EMC Test Report	
For:	**MysteryVibe Limited**
Product:	**Molto Personal Massage Device**
Model:	**6915**
FCC ID:	**2AHVA-6915**
	
Project Engineer:	**Graeme Lawler**
	
Approval Signatory:	**Dan Tiroke**

Document Reference:	**4849 FR**

Issue Number:	Date:	Test Report Revisions History:
1	23rd August 2023	Original report issued
2	25th September 2023	Updated with editorial corrections

UKAS Accredited:	1871
FCC Registered:	UK2006
KC Lab ID:	UK 1871
Canada CAB ID:	UK0005

Eurofins E&E UK Hursley Laboratory
Trafalgar House, Trafalgar Close
Chandlers Ford, Eastleigh
Hampshire, SO53 4BW
United Kingdom

1871

Phone: +44 (0) 23 8027 1111
e-mail: adminhursley@eurofins.com
www.eurofins.co.uk/hursley

Contents

1.0 OVERVIEW

1.1 Introduction

The equipment under test (EUT) as described within this document was submitted for testing as agreed with the customer.

1.2 Objective

The purpose of the test was to measure and report the EUT against limits and methods of the requested standards as listed in section 2.0 Test Summary.

1.3 Product Modifications

None to sample submitted.

1.4 Conclusion

The EUT met the emission requirements of the tests defined in section 2.0 Test Summary.

This report relates to the sample tested and may not represent the entire population. It is valid only for the product identified, either in part or in full, to the standards and/or tests covered in this document.

1.5 EMC Test Lab Reference

Eurofins E&E UK Hursley Laboratory File: 4849

1.6 Test Deviations

None.

2.0 TEST SUMMARY

2.1 Summary

The EUT, as described and reported within this document, complies with the applied requested sections of the standards listed below.

The EUT met the **emissions** test requirements of the following standards:			
Description	**General Standard**	**Referenced Standard**	**Status**
Radiated Emissions (30 MHz to 12.5 GHz)	FCC/CFR 47: Part 15B 15.109 Class B	ANSI C63.4: 2014	Pass
Conducted Emissions	FCC/CFR 47: Part 15B 15.107 Class B		Pass
Radiated Emissions (30 MHz to 25 GHz)	FCC 15.249 / 15.209	ANSI C63.10: 2013	Pass
Conducted Emissions	FCC 15.207		Pass
Occupied Bandwidth	FCC 15.215(c)	ANSI C63.10: 2013 clause 6.9.3	Pass

Note(s):

- The highest internal operating frequency declared by the manufacturer is 2483.5 MHz.

3.0 EQUIPMENT AND TEST DETAILS

3.1 General

Product (EUT):	Molto Personal Massage Device		
Model:	6915	**Serial Numbers:**	003 and 005
Sample Build:	Production Sample		
EUT Power:	Battery Powered / 110 V/60 Hz (while charging via PSU)		
Customer Test Plan:	Sulis_FCC EUT Information		
Alternate Models:	Not Applicable		
EUT Manufacturer:	MysteryVibe Limited		
Customer Name:	MysteryVibe Limited		
Customer Address:	The Dairy South Shoelands Farm Offices Puttenham Surrey GU10 1HL United Kingdom		
Test Commissioned By:	Charlie Blackham, Sulis Consultants Limited		
Date EUT Received:	5th May 2023		
Test Date(s):	5th to 18th May and 8th to 26th June 2023		
EMC Measurement Site:	Eurofins E&E UK Hursley Laboratory		
	Trafalgar Close, Chandlers Ford, Hampshire, United Kingdom		
Product Category:	Personal Vibrator Toy		

3.2 EUT Description

The EUT is a personal vibrator toy.

3.3 Support Equipment

Description	Manufacturer	Model	Serial Number
AC Mains to USB Charger	Apple	A1399	Not Serialised

3.4 EUT Test Exerciser

For Radio Emissions testing, the EUT was set to receive or transmit on either the bottom, middle or top channel individually. For EMC emissions testing the EUT was either vibrating or charging via its USB connector.

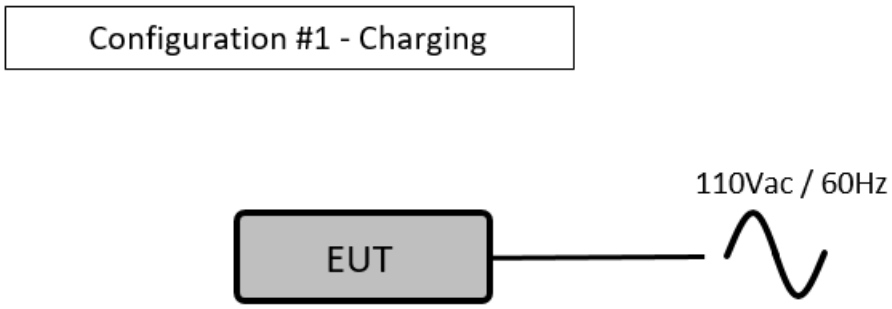
The EUT operates inside the 2400 – 2483.5 MHz band:

- 40 channels with centre frequencies on 2 MHz spacing from 2402 to 2480 MHz inclusive
- The device includes a rechargeable LiIon battery and is charged from external mains to 5V dc power supply.

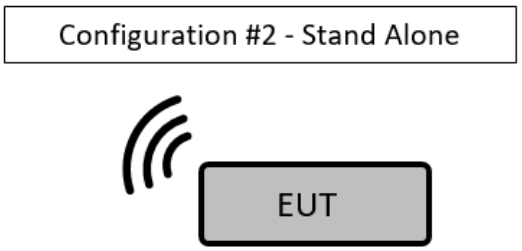
The following test frequencies were used to cover the full band of operation of the device:

Test Channel	**Description**
Top	Continuous transmit on 2480 MHz
Middle	Continuous transmit on 2440 MHz
Bottom	Continuous transmit on 2402 MHz

3.5.1 EUT Test Configuration #1



3.5.2 EUT Test Configuration #2



4.0 TEST RESULTS

4.1 Radiated Emissions; FCC 15B (110 V 60 Hz)

4.1.1 Test Parameters

A profile scan was taken using an EMI receiver at a distance of three metres on eight azimuths of the EUT in both the vertical and horizontal polarisation of the field in a semi-anechoic chamber.

Using the pre-scan results as a guide, each emission from the EUT was maximised. Measurements were carried out at a distance of three metres using the specified detector in a CISPR 16-1-4 compliant semi-anechoic chamber. Antenna and turntable positions were then finally adjusted to produce the maximum emission levels. The worst-case results are reported below.

Test Equipment						
#ID	CP	Manufacturer	Type	Serial Number	Description	Calibration Due Date
750	1	Global	CISPR16	1	11 x 7 x 6.2m, chamber	22/12/2023
893	1	Rohde & Schwarz	ESW 44	103044	EMI test receiver	11/11/2023
762	3	Schwarzbeck	VULB9162	129	30-7000 MHz	04/03/2024
877	1	Huber & Suhner	SUCOTEST_18A	602608/18A	ST_18A/Nm/Nm/3m	21/11/2023
272	1	Sucoflex	106	72467-6	Cable SMA	02/06/2024
053	1	HP	8449B	3008A01394	Pre-amplifier (1.0-26.5 GHz)	24/10/2023
073	3	Schwarzbeck	BBHA9120B	237	Horn Antenna (1-10 GHz)	20/05/2024
340	1	Sucoflex with #053 Pre-amplifier	104	340	26.5 GHz	24/10/2023
952	3	Schwarzbeck	HWRD750	66	Horn Antenna 7 to 18 GHz	21/06/2026
779	3	NPL	QWH-SL-18-40-K-SG	17504	Horn Antenna 18 to 40 GHz	05/08/2024
Test Equipment Software						
#ID	CP	Manufacturer	Type		Description	Calibration Due Date
856	0	Rohde & Schwarz	Software	856	EMC32 v11.30.0	Not required

Frequency	**Below 1 GHz**	**Above 1 GHz**	**Above 1 GHz**	**Above 1 GHz**
Temperature	22.9° Celsius	24.9° Celsius	25.4° Celsius	24.5° Celsius
Relative Humidity	51 %	41 %	41 %	47 %
Atmospheric Pressure	1016.5 millibars	1029.8 millibars	1018.6 millibars	1023.3 millibars
Test Date:	5th May 2023	18th May 2023	8th June 2023	26th June 2023
Test Engineer:	Malcolm Musgrave	Graeme Lawler	Graeme Lawler	Graeme Lawler

Note: “Calibration due date” means the instrument is certified within UKAS or traceable calibration certificate. “Internal” means the instrument is calibrated using Eurofins Hursley procedures. “Not required” means the asset does not require calibration. “CP” is the interval period [year] prescribed for external calibration.

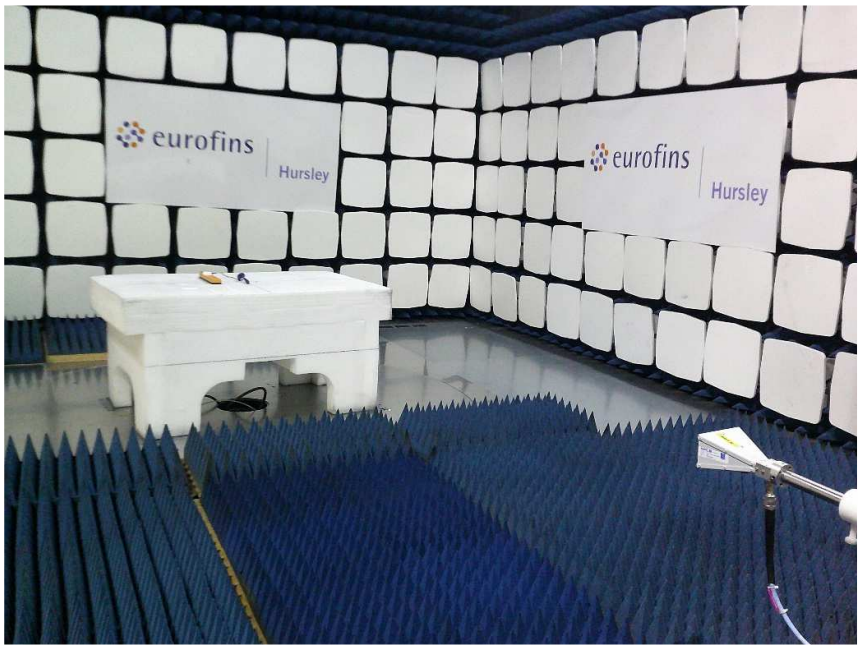
4.1.2 Test Configuration

Please refer to EUT Test Configuration #1.

4.1.3 Set-up Photos

Radiated Emissions; Below 1 GHz

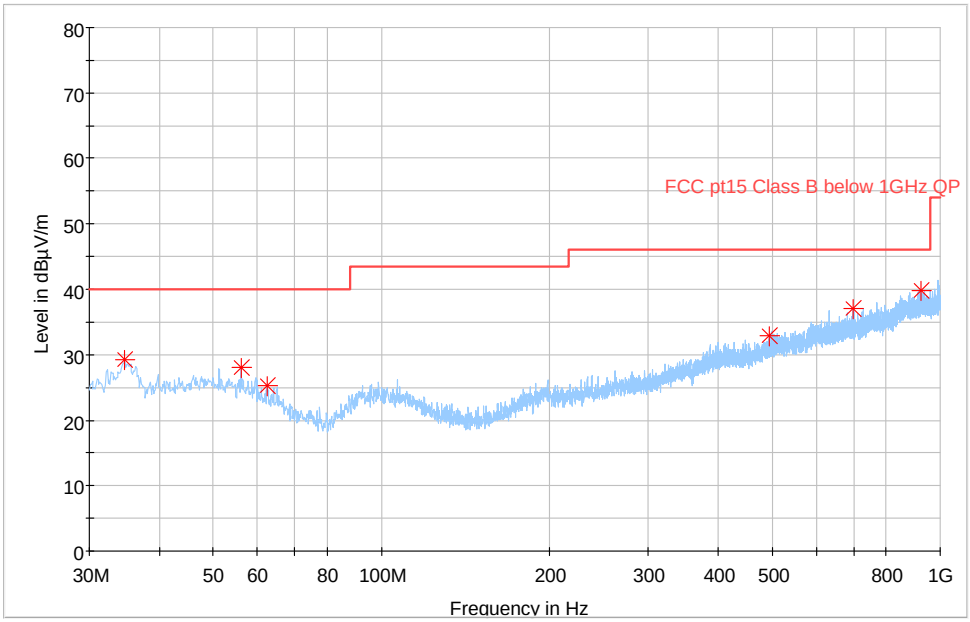
Radiated Emissions; Above 1 GHz



4.1.4 Profile; 30 MHz to 1 GHz, Receive Mode Channel with Charging Cable, FCC 15B (110 V 60 Hz), Z Orientation

Maximum peak hold trace with quasi-peak values (◆)
Peak measurements (✳)

30 MHz to 1 GHz



4.1.5 Data; 30 MHz to 1 GHz, Receive Mode Channel with Charging Cable, FCC 15B (110 V 60 Hz), Z Orientation

Emission Frequency	Measured Quasi-Peak Value	Class B Specified Quasi-Peak Limit	Pass Margin	Antenna Polarisation	Antenna Height	Turntable Azimuth	
MHz	dBµV/m	dBµV/m	dB	H/V	cm	deg	Status
-	-	-	-	-	-	-	Pass

V = Vertical / H = Horizontal

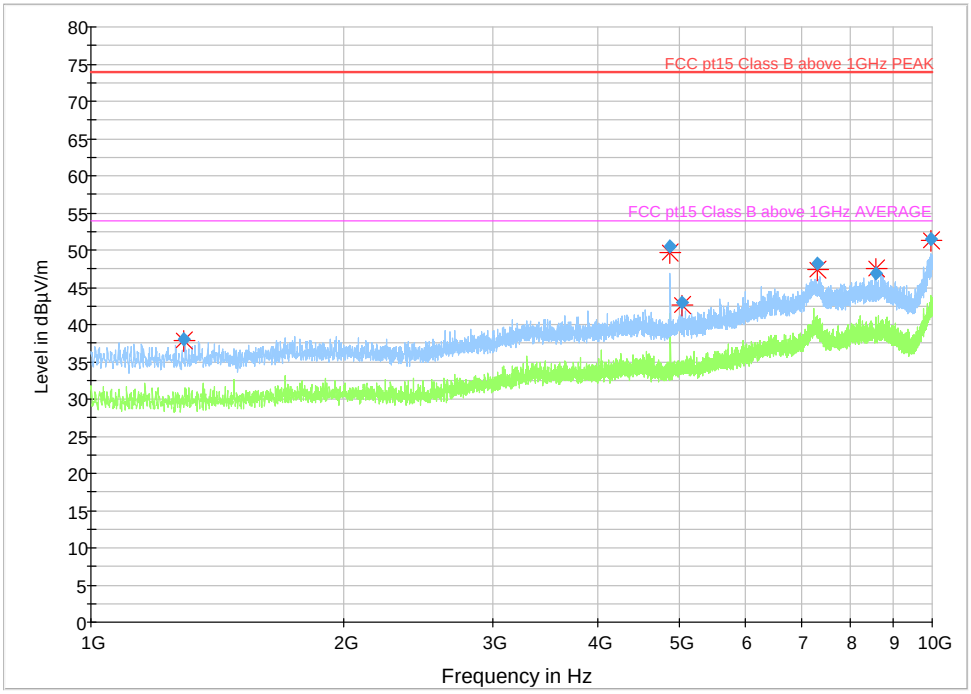
No measurements were taken based on the max peak data values high margins relative to the limit lines.

The measurements reported are the highest emissions relative to the FCC/CISPR Class B limits and take into account the correction factor*. Measurements made according to the CISPR test standard and Eurofins Hursley test procedure RAD-01.
*Correction factor (dB) = cable and antenna losses as summed positive values (dB) – pre-amp gain where applicable (dB).
The recorded measured value (dB) = measured receiver value (dB) + correction factor (dB).
Note: Path losses are factored into the limit value, and given by the test standard. Chamber calibration data contributes to the measurement uncertainty figure.

4.1.6 Profile; 1 to 10 GHz, Middle Channel with Charging Cable, FCC 15B (110 V 60 Hz), X Orientation

Maximum hold trace with peak values (◆)
Peak measurements (✳)
Average measurements (◆)

1 to 10 GHz



4.1.7 Data; 1 to 10 GHz, Middle Channel with Charging Cable, FCC 15B (110 V 60 Hz), X Orientation

Frequency	Peak	CISPR Average	Class B Limit	Margin	Height	Pol	Azimuth	Corr.	
MHz	dBµV/m	dBµV/m	dBµV/m	dB	cm	H/V	Deg	dB/m	Status
1289.884781	37.98	---	74.00	36.02	311.0	H	76.0	-9.8	Pass
4882.008822	50.42	---	74.00	23.58	368.0	V	180.0	-1.8	Pass
5044.374311	43.03	---	74.00	30.97	252.0	V	217.0	-1.3	Pass
7316.169472	48.13	---	74.00	25.87	396.0	H	69.0	3.6	Pass
8576.046829	46.84	---	74.00	27.16	109.0	H	187.0	2.7	Pass
9963.448644	51.48	---	74.00	22.52	214.0	H	319.0	6.2	Pass

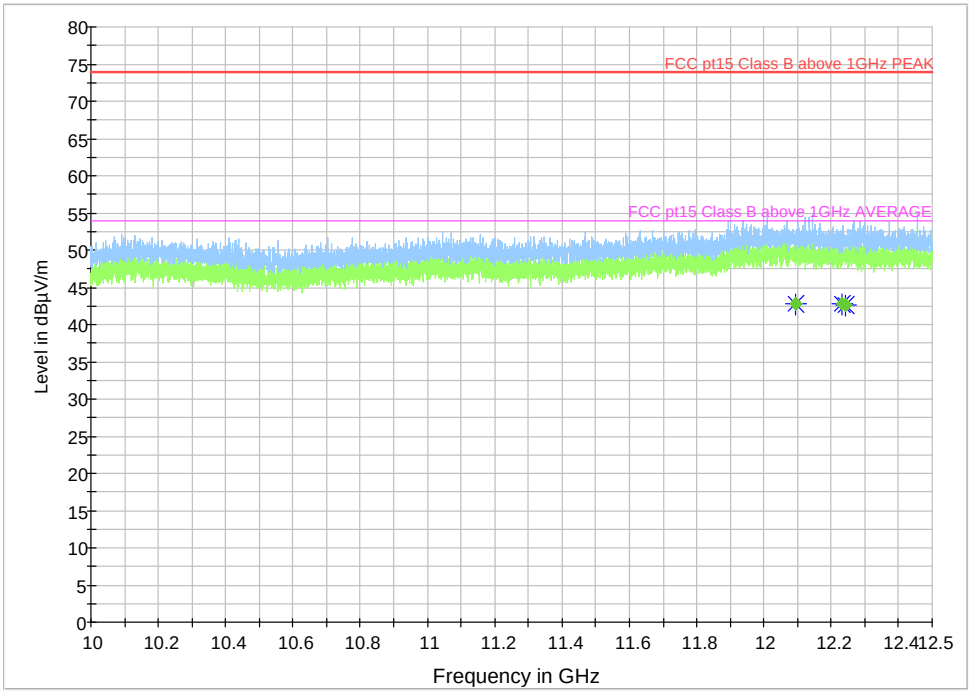
V = Vertical / H = Horizontal

The measurements reported are the highest emissions relative to the FCC/CISPR Class B limits and take into account the correction factor*. Measurements made according to the CISPR test standard and Eurofins Hursley test procedure RAD-01.
*Correction factor (dB) = cable and antenna losses as summed positive values (dB) – pre-amp gain where applicable (dB).
The recorded measured value (dB) = measured receiver value (dB) + correction factor (dB).
Note: path losses are factored into the limit value, and given by the test standard. Chamber calibration data contributes to the measurement uncertainty figure.

4.1.8 Profile; 10 to 12.5 GHz, Middle Channel with Charging Cable, FCC 15B (110 V 60 Hz), X Orientation

Maximum hold trace with peak values (◆)
Peak measurements (✳)
Average measurements (◆)

10 to 12.5 GHz



4.1.9 Data; 10 to 12.5 GHz, Middle Channel with Charging Cable, FCC 15B (110 V 60 Hz), X Orientation

Frequency	Peak	CISPR Average	Class B Limit	Margin	Height	Pol	Azimuth	Corr.	
MHz	dBµV/m	dBµV/m	dBµV/m	dB	cm	H/V	Deg	dB/m	Status
12093.13515	---	42.72	54.00	11.28	349.0	H	300.0	11.2	Pass
12230.00673	---	42.71	54.00	11.29	165.0	V	292.0	11.4	Pass
12241.29882	---	42.66	54.00	11.34	252.0	V	0.0	11.4	Pass

V = Vertical / H = Horizontal

The measurements reported are the highest emissions relative to the FCC/CISPR Class B limits and take into account the correction factor*. Measurements made according to the CISPR test standard and Eurofins Hursley test procedure RAD-01.
*Correction factor (dB) = cable and antenna losses as summed positive values (dB) – pre-amp gain where applicable (dB).
The recorded measured value (dB) = measured receiver value (dB) + correction factor (dB).
Note: path losses are factored into the limit value, and given by the test standard. Chamber calibration data contributes to the measurement uncertainty figure.

4.2 Radiated Emissions; FCC 15.249 (110 V 60 Hz)

4.2.1 Test Parameters

A profile scan was taken using an EMI receiver at a distance of three metres on eight azimuths of the EUT in both the vertical and horizontal polarisation of the field in a semi-anechoic chamber.

Using the pre-scan results as a guide, each emission from the EUT was maximised. Measurements were carried out at a distance of three metres using the specified detector in a CISPR 16-1-4 compliant semi-anechoic chamber. Antenna and turntable positions were then finally adjusted to produce the maximum emission levels. The worst-case results are reported below.

Test Equipment						
#ID	CP	Manufacturer	Type	Serial Number	Description	Calibration Due Date
750	1	Global	CISPR16	1	11 x 7 x 6.2m, chamber	22/12/2023
893	1	Rohde & Schwarz	ESW 44	103044	EMI test receiver	11/11/2023
762	3	Schwarzbeck	VULB9162	129	30-7000 MHz	04/03/2024
877	1	Huber & Suhner	SUCOTEST_18A	602608/18A	ST_18A/Nm/Nm/3m	21/11/2023
272	1	Sucoflex	106	72467-6	Cable SMA	02/06/2024
053	1	HP	8449B	3008A01394	Pre-amplifier (1.0-26.5 GHz)	24/10/2023
073	3	Schwarzbeck	BBHA9120B	237	Horn Antenna (1-10 GHz)	20/05/2024
340	1	Sucoflex with #053 Pre-amplifier	104	340	26.5 GHz	24/10/2023
952	3	Schwarzbeck	HWRD750	66	Horn Antenna 7 to 18 GHz	21/06/2026
779	3	NPL	QWH-SL-18-40-K-SG	17504	Horn Antenna 18 to 40 GHz	05/08/2024
Test Equipment Software						
#ID	CP	Manufacturer	Type		Description	Calibration Due Date
856	0	Rohde & Schwarz	Software	856	EMC32 v11.30.0	Not required

Frequency	**Below 1 GHz**	**Above 1 GHz**	**Above 1 GHz**	**Above 1 GHz**
Temperature	22.9° Celsius	24.9° Celsius	25.4° Celsius	24.5° Celsius
Relative Humidity	51 %	41 %	41 %	47 %
Atmospheric Pressure	1016.5 millibars	1029.8 millibars	1018.6 millibars	1023.3 millibars
Test Date:	5th May 2023	18th May 2023	8th June 2023	26th June 2023
Test Engineer:	Malcolm Musgrave	Graeme Lawler	Graeme Lawler	Graeme Lawler

Note: “Calibration due date” means the instrument is certified within UKAS or traceable calibration certificate. “Internal” means the instrument is calibrated using Eurofins Hursley procedures. “Not required” means the asset does not require calibration. “CP” is the interval period [year] prescribed for external calibration.

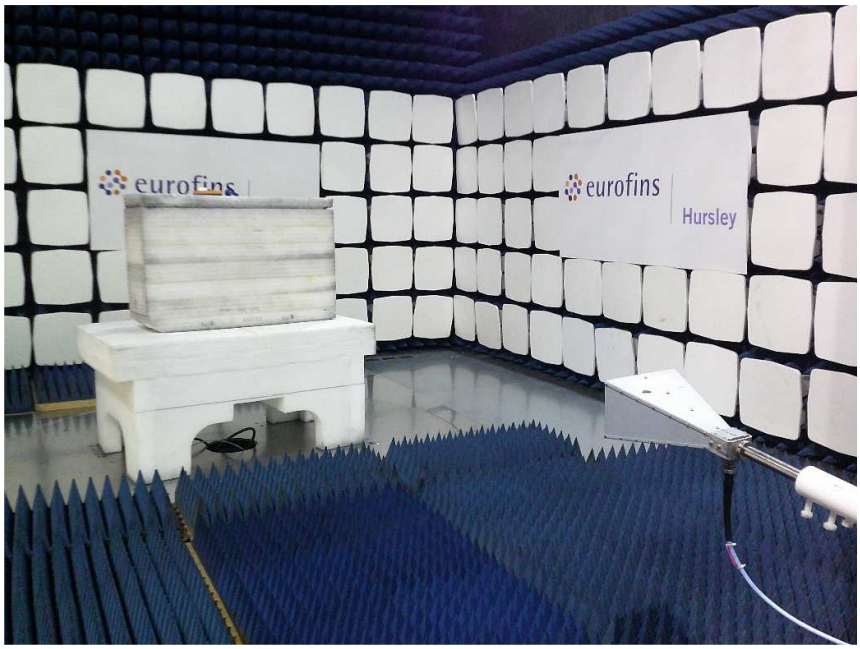
4.2.2 Test Configuration

Please refer to EUT Test Configuration #1.

4.2.3 Set-up Photos

Radiated Emissions; Below 1 GHz

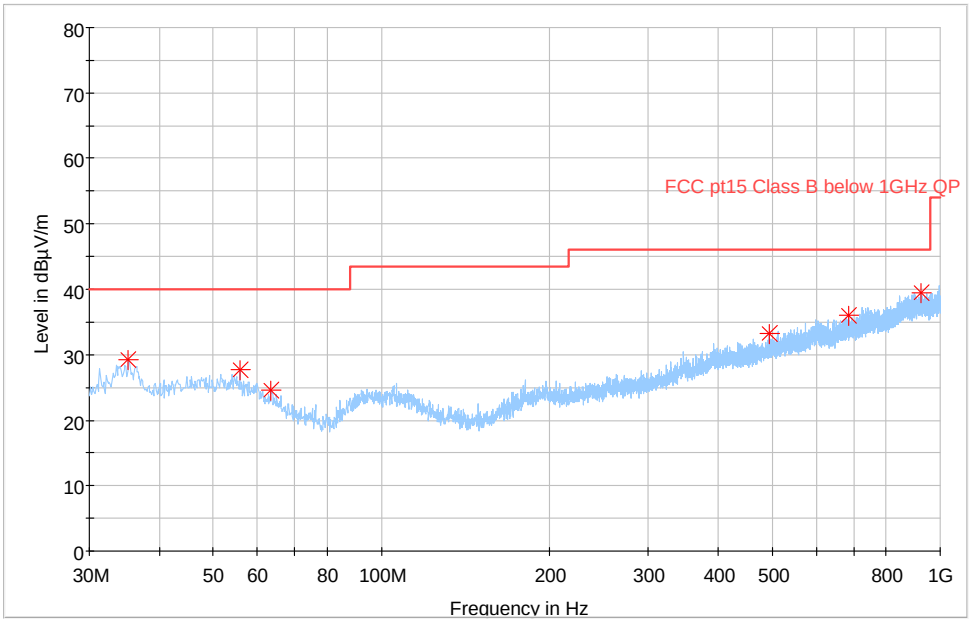
Radiated Emissions; Above 1 GHz



4.2.4 Profile; 30 MHz to 1 GHz, Middle Channel with Charging Cable, FCC 15.249 (110 V 60 Hz), Z Orientation

Maximum peak hold trace with quasi-peak values (◆)
Peak measurements (✳)

30 MHz to 1 GHz



4.2.5 Data; 30 MHz to 1 GHz, FCC 15.249 (110 V 60 Hz), Middle Channel with Charging Cable, Z Orientation

Emission Frequency	Measured Quasi-Peak Value	Class B Specified Quasi-Peak Limit	Pass Margin	Antenna Polarisation	Antenna Height	Turntable Azimuth	
MHz	dBµV/m	dBµV/m	dB	H/V	cm	deg	Status
-	-	-	-	-	-	-	Pass

V = Vertical / H = Horizontal

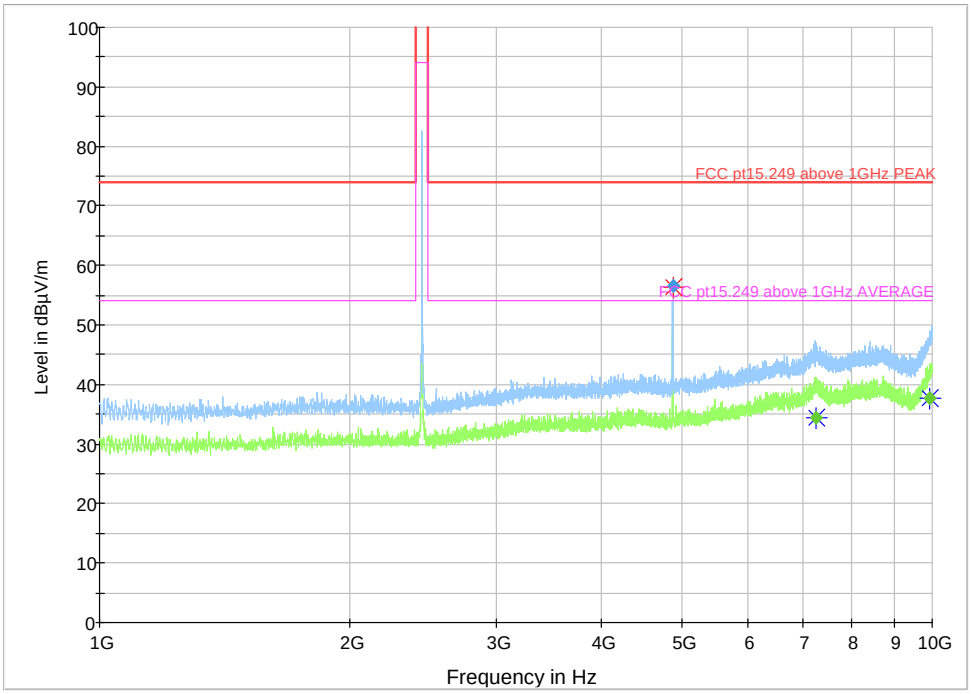
No measurements were taken based on the max peak data values high margins relative to the limit lines.

The measurements reported are the highest emissions relative to the FCC/CISPR Class B limits and take into account the correction factor*. Measurements made according to the CISPR test standard and Eurofins Hursley test procedure RAD-01.
*Correction factor (dB) = cable and antenna losses as summed positive values (dB) – pre-amp gain where applicable (dB).
The recorded measured value (dB) = measured receiver value (dB) + correction factor (dB).
Note: Path losses are factored into the limit value, and given by the test standard. Chamber calibration data contributes to the measurement uncertainty figure.

4.2.6 Profile; 1 to 10 GHz, FCC 15.249 (110 V 60 Hz), Middle Channel with Charging Cable, X Orientation

Maximum hold trace with peak values (◆)
Peak measurements (✳)
Average measurements (◆)

1 to 10 GHz



4.2.7 Data; 1 to 10 GHz, FCC 15.249 (110 V 60 Hz), Middle Channel with Charging Cable, X Orientation

Frequency	Peak	CISPR Average	Class B Limit	Margin	Height	Pol	Azimuth	Corr.	
MHz	dBµV/	dBµV/m	dBµV/m	dB	cm	H/V	Deg	dB/m	Status
4880.000000	56.50	---	74.00	17.50	198.0	H	194.0	-1.8	Pass
4880.000000	---	17.94*	54.00	36.04	198.0	H	194.0	-1.8	Pass
7246.000000	---	34.44	54.00	19.56	147.0	H	98.0	4.0	Pass
9937.000000	---	37.68	54.00	16.32	256.0	V	168.0	5.8	Pass

V = Vertical / H = Horizontal

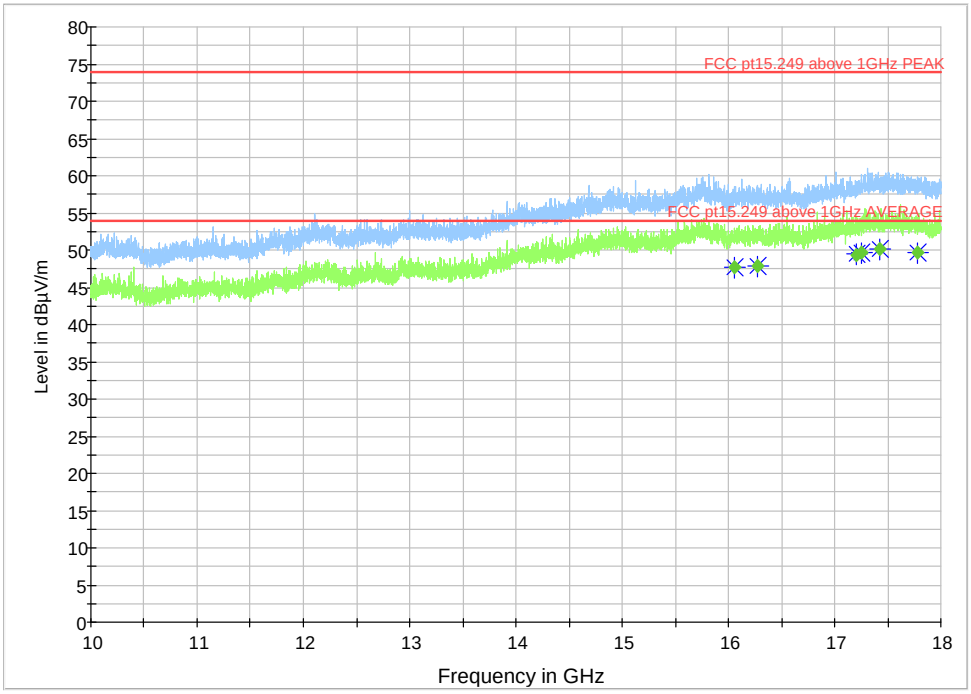
The measurements reported are the highest emissions relative to the FCC/CISPR Class B limits and take into account the correction factor*. Measurements made according to the CISPR test standard and Eurofins Hursley test procedure RAD-01.
*Correction factor (dB) = cable and antenna losses as summed positive values (dB) – pre-amp gain where applicable (dB).
The recorded measured value (dB) = measured receiver value (dB) + correction factor (dB).
Note: path losses are factored into the limit value, and given by the test standard. Chamber calibration data contributes to the measurement uncertainty figure.

*The average value of the emission at 4880.000 MHz has been determined by calculation in accordance with ANSI c63.10 clause 7.5.
The EUT was found to transmit on 40 channels, repeating on each channel every 370mS. In accordance with ANSI c63.10 clause 7.5, the transmitter on time can be considered in a 100mS time interval only.
So the number of transmissions in 100mS = 1 + (100/9.25) = 11.81 = 12 transmissions. Each burst duration was found to be 98.625uS.
The total transmitter on-time is 98.625uS x 12 = 1183.5uS = 1.1835mS
So Duty Cycle Correction factor is given by δ (dB) = 20log(Δ) (ANSI c63.10 clause 7.5 equation (10))
δ (dB) = 20log(Δ)
δ (dB) = 20log(1.18/100) = -38.56 dB

4.2.8 Profile; 10 to 18 GHz, FCC 15.249 (110 V 60 Hz), Middle Channel with Charging Cable, X Orientation

Maximum hold trace with peak values (◆)
Peak measurements (✳)
Average measurements (◆)

10 to 18 GHz



4.2.9 Data; 10 to 18 GHz, FCC 15.249 (110 V 60 Hz), Middle Channel with Charging Cable, X Orientation

Frequency	Peak	CISPR Average	Class B Limit	Margin	Height	Pol	Azimuth	Corr.	
MHz	dBµV/m	dBµV/m	dBµV/m	dB	cm	H/V	Deg	dB/m	Status
16062.66290	---	47.72	54.00	6.28	150.0	H	332.0	16.9	Pass
16281.37035	---	47.84	54.00	6.16	149.0	V	304.0	17.0	Pass
17208.92569	---	49.40	54.00	4.60	259.0	H	336.0	19.2	Pass
17251.98190	---	49.68	54.00	4.32	226.0	V	3.0	19.3	Pass
17420.23363	---	50.20	54.00	3.80	310.0	V	148.0	19.4	Pass
17781.01875	---	49.67	54.00	4.33	312.0	H	0.0	19.1	Pass

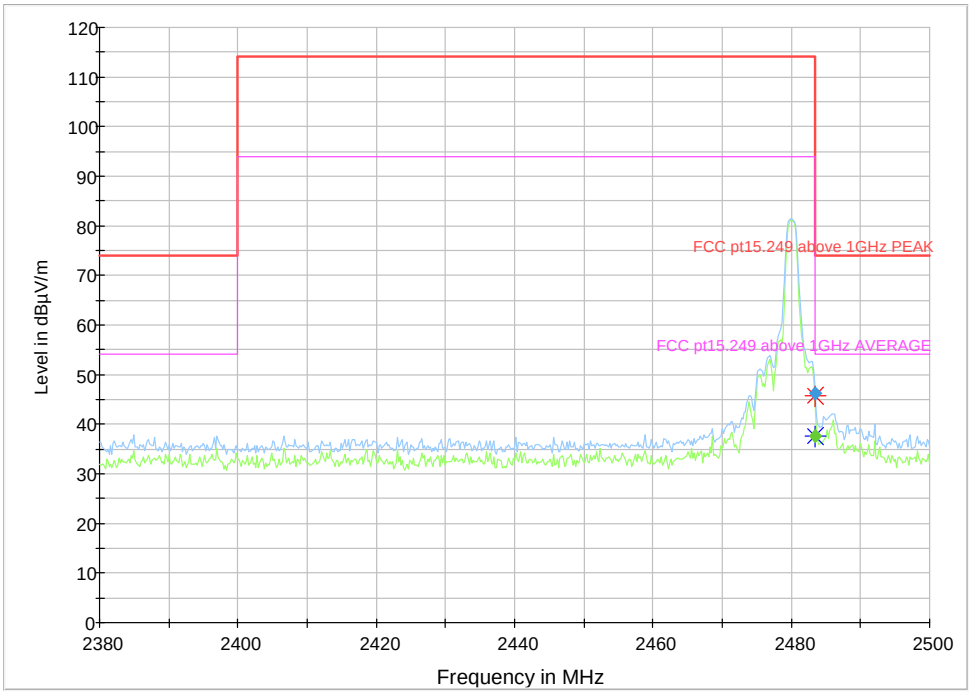
V = Vertical / H = Horizontal

The measurements reported are the highest emissions relative to the FCC/CISPR Class B limits and take into account the correction factor*. Measurements made according to the CISPR test standard and Eurofins Hursley test procedure RAD-01.
*Correction factor (dB) = cable and antenna losses as summed positive values (dB) – pre-amp gain where applicable (dB).
The recorded measured value (dB) = measured receiver value (dB) + correction factor (dB).
Note: path losses are factored into the limit value, and given by the test standard. Chamber calibration data contributes to the measurement uncertainty figure.

4.2.10 Profile; 2380 to 2500 MHz, FCC 15.249 (110 V 60 Hz), Top Channel with Charging Cable, Band Edge, X Orientation

Maximum hold trace with peak values (◆)
Peak measurements (✳)
Average measurements (◆)

1 to 10 GHz



4.2.11 Data; 2380 to 2500 MHz, FCC 15.249 (110 V 60 Hz), Top Channel with Charging Cable, Band Edge, X Orientation

Frequency	Peak	CISPR Average	Class B Limit	Margin	Height	Pol	Azimuth	Corr.	
MHz	dBµV/m	dBµV/m	dBµV/m	dB	cm	H/V	Deg	dB/m	Status
2483.500000	---	37.74	54.00	16.26	138.0	H	44.0	-7.3	Pass
2483.500000	46.20	---	74.00	27.80	155.0	H	41.0	-7.3	Pass

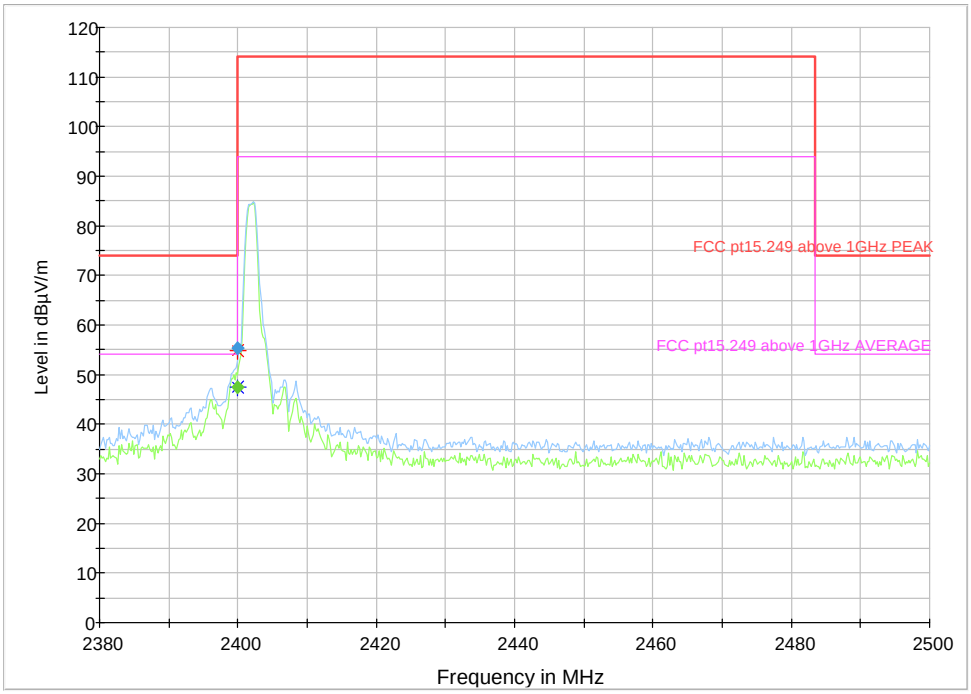
V = Vertical / H = Horizontal

The measurements reported are the highest emissions relative to the FCC/CISPR Class B limits and take into account the correction factor*. Measurements made according to the CISPR test standard and Eurofins Hursley test procedure RAD-01.
*Correction factor (dB) = cable and antenna losses as summed positive values (dB) – pre-amp gain where applicable (dB).
The recorded measured value (dB) = measured receiver value (dB) + correction factor (dB).
Note: path losses are factored into the limit value, and given by the test standard. Chamber calibration data contributes to the measurement uncertainty figure.

4.2.12 Profile; 2380 to 2500 MHz, FCC 15.249 (110 V 60 Hz), Bottom Channel with Charging Cable, Band Edge, X Orientation

Maximum hold trace with peak values (◆)
Peak measurements (✳)
Average measurements (◆)

1 to 10 GHz



4.2.13 Data; 2380 to 2500 MHz, FCC 15.249 (110 V 60 Hz), Bottom Channel with Charging Cable, Band Edge, X Orientation

Frequency	Peak	CISPR Average	Class B Limit	Margin	Height	Pol	Azimuth	Corr.	
MHz	dBµV/m	dBµV/m	dBµV/m	dB	cm	H/V	Deg	dB/m	Status
2400.000000	---	47.36	54.00	6.64	202.0	H	49.0	-7.3	Pass
2400.000000	55.39	---	74.00	18.61	199.0	H	50.0	-7.3	Pass

V = Vertical / H = Horizontal

The measurements reported are the highest emissions relative to the FCC/CISPR Class B limits and take into account the correction factor*. Measurements made according to the CISPR test standard and Eurofins Hursley test procedure RAD-01.
*Correction factor (dB) = cable and antenna losses as summed positive values (dB) – pre-amp gain where applicable (dB).
The recorded measured value (dB) = measured receiver value (dB) + correction factor (dB).
Note: path losses are factored into the limit value, and given by the test standard. Chamber calibration data contributes to the measurement uncertainty figure.

4.3 Radiated Emissions; FCC 15.249

4.3.1 Test Parameters

A profile scan was taken using an EMI receiver at a distance of three metres on eight azimuths of the EUT in both the vertical and horizontal polarisation of the field in a semi-anechoic chamber.

Using the pre-scan results as a guide, each emission from the EUT was maximised. Measurements were carried out at a distance of three metres using the specified detector in a CISPR 16-1-4 compliant semi-anechoic chamber. Antenna and turntable positions were then finally adjusted to produce the maximum emission levels. The worst-case results are reported below.

Test Equipment						
#ID	CP	Manufacturer	Type	Serial Number	Description	Calibration Due Date
750	1	Global	CISPR16	1	11 x 7 x 6.2m, chamber	22/12/2023
893	1	Rohde & Schwarz	ESW 44	103044	EMI test receiver	11/11/2023
762	3	Schwarzbeck	VULB9162	129	30-7000 MHz	04/03/2024
877	1	Huber & Suhner	SUCOTEST_18A	602608/18A	ST_18A/Nm/Nm/3m	21/11/2023
272	1	Sucoflex	106	72467-6	Cable SMA	02/06/2024
053	1	HP	8449B	3008A01394	Pre-amplifier (1.0-26.5 GHz)	24/10/2023
073	3	Schwarzbeck	BBHA9120B	237	Horn Antenna (1-10 GHz)	20/05/2024
340	1	Sucoflex with #053 Pre-amplifier	104	340	26.5 GHz	24/10/2023
952	3	Schwarzbeck	HWRD750	66	Horn Antenna 7 to 18 GHz	21/06/2026
779	3	NPL	QWH-SL-18-40-K-SG	17504	Horn Antenna 18 to 40 GHz	05/08/2024
Test Equipment Software						
#ID	CP	Manufacturer	Type		Description	Calibration Due Date
856	0	Rohde & Schwarz	Software	856	EMC32 v11.30.0	Not required

Frequency	**Below 1 GHz**	**Above 1 GHz**	**Above 1 GHz**	**Above 1 GHz**
Temperature	22.9° Celsius	24.9° Celsius	25.4° Celsius	24.5° Celsius
Relative Humidity	51 %	41 %	41 %	47 %
Atmospheric Pressure	1016.5 millibars	1029.8 millibars	1018.6 millibars	1023.3 millibars
Test Date:	5th May 2023	18th May 2023	8th June 2023	26th June 2023
Test Engineer:	Malcolm Musgrave	Graeme Lawler	Graeme Lawler	Graeme Lawler

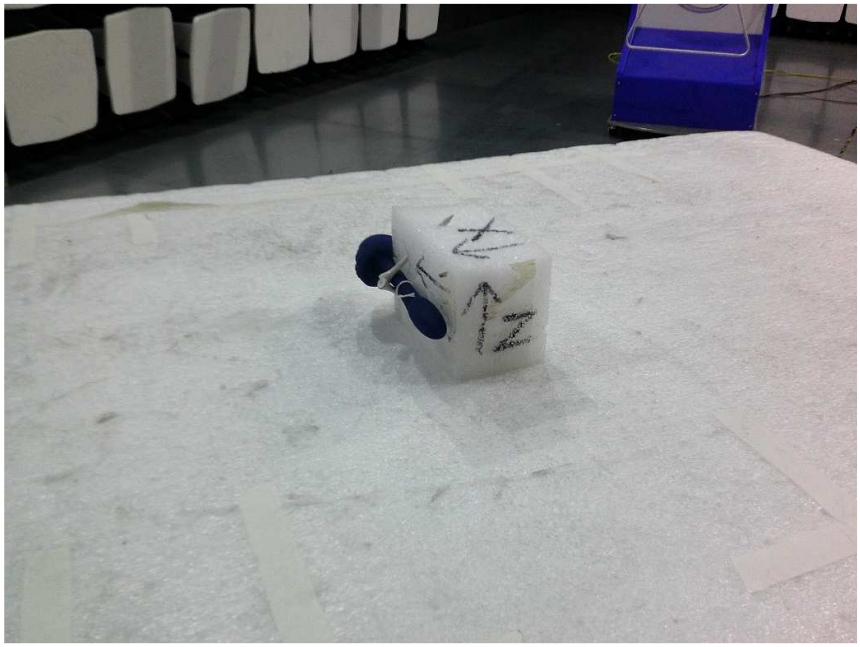
Note: “Calibration due date” means the instrument is certified within UKAS or traceable calibration certificate. “Internal” means the instrument is calibrated using Eurofins Hursley procedures. “Not required” means the asset does not require calibration. “CP” is the interval period [year] prescribed for external calibration.

4.3.2 Test Configuration

Please refer to EUT Test Configuration #2.

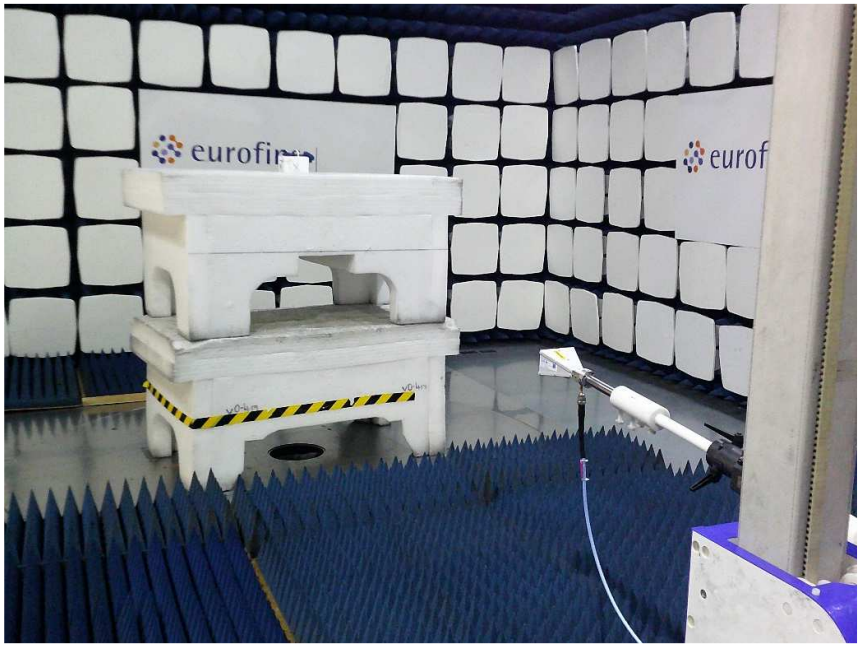
4.3.3 Set-up Photos

Radiated Emissions; Below 1 GHz



4.3.4 Set-up Photos (Continued)

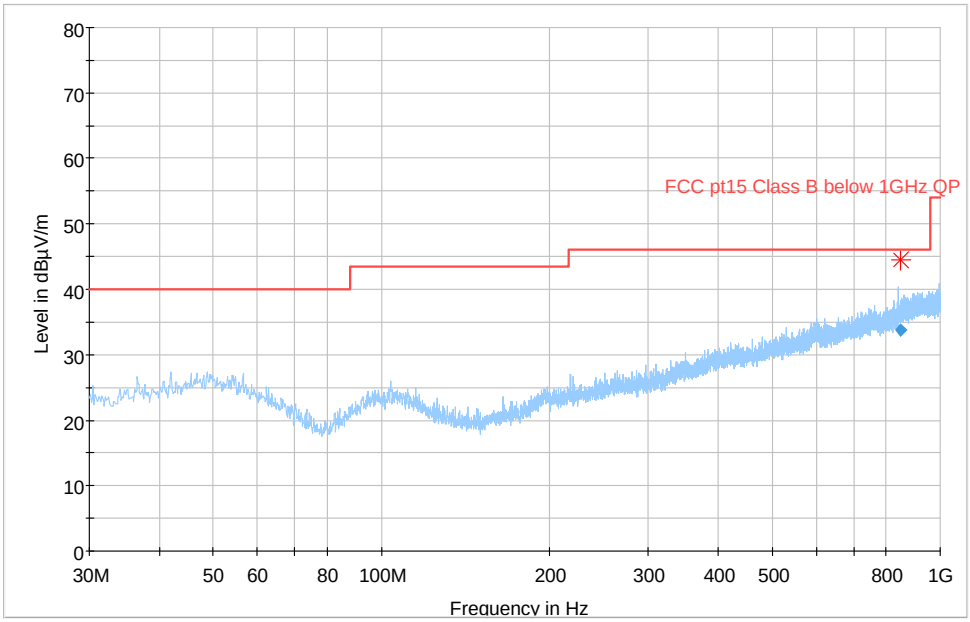
Radiated Emissions; Above 1 GHz



4.3.5 Profile; 30 MHz to 1 GHz, FCC 15.249, Top Channel, Z Orientation

Maximum peak hold trace with quasi-peak values (◆)
Peak measurements (✳)

30 MHz to 1 GHz



4.3.6 Data; 30 MHz to 1 GHz, FCC 15.249, Top Channel, Z Orientation

Emission Frequency	Measured Quasi-Peak Value	Class B Specified Quasi-Peak Limit	Pass Margin	Antenna Polarisation	Antenna Height	Turntable Azimuth	
MHz	dBµV/m	dBµV/m	dB	H/V	cm	deg	Status
849.077268	33.77	46.00	12.23	H	293.0	280.0	Pass

V = Vertical / H = Horizontal

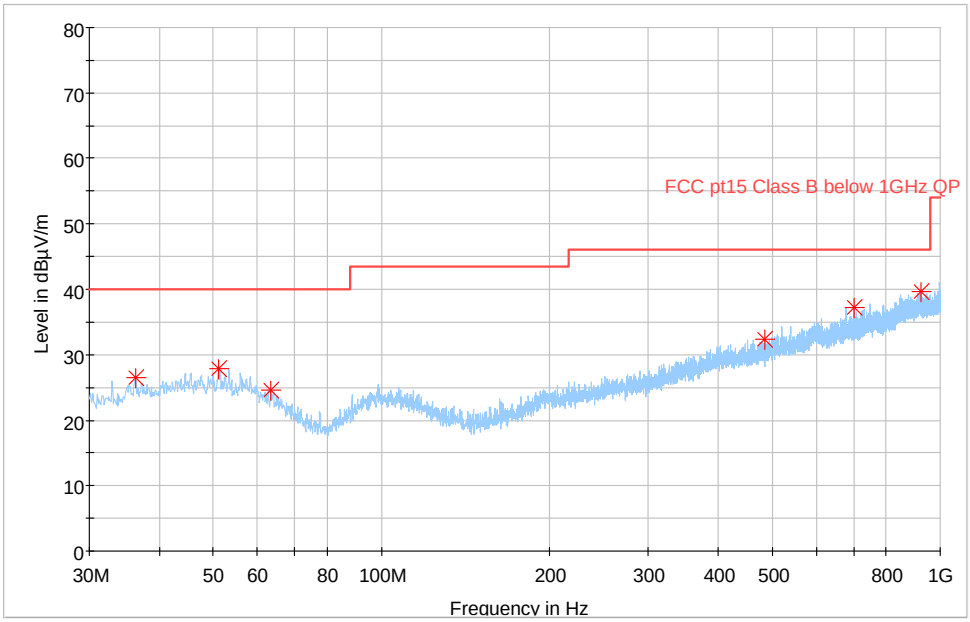
No measurements were taken based on the max peak data values high margins relative to the limit lines.

The measurements reported are the highest emissions relative to the FCC/CISPR Class B limits and take into account the correction factor*. Measurements made according to the CISPR test standard and Eurofins Hursley test procedure RAD-01.
*Correction factor (dB) = cable and antenna losses as summed positive values (dB) – pre-amp gain where applicable (dB).
The recorded measured value (dB) = measured receiver value (dB) + correction factor (dB).
Note: Path losses are factored into the limit value, and given by the test standard. Chamber calibration data contributes to the measurement uncertainty figure.

4.3.7 Profile; 30 MHz to 1 GHz, FCC 15.249, Middle Channel, X Orientation

Maximum peak hold trace with quasi-peak values (◆)
Peak measurements (✳)

30 MHz to 1 GHz



4.3.8 Data; 30 MHz to 1 GHz, FCC 15.249, Middle Channel, X Orientation

Emission Frequency	Measured Quasi-Peak Value	Class B Specified Quasi-Peak Limit	Pass Margin	Antenna Polarisation	Antenna Height	Turntable Azimuth	
MHz	dBµV/m	dBµV/m	dB	H/V	cm	deg	Status
-	-	-	-	-	-	-	Pass

V = Vertical / H = Horizontal

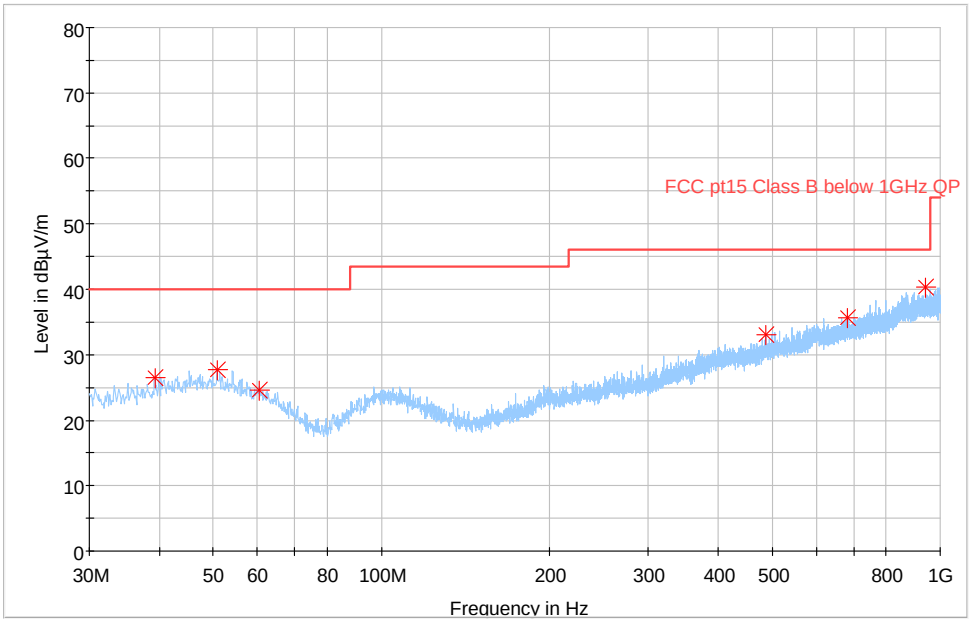
No measurements were taken based on the max peak data values high margins relative to the limit lines.

The measurements reported are the highest emissions relative to the FCC/CISPR Class B limits and take into account the correction factor*. Measurements made according to the CISPR test standard and Eurofins Hursley test procedure RAD-01.
*Correction factor (dB) = cable and antenna losses as summed positive values (dB) – pre-amp gain where applicable (dB).
The recorded measured value (dB) = measured receiver value (dB) + correction factor (dB).
Note: Path losses are factored into the limit value, and given by the test standard. Chamber calibration data contributes to the measurement uncertainty figure.

4.3.9 Profile; 30 MHz to 1 GHz, FCC 15.249, Middle Channel, Y Orientation

Maximum peak hold trace with quasi-peak values (◆)
Peak measurements (✳)

30 MHz to 1 GHz



4.3.10 Data; 30 MHz to 1 GHz, FCC 15.249, Middle Channel, Y Orientation

Emission Frequency	Measured Quasi-Peak Value	Class B Specified Quasi-Peak Limit	Pass Margin	Antenna Polarisation	Antenna Height	Turntable Azimuth	
MHz	dBµV/m	dBµV/m	dB	H/V	cm	deg	Status
-	-	-	-	-	-	-	Pass

V = Vertical / H = Horizontal

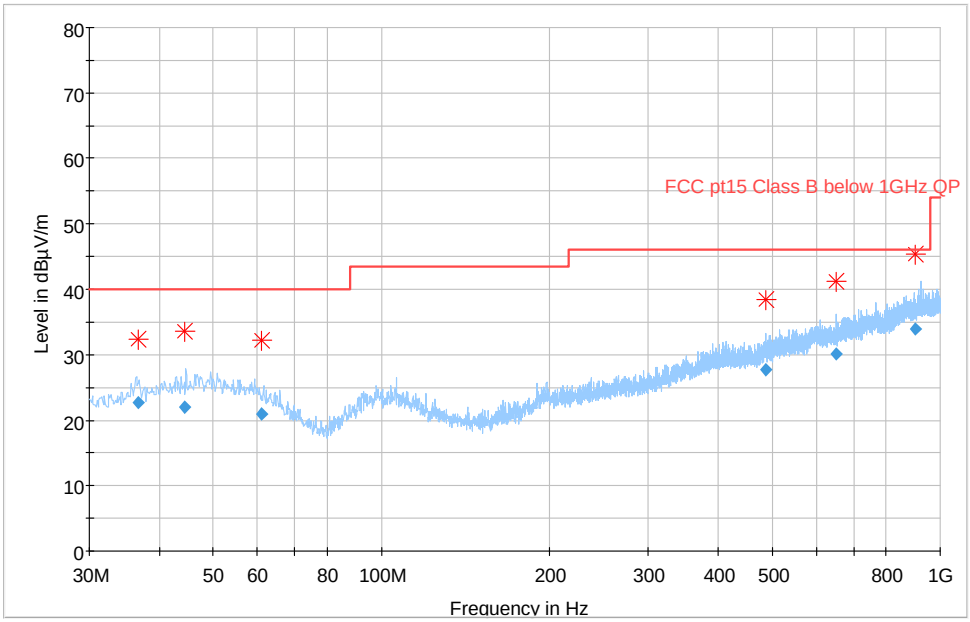
No measurements were taken based on the max peak data values high margins relative to the limit lines.

The measurements reported are the highest emissions relative to the FCC/CISPR Class B limits and take into account the correction factor*. Measurements made according to the CISPR test standard and Eurofins Hursley test procedure RAD-01.
*Correction factor (dB) = cable and antenna losses as summed positive values (dB) – pre-amp gain where applicable (dB).
The recorded measured value (dB) = measured receiver value (dB) + correction factor (dB).
Note: Path losses are factored into the limit value, and given by the test standard. Chamber calibration data contributes to the measurement uncertainty figure.

4.3.11 Profile; 30 MHz to 1 GHz, FCC 15.249, Middle Channel, Z Orientation

Maximum peak hold trace with quasi-peak values (◆)
Peak measurements (✳)

30 MHz to 1 GHz



4.3.12 Data; 30 MHz to 1 GHz, FCC 15.249, Middle Channel, Z Orientation

Emission Frequency	Measured Quasi-Peak Value	Class B Specified Quasi-Peak Limit	Pass Margin	Antenna Polarisation	Antenna Height	Turntable Azimuth	
MHz	dBµV/m	dBµV/m	dB	H/V	cm	deg	Status
36.663435	22.67	40.00	17.33	V	100.0	155.0	Pass
44.410989	22.06	40.00	17.94	H	201.0	324.0	Pass
61.113201	20.94	40.00	19.06	V	212.0	284.0	Pass
486.834314	27.72	46.00	18.28	H	152.0	153.0	Pass
651.532150	30.17	46.00	15.83	H	294.0	237.0	Pass
901.661755	33.85	46.00	12.15	H	299.0	181.0	Pass

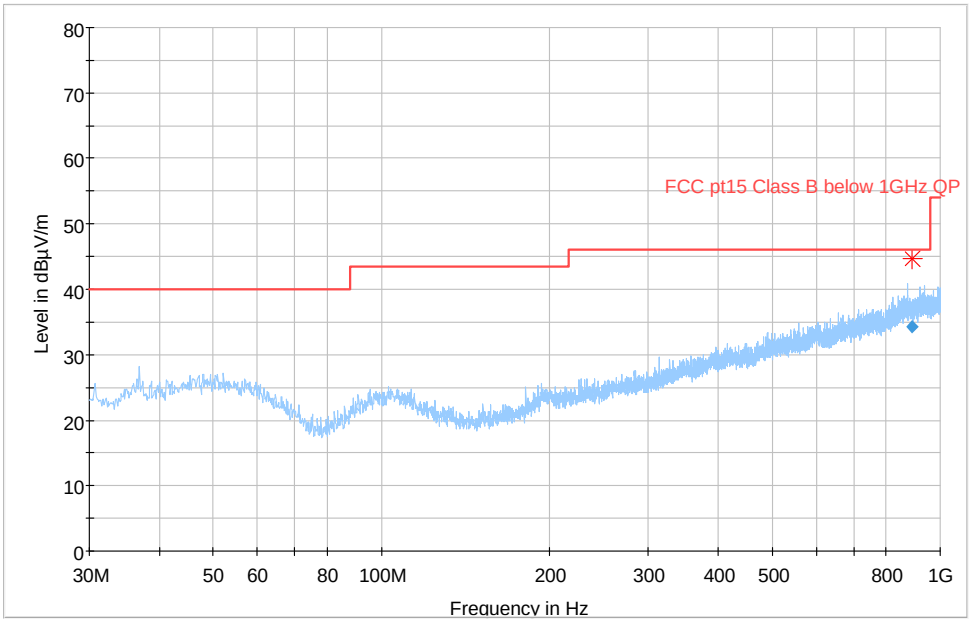
V = Vertical / H = Horizontal

The measurements reported are the highest emissions relative to the FCC/CISPR Class B limits and take into account the correction factor*. Measurements made according to the CISPR test standard and Eurofins Hursley test procedure RAD-01.
*Correction factor (dB) = cable and antenna losses as summed positive values (dB) – pre-amp gain where applicable (dB).
The recorded measured value (dB) = measured receiver value (dB) + correction factor (dB).
Note: Path losses are factored into the limit value, and given by the test standard. Chamber calibration data contributes to the measurement uncertainty figure.

4.3.13 Profile; 30 MHz to 1 GHz, FCC 15.249, Bottom Channel, Z Orientation

Maximum peak hold trace with quasi-peak values (◆)
Peak measurements (✳)

30 MHz to 1 GHz



4.3.14 Data; 30 MHz to 1 GHz, FCC 15.249, Bottom Channel, Z Orientation

Emission Frequency	Measured Quasi-Peak Value	Class B Specified Quasi-Peak Limit	Pass Margin	Antenna Polarisation	Antenna Height	Turntable Azimuth	
MHz	dBµV/m	dBµV/m	dB	H/V	cm	deg	Status
889.010100	34.22	46.00	11.78	V	181.0	84.0	Pass

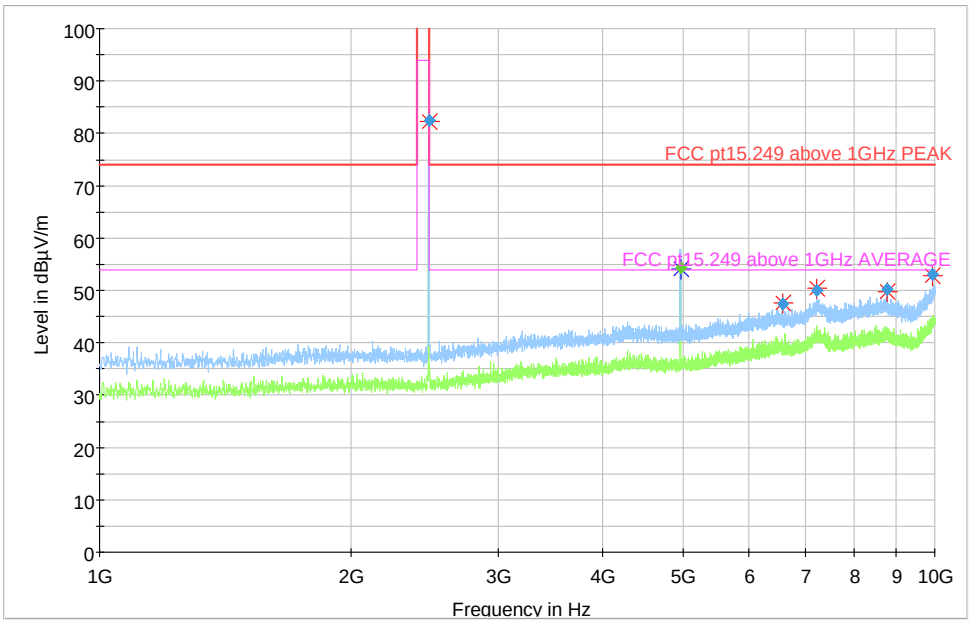
V = Vertical / H = Horizontal

The measurements reported are the highest emissions relative to the FCC/CISPR Class B limits and take into account the correction factor*. Measurements made according to the CISPR test standard and Eurofins Hursley test procedure RAD-01.
*Correction factor (dB) = cable and antenna losses as summed positive values (dB) – pre-amp gain where applicable (dB).
The recorded measured value (dB) = measured receiver value (dB) + correction factor (dB).
Note: Path losses are factored into the limit value, and given by the test standard. Chamber calibration data contributes to the measurement uncertainty figure.

4.3.15 Profile; 1 to 10 GHz, FCC 15.249, Top Channel, X Orientation

Maximum hold trace with peak values (◆)
Peak measurements (✳)
Average measurements (◆)

1 to 10 GHz



4.3.16 Data; 1 to 10 GHz, FCC 15.249, Top Channel, X Orientation

Frequency	Peak	CISPR Average	Limit	Margin	Height	Pol	Azimuth	Corr.	
MHz	dBµV/m	dBµV/m	dBµV/m	dB	cm	H/V	Deg	dB/m	Status
2479.375000	82.36	---	94.00	11.64	235.0	H	157.0	-6.2	Pass
4960.000000	55.27	---	54.00	-0.37	200.0	V	347.0	0.1	Pass
4960.000000	---	15.81*	54.00	38.19	200.0	V	347.0	0.1	Pass
6569.875000	47.50	---	74.00	26.50	112.0	V	58.0	3.4	Pass
7215.625000	49.90	---	74.00	24.10	168.0	V	81.0	5.5	Pass
8761.375000	50.22	---	74.00	23.78	326.0	V	350.0	5.0	Pass
9951.625000	52.94	---	74.00	21.06	336.0	V	146.0	7.6	Pass

V = Vertical / H = Horizontal

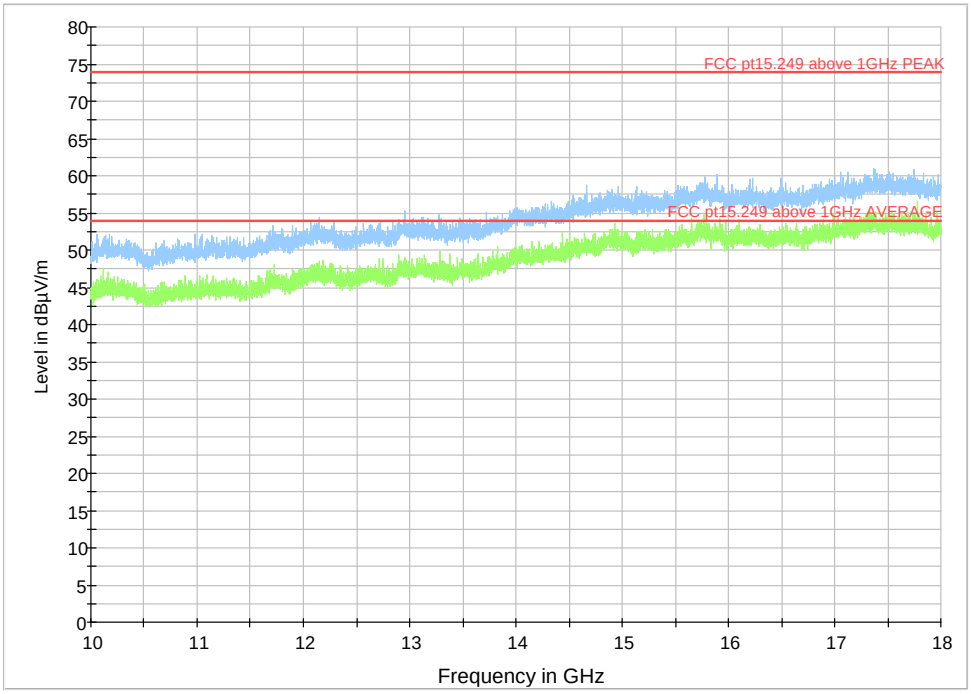
The measurements reported are the highest emissions relative to the FCC/CISPR Class B limits and take into account the correction factor*. Measurements made according to the CISPR test standard and Eurofins Hursley test procedure RAD-01.
*Correction factor (dB) = cable and antenna losses as summed positive values (dB) – pre-amp gain where applicable (dB).
The recorded measured value (dB) = measured receiver value (dB) + correction factor (dB).
Note: path losses are factored into the limit value, and given by the test standard. Chamber calibration data contributes to the measurement uncertainty figure.

*The average value of the emission at 4960.000 MHz has been determined by calculation in accordance with ANSI c63.10 clause 7.5.
The EUT was found to transmit on 40 channels, repeating on each channel every 370mS.
In accordance with ANSI c63.10 clause 7.5, the transmitter on time can be considered in a 100mS time interval only.
So the number of transmissions in 100mS = 1 + (100/9.25) = 11.81 = 12 transmissions.
Each burst duration was found to be 98.625uS. The total transmitter on-time is 98.625uS x 12 = 1183.5uS = 1.1835mS
So Duty Cycle Correction factor is given by δ (dB) = 20log(Δ) (ANSI c63.10 clause 7.5 equation (10))
δ (dB) = 20log(Δ)
δ (dB) = 20log(1.18/100) = -38.56 dB

4.3.17 Profile; 10 to 18 GHz, FCC 15.249, Top Channel, X Orientation

Maximum hold trace with peak values (◆)
Peak measurements (✳)
Average measurements (◆)

10 to 18 GHz



4.3.18 Data; 10 to 18 GHz, FCC 15.249, Top Channel, X Orientation

Frequency	Peak	CISPR Average	Limit	Margin	Height	Pol	Azimuth	Corr.	
MHz	dBµV/m	dBµV/m	dBµV/m	dB	cm	H/V	Deg	dB/m	Status
-	-	-	-	-	-	-	-	-	Pass

V = Vertical / H = Horizontal

No measurements were taken based on the max peak data values high margins relative to the limit lines.

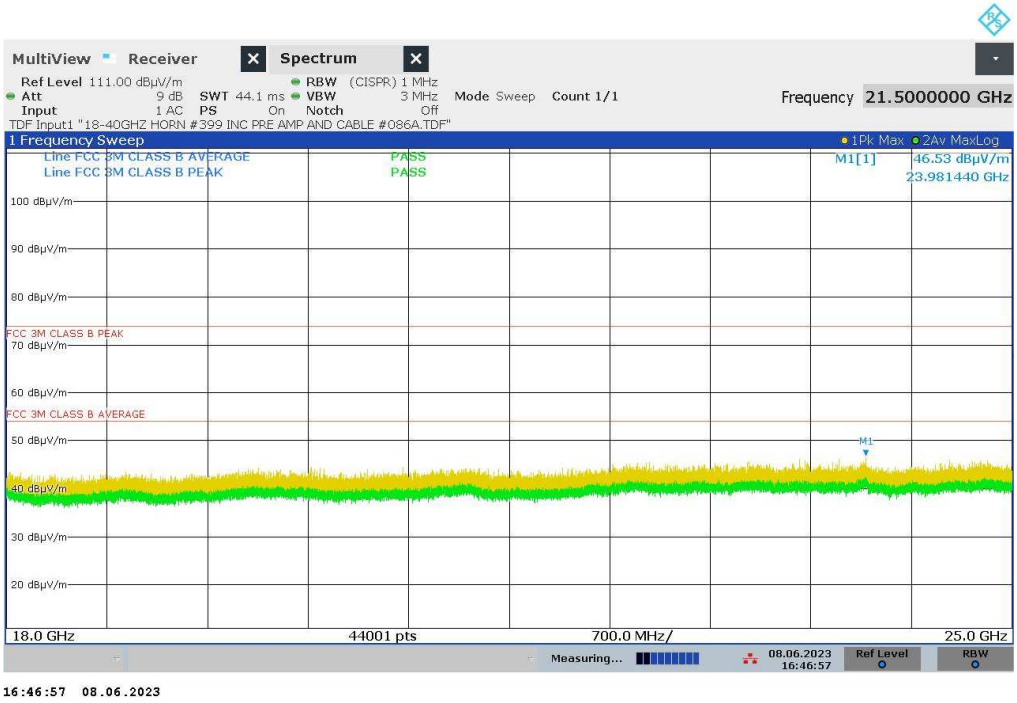
The measurements reported are the highest emissions relative to the FCC/CISPR Class B limits and take into account the correction factor*. Measurements made according to the CISPR test standard and Eurofins Hursley test procedure RAD-01.
*Correction factor (dB) = cable and antenna losses as summed positive values (dB) – pre-amp gain where applicable (dB).
The recorded measured value (dB) = measured receiver value (dB) + correction factor (dB).
Note: path losses are factored into the limit value, and given by the test standard. Chamber calibration data contributes to the measurement uncertainty figure.

4.3.19 Profile; 18 to 25 GHz, FCC 15.249, Top Channel, X Orientation

Maximum hold trace with peak values (▽)

Maximum hold trace with average values (▼)

18 to 25 GHz



4.3.20 Data; 18 to 25 GHz, FCC 15.249, Top Channel, X Orientation

Frequency	Peak	CISPR Average	Limit	Margin	Height	Pol	Azimuth	Corr.	
MHz	dBµV/m	dBµV/m	dBµV/m	dB	cm	H/V	Deg	dB/m	Status
-	-	-	-	-	-	-	-	-	Pass

V = Vertical / H = Horizontal

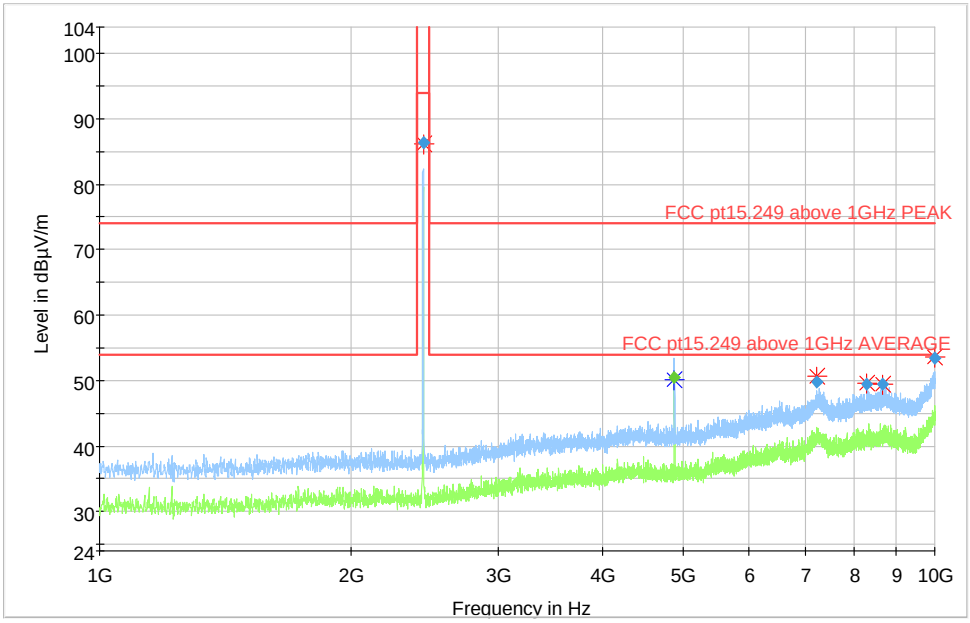
No measurements were taken based on the max peak data values high margins relative to the limit lines.

The measurements reported are the highest emissions relative to the FCC/CISPR Class B limits and take into account the correction factor*. Measurements made according to the CISPR test standard and Eurofins Hursley test procedure RAD-01.
*Correction factor (dB) = cable and antenna losses as summed positive values (dB) – pre-amp gain where applicable (dB).
The recorded measured value (dB) = measured receiver value (dB) + correction factor (dB).
Note: path losses are factored into the limit value, and given by the test standard. Chamber calibration data contributes to the measurement uncertainty figure.

4.3.21 Profile; 1 to 10 GHz, FCC 15.249, Middle Channel, X Orientation

Maximum hold trace with peak values (◆)
Peak measurements (✳)
Average measurements (◆)

1 to 10 GHz



4.3.22 Data; 1 to 10 GHz, FCC 15.249, Middle Channel, X Orientation

Frequency	Peak	CISPR Average	Limit	Margin	Height	Pol	Azimuth	Corr.	
MHz	dBµV/m	dBµV/m	dBµV/m	dB	cm	H/V	Deg	dB/m	Status
2440.244000	86.37	---	94.00	7.63	311.0	H	155.0	-6.2	Pass
4880.430008	---	50.56	54.00	3.44	187.0	V	349.0	-0.1	Pass
7224.951669	49.76	---	74.00	24.24	118.0	H	213.0	5.6	Pass
8278.756917	49.51	---	74.00	24.49	155.0	V	145.0	4.5	Pass
8655.079600	49.37	---	74.00	24.63	271.0	V	90.0	4.9	Pass
9995.095231	53.39	---	74.00	20.61	367.0	H	96.0	8.0	Pass

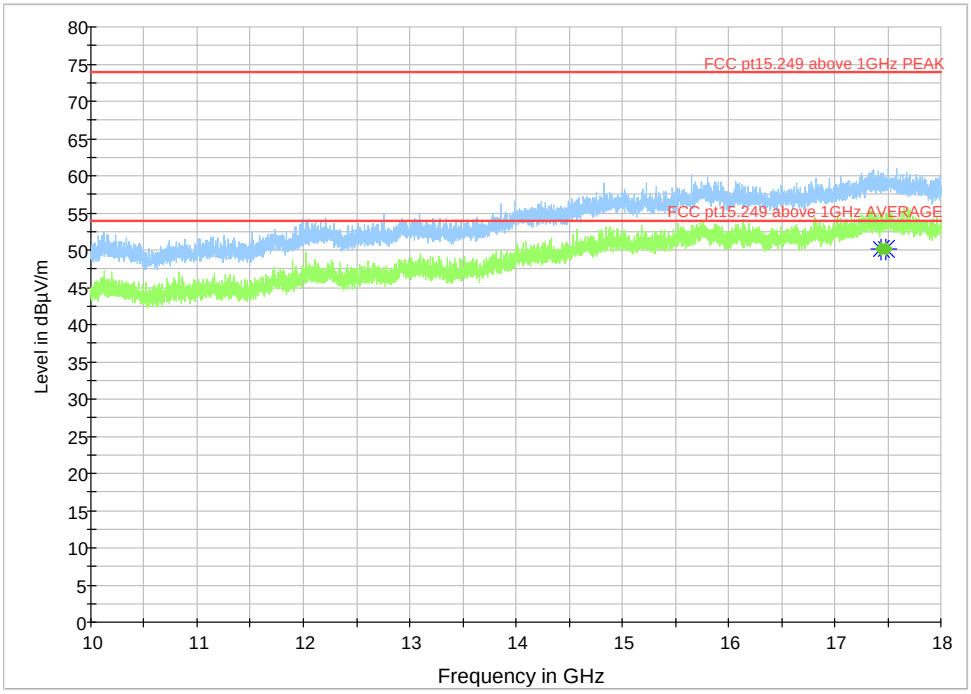
V = Vertical / H = Horizontal

The measurements reported are the highest emissions relative to the FCC/CISPR Class B limits and take into account the correction factor*. Measurements made according to the CISPR test standard and Eurofins Hursley test procedure RAD-01.
*Correction factor (dB) = cable and antenna losses as summed positive values (dB) – pre-amp gain where applicable (dB).
The recorded measured value (dB) = measured receiver value (dB) + correction factor (dB).
Note: path losses are factored into the limit value, and given by the test standard. Chamber calibration data contributes to the measurement uncertainty figure.

4.3.23 Profile; 10 to 18 GHz, FCC 15.249, Middle Channel, X Orientation

Maximum hold trace with peak values (◆)
Peak measurements (✳)
Average measurements (◆)

10 to 18 GHz



4.3.24 Data; 10 to 18 GHz, FCC 15.249 (110 V 60 Hz), Middle Channel, X Orientation

Frequency	Peak	CISPR Average	Limit	Margin	Height	Pol	Azimuth	Corr.	
MHz	dBµV/m	dBµV/m	dBµV/m	dB	cm	H/V	Deg	dB/m	Status
17439.56575	---	50.16	54.00	3.84	375.0	V	166.0	19.4	Pass
17487.81621	---	50.15	54.00	3.85	395.0	V	259.0	19.4	Pass

V = Vertical / H = Horizontal

The measurements reported are the highest emissions relative to the FCC/CISPR Class B limits and take into account the correction factor*. Measurements made according to the CISPR test standard and Eurofins Hursley test procedure RAD-01.
*Correction factor (dB) = cable and antenna losses as summed positive values (dB) – pre-amp gain where applicable (dB).
The recorded measured value (dB) = measured receiver value (dB) + correction factor (dB).
Note: path losses are factored into the limit value, and given by the test standard. Chamber calibration data contributes to the measurement uncertainty figure.

4.3.25 Profile; 18 to 25 GHz, FCC 15.249, Middle Channel, X Orientation

Maximum hold trace with peak values (▽)

Maximum hold trace with average values (▼)

18 to 25 GHz

4.3.26 Data; 18 to 25 GHz, FCC 15.249, Middle Channel, X Orientation

Frequency	Peak	CISPR Average	Limit	Margin	Height	Pol	Azimuth	Corr.	
MHz	dBµV/m	dBµV/m	dBµV/m	dB	cm	H/V	Deg	dB/m	Status
-	-	-	-	-	-	-	-	-	Pass

V = Vertical / H = Horizontal

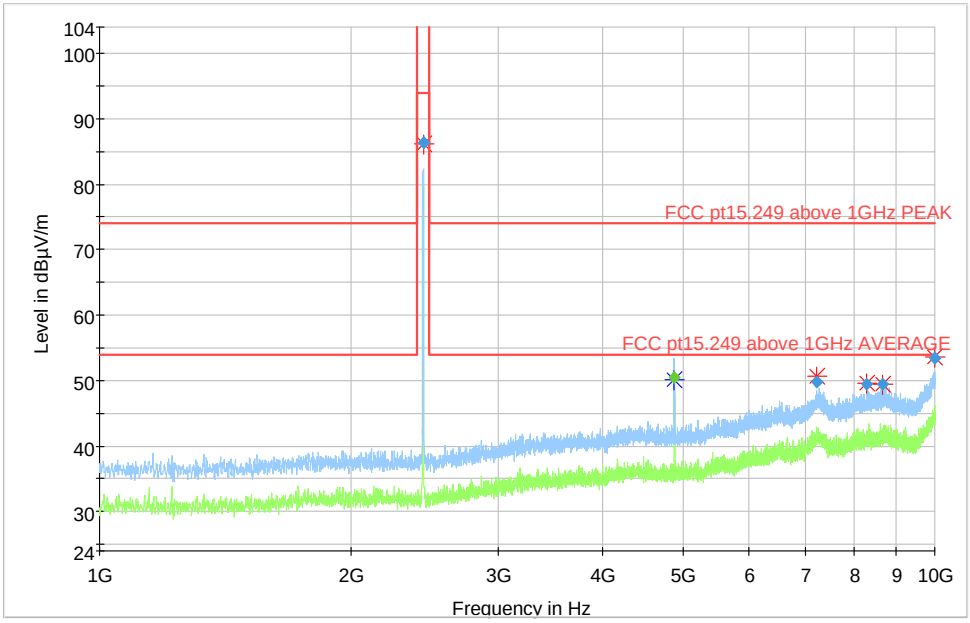
No measurements were taken based on the max peak data values high margins relative to the limit lines.

The measurements reported are the highest emissions relative to the FCC/CISPR Class B limits and take into account the correction factor*. Measurements made according to the CISPR test standard and Eurofins Hursley test procedure RAD-01.
*Correction factor (dB) = cable and antenna losses as summed positive values (dB) – pre-amp gain where applicable (dB).
The recorded measured value (dB) = measured receiver value (dB) + correction factor (dB).
Note: path losses are factored into the limit value, and given by the test standard. Chamber calibration data contributes to the measurement uncertainty figure.

4.3.27 Profile; 1 to 10 GHz, FCC 15.249, Bottom Channel, X Orientation

Maximum hold trace with peak values (◆)
Peak measurements (✳)
Average measurements (◆)

1 to 10 GHz



4.3.28 Data; 1 to 10 GHz, FCC 15.249, Bottom Channel, X Orientation

Frequency	Peak	CISPR Average	Limit	Margin	Height	Pol	Azimuth	Corr.	
MHz	dBµV/m	dBµV/m	dBµV/m	dB	cm	H/V	Deg	dB/m	Status
2440.244000	86.37	---	94.00	7.63	311.0	H	155.0	-6.2	Pass
4880.430008	---	50.56	54.00	3.44	187.0	V	349.0	-0.1	Pass
7224.951669	49.76	---	74.00	24.24	118.0	H	213.0	5.6	Pass
8278.756917	49.51	---	74.00	24.49	155.0	V	145.0	4.5	Pass
8655.079600	49.37	---	74.00	24.63	271.0	V	90.0	4.9	Pass
9995.095231	53.39	---	74.00	20.61	367.0	H	96.0	8.0	Pass

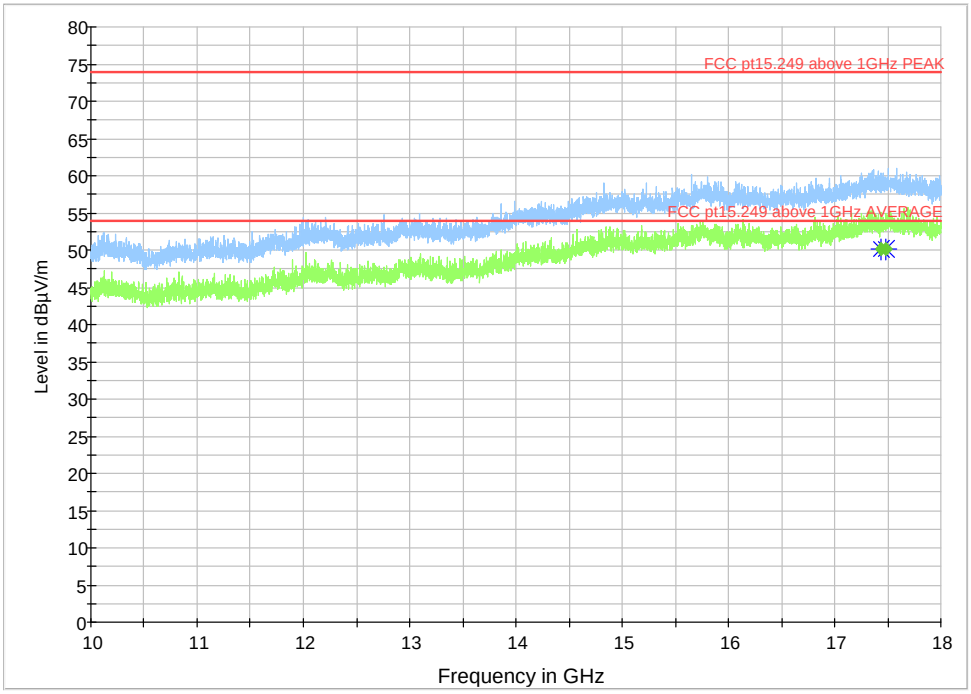
V = Vertical / H = Horizontal

The measurements reported are the highest emissions relative to the FCC/CISPR Class B limits and take into account the correction factor*. Measurements made according to the CISPR test standard and Eurofins Hursley test procedure RAD-01.
*Correction factor (dB) = cable and antenna losses as summed positive values (dB) – pre-amp gain where applicable (dB).
The recorded measured value (dB) = measured receiver value (dB) + correction factor (dB).
Note: path losses are factored into the limit value, and given by the test standard. Chamber calibration data contributes to the measurement uncertainty figure.

4.3.29 Profile; 10 to 18 GHz, FCC 15.249, Bottom Channel, X Orientation

Maximum hold trace with peak values (◆)
Peak measurements (✳)
Average measurements (◆)

10 to 18 GHz



4.3.30 Data; 10 to 18 GHz, FCC 15.249, Bottom Channel, X Orientation

Frequency	Peak	CISPR Average	Limit	Margin	Height	Pol	Azimuth	Corr.	
MHz	dBµV/m	dBµV/m	dBµV/m	dB	cm	H/V	Deg	dB/m	Status
17439.56575	---	50.16	54.00	3.84	375.0	V	166.0	19.4	Pass
17487.81621	---	50.15	54.00	3.85	395.0	V	259.0	19.4	Pass

V = Vertical / H = Horizontal

The measurements reported are the highest emissions relative to the FCC/CISPR Class B limits and take into account the correction factor*. Measurements made according to the CISPR test standard and Eurofins Hursley test procedure RAD-01.
*Correction factor (dB) = cable and antenna losses as summed positive values (dB) – pre-amp gain where applicable (dB).
The recorded measured value (dB) = measured receiver value (dB) + correction factor (dB).
Note: path losses are factored into the limit value, and given by the test standard. Chamber calibration data contributes to the measurement uncertainty figure.

4.3.31 Profile; 18 to 25 GHz, FCC 15.249, Bottom Channel, X Orientation

Maximum hold trace with peak values (▽)

Maximum hold trace with average values (▼)

18 to 25 GHz

4.3.32 Data; 18 to 25 GHz, FCC 15.249, Bottom Channel, X Orientation

Frequency	Peak	CISPR Average	Limit	Margin	Height	Pol	Azimuth	Corr.	
MHz	dBµV/m	dBµV/m	dBµV/m	dB	cm	H/V	Deg	dB/m	Status
-	-	-	-	-	-	-	-	-	Pass

V = Vertical / H = Horizontal

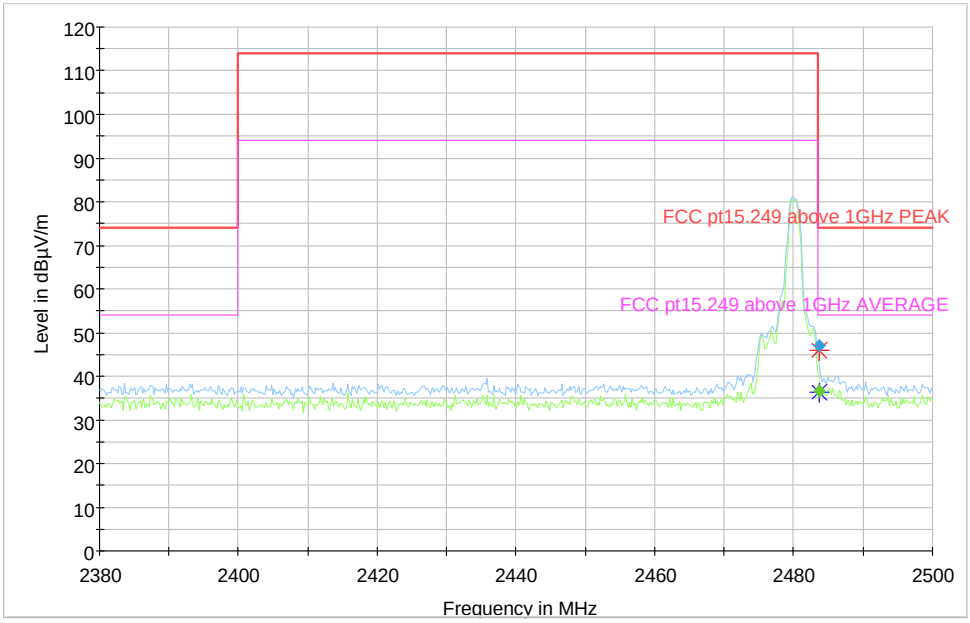
No measurements were taken based on the max peak data values high margins relative to the limit lines.

The measurements reported are the highest emissions relative to the FCC/CISPR Class B limits and take into account the correction factor*. Measurements made according to the CISPR test standard and Eurofins Hursley test procedure RAD-01.
*Correction factor (dB) = cable and antenna losses as summed positive values (dB) – pre-amp gain where applicable (dB).
The recorded measured value (dB) = measured receiver value (dB) + correction factor (dB).
Note: path losses are factored into the limit value, and given by the test standard. Chamber calibration data contributes to the measurement uncertainty figure.

4.3.33 Profile; FCC 15.249, Top Channel, X Orientation, Top Band Edge

Maximum hold trace with peak values (◆)
Peak measurements (✳)
Average measurements (◆)

Top Channel Band Edge



4.3.34 Data; FCC 15.249, Top Channel, X Orientation, Top Band Edge

Frequency	Peak	CISPR Average	Limit	Margin	Height	Pol	Azimuth	Corr.	
MHz	dBµV/m	dBµV/m	dBµV/m	dB	cm	H/V	Deg	dB/m	Status
2483.500000	---	38.20	54.00	17.50	167.0	H	160.0	-6.2	Pass
2483.500000	47.10	---	74.00	27.00	311.0	H	163.0	-6.2	Pass

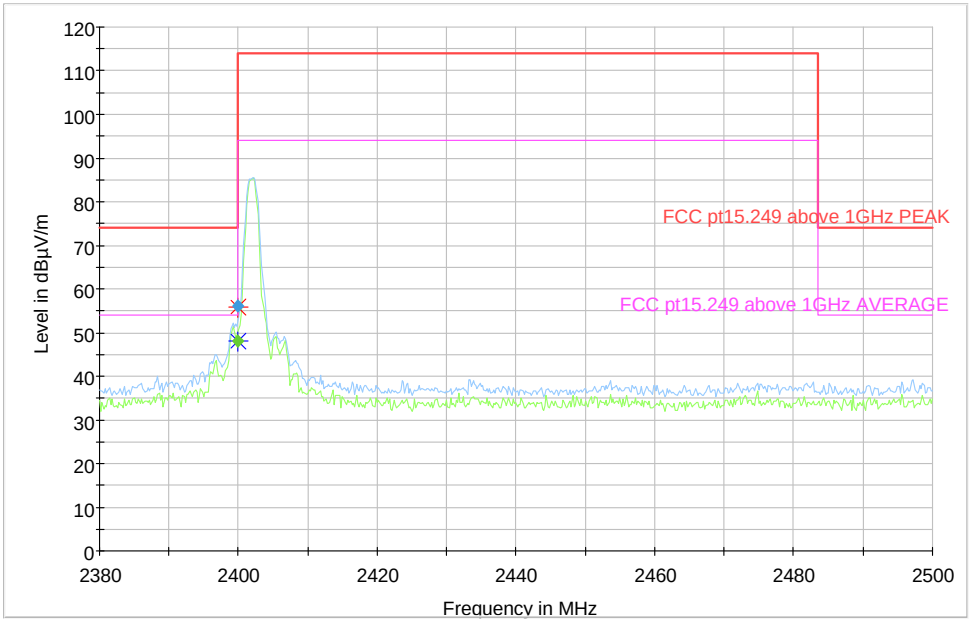
V = Vertical / H = Horizontal

The measurements reported are the highest emissions relative to the FCC/CISPR Class B limits and take into account the correction factor*. Measurements made according to the CISPR test standard and Eurofins Hursley test procedure RAD-01.
*Correction factor (dB) = cable and antenna losses as summed positive values (dB) – pre-amp gain where applicable (dB).
The recorded measured value (dB) = measured receiver value (dB) + correction factor (dB).
Note: path losses are factored into the limit value, and given by the test standard. Chamber calibration data contributes to the measurement uncertainty figure.

4.3.35 Profile; FCC 15.249, Bottom Channel, X Orientation, Bottom Band Edge

Maximum hold trace with peak values (◆)
Peak measurements (✳)
Average measurements (◆)

Bottom Channel Band Edge



4.3.36 Data; 1 to 10 GHz, FCC 15.249, Bottom Channel, X Orientation, Bottom Band Edge

Frequency	Peak	CISPR Average	Limit	Margin	Height	Pol	Azimuth	Corr.	
MHz	dBµV/m	dBµV/m	dBµV/m	dB	cm	H/V	Deg	dB/m	Status
2400.000000	---	48.03	54.00	5.97	155.0	H	155.0	-6.2	Pass
2400.000000	56.08	---	74.00	17.92	327.0	H	151.0	-6.2	Pass

V = Vertical / H = Horizontal

The measurements reported are the highest emissions relative to the FCC/CISPR Class B limits and take into account the correction factor*. Measurements made according to the CISPR test standard and Eurofins Hursley test procedure RAD-01.
*Correction factor (dB) = cable and antenna losses as summed positive values (dB) – pre-amp gain where applicable (dB).
The recorded measured value (dB) = measured receiver value (dB) + correction factor (dB).
Note: path losses are factored into the limit value, and given by the test standard. Chamber calibration data contributes to the measurement uncertainty figure.

5.0 Occupied Bandwidth

99% occupied bandwidth was measured using the inbuilt function in the spectrum analyser. The results are presented in the table below.

Channel	99% Occupied Bandwidth	Result
Top	1.102 MHz	Pass
Middle	1.091 MHz	Pass
Bottom	1.064 MHZ	Pass

5.1.1 Test Parameters

This testing was performed with the EUT located within the semi-anechoic chamber. No maximisation of the wanted signal is required as only relative measurements are performed for bandwidth tests.

Test Equipment						
#ID	CP	Manufacturer	Type	Serial Number	Description	Calibration Due Date
750	1	Global	CISPR16	1	11 x 7 x 6.2m, chamber	22/12/2023
893	1	Rohde & Schwarz	ESW 44	103044	EMI test receiver	11/11/2023
877	1	Huber & Suhner	SUCOTEST_18A	602608/18A	ST_18A/Nm/Nm/3m	21/11/2023
272	1	Sucoflex	106	72467-6	Cable SMA	02/06/2024
073	3	Schwarzbeck	BBHA9120B	237	Horn Antenna (1-10 GHz)	20/05/2024
Test Equipment Software						
#ID	CP	Manufacturer	Type		Description	Calibration Due Date
No software used for this testing.						

Environmental Test Conditions	
Temperature	24.5° Celsius
Relative Humidity	47%
Atmospheric Pressure	1023.3 millibars
Test Date:	26 June 2023
Test Engineer:	Graeme Lawler

Note: “Calibration due date” means the instrument is certified within UKAS or traceable calibration certificate. “Internal” means the instrument is calibrated using Eurofins Hursley procedures. “Not required” means the asset does not require calibration. “CP” is the interval period [year] prescribed for external calibration.

5.1.2 Test Configuration

Please refer to EUT Test Configuration #2.

5.1.3 Set-up Photos

Occupied Bandwidth

5.1.4 Profiles; 99% Occupied Bandwidth

Top Channel (2480 MHz)

Middle Channel (2440 MHz)

Bottom Channel (2402 MHz)

6.0 Conducted Emissions; Charging Mode, FCC (110 V 60 Hz)

6.1.1 Test Parameters

A filtered supply was fed to the EUT via a 50Ω/50µH Artificial Mains Network (AMN). The AMN was bonded to a conductive ground plane. Line and neutral phases were measured separately.

An EMI receiver was set to scan between 0.15 MHz and 30.0 MHz with a 20s measurement time. A CISPR Average and Quasi-Peak trace was generated and compared to the limits and take into account the correction factor. Measurements made according to the test standard and Eurofins Hursley test procedure CON-02.

Test Equipment						
#ID	CP	Manufacturer	Type	Serial Number	Description	Calibration Due Date
652	1	TFA	Weather Station	Jupiter	Weather Station	02/11/2023
750	1	Global	CISPR16	1	11 x 7 x 6.2m, chamber	22/12/2023
674	1	Rohde & Schwarz	ESH3-Z5	838576-018	1 phase LISN ANSI & CISPR	16/09/2023
252	1	Rohde & Schwarz	ESH3-Z2	08970	10 dB pulse limiter	26/05/2024
480	1	-	Cable BNC	480	Cable BNC	10/02/2024
679	1	Gauss	TDEIM30M	1510003	30 MHz TD receiver	18/04/2024
Test Equipment Software						
#ID	CP	Manufacturer	Type		Description	Calibration Due Date
857	0	Gauss	Software	857	TDMI 30 v5.00	Not required

Environmental Test Conditions	
Temperature	24.2° Celsius
Relative Humidity	40 %
Atmospheric Pressure	1031 millibars
Test Date:	17th May 2023
Test Engineer:	Graeme Lawler

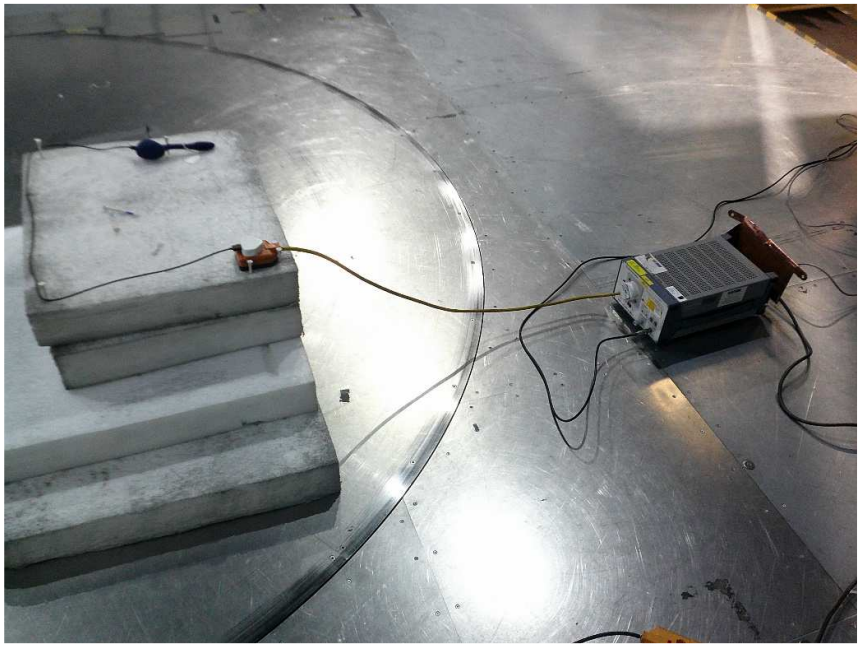
Note: “Calibration due date” means the instrument is certified within UKAS or traceable calibration certificate. “Internal” means the instrument is calibrated using Eurofins Hursley procedures. “Not required” means the asset does not require calibration. “CP” is the interval period [year] prescribed for external calibration.

6.1.2 Test Configuration

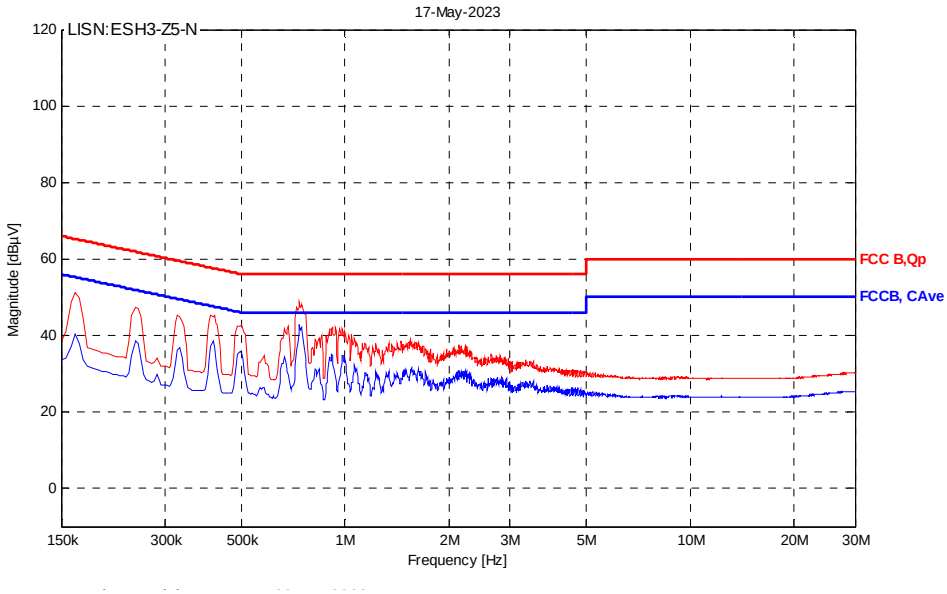
Please refer to EUT Test Configuration #1.

6.1.3 Set-up Photos

Conducted Emissions



6.1.4 Profile; Mains Neutral, Charging Mode, FCC (110 V 60 Hz)



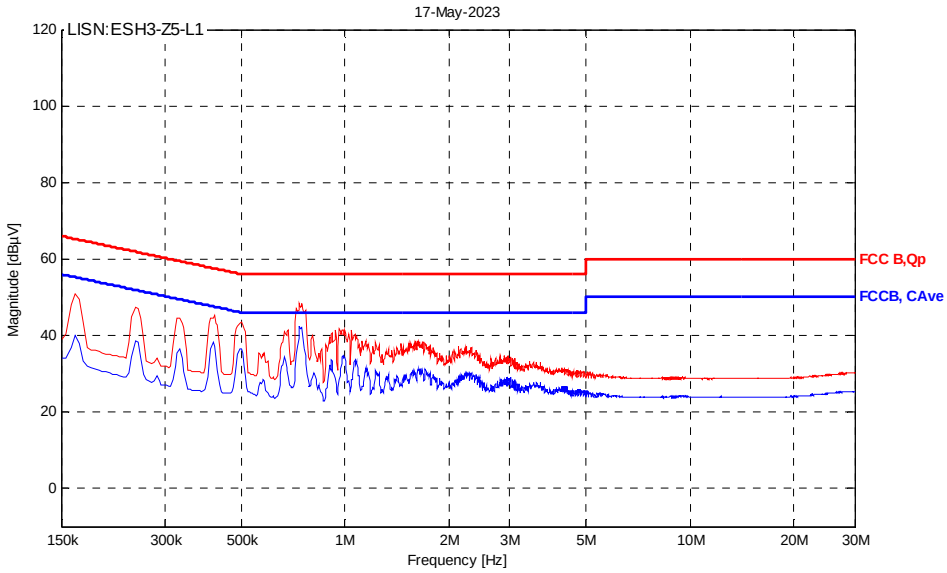
6.1.5 Data; Mains Neutral, Charging Mode, FCC (110 V 60 Hz))

Quasi-peak value (dBµV)				
Frequency	**Measured**	**Class B Limit**	**Margin**	**Status**
736.713 kHz	48.58	56.00	7.42	Pass
3.335 MHz	33.53	56.00	22.47	Pass
6.173 MHz	29.22	60.00	30.78	Pass
9.120 MHz	29.08	60.00	30.92	Pass
12.343 MHz	28.91	60.00	31.09	Pass
18.017 MHz	28.91	60.00	31.09	Pass
20.759 MHz	28.99	60.00	31.01	Pass
24.002 MHz	29.57	60.00	30.43	Pass
26.963 MHz	29.98	60.00	30.02	Pass
29.738 MHz	30.31	60.00	29.69	Pass

CISPR Average value (dBµV)				
Frequency	**Measured**	**Class B Limit**	**Margin**	**Status**
736.713 kHz	42.72	46.00	3.28	Pass
3.335 MHz	28.18	46.00	17.82	Pass
8.543 MHz	24.22	50.00	25.78	Pass
9.205 MHz	24.17	50.00	25.83	Pass
12.343 MHz	24.06	50.00	25.94	Pass
18.017 MHz	23.99	50.00	26.01	Pass
21.002 MHz	24.15	50.00	25.85	Pass
24.002 MHz	24.82	50.00	25.18	Pass
26.853 MHz	25.07	50.00	24.93	Pass
29.709 MHz	25.39	50.00	24.61	Pass

The measured value takes into account the correction factor.
Correction factor (dB) = cable, AMN, and pulse limiter losses as summed positive values (dB)
The recorded measured value (dB) = measured receiver value (dB) + correction factor (dB).

6.1.6 Profile; Mains Line, Charging Mode, FCC (110 V 60 Hz)



6.1.7 Data; Mains Line, Charging Mode, FCC (110 V 60 Hz)

Quasi-peak value (dBµV)				
Frequency	**Measured**	**Class B Limit**	**Margin**	**Status**
736.713 kHz	48.43	56.00	7.57	Pass
3.417 MHz	33.30	56.00	22.70	Pass
6.177 MHz	29.21	60.00	30.79	Pass
9.463 MHz	29.02	60.00	30.98	Pass
12.438 MHz	28.88	60.00	31.12	Pass
18.013 MHz	28.85	60.00	31.15	Pass
20.940 MHz	29.03	60.00	30.97	Pass
24.002 MHz	29.66	60.00	30.34	Pass
26.958 MHz	29.96	60.00	30.04	Pass
29.953 MHz	30.38	60.00	29.62	Pass

CISPR Average value (dBµV)				
Frequency	**Measured**	**Class B Limit**	**Margin**	**Status**
736.713 kHz	42.24	46.00	3.76	Pass
3.507 MHz	27.74	46.00	18.26	Pass
6.177 MHz	24.21	50.00	25.79	Pass
9.463 MHz	24.11	50.00	25.89	Pass
12.300 MHz	24.01	50.00	25.99	Pass
18.051 MHz	23.94	50.00	26.06	Pass
21.002 MHz	24.16	50.00	25.84	Pass
24.002 MHz	24.80	50.00	25.20	Pass
27.001 MHz	25.08	50.00	24.92	Pass
29.719 MHz	25.40	50.00	24.60	Pass

The measured value takes into account the correction factor.
Correction factor (dB) = cable, AMN, and pulse limiter losses as summed positive values (dB)
The recorded measured value (dB) = measured receiver value (dB) + correction factor (dB).

7.0 MEASUREMENT UNCERTAINTIES

Emissions tests

For all emissions tests, measurement uncertainties have been calculated in line with the requirements of CISPR 16-4-2 to give a confidence level of greater than 95 %. In all cases the laboratories calculated uncertainty values (known as Ulab) are equal to or are less than the expected uncertainty values contained in CISPR 16-4-2 (known as Ucispr). Below is a list of the laboratories calculated measurement uncertainties:

Conducted emissions:

Via AMN/LISN:	±3.27 dB (9 kHz – 150 kHz), ±3.27 dB (150 kHz – 30 MHz)
Via AAN/ISN:	±5.00 dB (150 kHz – 30 MHz)
Via CVP:	±3.47 dB (150 kHz – 30 MHz)
Via CP:	±2.69 dB (150 kHz – 30 MHz)
Via 100 Ω:	±2.68 dB (150 kHz – 30 MHz)
Clicks:	±2.83 dB (150 kHz – 30 MHz)
Harmonics:	±1.42 % (100 Hz – 2 kHz)
Flicker:	±1.76 % (worst case for all parameters)

Radiated emissions:

H-Field:	±2.84 dB (9 kHz – 3 MHz), ±2.92 dB (3 MHz – 3 0 MHz)
D = 3.0 m (Horizontal):	±3.91 dB (30 MHz – 1 GHz SAC), ±3.82 dB (30 MHz – 1 GHz FAC)
D = 3.0 m (Vertical):	±5.22 dB (30 MHz – 1 GHz SAC), ±3.82 dB (30 MHz – 1 GHz FAC)
D = 3.0 m:	±5.13 dB (1 GHz – 6 GHz SAC), ±5.15 dB (1 GHz – 10 GHz SAC), ±3.64 dB (10 GHz – 18 GHz SAC), ±3.10 dB (18 GHz – 40 GHz SAC). ±3.05 dB (1 GHz – 6 GHz FAC)

Radiated spurious emissions (RSE):

±1.71 dB (30 MHz – 1 GHz), ±1.81 dB (1 – 12.75 GHz), ±2.07 dB (12.75 – 18 GHz)

Immunity tests

For IEC 61000-4-2, IEC 61000-4-4, IEC 61000-4-5, IEC 61000-4-8, IEC 61000-4-9, IEC 61000-4-11 tests, the following applies:

Measurement uncertainty has been calculated or calibrated for the various required parameters to provide a confidence level of 95 % (k=2). These parameters have been compared to the basic standard tolerance requirements for each of the various parameters.
In all cases the calculated or calibrated uncertainty meets the basic standard requirements.

For IEC 61000-4-3, IEC 61000-4-6 tests, the following applies:

Measurement uncertainty has been calculated to provide a confidence level of 95 %, or k=2, but this has not been applied to the applied test level, therefore the applied test level has an uncertainty of ±50 %. This is in accordance with CENELEC and other international guidance.

In the case of Maritime equipment tested to EN/IEC 60945, there is a specific requirement that the applied test level be increased by the calculated measurement uncertainty. This is done by applying a coverage factor of k=1.64, which provides a 95 % confidence that the applied test level has been achieved.

Test Results - Decision Rules

As the decision is generally inherent in the standard for Commercial EMC a simple acceptance rule can be applied. The following statement will be added to EMC quotes and reports. "The Decision Rule is applied on the basis of CISPR16-4-2 and/or EN61000-4-x (TR61000-1-6) These standards provide guidance on how to calculate and apply measurement uncertainty whilst providing maximum uncertainties allowance. Due consideration will also be given to JCGM 106:2012, ILAC-G8:09/2019 and LAB 48. This laboratory has demonstrated by calibrating its equipment and facilities, and calculating its own uncertainties, that it complies with the above requirements and therefore no allowance of uncertainties has been given to the tolerances." Where a result is considered marginal in respect of its proximity to the limit line, for example, the customer would be made aware of situation so that they can make an informed decision on how to proceed.

Published 06/01/2023

End of Document