

Luxshare Precision Industry Co.,Ltd.

TEST REPORT

SCOPE OF WORK

FCC TESTING–VSN:100133520

REPORT NUMBER

231215058SZN-004

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RF TEST REPORT

Report No. : 231215058SZN-004
Product : onn. Full HD Streaming Device
Google TV
Model No. : VSN:100133520
FCC ID : 2AYYS-8822K2VTG

Applicant: Luxshare Precision Industry Co.,Ltd.
Floor 2, Block A, Sanyo New Industrial Area, West
Haoyi Community, Shajing Subdistrict Office, Bao an
District Shenzhen, China
**Test Method/
Standard:** FCC Part 15 Subpart E;
KDB 789033 D02 v02r01;
KDB 662911 D01 v02r01;
KDB 905462 D02 v02;
ANSI C63.10-2013
Test By: Intertek Testing Services Shenzhen Ltd. Longhua Branch
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Summary of Tests

FCC Parts	Test	Section	Results
15.407 b, 15.205, 15.209	Radiated spurious emission test	6	Pass

1. General information

1.1 Identification of the EUT

Product:	onn. Full HD Streaming Device Google TV
Model No.:	VSN:100133520
Type of Device:	Slave device
Nominal Channel Bandwidth:	802.11a/n-HT20(20MHz), 802.11n-HT40(40MHz), 802.11ac(20/40/80MHz)
Frequency range:	5150MHz~5250 MHz, 5250MHz~5350MHz, 5470MHz-5725MHZ, 5725MHz~5850MHz
Channel Number and Operating Frequency:	4 channels for 5180 MHz ~ 5240 MHz (802.11 a/n20/ac-HT20); 2 channels for 5190 MHz ~ 5230 MHz (802.11 n40/ac-HT40); 1 channels for 5210 MHz (802.11ac-HT80); 4 channels for 5260 MHz ~ 5320 MHz (802.11 a/n20/ac-HT20); 2 channels for 5270 MHz ~ 5310 MHz (802.11 n40/ac-HT40); 1 channels for 5290 MHz (802.11ac-HT80); 8 channels for 5500 MHz ~ 5580 & 5660MHz ~ 5700 MHz (802.11a/n20/ac-HT20); 3 channels for 5510 MHz ~ 5550MHz & 5670 MHz (802.11n40/ac-HT40); 1 channels for 5530 MHz (802.11ac-HT80); 5 channels for 5745 MHz ~ 5825 MHz (802.11a/n20/ac-HT20); 2 channels for 5755 MHz ~ 5795 MHz (802.11n40/ac-HT40); 1 channels for 5775 MHz (802.11ac-HT80);
Modulation:	802.11a: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11n: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)
Rated Power:	DC 5V/1A
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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 onn. Full HD Streaming Device Google TV with Bluetooth 5.0 (dual-mode) function operating in 2402-2480MHz, 2.4G WIFI function operating in 2412-2462MHz and 5G WIFI function operating in 5150MHz~5250 MHz, 5250MHz~5350MHz, 5470MHz- 5725MHZ, 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". This report bases on the previous report with report number 230908023SZN-004 Dated 12 September 2023. The changes are: replace DDR and eMMc chips from different manufacturers. The chips are replaced pin to pin. Considering RF module has not changed, RF specifications are the same. Spurious emissions have been re-performed.

Related Submittal(s) Grants

This is an application for certification of U-NII device (5GHz Wi-Fi transmitter portion). For the BT classic function was tested and demonstrated in report 231215058SZN-001. For the BT BLE function was tested and demonstrated in report 231215058SZN-002. For the 2.4GHz WIFI function was tested and demonstrated in report 231215058SZN-003.

1.3 Antenna description (15.203)

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

Antenna1 Gain: 3.13 dBi Max for 5G WIFI.

Antenna2 Gain: 3.23 dBi Max for 5G WIFI.

MIMO Gain: 6.19 dBi Max for 5G WIFI.

1.4 Peripherals equipment

Description	Manufacturer	Remark
TV (Provided by Intertek)	SONY	150B4CG
HDMI Cable (Provided by applicant)	N/A	unshielded, 30cm
Adaptor (Provided by applicant)	N/A	Model: PS06T050K1000UD Input: 100-240V~50/60Hz 0.25A Output: DC 5.0V/1.0A
Remote control (Provided by applicant)	N/A	N/A

2. Test specifications

2.1 Test standard

The EUT was performed according to the procedures in FCC Part 15 E, Section 15.203, 15.207, 15.209, 15.407 and ANSI C63.10/2013, method of measurement: KDB 789033.

The test of radiated measurements according to FCC Part 15 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.

The AC power conducted emissions was investigated over the frequency range from 0.15 MHz to 30 MHz using a receiver bandwidth of 9 kHz (15.207 paragraph).

Radiated emissions were investigated 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, 13.5 Mbps data rate for 802.11n-HT40 mode, 29.3Mbps data rate for 802.11ac. The final tests were executed under these conditions and recorded in this report individually.

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: CMD

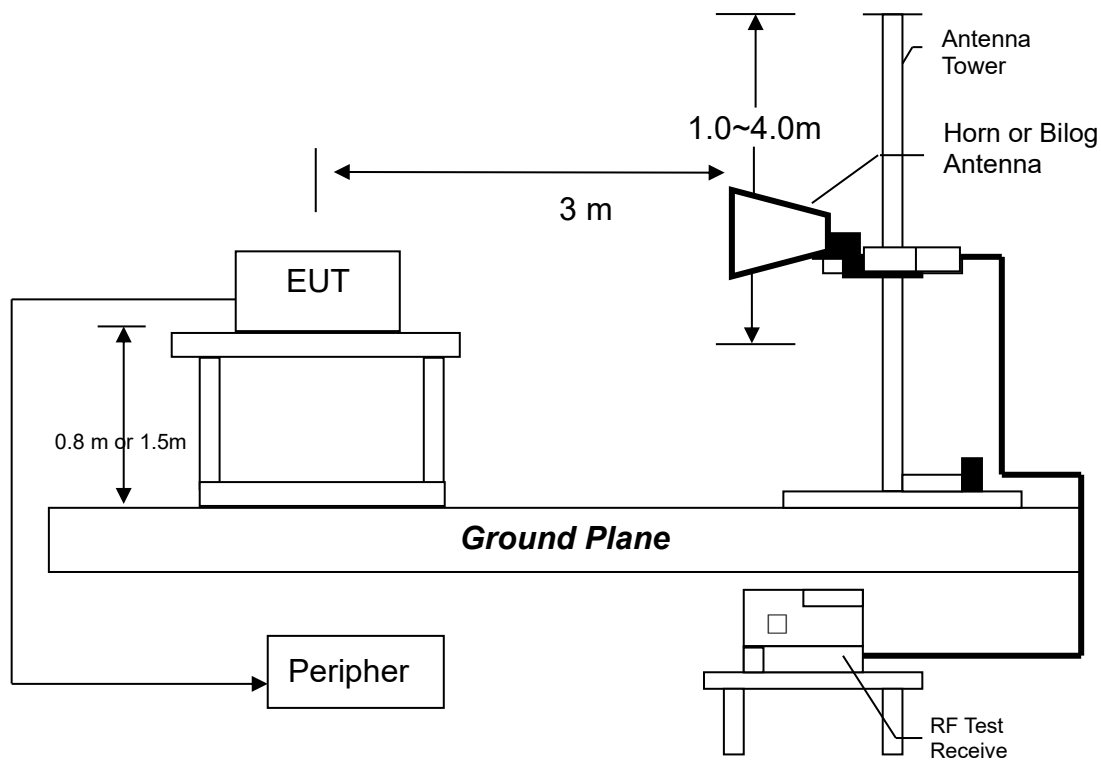
3. Radiated Emission test (FCC 15.205 & 15.209 & 15.407)

3.1 Operating environment

Temperature:	23	°C
Relative Humidity:	56	%
Atmospheric Pressure	1011	hPa

3.2 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

3.3 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, All emission out-side of the 5.15-5.35GHz & 5.47-5.725GHz band shall not exceed an EIRP of -27dBm/MHz (68.2dBuV/m, test distance: 3 meter), 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/ac-HT20/HT40/HT80 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.

3.3.1 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 dB μ V/m
 RA = Receiver Amplitude (including preamplifier) in dB μ V
 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 dB μ V 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 dB μ V/m. This value in dB μ V/m was converted to its corresponding level in μ V/m.

$$\begin{aligned} RA &= 62.0 \text{ dB}\mu\text{V} \\ AF &= 7.4 \text{ dB} \\ CF &= 1.6 \text{ dB} \\ AG &= 29.0 \text{ dB} \\ PD &= 0 \text{ dB} \\ FS &= 62 + 7.4 + 1.6 - 29 + 0 = 42 \text{ dB}\mu\text{V/m} \end{aligned}$$

$$\text{Level in mV/m} = \text{Common Antilogarithm} [(42 \text{ dB}\mu\text{V/m})/20] = 125.9 \mu\text{V/m}$$

3.4 Radiated spurious emission test data

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

Applicant: Luxshare Precision Industry Co.,Ltd.

Date of Test: 25 December 2023

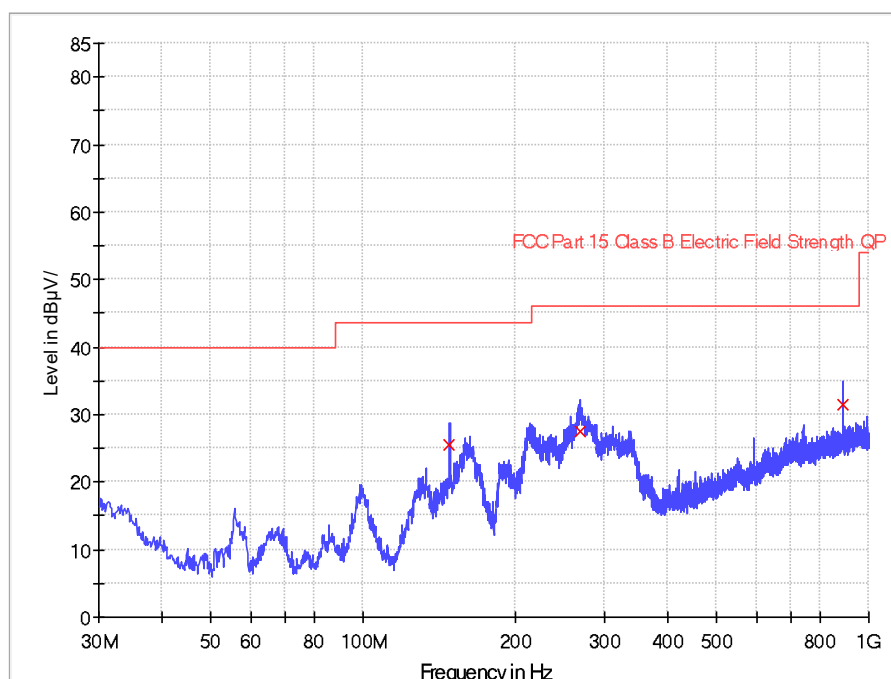
Model: VSN:100133520

Worst Case Operating Mode: Simultaneous transmission

Radiated Emissions

ANT Polarity: Horizontal

FCC Part 15



Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Polarization	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
148.218750	25.6	1000.0	120.000	H	10.4	17.9	43.5
269.226250	27.5	1000.0	120.000	H	14.6	18.5	46.0
890.511250	31.4	1000.0	120.000	H	26.3	14.6	46.0

NOTES:

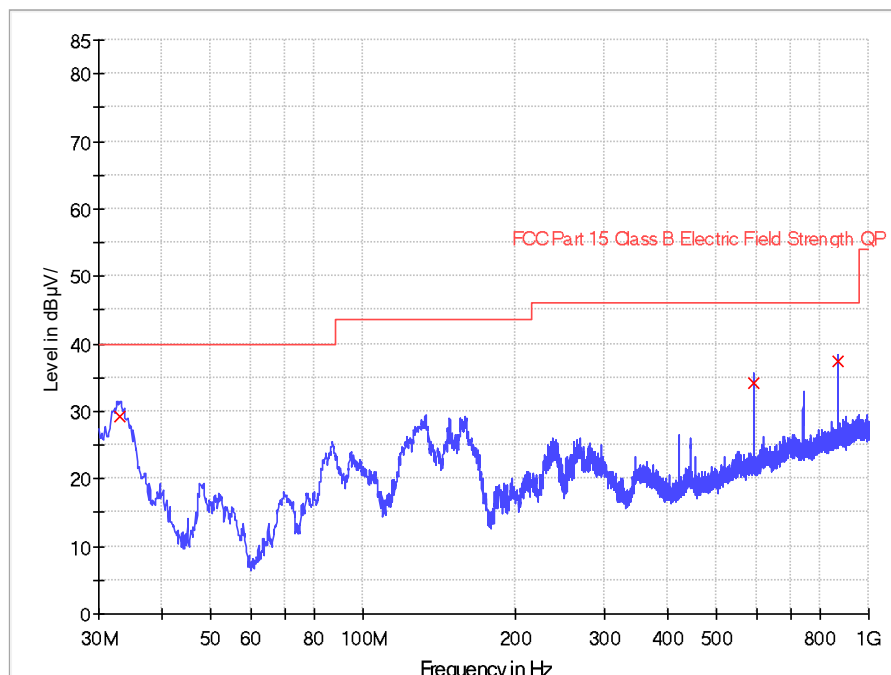
1. Quasi-Peak detector is used for frequency below 1GHz.
2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic 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: Luxshare Precision Industry Co.,Ltd.
Date of Test: 25 December 2023 Model: VSN:100133520
Worst Case Operating Mode: Simultaneous transmission

Radiated Emissions

ANT Polarity: Vertical

FCC Part 15



Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Polarization	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
33.031250	29.4	1000.0	120.000	V	15.9	10.7	40.0
593.570000	34.3	1000.0	120.000	V	22.3	11.7	46.0
868.443750	37.4	1000.0	120.000	V	25.8	8.7	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.

3.4.2 Measurement results: frequency above 1GHz

Date of Test: 25 December 2023

The worst case occurred at 802.11N-HT40 MIMO

Channel 38/27 Mbps

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	10380.000	48.8	36.3	38.9	51.4	68.2	-16.8
Horizontal	15570.000	46.5	34.7	41.0	52.8	68.2	-15.4

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	10380.000	41.9	36.3	38.9	44.5	54.0	-9.5
Horizontal	15570.000	40.7	34.7	41.0	47.0	54.0	-7.0

Channel 46/27Mbps

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	10460.000	50.2	36.3	38.9	52.8	68.2	-15.4
Horizontal	15690.000	46.9	34.7	41.0	53.2	68.2	-15.0

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	10460.000	41.5	36.3	38.9	44.1	54.0	-9.9
Horizontal	15690.000	39.9	34.7	41.0	46.2	54.0	-7.8

Channel 54/27Mbps

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	10540.000	48.7	36.3	38.9	51.3	68.2	-16.9
Horizontal	15810.000	44.0	34.7	41.0	50.3	68.2	-17.9

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	10540.000	41.8	36.3	38.9	44.4	54.0	-9.6
Horizontal	15810.000	38.8	34.7	41.0	45.1	54.0	-8.9

Channel 62/27Mbps

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	10620.000	53.1	36.3	38.9	55.7	68.2	-12.5
Horizontal	15930.000	51.8	34.7	41.0	58.1	68.2	-10.1

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	10620.000	42.5	36.3	38.9	45.1	54.0	-8.9
Horizontal	15930.000	39.9	34.7	41.0	46.2	54.0	-7.8

Channel 102/27Mbps

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	11020.000	51.8	36.3	38.9	54.4	68.2	-13.8
Horizontal	16530.000	49.6	34.7	41.0	55.9	68.2	-12.3

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	11020.000	40.8	36.3	38.9	43.4	54.0	-10.6
Horizontal	16530.000	38.3	34.7	41.0	44.6	54.0	-9.4

Channel 110/27Mbps

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	11100.000	53.2	36.3	38.9	55.8	68.2	-12.4
Horizontal	16650.000	51.2	34.7	41.0	57.5	68.2	-10.7

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	11100.000	42.3	36.3	38.9	44.9	54.0	-9.1
Horizontal	16650.000	39.7	34.7	41.0	46.0	54.0	-8.0

Channel 134/27Mbps

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	11340.000	52.1	36.3	39.0	54.8	68.2	-13.4
Horizontal	17010.000	48.9	34.7	41.2	55.4	68.2	-12.8

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	11340.000	41.6	36.3	39.0	44.3	54.0	-9.7
Horizontal	17010.000	40.9	34.7	41.2	47.4	54.0	-6.6

Channel 151/27Mbps

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	11510.000	51.5	36.3	39.0	54.2	68.2	-14.0
Horizontal	17265.000	49.3	34.7	41.2	55.8	68.2	-12.4

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	11510.000	43.1	36.3	39.0	45.8	54.0	-8.2
Horizontal	17265.000	41.7	34.7	41.2	48.2	54.0	-5.8

Channel 159/27Mbps

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	11590.000	51.6	36.3	39.0	54.3	68.2	-13.9
Horizontal	17385.000	48.6	34.7	41.2	55.1	68.2	-13.1

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	11590.000	41.5	36.3	39.0	44.2	54.0	-9.8
Horizontal	17385.000	39.8	34.7	41.2	46.3	54.0	-7.7

- * 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 5.15-5.35GHz & 5.47-5.725GHz & 5.725-5.850 bands are complied with the limit.

Appendix A: Test equipment list

Equipment No.	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
SZ061-03	BiConiLog Antenna	ETS	3142E	00217919	2021-07-07	2024-07-07
SZ061-06	Active Loop Antenna	Electro-Metrics	EM-6876	217	2021-05-18	2024-05-18
SZ061-09	Horn Antenna	ETS	3115	00092346	2022-10-14	2025-10-14
SZ061-07	Pyramidal Horn Antenna	ETS	3160-09	00083067	2022-08-31	2025-05-31
SZ185-03	EMI Receiver	R&S	ESR7	101975	2023-04-27	2024-04-27
SZ056-07	Signal Analyzer	R&S	FSV40	101214	2023-01-06	2024-01-06
SZ181-04	Preamplifier	Agilent	8449B	3008A02474	2023-04-27	2024-04-27
SZ188-01	Anechoic Chamber	ETS	RFD-F/A-100	4102	2021-12-12	2024-12-12
SZ062-02	RF Cable	RADIALL	RG 213U	--	2023-07-18	2024-07-18
SZ062-05	RF Cable	RADIALL	0.04-26.5GHz	--	2023-07-18	2024-07-18
SZ062-12	RF Cable	RADIALL	0.04-26.5GHz	--	2023-07-18	2024-07-18
SZ067-25	Notch Filter	Micro-Tronics	BRM50716	--	2023-04-27	2024-04-27
SZ067-04	Notch Filter	Micro-Tronics	BRM50702-02	--	2023-04-27	2024-04-27

Expanded uncertainty of radiated emission measurement is ± 4.9 dB.

Expanded uncertainty of conducted emission measurement is ± 3.6 dB.

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