N° 1-6736
Scope available
on www.cofrac.fr

TEST REPORT

EUT Description	**WLAN and BT, 2x2 PCIe M.2 1216 adapter card**
Brand Name	**Intel®**
Model Name	**BE201D2W**
Date of Test Start/End	**2024-01-08 / 2024-02-09**
Features	**2x2 WiFi - Bluetooth®** (see section 5)

Applicant	**Intel Corporation SAS**
Address	**425 rue de Goa - Le Cargo B6 - 06600, Antibes, FRANCE**
Contact Person	**Irina Vicente**
Telephone/Fax/ Email	**Irina.vicente@intel.com**

Reference Standards	**ETSI EN 301 893 V2.1.1** **(see section 1)**

Test Report identification	**231120-05.TR04**
Revision Control	**Rev. 01** **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.

Reviewed by

Digitally signed by zayd
DN: cn=zayd, email=zayd.ouachicha@intel.com, c=US
Date: 2024.05.07 14:47:23 +02'00'

Zayd OUACHICHA
(Technical Manager)

Table of Contents

1. Standards, reference documents and applicable test methods

1. ETSI EN 301 893 V2.1.1 – 5GHz RLAN; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU.

2. General conditions, competences and guarantees

- ✓ 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 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	22.9ºC ± 0.9ºC
Humidity	53.0% ± 17.0%

4. Test samples

Sample	Control #	Description	Model	Serial #	Date of receipt	Note
#01	231120-05.S04	WIFI 7 Module	BE201D2W	WFM:60452EB8A42F	2024-01-05	Conducted Tests
	230528-03.S50	Extender	PCB00862-00_A	2305108150	2023-11-10	
	200702-02.S05	Laptop	HP(HSN-I41C-5)	00095002K9	2020-07-07	
#02	231120-05.S04	WIFI 7 Module	BE201D2W	WFM:60452EB8A42F	2024-01-05	Adaptivity Tests
	230528-03.S50	Extender	PCB00862-00_A	2305108150	2023-11-10	
	200702-02.S03	Laptop	HP(HSN-I41C-5)	00095002JP	2020-07-10	
#03	231120-05.S03	WiFi 7 Module	BE201D2W	60452EB8A3BC	2024-01-05	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	
	231120-05.S21	WiFi 7 Module	BE201D2W	F8FE5CDCA49	2024-02-07	
	180001-01.S21	Socket	1216SD to M.2	-	2021-06-07	
#04	231120-05.S02	WiFi 7 Module	BE201D2W	60452EB8A407	2024-01-05	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	
	231120-05.S20	WiFi 7 Module	BE201D2W	F8FE5ECDCB43	2024-02-07	
	180001-01.S21	Socket	1216SD to M.2	-	2021-06-07	
#05	231120-05.S12	WIFI 7 Module	BE201D2W	WFM: F8FE5ECDC927	2024-02-06	Receiver Blocking Tests
	231109-03.S49	Extender	PCB00862-00_A	2305108150	2023-11-10	
	200702-02.S03	Laptop	HP(HSN-I41C-5)	00095002JP	2020-07-10	

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.

<table>
<tr><td>Brand Name</td><td>Intel®</td></tr>
<tr><td>Model Name</td><td>BE201D2W</td></tr>
<tr><td>Software Version</td><td>Radiated: DRTU.05312.99.0.85
Conducted: DRTU.05726.99.0.86</td></tr>
<tr><td>Driver Version</td><td>Radiated: 99.0.85.3
Conducted: 99.0.86.3</td></tr>
<tr><td>Supported Radios</td><td>802.11b/g/n/ax/be 2.4GHz
802.11a/n/ac/ax/be 5.2GHz
5.6GHz
5.8GHz
802.11ax/be 6.0GHz
Bluetooth 2.4GHz</td></tr>
<tr><td>Antenna Information</td><td>
<table>
<tr><td>Transmitter</td><td>Chain A(1)</td><td>Chain B(2)</td></tr>
<tr><td>Manufacturer</td><td>Intel WRF Lab</td><td>Intel WRF Lab</td></tr>
<tr><td>Antenna type</td><td>PIFA</td><td>PIFA</td></tr>
<tr><td>Part number</td><td>WRF-Tri Band-Antenna</td><td>WRF-Tri Band-Antenna</td></tr>
<tr><td>Antenna peak gain (dBi)</td><td>+5</td><td>+5</td></tr>
</table>
</td></tr>
</table>

6. Remarks and comments

1. At customer request, all normal condition tests were carried out at tune up power (+0.5dB) Vs device setting.
2. At customer request, all tests except RF Output Power (4.2.3.1.1), Transmit Power Control (TPC) (4.2.3.1.2) & Power Spectral Density (4.2.3.1.3) were carried out at higher Tx Power (as below table) vs nominal declared power.

Bandwidth	Chain	PPAG delta [dB]
20	A/B	5.25
	A+B	5.50
40	A/B	4.50
	A+B	5.00
80	A/B	4.50
	A+B	5.50
160	A/B	4.50
	A+B	4.75

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. 802.11a/n/ac/ax/be

Mode	ETSI clause	Test	Verdict
5.2GHz	4.2.1	Nominal Centre Frequencies	P
	4.2.2	Nominal Channel Bandwidth and Occupied Channel Bandwidth	P
	4.2.3.1.1	RF output power	P
	4.2.3.1.2	Transmit Power Control (TPC)	P
	4.2.3.1.3	Power Density	P
	4.2.4.1	Transmitter unwanted emissions outside the 5GHz RLAN bands	P
	4.2.4.2	Transmitter unwanted emissions within the 5GHz RLAN bands	P
	4.2.5	Receiver spurious emissions	P
	4.2.6	Dynamic Frequency Selection	P
	4.2.7	Adaptivity(Channel Access Mechanism)	P
	4.2.8	Receiver Blocking	P

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

8. Document Revision History

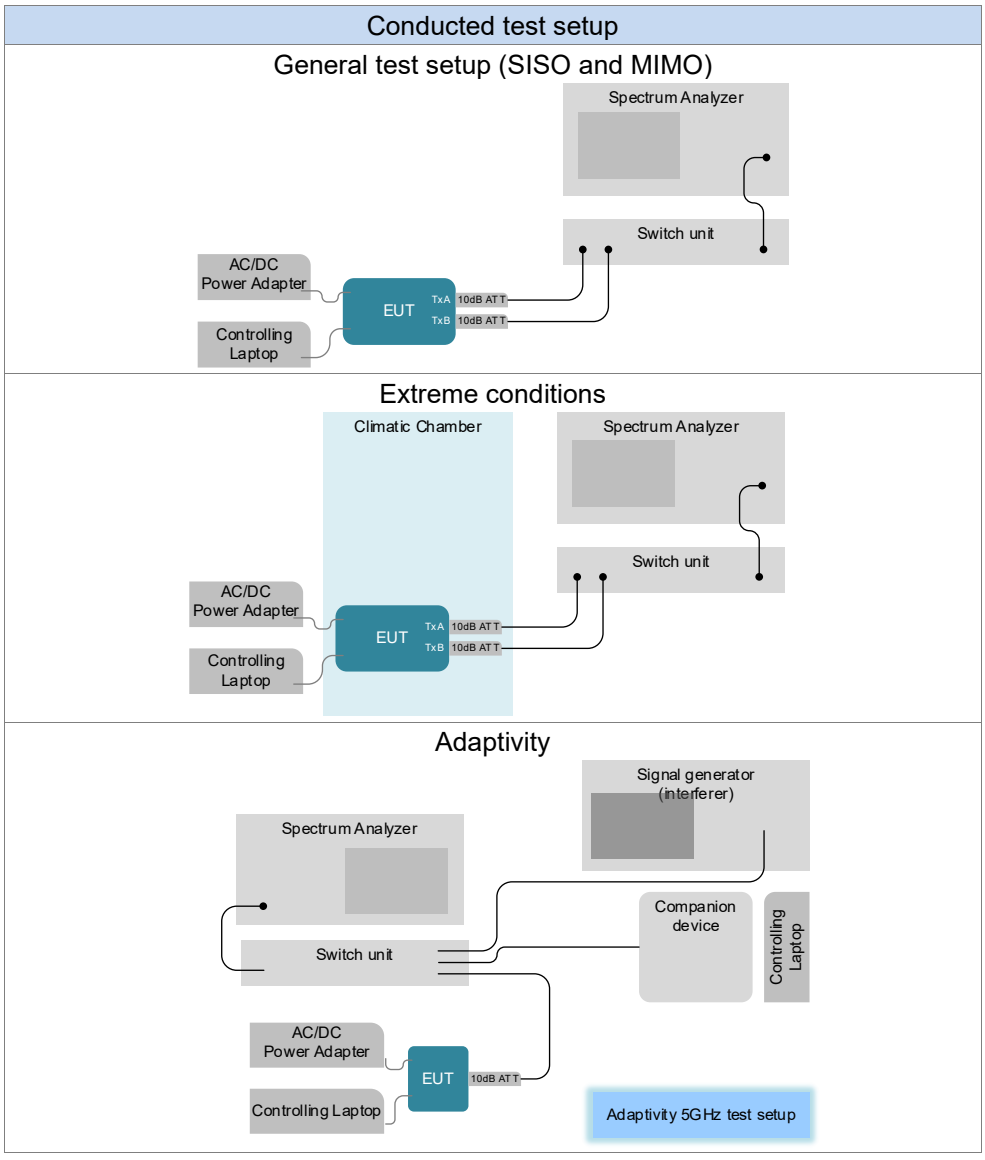
Revision #	Modified by	Revision Details
Rev. 00	T. GAMAIN R.SIMONINI	First Issue
Rev.01	Z.OUACHICHA	Upon customer request, editorial typo has been updated in section B.8 page 58

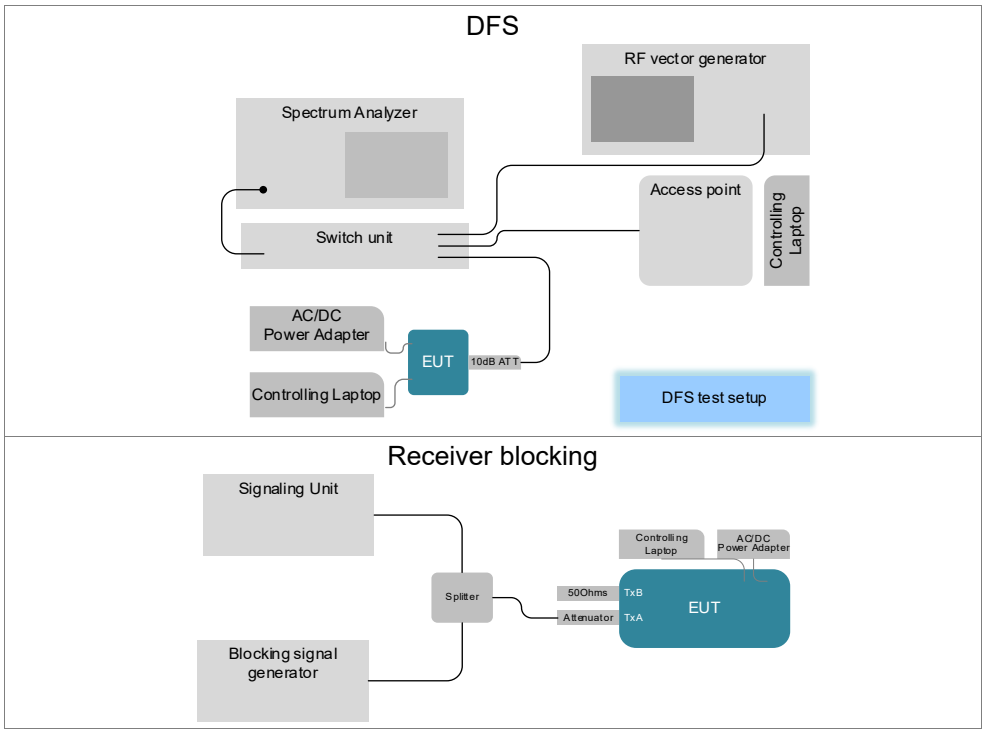
Annex A. Test & System Description

A.1 Measurement System

Measurements were performed using the following setups, made in accordance to the general provisions of ETSI EN 301 893 V2.1.1. test method. Rohde & Schwarz TS8997 system with the switching unit OSP120, OSP B-157 and software EMC32 were employed.

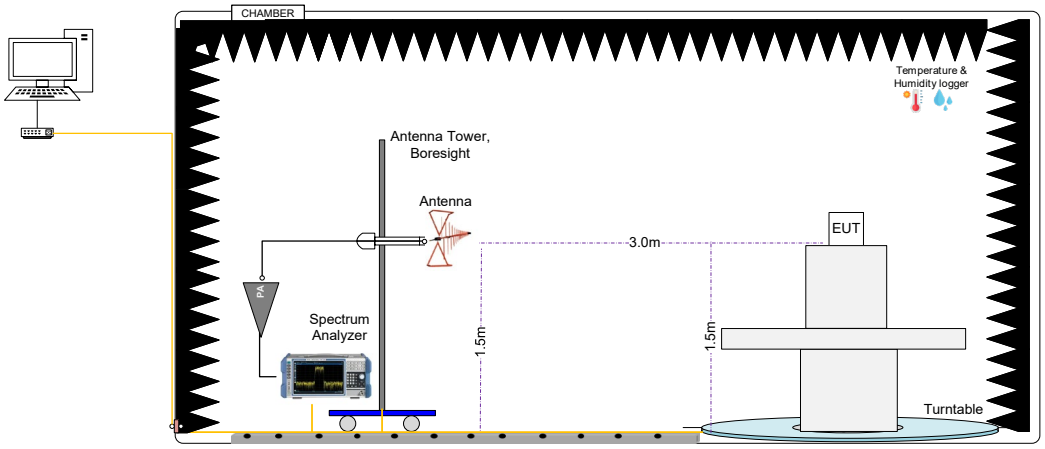
The EUT was installed in a test fixture and this test fixture is connected to a laptop computer and AC/DC power adapter. The laptop computer was used to configure the EUT to continuously transmit at a specified output power using all different modes and modulation schemes, using the Intel proprietary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



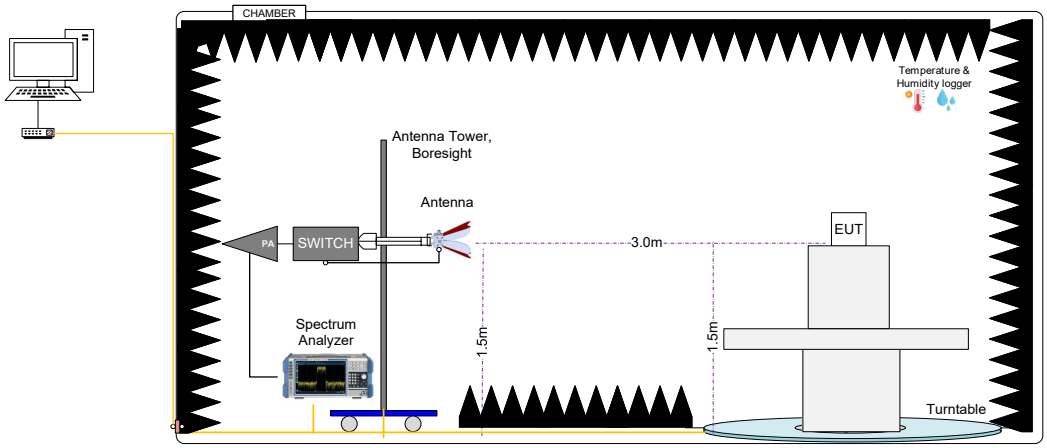

DFS
RF vector generator
Spectrum Analyzer
Access point
Controlling Laptop
Switch unit
AC/DC Power Adapter
EUT
10dB ATT
Controlling Laptop
DFS test setup
Receiver blocking
Signaling Unit
Controlling Laptop
AC/DC Power Adapter
Splitter
50Ohms
TxB
Attenuator
TxA
EUT
Blocking signal generator

Radiated test setup

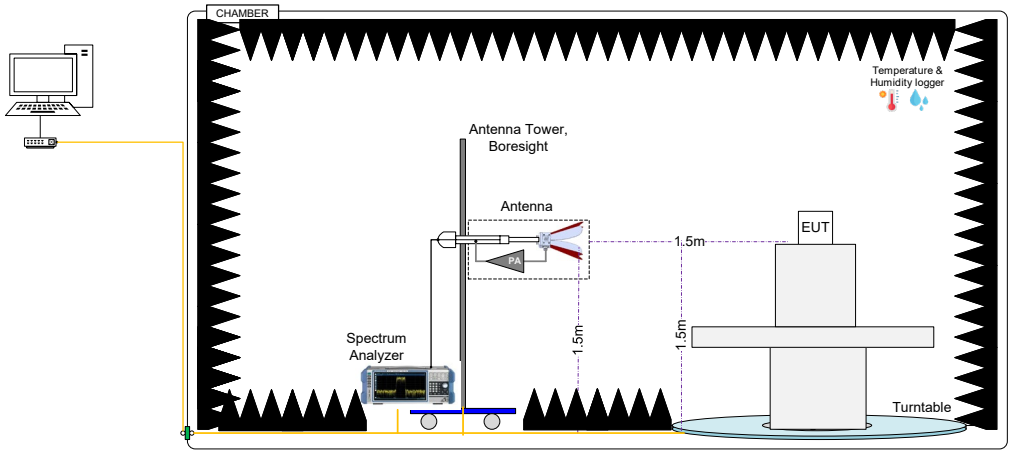
Radiated Setup 30 MHz - 1 GHz (Transmitter tests)



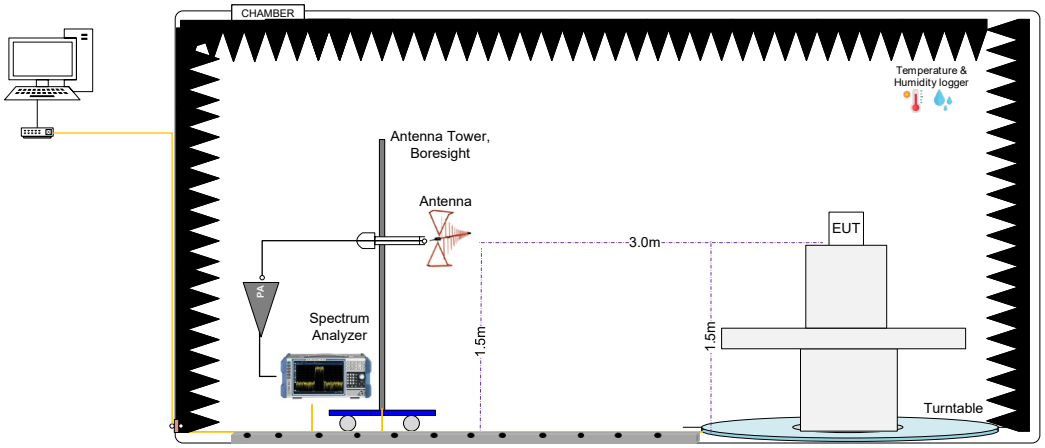
Radiated Setup 1 GHz – 11 GHz (Transmitter tests)



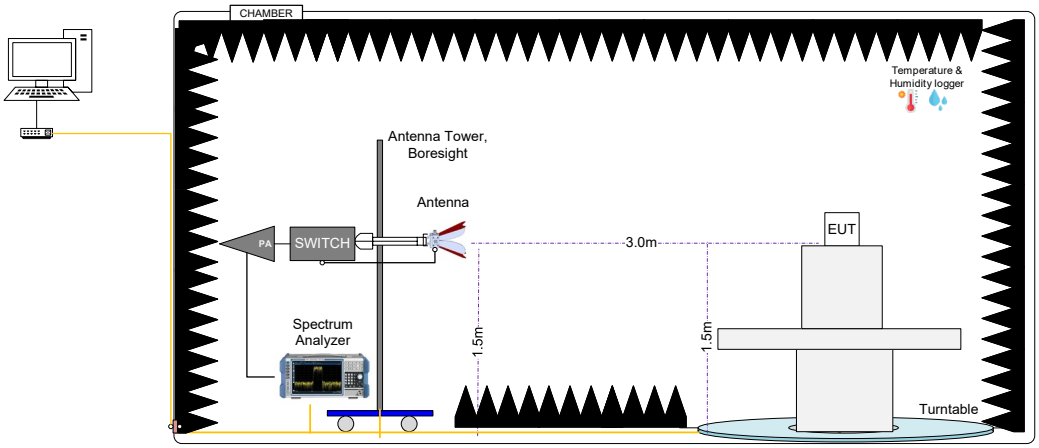
Radiated Setup 11 GHz - 26 GHz (Transmitter tests)



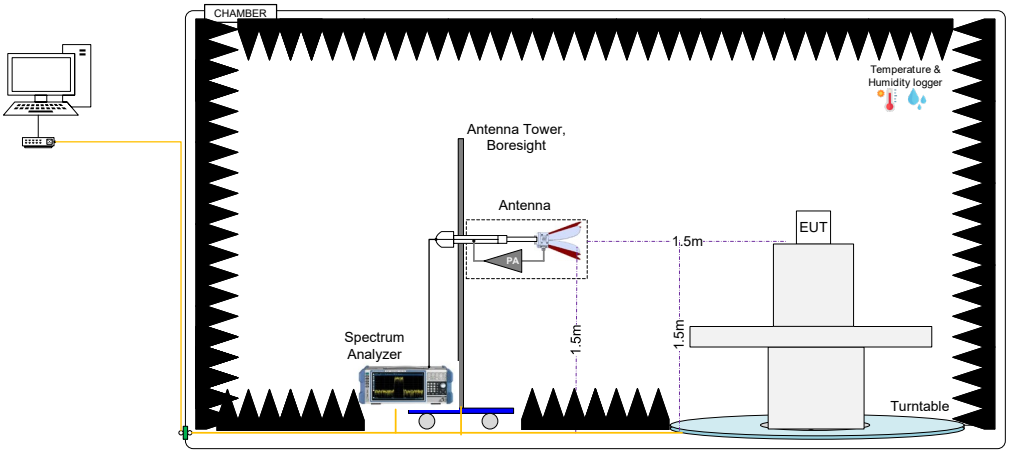
Radiated Setup 30 MHz – 1 GHz (Receiver tests)



Radiated Setup 1 GHz - 11 GHz (Receiver tests)



Radiated Setup 11 GHz - 26 GHz (Receiver tests)



A.2 Test Equipment List

Conducted Setup

ID#	Device	Type/Model	Serial #	Manufacturer	Cal. Date	Cal. Due Date
017-015	Switch unit	OSP 120	101172	Rohde & Schwarz	2022-04-29	2024-04-29
481-000	Access point 802.11n	AIR-CAP3502E-A-K9	FTX1438S6P4	Cisco	N/A	N/A
017-003	DC Power supply	E3640A	MY40006885	Agilent	N/A	N/A
133-000	Oscilloscope	RTE1052	101135	Rohde & Schwarz	2022-03-25	2024-03-25
299-000	Multimeter	34401A	US360546853146A00597	HPAgilent	2022-01-18	2024-01-18*
311-000	Climatic chamber	SLT34/40	56746020930010	Secasi	2023-12-20	2025-12-20
134-000	Spectrum analyzer	FSV30	103308	Rohde & Schwarz	2023-07-26	2025-07-26
273-000	Spectrum analyzer	FSV30	103309	Rohde & Schwarz	2023-02-01	2025-02-01
503-000	Spectrum analyzer	FSVA3013	102318	Rohde & Schwarz	2023-08-09	2025-08-09
017-000	Measurement Software	WMS32 V11.40	200226	Rohde & Schwarz	N/A	N/A
363-000	Temp & Humidity Logger	RA12E-TH1-RAS	RA12-D0EB1A	AVTECH	2023-09-28	2025-09-28
237-000	10dB directional coupler	MC2047-10	01-062	Fairview	2023-03-03	2024-03-03
017-005	RF Cable 0.5m	PE3CA1039	-	Pasternack	2023-03-03	2024-03-03
017-006	RF Cable 1.2m	PE3C0666	-	Pasternack	2023-03-03	2024-03-03
017-007	Cable SMA Male to ML51-P	HRMP-ML51LP	DTR178-100RS	Hirose	2023-03-03	2024-03-03
017-008	Cable SMA Male to ML51-P	HRMP-ML51LP	DTR178-100RS	Hirose	2023-03-03	2024-03-03
281-000	Thermometer	t3000FC	46320036	Fluke	2022-03-03	2024-03-03
017-011	RF Cable 2m	0900670672000PJ	1936949	Radiall	2023-03-03	2024-03-03
017-012	RF Cable 2m	0900670672000PJ	1936947	Radiall	2023-03-03	2024-03-03
017-019	10dB attenuator	-	-	Pasternack	2023-03-03	2024-03-03
017-020	10dB attenuator	-	-	Pasternack	2023-03-03	2024-03-03
008-025	Power Sensor	NRP-Z57	101280	Rohde & Schwarz	2022-04-22	2024-04-22

*Equipment not used outside of calibration period
N/A: Not Applicable

Receiver blocking Setup

ID#	Device	Type/Model	Serial #	Manufacturer	Cal. Date	Cal. Due Date
125-000	Communication tester	CMW500	129337	Rohde & Schwarz	2023-04-20	2025-04-20
130-000	Signal generator	SMB100A	178217	Rohde & Schwarz	2023-07-26	2025-07-26
018-005	SMA-SMA 45cm RF Cable	FMC020285-18	-	Fairview Microwave	2023-03-03	2024-03-03
363-000	Temp & Humidity Logger	RA12E-TH1-RAS	RA12-D0EB1A	AVTECH	2023-09-28	2025-09-28
018-000	2 Way SMA Power Divider	PE2084	-	Pasternack	2023-03-03	2024-03-03
016-003	SMA-SMA 45cm RF Cable	FMC0202085-18	-	Fairview Microwave	2023-03-03	2024-03-03
018-006	SMA-SMA 45cm RF Cable	FMC0202085-18	-	Fairview Microwave	2023-03-03	2024-03-03

N/A: Not Applicable

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	2024-02-21
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
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
006-068	RF Switch	RC-2SP6T-40	02112090061	Micro-Circuits	2023-08-22	2024-08-22
006-066	Cable 7m – 25MHz to 40GHz	R286304174	20.46.370	Radiall	2023-08-16	2024-08-16
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
*Within a grace period of 30 days

Radiated Setup #2

ID#	Device	Type/Model	Serial #	Manufacturer	Cal. Date	Cal. Due Date
007-000	Anechoic chamber	RFD-FA-100	5996	ETS Lindgren	2021-09-14	2024-03-14
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
059-000	Double Ridge Horn (1- 18GHz)	3117	201542	ETS-Lindgren	2023-09-26	2025-09-26
264-000	Amplifier 1GHz-18GHz	3117-PA	00169546	ETS-Lindgren	2023-02-20	2024-02-20
007-011*	RF Cable 1-18GHz - 6.5m	140-8500-11-51	001	Atem	2023-02-15	2024-03-15
007-005	Measurement SW, v11.20.00	EMC32	100401	Rohde & Schwarz	N/A	N/A
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	2024-03-16
007-022*	RF Cable 1-18GHz, 1.5m	0501050991200GX	19.23.493	Radiall	2023-02-13	2024-03-13
007-015*	RF Cable 1GHz-18GHz 1.5m	-	-	Spirent	2023-02-13	2024-03-13
007-018*	RF Cable 1-9.5GHz 1.2m	0500990991200KE	-	Radiall	2023-02-13	2024-03-13
007-020*	RF Cable 1-18GHz, 1.2 m	2301761761200PJ	12.22.1104	Radiall	2023-02-15	2024-03-15
349-000	Temp & Humidity Logger	RA12E-TH1-RAS	RA12-D4F8C3	Avtech	2023-11-30	2025-11-30

N/A: Not Applicable
*Within a grace period of 30 days

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	Limit	Unit
Frequency Stability	±6.18	±10	ppm
RF Output Power, conducted	±0.99	±1.5	dB
Power Spectral Density, conducted	±0.99	±1.5	dB
Unwanted Emission, conducted	±0.89	±3	dB
Radiated test < 1GHz	±4.03	±6	dB
Radiated test 1GHz – 26.5 GHz	±4.68	±6	dB
Temperature	±0.3	±2	ºC
Humidity	2.3	±5	%
Time	±0.01	±10	%

Annex B. Test Results

The herein test results were performed by:

Test case measurement	Test Personnel
Carrier frequencies	T.Gamain
Occupied channel bandwidth	T.Gamain
RF output power at the highest power	T.Gamain
RF output power at the lowest power of the TPC	T.Gamain
Power density	T.Gamain
Transmitter unwanted emissions within the 5GHz RLAN bands	T.Gamain
Transmitter unwanted emissions outside the 5GHz RLAN bands	K.Khatib, R.Simonini
Receiver spurious emissions	K.Khatib, R.Simonini
Dynamic Frequency Selection	T.Gamain
Adaptivity(Channel Access Mechanism)	T.Gamain
Receiver Blocking	Z.Ouachicha

B.1 Test Conditions

ETSI clause	Conditions	ETSI EN 301 893 V2.1.1.Annex G
5.1.1	Tests defined in the present document shall be carried out at representative points within the boundary limits of the declared operational environmental profile, see clause 5.4.1, item m). Where technical performance varies subject to environmental conditions, tests shall be carried out under a sufficient variety of environmental conditions (within the boundary limits of the declared operational environmental profile) to give confidence of compliance for the affected technical requirements. For each test defined in the present document, the environmental condition(s) at which the test has to be performed is specified in the clause on test conditions for that particular test.	 **"Information provided by the customer"**
5.4.1, item m).	The operational environmental profile (e.g. the normal test conditions and the extreme test conditions) that applies to the equipment.	

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

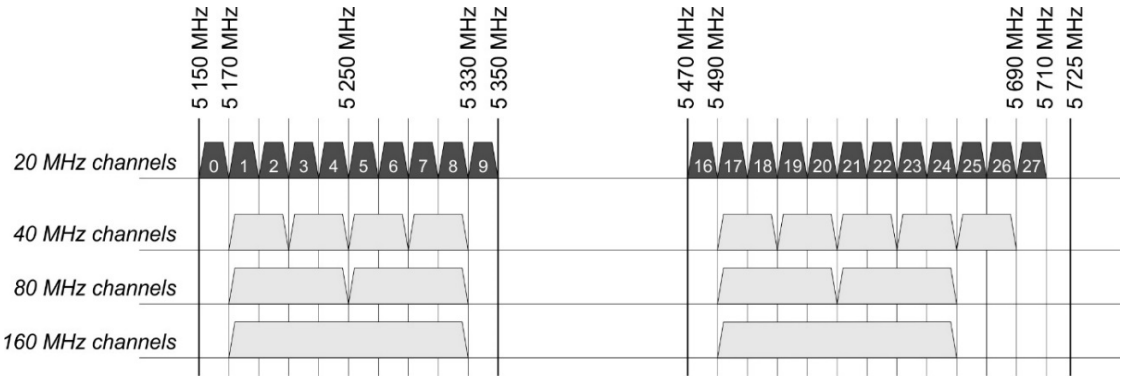
For 802.11n20, 802.11ax/be20 (20 MHz channel bandwidth), 802.11n40, 802.11ax/be40 (40MHz channel bandwidth), 802.11ac80, 802.11ax/be80 (80MHz channel bandwidth) and 802.11ac160, 802.11ax/be160 (160 MHz channel bandwidth) modes the EUT can transmit at both CHAIN A and CHAIN B RF outputs individually, 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
		160	VHT0
	802.11ax/be	20	MCS0
		40	MCS0
		80	MCS0
		160	MCS0
MIMO	802.11n	20/40	HT8
	802.11ac	80/160	VHT0
	802.11ax/be	20/40/80/160	MCS0

B.2 Carrier frequencies

Test limits

ETSI clause	Limits
4.2.1.3	The Nominal Centre Frequencies (fc) for a Nominal Channel Bandwidth of 20 MHz are defined by equation (1). See also figure 3. fc = 5 160 + (g × 20) MHz, where 0 ≤ g ≤ 9 or 16 ≤ g ≤ 27 and where g shall be an integer. (1)  **Figure 3** A maximum offset of the Nominal Centre Frequency of ± 200 kHz is permitted. Where the manufacturer decides to make use of this frequency offset, the manufacturer shall declare the actual centre frequencies used by the equipment. See clause 5.4.1, item a). The actual centre frequency for any given channel shall be maintained within the range fc ± 20 ppm.

Test conditions

ETSI clause	Conditions
5.4.2.1	These measurements shall be performed under both normal and extreme test conditions The UUT shall be configured to operate at a normal RF Output Power level. In addition, the UUT shall be configured to operate on a single channel.

Test procedure

The conducted setups shown in section *Test & System Description* were used to measure the center frequency accordingly to the test procedure described in ETSI EN 301 893 V2.1.1.. The antenna terminal of the EUT is connected to the OSP120 through an attenuator and a cable, the spectrum analyzer is connected to the receiver port on the OSP. System connection cable loss is compensated by the EMC32 software on measured parameters.

For MIMO transmission modes, measurements are taken from chain A on the EUT.

Results tables

Centre Frequencies			Normal condition Ambient Temperature +23ºC		Extreme condition High Temperature +70ºC		Extreme condition Low Temperature -10ºC	
#Ch	Freq [MHz]	Chain	Centre frequency [MHz]	Deviation [ppm]	Centre frequency [MHz]	Deviation [ppm]	Centre frequency [MHz]	Deviation [ppm]
36	5180	A	5179.998000	0.386	5180.085992	16.601	5180.009999	1.930
		B	5179.990001	1.930	5180.091521	17.668	5180.017999	3.475
38	5190	A	5189.990001	1.927	5190.085992	16.569	5190.011999	2.312
		B	5189.990001	1.927	5190.089991	17.339	5190.013058	2.516
42	5210	A	5209.996000	0.768	5210.087992	16.889	5210.004000	0.768
		B	5209.990120	1.896	5210.090110	17.296	5210.008000	1.535
50	5250	A	5249.984002	3.047	5250.095990	18.284	5250.015998	3.047
		B	5249.984002	3.047	5250.079992	15.237	5250.007999	1.524

B.3 Occupied Channel Bandwidth

Test limits

ETSI clause	Limits
4.2.2.2	The Nominal Channel Bandwidth for a single Operating Channel shall be 20 MHz. Alternatively, equipment may implement a lower Nominal Channel Bandwidth with a minimum of 5 MHz, providing they still comply with the Nominal Centre Frequencies defined in clause 4.2.1 (20 MHz raster). The Occupied Channel Bandwidth shall be between 80 % and 100 % of the Nominal Channel Bandwidth. In case of smart antenna systems (devices with multiple transmit chains) each of the transmit chains shall meet this requirement. The Occupied Channel Bandwidth might change with time/payload. During a Channel Occupancy Time (COT), equipment may operate temporarily with an Occupied Channel Bandwidth of less than 80 % of its Nominal Channel Bandwidth with a minimum of 2 MHz.

Test conditions

ETSI clause	Conditions
5.4.3.1	The conformance requirements in clause 4.2.2 shall be verified only under normal operating conditions, and on those channels and channel bandwidths defined in clause 5.3.2. The measurements shall be performed using normal operation of the equipment with the test signal applied (see clause 5.3.1.1). The UUT shall be configured to operate at a typical RF power output level used for normal operation. When equipment has simultaneous transmissions in adjacent channels, these transmissions may be considered as one signal with an actual *Nominal Channel Bandwidth* of "n" times the individual *Nominal Channel Bandwidth* where "n" is the number of adjacent channels. When equipment has simultaneous transmissions in non-adjacent channels, each power envelope shall be considered separately.

Test procedure

The conducted setups shown in section *Test & System Description* were used to measure the occupied channel bandwidth accordingly to the test procedure described in ETSI EN 301 893 V2.1.1.. The antenna terminal of the EUT is connected to the OSP120 through an attenuator and a cable, the spectrum analyzer is connected to the receiver port on the OSP. System connection cable loss is compensated by the EMC32 software on measured parameters.

For MIMO transmission mode, measurements are taken from chain A on the EUT.

Results tables

Mode	Rate	#Ch	Freq [MHz]	Chain	Measured 99% BW [MHz]	Min OBW 80%	Max OBW 100%
802.11a	6Mbps	36	5180	A	16.5	16.0	20.0
				B	16.5	16.0	20.0
802.11n20	HT0			A	17.7	16.0	20.0
				B	17.7	16.0	20.0
	HT8			A+B	17.7	16.0	20.0
802.11n40	HT0	38	5190	A	36.3	32.0	40.0
				B	36.3	32.0	40.0
	HT8			A+B	36.3	32.0	40.0
802.11ac80	VHT0	42	5210	A	76.1	64.0	80.0
				B	76.0	64.0	80.0
	VHT0			A+B	75.9	64.0	80.0
802.11ac160	VHT0	50	5250	A	155.1	128.0	160.0
				B	155.2	128.0	160.0
	VHT0			A+B	155.1	128.0	160.0
802.11ax/be20	MCS0	36	5180	A	18.9	16.0	20.0
				B	18.9	16.0	20.0
	MCS0			A+B	18.9	16.0	20.0
802.11ax/be40	MCS0	38	5190	A	37.8	32.0	40.0
				B	37.8	32.0	40.0
	MCS0			A+B	37.7	32.0	40.0
802.11ax/be80	MCS0	42	5210	A	77.4	64.0	80.0
				B	77.4	64.0	80.0
	MCS0			A+B	77.3	64.0	80.0
802.11ax/be160	MCS0	50	5250	A	156.7	128.0	160.0
				B	156.7	128.0	160.0
	MCS0			A+B	156.5	128.0	160.0

B.4 RF Output Power at the highest power level

Test limits

<table>
<tr><th>ETSI clause</th><th>Limits</th></tr>
<tr><td>4.2.3.2.1</td><td>TPC (Transmit Power Control) is not required for channels whose nominal bandwidth falls completely within the band 5 150 MHz to 5 250 MHz.
For devices with TPC, the RF output power and the Power Density when configured to operate at the highest stated power level (P_H) of the TPC range shall not exceed the levels given in table 2.
Devices are allowed to operate without TPC. See table 2 for the applicable limits that shall apply in this case.

Table 2: Mean e.i.r.p. limits for RF output and Power Density at the highest power level (P_H)
<table>
<tr><th rowspan="2">Frequency range [MHz]</th><th colspan="2">Mean e.i.r.p. limit for P_H [dBm]</th><th colspan="2">Mean e.i.r.p. density limit [dBm/MHz]</th></tr>
<tr><th>With TPC</th><th>Without TPC</th><th>With TPC</th><th>Without TPC</th></tr>
<tr><td>5 150 to 5 350</td><td>23</td><td>20/23 (see note 1)</td><td>10</td><td>7/10 (see note 2)</td></tr>
<tr><td>5 470 to 5 725</td><td>30 (see note 3)</td><td>27 (see note 3)</td><td>17 (see note 3)</td><td>14 (see note 3)</td></tr>
<tr><td colspan="5">NOTE 1: The applicable limit is 20 dBm, except for transmissions whose nominal bandwidth falls completely within the band 5 150 MHz to 5 250 MHz, in which case the applicable limit is 23 dBm.
NOTE 2: The applicable limit is 7 dBm/MHz, except for transmissions whose nominal bandwidth falls completely within the band 5 150 MHz to 5 250 MHz, in which case the applicable limit is 10 dBm/MHz.
NOTE 3: Slave devices without a Radar Interference Detection function shall comply with the limits for the frequency range 5 250 MHz to 5 350 MHz.</td></tr>
</table>
</td></tr>
</table>

Test conditions

ETSI clause	Conditions
5.4.4.2.1.1.1	These measurements shall be performed under both normal and extreme test conditions The UUT shall be configured to operate at: • the highest stated transmitter output power level of the TPC range; or • the maximum stated transmitter output power level in case the equipment has no TPC feature.

Test procedure

The conducted setups shown in section *Test & System Description* were used to measure the RF output power at the highest power. The antenna terminal of the EUT is connected to the OSP120 through an attenuator and a cable. System connection cable loss is compensated by the EMC32 software on the measured parameters.

Antenna gain is taken into account and added by the software to the measurements. The EIRP power (dBm) is calculated by adding the declared maximum antenna gain to the measured conducted power.

According to the test procedure described in ETSI EN 301 893 V2.1.1., the measurement for MIMO modes is done synchronously on all transmit ports, the power of the individual samples is sum for all ports and then the reported power is the highest calculated RMS power for the active bursts.

Results tables

RF Output Power						Normal condition Ambient Temperature +23ºC		Extreme condition High Temperature +70ºC		Extreme condition Low Temperature -10ºC	
Mode	Meas Duty Cycle %	Rate	#Ch	Freq [MHz]	Chain	Measured Conducted [dBm]	EIRP [dBm]	Measured Conducted [dBm]	EIRP [dBm]	Measured Conducted [dBm]	EIRP [dBm]
802.11a	97.8	6Mbps	36	5180	A	16.7	21.7	15.5	20.5	16.2	21.2
					B	16.7	21.7	15.3	20.3	16.1	21.1
			64	5320	A	16.6	21.6	15.5	20.5	16.2	21.2
					B	16.7	21.7	15.4	20.4	16.1	21.1
802.11n20	98.8	HT0	36	5180	A	17.0	22.0	15.7	20.7	16.5	21.5
					B	16.9	21.9	15.6	20.6	16.3	21.3
			64	5320	A	17.1	22.1	15.8	20.8	16.4	21.4
					B	16.9	21.9	15.7	20.7	16.3	21.3
	98.8	HT8	36	5180	A+B	17.1	22.1	15.9	20.9	16.6	21.6
			64	5320	A+B	17.2	22.2	15.9	20.9	16.6	21.6
802.11n40	98.8	HT0	38	5190	A	17.8	22.8	16.5	21.5	17.2	22.2
					B	17.8	22.8	16.6	21.6	17.2	22.2
			62	5310	A	17.8	22.8	16.5	21.5	17.2	22.2
					B	17.8	22.8	16.6	21.6	17.2	22.2
	98.8	HT8	38	5190	A+B	17.8	22.8	16.5	21.5	17.2	22.2
			62	5310	A+B	17.8	22.8	16.6	21.6	17.2	22.2
802.11ac80	98.8	VHT0	42	5210	A	17.9	22.9	16.5	21.5	17.3	22.3
					B	17.8	22.8	16.5	21.5	17.2	22.2
			58	5290	A	17.8	22.8	16.4	21.4	17.1	22.1
					B	17.8	22.8	16.5	21.5	17.1	22.1
	99.4	VHT0	42	5210	A+B	17.8	22.8	16.5	21.5	17.2	22.2
			58	5290	A+B	17.9	22.9	16.6	21.6	17.3	22.3
802.11ac160	98.8	VHT0	50	5250	A	17.8	22.8	16.4	21.4	17.2	22.2
					B	17.7	22.7	16.3	21.3	17.1	22.1
	99.2	VHT0			A+B	17.8	22.8	16.4	21.4	17.2	22.2
802.11ax/be20	98.8	MCS0	36	5180	A	17.6	22.6	15.9	20.9	16.6	21.6
					B	17.5	22.5	15.9	20.9	16.5	21.5
			64	5320	A	17.4	22.5	15.7	20.7	16.3	21.3
					B	17.6	22.6	15.9	20.9	16.5	21.5
	99.4	MCS0	36	5180	A+B	17.6	22.6	16.0	21.0	16.6	21.6
			64	5320	A+B	17.4	22.4	15.9	20.9	16.3	21.3
802.11ax/be40	98.8	MCS0	38	5190	A	17.9	22.9	16.7	21.7	17.3	22.3
					B	17.9	22.9	16.7	21.7	17.2	22.2
			62	5310	A	17.9	22.9	16.6	21.6	17.2	22.2
					B	17.8	22.8	16.6	21.6	17.1	22.1
	99.4	MCS0	38	5190	A+B	17.9	22.9	16.6	21.6	17.3	22.3
			62	5310	A+B	17.9	22.9	16.7	21.7	17.3	22.3
802.11ax/be80	98.8	MCS0	42	5210	A	17.8	22.8	16.5	21.5	17.2	22.2
					B	17.8	22.8	16.5	21.5	17.1	22.1
			58	5290	A	17.8	22.8	16.5	21.5	17.2	22.2
					B	17.7	22.7	16.5	21.5	17.1	22.1
	99.4	MCS0	42	5210	A+B	17.8	22.8	16.6	21.6	17.2	22.2
			58	5290	A+B	17.8	22.8	16.6	21.6	17.2	22.2
802.11ax/be160	98.8	MCS0	50	5250	A	17.8	22.8	16.4	21.4	17.2	22.2
					B	17.8	22.8	16.4	21.4	17.2	22.2
	99.0	MCS0			A+B	17.8	22.8	16.5	21.4	17.3	22.3

B.5 RF Output Power at the lowest level of the TPC range

Test limits

<table>
<tr><th>ETSI clause</th><th>Limits</th></tr>
<tr><td>4.2.3.2.3</td><td>For devices using TPC, the RF Output Power during a transmission burst when configured to operate at the lowest stated power level (PL) of the TPC range shall not exceed the levels given in table 3. For devices without TPC, the limits in table 3 do not apply.

Table 3: Mean e.i.r.p. limits for RF Output Power at the lowest power level of the TPC range
<table>
<tr><th>Frequency range</th><th>Mean e.i.r.p. [dBm]</th></tr>
<tr><td>5 250 MHz to 5 350 MHz</td><td>17</td></tr>
<tr><td>5 470 MHz to 5 725 MHz</td><td>24 (see note)</td></tr>
<tr><td colspan="2">NOTE: Slave devices without a Radar Interference Detection function shall comply with the limits for the band 5 250 MHz to 5 350 MHz.</td></tr>
</table></td></tr>
</table>

Test conditions

ETSI clause	Conditions
5.4.4.2.1.2.1	This test is only required for equipment with a TPC feature. These measurements shall be performed under both normal and extreme test conditions (see clause 5.1.3). The UUT shall be configured to operate at the lowest stated transmitter output power level of the TPC range.

Test procedure

The conducted setups shown in section *Test & System Description* were used to measure the RF output power at the lowest level of the TPC. The antenna terminal of the EUT is connected to the OSP120 through an attenuator and a cable. System connection cable loss is compensated by the EMC32 software on the measured parameters.

Antenna gain is taken into account and added by the software to the measurements. The EIRP power (dBm) is calculated by adding the declared maximum antenna gain to the measured conducted power.

According to the test procedure described in ETSI EN 301 893 V2.1.1., the measurement for MIMO modes is done synchronously on all transmit ports, the power of the individual samples is sum for all ports and then the reported power is the highest calculated RMS power for the active bursts.

Results tables

TPC RF Output Power						Normal condition Ambient Temperature +23ºC		Extreme condition High Temperature +70ºC		Extreme condition Low Temperature -10ºC	
Mode	Meas Duty Cycle %	Rate	#Ch	Freq [MHz]	Chain	Measured Conducted [dBm]	EIRP [dBm]	Measured Conducted [dBm]	EIRP [dBm]	Measured Conducted [dBm]	EIRP [dBm]
802.11a	97.8	6Mbps	36	5180	A	-	-	-	-	-	-
					B	-	-	-	-	-	-
			64	5320	A	11.9	16.9	10.6	15.6	11.3	16.3
					B	11.9	16.9	10.6	15.6	11.3	16.3
802.11n20	98.8	HT0	36	5180	A	-	-	-	-	-	-
					B	-	-	-	-	-	-
			64	5320	A	11.8	16.8	10.5	15.5	11.1	16.1
					B	11.8	16.8	10.6	15.6	11.2	16.2
	98.8	HT8	36	5180	A+B	-	-	-	-	-	-
			64	5320	A+B	11.8	16.8	10.5	15.5	11.1	16.1
802.11n40	98.8	HT0	38	5190	A	-	-	-	-	-	-
					B	-	-	-	-	-	-
			62	5310	A	11.8	16.8	10.5	15.5	11.1	16.1
					B	11.9	16.9	10.7	15.7	11.3	16.3
	98.8	HT8	38	5190	A+B	-	-	-	-	-	-
			62	5310	A+B	11.7	16.7	10.4	15.4	11.1	16.1
802.11ac80	98.8	VHT0	42	5210	A	-	-	-	-	-	-
					B	-	-	-	-	-	-
			58	5290	A	11.8	16.8	10.4	15.4	11.1	16.1
					B	11.8	16.8	10.5	15.5	11.2	16.2
	99.4	VHT0	42	5210	A+B	-	-	-	-	-	-
			58	5290	A+B	11.8	16.8	10.5	15.5	11.1	16.1
802.11ac160	98.8	VHT0	50	5250	A	11.8	16.8	10.5	15.5	11.3	16.3
					B	11.8	16.8	10.4	15.4	11.1	16.1
	99.2	VHT0			A+B	11.9	16.9	10.5	15.5	11.3	16.3
802.11ax/be20	98.8	MCS0	36	5180	A	-	-	-	-	-	-
					B	-	-	-	-	-	-
			64	5320	A	11.8	16.8	10.6	15.6	11.2	16.2
					B	11.8	16.8	10.7	15.7	11.2	16.2
	99.4	MCS0	36	5180	A+B	-	-	-	-	-	-
			64	5320	A+B	11.8	16.8	10.6	15.6	11.1	16.1
802.11ax/be40	98.8	MCS0	38	5190	A	-	-	-	-	-	-
					B	-	-	-	-	-	-
			62	5310	A	11.8	16.8	10.6	15.6	11.2	16.2
					B	11.8	16.8	10.7	15.7	11.2	16.2
	99.4	MCS0	38	5190	A+B	-	-	-	-	-	-
			62	5310	A+B	11.9	16.9	10.7	15.7	11.3	16.3
802.11ax/be80	98.8	MCS0	42	5210	A	-	-	-	-	-	-
					B	-	-	-	-	-	-
			58	5290	A	11.9	16.9	10.7	15.7	11.3	16.3
					B	11.9	16.9	10.6	15.6	11.2	16.2
	99.4	MCS0	42	5210	A+B	-	-	-	-	-	-
			58	5290	A+B	11.9	16.9	10.7	15.7	11.3	16.3
802.11ax/be160	98.8	MCS0	50	5250	A	11.8	16.8	10.5	15.5	11.3	16.3
					B	11.8	16.8	10.5	15.5	11.2	16.2
	99.0	MCS0			A+B	11.8	16.8	10.5	15.5	11.2	16.2

B.6 Power Density

Test limits

<table>
<tr><th>ETSI clause</th><th>Limits</th></tr>
<tr><td>4.2.3.2.1</td><td>TPC is not required for channels whose nominal bandwidth falls completely within the band 5 150 MHz to 5 250 MHz.
For devices with TPC, the RF output power and the Power Density when configured to operate at the highest stated power level (P_H) of the TPC range shall not exceed the levels given in table 2.
Devices are allowed to operate without TPC. See table 2 for the applicable limits that shall apply in this case.
Table 2: Mean e.i.r.p. limits for RF output and Power Density at the highest power level (P_H)
<table>
<tr><th rowspan="2">Frequency range [MHz]</th><th colspan="2">Mean e.i.r.p. limit for P_H [dBm]</th><th colspan="2">Mean e.i.r.p. density limit [dBm/MHz]</th></tr>
<tr><th>With TPC</th><th>Without TPC</th><th>With TPC</th><th>Without TPC</th></tr>
<tr><td>5 150 to 5 350</td><td>23</td><td>20/23 (see note 1)</td><td>10</td><td>7/10 (see note 2)</td></tr>
<tr><td>5 470 to 5 725</td><td>30 (see note 3)</td><td>27 (see note 3)</td><td>17 (see note 3)</td><td>14 (see note 3)</td></tr>
<tr><td colspan="5">NOTE 1: The applicable limit is 20 dBm, except for transmissions whose nominal bandwidth falls completely within the band 5 150 MHz to 5 250 MHz, in which case the applicable limit is 23 dBm.
NOTE 2: The applicable limit is 7 dBm/MHz, except for transmissions whose nominal bandwidth falls completely within the band 5 150 MHz to 5 250 MHz, in which case the applicable limit is 10 dBm/MHz.
NOTE 3: Slave devices without a Radar Interference Detection function shall comply with the limits for the frequency range 5 250 MHz to 5 350 MHz.</td></tr>
</table>
</td></tr>
</table>

Test conditions

ETSI clause	Conditions
5.4.4.2.1.3.1	These measurements shall only be performed at normal test conditions (see clause 5.1.2). The UUT shall be configured to operate at the lowest nominal Channel Bandwidth with: • the highest stated transmitter output power level of its TPC range; or • the maximum stated transmitter output power level in case the equipment has no TPC feature.

Test procedure

The conducted setups shown in section *Test & System Description* were used to measure the power spectral density (PSD). The antenna terminal of the EUT is connected to the OSP120 through an attenuator and a cable, the spectrum analyzer is connected to the receiver port on the OSP. System connection cable loss is compensated by the EMC32 software to measure all parameters.

Antenna gain is taken into account and added by the software to the measurements. The EIRP power (dBm) is calculated by adding the declared maximum antenna gain to the measured conducted power.

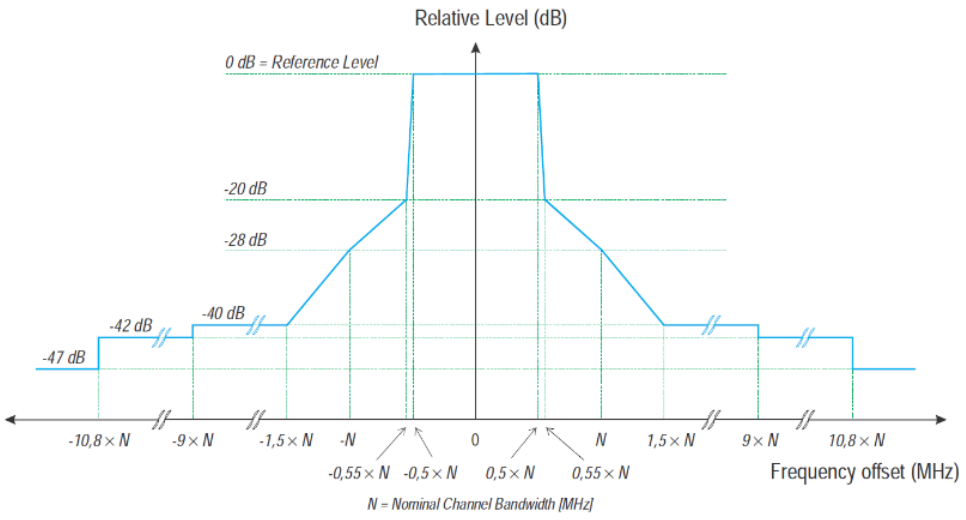
According to the test procedure described in ETSI EN 301 893 V2.1.1.the measurement for MIMO modes is done separately on each transmit ports and the power of the individual samples per frequency is sum for all ports. Finally, the software takes the highest PSD among all the 1MHz calculated segments.

Results tables

Mode	Meas. Duty Cycle %	Rate	Ch Number	Frequency [MHz]	Chain	EIRP PSD [dBm/MHz]
802.11a	97.8	6Mbps	36	5180	A	9.87
					B	9.87
			64	5320	A	9.84
					B	9.86
802.11n20	98.8	HT0	36	5180	A	9.92
					B	9.82
			64	5320	A	9.93
					B	9.81
	98.8	HT8	36	5180	A+B	9.93
			64	5320	A+B	9.99
802.11ax/be20	98.8	MCS0	36	5180	A	9.89
					B	9.84
			64	5320	A	9.87
					B	9.90
	99.4	MCS0	36	5180	A+B	9.91
			64	5320	A+B	9.89

B.7 Transmitter unwanted emissions within the 5GHz RLAN bands

Test limits

ETSI clause	Limits
4.2.4.2.2	The mean Power Density (measured with a 1 MHz measurement bandwidth) of the transmitter unwanted emissions within the 5 GHz RLAN bands shall not exceed the limits of the mask provided in figure 1 or an absolute level of -30 dBm/MHz, whichever is greater. The limits in figure 1 are relative to the maximum Power Density of the RLAN device when measured with a reference bandwidth of 1 MHz. The mask is only applicable within the band of operation. Beyond the band edges the requirements of clause 4.2.4.1 apply. In case of smart antenna systems (devices with multiple transmit chains) each of the transmit chains shall meet the limits provided in figure 1. **Figure 1. Transmit spectral power mask** 

Test conditions

ETSI clause	Conditions
5.4.6.1	The conformance requirements in clause 4.2.4.2 shall be verified only under normal operating conditions, and when operating on those channels and channel bandwidths defined in clause 5.3.2. The equipment shall be configured to operate under its worst case situation with respect to unwanted emissions within the 5 GHz RLAN bands. In case of conducted measurements on smart antenna systems (devices with multiple transmit chains) operating in a mode with more than one transmit chain being active simultaneously, measurements shall only be performed on one of the transmit chains (antenna outputs).

Test procedure

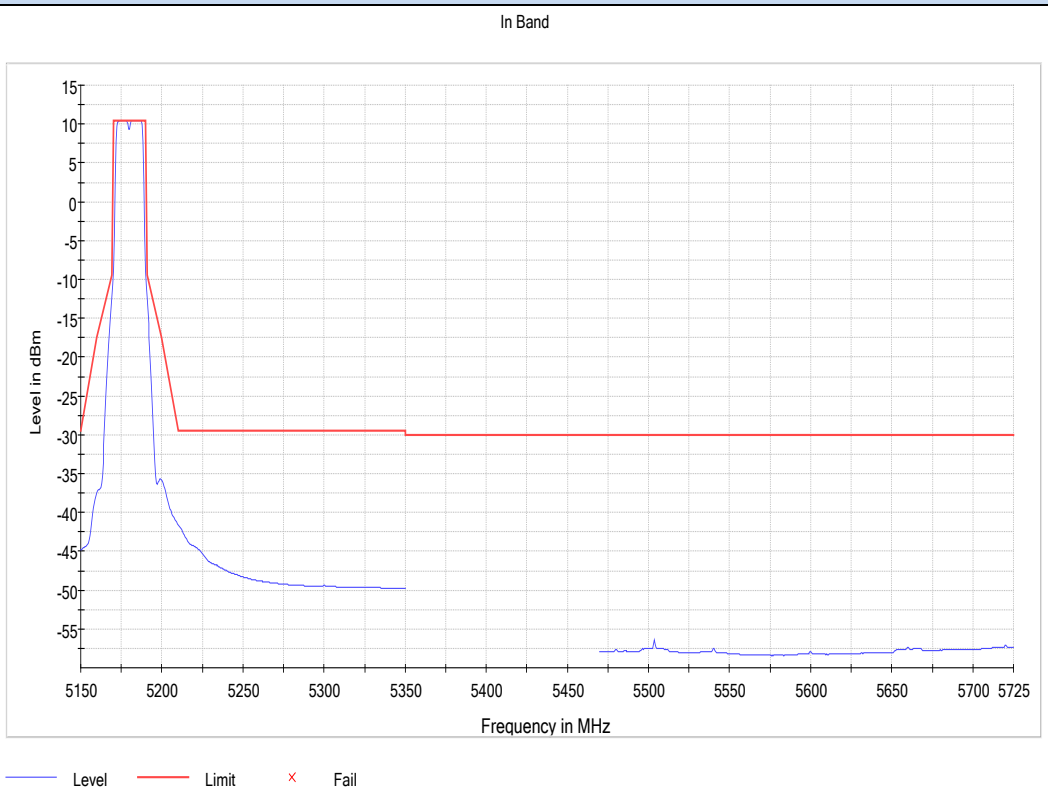
The conducted setups shown in section *Test & System Description* were used to measure the unwanted emissions within the 5GHz RLAN bands (Band Edge). The antenna terminal of the EUT is connected to the OSP120 through an attenuator and a cable, the spectrum analyzer is connected to the receiver port on the OSP. System connection cable loss is compensated by the EMC32 software on measured parameters.

Antenna gain is taken into account and added by the software to the measurements. The EIRP power (dBm) is calculated by adding the declared maximum antenna gain to the measured conducted power. EMC32 provides the mask and the frequency limits based in the measured channel bandwidth. For MIMO transmission mode, measurements are taken from chain A on the EUT.

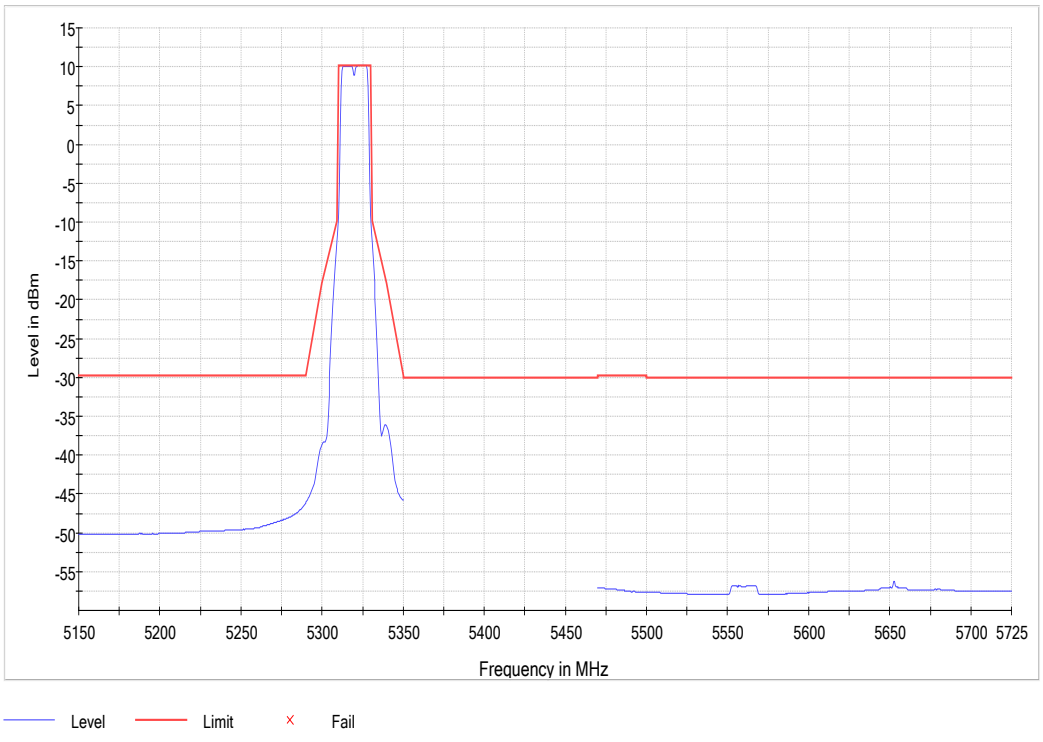
Results Screenshot

802.11a, 6Mbps – Chain A

Channel 36



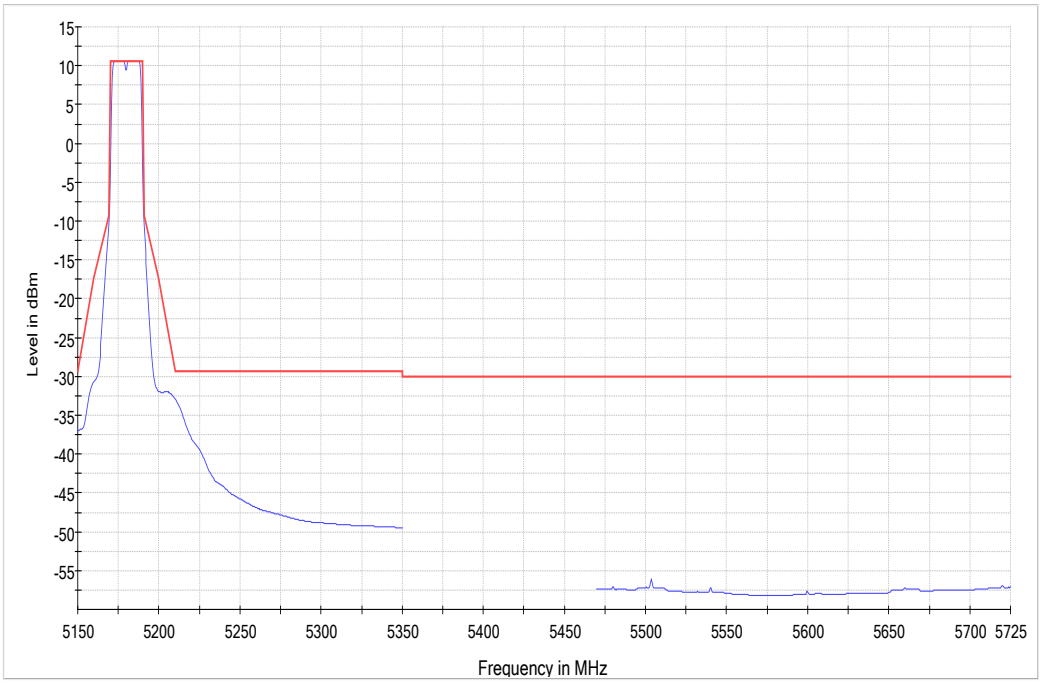
Channel 64



802.11n20 (SISO), HT0 – Chain A

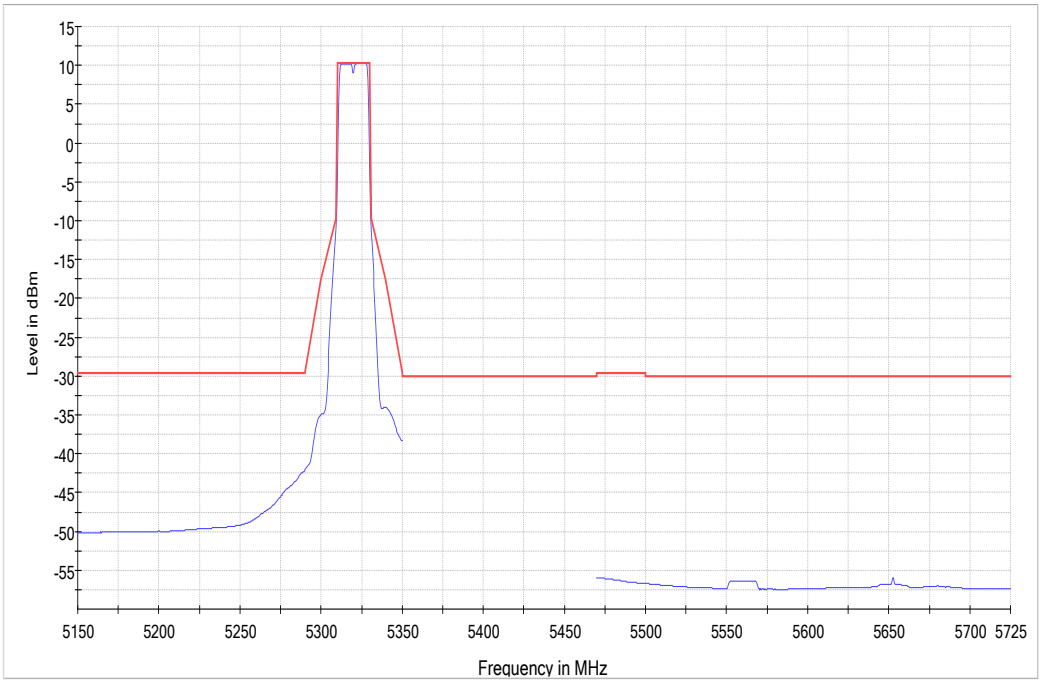
Channel 36

In Band



Channel 64

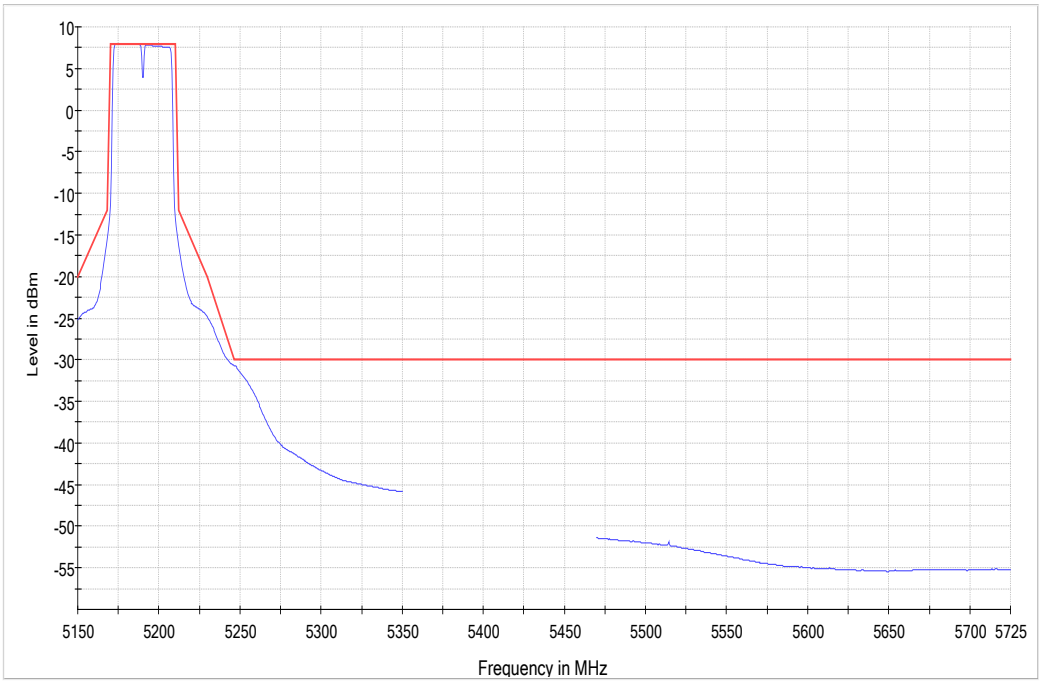
In Band



802.11n40 (SISO), HT0 – Chain A

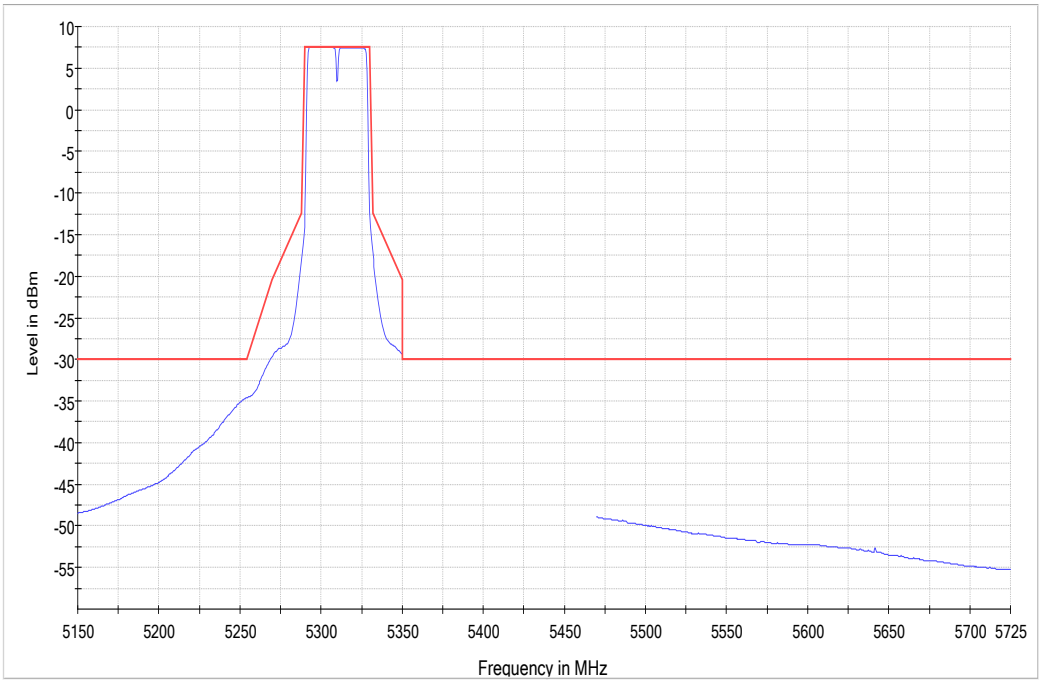
Channel 38

In Band



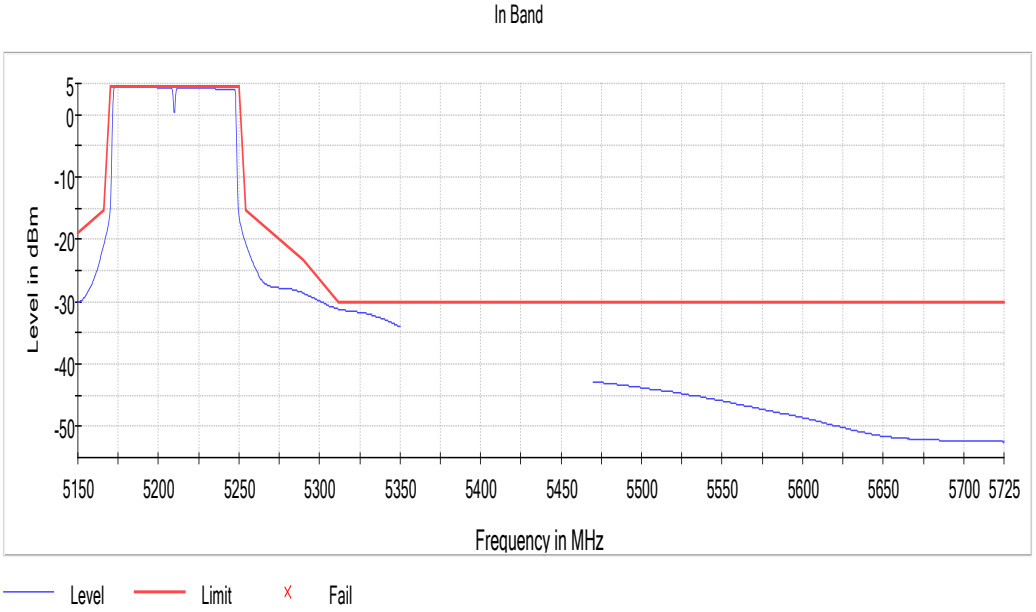
Channel 62

In Band

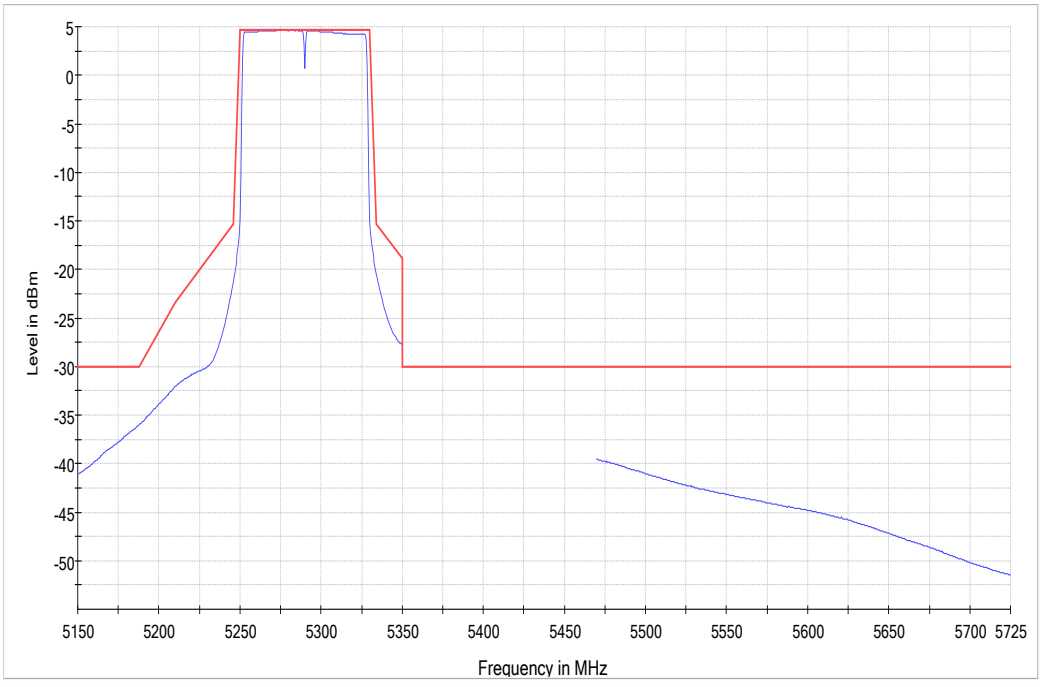


802.11ac80 (SISO), VHT0 – Chain A

Channel 42

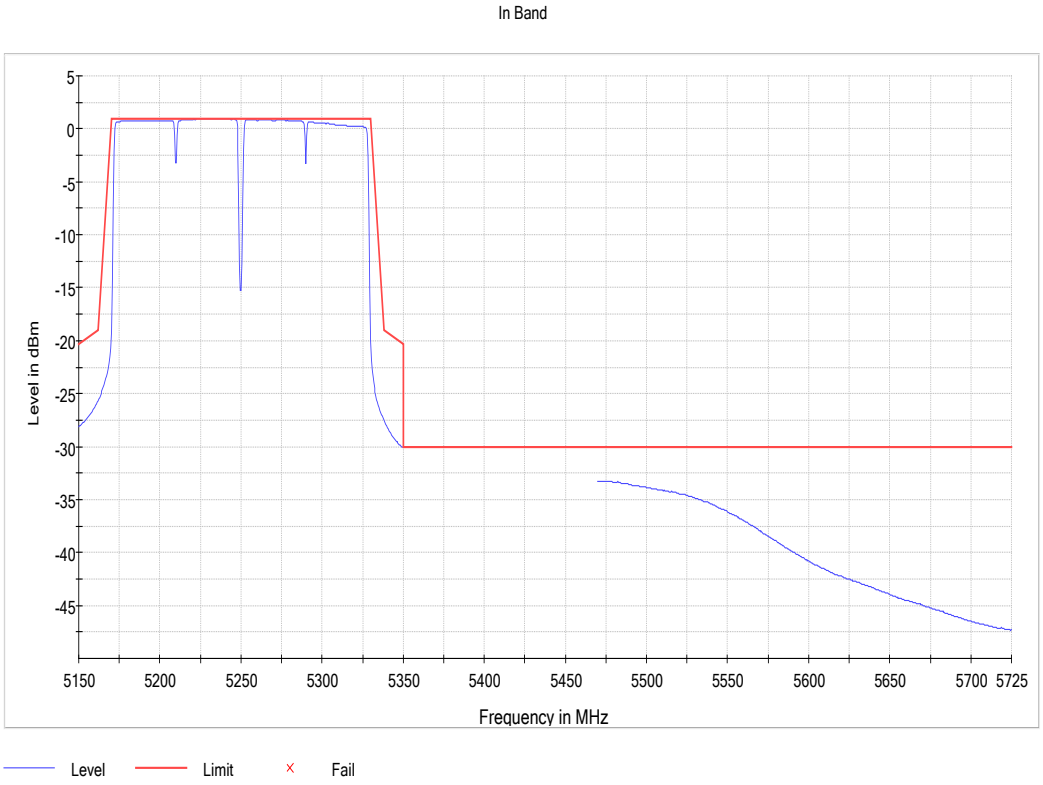


Channel 58



802.11ac160 (SISO), VHT0 – Chain A

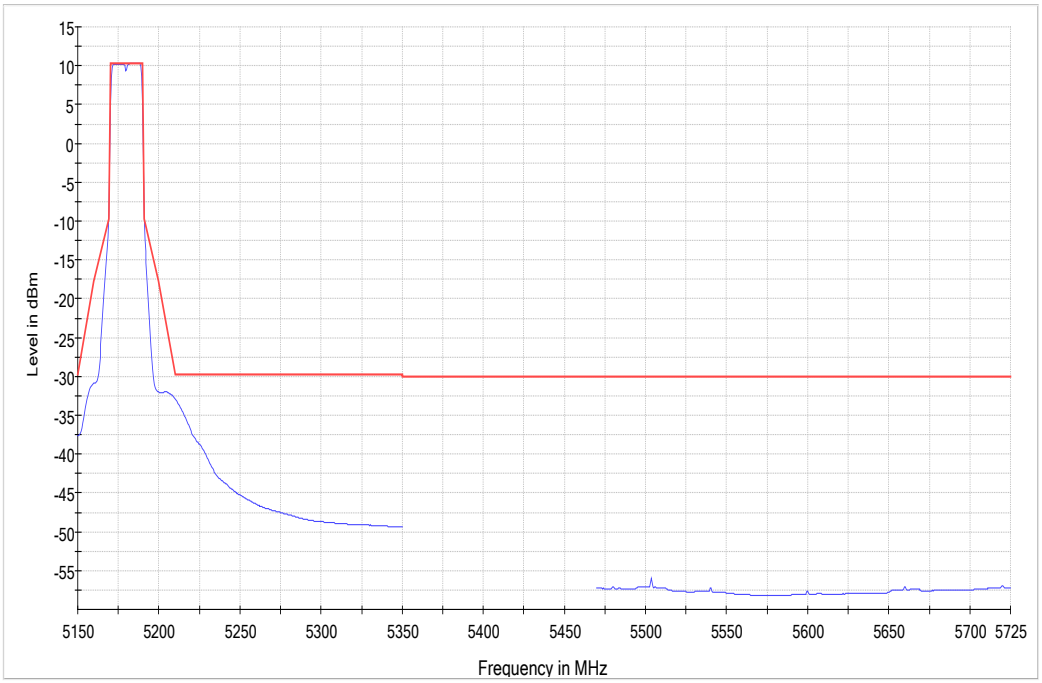
Channel 50



802.11ax/be20 (SISO), MCS0 – Chain A

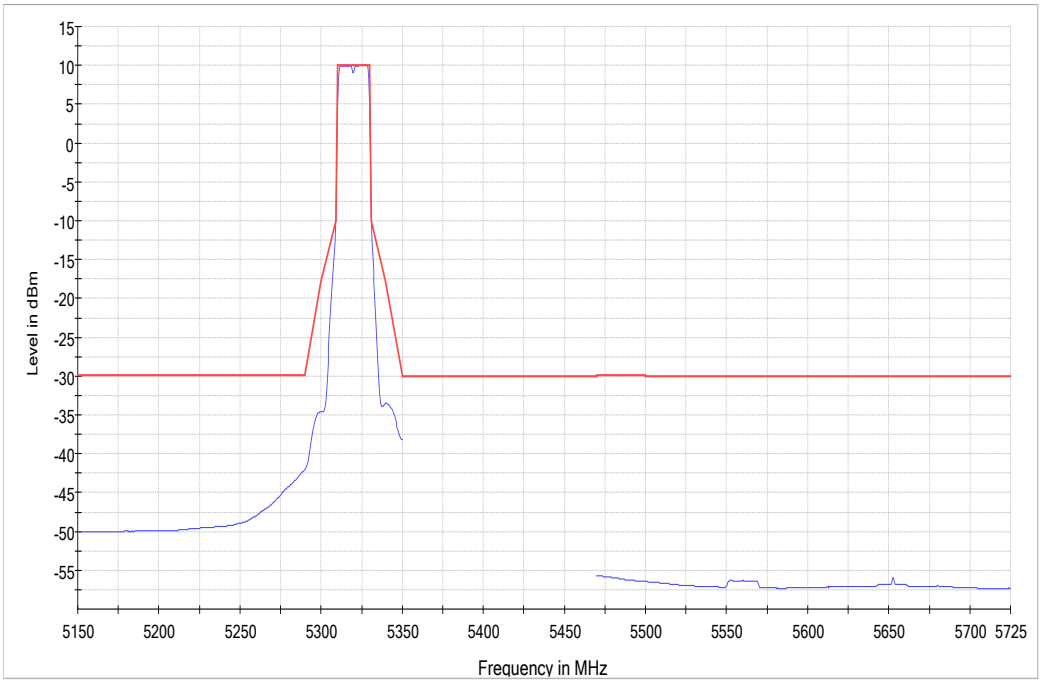
Channel 36

In Band



Channel 64

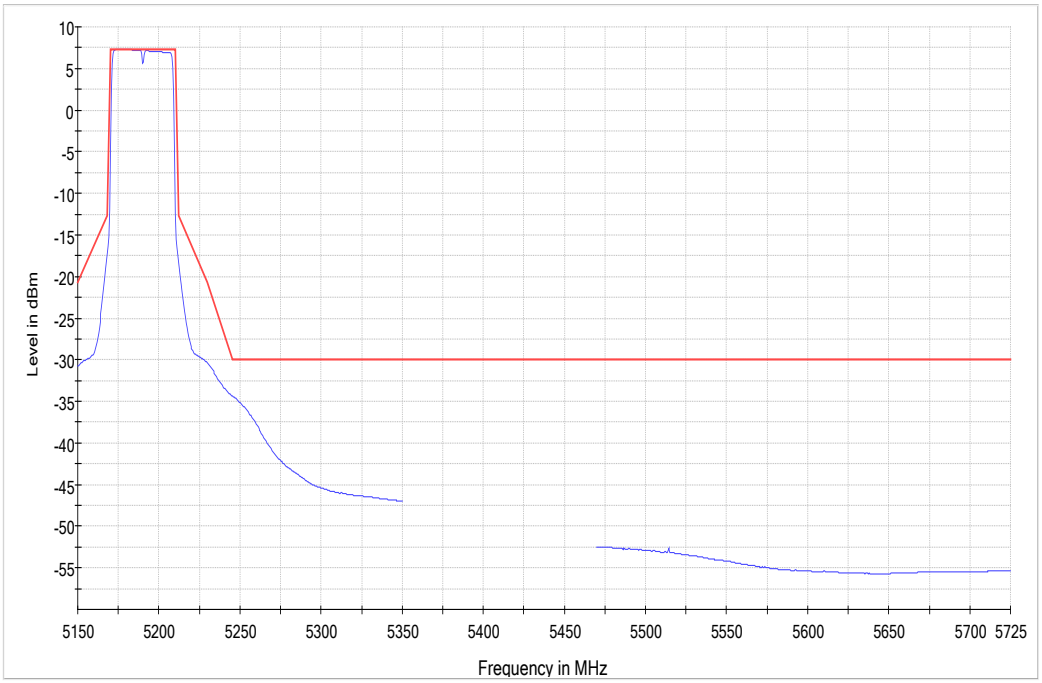
In Band



802.11ax/be40 (SISO), MCS0 – Chain A

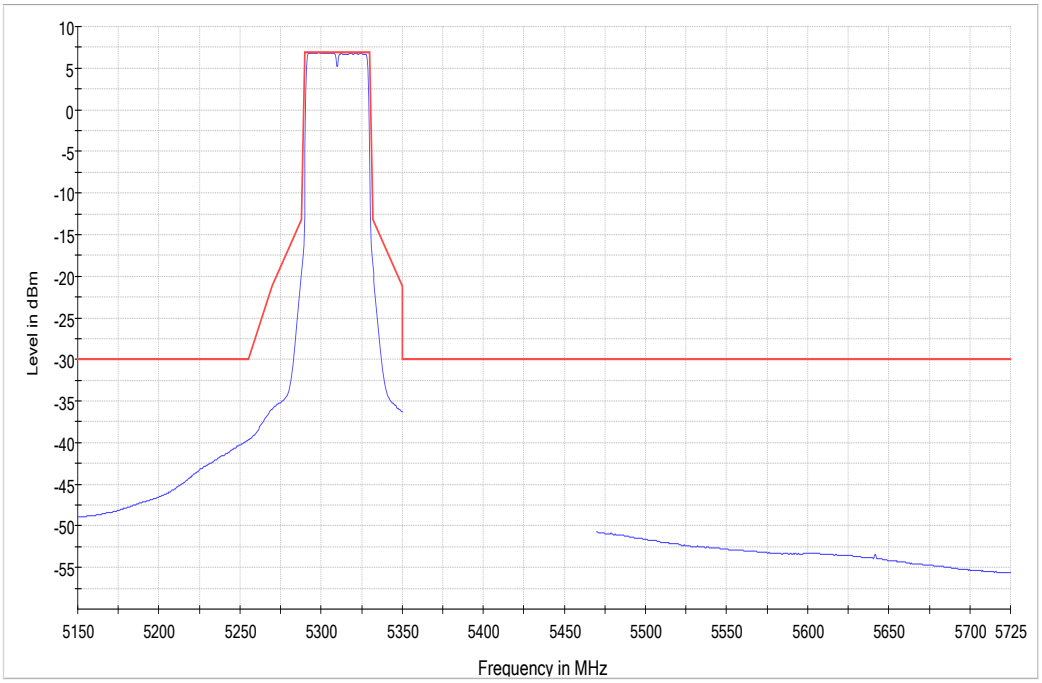
Channel 38

In Band



Channel 62

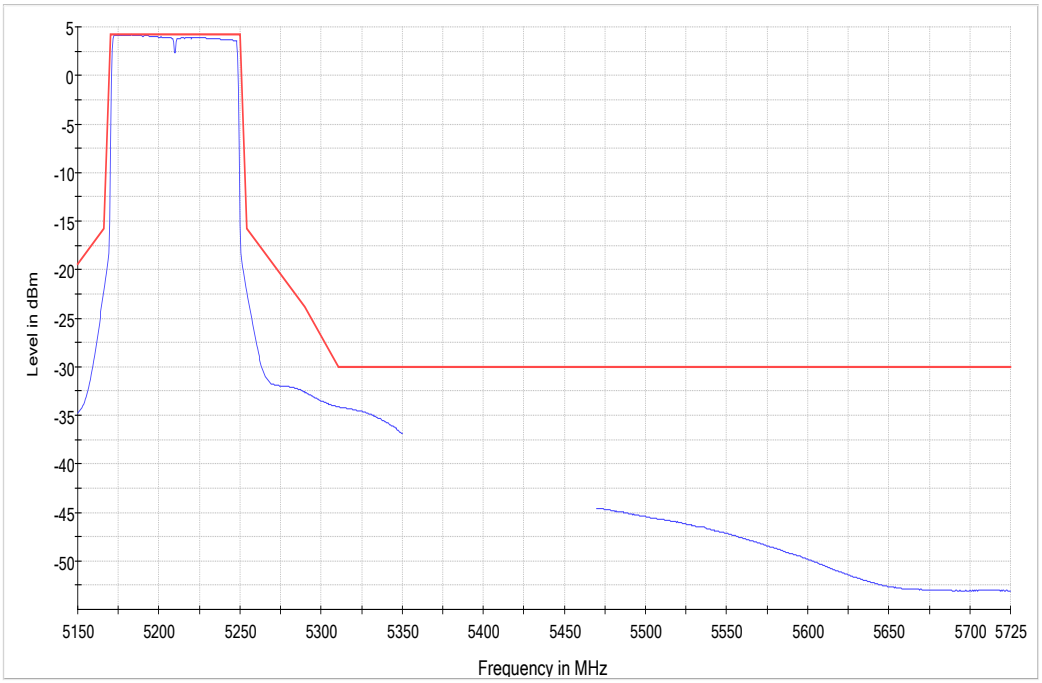
In Band



802.11ax/be80 (SISO), MCS0 – Chain A

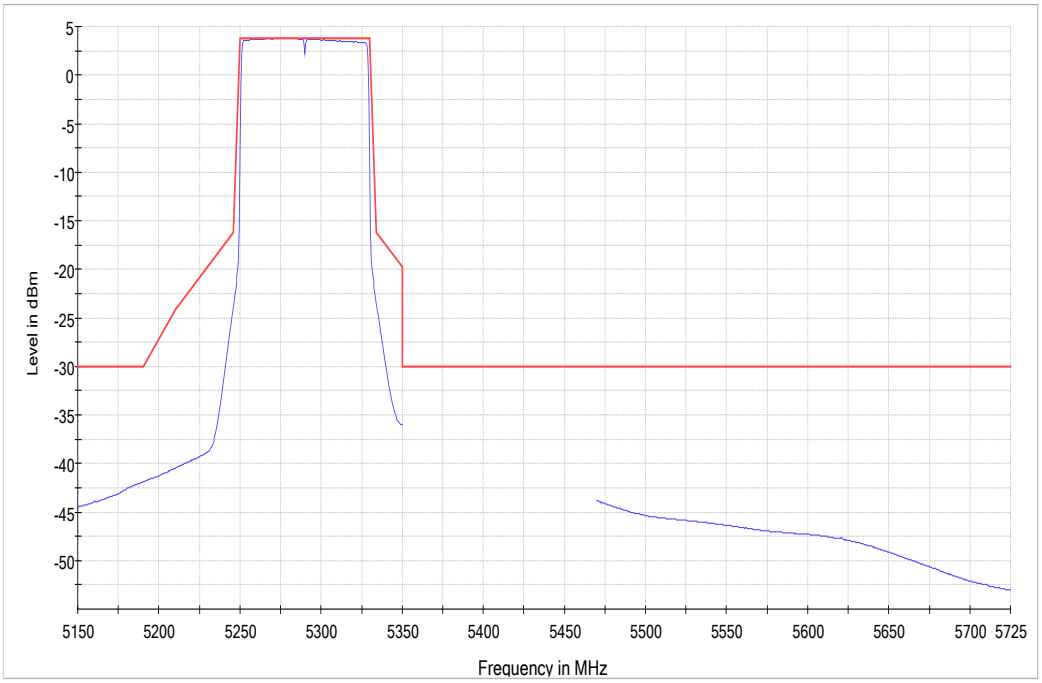
Channel 42

In Band



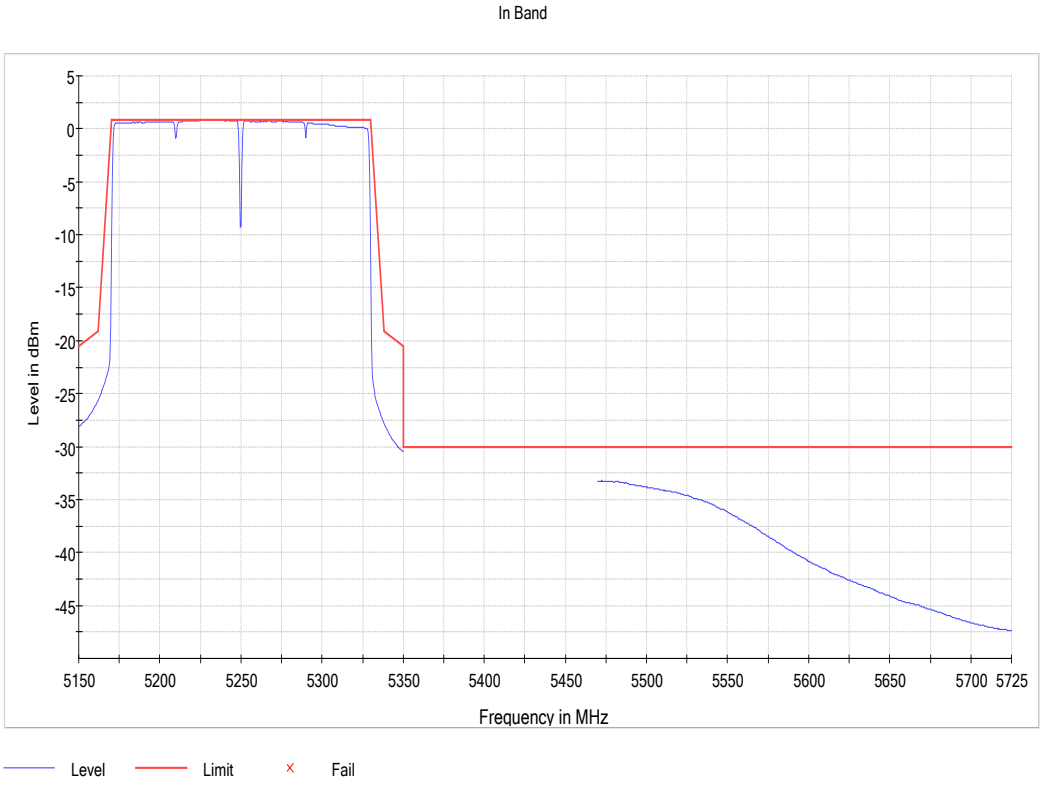
Channel 58

In Band



802.11ax/be160 (SISO), MCS0 – Chain A

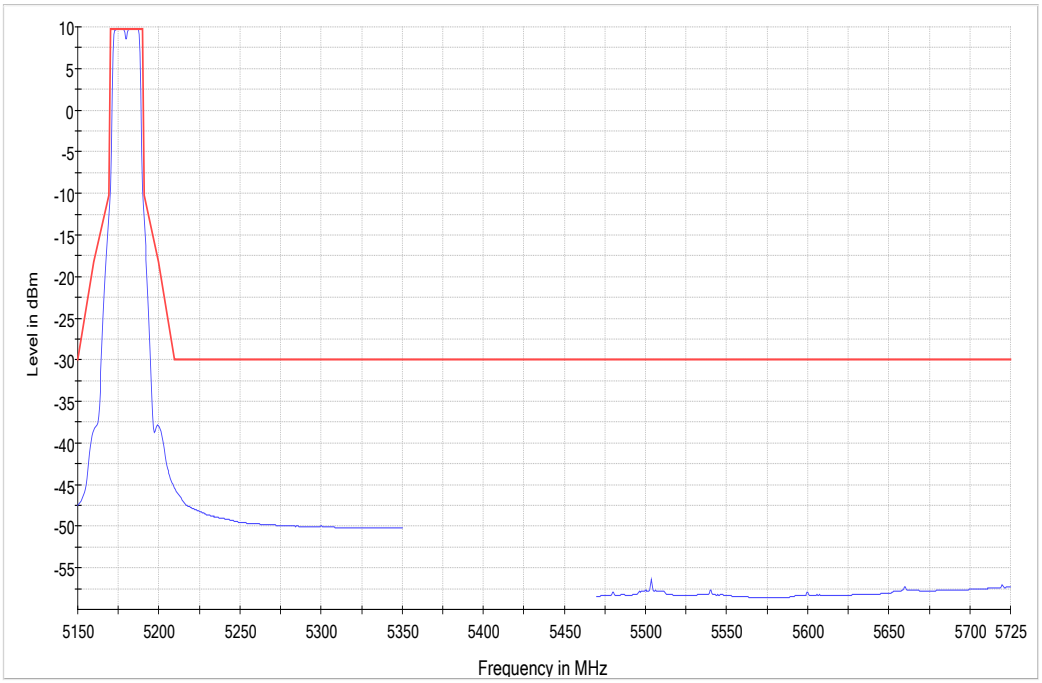
Channel 50



802.11a, 6Mbps – Chain B

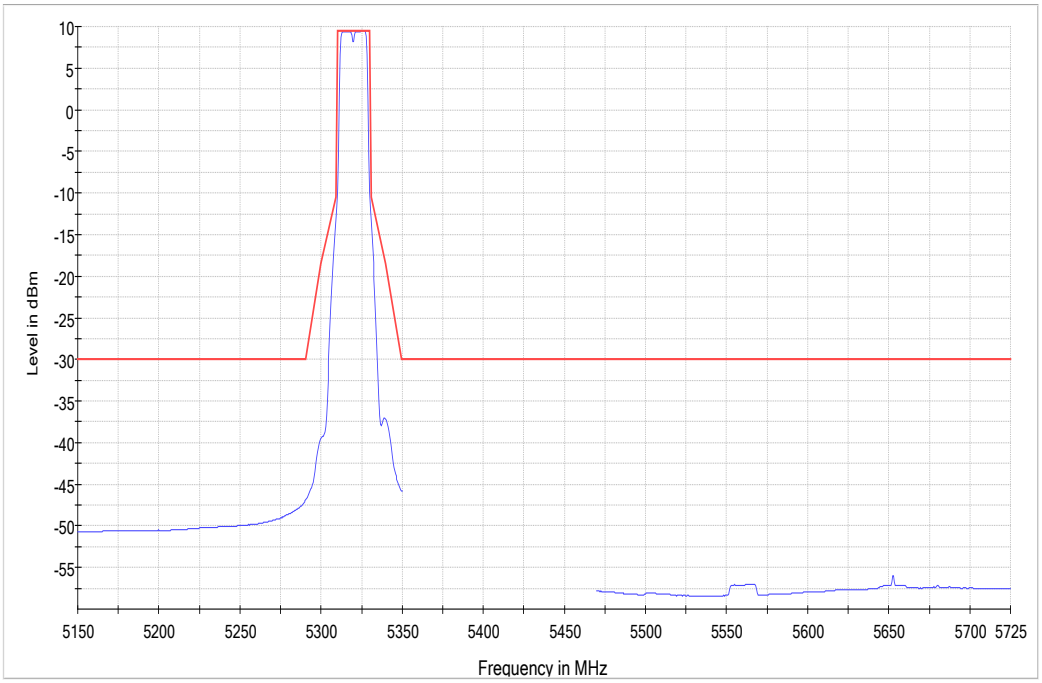
Channel 36

In Band



Channel 64

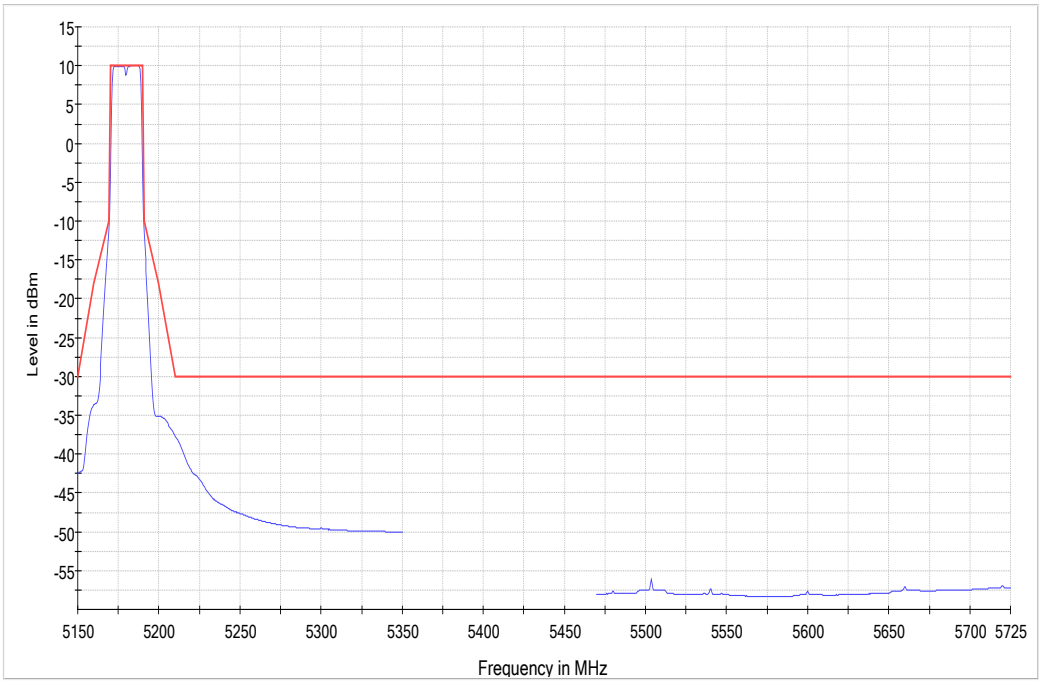
In Band



802.11n20 (SISO), HT0 – Chain B

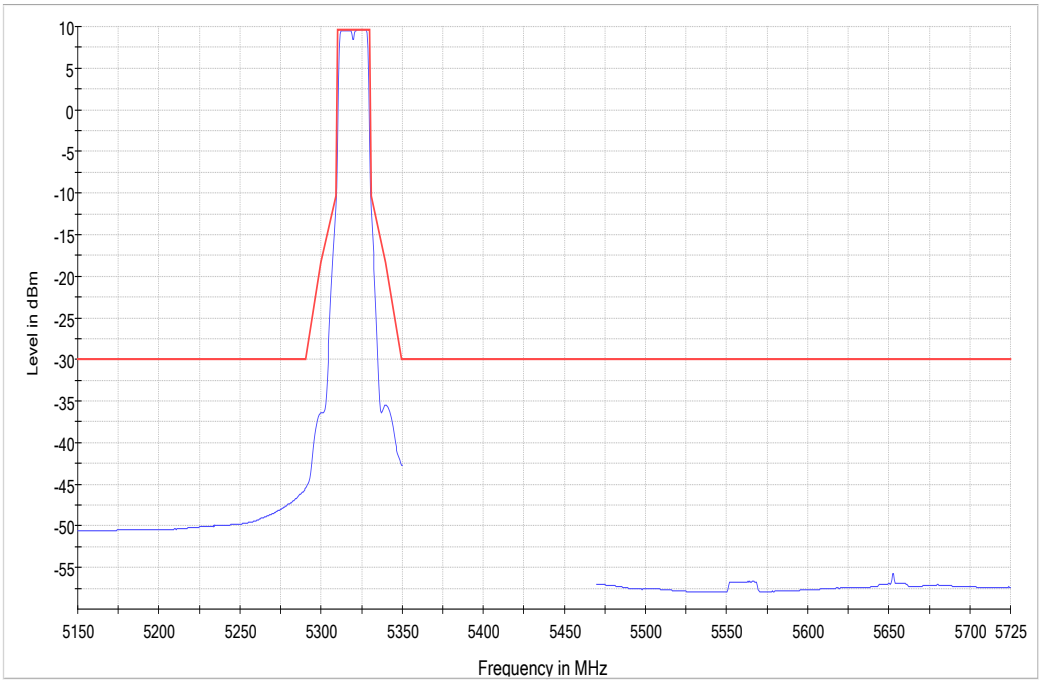
Channel 36

In Band



Channel 64

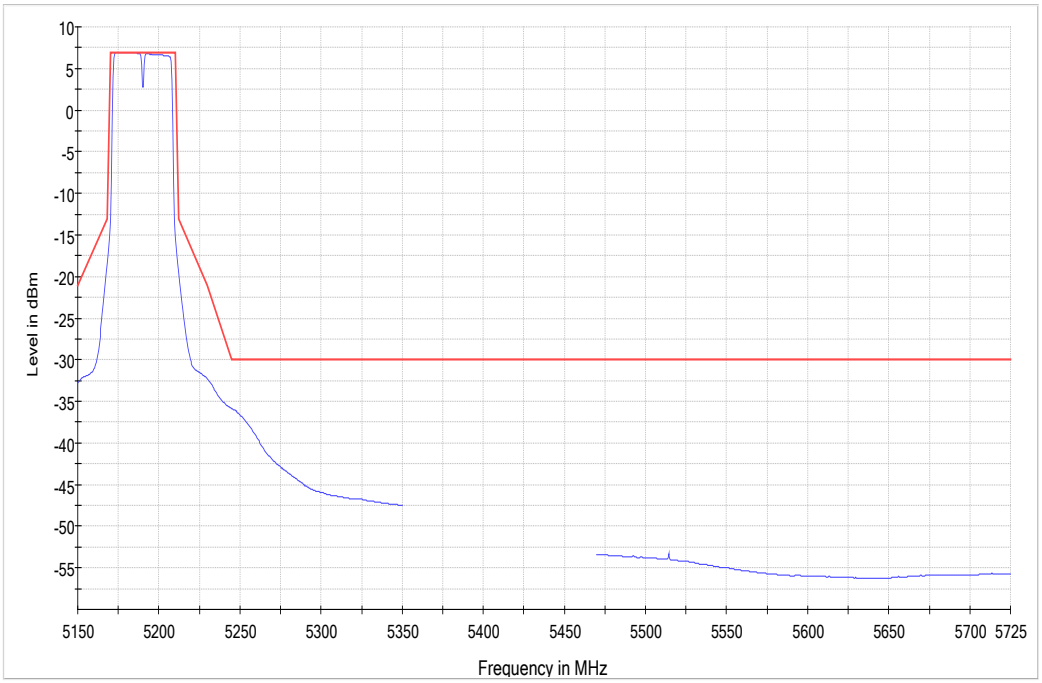
In Band



802.11n40 (SISO), HT0 – Chain B

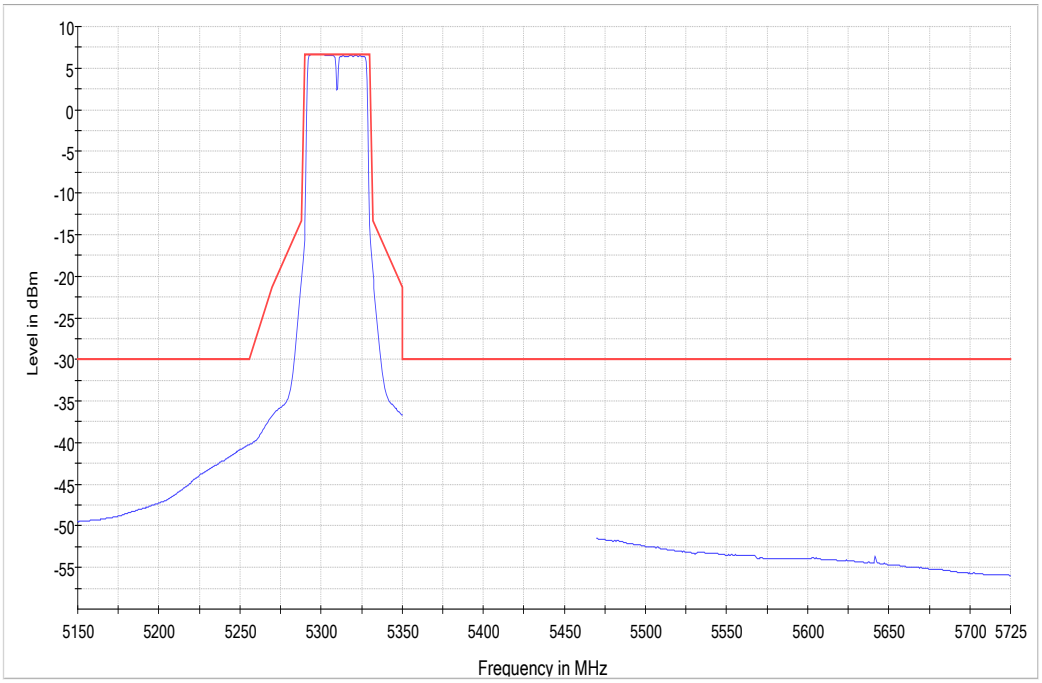
Channel 38

In Band



Channel 62

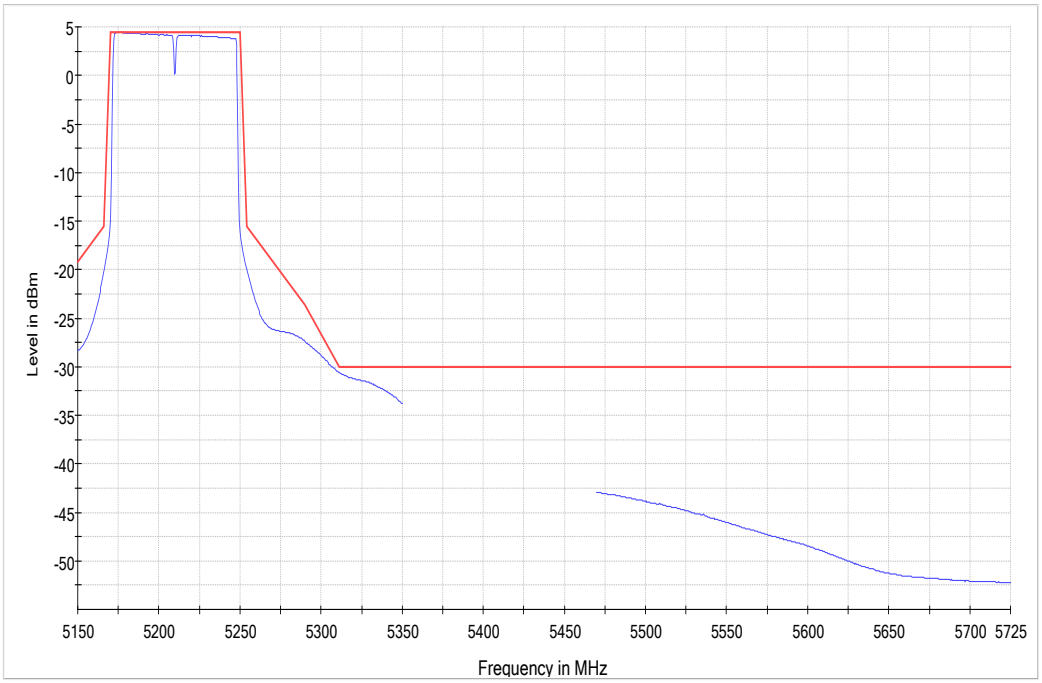
In Band



802.11ac80 (SISO), VHT0 – Chain B

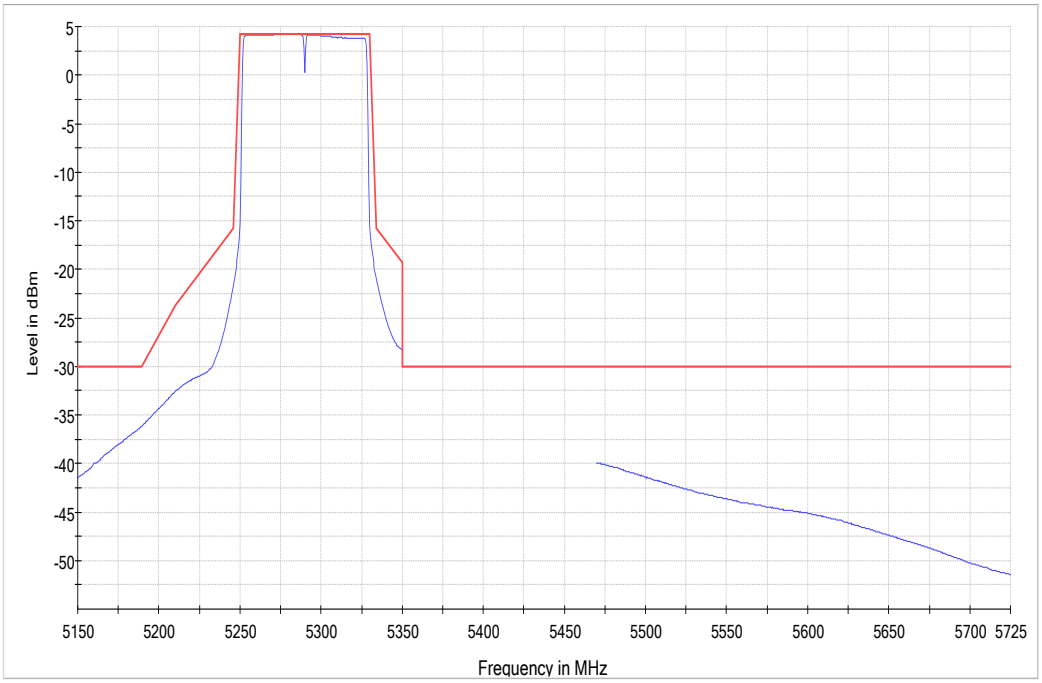
Channel 42

In Band



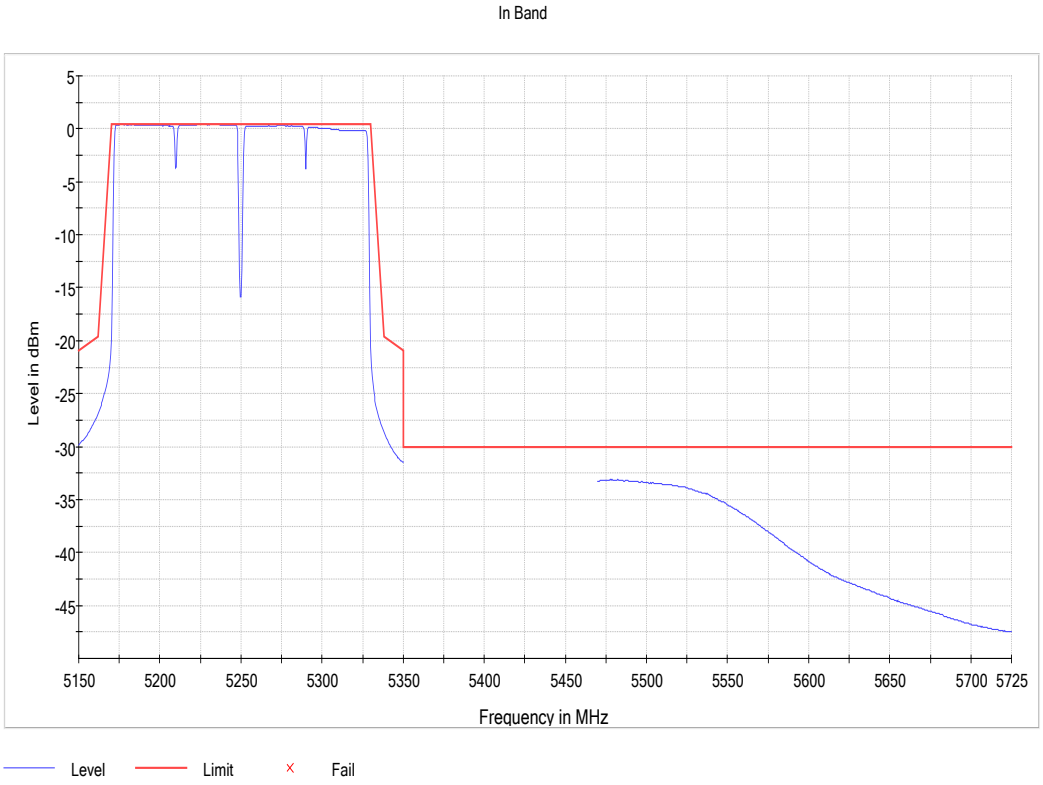
Channel 58

In Band



802.11ac160 (SISO), VHT0 – Chain B

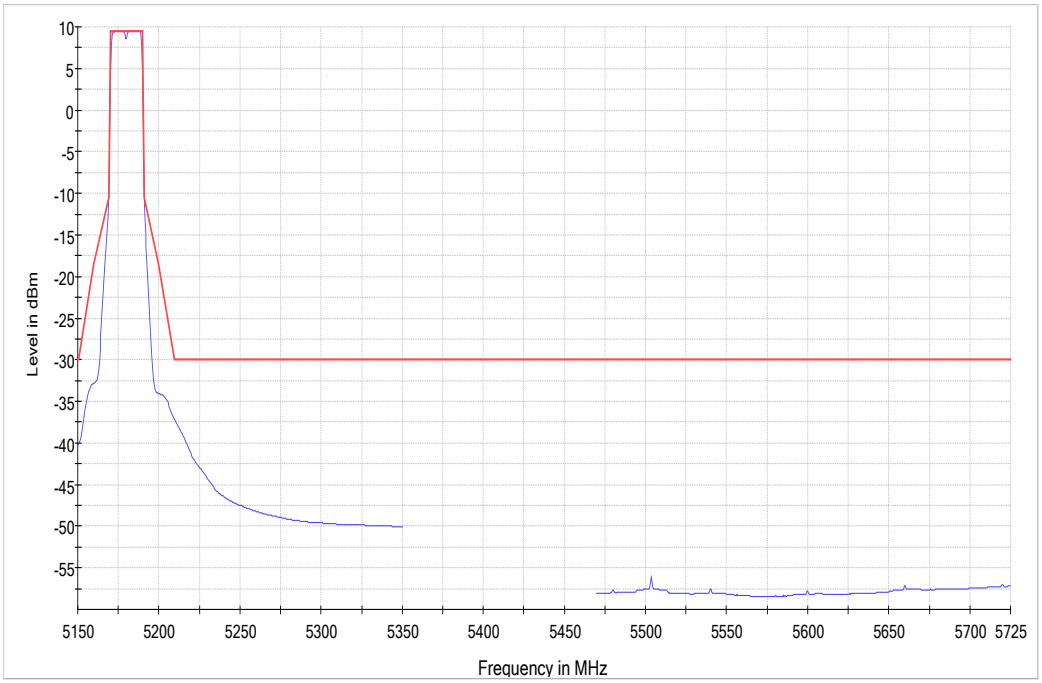
Channel 50



802.11ax/be20 (SISO), MCS0 – Chain B

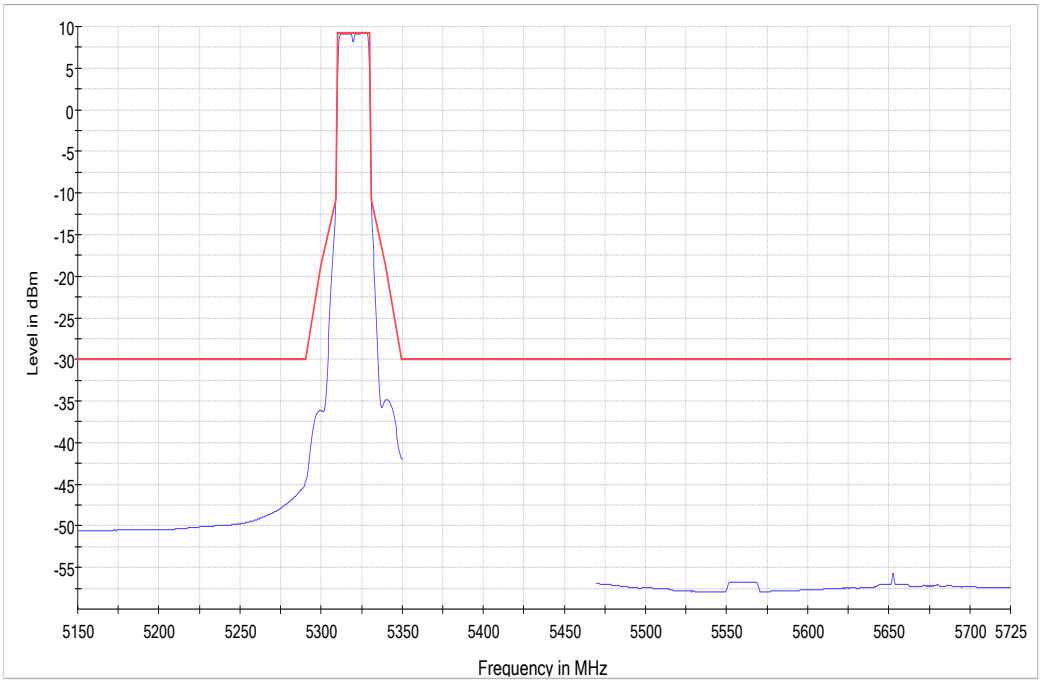
Channel 36

In Band



Channel 64

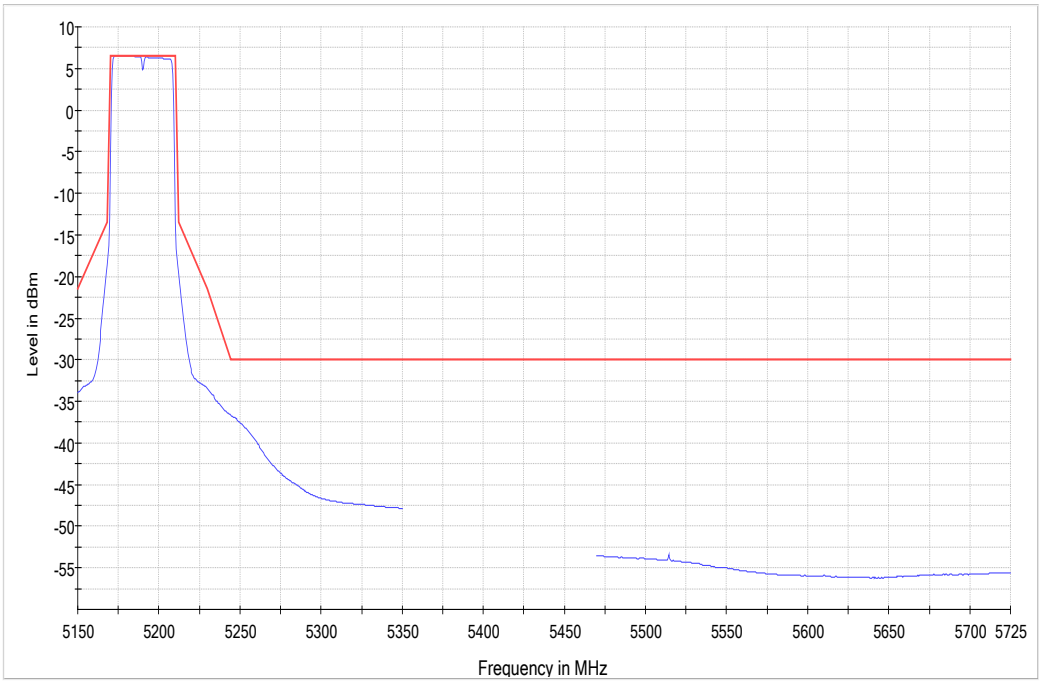
In Band



802.11ax/be40 (SISO), MCS0 – Chain B

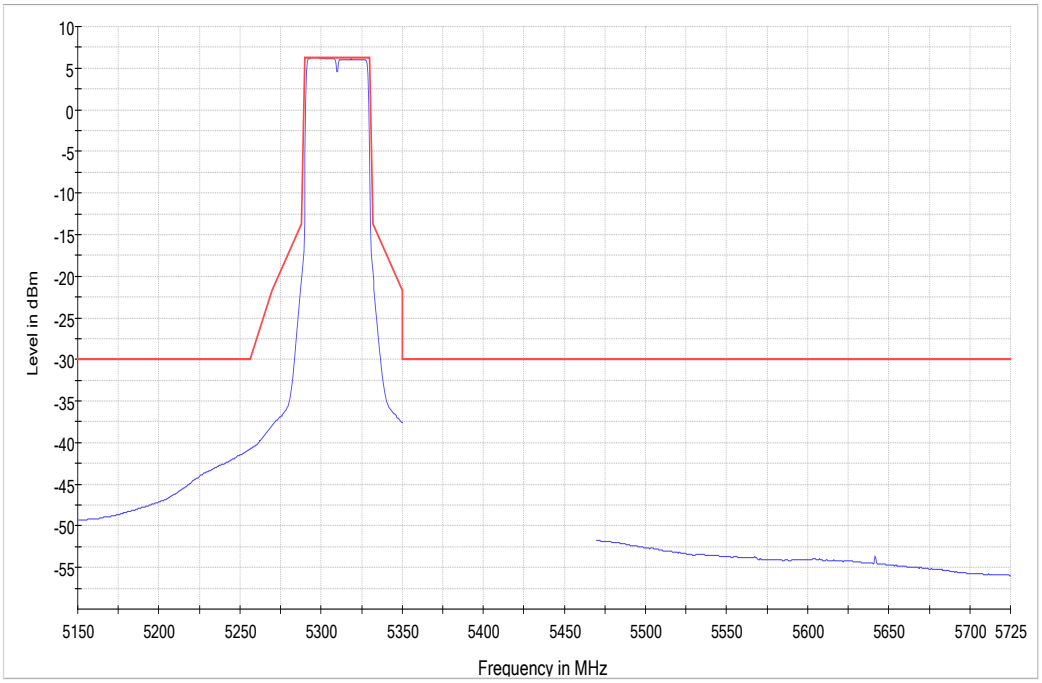
Channel 38

In Band



Channel 62

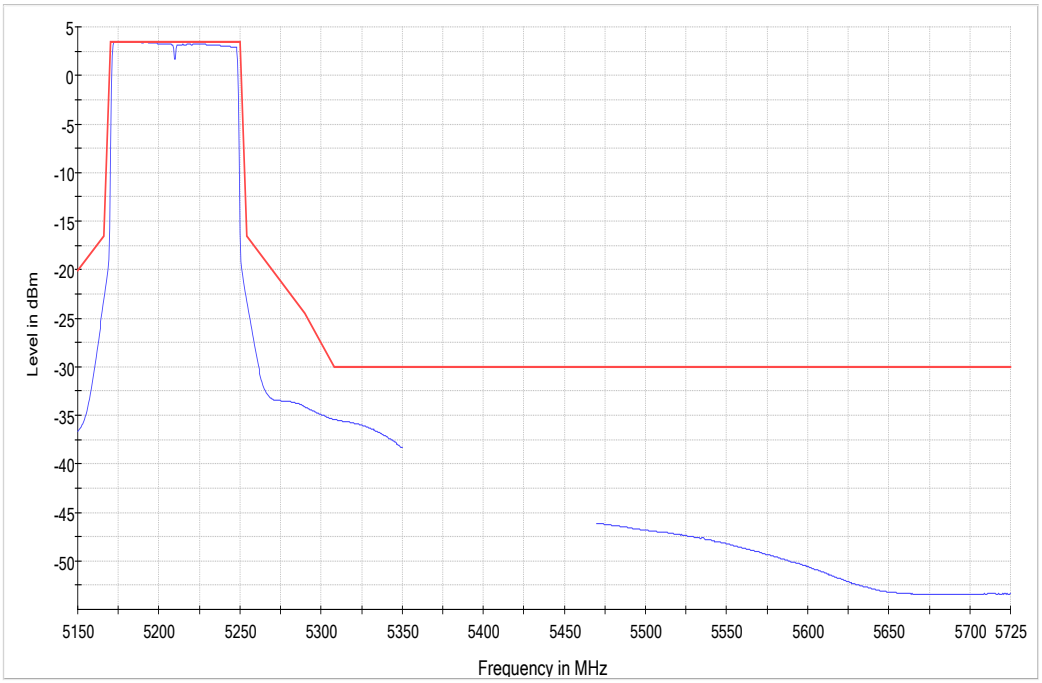
In Band



802.11ax/be80 (SISO), MCS0 – Chain B

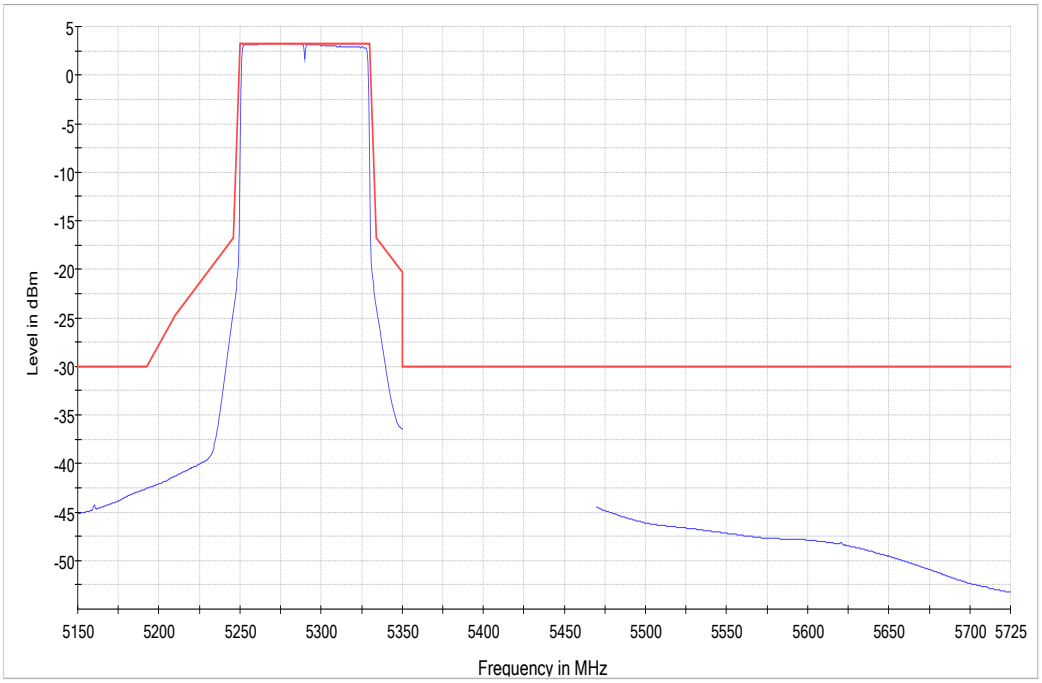
Channel 42

In Band



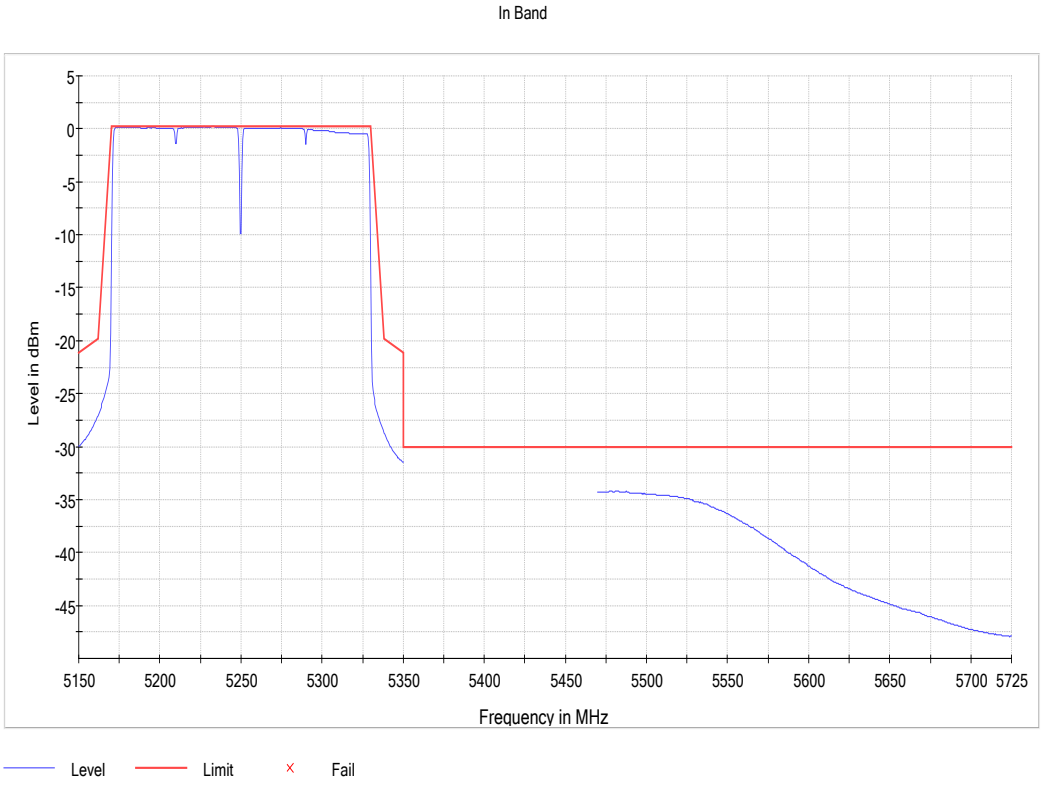
Channel 58

In Band



802.11ax/be160 (SISO), MCS0 – Chain B

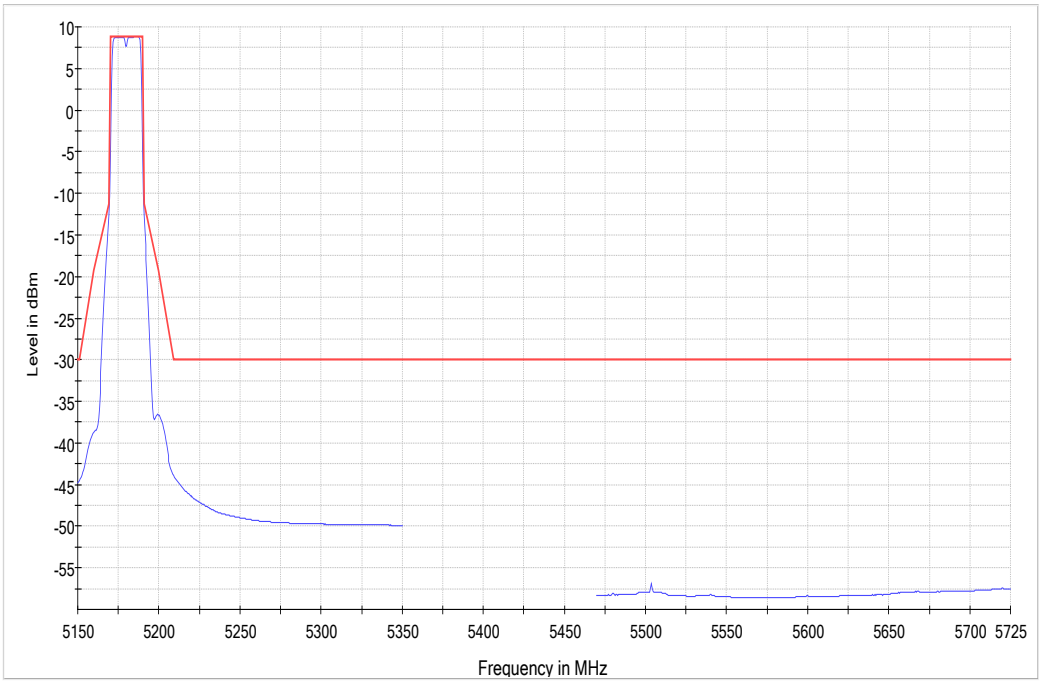
Channel 50



802.11n20 (MIMO), HT0

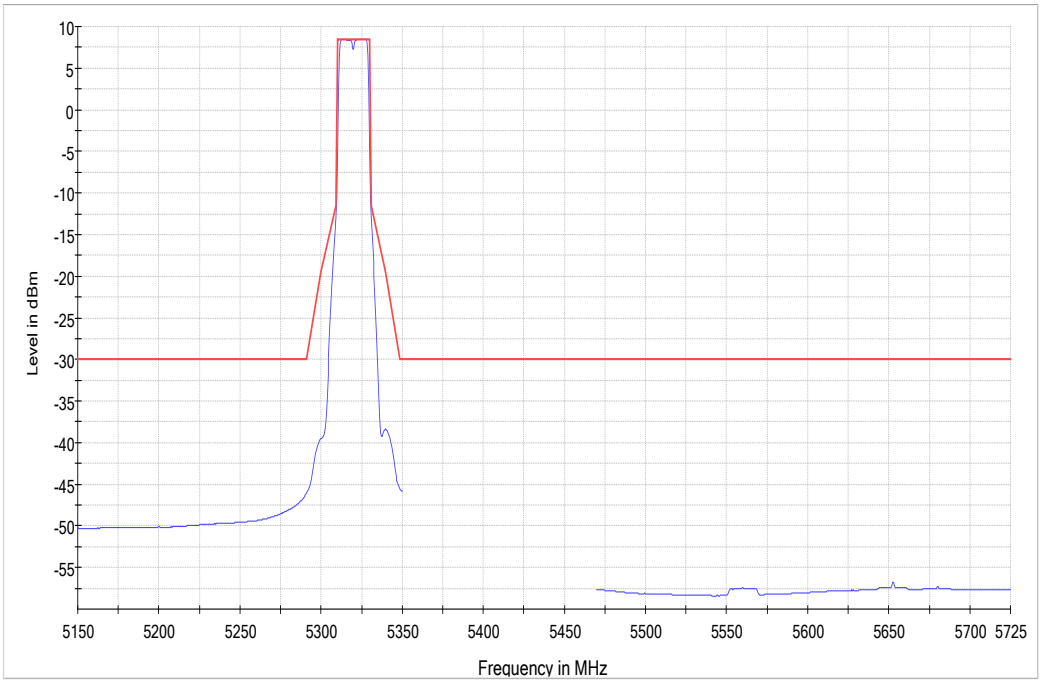
Channel 36

In Band



Channel 64

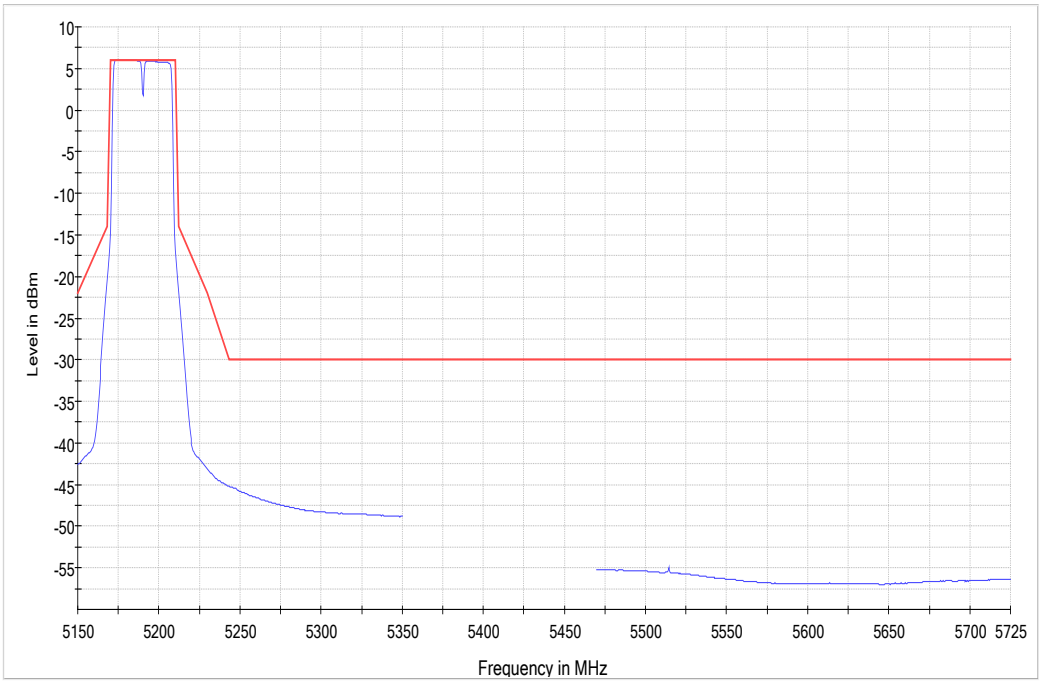
In Band



802.11n40 (MIMO), HT0

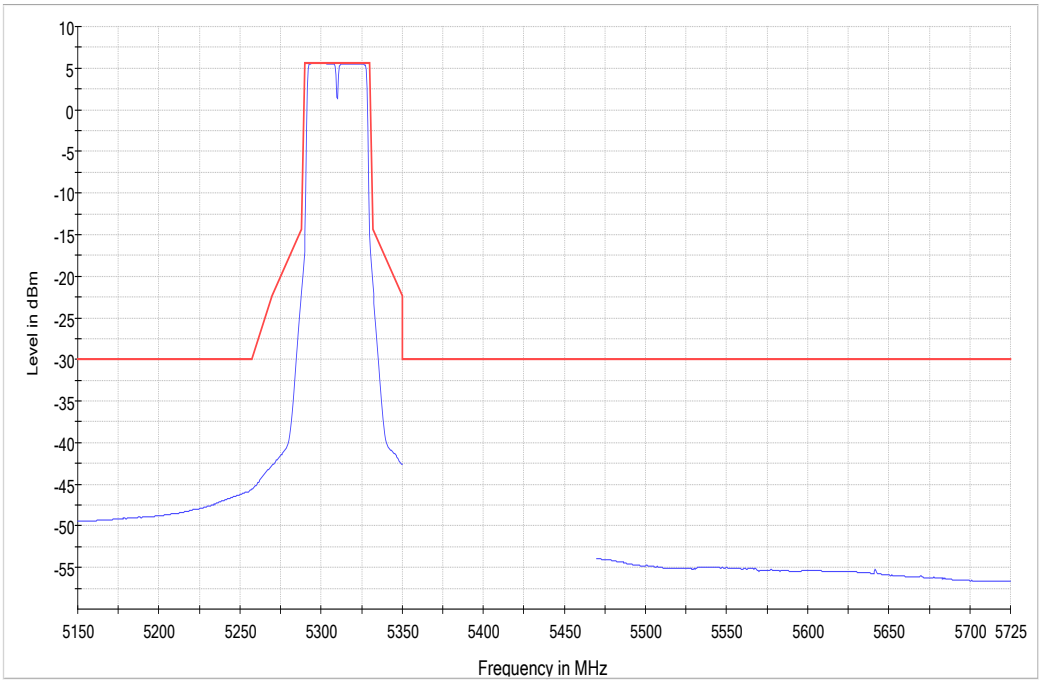
Channel 38

In Band



Channel 62

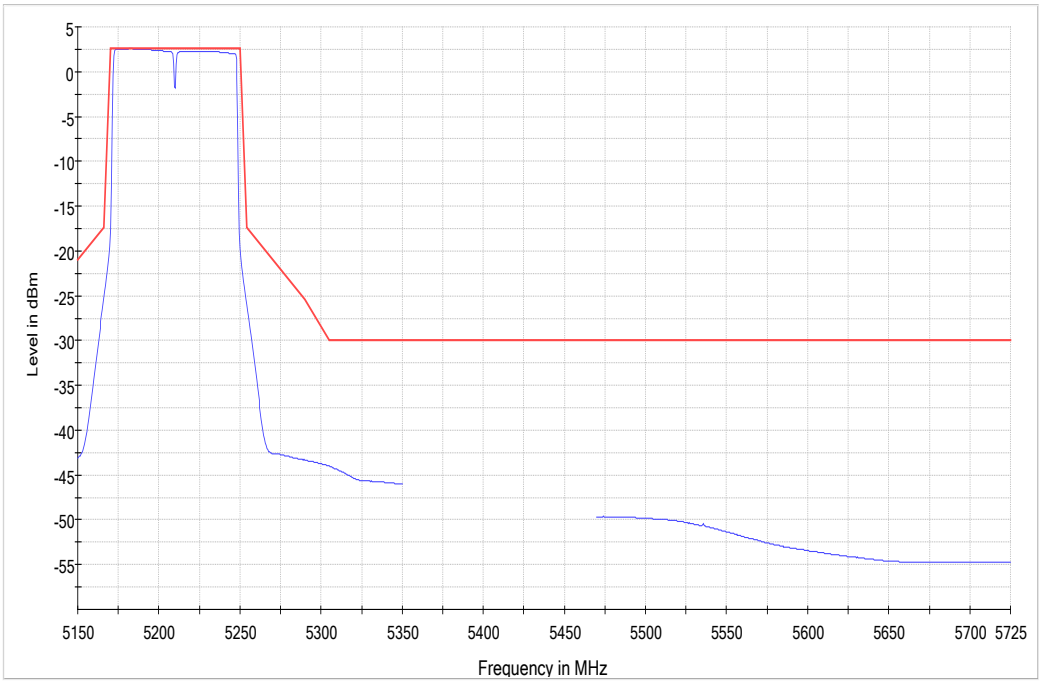
In Band



802.11ac80 (MIMO), VHT0

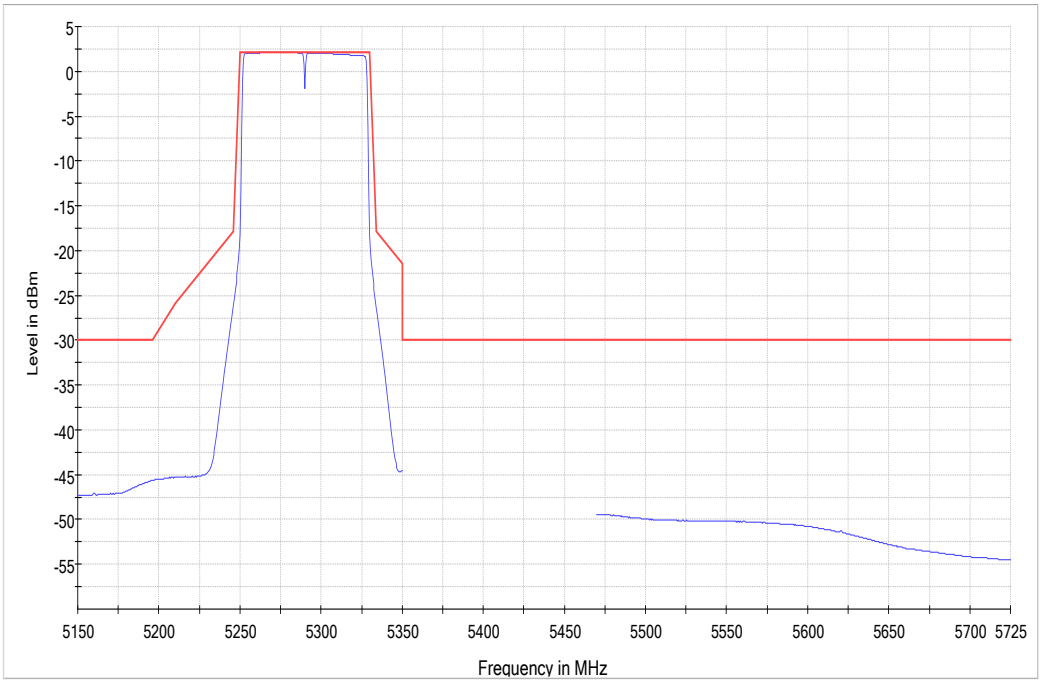
Channel 42

In Band



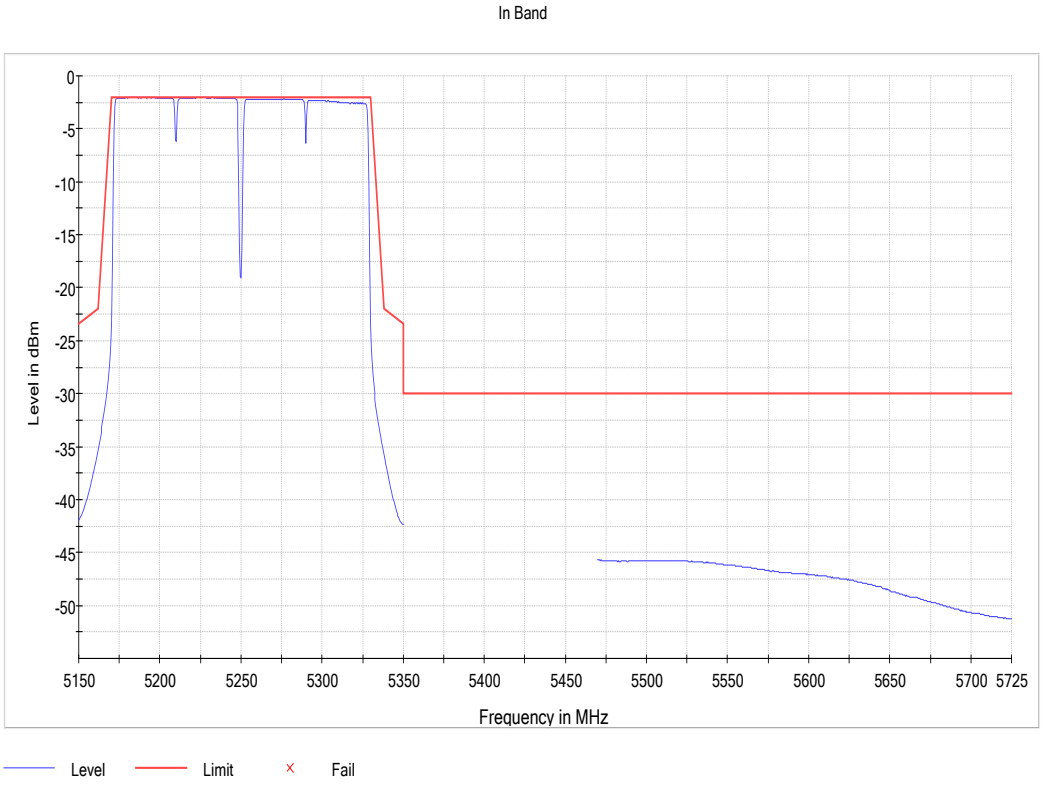
Channel 58

In Band



802.11ac160 (MIMO), VHT0

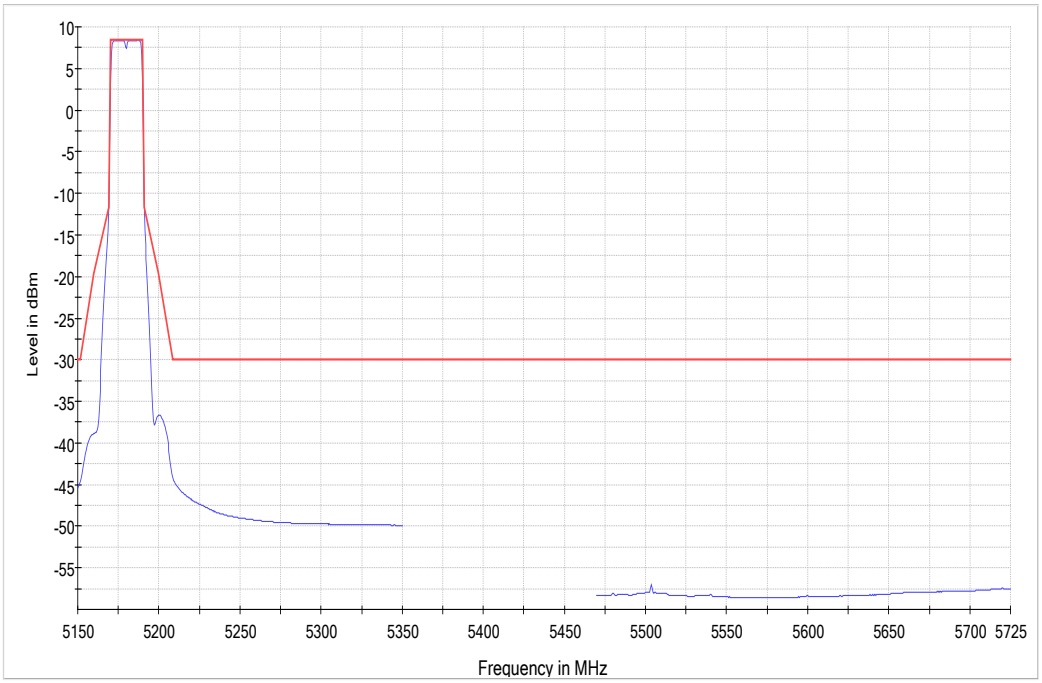
Channel 50



802.11ax/be20 (MIMO), MCS0

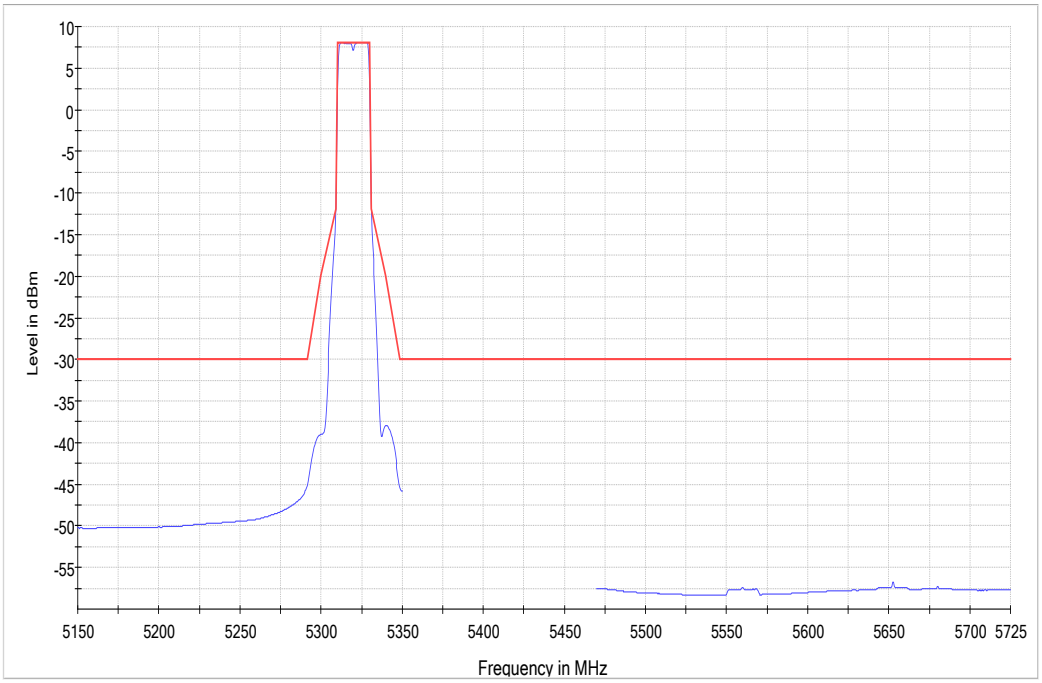
Channel 36

In Band



Channel 64

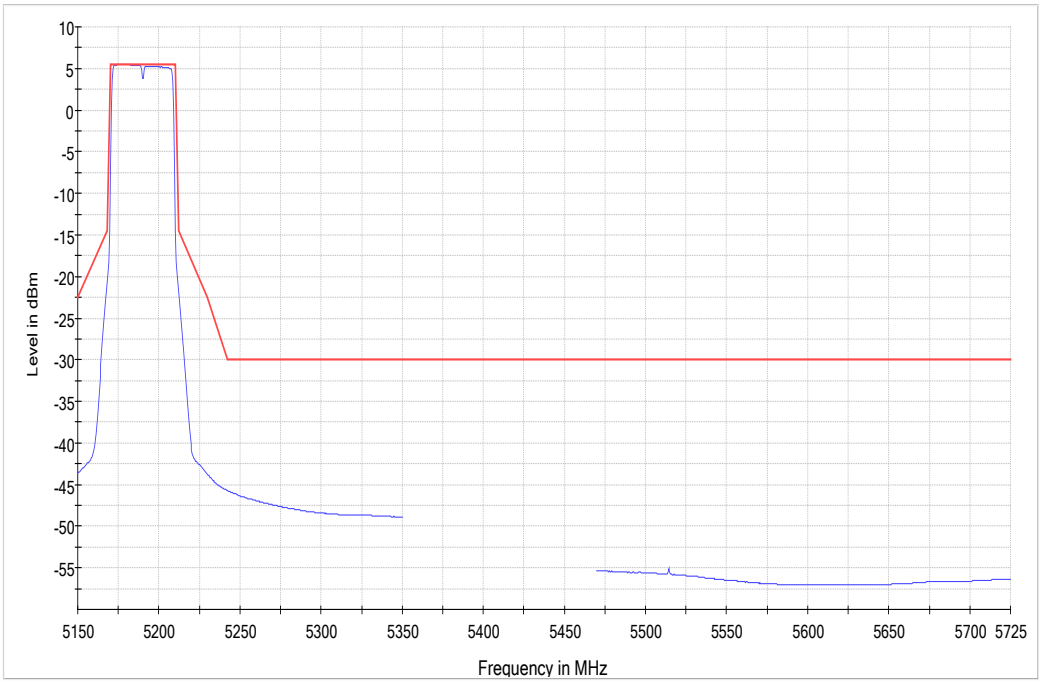
In Band



802.11ax/be40 (MIMO), MCS0

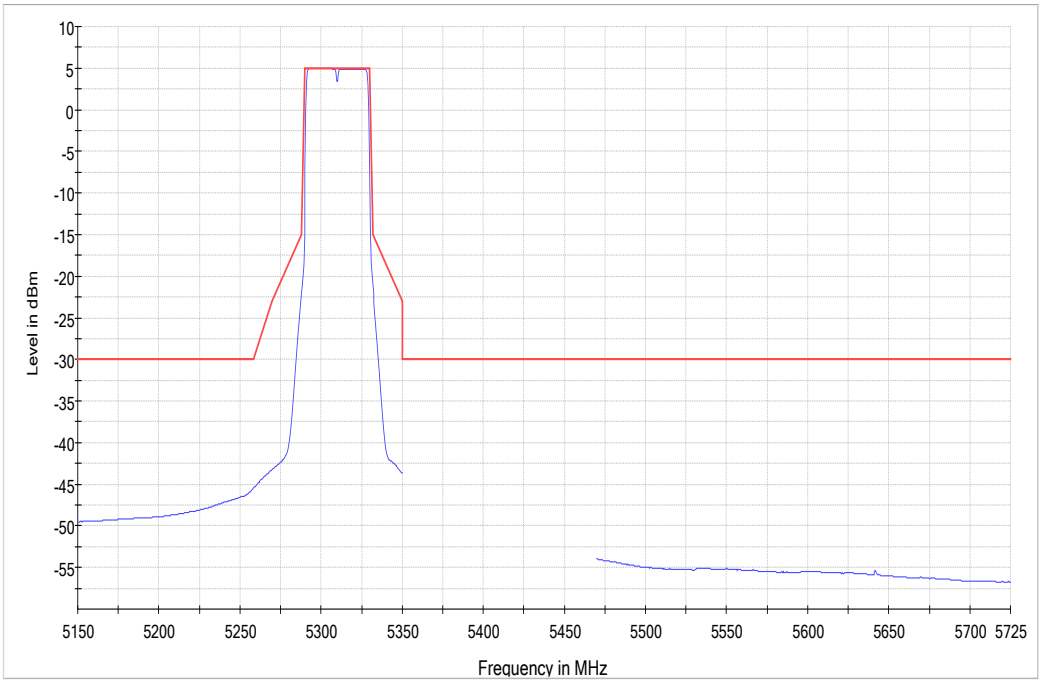
Channel 38

In Band



Channel 62

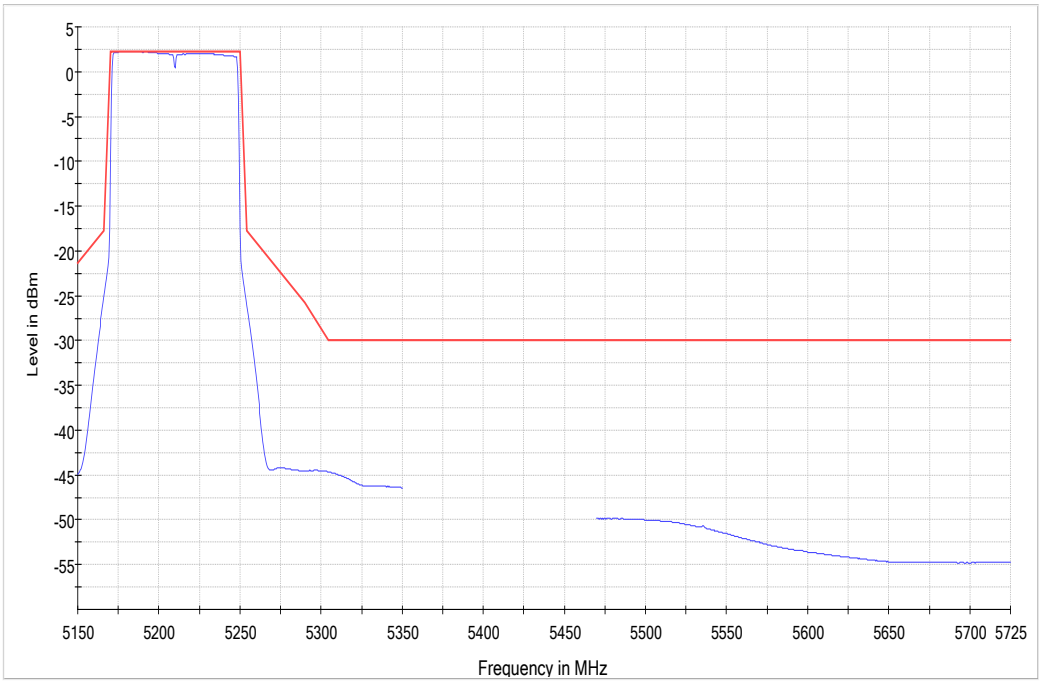
In Band



802.11ax/be80 (MIMO), MCS0

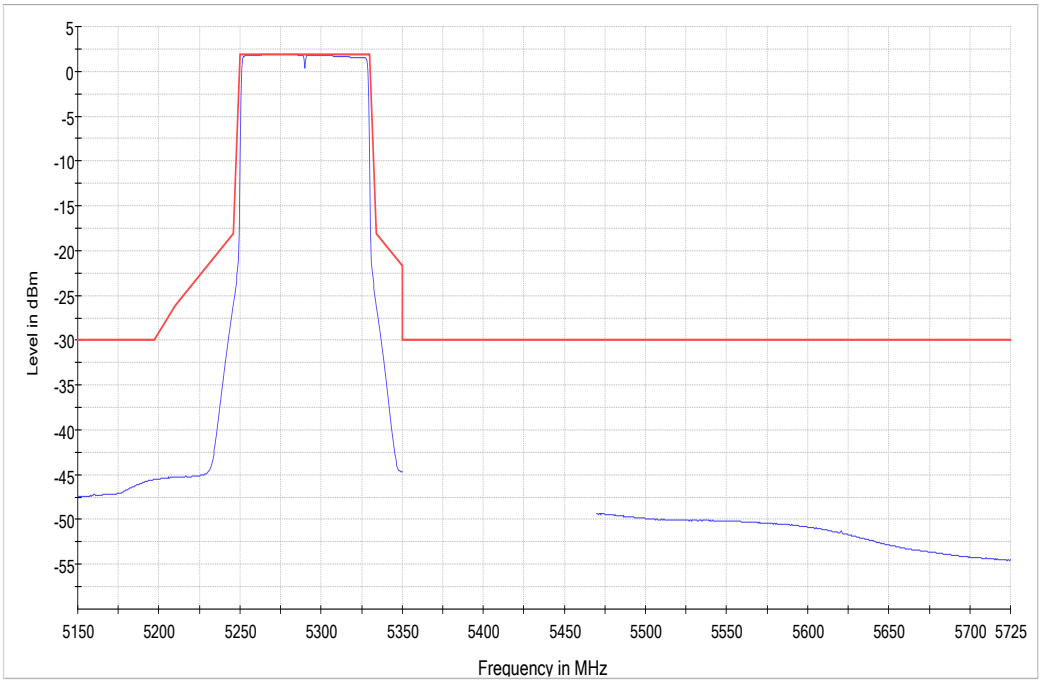
Channel 42

In Band



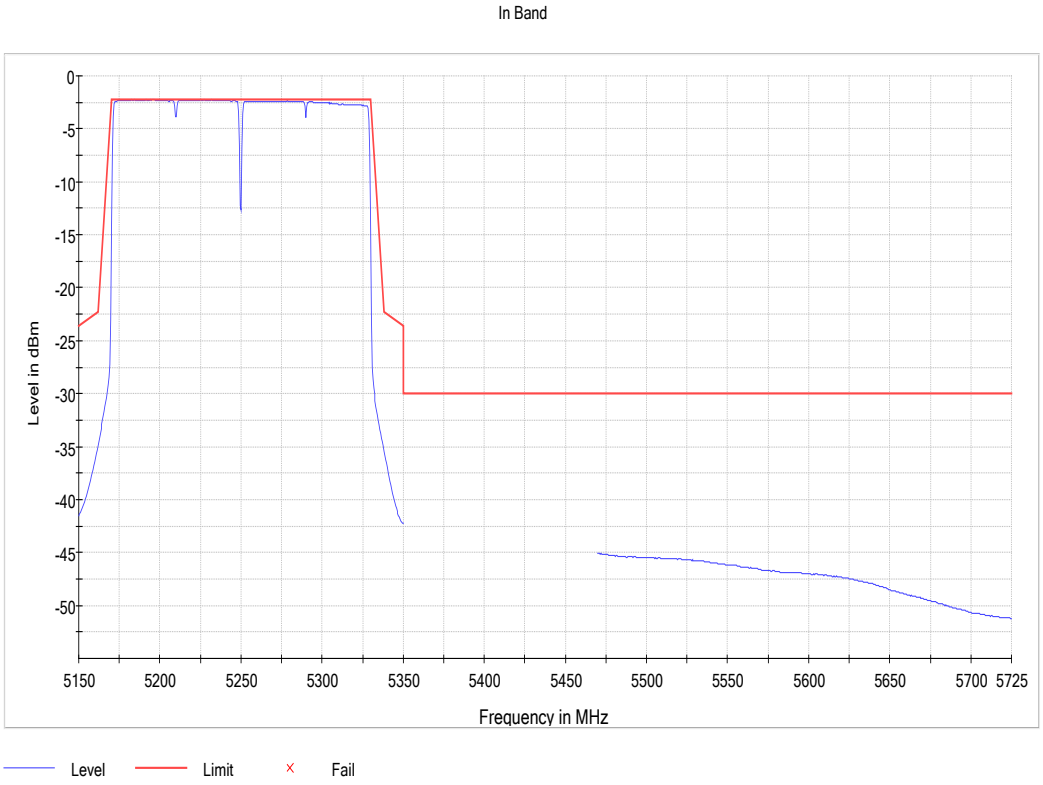
Channel 58

In Band



802.11ax/be160 (MIMO), MCS0

Channel 50



B.8 Transmitter unwanted emissions outside the 5GHz RLAN bands

Standard references

<table>
<tr><th>ETSI clause</th><th>Limits</th></tr>
<tr><td>4.2.4.1.2</td><td>The level of transmitter unwanted emissions outside the 5 GHz RLAN bands shall not exceed the limits given in table 4.

Table 4. Transmitter unwanted emission limits outside the 5GHz RLAN bands
<table>
<tr><th>Frequency range</th><th>Maximum power</th><th>Bandwidth</th></tr>
<tr><td>30 MHz to 47 MHz</td><td>-36 dBm</td><td>100 kHz</td></tr>
<tr><td>47 MHz to 74 MHz</td><td>-54 dBm</td><td>100 kHz</td></tr>
<tr><td>74 MHz to 87.5 MHz</td><td>-36 dBm</td><td>100 kHz</td></tr>
<tr><td>87.5 MHz to 118 MHz</td><td>-54 dBm</td><td>100 kHz</td></tr>
<tr><td>118 MHz to 174 MHz</td><td>-36 dBm</td><td>100 kHz</td></tr>
<tr><td>174 MHz to 230 MHz</td><td>-54 dBm</td><td>100 kHz</td></tr>
<tr><td>230 MHz to 470 MHz</td><td>-36 dBm</td><td>100 kHz</td></tr>
<tr><td>470 MHz to 862 MHz</td><td>-54 dBm</td><td>100 kHz</td></tr>
<tr><td>862 MHz to 1 GHz</td><td>-36 dBm</td><td>100 kHz</td></tr>
<tr><td>1 GHz to 5.15 GHz</td><td>-30 dBm</td><td>1 MHz</td></tr>
<tr><td>5.35 GHz to 5.47 GHz</td><td>-30 dBm</td><td>1 MHz</td></tr>
<tr><td>5.725 GHz to 26 GHz</td><td>-30 dBm</td><td>1 MHz</td></tr>
</table></td></tr>
</table>

Test conditions

<table>
<tr><th>ETSI clause</th><th>Conditions</th></tr>
<tr><td>5.4.5.1</td><td>The conformance requirements in clause 4.2.4.1 shall be verified only under normal operating conditions, and when operating on those channels defined in clause 5.3.2.

The equipment shall be configured to operate under its worst case situation with respect to unwanted emissions outside the 5 GHz RLAN bands.

If possible, the UUT shall be set to continuous transmit (duty cycle = 1) for the duration of this test.

If continuous transmit is not possible, the UUT should be configured to operate at its maximum duty cycle.

The level of transmitter unwanted emissions shall be measured as, either:
a) their power in a specified load (conducted emissions) and their radiated power (e.r.p. or e.i.r.p as given in clause 4.2.4.1.2) when radiated by the cabinet or structure of the equipment (cabinet radiation); or
b) their radiated power (e.r.p. or e.i.r.p as given in clause 4.2.4.1.2) when radiated by cabinet and antenna.</td></tr>
</table>

Test procedure

The radiated setups (transmitter) shown in section *Test & System Description* were used to measure the transmission spurious emissions. Depending of the frequency range and bands being tested, different antennas and filters were used; in consequence different setups are employed.

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 on one channel for each transmission mode.

Test Results

30 MHz – 1 GHz, Tx spurious emissions

Radiated Spurious – All modes

Frequency	Level	Detector	Limit (e.i.r.p)	Margin	Polar
MHz	dBm	---	dBm	dB	---
50.0	-65.5	RMS	-51.9	13.7	V
562.5	-62.4	RMS	-51.9	10.5	V

Tx Spurious Emissions – 1GHz to 26 GHz

802.11a

Tx Spurious Emissions – 802.11a (SISO), Chain A, CH52

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBm	---	dBm	dB	---
8306.8	-49.7	RMS	-30.0	19.7	V
24005.5	-55.1	RMS	-30.0	25.1	V

Tx Spurious Emissions – 802.11a (SISO), Chain B, CH52

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBm	---	dBm	dB	---
8176.4	-50.3	RMS	-30.0	20.3	V
23993.0	-55.2	RMS	-30.0	25.2	H

802.11n

Tx Spurious Emissions – 802.11n20 (SISO), Chain A, CH52

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBm	---	dBm	dB	---
9365.5	-48.2	RMS	-30.0	18.2	H
23972.2	-55.1	RMS	-30.0	25.1	H

Tx Spurious Emissions – 802.11n20 (SISO), Chain B, CH52

Tx Spurious Emissions – 802.11n20 (MIMO), Chain A+B, CH52

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBm	---	dBm	dB	---
3945.0	-47.9	RMS	-30.0	17.9	V
7888.5	-47.9	RMS	-30.0	17.9	V
21721.8	-54.8	RMS	-30.0	24.8	H

Tx Spurious Emissions – 802.11n40 (SISO), Chain A, CH38

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBm	---	dBm	dB	---
9477.8	-48.3	RMS	-30.0	18.3	H
23979.9	-55.1	RMS	-30.0	25.1	V

Tx Spurious Emissions – 802.11n40 (SISO), Chain B, CH38

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBm	---	dBm	dB	---
3892.5	-48.5	RMS	-30.0	18.5	V
7987.4	-50.0	RMS	-30.0	20.0	H
23890.0	-55.1	RMS	-30.0	25.1	V

Tx Spurious Emissions – 802.11n40 (MIMO), Chain A+B, CH38

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBm	---	dBm	dB	---
4556.6	-46.6	RMS	-30.0	16.6	V
7987.7	-49.1	RMS	-30.0	19.1	H
25930.2	-53.1	RMS	-30.0	23.1	V

802.11ac

Tx Spurious Emissions – 802.11ac80 (SISO), Chain A, CH42

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBm	---	dBm	dB	---
8239.1	-50.0	RMS	-30.0	20.0	H
23912.7	-55.0	RMS	-30.0	25.0	H

Tx Spurious Emissions – 802.11ac80 (SISO), Chain B, CH42

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBm	---	dBm	dB	---
8275.3	-50.4	RMS	-30.0	20.4	H
23963.0	-55.0	RMS	-30.0	25.0	V

Tx Spurious Emissions – 802.11ac80 (MIMO), Chain A+B, CH42

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBm	---	dBm	dB	---
8225.7	-50.0	RMS	-30.0	20.0	V
23869.2	-54.9	RMS	-30.0	24.9	V

802.11ax/be

Tx Spurious Emissions – 802.11ax/be20 (SISO), MCS0, Chain A, CH52

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBm	---	dBm	dB	---
7877.1	-47.6	RMS	-30.0	17.6	V
15754.5	-55.7	RMS	-30.0	25.7	H

Tx Spurious Emissions – 802.11ax/be20 (SISO), MCS0, Chain B, CH52

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBm	---	dBm	dB	---
1046.0	-55.6	RMS	-30.0	25.6	H
3938.5	-46.3	RMS	-30.0	16.3	H
7877.7	-44.2	RMS	-30.0	14.2	H
15754.1	-54.3	RMS	-30.0	24.3	V
21006.0	-53.7	RMS	-30.0	23.7	H

Tx Spurious Emissions – 802.11ax/be20 (MIMO), MCS0, Chain A+B, CH52

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBm	---	dBm	dB	---
1046.6	-57.8	RMS	-30.0	27.8	H
3938.5	-46.5	RMS	-30.0	16.5	H
7877.7	-45.2	RMS	-30.0	15.2	H
10503.6	-42.9	RMS	-30.0	12.9	H
15754.5	-53.1	RMS	-30.0	23.1	V

Tx Spurious Emissions - 802.11ax/be40 (SISO), MCS0, Chain A, CH38F

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBm	---	dBm	dB	---
7770.4	-46.5	RMS	-30.0	16.5	H
15540.4	-55.1	RMS	-30.0	25.1	H
25901.2	-52.8	RMS	-30.0	22.8	V

Tx Spurious Emissions - 802.11ax/be40 (SISO), MCS0, Chain B, CH38F

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBm	---	dBm	dB	---
3885.5	-46.5	RMS	-30.0	16.5	H
7771.3	-44.7	RMS	-30.0	14.7	H
10360.7	-42.5	RMS	-30.0	12.5	H
25901.2	-42.5	RMS	-30.0	12.5	V

Tx Spurious Emissions - 802.11ax/be40 (SISO), MCS0, Chain A+B, CH38F

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBm	---	dBm	dB	---
3885.5	-45.9	RMS	-30.0	15.9	H
7771.3	-41.1	RMS	-30.0	11.1	H
10361.0	-40.8	RMS	-30.0	10.8	H
15540.9	-54.7	RMS	-30.0	24.7	H
25899.2	-47.6	RMS	-30.0	17.6	V
25903.6	-45.3	RMS	-30.0	15.3	V

Tx Spurious Emissions - 802.11ax/be80 (SISO), MCS0, Chain A, CH42

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBm	---	dBm	dB	---
3891.4	-48.3	RMS	-30.0	18.3	V
7783.5	-41.6	RMS	-30.0	11.6	H
15566.0	-55.6	RMS	-30.0	25.6	H
25943.2	-50.7	RMS	-30.0	20.7	V

Tx Spurious Emissions - 802.11ax/be80 (SISO), MCS0, Chain B, CH42

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBm	---	dBm	dB	---
3891.4	-46.5	RMS	-30.0	16.5	H
7783.5	-43.3	RMS	-30.0	13.3	H
10377.9	-42.5	RMS	-30.0	12.5	H
25943.7	-42.4	RMS	-30.0	12.4	V
25946.1	-49.4	RMS	-30.0	19.4	V

Tx Spurious Emissions - 802.11ax/be80 (MIMO), MCS0, Chain A+B, CH42

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBm	---	dBm	dB	---
3892.0	-48.2	RMS	-30.0	18.2	V
7782.9	-41.3	RMS	-30.0	11.3	H
15566.5	-55.1	RMS	-30.0	25.1	H
25942.2	-44.1	RMS	-30.0	14.1	V

B.9 Receiver spurious emissions

Test limits

ETSI clause	Limits
4.2.5.2	The spurious emissions of the receiver shall not exceed the limits given in table 5. **Table 5: Spurious emissions limits for receivers** Frequency range / Maximum power / Bandwidth 30 MHz to 1GHz / -57 dBm / 100 kHz 1GHz to 26 GHz / -47 dBm / 1 MHz

Test conditions

ETSI clause	Conditions
5.4.7.1	The conformance requirements in clause 4.2.5 shall be verified only under normal operating conditions, and when operating on those channels defined in clause 5.3.2. For equipment having different operating modes (see clause 5.3.3.2) the measurements described in the present clause may not need to be repeated for all the operating modes. The level of transmitter unwanted emissions shall be measured as, either: • their power in a specified load (conducted emissions) and their radiated power (e.r.p. or e.i.r.p as given in clause 4.2.5.2) when radiated by the cabinet or structure of the equipment (cabinet radiation); or • their radiated power (e.r.p. or e.i.r.p as given in clause 4.2.5.2) when radiated by cabinet and antenna. The test method in clause 5.4.7.2 below assumes, that for the duration of the test, the UUT is configured into a continuous receive mode, or is operated in a mode where no transmissions occur.

Test procedure

The radiated setups (receiver) shown in section *Test & System Description* were used to measure the receiver spurious emissions. Depending of the frequency range and bands being tested, different antennas and filters were used, in consequence different setups are employed.

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 on one channel for each transmission mode.

Test Results Rx

Rx Spurious Emissions – 30 MHz to 26 GHz

Rx Spurious Emissions – 802.11a/n20 (MIMO), Chain A+B CH52

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBm	---	dBm	dB	---
169.1	-68.9	RMS	-54.9	14.0	H
10500.0	-48.5	RMS	-47.0	1.5	V
25997.0	-54.9	RMS	-47.0	7.9	V

Rx Spurious Emissions – 802.11n40 (MIMO), Chain A+B CH38

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBm	---	dBm	dB	---
83.9	-68.1	RMS	-54.9	13.2	V
10500.7	-53.5	RMS	-47.0	6.5	V
25384.5	-55.1	RMS	-47.0	8.1	V

Rx Spurious Emissions – 802.11ac80 (MIMO), Chain A+B, CH42

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBm	---	dBm	dB	---
81.2	-67.5	RMS	-54.9	12.6	V
10500.7	-51.0	RMS	-47.0	4.0	V
25477.8	-55.1	RMS	-47.0	8.1	V

Rx Spurious Emissions – 802.11ac160 (MIMO), Chain A+B, CH50

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBm	---	dBm	dB	---
169.4	-68.7	RMS	-54.9	13.8	H
10500.7	-51.0	RMS	-47.0	4.0	V
25389.2	-54.8	RMS	-47.0	7.8	H

B.10 Dynamic Frequency Selection

Test limits

<table>
<tr><th>ETSI clause</th><th>Limits</th></tr>
<tr><td>4.2.6.2.1</td><td>The table below lists the DFS related technical requirements and their applicability for every operational mode. If the RLAN device is capable of operating in more than one operational mode then every operating mode shall be assessed separately.
<table>
<tr><th>Requirement</th><th>Slave without radar detection (See Note 2)</th></tr>
<tr><td>Channel Availability Check</td><td>Not required</td></tr>
<tr><td>Off-Channel CAC (see note 1)</td><td>Not required</td></tr>
<tr><td>In-Service Monitoring</td><td>Not required</td></tr>
<tr><td>Channel Shutdown</td><td>✓</td></tr>
<tr><td>Non-Occupancy Period</td><td>Not required</td></tr>
<tr><td>Uniform Spreading</td><td>Not required</td></tr>
<tr><td colspan="2">Note 1: Where implemented by the manufacturer.
Note 2: A slave with radar detection is not required to perform a CAC or Off-Channel CAC at initial use of the channel but only after the slave has detected a radar signal on the Operating Channel by In-Service Monitoring and the Non-Occupancy Period resulting from this detection has elapsed.</td></tr>
</table></td></tr>
<tr><td>4.2.6.2.5

Annex D</td><td>Channel Shutdown
The Channel Move Time shall not exceed the limit defined in table D.1.
The Channel Closing Transmission Time shall not exceed the limit defined in table D.1.
Table D.1. DFS requirement values
<table>
<tr><th>Parameter</th><th>Value</th></tr>
<tr><td>Channel Move Time</td><td>10 s</td></tr>
<tr><td>Channel Closing Transmission Time</td><td>1s</td></tr>
</table></td></tr>
</table>

Test conditions

ETSI clause	Conditions
5.4.8.1.1	The conformance requirements in clause 4.2.6 shall be verified only under normal operating conditions. The channels and the channel bandwidths to be used for testing are defined in clause 5.3.2. The UUT is capable of transmitting a test transmission sequence as described in clause 5.3.1.2. The UUT shall be configured to operate at its maximum *Channel Occupancy Time* without the use of any pauses in between transmissions.

Test procedure

The DFS setup shown in section *Test & System Description* was used to measure the Dynamic Frequency Selection (DFS). The DUT (slave device) is connected to the access point through an attenuator and a power splitter. A laptop is connected to the access point (master device) through an Ethernet connection and it receives the broadcasted data from the DUT. According to the test method 5.4.8.1.3.2 described in ETSI EN 301 893 V2.1.1., set-up B is used

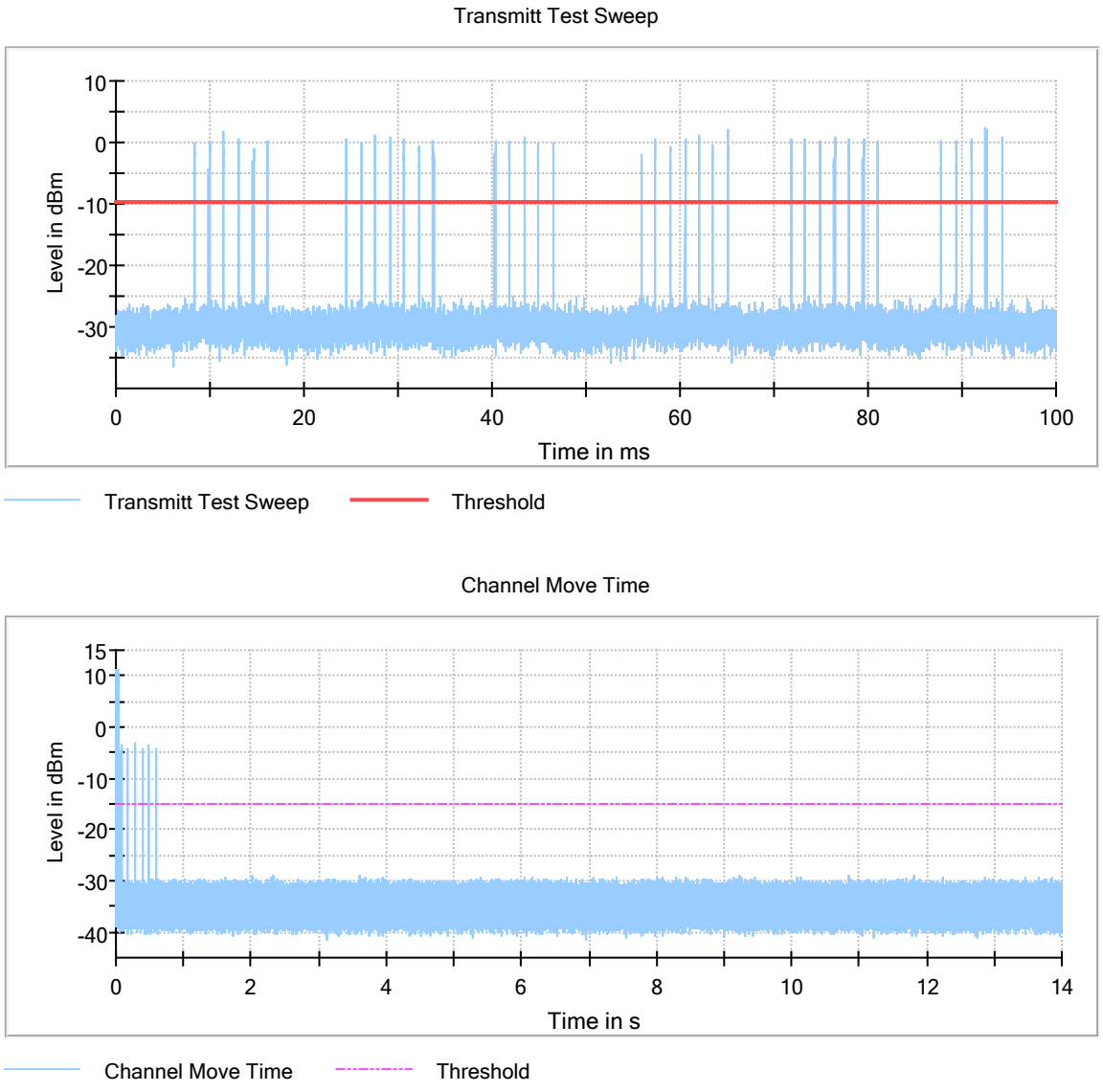
For the DFS measurement, the vector signal generator (VSG) send the reference DFS test signal to the access point. Then the access point should detect the radar, the DUT (slave) should stop its transmission on the current channel whenever instructed by the master device. All signals – master, slave, radar – are captured by the spectrum analyzer.

Results tables

Tested Channel: 64, Frequency: 5320 MHz

Test item	Results	Limit
Transmit Test Duty Cycle	1.647 %	-
Channel Closing Transmission Time	593 ms	1 second
Channel Move Time	1796 ms	10 seconds

Results Screenshot



Channel Move Time < 10s. Test PASS
Channel Closing Transmission Time (*Aggregate Time*) = 593 ms. Test PASS
Channel Move Time (*Channel Closing Time*) = 1796 ms. Test PASS

B.11 Adaptivity (Channel Access Mechanism)

Test limits

ETSI clause	Limits
4.2.7.3.2	*Load Based Equipment*. Load based Equipment shall implement a Listen Before Talk (LBT) based Channel Access Mechanism to detect the presence of other RLAN transmissions on an Operating Channel.
4.2.7.3.2.5 Option 1	*ED Threshold Level.* For equipment that for its operation in the 5 GHz bands is conforming to IEEE 802.11™-2016 [9], clause 17, clause 19 or clause 21, or any combination of these clauses, the ED Threshold Level (TL) is independent of the equipment's maximum transmit power (PH). Assuming a 0 dBi receive antenna the ED Threshold Level (TL) shall be: ***TL = -75 dBm/MHz***
4.2.7.3.3.3	*Short control signalling transmissions:* • within an observation period of 50 ms, the number of Short Control Signalling Transmissions by the equipment shall be equal to or less than 50; and • the total duration of the equipment's Control Signalling Transmissions shall be less than 2 500 µs within said observation period.

Test conditions

ETSI clause	Conditions
5.4.9.1	See clause 5.1 for the test conditions. These measurements shall only be performed at normal test conditions. The channel(s) to be used for testing is defined in clause 5.3.2. The device shall be configured to operate at its maximum output power level.

Test procedure

ETSI clause	Conducted measurements, verification of reaction to the interference signal.
5.4.9.2.2	It shall be verified that: • The UUT stops transmissions on the current operating channel. • Apart from Short Control Signaling Transmissions there shall be no subsequent transmissions while the interfering signal is present. • The Short Control Signalling Transmissions shall comply with the limits defined in clause 4.2.7.3.3.

The adaptivity setup shown in section *Test & System Description* was used to verify the adaptivity of the UUT.

The UUT connects to a companion device with the maximum possible payload.

The spectrum analyzer monitors the transmissions in response to three different interference signals.

These interferers are three 100% duty cycle noise signal: one Gaussian noise signal, one OFDM signal and one LTE type signal. These signals are injected on the current operating channel of the UUT

The power levels for the signals at the input of the receiver are as follows:

- Companion device= -50dBm/MHz
- Interference signal = ***TL + Antenna gain - Margin*** = -77dBm/MHz
  TL = -75 dBm/MHz, limit of the ED Threshold Level assuming 0dBi antenna gain
  Antenna gain = Antenna gain declared by the applicant(Section 5)
  Margin = Additionnal margin requested by the applicant (7dB)

Results Tables

802.11a Channel 40 – 5200 MHz, 6Mbps

Normal Operation

DutyCycle DUT (%)	Monitoring Length (ms)	COT Max (ms)	Limit Max (ms)	COT Min (ms)	Number of COTs	Idle Time Min (ms)	Idle Time Max (ms)	Idle Time Limit Min (ms)
88.724	30000.000	0.572	8.000	0.043	13394	0.026	17.111	0.025

Idle Period Probability

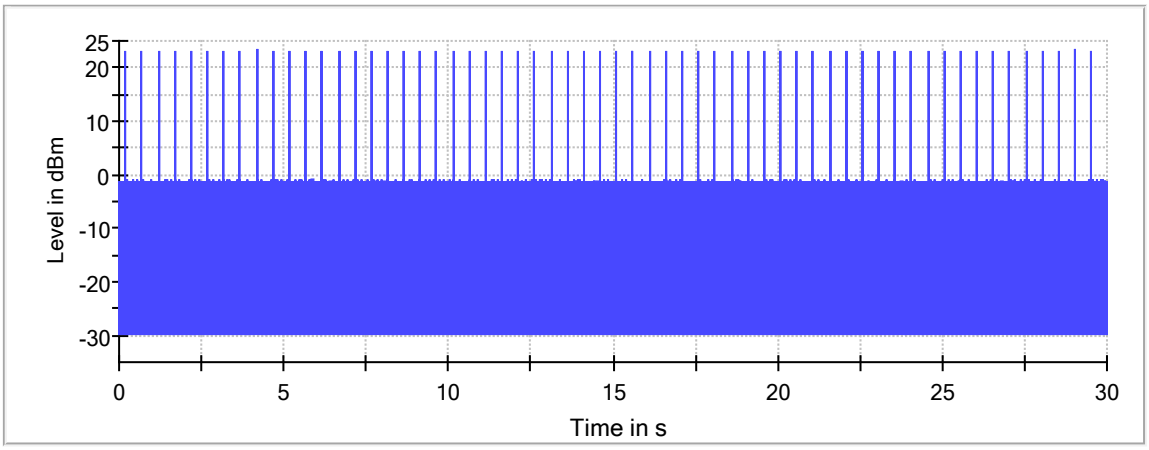
Result	Bin	Probability (%)	Limit (%)	Cumulative Probability (%)
PASS	B0	1.852	5.000	1.852
PASS	B1	0.007	9.000	1.860
PASS	B2	0.082	12.125	1.942
PASS	B3	0.134	15.250	2.076
PASS	B4	0.075	18.375	2.151
PASS	B5	0.045	21.500	2.196
PASS	B6	0.067	24.625	2.263
PASS	B7	0.045	27.750	2.308
PASS	B8	0.045	80.875	2.353
PASS	B9	0.082	84.000	2.435
PASS	B10	0.022	87.125	2.457
PASS	B11	0.022	90.250	2.480
PASS	B12	0.015	93.375	2.495
PASS	B13	0.000	96.500	2.495
PASS	B14	0.007	99.625	2.502
PASS	B15	0.007	100.000	2.510
PASS	B16	97.490	100.000	100.000

Reaction on Interferer

Interferer Signal	On Time in max DC Evaluation Window (ms)	Time Limit Max (ms)	Bursts in max DC Evaluation Window	Burst Limit Max	DC in max DC Evaluation Window (%)	Length of max DC Evaluation Window (ms)	DC Limit Max (%)	Result
AWGN	0.000	2.500	0	50	0.000	50.000	5.000	**PASS**
OFDM	0.000	2.500	0	50	0.000	50.000	5.000	**PASS**
LTE	0.000	2.500	0	50	0.000	50.000	5.000	**PASS**

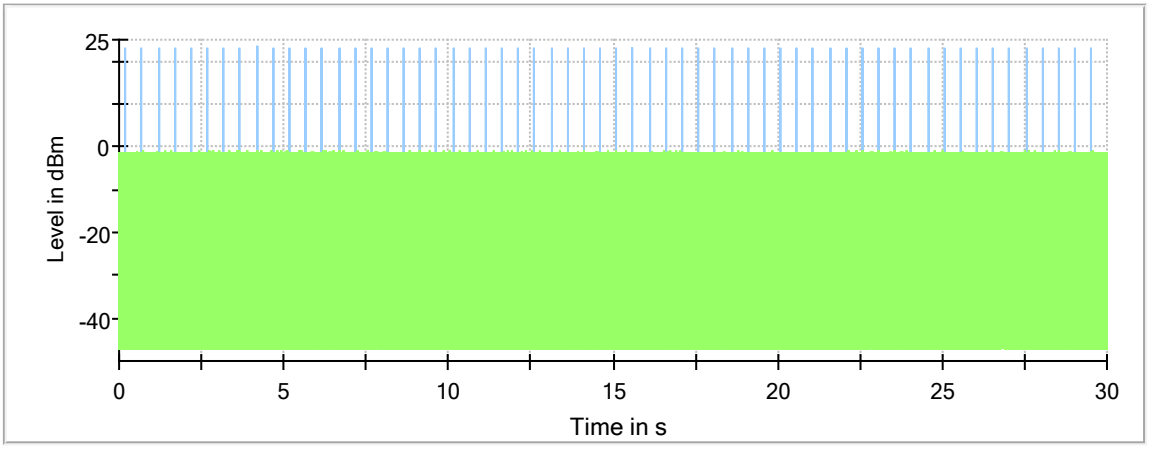
Results Screenshot

Normal Operation



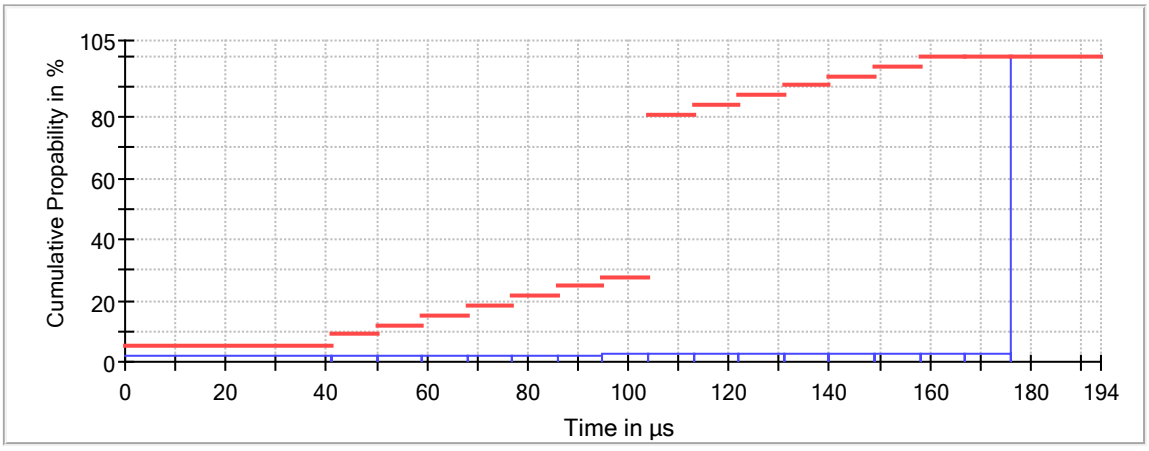
Trace

Normal Operation_Comp_DUT



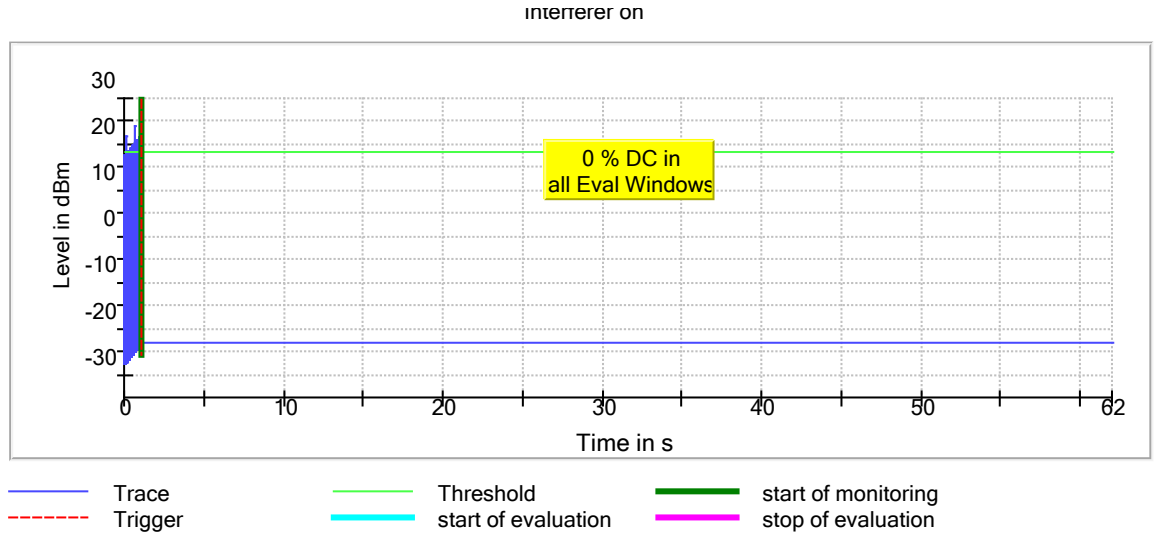
DUT Companion

Histogram

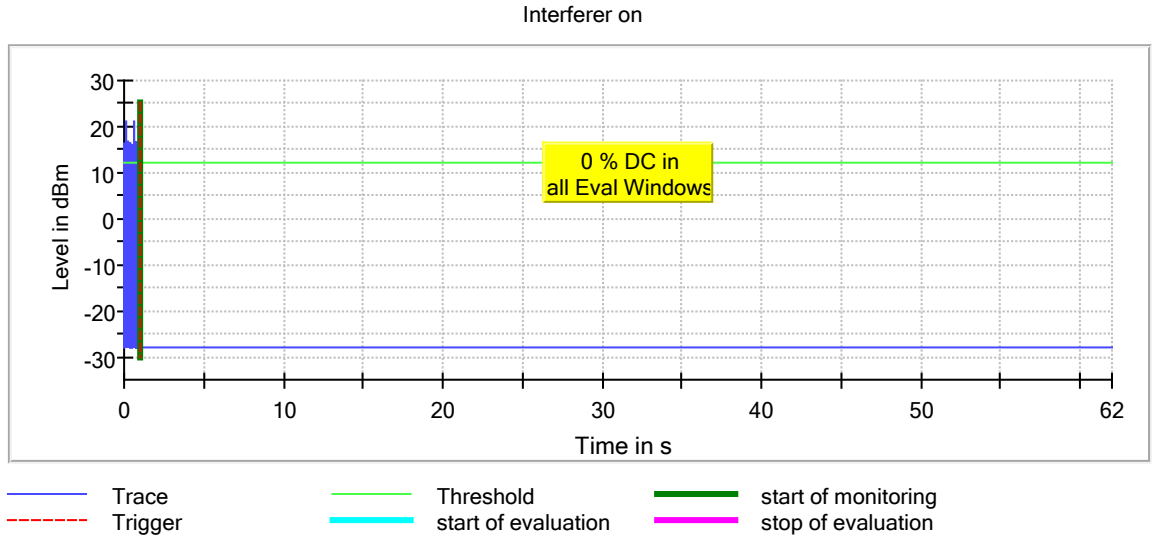


Histogram Limit

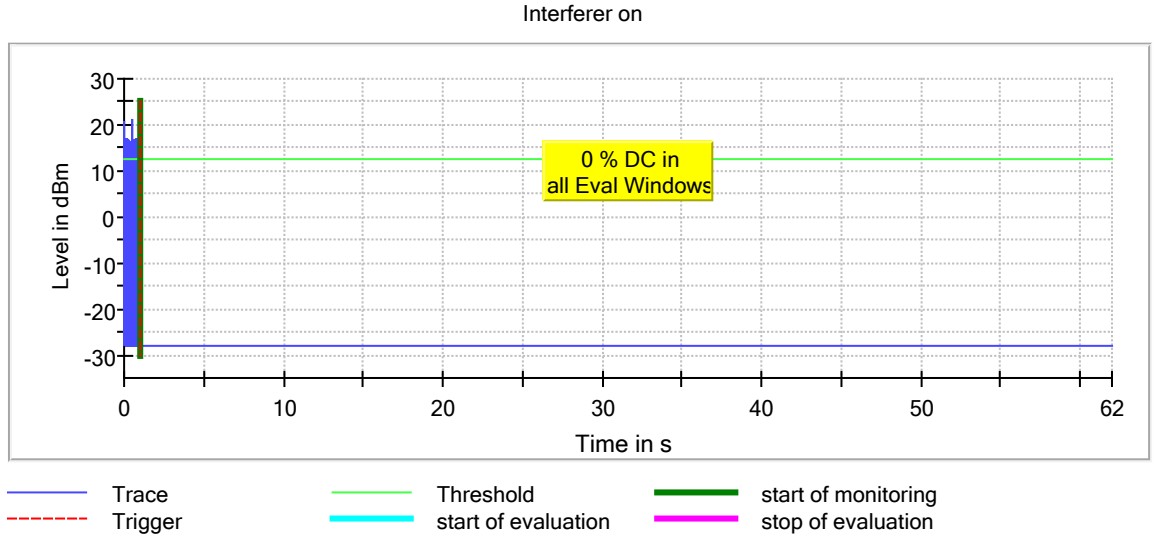
Reaction on Interferer AWGN



Reaction on Interferer OFDM



Reaction on Interferer LTE



B.12 Receiver Blocking

Test limits

<table>
<tr><th>ETSI clause</th><th>Limits</th></tr>
<tr><td>4.2.8.3

4.2.8.4</td><td>The minimum performance criterion shall be a PER of less than or equal to 10 %.

While maintaining the minimum performance criteria as defined in clause 4.2.8.3, the blocking levels at specified frequency offsets shall be equal to or greater than the limits defined in table 9.
Table 9: Receiver Blocking parameters
<table>
<tr><th rowspan="2">Wanted signal mean power from companion device (dBm)</th><th rowspan="2">Blocking signal frequency (MHz)</th><th colspan="2">Blocking signal power (dBm) (see note 2)</th><th rowspan="2">Type of blocking signal</th></tr>
<tr><th>Master or Slave signal with radar detection (see table D.2, note 2)</th><th>Slave without radar detection (see table D.2, note 2)</th></tr>
<tr><td>Pmin + 6 dB</td><td>5 100</td><td>-53</td><td>-59</td><td>Continuous Wave</td></tr>
<tr><td>Pmin + 6 dB</td><td>4 900
5 000
5 975</td><td>-47</td><td>-53</td><td>Continuous Wave</td></tr>
<tr><td colspan="5">NOTE 1: P_{min} is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined clause 4.2.8.3 in the absence of any blocking signal.
NOTE 2: The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the same levels should be used at the antenna connector irrespective of antenna gain.</td></tr>
</table>
</td></tr>
</table>

Test conditions

ETSI clause	Conditions
5.4.10.1	These measurements shall only be performed at normal test conditions. The UUT shall operate in its normal operational mode. If the equipment can be configured to operate with different Nominal Channel Bandwidths (e.g. 20 MHz and 40 MHz) and different data rates, then the combination of the smallest channel bandwidth and the lowest data rate for this channel bandwidth which still allows the equipment to operate as intended shall be used. It shall be verified that this performance criteria as defined by the manufacturer is achieved during the blocking test.

Test procedure

The receiver blocking setup shown in section *Test & System Description* was used to measure receiver blocking signal. The signaling Unit is the CMW500.

The packet error rate (PER) is measured with the CMW500. The blocking signal is emulated by the Signal generator SMB100A. According to the applicant declaration, the device is considered as a slave device.

Test results

Configuration tested: 802.11a, Chain A, Channel 36, 6Mbps.

- **Minimum performance result without interferer**

Wanted signal mean power from companion device: Pmin [dBm]	PER [%]
-91.00	8.77

- **Minimum performance results with interferer**

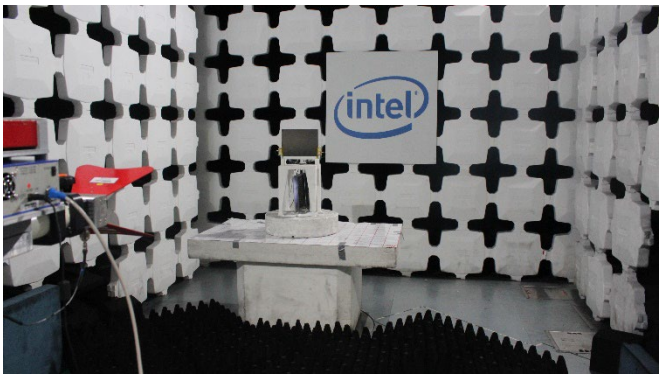
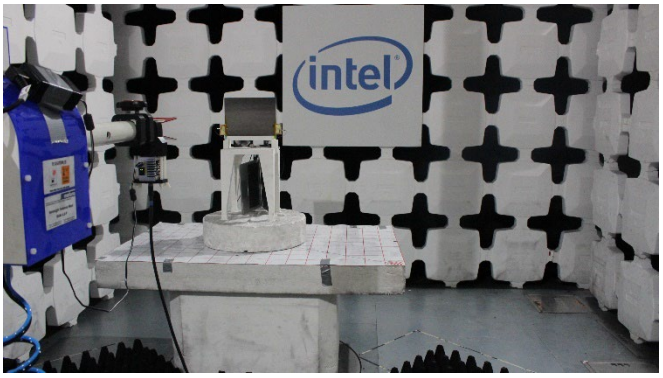
Wanted signal mean power from companion device:

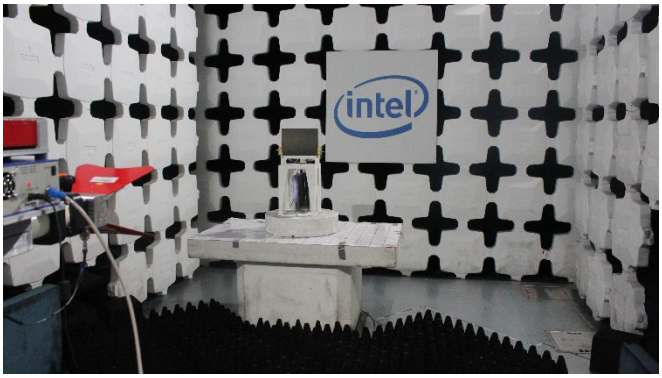
✓ Pmin [dBm] + 6dB = -85.00dBm

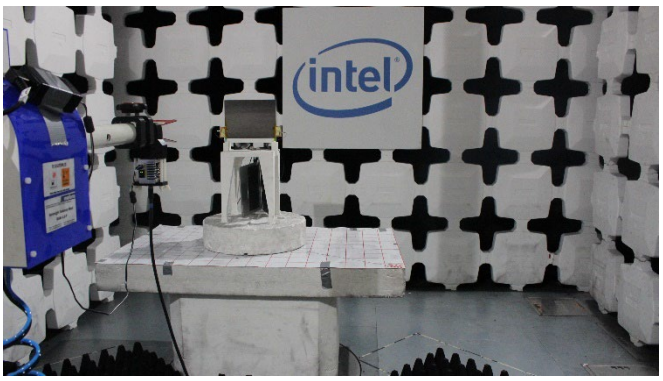
Blocking signal Frequency [MHz]	Blocking signal Power [dBm]	PER [%]	Verdict
5100	-59.00	0.07	Pass
4900	-53.00	1.19	Pass
5000	-53.00	1.11	Pass
5975	-53.00	0.87	Pass

Annex C. Photographs

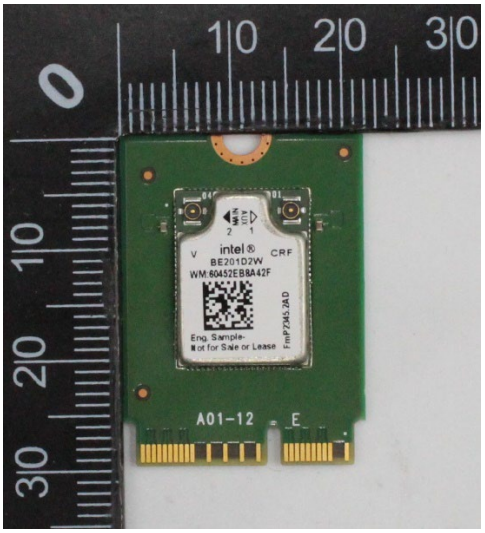
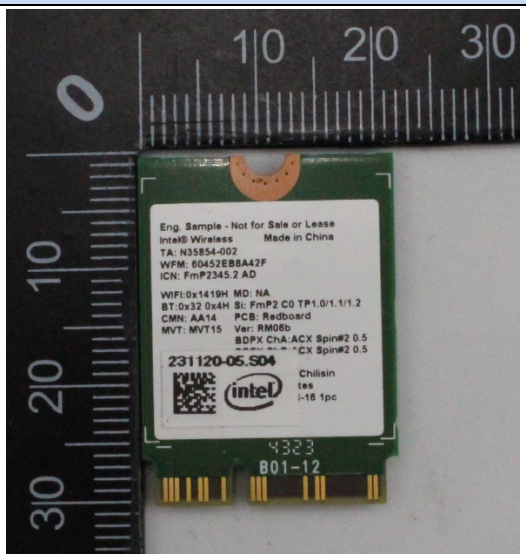
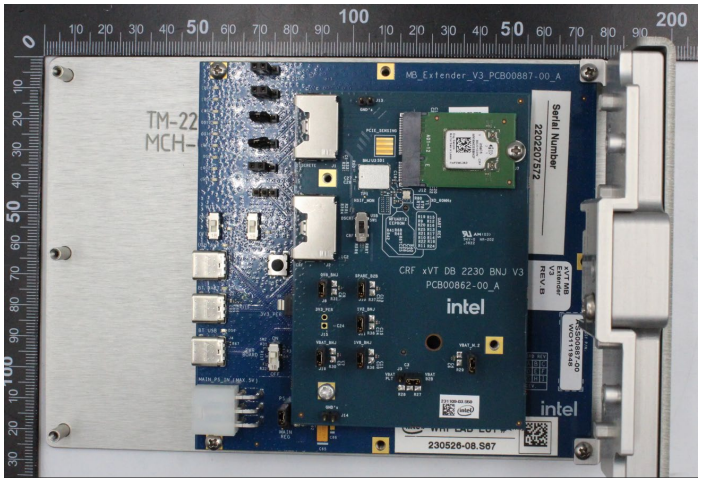
C.1 Test Setup

Radiated Setup 30 MHz – 1 GHz (Transmitter tests)	Radiated Setup 1 GHz – 11 GHz (Transmitter tests)
	
Radiated Setup 11 GHz – 26 GHz (Transmitter tests)	
	

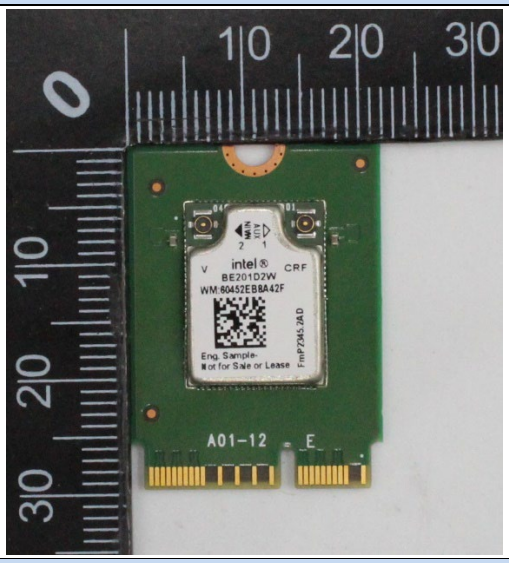
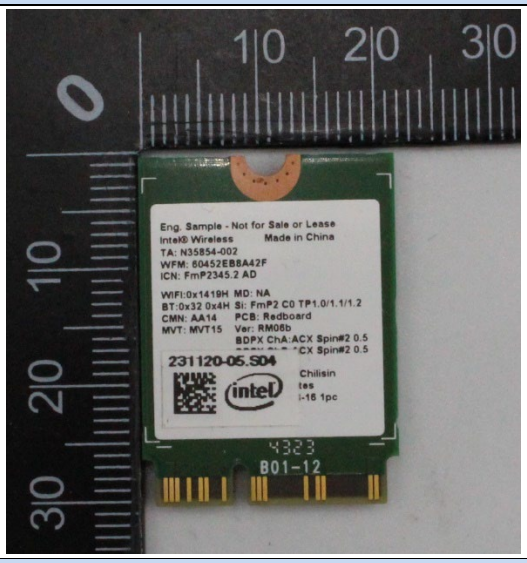
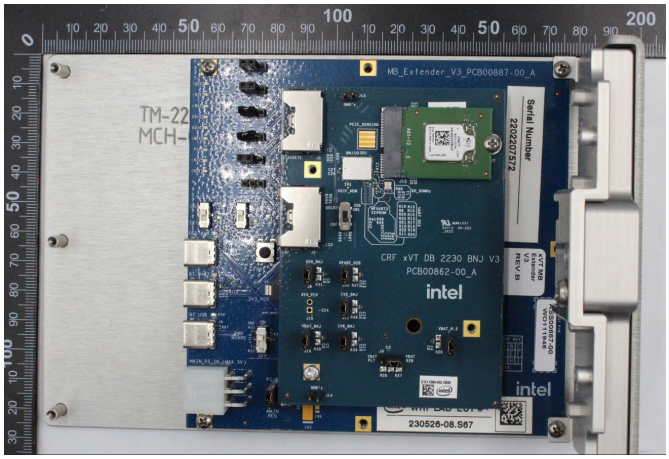
Radiated Setup 30 MHz – 1 GHz (Receiver tests)	Radiated Setup 1 GHz – 11 GHz (Receiver tests)
	

Radiated Setup 11 GHz – 26 GHz (Receiver tests)


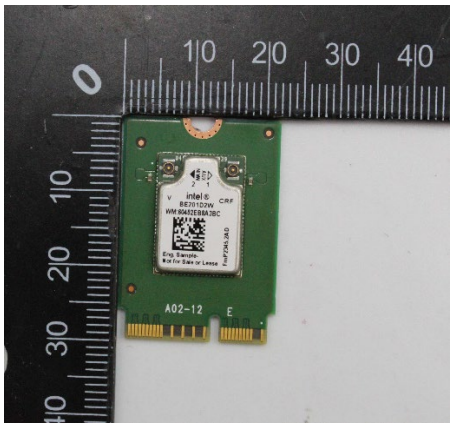
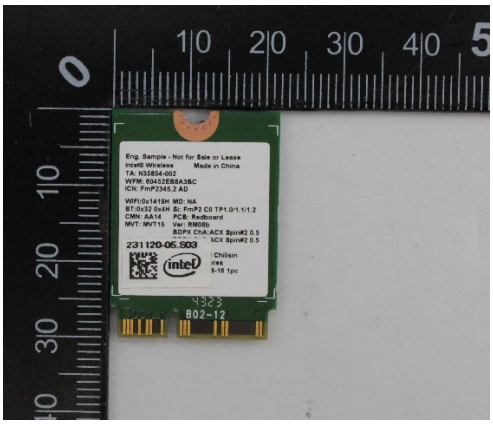
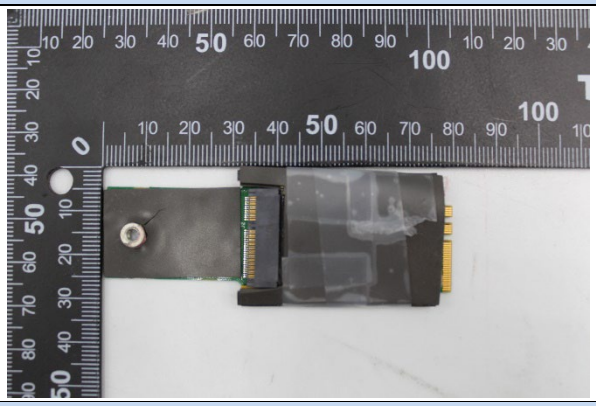
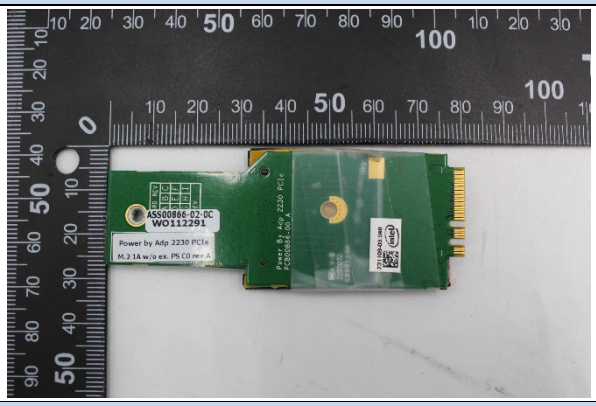
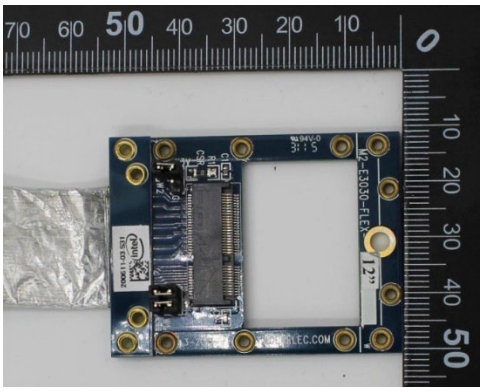
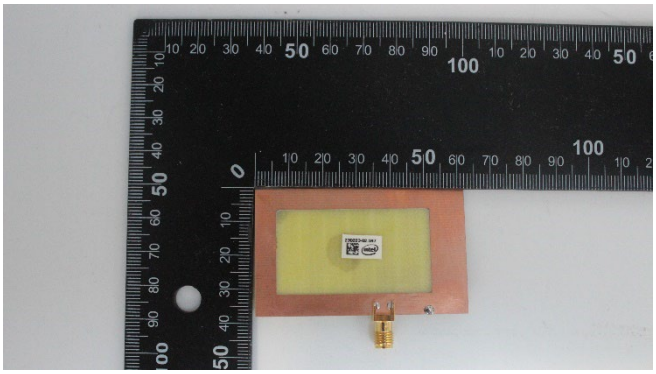
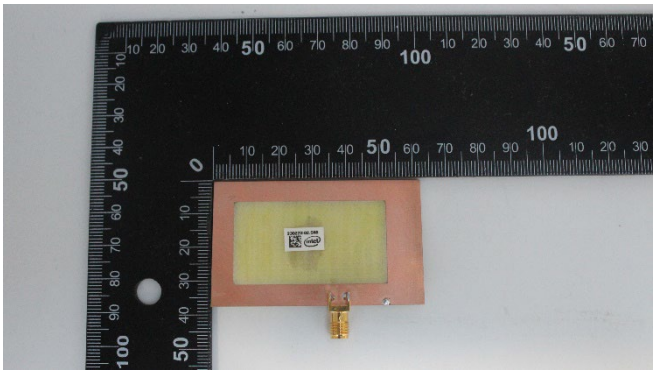
C.2 Test Sample

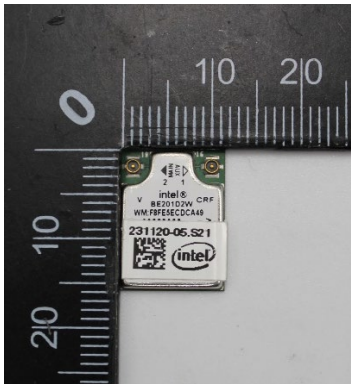
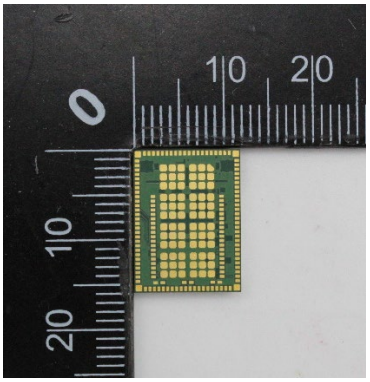
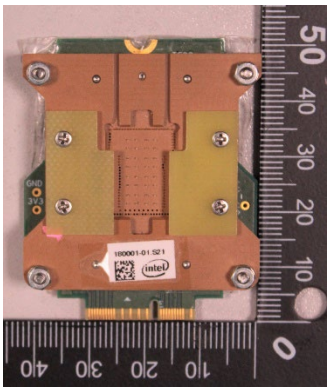
Sample #01	
Module Front	Module Back
	
Extender board	Laptop
	

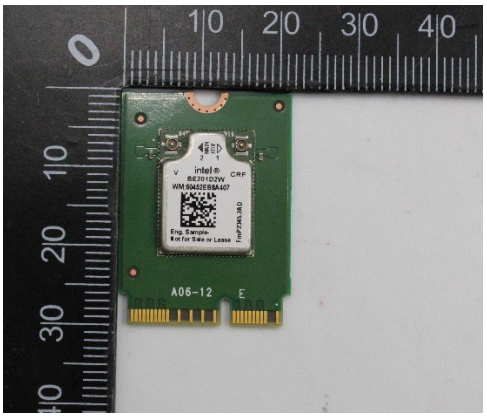
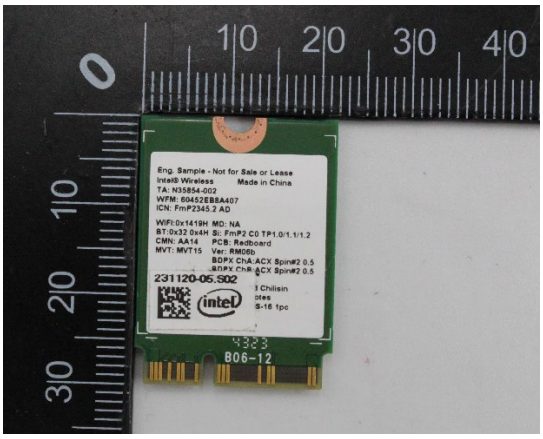
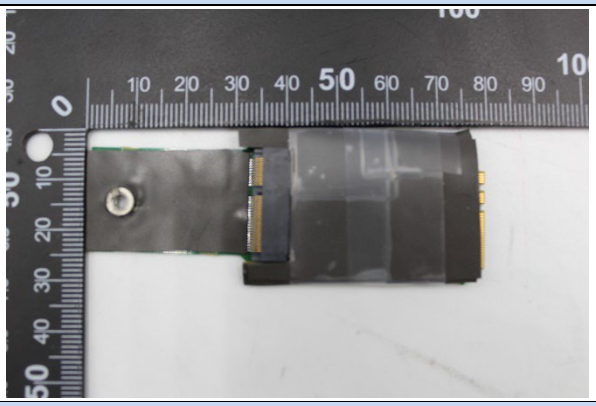
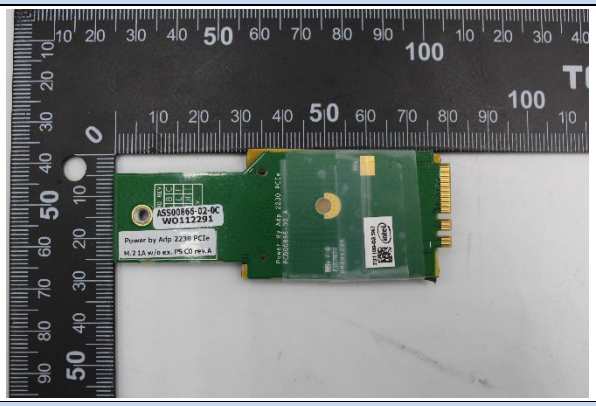
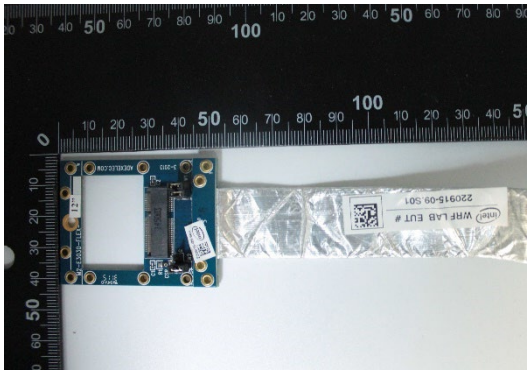
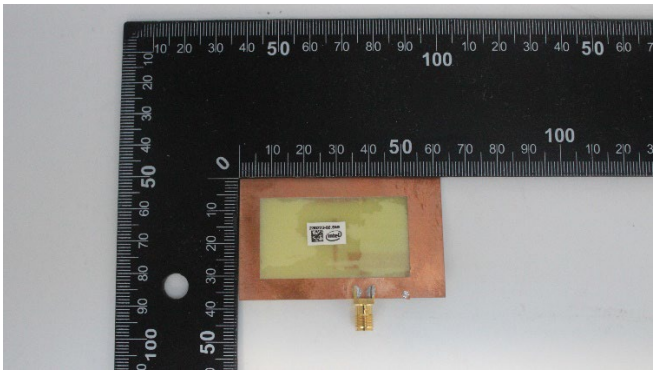
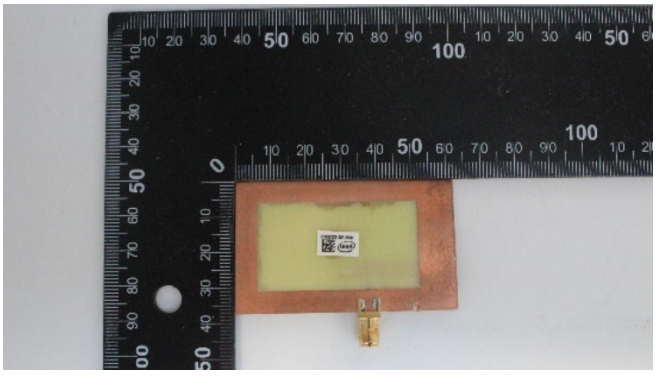
Sample #02

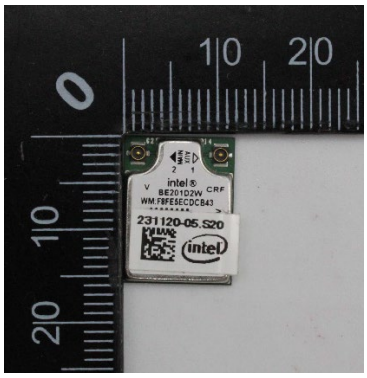
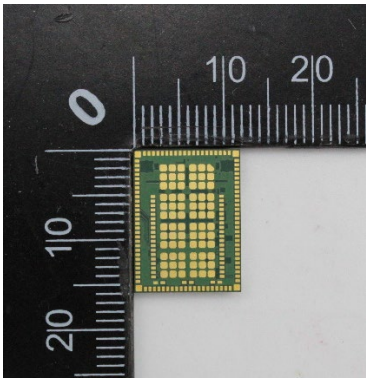
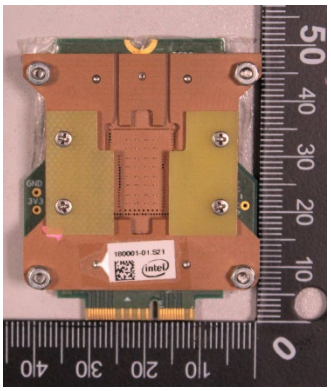
Module Front	Module Back
	
Extender board	**Laptop**
	

Sample #03

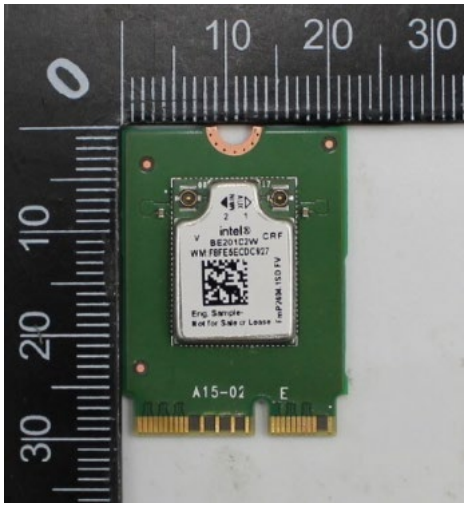
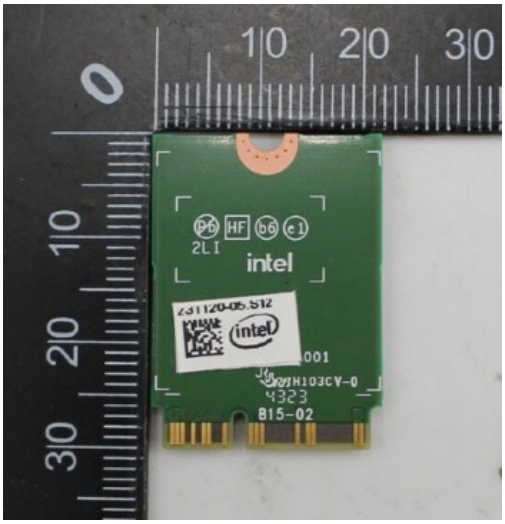
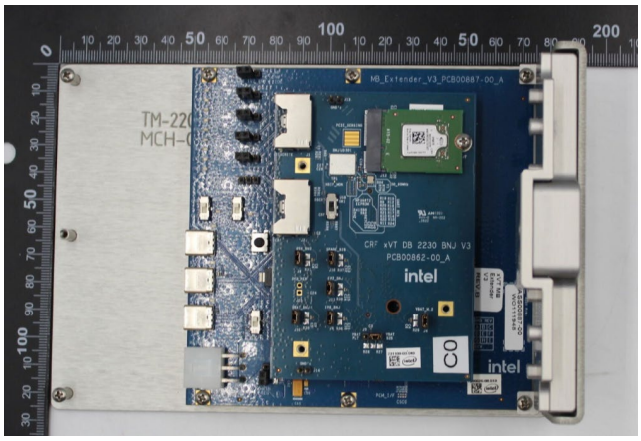
Module Front	Module Back
	
Adaptor Front	**Adaptor Back**
	
Extender board	**Laptop**
	
Main antenna	**Aux antenna**
	

Module Front	Module back
	
Socket Front	**Socket Back**
	

Sample #04	
Module Front	Module Back
	
Adaptor Front	Adaptor Back
	
Extender board	Laptop
	
Main antenna	Aux antenna
	

Module Front	Module back
	
Socket Front	**Socket Back**
	

Sample #05

Module Front	Module Back
	
Extender board	**Laptop**
	

End of the report

This page is intentionally left blank and marks the last page of the test report.