N° 1-6736
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CERTIFICATE #3478.01

TEST REPORT

EUT Description	**WLAN and BT, 2x2 PCIe M.2 1216 SD adapter card, LTE Coexistence**
Brand Name	**Intel® Wi-Fi 6E AX211**
Model Name	**AX211D2WL**
FCC ID / IC ID	**FCC ID: PD9AX211D2L / IC ID: 1000M-AX211D2L**
Date of Test Start/End	**2021-09-01 /2021-02-04**
Features	**802.11ax, Dual Band, 2x2 Wi-Fi 6 + Bluetooth® 5.2** (see section 5)

Applicant	**Intel Mobile Communications**
Address	**100 Center Point Circle, Suite 200** **Columbia, South Carolina 29210** **USA**
Contact Person	**Steven Hackett**
Telephone/Fax/ Email	**steven.c.hackett@intel.com**

Reference Standards	**FCC CFR Title 47 Part 15 E** **RSS-247 issue 2, RSS-Gen A1 issue 5** (see section 1)

Test Report identification	**201218-01.TR03**
Revision Control	**Rev. 00** **This test report revision replaces any previous test report revision** (see section 8)

The test results relate only to the samples tested.
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Reference to accreditation shall be used only by full reproduction of test report.

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1. Standards, reference documents and applicable test methods

FCC	1. FCC Title 47 CFR part 15 – Subpart E – Unlicensed National Information Infrastructure Devices. 2019-10-01 Edition 2. FCC Title 47 CFR part 15 – Subpart C – §15.209 Radiated emission limits; general requirements. 2019-10-01 Edition 3. FCC OET KDB 789033 D02 v02r01 - General U-NII Test Procedures New Rules – Guidelines for compliance testing of Unlicensed National Information Infrastructure (U-NII) Devices (Part 15, Subpart E) 4. FCC OET KDB 662911 D01 v02r01 - Emissions Testing of Transmitters with Multiple Outputs in the Same Band. 5. ANSI C63.10-2013 American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.
ISED	1. RSS-Gen Issue 5 Amendment 1 - General Requirements for Compliance of Radio Apparatus. 2. RSS-247 Issue 2 - Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and License-Exempt Local Area Network (LE-LAN) Devices. 3. FCC OET KDB 789033 D02 v02r01 - General U-NII Test Procedures New Rules – Guidelines for compliance testing of Unlicensed National Information Infrastructure (U-NII) Devices (Part 15, Subpart E). 4. ANSI C63.10-2013 American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

2. General conditions, competences and guarantees

- ✓ Tests performed under FCC standards identified in section 1 are covered by A2LA accreditation.
- ✓ Tests performed under ISED standards identified in section 1 are covered by Cofrac accreditation.
- ✓ Intel Corporation SAS Wireless RF Lab (Intel WRF Lab) is an ISO/IEC 17025:2017 laboratory accredited by the American Association for Laboratory Accreditation (A2LA) with the certificate number 3478.01.
- ✓ Intel Corporation SAS Wireless RF Lab (Intel WRF Lab) is an Accredited Test Firm recognized by the FCC, with Designation Number FR0011.
- ✓ Intel Corporation SAS Wireless RF Lab (Intel WRF Lab) is an ISO/IEC 17025:2017 testing laboratory accredited by the French Committee for Accreditation (Cofrac) with the certificate number 1-6736.
- ✓ Intel Corporation SAS Wireless RF Lab (Intel WRF Lab) is a Registered Test Site listed by ISED, with ISED #1000Y.
- ✓ Intel WRF Lab declines any responsibility with respect to the identified information provided by the customer and that may affect the validity of results.
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- ✓ Intel WRF Lab is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.
- ✓ Intel WRF Lab has developed calibration and proficiency programs for its measurement equipment to ensure correlated and reliable results to its customers.
- ✓ This report is only referred to the item that has undergone the test.
- ✓ This report does not imply an approval of the product by the Certification Bodies or competent Authorities.
- ✓ Complete or partial reproduction of the report cannot be made without written permission of Intel WRF Lab.

3. Environmental Conditions

- ✓ At the site where the measurements were performed the following limits were not exceeded during the tests:

Temperature	21.7ºC ± 2.2ºC
Humidity	38.8% ± 14.2%

4. Test samples

Sample	Control #	Description	Model	Serial #	Date of receipt	Note
#1	201218-01.S08	WiFi 6E Module	AX211D2WL	WFM:18CC18F94BB5	2021-01-06	RF Conducted
	180000-01.S06	Adapter 1216SD to M.2	Adapter M2	N/A	2017-05-11	
	170000-01.S02	Laptop	Latitude E5450	21HTPF2	2017-03-28	
	200611-01.S10	Extender	PCB00651_01	-	2020-11-30	
#2	201218-01.S06	WiFi 6E Module	AX211D2WL	WFM18XCC18F94B42	2021-01-06	Used for 30MHz - 6.4GHz Radiated Spurious Emission tests and 18GHz-40GHz Radiated Spurious Emission tests
	200102-01.S03	Extender	ADEXELEC	-	2020-01-02	
	200611-01.S06	Adaptor	PowerBy SNJ A4	-	2020-11-30	
	200602-03.S06	Absorber	MCS0	-	2020-07-03	
	180000-01.S05	Socket	Adapter 1216SD to M.2	-	2017-08-09	
	170801-01.S10	Laptop	Latitude E7470	7KNOXF2	2017-09-08	
	200611-03.S28	Main Antenna	SkyCross	-	2020-07-01	
	200611-03.S29	Aux Antenna	SkyCross	-	2020-07-01	
#3	201218-01.S07	WiFi 6E Module	AX211D2WL	WFM:18CC18F94B6F	2021-01-06	Used for 6.4GHz-18GHz Radiated Spurious Emission tests
	200611-03.S26	Extender	ADEXELEC	-	2020-07-01	
	200611-01.S07	Adaptor	PowerBy SNJ A4	-	2020-11-30	
	200602-03.S06	Absorber	MCS0	-	2020-07-03	
	180000-01.S02	Socket	Adapter 1216SD to M.2	-	2017-08-09	
	170000-01.S01	Laptop	Latitude E5470	DBPLMC2	2017-03-28	
	200928-03.S08	Main Antenna	SkyCross	-	2020-09-01	
	200928-03.S09	Aux Antenna	SkyCross	-	2020-09-01	

5. EUT Features

The herein information is provided by the customer

<table>
<tr><td>Brand Name</td><td>Intel® Wi-Fi 6E AX211</td></tr>
<tr><td>Model Name</td><td>AX211D2WL</td></tr>
<tr><td>Software Version</td><td>DRTU Version: 11195_99_2100_51G</td></tr>
<tr><td>Driver Version</td><td>99.0.59.4</td></tr>
<tr><td>Prototype / Production</td><td>Production</td></tr>
<tr><td>Supported Radios</td><td>802.11b/g/n/ax 2.4GHz (2400.0 – 2483.5 MHz)
802.11a/n/ac/ax 5.2GHz (5150.0 – 5350.0 MHz)
5.6GHz (5470.0 – 5725.0 MHz)
5.8GHz (5725.0 – 5850.0 MHz)

Bluetooth 5.2 2.4GHz (2400.0 – 2483.5 MHz)</td></tr>
<tr><td>Antenna Information</td><td>
<table>
<tr><th>Transmitter</th><th>Main (chain A)</th><th>Aux (chain B)</th></tr>
<tr><td>Manufacturer</td><td>SkyCross</td><td>Skycross</td></tr>
<tr><td>Antenna type</td><td>PIFA antenna</td><td>PIFA antenna</td></tr>
<tr><td>Part number</td><td>N/A</td><td>N/A</td></tr>
<tr><td>Declared antenna gain (dBi)</td><td>+5</td><td>+5</td></tr>
</table>
</td></tr>
<tr><td>Document</td><td>
<table>
<tr><th>Filename</th><th>Date of receipt</th></tr>
<tr><td>Intel_Ref_Antenna data_HMC-M2 Ant_Spec_Universe_SkyCross Antenna</td><td>2013-01-28</td></tr>
</table>
</td></tr>
</table>

6. Remarks and comments

1. No deviations were made from the test methods listed in section 1 of this report

7. Test Verdicts summary

The statement of conformity to applicable standards in the table below are based on the measured values, without taking into account the measurement uncertainties.

7.1. 802.11 a/n/ac/ax – U-NII- 3

FCC part	RSS clause	Test name	Verdict
15.407 (a) (3)	RSS-247 Clause 6.2.4.1	Power Limits. Maximum output power	P
15.407 (a) (3)	RSS-247 Clause 6.2.4.1	Power spectral density	P
15.407 (b) (3)	RSS-247 Clause 6.2.4.2	Undesirable emissions limits: out of band (conducted)	P
15.407 (b) (3) 15.209	RSS-247 Clause 6.2.4.2 RSS-GEN A1 Clause 8.9	Undesirable emissions limits: Spurious emissions (radiated)	P

8. Document Revision History

Revision #	Modified by	Revision Details
Rev. 00	C.Requin	First Issue

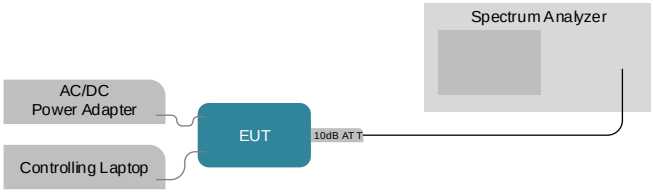
Annex A. Test & System Description

A.1 Measurement System

Measurements were performed using the following setups, made in accordance to the general provisions of FCC KDB 789033 D02 General UNII Test Procedures.

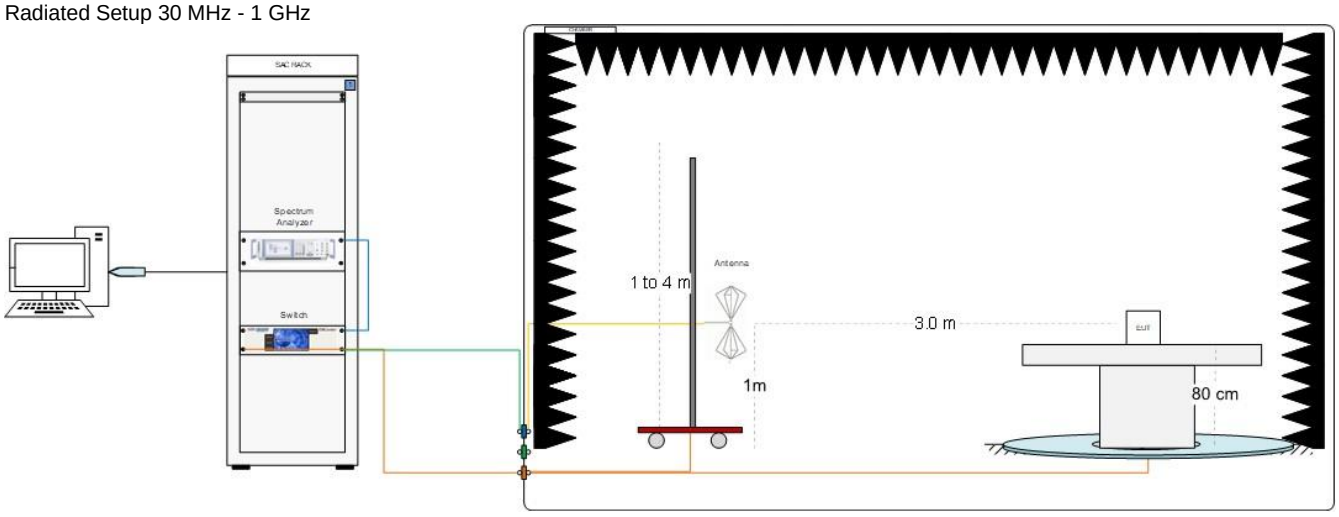
The DUT was installed in a test fixture and this test fixture is connected to a laptop computer and AC/DC power adapter. The laptop computer was used to configure the EUT to continuously transmit at a specified output power using all different modes and modulation schemes, using the Intel proprietary tool DRTU.

Conducted test setup

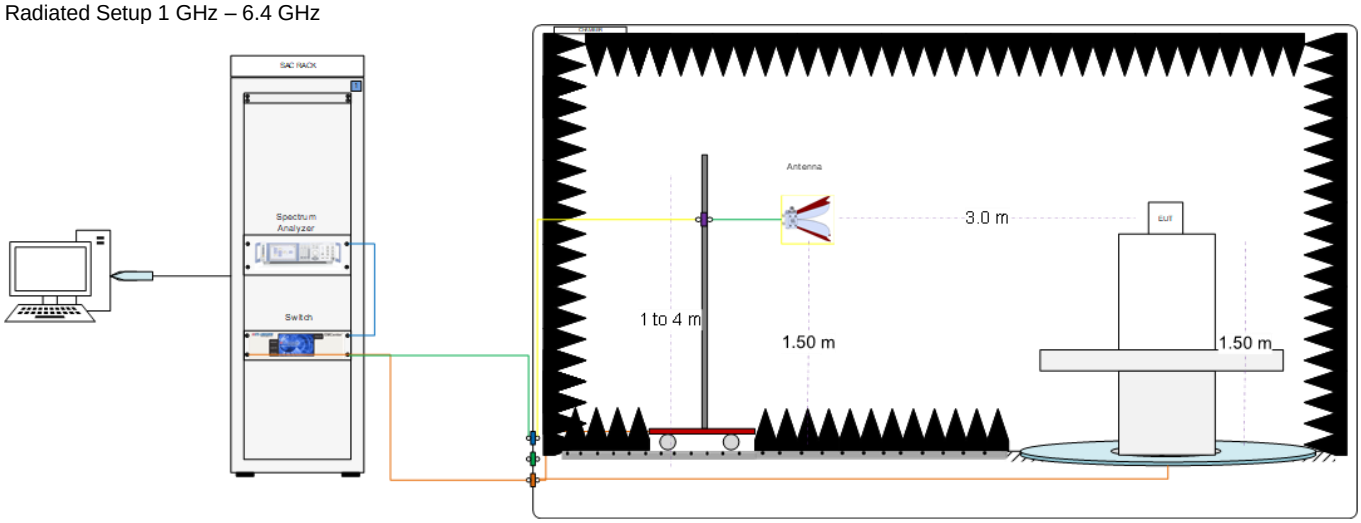


Radiated test setup

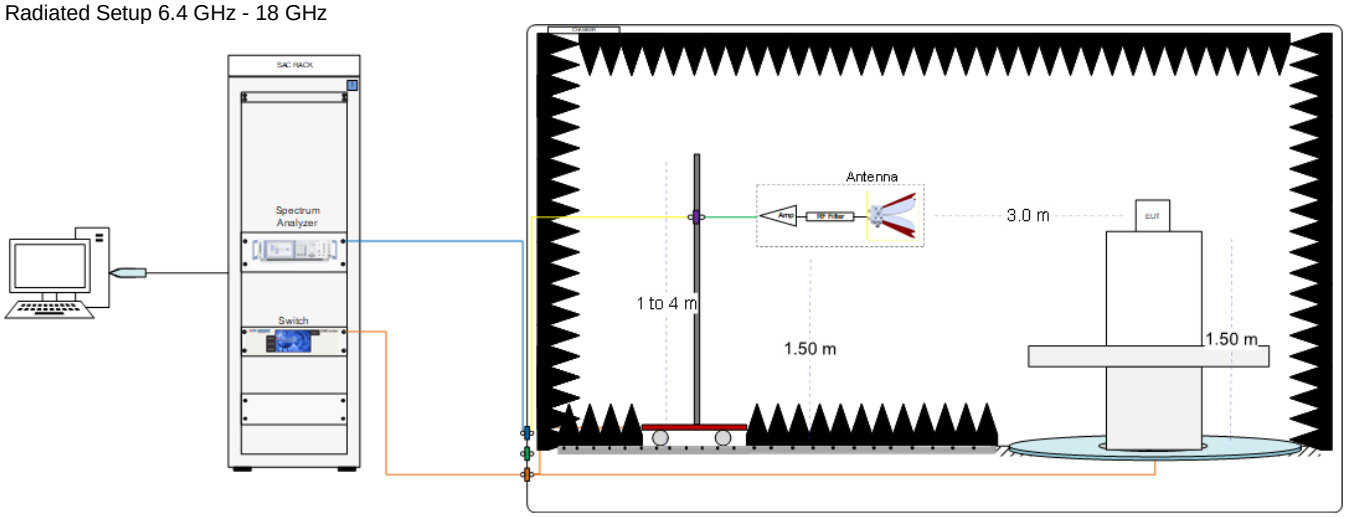
Radiated Setup 30 MHz - 1 GHz



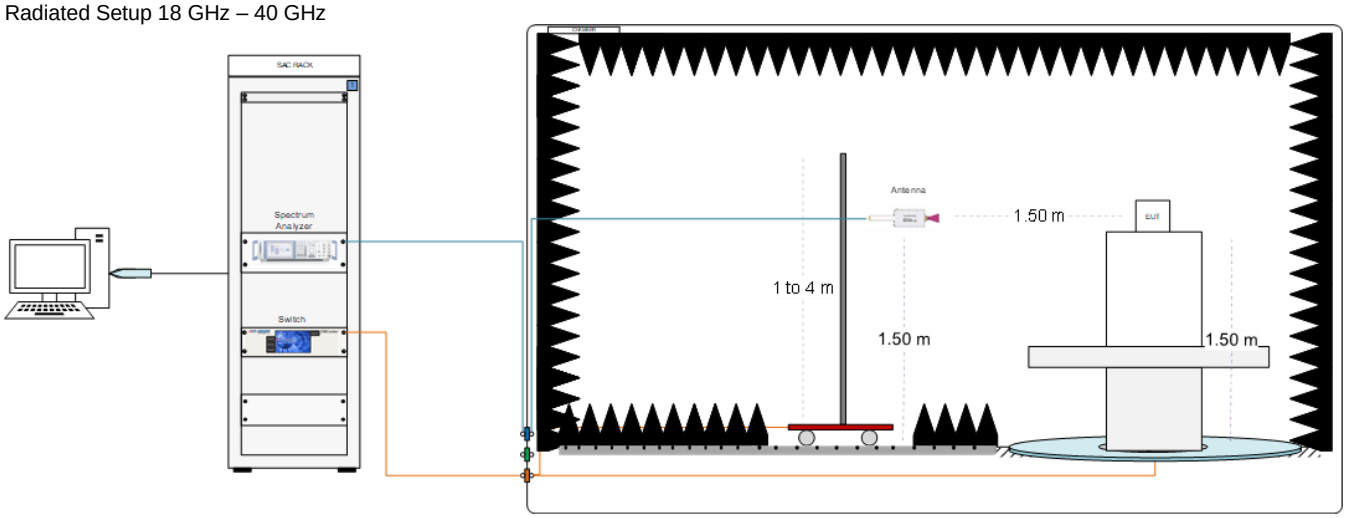
Radiated Setup 1 GHz – 6.4 GHz



Radiated Setup 6.4 GHz - 18 GHz



Radiated Setup 18 GHz – 40 GHz



Sample Calculation

The spurious received voltage V(dBµV) in the spectrum Analyzer is converted to Electric field strength using the transducer factor F corresponding to the Rx path Loss:

F (dB/m)= Rx Antenna Factor (dB/m) + Cable losses (dB) – Amplifiers Gain (dBi)
E (dBµV/m) = V(dBµV) + F (dB/m)

For field strength measurements made at other than the distance at which the applicable limit is specified, the field strength of the emission at the distance specified by the limit is deduced as follows:

$$E_{SpecLimit} = E_{Meas} + 20*\log(D_{Meas}/D_{SpecLimit})$$

where

$E_{SpecLimit}$ is the field strength of the emission at the distance specified by the limit, in dBµV/m
E_{Meas} is the field strength of the emission at the measurement distance, in dBµV/m
D_{Meas} is the measurement distance, in m
$D_{SpecLimit}$ is the distance specified by the limit, in m

A.2 Test Equipment List

Conducted setup

ID#	Device	Type/Model	Serial #	Manufacturer	Cal. Date	Cal. Due Date
0316	Spectrum Analyzer	FSV30	103309	Rohde & Schwarz	2019-09-02	2021-09-02
0442	RF cable 50cm	Coax 2.92mm Male To 2.92mm Male	N/A	PASTERNACK	2020-08-26	2021-02-26
1044	10dB Attenuator + MH4	N/A	N/A	N/A	N/A	N/A
0581	Temp & Humidity Logger	RA12E-TH1-RAS	RA12-B89BE3	Avtech	2020-01-23	2022-01-23
1002	Measurement SW v1.5.4.2	Octopi	N/A	Step AT	N/A	N/A

Radiated Setup #1

ID#	Device	Type/Model	Serial #	Manufacturer	Cal. Date	Cal. Due Date
0135	Anechoic Chamber	FACT3	5720	ETS-Lindgren	2020-07-06	2022-01-07
0136	Turn Table	ETS	-	ETS-Lindgren	N/A	N/A
0147	Switch & Positioning systems	EMC Center	00159757	ETS-Lindgren	N/A	N/A
0530	Measurement SW	EMC32, v10.40.10	100623	Rohde & Schwarz	N/A	N/A
1033	Boresight antenna mast	BAM 4.0-P	P/278/2890.01	Maturo	N/A	N/A
1076	Spectrum Analyzer	FSW43	101847	Rohde & Schwarz	2020-11-02	2022-11-02
0993	Biconical antenna 30 MHz – 1 GHz	UBAA9115 + BBVU9135 + DGA9552N	0286 + CH 9044	Schwarzbeck	2019-11-22	2021-11-22
0325	Horn antenna	3117	00157734	ETS-Lindgren	2019-08-12	2021-08-12
0141	Horn Antenna + Amplifier + HPF6.4	3117	00157736	ETS-Lindgren	2020-04-02	2022-04-02
0334	Double-Ridged Waveguide Horn with Pre-Amplifier 18 GHz to 40 GHz	3116C+PA	00169308bis + 00196308	ETS-Lindgren	2019-07-24	2021-07-24
0859	Cable 2.5m - 30MHz to 18GHz	0500990992500KE	19.23.395	Radiall	2020-11-27	2021-05-27
0206	Cable 1.2m – 18 to 40 GHz	UFA147A-0-0480-200200	MFR 64639223720-003	Micro-coax	2020-08-25	2021-02-25
0263	Cable 1m - 1GHz to 18GHz	UFA147A	-	Utilflex	2020-08-25	2021-02-25
0369	Cable 2m - 26.5GHz to 40GHz	794-9191-2000A	E00327	Atem	2020-08-25	2021-02-25
0371	Cable 1m – 30 MHz - 18GHz	UFB311A-0-0590-50U50U	MFR 64639 223230-001	Micro-coax	2020-08-25	2021-02-25
1099	Cable 7m DC-18 GHz	0501051057000GX	19.35.850	Radial	2020-11-27	2021-05-27
0809	Cable 7m - 18GHz to 40GHz	R286304009	-	Radiall	2020-08-25	2021-02-25
1098	Cable 1.5m - DC-18GHz	CBL-1.5M-SMSM+	202879	Mini-Circuits	2020-11-27	2021-05-27
0797	Temp & Humidity Logger	RA12E-TH1-RAS	RA12-D0EB1A	Avtech	2019-07-04	2021-07-04

N/A: Not Applicable

Radiated Setup #2

ID#	Device	Type/Model	Serial #	Manufacturer	Cal. Date	Cal. Due Date
0337	Anechoic chamber	RFD-FA-100	5996	ETS Lindgren	2020-07-06	2022-07-06
0238	Switch	EMCenter	00151232	ETS Lindgren	N/A	N/A
0301	Positioner	EMCenter	00162359	ETS Lindgren	N/A	N/A
0382	Antenna Tower	2171B-3.0M	00150123	ETS Lindgren	N/A	N/A
0383	Turntable	-	-	ETS Lindgren	N/A	N/A
0329	Measurement SW	EMC32, v10.50.10	100401	Rohde & Schwarz	N/A	N/A
0133	Spectrum Analyzer	FSV40	101358	Rohde & Schwarz	2021-01-15	2023-01-15
0420	Spectrum Analyzer	FSV40	101556	Rohde & Schwarz	2021-01-27	2023-01-27
0138	Double Ridge Horn (1- 18GHz)	3117	00152266	ETS Lindgren	2020-03-08	2022-03-08
0141	Horn Antenna + Amplifier + HPF6.4	3117	00157736	ETS-Lindgren	2020-04-02	2022-04-02
0334	Double Horn Ridged antenna	3116C-PA	00169308bis + 00196308	ETS-Lindgren	2019-07-24	2021-07-24
0871	RF Cable 1-18GHz, 1.5 m	0501050991200GX	19.21.710	Radiall	2020-08-20	2021-02-20
0860	RF Cable 1-18GHz, 1.2 m	2301761761200PJ	12.22.1104	Radiall	2020-08-20	2021-02-20
0275	RF Cable 1-18GHz - 6.5m	140-8500-11-51	001	Spectrum	2020-08-20	2021-02-20
0684	RF Cable 1GHz-18GHz 1.5m	-	-	Spirent	2020-08-20	2021-02-20
0679	RF Cable 18-40 GHz 6m	R286304009	1747364	Radiall	2020-08-20	2021-02-20
0028	RF Cable 1.2m 40MHz-40GHz	794-9191-1200A	DA585	Atem	2020-08-20	2021-02-20
0725	RF Cable 1-9.5GHz 1.2m	0500990991200KE	-	Radiall	2020-08-20	2021-02-20
0796	Temp & Humidity Logger	RA12E-TH1-RAS	RA12-D4F316	Avtech	2019-07-05	2021-07-05

Shared Radiated Equipment

ID#	Device	Type/Model	Serial #	Manufacturer	Cal. Date	Cal. Due Date
0616	Power Sensor	NRP-Z81	104385	Rohde & Schwarz	2020-04-08	2022-04-08
0617	Power Sensor	NRP-Z81	104386	Rohde & Schwarz	2020-04-08	2022-04-08
0618	Power Sensor	NRP-Z81	104382	Rohde & Schwarz	2020-04-08	2022-04-08

A.3 Measurement Uncertainty Evaluation

The system uncertainty evaluation is shown in the table below with a coverage factor of k = 2 to indicate a 95% level of confidence:

Measurement type	Uncertainty	Unit
Timing	±0.12	%
Power Spectral density	±1.47	dB
Occupied bandwidth	±2.07	%
Conducted Power	±1.03	dB
Conducted Spurious Emission <40 GHz	±3.45	dB
Radiated tests <1GHz	±5.26	dB
Radiated tests on 1-40GHz	±4.85	dB

Annex B. Test Results U-NII-3

The herein test results were performed by:

Test case measurement	Test Engineer
6dB and 99% Bandwidth	C.Requin
Maximum output power & Maximum PSD	C.Requin
Undesirable emission limits: out of band	C.Requin
Radiated spurious emissions	A.Lounes, N.Bui

B.1 Test Conditions

For 802.11a mode the EUT can transmit at both CHAIN A and CHAIN B RF outputs individually, but not simultaneously.

For 802.11n20 & 802.11ax20 (20 MHz channel bandwidth), 802.11n40 and 802.11ax40 (40MHz channel bandwidth) 802.11ac80 & 802.11ax80 (80MHz channel bandwidth) modes the EUT can transmit at both CHAIN A and CHAIN B RF outputs individually, and also simultaneously.

The following data rates were selected based on preliminary testing that identified those rates as the worst cases for output power and spurious levels at the band edges:

Transmission	Mode	Bandwidth (MHz)	Worst Case Data Rate
SISO	802.11a	20	6Mbps
	802.11n	20	HT0
		40	HT0
	802.11ac	80	VHT0
	802.11ax	20	HE0
		40	HE0
		80	HE0
MIMO	802.11n	20/40	HT8
	802.11ac	80	VHT0
	802.11ax	20/40/80	HE0

B.2 Test Results Tables

B.2.1 6dB & 99% Bandwidth

Test limits

FCC part	RSS clause	Limits
15.407 (e)	RSS-247 Clause 6.2.4.1	For equipment operating in the band 5725-5850 MHz, the minimum 6 dB bandwidth shall be at least 500 kHz.

Test procedure

The conducted setup shown in section *Test & System Description* was used to measure the 6dB & 99% Bandwidth. The antenna terminal of the EUT is connected to the spectrum analyzer through an attenuator, and the spectrum analyzer reading is compensated to include the RF path loss.

For the overlapped channels between U-NII-2C and U-NII-3 bands, and according to FCC KDB 789033 D02, the boundary frequency between the bands is used as one edge for defining the portion of the 6dB bandwidth that falls within a particular U-NII band. This rule is only applicable for the 6dB bandwidth and for those channels marked as overlapped.

Results tables

U-NII-3 channels

Mode	Rate	Antenna	Channel	Freq [MHz]	6dB BW [MHz]	99% BW [MHz]
802.11a	6Mbps	SISO A	149	5745	15.87	22.20
			157	5785	15.12	23.24
			165	5825	15.09	21.80
		SISO B	149	5745	15.03	21.28
			157	5785	15.10	19.24
			165	5825	15.31	19.32
802.11n20	HT0	SISO A	149	5745	15.10	22.60
			157	5785	15.05	23.88
			165	5825	16.04	22.28
		SISO B	149	5745	14.42	21.24
			157	5785	15.33	19.88
			165	5825	15.03	19.96
	HT8	MIMO A	149	5745	15.03	22.84
			157	5785	15.39	23.12
			165	5825	14.67	23.64
		MIMO B	149	5745	17.25	24.12
			157	5785	17.14	22.68
			165	5825	17.52	23.04
802.11n40	HT0	SISO A	151	5755	34.99	36.88
			159	5795	35.05	37.68
		SISO B	151	5755	35.01	36.40
			159	5795	35.05	37.84
	HT8	MIMO A	151	5755	35.02	36.80
			159	5795	35.05	38.24
		MIMO B	151	5755	35.02	36.48
			159	5795	35.02	38.72
802.11ac80	VHT0	SISO A	155	5775	71.37	75.12
		SISO B			71.40	75.24
		MIMO A			71.37	75.24
		MIMO B			72.60	75.00

Max Value

Mode	Rate	Antenna	Channel	Freq [MHz]	RU config.	6dB BW [MHz]	99% BW [MHz]
802.11ax20	HE0	SISO A	149	5745	Full	16.70	20.52
					26/0	2.02	18.16
					52/37	16.98	18.32
					106/53	17.13	18.40
			157	5785	Full	15.09	21.68
			165	5825	Full	16.96	22.20
		SISO B	149	5745	Full	16.95	20.72
					26/0	1.98	18.48
					52/37	17.06	17.84
					106/53	15.81	17.84
			157	5785	Full	15.41	19.40
			165	5825	Full	16.12	19.28
		MIMO A	149	5745	Full	16.75	22.76
					26/0	2.00	18.72
					52/37	17.01	18.60
					106/53	17.14	18.32
			157	5785	Full	16.77	22.56
			165	5825	Full	16.65	21.08
		MIMO B	149	5745	Full	14.97	20.60
					26/0	2.04	18.28
					52/37	15.71	18.28
					106/53	17.68	18.28
			157	5785	Full	15.29	21.04
			165	5825	Full	15.78	20.76
802.11ax40	HE0	SISO A	151	5755	Full	35.83	37.92
					242/61	15.94	18.88
			159	5795	Full	33.82	38.24
		SISO B	151	5755	Full	35.37	37.68
					242/61	17.50	19.04
			159	5795	Full	35.81	38.24
		MIMO A	151	5755	Full	35.55	37.68
					242/61	16.96	19.12
			159	5795	Full	33.82	40.24
		MIMO B	151	5755	Full	34.97	37.92
					242/61	17.20	19.36
			159	5795	Full	33.83	38.64
802.11ax80	HE0	SISO A	155	5775	Full	75.03	76.68
					484/65	35.50	37.56
		SISO B			Full	75.07	76.56
					484/65	33.47	37.68
		MIMO A			Full	73.87	77.04
					484/65	35.27	37.80
		MIMO B			Full	75.03	76.92
					484/65	35.20	37.68

Max Value

Overlapped channels between U-NII-2C and U-NII-3

Mode	Channel	Frequency (MHz)	Antenna	Chain	6dB BW [MHz]	26dB BW UNII-3 [MHz]
802.11n20	144	5720	SISO	A	3.11	8.13
				B	3.38	9.28
			MIMO	A	3.84	6.78
				B	3.54	6.38
802.11n40	142	5710	SISO	A	3.26	11.33
				B	3.26	15.38
			MIMO	A	3.19	7.10
				B	3.17	5.84
802.11ac80	138	5690	SISO	A	3.24	12.22
				B	3.23	18.11
			MIMO	A	3.18	8.04
				B	3.17	7.47
802.11ax20	144	5720	SISO	A	4.54	7.88
				B	3.38	8.48
			MIMO	A	4.11	6.58
				B	2.41	6.08
802.11ax40	142	5710	SISO	A	4.12	7.37
				B	4.04	8.90
			MIMO	A	4.13	6.19
				B	3.59	5.93
802.11ax80	138	5690	SISO	A	4.09	7.66
				B	4.07	9.18
			MIMO	A	4.11	6.14
				B	4.14	6.90

Max Value

Note, the 26dB bandwidth of the overlapped channels falling in U-NII-3 band is shown in the above table. These values were used to measure the maximum output power in the U-NII-3 band as specified in chapter B.2.2.

See annex C.1.1 and C.1.2 for screenshot results

B.2.2 Power Limits. Maximum output power & Maximum power spectral Density

Test limits

FCC part	RSS clause	Limits
15.407 (a) (3)	RSS-247 Clause 6.2.4.1	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

Test procedure

The Maximum Conducted Output Power was measured using the channel integration method over the entire 99% occupied bandwidth according to section E) 2) d) (Method SA-2) of KDB 789033
The maximum power spectral density (PSD) was measured using the method according to section F) (Method SA-2) of KDB 789033.

In the measure-and-sum approach for MIMO mode, the conducted emission level (e.g., transmit power or power in specified bandwidth) is measured at each antenna port. The measured results at the various antenna ports are then summed mathematically in linear power units to determine the total emission level from the device.

The EIRP power (dBm) is calculated by adding the declared maximum antenna gain to the measured conducted power.

The conducted setup shown in section *Test & System Description* was used to measure the maximum conducted output power and power spectral density. The antenna terminal of the EUT is connected to the spectrum analyser through an attenuator, and the spectrum analyzer reading is compensated to include the RF path loss.

For the overlapped channels between U-NII-2C and U-NII-3, and according to FCC KDB 789033 D02, the power is computed based on the portion of the emission bandwidth (26dB) contained within that band. This rule is only applicable for those channels marked as overlapped.

Results tables

Duty cycle

Mode	Rate	Antenna	Duty Cycle [%]
802.11a	6Mbps	SISO A	95.74
		SISO B	95.74
802.11n20	HT0	SISO A	98.73
		SISO B	98.73
	HT8	MIMO A	98.84
		MIMO B	98.84
802.11ax20	HE0	SISO A	98.72
		SISO B	98.72
		MIMO A	98.57
		MIMO B	98.57
802.11n40	HT0	SISO A	98.53
		SISO B	98.53
	HT8	MIMO A	98.84
		MIMO B	98.84
802.11ax40	HE0	SISO A	98.72
		SISO B	98.72
		MIMO A	98.57
		MIMO B	98.57
802.11ac80	VHT0	SISO A	98.78
		SISO B	98.78
		MIMO A	98.30
		MIMO B	98.30
802.11ax80	HE0	SISO A	98.78
		SISO B	98.78
		MIMO A	97.98
		MIMO B	97.98
802.11ac160	VTH0	SISO A	98.29
		SISO B	98.29
		MIMO A	96.72
		MIMO B	96.72
802.11ax160	HE0	SISO A	98.05
		SISO B	98.05
		MIMO A	95.71
		MIMO B	95.71

Maximum output power – U-NII-3 Channels

Mode	Rate	Channel	Freq [MHz]	Antenna	Average Conducted Ouput Power [dBm]	Avg Max* Conducted Ouput Power [dBm]	Avg Max*. EIRP [dBm]	Avg Max* Conducted Power [mW]
802.11a	6Mbps	149	5745	SISO A	21.07	21.26	26.26	133.63
				SISO B	20.93	21.12	26.12	129.39
		157	5785	SISO A	21.02	21.21	26.21	132.10
				SISO B	20.84	21.03	26.03	126.74
		165	5825	SISO A	21.05	21.24	26.24	133.02
				SISO B	20.89	21.08	26.08	128.21
802.11n20	HT0	149	5745	SISO A	21.00	21.00	26.00	125.89
				SISO B	20.89	20.89	25.89	122.74
		157	5785	SISO A	20.98	20.98	25.98	125.31
				SISO B	20.82	20.82	25.82	120.78
		165	5825	SISO A	21.02	21.02	26.02	126.47
				SISO B	20.84	20.84	25.84	121.34
	HT8	149	5745	MIMO A	21.13	21.13	26.13	129.72
				MIMO B	21.01	21.01	26.01	126.18
				Combined A+B	24.08	24.08	29.08	255.90
		157	5785	MIMO A	21.04	21.04	26.04	127.06
				MIMO B	21.04	21.04	26.04	127.06
				Combined A+B	24.05	24.05	29.05	254.11
		165	5825	MIMO A	21.20	21.20	26.20	131.83
				MIMO B	21.19	21.19	26.19	131.52
				Combined A+B	24.21	24.21	29.21	263.35
802.11n40	HT0	151	5755	SISO A	20.76	20.76	25.76	119.12
				SISO B	20.32	20.32	25.32	107.65
		159	5795	SISO A	21.08	21.08	26.08	128.23
				SISO B	21.08	21.08	26.08	128.23
	HT8	151	5755	MIMO A	19.55	19.55	24.55	90.16
				MIMO B	19.31	19.31	24.31	85.31
				Combined A+B	22.44	22.44	27.44	175.47
		159	5795	MIMO A	20.90	20.90	25.90	123.03
				MIMO B	20.75	20.75	25.75	118.85
				Combined A+B	23.84	23.84	28.84	241.88
802.11ac80	VHT0	155	5775	SISO A	18.77	18.77	23.77	75.34
				SISO B	17.59	17.59	22.59	57.41
				MIMO A	18.05	18.05	23.05	63.83
				MIMO B	16.75	16.75	21.75	47.32
				Combined A+B	20.46	20.46	25.46	111.14

* Maximum values are the duty cycle compensated values calculated from the average (measured)

Max Value

Min Value

Mode	Rate	Channel	Freq [MHz]	Antenna	RU config.	Average Conducted Ouput Power [dBm]	Avg Max* Conducted Ouput Power [dBm]	Avg Max*. EIRP [dBm]	Avg Max* Conducted Power [mW]
802.11ax20	HE0	149	5745	SISO A	Full	21.03	21.03	26.03	126.77
					26/0	14.14	14.14	19.14	25.94
					52/37	17.18	17.18	22.18	52.24
					106/53	19.84	19.84	24.84	96.38
				SISO B	Full	20.96	20.96	25.96	124.74
					26/0	14.06	14.06	19.06	25.47
					52/37	17.06	17.06	22.06	50.82
					106/53	19.99	19.99	24.99	99.77
				MIMO A	Full	21.17	21.17	26.17	130.92
					26/0	11.02	11.02	16.02	12.65
					52/37	13.96	13.96	18.96	24.89
					106/53	16.86	16.86	21.86	48.53
				MIMO B	Full	20.94	20.94	25.94	124.17
					26/0	11.19	11.19	16.19	13.15
					52/37	13.94	13.94	18.94	24.77
					106/53	16.72	16.72	21.72	46.99
				Combined A+B	Full	24.07	24.07	29.07	255.08
					26/0	14.12	14.12	19.12	25.80
					52/37	16.96	16.96	21.96	49.66
					106/53	19.80	19.80	24.80	95.52
		157	5785	SISO A	Full	21.00	21.00	26.00	125.89
				SISO B	Full	20.85	20.85	25.85	121.62
				MIMO A	Full	21.13	21.13	26.13	129.72
				MIMO B	Full	21.12	21.12	26.12	129.42
				Combined A+B	Full	24.14	24.14	29.14	259.14
		165	5825	SISO A	Full	21.04	21.04	26.04	127.06
				SISO B	Full	20.94	20.94	25.94	124.17
				MIMO A	Full	21.06	21.06	26.06	127.64
				MIMO B	Full	21.23	21.23	26.23	132.74
				Combined A+B	Full	24.16	24.16	29.16	260.38
802.11ax40	HE0	151	5755	SISO A	Full	20.85	20.85	25.85	121.62
					242/61	20.47	20.47	25.47	111.43
				SISO B	Full	20.06	20.06	25.06	101.39
					242/61	20.38	20.38	25.38	109.14
				MIMO A	Full	19.96	19.96	24.96	99.08
					242/61	20.57	20.57	25.57	114.02
				MIMO B	Full	18.92	18.92	23.92	77.98
					242/61	20.54	20.54	25.54	113.24
				Combined A+B	Full	22.48	22.48	27.48	177.07
					242/61	23.57	23.57	28.57	227.27
		159	5795	SISO A	Full	21.01	21.01	26.01	126.18
				SISO B	Full	20.97	20.97	25.97	125.03
				MIMO A	Full	20.82	20.82	25.82	120.78
				MIMO B	Full	20.95	20.95	25.95	124.45
				Combined A+B	Full	23.90	23.90	28.90	245.23
802.11ax80	HE0	155	5775	SISO A	Full	18.77	18.77	23.77	75.34
					484/65	20.04	20.04	25.04	100.93
				SISO B	Full	17.76	17.76	22.76	59.70
					484/65	20.07	20.07	25.07	101.62
				MIMO A	Full	17.98	18.07	23.07	64.10
					484/65	19.68	19.77	24.77	94.81
				MIMO B	Full	16.98	17.07	22.07	50.92
					484/65	19.01	19.10	24.10	81.26
				Combined A+B	Full	20.52	20.61	25.61	115.02
					484/65	22.37	22.46	27.46	176.07

* Maximum values are the duty cycle compensated values calculated from the average (measured)

Max Value

Min Value

Maximum output power – Overlapped channels between U-NII-2C and U-NII-3

Mode	Channel	Freq (MHz)	Antenna	Chain	Average Cond. Output Power UNII-3 [dBm]	Max.* Cond. Output Power UNII-3 [dBm]	Max.* EIRP UNII-3 [dBm]	Max.* Cond. Output Power UNII-3 [mW]
802.11n20	144	5720	SISO	A	12.75	12.75	17.75	18.84
				B	12.65	12.65	17.65	18.41
			MIMO	A	9.78	9.78	14.78	9.51
				B	9.78	9.78	14.78	9.51
			Combined	A+B	12.79	12.79	17.79	19.01
802.11n40	142	5710	SISO	A	8.29	8.29	13.29	6.75
				B	8.38	8.38	13.38	6.89
			MIMO	A	5.24	5.24	10.24	3.34
				B	5.32	5.32	10.32	3.40
			Combined	A+B	8.29	8.29	13.29	6.75
802.11ac80	138	5690	SISO	A	4.61	4.61	9.61	2.89
				B	4.47	4.47	9.47	2.80
			MIMO	A	1.29	1.29	6.29	1.35
				B	1.19	1.19	6.19	1.32
			Combined	A+B	4.25	4.25	9.25	2.66
802.11ax20	144	5720	SISO	A	13.16	13.16	18.16	20.70
				B	13.11	13.11	18.11	20.46
			MIMO	A	10.22	10.22	15.22	10.52
				B	10.20	10.20	15.20	10.47
			Combined	A+B	13.22	13.22	18.22	20.99
802.11ax40	142	5710	SISO	A	8.88	8.88	13.88	7.73
				B	8.69	8.69	13.69	7.40
			MIMO	A	5.90	5.90	10.90	3.89
				B	5.83	5.83	10.83	3.83
			Combined	A+B	8.88	8.88	13.88	7.72
802.11ax80	138	5690	SISO	A	5.22	5.22	10.22	3.33
				B	5.22	5.22	10.22	3.33
			MIMO	A	2.08	2.17	7.17	1.65
				B	2.24	2.33	7.33	1.71
			Combined	A+B	5.17	5.26	10.26	3.36

* Maximum values are the duty cycle compensated values calculated from the average (measured)

Max Value

Min Value

Maximum Power Spectral Density (PSD) – U-NII-3 channels

Mode	Rate	Channel	Freq [MHz]	Antenna	Average conducted PSD [dBm/500kHz]	Max.* conducted PSD [dBm/500kHz]
802.11a	6Mbps	149	5745	SISO A	7.17	7.36
				SISO B	7.07	7.26
		157	5785	SISO A	7.24	7.43
				SISO B	7.06	7.25
		165	5825	SISO A	7.19	7.38
				SISO B	7.02	7.21
802.11n20	HT0	149	5745	SISO A	6.90	6.90
				SISO B	6.82	6.82
		157	5785	SISO A	6.88	6.88
				SISO B	6.75	6.75
		165	5825	SISO A	6.90	6.90
				SISO B	6.75	6.75
	HT8	149	5745	MIMO A	7.03	7.03
				MIMO B	7.10	7.10
				Combined A+B	10.08	10.08
		157	5785	MIMO A	7.01	7.01
				MIMO B	7.01	7.01
				Combined A+B	10.02	10.02
		165	5825	MIMO A	7.10	7.10
				MIMO B	7.09	7.09
				Combined A+B	10.11	10.11
802.11n40	HT0	151	5755	SISO A	3.33	3.33
				SISO B	2.90	2.90
		159	5795	SISO A	3.58	3.58
				SISO B	3.68	3.68
	HT8	151	5755	MIMO A	2.88	2.88
				MIMO B	2.57	2.57
				Combined A+B	5.74	5.74
		159	5795	MIMO A	3.48	3.48
				MIMO B	3.78	3.78
				Combined A+B	6.64	6.64
802.11ac80	VHT0	155	5775	SISO A	-2.23	-2.23
				SISO B	-2.96	-2.96
				MIMO A	-2.38	-2.38
				MIMO B	-2.72	-2.72
				Combined A+B	0.46	0.46

* Maximum values are the duty cycle compensated values calculated from the average (measured)

Mode	Rate	Channel	Freq [MHz]	Antenna	RU config.	Average conducted PSD [dBm/500kHz]	Max.* conducted PSD [dBm/500kHz]
802.11ax20	HE0	149	5745	SISO A	Full	6.79	6.79
					26/0	8.37	8.37
					52/37	8.30	8.30
					106/53	7.97	7.97
				SISO B	Full	6.68	6.68
					26/0	8.38	8.38
					52/37	8.29	8.29
					106/53	8.10	8.10
				MIMO A	Full	6.92	6.92
					26/0	5.35	5.35
					52/37	5.18	5.18
					106/53	5.02	5.02
				MIMO B	Full	6.71	6.71
					26/0	5.70	5.70
					52/37	5.23	5.23
					106/53	4.91	4.91
				Combined A+B	Full	9.83	9.83
					26/0	8.54	8.54
					52/37	8.22	8.22
					106/53	7.98	7.98
		157	5785	SISO A	Full	6.72	6.72
				SISO B	Full	6.61	6.61
				MIMO A	Full	6.86	6.86
				MIMO B	Full	6.89	6.89
				Combined A+B	Full	9.89	9.89
		165	5825	SISO A	Full	6.75	6.75
				SISO B	Full	6.67	6.67
				MIMO A	Full	6.75	6.75
				MIMO B	Full	6.94	6.94
				Combined A+B	Full	9.86	9.86
802.11ax40	HE0	151	5755	SISO A	Full	3.04	3.04
					242/61	6.10	6.10
				SISO B	Full	2.24	2.24
					242/61	6.07	6.07
				MIMO A	Full	2.54	2.54
					242/61	6.26	6.26
				MIMO B	Full	2.36	2.36
					242/61	6.23	6.23
				Combined A+B	Full	5.46	5.46
					242/61	9.26	9.26
		159	5795	SISO A	Full	3.40	3.40
				SISO B	Full	3.41	3.41
				MIMO A	Full	3.54	3.54
				MIMO B	Full	3.48	3.48
				Combined A+B	Full	6.52	6.52
802.11ax80	HE0	155a	5775	SISO A	Full	-1.89	-1.89
					484/65	2.48	2.48
				SISO B	Full	-2.75	-2.75
					484/65	2.55	2.55
				MIMO A	Full	-0.37	-0.28
					484/65	2.03	2.12
				MIMO B	Full	-0.79	-0.70
					484/65	2.25	2.34
				Combined A+B	Full	2.44	2.52
					484/65	5.15	5.24

* Maximum values are the duty cycle compensated values calculated from the average (measured)

Maximum Power Spectral Density (PSD) – Overlapped channels between U-NII-2C and U-NII-3

Mode	Channel	Freq (MHz)	Antenna	Chain	Average conducted PSD UNII-3 [dBm/MHz]	Maximum* conducted PSD UNII-3 [dBm/MHz]
802.11n20	144	5720	SISO	A	5.65	5.65
				B	5.64	5.64
			MIMO	A	2.79	2.79
				B	2.72	2.72
			Combined	A+B	5.77	5.77
802.11n40	142	5710	SISO	A	0.37	0.37
				B	0.43	0.43
			MIMO	A	0.36	0.36
				B	-2.69	-2.69
			Combined	A+B	-2.62	-2.62
802.11ac80	138	5690	SISO	A	-3.34	-3.34
				B	-3.53	-3.53
			MIMO	A	-6.58	-6.58
				B	-6.69	-6.69
			Combined	A+B	-3.62	-3.62
802.11ax20	144	5720	SISO	A	5.54	5.54
				B	5.53	5.53
			MIMO	A	2.69	2.69
				B	2.59	2.59
			Combined	A+B	5.65	5.65
802.11ax40	142	5710	SISO	A	0.15	0.15
				B	-0.02	-0.02
			MIMO	A	0.22	0.22
				B	-2.72	-2.72
			Combined	A+B	-2.86	-2.86
802.11ax80	138	5690	SISO	A	-3.54	-3.54
				B	-3.60	-3.60
			MIMO	A	-6.66	-6.57
				B	-6.54	-6.45
			Combined	A+B	-3.59	-3.50

* Maximum values are the duty cycle compensated values calculated from the average (measured)

See annex C.1.3 for screenshot results

B.2.3 Undesirable emission limits : out of band (Conducted)

Test limits

FCC part	RSS clause	Limits
15.407 (b) (4)	RSS-247 Clause 6.2.4.2	For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

Test procedure

The conducted setup shown in section *Test & System Description* was used to measure undesirable emissions on the Band Edge domain. The antenna terminal of the EUT is connected to the spectrum analyzer through an attenuator, and the spectrum analyzer reading is compensated to include the RF path loss and the declared antenna gain.
For out of band emission measurements in MIMO mode the emission level of individual output is adjusted by 10 log (Nant) = 3dB for Nant = 2 which is equivalent to compare the individual output emission level to the limit minus 3dB.

See Section C.1.4 for the screenshot results.

B.2.4 Radiated spurious emission

Standard references

<table>
<tr><th>FCC part</th><th>RSS clause</th><th>Limits</th></tr>
<tr><td>15.407 (b) (4)</td><td>RSS-247 Clause 6.2.4.2</td><td>For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.</td></tr>
<tr><td>15.209</td><td>RSS-GEN A1, Clause 8.9</td><td>Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a):
<table>
<tr><th>Freq Range (MHz)</th><th>Field Strength (µV/m)</th><th>Field Strength (dBµV/m)</th><th>Meas. Distance (m)</th></tr>
<tr><td>30-88</td><td>100</td><td>40</td><td>3</td></tr>
<tr><td>88-216</td><td>150</td><td>43.5</td><td>3</td></tr>
<tr><td>216-960</td><td>200</td><td>46</td><td>3</td></tr>
<tr><td>Above 960</td><td>500</td><td>54</td><td>3</td></tr>
</table>
The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.
For average radiated emission measurements above 1000 MHz, there is also a limit specified when measuring with peak detector function, corresponding to 20 dB above the indicated values in the table.</td></tr>
</table>

Test procedure

The radiated setups shown in section *Test & System Description* were used to measure the radiated spurious emissions.

Depending of the frequency range and bands being tested, different antennas and filters were used.

The final measurement is done by varying the antenna height, the EUT azimuth over 360º and for both Vertical and Horizontal polarizations.

The radiated spurious emission was measured on the worst case configuration selected from the chapter B.1 and using the low, middle and high channels.

For 802.11ax20, 802.11ax40 and 802.11ax80 modes, the worst case spurious emission result among the low, mid and high channels tested separately on Chain A and B is used to perform the test on MIMO mode (Chain A+B).

For 802.11n20, 802.11n40 and 802.11ac80 modes the worst channel found among all 802.11ax modes mentioned above is chosen to perform the test in Chain A, B ,and MIMO (Chain A+B).

Test Results

Radiated spurious - 30 MHz – 1 GHz

Radiated Spurious – All modes

Frequency	Quasi-Peak	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dB	---
37.5	30.7	40.0	9.3	V
264.0	39.4	46.0	6.7	H

Note 1: The spurious signals detected do not depend on either the operating channel or the modulation mode.

802.11a

1 GHz – 40 GHz, 802.11a, 6Mbps, Chain A

Radiated Spurious – CH149

Frequency	MaxPeak	Average	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	dB	---
3299.5	60.3	---	68.2	7.9	H
11492.4	50.3	---	74.0	23.7	V
11492.4	---	41.2	54.0	12.8	V
39656.7	57.7	---	74.0	16.3	V
39869.8	---	46.8	54.0	**7.2**	V

Radiated Spurious – CH157

Frequency	MaxPeak	Average	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	dB	---
3399.5	59.5	---	68.2	8.7	H
11570.7	53.6	---	74.0	20.4	V
11570.7	---	45.3	54.0	8.7	V
23139.7	48.7	---	68.2	19.5	V

Radiated Spurious – CH165

Frequency	MaxPeak	Average	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	dB	---
3373.5	60.5	---	68.2	7.7	V
11650.0	52.7	---	74.0	21.3	V
11650.0	---	44.4	54.0	9.6	V
23301.2	49.5	---	68.2	18.8	H

1 GHz – 40 GHz, 802.11a, 6Mbps, Chain B

Radiated Spurious – CH149

Frequency	MaxPeak	Average	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	dB	---
3391.0	59.6	---	68.2	8.6	H
11493.9	48.1	---	74.0	25.9	V
11493.9	---	38.2	54.0	15.8	H
39882.8	---	46.6	54.0	7.4	H
39893.4	57.7	---	74.0	16.3	V

Radiated Spurious – CH157

Frequency	MaxPeak	Average	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	dB	---
3395.0	59.6	---	68.2	8.6	V
11570.2	50.1	---	74.0	23.9	V
11570.2	---	40.9	54.0	13.1	V
22883.7	---	37.1	54.0	16.9	V
22899.8	48.0	---	74.0	26.0	V

Radiated Spurious – CH165

Frequency	MaxPeak	Average	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	dB	---
3377.0	59.1	---	68.2	9.1	H
11649.0	49.6	---	74.0	24.4	V
11649.0	---	41.4	54.0	12.6	V
23306.4	49.4	---	68.2	18.8	V

802.11n

1 GHz – 40 GHz, 802.11n20, HT0, Chain A

Radiated Spurious – CH165

Frequency	MaxPeak	Average	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	dB	---
3391.5	60.0	---	68.2	**8.2**	V
11651.4	52.7	---	74.0	21.3	V
11651.4	---	44.0	54.0	10.0	V
23312.0	49.9	---	68.2	18.3	H

1 GHz – 40 GHz, 802.11n20, HT0, Chain B

Radiated Spurious – CH165

Frequency	MaxPeak	Average	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	dB	---
3395.0	59.8	---	68.2	8.4	V
11650.0	49.6	---	74.0	24.4	V
11650.0	---	41.9	54.0	12.1	V
23306.8	50.5	---	68.2	17.7	V
33984.3	51.6	---	68.2	16.6	H

1 GHz – 40 GHz, 802.11n20, HT8, Chain A+B

Radiated Spurious – CH165

Frequency	MaxPeak	Average	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	dB	---
3391.0	59.5	---	68.2	8.7	H
11650.9	53.4	---	74.0	20.6	V
11650.9	---	44.7	54.0	9.3	V
23296.4	54.1	---	68.2	14.1	V

1 GHz – 40 GHz, 802.11n40, HT0, Chain A

Radiated Spurious – CH159

Frequency	MaxPeak	Average	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	dB	---
3388.5	59.5	---	68.2	8.7	V
11586.6	50.3	---	74.0	23.7	V
11586.6	---	40.6	54.0	13.4	V
23170.8	48.9	---	68.2	19.3	V

1 GHz – 40 GHz, 802.11n40, HT0, Chain B

Radiated Spurious – CH159

Frequency	MaxPeak	Average	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	dB	---
3394.5	59.8	---	68.2	8.4	V
11590.0	48.8	---	74.0	25.2	H
11590.0	---	40.8	54.0	13.2	V
39677.0	58.4	---	74.0	15.6	H
39908.9	---	47.1	54.0	**6.9**	V

1 GHz – 40 GHz, 802.11n40, HT8, Chain A+B

Radiated Spurious – CH159

Frequency	MaxPeak	Average	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	dB	---
3154.0	58.5	---	68.2	9.8	V
11592.0	51.3	---	74.0	22.7	V
11592.0	---	42.1	54.0	11.9	V
23189.2	49.5	---	68.2	18.7	H

802.11ac

1 GHz – 40 GHz, 802.11ac80, VHT0, Chain A

Radiated Spurious – CH155

Frequency	MaxPeak	Average	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	dB	---
3383.0	58.8	---	68.2	9.4	H
11553.3	48.2	---	74.0	25.8	H
11553.3	---	40.2	54.0	13.8	V
39882.8	---	47.0	54.0	7.0	H
39896.8	58.3	---	74.0	15.7	V

1 GHz – 40 GHz, 802.11ac80, VHT0, Chain B

Radiated Spurious – CH155

Frequency	MaxPeak	Average	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	dB	---
3398.5	58.9	---	68.2	9.3	V
17787.3	---	43.3	54.0	10.7	H
17787.3	55.8	---	74.0	18.2	V
22264.2	---	36.6	54.0	17.4	V
22264.6	46.2	---	74.0	27.8	V

1 GHz – 40 GHz, 802.11ac80, VHT0, Chain A+B

Radiated Spurious – CH155

Frequency	MaxPeak	Average	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	dB	---
3216.5	59.4	---	68.2	8.8	V
11544.6	47.6	---	74.0	26.4	V
11544.6	---	39.6	54.0	14.4	V
39866.4	---	47.5	54.0	**6.5**	V
39979.3	58.7	---	74.0	15.3	H

802.11ax

1 GHz – 40 GHz, 802.11ax20, HE0, Chain A

Radiated Spurious – CH149

Frequency	MaxPeak	Average	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	dB	---
3369.0	59.8	---	68.2	8.4	V
11473.1	51.9	---	74.0	22.1	V
11473.1	---	44.2	54.0	9.8	V
22946.1	46.9	---	74.0	27.1	H
22946.1	---	37.6	54.0	16.4	V
23380.5	48.2	---	68.2	20.0	V

Radiated Spurious – CH157

Frequency	MaxPeak	Average	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	dB	---
3379.0	59.4	---	68.2	8.8	V
11552.8	53.7	---	74.0	20.3	V
11552.8	---	46.3	54.0	7.7	V
11570.7	48.1	---	74.0	25.9	V
11570.7	---	36.9	54.0	17.1	V
23106.1	---	42.5	54.0	11.5	H
23107.1	52.0	---	74.0	22.0	H

Radiated Spurious – CH165

Frequency	MaxPeak	Average	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	dB	---
3386.5	58.6	---	68.2	9.6	V
11633.0	54.0	---	74.0	20.0	V
11633.0	---	48.2	54.0	**5.8**	V
23267.2	55.1	---	68.2	13.1	H

1 GHz – 40 GHz, 802.11ax20, HE0, Chain B

Radiated Spurious – CH149

Frequency	MaxPeak	Average	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	dB	---
3393.0	59.5	---	68.2	8.7	V
11473.1	50.8	---	74.0	23.2	H
11473.1	---	40.7	54.0	13.3	H
22946.5	---	42.2	54.0	11.8	V
22947.5	52.0	---	74.0	22.0	V

Radiated Spurious – CH157

Frequency	MaxPeak	Average	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	dB	---
3371.0	59.6	---	68.2	8.6	V
11552.8	53.6	---	74.0	20.4	H
11552.8	---	48.0	54.0	6.0	V
23105.7	---	40.1	54.0	13.9	V
23106.6	50.1	---	74.0	23.9	V

Radiated Spurious – CH165

Frequency	MaxPeak	Average	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	dB	---
3378.0	58.4	---	68.2	9.8	V
11632.6	56.7	---	74.0	17.3	V
11632.6	---	48.4	54.0	**5.6**	V
23268.6	56.0	---	68.2	12.2	V
23300.7	48.7	---	68.2	19.5	V

1 GHz – 40 GHz, 802.11ax20, HE0, Chain A+B

Radiated Spurious – CH165

Frequency	MaxPeak	Average	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	dB	---
3371.0	58.9	---	68.2	9.3	V
11633.0	55.1	---	74.0	18.9	H
11633.0	---	47.2	54.0	6.8	H
23266.2	57.7	---	68.2	10.5	V
23304.5	51.5	---	68.2	16.7	H

1 GHz – 40 GHz, 802.11ax40, HE0, Chain A

Radiated Spurious – CH151

Frequency	MaxPeak	Average	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	dB	---
3391.5	58.3	---	68.2	9.9	V
11474.0	52.9	---	74.0	21.1	V
11474.0	---	44.8	54.0	9.2	V
22947.9	48.3	---	74.0	25.7	V
22947.9	---	38.1	54.0	15.9	V

Radiated Spurious – CH159

Frequency	MaxPeak	Average	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	dB	---
3393.5	59.7	---	68.2	8.5	H
11554.3	53.5	---	74.0	20.5	V
11554.3	---	46.8	54.0	7.2	V
23107.6	---	42.8	54.0	11.2	H
23108.0	53.7	---	74.0	20.3	H

1 GHz – 40 GHz, 802.11ax40, HE0, Chain B

Radiated Spurious – CH151

Frequency	MaxPeak	Average	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	dB	---
3382.0	58.0	---	68.2	10.2	H
11474.0	50.5	---	74.0	23.5	H
11474.0	---	40.0	54.0	14.0	H
22947.9	---	41.6	54.0	12.4	V
22949.4	53.3	---	74.0	20.7	V

Radiated Spurious – CH159

Frequency	MaxPeak	Average	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	dB	---
3400.0	59.4	---	68.2	8.8	V
11554.3	56.2	---	74.0	17.8	H
11554.3	---	48.5	54.0	**5.5**	H
23107.6	---	40.2	54.0	13.8	V
23108.5	50.2	---	74.0	23.8	V

1 GHz – 40 GHz, 802.11ax40, HE0, Chain A+B

Radiated Spurious – CH159

Frequency	MaxPeak	Average	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	dB	---
3292.0	59.1	---	68.2	9.1	V
11554.3	54.9	---	74.0	19.1	H
11554.3	---	46.9	54.0	7.1	H
23108.5	---	46.9	54.0	7.1	H
23109.4	54.0	---	74.0	20.1	H

1 GHz – 40 GHz, 802.11ax80, HE0, Chain A

Radiated Spurious – CH155

Frequency	MaxPeak	Average	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	dB	---
3375.0	58.9	---	68.2	9.3	V
7180.6	47.9	---	68.2	20.3	V
11474.0	53.3	---	74.0	20.7	V
11474.0	---	45.3	54.0	8.7	V
22948.4	47.5	---	74.0	26.4	V
22948.4	---	37.0	54.0	17.0	H

1 GHz – 40 GHz, 802.11ax80, HE0, Chain B

Radiated Spurious – CH155

Frequency	MaxPeak	Average	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	dB	---
3400.0	59.4	---	68.2	8.8	V
7180.1	48.3	---	68.2	19.9	H
11475.0	50.2	---	74.0	23.8	H
11475.0	---	39.7	54.0	14.3	H
22948.4	---	42.4	54.0	11.6	V
22948.9	52.8	---	74.0	21.2	V

1 GHz – 40 GHz, 802.11ax80, HE0, Chain A+B

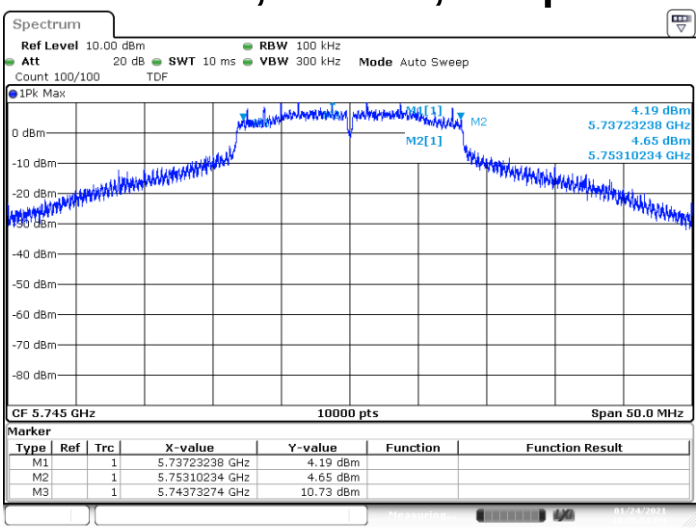
Radiated Spurious – CH155

Frequency	MaxPeak	Average	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	dB	---
3392.5	59.0	---	68.2	9.2	V
7180.6	49.1	---	68.2	19.1	H
11473.5	53.9	---	74.0	20.1	V
11473.5	---	45.9	54.0	**8.1**	V
22948.4	---	44.8	54.0	9.2	V
22950.3	53.7	---	74.0	20.3	V
34422.1	53.3	---	68.2	14.9	V

Annex C. System Plots

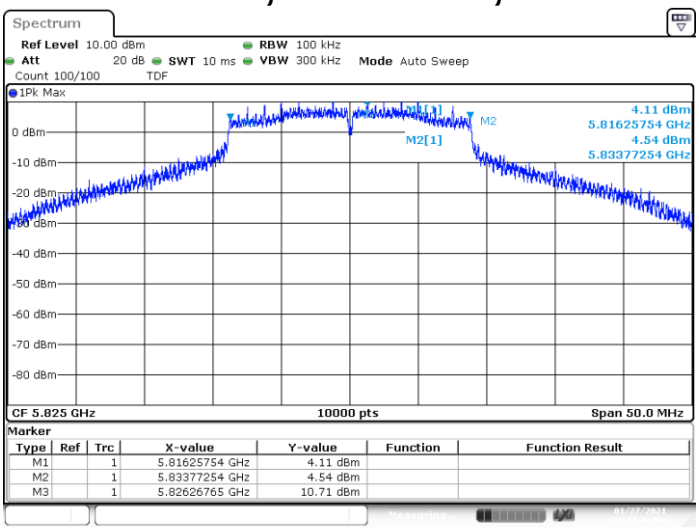
C.1.1 6dB Bandwidth

SISO-A, 802.11a, 6Mbps



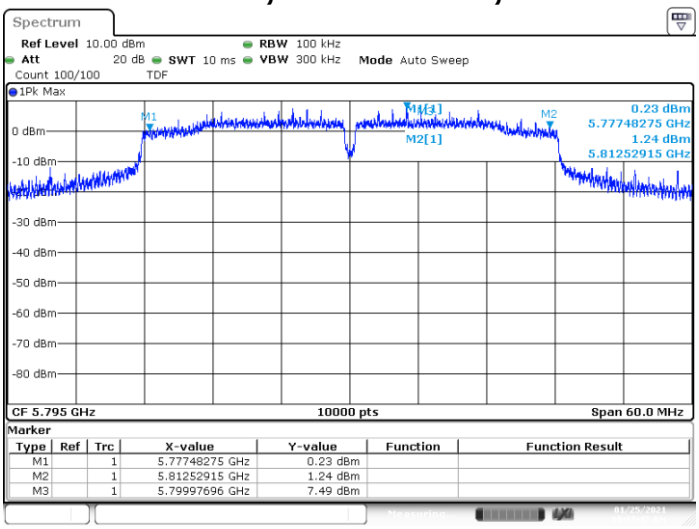
Channel 149

MIMO-B, 802.11n20, HT8



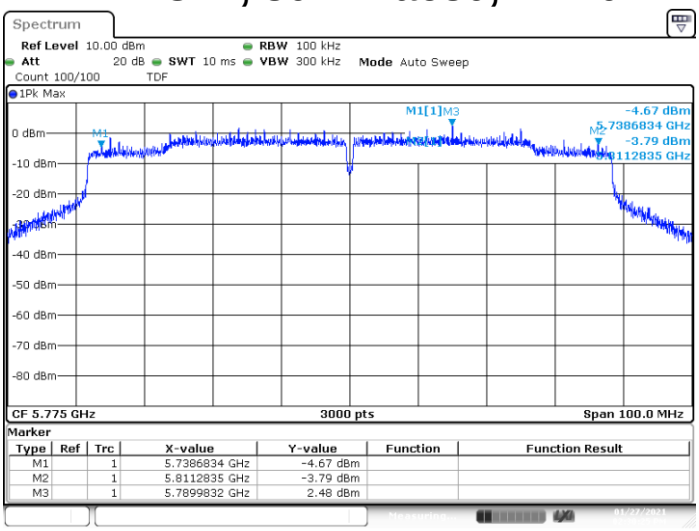
Channel 149

MIMO-A, 802.11n40, HT8



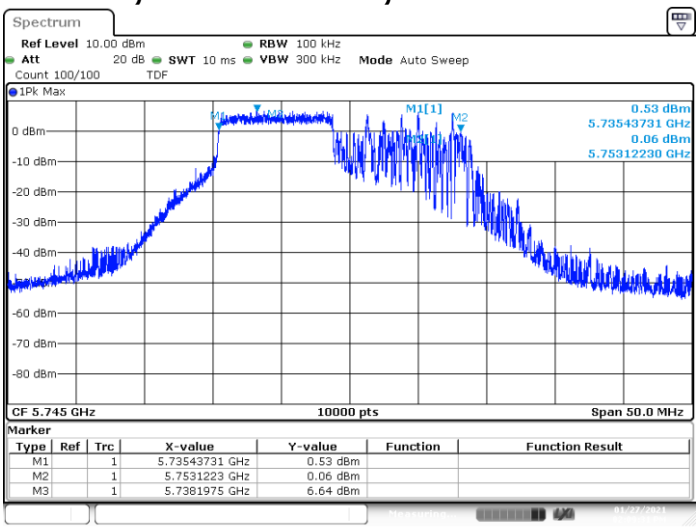
Channel 159

MIMO-B, 802.11ac80, VHT0



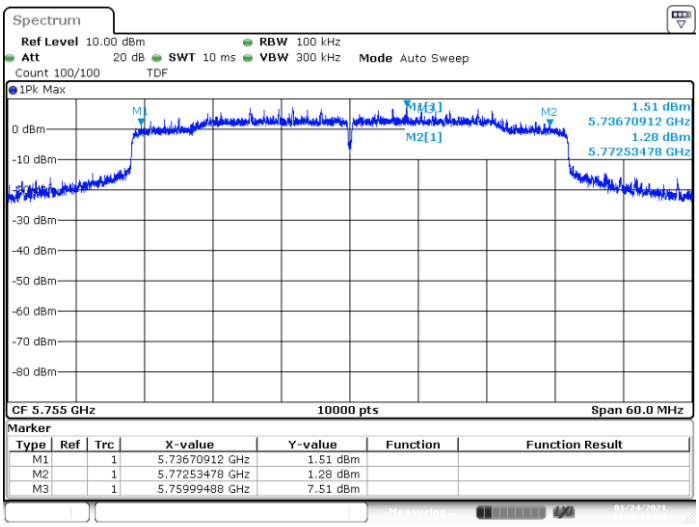
Channel 155

MIMO-B, 802.11ax20, HE0 – RU106/53



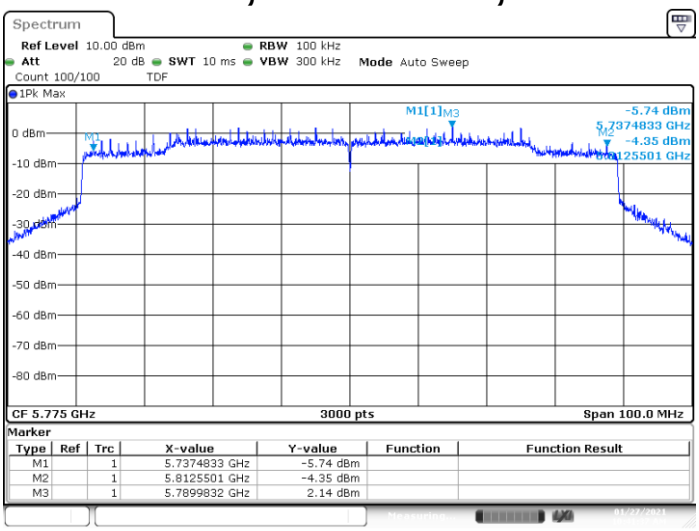
Channel 149

SISO-A, 802.11ax40, HE0



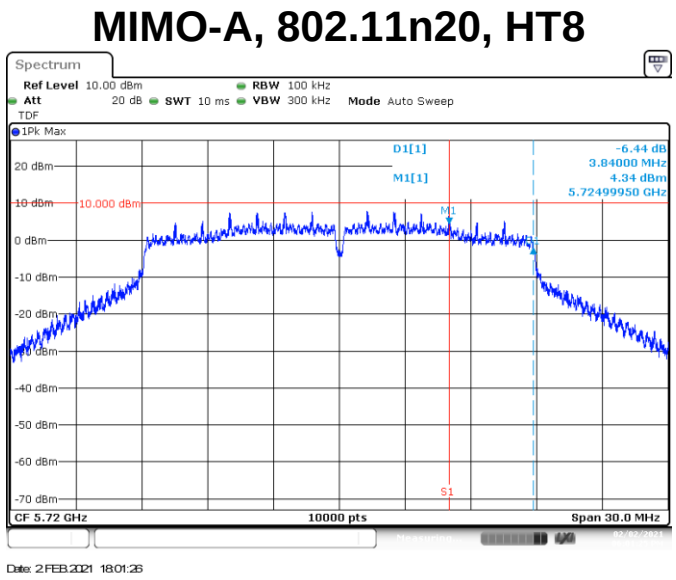
Channel 151

SISO-B, 802.11ax80, HE0

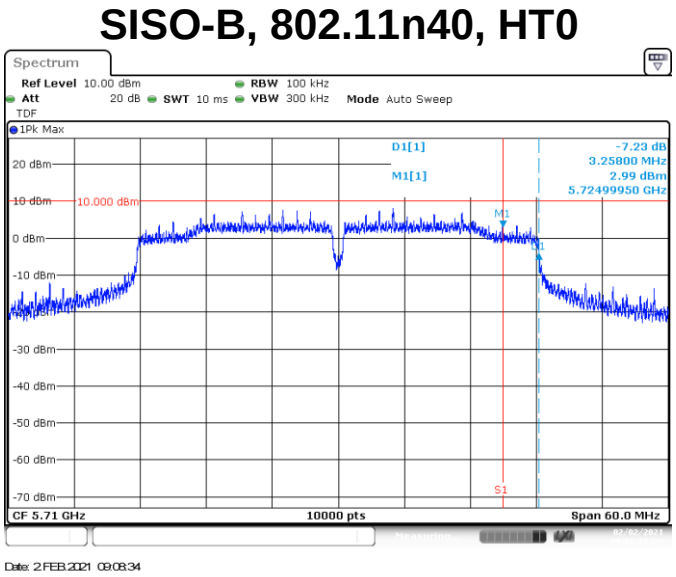


Channel 155

C.1.2 6dB Bandwidth (Overlapped Channel)

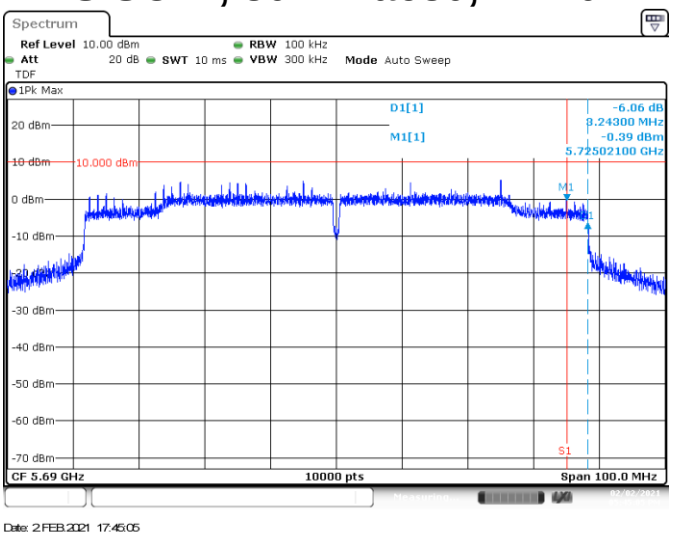


Channel 144 (Overlapped Channel)



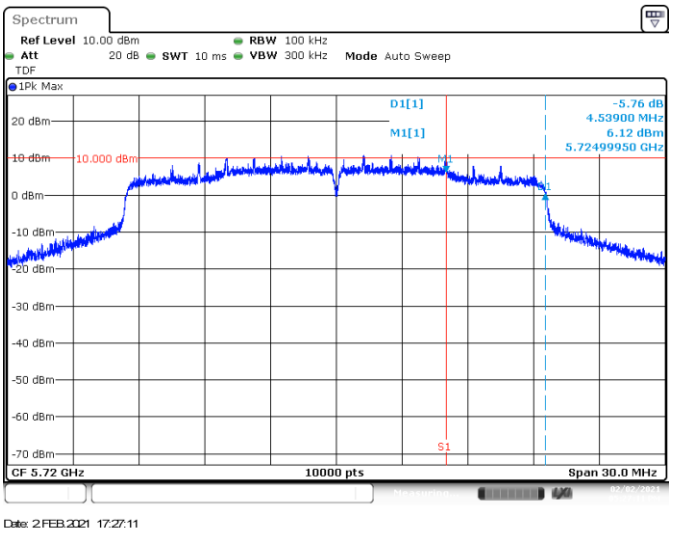
Channel 142 (Overlapped Channel)

SISO-A, 802.11ac80, VHT0



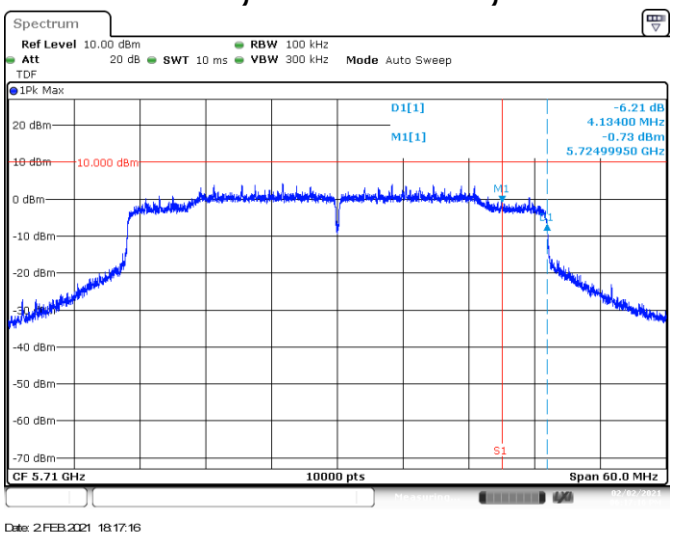
Channel 138 (Overlapped Channel)

SISO-A, 802.11ax20, HE0



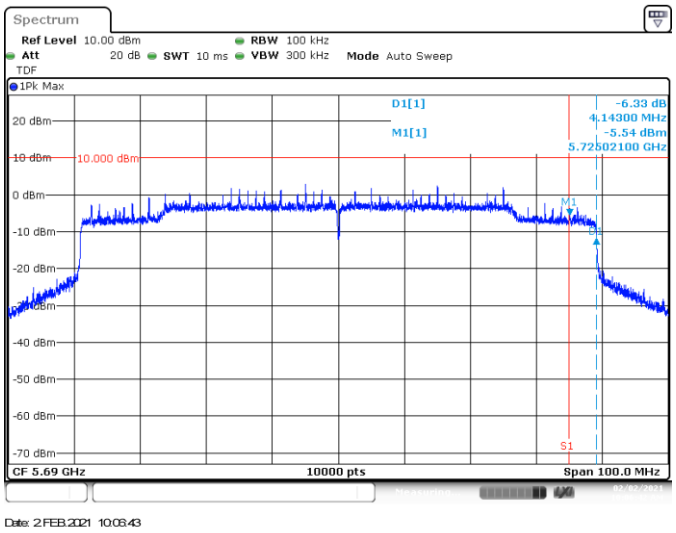
Channel 144 (Overlapped Channel)

MIMO-A, 802.11ax40, HE0



Channel 142 (Overlapped Channel)

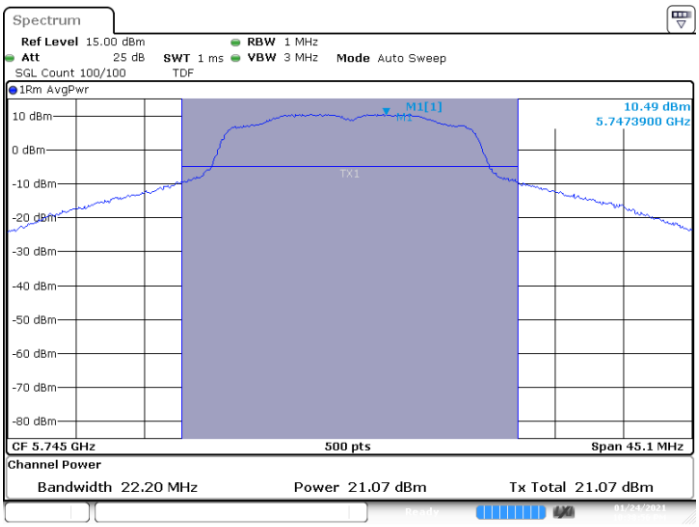
MIMO-B, 802.11ax80, HE0



Channel 138 (Overlapped Channel)

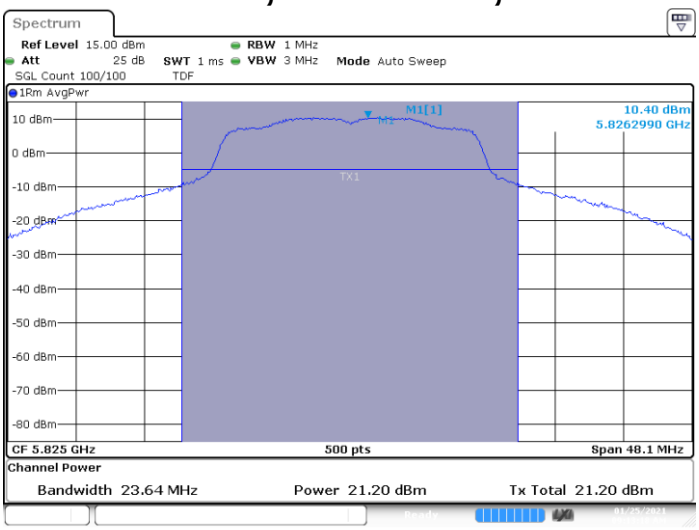
C.1.3 Maximum output power

SISO-A, 802.11a, 6Mbps



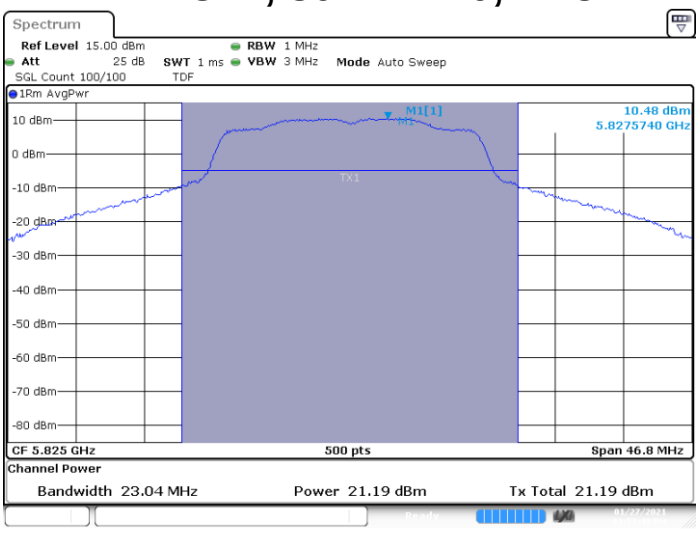
Channel 149

MIMO-A, 802.11n20, HT8



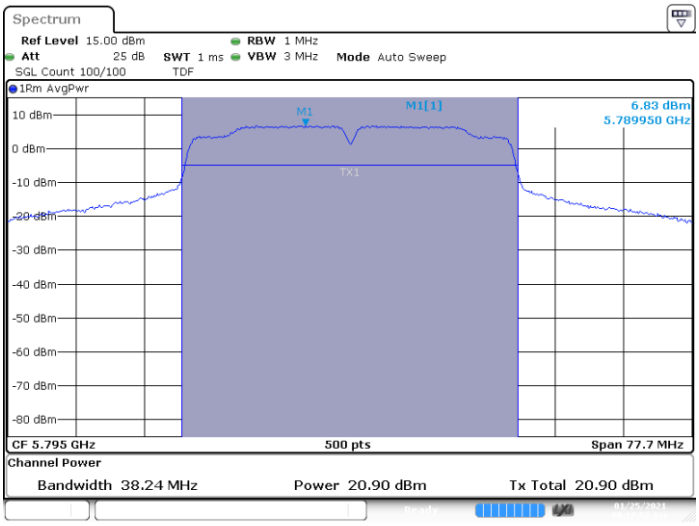
Channel 165

MIMO-B, 802.11n20, HT8



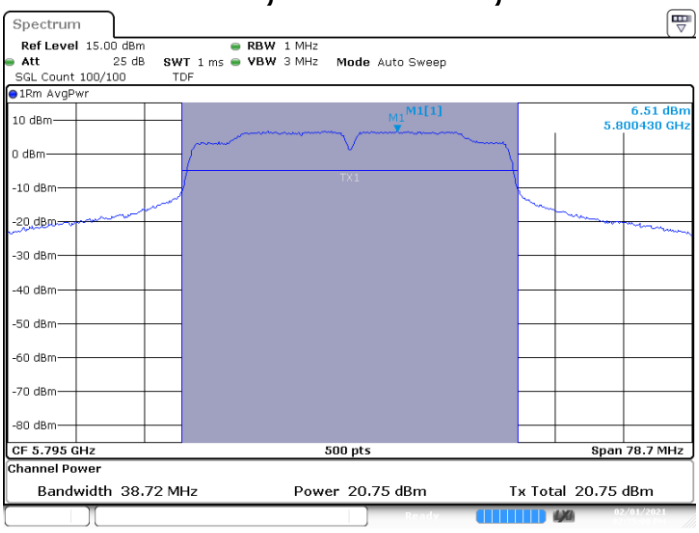
Channel 165

MIMO-A, 802.11n40, HT8



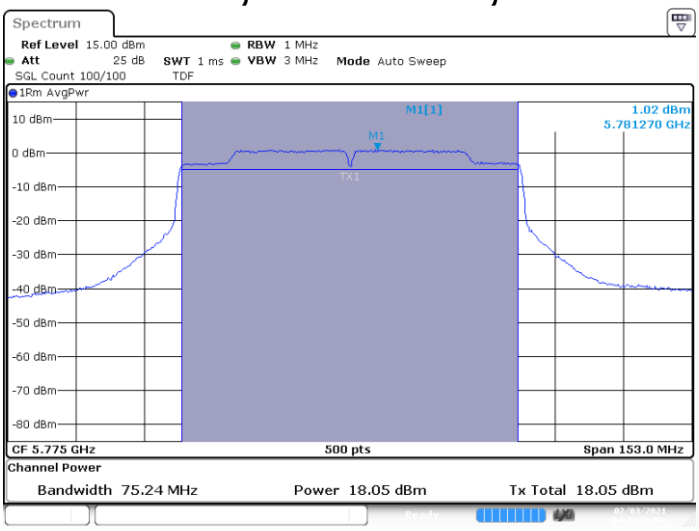
Channel 159

MIMO-B, 802.11n40, HT8



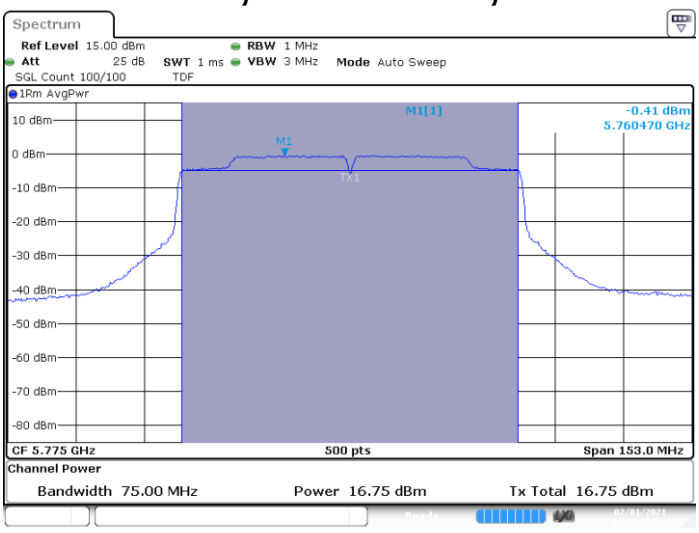
Channel 159

MIMO-A, 802.11ac80, VHT0



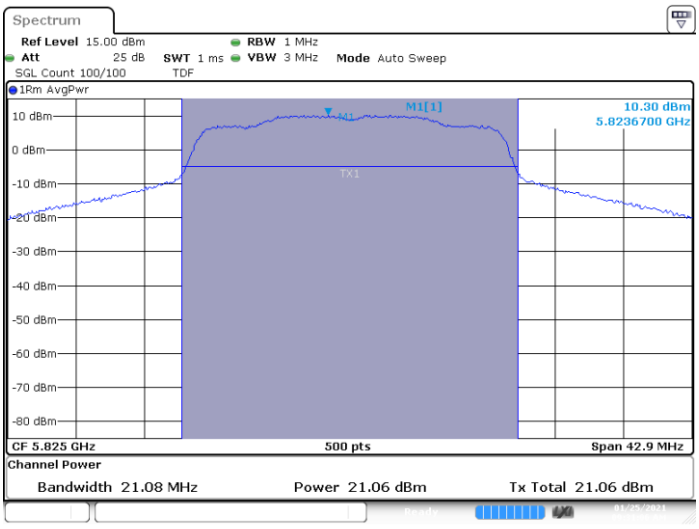
Channel 155

MIMO-B, 802.11ac80, VHT0



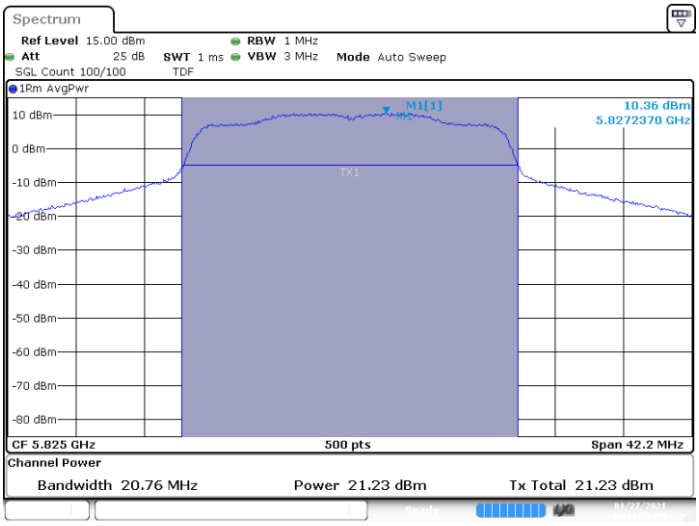
Channel 155

MIMO-A, 802.11ax20, HE0



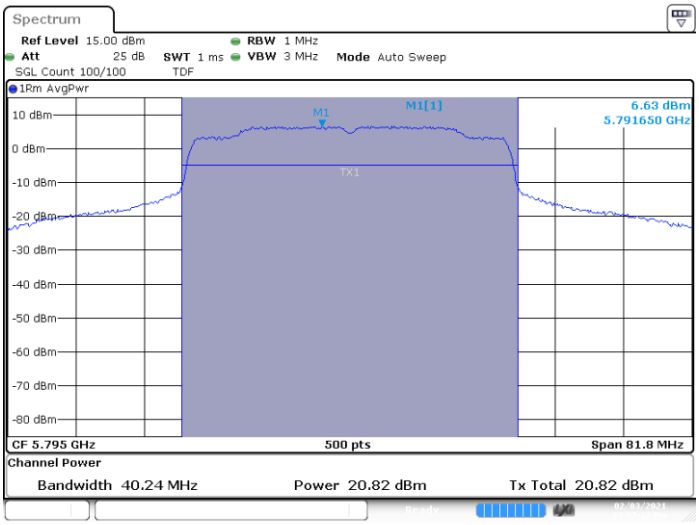
Channel 165

MIMO-B, 802.11ax20, HE0



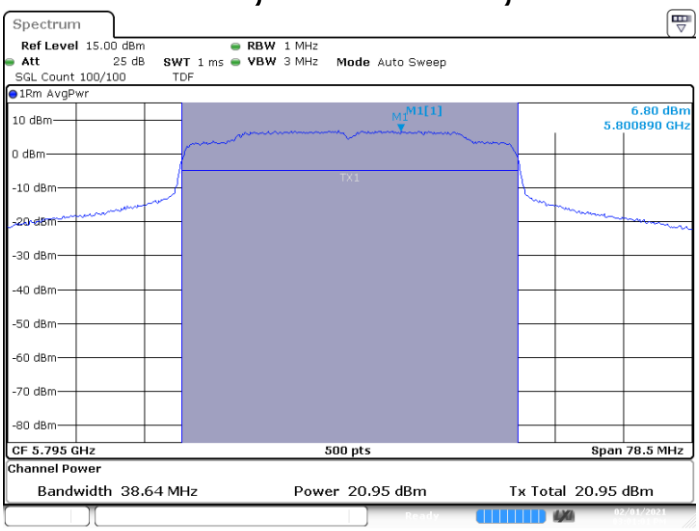
Channel 165

MIMO-A, 802.11ax40, HE0



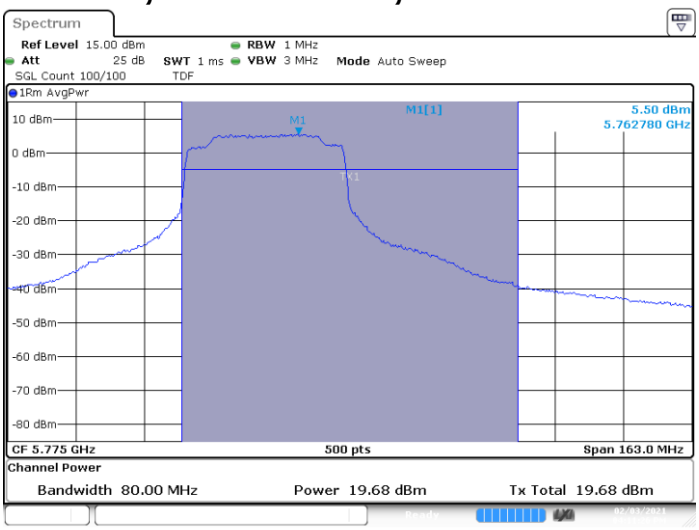
Channel 159

MIMO-B, 802.11ax40, HE0



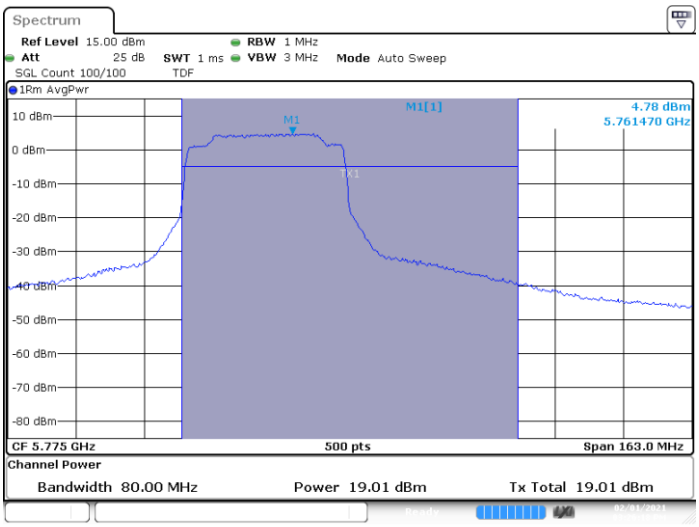
Channel 159

MIMO-A, 802.11ax80, HE0 RU:484/65



Channel 155

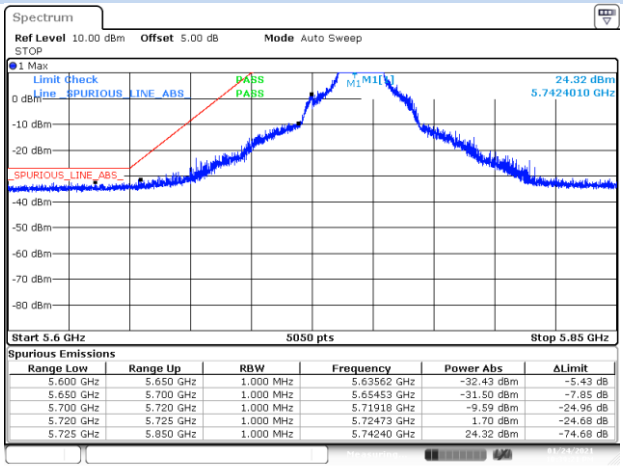
MIMO-B, 802.11ax80, HE0 RU:484/65



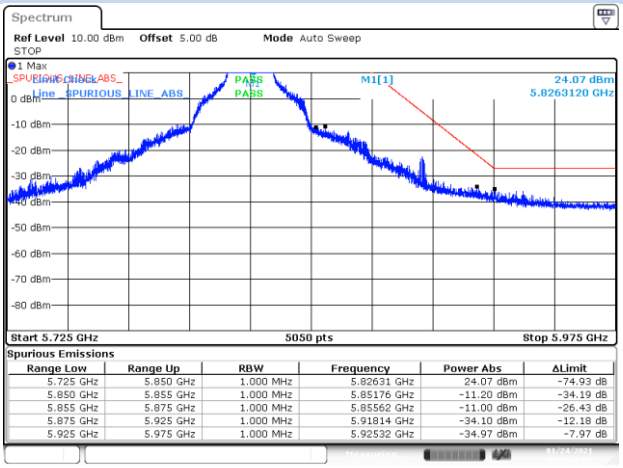
Channel 155

C.1.4 Undesirable emission limits : out of band (Conducted)

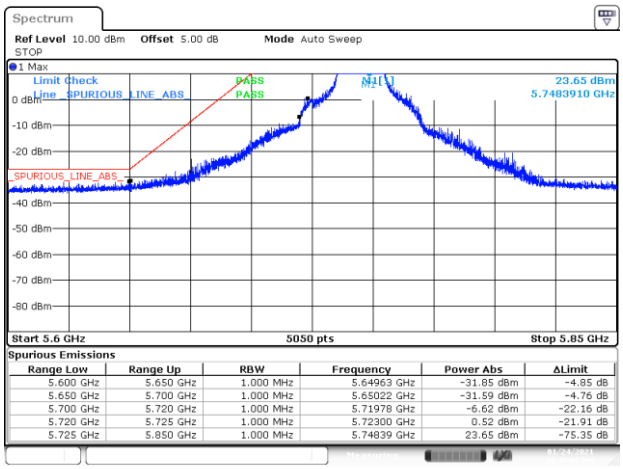
SISO A



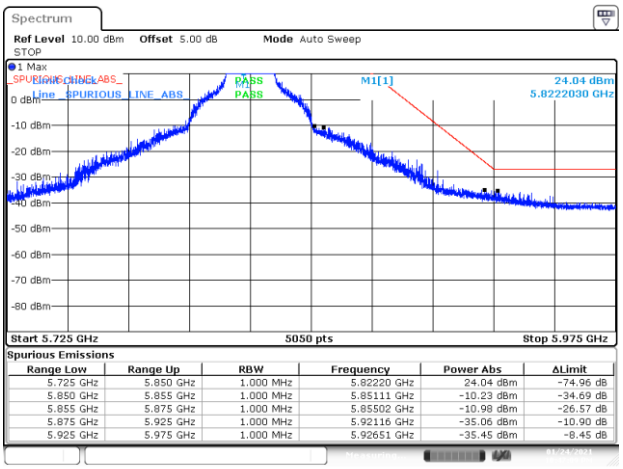
BE-NR-LOW, SISO-A, 802.11a-6Mbps, Ch149



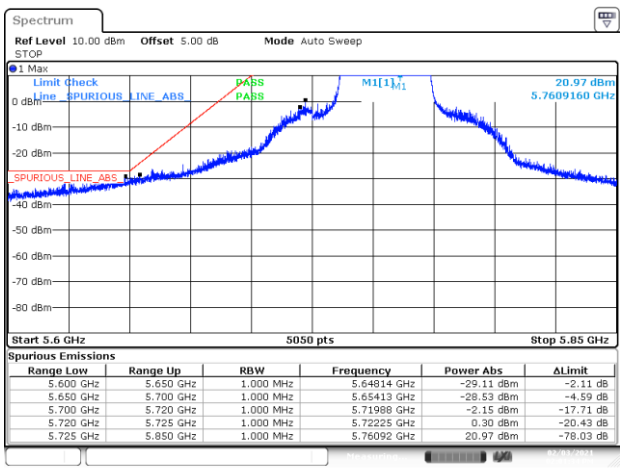
BE-NR-HIGH, SISO-A, 802.11a-6Mbps, Ch165



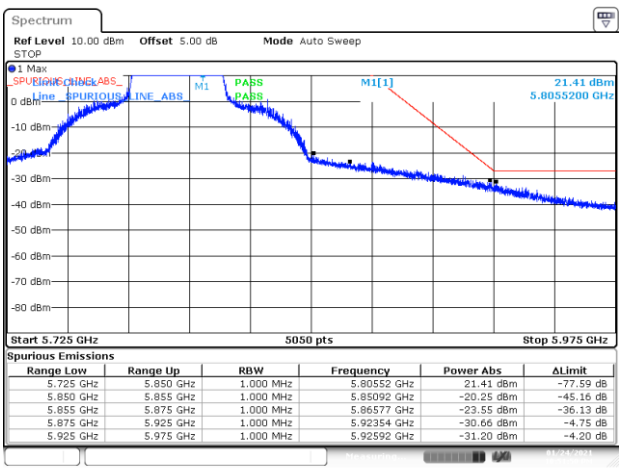
BE-NR-LOW, SISO-A, 802.11n20-HT0, Ch149

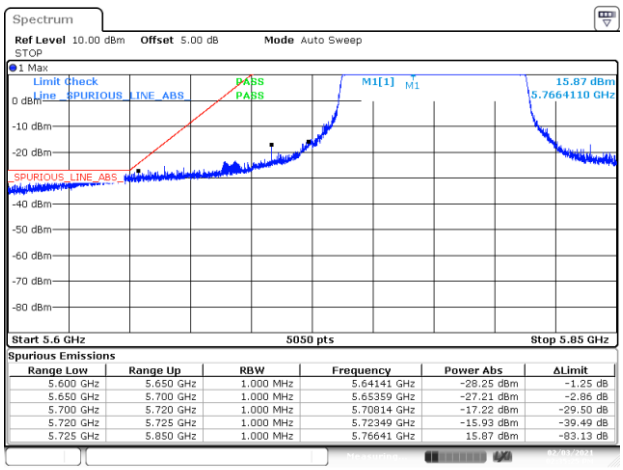


BE-NR-LOW, SISO-A, 802.11n40-HT0, Ch151

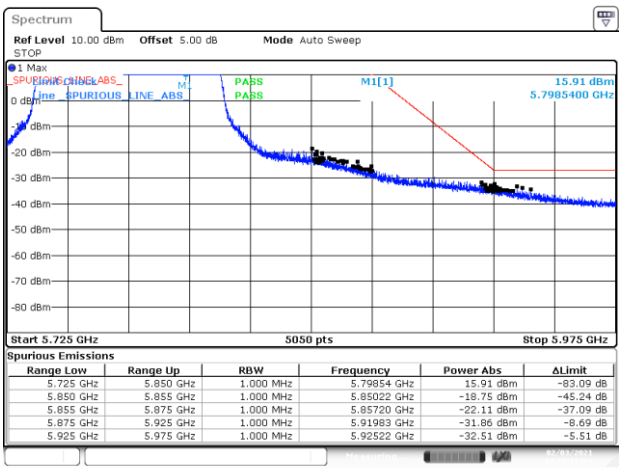


BE-NR-LOW, SISO-A, 802.11n40-HT0, Ch151

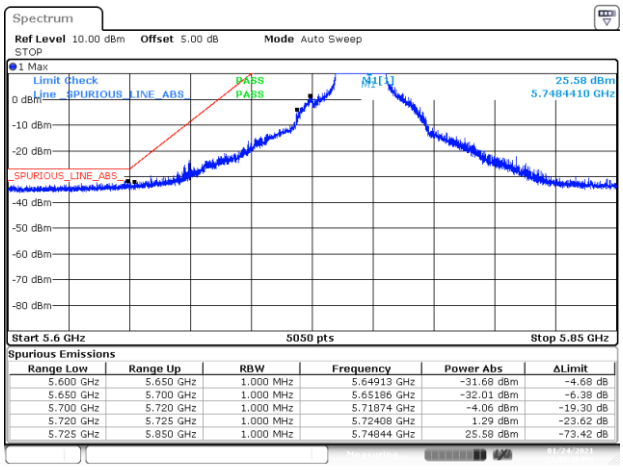




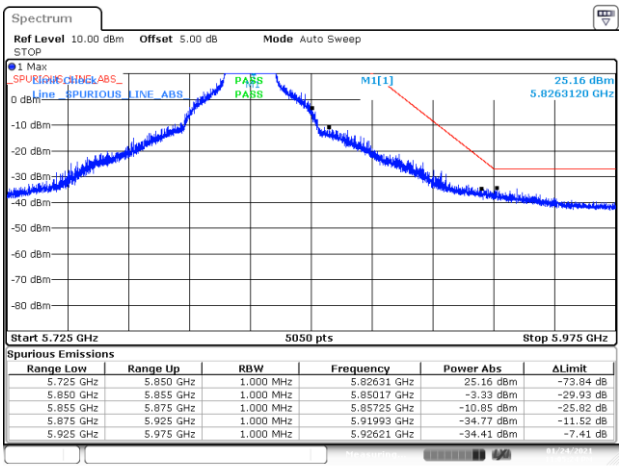
BE-NR-LOW, SISO-A, 802.11ac80-VHT0, Ch155



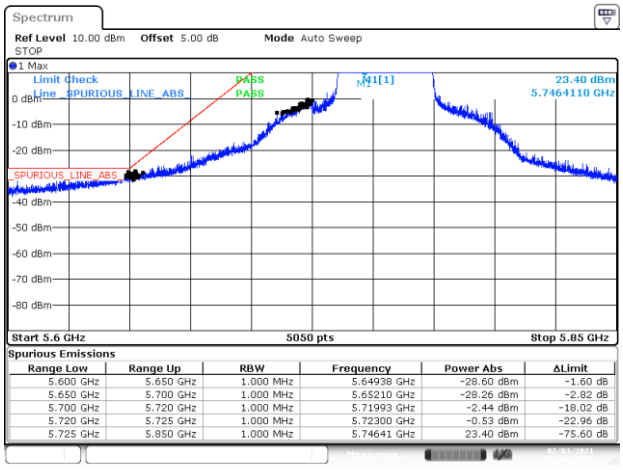
BE-NR-HIGH, SISO-A, 802.11ac80-VHT0, Ch155



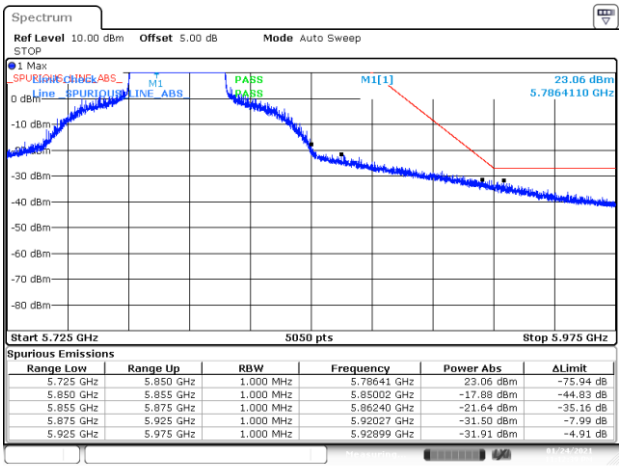
BE-NR-LOW, SISO-A, 802.11ax20-HE0, Ch149

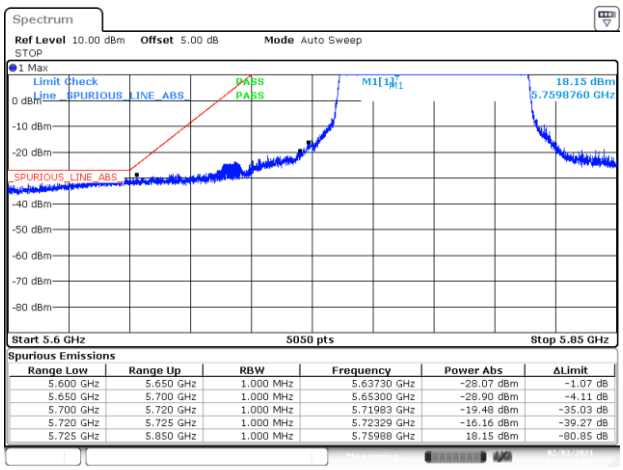


BE-NR-LOW, SISO-A, 802.11ax40-HE0, Ch151

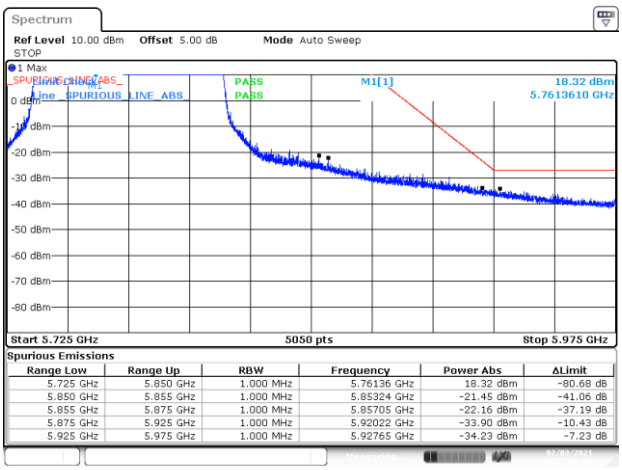


BE-NR-LOW, SISO-A, 802.11ax40-HE0, Ch151



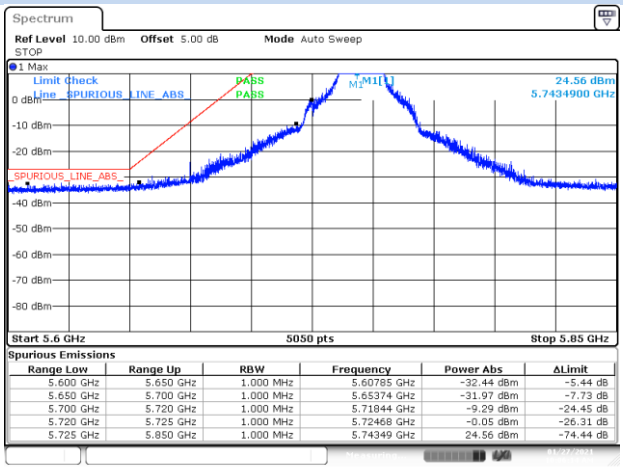


BE-NR-LOW, SISO-A, 802.11ax80-HE0, Ch155

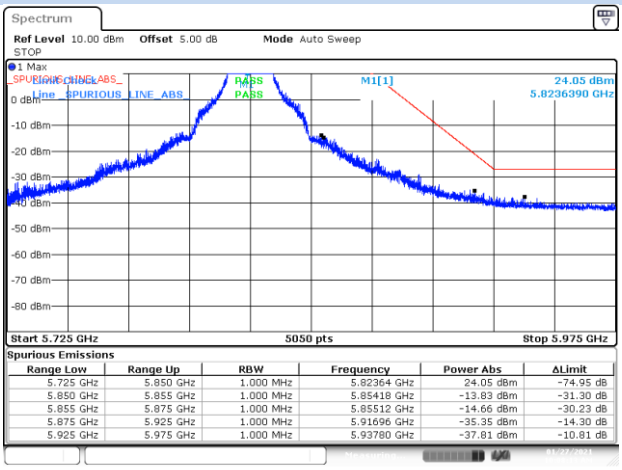


BE-NR-HIGH, SISO-A, 802.11ax80-HE0, Ch155

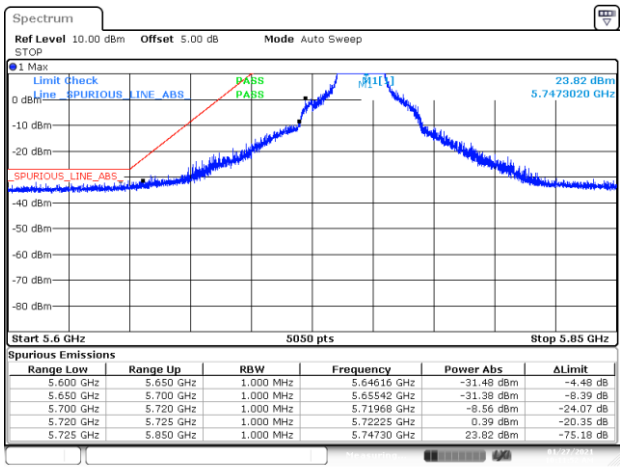
SISO B



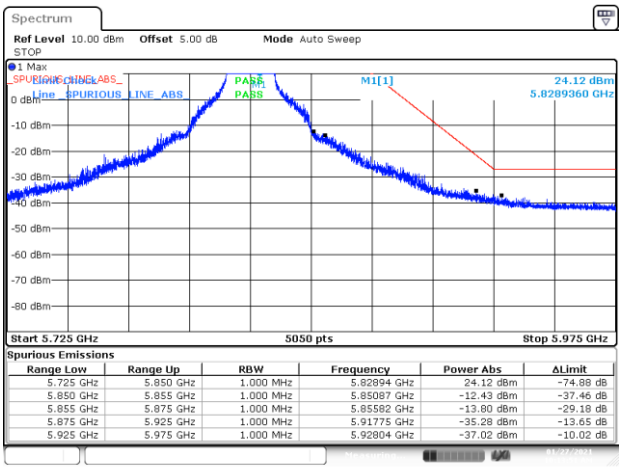
BE-NR-LOW, SISO-B, 802.11a-6Mbps, Ch149



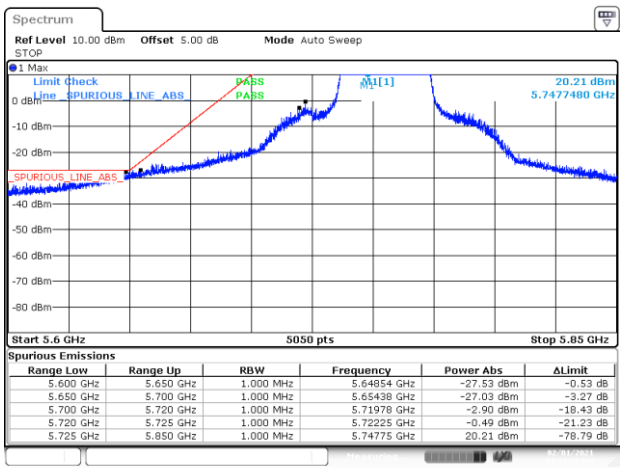
BE-NR-HIGH, SISO-B, 802.11a-6Mbps, Ch165



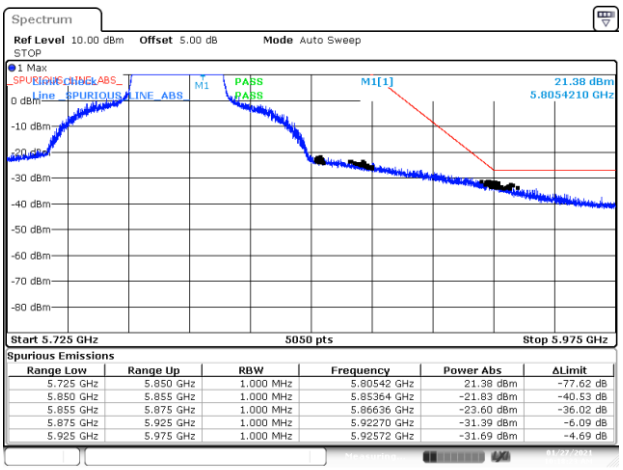
BE-NR-LOW, SISO-B, 802.11n20-HT0, Ch149



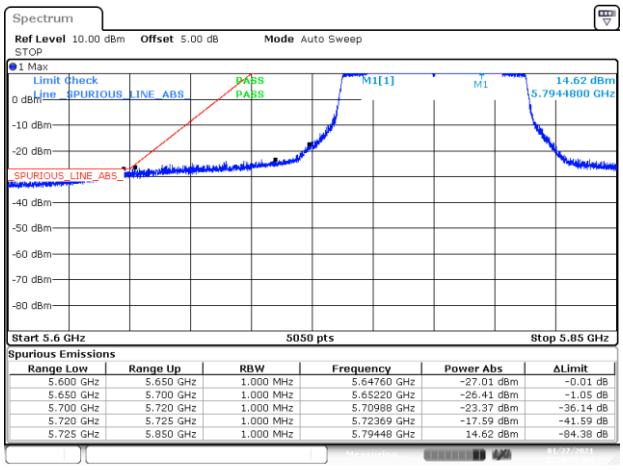
BE-NR-HIGH, SISO-B, 802.11n20-HT0, Ch165



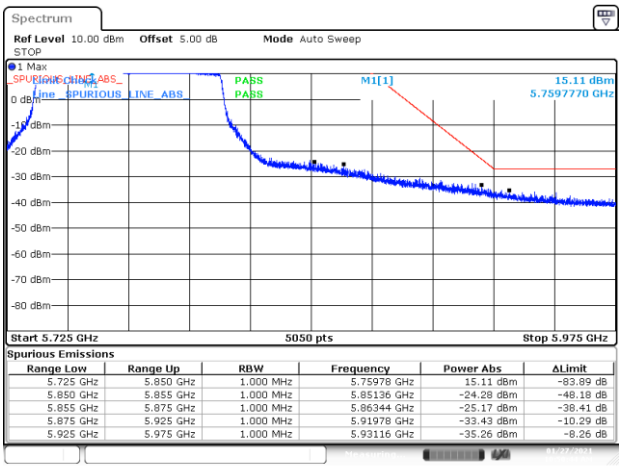
BE-NR-LOW, SISO-B, 802.11n40-HT0, Ch151



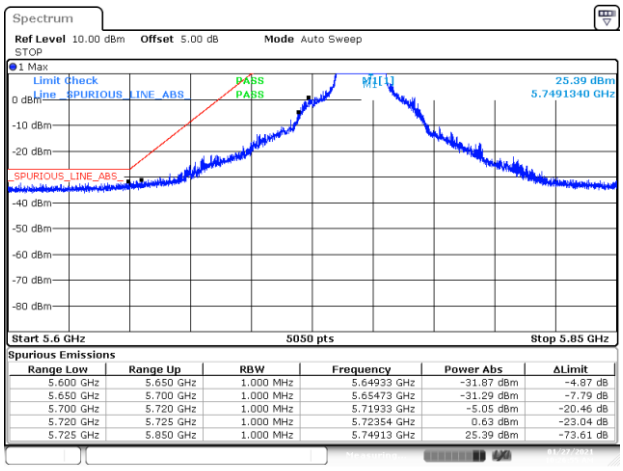
BE-NR-HIGH, SISO-B, 802.11n40-HT0, Ch159



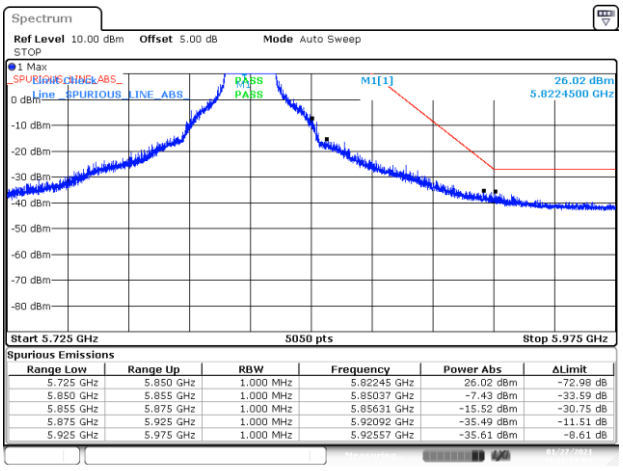
BE-NR-LOW, SISO-B, 802.11ac80-VHT0, Ch155



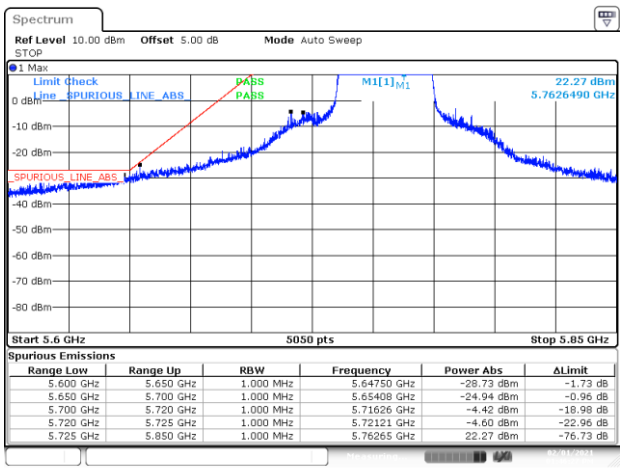
BE-NR-HIGH, SISO-B, 802.11ac80-VHT0, Ch155



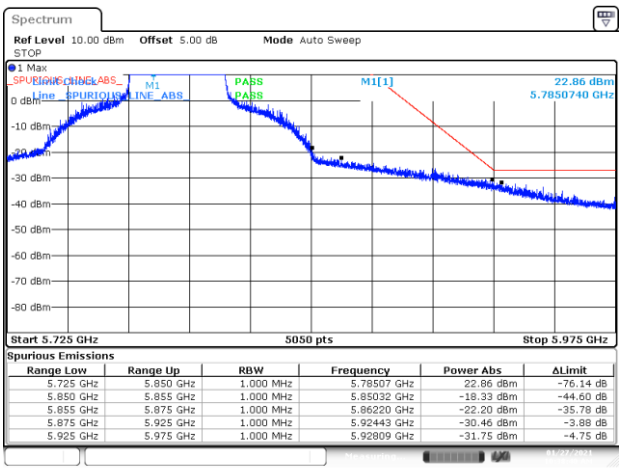
BE-NR-LOW, SISO-B, 802.11ax20-HE0, Ch149



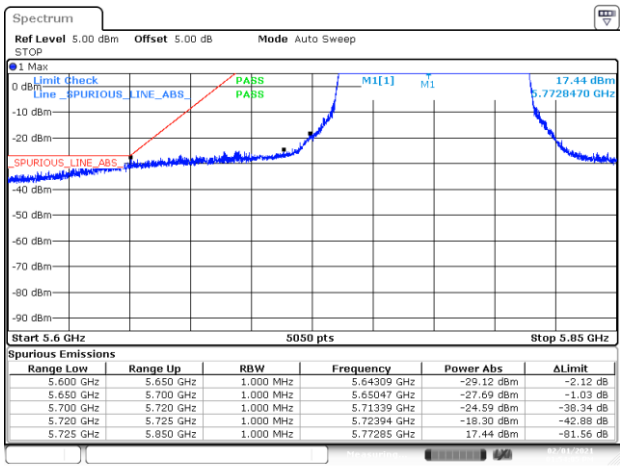
BE-NR-HIGH, SISO-B, 802.11ax20-HE0, Ch165



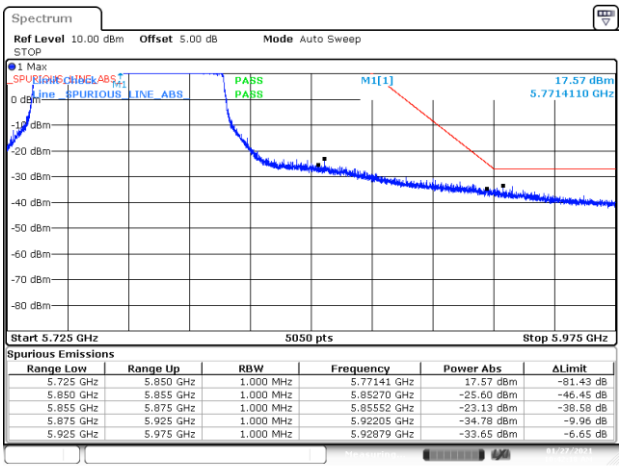
BE-NR-LOW, SISO-B, 802.11ax40-HE0, Ch151



BE-NR-HIGH, SISO-B, 802.11ax40-HE0, Ch159

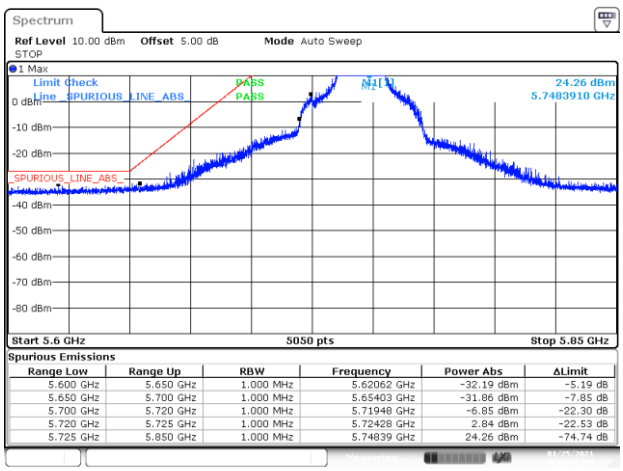


BE-NR-LOW, SISO-B, 802.11ax80-HE0, Ch155

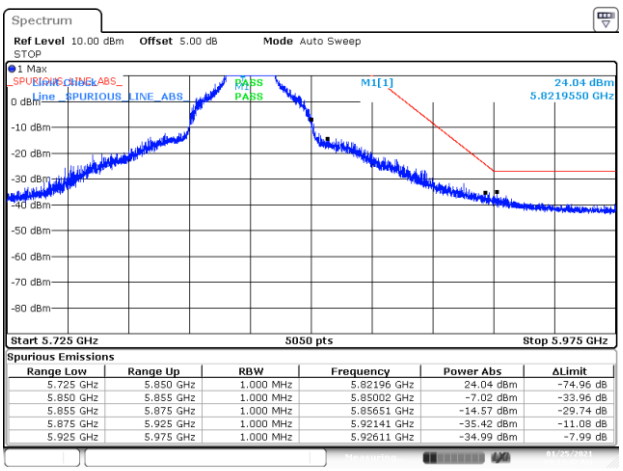


BE-NR-HIGH, SISO-B, 802.11ax80-HE0, Ch155

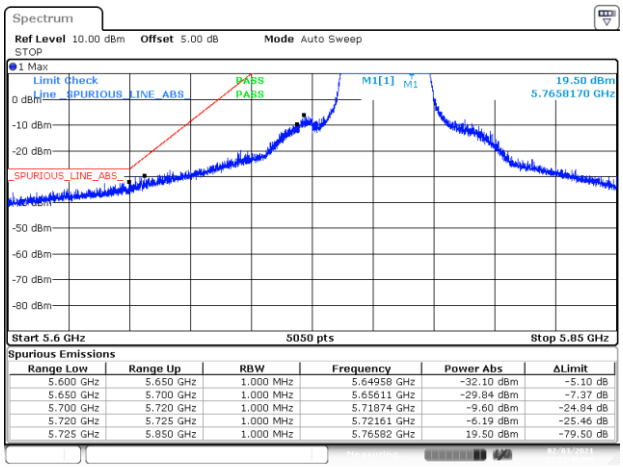
MIMO A



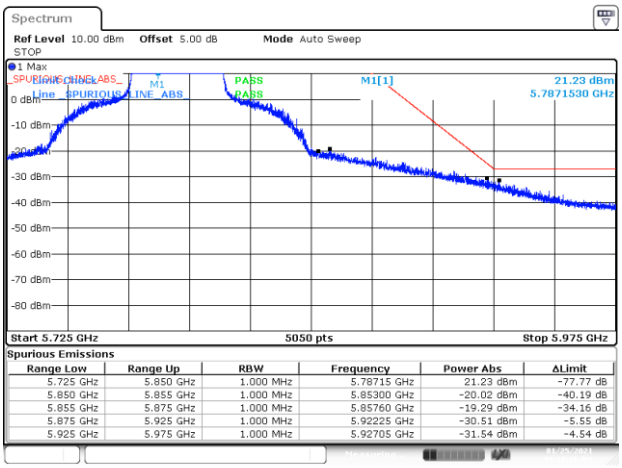
BE-NR-LOW, MIMO-A, 802.11n20-HT8, Ch149



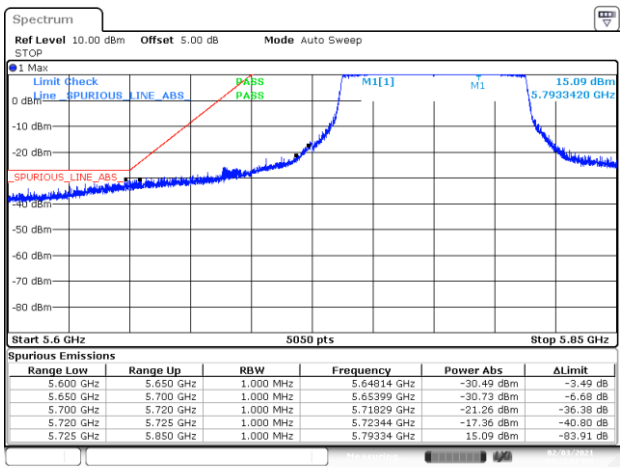
BE-NR-HIGH, MIMO-A, 802.11n20-HT8, Ch165



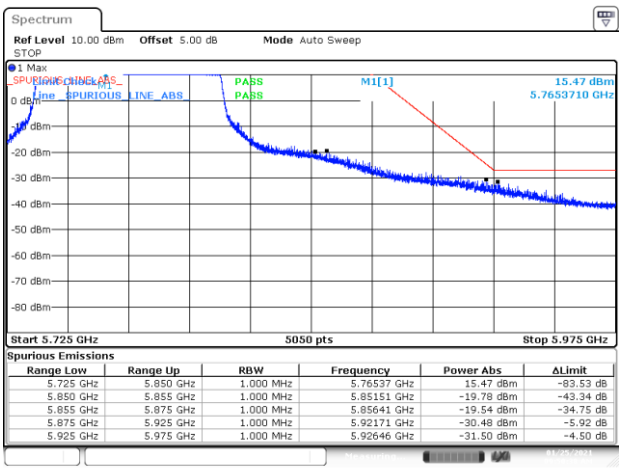
BE-NR-LOW, MIMO-A, 802.11n40-HT8, Ch151



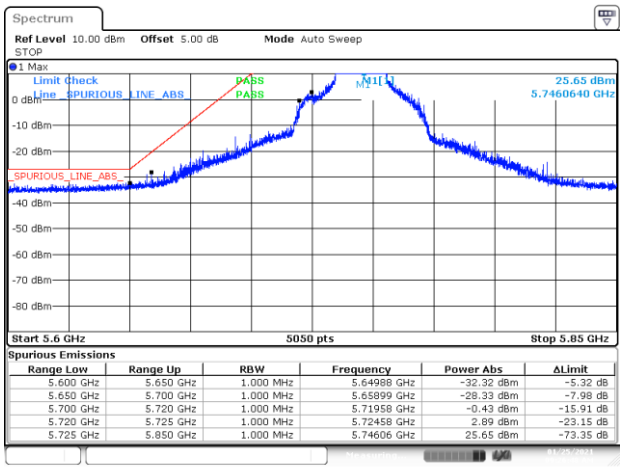
BE-NR-HIGH, MIMO-A, 802.11n40-HT8, Ch159



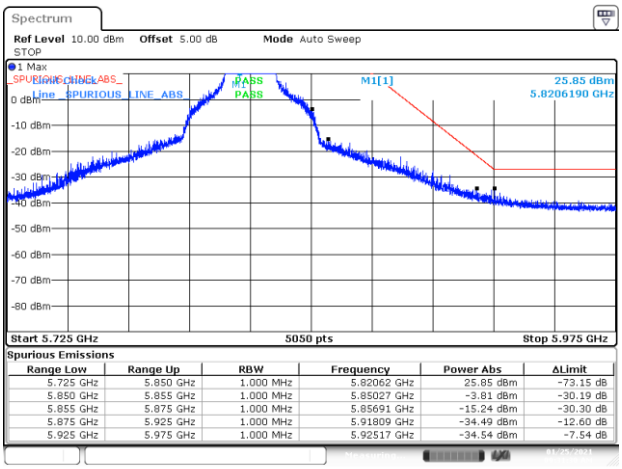
BE-NR-LOW, MIMO-A, 802.11ac80-VHT0, Ch155



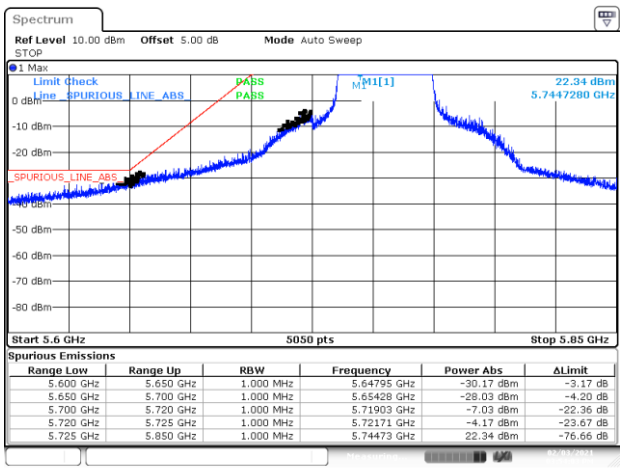
BE-NR-HIGH, MIMO-A, 802.11ac80-VHT0, Ch155



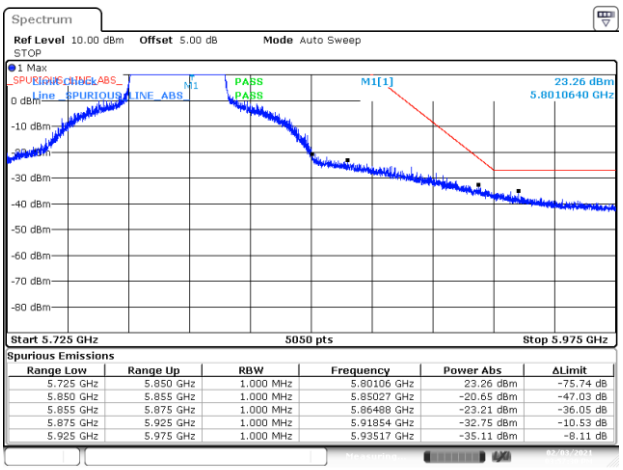
BE-NR-LOW, MIMO-A, 802.11ax20-HE0, Ch149



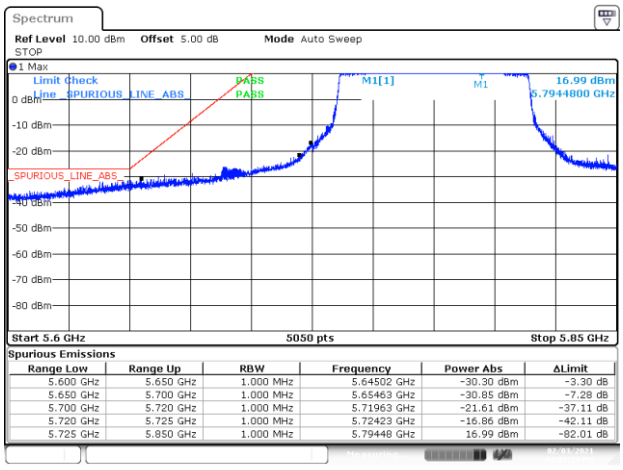
BE-NR-HIGH, MIMO-A, 802.11ax20-HE0, Ch165



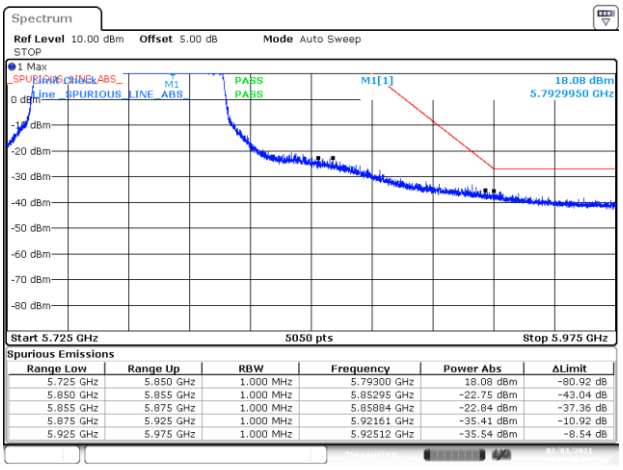
BE-NR-LOW, MIMO-A, 802.11ax40-HE0, Ch151



BE-NR-HIGH, MIMO-A, 802.11ax40-HE0, Ch159

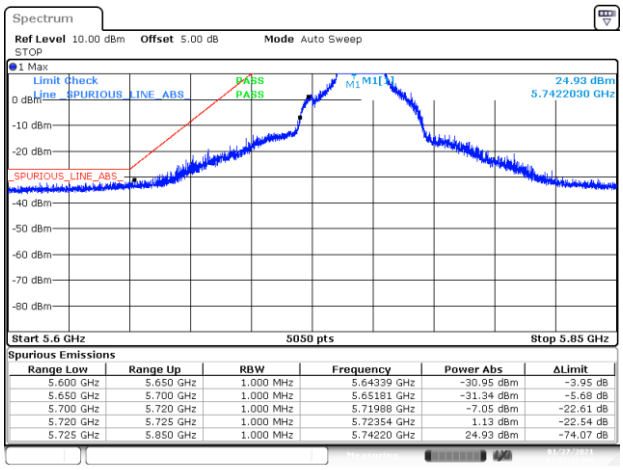


BE-NR-LOW, MIMO-A, 802.11ax80-HE0, Ch155

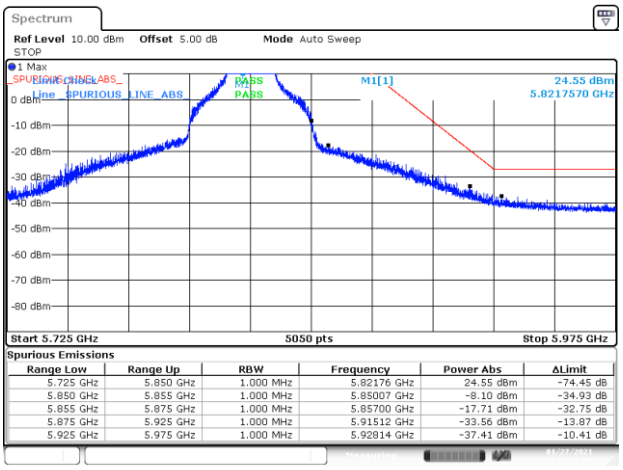


BE-NR-HIGH, MIMO-A, 802.11ax80-HE0, Ch155

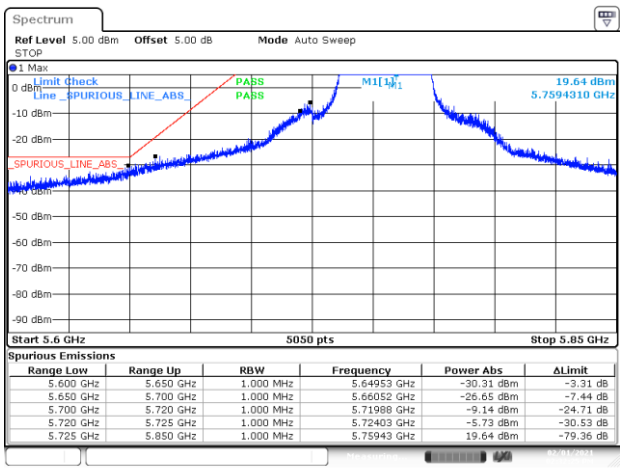
MIMO B



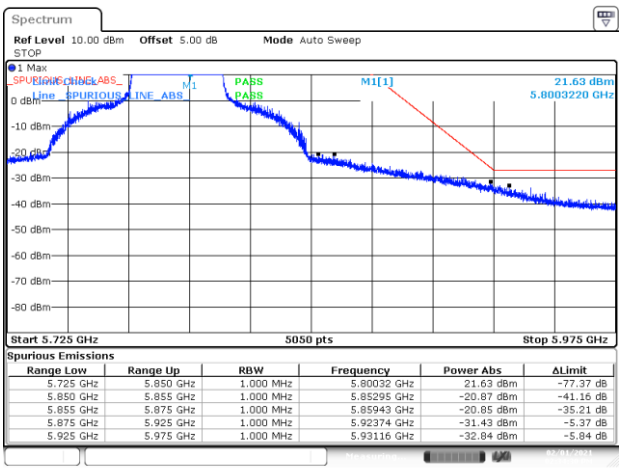
BE-NR-LOW, MIMO-B, 802.11n20-HT8, Ch149



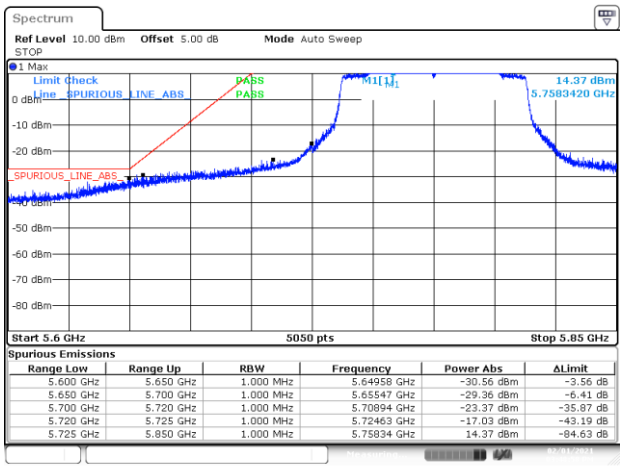
BE-NR-HIGH, MIMO-B, 802.11n20-HT8, Ch165



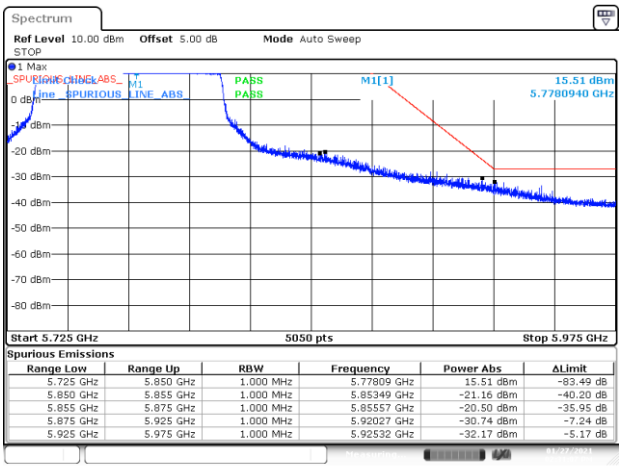
BE-NR-LOW, MIMO-B, 802.11n40-HT8, Ch151



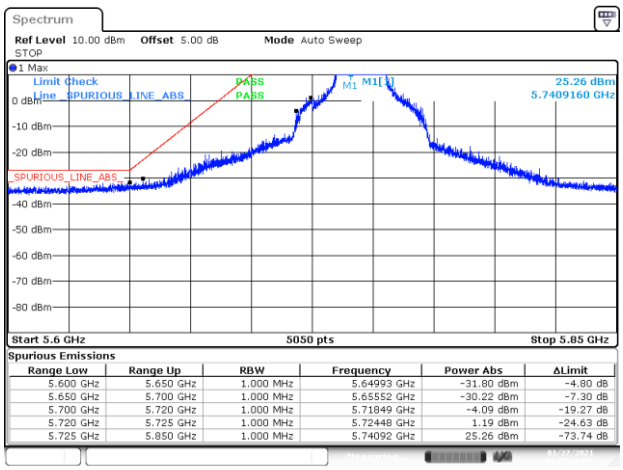
BE-NR-HIGH, MIMO-B, 802.11n40-HT8, Ch159



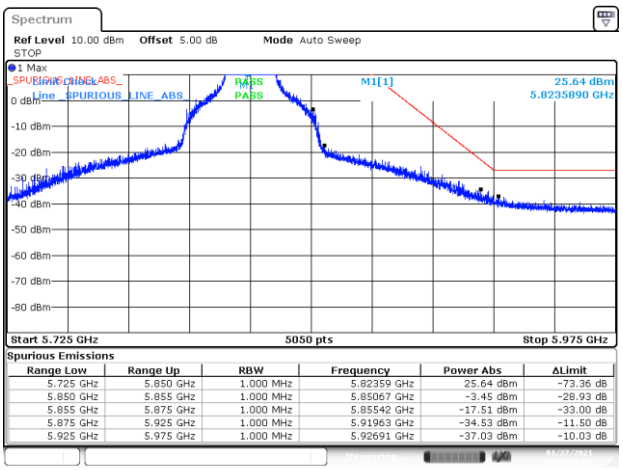
BE-NR-LOW, MIMO-B, 802.11ac80-VHT0, Ch155



BE-NR-HIGH, MIMO-B, 802.11ac80-VHT0, Ch155



BE-NR-LOW, MIMO-B, 802.11ax20-HE0, Ch149



BE-NR-HIGH, MIMO-B, 802.11ax20-HE0, Ch165