UNIFIED COMPLIANCE LABORATORY

427 West 12800 South
Draper, UT 84020

Test Report

Certification

FCC ID	SWX-E7
ISED ID	6545A-E7
Equipment Under Test	E7
Test Report Serial Number	TR9084_06
Date of Tests	21, 23, 27 February; 11, 16 April; 5, 20 June 2024
Report Issue Date	25 June 2024

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

NVLAP TESTING ilac-MRA

NVLAP LAB CODE 600241-0

Certification of Engineering Report

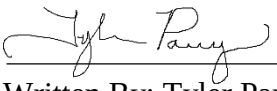
This report has been prepared by Unified Compliance Laboratory (UCL) to document compliance of the device described below with the requirement of Federal Communication Commissions (FCC) Part 15, Subpart E. This report may be reproduced in full. Partial reproduction of this report may only be made with the written consent of the laboratory. The results in this report apply only to the sample tested.

Applicant	Ubiquiti Inc.
Manufacturer	Ubiquiti Inc.
Brand Name	UBIQUITI
Model Number	E7
FCC ID	SWX-E7
ISED ID	6545A-E7

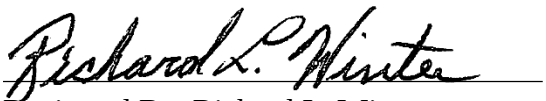
On this 25th day of June 2024, I individually and for Unified Compliance Laboratory certify that the statements made in this engineering report are true, complete, and correct to the best of my knowledge and are made in good faith.

Although NVLAP has accredited the Unified Compliance Laboratory testing facilities, this report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the U.S. federal government.

Unified Compliance Laboratory



Written By: Tyler Parry



Reviewed By: Richard L. Winter

Revision History		
Revision	**Description**	**Date**
01	Original Report Release	25 June 2024
02	Amend Standard to RSS-248 in Section 3.3.1 and Amend Section 5.4	19 September 2024
03	Amended KDB Reference in Sections 5.3, 5.4 and 5.6	27 September 2024
04	Added Detection Level Formula in Section 5.7	28 October 2024
05	Amended Section 2.2	29 October 2024
06	Amended Section 5.7	30 October 2024

Table of Contents

1 Client Information

1.1 Applicant

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

1.2 Manufacturer

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

2 Equipment Under Test (EUT)

2.1 Identification of EUT

Brand Name	UBIQUITI
Model Number	E7
Serial Number	1FD62F
Dimensions (cm)	25 x 25 x 4.35

2.2 Description of EUT

The E7 is a WiFi 7 access point with (1) 10GbE PoE port and (1) 1GbE PoE port. The E7 transmits in the 2.4 GHz, 5 GHz, and 6 GHz frequency bands using integral antennas and is powered by an 802.3bt PoE power adapter.

This device does not support channel puncturing.

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

The table below show the channels used within the different modulation bandwidths.

Band	Modulation Bandwidth	Frequency (MHz)	Maximum Power Setting
UNII-6	be (EHT20)	6435, 6455, 6475	TP11
		6515	TP12
	be (EHT 40)	6445, 6485	TP15
	be (EHT 80)	6465	TP18
	be (EHT 160)	6505	TP20

2.3 EUT and Support Equipment

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

Brand Name Model Number Serial Number	Description	Name of Interface Ports / Interface Cables
BN: UBIQUITI MN: E7 SN: 1FD62F	Access Point	PoE Input / Shielded Cat 5E cable

BN: UBIQUITI MN: GP-h480-065G SN: N/A	PoE Injector	PoE Output / Shielded Cat 5E to E7, and Ethernet / unshielded Cat 5E to PC
BN: DELL MN: XPS SN: N/A	Laptop PC	Ethernet / un-shielded Cat 5E

Notes: (1) EUT
(2) Interface port connected to EUT (See Section 2.4)

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

2.4 Interface Ports on EUT

Name of Ports	No. of Ports Fitted to EUT	Cable Description/Length
PoE Input	1	7m Shielded Cat 5E
PoE Output (PoE Injector)	1	7m Shielded Cat 5E to E7 PoE Input
LAN (PoE Injector)	1	unshielded Cat 5E to Laptop PC
AC (PoE Injector)	1	3 Conductor power cord to AC mains/80cm

2.5 Operating Environment

Power Supply	120 VAC
AC Mains Frequency	60 Hz
Temperature	20.2 – 25.7 °C
Humidity	17.6 – 33.2 %
Barometric Pressure	1012 mBar

2.6 Operating Modes

The E7 was tested using test software in order to enable to constant transmission. The measurements within this report are corrected to reference a 100% duty cycle. All emission modes of 802.11be were investigated. All measurements are reported with the worst-case mode (802.11be) unless otherwise stated.

2.7 EUT Exercise Software

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

2.8 Block Diagram of Test Configuration

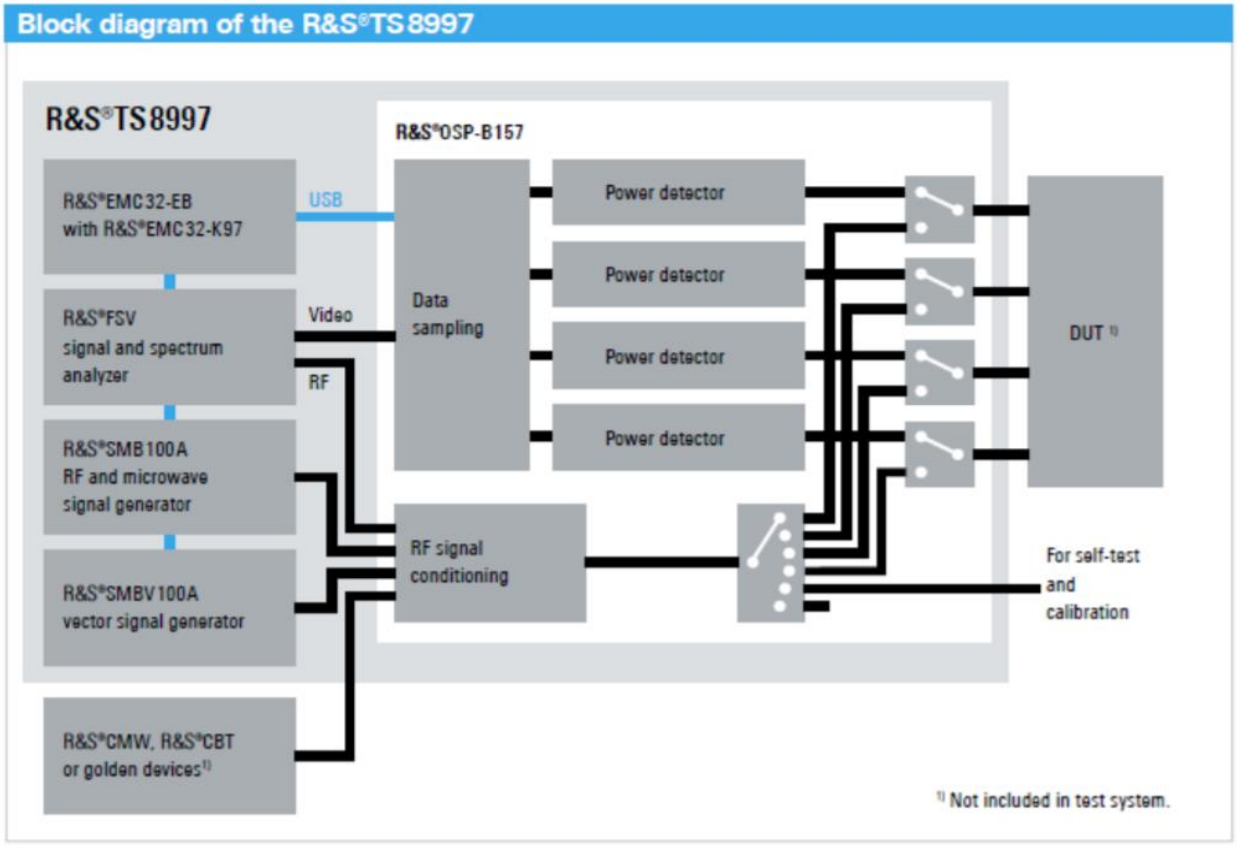


Diagram 1: Test Configuration Block Diagram

2.9 Modification Incorporated/Special Accessories on EUT

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

2.10 Deviation, Opinions Additional Information or Interpretations from Test Standard

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

3 Test Specification, Method and Procedures

3.1 Test Specification

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

3.2 Methods & Procedures

3.2.1 47 CFR FCC Part 15 Section 15.407

See test standard for details.

3.3 FCC Part 15, Subpart E

3.3.1 Summary of Tests

FCC Section	ISED Section	Environmental Phenomena	Frequency Range (MHZ)	Result
15.203	N/A	Antenna requirements	Structural Requirement	Compliant
15.207	RSS-Gen	Conducted Disturbance at Mains Port	0.15 to 30	Compliant
15.407(c)	RSS-248 §4.4	Bandwidth Requirement	6435 to 6515	Compliant
15.407(e)	RSS-248 §4.5	Peak Output Power[1]	6435 to 6515	Compliant
15.407(f)	RSS-248 §4.6	Antenna Conducted Spurious Emissions[1]	0.009 to 40000	N/A
15.407(g)	RSS-248 §4.6	Radiated Spurious Emissions	0.009 to 40000	Compliant
15.407(h)	RSS-248 §4.5	Peak Power Spectral Density[1]	6435 to 6515	Compliant
15.407(d)	RSS-248 §4.7	Contention Based Protocol	6435 to 6515	Compliant
The testing was performed according to the procedures in ANSI C63.10-2013, KDB 789033, KDB 987594 and 47 CFR Part 15. Where applicable, KDB 662911 was followed to sum required measurements. Note [1]: Various RU modes were considered for RF Power, PSD, and Spurious Emissions, and the "single client" RU mode is the worst case - the results herein are "single client" RU mode.				

3.4 Results

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

3.5 Test Location

Testing was performed at the Unified Compliance Laboratory located at 427 West 12800 South, Draper, UT 84020. Unified Compliance Laboratory is accredited by National Voluntary Laboratory Accreditation Program (NVLAP); NVLAP Code 600241-0 which is effective until 30 June 2025. This site has also been registered with Innovations, Science and Economic Development (ISED) department as was accepted under Appendix B, Phase 1 procedures of the APEC Tel MRA for Canadian recognition. ISED No.: 25346, effective until 30 June 2025.

Unified Compliance Laboratory has been assigned Designation Number US5037 by the FCC and Conformity Assessment Number US0223 by ISED.

4 Test Equipment

4.1 Conducted Emissions at Mains Ports

Type of Equipment	Manufacturer	Model Number	Asset Number	Date of Last Calibration	Due Date of Calibration
EMI Receiver	AFJ	FFT3010	UCL-2500	7/13/2023	7/13/2024
LISN	AFJ	LS16C/10	UCL-2512	5/26/2023	5/26/2024
ISN	Teseq	ISN T800	UCL-2974	6/27/2023	6/27/2024
LISN	AFJ	LS16C\10	UCL-6749	1/29/2024	1/29/2025
AC Power Source	Laplace Instruments	AC1000A	UCL-2857	N/A	N/A
Test Software	UCL	Revision 1	UCL-3107	N/A	N/A

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

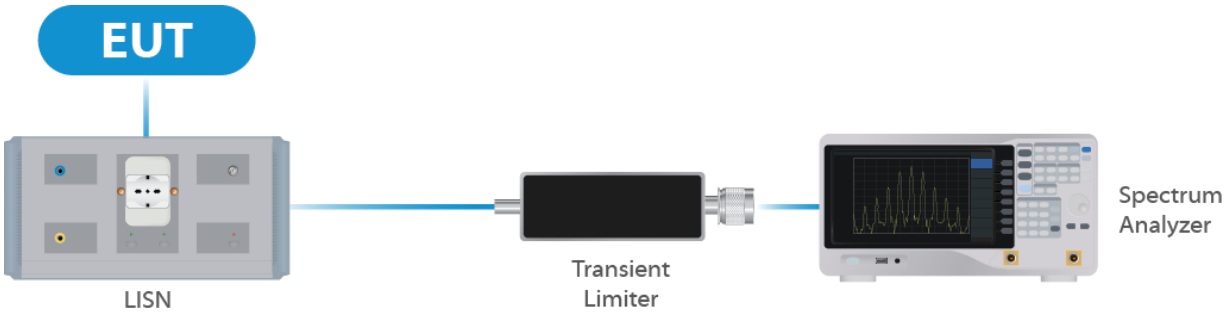


Figure 1: Conducted Emissions Test

4.2 Direct Connect at the Antenna Port Tests

Type of Equipment	Manufacturer	Model Number	Asset Number	Date of Last Calibration	Due Date of Calibration
Spectrum Analyzer	R&S	FSV40	UCL-2861	11/27/2023	11/27/2024
Signal Generator	R&S	SMB100A	UCL-2864	N/A	N/A
Vector Signal Generator	R&S	SMBV100A	UCL-2873	N/A	N/A
Switch Extension	R&S	OSP-B157WX	UCL-2867	4/12/2024	4/19/2025
Switch Extension	R&S	OSP-150W	UCL-2870	4/12/2024	4/19/2025

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

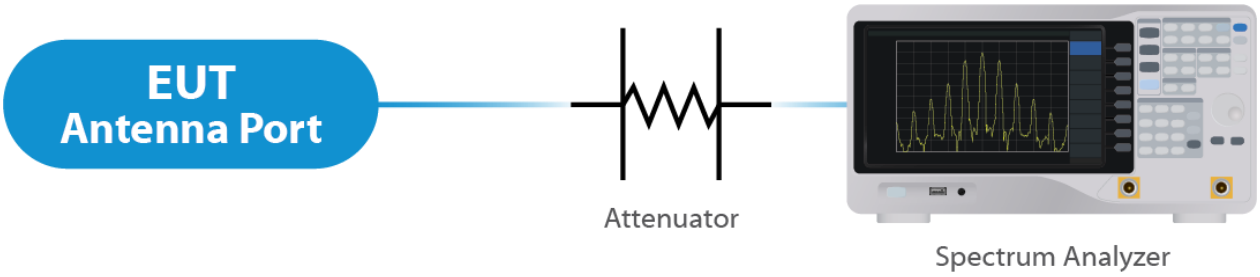


Figure 2: Direct Connect at the Antenna Port Test

4.3 Radiated Emissions

Type of Equipment	Manufacturer	Model Number	Asset Number	Date of Last Calibration	Due Date of Calibration
EMI Receiver	Keysight	N9038A	UCL-2778	1/25/2024	1/29/2025
Pre-Amplifier 9 kHz – 1 GHz	Sonoma Instruments	310N	UCL-2889	1/19/2024	1/19/2026
Broadband Antenna	Scwarzbeck	VULB 9163	UCL-3062	9/13/2022	9/13/2024
Broadband Antenna	Scwarzbeck	VULB 9163	UCL-3071	6/08/2022	6/22/2024
Double Ridge Horn Antenna	Scwarzbeck	BBHA 9120D	UCL-3065	9/22/2022	9/22/2024
Log Periodic	Scwarzbeck	STLP 9129	UCL-3068	1/27/2023	1/27/2025
15 - 40 GHz Horn Antenna	Scwarzbeck	BBHA 9170	UCL-2487	3/10/2023	3/10/2025
1 – 18 GHz Amplifier	Com-Power	PAM 118A	UCL-3833	1/19/2024	1/19/2026
Test Software	UCL	Revision 1	UCL-3108	N/A	N/A

Table 3: List of equipment used for Radiated Emissions

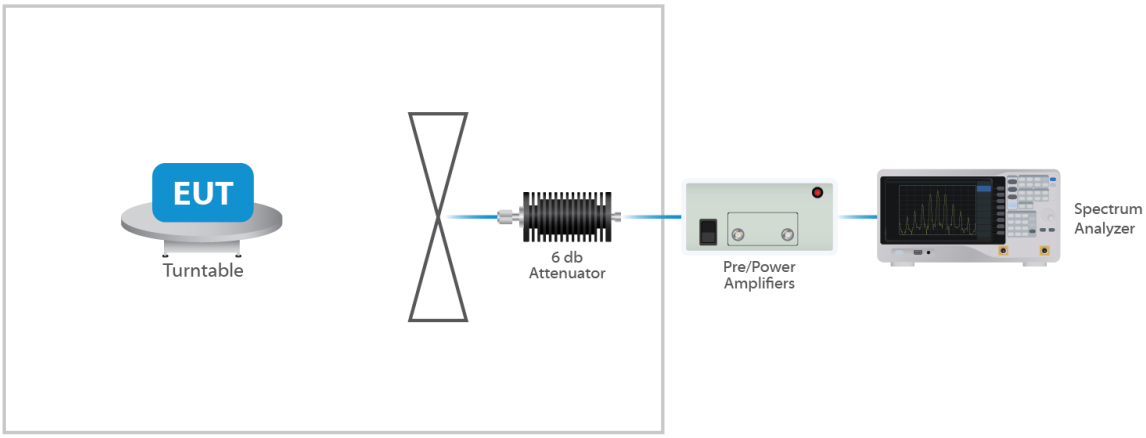


Figure 3: Radiated Emissions Test

4.4 Contention Base Protocol Tests

Type of Equipment	Manufacturer	Model Number	Asset Number	Date of Last Calibration	Due Date of Calibration
Spectrum Analyzer	Keysight	N9010B EXA	UCL-7069	5/3/2024	5/3/2025
Signal Generator	Keysight	MXG-B	UCL-6291	6/29/2023	6/29/2024
MIMO Test Set	Keysight	X8750A	UCL-7373	9/19/2023	9/19/2024

Table 4: List of equipment used for Direct Connect at the Antenna Port

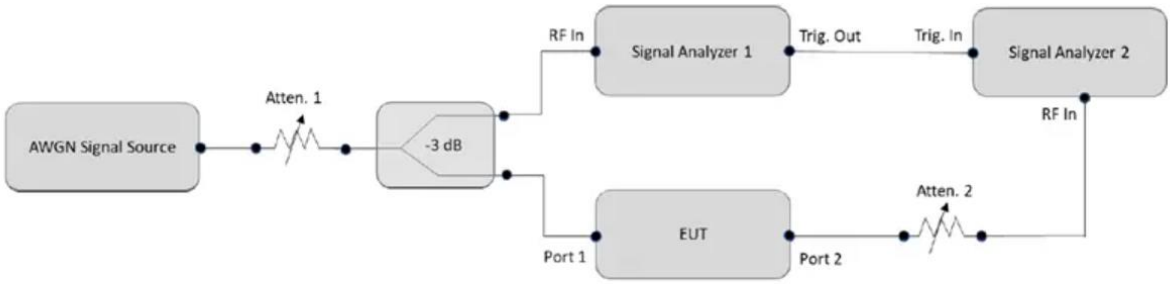


Figure 1. CBP conducted test setup diagram. Source: KDB 987594 D02 V01r01

Figure 4: Contention Base Protocol Test

4.5 Equipment Calibration

All applicable equipment is calibrated using either an independent calibration laboratory or Unified Compliance Laboratory personnel at intervals defined in ANSI C63.4:2014 following outlined calibration procedures. All measurement instrumentation is traceable to the National Institute of Standards and

Technology (NIST). Supporting documentation relative to traceability is on file and is available for examination upon request.

4.6 Measurement Uncertainty

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

5 Test Results

5.1 §15.203 Antenna Requirements

The EUT uses an internal antenna. Per the manufacturer, the Maximum gain of the antenna per chain is 6 dBi. This is an 802.11 device and utilizes CDD as described in KDB 662911 D01. The antenna is not user replaceable. For CDD transmissions, directional gain is calculated as follows.

Array Gain = 10 log(NANT/NSS) dB
NANT = number of transmit antennas and
NSS = number of spatial streams. NSS = 1 considered worst case.

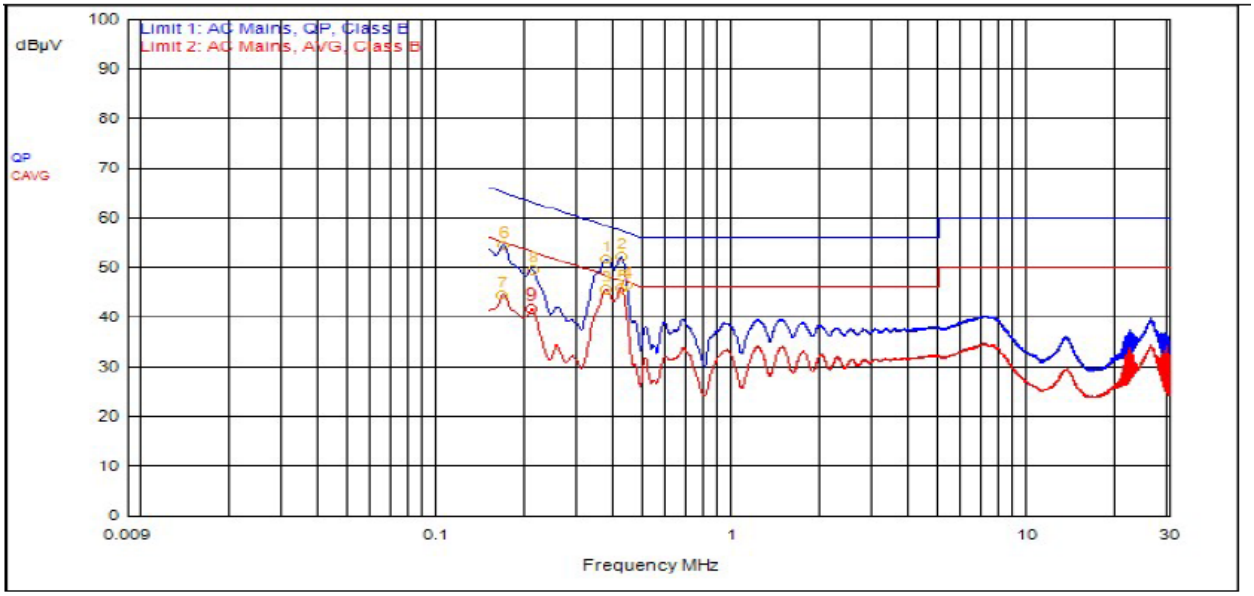
For power measurements on IEEE 802.11 devices, Array Gain = 0 dB for NANT ≤ 4;
For PSD measurements when Nss=1: Directional Gain = 10 log(NANT/NSS) dB + Antenna Gain (dBi), or (6.02 dB + 6 dBi) = 12.02 dBi.

Results

The EUT complied with the specification

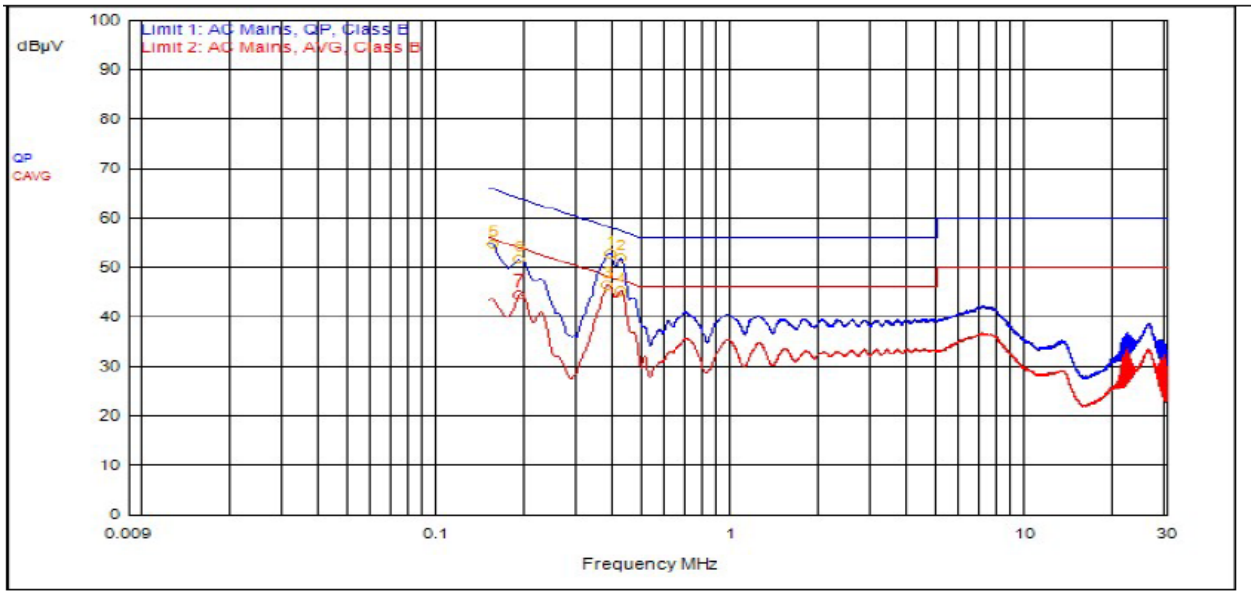
5.2 Conducted Emissions at Mains Ports Data

5.2.1 Line



ID	Frequency	Probe	Cable	Atten.	Detector	Meter Read	Meas Level	Limit 1	Limit 1 Dist.	Limit 2	Limit 2 Dist.	P/F
MU	MHz	dB	dB	dB	Type	dBµV	dBµV	dBµV	dB	dBµV	dB	P/F
2	417,000kHz	12.39	0.00		QPeak	39.76	52.15	57.51	-5.36			
1	369,000kHz	12.37	0.00		QPeak	39.39	51.76	58.52	-6.77			
6	168,000kHz	12.35	0.00		QPeak	42.03	54.38	65.06	-10.68			
4	438,000kHz	12.40	0.00		QPeak	33.97	46.37	57.10	-10.73			
8	210,000kHz	12.37	0.00		QPeak	37.09	49.46	63.21	-13.75			
3	369,000kHz	12.37	0.00		C_AVG	33.20	45.57			48.52	-2.96	
5	417,000kHz	12.39	0.00		C_AVG	33.55	45.94			47.51	-1.56	
7	165,000kHz	12.36	0.00		C_AVG	31.95	44.31			55.21	-10.90	
9	207,000kHz	12.37	0.00		C_AVG	29.23	41.60			53.32	-11.72	

5.2.2 Neutral



ID	Frequency	Probe	Cable	Atten.	Detector	Meter Read	Meas Level	Limit 1	Limit 1 Dist.	Limit 2	Limit 2 Dist.	P/F
MU	MHz	dB	dB	dB	Type	dBµV	dBµV	dBµV	dB	dBµV	dB	P/F
1	384,000kHz	12.39	0.00		QPeak	40.41	52.80	58.19	-5.40			
2	417,000kHz	12.40	0.00		QPeak	39.46	51.86	57.51	-5.65			
5	153,000kHz	12.37	0.00		QPeak	42.36	54.73	65.84	-11.11			
6	189,000kHz	12.41	0.00		QPeak	39.28	51.69	64.08	-12.39			
3	375,000kHz	12.39	0.00		C_AVG	33.92	46.31			48.39	-2.08	
4	417,000kHz	12.40	0.00		C_AVG	32.90	45.30			47.51	-2.21	
7	189,000kHz	12.41	0.00		C_AVG	32.07	44.48			54.08	-9.60	

Result

The EUT complied with the specification limit.

5.3 §15.403(i) 26 dB Emissions Bandwidth

All chains were measured under the guidance of KDB 789033 Section II.C. and KDB 662911 D01. Please see associated annex for details on instrument settings.

Nominal BW (MHz)	Frequency (MHz)	99% Bandwidth (MHz)	26 dB Bandwidth (MHz)
EHT 20	6435	19.5	22.1
EHT 20	6475	19.8	22.3
EHT 20	6515	19.5	22.5
EHT 40	6445	38.3	44.9
EHT 40	6485	38.3	41.6
EHT 80	6465	77.5	88.0
EHT 160	6505	158.0	170.0

Result

All chains were tested and the highest bandwidth per chain is reported above.
The 26 dB bandwidths are reported for information purposes. Please see Annex for all bandwidth measurements.

5.4 §15.407(a)(3) Maximum Average Output Power

All chains were measured and summed under the guidance of KDB 789033 Section II. E.2. and KDB 662911 D01. Please see associated annex for details on instrument settings.

The maximum average RF conducted output power measured for this device was 23.30 dBm or 213.80 mW. The limit is 30 dBm EIRP. The antenna has a gain of 6 dBi.

Modulation (BW)	Frequency (MHz)	Data Rate	TP Setting	Conducted Output Power	EIRP
EHT 20	6435	Mcs0_Nss4	11	14.68	20.68
EHT 20	6475	Mcs0_Nss4	11	14.58	20.58
EHT 20	6515	Mcs0_Nss4	12	15.39	21.39
EHT 40	6445	Mcs0_Nss4	15	18.42	24.42
EHT 40	6485	Mcs0_Nss4	15	18.45	24.45
EHT 80	6465	Mcs0_Nss4	18	21.39	27.39
EHT 160	6505	Mcs0_Nss4	20	23.30	29.30

Again, for the Nss = 1 case, the PSD Directional Gain = 10 log(NANT/NSS) dB + Antenna Gain (dBi) or (6.02 dB + 6 dBi) = 12.02 dBi. Thus, for the Nss =1 case, the EIRP PSD limit is -1.02 (or a PSD of -7.02 for this device, which has a 6 dBi antenna gain). Reducing the power to meet this Nss=1 PSD limit results in the following output power measurements:

Modulation (BW)	Frequency (MHz)	Data Rate	TP Setting	Conducted Output Power	EIRP
EHT 20	6435	Mcs0_Nss1	3	4.25	10.25
EHT 20	6475	Mcs0_Nss1	3	4.18	10.18
EHT 20	6515	Mcs0_Nss1	3	4.45	10.45
EHT 40	6445	Mcs0_Nss1	6	7.63	13.63
EHT 40	6485	Mcs0_Nss1	6	7.40	13.40
EHT 80	6465	Mcs0_Nss1	9	10.55	16.55
EHT 160	6505	Mcs0_Nss1	11	12.49	18.49

Result

In the configuration tested, the maximum average RF outpower was less than 1 watt EIRP; therefore, the EUT compiled with the requirements of the specification (see spectrum analyzer plots in attached Annex).

***Gated EIRP shown in the Annex is the conducted measurement**

5.5 §15.407(b)(7) Spurious Emissions

5.5.1 Conducted Spurious Emissions

The frequency range from the lowest frequency generated or used in the device to the tenth harmonic of the highest fundamental frequency was investigated to measure any antenna-conducted emissions. The graphs show the measurement data from spurious emissions noted across the frequency range when transmitting at the lowest frequency, middle frequency and upper frequency. Shown below are plots with the EUT turned to the upper and lower channels with the antenna gain of 6 dBi accounted for. These demonstrate compliance with the provisions of this section at the band edges.

The emission must be remain below -27 dBm EIRP.

Result

Conducted spurious emissions were attenuated below the limit; therefore, the EUT complies with the specification.

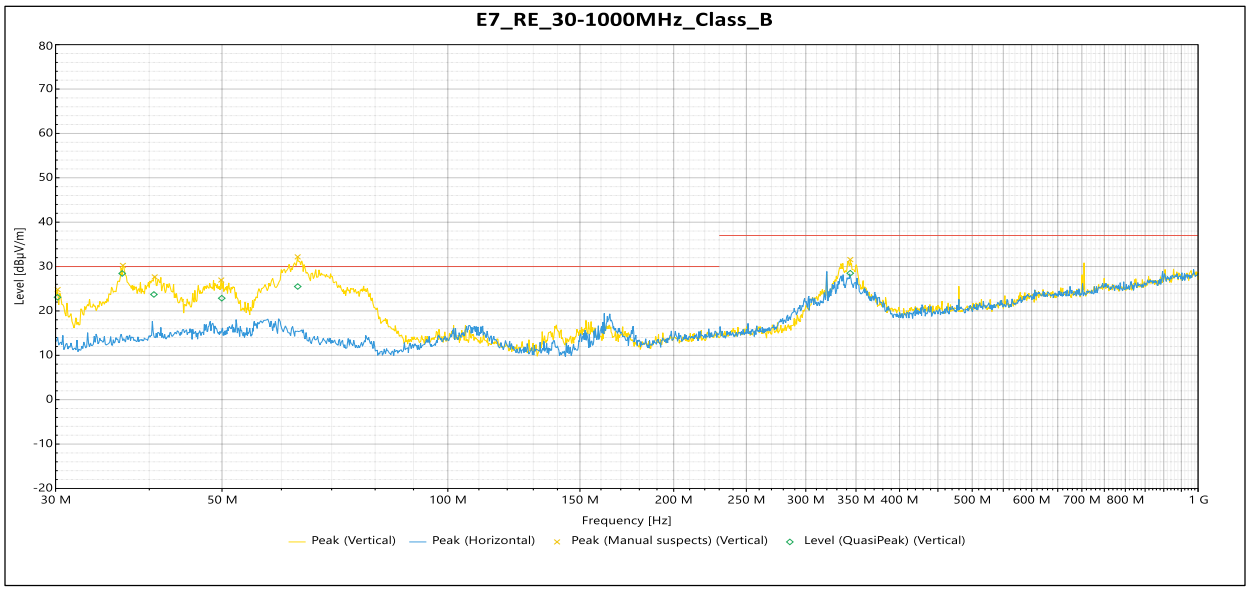
5.5.2 Radiated Spurious Emissions in the Restricted Bands of § 15.205

The EUT uses various power settings based on the channel in use. In order to reduce test time, the radiated spurious emissions at the lowest, middle, and highest channel were measured at the maximum power of TP31.

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

Result

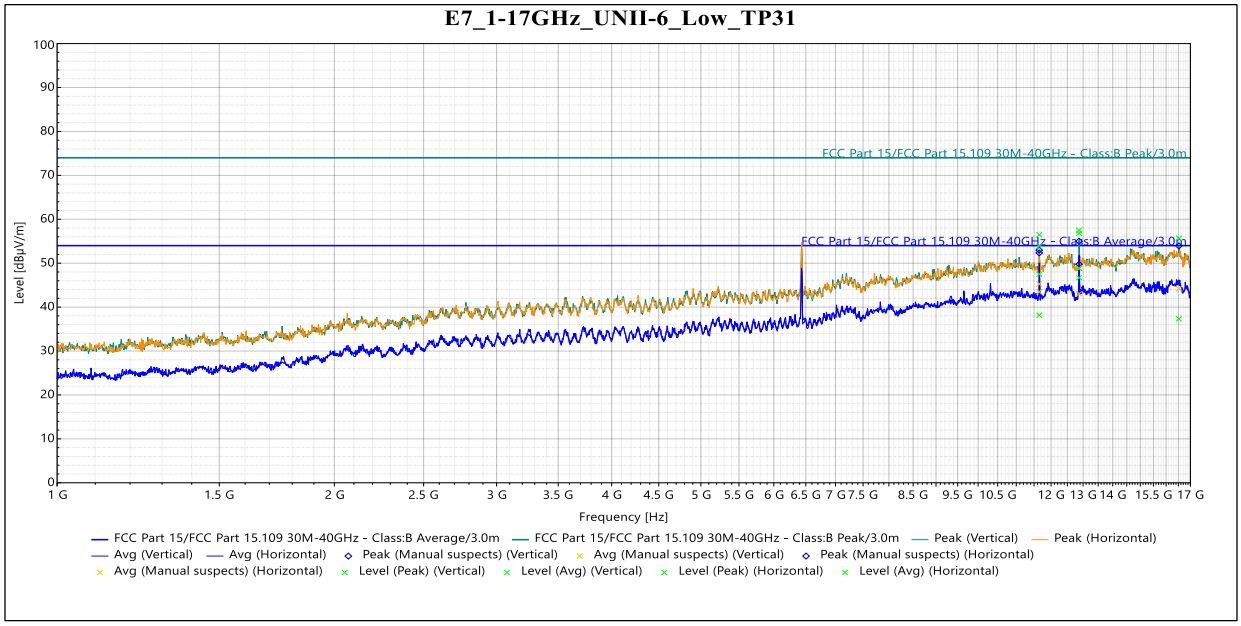
All emissions in the restricted bands of § 15.205 met the limits specified in § 15.209; therefore, the EUT complies with the specification. See Annex for Conducted Band edge plots.



QuasiPeak

Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin	Azimuth (°)	Height	Pol.	Correction (dB)
30.18 MHz	23.082	30	-6.918	188	1.048	Vertical	-16.017
36.804 MHz	28.443	30	-1.557	92	1.043	Vertical	-14.791
40.572 MHz	23.712	30	-6.288	122	2.344	Vertical	-13.478
49.964 MHz	22.859	30	-7.141	322	2.392	Vertical	-12.202
63.085 MHz	25.502	30	-4.498	341	3.518	Vertical	-14.826
343.85 MHz	28.495	37	-8.505	65	4.006	Vertical	-10.869
NOTE: No significant emissions were observed in the horizontal orientation of the antenna							

Table 5: Radiated Emissions 30 – 1000 MHz



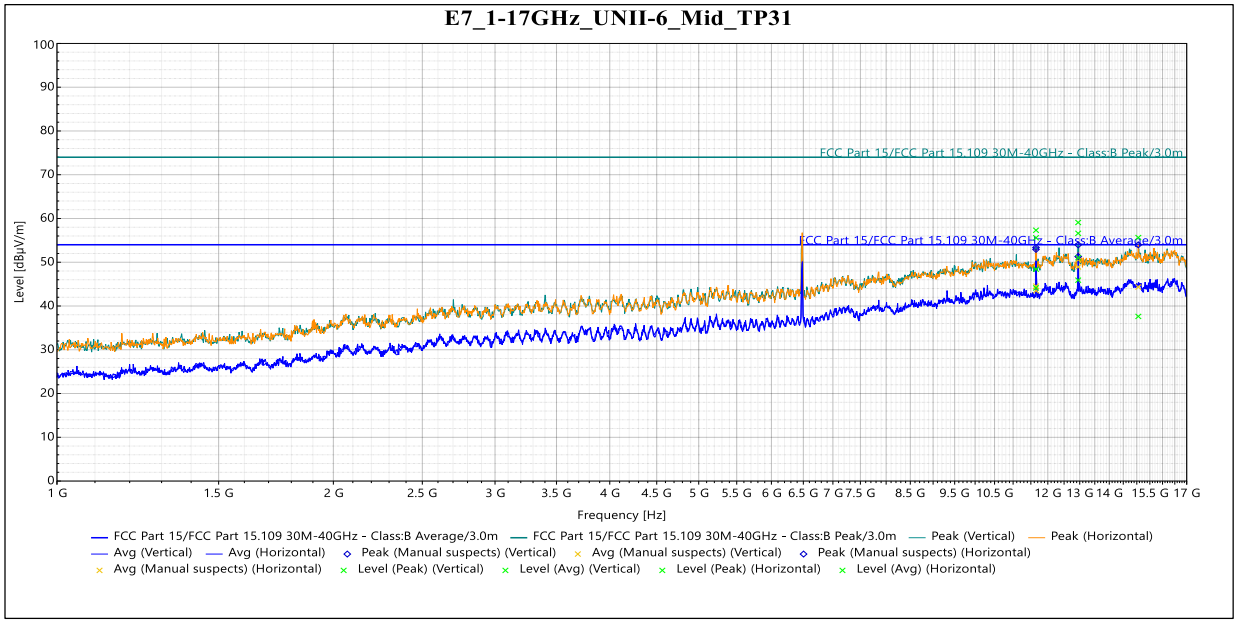
Peak

Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
11.65 GHz	56.475	74	-17.525	15	1.811	Vertical	14.5
12.87 GHz	57.475	74	-16.525	23	1.627	Vertical	15.685
16.519 GHz	55.675	74	-18.325	140	1.99	Vertical	18.315
11.65 GHz	53.855	74	-20.145	329	4	Horizontal	14.5
12.87 GHz	56.779	74	-17.221	345	2.057	Horizontal	15.685

Avg

Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
11.65 GHz	47.476	54	-6.524	15	1.811	Vertical	14.5
12.87 GHz	48.866	54	-5.134	23	1.627	Vertical	15.685
16.519 GHz	37.327	54	-16.673	140	1.99	Vertical	18.315
11.65 GHz	38.155	54	-15.845	329	4	Horizontal	14.5
12.87 GHz	46.701	54	-7.299	345	2.057	Horizontal	15.685

Table 6: Radiated Emissions 1 – 17 GHz Lowest Frequency



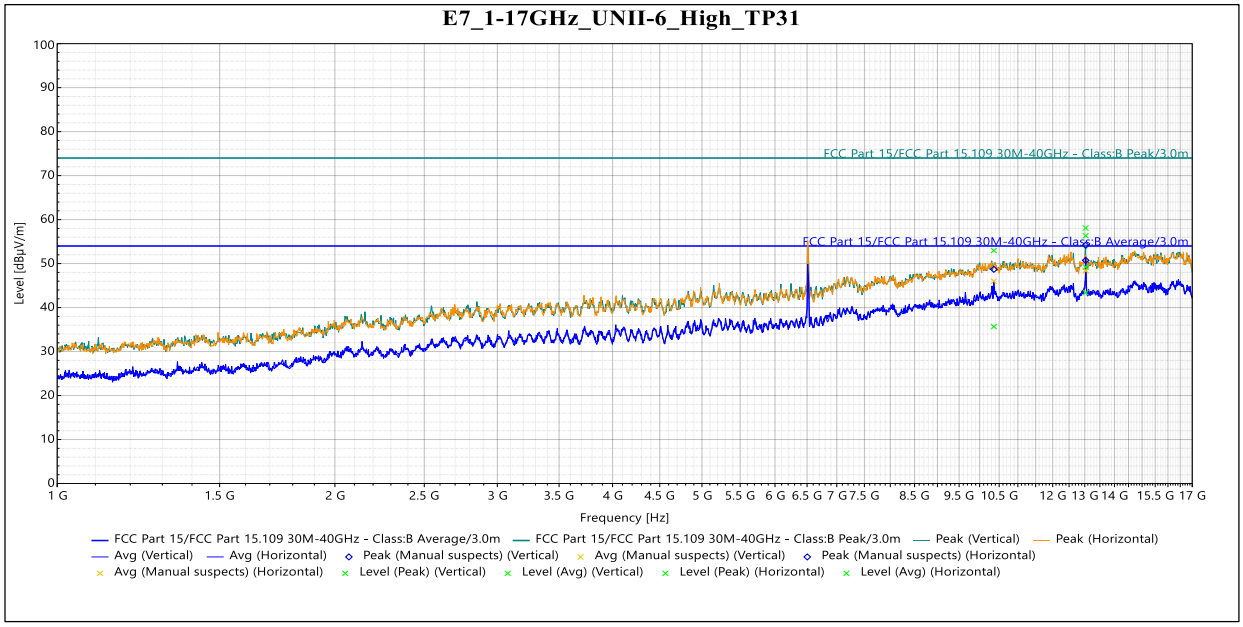
Peak

Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
11.65 GHz	57.309	74	-16.691	17	1.631	Vertical	14.5
12.95 GHz	59.084	74	-14.916	19	1.808	Vertical	16.405
11.65 GHz	55.594	74	-18.406	1	1.989	Horizontal	14.5
12.95 GHz	56.614	74	-17.386	353	1.631	Horizontal	16.405
15.058 GHz	55.644	74	-18.356	115	3.071	Horizontal	16.377

Avg

Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
11.65 GHz	48.424	54	-5.576	17	1.631	Vertical	14.5
12.95 GHz	51.036	54	-2.964	19	1.808	Vertical	16.405
11.65 GHz	44.132	54	-9.868	1	1.989	Horizontal	14.5
12.95 GHz	45.896	54	-8.104	353	1.631	Horizontal	16.405
15.058 GHz	37.616	54	-16.384	115	3.071	Horizontal	16.377

Table 7: Radiated Emissions 1 – 17 GHz Middle Frequency



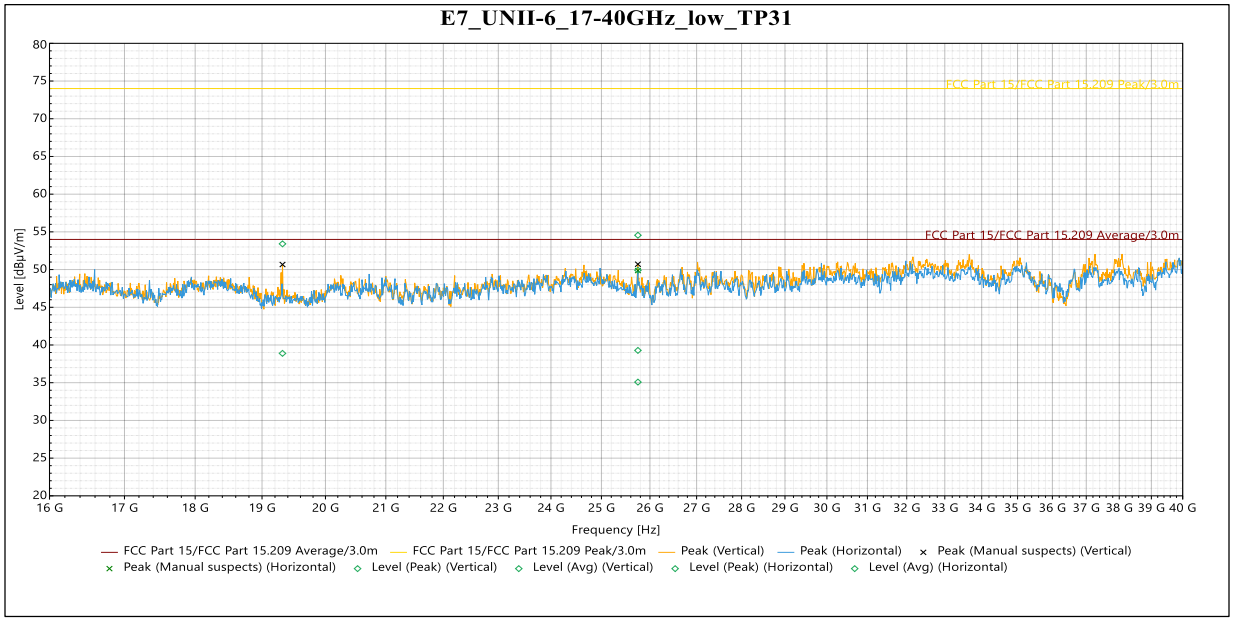
Peak

Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
13.03 GHz	58.075	74	-15.925	356	1.631	Vertical	16.531
10.361 GHz	52.97	74	-21.03	171	2.17	Horizontal	14.857
13.03 GHz	56.338	74	-17.662	13	1.989	Horizontal	16.531

Avg

Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
13.03 GHz	49.19	54	-4.81	356	1.631	Vertical	16.531
10.361 GHz	35.684	54	-18.316	171	2.17	Horizontal	14.857
13.03 GHz	43.376	54	-10.624	13	1.989	Horizontal	16.531

Table 8: Radiated Emissions 1 – 17 GHz Highest Frequency



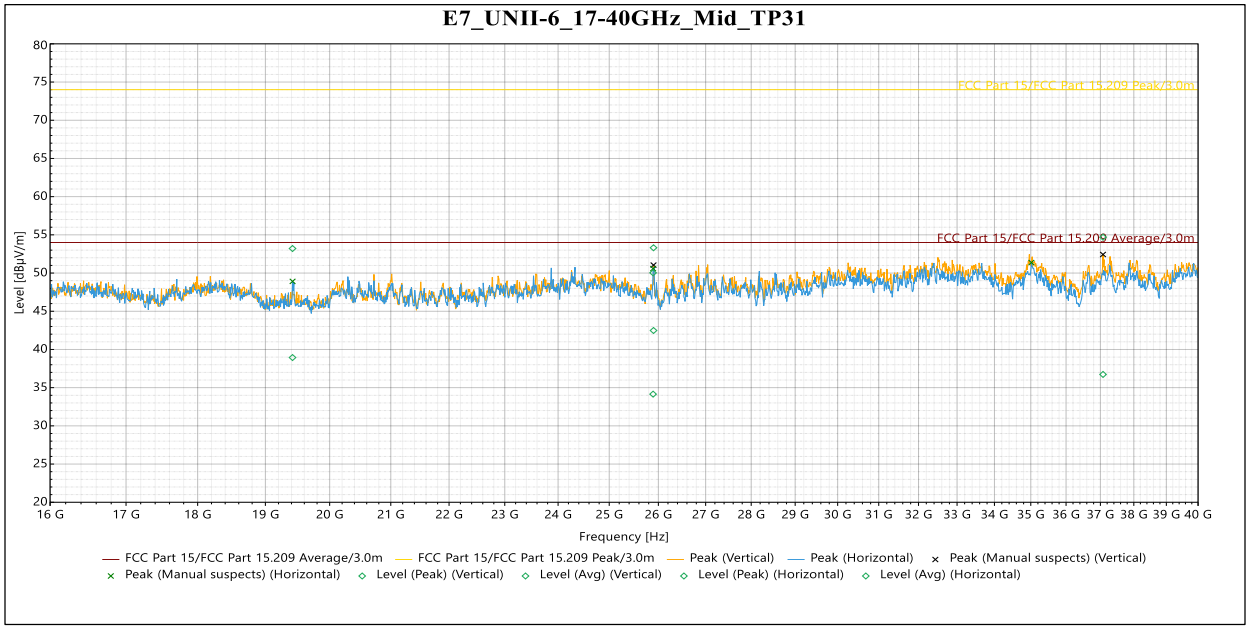
Peak

Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Pol.	Correction (dB)
19.317 GHz	53.413	74	-20.587	322	Vertical	-0.556
25.749 GHz	49.922	74	-24.078	351	Vertical	-0.322
25.749 GHz	54.546	74	-19.454	335	Horizontal	-0.322

Avg

Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Pol.	Correction (dB)
19.317 GHz	38.888	54	-15.112	322	Vertical	-0.556
25.749 GHz	35.08	54	-18.92	351	Vertical	-0.322
25.749 GHz	39.283	54	-14.717	335	Horizontal	-0.322

Table 9: Radiated Emissions 17 – 40 GHz Lowest Frequency



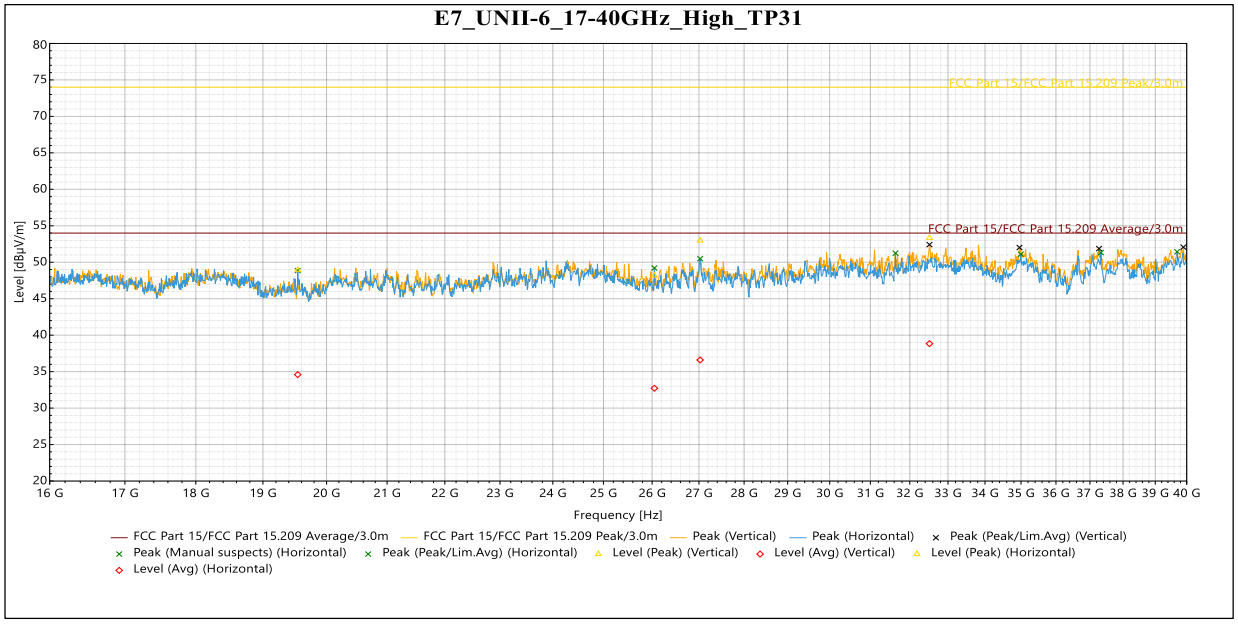
Peak

Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Pol.	Correction (dB)
25.9 GHz	53.315	74	-20.685	5	Vertical	-0.4
37.078 GHz	54.695	74	-19.305	296	Vertical	4.147
19.416 GHz	53.213	74	-20.787	313	Horizontal	-0.329
25.891 GHz	50.034	74	-23.966	26	Horizontal	-0.294

Avg

Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Pol.	Correction (dB)
25.9 GHz	42.479	54	-11.521	5	Vertical	-0.4
37.078 GHz	36.73	54	-17.27	296	Vertical	4.147
19.416 GHz	38.945	54	-15.055	313	Horizontal	-0.329
25.891 GHz	34.153	54	-19.847	26	Horizontal	-0.294

Table 10: Radiated Emissions 17 – 40 GHz Middle Frequency



Peak

Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Pol.	Correction (dB)
32.512 GHz	53.332	74	-20.668	193	Vertical	2.5
19.541 GHz	48.949	74	-25.051	306	Horizontal	-0.766
26.048 GHz	48.162	74	-25.838	50	Horizontal	-1.568
27.026 GHz	52.969	74	-21.031	189	Horizontal	1.927

Avg

Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Pol.	Correction (dB)
32.512 GHz	38.84	54	-15.16	193	Vertical	2.5
19.541 GHz	34.592	54	-19.408	306	Horizontal	-0.766
26.048 GHz	32.724	54	-21.276	50	Horizontal	-1.568
27.026 GHz	36.599	54	-17.401	189	Horizontal	1.927

Table 11: Radiated Emissions 17 – 40 GHz Highest Frequency

5.6 §15.407(a) Maximum Power Spectral Density

All chains were measured and summed under the guidance of KDB 789033 Section II. F. and KDB 662911 D01. Please see associated annex for details on instrument settings.

The maximum average power spectral density conducted from the intentional radiator of the antenna shall not be greater than 5 dBm EIRP in any 1 MHz band during any time interval of continuous transmission. As per KDB 662911, When the EUT is using spatial-multiplexing in HE modes, there is not additional array gain to accommodate. When the EUT uses Nss=1 data rates, the directional antenna gain is 6 dBi + Array gain of 6.02 dB which is a total of 12.02 dBi for PSD measurements. Thus, for the Nss =1 case, the EIRP PSD limit is -1.02 (or a PSD of -7.02 for this device):
Results of this testing are summarized:

Modulation (BW)	Frequency (MHz)	Data Rate	TP Setting	Measured PSD
EHT 20	6435	Mcs0_Nss4	11	-1.96
EHT 20	6475	Mcs0_Nss4	11	-1.96
EHT 20	6515	Mcs0_Nss4	12	-1.19
EHT 40	6445	Mcs0_Nss4	15	-1.03
EHT 40	6485	Mcs0_Nss4	15	-1.21
EHT 80	6465	Mcs0_Nss4	18	-1.12
EHT 160	6505	Mcs0_Nss4	20	-1.69

Modulation (BW)	Frequency (MHz)	Data Rate	TP Setting	Measured PSD
EHT 20	6435	Mcs0_Nss1	3	-8.19
EHT 20	6475	Mcs0_Nss1	3	-7.93
EHT 20	6515	Mcs0_Nss1	3	-7.45
EHT 40	6445	Mcs0_Nss1	6	-7.55
EHT 40	6485	Mcs0_Nss1	6	-7.54
EHT 80	6465	Mcs0_Nss1	9	-7.34
EHT 160	6505	Mcs0_Nss1	11	-7.88

Result

The maximum average power spectral density was less than the limit of 5 dBm EIRP; therefore, the EUT complies with the specification.

5.6.1 OFDMA RU Check

EUT supports OFDMA multiple partial Resource Unit (RU) configurations were verified and the worst-case mode was tested.

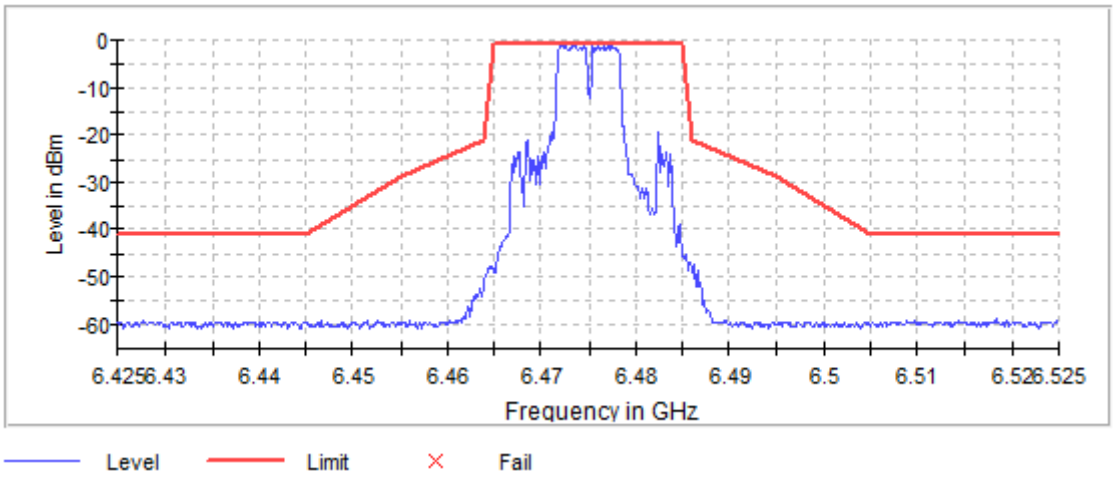


Figure 5: 6475 20MHz RU Vérification - Center

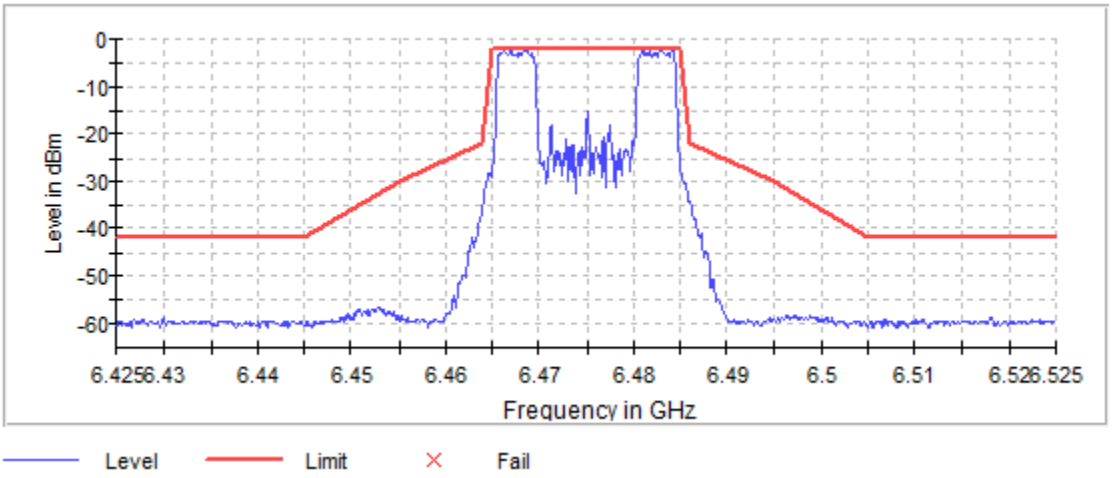


Figure 6: 6475 20MHz RU Vérification – Edge

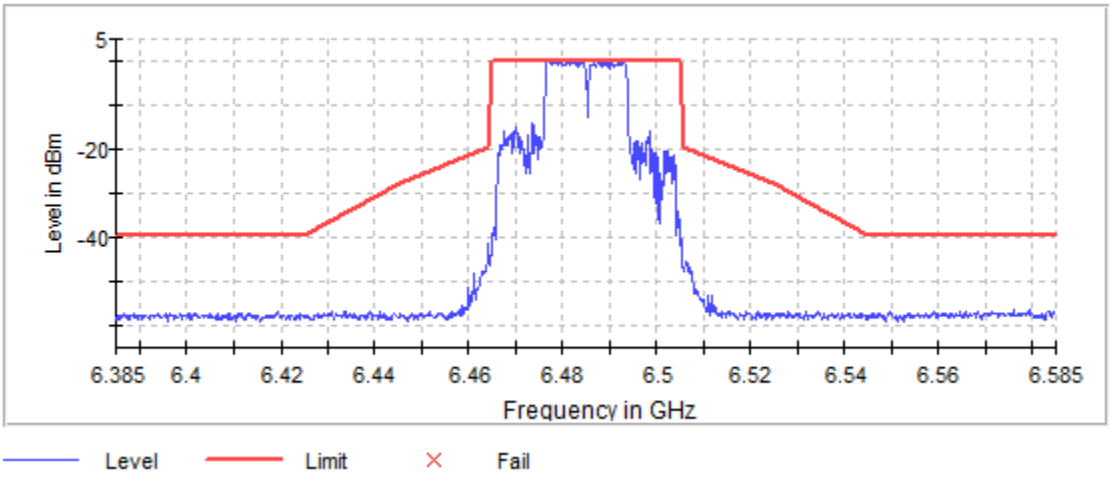


Figure 7: 6485 40MHz RU Vérification - Center

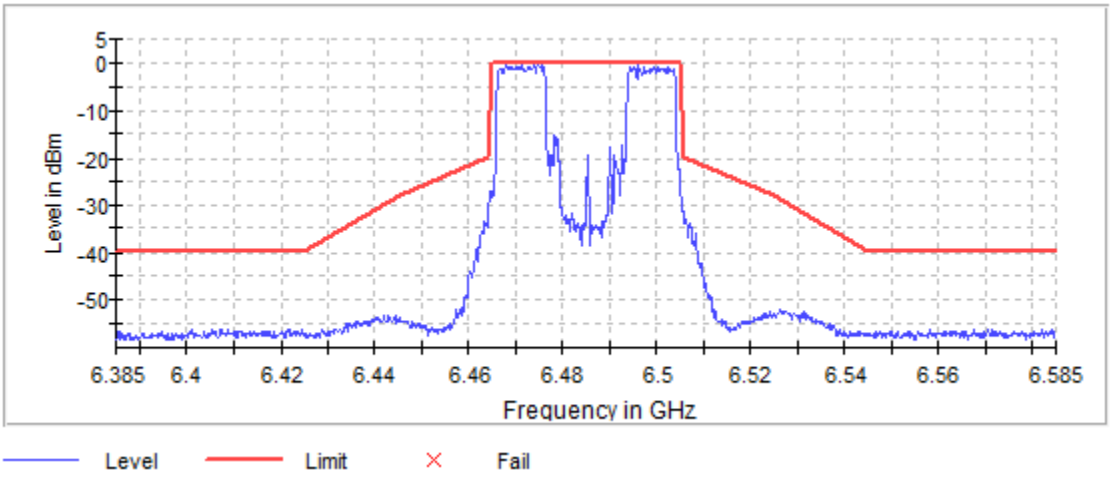


Figure 8: 6485 40MHz RU Vérification - Edge

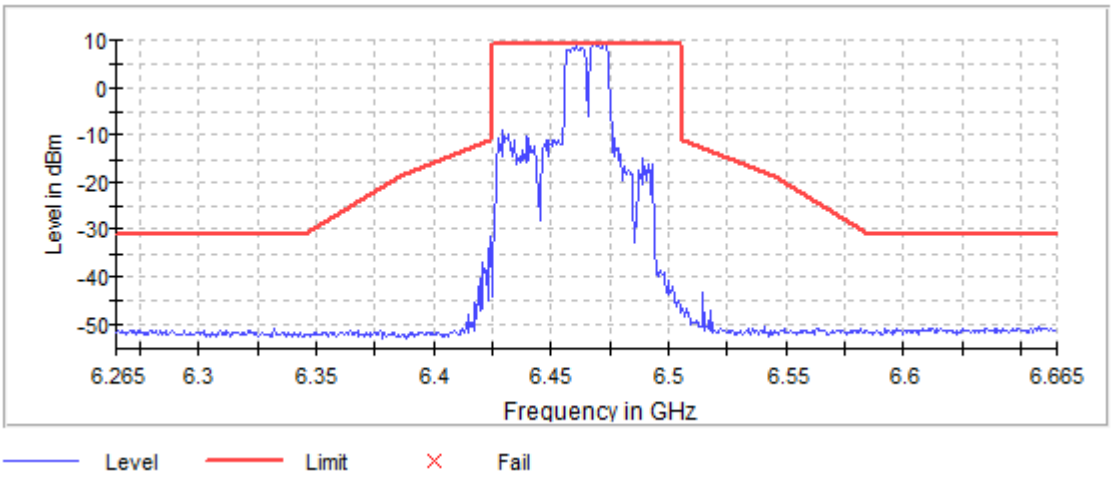


Figure 9: 6465 80MHz RU Vérification - Center

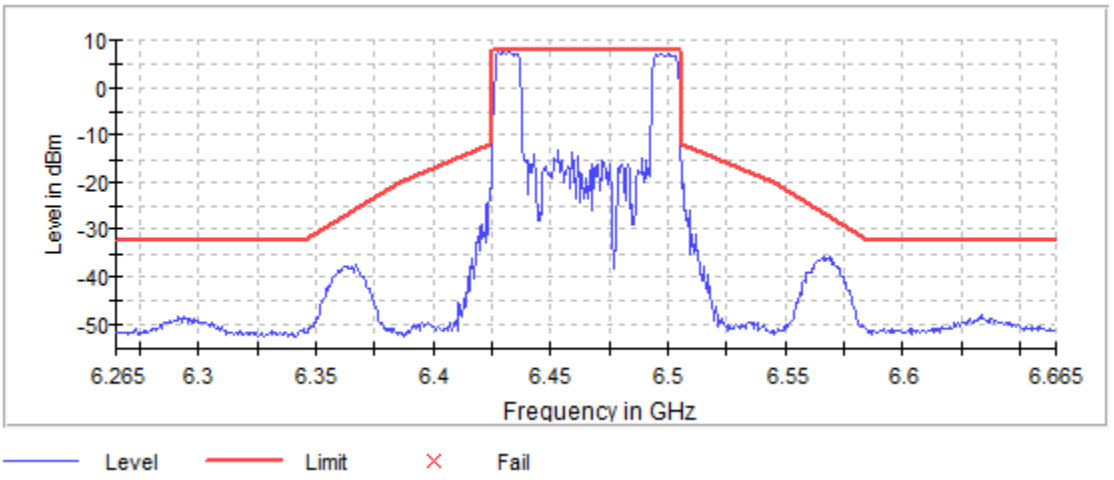


Figure 10: 6465 80MHz RU Vérification - Edge

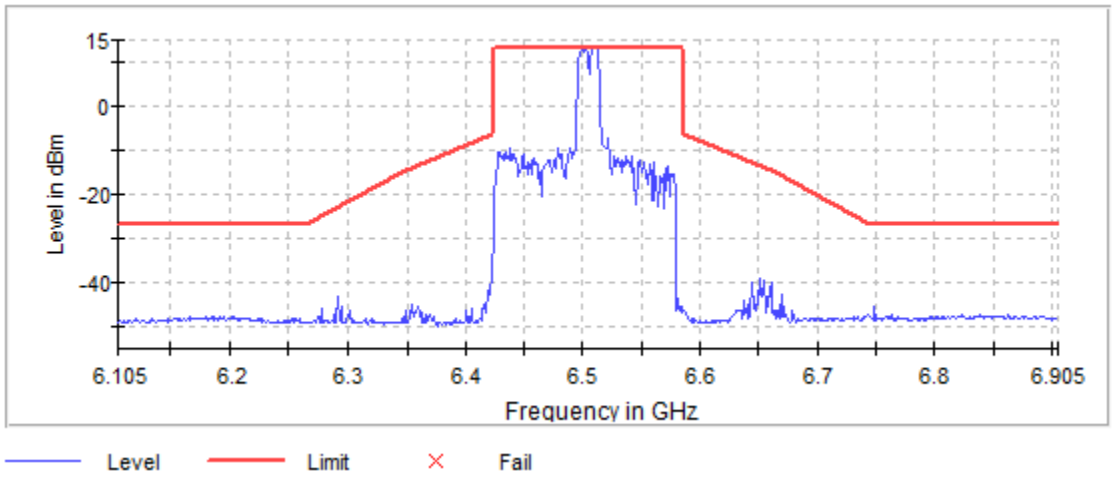


Figure 11: 6505 160MHz RU Vérification - Center

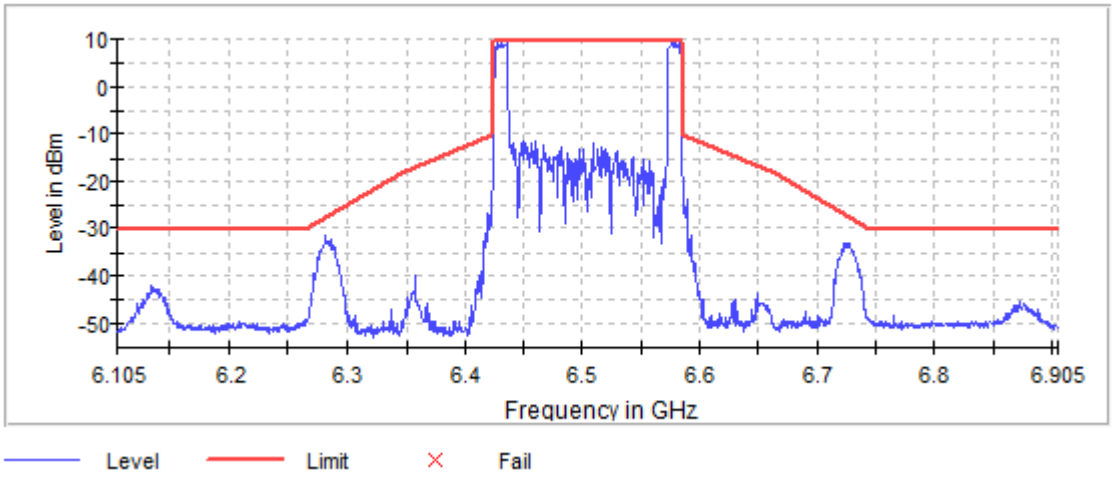


Figure 12: 6505 160MHz RU Vérification - Edge

5.7 §15.407(d) Contention Based Protocol

This product was tested and found to be compliant with the requirements of Contention-based Protocol as specified in FCC Part 15.407 and KDB 987594 D02.

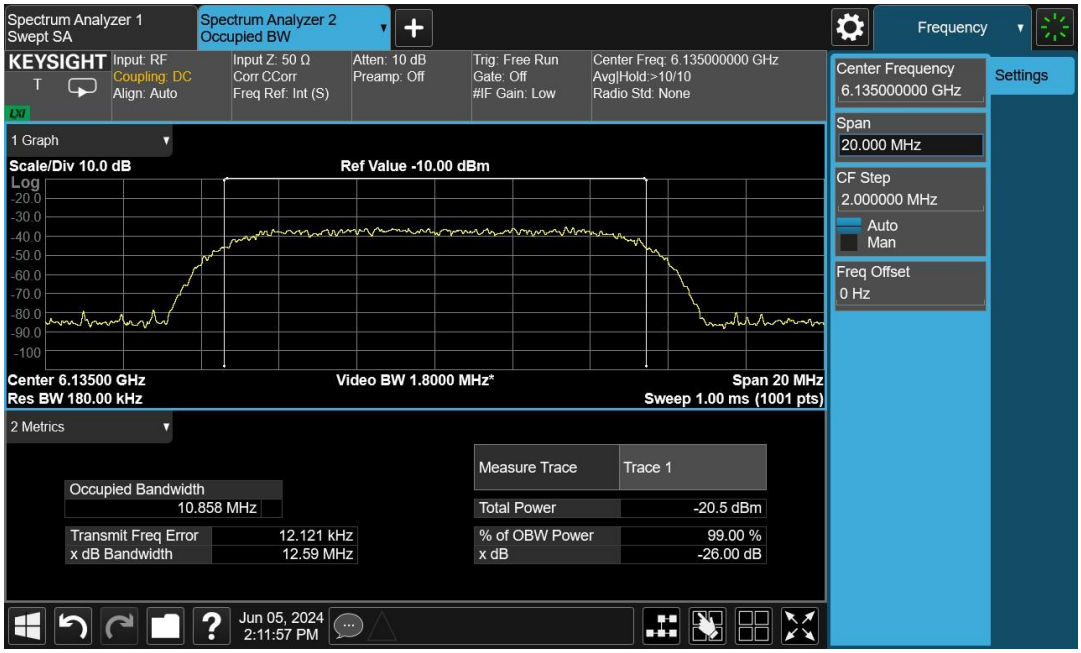
Initially the test setup was connected directly to the signal source with all splitters (splitters terminated with a 50-ohm loads on unused ports) and cables in place to verify the AWGN signal is 10MHz wide at a signal level of less than or equal to -82dBm and for conducted measurements the threshold was adjusted for an antenna gain of 6 dBi. The level at the signal generator required to achieve the required signal level at the DUT was recorded for use during testing.

The DUT was connected as shown in figure 4 above and set to transmit at a constant duty cycle at each frequency and bandwidth noted in the table below and verified to be communicating with the companion device as intended.

Starting at the levels established above, the AWGN signal was introduced to the DUT and increased to determine a threshold level at where the DUT will terminate with at least a 90% detection rate. The level at the DUT, which the 90% detection rate was achieved was recorded as the “Sensitivity Level” below.

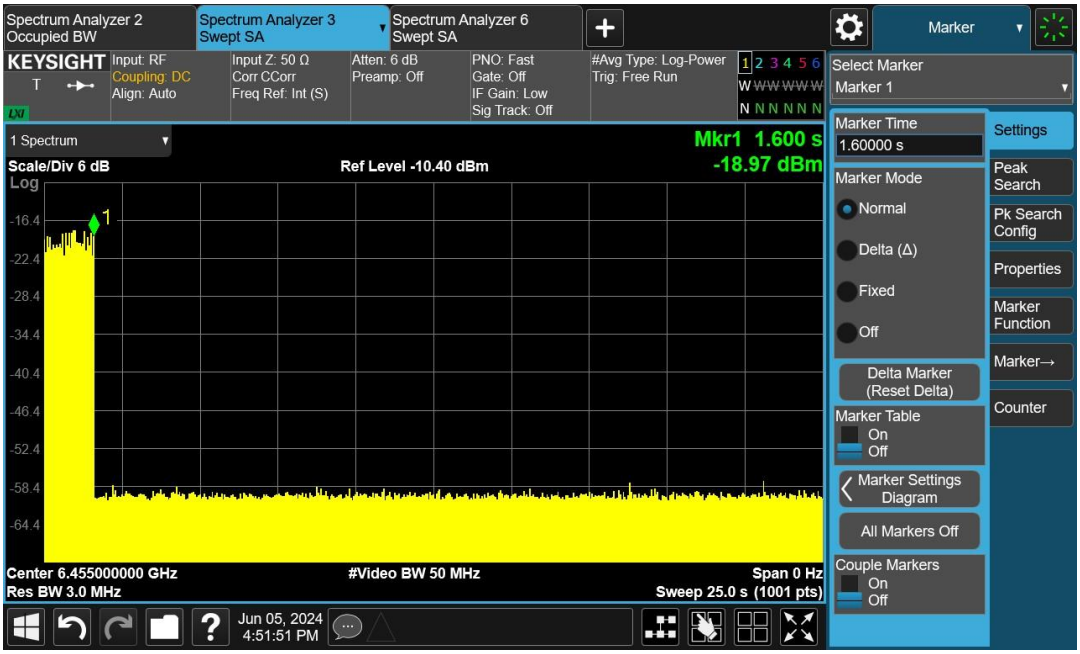
Any measurement below the sensitivity level will result in the Tx minimal and any further measurement below the sensitivity level will result in Tx on.

Testing shall be repeated at each applicable channel and bandwidth as noted in Table 1 of KDB 987594 D02.

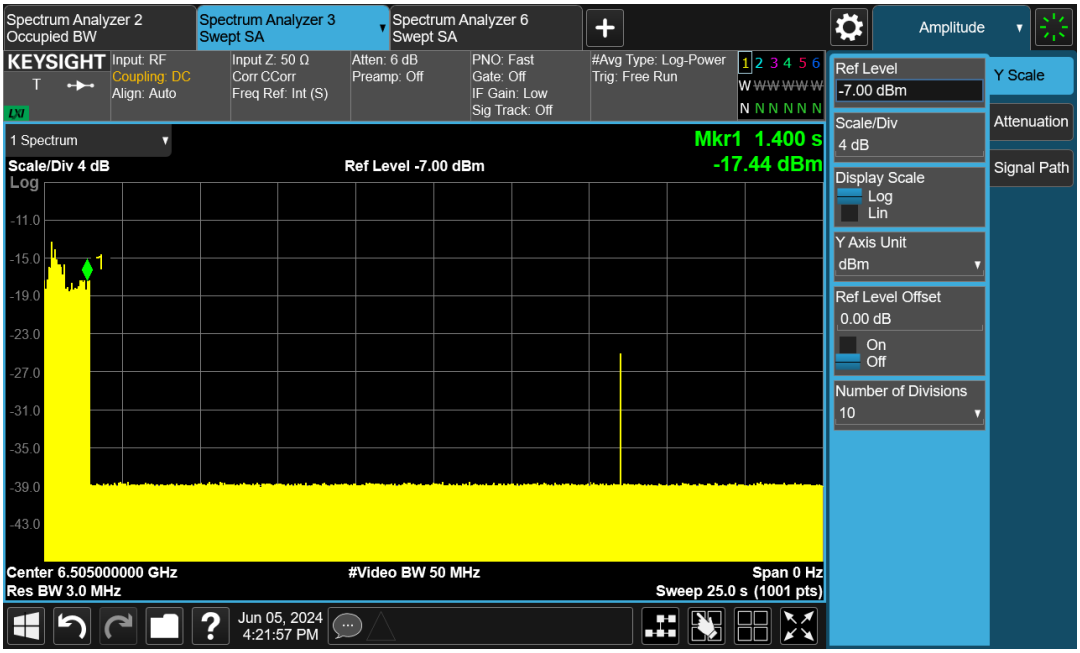


Plot 1: AWGN Signal BW Details

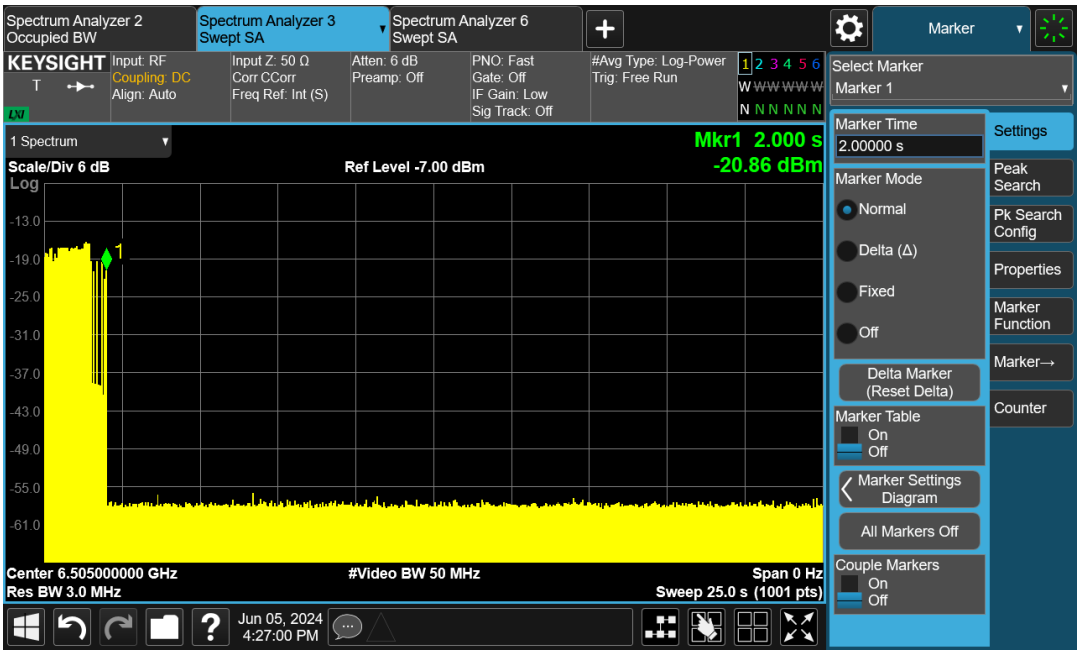
Plot 2: AWGN Signal Level Details



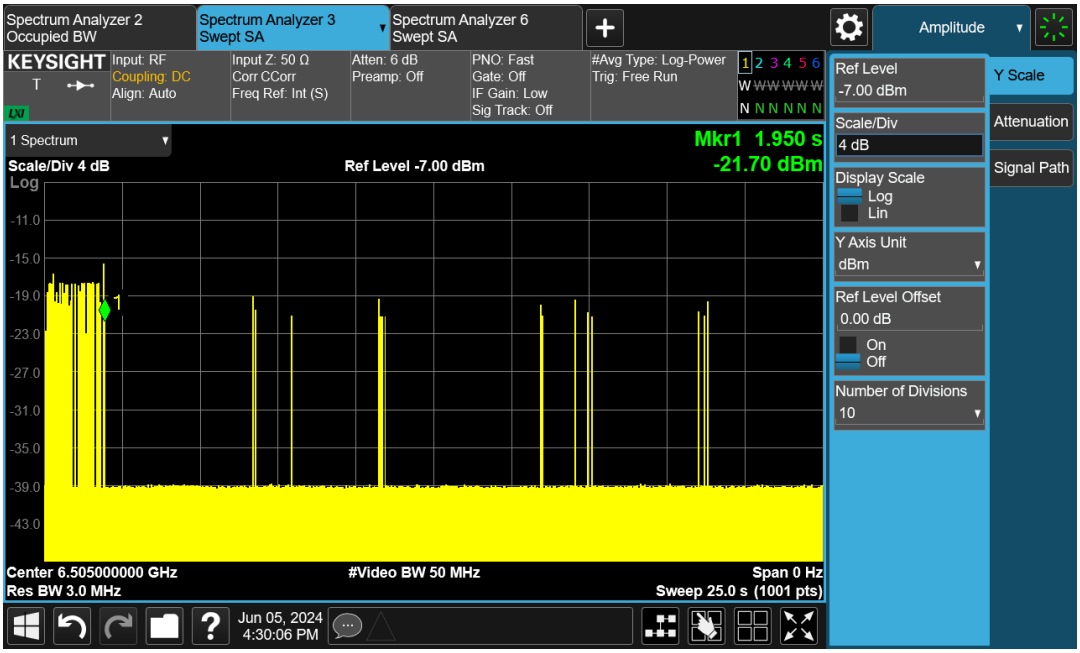
Plot 3: AWGN Signal Detection Details 20 MHz BW, 6455



Plot 4: AWGN Signal Detection Details 160 MHz BW, 6505 – 6430



Plot 5: AWGN Signal Detection Details 160 MHz BW, 6505



Plot 6: AWGN Signal Detection Details 160 MHz BW, 6505 – 6580

Contention Based Protocol 987594 D02 U-NNI 6 GHz EMC Measurement

Band	BW_{EUT}	F_{c1}	F_{c2}	Signal Power Level (dBm)	Detection Rate (%)	Margin (dB)
UNII-5 5.925 - 6.425GHz	20	6135	6135	-70.3	100	14.3
	160	6185	6110	-66	100	10
			6185	-70.3	100	14.3
			6260	-71.5	100	15.5
	320	6265	6110	-57.7	100	1.7
			6265	-74.3	100	18.3
			6410	-56.7	100	0.7
UNII-6 6.425 - 6.525GHz	20	6455	6455	-74.3	100	18.3
	160	6505	6430	-69.6	100	13.6
			6505	-71.5	100	15.5
			6580	-62.3	100	6.3
UN1I-7 6.525 - 6.875GHz	20	6695	6695	-75	100	19
	160	6665	6595	-62.3	100	6.3
			6665	-71.5	100	15.5
			6740	-66.9	100	10.9
	320	6745	6590	-57.6	100	1.6
			6745	-74.3	100	18.3
			6860	-66.9	100	10.9
UNII-8 6.875 - 7.125GHz	20	7015	7015	-75.3	100	19.3
	160	6985	6910	-61.3	100	5.3
			6985	-69.6	100	13.6
			7060	-57.6	100	1.6

Table 12: Trial Table

CBP Path Loss is – 22 dB
Detection Level = Injected AWGN Power (dBm) – Antenna Gain (dBi) + Path Loss (dB)

Result

The EUT complies with the specification.

-- End of Test Report --