



427 West 12800 South
 Draper, UT 84020

Test Report Certification

FCC ID	SWX-UKU
ISED ID	6545A-UKU
Equipment Under Test	UK-ULTRA
Test Report Serial Number	TR8513_04
Date of Test(s)	4, 8 – 10, 14, 23 August and 11, 14 September 2023
Report Issue Date	September 26, 2023

Test Specification	Applicant
47 CFR FCC Part 15, Subpart E RSS-GEN Issue 5	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	UK-ULTRA
FCC ID	SWX-UKU
ISED ID	6545A-UKU

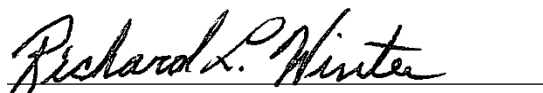
On this 26th day of September 2023, I individually and for Unified Compliance Laboratory certify that the statements made in this engineering report are true, complete and correct to the best of my knowledge and are made in good faith.

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: Clay Allred



Reviewed By: Richard L. Winter

Revision History		
Revision	Description	Date
01	Original Report Release	September 26, 2023
02	Amend Antenna Gain in Section 5.4	October 19, 2023
03	Amended FCC ID Number on Title Page and Page 2	28 November 2023
04	Added External Panel Antenna Data in Sections 5.1, 5.3, 5.4 and 5.6	18 December 2023

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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	UK-ULTRA
Serial Number	077-M5ELV7
Dimensions (cm)	13.7 x 8.4 x 3.4

2.2 Description of EUT

The UK-Ultra is a WiFi mesh that provides simultaneous, dual-band, 2x2 MIMO technology. The UK-Ultra is used to expand the coverage of an UniFi system. The UK-Ultra provides 802.11ac technology for ubiquitous WiFi coverage for both indoor and outdoor use. The UK-Ultra is power from a 48-volt PoE adapter POE-24-12W-G-WH

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
	ac	20 MHz	VHT	5745, 5775, 5825
	ac	40 MHz	VHT	5755, 5775, 5795
	ac	80 MHz	VHT	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: UK-Ultra (Note 1) SN: 077-M5ELV7	Wireless Access Point	See Section 2.4
BN: UBIQUITI MN: U-POE-af SN: N/A	PoE Power Adapter	Shielded or Un-shielded cat 5e cable / < 3 meters
BN: Dell MN: XPS 13 SN: N/A	Laptop Computer	Shielded or Un-shielded cat 5e cable / < 3 meters

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/80cm
PoE (PoE Injector)	1	Shielded or Un-shielded cat 5e cable/8 meters
LAN (PoE Injector)	1	Shielded or Un-shielded cat 5e cable/1 meters

2.5 Operating Environment

Power Supply	120 VAC
AC Mains Frequency	60 Hz
Temperature	20.1 – 26.0 °C
Humidity	35.2 – 50.3 %
Barometric Pressure	1015 mBar

2.6 Operating Modes

The UK-ULTRA 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/ac were investigated. All measurements are reported with the worst-case mode (802.11ac) 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

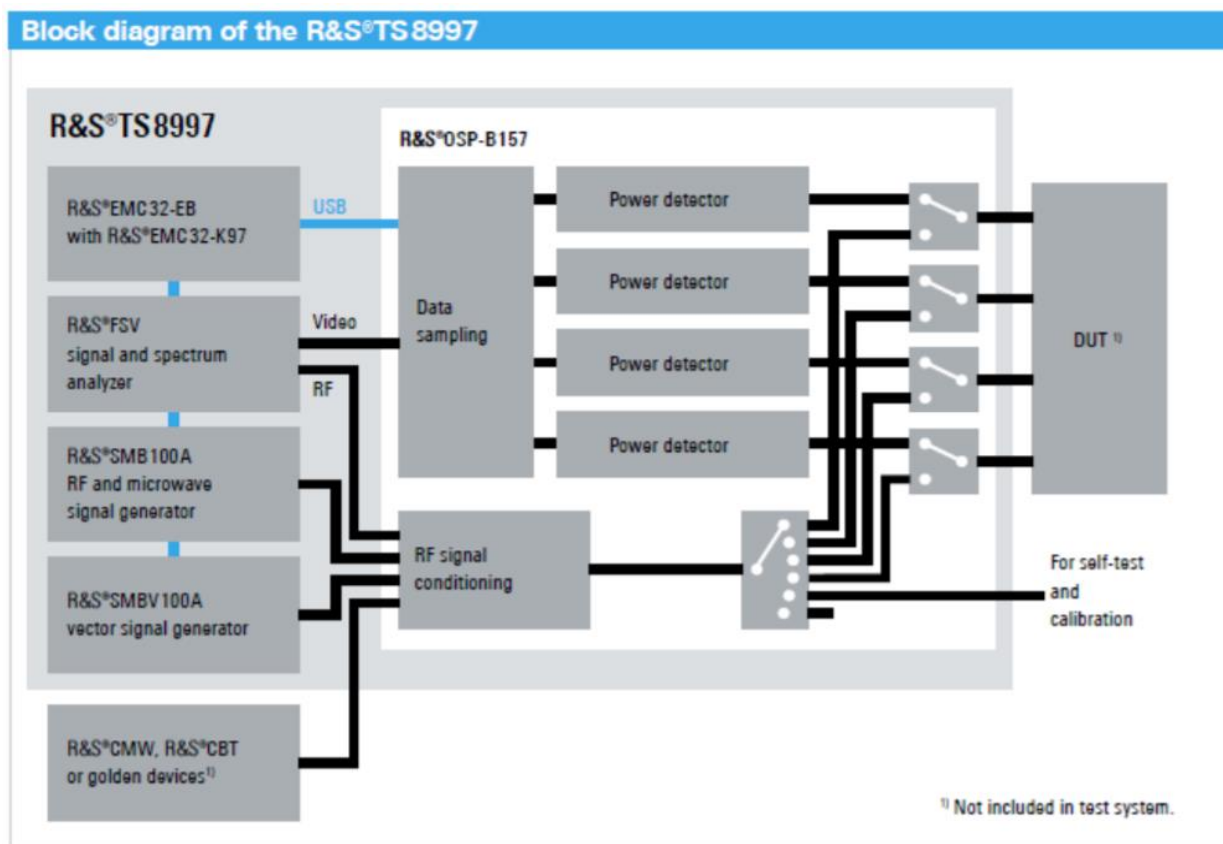


Diagram 1: Test Configuration Block Diagram

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	0.03 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 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-6754	2/22/2023	2/22/2024
LISN	AFJ	LS16C/10	UCL-6749	12/6/2021	12/6/2023
ISN	Teseq	ISN T800	UCL-2974	6/27/2022	6/27/2024
LISN	Com-Power	LIN-120C	UCL-2612	1/24/2023	1/24/2024
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

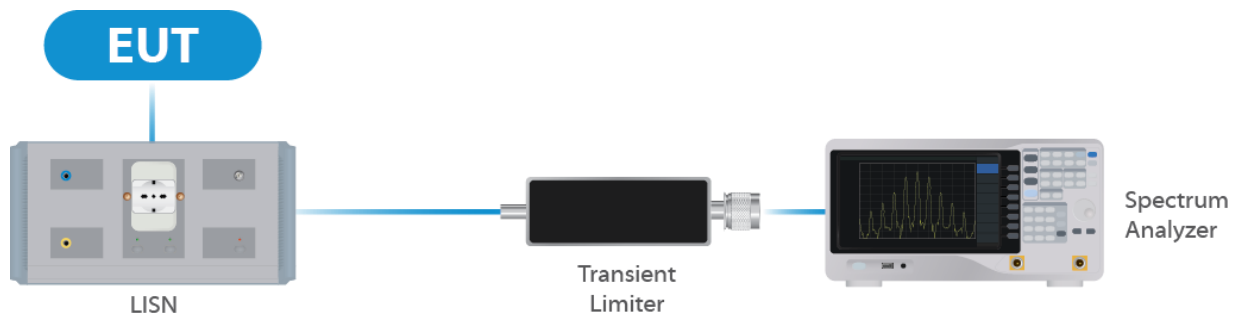


Figure 1: Conducted Emissions Test

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	11/7/2022	11/7/2023
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	2/22/2024
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

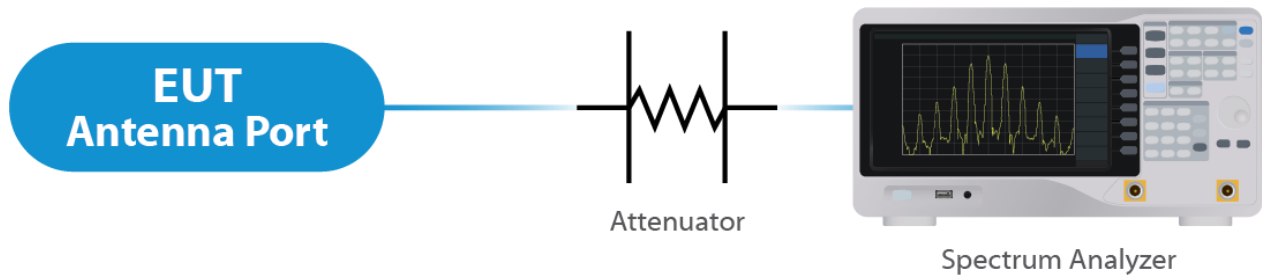


Figure 2: Direct Connect at the Antenna Port Test



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	1/27/2023	1/27/2024
Pre-Amplifier 9 kHz – 1 GHz	Sonoma Instruments	310N	UCL-2889	10/7/2021	10/7/2023
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	12/9/2022	12/9/2023
Test Software	UCL	Revision 1	UCL-3108	N/A	N/A

Table 3: List of equipment used for Radiated Emissions

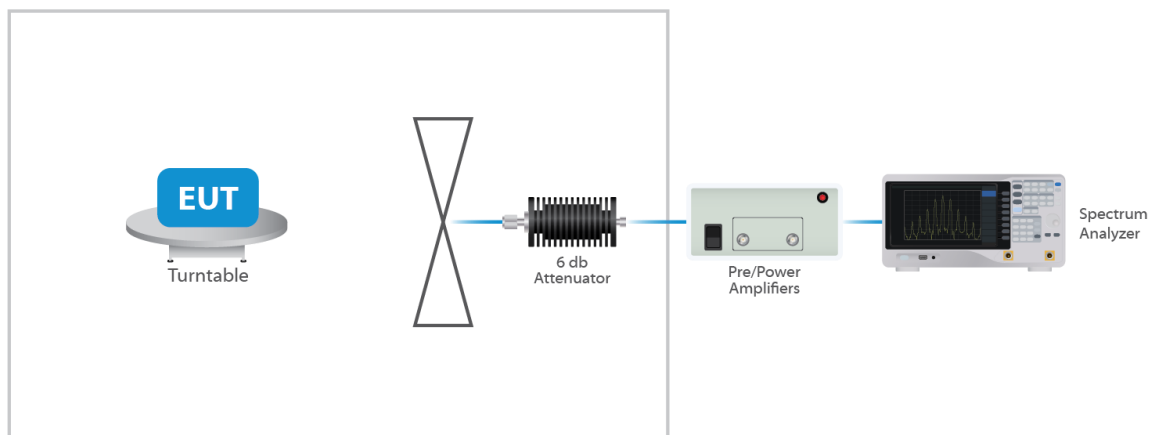


Figure 4: Radiated Emissions Test

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 integrated antenna structure and an omni external antenna. Per the manufacturer, the maximum gain of the integrated antenna per chain is 6.1 dBi, the omni external antenna is 4.57 dBi and the external panel antenna is 15 dBi.

This is an 802.11 device and utilizes CDD as described in KDB 662911 D01. The integrated antenna is not user replaceable whereas the external omni antenna is user replaceable.

For power measurements on IEEE 802.11 devices, Array Gain = 0 dB for $N_{ANT} \leq 4$;

For PSD measurements when $N_{ss}=1$: Array Gain = $10 \log(N_{ant}/N_{ss})$ dB = 9.1 dB for the integrated antenna and 7.58 dB for the external omni antenna.

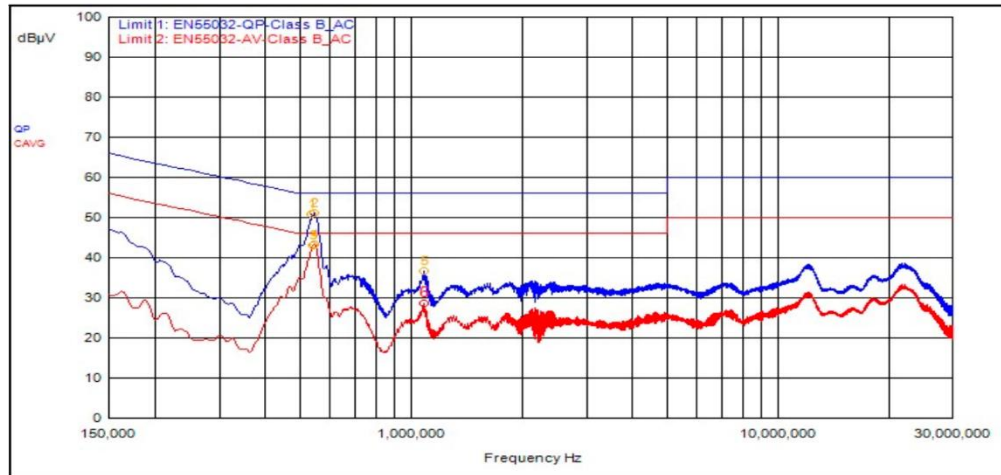
Results

The EUT complied with the specification

5.2 Conducted Emissions at Mains Ports Data

5.2.1 Line

Hot Lead



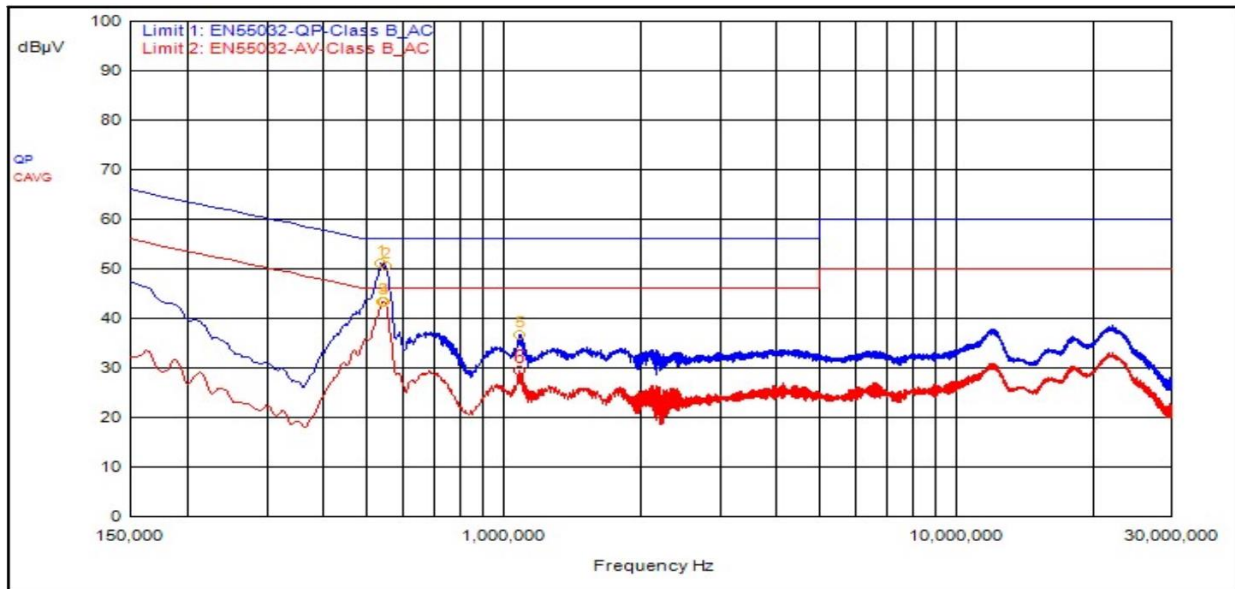
ID	Frequency	Probe	Cable	Atten.	Detector	Meter Read	Meas Level	Limit 1	Limit 1 Dist.	Limit 2	Limit 2 Dist.	P/F
MU	MHz	dB	dB	dB	Type	dBµV	dBµV	dBµV	dB	dBµV	dB	P/F
2	543,000kHz	9.49	0.00		QPeak	41.71	51.20	56.00	-4.80			
1	537,000kHz	9.49	0.00		QPeak	41.29	50.78	56.00	-5.22			
5	1.086	9.58	0.00		QPeak	26.96	36.54	56.00	-19.46			
3	540,000kHz	9.49	0.00		C_AVG	33.68	43.17			46.00	-2.83	
4	546,000kHz	9.49	0.00		C_AVG	33.80	43.29			46.00	-2.71	
6	1.086	9.58	0.00		C_AVG	18.98	28.56			46.00	-17.44	

Note 1: The reference detector used for the measurements was Quasi-Peak or Peak and the data was compared to the average limit: therefore, the EUT was deemed to meet both the average and quasi-peak limits.

Note 2: The reference detector used for the measurements was quasi-peak and average and the data was compared to the respective limits.

Note 3: The device the transceiver is in is a Class A device and the limits shown are from §15.207 which are the same as the limits for a Class B device under §15.107. These emissions were investigated and were found to be at the same level regardless of whether the transceivers of the device were not powered, powered and idle, or powered and active, therefore, the conducted emissions of the transceivers were deemed compliant with the requirements of the standard.

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	537,000kHz	9.62	0.00		QPeak	41.42	51.04	56.00	-4.96			
2	549,000kHz	9.62	0.00		QPeak	41.06	50.68	56.00	-5.32			
5	1.086	9.56	0.00		QPeak	27.15	36.71	56.00	-19.29			
3	540,000kHz	9.62	0.00		C_AVG	33.68	43.30			46.00	-2.70	
4	546,000kHz	9.62	0.00		C_AVG	33.65	43.27			46.00	-2.73	
6	1.086	9.56	0.00		C_AVG	19.86	29.42			46.00	-16.58	

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 Integrated Antenna

Nominal BW (MHz)	Frequency (MHz)	99% Bandwidth (MHz)	26 dB Bandwidth (MHz)
20	5745	22.9	37.4
20	5775	20.5	36.7
20	5825	20.6	36.1
40	5755	44.75	81.9
40	5775	46.25	88.31
40	5795	40.25	77.06
80	5775	86.0	171.0

5.3.2 Omni External Antenna

Nominal BW (MHz)	Frequency (MHz)	99% Bandwidth (MHz)	26 dB Bandwidth (MHz)
20	5745	21.3	36.0
20	5775	22.3	37.9
20	5825	18.8	31.9
40	5755	38.75	80.96
40	5775	46.25	84.11
40	5795	38.25	75.35
80	5775	88.5	174.5

5.3.3 Panel External Antenna

Nominal BW (MHz)	Frequency (MHz)	99% Bandwidth (MHz)	26 dB Bandwidth (MHz)
20	5745	20.2	37.8
20	5775	27.3	45.6
20	5825	26.4	43.0
40	5755	38.0	77.7
40	5775	55.5	88.9
40	5795	55.8	92.5
80	5775	76.0	100.5

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 21.38 dBm or 137.4 mW. The limit is 30 dBm, or 1 Watt when using antennas with 6 dBi or less gain. The internal antenna gain is 6.1 dBi however, the measured conducted output power is below an adjusted 29.0 dBm or 0.79 watts limit. The omni external antenna gain is 4.57 dBi.

5.4.1 Integrated Antenna

Modulation (BW)	Frequency (MHz)	Data Rate	TP Setting	Conducted Output Power *	Measured EIRP	Measured PSD
OFDM 20	5745	Mcs0	20	21.51	27.61	5.73
OFDM 20	5775	Mcs0	20	21.19	27.29	5.38
OFDM 20	5825	Mcs0	20	20.80	26.90	4.66
VHT 20	5745	Mcs0	20	21.38	27.48	5.13
VHT 20	5775	Mcs0	20	21.12	27.22	4.88
VHT 20	5825	Mcs0	20	20.75	26.85	4.61
VHT 40	5755	Mcs0	20	21.13	27.23	2.12
VHT 40	5775	Mcs0	20	21.11	27.21	1.71
VHT 40	5795	Mcs0	20	20.87	26.97	1.48
VHT 80	5775	Mcs0	20	20.93	27.03	-0.42

5.4.2 Omni External Antenna

Modulation (BW)	Frequency (MHz)	Data Rate	TP Setting	Conducted Output Power *	Measured EIRP	Measured PSD
OFDM 20	5745	Mcs0	19	20.75	25.32	5.12
OFDM 20	5775	Mcs0	20	21.35	25.92	5.50
OFDM 20	5825	Mcs0	19	20.40	24.97	4.35
VHT 20	5745	Mcs0	19	20.78	25.35	4.47
VHT 20	5775	Mcs0	20	21.32	25.89	5.06
VHT 20	5825	Mcs0	19	20.35	24.92	3.86
VHT 40	5755	Mcs0	19	20.44	25.01	0.97
VHT 40	5775	Mcs0	20	21.29	25.86	2.27
VHT 40	5795	Mcs0	19	20.32	24.89	1.22
VHT 80	5775	Mcs0	20	20.99	25.56	-1.02

5.4.3 Panel External Antenna

Modulation (BW)	Frequency (MHz)	Data Rate	TP Setting	Conducted Output Power *	Measured EIRP	Measured PSD
OFDM 20	5745	Mcs0	19	20.64	35.64	3.25
OFDM 20	5775	Mcs0	20	20.88	35.88	3.45
OFDM 20	5825	Mcs0	16	17.95	32.95	0.16
VHT 20	5745	Mcs0	18	20.78	35.78	2.76
VHT 20	5775	Mcs0	18	20.41	35.41	2.69
VHT 20	5825	Mcs0	16	17.83	32.83	-0.17
VHT 40	5755	Mcs0	19	20.41	35.41	-0.35
VHT 40	5775	Mcs0	19	20.48	35.48	-0.32
VHT 40	5795	Mcs0	18	19.32	34.32	-1.49
VHT 80	5775	Mcs0	15	16.66	31.66	-6.84

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

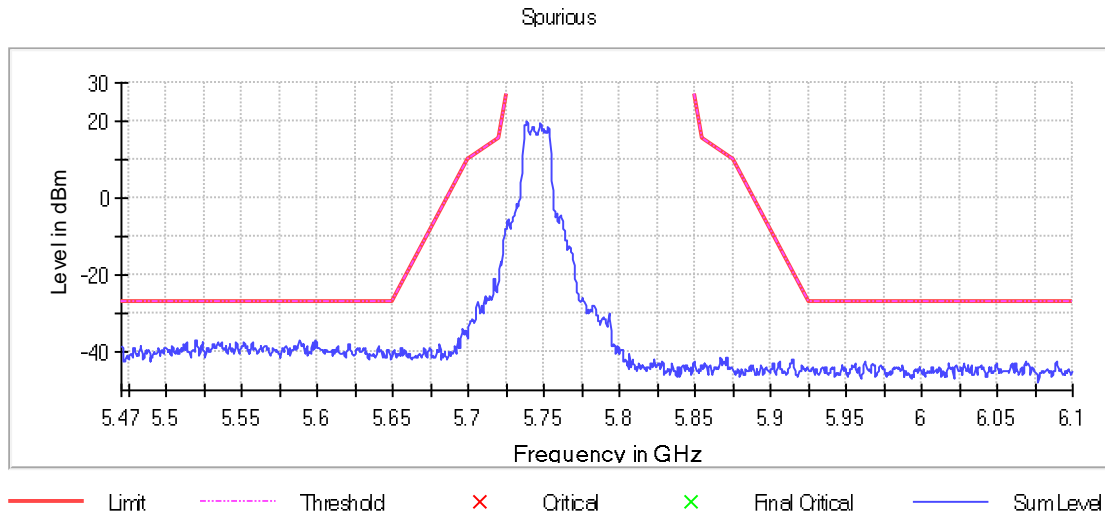
5.5.1 Conducted Spurious Emissions

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 below are plots with the EUT turned to the upper and lower channels with the maximum antenna gain of 6.1 dBi accounted for. These demonstrate compliance with the provisions of this section at the band edges.

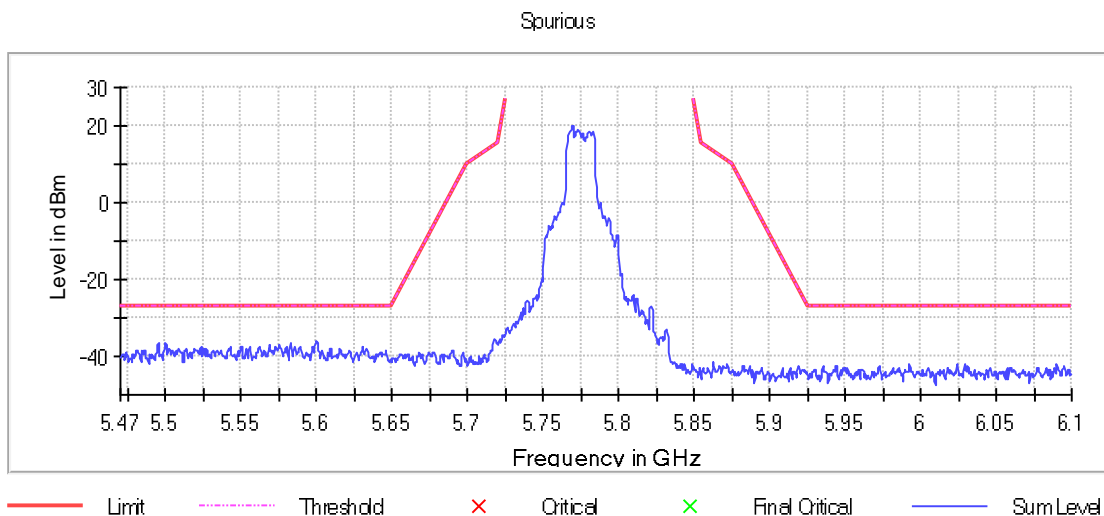
All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band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

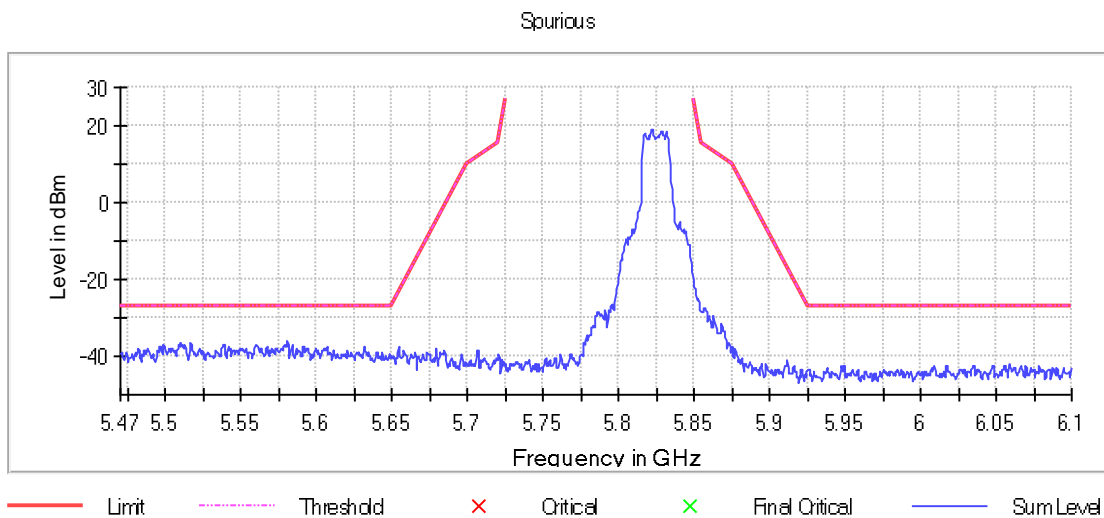
Conducted spurious emissions were attenuated below the limit; therefore, the EUT complies with the specification.



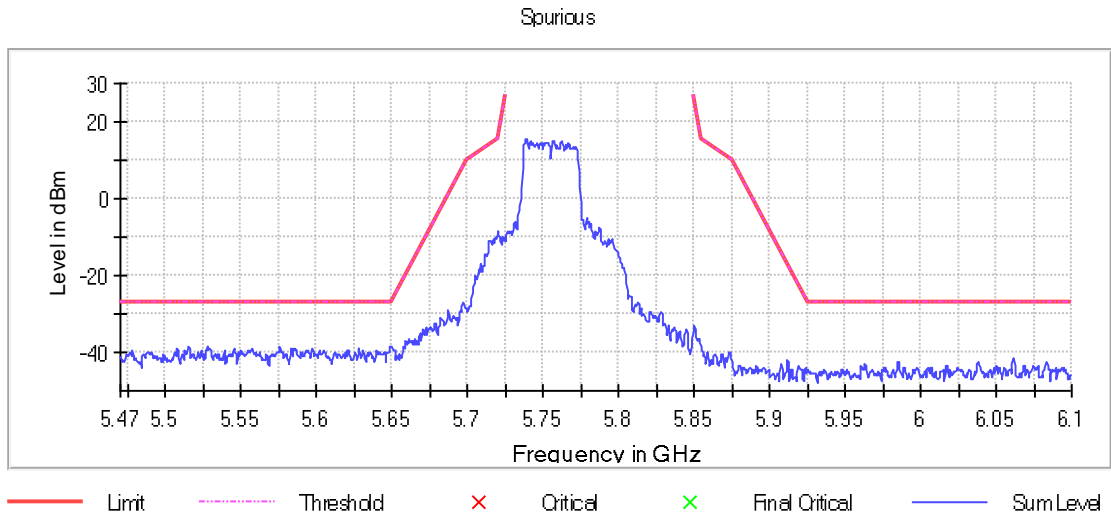
Graph 1: 20 MHz 5745 MHz



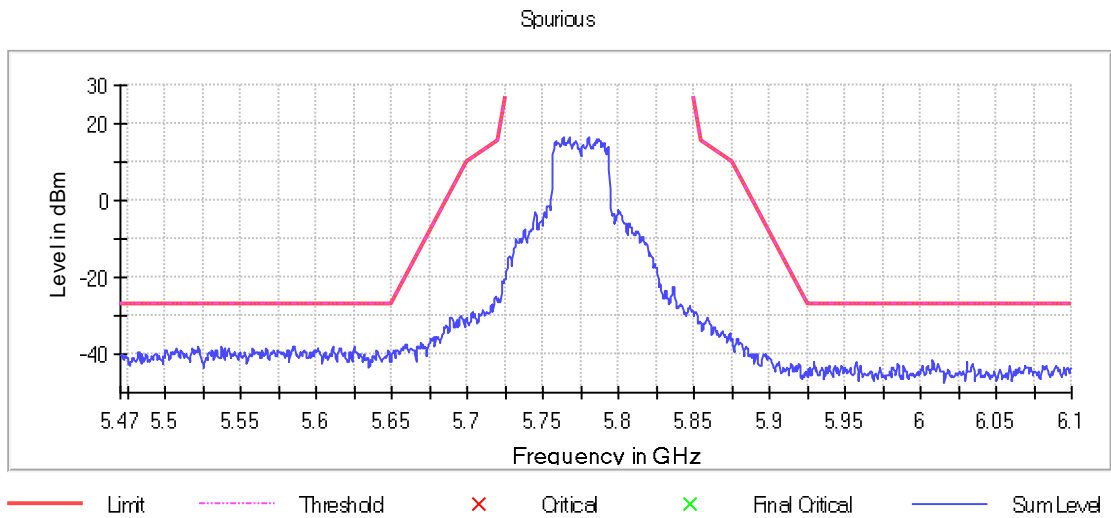
Graph 2: 20 MHz 5775 MHz



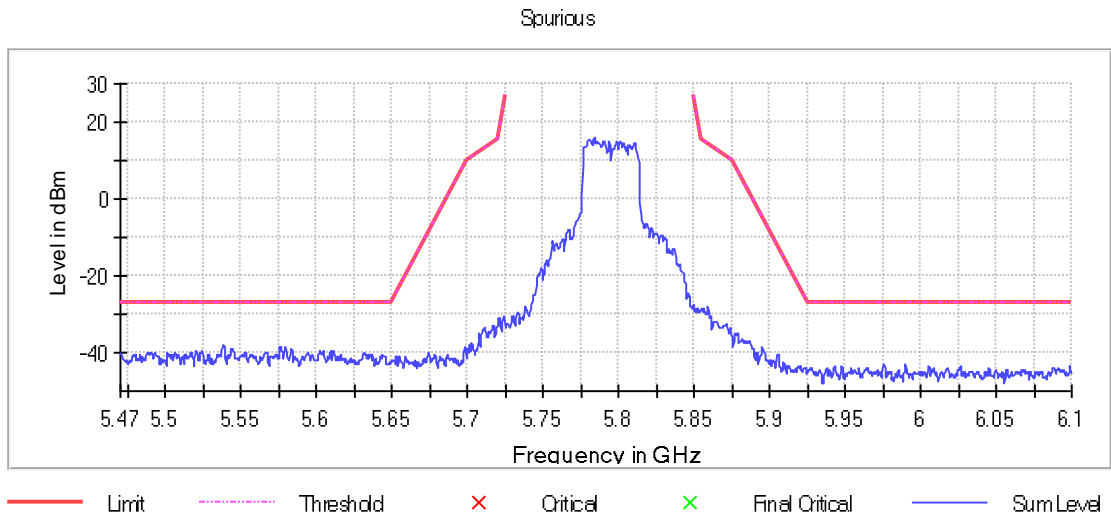
Graph 3: 20 MHz 5825 MHz



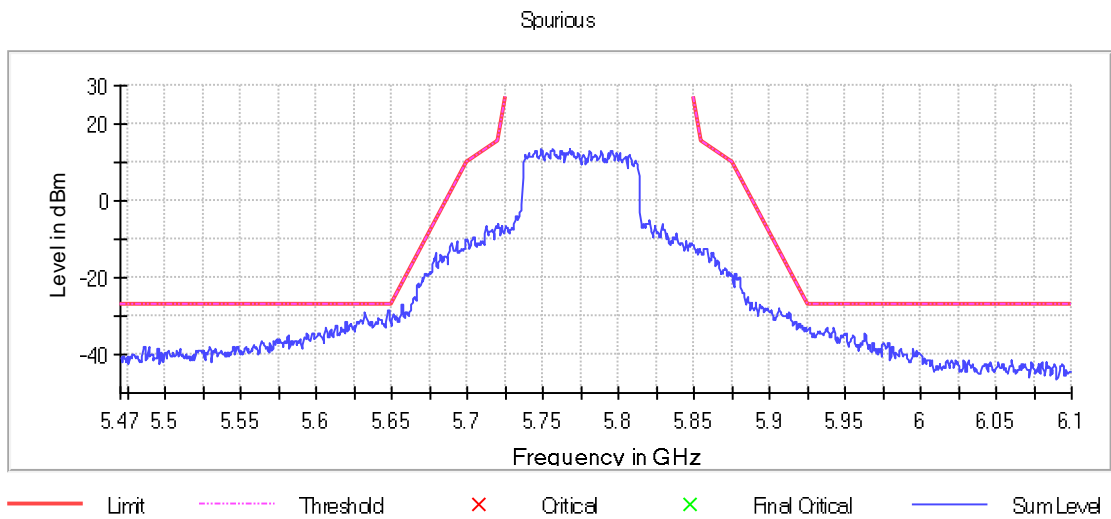
Graph 4: 40 MHz 5755 MHz



Graph 5: 40 MHz 5775 MHz



Graph 6: 40 MHz 5795 MHz



Graph 7: 80 MHz 5775 MHz

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 TP20.

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.

1-17GHz

Frequency	Det.	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
4.4375 GHz	Pk	47.896	74	-26.104	290	3.802	Vertical	-4.706
6.1033 GHz	Pk	47.476	74	-26.524	184	3.798	Vertical	-1.266
11.497 GHz	Pk	51.819	74	-22.181	168	2.82	Vertical	7.821
16.023 GHz	Pk	56.341	74	-17.659	279	3.802	Vertical	12.315
4.4375 GHz	Av	37.424	54	-16.576	290	3.802	Vertical	-4.706
6.1033 GHz	Av	33.744	54	-20.256	184	3.798	Vertical	-1.266
11.497 GHz	Av	39.111	54	-14.889	168	2.82	Vertical	7.821
16.023 GHz	Av	43.706	54	-10.294	279	3.802	Vertical	12.315
3.7504 GHz	Pk	50.767	74	-23.233	124	1.5	Horizontal	-4.611
3.83 GHz	Pk	51.409	74	-22.591	180	1.638	Horizontal	-4.925
11.485 GHz	Pk	69.133	74	-4.867	145	1.638	Horizontal	7.816
16.164 GHz	Pk	56.607	74	-17.393	277	1.643	Horizontal	13.061
3.7504 GHz	Av	40.763	54	-13.237	124	1.5	Horizontal	-4.611
3.83 GHz	Av	45.7	54	-8.3	180	1.638	Horizontal	-4.925
11.485 GHz	Av	53.316	54	-0.684	145	1.638	Horizontal	7.816
16.164 GHz	Av	43.672	54	-10.328	277	1.643	Horizontal	13.061

17-40GHz

Frequency	Det	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Pol.	Correction (dB)
17.235 GHz	Pk	60.476	74	-13.524	172	Vertical	-1.207
22.977 GHz	Pk	60.492	74	-13.508	142	Vertical	-1.884
28.696 GHz	Pk	65.762	74	-8.238	226	Vertical	-0.91
28.721 GHz	Pk	66.339	74	-7.661	175	Vertical	-0.772
34.479 GHz	Pk	55.723	74	-18.277	174	Vertical	2.722
17.235 GHz	Av	46.237	54	-7.763	172	Vertical	-1.207
22.977 GHz	Av	45.576	54	-8.424	142	Vertical	-1.884
28.696 GHz	Av	44.467	54	-9.533	226	Vertical	-0.91
28.721 GHz	Av	51.726	54	-2.274	175	Vertical	-0.772
34.479 GHz	Av	41.751	54	-12.249	174	Vertical	2.722
17.241 GHz	Pk	62.235	74	-11.765	222	Horizontal	-1.269
28.703 GHz	Pk	57.933	74	-16.067	152	Horizontal	-0.854
28.731 GHz	Pk	59.089	74	-14.911	213	Horizontal	-0.795
39.912 GHz	Pk	57.248	74	-16.752	313	Horizontal	5.715
17.241 GHz	Av	47.843	54	-6.157	222	Horizontal	-1.269
28.703 GHz	Av	40.618	54	-13.382	152	Horizontal	-0.854
28.731 GHz	Av	43.697	54	-10.303	213	Horizontal	-0.795
39.912 GHz	Av	43.898	54	-10.102	313	Horizontal	5.715

Table 4: Transmitting on the Lowest Frequency 5745 MHz

1-17GHz

Frequency	Det	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
3.8501 GHz	Pk	49.72	74	-24.28	189	3.798	Vertical	-5.131
4.4378 GHz	Pk	46.361	74	-27.639	259	3.802	Vertical	-4.706
11.553 GHz	Pk	62.986	74	-11.014	173	1.5	Vertical	7.755
16.061 GHz	Pk	56.958	74	-17.042	2	4	Vertical	12.673
3.8501 GHz	Av	43.678	54	-10.322	189	3.798	Vertical	-5.131
4.4378 GHz	Av	34.334	54	-19.666	259	3.802	Vertical	-4.706
11.553 GHz	Av	47.34	54	-6.66	173	1.5	Vertical	7.755
16.061 GHz	Av	44.024	54	-9.976	2	4	Vertical	12.673
3.7499 GHz	Pk	53.235	74	-20.765	130	1.5	Horizontal	-4.612
6.089 GHz	Pk	52.243	74	-21.757	239	1.638	Horizontal	-1.311
11.548 GHz	Pk	69.317	74	-4.683	130	2.146	Horizontal	7.769
16.06 GHz	Pk	56.859	74	-17.141	158	3.153	Horizontal	12.664
3.7499 GHz	Av	46.253	54	-7.747	130	1.5	Horizontal	-4.612
6.089 GHz	Av	39.394	54	-14.606	239	1.638	Horizontal	-1.311
11.548 GHz	Av	53.101	54	-0.899	130	2.146	Horizontal	7.769
16.06 GHz	Av	43.911	54	-10.089	158	3.153	Horizontal	12.664

17-40GHz

Frequency	Det	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Pol.	Correction (dB)
17.33 GHz	Pk	58.942	74	-15.058	168	Vertical	-1.458
23.096 GHz	Pk	58.977	74	-15.023	145	Vertical	-1.55
28.873 GHz	Pk	62.632	74	-11.368	226	Vertical	-1.808
28.908 GHz	Pk	61.695	74	-12.305	176	Vertical	-1.285
17.33 GHz	Av	44.77	54	-9.23	168	Vertical	-1.458
23.096 GHz	Av	43.624	54	-10.376	145	Vertical	-1.55
28.873 GHz	Av	48.056	54	-5.944	226	Vertical	-1.808
28.908 GHz	Av	40.491	54	-13.509	176	Vertical	-1.285
17.323 GHz	Pk	60.59	74	-13.41	220	Horizontal	-1.363
28.873 GHz	Pk	52.341	74	-21.659	181	Horizontal	-1.808
35.245 GHz	Pk	55.453	74	-18.547	138	Horizontal	5.345
39.81 GHz	Pk	57.218	74	-16.782	169	Horizontal	6.427
17.323 GHz	Av	47.035	54	-6.965	220	Horizontal	-1.363
28.873 GHz	Av	38.877	54	-15.123	181	Horizontal	-1.808
35.245 GHz	Av	42.765	54	-11.235	138	Horizontal	5.345
39.81 GHz	Av	44.232	54	-9.768	169	Horizontal	6.427

Table 5: Transmitting on the Middle Frequency 5775 MHz
1-17GHz

Frequency	Det	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
4.4374 GHz	Pk	46.996	74	-27.004	63	3.798	Vertical	-4.706
6.1443 GHz	Pk	51.931	74	-22.069	155	1.5	Vertical	-1.199
11.652 GHz	Pk	64.069	74	-9.931	155	2.146	Vertical	7.815
16.1 GHz	Pk	56.937	74	-17.063	359	1.643	Vertical	12.863
4.4374 GHz	Av	35.891	54	-18.109	63	3.798	Vertical	-4.706
6.1443 GHz	Av	38.782	54	-15.218	155	1.5	Vertical	-1.199
11.652 GHz	Av	49.767	54	-4.233	155	2.146	Vertical	7.815
16.1 GHz	Av	43.689	54	-10.311	359	1.643	Vertical	12.863
3.7499 GHz	Pk	52.827	74	-21.173	132	1.5	Horizontal	-4.612
11.647 GHz	Pk	67.799	74	-6.201	121	2.146	Horizontal	7.807
13.007 GHz	Pk	55.081	74	-18.919	320	3.652	Horizontal	10.934
16.061 GHz	Pk	56.759	74	-17.241	170	2.82	Horizontal	12.673
3.7499 GHz	Av	45.586	54	-8.414	132	1.5	Horizontal	-4.612
11.647 GHz	Av	53.504	54	-0.496	121	2.146	Horizontal	7.807
13.007 GHz	Av	41.781	54	-12.219	320	3.652	Horizontal	10.934
16.061 GHz	Av	43.966	54	-10.034	170	2.82	Horizontal	12.673

17-40GHz

Frequency	Det.	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Azimuth (°)	Pol.	Correction (dB)
17.331 GHz	Pk	59.255	74	-14.745	170	Vertical	-1.471
23.112 GHz	Pk	61.374	74	-12.626	144	Vertical	-1.538
28.849 GHz	Pk	60.695	74	-13.305	179	Vertical	-1.565
28.884 GHz	Pk	63.95	74	-10.05	180	Vertical	-1.631
17.331 GHz	Av	45.098	54	-8.902	170	Vertical	-1.471
23.112 GHz	Av	44.133	54	-9.867	144	Vertical	-1.538
28.849 GHz	Av	41.267	54	-12.733	179	Vertical	-1.565
28.884 GHz	AV	47.282	54	-6.718	180	Vertical	-1.631
17.475 GHz	Pk	62.215	74	-11.785	185	Horizontal	-1.873
23.279 GHz	Pk	56.125	74	-17.875	147	Horizontal	-2.091
35.493 GHz	Pk	55.108	74	-18.892	203	Horizontal	4.227
39.898 GHz	Pk	56.961	74	-17.039	71	Horizontal	5.801
17.475 GHz	Av	48.167	54	-5.833	185	Horizontal	-1.873
23.279 GHz	Av	39.648	54	-14.352	147	Horizontal	-2.091
35.493 GHz	Av	41.874	54	-12.126	203	Horizontal	4.227
39.898 GHz	AV	43.888	54	-10.112	71	Horizontal	5.801

Table 6: Transmitting on the Highest Frequency 5825 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 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. Results of this testing are summarized.

When the EUT uses Nss=1 data rates, the antenna gain is 6.1 dBi + Array gain of 3.01 for a directional gain of 9.11 dBi which is a total of 26.89 dB for the internal Antenna. The external antenna an antenna gain is 4.57dBi + Array gain of 3.01 for a directional gain of 7.58 dBi, which is a total of 28.42 dB

5.6.1 Integrated Antenna

Modulation (BW)	Frequency (MHz)	Data Rate	TP Setting	Measured PSD
OFDM 20	5745	Mcs0	20	5.73
OFDM 20	5775	Mcs0	20	5.38
OFDM 20	5825	Mcs0	20	4.66
VHT 20	5745	Mcs0	20	5.13
VHT 20	5775	Mcs0	20	4.88
VHT 20	5825	Mcs0	20	4.61
VHT 40	5755	Mcs0	20	2.12
VHT 40	5775	Mcs0	20	1.71
VHT 40	5795	Mcs0	20	1.48
VHT 80	5775	Mcs0	20	-0.42

5.6.2 Omni External Antenna

Modulation (BW)	Frequency (MHz)	Data Rate	TP Setting	Measured PSD
OFDM 20	5745	Mcs0	19	5.12
OFDM 20	5775	Mcs0	20	5.50
OFDM 20	5825	Mcs0	19	4.35
VHT 20	5745	Mcs0	19	4.47
VHT 20	5775	Mcs0	20	5.06
VHT 20	5825	Mcs0	19	3.86
VHT 40	5755	Mcs0	19	0.97
VHT 40	5775	Mcs0	20	2.27
VHT 40	5795	Mcs0	19	1.22
VHT 80	5775	Mcs0	20	-1.02

5.6.3 Panel External Antenna

Modulation (BW)	Frequency (MHz)	Data Rate	TP Setting	Measured PSD
OFDM 20	5745	Mcs0	19	3.25
OFDM 20	5775	Mcs0	20	3.45
OFDM 20	5825	Mcs0	16	0.16
VHT 20	5745	Mcs0	18	2.76
VHT 20	5775	Mcs0	18	2.69
VHT 20	5825	Mcs0	16	-0.17
VHT 40	5755	Mcs0	19	-0.35
VHT 40	5775	Mcs0	19	-0.32
VHT 40	5795	Mcs0	18	-1.49
VHT 80	5775	Mcs0	15	-6.84

Result

The maximum summed average power spectral density was less than the limit of 30 dBm; therefore, the EUT complies with the specification.

-- End of Test Report --