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	TR9005_04
Date of Test(s)	20-21, 23 February and 9, 16 April 2024
Report Issue Date	9 May 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.

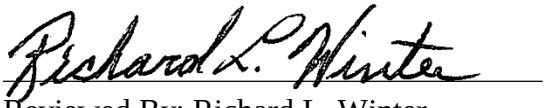
Applicant	Ubiquiti Inc.
Manufacturer	Ubiquiti Inc.
Brand Name	UBIQUITI
Model Number	E7
FCC ID	SWX-E7
ISED ID	6545A-E7

On this 9th day of May 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: Evan J. Hartzell



Reviewed By: Richard L. Winter

Revision History		
Revision	**Description**	**Date**
01	Original Report Release	9 May 2024
02	Add Canada Power Table in Section 5.4	21 September 2024
03	Amended KDB Reference in Sections 5.3, 5.4 and 5.6, and PSD section to account for directional gain reduction.	30 September 2024
04	Added Canada Limit in Section 5.4	28 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 802.3at PoE power adapter.

Band	WiFi Mode	Modulation Bandwidth	Modulation Type	Frequency (MHz)
UNII-1	a	20 MHz	OFDM	5180, 5200, 5210, 5240
	ax	20 MHz	HE	5180, 5200, 5210, 5240
	ax	40 MHz	HE	5190, 5230
	ax	80 MHz	HE	5210

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.

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	19.6-22.3 °C
Humidity	21.12-32.11 %
Barometric Pressure	1020 mBar

2.6 Operating Modes

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

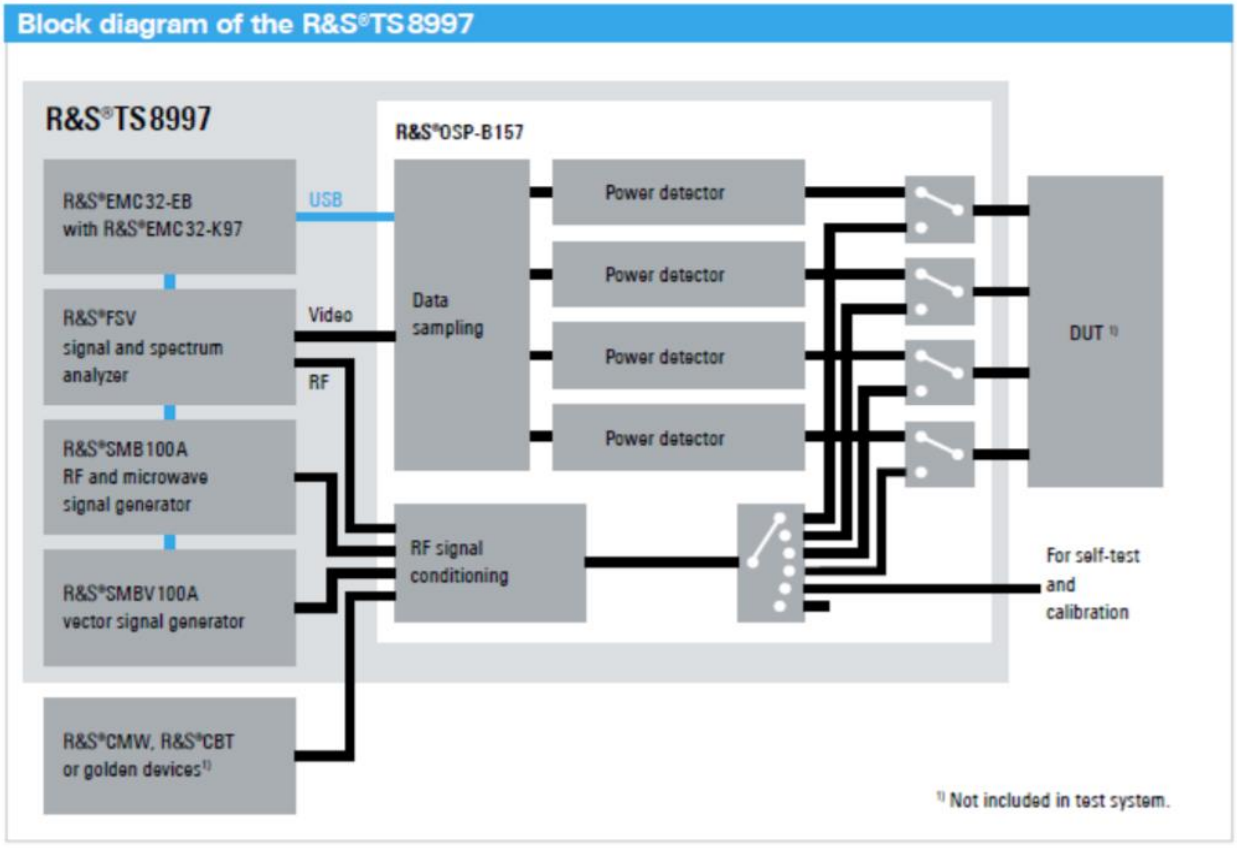


Diagram 1: Test Configuration Block Diagram

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
15.407(a)	N/A	Antenna requirements	Structural Requirement	Compliant
15.407(b)	RSS-Gen	Conducted Disturbance at Mains Port	0.15 to 30	Compliant
15.407(c)	RSS-247 §6.2.2, §6.2.3	Bandwidth Requirement	5180 to 5210	Compliant
15.407(e)	RSS-247 §6.2.2, §6.2.3	Peak Output Power	5180 to 5210	Compliant
15.407(f)	RSS-247 §6.2.2, §6.2.3	Antenna Conducted Spurious Emissions	0.009 to 40000	N/A
15.407(g)	RSS-247 §6.2.2, §6.2.3	Radiated Spurious Emissions	0.009 to 40000	Compliant
15.407(h)	RSS-247 §6.2.2, §6.2.3	Peak Power Spectral Density	5180 to 5210	Compliant
The testing was performed according to the procedures in ANSI C63.10-2013, KDB 789033 and 47 CFR Part 15. Where applicable, KDB 662911 was followed to sum required measurements.				

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 2024. 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 2024.

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

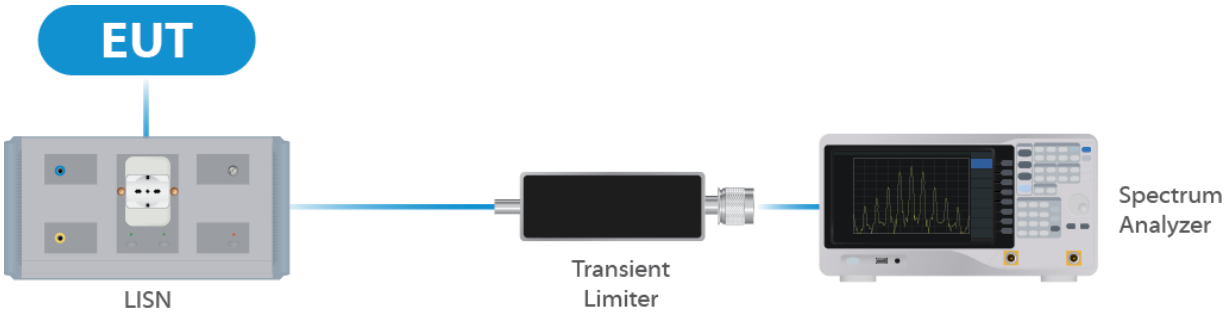


Figure 1: Conducted Emissions Test

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	4/12/2025
Switch Extension	R&S	OSP-150W	UCL-2870	4/12/2024	4/12/2025

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

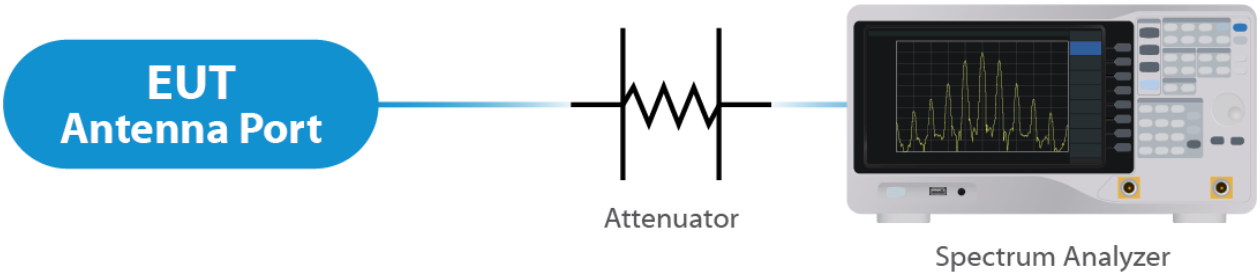


Figure 2: Direct Connect at the Antenna Port Test

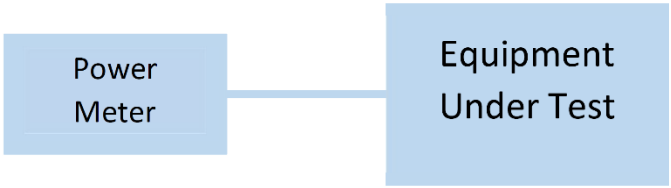


Figure 3: Output Power Measurement

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	2/22/2023	2/22/2025
Broadband Antenna	Scwarzbeck	VULB 9163	UCL-3071	1/11/2023	1/11/2025
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	6/09/2022	6/09/2024
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

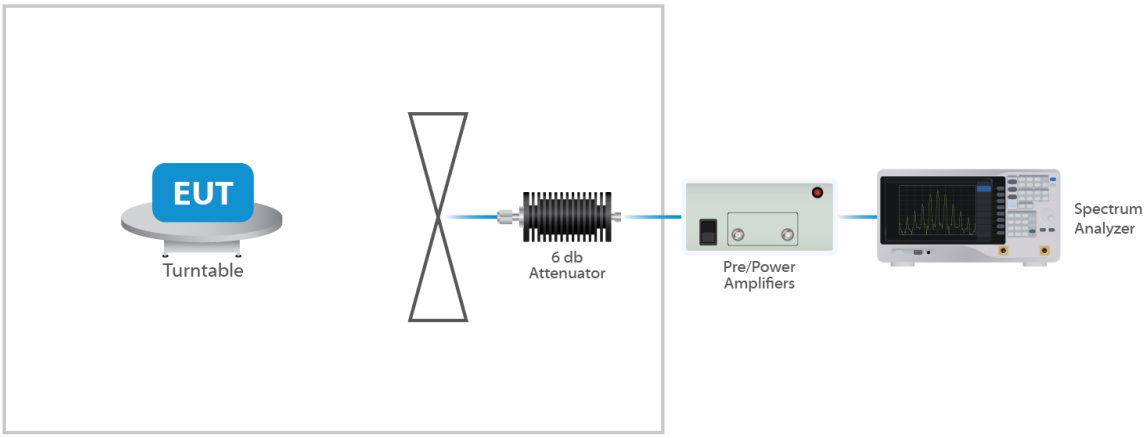


Figure 4: Radiated Emissions Test

4.4 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.

4.5 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.

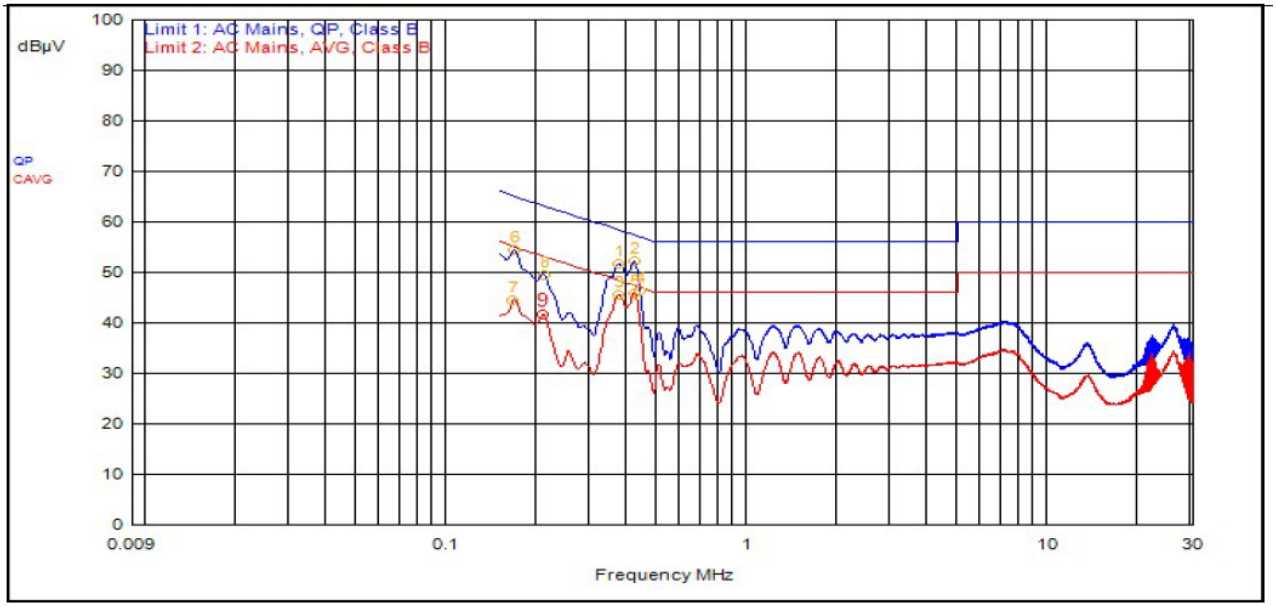
For power measurements on IEEE 802.11 devices, Array Gain = 0 dB for NANT ≤ 4;
For PSD measurements when Nss=1: Array Gain = 10 log(NANT/NSS) dB + Antenna Gain (dBi). Or 6.02 dB + 6 dBi = 12.02 dBi.

Results

The EUT complied with the specification

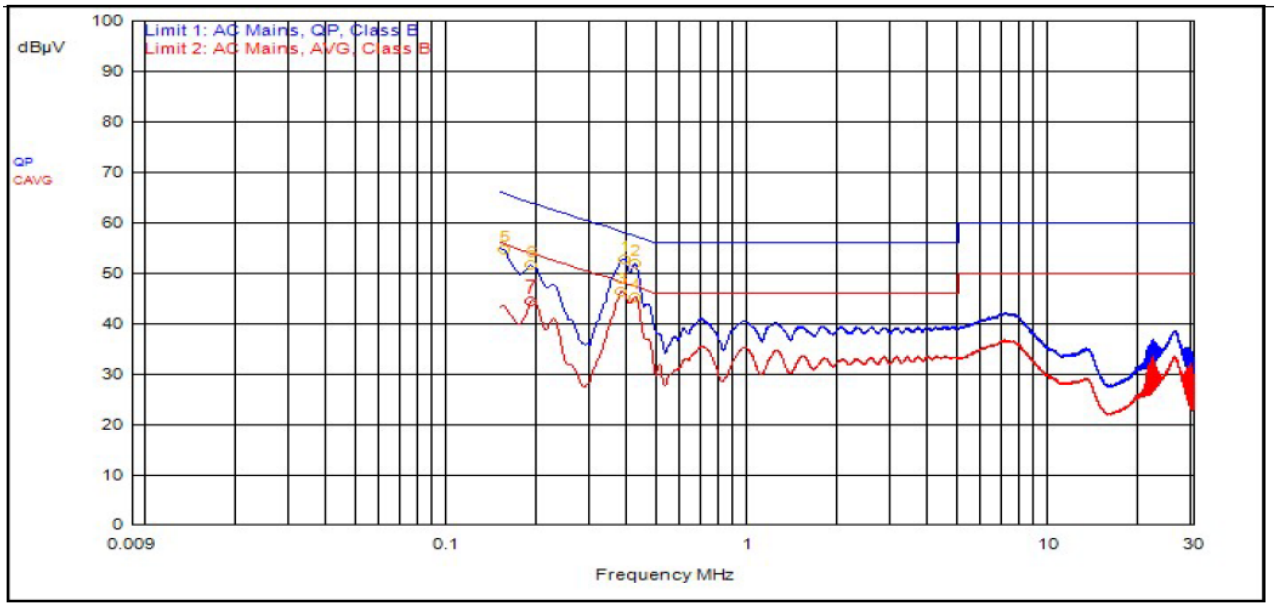
5.2 Conducted Emissions at Mains Ports Data

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)	Emissions 26 dB Bandwidth (MHz)
OFDM 20 MHz	**5180**	17.75	22.60
OFDM 20 MHz	**5210**	17.25	22.20
OFDM 20 MHz	**5240**	18.75	28.80
HE 20 MHz	**5180**	19.50	23.20
HE 20 MHz	**5210**	19.25	22.30
HE 20 MHz	**5240**	19.75	38.90
HE 40 MHz	**5190**	38.25	43.50
HE 40 MHz	**5230**	38.25	42.90
HE 80 MHz	**5210**	77.50	90.50

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)(2) 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 29.78 dBm or 950.6 mW. The FCC limit is 30 dBm, or 1 Watt when using an antenna with 6 dBi (indoor/outdoor access point) or less gain. The antenna has a gain of 6 dBi. The Canadian limit is 23 dBm EIRP.

Modulation (BW)	Frequency (MHz)	Data Rate	TP Setting	Conducted Output Power	Measured EIRP	Measured PSD
OFDM 20	5180	Nss4-6M	21	25.28	31.28	10.25
OFDM 20	5200	Nss4-6M	22	25.97	31.97	-
OFDM 20	5210	Nss4-6M	23	26.91	32.91	11.82
OFDM 20	5240	Nss4-6M	27	29.75	35.75	14.61
HE 20	5180	Nss4-Mcs0	21	25.47	31.47	9.87
HE 20	5200	Nss4-Mcs0	22	26.10	32.10	-
HE 20	5210	Nss4-Mcs0	22	25.93	31.93	10.31
HE 20	5240	Nss4-Mcs0	27	29.78	35.78	14.10
HE 40	5190	Nss4-Mcs0	18	22.27	28.27	3.73
HE 40	5230	Nss4-Mcs0	21	24.68	30.68	6.08
HE 80	5210	Nss4-Mcs0	17	20.98	26.98	5.22

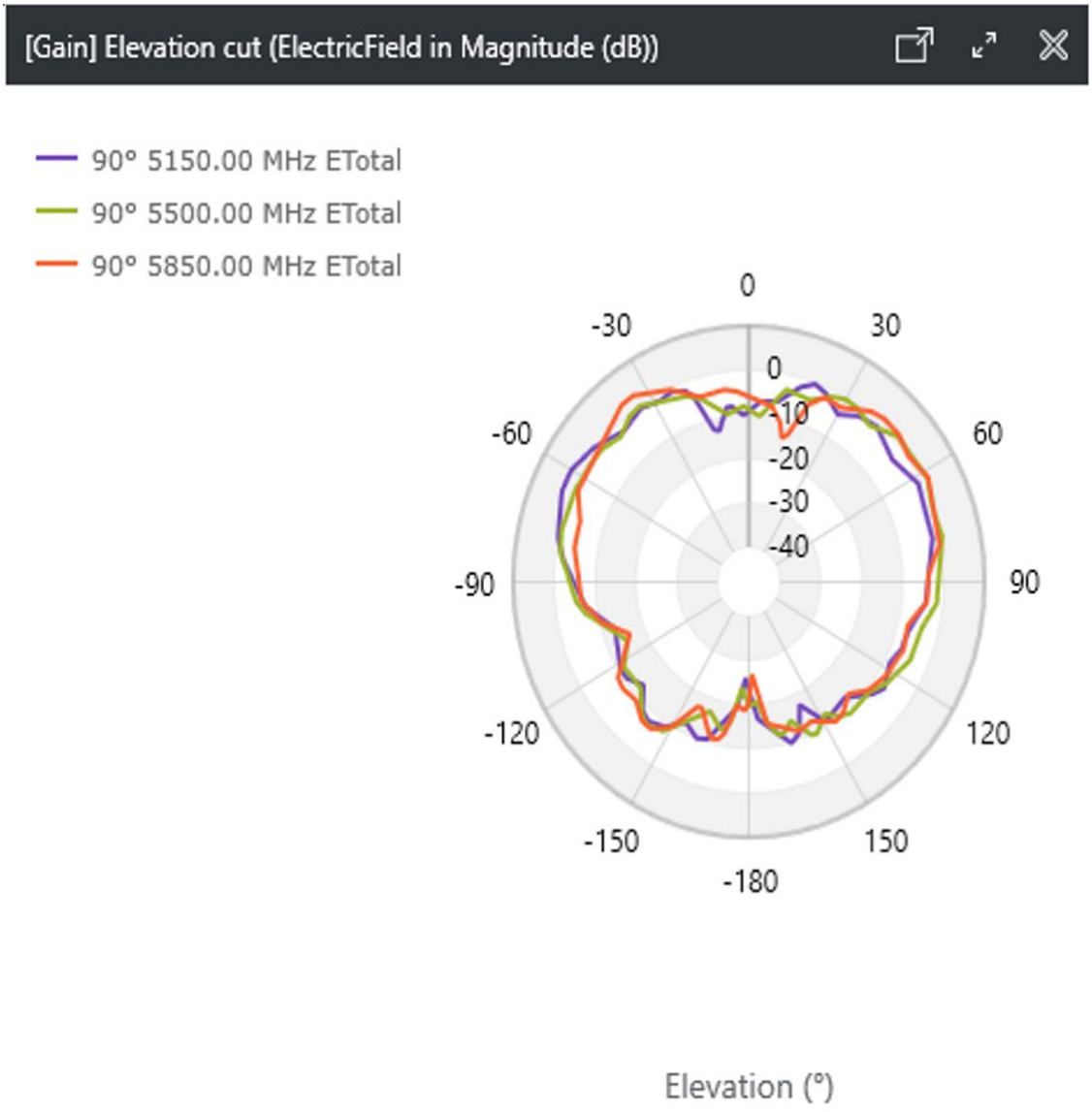
Modulation (BW)	Frequency (MHz)	Data Rate	TP Setting	Conducted Output Power	Measured EIRP	Measured PSD
OFDM 20	5180	Nss1-6M	21	25.28	31.28	10.25
OFDM 20	5200	Nss1-6M	22	25.97	31.97	-
OFDM 20	5210	Nss1-6M	22	25.91	31.91	10.82
OFDM 20	5240	Nss1-6M	23	25.75	31.75	10.61
HE 20	5180	Nss1-Mcs0	21	25.47	31.47	9.87
HE 20	5200	Nss1-Mcs0	22	26.10	32.10	-
HE 20	5210	Nss1-Mcs0	22	25.93	31.93	10.31
HE 20	5240	Nss1-Mcs0	23	25.78	31.78	10.10
HE 40	5190	Nss1-Mcs0	18	22.27	28.27	3.73
HE 40	5230	Nss1-Mcs0	21	24.68	30.68	6.08
HE 80	5210	Nss1-Mcs0	17	20.98	26.98	5.22

CANADA (Indoor Use Only)

Modulation (BW)	Frequency (MHz)	Data Rate	TP Setting	Conducted Output Power	Measured EIRP	Measured PSD
OFDM 20	5180	Nss4-6M	10	15.13	21.13	3.46
OFDM 20	5200	Nss4-6M	11	15.93	21.93	-
OFDM 20	5210	Nss4-6M	11	15.63	21.63	3.81
OFDM 20	5240	Nss4-6M	11	15.49	21.49	3.53
HE 20	5180	Nss4-Mcs0	12	15.24	21.24	3.03
HE 20	5200	Nss4-Mcs0	11	16.06	22.06	-
HE 20	5210	Nss4-Mcs0	11	15.74	21.74	3.36
HE 20	5240	Nss4-Mcs0	11	15.59	21.59	3.13
HE 40	5190	Nss4-Mcs0	11	16.07	22.07	0.93
HE 40	5230	Nss4-Mcs0	12	16.58	22.58	1.34
HE 80	5210	Nss4-Mcs0	12	16.67	22.67	-1.63

Result

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



Plot 1: Elevation Plot Greater Then 30-Degrees From Horizon

5.5 §15.407(b) 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 emissions must be remain below -27 dBm EIRP.

Result

Conducted spurious emissions were below -27 dBm; therefore, the EUT complies with the specification.

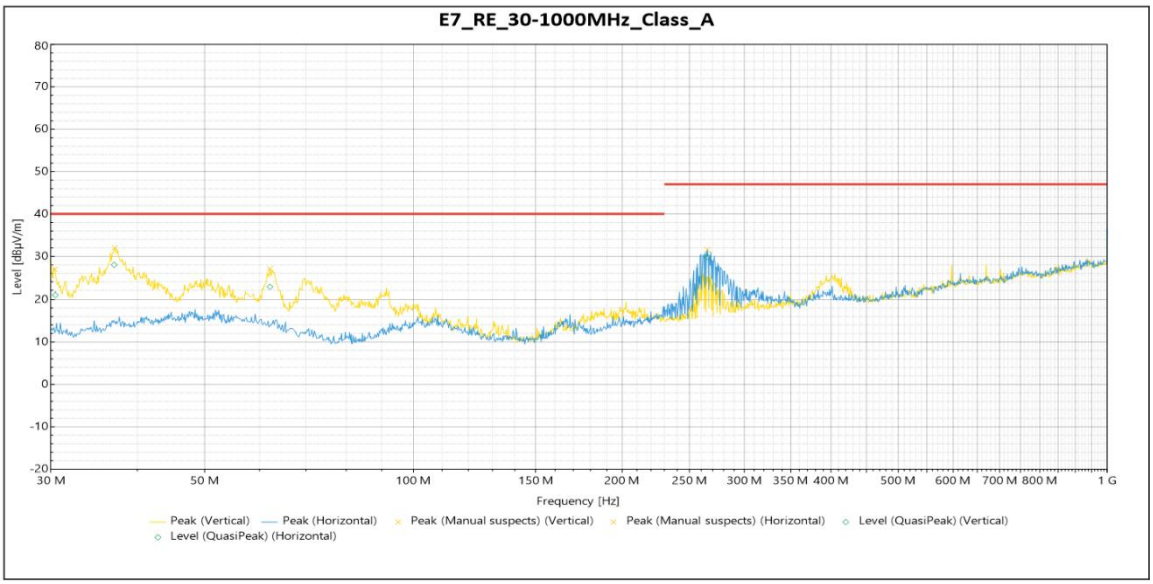
5.5.2 Radiated Spurious Emissions in the Restricted Bands of § 15.205

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, as this setting was found to be worst case for spurious emissions. Power was subsequently reduced during in-band and band edge testing. The band edge at the restricted band ending at 5150 MHz was measured using radiated measurement or conducted at the antenna port methods. [For radiated] All emissions modes were tested, and the worst-case measurement are shown below. For frequencies above 1 GHz, a measurement of 3 meters was used. For frequencies below 1 GHz, a measurement distance of 10 meters was used.

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

Result

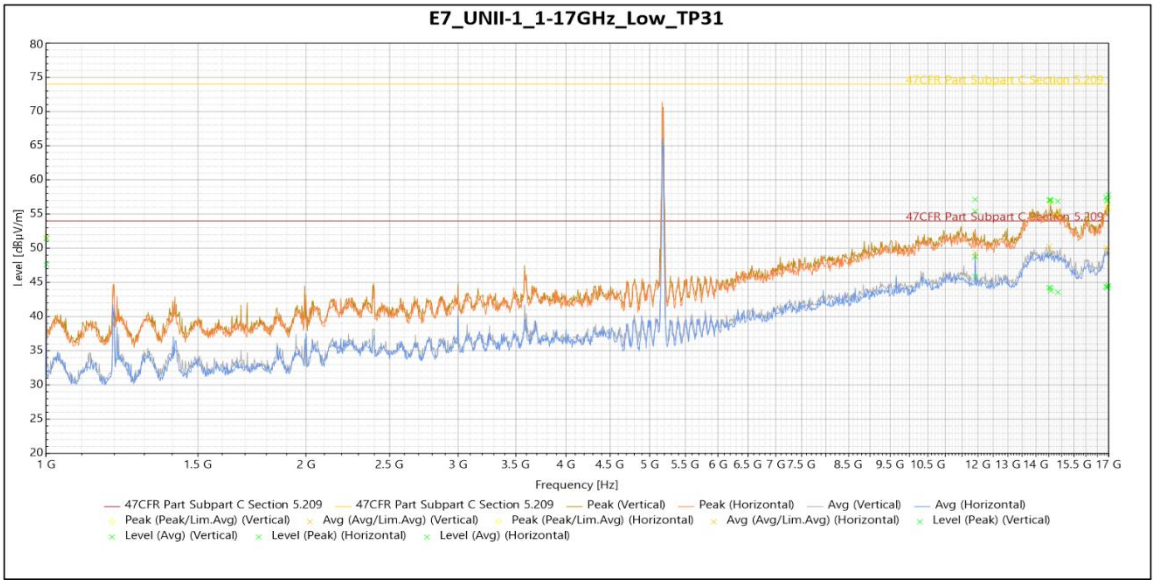
All emissions in the restricted bands of § 15.205 met the limits specified in § 15.209; therefore, the EUT complies with the specification. All emissions me the limits specified in § 15.407(b). Representative band edge plots are included in this report. See Annex for Conducted Band edge plots.



QuasiPeak

Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin	Azimuth (°)	Height	Pol.	Correction (dB)
30.455 MHz	21.073	40	-18.927	106	0.999	Vertical	-16.07
37.03 MHz	28.019	40	-11.981	238	1.132	Vertical	-14.769
62.105 MHz	22.817	40	-17.183	331	3.17	Vertical	-14.457
265.26 MHz	29.89	47	-17.11	95	3.35	Horizontal	-13.638

Table 4: Spurious Emissions 30-1000 MHz



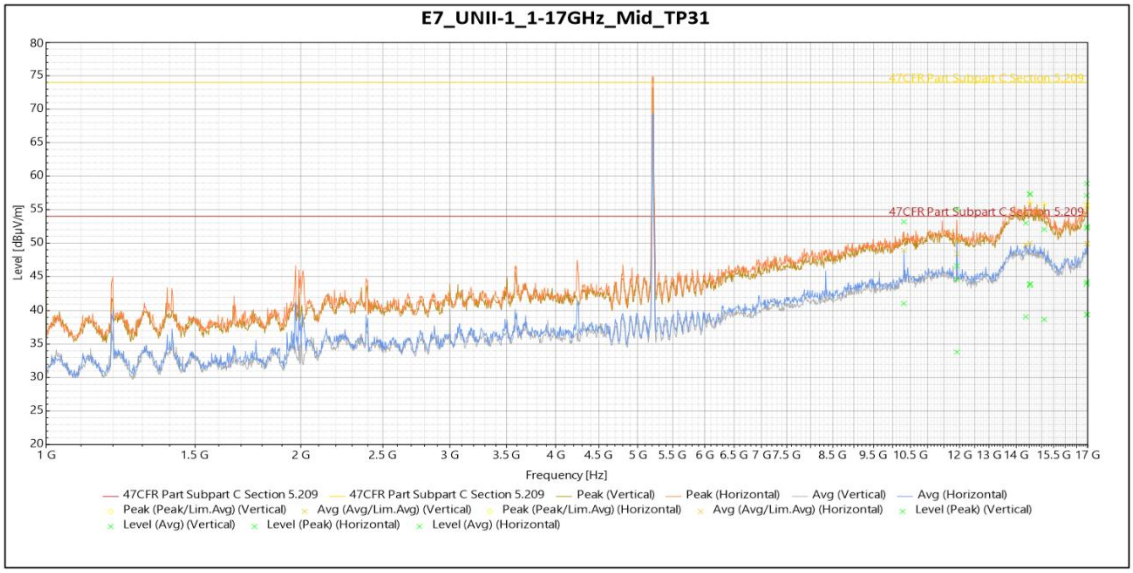
Peak

Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
11.91 GHz	57.142	74	-16.858	80	1.5	Vertical	8.285
14.512 GHz	57.058	74	-16.942	61	2.146	Vertical	11.724
14.561 GHz	57.072	74	-16.928	113	1.638	Vertical	11.774
16.896 GHz	57.426	74	-16.574	324	1.643	Vertical	13.212
16.951 GHz	57.034	74	-16.966	146	3.153	Vertical	13.446
1 GHz	51.425	74	-22.575	328	1.838	Horizontal	-14.619
11.91 GHz	55.411	74	-18.589	146	2.146	Horizontal	8.285
14.565 GHz	56.962	74	-17.038	229	3.153	Horizontal	11.758
14.848 GHz	56.869	74	-17.131	148	1.5	Horizontal	11.539
16.932 GHz	56.987	74	-17.013	211	2.142	Horizontal	13.268
16.994 GHz	57.823	74	-16.177	107	2.142	Horizontal	13.507

Avg

Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
11.91 GHz	48.748	54	-5.252	80	1.5	Vertical	8.285
14.512 GHz	44.274	54	-9.726	61	2.146	Vertical	11.724
14.561 GHz	44.192	54	-9.808	113	1.638	Vertical	11.774
16.896 GHz	44.431	54	-9.569	324	1.643	Vertical	13.212
16.951 GHz	44.311	54	-9.689	146	3.153	Vertical	13.446
1 GHz	47.578	54	-6.422	328	1.838	Horizontal	-14.619
11.91 GHz	45.865	54	-8.135	146	2.146	Horizontal	8.285
14.565 GHz	43.779	54	-10.221	229	3.153	Horizontal	11.758
14.848 GHz	43.56	54	-10.44	148	1.5	Horizontal	11.539
16.932 GHz	44.245	54	-9.755	211	2.142	Horizontal	13.268
16.994 GHz	44.538	54	-9.462	107	2.142	Horizontal	13.507

Table 5: Spurious Emissions 1-17 GHz, Lowest Frequency



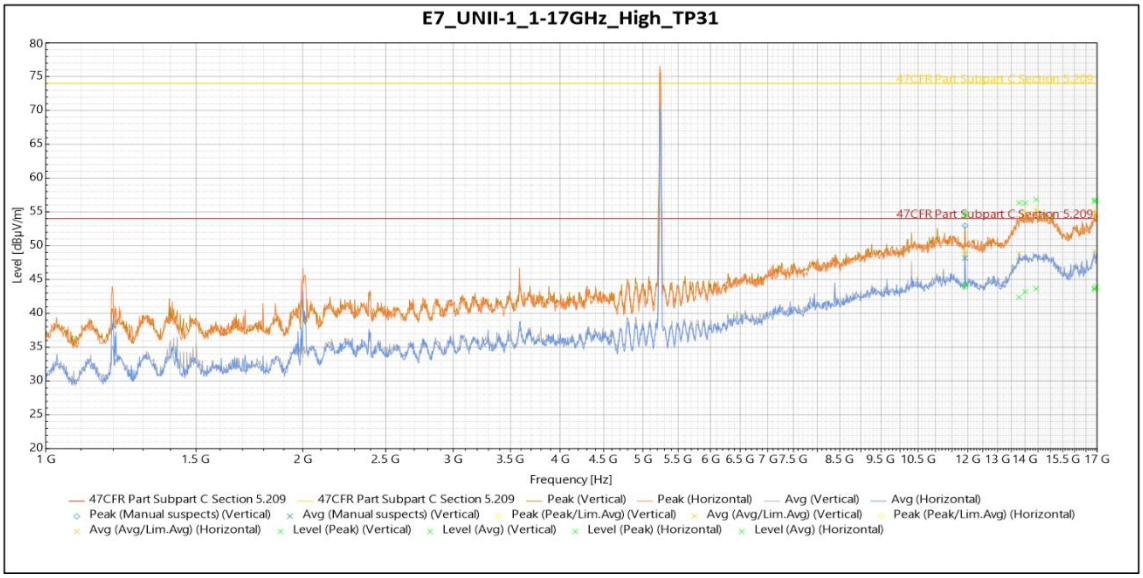
Peak

Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
11.91 GHz	46.576	74	-27.424	13	1.838	Vertical	8.285
14.369 GHz	52.99	74	-21.01	317	2.65	Vertical	11.954
15.106 GHz	52.045	74	-21.955	69	3.153	Vertical	11.169
16.968 GHz	52.237	74	-21.763	278	3.307	Vertical	13.572
16.979 GHz	52.451	74	-21.549	42	1.5	Vertical	13.544
10.313 GHz	53.181	74	-20.819	92	3.802	Horizontal	6.447
11.91 GHz	55.056	74	-18.944	140	1.5	Horizontal	8.285
14.526 GHz	57.287	74	-16.713	144	4	Horizontal	11.819
14.543 GHz	57.337	74	-16.663	118	2.329	Horizontal	11.848
16.955 GHz	57.121	74	-16.879	336	4	Horizontal	13.484
16.968 GHz	58.878	74	-15.122	190	3.311	Horizontal	13.572

Avg

Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
11.91 GHz	33.835	54	-20.165	13	1.838	Vertical	8.285
14.369 GHz	39.087	54	-14.913	317	2.65	Vertical	11.954
15.106 GHz	38.698	54	-15.302	69	3.153	Vertical	11.169
16.968 GHz	39.444	54	-14.556	278	3.307	Vertical	13.572
16.979 GHz	39.402	54	-14.598	42	1.5	Vertical	13.544
10.313 GHz	41.068	54	-12.932	92	3.802	Horizontal	6.447
11.91 GHz	44.537	54	-9.463	140	1.5	Horizontal	8.285
14.526 GHz	43.772	54	-10.228	144	4	Horizontal	11.819
14.543 GHz	43.929	54	-10.071	118	2.329	Horizontal	11.848
16.955 GHz	43.94	54	-10.06	336	4	Horizontal	13.484
16.968 GHz	44.171	54	-9.829	190	3.311	Horizontal	13.572

Table 6: Spurious Emissions 1-17 GHz, Middle Frequency



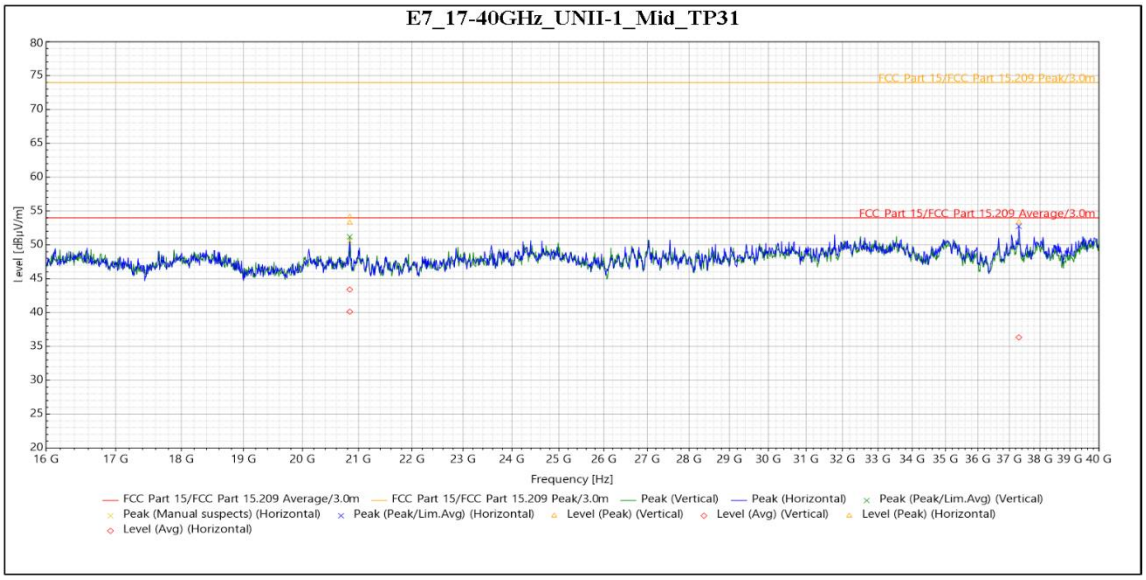
Peak

Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
11.91 GHz	54.417	74	-19.583	99	1.638	Vertical	8.285
14.43 GHz	56.838	74	-17.162	308	1.638	Vertical	11.799
16.88 GHz	56.566	74	-17.434	358	1.638	Vertical	13.213
16.963 GHz	56.773	74	-17.227	178	4	Vertical	13.56
11.91 GHz	54.831	74	-19.169	52	1.5	Horizontal	8.285
13.782 GHz	56.336	74	-17.664	348	2.146	Horizontal	10.517
14.011 GHz	56.318	74	-17.682	56	1.638	Horizontal	11.075
16.891 GHz	56.646	74	-17.354	247	2.65	Horizontal	13.212

Avg

Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
11.91 GHz	43.923	54	-10.077	99	1.638	Vertical	8.285
14.43 GHz	43.642	54	-10.358	308	1.638	Vertical	11.799
16.88 GHz	43.694	54	-10.306	358	1.638	Vertical	13.213
16.963 GHz	43.908	54	-10.092	178	4	Vertical	13.56
11.91 GHz	44.325	54	-9.675	52	1.5	Horizontal	8.285
13.782 GHz	42.389	54	-11.611	348	2.146	Horizontal	10.517
14.011 GHz	43.211	54	-10.789	56	1.638	Horizontal	11.075
16.891 GHz	43.552	54	-10.448	247	2.65	Horizontal	13.212

Table 7: Spurious Emissions 1-17 GHz, Highest Frequency



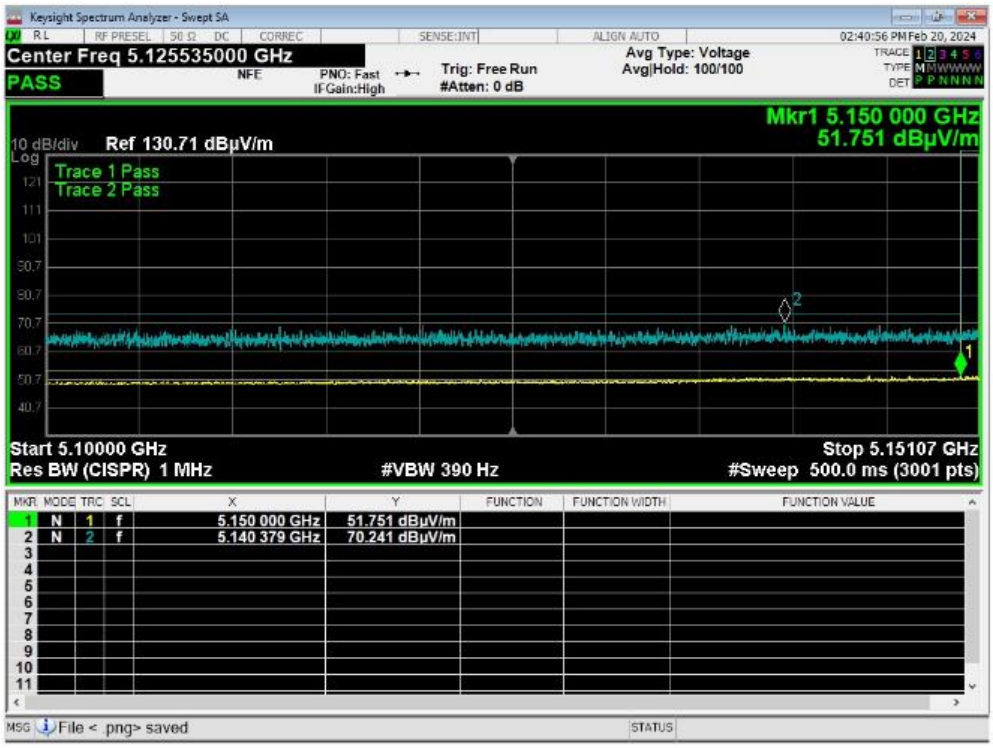
Peak

Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Pol.	Correction (dB)
20.84 GHz	53.28	74	-20.72	353	Vertical	-0.337
20.84 GHz	54.146	74	-19.854	70	Horizontal	-0.337
37.305 GHz	53.346	74	-20.654	143	Horizontal	3.94

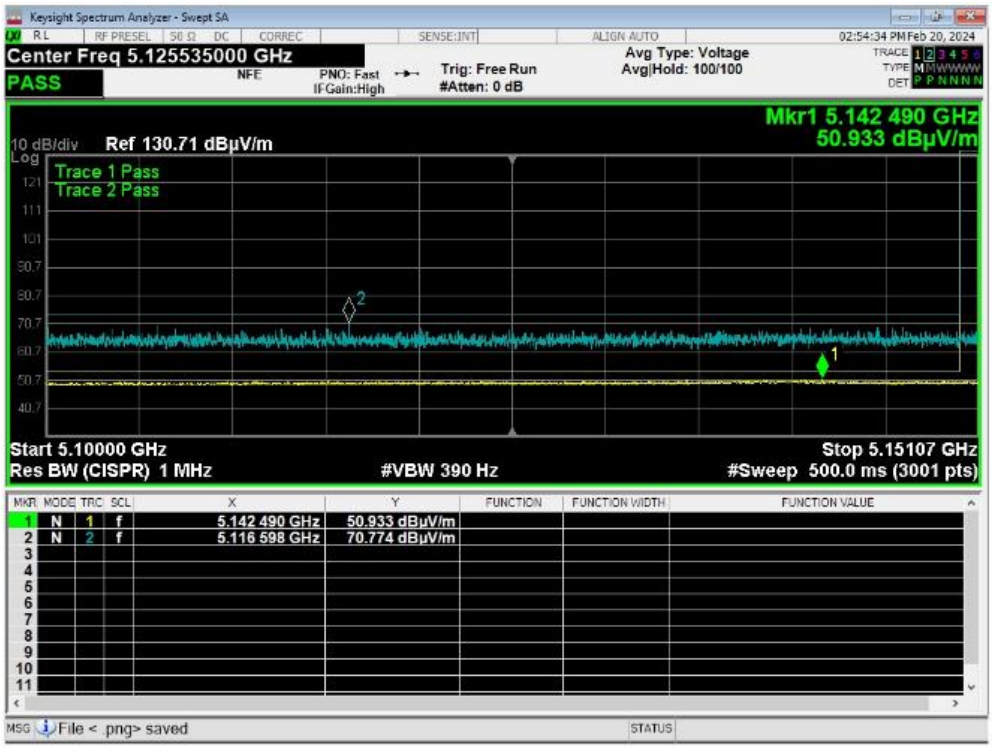
Avg

Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Pol.	Correction (dB)
20.84 GHz	43.4	54	-10.6	353	Vertical	-0.337
20.84 GHz	40.117	54	-13.883	70	Horizontal	-0.337
37.305 GHz	36.337	54	-17.663	143	Horizontal	3.94

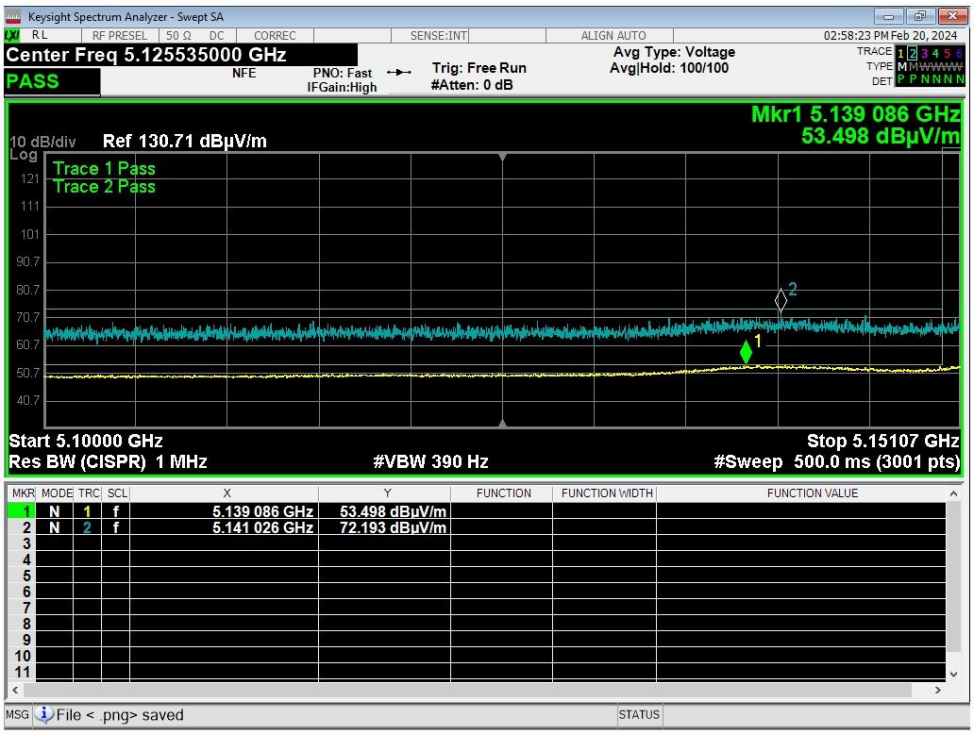
Table 11: Radiated Emissions 17 – 40 GHz on the Middle Frequency (worse case)



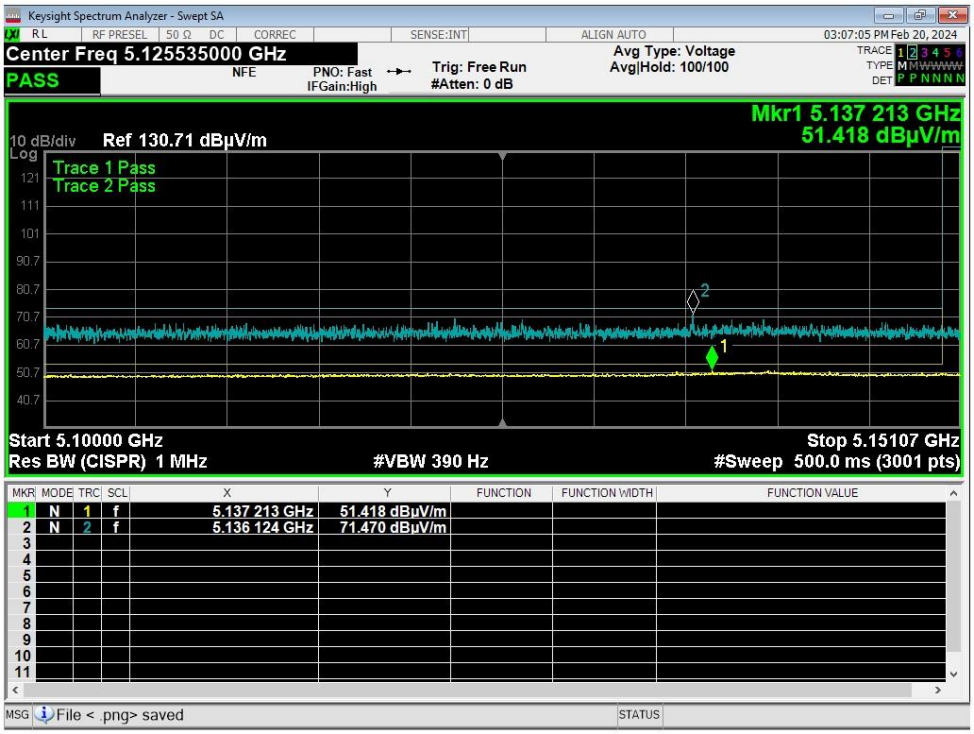
Graph 5: Band Edge a Mode 20 MHz, 5180 MHz



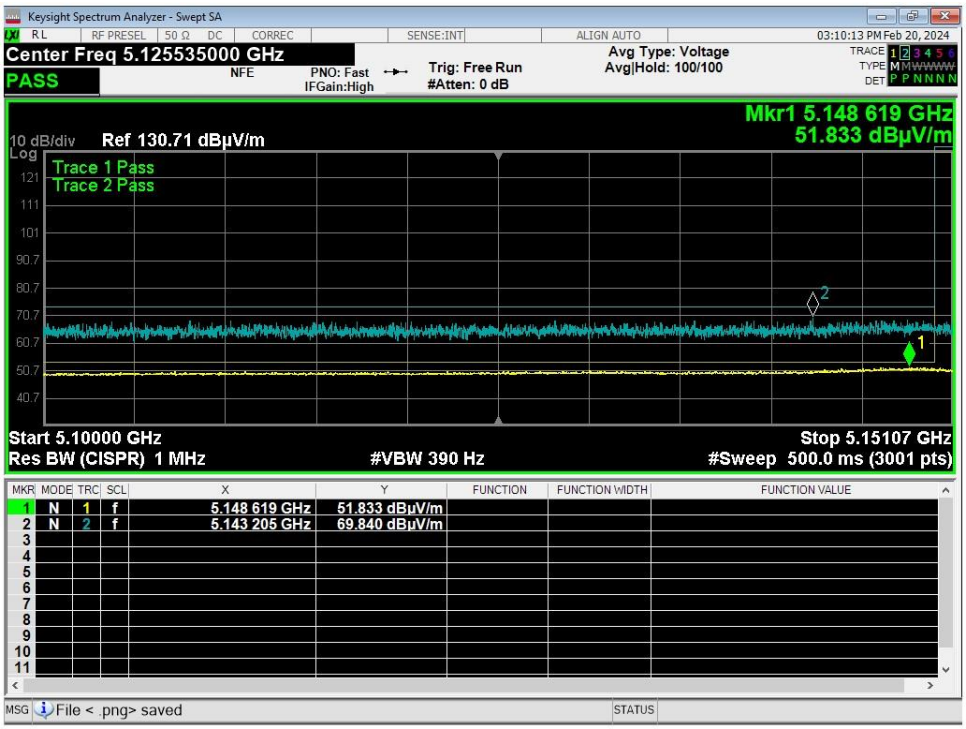
Graph 6: Band Edge a Mode 20 MHz, 5240 MHz



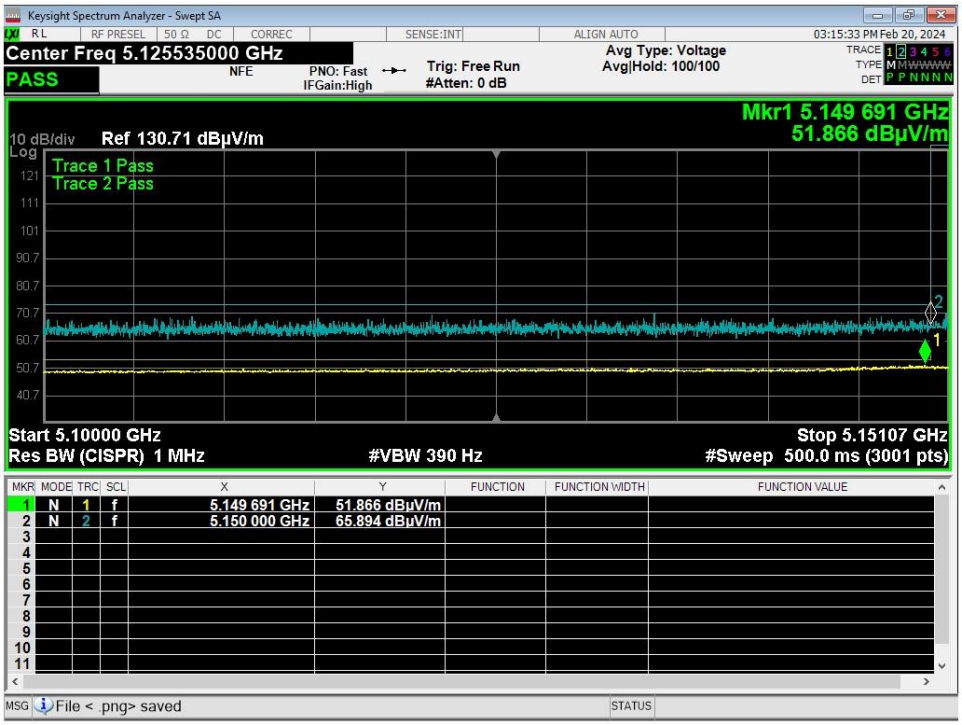
Graph 7: Band Edge ax Mode 20 MHz, 5180 MHz



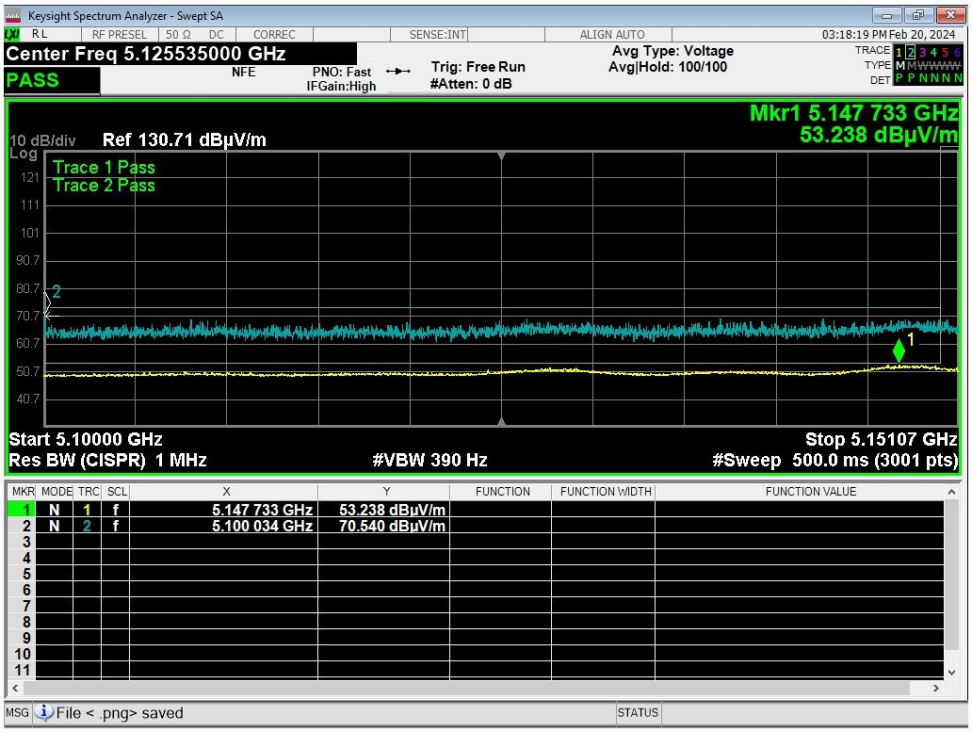
Graph 8: Band Edge ax Mode 20 MHz, 5240 MHz



Graph 9: Band Edge ax Mode 40 MHz, 5190 MHz



Graph 10: Band Edge ax Mode 40 MHz, 5230 MHz



Graph 11: Band Edge ax Mode 80 MHz, 5210 MHz

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 17 dBm in any 1 MHz band during any time interval of continuous transmission.
As per KDB 662911, when the EUT is using spatial-multiplexing in HT to HE modes, there is not additional array gain to accommodate. When the EUT uses Nss=1 data rates, the antenna gain is 6 dBi + Array gain of 6.02 dB which is a total of 12.02 dBi. The limit was reduced to 10.98 dB for NSS-1 mode by subtracting the amount the direction gain exceeds 6dB (6.02 dB).
Results of this testing are summarized.

NSS-4 Mode

Modulation (BW)	Frequency (MHz)	Data Rate	TP Setting	Measured PSD
OFDM 20	5180	Nss4-6M	21	10.25
OFDM 20	5210	Nss4-6M	23	11.82
OFDM 20	5240	Nss4-6M	27	14.61
HE 20	5180	Nss4-Mcs0	21	9.87
HE 20	5210	Nss4-Mcs0	22	10.31
HE 20	5240	Nss4-Mcs0	27	14.10
HE 40	5190	Nss4-Mcs0	18	3.73
HE 40	5230	Nss4-Mcs0	21	6.08
HE 80	5210	Nss4-Mcs0	17	5.22

NSS-1 Mode

Modulation (BW)	Frequency (MHz)	Data Rate	TP Setting	Measured PSD
OFDM 20	5180	Nss1-6M	21	10.25
OFDM 20	5210	Nss1-6M	22*	10.82
OFDM 20	5240	Nss1-6M	23*	10.61
HE 20	5180	Nss1-Mcs0	21	9.87
HE 20	5210	Nss1-Mcs0	22	10.31
HE 20	5240	Nss1-Mcs0	23*	10.10
HE 40	5190	Nss1-Mcs0	18	3.73
HE 40	5230	Nss1-Mcs0	21	6.08
HE 80	5210	Nss1-Mcs0	17	5.22

*Mathematically reduced based on measurement of 1 TP = 1 dB.

Result

The maximum summed average power spectral density was less than the limit of 17dBm and 10.98 for NSS-1 mode; therefore, the EUT complies with the specification.

-- End of Test Report --