



427 West 12800 South
 Draper, UT 84020

Test Report Certification

FCC ID	SWX-UKPRO
ISED ID	6545A-UKPRO
Equipment Under Test	U7-Outdoor
Test Report Serial Number	TR8836_02
Date of Test(s)	22, 29 November; 4, 8 December 2023; 2 January and 17 – 18 April 2024
Report Issue Date	19 April 2024

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



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	U7-Outdoor
FCC ID	SWX-UKPRO
ISED ID	6545A-UKPRO

On this 19th day of April 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: Joseph W. Jackson



Reviewed By: Richard L. Winter

Revision History		
Revision	Description	Date
01	Original Report Release	19 April 2024
02	New Model Number	10 May 2024

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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	U7-Outdoor
Serial Number	68D79A05C391
Dimensions (cm)	17.0 x 20.8 x 5.5

2.2 Description of EUT

The U7-Outdoor is a PoE powered WiFi 7 access point with a 2.5 GbE PoE port. The U7-Outdoor provides a 3.6 Gbps aggregate throughput rate. The U7-Outdoor transmits in the 2.4 (2x2) GHz and 5 (2x2) GHz frequency bands and uses an internal integrated or external dipole antenna. The U7-Outdoor is powered by an 802.3at PoE power adapter. The U7-Outdoor is outdoor device.

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

Band	WiFi Mode	Modulation Bandwidth	Modulation Type	Frequency (MHz)
UNII-3	a	20 MHz	OFDM	5745, 5775, 5825
	ax	20 MHz	HE	5745, 5775, 5825
	ax	40 MHz	HE	5755, 5775, 5795
	ax	80 MHz	HE	5775

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: U7-Outdoor (Note 1) SN: 68D79A05C391	WiFi Access Point	See Section 2.4
BN: UBIQUITI MN: U-POE-at SN: N/A	PoE Power Adapter	Unshielded Cat 5e cable/1 meters
BN: Dell	Laptop Personal Computer	Unshielded Cat 5e cable/1 meters

MN: XPS 13 SN: N/A		
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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
AC Mains	1	3 conductor power cord/80 cm
POE (POE Injector)	1	Unshielded Cat 5e cable/8 meters
LAN (POE Injector)	1	Unshielded Cat 5e cable/1 meters

2.5 Operating Environment

Power Supply	120 Volts AC Mains to 48 Volts PoE
AC Mains Frequency	60 Hz
Temperature	22.7 – 23.2 °C
Humidity	28.2 – 34.1 %
Barometric Pressure	1015 mBar

2.6 Operating Modes

The U7-Outdoor 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

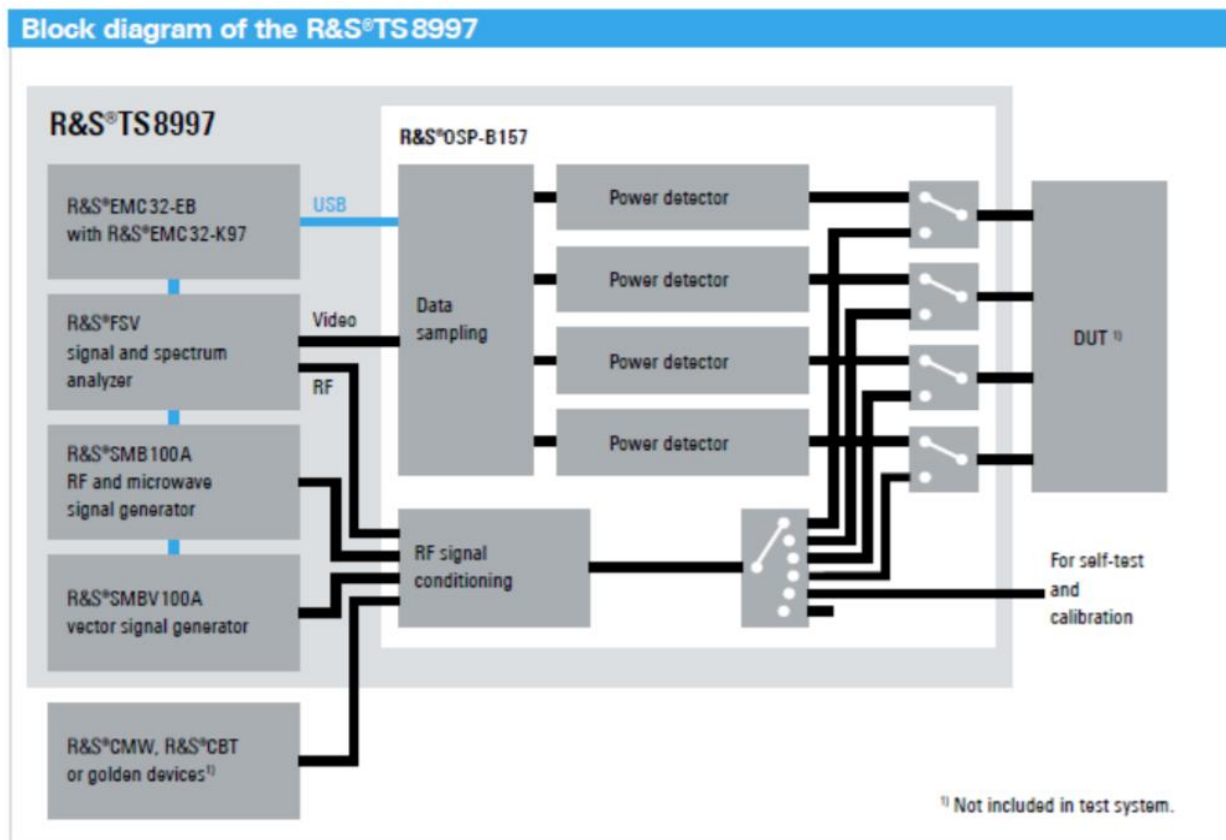


Diagram 1: Test Configuration Block Diagram

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	5725 to 5850	Compliant
15.407(e)	RSS-247 §6.2.2, §6.2.3	Peak Output Power	5725 to 5850	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	5725 to 5850	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 3-Meter and 10-Meter chambers 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	6/27/2022	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

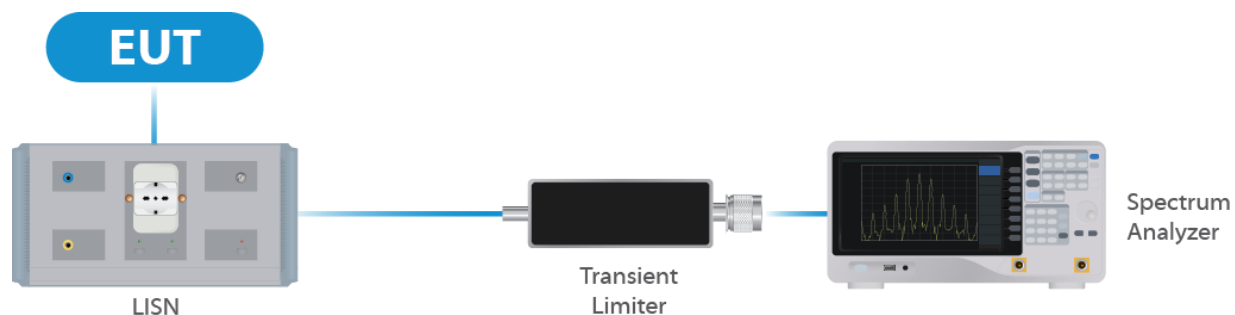


Figure 1: Conducted Emissions Test

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	2/22/2023	3/20/2024
Switch Extension	R&S	OSP-150W	UCL-2870	2/22/2023	2/22/2024

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

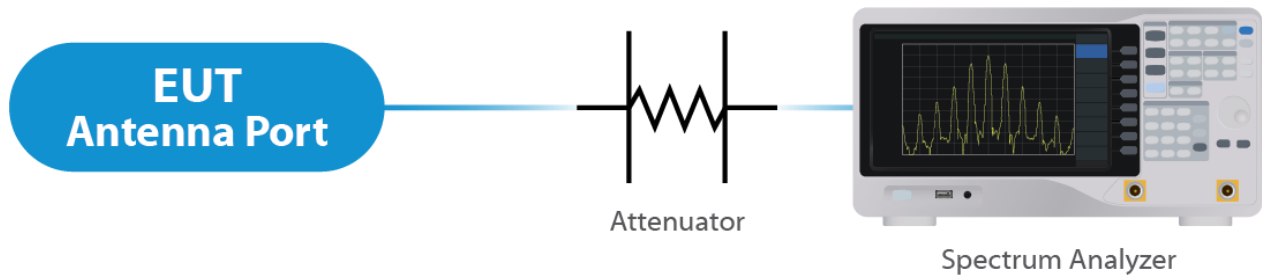


Figure 2: Direct Connect at the Antenna Port Test



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

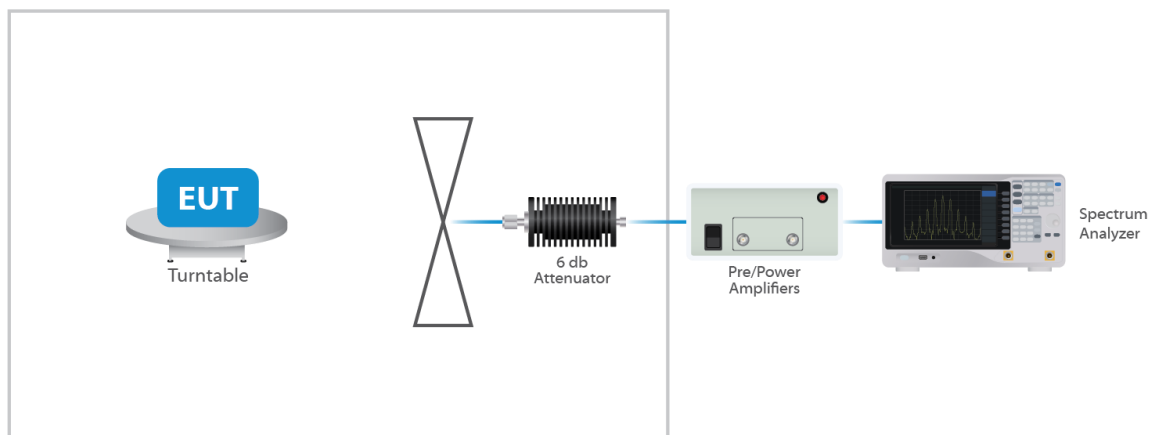


Figure 4: Radiated Emissions Test

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 (\pm 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 and an optional external antenna. Per the manufacturer, the Maximum gain of the internal antenna per chain is 12.5 dBi and the Maximum gain of the external antenna per chain is 4.57 dBi. This is an 802.11 device and utilizes CDD as described in KDB 662911 D01. The internal antenna is not user replaceable, the external antenna is user replaceable. For CDD transmissions, directional gain is calculated as follows.

Array Gain = $10 \log(\text{NANT}/\text{NSS})$ 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 $\text{NANT} \leq 4$;

For PSD measurements when $\text{Nss}=1$: Array Gain = $10 \log(\text{NANT}/\text{NSS})$ dB + Antenna Gain (dBi).

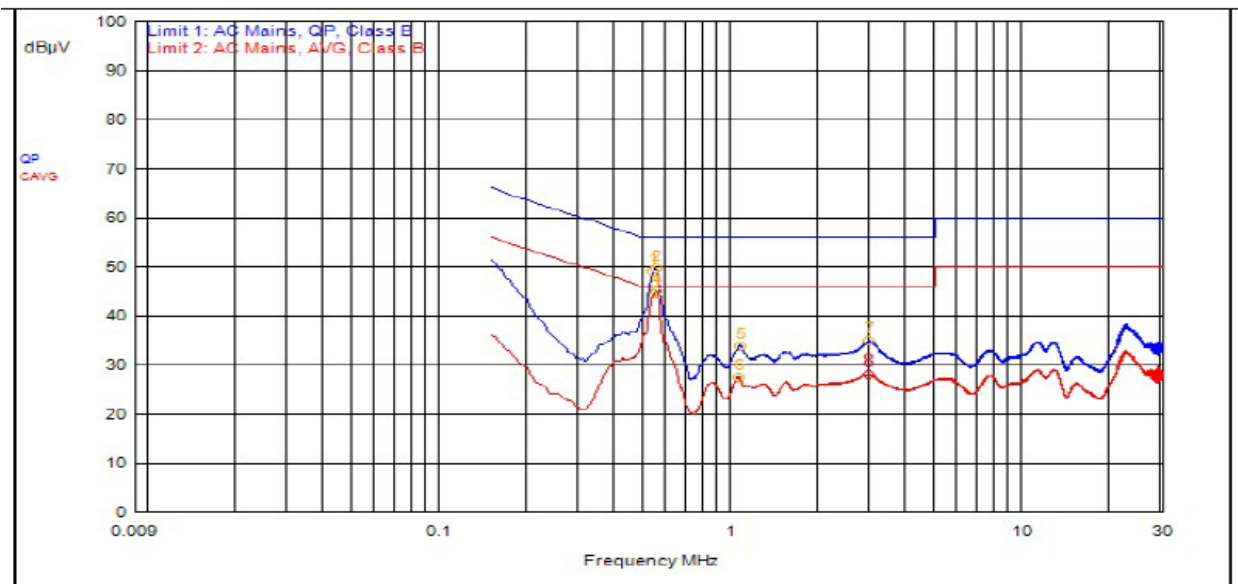
Or $3.01 \text{ dB} + 12.5 \text{ dBi} = 15.51 \text{ dBi}$ for the internal antenna and $3.01 \text{ dB} + 4.57 \text{ dBi} = 7.58 \text{ dBi}$ for the external antenna.

Results

The EUT complied with the specification

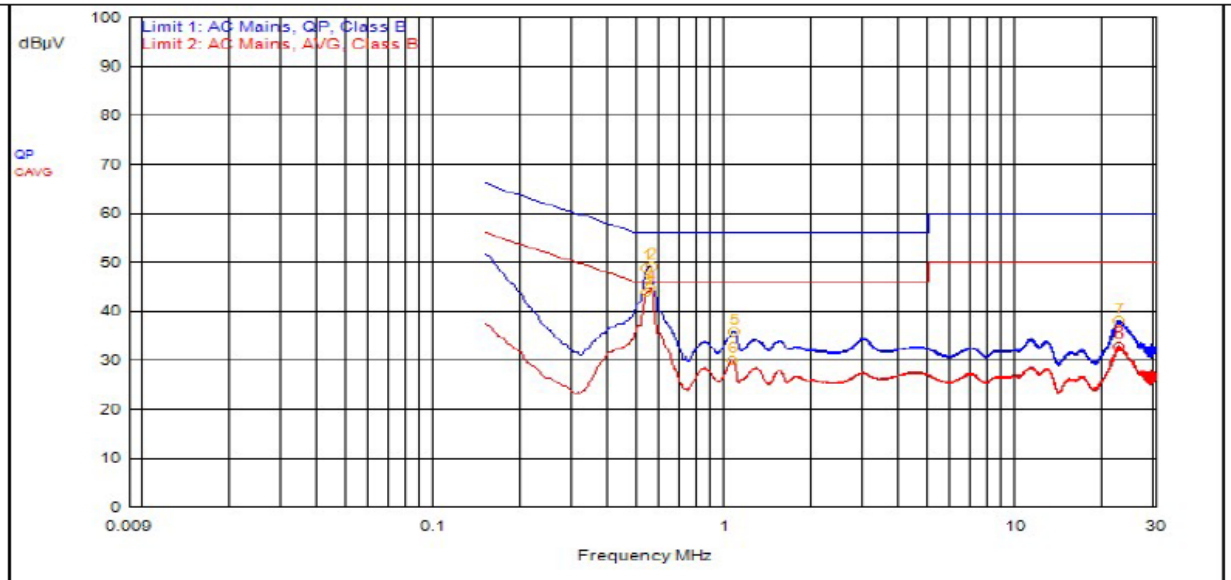
5.2 Conducted Emissions at Mains Ports Data

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	549,000kHz	12.41	0.00		QPeak	37.23	49.64	56.00	-6.36			
1	537,000kHz	12.41	0.00		QPeak	36.86	49.27	56.00	-6.73			
7	2.952	12.30	0.10		QPeak	22.60	35.00	56.00	-21.00			
5	1.059	12.38	0.10		QPeak	21.45	33.93	56.00	-22.07			
3	540,000kHz	12.41	0.00		C_AVG	32.16	44.57			46.00	-1.43	
4	549,000kHz	12.41	0.00		C_AVG	32.72	45.13			46.00	-0.87	
6	1.047	12.38	0.10		C_AVG	14.97	27.45			46.00	-18.55	
8	2.949	12.30	0.10		C_AVG	15.75	28.15			46.00	-17.85	

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
2	555,000kHz	12.41	0.00		QPeak	36.62	49.03	56.00	-6.97			
1	537,000kHz	12.42	0.00		QPeak	36.51	48.93	56.00	-7.07			
5	1.065	12.39	0.10		QPeak	23.39	35.88	56.00	-20.12			
7	22.383	12.39	0.20		QPeak	25.60	38.19	60.00	-21.81			
3	537,000kHz	12.42	0.00		C_AVG	31.47	43.89			46.00	-2.11	
4	552,000kHz	12.41	0.00		C_AVG	32.38	44.79			46.00	-1.21	
6	1.050	12.39	0.10		C_AVG	17.54	30.03			46.00	-15.97	
8	22.386	12.39	0.20		C_AVG	20.28	32.87			50.00	-17.13	

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 66291 D01. Please see associated annex for details on instrument settings.

5.3.1 Internal Antenna

Nominal BW (MHz)	Frequency (MHz)	99% Bandwidth (MHz)	26 dB Bandwidth (MHz)
a 20	5745	16.7	20.4
a 20	5775	16.6	21.0
a 20	5825	16.7	20.7
ax 20	5745	29.8	22.5
ax 20	5775	30.8	22.6
ax 20	5825	28.5	22.5
ax 40	5755	39.0	43.7
ax 40	5775	38.5	42.9
ax 40	5795	39.0	43.1
ax 80	5775	79.0	86.5

5.3.2 External Antenna

Nominal BW (MHz)	Frequency (MHz)	99% Bandwidth (MHz)	26 dB Bandwidth (MHz)
a 20	5745	24.7	39.9
a 20	5775	25.5	39.8
a 20	5825	24.7	39.4
ax 20	5745	31.3	40.0
ax 20	5775	30.3	40.0
ax 20	5825	29.8	40.0
ax 40	5755	39.0	80.0
ax 40	5775	39.5	80.0
ax 40	5795	39.0	80.0
ax 80	5775	79.0	90.0

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 66291 D01. Please see associated annex for details on instrument settings.

The maximum average RF conducted output power measured for this device was 23.48 dBm or 222.84 mW. The limit is 30 dBm, or 1 Watt when using antennas with 6 dBi or less gain. The internal antenna has a gain of 12.5 dBi so the adjusted limit is 23.5 dBm or 0.224 Watts. The external antenna has a gain of 4.57 dBi.

5.4.1 Internal Antenna

Modulation (BW)	Frequency (MHz)	Data Rate	TP Setting	Conducted Output Power *	Measured EIRP	Measured PSD
OFDM 20	5745	Nss2-Mcs0	22	23.47	35.97	5.27
OFDM 20	5775	Nss2-Mcs0	21	22.71	35.21	4.46
OFDM 20	5825	Nss2-Mcs0	21	22.66	35.16	4.03
HE 20	5745	Nss2-Mcs0	22	23.25	35.75	4.52
HE 20	5775	Nss2-Mcs0	22	23.45	35.95	4.70
HE 20	5825	Nss2-Mcs0	22	23.45	35.95	4.26
HE 40	5755	Nss2-Mcs0	22	23.28	35.78	1.50
HE 40	5775	Nss2-Mcs0	22	23.49	35.99	1.71
HE 40	5795	Nss2-Mcs0	22	23.47	35.97	1.68
HE 80	5775	Nss2-Mcs0	22	23.25	35.75	-1.48

Modulation (BW)	Frequency (MHz)	Data Rate	TP Setting	Conducted Output Power *	Measured EIRP	Measured PSD
OFDM 20	5745	Nss1-Mcs0	19	20.45	32.95	0.27
OFDM 20	5775	Nss1-Mcs0	18	19.59	32.09	-0.43
OFDM 20	5825	Nss1-Mcs0	19	20.34	32.84	0.41
HE 20	5745	Nss1-Mcs0	19	20.24	32.74	2.39
HE 20	5775	Nss1-Mcs0	19	20.45	32.95	2.22
HE 20	5825	Nss1-Mcs0	19	20.20	32.70	1.92
HE 40	5755	Nss1-Mcs0	19	20.32	32.80	-0.54
HE 40	5775	Nss1-Mcs0	19	20.44	32.94	-0.44
HE 40	5795	Nss1-Mcs0	19	20.38	32.88	-0.64
HE 80	5775	Nss1-Mcs0	19	20.24	32.74	-3.72

5.4.2 External Antenna

Modulation (BW)	Frequency (MHz)	Data Rate	TP Setting	Conducted Output Power *	Measured EIRP	Measured PSD
OFDM 20	5745	Nss2-Mcs0	30	27.86	32.43	7.71
OFDM 20	5775	Nss2-Mcs0	30	27.95	32.52	7.87
OFDM 20	5825	Nss2-Mcs0	30	27.51	32.08	7.24
HE 20	5745	Nss2-Mcs0	30	28.69	33.26	10.44
HE 20	5775	Nss2-Mcs0	30	28.21	32.78	9.93
HE 20	5825	Nss2-Mcs0	29	27.83	32.40	9.36
HE 40	5755	Nss2-Mcs0	26	26.66	31.23	5.80
HE 40	5775	Nss2-Mcs0	26	26.77	31.34	5.68
HE 40	5795	Nss2-Mcs0	26	26.68	31.25	5.61
HE 80	5775	Nss2-Mcs0	23	23.60	28.17	-0.42

Modulation (BW)	Frequency (MHz)	Data Rate	TP Setting	Conducted Output Power *	Measured EIRP	Measured PSD
OFDM 20	5745	Nss1-Mcs0	30	27.86	32.43	7.71
OFDM 20	5775	Nss1-Mcs0	30	27.95	32.52	7.87
OFDM 20	5825	Nss1-Mcs0	30	27.51	32.08	7.24
HE 20	5745	Nss1-Mcs0	30	28.69	33.26	10.44
HE 20	5775	Nss1-Mcs0	30	28.21	32.78	9.93
HE 20	5825	Nss1-Mcs0	29	27.83	32.40	9.36
HE 40	5755	Nss1-Mcs0	26	26.66	31.23	5.80
HE 40	5775	Nss1-Mcs0	26	26.77	31.34	5.68
HE 40	5795	Nss1-Mcs0	26	26.68	31.25	5.61
HE 80	5775	Nss1-Mcs0	23	23.60	28.17	-0.42

Result

In the configuration tested, the maximum summed average RF output power was less than 1 watt; therefore, the EUT complied 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 ranges 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 within the annex are plots with the EUT turned to the upper and lower channels with the internal antenna gain of 12.5 dBi and external antenna gain of 4.57 dBi accounted for. These demonstrate compliance with the provisions of this section at the band edges.

All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

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

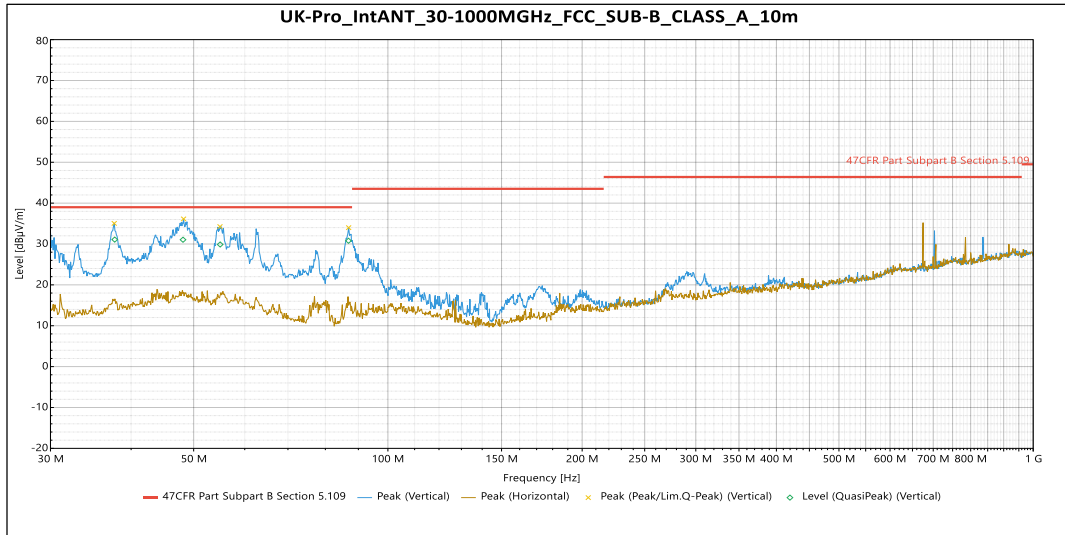
The EUT uses various power settings based on the channel in use. In order to reduce test time, the radiated spurious emissions at the lowest, middle, and highest channel were measured at the maximum power of TP30 (external antenna) and TP22 (internal antenna).

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.

Internal Antenna

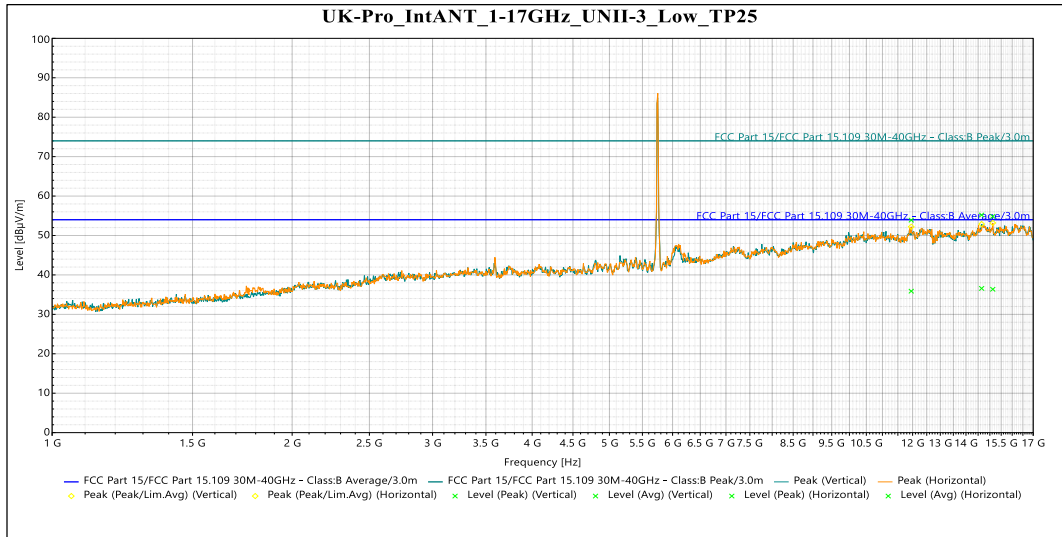


QuasiPeak

Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin	Azimuth (°)	Height	Pol.	Correction (dB)
37.726 MHz	31.084	39	-7.916	98	1.019	Vertical	-14.6
48.139 MHz	31.043	39	-7.957	76	2.405	Vertical	-12.303
54.963 MHz	29.877	39	-9.123	306	3.932	Vertical	-12.674
86.879 MHz	30.788	39	-8.212	178	1.35	Vertical	-17.381

Note: No Significant emissions were observed in the horizontal orientation of the antenna

Table 4: Radiated Emissions 30 – 1000 MHz

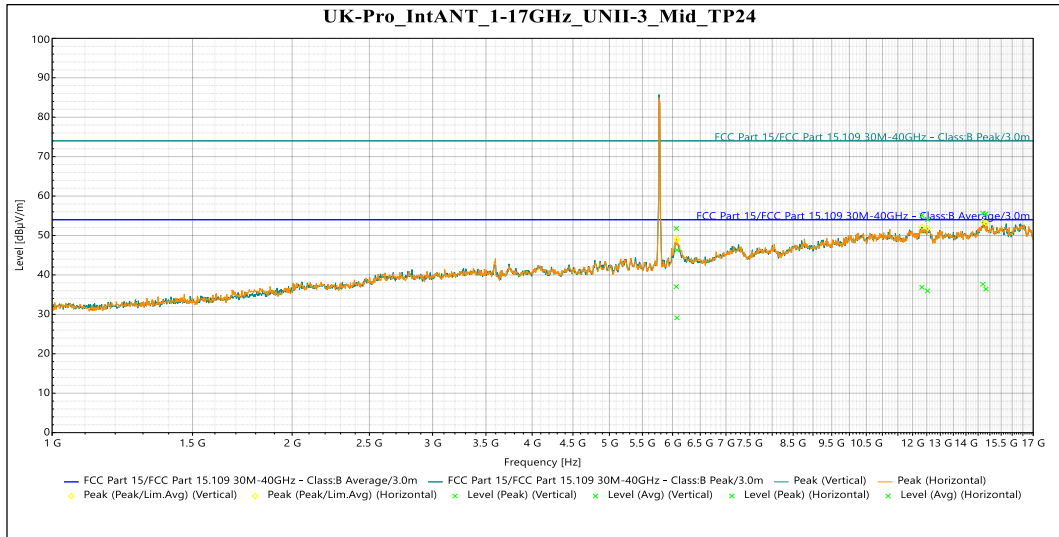

Peak

Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
14.648 GHz	55.187	74	-18.813	84	3.069	Vertical	16.776
11.954 GHz	53.893	74	-20.107	299	4	Horizontal	16.485
15.127 GHz	54.826	74	-19.174	274	3.287	Horizontal	16.251

Avg

Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
14.648 GHz	36.583	54	-17.417	84	3.069	Vertical	16.776
11.954 GHz	35.878	54	-18.122	299	4	Horizontal	16.485
15.127 GHz	36.358	54	-17.642	274	3.287	Horizontal	16.251

Table 5: Radiated Emissions 1 – 17 GHz Transmitting on the Lowest Frequency

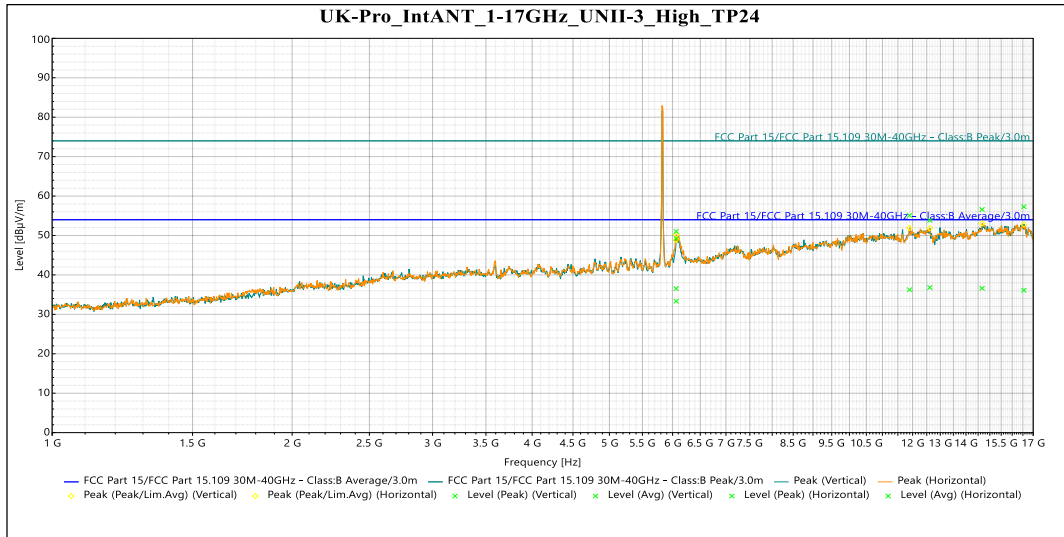

Peak

Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
6.077 GHz	46.315	74	-27.685	158	1.879	Vertical	7.3
12.328 GHz	55.084	74	-18.916	170	2.529	Vertical	16.643
14.703 GHz	55.703	74	-18.297	313	1.632	Vertical	17.428
6.0658 GHz	51.792	74	-22.208	355	1.63	Horizontal	7.249
12.534 GHz	54.114	74	-19.886	294	4	Horizontal	16.583
14.831 GHz	55.501	74	-18.499	245	3.637	Horizontal	16.568

Avg

Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
6.077 GHz	29.132	54	-24.868	158	1.879	Vertical	7.3
12.328 GHz	36.863	54	-17.137	170	2.529	Vertical	16.643
14.703 GHz	37.627	54	-16.373	313	1.632	Vertical	17.428
6.0658 GHz	37.022	54	-16.978	355	1.63	Horizontal	7.249
12.534 GHz	35.961	54	-18.039	294	4	Horizontal	16.583
14.831 GHz	36.422	54	-17.578	245	3.637	Horizontal	16.568

Table 6: Radiated Emissions 1 – 17 GHz Transmitting on the Middle Frequency

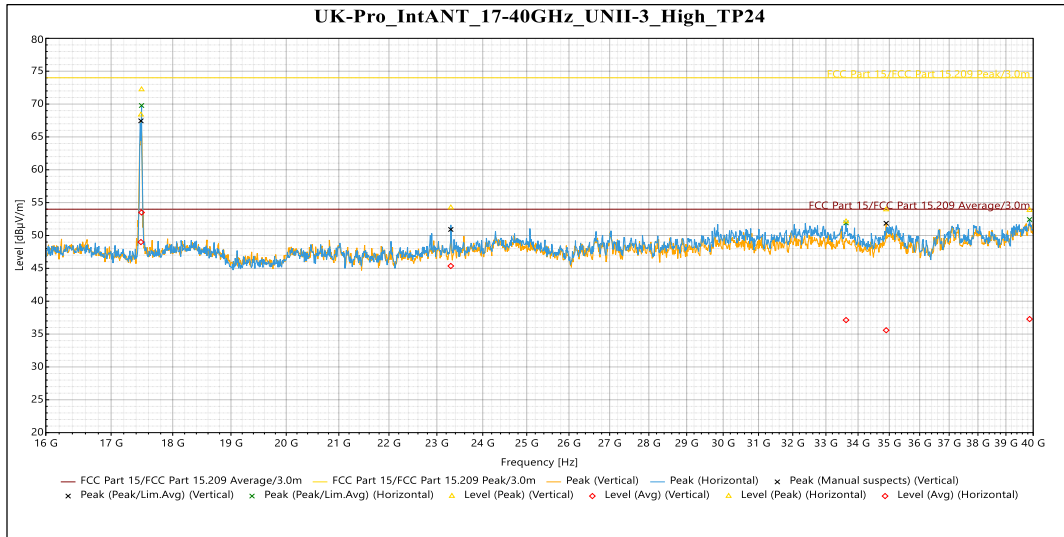

Peak

Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
6.0639 GHz	49.227	74	-24.773	343	2.58	Vertical	7.24
12.614 GHz	53.833	74	-20.167	54	3.786	Vertical	16.543
16.548 GHz	57.291	74	-16.709	21	1.706	Vertical	18.37
6.0637 GHz	51.019	74	-22.981	17	1.632	Horizontal	7.239
11.895 GHz	55.097	74	-18.903	62	2.528	Horizontal	16.492
14.667 GHz	56.594	74	-17.406	266	3.794	Horizontal	17.035

Avg

Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
6.0639 GHz	33.332	54	-20.668	343	2.58	Vertical	7.24
12.614 GHz	36.797	54	-17.203	54	3.786	Vertical	16.543
16.548 GHz	36.103	54	-17.897	21	1.706	Vertical	18.37
6.0637 GHz	36.544	54	-17.456	17	1.632	Horizontal	7.239
11.895 GHz	36.254	54	-17.746	62	2.528	Horizontal	16.492
14.667 GHz	36.599	54	-17.401	266	3.794	Horizontal	17.035

Table 7: Radiated Emissions 1 – 17 GHz Transmitting on the Highest Frequency


Peak

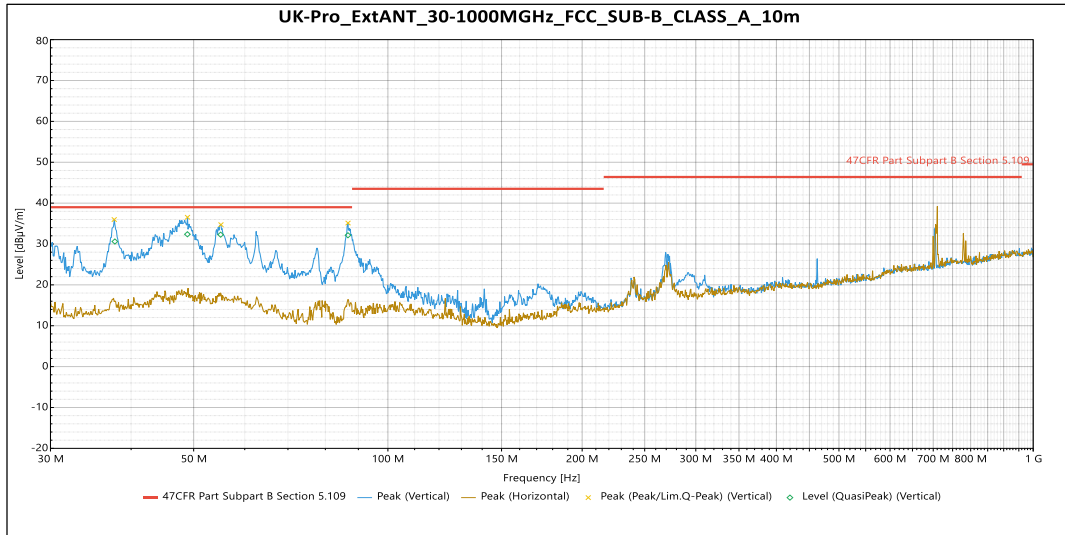
Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Pol.	Correction (dB)
17.477 GHz	68.366	74	-5.634	1	Vertical	-1.135
23.3 GHz	54.237	74	-19.763	76	Vertical	0.407
34.899 GHz	53.95	74	-20.05	37	Vertical	3.345
17.487 GHz	72.222	74	-1.778	331	Horizontal	-1.111
33.623 GHz	52.131	74	-21.869	169	Horizontal	2.181
39.867 GHz	53.857	74	-20.143	171	Horizontal	3.326

Avg

Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Pol.	Correction (dB)
17.477 GHz	48.997	54	-5.003	1	Vertical	-1.135
23.3 GHz	45.362	54	-8.638	76	Vertical	0.407
34.899 GHz	35.575	54	-18.425	37	Vertical	3.345
17.487 GHz	53.498	54	-0.502	331	Horizontal	-1.111
33.623 GHz	37.13	54	-16.87	169	Horizontal	2.181
39.867 GHz	37.277	54	-16.723	171	Horizontal	3.326

Table 8: Radiated Emissions 17 – 40 GHz on the Highest Frequency (worse case)

External Antenna

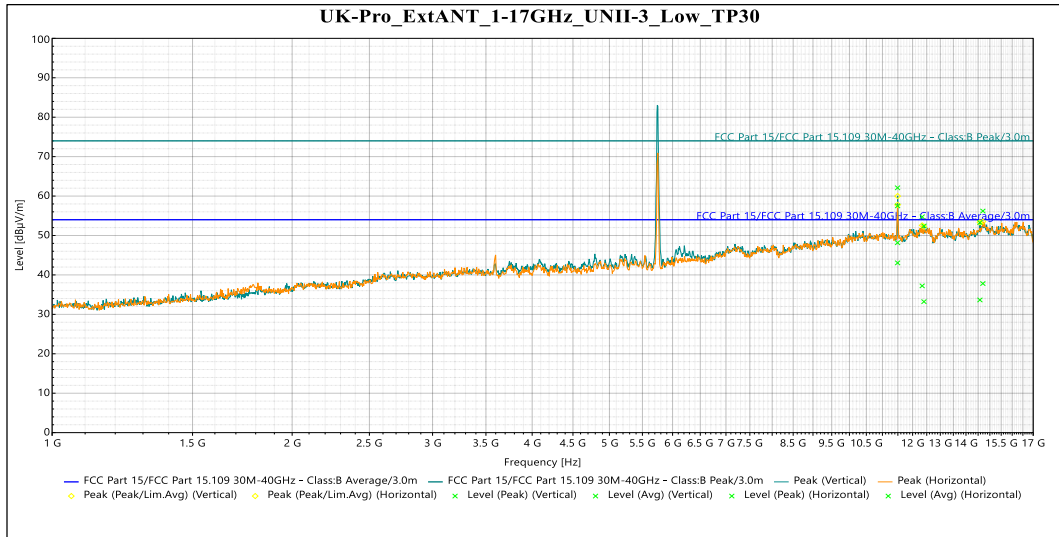


QuasiPeak

Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin	Azimuth (°)	Height	Pol.	Correction (dB)
37.748 MHz	30.612	39	-8.388	93	1.095	Vertical	-14.598
48.899 MHz	32.378	39	-6.622	205	3.312	Vertical	-12.379
55.058 MHz	32.282	39	-6.718	202	3.827	Vertical	-12.699
86.715 MHz	32.138	39	-6.862	142	1.707	Vertical	-17.43

Note: No Significant emissions were observed in the horizontal orientation of the antenna

Table 9: Radiated Emissions 30 – 1000 MHz



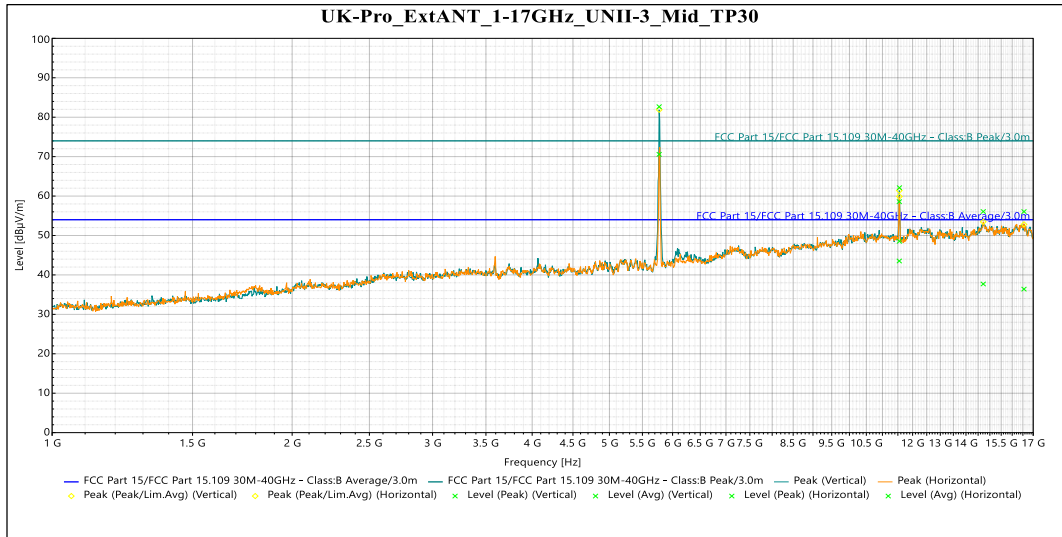
Peak

Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
11.492 GHz	57.513	74	-16.487	19	3.252	Vertical	14.614
12.4 GHz	52.405	74	-21.595	51	1.528	Vertical	16.299
14.576 GHz	53.276	74	-20.724	168	2.168	Vertical	16.106
11.491 GHz	62.088	74	-11.912	321	3.287	Horizontal	14.614
12.337 GHz	54.743	74	-19.257	359	3.81	Horizontal	16.601
14.7 GHz	56.198	74	-17.802	353	3.111	Horizontal	17.463

Avg

Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
11.492 GHz	43.052	54	-10.948	19	3.252	Vertical	14.614
12.4 GHz	33.217	54	-20.783	51	1.528	Vertical	16.299
14.576 GHz	33.653	54	-20.347	168	2.168	Vertical	16.106
11.491 GHz	48.163	54	-5.837	321	3.287	Horizontal	14.614
12.337 GHz	37.222	54	-16.778	359	3.81	Horizontal	16.601
14.7 GHz	37.81	54	-16.19	353	3.111	Horizontal	17.463

Table 10: Radiated Emissions 1 – 17 GHz Transmitting on the Lowest Frequency

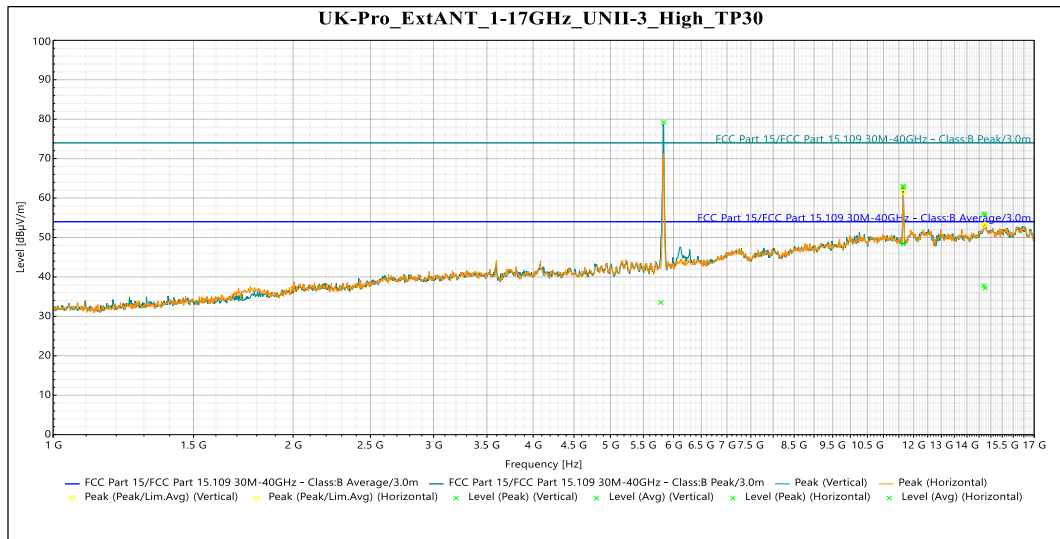

Peak

Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
5.7721 GHz	82.662	74	8.662	53	2.933	Vertical	6.365
11.548 GHz	58.582	74	-15.418	27	3.462	Vertical	14.668
16.554 GHz	56.06	74	-17.94	279	2.058	Vertical	18.382
11.552 GHz	62.116	74	-11.884	44	2.933	Horizontal	14.672
14.716 GHz	56.065	74	-17.935	98	2.23	Horizontal	17.283

Avg

Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
5.7721 GHz	70.583	54	16.583	53	2.933	Vertical	6.365
11.548 GHz	43.528	54	-10.472	27	3.462	Vertical	14.668
16.554 GHz	36.4	54	-17.6	279	2.058	Vertical	18.382
11.552 GHz	48.538	54	-5.462	44	2.933	Horizontal	14.672
14.716 GHz	37.699	54	-16.301	98	2.23	Horizontal	17.283

Table 11: Radiated Emissions 1 – 17 GHz Transmitting on the Middle Frequency



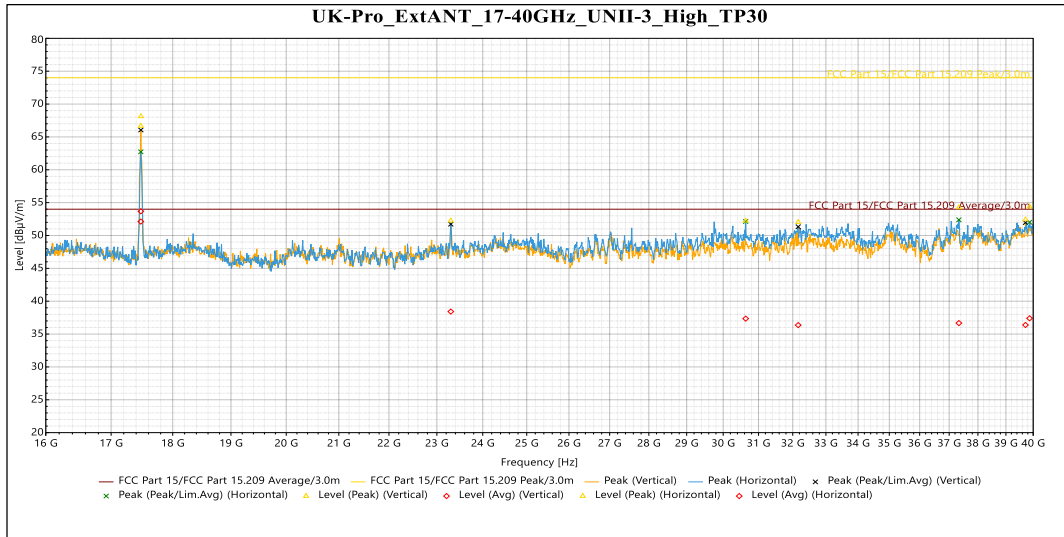
Peak

Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
5.8308 GHz	79.253	74	5.253	342	1.63	Vertical	6.184
11.644 GHz	62.959	74	-11.041	8	2.348	Vertical	14.501
14.704 GHz	56.051	74	-17.949	103	1.63	Vertical	17.417
11.651 GHz	62.82	74	-11.18	46	2.932	Horizontal	14.5
14.749 GHz	55.739	74	-18.261	129	2.055	Horizontal	17.068

Avg

Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
5.7824 GHz	33.512	54	-20.488	18	1.5	Vertical	6.311
11.644 GHz	48.367	54	-5.633	8	2.348	Vertical	14.501
14.704 GHz	37.771	54	-16.229	103	1.63	Vertical	17.417
11.651 GHz	48.511	54	-5.489	46	2.932	Horizontal	14.5
14.749 GHz	37.168	54	-16.832	129	2.055	Horizontal	17.068

Table 12: Radiated Emissions 1 – 17 GHz Transmitting on the Highest Frequency



Peak

Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Pol.	Correction (dB)
17.476 GHz	68.132	74	-5.868	320	Vertical	-1.137
23.3 GHz	52.25	74	-21.75	345	Vertical	0.407
32.163 GHz	52.031	74	-21.969	11	Vertical	2.557
39.715 GHz	52.426	74	-21.574	70	Vertical	2.873
17.475 GHz	66.664	74	-7.336	74	Horizontal	-1.139
30.633 GHz	52.24	74	-21.76	308	Horizontal	1.034
37.335 GHz	54.269	74	-19.731	245	Horizontal	3.972
39.866 GHz	54.377	74	-19.623	19	Horizontal	3.32

Avg

Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Pol.	Correction (dB)
17.476 GHz	53.683	54	-0.317	320	Vertical	-1.137
23.3 GHz	38.416	54	-15.584	345	Vertical	0.407
32.163 GHz	36.359	54	-17.641	11	Vertical	2.557
39.715 GHz	36.377	54	-17.623	70	Vertical	2.873
17.475 GHz	52.115	54	-1.885	74	Horizontal	-1.139
30.633 GHz	37.352	54	-16.648	308	Horizontal	1.034
37.335 GHz	36.672	54	-17.328	245	Horizontal	3.972
39.866 GHz	37.4	54	-16.6	19	Horizontal	3.32

Table 13: Radiated Emissions 17 – 40 GHz on the Highest Frequency (worse case)

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 66291 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 30 dBm in any 500 kHz band during any time interval of continuous transmission.

As per KDB 662911, When the EUT is using spatial-multiplexing in HE modes, there is no additional array gain to accommodate. When the EUT uses Nss=1 data rate; the internal antenna gain is 12.5 dBi + Array gain of 3.01 dB which is a total of 15.51 dBi; the external antenna gain is 4.57 dBi + Array gain of 3.01 dB which is a total of 7.58 dBi.

Results of this testing are summarized.

5.6.1 Internal Antenna

Modulation (BW)	Frequency (MHz)	Data Rate	TP Setting	Conducted Output Power	Measured EIRP	Measured PSD
OFDM 20	5745	Nss2-Mcs0	22	23.47	35.97	5.27
OFDM 20	5775	Nss2-Mcs0	21	22.71	35.21	4.46
OFDM 20	5825	Nss2-Mcs0	21	22.66	35.16	4.03
HE 20	5745	Nss2-Mcs0	22	23.25	35.75	4.52
HE 20	5775	Nss2-Mcs0	22	23.45	35.95	4.70
HE 20	5825	Nss2-Mcs0	22	23.45	35.95	4.26
HE 40	5755	Nss2-Mcs0	22	23.28	35.78	1.50
HE 40	5775	Nss2-Mcs0	22	23.49	35.99	1.71
HE 40	5795	Nss2-Mcs0	22	23.47	35.97	1.68
HE 80	5775	Nss2-Mcs0	22	23.25	35.75	-1.48

Modulation (BW)	Frequency (MHz)	Data Rate	TP Setting	Conducted Output Power *	Measured EIRP	Measured PSD
OFDM 20	5745	Nss1-Mcs0	19	20.45	32.95	0.27
OFDM 20	5775	Nss1-Mcs0	18	19.59	32.09	-0.43
OFDM 20	5825	Nss1-Mcs0	19	20.34	32.84	0.41
HE 20	5745	Nss1-Mcs0	19	20.24	32.74	2.39

HE 20	5775	Nss1-Mcs0	19	20.45	32.95	2.22
HE 20	5825	Nss1-Mcs0	19	20.20	32.70	1.92
HE 40	5755	Nss1-Mcs0	19	20.32	32.80	-0.54
HE 40	5775	Nss1-Mcs0	19	20.44	32.94	-0.44
HE 40	5795	Nss1-Mcs0	19	20.38	32.88	-0.64
HE 80	5775	Nss1-Mcs0	19	20.24	32.74	-3.72

5.6.2 External Antenna

Modulation (BW)	Frequency (MHz)	Data Rate	TP Setting	Conducted Output Power	Measured EIRP	Measured PSD
OFDM 20	5745	Nss2-Mcs0	30	27.86	32.43	7.71
OFDM 20	5775	Nss2-Mcs0	30	27.95	32.52	7.87
OFDM 20	5825	Nss2-Mcs0	30	27.51	32.08	7.24
HE 20	5745	Nss2-Mcs0	30	28.69	33.26	10.44
HE 20	5775	Nss2-Mcs0	30	28.21	32.78	9.93
HE 20	5825	Nss2-Mcs0	29	27.83	32.40	9.36
HE 40	5755	Nss2-Mcs0	26	26.66	31.23	5.80
HE 40	5775	Nss2-Mcs0	26	26.77	31.34	5.68
HE 40	5795	Nss2-Mcs0	26	26.68	31.25	5.61
HE 80	5775	Nss2-Mcs0	23	23.60	28.17	-0.42

Modulation (BW)	Frequency (MHz)	Data Rate	TP Setting	Conducted Output Power	Measured EIRP	Measured PSD
OFDM 20	5745	Nss1-Mcs0	30	27.86	32.43	7.71
OFDM 20	5775	Nss1-Mcs0	30	27.95	32.52	7.87
OFDM 20	5825	Nss1-Mcs0	30	27.51	32.08	7.24
HE 20	5745	Nss1-Mcs0	30	28.69	33.26	10.44
HE 20	5775	Nss1-Mcs0	30	28.21	32.78	9.93
HE 20	5825	Nss1-Mcs0	29	27.83	32.40	9.36
HE 40	5755	Nss1-Mcs0	26	26.66	31.23	5.80
HE 40	5775	Nss1-Mcs0	26	26.77	31.34	5.68
HE 40	5795	Nss1-Mcs0	26	26.68	31.25	5.61
HE 80	5775	Nss1-Mcs0	23	23.60	28.17	-0.42

Result

The maximum summed average power spectral density was less than the limit of 30 dBm (28.42 for Nss1) for the external antenna and less than the limit of 23.5 dBm (13.99 dBm for Nss1) for the internal antenna; therefore, the EUT complies with the specification.

-- End of Test Report --