

TEST REPORT

EUT Description	WLAN and BT, 2x2 PCIe M.2 2230 adapter card
Brand Name	Intel®
Model Name	BE201NGW
FCC/IC ID	PD9BE201NG ; 1000M-BE201NG
Date of Test Start/End	2023-11-12 /2023-12-29
Features	2x2 WiFi - Bluetooth® (see section 5)

Applicant	Intel Corporation SAS
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Reference Standards	FCC CFR Title 47 Part 15 E RSS-247 issue 3, RSS-Gen A1 issue 5 - A1 (see section 1)
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Test Report identification	231109-03.TR10
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.
 Reference to accreditation shall be used only by full reproduction of test report.

Issued by _____

Reviewed by _____

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1. Standards, reference documents and applicable test methods

FCC	<ol style="list-style-type: none"> 1. FCC Title 47 CFR part 15 – Subpart E – Unlicensed National Information Infrastructure Devices. 2021-10-01 Edition 2. FCC Title 47 CFR part 15 – Subpart C – §15.209 Radiated emission limits; general requirements. 2021-10-01 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	<ol style="list-style-type: none"> 1. RSS-Gen Issue 5 Amendment 1 - General Requirements for Compliance of Radio Apparatus. 2. RSS-247 Issue 3 - 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. 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

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 company number 1000Y and CAB identifier FR0005.
- ✓ Intel WRF Lab only provides testing services and is committed to providing reliable, unbiased test results and interpretations.
- ✓ 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.

3. Environmental Conditions

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

Temperature	23.2+/- 2.6C
Humidity	53.5+/-17.1%

4. Test samples

Sample	Control #	Description	Model	Serial #	Date of receipt	Note
#01	231109-03.S02	WiFi 7 Module	BE201NGW	A002A5B1A62F	2023-11-10	Used for Overlapped channels RF conducted tests
	200904-01.S10	Laptop	HP (HSN-I42C)	000075059C	2023-04-24	
	231109-03.S46	CRF DB 2230 BNJ Extender Board	PCB00862-00_A	ASS00862-01-0A	2023-11-16	
#02	231109-03.S04	WiFi 7 Module	BE201NGW	A002A5B1A56C	2023-11-10	Used for all other RF conducted tests
	231109-03.S53	WiFi 7 Module	BE201NGW	4C496C6BD41A	2023-12-21	
	200203-01.S10	Laptop	HP (HSN-I38C)	000951007L	2023-04-24	
	231109-03.S31	CRF DB 2230 BNJ Extender Board	PCB00862-00_A	ASS00862-01-0A	2023-11-10	
#03	231109-03.S09	WiFi 7 Module	BE201NGW	A002A5B1A61B	2023-11-13	Used for Radiated Spurious Emissions tests
	220225-03.S07	Microwave Absorber	Eccosorb BSR-1	-	2022-03-14	
	231109-03.S48	Adaptor	PCB00866-00_A	124627	2023-11-24	
	200611-03.S31	Extender	ADEXELEC	-	2020-08-19	
	200504-04.S07	Laptop	Latitude 5401	BVHLK13	2020-06-02	
	230223-02.S47	Triband Antenna	-	005	2023-04-20	
	230223-02.S48	Triband Antenna	-	006	2023-04-20	
#04	231109-03.S01	WiFi 7 Module	BE201NGW	A002A5B1A620	2023-11-24	Used for Radiated Spurious Emissions tests
	220225-03.S07	Microwave Absorber	Eccosorb BSR-1	-	2022-03-14	
	231109-03.S47	Adaptor	PCB00866-00_A	124727	2023-11-24	
	220915-09.S01	Extender	ADEXELEC	-	2022-04-06	
	200611-03.S30	Laptop	Latitude 5401	6DJLK13	2020-08-19	
	230223-02.S49	Triband Antenna	-	007	2023-04-20	
	230223-02.S50	Triband Antenna	-	008	2023-04-20	

5. EUT Features

The herein information is provided by the customer

Intel WRF Lab declines any responsibility for the accuracy of the stated customer provided information, especially if it has any impact on the correctness of test results presented in this report.

Brand Name	Intel®		
Model Name	BE201NGW		
Software Version	DRTU.05312.99.0.84 / DRTU.05490.99.0.85		
Driver Version	99.0.84.6 / 99.0.85.2		
Prototype / Production	Production		
Supported Radios	802.11b/g/n/ac/ax/be	2.4GHz	
	802.11a/n/ac/ax/be	5.2GHz	
		5.6GHz	
		5.8GHz	
	802.11ax/be	6.0GHz	
Antenna Information	Bluetooth	2.4GHz	
	Transmitter	Chain A(1)	Chain B(2)
	Manufacturer	Intel WRF Lab	Intel WRF Lab
	Antenna type	PIFA	PIFA
	Part number	WRF-Tri Band-Antenna	WRF-Tri Band-Antenna
Declared antenna gain (dBi)	+5.15	+5.15	

6. Remarks and comments

1. No deviations were made from the test methods listed in section 1 of this report
2. Only the worst-case plot per bandwidth and test case measurements have been reported excepted for band edge measurements where all plots are reported

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/be – 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

P: Pass
 F: Fail
 NM: Not Measured
 NA: Not Applicable

8. Document Revision History

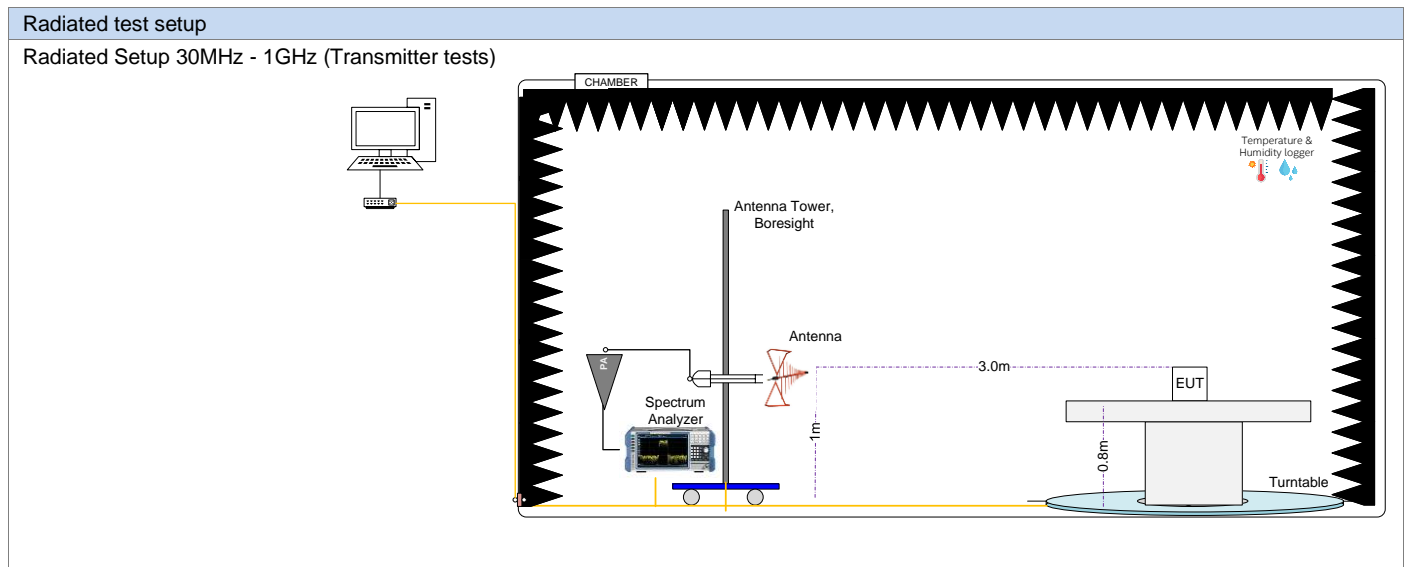
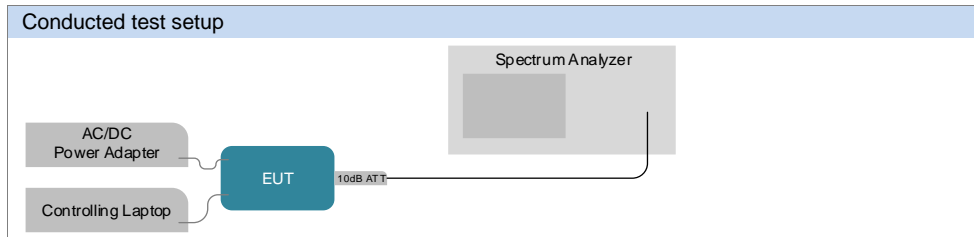
Revision #	Modified by	Revision Details
Rev. 00	T.MATHIEU R.SIMONINI	First Issue

Annex A. Test & System Description

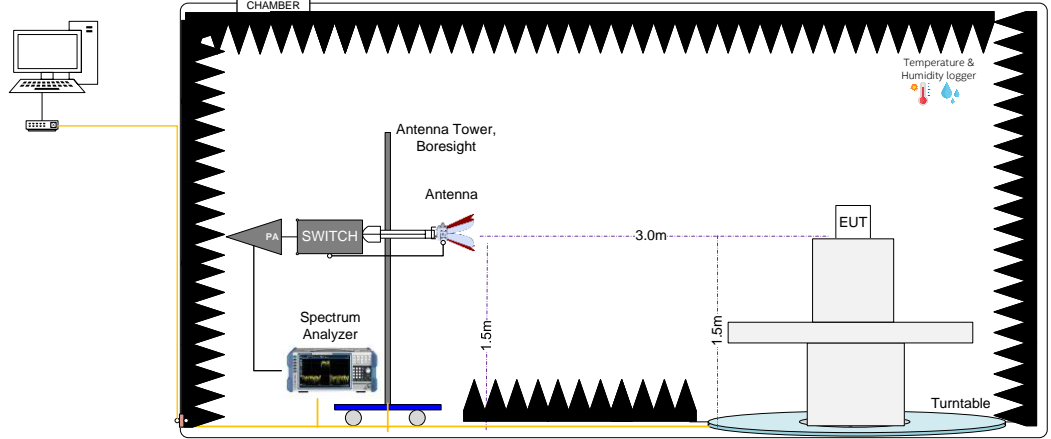
A.1 Measurement System

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

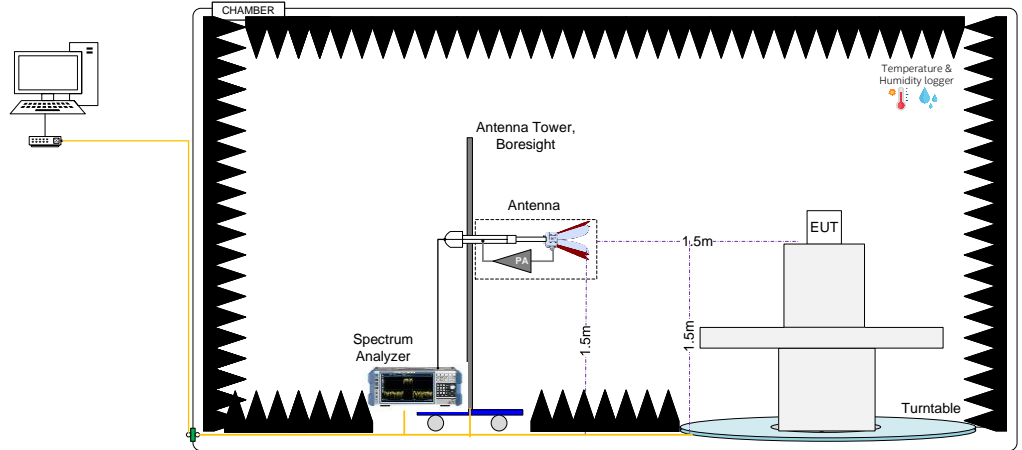
The DUT was installed in a test fixture and this test fixture is connected to a laptop computer and AC/DC power adapter. The laptop computer was used to configure the EUT to continuously transmit at a specified output power using all different modes and modulation schemes, using the Intel proprietary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



Radiated Setup 1GHz – 10GHz (Transmitter tests)



Radiated Setup 10GHz – 40GHz (Transmitter tests)



Sample Calculation

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

$$F \text{ (dB/m)} = \text{Rx Antenna Factor (dB/m)} + \text{Cable losses (dB)} - \text{Amplifiers Gain (dBi)}$$

$$E \text{ (dB}\mu\text{V)} = V \text{ (dB}\mu\text{V)} + F \text{ (dB/m)}$$

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:

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

where

$E_{\text{SpecLimit}}$ is the field strength of the emission at the distance specified by the limit, in dB μ V/m

E_{Meas} is the field strength of the emission at the measurement distance, in dB μ V/m

D_{Meas} is the measurement distance, in m

$D_{\text{SpecLimit}}$ 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
131-000	Spectrum Analyzer	FSV40	101425	Rohde & Schwarz	2022-07-10	2024-07-10
018-003	RF cable 50cm	PE360-50CM	N/A	PASTERNAK	2023-03-03	2024-03-03
018-001	10dB Attenuator + MH4	N/A	N/A	N/A	2023-03-03	2024-03-03
407-000	Temp & Humidity Logger	RA12E-TH1-RAS	RA12-E16EDA	AVITECH	2023-07-12	2025-07-12
413-000	Measurement SW v1.5.4.2	Octopi	N/A	Step AT	N/A	N/A

Conducted setup for Overlapped test

ID#	Device	Type/Model	Serial #	Manufacturer	Cal. Date	Cal. Due Date
266-000	Spectrum Analyzer	FSV30	103307	Rohde & Schwarz	2022-04-26	2024-04-26
019-000	RF cable 50cm	PE360-50CM	N/A	PASTERNAK	2023-03-03	2024-03-03
019-002	10dB Attenuator + MH4	N/A	N/A	N/A	2023-03-03	2024-03-03
407-000	Temp & Humidity Logger	RA12E-TH1-RAS	RA12-E16EDA	AVITECH	2023-07-12	2025-07-12
413-000	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
006-000	Anechoic Chamber	FACT3	5720	ETS-Lindgren	2022-01-21	2024-01-21
006-008	Measurement SW, v11.30	EMC32	100623	Rohde & Schwarz	N/A	N/A
259-000	Temp & Humidity Logger	RA12E-TH-RAS	RA12-B9BD70	Avtech	2022-06-27	2024-06-27
006-001	Turn Table	ETS	-	ETS-Lindgren	N/A	N/A
006-011	Boresight antenna mast	BAM 4.0-P	P/278/2890.01	Maturo	N/A	N/A
007-008	Double Horn Ridged antenna +PA	3116C-PA	00169308bis + 00196308	ETS-Lindgren	2023-0-30	2025-05-30
057-000	Double Horn Ridged antenna	3117	167062	ETS-Lindgren	2022-07-08	2024-07-08
058-000	Double Horn Ridged antenna	3116C	157511	ETS-Lindgren	2022-10-21	2024-10-21
006-061	Bi-Log Periodic antenna	CBL6143A	61382	Teseq	2022-10-24	2024-10-24
147-000	Spectrum analyzer	FSW43	101847	Rohde & Schwarz	2022-11-30	2024-11-30
301-000	Amplifier 9kHz-1300MHz	8447F	3113A07440	HP	2023-03-03	2024-03-03
261-000	Amplifier 1GHz-18GHz	3117-PA	00157993	ETS-Lindgren	2023-02-20	2024-02-20
502-006	Amplifier 0.5GHz-40GHz	DEPA0540-43	2023A05	Diamond Engineering	2023-06-09	2024-06-09
009-007	RF Filter	ZHSS-k11G+	8493 1831830	Mini-Circuits	2023-06-09	2024-06-09
006-068	RF Switch	RC-2SP6T-40	02112090061	Micro-Circuits	2023-08-22	2024-08-22
006-059	Cable 7m – 25MHz to 40GHz	R286304174	20.46.369	Radiall	2023-02-20	2024-02-20
006-063	Cable 30cm – 1GHz to 40GHz	PE371-12	-	Pasternack	2023-02-27	2024-02-27
006-064	Cable 30cm – 1GHz to 40GHz	PE371-12	-	Pasternack	2023-02-27	2024-02-27
006-065	Cable 60cm – 25MHz to 1GHz	PE300-24	-	Pasternack	2023-06-02	2024-06-02

N/A: Not Applicable

Radiated Setup #2

ID#	Device	Type/Model	Serial #	Manufacturer	Cal. Date	Cal. Due Date
127-000	Spectrum Analyzer	FSV40	101358	Rohde & Schwarz	2023-01-27	2025-01-27
007-007	Double Ridge Horn (1- 18GHz)	3117	00152266	ETS Lindgren	2022-03-29	2024-03-29
007-006	Switch & Positioner	EMCenter	00151232	ETS Lindgren	N/A	N/A
007-011	RF Cable 1-18GHz - 6.5m	140-8500-11-51	001	Atem	2023-02-15	2024-02-15
007-005	Measurement SW, v11.20.00	EMC32	100401	Rohde & Schwarz	N/A	N/A
007-000	Anechoic chamber	RFD-FA-100	5996	ETS Lindgren	2021-09-14	2024-03-14
007-003	Antenna Tower	2171B-3.0M	00150123	ETS Lindgren	N/A	N/A
007-002	Turntable	-	-	ETS Lindgren	N/A	N/A
007-014	RF Cable 18-40 GHz 6m	R286304009	1747364	Radiall	2023-02-16	2024-02-16
007-022	RF Cable 1-18GHz, 1.5m	0501050991200GX	19.23.493	Radiall	2023-02-13	2024-02-13
007-015	RF Cable 1GHz-18GHz 1.5m	-	-	Spirent	2023-02-13	2024-02-13
007-018	RF Cable 1-9.5GHz 1.2m	0500990991200KE	-	Radiall	2023-02-13	2024-02-13
007-020	RF Cable 1-18GHz, 1.2 m	2301761761200PJ	12.22.1104	Radiall	2023-02-15	2024-02-15
325-000	Temp & Humidity Logger	RA12E-TH1-RAS	RA12-B9B7C6	Avtech	2022-01-17	2024-01-17

N/A: Not Applicable

Shared Radiated Equipment

ID#	Device	Type/Model	Serial #	Manufacturer	Cal. Date	Cal. Due Date
412-000	DRTU Power finder V2.1	-	-	Intel	NA	NA
139-000	Power Sensor	NRP-Z81	104383	Rohde & Schwarz	2023-04-21	2025-04-21
061-000	Power Sensor	NRP-Z81	104386	Rohde & Schwarz	2022-03-25	2024-03-25
140-000	Power Sensor	NRP-Z81	104382	Rohde & Schwarz	2022-03-25	2024-03-25
423-000	Power Sensor	NRP-Z81	101152	Rohde & Schwarz	2022-05-18	2024-05-18

N/A: Not Applicable

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 <26.5 GHz	± 3.45	dB
Radiated tests <1GHz	± 6.40	dB
Radiated tests 1GHz – 40 GHz	± 6.04	dB

Annex B. Test Results U-NII-3

The herein test results were performed by:

Test case measurement	Test Personnel
6dB and 99% Bandwidth	T.MATHIEU, C.REQUIN
Maximum output power & Maximum PSD	T.MATHIEU, C.REQUIN
Undesirable emission limits: out of band	T.MATHIEU
Radiated spurious emissions	K.KHATIB, R.SIMONINI

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 & 802.11ax/be20 (20 MHz channel bandwidth), 802.11n40 and 802.11ax/be40 (40MHz channel bandwidth) 802.11ac80 & 802.11ax/be80 (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/be/be	20/40/80	MCS0
MIMO	802.11n	20/40	HT8
	802.11ac	80	VHT0
	802.11ax/be/be	20/40/80	MCS0

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	15.03	18.20
			157	5785	15.09	17.76
			165	5825	15.30	16.84
		SISO B	149	5745	15.12	18.28
			157	5785	15.09	17.76
			165	5825	15.08	17.40
802.11n20	HT0	SISO A	149	5745	14.42	18.52
			157	5785	15.94	18.36
			165	5825	15.68	17.84
		SISO B	149	5745	15.01	18.44
			157	5785	15.28	18.12
			165	5825	13.88	18.24
	HT8	MIMO A	149	5745	16.14	18.64
			157	5785	15.09	18.44
			165	5825	15.09	18.12
		MIMO B	149	5745	16.88	18.44
			157	5785	15.12	18.16
			165	5825	16.30	17.76
802.11n40	HT0	SISO A	151	5755	35.06	36.08
			159	5795	35.08	36.48
		SISO B	151	5755	35.05	36.64
			159	5795	34.34	36.56
	HT8	MIMO A	151	5755	35.08	36.64
			159	5795	33.85	36.64
		MIMO B	151	5755	35.09	36.16
			159	5795	35.06	36.08
			159	5795	35.06	36.08
802.11ac80	VHT0	SISO A	155	5775	75.03	75.24
		SISO B			72.57	75.72
		MIMO A			71.40	75.24
		MIMO B			75.07	75.00

Max Value

Mode	Rate	Antenna	Channel	Freq [MHz]	RU config.	6dB BW [MHz]	99% BW [MHz]
802.11ax/be20	MCS0	SISO A	149	5745	Full	16.29	19.20
					26/0	2.03	18.40
					52/37	17.01	18.56
			157	5785	106/53	17.08	18.52
					Full	16.56	19..20
					Full	18.06	18.96
		SISO B	149	5745	Full	16.78	19.12
					26/0	2.07	18.60
					52/37	17.01	18.76
			157	5785	106/53	17.15	18.52
					Full	17.40	19.00
					Full	16.55	19.04
		MIMO A	149	5745	Full	17.74	19.16
					26/0	2.03	18.68
					52/37	15.71	18.04
			157	5785	106/53	17.16	18.48
					Full	17.61	19.04
					Full	17.23	19.16
		MIMO B	149	5745	Full	13.79	19.24
					26/0	2.04	18.76
					52/37	16.99	18.80
			157	5785	106/53	17.13	18.40
					Full	15.07	19.08
					Full	15.75	18.96
802.11ax/be40	MCS0	SISO A	151	5755	Full	35.26	37.52
					242/61	16.93	19.28
			159	5795	Full	34.66	37.52
					Full	36.01	37.92
		SISO B	151	5755	242/61	16.26	19.28
					Full	35.00	37.84
			159	5795	Full	35.80	37.92
					242/61	17.42	19.52
		MIMO A	151	5755	Full	35.19	37.92
					242/61	34.40	37.52
			159	5795	Full	34.40	37.52
					242/61	16.66	19.20
MIMO B	151	5755	Full	33.76	37.60		
			242/61	16.66	19.20		
	159	5795	Full	33.76	37.60		
			242/61	16.66	19.20		
802.11ax/be80	MCS0	SISO A	155	5775	Full	72.63	76.68
					484/65	35.30	37.44
		SISO B			Full	72.63	77.16
					484/65	35.87	37.92
		MIMO A	Full	70.13	76.68		
			484/65	35.27	37.32		
		MIMO B	Full	71.40	76.56		
			484/65	36.33	37.44		
Full	71.40		76.56				
484/65	36.33		37.44				

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	2.86	7.28
				B	1.27	7.43
			MIMO	A	3.40	6.87
				B	3.75	6.98
802.11n40	142	5710	SISO	A	1.26	22.35
				B	2.52	19.15
			MIMO	A	2.49	6.65
				B	2.52	6.45
802.11ac80	138	5690	SISO	A	2.51	20.50
				B	2.54	16.66
			MIMO	A	2.57	9.22
				B	2.53	6.58
802.11ax/be20	144	5720	SISO	A	4.07	6.77
				B	2.56	6.77
			MIMO	A	4.12	6.98
				B	2.49	6.92
802.11ax/be40	142	5710	SISO	A	3.48	16.35
				B	3.24	16.35
			MIMO	A	2.04	6.45
				B	3.10	6.25
802.11ax/be80	138	5690	SISO	A	2.48	15.22
				B	2.49	12.94
			MIMO	A	2.53	6.46
				B	2.53	5.74

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 Section B.3.1 and B.3.2 for the screenshot results.

B.2.2 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 according to section E) 2) e) (Method SA-2 Alternative) of FCC KDB 789033 D02

The maximum power spectral density (PSD) was measured using the method according to section F) (Method SA-2 Alternative) of FCC KDB 789033 D02

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	97.739
		SISO B	97.739
802.11n20	HT0	SISO A	98.785
		SISO B	98.785
	HT8	MIMO A	99.574
		MIMO B	99.574
802.11ax/be20	MCS0	SISO A	98.778
		SISO B	98.778
		MIMO A	99.671
		MIMO B	99.671
802.11n40	HT0	SISO A	98.8
		SISO B	98.8
	HT8	MIMO A	99.353
		MIMO B	99.353
802.11ax/be40	MCS0	SISO A	98.793
		SISO B	98.793
		MIMO A	99.895
		MIMO B	99.895
802.11ac80	VHT0	SISO A	98.795
		SISO B	98.795
		MIMO A	98.777
		MIMO B	98.777
802.11ax/be80	MCS0	SISO A	98.793
		SISO B	98.793
		MIMO A	98.784
		MIMO B	98.784
802.11ac160	VTH0	SISO A	98.796
		SISO B	98.796
		MIMO A	98.283
		MIMO B	98.283
802.11ax/be160	MCS0	SISO A	98.784
		SISO B	98.784
		MIMO A	98
		MIMO B	98

Maximum output power – U-NII-3 Channels

Mode	Rate	Channel	Freq [MHz]	Antenna	Average Conducted Output Power [dBm]	Avg Max* Conducted Output Power [dBm]	Avg Max* EIRP [dBm]	Avg Max* Conducted Power [mW]	
802.11a	6Mbps	149	5745	SISO A	23.84	23.94	29.09	247.70	
				SISO B	24.22	24.32	29.47	270.35	
		157	5785	SISO A	23.81	23.91	29.06	246.00	
				SISO B	24.05	24.15	29.30	259.98	
		165	5825	SISO A	23.03	23.13	28.28	205.56	
				SISO B	23.25	23.35	28.50	216.24	
802.11n20	HT0	149	5745	SISO A	23.80	23.80	28.95	239.88	
				SISO B	24.06	24.06	29.21	254.68	
		157	5785	SISO A	23.76	23.76	28.91	237.68	
				SISO B	24.01	24.01	29.16	251.77	
		165	5825	SISO A	23.03	23.03	28.18	200.91	
				SISO B	23.22	23.22	28.37	209.89	
	HT8	149	5745	MIMO A	23.75	23.75	28.90	237.14	
				MIMO B	24.01	24.01	29.16	251.77	
				Combined A+B	26.89	26.89	32.04	488.91	
		157	5785	MIMO A	23.68	23.68	28.83	233.35	
				MIMO B	23.90	23.90	29.05	245.47	
				Combined A+B	26.80	26.80	31.95	478.82	
	165	5825	MIMO A	22.48	22.48	27.63	177.01		
			MIMO B	22.48	22.48	27.63	177.01		
			Combined A+B	25.49	25.49	30.64	354.02		
	802.11n40	HT0	151	5755	SISO A	22.47	22.47	27.62	176.60
					SISO B	22.76	22.76	27.91	188.80
			159	5795	SISO A	23.33	23.33	28.48	215.28
SISO B		23.55			23.55	28.70	226.46		
HT8		151	5755	MIMO A	21.44	21.44	26.59	139.32	
				MIMO B	21.61	21.61	26.76	144.88	
				Combined A+B	24.54	24.54	29.69	284.19	
		159	5795	MIMO A	22.41	22.41	27.56	174.18	
				MIMO B	22.03	22.03	27.18	159.59	
	Combined A+B			25.23	25.23	30.38	333.77		
802.11ac80	VHT0	155	5775	SISO A	21.04	21.04	26.19	127.06	
				SISO B	21.36	21.36	26.51	136.77	
				MIMO A	20.01	20.01	25.16	100.23	
				MIMO B	20.12	20.12	25.27	102.80	
				Combined A+B	23.08	23.08	28.23	203.03	

* 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]
802.11ax/be20	MCS0	149	5745	SISO A	Full	23.74	23.74	28.89	236.59
					26/0	23.80	23.80	28.95	239.88
					52/37	24.01	24.01	29.16	251.77
					106/53	23.89	23.89	29.04	244.91
				SISO B	Full	23.98	23.98	29.13	250.03
					26/0	23.99	23.99	29.14	250.61
					52/37	24.16	24.16	29.31	260.62
					106/53	24.10	24.10	29.25	257.04
				MIMO A	Full	23.59	23.59	28.74	228.56
					26/0	23.72	23.72	28.87	235.50
					52/37	23.75	23.75	28.90	237.14
					106/53	23.79	23.79	28.94	239.33
		MIMO B	Full	23.83	23.83	28.98	241.55		
			26/0	23.83	23.83	28.98	241.55		
			52/37	24.01	24.01	29.16	251.77		
			106/53	23.95	23.95	29.10	248.31		
		Combined A+B	Full	26.72	26.72	31.87	470.11		
			26/0	26.79	26.79	31.94	477.05		
			52/37	26.89	26.89	32.04	488.91		
			106/53	26.88	26.88	32.03	487.64		
		157	5785	SISO A	Full	23.63	23.63	28.78	230.67
				SISO B	Full	23.89	23.89	29.04	244.91
				MIMO A	Full	23.51	23.51	28.66	224.39
				MIMO B	Full	23.70	23.70	28.85	234.42
				Combined A+B	Full	26.62	26.62	31.77	458.81
		165	5825	SISO A	Full	22.94	22.94	28.09	196.79
				SISO B	Full	23.58	23.58	28.73	228.03
				MIMO A	Full	22.39	22.39	27.54	173.38
				MIMO B	Full	22.41	22.41	27.56	174.18
				Combined A+B	Full	25.41	25.41	30.56	347.56
802.11ax/be40	MCS0	151	5755	SISO A	Full	21.91	21.91	27.06	155.24
					242/61	23.78	23.78	28.93	238.78
				SISO B	Full	22.20	22.20	27.35	165.96
					242/61	24.04	24.04	29.19	253.51
				MIMO A	Full	20.86	20.86	26.01	121.90
					242/61	23.64	23.64	28.79	231.21
				MIMO B	Full	21.02	21.02	26.17	126.47
		242/61	23.87		23.87	29.02	243.78		
		Combined A+B	Full	23.95	23.95	29.10	248.37		
			242/61	26.77	26.77	31.92	474.99		
		159	5795	SISO A	Full	22.86	22.86	28.01	193.20
				SISO B	Full	23.10	23.10	28.25	204.17
				MIMO A	Full	21.94	21.94	27.09	156.31
				MIMO B	Full	21.94	21.94	27.09	156.31
Combined A+B	Full			24.95	24.95	30.10	312.63		
802.11ax/be80	MCS0	155	5775	SISO A	Full	20.98	20.98	26.13	125.31
					484/65	21.97	21.97	27.12	157.40
				SISO B	Full	21.27	21.27	26.42	133.97
					484/65	22.20	22.20	27.35	165.96
				MIMO A	Full	19.92	19.92	25.07	98.17
					484/65	21.95	21.95	27.10	156.68
				MIMO B	Full	20.05	20.05	25.20	101.16
					484/65	21.59	21.59	26.74	144.21
				Combined A+B	Full	23.00	23.00	28.15	199.33
					484/65	24.78	24.78	29.93	300.89

* 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	13.62	13.62	18.77	23.01
				B	13.32	13.32	18.47	21.48
			MIMO	A	10.54	10.54	15.69	11.32
				B	10.58	10.58	15.73	11.43
			Combined	A+B	13.57	13.57	18.72	22.75
802.11n40	142	5710	SISO	A	10.52	10.52	15.67	11.27
				B	10.36	10.36	15.51	10.86
			MIMO	A	8.39	8.39	13.54	6.90
				B	8.29	8.29	13.44	6.75
			Combined	A+B	11.35	11.35	16.50	13.65
802.11ac80	138	5690	SISO	A	6.67	6.67	11.82	4.65
				B	6.47	6.47	11.62	4.44
			MIMO	A	4.54	4.54	9.69	2.84
				B	4.61	4.61	9.76	2.89
			Combined	A+B	7.59	7.59	12.74	5.74
802.11ax/be20	144	5720	SISO	A	14.17	14.17	19.32	26.12
				B	13.87	13.87	19.02	24.38
			MIMO	A	11.09	11.09	16.24	12.85
				B	10.78	10.78	15.93	11.97
			Combined	A+B	13.95	13.95	19.10	24.82
802.11ax/be40	142	5710	SISO	A	11.23	11.23	16.38	13.27
				B	11.19	11.19	16.34	13.15
			MIMO	A	9.07	9.07	14.22	8.07
				B	9.05	9.05	14.20	8.04
			Combined	A+B	12.07	12.07	17.22	16.11
802.11ax/be80	138	5690	SISO	A	7.48	7.48	12.63	5.60
				B	7.61	7.61	12.76	5.77
			MIMO	A	4.96	4.96	10.11	3.13
				B	5.55	5.55	10.70	3.59
			Combined	A+B	8.28	8.28	13.43	6.72

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

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	10.08	10.18	
				SISO B	10.44	10.54	
		157	5785	SISO A	10.02	10.12	
				SISO B	10.32	10.42	
		165	5825	SISO A	9.29	9.39	
				SISO B	9.47	9.57	
802.11n20	HT0	149	5745	SISO A	9.85	9.85	
				SISO B	10.12	10.12	
		157	5785	SISO A	9.80	9.80	
				SISO B	10.04	10.04	
		165	5825	SISO A	9.06	9.06	
				SISO B	9.26	9.26	
	HT8	149	5745	MIMO A	9.76	9.76	
				MIMO B	10.05	10.05	
				Combined A+B	12.92	12.92	
		157	5785	MIMO A	9.71	9.71	
				MIMO B	9.97	9.97	
				Combined A+B	12.85	12.85	
	165	5825	MIMO A	8.48	8.48		
			MIMO B	8.53	8.53		
			Combined A+B	11.52	11.52		
	802.11n40	HT0	151	5755	SISO A	5.05	5.05
					SISO B	5.29	5.29
			159	5795	SISO A	5.94	5.94
SISO B					6.17	6.17	
HT8		151	5755	MIMO A	4.02	4.02	
				MIMO B	4.18	4.18	
				Combined A+B	7.11	7.11	
		159	5795	MIMO A	4.98	4.98	
MIMO B				4.61	4.61		
Combined A+B				7.81	7.81		
802.11ac80		VHT0	155	5775	SISO A	0.59	0.59
					SISO B	0.87	0.87
	MIMO A				-0.50	-0.50	
	MIMO B				-0.32	-0.32	
	Combined A+B				2.60	2.60	

* 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	6.41	6.41
				B	6.18	6.18
			MIMO	A	3.24	3.24
				B	3.35	3.35
			Combined	A+B	6.31	6.31
802.11n40	142	5710	SISO	A	2.46	2.46
				B	2.42	2.42
			MIMO	A	0.64	0.64
				B	0.48	0.48
			Combined	A+B	3.57	3.57
802.11ac80	138	5690	SISO	A	-1.42	-1.42
				B	-1.57	-1.57
			MIMO	A	-3.22	-3.22
				B	-3.19	-3.19
			Combined	A+B	-0.19	-0.19
802.11ax/be20	144	5720	SISO	A	6.37	6.37
				B	6.07	6.07
			MIMO	A	3.36	3.36
				B	3.06	3.06
			Combined	A+B	6.22	6.22
802.11ax/be40	142	5710	SISO	A	2.39	2.39
				B	2.36	2.36
			MIMO	A	0.44	0.44
				B	0.49	0.49
			Combined	A+B	3.48	3.48
802.11ax/be80	138	5690	SISO	A	-1.38	-1.38
				B	-1.28	-1.28
			MIMO	A	-3.73	-3.73
				B	-3.18	-3.18
			Combined	A+B	-0.44	-0.44

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

See Section B.3.3 for the 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.

See Section B.3.4 for the screenshot results.

B.2.4 Radiated spurious emission

Standard references

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.																				
15.209	RSS-GEN A1, Clause 8.9	<p>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):</p> <table border="1"> <thead> <tr> <th>Freq Range (MHz)</th> <th>Field Strength (µV/m)</th> <th>Field Strength (dBµV/m)</th> <th>Meas. Distance (m)</th> </tr> </thead> <tbody> <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> </tbody> </table> <p>The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.</p> <p>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.</p>	Freq Range (MHz)	Field Strength (µV/m)	Field Strength (dBµV/m)	Meas. Distance (m)	30-88	100	40	3	88-216	150	43.5	3	216-960	200	46	3	Above 960	500	54	3
Freq Range (MHz)	Field Strength (µV/m)	Field Strength (dBµV/m)	Meas. Distance (m)																			
30-88	100	40	3																			
88-216	150	43.5	3																			
216-960	200	46	3																			
Above 960	500	54	3																			

Test procedure

The radiated setup shown in section *Test & System Description* was 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 360° and for both Vertical and Horizontal polarizations.

The radiated spurious emission was measured on the worst case configuration selected from the section B.2.2 and using the low, middle and high channels.

Test Results**Radiated spurious - 30 MHz to 1 GHz****Radiated Spurious – All modes**

Frequency	Level	Detector	Limit	Margin	Polarization
MHz	dB μ V/m	---	dB μ V/m	dB	---
32.6	34.2	Quasi-Peak	40.0	5.8	V
47.8	35.7	Quasi-Peak	40.0	4.3	V
87.5	36.2	Quasi-Peak	40.0	3.8	V

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	Level	Detector	Limit	Margin	Polar
MHz	dB μ V/m	---	dB μ V/m	dB	---
3864.3	52.9	Peak	74.0	21.1	H
3864.3	43.5	Average	54.0	10.5	H
11492.5	58.3	Peak	74.0	15.7	H
11492.5	51.1	Average	54.0	2.9	H

Radiated Spurious – CH157

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dB μ V/m	---	dB μ V/m	dB	---
7038.0	62.5	Peak	68.2	5.7	H
11571.0	49.6	Average	54.0	4.4	H
11571.5	59.0	Peak	74.0	15.0	H

Radiated Spurious – CH165

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dB μ V/m	---	dB μ V/m	dB	---
1249.7	44.7	Peak	74.0	29.3	V
1249.7	37.1	Average	54.0	16.9	V
11653.5	43.6	Peak	74.0	30.4	H
11653.5	36.5	Average	54.0	17.5	H

1 GHz – 40 GHz, 802.11a, 6Mbps, Chain B**Radiated Spurious – CH149**

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dB μ V/m	---	dB μ V/m	dB	---
1249.7	45.2	Peak	74.0	28.8	V
1249.7	36.6	Average	54.0	17.4	V
11494.0	58.0	Peak	74.0	16.0	V
11494.0	49.3	Average	54.0	4.7	V

Radiated Spurious – CH157

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dB μ V/m	---	dB μ V/m	dB	---
8220.7	44.8	Average	54.0	9.2	H
8236.2	56.2	Peak	74.0	17.8	V
11568.0	57.3	Peak	74.0	16.7	V
11568.0	49.3	Average	54.0	4.7	V

Radiated Spurious – CH165

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dB μ V/m	---	dB μ V/m	dB	---
1249.7	44.6	Peak	74.0	29.4	V
1249.7	36.4	Average	54.0	17.6	V
11647.5	59.0	Peak	74.0	15.0	V
11647.5	50.1	Average	54.0	3.9	V
11653.5	58.0	Peak	74.0	16.0	V
11653.5	50.1	Average	54.0	3.9	V

802.11n

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

Radiated Spurious – CH149

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dB μ V/m	---	dB μ V/m	dB	---
1249.7	44.8	Peak	74.0	29.2	V
1249.7	36.8	Average	54.0	17.2	V
11488.0	58.2	Peak	74.0	15.8	H
11488.0	49.3	Average	54.0	4.7	H

Radiated Spurious – CH157

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dB μ V/m	---	dB μ V/m	dB	---
1249.7	44.2	Peak	74.0	29.8	V
1249.7	36.4	Average	54.0	17.6	V
11569.5	61.6	Peak	74.0	12.4	H
11569.5	51.4	Average	54.0	2.6	H

Radiated Spurious – CH165

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBµV/m	---	dBµV/m	dB	---
1249.7	45.3	Peak	74.0	28.7	V
1249.7	36.5	Average	54.0	17.5	V
11648.5	58.4	Peak	74.0	15.6	H
11648.5	51.0	Average	54.0	3.0	H

1 GHz – 40 GHz, 802.11n20, HT0, Chain B**Radiated Spurious – CH149**

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBµV/m	---	dBµV/m	dB	---
1249.7	44.0	Peak	74.0	30.0	V
1249.7	36.4	Average	54.0	17.6	V
11492.0	56.5	Peak	74.0	17.5	V
11492.0	49.3	Average	54.0	4.7	V

Radiated Spurious – CH157

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBµV/m	---	dBµV/m	dB	---
1249.7	45.9	Peak	74.0	28.1	V
1249.7	37.6	Average	54.0	16.4	V
11571.0	57.4	Peak	74.0	16.6	V
11571.0	48.8	Average	54.0	5.2	V

Radiated Spurious – CH165

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBµV/m	---	dBµV/m	dB	---
1249.7	45.3	Peak	74.0	28.7	V
1250.2	36.4	Average	54.0	17.6	V
11649.5	50.9	Average	54.0	3.1	V
11650.0	59.7	Peak	74.0	14.3	V

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

Radiated Spurious – CH149

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dB μ V/m	---	dB μ V/m	dB	---
1250.2	45.0	Peak	74.0	29.0	V
1250.2	36.5	Average	54.0	17.5	V
39970.5	56.5	Peak	74.0	17.5	H
39971.0	48.0	Average	54.0	6.0	V

Radiated Spurious – CH157

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dB μ V/m	---	dB μ V/m	dB	---
1249.7	46.5	Peak	74.0	27.5	V
1249.7	36.5	Average	54.0	17.5	V
11571.0	60.3	Peak	74.0	13.7	H
11571.0	51.2	Average	54.0	2.8	H

Radiated Spurious – CH165

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dB μ V/m	---	dB μ V/m	dB	---
1249.7	44.8	Peak	74.0	29.2	V
1249.7	36.9	Average	54.0	17.1	V
11644.5	60.3	Peak	74.0	13.7	V
11644.5	50.6	Average	54.0	3.4	H

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

Radiated Spurious – CH151

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dB μ V/m	---	dB μ V/m	dB	---
9472.0	55.9	Peak	74.0	18.1	V
9472.0	46.2	Average	54.0	7.8	H
11508.5	47.8	Average	54.0	6.2	H
11509.0	56.4	Peak	74.0	17.6	H

Radiated Spurious – CH159

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dB μ V/m	---	dB μ V/m	dB	---
9493.2	56.3	Peak	74.0	17.7	V
9493.5	46.6	Average	54.0	7.4	V
11592.0	57.1	Peak	74.0	16.9	H
11592.0	47.9	Average	54.0	6.1	H

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

Radiated Spurious – CH151

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dB μ V/m	---	dB μ V/m	dB	---
9460.0	57.1	Peak	74.0	16.9	H
9460.0	46.1	Average	54.0	7.9	H
11509.0	56.2	Peak	74.0	17.8	V
11509.0	46.5	Average	54.0	7.5	V

Radiated Spurious – CH159

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dB μ V/m	---	dB μ V/m	dB	---
9479.2	56.0	Peak	74.0	18.0	V
9479.5	46.4	Average	54.0	7.6	H
11585.0	57.7	Peak	74.0	16.3	V
11585.0	45.5	Average	54.0	8.5	V

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

Radiated Spurious – CH151

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dB μ V/m	---	dB μ V/m	dB	---
9437.8	56.1	Peak	74.0	17.9	V
9437.8	46.4	Average	54.0	7.6	V
11513.0	54.5	Peak	74.0	19.5	V
11513.0	49.7	Average	54.0	4.3	V

Radiated Spurious – CH159

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dB μ V/m	---	dB μ V/m	dB	---
9440.5	56.4	Peak	74.0	17.6	H
9440.5	46.3	Average	54.0	7.7	H
11591.0	48.3	Average	54.0	5.7	H
11591.5	55.8	Peak	74.0	18.2	H

802.11ac

1 GHz – 40 GHz, 802.11ac80, VHT0, Chain A**Radiated Spurious – CH155**

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBµV/m	---	dBµV/m	dB	---
7978.0	59.3	Peak	68.2	8.9	V
11559.0	53.8	Peak	74.0	20.2	H
11559.0	44.7	Average	54.0	9.3	H

1 GHz – 40 GHz, 802.11ac80, VHT0, Chain B**Radiated Spurious – CH155**

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBµV/m	---	dBµV/m	dB	---
8252.8	55.0	Peak	74.0	19.0	H
8253.1	45.1	Average	54.0	8.9	V
11576.0	41.8	Average	54.0	12.2	V
11576.5	55.1	Peak	74.0	18.9	V

1 GHz – 40 GHz, 802.11ac80, VHT0, Chain A+B**Radiated Spurious – CH155**

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBµV/m	---	dBµV/m	dB	---
8221.3	54.9	Peak	74.0	19.1	V
8221.3	44.6	Average	54.0	9.4	H
11510.0	54.9	Peak	74.0	19.1	V
11510.0	42.6	Average	54.0	11.4	V

802.11ax/be

1 GHz – 40 GHz, 802.11ax/be20, MCS0, Chain A

Radiated Spurious – CH149

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dB μ V/m	---	dB μ V/m	dB	---
8240.8	54.7	Peak	74.0	19.3	H
8241.1	45.1	Average	54.0	8.9	H
39986.0	56.9	Peak	74.0	17.1	H
39986.0	48.0	Average	54.0	6.0	H

Radiated Spurious – CH157

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dB μ V/m	---	dB μ V/m	dB	---
8270.3	55.1	Peak	74.0	18.9	V
8270.3	45.0	Average	54.0	9.0	V
23980.9	47.9	Peak	74.0	26.1	H
23980.9	41.1	Average	54.0	12.9	H
39848.7	55.5	Peak	74.0	18.5	V
39848.7	47.8	Average	54.0	6.2	V

Radiated Spurious – CH165

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dB μ V/m	---	dB μ V/m	dB	---
7984.2	58.8	Peak	68.2	9.4	V
11633.2	46.2	Peak	74.0	27.8	H
11633.2	38.4	Average	54.0	15.6	H

1 GHz – 40 GHz, 802.11ax/be20, MCS0, Chain B

Radiated Spurious – CH149

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dB μ V/m	---	dB μ V/m	dB	---
8604.3	60.1	Peak	68.2	8.1	H
39893.7	54.5	Peak	74.0	19.5	H
39893.7	48.0	Average	54.0	6.0	H

Radiated Spurious – CH157

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dB μ V/m	---	dB μ V/m	dB	---
8664.9	60.4	Peak	68.2	7.8	H
23900.2	49.1	Peak	74.0	24.9	H
23900.2	41.5	Average	54.0	12.5	V
39955.5	48.0	Average	54.0	6.0	V
39956.0	56.6	Peak	74.0	17.4	H

Radiated Spurious – CH165

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dB μ V/m	---	dB μ V/m	dB	---
8724.4	60.0	Peak	68.2	8.2	H
39797.0	56.0	Peak	74.0	18.0	V
39797.0	47.9	Average	54.0	6.1	V

1 GHz – 40 GHz, 802.11ax/be20, MCS0, Chain A+B

Radiated Spurious – CH149

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dB μ V/m	---	dB μ V/m	dB	---
8605.1	62.1	Peak	68.2	6.1	H
11473.2	45.8	Peak	74.0	28.2	H
11473.2	37.2	Average	54.0	16.8	H

Radiated Spurious – CH157

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dB μ V/m	---	dB μ V/m	dB	---
8665.8	60.6	Peak	68.2	7.6	H
11553.4	37.0	Average	54.0	17.0	H
11553.4	46.5	Peak	74.0	27.5	H
23949.5	49.2	Peak	74.0	24.8	V
23949.5	41.0	Average	54.0	13.0	V
39885.9	55.5	Peak	74.0	18.5	V
39885.9	48.0	Average	54.0	6.0	V

Radiated Spurious – CH165

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dB μ V/m	---	dB μ V/m	dB	---
8724.4	59.4	Peak	68.2	8.8	H
11633.2	45.6	Peak	74.0	28.4	H
11633.2	38.1	Average	54.0	15.9	H

1 GHz – 40 GHz, 802.11ax/be40, MCS0, Chain A

Radiated Spurious – CH151

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBµV/m	---	dBµV/m	dB	---
7968.7	58.8	Peak	68.2	9.4	V
39972.4	55.3	Peak	74.0	18.7	H
39972.4	47.9	Average	54.0	6.1	H

Radiated Spurious – CH159

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBµV/m	---	dBµV/m	dB	---
8678.0	59.6	Peak	68.2	8.6	H
23954.3	48.9	Peak	74.0	25.1	H
23954.3	40.9	Average	54.0	13.1	V
39980.2	55.1	Peak	74.0	18.9	V
39980.2	47.7	Average	54.0	6.3	V

1 GHz – 40 GHz, 802.11ax/be40, MCS0, Chain B

Radiated Spurious – CH151

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dB μ V/m	---	dB μ V/m	dB	---
8617.4	59.8	Peak	68.2	8.4	H
39951.2	55.4	Peak	74.0	18.6	H
39951.7	47.9	Average	54.0	6.1	V

Radiated Spurious – CH159

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dB μ V/m	---	dB μ V/m	dB	---
8677.5	59.8	Peak	68.2	8.4	H
23979.4	50.0	Peak	74.0	24.0	V
23979.4	41.1	Average	54.0	12.9	V
39967.6	56.8	Peak	74.0	17.2	H
39967.6	47.5	Average	54.0	6.5	H

1 GHz – 40 GHz, 802.11ax/be40, MCS0, Chain A+B

Radiated Spurious – CH151

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBµV/m	---	dBµV/m	dB	---
8617.1	62.1	Peak	68.2	6.1	H
11490.1	45.1	Peak	74.0	28.9	V
11490.1	37.3	Average	54.0	16.7	V

Radiated Spurious – CH159

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBµV/m	---	dBµV/m	dB	---
8677.8	61.1	Peak	68.2	7.1	H
11569.9	45.3	Peak	74.0	28.7	V
11570.8	37.2	Average	54.0	16.8	H

1 GHz – 40 GHz, 802.11ax/be80, MCS0, Chain A

Radiated Spurious – CH155

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dB μ V/m	---	dB μ V/m	dB	---
8630.5	57.8	Peak	68.2	10.4	H
23921.9	48.4	Peak	74.0	25.6	V
23921.9	41.5	Average	54.0	12.5	V
39983.6	55.9	Peak	74.0	18.1	H
39984.1	47.7	Average	54.0	6.3	V

1 GHz – 40 GHz, 802.11ax/be80, MCS0, Chain B

Radiated Spurious – CH155

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dB μ V/m	---	dB μ V/m	dB	---
8631.1	60.4	Peak	68.2	7.8	H
23953.3	48.4	Peak	74.0	25.6	H
23953.3	41.0	Average	54.0	13.0	H
39987.9	55.0	Peak	74.0	19.0	V
39988.4	47.8	Average	54.0	6.2	H

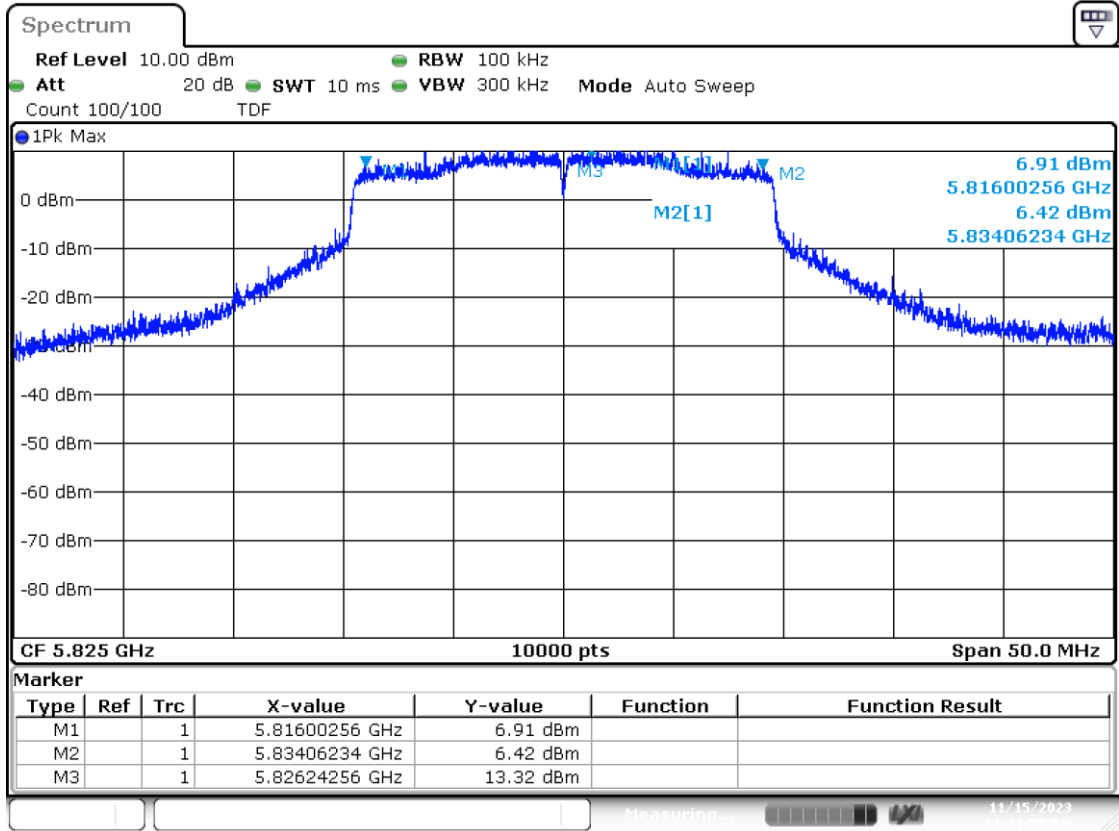
1 GHz – 40 GHz, 802.11ax/be80, MCS0, Chain A+B

Radiated Spurious – CH155

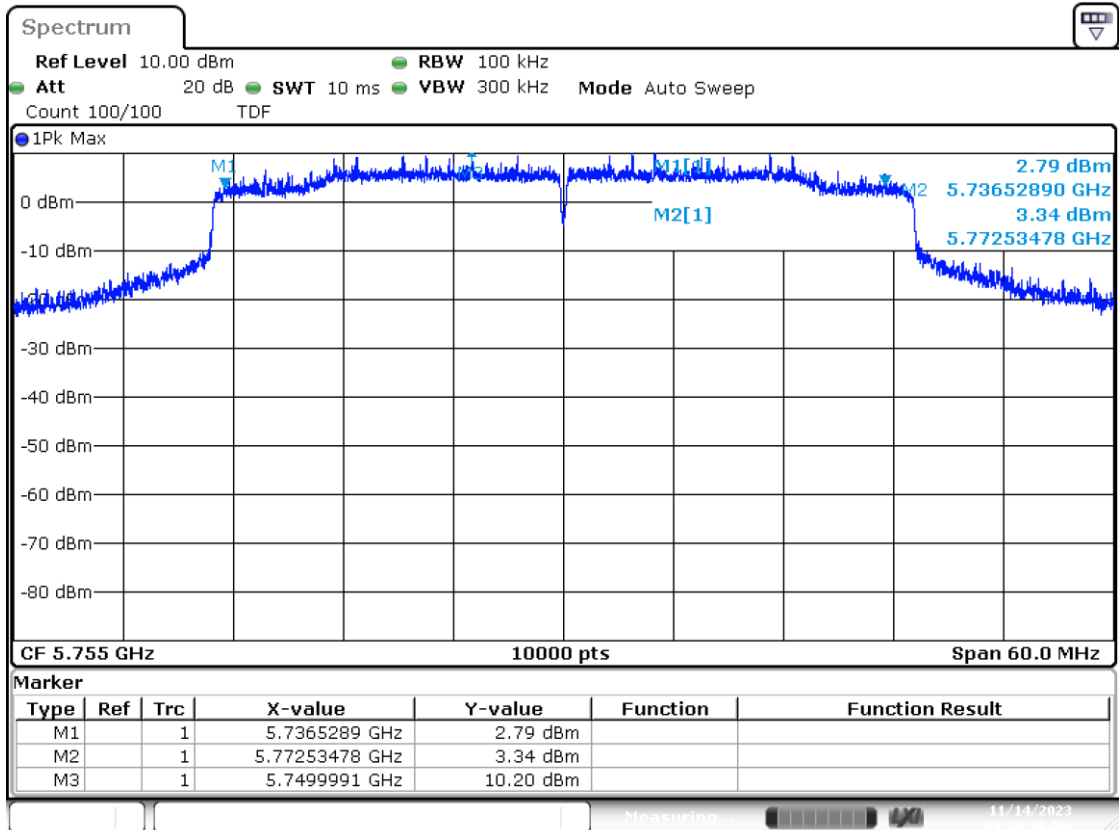
Frequency	Level	Detector	Limit	Margin	Polar
MHz	dB μ V/m	---	dB μ V/m	dB	---
8629.6	61.1	Peak	68.2	7.1	H
11506.5	44.0	Peak	74.0	30.0	V
11506.5	36.6	Average	54.0	17.4	V

B.3 Test Results Screenshot

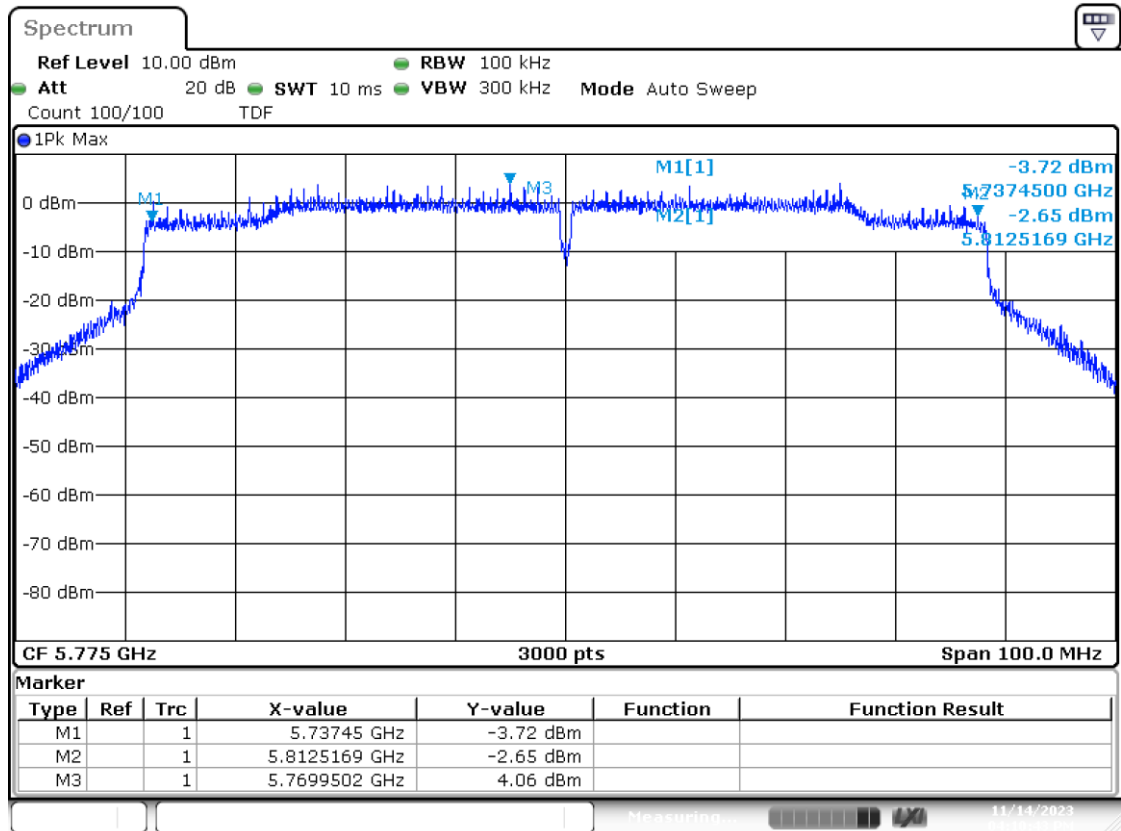
B.3.1 6dB Bandwidth



SISO A-802.11ax/be20-CH165-5825MHz-MCS0

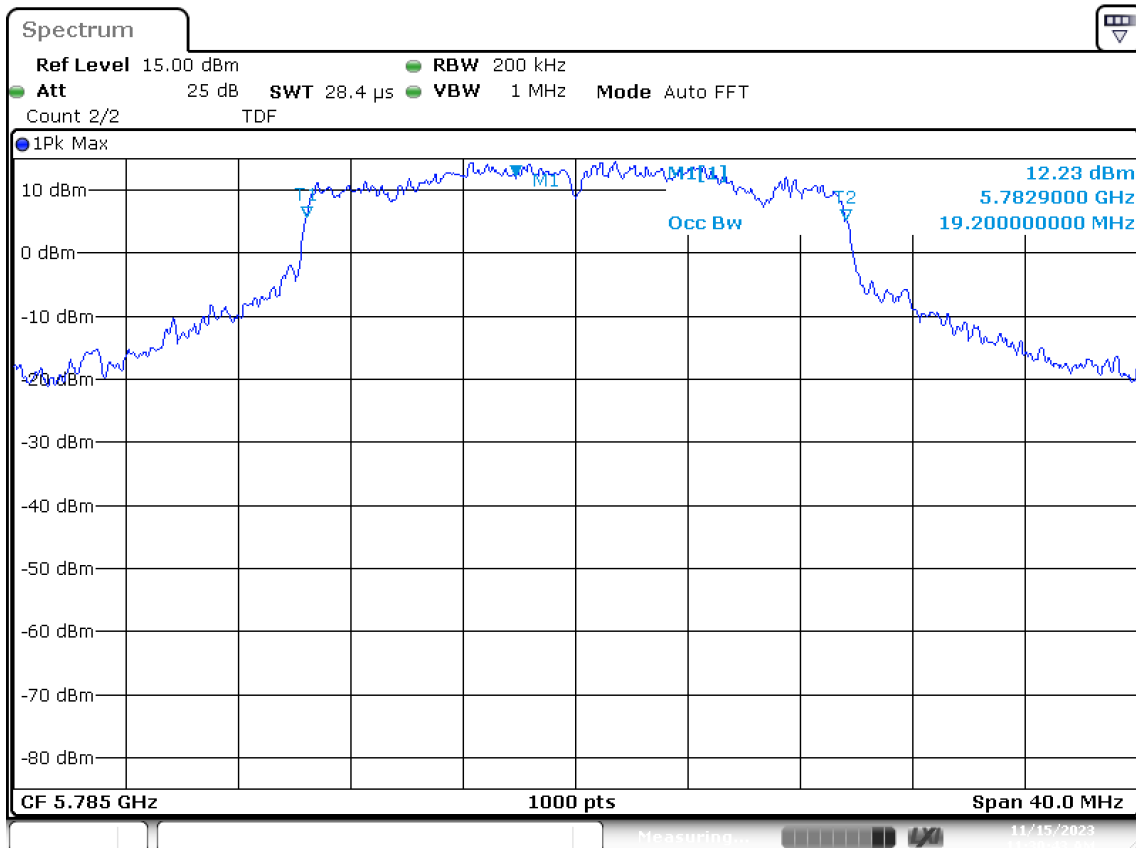


SISO B-802.11ax/be40-CH151-5755MHz-MCS0

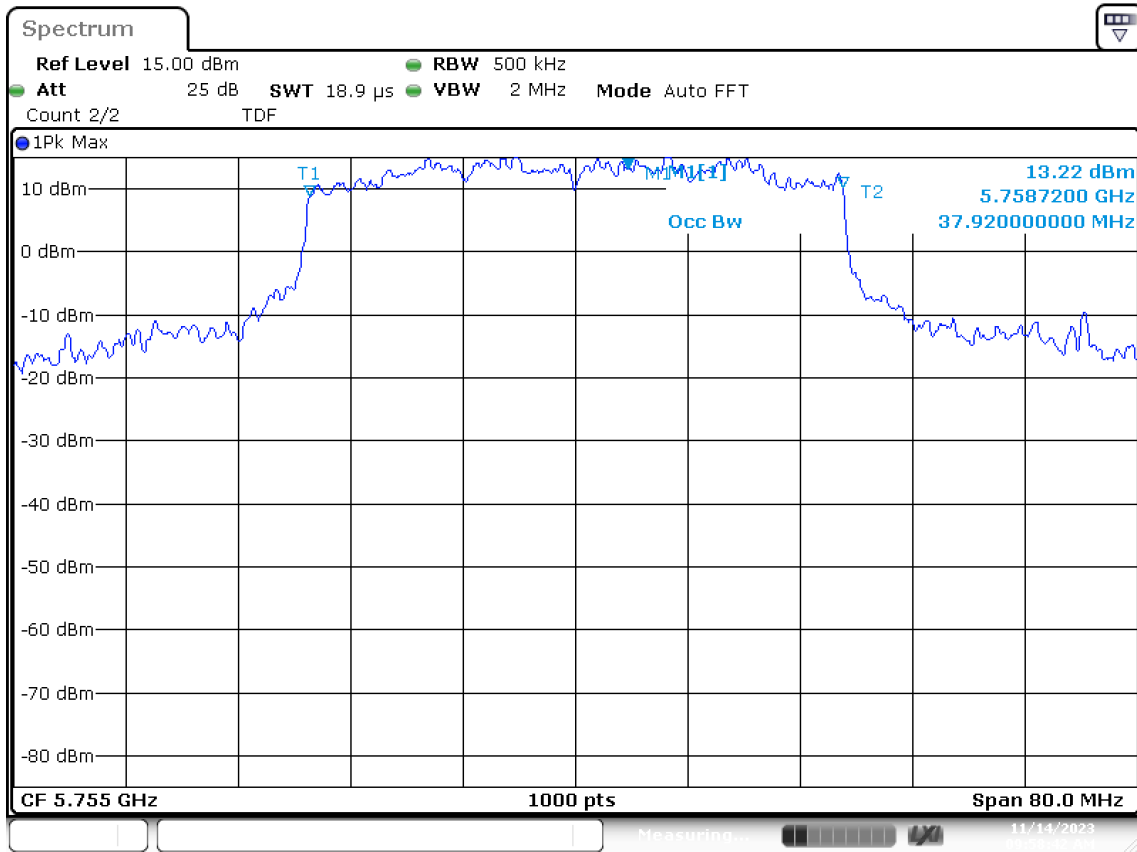


MIMO B-802.11ac80-CH155-5775MHz-VHT0

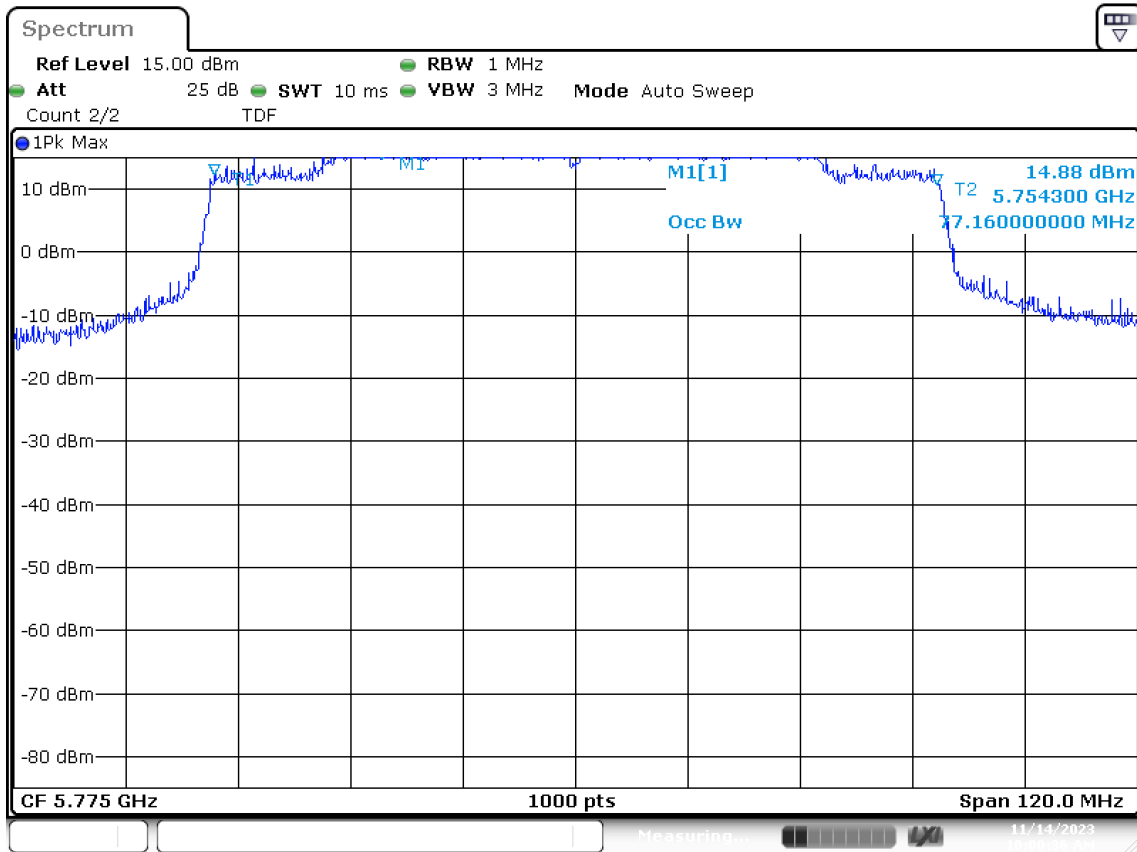
B.3.2 99% Bandwidth



SISO A-802.11ax/be20-CH157-5785MHz-MCS0

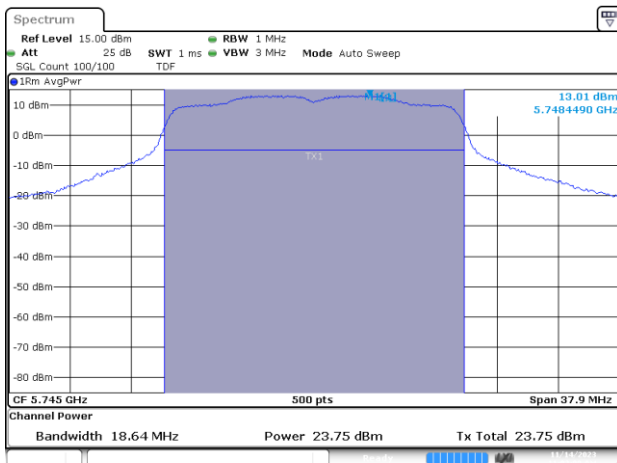


SISO B-802.11ax/be40-CH151-5755MHz-MCS0

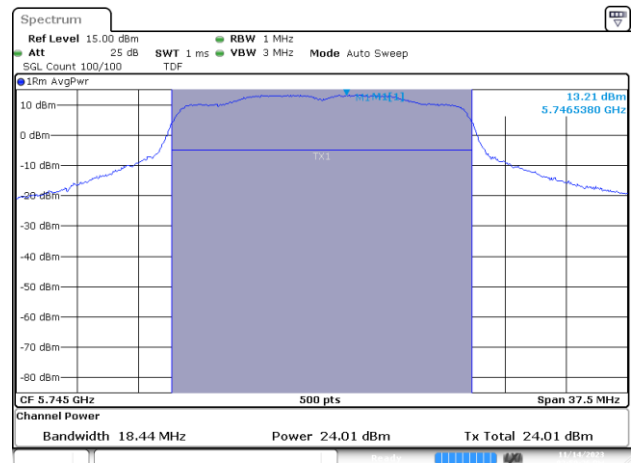


SISO B-802.11ax/be80-CH155-5775MHz-MCS0

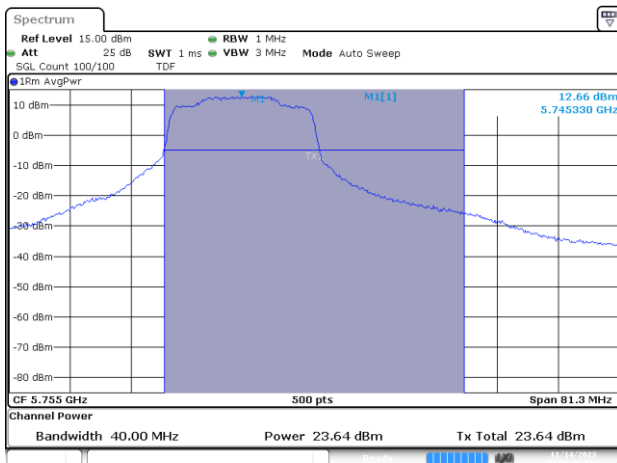
B.3.3 Maximum output power



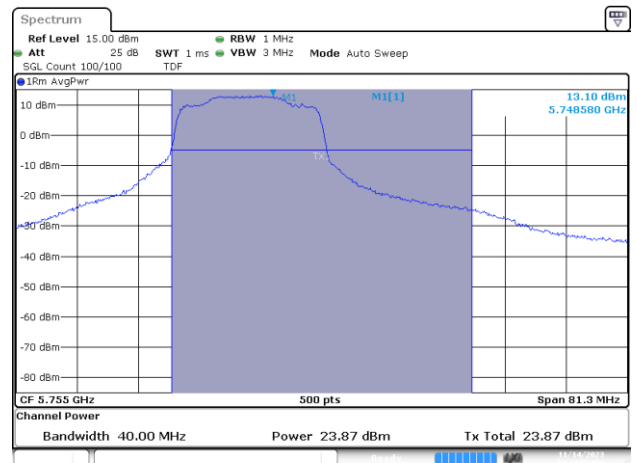
MIMO A-802.11n20-CH149-5745MHz-HT8 FullBW



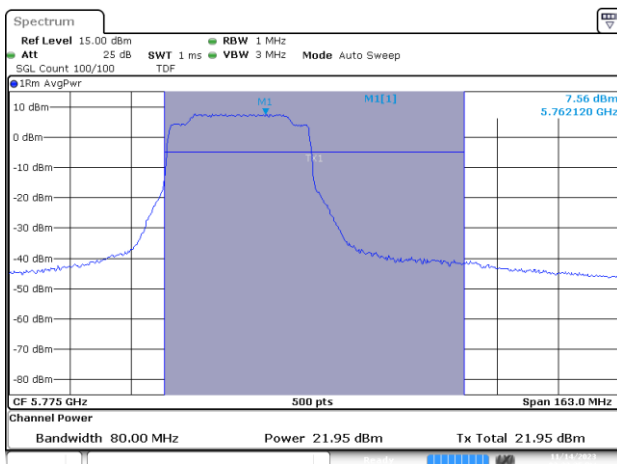
MIMO B-802.11n20-CH149-5745MHz-HT8 FullBW



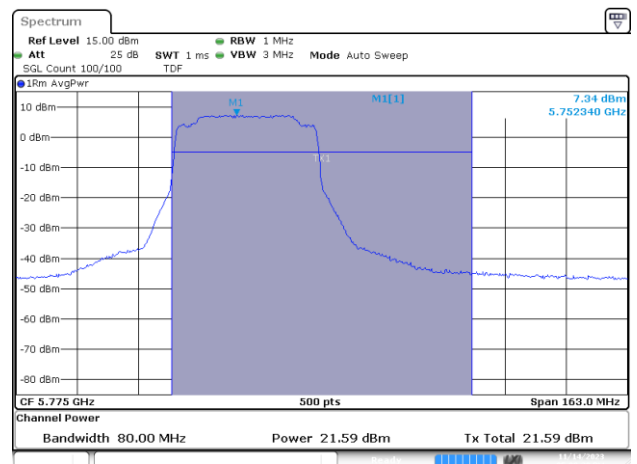
MIMO A-802.11ax/be40-CH151-5755MHz-MCS0 20m



MIMO B-802.11ax/be40-CH151-5755MHz-MCS0 20m

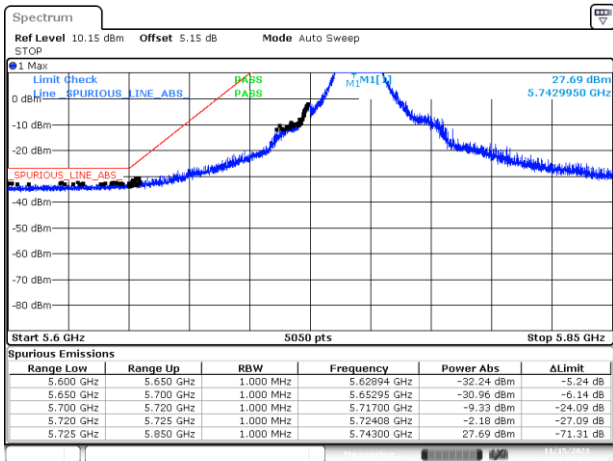


MIMO A-802.11ax/be80-CH155-5775MHz-MCS0 40m

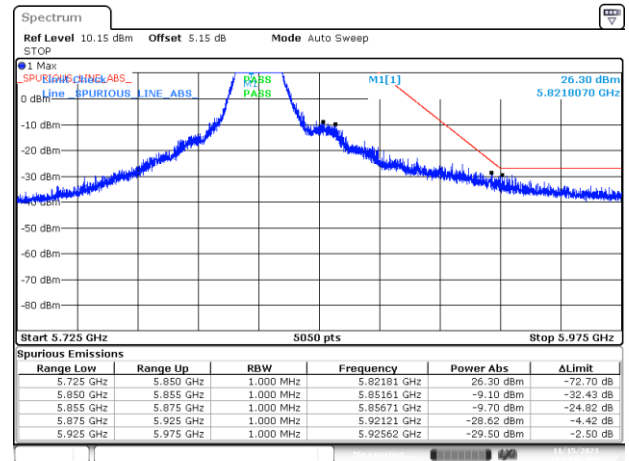


MIMO B-802.11ax/be80-CH155-5775MHz-MCS0 40m

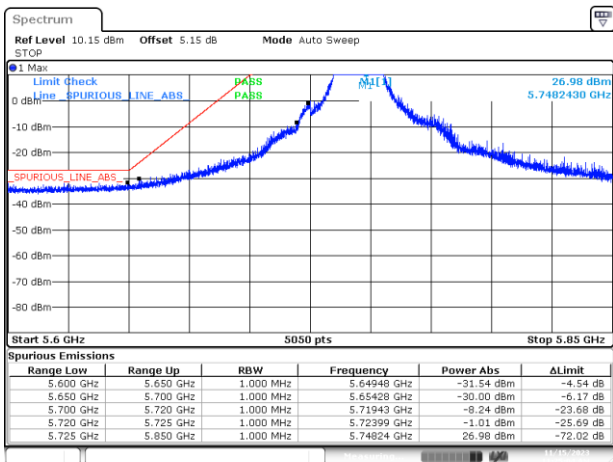
B.3.4 Undesirable emission limits : out of band (Conducted)



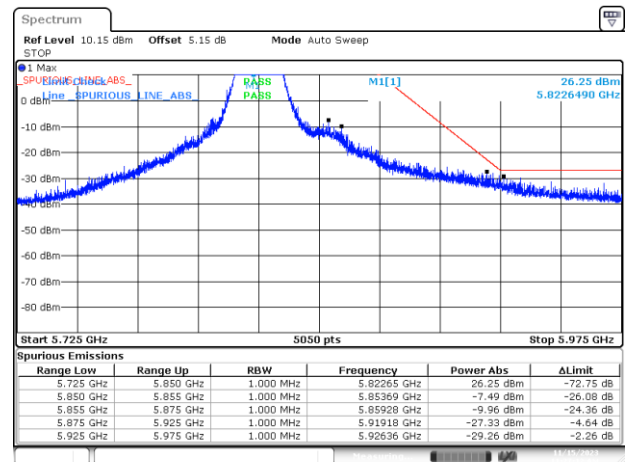
BE-NR-LOW, SISO-A, 802.11a-6Mbps, Ch149



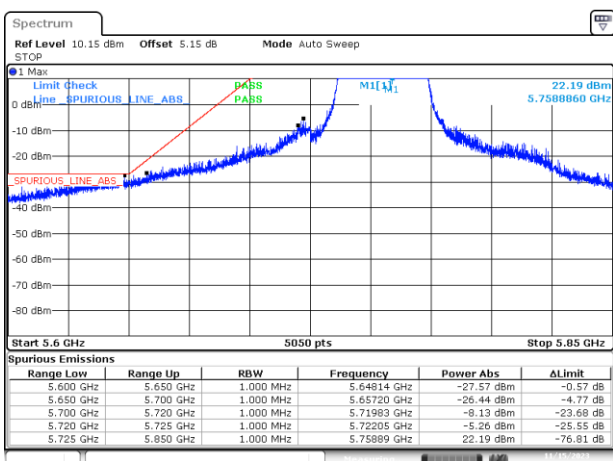
BE-NR-HIGH, SISO-A, 802.11a-6Mbps, Ch165



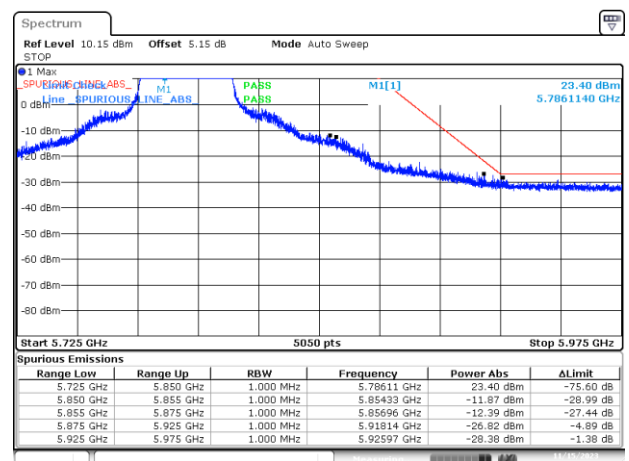
BE-NR-LOW, SISO-A, 802.11n20-HT0, Ch149



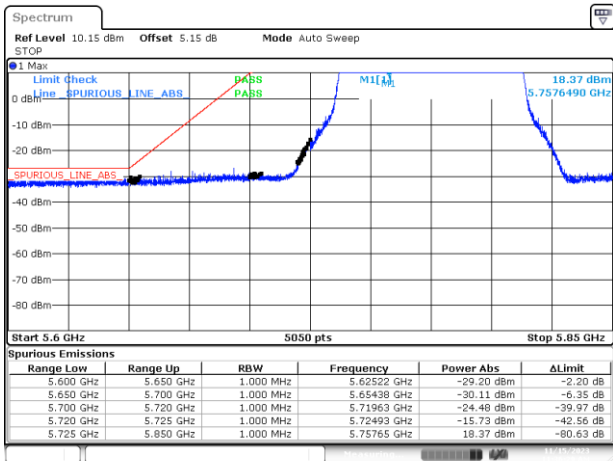
BE-NR-HIGH, SISO-A, 802.11n20-HT0, Ch165



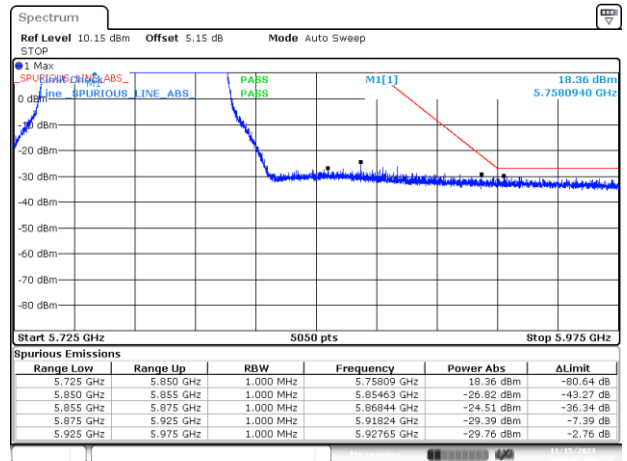
BE-NR-LOW, SISO-A, 802.11n40-HT0, Ch151



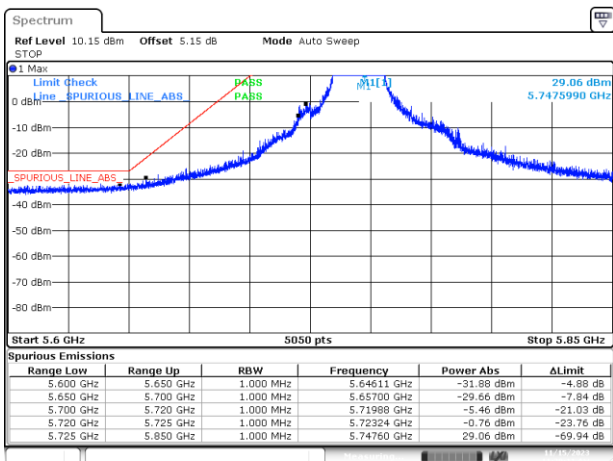
BE-NR-HIGH, SISO-A, 802.11n40-HT0, Ch159



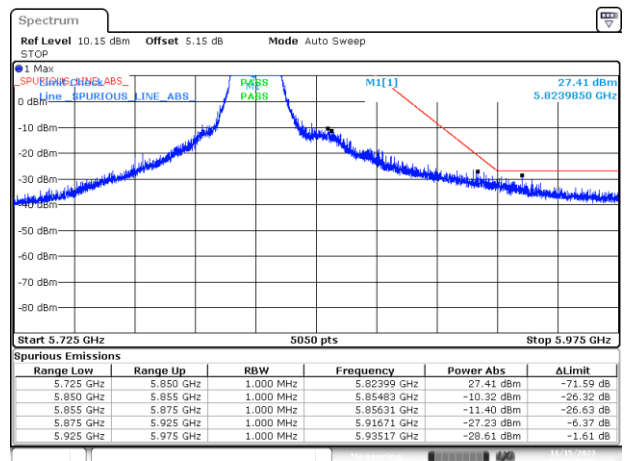
BE-NR-LOW, SISO-A, 802.11ac80-VHT0, Ch155



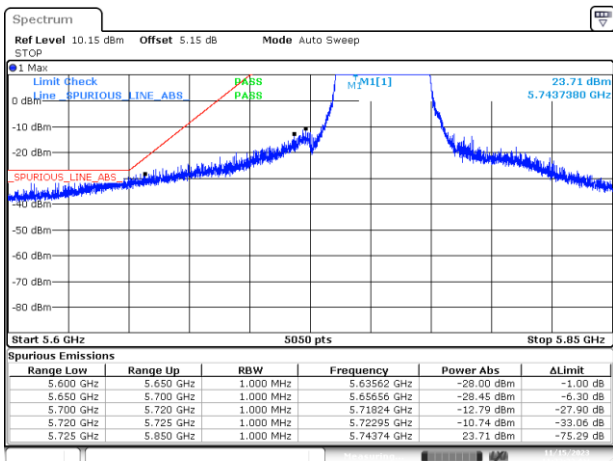
BE-NR-HIGH, SISO-A, 802.11ac80-VHT0, Ch155



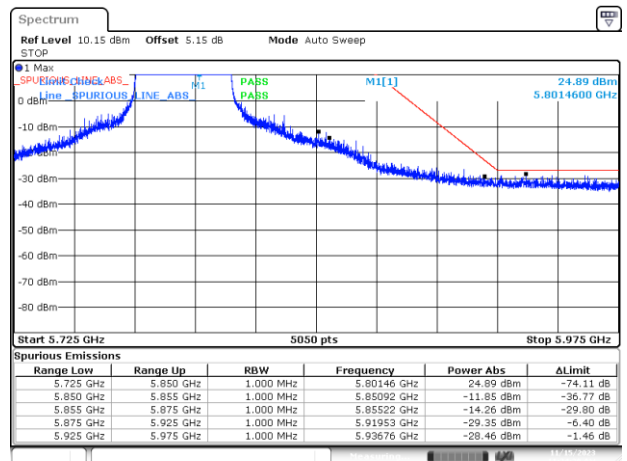
BE-NR-LOW, SISO-A, 802.11ax/be20-MCS0, Ch149



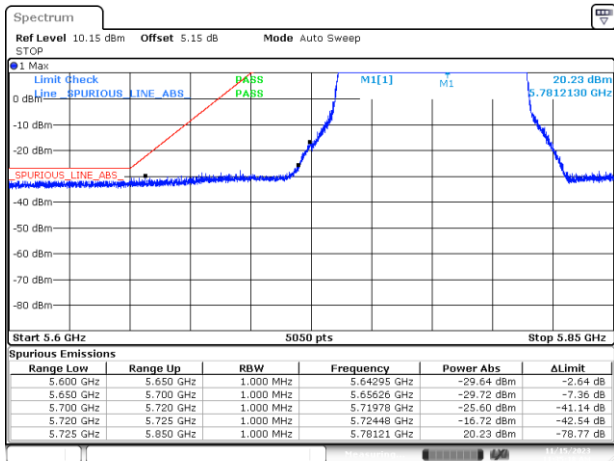
BE-NR-HIGH, SISO-A, 802.11ax/be20-MCS0, Ch165



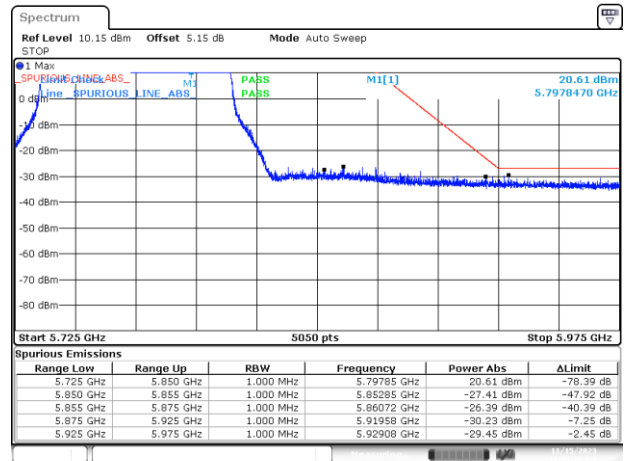
BE-NR-LOW, SISO-A, 802.11ax/be40-MCS0, Ch151



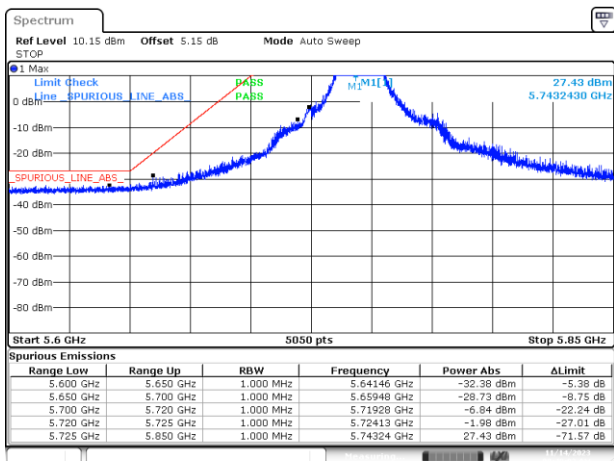
BE-NR-HIGH, SISO-A, 802.11ax/be40-MCS0, Ch159



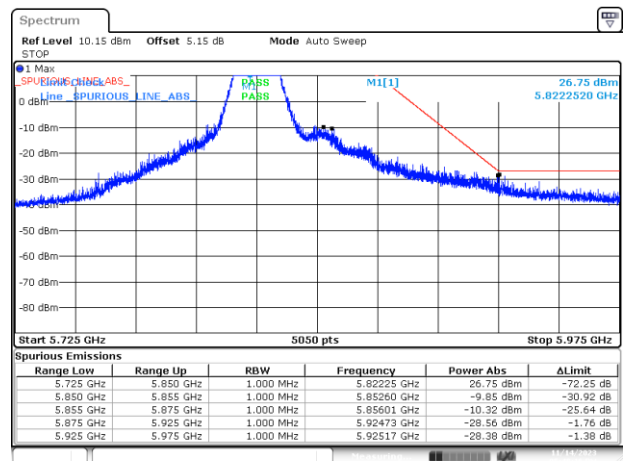
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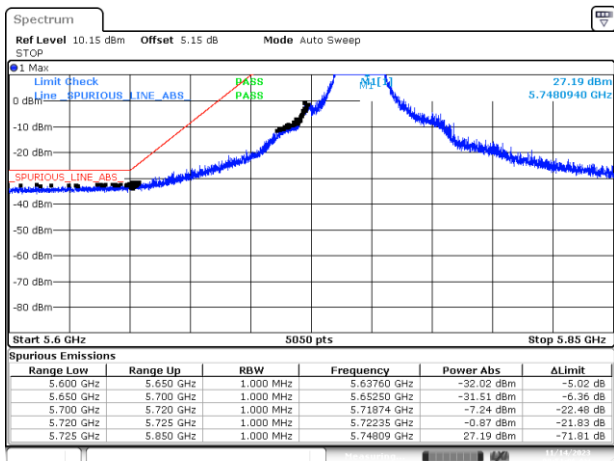
BE-NR-HIGH, SISO-A, 802.11ax/be80-MCS0, Ch155



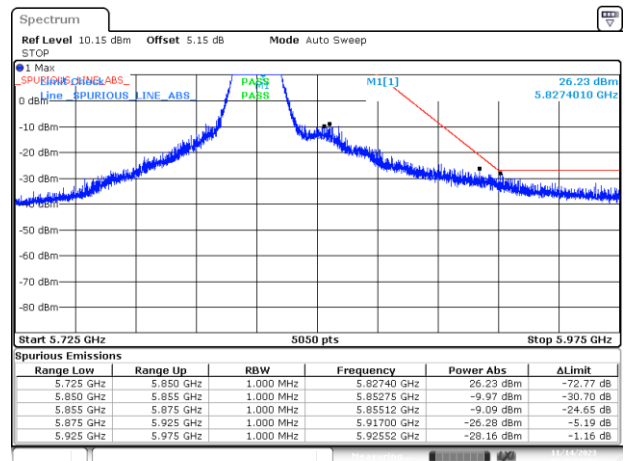
BE-NR-LOW, SISO-B, 802.11a-6Mbps, Ch149



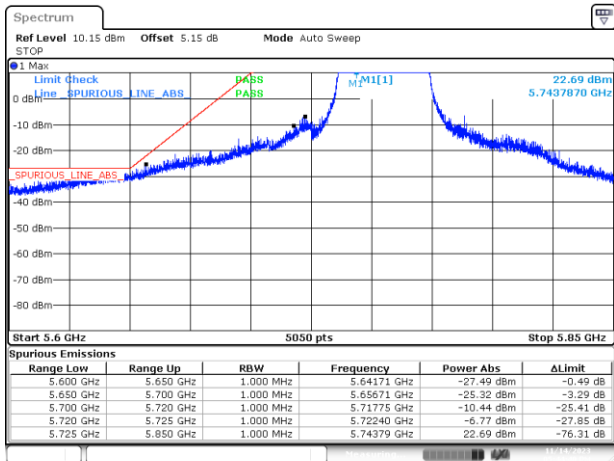
BE-NR-HIGH, SISO-B, 802.11a-6Mbps, Ch165



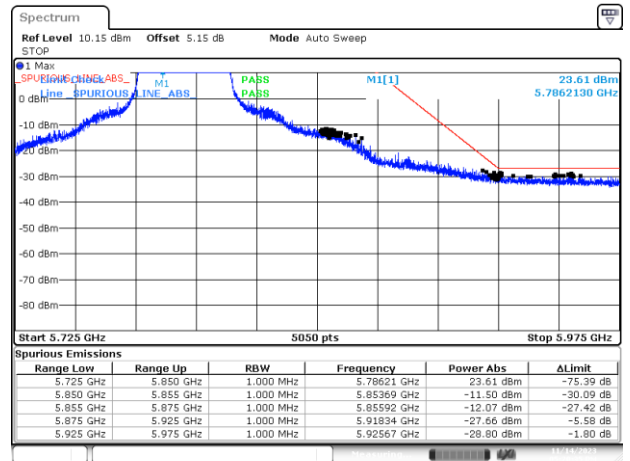
BE-NR-LOW, SISO-B, 802.11n20-HT0, Ch149



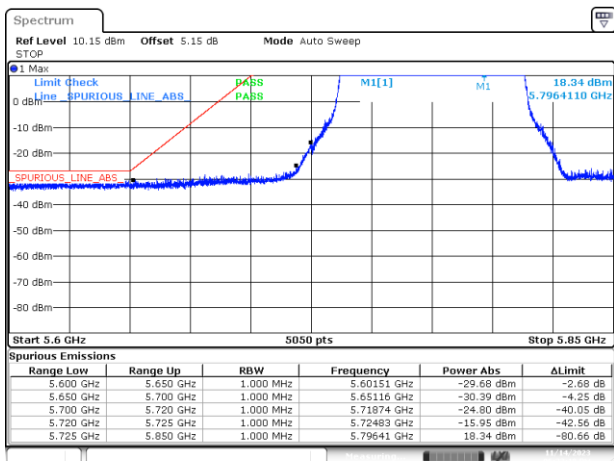
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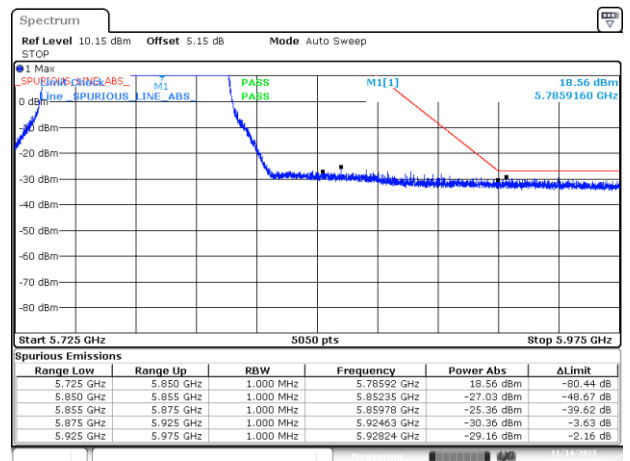
BE-NR-LOW, SISO-B, 802.11n40-HT0, Ch151



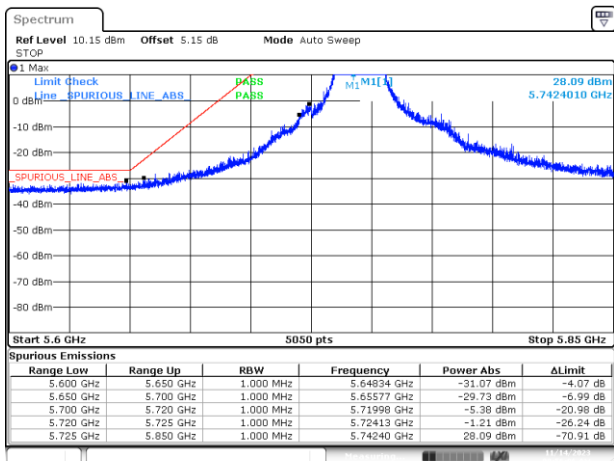
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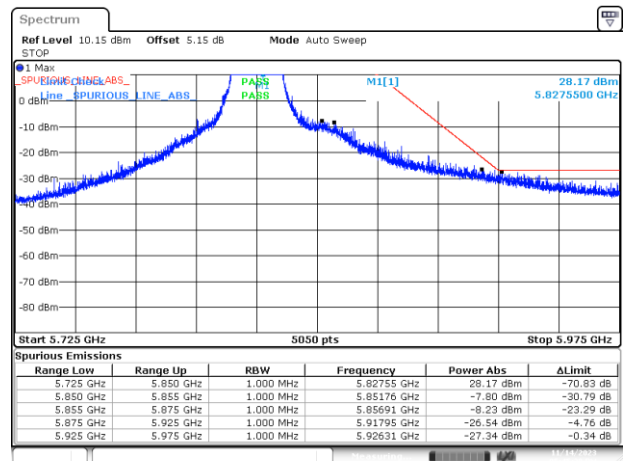
BE-NR-LOW, SISO-B, 802.11ac80-VHT0, Ch155



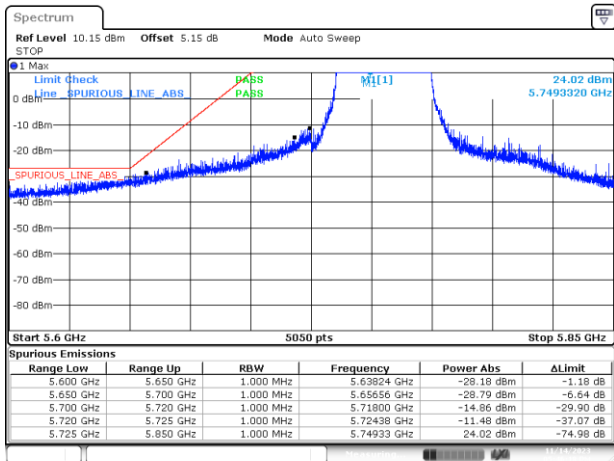
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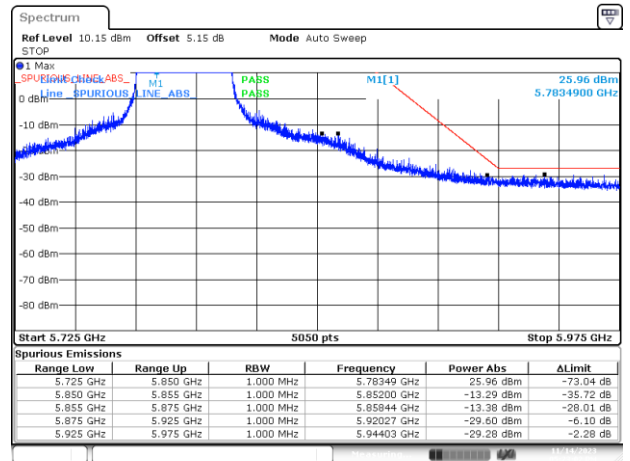
BE-NR-LOW, SISO-B, 802.11ax/be20-MCS0, Ch149



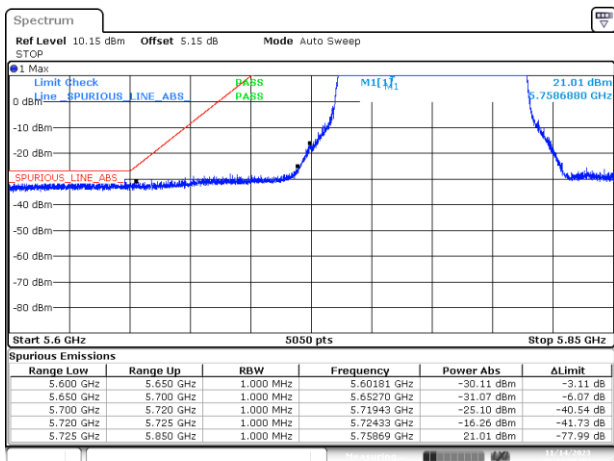
BE-NR-HIGH, SISO-B, 802.11ax/be20-MCS0, Ch165



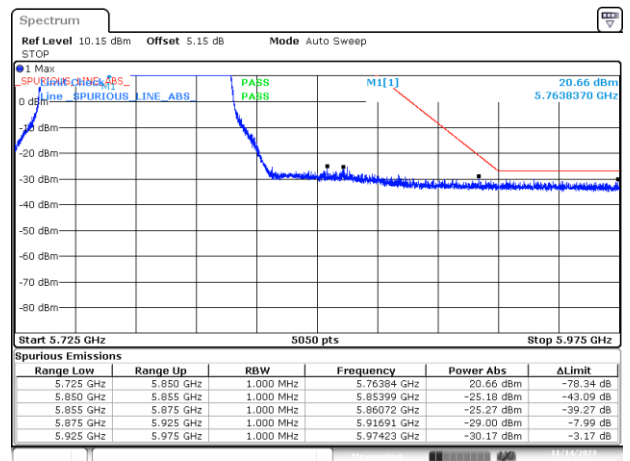
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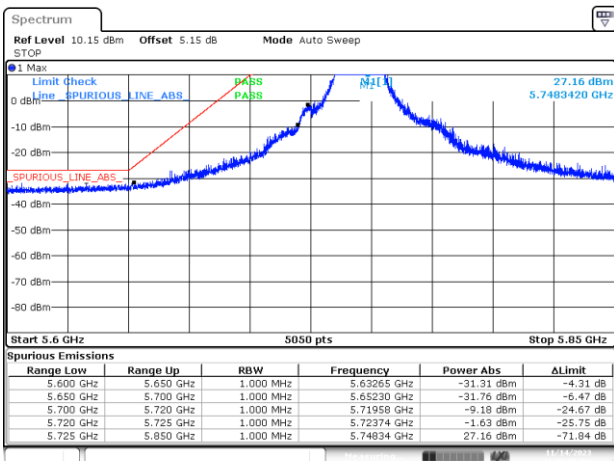
BE-NR-HIGH, SISO-B, 802.11ax/be40-MCS0, Ch159



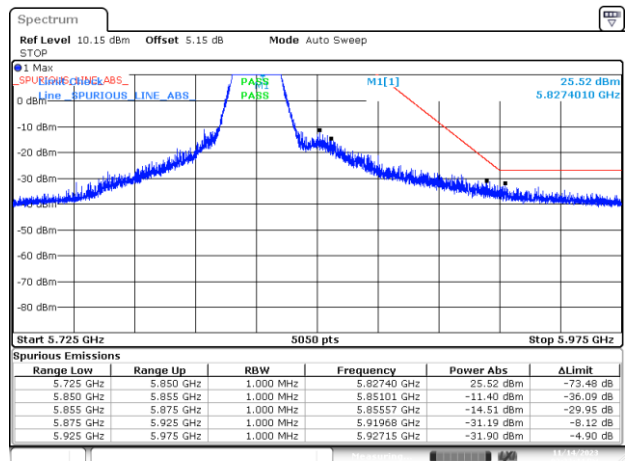
BE-NR-LOW, SISO-B, 802.11ax/be80-MCS0, Ch155



BE-NR-HIGH, SISO-B, 802.11ax/be80-MCS0, Ch155



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



BE-NR-HIGH, MIMO-A, 802.11n20-HT0, Ch165