Guangzhou Xaircraft Technology CO.,LTD.

TEST REPORT

SCOPE OF WORK

FCC TESTING–WM101

REPORT NUMBER

240613075SZN-006

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TEST REPORT Intertek Report No.: 240613075SZN-006

RF TEST REPORT

Report No.	**: 240613075SZN-006**
Product	**: WLAN Model**
Model No.	**: WM101**
FCC ID	**: 2A46G-WM101A**

Applicant:	**Guangzhou Xaircraft Technology CO.,LTD. Block C, No.115, Gaopu Road, Tianhe District, GuangzhouCity, Guangdong,P.R.China**
Test Method/ Standard:	**FCC Part 15 Subpart E; KDB 789033 D02 v02r01; ANSI C63.10-2013**
Test By:	**Intertek Testing Services Shenzhen Ltd. Longhua Branch 101, 201, Building B, No. 308 Wuhe Avenue, Zhangkengjing Community, GuanHu Subdistrict, LongHua District, Shenzhen, P.R. China.**

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Date: 26 September 2024

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Summary of Tests

FCC Parts	Test	Section	Results
15.203	Antenna Requirement	1.3	Pass
15.407 a (1) / (3)	Maximum output power test	3	Pass
15.407 b, 15.205, 15.209	Radiated spurious emission test	6	Pass

1. General information

1.1 Identification of the EUT

Product:	WLAN Model
Model No.:	WM101
Type of Device:	Slave device
Nominal Channel Bandwidth:	802.11a/n-HT20(20MHz),
Frequency range:	5725MHz~5850MHz
Channel Number and Operating Frequency:	5 channels for 5745 MHz ~ 5825 MHz (802.11a/n20);
Modulation:	802.11a: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11n: OFDM (BPSK, QPSK, 16QAM, 64QAM)
Rated Power:	DC 3.65V
Test Date(s):	13 June 2024 to 30 July 2024
Note 1:	This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.
Note 2:	When determining the test conclusion, the Measurement Uncertainty of test has been considered.

1.2 Additional information about the EUT

The equipment under test (EUT) is a WLAN Model with 2.4G WIFI function operating in 2412-2462MHz and 5G WIFI function operating in 5725MHz~5850MHz. For more detail information pls. refer to the user manual.

For more detail features, please refer to User's description as file name “descri.pdf”.

Related Submittal(s) Grants
This is an application for certification of U–NII device (5GHz Wi-Fi transmitter portion).
This report is Class II Permissive Change for FCC ID: 2A46G-WM101A, due to the change the antenna and reduce 802.11n-HT40 function, partial tests are required after evaluation..
For the 2.4GHz WIFI function was tested and demonstrated in report 240613075SZN-005.

1.3 Antenna description (15.203)

The EUT uses Internal Antenna which in accordance to Section 15.203 is considered sufficient to comply with the provisions of this section.

Antenna 1 Gain: 5.09dBi Max for 5G WIFI.
Antenna 2 Gain: 5.12dBi Max for 5G WIFI.

For electronic filing, Antenna specifications is refer to filename: Antenna specification. pdf.
Antenna photos is refer to filename: description. pdf.

1.4 Peripherals equipment

Description	Manufacturer	Remark
USB Cable (Provided by Applicant)	/	0.2m
Adaptor (Provided by Intertek)	/	Model: GS-W30A0936 Input: 100-240V~50/60Hz 0.8A, Output: DC 5V/3A, 9V/3A,12V/2.5A, 15V/2A, 20V/1.5A

2. Test specifications

2.1 Test standard

The EUT was performed according to the procedures in FCC Part 15 E, Section15.203, 15.207, 15.209, 15.407 and ANSI C63.10/2013, method of measurement: KDB 789033.

The test of radiated measurements according to FCC Part15 Section 15.33(a) had been conducted and the field strength of this frequency band was all meet limit requirement, thus we evaluate the EUT pass the specified test.

Radiated emissions were invested cover the frequency range from 9KHz to 30MHz using a receiver RBW of 9kHz, from 30 MHz to 1000 MHz using a receiver RBW of 120 kHz record QP reading, and the frequency over 1 GHz using a spectrum analyzer RBW of 1 MHz, VBW of 3MHz, Detector=Peak record for Peak reading, RBW of 1 MHz, VBW of 3MHz, Detector=RMS record for Average reading recorded on the report.

The EUT setup configurations please refer to the photo of radiated setup photos.pdf & conducted setup photos.pdf.

2.2 Operation mode

The EUT was supplied by and it was run in TX mode that was controlled by client provided RF testing program.

The EUT was transmitted continuously during the test. The worst case test result was showed in the report.

With individual verifying, the maximum output power was found at 6 Mbps data rate for 802.11a mode, 6.5 Mbps data rate for 802.11n-HT20 mode. The final tests were executed under these conditions and recorded in this report individually.
802.11a only supports SISO mode.
802.11n HT20 supports SISO and MIMO mode.

2.3 EUT Exercising Software

The EUT exercise program (provided by client) used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use. The worst case configuration is used in all specified testing.

Table for Parameters of Test Software Setting
During testing, Channel & Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

Test software: ART2-GUI: V2.3

3. Maximum Output Power test (FCC 15.407)

3.1 Operating environment

Temperature:	25	℃
Relative Humidity:	55	%
Atmospheric Pressure:	1011	hPa

3.2 Test setup & procedure

The power output per FCC §15.407(a) was measured on the EUT using a 50 ohm SMA cable connected to Power Meter and the measurement method refer to 789033 D02. Power was read directly and cable loss correction (1.0dB) was added to the reading to obtain power at the EUT antenna terminals.

3.3 Limit

Operating Frequency (MHz)	Max Conducted TX Power	Max EIRP
5150~5250	30dBm (1W) for master device	4W (36dBm) with 6dBi antenna
	24dBm (250mW) for client device	
5250~5350	24dBm (250mW) or 11dBm+ 10logB*	1W (30dBm) with 6dBi antenna
5470~5725	24dBm (250mW) or 11dBm+ 10logB*	
5725~5850	30dBm (1W)	4W (36dBm) with 6dBi antenna

Remark: 1) *Where B is the 26dB emission Bandwidth in MHz.
2) The device was declared as Slave device.
3) Tx Power Reduction (dBm-by-dBi) required when antenna exceeds 6dBi.
4) In MIMO (2Tx), Ant1+Ant2 Directional gain = GANT + Array Gain= 5.12 + 0= 5.12 dBi< 6 dBi.

3.4 Measured data of Maximum Output Power test results

Max Conducted TX Power

TestMode	Antenna	Channel	Result	Limit	Verdict
11A	Ant1	5745	22.49	<=30	PASS
	Ant2	5745	23.53	<=30	PASS
	Ant1	5785	22.32	<=30	PASS
	Ant2	5785	23.65	<=30	PASS
	Ant1	5825	22.57	<=30	PASS
	Ant2	5825	22.75	<=30	PASS
11N20MIMO	Ant1	5745	20.12	<=30	PASS
	Ant2	5745	23.33	<=30	PASS
	total	5745	25.03	<=30	PASS
	Ant1	5785	21.84	<=30	PASS
	Ant2	5785	23.66	<=30	PASS
	total	5785	25.85	<=30	PASS
	Ant1	5825	21.92	<=30	PASS
	Ant2	5825	22.67	<=30	PASS
	total	5825	25.32	<=30	PASS

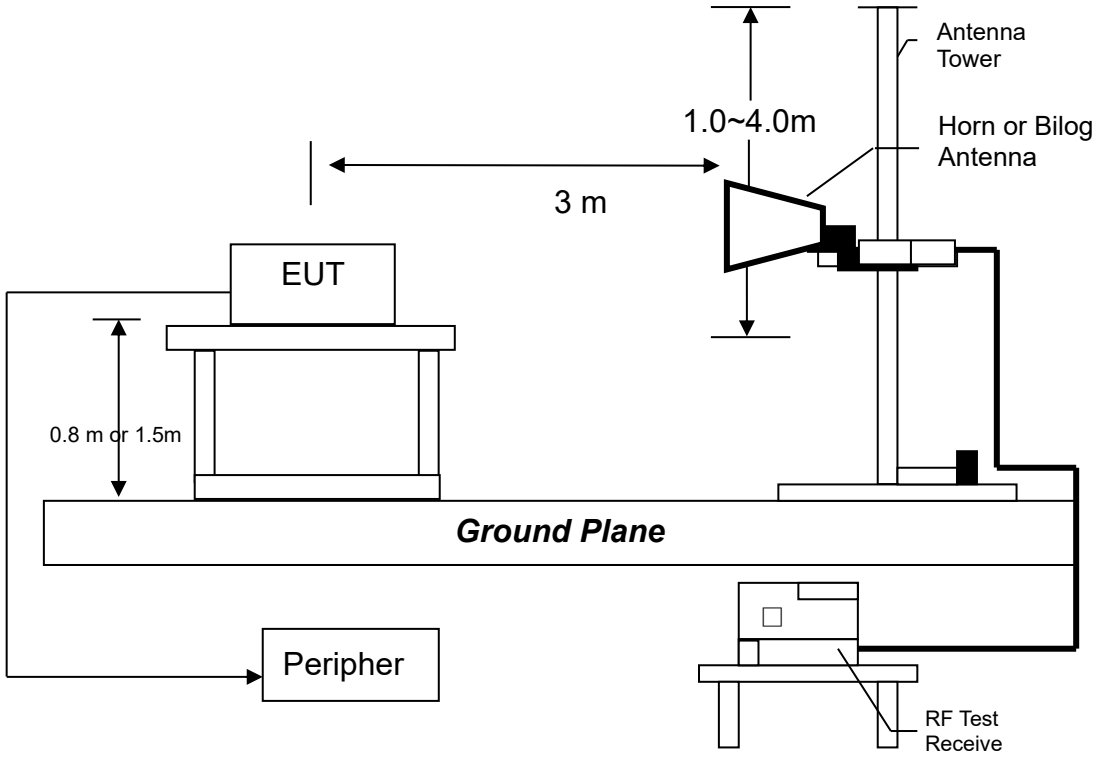
4. Radiated Emission test (FCC 15.205 & 15.209 & 15.407)

4.1 Operating environment

Temperature:	23	℃
Relative Humidity:	56	%
Atmospheric Pressure	1011	hPa

4.2 Test setup & procedure

The Diagram below shows the test setup, which is utilized to make these measurements.



Radiated emission measurements were performed from 9KHz to tenth harmonic or 40GHz.

The EUT for testing is arranged on a styrene turntable with the height of 0.8m up to 1GHz and 1.5m above 1GHz. If some peripherals apply to the EUT, the peripherals will be connected to EUT and the whole system. During the test, all cables were arranged to produce worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meters and down to 1 meter.

The measurement for radiated emission will be done at the distance of three meters unless the signal level is too low to measure at that distance. In the case of the reading under noise floor, a pre-amplifier is used and/or the test is conducted at a closer distance. And then all readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance.

Testing settings (refer to KDB 789033 D02)
Peak Measurements below 1GHz
1, Analyzer center frequency was set to the frequency of the radiated spurious emission.
2, Span=encompass the entire emission
3, RBW=120KHz
4, Detector=Quasi-Peak
5, Trace was allowed to stabilize

Peak Measurements above 1GHz
1, Analyzer center frequency was set to the frequency of the radiated spurious emission.
2, Span=encompass the entire emission
3, RBW=1MHz
4, VBW=3MHz
4, Detector= Peak (Max-hold)
5, Trace was allowed to stabilize

Average Measurements above 1GHz
1, Analyzer center frequency was set to the frequency of the radiated spurious emission.
2, Span=encompass the entire emission
3, RBW=1MHz
4, VBW=3MHz
4, Detector= RMS (Max-hold)
5, Trace was allowed to stabilize

4.3 Limit

The spurious Emission shall test through the 10th harmonic or 40GHz (whichever is lower). In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

Notes:

1, For the band 5.725-5.85GHz, 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.

2, The spectrum is measured from 9KHz to the 10th harmonic of the fundamental frequency of the transmitter using QP detector below 1GHz, above 1GHz, average & peak measurements were taken using for test. The worst-case emission are reported however emission whose levels were not within 20dB of the respective limited were not reported.

3, The test was performed on EUT under 802.11a/n-HT20/n-HT40 continuously transmitting mode. Simultaneous transmitting was considered during the testing. All mode had been tested, but only the worst-case is recorded in the following graph and table.

4.3.1 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

FS = RA + AF + CF - AG + PD

Where FS = Field Strength in dBμV/m
RA = Receiver Amplitude (including preamplifier) in dBμV
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB
AG = Amplifier Gain in dB
PD = Pulse Desensitization in dB

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

FS = RA + AF + CF - AG + PD

Example
Assume a receiver reading of 62.0 dBμV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0 dB. The net field strength for comparison to the appropriate emission limit is 32 dBμV/m. This value in dBμV/m was converted to its corresponding level in μV/m.

RA = 62.0 dBμV
AF = 7.4 dB
CF = 1.6 dB
AG = 29.0 dB
PD = 0 dB
FS = 62 + 7.4 + 1.6 - 29 + 0 = 42 dBμV/m

Level in mV/m = Common Antilogarithm [(42 dBμV/m)/20] = 125.9 μV/m

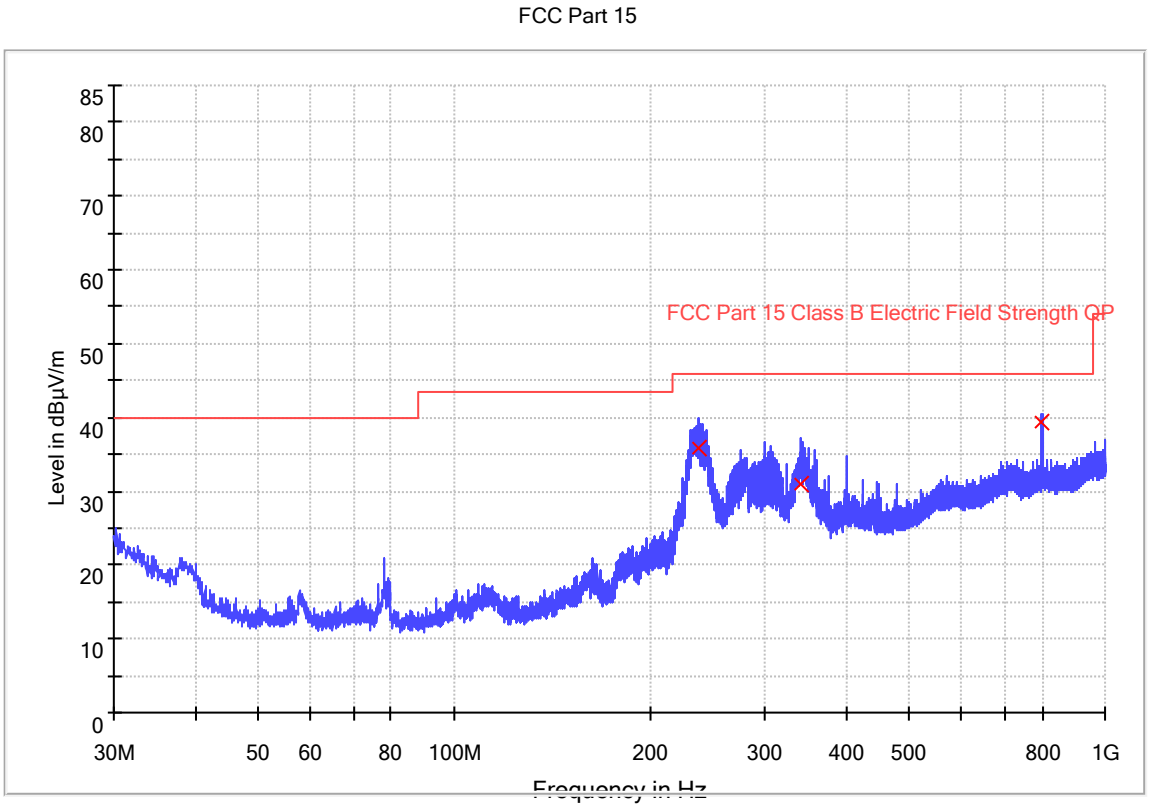
4.4 Radiated spurious emission test data

4.4.1 Measurement results: frequencies equal to or less than 1 GHz

Applicant: Guangzhou Xaircraft Technology CO.,LTD.
Date of Test: 31 July 2024 Model: WM101
Worst Case Operating Mode: transmission(channel 151)

Radiated Emissions

ANT Polarity: Horizontal



Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Polarization	Corr. (dB/ m)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
237.968000	35.9	1000.0	120.000	H	18.5	10.1	46.0
341.628667	30.9	1000.0	120.000	H	22.3	15.1	46.0
799.986000	39.5	1000.0	120.000	H	32.2	6.5	46.0

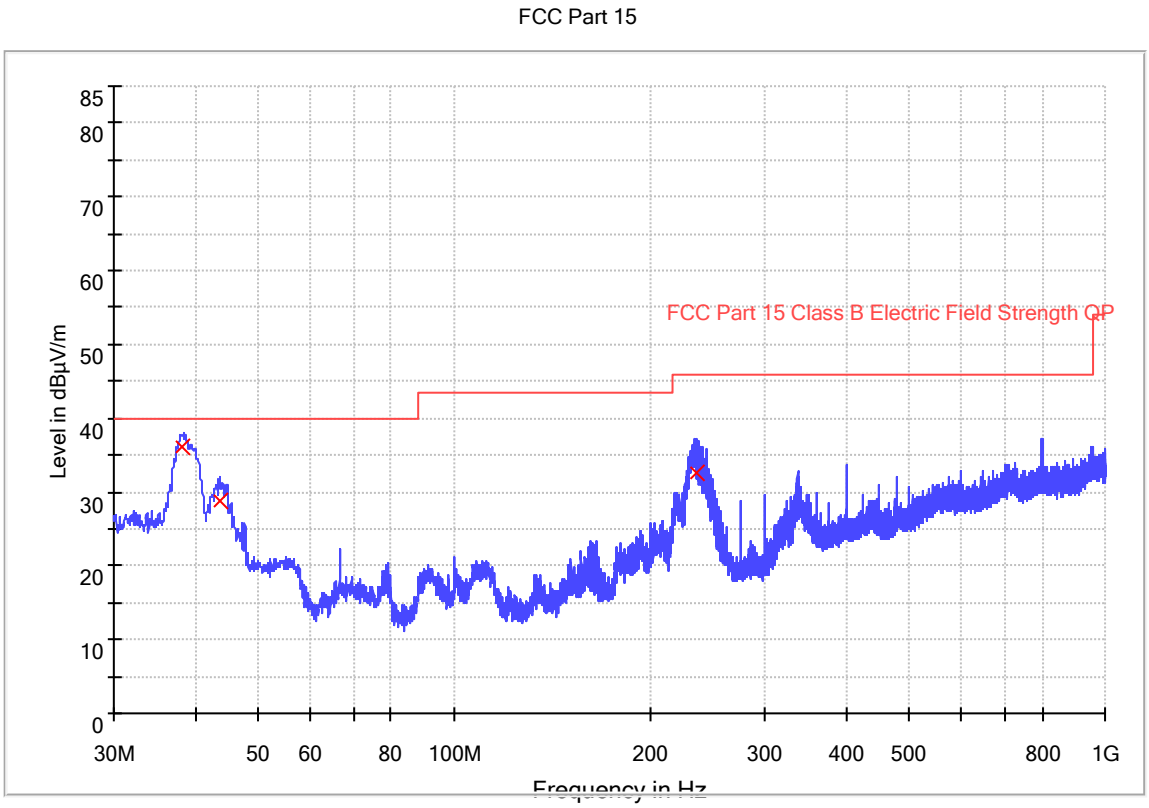
NOTES:

1. Quasi-Peak detector is used for frequency below 1GHz.
2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. All emissions are below the QP limit.

Applicant: Guangzhou Xaircraft Technology CO.,LTD.
Date of Test: 31 July 2024 Model: WM101
Worst Case Operating Mode: transmission(channel 151)

Radiated Emissions

ANT Polarity: Vertical



Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Polarization	Corr. (dB/ m)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
38.083333	36.1	1000.0	120.000	V	17.6	3.9	40.0
43.612333	28.9	1000.0	120.000	V	15.0	11.1	40.0
235.963333	32.6	1000.0	120.000	V	18.3	13.4	46.0

NOTES:

1. Quasi-Peak detector is used for frequency below 1GHz.
2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. All emissions are below the QP limit.

4.4.2 Measurement results: frequency above 1GHz

The worst case occurred at 802.11N-HT20

Channel 149/6.5Mbps

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Peak Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	11490.000	47.9	36.3	39.0	50.6	68.2	-17.6
Horizontal	17235.000	49.0	34.7	41.2	55.5	68.2	-12.7
Horizontal	5725.000	82.2	33.4	33.5	82.3	122.2	-39.9

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	11490.000	38.7	36.3	39.0	41.4	54.0	-12.6
Horizontal	17235.000	39.9	34.7	41.2	46.4	54.0	-7.6

Channel 157/6.5Mbps

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Peak Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	11570.000	48.6	36.3	39.0	51.3	68.2	-16.9
Horizontal	17355.000	50.0	34.7	41.2	56.5	68.2	-11.7

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	11570.000	39.8	36.3	39.0	42.5	54.0	-11.5
Horizontal	17355.000	40.9	34.7	41.2	47.4	54.0	-6.6

Channel 165/6.5Mbps

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Peak Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	11650.000	49.6	36.3	39.0	52.3	68.2	-15.9
Horizontal	17475.000	51.0	34.7	41.2	57.5	68.2	-10.7
Horizontal	5850.000	70.4	33.4	33.5	70.5	122.2	-51.7

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	11650.000	40.2	36.3	39.0	42.9	54.0	-11.1
Horizontal	17475.000	41.2	34.7	41.2	47.7	54.0	-6.3

* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function. All unwanted emissions outside of the 5725-5850 bands are complied with the limit.

Appendix A: Test equipment list

Equipment No.	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
SZ061-13	BiConiLog Antenna	ETS	3142E	00217919	2021-09-05	2024-09-05
SZ185-03	EMI Receiver	R&S	ESR7	101975	2024-04-23	2025-04-23
SZ061-08	Horn Antenna	ETS	3115	00092346	2021-09-05	2024-09-05
SZ061-06	Active Loop Antenna	Electro-Metrics	EM-6876	217	2024-05-05	2027-05-05
SZ056-03	Spectrum Analyzer	R&S	FSP 30	101148	2024-04-22	2025-04-22
SZ056-08	Signal Analyzer	R&S	FSV 40	101430	2023-12-13	2024-12-13
SZ181-04	Preamplifier	Agilent	8449B	3008A02474	2024-04-22	2025-04-22
SZ188-01	Anechoic Chamber	ETS	RFD-F/A-100	4102	2021-12-12	2024-12-12
SZ062-24	RF Cable	RADIALL	RG 213U	--	2023-09-26	2024-09-26
SZ062-25	RF Cable	RADIALL	0.04-26.5GHz	--	2023-09-26	2024-09-26
SZ062-38	RF Cable	RADIALL	0.04-26.5GHz	--	2023-09-26	2024-09-26
SZ067-04	Notch Filter	Micro-Tronics	BRM50702-02	--	2024-04-23	2025-04-23

Expanded uncertainty of radiated emission measurement is ±4.9 dB.

Expanded uncertainty of conducted emission measurement is ±3.6 dB.

********** End of Report**********