TEST REPORT

Test Report No. : UL-RPT-RP15465903-116A

Manufacturer	:	Somvai Limited
Model No.	:	SOMA
FCC ID	:	2BLG4-SOMA
Test Standard(s)	:	FCC Parts 15.207, 15.209, 15.215 & 15.255

1. This test report shall not be reproduced except in full, without the written approval of UL International (UK) Ltd.
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 4.0 supersedes all previous versions.

Date of Issue: 23 April 2025

Checked by:

Sarah Williams
Staff Engineer, Radio Laboratory

Company Signatory:

Ben Mercer
Lead Test Engineer, Radio Laboratory

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1. Customer Information

Company Name:	Somvai Limited
Address:	20-22 Wenlock Road, London, N1 7GU, United Kingdom

2. Summary of Testing

2.1. General Information

Specification Reference:	47CFR15.255
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart C (Radio Frequency Devices) – Section 15.255
Specification Reference:	47CFR15.207 and 47CFR15.209
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart C (Intentional Radiators) - Sections 15.207 & 15.209
Specification Reference:	47CFR15.215
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart C (Intentional Radiators) - Section 15.215
Site Registration:	685609
FCC Lab. Designation No.:	UK2011
Location of Testing:	Unit 3 Horizon, Wade Road, Kingsland Business Park, Basingstoke, Hampshire, RG24 8AH, United Kingdom
Test Dates:	29 October 2024 to 08 November 2024

2.2. Summary of Test Results

FCC Reference (47CFR)	Measurement	Result
Part 15.255(c)(2)	Transmitter Duty Cycle	✓
Part 15.255(c)(2)	Transmitter EIRP	✓
Part 15.215(c)	Transmitter 20 dB Bandwidth	✓
Part 15.255(d) / 15.209	Transmitter Spurious Emissions	✓
Part 15.255(f)	Transmitter Frequency Stability (Temperature & Voltage Variation)	✓
Part 15.207	AC Conducted Emissions	✓

Key to Results

✓ = Complied ✗ = Did not comply

2.3. Methods and Procedures

Reference:	ANSI C63.10-2013
Title:	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
Reference:	FCC KDB 174176 D01 Line Conducted FAQ v01r01 June 3, 2015
Title:	AC Power-Line Conducted Emissions Frequently Asked Questions
Reference:	Keysight Technologies Application Note 5952-1039
Title:	Spectrum and Signal Analysis Pulsed RF
Reference:	FCC KDB 364244 D01 April 16 2024
Title:	Radar Devices Certifying Under the Provisions of §15.255

2.4. 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 specification identified above.

3. Equipment Under Test (EUT)

3.1. Identification of Equipment Under Test (EUT)

Brand Name:	Somvai
Model Name or Number:	SOMA
Test Sample Serial Number:	Not marked or stated, UL#7760328 *(Radiated sample #1)*
Hardware Version:	H4.0
Software Version:	S1.0.0
Firmware Version:	F1.0.0
FCC ID:	2BLG4-SOMA
Date of Receipt:	29 October 2024

Brand Name:	Somvai
Model Name or Number:	SOMA
Test Sample Serial Number:	Not marked or stated, UL#7770035 *(Radiated sample #2)*
Hardware Version:	H4.0
Software Version:	S1.0.0
Firmware Version:	F1.0.0
FCC ID:	2BLG4-SOMA
Date of Receipt:	29 October 2024

3.2. Description of EUT

The equipment under test was a smart alarm incorporating a 60 GHz radar.

3.3. Modifications Incorporated in the EUT

No modifications were applied to the EUT during testing.

3.4. Additional Information Related to Testing

Category of Equipment:	Transceiver	
Modulation Type:	FMCW	
Power Supply Requirement:	Nominal	3.7 VDC
Operating Temperature:	10°C - 35°C	
Antenna Type:	Integrated Patch	
Antenna Gain:	5.0 dBi	
Transmit Frequency Range:	60.0 GHz to 62.5 GHz	
Transmit Channels Tested:	**Channel ID**	**Channel Frequency (GHz)**
	Single	61.25

3.5. Support Equipment

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

Description:	USB Charger
Brand Name:	Amazon
Model Name or Number:	PS39WR
Serial Number:	LTUK14B2032N2L886

Description:	USB A to C Cable
Brand Name:	Somvai
Model Name or Number:	Not marked or stated
Serial Number:	Not marked or stated

4. Operation and Monitoring of the EUT during Testing

4.1. Operating Modes

- Transmit Mode: transmitting at maximum power with a FMCW modulated signal.

4.2. Configuration and Peripherals

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

- Transmit tests: The EUT powered up in transmit mode. No configuration was required.
- The EUT was connected to a USB charger. The USB charger was connected to a 120 VAC 60 Hz single phase main supply.
- Transmitter radiated spurious emission tests were performed with the EUT in its normal orientation. There were no ports to terminate.
- To facilitate transmitter frequency stability tests at variations of voltage, the battery connector was removed from the battery and connected to a benchtop DC power supply.

5. Measurements, Examinations and Derived Results

5.1. General Comments

Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to *Section 6: Measurement Uncertainties* for details.

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.

5.2. Test Results

5.2.1 Transmitter Duty Cycle

Test Summary:

Test Engineer:	Ben Mercer	**Test Date:**	29 October 2024
Test Sample Serial Number:	UL#7760328		

FCC Reference:	Part 15.255(c)(2)(iii)(A)
Test Method Used:	ANSI C63.10 Section 7.5 and notes below

Environmental Conditions:

Temperature (°C):	22
Relative Humidity (%):	53

Note(s):

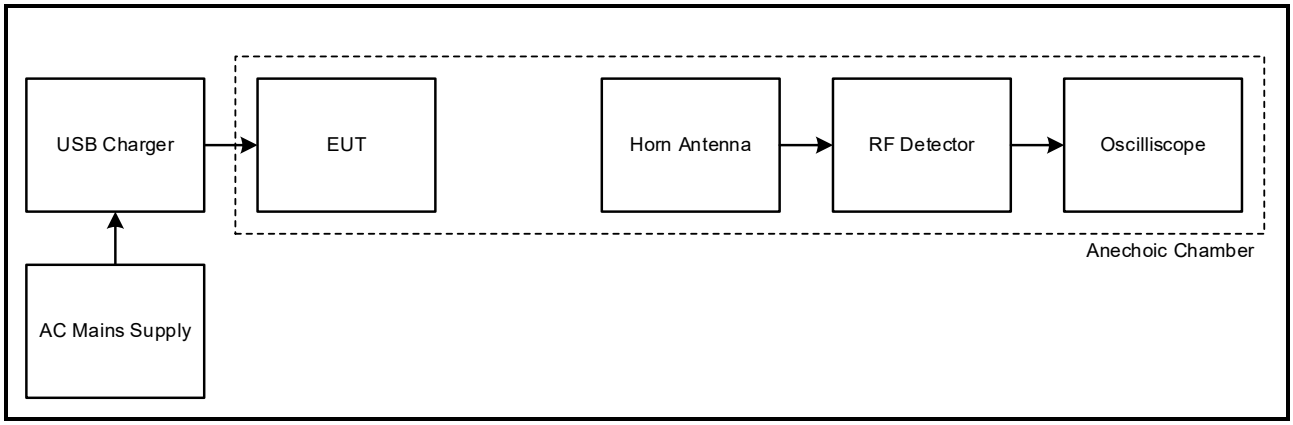
1. Transmitter duty cycle was measured using an RF detector connected to a digital storage oscilloscope. The raw data was captured and analysed to calculate the duty cycle.

   On Time / [Period or 100 ms whichever is the lesser].

   Profile 2 duty cycle: 0.06 ms / 10.02 ms = 0.6%

2. Transmitter off times exceeding 2 ms were summed over a rolling 33 ms period. The minimum combined off time in any 33 ms period was recorded below.

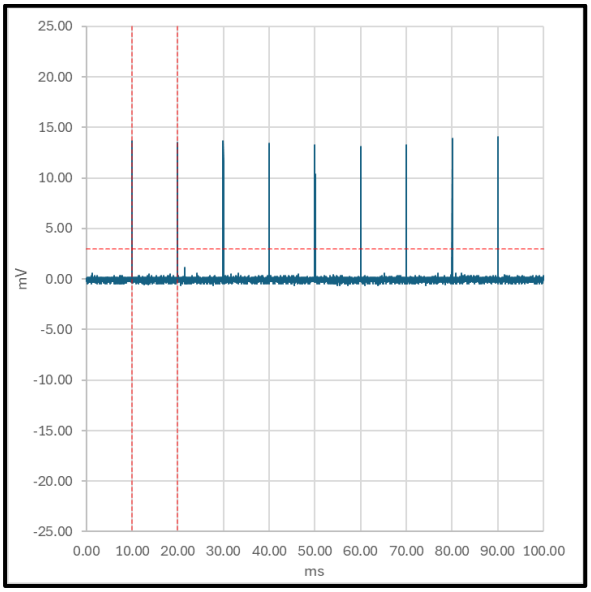
Test Setup:



Transmitter Duty Cycle (continued)

Results:

Tx On Duration (ms)	Period (ms)	Duty Cycle (%)	Minimum Tx Off Duration (ms)	Tx Off Limit (ms)	Result
0.06	10.02	0.6	32.76	>25.5	Complied



Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
A2964	Horn Antenna	Link Microtek	AM15HA-ULV1	14930	24 Jun 2025	36
M2070	Oscilloscope	Keysight	DSOX2024A	MY59125508	28 Feb 2026	24
A3233	RF Detector	Sage Millimeter	SFD-503753-15SF-P1	18199-01	Calibration not required	-

5.2.2 Transmitter Peak EIRP

Test Summary:

Test Engineer:	Ben Mercer	**Test Date:**	29 October 2024
Test Sample Serial Number:	UL#7760328		

FCC Reference:	Part 15.255(c)(2)(iii)(A)
Test Method Used:	ANSI C63.10 Section 9.11

Environmental Conditions:

Temperature (°C):	22
Relative Humidity (%):	54

Note(s):

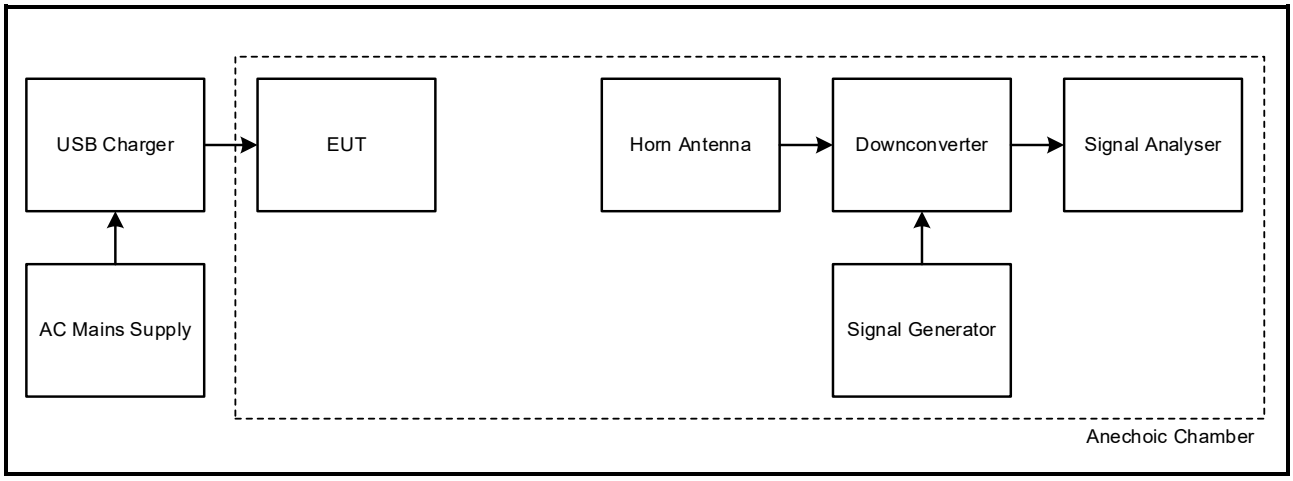
1. The signal analyser resolution bandwidth was set to 1 MHz and the video bandwidth to 3 MHz. A peak detector was used, sweep time was set to 1 second and the trace mode was Max Hold. The span was set to 5 GHz. A marker was placed on the peak level of the emission.
2. The EUT uses FMCW modulation. Although the total bandwidth is 2.5 GHz, the instantaneous bandwidth is <1 MHz. Therefore the total peak power can be captured using a 1 MHz RBW.
3. The FMCW signal is swept by the signal analyser IF amplifier at a high rate compared to the square of the RBW. As such a peak desensitisation factor has been applied, derived from Keysight Technologies Application Note 5952-1039 Annex B:

$$\alpha = \frac{1}{\sqrt[4]{1 + \left(\frac{2\ln(2)}{\pi}\right)^2 \left(\frac{F_S}{T_S B^2}\right)^2}}$$

Where:
F_S = Sweep Width = 2523.750 MHz
T_S = Sweep Time = 0.06 ms
B = RBW = 1 MHz

α = 12.7 dB

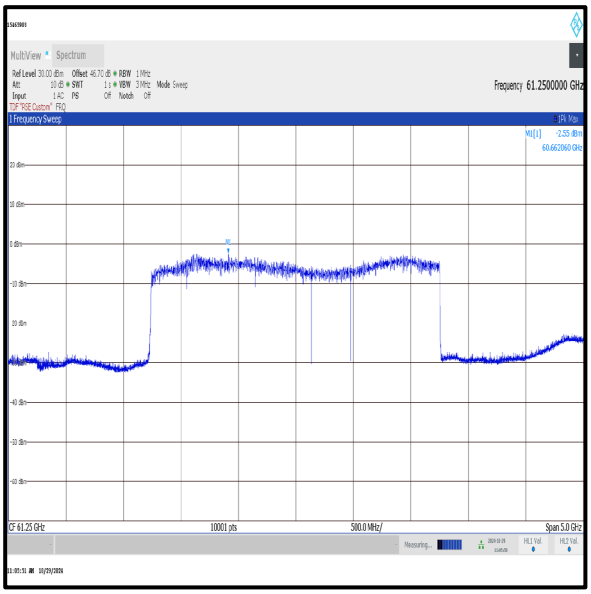
Test Setup:



Transmitter Peak EIRP (continued)

Results:

Frequency (GHz)	Level (dBm)	Correction Factor (dB)	Corrected Level (dBm)	Limit (dBm)	Margin (dB)	Result
60.662	-2.5	12.7	10.2	14.0	3.8	Complied



Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M2040	Thermohygrometer	Testo	608-H1	45124934	27 Dec 2024	12
K0001	3m RSE Chamber	MVG Industries UK Ltd.	N/A	N/A	11 Sep 2025	12
M236226	Test Receiver	Rohde & Schwarz	ESW26	103134	06 May 2025	12
M2069	Downconverter	Virginia Diodes, Inc.	WR15SAX	SAX 394	12 Oct 2025	24
A2964	Horn Antenna	Link Microtek Ltd.	AM15HA-ULV1	14930	26 Mar 2025	12
M1252	Signal Generator	Hewlett Packard	83640A	3119A00489	05 Mar 2026	24

5.2.3 Transmitter 20 dB Bandwidth

Test Summary:

Test Engineer:	Ben Mercer	**Test Date:**	29 October 2024
Test Sample Serial Number:	UL#7760328		

FCC Reference:	Part 15.215(c)
Test Method Used:	ANSI C63.10 Section 6.9.2

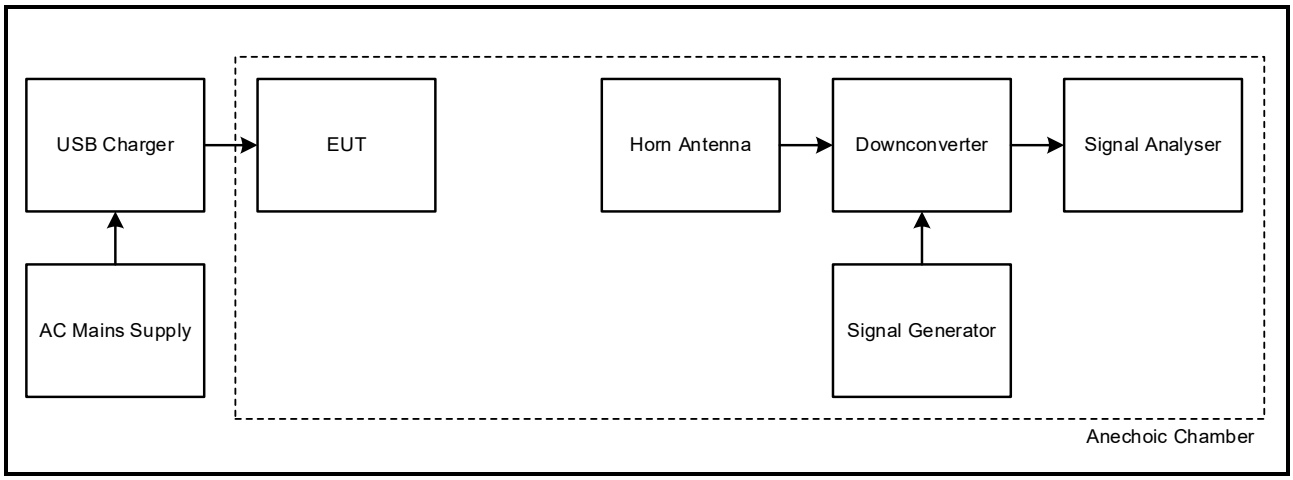
Environmental Conditions:

Temperature (°C):	22
Relative Humidity (%):	54

Note(s):

1. Due to instrument limitations, it was not possible to set the RBW in the range 1% to 5% of OBW as required by ANSI C63.10 Section 6.9.2. An enquiry was submitted to the FCC OET and it was deemed acceptable to use a minimum RBW of 1 MHz.
2. The signal analyser resolution bandwidth was set to 1 MHz and the video bandwidth to 3 MHz. A peak detector was used, sweep time was set to auto and the trace mode was Max Hold. The span was set to 5 GHz. The marker delta function was used to measure 20 dB down from the peak on both sides of the emission. The resulting frequency delta between the two markers was recorded as the 20 dB bandwidth.

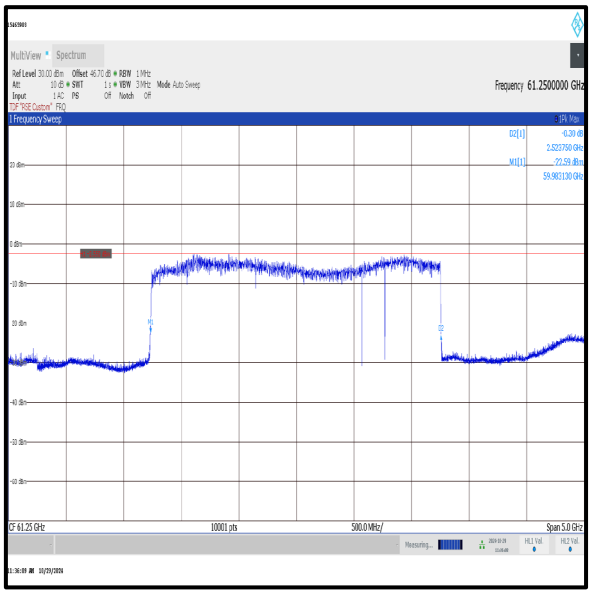
Test Setup:



Transmitter 20 dB Bandwidth (continued)

Results:

Channel	20 dB Bandwidth (MHz)
Single	2523.750



Test Equipment Used

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M2040	Thermohygrometer	Testo	608-H1	45124934	27 Dec 2024	12
K0001	3m RSE Chamber	MVG Industries UK Ltd.	N/A	N/A	11 Sep 2025	12
M236226	Test Receiver	Rohde & Schwarz	ESW26	103134	06 May 2025	12
M2069	Downconverter	Virginia Diodes, Inc.	WR15SAX	SAX 394	12 Oct 2025	24
A2964	Horn Antenna	Link Microtek Ltd.	AM15HA-ULV1	14930	26 Mar 2025	12
M1252	Signal Generator	Hewlett Packard	83640A	3119A00489	05 Mar 2026	24

5.2.4 Transmitter Radiated Spurious Emissions

Test Summary:

Test Engineer:	Nick Steele	**Test Dates:**	29 October 2024 to 08 November 2024
Test Sample Serial Number:	UL#7760328		

FCC Reference:	Part 15.255(d) / 15.209
Test Method Used:	ANSI C63.10 Sections 6.3, 6.4 and 6.5
Frequency Range	9 kHz to 1000 MHz

Environmental Conditions:

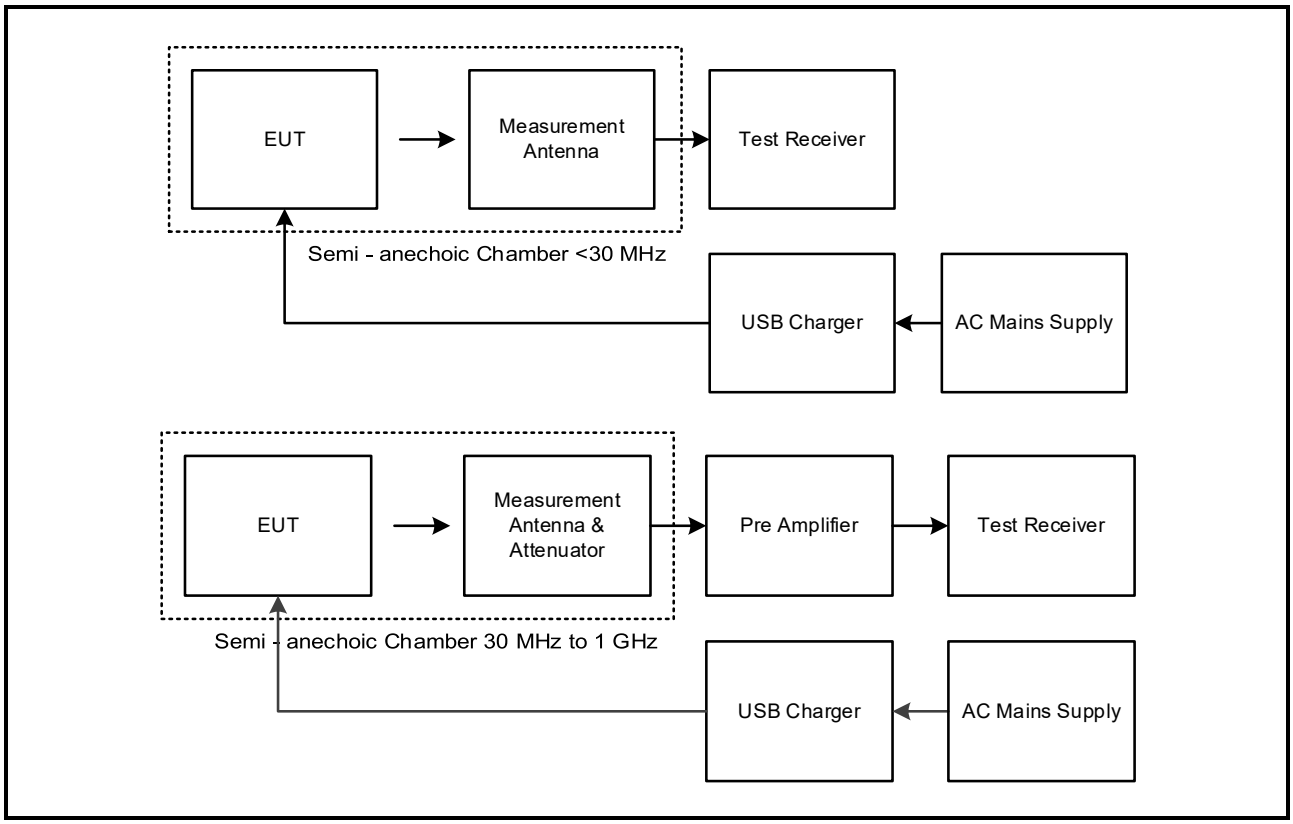
Temperature (°C):	20 to 22
Relative Humidity (%):	51 to 55

Note(s):

1. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
2. All other emissions shown on the pre-scan plot were investigated and found to be ambient, >20 dB below the applicable limit or below the measurement system noise floor.
3. Measurements below 30 MHz were performed in a semi-anechoic chamber (Asset Number K0001) at 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. ANSI C63.10 clause 5.2 states an alternative test site that can demonstrate equivalence to an open area test site may be used for measurements below 30 MHz. Therefore, measurements were performed in a semi-anechoic chamber. The correlation data between semi-anechoic chamber and an open field test site is available upon request.
4. The measured values at 3 metres were extrapolated to the required measurement distances of 300 metres and 30 metres and compared to the specified limits at those distances:
    a. 9 kHz to 490 kHz: measured value extrapolated from 3 metres to 300 metres by subtracting 80 dB at 40 dB / decade
    b. 490 kHz to 30 MHz: measured value extrapolated from 3 metres to 30 metres by subtracting 40 dB at 40 dB / decade
5. Measurements from 30 MHz to 1 GHz were performed in a semi-anechoic chamber (Asset Number K0001) 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.
6. Pre-scans were performed and markers placed on the highest measured levels. The test receiver was configured as follows: For 9 kHz to 150 kHz, the resolution bandwidth was set to 300 Hz and video bandwidth 1 kHz. A peak detector was used and trace mode was Max Hold. For 150 kHz to 30 MHz, the resolution bandwidth was set to 10 kHz and video bandwidth 30 kHz, trace mode was Max Hold. For 30 MHz to 1 GHz, the resolution bandwidth was set to 120 kHz and video bandwidth 500 kHz. A peak detector was used, sweep time was set to auto and trace mode was Max Hold.

Transmitter Radiated Spurious Emissions (continued)

Test Setup:

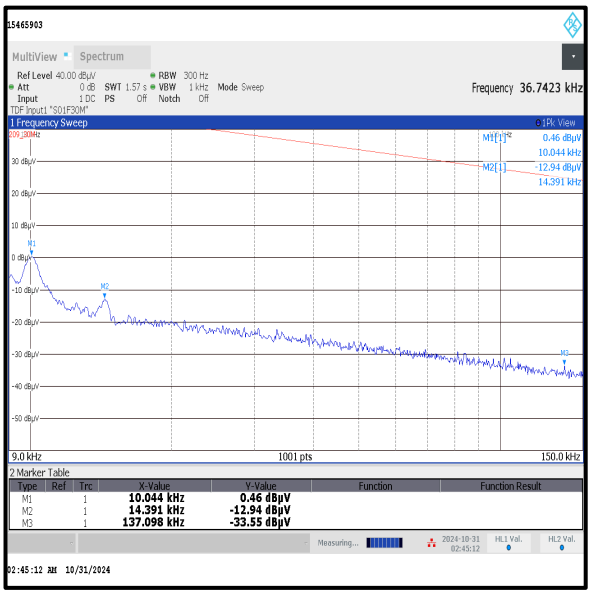


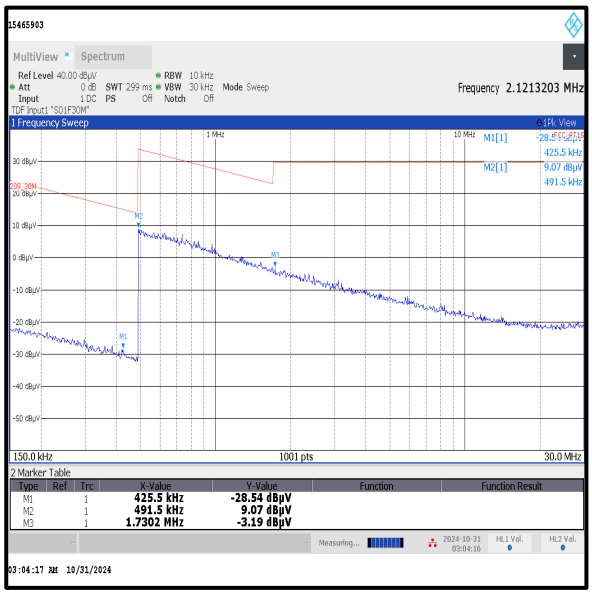
Transmitter Radiated Spurious Emissions (continued)

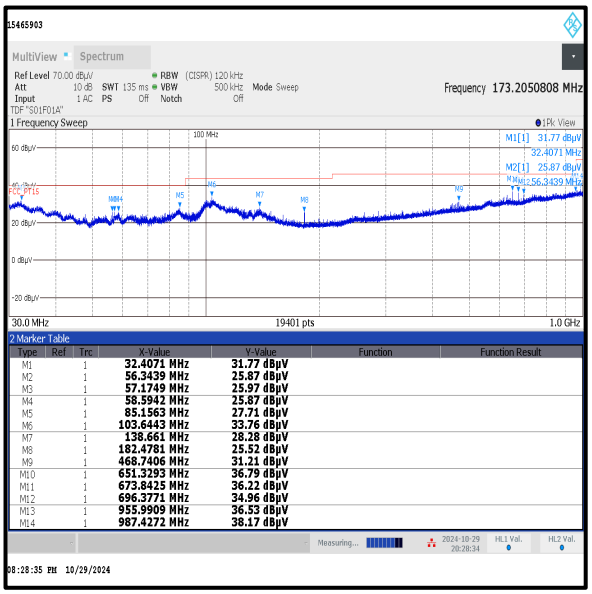
Results:

Frequency (MHz)	Antenna Polarity	Quasi-Peak Level (dBμV/m)	Quasi-Peak Limit (dBμV/m)	Margin (dB)	Result
56.337	Vertical	23.6	40.0	16.4	Complied
57.175	Vertical	21.9	40.0	18.1	Complied
58.593	Vertical	22.4	40.0	17.6	Complied
84.766	Vertical	24.1	40.0	15.9	Complied
103.678	Vertical	30.8	43.5	12.7	Complied
137.465	Vertical	25.2	43.5	18.3	Complied
182.538	Vertical	25.2	43.5	18.3	Complied
468.729	Vertical	28.9	46.0	17.1	Complied
651.248	Vertical	32.1	46.0	13.9	Complied
673.789	Vertical	35.3	46.0	10.7	Complied
696.377	Vertical	32	46.0	14.0	Complied

Transmitter Radiated Spurious Emissions (continued)







Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Transmitter Radiated Spurious Emissions (continued)

Test Summary:

Test Engineers:	Ben Mercer & Nick Steele	**Test Dates:**	29 October 2024 to 01 November 2024
Test Sample Serial Number:	UL#7760328		

FCC Reference:	Part 15.255(d) / 15.209
Test Method Used:	ANSI C63.10 Sections 6.3, 6.6, 9.8, 9.9, 9.12 & 9.13
Frequency Range:	1 GHz to 200 GHz

Environmental Conditions:

Temperature (°C):	21 to 22
Relative Humidity (%):	51 to 55

Note(s):

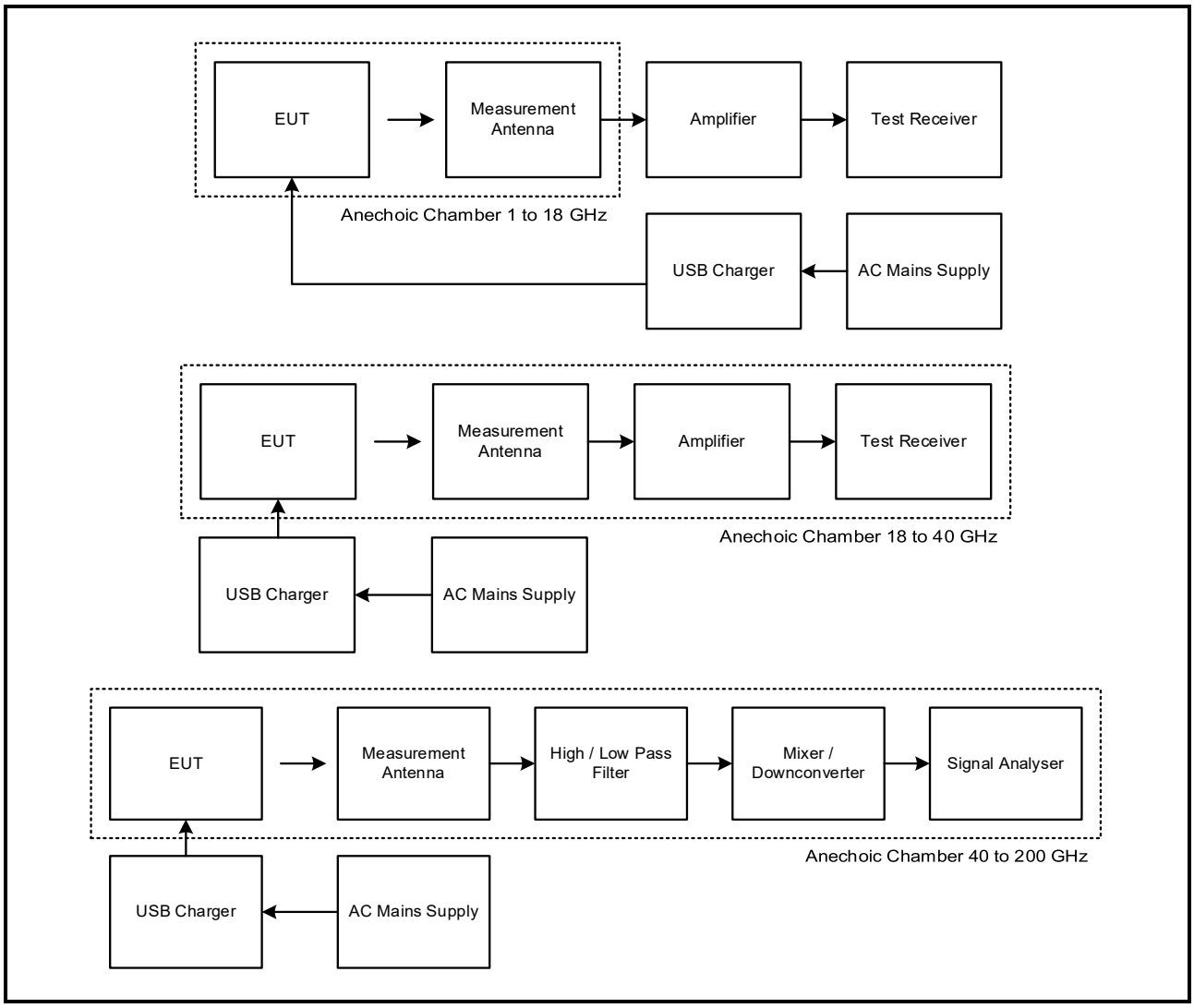
1. The final measured value, for the given emission in the field strength result tables, incorporates the calibrated antenna factor and cable loss.
2. All other emissions were >20 dB below the applicable limit, below the noise floor of the measurement system, or mixing products.
3. Measurements from 1 GHz to 18 GHz were performed in a semi-anechoic chamber (Asset Number K0001) at 3 metres. The EUT was placed at a height of 1.5 m 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.
4. Measurements from 18 GHz to 40 GHz were performed in a semi-anechoic chamber (Asset Number K0001) at 1 metre. The EUT was placed at a height of 1.5 m above the reference ground plane in the centre of the chamber turntable
5. Part 15.255(d)(3) defines a power density limit of 90 pW/cm^2 at 3 metres for spurious emissions between 40 GHz and 200 GHz. This was converted to a field strength limit of 85.31 dBuV/m using the equations provided in section 9.6 of ANSI C63.10.
6. Measurements distances above 40 GHz were determined using the procedure defined in section 9.8 of ANSI C63.10. Measurements were made at the following distances:

   40 GHz to 200 GHz – 1 metre

7. Where measurements were performed at a distance other than that specified by the limit, a correction factor was calculated using the equation provided in section 9.4 of ANSI C63.10. This correction factor was included in the transducer factor entered on the signal analyser.
8. *In accordance with ANSI C63.10 Section 6.6.4.3 Note 1, if the maximized peak measured value complies with the average limit, then it is unnecessary to perform an average measurement.
9. For measurements from 50 GHz to 55 GHz, a block downconverter was used with high side LO injection. In order to display the correct frequency values on the spectrum analyser, negative frequency values were used.

Transmitter Radiated Spurious Emissions (continued)

Test setup:



Transmitter Radiated Spurious Emissions (continued)

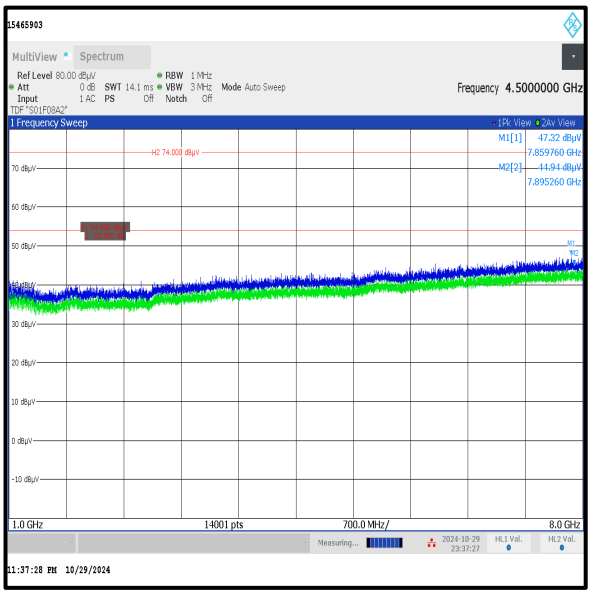
Results: Peak

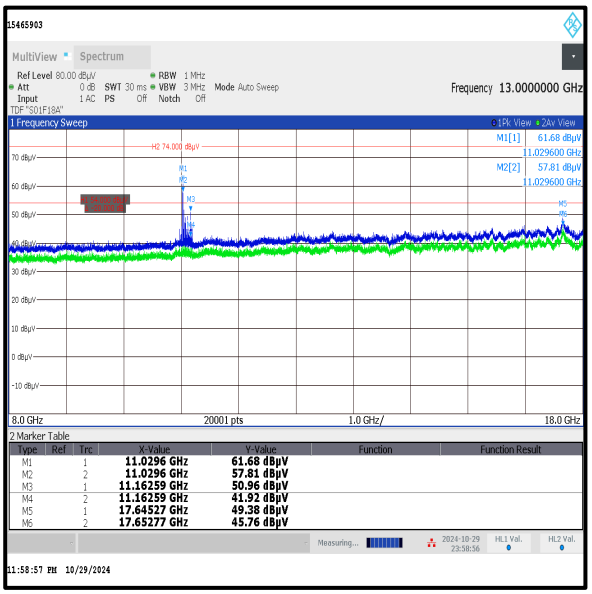
Frequency (MHz)	Antenna Polarity	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
11025.450	Vertical	70.9	74.0	3.1	Complied
17649.161	Horizontal	50.2	54.0*	3.8	Complied
29318.448	Vertical	49.3	54.0*	4.7	Complied

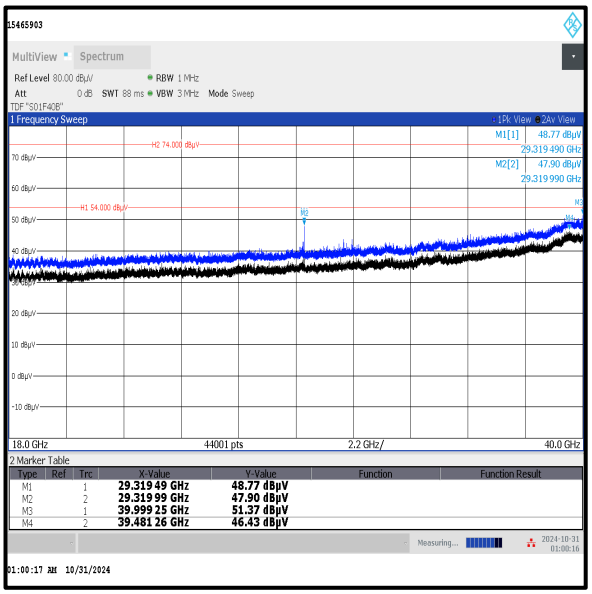
Results: Average

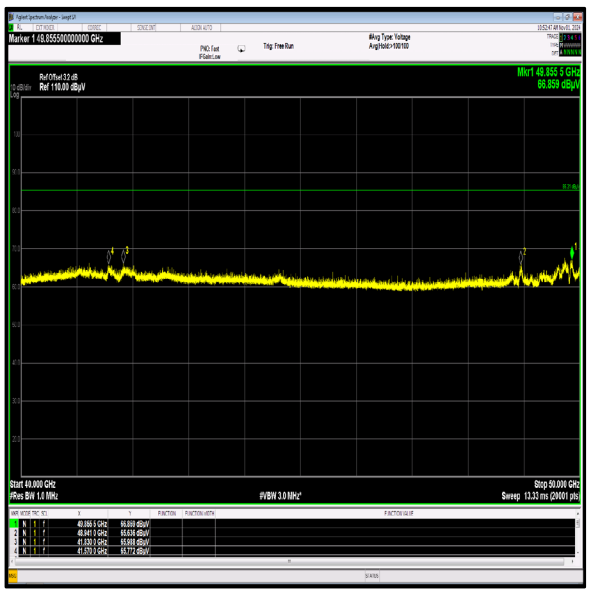
Frequency (MHz)	Antenna Polarity	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
11025.510	Vertical	29.1	54.0	24.9	Complied

Transmitter Radiated Spurious Emissions (continued)



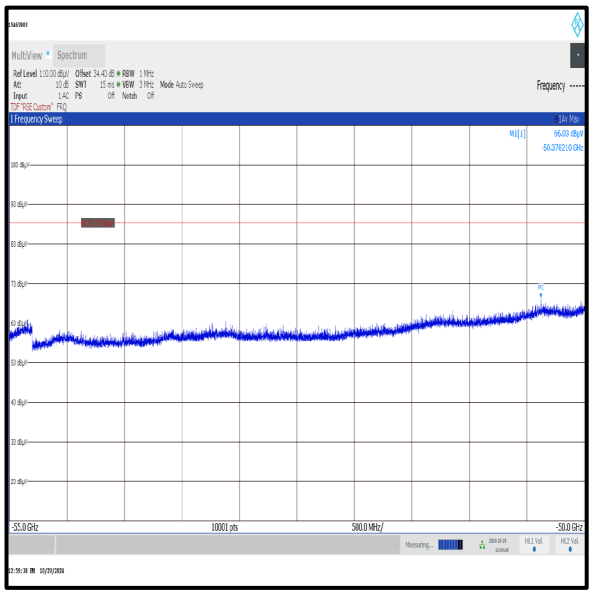


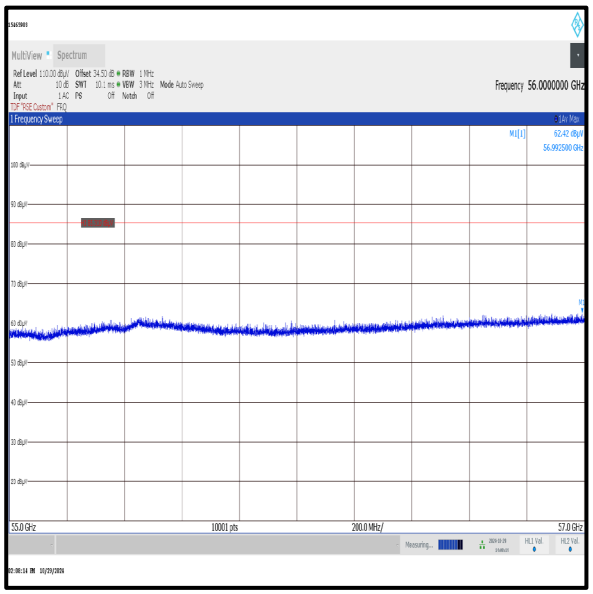


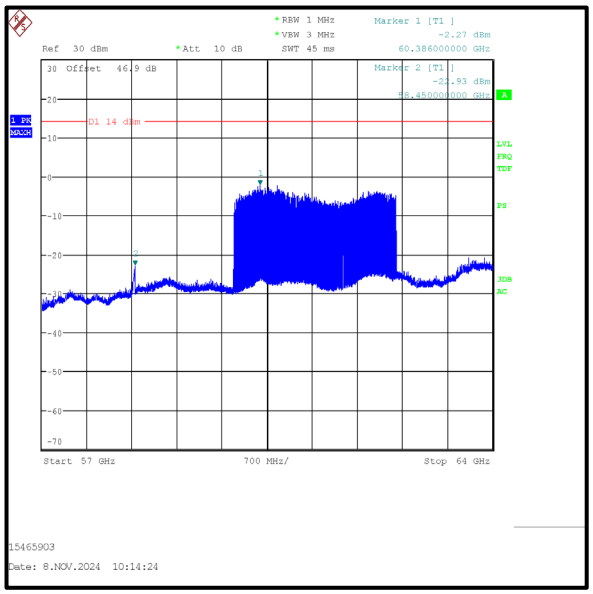


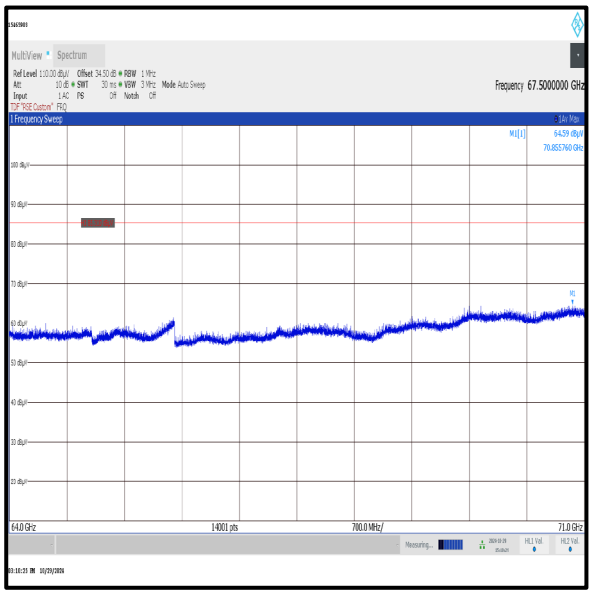
Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Transmitter Radiated Spurious Emissions (continued)



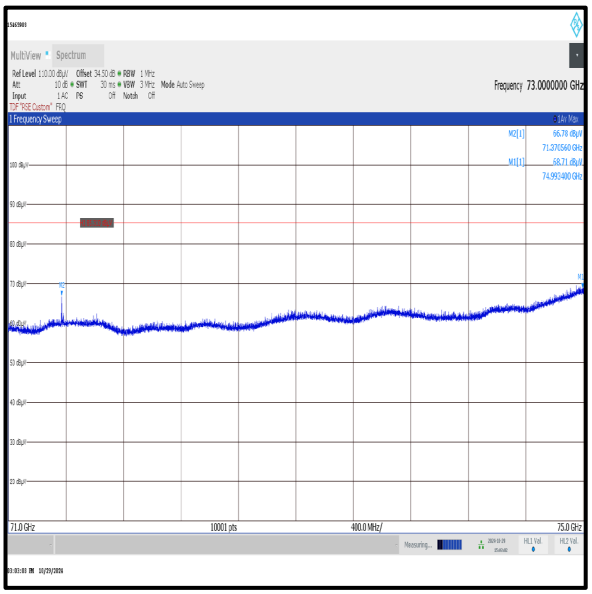


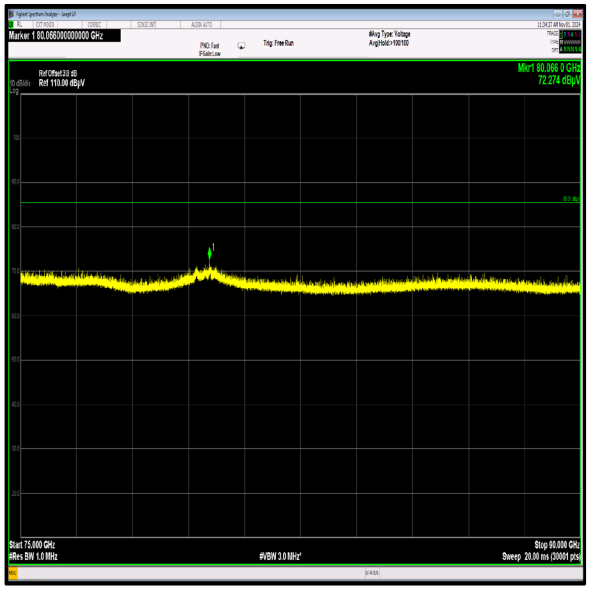


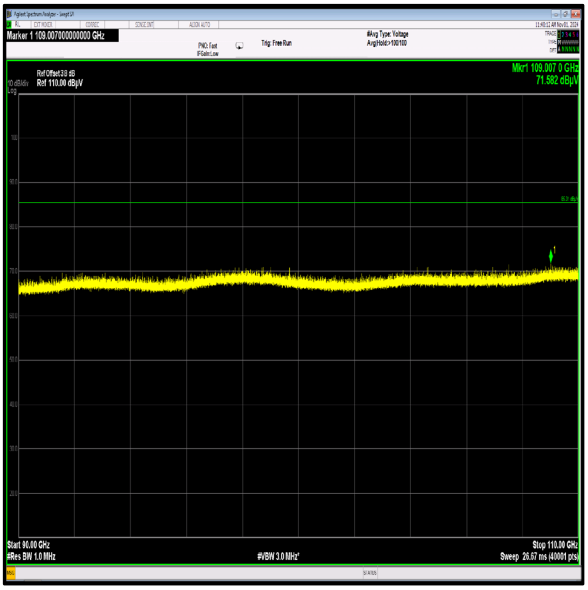


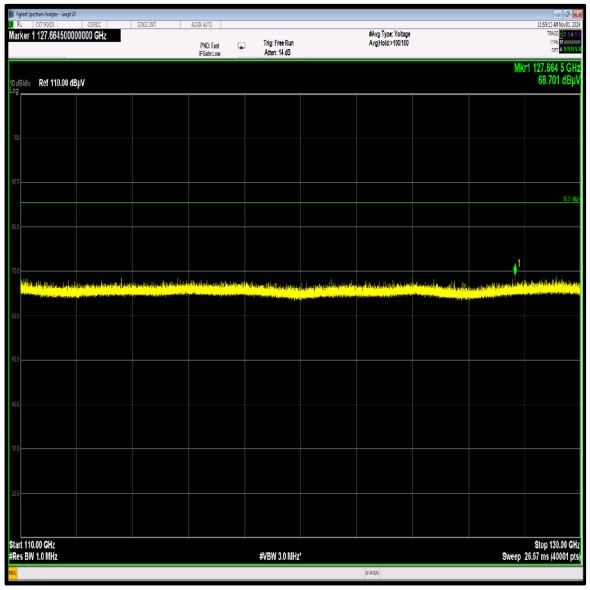
Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Transmitter Radiated Spurious Emissions (continued)



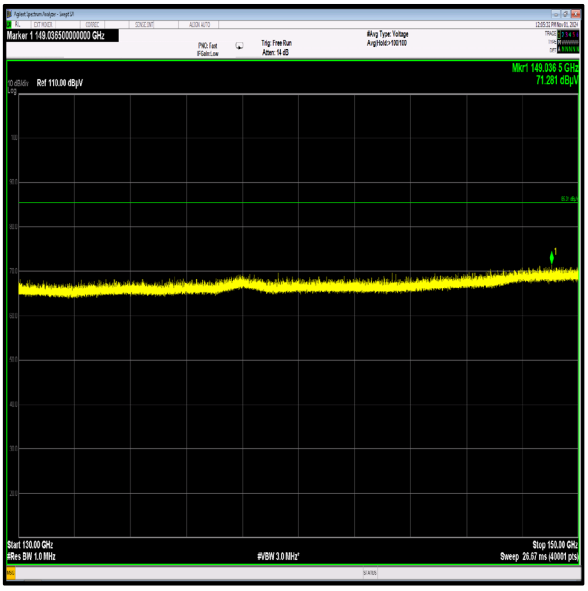


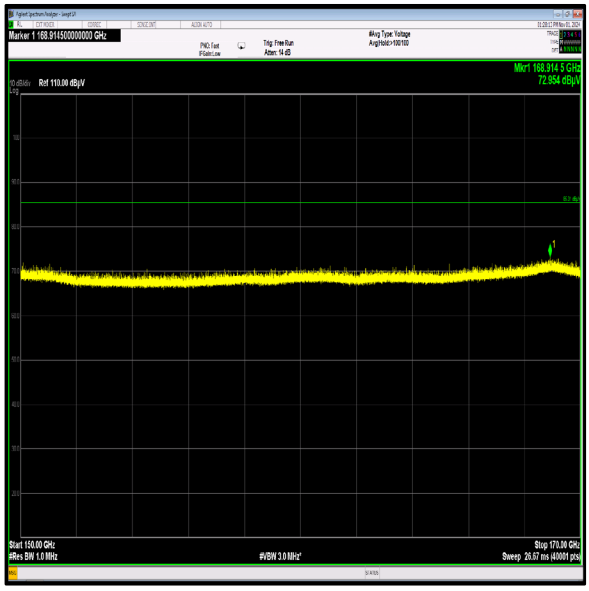


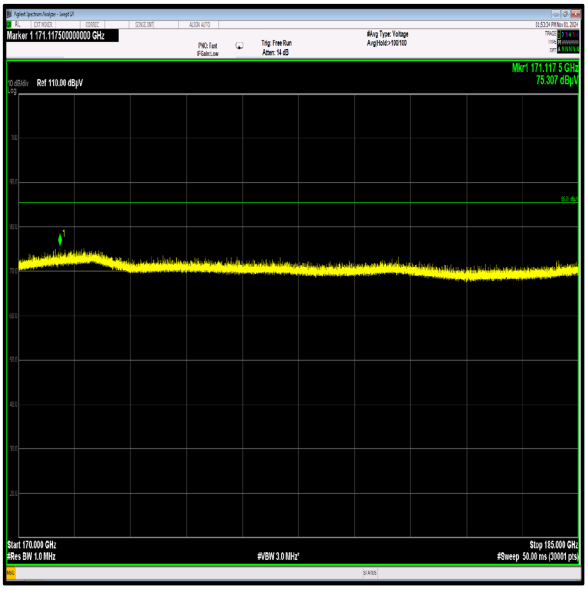


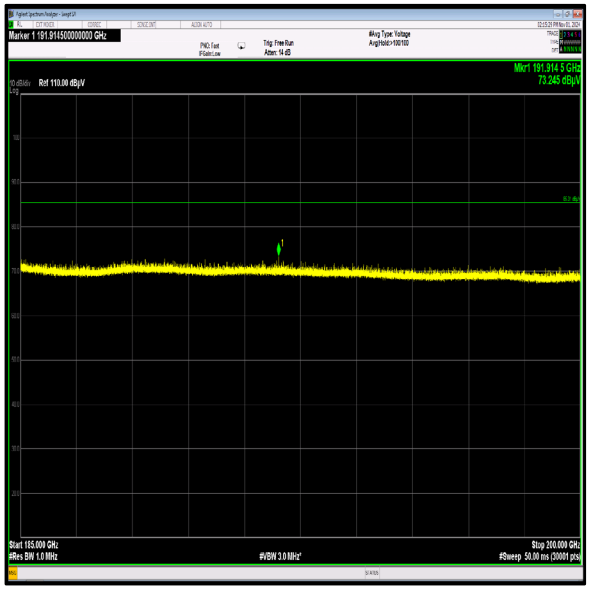
Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Transmitter Radiated Spurious Emissions (continued)









Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Transmitter Radiated Spurious Emissions (continued)

Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
K0001	3m RSE Chamber	MVG Industries	N/A	N/A	11 Sep 2025	12
M2040	Thermohygrometer	Testo	608-H1	45124934	27 Dec 2024	12
M236226	Test Receiver	Rohde & Schwarz	ESW26	103134	06 May 2025	12
A3154	Pre-Amplifier	Com-Power	PAM-103	18020012	28 Aug 2025	12
A553	Bi-Log Antenna	Chase EMC Ltd	CBL6111A	1593	27 Aug 2025	12
A3112	Attenuator	AtlanTecRF	AN18-06	219706#2	27 Aug 2025	12
A3179	Pre-Amplifier	Hewlett Packard	8449B	3008A00934	30 Aug 2025	12
A3138	Horn Antenna	Schwarzbeck	BBHA 9120 B	00702	06 Sep 2025	12
A3139	Horn Antenna	Schwarzbeck	HWRD750	00027	06 Sep 2025	12
A222867	Pre-Amplifier	Atlantic Microwave	A-LNAKX-380116-S5S5	220705003	30 Aug 2025	12
M227313	Signal Analyser	Rohde & Schwarz	FSW43	102471	20 Sep 2025	12
A2895	Horn Antenna	Schwarzbeck	BBHA 9170	9170-728	04 Mar 2025	12
A2896	Pre-Amplifier	Schwarzbeck	BBV 9721	9721 - 023	27 Feb 2025	12
M1832	Signal Analyser	Keysight	N9010A	MY53470303	03 Jul 2026	24
A219915	Downconverter	Virginia Diodes	WR19SAX	SAX 897	29 Aug 2026	24
A2963	Horn Antenna	Link Microtek	AM19HA-ULV1	14929	26 Mar 2025	12
M2069	Downconverter	Virginia Diodes	WR15SAX	SAX 394	12 Oct 2025	24
A2964	Horn Antenna	Link Microtek	AM15HA-ULV1	14930	26 Mar 2025	12
M2065	Downconverter	Virginia Diodes	WR10SAX	SAX 393	30 Jul 2025	24
A2967	Horn Antenna	Link Microtek	AM10HA-ULV1	14933	26 Mar 2025	12
M2066	Downconverter	Virginia Diodes	WR6.5SAX	SAX 392	02 Sep 2026	24
A2968	Horn Antenna	Link Microtek	AM7HA-ULV1	14934	26 Mar 2025	12
M2067	Downconverter	Virginia Diodes	WR4.3SAX	SAX 391	18 Nov 2026	24
A2969	Horn Antenna	Link Microtek	AM4HA-ULV1	14935	27 Mar 2025	12
A3212	50 GHz Low Pass Filter	Sage Millimeter	SWF-50354340-22-L1	B10754-01	29 Aug 2026	24
A3213	75 GHz High Pass Filter	Sage Millimeter	SWF-75370340-10-H1	18199-01	01 Nov 2026	24
G0640	Signal Generator	Keysight	E8257D	US00000055	10 Jan 2025	24

5.2.5 Transmitter Frequency Stability (Temperature Variation)

Test Summary:

Test Engineers:	Ben Mercer & Miriam Thompson	**Test Date:**	31 October 2024
Test Sample Serial Numbers:	UL#7760328		

FCC Reference:	Part 15.255(f)
Test Method Used:	ANSI C63.10 Section 9.14

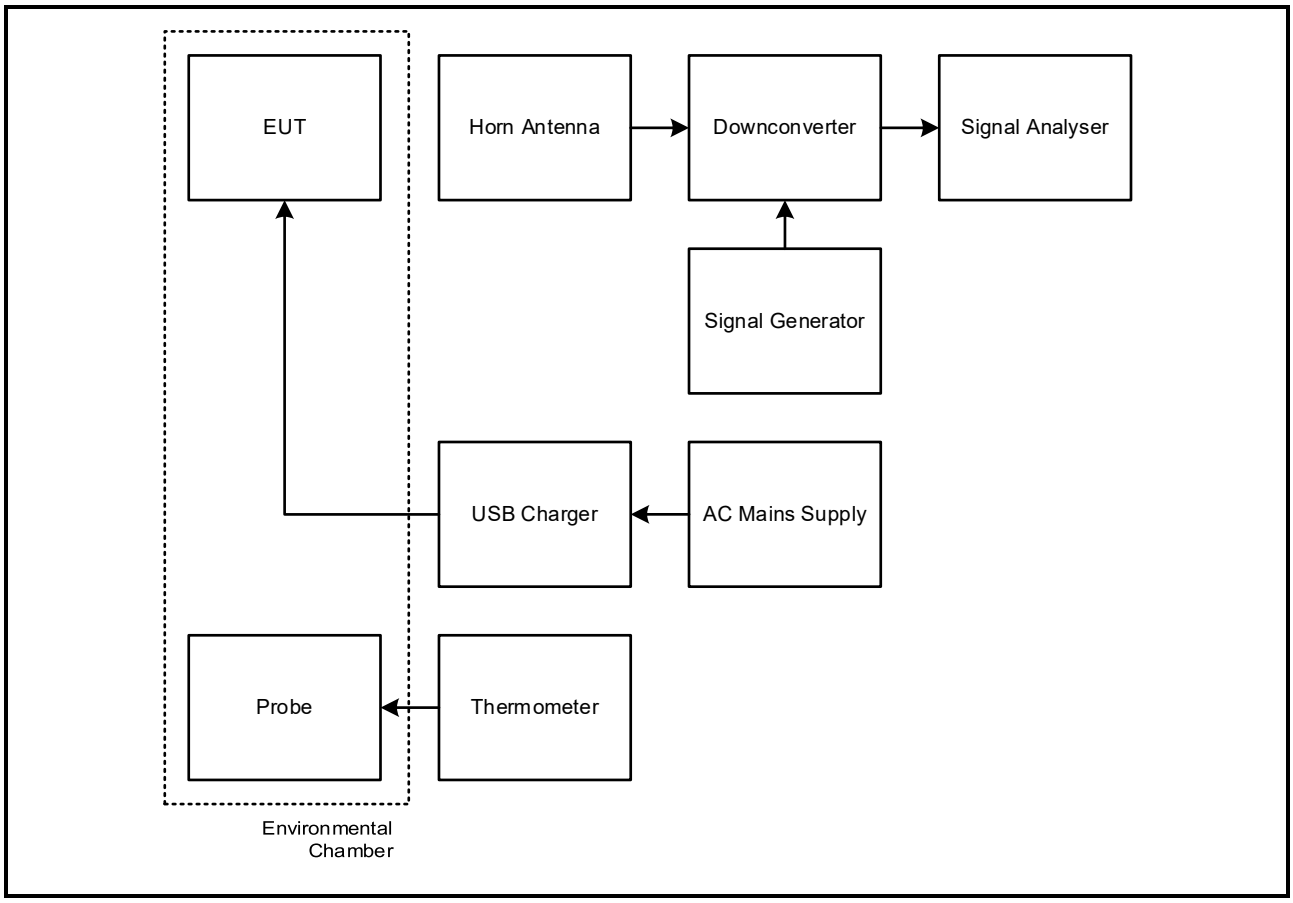
Environmental Conditions:

Ambient Temperature (°C):	22
Ambient Relative Humidity (%):	47

Note(s):

1. The 20 dB emission bandwidth was recorded on a signal analyser and compared to the lower and upper emission edges.
2. Temperature was monitored throughout the test with a calibrated digital thermometer.

Test Setup:



Transmitter Frequency Stability (Temperature Variation) (continued)

Results: Lower Band Edge

Temperature (°C)	Lower Band Edge Frequency (MHz)	Lower 20 dB Emission Bandwidth Frequency (MHz)	Result
10	57000.000	59978.300	Complied
20	57000.000	59979.300	Complied
30	57000.000	59978.300	Complied
35	57000.000	59978.300	Complied
Worst-case Margin (MHz)		2978.300	

Results: Upper Band Edge

Temperature (°C)	Upper Band Edge Frequency (MHz)	Upper 20 dB Emission Bandwidth Frequency (MHz)	Result
10	64000.000	62507.800	Complied
20	64000.000	62506.800	Complied
30	64000.000	62506.800	Complied
35	64000.000	62506.800	Complied
Worst-case Margin (MHz)		1492.200	

Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M2042	Thermohygrometer	Testo	608-H1	45124926	27 Dec 2024	12
M2033	Signal Analyser	Rohde & Schwarz	FSV13	101667	19 Sep 2025	12
M2069	Downconverter	Virginia Diodes	WR15SAX	SAX 394	16 Oct 2025	24
M2053	Thermometer	Fluke Corporation	52II	4232071WS	08 Apr 2025	12
M1252	Signal Generator	Hewlett Packard	83640A	3119A00489	05 Mar 2026	24
E0523	Environmental Chamber	Espec	ESZ-3CA	018310	Calibrated before use	-
A2964	Antenna	Link Microtek.	AM15HA-ULV1	14930	24 Jun 2025	36

5.2.6 Transmitter Frequency Stability (Voltage Variation)

Test Summary:

Test Engineers:	Ben Mercer & Miriam Thompson	**Test Date:**	31 October 2024
Test Sample Serial Numbers:	UL#7770035		

FCC Reference:	Part 15.255(f)
Test Method Used:	ANSI C63.10 Section 9.14

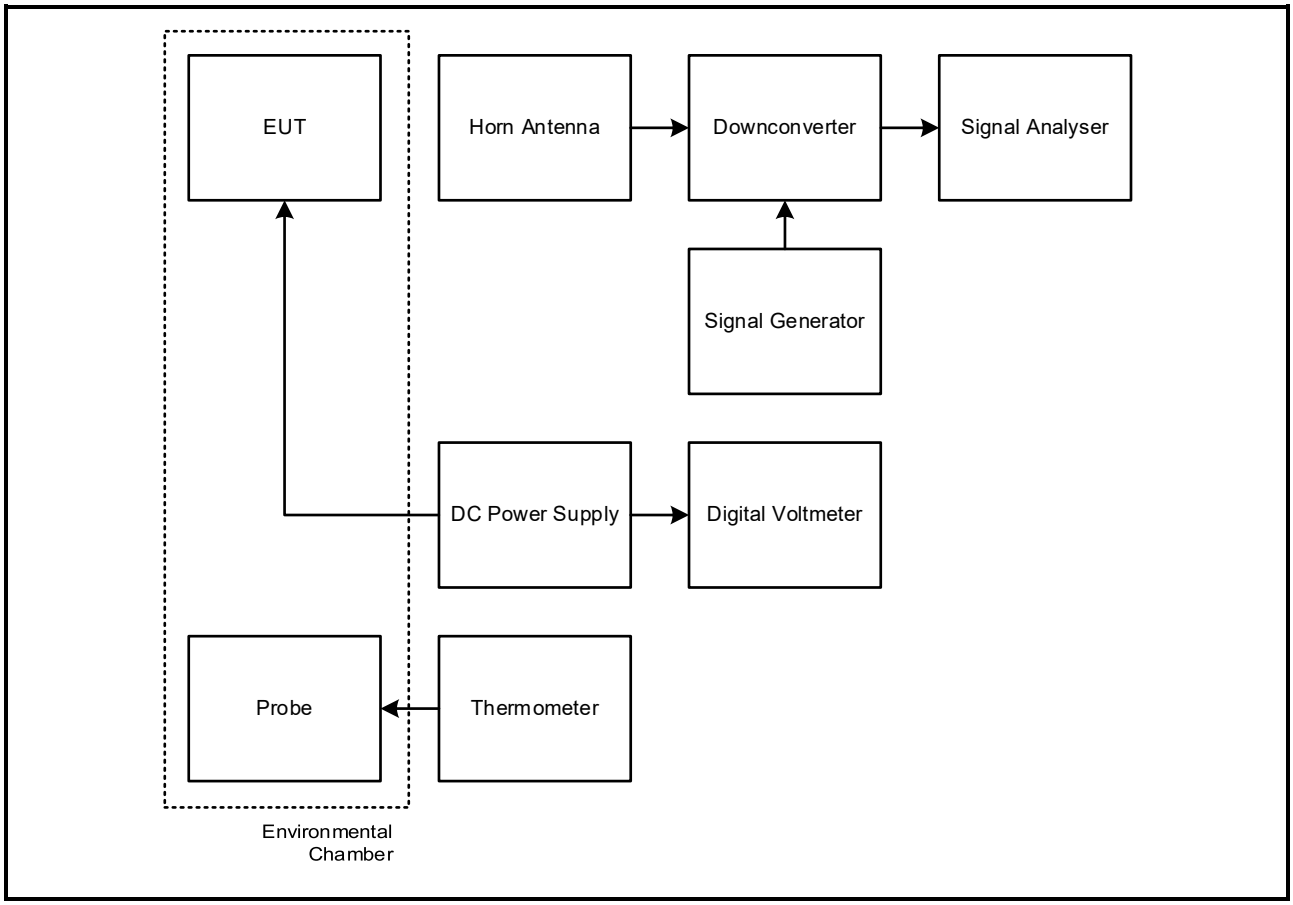
Environmental Conditions:

Ambient Temperature (°C):	22
Ambient Relative Humidity (%):	47

Note(s):

1. The 20 dB emission bandwidth was recorded on a signal analyser and compared to the lower and upper emission edges.
2. The DC power supply voltage was set to 85% and 115% of the stated battery voltage of 3.7 VDC.
3. Voltage was monitored throughout the test with a calibrated digital voltmeter.

Test Setup:



Transmitter Frequency Stability (Voltage Variation) (continued)

Results: Lower Band Edge

Supply Voltage (VDC)	Lower Band Edge Frequency (MHz)	Lower 20 dB Emission Bandwidth Frequency (MHz)	Result
3.145	57000.000	59973.300	Complied
3.7	57000.000	59974.300	Complied
4.255	57000.000	59972.300	Complied
Worst-case Margin (MHz)		2972.300	

Results: Upper Band Edge

Supply Voltage (VDC)	Upper Band Edge Frequency (MHz)	Upper 20 dB Emission Bandwidth Frequency (MHz)	Result
3.145	64000.000	62505.800	Complied
3.7	64000.000	62504.800	Complied
4.255	64000.000	62505.800	Complied
Worst-case Margin (MHz)		1494.200	

Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M2042	Thermohygrometer	Testo	608-H1	45124926	27 Dec 2024	12
M2033	Signal Analyser	Rohde & Schwarz	FSV13	101667	19 Sep 2025	12
M2069	Downconverter	Virginia Diodes	WR15SAX	SAX 394	16 Oct 2025	24
M1251	Multimeter	Fluke Corporation	175	89170179	21 Jun 2025	12
M1252	Signal Generator	Hewlett Packard	83640A	3119A00489	05 Mar 2026	24
A2964	Antenna	Link Microtek.	AM15HA-ULV1	14930	24 Jun 2025	36
S0558	DC Power supply	Thurlby Thandar Instruments	EL303R	395825	Calibrated before use	-

5.2.7 Transmitter AC Conducted Spurious Emissions

Test Summary:

Test Engineer:	Alison Johnston	**Test Date:**	30 October 2024
Test Sample Serial Numbers:	UL#7760328		

FCC Reference:	Part 15.207
Test Method Used:	ANSI C63.10 Section 6.2, FCC KDB 174176 and notes below

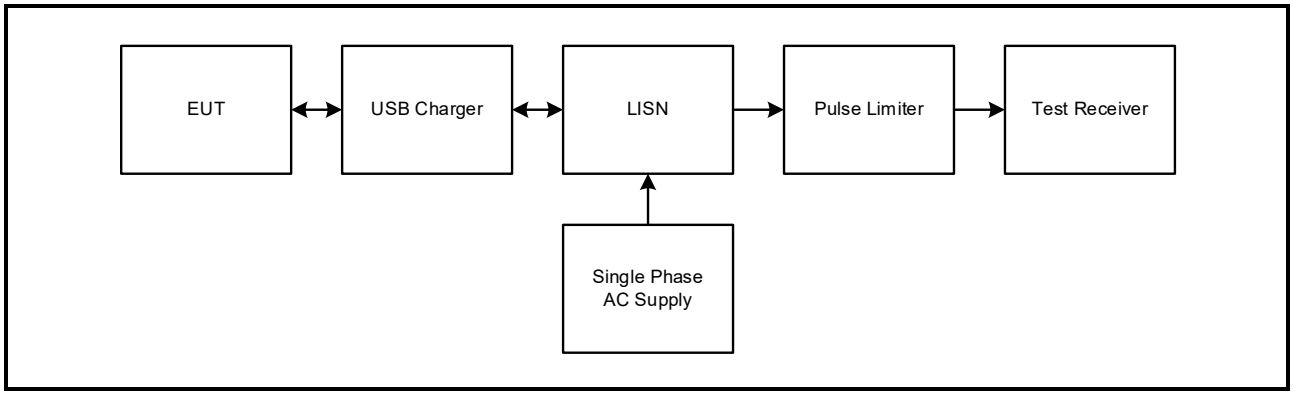
Environmental Conditions:

Temperature (°C):	24
Relative Humidity (%):	46

Note(s):

1. The EUT was connected to the USB charger via USB A to USB C cable. The USB charger was connected to a 120 VAC 60 Hz single phase supply via a LISN.
2. In accordance with FCC KDB 174176 Q4, all tests were also performed with a 240 VAC 60 Hz single phase supply.
3. Preliminary measurements were performed at both 50 Hz and 60 Hz supply frequencies. There was no change to the observed emissions.
4. Pre-scans were performed and markers placed on the highest live and neutral measured levels. Final measurements were performed on the marker frequencies and the results entered into the tables below.
5. A pulse limiter was fitted between the LISN and the test receiver.

Test Setup Diagrams



Transmitter AC Conducted Spurious Emissions (continued)

Results: Live / Quasi Peak / 120 VAC 60 Hz

Frequency (MHz)	Line	Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
0.659	Live	49.1	56.0	6.9	Complied
1.320	Live	38.6	56.0	17.4	Complied
4.011	Live	34.1	56.0	21.9	Complied
6.207	Live	41.0	60.0	19.0	Complied
8.606	Live	38.7	60.0	21.3	Complied
18.267	Live	40.9	60.0	19.1	Complied

Results: Live / Average / 120 VAC 60 Hz

Frequency (MHz)	Line	Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
0.659	Live	39.6	46.0	6.4	Complied
2.211	Live	23.9	46.0	22.1	Complied
6.189	Live	30.6	50.0	19.4	Complied
8.583	Live	29.7	50.0	20.3	Complied
11.265	Live	29.0	50.0	21.0	Complied
18.227	Live	31.8	50.0	18.2	Complied

Results: Neutral / Quasi Peak / 120 VAC 60 Hz

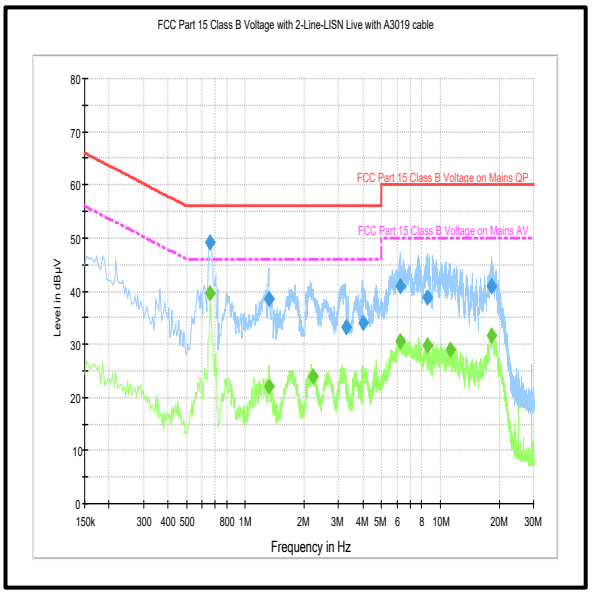
Frequency (MHz)	Line	Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
0.663	Neutral	49.0	56.0	7.0	Complied
1.320	Neutral	39.7	56.0	16.3	Complied
2.706	Neutral	37.4	56.0	18.6	Complied
6.644	Neutral	44.6	60.0	15.4	Complied
8.106	Neutral	41.2	60.0	18.8	Complied
18.780	Neutral	40.9	60.0	19.1	Complied

Results: Neutral / Average / 120 VAC 60 Hz

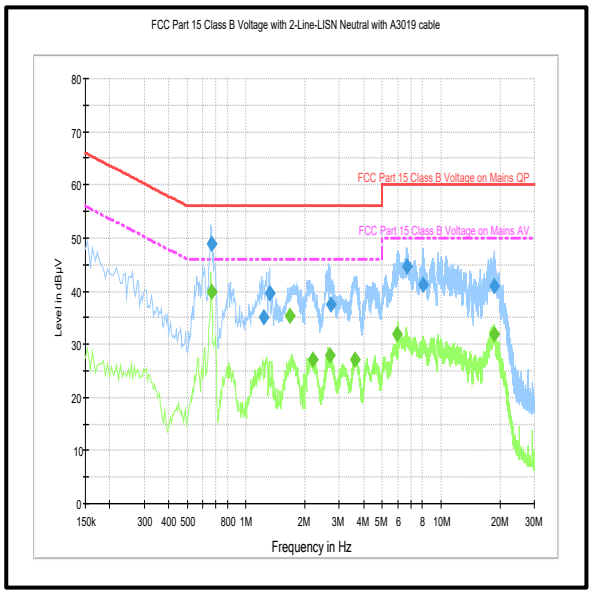
Frequency (MHz)	Line	Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
0.663000	Neutral	39.8	46.0	6.2	Complied
1.680000	Neutral	35.4	46.0	10.6	Complied
2.679000	Neutral	27.8	46.0	18.2	Complied
3.633000	Neutral	27.2	46.0	18.8	Complied
5.932500	Neutral	31.8	50.0	18.2	Complied
18.793500	Neutral	31.8	50.0	18.2	Complied

Transmitter AC Conducted Spurious Emissions (continued)

Results: 120 VAC 60 Hz



Live



Neutral

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

Transmitter AC Conducted Spurious Emissions (continued)

Results: Live / Quasi Peak / 240 VAC 60 Hz

Frequency (MHz)	Line	Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
0.528	Live	39.6	56.0	16.4	Complied
0.650	Live	48.8	56.0	7.2	Complied
2.558	Live	41.5	56.0	14.5	Complied
4.857	Live	41.6	56.0	14.4	Complied
6.612	Live	45.4	60.0	14.6	Complied
8.070	Live	43.6	60.0	16.4	Complied

Results: Live / Average / 240 VAC 60 Hz

Frequency (MHz)	Line	Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
0.650	Live	38.1	46.0	7.9	Complied
1.307	Live	28.9	46.0	17.1	Complied
4.884	Live	30.5	46.0	15.5	Complied
6.698	Live	34.6	50.0	15.4	Complied
8.034	Live	35.6	50.0	14.4	Complied
18.866	Live	33.1	50.0	16.9	Complied

Results: Neutral / Quasi Peak / 240 VAC 60 Hz

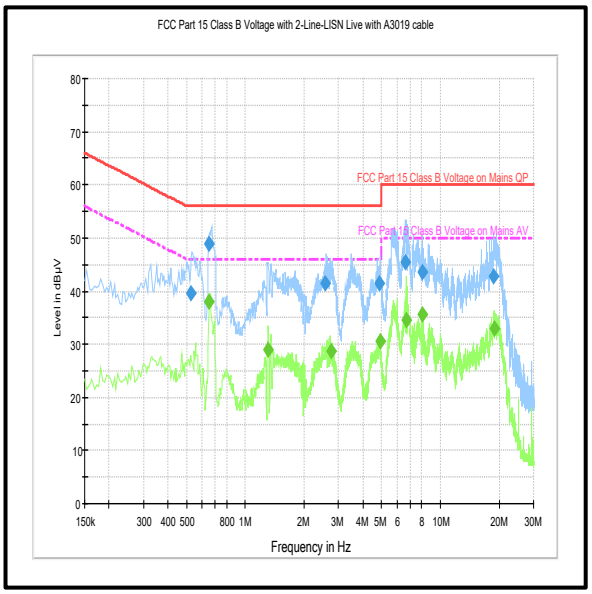
Frequency (MHz)	Line	Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
0.663	Neutral	50.6	56.0	5.4	Complied
1.415	Neutral	43.6	56.0	12.4	Complied
2.526	Neutral	43.2	56.0	12.8	Complied
2.796	Neutral	41.6	56.0	14.4	Complied
5.888	Neutral	49.0	60.0	11.0	Complied
7.409	Neutral	42.4	60.0	17.6	Complied

Results: Neutral / Average / 240 VAC 60 Hz

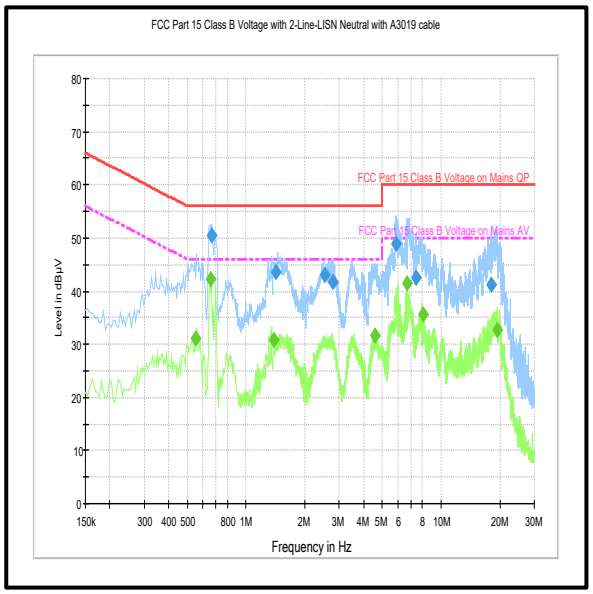
Frequency (MHz)	Line	Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
0.551	Neutral	31.1	46.0	14.9	Complied
0.654	Neutral	42.3	46.0	3.8	Complied
1.388	Neutral	30.7	46.0	15.3	Complied
4.565	Neutral	31.6	46.0	14.4	Complied
6.675	Neutral	41.4	50.0	8.6	Complied
8.025	Neutral	35.7	50.0	14.3	Complied

Transmitter AC Conducted Spurious Emissions (continued)

Results: 240 VAC 60 Hz



Live



Neutral

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

Test Equipment Used for Transmitter AC Conducted Spurious Emissions:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M2037	Thermohygrometer	Testo	608-H1	45124925	27 Dec 2024	12
A649	LISN	Rohde & Schwarz	ESH3-Z5	825562/008	07 Aug 2025	12
A1830	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100668	15 Jul 2025	12
M1124	Test Receiver	Rohde & Schwarz	ESIB 26	100046	15 Oct 2025	12

Test Measurement Software/Firmware Used:

Name	Version	Release Date
Rohde & Schwarz EMC32	6.30.0	2018

6 Measurement Uncertainty & Decision Rule

Overview

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 of the measurand (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.

Decision Rule

Measurement system instrumentation shall be used with an accuracy specification meeting the accuracy specification limits according to IEC/IECEE OD-5014.

As applicable, unless specified otherwise in this report, the compliance “Decision Rule” is based on Simple Acceptance. If the measured value is on the limit, the result is defined as a pass. In this case the risk of a false positive is 50%. For further information regarding risk assessment refer to ILAC G8:09/2019.

Measurement Uncertainty

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
Transmitter EIRP	57 to 71 GHz	95%	±5.12 dB
Transmitter Duty Cycle	57 to 71 GHz	95%	±1.14 %
Transmitter 20 dB Bandwidth	57 to 71 GHz	95%	±3.27 %
Transmitter Radiated Emissions	9 kHz to 30 MHz	95%	±5.44 dB
Transmitter Radiated Emissions	30 MHz to 1 GHz	95%	±2.98 dB
Transmitter Radiated Emissions	1 GHz to 40 GHz	95%	±3.64 dB
Transmitter Radiated Emissions	40 GHz to 200 GHz	95%	±5.12 dB
AC Conducted Spurious Emissions	0.15 MHz to 30 MHz	95%	±1.88 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.

7. Report Revision History

Version Number	Revision Details		
	Page No(s)	**Clause**	**Details**
1.0	-	-	Initial Version
2.0	6	2.3	KDB 364244 D01 added
	7	3.4	Operating temperature range added
	17	5.2.4	Note 3 amended, Note 7 removed
	21	5.2.4	Note 9 added
3.0	-	-	References to 6 dB Bandwidth and 99% Bandwidth removed.
	38	6	Duty Cycle uncertainty added
4.0	20	5.2.4	Note added to pre-scans
	33	5.2.7	Note 3 added

--- END OF REPORT ---