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

CERTIFICATE #3478.01

TEST REPORT

EUT Description	**WLAN and BT, 2x2 PCIe M.2 1216 SD adapter card**
Brand Name	**Intel® Wi-Fi 6E AX211**
Model Name	**AX211D2WH**
FCC ID/IC ID	**FCC ID: PD9AX211D2H; IC ID: 1000M-AX211D2H**
Date of Test Start/End	**2022-02-01 / 2022-05-31**
Features	**802.11ax, Tri Band, 2x2 Wi-Fi 6E + Bluetooth® 5.2** (see section 5)

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

Reference Standards	**FCC CFR Title 47 Part 15 E** **RSS-248 issue 1, RSS-Gen issue 5 - A1** (see section 1)

Test Report identification	**220916-01.TR06**
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.

Issued by

Digitally signed by Requin
Date: 2023.01.11 16:50:47 +01'00'

Cedric REQUIN
(Test Lead)

Reviewed by

Date: 2023.01.11 16:58:23 +01'00'

Zayd OUACHICHA
(Technical Manager)

Intel Corporation S.A.S – WRF Lab
425 rue de Goa – Le Cargo B6 - 06600, Antibes, France
Tel. +33493001400 / Fax +33493001401

Table of Contents

1. Table of Contents

1. Standards, reference documents and applicable test methods

FCC	1. FCC Title 47 eCFR part 15 – Subpart E - Unlicensed National Information Infrastructure Devices. 2020-10-01 2. FCC Title 47 eCFR part 15 – Subpart C – §15.209 Radiated emission limits; general requirements. 2020-10-01 3. FCC OET KDB 987594 D01 U-NII 6GHz General Requirements v01r02 4. FCC OET KDB 987594 D02 U-NII 6 GHz EMC Measurement v01r01 5. FCC OET KDB 987594 D03 U-NII 6 GHz QA v01 6. 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). 7. ANSI C63.10-2013 American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.
ISED	1. RSS-248 Issue 1 - Radio Local Area Network (RLAN) Devices operating in the 5925-7125 MHz band. 2. RSS-Gen Issue 5 Amendment 1 - General Requirements for Compliance of Radio Apparatus. 3. FCC OET KDB 987594 D01 U-NII 6GHz General Requirements v01r02 4. FCC OET KDB 987594 D02 U-NII 6 GHz EMC Measurement v01r01 5. FCC OET KDB 987594 D03 U-NII 6 GHz QA v01 6. ANSI C63.10-2013 American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

2. General conditions, competences and guarantees

- ✓ Tests performed under FCC standards identified in section 1 are covered by A2LA accreditation.
- ✓ Tests performed under ISED standards identified in section 1 are covered by Cofrac accreditation.
- ✓ Intel Corporation SAS Wireless RF Lab (Intel WRF Lab) is an ISO/IEC 17025:2017 laboratory accredited by the American Association for Laboratory Accreditation (A2LA) with the certificate number 3478.01.
- ✓ Intel Corporation SAS Wireless RF Lab (Intel WRF Lab) is an Accredited Test Firm recognized by the FCC, with Designation Number FR0011.
- ✓ Intel Corporation SAS Wireless RF Lab (Intel WRF Lab) is an ISO/IEC 17025:2017 testing laboratory accredited by the French Committee for Accreditation (Cofrac) with the certificate number 1-6736.
- ✓ Intel Corporation SAS Wireless RF Lab (Intel WRF Lab) is a Registered Test Site listed by ISED, with ISED #1000Y.
- ✓ Intel WRF Lab 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	23.4ºC ± 2.2ºC
Humidity	38.3% ± 22.3%

4. Test samples

Sample	Control #	Description	Model	Serial #	Date of receipt	Note
#01	220117-04.S03	WiFi 6E Module	AX211D2WH	2C0DA7F5BA4F	2022-01-19	Used for 1-18 GHz Tx Radiated Spurious Emissions tests
	180000-01.S05	Socket	1216SD to M.2	-	2017-08-09	
	210611-02.S16	Adaptor	PowerBy SNJ A4	-	2021-07-02	
	220225-03.S07	Microwave Absorber	Eccosorb BSR-1	-	2022-03-14	
	200611-03.S31	Extender	ADEXELEC	-	2020-08-19	
	200504-04.S07	Laptop	Latitude 5401	BVHLK13	2020-06-02	
	220117-04.S38	Antenna 6GHz	WRF-8dBi-Slot-6G	-	2022-04-21	
	220117-04.S39	Antenna 6GHz	WRF-8dBi-Slot-6G	-	2022-04-21	
#02	220117-04.S01	WiFi 6E Module	AX211D2WH	7C0DA7F5B6AD	2022-01-19	Used for 30 MHz-1 GHz and for 18-40 GHz Tx Radiated Spurious Emissions tests
	180001-01.S21	Socket	1216SD to M.2	-	2021-06-07	
	210611-02.S17	Adaptor	PowerBy SNJ A4	-	2021-07-02	
	220225-03.S07	Microwave Absorber	Eccosorb BSR-1	-	2022-03-14	
	210209-01.S06	Extender	Adexelec	-	2022-04-06	
	200611-03.S30	Laptop	LATITUDE 5401	6DJLK13	2020-08-19	
	220117-04.S40	Antenna 6GHz	WRF-8dBi-Slot-6G	-	2022-04-21	
	220117-04.S41	Antenna 6GHz	WRF-8dBi-Slot-6G	-	2022-04-21	
#03	220117-04.S08	WiFi 6E Module	AX211D2WH	2C0DA7F5B8CE	2022-01-19	Used for Contention-based protocol test case
	170000-01.S18	Laptop	Latitude E5470	4L1BVF2	2019-05-23	
	200611-01.S13	Extender	XVT EXTENDER SNJ A4	-	2020-11-30	

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® Wi-Fi 6E AX211</td></tr>
<tr><td>Model Name</td><td>AX211D2WH</td></tr>
<tr><td>Software Version</td><td>DRTU_00699_99.0.69C (used for RSE tests)
DRTU_11195_99_2100_51G</td></tr>
<tr><td>Driver Version</td><td>99.0.69.5</td></tr>
<tr><td>Prototype / Production</td><td>Production</td></tr>
<tr><td>Supported Radios</td><td>802.11b/g/n/ax 2.4GHz (2400.0 – 2483.5 MHz)
802.11a/n/ac/ax 5.2GHz (5150.0 – 5350.0 MHz)
5.6GHz (5470.0 – 5725.0 MHz)
5.8GHz (5725.0 – 5895.0 MHz)
802.11ax 6.0GHz (5925.0 - 7125.0MHz)
Bluetooth 5.2 2.4GHz (2400.0 – 2483.5 MHz)</td></tr>
<tr><td>Antenna Information</td><td>
<table>
<tr><th>Transmitter</th><th>Chain 1 (A)</th><th>Chain 2 (B)</th></tr>
<tr><td>Manufacturer</td><td>Intel WRF Lab</td><td>Intel WRF Lab</td></tr>
<tr><td>Antenna type</td><td>Slot</td><td>Slot</td></tr>
<tr><td>Part number</td><td>WRF-8dBi-Slot-6G</td><td>WRF-8dBi-Slot-6G</td></tr>
<tr><td>Declared Antenna gain (dBi) – 6.2 GHz</td><td>+7.80</td><td>+7.80</td></tr>
<tr><td>Declared Antenna gain (dBi) – 6.5 GHz</td><td>+7.32</td><td>+7.32</td></tr>
<tr><td>Declared Antenna gain (dBi) – 6.6 GHz</td><td>+7.66</td><td>+7.66</td></tr>
<tr><td>Declared Antenna gain (dBi) – 7.0 GHz</td><td>+6.96</td><td>+6.96</td></tr>
</table>
</td></tr>
<tr><td>Additional information</td><td></td></tr>
</table>

6. Remarks and comments

The low, mid, high channels were tested for each RF chain (A, B or A+B), bandwidth, modulation and sub- band. Only the worst case among the low, mid and high channels per sub-band has been 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.

802.11 ax – U-NII- 5 to U-NII-8

FCC part	ISED Clause	Test name	Verdict
15.209 15.35 (b) 15.407 (b) (5) (8)	RSS-248 Clause 4.7.2 RSS-247 Clause 5.5	Undesirable emissions limits (radiated)	P
15.407 (d) (6)	RSS-248 Clause 4.8	Contention based protocol	P

8. Document Revision History

Revision #	Modified by	Revision Details
Rev. 00	K.Khatib	First Issue
Rev. 01	C.Requin	Contention-Based Protocol test case added in section B3

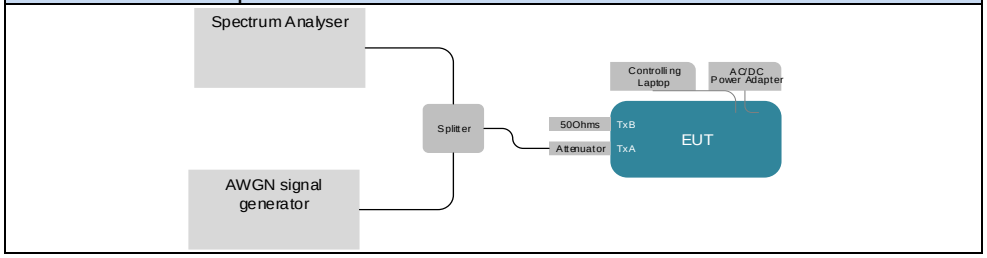
Annex A. Test & System Description

A.1 Measurement System

Measurements were performed using the following setups, made in accordance to the general provisions of ANSI C63.10-2013 Test Procedures.

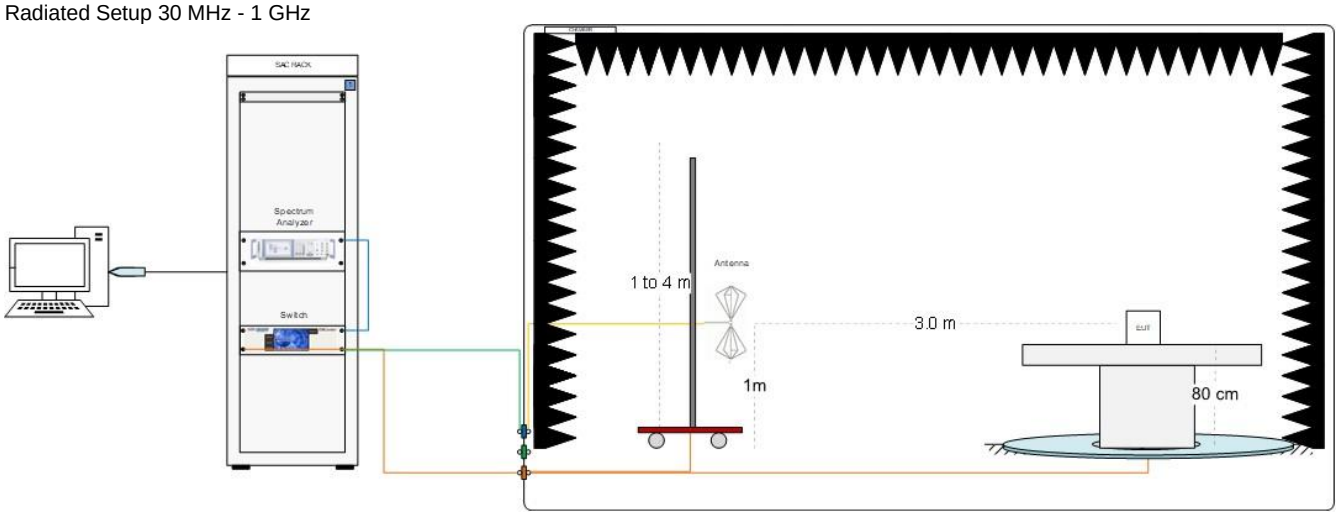
The DUT is installed in a test fixture and this test fixture is connected to a laptop computer and AC/DC power adapter. The laptop computer was used to configure the EUT to continuously transmit at a specified output power using all different modes and modulation schemes, using the Intel proprietary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

Contention-based protocol

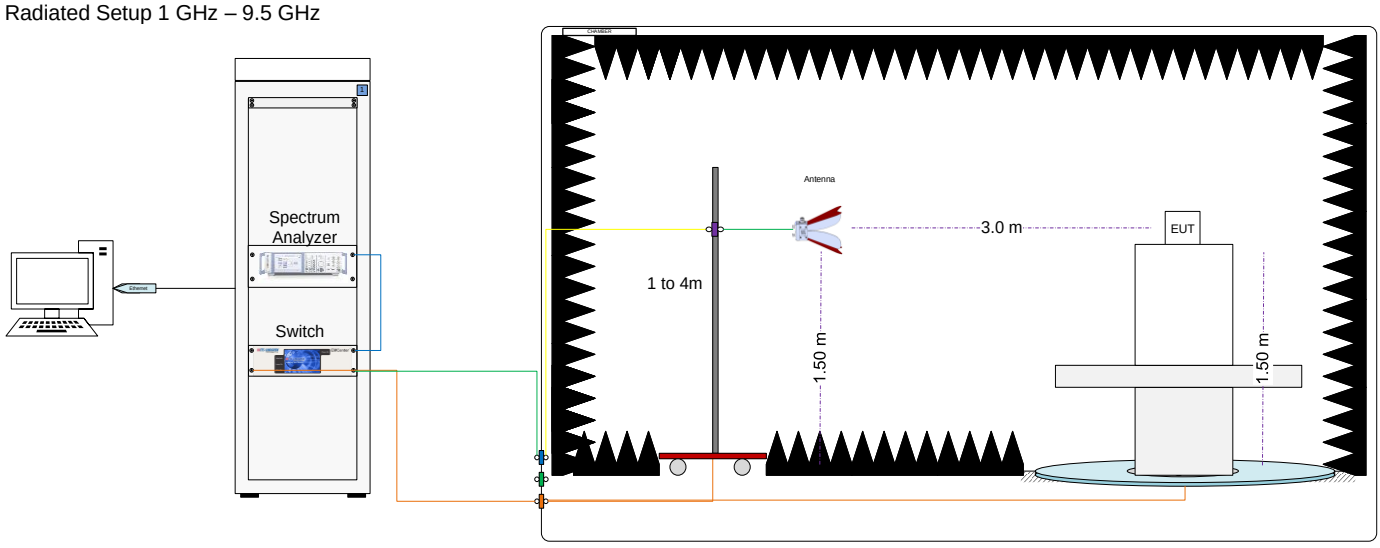


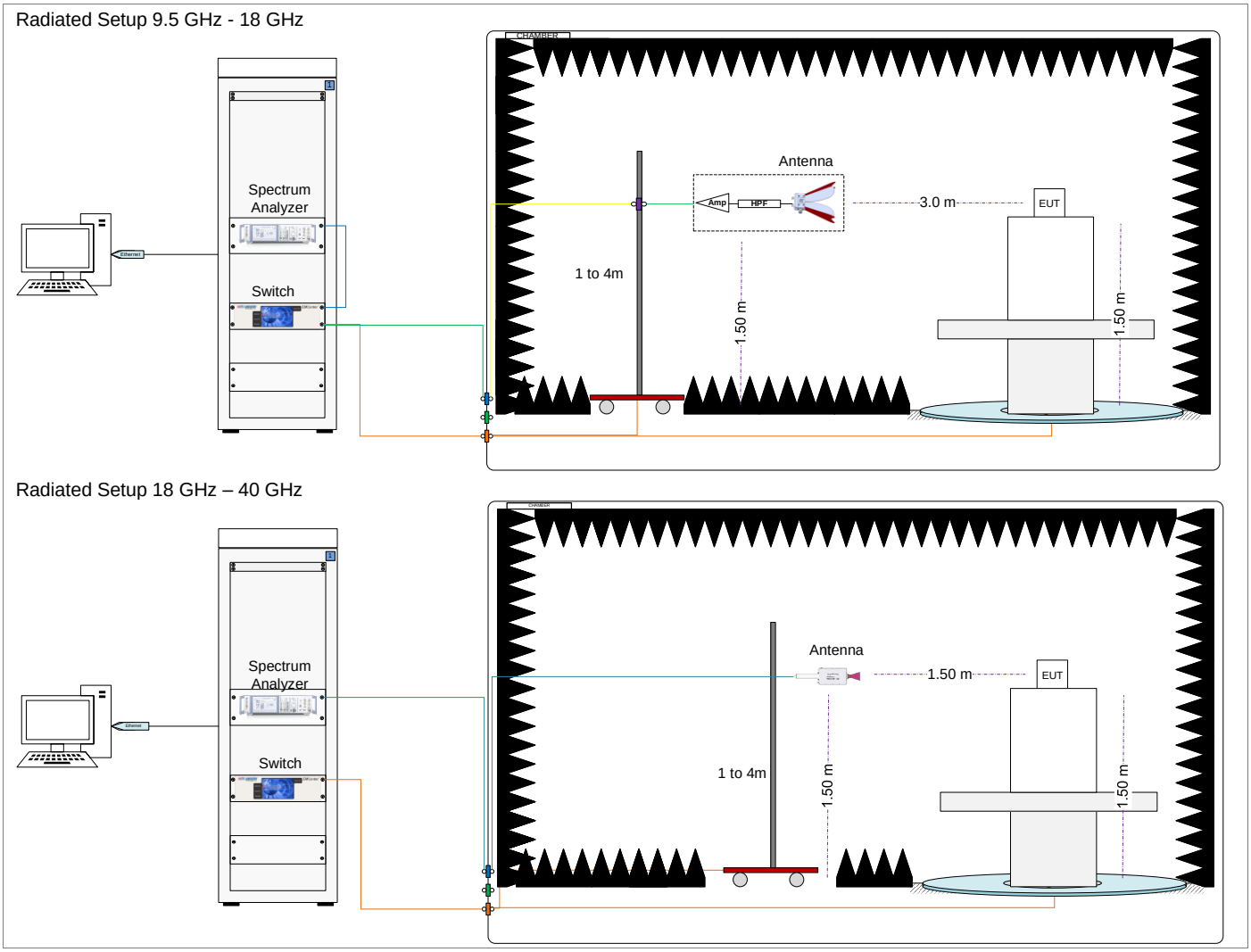
Radiated test setup

Radiated Setup 30 MHz - 1 GHz



Radiated Setup 1 GHz – 9.5 GHz





Sample Calculation

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

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

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

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

where

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

A.2 Test Equipment List

Radiated Setup #1

ID#	Device	Type/Model	Serial #	Manufacturer	Cal. Date	Cal. Due Date
006-000	Anechoic chamber	FACT 3	5720	ETS Lindgren	2022-01-12	2024-01-12
006-001	Turntable	-	-	ETS Lindgren	N/A	N/A
006-008	Measurement Software v11.30.00	EMC32	100623	Rohde & Schwarz	N/A	N/A
147-000	Spectrum analyzer	FSW43	101847	Rohde & Schwarz	2020-11-02	2022-11-02
006-002	Switch & Positioning	EMC center	00159757	ETS Lindgren	N/A	N/A
006-011	Boresight antenna mast	BAM4.0-P	P/278/2890.01	Maturo	N/A	N/A
006-022	Biconilog Antenna	3142E	00156946	ETS-Lindgren	2021-08-05	2023-08-05
057-000	Horn Antenna 3117 + Amplifier + HPF9.5	3117	00167062+00169546	ETS-Lindgren	2020-06-26	2022-06-26
007-008	Double Horn Ridged antenna	3116C-PA	00169308bis + 00196308	ETS-Lindgren	2021-08-05	2023-08-05
059-000	Double ridged horn antenna	3117-PA	00201542	ETS-Lindgren	2021-08-05	2023-08-05
006-059	RF Cable 7.0m	R286304174	20.46.369	Radiall	2022-03-04	2022-09-04
006-051	RF Cable 1.0m	CBL-1.5M-SMSM+	202879	Mini-Circuits	2022-02-02	2022-08-02
006-030	RF Cable 1.2m	UFA147A-0-0480-200200	MFR 64639223720-003	Micro-coax	2022-02-02	2022-08-02
006-034	Cable 1m - 1GHz to 18GHz	UFA147A	-	Utilflex	2022-02-02	2022-08-02
006-036*	Cable 1m – 30 MHz - 18GHz	UFB311A-0-0590-50U50U	MFR 64639 223230-001	Micro-coax	2022-02-02	2022-05-09
026-018	RF Cable 1.2m	0500990991200KE	18.23.179	Radiall	2022-05-09	2022-11-09
006-038*	Cable 7m - 18GHz to 40GHz	R286304009	-	Radiall	2022-02-02	2022-05-16
006-039	RF Cable 2.5m	0500990992500KE	19.23.395	Radiall	2022-02-02	2022-08-02
365-000	Temperature & Humidity logger	RA12E-TH1-RAS	00-80-A3-E1-6E-55	Avtech	2021-03-08	2023-03-08

*Items not used during out of calibration
N/A: Not Applicable

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	2023-09-14
007-002	Turntable	-	-	ETS Lindgren	N/A	N/A
007-003	Antenna Tower	2171B-3.0M	00150123	ETS Lindgren	N/A	N/A
007-006	Switch & Positioner	EMCenter	00151232	ETS Lindgren	N/A	N/A
007-005	Measurement SW, V11.20.00	EMC32	100401	Rohde & Schwarz	N/A	N/A
127-000	Spectrum Analyzer	FSV40	101358	Rohde & Schwarz	2021-01-15	2023-01-15
007-007	Double Ridge Horn (1-18GHz)	3117	00152266	ETS Lindgren	2022-03-29	2024-03-29
057-000	Horn Antenna 3117 + Amplifier + HPF9.5	3117	00167062+00169546	ETS-Lindgren	2020-06-26	2022-06-26
007-008	Double Horn Ridged antenna	3116C-PA	00169308bis + 00196308	ETS-Lindgren	2021-08-05	2023-08-05
059-000	Double ridged horn antenna	3117-PA	00201542	ETS-Lindgren	2021-08-05	2023-08-05
007-022	RF Cable 1-18GHz, 1.5m	0501050991200GX	19.23.493	Radiall	2022-02-03	2022-08-03
007-020	RF Cable 1-18GHz, 1.2 m	2301761761200PJ	12.22.1104	Radiall	2022-02-03	2022-08-03
007-011	RF Cable 1-18GHz – 6.5m	140-8500-11-51	001	Spectrum	2022-02-03	2022-08-03
007-015	RF Cable 1GHz-18GHz 1.5m	-	-	Spirent	2022-02-03	2022-08-03
007-014	RF Cable 18-40 GHz 6m	R286304009	1747364	Radiall	2022-02-03	2022-08-03
007-023	RF Cable 1m DC-40GHz	PE360-100CM	-	Pasternack	2022-02-03	2022-08-03
007-018	RF Cable 1-9.5GHz 1.2m	0500990991200KE	-	Radiall	2022-02-03	2022-08-03
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 V2.0	-	-	Intel	NA	NA
139-000	Power Sensor	NRP-Z81	104383	Rohde & Schwarz	2021-04-07	2023-04-07
140-000	Power Sensor	NRP-Z81	104382	Rohde & Schwarz	2022-03-25	2024-03-25

Contention-based protocol

ID#	Device	Type/Model	Serial #	Manufacturer	Cal. Date	Cal. Due Date
098-000	Vector Signal generator	SMW200A	103732	Rohde & Schwarz	2021-02-04	2023-02-04
134-000	Spectrum Analyzer	FSV13	103308	Rohde & Schwarz	2021-04-21	2023-04-21
018-004	50 Ohm Load	-	-	-	2022-02-04	2022-08-04
018-000*	2 Way SMA Power Divider	PE2084	-	Pasternack	2022-02-04	2022-08-04
349-000	Temp & Humidity Logger	RA12E-TH1-RAS	RA12-D4F8C3	Avtech	2021-07-30	2023-07-30
018-005*	Cable SMA Male to SMA Male 45CM	FMC0202085-18	-	Fairview Microwave	2022-02-04	2022-08-04
018-006*	Cable SMA Male to SMA Male 45CM	FMC0202085-18	-	Fairview Microwave	2022-02-04	2022-08-04
016-003*	Cable SMA Male to SMA Male 45CM	FMC0202085-18	-	Fairview Microwave	2022-02-04	2022-08-04

N/A: Not Applicable
*The equipment were used only on their calibration period

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
Radiated tests <1GHz	±6.24	dB
Radiated tests 1GHz – 40 GHz	±6.04	dB
Contention Based Protocol	±1.21	dB

Annex B. Test Results

The herein test results were performed by:

Test case measurement	Test Personnel
Radiated spurious emissions	K.Khatib, R.Simonini
Contention-based Protocol	G. Roustan

B.1 Test Conditions

For 802.11ax20 (20 MHz channel bandwidth), 802.11ax40 (40MHz channel bandwidth), 802.11ax80 (80MHz channel bandwidth) and 802.11ax160 (160MHz channel bandwidth) modes the EUT can transmit at both CHAIN A and CHAIN B RF outputs individually, and also simultaneously. The conducted RF output power at each chain was adjusted according to target values from the following table using the Intel DRTU tool and measuring the power by using a power meter.
Measured values for adjustment were within +/- 0.25 dB from the declared target values.

UNII-5 to UNII-8					Conducted Power, Target Value (dBm)		
Mode	BW (MHz)	Data Rate	CH #	Freq. (MHz)	SISO Chain A	SISO Chain B	MIMO at each ports A and B
802.11ax20	20	HE0	1	5955	21	21	21
			45	6175	21	21	21
			93	6415	21	21	21
			97	6435	18	18	15
			105	6475	18	18	15
			113	6515	18	18	15
			117	6535	21	21	21
			149	6695	21	21	21
			181	6855	21	21	21
			185	6875	18	18	15
			209	6995	18	18	15
			233	7115	18	18	15
802.11ax40	40	HE0	3	5965	21	21	21
			43	6165	21	21	21
			91	6405	21	21	21
			99	6445	18	18	15
			107	6485	18	18	15
			115	6525	18	18	15
			147	6685	21	21	21
			179	6845	21	21	21
			187	6885	18	18	15
			227	7085	18	18	15
802.11ax80	80	HE0	7	5985	21	21	21
			39	6145	21	21	21
			87	6385	21	21	21
			103	6465	18	18	15
			119	6545	18	18	15
			135	6625	21	21	21
			167	6785	21	21	21
			183	6865	18	18	15
			199	6945	18	18	15
			215	7025	18	18	15
802.11ax160	160	HE0	15	6025	20	20	20
			79	6345	21	21	21
			111	6505	18	18	15
			143	6665	21	21	21
			207	6985	18	18	15

B.2 Radiated spurious emission

Standard references

<table>
<tr><th>FCC part</th><th>ISED Clause</th><th>Limits</th></tr>
<tr><td>15.407 (b) (5)</td><td>RSS-248 Clause 4.7.2</td><td>For transmitters operating within the 5.925-7.125 GHz band: Any emissions outside of the 5.925-7.125 GHz band must not exceed an e.i.r.p. of −27 dBm/MHz.</td></tr>
<tr><td>-</td><td>RSS-Gen Clause 8.1</td><td>If an average limit is specified for the EUT, then the peak emission shall also be measured with instrumentation properly adjusted for factors such as pulse desensitization to ensure that the peak emission is less than 20 dB above the average limit.</td></tr>
<tr><td>15.35 (b)</td><td>-</td><td>When average radiated emission measurements are specified in this part, including average emission measurements below 1000 MHz, there also is a limit on the peak level of the radio frequency emissions. Unless otherwise specified, e.g., see §§15.250, 15.252, 15.253(d), 15.255, 15.256, and 15.509 through 15.519, the limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test.</td></tr>
<tr><td>15.407 (b) (8)</td><td>-</td><td>Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209.</td></tr>
<tr><td>-</td><td>RSS-248 Clause 4.7.2</td><td>Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in RSS-Gen.</td></tr>
<tr><td>15.209</td><td>-</td><td>Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a):
<table>
<tr><th>Freq Range (MHz)</th><th>Field Strength (µV/m)</th><th>Field Strength (dBµV/m)</th><th>Meas. Distance (m)</th></tr>
<tr><td>30-88</td><td>100</td><td>40</td><td>3</td></tr>
<tr><td>88-216</td><td>150</td><td>43.5</td><td>3</td></tr>
<tr><td>216-960</td><td>200</td><td>46</td><td>3</td></tr>
<tr><td>Above 960</td><td>500</td><td>54</td><td>3</td></tr>
</table>
The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands above 1000 MHz. Radiated emission limits in this band is based on measurements employing an average detector. For average radiated emission measurements above 1000 MHz, there is also a limit specified when measuring with peak detector function, corresponding to 20 dB above the indicated values in the table.</td></tr>
<tr><td>-</td><td>RSS-247 Clause 5.5 RSS-Gen Clause 8.9</td><td>Radiated emissions which fall in the restricted bands, as defined in §8.10, shall comply with the field strength limits shown below
<table>
<tr><th>Freq Range (MHz)</th><th>Field Strength (µV/m)</th><th>Field Strength (dBµV/m)</th><th>Meas. Distance (m)</th></tr>
<tr><td>30-88</td><td>100</td><td>40</td><td>3</td></tr>
<tr><td>88-216</td><td>150</td><td>43.5</td><td>3</td></tr>
<tr><td>216-960</td><td>200</td><td>46</td><td>3</td></tr>
<tr><td>Above 960</td><td>500</td><td>54</td><td>3</td></tr>
</table>
The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands above 1000 MHz. Radiated emission limits in this band is based on measurements employing an average detector. For average radiated emission measurements above 1000 MHz, there is also a limit specified when measuring with peak detector function, corresponding to 20 dB above the indicated values in the table.</td></tr>
</table>

Test procedure

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

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

The final measurement is performed by varying the antenna height from 1 m to 4 m, the EUT rotating in azimuth over 360º for both vertical and horizontal polarizations.

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

For FCC:

- For frequencies less than or equal to 1000 MHz, measurements were made with the CISPR quasi-peak detector with a resolution bandwidth of 120kHz and a video bandwith 3 times of the resolution bandwidth.
- For restricted bands, measurements above 1000 MHz were performed using average and peak detectors with a minimum resolution bandwidth of 1 MHz and a video bandwith 3 times of the resolution bandwidth
- For unrestricted bands, measurements above 1000 MHz were performed using RMS and peak detectors with a minimum resolution bandwidth of 1 MHz and a video bandwith 3 times of the resolution bandwidth

For ISED:

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

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

- For frequencies less than or equal to 1000 MHz, measurements were made with the CISPR quasi-peak detector with a resolution bandwidth of 120kHz and a video bandwith 3 times of the resolution bandwidth.
- For frequencies above 1000 MHz, measurements were performed using average and peak detectors with a minimum resolution bandwidth of 1 MHz and a video bandwith 3 times of the resolution bandwidth

Test Results

B.2.1 802.11ax U-NII-5 to U-NII-8

Radiated spurious - 30 MHz – 1 GHz

Radiated Spurious – All modes

Frequency	QuasiPeak	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dB	---
30.6	31.2	40.0	8.8	V

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

UNII-5

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

Radiated Spurious – CH39

Frequency	MaxPeak	Average	RMS	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	dBµV/m	dB	---
7374.0	---	48.8	---	54.0	5.2	H
7374.5	54.4	---	---	74.0	19.5	H
12304.5	---	38.5	---	54.0	15.5	H
12305.9	48.4	---	---	74.0	25.6	H
24580.0	48.3	---	---	88.2	39.9	V
24580.0	---	---	41.2	68.2	27.0	H

UNII-6

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

Radiated Spurious – CH105

Frequency	MaxPeak	Average	RMS	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	dBµV/m	dB	---
5180.1	52.6	---	---	88.2	35.6	H
5180.1	---	---	45.1	68.2	23.1	H
17796.9	50.2	---	---	74.0	23.8	V
17821.5	---	40.8	---	54.0	13.2	V
25899.5	---	---	45.3	68.2	22.9	V
25900.0	50.4	---	---	88.2	37.8	V

UNII-7

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

Radiated Spurious – CH167

Frequency	MaxPeak	Average	RMS	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	dBµV/m	dB	---
5428.0	---	49.5	---	54.0	4.5	H
5428.5	53.4	---	---	74.0	20.6	H
17800.7	49.7	---	---	74.0	24.3	V
17800.7	---	40.3		54.0	13.7	V
27139.8	49.6	---	---	88.2	38.6	V
27139.8	---	---	43.8	68.2	24.4	H

UNII-8

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

Radiated Spurious – CH185

Frequency	MaxPeak	Average	RMS	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	dBµV/m	dB	---
5499.8	55.0	---	---	88.2	33.2	H
5499.8	---	---	50.7	68.2	17.5	H
17797.4	51.2	---	---	74.0	22.8	H
17804.9	---	40.3	---	54.0	13.7	H
27500.0	49.2	---	---	88.2	39.0	V
27500.0	---	---	43.7	68.2	24.5	H

B.3 Contention-based protocol

Test limits

Indoor access points, subordinate devices and client devices operating in the 5.925-7.125 GHz band are required to use technologies that include a contention-based protocol to avoid co-channel interference with incumbent devices sharing the band. To ensure incumbent co-channel operations are detected in a technology-agnostic manner, unlicensed devices are required to detect co-channel radio frequency energy (energy detect) and avoid simultaneous transmission.
Unlicensed indoor low-power devices must detect co-channel radio frequency power that is at least -62 dBm or lower. Upon detection of energy in the band, unlicensed low power indoor devices must vacate the channel and stay off the channel as long as detected radio frequency power is equal to or greater than the threshold (-62 dBm).

Test procedure

The contention-based protocol setup shown in section *Test & System Description* was used to measure the contention-based protocol. The EUT ceased transmission when the AWGN source signal level described in table result below is set to transmit.
Incumbent signal is emulated by using a 10MHz bandwidth AWGN source generated by the vector signal generator.
The EUT is transmitting at the maximum possible payload and the spectrum analyzer monitors the transmissions in response to the AWGN signal. Insertion loss of the test setup were considered on the spectrum analyser reading.

Result Tables

Contention-based Protocol Threshold minimum level

UNII	Channel	Bandwidth [MHz]	EUT Freq [MHz] f_{c1}	Incumbent Placement/Frequency [MHz] f_{c2}		Threshold level of AWGN incumbent (dBm) at antenna level*see note below	Status of EUT transmision
5	45	20	6175	$f_{c1} = f_{c2}$	6175	-72.7	**Ceased**
						-73.7	Minimal
						-74.7	Minimal
						-75.7	Normal
6	105	20	6475	$f_{c1} = f_{c2}$	6475	-72.4	**Ceased**
						-73.4	Minimal
						-74.4	Minimal
						-75.4	Normal
7	149	20	6695	$f_{c1} = f_{c2}$	6695	-72.1	**Ceased**
						-73.1	Minimal
						-74.1	Minimal
						-75.1	Normal
8	209	20	6995	$f_{c1} = f_{c2}$	6995	-72.7	**Ceased**
						-73.7	Minimal
						-74.7	Minimal
						-75.7	Normal
5	15	160	6025	Lower edge	5950	-71.5	**Ceased**
						-72.5	Minimal
						-73.5	Normal
				$f_{c1} = f_{c2}$	6025	-74.8	**Ceased**
						-75.8	Minimal
						-76.8	Normal
				Upper edge	6100	-71.9	**Ceased**
						-72.9	Minimal
						-73.9	Normal
6-7	111	160	6505	Lower edge	6430	-71.2	**Ceased**
						-72.2	Minimal
						-73.2	Normal
				$f_{c1} = f_{c2}$	6505	-73.8	**Ceased**
						-74.8	Minimal
						-75.8	Normal
				Upper edge	6580	-71.7	**Ceased**
						-72.7	Minimal
						-73.7	Normal
7	143	160	6665	Lower Edge	6590	-70.9	**Ceased**
						-71.9	Minimal
						-72.9	Normal
				$f_{c1} = f_{c2}$	6665	-73.7	**Ceased**
						-74.7	Minimal
						-75.7	Normal
				Upper edge	6740	-71.5	**Ceased**
						-72.5	Minimal
						-73.5	Normal
8	207	160	6985	Lower Edge	6910	-70.8	**Ceased**
						-71.8	Minimal
						-72.8	Normal
				$f_{c1} = f_{c2}$	6985	-73.5	**Ceased**
						-74.5	Minimal
						-75.5	Normal
				Upper edge	7060	-72.7	**Ceased**
						-73.7	Minimal
						-74.7	Normal

Note : EUT antenna gain +6.64dBi considered in the measurement path loss.

Summary table

Bandwidth	UNII Sub-band	Channel	EUT Freq [MHz] f_{c1}	Incumbent Placement/Frequency [MHz] f_{c2}		Incumbent Threshold level of AWGN interference at antenna level (dBm)*see note below	Number of iterations	Detection Probability (%)	Limit (%)	Verdict
20MHz	5	45	6175	$f_{c1} = f_{c2}$	6175	-72.7	10	100	90	PASS
	6	105	6475	$f_{c1} = f_{c2}$	6475	-72.4	10	100	90	PASS
	7	149	6695	$f_{c1} = f_{c2}$	6695	-72.1	10	100	90	PASS
	8	209	6995	$f_{c1} = f_{c2}$	6995	-72.7	10	100	90	PASS
160MHz	5	15	6025	Lower edge	5950	-71.5	10	100	90	PASS
				$f_{c1} = f_{c2}$	6025	-74.8	10	100	90	PASS
				Upper edge	6100	-71.9	10	100	90	PASS
	6-7	111	6505	Lower edge	6430	-71.2	10	100	90	PASS
				$f_{c1} = f_{c2}$	6505	-73.8	10	100	90	PASS
				Upper edge	6580	-71.7	10	100	90	PASS
	7	143	6665	Lower Edge	6590	-70.9	10	100	90	PASS
				$f_{c1} = f_{c2}$	6665	-73.7	10	100	90	PASS
				Upper edge	6740	-71.5	10	100	90	PASS
	8	207	6985	Lower edge	6910	-70.8	10	100	90	PASS
				$f_{c1} = f_{c2}$	6985	-73.5	10	100	90	PASS
				Upper edge	7060	-72.7	10	100	90	PASS

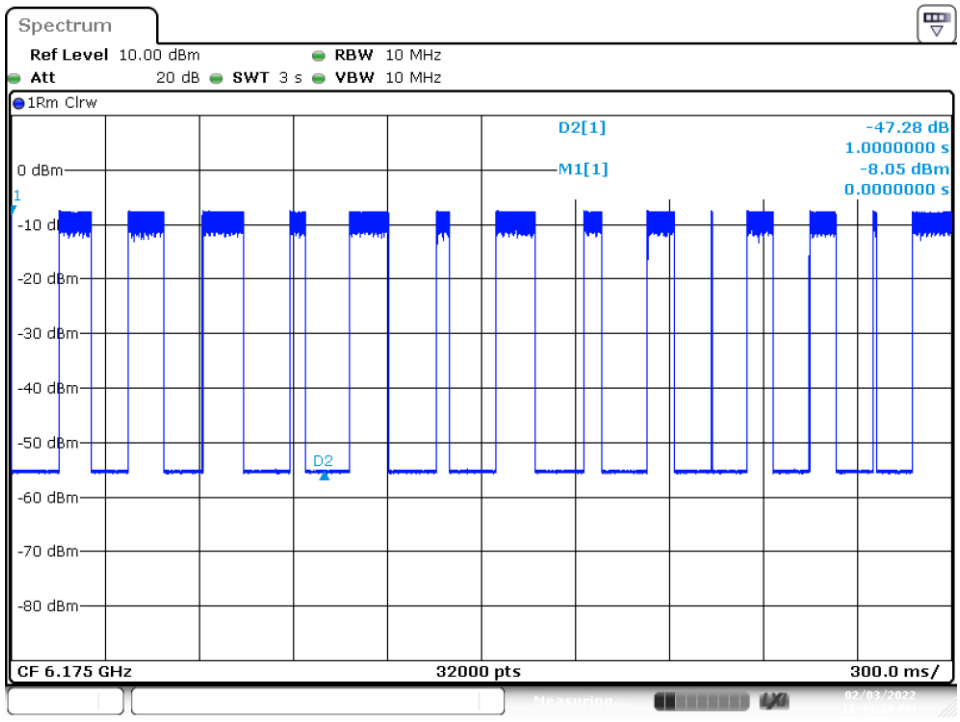
Note : EUT antenna gain = +6.64dBi considered in the measurement path loss.

See Section C.1. for the screenshot results.

C.1 System Plots

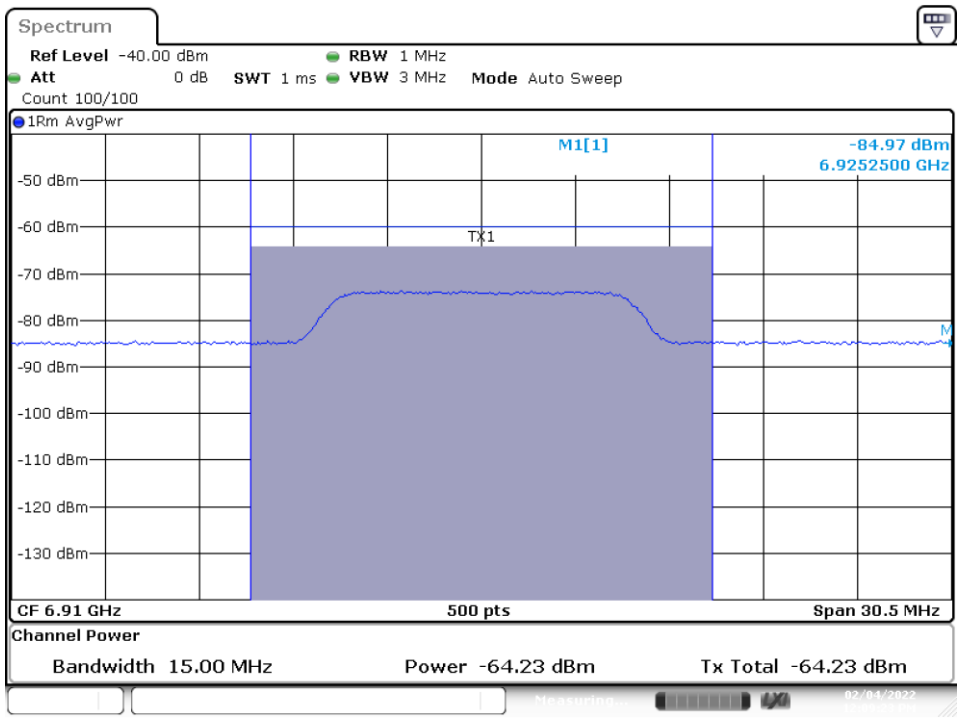
Contention-based protocol

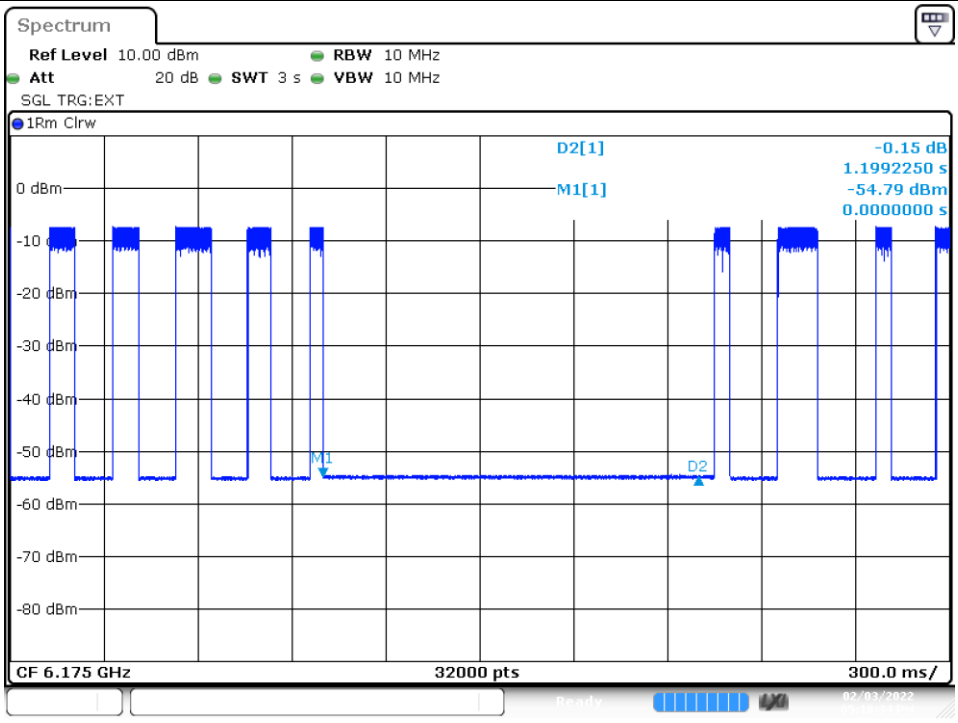
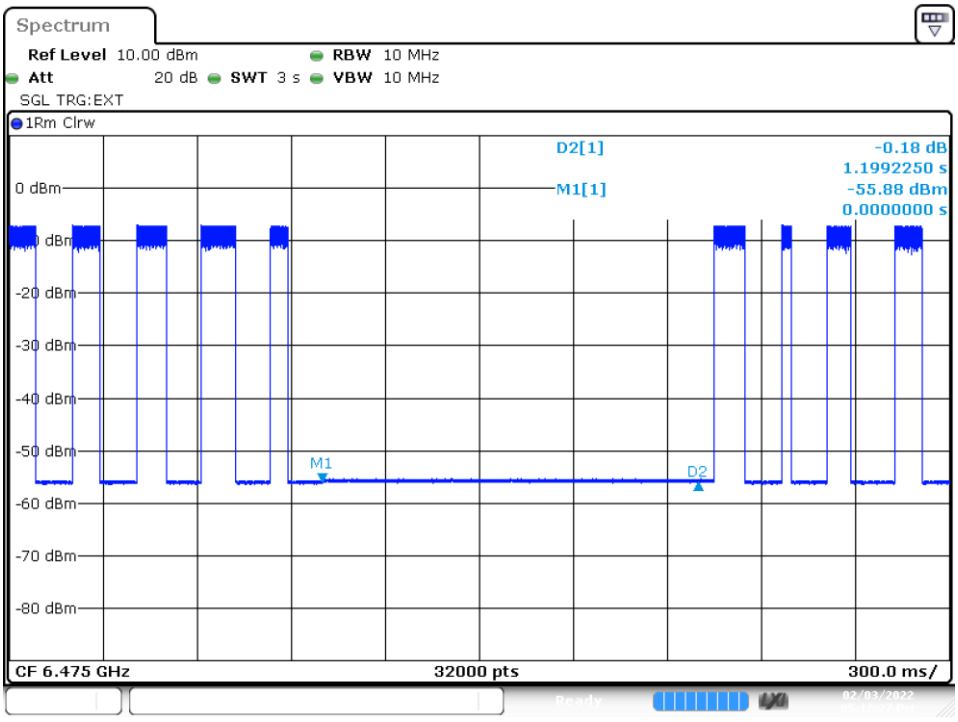
EUT transmission plot

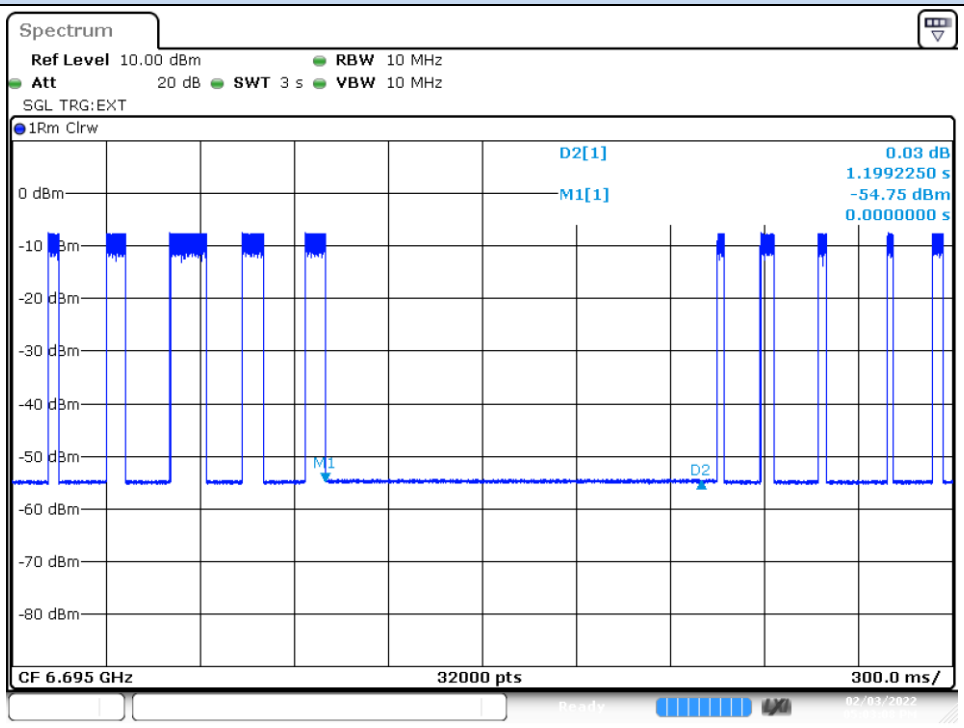
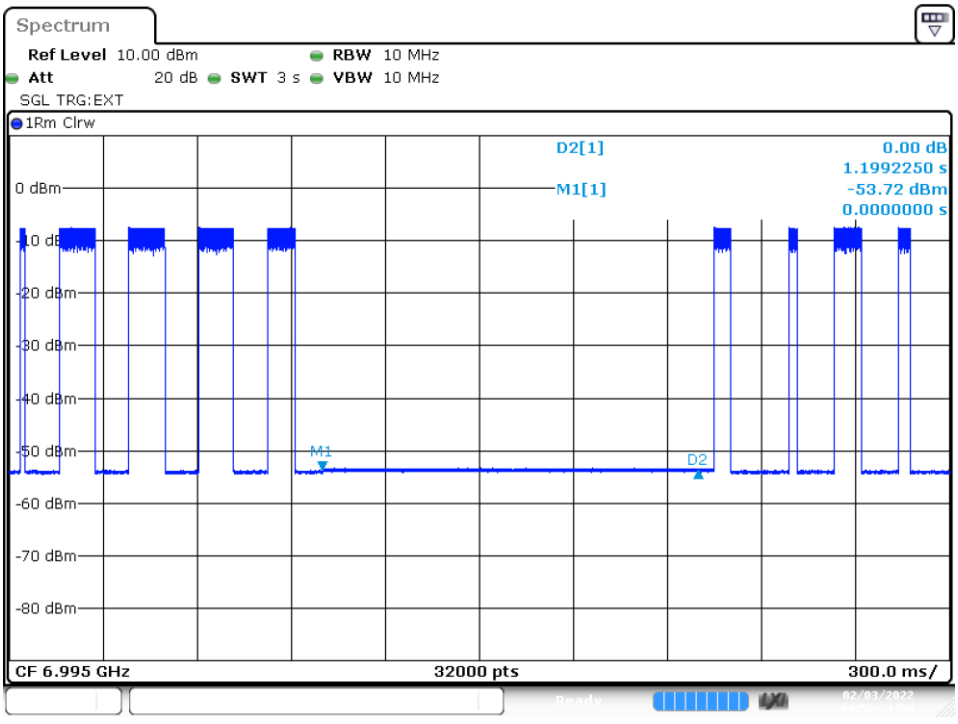


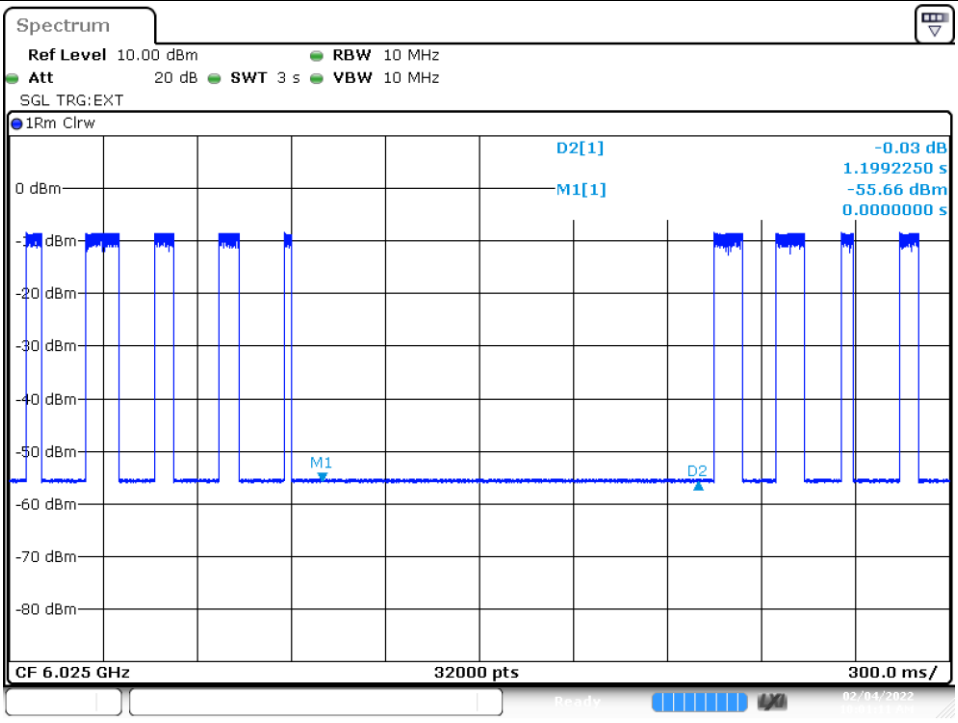
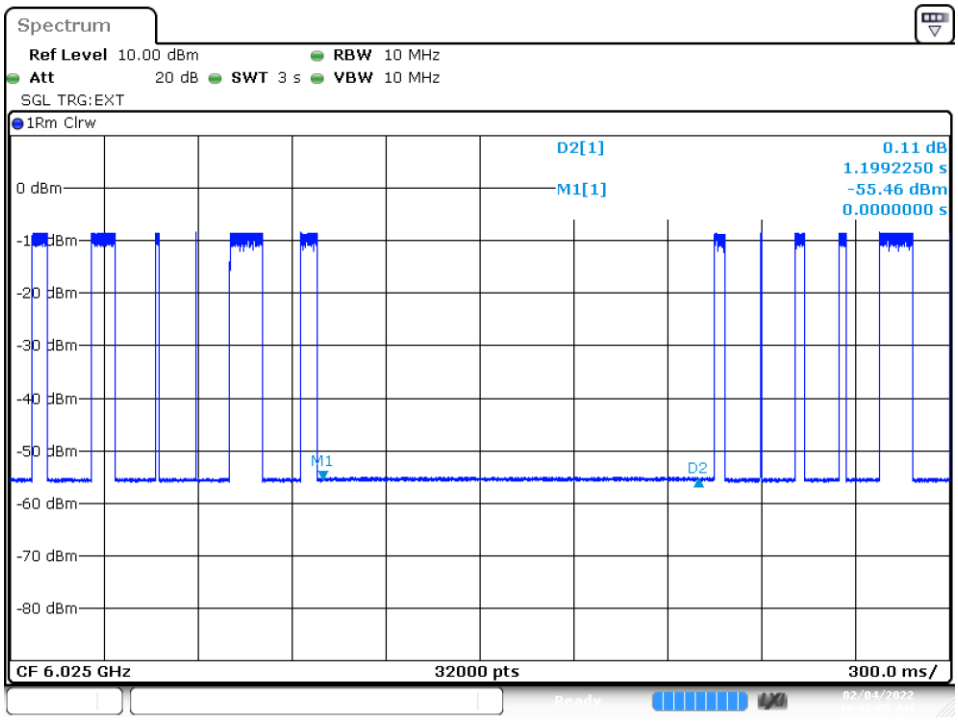
Date: 3.FEB.2022 11:44:35

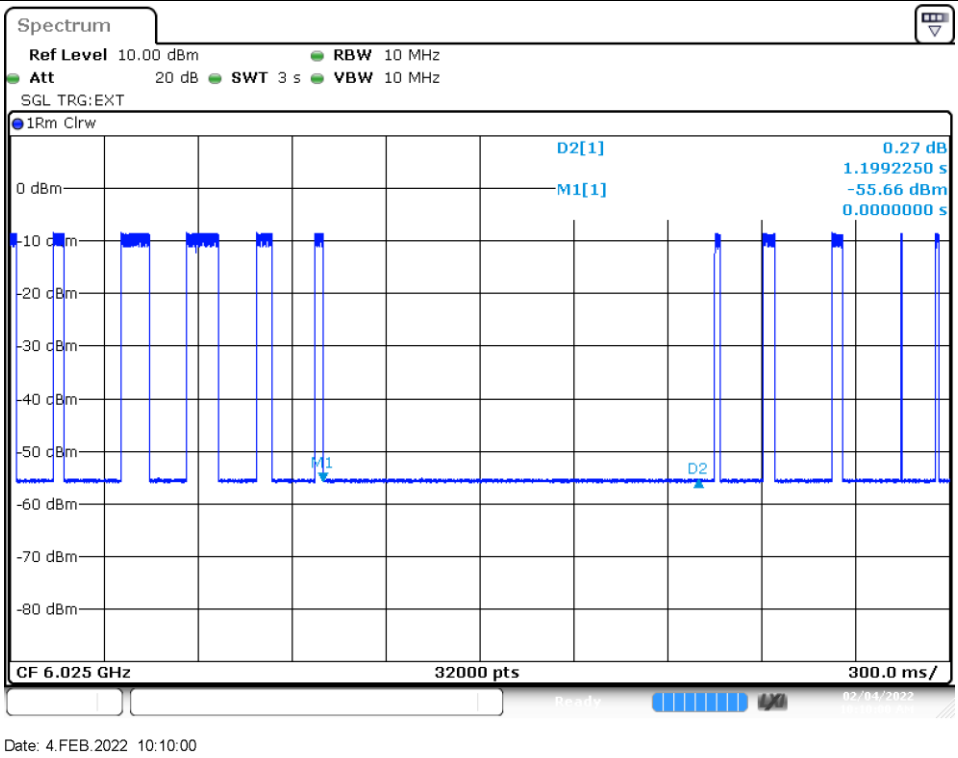
Example of AWGN signal used as incumbent signal

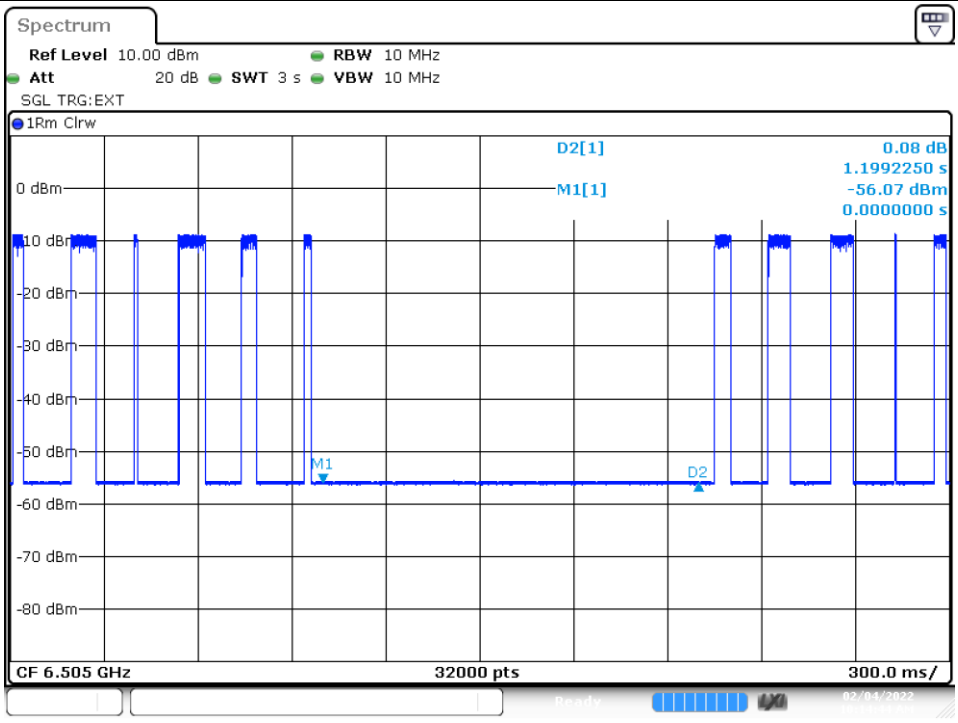
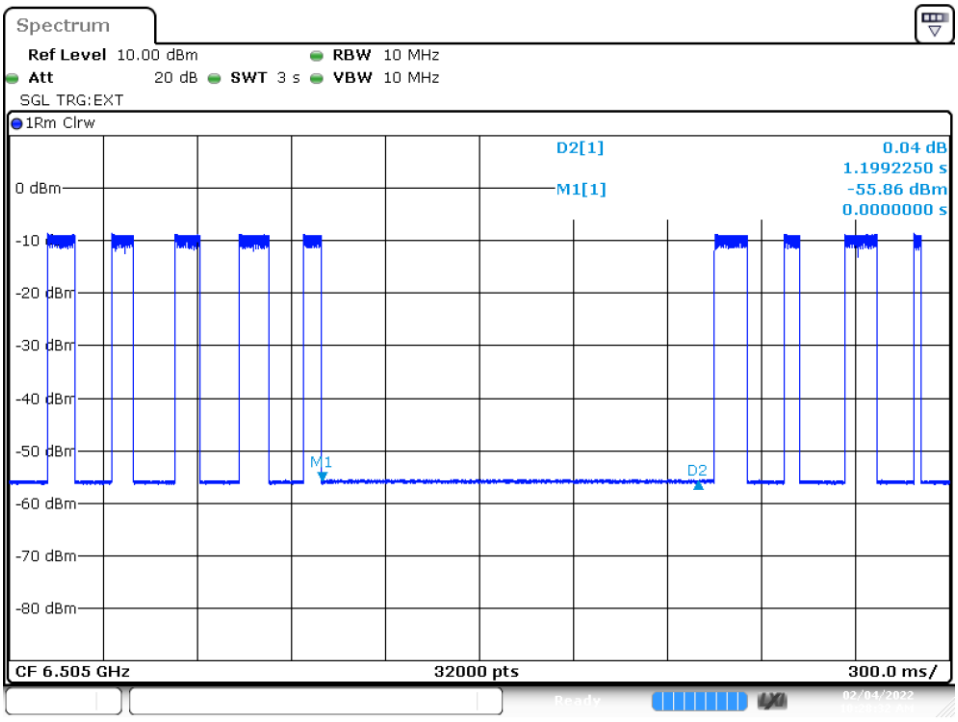


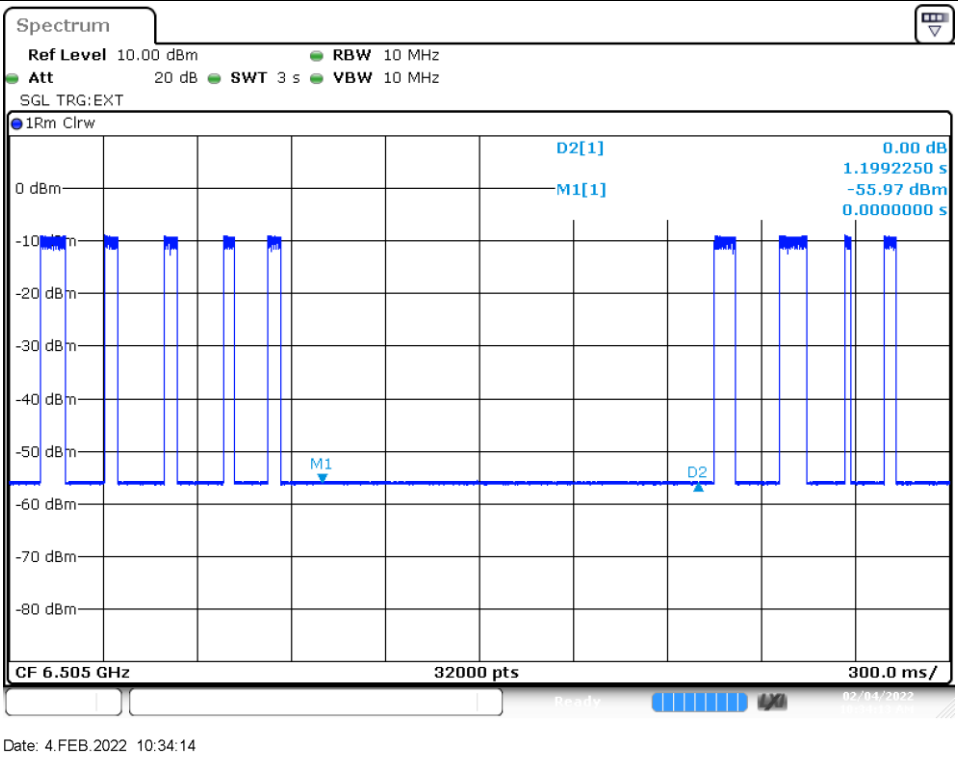
Channel 45 – Incumbent signal 6175 MHz

Note - M1: Injection of AWGN signal, D2: Removal of AWGN signal
Channel 105 - Incumbent signal 6475 MHz

Note - M1: Injection of AWGN signal, D2: Removal of AWGN signal

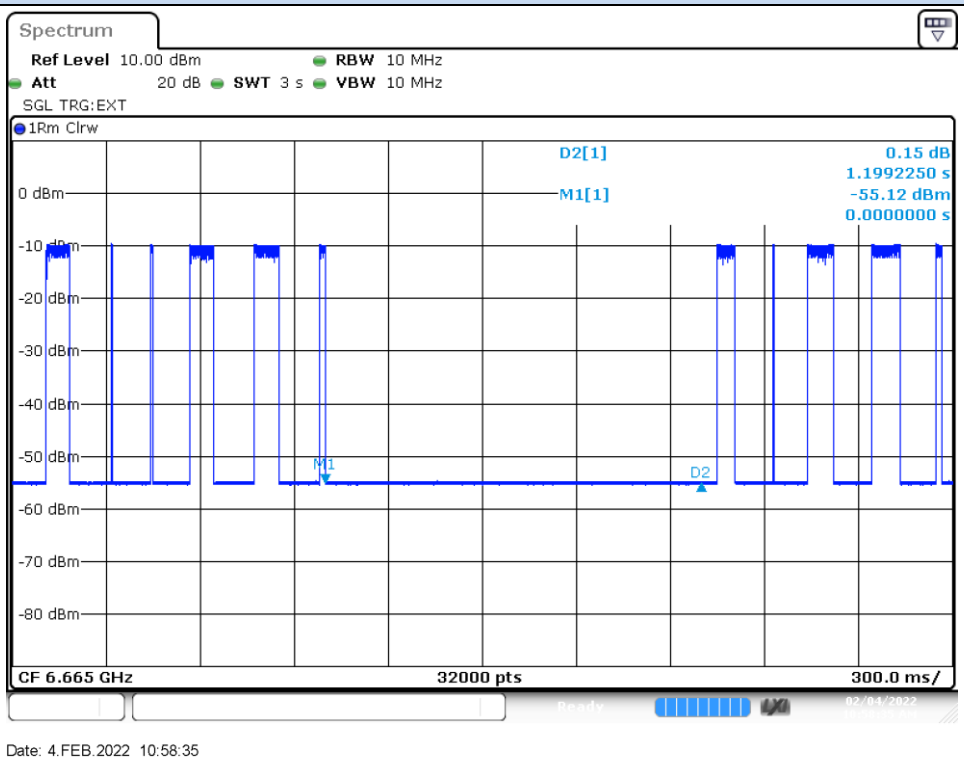
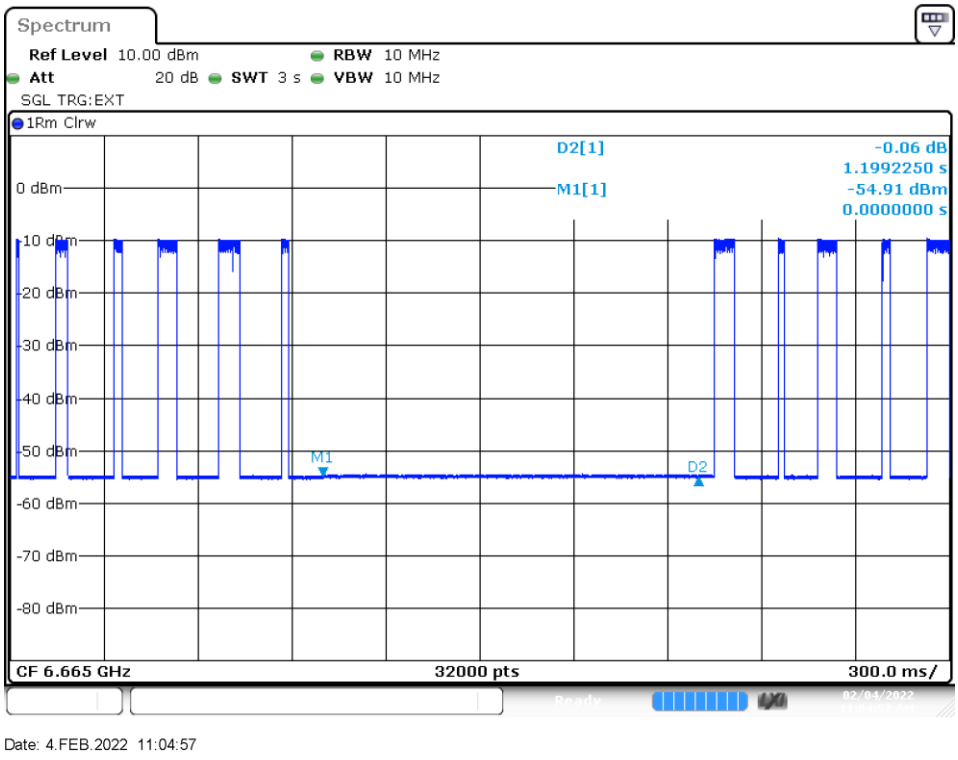
Channel 149 - Incumbent signal 6695 MHz

Note - M1: Injection of AWGN signal, D2: Removal of AWGN signal
Channel 209 - Incumbent signal 6995 MHz

Note - M1: Injection of AWGN signal, D2: Removal of AWGN signal

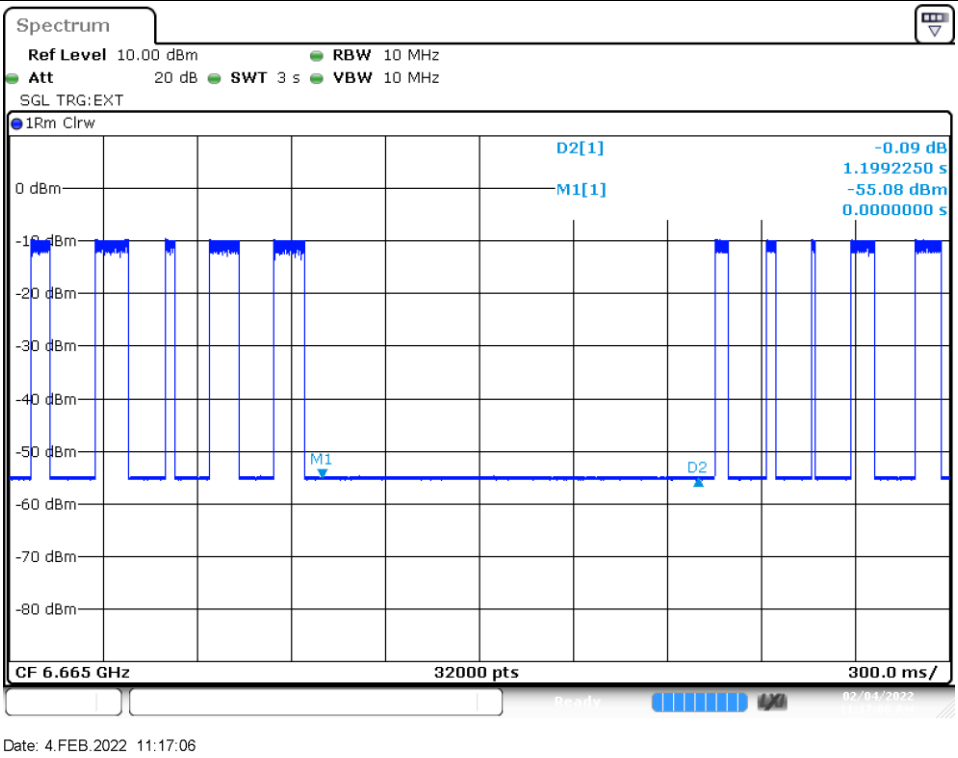
Channel 15 - Incumbent signal 5950 MHz

Note - M1: Injection of AWGN signal, D2: Removal of AWGN signal
Channel 15 - Incumbent signal 6025 MHz

Note - M1: Injection of AWGN signal, D2: Removal of AWGN signal

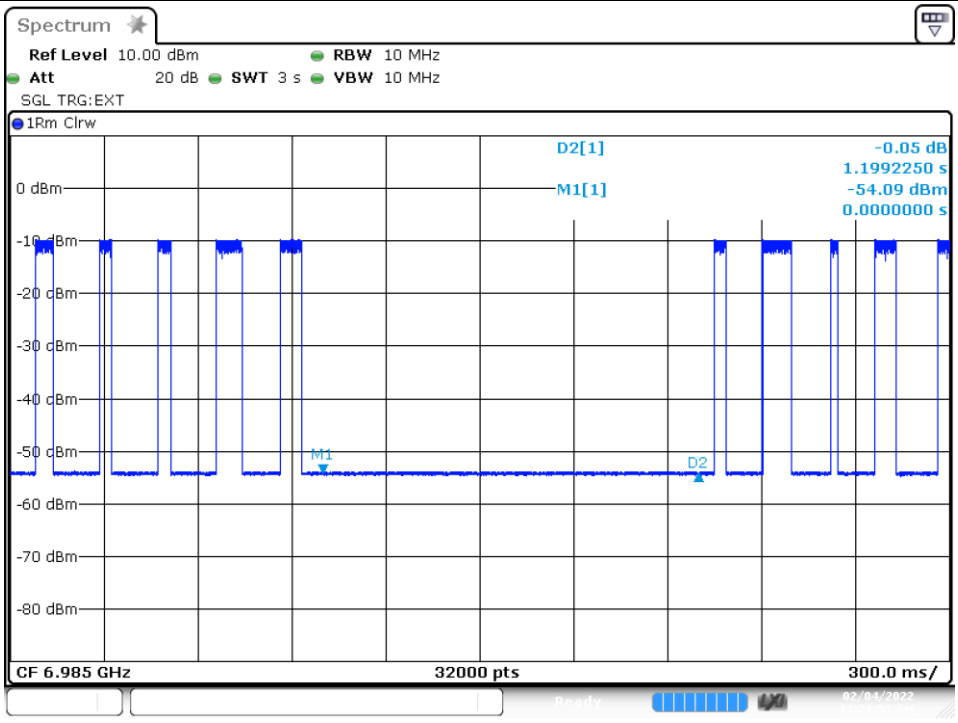
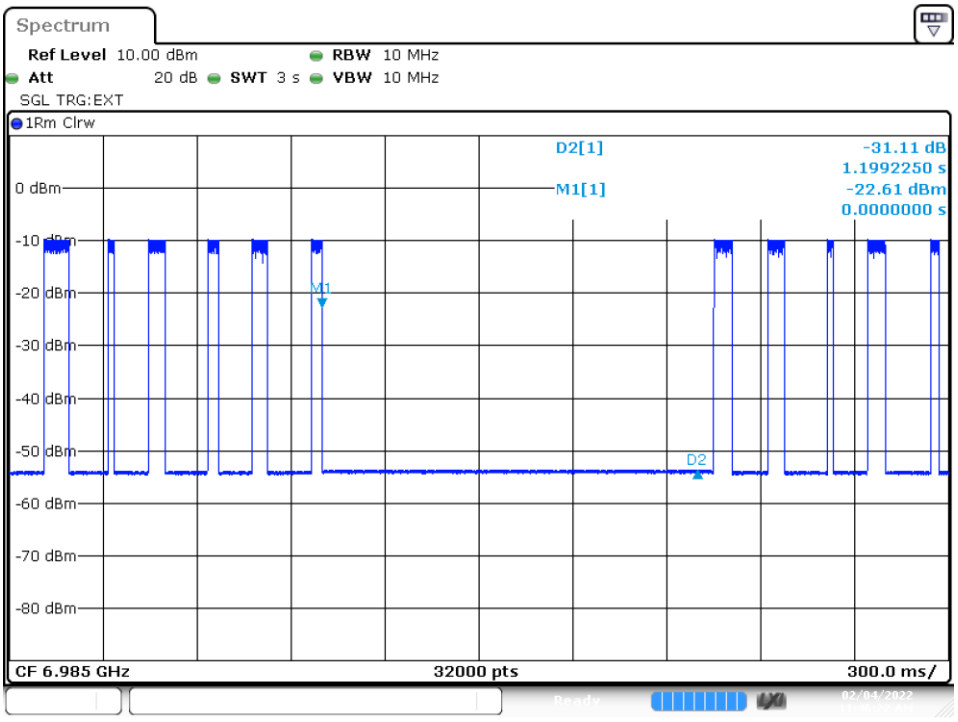
Channel 15 - Incumbent signal 6100 MHz

Note - M1: Injection of AWGN signal, D2: Removal of AWGN signal

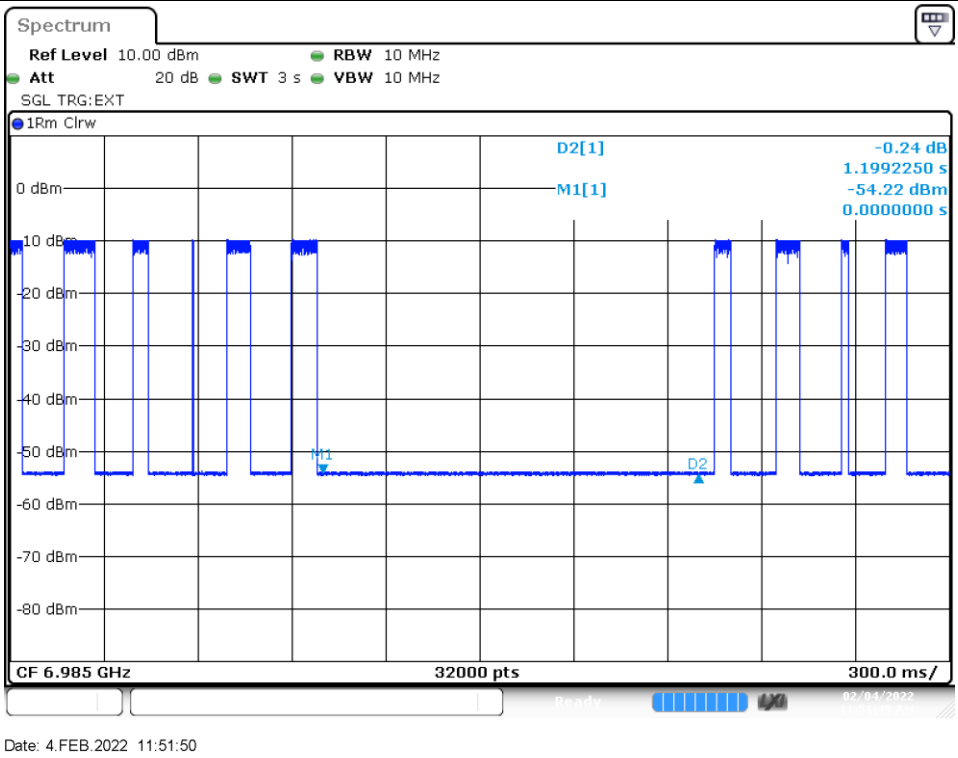
Channel 111 - Incumbent signal 6430 MHz

Note - M1: Injection of AWGN signal, D2: Removal of AWGN signal
Channel 111 - Incumbent signal 6505 MHz

Note - M1: Injection of AWGN signal, D2: Removal of AWGN signal

Channel 111 - Incumbent signal 6580 MHz

Note - M1: Injection of AWGN signal, D2: Removal of AWGN signal

Channel 143 - Incumbent signal 6590 MHz

Note - M1: Injection of AWGN signal, D2: Removal of AWGN signal
Channel 143 - Incumbent signal 6665 MHz

Note - M1: Injection of AWGN signal, D2: Removal of AWGN signal

Channel 143 - Incumbent signal 6740 MHz

Note - M1: Injection of AWGN signal, D2: Removal of AWGN signal

Channel 207 - Incumbent signal 6910 MHz

Note - M1: Injection of AWGN signal, D2: Removal of AWGN signal
Channel 207 - Incumbent signal 6985 MHz

Note - M1: Injection of AWGN signal, D2: Removal of AWGN signal

Channel 207 - Incumbent signal 7060 MHz

Note - M1: Injection of AWGN signal, D2: Removal of AWGN signal