

FCC Part 15.407

TEST REPORT

For

Iconnect

NO.9, Aly.58,Ln,112.Ruiguand Rd, Neihu District, Taipei City, Taiwan, R.O.C.

FCC ID: 2AB877610

Report Type:
Original Report

Product Type:
WiFi 802.11ac outdoor USB adapter

Report Producer : Jane Chen

Jane Chen

Report Number : RXZ211018004RF02

Report Date : 2021-12-21

Reviewed By: Andy Shih

Andy. Shih

Prepared By: Bay Area Compliance Laboratories Corp.

(New Taipei Laboratory)

70, Lane 169, Sec. 2, Datong Road, Xizhi Dist.,

New Taipei City 22183, Taiwan, R.O.C.

Tel: +886 (2) 2647 6898

Fax: +886 (2) 2647 6895

www.bacl.com.tw

Revision History

Revision	No.	Report Number	Issue Date	Description	Author/ Revised by
0.0	RXZ211018004	RXZ211018004RF02	2021-12-21	Original Report	Jane Chen

TABLE OF CONTENTS

1	General Information	5
1.1	Product Description for Equipment under Test (EUT).....	5
1.2	Objective.....	6
1.3	Related Submittal(s)/Grant(s).....	6
1.4	Test Methodology.....	6
1.5	Statement of Compliance.....	6
1.6	Measurement Uncertainty.....	7
1.7	Environmental Conditions	7
1.8	Test Facility	7
2	System Test Configuration.....	8
2.1	Description of Test Configuration.....	8
2.2	Equipment Modifications	9
2.3	EUT Exercise Software	9
2.4	Test Mode	9
2.5	Support Equipment List and Details.....	10
2.6	External Cable List and Details	10
2.7	Block Diagram of Test Setup	10
2.8	Duty Cycle	12
3	Summary of Test Results.....	15
4	Test Equipment List and Details	16
5	FCC §15.407(f), §1.1310, § 2.1091 - Maximum Permissible Exposure (MPE).....	18
5.1	Applicable Standard.....	18
5.2	RF Exposure Evaluation Result.....	18
6	FCC §15.203 – Antenna Requirements.....	19
6.1	Applicable Standard.....	19
6.2	Antenna List and Details	19
7	FCC §15.407(b)(9) & §15.207(a) – AC Line Conducted Emissions.....	20
7.1	Applicable Standard.....	20
7.2	EUT Setup	20
7.3	EMI Test Receiver Setup	21
7.4	Test Procedure	21
7.5	Corrected Factor & Margin Calculation.....	21
7.6	Test Results.....	22
8	FCC §15.209, §15.205 , §15.407(b) – Spurious Emissions	24
8.1	Applicable Standard.....	24
8.2	EUT Setup	25
8.3	EMI Test Receiver & Spectrum Analyzer Setup.....	26
8.4	Test Procedure	26
8.5	Corrected Factor & Margin Calculation.....	26
8.6	Test Results.....	27
9	FCC §15.407(a)(e) – Emission Bandwidth And Occupied Bandwidth	43
9.1	Applicable Standard.....	43

9.2	Test Procedure	43
9.3	Test Results.....	44
10	FCC §15.407(a) – Maximum Output Power.....	63
10.1	Applicable Standard.....	63
10.2	Test Procedure	63
10.3	Test Results.....	64
11	FCC §15.407(a) – Power Spectral Density.....	65
11.1	Applicable Standard.....	65
11.2	Test Procedure	65
11.3	Test Results.....	66

1 General Information

1.1 Product Description for Equipment under Test (EUT)

Applicant	Iconnect.
	NO.9, Aly.58,Ln,112.Ruiguang Rd, Neihu District, Taipei City, Taiwan, R.O.C.
Manufacturer	ALFA NETWORK Inc.
	4F.-1, NO. 106, Rueiguang Rd., Neihu District, Taipei City, Taiwan, R.O.C.
Brand(Trade) Name	ALFA
Product (Equipment)	WiFi 802.11ac outdoor USB adapter
Main Model Name	Tube-UAC2
Series Model Name	Tube-UAC3,Tube-UACXXX,Tube-UXXX,AWUS036ACHM, AWUS036ACH-C,AWUS036ACU, AWUS036EACS,AWUS036ACT, AWUS036EACU,AWUS036ACZ,AWUS036EACZ X:Any alphanumeric character or blank
Model Discrepancy	The major electrical and mechanical constructions of series models are identical to the basic model, except Market segmentation. The model, Tube-UAC2 is the testing sample, and the final test data are shown on this test report.
Frequency Range	5150 MHz ~ 5250 MHz, 5725 MHz ~ 5850 MHz
Transmit Power	5150-5250 MHz: IEEE 802.11a Mode: 18.04 dBm IEEE802.11n HT20/ ac VHT20 Mode: 17.11 dBm IEEE 802.11n HT40/ ac VHT40 Mode: 14.79 dBm IEEE 802.11ac VHT80 Mode: 13.53 dBm 5725-5850 MHz: IEEE 802.11a Mode: 11.72 dBm IEEE 802.11n HT20/ ac VHT20 Mode: 12.88 dBm IEEE 802.11n HT40/ ac VHT40 Mode: 12.59 dBm IEEE 802.11ac VHT80 Mode: 13.33 dBm
Modulation Technique	IEEE 802.11a Mode: OFDM IEEE 802.11n HT20/ ac VHT20 Mode: OFDM IEEE 802.11n HT20/ ac VHT40 Mode: OFDM IEEE 802.11ac VHT80 Mode: OFDM
Power Operation (Voltage Range)	☐ AC Type ☐ Adapter ☐ PoE

	☐ DC Type ☐ Battery ☐ DC Power Supply ☒ External from USB Cable, 5Vdc
	☐ Host System
Received Date	Oct. 18, 2021
Date of Test	Dec. 2, 2021~ Dec. 6, 2021

*All measurement and test data in this report was gathered from production sample serial number: RXZ211018004-01(Assigned by BACL, New Taipei Laboratory).

1.2 Objective

This report is prepared on behalf of *Iconnect* in accordance with Part 2, Subpart J, Part 15, Subparts A, C and E of the Federal Communication Commission's rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart E, and section 15.203, 15.205, 15.207, 15.209 and 15.407 rules.

1.3 Related Submittal(s)/Grant(s)

FCC Part 15.247 DTS submission with FCC ID: 2AB877610

1.4 Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices KDB 789033 D02 General UNII Test Procedures New Rules v02r01

1.5 Statement of Compliance

Decision Rule: No, (The test results do not include MU judgment)

It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (New Taipei Laboratory).

Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

The determination of the test results does not require consideration of the uncertainty of the measurement, unless the assessment is required by customer agreement, regulation or standard document specification.

Bay Area Compliance Laboratories Corp. (New Taipei Laboratory) is not responsible for the authenticity of the information provided by the applicant that affects the test results.

1.6 Measurement Uncertainty

Parameter		Uncertainty
AC Mains		+/- 2.36 dB
RF output power, conducted		+/- 0.93 dB
Power Spectral Density, conducted		+/- 0.93 dBm
Occupied Bandwidth		+/- 0.35 MHz
Unwanted Emissions, conducted		+/- 1.69 dBm
Emissions, radiated	30 MHz~1GHz	+/- 5.46 dB
	1 GHz~18 GHz	+/- 5.24 dB
	18 GHz~40 GHz	+/- 5.86 dB
Temperature		+/- 1.27 °C
Humidity		+/- 3 %

1.7 Environmental Conditions

Test Site	Test Data	Temperature (°C)	Relative Humidity (%)	ATM Pressure (hPa)	Test Engineer
AC Line Conducted Emissions	2021/12/6	20.3	55	1010	Howard
Radiation Spurious Emissions	2021/12/2~2021/12/3	20.1~21.2	49~62	1010	Aaron
Emission Bandwidth And Occupied Bandwidth	2021/12/6	21.8	49	1010	Howard
Maximum Output Power	2021/12/6	21.8	49	1010	Howard
Power Spectral Density	2021/12/6	21.8	49	1010	Howard

1.8 Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (New Taipei Laboratory) to collect test data is located on

☒ 70, Lane 169, Sec. 2, Datong Road, Xizhi Dist., New Taipei City 22183, Taiwan, R.O.C.

Bay Area Compliance Laboratories Corp. (New Taipei Laboratory) is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code: 3732) and the FCC designation No.TW3732 under the Mutual Recognition Agreement (MRA) in FCC Test.

2 System Test Configuration

2.1 Description of Test Configuration

The system was configured for testing in an engineering mode, which is provided by manufacturer. The system support 802.11a/n ht20/n ht40/ac vht20/ac vht40/ac vht80, the ht20/ht40 were reduced since the identical parameters with 802.11ac vht20 and vht40.

For 5150 ~ 5250MHz

4 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	44	5220
40	5200	48	5240

2 channels are provided for 802.11n (HT40), 802.11ac (VHT40):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
38	5190	46	5230

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency (MHz)
42	5210

802.11a/n20/ac20 mode Channel 36, 40, 48 were tested.

802.11n40/ac40 mode Channel 38, 46 were tested.

802.11ac80 mode Channel 42 was tested.

For 5725 ~ 5825MHz:

5 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	161	5805
153	5765	165	5825
157	5785		

2 channels are provided for 802.11n (HT40), 802.11ac (VHT40):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
151	5755	159	5795

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency (MHz)
155	5775

802.11a/n20/ac20 mode Channel 149, 157, 165 were tested.

802.11n40/ac40 mode Channel 151, 159 were tested.

802.11ac80 mode Channel 155 was tested.

2.2 Equipment Modifications

No modification was made to the EUT.

2.3 EUT Exercise Software

The EUT was programmed to be in continuously transmitting mode.

The software was used “MT76xxU QA V2.0.10.2”.

UNII Band	Mode	Channel	Frequency (MHz)	Power setting
UNII-1	802.11a	36	5180	1E
		40	5200	1E
		48	5240	1E
UNII-3		149	5745	09
		157	5785	0A
		165	5825	0B
UNII-1	802.11n 20 / ac 20	36	5180	1C
		40	5200	1C
		48	5240	1C
UNII-3		149	5745	0B
		157	5785	0D
		165	5825	0D
UNII-1	802.11n 40 / ac 40	38	5190	15
		46	5230	15
UNII-3		151	5755	0B
		159	5795	0B
UNII-1	802.11ac 80	42	5210	12
UNII-3		155	5775	0D

The EUT was configured for testing in an engineering mode which was provided by the manufacturer.

The worst-case data rates are determined to be as follows for each mode based upon investigations by measuring the average power and PSD across all data rates bandwidths, and modulations.

802.11a: 6Mbps

802.11ac20: MCS0

802.11ac40: MCS0

802.11ac80: MCS0

2.4 Test Mode

Mode: Full System (Model: TUBE-UAC2) tested all measure item.

2.5 Support Equipment List and Details

Description	Manufacturer	Model Number	S/N
NB	DELL	E6410	N/A

2.6 External Cable List and Details

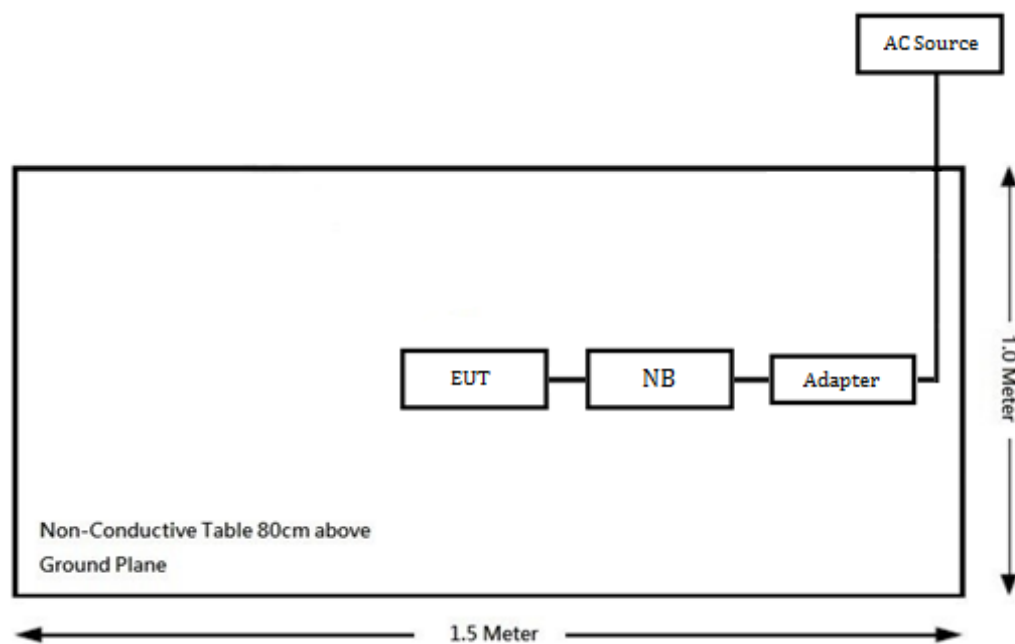
Cable Description	Length (m)	From	To
USB Cable	4.8	EUT	NB

2.7 Block Diagram of Test Setup

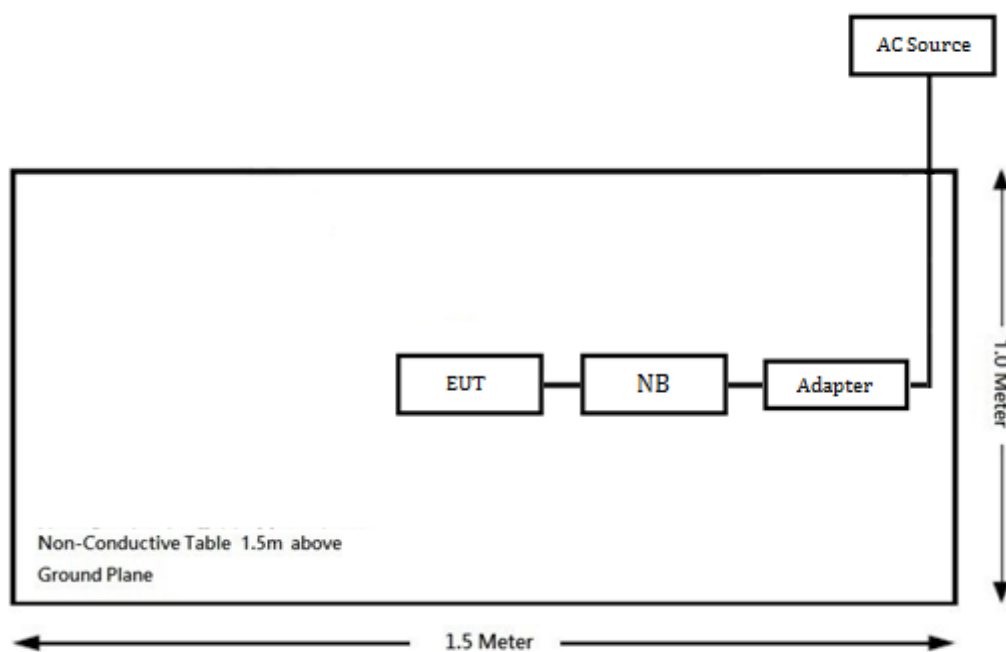
See test photographs attached in setup photos for the actual connections between EUT and support equipment.

Radiation:

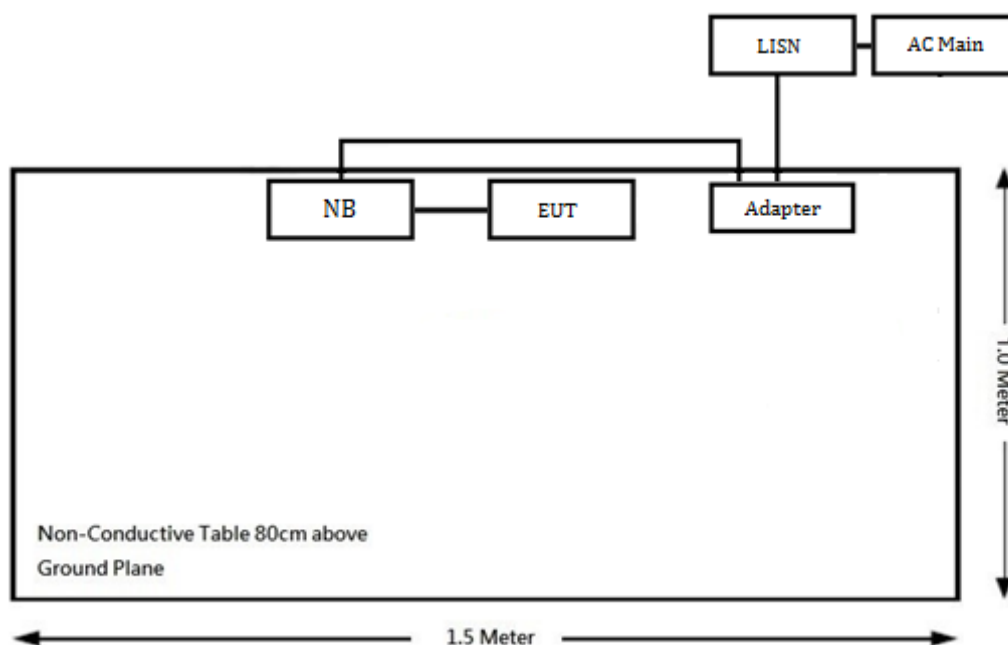
Below 1GHz:



Above 1GHz:



Conduction:



2.8 Duty Cycle

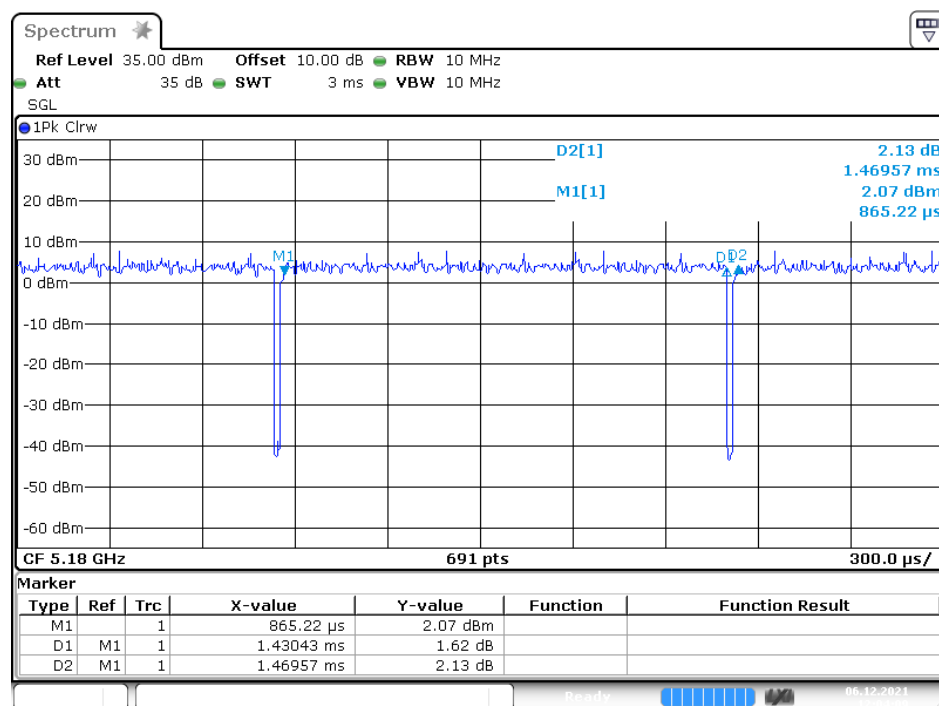
The duty cycle as below:

Radio Mode	On Time (ms)	Off Time (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
802.11a	1.43	0.03	0.98	0.09
802.11ac20	1.35	0.04	0.97	0.13
802.11ac40	0.64	0.06	0.91	0.41
802.11ac80	0.33	0.04	0.88	0.56

Note: Duty Cycle Correction Factor = $10 \cdot \log(1/\text{duty cycle})$

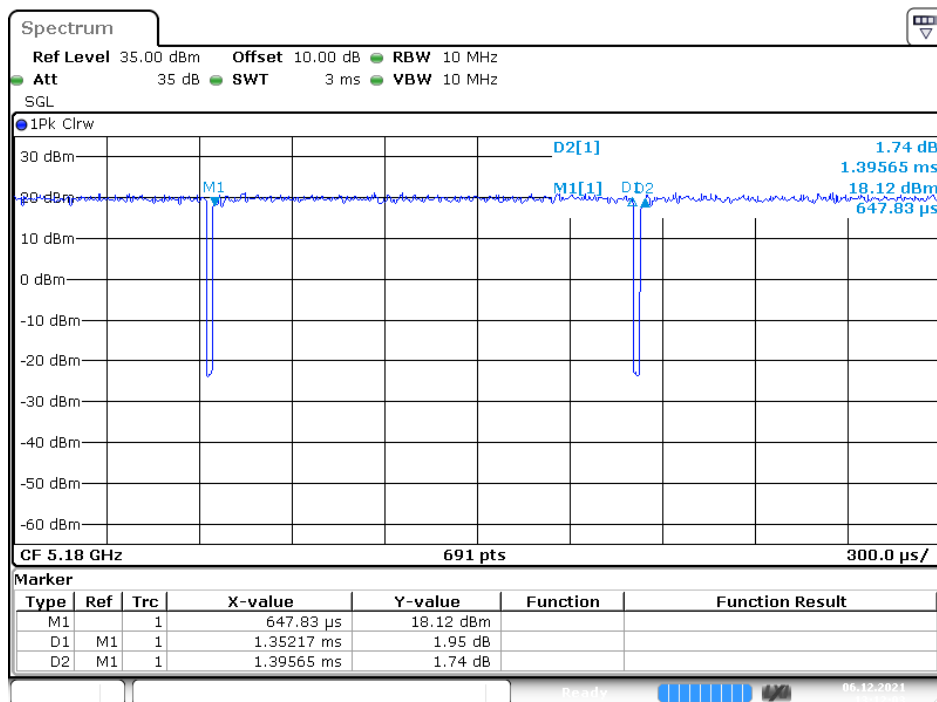
Please refer to the following plots.

802.11a Mode



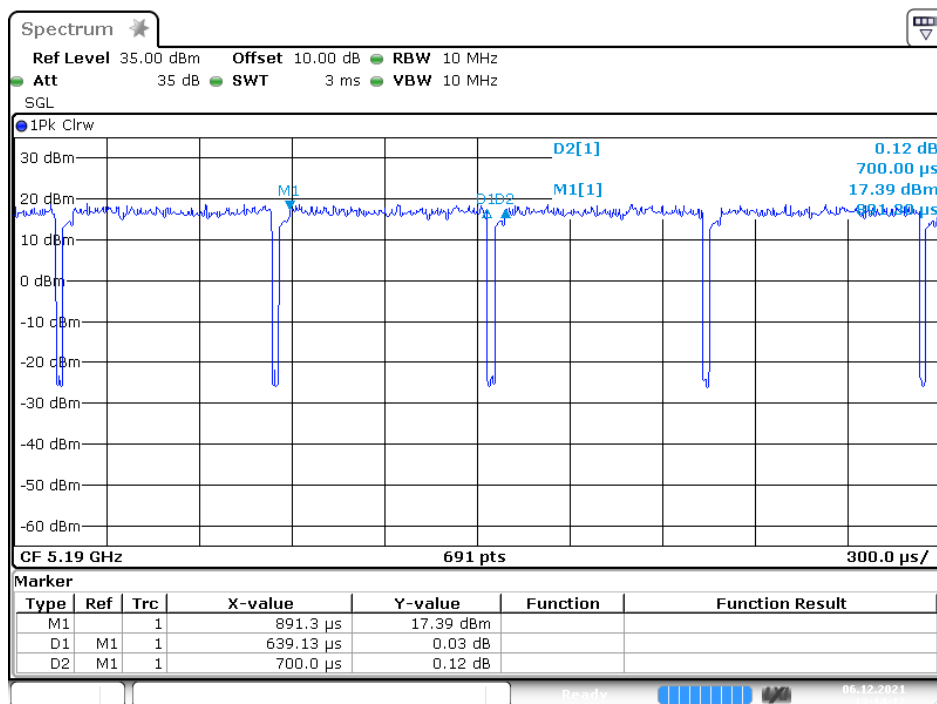
Date: 6 DEC 2021 12:04:09

802.11ac VHT20 Mode



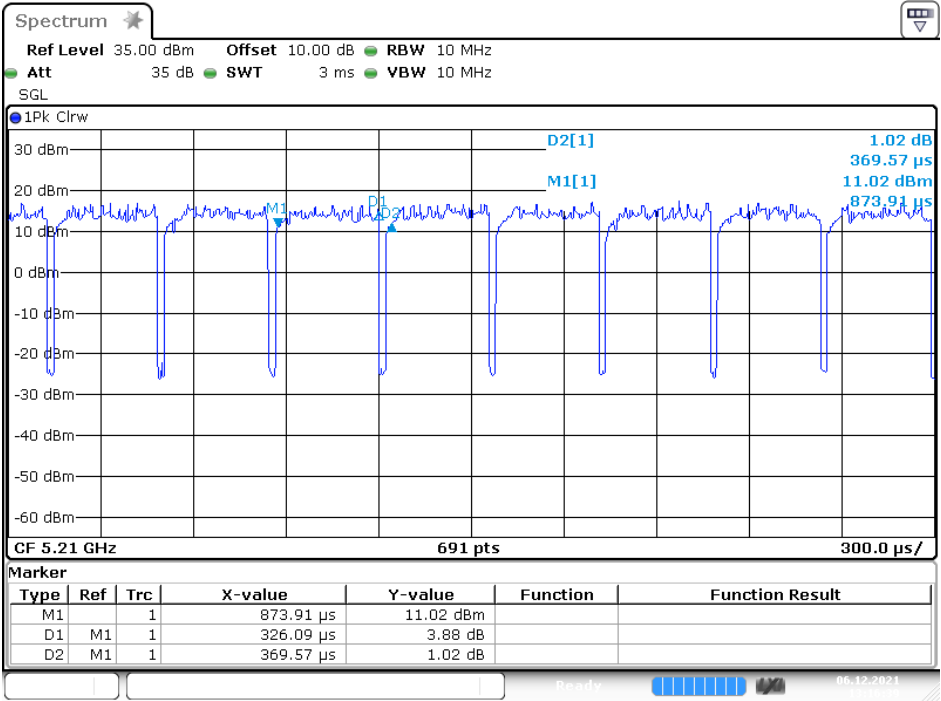
Date: 6 DEC 2021 13:12:03

802.11ac VHT40 Mode



Date: 6 DEC 2021 13:14:12

802.11ac VHT80 Mode



Date: 6 DEC 2021 13:16:39

3 Summary of Test Results

FCC Rules	Description of Test	Results
§15.407(f), §1.1310, §2.1091	Maximum Permissible Exposure (MPE)	Compliance
§15.203	Antenna Requirement	Compliance
§15.407(b)(9) & §15.207(a)	AC Line Conducted Emissions	Compliance
§15.205 & §15.209 & §15.407(b)	Unwanted Emission	Compliance
§15.407(a)(e)	Emission Bandwidth	Compliance
§15.407(a)(1)(3)	Conducted Transmitter Output Power	Compliance
§15.407(a)(1)(3)	Power Spectral Density	Compliance

4 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due Date
AC Line Conduction Room (CON-A)					
LISN	Rohde & Schwarz	ENV216	101612	2020/12/30	2021/12/29
EMI Test Receiver	Rohde & Schwarz	ESR3	102099	2021/6/9	2022/6/8
Pulse Limiter	Rohde & Schwarz	ESH3Z2	TXZEM104	2021/7/29	2022/7/28
RF Cable	EMEC	EM-CB5D	1	2021/6/11	2022/6/10
Software	AUDIX	E3	V9.150826k	N.C.R	N.C.R
Radiated Room (966-A)					
Bilog Antenna with 6 dB Attenuator	SUNOL SCIENCES & MINI-CIRCUITS	JB6/UNAT-6+	A050115/15542_01	2021/1/19	2022/1/18
EMI Test Receiver	Rohde & Schwarz	ESR7	101419	2021/11/9	2022/11/8
Horn Antenna	EMCO	SAS-571	1020	2021/4/23	2022/4/22
Horn Antenna	ETS-Lindgren	3116	62638	2021/8/11	2022/8/10
Preamplifier	Sonoma	310N	130602	2021/6/8	2022/6/7
Microwave Preamplifier	EM Electronics Corporation	EM18G40G	60656	2020/12/30	2021/12/29
Spectrum Analyzer	Rohde & Schwarz	FSV40	101435	2021/1/7	2022/1/6
Micro flex Cable	UTIFLEX	UFB197C-1-2362-70U-70U	225757-001	2021/2/1	2022/1/31
Coaxial Cable	COMMATE	PEWC	8Dr	2020/12/25	2021/12/24
Coaxial Cable	UTIFLEX	UFB311A-Q-1440-300300	220490-006	2021/2/1	2022/1/31
Coaxial Cable	JUNFLON	J12J102248-00-B-5	AUG-07-15-044	2020/12/25	2021/12/24
Cable	EMC	EMC105-SM-SM-10000	201003	2021/2/3	2022/2/2
Preamplifier	A.H. system Inc.	PAM-0118P	470	2021/3/15	2022/3/14
Software	Farad	EZ_EMCC	BACL-03A1	N.C.R	N.C.R

Conducted Room					
Spectrum Analyzer	Rohde & Schwarz	FSV40	101140	2021/1/7	2022/1/6
Cable	UTIFLEX	UFA210A	9435	2021/10/5	2022/10/4
Power Sensor	KEYSIGHT	U2021XA	MY54080018	2021/1/28	2022/1/27
Attenuator	MINI-CIRCUITS	BW-S10W5+	1419	2021/1/28	2022/1/27

***Statement of Traceability:** BACL Corp. attests that all of the calibrations on the equipment items listed above were traceable to the SI System of Units via the R.O.C. Center for Measurement Standards of the Electronics Testing Center, Taiwan (ETC) or to another internationally recognized National Metrology Institute (NMI), and were compliant with the current Taiwan Accreditation Foundation (TAF) requirements

5 FCC §15.407(f), §1.1310, § 2.1091 - Maximum Permissible Exposure (MPE)

5.1 Applicable Standard

According to subpart 1.1310, 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minutes)
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500	/		f/1500	30
1500-100,000	/		1.0	30

f = frequency in MHz; * = Plane-wave equivalent power density

Calculated Formulary:

Predication of MPE limit at a given distance

$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm²);

P = power input to the antenna (in appropriate units, e.g., mW);

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain

factor, is normally numeric gain;

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

5.2 RF Exposure Evaluation Result

MPE evaluation for single transmission:

Mode	Frequency Range (MHz)	Antenna Gain		Target Power		Evaluation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)
		(dBi)	(numeric)	(dBm)	(mW)			
2.4G WIFI	2412-2462	5	3.162	25	316.228	20	0.1989	1
5G WIFI B1	5150-5250	5	3.162	18.5	70.795	20	0.0445	1
5G WIFI B4	5725-5825	5	3.162	13.5	22.387	20	0.0141	1

Note: Wi-Fi 2.4G and Wi-Fi 5G can't transmit simultaneously.

Result: MPE evaluation meets the requirements of the **20cm** standard.

6 FCC §15.203 – Antenna Requirements

6.1 Applicable Standard

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited.

And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna does not exceed 6dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple colocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

6.2 Antenna List and Details

Manufacturer	Model	Antenna Type	Antenna Gain
ALFA Network	AOA-2458-79AM	Dual-Band Antenna	5 dBi

Fulfill the requirement of this section. Please refer to the EUT photos

Result: Compliance

7 FCC §15.407(b)(9) & §15.207(a) – AC Line Conducted Emissions

7.1 Applicable Standard

As per FCC §15.407(b) (9)

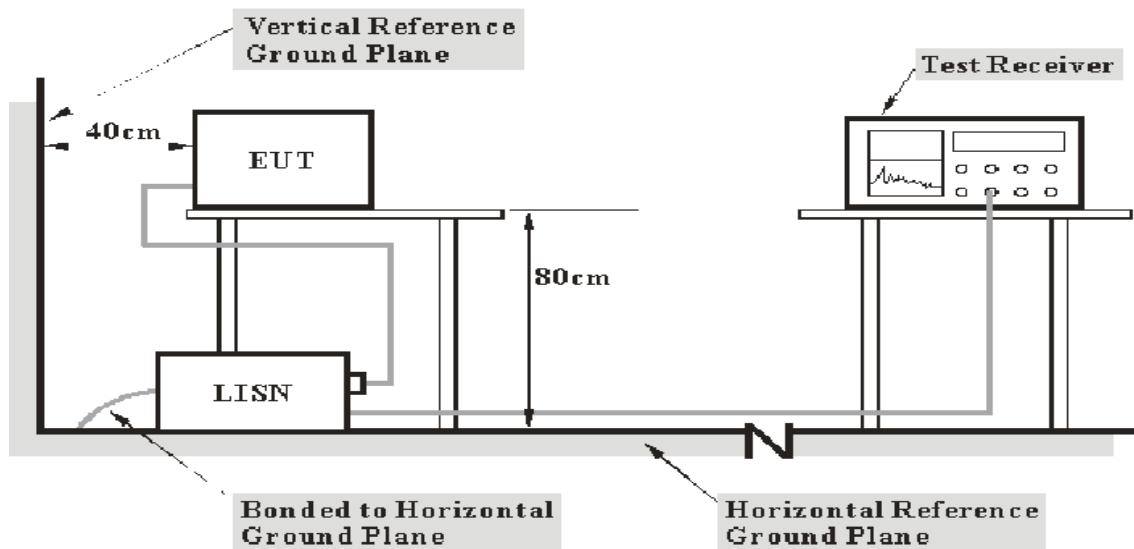
Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207

The lower limit applies at the boundary between the frequencies ranges.

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56 ^{Note 1}	56 to 46 ^{Note 1}
0.5-5	56	46
5-30	60	50

Note 1: Decreases with the logarithm of the frequency.

7.2 EUT Setup



- Note: 1. Support units were connected to second LISN.
 2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits.

7.3 EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150kHz to 30MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations

Frequency Range	IF B/W
150kHz – 30MHz	9kHz

7.4 Test Procedure

During the conducted emission test, the adapter was connected to the outlet of the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

7.5 Corrected Factor & Margin Calculation

The factor is calculated by adding LISN/ISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

$$\text{Factor} = \text{LISN VDF} + \text{Cable Loss} + \text{Transient Limiter Attenuation}$$

The “Over Limit” column of the following data tables indicates the degree of compliance with the applicable limit. For example, an over limit of -7 dB means the emission is 7 dB below the limit. The equation for Over Limit calculation is as follows:

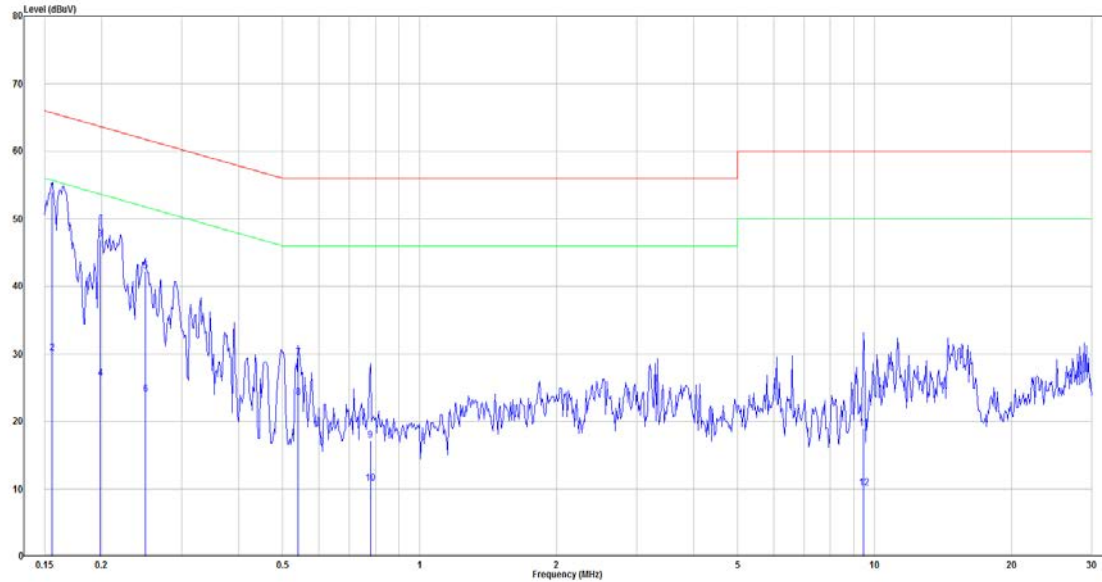
$$\text{Over Limit} = \text{Level} - \text{Limit Line}$$

7.6 Test Results

Test Mode: Transmitting

Worst case is 802.11a mode 5240MHz

Main: AC120 V, 60 Hz, Line



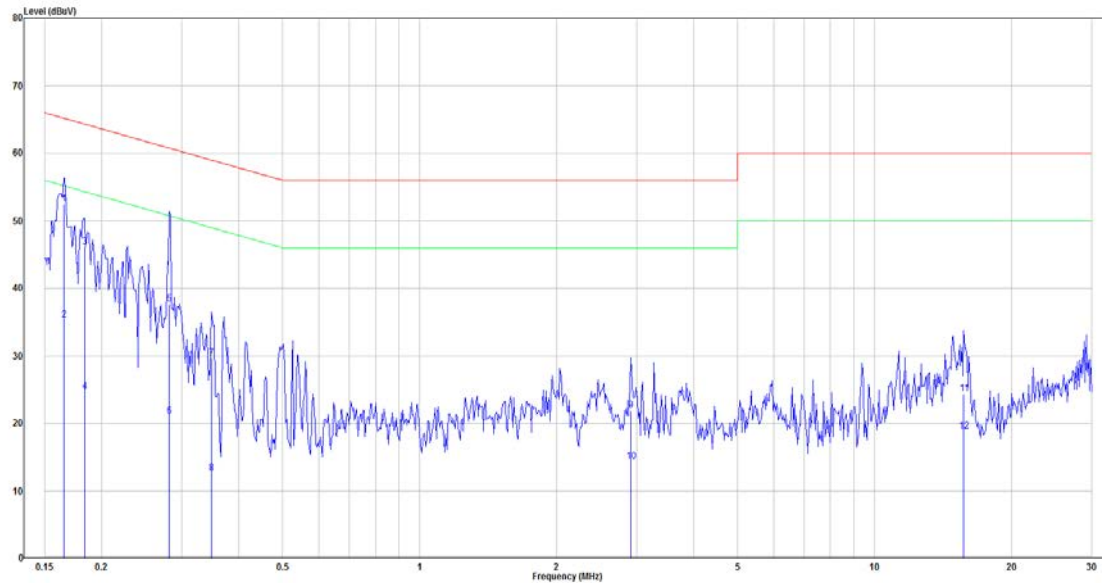
No.	Frequency (MHz)	Reading (dBμV)	Correct Factor(dB)	Result (dBμV)	Limit (dBμV)	Over limit (dB)	Remark
1	0.156	34.37	19.59	53.96	65.69	-11.73	QP
2	0.156	10.56	19.59	30.15	55.69	-25.54	Average
3	0.199	27.32	19.58	46.90	63.67	-16.77	QP
4	0.199	6.76	19.58	26.34	53.67	-27.33	Average
5	0.249	22.64	19.58	42.22	61.78	-19.56	QP
6	0.249	4.38	19.58	23.96	51.78	-27.82	Average
7	0.541	9.87	19.59	29.46	56.00	-26.54	QP
8	0.541	3.94	19.59	23.53	46.00	-22.47	Average
9	0.779	-2.41	19.60	17.19	56.00	-38.81	QP
10	0.779	-8.79	19.60	10.81	46.00	-35.19	Average
11	9.451	-0.88	19.80	18.92	60.00	-41.08	QP
12	9.451	-9.64	19.80	10.16	50.00	-39.84	Average

Note:

Level = Read Level + Factor

Over Limit = Level – Limit Line

Factor = (LISN, ISN, PLC or current probe) Factor + Cable Loss + Attenuator

Main: AC120 V, 60 Hz, Neutral

No.	Frequency	Reading	Correct	Result	Limit	Over limit	Remark
	(MHz)	(dBμV)	Factor(dB)	(dBμV)	(dBμV)	(dB)	
1	0.165	32.93	19.59	52.52	65.21	-12.69	QP
2	0.165	15.67	19.59	35.26	55.21	-19.95	Average
3	0.183	26.59	19.58	46.17	64.33	-18.16	QP
4	0.183	5.11	19.58	24.69	54.33	-29.64	Average
5	0.282	18.04	19.58	37.62	60.76	-23.14	QP
6	0.282	1.52	19.58	21.10	50.76	-29.66	Average
7	0.348	10.02	19.58	29.60	59.00	-29.40	QP
8	0.348	-6.97	19.58	12.61	49.00	-36.39	Average
9	2.915	2.23	19.66	21.89	56.00	-34.11	QP
10	2.915	-5.27	19.66	14.39	46.00	-31.61	Average
11	15.718	4.45	19.87	24.32	60.00	-35.68	QP
12	15.718	-1.06	19.87	18.81	50.00	-31.19	Average

Note:

Level = Read Level + Factor

Over Limit = Level – Limit Line

Factor = (LISN, ISN, PLC or current probe) Factor + Cable Loss + Attenuator

8 FCC §15.209, §15.205 , §15.407(b) – Spurious Emissions

8.1 Applicable Standard

As Per FCC §15.205(a) except as show 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	608 – 614	4.5 – 5.15
0.495 – 0.505	16.69475 – 16.69525	960 – 1240	5.35 – 5.46
2.1735 – 2.1905	16.80425 – 16.80475	1300 – 1427	7.25 – 7.75
4.125 – 4.128	25.5 – 25.67	1435 – 1626.5	8.025 – 8.5
4.17725 – 4.17775	37.5 – 38.25	1645.5 – 1646.5	9.0 – 9.2
4.20725 – 4.20775	73 – 74.6	1660 – 1710	9.3 – 9.5
6.215 – 6.218	74.8 – 75.2	1718.8 – 1722.2	10.6 – 12.7
6.26775 – 6.26825	108 – 121.94	2200 – 2300	13.25 – 13.4
6.31175 – 6.31225	123 – 138	2310 – 2390	14.47 – 14.5
8.291 – 8.294	149.9 – 150.05	2483.5 – 2500	15.35 – 16.2
8.362 – 8.366	156.52475 – 156.52525	2690 – 2900	17.7 – 21.4
8.37625 – 8.38675	156.7 – 156.9	3260 – 3267	22.01 – 23.12
8.41425 – 8.41475	162.0125 – 167.17	3.332 – 3.339	23.6 – 24.0
12.29 – 12.293	167.72 – 173.2	3.3458 – 3.358	31.2 – 31.8
12.51975 – 12.52025	240 – 285	3.600 – 4.400	36.43 – 36.5
12.57675 – 12.57725	322 – 335.4		Above 38.6
13.36 – 13.41	399.9 – 410		

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

As per FCC Part 15.407 (b)

For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level

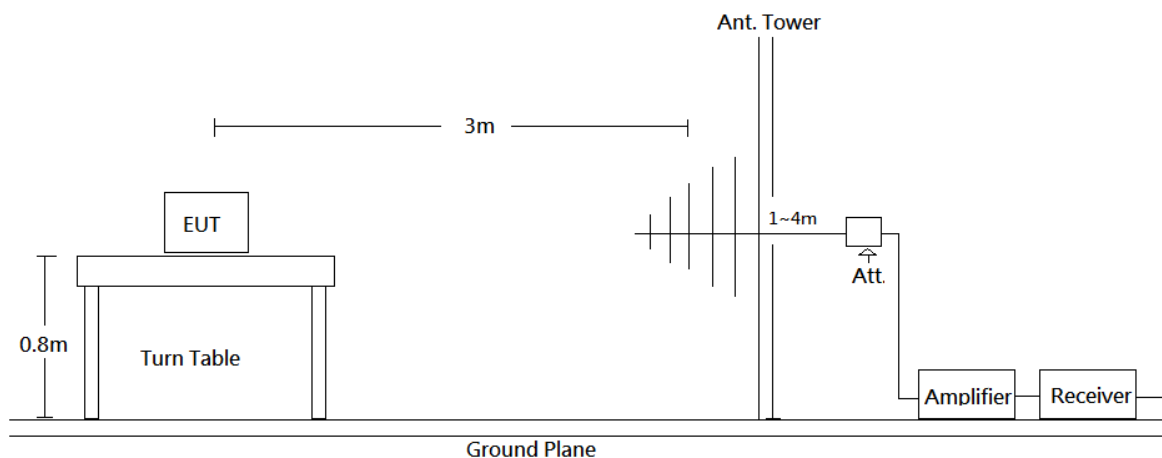
of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge..

The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.

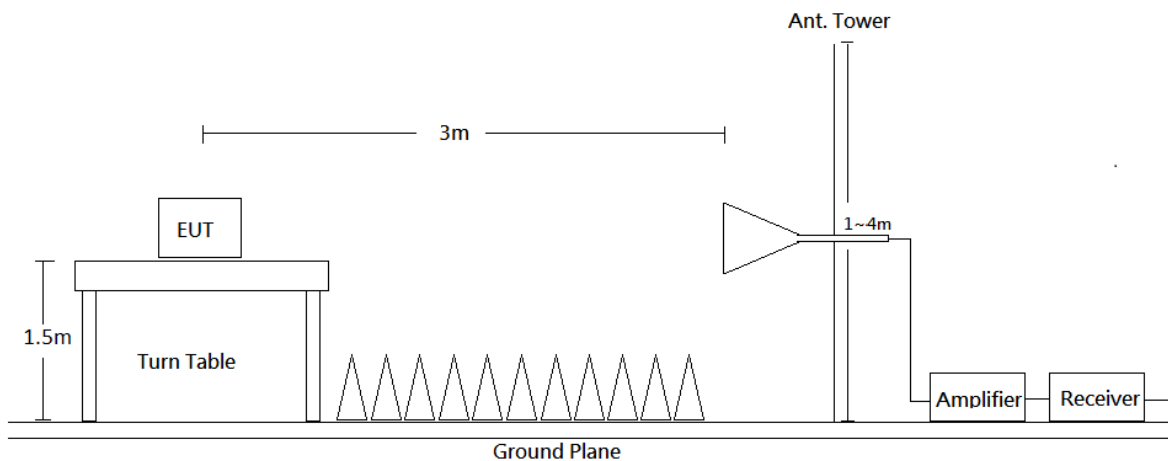
Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209.

8.2 EUT Setup

Below 1 GHz:



Above 1 GHz:



Radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC Part 15.209 and FCC 15.407 Limits.

8.3 EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 40 GHz. During the radiated emission test, the EMI test receiver was set with the following configurations measurement method 6.3 in ANSI C63.10.

Frequency Range	RBW	VBW	Duty cycle	Measurement method
30-1000 MHz	120 kHz	/	/	QP
Above 1 GHz	1 MHz	3 MHz	/	PK
	1 MHz	10 Hz	>98%	Ave
	1 MHz	1/T	<98%	Ave

8.4 Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All data was recorded in the Quasi-peak detector mode from 30 MHz to 1 GHz and PK and average detector modes for frequencies above 1 GHz.

According to C63.10, emission shall be computed as: $E [dB\mu V/m] = EIRP[dBm] + 95.2$, for $d = 3$ meters.

All emissions under the average limit and under the noise floor have not recorded in the report

8.5 Corrected Factor & Margin Calculation

The Correct Factor is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

$$\text{Correct Factor} = \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7 dB means the emission is 7 dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Result} - \text{Limit}$$

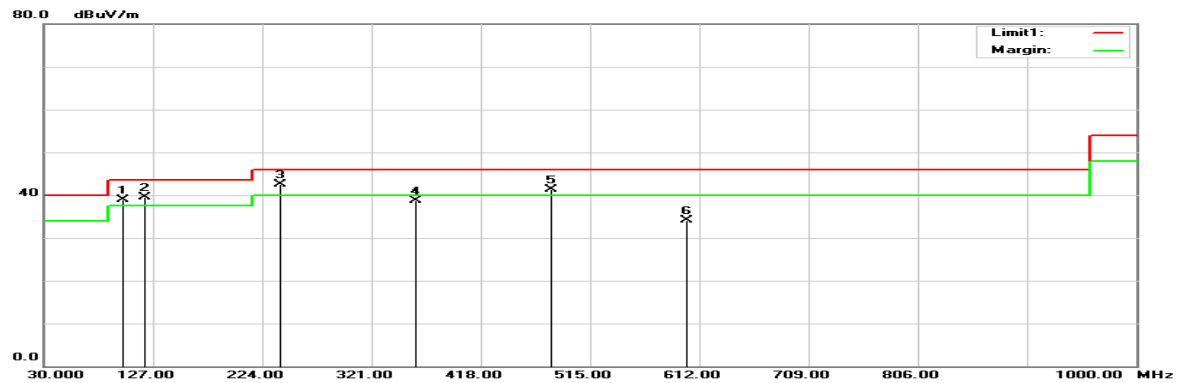
8.6 Test Results

Test Mode: Transmitting

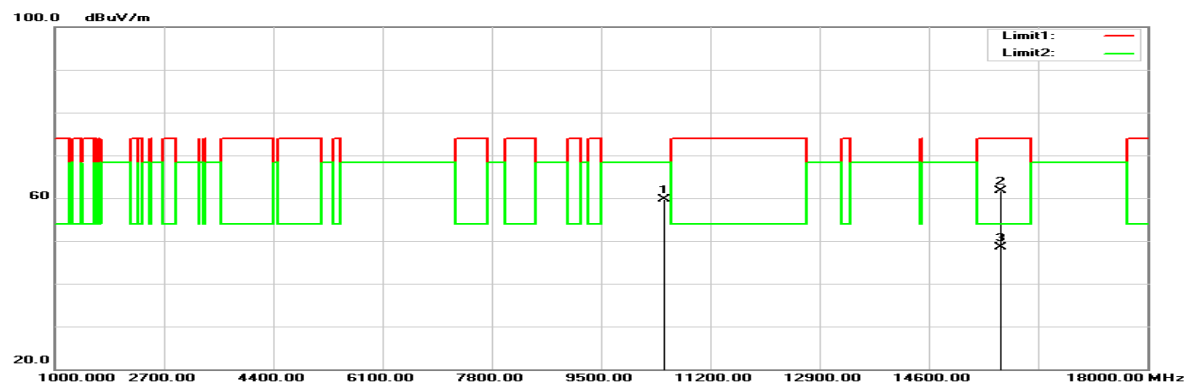
(Pre-scan with three orthogonal axis, and worse case as Z axis.)

Horizontal (worst case is Wi-Fi a mode 5240MHz)

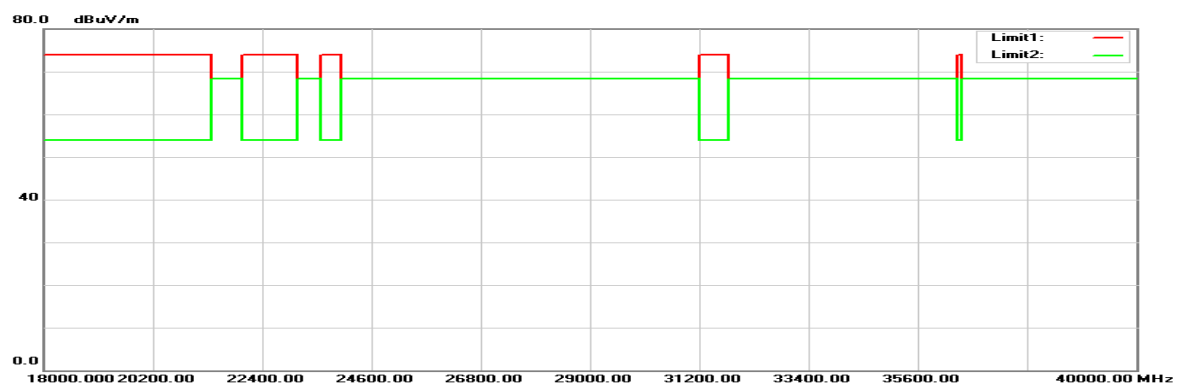
30MHz-1GHz:



1GHz-18GHz:

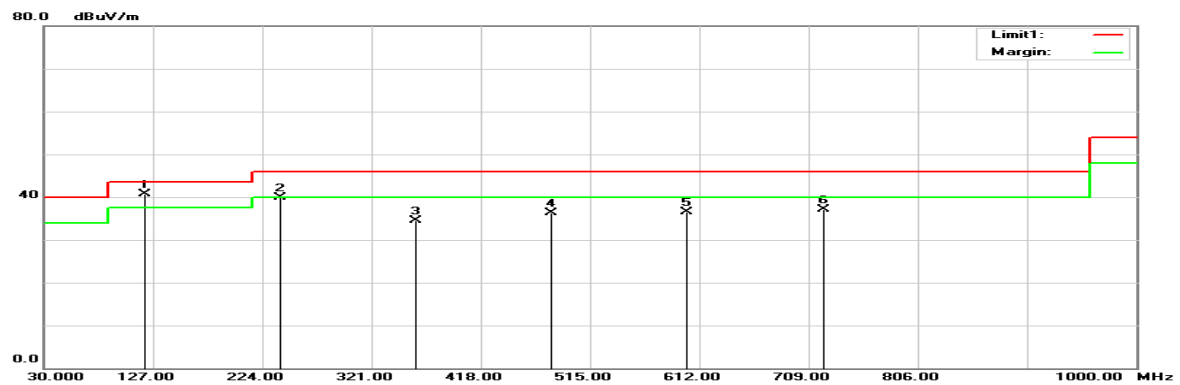


18GHz-40GHz:

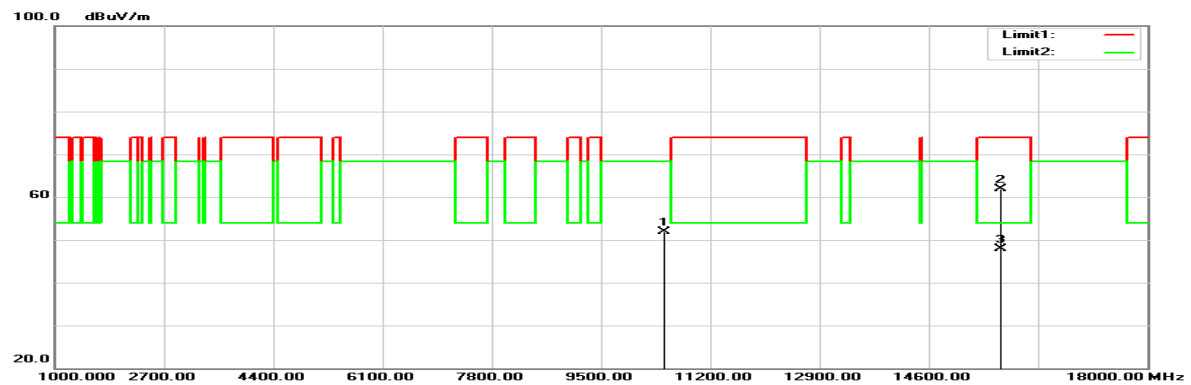


Vertical (worst case is Wi-Fi a mode 5240MHz)

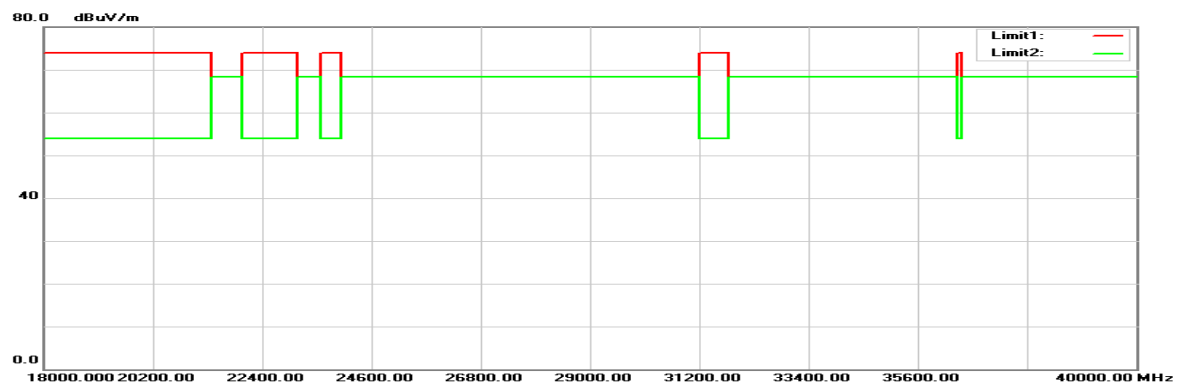
30MHz-1GHz:



1GHz-18GHz:



18GHz-40GHz:



Below 1GHz**Horizontal**

Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
(MHz)	(dB μ V)	Factor(dB/m)	(dB μ V/m)	(dB μ V/m)	(dB)	(cm)	(°)	
99.8400	52.89	-14.06	38.83	43.50	-4.67	100	156	peak
119.2400	50.11	-10.54	39.57	43.50	-3.93	100	258	peak
239.5200	54.76	-12.25	42.51	46.00	-3.49	100	333	peak
359.8000	47.55	-8.91	38.64	46.00	-7.36	100	85	peak
480.0800	47.37	-6.00	41.37	46.00	-4.63	100	97	peak
600.3600	39.23	-5.13	34.10	46.00	-11.90	100	158	peak

Vertical

Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
(MHz)	(dB μ V)	Factor(dB/m)	(dB μ V/m)	(dB μ V/m)	(dB)	(cm)	(°)	
119.2400	51.19	-10.54	40.65	43.50	-2.85	100	135	peak
239.5200	52.23	-12.25	39.98	46.00	-6.02	100	288	peak
359.8000	43.40	-8.91	34.49	46.00	-11.51	100	86	peak
480.0800	42.29	-6.00	36.29	46.00	-9.71	100	106	peak
600.3600	41.70	-5.13	36.57	46.00	-9.43	100	144	peak
722.5800	39.58	-2.48	37.10	46.00	-8.90	100	328	peak

Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported.

For UNII-1 Band I:**Above 1GHz****Horizontal**

Frequency (MHz)	Reading (dBμV)	Correct Factor(dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
a Mode, Low channel								
5149.000	59.00	-1.03	57.97	74.00	-16.03	106	303	peak
5149.000	44.47	-1.03	43.44	54.00	-10.56	106	303	AVG
5180.000	98.67	-1.16	97.51	N/A	N/A	106	303	peak
5180.000	88.36	-1.16	87.20	N/A	N/A	106	303	AVG
10360.000	50.55	7.66	58.21	68.20	-9.99	185	0	peak
15540.000	47.73	14.05	61.78	74.00	-12.22	158	310	peak
15540.000	33.83	14.05	47.88	54.00	-6.12	158	310	AVG
a Mode, Middle channel								
5149.000	53.64	-1.03	52.61	74.00	-21.39	100	302	peak
5149.000	42.38	-1.03	41.35	54.00	-12.65	100	302	AVG
5200.000	99.13	-1.24	97.89	N/A	N/A	100	302	peak
5200.000	89.34	-1.24	88.10	N/A	N/A	100	302	AVG
10400.000	49.78	7.97	57.75	68.20	-10.45	177	2	peak
15600.000	48.87	13.74	62.61	74.00	-11.39	154	310	peak
15600.000	35.34	13.74	49.08	54.00	-4.92	154	310	AVG
a Mode, High channel								
5149.000	53.03	-1.03	52.00	74.00	-22.00	101	303	peak
5149.000	42.40	-1.03	41.37	54.00	-12.63	101	303	AVG
5242.080	100.52	-1.54	98.98	N/A	N/A	101	303	peak
5242.080	90.22	-1.54	88.68	N/A	N/A	101	303	AVG
5351.000	52.88	-1.56	51.32	74.00	-22.68	101	303	peak
5351.000	42.21	-1.56	40.65	54.00	-13.35	101	303	AVG
10480.000	51.13	8.51	59.64	68.20	-8.56	178	2	peak
15720.000	48.25	13.49	61.74	74.00	-12.26	161	351	peak
15720.000	34.93	13.49	48.42	54.00	-5.58	161	351	AVG

Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported.

Vertical

Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
(MHz)	(dBμV)	Factor(dB/m)	(dBμV/m)	(dBμV/m)	(dB)	(cm)	(°)	
a Mode, Low channel								
5149.000	69.30	-1.03	68.27	74.00	-5.73	123	189	peak
5149.000	53.72	-1.03	52.69	54.00	-1.31	123	189	AVG
5180.000	112.89	-1.16	111.73	N/A	N/A	123	189	peak
5180.000	102.84	-1.16	101.68	N/A	N/A	123	189	AVG
10360.000	43.56	7.66	51.22	68.20	-16.98	154	318	peak
15540.000	47.35	14.05	61.40	74.00	-12.60	155	0	peak
15540.000	33.26	14.05	47.31	54.00	-6.69	155	0	AVG
a Mode, Middle channel								
5149.000	61.89	-1.03	60.86	74.00	-13.14	149	201	peak
5149.000	45.82	-1.03	44.79	54.00	-9.21	149	201	AVG
5200.000	113.27	-1.24	112.03	N/A	N/A	149	201	peak
5200.000	102.96	-1.24	101.72	N/A	N/A	149	201	AVG
10400.000	43.65	7.97	51.62	68.20	-16.58	154	233	peak
15720.000	48.50	13.49	61.99	74.00	-12.01	144	348	peak
15720.000	34.59	13.49	48.08	54.00	-5.92	144	348	AVG
a Mode, High channel								
5149.000	55.64	-1.03	54.61	74.00	-19.39	137	194	peak
5149.000	43.80	-1.03	42.77	54.00	-11.23	137	194	AVG
5240.000	113.96	-1.52	112.44	N/A	N/A	137	194	peak
5240.000	103.73	-1.52	102.21	N/A	N/A	137	194	AVG
5351.000	55.91	-1.56	54.35	74.00	-19.65	137	194	peak
5351.000	45.61	-1.56	44.05	54.00	-9.95	137	194	AVG
10480.000	43.46	8.51	51.97	68.20	-16.23	157	23	peak
15720.000	48.44	13.49	61.93	74.00	-12.07	151	349	peak
15720.000	34.46	13.49	47.95	54.00	-6.05	151	349	AVG

Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported.

Horizontal

Frequency (MHz)	Reading (dB μ V)	Correct Factor(dB/m)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
ac20 Mode, Low channel								
5149.000	59.83	-1.03	58.80	74.00	-15.20	107	302	peak
5149.000	43.49	-1.03	42.46	54.00	-11.54	107	302	AVG
5180.000	97.69	-1.16	96.53	N/A	N/A	107	302	peak
5180.000	87.57	-1.16	86.41	N/A	N/A	107	302	AVG
10360.000	48.80	7.66	56.46	68.20	-11.74	182	7	peak
15540.000	47.79	14.05	61.84	74.00	-12.16	158	318	peak
15540.000	33.30	14.05	47.35	54.00	-6.65	158	318	AVG
ac20 Mode, Middle channel								
5149.000	54.03	-1.03	53.00	74.00	-21.00	100	304	peak
5149.000	42.46	-1.03	41.43	54.00	-12.57	100	304	AVG
5200.000	97.54	-1.24	96.30	N/A	N/A	100	304	peak
5200.000	87.70	-1.24	86.46	N/A	N/A	100	304	AVG
10400.000	49.09	7.97	57.06	68.20	-11.14	181	4	peak
15600.000	47.50	13.74	61.24	74.00	-12.76	156	311	peak
15600.000	33.31	13.74	47.05	54.00	-6.95	156	311	AVG
ac20 Mode, High channel								
5149.000	54.04	-1.03	53.01	74.00	-20.99	101	306	peak
5149.000	42.33	-1.03	41.30	54.00	-12.70	101	306	AVG
5240.000	99.38	-1.52	97.86	N/A	N/A	101	306	peak
5240.000	89.52	-1.52	88.00	N/A	N/A	101	306	AVG
5351.000	53.94	-1.56	52.38	74.00	-21.62	101	306	peak
5351.000	42.34	-1.56	40.78	54.00	-13.22	101	306	AVG
10480.000	51.38	8.51	59.89	68.20	-8.31	176	3	peak
15720.000	47.76	13.49	61.25	74.00	-12.75	148	352	peak
15720.000	33.53	13.49	47.02	54.00	-6.98	148	352	AVG

Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported.

Vertical

Frequency (MHz)	Reading (dBμV)	Correct Factor(dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
ac20 Mode, Low channel								
5149.000	72.64	-1.03	71.61	74.00	-2.39	136	187	peak
5149.000	53.58	-1.03	52.55	54.00	-1.45	136	187	AVG
5180.000	111.74	-1.16	110.58	N/A	N/A	136	187	peak
5180.000	102.54	-1.16	101.38	N/A	N/A	136	187	AVG
10360.000	43.47	7.66	51.13	68.20	-17.07	159	221	peak
15540.000	47.80	14.05	61.85	74.00	-12.15	151	360	peak
15540.000	33.06	14.05	47.11	54.00	-6.89	151	360	AVG
ac20 Mode, Middle channel								
5149.000	60.67	-1.03	59.64	74.00	-14.36	152	202	peak
5149.000	45.75	-1.03	44.72	54.00	-9.28	152	202	AVG
5200.000	112.02	-1.24	110.78	N/A	N/A	152	202	peak
5200.000	102.18	-1.24	100.94	N/A	N/A	152	202	AVG
10400.000	43.97	7.97	51.94	68.20	-16.26	146	2	peak
15600.000	46.97	13.74	60.71	74.00	-13.29	148	360	peak
15600.000	33.02	13.74	46.76	54.00	-7.24	148	360	AVG
ac20 Mode, High channel								
5149.000	56.11	-1.03	55.08	74.00	-18.92	151	226	peak
5149.000	43.59	-1.03	42.56	54.00	-11.44	151	226	AVG
5240.000	112.84	-1.52	111.32	N/A	N/A	151	226	peak
5240.000	103.00	-1.52	101.48	N/A	N/A	151	226	AVG
5351.000	56.47	-1.56	54.91	74.00	-19.09	151	226	peak
5351.000	45.15	-1.56	43.59	54.00	-10.41	151	226	AVG
10480.000	44.52	8.51	53.03	68.20	-15.17	155	24	peak
15720.000	46.56	13.49	60.05	74.00	-13.95	137	19	peak
15720.000	33.90	13.49	47.39	54.00	-6.61	137	19	AVG

Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported.

Horizontal

Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
(MHz)	(dBμV)	Factor(dB/m)	(dBμV/m)	(dBμV/m)	(dB)	(cm)	(°)	
ac40 Mode, Low channel								
5149.000	57.09	-1.03	56.06	74.00	-17.94	109	302	peak
5149.000	42.96	-1.03	41.93	54.00	-12.07	109	302	AVG
5188.500	92.42	-1.20	91.22	N/A	N/A	109	302	peak
5188.500	82.75	-1.20	81.55	N/A	N/A	109	302	AVG
10380.000	44.76	7.82	52.58	68.20	-15.62	162	318	peak
15570.000	44.39	13.90	58.29	74.00	-15.71	152	17	peak
15570.000	31.68	13.90	45.58	54.00	-8.42	152	17	AVG
ac40 Mode, High channel								
5149.000	53.99	-1.03	52.96	74.00	-21.04	102	303	peak
5149.000	42.72	-1.03	41.69	54.00	-12.31	102	303	AVG
5230.000	93.32	-1.45	91.87	N/A	N/A	102	303	peak
5230.000	83.80	-1.45	82.35	N/A	N/A	102	303	AVG
5351.000	52.64	-1.56	51.08	74.00	-22.92	102	303	peak
5351.000	42.56	-1.56	41.00	54.00	-13.00	102	303	AVG
10460.000	45.19	8.37	53.56	68.20	-14.64	154	360	peak
15690.000	46.09	13.46	59.55	74.00	-14.45	162	107	peak
15690.000	33.25	13.46	46.71	54.00	-7.29	162	107	AVG

Vertical

Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
(MHz)	(dBμV)	Factor(dB/m)	(dBμV/m)	(dBμV/m)	(dB)	(cm)	(°)	
ac40 Mode, Low channel								
5149.000	73.27	-1.03	72.24	74.00	-1.76	134	190	peak
5149.000	52.41	-1.03	51.38	54.00	-2.62	134	190	AVG
5190.000	106.54	-1.20	105.34	N/A	N/A	134	190	peak
5190.000	96.92	-1.20	95.72	N/A	N/A	134	190	AVG
10380.000	43.87	7.82	51.69	68.20	-16.51	150	221	peak
15570.000	42.49	13.90	56.39	74.00	-17.61	145	102	peak
15570.000	31.41	13.90	45.31	54.00	-8.69	145	102	AVG
ac40 Mode, High channel								
5149.000	55.61	-1.03	54.58	74.00	-19.42	117	188	peak
5149.000	43.53	-1.03	42.50	54.00	-11.50	117	188	AVG
5230.000	107.48	-1.45	106.03	N/A	N/A	117	188	peak
5230.000	97.89	-1.45	96.44	N/A	N/A	117	188	AVG
5351.000	55.56	-1.56	54.00	74.00	-20.00	117	188	peak
5351.000	44.04	-1.56	42.48	54.00	-11.52	117	188	AVG
10460.000	43.23	8.37	51.60	68.20	-16.60	159	325	peak
15690.000	46.33	13.46	59.79	74.00	-14.21	147	294	peak
15690.000	33.22	13.46	46.68	54.00	-7.32	147	294	AVG

Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported.

Horizontal

Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
(MHz)	(dB μ V)	Factor(dB/m)	(dB μ V/m)	(dB μ V/m)	(dB)	(cm)	(°)	
ac80 Mode, Low channel								
5149.000	54.78	-1.03	53.75	74.00	-20.25	101	303	peak
5149.000	43.75	-1.03	42.72	54.00	-11.28	101	303	AVG
5210.000	90.81	-1.32	89.49	N/A	N/A	101	303	peak
5210.000	80.45	-1.32	79.13	N/A	N/A	101	303	AVG
10420.000	42.99	8.11	51.10	68.20	-17.10	142	126	peak
15630.000	45.42	13.65	59.07	74.00	-14.93	153	244	peak
15630.000	33.52	13.65	47.17	54.00	-6.83	153	244	AVG

Vertical

Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
(MHz)	(dB μ V)	Factor(dB/m)	(dB μ V/m)	(dB μ V/m)	(dB)	(cm)	(°)	
ac80 Mode, Low channel								
5149.000	69.77	-1.03	68.74	74.00	-5.26	117	196	peak
5149.000	53.94	-1.03	52.91	54.00	-1.09	117	196	AVG
5210.000	103.42	-1.32	102.10	N/A	N/A	117	196	peak
5210.000	93.64	-1.32	92.32	N/A	N/A	117	196	AVG
10420.000	43.26	8.11	51.37	68.20	-16.83	162	272	peak
15630.000	45.75	13.65	59.40	74.00	-14.60	149	347	peak
15630.000	33.42	13.65	47.07	54.00	-6.93	149	347	AVG

Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported.

For UNII-3 Band IV:**Above 1GHz****Horizontal**

Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
(MHz)	(dBμV)	Factor(dB/m)	(dBμV/m)	(dBμV/m)	(dB)	(cm)	(°)	
a Mode, Low channel								
5617.200	54.89	-1.77	53.12	68.20	-15.08	100	345	peak
5697.120	56.22	-1.65	54.57	103.07	-48.50	100	345	peak
5719.800	69.18	-1.67	67.51	110.74	-43.23	100	345	peak
5724.840	75.77	-1.68	74.09	121.84	-47.75	100	345	peak
5745.000	97.07	-1.70	95.37	N/A	N/A	100	345	peak
5745.000	86.38	-1.70	84.68	N/A	N/A	100	345	AVG
5854.080	55.56	-1.12	54.44	112.90	-58.46	100	345	peak
5867.040	55.01	-1.00	54.01	107.43	-53.42	100	345	peak
5915.280	55.66	-0.61	55.05	75.39	-20.34	100	345	peak
5925.360	55.29	-0.64	54.65	68.20	-13.55	100	345	peak
11490.000	57.27	9.04	66.31	74.00	-7.69	213	360	peak
11490.000	43.23	9.04	52.27	54.00	-1.73	213	360	AVG
17235.000	44.47	16.75	61.22	68.20	-6.98	154	139	peak
a Mode, Middle channel								
5618.640	54.81	-1.77	53.04	68.20	-15.16	101	347	peak
5657.880	55.38	-1.71	53.67	74.03	-20.36	101	347	peak
5716.920	55.43	-1.66	53.77	109.94	-56.17	101	347	peak
5723.040	54.27	-1.68	52.59	117.73	-65.14	101	347	peak
5785.000	97.72	-1.67	96.05	N/A	N/A	101	347	peak
5785.000	88.23	-1.67	86.56	N/A	N/A	101	347	AVG
5851.560	55.09	-1.14	53.95	118.64	-64.69	101	347	peak
5872.440	55.19	-0.94	54.25	105.92	-51.67	101	347	peak
5904.840	55.64	-0.59	55.05	83.12	-28.07	101	347	peak
5938.680	55.55	-0.67	54.88	68.20	-13.32	101	347	peak
11570.000	56.41	9.62	66.03	74.00	-7.97	211	360	peak
11570.000	43.12	9.62	52.74	54.00	-1.26	211	360	AVG
17355.000	44.62	16.82	61.44	68.20	-6.76	153	126	peak
a Mode, High channel								
5634.120	54.54	-1.75	52.79	68.20	-15.41	108	301	peak
5668.680	55.47	-1.70	53.77	82.02	-28.25	108	301	peak
5703.600	55.14	-1.66	53.48	106.21	-52.73	108	301	peak
5722.680	55.11	-1.68	53.43	116.91	-63.48	108	301	peak
5825.000	93.68	-1.41	92.27	N/A	N/A	108	301	peak
5825.000	84.40	-1.41	82.99	N/A	N/A	108	301	AVG
5850.480	70.22	-1.15	69.07	121.11	-52.04	108	301	peak
5855.520	64.12	-1.11	63.01	110.65	-47.64	108	301	peak
5922.840	56.22	-0.63	55.59	69.80	-14.21	108	301	peak
5928.240	55.40	-0.65	54.75	68.20	-13.45	108	301	peak
11650.000	55.37	9.62	64.99	74.00	-9.01	212	360	peak
11650.000	42.26	9.62	51.88	54.00	-2.12	212	360	AVG
17475.000	44.48	16.32	60.80	68.20	-7.40	146	138	peak

Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported.

Vertical

Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
(MHz)	(dBμV)	Factor(dB/m)	(dBμV/m)	(dBμV/m)	(dB)	(cm)	(°)	
a Mode, Low channel								
5649.600	58.45	-1.73	56.72	68.20	-11.48	163	188	peak
5698.200	70.06	-1.65	68.41	103.87	-35.46	163	188	peak
5719.440	86.05	-1.67	84.38	110.64	-26.26	163	188	peak
5724.840	92.63	-1.68	90.95	121.84	-30.89	163	188	peak
5745.000	112.19	-1.70	110.49	N/A	N/A	163	188	peak
5745.000	101.80	-1.70	100.10	N/A	N/A	163	188	AVG
5853.720	56.42	-1.12	55.30	113.72	-58.42	163	188	peak
5859.480	57.19	-1.06	56.13	109.55	-53.42	163	188	peak
5881.080	56.67	-0.85	55.82	100.70	-44.88	163	188	peak
5948.760	55.62	-0.70	54.92	68.20	-13.28	163	188	peak
11490.000	51.33	9.04	60.37	74.00	-13.63	170	0	peak
11490.000	38.04	9.04	47.08	54.00	-6.92	170	0	AVG
17235.000	44.38	16.75	61.13	68.20	-7.07	146	354	peak
a Mode, Middle channel								
5622.240	55.19	-1.77	53.42	68.20	-14.78	111	167	peak
5697.480	57.17	-1.65	55.52	103.34	-47.82	111	167	peak
5717.280	61.28	-1.66	59.62	110.04	-50.42	111	167	peak
5723.760	61.81	-1.68	60.13	119.37	-59.24	111	167	peak
5785.000	112.60	-1.67	110.93	N/A	N/A	111	167	peak
5785.000	103.06	-1.67	101.39	N/A	N/A	111	167	AVG
5850.120	62.06	-1.15	60.91	121.93	-61.02	111	167	peak
5858.760	59.42	-1.08	58.34	109.75	-51.41	111	167	peak
5883.960	56.81	-0.83	55.98	98.57	-42.59	111	167	peak
5936.520	55.83	-0.66	55.17	68.20	-13.03	111	167	peak
11570.000	51.16	9.62	60.78	74.00	-13.22	158	0	peak
11570.000	37.70	9.62	47.32	54.00	-6.68	158	0	AVG
17355.000	43.66	16.82	60.48	68.20	-7.72	151	222	peak
a Mode, High channel								
5633.040	56.10	-1.75	54.35	68.20	-13.85	113	169	peak
5678.400	56.15	-1.68	54.47	89.22	-34.75	113	169	peak
5709.000	55.91	-1.67	54.24	107.72	-53.48	113	169	peak
5724.480	56.68	-1.68	55.00	121.01	-66.01	113	169	peak
5825.000	112.46	-1.41	111.05	N/A	N/A	113	169	peak
5825.000	102.45	-1.41	101.04	N/A	N/A	113	169	AVG
5851.920	84.19	-1.14	83.05	117.82	-34.77	113	169	peak
5855.160	79.35	-1.11	78.24	110.76	-32.52	113	169	peak
5876.400	65.48	-0.90	64.58	104.16	-39.58	113	169	peak
5949.480	55.79	-0.70	55.09	68.20	-13.11	113	169	peak
11650.000	49.87	9.62	59.49	74.00	-14.51	170	356	peak
11650.000	36.26	9.62	45.88	54.00	-8.12	170	356	AVG
17475.000	46.75	16.32	63.07	68.20	-5.13	159	343	peak

Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported.

Horizontal

Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
(MHz)	(dBμV)	Factor(dB/m)	(dBμV/m)	(dBμV/m)	(dB)	(cm)	(°)	
ac20 Mode, Low channel								
5643.480	55.21	-1.74	53.47	68.20	-14.73	148	142	peak
5672.640	55.00	-1.69	53.31	84.95	-31.64	148	142	peak
5719.800	56.84	-1.67	55.17	110.74	-55.57	148	142	peak
5724.120	63.18	-1.68	61.50	120.19	-58.69	148	142	peak
5745.000	93.64	-1.70	91.94	N/A	N/A	148	142	peak
5745.000	83.90	-1.70	82.20	N/A	N/A	148	142	AVG
5854.800	54.52	-1.11	53.41	111.26	-57.85	148	142	peak
5856.960	55.95	-1.09	54.86	110.25	-55.39	148	142	peak
5909.880	55.98	-0.61	55.37	79.39	-24.02	148	142	peak
5945.880	54.77	-0.68	54.09	68.20	-14.11	148	142	peak
11490.000	59.16	9.04	68.20	74.00	-5.80	165	0	peak
11490.000	43.68	9.04	52.72	54.00	-1.28	165	0	AVG
17235.000	44.57	16.75	61.32	68.20	-6.88	154	319	peak
ac20 Mode, Middle channel								
5631.600	54.68	-1.75	52.93	68.20	-15.27	150	117	peak
5684.880	54.97	-1.68	53.29	94.01	-40.72	150	117	peak
5706.480	54.51	-1.66	52.85	107.01	-54.16	150	117	peak
5720.880	55.03	-1.67	53.36	112.81	-59.45	150	117	peak
5785.000	96.92	-1.67	95.25	N/A	N/A	150	117	peak
5785.000	87.22	-1.67	85.55	N/A	N/A	150	117	AVG
5851.920	55.18	-1.14	54.04	117.82	-63.78	150	117	peak
5855.520	55.23	-1.11	54.12	110.65	-56.53	150	117	peak
5881.800	55.42	-0.85	54.57	100.17	-45.60	150	117	peak
5941.200	54.57	-0.67	53.90	68.20	-14.30	150	117	peak
11570.000	54.80	9.62	64.42	74.00	-9.58	174	0	peak
11570.000	43.21	9.62	52.83	54.00	-1.17	174	0	AVG
17355.000	43.69	16.82	60.51	68.20	-7.69	152	346	peak
ac20 Mode, High channel								
5645.640	54.96	-1.73	53.23	68.20	-14.97	140	115	peak
5669.400	54.64	-1.70	52.94	82.56	-29.62	140	115	peak
5707.200	54.17	-1.66	52.51	107.22	-54.71	140	115	peak
5721.240	54.96	-1.67	53.29	113.63	-60.34	140	115	peak
5825.000	97.10	-1.41	95.69	N/A	N/A	140	115	peak
5825.000	87.45	-1.41	86.04	N/A	N/A	140	115	AVG
5850.120	62.99	-1.15	61.84	121.93	-60.09	140	115	peak
5855.160	57.54	-1.11	56.43	110.76	-54.33	140	115	peak
5900.160	55.39	-0.67	54.72	86.58	-31.86	140	115	peak
5925.000	55.27	-0.64	54.63	68.20	-13.57	140	115	peak
11650.000	57.24	9.62	66.86	74.00	-7.14	207	0	peak
11650.000	42.15	9.62	51.77	54.00	-2.23	207	0	AVG
17475.000	48.28	16.32	64.60	68.20	-3.60	158	312	peak

Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported.

Vertical

Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
(MHz)	(dBμV)	Factor(dB/m)	(dBμV/m)	(dBμV/m)	(dB)	(cm)	(°)	
ac20 Mode, Low channel								
5639.160	55.59	-1.74	53.85	68.20	-14.35	149	180	peak
5691.720	56.50	-1.66	54.84	99.07	-44.23	149	180	peak
5719.800	70.74	-1.67	69.07	110.74	-41.67	149	180	peak
5724.480	78.77	-1.68	77.09	121.01	-43.92	149	180	peak
5745.000	109.76	-1.70	108.06	N/A	N/A	149	180	peak
5745.000	100.08	-1.70	98.38	N/A	N/A	149	180	AVG
5851.200	56.12	-1.14	54.98	119.46	-64.48	149	180	peak
5863.800	56.79	-1.03	55.76	108.34	-52.58	149	180	peak
5910.240	56.18	-0.60	55.58	79.12	-23.54	149	180	peak
5930.040	56.40	-0.65	55.75	68.20	-12.45	149	180	peak
11490.000	53.35	9.04	62.39	74.00	-11.61	160	5	peak
11490.000	38.70	9.04	47.74	54.00	-6.26	160	5	AVG
17235.000	44.75	16.75	61.50	68.20	-6.70	148	261	peak
ac20 Mode, Middle channel								
5647.080	55.48	-1.73	53.75	68.20	-14.45	146	210	peak
5686.320	58.02	-1.67	56.35	95.08	-38.73	146	210	peak
5703.960	56.60	-1.66	54.94	106.31	-51.37	146	210	peak
5724.480	55.21	-1.68	53.53	121.01	-67.48	146	210	peak
5785.000	110.22	-1.67	108.55	N/A	N/A	146	210	peak
5785.000	100.22	-1.67	98.55	N/A	N/A	146	210	AVG
5850.120	56.57	-1.15	55.42	121.93	-66.51	146	210	peak
5874.240	57.63	-0.92	56.71	105.41	-48.70	146	210	peak
5886.840	55.99	-0.80	55.19	96.44	-41.25	146	210	peak
5945.160	56.43	-0.69	55.74	68.20	-12.46	146	210	peak
11570.000	53.22	9.62	62.84	74.00	-11.16	162	5	peak
11570.000	38.30	9.62	47.92	54.00	-6.08	162	5	AVG
17355.000	43.82	16.82	60.64	68.20	-7.56	175	171	peak
ac20 Mode, High channel								
5647.440	54.98	-1.73	53.25	68.20	-14.95	181	360	peak
5696.040	56.00	-1.65	54.35	102.27	-47.92	181	360	peak
5708.640	56.26	-1.67	54.59	107.62	-53.03	181	360	peak
5720.880	55.31	-1.67	53.64	112.81	-59.17	181	360	peak
5825.000	110.84	-1.41	109.43	N/A	N/A	181	360	peak
5825.000	101.06	-1.41	99.65	N/A	N/A	181	360	AVG
5850.120	74.14	-1.15	72.99	121.93	-48.94	181	360	peak
5856.240	69.47	-1.09	68.38	110.45	-42.07	181	360	peak
5876.400	60.14	-0.90	59.24	104.16	-44.92	181	360	peak
5938.680	57.32	-0.67	56.65	68.20	-11.55	181	360	peak
11650.000	51.06	9.62	60.68	74.00	-13.32	171	15	peak
11650.000	36.61	9.62	46.23	54.00	-7.77	171	15	AVG
17475.000	48.26	16.32	64.58	68.20	-3.62	152	27	peak

Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported.

Horizontal

Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
(MHz)	(dB μ V)	Factor(dB/m)	(dB μ V/m)	(dB μ V/m)	(dB)	(cm)	(°)	
ac40 Mode, Low channel								
5641.320	54.52	-1.74	52.78	68.20	-15.42	139	119	peak
5698.560	55.21	-1.65	53.56	104.13	-50.57	139	119	peak
5719.800	67.14	-1.67	65.47	110.74	-45.27	139	119	peak
5722.680	67.18	-1.68	65.50	116.91	-51.41	139	119	peak
5755.000	94.80	-1.69	93.11	N/A	N/A	139	119	peak
5755.000	84.95	-1.69	83.26	N/A	N/A	139	119	AVG
5853.720	54.64	-1.12	53.52	113.72	-60.20	139	119	peak
5871.000	55.45	-0.95	54.50	106.32	-51.82	139	119	peak
5888.640	55.69	-0.79	54.90	95.11	-40.21	139	119	peak
5932.920	55.90	-0.65	55.25	68.20	-12.95	139	119	peak
11510.000	56.36	9.17	65.53	74.00	-8.47	165	172	peak
11510.000	43.60	9.17	52.77	54.00	-1.23	165	172	AVG
17265.000	44.46	16.80	61.26	68.20	-6.94	154	296	peak
ac40 Mode, High channel								
5629.440	54.72	-1.76	52.96	68.20	-15.24	144	166	peak
5697.840	55.31	-1.65	53.66	103.60	-49.94	144	166	peak
5700.000	55.54	-1.65	53.89	105.20	-51.31	144	166	peak
5722.680	54.57	-1.68	52.89	116.91	-64.02	144	166	peak
5795.000	94.78	-1.65	93.13	N/A	N/A	144	166	peak
5795.000	84.91	-1.65	83.26	N/A	N/A	144	166	AVG
5850.840	58.91	-1.14	57.77	120.28	-62.51	144	166	peak
5861.640	56.08	-1.05	55.03	108.94	-53.91	144	166	peak
5886.840	55.74	-0.80	54.94	96.44	-41.50	144	166	peak
5938.320	55.86	-0.67	55.19	68.20	-13.01	144	166	peak
11590.000	55.54	9.78	65.32	74.00	-8.68	172	167	peak
11590.000	42.66	9.78	52.44	54.00	-1.56	172	167	AVG
17385.000	43.23	16.79	60.02	68.20	-8.18	162	77	peak

Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported.

Vertical

Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
(MHz)	(dBμV)	Factor(dB/m)	(dBμV/m)	(dBμV/m)	(dB)	(cm)	(°)	
ac40 Mode, Low channel								
5648.880	57.03	-1.73	55.30	68.20	-12.90	145	360	peak
5697.480	64.97	-1.65	63.32	103.34	-40.02	145	360	peak
5719.800	83.47	-1.67	81.80	110.74	-28.94	145	360	peak
5722.680	83.48	-1.68	81.80	116.91	-35.11	145	360	peak
5755.000	107.72	-1.69	106.03	N/A	N/A	145	360	peak
5755.000	97.64	-1.69	95.95	N/A	N/A	145	360	AVG
5851.200	57.44	-1.14	56.30	119.46	-63.16	145	360	peak
5858.760	59.26	-1.08	58.18	109.75	-51.57	145	360	peak
5901.960	55.75	-0.64	55.11	85.25	-30.14	145	360	peak
5925.720	55.73	-0.65	55.08	68.20	-13.12	145	360	peak
11510.000	52.36	9.17	61.53	74.00	-12.47	158	175	peak
11510.000	38.76	9.17	47.93	54.00	-6.07	158	175	AVG
17265.000	45.16	16.80	61.96	68.20	-6.24	129	317	peak
ac40 Mode, High channel								
5633.760	55.73	-1.75	53.98	68.20	-14.22	143	0	peak
5650.680	57.22	-1.72	55.50	68.70	-13.20	143	0	peak
5718.360	61.70	-1.67	60.03	110.34	-50.31	143	0	peak
5724.480	63.61	-1.68	61.93	121.01	-59.08	143	0	peak
5795.000	108.10	-1.65	106.45	N/A	N/A	143	0	peak
5795.000	98.35	-1.65	96.70	N/A	N/A	143	0	AVG
5851.560	70.20	-1.14	69.06	118.64	-49.58	143	0	peak
5856.600	67.41	-1.09	66.32	110.35	-44.03	143	0	peak
5909.880	59.18	-0.61	58.57	79.39	-20.82	143	0	peak
5944.080	56.01	-0.69	55.32	68.20	-12.88	143	0	peak
11590.000	50.84	9.78	60.62	74.00	-13.38	155	181	peak
11590.000	37.97	9.78	47.75	54.00	-6.25	155	181	AVG
17385.000	43.92	16.79	60.71	68.20	-7.49	146	149	peak

Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported.

Horizontal

Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
(MHz)	(dBμV)	Factor(dB/m)	(dBμV/m)	(dBμV/m)	(dB)	(cm)	(°)	
ac80 Mode, Low channel								
5625.120	54.86	-1.76	53.10	68.20	-15.10	145	149	peak
5694.960	60.98	-1.66	59.32	101.47	-42.15	145	149	peak
5719.440	66.86	-1.67	65.19	110.64	-45.45	145	149	peak
5724.120	67.86	-1.68	66.18	120.19	-54.01	145	149	peak
5775.000	91.05	-1.67	89.38	N/A	N/A	145	149	peak
5775.000	81.25	-1.67	79.58	N/A	N/A	145	149	AVG
5851.920	63.55	-1.14	62.41	117.82	-55.41	145	149	peak
5855.880	62.31	-1.10	61.21	110.55	-49.34	145	149	peak
5905.200	56.63	-0.60	56.03	82.85	-26.82	145	149	peak
5940.120	55.30	-0.68	54.62	68.20	-13.58	145	149	peak
11550.000	54.49	9.48	63.97	74.00	-10.03	167	164	peak
11550.000	43.05	9.48	52.53	54.00	-1.47	167	164	AVG
17325.000	44.60	16.85	61.45	68.20	-6.75	142	236	peak

Vertical

Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
(MHz)	(dBμV)	Factor(dB/m)	(dBμV/m)	(dBμV/m)	(dB)	(cm)	(°)	
ac80 Mode, Low channel								
5610.000	60.64	-1.79	58.85	68.20	-9.35	158	0	peak
5699.640	76.62	-1.65	74.97	104.93	-29.96	158	0	peak
5719.800	82.14	-1.67	80.47	110.74	-30.27	158	0	peak
5724.120	83.07	-1.68	81.39	120.19	-38.80	158	0	peak
5775.000	106.47	-1.67	104.80	N/A	N/A	158	0	peak
5775.000	95.72	-1.67	94.05	N/A	N/A	158	0	AVG
5852.280	79.59	-1.14	78.45	117.00	-38.55	158	0	peak
5858.040	78.07	-1.08	76.99	109.95	-32.96	158	0	peak
5876.040	74.83	-0.90	73.93	104.43	-30.50	158	0	peak
5927.520	64.70	-0.64	64.06	68.20	-4.14	158	0	peak
11550.000	49.64	9.48	59.12	74.00	-14.88	164	168	peak
11550.000	38.71	9.48	48.19	54.00	-5.81	164	168	AVG
17325.000	43.72	16.85	60.57	68.20	-7.63	145	332	peak

Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported.

9 FCC §15.407(a)(e) – Emission Bandwidth And Occupied Bandwidth

9.1 Applicable Standard

As per FCC §15.407(a): The maximum power spectral density is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test. If the device cannot be connected directly, alternative techniques acceptable to the Commission may be used. Measurements in the 5.725-5.85 GHz band are made over a reference bandwidth of 500 kHz or the 26 dB emission bandwidth of the device, whichever is less. Measurements in the 5.15-5.25 GHz, 5.25-5.35 GHz, and the 5.47-5.725 GHz bands are made over a bandwidth of 1 MHz or the 26 dB emission bandwidth of the device, whichever is less. A narrower resolution bandwidth can be used, provided that the measured power is integrated over the full reference bandwidth.

As per FCC §15.407(e): for equipment operating in the band 5725 – 5850 MHz, the minimum 6 dB bandwidth of U-NII devices shall be 500 kHz.

9.2 Test Procedure

Emission Bandwidth (EBW)

- a) Set RBW = approximately 1% of the emission bandwidth.
- b) Set the VBW > RBW.
- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

Minimum Emission Bandwidth for the band 5.725-5.85 GHz

Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 KHz for the band 5.715-5.85 GHz. The following procedure shall be used for measuring this bandwidth:

- a) Set RBW = 100 kHz.
- b) Set the video bandwidth (VBW) $\geq 3 \times$ 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.

9.3 Test Results

Test mode: Transmitting

UNII Band	Mode	Channel	Frequency (MHz)	26dB Emission Bandwidth (MHz)	99% Emission Bandwidth (MHz)
UNII-1	802.11a	36	5180	36.24	18.06
		40	5200	36.28	17.62
		48	5240	36.20	17.78
	802.11ac 20	36	5180	35.60	17.82
		40	5200	37.44	17.82
		48	5240	38.16	17.82
	802.11ac 40	38	5190	46.56	36.36
		46	5230	40.96	36.36
	802.11ac 80	42	5210	105.12	75.92

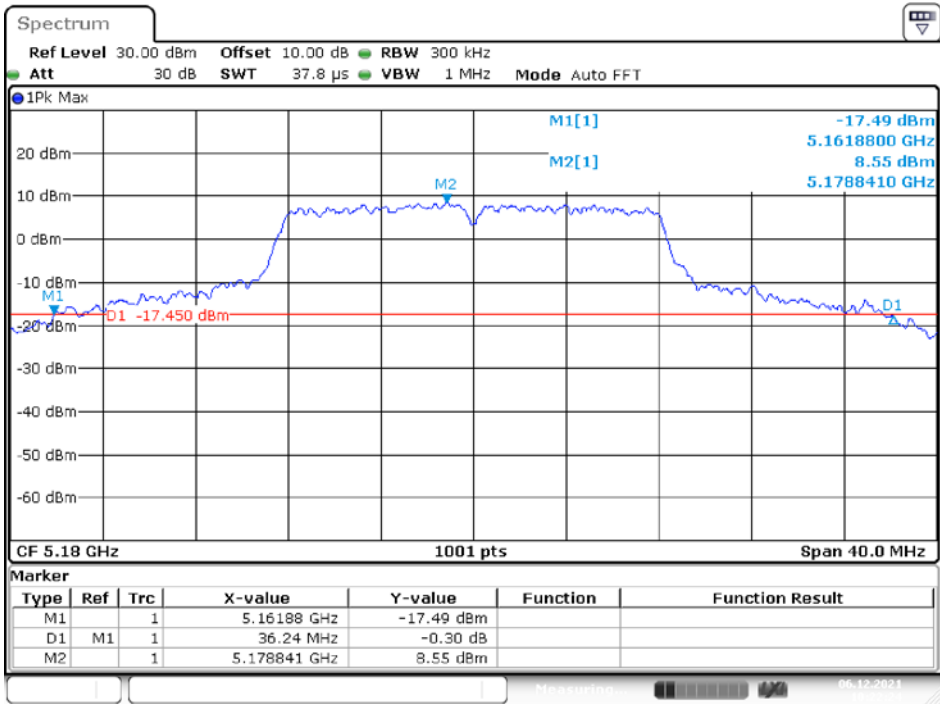
UNII Band	Mode	Channel	Frequency (MHz)	6dB Emission Bandwidth (MHz)	99% Emission Bandwidth (MHz)	Limit (kHz)	Result
UNII-3 Band IV	802.11a	149	5745	16.32	16.50	≥ 500	PASS
		157	5785	16.36	16.54	≥ 500	PASS
		165	5825	16.32	16.58	≥ 500	PASS
	802.11ac 20	149	5745	17.12	17.50	≥ 500	PASS
		157	5785	17.08	17.50	≥ 500	PASS
		165	5825	17.12	17.50	≥ 500	PASS
	802.11ac 40	151	5755	36.32	36.28	≥ 500	PASS
		159	5795	36.32	36.28	≥ 500	PASS
	802.11ac 80	155	5775	75.36	75.92	≥ 500	PASS

Note: the 99% Occupied Bandwidth have not fall into the band 5250-5350MHz or 5470-5725MHz, please refer to the test plots of 99% Occupied Bandwidth.

Please refer to the following plots

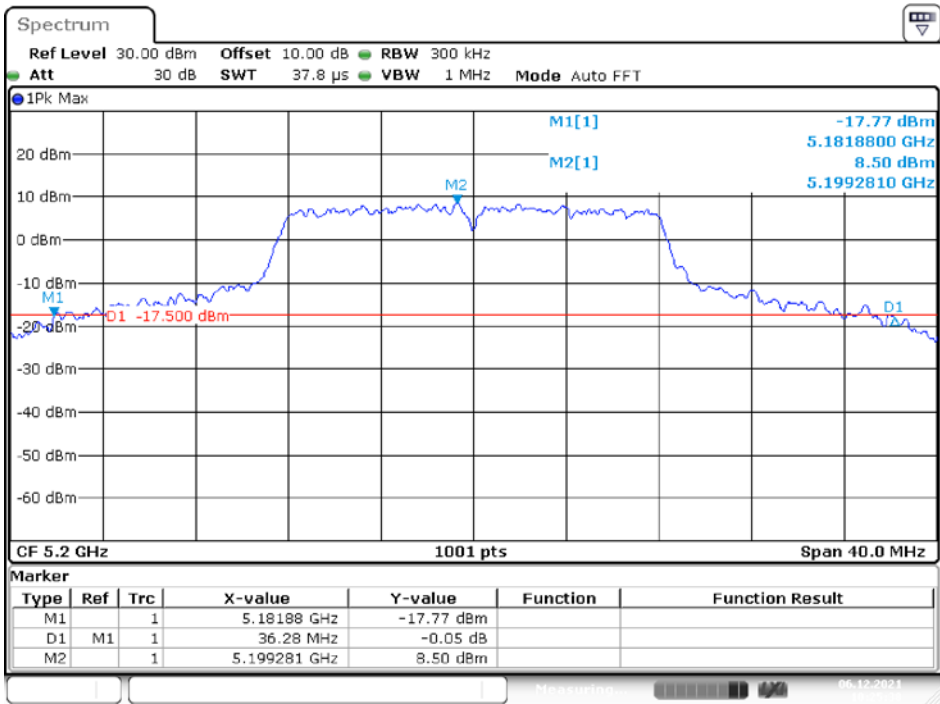
Transmitting Mode:

UNII-1 Band I / BW 26dBc
IEEE 802.11a Mode / 5150 ~ 5250MHz
5180MHz



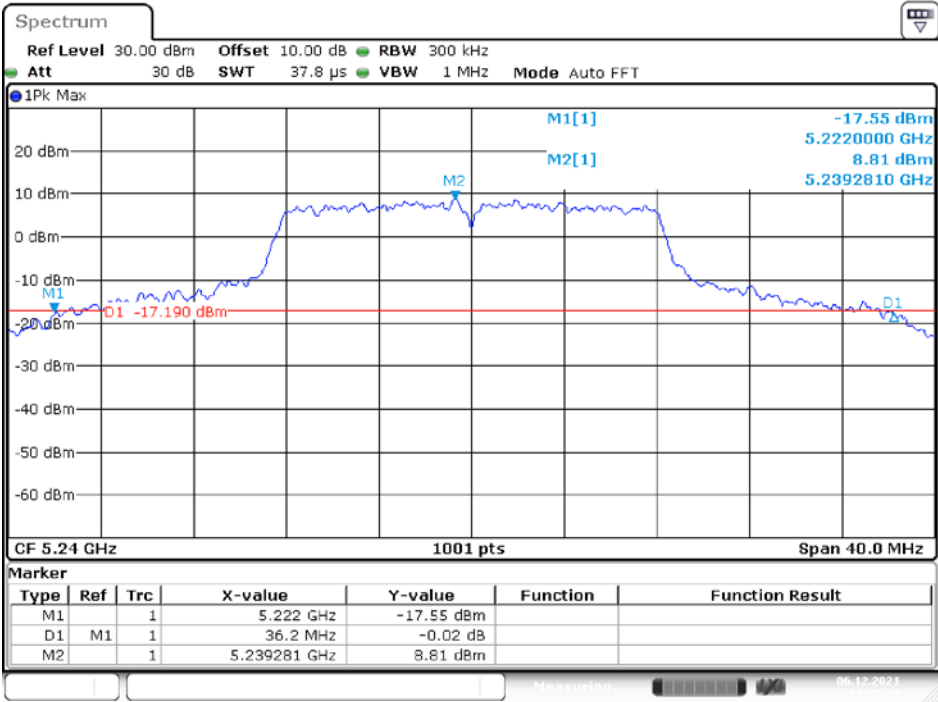
Date: 6.DEC.2021 10:22:24

5200MHz

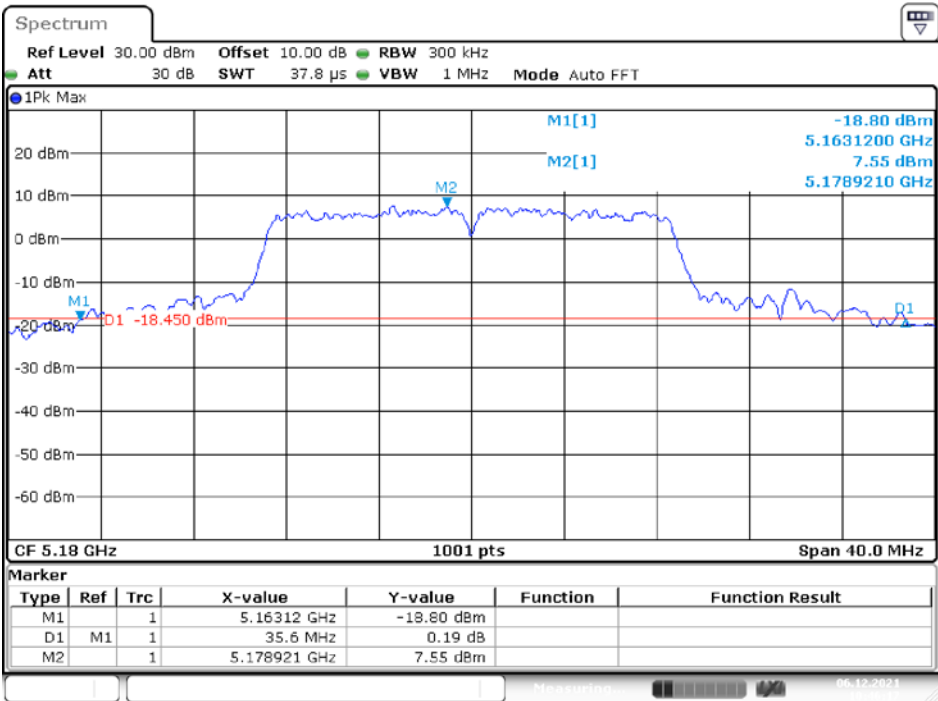


Date: 6.DEC.2021 10:25:38

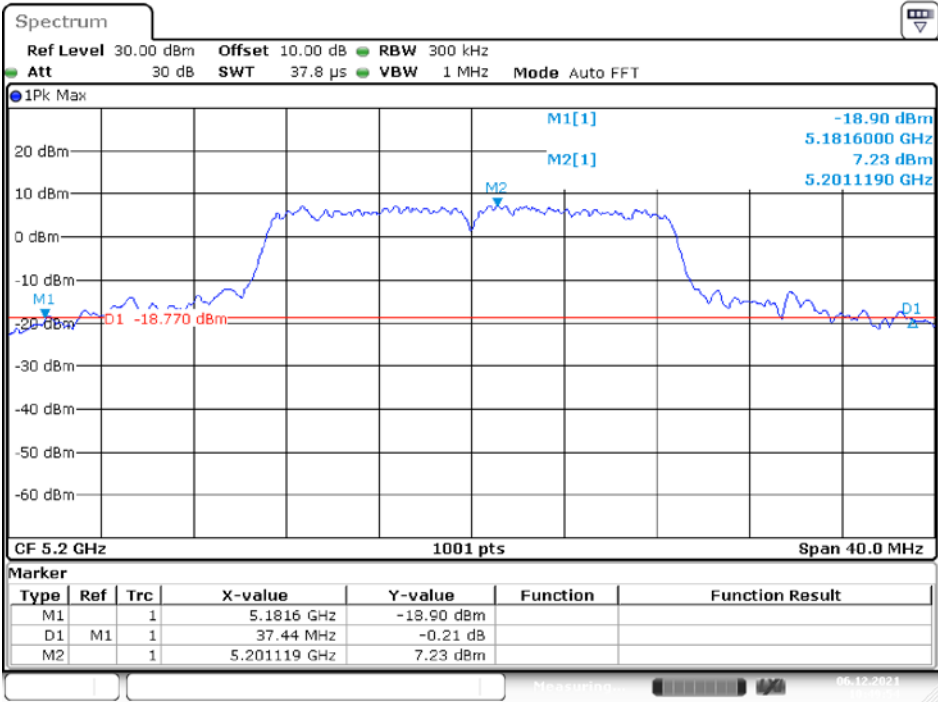
5240MHz



IEEE 802.11ac VHT20 Mode / 5150 ~ 5250MHz
5180MHz

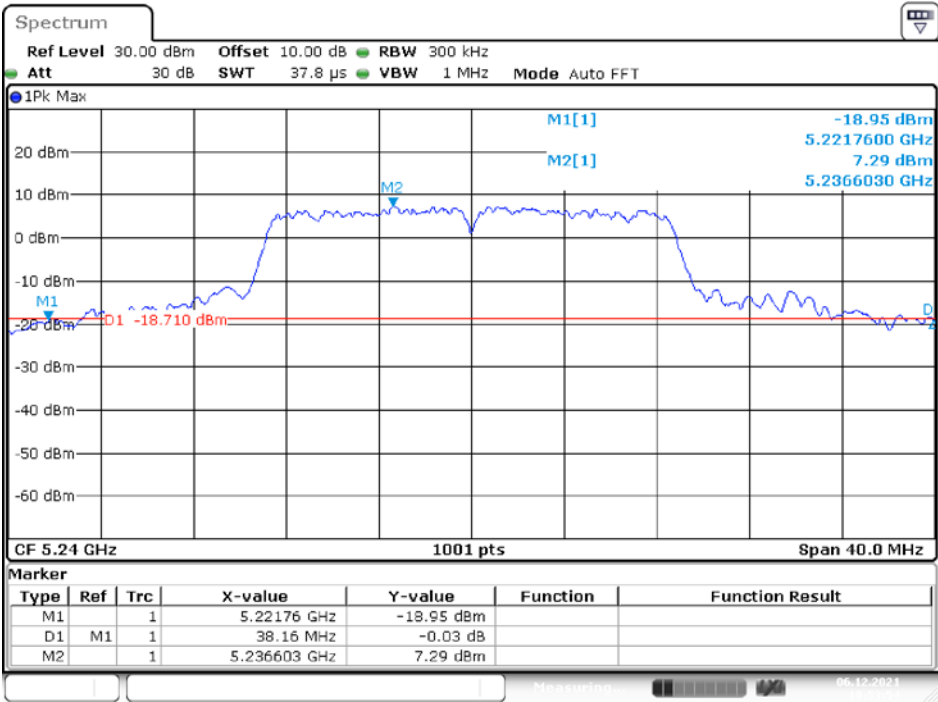


5200MHz

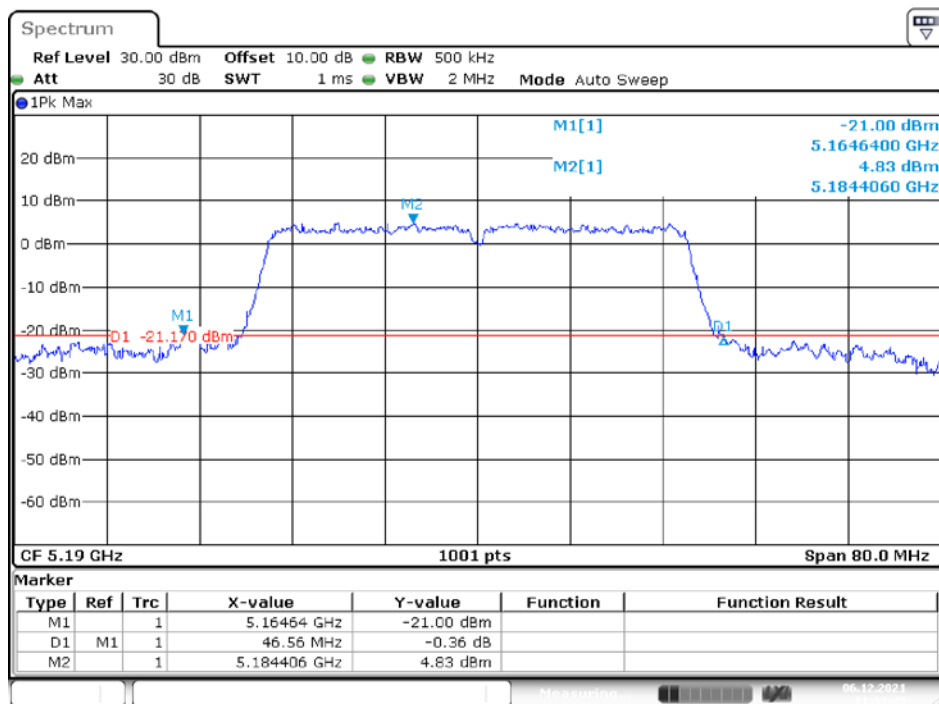


Date: 6.DEC.2021 10:49:54

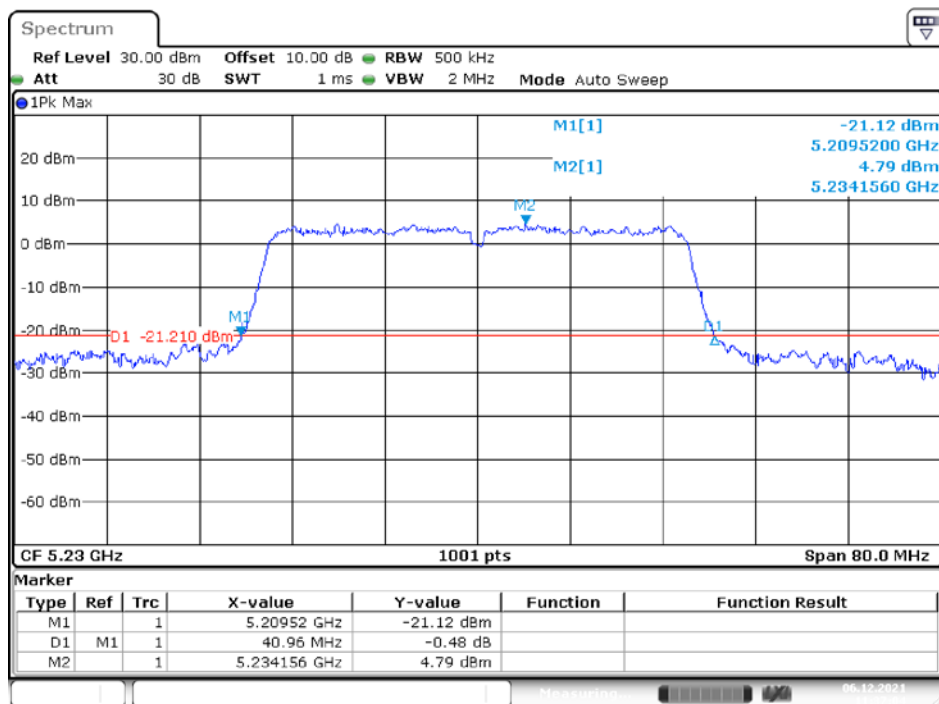
5240MHz



Date: 6.DEC.2021 10:53:54

IEEE 802.11ac VHT40 Mode / 5150 ~ 5250MHz
5190MHz

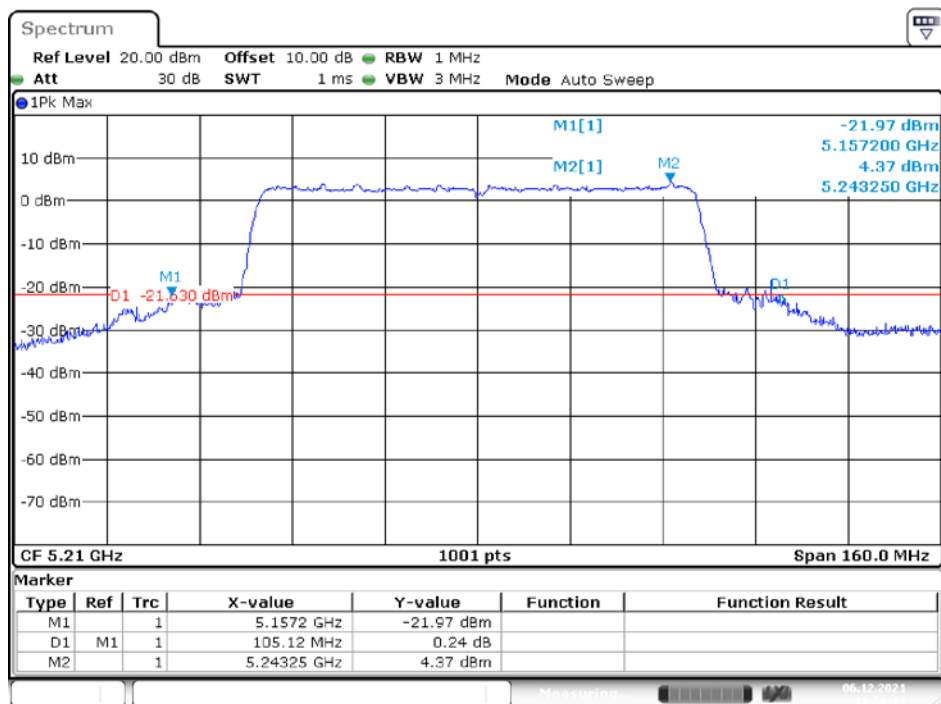
Date: 6.DEC.2021 11:33:46

5230MHz

Date: 6.DEC.2021 11:37:05

IEEE 802.11ac VHT80 Mode / 5150 ~ 5250MHz

5210MHz

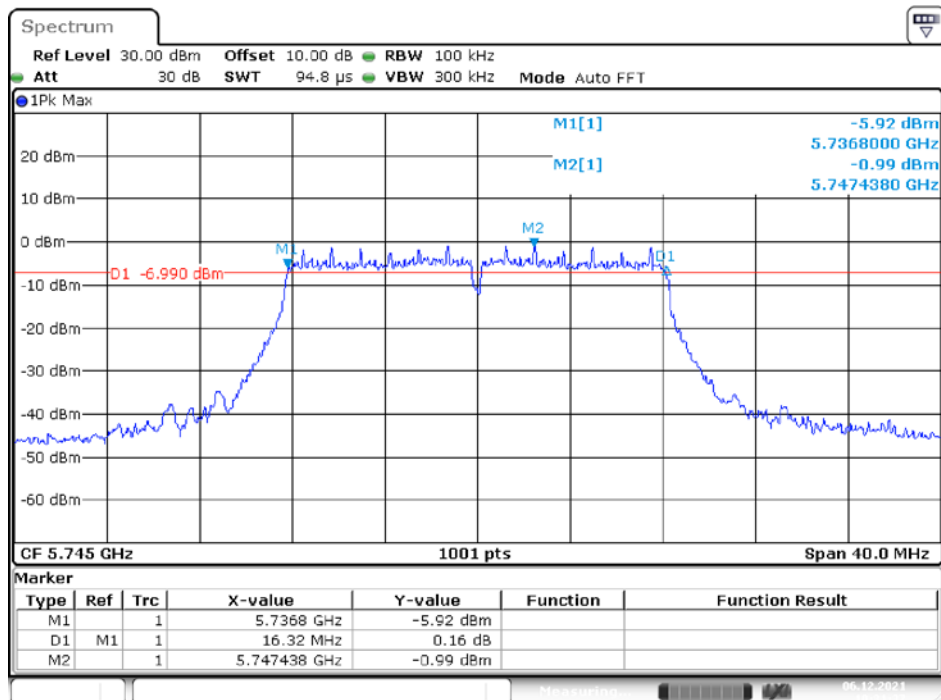


Date: 6.DEC.2021 11:50:14

UNII-3 Band IV / BW 6dBc

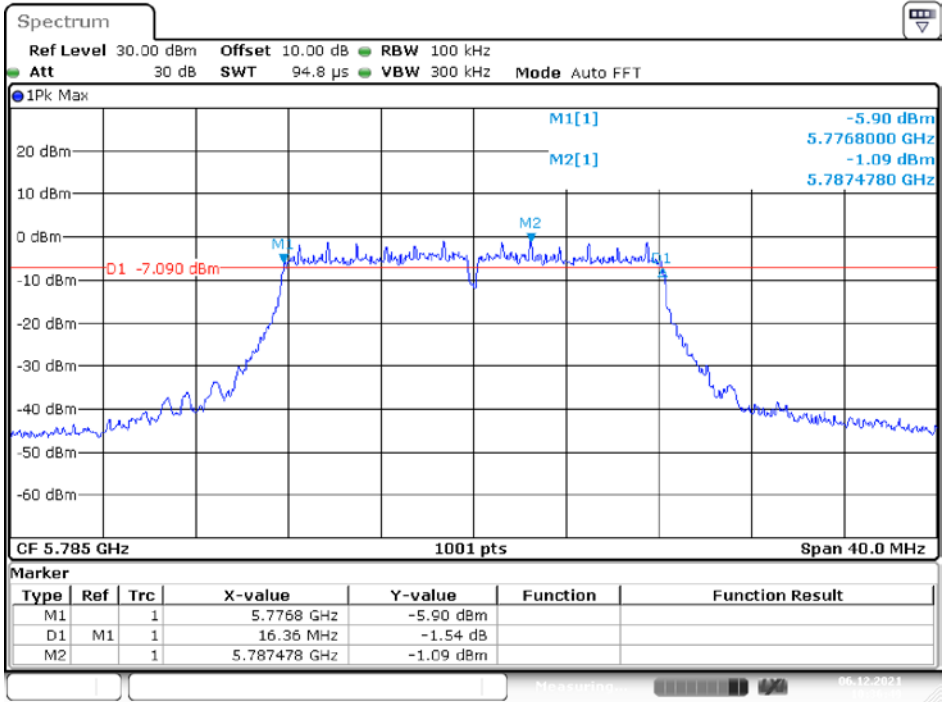
IEEE 802.11a Mode / 5725 ~ 5850MHz

5745MHz



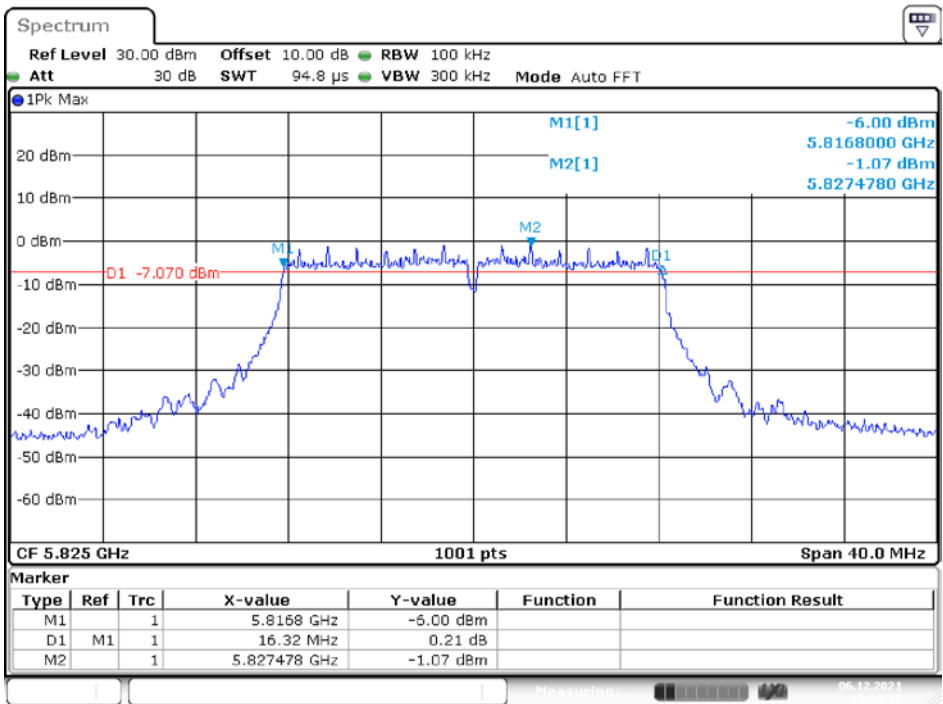
Date: 6.DEC.2021 10:31:37

5785MHz



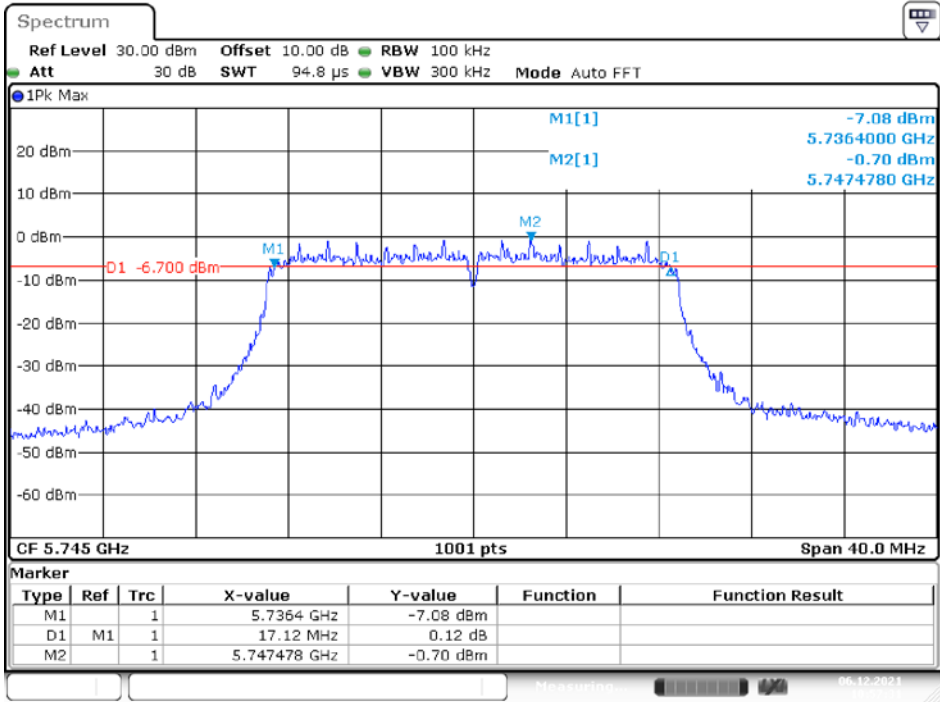
Date: 6.DEC.2021 10:36:50

5825MHz



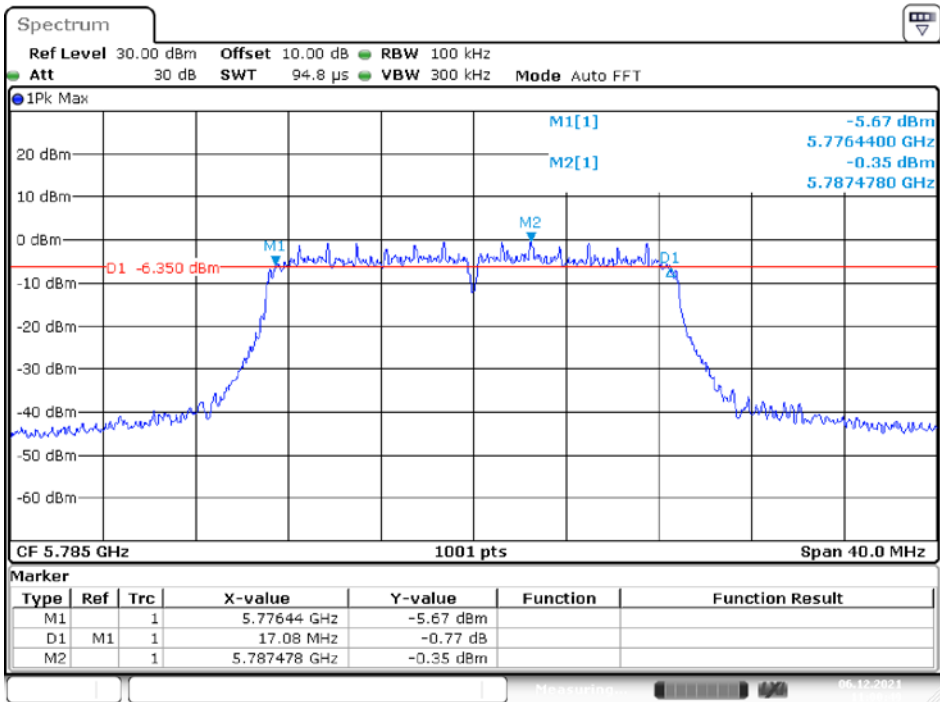
Date: 6.DEC.2021 10:40:59

IEEE 802.11ac VHT20 Mode / 5725 ~ 5850MHz
5745MHz



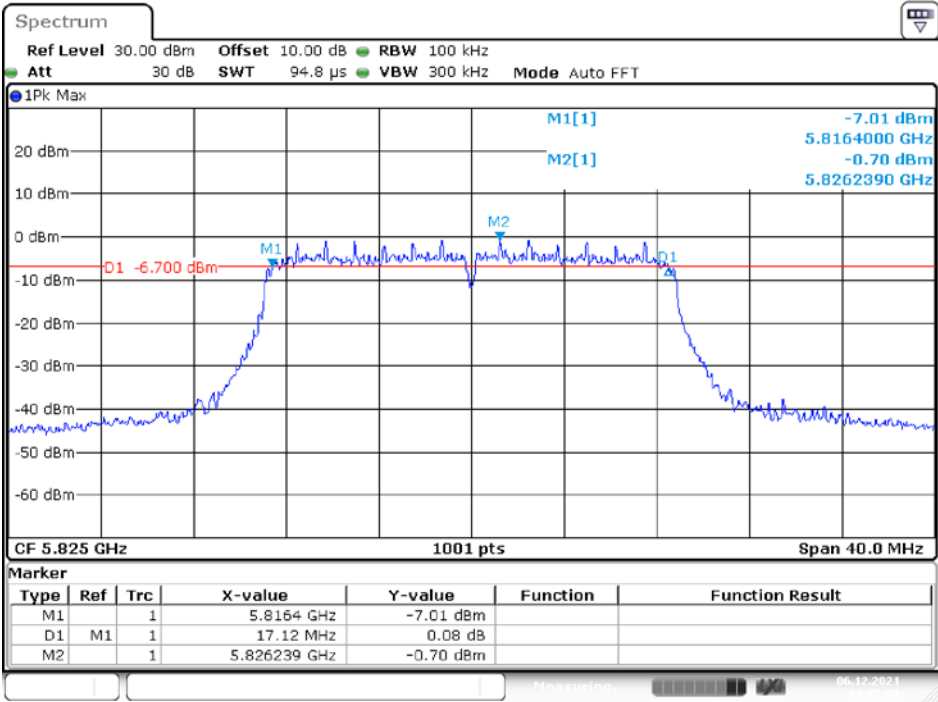
Date: 6.DEC.2021 10:57:31

5785MHz



Date: 6.DEC.2021 11:00:49

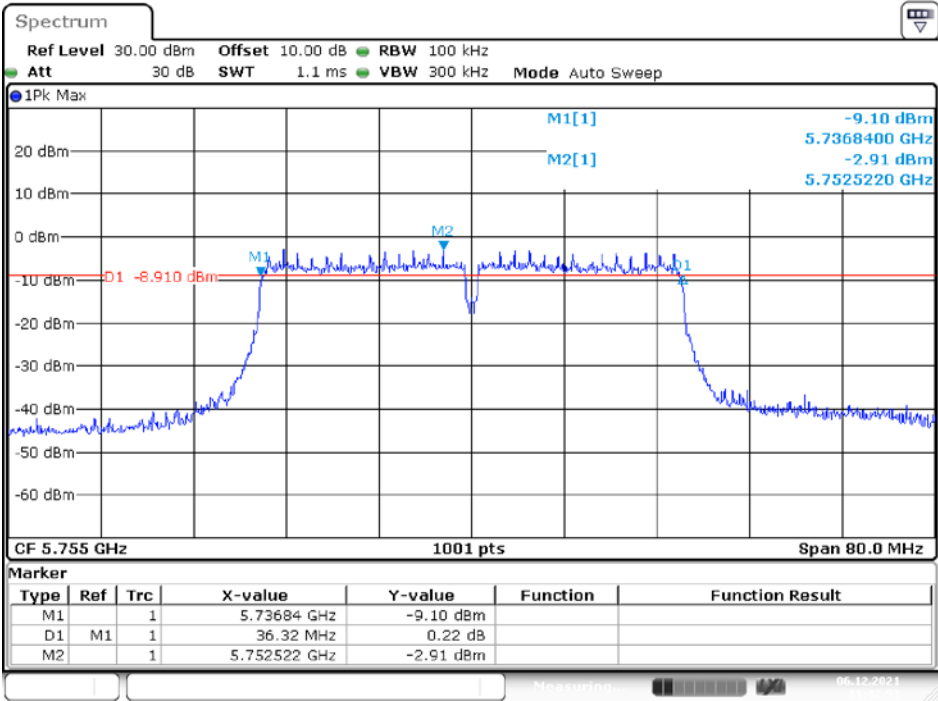
5825MHz



Date: 6.DEC.2021 11:05:08

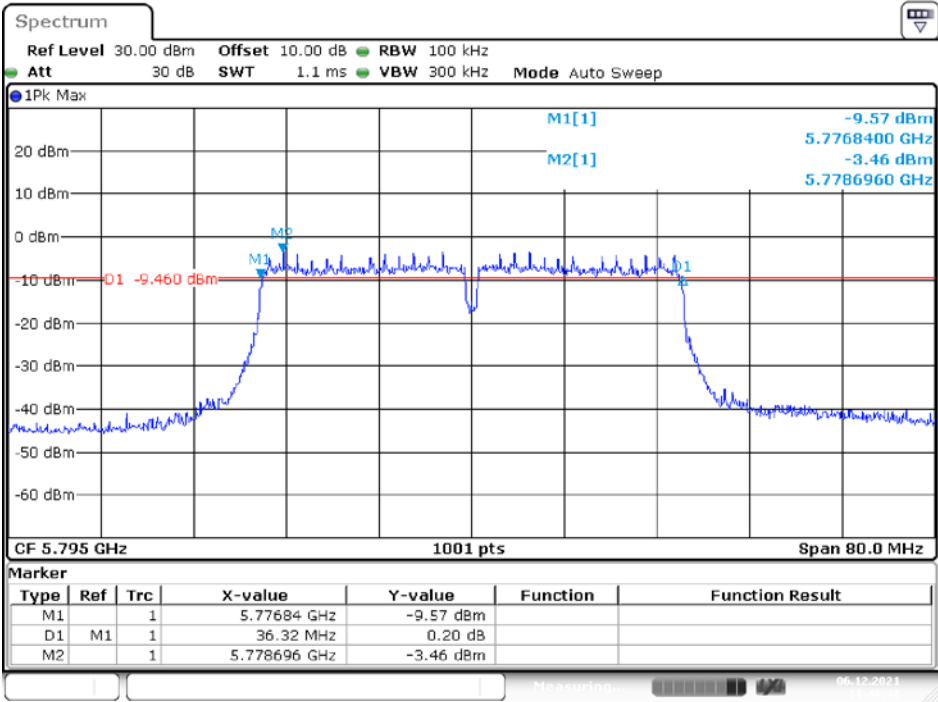
IEEE 802.11ac VHT40 Mode / 5725 ~ 5850MHz

5755MHz



Date: 6.DEC.2021 11:42:53

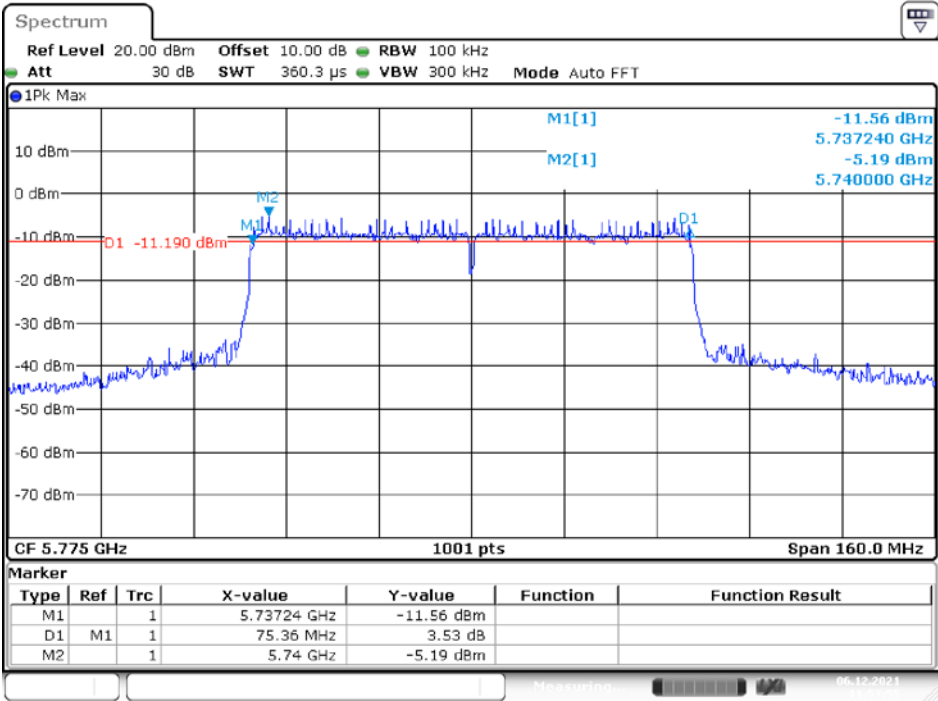
5795MHz



Date: 6.DEC.2021 11:46:41

IEEE 802.11ac VHT80 Mode / 5725 ~ 5850MHz

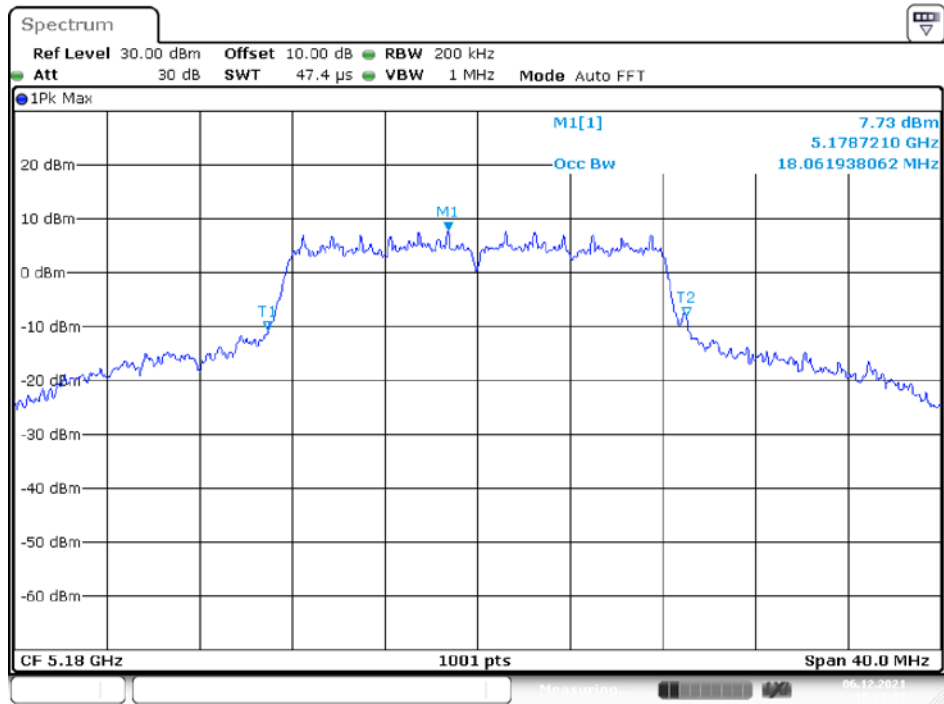
5775MHz



Date: 6.DEC.2021 11:53:55

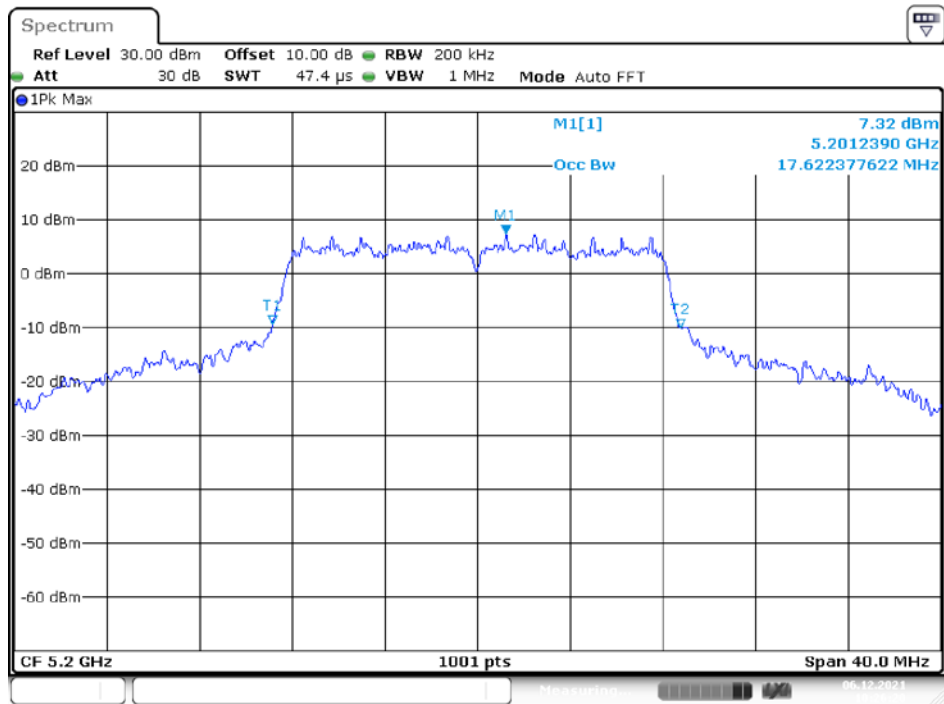
UNII-1 Band I / OBW 99%
IEEE 802.11a Mode / 5150 ~ 5250MHz

5180MHz



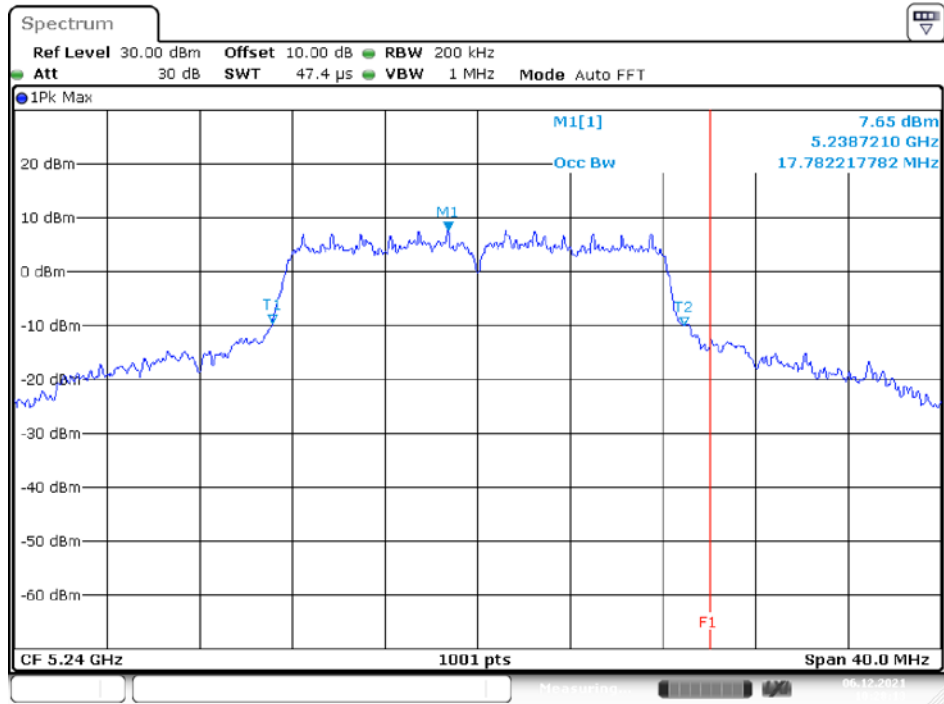
Date: 6.DEC.2021 10:23:07

5200MHz



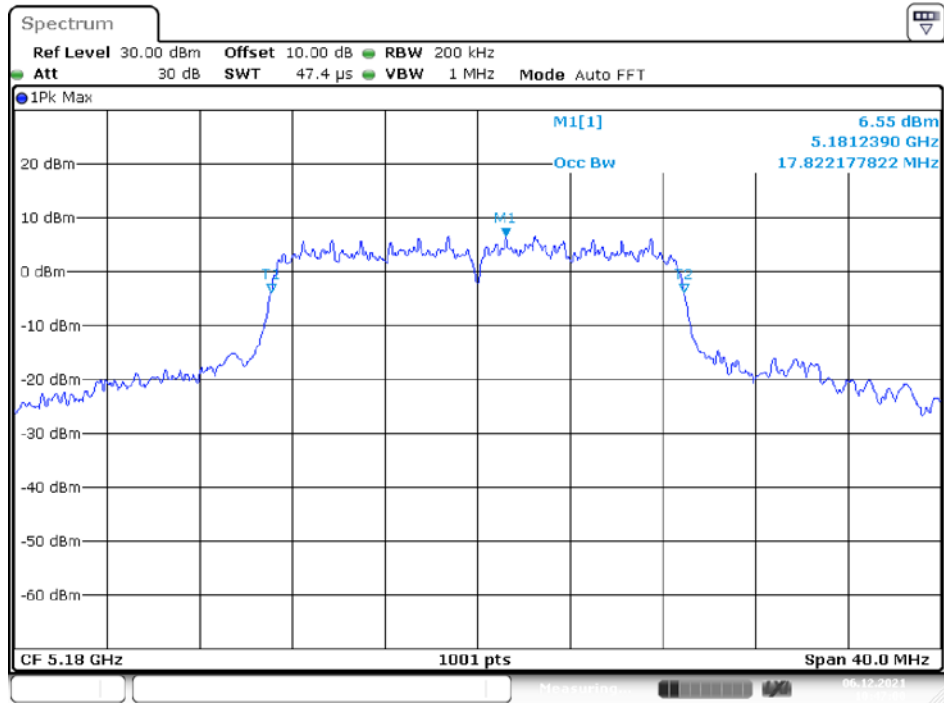
Date: 6.DEC.2021 10:26:20

5240MHz



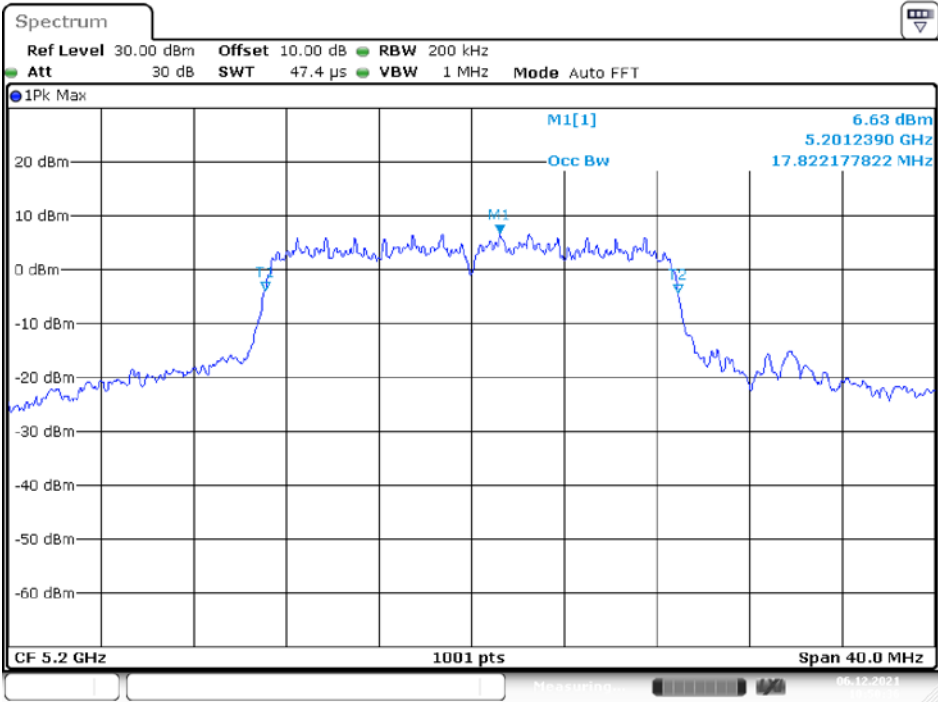
Date: 6.DEC.2021 10:28:14

IEEE 802.11ac VHT20 Mode / 5150 ~ 5250MHz
5180MHz



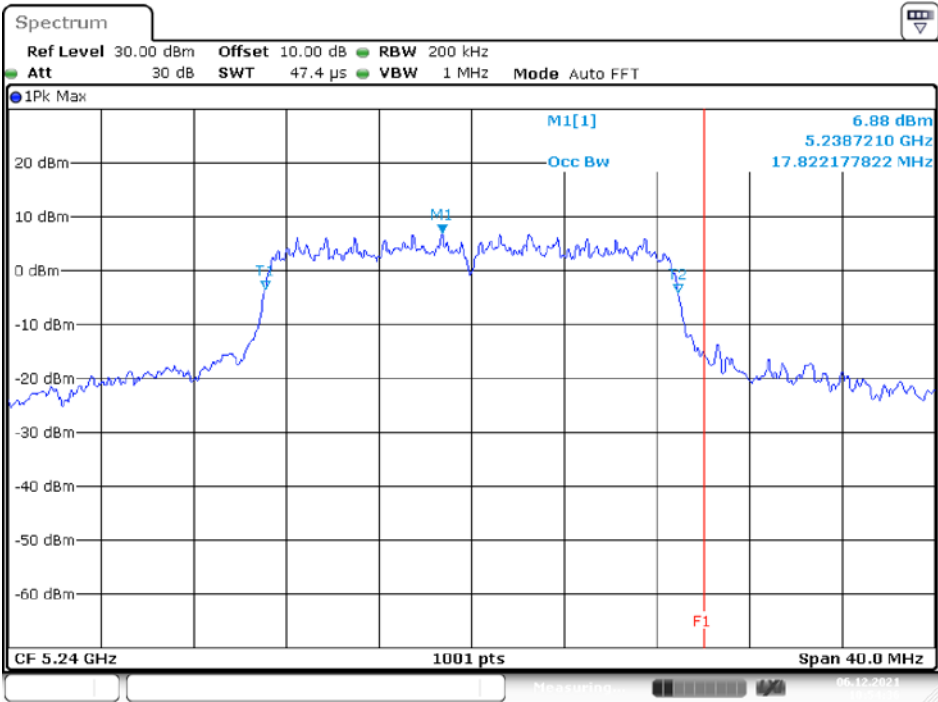
Date: 6.DEC.2021 10:47:00

5200MHz

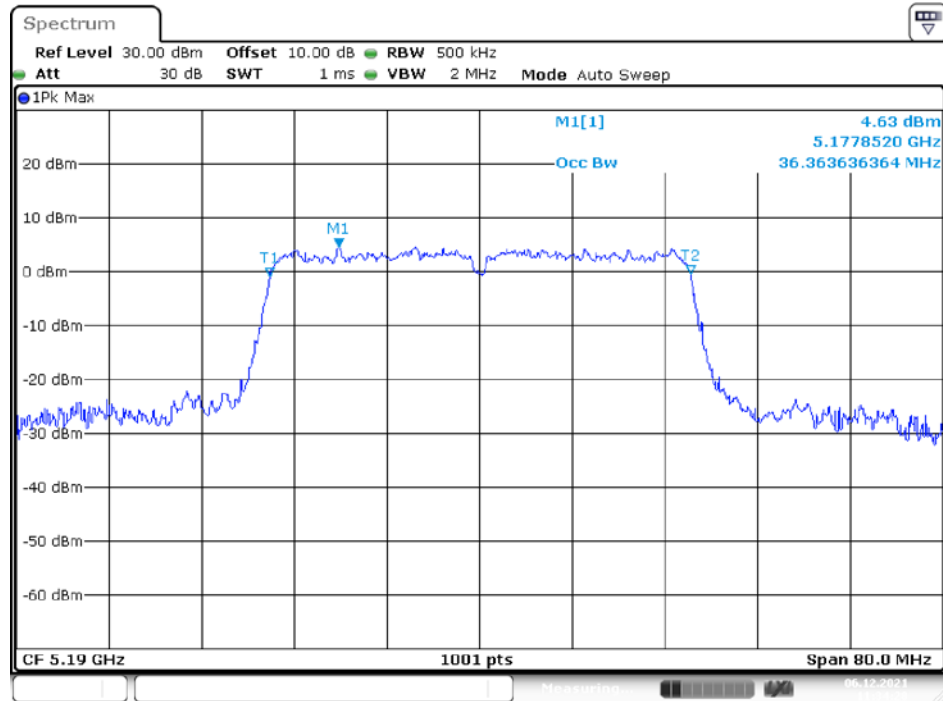


Date: 6.DEC.2021 10:50:36

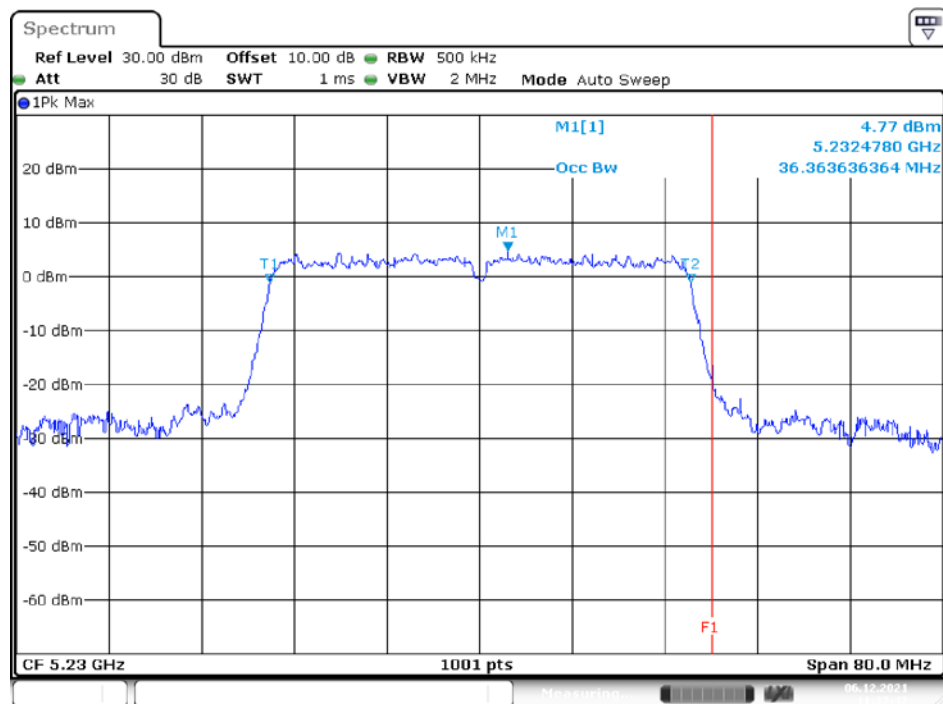
5240MHz



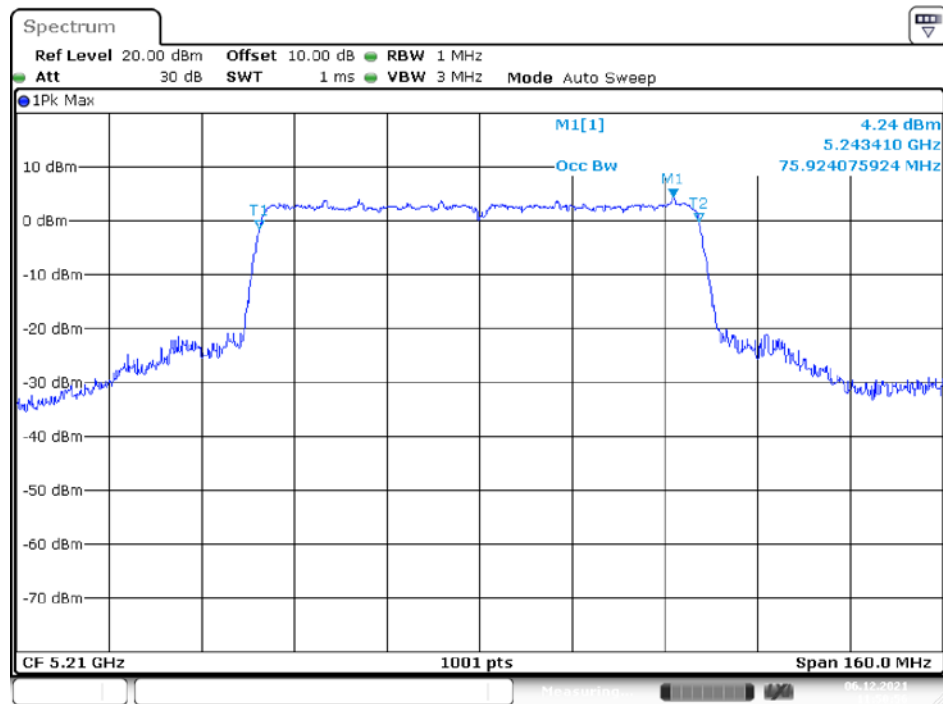
Date: 6.DEC.2021 10:54:36

IEEE 802.11ac VHT40 Mode / 5150 ~ 5250MHz
5190MHz

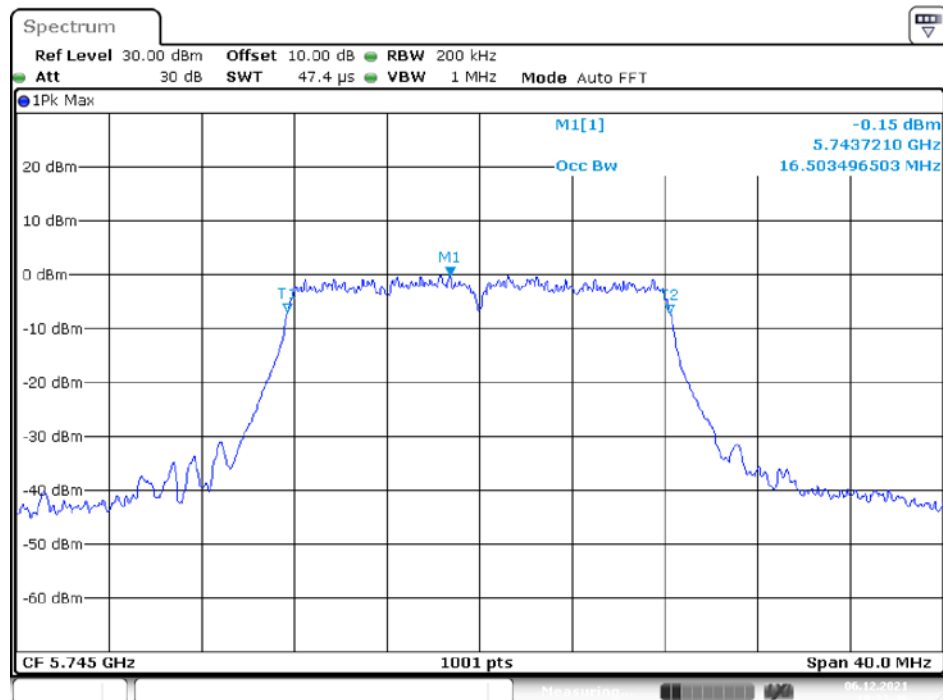
Date: 6.DEC.2021 11:34:28

5230MHz

Date: 6.DEC.2021 11:37:47

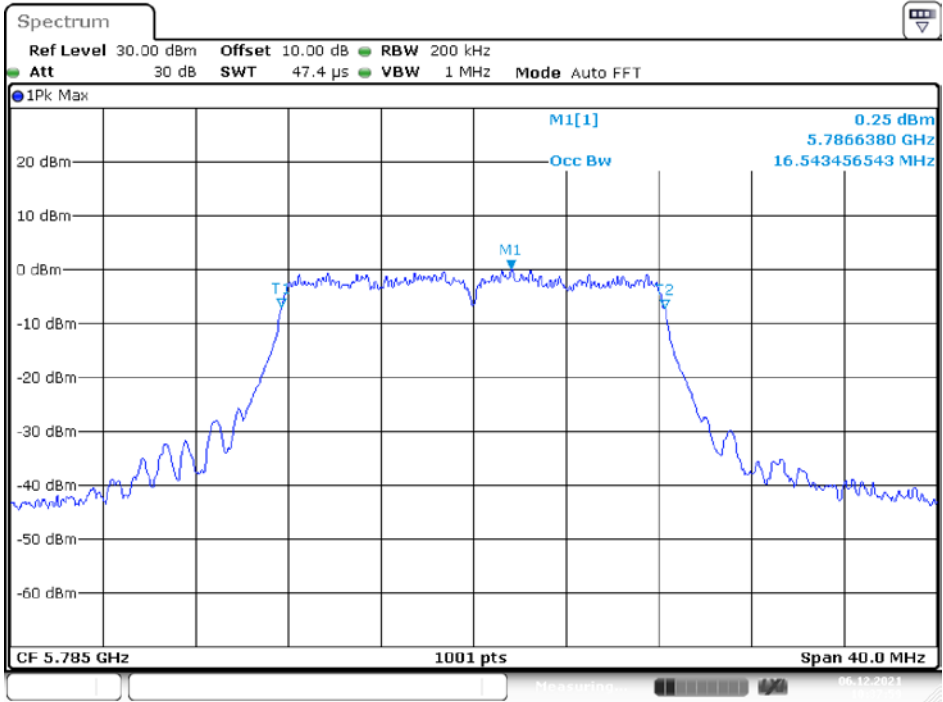
IEEE 802.11ac VHT80 Mode / 5150 ~ 5250MHz
5210MHz

Date: 6.DEC.2021 11:50:56

UNII-3 Band IV / OBW 99%
IEEE 802.11a Mode / 5725 ~ 5850MHz
5745MHz

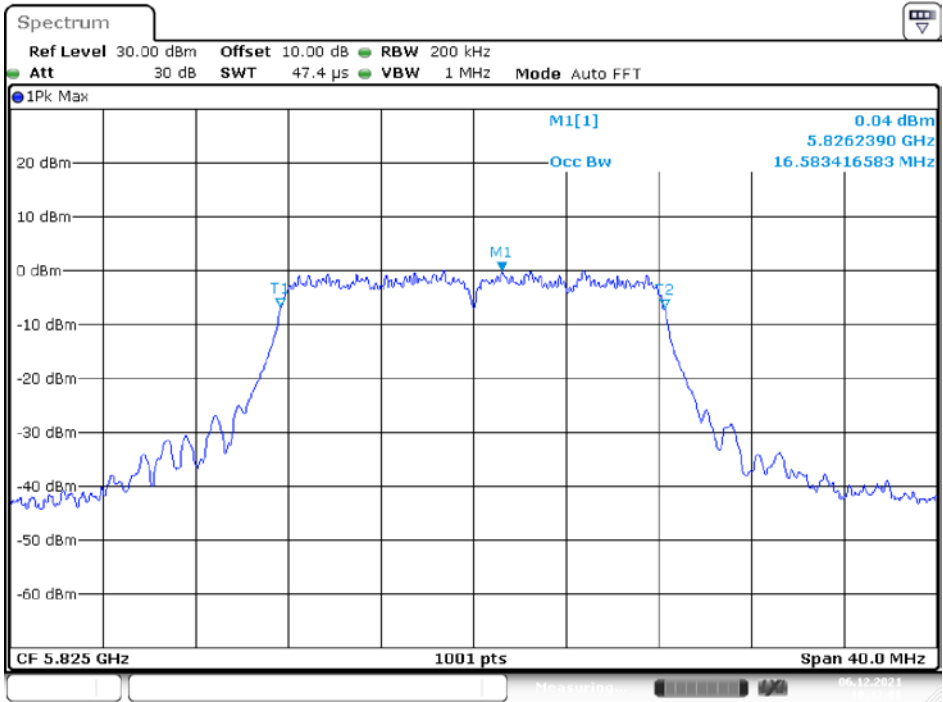
Date: 6.DEC.2021 10:32:47

5785MHz

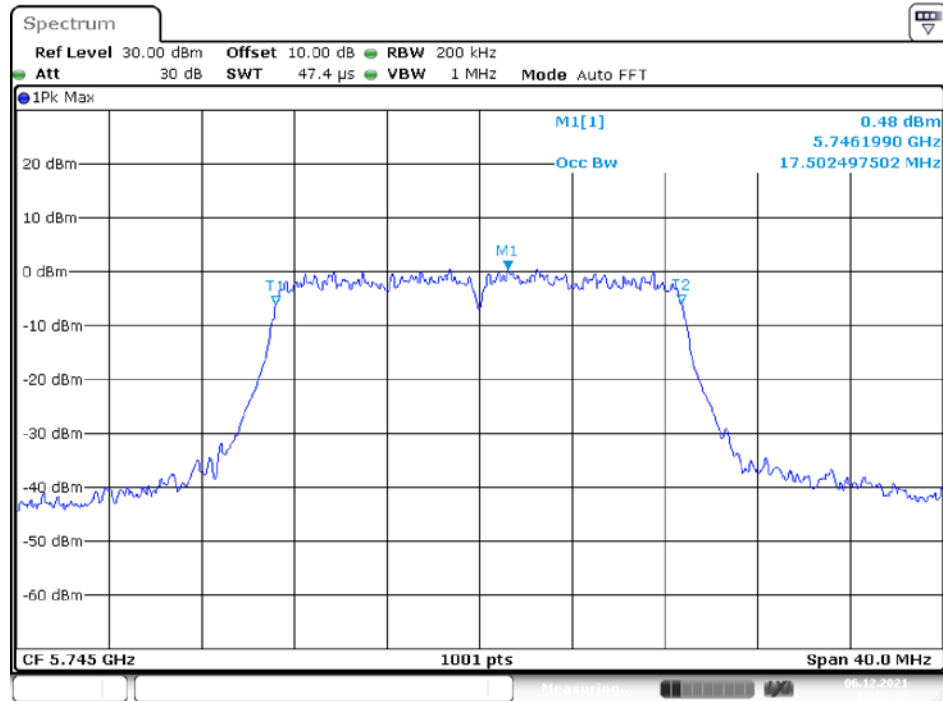


Date: 6.DEC.2021 10:37:59

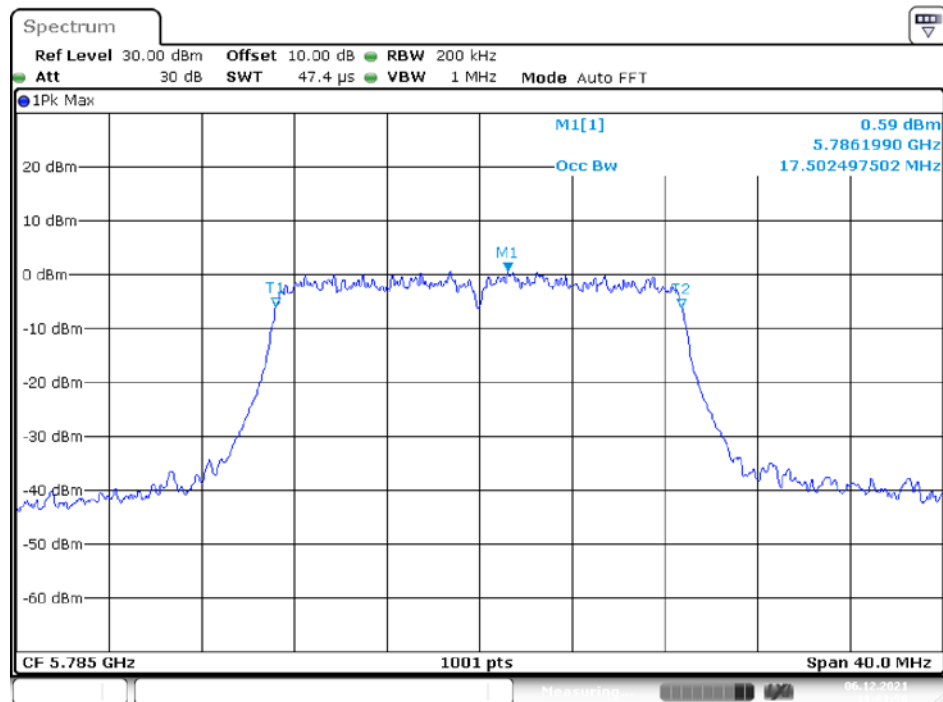
5825MHz



Date: 6.DEC.2021 10:42:08

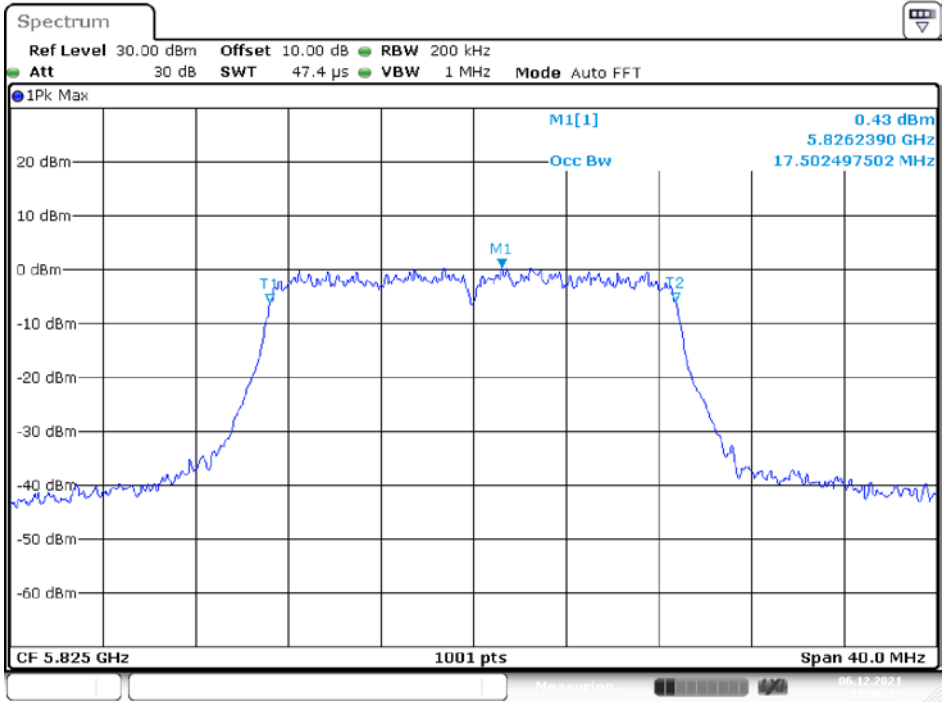
IEEE 802.11ac VHT20 Mode / 5725 ~ 5850MHz
5745MHz

Date: 6.DEC.2021 10:58:41

5785MHz

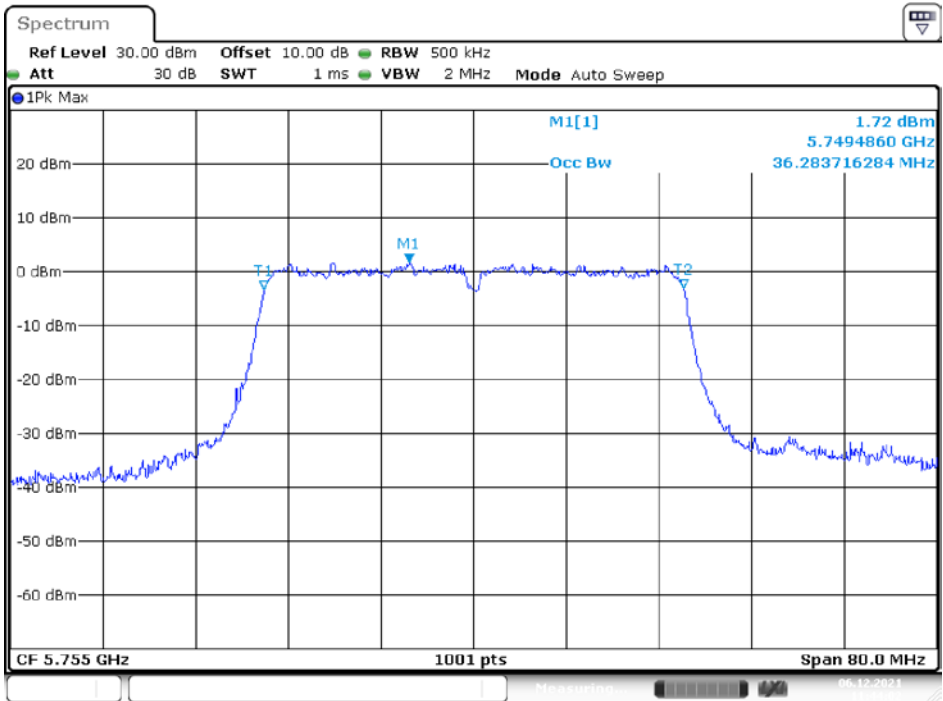
Date: 6.DEC.2021 11:01:58

5825MHz



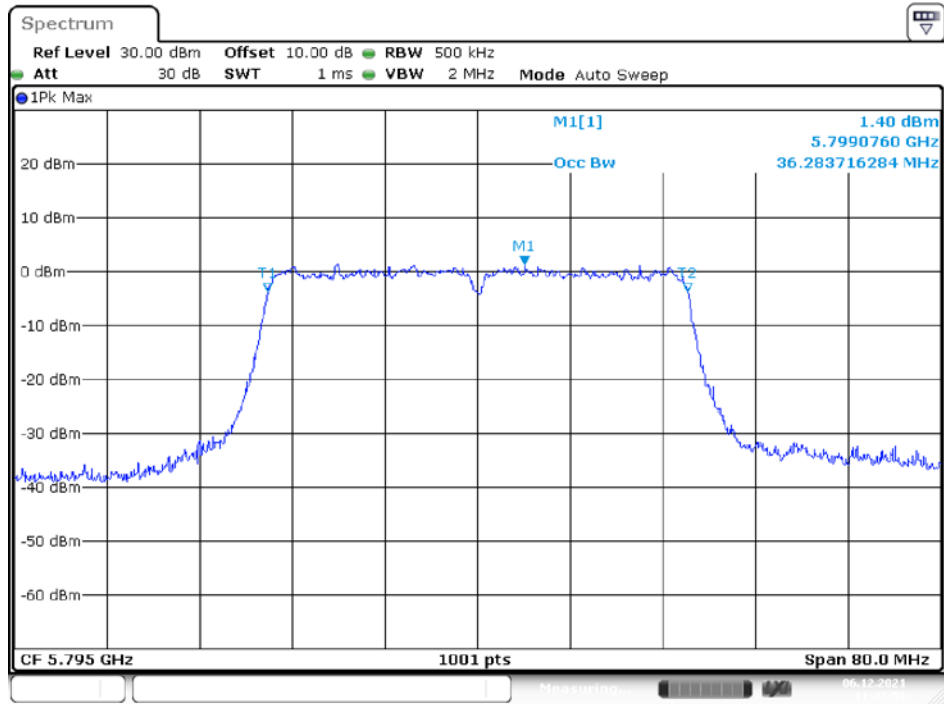
Date: 6.DEC.2021 11:06:17

IEEE 802.11ac VHT40 Mode / 5725 ~ 5850MHz
5755MHz



Date: 6.DEC.2021 11:44:03

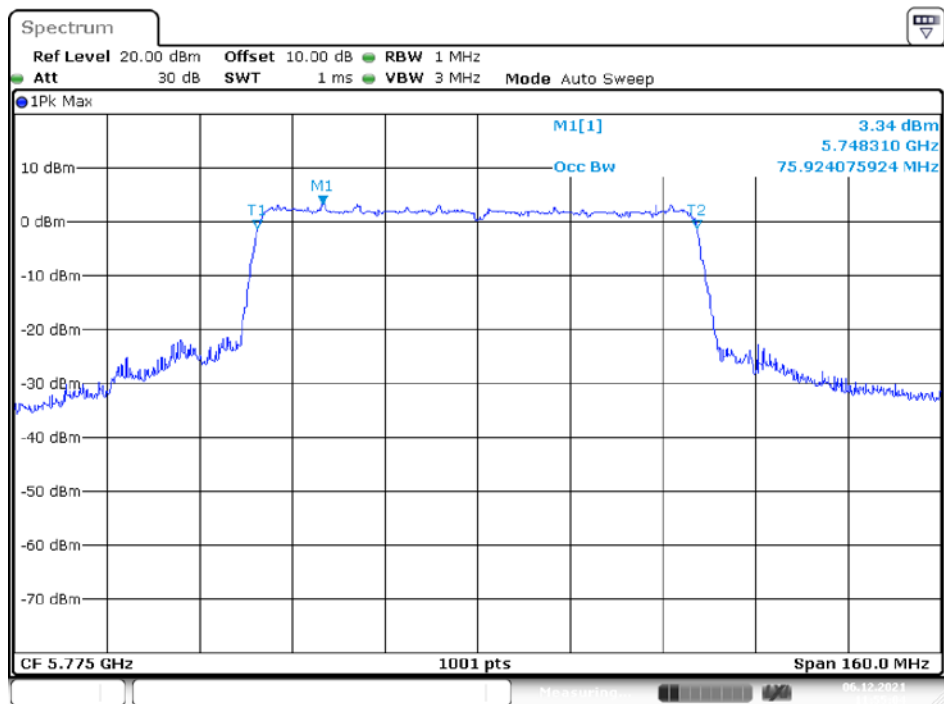
5795MHz



Date: 6.DEC.2021 11:47:50

IEEE 802.11ac VHT80 Mode / 5725 ~ 5850MHz

5775MHz



Date: 6.DEC.2021 11:55:05

10 FCC §15.407(a) – Maximum Output Power

10.1 Applicable Standard

According to FCC §15.407(a):

For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

10.2 Test Procedure

The use Power Meter

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to a Power sensor.

10.3 Test Results

Test Mode: Transmitting

UNII Band	Mode	Channel	Frequency (MHz)	Maximum Conducted Average Output Power (dBm)	Duty Factor (dB)	Total Maximum Conducted Average Output Power With Duty Factor (dBm)	Limit (dBm)
UNII-1	802.11a	36	5180	17.95	0.09	18.04	24
		40	5200	17.33	0.09	17.42	24
		48	5240	17.58	0.09	17.67	24
UNII-3		149	5745	10.77	0.09	10.86	30
		157	5785	11.63	0.09	11.72	30
		165	5825	11.55	0.09	11.64	30
UNII-1	802.11n HT20 / ac VHT 20	36	5180	16.73	0.13	16.86	24
		40	5200	16.79	0.13	16.92	24
		48	5240	16.98	0.13	17.11	24
UNII-3		149	5745	12.33	0.13	12.46	30
		157	5785	12.75	0.13	12.88	30
		165	5825	12.28	0.13	12.41	30
UNII-1	802.11n HT40 / ac VHT40	38	5190	13.69	0.41	14.10	24
		46	5230	14.38	0.41	14.79	24
UNII-3		151	5755	12.18	0.41	12.59	30
		159	5795	11.85	0.41	12.26	30
UNII-1	802.11ac	42	5210	12.97	0.56	13.53	24
UNII-3	VHT80	155	5775	12.77	0.56	13.33	30

Note: The maximum antenna gain is 5.0 dBi.

11 FCC §15.407(a) – Power Spectral Density

11.1 Applicable Standard

According to FCC §15.407(a):

For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

11.2 Test Procedure

The measurements are base on FCC KDB 789033 D02 General UNII Test Proceidyres New Rules v02r01: Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices section F: Maximum power spectral density (PPSD)

11.3 Test Results

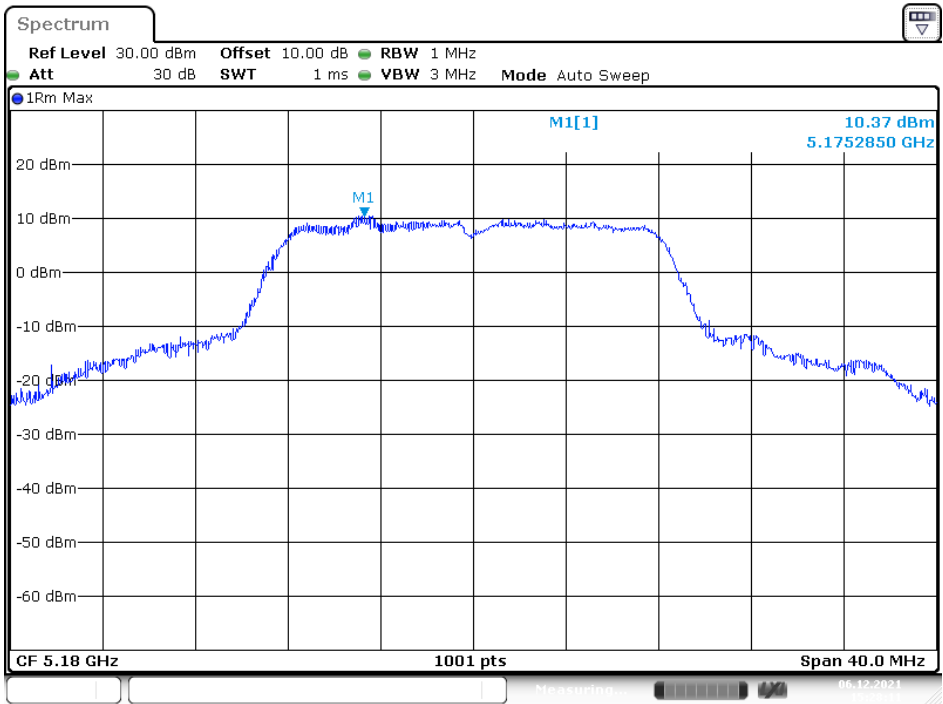
Test Mode: Transmitting

UNII Band	Mode	Channel	Frequency (MHz)	Power Spectral Density (dBm/MHz)	Duty Factor (dB)	Power Spectral Density with duty factor (dBm/MHz)	Limit (dBm/MHz)
UNII-1	802.11a	36	5180	10.37	0.09	10.46	11
		40	5200	10.16	0.09	10.25	11
		48	5240	10.80	0.09	10.89	11
	802.11 ac20	36	5180	10.75	0.13	10.88	11
		40	5200	10.34	0.13	10.47	11
		48	5240	10.12	0.13	10.25	11
	802.11 ac40	38	5190	6.08	0.41	6.49	11
		46	5230	5.69	0.41	6.10	11
	802.11 ac80	42	5210	2.48	0.56	3.04	11
UNII Band	Mode	Channel	Frequency (MHz)	Power Spectral Density (dBm/500kHz)	Duty Factor (dB)	Power Spectral Density with duty factor (dBm/500kHz)	Limit (dBm/500kHz)
UNII-3	802.11a	149	5745	3.63	0.09	3.72	30
		157	5785	3.45	0.09	3.54	30
		165	5825	3.70	0.09	3.79	30
	802.11 ac20	149	5745	3.80	0.13	3.93	30
		157	5785	4.09	0.13	4.22	30
		165	5825	3.63	0.13	3.76	30
	802.11 ac40	151	5755	1.25	0.41	1.66	30
		159	5795	0.88	0.41	1.29	30
	802.11 ac80	155	5775	-0.40	0.56	0.96	30

Note: The maximum antenna gain is 5.0 dBi.

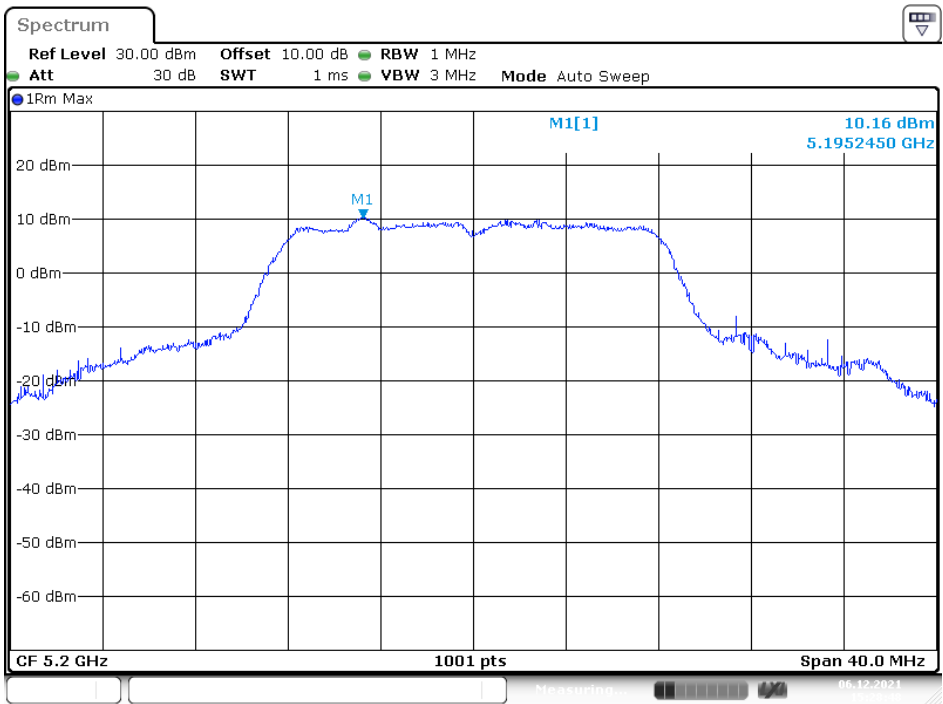
UNII-1 Band I PSD
IEEE 802.11a Mode / 5150 ~ 5250MHz

5180MHz



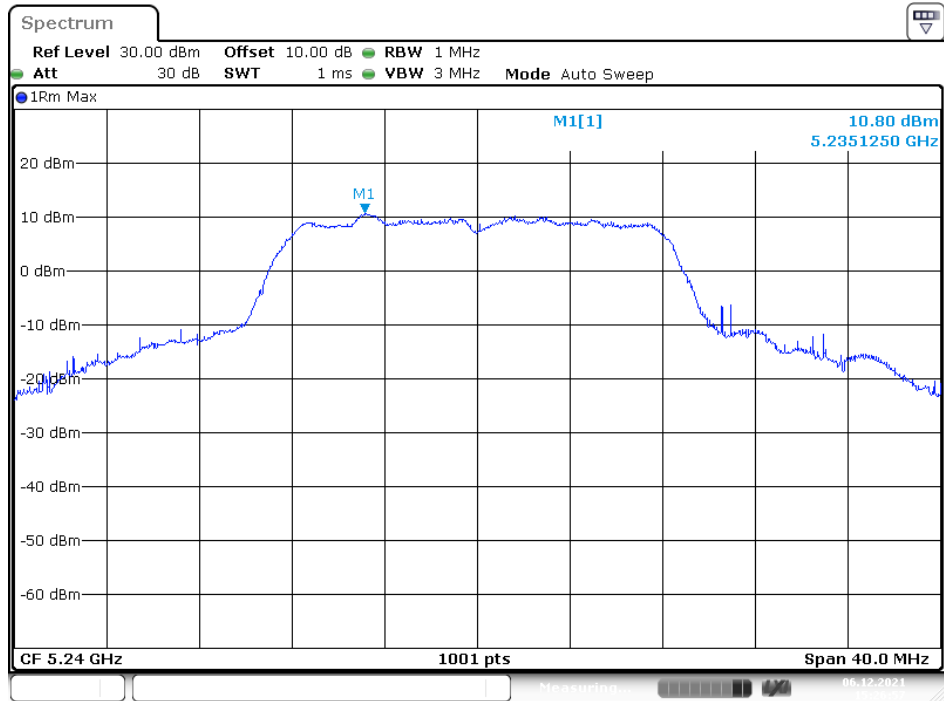
Date: 6 DEC 2021 15:28:11

5200MHz



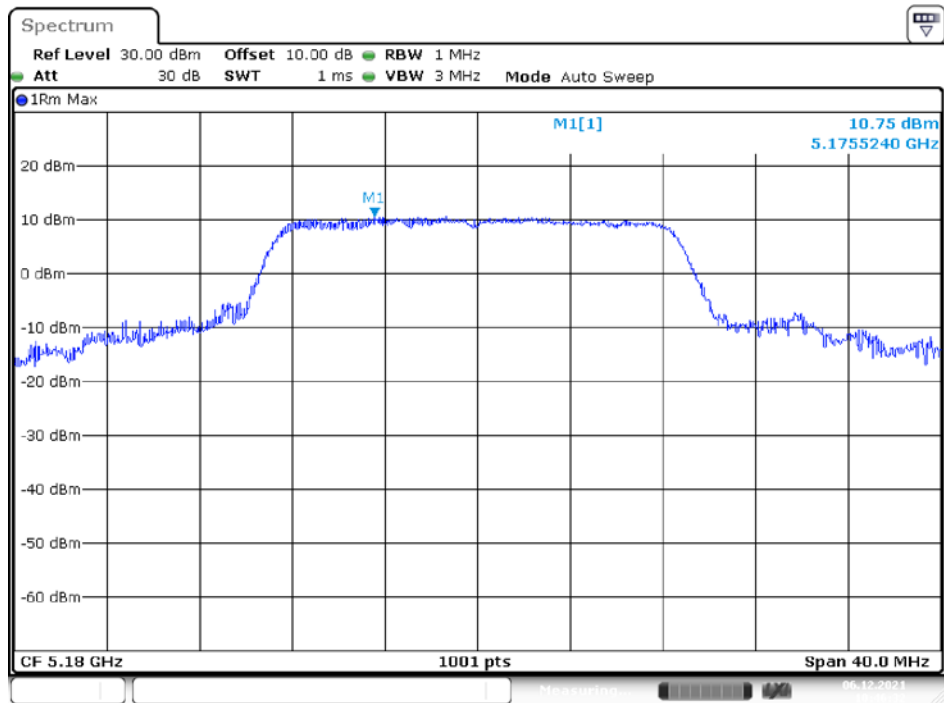
Date: 6 DEC 2021 15:28:49

5240MHz



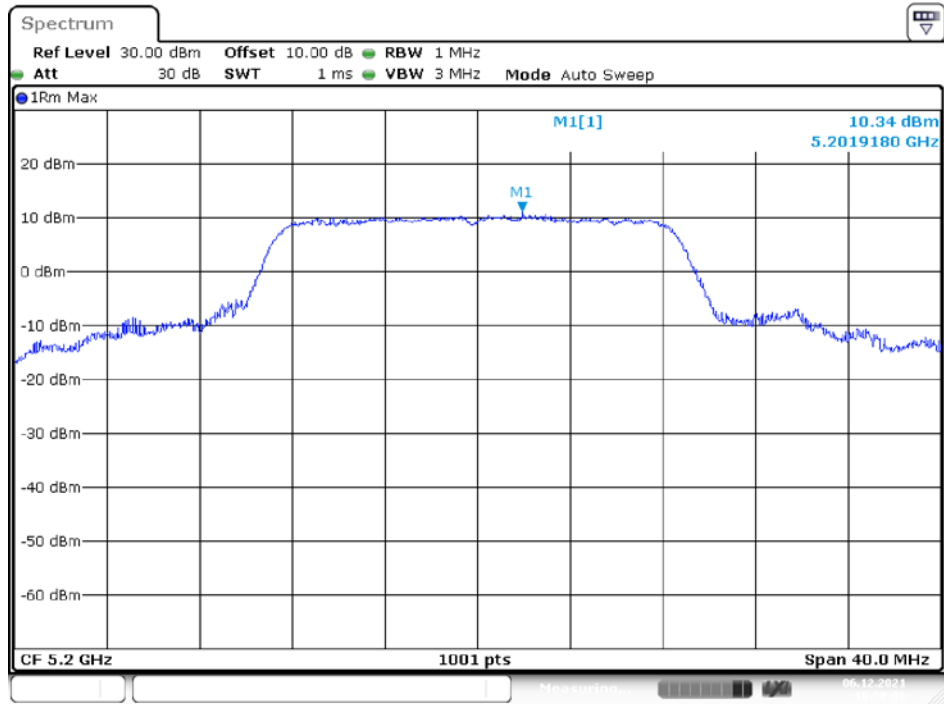
Date: 6 DEC. 2021 15:26:57

IEEE 802.11ac VHT20 Mode / 5150 ~ 5250MHz
5180MHz

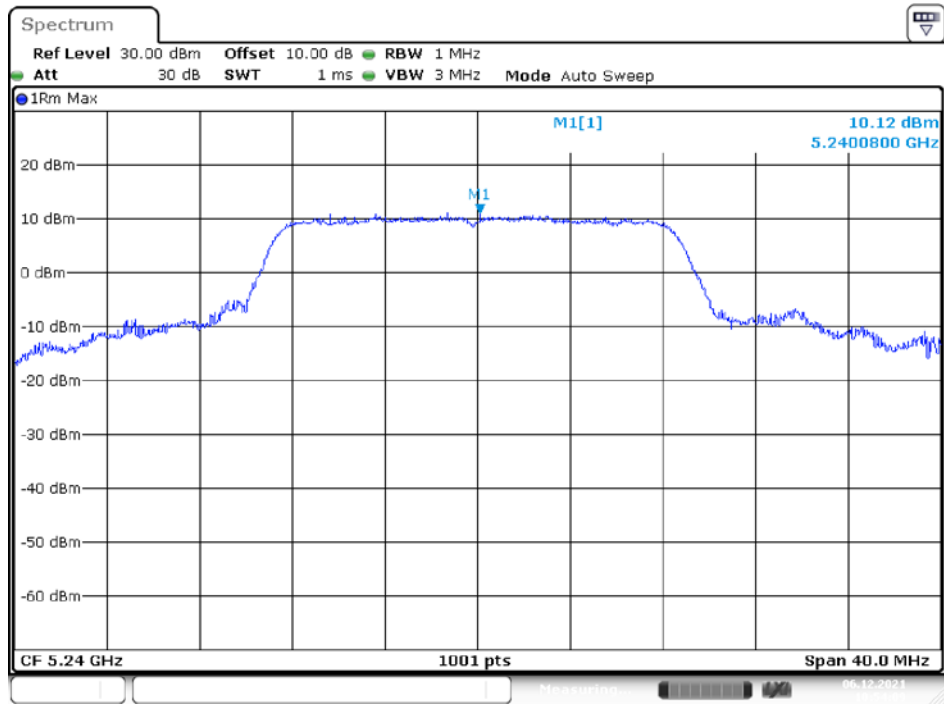


Date: 6 DEC. 2021 10:46:33

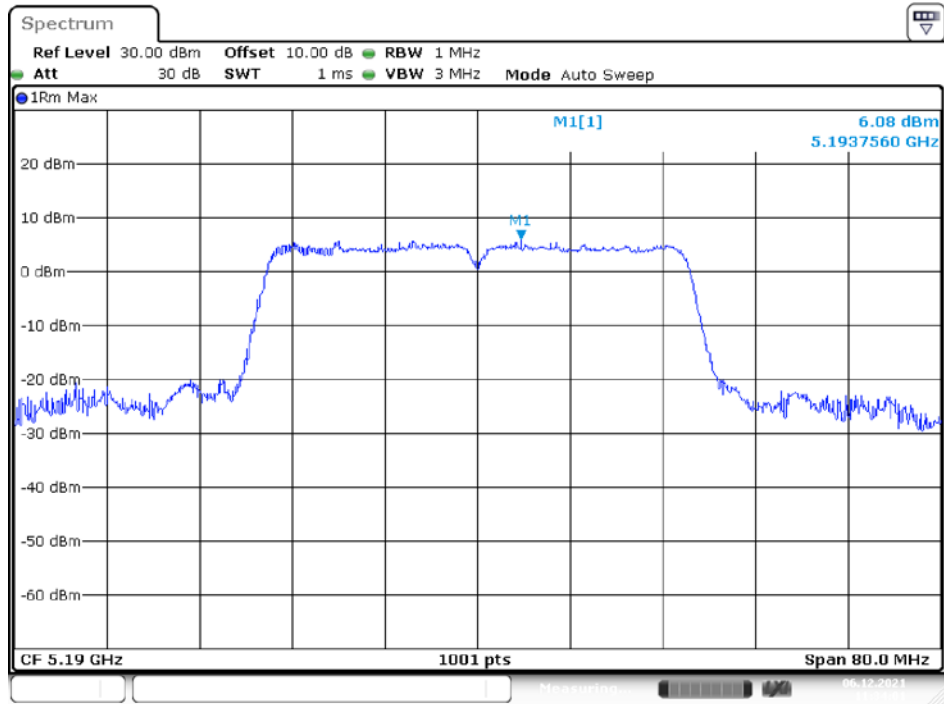
5200MHz



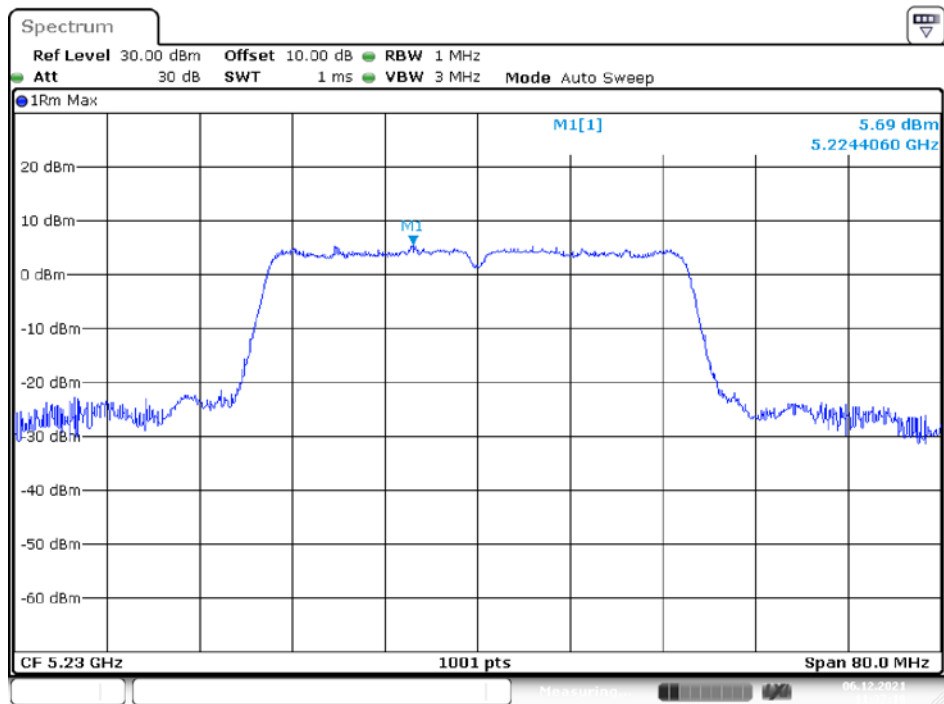
5240MHz

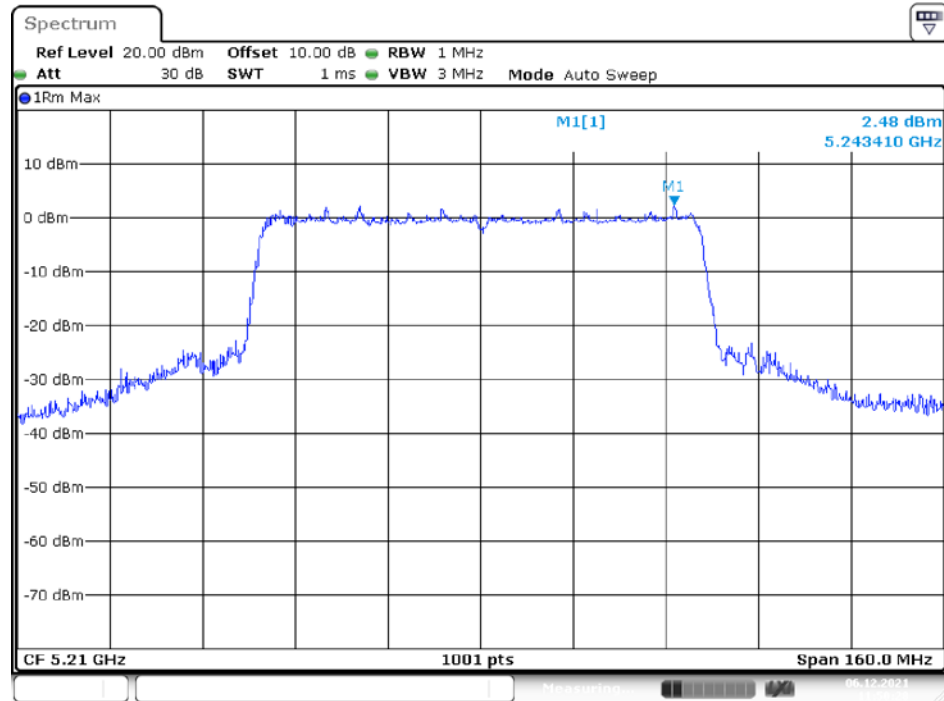


IEEE 802.11ac VHT40 Mode / 5150 ~ 5250MHz
5190MHz

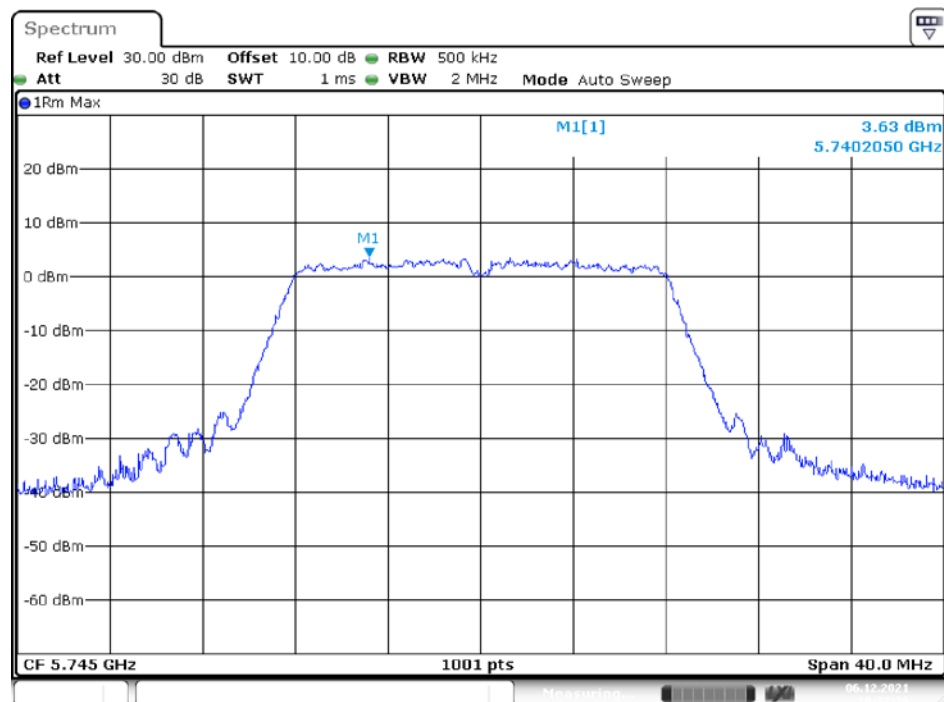


5230MHz



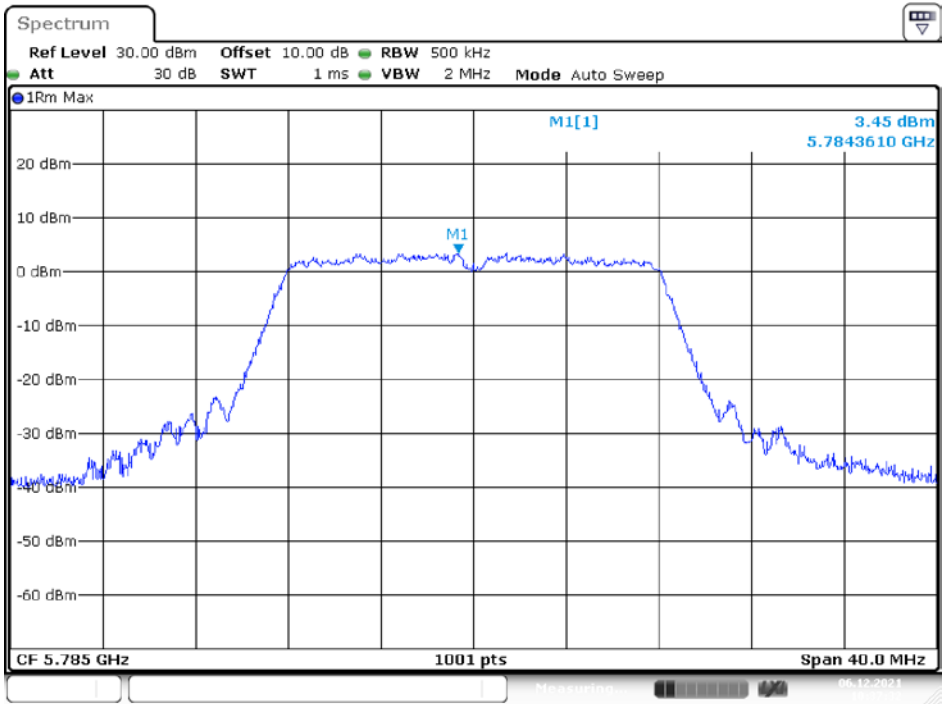
IEEE 802.11ac VHT80 Mode / 5150 ~ 5250MHz
5210MHz

Date: 6.DEC.2021 11:50:28

UNII-3 Band IV PSD
IEEE 802.11a mode / 5725 ~ 5850MHz
5745MHz

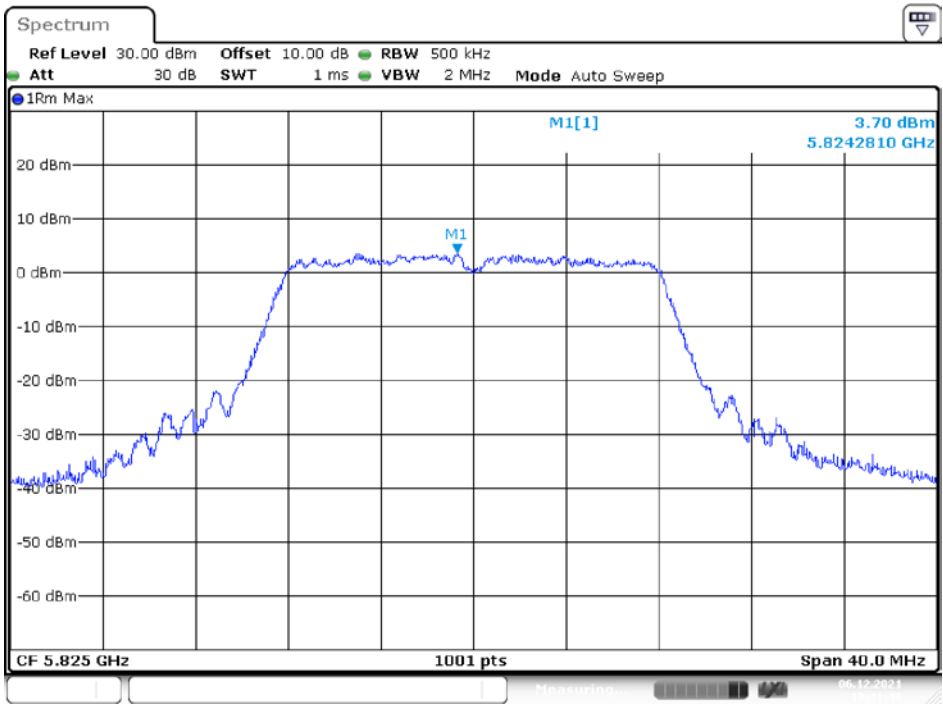
Date: 6.DEC.2021 10:32:19

5785MHz

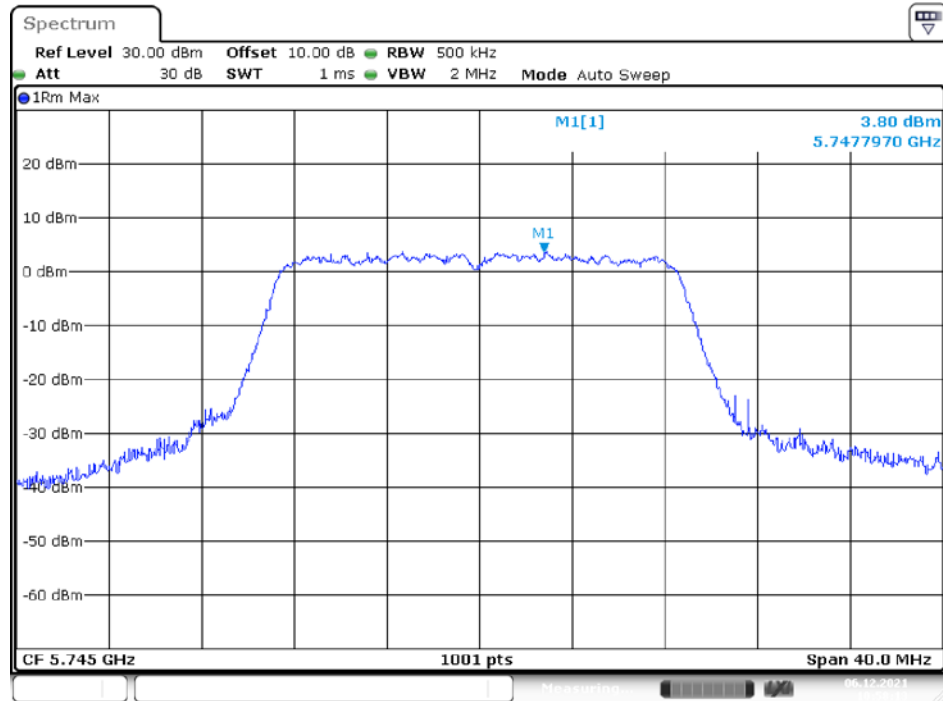


Date: 6.DEC.2021 10:37:32

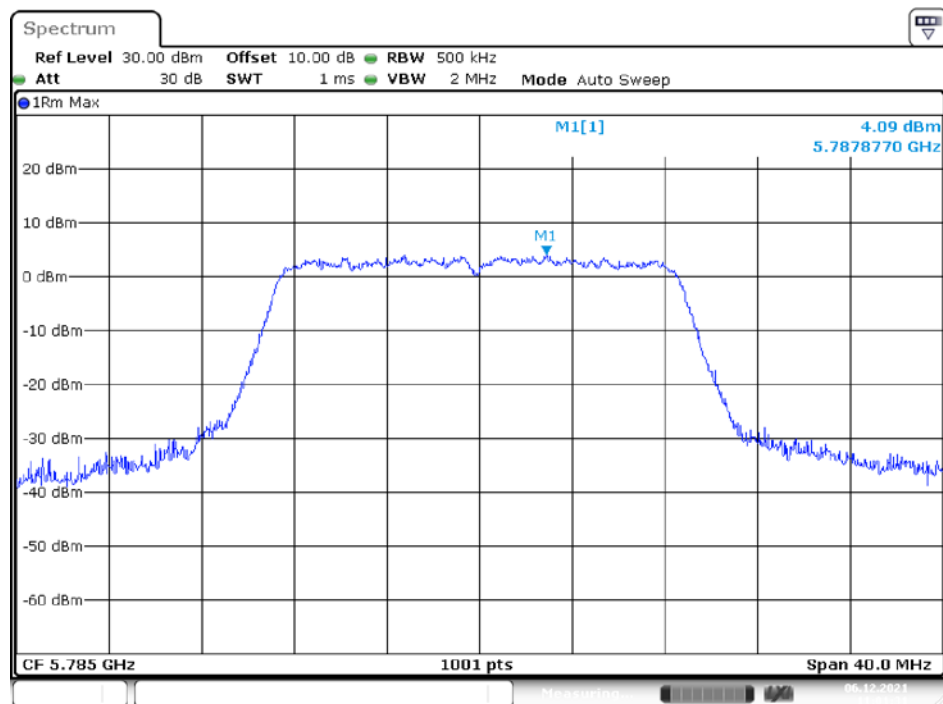
5825MHz



Date: 6.DEC.2021 10:41:41

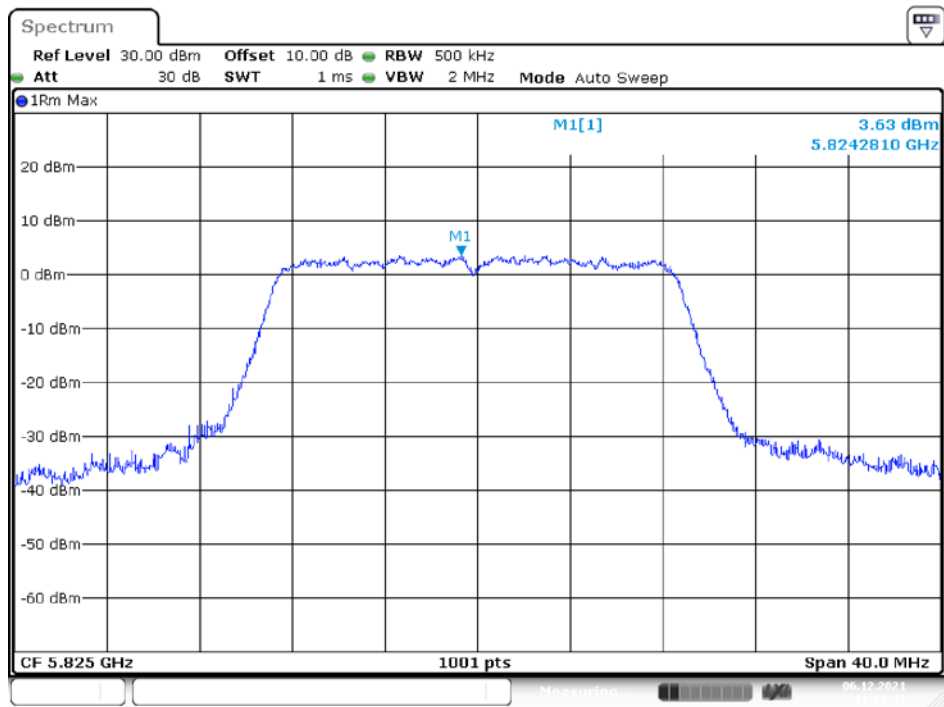
IEEE 802.11ac VHT20 Mode / 5725 ~ 5850MHz
5745MHz

Date: 6.DEC.2021 10:58:14

5785MHz

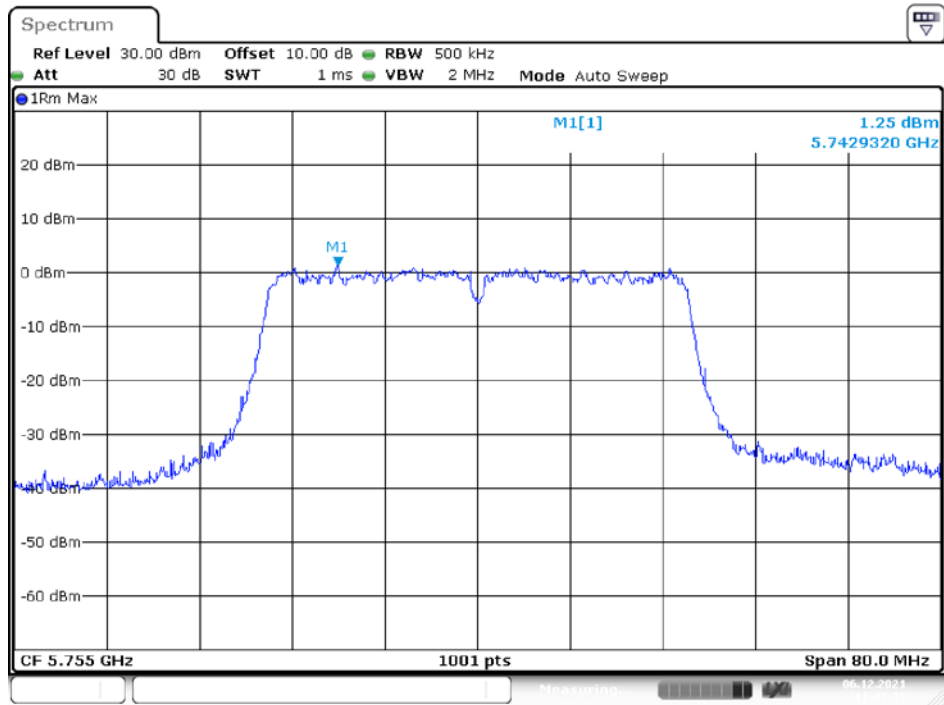
Date: 6.DEC.2021 11:01:31

5825MHz



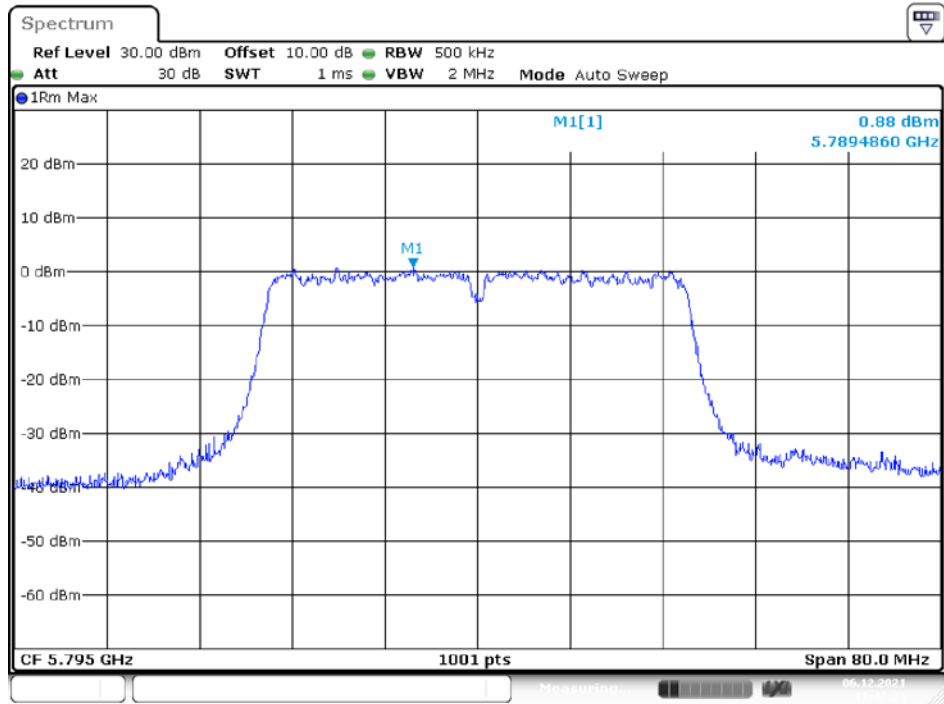
Date: 6.DEC.2021 11:05:50

IEEE 802.11ac VHT40 Mode / 5725 ~ 5850MHz
5755MHz



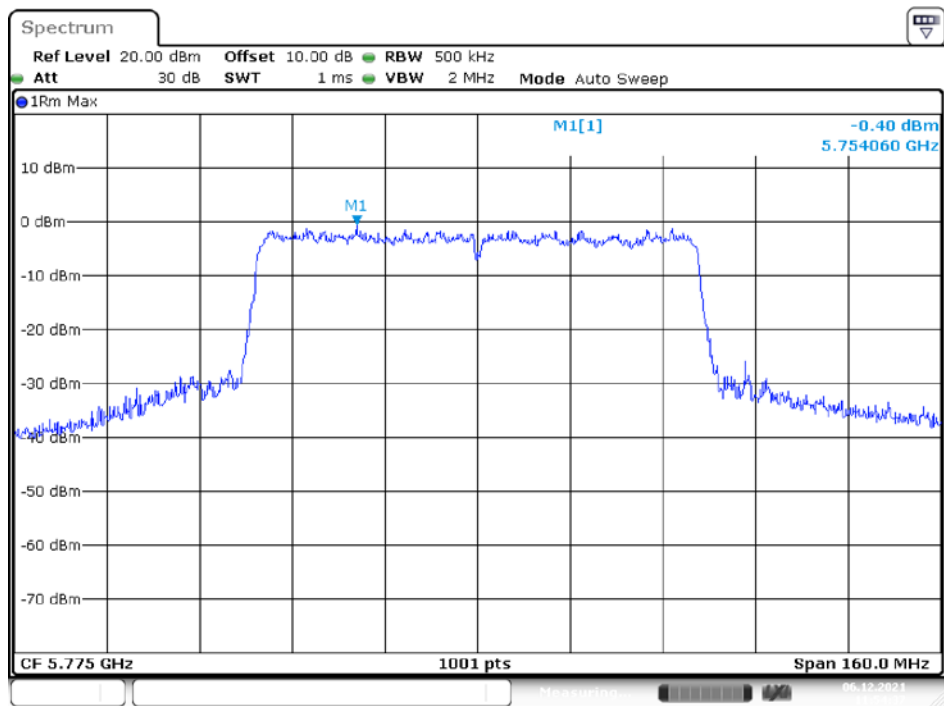
Date: 6.DEC.2021 11:43:35

5795MHz



IEEE 802.11ac VHT80 Mode / 5725 ~ 5850MHz

5775MHz



***** END OF REPORT *****