

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: 2AB877612

Report Type:
Original Report

Product Type:
802.11ac High-Speed USB Adapter

Report Producer : Jane Chen

Jane Chen

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Revision History

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1 General Information

1.1 Product Description for Equipment under Test (EUT)

Applicant	Iconnect.
	NO.9, Aly.58,Ln,112.Ruiguand 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)	802.11ac High-Speed USB Adapter
Main Model Name	AWUS036ACM
Series Model Name	AWUS036ACX, AWSU036AC-X, AWUS036EACX, AWUS036EAC-X, AWUS036ACHX, AWUS036ACH-X, AWUS1900 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, AWUS036ACM 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: 15.74 dBm IEEE 802.11n HT20/ ac VHT20 Mode: 15.15 dBm IEEE 802.11n HT40/ ac VHT40 Mode: 8.45 dBm IEEE 802.11ac VHT80 Mode: 7.76 dBm 5725-5850 MHz: IEEE 802.11a Mode: 17.88 dBm IEEE 802.11n HT20/ ac VHT20 Mode: 17.26 dBm IEEE 802.11n HT40/ ac VHT40 Mode: 16.86 dBm IEEE 802.11ac VHT80 Mode: 15.53 dBm
Modulation Technique	IEEE 802.11a Mode: OFDM IEEE 802.11n HT20/ ac VHT20 Mode: OFDM IEEE 802.11n HT40/ ac VHT40 Mode: OFDM IEEE 802.11ac VHT80 Mode: OFDM
Power Operation (Voltage Range)	☐ AC ☐ Adapter ☐ By AC Power Cord ☐ PoE

	☒ DC Type 5V/500mA ☐ Battery ☐ DC Power Supply ☒ from USB Port
	☐ Host System
Received Date	Oct. 19, 2021
Date of Test	Oct. 28, 2021 ~ Dec. 29, 2021

*All measurement and test data in this report was gathered from production sample serial number: RXZ211019002-01 (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: 2AB877612

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
Occupied Bandwidth		+/- 0.35 MHz
Power Spectral Density, conducted		+/- 0.93 dBm/3kHz
Emissions, radiated	30 MHz~1GHz	+/- 5.22 dB
	1 GHz~18 GHz	+/- 6.12 dB
	18 GHz~40 GHz	+/- 4.99 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	2021/11/03	23	41	1010	Howard.Ho
Radiation Spurious Emissions	2021/11/23 ~ 2021/12/24	22.9~24	65~74	1010	Howard.Ho
Emission Bandwidth And Occupied Bandwidth	2021/10/28 ~ 2021/12/28	22.2~24.2	45~50	1010	Boris
Maximum Output Power	2021/10/28	24.2	50	1010	Boris
Power Spectral Density	2021/10/28 ~ 2021/12/29	22.2~24.2	45~50	1010	Boris

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 manufacture. 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/ac20/n20 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 “MT7662UQA.exe (Version 1.0.3.19)”.

MIMO(CDD)

UNII Band	Mode	Channel	Frequency (MHz)	Power setting	
				Chain 0	Chain 1
UNII-1	802.11a	36	5180	18	18
		40	5200	18	18
		48	5240	18	18
UNII-3		149	5745	1D	1D
		157	5785	1D	1D
		165	5825	1D	1D
UNII-1	802.11n 20 / ac 20	36	5180	18	18
		40	5200	18	18
		48	5240	17	17
UNII-3		149	5745	1D	1D
		157	5785	1D	1D
		165	5825	1E	1E
UNII-1	802.11n 40 / ac 40	38	5190	0A	0A
		46	5230	0A	0A
UNII-3		151	5755	1E	1E
		159	5795	1E	1E
UNII-1	802.11ac 80	42	5210	08	08
UNII-3		155	5775	1D	1D

SISO mode and MIMO mode have the same power level setting and base on output power testing,

MIMO mode power than SISO mode large, MIMO mode was selected for full testing.

The device supports MIMO (CDD) at all modes.

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: MIMO(CDD) Mode :6Mbps

802.11ac VHT20 MIMO(CDD) Mode: MCS0

802.11ac VHT40 MIMO(CDD) Mode: MCS0

802.11ac VHT80 MIMO(CDD) Mode: MCS0

2.4 Test Mode

Mode: Full System (Model: AWUS036ACM) tested all measure item.

2.5 Support Equipment List and Details

Description	Manufacturer	Model Number	S/N
NB	DELL	E6410	8N7PXN1

2.6 External Cable List and Details

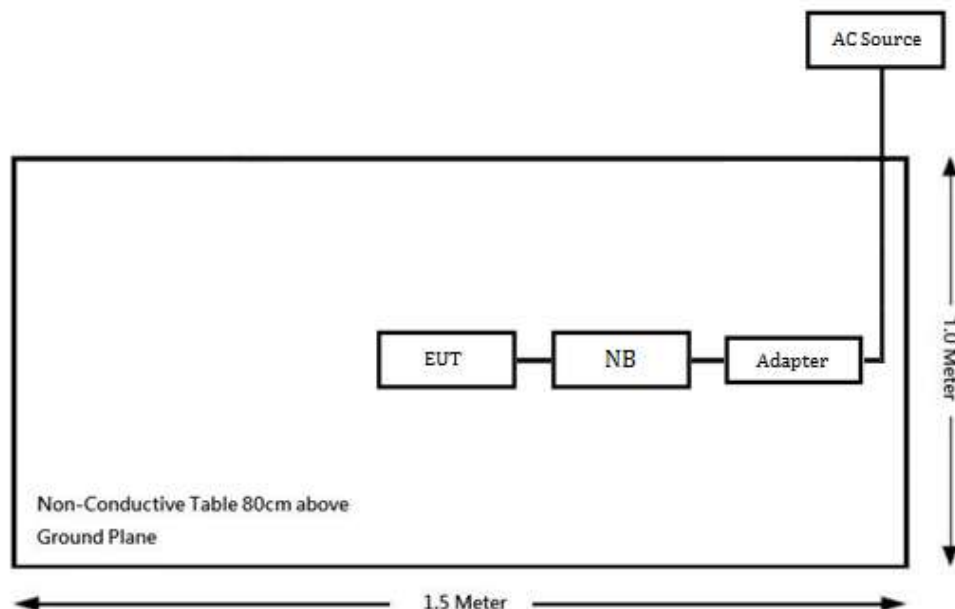
Cable Description	Length (m)	From	To
USB Cable	1	EUT	NB

2.7 Block Diagram of Test Setup

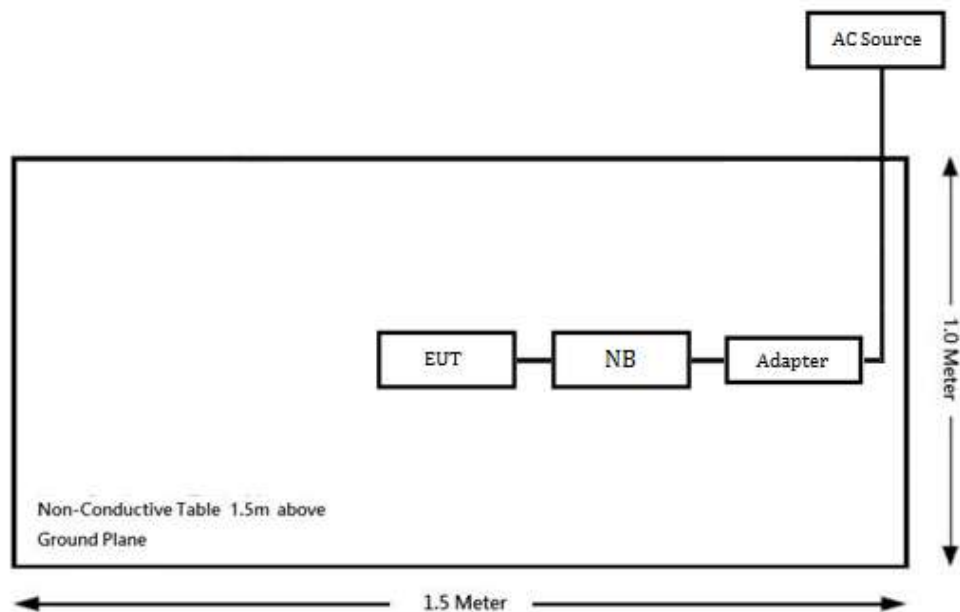
See test photographs attached in setup photos for the actual connections between EUT and support equipment.

Radiation:

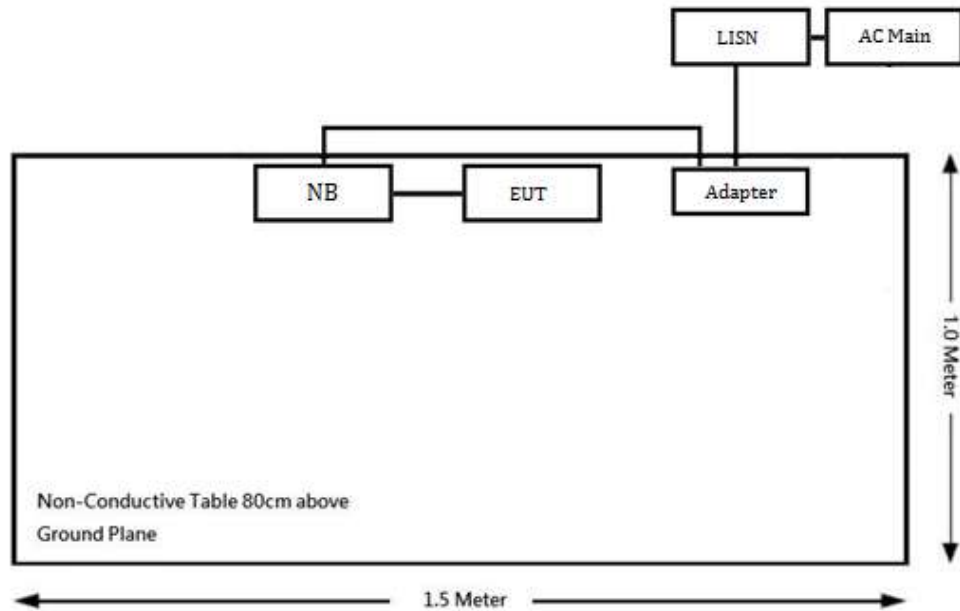
Below 1GHz:



Above 1GHz:



Conduction:



2.8 Duty Cycle

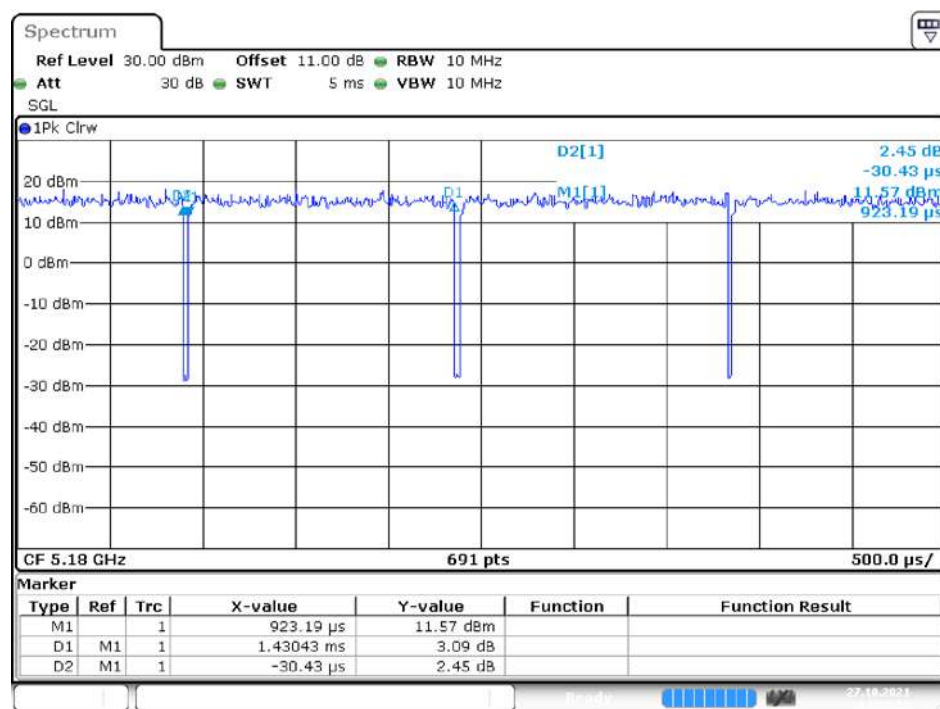
The duty cycle as below:

Radio Mode	On Time (ms)	Off Time (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
802.11a	1.43	0.03	98	0.09
802.11ac20	1.35	0.03	98	0.09
802.11ac40	0.68	0.02	97	0.13
802.11ac80	0.33	0.03	93	0.32

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

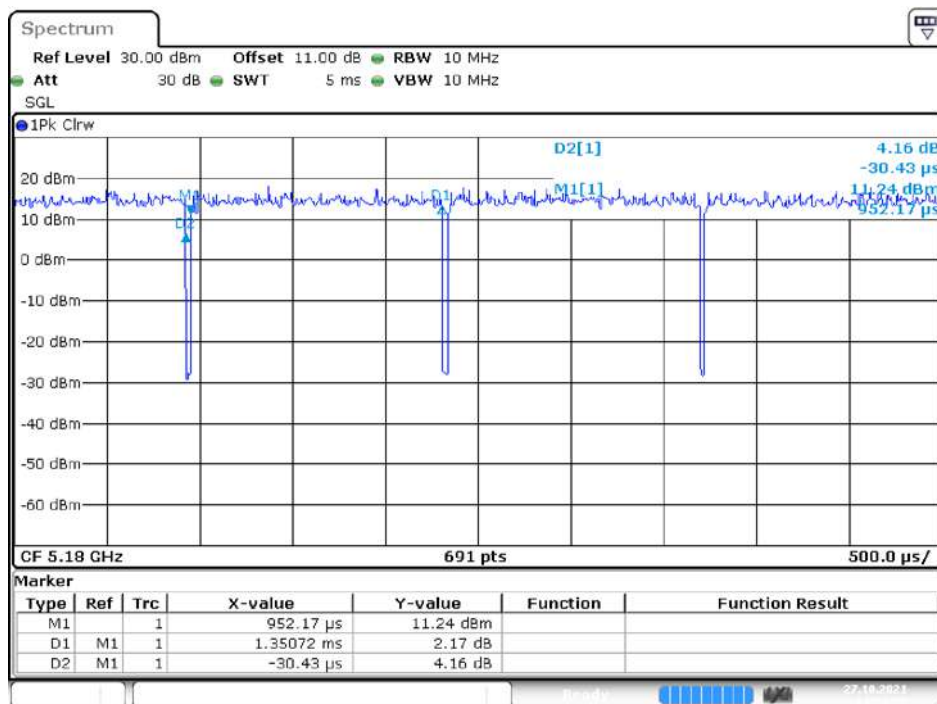
Please refer to the following plots.

802.11a Mode



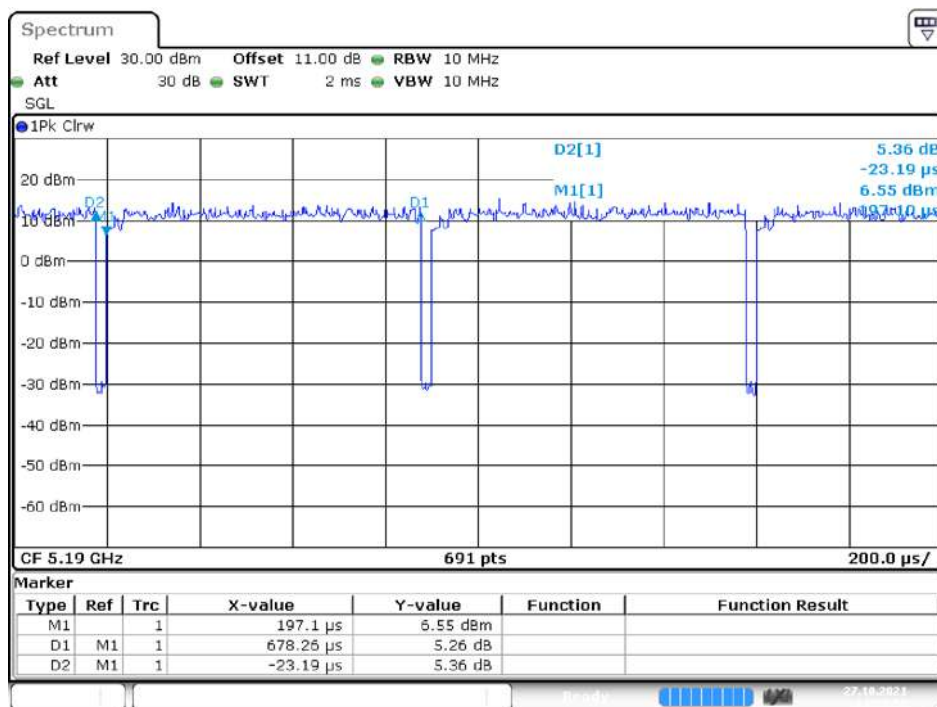
Date: 27.OCT.2021 14:27:51

802.11ac VHT20 Mode



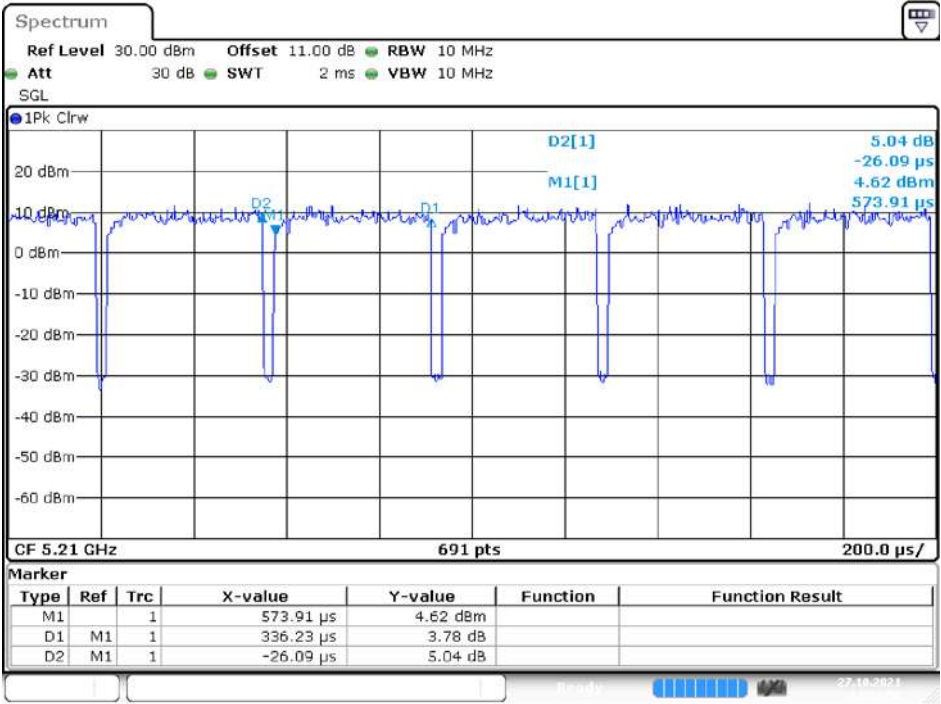
Date: 27.OCT.2021 14:26:33

802.11ac VHT40 Mode



Date: 27.OCT.2021 14:22:57

802.11ac VHT80 Mode



Date: 27.OCT.2021 14:21:50

3 Summary of Test Results

FCC Rules	Description of Test	Results
§15.407(f), §1.1310, §2.1093	RF Exposure	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	2022/7/29
RF Cable	EMEC	EM-CB5D	1	2021/6/11	2022/6/11
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_EMC	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, § 2.1093 - RF Exposure

5.1 Applicable Standard

According to §15.407(f) and §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline..

5.2 RF Exposure Evaluation Result

Please refer to the SAR report, report No.: RXZ211019002SA01

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 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.

6.2 Antenna List and Details

Manufacturer	Model	Antenna Type	Connector Type	Antenna Gain
ALFA	ARS-NT5B	Dipole Antenna	RP-SMA	5 dBi

The EUT has 2 external identical antenna use a unique type of connector to attach to the EUT, fulfill the requirement of this section.

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)

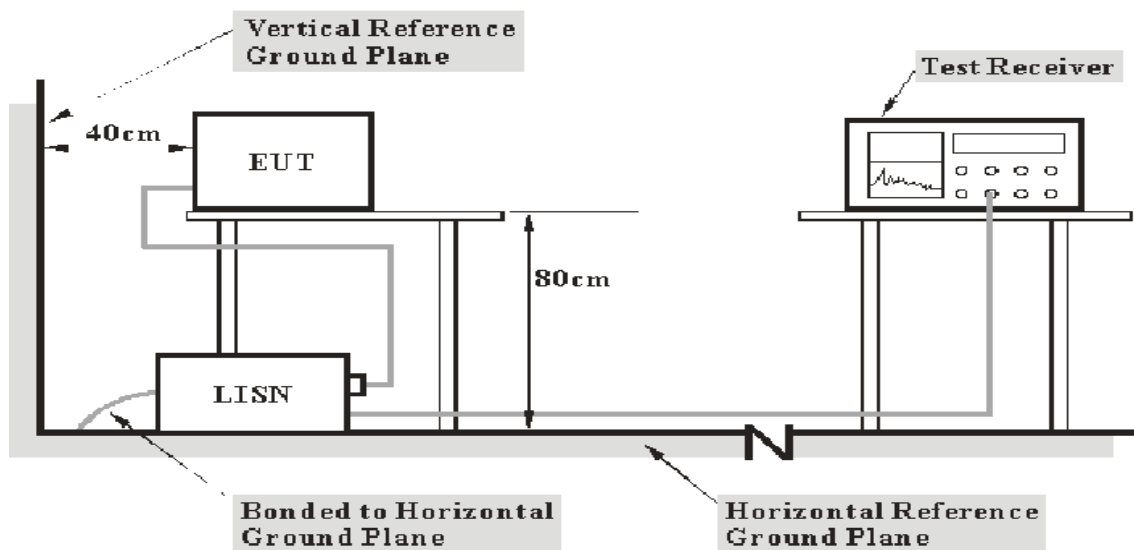
Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207

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 C63.10-2020 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:

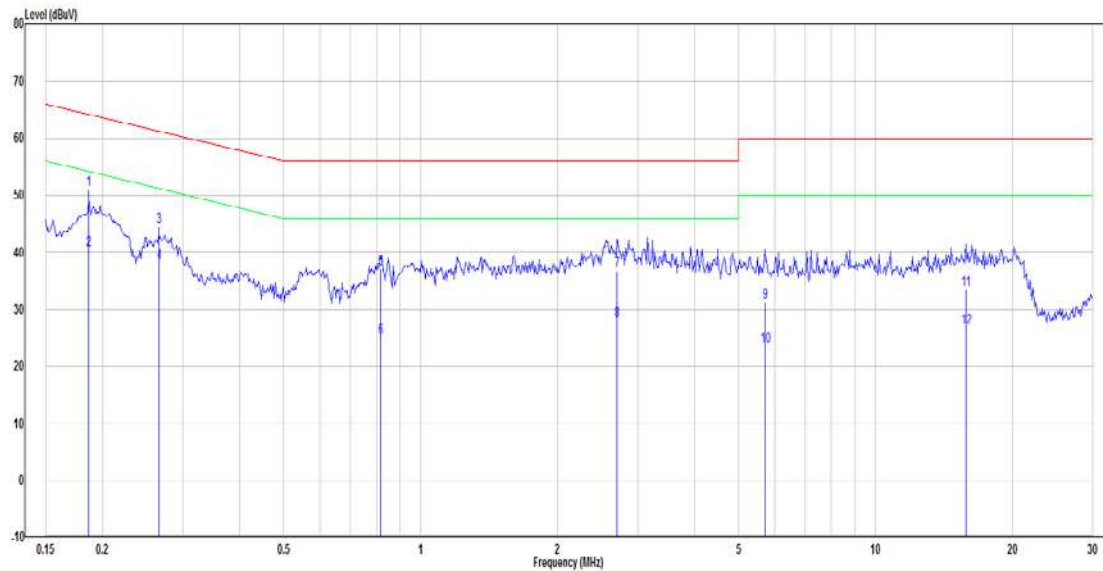
$$\text{Over Limit} = \text{Level} - \text{Limit Line}$$

7.6 Test Results

Test Mode: Transmitting

802.11ac VHT20 mode of 5150~5250MHz (worst case)

Main: AC120 V, 60 Hz, Line



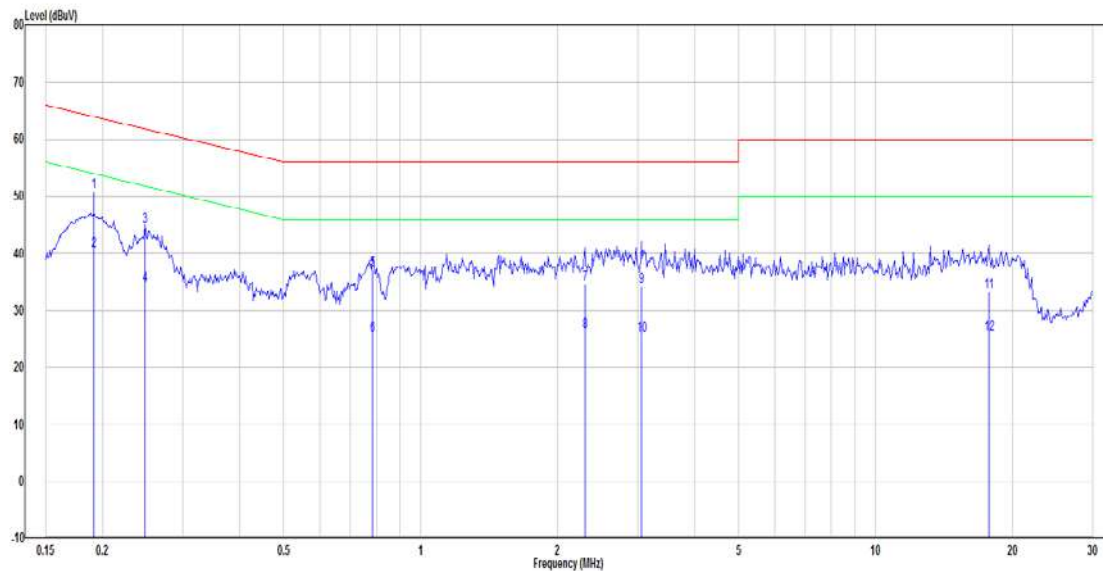
No.	Frequency (MHz)	Reading (dBμV)	Correct Factor(dB)	Result (dBμV)	Limit (dBμV)	Over limit (dB)	Remark
1	0.186	31.41	19.58	50.99	64.20	-13.21	QP
2	0.186	20.86	19.58	40.44	54.20	-13.76	Average
3	0.266	24.92	19.58	44.50	61.25	-16.75	QP
4	0.266	18.59	19.58	38.17	51.25	-13.08	Average
5	0.817	17.56	19.60	37.16	56.00	-18.84	QP
6	0.817	5.42	19.60	25.02	46.00	-20.98	Average
7	2.707	17.02	19.66	36.68	56.00	-19.32	QP
8	2.707	8.40	19.66	28.06	46.00	-17.94	Average
9	5.713	11.52	19.73	31.25	60.00	-28.75	QP
10	5.713	3.84	19.73	23.57	50.00	-26.43	Average
11	15.801	13.64	19.85	33.49	60.00	-26.51	QP
12	15.801	6.90	19.85	26.75	50.00	-23.25	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

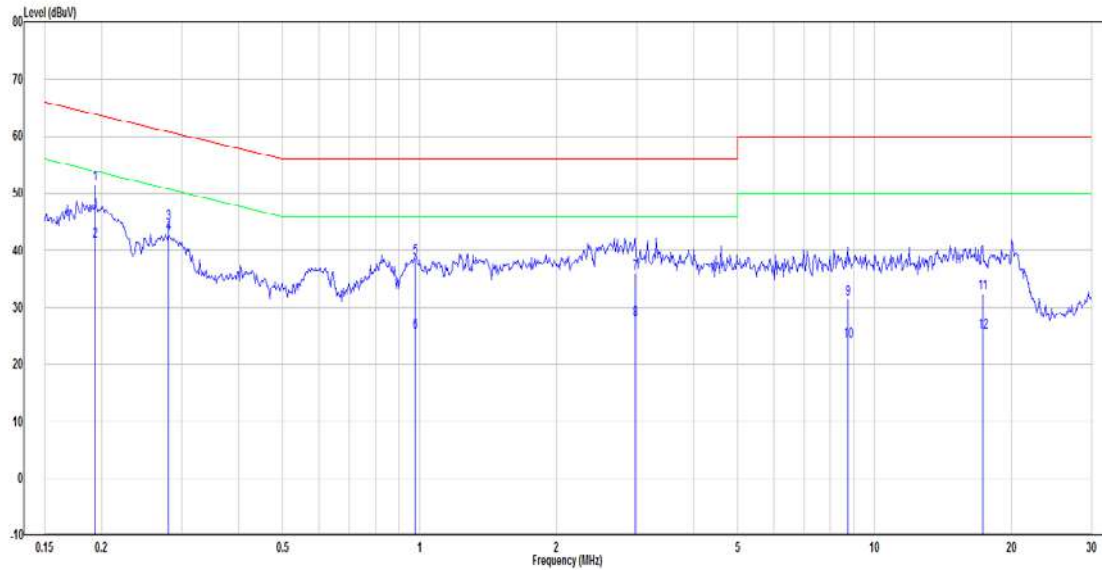
No.	Frequency	Reading	Correct	Result	Limit	Over limit	Remark
	(MHz)	(dBμV)	Factor(dB)	(dBμV)	(dBμV)	(dB)	
1	0.191	31.20	19.58	50.78	63.98	-13.20	QP
2	0.191	20.91	19.58	40.49	53.98	-13.49	Average
3	0.248	25.18	19.58	44.76	61.82	-17.06	QP
4	0.248	14.87	19.58	34.45	51.82	-17.37	Average
5	0.783	17.48	19.60	37.08	56.00	-18.92	QP
6	0.783	6.02	19.60	25.62	46.00	-20.38	Average
7	2.297	15.02	19.65	34.67	56.00	-21.33	QP
8	2.297	6.64	19.65	26.29	46.00	-19.71	Average
9	3.058	14.56	19.67	34.23	56.00	-21.77	QP
10	3.058	5.89	19.67	25.56	46.00	-20.44	Average
11	17.755	13.31	19.89	33.20	60.00	-26.80	QP
12	17.755	5.95	19.89	25.84	50.00	-24.16	Average

Note:

Level = Read Level + Factor

Over Limit = Level – Limit Line

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

802.11a mode of 5745~5850MHz (worst case)**Main: AC120 V, 60 Hz, Line**

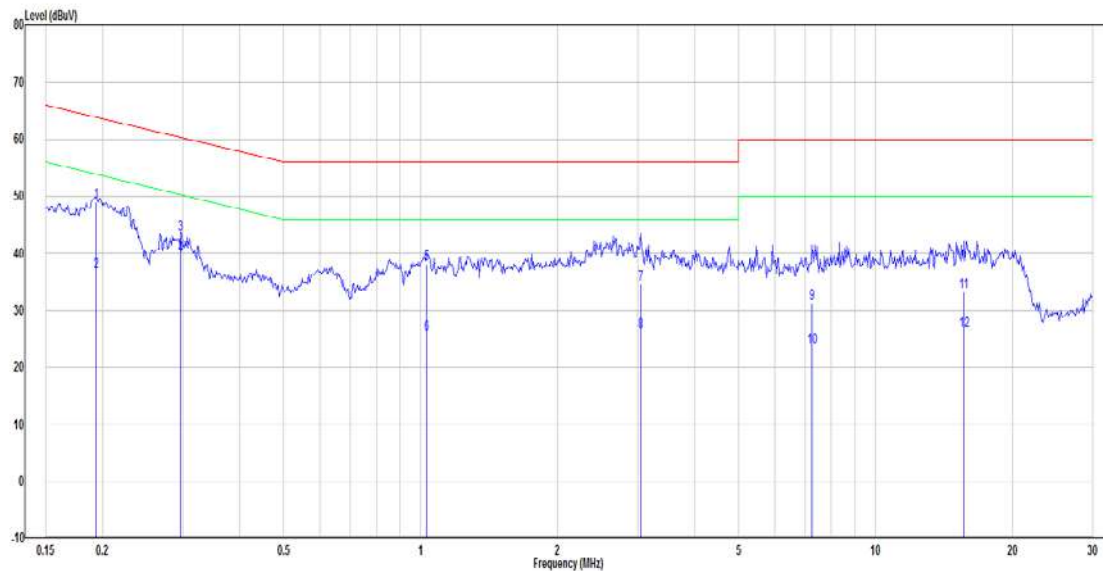
No.	Frequency (MHz)	Reading (dBμV)	Correct Factor(dB)	Result (dBμV)	Limit (dBμV)	Over limit (dB)	Remark
1	0.193	31.94	19.58	51.52	63.89	-12.37	QP
2	0.193	22.12	19.58	41.70	53.89	-12.19	Average
3	0.280	25.20	19.58	44.78	60.81	-16.03	QP
4	0.280	23.38	19.58	42.96	50.81	-7.85	Average
5	0.979	19.11	19.61	38.72	56.00	-17.28	QP
6	0.979	6.04	19.61	25.65	46.00	-20.35	Average
7	2.978	16.30	19.66	35.96	56.00	-20.04	QP
8	2.978	8.14	19.66	27.80	46.00	-18.20	Average
9	8.729	11.61	19.79	31.40	60.00	-28.60	QP
10	8.729	4.32	19.79	24.11	50.00	-25.89	Average
11	17.291	12.68	19.86	32.54	60.00	-27.46	QP
12	17.291	5.75	19.86	25.61	50.00	-24.39	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	0.193	29.38	19.58	48.96	63.89	-14.93	QP
2	0.193	17.20	19.58	36.78	53.89	-17.11	Average
3	0.297	23.89	19.58	43.47	60.32	-16.85	QP
4	0.297	20.01	19.58	39.59	50.32	-10.73	Average
5	1.032	18.60	19.60	38.20	56.00	-17.80	QP
6	1.032	6.29	19.60	25.89	46.00	-20.11	Average
7	3.041	14.95	19.67	34.62	56.00	-21.38	QP
8	3.041	6.63	19.67	26.30	46.00	-19.70	Average
9	7.252	11.57	19.76	31.33	60.00	-28.67	QP
10	7.252	3.78	19.76	23.54	50.00	-26.46	Average
11	15.635	13.28	19.87	33.15	60.00	-26.85	QP
12	15.635	6.60	19.87	26.47	50.00	-23.53	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)

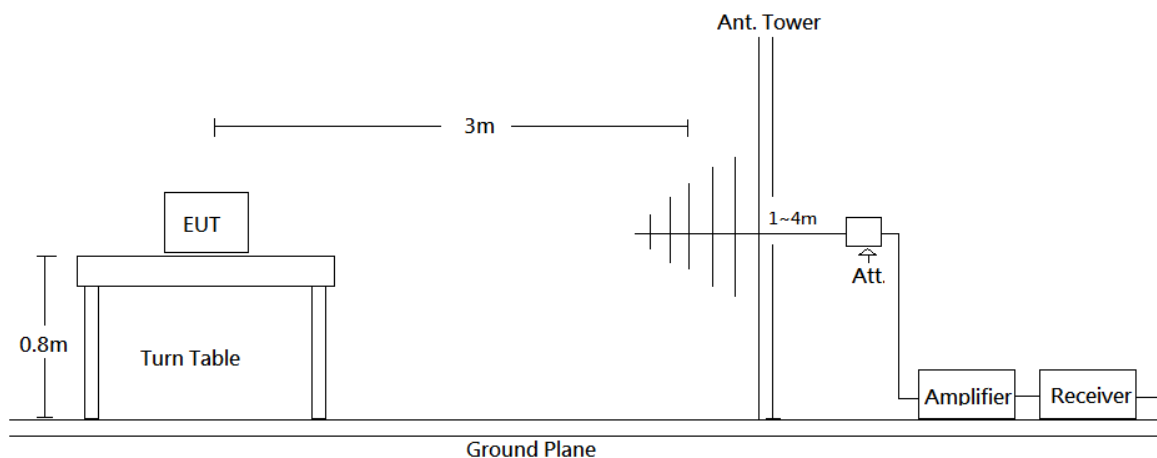
- For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of –27 dBm/MHz.
- For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of –27 dBm/MHz at 75 MHz or more above or below the band 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..

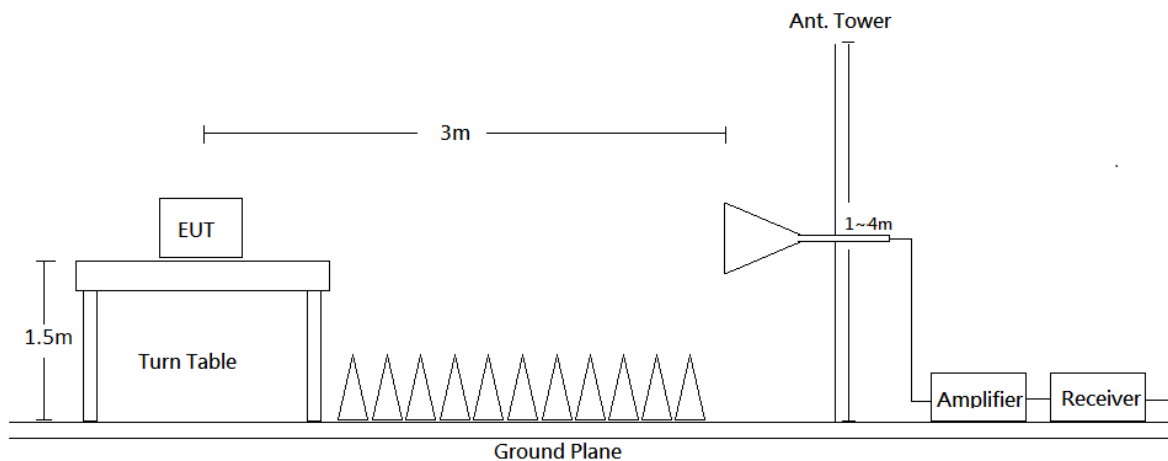
- The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.
- Unwanted emissions below 1 GHz must comply with 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 C63.10-2020. 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	3 MHz	>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:

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

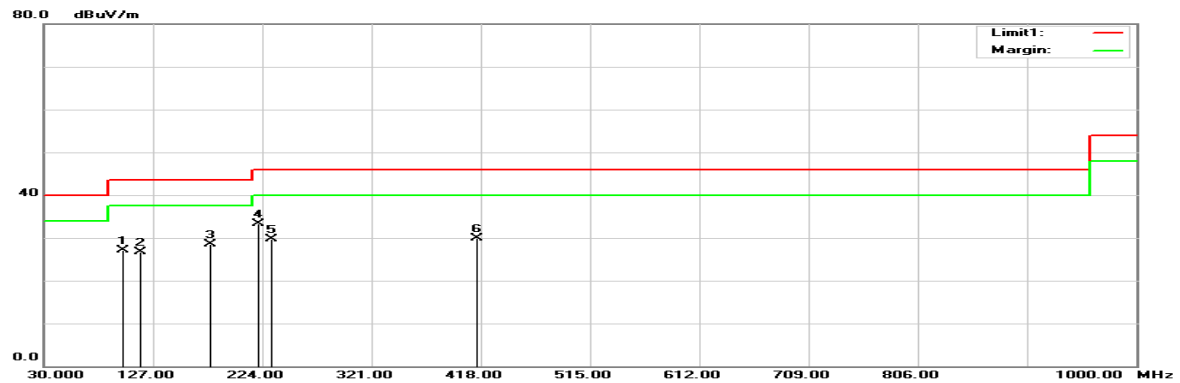
8.6 Test Results

Test Mode: Transmitting

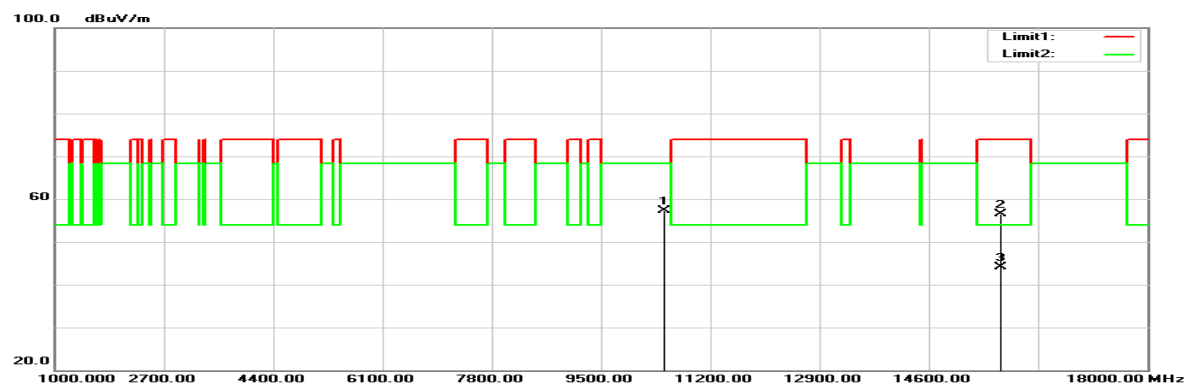
(Pre-scan with three orthogonal axis, and worse case as Z axis.)

Horizontal (worst case is 802.11ac VHT20 mode 5240MHz)

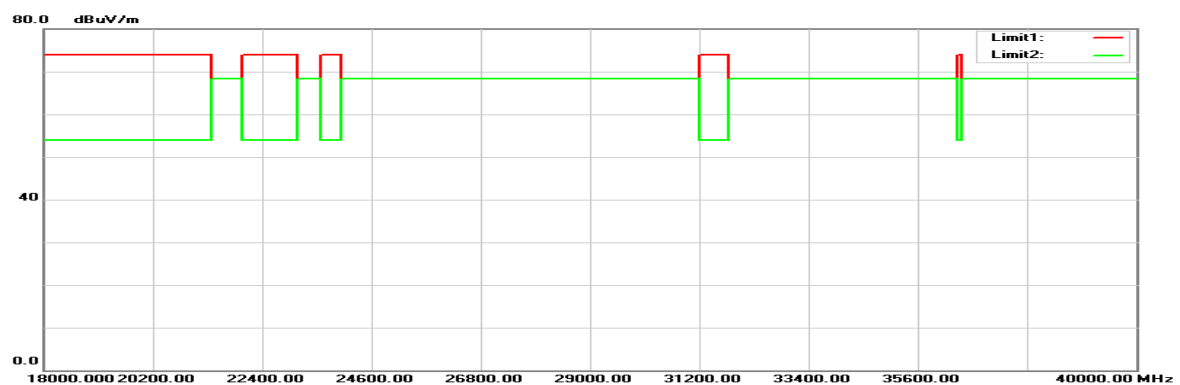
30MHz-1GHz:



1GHz-18GHz:

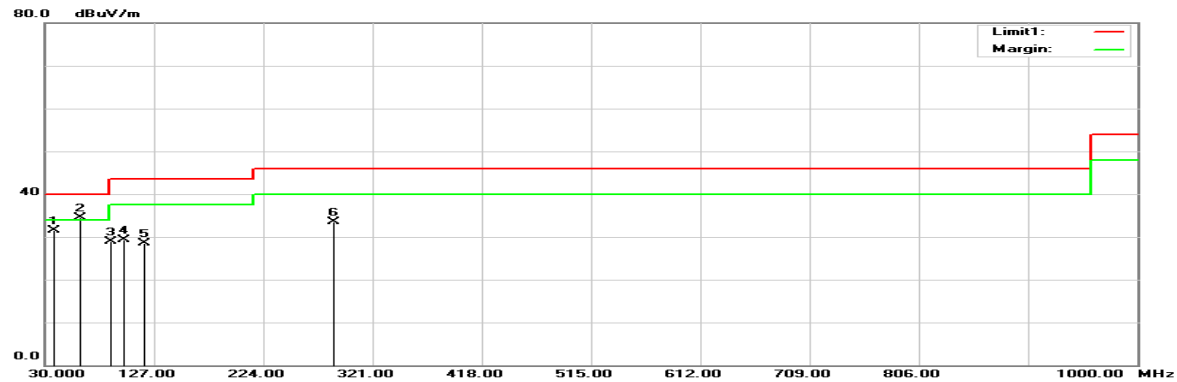


18GHz-40GHz:

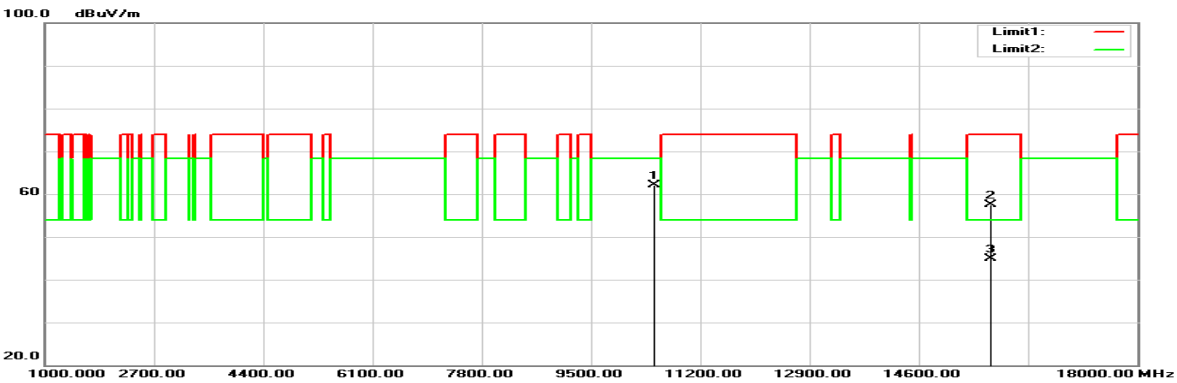


Vertical (worst case is 802.11ac VHT20 mode 5240MHz)

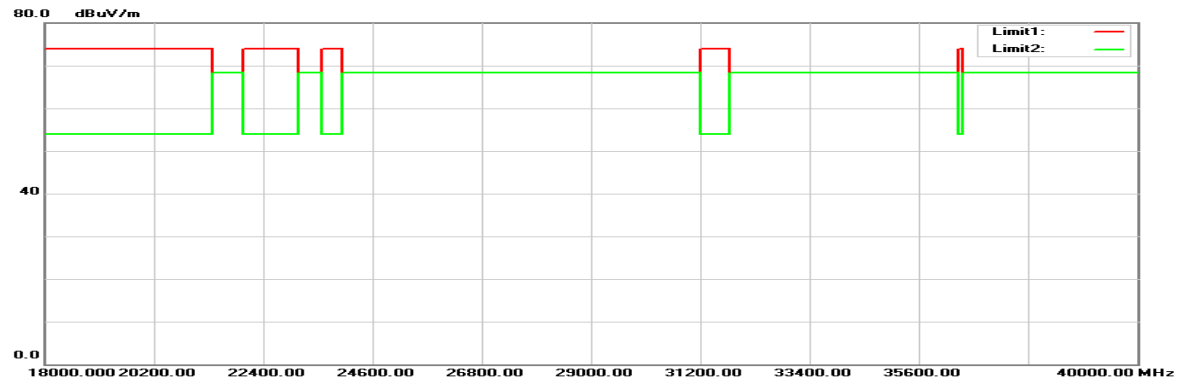
30MHz-1GHz:



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	41.20	-14.06	27.14	43.50	-16.36	100	112	peak
116.3300	37.70	-10.92	26.78	43.50	-16.72	100	226	peak
177.4400	41.32	-12.80	28.52	43.50	-14.98	100	206	peak
220.1200	46.31	-13.07	33.24	46.00	-12.76	100	36	peak
232.7300	42.34	-12.54	29.80	46.00	-16.20	100	344	peak
414.1200	37.43	-7.55	29.88	46.00	-16.12	100	1	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)	(°)	
37.7600	40.33	-8.77	31.56	40.00	-8.44	150	201	peak
61.0400	51.47	-17.01	34.46	40.00	-5.54	150	29	QP
88.2000	45.59	-16.73	28.86	43.50	-14.64	150	107	peak
99.8400	43.31	-14.06	29.25	43.50	-14.25	150	107	peak
118.2700	39.23	-10.69	28.54	43.50	-14.96	150	108	peak
287.0500	43.51	-10.10	33.41	46.00	-12.59	150	22	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	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
(MHz)	(dBμV)	Factor(dB/m)	(dBμV/m)	(dBμV/m)	(dB)	(cm)	(°)	
a Mode, Low channel								
5149.999	69.83	-2.18	67.65	74.00	-6.35	100	130	peak
5149.999	45.82	-2.18	43.64	54.00	-10.36	100	130	AVG
5180.000	107.89	-2.29	105.60	N/A	N/A	100	130	peak
5180.000	97.77	-2.29	95.48	N/A	N/A	100	130	AVG
10360.000	46.16	7.11	53.27	68.20	-14.93	157	330	peak
15540.000	47.01	11.95	58.96	74.00	-15.04	142	345	peak
15540.000	35.75	11.95	47.70	54.00	-6.30	142	345	AVG
a Mode, Middle channel								
5200.000	107.22	-2.37	104.85	N/A	N/A	106	60	peak
5200.000	97.43	-2.37	95.06	N/A	N/A	106	60	AVG
10400.000	45.62	7.42	53.04	68.20	-15.16	156	334	peak
15600.000	47.25	11.63	58.88	74.00	-15.12	139	340	peak
15600.000	34.42	11.63	46.05	54.00	-7.95	139	340	AVG
a Mode, High channel								
5136.800	55.92	-2.14	53.78	74.00	-20.22	106	25	peak
5136.800	42.77	-2.14	40.63	54.00	-13.37	106	25	AVG
5240.000	107.53	-2.62	104.91	N/A	N/A	106	25	peak
5240.000	97.62	-2.62	95.00	N/A	N/A	106	25	AVG
5420.400	55.78	-2.64	53.14	74.00	-20.86	106	25	peak
5420.400	42.75	-2.64	40.11	54.00	-13.89	106	25	AVG
10480.000	48.18	7.98	56.16	68.20	-12.04	121	334	peak
15720.000	46.43	11.35	57.78	74.00	-16.22	135	337	peak
15720.000	33.89	11.35	45.24	54.00	-8.76	135	337	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 (dB μ V)	Correct Factor(dB/m)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
a Mode, Low channel								
5149.999	70.52	-2.18	68.34	74.00	-5.66	186	0	peak
5149.999	55.13	-2.18	52.95	54.00	-1.05	186	0	AVG
5180.000	111.02	-2.29	108.73	N/A	N/A	186	0	peak
5180.000	100.35	-2.29	98.06	N/A	N/A	186	0	AVG
10360.000	48.75	7.11	55.86	68.20	-12.34	138	314	peak
15540.000	45.15	11.95	57.10	74.00	-16.90	150	302	peak
15540.000	32.02	11.95	43.97	54.00	-10.03	150	302	AVG
a Mode, Middle channel								
5149.999	68.70	-2.18	66.52	74.00	-7.48	209	0	peak
5149.999	50.16	-2.18	47.98	54.00	-6.02	209	0	AVG
5200.000	111.72	-1.24	110.48	N/A	N/A	110	158	peak
5200.000	101.36	-1.24	100.12	N/A	N/A	110	158	AVG
10400.000	48.43	7.42	55.85	68.20	-12.35	155	303	peak
15600.000	45.74	11.63	57.37	74.00	-16.63	142	336	peak
15600.000	32.83	11.63	44.46	54.00	-9.54	142	336	AVG
a Mode, High channel								
5139.200	58.40	-2.15	56.25	74.00	-17.75	194	0	peak
5139.200	45.56	-2.15	43.41	54.00	-10.59	194	0	AVG
5240.000	111.49	-2.62	108.87	N/A	N/A	194	0	peak
5240.000	100.99	-2.62	98.37	N/A	N/A	194	0	AVG
5350.400	55.96	-2.60	53.36	74.00	-20.64	194	0	peak
5350.400	44.11	-2.60	41.51	54.00	-12.49	194	0	AVG
10480.000	52.44	7.98	60.42	68.20	-7.78	126	266	peak
15720.000	45.06	11.35	56.41	74.00	-17.59	144	336	peak
15720.000	33.81	11.35	45.16	54.00	-8.84	144	336	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 (dBμV)	Correct Factor(dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
ac20 Mode, Low channel								
5149.999	60.37	-2.18	58.19	74.00	-15.81	105	117	peak
5149.999	44.64	-2.18	42.46	54.00	-11.54	105	117	AVG
5180.000	106.36	-2.29	104.07	N/A	N/A	105	117	peak
5180.000	95.86	-2.29	93.57	N/A	N/A	105	117	AVG
10360.000	47.17	7.11	54.28	68.20	-13.92	134	332	peak
15540.000	42.81	11.95	54.76	74.00	-19.24	150	328	peak
15540.000	31.25	11.95	43.20	54.00	-10.80	150	328	AVG
ac20 Mode, Middle channel								
5200.000	106.50	-2.37	104.13	N/A	N/A	106	58	peak
5200.000	96.11	-2.37	93.74	N/A	N/A	106	58	AVG
10400.000	46.79	7.42	54.21	68.20	-13.99	143	326	peak
15600.000	46.92	11.63	58.55	74.00	-15.45	155	328	peak
15600.000	31.82	11.63	43.45	54.00	-10.55	155	328	AVG
ac20 Mode, High channel								
5098.400	56.15	-2.02	54.13	74.00	-19.87	100	70	peak
5098.400	45.05	-2.02	43.03	54.00	-10.97	100	70	AVG
5240.000	106.51	-2.62	103.89	N/A	N/A	100	70	peak
5240.000	96.06	-2.62	93.44	N/A	N/A	100	70	AVG
5407.600	56.45	-2.48	53.97	74.00	-20.03	100	70	peak
5407.600	42.68	-2.48	40.20	54.00	-13.80	100	70	AVG
10480.000	49.40	7.98	57.38	68.20	-10.82	126	334	peak
15720.000	45.16	11.35	56.51	74.00	-17.49	139	340	peak
15720.000	32.80	11.35	44.15	54.00	-9.85	139	340	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								
5149.999	65.09	-2.18	62.91	74.00	-11.09	217	0	peak
5149.999	54.62	-2.18	52.44	54.00	-1.56	217	0	AVG
5180.000	109.68	-2.29	107.39	N/A	N/A	217	0	peak
5180.000	99.69	-2.29	97.40	N/A	N/A	217	0	AVG
10360.000	49.35	7.11	56.46	68.20	-11.74	121	312	peak
15540.000	43.53	11.95	55.48	74.00	-18.52	142	196	peak
15540.000	31.45	11.95	43.40	54.00	-10.60	142	196	AVG
ac20 Mode, Middle channel								
5149.999	70.61	-2.18	68.43	74.00	-5.57	130	72	peak
5149.999	49.99	-2.18	47.81	54.00	-6.19	130	72	AVG
5200.000	110.21	-2.37	107.84	N/A	N/A	130	72	peak
5200.000	99.72	-2.37	97.35	N/A	N/A	130	72	AVG
10400.000	47.10	7.42	54.52	68.20	-13.68	138	257	peak
15600.000	44.83	11.63	56.46	74.00	-17.54	150	336	peak
15600.000	31.79	11.63	43.42	54.00	-10.58	150	336	AVG
ac20 Mode, High channel								
5147.600	58.62	-2.18	56.44	74.00	-17.56	100	52	peak
5147.600	43.18	-2.18	41.00	54.00	-13.00	100	52	AVG
5240.000	109.39	-2.62	106.77	N/A	N/A	100	52	peak
5240.000	98.89	-2.62	96.27	N/A	N/A	100	52	AVG
5364.800	56.94	-2.54	54.40	74.00	-19.60	100	52	peak
5364.800	44.37	-2.54	41.83	54.00	-12.17	100	52	AVG
10480.000	54.22	7.98	62.20	68.20	-6.00	146	310	peak
15720.000	46.12	11.35	57.47	74.00	-16.53	141	280	peak
15720.000	33.53	11.35	44.88	54.00	-9.12	141	280	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								
5147.280	56.56	-2.17	54.39	74.00	-19.61	101	70	peak
5147.280	43.48	-2.17	41.31	54.00	-12.69	101	70	AVG
5190.000	93.75	-2.33	91.42	N/A	N/A	101	70	peak
5190.000	83.27	-2.33	80.94	N/A	N/A	101	70	AVG
10380.000	44.76	7.27	52.03	68.20	-16.17	146	333	peak
15570.000	43.77	11.79	55.56	74.00	-18.44	150	216	peak
15570.000	31.18	11.79	42.97	54.00	-11.03	150	216	AVG
ac40 Mode, High channel								
5148.000	55.88	-2.18	53.70	74.00	-20.30	100	60	peak
5148.000	43.62	-2.18	41.44	54.00	-12.56	100	60	AVG
5230.000	93.77	-2.56	91.21	N/A	N/A	100	60	peak
5230.000	83.61	-2.56	81.05	N/A	N/A	100	60	AVG
5380.000	55.90	-2.48	53.42	74.00	-20.58	100	60	peak
5380.000	43.19	-2.48	40.71	54.00	-13.29	100	60	AVG
10460.000	47.13	7.84	54.97	68.20	-13.23	141	336	peak
15690.000	44.92	11.33	56.25	74.00	-17.75	152	86	peak
15690.000	33.80	11.33	45.13	54.00	-8.87	152	86	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								
5149.999	73.04	-2.18	70.86	74.00	-3.14	117	51	peak
5149.999	54.90	-2.18	52.72	54.00	-1.28	117	51	AVG
5190.000	105.59	-2.33	103.26	N/A	N/A	117	51	peak
5190.000	95.30	-2.33	92.97	N/A	N/A	117	51	AVG
10380.000	46.92	7.27	54.19	68.20	-14.01	123	305	peak
15570.000	43.57	11.79	55.36	74.00	-18.64	136	2	peak
15570.000	32.06	11.79	43.85	54.00	-10.15	136	2	AVG
ac40 Mode, High channel								
5149.999	63.24	-2.18	61.06	74.00	-12.94	166	73	peak
5149.999	44.22	-2.18	42.04	54.00	-11.96	166	73	AVG
5230.000	105.59	-2.56	103.03	N/A	N/A	166	73	peak
5230.000	94.88	-2.56	92.32	N/A	N/A	166	73	AVG
5350.000	58.80	-2.60	56.20	74.00	-17.80	166	73	peak
5350.000	44.56	-2.60	41.96	54.00	-12.04	166	73	AVG
10460.000	50.50	7.84	58.34	68.20	-9.86	138	314	peak
15690.000	45.90	11.33	57.23	74.00	-16.77	157	147	peak
15690.000	33.32	11.33	44.65	54.00	-9.35	157	147	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								
5141.000	57.12	-2.15	54.97	74.00	-19.03	143	130	peak
5141.000	43.50	-2.15	41.35	54.00	-12.65	143	130	AVG
5210.000	88.71	-2.43	86.28	N/A	N/A	143	130	peak
5210.000	78.07	-2.43	75.64	N/A	N/A	143	130	AVG
10420.000	43.78	7.56	51.34	68.20	-16.86	150	328	peak
15630.000	43.96	11.54	55.50	74.00	-18.50	153	332	peak
15630.000	33.16	11.54	44.70	54.00	-9.30	153	332	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								
5149.999	69.80	-2.18	67.62	74.00	-6.38	100	53	peak
5149.999	54.63	-2.18	52.45	54.00	-1.55	100	53	AVG
5210.000	101.48	-2.43	99.05	N/A	N/A	100	53	peak
5210.000	89.98	-2.43	87.55	N/A	N/A	100	53	AVG
10420.000	45.86	7.56	53.42	68.20	-14.78	122	312	peak
15630.000	44.84	11.54	56.38	74.00	-17.62	136	2	peak
15630.000	33.29	11.54	44.83	54.00	-9.17	136	2	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								
5624.040	55.82	-2.75	53.07	68.20	-15.13	143	60	peak
5693.520	56.92	-2.65	54.27	100.40	-46.13	143	60	peak
5717.640	67.11	-2.67	64.44	110.14	-45.70	143	60	peak
5723.400	80.81	-2.67	78.14	118.55	-40.41	143	60	peak
5745.000	106.61	-2.70	103.91	N/A	N/A	143	60	peak
5745.000	96.79	-2.70	94.09	N/A	N/A	143	60	AVG
5852.640	54.97	-2.15	52.82	116.18	-63.36	143	60	peak
5868.480	55.23	-1.99	53.24	107.03	-53.79	143	60	peak
5910.960	56.24	-1.63	54.61	78.59	-23.98	143	60	peak
5943.000	55.68	-1.71	53.97	68.20	-14.23	143	60	peak
11490.000	46.28	9.04	55.32	74.00	-18.68	120	95	peak
11490.000	36.03	9.04	45.07	54.00	-8.93	120	95	AVG
17235.000	43.49	16.75	60.24	68.23	-7.99	141	241	peak
a Mode, Middle channel								
5637.720	56.46	-2.72	53.74	68.20	-14.46	157	104	peak
5683.440	56.28	-2.67	53.61	92.95	-39.34	157	104	peak
5712.960	56.04	-2.66	53.38	108.83	-55.45	157	104	peak
5723.400	55.05	-2.67	52.38	118.55	-66.17	157	104	peak
5785.000	103.04	-2.67	100.37	N/A	N/A	157	104	peak
5785.000	93.02	-2.67	90.35	N/A	N/A	157	104	AVG
5851.560	55.43	-2.16	53.27	118.64	-65.37	157	104	peak
5855.880	56.96	-2.12	54.84	110.55	-55.71	157	104	peak
5879.640	56.15	-1.89	54.26	101.77	-47.51	157	104	peak
5939.040	55.32	-1.70	53.62	68.20	-14.58	157	104	peak
11570.000	47.68	9.41	57.09	74.00	-16.91	117	251	peak
11570.000	35.96	9.41	45.37	54.00	-8.63	117	251	AVG
17355.000	43.32	13.67	56.99	68.20	-11.21	153	328	peak
a Mode, High channel								
5636.640	55.42	-2.72	52.70	68.20	-15.50	143	16	peak
5696.760	55.55	-2.64	52.91	102.80	-49.89	143	16	peak
5712.240	56.62	-2.65	53.97	108.63	-54.66	143	16	peak
5723.040	55.94	-2.67	53.27	117.73	-64.46	143	16	peak
5825.000	105.75	-2.42	103.33	N/A	N/A	143	16	peak
5825.000	95.78	-2.42	93.36	N/A	N/A	143	16	AVG
5852.640	71.44	-2.15	69.29	116.18	-46.89	143	16	peak
5858.400	64.64	-2.10	62.54	109.85	-47.31	143	16	peak
5878.560	57.49	-1.90	55.59	102.57	-46.98	143	16	peak
5948.040	56.29	-1.73	54.56	68.20	-13.64	143	16	peak
11650.000	47.27	9.34	56.61	74.00	-17.39	138	254	peak
11650.000	36.74	9.34	46.08	54.00	-7.92	138	254	AVG
17475.000	43.31	13.14	56.45	68.20	-11.75	141	148	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	56.94	-2.71	54.23	68.20	-13.97	166	59	peak
5698.200	67.42	-2.64	64.78	103.87	-39.09	166	59	peak
5719.800	83.39	-2.67	80.72	110.74	-30.02	166	59	peak
5724.480	90.86	-2.67	88.19	121.01	-32.82	166	59	peak
5745.000	117.05	-2.70	114.35	N/A	N/A	166	59	peak
5745.000	106.96	-2.70	104.26	N/A	N/A	166	59	AVG
5851.920	57.34	-2.16	55.18	117.82	-62.64	166	59	peak
5861.280	56.15	-2.07	54.08	109.04	-54.96	166	59	peak
5888.280	56.45	-1.81	54.64	95.37	-40.73	166	59	peak
5948.400	55.35	-1.73	53.62	68.20	-14.58	166	59	peak
11490.000	46.22	9.04	55.26	74.00	-18.74	100	153	peak
11490.000	34.73	9.04	43.77	54.00	-10.23	100	153	AVG
17235.000	47.23	16.75	63.98	68.23	-4.25	116	134	peak
a Mode, Middle channel								
5630.520	56.54	-2.74	53.80	68.20	-14.40	201	92	peak
5676.960	57.55	-2.67	54.88	88.15	-33.27	201	92	peak
5710.080	57.53	-2.65	54.88	108.02	-53.14	201	92	peak
5720.160	58.48	-2.67	55.81	111.16	-55.35	201	92	peak
5785.000	116.13	-2.67	113.46	N/A	N/A	201	92	peak
5785.000	106.23	-2.67	103.56	N/A	N/A	201	92	AVG
5851.200	57.92	-2.16	55.76	119.46	-63.70	201	92	peak
5871.720	58.16	-1.96	56.20	106.12	-49.92	201	92	peak
5877.120	57.53	-1.92	55.61	103.63	-48.02	201	92	peak
5929.320	56.03	-1.67	54.36	68.20	-13.84	201	92	peak
11570.000	45.98	9.62	55.60	74.00	-18.40	122	283	peak
11570.000	35.23	9.62	44.85	54.00	-9.15	122	283	AVG
17355.000	45.28	16.82	62.10	68.23	-6.13	150	54	peak
a Mode, High channel								
5629.080	56.21	-2.74	53.47	68.20	-14.73	134	264	peak
5663.640	55.24	-2.69	52.55	78.29	-25.74	134	264	peak
5701.080	56.05	-2.64	53.41	105.50	-52.09	134	264	peak
5724.120	55.17	-2.67	52.50	120.19	-67.69	134	264	peak
5825.000	113.68	-2.42	111.26	N/A	N/A	134	264	peak
5825.000	103.86	-2.42	101.44	N/A	N/A	134	264	AVG
5850.480	80.93	-2.17	78.76	121.11	-42.35	134	264	peak
5859.480	75.86	-2.08	73.78	109.55	-35.77	134	264	peak
5881.800	58.92	-1.87	57.05	100.17	-43.12	134	264	peak
5937.600	56.58	-1.69	54.89	68.20	-13.31	134	264	peak
11650.000	47.72	9.34	57.06	74.00	-16.94	120	315	peak
11650.000	37.58	9.34	46.92	54.00	-7.08	120	315	AVG
17475.000	43.73	13.14	56.87	68.20	-11.33	143	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)	(dBμV)	Factor(dB/m)	(dBμV/m)	(dBμV/m)	(dB)	(cm)	(°)	
AC20 Mode, Low channel								
5621.520	55.94	-2.75	53.19	68.20	-15.01	155	27	peak
5677.680	55.68	-2.67	53.01	88.68	-35.67	155	27	peak
5719.800	66.93	-2.67	64.26	110.74	-46.48	155	27	peak
5724.840	73.28	-2.67	70.61	121.84	-51.23	155	27	peak
5745.000	103.23	-2.70	100.53	N/A	N/A	155	27	peak
5745.000	93.53	-2.70	90.83	N/A	N/A	155	27	AVG
5851.920	55.56	-2.16	53.40	117.82	-64.42	155	27	peak
5867.760	55.68	-2.00	53.68	107.23	-53.55	155	27	peak
5895.840	56.18	-1.73	54.45	89.78	-35.33	155	27	peak
5945.520	55.52	-1.71	53.81	68.20	-14.39	155	27	peak
11490.000	45.33	8.87	54.20	74.00	-19.80	141	328	peak
11490.000	35.39	8.87	44.26	54.00	-9.74	141	328	AVG
17235.000	43.81	13.63	57.44	68.20	-10.76	137	238	peak
AC20 Mode, Middle channel								
5630.520	55.29	-2.74	52.55	68.20	-15.65	163	16	peak
5653.560	56.01	-2.71	53.30	70.83	-17.53	163	16	peak
5706.120	55.37	-2.65	52.72	106.91	-54.19	163	16	peak
5721.960	55.09	-2.66	52.43	115.27	-62.84	163	16	peak
5785.000	103.16	-2.67	100.49	N/A	N/A	163	16	peak
5785.000	93.81	-2.67	91.14	N/A	N/A	163	16	AVG
5852.640	55.68	-2.15	53.53	116.18	-62.65	163	16	peak
5864.520	55.73	-2.04	53.69	108.13	-54.44	163	16	peak
5919.600	56.70	-1.66	55.04	72.20	-17.16	163	16	peak
5925.000	55.57	-1.67	53.90	68.20	-14.30	163	16	peak
11570.000	47.06	9.41	56.47	74.00	-17.53	140	175	peak
11570.000	36.06	9.41	45.47	54.00	-8.53	140	175	AVG
17355.000	42.55	13.67	56.22	68.20	-11.98	123	274	peak
AC20 Mode, High channel								
5628.720	55.05	-2.74	52.31	68.20	-15.89	120	238	peak
5679.480	55.38	-2.67	52.71	90.02	-37.31	120	238	peak
5706.120	55.31	-2.65	52.66	106.91	-54.25	120	238	peak
5721.240	54.59	-2.66	51.93	113.63	-61.70	120	238	peak
5825.000	109.11	-2.42	106.69	N/A	N/A	120	238	peak
5825.000	99.12	-2.42	96.70	N/A	N/A	120	238	AVG
5850.480	76.26	-2.17	74.09	121.11	-47.02	120	238	peak
5856.600	70.77	-2.11	68.66	110.35	-41.69	120	238	peak
5875.320	58.46	-1.93	56.53	104.96	-48.43	120	238	peak
5929.320	56.28	-1.67	54.61	68.20	-13.59	120	238	peak
11650.000	46.40	9.34	55.74	74.00	-18.26	150	1	peak
11650.000	34.52	9.34	43.86	54.00	-10.14	150	1	AVG
17475.000	42.47	13.14	55.61	68.20	-12.59	150	300	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								
5629.440	56.25	-2.74	53.51	68.20	-14.69	190	268	peak
5699.640	59.74	-2.64	57.10	104.93	-47.83	190	268	peak
5719.800	84.44	-2.67	81.77	110.74	-28.97	190	268	peak
5723.760	89.73	-2.67	87.06	119.37	-32.31	190	268	peak
5745.000	113.48	-2.70	110.78	N/A	N/A	190	268	peak
5745.000	103.33	-2.70	100.63	N/A	N/A	190	268	AVG
5850.840	55.25	-2.16	53.09	120.28	-67.19	190	268	peak
5859.840	56.84	-2.08	54.76	109.44	-54.68	190	268	peak
5882.880	56.52	-1.86	54.66	99.37	-44.71	190	268	peak
5933.640	55.19	-1.68	53.51	68.20	-14.69	190	268	peak
11490.000	52.32	8.87	61.19	74.00	-12.81	135	314	peak
11490.000	42.35	8.87	51.22	54.00	-2.78	135	314	AVG
17235.000	43.15	13.63	56.78	68.20	-11.42	146	73	peak
AC20 Mode, Middle channel								
5640.600	55.61	-2.72	52.89	68.20	-15.31	196	266	peak
5694.600	56.56	-2.65	53.91	101.20	-47.29	196	266	peak
5719.080	56.97	-2.67	54.30	110.54	-56.24	196	266	peak
5723.760	55.72	-2.67	53.05	119.37	-66.32	196	266	peak
5785.000	113.49	-2.67	110.82	N/A	N/A	196	266	peak
5785.000	103.69	-2.67	101.02	N/A	N/A	196	266	AVG
5854.080	55.97	-2.14	53.83	112.90	-59.07	196	266	peak
5855.880	57.22	-2.12	55.10	110.55	-55.45	196	266	peak
5889.000	57.10	-1.81	55.29	94.84	-39.55	196	266	peak
5931.480	56.02	-1.67	54.35	68.20	-13.85	196	266	peak
11570.000	51.88	9.41	61.29	74.00	-12.71	131	313	peak
11570.000	42.55	9.41	51.96	54.00	-2.04	131	313	AVG
17355.000	43.67	13.67	57.34	68.20	-10.86	154	184	peak
AC20 Mode, High channel								
5621.160	55.07	-2.75	52.32	68.20	-15.88	194	258	peak
5676.600	55.85	-2.67	53.18	87.88	-34.70	194	258	peak
5712.600	55.56	-2.66	52.90	108.73	-55.83	194	258	peak
5723.040	55.60	-2.67	52.93	117.73	-64.80	194	258	peak
5825.000	113.45	-2.42	111.03	N/A	N/A	194	258	peak
5825.000	103.17	-2.42	100.75	N/A	N/A	194	258	AVG
5853.000	80.19	-2.15	78.04	115.36	-37.32	194	258	peak
5855.880	76.00	-2.12	73.88	110.55	-36.67	194	258	peak
5878.560	60.18	-1.90	58.28	102.57	-44.29	194	258	peak
5925.000	56.91	-1.67	55.24	68.20	-12.96	194	258	peak
11650.000	51.91	9.34	61.25	74.00	-12.75	141	321	peak
11650.000	39.91	9.34	49.25	54.00	-4.75	141	321	AVG
17475.000	43.92	13.14	57.06	68.20	-11.14	150	189	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)	(°)	
AC40 Mode, Low channel								
5637.720	56.41	-2.72	53.69	68.20	-14.51	125	239	peak
5699.280	67.92	-2.64	65.28	104.67	-39.39	125	239	peak
5717.640	83.13	-2.67	80.46	110.14	-29.68	125	239	peak
5723.040	84.88	-2.67	82.21	117.73	-35.52	125	239	peak
5755.000	106.44	-2.69	103.75	N/A	N/A	125	239	peak
5755.000	96.24	-2.69	93.55	N/A	N/A	125	239	AVG
5851.200	56.05	-2.16	53.89	119.46	-65.57	125	239	peak
5862.360	57.01	-2.06	54.95	108.74	-53.79	125	239	peak
5879.640	56.58	-1.89	54.69	101.77	-47.08	125	239	peak
5927.520	56.52	-1.66	54.86	68.20	-13.34	125	239	peak
11510.000	45.03	9.01	54.04	74.00	-19.96	147	332	peak
11510.000	34.24	9.01	43.25	54.00	-10.75	147	332	AVG
17265.000	44.75	13.67	58.42	68.20	-9.78	145	16	peak
AC40 Mode, High channel								
5640.600	55.41	-2.72	52.69	68.20	-15.51	127	240	peak
5687.400	56.72	-2.66	54.06	95.88	-41.82	127	240	peak
5717.280	61.82	-2.66	59.16	110.04	-50.88	127	240	peak
5722.680	63.64	-2.67	60.97	116.91	-55.94	127	240	peak
5795.000	107.09	-2.66	104.43	N/A	N/A	127	240	peak
5795.000	97.01	-2.66	94.35	N/A	N/A	127	240	AVG
5850.480	70.13	-2.17	67.96	121.11	-53.15	127	240	peak
5855.880	67.19	-2.12	65.07	110.55	-45.48	127	240	peak
5875.320	62.48	-1.93	60.55	104.96	-44.41	127	240	peak
5946.960	55.82	-1.72	54.10	68.20	-14.10	127	240	peak
11590.000	42.28	9.55	51.83	74.00	-22.17	137	320	peak
11590.000	31.18	9.55	40.73	54.00	-13.27	137	320	AVG
17385.000	43.34	13.63	56.97	68.20	-11.23	150	211	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								
5637.720	57.16	-2.72	54.44	68.20	-13.76	144	348	peak
5695.320	74.82	-2.64	72.18	101.74	-29.56	144	348	peak
5715.840	89.03	-2.66	86.37	109.64	-23.27	144	348	peak
5724.120	90.70	-2.67	88.03	120.19	-32.16	144	348	peak
5755.000	110.26	-2.69	107.57	N/A	N/A	144	348	peak
5755.000	100.30	-2.69	97.61	N/A	N/A	144	348	AVG
5854.440	61.33	-2.13	59.20	112.08	-52.88	144	348	peak
5873.160	58.52	-1.95	56.57	105.72	-49.15	144	348	peak
5878.920	58.06	-1.90	56.16	102.30	-46.14	144	348	peak
5946.960	56.40	-1.72	54.68	68.20	-13.52	144	348	peak
11510.000	48.32	9.01	57.33	74.00	-16.67	124	311	peak
11510.000	38.36	9.01	47.37	54.00	-6.63	124	311	AVG
17265.000	44.26	13.67	57.93	68.20	-10.27	139	244	peak
AC40 Mode, High channel								
5620.080	55.21	-2.75	52.46	68.20	-15.74	160	261	peak
5697.840	57.67	-2.64	55.03	103.60	-48.57	160	261	peak
5718.360	67.72	-2.67	65.05	110.34	-45.29	160	261	peak
5724.120	67.95	-2.67	65.28	120.19	-54.91	160	261	peak
5795.000	110.51	-2.66	107.85	N/A	N/A	160	261	peak
5795.000	100.53	-2.66	97.87	N/A	N/A	160	261	AVG
5853.720	76.04	-2.14	73.90	113.72	-39.82	160	261	peak
5857.320	72.84	-2.11	70.73	110.15	-39.42	160	261	peak
5886.840	64.21	-1.82	62.39	96.44	-34.05	160	261	peak
5931.840	58.04	-1.68	56.36	68.20	-11.84	160	261	peak
11590.000	49.62	9.55	59.17	74.00	-14.83	118	318	peak
11590.000	40.85	9.55	50.40	54.00	-3.60	118	318	AVG
17385.000	43.95	13.63	57.58	68.20	-10.62	136	330	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								
5644.920	65.77	-2.72	63.05	68.20	-5.15	117	237	peak
5698.560	78.99	-2.64	76.35	104.13	-27.78	117	237	peak
5719.800	84.71	-2.67	82.04	110.74	-28.70	117	237	peak
5723.760	84.75	-2.67	82.08	119.37	-37.29	117	237	peak
5775.000	104.01	-2.68	101.33	N/A	N/A	117	237	peak
5775.000	93.24	-2.68	90.56	N/A	N/A	117	237	AVG
5851.200	80.60	-2.16	78.44	119.46	-41.02	117	237	peak
5861.280	79.82	-2.07	77.75	109.04	-31.29	117	237	peak
5875.680	74.81	-1.93	72.88	104.70	-31.82	117	237	peak
5927.880	63.51	-1.67	61.84	68.20	-6.36	117	237	peak
11550.000	44.38	9.28	53.66	74.00	-20.34	127	333	peak
11550.000	34.22	9.28	43.50	54.00	-10.50	127	333	AVG
17325.000	42.36	13.71	56.07	68.20	-12.13	135	300	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								
5647.440	69.21	-2.71	66.50	68.20	-1.70	144	347	peak
5699.280	84.11	-2.64	81.47	104.67	-23.20	144	347	peak
5716.560	90.76	-2.66	88.10	109.84	-21.74	144	347	peak
5724.120	90.54	-2.67	87.87	120.19	-32.32	144	347	peak
5775.000	108.24	-2.68	105.56	N/A	N/A	144	347	peak
5775.000	97.63	-2.68	94.95	N/A	N/A	144	347	AVG
5850.120	88.23	-2.17	86.06	121.93	-35.87	144	347	peak
5863.080	84.49	-2.05	82.44	108.54	-26.10	144	347	peak
5880.720	80.31	-1.88	78.43	100.97	-22.54	144	347	peak
5930.400	68.31	-1.68	66.63	68.20	-1.57	144	347	peak
11550.000	47.13	9.28	56.41	74.00	-17.59	122	311	peak
11550.000	36.36	9.28	45.64	54.00	-8.36	122	311	AVG
17325.000	43.27	13.71	56.98	68.20	-11.22	131	330	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)	
				Chain 0	Chain 1	Chain 0	Chain 1
UNII-1	802.11a	36	5180	20.08	20.24	16.58	16.58
		40	5200	20.04	20.24	16.54	16.58
		48	5240	20.20	20.24	16.66	16.62
	802.11ac 20	36	5180	20.56	20.68	17.66	17.62
		40	5200	20.64	20.80	17.62	17.58
		48	5240	20.60	20.56	17.62	17.58
	802.11ac 40	38	5190	41.28	41.44	36.20	36.28
		46	5230	40.80	41.20	36.20	36.28
	802.11ac 80	42	5210	81.76	81.44	74.97	74.97

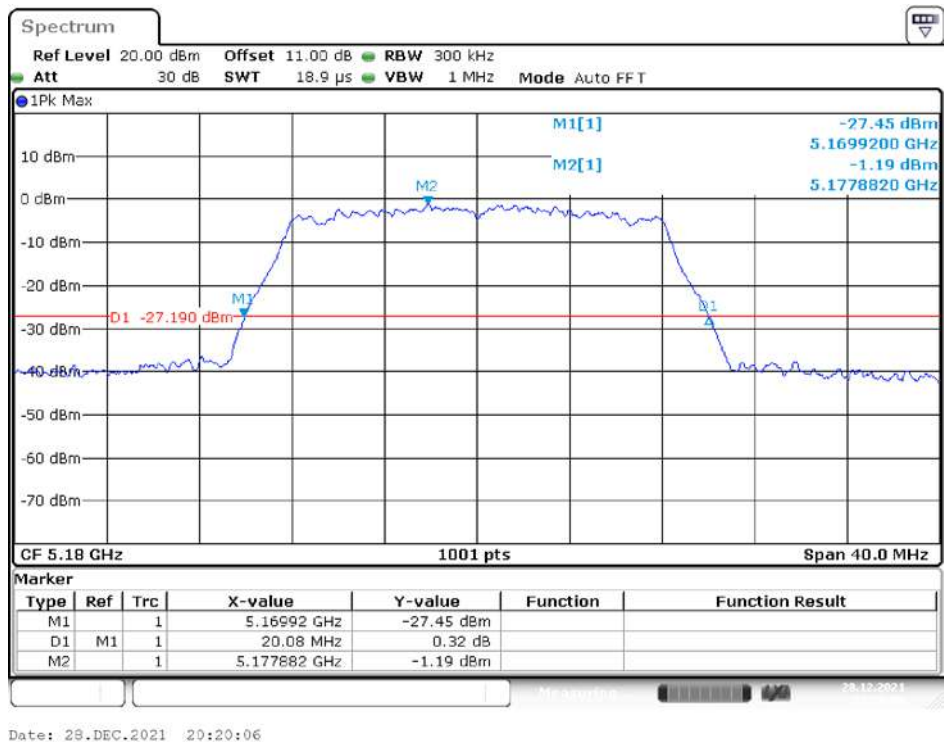
UNII Band	Mode	Channel	Frequency (MHz)	6dB Emission Bandwidth (MHz)		99% Emission Bandwidth (MHz)		Limit (kHz)	Result
				Chain0	Chain 1	Chain 0	Chain 1		
UNII-3 Band IV	802.11a	149	5745	16.32	16.32	16.50	16.58	≥500	PASS
		157	5785	16.32	16.32	16.70	16.58	≥500	PASS
		165	5825	16.32	16.36	16.62	16.66	≥500	PASS
	802.11ac20	149	5745	17.32	17.28	17.66	17.62	≥500	PASS
		157	5785	17.08	17.28	17.58	17.58	≥500	PASS
		165	5825	17.32	17.32	17.62	17.62	≥500	PASS
	802.11ac 40	151	5755	35.68	35.68	36.28	36.20	≥500	PASS
		159	5795	35.52	35.84	36.28	36.28	≥500	PASS
	802.11ac 80	155	5775	75.20	75.20	75.12	75.12	≥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.

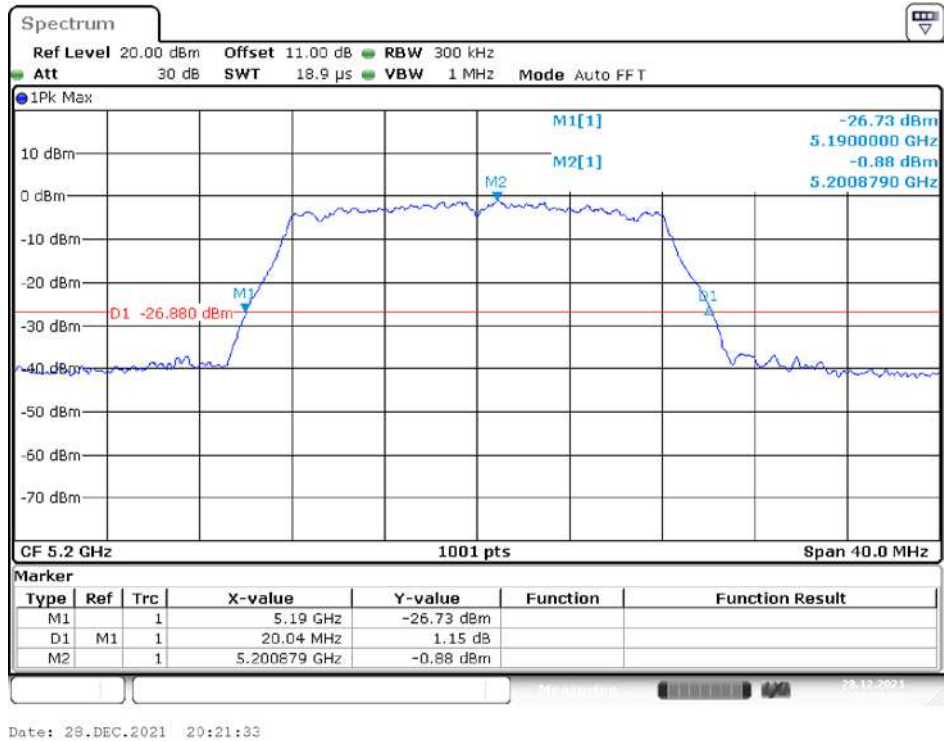
Please refer to the following plots

Transmitting Mode:

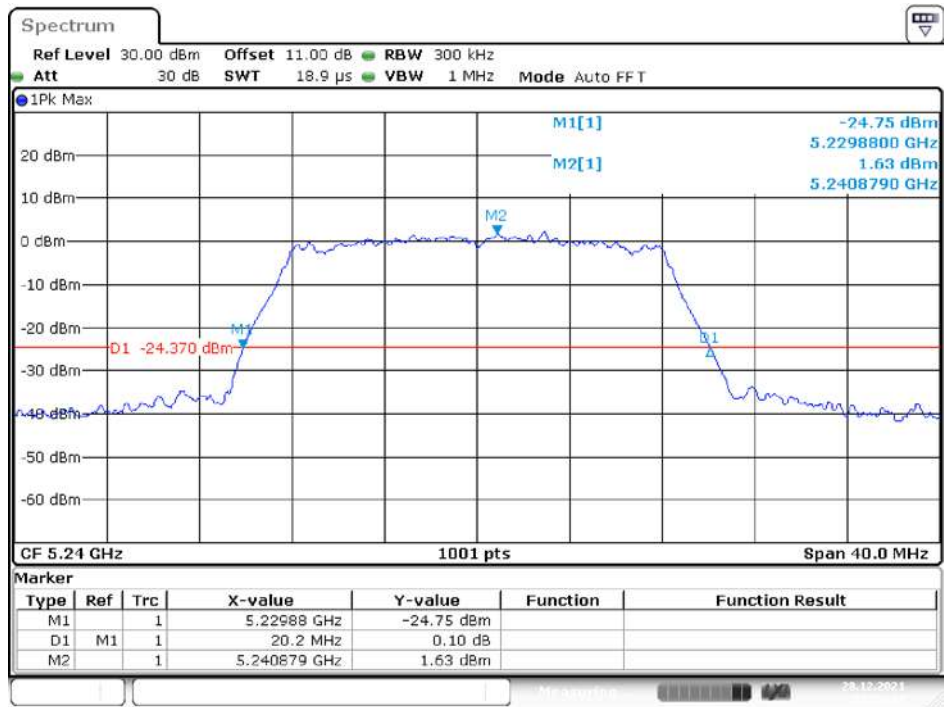
UNII-1 Band I / BW 26dBc
IEEE 802.11a Mode / 5150 ~ 5250MHz (chain 0)
5180MHz



5200MHz

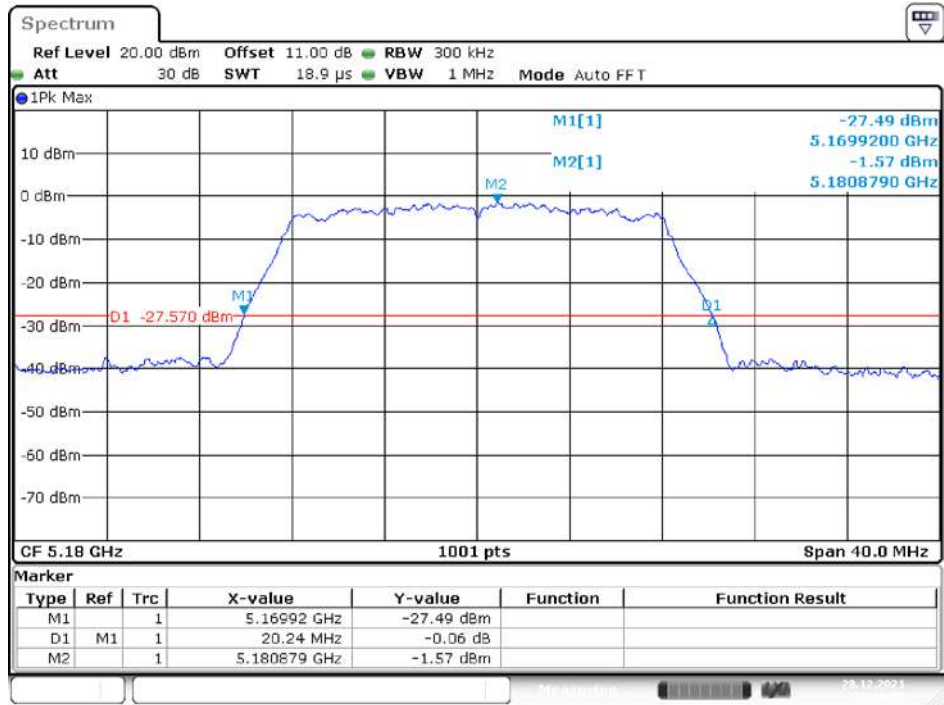


5240MHz

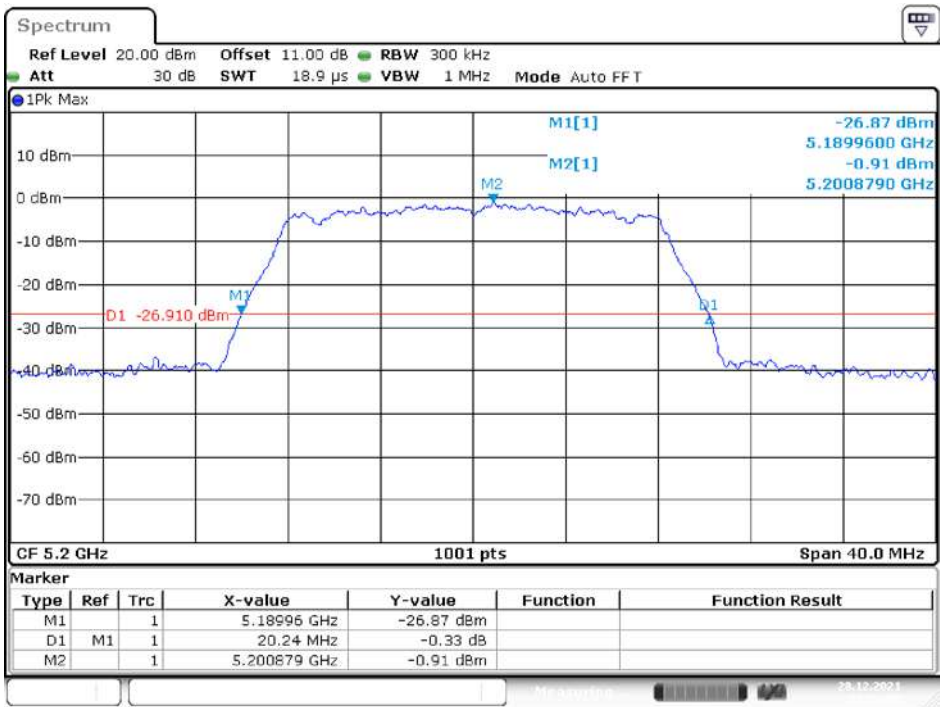


IEEE 802.11a Mode / 5150 ~ 5250MHz (chain 1)

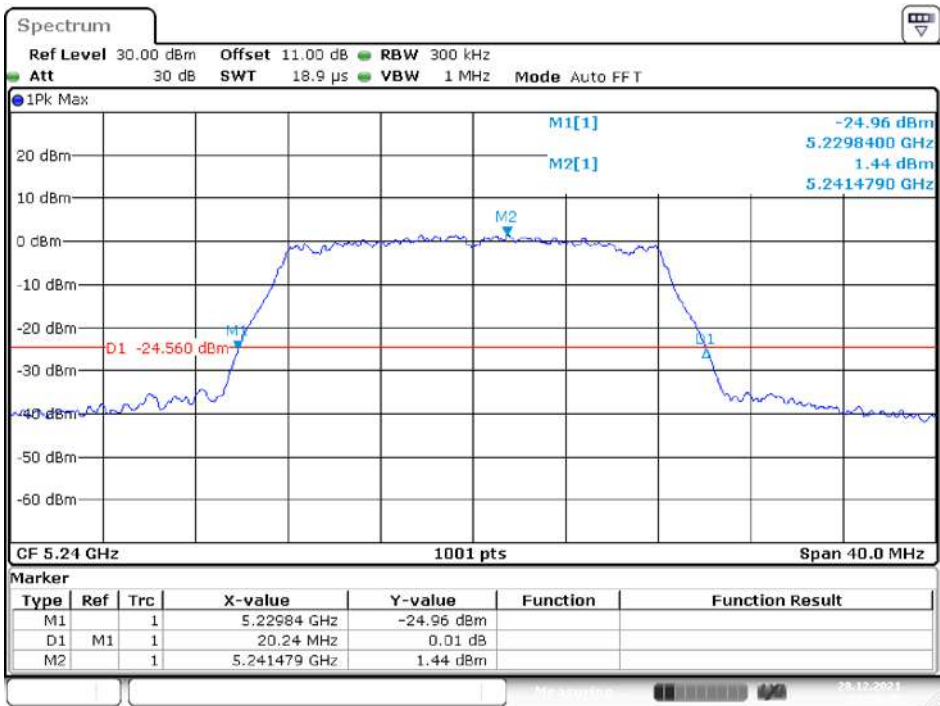
5180MHz



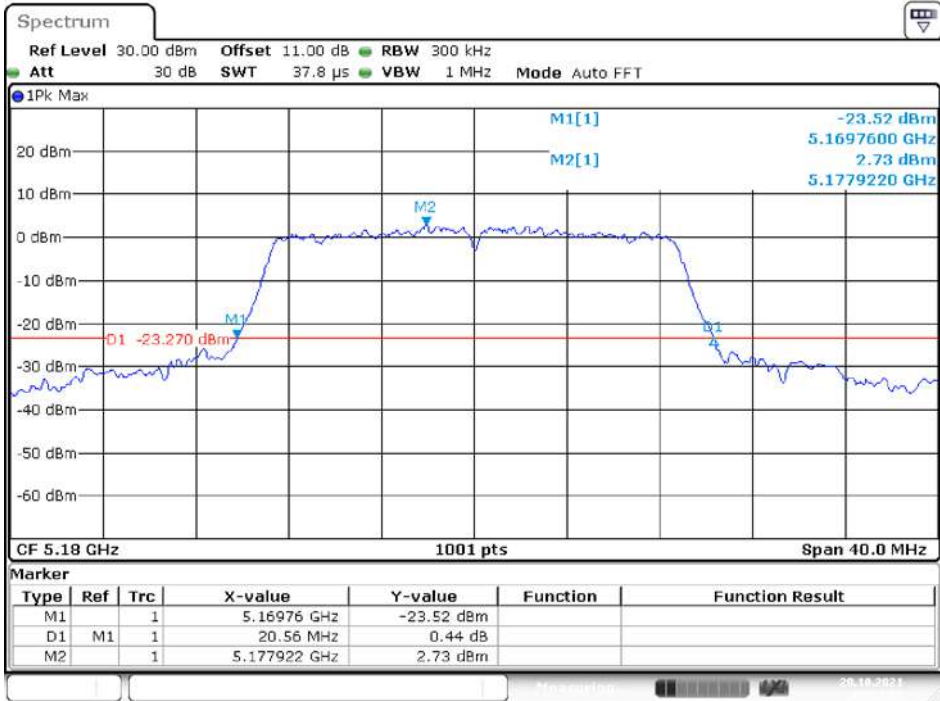
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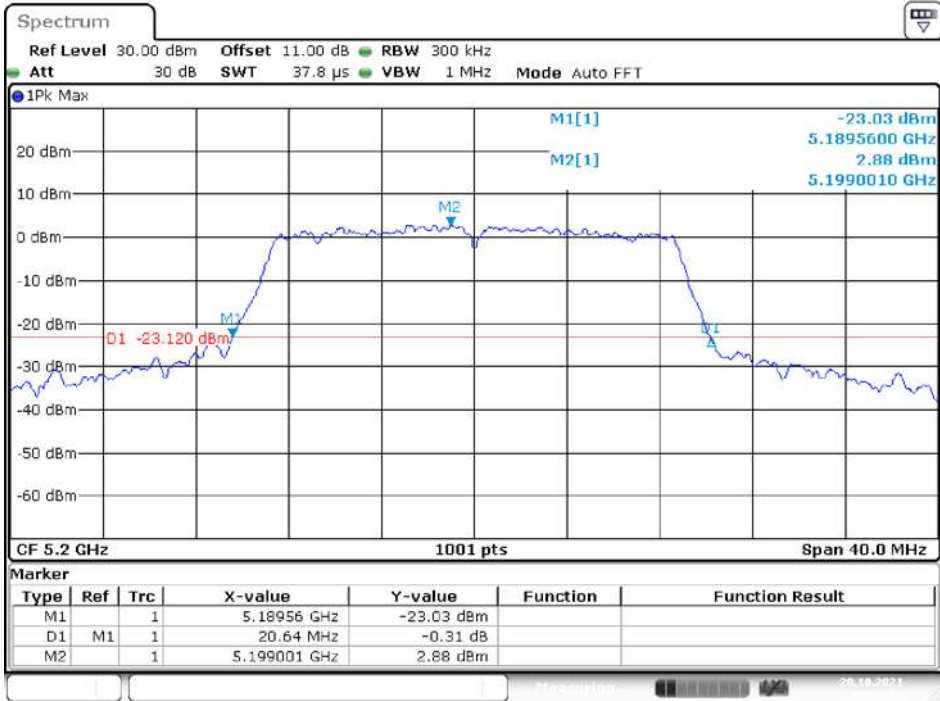
5240MHz



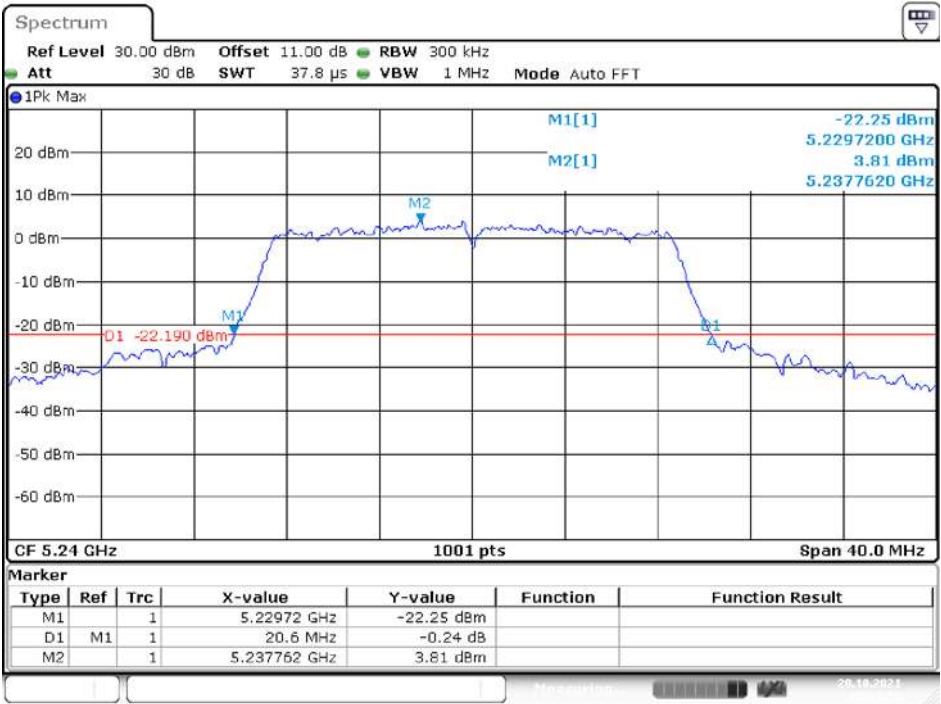
IEEE 802.11ac VHT20 Mode / 5150 ~ 5250MHz (chain 0)
5180MHz



5200MHz



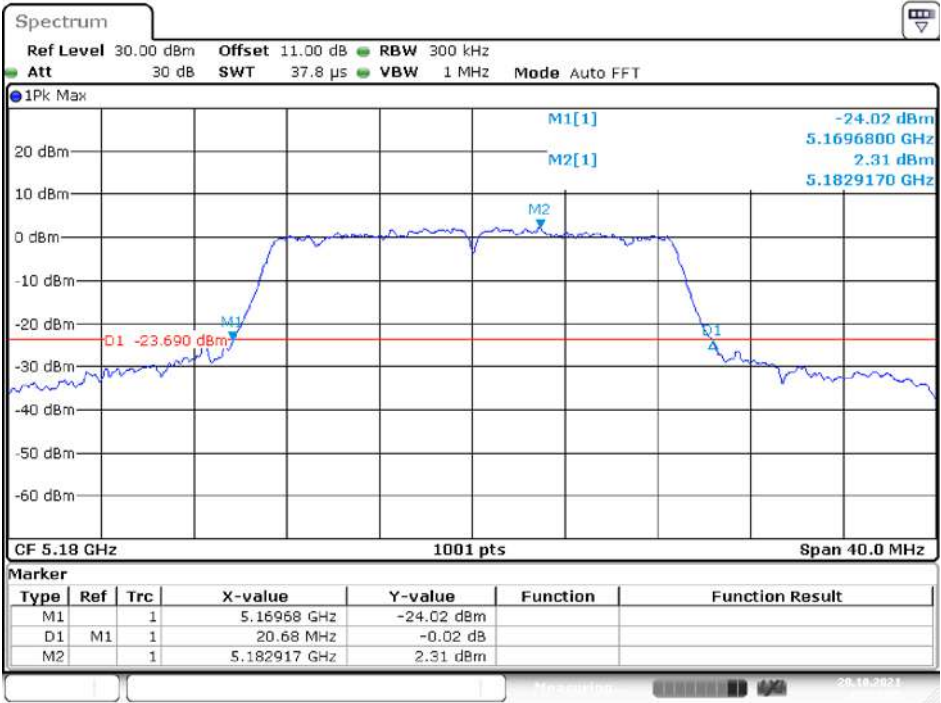
5240MHz



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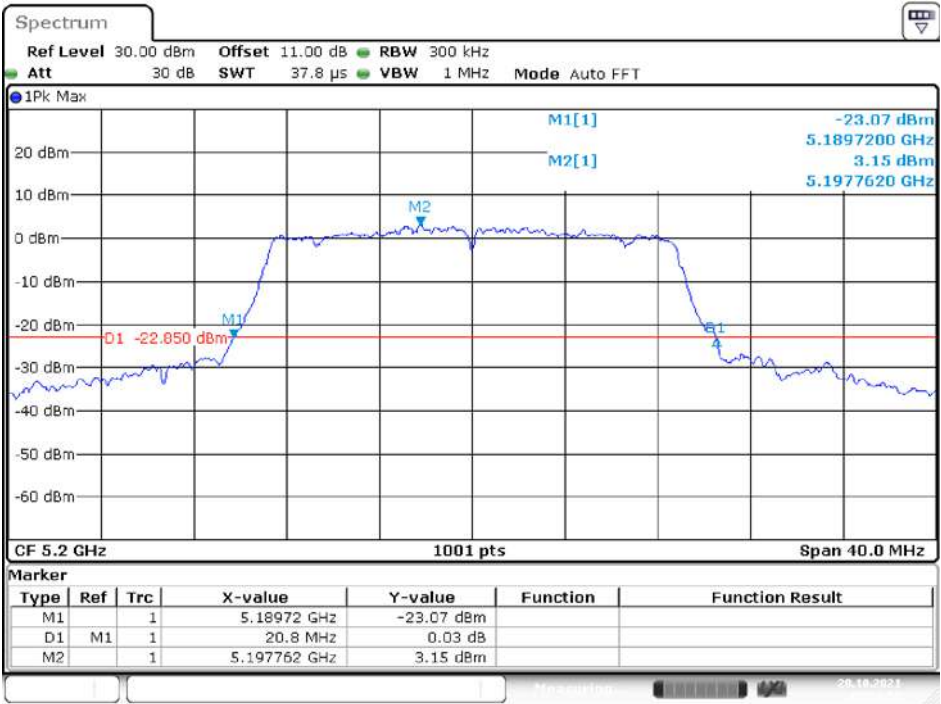
IEEE 802.11ac VHT20 Mode / 5150 ~ 5250MHz (chain 1)

5180MHz



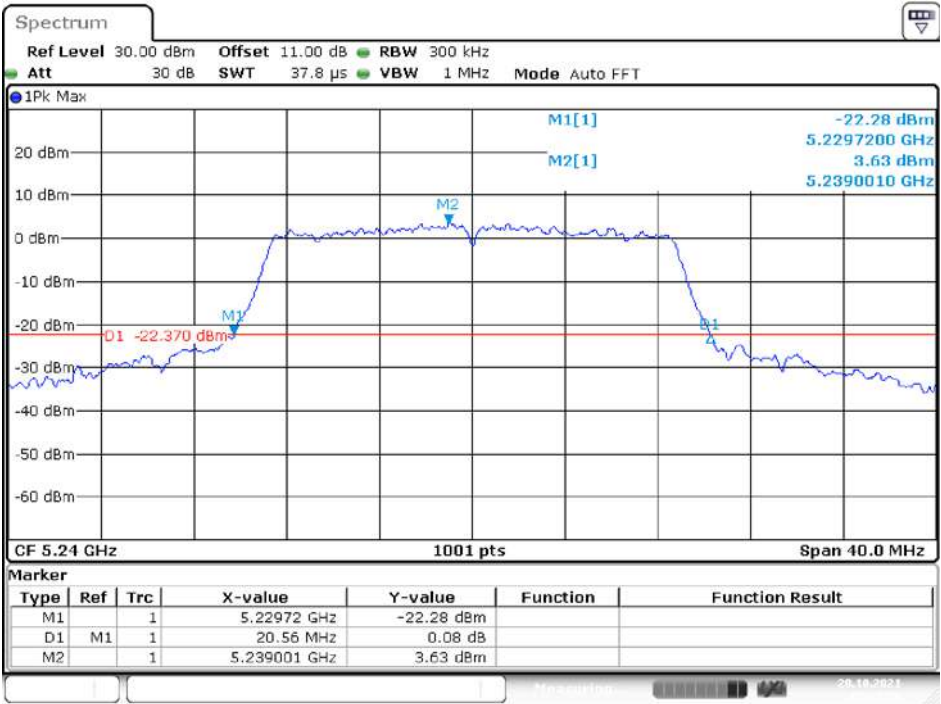
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5200MHz

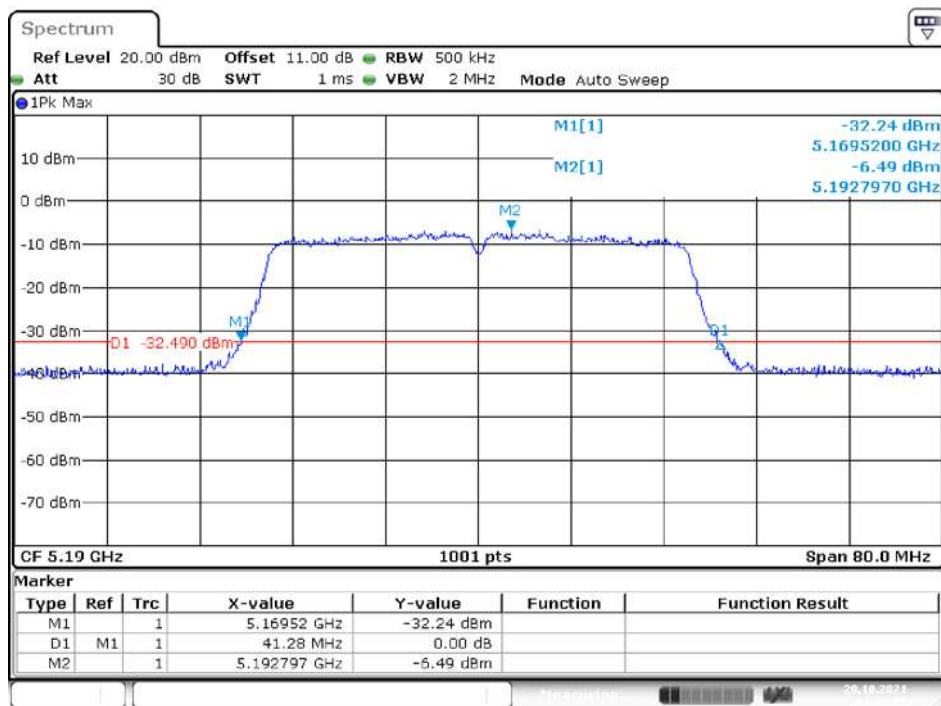
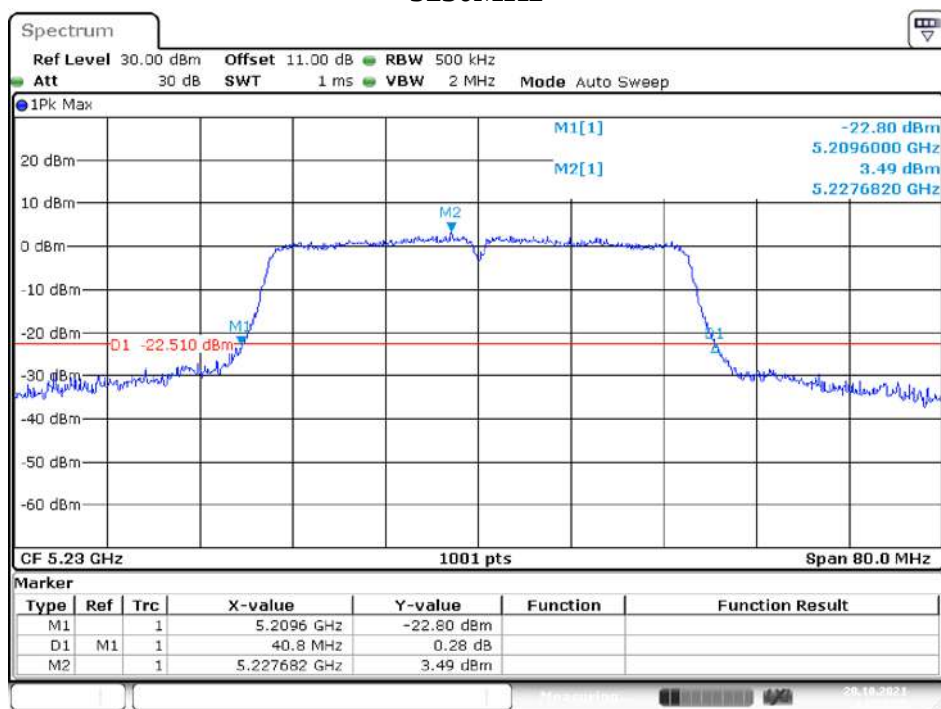


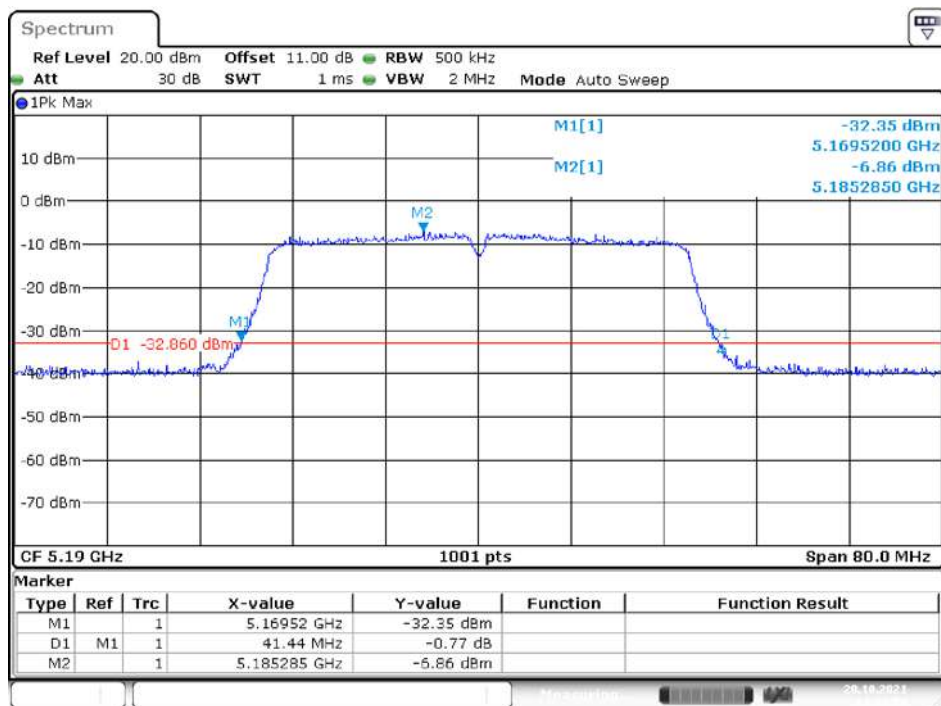
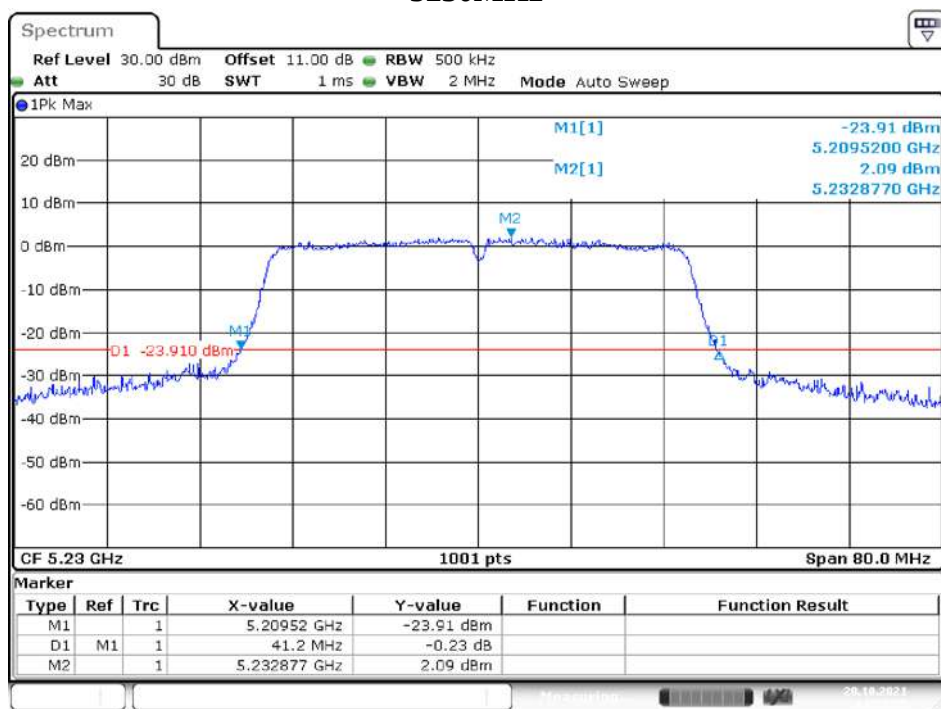
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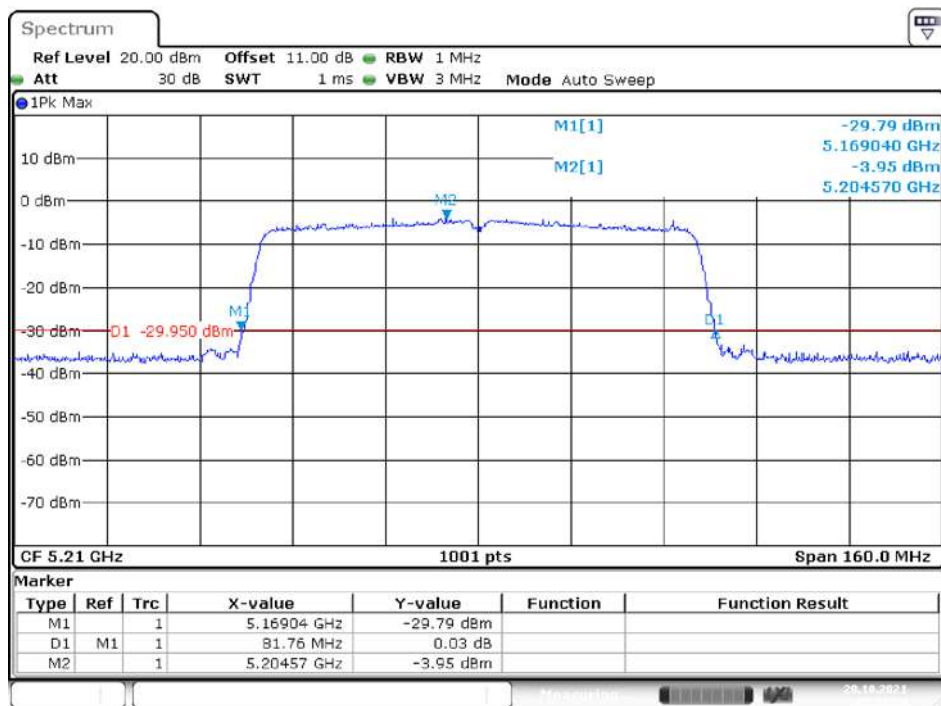
5240MHz



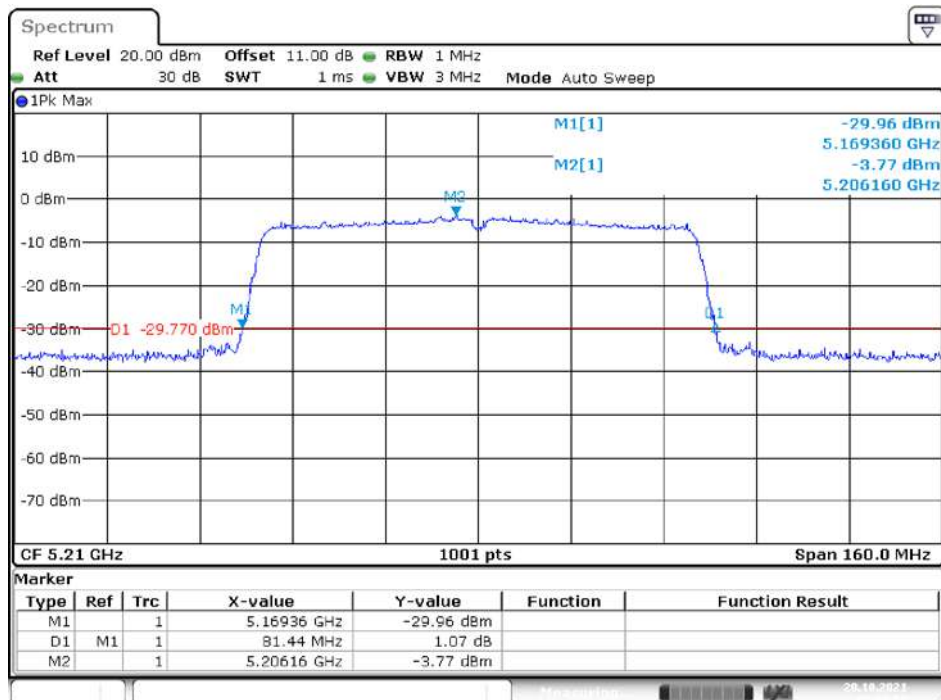
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IEEE 802.11ac VHT40 Mode / 5150 ~ 5250MHz (chain 0)
5190MHz**5230MHz**

IEEE 802.11ac VHT40 Mode / 5150 ~ 5250MHz (chain 1)
5190MHz**5230MHz**

IEEE 802.11ac VHT80 Mode / 5150 ~ 5250MHz (chain 0)
5210MHz

Date: 28.OCT.2021 12:53:35

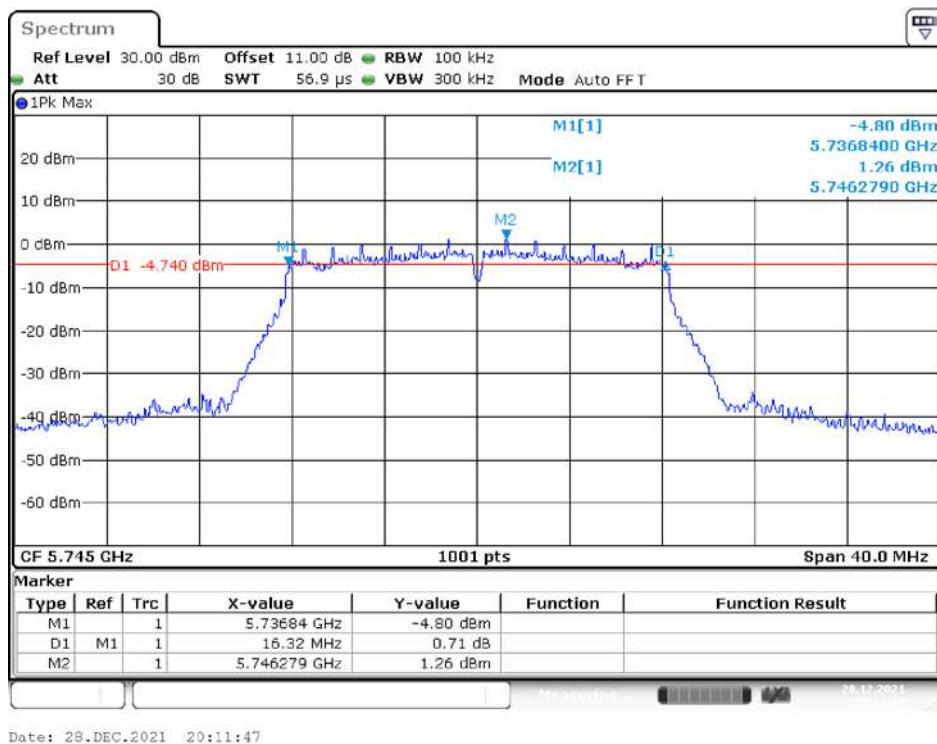
IEEE 802.11ac VHT80 Mode / 5150 ~ 5250MHz (chain 1)
5210MHz

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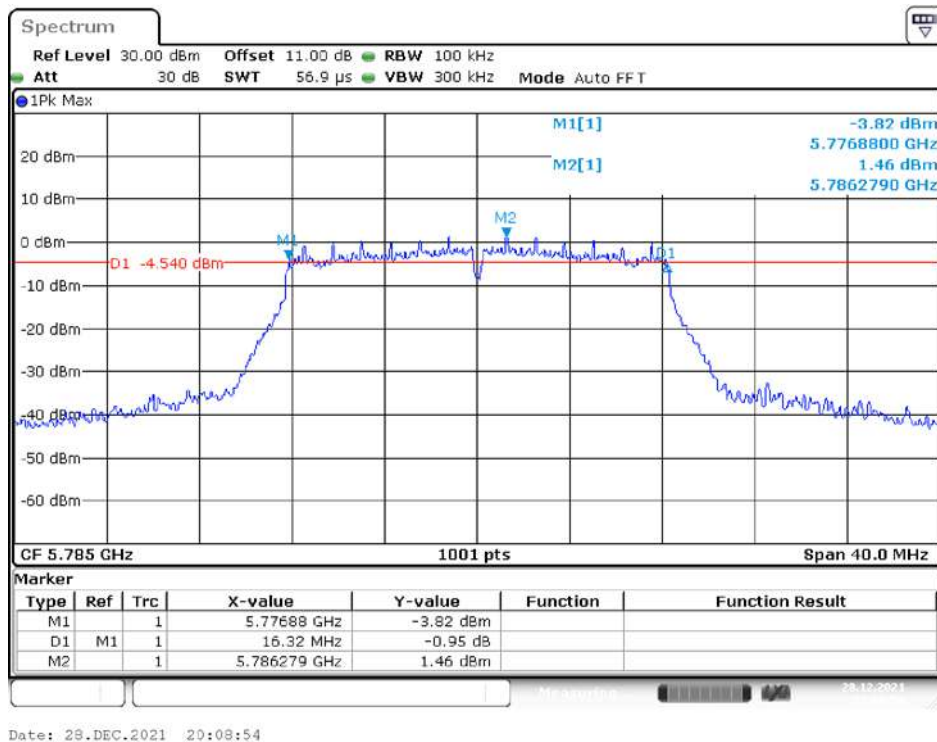
UNII-3 Band IV / BW 6dBc

IEEE 802.11a Mode / 5725 ~ 5850MHz (chain 0)

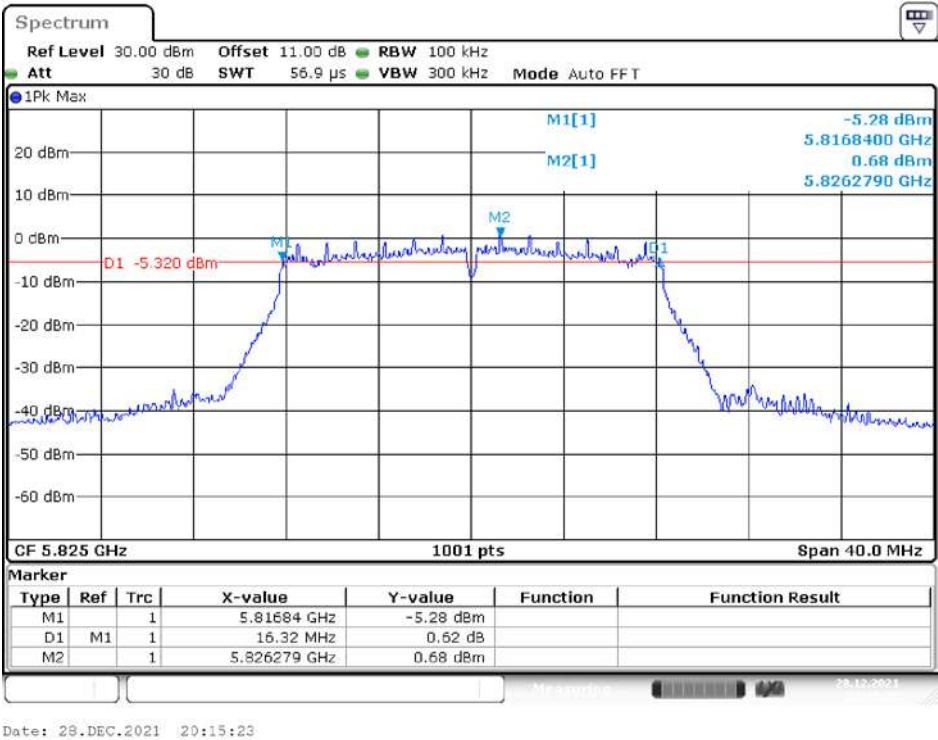
5745MHz



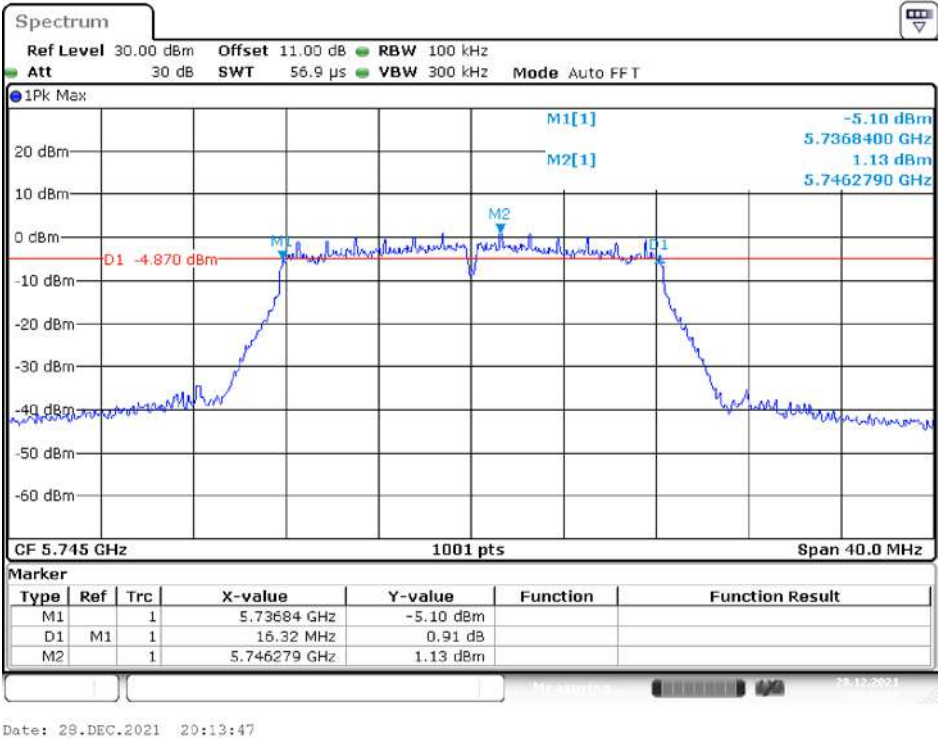
5785MHz



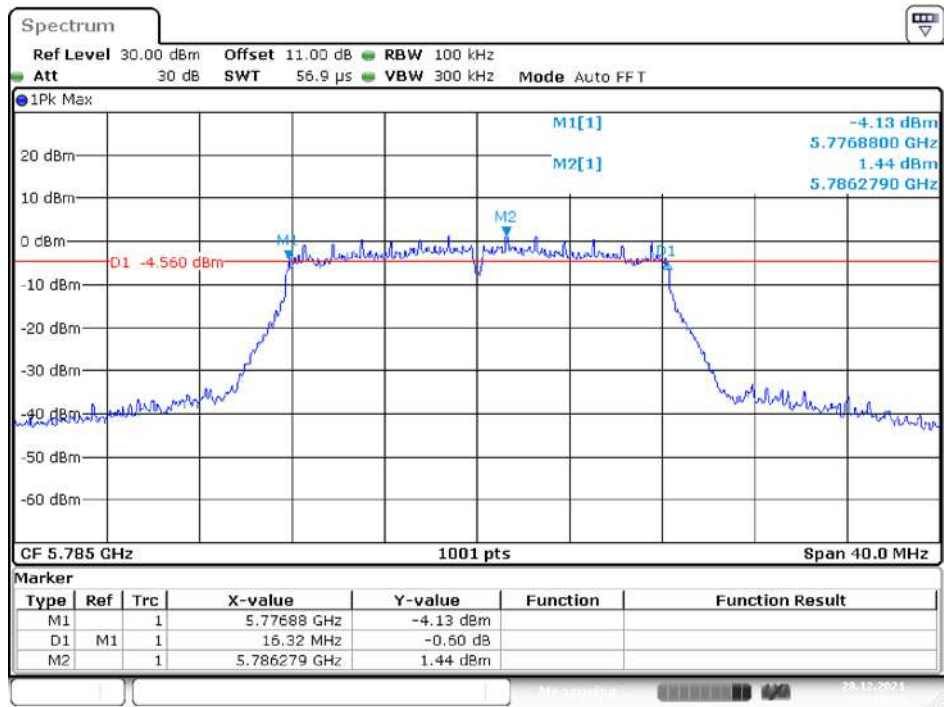
5825MHz



IEEE 802.11a Mode / 5725 ~ 5850MHz (chain 1)
5745MHz

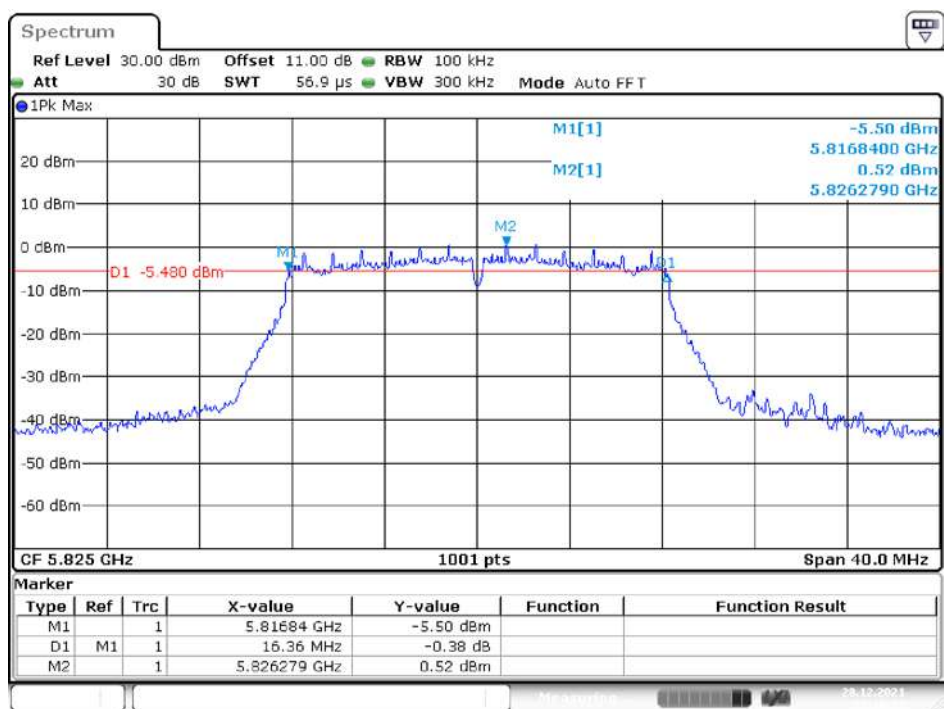


5785MHz



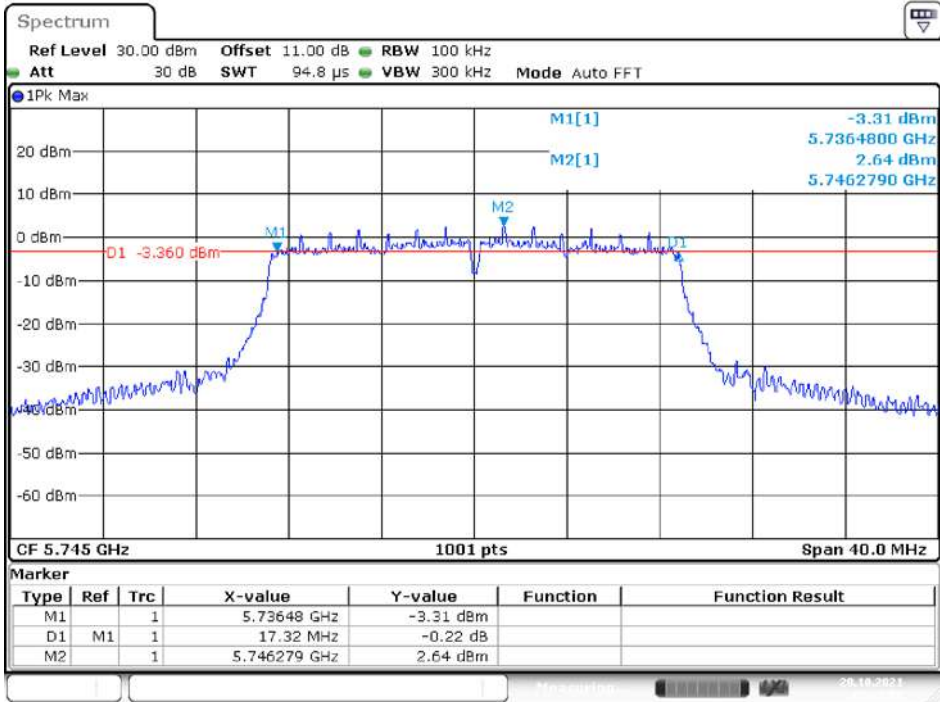
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5825MHz



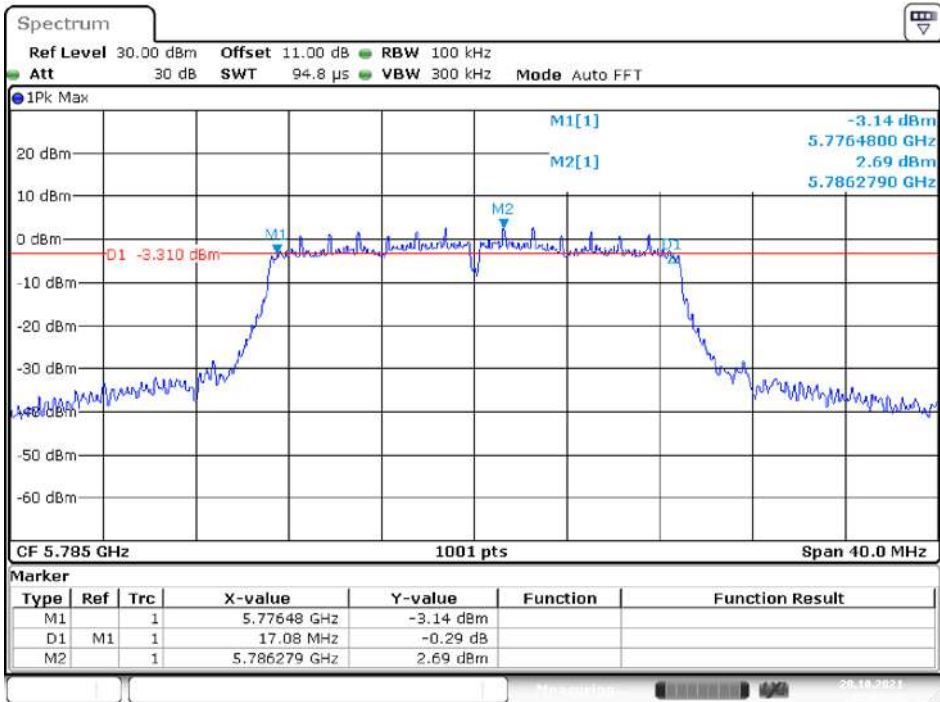
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IEEE 802.11ac VHT20 Mode / 5725 ~ 5850MHz (chain 0)
5745MHz



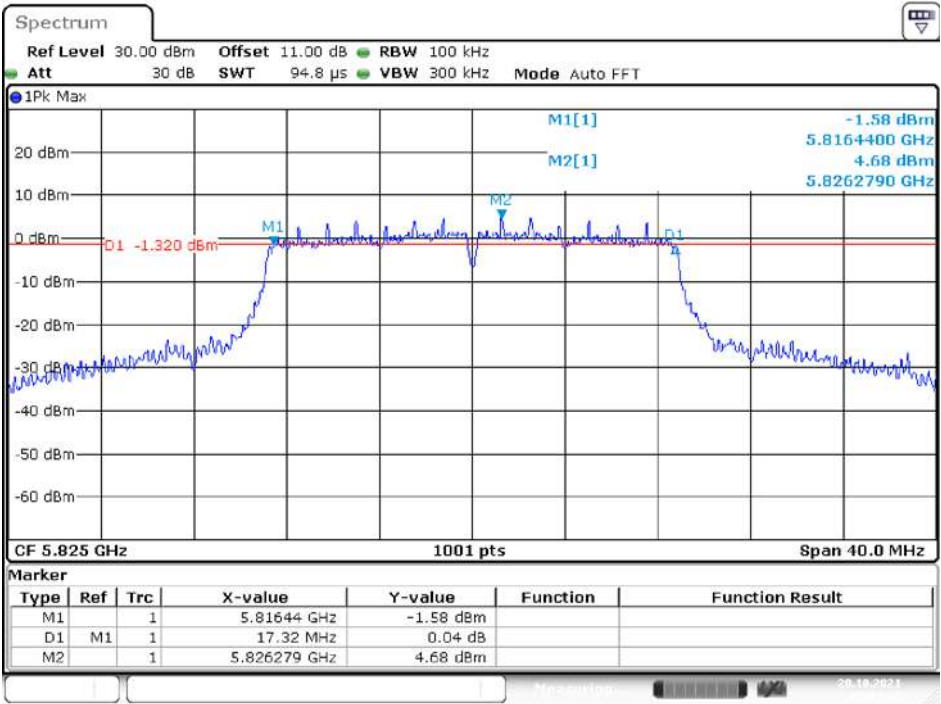
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5785MHz



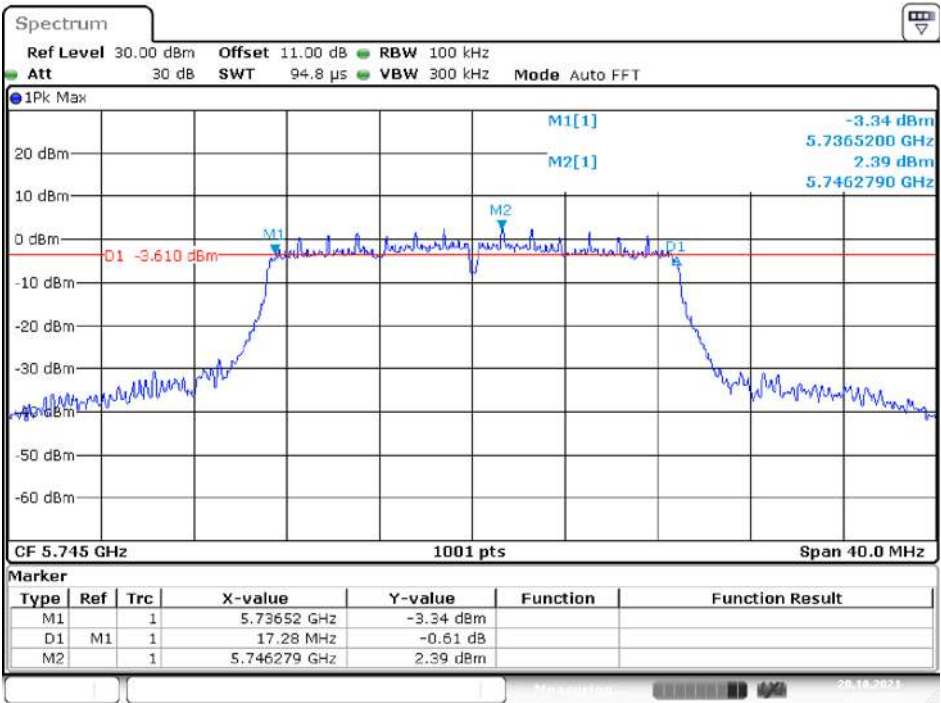
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5825MHz



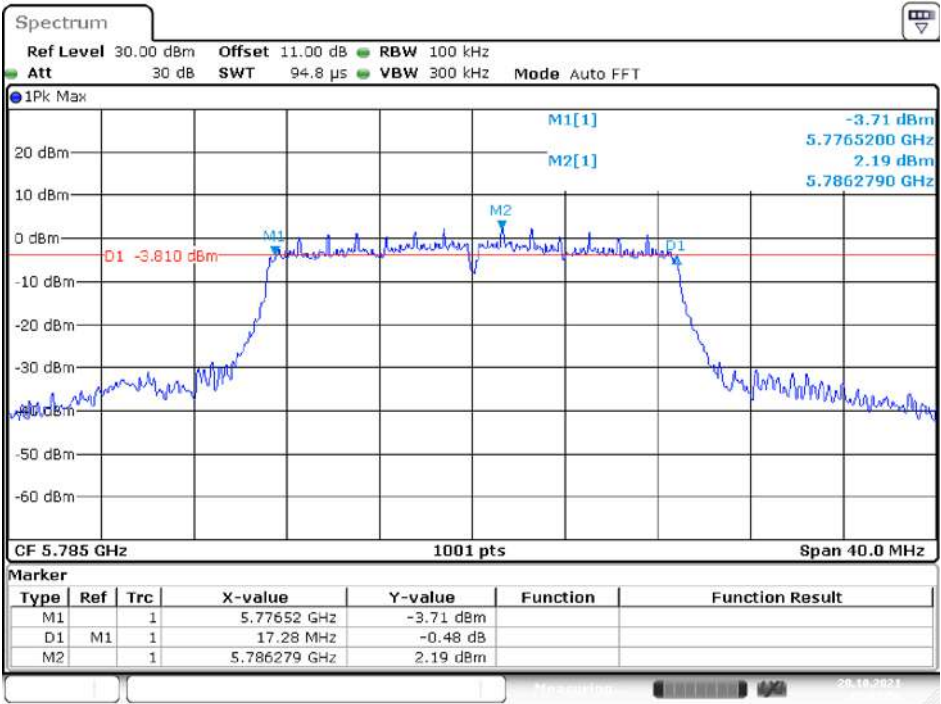
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IEEE 802.11ac VHT20 Mode / 5725 ~ 5850MHz (chain 1)
5745MHz



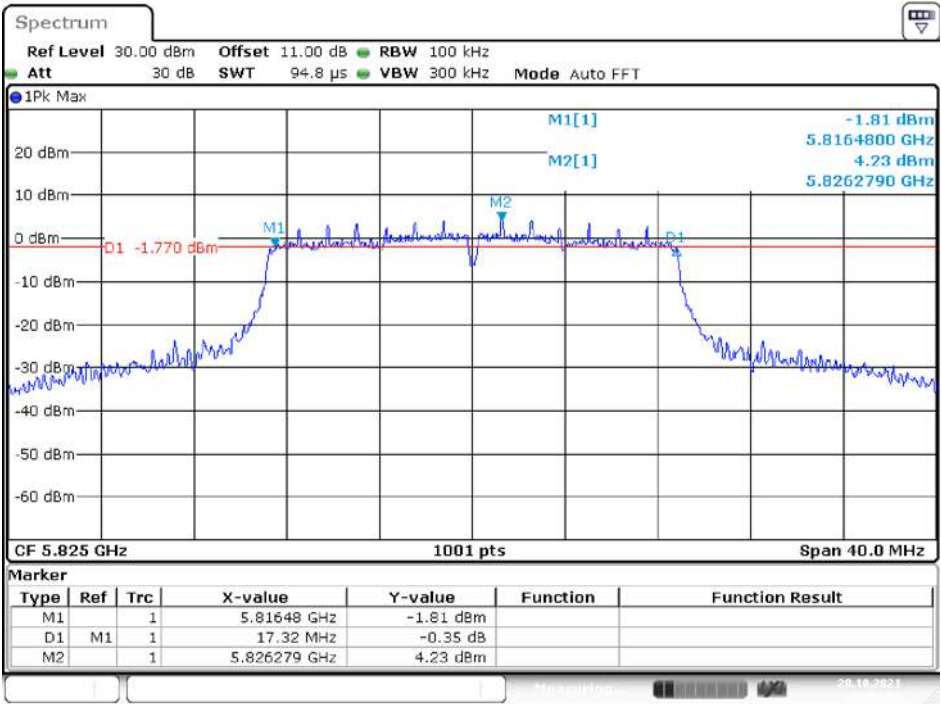
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5785MHz



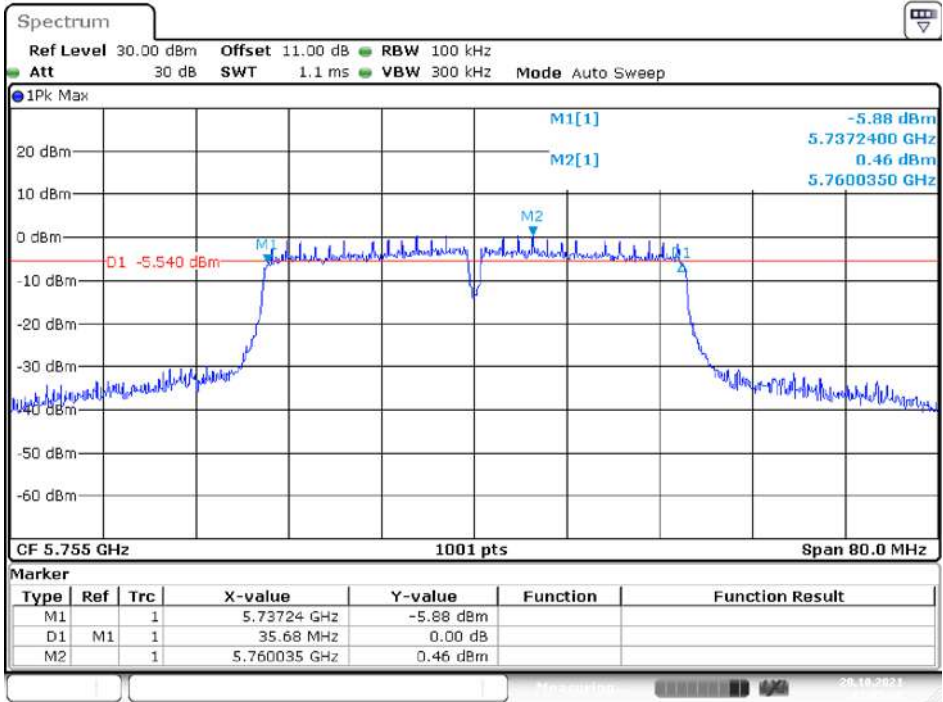
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5825MHz



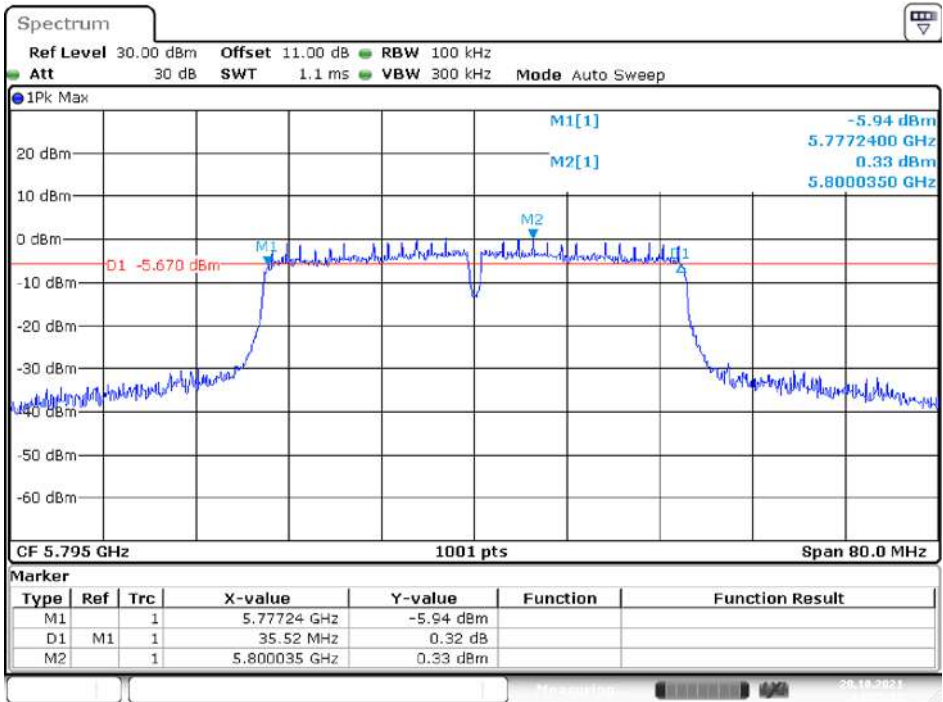
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IEEE 802.11ac VHT40 Mode / 5725 ~ 5850MHz (chain 0)
5755MHz

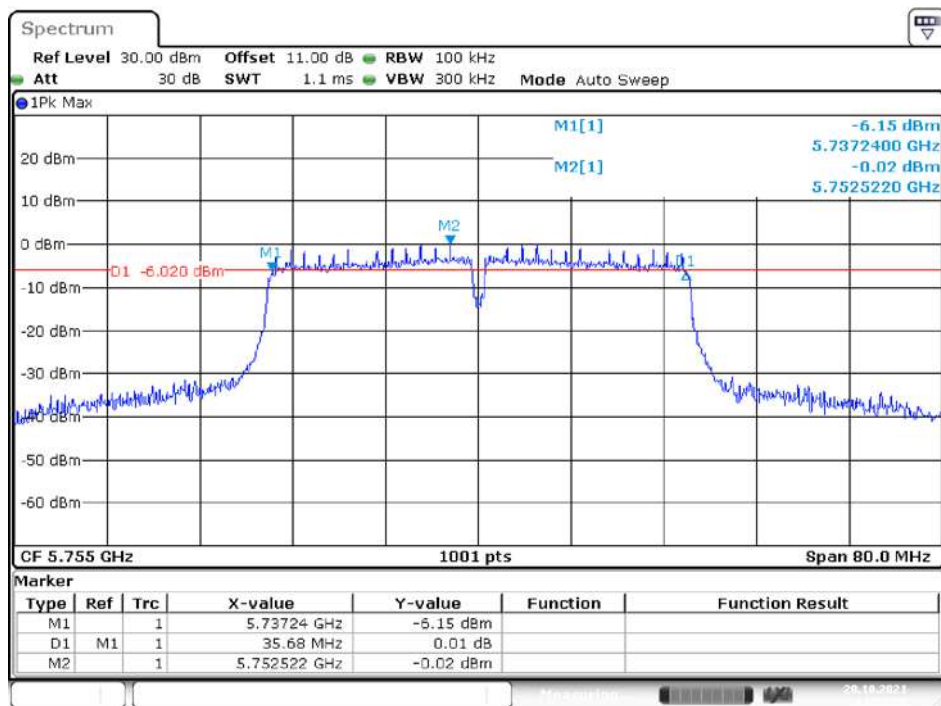
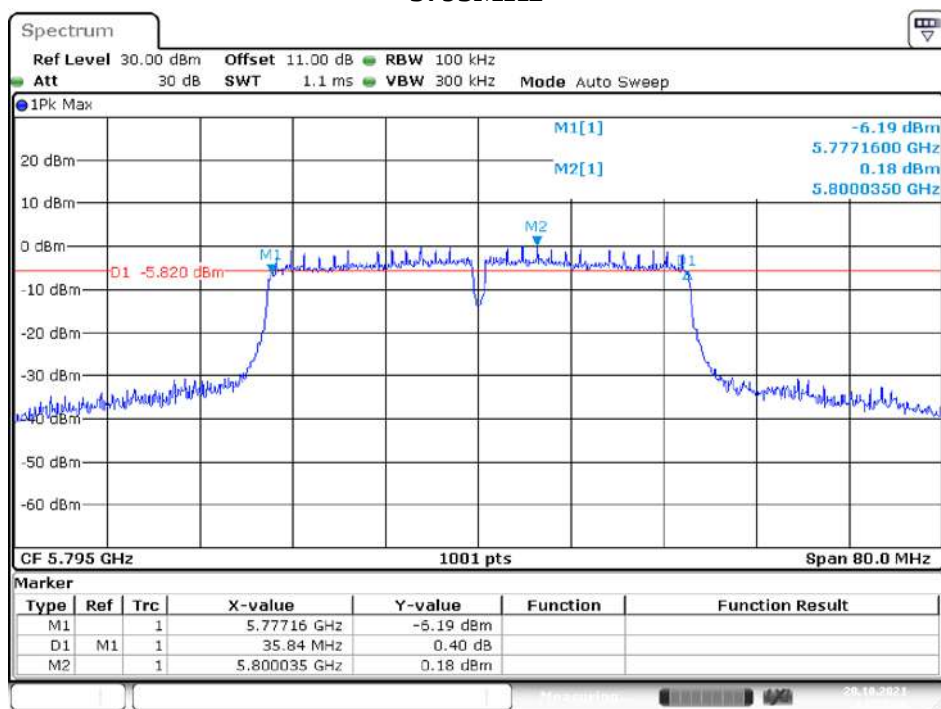


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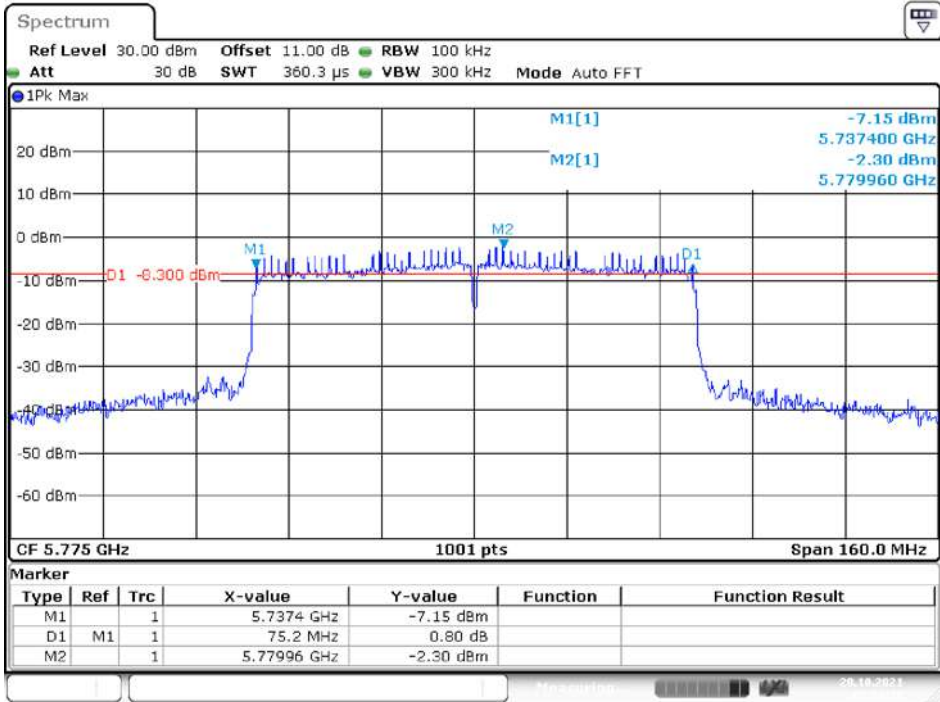
5795MHz



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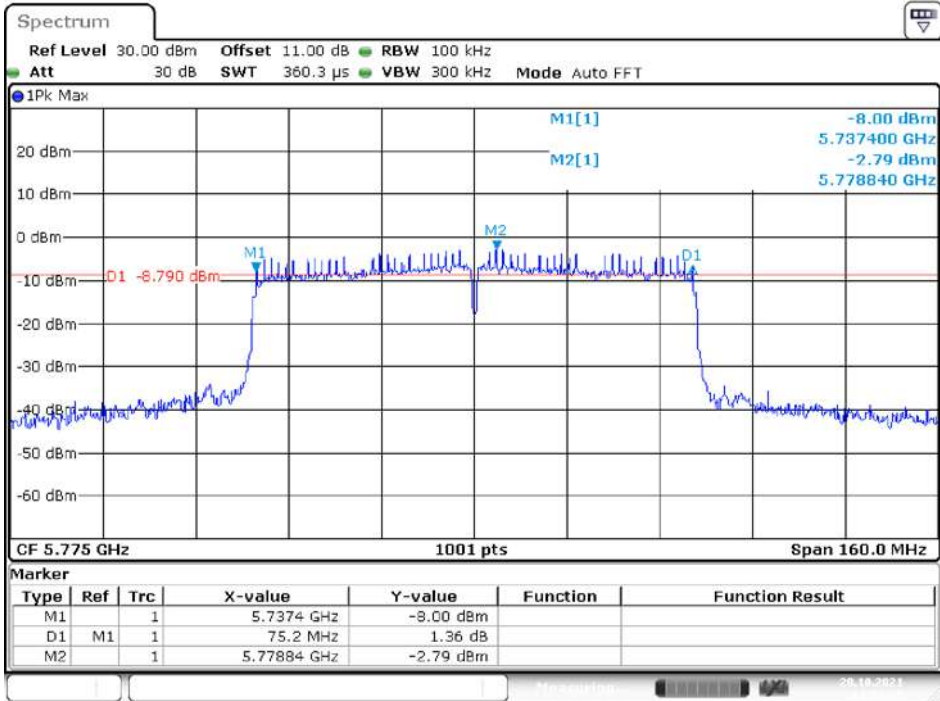
IEEE 802.11ac VHT40 Mode / 5725 ~ 5850MHz (chain 1)
5755MHz**5795MHz**

IEEE 802.11ac VHT80 Mode / 5725 ~ 5850MHz (chain 0)
5775MHz

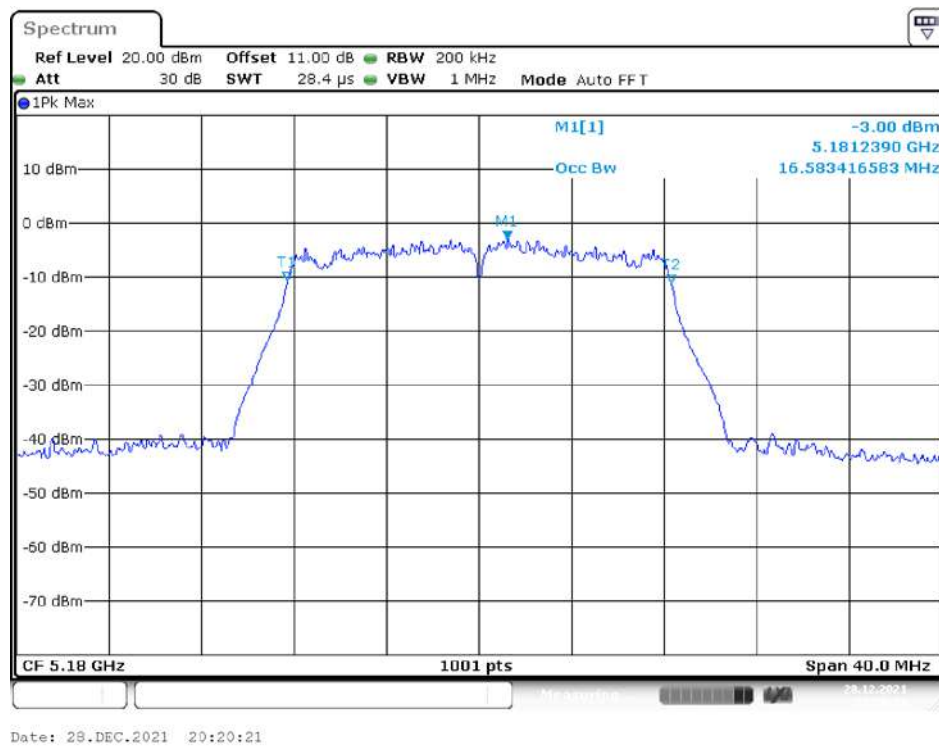
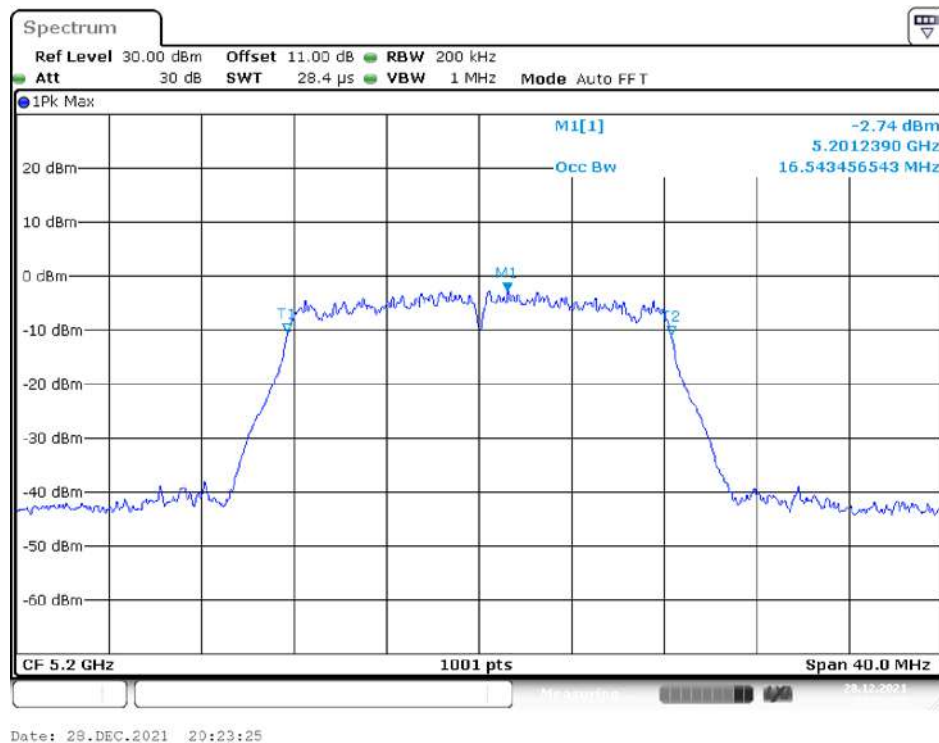


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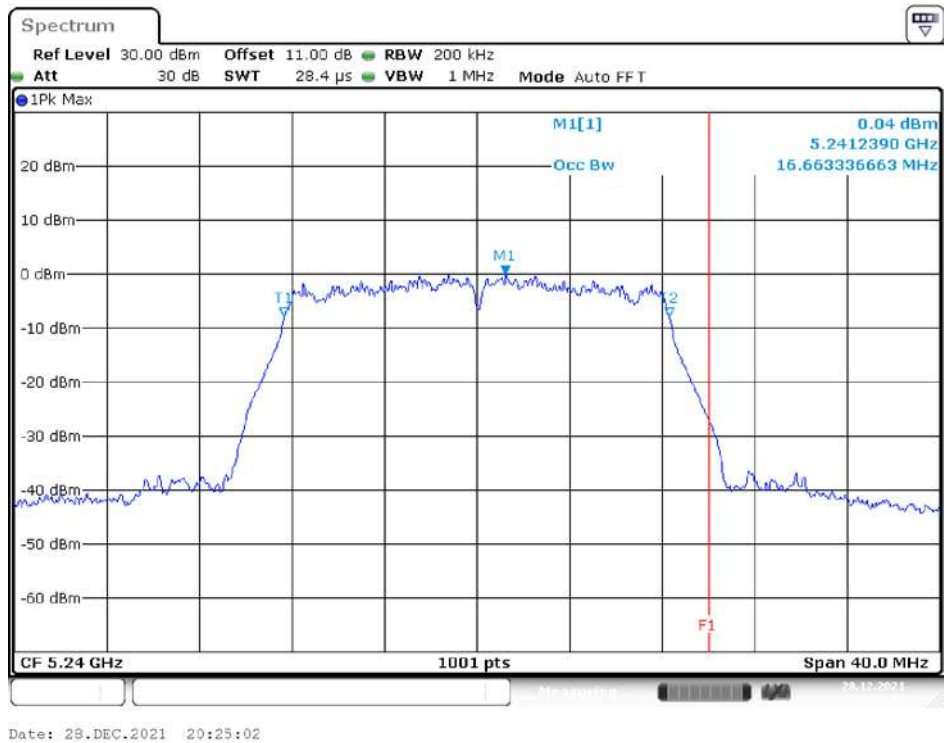
IEEE 802.11ac VHT80 Mode / 5725 ~ 5850MHz (chain 1)
5775MHz



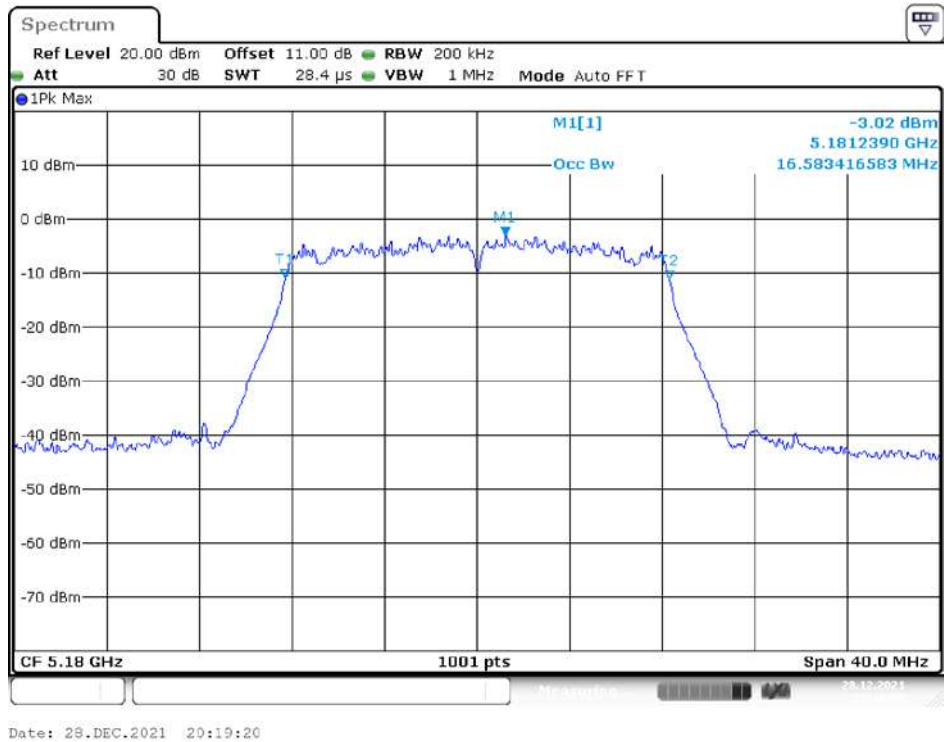
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UNII-1 Band I / OBW 99%**IEEE 802.11a Mode / 5150 ~ 5250MHz (chain 0)****5180MHz****5200MHz**

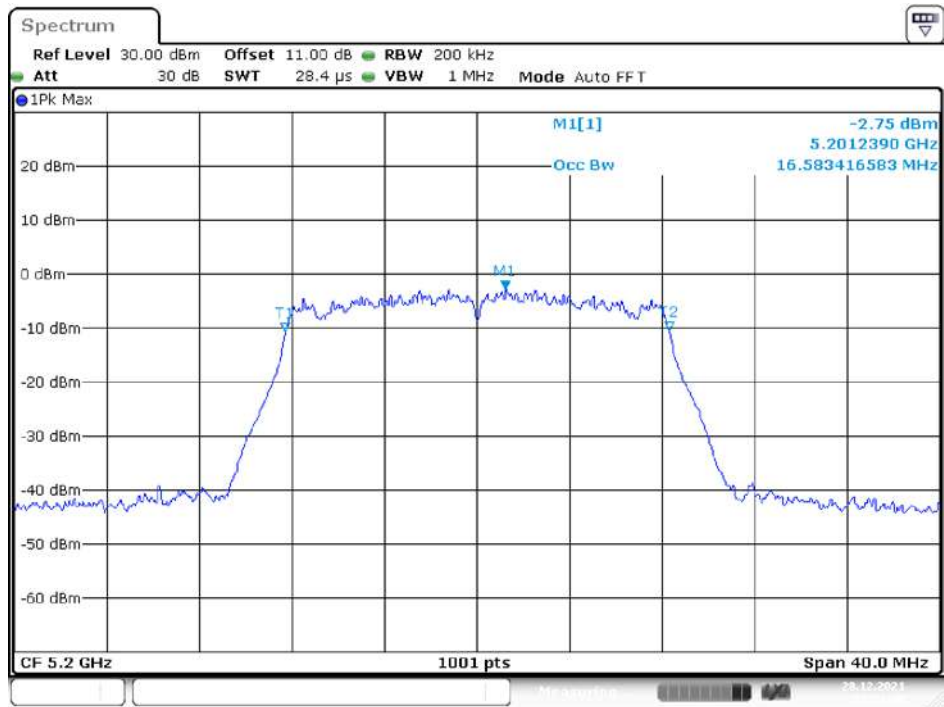
5240MHz



IEEE 802.11a Mode / 5150 ~ 5250MHz (chain 1)
5180MHz

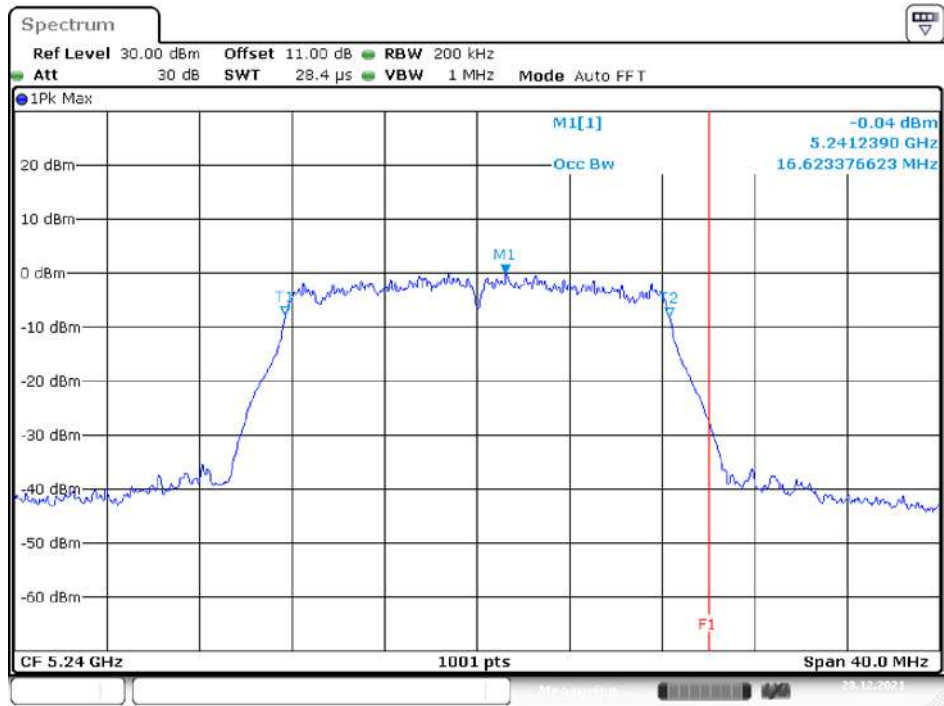


5200MHz

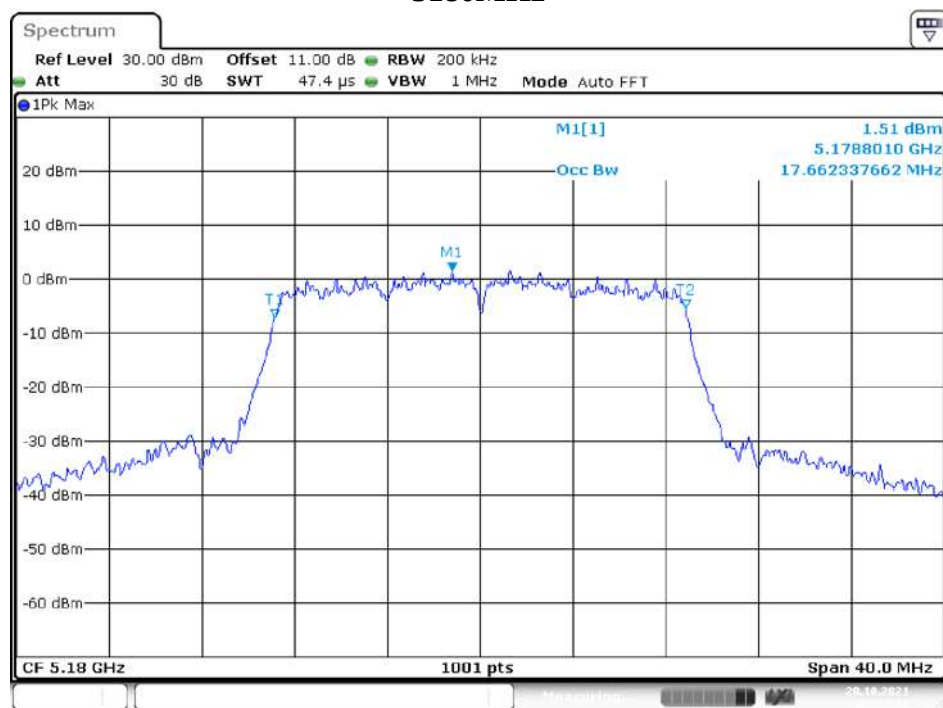


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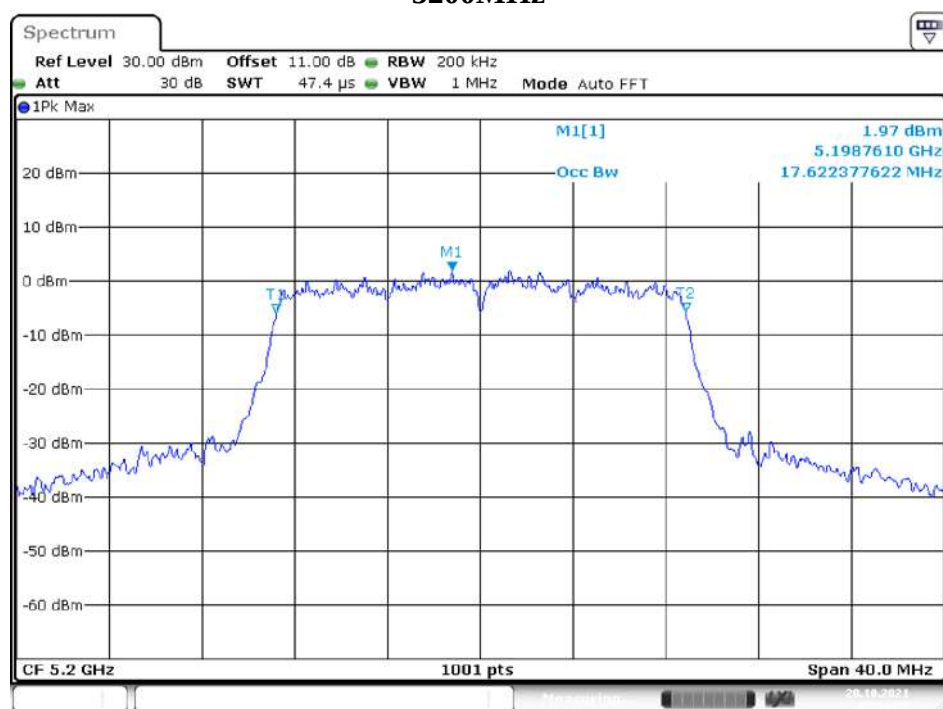
5240MHz



Date: 28.DEC.2021 20:27:01

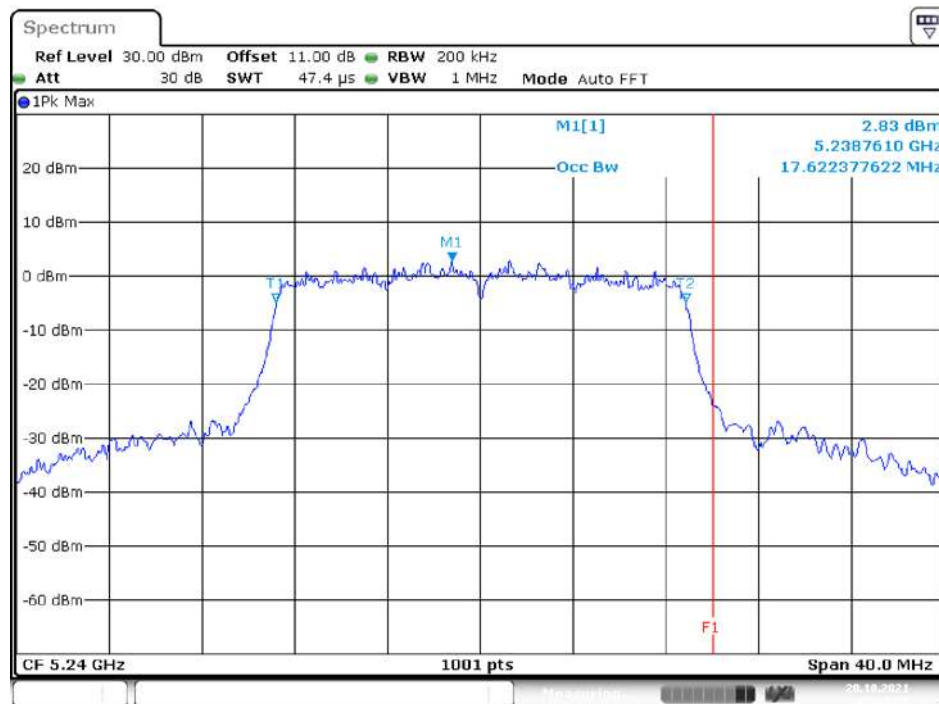
IEEE 802.11ac VHT20 Mode / 5150 ~ 5250MHz (chain 0)
5180MHz

Date: 28.OCT.2021 15:22:18

5200MHz

Date: 28.OCT.2021 15:20:22

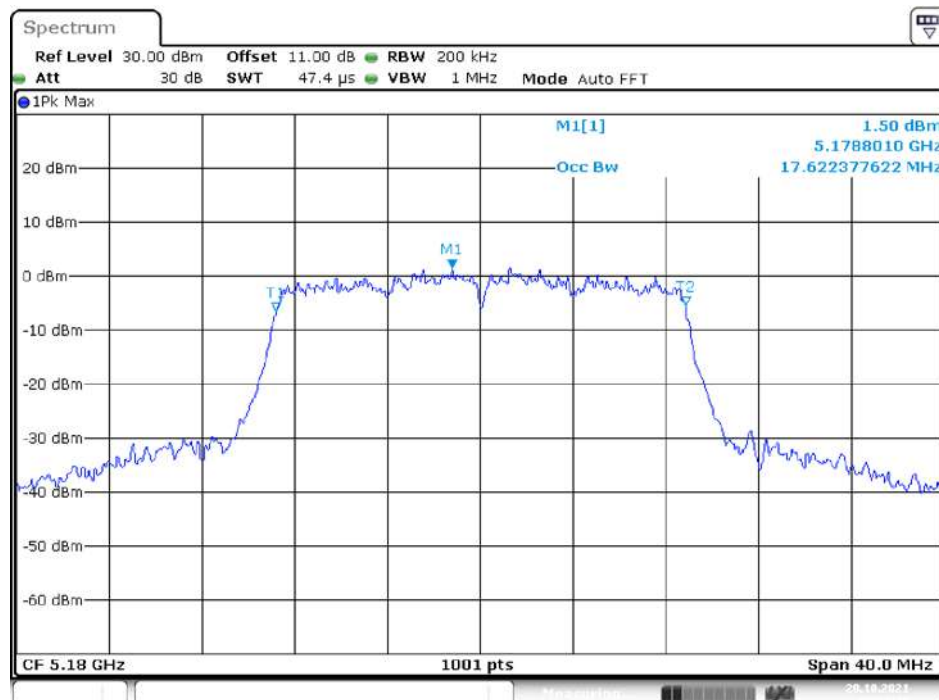
5240MHz



Date: 28.OCT.2021 15:17:21

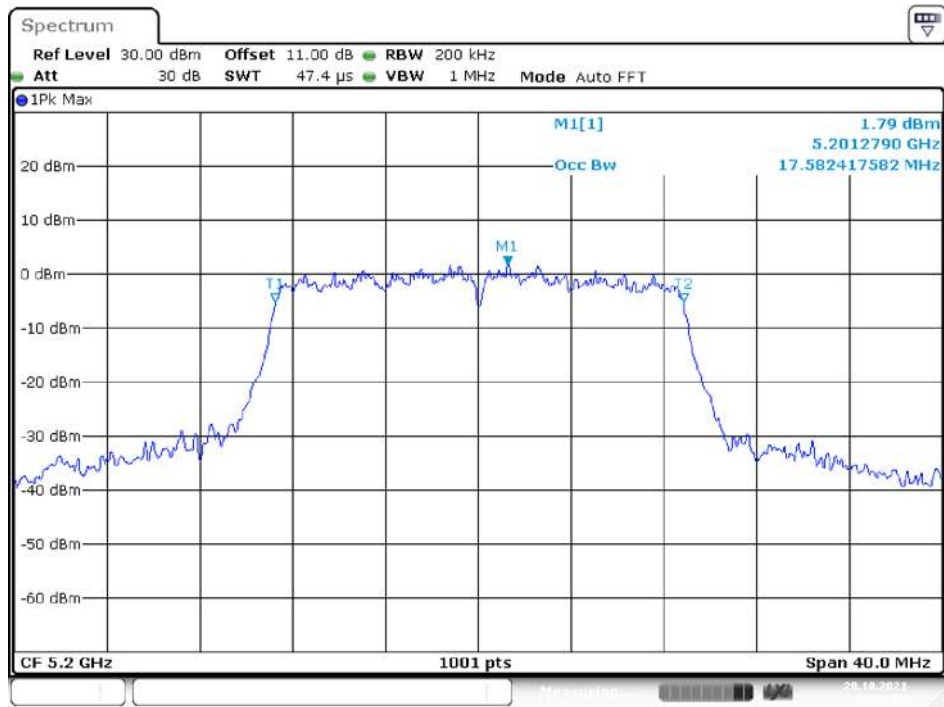
IEEE 802.11ac VHT20 Mode / 5150 ~ 5250MHz (chain 1)

5180MHz



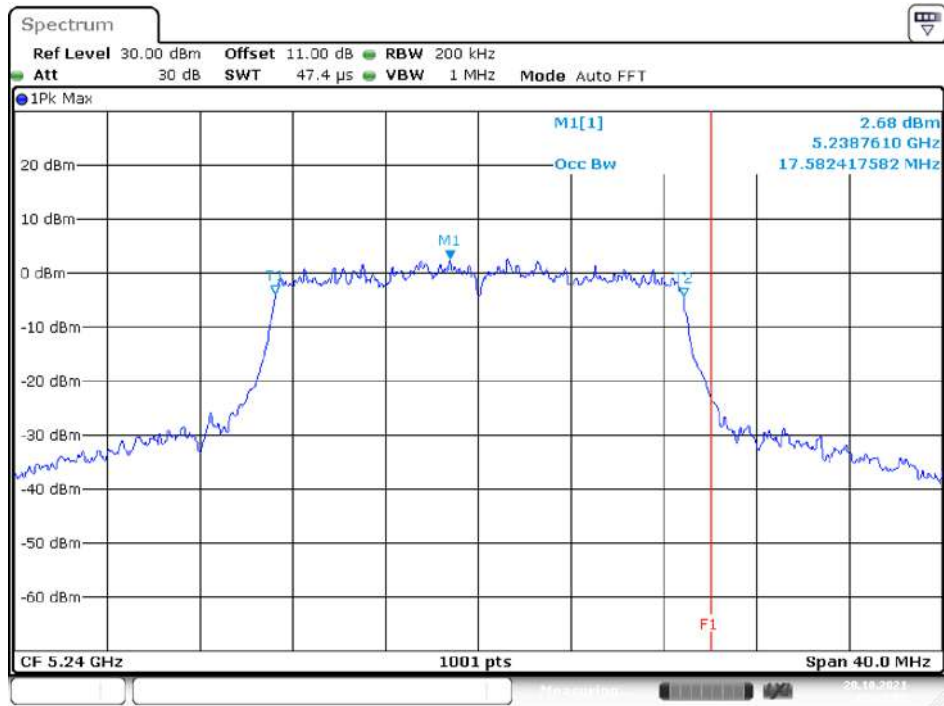
Date: 28.OCT.2021 15:23:11

5200MHz

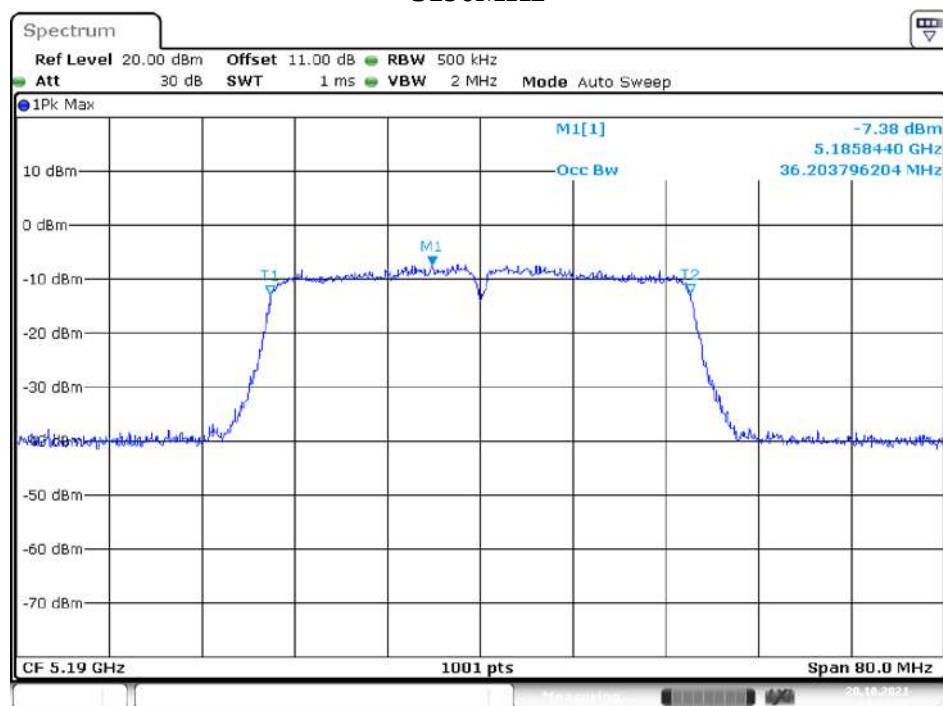


Date: 28.OCT.2021 15:21:07

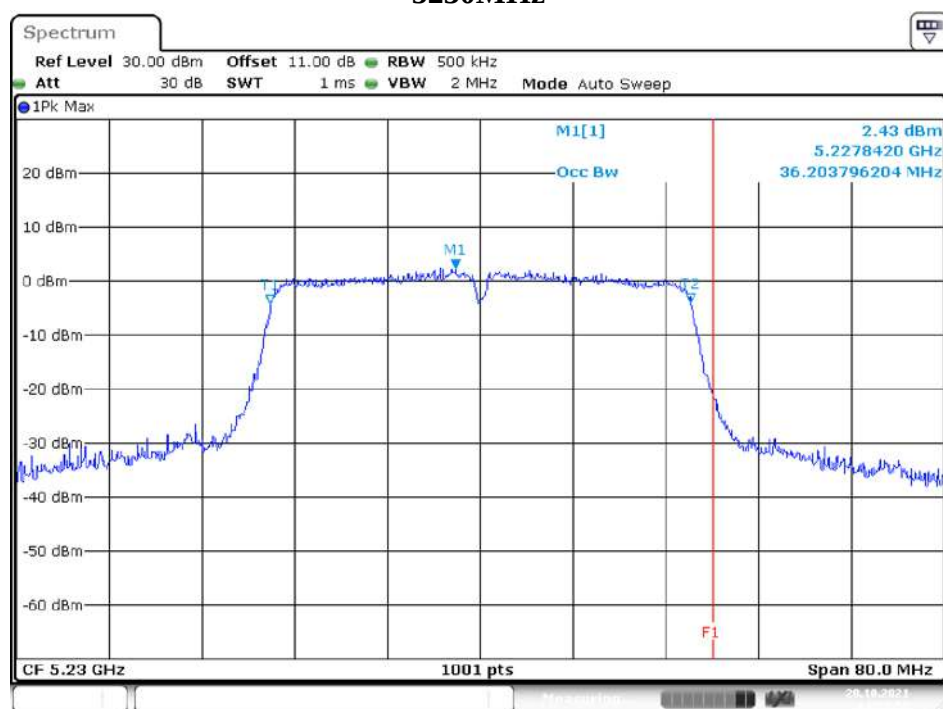
5240MHz



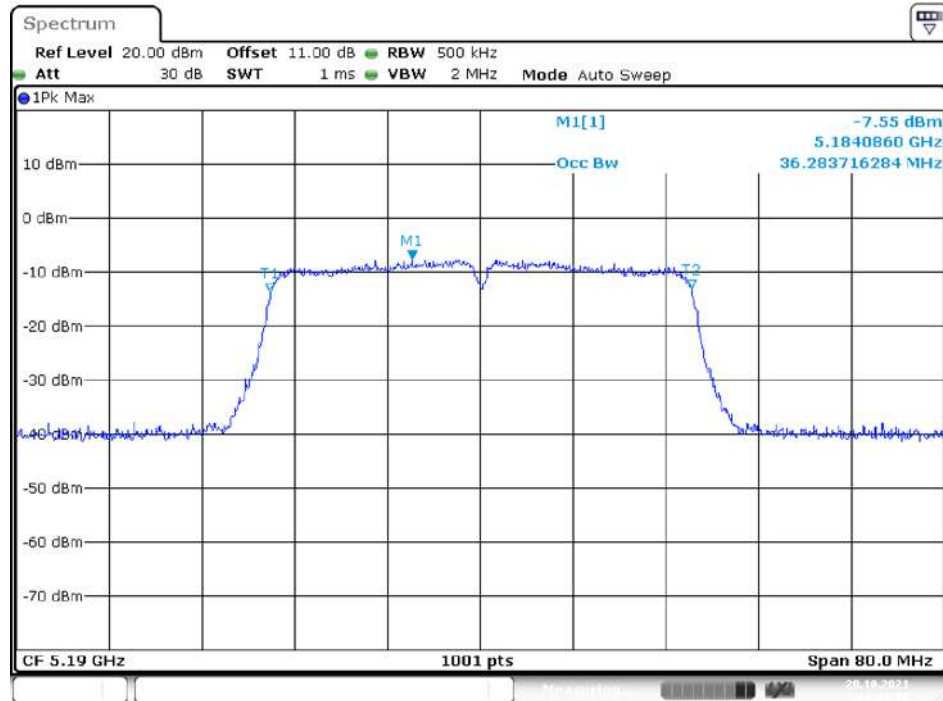
Date: 28.OCT.2021 15:18:07

IEEE 802.11ac VHT40 Mode / 5150 ~ 5250MHz (chain 0)
5190MHz

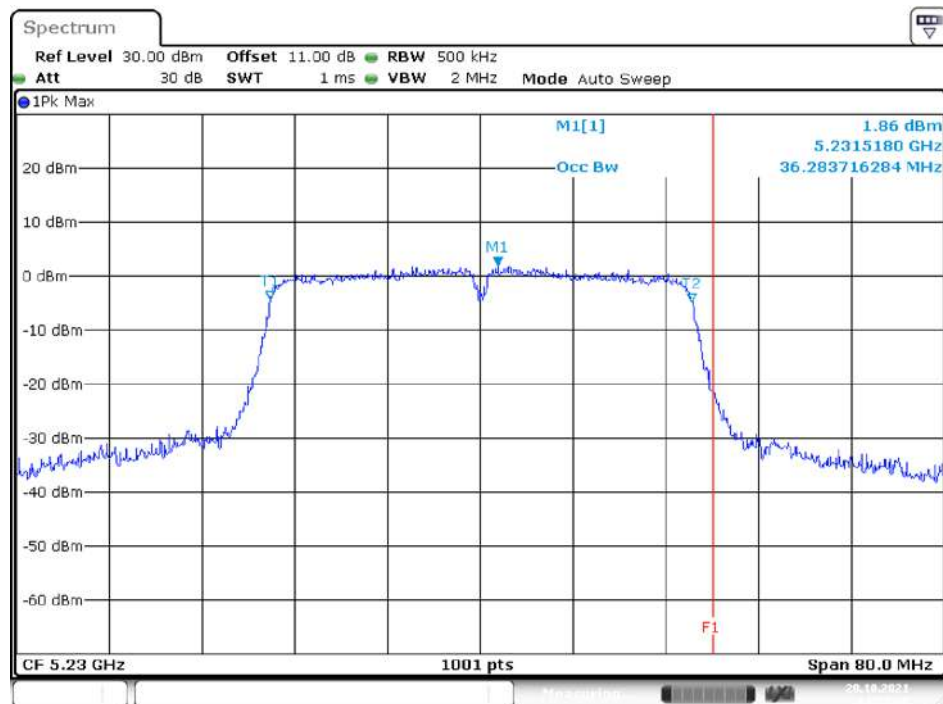
Date: 26.OCT.2021 14:42:21

5230MHz

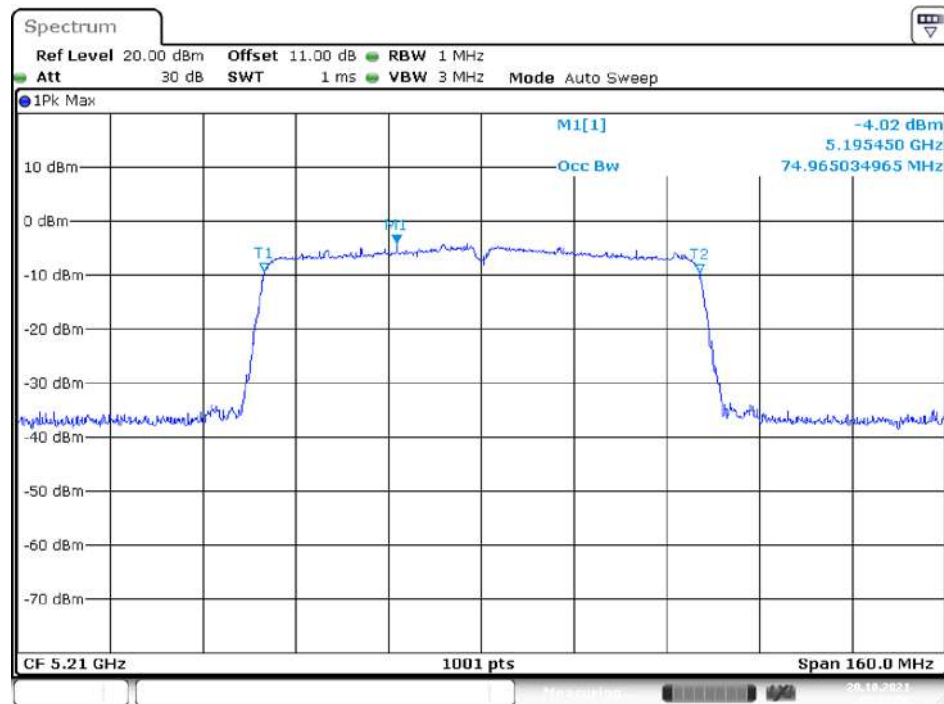
Date: 26.OCT.2021 14:37:52

IEEE 802.11ac VHT40 Mode / 5150 ~ 5250MHz (chain 1)
5190MHz

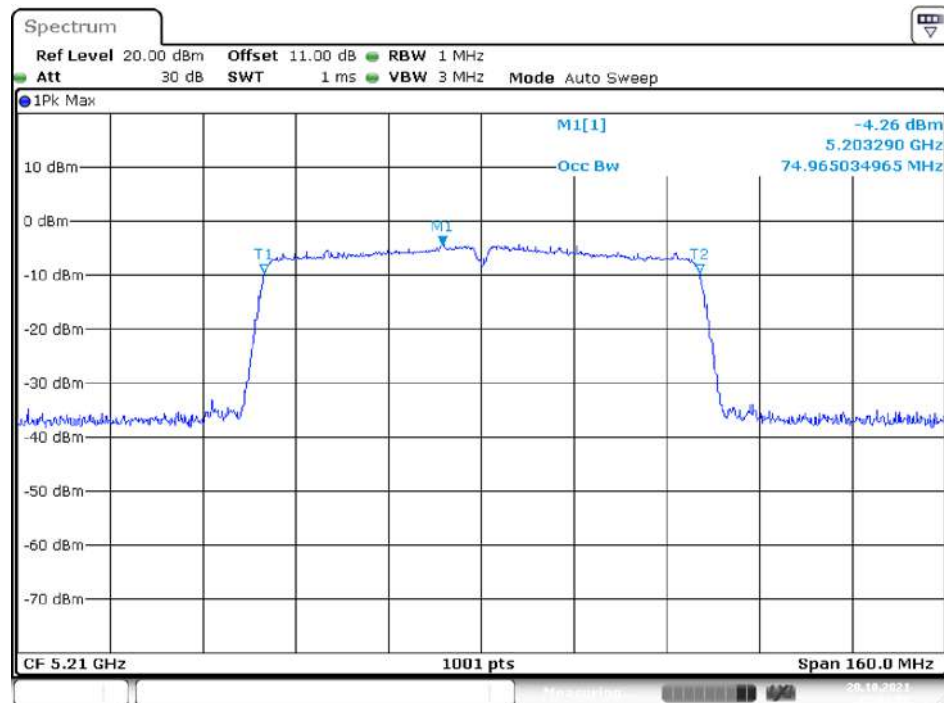
Date: 28.OCT.2021 14:43:20

5230MHz

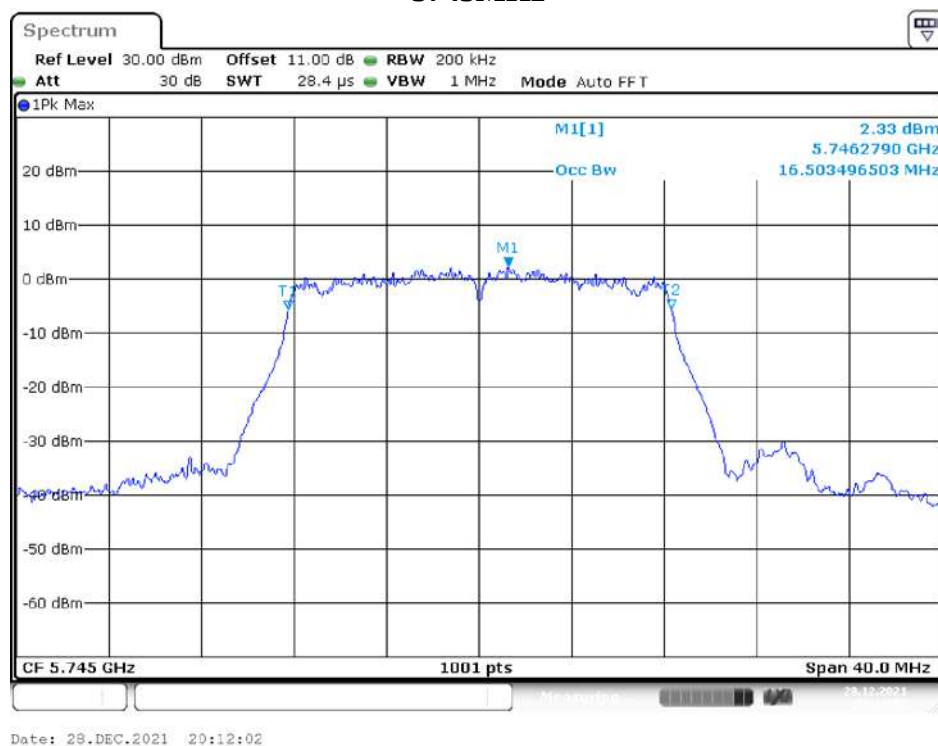
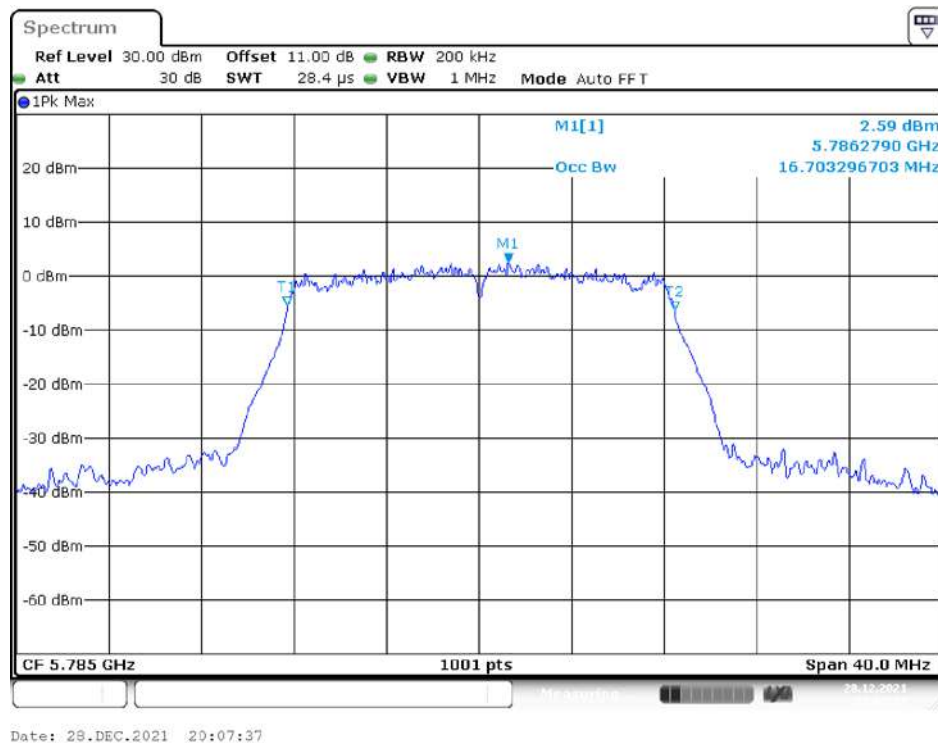
Date: 28.OCT.2021 14:38:41

IEEE 802.11ac VHT80 Mode / 5150 ~ 5250MHz (chain 0)
5210MHz

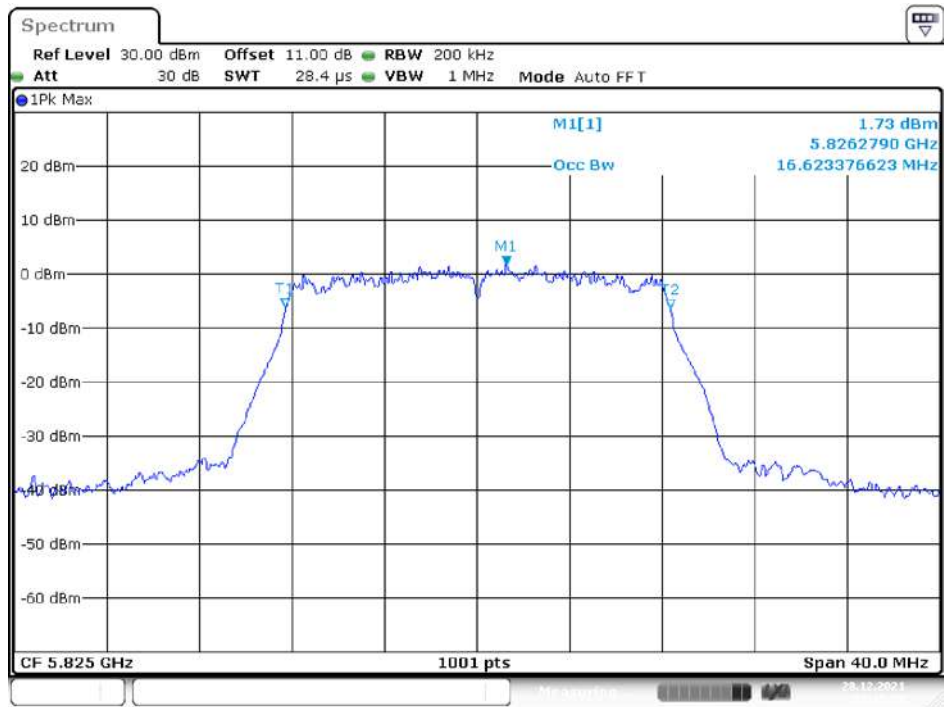
Date: 28.OCT.2021 12:53:51

IEEE 802.11ac VHT80 Mode / 5150 ~ 5250MHz (chain 1)
5210MHz

Date: 28.OCT.2021 15:01:08

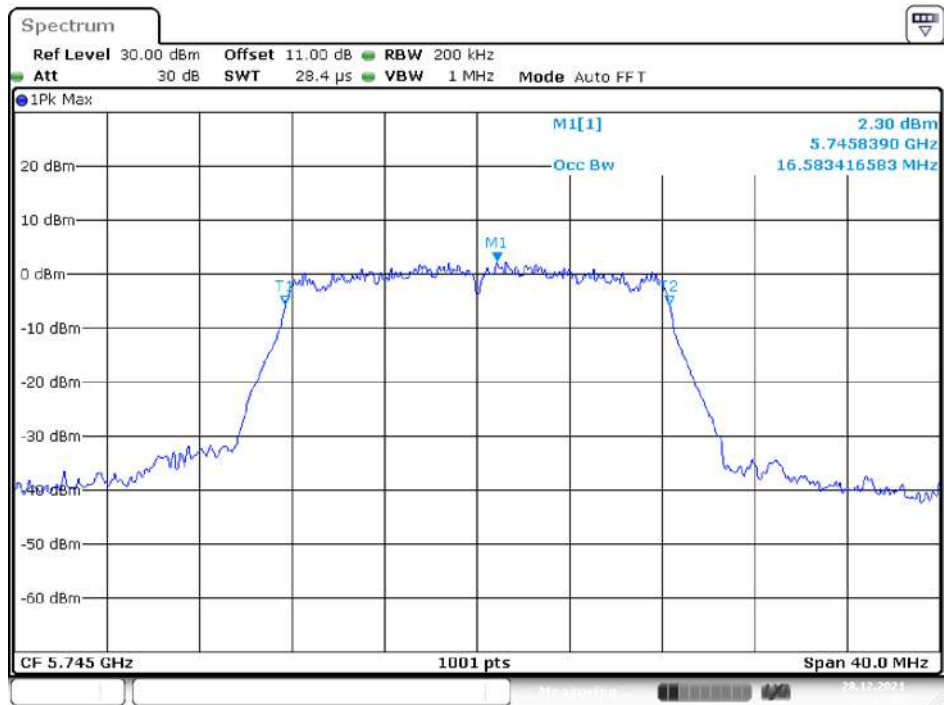
UNII-3 Band IV / OBW 99%**IEEE 802.11a Mode / 5725 ~ 5850MHz (chain 0)**
5745MHz**5785MHz**

5825MHz

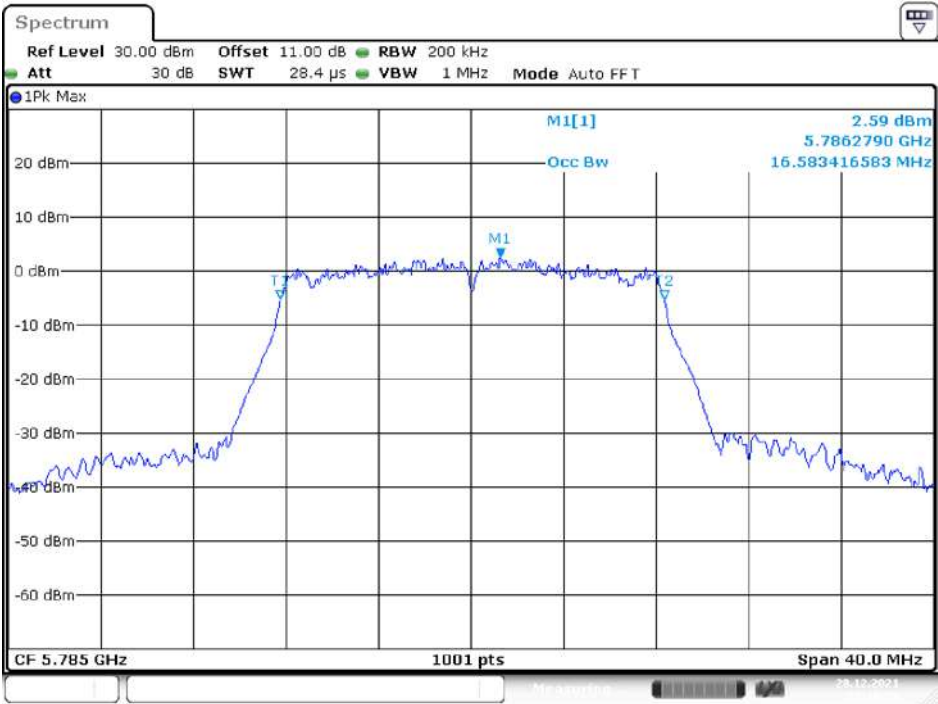


IEEE 802.11a Mode / 5725 ~ 5850MHz (chain 1)

5745MHz

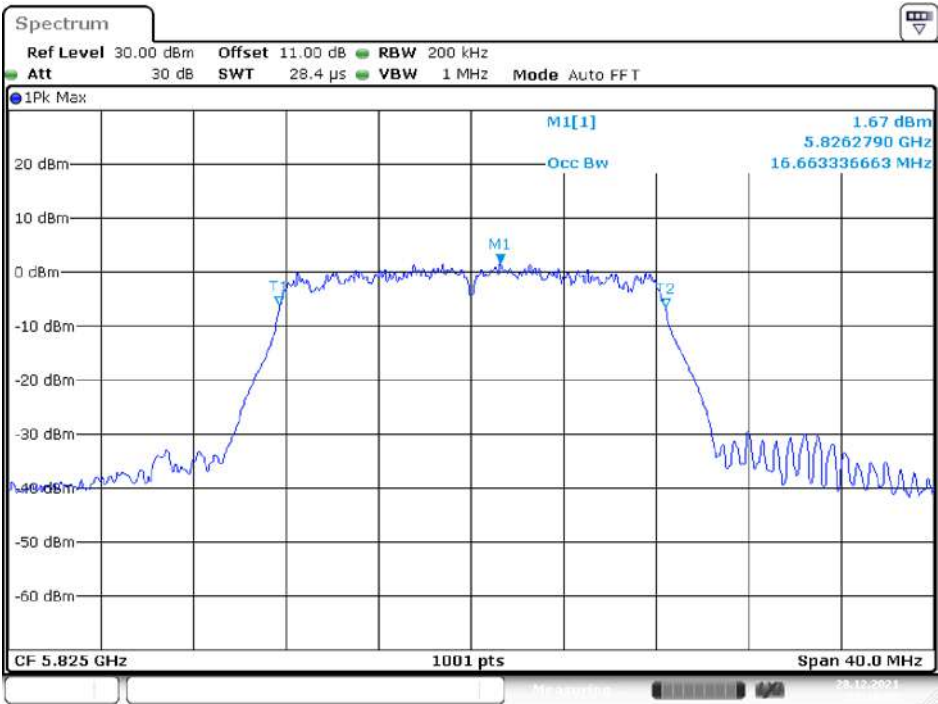


5785MHz



Date: 29.DEC.2021 20:10:29

5825MHz



Date: 29.DEC.2021 20:16:30

Spectrum

Ref Level 30.00 dBm Offset 11.00 dB RBW 200 kHz

Att 30 dB SWT 47.4 μ s VBW 1 MHz Mode Auto FFT

● 1Pk Max

M1[1] 3.48 dBm
5.7462790 GHz
17.662337662 MHz

Occ Bw

M1

CF 5.745 GHz 1001 pts Span 40.0 MHz

Spectrum

Ref Level 30.00 dBm Offset 11.00 dB RBW 200 kHz
Att 30 dB SWT 47.4 μ s VBW 1 MHz Mode Auto FFT

1Pk Max

M1[1] 3.39 dBm
5.7862790 GHz
Occ Bw 17.582417582 MHz

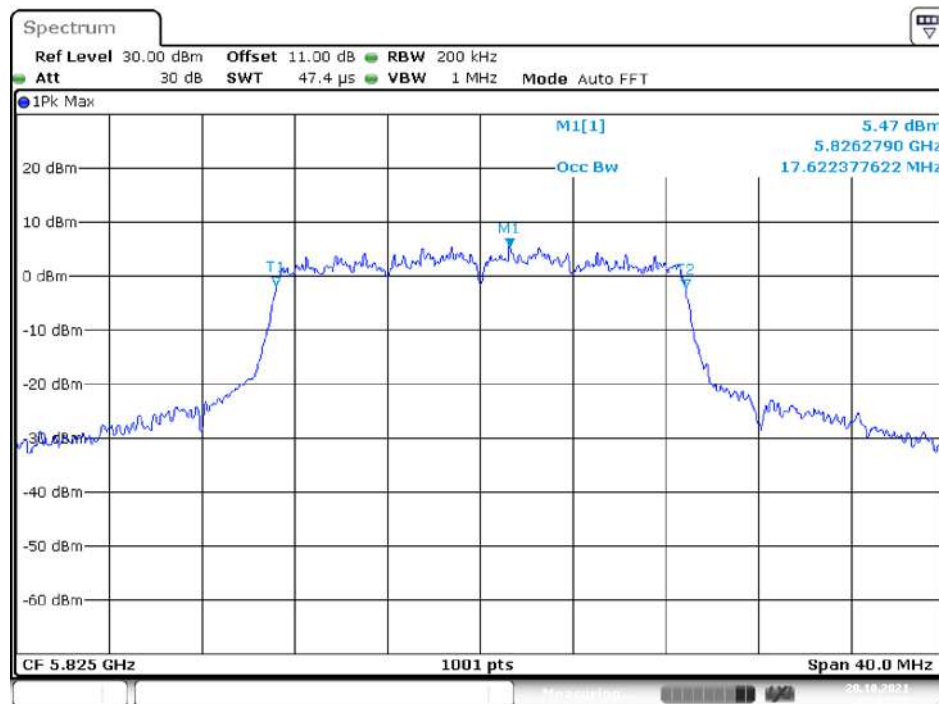
M1

20 dBm
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm

CF 5.785 GHz 1001 pts Span 40.0 MHz

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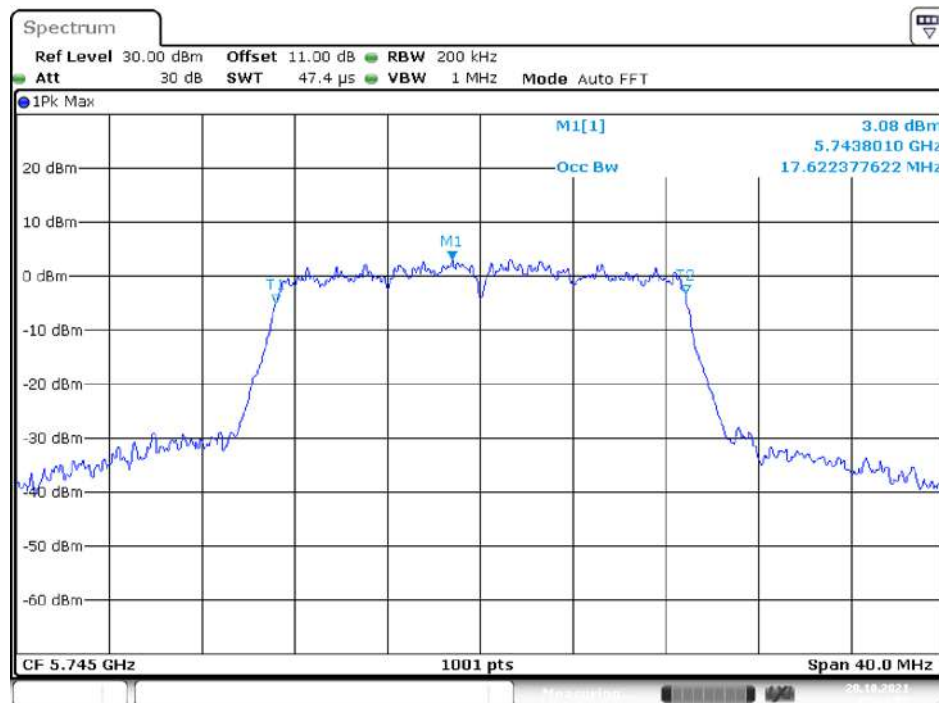
5825MHz



Date: 28.OCT.2021 15:03:32

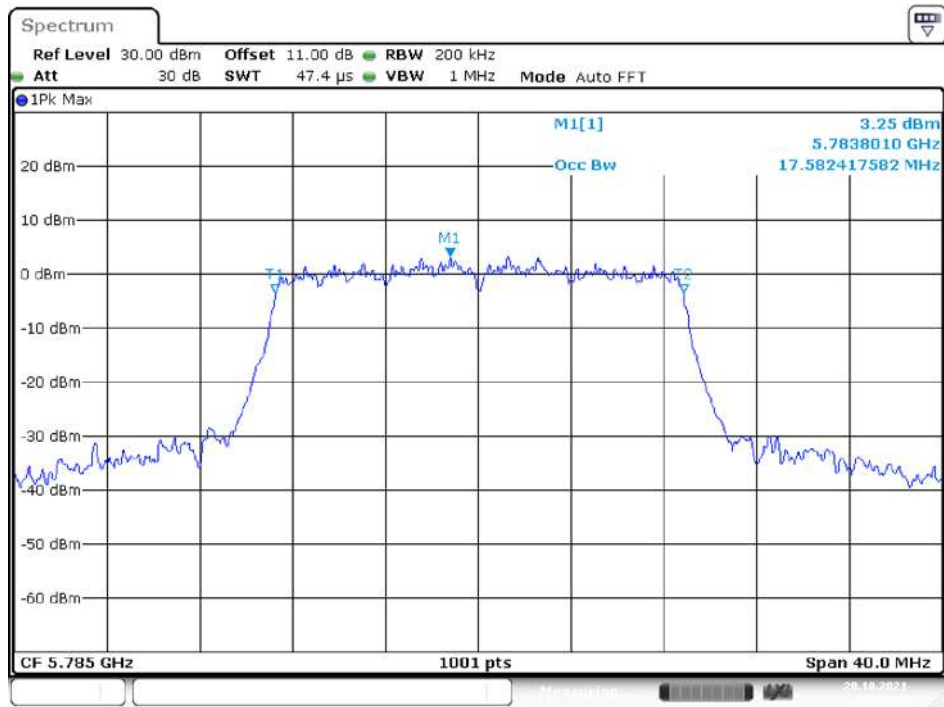
IEEE 802.11ac VHT20 Mode / 5725 ~ 5850MHz (chain 1)

5745MHz



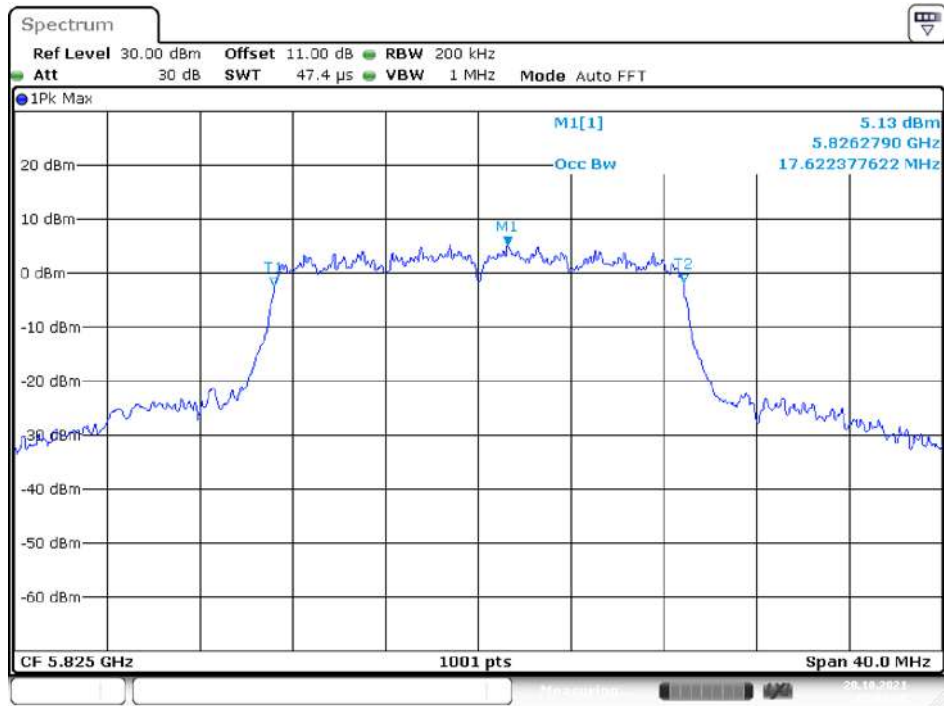
Date: 28.OCT.2021 15:14:07

5785MHz



Date: 28.OCT.2021 15:10:41

5825MHz



Date: 28.OCT.2021 15:04:48

Spectrum

Ref Level 30.00 dBm Offset 11.00 dB RBW 500 kHz
 Att 30 dB SWT 1 ms VBW 2 MHz Mode Auto Sweep

1Pk Max

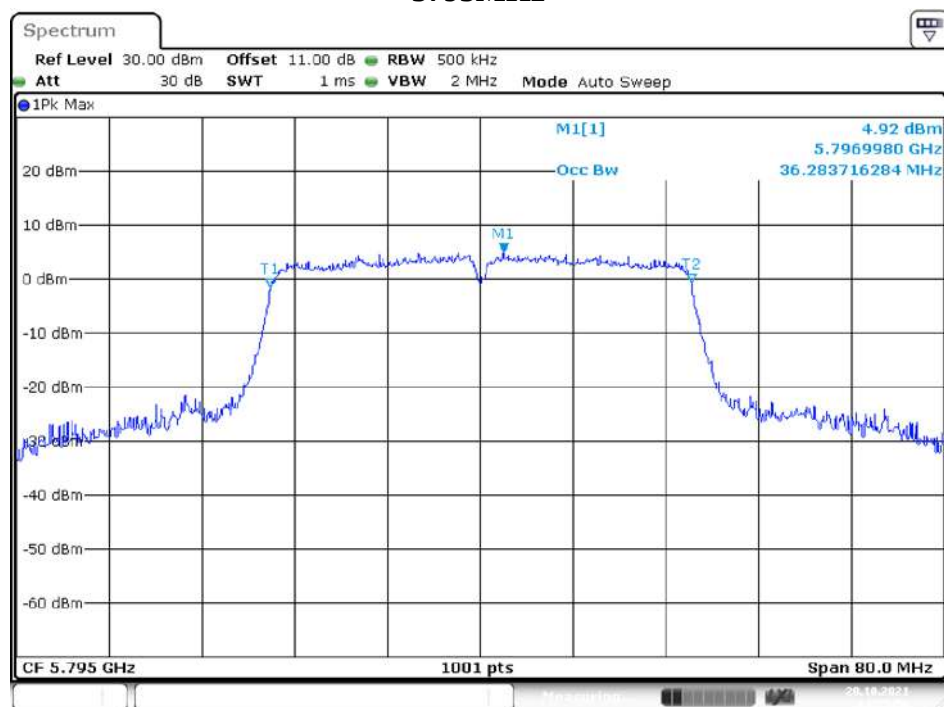
M1[1] 5.77 dBm
 5.7535610 GHz
 36.283716284 MHz

Occ Bw

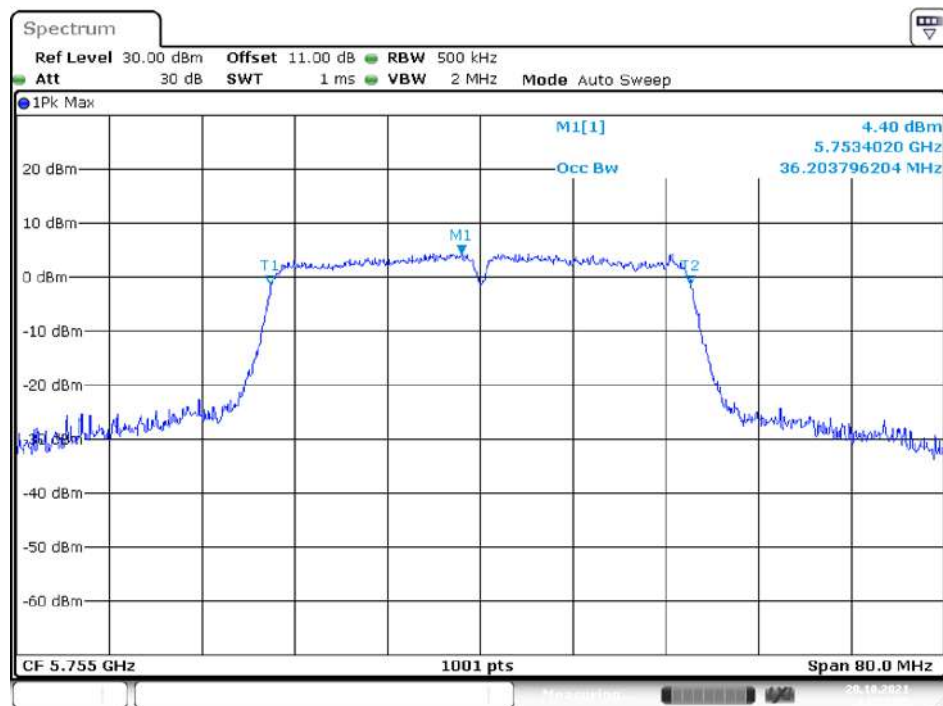
T1 T2

CF 5.755 GHz 1001 pts Span 80.0 MHz

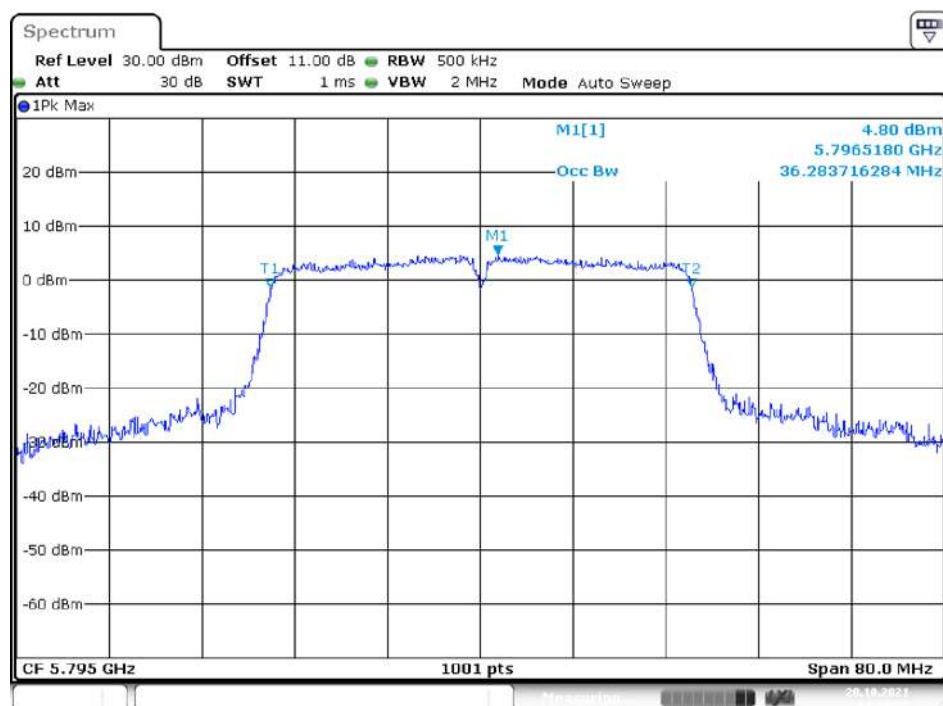
5795MHz



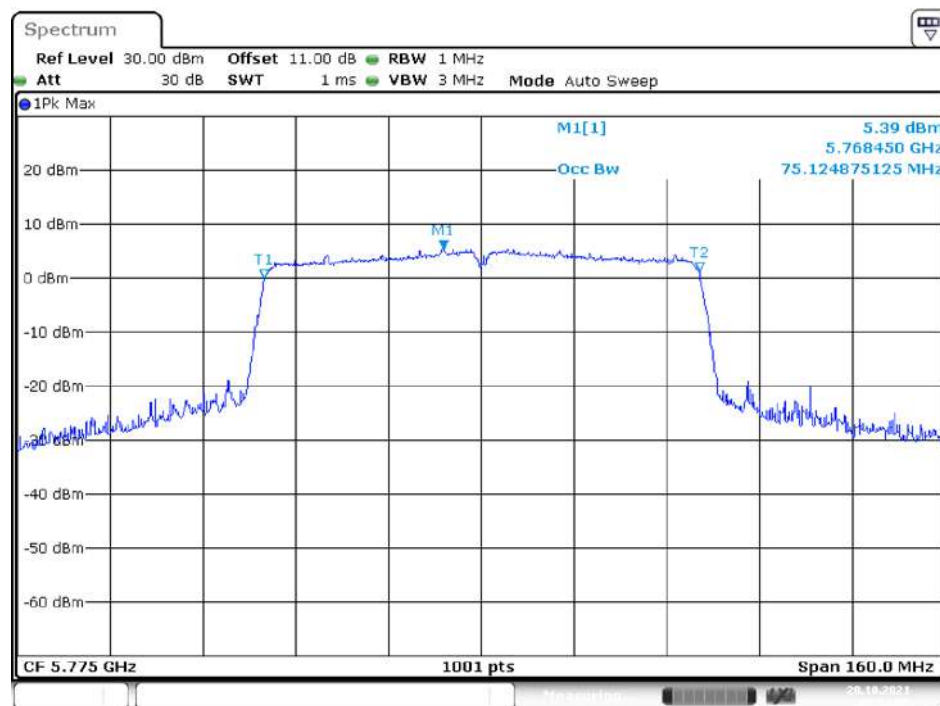
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IEEE 802.11ac VHT40 Mode / 5725 ~ 5850MHz (chain 1)
5755MHz

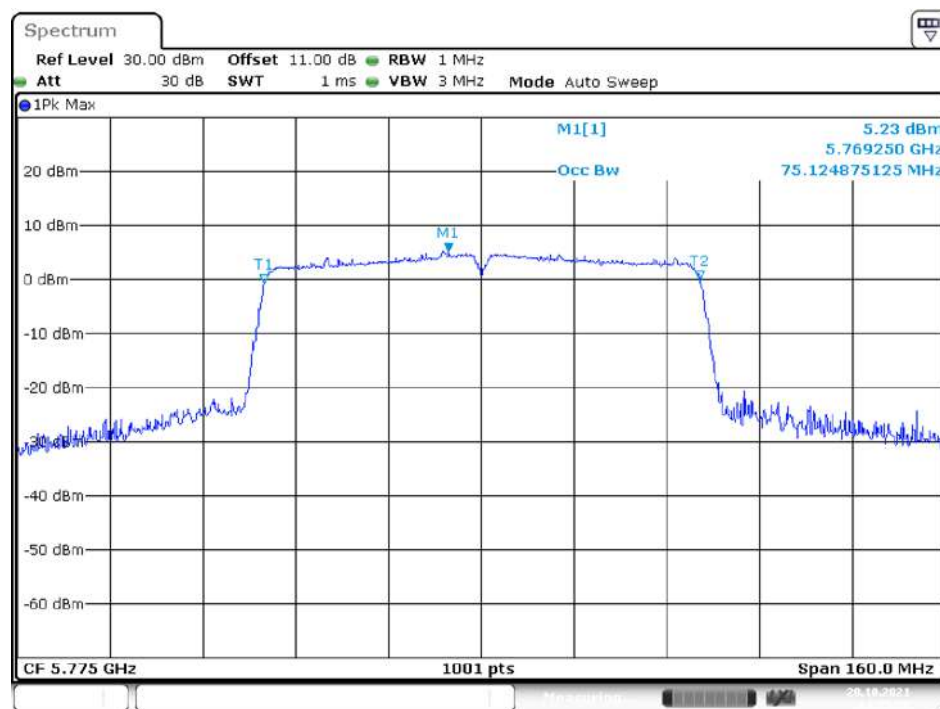
Date: 26.OCT.2021 14:33:55

5795MHz

Date: 26.OCT.2021 14:40:32

IEEE 802.11ac VHT80 Mode / 5725 ~ 5850MHz (chain 0)**5775MHz**

Date: 28.OCT.2021 12:56:56

IEEE 802.11ac VHT80 Mode / 5725 ~ 5850MHz (chain 1)**5775MHz**

Date: 28.OCT.2021 14:55:29

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)
				Chain 0	Chain 1	Total			
UNII-1	802.11a	36	5180	12.74	11.68	15.25	0.09	15.34	24
		40	5200	13.08	12.14	15.65	0.09	15.74	24
		48	5240	12.01	11.01	14.55	0.09	14.64	24
UNII-3		149	5745	13.56	13.65	16.62	0.09	16.71	30
		157	5785	14.71	14.65	17.69	0.09	17.78	30
		165	5825	14.90	14.65	17.79	0.09	17.88	30
UNII-1	802.11 ac20	36	5180	12.24	11.44	14.87	0.09	14.96	24
		40	5200	12.53	11.51	15.06	0.09	15.15	24
		48	5240	11.90	10.91	14.44	0.09	14.53	24
UNII-3		149	5745	13.46	13.48	16.48	0.09	16.57	30
		157	5785	13.65	13.55	16.61	0.09	16.70	30
		165	5825	14.13	14.18	17.17	0.09	17.26	30
UNII-1	802.11 ac40	38	5190	5.86	4.54	8.26	0.13	8.39	24
		46	5230	5.92	4.61	8.32	0.13	8.45	24
UNII-3		151	5755	13.64	13.79	16.73	0.13	16.86	30
		159	5795	13.51	13.64	16.59	0.13	16.72	30
UNII-1	802.11 ac80	42	5210	4.44	4.41	7.44	0.32	7.76	24
UNII-3		155	5775	12.21	12.18	15.21	0.32	15.53	30

According to FCC KDB 662911 D01 Multiple Transmitter Output v02r01

For power measurements on IEEE 802.11 devices, Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$.

The device have two antenna, so array gain is 0 dB.

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)
				Chain 0	Chain 1	Total			
UNII-1	802.11a	36	5180	3.51	3.13	6.33	0.09	6.42	8.99
		40	5200	3.64	3.42	6.54	0.09	6.63	8.99
		48	5240	3.38	3.09	6.25	0.09	6.34	8.99
	802.11 ac20	36	5180	2.40	1.89	5.16	0.09	5.25	8.99
		40	5200	2.56	2.09	5.34	0.09	5.43	8.99
		48	5240	2.05	1.73	4.90	0.09	4.99	8.99
	802.11 ac40	38	5190	-8.15	-8.72	-5.42	0.13	-5.29	8.99
		46	5230	-8.07	-8.59	-5.31	0.13	-5.18	8.99
	802.11 ac80	42	5210	-11.65	-11.98	-8.80	0.32	-8.48	8.99
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)
				Chain 0	Chain 1	Total			
UNII-3	802.11a	149	5745	7.36	7.05	10.22	0.09	10.31	27.99
		157	5785	7.23	7.06	10.16	0.09	10.25	27.99
		165	5825	7.34	7.20	10.28	0.09	10.37	27.99
	802.11 ac20	149	5745	6.40	6.12	9.27	0.09	9.36	27.99
		157	5785	6.25	6.05	9.16	0.09	9.25	27.99
		165	5825	6.55	6.39	9.48	0.09	9.57	27.99
	802.11 ac40	151	5755	2.85	2.51	5.69	0.13	5.82	27.99
		159	5795	2.82	2.65	5.75	0.13	5.88	27.99
	802.11 ac80	155	5775	0.18	0.09	3.15	0.32	3.47	27.99

The device is a master device. the 2 antenna maximum antenna gain are 5dBi, and employed Cyclic Delay Diversity (CDD) for 802.11 MIMO transmitting, per KDB 662911 D01 Multiple Transmitter Output v02r01, for Power spectral density (PSD) measurements on the devices:

Array Gain = $10 \log(\text{NANT}/\text{NSS})$ dB.

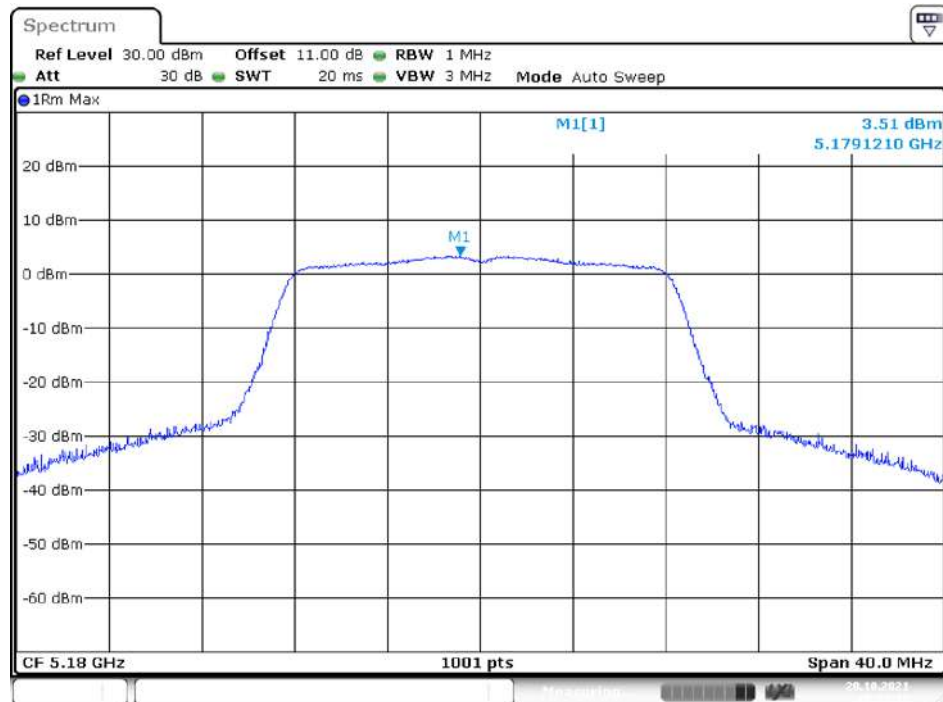
So:

Directional gain = GANT + Array Gain = $5 + 10 * \log(2) = 8.01$ dBi

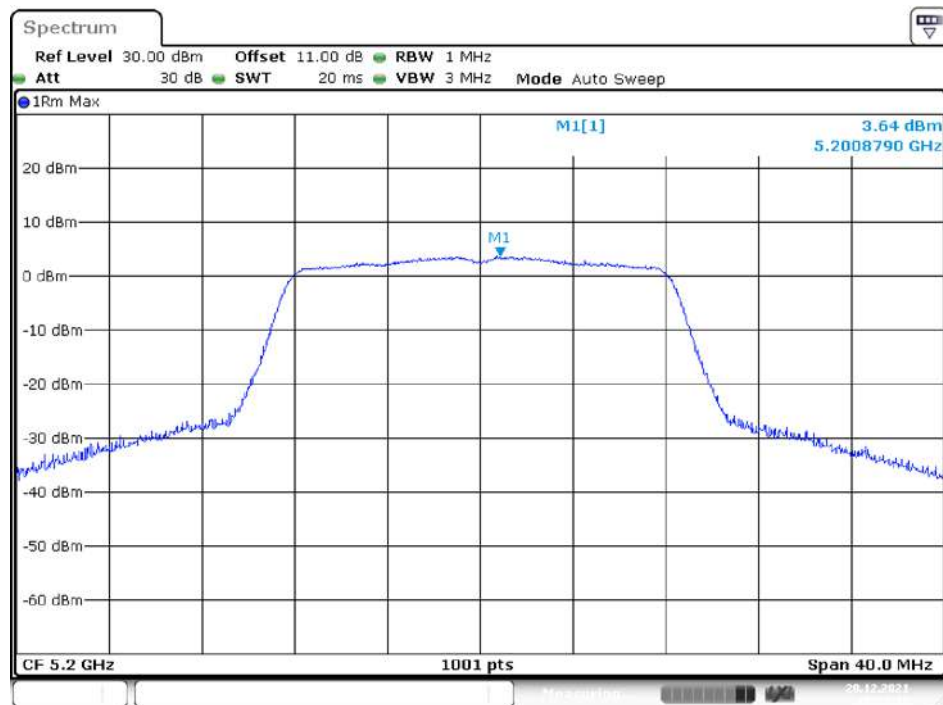
The Power density Limits was reduce 2.01 dB.

Please refer to the following plot

Test Mode: Transmitting

UNII-1 Band I PSD**IEEE 802.11a Mode / 5150 ~ 5250MHz (chain 0)****5180MHz**

Date: 28.OCT.2021 10:53:16

5200MHz

Date: 28.DEC.2021 19:29:11

5240MHz

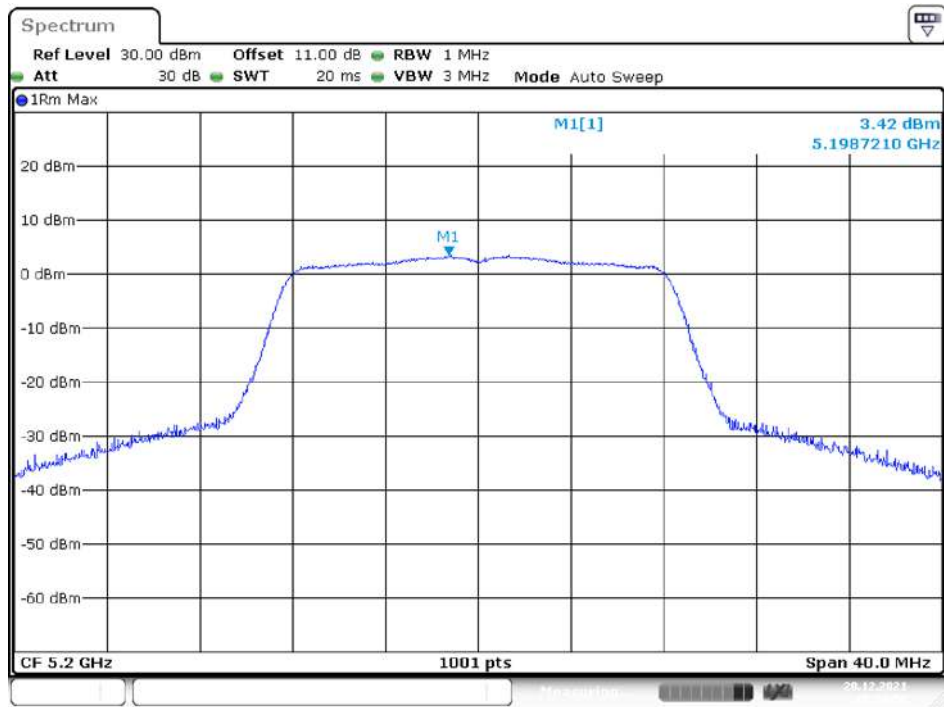


IEEE 802.11a Mode / 5150 ~ 5250MHz (chain 1)

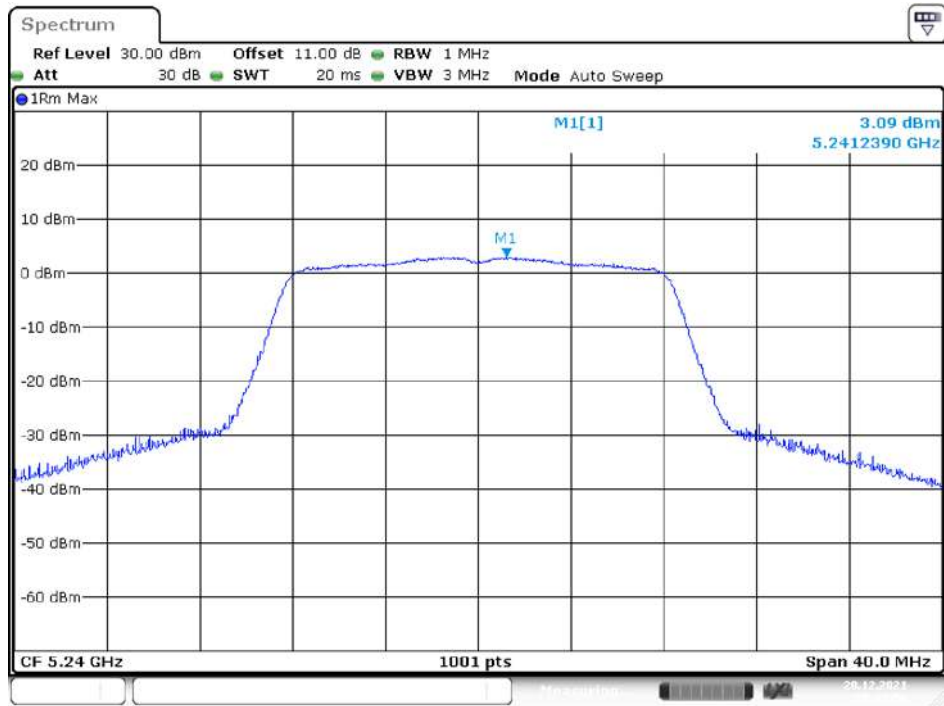
5180MHz



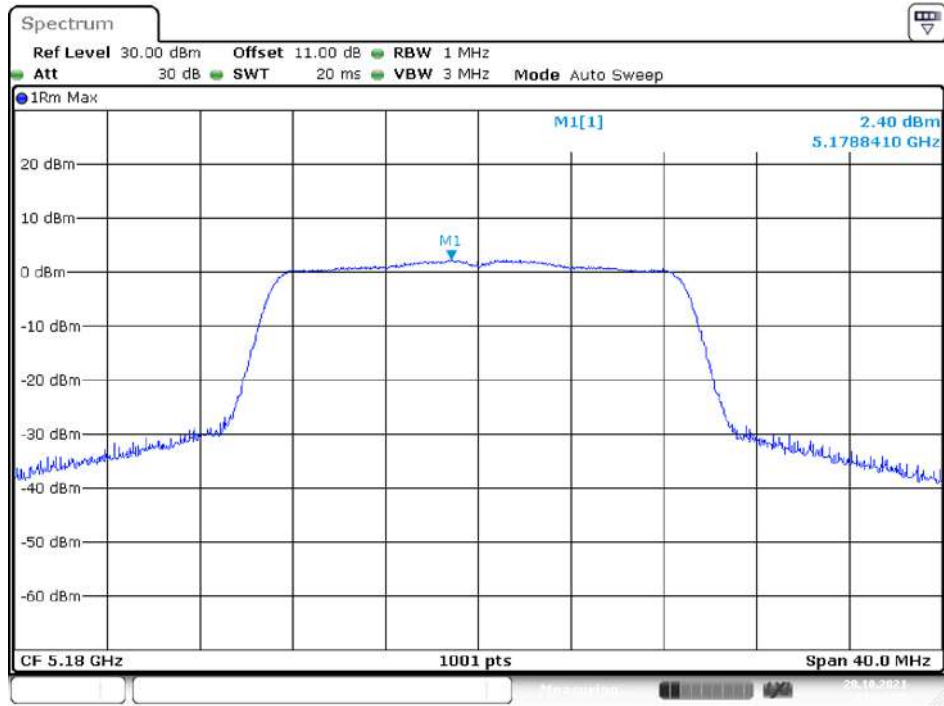
5200MHz



5240MHz

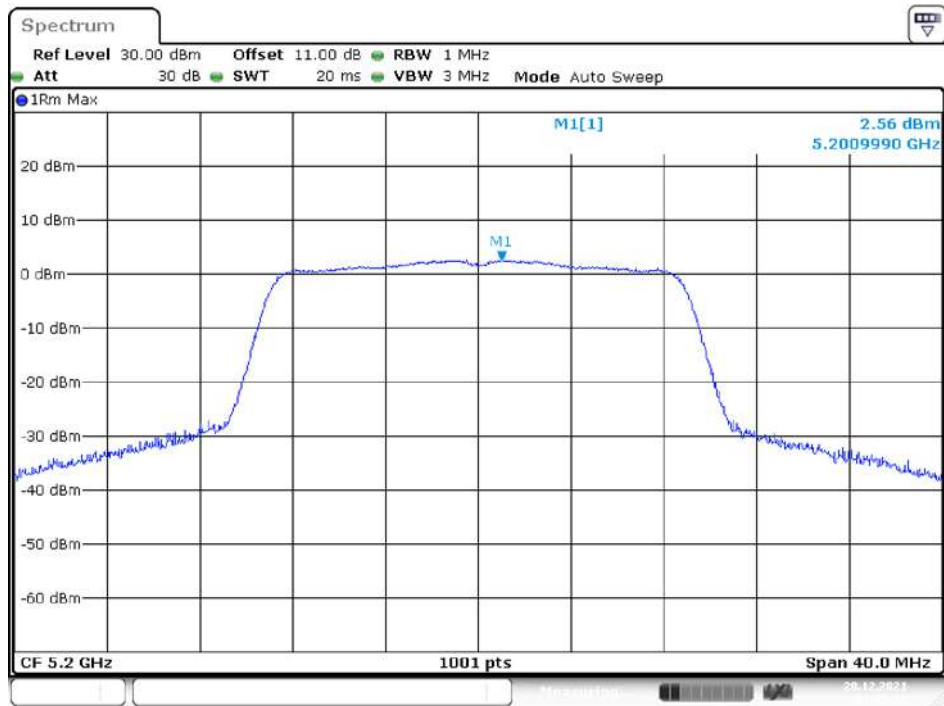


IEEE 802.11ac VHT20 Mode / 5150 ~ 5250MHz (chain 0)
5180MHz



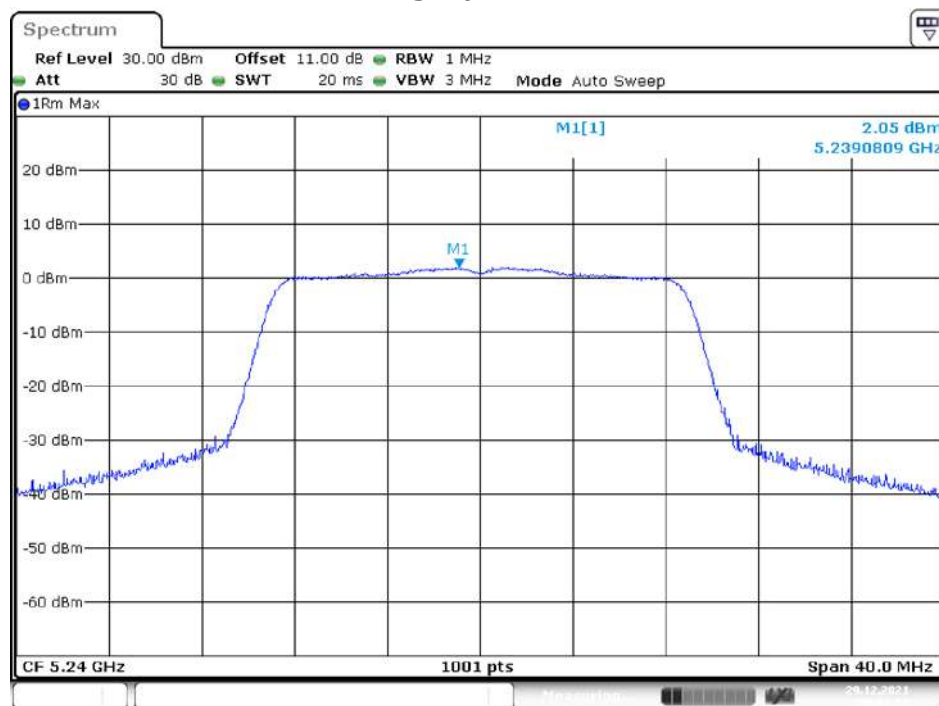
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5200MHz



Date: 28.DEC.2021 21:05:17

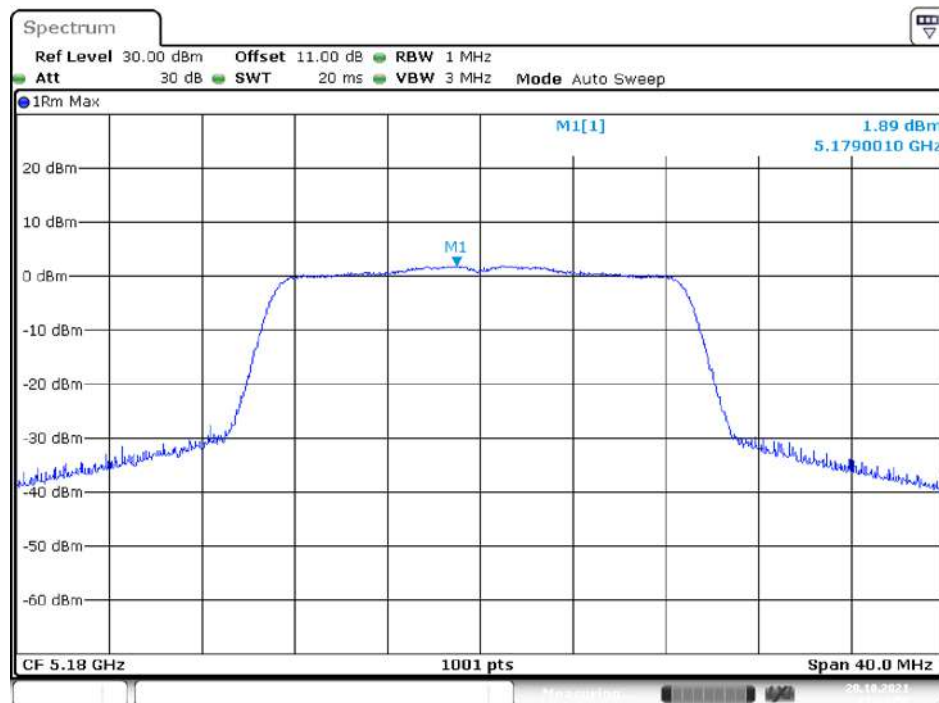
5240MHz



Date: 29.DEC.2021 09:06:51

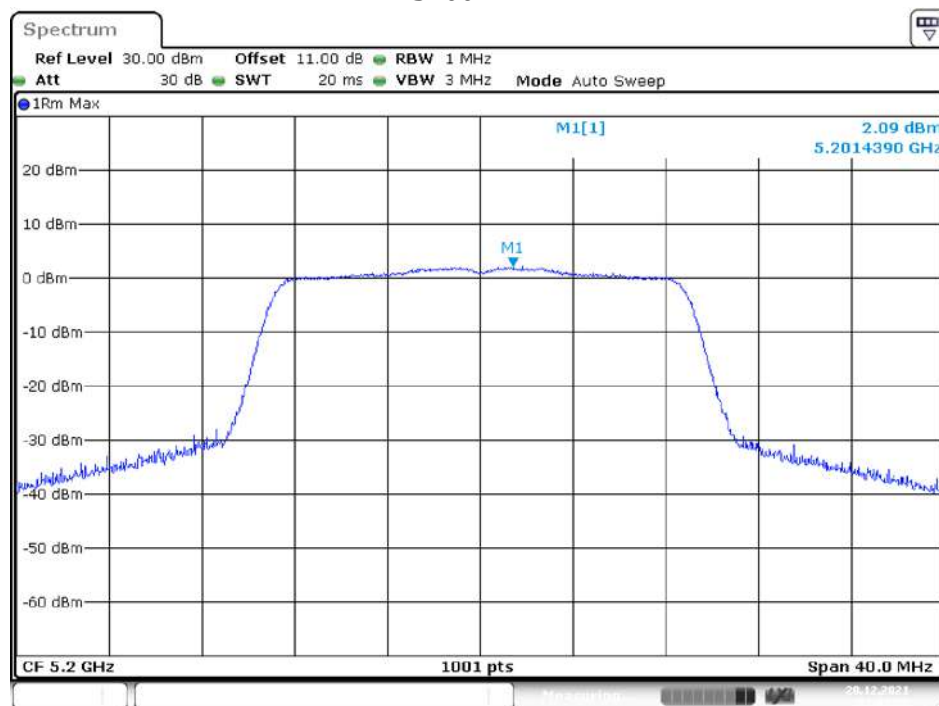
IEEE 802.11ac VHT20 Mode / 5150 ~ 5250MHz (chain 1)

5180MHz



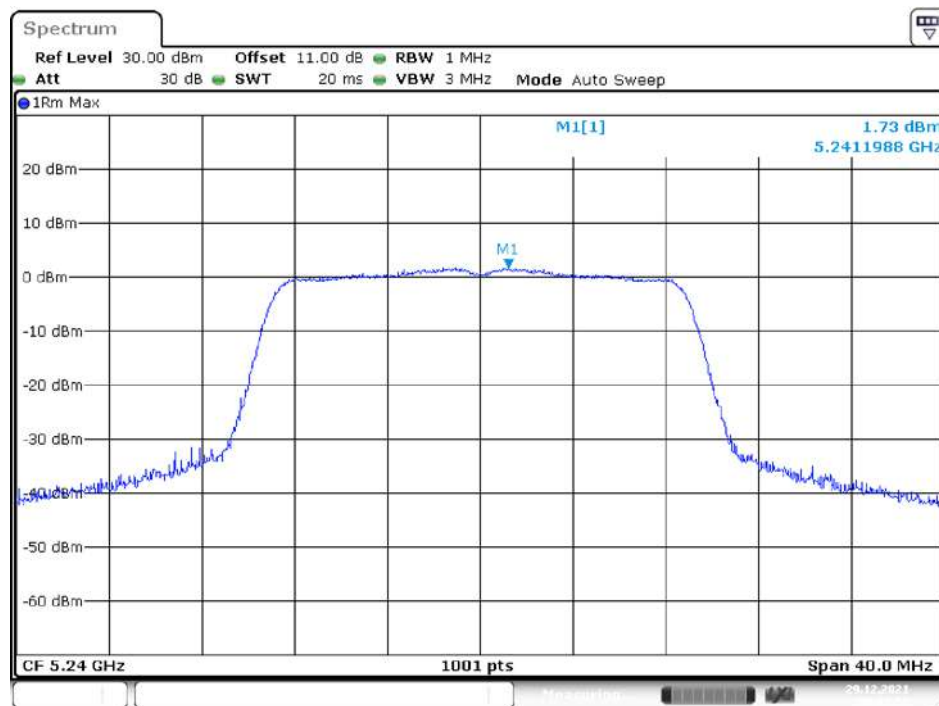
Date: 28.OCT.2021 11:10:51

5200MHz



Date: 28.DEC.2021 21:02:23

5240MHz



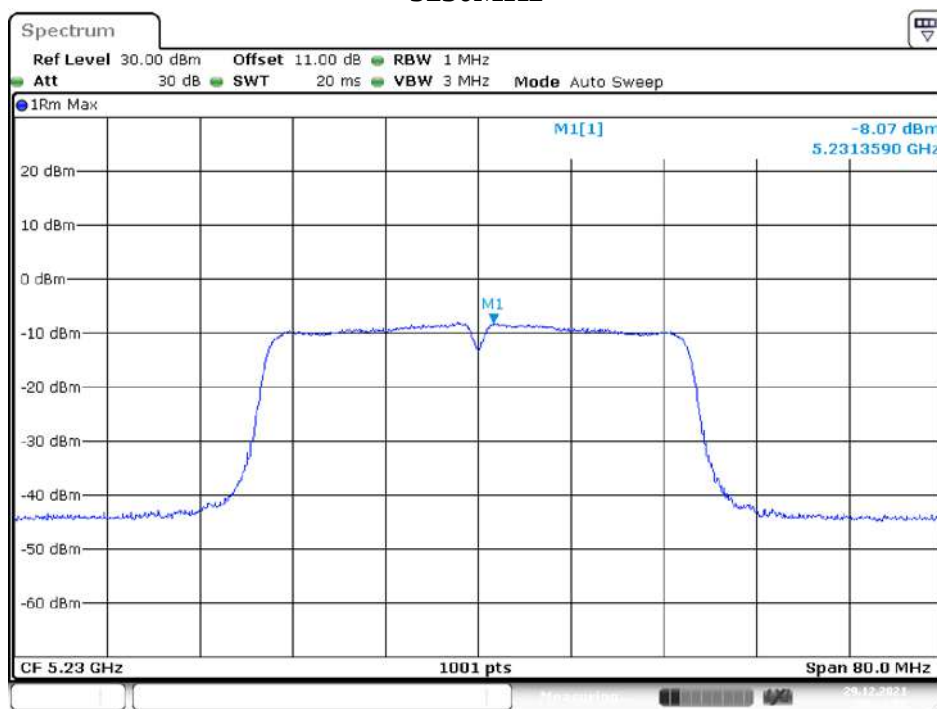
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IEEE 802.11ac VHT40 Mode / 5150 ~ 5250MHz (chain 0)
5190MHz

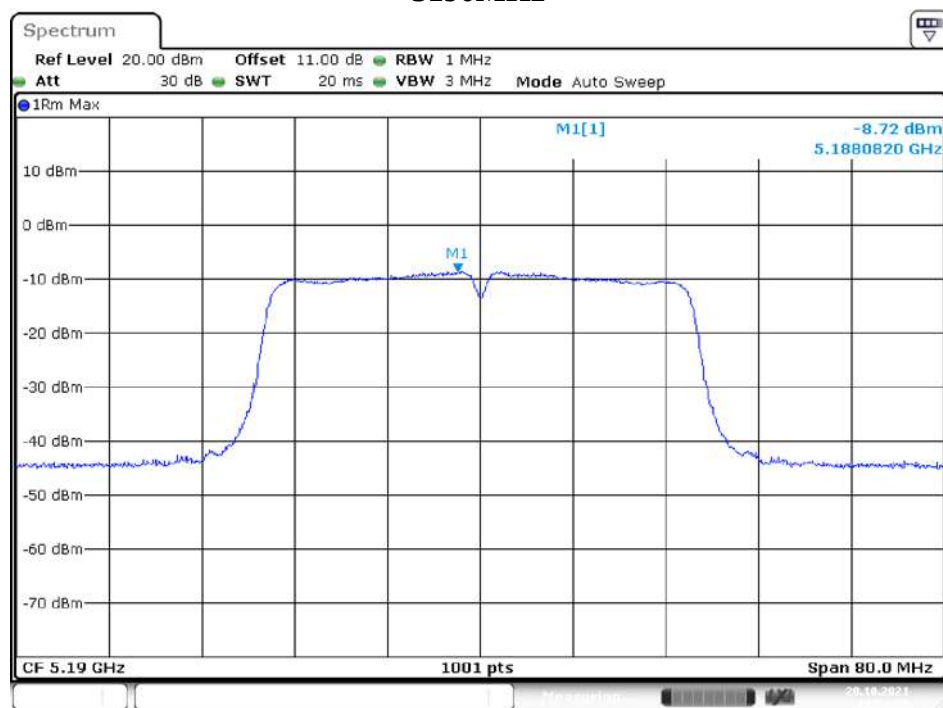
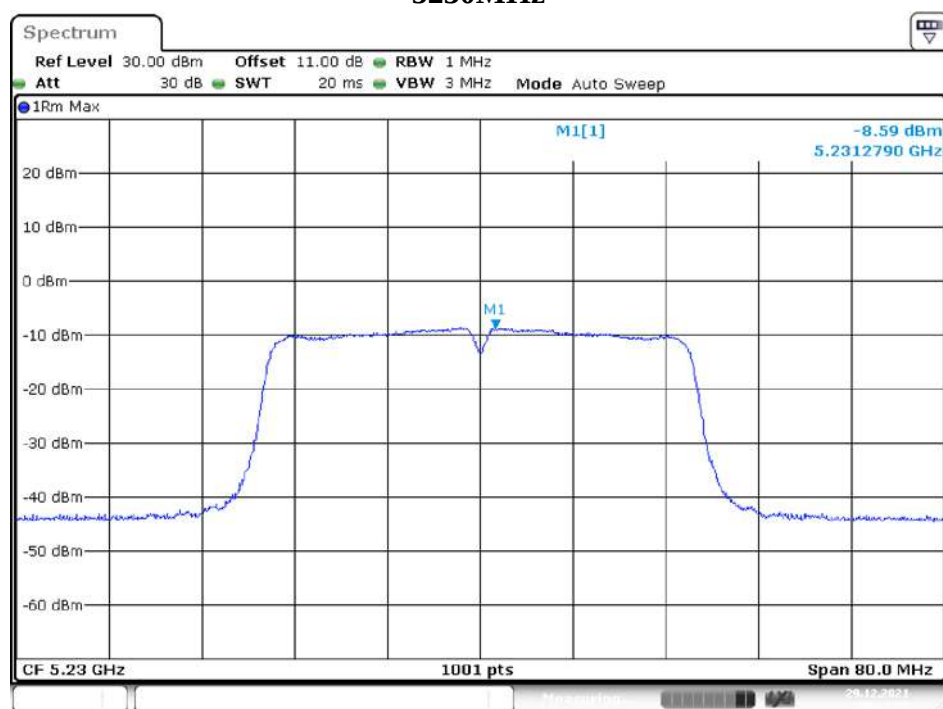


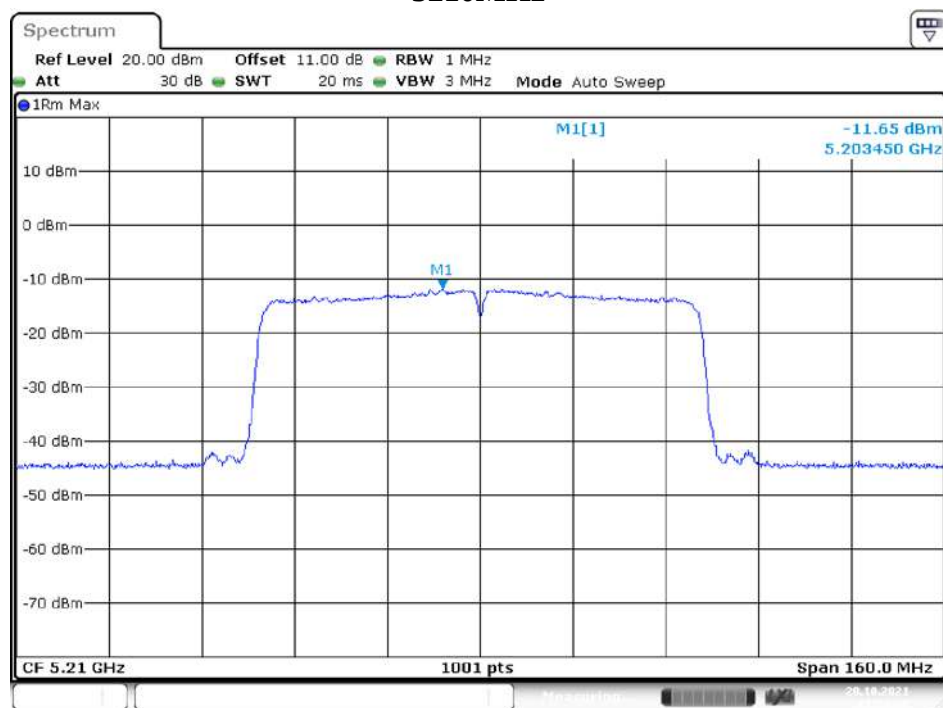
Date: 28.OCT.2021 11:26:16

5230MHz



Date: 29.DEC.2021 09:14:00

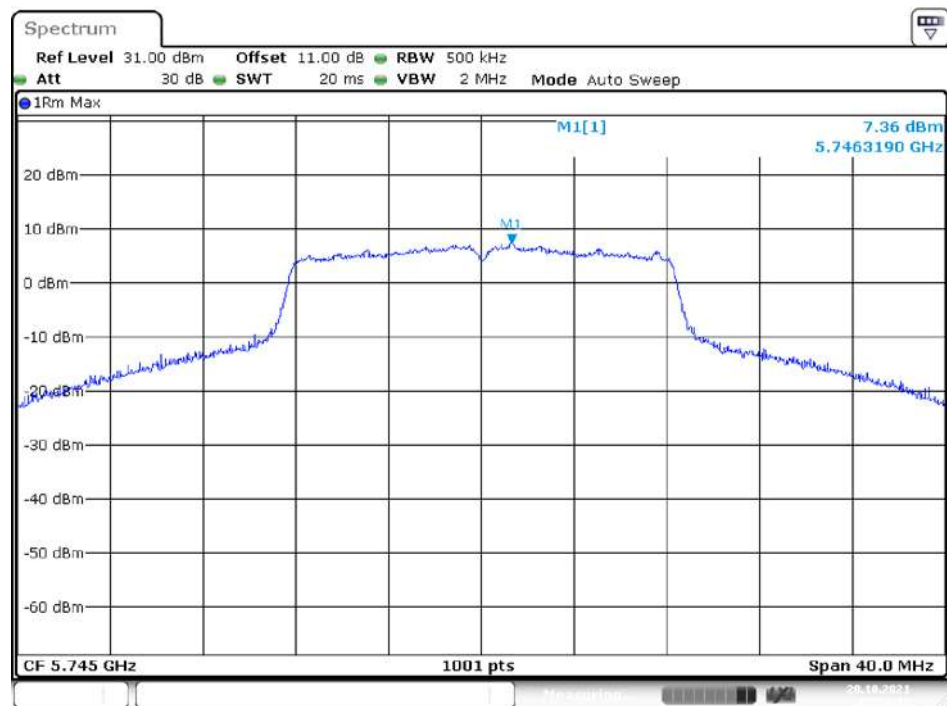
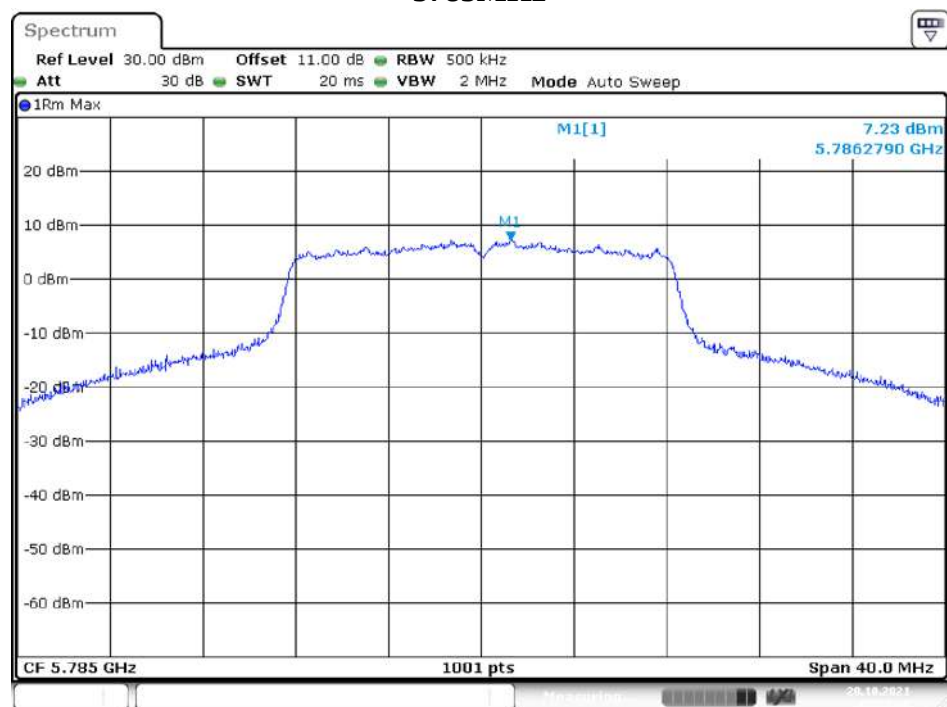
IEEE 802.11ac VHT40 Mode / 5150 ~ 5250MHz (chain 1)
5190MHz**5230MHz**

IEEE 802.11ac VHT80 Mode / 5150 ~ 5250MHz (chain 0)
5210MHz

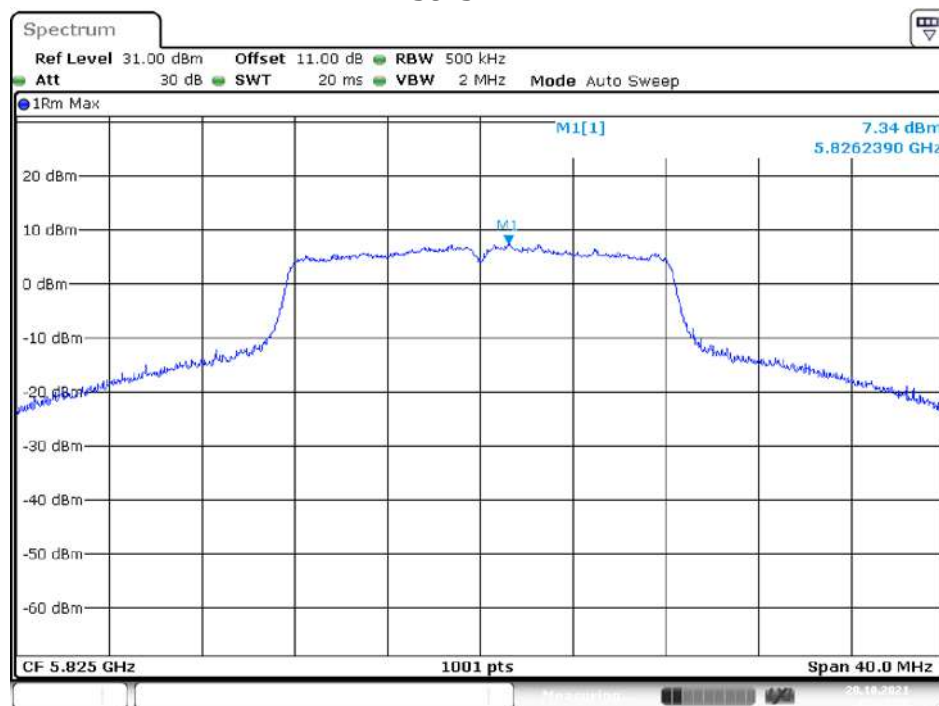
Date: 26.OCT.2021 11:36:41

IEEE 802.11ac VHT80 Mode / 5150 ~ 5250MHz (chain 1)
5210MHz

Date: 26.OCT.2021 11:36:58

UNII-3 Band IV PSD**IEEE 802.11a mode / 5725 ~ 5850MHz (chain 0)****5745MHz****5785MHz**

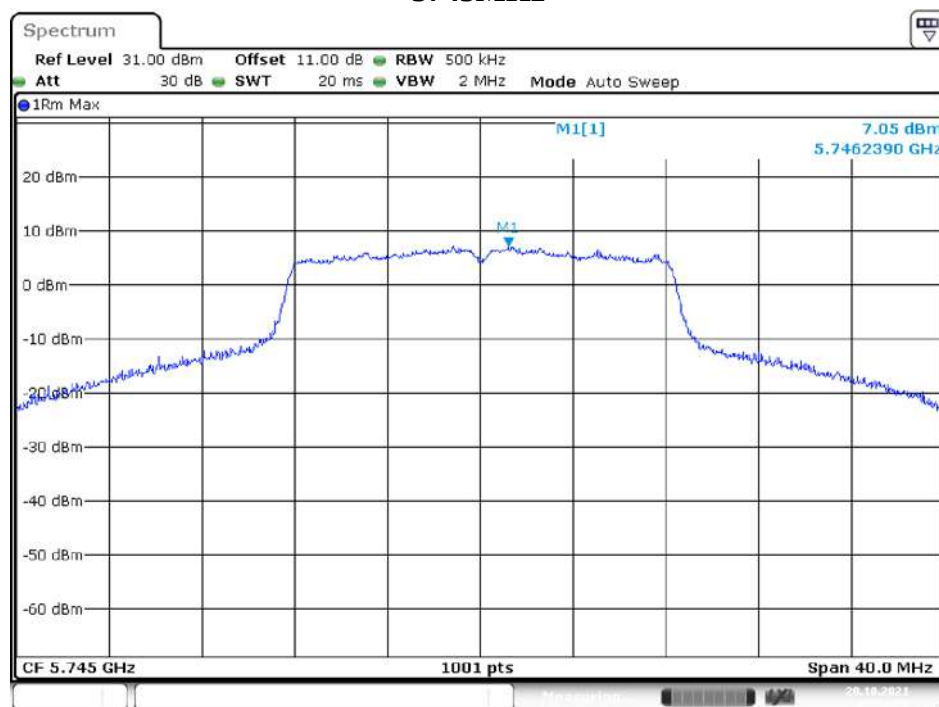
5825MHz



Date: 28.OCT.2021 12:17:21

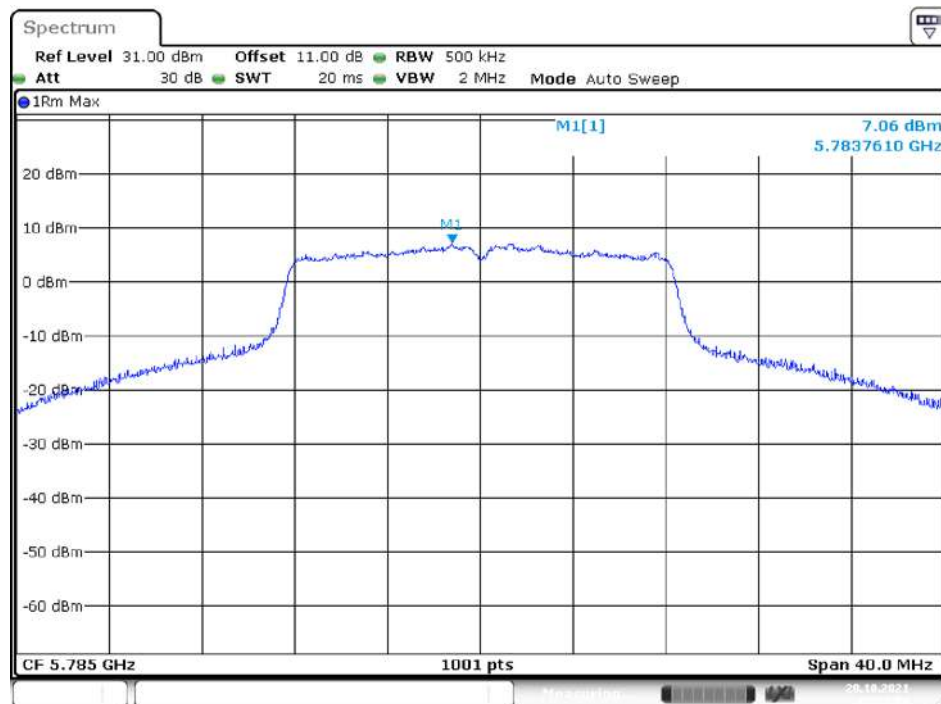
IEEE 802.11a mode / 5725 ~ 5850MHz (chain 1)

5745MHz



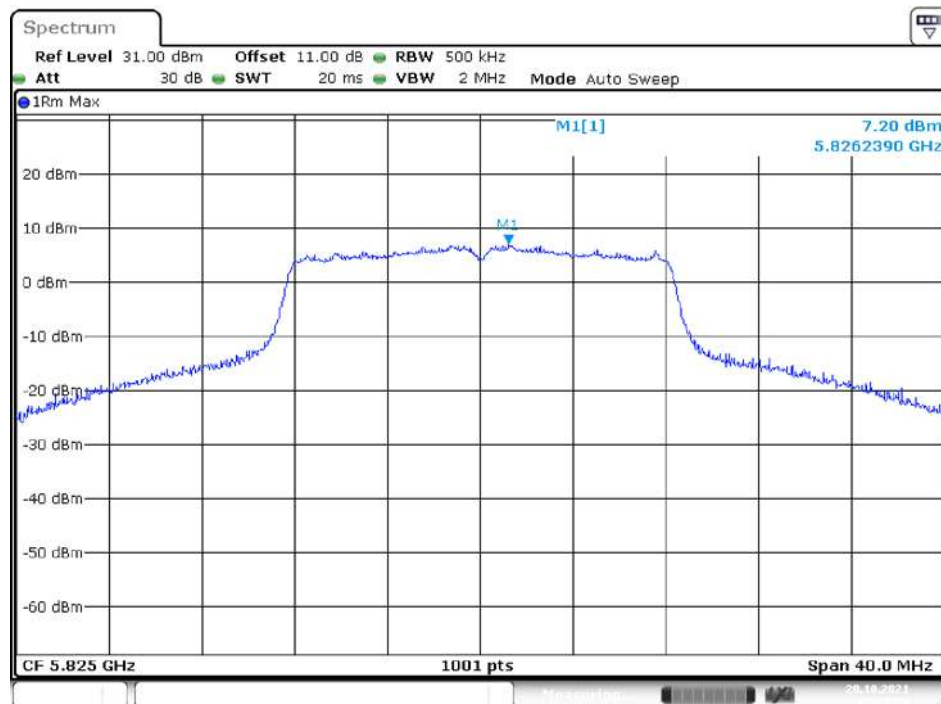
Date: 28.OCT.2021 12:26:28

5785MHz

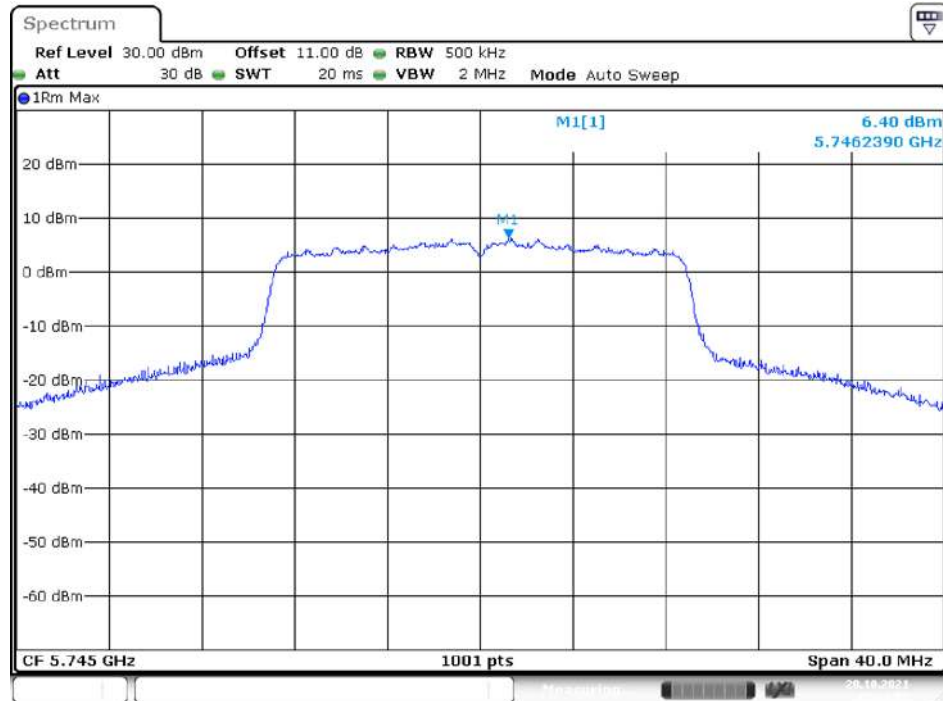


Date: 28.OCT.2021 12:23:04

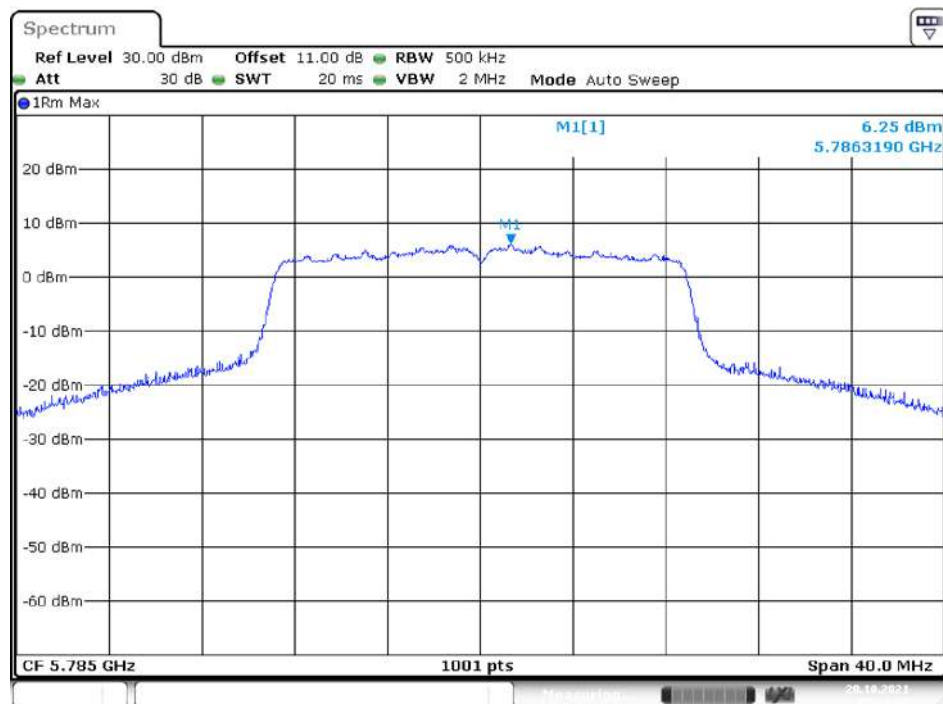
5825MHz



Date: 28.OCT.2021 12:18:35

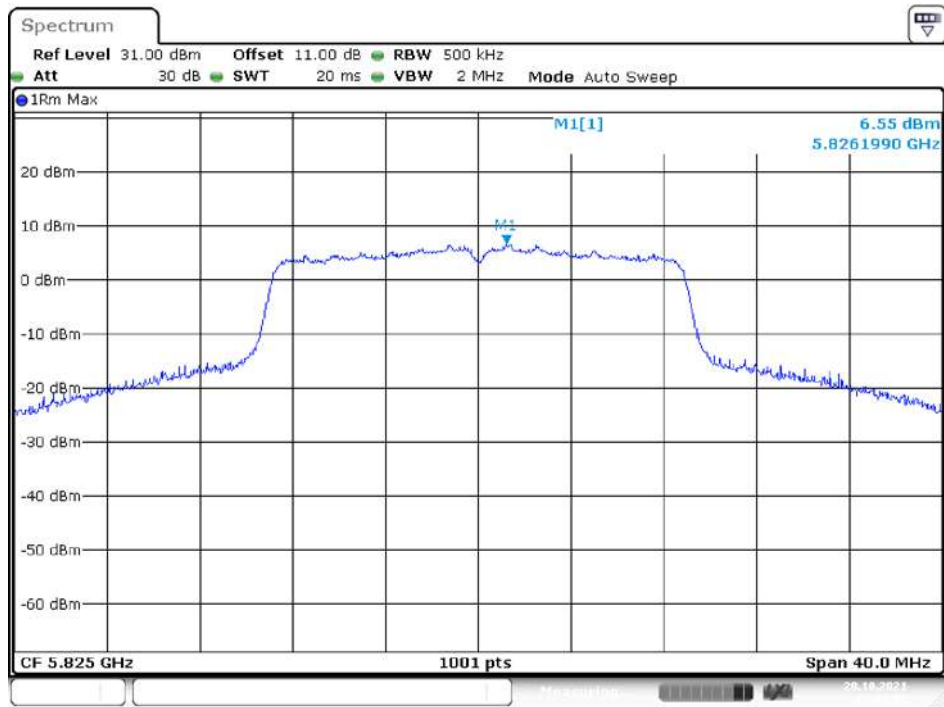
IEEE 802.11ac VHT20 Mode / 5725 ~ 5850MHz (chain 0)
5745MHz

Date: 28.OCT.2021 12:14:07

5785MHz

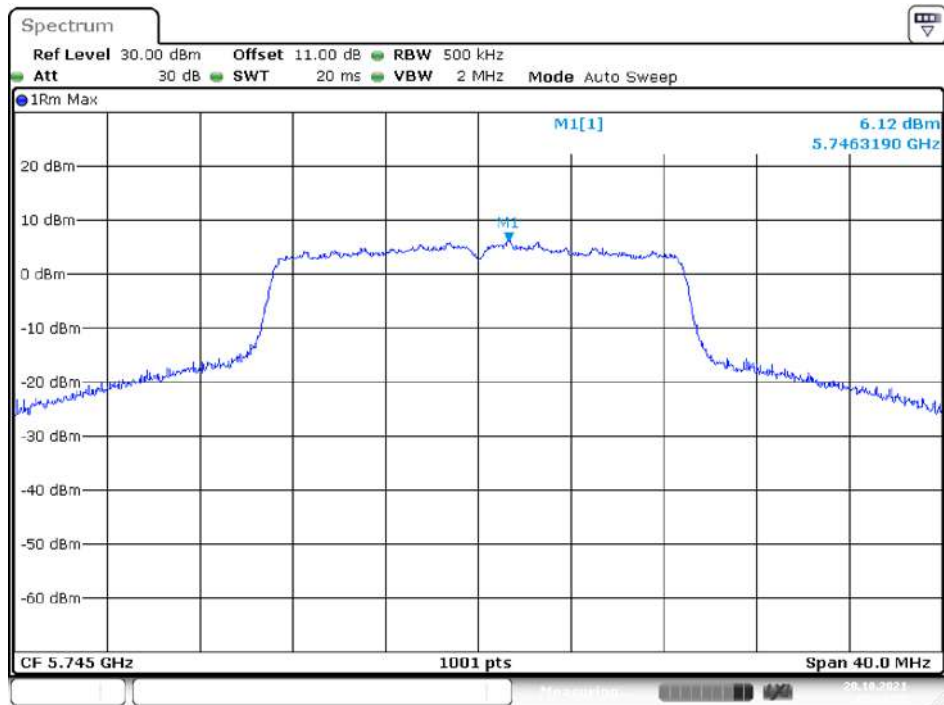
Date: 28.OCT.2021 12:11:43

5825MHz



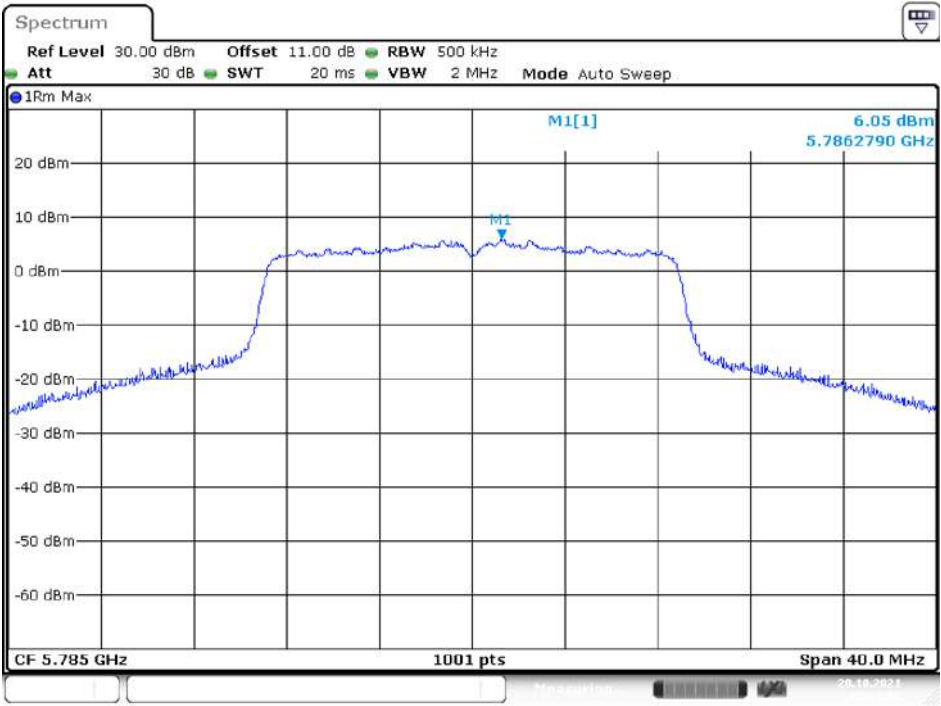
Date: 28.OCT.2021 12:09:07

IEEE 802.11ac VHT20 Mode / 5725 ~ 5850MHz (chain 1)
5745MHz



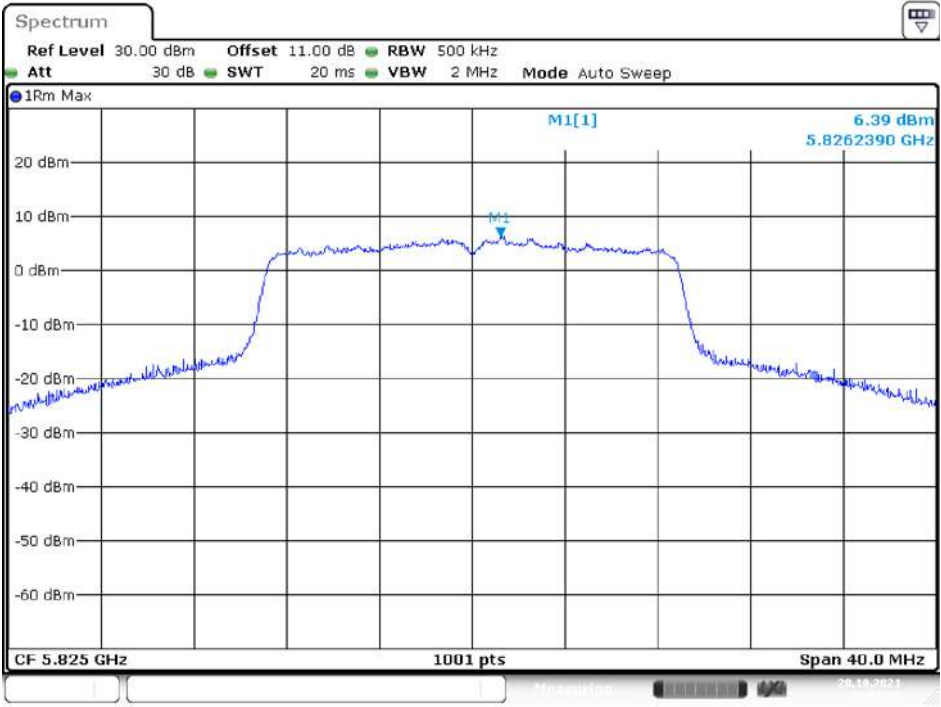
Date: 28.OCT.2021 12:14:23

5785MHz

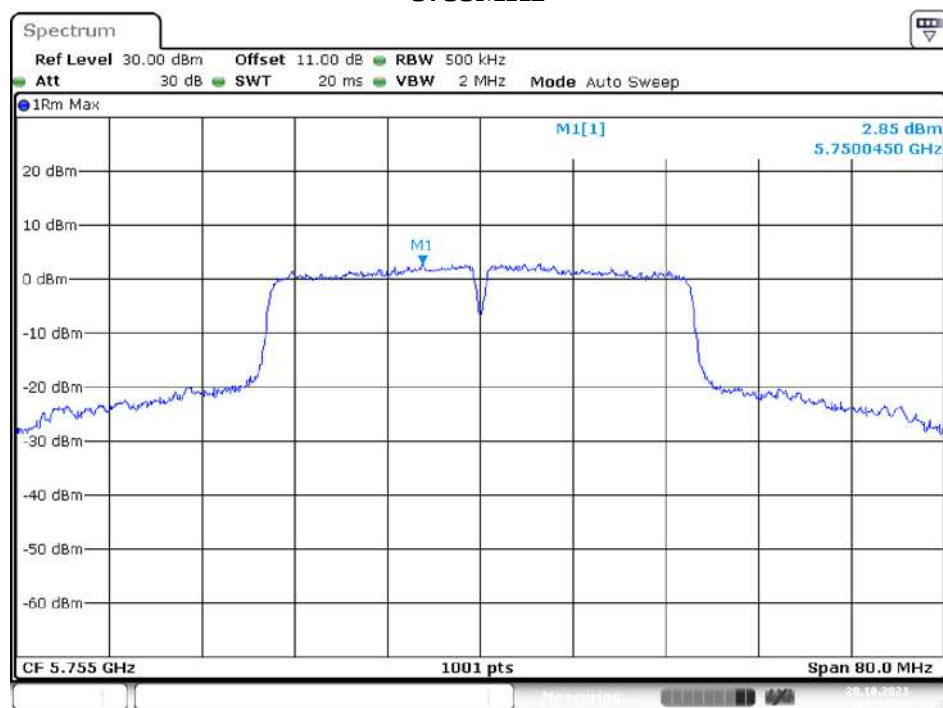


Date: 28.OCT.2021 12:12:08

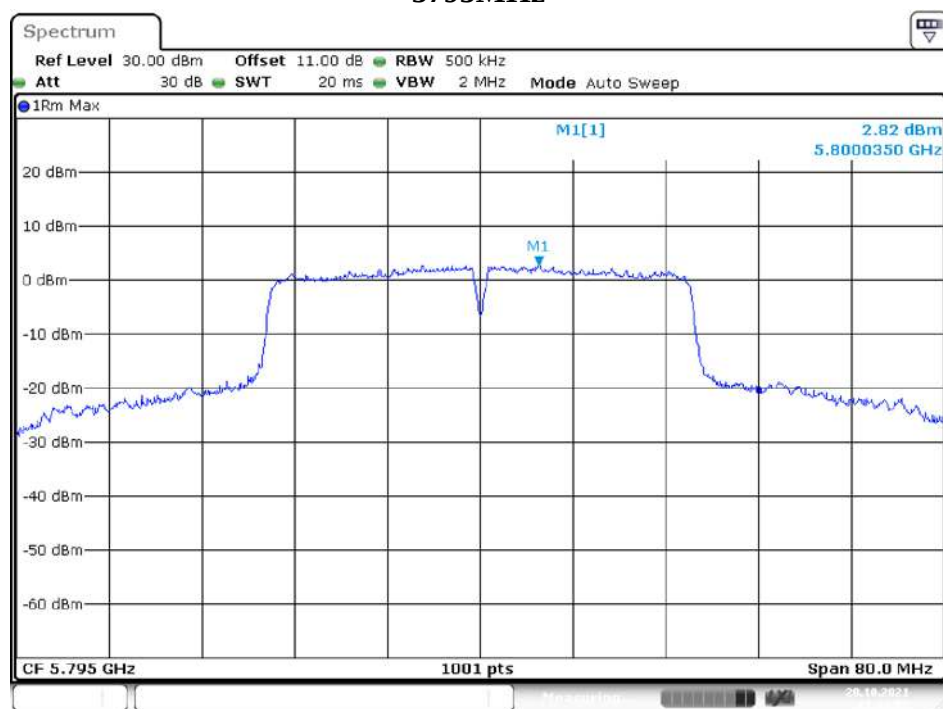
5825MHz



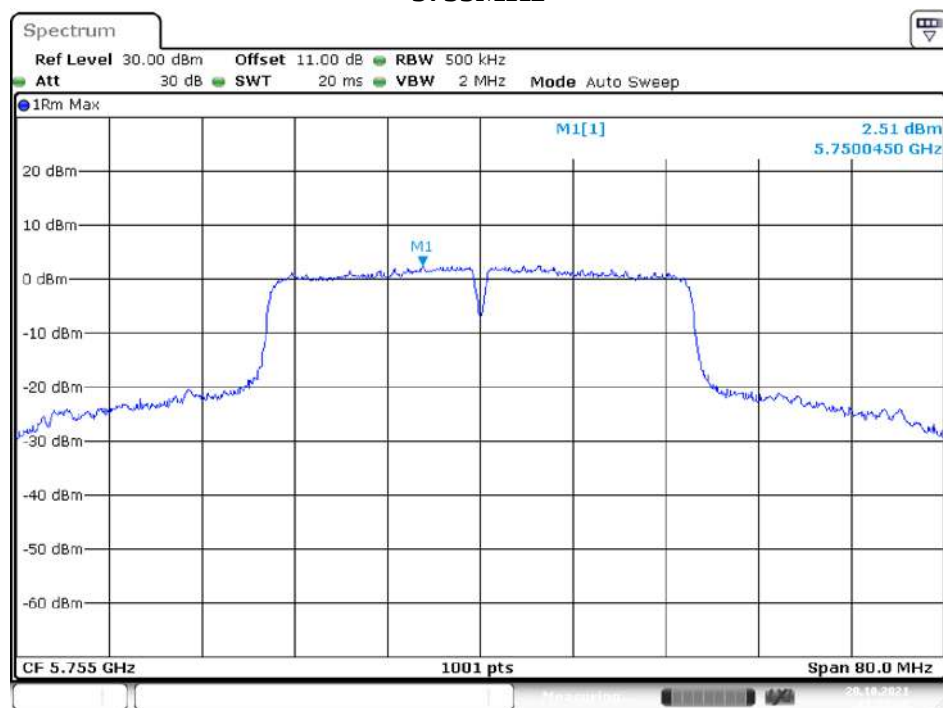
Date: 28.OCT.2021 12:09:23

IEEE 802.11ac VHT40 Mode / 5725 ~ 5850MHz (chain 0)
5755MHz

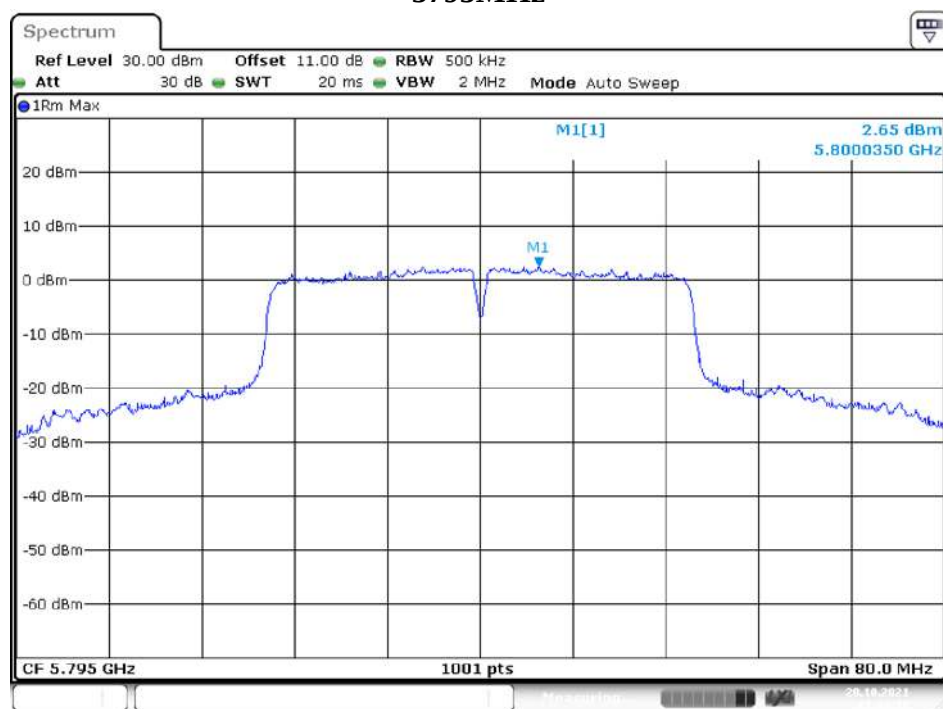
Date: 28.OCT.2021 11:57:33

5795MHz

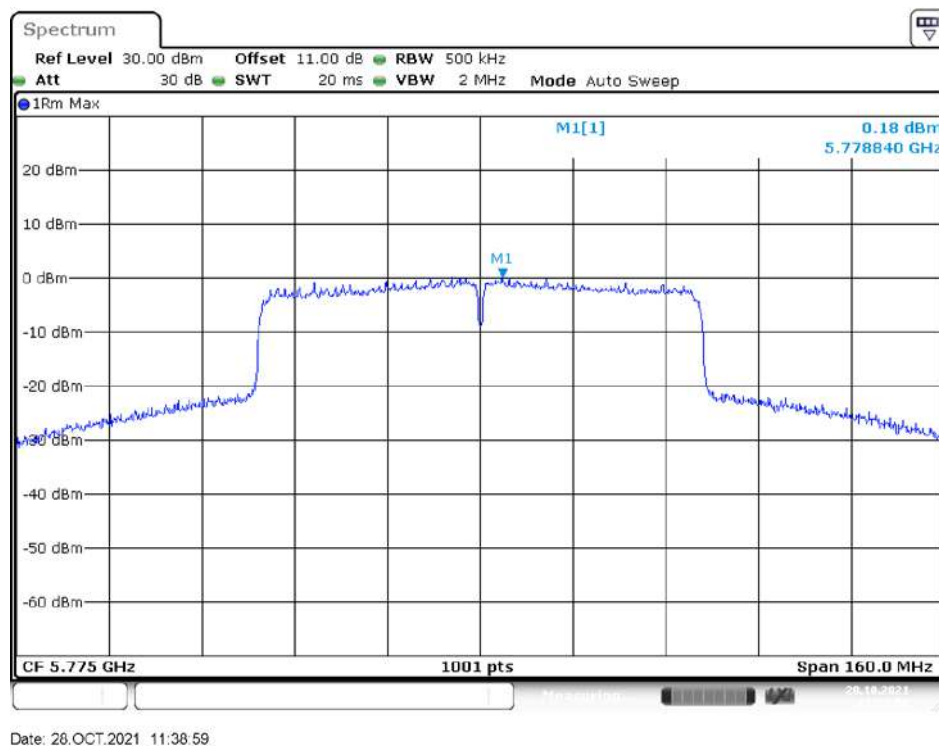
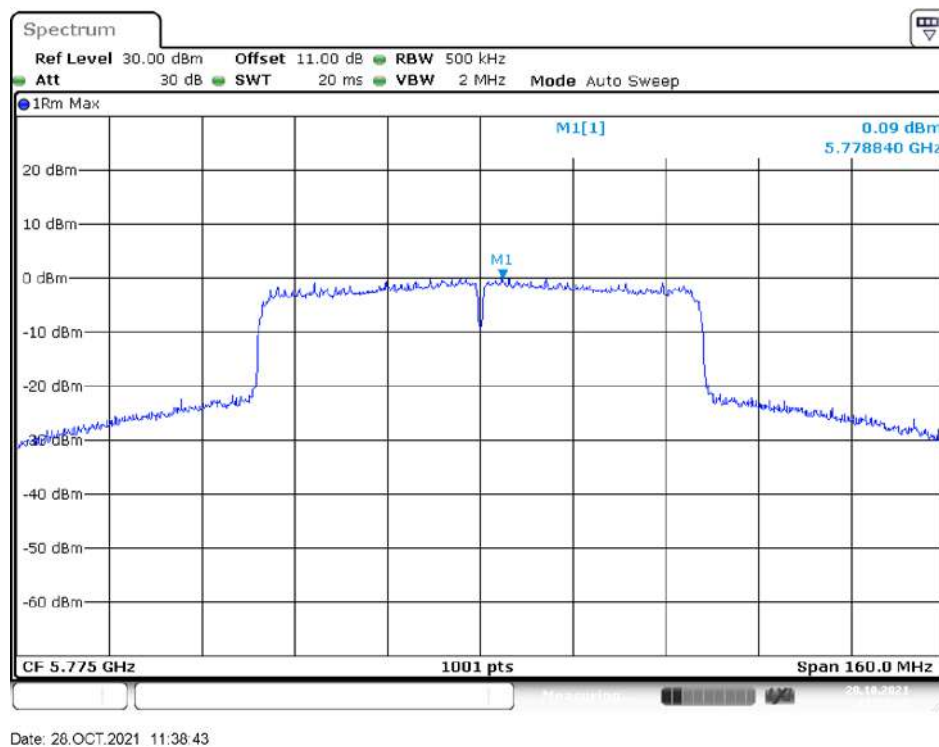
Date: 28.OCT.2021 11:41:02

IEEE 802.11ac VHT40 Mode / 5725 ~ 5850MHz (chain 1)
5755MHz

Date: 28.OCT.2021 11:57:50

5795MHz

Date: 28.OCT.2021 11:41:19

IEEE 802.11ac VHT80 Mode / 5725 ~ 5850MHz (chain 0)**5775MHz****IEEE 802.11ac VHT80 Mode / 5725 ~ 5850MHz (chain 1)****5775MHz********* END OF REPORT *******