

TEST REPORT

Test Report No. : UL-RPT-RP15107067-516A

Manufacturer	:	SECO S.p.A.
Model Name / HMN	:	KIOSK-HEAD27"
Contains FCC ID	:	2ALZB-AS2DTGM
Contains IC	:	22688-AS2DTGM
Technology	:	WLAN
Test Standard(s)	:	FCC Parts 15.209(a) & 15.407 Innovation, Science and Economic Development Canada RSS-247 Issue 3 August 2023 & RSS-Gen Issue 5 April 2018
Test Laboratory	:	UL International (UK) Ltd, Basingstoke, Hampshire, RG24 8AH, United Kingdom

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- 2. The results in this report apply only to the sample(s) tested.
- 3. The sample tested is in compliance with the above standard(s).
- 4. The test results in this report are traceable to the national or international standards.
- 5. Version 2.0 supersedes all previous versions.

Date of Issue:

18 December 2024

Checked by:

Ben Mercer Lead Project Engineer, Radio Laboratory

Company Signatory:

WElders

Sarah Williams RF Operations Leader, Radio Laboratory



Customer Information

Company Name:	SECO S.p.A.
Address:	Via Achille Grandi, 20 - 52100 Arezzo,
	Italy

Report Revision History

Version Number	Issue Date	Revision Details	Revised By
1.0	16/12/2024	Initial Version	Ben Mercer
2.0	18/12/2024	Corrected HMN	Ben Mercer

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1 Attestation of Test Results

1.1 Description of EUT

The equipment under test was a HMI touchscreen containing a 2.4 GHz WLAN / 5 GHz WLAN / *Bluetooth* module (FCC ID: 2ALZB-AS2DTGM & IC: 22688-AS2DTGM) and an NFC / *Bluetooth* LE module (FCC ID: 2ARDN0615D & IC: 24364-0615D).

1.2 General Information

Specification Reference:	47CFR15.407
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart E (Unlicensed National Information Infrastructure Devices) – Section 15.407
Specification Reference:	47CFR15.209
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart C (Intentional Radiators) - Section 15.209
Specification Reference:	RSS-Gen Issue 5 April 2018
Specification Title:	General Requirements for Compliance of Radio Apparatus
Specification Reference:	RSS-247 Issue 3 August 2023
Specification Title:	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices
Site Registration:	FCC: 685609, ISEDC: 20903
FCC Lab. Designation No.:	UK2011
ISEDC CABID:	UK0001
Location of Testing:	Unit 3 & 4 Horizon, Wade Road, Kingsland Business Park, Basingstoke, Hampshire, RG24 8AH, United Kingdom
Test Dates:	27 March 2024 to 20 May 2024

1.3 Summary of Test Results

FCC Reference (47CFR)	ISED Canada Reference	Measurement	Result			
Part 15.35(c)	RSS-Gen 8.2	Transmitter Duty Cycle	Note 1			
Part 15.407(b) / 15.209(a)	RSS-Gen 6.13 & 8.9 / RSS-247 6.2.1.2, 6.2.2.2, 6.2.3.2 & 6.2.4.2	Transmitter Out of Band Radiated Emissions	0			
Part 15.407(b) / 15.209(a)	RSS-Gen 6.13, 8.9 & 8.10 / RSS-247 6.2.1.2, 6.2.2.2, 6.2.3.2 & 6.2.4.2	Transmitter Band Edge Radiated Emissions				
Key to Results Image: Complied Image: Complex						

Note(s):

1. The measurement was performed to assist in the calculation of the level of average emissions as the EUT employs pulsed operation.

1.4 Deviations from the Test Specification

For the measurements contained within this test report, there were no deviations from, additions to, or exclusions from the test specifications identified above.

2 Summary of Testing

2.1 Facilities and Accreditation

The test site and measurement facilities used to collect data are located at Unit 3 Horizon, Wade Road, Kingsland Business Park, Basingstoke, Hampshire, RG24 8AH, United Kingdom. The following table identifies which facilities were utilised for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

Site 1	х
Site 2	
Site 17	
Site 32	
Site 33	х

UL International (UK) Ltd is accredited by UKAS. The tests reported herein have been performed in accordance with its terms of accreditation.

2.2 Methods and Procedures

Reference:	ANSI C63.10-2013
Title:	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
Reference:	KDB 789033 D02 General U-NII Test Procedures New Rules v02r01 December 14, 2017
Title:	Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices (Part 15, Subpart E)

2.3 Calibration and Uncertainty

Measuring Instrument Calibration

In accordance with UKAS requirements all the measurement equipment is on a calibration schedule. All equipment was within the calibration period on the date of testing.

Measurement Uncertainty

No measurement or test can ever be perfect and the imperfections give rise to error of measurement in the results. Consequently the result of a measurement is only an approximation to the value measured (the specific quantity subject to measurement) and is only complete when accompanied by a statement of the uncertainty of the approximation.

The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

The uncertainty of the result may need to be taken into account when interpreting the measurement results.

The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor such that a confidence level of approximately 95% is maintained. For the purposes of this document "approximately" is interpreted as meaning "effectively" or "for most practical purposes".

Measurement Type	Range	Confidence Level (%)	Calculated Uncertainty
Duty Cycle	5.15 GHz to 5.850 GHz	95%	±1.14 %
Radiated Spurious Emissions	9 kHz to 30 MHz	95%	±5.32 dB
Radiated Spurious Emissions	30 MHz to 1 GHz	95%	±3.30 dB
Radiated Spurious Emissions	1 GHz to 40 GHz	95%	±3.13 dB

The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty the published guidance of the appropriate accreditation body is followed.

2.4 Test and Measurement Equipment

Test Equipment Used for Transmitter Duty Cycle

Asset No.	Instrument	Manufacturer	Туре No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M226556	Thermohygrometer	Testo	608-H1	83800306	28 Dec 2024	12
K226203	3m RSE Chamber	Albatross Projects	N/A	N/A	25 Apr 2024	12
M227312	Test Receiver	Rohde & Schwarz	ESW44	103203	11 May 2024	12
A231864	Pre Amplifier	Atlantic Microwave	A-LNAKX- 380116-S5S5	221044002	22 Apr 2024	12
A231044	Antenna	Schwarzbeck	BBHA 9120 B	00835	22 Apr 2024	12
A230451	Attenuator	Atlantic Microwave	ATT10KXP- 483034-N4N5	#3	30 Apr 2024	12

Test Equipment Used for Transmitter Band Edge Radiated Emissions

Asset No.	Instrument	Manufacturer	Туре No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M226556	Thermohygrometer	Testo	608-H1	83800306	28 Dec 2024	12
K226203	3m RSE Chamber	Albatross Projects	N/A	N/A	25 Apr 2024	12
M1874	Test Receiver	Rohde & Schwarz	ESU26	100553	08 Jun 2024	12
A231864	Pre Amplifier	Atlantic Microwave	A-LNAKX- 380116-S5S5	221044002	22 Apr 2024	12
A231044	Antenna	Schwarzbeck	BBHA 9120 B	00835	22 Apr 2024	12
A230451	Attenuator	Atlantic Microwave	ATT10KXP- 483034-N4N5	#3	30 Apr 2024	12

Test and Measurement Equipment (continued)

Test Equipment Used for Transmitter Radiated Emissions

Asset No.	Instrument	Manufacturer	Туре No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M2003	Thermohygrometer	Testo	608-H1	45046641	27 Dec 2024	12
K0017	3m RSE Chamber	MVG Industries UK Ltd.	N/A	N/A	09 Nov 2024	12
M1995	Test Receiver	Rohde & Schwarz	ESU40	100428	20 Nov 2024	12
A2863	Pre Amplifier	Keysight Technologies Inc	8449B	3008A02100	30 Oct 2024	12
A2889	Antenna	Schwarzbeck	BBHA 9120 B	00653	06 Nov 2024	12
A2890	Antenna	Schwarzbeck	HWRD 750	014	06 Nov 2024	12
A2918	Attenuator	AtlanTecRF	AN18W5-20	832828#4	25 Jan 2025	12
A2943	Attenuator	AtlanTecRF	AN18W5-06	208147#2	25 Jan 2025	12
A212035	High Pass Filter	Micro-Tronics	HPS20722	001	25 Jan 2025	12
A223628	Pre Amplifier	Atlantic Microwave	A-LNAKX- 380116-S5S5	210837001	14 Nov 2024	12
M226556	Thermohygrometer	Testo	608-H1	83800306	28 Dec 2024	12
K226203	3m RSE Chamber	Albatross Projects	N/A	N/A	25 Apr 2024	12
M227312	Test Receiver	Rohde & Schwarz	ESW44	103203	11 May 2024	12
A231864	Pre Amplifier	Atlantic Microwave	A-LNAKX- 380116-S5S5	221044002	22 Apr 2024	12
A231044	Antenna	Schwarzbeck	BBHA 9120 B	00835	22 Apr 2024	12
A230451	Attenuator	Atlantic Microwave	ATT10KXP- 483034-N4N5	#3	30 Apr 2024	12
A231046	Antenna	Schwarzbeck	HWRD 750	00065	22 Apr 2024	12
A227129	High Pass Filter	Micro-Tronics	HPS20722	003	30 Apr 2024	12
A230452	Attenuator	Atlantic Microwave	ATT20KXP- 483034-N4N5	#7	30 Apr 2024	12
A230567	Pre Amplifier	Atlantic Microwave	A-HPAKX- 380143-K5K5	VJ3601001	04 Apr 2024	12
A231050	Antenna	Schwarzbeck	BBHA 9170	01280	05 Apr 2024	12
A230452	Attenuator	Atlantic Microwave	ATT20KXP- 483034-N4N5	#7	30 Apr 2024	12
A231567	Pre Amplifier	RF Bay Inc.	LNA-1070	2	22 Apr 2024	12
A227142	Low Pass Filter	Micro-Tronics	LPM21016	001	30 Apr 2024	12
A3161	Antenna	Teseq, Inc	CBL6111D	50859	25 Aug 2024	12
A3113	Attenuator	AtlanTecRF	AN18-06	219706#3	25 Aug 2024	12
M2040	Thermohygrometer	Testo	608-H1	45124934	02 Dec 2024	12
K0001	3m RSE Chamber	Rainford EMC	N/A	N/A	06 Sep 2024	12
M236226	Test Receiver	Rohde & Schwarz	ESW26	103134	21 Apr 2024	12
M1874	Test Receiver	Rohde & Schwarz	ESU26	100553	08 Jun 2024	12

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Asset No.	Instrument	Manufacturer	Туре No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
A3198	Magnetic Loop Antenna	ETS-Lindgren	6502	00221887	18 Oct 2024	12
A3224	Pre-Amplifier	Schwarzbeck	BBV 9718 C	00071	28 Feb 2025	12
A3139	Antenna	Schwarzbeck	HWRD750	00027	23 Aug 2024	12
A227131	High Pass Filter	Micro-Tronics	HPS20722	005	03 Jan 2025	12

3 Equipment Under Test (EUT)

3.1 Identification of Equipment Under Test (EUT)

Brand Name:	Technogym
Model Name / HMN:	KIOSK-HEAD27"
Test Sample Serial Number:	240147739 (Radiated sample)
Hardware Version:	Not marked or stated
Software Version:	5.10.110_v1
Firmware Version:	17.92.1.p136.131
Contains FCC ID:	2ALZB-AS2DTGM
Contains IC:	22688-AS2DTGM
Date of Receipt:	19 February 2024

3.2 Modifications Incorporated in the EUT

No modifications were applied to the EUT during testing.

3.3 Additional Information Related to Testing

Technology Tested:	WLAN (IEEE 802.11a,n,ac,ax) / U-NII		
Type of Unit:	Transceiver		
Modulation:	BPSK		
Data rates:	802.11a 6 Mbps (MIMO)		
	802.11n HT20	MCS8 (MIMO)	
	802.11n HT40 MCS8 (MIMO) 802.11ac VHT80 MCS0 (MIMO)		
	802.11ax HE20 MCS0 (MIMO)		
	802.11ax HE40 MCS0 (MIMO)		
	802.11ax HE80 MCS0 (MIMO)		
Power Supply Requirement(s):	Nominal	12.0 VDC via 120 VAC 60 Hz adaptor	

Additional Information Related to Testing (continued)

Channel Spacing:	20 MHz		
Transmit Frequency Band:	5150 MHz to 5250 MHz		
Transmit Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	Bottom	36	5180
	Middle	44	5220
	Тор	48	5240
Transmit Frequency Band:	5250 MHz to 5350 M	Hz	
Transmit Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	Bottom	52	5260
	Middle	56	5280
	Тор	64	5320
Transmit Frequency Band:	5470 MHz to 5725 MHz		
Transmit Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	Bottom	100	5500
	Middle	116	5580
	Тор	140	5700
Transmit Frequency Band:	5725 MHz to 5850 MHz		
Transmit Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	Bottom	149	5745
	Middle	161	5805
	Тор	165	5825

Additional Information Related to Testing (continued)

Channel Spacing:	40 MHz		
Transmit Frequency Band:	5150 MHz to 5250 MHz		
Transmit Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	Bottom	38	5190
Transmit Frequency Band:	5250 MHz to 5350 M	Hz	
Transmit Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	Тор	62	5310
Transmit Frequency Band:	5470 MHz to 5725 M	Hz	
Transmit Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	Bottom	102	5510
	Тор	134	5670
Transmit Frequency Band:	5725 MHz to 5850 M	Hz	
Transmit Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	Bottom	151	5755
	Тор	159	5795
Channel Spacing:	80 MHz		
Transmit Frequency Band:	5150 MHz to 5250 MHz		
Transmit Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	Single	42	5210
Transmit Frequency Band:	5250 MHz to 5350 M	Hz	
Transmit Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	Single	58	5290
Transmit Frequency Band:	5470 MHz to 5725 M	Hz	
Transmit Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	Bottom	106	5530
	Тор	122	5610
Transmit Frequency Band:	5725 MHz to 5850 MHz		
Transmit Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	Single	155	5775

Additional Information Related to Testing (continued)

Power Settings

Mode	Channel	Power Setting	Mode	Channel	Power Setting
	36	15	802.11ac	42	11
	44	15		58	11
	48	15		106	10.5
	52	15	VHT80	122	17
	56	15		155	17
802 110	64	15		-	-
002.11a	100	16.5		36	15
	116	16.5		64	14.5
	140	14	802.11ax	100	16
	149	18.5	HE20	140	15.5
	161	19.5		149	18
	165	14		165	14
	36	14	802.11ax HE40	38	12.5
	64	15		62	12.5
802.11n	100	16.5		102	13.5
HT20	140	14		134	15.5
	149	18.5		151	18
	165	14		159	14
	38	13		42	10.5
	62	13		58	10.5
802.11n	102	14	802.11ax	106	10.5
HT40	134	16.5	HE80	122	15.5
	151	18.5		155	17
	159	14		-	-

3.4 Description of Test Setup

Support Equipment

Serial Number:

The following support equipment was used to exercise the EUT during testing:

Description:	Scription: USB Keyboard	
Brand Name:	Dell	
Model Name or Number:	RT7D50	
Serial Number:	Not marked or stated	
Description:	Ethernet Cable	
Brand Name:	Not marked or stated	
Model Name or Number:	Not marked or stated	
Serial Number:	Not marked or stated	
Description:	USB Docking Station	
Brand Name:	Think Pad	
Model Name or Number:	USB-C Dock / 40A9	
Serial Number:	ZAF0LGYW	
Description:	USB / Ethernet Hub	
Brand Name:	Lemorele	
Model Name or Number:	TC19	
Serial Number:	Not marked or stated	
Description:	USB Cable	
Brand Name:	Not marked or stated	
Model Name or Number:	Not marked or stated	
Serial Number:	Not marked or stated	
Description:	AC/DC Power Adapter	
Brand Name:	EDAC Power Electronics Co., Ltd	
Model Name or Number:	EM10952F	

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Operating Modes

The EUT was tested in the following operating mode(s):

• Continuously transmitting with a modulated carrier at the power setting stated in section 3.3 on the bottom, middle and top channels as required using the supported data rates/modulation types.

Configuration and Peripherals

The EUT was tested in the following configuration(s):

- The EUT was placed in a test mode enabled by a software application provided by the customer. The software application was run from the EUT user interface.
- The EUT was powered from a 120 VAC mains supply via the supplied AC/DC power adapter.
- Test instructions were provided by the customer in the document "RF_TEST_GUIDE_20240209.pdf" dated 09 February 2024.
- All ports were terminated with suitable loads.
- The following worst-case data rates were used for Radiated Band Edge measurements.
 - o 802.11a MIMO BPSK / 6 Mbps
 - o 802.11n HT20 / MIMO 256QAM / MCS8
 - o 802.11n HT40 / MIMO 256QAM / MCS8
 - o 802.11ac VHT80 / MIMO BPSK / MCS0
 - o 802.11ac HE20 / MIMO BPSK / MCS0
 - 802.11ac HE40 / MIMO BPSK / MCS0
 - 802.11ac HE80 / MIMO BPSK / MCS0
- Transmitter spurious emissions were performed with the EUT transmitting with a data rate of 6 Mbps (802.11a). This was found deemed be the worst case modulation scheme with regards to emissions based on the module test report.
- The EUT was placed in three orthogonal orientations X, Y and Z to determine the worst case orientation for radiated spurious emissions. The worst case orientation was X.

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Test Setup Diagrams

Radiated Tests:



4 Radiated Test Results

4.1 Transmitter Duty Cycle

Test Summary:

Test Engineer:	Vi Van	Test Date:	21 April 2024
Test Sample Serial Number:	OWR01635AC-ENR		

FCC Reference:	Part 15.35(c)
ISED Canada Reference:	RSS-Gen 8.2
Test Method Used:	KDB 789033 D02 Section II.B.2.b)

Environmental Conditions:

Temperature (°C):	20
Relative Humidity (%):	35

Note(s):

1. In order to assist with the determination of the average level of fundamental and spurious emissions field strength, measurements were made of duty cycle to determine the transmission duration and the silent period time of the transmitter. The transmitter duty cycle was measured using a spectrum analyser in the time domain and calculated by using the following calculation:

10 log 1 / (On Time / [Period or 100ms whichever is the lesser]).

802.11n HT20 / MIMO / MCS8 duty cycle: 10 log (1 / (0.691/0.708)) = 0.1 802.11n HT40 / MIMO / MCS8 duty cycle: 10 log (1 / (0.355/0.372)) = 0.2 802.11ac VHT80 / MIMO / MCS0 duty cycle: 10 log (1 / (0.331/0.350)) = 0.2 802.11ax HE40 / MIMO / MCS0 duty cycle: 10 log (1 / (0.548/0.568)) = 0.2 802.11ax HE80 / MIMO / MCS0 duty cycle: 10 log (1 / (0.291/0.309)) = 0.3

 Plots below are for data rates with a duty cycle less than 98%. Results for all other modes having a duty cycle >98% are archived on the UL International (UK) Ltd IT server and available for inspection if required.

Transmitter Duty Cycle (continued)

Results: 802.11n / 20 MHz / MIMO / MCS8

Pulse Duration	Period	Duty Cycle
(ms)	(ms)	(dB)
0.691	0.708	0.1



Results: 802.11n/ 40 MHz / MIMO / MCS8

Pulse Duration	Period	Duty Cycle
(ms)	(ms)	(dB)
0.355	0.372	0.2



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Transmitter Duty Cycle (continued)

Results: 802.11ac / 80 MHz / MIMO / MCS0

Pulse Duration	Period	Duty Cycle	
(ms)	(ms)	(dB)	
0.331	0.350	0.2	



Results: 802.11ax / 40 MHz / MCS0

Pulse Duration	Period	Duty Cycle
(ms)	(ms)	(dB)
0.548	0.568	0.2



Transmitter Duty Cycle (continued)

Results: 802.11ax / 80 MHz / MCS0

Pulse Duration	Period	Duty Cycle	
(ms)	(ms)	(dB)	
0.291	0.309	0.3	



4.2 Transmitter Out of Band Radiated Emissions <1 GHz

Test Summary:

Test Engineers:	Andrew Harding & Vi Van	Test Date:	30 March 2024
Test Sample Serial Number:	OWR01635AC-ENR		

FCC Reference:	Parts 15.407(b)(2),(6),(7) & 15.209(a)
ISED Canada Reference:	RSS-Gen 6.13 & 8.9 / RSS-247 6.2.4.2
Test Method Used:	KDB 789033 II.G. & ANSI C63.10 Sections 6.3 and 6.5
Frequency Range:	9 kHz to 1000 MHz

Environmental Conditions:

Temperature (°C):	19
Relative Humidity (%):	44

Note(s):

- 1. The final measured value, for the given emission in the field strength result tables, incorporates the calibrated antenna factor and cable loss.
- 2. Pre-scans were performed with the EUT transmitting in the band 5.725 to 5.85 GHz band with a configuration of 802.11a / 6 Mbps as it produced the highest power spectral density and was therefore deemed worst case. An inquiry was made to the FCC and the response was pre-scans could be performed in the band with the highest power spectral density and all final measurements should be performed on any emissions seen in each band.
- 3. The preliminary scans showed similar emission levels below 1 GHz, for each channel of operation. Therefore final radiated emissions measurements were performed with the EUT set to the middle channel only.
- 4. In accordance with FCC part 15.33, pre-scans were performed from 9 kHz to 30 MHz. As there were no emissions observed within 20 dB of the limit, in accordance with 15.31(o), no pre-scans are included in this test report. The pre-scans are kept on file and available upon request.
- 5. All other emissions shown on the pre-scan were investigated and found to be ambient, or >20 dB below the applicable limit or below the measurement system noise floor.
- 6. Measurements below 1 GHz were performed in a semi-anechoic chamber (Asset Number K226203) at a distance of 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.
- 7. Pre-scans were performed and markers placed on the highest measured levels. The test receiver resolution bandwidth was set to 120 kHz and video bandwidth 500 kHz. The sweep time was set to auto. A peak detector was used, sweep time was set to auto and trace mode was Max Hold.
- 8. Final measurements were performed on the marker frequencies and the results entered into the table below. The test receiver resolution bandwidth was set to 120 kHz, using a CISPR quasi-peak detector and span wide enough to see the whole emission.

Transmitter Out of Band Radiated Emissions

Results: Quasi-Peak / Peak / Channel 161 / 802.11a / 20 MHz / 6 Mbps

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
51.018	Vertical	23.4	40.0	16.6	Complied
106.695	Vertical	27.2	43.5	16.3	Complied
134.983	Vertical	23.7	43.5	19.8	Complied
164.419	Vertical	23.9	43.5	19.6	Complied
243.009	Vertical	28.2	46.0	17.8	Complied
250.000	Vertical	34.1	46.0	11.9	Complied
270.008	Vertical	27.5	46.0	18.6	Complied
593.990	Horizontal	27.6	46.0	18.4	Complied



Note: This plot is a pre-scan for indication purposes only. For final measurements, see accompanying table.

4.3 Transmitter Out of Band Radiated Emissions >1 GHz

4.3.1 5.15-5.25 GHz band

Transmitter Out of Band Radiated Emissions (5.15-5.25 GHz band operation)

Test Summary:

Test Engineers:	Andrew Harding & Vi Van	Test Datse:	27 March 2024 to 02 May 2024
Test Sample Serial Number:	OWR01635AC-ENR		

FCC Reference:	Part 15.407(b)(1),(7) & 15.209(a)
ISED Canada Reference:	RSS-Gen 6.13 & 8.9 / RSS-247 6.2.1.2
Test Method Used:	KDB 789033 II.G. & ANSI C63.10 Sections 6.3 and 6.6
Frequency Range:	1 GHz to 40 GHz

Environmental Conditions:

Temperature (°C):	19 to 23
Relative Humidity (%):	37 to 44

Note(s):

- FCC Part 15.407(b)(1) states for transmitters operating in the band 5.15 to 5.25 GHz: all emissions outside of the 5.15 to 5.35 GHz band will not exceed -27 dBm/MHz. Part(b)(7) states the provisions of 15.205 apply e.g. restricted bands of operation.
- 2. Pre-scans were performed with the EUT transmitting in the band 5.725 to 5.85 GHz band with a data rate of 802.11a / 6 Mbps as it produced the highest power spectral density and was therefore deemed worst case. An inquiry was made to the FCC and the response was pre-scans could be performed in the band with the highest power spectral density and all final measurements should be performed on any emissions seen in each band.
- 3. The final measured value, for the given emission in the field strength result tables, incorporates the calibrated antenna factor and cable loss.
- 4. Measurements above 1 GHz were performed in a fully anechoic chamber (Asset Number K226203) at a distance of 3 metres. The EUT was placed at a height of 1.5 metres above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.
- 5. All other emissions shown on the pre-scan plots were investigated and found to be ambient, >20 dB below the applicable limit or below the measurement system noise floor.
- For completeness, results are also shown as EIRP in dBm and also as field strength in dBµV/m. Measured field strength was converted to EIRP in accordance with KDB 789033 II.G.2.c)(iii) using a conversion factor of 95.2.

Transmitter Out of Band Radiated Emissions (5.15-5.25 GHz band operation) (continued)

Results: Bottom Channel / Field Strength (Peak)

Frequency	Antenna	Peak Level	Peak Limit	Margin	Result
(MHz)	Polarity	(dBμV/m)	(dBμV/m)	(dB)	
10365.750	Horizontal	67.4	68.2	0.8	Complied

Results: Bottom Channel / EIRP (Peak)

Frequency	Antenna	Peak Level	Peak Limit	Margin	Result
(MHz)	Polarity	(dBm)	(dBm)	(dB)	
10365.750	Horizontal	-27.8	-27.0	0.8	Complied

Results: Middle Channel / Field Strength (Peak)

Frequency	Antenna	Peak Level	Peak Limit	Margin	Result
(MHz)	Polarity	(dBμV/m)	(dBμV/m)	(dB)	
10445.939	Horizontal	65.2	68.2	3.0	Complied

Results: Middle Channel / EIRP (Peak)

Frequency	Antenna	Peak Level	Peak Limit	Margin	Result
(MHz)	Polarity	(dBm)	(dBm)	(dB)	
10445.939	Horizontal	-30.0	-27.0	3.0	Complied

Results: Top Channel / Field Strength (Peak)

Frequency	Antenna	Peak Level	Peak Limit	Margin	Result
(MHz)	Polarity	(dBμV/m)	(dBμV/m)	(dB)	
10487.500	Horizontal	67.1	68.2	1.1	Complied

Results: Top Channel / EIRP (Peak)

Frequency	Antenna	Peak Level	Peak Limit	Margin	Result
(MHz)	Polarity	(dBμV/m)	(dBμV/m)	(dB)	
10487.500	Horizontal	-28.1	-27.0	1.1	Complied

4.3.2 5.25-5.35 GHz band

Transmitter Out of Band Radiated Emissions (5.25-5.35 GHz band operation)

Test Summary:

Test Engineers:	Andrew Harding & Vi Van		27 March 2024 to 03 May 2024
Test Sample Serial Number: OWR01635AC-ENR			

FCC Reference:	Part 15.407(b)(2),(7) & 15.209(a)
ISED Canada Reference:	RSS-Gen 6.13 & 8.9 / RSS-247 6.2.2.2
Test Method Used:	KDB 789033 II.G. & ANSI C63.10 Sections 6.3 and 6.6
Frequency Range:	1 GHz to 40 GHz

Environmental Conditions:

Temperature (°C):	19 to 23
Relative Humidity (%):	37 to 44

Note(s):

- FCC Part 15.407(b)(2) states for transmitters operating in the band 5.25 to 5.35 GHz: all emissions outside of the 5.15-5.35 GHz band will not exceed -27 dBm/MHz. Part(b)(7) states the provisions of 15.205 apply e.g. restricted bands of operation.
- 2. Pre-scans were performed with the EUT transmitting in the band 5.725 to 5.85 GHz band with a data rate of 802.11a / 6 Mbps as it produced the highest power spectral density and was therefore deemed worst case. An inquiry was made to the FCC and the response was pre-scans could be performed in the band with the highest power spectral density and all final measurements should be performed on any emissions seen in each band.
- 3. The final measured value, for the given emission in the field strength result tables, incorporates the calibrated antenna factor and cable loss.
- 4. All other emissions shown on the pre-scan plot were investigated and found to be ambient or >20 dB below the applicable limit or below the measurement system noise floor.
- 5. Measurements above 1 GHz were performed in a fully anechoic chamber (Asset Number K226203) at a distance of 3 metres. The EUT was placed at a height of 1.5 metres above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.
- For completeness, results are also shown as EIRP in dBm and also as field strength in dBµV/m. Measured field strength was converted to EIRP in accordance with KDB 789033 II.G.2.c)(iii) using a conversion factor of 95.2.

Transmitter Out of Band Radiated Emissions (5.25-5.35 GHz band operation) (continued)

Results: Bottom Channel / Field Strength (Peak)

Frequency	Antenna	Peak Level	Peak Limit	Margin	Result
(MHz)	Polarity	(dBμV/m)	(dBμV/m)	(dB)	
10515.950	Horizontal	66.8	68.2	1.4	Complied

Results: Bottom Channel / EIRP (Peak)

Frequency	Antenna	Peak Level	Peak Limit	Margin	Result
(MHz)	Polarity	(dBm)	(dBm)	(dB)	
10515.950	Horizontal	-28.4	-27.0	1.4	Complied

Results: Middle Channel / Field Strength (Peak)

Frequency	Antenna	Peak Level	Peak Limit	Margin	Result
(MHz)	Polarity	(dBμV/m)	(dBμV/m)	(dB)	
10556.800	Horizontal	63.9	68.2	4.3	Complied

Results: Middle Channel / EIRP (Peak)

Frequency	Antenna	Peak Level	Peak Limit	Margin	Result
(MHz)	Polarity	(dBm)	(dBm)	(dB)	
10556.800	Horizontal	-31.3	-27.0	4.3	Complied

Results: Top Channel / Field Strength (Peak)

Frequency	Antenna	Peak Level	Peak Limit	Margin	Result
(MHz)	Polarity	(dBμV/m)	(dBμV/m)	(dB)	
10641.200	Horizontal	51.4	68.2	16.8	Complied

Results: Top Channel / EIRP (Peak)

Frequency	Antenna	Peak Level	Peak Limit	Margin	Result
(MHz)	Polarity	(dB/m)	(dB/m)	(dB)	
10641.200	Horizontal	-43.8	-27.0	16.8	Complied

4.3.3 5.47-5.725 GHz band

Transmitter Out of Band Radiated Emissions (5.47-5.725 GHz band operation)

Test Summary:

Test Engineers:	Andrew Harding & Vi Van	Test Dates:	27 March 2024 to 03 May 2024
Test Sample Serial Number:	OWR01635AC-ENR		

FCC Reference:	Part 15.407(b)(3),(7) & 15.209(a)
ISED Canada Reference:	RSS-Gen 6.13 & 8.9 / RSS-247 6.2.3.2
Test Method Used:	KDB 789033 II.G. & ANSI C63.10 Sections 6.3 and 6.6
Frequency Range:	1 GHz to 40 GHz

Environmental Conditions:

Temperature (°C):	19 to 22
Relative Humidity (%):	37 to 44

Note(s):

- 1. FCC Part 15.407(b)(3) states for transmitters operating in the band 5.47 to 5.725 GHz: all emissions outside of the band will not exceed -27 dBm/MHz. Part(b)(7) states the provisions of 15.205 apply e.g. restricted bands of operation.
- 2. Pre-scans were performed with the EUT transmitting in the band 5.725 to 5.85 GHz band with a data rate of 802.11a / 6 Mbps as it produced the highest power spectral density and was therefore deemed worst case. An inquiry was made to the FCC and the response was pre-scans could be performed in the band with the highest power spectral density and all final measurements should be performed on any emissions seen in each band.
- 3. The final measured value, for the given emission in the field strength result tables, incorporates the calibrated antenna factor and cable loss.
- 4. All other emissions shown on the pre-scan plot were investigated and found to be ambient or >20 dB below the applicable limit or below the measurement system noise floor.
- 5. Measurements above 1 GHz were performed in a fully anechoic chamber (Asset Number K226203) at a distance of 3 metres. The EUT was placed at a height of 1.5 metres above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.
- For completeness, results are also shown as EIRP in dBm and also as field strength in dBµV/m. Measured field strength was converted to EIRP in accordance with KDB 789033 II.G.2.c)(iii) using a conversion factor of 95.2.

Transmitter Out of Band Radiated Emissions (5.47-5.725 GHz band operation) (continued)

Results: Bottom Channel / Field Strength (Peak)

Frequency	Antenna	Peak Level	Peak Limit	Margin	Result
(MHz)	Polarity	(dBμV/m)	(dBμV/m)	(dB)	
11005.850	Horizontal	62.5	74.0	11.5	Complied

Results: Bottom Channel / Field Strength (Average)

Frequency	Antenna	Average Level	Average Limit	Margin	Result
(MHz)	Polarity	(dBμV/m)	(dBµV/m)	(dB)	
11000.650	Horizontal	50.9	54.0	3.1	Complied

Results: Middle Channel / Field Strength (Peak)

Frequency	Antenna	Peak Level	Peak Limit	Margin	Result
(MHz)	Polarity	(dBμV/m)	(dBμV/m)	(dB)	
11160.352	Horizontal	62.2	74.0	11.8	Complied

Results: Middle Channel / Field Strength (Average)

Frequency	Antenna	Average Level	Average Limit	Margin	Result
(MHz)	Polarity	(dBμV/m)	(dBμV/m)	(dB)	
11160.501	Horizontal	50.8	54.0	3.2	Complied

Results: Top Channel / Field Strength (Peak)

Frequency	Antenna	Peak Level	Peak Limit	Margin	Result
(MHz)	Polarity	(dBμV/m)	(dBμV/m)	(dB)	
11405.999	Horizontal	63.6	74.0	10.4	Complied

Results: Top Channel / Field Strength (Average)

Frequency	Antenna	Average Level	Average Limit	Margin	Result
(MHz)	Polarity	(dBμV/m)	(dBμV/m)	(dB)	
11401.200	Horizontal	52.9	54.0	1.1	Complied

4.3.4 5.725-5.85 GHz band

Transmitter Out of Band Radiated Emissions (5.725-5.85 GHz band operation)

Test Summary:

Test Engineers:	Andrew Harding & Vi Van	Test Dates:	27 March 2024 to 03 May 2024
Test Sample Serial Number:	OWR01635AC-ENR		

FCC Reference:	Part 15.407(b)(4)(i),(7) & 15.209(a)
ISED Canada Reference:	RSS-Gen 6.13 & 8.9 / RSS-247 6.2.4.2
Test Method Used:	KDB 789033 II.G. & ANSI C63.10 Sections 6.3 and 6.6
Frequency Range:	1 GHz to 40 GHz

Environmental Conditions:

Temperature (°C):	19 to 23
Relative Humidity (%):	37 to 44

Note(s):

- FCC Part 15.407(b)(4)(i) states for transmitters operating in the band 5.725 to 5.85 GHz: 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. Part(b)(7) states the provisions of 15.205 apply e.g. restricted bands of operation.
- 2. Pre-scans were performed with the EUT transmitting in the band 5.725 to 5.85 GHz band with a data rate of 802.11a / 6 Mbps as it produced the highest power spectral density and was therefore deemed worst case. An inquiry was made to the FCC and the response was pre-scans could be performed in the band with the highest spectral power density and all final measurements should be performed on any emissions seen in each band.
- 3. The final measured value, for the given emission in the field strength result tables, incorporates the calibrated antenna factor and cable loss.
- 4. Appropriate RF filters and attenuators were used during pre-scans and final measurements. Insertion losses were entered on the spectrum analyser as RF levels offsets.
- 5. All other emissions shown on the pre-scan plot were investigated and found to be ambient or >20 dB below the applicable limit or below the measurement system noise floor.
- 6. The emission shown on the 1 GHz to 8 GHz plot is the EUT fundamental.
- 7. Measurements were performed across the two restricted bands closest to the bands of operation with the EUT transmitting on the bottom channel in the 5.15 to 5.25 GHz band and top channel 5.25 to 5.35 GHz range. Plots are included in this section of the test report. Peak and average measurements were made.
- 8. Pre-scans above 1 GHz were performed in a fully anechoic chamber (Asset Number K0017) at a distance of 3 metres. The EUT was placed at a height of 1.5 metres above the reference ground plane in the centre of the chamber turntable. All measurement antennas were placed at a fixed height of 1.5 metres above the test chamber floor, in line with the EUT.
- For completeness, results are also shown as EIRP in dBm and also as field strength in dBµV/m. Measured field strength was converted to EIRP in accordance with KDB 789033 II.G.2.c)(iii) using a conversion factor of 95.2.

<u>Transmitter Out of Band Radiated Emissions (5.725-5.85 GHz band operation) (continued)</u> <u>Results: Bottom Channel / Field Strength (Peak)</u>

Frequency (MHz)	Antenna Polarity	Peak Level (dBμV/m)	Peak Limit (dBμV/m)	Margin (dB)	Result
11485.850	Horizontal	65.1	74.0	8.9	Complied
22980.000	Horizontal	56.4	74.0	17.6	Complied

Results: Bottom Channel / Field Strength (Average)

Frequency (MHz)	Antenna Polarity	Average Level (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
11491.200	Horizontal	53.1	54.0	0.9	Complied
22980.000	Horizontal	53.1	54.0	0.9	Complied

Results: Middle Channel / Field Strength (Peak)

Frequency (MHz)	Antenna Polarity	Peak Level (dBμV/m)	Peak Limit (dBμV/m)	Margin (dB)	Result
11610.297	Horizontal	62.1	74.0	11.9	Complied
23220.130	Horizontal	58.2	68.2	10.0	Complied

Results: Middle Channel / Field Strength (Average)

Frequency	Antenna	Average Level	Average Limit	Margin	Result
(MHz)	Polarity	(dBμV/m)	(dBµV/m)	(dB)	
11610.646	Horizontal	50.0	54.0	4.0	Complied

Results: Top Channel / Field Strength (Peak)

Frequency (MHz)	Antenna Polarity	Peak Level (dBμV/m)	Peak Limit (dBμV/m)	Margin (dB)	Result
11646.600	Horizontal	60.5	74.0	13.5	Complied
23299.888	Horizontal	55.5	68.2	12.7	Complied

Results: Top Channel / Field Strength (Average)

Frequency	Antenna	Average Level	Average Limit	Margin	Result
(MHz)	Polarity	(dBμV/m)	(dBµV/m)	(dB)	
11651.750	Horizontal	48.3	54.0	5.7	Complied

Transmitter Out of Band Radiated Emissions (5.725-5.85 GHz band operation) (continued)



Restricted Band 4.5 GHz to 5.15 GHz

Transmitter Out of Band Radiated Emissions (5.725-5.85 GHz band operation) (continued)



4.4 Transmitter Band Edge Radiated Emissions

4.4.1 5.15-5.25 GHz band

Test Summary:

Test Engineers:	Andrew Harding & Vi Van	Test Dates:	28 March 2024 to 04 April 2024
Test Sample Serial Number:	OWR01635AC-ENR		

FCC Reference:	Parts 15.407(b)(1),(7), 15.205 & 15.209(a)
ISED Canada Reference:	RSS-Gen 6.13, 8.9 & 8.10 / RSS-247 6.2.1.2
Test Method Used:	ANSI C63.10 Section 6.10 & KDB 789033 II.G.

Environmental Conditions:

Temperature (°C):	19 to 21
Relative Humidity (%):	41 to 45

Note(s):

- 1. The following modes were tested:
 - o 802.11a MIMO BPSK / 6 Mbps
 - o 802.11ax HE20 / MIMO BPSK / MCS0
 - o 802.11ax HE40 / MIMO BPSK / MCS0
 - o 802.11ax HE80 / MIMO BPSK / MCS0
 - o 802.11n HT20 / MIMO 256QAM / MCS8
 - o 802.11n HT40 / MIMO 256QAM / MCS8
 - 802.11ac VHT80 / MIMO BPSK / MCS0
- 2. Lower band edge measurements were performed with the EUT transmitting on the bottom channel. Upper band edge measurements were performed with the EUT transmitting on the top channel.
- 3. For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz. However, there are restricted bands of operation below the lower band edge at 4.5-5.15 GHz and also above the upper band edge at 5.35-5.46 GHz therefore the provisions of FCC Part 15.205 apply.
- 4. For all average measurments if this section, 300 sweeps were used. This satisfies the requirement for the minimum number of sweep points, as stated in KDB 789033 Section II.G.6.c) Method AD (vi).

Transmitter Band Edge Radiated Emissions (5.15-5.25 GHz band operation) (continued)

Results: 802.11a / 20 MHz / MIMO / BPSK / 6 Mbps

Results: Lower Band Edge / Peak

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5149.201	56.4	74.0	17.6	Complied
5150	54.3	74.0	19.7	Complied

Results: Lower Band Edge / Average

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5149.920	42.8	54.0	11.2	Complied
5150	42.7	54.0	11.3	Complied



Lower Band Edge

Transmitter Band Edge Radiated Emissions (5.15-5.25 GHz band operation) (continued)

Results: 802.11ax / 20 MHz / MIMO / BPSK / MCS0

Results: Lower Band Edge / Peak

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5148.002	60.7	74.0	13.3	Complied
5150	55.5	74.0	18.5	Complied

Results: Lower Band Edge / Average

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5147.842	44.7	54.0	9.3	Complied
5150	43.0	54.0	11.0	Complied



Lower Band Edge

<u>Transmitter Band Edge Radiated Emissions (5.15-5.25 GHz band operation) (continued)</u> <u>Results: 802.11ax / 40 MHz / MIMO / BPSK / MCS0</u>

Results: Lower Band Edge / Peak

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5143.170	61.1	74.0	12.9	Complied
5150	5150 60.8		13.2	Complied

Results: Lower Band Edge / Average

Frequency (MHz)	Level (dBµV/m)	Duty Cycle Correction (dB)	Corrected Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5149.880	46.8	0.2	47.0	54.0	7.0	Complied
5150	46.7	0.2	46.9	54.0	7.1	Complied



Transmitter Band Edge Radiated Emissions (5.15-5.25 GHz band operation) (continued) Results: 802.11ax / 80 MHz / MIMO / BPSK / MCS0

Results: Lower Band Edge / Peak

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5117.030	56.8	74.0	17.2	Complied
5150	54.6	74.0	19.4	Complied

Results: Lower Band Edge / Average

Frequency (MHz)	Level (dBµV/m)	Duty Cycle Correction (dB)	Corrected Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5126.420	44.0	0.3	44.3	54.0	9.7	Complied
5150	42.6	0.3	42.9	54.0	11.1	Complied



Transmitter Band Edge Radiated Emissions (5.15-5.25 GHz band operation) (continued) Results: 802.11n / 20 MHz / MIMO / 256QAM / MCS8

Results: Lower Band Edge / Peak

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result	
5148.641	54.8	74.0	19.2	Complied	
5150	53.3	74.0	20.7	Complied	

Results: Lower Band Edge / Average

Frequency (MHz)	Level (dBµV/m)	Duty Cycle Correction (dB)	Corrected Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5148.561	42.5	0.1	42.6	54.0	11.4	Complied
5150	42.0	0.1	42.1	54.0	11.9	Complied



Transmitter Band Edge Radiated Emissions (5.15-5.25 GHz band operation) (continued) Results: 802.11n / 40 MHz / MIMO / 256QAM / MCS8

Results: Lower Band Edge / Peak

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5144.370	58.7	74.0	15.3	Complied
5150	57.3	74.0	16.7	Complied

Results: Lower Band Edge / Average

Frequency (MHz)	Level (dBµV/m)	Duty Cycle Correction (dB)	Corrected Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5149.520	45.3	0.2	45.5	54.0	8.5	Complied
5150	45.1	0.2	45.3	54.0	8.7	Complied



<u>Transmitter Band Edge Radiated Emissions (5.15-5.25 GHz band operation) (continued)</u> <u>Results: 802.11ac / 80 MHz / MIMO / BPSK / MCS0</u>

Results: Lower Band Edge / Peak

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Limit Margin (dBµV/m) (dB)	
5133.850	62.6	74.0	11.4	Complied
5150	56.2	56.2 74.0 17.8		Complied

Results: Lower Band Edge / Average

Frequency (MHz)	Level (dBµV/m)	Duty Cycle Correction (dB)	Corrected Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5113.710	46.4	0.2	46.6	54.0	7.4	Complied
5150	42.8	0.2	43.0	54.0	11.0	Complied



Transmitter Band Edge Radiated Emissions (5.25-5.35 GHz band)

4.4.2 5.25-5.35 GHz band

Test Summary:

Test Engineers:	Andrew Harding & Vi Van	Test Dates:	28 March 2024 to 04 April 2024
Test Sample Serial Number:	OWR01635AC-ENR		

FCC Reference:	Parts 15.407(b)(2),(7), 15.205 & 15.209(a)
ISED Canada Reference:	RSS-Gen 6.13, 8.9 & 8.10 / RSS-247 6.2.1.2
Test Method Used:	ANSI C63.10 Section 6.10 & KDB 789033 II.G.

Environmental Conditions:

Temperature (°C):	19 to 21
Relative Humidity (%):	41 to 45

Note(s):

- 1. The following modes were tested:
 - o 802.11a MIMO BPSK / 6 Mbps
 - o 802.11ax HE20 / MIMO BPSK / MCS0
 - o 802.11ax HE40 / MIMO BPSK / MCS0
 - o 802.11ax HE80 / MIMO BPSK / MCS0
 - o 802.11n HT20 / MIMO 256QAM / MCS8
 - o 802.11n HT40 / MIMO 256QAM / MCS8
 - 802.11ac VHT80 / MIMO BPSK / MCS0
- 2. Lower band edge measurements were performed with the EUT transmitting on the bottom channel. Upper band edge measurements were performed with the EUT transmitting on the top channel.
- 3. For transmitters operating in the 5.25-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz. However, there are restricted bands of operation below the lower band edge at 4.5-5.15 GHz and also above the upper band edge at 5.35-5.46 GHz therefore the provisions of FCC Part 15.205 apply.
- 4. For all average measurments if this section, 300 sweeps were used. This satisfies the requirement for the minimum number of sweep points, as stated in KDB 789033 Section II.G.6.c) Method AD (vi).

Transmitter Band Edge Radiated Emissions (5.25-5.35 GHz band operation) (continued)

Results: 802.11a / 20 MHz / MIMO / BPSK / 6 Mbps

Results: Upper Band Edge / Peak

Frequency (MHz)	Peak Level (dBμV/m)	Average Limit (dBμV/m)	Margin (dB)	Result
5350	58.1	74.0	15.9	Complied
5350.320	59.9	74.0	14.1	Complied

Results: Upper Band Edge / Average

Frequency	Level	Limit	Margin	Result
(MHz)	(dBµV/m)	(dBµV/m)	(dB)	
5150	42.9	54.0	11.1	Complied



Transmitter Band Edge Radiated Emissions (5.25-5.35 GHz band operation) (continued)

Results: 802.11ax / 20 MHz / MIMO / BPSK / MCS0

Results: Upper Band Edge / Peak

Frequency (MHz)	Peak Level (dBμV/m)	Average Limit (dBμV/m)	Margin (dB)	Result
5350	61.4	74.0	12.6	Complied
5352.717	62.8	74.0	11.2	Complied

Results: Upper Band Edge / Average

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5350	42.4	54.0	11.6	Complied
5352.637	43.9	54.0	10.1	Complied



Transmitter Band Edge Radiated Emissions (5.25-5.35 GHz band operation) (continued)

Results: 802.11ax / 40 MHz / MIMO / BPSK / MCS0

Results: Upper Band Edge / Peak

Frequency (MHz)	Peak Level (dBμV/m)	Average Limit (dBμV/m)	Margin (dB)	Result
5350	64.8	74.0	9.2	Complied
5355.270	63.3	74.0	10.7	Complied

Results: Upper Band Edge / Average

Frequency (MHz)	Level (dBµV/m)	Duty Cycle Correction (dB)	Corrected Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5350	49.8	0.2	50.0	54.0	4.0	Complied



Transmitter Band Edge Radiated Emissions (5.25-5.35 GHz band operation) (continued)

Results: 802.11ax / 80 MHz / MIMO / BPSK / MCS0

Results: Upper Band Edge / Peak

Frequency (MHz)	Peak Level (dBμV/m)	Average Limit (dBμV/m)	Margin (dB)	Result
5350	56.2	74.0	17.8	Complied
5356.990	57.9	74.0	16.1	Complied

Results: Upper Band Edge / Average

Frequency (MHz)	Level (dBµV/m)	Duty Cycle Correction (dB)	Corrected Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5350	43.9	0.3	44.2	54.0	9.8	Complied
5353.200	44.3	0.3	44.6	54.0	9.4	Complied



Transmitter Band Edge Radiated Emissions (5.25-5.35 GHz band operation) (continued)

Results: 802.11n / 20 MHz / MIMO / 256QAM / MCS8

Results: Upper Band Edge / Peak

Frequency	Peak Level	Average Limit	Margin	Result
(MHz)	(dBμV/m)	(dBμV/m)	(dB)	
5350	65.3	74.0	8.7	Complied

Results: Upper Band Edge / Average

Frequency (MHz)	Level (dBµV/m)	Duty Cycle Correction (dB)	Corrected Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5350	44.9	0.1	45.0	54.0	9.0	Complied



Transmitter Band Edge Radiated Emissions (5.25-5.35 GHz band operation) (continued)

Results: 802.11n / 40 MHz / MIMO / 256QAM / MCS8

Results: Upper Band Edge / Peak

Frequency (MHz)	Peak Level (dBμV/m)	Average Limit (dBμV/m)	Margin (dB)	Result
5350	62.3	54.0	11.7	Complied
5351.440	63.3	54.0	10.7	Complied

Results: Upper Band Edge / Average

Frequency (MHz)	Level (dBµV/m)	Duty Cycle Correction (dB)	Corrected Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5350	48.6	0.2	48.8	54.0	5.2	Complied



Transmitter Band Edge Radiated Emissions (5.25-5.35 GHz band operation) (continued)

Results: 802.11ac / 80 MHz / MIMO / BPSK / MCS0

Results: Upper Band Edge / Peak

Frequency (MHz)	Peak Level (dBμV/m)	Average Limit (dBμV/m)	Margin (dB)	Result
5350	57.3	74.0	16.7	Complied
5365.940	63.1	74.0	10.9	Complied

Results: Upper Band Edge / Average

Frequency (MHz)	Level (dBµV/m)	Duty Cycle Correction (dB)	Corrected Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5350	43.0	0.2	43.2	54.0	10.8	Complied
5365.730	46.3	0.2	46.5	54.0	7.5	Complied



Transmitter Band Edge Radiated Emissions (5.47-5.725 GHz band)

4.4.3 5.47-5.725 GHz band

Test Summary:

Test Engineers:	Andrew Harding & Vi Van	Test Dates:	28 April 2024 to 04 April 2024
Test Sample Serial Number:	OWR01635AC-ENR		

FCC Reference:	Parts 15.407(b)(3),(7), 15.205 & 15.209(a)
ISED Canada Reference:	RSS-Gen 6.13, 8.9 & 8.10 / RSS-247 6.2.3.2
Test Method Used:	ANSI C63.10 Section 6.10 & KDB 789033 II.G.

Environmental Conditions:

Temperature (°C):	19 to 21
Relative Humidity (%):	41 to 45

Note(s):

- 1. The following modes were tested:
 - o 802.11a MIMO BPSK / 6 Mbps
 - o 802.11ax HE20 / MIMO BPSK / MCS0
 - o 802.11ax HE40 / MIMO BPSK / MCS0
 - o 802.11ax HE80 / MIMO BPSK / MCS0
 - o 802.11n HT20 / MIMO 256QAM / MCS8
 - o 802.11n HT40 / MIMO 256QAM / MCS8
 - 802.11ac VHT80 / MIMO BPSK / MCS0
- 2. Lower band edge measurements were performed with the EUT transmitting on the bottom channel. Upper band edge measurements were performed with the EUT transmitting on the top channel.
- 3. For transmitters operating in the 5.47-5.725 GHz band: all emissions outside of the 5.47-5.725 GHz band shall not exceed an EIRP of -27 dBm/MHz. However, there are restricted bands of operation below the lower band edge at 4.5-5.15 GHz and also at 5.35-5.46 GHz therefore the provisions of FCC Part 15.205 apply.
- For completeness, results are also shown as EIRP in dBm and also as field strength in dBµV/m. Measured field strength was converted to EIRP in accordance with KDB 789033 II.G.2.c)(iii) using a conversion factor of 95.2.

ISSUE DATE: 18 DECEMBER 2024

<u>Transmitter Band Edge Radiated Emissions (5.47-5.725 GHz band operation) (continued)</u> Results: 802.11a / 20 MHz / MIMO / BPSK / 6 Mbps / Peak

Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Result
5469.680	-29.8	-27.0	2.8	Complied
5470	-30.1	-27.0	3.1	Complied
5725	-32.3	-27.0	5.3	Complied

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5469.680	65.4	68.2	2.8	Complied
5470	65.1	68.2	3.1	Complied
5725	62.9	68.2	5.3	Complied

Results: 802.11a / 20 MHz / MIMO / BPSK / 6 Mbps / Average

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5457.293	41.8	-54.0	12.2	Complied
5460	41.0	-54.0	13.0	Complied







Upper Band Edge

<u>Transmitter Band Edge Radiated Emissions (5.47-5.725 GHz band operation) (continued)</u> Results: 802.11ax / 20 MHz / MIMO / BPSK / MCS0 / Peak

Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Result
5469.840	-27.9	-27.0	0.9	Complied
5470	-28.9	-27.0	1.9	Complied
5725	-30.0	-27.0	3.0	Complied
5725.420	-29.1	-27.0	2.1	Complied

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5469.840	67.3	68.2	0.9	Complied
5470	66.3	68.2	1.9	Complied
5725	65.2	68.2	3	Complied
5725.420	66.1	68.2	2.1	Complied

Results: 802.11ax / 20 MHz / MIMO / BPSK / MCS0 / Average

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5459.051	42.5	-54.0	11.5	Complied
5460	41.9	-54.0	12.1	Complied





Lower Band Edge

ISSUE DATE: 18 DECEMBER 2024

<u>Transmitter Band Edge Radiated Emissions (5.47-5.725 GHz band operation) (continued)</u> Results: 802.11ax / 40 MHz / MIMO / BPSK / MCS0 / Peak

Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Result
5469.68	-27.9	-27.0	0.9	Complied
5470	-29.3	-27.0	2.3	Complied
5725	-29.2	-27.0	2.2	Complied
5726.35	-29.0	-27.0	2.0	Complied

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5469.680	67.3	68.2	0.9	Complied
5470	65.9	68.2	2.3	Complied
5725	66.0	68.2	2.2	Complied
5726.350	66.2	68.2	2.0	Complied

Results: 802.11ax / 40 MHz / MIMO / BPSK / MCS0 / Average

Frequency (MHz)	Level (dBm)	Duty Cycle Correction (dB)	Corrected Level (dBµV/m)	Limit (dBuV)	Margin (dB)	Result
5460	47.1	0.2	47.3	54.0	6.7	Complied





Lower Band Edge

<u>Transmitter Band Edge Radiated Emissions (5.47-5.725 GHz band operation) (continued)</u> Results: 802.11ax / 80 MHz / MIMO / BPSK / MCS0 / Peak

Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Result
5463.210	-31.4	-27.0	4.4	Complied
5470	-32.5	-27.0	5.5	Complied
5725	-35.0	-27.0	8.0	Complied
5725.310	-33.8	-27.0	6.8	Complied

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5463.210	63.8	68.2	4.4	Complied
5470	62.7	68.2	5.5	Complied
5725	60.2	68.2	8.0	Complied
5725.310	61.4	68.2	6.8	Complied

Results: 802.11ax / 80 MHz / MIMO / BPSK / MCS0 / Average

Frequency (MHz)	Level (dBm)	Duty Cycle Correction (dB)	Corrected Level (dBµV/m)	Limit (dBuV)	Margin (dB)	Result
5459.010	49.3	0.3	49.5	54.0	4.5	Complied
5460	48.7	0.3	49.0	54.0	5.0	Complied





Lower Band Edge

ISSUE DATE: 18 DECEMBER 2024

Transmitter Band Edge Radiated Emissions (5.47-5.725 GHz band operation) (continued)

Results:	802.11n	/ 20 MHz /	' MIMO /	256QAM /	MCS8 / Peak

Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Result
5469.920	-28.7	-27.0	1.7	Complied
5470	-29.0	-27.0	2.0	Complied
5725	-29.7	-27.0	2.7	Complied
5725.140	-28.7	-27.0	1.7	Complied

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5469.920	66.5	68.2	1.7	Complied
5470	66.2	68.2	2.0	Complied
5725	65.5	68.2	2.7	Complied
5725.140	66.5	68.2	1.7	Complied

Results: 802.11n / 20 MHz / MIMO / 256QAM / MCS8 / Average

Frequency (MHz)	Level (dBm)	Duty Cycle Correction (dB)	Corrected Level (dBµV/m)	Limit (dBuV)	Margin (dB)	Result
5459.371	42.6	0.1	42.7	54.0	11.3	Complied
5460	42.3	0.1	42.4	54.0	11.6	Complied





Lower Band Edge

1.3

5726.500

Complied

VERSION 2.0

Transmitter Band Edge Radiated Emissions (5.47-5.725 GHz band operation) (continued)

ŀ	<u> Results: 802.11n / 40 MHz / MIMO / 256QAM / MCS8 / Peak</u>							
	Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Result			
ſ	5466.040	-29.0	-27.0	2.0	Complied			
	5470	-30.5	-27.0	3.5	Complied			
ſ	5725	-31.4	-27.0	4.4	Complied			

Results: 802.11n / 40 MHz / MIMO / 256QAM / MCS8 / Peak	

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5466.040	66.2	68.2	2.0	Complied
5470	64.7	68.2	3.5	Complied
5725	63.8	68.2	4.4	Complied
5726.500	66.9	68.2	1.3	Complied

-27.0

Results: 802.11n / 40 MHz / MIMO / 256QAM / MCS8 / Average

-28.3

Frequency (MHz)	Level (dBm)	Duty Cycle Correction (dB)	Corrected Level (dBµV/m)	Limit (dBuV)	Margin (dB)	Result
5457.530	46.6	0.2	46.8	54.0	7.2	Complied
5460	45.0	0.2	45.2	54.0	8.8	Complied





Lower Band Edge

<u>Transmitter Band Edge Radiated Emissions (5.47-5.725 GHz band operation) (continued)</u> Results: 802.11ac / 80 MHz / MIMO / BPSK / MCS0 / Peak

Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Result
5454.060	-29.6	-27.0	2.6	Complied
5470	-34.1	-27.0	7.1	Complied
5725	-32.1	-27.0	5.1	Complied
5737.700	-32.0	-27.0	5.0	Complied

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5454.060	65.6	68.2	2.6	Complied
5470	61.1	68.2	7.1	Complied
5725	63.1	68.2	5.1	Complied
5737.700	63.2	68.2	5.0	Complied

Results: 802.11ac / 80 MHz / MIMO / BPSK / MCS0 / Average

Frequency (MHz)	Level (dBm)	Duty Cycle Correction (dB)	Corrected Level (dBµV/m)	Limit (dBuV)	Margin (dB)	Result
5457.530	49.3	0.2	49.5	54.0	4.5	Complied
5460	45.6	0.2	45.8	54.0	8.2	Complied





Lower Band Edge

Transmitter Band Edge Radiated Emissions (5.725-5.85 GHz band)

4.4.4 5.725-5.85 GHz band

Test Summary:

Test Engineer:	Andrew Harding & Nick Steele	Test Dates:	18 April 2024 to 20 May 2024
Test Sample Serial Number:	OWR01635AC-ENR		

FCC Reference:	Parts 15.407(b)(4)(i),(7), 15.205 & 15.209(a)
ISED Canada Reference:	RSS-Gen 6.13, 8.9 & 8.10 / RSS-247 6.2.4.2
Test Method Used:	ANSI C63.10 Section 6.10 & KDB 789033 II.G.

Environmental Conditions:

Temperature (°C):	21 to 23
Relative Humidity (%):	40 to 47

Note(s):

- 1. The following modes were tested:
 - o 802.11a MIMO BPSK / 6 Mbps
 - o 802.11ax HE20 / MIMO BPSK / MCS0
 - o 802.11ax HE40 / MIMO BPSK / MCS0
 - o 802.11ax HE80 / MIMO BPSK / MCS0
 - o 802.11n HT20 / MIMO 256QAM / MCS8
 - o 802.11n HT40 / MIMO 256QAM / MCS8
 - 802.11ac VHT80 / MIMO BPSK / MCS0
- 2. Lower band edge measurements were performed with the EUT transmitting on the bottom channel. Upper band edge measurements were performed with the EUT transmitting on the top channel.
- For completeness, results are also shown as EIRP in dBm and also as field strength in dBµV/m. Measured field strength was converted to EIRP in accordance with KDB 789033 G.2.c)(iii) using a conversion factor of 95.2.

<u>Transmitter Band Edge Radiated Emissions (5.725-5.85 GHz band operation) (continued)</u> Results: 802.11a / 20 MHz / MIMO / BPSK / 6 Mbps / Peak

Frequency (MHz)	Level (dBm)	Limit (dBm/MHz)	Margin (dB)	Result
5641.400	-38.3	-27.0	11.3	Complied
5725	-17.9	27.0	44.9	Complied
5850	-39.4	27.0	66.4	Complied
5938.400	-38.3	-27.0	11.3	Complied
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Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5641.400	56.9	68.2	11.3	Complied
5725	77.3	122.2	44.9	Complied
5850	55.8	122.2	66.4	Complied
5938.400	56.9	68.2	11.3	Complied







Upper Band Edge

<u>Transmitter Band Edge Radiated Emissions (5.725-5.85 GHz band operation) (continued)</u> Results: 802.11ax / 20 MHz / MIMO / BPSK / MCS0 / Peak

		()	
9.1	-27.0	12.1	Complied
2.0	27.0	39.0	Complied
5.9	27.0	62.9	Complied
5.0	-27.0	8.0	Complied
3	39.1 12.0 35.9 35.0	39.1 -27.0 12.0 27.0 35.9 27.0 35.0 -27.0	39.1 -27.0 12.1 12.0 27.0 39.0 35.9 27.0 62.9 35.0 -27.0 8.0

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5646.200	56.1	68.2	12.1	Complied
5725	83.2	122.2	39.0	Complied
5850	59.3	122.2	62.9	Complied
5950.000	60.2	68.2	8.0	Complied







Upper Band Edge

ISSUE DATE: 18 DECEMBER 2024

<u>Transmitter Band Edge Radiated Emissions (5.725-5.85 GHz band operation) (continued)</u> Results: 802.11ax / 40 MHz / MIMO / BPSK / MCS0 / Peak

Frequency (MHz)	Level (dBm)	Limit (dBm/MHz)	Margin (dB)	Result
5647.200	-38.9	-27.0	11.9	Complied
5725	-14.2	27.0	41.2	Complied
5850	-39.2	27.0	66.2	Complied
5928.600	-38.8	-27.0	11.8	Complied
	1		1	1

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5647.200	56.3	68.2	11.9	Complied
5725	81.0	122.2	41.2	Complied
5850	56.0	122.2	66.2	Complied
5928.600	56.4	68.2	11.8	Complied



Lower Band Edge



Upper Band Edge

<u>Transmitter Band Edge Radiated Emissions (5.725-5.85 GHz band operation) (continued)</u> Results: 802.11ax / 80 MHz / MIMO / BPSK / MCS0 / Peak

Frequency (MHz)	Level (dBm)	Limit (dBm/MHz)	Margin (dB)	Result
5647.200	-28.2	-27.0	1.2	Complied
5725	-22.1	27.0	49.1	Complied
5850	-24.6	27.0	51.6	Complied
5927.040	-30.0	-27.0	3.0	Complied
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Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5647.200	67.0	68.2	1.2	Complied
5725	73.1	122.2	49.1	Complied
5850	70.6	122.2	51.6	Complied
5927.040	65.2	68.2	3.0	Complied



Lower Band Edge



Upper Band Edge

<u>Transmitter Band Edge Radiated Emissions (5.725-5.85 GHz band operation) (continued)</u> Results: 802.11n / 20 MHz / MIMO / 256QAM / MCS8 / Peak

Frequency (MHz)	Level (dBm)	Limit (dBm/MHz)	Margin (dB)	Result
5627.600	-38.3	-27.0	11.3	Complied
5725	-18.1	27.0	45.1	Complied
5850	-39.0	27.0	66.0	Complied
5927.040	-38.2	-27.0	11.2	Complied

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5627.600	56.9	68.2	11.3	Complied
5725	77.1	122.2	45.1	Complied
5850	56.2	122.2	66.0	Complied
5927.040	57.0	68.2	11.2	Complied



Lower Band Edge



Upper Band Edge

Transmitter Band Edge Radiated Emissions (5.725-5.85 GHz band operation) (continued)

<u>Results: 802.11n / 40 MHz / MIMO / 256QAM / MCS8 / Peak</u>

Frequency (MHz)	Level (dBm)	Limit (dBm/MHz)	Margin (dB)	Result
5645.000	-35.1	-27.0	8.1	Complied
5725	-14.4	27.0	41.4	Complied
5850	-39.2	27.0	66.2	Complied
5934.800	-38.3	-27.0	11.3	Complied

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5645.000	60.1	68.2	8.1	Complied
5725	80.8	122.2	41.4	Complied
5850	56.0	122.2	66.2	Complied
5934.800	56.9	68.2	11.3	Complied



Lower Band Edge



Upper Band Edge

Span 240 MH:

Transmitter Band Edge Radiated Emissions (5.725-5.85 GHz band operation) (continued)

Results: 802.11ac / 80 MHz / MIMO / BPSK / MCS0 / Peak

Frequency (MHz)	Level (dBm)	Limit (dBm/MHz)	Margin (dB)	Result
5641.400	-35.1	-28.2	1.2	Complied
5725	-14.4	-23.2	50.2	Complied
5850	-39.2	-27.3	54.3	Complied
5931.360	-38.3	-30.9	3.9	Complied

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5641.400	67.0	68.2	1.2	Complied
5725	72.0	122.2	50.2	Complied
5850	67.9	122.2	54.3	Complied
5931.360	64.3	68.2	3.9	Complied

Ø

Ref 120 dBuV

20 Offset

enter 5.85 GHz

107067

.11







24 MHz/

*RBW 1 MHz *VBW 3 MHz SWT 20 ms

• Att 10 di

Upper Band Edge

--- END OF REPORT ---