



427 West 12800 South
Draper, UT 84020

Test Report Certification

FCC ID	SWX-WAVEAM
ISED ID	6545A-WAVEAM
Equipment Under Test	Wave-AP-Micro
Test Report Serial Number	TR7568_01
Date of Tests	August 12, through September 12, 2022,
Report Issue Date	October 26, 2022

Test Specification	Applicant
47 CFR FCC Part 15, Subpart E	Ubiquiti Inc. 685 Third Avenue New York, NY 10017 U.S.A.



NVLAP LAB CODE 600241-0

Certification of Engineering Report

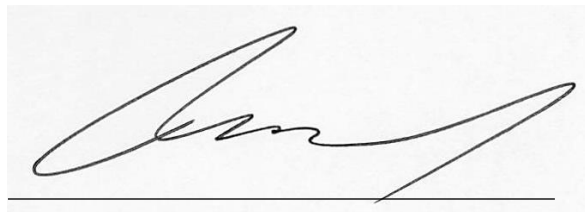
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Applicant	Ubiquiti Inc.
Manufacturer	Ubiquiti Inc.
Brand Name	Wave
Model Number	Wave-AP-Micro
FCC ID	SWX-WAVEAM
ISED ID	6545A-WAVEAM

On this 26th day of October 2022, I individually and for Unified Compliance Laboratory certify that the statements made in this engineering report are true, complete, and correct to the best of my knowledge and are made in good faith.

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Unified Compliance Laboratory



Written By: Clay Allred



Reviewed By: Richard L. Winter

Revision History		
Revision	Description	Date
01	Original Report Release	26 October 2022

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1 Client Information

1.1 Applicant

Company	Ubiquiti Inc. 685 Third Avenue New York, NY 10017 U.S.A.
Contact Name	Alex Macon
Title	Compliance

1.2 Manufacturer

Company	Ubiquiti Inc. 685 Third Avenue New York, NY 10017 U.S.A.
Contact Name	Alex Macon
Title	Compliance

2 Equipment Under Test (EUT)

2.1 Identification of EUT

Brand Name	Wave
Model Number	Wave-AP-Micro
Serial Number	0418D6A28CB3
Dimensions (cm)	28.4 x 15.6 x 7.6

2.2 Description of EUT

The Wave-AP-Micro is 60 GHz point-to-multipoint customer premise equipment that features wave technology with a 1.5+ Gbps throughput rate. The Wave-AP-Micro is also equipped with a 5 GHz WiFi 6 backup radio to sustain connectivity during a 60 GHz link disruption caused by inclement weather conditions. A Bluetooth LE transceiver is included for device management. The Wave-AP-Micro is an outdoor device and has an Ethernet port which is used for data transfer and to provide power using an Ubiquiti U-POE-at 48-volt PoE power adapter.

This report covers the circuitry of the device subject to FCC Part 15, Subpart C. The circuitry of the device subject to FCC Part 15 Subpart B was found to be compliant and is covered under a separate Unified Compliance Laboratory test report.

Band	WiFi Mode	Modulation Bandwidth	Modulation Type	Frequency (MHz)
UNII-1	ax	20 MHz	HE	5165 5175, 5185, 5200, 5210, 5220 5230, 5240
	ax	40 MHz	HE	5175, 5185, 5200, 5215, 5230
	ax	80 MHz	HE	5195, 5200, 5205, 5210

2.3 EUT and Support Equipment

The EUT and support equipment used during the test are listed below.

Brand Name Model Number Serial Number	Description	Name of Interface Ports / Interface Cables
BN: Wave MN: Wave-AP-Micro (Note 1) SN: 0418D6A28CB3	Wireless P-P/P-MP Radio	See Section 2.4
BN: Ubiquiti MN: U-POE-at SN: N/A	PoE Power Adapter	Shielded or Un-shielded cat 5e cable
BN: Dell MN: XPS 13 SN: N/A	Laptop Computer	Shielded or Un-shielded cat 5e cable

Notes: (1) EUT

(2) Interface port connected to EUT (See Section 2.4)

The support equipment listed above was not modified in order to achieve compliance with this standard.

2.4 Interface Ports on EUT

Name of Ports	No. of Ports Fitted to EUT	Cable Description/Length
PoE In	1	Shielded or Un-shielded cat 5e cable/7 meter

2.5 Operating Environment

Power Supply	120 Volts AC to 48 Volts PoE
AC Mains Frequency	60 Hz
Temperature	22.1-22.8 °C
Humidity	19.3-23.9 %
Barometric Pressure	1009 mBar

2.6 Operating Modes

The WAVE-AP-Micro was tested using test software in order to enable a constant transmission. The measurements within this report are corrected to reference a 100% duty cycle. All emission modes of 802.11 ax, a, ac and n were investigated.

2.7 EUT Exercise Software

EUT firmware version 1.0 was used to operate the transmitter using a constant transmit mode.

2.8 Block Diagram of Test Configuration

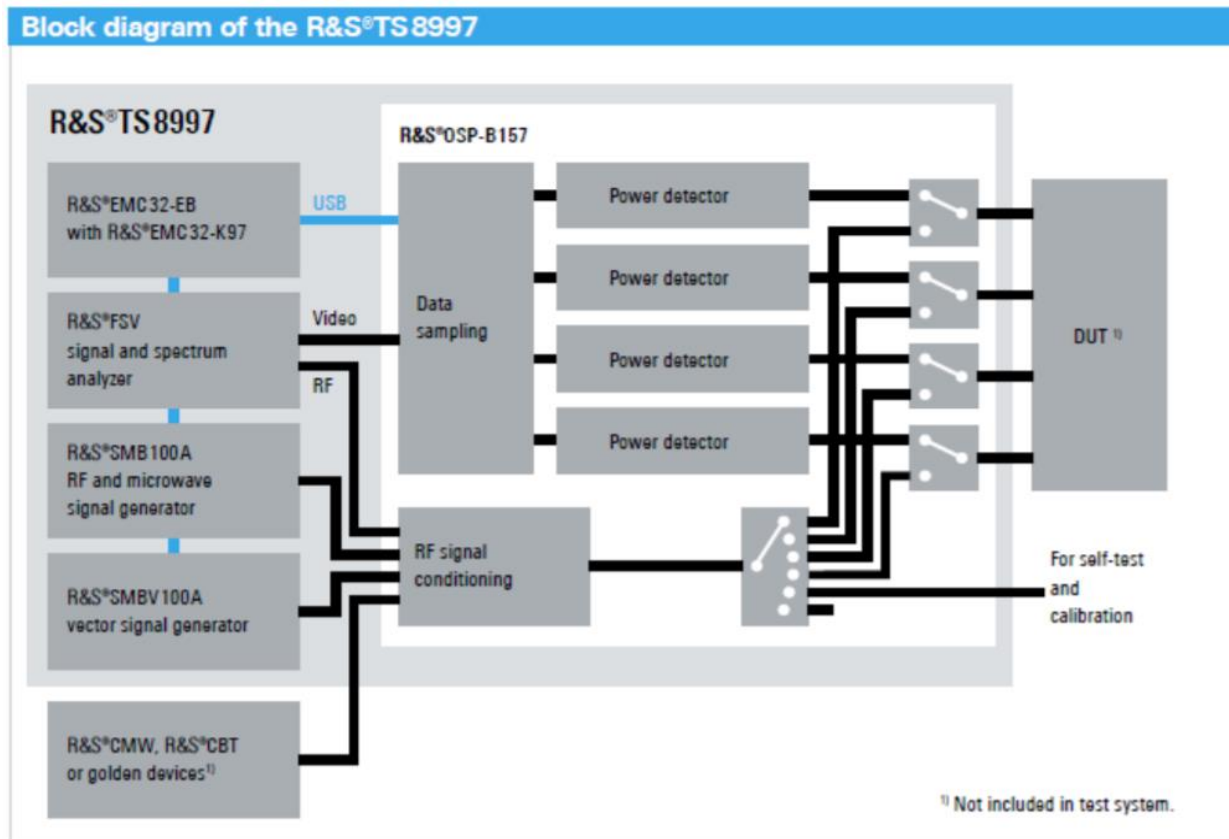


Diagram 1: Test Configuration Block Diagram

2.9 Modification Incorporated/Special Accessories on EUT

There were no modifications made to the EUT during testing to comply with the specification.

2.10 Deviation, Opinions Additional Information or Interpretations from Test Standard

There were no deviations, opinions, additional information or interpretations from the test specification.

3 Test Specification, Method and Procedures

3.1 Test Specification

Title	-47 CFR FCC Part 15, Subpart E, Section 15.407 Limits and methods of measurement of radio interference characteristics of Unlicensed National Information Infrastructure Devices
Purpose of Test	The tests were performed to demonstrate initial compliance

3.2 Methods & Procedures

3.2.1 47 CFR FCC Part 15 Section 15.407

See test standard for details.

3.3 FCC Part 15, Subpart E

3.3.1 Summary of Tests

FCC Section	Environmental Phenomena	Frequency Range (MHZ)	Result
15.407(a)	Antenna requirements	Structural Requirement	Compliant
15.407(b)	Conducted Disturbance at Mains Port	0.15 to 30	Compliant
15.407(c)	Bandwidth Requirement	5165 to 5240	Compliant
15.407(e)	Peak Output Power	5165 to 5240	Compliant
15.407(f)	Antenna Conducted Spurious Emissions	0.009 to 40000	N/A
15.407(g)	Radiated Spurious Emissions	30 to 40000	Compliant
15.407(h)	Peak Power Spectral Density	5165 to 5240	Compliant
The testing was performed according to the procedures in ANSI C63.10-2013, KDB 789033 and 47 CFR Part 15. Where applicable, KDB 662911 was followed to sum required measurements.			

3.4 Results

In the configuration tested, the EUT complied with the requirements of the specification.

3.5 Test Location

Testing was performed at the Unified Compliance Laboratory 3-meter and 10-meter chambers located at 427 West 12800 South, Draper, UT 84020. Unified Compliance Laboratory is accredited by National Voluntary Laboratory Accreditation Program (NVLAP); NVLAP Code 600241-0. This site has also been registered with Innovations, Science and Economic Development (ISED) department as was accepted under Appendix B, Phase 1 procedures of the APEC Tel MRA for Canadian recognition. ISED No.: 25346. Unified Compliance Laboratory has been assigned Conformity Assessment Number US0223 by ISED and has registered MRA Test Site number US5037.

4 Test Equipment

4.1 Conducted Emissions at Mains Ports

Type of Equipment	Manufacturer	Model Number	Asset Number	Date of Last Calibration	Due Date of Calibration
EMI Receiver	AFJ	FFT3010	UCL-6754	12/8/2021	12/8/2022
LISN	AFJ	LS16C/10	UCL-6749	12/6/2021	12/6/2023
Cat6 ISN	Teseq	ISN T8-Cat6	UCL-2971	1/30/2022	1/30/2023
ISN	Teseq	ISN T800	UCL-2974	6/27/2022	6/27/2023
LISN	Com-Power	LIN-120C	UCL-2612	1/6/2022	1/6/2023
AC Power Source	Laplace Instruments	AC1000A	UCL-2857	N/A	N/A
Test Software	UCL	Revision 1	UCL-3107	N/A	N/A

Table 1: List of equipment used for Conducted Emissions Testing at Mains Port

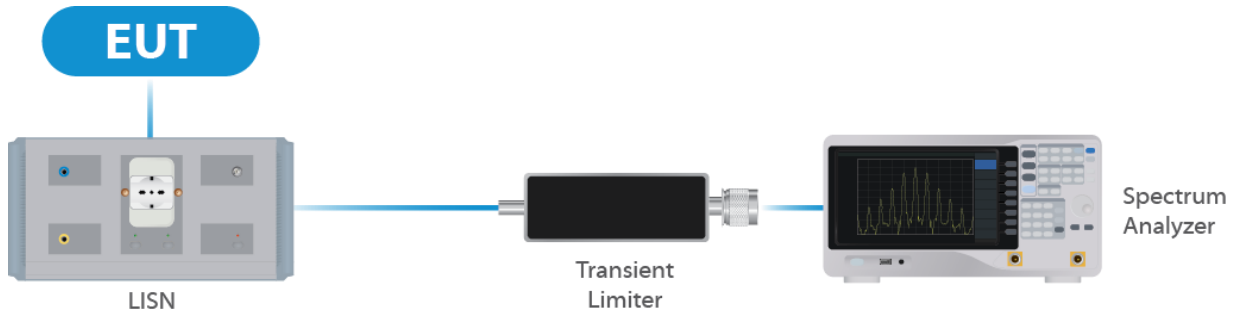


Figure 1: Conducted Emissions Test

4.2 Direct Connect at the Antenna Port Tests

Type of Equipment	Manufacturer	Model Number	Asset Number	Date of Last Calibration	Due Date of Calibration
Spectrum Analyzer	R&S	FSV40	UCL-2861	1/03/2022	1/03/2023
Signal Generator	R&S	SMB100A	UCL-2864	N/A	N/A
Vector Signal Generator	R&S	SMBV100A	UCL-2873	N/A	N/A
Switch Extension	R&S	OSP-B157WX	UCL-2867	1/03/2022	1/03/2023
Switch Extension	R&S	OSP-150W	UCL-2870	1/03/2022	1/03/2023

Table 2: List of equipment used for Direct Connect at the Antenna Port

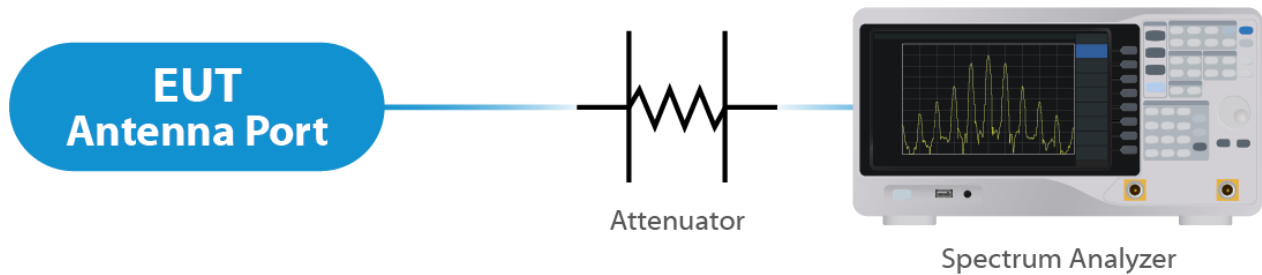


Figure 2: Direct Connect at the Antenna Port Test



Figure 3: Output Power Measurement

4.3 Radiated Emissions

Type of Equipment	Manufacturer	Model Number	Asset Number	Date of Last Calibration	Due Date of Calibration
EMI Receiver	Keysight	N9038A	UCL-2778	1/4/2022	1/4/2023
Pre-Amplifier 9 kHz – 1 GHz	Sonoma Instruments	310N	UCL-2889	10/7/2021	11/7/2022
Broadband Antenna	Scwarzbeck	VULB 9163	UCL-3062	9/13/2022	9/13/2024
Broadband Antenna	Scwarzbeck	VULB 9163	UCL-3071	6/08/2022	6/22/2024
Double Ridge Horn Antenna	Scwarzbeck	BBHA 9120D	UCL-3065	9/22/2022	9/22/2024
Log Periodic	Scwarzbeck	STLP 9129	UCL-3068	11/16/2020	11/16/2022
15 - 40 GHz Horn Antenna	Scwarzbeck	BBHA 9170	UCL-2487	6/09/2022	6/09/2024
1 – 18 GHz Amplifier	Com-Power	PAM 118A	UCL-3833	10/7/2021	11/7/2022
Test Software	UCL	Revision 1	UCL-3108	N/A	N/A

Table 3: List of equipment used for Radiated Emissions

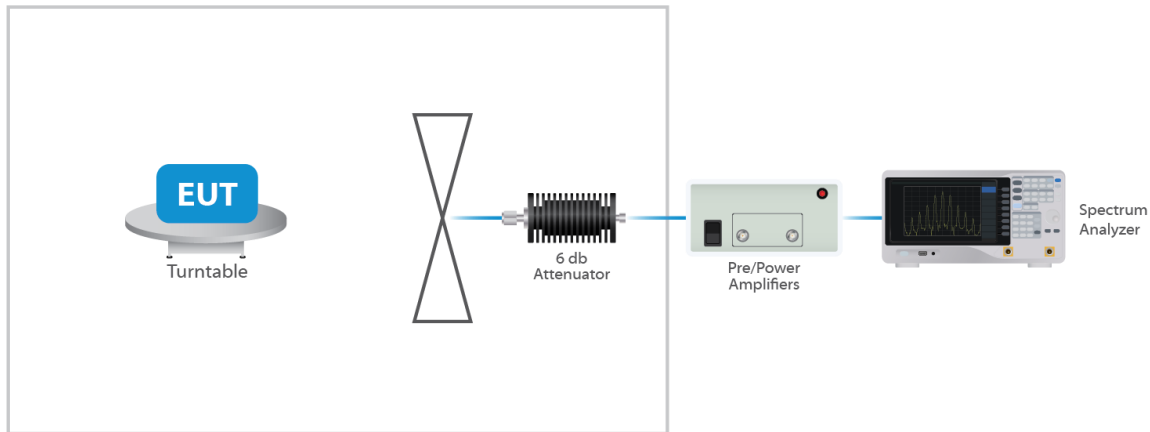


Figure 4: Radiated Emissions Test

4.4 Equipment Calibration

All applicable equipment is calibrated using either an independent calibration laboratory or Unified Compliance Laboratory personnel at intervals defined in ANSI C63.4:2014 following outlined calibration procedures. All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST). Supporting documentation relative to traceability is on file and is available for examination upon request.

4.5 Measurement Uncertainty

Test	Uncertainty (\pm dB)	Confidence (%)
Conducted Emissions	1.44	95
Radiated Emissions (9 kHz to 30 MHz)	2.50	95
Radiated Emissions (30 MHz to 1 GHz)	4.38	95
Radiated Emissions (1 GHz to 18 GHz)	4.37	95
Radiated Emissions (18 GHz to 40 GHz)	3.93	95
Direct Connect Tests	K Factor	Value
Emissions Bandwidth	2	2.0%
Output Power	2	1.0 dB
Peak Power Spectral Density	2	1.3 dB
Band Edge	2	0.8 dB
Transmitter Spurious Emissions	2	1.8 dB

5 Test Results

5.1 §15.203 Antenna Requirements

The EUT uses a single integral antenna structure. The maximum gain of the antenna per chain is 13.5 dBi. This is an 802.11 device and utilizes MIMO modes as described in KDB 662911 D01. The antenna is not user replaceable and is cross polarized therefore KDB 662911 D01 Multiple Transmitter Output v02r01 section F) paragraph 2) c) (i) is considered.

CFR 47 Part 15.407 limits shall account for beamforming techniques; therefore, for RF Power and PSD measurements Directional Gain shall be 13.5 per the following:

The device is considered “Correlated” with a single antenna therefore equation (i) of KDB 662911 D01 Multiple Transmitter Output v02r01 section F) paragraph 2), or $\text{Directional Gain} = G_{ant} + 10 \text{Log}(N_{ant})$

$G_{ant} = 13.5$ (Max gain form Antenna Dataset)

$N_{ant} = 1$ (Single Antenna)

$$13.5 + 10 \text{Log}(1) = 13.5$$

Results

The EUT complied with the specification

5.2 §15.403(i) 26 dB and 99% Emissions Bandwidth

All chains were measured under the guidance of KDB 789033 Section II.C. and KDB 66291 D01. Please see associated annex for details on instrument settings.

Tested at CFR 47 Part 15.407 test Limit (30dBm)

Modulation	Nominal BW (MHz)	Frequency (MHz)	99% Bandwidth (MHz)	Emissions 26 dB Bandwidth (MHz)
HE	20	5165	19.1	21.8
HE	20	5200	19.2	21.6
HE	20	5240	19.2	21.8
HE	40	5175	37.8	39.9
HE	40	5200	37.8	39.8
HE	40	5230	37.8	39.9
HE	80	5195	77.5	81.5
HE	80	5200	77.5	82.0
HE	80	5210	77.5	81.5

Result

All chains were tested and the highest bandwidth per chain is reported above.

The 26 dB bandwidths are reported for information purposes. Please see Annex for all bandwidth measurements.

5.3 §15.407(a)(2) Maximum Average Output Power

All chains were measured and summed under the guidance of KDB 789033 Section II. E.2. and KDB 66291 D01. Please see associated annex for details on instrument settings.

The maximum average RF conducted output power measured for this device was 16.17 dBm or 41.4 mW. The limit is 30 dBm, or 1 Watt when using an antenna with 6 dBi or less gain. If transmitting antennas that have a 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. The antenna has a gain of 13.5 dBi therefore the conducted output is 178mW or 22.5dBm.

The maximum average RF conducted output power was additionally calculated for the radiation pattern between 30° and 90° based on the highest conducted output power. The calculated value shall be below 125 mW (21 dBm) per KDB 789033 Do2 Section H at an elevation angle higher than 30°.

Modulation	Frequency (MHz)	Data Rate	TP Setting	Conducted Output Power	Max Ant. Gain 30-90° (dBm)	Max EIRP. 30-90° (dBm)	Limit. 30-90° (dBm)	Ant Ptrn Delta (dB)
HE	5165	MCS0	24	12.37	4.8	17.17	21.0	-3.83
HE	5200	MCS0	31	16.03	4.8	20.83	21.0	-0.17
HE	5240	MCS0	30	15.63	4.8	20.43	21.0	-0.57
HE	5175	MCS0	31	16.13	4.8	20.93	21.0	-0.07
HE	5200	MCS0	31	16.04	4.8	20.84	21.0	-0.16
HE	5230	MCS0	31	16.17	4.8	20.97	21.0	-0.03
HE	5195	MCS0	31	16.1	4.8	20.9	21.0	-0.1
HE	5200	MCS0	31	16.03	4.8	20.83	21.0	-0.17
HE	5210	MCS0	31	16.04	4.8	20.84	21.0	-0.16

Result

In the configuration tested, the maximum summed average RF output power was less than 125W or 21dBm; therefore, the EUT complied with the requirements of the specification (see spectrum analyzer plots in attached Annex).

5.4 §15.407(b) Spurious Emissions

5.4.1 Conducted Spurious Emissions

The frequency range from the lowest frequency generated or used in the device to the tenth harmonic of the highest fundamental frequency was investigated to measure any antenna-conducted emissions. The graphs show the measurement data from spurious emissions noted across the frequency range when transmitting at the lowest frequency, middle frequency and upper frequency. Shown below are plots with the EUT turned to the upper and lower channels with the antenna gain of 18.2 dBi accounted for. These demonstrate compliance with the provisions of this section at the band edges.

The emissions must be remain below -27 dBm EIRP.

Result

Conducted spurious emissions were below -27 dBm; therefore, the EUT complies with the specification.

5.4.2 Radiated Spurious Emissions in the Restricted Bands of § 15.205

The EUT uses various power settings based on the channel in use. In order to reduce test time, the radiated spurious emissions at the lowest, middle, and highest channel were measured at the maximum power of TP39, as this setting was found to be worst case for spurious emissions. Power was subsequently reduced during in-band and band edge testing. The band edge at the restricted band ending at 5150 MHz was measured using radiated measurement. All emissions modes were tested, and the worst-case measurement are shown below. For frequencies above 1 GHz, a measurement of 3 meters was used. For frequencies below 1 GHz, a measurement distance of 10 meters was used.

Correction Factor = Antenna Factor + Cable Loss - Pre-Amplifier Gain, and is added to the Receiver reading.

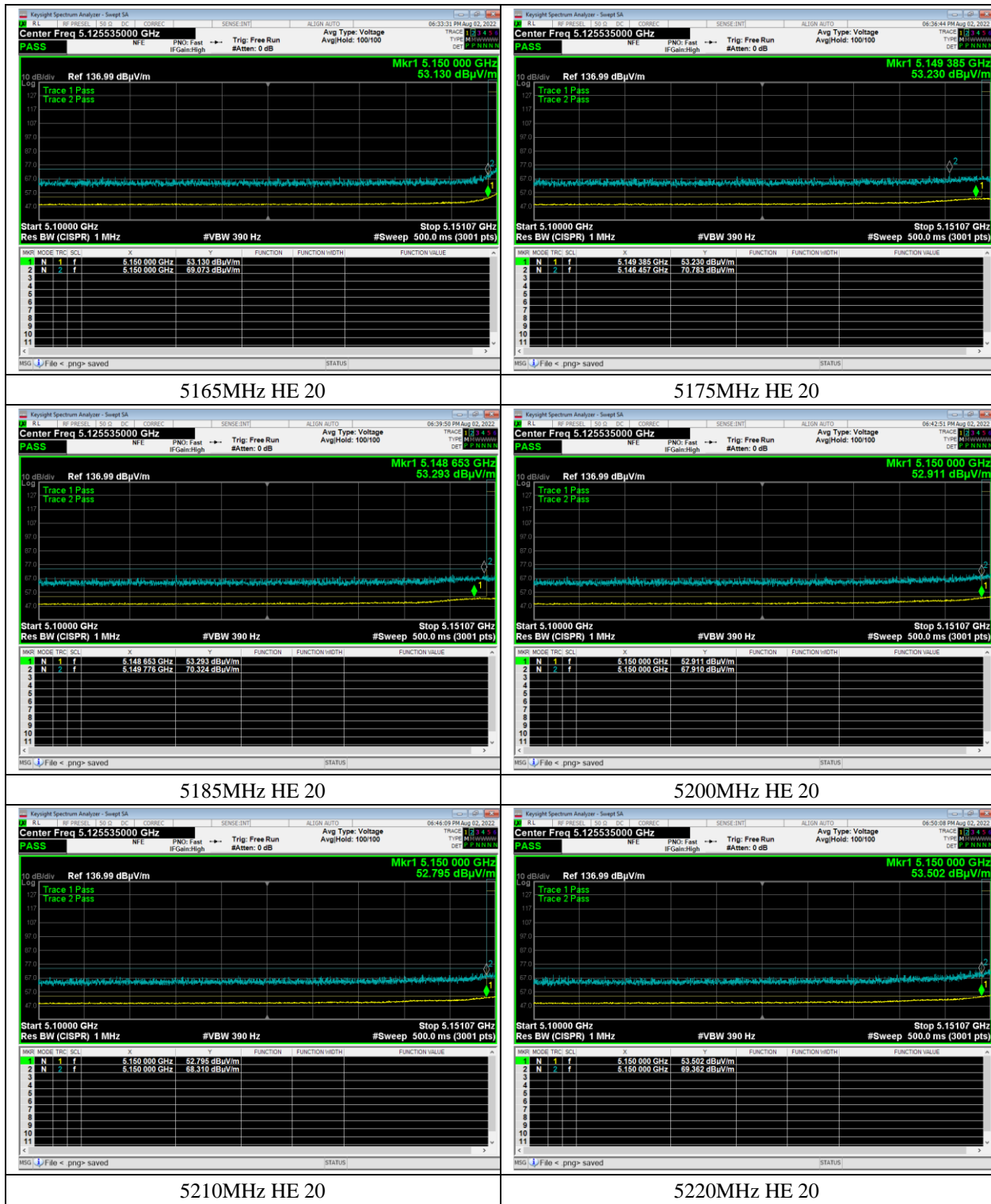
Radiated Spurious Emissions

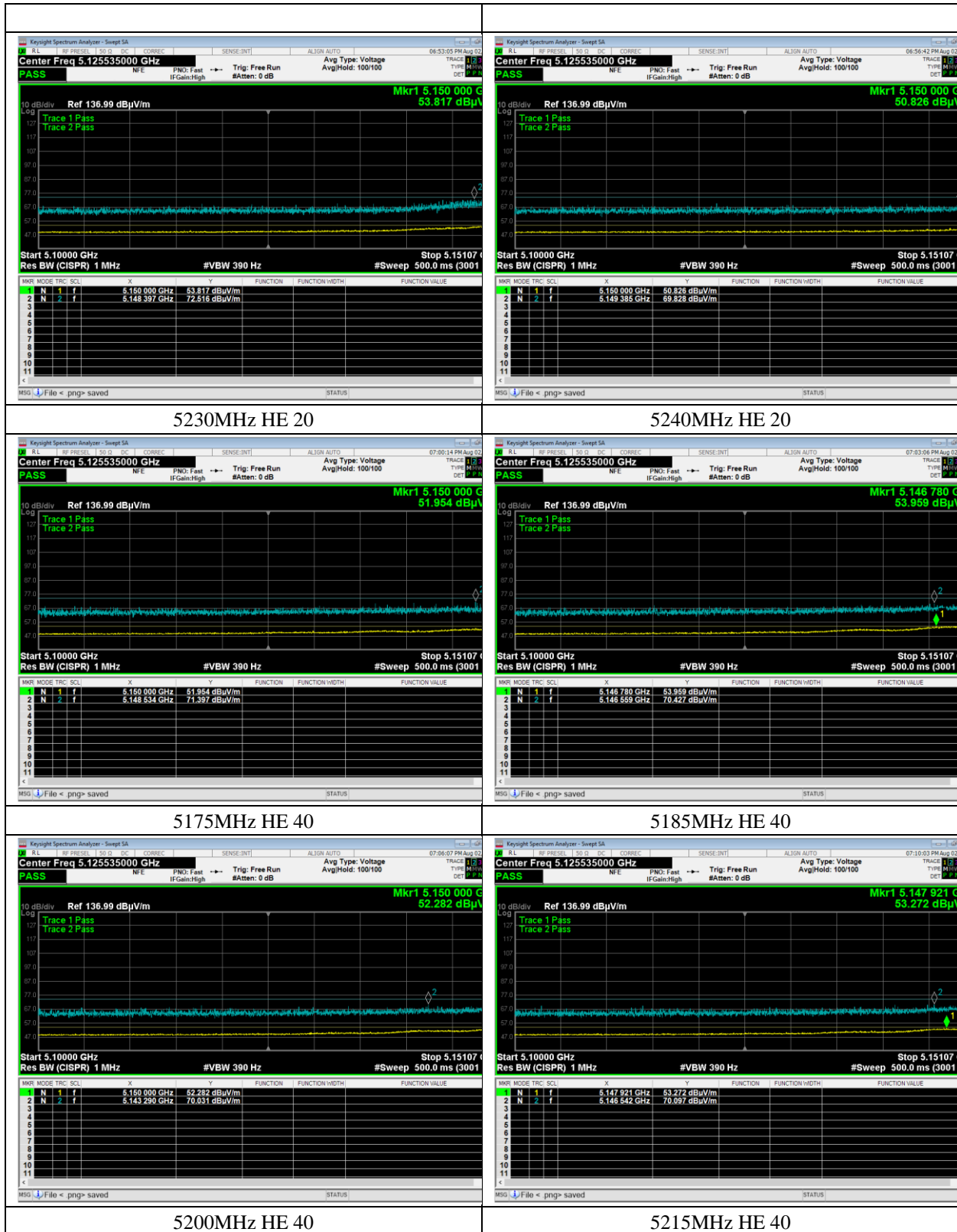
Result

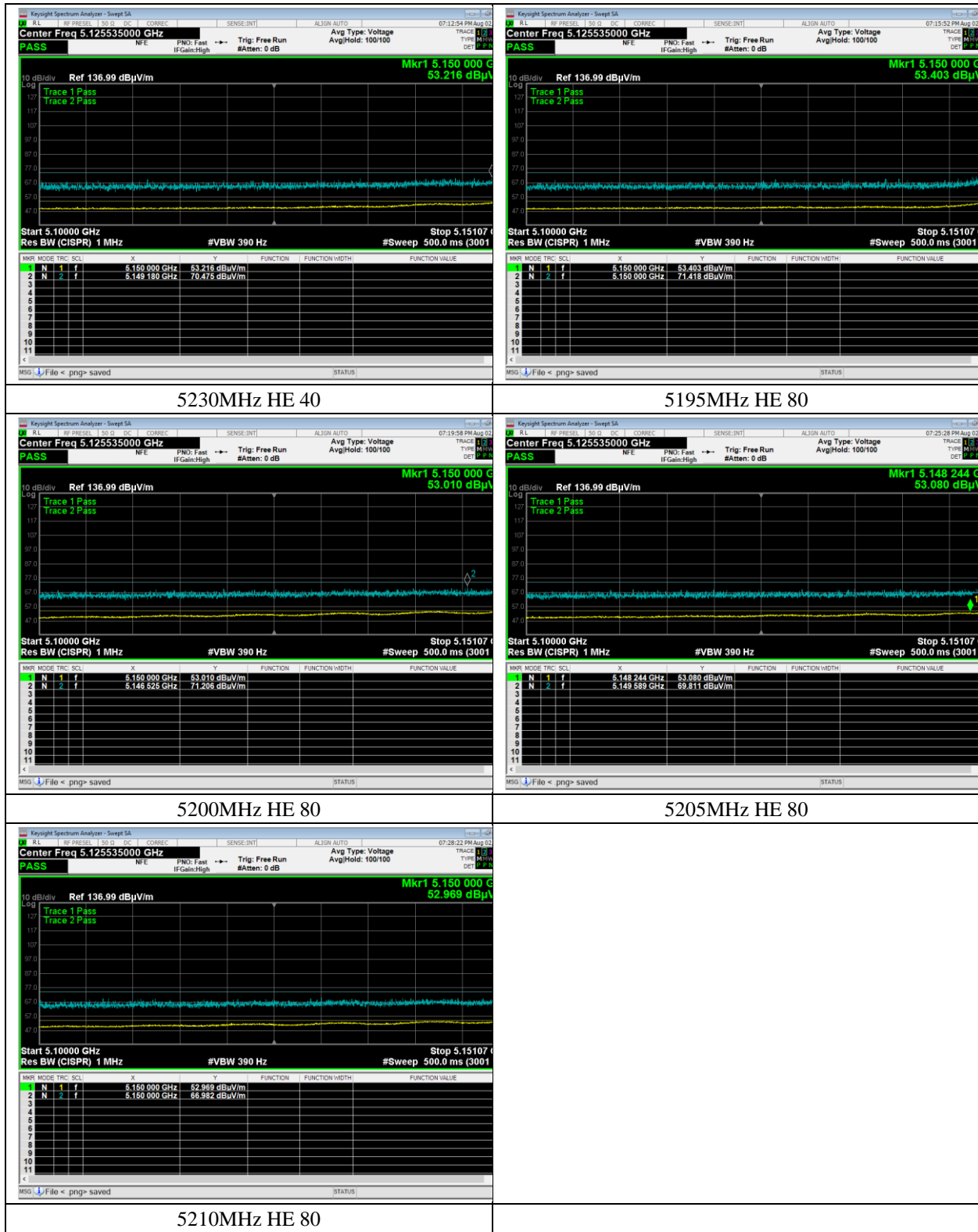
All emissions in the restricted bands of § 15.205 met the limits specified in § 15.209; therefore, the EUT complies with the specification. All emissions me the limits specified in § 15.407(b). Representative band edge plots are included in this report. Tested was applied at CFR 47 Part 15.407 limits, which are considered worst case.

Frequency	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Meas. Time (s)	RBW (Hz)	Detector	Correction (dB)
4.8474 GHz	48.604	74	-25.396	215	1.5	Vertical	5	1000000	PK	-10.687
10.488 GHz	48.328	74	-25.672	184	1.643	Vertical	5	1000000	PK	1.497
15.723 GHz	50.452	74	-23.548	141	3.798	Horizontal	5	1000000	PK	5.083
4.8474 GHz	34.948	54	-19.052	215	1.5	Vertical	5	1000000	AVE	-10.687
10.488 GHz	34.578	54	-19.422	184	1.643	Vertical	5	1000000	AVE	1.497
10.491 GHz	48.013	74	-25.987	202	2.142	Horizontal	5	1000000	PK	1.607
15.162 GHz	51.961	74	-22.039	60	4	Horizontal	5	1000000	PK	7.289
15.723 GHz	36.733	54	-17.267	141	3.798	Horizontal	5	1000000	AVE	5.083
10.491 GHz	34.162	54	-19.838	202	2.142	Horizontal	5	1000000	AVE	1.607
15.162 GHz	38.78	54	-15.22	60	4	Horizontal	5	1000000	AVE	7.289
4.7825 GHz	52.482	74	-21.518	210	1.5	Vertical	5	1000000	PK	-10.334
10.322 GHz	47.155	74	-26.845	31	3.802	Vertical	5	1000000	PK	1.418
15.493 GHz	49.976	74	-24.024	97	3.307	Vertical	5	1000000	PK	5.597
4.7825 GHz	38.661	54	-15.339	210	1.5	Vertical	5	1000000	AVE	-10.334
10.322 GHz	33.974	54	-20.026	31	3.802	Vertical	5	1000000	AVE	1.418
15.493 GHz	36.889	54	-17.111	97	3.307	Vertical	5	1000000	AVE	5.597
15.727 GHz	49.138	74	-24.862	224	4	Vertical	5	1000000	PK	5.084
15.727 GHz	35.961	54	-18.039	224	4	Vertical	5	1000000	AVE	5.084
4.8082 GHz	50.75	74	-23.25	218	1.5	Vertical	5	1000000	PK	-10.307
10.405 GHz	53.247	74	-20.753	199	1.643	Vertical	5	1000000	PK	2.095
15.589 GHz	48.693	74	-25.307	171	1.638	Vertical	5	1000000	PK	4.875
4.8082 GHz	36.781	54	-17.219	218	1.5	Vertical	5	1000000	AVE	-10.307
10.405 GHz	38.355	54	-15.645	199	1.643	Vertical	5	1000000	AVE	2.095
15.589 GHz	35.728	54	-18.272	171	1.638	Vertical	5	1000000	AVE	4.875
4.8115 GHz	47.092	74	-26.908	171	1.5	Horizontal	5	1000000	PK	-10.356
10.406 GHz	48.099	74	-25.901	204	4	Horizontal	5	1000000	PK	2.101
15.602 GHz	48.822	74	-25.178	294	3.311	Horizontal	5	1000000	PK	5.111
4.8115 GHz	33.49	54	-20.51	171	1.5	Horizontal	5	1000000	AVE	-10.356
10.406 GHz	33.816	54	-20.184	204	4	Horizontal	5	1000000	AVE	2.101
15.602 GHz	35.989	54	-18.011	294	3.311	Horizontal	5	1000000	AVE	5.111
29.171 GHz	48.21	74	-25.79	327	1.500	Vertical	5	1000000	PK	-3.82
24.169 GHz	49.484	74	-24.516	117	1.500	Vertical	5	1000000	PK	-5.044
24.169 GHz	32.767	54	-21.233	117	1.500	Vertical	5	1000000	AVE	-5.044
28.967 GHz	47.968	74	-26.032	97	1.500	Horizontal	5	1000000	PK	-4.041
28.967 GHz	34.34	54	-19.66	97	1.500	Horizontal	5	1000000	AVE	-4.041
24.169 GHz	46.958	74	-27.042	66	1.500	Vertical	5	1000000	PK	-5.044
26.217 GHz	49.092	74	-24.908	325	1.500	Vertical	5	1000000	PK	-5.348
29.171 GHz	48.21	74	-25.79	327	1.500	Vertical	5	1000000	PK	-3.82
24.169 GHz	32.634	54	-21.366	66	1.500	Vertical	5	1000000	AVE	-5.044
26.217 GHz	33.985	54	-20.015	325	1.500	Vertical	5	1000000	AVE	-5.348
29.171 GHz	33.788	54	-20.212	327	1.500	Vertical	5	1000000	AVE	-3.82

5.4.3 Band Edge Results







5.5 §15.407(a) Maximum Power Spectral Density

All chains were measured and summed under the guidance of KDB 789033 Section II. F. and KDB 66291 D01. Please see associated annex for details on instrument settings.

The maximum average power spectral density conducted from the intentional radiator of the antenna shall not be greater than 17 dBm in any 1 MHz band during any time interval of continuous transmission. If transmitting antennas that have a 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. The antenna has a gain of 13.5 dBi therefore the power spectral density has a limit of 9.5dBm.

Results of this testing are summarized.

Tested at CFR 47 Part 15.407 test Limit (30dBm)

Modulation (BW)	Frequency (MHz)	Data Rate	TP Setting	Measured PSD
HE	5165	MCS0	24	-2.94
HE	5200	MCS0	31	0.73
HE	5240	MCS0	30	0.24
HE	5175	MCS0	31	-2.02
HE	5200	MCS0	31	-2.20
HE	5230	MCS0	31	-2.16
HE	5195	MCS0	31	-5.13
HE	5200	MCS0	31	-5.26
HE	5210	MCS0	31	-5.27

Result

The maximum summed average power spectral density was less than the limit of 9.5dBm; therefore, the EUT complies with the specification.

Test Results

FCC 15.407 2018

DUT Information

Frequencies

5155 MHz (5155 MHz)	5160 MHz (5160 MHz)	5165 MHz (5165 MHz)
5170 MHz (5170 MHz)	5175 MHz (5175 MHz)	5180 MHz (5180 MHz)
5185 MHz (5185 MHz)	5190 MHz (5190 MHz)	5195 MHz (5195 MHz)
5200 MHz (5200 MHz)	5205 MHz (5205 MHz)	5210 MHz (5210 MHz)
5215 MHz (5215 MHz)	5220 MHz (5220 MHz)	5225 MHz (5225 MHz)
5230 MHz (5230 MHz)	5235 MHz (5235 MHz)	5240 MHz (5240 MHz)
5245 MHz (5245 MHz)	5250 MHz (5250 MHz)	5255 MHz (5255 MHz)
5260 MHz (5260 MHz)	5265 MHz (5265 MHz)	5270 MHz (5270 MHz)
5275 MHz (5275 MHz)	5280 MHz (5280 MHz)	5285 MHz (5285 MHz)
5290 MHz (5290 MHz)	5295 MHz (5295 MHz)	5300 MHz (5300 MHz)
5305 MHz (5305 MHz)	5310 MHz (5310 MHz)	5315 MHz (5315 MHz)
5320 MHz (5320 MHz)	5325 MHz (5325 MHz)	5330 MHz (5330 MHz)
5335 MHz (5335 MHz)	5340 MHz (5340 MHz)	5345 MHz (5345 MHz)
5350 MHz (5350 MHz)	5470 MHz (5470 MHz)	5475 MHz (5475 MHz)
5480 MHz (5480 MHz)	5485 MHz (5485 MHz)	5490 MHz (5490 MHz)
5495 MHz (5495 MHz)	5500 MHz (5500 MHz)	5505 MHz (5505 MHz)
5510 MHz (5510 MHz)	5515 MHz (5515 MHz)	5520 MHz (5520 MHz)
5525 MHz (5525 MHz)	5530 MHz (5530 MHz)	5535 MHz (5535 MHz)
5540 MHz (5540 MHz)	5545 MHz (5545 MHz)	5550 MHz (5550 MHz)
5555 MHz (5555 MHz)	5560 MHz (5560 MHz)	5565 MHz (5565 MHz)
5570 MHz (5570 MHz)	5575 MHz (5575 MHz)	5580 MHz (5580 MHz)
5585 MHz (5585 MHz)	5590 MHz (5590 MHz)	5595 MHz (5595 MHz)
5600 MHz (5600 MHz)	5605 MHz (5605 MHz)	5610 MHz (5610 MHz)
5615 MHz (5615 MHz)	5620 MHz (5620 MHz)	5625 MHz (5625 MHz)
5630 MHz (5630 MHz)	5635 MHz (5635 MHz)	5640 MHz (5640 MHz)
5645 MHz (5645 MHz)	5650 MHz (5650 MHz)	5655 MHz (5655 MHz)
5660 MHz (5660 MHz)	5665 MHz (5665 MHz)	5670 MHz (5670 MHz)
5675 MHz (5675 MHz)	5680 MHz (5680 MHz)	5685 MHz (5685 MHz)
5690 MHz (5690 MHz)	5695 MHz (5695 MHz)	5700 MHz (5700 MHz)
5705 MHz (5705 MHz)	5710 MHz (5710 MHz)	5715 MHz (5715 MHz)
5720 MHz (5720 MHz)	5725 MHz (5725 MHz)	5730 MHz (5730 MHz)
5735 MHz (5735 MHz)	5740 MHz (5740 MHz)	5745 MHz (5745 MHz)
5750 MHz (5750 MHz)	5755 MHz (5755 MHz)	5760 MHz (5760 MHz)
5765 MHz (5765 MHz)	5770 MHz (5770 MHz)	5775 MHz (5775 MHz)
5780 MHz (5780 MHz)	5785 MHz (5785 MHz)	5790 MHz (5790 MHz)
5795 MHz (5795 MHz)	5800 MHz (5800 MHz)	5805 MHz (5805 MHz)
5810 MHz (5810 MHz)	5815 MHz (5815 MHz)	5820 MHz (5820 MHz)
5825 MHz (5825 MHz)	5830 MHz (5830 MHz)	5835 MHz (5835 MHz)
5840 MHz (5840 MHz)	5845 MHz (5845 MHz)	5850 MHz (5850 MHz)

Bandwidths

10 MHz (10 MHz)	20 MHz (20 MHz)	30 MHz (30 MHz)
40 MHz (40 MHz)	80 MHz (80 MHz)	50 MHz (50 MHz)
60 MHz (60 MHz)	160 MHz (160 MHz)	

Power

24.000 dBm (24 dBm)

Beamforming Gain

 Powerstep name (value)
 24.000 dBm (24 dBm)

 Beamforming gain table names

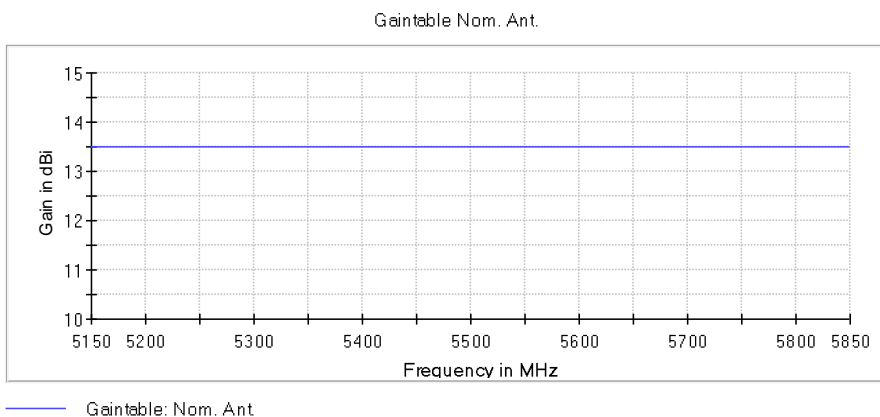
Gain Tables

 Powerstep name (value)
 24.000 dBm (24 dBm)

 Gain table names
 Port 1: Nom. Ant.; Port 2: Nom. Ant.;

DUT Settings

 No. of transmission chains
 DFS capability
 DFS Mode
 Equipment Type
 TPC

 2
 Yes
 Client with radar detection
 Outdoor AP
 No


Hardware Setup: WMS Measurements\TS8997 Hardware Setup

Spectrum Analyzer:	SA FSV 40 (SA FSV 40) @ VISA (ADR TCPIP::192.168.48.100::inst0::instr), SN 1321.3008K40/101752, FW 3.70
Vector Generator:	VG SMW200A (VG SMW200A) @ VISA (ADR TCPIP0::A-N5182B-301471::inst0::INSTR), SN 101752, FW 3.70
Generator:	SMB100A (SMB100A) @ VISA (ADR TCPIP::192.168.48.110::inst0::INSTR), SN 180599, FW 3.20.390.24 / Drv:Rev 2.21.0, 07/2016, CVI 2015
OSP:	OSP-B157W8PLUS (OSP-B157W8PLUS) @ VISA (ADR TCPIP::192.168.48.157::inst0::instr), SN 1527.1144.06 / 100955, FW 2.00.1.0

Summary

Test	Frequency (MHz)	Nominal Power (dBm)	Nominal Bandwidth (MHz)	Result
Emission Bandwidth 26 dB	5165.000	24.0	20.000000	PASS
RF output power	5165.000	24.0	20.000000	PASS
Power Spectral Density	5165.000	24.0	20.000000	PASS
Occupied Channel Bandwidth 99%	5165.000	24.0	20.000000	PASS
Emission Bandwidth 26 dB	5200.000	24.0	20.000000	PASS
Occupied Channel Bandwidth 99%	5200.000	24.0	20.000000	PASS
Emission Bandwidth 26 dB	5240.000	24.0	20.000000	PASS
Occupied Channel Bandwidth 99%	5240.000	24.0	20.000000	PASS
Emission Bandwidth 26 dB	5175.000	24.0	40.000000	PASS
Occupied Channel Bandwidth 99%	5175.000	24.0	40.000000	PASS
Emission Bandwidth 26 dB	5200.000	24.0	40.000000	PASS
Occupied Channel Bandwidth 99%	5200.000	24.0	40.000000	PASS
Emission Bandwidth 26 dB	5230.000	24.0	40.000000	PASS
Occupied Channel Bandwidth 99%	5230.000	24.0	40.000000	PASS
Emission Bandwidth 26 dB	5195.000	24.0	80.000000	PASS
Occupied Channel Bandwidth 99%	5195.000	24.0	80.000000	PASS
Emission Bandwidth 26 dB	5200.000	24.0	80.000000	PASS
Occupied Channel Bandwidth 99%	5200.000	24.0	80.000000	PASS
Emission Bandwidth 26 dB	5210.000	24.0	80.000000	PASS
Occupied Channel Bandwidth 99%	5210.000	24.0	80.000000	PASS

Emission Bandwidth 26 dB (5165 MHz; 24.000 dBm; 20 MHz)

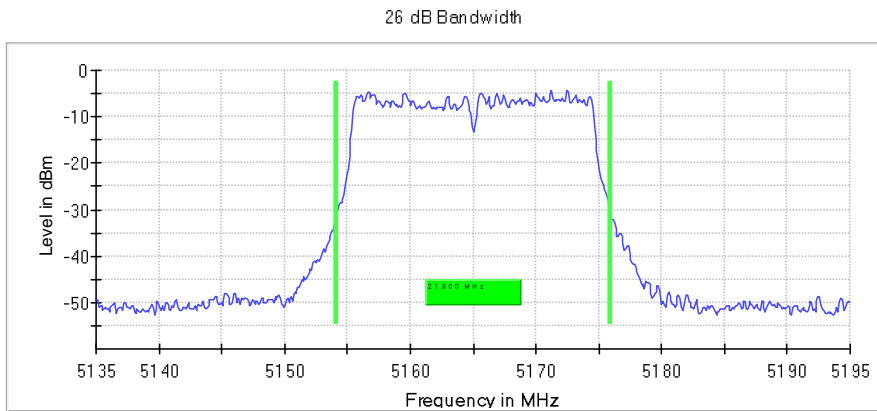
Customized settings.

26 dB Bandwidth

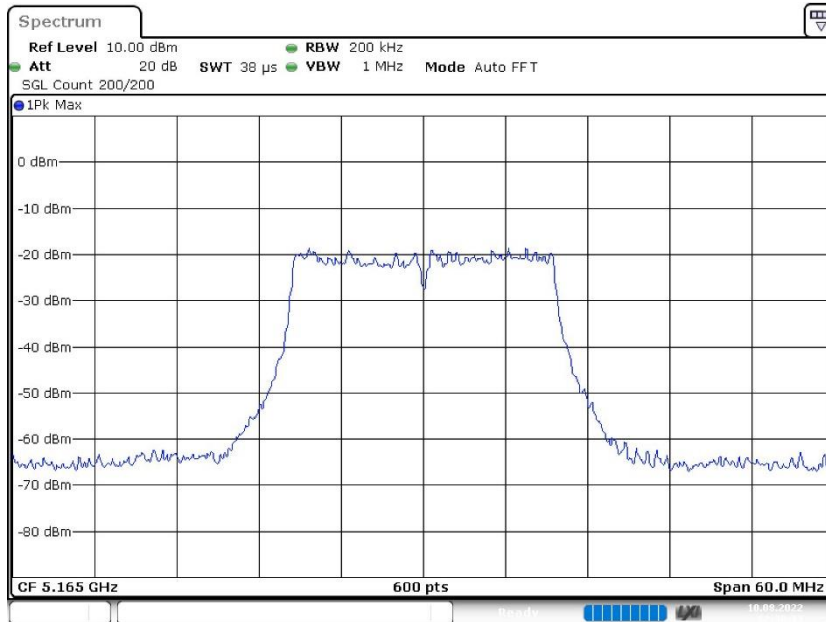
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
5165.000000	21.800000	---	---	5154.150000	5175.950000

(continuation of the "26 dB Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Max Level (dBm)	Result
5165.000000	-4.4	PASS



Bandwidth



Date: 10.AUG.2022 22:30:33

Measurement

Setting	Instrument Value	Target Value
Start Frequency	5.13500 GHz	5.13500 GHz
Stop Frequency	5.19500 GHz	5.19500 GHz
Span	60.000 MHz	60.000 MHz
RBW	200.000 kHz	~ 200.000 kHz
VBW	1.000 MHz	>= 600.000 kHz
SweepPoints	600	~ 600
SweepTime	37.969 μ s	AUTO
Reference Level	10.000 dBm	AUTO
Attenuation	20.000 dB	20.000 dB
Detector	MaxPeak	MaxPeak
SweepCount	200	200
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamp	off	off

RF output power (5165 MHz; 24.000 dBm; 20 MHz)

Customized settings.

Result

DUT Frequency (MHz)	Gated RMS (dBm)	Limit Max (dBm)	Gated EIRP (dBm)	DutyCycle (%)	Result
5165.000000	12.4	30.0	12.4	85.928	PASS

OSP PowerMeter settings

Setting	Instrument Value	Target Value
Measurement Time	1.000 s	1.000 s
Points	1000000	1000000
Time resolution	1.000 μ s	1.000 μ s

Power Spectral Density (5165 MHz; 24.000 dBm; 20 MHz)

Customized settings.

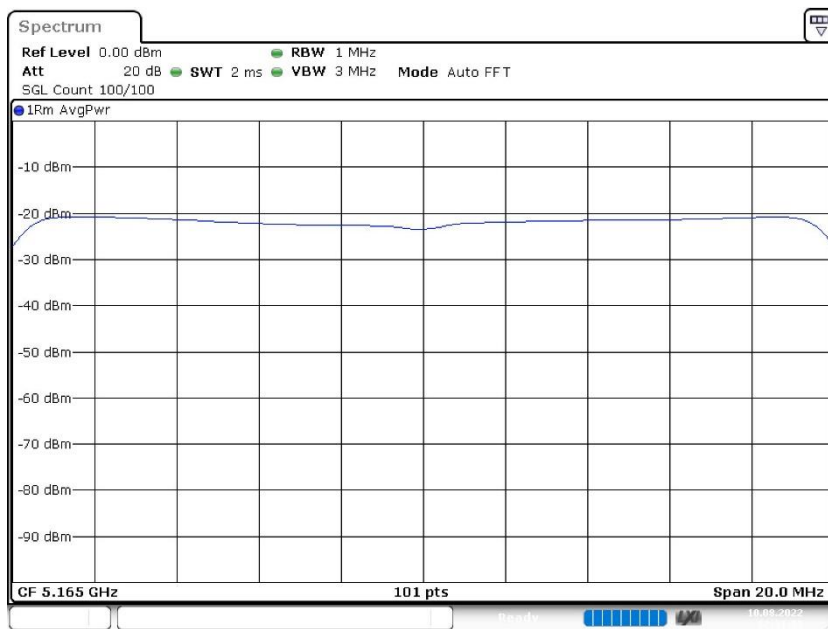
Result

DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
5165.000000	5173.514851	-2.940	17.0	PASS

Ports

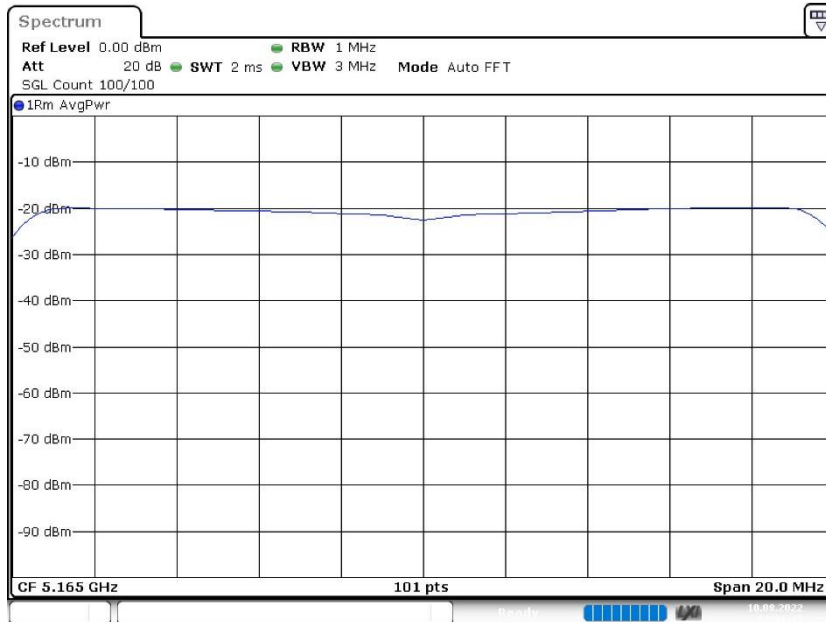
Port	State
1	used
2	used

PSD Connector 1



Date: 10.AUG.2022 22:31:10

PSD Connector 2



Date: 10.AUG.2022 22:31:16

Measurement

Setting	Instrument Value	Target Value
Start Frequency	5.15500 GHz	5.15500 GHz
Stop Frequency	5.17500 GHz	5.17500 GHz
Span	20.000 MHz	20.000 MHz
RBW	1.000 MHz	<= 1.000 MHz
VBW	3.000 MHz	>= 3.000 MHz
SweepPoints	101	~ 40
Sweeptime	2.020 ms	2.020 ms
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	RMS	RMS
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Average Power	Average Power
SweepType	FFT	AUTO
Preamp	off	off

Occupied Channel Bandwidth 99% (5165 MHz; 24.000 dBm; 20 MHz)

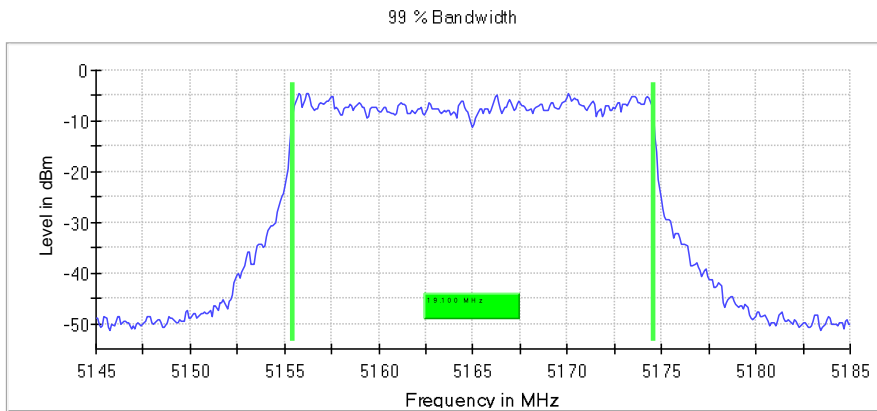
Customized settings.

99 % Bandwidth

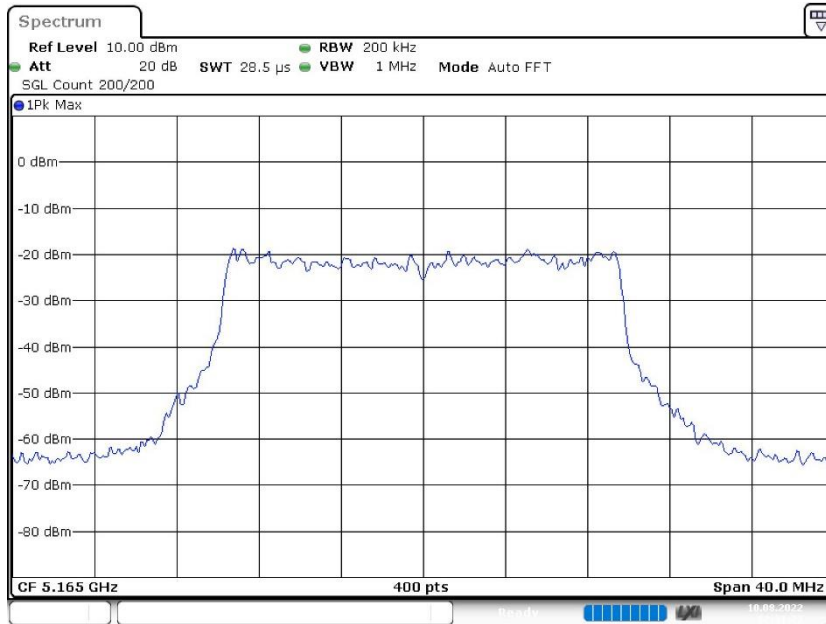
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
5165.000000	19.100000	---	---	5155.450000	5174.550000

(continuation of the "99 % Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Result
5165.000000	PASS



Bandwidth



Date: 10.AUG.2022 22:31:22

Measurement

Setting	Instrument Value	Target Value
Start Frequency	5.14500 GHz	5.14500 GHz
Stop Frequency	5.18500 GHz	5.18500 GHz
Span	40.000 MHz	40.000 MHz
RBW	200.000 kHz	\geq 200.000 kHz
VBW	1.000 MHz	\geq 600.000 kHz
SweepPoints	400	~ 400
SweepTime	28.477 μ s	AUTO
Reference Level	10.000 dBm	AUTO
Attenuation	20.000 dB	20.000 dB
Detector	MaxPeak	MaxPeak
SweepCount	200	200
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamp	off	off

Emission Bandwidth 26 dB (5200 MHz; 24.000 dBm; 20 MHz)

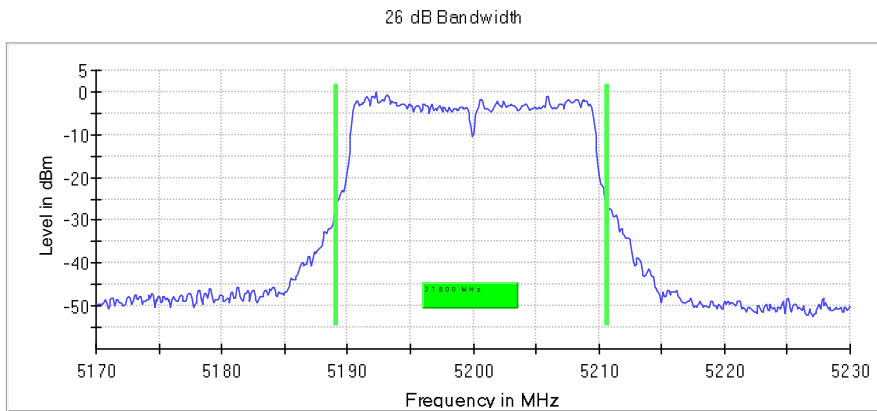
Customized settings.

26 dB Bandwidth

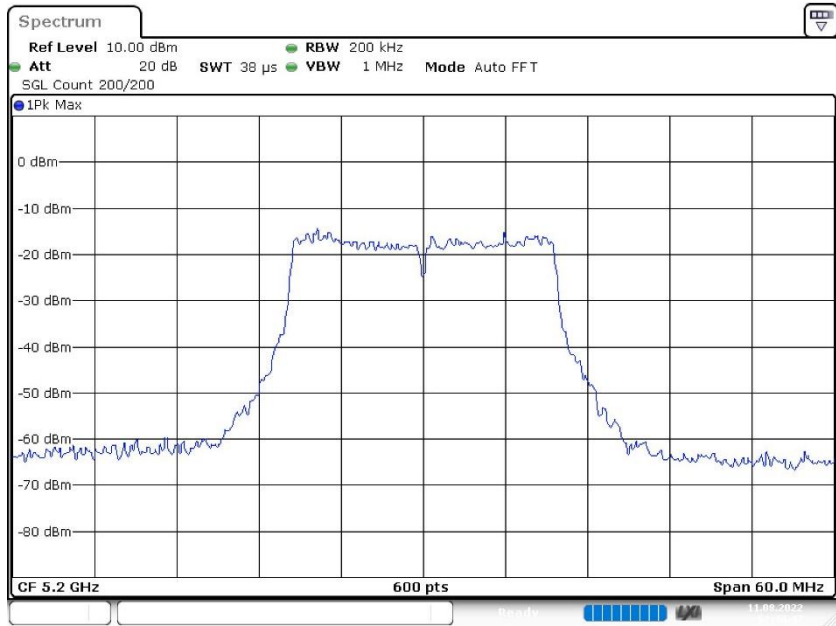
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
5200.000000	21.600000	---	---	5189.050000	5210.650000

(continuation of the "26 dB Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Max Level (dBm)	Result
5200.000000	-0.2	PASS



Bandwidth



Date: 11.AUG.2022 02:44:47

Occupied Channel Bandwidth 99% (5200 MHz; 24.000 dBm; 20 MHz)

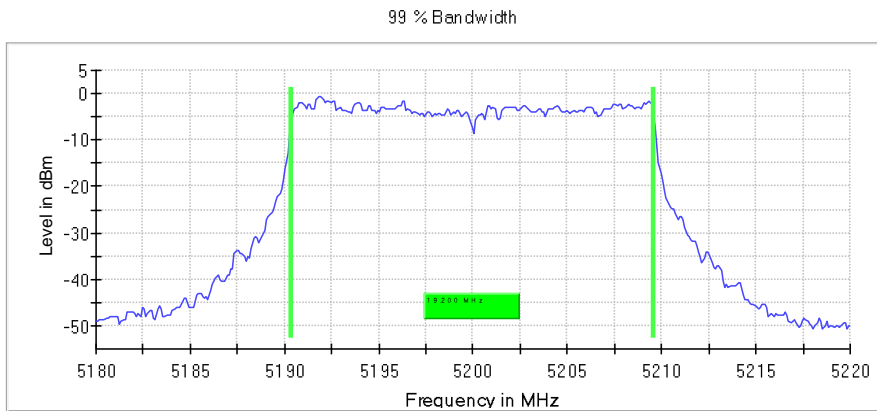
Customized settings.

99 % Bandwidth

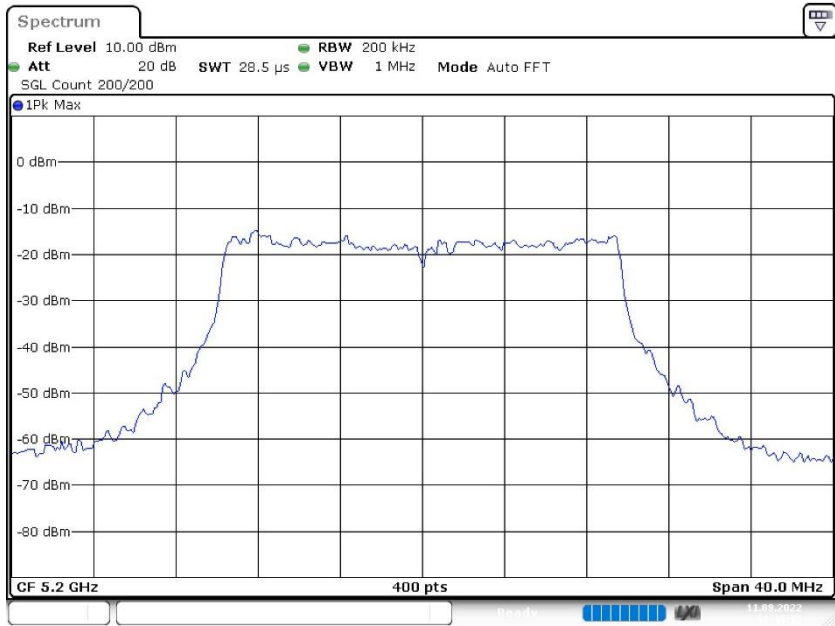
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
5200.000000	19.200000	---	---	5190.350000	5209.550000

(continuation of the "99 % Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Result
5200.000000	PASS



Bandwidth



Date: 11.AUG.2022 02:45:35

Emission Bandwidth 26 dB (5240 MHz; 24.000 dBm; 20 MHz)

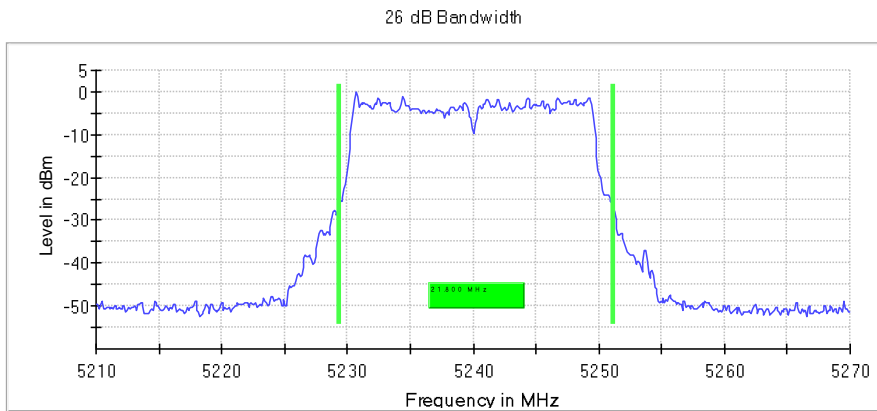
Customized settings.

26 dB Bandwidth

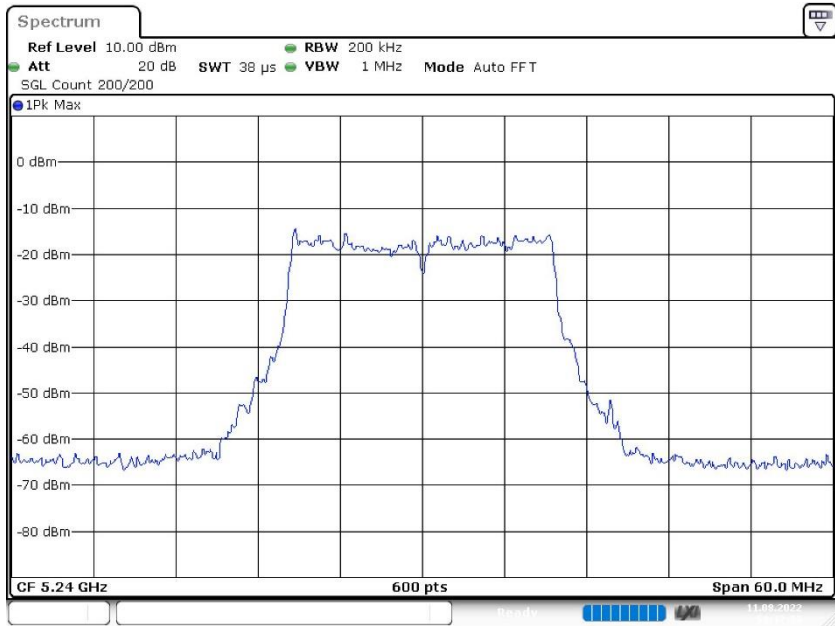
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
5240.000000	21.800000	---	---	5229.350000	5251.150000

(continuation of the "26 dB Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Max Level (dBm)	Result
5240.000000	-0.1	PASS



Bandwidth



Date: 11.AUG.2022 03:12:38

Occupied Channel Bandwidth 99% (5240 MHz; 24.000 dBm; 20 MHz)

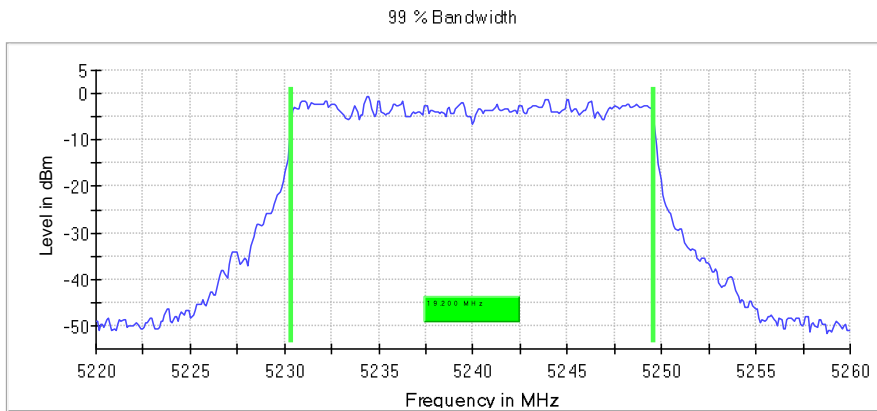
Customized settings.

99 % Bandwidth

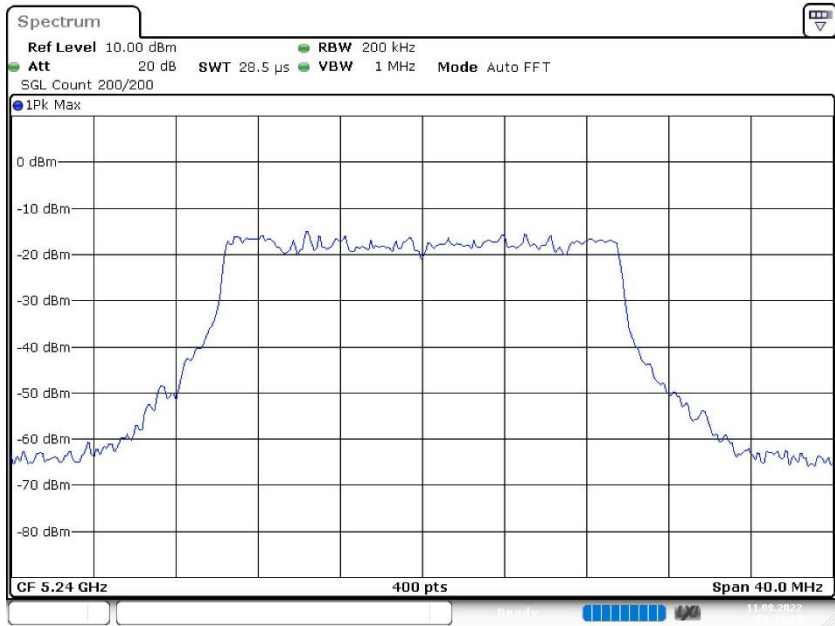
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
5240.000000	19.200000	---	---	5230.350000	5249.550000

(continuation of the "99 % Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Result
5240.000000	PASS



Bandwidth



Date: 11.AUG.2022 03:13:26

Emission Bandwidth 26 dB (5175 MHz; 24.000 dBm; 40 MHz)

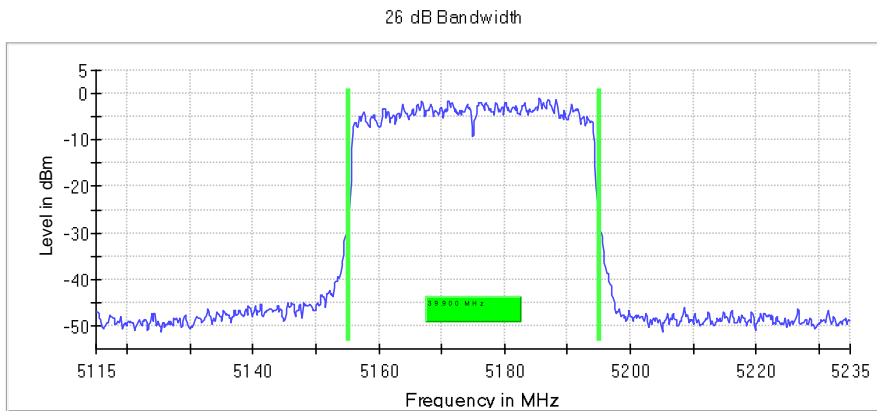
Customized settings.

26 dB Bandwidth

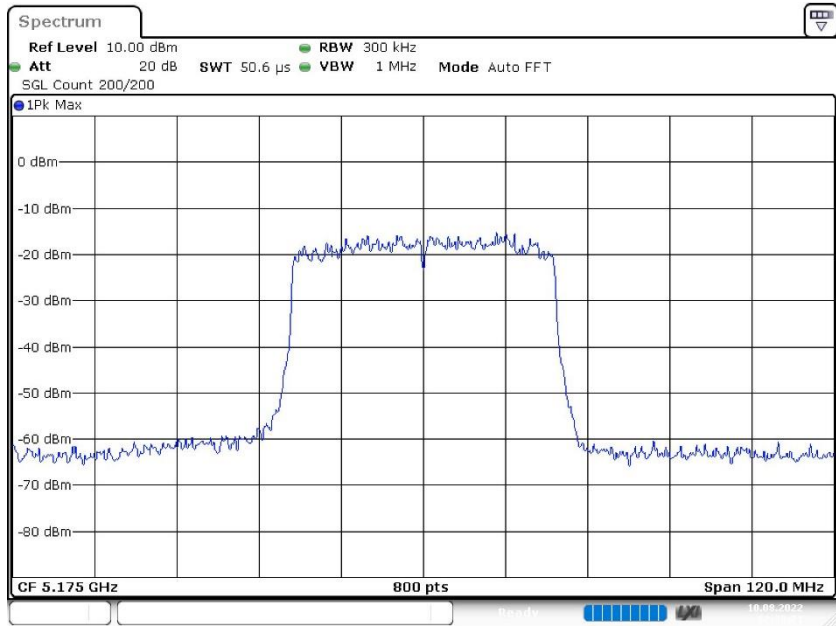
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
5175.000000	39.900000	---	---	5155.125000	5195.025000

(continuation of the "26 dB Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Max Level (dBm)	Result
5175.000000	-1.1	PASS



Bandwidth



Date: 16.AUG.2022 22:39:22

Occupied Channel Bandwidth 99% (5175 MHz; 24.000 dBm; 40 MHz)

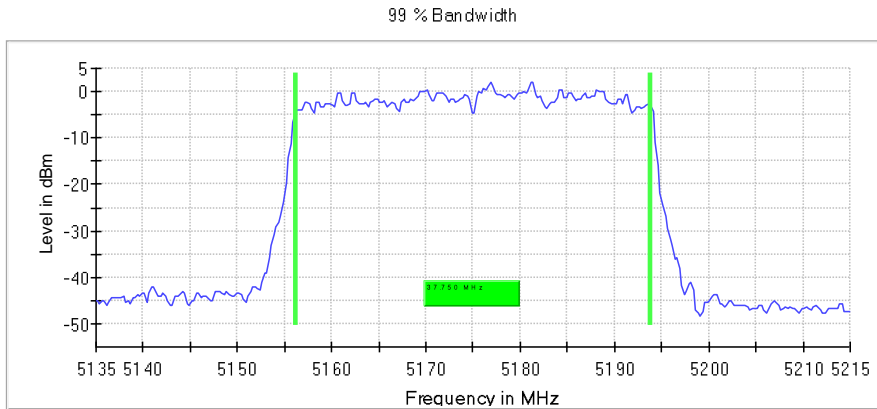
Customized settings.

99 % Bandwidth

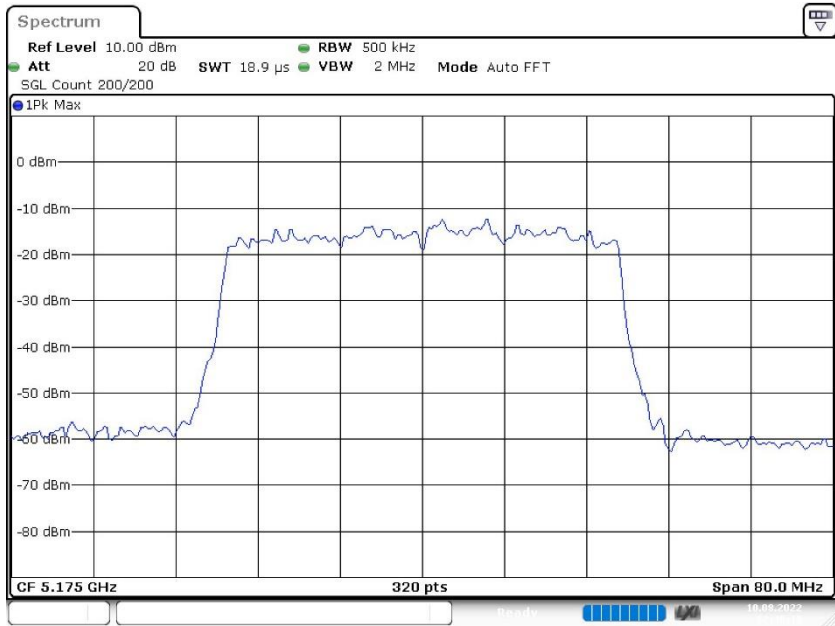
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
5175.000000	37.750000	---	---	5156.125000	5193.875000

(continuation of the "99 % Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Result
5175.000000	PASS



Bandwidth



Date: 16.AUG.2022 22:40:11

Emission Bandwidth 26 dB (5200 MHz; 24.000 dBm; 40 MHz)

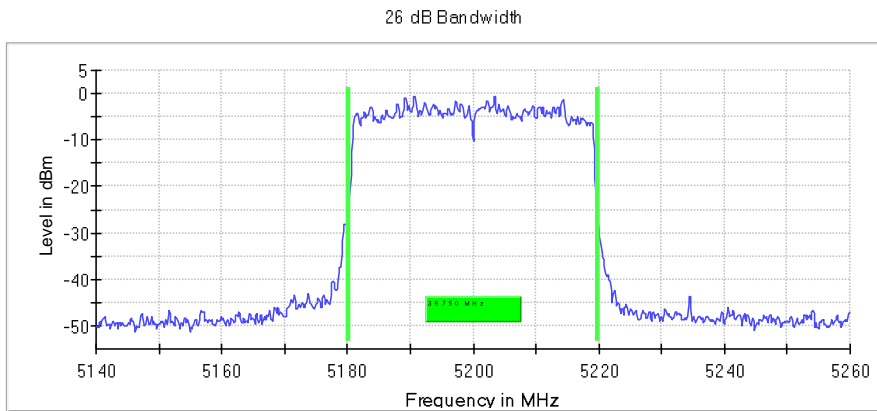
Customized settings.

26 dB Bandwidth

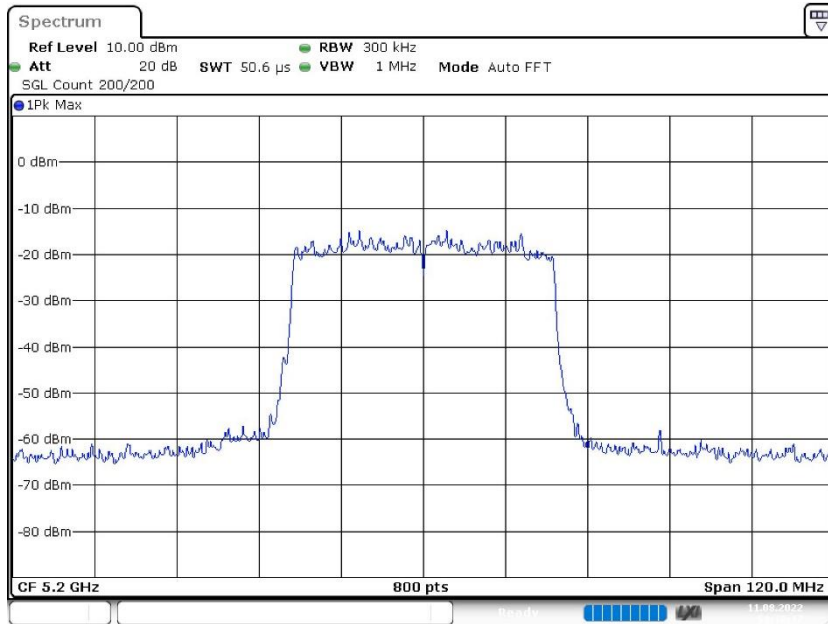
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
5200.000000	39.750000	---	---	5180.125000	5219.875000

(continuation of the "26 dB Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Max Level (dBm)	Result
5200.000000	-0.5	PASS



Bandwidth



Date: 11.AUG.2022 03:18:17

Occupied Channel Bandwidth 99% (5200 MHz; 24.000 dBm; 40 MHz)

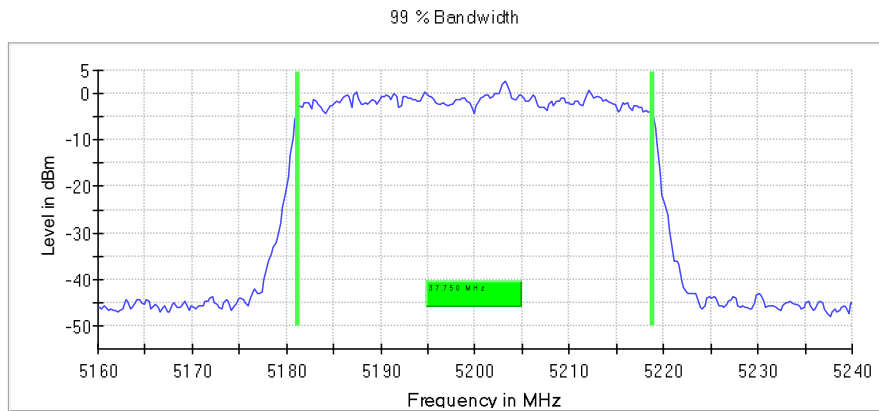
Customized settings.

99 % Bandwidth

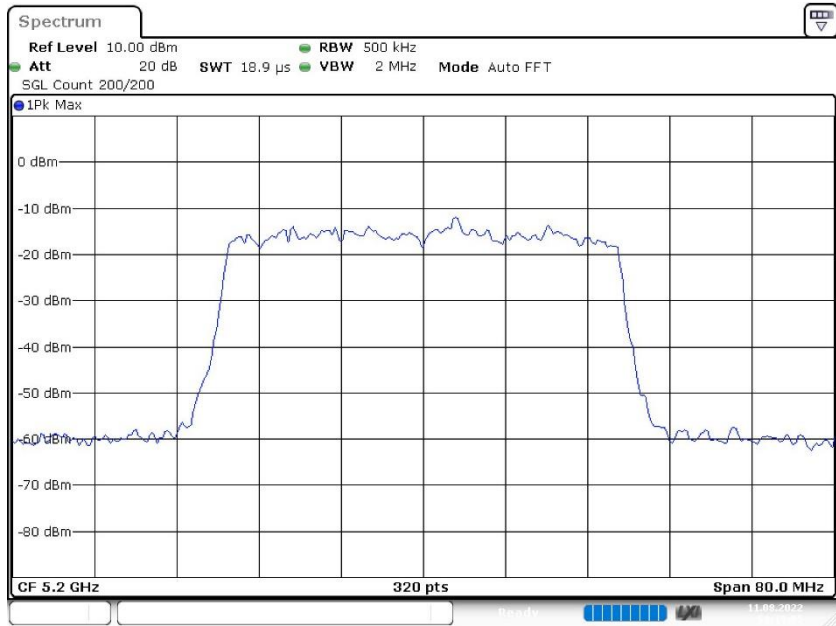
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
5200.000000	37.750000	---	---	5181.125000	5218.875000

(continuation of the "99 % Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Result
5200.000000	PASS



Bandwidth



Date: 11.AUG.2022 03:19:04

Emission Bandwidth 26 dB (5230 MHz; 24.000 dBm; 40 MHz)

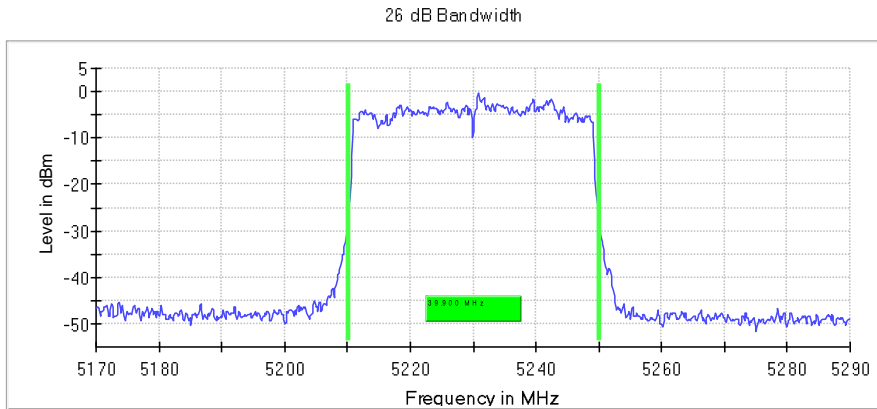
Customized settings.

26 dB Bandwidth

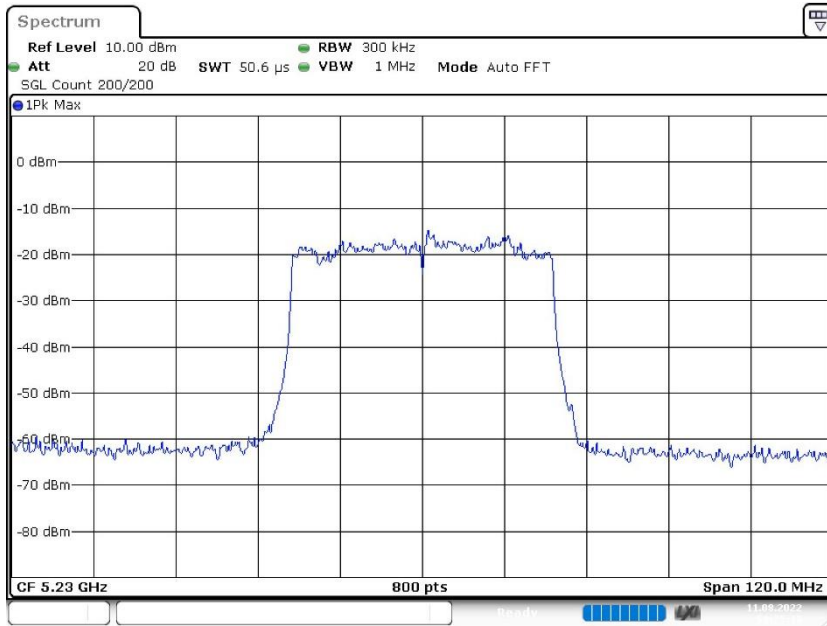
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
5230.000000	39.900000	---	---	5210.125000	5250.025000

(continuation of the "26 dB Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Max Level (dBm)	Result
5230.000000	-0.4	PASS



Bandwidth



Date: 11.AUG.2022 03:25:10

Occupied Channel Bandwidth 99% (5230 MHz; 24.000 dBm; 40 MHz)

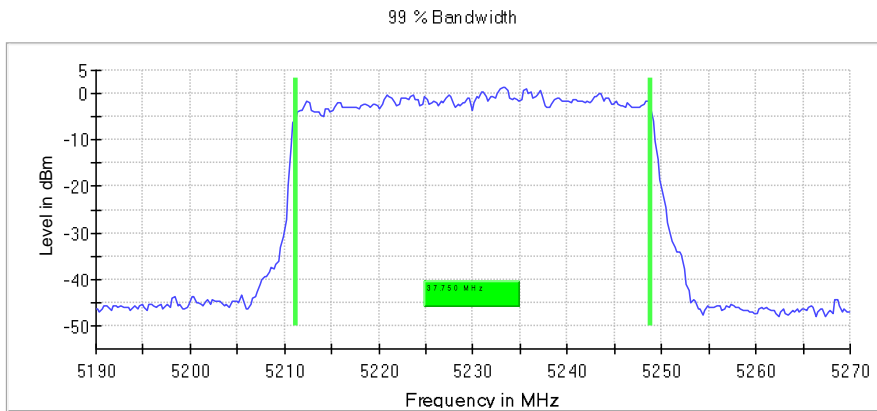
Customized settings.

99 % Bandwidth

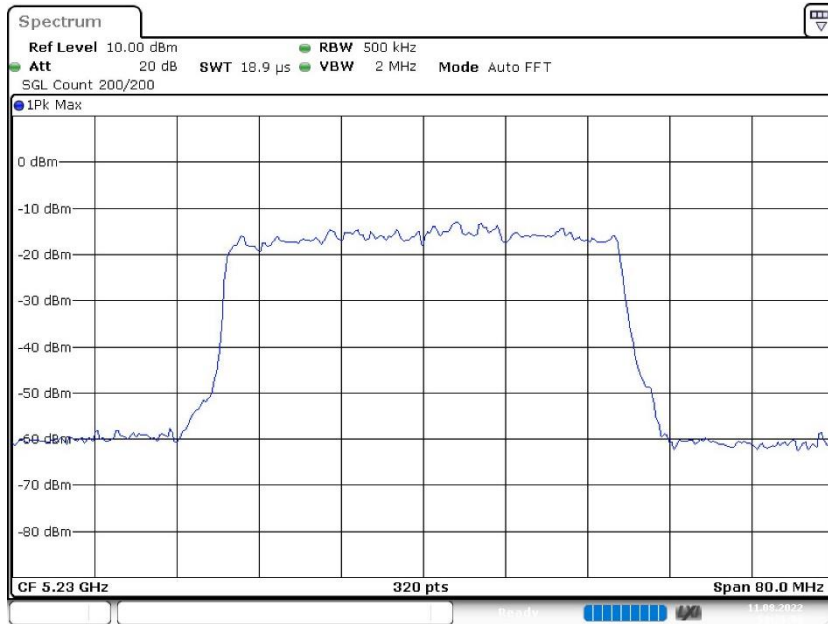
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
5230.000000	37.750000	---	---	5211.125000	5248.875000

(continuation of the "99 % Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Result
5230.000000	PASS



Bandwidth



Date: 11.AUG.2022 03:26:05

Emission Bandwidth 26 dB (5195 MHz; 24.000 dBm; 80 MHz)

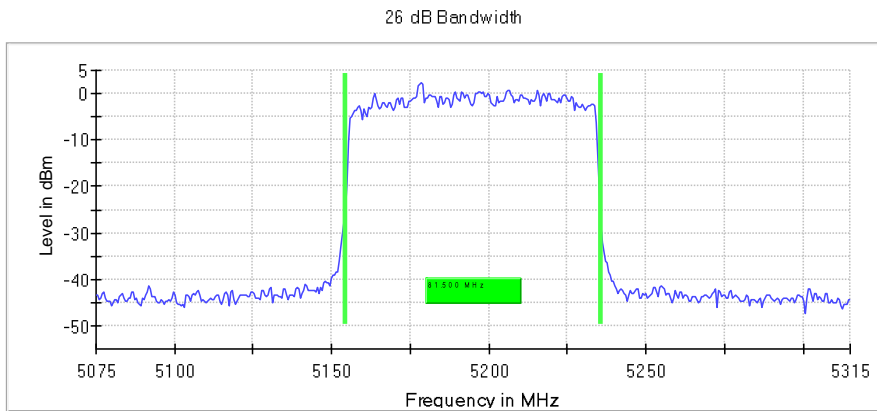
Customized settings.

26 dB Bandwidth

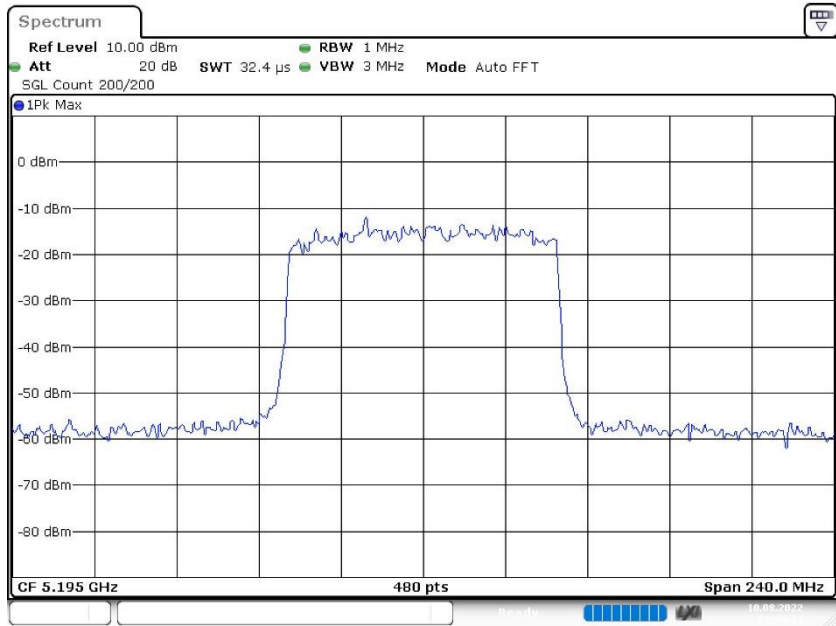
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
5195.000000	81.500000	---	---	5154.250000	5235.750000

(continuation of the "26 dB Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Max Level (dBm)	Result
5195.000000	2.4	PASS



Bandwidth



Date: 16.AUG.2022 22:44:12

Occupied Channel Bandwidth 99% (5195 MHz; 24.000 dBm; 80 MHz)

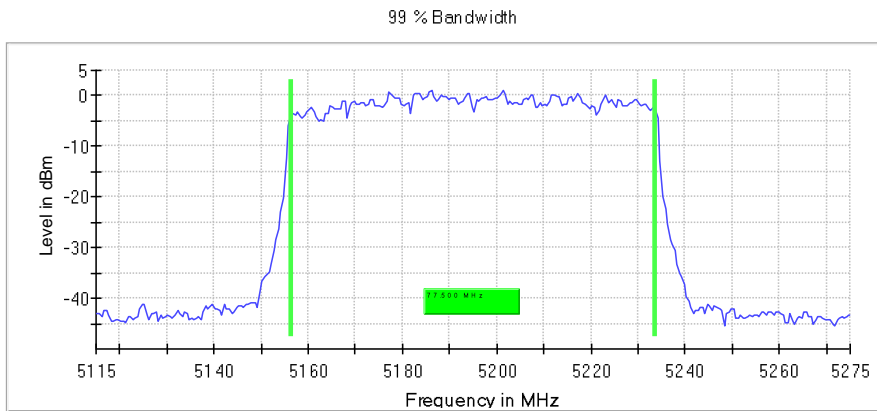
Customized settings.

99 % Bandwidth

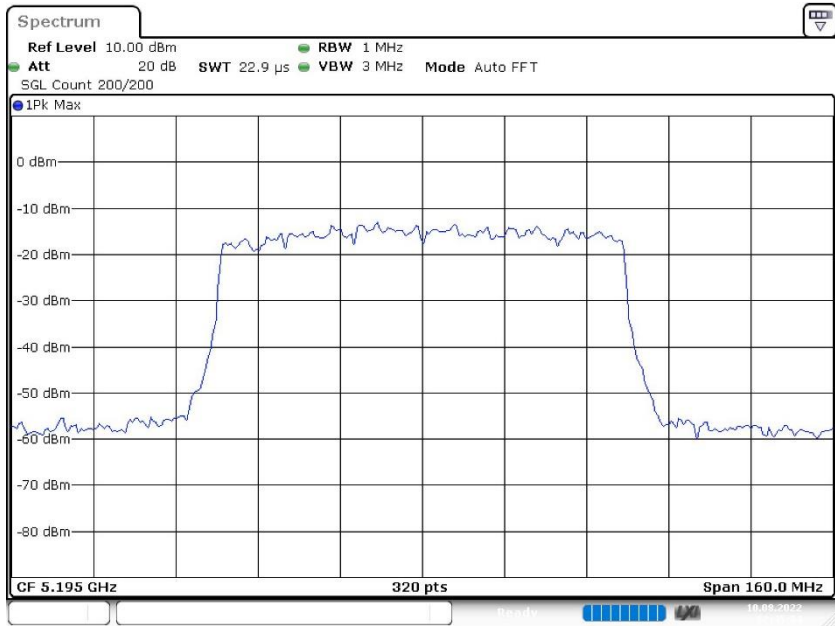
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
5195.000000	77.500000	---	---	5156.250000	5233.750000

(continuation of the "99 % Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Result
5195.000000	PASS



Bandwidth



Date: 16.AUG.2022 22:45:04

Emission Bandwidth 26 dB (5200 MHz; 24.000 dBm; 80 MHz)

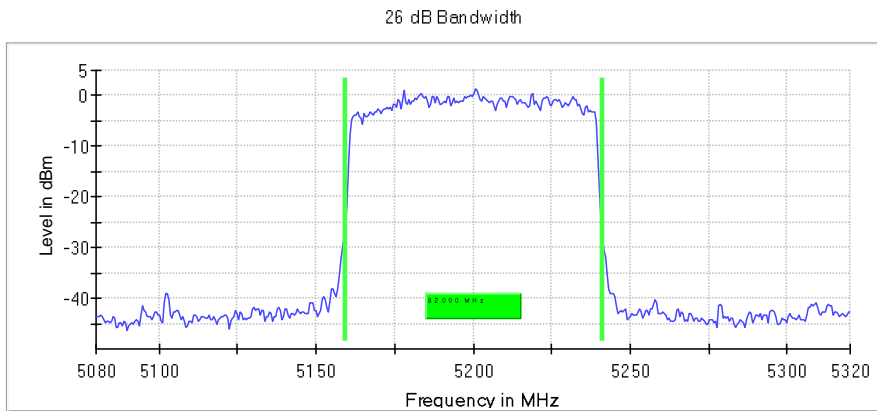
Customized settings.

26 dB Bandwidth

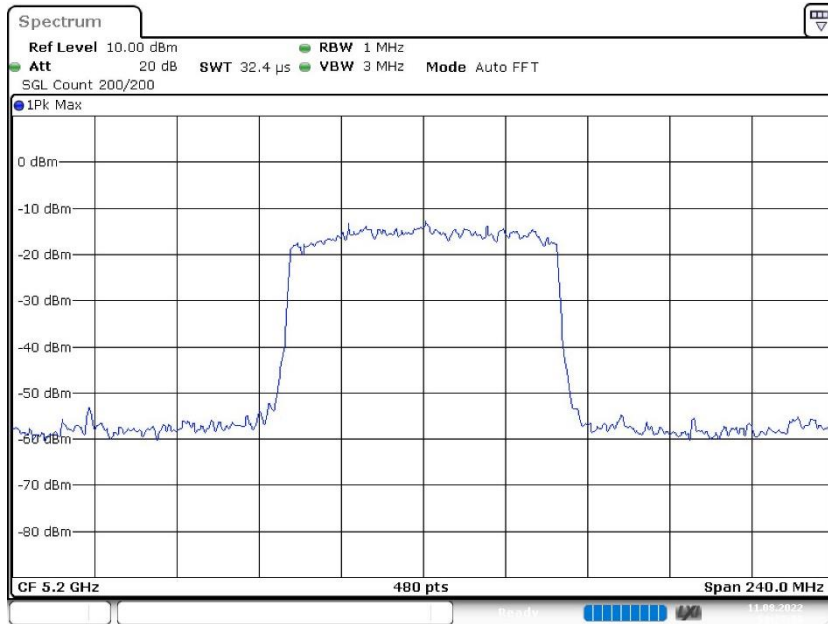
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
5200.000000	82.000000	---	---	5159.250000	5241.250000

(continuation of the "26 dB Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Max Level (dBm)	Result
5200.000000	1.5	PASS



Bandwidth



Date: 11.AUG.2022 03:27:38

Occupied Channel Bandwidth 99% (5200 MHz; 24.000 dBm; 80 MHz)

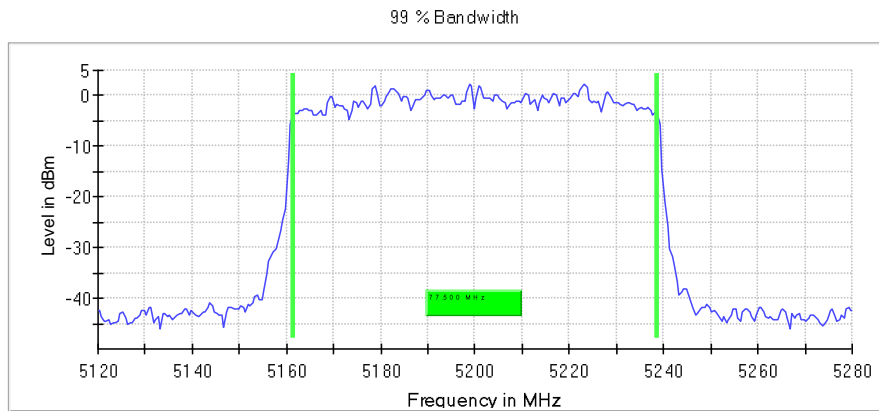
Customized settings.

99 % Bandwidth

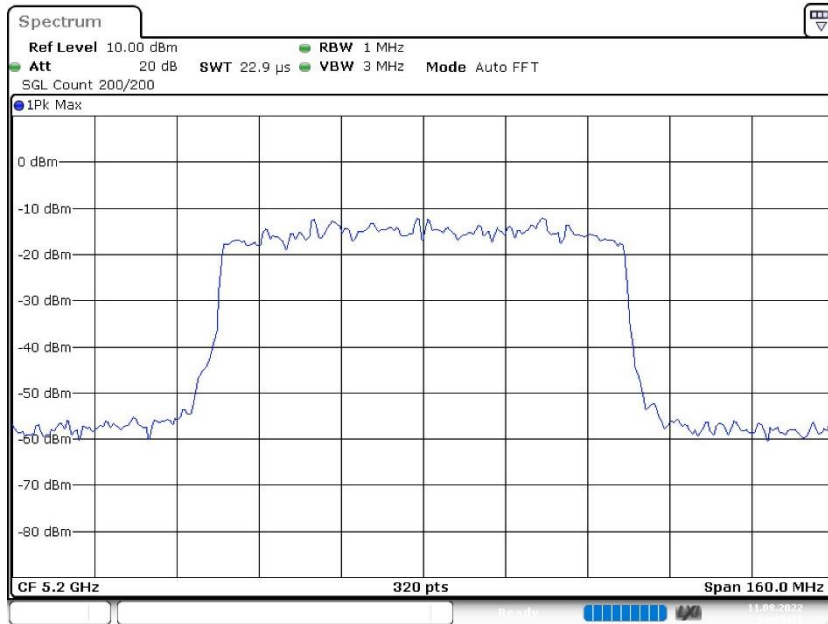
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
5200.000000	77.500000	---	---	5161.250000	5238.750000

(continuation of the "99 % Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Result
5200.000000	PASS



Bandwidth



Date: 11.AUG.2022 03:28:29

Emission Bandwidth 26 dB (5210 MHz; 24.000 dBm; 80 MHz)

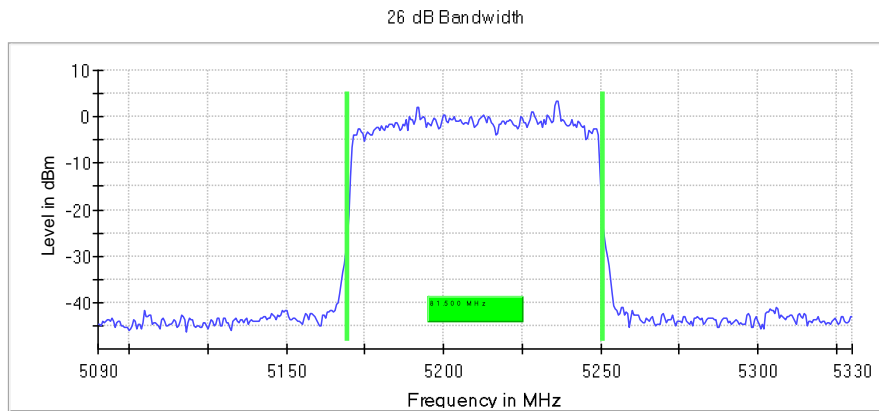
Customized settings.

26 dB Bandwidth

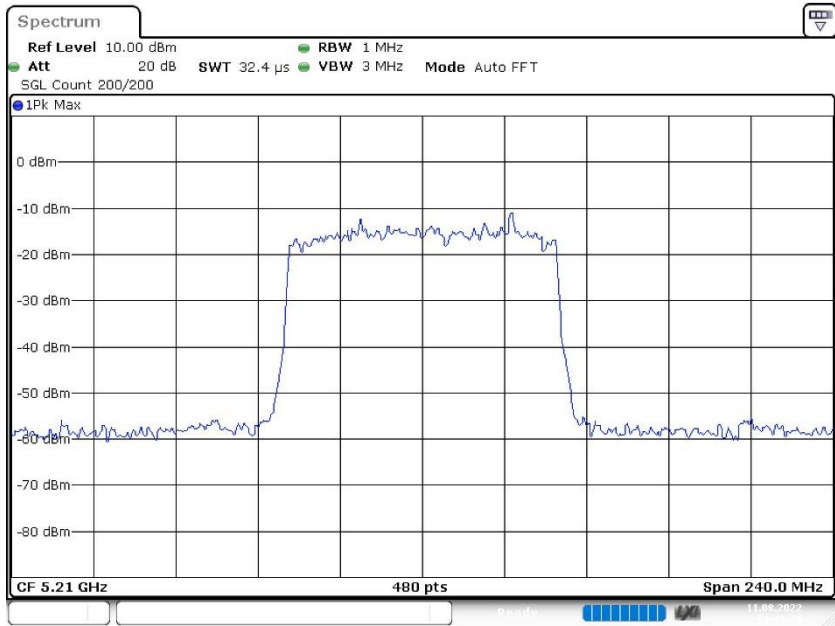
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
5210.000000	81.500000	---	---	5169.250000	5250.750000

(continuation of the "26 dB Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Max Level (dBm)	Result
5210.000000	3.5	PASS



Bandwidth



Date: 11.AUG.2022 03:43:20

Occupied Channel Bandwidth 99% (5210 MHz; 24.000 dBm; 80 MHz)

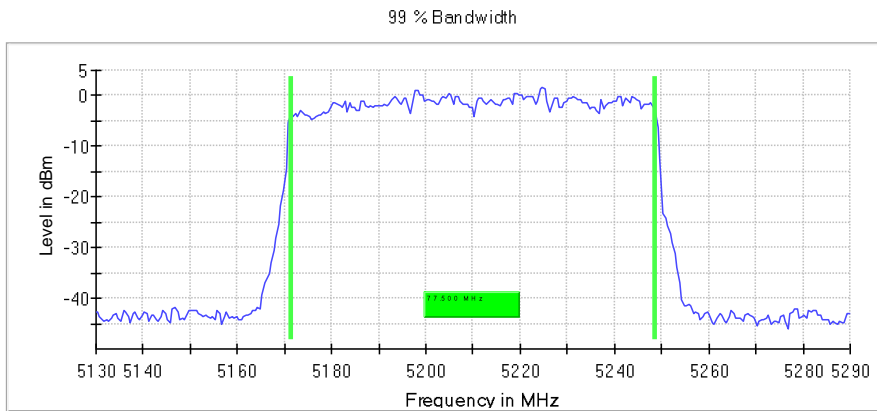
Customized settings.

99 % Bandwidth

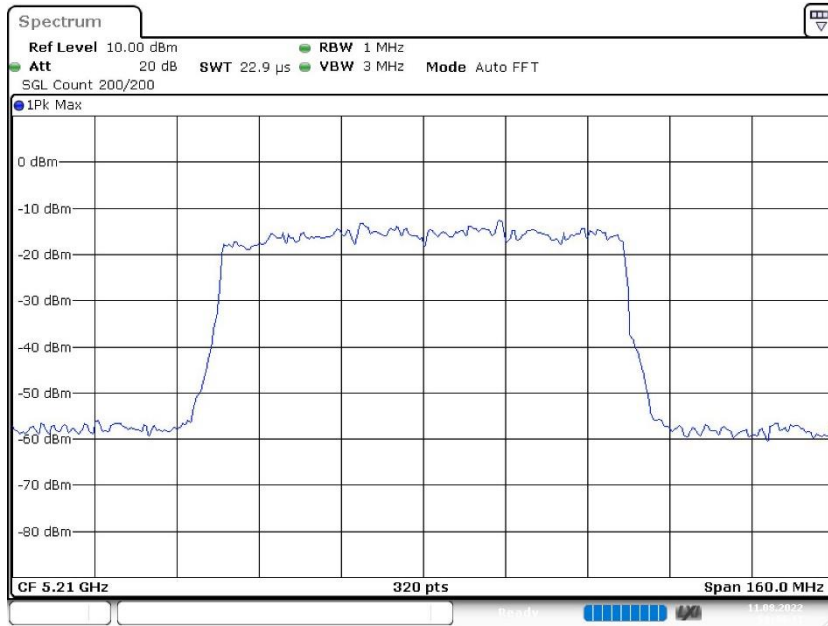
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
5210.000000	77.500000	---	---	5171.250000	5248.750000

(continuation of the "99 % Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Result
5210.000000	PASS



Bandwidth



Date: 11.AUG.2022 03:44:11

-- End of Test Report --