FCC PART 15.407
ISEDC RSS-247, ISSUE 2, FEBRUARY 2017

TEST REPORT

For

Roku, Inc.

1155 Coleman Ave., San Jose, CA 95110, USA

FCC ID: TC2-R1040
IC: 5959A-R1037

Report Type:	**Product Type:**
Original Report	Set-top-box

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Report Number:	R2101064-NII
Report Date:	2021-03-23
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A2LA ACCREDITED CERTIFICATE #3297.02

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R2101064-NII	Original Report	2021-03-23

1 General Description

1.1 Product Description for Equipment under Test (EUT)

This test report was prepared on behalf of *Roku, Inc.*, and their product model: *3940X* and a similar model *3941X*, FCC ID: *TC2-R1040*; IC: *5959A-R1037* or the "EUT" as referred to in this report. It is a Set-top-box with 2.4 GHz and 5 GHz Wi-Fi. 2.4 GHz and 5 GHz Wi-Fi cannot transmit simultaneously.

1.2 Objective

This report was prepared on behalf of Roku, Inc in accordance with FCC CFR47 §15.407 and ISEDC RSS-247 Issue 2, February2017.

The objective was to determine compliance with FCC Part 15.407 and ISEDC RSS-247 rules for Output Power, Antenna Requirements, AC Line Conducted Emissions, Emission Bandwidth, Power spectral density, Conducted and Radiated Spurious Emissions.

1.3 Related Submittal(s)/Grant(s)

FCC Part 15, Subpart C, Equipment DTS with FCC ID: TC2-R1040; IC: 5959A-R1037

1.4 Test Methodology

All measurements contained in this report were conducted in accordance with ANSI C63.10-2013, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz, and FCC KDB 789033 D02 General UNII Test Procedure New Rules v02r01.

1.5 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in the field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Parameter	Measurement uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±0.57 dB
Power Spectral Density, conducted	±1.48dB
Unwanted Emissions, conducted	±1.57dB
All emissions, radiated	±4.0 dB
AC power line Conducted Emission	±2.0 dB
Temperature	±2 º C
Humidity	±5 %
DC and low frequency voltages	±1.0 %
Time	±2 %
Duty Cycle	±3 %

1.6 Test Facility Registrations

BACLs test facilities that are used to perform Radiated and Conducted Emissions tests are currently recognized by the Federal Communications Commission as Accredited with NIST Designation Number US1129.

BACL's test facilities that are used to perform Radiated and Conducted Emissions tests are currently registered with Industry Canada under Registration Numbers: 3062A-1, 3062A-2, and 3062A-3.

BACL is a Chinese Taipei Bureau of Standards Metrology and Inspection (BSMI) validated Conformity Assessment Body (CAB), under Appendix B, Phase I Procedures of the APEC Mutual Recognition Arrangement (MRA). BACL's BSMI Lab Code Number is: SL2-IN-E-1002R

BACL's test facilities that are used to perform AC Line Conducted Emissions, Telecommunications Line Conducted Emissions, Radiated Emissions from 30 MHz to 1 GHz, and Radiated Emissions from 1 GHz to 6 GHz are currently recognized as Accredited in accordance with the Voluntary Control Council for Interference [VCCI] Article 15 procedures under Registration Number A-0027.

1.7 Test Facility Accreditations

Bay Area Compliance Laboratories Corp. (BACL) is:

A- ***An independent, 3rd-Party, Commercial Test Laboratory accredited to ISO/IEC 17025:2005 by A2LA (Test Laboratory Accreditation Certificate Number 3297.02)*****,** in the fields of: Electromagnetic Compatibility and Telecommunications. Unless noted by an Asterisk (*) in the Compliance Matrix (See Section 3 of this Test Report), BACL's ISO/IEC 17025:2005 Scope of Accreditation includes all of the Test Method Standards and/or the Product Family Standards detailed in this Test Report..

BACL's ISO/IEC 17025:2005 Scope of Accreditation includes a comprehensive suite of EMC Emissions, EMC Immunity, Radio, RF Exposure, Safety and wireline Telecommunications test methods applicable to a wide range of product categories. These product categories include Central Office Telecommunications Equipment [including NEBS - Network Equipment Building Systems], Unlicensed and Licensed Wireless and RF devices, Information Technology Equipment (ITE); Telecommunications Terminal Equipment (TTE); Medical Electrical Equipment; Industrial, Scientific and Medical Test Equipment; Professional Audio and Video Equipment; Industrial and Scientific Instruments and Laboratory Apparatus; Cable Distribution Systems, and Energy Efficient Lighting.

B- ***A Product Certification Body accredited to ISO/IEC 17065:2012 by A2LA (Product Certification Body Accreditation Certificate Number 3297.03)*** to certify

- For the USA (Federal Communications Commission):
  - 1- All Unlicensed radio frequency devices within FCC Scopes A1, A2, A3, and A4;
  - 2- All Licensed radio frequency devices within FCC Scopes B1, B2, B3, and B4;
  - 3- All Telephone Terminal Equipment within FCC Scope C.
- For the Canada (Industry Canada):
  - 1 All Scope 1-Licence-Exempt Radio Frequency Devices;
  - 2 All Scope 2-Licensed Personal Mobile Radio Services;
  - 3 All Scope 3-Licensed General Mobile & Fixed Radio Services;
  - 4 All Scope 4-Licensed Maritime & Aviation Radio Services;
  - 5 All Scope 5-Licensed Fixed Microwave Radio Services
  - 6 All Broadcasting Technical Standards (BETS) in the Category I Equipment Standards List.
- For Singapore (Info-Communications Development Authority (IDA)):
  - 1 All Line Terminal Equipment: All Technical Specifications for Line Terminal Equipment – Table 1 of IDA MRA Recognition Scheme: 2011, Annex 2
  - 2. All Radio-Communication Equipment: All Technical Specifications for Radio-Communication Equipment – Table 2 of IDA MRA Recognition Scheme: 2011, Annex 2

- For the Hong Kong Special Administrative Region:
  1 All Radio Equipment, per KHCA 10XX-series Specifications;
  2 All GMDSS Marine Radio Equipment, per HKCA 12XX-series Specifications;
  3 All Fixed Network Equipment, per HKCA 20XX-series Specifications.
- For Japan:
  1 MIC Telecommunication Business Law (Terminal Equipment):
  - All Scope A1 - Terminal Equipment for the Purpose of Calls;
  - All Scope A2 - Other Terminal Equipment
  2 Radio Law (Radio Equipment):
  - All Scope B1 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 1 of the Radio Law
  - All Scope B2 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 2 of the Radio Law
  - All Scope B3 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 3 of the Radio Law

C- ***A Product Certification Body accredited to ISO/IEC 17065:2012 by A2LA (Product Certification Body Accreditation Certificate Number 3297.01)*** to certify Products to USA's Environmental Protection Agency (EPA) ENERGY STAR Product Specifications for:

1 Electronics and Office Equipment:
- for Telephony (ver. 3.0)
- for Audio/Video (ver. 3.0)
- for Battery Charging Systems (ver. 1.1)
- for Set-top Boxes & Cable Boxes (ver. 4.1)
- for Televisions (ver. 6.1)
- for Computers (ver. 6.0)
- for Displays (ver. 6.0)
- for Imaging Equipment (ver. 2.0)
- for Computer Servers (ver. 2.0)

2 Commercial Food Service Equipment
- for Commercial Dishwashers (ver. 2.0)
- for Commercial Ice Machines (ver. 2.0)
- for Commercial Ovens (ver. 2.1)
- for Commercial Refrigerators and Freezers

3 Lighting Products
- For Decorative Light Strings (ver. 1.5)
- For Luminaires (including sub-components) and Lamps (ver. 1.2)
- For Compact Fluorescent Lamps (CFLs) (ver. 4.3)
- For Integral LED Lamps (ver. 1.4)

4 Heating, Ventilation, and AC Products
- for Residential Ceiling Fans (ver. 3.0)
- for Residential Ventilating Fans (ver. 3.2)

5 Other
- For Water Coolers (ver. 3.0)

D- ***A NIST Designated Phase-I and Phase-II Conformity Assessment Body (CAB) for the following economies and regulatory authorities under the terms of the stated MRAs/Treaties:***

- Australia: ACMA (Australian Communication and Media Authority) – APEC Tel MRA -Phase I;
- Canada: (Innovation, Science and Economic development Canada - ISEDC) Foreign Certification Body – FCB – APEC Tel MRA -Phase I & Phase II;
- Chinese Taipei (Republic of China – Taiwan):
  - BSMI (Bureau of Standards, Metrology and Inspection) APEC Tel MRA -Phase I;
  - NCC (National Communications Commission) APEC Tel MRA -Phase I;

- European Union:
  - EMC Directive 2014/30/EU US-EU EMC & Telecom MRA CAB (NB)
  - Radio Equipment (RE) Directive 2014/53/EU US-EU EMC & Telecom MRA CAB (NB)
  - Low Voltage Directive (LVD) 2014/35/EU
- Hong Kong Special Administrative Region: (Office of the Telecommunications Authority – OFTA) APEC Tel MRA -Phase I & Phase II
- Israel – US-Israel MRA Phase I
- Republic of Korea (Ministry of Communications - Radio Research Laboratory) APEC Tel MRA -Phase I
- Singapore: (Infocomm Media Development Authority - IMDA) APEC Tel MRA -Phase I & Phase II;
- Japan: VCCI - Voluntary Control Council for Interference US-Japan Telecom Treaty VCCI Side Letter-
- USA:
  - ENERGY STAR Recognized Test Laboratory – US EPA
  - Telecommunications Certification Body (TCB) – US FCC;
  - Nationally Recognized Test Laboratory (NRTL) – US OSHA
- Vietnam: APEC Tel MRA -Phase I;

2 EUT Test Configuration

2.1 Justification

The EUT was configured for testing according to ANSI C63.10-2013 and FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.

The EUT was tested in a testing mode to represent worst-case results during the final qualification test.

The worst-case data rates are determined by measuring the average power, peak power and PPSD across all data rates bandwidths, and modulations.

2.2 EUT Exercise Software

The test software used was Teraterm. The software is compliant with the standard requirements being tested against.

Please refer to the following power setting table.

Modulation	Frequency (MHz)	Power Setting	
		Ant A	Ant B
802.11a	5180	61	61
	5220	60	64
	5240	60	64
	5745	64	64
	5785	64	64
	5825	64	64
802.11n20	5180	60	60
	5220	61	64
	5240	64	64
	5745	64	64
	5785	64	64
	5825	64	64
802.11ac20	5180	60	60
	5220	62	64
	5240	61	64
	5745	64	64
	5785	64	64
	5825	64	64
802.11n40	5190	49	49
	5230	64	64
	5755	64	64
	5795	64	64
802.11ac40	5190	49	49
	5230	64	64
	5755	64	64
	5795	64	64
802.11ac80	5210	45	46
	5775	64	64

*Data rates tested:
802.11a mode: 6Mbps
802.11n HT20: MCS0
802.11n HT40: MCS0
802.11ac VHT20: MCS0
802.11ac VHT40: MCS0
802.11ac VHT80: MCS0

2.3 Duty Cycle Correction Factor

According to KDB 789033 D02 General UNII Test Procedures New Rules v02r01 section B:

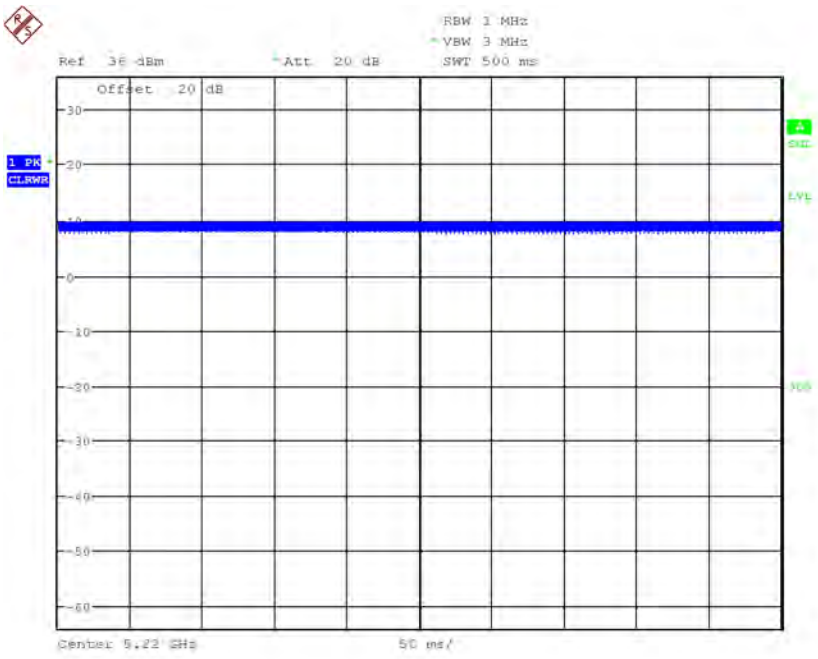
All measurements are to be performed with the EUT transmitting at 100% duty cycle at its maximum power control level; however, if 100% duty cycle cannot be achieved, measurements of duty cycle, x, and maximum-power transmission duration, T, are required for each tested mode of operation.

Radio Mode	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
802.11a	-	-	100	0
802.11n20	-	-	100	0
802.11ac20	-	-	100	0
802.11n40	-	-	100	0
802.11ac40	-	-	100	0
802.11ac80	-	-	100	0

Note: Duty Cycle = On Time (ms)/ Period (ms)
Note: Duty Cycle Correction Factor = 10*log(1/duty cycle)

Please refer to the following plots.

802.11a mode



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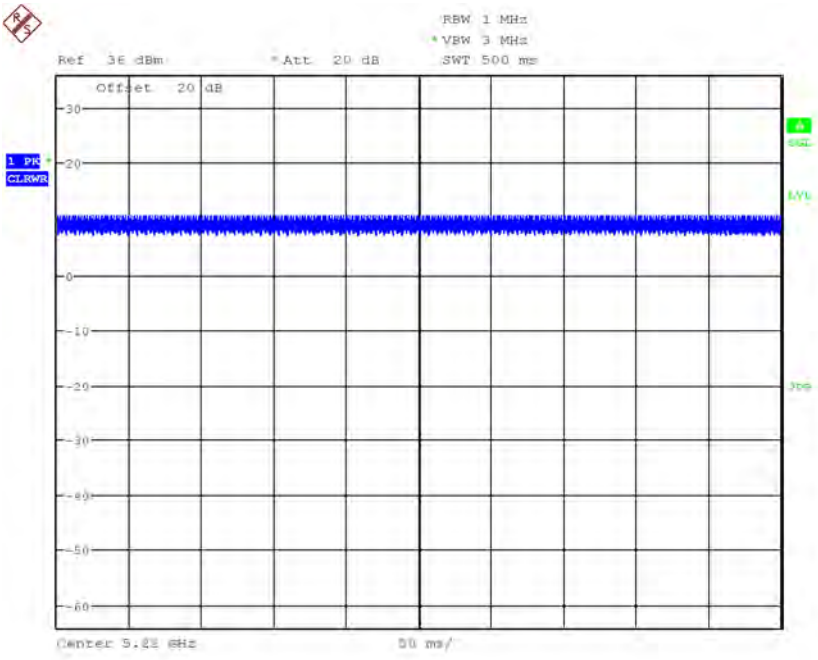
802.11n20 mode



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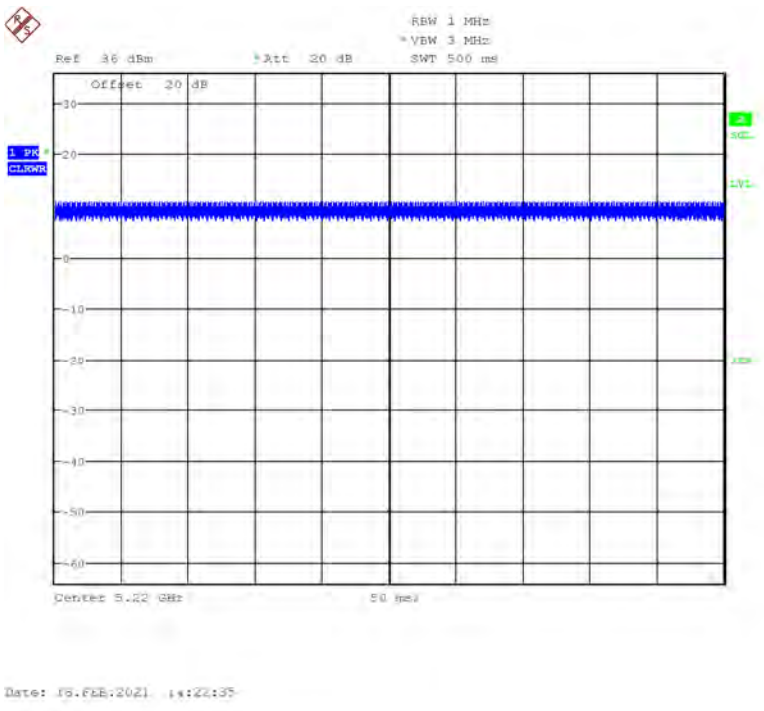
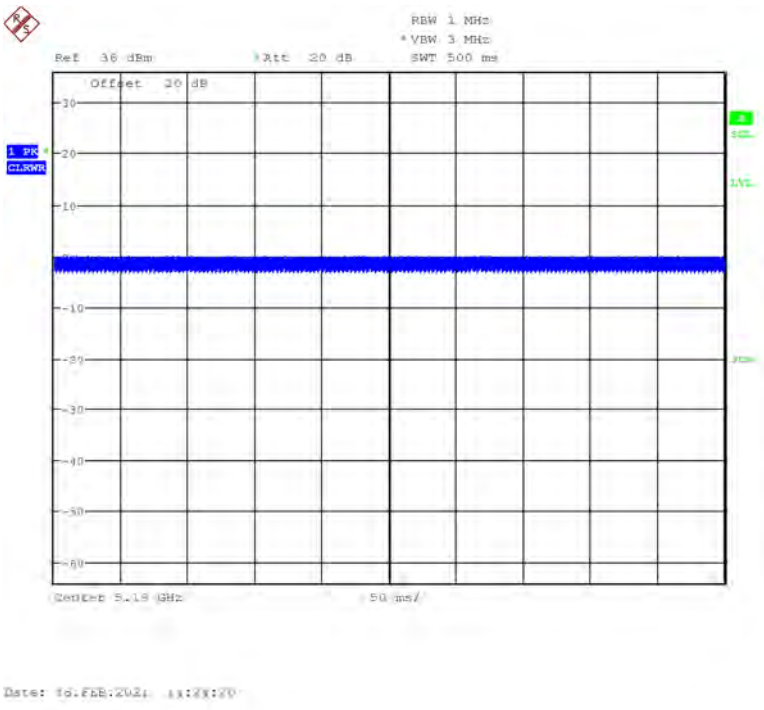
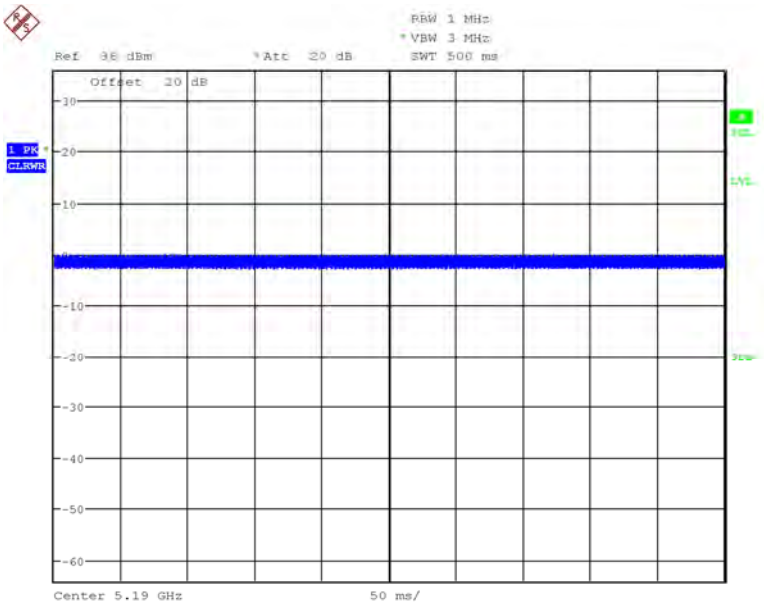
802.11ac20 mode



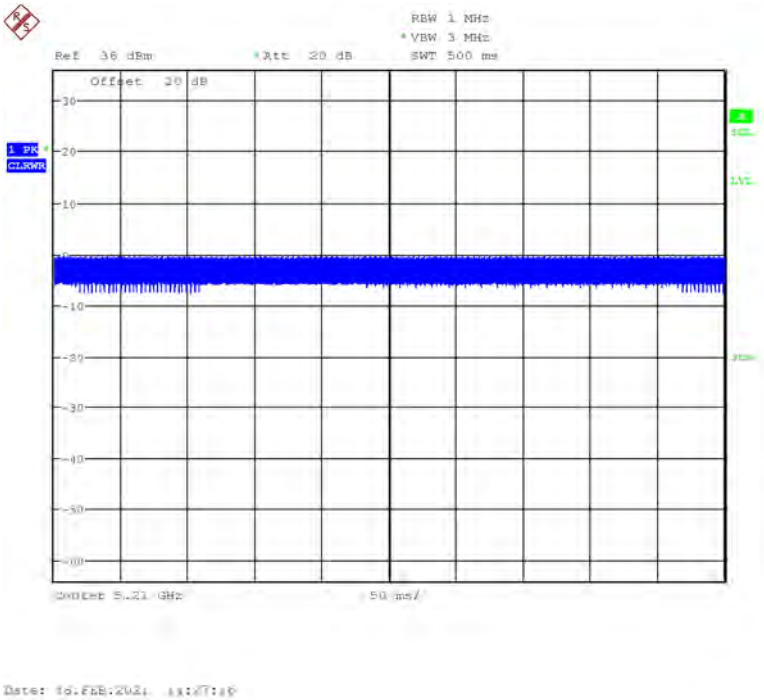
802.11n40 mode



802.11ac40 mode



802.11ac80 mode



2.4 Equipment Modifications

None

2.5 Local Support Equipment

Manufacturer	Description	Model
Dell	Laptop	Latitude E6410

2.6 Remote Support Equipment

None

2.7 Interface Ports and Cabling

Cable Description	Length (m)	To	From
USB Cable	< 1 m	Laptop	EUT
RF Cable	< 1 m	EUT	PSA

3 Summary of Test Results

Results reported relate only to the product tested.

FCC and ISEDC Rules	Description of Test	Result
FCC §2.1091, §15.407(f), ISEDC RSS-102	RF Exposure	Compliant
FCC §15.203 ISEDC RSS-Gen §6.8	Antenna Requirement	Compliant
FCC §15.207 ISEDC RSS-Gen §8.8	AC Power Line Conducted Emissions	Compliant
FCC §2.1053, §15.205, §15.209, 15.407(b) ISEDC RSS-247 §6.2	Spurious Radiated Emissions	Compliant
FCC §15.407(e) ISEDC RSS-Gen §6.2	Emission Bandwidth	Compliant
FCC §407(a) ISEDC RSS-247 §6.2	Output Power	Compliant
FCC §2.1051, §15.407(b) ISEDC RSS-247 §6.2	Band Edges	Compliant
FCC §15.407(a) ISEDC RSS-247 §6.2	Power Spectral Density	Compliant
FCC §2.1051, §15.407(b) ISEDC RSS-247 §6.2	Spurious Emissions at Antenna Terminals	Compliant

4 FCC §2.1091, §15.407(f) & ISEDC RSS-102 - RF Exposure

4.1 Applicable Standards

According to FCC §15.247(i) and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

According to KDB 447 498 Section (7.2), "simultaneous transmission of MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on calculated or measured field strengths or power density, is ≤ 1.0. The MPE ratio of each antenna is determined at the minimum *test separation distance* required by the operating configurations and exposure conditions of the host device, according to the ratio of field strengths or power density to MPE limit, at the test frequency.

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)
Limits for General Population/Uncontrolled Exposure				
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

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

Before equipment certification is granted, the procedure of IC RSS-102 must be followed concerning the exposure of humans to RF field.

According to ISED RSS-102 Issue 5:

2.5.2 Exemption Limits for Routine Evaluation – RF Exposure Evaluation

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

- below 20 MHz[6] and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $4.49/f^{0.5}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the e.i.r.p. was derived.

4.2 MPE Prediction

Predication of MPE limit at a given distance, Equation from OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

Where: S = power density
P = power input to antenna
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna

4.3 MPE Results

Worst Case: Antenna B, 802.11n40, 5755 MHz

Maximum output power at antenna input terminal (dBm):	18.71
Maximum output power at antenna input terminal (mW):	74.3019
Prediction distance (cm):	20
Prediction frequency (MHz):	5755
Maximum Antenna Gain, typical (dBi):	4
Maximum Antenna Gain (numeric):	2.512
Power density of prediction frequency at 20.0 cm (mW/cm^2):	0.037
FCC MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	1.0

The device is compliant with the requirement MPE limit for uncontrolled exposure. The maximum power density at the distance of 20 cm is 0.037 mW/cm^2. Limit is 1.0 mW/cm^2.

4.4 RF exposure evaluation exemption for IC

Worst Case: Antenna B, 802.11n40, 5755 MHz

Maximum EIRP power = 18.71 dBm + 4 dBi = 22.71 dBm which is less than $1.31\times10^{-2}f^{0.6834}$ = 4.86 W = 36.87 dBm

Therefore, the RF exposure Evaluation is not required.

5 FCC §15.203 & ISEDC RSS-Gen §6.8 - Antenna Requirements

5.1 Applicable Standards

According to FCC §15.203:

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 use of a standard antenna jack or electrical connector is prohibited.

And according to FCC §15.247 (b) (4), if transmitting antennas of directional gain greater than 6 dBi are used the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

According to ISEDC RSS-Gen §6.8: Transmitter Antenna

The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report (and in the notice to be included in the user manual, provided below).

When measurements at the antenna port are used to determine the RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna's manufacturer.

The test report shall state the RF power, output power setting and spurious emission measurements with each antenna type that is used with the transmitter being tested.

For licence-exempt equipment with detachable antennas, the user manual shall also contain the following notice in a conspicuous location:

This radio transmitter [enter the device's ISED certification number] has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Immediately following the above notice, the manufacturer shall provide a list of all antenna types which can be used with the transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna type.

5.2 Antenna List

The antennas used by the EUT are permanent attached antennas.
Antenna used is a Chip Antenna.

Radio	Frequency Range (MHz)	Maximum Antenna Gain (dBi)
2.4 GHz Wi-Fi (Ant A)	2400-2483.5	0
2.4 GHz Wi-Fi (Ant B)		2.9
5.2 GHz Wi-Fi (Ant A)	5150-5250	3
5.2 GHz Wi-Fi (Ant B)		2.2
5.8 GHz Wi-Fi (Ant A)	5725-5850	3
5.8 GHz Wi-Fi (Ant B)		4

Note: the antenna gain is provided by manufacturer.

6 FCC §15.207 & ISEDC RSS-Gen §8.8 - AC Power Line Conducted Emissions

6.1 Applicable Standards

As per FCC §15.207 and ISEDC RSS GEN §8.8

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. 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 Note1	56 to 46 Note2
0.5-5	56	46
5-30	60	50

Note1: Decreases with the logarithm of the frequency.
Note2: A linear average detector is required

6.2 Test Setup

The measurement was performed at shield room, using the setup per ANSI C63.10-2013 measurement procedure. The specification used was FCC §15.207 limits and and ISEDC RSS GEN §8.8.

External I/O cables were draped along the edge of the test table and bundle when necessary.
The AC/DC power adapter of the EUT was connected with LISN-1 which provided 120 V / 60 Hz AC power.

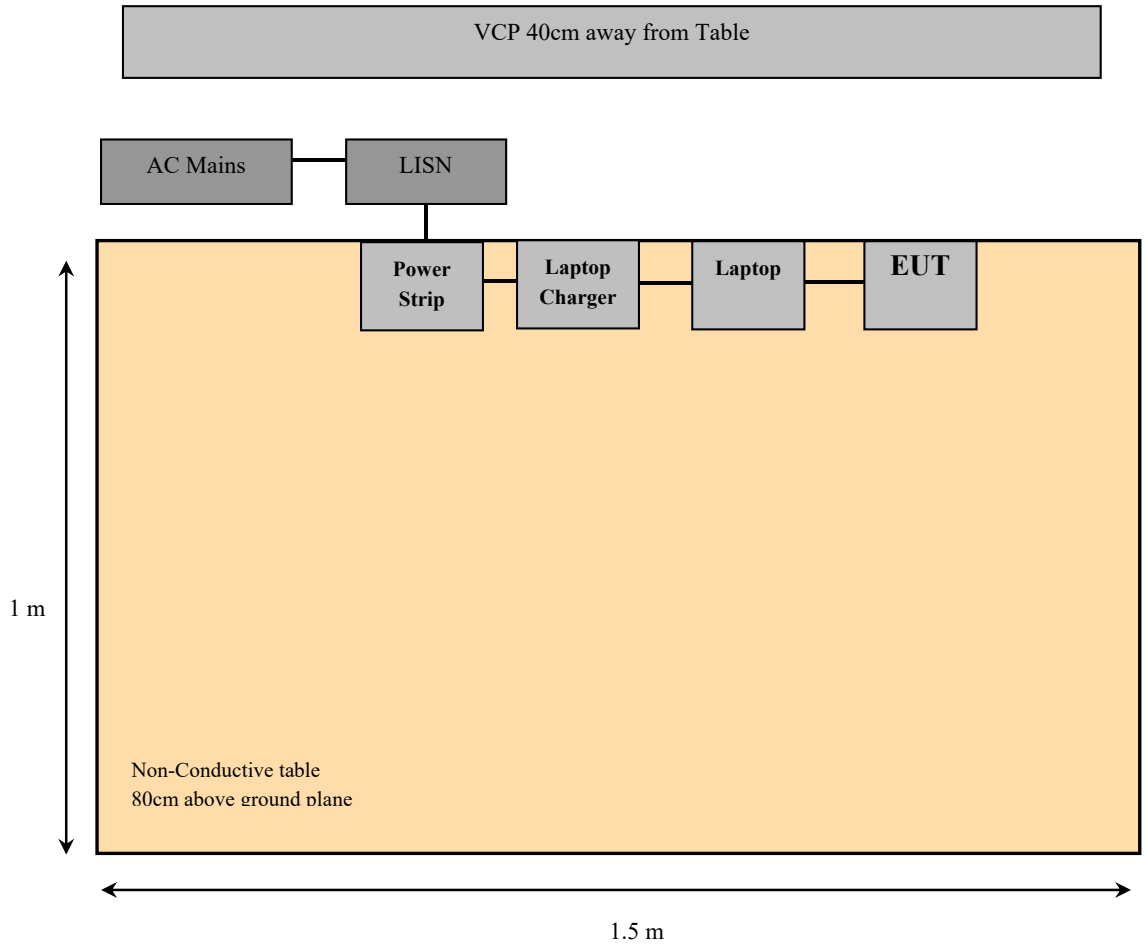
6.3 Test Procedure

During the conducted emissions test, the power cord of the EUT host system was connected to the mains outlet of the LISN-1 and the power cords of support equipment were connected to LISN-2.

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

All data was recorded in the peak, quasi-peak, and average detection mode. Quasi-Peak readings are distinguished with a “QP.” Average readings are distinguished with an “Ave”.

6.4 Test Setup Block Diagram



6.5 Corrected Amplitude and Margin Calculation

The Corrected Amplitude (CA) is calculated by adding the Correction Factor to the S.A. Reading. The basic equation is as follows:

CA = S.A. Reading + Correction Factor

For example, a corrected amplitude of 40.3 dBuV = S.A. Reading (32.5 dBuV) + Correction Factor (7.8 dB)

The Correction Factor is calculated by adding the Cable Loss (CL) and the Attenuator Factor (Atten) together. This calculation is done in the measurement software, and reported in the test result section. The basic equation is as follows:

Correction Factor = CL + Atten

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

Margin = Corrected Amplitude – Limit

6.6 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Rohde and Schwarz	Receiver, EMI Test	ESCI 1166.5950.03	100338	2020-03-17	18 months
Rohde and Schwarz	Impulse Limiter	ESH3-Z2	101964	2020-07-01	1 year
Solar Electronics Company	High Pass Filter	Type 7930-100	7930150204	2020-11-12	1 year
Suirong	30 ft conductive emission cable	LMR 400	-	N/R	N/A
FCC	LISN	FCC-LISN-50-25-2-10-CISPR16	160129	2020-10-13	14 months
Vasona	Test software	V6.0 build 11	10400213	N/R	N/R

Statement of Traceability: BACL Corp. *attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with the latest version of A2LA policy P102 "A2LA Policy on Metrological Traceability".*

6.7 Test Environmental Conditions

Temperature:	23º C
Relative Humidity:	42 %
ATM Pressure:	101.31 kPa

The testing was performed by Allen Huang on 2021-02-18 in the Ground Plane test site.

6.8 Summary of Test Results

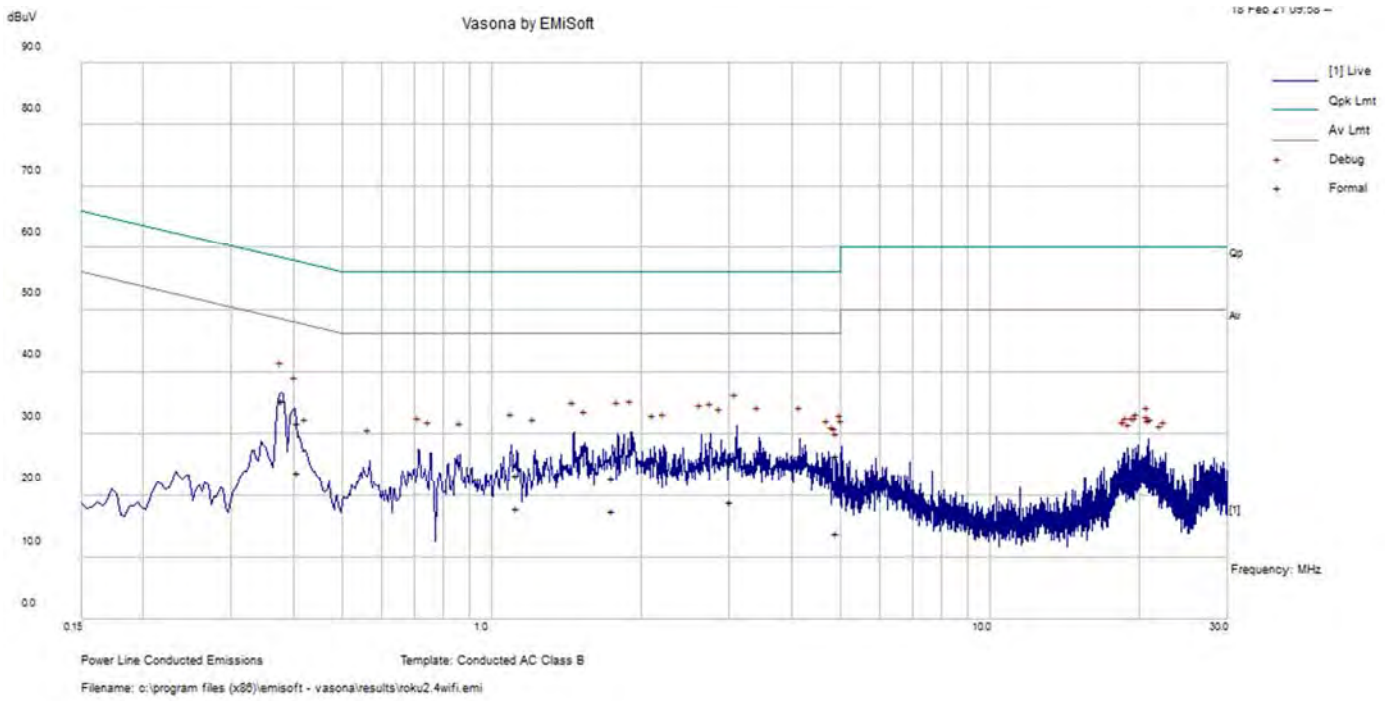
According to the recorded data in following table, the EUT complied with the FCC Part 15 and RSS-Gen standards' conducted emissions limits, with the margin reading of:

Connection: AC/DC adapter connected to 120 V/60 Hz, AC			
Margin (dB)	**Frequency (MHz)**	**Conductor Mode (Live/Neutral)**	**Range (MHz)**
-12.32	0.380633	Neutral	0.15-30

6.9 Conducted Emissions Test Plots and Data

Worst Case: Antenna B, 802.11n40 mode – Low Channel, 5755 MHz

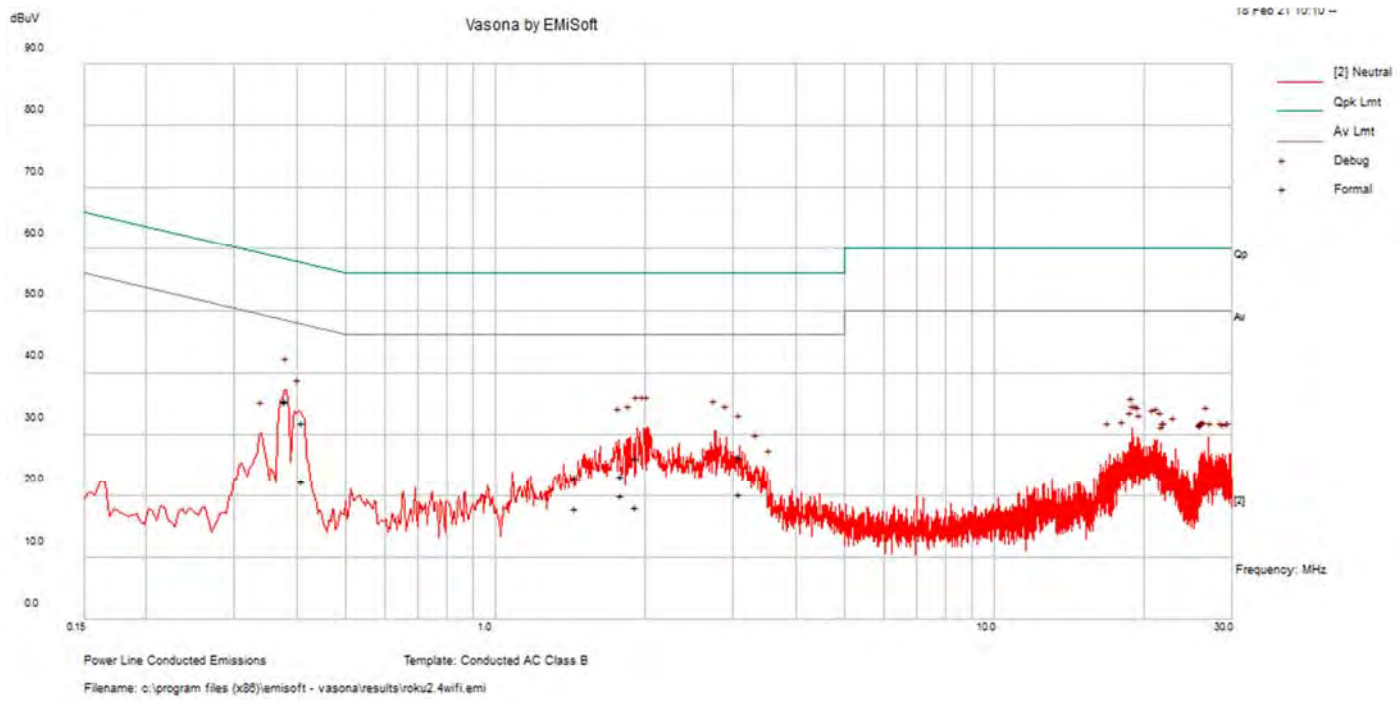
120 V, 60 Hz – Line



Frequency (MHz)	S.A. Reading (dBµV)	Correction Factor (dB)	Corrected Amplitude (dBµV)	Conductor (Line/ Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.379206	25.79	9.78	35.57	Line	58.3	-22.73	QP
0.410204	22.22	9.78	32	Line	57.64	-25.64	QP
3.087751	16.51	9.94	26.45	Line	56	-29.55	QP
1.916699	16.25	9.9	26.15	Line	56	-29.85	QP
1.446689	13.07	9.88	22.95	Line	56	-33.05	QP
1.793498	13.25	9.89	23.14	Line	56	-32.86	QP

Frequency (MHz)	S.A. Reading (dBµV)	Correction Factor (dB)	Corrected Amplitude (dBµV)	Conductor (Line/ Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.379206	25.62	9.78	35.4	Line	48.3	-12.89	Ave.
0.410204	12.66	9.78	22.44	Line	47.64	-25.2	Ave.
3.087751	10.24	9.94	20.18	Line	46	-25.82	Ave.
1.916699	8.1	9.9	17.99	Line	46	-28.01	Ave.
1.446689	7.95	9.88	17.82	Line	46	-28.18	Ave.
1.793498	10.17	9.89	20.07	Line	46	-25.93	Ave.

120 V, 60 Hz – Neutral



Frequency (MHz)	S.A. Reading (dBµV)	Correction Factor (dB)	Corrected Amplitude (dBµV)	Conductor (Line/ Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.380633	26.59	9.78	36.37	Neutral	58.27	-21.89	QP
0.403346	22.32	9.78	32.1	Neutral	57.78	-25.68	QP
2.012809	14.84	9.9	24.74	Neutral	56	-31.26	QP
1.977654	15.16	9.9	25.06	Neutral	56	-30.94	QP
1.911213	16.73	9.9	26.63	Neutral	56	-29.37	QP
2.772917	14.47	9.93	24.39	Neutral	56	-31.61	QP

Frequency (MHz)	S.A. Reading (dBµV)	Correction Factor (dB)	Corrected Amplitude (dBµV)	Conductor (Line/ Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.380633	26.16	9.78	35.94	Neutral	48.27	-12.32	Ave.
0.403346	18.97	9.78	28.75	Neutral	47.78	-19.03	Ave.
2.012809	9.27	9.9	19.17	Neutral	46	-26.83	Ave.
1.977654	8.35	9.9	18.25	Neutral	46	-27.75	Ave.
1.911213	7.78	9.9	17.67	Neutral	46	-28.33	Ave.
2.772917	8.89	9.93	18.82	Neutral	46	-27.18	Ave.

7 FCC §15.209, §15.407(b) & ISEDC RSS-247 §6.2 - Spurious Radiated Emissions

7.1 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	960 – 1240	4. 5 – 5. 15
0.495 – 0.505	16.69475 – 16.69525	1300 – 1427	5. 35 – 5. 46
2.1735 – 2.1905	25.5 – 25.67	1435 – 1626.5	7.25 – 7.75
4.125 – 4.128	37.5 – 38.25	1645.5 – 1646.5	8.025 – 8.5
4.17725 – 4.17775	73 – 74.6	1660 – 1710	9.0 – 9.2
4.20725 – 4.20775	74.8 – 75.2	1718.8 – 1722.2	9.3 – 9.5
6.215 – 6.218	108 – 121.94	2200 – 2300	10.6 – 12.7
6.26775 – 6.26825	123 – 138	2310 – 2390	13.25 – 13.4
6.31175 – 6.31225	149.9 – 150.05	2483.5 – 2500	14.47 – 14.5
8.291 – 8.294	156.52475 – 156.52525	2690 – 2900	15.35 – 16.2
8.362 – 8.366	156.7 – 156.9	3260 – 3267	17.7 – 21.4
8.37625 – 8.38675	162.0125 –167.17	3.332 – 3.339	22.01 – 23.12
8.41425 – 8.41475	167.72 – 173.2	3 3458 – 3 358	23.6 – 24.0
12.29 – 12.293	240 – 285	3.600 – 4.400	31.2 – 31.8
12.51975 – 12.52025	322 – 335.4		36.43 – 36.5
12.57675 – 12.57725	399.9 – 410		Above 38.6
13.36 – 13.41	608 – 614		

As per FCC §15.209: 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 Note 1	3
88 - 216	150 Note 1	3
216 - 960	200 Note 1	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 470-806 MHz. 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)

(1) 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.

(2) For transmitters operating in the 5.25-5.35 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.

(3) For transmitters operating in the 5.47 -5.725 GHz band: All emissions outside of the 5.47-5725 GHz band shall not exceed an ei.r.p. of -27 dBm/MHz.

(4) For transmitters operating in the 5.725-5.85 GHz band: All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall noet exceed an e.i.r.p. of -27 dBm/MHz.

(5) 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.

(6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.

(7) The provisions of §15.205 apply to intentional radiators operating under this section.

As per ISEDC RSS-247 §6.2

For transmitters operating in the band 5150-5250 MHz, all emissions outside the band 5150-5350 MHz shall not exceed -27 dBm/MHz e.i.r.p. However, any unwanted emissions that fall into the band 5250- 5350 MHz must be 26 dBc, when measured using a resolution bandwidth between 1 and 5% of the occupied bandwidth, above 5.25 GHz. Otherwise, the transmission is considered as intentional and the devices shall implement dynamic frequency selection (DFS) and transmitter power control (TPC) as per the requirements for the band 5250-5350 MHz

For devices with both operating frequencies and channel bandwidths contained within the band 5250-5350 MHz, the device shall comply with the following:

1. All emissions outside the band 5250-5350 MHz shall not exceed -27 dBm/MHz e.i.r.p. if the equipment is intended for outdoor use; or
2. All emissions outside the band 5150-5350 MHz shall not exceed -27 dBm/MHz e.i.r.p. and any emissions within the band 5150-5250 MHz shall meet the power spectral density limits of Section 6.2.1. The device shall be labelled “for indoor use only.”

For devices with operating frequencies in the band 5250-5350 MHz but having a channel bandwidth that overlaps the band 5150-5250 MHz, the devices’ unwanted emission shall not exceed -27 dBm/MHz e.i.r.p. outside the band 5150-5350 MHz and its power shall comply with the spectral power density for operation within the band 5150-5250 MHz. The device shall be labelled “for indoor use only.”

For transmitters operating in the band 5470-5725 MHz, emissions outside the band shall not exceed -27 dBm/MHz e.i.r.p.

For the band 5725-5850 MHz, emissions at frequencies from the band edges to 10 MHz above or below the band edges shall not exceed -17 dBm/MHz e.i.r.p. For emissions at frequencies more than 10 MHz above or below the band edges, the emissions power shall not exceed -27 dBm/MHz.

7.2 Test Setup

The radiated emissions tests were performed in the 5-meter Chamber, using the setup in accordance with ANSI C63.10-2013. The specification used was the FCC 15.407 and ISEDC RSS-247 limits.

The spacing between the peripherals was 10 centimeters.

External I/O cables were draped along the edge of the test table and bundle when necessary.

7.3 Test Procedure

For the radiated emissions test, the EUT host, and all support equipment power cords were connected to the AC floor outlet.

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

The EUT is set 3 meter away from the testing antenna, which is varied from 1-4 meter, and the EUT is placed on a turntable, which is 0.8 meter or 1.5 meter above ground plane, the table shall be rotated for 360 degrees to find out the highest emission. The receiving antenna should be changed the polarization both of horizontal and vertical.

The spectrum analyzer or receiver is set as:

Below 1000 MHz:

RBW = 100 kHz / VBW = 300 kHz / Sweep = Auto

Above 1000 MHz:

(1) Peak: RBW = 1MHz / VBW = 3MHz / Sweep = 100ms
(2) Average: RBW = 1MHz / VBW = 10Hz / Sweep = Auto

7.4 Corrected Amplitude and Margin Calculation

For emissions below 1 GHz,

The Corrected Amplitude (CA) is calculated by adding the Correction Factor to the S.A. Reading. The basic equation is as follows:

CA = S.A. Reading + Correction Factor

For example, a corrected amplitude of 40.3 dBuV/m = S.A. Reading (32.5 dBuV) + Correction Factor (7.8 dB/m)

The Correction Factor is calculated by adding the Antenna Factor (AF), the Cable Loss (CL), the Attenuator Factor (Atten) and subtracting the Amplifier Gain (Ga) together. This calculation is done in the measurement software, and reported in the test result section. The basic equation is as follows:

Correction Factor = AF + CL + Atten – Ga

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

Margin = Corrected Amplitude – Limit

For emission above 1 GHz and below 26.5 GHz,

The Corrected Amplitude (CA) is calculated by adding the Antenna Factor (AF), the Cable Loss (CL), the Attenuator Factor (Atten) and subtracting the Amplifier Gain (Ga) to indicated Amplitude (Ai) reading. The basic equation is as follows:

CA = Ai + AF + CL + Atten – Ga

For example, a corrected amplitude of 40.3 dBuV/m = Indicated Reading (32.5 dBuV) + Antenna Factor (+23.5dB) + Cable Loss (3.7 dB) + Attenuator (10 dB) - Amplifier Gain (29.4 dB)

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

Margin = Corrected Amplitude – Limit

For emissions above 26.5 GHz,

The Corrected Amplitude (CA) is calculated by adding the Correction Factor to the S.A. Reading. The basic equation is as follows:

CA = S.A. Reading + Correction Factor

For example, a corrected amplitude of 40.3 dBuV/m = S.A. Reading (32.5 dBuV) + Correction Factor (7.8 dB/m)

The Correction Factor is calculated by adding the Antenna Factor (AF), the Cable Loss (CL), the Attenuator Factor (Atten) and subtracting the Amplifier Gain (Ga) together. This calculation is done in the measurement software, and reported in the test result section. The basic equation is as follows:

Correction Factor = AF + CL + Atten – Ga

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

Margin = Corrected Amplitude – Limit

7.5 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
HP	Spectrum Analyzer 46 GHz	E4446A	US44300386	2019-08-24	18 Months
Rohde and Schwarz	Receiver, EMI Test	ESCI 1166.5950.03	100338	2020-03-17	18 months
BACL	5m3 Sensitivity Box	1	2	2020-10-27	1 year
Sunol Sciences	System Controller	SC99V	011003-1	N/R	N/A
Sunol Sciences	Biconilog Antenna	JB3	A020106-2	2019-11-20	2 years
ETS Lindgren	Horn Antenna	3117	00218973	2019-02-13	2.5 years
Wisewave	Antenna, Horn	ARH-4223-02	10555-01	2020-02-27	2 years
Wisewave	Antenna, Horn	ARH-2823-02	10555-02	2020-02-27	2 years
-	SMA cable	-	-	Each time[1]	N/A
Insulted Wire Corp.	157 Series 2.92 SM (x2) Armored 33 ft. Cable	KPS-1571AN-3960-KPS	DC 1917	2020-02-28	1 year
IW Microwave	157 Series Cable Armored with 2.92mm Male Plugs	KPS-1571AN-2400	DC 1922	2020-06-06	1 year
MDP DIgital	Times Microwave LMR 400 UltraFex Coaxial Cable 35\'	LMR400UF	BACL1904161	2020-05-20	1 year
AH Systems	Preamplifier	PAM 1840 VH	170	2020-11-09	1 year
Agilent	Preamplifier	8449B	3147A00400	2020-02-27	1 year
HP	Pre Amplifier	8447D	2944A07030	2020-08-17	1 year
Vasona	Test software	V6.0 build 11	10400213	N/R	N/R

Note[1]: cables and attenuators included in the test set-up will be checked each time before testing.
Statement of Traceability: BACL Corp. *attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with the latest version of A2LA policy P102 "A2LA Policy on Metrological Traceability".*

7.6 Test Environmental Conditions

Temperature:	22-24 ºC
Relative Humidity:	40-41 %
ATM Pressure:	103.1-104.1 kPa

The testing was performed by Tri Pham and Allen Huang from 2021-01-29 to 2021-02-24 in 5m chamber 3.

7.7 Summary of Test Results

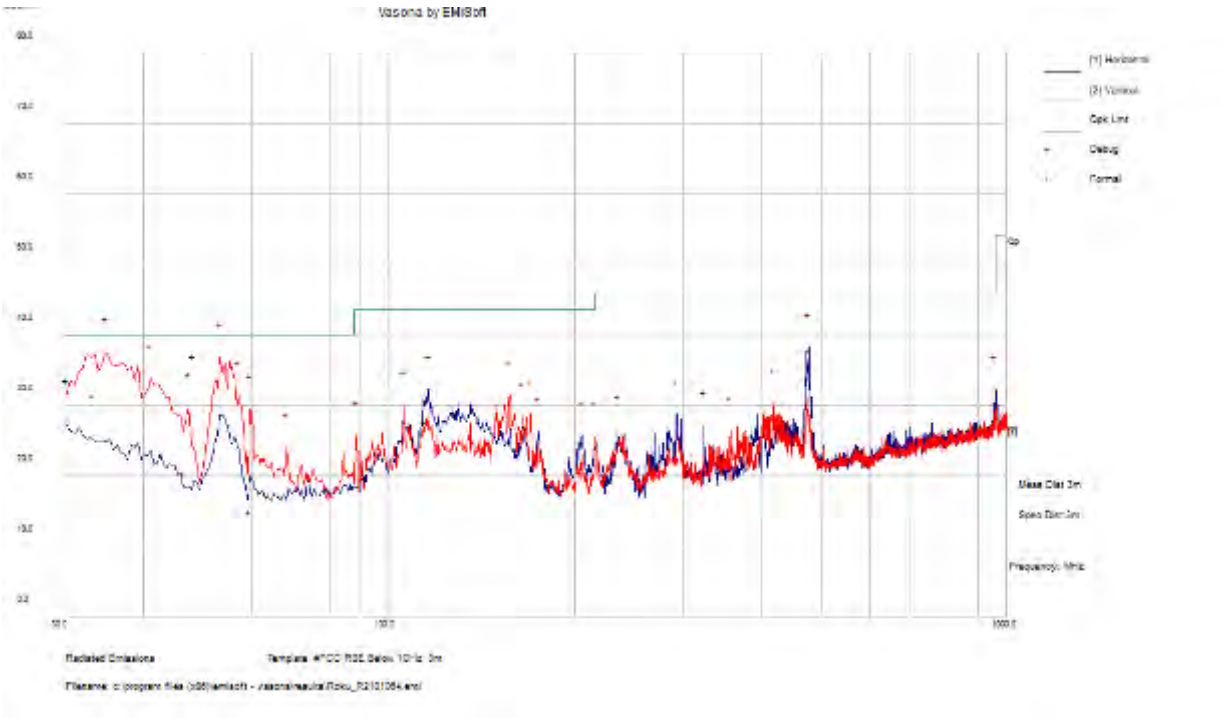
According to the data hereinafter, the EUT complied with the FCC Part 15.407 and RSS-247 standards' radiated emissions limits, and had the worst margin of:

Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Mode, Channel**
-0.16	5150	Horizontal	802.11n20/ac40 mode, 5190 MHz, Antenna B

7.8 Radiated Emissions Test Result Data

1) 30 MHz – 1 GHz at 3 meters

Worst Case: Antenna B, 802.11n40 mode – Low Channel, 5755 MHz



Frequency (MHz)	S.A. Reading (dBµV)	Correction Factor (dB)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Comment
34.661	37.19	-5.75	31.44	108	V	223	40	-8.56	QP
53.46725	44.5	-16.1	28.4	118	V	68	40	-11.6	QP
41.33175	37.69	-10.93	26.76	128	V	306	40	-13.24	QP
478.50925	36.77	-5.51	31.26	182	H	121	46	-14.74	QP
56.8945	39.56	-16.21	23.35	169	V	194	40	-16.65	QP
47.291	33.55	-14.52	19.02	236	V	327	40	-20.98	QP

2) 1-18 GHz

5150 - 5250 MHz

Band Edges measured at 3 meters, Harmonics measured at 1 meter.

802.11a mode Antenna A

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/ISEDC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5180 MHz											
5150	54.18	307	100	V	35.50	10.20	35.20	64.68	84	-9.32	Peak
5150	57.99	311	100	H	35.50	10.20	35.20	68.49	74	-5.51	Peak
5150	40.66	307	100	V	35.50	10.20	35.20	51.16	64	-2.84	Ave
5150	43.24	311	100	H	35.50	10.20	35.20	53.74	54	-0.26	Ave
10360	47.69	186	135	V	38.10	14.78	35.74	64.83	84	-19.17	Peak
10360	47.49	281	133	H	38.10	14.78	35.74	64.63	84	-19.37	Peak
15540	36.42	0	100	V	40.50	19.23	27.57	68.58	84	-15.42	Peak
15540	36.29	0	100	H	40.50	19.23	27.57	68.45	84	-15.55	Peak
15540	25.01	0	100	V	40.50	19.23	27.57	57.17	64	-6.83	Ave
15540	24.92	0	100	H	40.50	19.23	27.57	57.08	64	-6.92	Ave
Middle Channel 5220 MHz											
10440	47.92	186	127	V	38.10	14.78	35.49	65.31	78	-12.69	Peak
10440	47.93	281	133	H	38.10	14.78	35.49	65.32	78	-12.68	Peak
15660	35.8	0	100	V	40.70	19.23	26.13	69.60	84	-14.40	Peak
15660	35.97	0	100	H	40.70	19.23	26.13	69.77	84	-14.23	Peak
15660	24.79	0	100	V	40.70	19.23	26.13	58.59	64	-5.41	Ave
15660	25.01	0	100	H	40.70	19.23	26.13	58.81	64	-5.19	Ave
High Channel 5240 MHz											
10480	46.87	186	127	V	38.20	14.63	35.49	64.21	78	-13.79	Peak
10480	46.47	281	133	H	38.20	14.63	35.49	63.81	78	-14.19	Peak
15720	36.16	0	100	V	40.70	19.23	26.13	69.96	84	-14.04	Peak
15720	36.11	0	100	H	40.70	19.23	26.13	69.91	84	-14.09	Peak
15720	25	0	100	V	40.70	19.23	26.13	58.80	64	-5.20	Ave
15720	24.83	0	100	H	40.70	19.23	26.13	58.63	64	-5.37	Ave

802.11a mode Antenna B

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/ISEDC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5180 MHz											
5150	52.28	180	140	V	35.50	10.20	35.20	73.50	74	-11.22	Peak
5150	58.00	63	125	H	35.50	10.20	35.20	68.50	74	-5.50	Peak
5150	39.84	180	140	V	35.50	10.20	35.20	60.00	54	-3.66	Ave
5150	43.16	63	125	H	35.50	10.20	35.20	53.66	54	-0.34	Ave
10360	49.06	186	127	V	38.10	14.78	35.74	66.20	84	-17.80	Peak
10360	47.52	290	130	H	38.10	14.78	35.74	64.66	84	-19.34	Peak
15540	36.55	0	100	V	40.50	19.23	27.57	68.71	84	-15.29	Peak
15540	36.69	0	100	H	40.50	19.23	27.57	68.85	84	-15.15	Peak
15540	24.57	0	100	V	40.50	19.23	27.57	56.73	64	-7.27	Ave
15540	24.70	0	100	H	40.50	19.23	27.57	56.86	64	-7.14	Ave
Middle Channel 5220 MHz											
10440	47.55	196	141	V	38.10	14.78	35.49	64.94	78	-13.06	Peak
10440	47.7	65	100	H	38.10	14.78	35.49	65.09	78	-12.91	Peak
15660	36.67	0	100	V	40.70	19.23	26.13	70.47	84	-13.53	Peak
15660	36.52	0	100	H	40.70	19.23	26.13	70.32	84	-13.68	Peak
15660	25.19	0	100	V	40.70	19.23	26.13	58.99	64	-5.01	Ave
15660	24.88	0	100	H	40.70	19.23	26.13	58.68	64	-5.32	Ave
High Channel 5240 MHz											
10480	47.03	186	127	V	38.20	14.63	35.49	64.37	78	-13.63	Peak
10480	46.2	65	100	H	38.20	14.63	35.49	63.54	78	-14.46	Peak
15720	35.73	0	100	V	40.70	19.23	26.13	69.53	84	-14.47	Peak
15720	35.56	0	100	H	40.70	19.23	26.13	69.36	84	-14.64	Peak
15720	24.57	0	100	V	40.70	19.23	26.13	58.37	64	-5.63	Ave
15720	24.61	0	100	H	40.70	19.23	26.13	58.41	64	-5.59	Ave

802.11n/ac20 mode Antenna A

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/ISEDC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5180 MHz											
5150	53.39	307	100	V	35.50	10.20	35.20	63.89	74	-10.11	Peak
5150	57.67	311	100	H	35.50	10.20	35.20	68.17	74	-5.83	Peak
5150	39.24	307	100	V	35.50	10.20	35.20	49.74	54	-4.26	Ave
5150	42.87	311	100	H	35.50	10.20	35.20	53.37	54	-0.63	Ave
10360	47.28	186	135	V	38.10	14.78	35.74	64.42	84	-19.58	Peak
10360	46.99	281	133	H	38.10	14.78	35.74	64.13	84	-19.87	Peak
15540	36.22	0	100	V	40.50	19.23	27.57	68.38	84	-15.62	Peak
15540	36.50	0	100	H	40.50	19.23	27.57	68.66	84	-15.34	Peak
15540	24.93	0	100	V	40.50	19.23	27.57	57.09	64	-6.91	Ave
15540	25.10	0	100	H	40.50	19.23	27.57	57.26	64	-6.74	Ave
Middle Channel 5220 MHz											
10440	48.58	186	127	V	38.10	14.78	35.49	65.97	78	-12.03	Peak
10440	47.73	281	133	H	38.10	14.78	35.49	65.12	78	-12.88	Peak
15660	36.15	0	100	V	40.70	19.23	26.13	69.95	84	-14.05	Peak
15660	36.00	0	100	H	40.70	19.23	26.13	69.80	84	-14.20	Peak
15660	25.05	0	100	V	40.70	19.23	26.13	58.85	64	-5.15	Ave
15660	24.88	0	100	H	40.70	19.23	26.13	58.68	64	-5.32	Ave
High Channel 5240 MHz											
10480	47.47	186	127	V	38.20	13.25	35.49	63.43	78	-14.57	Peak
10480	47.40	281	133	H	38.20	13.25	35.49	63.36	78	-14.64	Peak
15720	36.39	0	100	V	40.70	19.09	33.87	62.31	84	-21.69	Peak
15720	36.43	0	100	H	40.70	19.09	33.87	62.35	84	-21.65	Peak
15720	24.81	0	100	V	40.70	19.09	33.87	50.73	64	-13.27	Ave
15720	24.99	0	100	H	40.70	19.23	26.13	58.79	64	-5.21	Ave

802.11n/ac20 mode Antenna B

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/ISEDC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5180 MHz											
5150	52.28	180	140	V	35.50	10.20	35.20	62.78	74	-11.22	Peak
5150	57.64	63	125	H	35.50	10.20	35.20	68.14	74	-5.86	Peak
5150	38.92	180	140	V	35.50	10.20	35.20	49.42	54	-4.58	Ave
5150	43.05	63	125	H	35.50	10.20	35.20	53.55	54	-0.45	Ave
10360	46.84	186	127	V	38.10	14.78	35.74	63.98	84	-20.02	Peak
10360	44.73	290	130	H	38.10	14.78	35.74	61.87	84	-22.13	Peak
15540	36.79	0	100	V	40.50	19.23	27.57	68.95	84	-15.05	Peak
15540	36.66	0	100	H	40.50	19.23	27.57	68.82	84	-15.18	Peak
15540	25.03	0	100	V	40.50	19.23	27.57	57.19	64	-6.81	Ave
15540	24.90	0	100	H	40.50	19.23	27.57	57.06	64	-6.94	Ave
Middle Channel 5220 MHz											
10440	48.39	196	141	V	38.10	14.78	35.49	65.78	78	-12.22	Peak
10440	48.25	155	131	H	38.10	14.78	35.49	65.64	78	-12.36	Peak
15660	36.33	0	100	V	40.70	19.23	26.13	70.13	84	-13.87	Peak
15660	36.20	0	100	H	40.70	19.23	26.13	70.00	84	-14.00	Peak
15660	24.87	0	100	V	40.70	19.23	26.13	58.67	64	-5.33	Ave
15660	24.92	0	100	H	40.70	19.23	26.13	58.72	64	-5.28	Ave
High Channel 5240 MHz											
10480	47.69	186	127	V	38.20	13.25	35.49	63.65	78	-14.35	Peak
10480	47.73	65	100	H	38.20	13.25	35.49	63.69	78	-14.31	Peak
15720	36.31	0	100	V	40.70	19.23	26.13	70.11	84	-13.89	Peak
15720	36.08	0	100	H	40.70	19.23	26.13	69.88	84	-14.12	Peak
15720	24.82	0	100	V	40.70	19.23	26.13	58.62	64	-5.38	Ave
15720	24.64	0	100	H	40.70	19.23	26.13	58.44	64	-5.56	Ave

802.11n/ac40 mode Antenna A

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/ISEDC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5190 MHz											
5150	52.86	18.00	255	V	35.50	10.20	35.20	70.25	74	-10.64	Peak
5150	55.67	311	100	H	35.50	10.20	35.20	66.17	74	-7.83	Peak
5150	41.90	18.00	255	V	35.50	10.20	35.20	57.30	54	-1.60	Ave
5150	43.05	311	100	H	35.50	10.20	35.20	53.55	54	-0.45	Ave
10380	44.97	186	135	V	38.10	13.40	35.74	60.73	78	-17.27	Peak
10380	45.32	281	133	H	38.10	13.40	35.74	61.08	78	-16.92	Peak
15570	35.96	0	100	V	40.50	19.23	26.34	69.35	84	-14.65	Peak
15570	36.09	0	100	H	40.50	19.23	26.34	69.48	84	-14.52	Peak
15570	25.12	0	100	V	40.50	19.23	26.34	58.51	64	-5.49	Ave
15570	24.81	0	100	H	40.50	19.23	26.34	58.20	64	-5.80	Ave
Middle Channel 5230 MHz											
10460	45.93	186	127	V	38.10	13.25	35.49	61.79	78	-16.21	Peak
10460	47.28	281	133	H	38.10	13.25	35.49	63.14	78	-14.86	Peak
15690	36.11	0	100	V	40.70	19.23	26.13	69.91	84	-14.09	Peak
15690	36.30	0	100	H	40.70	19.23	26.13	70.10	84	-13.90	Peak
15690	24.89	0	100	V	40.70	19.23	26.13	58.69	64	-5.31	Ave
15690	25.04	0	100	H	40.70	19.23	26.13	58.84	64	-5.16	Ave

802.11n/ac40 mode Antenna B

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/ISEDC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5190 MHz											
5150	55.10	180	140	V	35.50	10.20	35.20	65.60	74	-8.40	Peak
5150	54.96	63	125	H	35.50	10.20	35.20	65.46	74	-8.54	Peak
5150	42.84	180	140	V	35.50	10.20	35.20	53.34	54	-0.66	Ave
5150	**43.34**	**63**	**125**	**H**	**35.50**	**10.20**	**35.20**	**53.84**	**54**	**-0.16**	**Ave**
10380	44.84	186	127	V	38.10	13.40	35.74	60.60	78	-17.40	Peak
10380	45.96	65	100	H	38.10	13.40	35.74	61.72	78	-16.28	Peak
15570	36.51	0	100	V	40.50	19.23	26.34	69.90	84	-14.10	Peak
15570	36.79	0	100	H	40.50	19.23	26.34	70.18	84	-13.82	Peak
15570	24.91	0	100	V	40.50	19.23	26.34	58.30	64	-5.70	Ave
15570	25.20	0	100	H	40.50	19.23	26.34	58.59	64	-5.41	Ave
Middle Channel 5230 MHz											
10460	45.85	186	141	V	38.10	13.25	35.49	61.71	78	-16.29	Peak
10460	46.08	65	100	H	38.10	13.25	35.49	61.94	78	-16.06	Peak
15690	36.49	0	100	V	40.70	19.23	26.13	70.29	84	-13.71	Peak
15690	36.40	0	100	H	40.70	19.23	26.13	70.20	84	-13.80	Peak
15690	25.18	0	100	V	40.70	19.23	26.13	58.98	64	-5.02	Ave
15690	25.21	0	100	H	40.70	19.23	26.13	59.01	64	-4.99	Ave

802.11ac80 mode Antenna A

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/ISEDC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5210 MHz											
5150	52.25	18	255	V	35.50	10.20	35.20	62.75	74	-11.25	Peak
5150	54.75	311	100	H	35.50	10.20	35.20	65.25	74	-8.75	Peak
5150	41.26	18	255	V	35.50	10.20	35.20	51.76	54	-2.24	Ave
5150	42.73	311	100	H	35.50	10.20	35.20	53.23	54	-0.77	Ave
10420	45.26	186	135	V	38.10	13.40	35.74	61.02	78	-16.98	Peak
10420	44.88	281	133	H	38.10	13.40	35.74	60.64	78	-17.36	Peak
15630	36.17	0	100	V	40.50	19.23	26.34	69.56	84	-14.44	Peak
15630	35.98	0	100	H	40.50	19.23	26.34	69.37	84	-14.63	Peak
15630	25.11	0	100	V	40.50	19.23	26.34	58.50	64	-5.50	Ave
15630	24.79	0	100	H	40.50	19.23	26.34	58.18	64	-5.82	Ave

802.11ac80 mode Antenna B

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/ISEDC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5210 MHz											
5150	53.21	180	140	V	35.50	10.20	35.20	63.71	74	-10.29	Peak
5150	54.42	63	125	H	35.50	10.20	35.20	64.92	74	-9.08	Peak
5150	41.63	180	140	V	35.50	10.20	35.20	52.13	54	-1.87	Ave
5150	43.15	63	125	H	35.50	10.20	35.20	53.65	54	-0.35	Ave
10420	44.53	186	141	V	38.10	13.40	35.74	60.29	78	-17.71	Peak
10420	46.29	65	100	H	38.10	13.40	35.74	62.05	78	-15.95	Peak
15630	36.59	0	100	V	40.50	19.23	26.34	69.98	84	-14.02	Peak
15630	36.75	0	100	H	40.50	19.23	26.34	70.14	84	-13.86	Peak
15630	24.80	0	100	V	40.50	19.23	26.34	58.19	64	-5.81	Ave
15630	24.72	0	100	H	40.50	19.23	26.34	58.11	64	-5.89	Ave

5725 - 5850 MHz

All measurements were made at 1m.

802.11a mode Antenna A

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/ISEDC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5745 MHz											
5650	27.93	200	238	V	35.40	9.05	0.00	72.38	78.20	-5.82	Peak
5670.3	27.96	200	238	V	35.40	9.05	0.00	72.41	93.22	-20.81	Peak
5720	28.56	200	238	V	35.40	9.05	0.00	73.01	120.82	-47.81	Peak
5724.8	35.63	200	238	V	35.40	9.05	0.00	80.08	131.68	-51.60	Peak
5650	27.89	317	125	H	35.40	9.05	0.00	72.34	78.20	-5.86	Peak
5699.2	29.67	317	125	H	35.40	9.05	0.00	74.12	114.62	-40.50	Peak
5719.9	42	317	125	H	35.40	9.05	0.00	86.45	120.80	-34.35	Peak
5724.9	52.1	317	125	H	35.40	9.05	0.00	96.55	132.00	-35.45	Peak
11490	44.19	0	100	V	38.70	14.17	34.47	62.59	84.00	-21.41	Peak
11490	43.13	0	100	H	38.70	14.17	34.47	61.53	84.00	-22.47	Peak
11490	33.5	0	100	V	38.70	14.17	34.47	51.90	64.00	-12.10	Ave
11490	32.59	0	100	H	38.70	14.17	34.47	50.99	64.00	-13.01	Ave
17235	43.85	0	100	V	41.80	16.26	32.84	69.07	78.00	-8.94	Peak
17235	44.11	0	100	H	41.80	16.26	32.84	69.33	78.00	-8.68	Peak
Middle Channel 5785 MHz											
11570	45.42	0	100	V	38.90	14.26	34.47	64.11	84.00	-19.89	Peak
11570	44.16	0	100	H	38.90	14.26	34.47	62.85	84.00	-21.15	Peak
11570	32.89	0	100	V	38.90	14.26	34.47	51.58	64.00	-12.42	Ave
11570	33.51	0	100	H	38.90	14.26	34.47	52.20	64.00	-11.80	Ave
17355	44.61	0	100	V	41.90	17.54	32.84	71.21	78.00	-6.80	Peak
17355	44.36	0	100	H	41.90	17.54	32.84	70.96	78.00	-7.05	Peak
High Channel 5825 MHz											
5850.5	29.69	200	108	V	35.60	9.05	0.00	74.34	131.00	-56.66	Peak
5870.6	29.01	200	108	V	35.60	9.05	0.00	73.66	116.46	-42.80	Peak
5888.2	28.13	200	108	V	35.60	9.05	0.00	72.78	105.48	-32.70	Peak
5925	29.05	200	108	V	35.60	9.05	0.00	73.70	78.20	-4.50	Peak
5851.1	42.5	317	125	H	35.60	9.05	0.00	87.15	129.79	-42.64	Peak
5855	37.55	317	125	H	35.60	9.05	0.00	82.20	120.82	-38.62	Peak
5913.8	29.59	317	125	H	35.60	9.05	0.00	74.24	86.49	-12.25	Peak
5925	30.04	317	125	H	35.60	9.05	0.00	74.69	78.20	-3.51	Peak
11650	44.63	0	100	V	39.00	14.09	34.49	63.23	84.00	-20.77	Peak
11650	44.26	0	100	H	39.00	14.09	34.49	62.86	84.00	-21.14	Peak
11650	33.62	0	100	V	39.00	14.09	34.49	52.22	64.00	-11.78	Ave
11650	33.73	0	100	H	39.00	14.09	34.49	52.33	64.00	-11.67	Ave
17475	42.56	0	100	V	41.80	16.41	32.73	68.04	78.00	-9.97	Peak
17475	43.56	0	100	H	41.80	16.41	32.73	69.04	78.00	-8.97	Peak

802.11a mode Antenna B

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/ISEDC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5745 MHz											
5650	27.89	168	208	V	35.40	9.05	0.00	72.34	78.20	-5.86	Peak
5699	28.6	168	208	V	35.40	9.05	0.00	73.05	114.49	-41.44	Peak
5719.3	29.52	168	208	V	35.40	9.05	0.00	73.97	120.63	-46.66	Peak
5725	39.17	168	208	V	35.40	9.05	0.00	83.62	132.23	-48.61	Peak
5650	28.06	68	130	H	35.40	9.05	0.00	72.51	78.20	-5.69	Peak
5698.6	31	68	130	H	35.40	9.05	0.00	75.45	114.16	-38.71	Peak
5720	45.55	68	130	H	35.40	9.05	0.00	90.00	120.82	-30.82	Peak
5724.8	55.94	68	130	H	35.40	9.05	0.00	100.39	131.67	-31.28	Peak
11490	44.61	0	100	V	38.70	14.17	34.47	63.01	84.00	-20.99	Peak
11490	44.53	0	100	H	38.70	14.17	34.47	62.93	84.00	-21.07	Peak
11490	33.6	0	100	V	38.70	14.17	34.47	52.00	64.00	-12.00	Ave
11490	33.62	0	100	H	38.70	14.17	34.47	52.02	64.00	-11.98	Ave
17235	45.48	0	100	V	41.80	16.26	32.84	70.70	78.00	-7.31	Peak
17235	44.07	0	100	H	41.80	16.26	32.84	69.29	78.00	-8.72	Peak
Middle Channel 5785 MHz											
11570	44.61	0	100	V	38.90	14.26	34.47	63.30	84.00	-20.70	Peak
11570	45.91	0	100	H	38.90	14.26	34.47	64.60	84.00	-19.40	Peak
11570	33.6	0	100	V	38.90	14.26	34.47	52.29	64.00	-11.71	Ave
11570	34.12	0	100	H	38.90	14.26	34.47	52.81	64.00	-11.19	Ave
17355	45.13	0	100	V	41.90	17.54	32.84	71.73	78.00	-6.28	Peak
17355	44.41	0	100	H	41.90	17.54	32.84	71.01	78.00	-7.00	Peak
High Channel 5825 MHz											
5850.5	29.06	179	195	V	35.60	9.05	0.00	73.71	131.03	-57.32	Peak
5857.3	28.75	179	195	V	35.60	9.05	0.00	73.40	120.19	-46.79	Peak
5886.4	29.18	179	195	V	35.60	9.05	0.00	73.83	106.79	-32.96	Peak
5925	28.88	179	195	V	35.60	9.05	0.00	73.53	78.20	-4.67	Peak
5850.9	44.28	68	130	H	35.60	9.05	0.00	88.93	130.29	-41.36	Peak
5857.8	39.94	68	130	H	35.60	9.05	0.00	84.59	120.05	-35.46	Peak
5892.3	28.69	68	130	H	35.60	9.05	0.00	73.34	102.45	-29.11	Peak
5925	28.71	68	130	H	35.60	9.05	0.00	73.36	78.20	-4.84	Peak
11650	44.68	0	100	V	39.00	14.09	34.49	63.28	84.00	-20.72	Peak
11650	45.39	0	100	H	39.00	14.09	34.49	63.99	84.00	-20.01	Peak
11650	33.9	0	100	V	39.00	14.09	34.49	52.50	64.00	-11.50	Ave
11650	34.21	0	100	H	39.00	14.09	34.49	52.81	64.00	-11.19	Ave
17475	43.8	0	100	V	41.80	16.41	32.73	69.28	78.00	-8.72	Peak
17475	42.75	0	100	H	41.80	16.41	32.73	68.23	78.00	-9.78	Peak

802.11n/ac20 mode Antenna A

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/ISEDC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5745 MHz											
5650	28.17	13	300	V	35.40	9.05	0.00	72.62	78.20	-5.58	Peak
5691.8	27.93	13	300	V	35.40	9.05	0.00	72.38	109.13	-36.75	Peak
5719.9	35.69	13	300	V	35.40	9.05	0.00	80.14	120.80	-40.66	Peak
5724.2	49.09	13	300	V	35.40	9.05	0.00	93.54	130.50	-36.96	Peak
5650	28.7	317	125	H	35.40	9.05	0.00	73.15	78.20	-5.05	Peak
5697.2	32.33	317	125	H	35.40	9.05	0.00	76.78	113.14	-36.36	Peak
5719.7	41.35	317	125	H	35.40	9.05	0.00	85.80	120.75	-34.95	Peak
5723.9	55.57	317	125	H	35.40	9.05	0.00	100.02	129.79	-29.77	Peak
11490	45.41	0	100	V	38.70	14.17	34.47	63.81	84.00	-20.19	Peak
11490	44.04	0	100	H	38.70	14.17	34.47	62.44	84.00	-21.56	Peak
11490	33.29	0	100	V	38.70	14.17	34.47	51.69	64.00	-12.31	Ave
11490	33	0	100	H	38.70	14.17	34.47	51.40	64.00	-12.60	Ave
17235	43.22	0	100	V	41.80	16.26	32.84	68.44	78.00	-9.57	Peak
17235	43.87	0	100	H	41.80	16.26	32.84	69.09	78.00	-8.92	Peak
Middle Channel 5785 MHz											
11570	45.11	0	100	V	38.90	13.77	34.47	63.31	84.00	-20.69	Peak
11570	44.16	0	100	H	38.90	13.77	34.47	62.36	84.00	-21.64	Peak
11570	33.63	0	100	V	38.90	13.77	34.47	51.83	64.00	-12.17	Ave
11570	34.01	0	100	H	38.90	13.77	34.47	52.21	64.00	-11.79	Ave
17355	44.11	0	100	V	41.90	17.83	32.84	71.00	78.00	-7.00	Peak
17355	43.87	0	100	H	41.90	17.83	32.84	70.76	78.00	-7.24	Peak
High Channel 5825 MHz											
5850	38.93	354	233	V	35.60	9.05	0.00	83.58	132.23	-48.65	Peak
5858.3	34.01	354	233	V	35.60	9.05	0.00	78.66	119.91	-41.25	Peak
5875.5	28.41	354	233	V	35.60	9.05	0.00	73.06	114.86	-41.80	Peak
5925	29.09	354	233	V	35.60	9.05	0.00	73.74	78.20	-4.46	Peak
5850.1	46	317	125	H	35.60	9.05	0.00	90.65	132.07	-41.42	Peak
5857.9	40.79	317	125	H	35.60	9.05	0.00	85.44	120.02	-34.58	Peak
5898.3	29.74	317	125	H	35.60	9.05	0.00	74.39	97.99	-23.60	Peak
5925	28.91	317	125	H	35.60	9.05	0.00	73.56	78.20	-4.64	Peak
11650	45.22	0	100	V	39.00	14.09	34.49	63.82	84.00	-20.18	Peak
11650	44.24	0	100	H	39.00	14.09	34.49	62.84	84.00	-21.16	Peak
11650	33.71	0	100	V	39.00	14.09	34.49	52.31	64.00	-11.69	Ave
11650	33.65	0	100	H	39.00	14.09	34.49	52.25	64.00	-11.75	Ave
17475	43.69	0	100	V	41.80	16.41	32.73	69.17	78.00	-8.84	Peak
17475	44.31	0	100	H	41.80	16.41	32.73	69.79	78.00	-8.22	Peak

802.11n/ac20 mode Antenna B

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/ISEDC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5745 MHz											
5650	28.45	168	208	V	35.40	9.05	0.00	72.90	78.20	-5.30	Peak
5698.4	28.1	168	208	V	35.40	9.05	0.00	72.55	114.06	-41.51	Peak
5719.6	30.93	168	208	V	35.40	9.05	0.00	75.38	120.73	-45.35	Peak
5722.6	41.43	168	208	V	35.40	9.05	0.00	85.88	126.76	-40.88	Peak
5650	28.49	68	130	H	35.40	9.05	0.00	72.94	78.20	-5.26	Peak
5697.1	32.18	68	130	H	35.40	9.05	0.00	76.63	113.05	-36.42	Peak
5719.6	46.46	68	130	H	35.40	9.05	0.00	90.91	120.73	-29.82	Peak
5723.4	59.1	68	130	H	35.40	9.05	0.00	103.55	128.53	-24.98	Peak
11490	44.18	0	100	V	38.70	14.17	34.47	62.58	84.00	-21.42	Peak
11490	44.69	0	100	H	38.70	14.17	34.47	63.09	84.00	-20.91	Peak
11490	33.17	0	100	V	38.70	14.17	34.47	51.57	64.00	-12.43	Ave
11490	32.64	0	100	H	38.70	14.17	34.47	51.04	64.00	-12.96	Ave
17235	45.14	0	100	V	41.80	16.26	32.84	70.36	78.00	-7.65	Peak
17235	44.3	0	100	H	41.80	16.26	32.84	69.52	78.00	-8.49	Peak
Middle Channel 5785 MHz											
11570	44.27	0	100	V	38.90	14.26	34.47	62.96	84.00	-21.04	Peak
11570	44.47	0	100	H	38.90	14.26	34.47	63.16	84.00	-20.84	Peak
11570	33.35	0	100	V	38.90	14.26	34.47	52.04	64.00	-11.96	Ave
11570	33.8	0	100	H	38.90	14.26	34.47	52.49	64.00	-11.51	Ave
17355	44.87	0	100	V	41.90	17.54	32.84	71.47	78.00	-6.54	Peak
17355	45.55	0	100	H	41.90	17.54	32.84	72.15	78.00	-5.86	Peak
High Channel 5825 MHz											
5850	40.38	115	243	V	35.60	9.05	0.00	85.03	132.23	-47.20	Peak
5858.1	36.09	115	243	V	35.60	9.05	0.00	80.74	119.96	-39.22	Peak
5897.7	28.65	115	243	V	35.60	9.05	0.00	73.30	98.45	-25.15	Peak
5925	28.27	115	243	V	35.60	9.05	0.00	72.92	78.20	-5.28	Peak
5850	46.35	68	130	H	35.60	9.05	0.00	91.00	132.16	-41.16	Peak
5858.3	42.89	68	130	H	35.60	9.05	0.00	87.54	119.91	-32.37	Peak
5887.4	28.71	68	130	H	35.60	9.05	0.00	73.36	106.05	-32.69	Peak
5925	29.28	68	130	H	35.60	9.05	0.00	73.93	78.20	-4.27	Peak
11650	45.03	0	100	V	39.00	14.09	34.49	63.63	84.00	-20.37	Peak
11650	44.8	0	100	H	39.00	14.09	34.49	63.40	84.00	-20.60	Peak
11650	33.48	0	100	V	39.00	14.09	34.49	52.08	64.00	-11.92	Ave
11650	34.4	0	100	H	39.00	14.09	34.49	53.00	64.00	-11.00	Ave
17475	44.12	0	100	V	41.80	16.41	32.73	69.60	78.00	-8.41	Peak
17475	43.72	0	100	H	41.80	16.41	32.73	69.20	78.00	-8.81	Peak

802.11n/ac40 mode Antenna A

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/ISEDC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5755 MHz											
5650	27.7	360	236	V	35.40	9.05	0.00	72.15	78.20	-6.05	Peak
5699.3	28.9	360	236	V	35.40	9.05	0.00	73.35	114.71	-41.36	Peak
5718.9	42.43	360	236	V	35.40	9.05	0.00	86.88	120.52	-33.64	Peak
5722	45.06	360	236	V	35.40	9.05	0.00	89.51	125.31	-35.80	Peak
5650	28.57	317	125	H	35.40	9.05	0.00	73.02	78.20	-5.18	Peak
5698.7	34.2	317	125	H	35.40	9.05	0.00	78.65	114.25	-35.60	Peak
5719.3	51.66	317	125	H	35.40	9.05	0.00	96.11	120.63	-24.52	Peak
5721.9	53.87	317	125	H	35.40	9.05	0.00	98.32	125.14	-26.82	Peak
11510	44.05	0	100	V	38.70	13.68	34.47	61.96	84.00	-22.04	Peak
11510	43.89	0	100	H	38.70	13.68	34.47	61.80	84.00	-22.20	Peak
11510	34.1	0	100	V	38.70	13.68	34.47	52.01	64.00	-11.99	Ave
11510	33.53	0	100	H	38.70	13.68	34.47	51.44	64.00	-12.56	Ave
17265	44.61	0	100	V	41.80	16.35	32.84	69.92	78.00	-8.08	Peak
17265	45.96	0	100	H	41.80	16.35	32.84	71.27	78.00	-6.73	Peak
High Channel 5795 MHz											
5850	35.89	0	258	V	35.60	9.05	0.00	80.54	132.16	-51.62	Peak
5856.4	32.78	0	258	V	35.60	9.05	0.00	77.43	120.44	-43.01	Peak
5905	29.55	0	258	V	35.60	9.05	0.00	74.20	93.03	-18.83	Peak
5925	28.18	0	258	V	35.60	9.05	0.00	72.83	78.20	-5.37	Peak
5850	40.6	317	125	H	35.60	9.05	0.00	85.25	132.18	-46.93	Peak
5855.7	37.43	317	125	H	35.60	9.05	0.00	82.08	120.62	-38.54	Peak
5883.4	30.21	317	125	H	35.60	9.05	0.00	74.86	109.04	-34.18	Peak
5925	29.25	317	125	H	35.60	9.05	0.00	73.90	78.20	-4.30	Peak
11590	44.12	0	100	V	38.90	13.77	34.47	62.32	84.00	-21.68	Peak
11590	44.81	0	100	H	38.90	13.77	34.47	63.01	84.00	-20.99	Peak
11590	33.62	0	100	V	38.90	13.77	34.47	51.82	64.00	-12.18	Ave
11590	33.21	0	100	H	38.90	13.77	34.47	51.41	64.00	-12.59	Ave
17385	43.51	0	100	V	41.90	17.83	32.84	70.40	78.00	-7.60	Peak
17385	43.66	0	100	H	41.90	17.83	32.84	70.55	78.00	-7.45	Peak

802.11n/ac40 mode Antenna B

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/ISEDC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5755 MHz											
5650	30.63	100	100	V	35.40	9.05	0.00	75.08	78.20	-3.12	Peak
5664.3	36.32	100	100	V	35.40	9.05	0.00	80.77	88.81	-8.04	Peak
5717.8	49.73	100	100	V	35.40	9.05	0.00	94.18	120.21	-26.03	Peak
5724.1	53.28	100	100	V	35.40	9.05	0.00	97.73	130.12	-32.39	Peak
5650	28.58	68	130	H	35.40	9.05	0.00	73.03	78.20	-5.17	Peak
5700	40.87	68	130	H	35.40	9.05	0.00	85.32	115.19	-29.87	Peak
5718.5	53.74	68	130	H	35.40	9.05	0.00	98.19	120.42	-22.23	Peak
5721.9	57.15	68	130	H	35.40	9.05	0.00	101.60	125.18	-23.58	Peak
11510	42.74	0	100	V	38.70	14.17	34.47	61.14	84.00	-22.86	Peak
11510	44.11	0	100	H	38.70	14.17	34.47	62.51	84.00	-21.49	Peak
11510	32.24	0	100	V	38.70	14.17	34.47	50.64	64.00	-13.36	Ave
11510	33.25	0	100	H	38.70	14.17	34.47	51.65	64.00	-12.35	Ave
17265	45.51	0	100	V	41.80	16.26	32.84	70.73	78.00	-7.28	Peak
17265	46.52	0	100	H	41.80	16.26	32.84	71.74	78.00	-6.27	Peak
High Channel 5795 MHz											
5850	36.16	115	241	V	35.60	9.05	0.00	80.81	132.23	-51.42	Peak
5858.7	33.51	115	241	V	35.60	9.05	0.00	78.16	119.79	-41.63	Peak
5878	28.29	115	241	V	35.60	9.05	0.00	72.94	113.01	-40.07	Peak
5925	29.7	115	241	V	35.60	9.05	0.00	74.35	78.20	-3.85	Peak
5850	42.48	68	130	H	35.60	9.05	0.00	87.13	132.23	-45.10	Peak
5859.4	38.73	68	130	H	35.60	9.05	0.00	83.38	119.60	-36.22	Peak
5878	30.63	68	130	H	35.60	9.05	0.00	75.28	113.05	-37.77	Peak
5925	29.34	68	130	H	35.60	9.05	0.00	73.99	78.20	-4.21	Peak
11590	43.09	0	100	V	38.90	14.17	34.47	61.69	84.00	-22.31	Peak
11590	44.21	0	100	H	38.90	14.17	34.47	62.81	84.00	-21.19	Peak
11590	32.66	0	100	V	38.90	14.17	34.47	51.26	64.00	-12.74	Ave
11590	33.51	0	100	H	38.90	14.17	34.47	52.11	64.00	-11.89	Ave
17385	44.61	0	100	V	41.90	16.26	32.84	69.93	78.00	-8.08	Peak
17385	43.76	0	100	H	41.90	16.26	32.84	69.08	78.00	-8.93	Peak

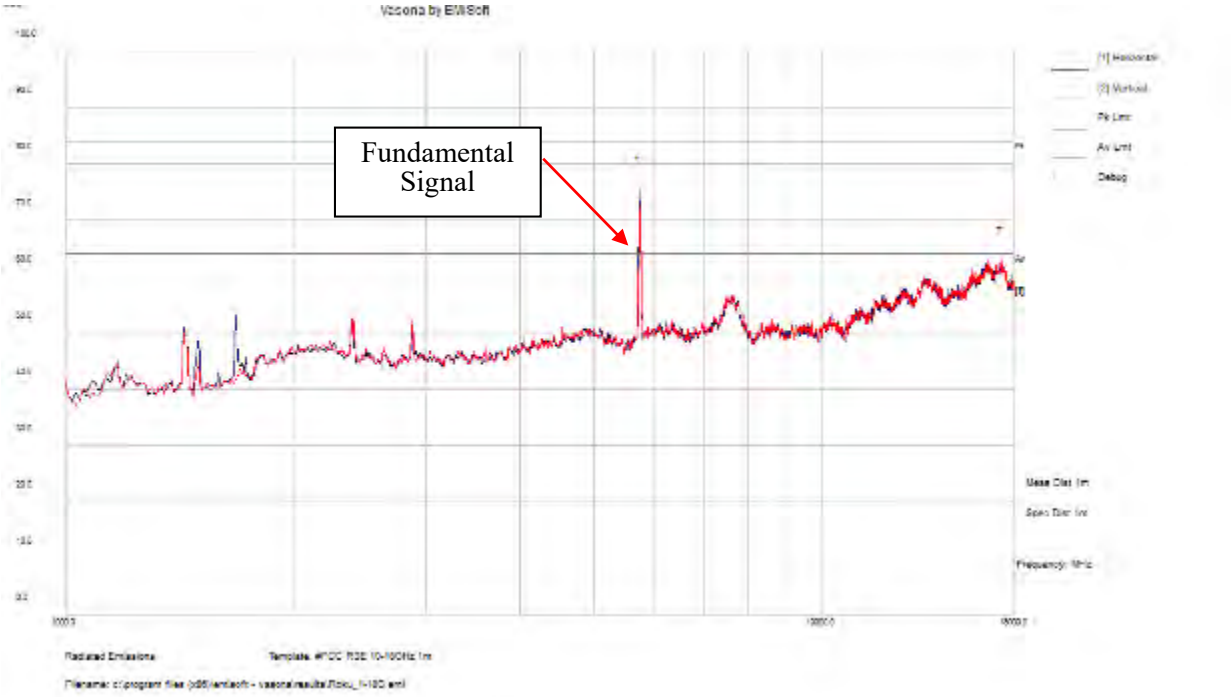
802.11ac80 mode Antenna A

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/ISEDC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5775 MHz											
5650	27.71	8	270	V	35.40	9.05	0.00	72.16	78.20	-6.04	Peak
5695.4	41.15	8	270	V	35.40	9.05	0.00	85.60	115.20	-29.60	Peak
5718.9	42.54	8	270	V	35.40	9.05	0.00	86.99	120.83	-33.84	Peak
5724.6	45.2	8	270	V	35.40	9.05	0.00	89.65	132.23	-42.58	Peak
5650	30.99	317	125	H	35.40	9.05	0.00	75.44	78.20	-2.76	Peak
5695.3	47.38	317	125	H	35.40	9.05	0.00	91.83	115.20	-23.37	Peak
5719.2	48.74	317	125	H	35.40	9.05	0.00	93.19	120.83	-27.64	Peak
5721.4	51.55	317	125	H	35.40	9.05	0.00	96.00	132.22	-36.22	Peak
11550	43.82	0	100	V	38.70	13.68	34.47	61.73	84.00	-22.27	Peak
11550	43.26	0	100	H	38.70	13.68	34.47	61.17	84.00	-22.83	Peak
11550	33.19	0	100	V	38.70	13.68	34.47	51.10	64.00	-12.90	Ave
11550	32.49	0	100	H	38.70	13.68	34.47	50.40	64.00	-13.60	Ave
17325	43.9	0	100	V	41.80	16.35	32.84	69.21	78.00	-8.79	Peak
17325	44.43	0	100	H	41.80	16.35	32.84	69.74	78.00	-8.26	Peak
5850.8	46.7	14	258	V	35.60	9.05	0.00	96.55	130.31	-33.76	Peak
5856.3	43.39	14	258	V	35.60	9.05	0.00	93.30	120.47	-27.17	Peak
5875	39.32	14	258	V	35.60	9.05	0.00	89.80	115.23	-25.43	Peak
5925	29.82	14	258	V	35.60	9.05	0.00	74.47	78.20	-3.73	Peak
5851.1	51.9	317	125	H	35.60	9.05	0.00	96.55	129.77	-33.22	Peak
5855.1	48.65	317	125	H	35.60	9.05	0.00	93.30	120.79	-27.49	Peak
5875.6	45.15	317	125	H	35.60	9.05	0.00	89.80	114.79	-24.99	Peak
5925	33.13	317	125	H	35.60	9.05	0.00	77.78	78.20	-0.42	Peak

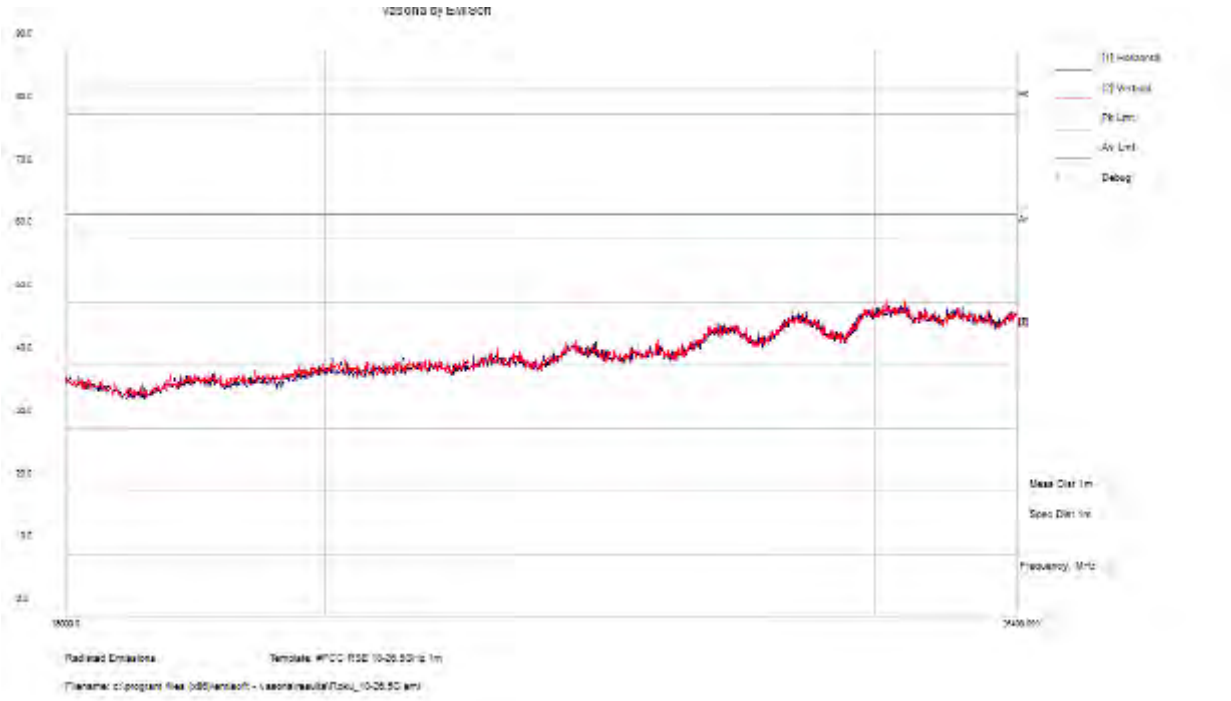
802.11ac80 mode Antenna B

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/ISEDC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5775 MHz											
5650	29.34	100	100	V	35.40	9.05	0.00	73.79	78.20	-4.41	Peak
5664.3	47.2	100	100	V	35.40	9.05	0.00	91.65	115.00	-23.35	Peak
5717.8	48.09	100	100	V	35.40	9.05	0.00	92.54	120.83	-28.29	Peak
5724.1	51.49	100	100	V	35.40	9.05	0.00	95.94	132.23	-36.29	Peak
5650	30.68	68	130	H	35.40	9.05	0.00	75.13	78.20	-3.07	Peak
5695.7	51.26	68	130	H	35.40	9.05	0.00	95.71	115.20	-19.49	Peak
5719.1	51.96	68	130	H	35.40	9.05	0.00	96.41	120.83	-24.42	Peak
5724.2	55.34	68	130	H	35.40	9.05	0.00	99.79	132.23	-32.44	Peak
11550	43.64	0	100	V	38.70	14.17	34.47	62.04	84.00	-21.96	Peak
11550	43.25	0	100	H	38.70	14.17	34.47	61.65	84.00	-22.35	Peak
11550	32.49	0	100	V	38.70	14.17	34.47	50.89	64.00	-13.11	Ave
11550	32.8	0	100	H	38.70	14.17	34.47	51.20	64.00	-12.80	Ave
17325	45.16	0	100	V	41.80	16.26	32.84	70.38	78.00	-7.63	Peak
17325	44.81	0	100	H	41.80	16.26	32.84	70.03	78.00	-7.98	Peak
5851.3	47.48	115	241	V	35.60	9.05	0.00	98.19	129.27	-31.08	Peak
5856.6	43.71	115	241	V	35.60	9.05	0.00	94.65	120.38	-25.73	Peak
5875.1	40.05	115	241	V	35.60	9.05	0.00	90.41	115.17	-24.76	Peak
5925	29.5	115	241	V	35.60	9.05	0.00	74.15	78.20	-4.05	Peak
5851	53.54	68	130	H	35.60	9.05	0.00	98.19	129.95	-31.76	Peak
5856.3	50	68	130	H	35.60	9.05	0.00	94.65	120.47	-25.82	Peak
5875.7	45.76	68	130	H	35.60	9.05	0.00	90.41	114.71	-24.30	Peak
5925	33.37	68	130	H	35.60	9.05	0.00	78.02	78.20	-0.18	Peak

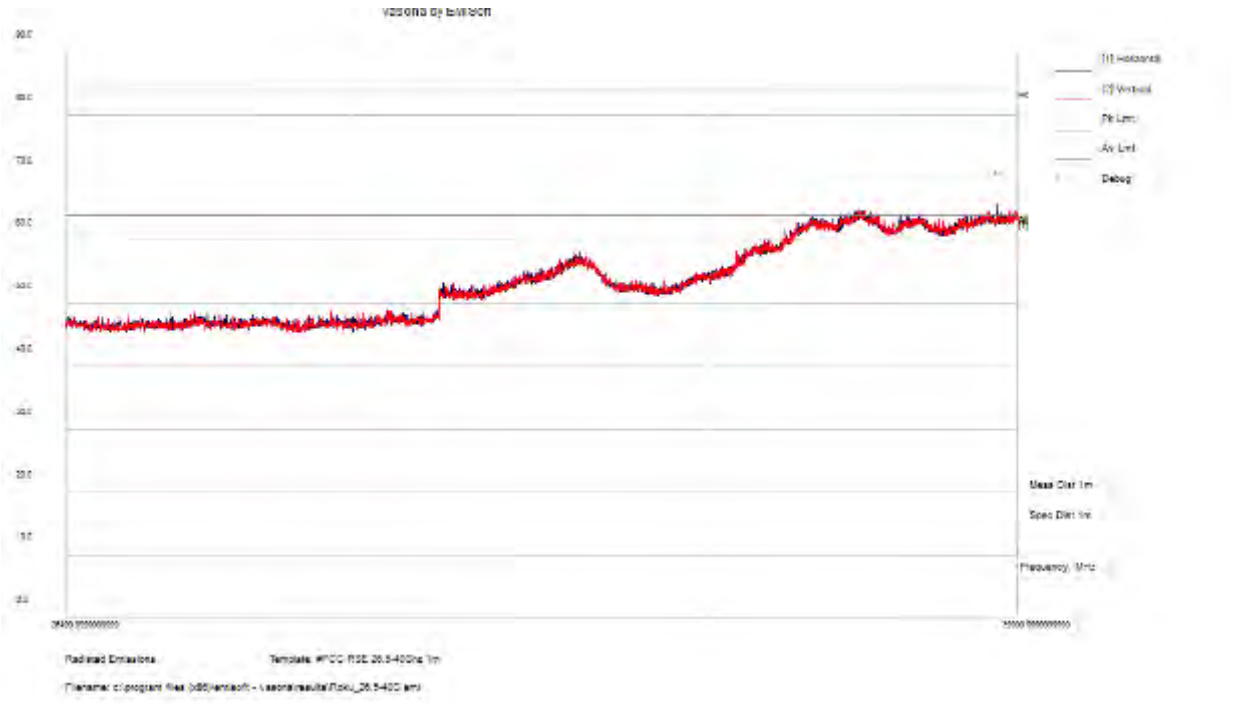
1 GHz – 18 GHz Worst Case Scan at 1 Meter



18 GHz – 26.5 GHz Worst Case Scan at 1 Meter



26.5 GHz – 40 GHz Worst Case Scan at 1 Meter



Frequency (MHz)	Raw Amplitude (dBµV)	Correction Factor (dB)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Comments (PK/QP/Ave.)
39642.775	51.18	19.8	70.98	233	H	352	84	-13.02	Peak
39642.775	40.86	19.8	60.66	114	V	311	64	-3.34	Ave

8 FCC §15.407(e) & ISEDC RSS-247 §6.2 - Occupied Bandwidth

8.1 Applicable Standards

As per FCC §15.407(e) and ISEDC RSS-247 6.2.4(1): for equipment operating in the band 5725 – 5850 MHz, the minimum 6 dB bandwidth of U-NII devices shall be 500 kHz.

8.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 6 or 26 dB from the reference level. Record the frequency difference as the minimum emission or emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

8.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Rhode & Schwarz	Signal Analyzer	FSV40	1321.3008K39 -101203-UW	2019-08-06	2 years
Rhode & Schwarz	Signal Analyzer	FSQ26	200749	2019-11-07	2 years
-	RF cable	-	-	Each time[1]	N/A
-	20 dB attenuator	-	-	Each time[1]	N/A

Note[1]: cable and attenuator included in the test set-up will be checked each time before testing.
Statement of Traceability: BACL Corp. *attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with the latest version of A2LA policy P102 "A2LA Policy on Metrological Traceability".*

8.4 Test Environmental Conditions

Temperature:	22-24 ºC
Relative Humidity:	40-41 %
ATM Pressure:	103.1-104.1 kPa

The testing was performed by Vang Lee and Tri Pham from 2021-02-11 to 2021-03-02 in RF site.

8.5 Test Results

Please refer to the following tables and plots.

5150 - 5250 MHz

Frequency (MHz)	99% OBW (MHz)	26 dB OBW (MHz)	99% OBW (MHz)	26 dB OBW (MHz)
	ANT A		ANT B	
802.11a mode				
5180	19.233	35.46	20.058	33.84
5220	21.678	35.34	22.323	36.90
5240	22.173	35.40	22.323	37.38
802.11n20 mode				
5180	19.923	38.48	20.883	38.24
5220	25.257	40.40	26.022	43.12
5240	25.972	43.60	26.312	43.76
802.11ac20 mode				
5180	20.103	39.52	20.533	38.96
5220	25.362	41.84	25.852	43.44
5240	25.887	40.00	26.107	43.84
802.11n40 mode				
5190	36.564	42.896	36.548	42.304
5230	47.405	79.710	48.025	78.490
802.11ac40 mode				
5190	36.564	42.680	36.548	42.272
5230	47.515	78.850	47.815	77.280
802.11ac80 mode				
5210	75.848	82.976	75.784	83.104

5725 - 5850 MHz

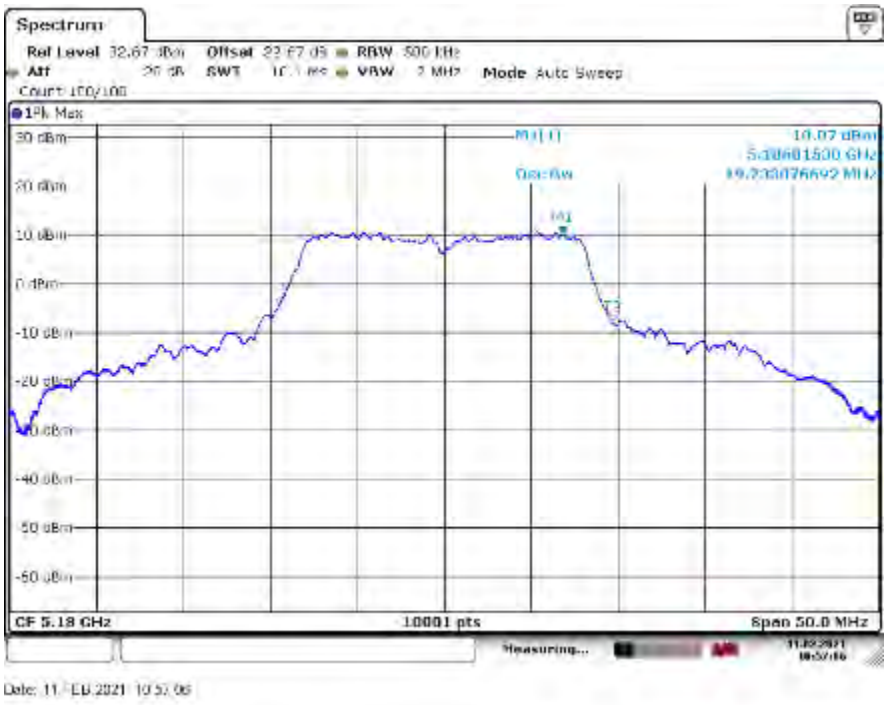
Frequency (MHz)	99% OBW (MHz)	6 dB OBW (MHz)	99% OBW (MHz)	6 dB OBW (MHz)	6 dB OBW Limit (kHz)
	ANT A		ANT B		
802.11a mode					
5745	24.118	16.455	24.634	16.455	≥500
5785	23.988	16.458	24.166	16.464	≥500
5825	24.008	16.47	22.374	16.464	≥500
802.11n20 mode					
5745	27.747	17.712	27.249	17.712	≥500
5785	27.972	17.706	26.141	17.712	≥500
5825	28.037	17.712	25.113	17.706	≥500
802.11ac20 mode					
5745	27.937	17.706	27.405	17.724	≥500
5785	27.907	17.658	26.069	17.670	≥500
5825	28.057	17.676	25.401	17.664	≥500
802.11n40 mode					
5755	50.715	36.402	49.635	36.450	≥500
5795	50.005	36.402	46.515	36.390	≥500
802.11ac40 mode					
5755	48.275	36.450	49.523	36.402	≥500
5795	47.123	36.426	46.563	36.402	≥500
802.11ac80 mode					
5775	93.847	76.074	96.326	75.960	≥500

Please refer to the following plots:

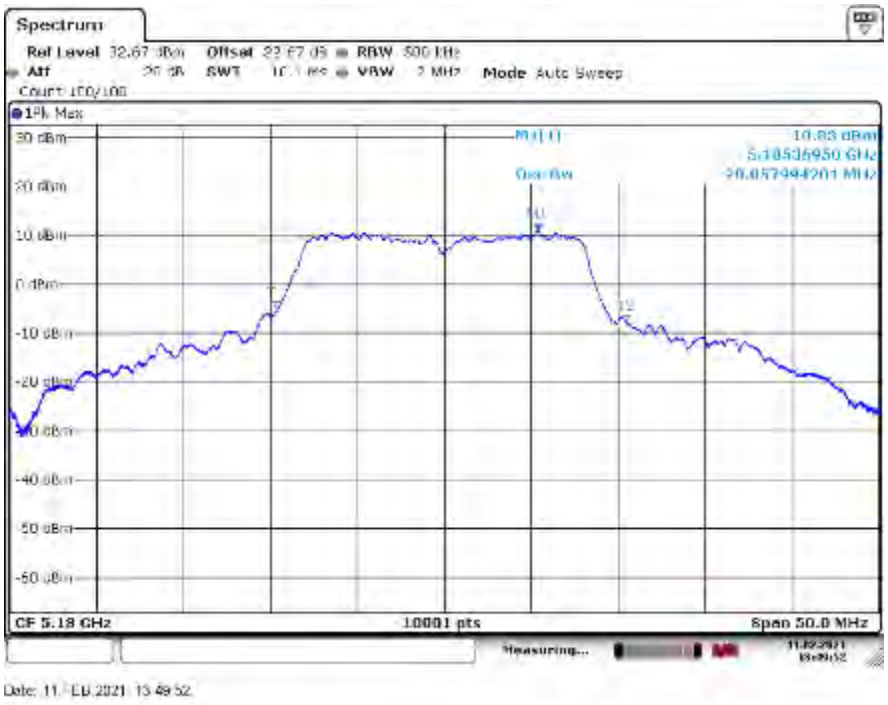
5150 - 5250 MHz

802.11a Mode

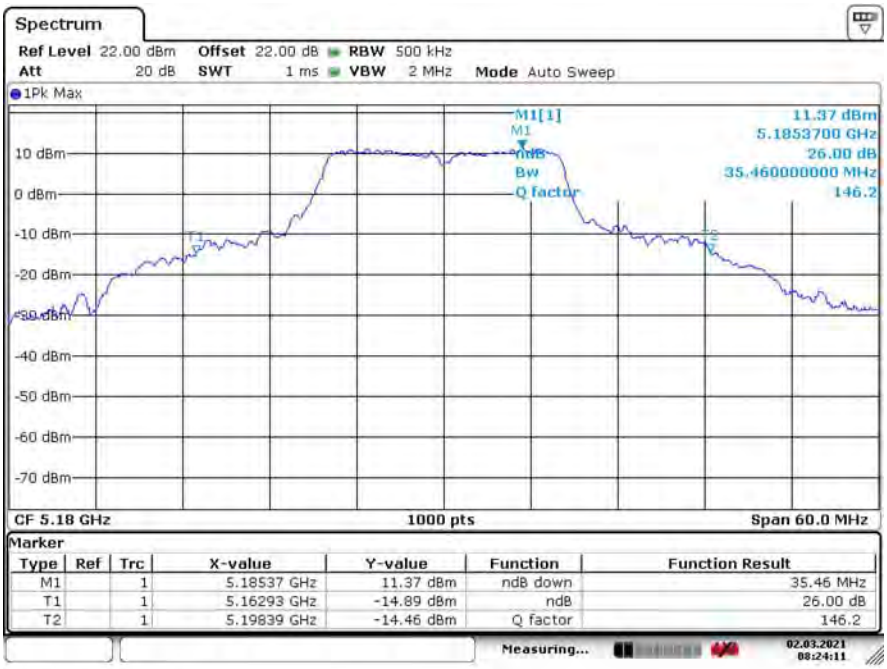
5180 MHz ANT A 99% OBW



5180 MHz ANT B 99% OBW

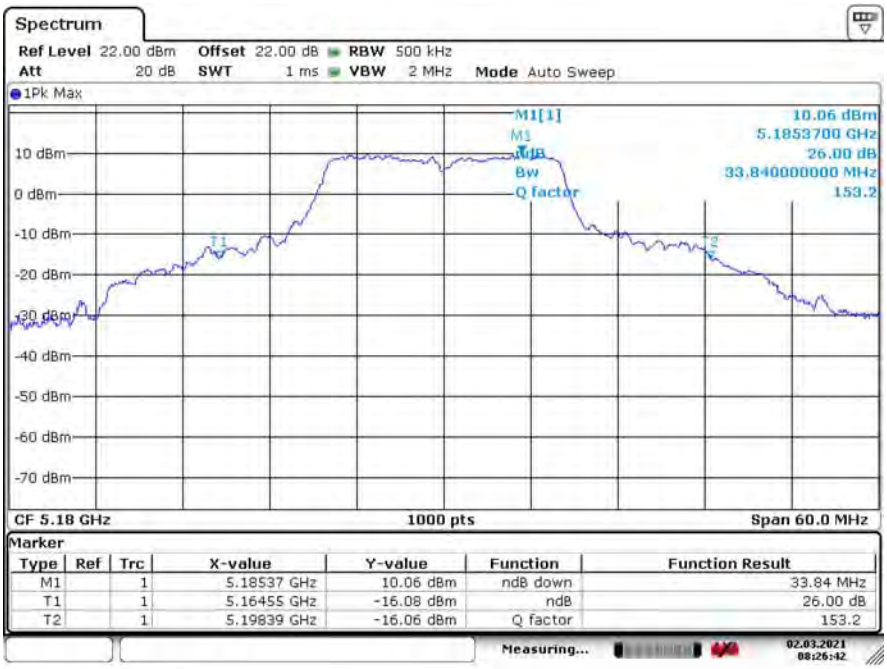


5180 MHz ANT A 26dB OBW



Date: 2.MAR.2021 08:24:11

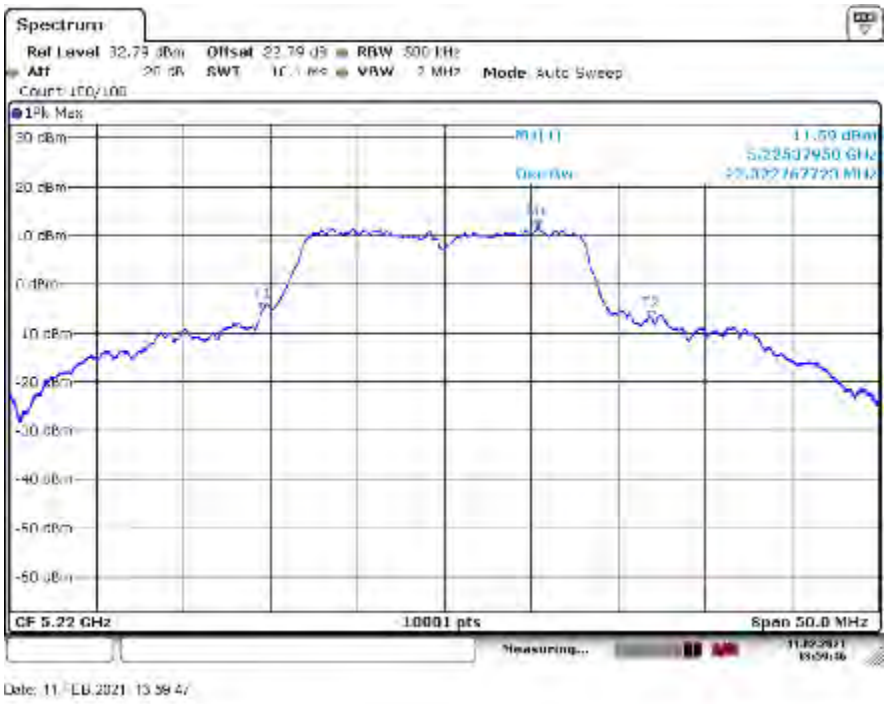
5180 MHz ANT B 26dB OBW



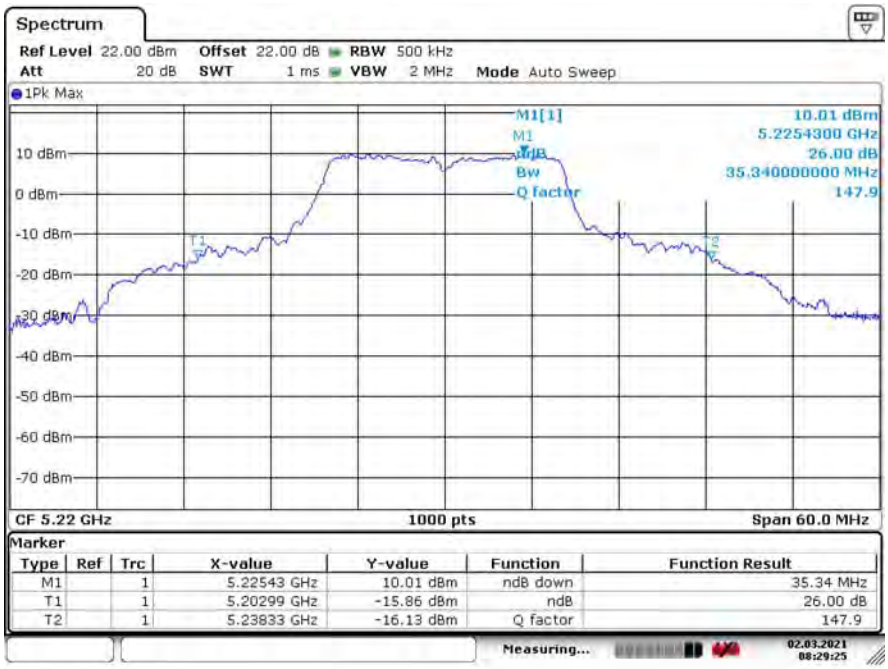
Date: 2.MAR.2021 08:26:43

5220 MHz ANT A 99% OBW

5220 MHz ANT B 99% OBW

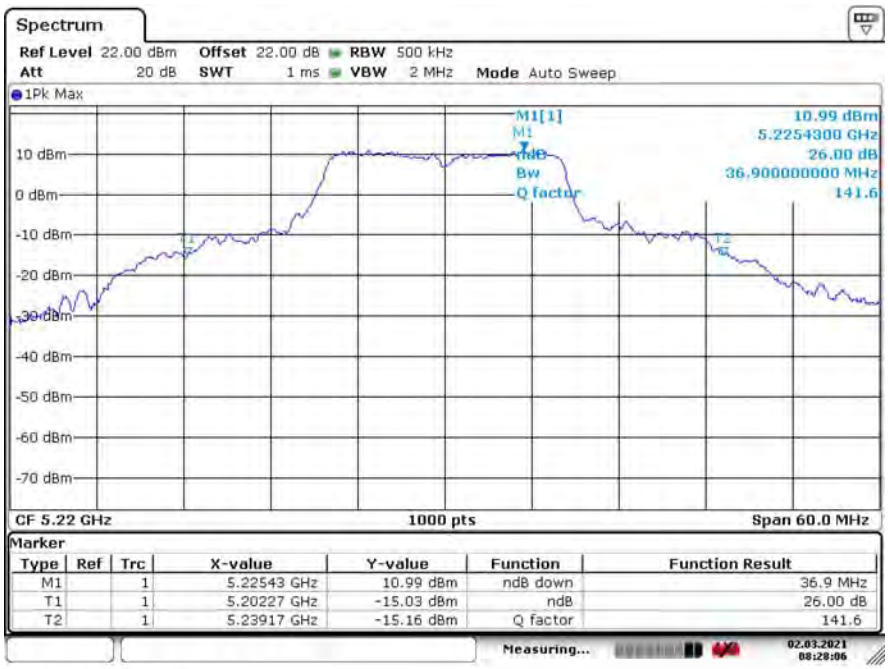


5220 MHz ANT A 26dB OBW



Date: 2.MAR.2021 08:29:26

5220 MHz ANT B 26dB OBW



Date: 2.MAR.2021 08:28:06

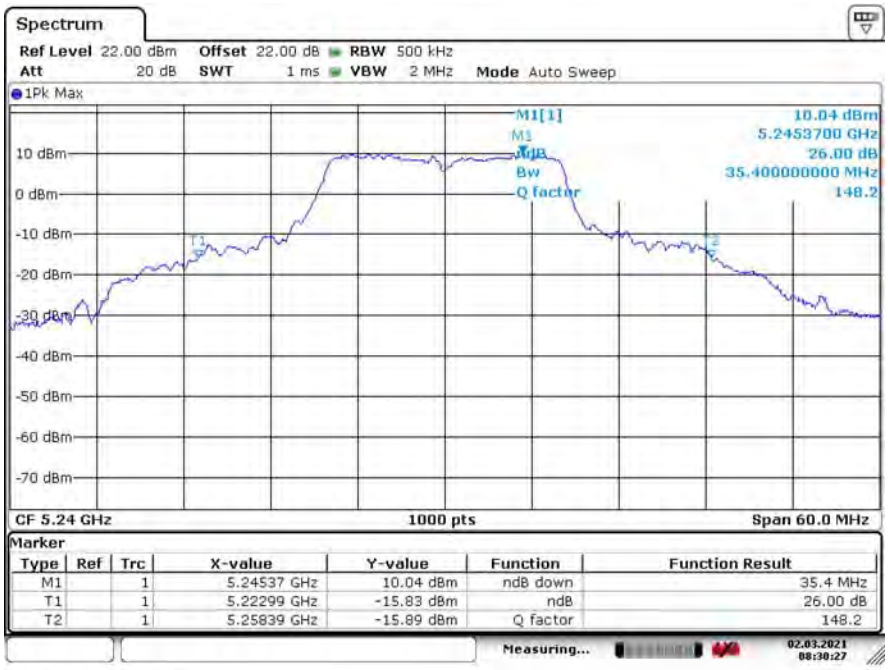
5240 MHz ANT A 99% OBW

Date: 11.FEB.2021 11:08:56

5240 MHz ANT B 99% OBW

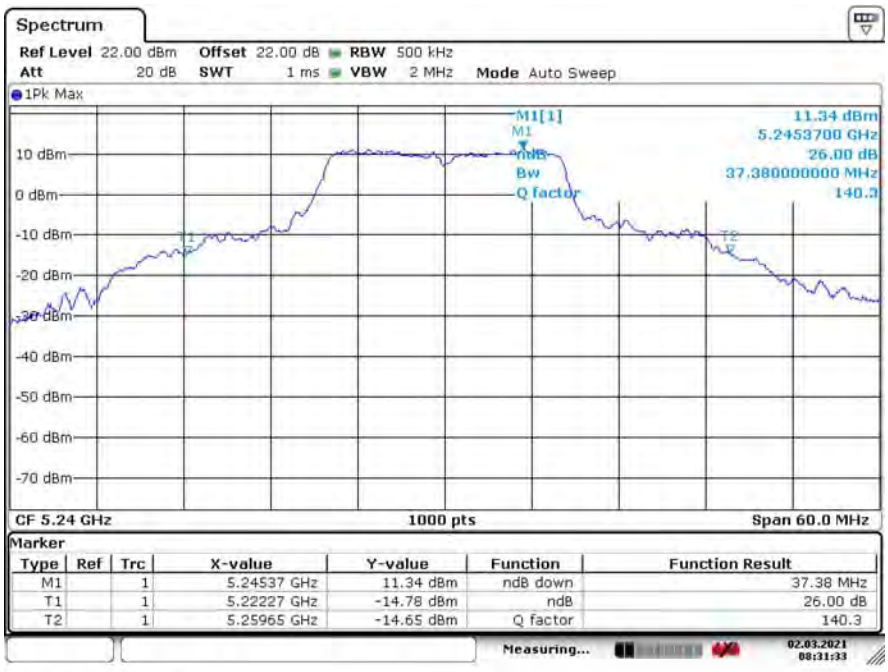
Date: 11.FEB.2021 14:09:44

5240 MHz ANT A 26dB OBW



Date: 2.MAR.2021 08:30:27

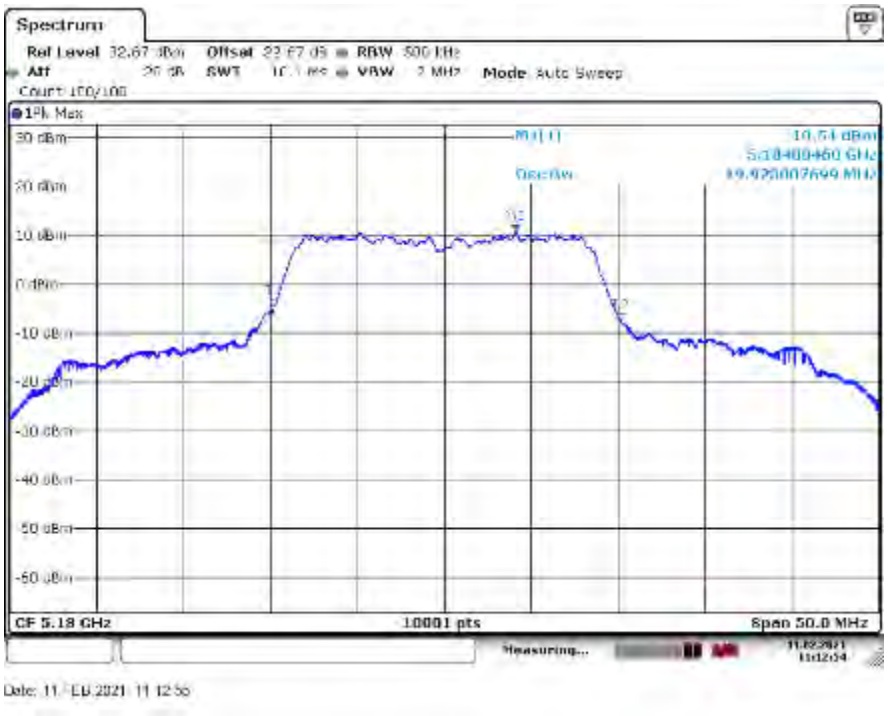
5240 MHz ANT B 26dB OBW



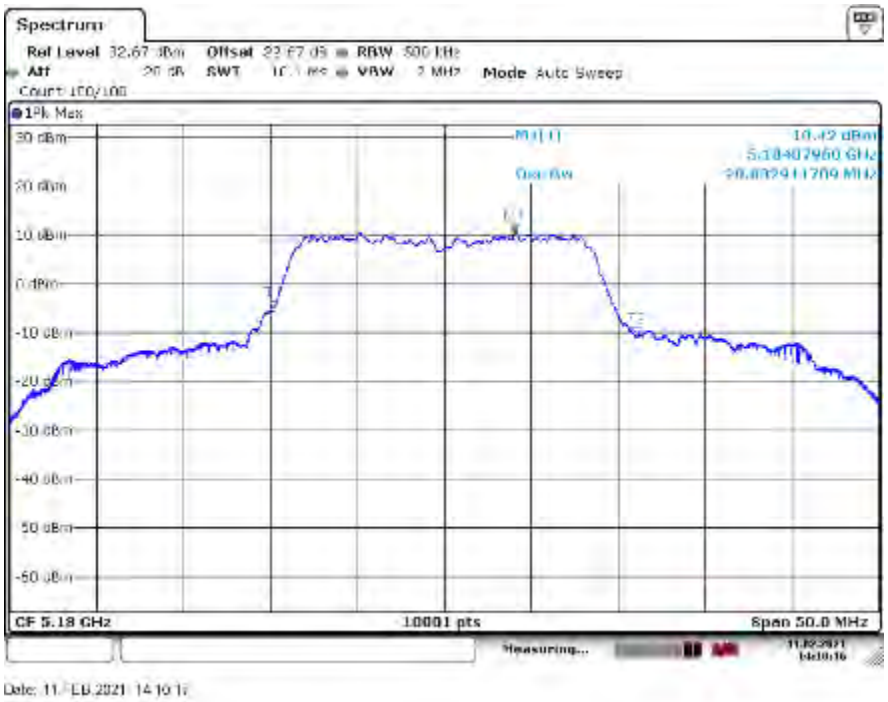
Date: 2.MAR.2021 08:31:33

802.11n20 Mode

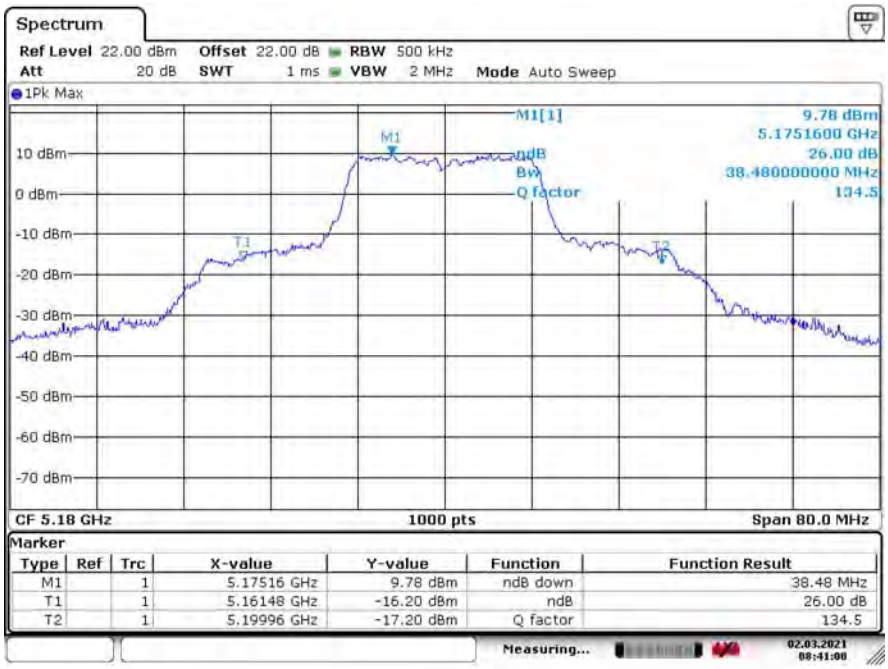
5180 MHz ANT A 99% OBW



5180 MHz ANT B 99% OBW



5180 MHz ANT A 26dB OBW



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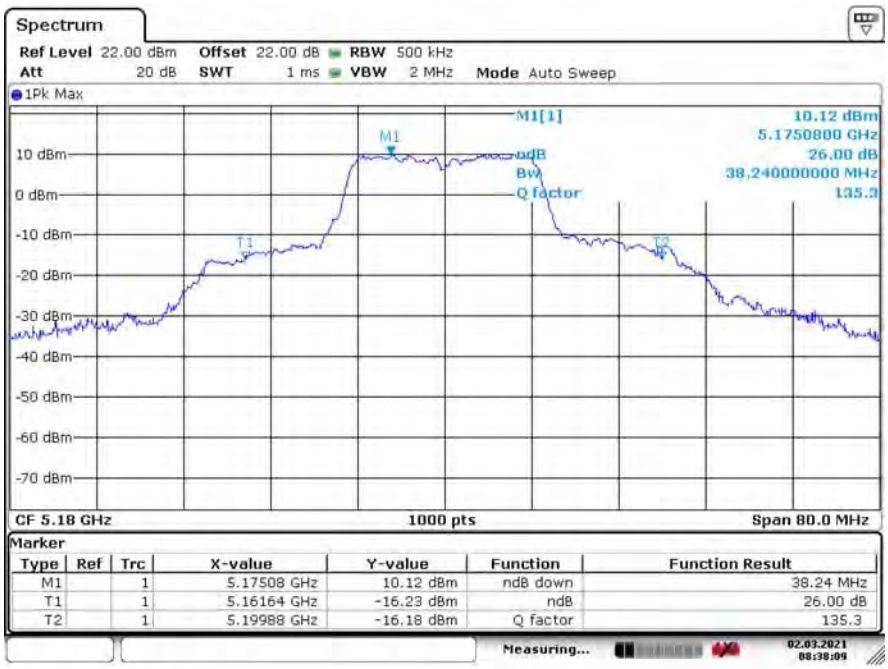
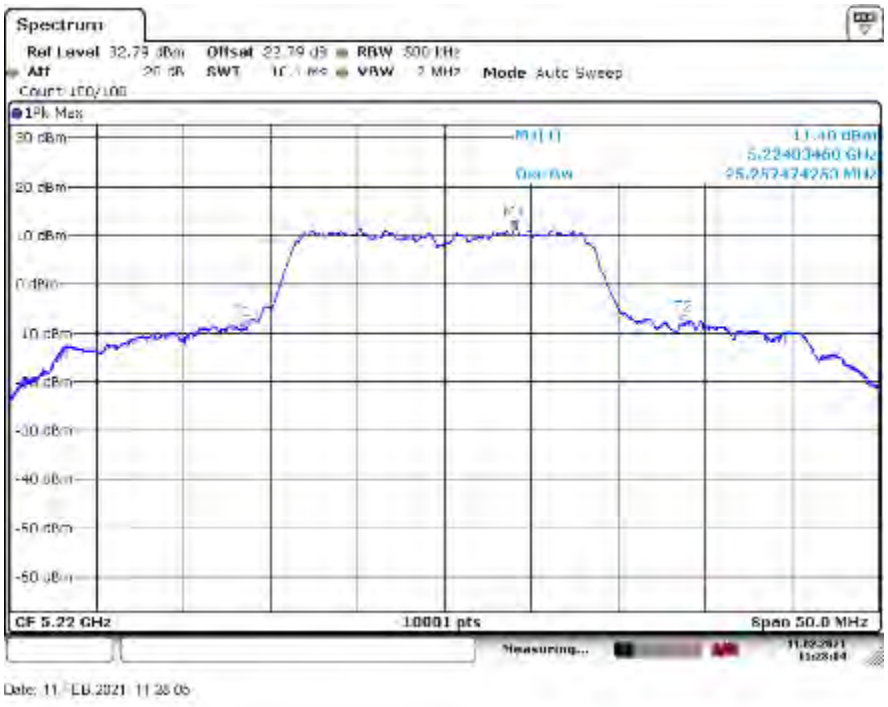
5180 MHz ANT B 26dB OBW

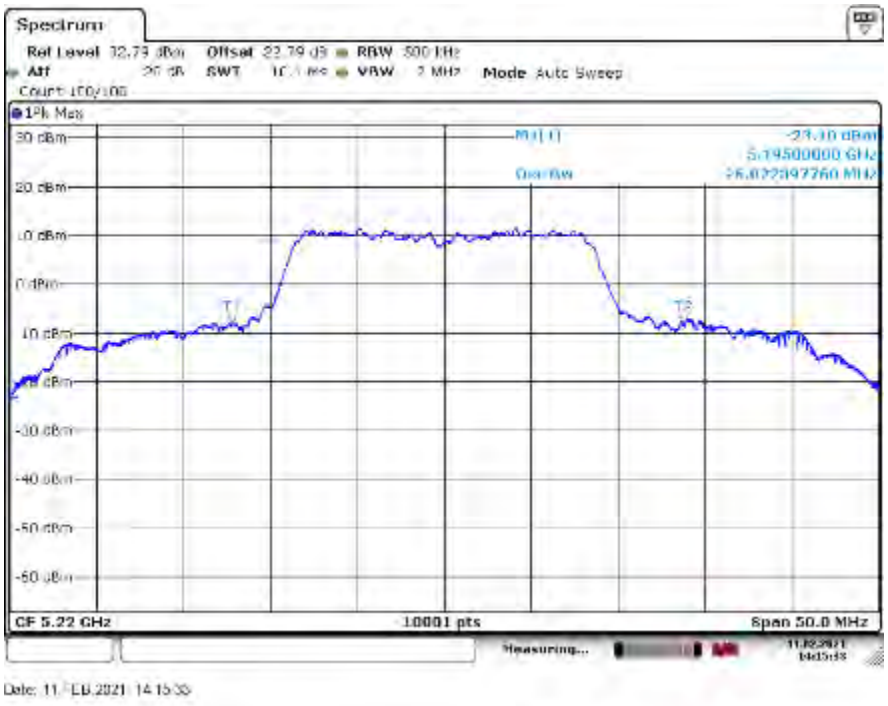


Date: 2.MAR.2021 08:38:10

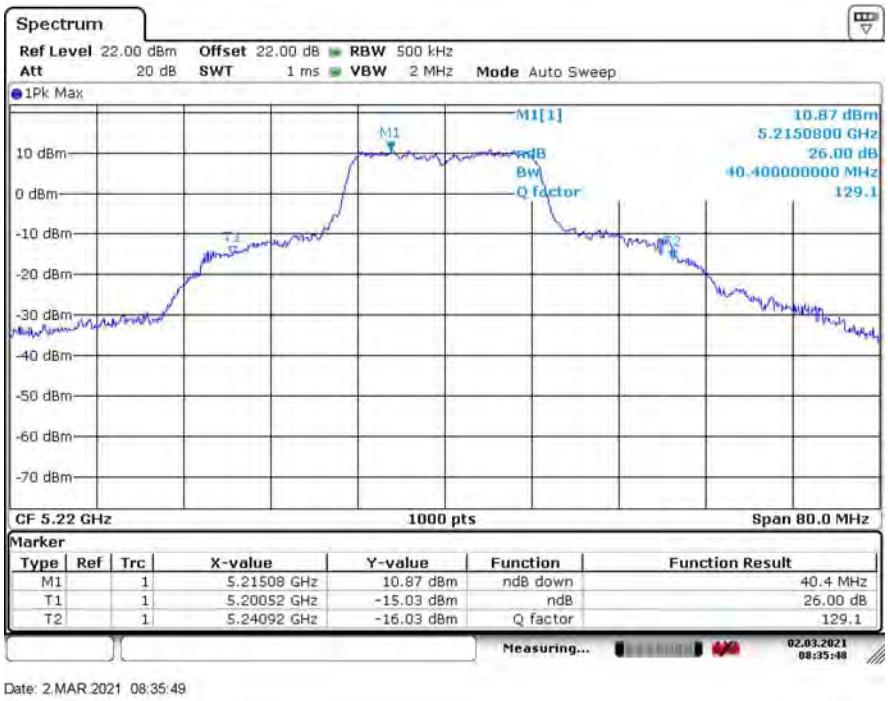
5220 MHz ANT A 99% OBW



5220 MHz ANT B 99% OBW

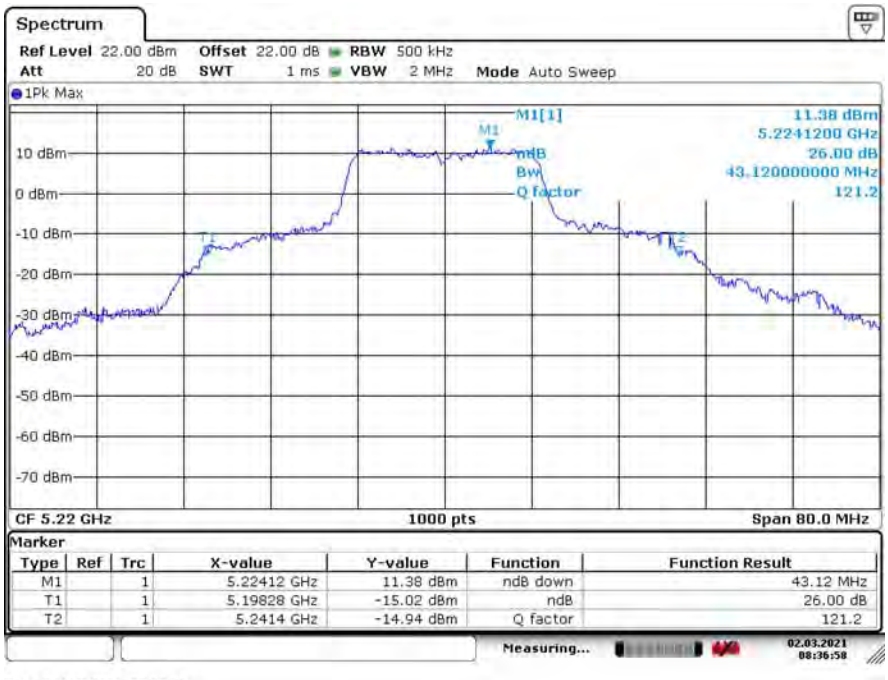


5220 MHz ANT A 26dB OBW



Date: 2.MAR.2021 08:35:49

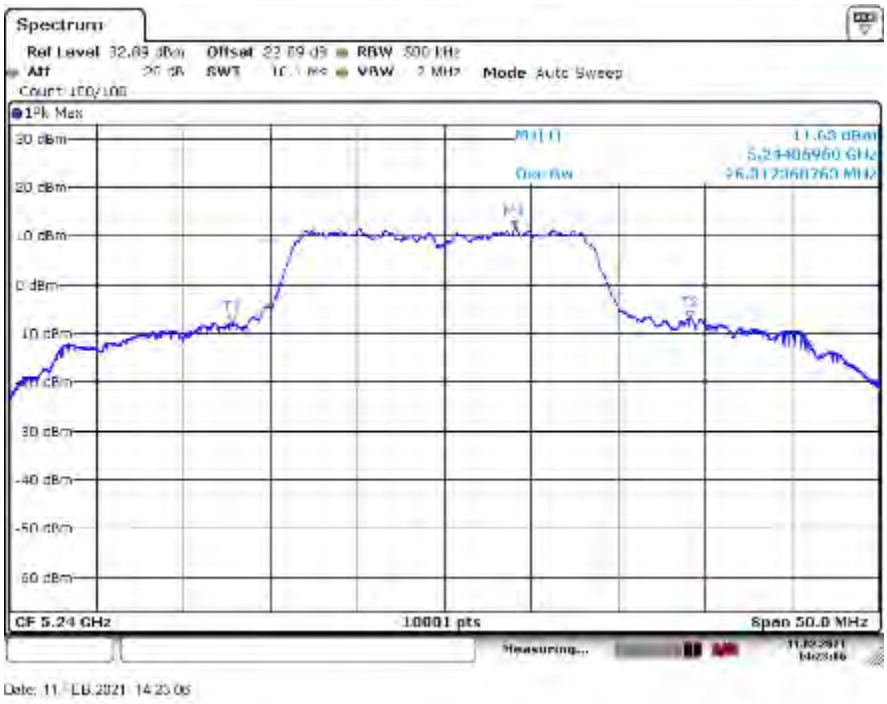
5220 MHz ANT B 26dB OBW



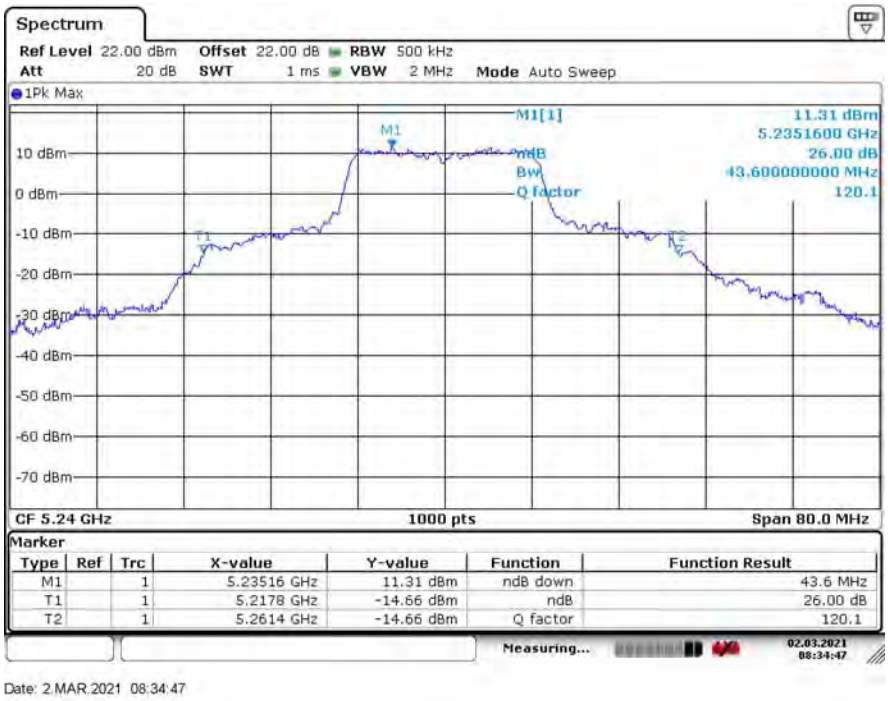
Date: 2.MAR.2021 08:36:58

5240 MHz ANT A 99% OBW

5240 MHz ANT B 99% OBW

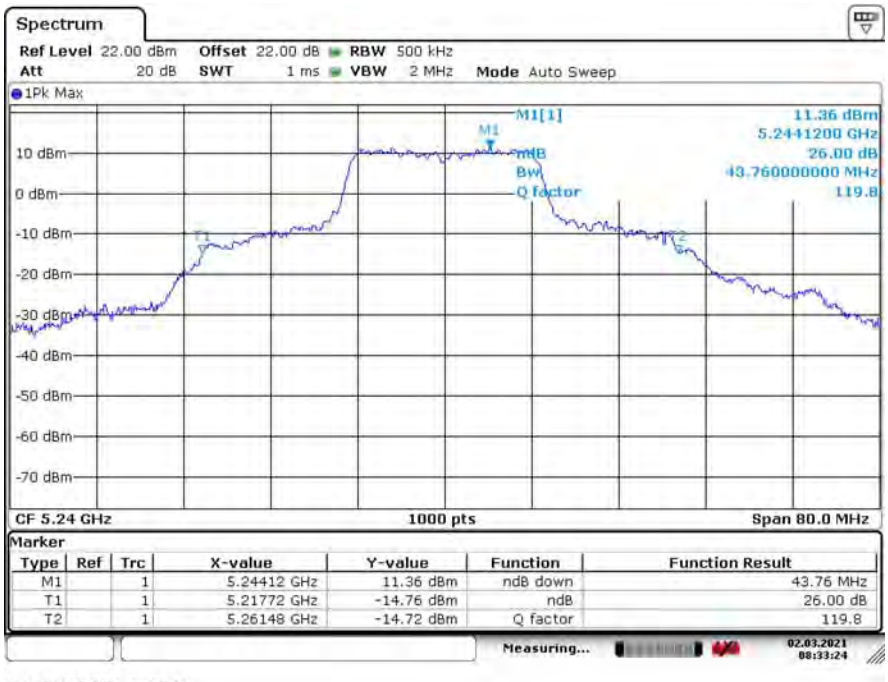


5240 MHz ANT A 26dB OBW



Date: 2.MAR.2021 08:34:47

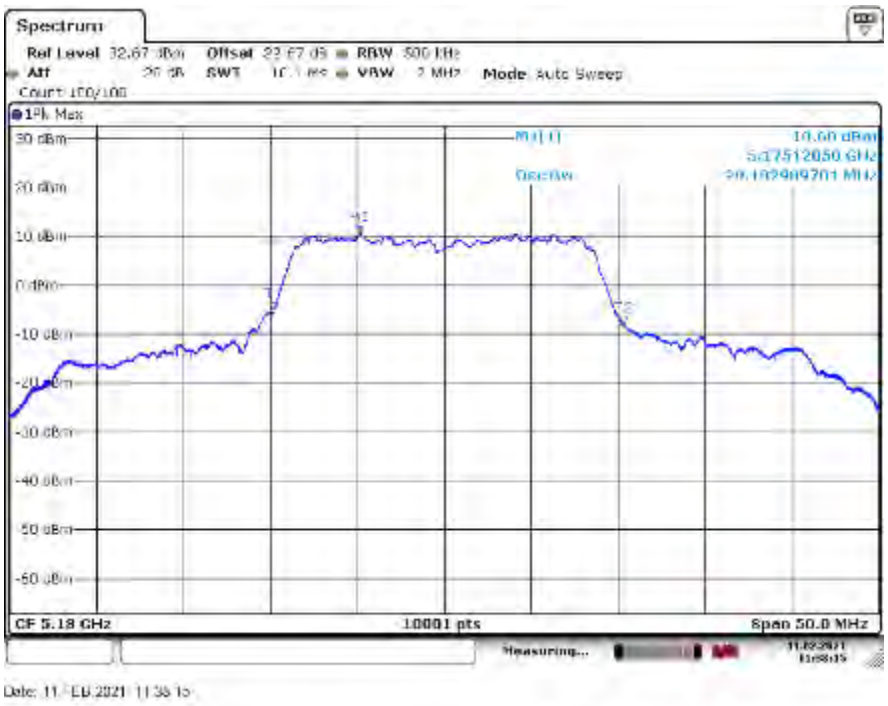
5240 MHz ANT B 26dB OBW



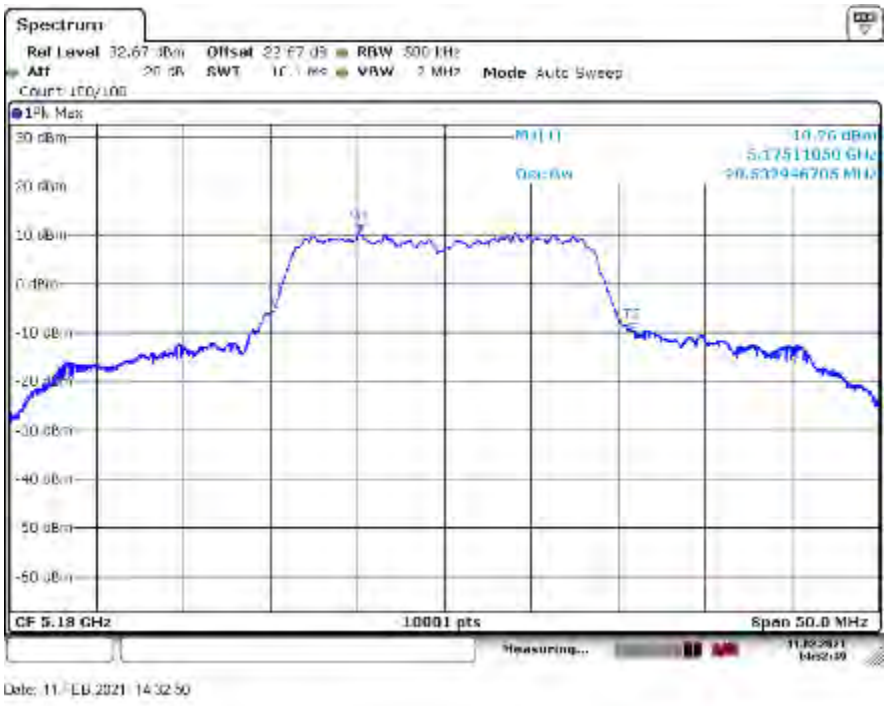
Date: 2.MAR.2021 08:33:24

802.11ac20 Mode

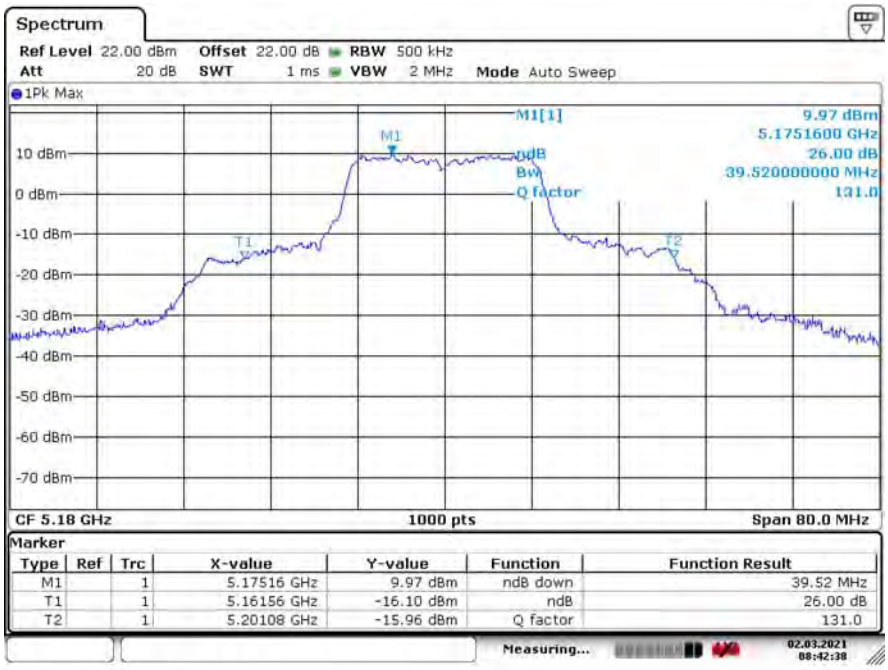
5180 MHz ANT A 99% OBW



5180 MHz ANT B 99% OBW

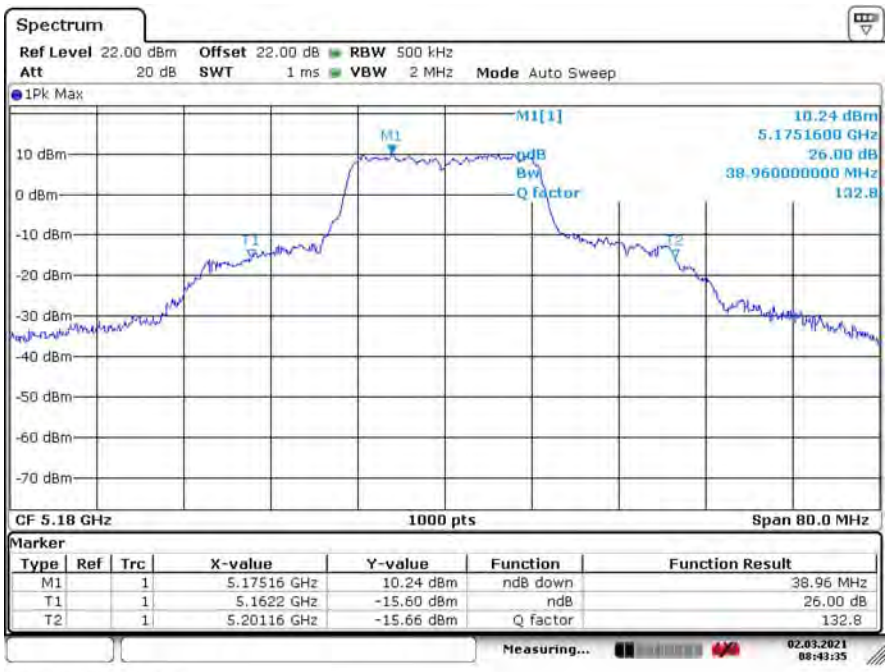


5180 MHz ANT A 26dB OBW



Date: 2.MAR.2021 08:42:38

5180 MHz ANT B 26dB OBW

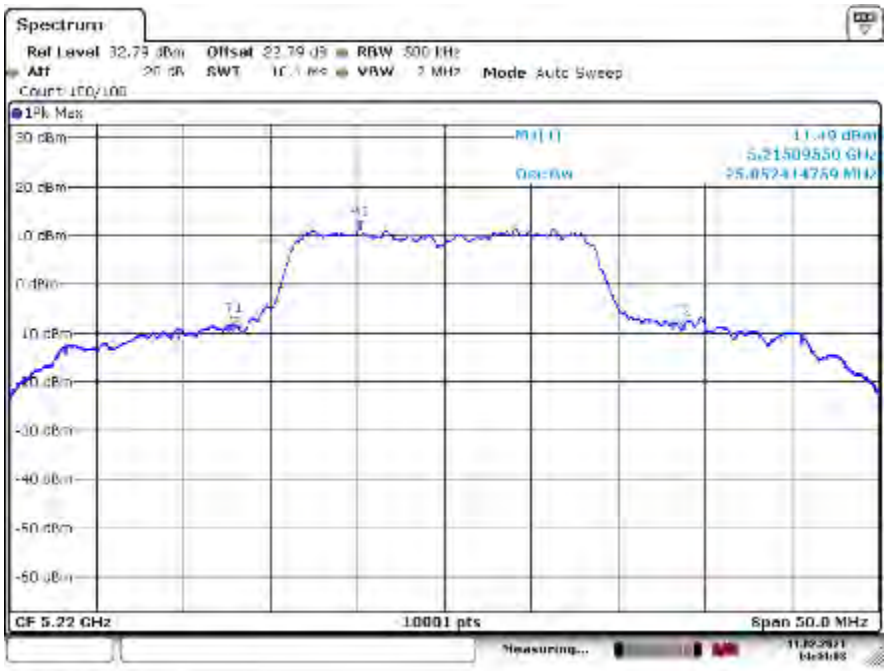


Date: 2.MAR.2021 08:43:36

5220 MHz ANT A 99% OBW

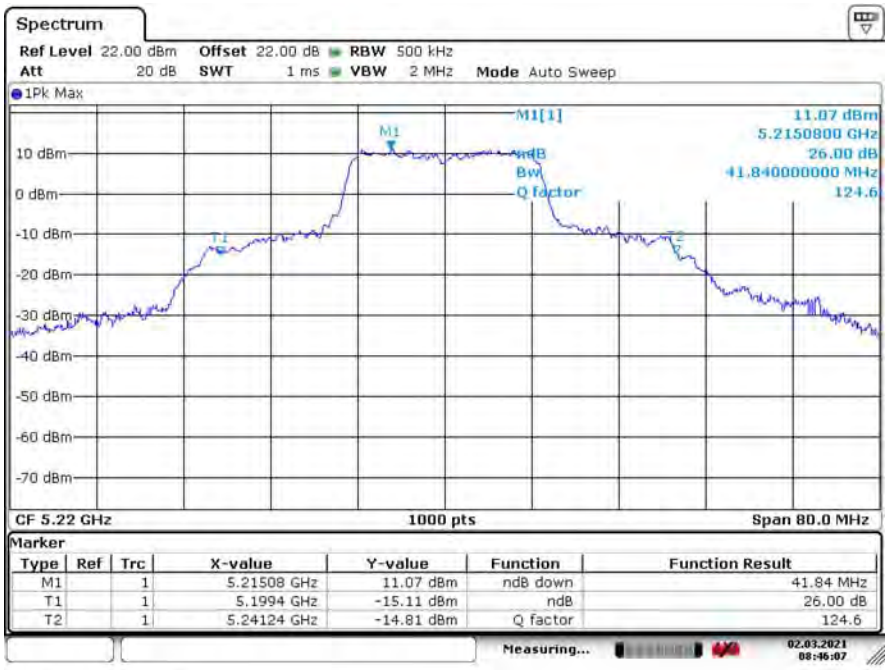
Date: 11.FEB.2021 11:42:14

5220 MHz ANT B 99% OBW



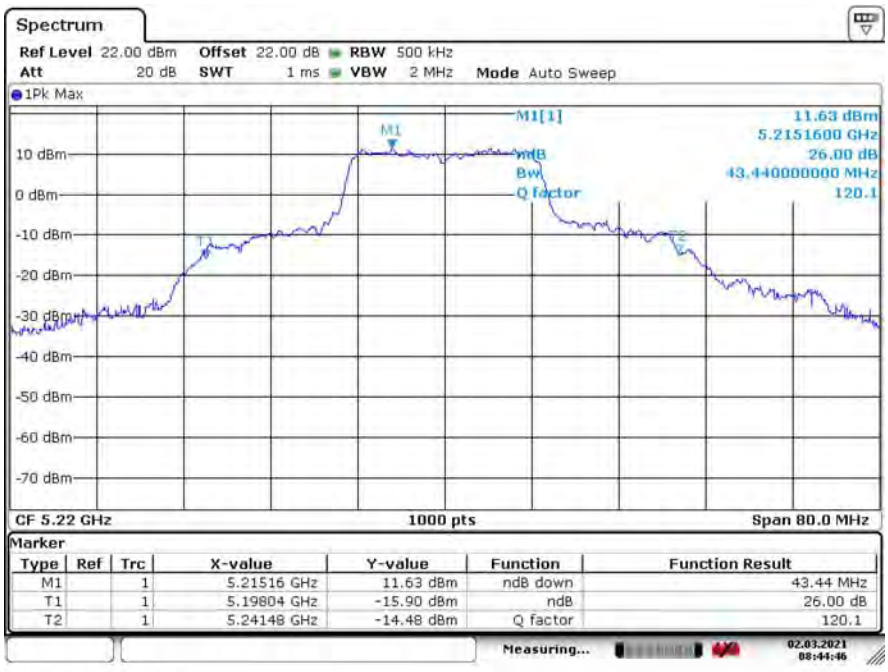
Date: 11.FEB.2021 14:44:09

5220 MHz ANT A 26dB OBW



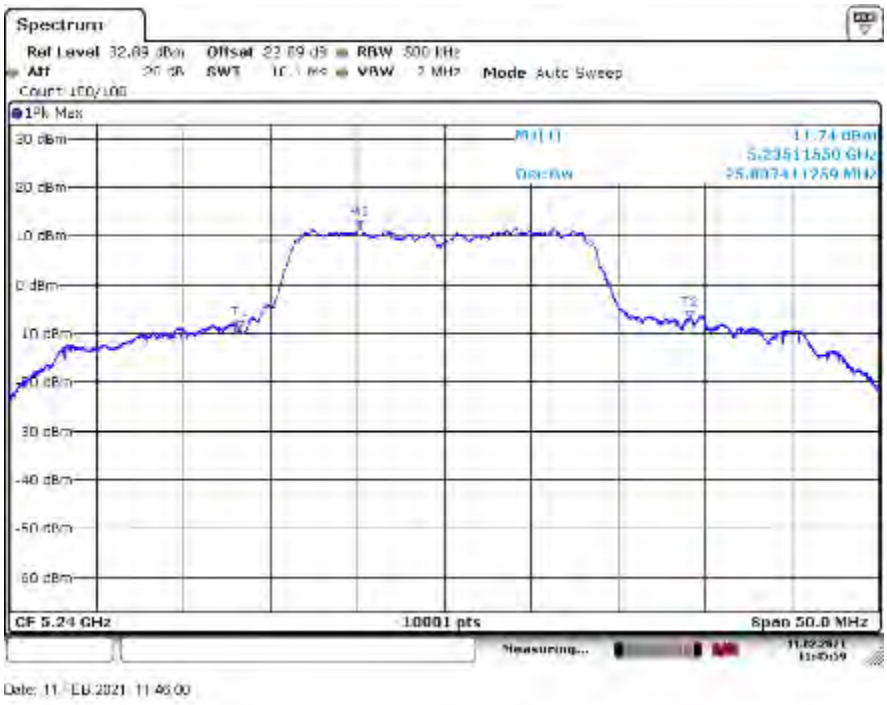
Date: 2.MAR.2021 08:46:07

5220 MHz ANT B 26dB OBW



Date: 2.MAR.2021 08:44:46

5240 MHz ANT A 99% OBW

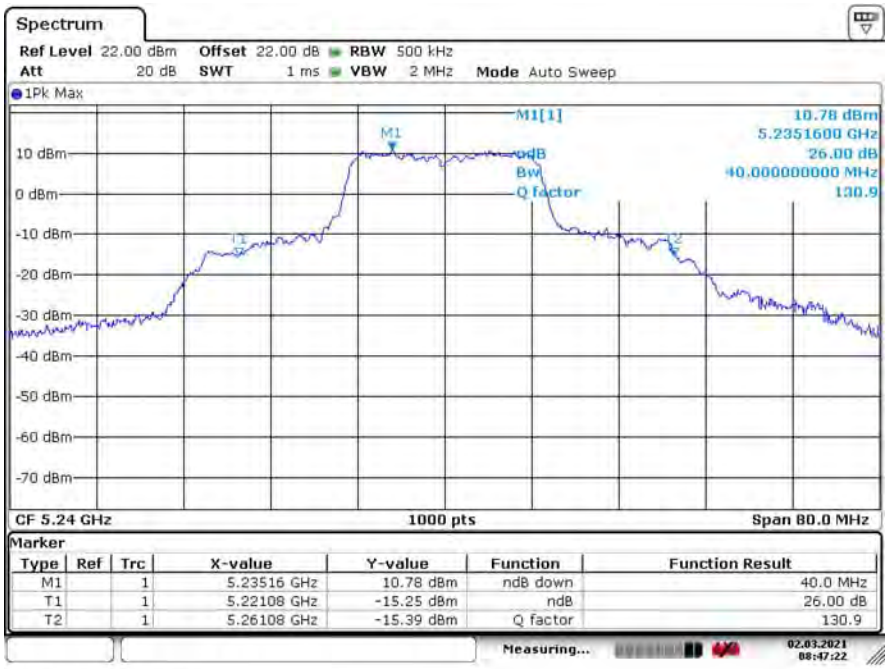


Date: 11.FEB.2021 11:46:00

5240 MHz ANT B 99% OBW

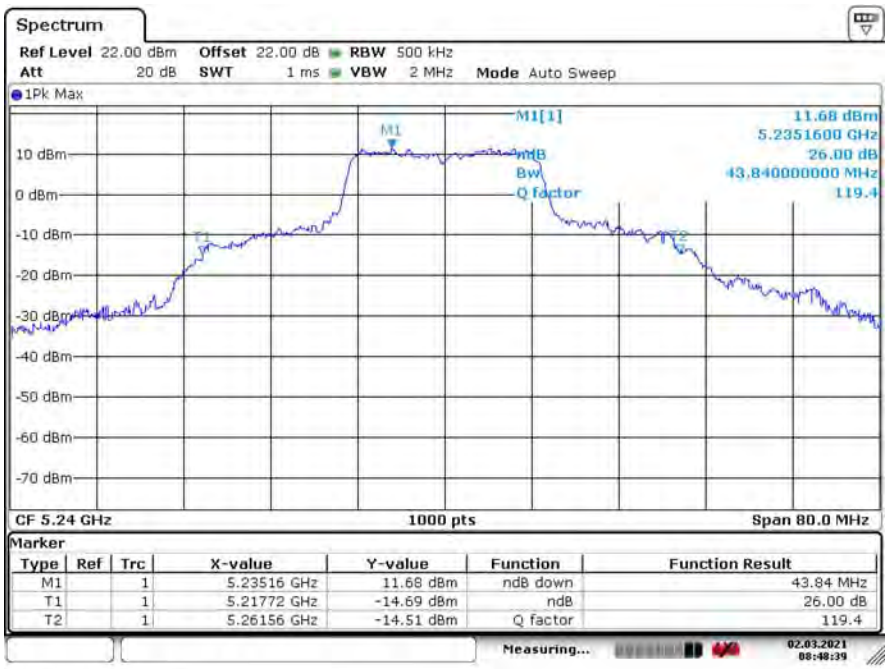
Date: 11.FEB.2021 14:45:16

5240 MHz ANT A 26dB OBW



Date: 2.MAR.2021 08:47:22

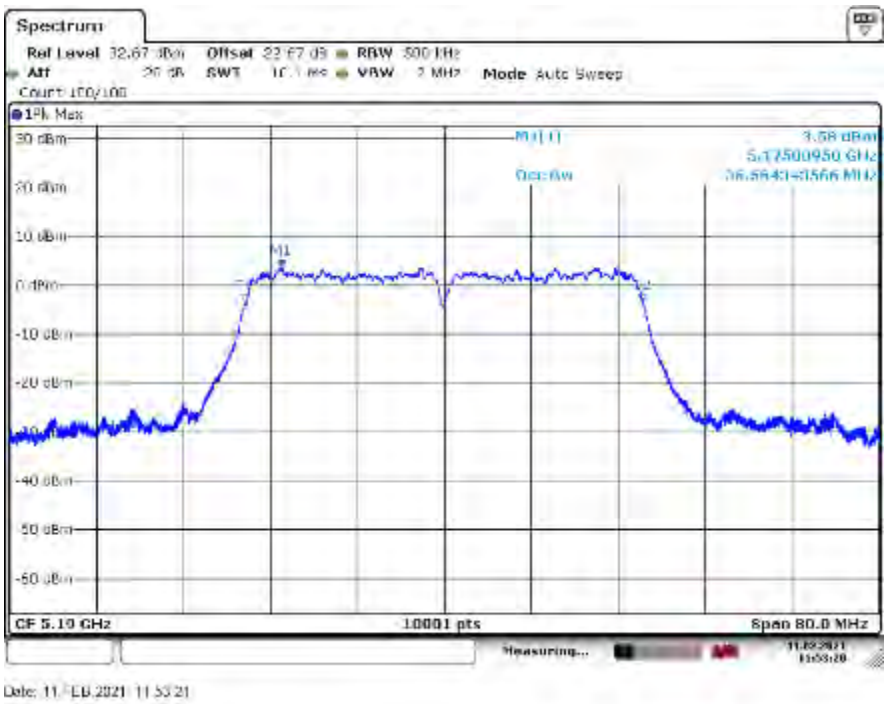
5240 MHz ANT B 26dB OBW



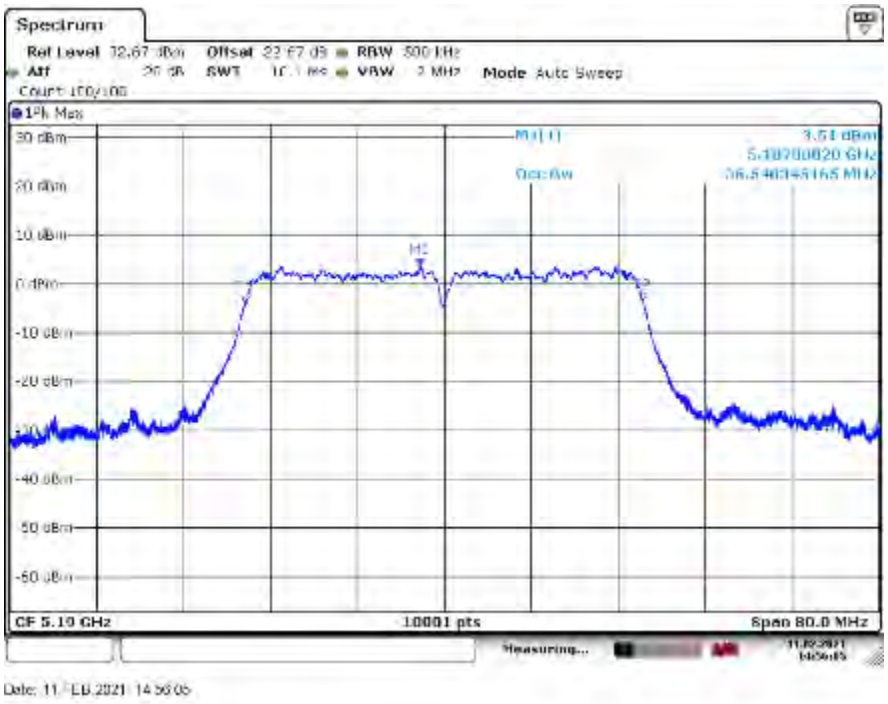
Date: 2.MAR.2021 08:48:39

802.11n40 Mode

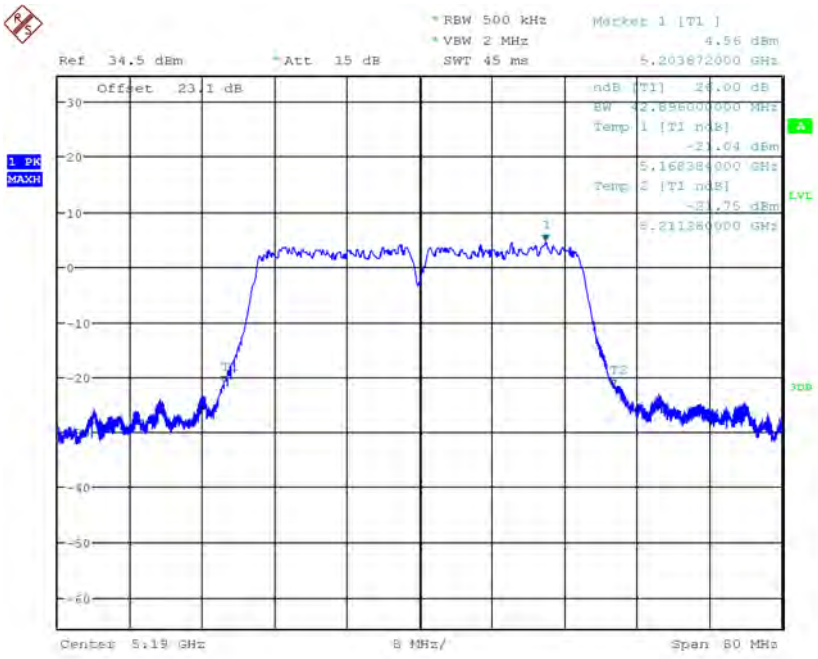
5190 MHz ANT A 99% OBW



5190 MHz ANT B 99% OBW

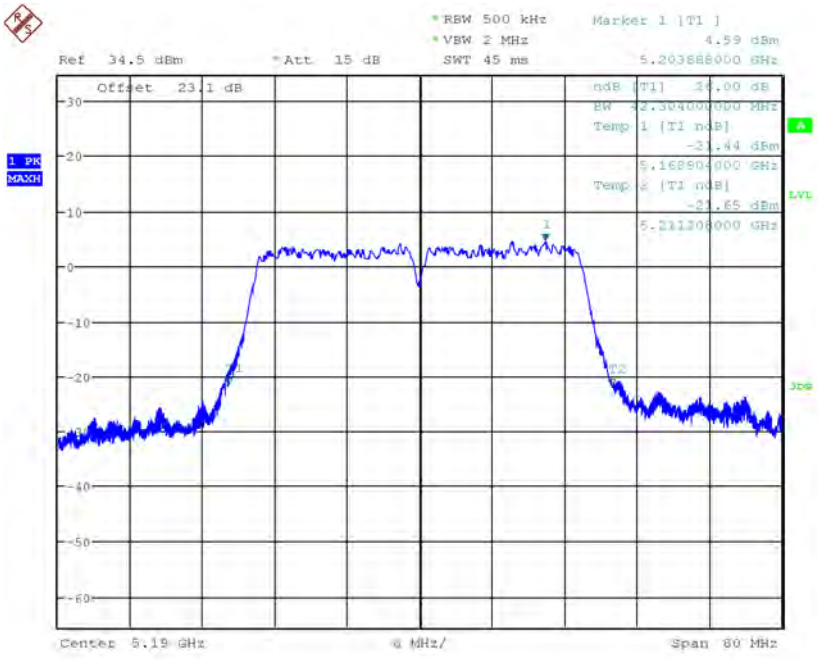


5190 MHz ANT A 26dB OBW



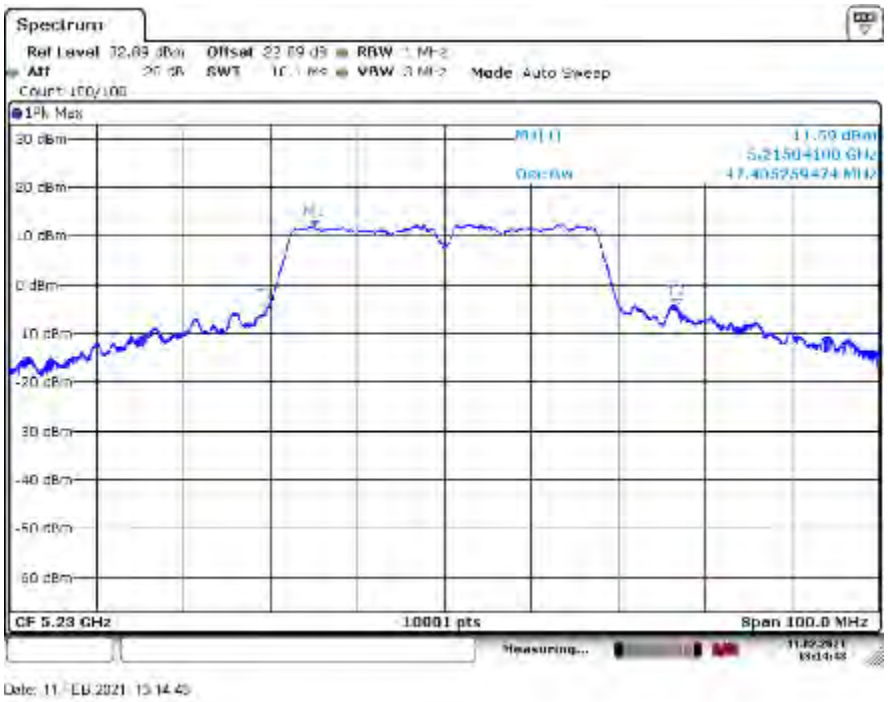
Date: 16.FEB.2021 13:16:28

5190 MHz ANT B 26dB OBW

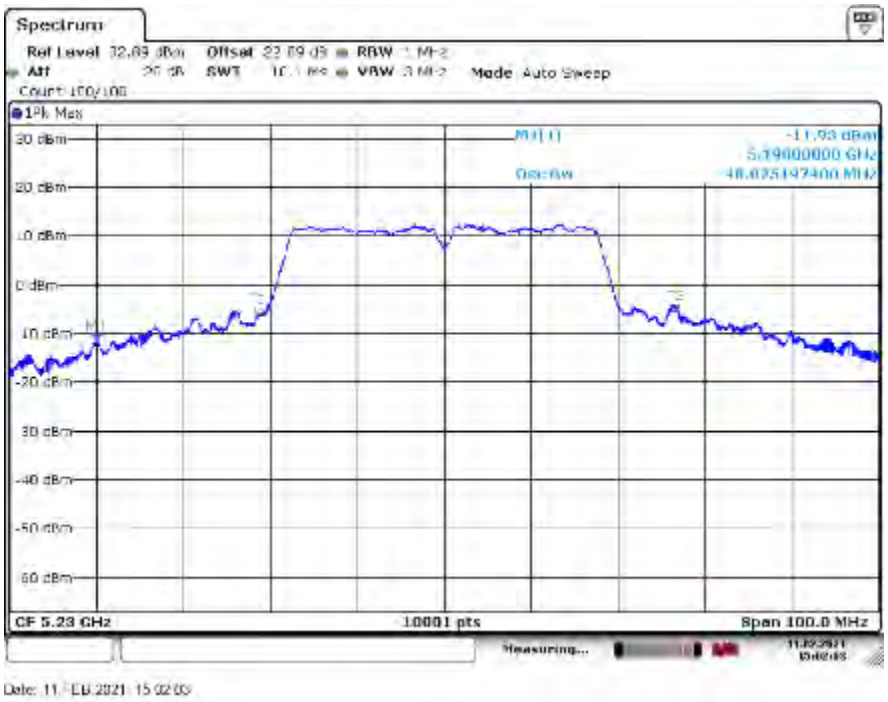


Date: 16.FEB.2021 14:08:11

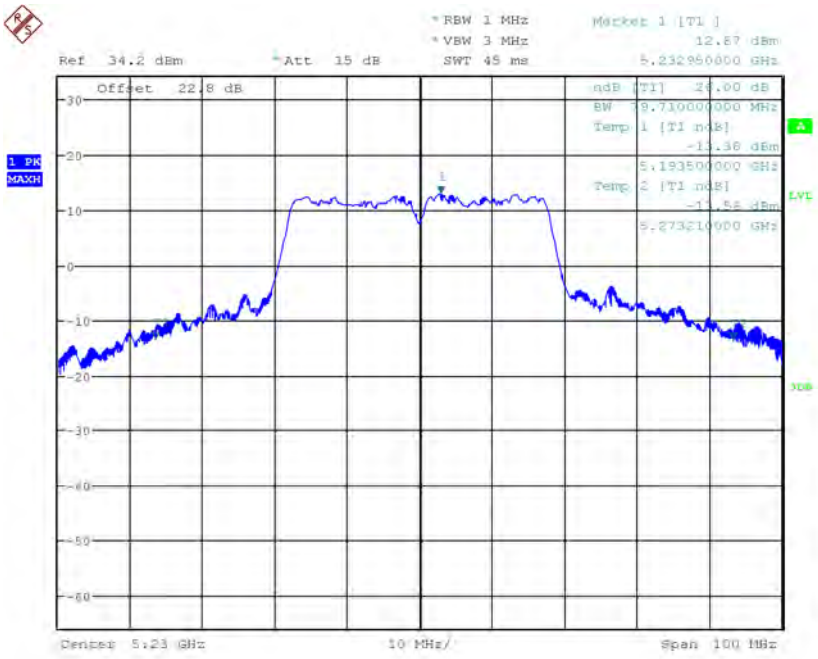
5230 MHz ANT A 99% OBW



5230 MHz ANT B 99% OBW

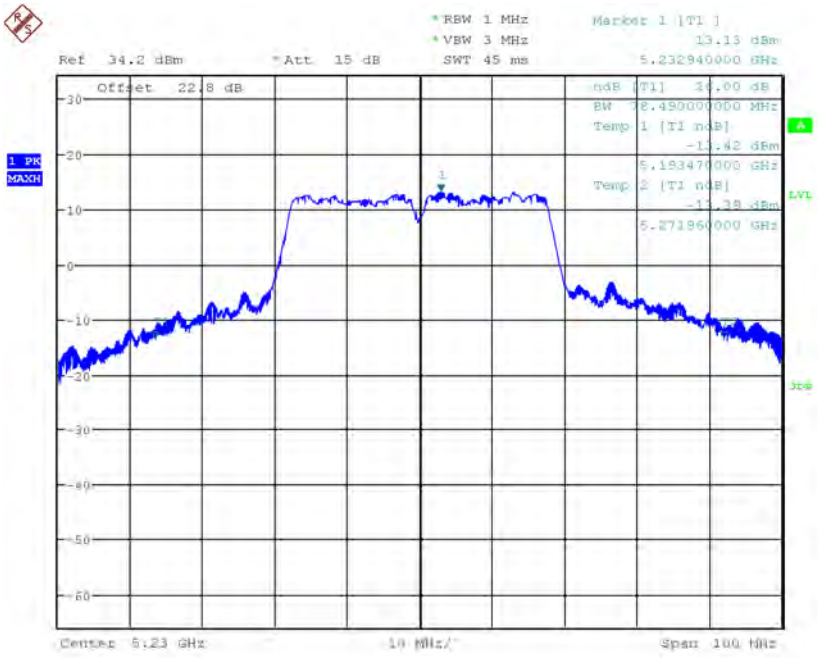


5230 MHz ANT A 26dB OBW



Date: 16.FEB.2021 13:24:08

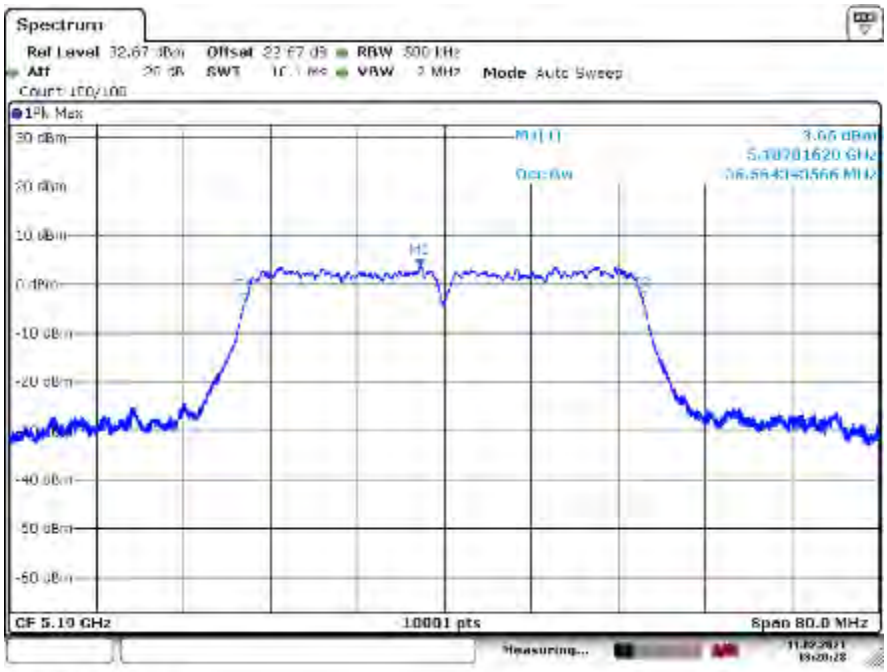
5230 MHz ANT B 26dB OBW



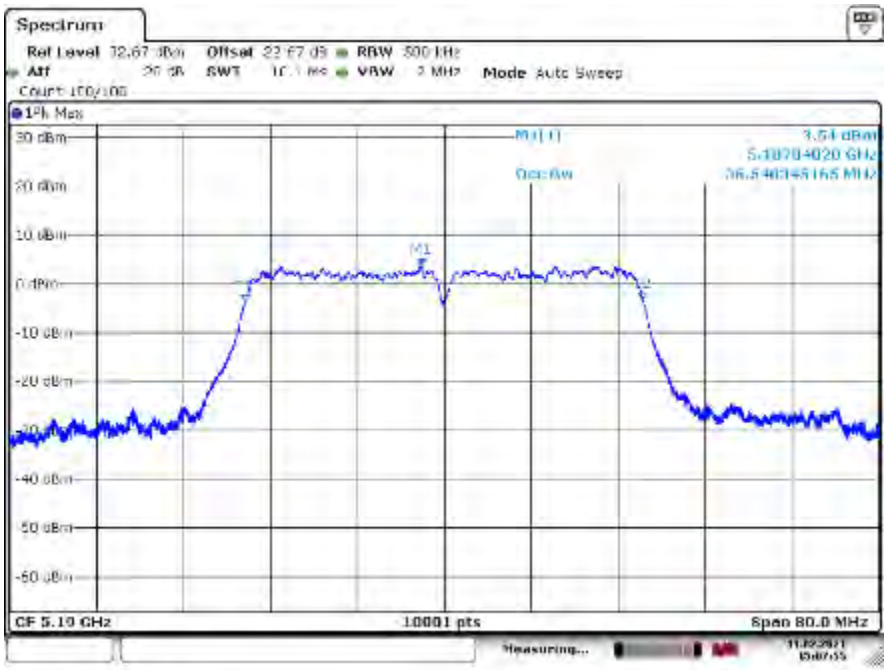
Date: 16.FEB.2021 13:14:34

802.11ac40 Mode

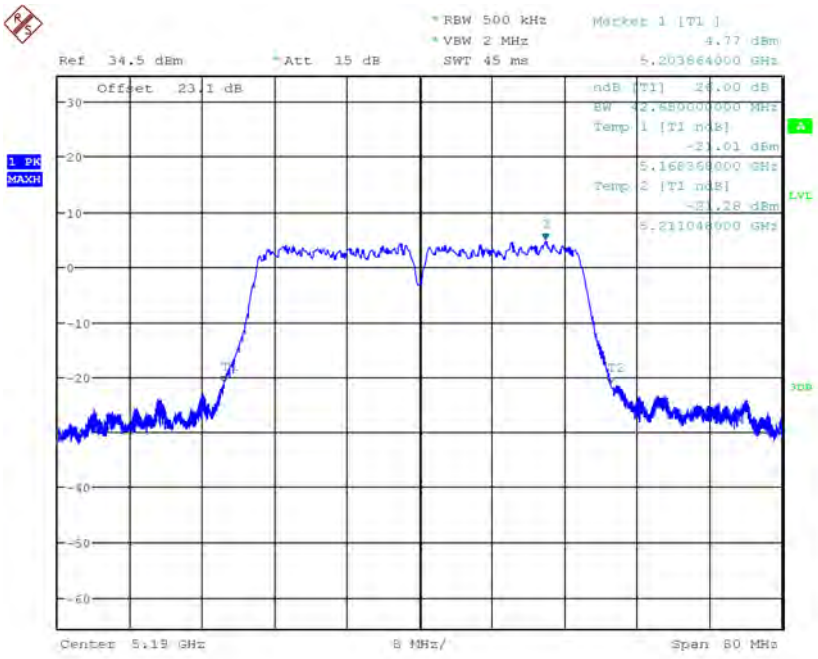
5190 MHz ANT A 99% OBW



5190 MHz ANT B 99% OBW

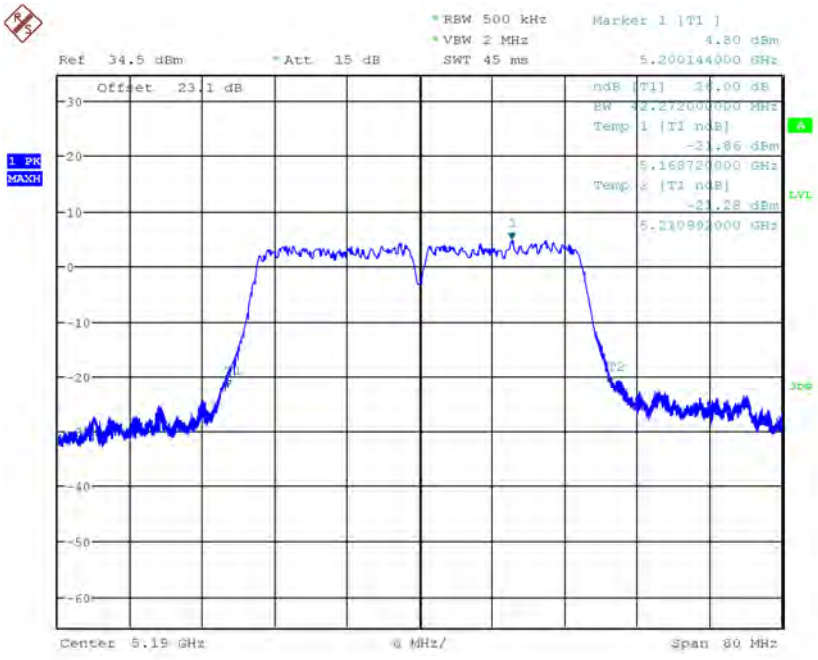


5190 MHz ANT A 26dB OBW



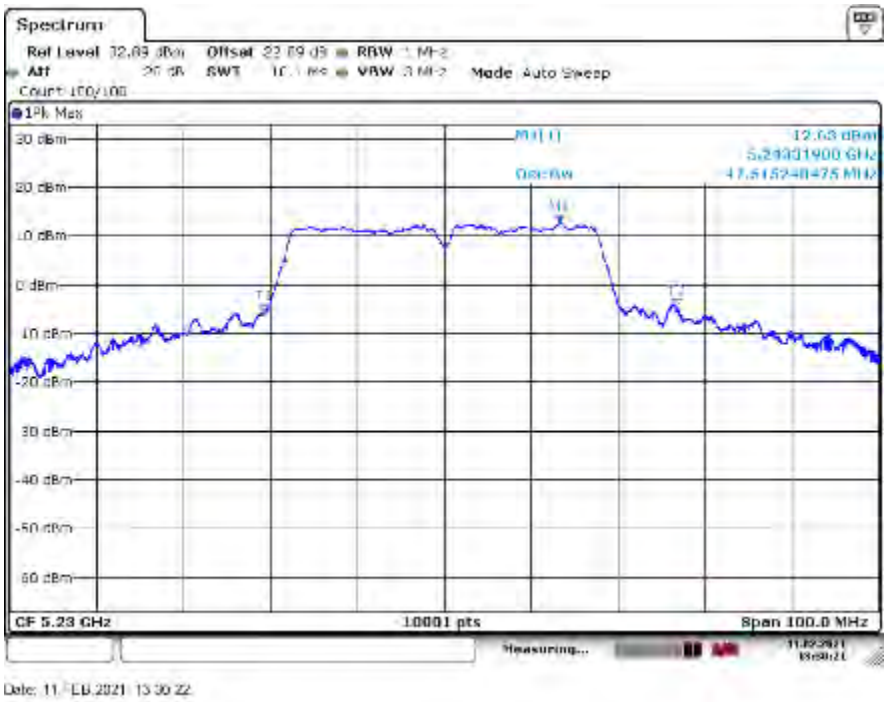
Date: 16.FEB.2021 13:18:48

5190 MHz ANT B 26dB OBW



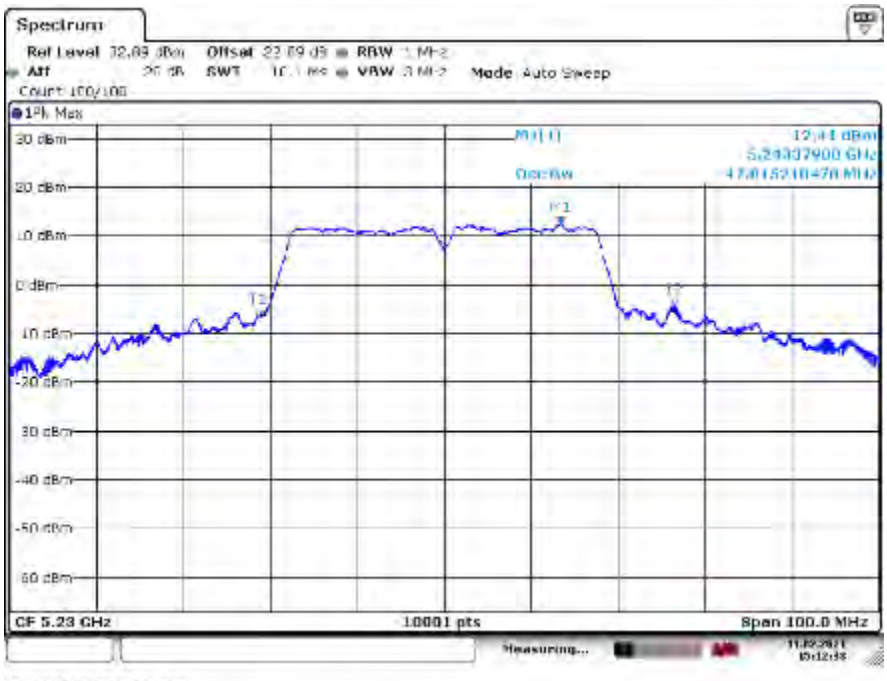
Date: 16.FEB.2021 14:10:32

5230 MHz ANT A 99% OBW



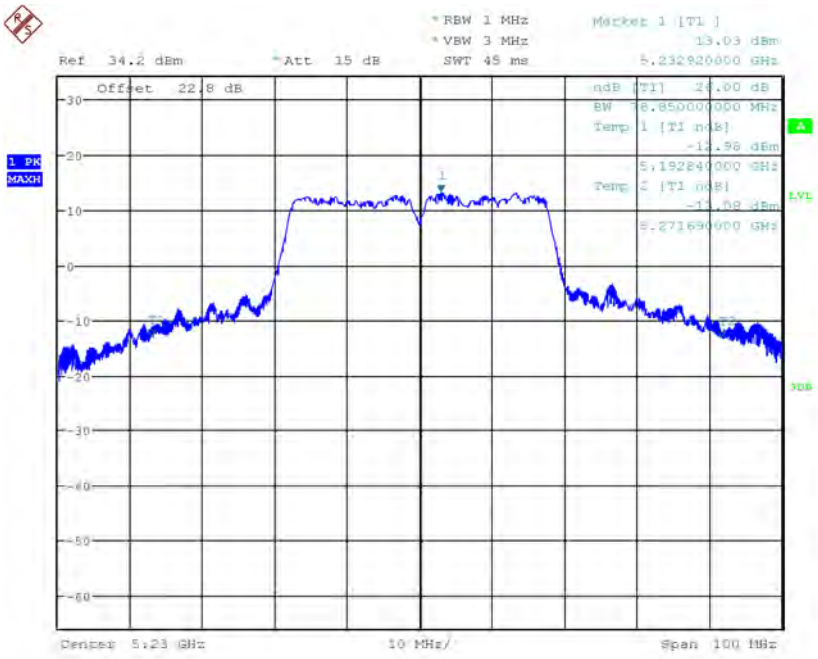
Date: 11.FEB.2021 15:30:22

5230 MHz ANT B 99% OBW



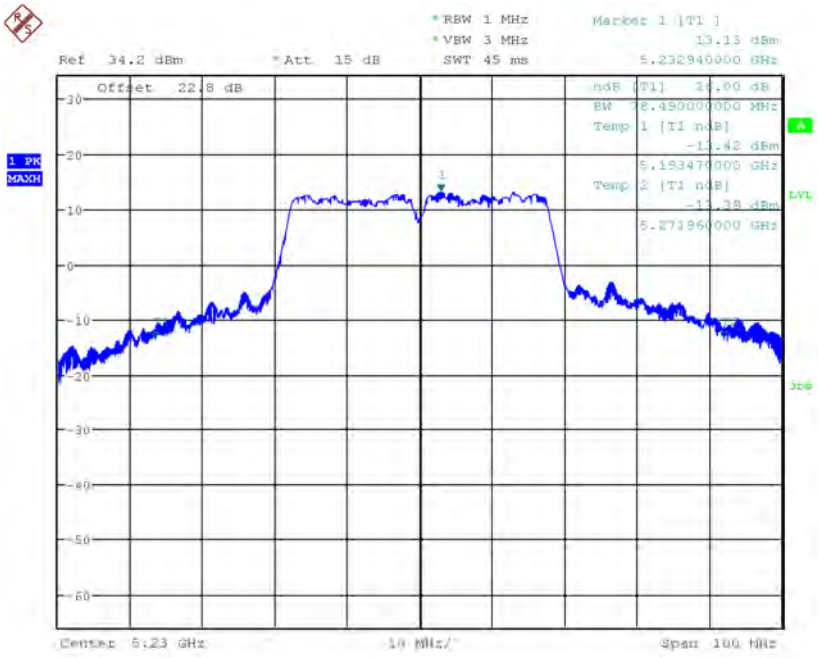
Date: 11.FEB.2021 15:12:34

5230 MHz ANT A 26dB OBW



Date: 16.FEB.2021 13:28:28

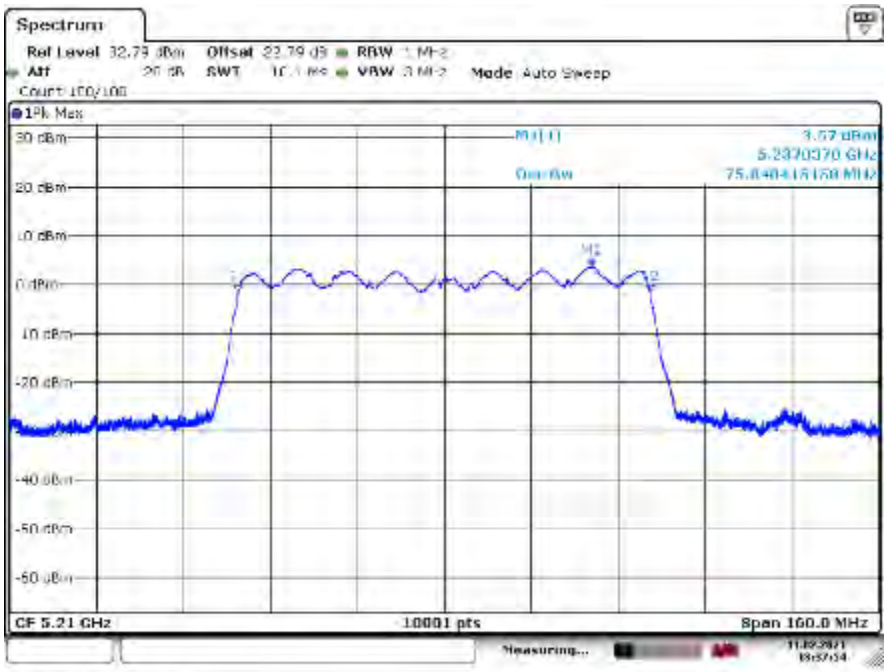
5230 MHz ANT B 26dB OBW



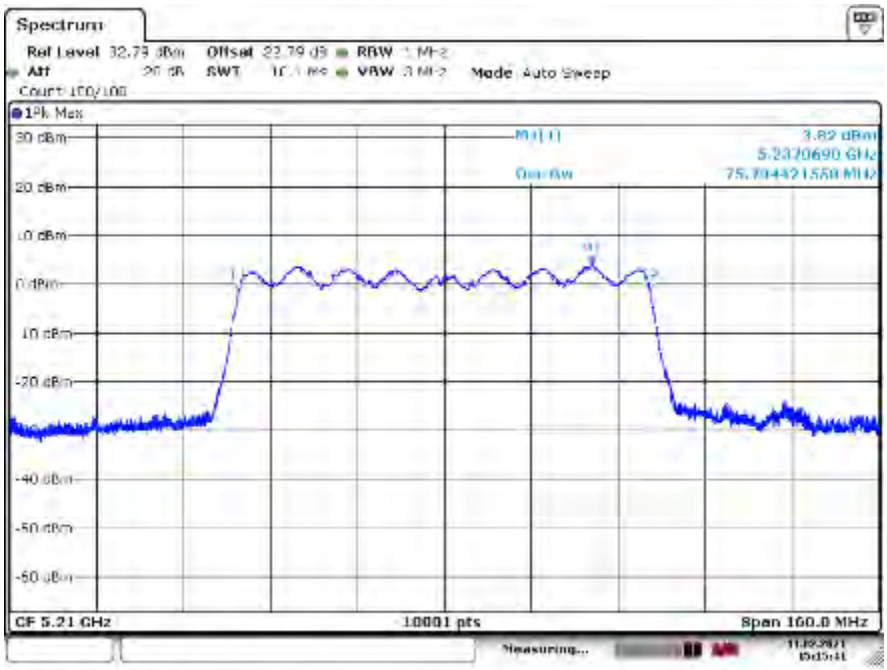
Date: 16.FEB.2021 13:14:34

802.11ac80 Mode

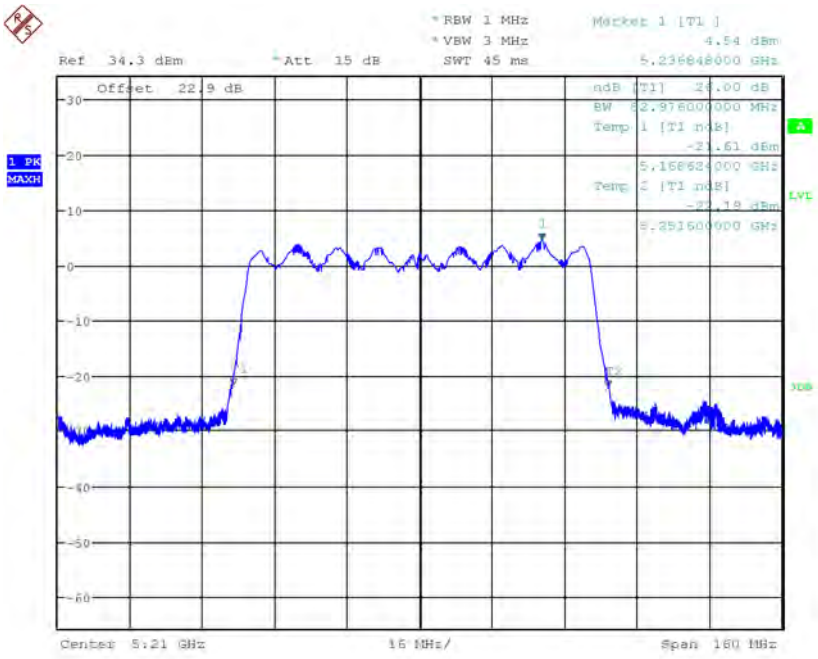
5210 MHz ANT A 99% OBW



5210 MHz ANT B 99% OBW



5210 MHz ANT A 26dB OBW



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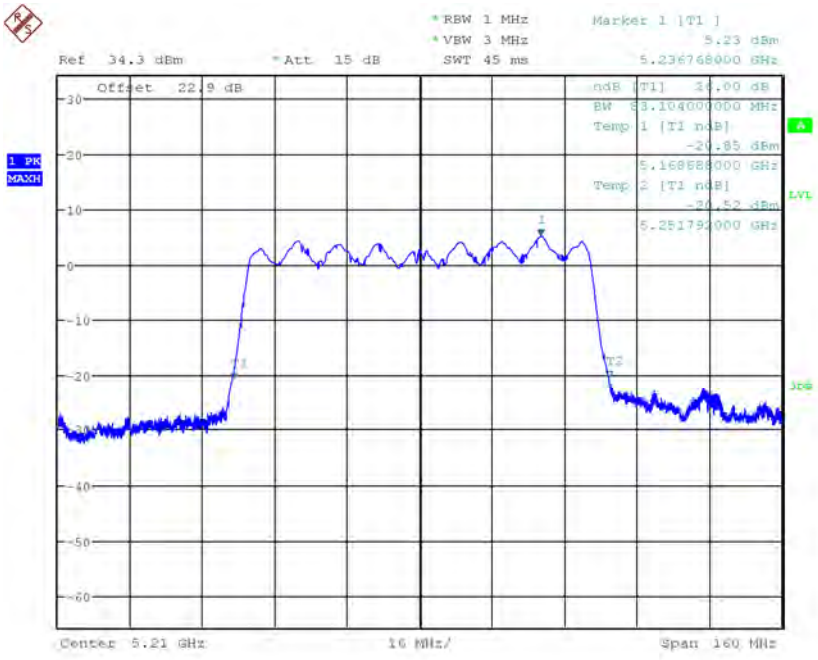
5210 MHz ANT B 26dB OBW

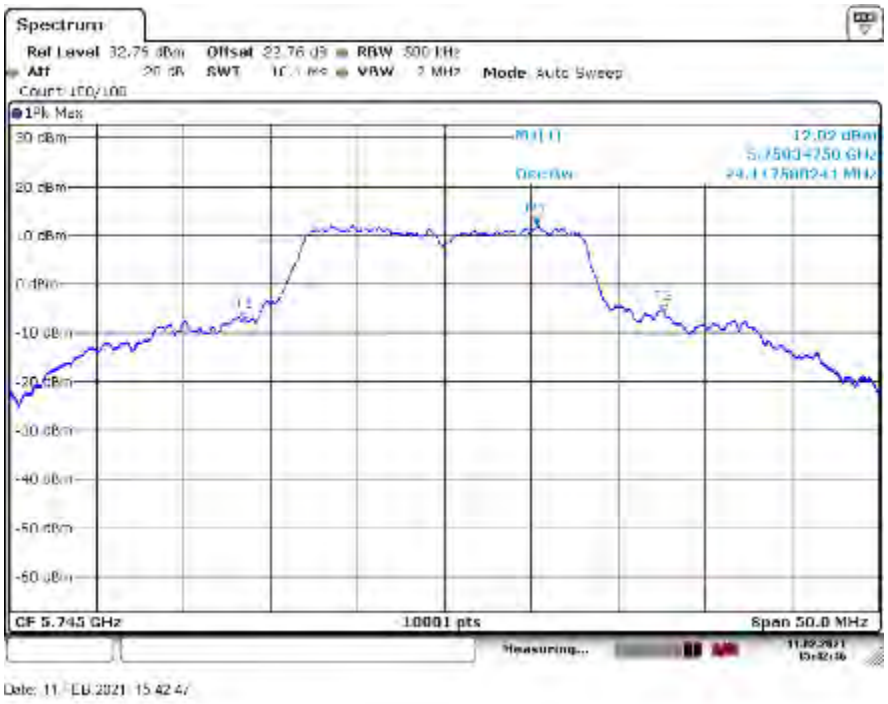


Date: 16.FEB.2021 14:19:51

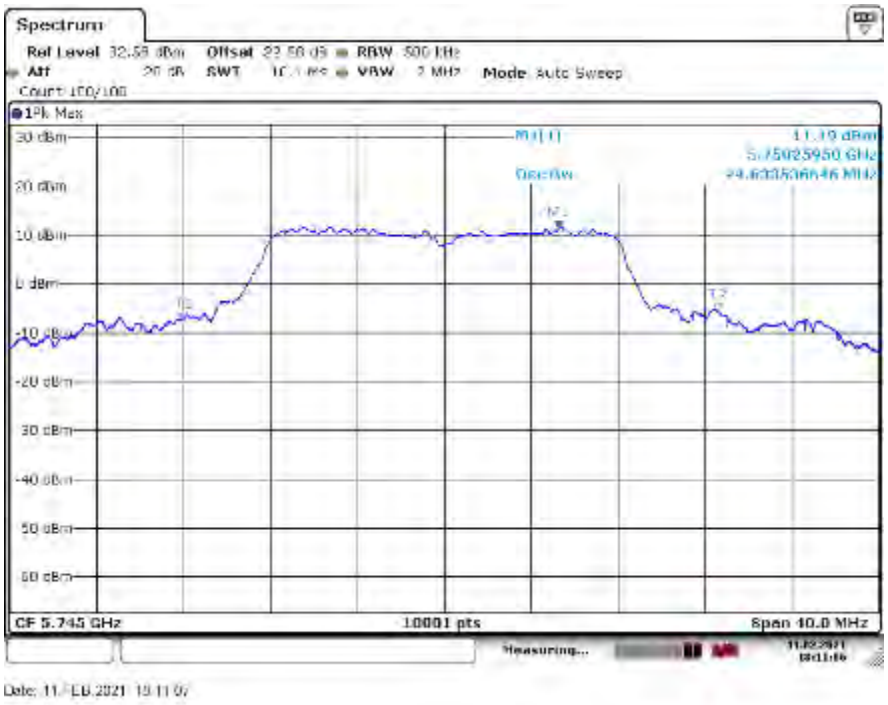
5725 - 5850 MHz

802.11a Mode

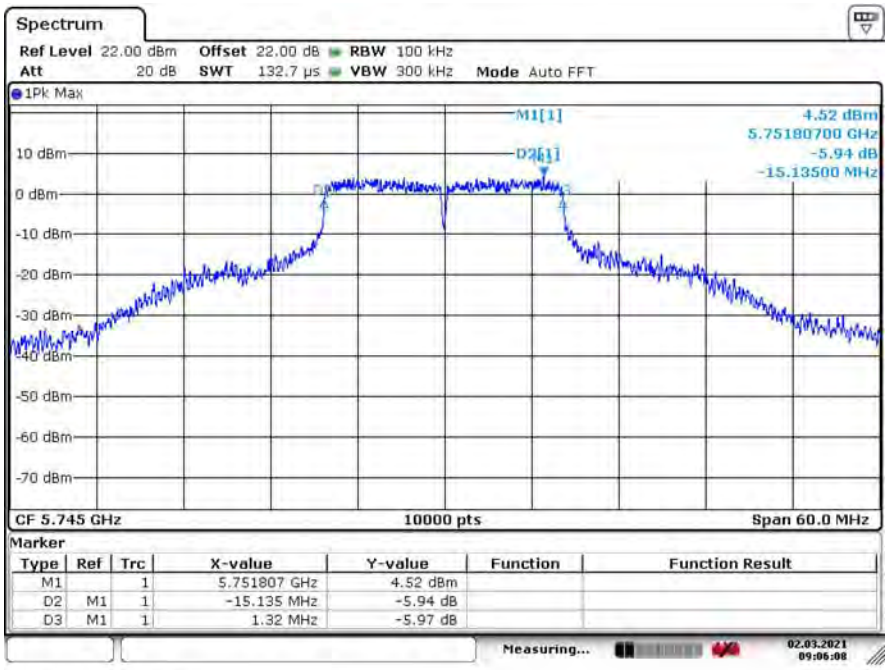
5745 MHz ANT A 99% OBW



5745 MHz ANT B 99% OBW

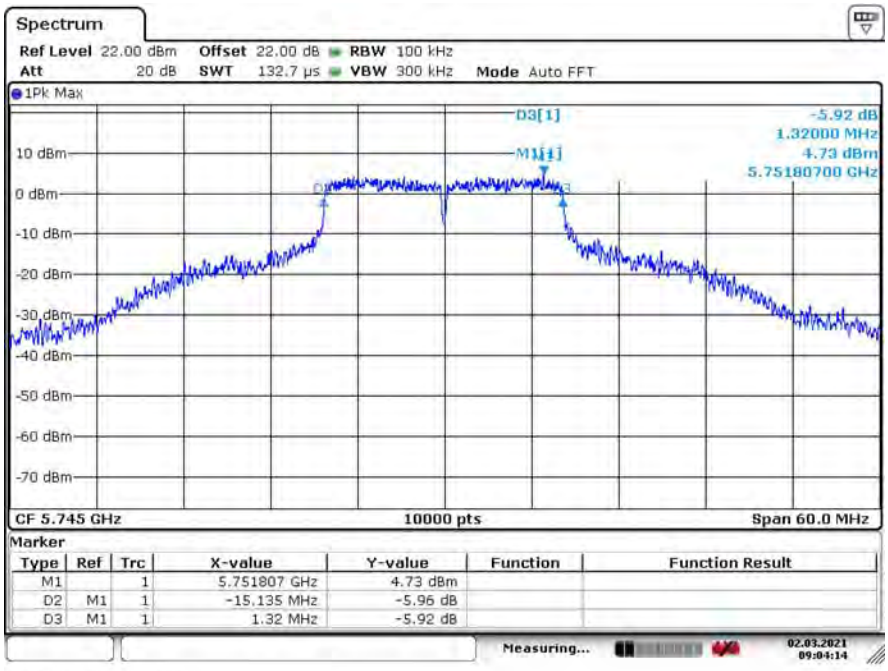


5745 MHz ANT A 6dB OBW



Date: 2.MAR.2021 09:06:09

5745 MHz ANT B 6dB OBW



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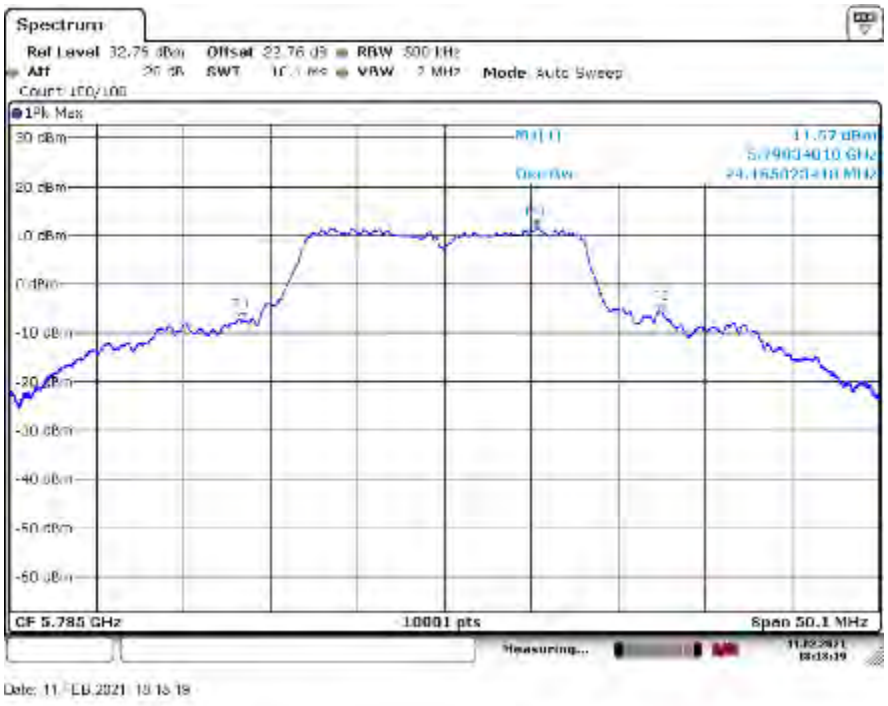
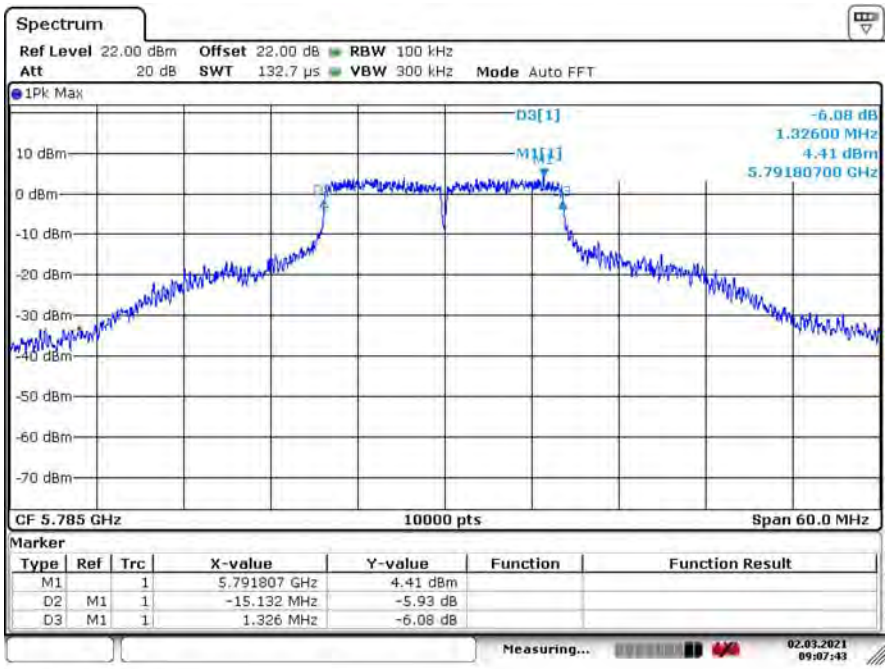
5785 MHz ANT A 99% OBW

5785 MHz ANT B 99% OBW

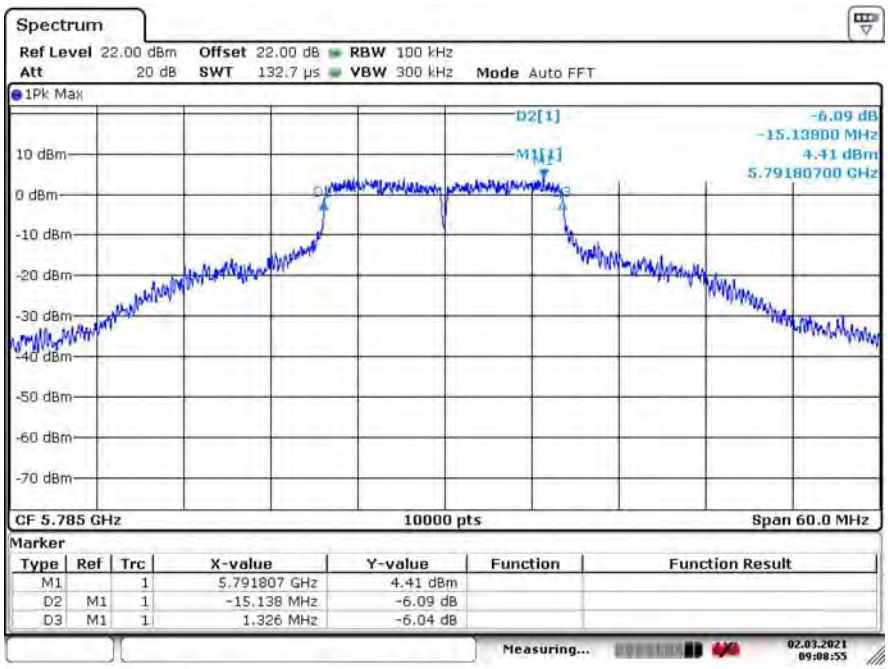


5785 MHz ANT A 6dB OBW



Date: 2.MAR.2021 09:07:44

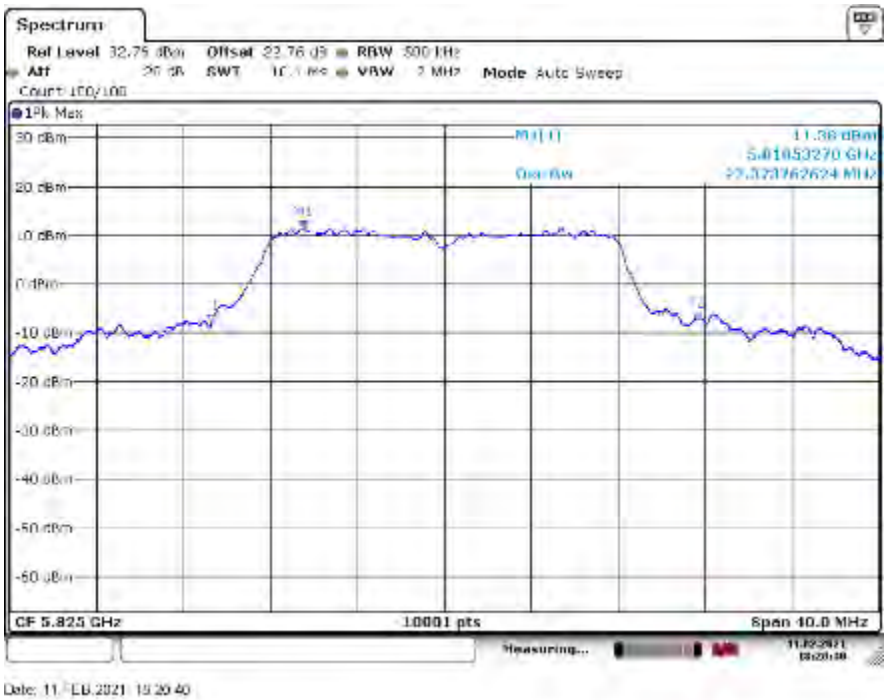
5785 MHz ANT B 6dB OBW



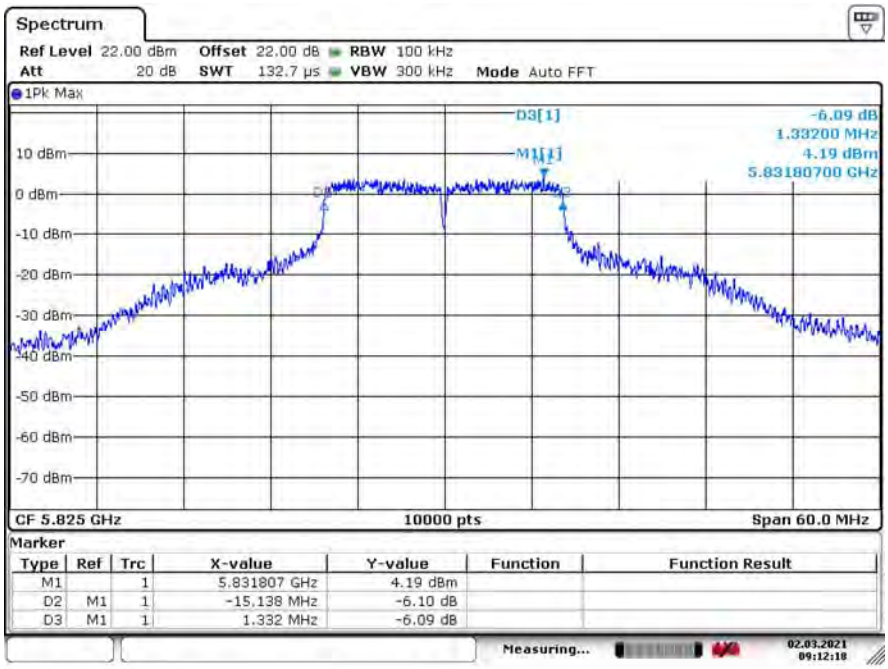
Date: 2.MAR.2021 09:08:56

5825 MHz ANT A 99% OBW

5825 MHz ANT B 99% OBW



5825 MHz ANT A 6dB OBW



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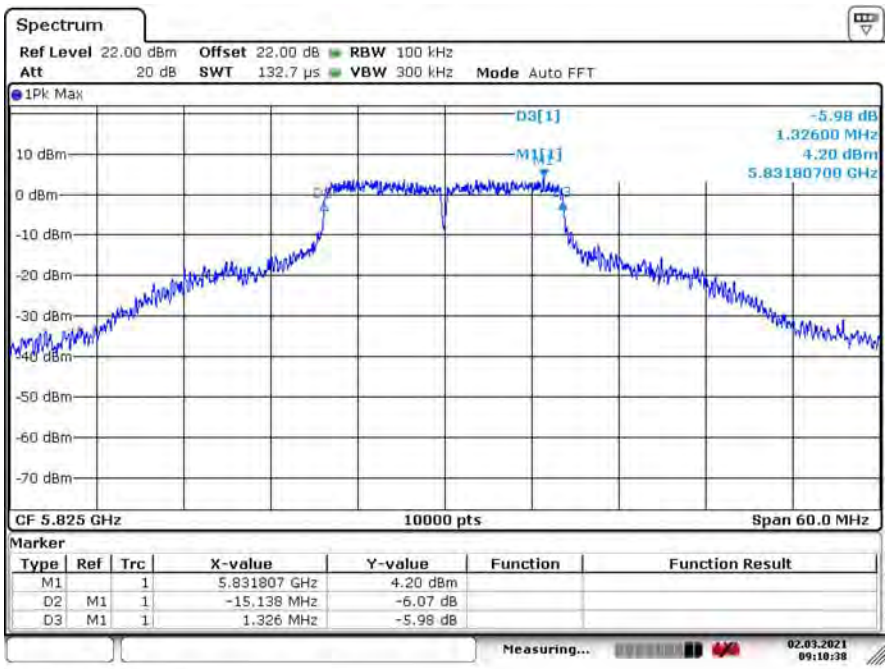
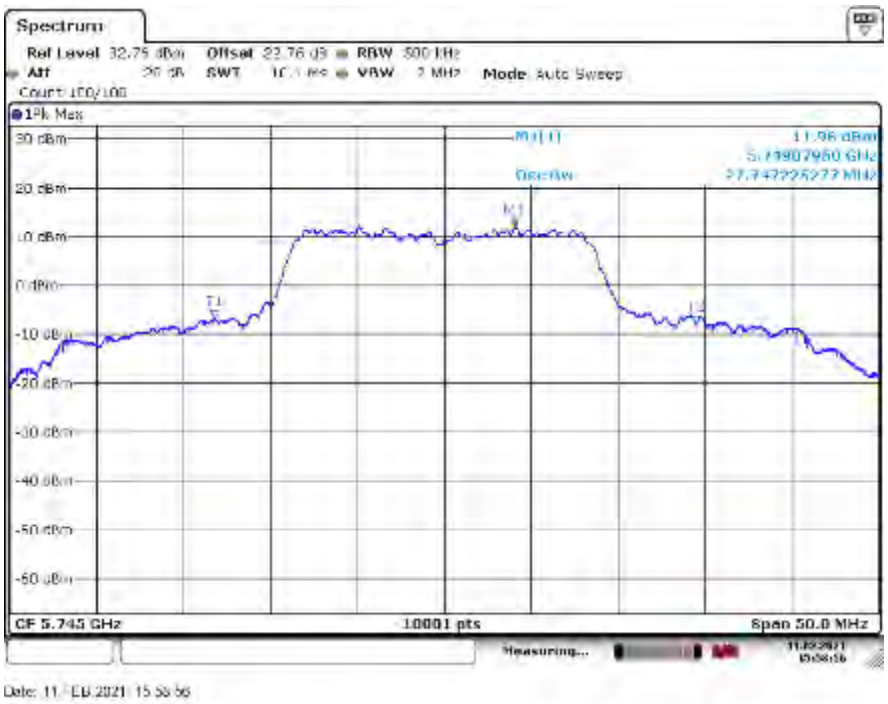
5825 MHz ANT B 6dB OBW



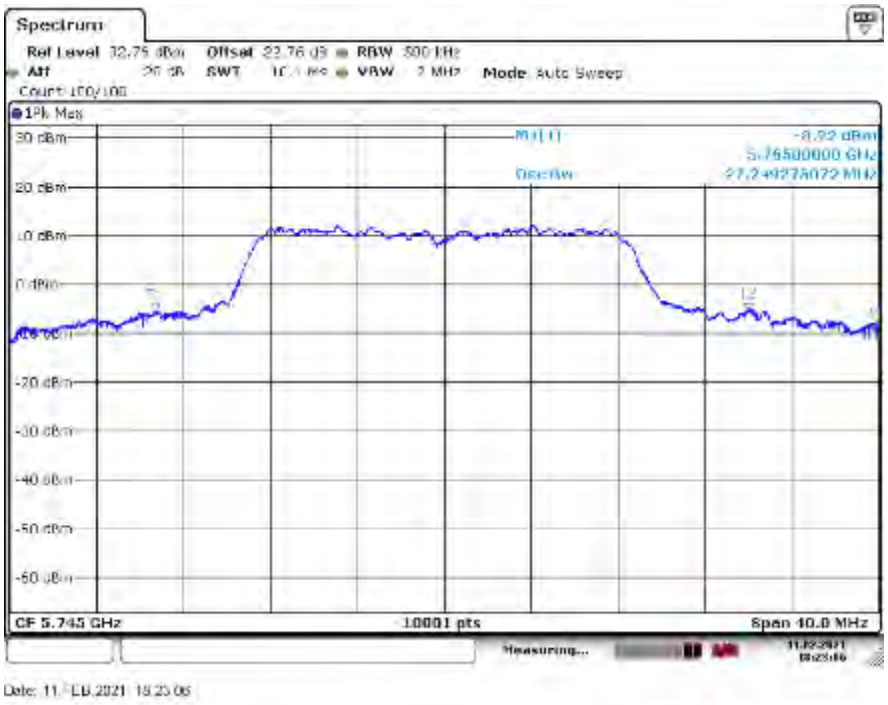
Date: 2.MAR.2021 09:10:38

802.11n20 Mode

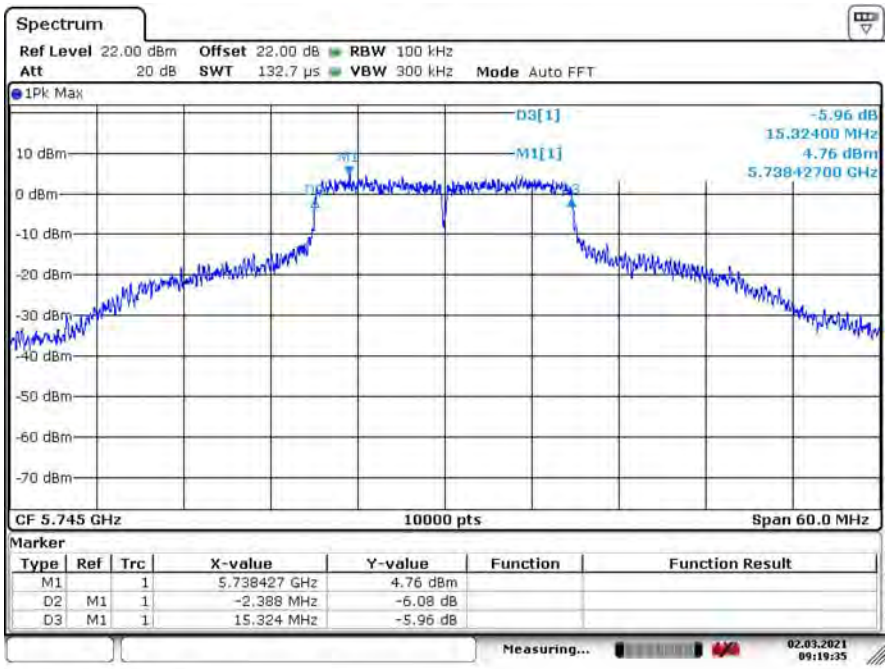
5745 MHz ANT A 99% OBW



5745 MHz ANT B 99% OBW



5745 MHz ANT A 6dB OBW



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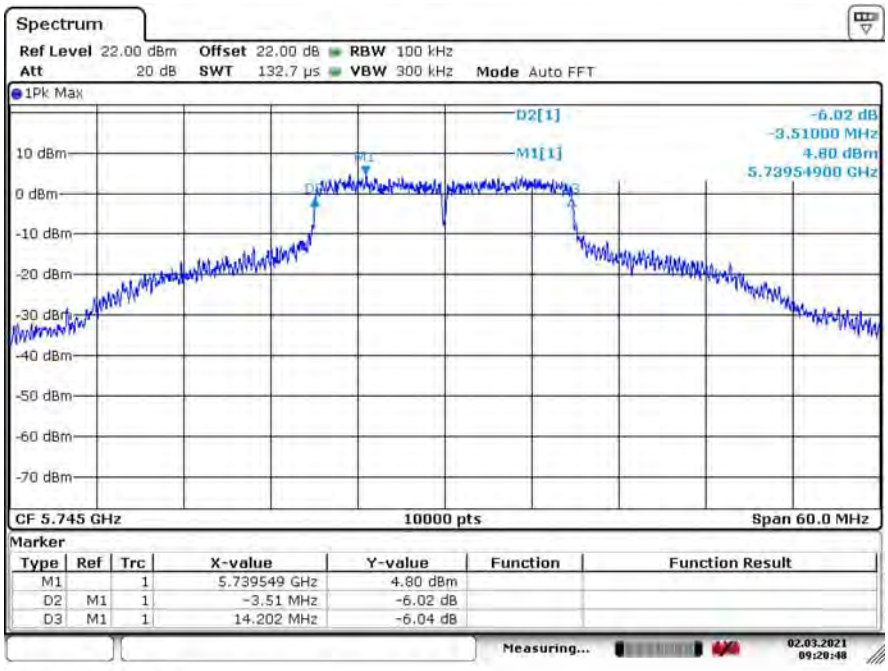
5745 MHz ANT B 6dB OBW



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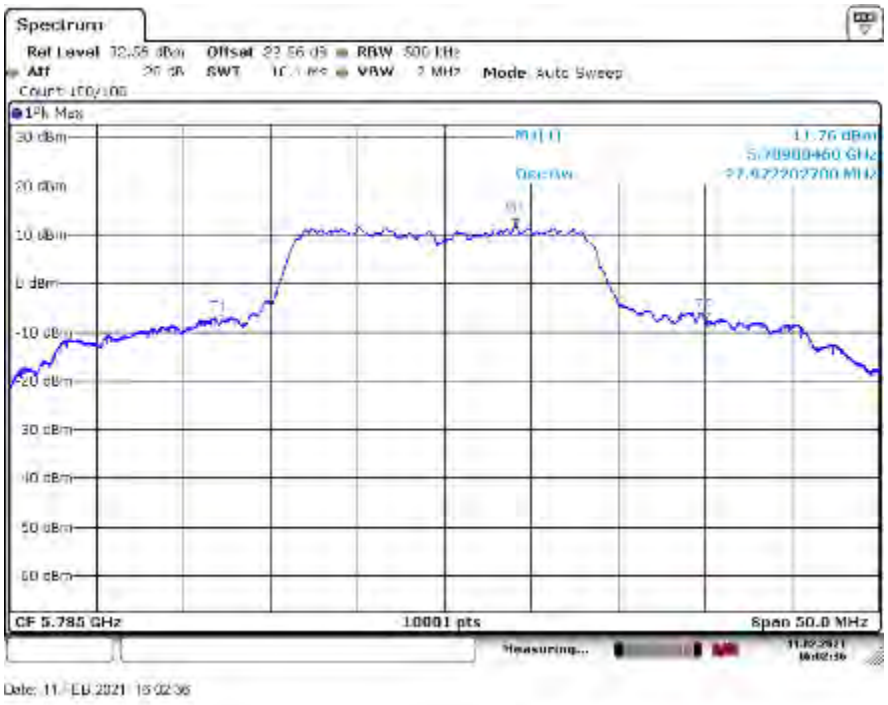
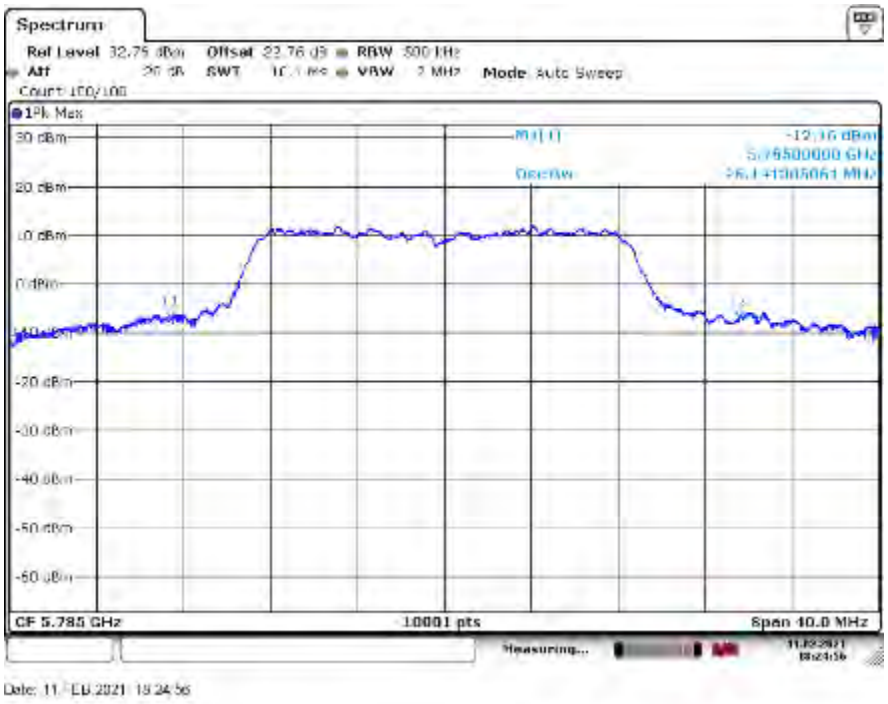
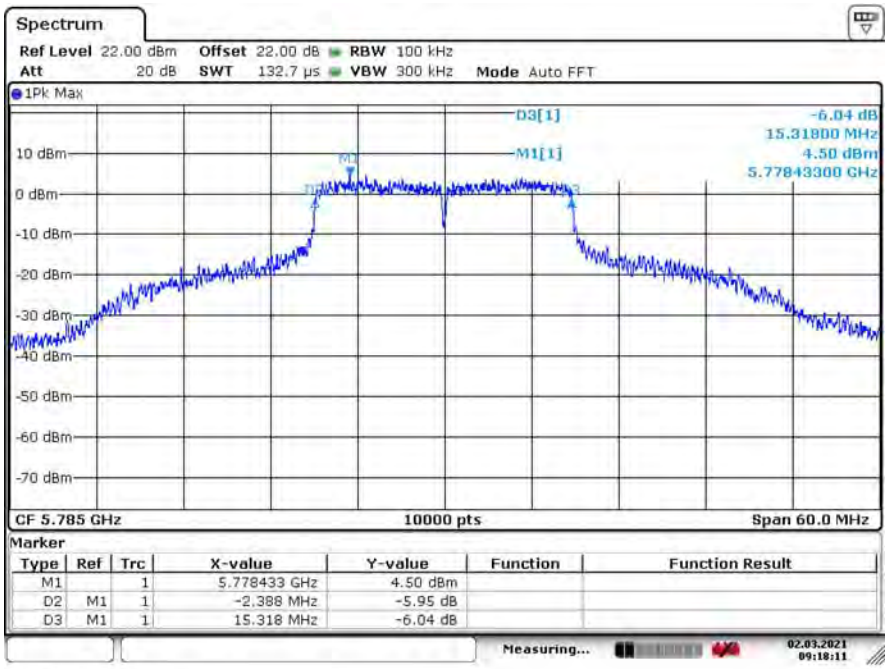
5785 MHz ANT A 99% OBW



5785 MHz ANT B 99% OBW

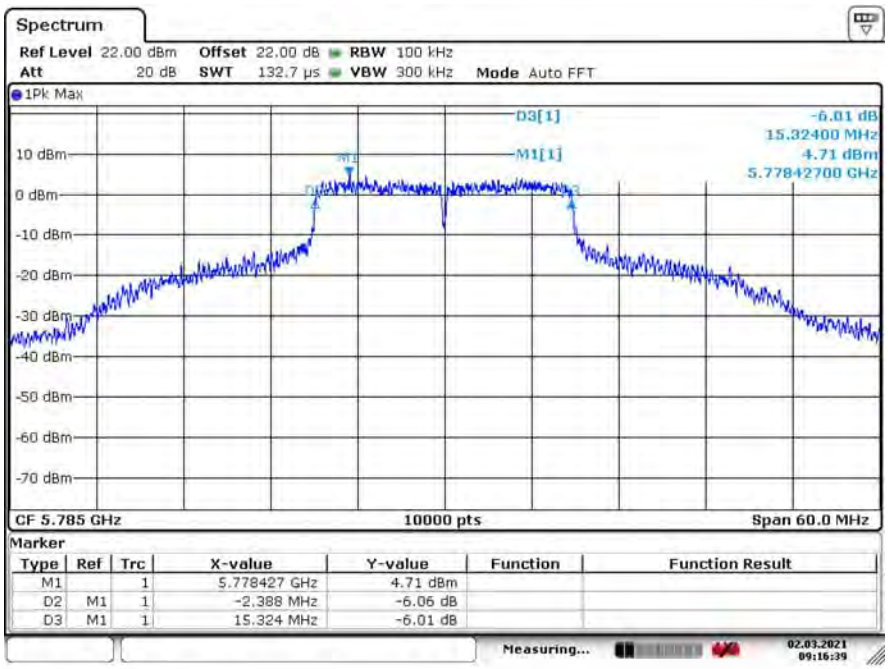


5785 MHz ANT A 6dB OBW



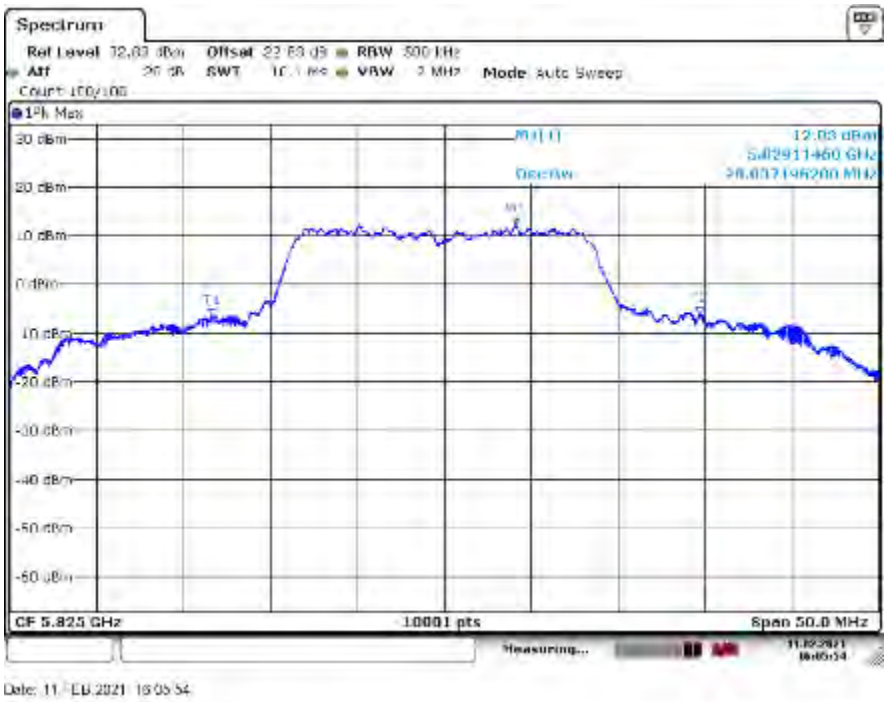
Date: 2.MAR.2021 09:18:11

5785 MHz ANT B 6dB OBW



Date: 2.MAR.2021 09:16:39

5825 MHz ANT A 99% OBW



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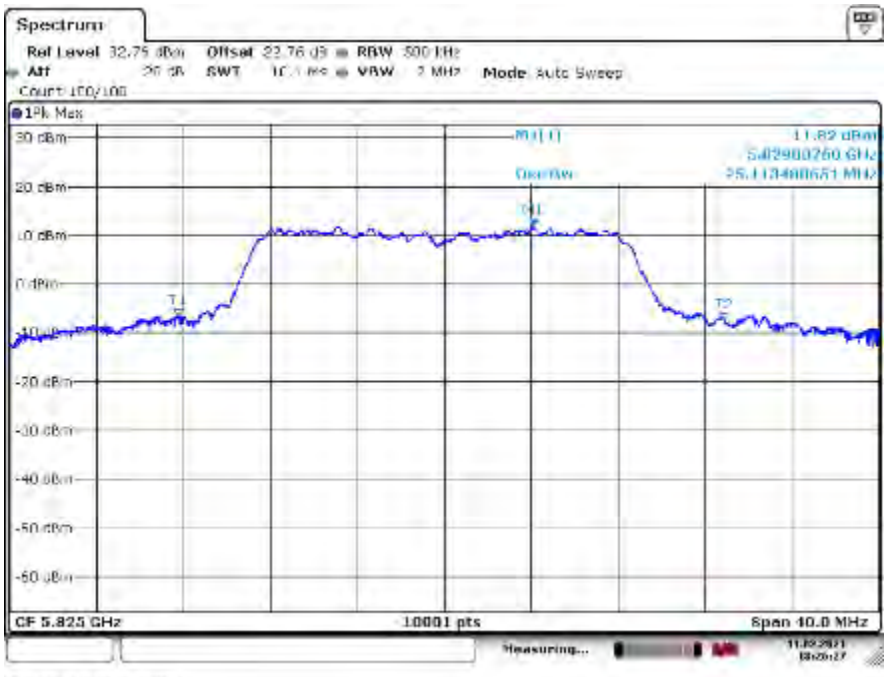
5825 MHz ANT B 99% OBW



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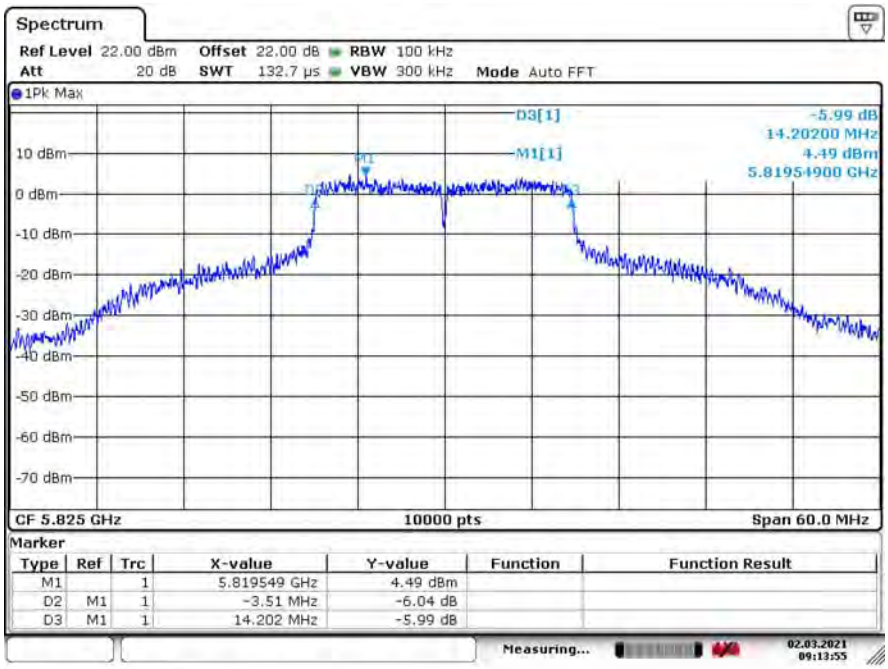
5825 MHz ANT A 6dB OBW



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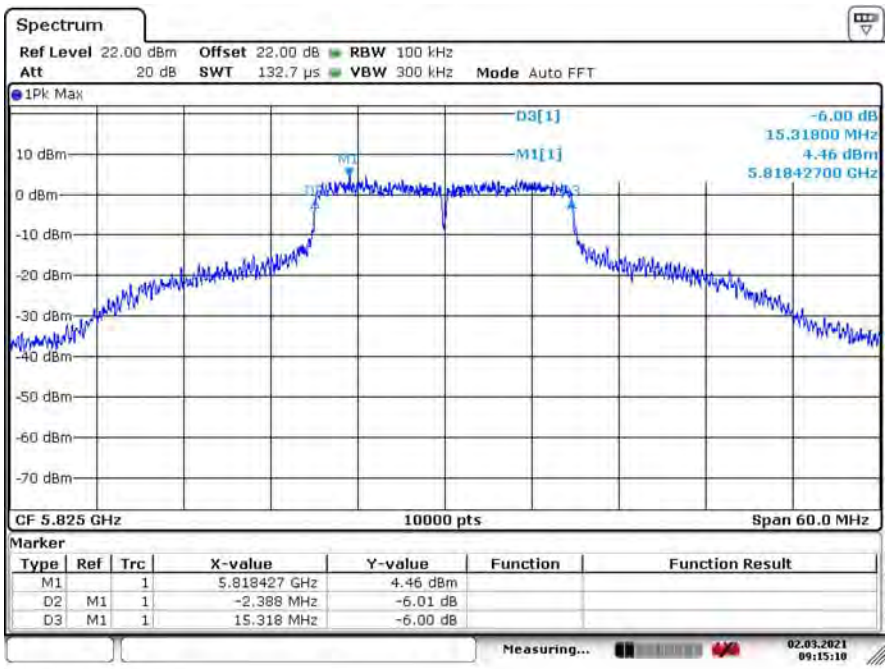
5825 MHz ANT B 6dB OBW



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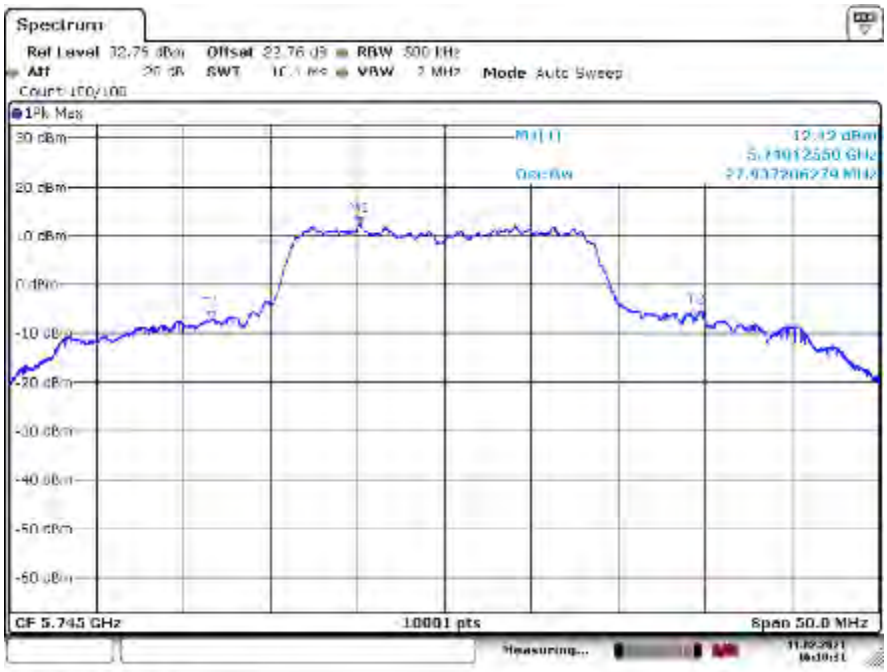
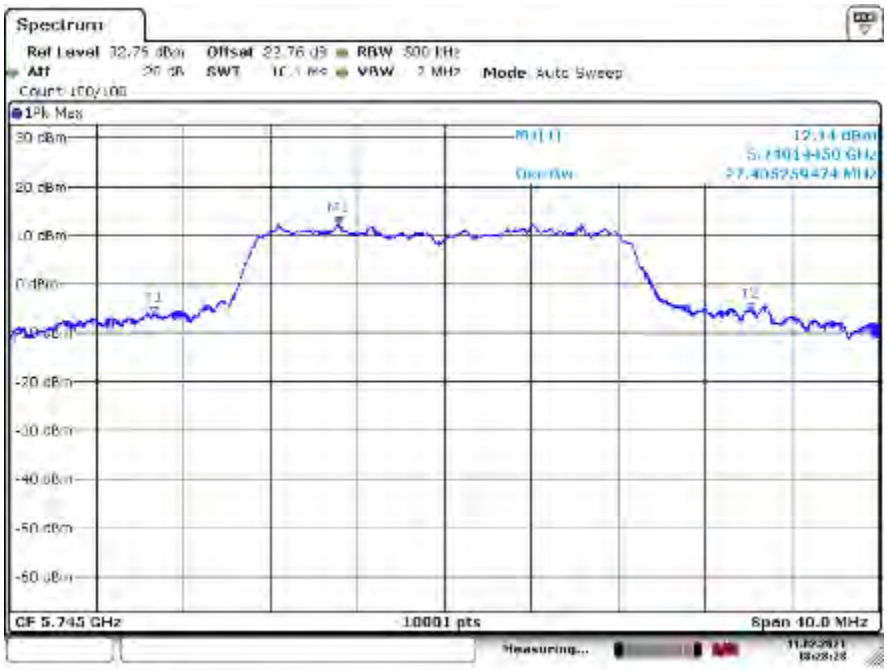
802.11ac20 Mode

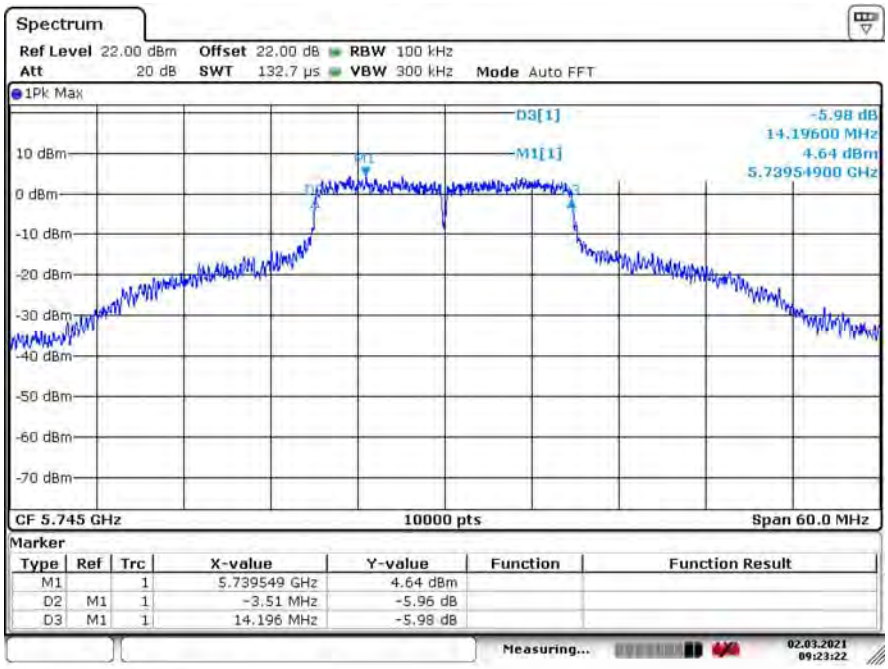
5745 MHz ANT A 99% OBW



5745 MHz ANT B 99% OBW



5745 MHz ANT A 6dB OBW



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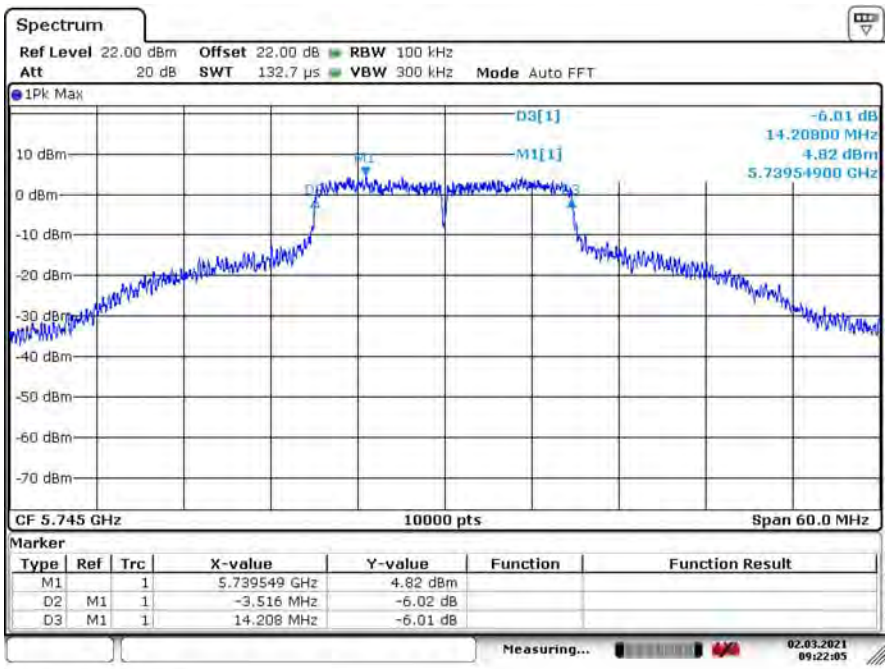
5745 MHz ANT B 6dB OBW



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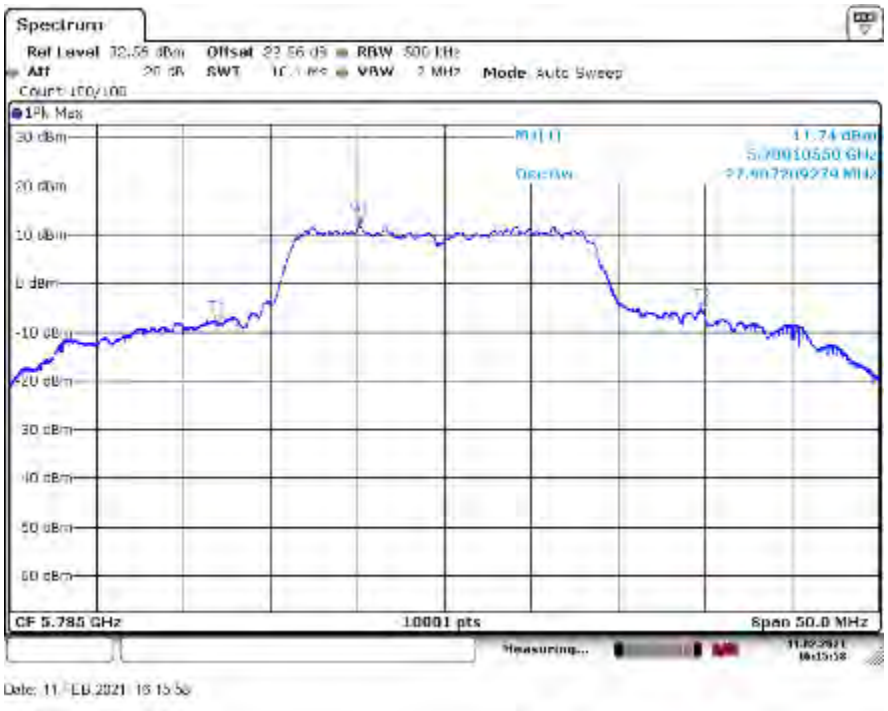
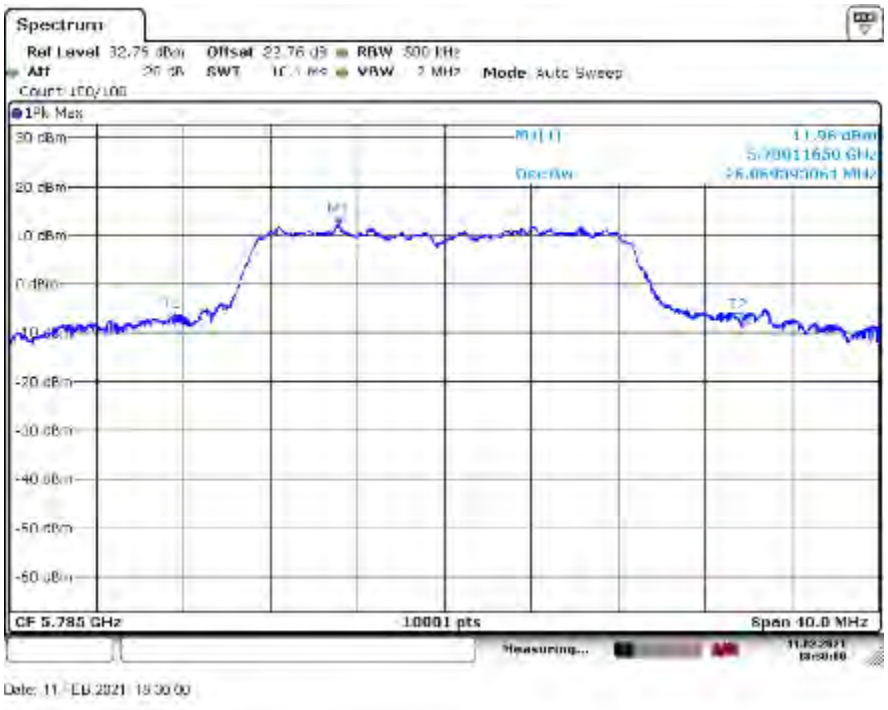
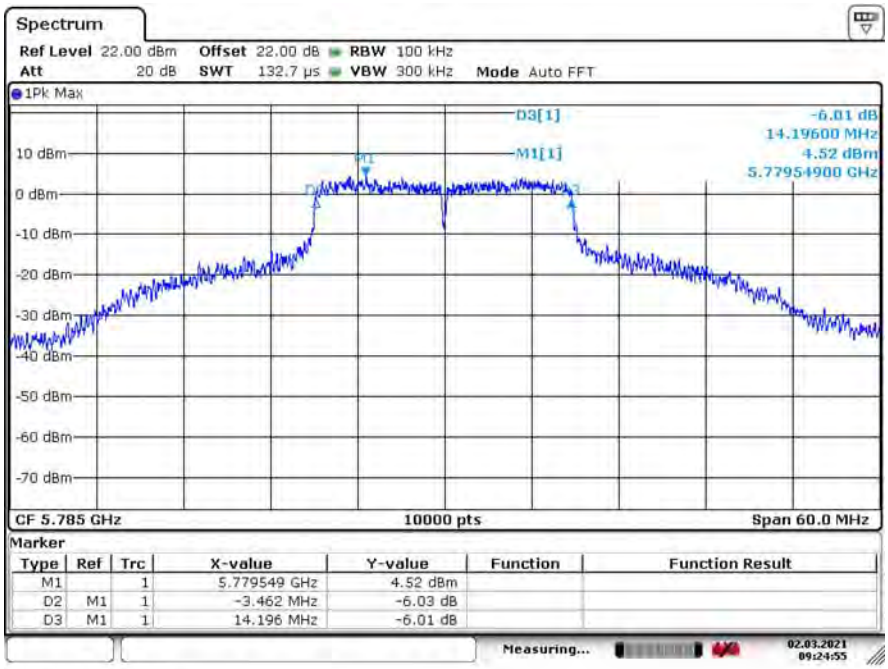
5785 MHz ANT A 99% OBW



5785 MHz ANT B 99% OBW



5785 MHz ANT A 6dB OBW



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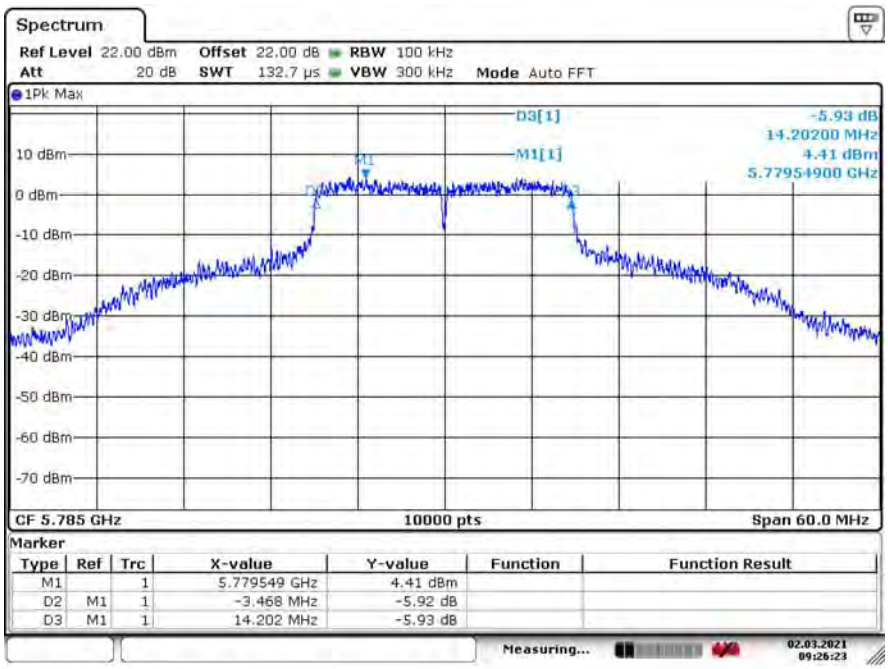
5785 MHz ANT B 6dB OBW



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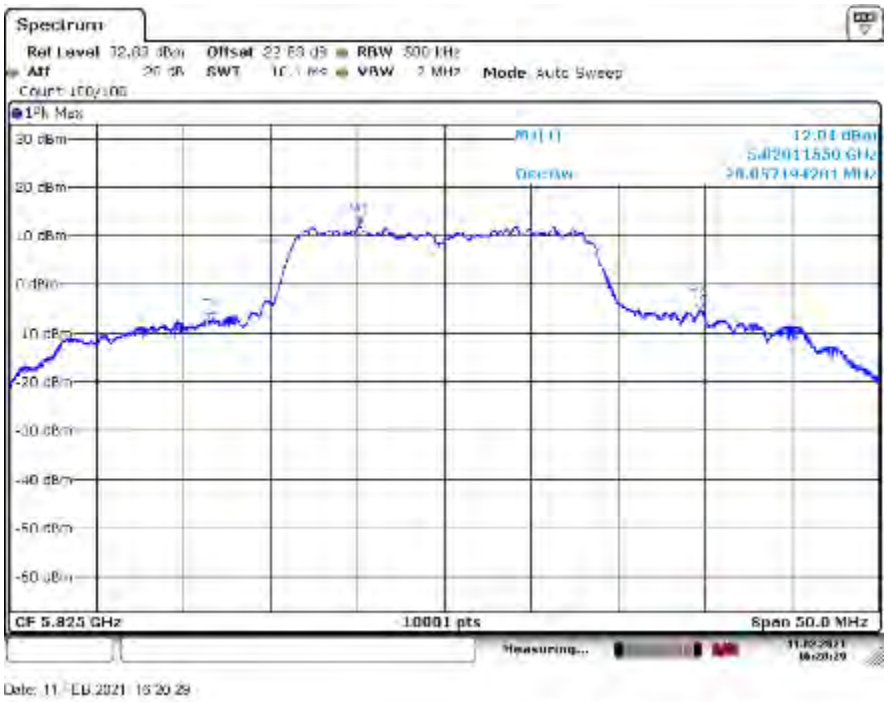
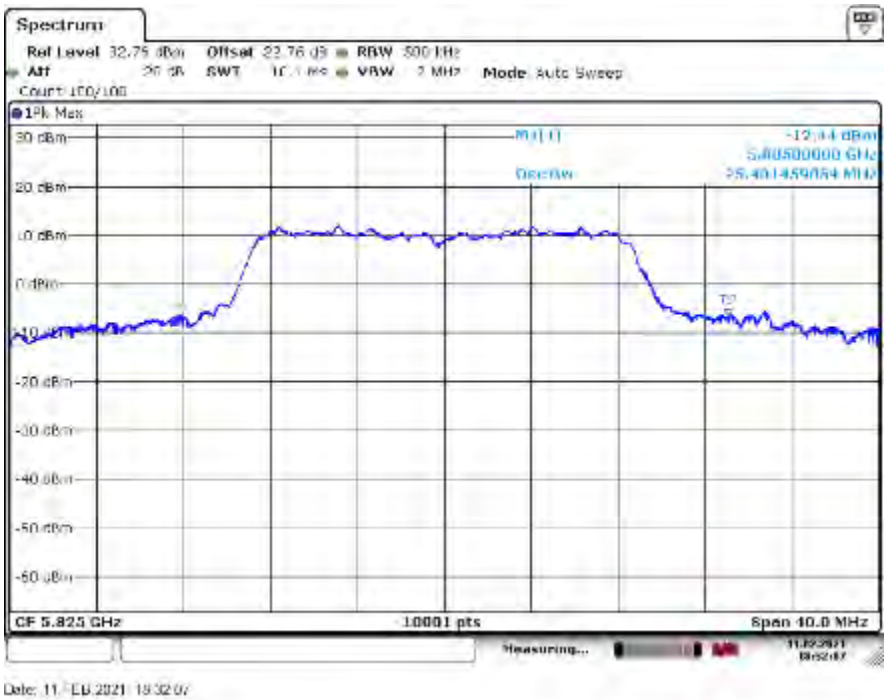
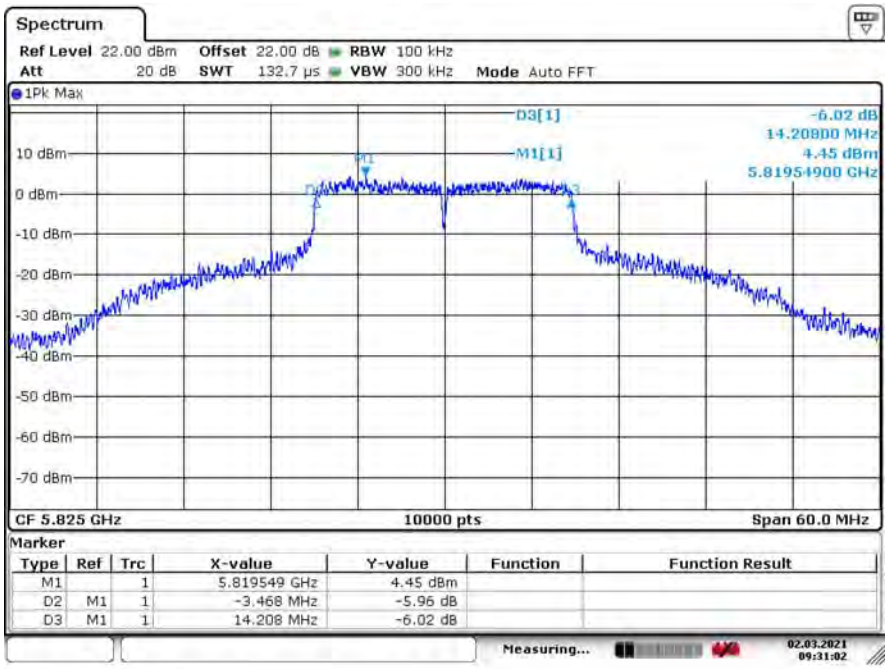
5825 MHz ANT A 99% OBW



5825 MHz ANT B 99% OBW



5825 MHz ANT A 6dB OBW



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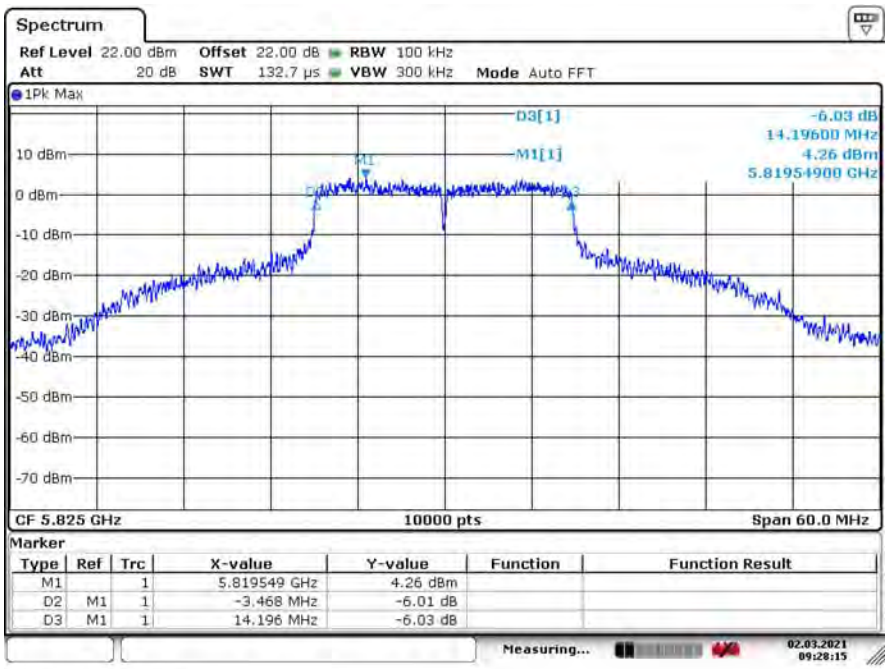
5825 MHz ANT B 6dB OBW



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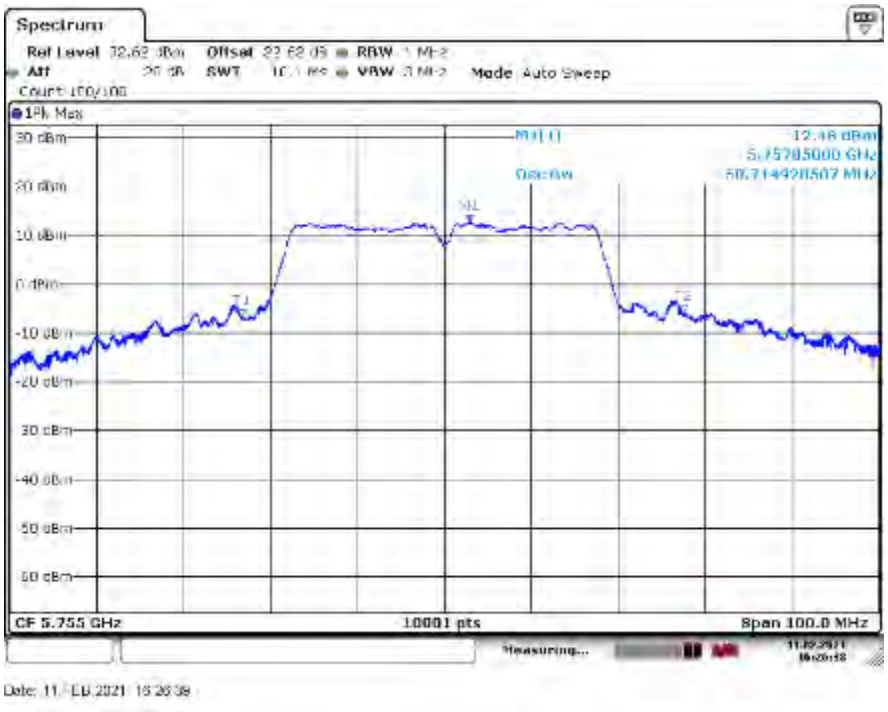
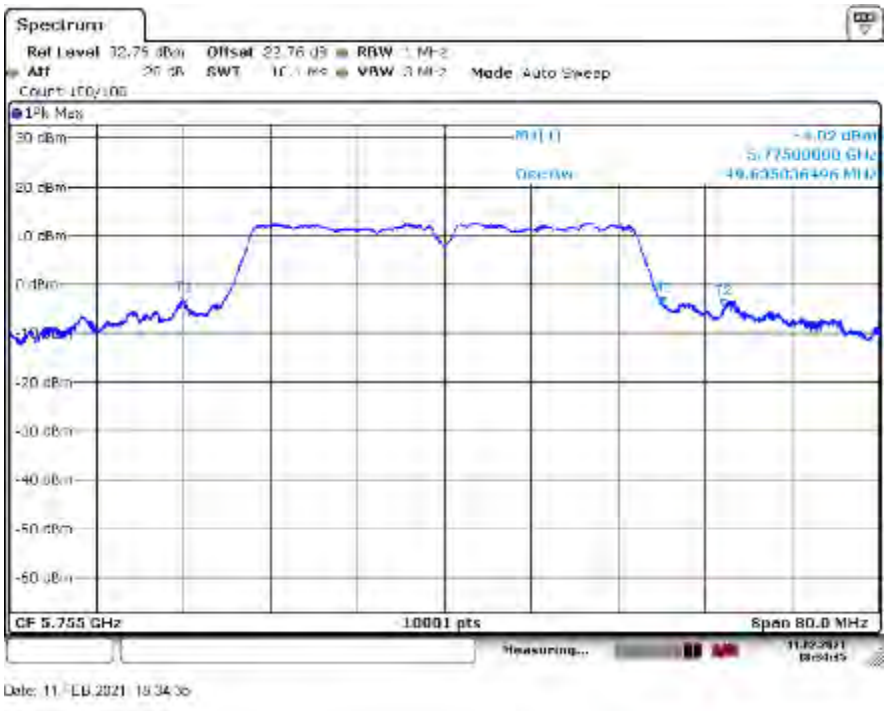
802.11n40 Mode

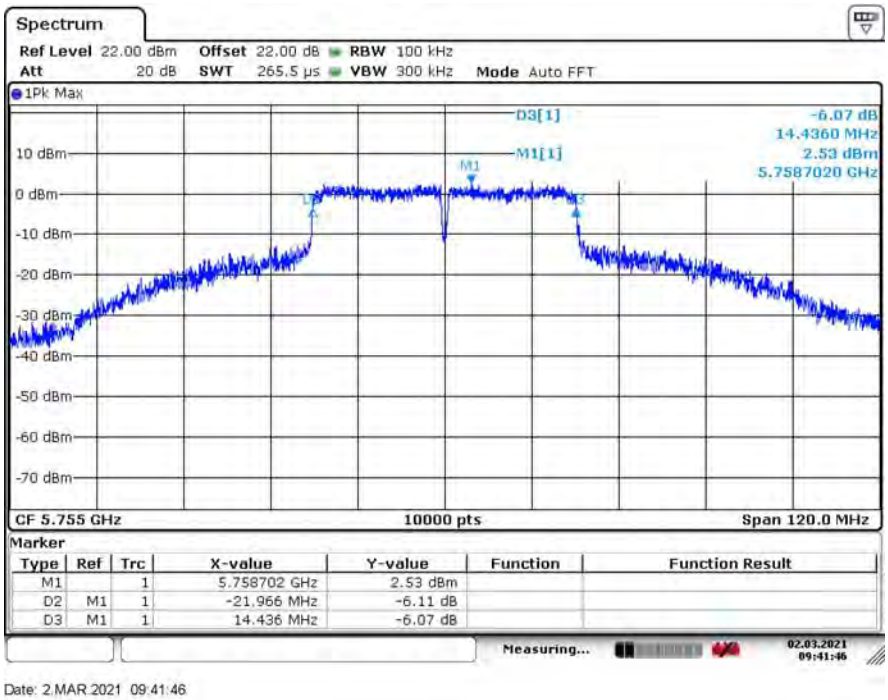
5755 MHz ANT A 99% OBW



5755 MHz ANT B 99% OBW



5755 MHz ANT A 6dB OBW



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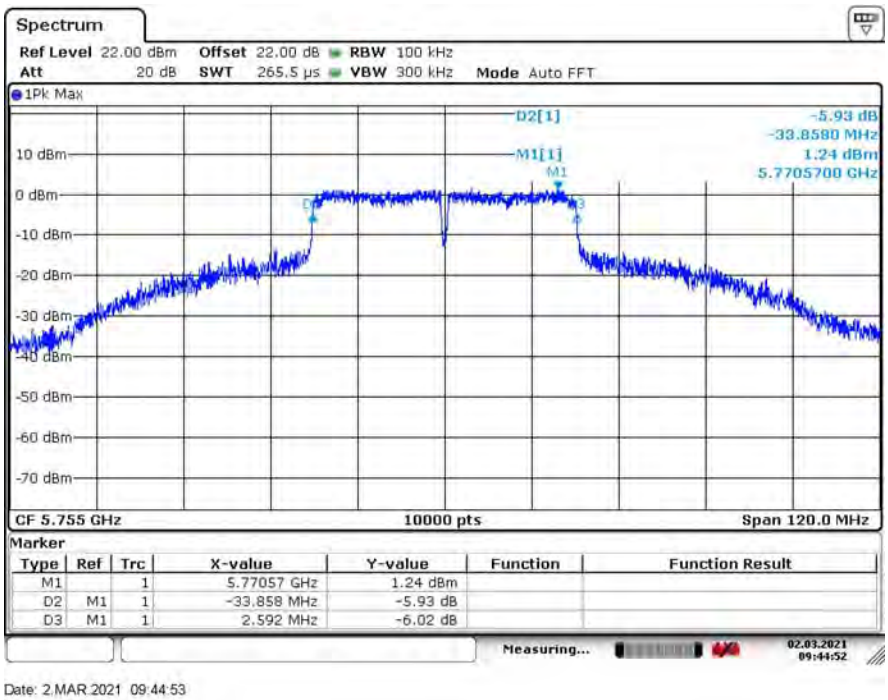
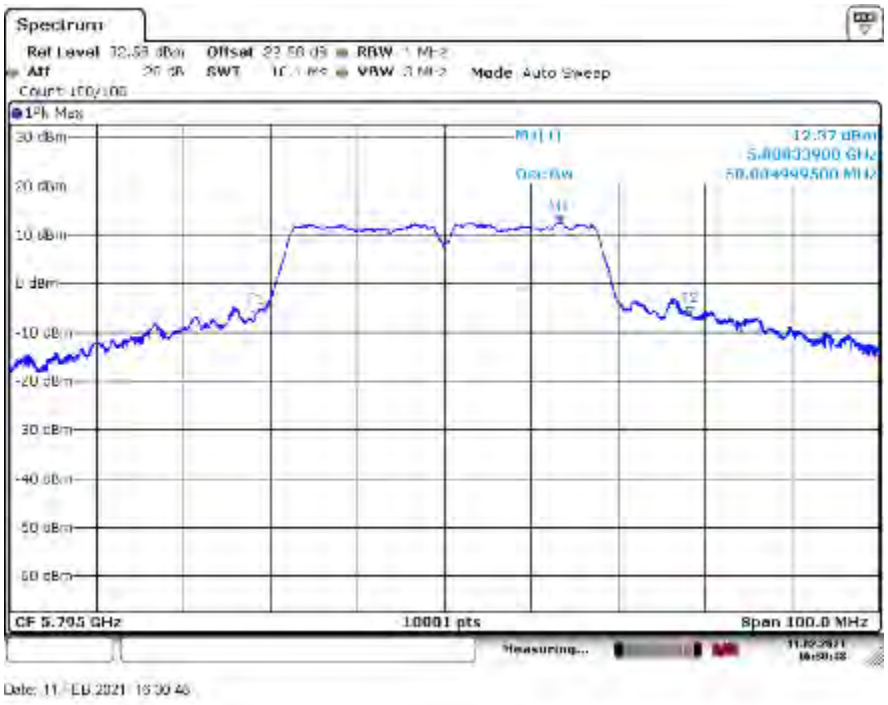
5755 MHz ANT B 6dB OBW

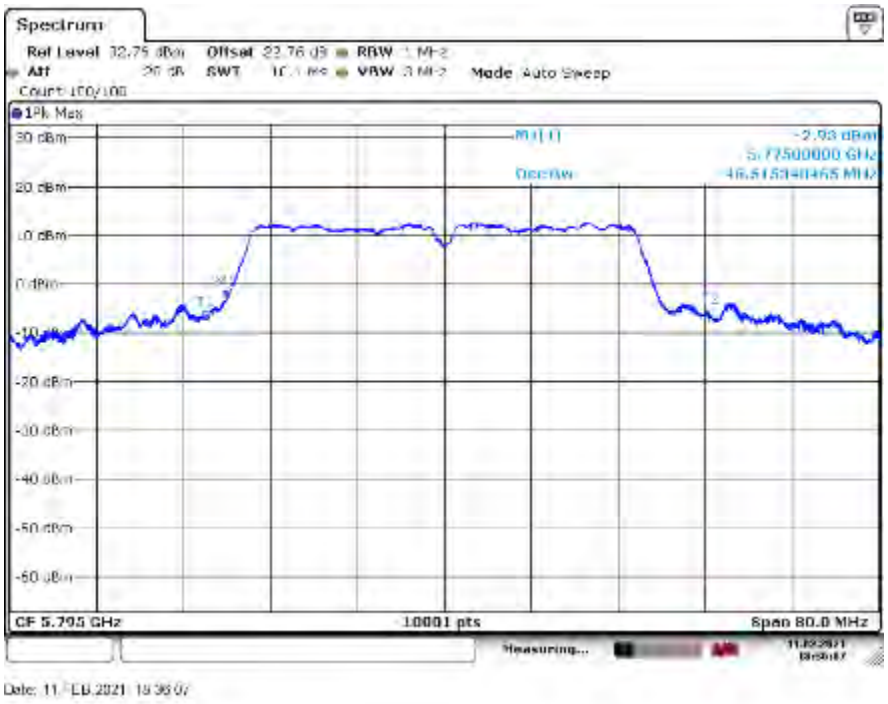


Date: 2.MAR.2021 09:44:53

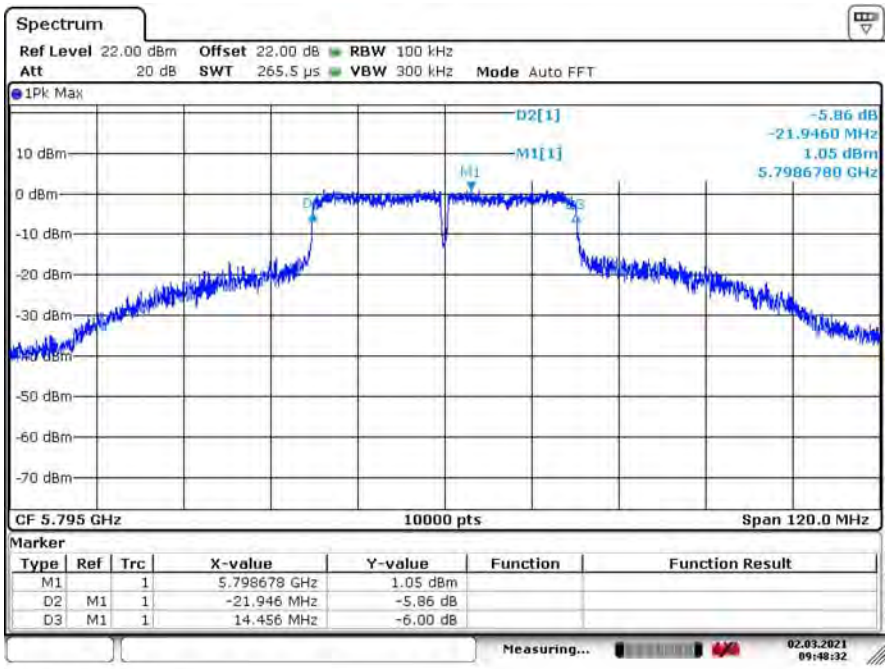
5795 MHz ANT A 99% OBW



5795 MHz ANT B 99% OBW



5795 MHz ANT A 6dB OBW



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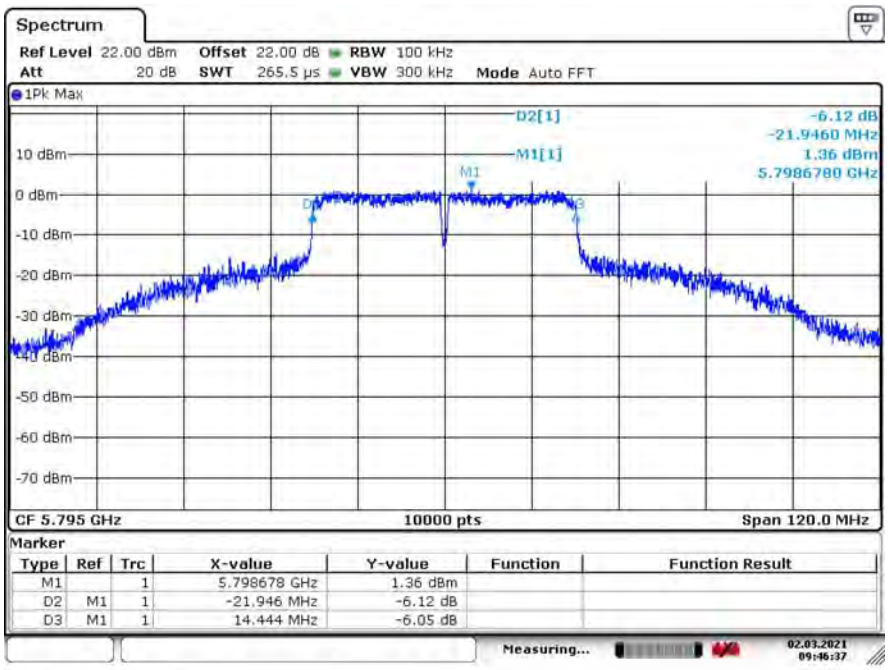
5795 MHz ANT B 6dB OBW



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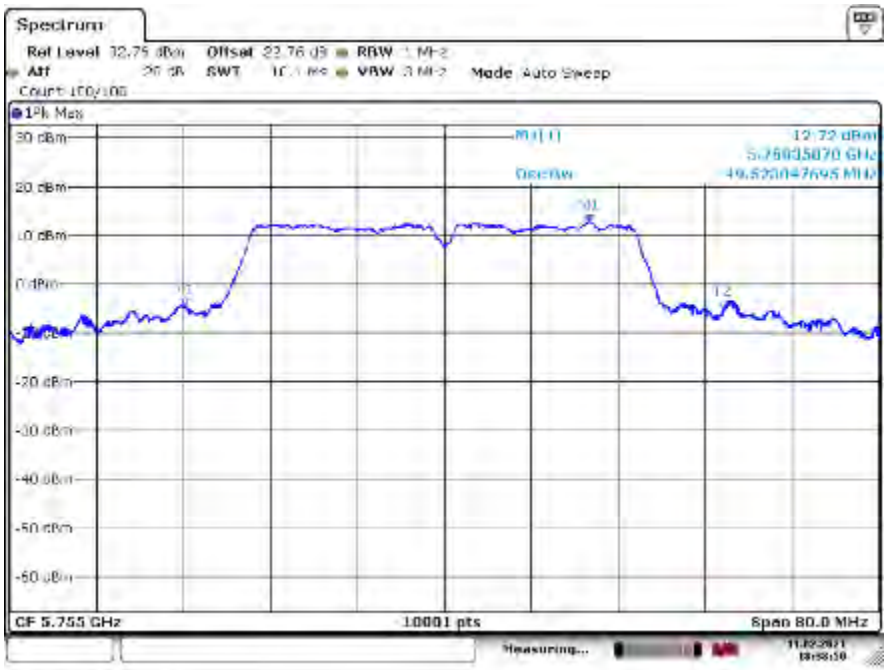
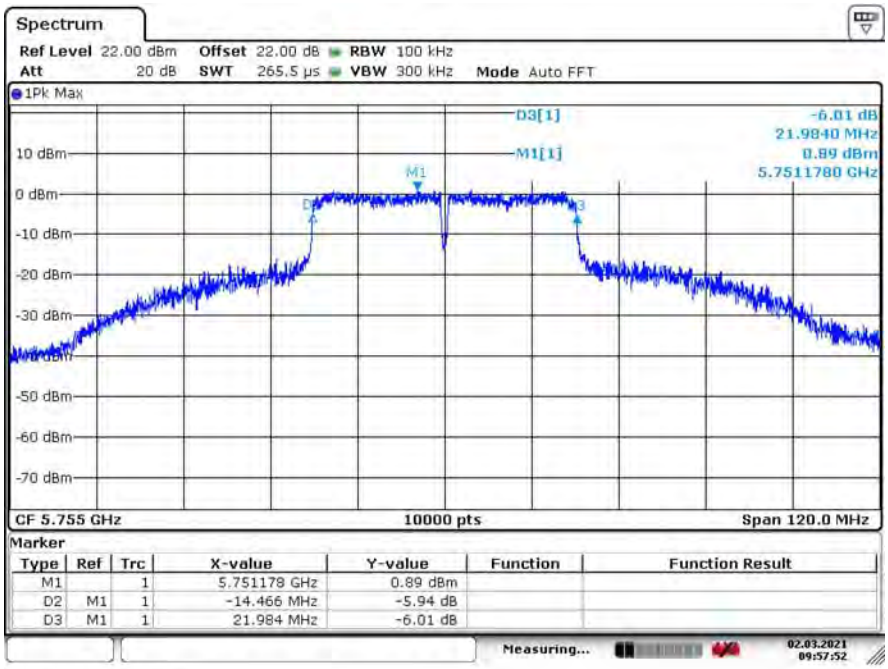
802.11ac40 Mode

5755 MHz ANT A 99% OBW

5755 MHz ANT B 99% OBW

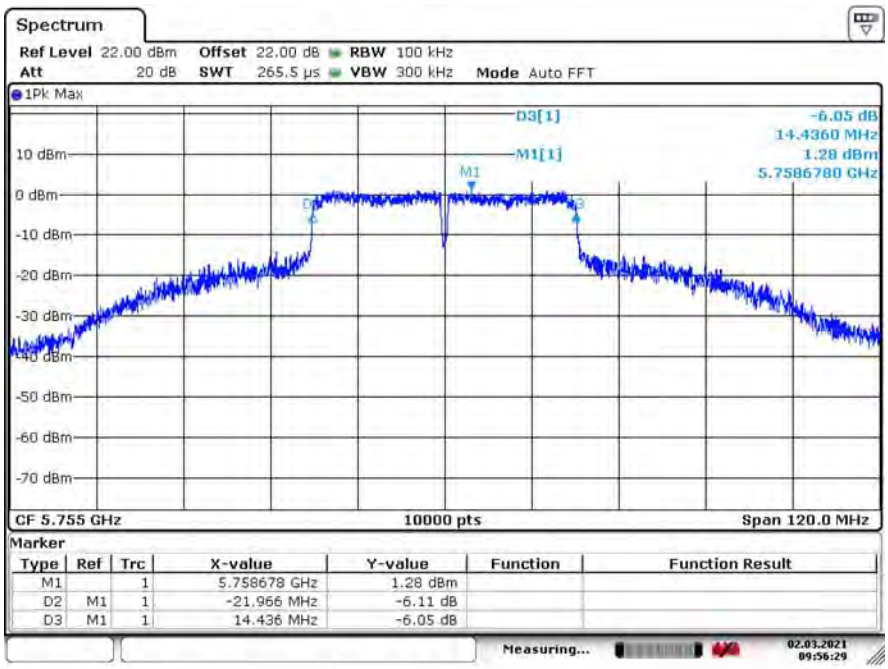


5755 MHz ANT A 6dB OBW



Date: 2.MAR.2021 09:57:53

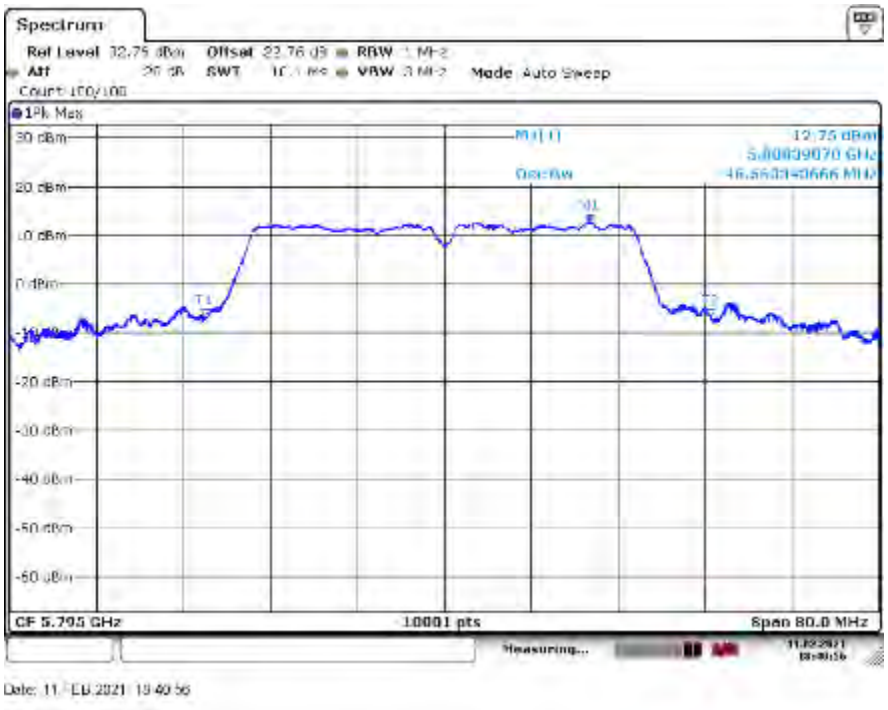
5755 MHz ANT B 6dB OBW



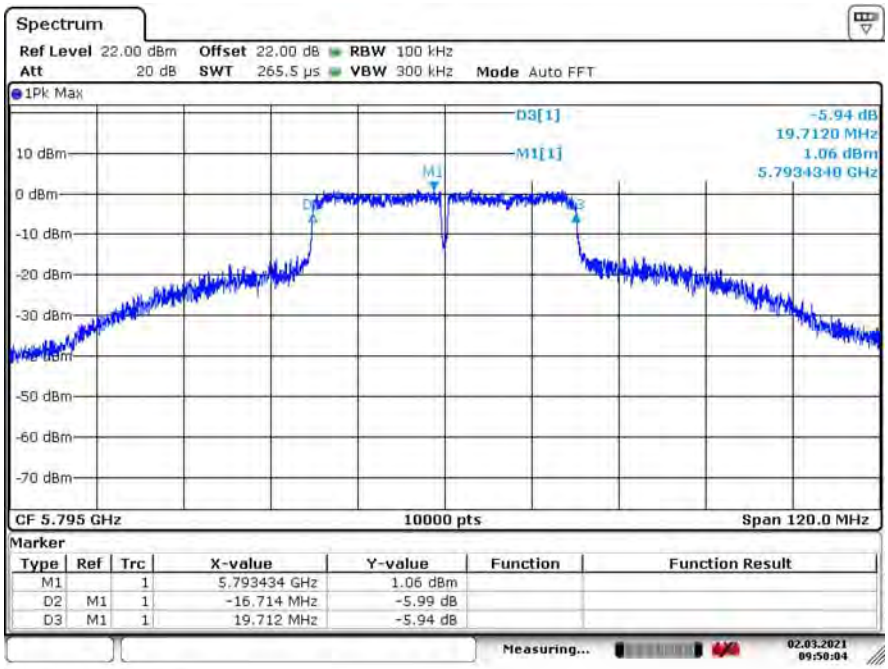
Date: 2.MAR.2021 09:56:30

5795 MHz ANT A 99% OBW

5795 MHz ANT B 99% OBW



5795 MHz ANT A 6dB OBW



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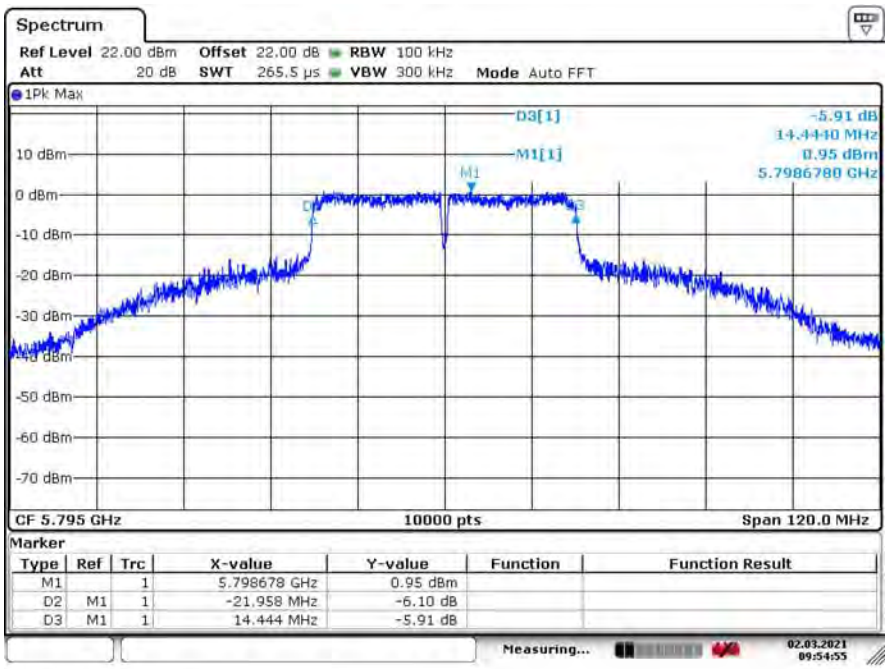
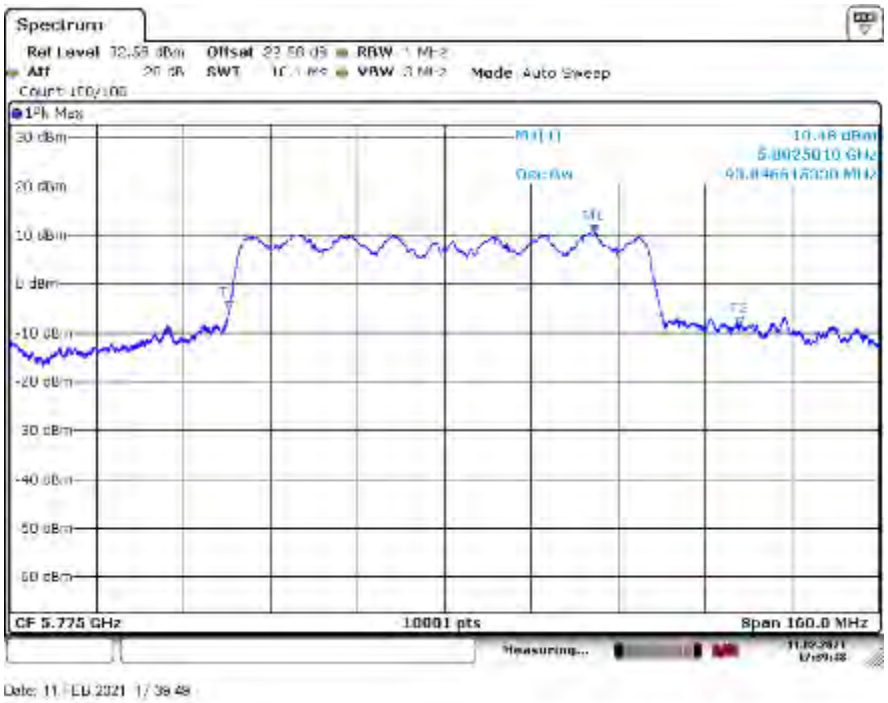
5795 MHz ANT B 6dB OBW



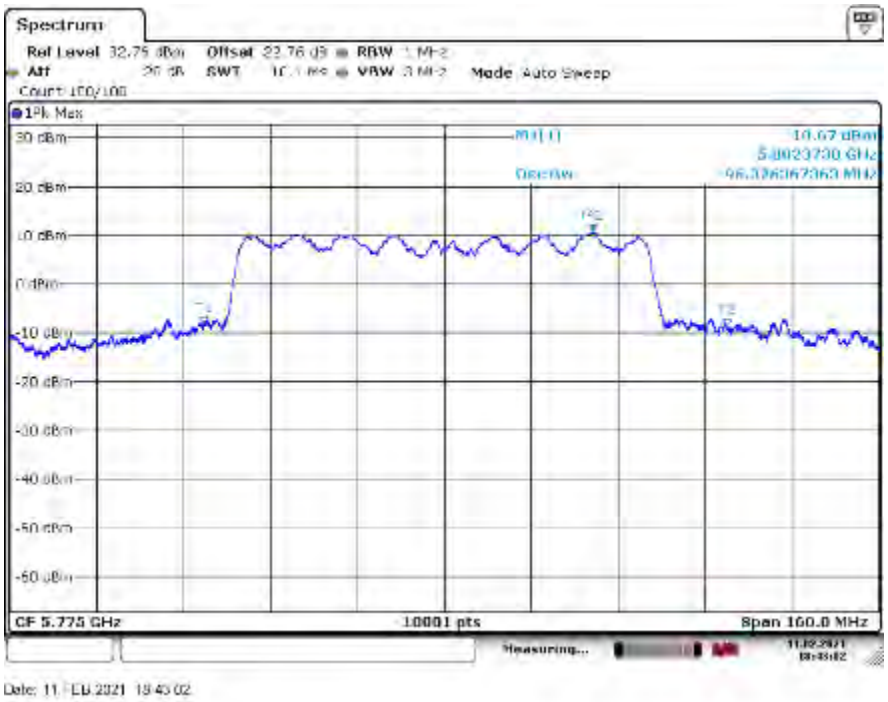
Date: 2.MAR.2021 09:54:54

802.11ac80 Mode

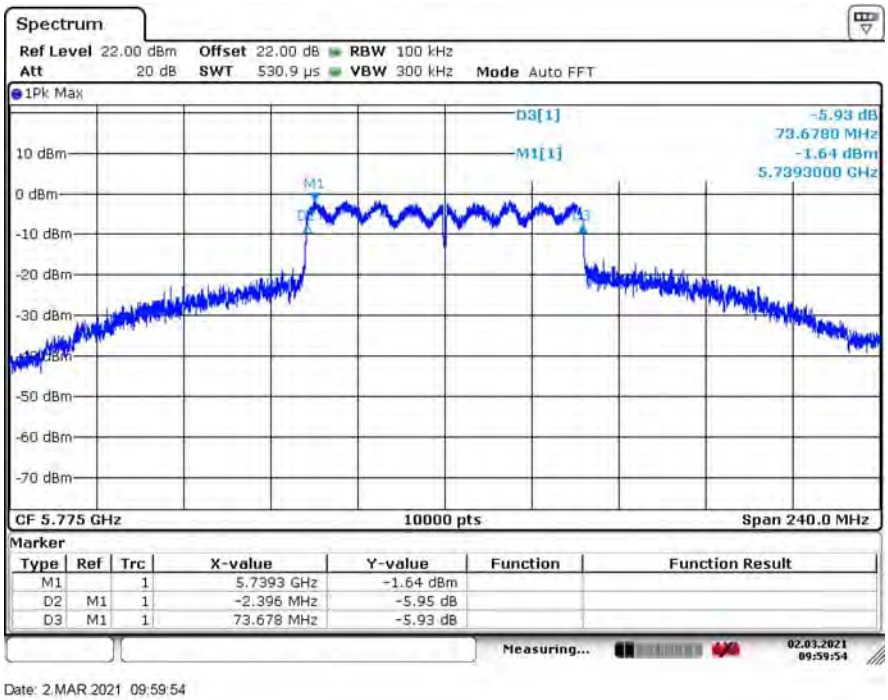
5775 MHz ANT A 99% OBW



5775 MHz ANT B 99% OBW

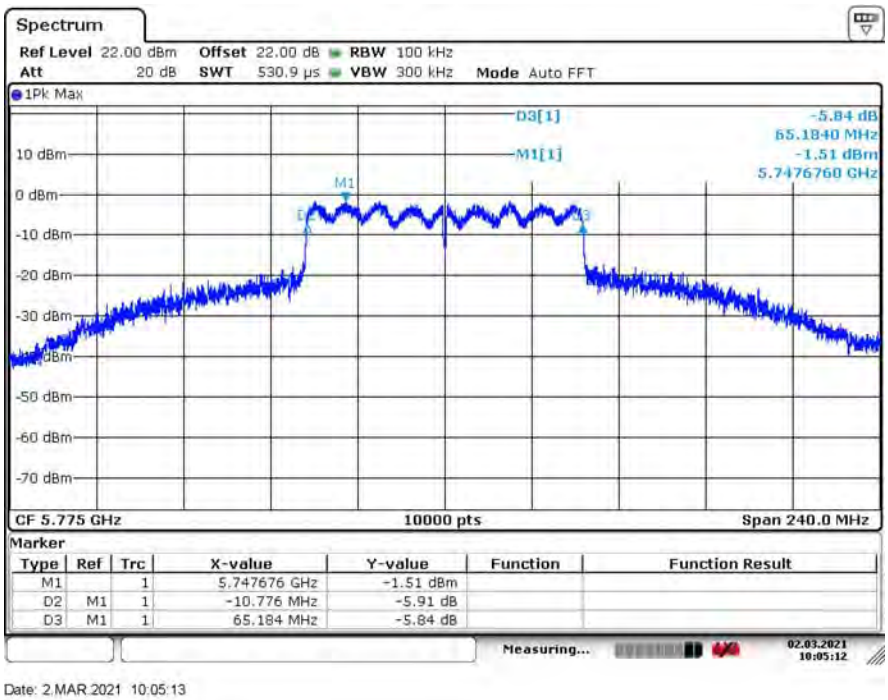


5775 MHz ANT A 6dB OBW



Date: 2.MAR.2021 09:59:54

5775 MHz ANT B 6dB OBW



Date: 2.MAR.2021 10:05:13

9 FCC §407(a) & ISEDC RSS-247 §6.2 - Output Power

9.1 Applicable Standards

According to FCC §15.407(a):

For mobile and portable 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 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. 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.

According to ISEDC RSS-247 §6.2.1 for frequency band 5150-5250 MHz:

The maximum e.i.r.p. shall not exceed 200 mW or $10 + 10 \log_{10}B$, dBm, whichever power is less. B is the 99% emission bandwidth in megahertz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

According to ISEDC RSS-247 §6.2.2 for frequency band 5250-5350 MHz:

The maximum conducted output power shall not exceed 250 mW or $11 + 10 \log_{10}B$, dBm, whichever is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.

The maximum e.i.r.p. shall not exceed 1.0 W or $17 + 10 \log_{10}B$, dBm, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

According to ISEDC RSS-247 §6.2.3 for frequency band 5470-5600 MHz and 5650-5725 MHz:

The maximum conducted output power shall not exceed 250 mW or $11 + 10 \log_{10}B$, dBm, whichever is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.
The maximum e.i.r.p. shall not exceed 1.0 W or $17 + 10 \log_{10}B$, dBm, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

According to ISEDC RSS-247 §6.2.4 for frequency band 5725-5850 MHz:

The maximum conducted output power shall not exceed 1 W. The 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 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 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.

9.2 Measurement Procedure

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 meter.

9.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Rhode & Schwarz	Signal Analyzer	FSV40	1321.3008K39 -101203-UW	2019-08-06	2 years
-	RF cable	-	-	Each time[1]	N/A
-	20 dB attenuator	-	-	Each time[1]	N/A

Note[1]: cable and attenuator included in the test set-up will be checked each time before testing.
Statement of Traceability: BACL Corp. *attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with the latest version of A2LA policy P102 "A2LA Policy on Metrological Traceability".*

9.4 Test Environmental Conditions

Temperature:	23º C
Relative Humidity:	42 %
ATM Pressure:	102.7 kPa

The testing was performed by Vang Lee from 2021-02-11 to 2021-02-12 in RF site.

9.5 Test Results

5150 - 5250 MHz

FCC Results

Frequency (MHz)	Conducted Output Power (dBm)		FCC Limit (dBm)
	ANT A	ANT B	
802.11a mode			
5180	17.48	17.38	24.00
5220	17.89	18.19	24.00
5240	18.06	18.14	24.00
802.11n20 mode			
5180	17.12	17.01	24.00
5220	18.34	18.03	24.00
5240	18.28	18.15	24.00
802.11ac20 mode			
5180	17.14	16.94	24.00
5220	18.69	17.96	24.00
5240	18.40	18.06	24.00
802.11n40 mode			
5190	13.29	13.18	24.00
5230	18.23	18.29	24.00
802.11ac40 mode			
5190	13.62	13.28	24.00
5230	18.40	18.26	24.00
802.11ac80 mode			
5210	11.64	11.93	24.00

IC Results

Antenna A

Frequency (MHz)	Conducted Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	ISEDC EIRP Limit (dBm)
802.11a mode				
5180	17.48	3	20.48	22.8
5220	17.89	3	20.89	23
5240	18.06	3	21.06	23
802.11n20 mode				
5180	17.12	3	20.12	23
5220	18.34	3	21.34	23
5240	18.28	3	21.28	23
802.11ac20 mode				
5180	17.14	3	20.14	23
5220	18.69	3	21.69	23
5240	18.40	3	21.40	23
802.11n40 mode				
5190	13.29	3	16.29	23
5230	18.23	3	21.23	23
802.11ac40 mode				
5190	13.62	3	16.62	23
5230	18.40	3	21.40	23
802.11ac80 mode				
5210	11.64	3	14.64	23

Note: Per RSS-247, Limit is determined to be the stricter of either 200 mW (23 dBm) or 10 +10 * log(B) dBm, where B is 99% emission bandwidth in MHz.
Note: EIRP (dBm) = Conducted Output Power (dBm) + Antenna Gain (dBi)

Antenna B

Frequency (MHz)	Conducted Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	ISEDC EIRP Limit (dBm)
802.11a mode				
5180	17.38	2.2	19.58	23
5220	18.19	2.2	20.39	23
5240	18.14	2.2	20.34	23
802.11n20 mode				
5180	17.01	2.2	19.23	23
5220	18.03	2.2	20.23	23
5240	18.15	2.2	20.35	23
802.11ac20 mode				
5180	16.94	2.2	19.14	23
5220	17.96	2.2	20.16	23
5240	18.06	2.2	20.26	23
802.11n40 mode				
5190	13.18	2.2	15.38	23
5230	18.29	2.2	20.49	23
802.11ac40 mode				
5190	13.28	2.2	15.48	23
5230	18.26	2.2	20.46	23
802.11ac80 mode				
5210	11.93	2.2	14.13	23

Note: Per RSS-247, Limit is determined to be the stricter of either 200 mW (23 dBm) or 10 +10 * log(B) dBm, where B is 99% emission bandwidth in MHz.
Note: EIRP (dBm) = Conducted Output Power (dBm) + Antenna Gain (dBi)

5725 - 5850 MHz

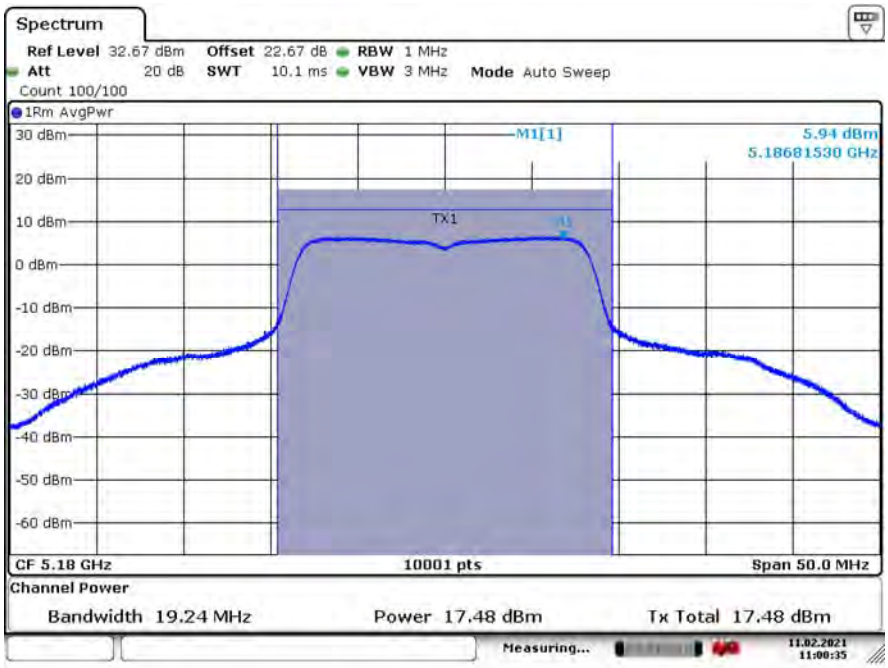
FCC/IC Results:

Frequency (MHz)	Conducted Output Power (dBm)		FCC/ISEDC Limit (dBm)
	ANT A	ANT B	
802.11a mode			
5745	18.74	18.66	30
5785	18.34	18.27	30
5825	18.62	18.45	30
802.11n20 mode			
5745	18.56	18.58	30
5785	18.24	18.19	30
5825	18.57	18.43	30
802.11ac20 mode			
5745	18.59	18.63	30
5785	18.26	18.22	30
5825	18.55	18.39	30
802.11n40 mode			
5755	18.55	18.71	30
5795	18.44	18.38	30
802.11ac40 mode			
5755	18.42	18.56	30
5795	18.34	18.38	30
802.11ac80 mode			
5775	18.06	18.22	30

5150 - 5250 MHz

802.11a Mode

5180 MHz ANT A



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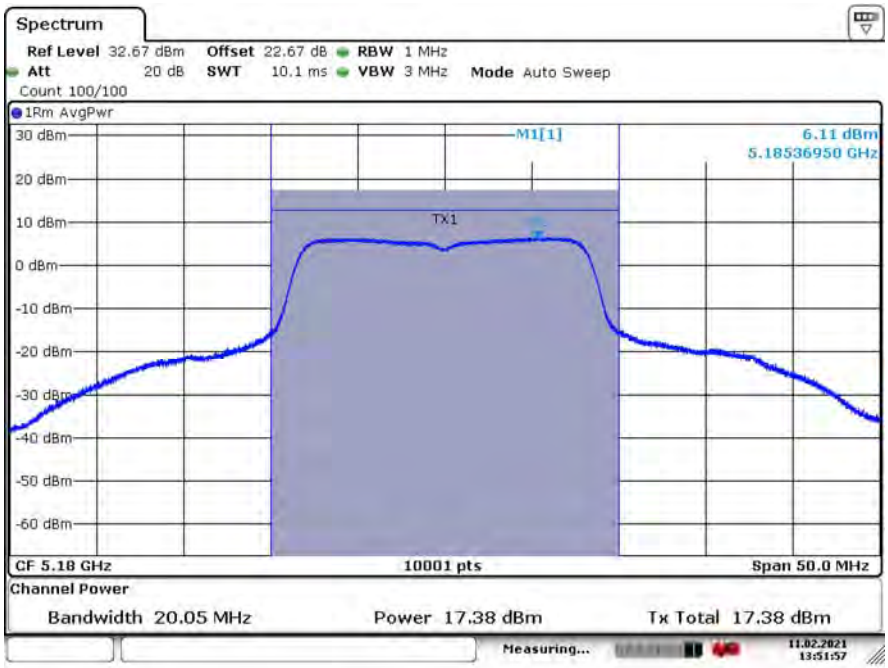
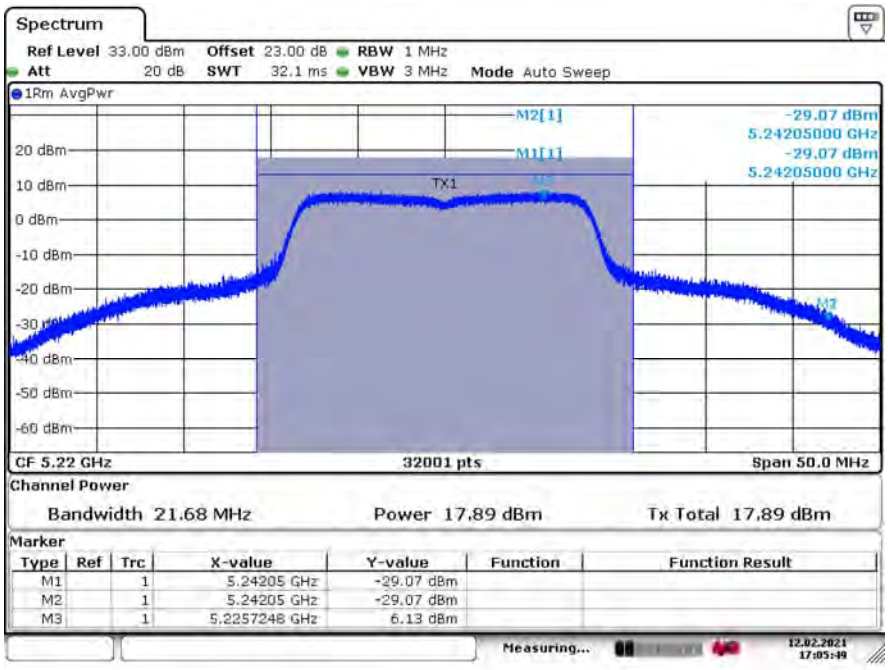
5180 MHz ANT B



Date: 11 FEB.2021 13:51:56

5220 MHz ANT A



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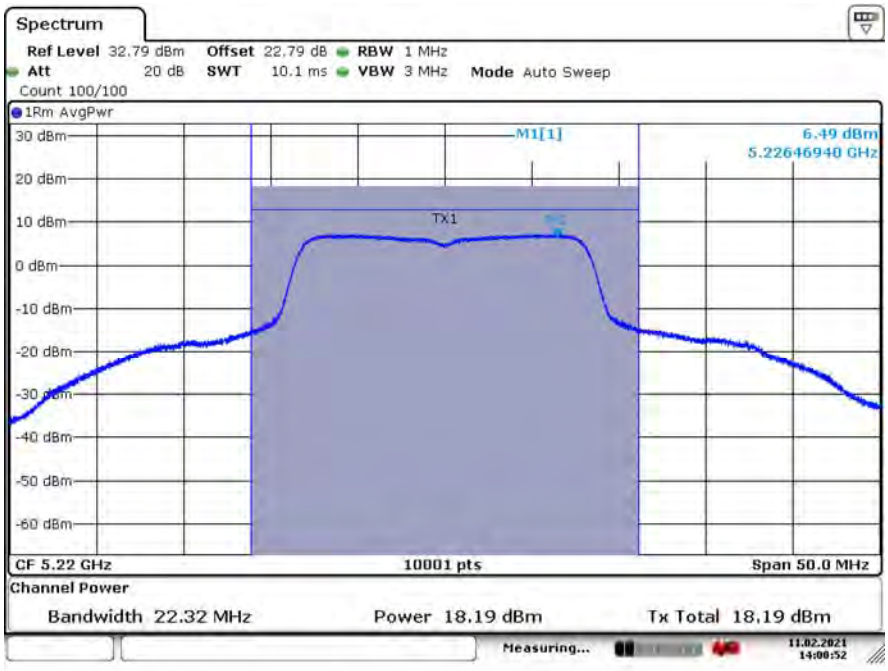
5220 MHz ANT B



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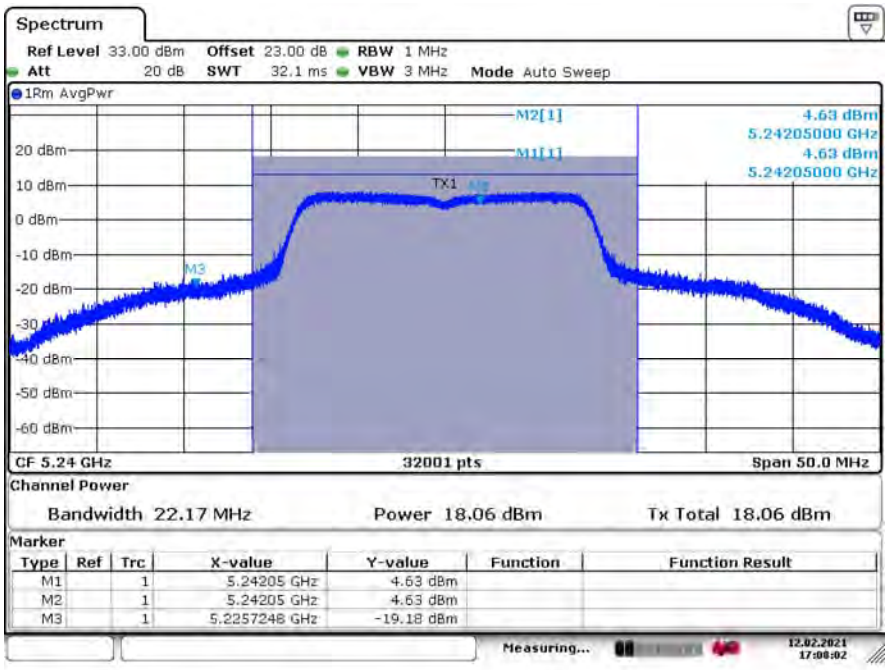
5240 MHz ANT A



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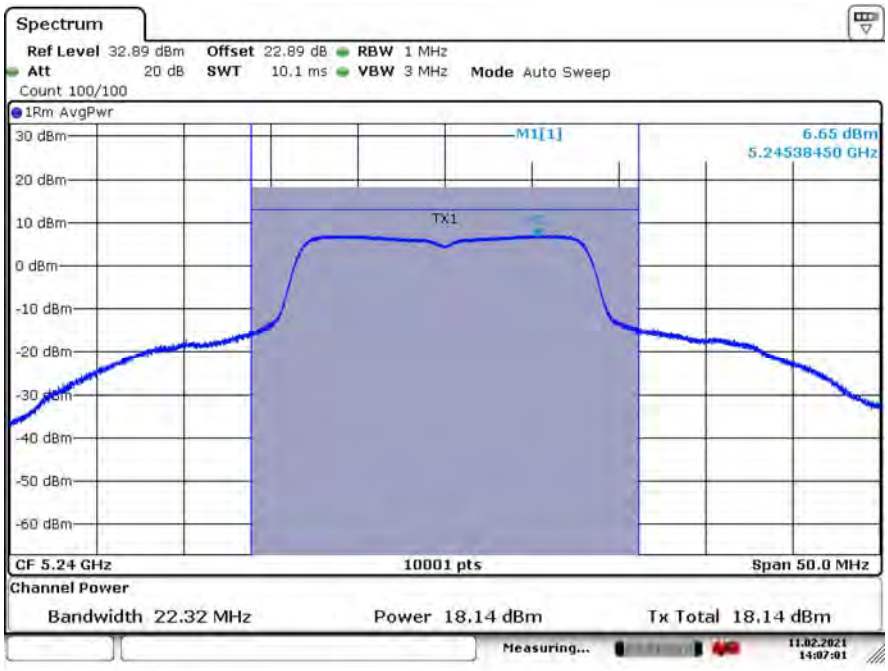
5240 MHz ANT B



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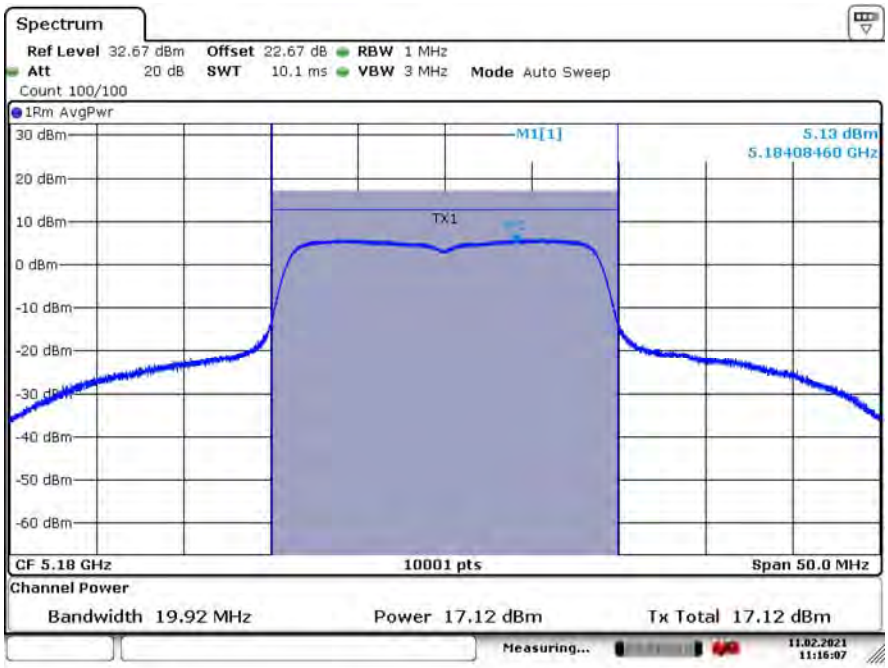
802.11n20 Mode

5180 MHz ANT A



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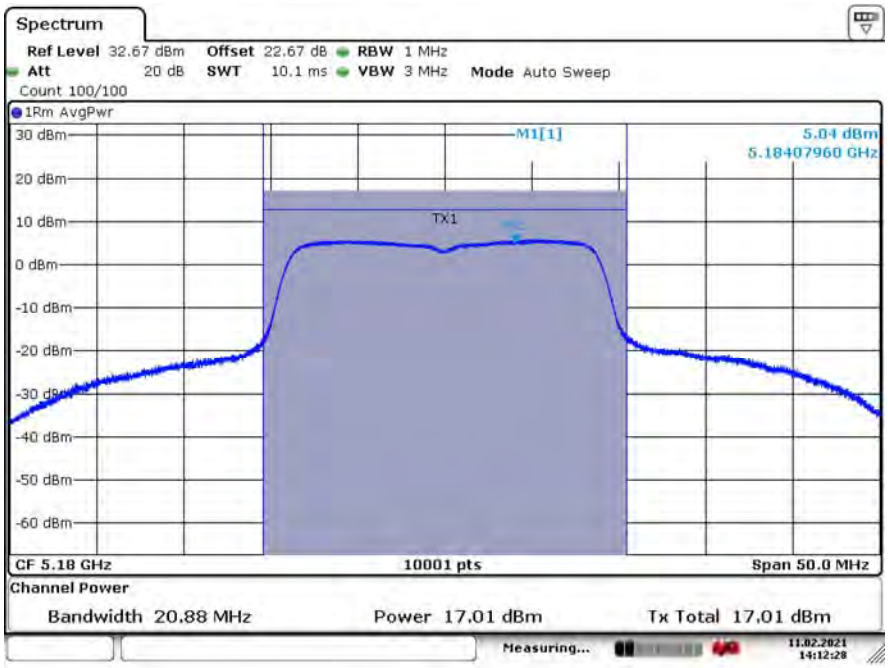
5180 MHz ANT B



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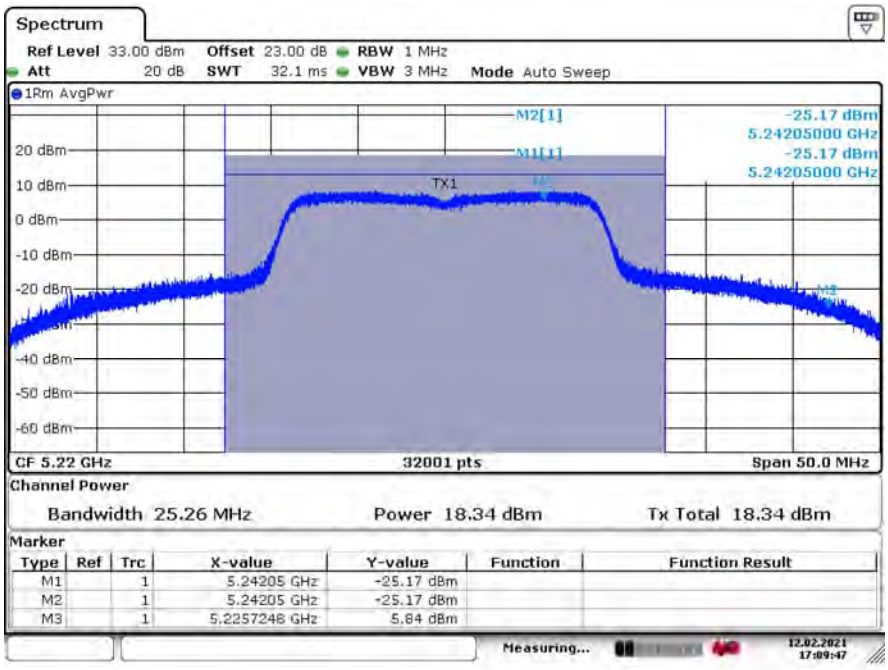
5220 MHz ANT A



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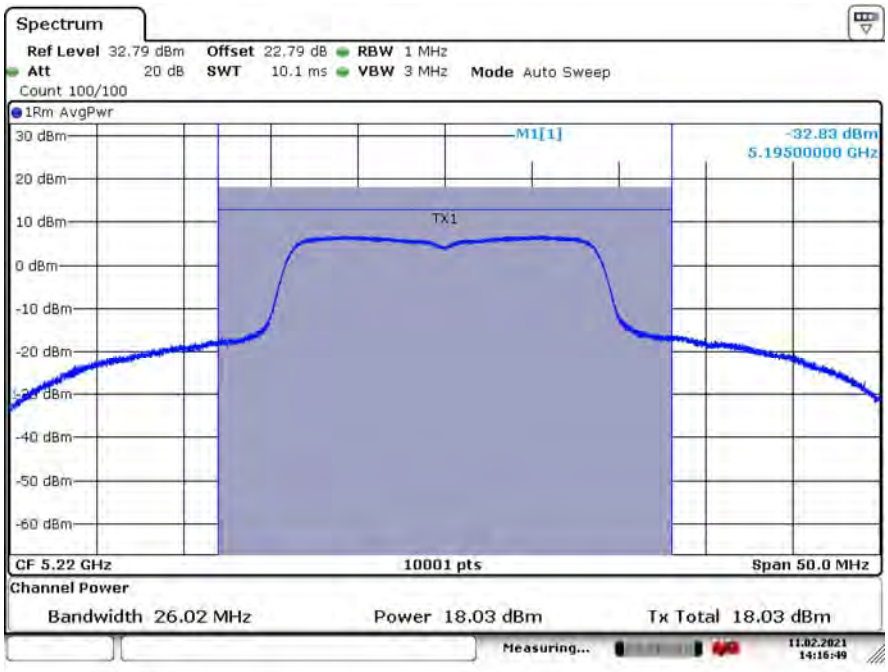
5220 MHz ANT B



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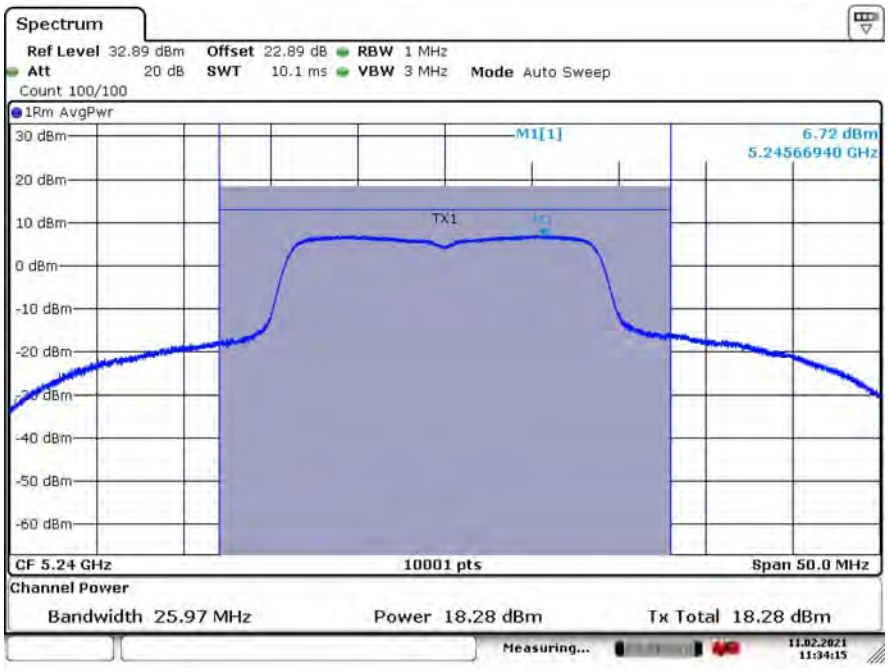
5240 MHz ANT A



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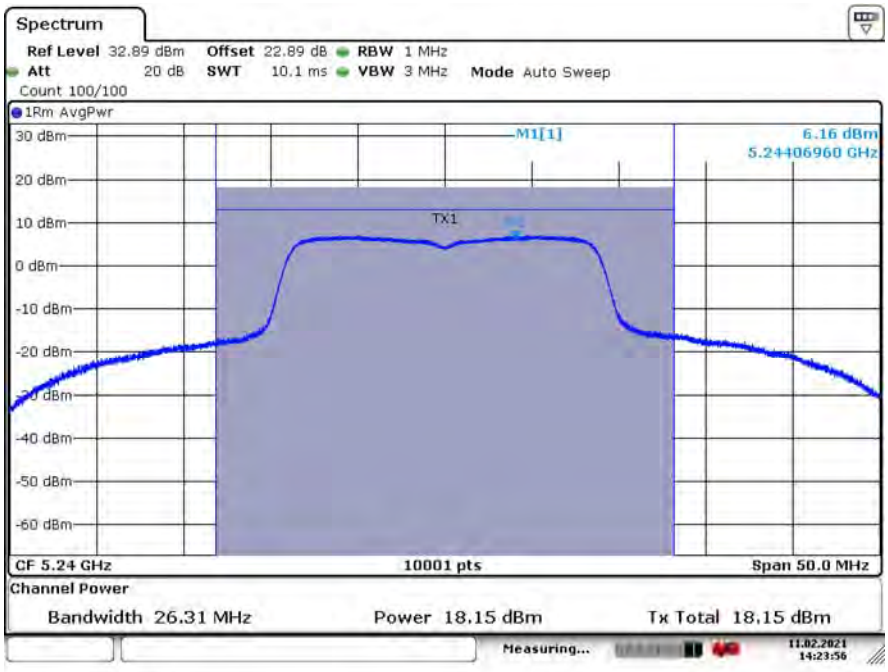
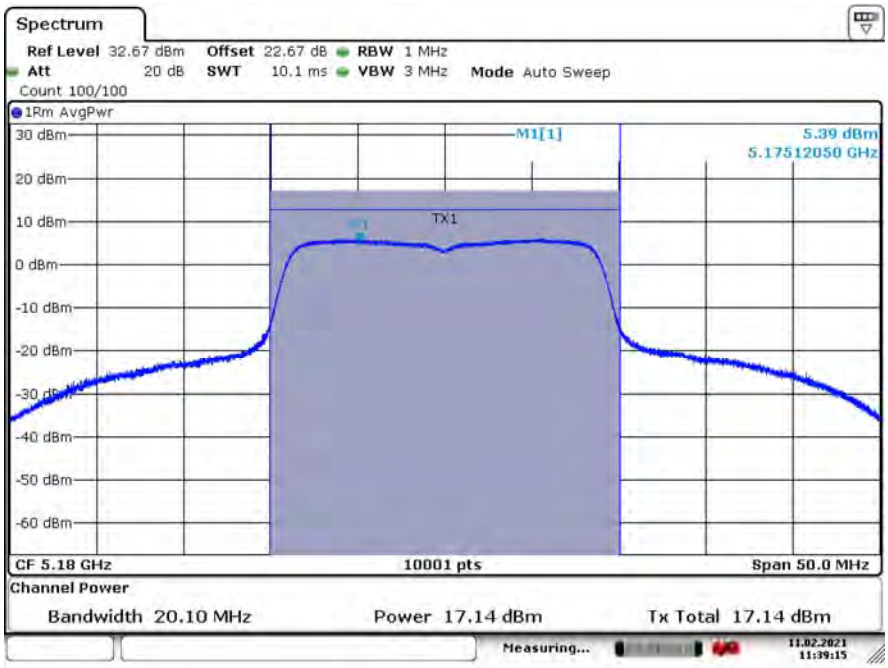
5240 MHz ANT B



Date: 11 FEB.2021 14:23:56

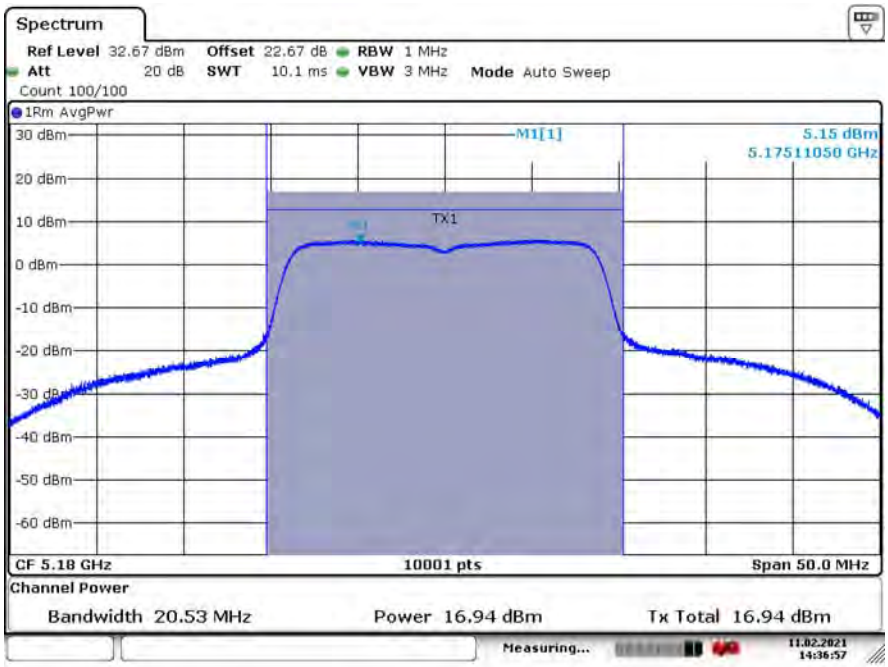
802.11ac20 Mode

5180 MHz ANT A



Date: 11 FEB 2021 11:39:14

5180 MHz ANT B



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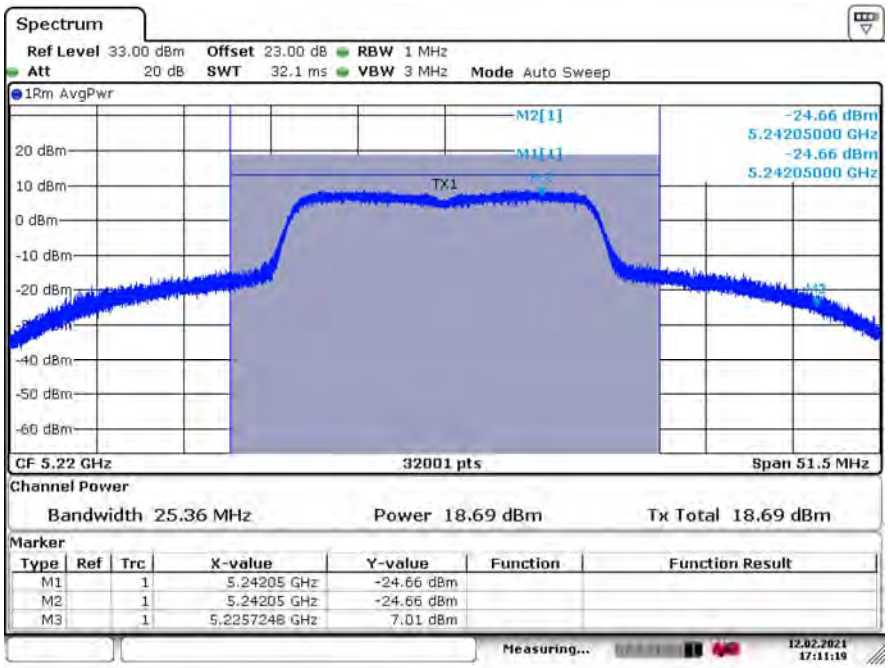
5220 MHz ANT A



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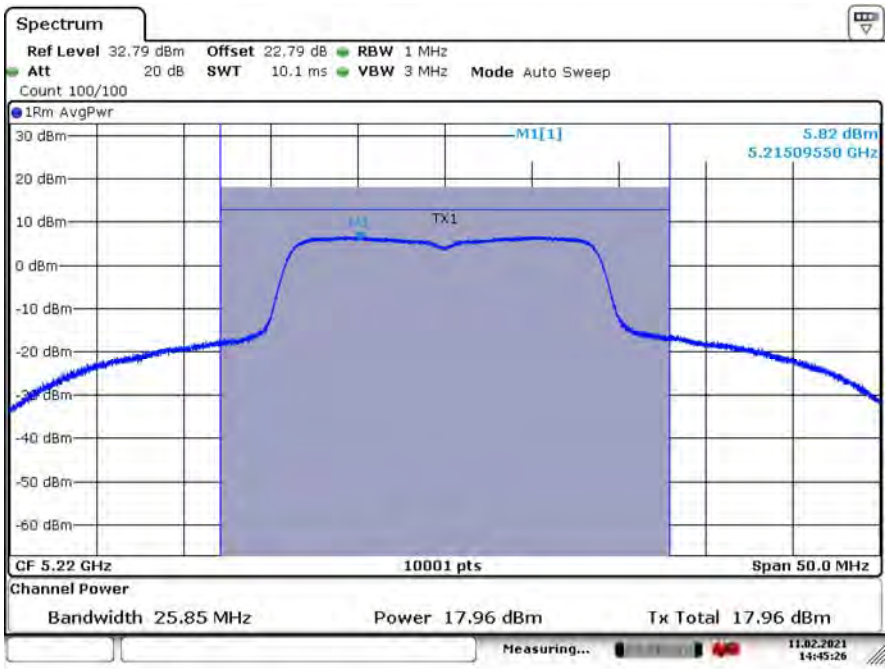
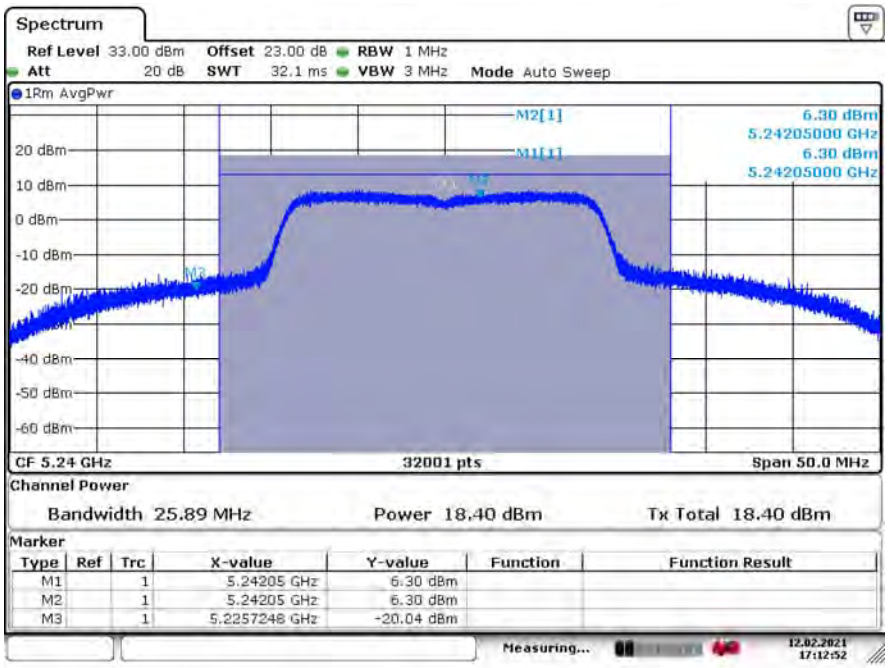
5220 MHz ANT B



Date: 11 FEB 2021 14:45:26

5240 MHz ANT A



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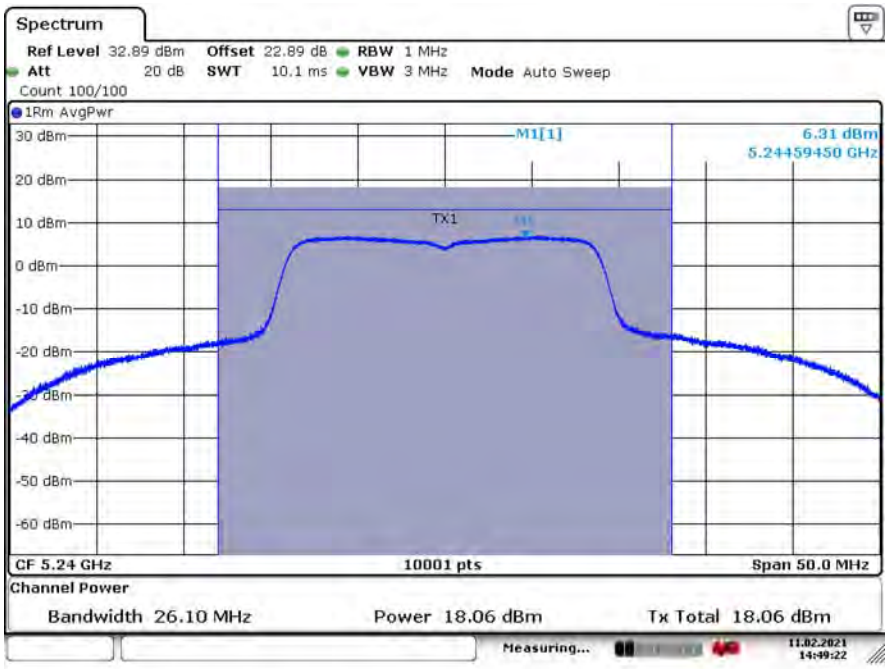
5240 MHz ANT B



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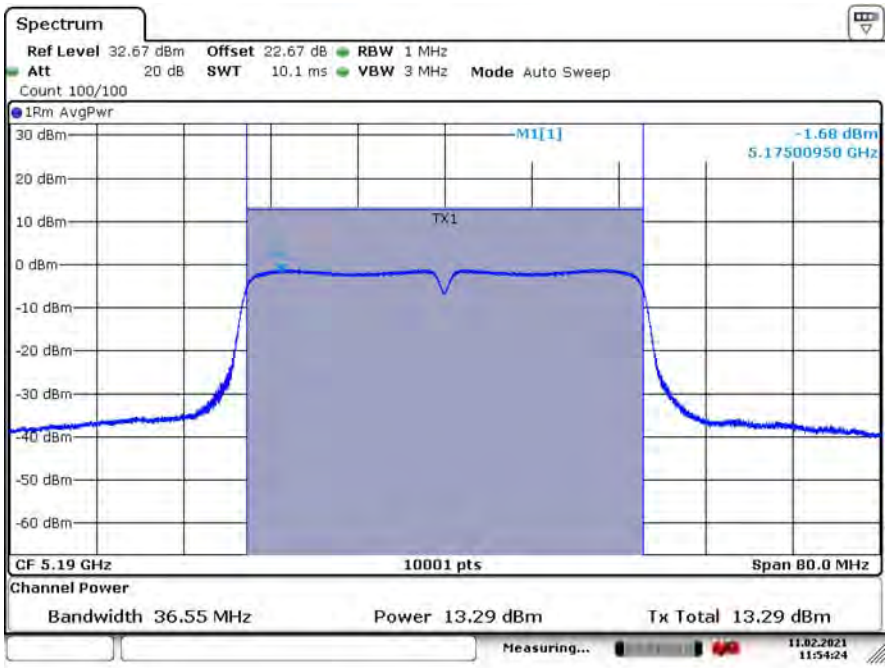
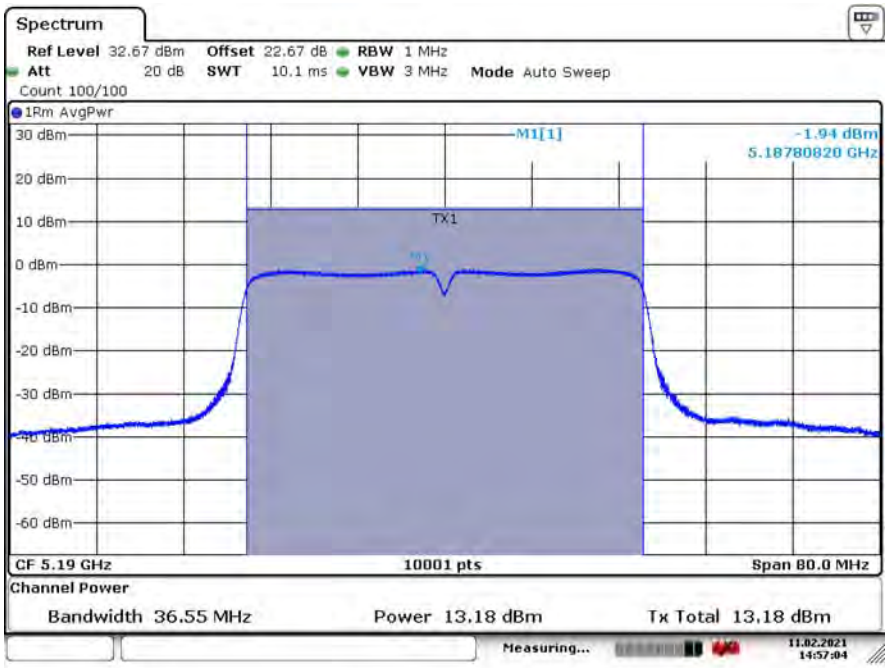
802.11n40 Mode

5190 MHz ANT A



Date: 11 FEB.2021 11:54:24

5190 MHz ANT B



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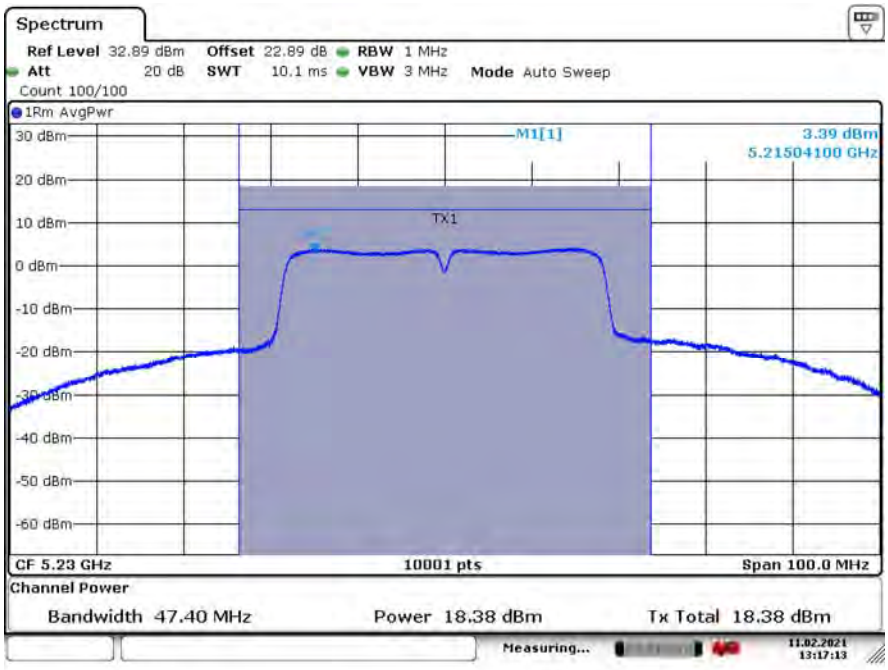
5230 MHz ANT A



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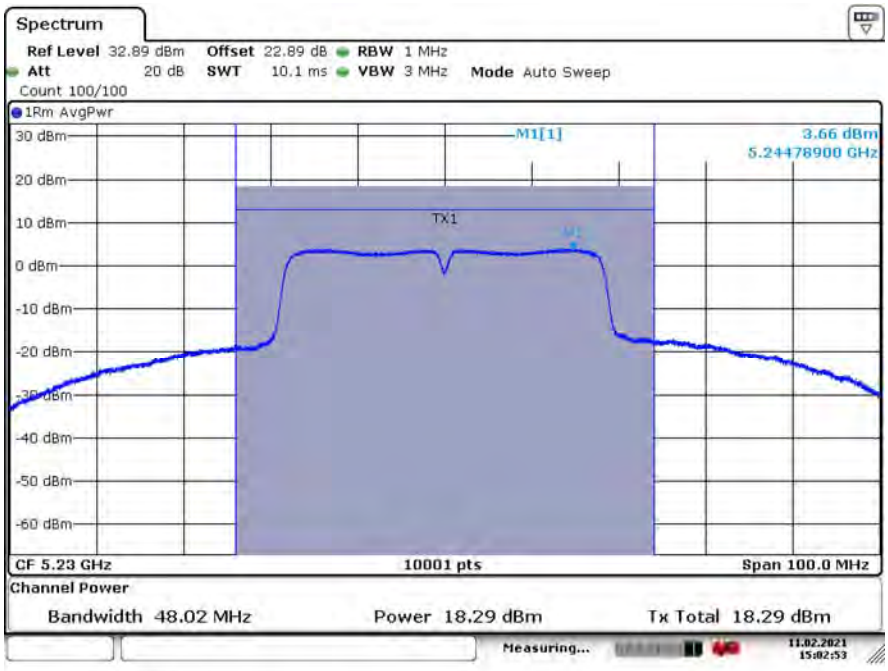
5230 MHz ANT B



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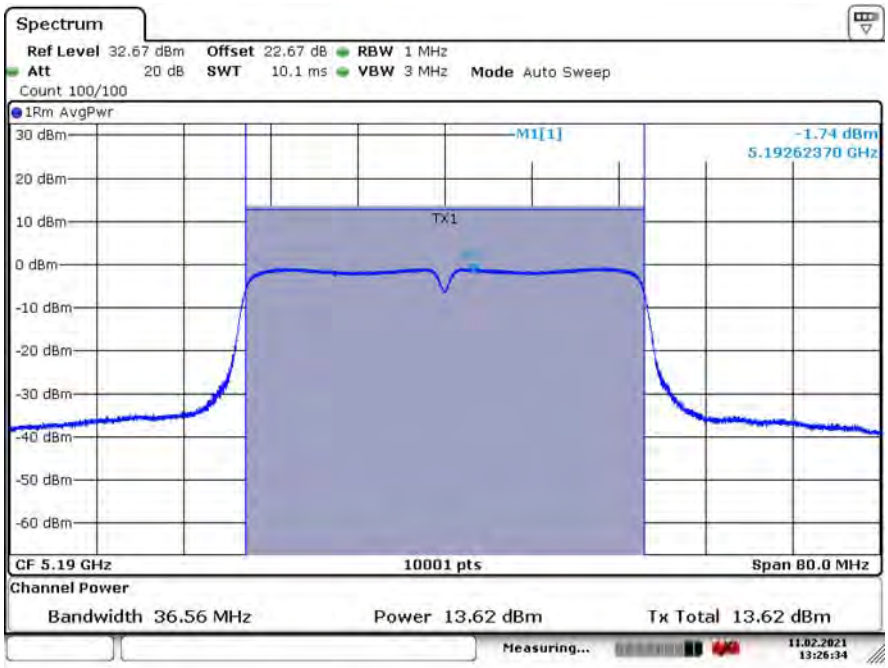
802.11ac40 Mode

5190 MHz ANT A



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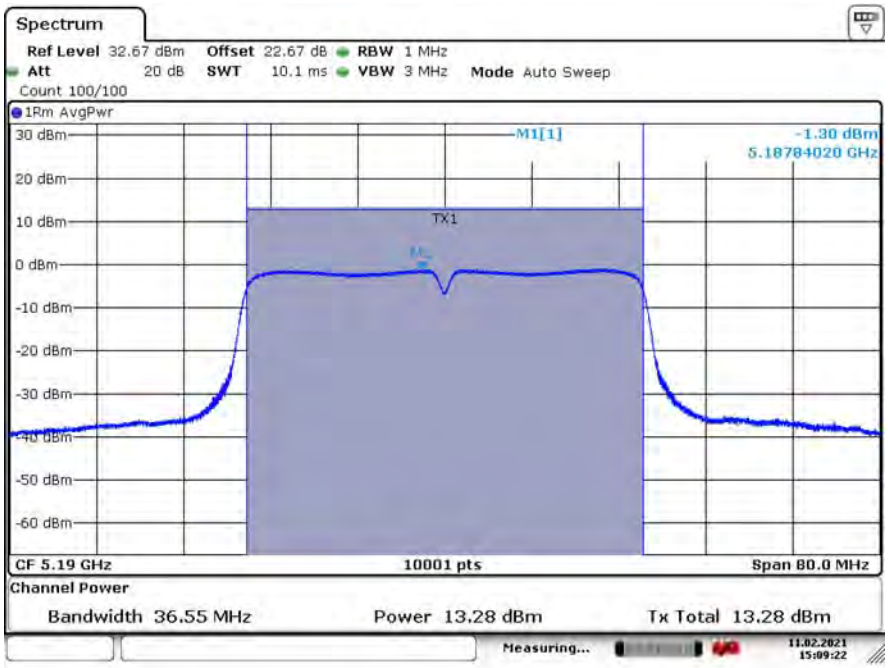
5190 MHz ANT B



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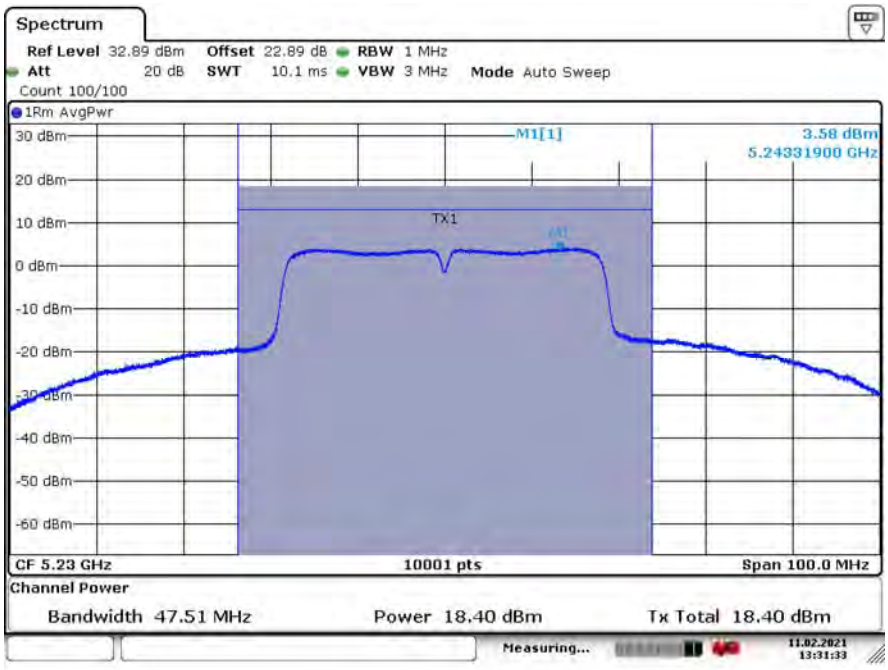
5230 MHz ANT A



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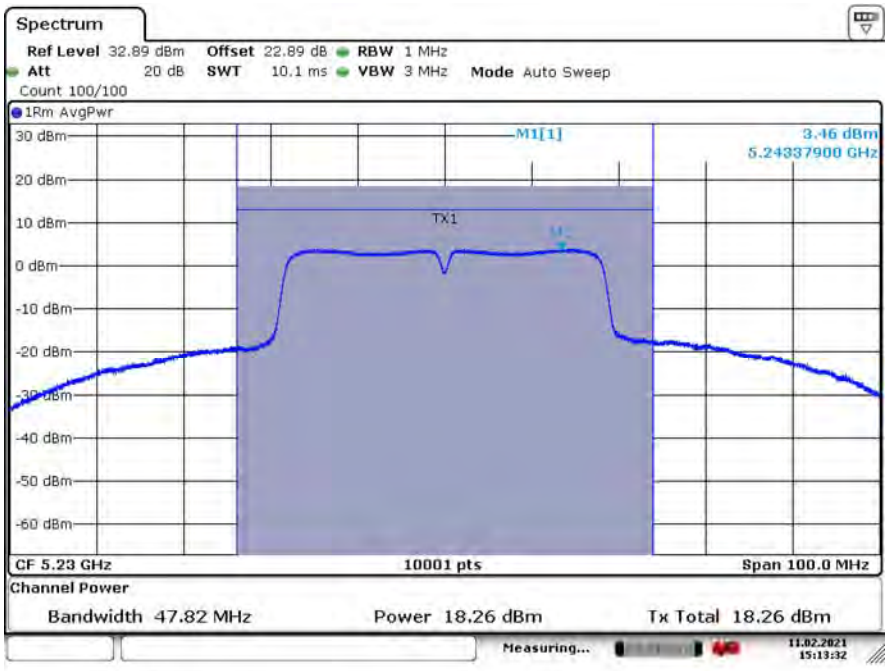
5230 MHz ANT B



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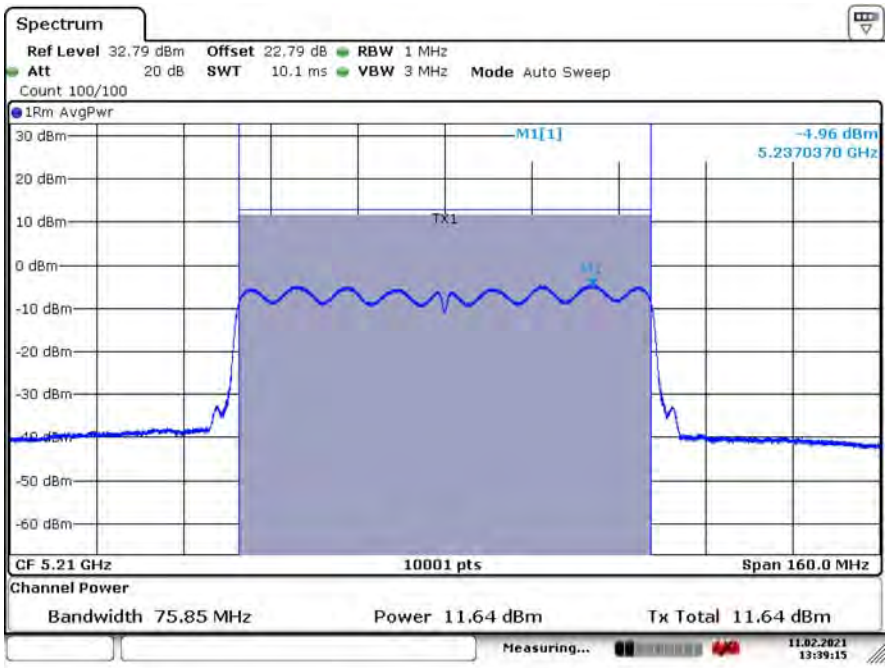
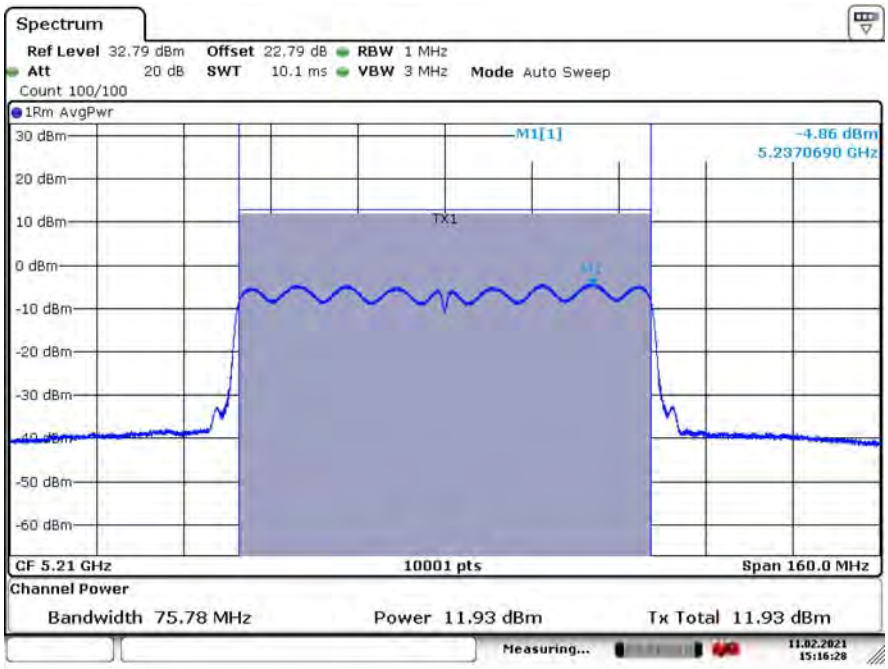
802.11ac80 Mode

5210 MHz ANT A



Date: 11.FEB.2021 13:39:15

5210 MHz ANT B



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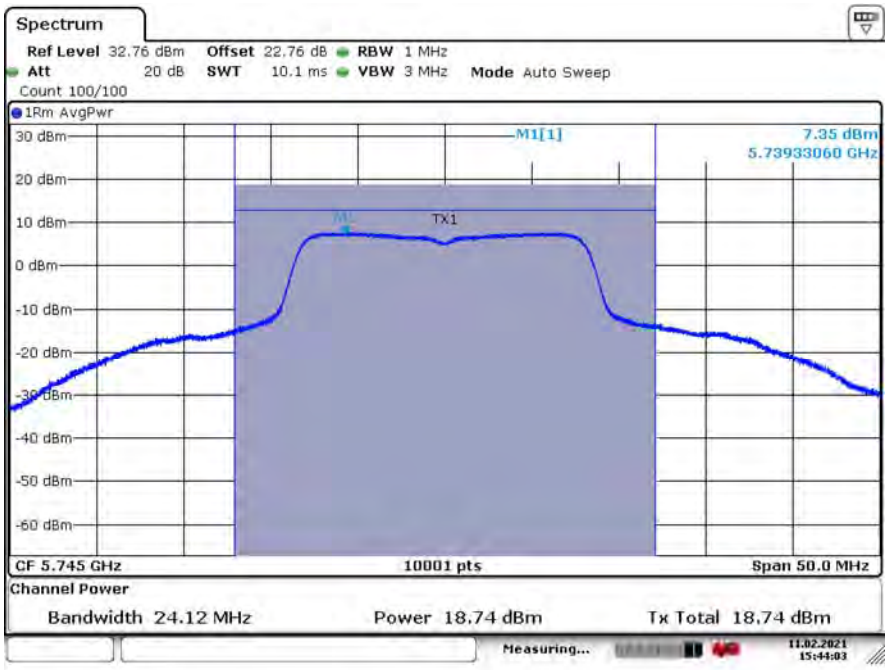
5725 - 5850 MHz

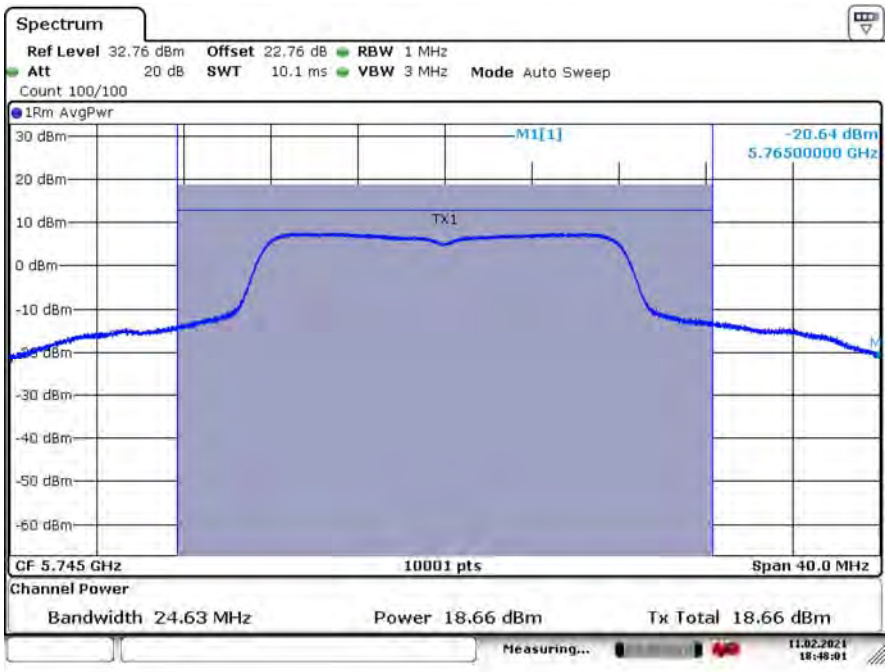
802.11a Mode

5745 MHz ANT A



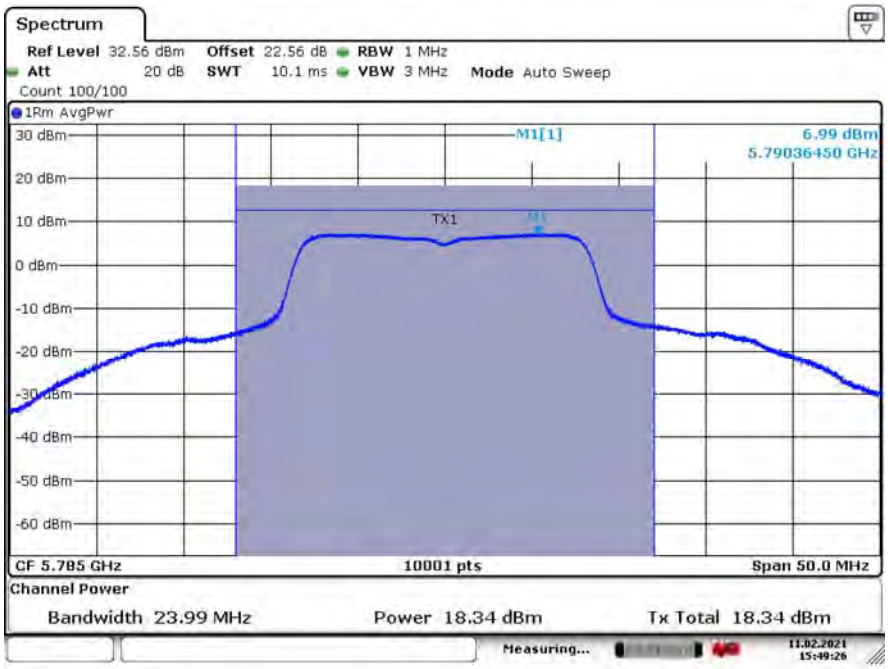
Date: 11 FEB 2021 15:44:04

5745 MHz ANT B



Date: 11 FEB 2021 18:48:01

5785 MHz ANT A



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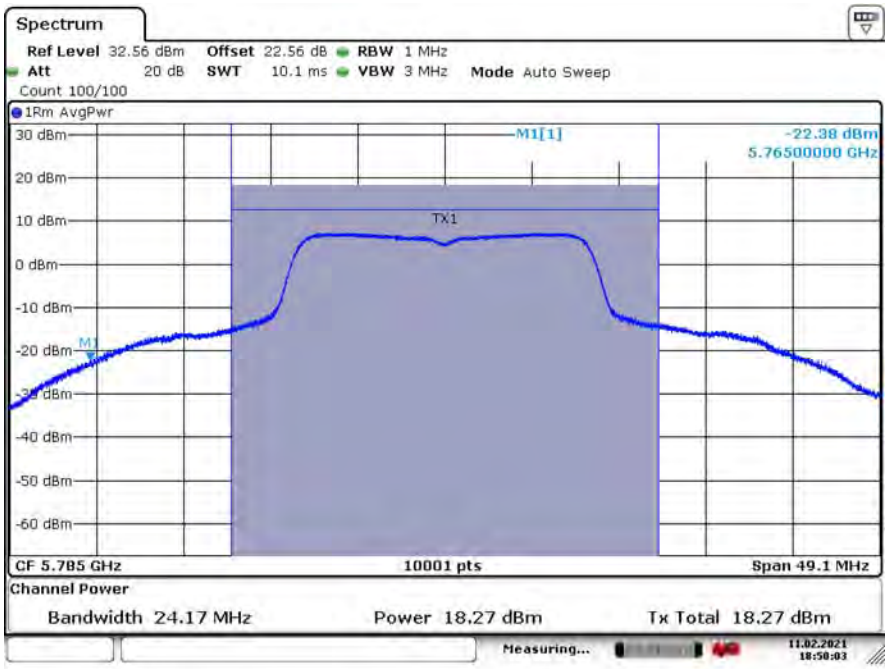
5785 MHz ANT B



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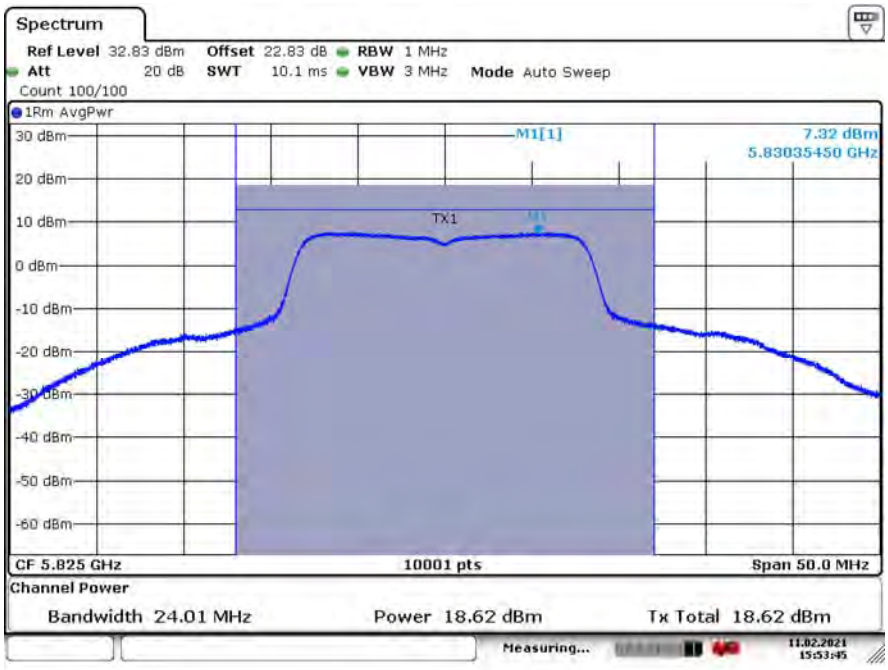
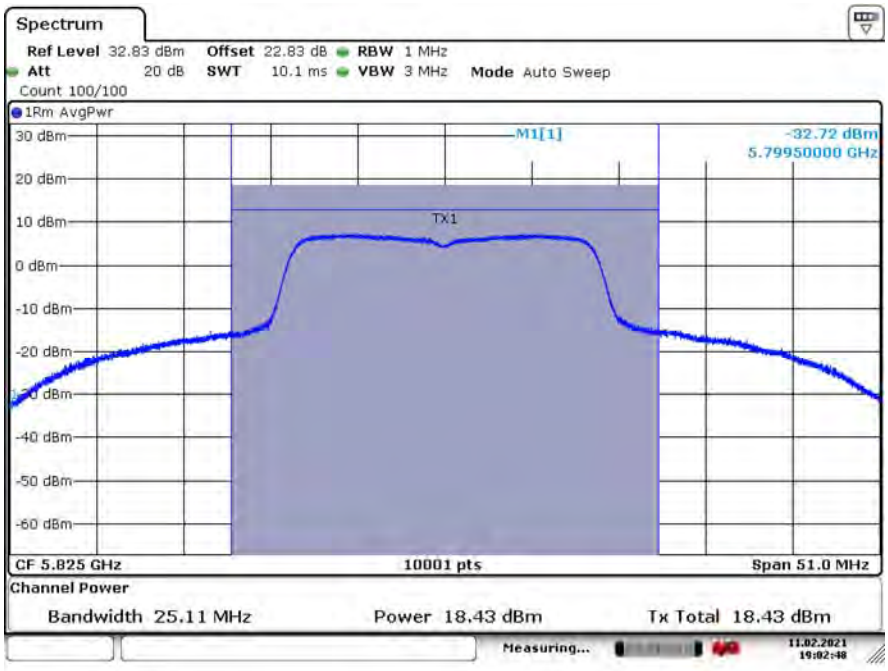
5825 MHz ANT A



Date: 11 FEB.2021 15:53:46

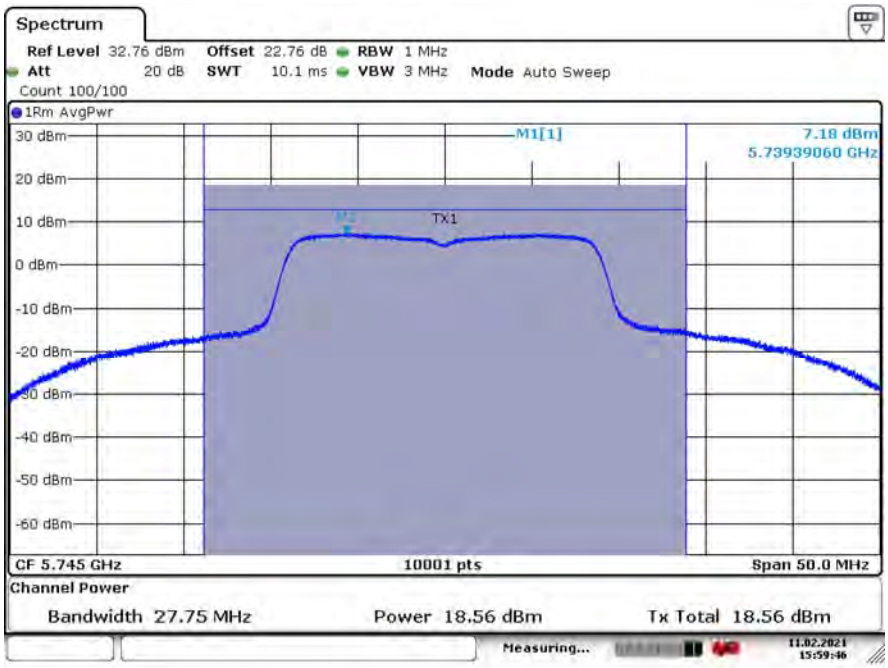
5825 MHz ANT B



Date: 11 FEB.2021 19:02:48

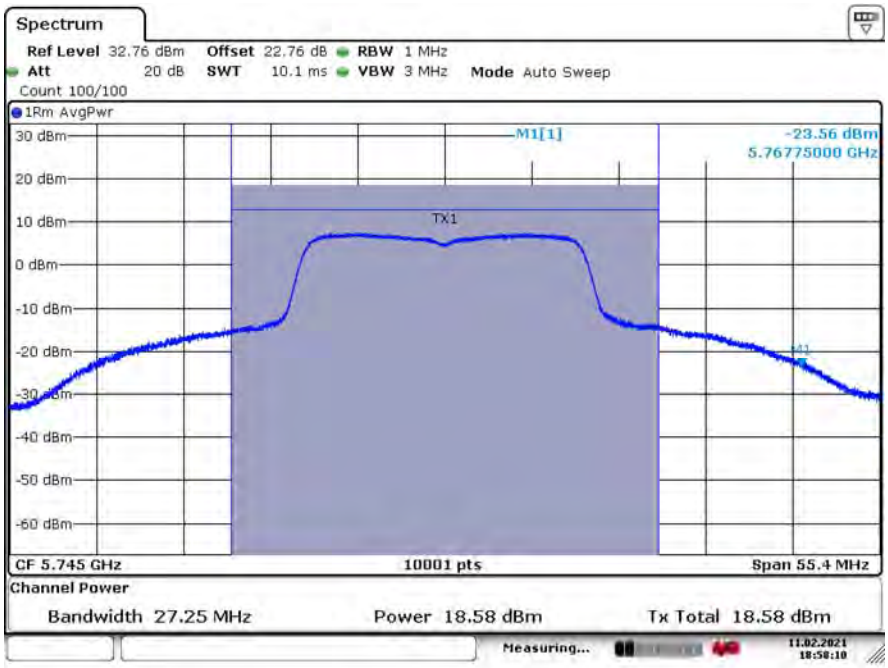
802.11n20 Mode

5745 MHz ANT A



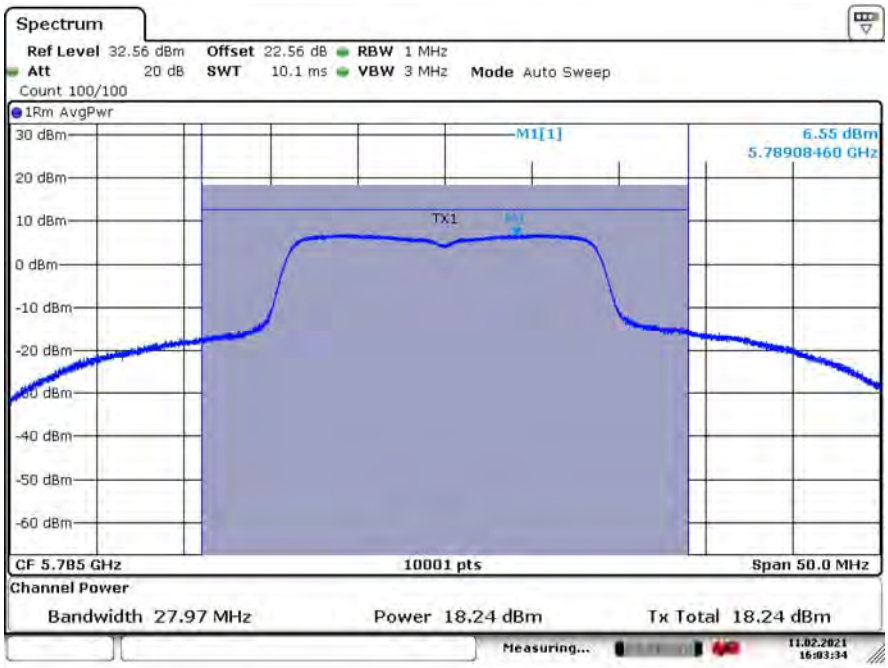
Date: 11.FEB.2021 15:59:47

5745 MHz ANT B



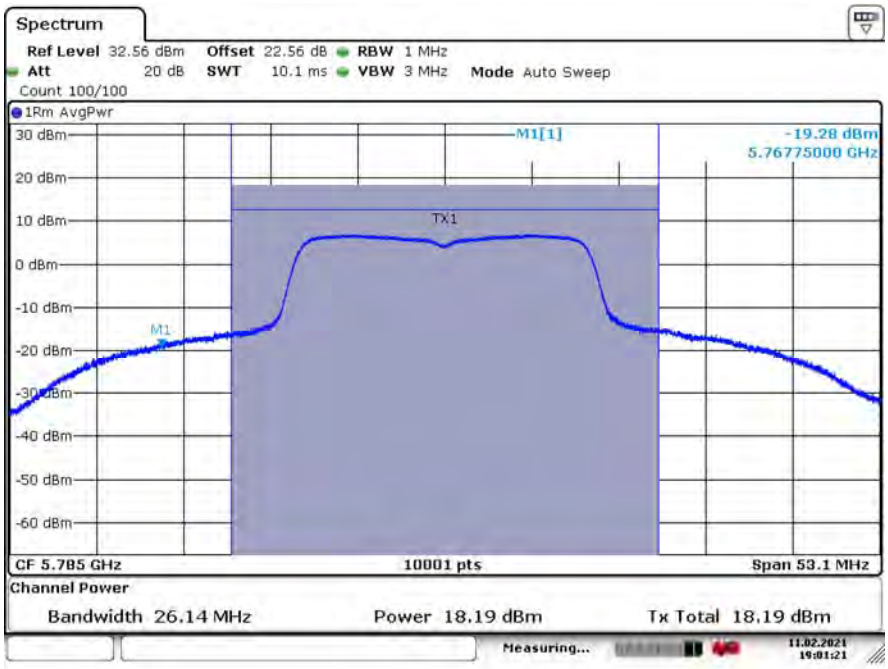
Date: 11.FEB.2021 18:58:11

5785 MHz ANT A



Date: 11 FEB.2021 16:03:34

5785 MHz ANT B



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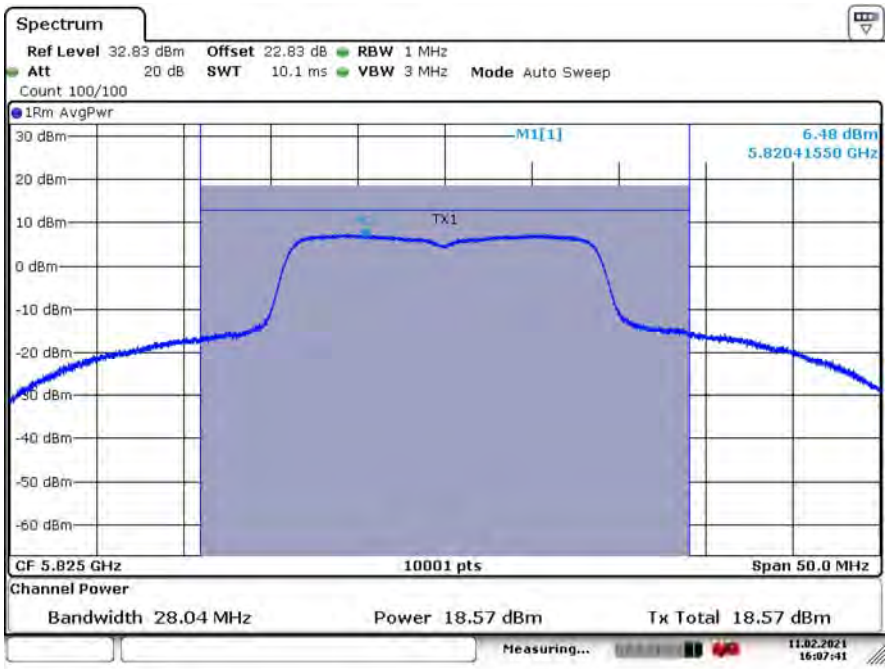
5825 MHz ANT A



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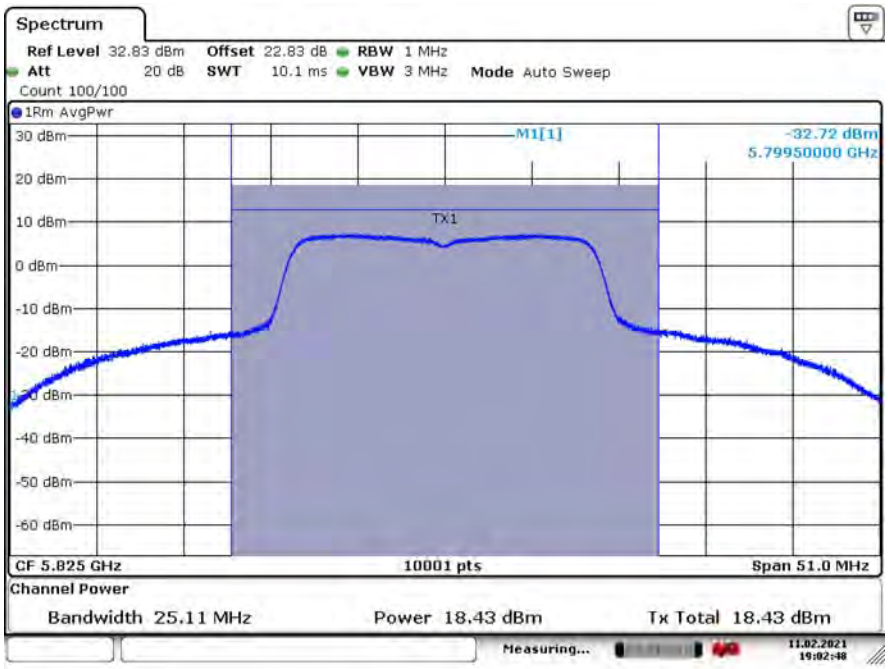
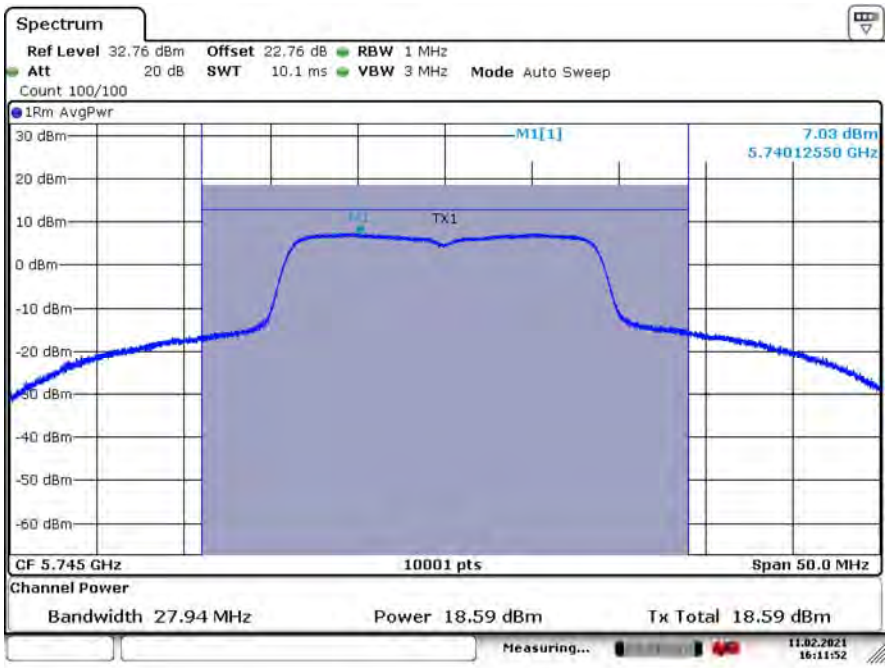
5825 MHz ANT B



Date: 11 FEB.2021 19:02:48

802.11ac20 Mode

5745 MHz ANT A



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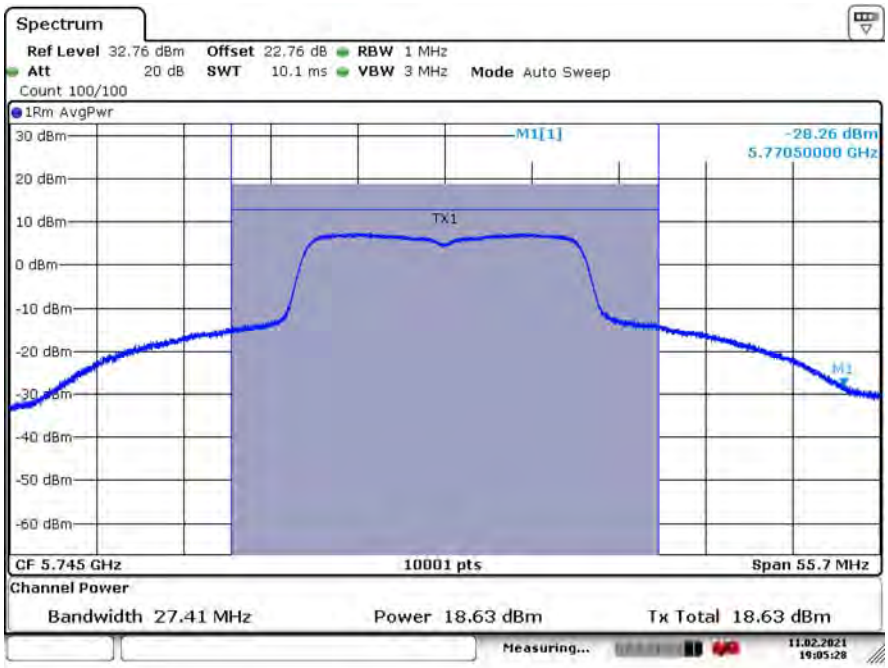
5745 MHz ANT B



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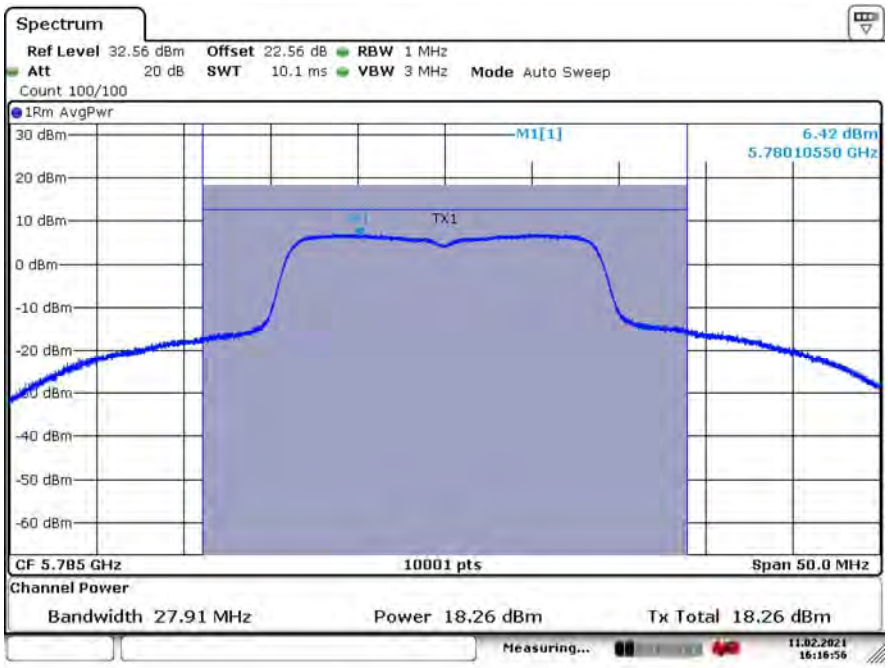
5785 MHz ANT A



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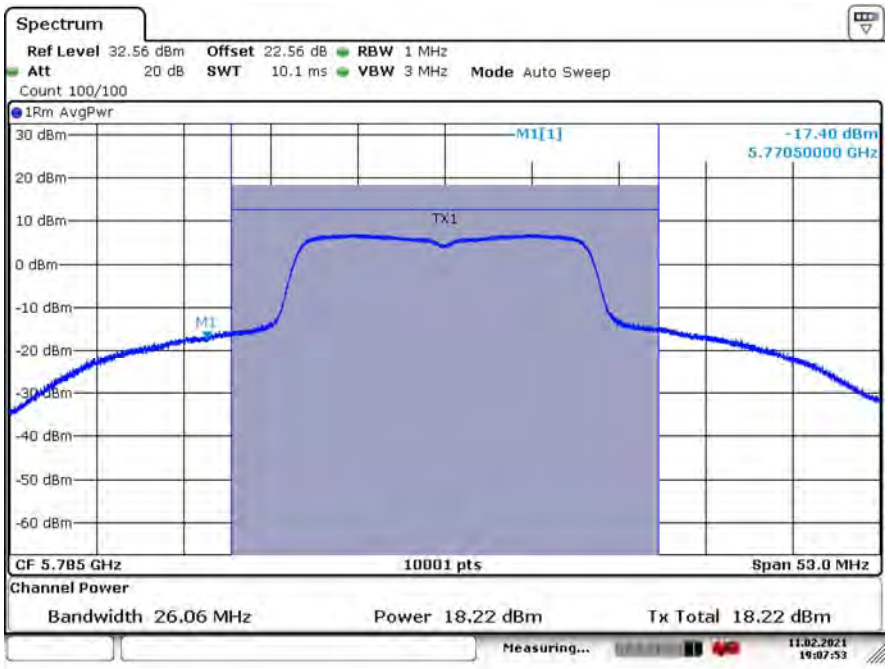
5785 MHz ANT B



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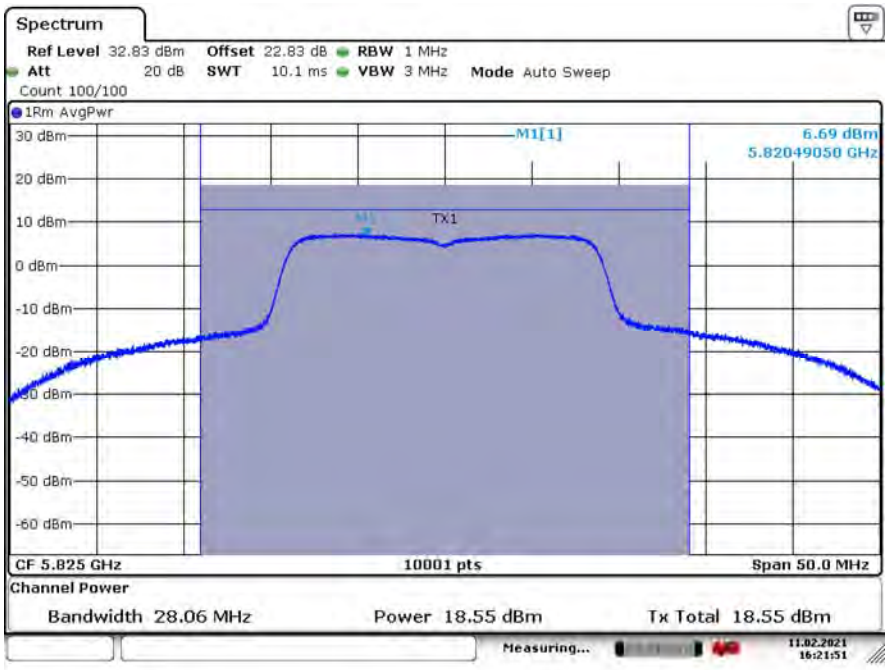
5825 MHz ANT A



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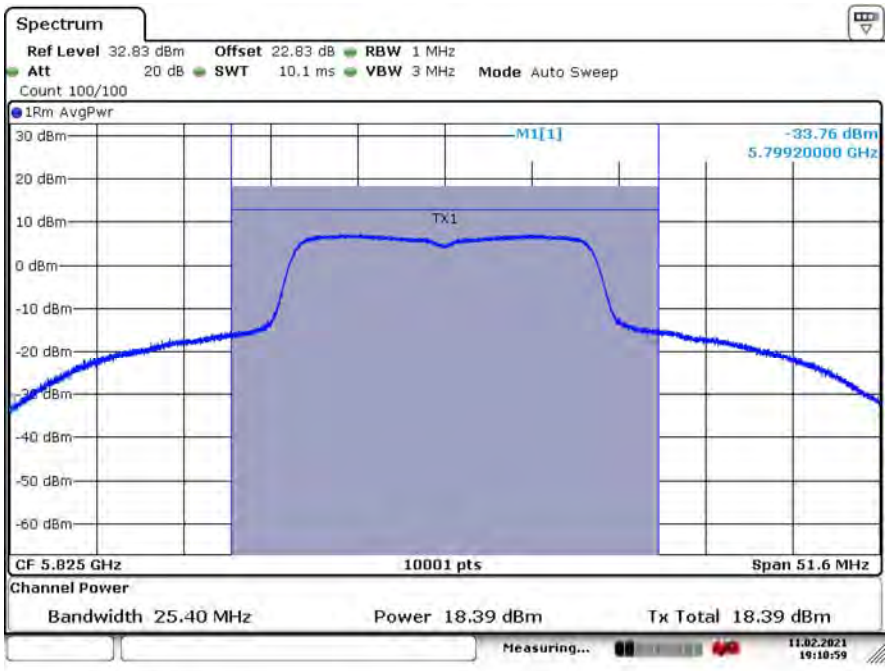
5825 MHz ANT B



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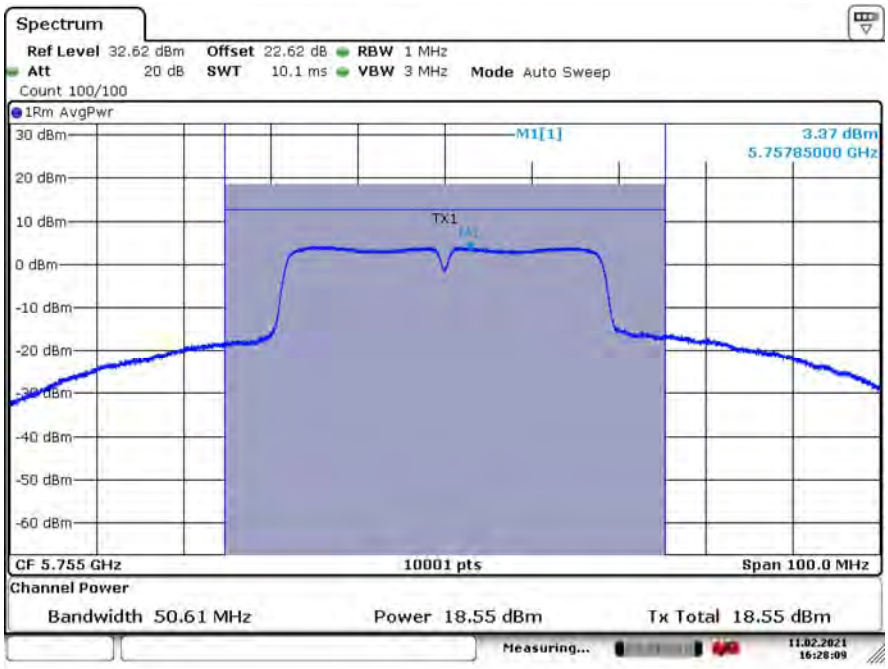
802.11n40 Mode

5755 MHz ANT A



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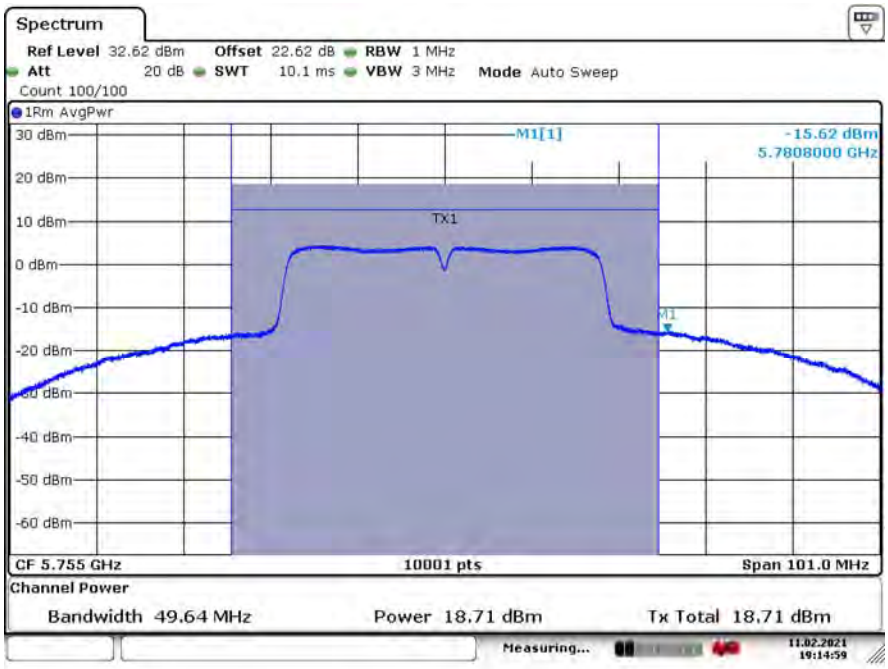
5755 MHz ANT B



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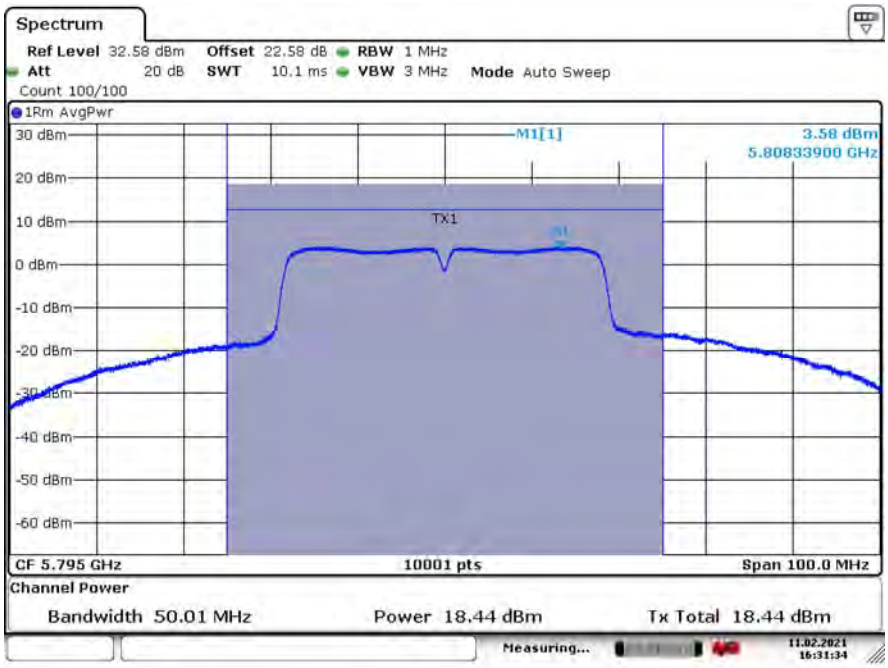
5795 MHz ANT A



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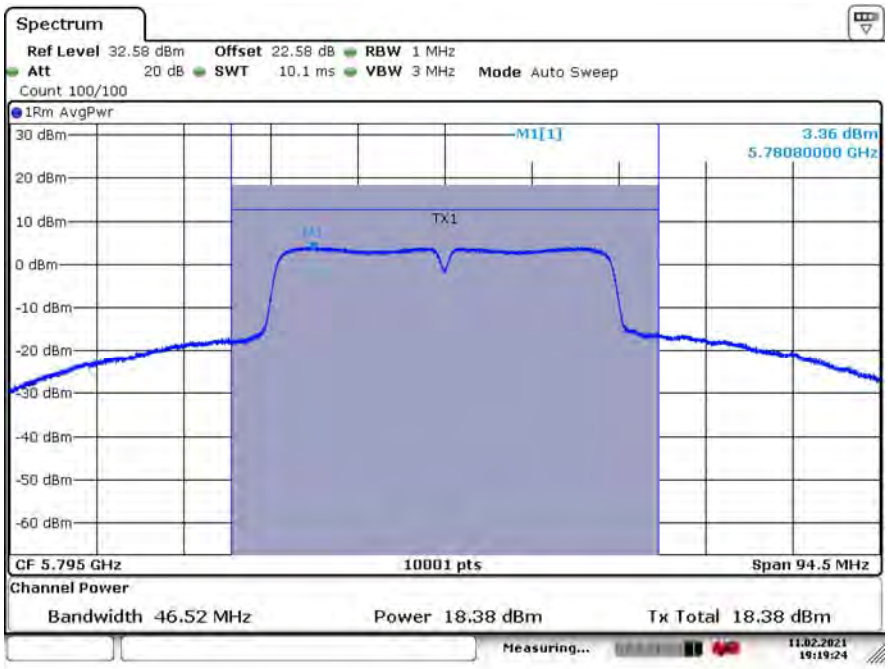
5795 MHz ANT B



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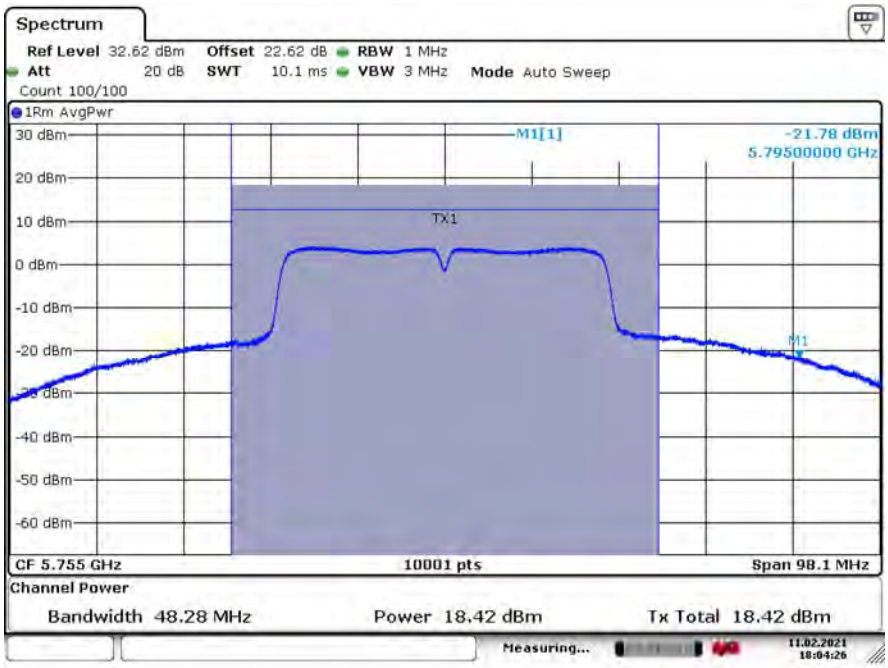
802.11ac40 Mode

5755 MHz ANT A



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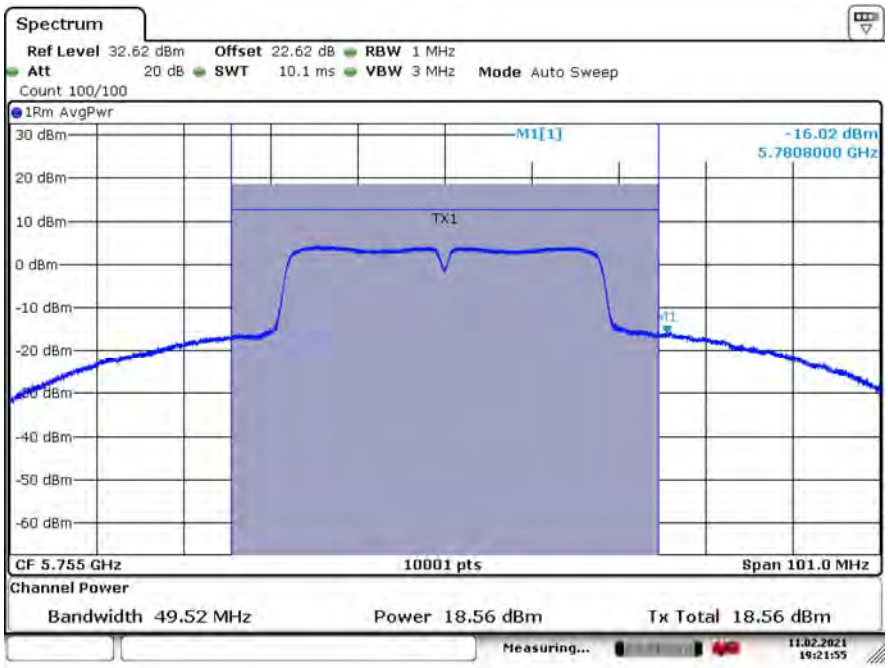

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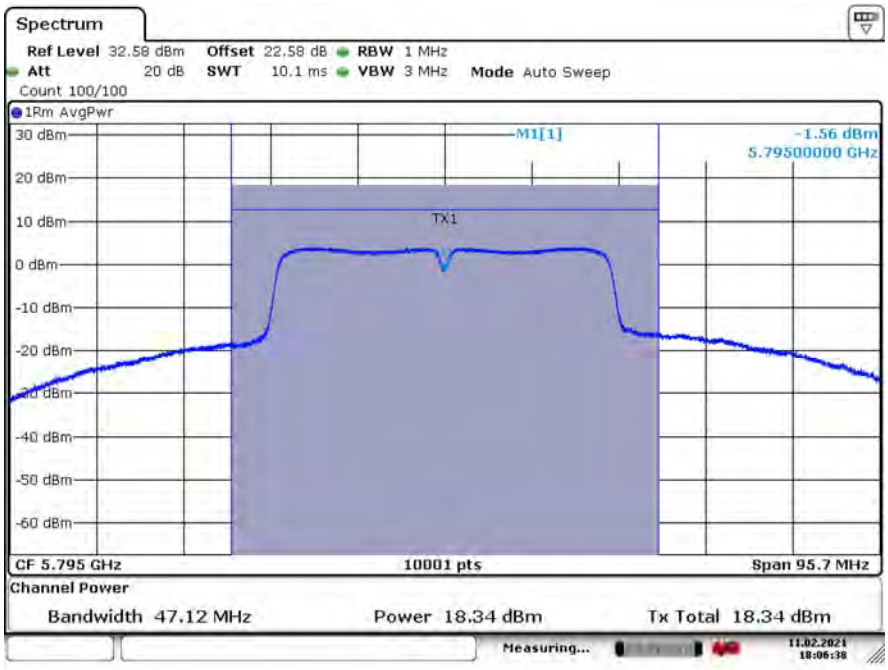
5795 MHz ANT A



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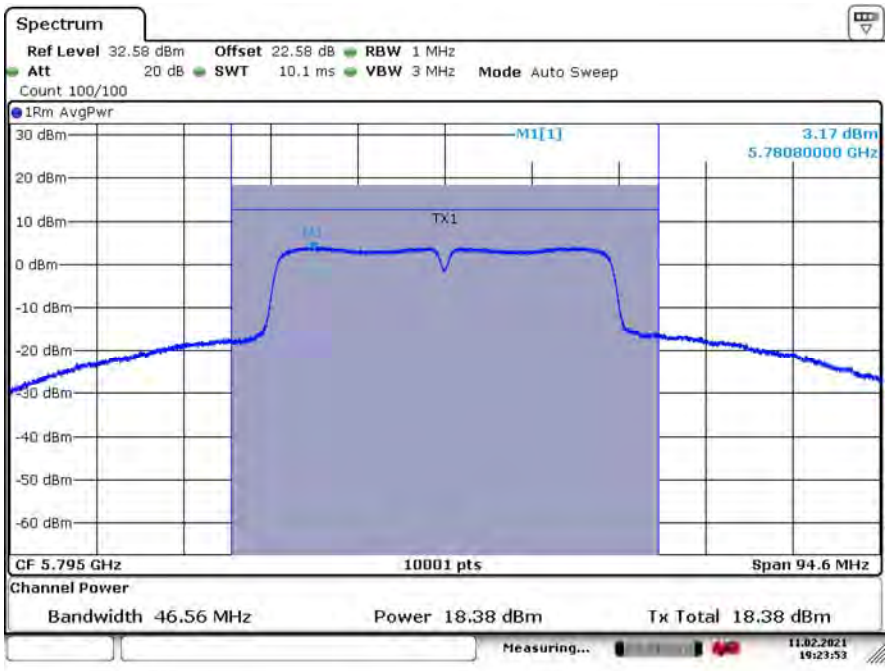
5795 MHz ANT B



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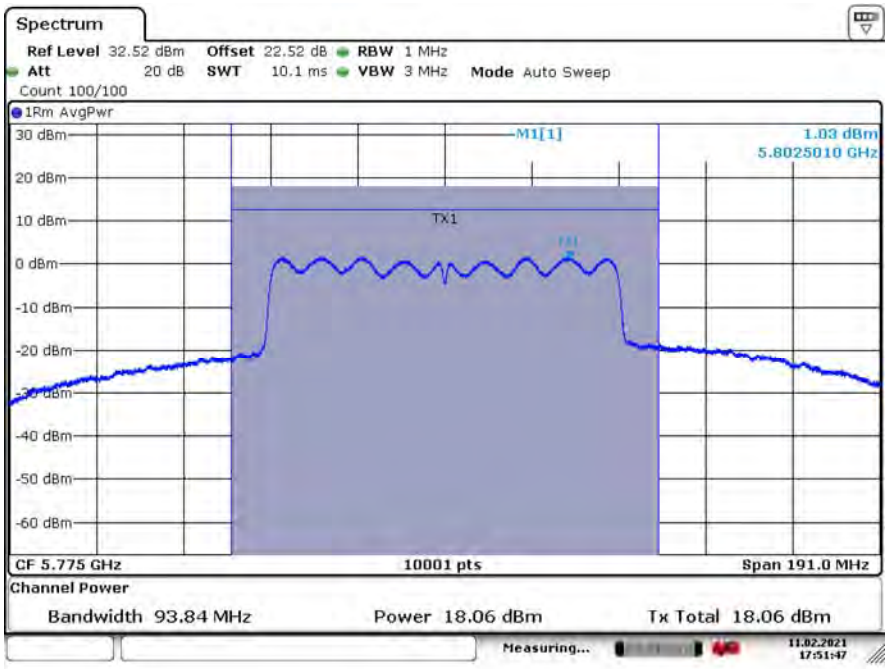
802.11ac80 Mode

5775 MHz ANT A



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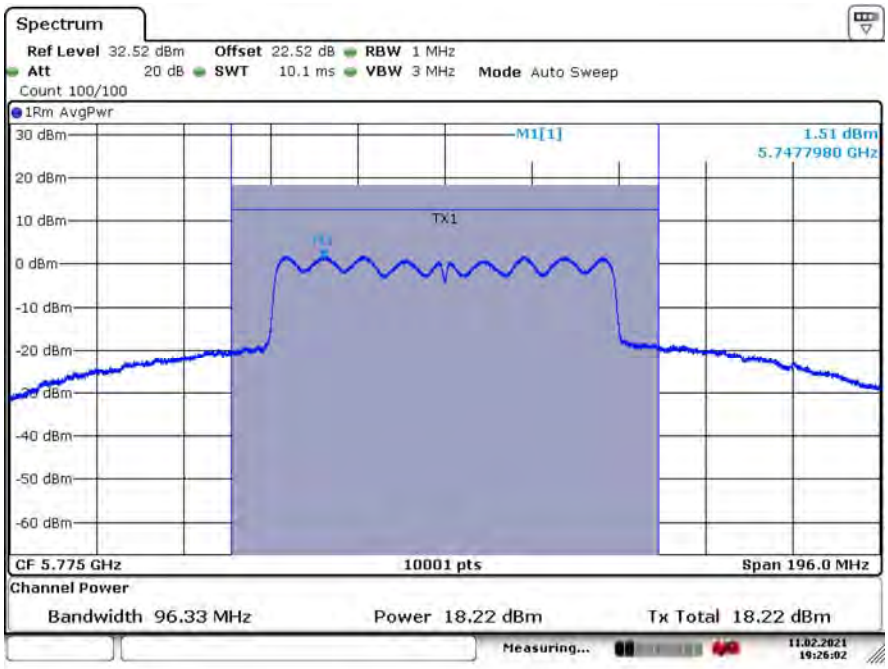
5775 MHz ANT B



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