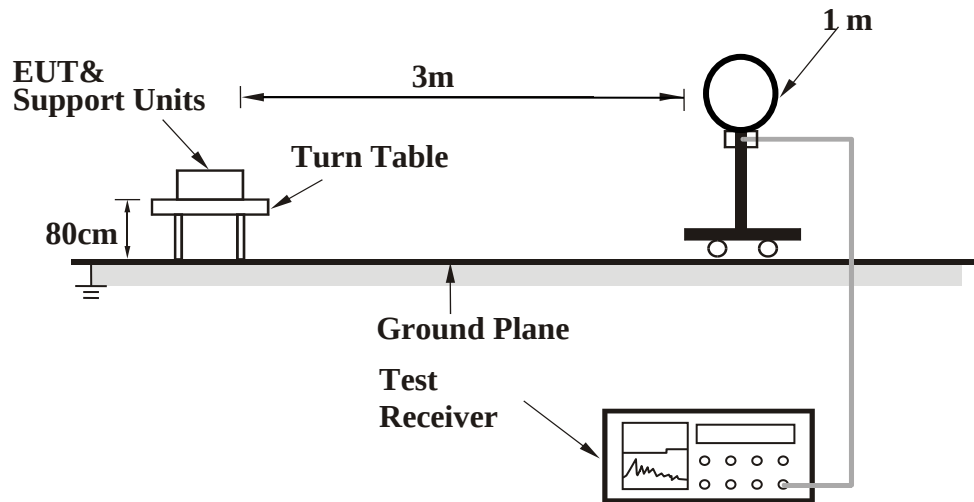
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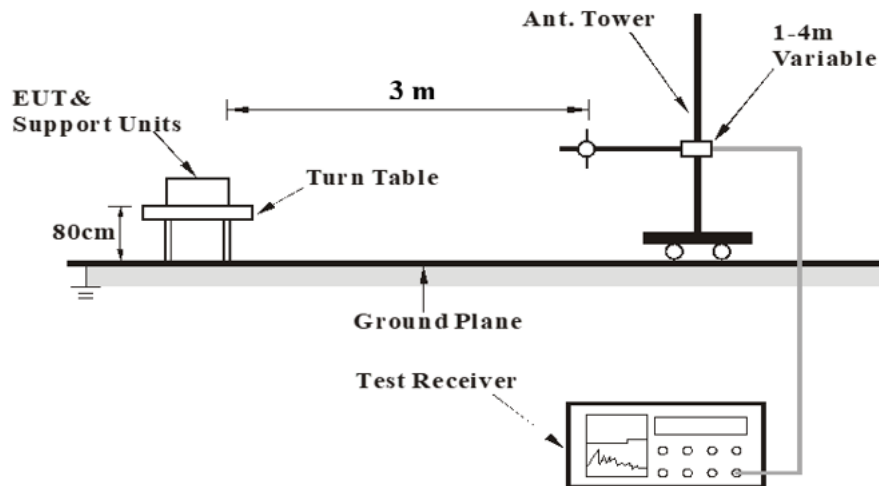
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Test Setup

<Frequency Range 9 kHz ~ 30 MHz>



<Frequency Range 30 MHz ~ 1 GHz >



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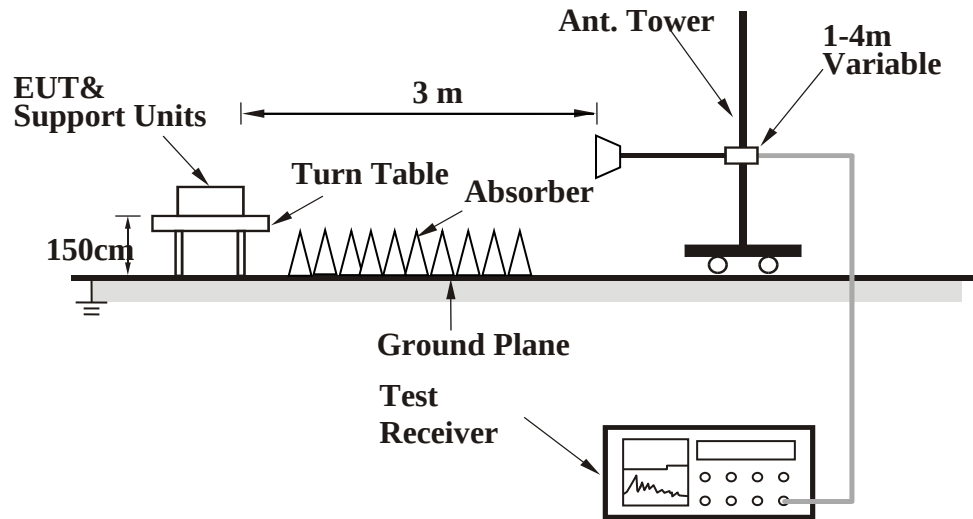
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<Frequency Range above 1 GHz>



For the actual test configuration, please refer to the Setup Configurations.

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Test Data

Above 1GHz Data

Non-Beamforming mode

802.11b

EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	1 GHz ~ 26.5 GHz

Antenna Polarity & Test Distance: Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	2385	47.94	6.74	54.68	74	-19.32	Peak
@	2412	97.44	6.68	104.12	-	-	Peak
-	2385	38.93	6.74	45.67	54	-8.33	Average
@	2412	94.28	6.68	100.96	-	-	Average
*	4824	40.39	3.53	43.92	74	-30.08	Peak
Antenna Polarity & Test Distance: Vertical at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	2385.6	51.5	6.74	58.24	74	-15.76	Peak
@	2412	103.7	6.68	110.38	-	-	Peak
-	2385.2	44.34	6.74	51.08	54	-2.92	Average
@	2412	100.42	6.68	107.1	-	-	Average
*	4824	47.5	3.53	51.03	74	-22.97	Peak

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. "@": Fundamental Frequency.
5. " * ": The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
6. The other emission levels were very low against the limit.

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EUT Test Condition		Measurement Detail	
Channel	Channel 6	Frequency Range	1 GHz ~ 26.5 GHz

Antenna Polarity & Test Distance: Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	2359.8	45.65	6.73	52.38	74	-21.62	Peak
@	2437	97.55	6.59	104.14	-	-	Peak
-	2493.8	43.38	6.53	49.91	74	-24.09	Peak
-	2389.6	34.61	6.74	41.35	54	-12.65	Average
@	2437	95.03	6.59	101.62	-	-	Average
-	2493.4	32.6	6.53	39.13	54	-14.87	Average
*	4874	38.29	3.63	41.92	74	-32.08	Peak
Antenna Polarity & Test Distance: Vertical at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	2354.4	46.65	6.73	53.38	74	-20.62	Peak
@	2437	104.32	6.59	110.91	-	-	Peak
-	2510	50.84	6.57	57.41	74	-16.59	Peak
-	2358.2	38.92	6.73	45.65	54	-8.35	Average
@	2437	100.62	6.59	107.21	-	-	Average
-	2493.8	41.49	6.53	48.02	54	-5.98	Average
*	4874	47.3	3.63	50.93	74	-23.07	Peak

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. "@": Fundamental Frequency.
5. "*": The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
6. The other emission levels were very low against the limit.

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EUT Test Condition		Measurement Detail	
Channel	Channel 11	Frequency Range	1 GHz ~ 26.5 GHz

Antenna Polarity & Test Distance: Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
@	2462	96.34	6.54	102.88	-	-	Peak
-	2489	43.16	6.53	49.69	74	-24.31	Peak
@	2462	94.21	6.54	100.75	-	-	Average
-	2487.8	34.48	6.52	41	54	-13	Average
*	4924	36.53	3.69	40.22	74	-33.78	Peak
Antenna Polarity & Test Distance: Vertical at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
@	2462	104.11	6.54	110.65	-	-	Peak
-	2486	51.66	6.53	58.19	74	-15.81	Peak
@	2462	100.69	6.54	107.23	-	-	Average
-	2488	42.06	6.52	48.58	54	-5.42	Average
*	4924	47.05	3.69	50.74	74	-23.26	Peak

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. "@": Fundamental Frequency.
5. " * ": The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
6. The other emission levels were very low against the limit.

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802.11g

EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	1 GHz ~ 26.5 GHz

Antenna Polarity & Test Distance: Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	2389.8	52.64	6.74	59.38	74	-14.62	Peak
@	2412	96.88	6.68	103.56	-	-	Peak
-	2390	35.16	6.74	41.9	54	-12.1	Average
@	2412	87.62	6.68	94.3	-	-	Average
*	4824	35.9	3.53	39.43	74	-34.57	Peak
Antenna Polarity & Test Distance: Vertical at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	2390	65.46	6.74	72.2	74	-1.8	Peak
@	2412	104.77	6.68	111.45	-	-	Peak
-	2390	46.18	6.74	52.92	54	-1.08	Average
@	2412	95.57	6.68	102.25	-	-	Average
*	4824	40.99	3.53	44.52	74	-29.48	Peak

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. "@": Fundamental Frequency.
5. " * ": The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
6. The other emission levels were very low against the limit.

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EUT Test Condition		Measurement Detail	
Channel	Channel 2	Frequency Range	1 GHz ~ 18 GHz

Antenna Polarity & Test Distance: Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	2389.8	54.57	6.74	61.31	74	-12.69	Peak
@	2417	95.74	6.66	102.4	-	-	Peak
-	2390	39.02	6.74	45.76	54	-8.24	Average
@	2417	88.71	6.66	95.37	-	-	Average
*	4834	36.35	3.56	39.91	74	-34.09	Peak
Antenna Polarity & Test Distance: Vertical at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	2389	60.81	6.73	67.54	74	-6.46	Peak
@	2417	104.35	6.66	111.01	-	-	Peak
-	2389.6	45.93	6.74	52.67	54	-1.33	Peak
@	2417	98.37	6.66	105.03	-	-	Peak
*	4834	34.97	3.56	38.53	74	-35.47	Peak

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. "@": Fundamental Frequency.
5. " * ": The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
6. The other emission levels were very low against the limit.

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EUT Test Condition		Measurement Detail	
Channel	Channel 6	Frequency Range	1 GHz ~ 26.5 GHz

Antenna Polarity & Test Distance: Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	2387.6	56.91	6.73	63.64	74	-10.36	Peak
@	2437	102.29	6.59	108.88	-	-	Peak
-	2487.6	54.67	6.52	61.19	74	-12.81	Peak
-	2390	38.46	6.74	45.2	54	-8.8	Average
@	2437	93.23	6.59	99.82	-	-	Average
-	2484.4	38.97	6.53	45.5	54	-8.5	Average
*	4874	37.08	3.63	40.71	74	-33.29	Peak
Antenna Polarity & Test Distance: Vertical at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	2388.6	63.04	6.73	69.77	74	-4.23	Peak
@	2437	108.32	6.59	114.91	-	-	Peak
-	2487.8	61.03	6.52	67.55	74	-6.45	Peak
-	2389.6	43.75	6.74	50.49	54	-3.51	Average
@	2437	99.95	6.59	106.54	-	-	Average
-	2484.8	45.61	6.53	52.14	54	-1.86	Average
*	4874	44.66	3.63	48.29	74	-25.71	Peak

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. "@": Fundamental Frequency.
5. "*": The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
6. The other emission levels were very low against the limit.

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EUT Test Condition		Measurement Detail	
Channel	Channel 10	Frequency Range	1 GHz ~ 18 GHz

Antenna Polarity & Test Distance: Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
@	2457	98	6.54	104.54	-	-	Peak
-	2486.6	51.59	6.53	58.12	74	-15.88	Peak
@	2457	88.68	6.54	95.22	-	-	Average
-	2484.2	37.73	6.53	44.26	54	-9.74	Average
*	4914	35.96	3.68	39.64	74	-34.36	Peak
Antenna Polarity & Test Distance: Vertical at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
@	2457	105.45	6.54	111.99	-	-	Peak
-	2484.8	59.72	6.53	66.25	74	-7.75	Peak
@	2457	97.76	6.54	104.3	-	-	Peak
-	2484	46.03	6.53	52.56	54	-1.44	Peak
*	4914	37.77	3.68	41.45	74	-32.55	Peak

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. "@": Fundamental Frequency.
5. " * ": The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
6. The other emission levels were very low against the limit.

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EUT Test Condition		Measurement Detail	
Channel	Channel 11	Frequency Range	1 GHz ~ 26.5 GHz

Antenna Polarity & Test Distance: Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
@	2462	93.73	6.54	100.27	-	-	Peak
-	2483.8	45.07	6.53	51.6	74	-22.4	Peak
@	2462	84.58	6.54	91.12	-	-	Average
-	2483.6	33.03	6.53	39.56	54	-14.44	Average
*	4924	36.85	3.69	40.54	74	-33.46	Peak
Antenna Polarity & Test Distance: Vertical at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
@	2462	102.77	6.54	109.31	-	-	Peak
-	2484	65.2	6.53	71.73	74	-2.27	Peak
@	2462	94.98	6.54	101.52	-	-	Average
-	2483.6	46.07	6.53	52.6	54	-1.4	Average
*	4924	40.2	3.69	43.89	74	-30.11	Peak

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. "@": Fundamental Frequency.
5. " * ": The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
6. The other emission levels were very low against the limit.

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802.11ax (HE20)

OFDM

EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	1 GHz ~ 26.5 GHz

Antenna Polarity & Test Distance: Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	2388.8	48.79	6.73	55.52	74	-18.48	Peak
@	2412	95.86	6.68	102.54	-	-	Peak
-	2389.6	34.75	6.74	41.49	54	-12.51	Average
@	2412	84.59	6.68	91.27	-	-	Average
*	4824	35.95	3.53	39.48	74	-34.52	Peak
Antenna Polarity & Test Distance: Vertical at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	2388.8	57.54	6.73	64.27	74	-9.73	Peak
@	2412	103.55	6.68	110.23	-	-	Peak
-	2390	45.81	6.74	52.55	54	-1.45	Average
@	2412	90.9	6.68	97.58	-	-	Average
*	4824	39.35	3.53	42.88	74	-31.12	Peak

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. "@": Fundamental Frequency.
5. "*": The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
6. The other emission levels were very low against the limit.

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EUT Test Condition		Measurement Detail	
Channel	Channel 2	Frequency Range	1 GHz ~ 18 GHz

Antenna Polarity & Test Distance: Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	2388.4	54.79	6.73	61.52	74	-12.48	Peak
@	2417	99.55	6.66	106.21	-	-	Peak
-	2388.8	38.14	6.73	44.87	54	-9.13	Average
@	2417	88.51	6.66	95.17	-	-	Average
*	4834	36.64	3.56	40.2	74	-33.8	Peak
Antenna Polarity & Test Distance: Vertical at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	2389.6	56.6	6.74	63.34	74	-10.66	Peak
@	2417	103.86	6.66	110.52	-	-	Peak
-	2390	46.06	6.74	52.8	54	-1.2	Average
@	2417	97.64	6.66	104.3	-	-	Average
*	4834	36.6	3.56	40.16	74	-33.84	Peak

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. "@": Fundamental Frequency.
5. " * ": The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
6. The other emission levels were very low against the limit.

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EUT Test Condition		Measurement Detail	
Channel	Channel 6	Frequency Range	1 GHz ~ 26.5 GHz

Antenna Polarity & Test Distance: Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	2387.6	54.85	6.73	61.58	74	-12.42	Peak
@	2437	103.04	6.59	109.63	-	-	Peak
-	2486.4	53.68	6.53	60.21	74	-13.79	Peak
-	2388.8	38.78	6.73	45.51	54	-8.49	Average
@	2437	91.79	6.59	98.38	-	-	Average
-	2483.8	38.75	6.53	45.28	54	-8.72	Average
*	4874	37.49	3.63	41.12	74	-32.88	Peak
Antenna Polarity & Test Distance: Vertical at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	2390	60.66	6.74	67.4	74	-6.6	Peak
@	2437	108.94	6.59	115.53	-	-	Peak
-	2484	63.32	6.53	69.85	74	-4.15	Peak
-	2389.4	44.77	6.73	51.5	54	-2.5	Average
@	2437	98.75	6.59	105.34	-	-	Average
-	2483.8	46.46	6.53	52.99	54	-1.01	Average
*	4874	42.65	3.63	46.28	74	-27.72	Peak

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. "@": Fundamental Frequency.
5. "*": The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
6. The other emission levels were very low against the limit.

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EUT Test Condition		Measurement Detail	
Channel	Channel 10	Frequency Range	1 GHz ~ 18 GHz

Antenna Polarity & Test Distance: Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
@	2457	96.97	6.54	103.51	-	-	Peak
-	2483.6	51.31	6.53	57.84	74	-16.16	Peak
@	2457	88.23	6.54	94.77	-	-	Average
-	2483.8	37.89	6.53	44.42	54	-9.58	Average
*	4914	36.38	3.68	40.06	74	-33.94	Peak
Antenna Polarity & Test Distance: Vertical at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
@	2457	103.73	6.54	110.27	-	-	Peak
-	2484.4	60.52	6.53	67.05	74	-6.95	Peak
@	2457	96.08	6.54	102.62	-	-	Average
-	2484	46.2	6.53	52.73	54	-1.27	Average
*	4914	36.04	3.68	39.72	74	-34.28	Peak

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. "@": Fundamental Frequency.
5. " * ": The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
6. The other emission levels were very low against the limit.

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EUT Test Condition		Measurement Detail	
Channel	Channel 11	Frequency Range	1 GHz ~ 26.5 GHz

Antenna Polarity & Test Distance: Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
@	2462	94.38	6.54	100.92	-	-	Peak
-	2484.6	47.22	6.53	53.75	74	-20.25	Peak
@	2462	82.85	6.54	89.39	-	-	Average
-	2484.4	32.65	6.53	39.18	54	-14.82	Average
*	4924	35.21	3.69	38.9	74	-35.1	Peak
Antenna Polarity & Test Distance: Vertical at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
@	2462	103.59	6.54	110.13	-	-	Peak
-	2486	62.21	6.53	68.74	74	-5.26	Peak
@	2462	93.99	6.54	100.53	-	-	Average
-	2483.6	45.97	6.53	52.5	54	-1.5	Average
*	4924	37.21	3.69	40.9	74	-33.1	Peak

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. "@": Fundamental Frequency.
5. " * ": The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
6. The other emission levels were very low against the limit.

Underwriters Laboratories Taiwan Co., Ltd.

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Doc No: 17-EM-F0876 / 5.0



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OFDMA

EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	1 GHz ~ 26.5 GHz

Antenna Polarity & Test Distance: Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	2388.8	50.73	6.73	57.46	74	-16.54	Peak
@	2412	94.12	6.68	100.8	-	-	Peak
-	2389.8	34.96	6.74	41.7	54	-12.3	Average
@	2412	82.34	6.68	89.02	-	-	Average
*	4824	36.44	3.53	39.97	74	-34.03	Peak
Antenna Polarity & Test Distance: Vertical at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	2389	65.5	6.73	72.23	74	-1.77	Peak
@	2412	102.96	6.68	109.64	-	-	Peak
-	2390	45.81	6.74	52.55	54	-1.45	Average
@	2412	90.9	6.68	97.58	-	-	Average
*	4824	38.11	3.53	41.64	74	-32.36	Peak

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. "@": Fundamental Frequency.
5. "*": The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
6. The other emission levels were very low against the limit.

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EUT Test Condition		Measurement Detail	
Channel	Channel 2	Frequency Range	1 GHz ~ 18 GHz

Antenna Polarity & Test Distance: Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	2389.6	54.06	6.74	60.8	74	-13.2	Peak
@	2417	97.54	6.66	104.2	-	-	Peak
-	2388.8	36.72	6.73	43.45	54	-10.55	Peak
@	2417	85.91	6.66	92.57	-	-	Peak
*	4834	36.45	3.56	40.01	74	-33.99	Peak
Antenna Polarity & Test Distance: Vertical at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	2390	64.05	6.74	70.79	74	-3.21	Peak
@	2417	106.15	6.66	112.81	-	-	Peak
-	2390	45.73	6.74	52.47	54	-1.53	Average
@	2417	94.43	6.66	101.09	-	-	Average
*	4834	35.67	3.56	39.23	74	-34.77	Peak

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. "@": Fundamental Frequency.
5. " * ": The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
6. The other emission levels were very low against the limit.

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EUT Test Condition		Measurement Detail	
Channel	Channel 6	Frequency Range	1 GHz ~ 26.5 GHz

Antenna Polarity & Test Distance: Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	2388.8	55.18	6.73	61.91	74	-12.09	Peak
@	2437	101.14	6.59	107.73	-	-	Peak
-	2483.6	57.58	6.53	64.11	74	-9.89	Peak
-	2389.4	38.3	6.73	45.03	54	-8.97	Average
@	2437	90.15	6.59	96.74	-	-	Average
-	2483.6	38.18	6.53	44.71	54	-9.29	Average
*	4874	36.04	3.63	39.67	74	-34.33	Peak
Antenna Polarity & Test Distance: Vertical at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	2390	62.25	6.74	68.99	74	-5.01	Peak
@	2437	108.03	6.59	114.62	-	-	Peak
-	2489	65.47	6.53	72	74	-2	Peak
-	2388.4	44.88	6.73	51.61	54	-2.39	Average
@	2437	97.35	6.59	103.94	-	-	Average
-	2483.6	46.6	6.53	53.13	54	-0.87	Average
*	4874	41.85	3.63	45.48	74	-28.52	Peak

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. "@": Fundamental Frequency.
5. "*": The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
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EUT Test Condition		Measurement Detail	
Channel	Channel 10	Frequency Range	1 GHz ~ 18 GHz

Antenna Polarity & Test Distance: Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
@	2457	96.36	6.54	102.9	-	-	Peak
-	2483.8	49.29	6.53	55.82	74	-18.18	Peak
@	2457	85.62	6.54	92.16	-	-	Peak
-	2483.6	36.95	6.53	43.48	54	-10.52	Peak
*	4914	35.85	3.68	39.53	74	-34.47	Peak
Antenna Polarity & Test Distance: Vertical at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
@	2457	104.9	6.54	111.44	-	-	Peak
-	2483.8	66.01	6.53	72.54	74	-1.46	Peak
@	2457	93.88	6.54	100.42	-	-	Average
-	2483.6	46.45	6.53	52.98	54	-1.02	Average
*	4914	36.68	3.68	40.36	74	-33.64	Peak

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. "@": Fundamental Frequency.
5. " * ": The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
6. The other emission levels were very low against the limit.

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EUT Test Condition		Measurement Detail	
Channel	Channel 11	Frequency Range	1 GHz ~ 26.5 GHz

Antenna Polarity & Test Distance: Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
@	2462	92.34	6.54	98.88	-	-	Peak
-	2484	47.77	6.53	54.3	74	-19.7	Peak
@	2462	81.43	6.54	87.97	-	-	Average
-	2484.4	33.57	6.53	40.1	54	-13.9	Average
*	4924	34.87	3.69	38.56	74	-35.44	Peak
Antenna Polarity & Test Distance: Vertical at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
@	2462	103.22	6.54	109.76	-	-	Peak
-	2483.6	66.15	6.53	72.68	74	-1.32	Peak
@	2462	90.89	6.54	97.43	-	-	Peak
-	2483.6	46.4	6.53	52.93	54	-1.07	Peak
*	4924	35.69	3.69	39.38	74	-34.62	Peak

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. "@": Fundamental Frequency.
5. " * ": The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
6. The other emission levels were very low against the limit.

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Beamforming mode

802.11ax (HE20)

OFDM

EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	1 GHz ~ 26.5 GHz

Antenna Polarity & Test Distance: Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	2388.8	49.79	6.73	56.52	74	-17.48	Peak
@	2412	96.58	6.68	103.26	-	-	Peak
-	2389.6	35.75	6.74	42.49	54	-11.51	Average
@	2412	83.59	6.68	90.27	-	-	Average
*	4824	35.78	3.53	39.31	74	-34.69	Peak
Antenna Polarity & Test Distance: Vertical at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	2388.6	57.7	6.73	64.43	74	-9.57	Peak
@	2412	103.55	6.68	110.23	-	-	Peak
-	2390	45.49	6.74	52.23	54	-1.77	Average
@	2412	92.45	6.68	99.13	-	-	Average
*	4824	39.3	3.53	42.83	74	-31.17	Peak

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. "@": Fundamental Frequency.
5. " * ": The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
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EUT Test Condition		Measurement Detail	
Channel	Channel 2	Frequency Range	1 GHz ~ 18 GHz

Antenna Polarity & Test Distance: Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	2384.4	49.04	6.73	55.77	74	-18.23	Peak
@	2417	97.05	6.66	103.71	-	-	Peak
-	2390	38.07	6.74	44.81	54	-9.19	Average
@	2417	88.06	6.66	94.72	-	-	Average
*	4834	35.51	3.56	39.07	74	-34.93	Peak
Antenna Polarity & Test Distance: Vertical at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	2388.6	62.29	6.73	69.02	74	-4.98	Peak
@	2417	106.24	6.66	112.9	-	-	Peak
-	2390	45.95	6.74	52.69	54	-1.31	Average
@	2417	97.5	6.66	104.16	-	-	Average
*	4834	37.02	3.56	40.58	74	-33.42	Peak

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. "@": Fundamental Frequency.
5. " * ": The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
6. The other emission levels were very low against the limit.

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EUT Test Condition		Measurement Detail	
Channel	Channel 6	Frequency Range	1 GHz ~ 26.5 GHz

Antenna Polarity & Test Distance: Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	2389.4	55.16	6.73	61.89	74	-12.11	Peak
@	2437	104.29	6.59	110.88	-	-	Peak
-	2488.2	54.09	6.53	60.62	74	-13.38	Peak
-	2390	37.71	6.74	44.45	54	-9.55	Average
@	2437	90.4	6.59	96.99	-	-	Average
-	2488.6	38.07	6.53	44.6	54	-9.4	Average
*	4874	37.47	3.63	41.1	74	-32.9	Peak
Antenna Polarity & Test Distance: Vertical at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	2388.8	60.94	6.73	67.67	74	-6.33	Peak
@	2437	109.94	6.59	116.53	-	-	Peak
-	2484	63.32	6.53	69.85	74	-4.15	Peak
-	2389.2	44.32	6.73	51.05	54	-2.95	Average
@	2437	96.43	6.59	103.02	-	-	Average
-	2483.8	45.87	6.53	52.4	54	-1.6	Average
*	4874	42.4	3.63	46.03	74	-27.97	Peak

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. "@": Fundamental Frequency.
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EUT Test Condition		Measurement Detail	
Channel	Channel 10	Frequency Range	1 GHz ~ 18 GHz

Antenna Polarity & Test Distance: Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
@	2457	100.04	6.54	106.58	-	-	Peak
-	2483.6	54.8	6.53	61.33	74	-12.67	Peak
@	2457	88.25	6.54	94.79	-	-	Peak
-	2483.6	38.45	6.53	44.98	54	-9.02	Peak
*	4914	35.32	3.68	39	74	-35	Peak
Antenna Polarity & Test Distance: Vertical at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
@	2457	107.53	6.54	114.07	-	-	Peak
-	2483.6	66.44	6.53	72.97	74	-1.03	Peak
@	2457	97.32	6.54	103.86	-	-	Average
-	2484	45.7	6.53	52.23	54	-1.77	Average
*	4914	36	3.68	39.68	74	-34.32	Peak

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. "@": Fundamental Frequency.
5. " * ": The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
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EUT Test Condition		Measurement Detail	
Channel	Channel 11	Frequency Range	1 GHz ~ 26.5 GHz

Antenna Polarity & Test Distance: Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
@	2462	95.04	6.54	101.58	-	-	Peak
-	2493	47.27	6.53	53.8	74	-20.2	Peak
@	2462	82.19	6.54	88.73	-	-	Average
-	2484.4	33.65	6.53	40.18	54	-13.82	Average
*	4924	35.11	3.69	38.8	74	-35.2	Peak
Antenna Polarity & Test Distance: Vertical at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
@	2462	105.59	6.54	112.13	-	-	Peak
-	2484	66.46	6.53	72.99	74	-1.01	Peak
@	2462	93.17	6.54	99.71	-	-	Average
-	2483.6	43.97	6.53	50.5	54	-3.5	Average
*	4924	37.03	3.69	40.72	74	-33.28	Peak

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. "@": Fundamental Frequency.
5. " * ": The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
6. The other emission levels were very low against the limit.

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OFDMA

EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	1 GHz ~ 26.5 GHz

Antenna Polarity & Test Distance: Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	2388.8	51.73	6.73	58.46	74	-15.54	Peak
@	2412	95.12	6.68	101.8	-	-	Peak
-	2389.8	35.96	6.74	42.7	54	-11.3	Average
@	2412	82.18	6.68	88.86	-	-	Average
*	4824	36.29	3.53	39.82	74	-34.18	Peak
Antenna Polarity & Test Distance: Vertical at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	2389	65.8	6.73	72.53	74	-1.47	Peak
@	2412	104.5	6.68	111.18	-	-	Peak
-	2390	43.81	6.74	50.55	54	-3.45	Average
@	2412	91.51	6.68	98.19	-	-	Average
*	4824	37.91	3.53	41.44	74	-32.56	Peak

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. "@": Fundamental Frequency.
5. " * ": The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
6. The other emission levels were very low against the limit.

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EUT Test Condition		Measurement Detail	
Channel	Channel 2	Frequency Range	1 GHz ~ 18 GHz

Antenna Polarity & Test Distance: Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	2389	49.02	6.73	55.75	74	-18.25	Peak
@	2417	93.99	6.66	100.65	-	-	Peak
-	2390	36.71	6.74	43.45	54	-10.55	Average
@	2417	85.6	6.66	92.26	-	-	Average
*	4834	34.9	3.56	38.46	74	-35.54	Peak
Antenna Polarity & Test Distance: Vertical at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	2388.2	60.37	6.73	67.1	74	-6.9	Peak
@	2417	103.26	6.66	109.92	-	-	Peak
-	2390	45.81	6.74	52.55	54	-1.45	Average
@	2417	96.74	6.66	103.4	-	-	Average
*	4834	37.01	3.56	40.57	74	-33.43	Peak

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. "@": Fundamental Frequency.
5. " * ": The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
6. The other emission levels were very low against the limit.

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EUT Test Condition		Measurement Detail	
Channel	Channel 6	Frequency Range	1 GHz ~ 26.5 GHz

Antenna Polarity & Test Distance: Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	2388	55.95	6.73	62.68	74	-11.32	Peak
@	2437	102.24	6.59	108.83	-	-	Peak
-	2487.4	57.86	6.53	64.39	74	-9.61	Peak
-	2389.4	38.3	6.73	45.03	54	-8.97	Average
@	2437	90.15	6.59	96.74	-	-	Average
-	2485.4	38.07	6.53	44.6	54	-9.4	Average
*	4874	35.88	3.63	39.51	74	-34.49	Peak
Antenna Polarity & Test Distance: Vertical at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	2384.2	61.26	6.73	67.99	74	-6.01	Peak
@	2437	107.46	6.59	114.05	-	-	Peak
-	2489	64.47	6.53	71	74	-3	Peak
-	2388.4	43.88	6.73	50.61	54	-3.39	Average
@	2437	97.87	6.59	104.46	-	-	Average
-	2483.6	45.6	6.53	52.13	54	-1.87	Average
*	4874	41.75	3.63	45.38	74	-28.62	Peak

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. "@": Fundamental Frequency.
5. "*": The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
6. The other emission levels were very low against the limit.

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EUT Test Condition		Measurement Detail	
Channel	Channel 10	Frequency Range	1 GHz ~ 18 GHz

Antenna Polarity & Test Distance: Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
@	2457	97.97	6.54	104.51	-	-	Peak
-	2485	51.7	6.53	58.23	74	-15.77	Peak
@	2457	85.3	6.54	91.84	-	-	Average
-	2483.6	36.7	6.53	43.23	54	-10.77	Average
*	4914	37.72	3.68	41.4	74	-32.6	Peak
Antenna Polarity & Test Distance: Vertical at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
@	2457	101.94	6.54	108.48	-	-	Peak
-	2483.8	58.87	6.53	65.4	74	-8.6	Peak
@	2457	96.36	6.54	102.9	-	-	Average
-	2483.6	45.99	6.53	52.52	54	-1.48	Average
*	4914	36.22	3.68	39.9	74	-34.1	Peak

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. "@": Fundamental Frequency.
5. " * ": The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
6. The other emission levels were very low against the limit.

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EUT Test Condition		Measurement Detail	
Channel	Channel 11	Frequency Range	1 GHz ~ 26.5 GHz

Antenna Polarity & Test Distance: Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
@	2462	93.03	6.54	99.57	-	-	Peak
-	2485	51.08	6.53	57.61	74	-16.39	Peak
@	2462	82.21	6.54	88.75	-	-	Average
-	2483.6	35.83	6.53	42.36	54	-11.64	Average
*	4924	34.74	3.69	38.43	74	-35.57	Peak
Antenna Polarity & Test Distance: Vertical at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
@	2462	103.23	6.54	109.77	-	-	Peak
-	2483.6	66.15	6.53	72.68	74	-1.32	Peak
@	2462	91.89	6.54	98.43	-	-	Average
-	2483.6	44.4	6.53	50.93	54	-3.07	Average
*	4924	35.65	3.69	39.34	74	-34.66	Peak

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. "@": Fundamental Frequency.
5. " * ": The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
6. The other emission levels were very low against the limit.

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9 kHz ~ 30 MHz Data:

For 9 kHz to 30 MHz radiated emission have performed all modes of operation were investigated. The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

No non-compliance noted:

KDB 414788 D01 OATS and Chamber Correlation Justification

- Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

- OATs and chamber correlation testing had been performed and chamber measured test results is the worst case test result.

Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30m open area test 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.

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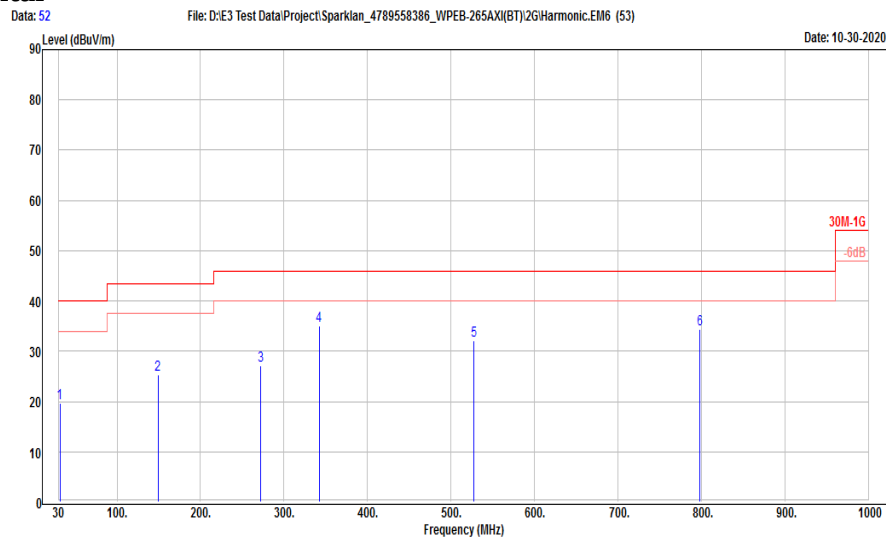
30 MHz ~ 1 GHz Data

Non-Beamforming mode

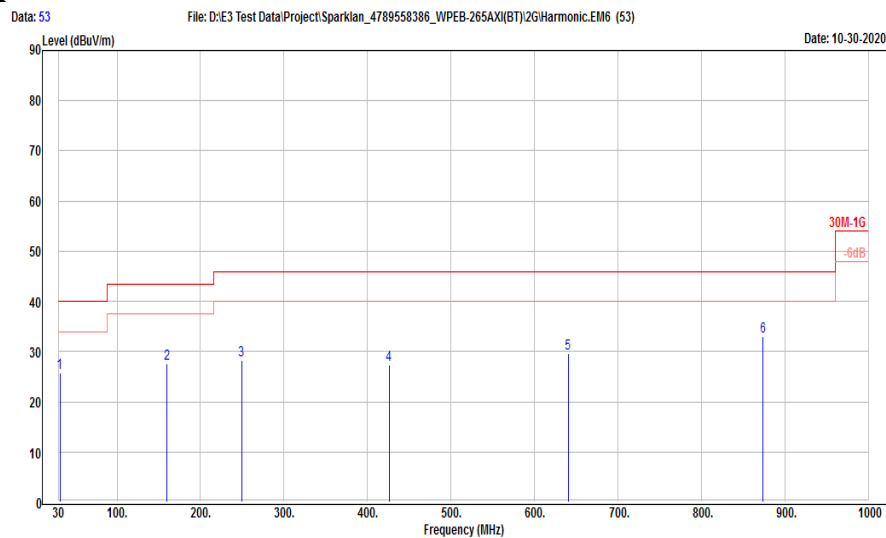
802.11b

EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	30 MHz ~ 1 GHz

Horizontal



Vertical



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Antenna Polarity & Test Distance: Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	31.94	32.1	-12.34	19.76	40	-20.24	Peak
-	149.31	36.91	-11.64	25.27	43.5	-18.23	Peak
-	272.5	37.72	-10.69	27.03	46	-18.97	Peak
-	342.34	43.71	-8.76	34.95	46	-11.05	Peak
-	527.61	35.74	-3.63	32.11	46	-13.89	Peak
-	798.24	33.58	0.9	34.48	46	-11.52	Peak
Antenna Polarity & Test Distance: Vertical at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	31.94	38.15	-12.34	25.81	40	-14.19	Peak
-	159.98	38.78	-11.22	27.56	43.5	-15.94	Peak
-	249.22	40.19	-11.85	28.34	46	-17.66	Peak
-	425.76	33.64	-6.35	27.29	46	-18.71	Peak
-	640.13	30.79	-1.16	29.63	46	-16.37	Peak
-	873.9	30.52	2.44	32.96	46	-13.04	Peak

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. The peak result complies with QP limit, QP result is deemed to comply with QP limit.
5. The other emission levels were very low against the limit.

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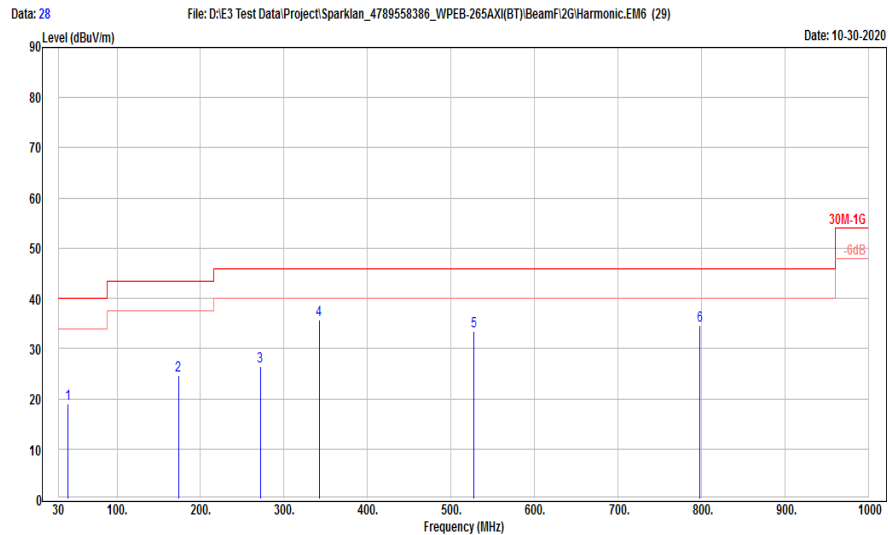


Beamforming mode

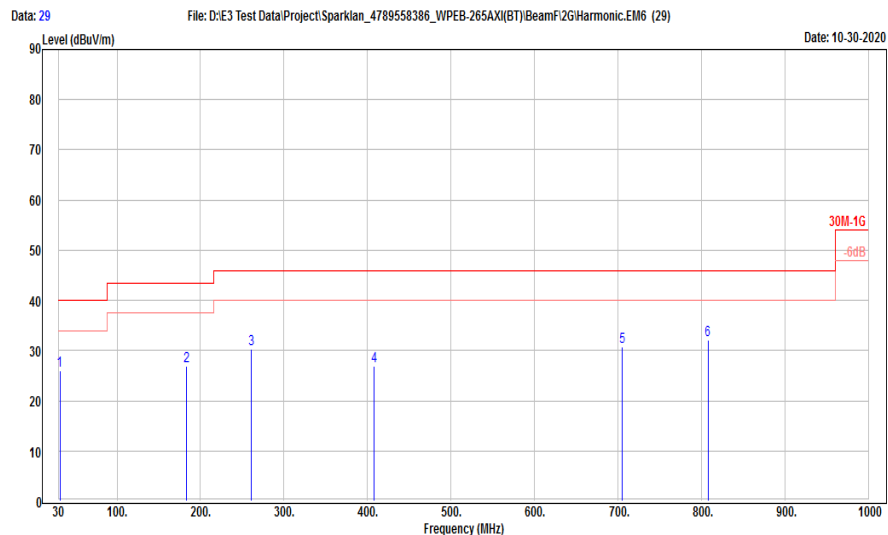
802.11ax (HE20)

EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	30 MHz ~ 1 GHz

Horizontal



Vertical



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Antenna Polarity & Test Distance: Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	41.64	30.85	-11.86	18.99	40	-21.01	Peak
-	173.56	36.01	-11.47	24.54	43.5	-18.96	Peak
-	271.53	37.28	-10.74	26.54	46	-19.46	Peak
-	342.34	44.56	-8.76	35.8	46	-10.2	Peak
-	527.61	37.03	-3.63	33.4	46	-12.6	Peak
-	798.24	33.77	0.9	34.67	46	-11.33	Peak
Antenna Polarity & Test Distance: Vertical at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	31.94	38.24	-12.34	25.9	40	-14.1	Peak
-	183.26	39.04	-12.15	26.89	43.5	-16.61	Peak
-	260.86	41.72	-11.43	30.29	46	-15.71	Peak
-	408.3	33.84	-6.91	26.93	46	-19.07	Peak
-	705.12	31.09	-0.36	30.73	46	-15.27	Peak
-	807.94	30.96	1.12	32.08	46	-13.92	Peak

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. The peak result complies with QP limit, QP result is deemed to comply with QP limit.
5. The other emission levels were very low against the limit.

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