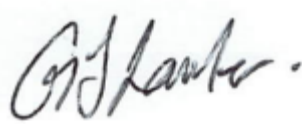


EMC Test Report	
For:	Luminary ROLI Limited
Product:	Piano
Model:	RP4901
FCC ID:	2AFT3-RP4901
IC ID:	20629-RP4901
	
Project Engineer:	Graeme Lawler
	
Approval Signatory:	Dan Tiroke

Document Reference:	H6236 FR
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Issue Number:	Date:	Test Report Revisions History:
1	26 th September 2025	Original report issued

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

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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 Electrical & Electronic UK Ltd File Ref: H6236
Customer test plan Ref: SC_ROL_TP06 and SC_ROL_TP08

1.6 Test Deviations

Latest editions of standards were used.

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	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
Field Strength of Fundamental	FCC/CFR 47: Part 15C 15.249 (a)	ANSI C63.10: 2013	Pass
Field Strength of Harmonics	FCC/CFR 47: Part 15C 15.249 (a)		Pass
Field Strength of Emissions	FCC/CFR 47: Part 15C 15.249 (d) FCC/CFR 47: Part 15C 15.209 (a)		Pass
Authorised Band Edge	FCC/CFR 47: Part 15C 15.249 (a)		Pass
Conducted Emissions	FCC/CFR 47: Part 15C 15.207 (a)		Pass

Note(s):

- The highest internal operating frequency declared by the manufacturer is 2480 MHz.

3.0 EQUIPMENT AND TEST DETAILS

3.1 General

Product (EUT):	Piano		
Model:	RP4901	Serial Number:	RP-027
Sample Build:	Production Sample		
EUT Power:	110 V 60 Hz		
Customer Test Plan:	SC_ROL_TP06 and SC_ROL_TP08		
Alternate Models:	Not Applicable		
EUT Manufacturer:	Luminary ROLI Limited		
Company Name:	Luminary ROLI Limited		
Company Address:	326 – 327 Stean Street London E8 4ED United Kingdom		
Test Commissioned By:	Charlie Blackham, Sulis Consultants Limited		
Date EUT Received:	18 th August 2025		
Test Date(s):	18 th to 21 st August 2025		
EMC Measurement Site:	Eurofins Electrical & Electronic UK Ltd Southampton Laboratory Trafalgar Close, Chandlers Ford, Hampshire, United Kingdom		
Product Category:	IT and Multimedia Electrical Equipment		

3.2 EUT Description

The EUT is a piano.

3.3 Support Equipment

Description	Manufacturer	Model	Serial Number
Laptop	Apple	A2992	CX2FVX63HQ
iPad	Apple	A2925	KG2664M0GF
Mains-DC PSU	Intops	PD0302C-0303	Not stated

3.4 EUT Test Exerciser

Radio Testing FCC 15.249

The Bluetooth Low Energy radio was tested in accordance with the test modes in the table below.

Channel Frequency (MHz)	Nominal Channel Bandwidth (MHz)	Test Performed			
		Field Strength of Fundamental	Field Strength of Harmonics	Field Strength of Emissions	Authorised Band Edge
2402	1	Tested	Tested	Tested	Tested
2440	1	Tested	Tested	Tested	N/A
2480	1	Tested	Tested	Tested	Tested
2402	2	Tested	Tested	Tested	Tested
2404	2	Tested	Tested	Tested	Tested
2440	2	Tested	Tested	Tested	N/A
2480	2	Tested	Tested	Tested	Tested

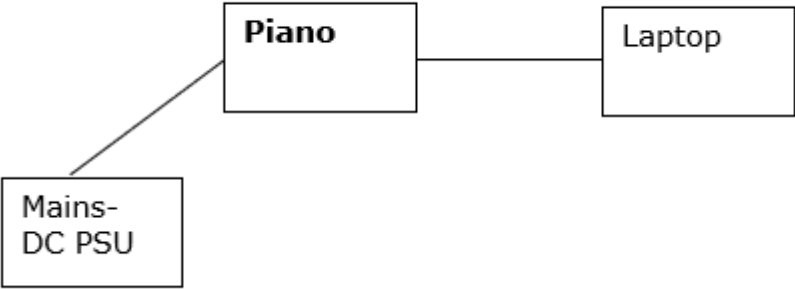
EMC Testing FCC 15B

Piano powered from mains-DC power supply and connected to Laptop using USB and keyboard key taped down to ensure continuous data processing and communication.

3.5 EUT Test Configuration #1



3.6 EUT Test Configuration #2



3.7 EUT Ports

Port	Type	Length	Shielded
AC Power Port	UK Mains Plug	2m	No
USB	Type C	2m	No

4.0 TEST RESULTS

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

4.1.1 Test Parameters

A profile scan was taken using an EMI receiver at a distance of three meters with the EUT being rotated from 0 to 360° with a continuous measurement being made on max hold 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
073	3	Schwarzbeck	BBHA9120B	237	Horn Antenna (1GHz - 10GHz)	08/05/2027
250	1	HP	8449B	3008A01077	Pre-Amplifier (1GHz - 26.5GHz)	10/03/2026
256	1	Eurofins E&E	Pre-Amp	001	Pre-Amp (1GHz - 18GHz) 35 dB	11/03/2026
516	1	Sucoflex	Cable N-Type	-	Cable N-Type (for #250)	10/03/2026
644	1	Intelliconnect	Cable SMA to N-Type	15072	SMA to N-Type Cable 10m	10/03/2026
652	1	TFA	Weather Station	Jupiter	Weather Station	05/11/2025
741	0	California Instruments	MX45	55282	3 Phase Voltage / Frequency Supply	Not Required
750	1	Global	CISPR16	-	11 x 7 x 6.2m, Chamber (Jupiter)	20/12/2025
762	3	Schwarzbeck	VULB9162	129	Trilog Broadband Antenna (30MHz - 7GHz)	12/03/2027
762a	3	Schwarzbeck	DGA 9552N	-	Attenuator (6dB) for #762	12/03/2027
788	1	Rohde & Schwarz	ESW44	101799	EMI Test Receiver (44GHz)	05/09/2025
856	0	Rohde & Schwarz	Software	-	EMC32 v11.50.00 (Pluto)	Not Required
877	1	Huber & Suhner	SUCOTEST_18A	602608/18A	ST_18A/Nm/Nm (3m)	08/11/2025
952	3	Schwarzbeck	HWRD 750	66	Horn Antenna (7GHz - 18GHz)	21/06/2026
Test Equipment Software						
#ID	CP	Manufacturer	Type		Description	Calibration Due Date
856	0	Rohde & Schwarz	Software	0	EMC32 v11.50.0 (Pluto)	Not required

Environmental Test Conditions		
Frequency	Below 1 GHz	Above 1 GHz
Temperature	22.9° Celsius	22.9° Celsius
Relative Humidity	47 %	52 %
Atmospheric Pressure	1021.1 millibars	1019.1 millibars
Test Date:	21 st August 2025	20 th August 2025
Test Engineer:	Richard Pennell	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 E&E UK 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 #2.

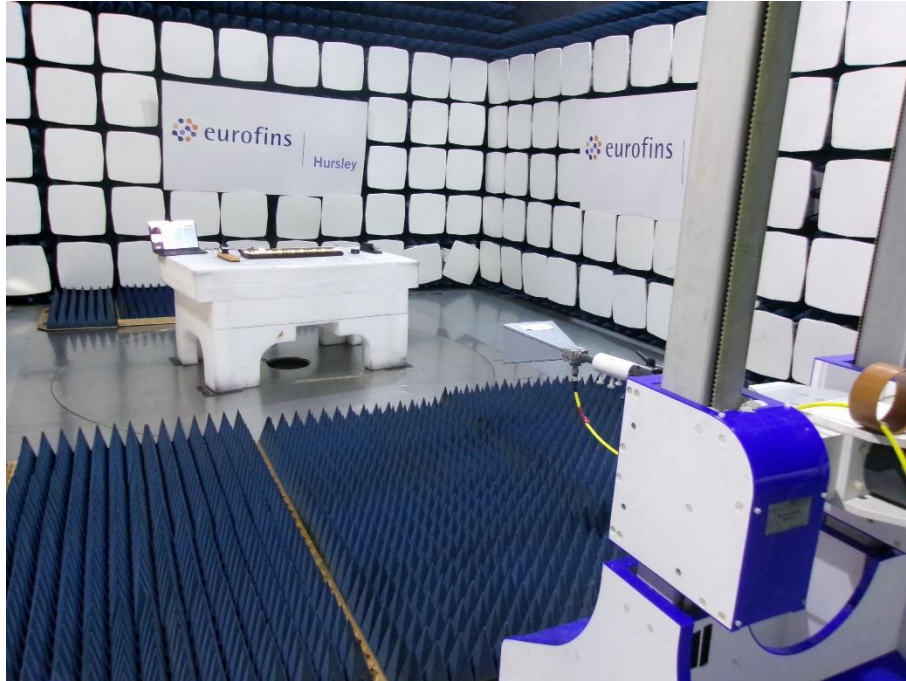
4.1.3 Set-up Photos

Radiated Emissions; Below 1 GHz



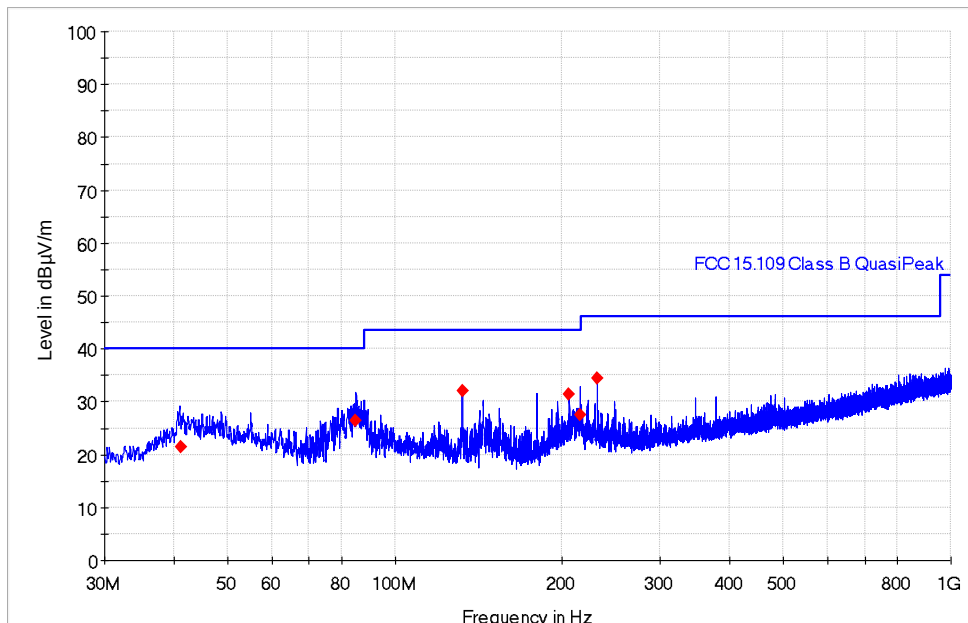
4.1.4 Set-up Photos (Continued)

Radiated Emissions; Above 1 GHz



4.1.5 Profile; 30 MHz to 1 GHz, FCC, Part 15B (110 V 60 Hz)
 Maximum peak hold trace with quasi-peak values (◆)

30 MHz to 1 GHz



4.1.6 Data; 30 MHz to 1 GHz, FCC, Part 15B (110 V 60 Hz)

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
41.186750	21.38	40.00	18.62	V	131.0	301.0	Pass
84.972200	26.47	40.00	13.53	V	167.0	165.0	Pass
131.993925	32.02	43.52	11.50	V	100.0	191.0	Pass
205.676925	31.44	43.52	12.08	H	166.0	239.0	Pass
215.676825	27.57	43.52	15.95	V	100.0	129.0	Pass
231.423650	34.32	46.02	11.70	H	145.0	201.0	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 E&E UK test procedure RAD-03.

*Correction factor (dB) = cable and antenna losses as summed positive values (dB) – pre-amp gain where applicable (dB).

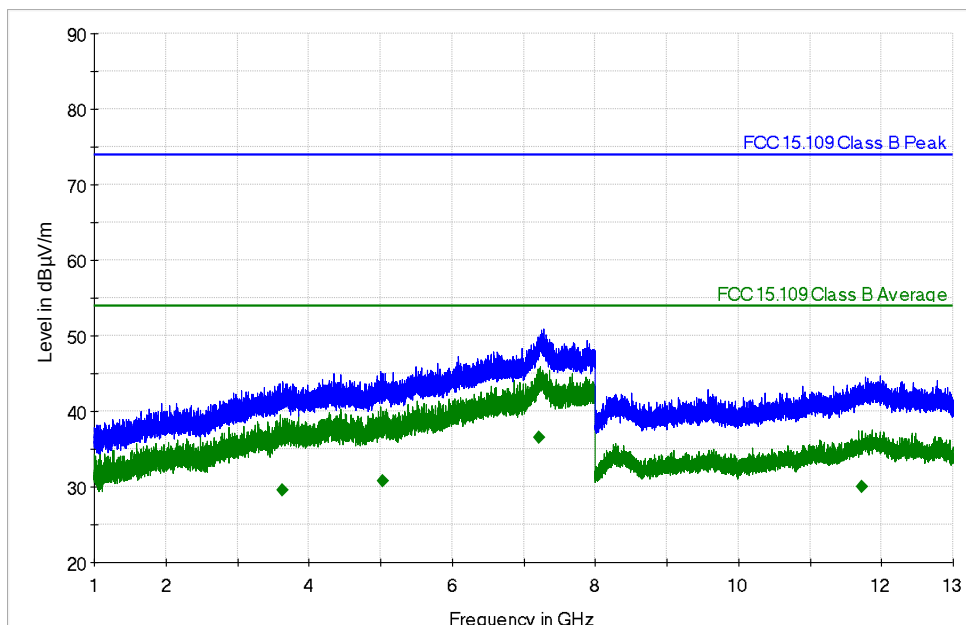
The recorded measured value (dB) = measured receiver value (dB) + correction factor (dB).

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; 1 to 13 GHz, FCC, Part 15B (110 V 60 Hz)

Average measurements (◆)

1 to 13 GHz



4.1.9 Data; 1 to 13 GHz, FCC, Part 15B (110 V 60 Hz)

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
3635.832143	---	29.58	53.98	24.40	105.0	H	94.0	-2.0	Pass
5027.820357	---	30.70	53.98	23.28	105.0	V	0.0	0.2	Pass
7207.199286	---	36.59	53.98	17.39	265.0	V	171.0	6.7	Pass
11727.86200	---	30.04	53.98	23.94	100.0	V	18.0	10.7	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 E&E UK test procedure RAD-03.

*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 Part 15.249

4.2.1 Test Parameters

A profile scan was taken using an EMI receiver at a distance of three meters with the EUT being rotated from 0 to 360° with a continuous measurement being made on max hold 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
073	3	Schwarzbeck	BBHA9120B	237	Horn Antenna (1GHz - 10GHz)	08/05/2027
086a	1	GORE	0K0CQ0CQ120.0	05609131	40GHz K-Type Cable	22/05/2026
250	1	HP	8449B	3008A01077	Pre-Amplifier (1GHz - 26.5GHz)	10/03/2026
256	1	Eurofins E&E	Pre-Amp	001	Pre-Amp (1GHz - 18GHz) 35 dB	11/03/2026
516	1	Sucoflex	Cable N-Type	-	Cable N-Type (for #250)	10/03/2026
644	1	Intelliconnect	Cable SMA to N-Type	15072	SMA to N-Type Cable 10m	10/03/2026
652	1	TFA	Weather Station	Jupiter	Weather Station	05/11/2025
741	0	California instruments	MX45	55282	3 Phase Voltage / Frequency Supply	Not Required
750	1	Global	CISPR16	-	11 x 7 x 6.2m, Chamber (Jupiter)	20/12/2025
762	3	Schwarzbeck	VULB9162	129	Trilog Broadband Antenna (30MHz - 7GHz)	12/03/2027
779	3	Steatite	QWH-SL-18-40-K-SG	17504	Horn Antenna (18GHz - 40GHz)	11/04/2027
788	1	Rohde & Schwarz	ESW44	101799	EMI Test Receiver (44GHz)	05/09/2025
821	0	York EMC	CNE	542	Comparison Noise Emitter	Not Required
822	0	York EMC	BP01	CGE03C	Comparison Noise Emitter	Not Required
823	0	York EMC	1.5 to 7GHz	CNE 6507	High Frequency Comparison Noise Emitter	Not Required
856	0	Rohde & Schwarz	Software	-	EMC32 v11.50.00 (Pluto)	Not Required
877	1	Huber & Suhner	SUCOTEST_18A	602608/18A	ST_18A/Nm/Nm (3m)	08/11/2025
951	1	Wainwright Instruments	WHKX12-2580-3000-18000-80SS	SN16	Highpass Filter (3GHz)	09/07/2026
952	3	Schwarzbeck	HWRD 750	66	Horn Antenna (7GHz - 18GHz)	21/06/2026

Test Equipment Software						
#ID	CP	Manufacturer	Type		Description	Calibration Due Date
856	0	Rohde & Schwarz	Software	0	EMC32 v11.50.0 (Pluto)	Not required

Environmental Test Conditions				
Frequency	Below 1 GHz	Above 1 GHz	Above 1 GHz	Above 1 GHz
Temperature	22.9° Celsius	22.9° Celsius	22.7	24.8
Relative Humidity	47 %	52 %	55	47
Atmospheric Pressure	1021.1 millibars	1019.1 millibars	1019.2 millibars	1023.5
Test Date:	21 st August 2025	20 th August 2025	19 August 2025	18 August 2025
Test Engineer:	Richard Pennell	Graeme Lawler	Graeme Lawler	Graeme Lawler

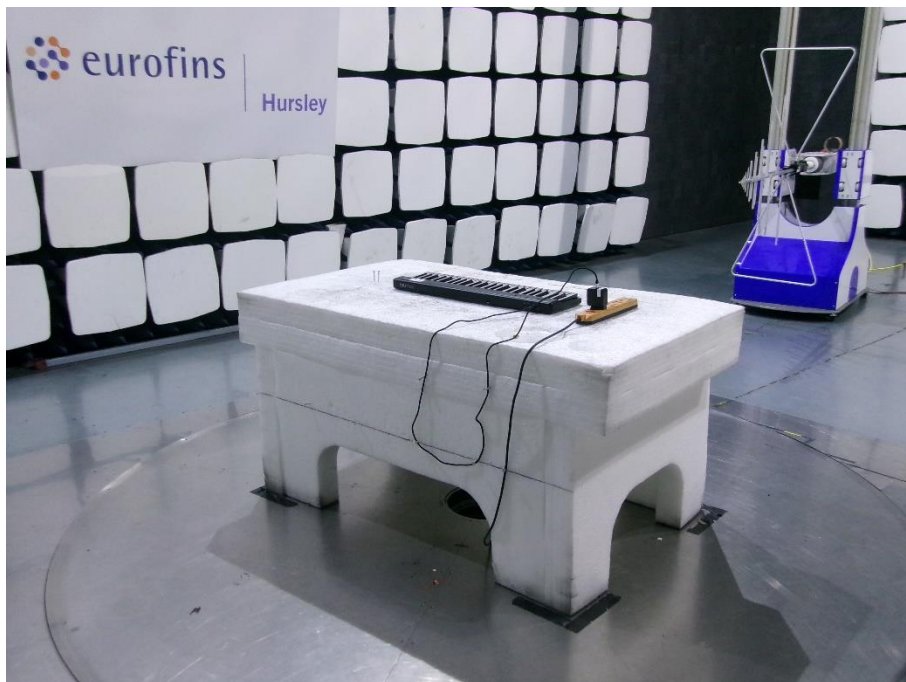
Note: "Calibration due date" means the instrument is certified within UKAS or traceable calibration certificate. "Internal" means the instrument is calibrated using Eurofins E&E UK procedures. "Not required" means the asset does not require calibration. "CP" is the interval period [year] prescribed for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

4.2.2 Test Configuration

Please refer to EUT Test Configuration #1.

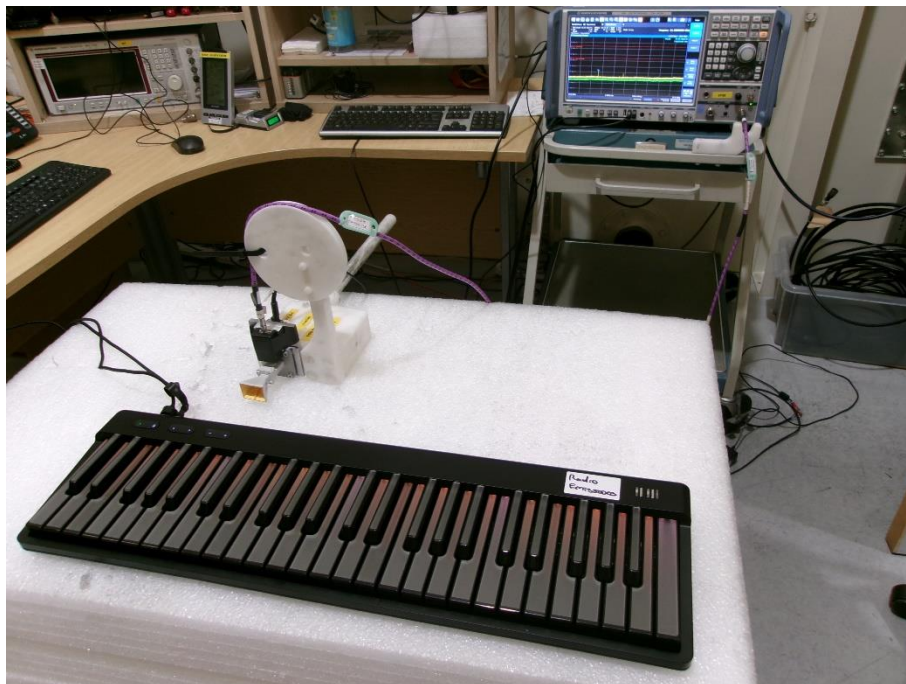
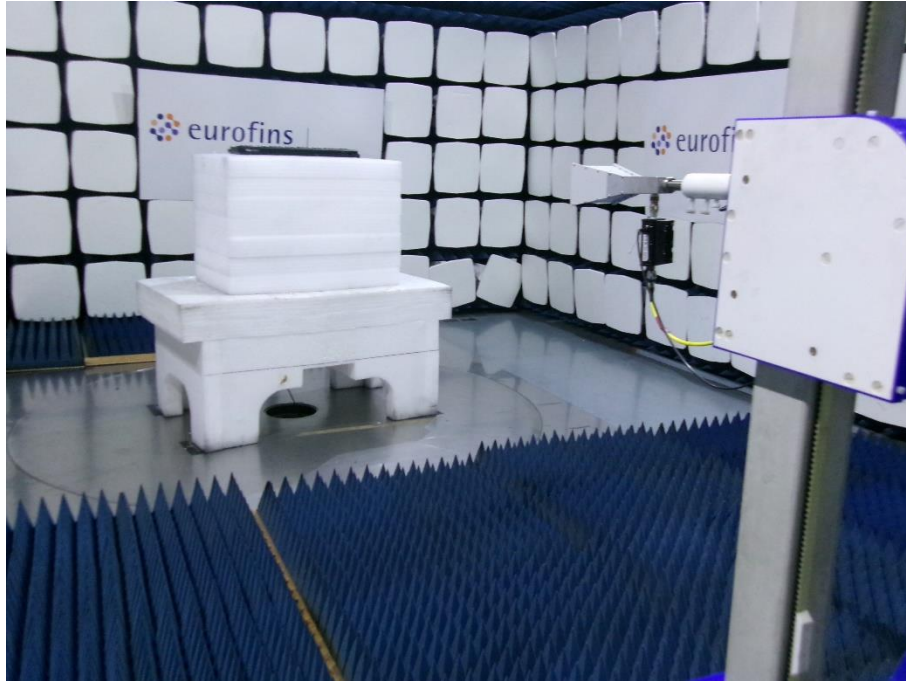
4.2.3 Set-up Photos

Radiated Emissions; Below 1 GHz



4.2.4 Set-up Photos (Continued)

Radiated Emissions; Above 1 GHz

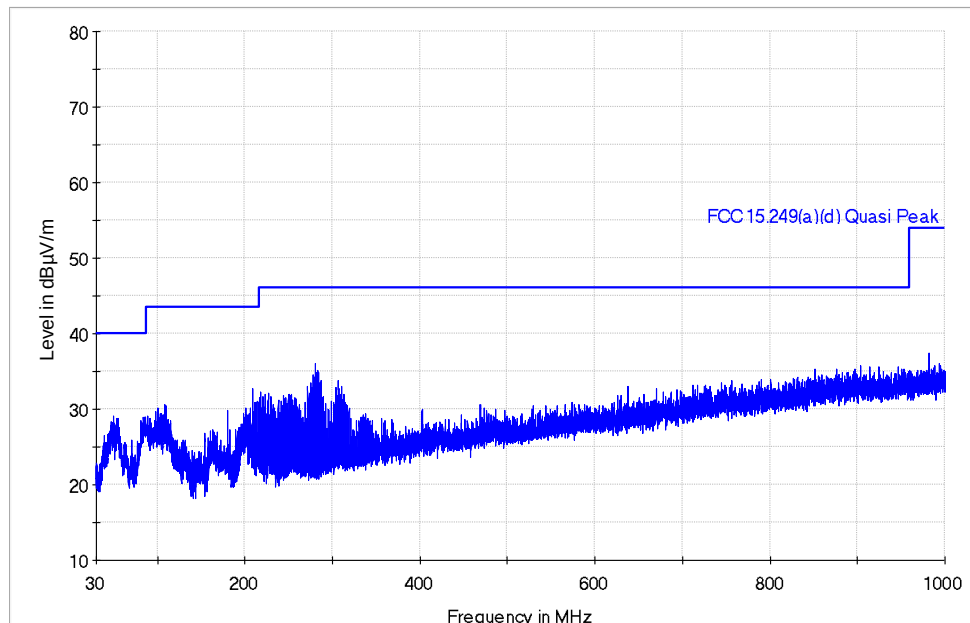


4.2.5 Profile; 30 MHz to 1 GHz, 2402MHz, Bottom Channel, 1MHz Channel Bandwidth, FCC Part 15.249

Maximum peak hold trace with quasi-peak values (♦) or (◆)

Peak measurements (✱)

30 MHz to 1 GHz



4.2.6 Data; 30 MHz to 1 GHz, 2402MHz, Bottom Channel, 1MHz Channel Bandwidth, FCC Part 15.249

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

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 E&E UK test procedure RAD-03.

*Correction factor (dB) = cable and antenna losses as summed positive values (dB) – pre-amp gain where applicable (dB).

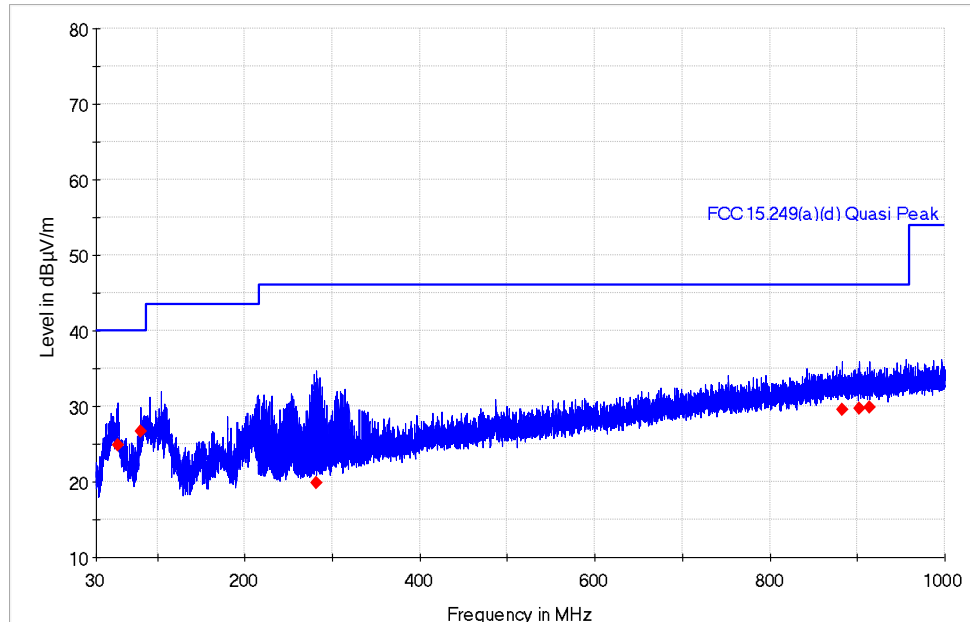
The recorded measured value (dB) = measured receiver value (dB) + correction factor (dB).

Note: Path losses are factored into the limit value, and given by the test standard. Chamber calibration data contributes to the measurement uncertainty figure.

4.2.7 Profile; 30 MHz to 1 GHz, 2440MHz, Middle Channel, 1MHz Channel Bandwidth, FCC Part 15.249

Maximum peak hold trace with quasi-peak values (◆)

30 MHz to 1 GHz



4.2.8 Data; 30 MHz to 1 GHz, 2440MHz, Middle Channel, 1MHz Channel Bandwidth, FCC Part 15.249

Emission Frequency	Measured Quasi-Peak Value	Specified Quasi-Peak Limit	Pass Margin	Antenna Polarisation	Antenna Height	Turntable Azimuth	
MHz	dBµV/m	dBµV/m	dB	H/V	cm	deg	Status
54.893850	24.90	40.00	15.10	H	168.0	130.0	Pass
80.882650	26.59	40.00	13.41	V	131.0	217.0	Pass
282.036000	19.82	46.02	26.20	H	118.0	176.0	Pass
882.185750	29.60	46.02	16.42	V	364.0	339.0	Pass
902.198500	29.66	46.02	16.36	H	400.0	178.0	Pass
913.611400	29.81	46.02	16.21	V	123.0	295.0	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 E&E UK test procedure RAD-03.

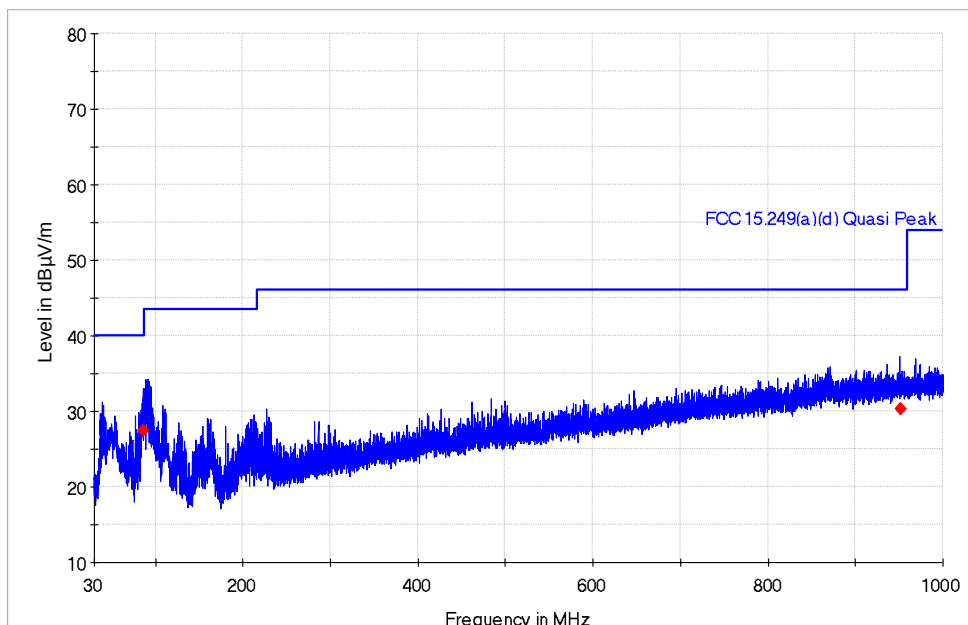
*Correction factor (dB) = cable and antenna losses as summed positive values (dB) – pre-amp gain where applicable (dB).

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.

4.2.9 Profile; 30 MHz to 1 GHz, 2480MHz, Top Channel, 1MHz Channel Bandwidth, FCC Part 15.249
Maximum peak hold trace with quasi-peak values (◆)

30 MHz to 1 GHz



4.2.10 Data; 30 MHz to 1 GHz, 2480MHz, Top Channel, 1MHz Channel Bandwidth, FCC Part 15.249

Emission Frequency	Measured Quasi-Peak Value	Specified Quasi-Peak Limit	Pass Margin	Antenna Polarisation	Antenna Height	Turntable Azimuth	
MHz	dBµV/m	dBµV/m	dB	H/V	cm	deg	Status
85.560950	27.45	40.00	12.55	V	131.0	203.0	Pass
951.358550	30.24	46.02	15.78	H	394.0	21.0	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 E&E UK test procedure RAD-03.

*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.

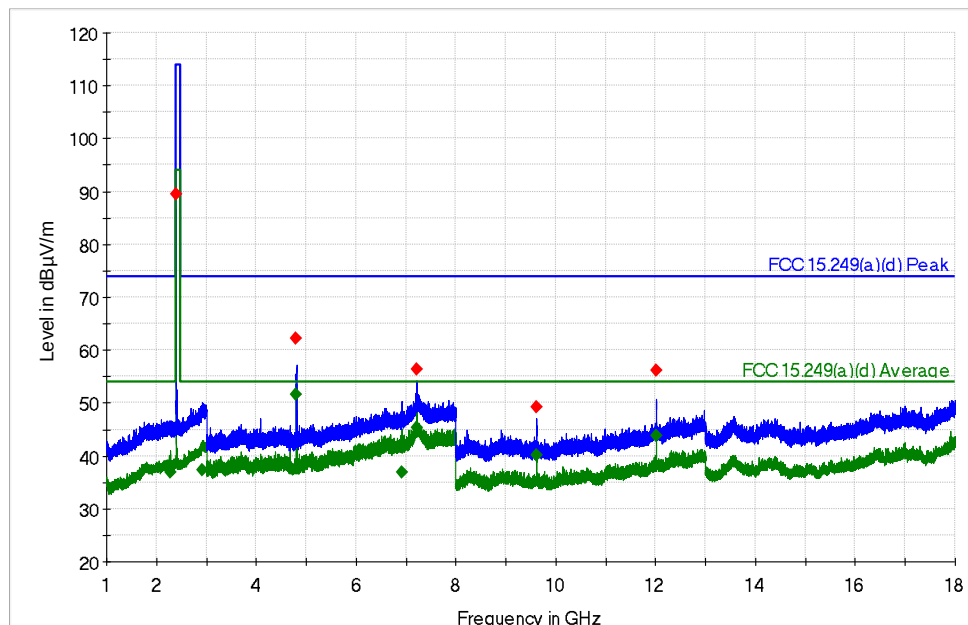
4.2.11 Profile; 1 to 18 GHz, 2402MHz, Bottom Channel, 1MHz Channel Bandwidth, FCC Part 15.249

Maximum hold trace with peak values (◆)

Peak measurements (✱)

Average measurements (◆)

1 to 18 GHz



4.2.12 Data; 1 to 18 GHz, 2402MHz, Bottom Channel, 1MHz Channel Bandwidth, FCC Part 15.249

Frequency	Peak	RMS Max Hold	Limit	Margin	Height	Pol	Azimuth	Corr.	
MHz	dBμV/m	dBμV/m	dBμV/m	dB	cm	H/V	Deg	dB/m	Status
2273.925000	---	36.92	53.98	17.06	121.0	H	13.0	31.8	Pass
2402.245000	89.45	---	113.98	24.53	280.0	H	20.0	31.8	Pass
2920.447500	---	37.36	53.98	16.62	122.0	V	261.0	33.6	Pass
4803.750000	62.19	---	73.98	11.79	124.0	H	49.0	-0.4	Pass
4803.759000	---	51.67	53.98	2.31	112.0	H	47.0	-0.4	Pass
6916.703000	---	36.92	53.98	17.06	211.0	H	341.0	4.5	Pass
7206.478000	56.41	---	73.98	17.57	108.0	H	98.0	7.3	Pass
7206.836000	---	45.26	53.98	8.72	255.0	H	23.0	7.3	Pass
9608.003000	---	40.12	53.98	13.86	111.0	V	177.0	7.3	Pass
9608.974000	49.25	---	73.98	24.73	112.0	V	197.0	7.3	Pass
12009.947000	---	43.82	53.98	10.16	230.0	V	163.0	11.2	Pass
12010.947000	56.07	---	73.98	17.91	254.0	V	163.0	11.2	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 E&E UK test procedure RAD-03.

*Correction factor (dB) = cable and antenna losses as summed positive values (dB) – pre-amp gain where applicable (dB).

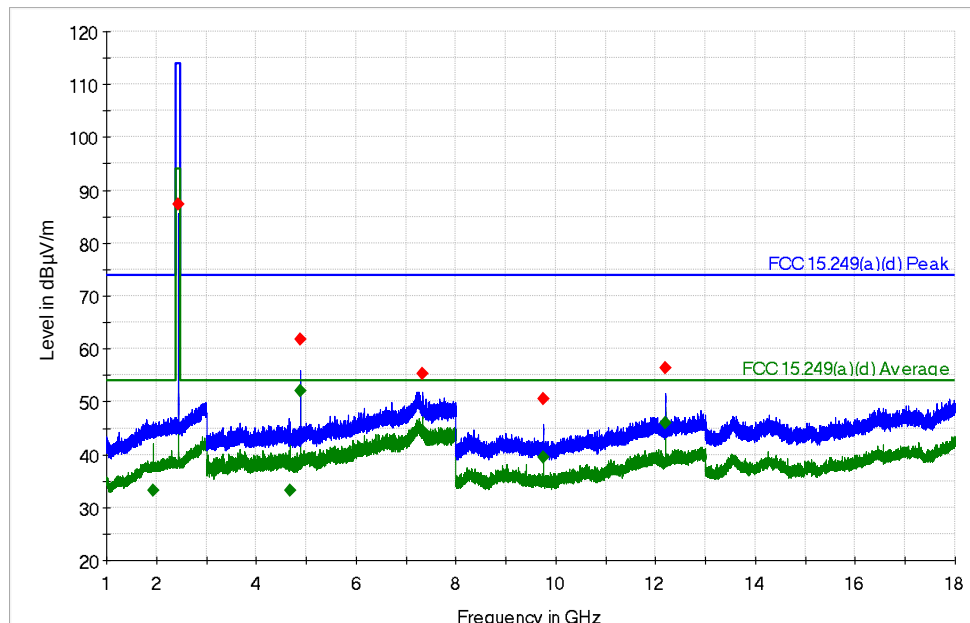
The recorded measured value (dB) = measured receiver value (dB) + correction factor (dB).

Note: path losses are factored into the limit value, and given by the test standard. Chamber calibration data contributes to the measurement uncertainty figure.

4.2.13 Profile; 1 to 18 GHz, 2440MHz, Middle Channel, 1MHz Channel Bandwidth, FCC Part 15.249

Maximum hold trace with peak values (◆)

1 to 18 GHz



4.2.14 Data; 1 to 18 GHz, 2440MHz, Middle Channel, 1MHz Channel Bandwidth, FCC Part 15.249

Frequency	Peak	RMS Max Hold	Limit	Margin	Height	Pol	Azimuth	Corr.	
MHz	dBμV/m	dBμV/m	dBμV/m	dB	cm	H/V	Deg	dB/m	Status
1945.490000	---	33.27	53.98	20.71	367.0	V	96.0	31.3	Pass
2439.705000	87.35	---	113.98	26.63	400.0	H	10.0	31.7	Pass
4677.267000	---	33.22	53.98	20.76	100.0	V	186.0	-0.6	Pass
4879.888000	61.80	---	73.98	12.18	156.0	H	46.0	-0.1	Pass
4879.958000	---	51.96	53.98	2.02	158.0	H	46.0	-0.1	Pass
7319.025000	---	44.49	53.98	9.49	131.0	H	110.0	6.4	Pass
7319.037000	55.27	---	73.98	18.71	100.0	V	333.0	6.4	Pass
9758.998000	50.45	---	73.98	23.53	303.0	V	180.0	7.4	Pass
9759.795000	---	39.40	53.98	14.58	303.0	V	181.0	7.4	Pass
12200.94100	56.33	---	73.98	17.65	238.0	V	167.0	11.4	Pass
12203.32900	---	45.95	53.98	8.03	238.0	V	167.0	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 E&E UK test procedure RAD-03.

*Correction factor (dB) = cable and antenna losses as summed positive values (dB) – pre-amp gain where applicable (dB).

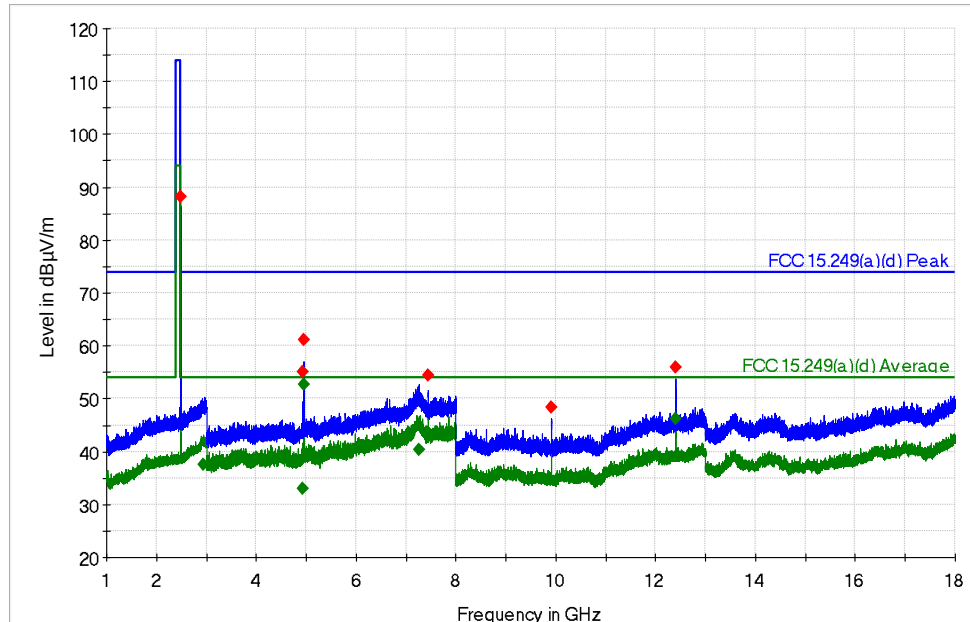
The recorded measured value (dB) = measured receiver value (dB) + correction factor (dB).

Note: path losses are factored into the limit value, and given by the test standard. Chamber calibration data contributes to the measurement uncertainty figure.

4.2.15 Profile; 1 to 18 GHz, 2480MHz, Top Channel, 1MHz Channel Bandwidth, FCC Part 15.249

Maximum hold trace with peak values (◆)

1 to 18 GHz



4.2.16 Data; 1 to 18 GHz, 2480MHz, Top Channel, 1MHz Channel Bandwidth, FCC Part 15.249

Frequency	Peak	RMS Max Hold	Limit	Margin	Height	Pol	Azimuth	Corr.	
MHz	dBµV/m	dBµV/m	dBµV/m	dB	cm	H/V	Deg	dB/m	Status
2480.245000	88.14	---	113.98	25.84	384.0	H	18.0	31.7	Pass
2935.800000	---	37.56	53.98	16.42	344.0	H	97.0	33.6	Pass
4933.117000	---	32.90	53.98	21.08	165.0	V	197.0	0.3	Pass
4933.117000	55.14	---	73.98	18.84	165.0	V	197.0	0.3	Pass
4959.958000	61.09	---	73.98	12.89	141.0	H	43.0	0.4	Pass
4959.969000	---	52.59	53.98	1.39	144.0	H	43.0	0.4	Pass
7249.759000	---	40.34	53.98	13.64	201.0	V	228.0	7.5	Pass
7439.027000	54.45	---	73.98	19.53	207.0	H	12.0	5.1	Pass
7439.350000	---	43.50	53.98	10.48	141.0	H	12.0	5.1	Pass
9920.021000	48.42	---	73.98	25.26	102.0	V	183.0	7.4	Pass
12398.26500	---	46.10	53.98	7.88	215.0	V	169.0	11.6	Pass
12398.75400	55.86	---	73.98	18.12	215.0	V	168.0	11.6	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 E&E UK test procedure RAD-03.

*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.

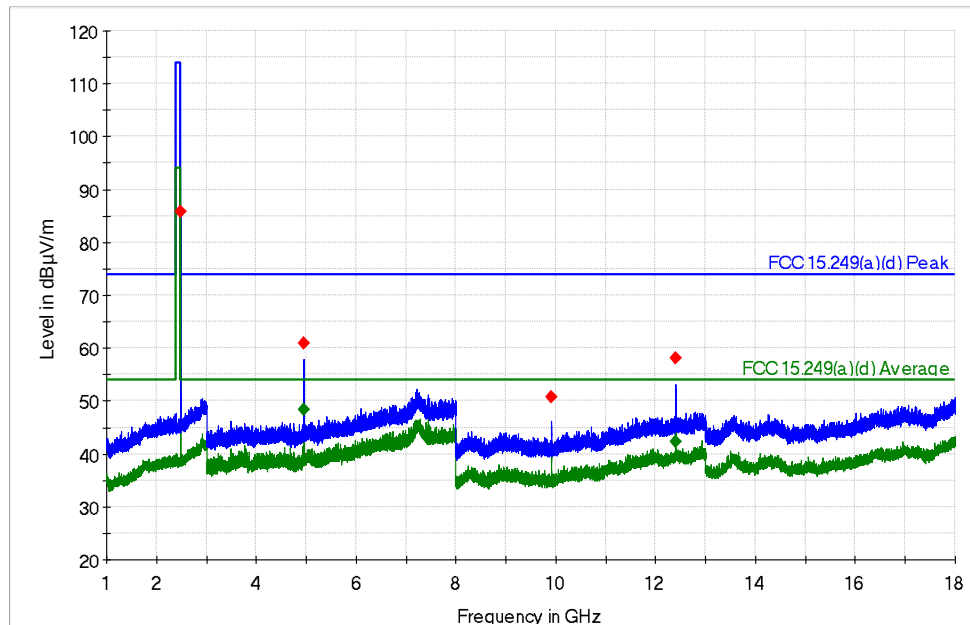
4.2.17 Profile; 1 to 18 GHz, 2480MHz, Top Channel, 2MHz Channel Bandwidth, FCC Part 15.249

Maximum hold trace with peak values (◆)

Peak measurements (✱)

Average measurements (◆)

1 to 18 GHz



4.2.18 Data; 1 to 18 GHz, 2480MHz, Top Channel, 2MHz Channel Bandwidth, FCC Part 15.249

Frequency	Peak	RMS Max Hold	Limit	Margin	Height	Pol	Azimuth	Corr.	
MHz	dBμV/m	dBμV/m	dBμV/m	dB	cm	H/V	Deg	dB/m	Status
2479.485000	85.82	---	113.98	28.16	151.0	V	90.0	31.7	Pass
4959.870000	60.91	---	73.98	13.07	108.0	H	42.0	0.4	Pass
4959.943000	---	48.25	53.98	5.73	167.0	H	44.0	0.4	Pass
9917.948000	50.76	---	73.98	23.22	322.0	V	183.0	7.4	Pass
12399.69400	58.03	---	73.98	15.95	214.0	V	168.0	11.6	Pass
12399.90100	---	42.21	53.98	11.77	203.0	V	168.0	11.6	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 E&E UK test procedure RAD-03.

*Correction factor (dB) = cable and antenna losses as summed positive values (dB) – pre-amp gain where applicable (dB).

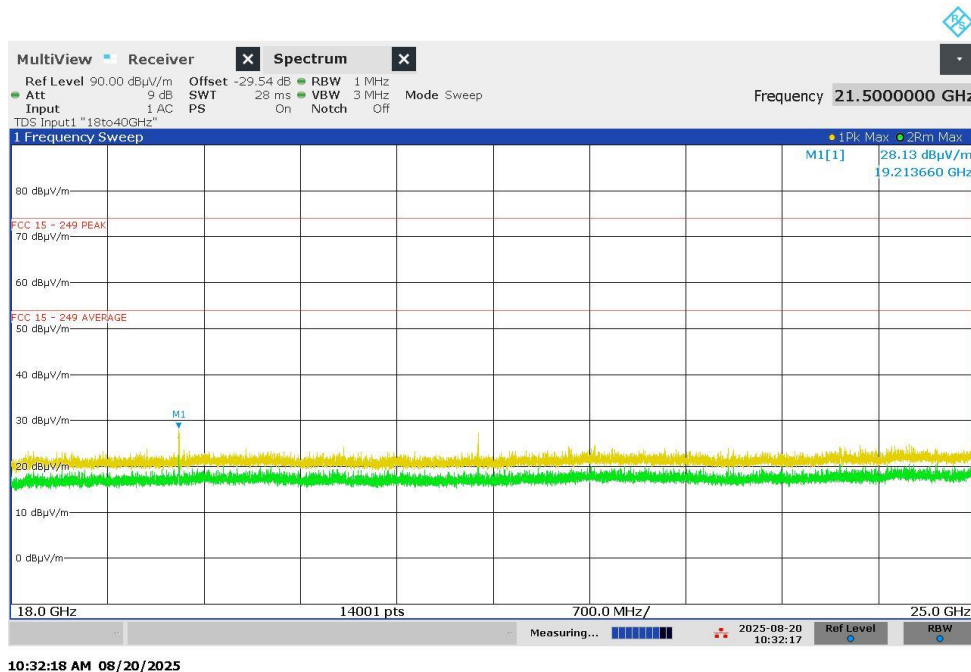
The recorded measured value (dB) = measured receiver value (dB) + correction factor (dB).

Note: path losses are factored into the limit value, and given by the test standard. Chamber calibration data contributes to the measurement uncertainty figure.

4.2.19 Profile; 18 to 25 GHz, 2402MHz, Bottom Channel, 1MHz Channel Bandwidth, FCC Part 15.249

Maximum hold trace with peak values (▼)

18 to 25 GHz



4.2.20 Data; 18 to 25 GHz, 2402MHz, Bottom Channel, 1MHz Channel Bandwidth, FCC Part 15.249

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 E&E UK test procedure RAD-03.

*Correction factor (dB) = cable and antenna losses as summed positive values (dB) – pre-amp gain where applicable (dB).

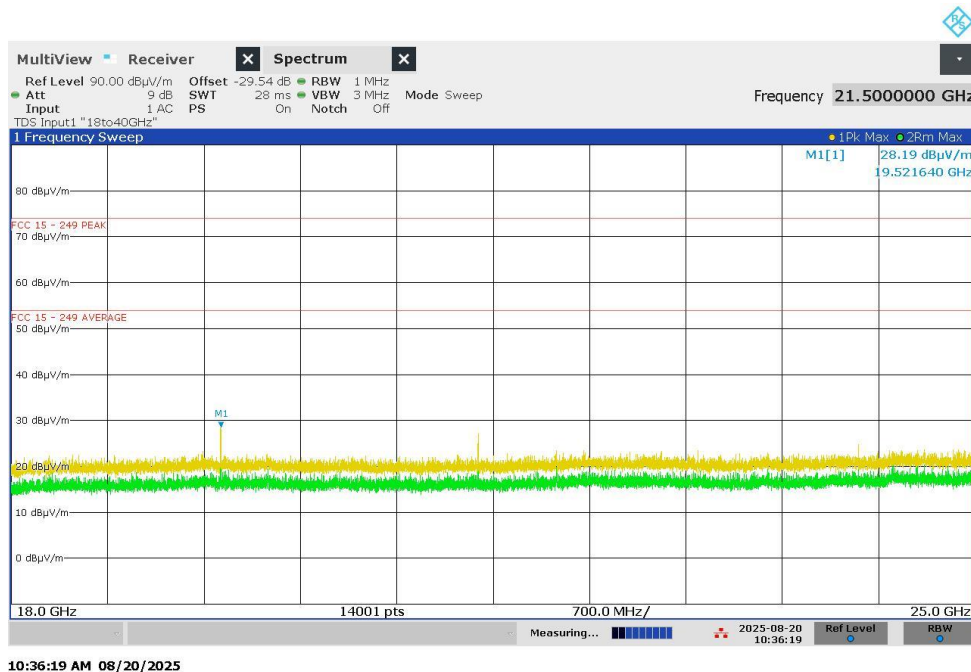
The recorded measured value (dB) = measured receiver value (dB) + correction factor (dB).

Note: path losses are factored into the limit value, and given by the test standard. Chamber calibration data contributes to the measurement uncertainty figure.

4.2.21 Profile; 18 to 25 GHz, 2440MHz, Middle Channel, 1MHz Channel Bandwidth, FCC Part 15.249

Maximum hold trace with peak values (▼)

18 to 25 GHz



4.2.22 Data; 18 to 25 GHz, 2440MHz, Middle Channel, 1MHz Channel Bandwidth, FCC Part 15.249

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 E&E UK test procedure RAD-03.

*Correction factor (dB) = cable and antenna losses as summed positive values (dB) – pre-amp gain where applicable (dB).

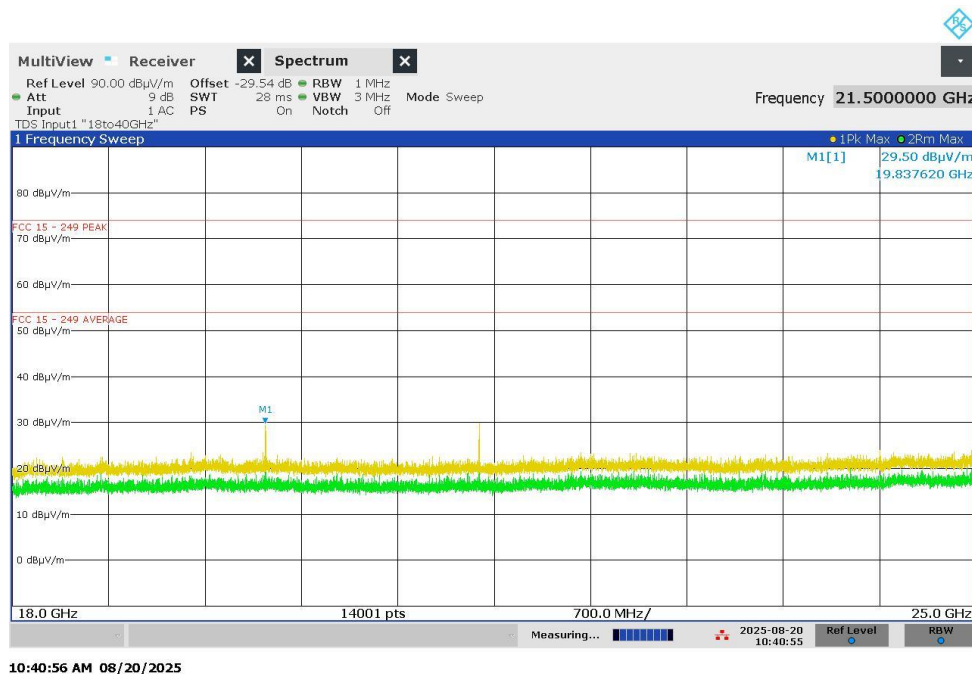
The recorded measured value (dB) = measured receiver value (dB) + correction factor (dB).

Note: path losses are factored into the limit value, and given by the test standard. Chamber calibration data contributes to the measurement uncertainty figure.

4.2.23 Profile; 18 to 25 GHz, 2480MHz, Top Channel, 1MHz Channel Bandwidth, FCC Part 15.249

Maximum hold trace with average values (▼)

18 to 25 GHz



4.2.24 Data; 18 to 25 GHz, 2480MHz, Top Channel, 1MHz Channel Bandwidth, FCC Part 15.249

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 E&E UK test procedure RAD-03.

*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 Band Edge Testing FCC 15.249

4.3.1 Specification Reference

FCC 47 CFR Part 15C Clause 15.249(d)

4.3.2 Test Parameters

This testing was performed with the EUT located within a semi-anechoic chamber.

The Spectrum Analyser was tuned to the wanted signal at a measurement distance of three metres. A 360-degree rotation of the EUT and height search from 1m to 4m was performed to determine the point of maximum wanted signal field strength.

Testing was performed in accordance with ANSI C63.10 clause 6.10.5.

Test Equipment						
#ID	CP	Manufacturer	Type	Serial Number	Description	Calibration Due Date
652	1	TFA	Weather Station	Jupiter	Weather Station	05/11/2025
073	3	Schwarzbeck	BBHA9120B	237	Horn Antenna (1GHz - 10GHz)	08/05/2027
644	1	Intelliconnect	Cable SMA to N-Type	15072	SMA to N-Type Cable 10m	10/03/2026
877	1	Huber & Suhner	SUCOTEST_18A	602608/18A	ST_18A/Nm/Nm (3m)	08/11/2025
788	1	Rohde & Schwarz	ESW44	101799	EMI Test Receiver (44GHz)	05/09/2025
750	1	Global	CISPR16	-	11 x 7 x 6.2m, Chamber (Jupiter)	20/12/2025
741	0	California instruments	MX45	55282	3 Phase Voltage / Frequency Supply	Not Required

Environmental Test Conditions		
Temperature	22.7	24.8
Relative Humidity	55	47
Atmospheric Pressure	1019.2	1023.5
Test Date:	19 August 2025	18 August 2025
Test Engineer:	Graeme Lawler	Graeme Lawler

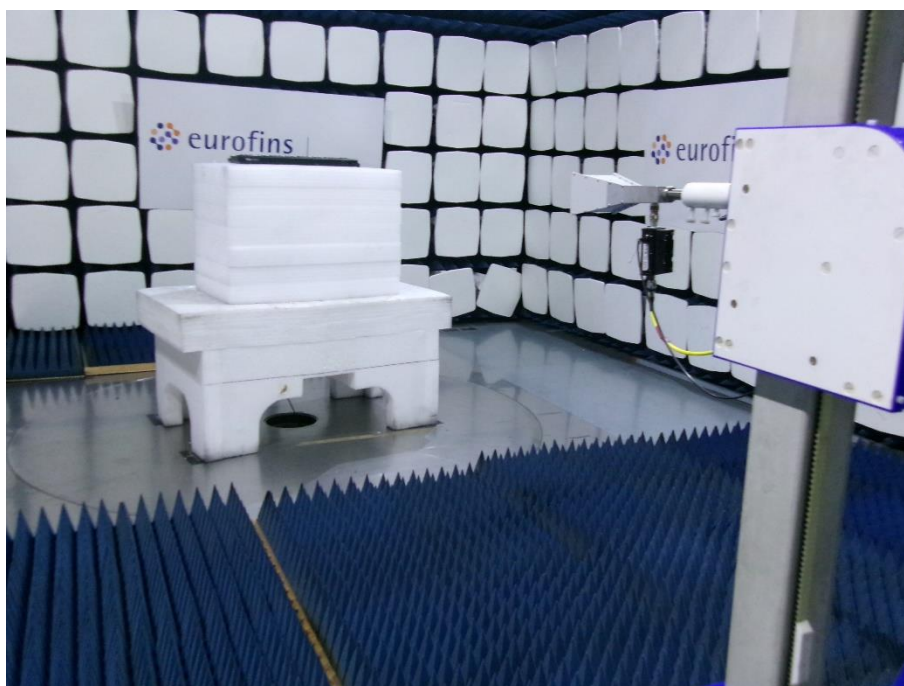
Note: "Calibration due date" means the instrument is certified within UKAS or traceable calibration certificate. "Internal" means the instrument is calibrated using Eurofins E&E UK procedures. "Not required" means the asset does not require calibration. "CP" is the interval period [year] prescribed for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

4.3.3 Test Configuration

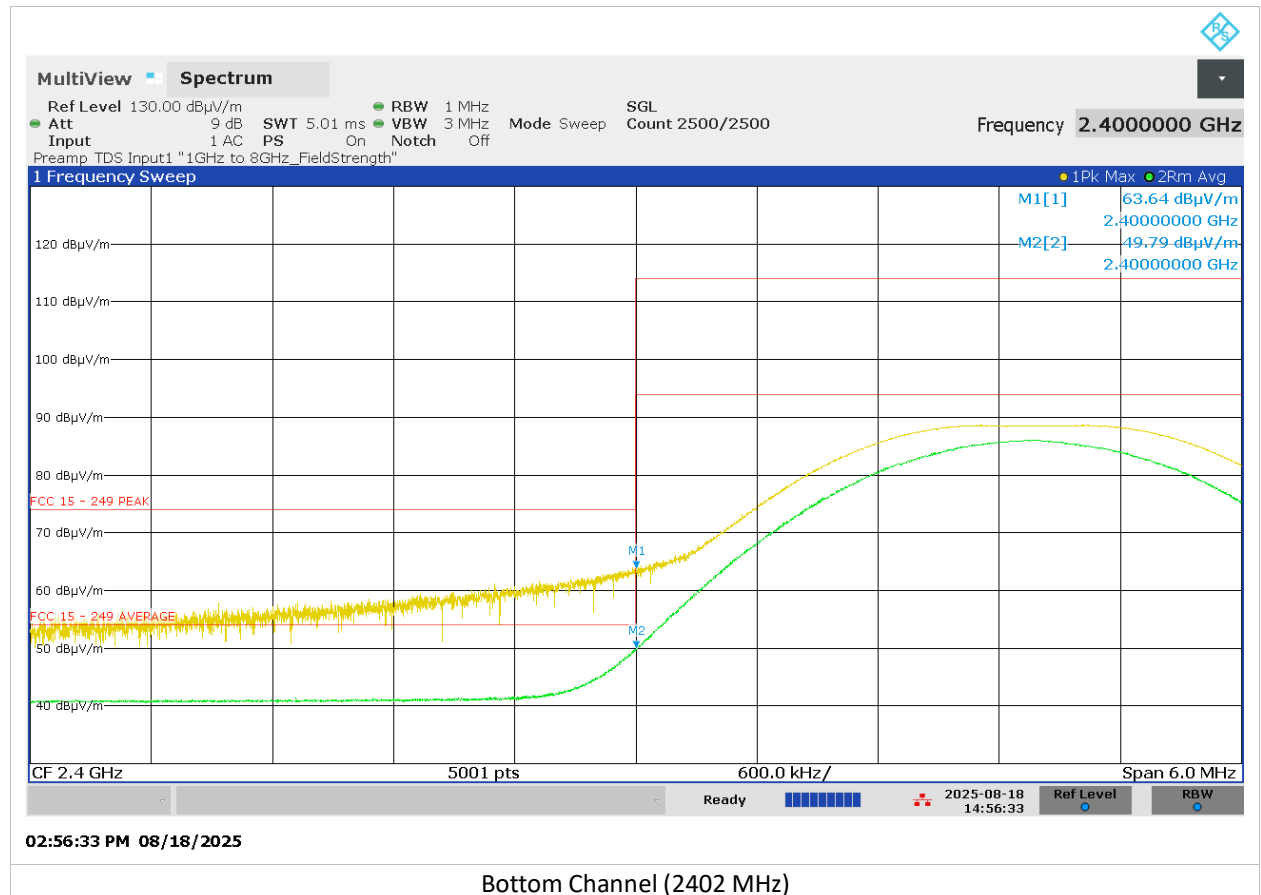
Please refer to EUT Test Configuration #1.

4.3.4 Setup Photo

Band Edge Testing



4.3.5 Profile; Authorised Band Edge, 2402MHz, 1MHz Channel Bandwidth, Bottom Channel



4.3.6 Data; Authorised Band Edge, 2402MHz, 1MHz Channel Bandwidth, Bottom Channel

Band Edge Frequency MHz	Detector	Result dBuV/m	Limit dBuV/m	Margin dB	Result
2400	Peak	63.64	73.98	10.34	Pass
2400	Average	51.83*	53.98	2.15	Pass

*A Duty Cycle Correction Factor (DCCF) has been determined in accordance with ANSI C63.10 clause 11.12.2.5.2. The calculation for 1MHz Channel Bandwidth is given below:

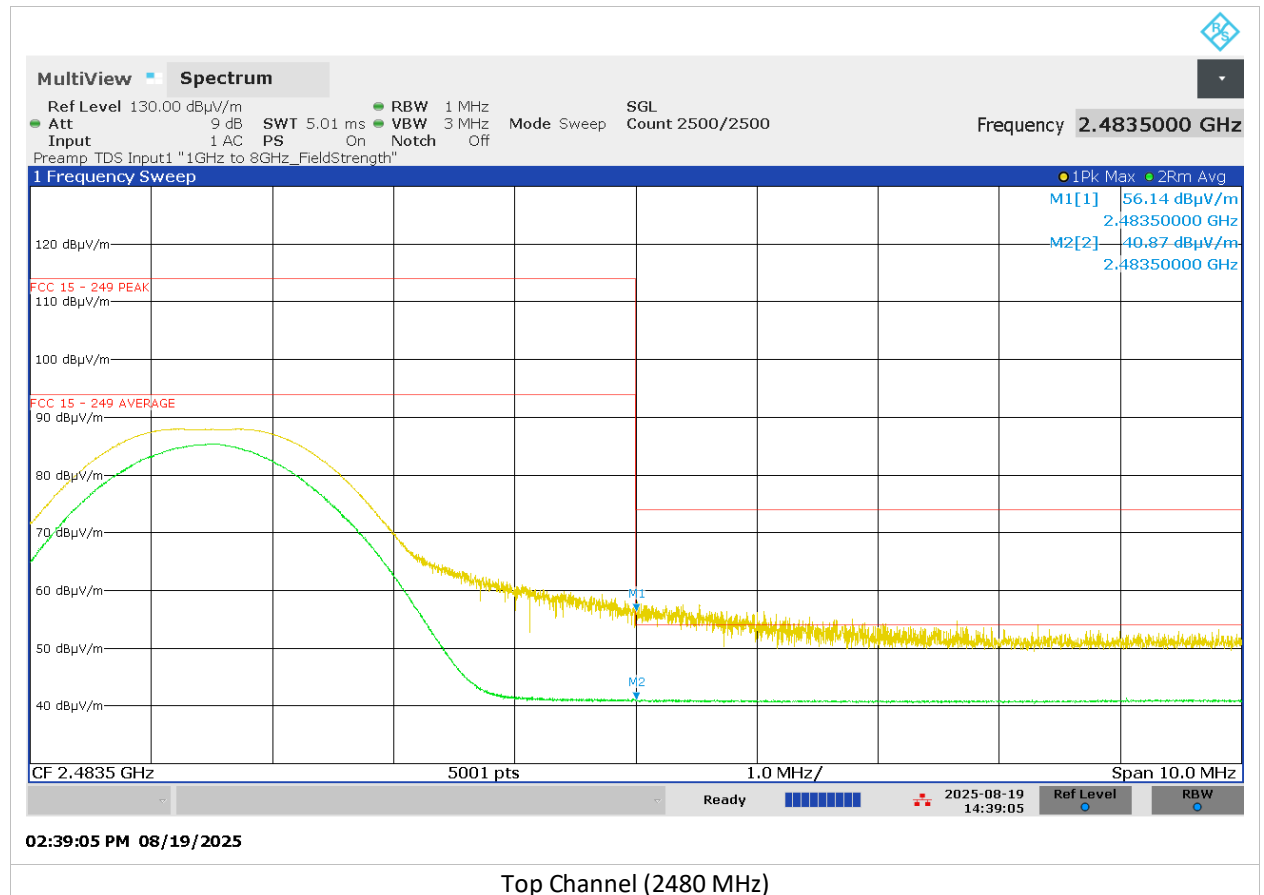
$$DCCF = 10 \cdot \log (T_{Xon} / (T_{Xon} + T_{Xoff}))$$

$$DCCF = 10 \cdot \log (391\mu S / (391\mu S + 234.3\mu S))$$

$$DCCF = 2.04dB$$

This DCCF has been added to the average level taken from the plot and presented in the results table above.

4.3.7 Profile; Authorised Band Edge, 2480MHz, 1MHz Channel Bandwidth, Top Channel



4.3.8 Data; Authorised Band Edge, 2480MHz, 1MHz Channel Bandwidth, Top Channel

Band Edge Frequency MHz	Detector	Result dBuV/m	Limit dBuV/m	Margin dB	Result
2483.5	Peak	56.14	73.98	17.84	Pass
2483.5	Average	42.91*	53.98	11.07	Pass

*A Duty Cycle Correction Factor (DCCF) has been determined in accordance with ANSI C63.10 clause 11.12.2.5.2. The calculation for 1MHz Channel Bandwidth is given below:

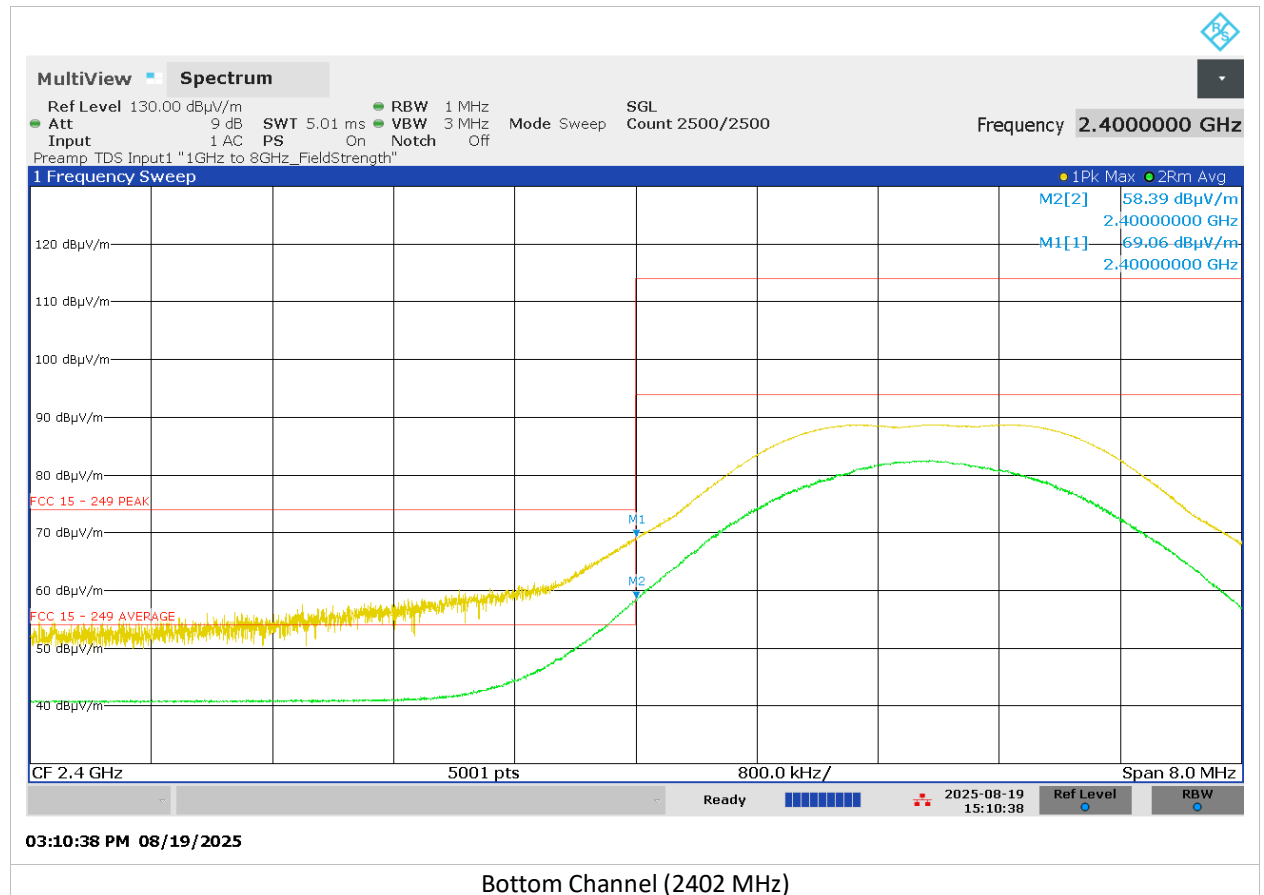
$$DCCF = 10 \cdot \log (T_{X_{On}} / (T_{X_{On}} + T_{X_{Off}}))$$

$$DCCF = 10 \cdot \log (391 \mu S / (391 \mu S + 234.3 \mu S))$$

$$DCCF = 2.04 \text{ dB}$$

This DCCF has been added to the average level taken from the plot and presented in the results table above.

4.3.9 Profile; Authorised Band Edge, 2402MHz, 2MHz Channel Bandwidth, Bottom Advertising Channel



4.3.10 Data; Authorised Band Edge, 2402MHz, 2MHz Channel Bandwidth, Bottom Advertising Channel

Band Edge Frequency MHz	Detector	Result dBμV/m	Limit dBμV/m	Margin dB	Result
2400	Peak	69.06	73.98	4.92	Pass
2400	Average	25.58*	53.98	28.40	Pass

*A Duty Cycle Correction Factor (DCCF) has been determined in accordance with ANSI C63.10 clause 7.5 based on pulsed operation.

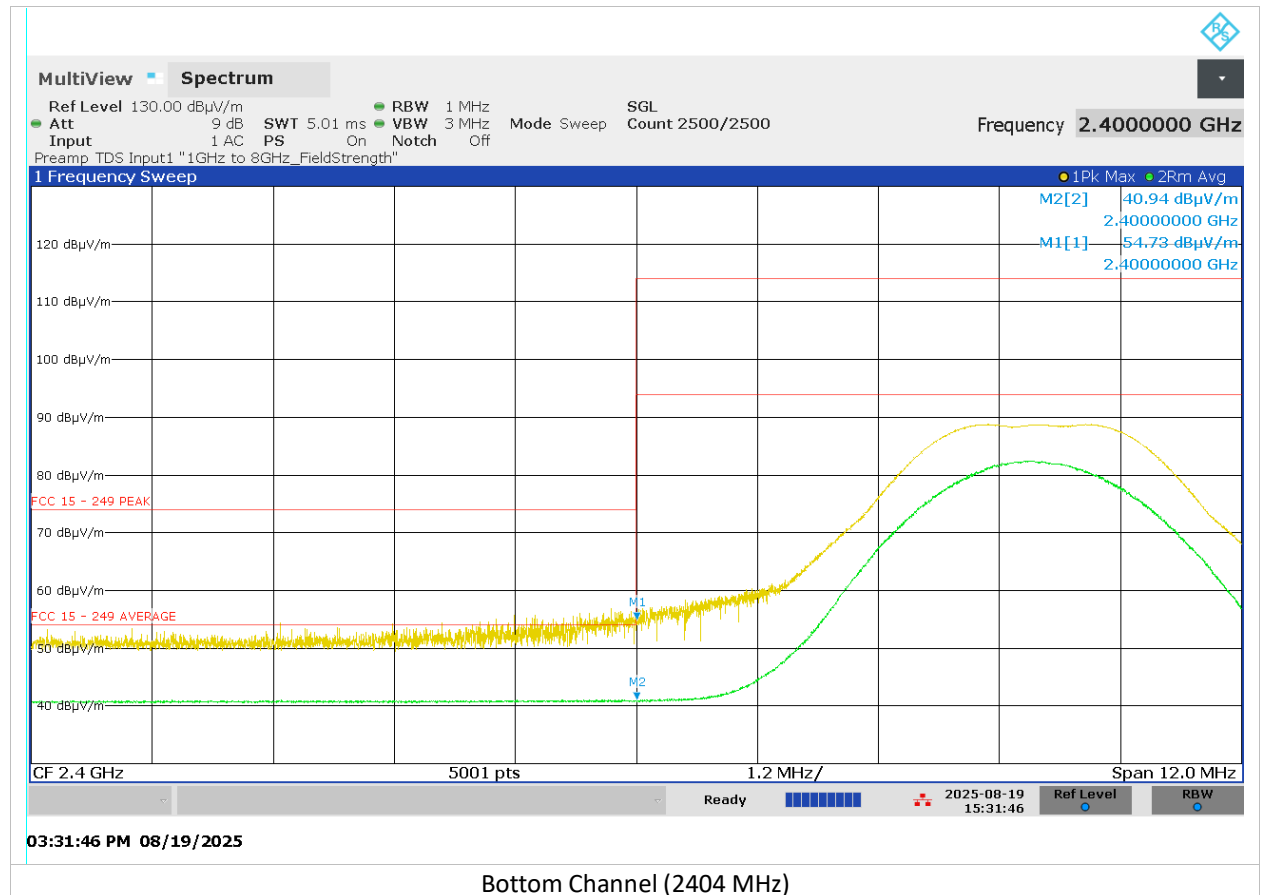
$$DCCF = 20 \cdot \log (T_{X_{On}} / (T_{X_{On}} + T_{X_{Off}}))$$

$$DCCF = 20 \cdot \log (670 \mu S / (670 \mu S + 99330 \mu S))$$

$$DCCF = 43.48 \text{ dB}$$

This DCCF has been subtracted from the peak level taken from the plot and presented in the results table above.

4.3.11 Profile; Authorised Band Edge, 2404MHz, 2MHz Channel Bandwidth, Bottom Channel



4.3.12 Data; Authorised Band Edge, 2404MHz, 2MHz Channel Bandwidth, Bottom Channel

Band Edge Frequency MHz	Detector	Result dBμV/m	Limit dBμV/m	Margin dB	Result
2404	Peak	54.73	73.98	19.25	Pass
2404	Average	45.79*	53.98	8.19	Pass

*A Duty Cycle Correction Factor (DCCF) has been determined in accordance with ANSI C63.10 clause 11.12.2.5.2. The calculation for 2MHz channel Bandwidth is given below:

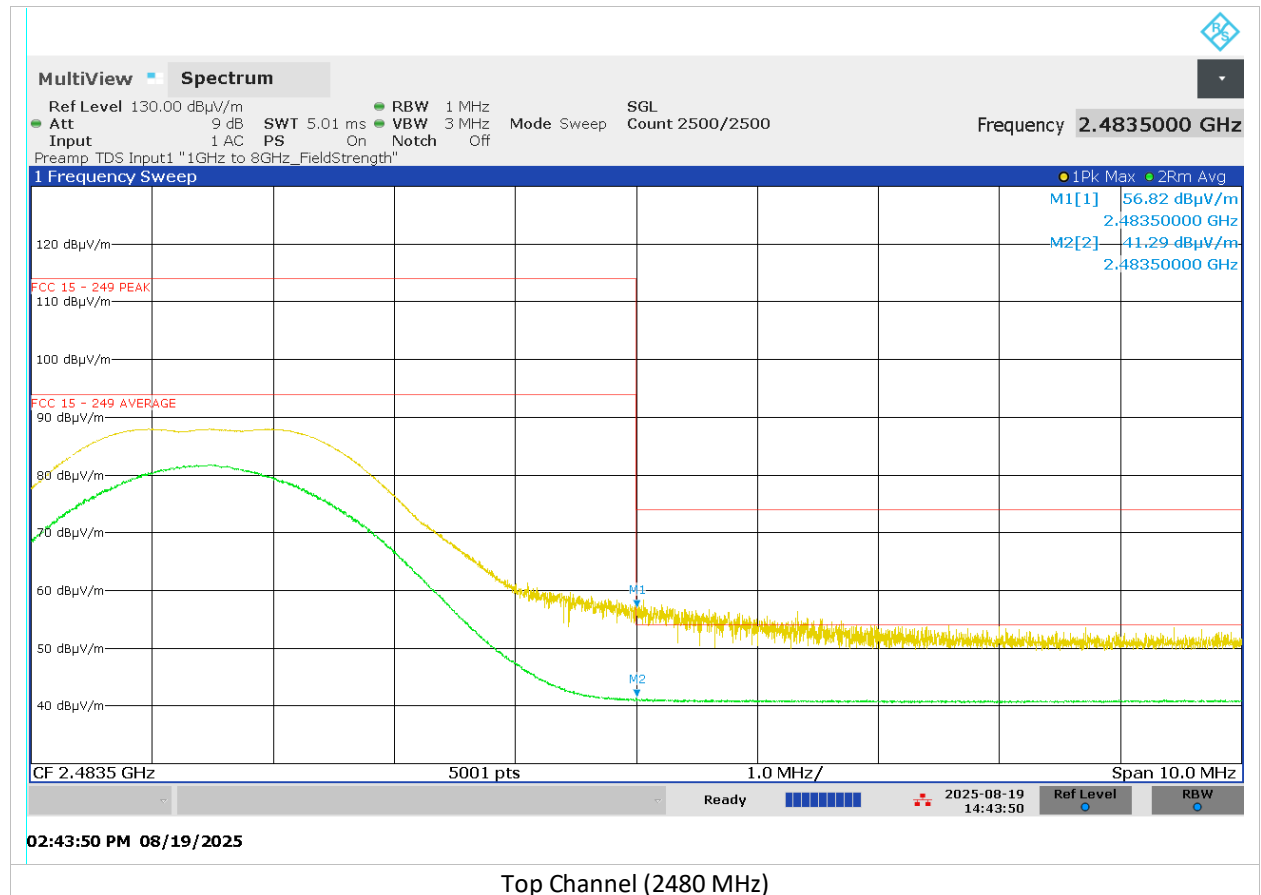
$$DCCF = 10 \cdot \log (T_{X_{On}} / (T_{X_{On}} + T_{X_{Off}}))$$

$$DCCF = 10 \cdot \log (204.6 \mu S / (204.6 \mu S + 420.6 \mu S))$$

$$DCCF = 4.85 \text{ dB}$$

This DCCF has been added to the average level taken from the plot and presented in the results table above.

4.3.13 Profile; Authorised Band Edge, 2480MHz, 2MHz Channel Bandwidth, Top Channel



4.3.14 Data; Authorised Band Edge, 2480MHz, 2MHz Channel Bandwidth, Top Channel

Band Edge Frequency MHz	Detector	Result dBuV/m	Limit dBuV/m	Margin dB	Result
2483.5	Peak	56.82	73.98	17.16	Pass
2483.5	Average	46.14	53.98	7.84	Pass

*A Duty Cycle Correction Factor (DCCF) has been determined in accordance with ANSI C63.10 clause 11.12.2.5.2. The calculation for 2MHz channel Bandwidth is given below:

$$DCCF = 10 \cdot \log (T_{X_{On}} / (T_{X_{On}} + T_{X_{Off}}))$$

$$DCCF = 10 \cdot \log (204.6 \mu S / (204.6 \mu S + 420.6 \mu S))$$

$$DCCF = 4.85 \text{ dB}$$

This DCCF has been added to the average level taken from the plot and presented in the results table above.

4.4 Field Strength of Fundamental FCC 15.249

4.4.1 Specification Reference

FCC 47 CFR Part 15C Clause 15.249(a)

4.4.2 Test Parameters

This testing was performed with the EUT located within a semi-anechoic chamber.

The Spectrum Analyser was tuned to the wanted signal at a measurement distance of three metres. A 360-degree rotation of the EUT and height search from 1m to 4m was performed to determine the point of maximum wanted signal field strength.

Test Equipment						
#ID	CP	Manufacturer	Type	Serial Number	Description	Calibration Due Date
652	1	TFA	Weather Station	Jupiter	Weather Station	05/11/2025
073	3	Schwarzbeck	BBHA9120B	237	Horn Antenna (1GHz - 10GHz)	08/05/2027
644	1	Intelliconnect	Cable SMA to N-Type	15072	SMA to N-Type Cable 10m	10/03/2026
877	1	Huber & Suhner	SUCOTEST_18A	602608/18A	ST_18A/Nm/Nm (3m)	08/11/2025
788	1	Rohde & Schwarz	ESW44	101799	EMI Test Receiver (44GHz)	05/09/2025
750	1	Global	CISPR16	-	11 x 7 x 6.2m, Chamber (Jupiter)	20/12/2025
741	0	California instruments	MX45	55282	3 Phase Voltage / Frequency Supply	Not Required

Environmental Test Conditions		
Temperature	22.7	24.8
Relative Humidity	55	47
Atmospheric Pressure	1019.2	1023.5
Test Date:	19 August 2025	18 August 2025
Test Engineer:	Graeme Lawler	Graeme Lawler

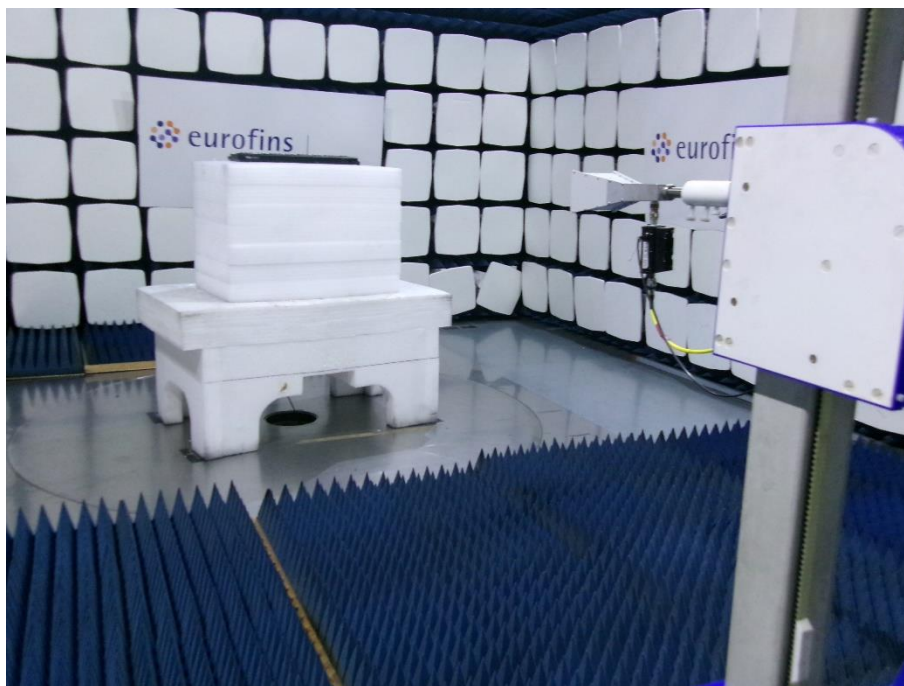
Note: "Calibration due date" means the instrument is certified within UKAS or traceable calibration certificate. "Internal" means the instrument is calibrated using Eurofins E&E UK procedures. "Not required" means the asset does not require calibration. "CP" is the interval period [year] prescribed for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

4.4.3 Test Configuration

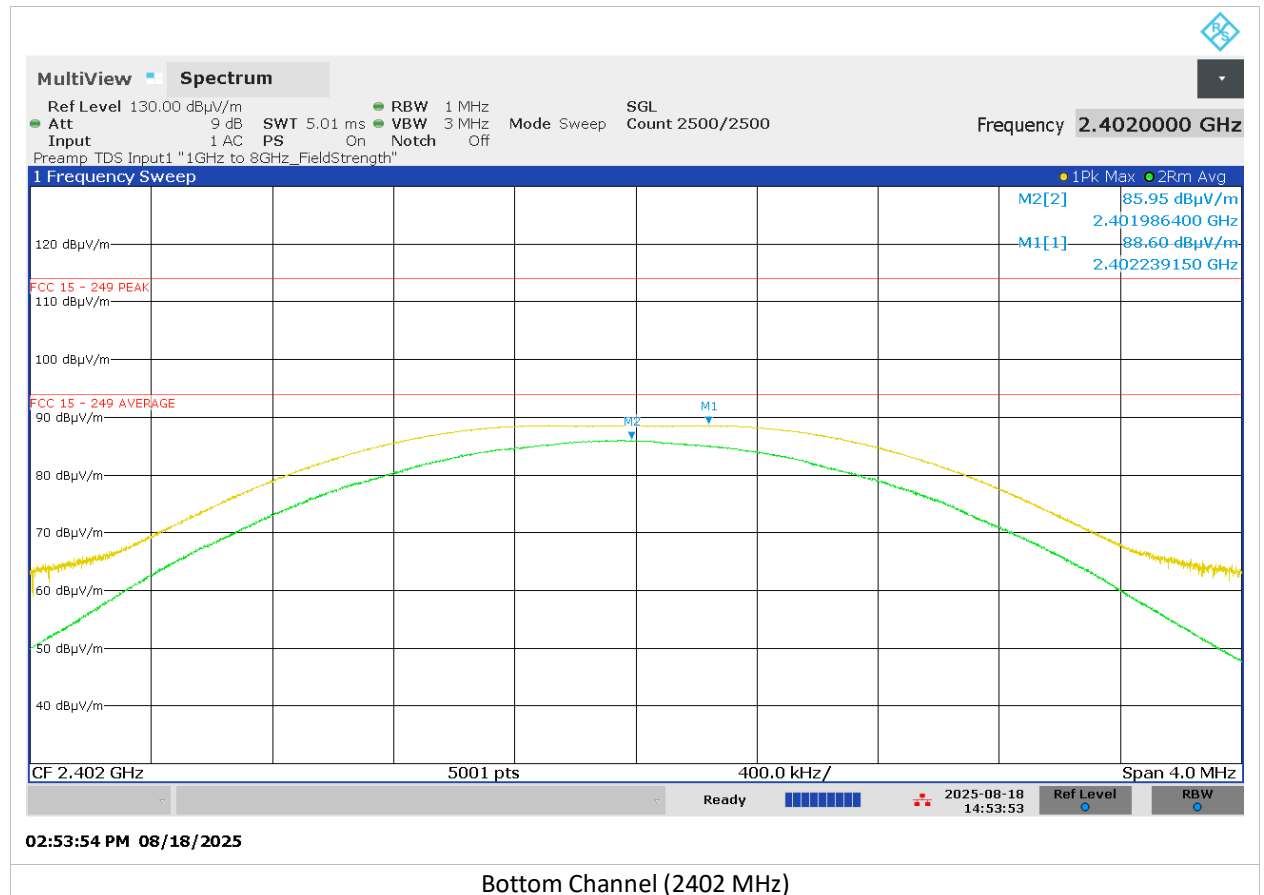
Please refer to EUT Test Configuration #1.

4.4.4 Setup Photo

Field Strength of Fundamental



4.4.5 Profile; Field Strength of Fundamental, 2402MHz, 1MHz Channel Bandwidth, Bottom Channel

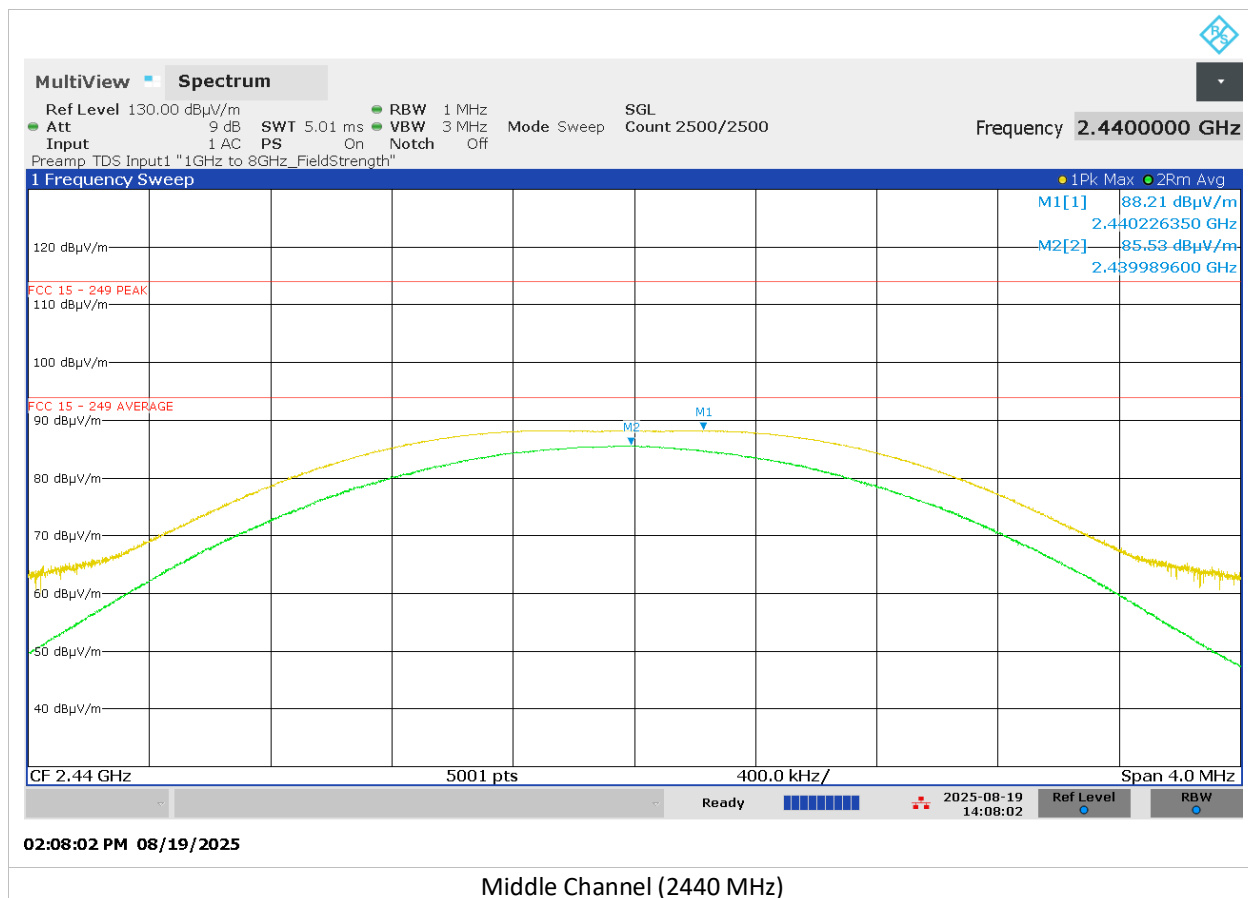


4.4.6 Data; Field Strength of Fundamental, 2402MHz, 1MHz Channel Bandwidth, Bottom Channel

Fundamental Frequency MHz	Detector	Result dBuV/m	Average Limit* dBuV/m	Margin dB	Result
2402	Peak	88.60	93.98	10.34	Pass

*An average measurement has not been performed as the Peak measurement meets the Average limit.

4.4.7 Profile; Field Strength of Fundamental, 2440MHz, 1MHz Channel Bandwidth, Middle Channel



4.4.8 Data; Field Strength of Fundamental, 2440MHz, 1MHz Channel Bandwidth, Middle Channel

Fundamental Frequency MHz	Detector	Result dBuV/m	Average Limit* dBuV/m	Margin dB	Result
2440	Peak	88.21	93.98	5.77	Pass

*An average measurement has not been performed as the Peak measurement meets the Average limit.

4.4.9 Profile; Field Strength of Fundamental, 2480MHz, 1MHz Channel Bandwidth, Top Channel

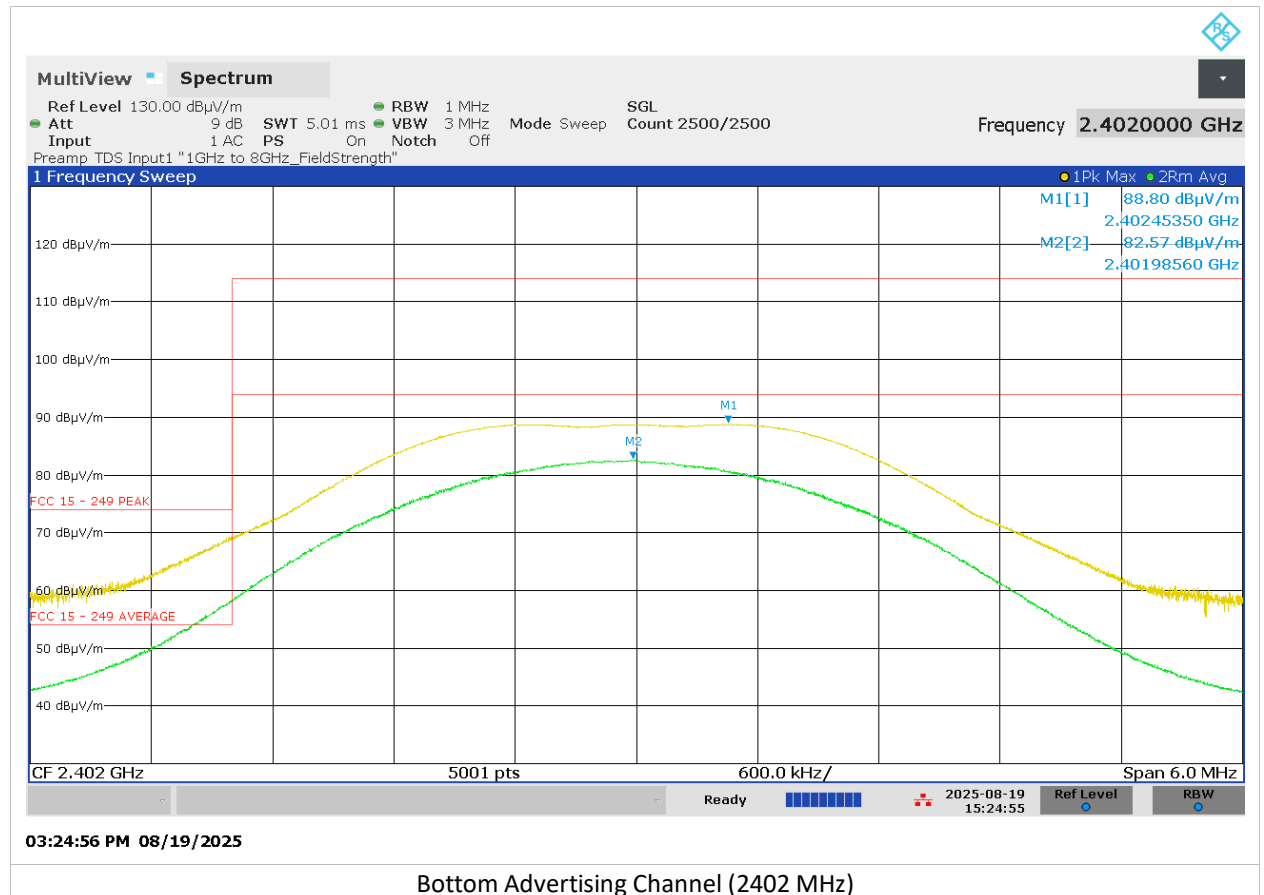


4.4.10 Data; Field Strength of Fundamental, 2480MHz, 1MHz Channel Bandwidth, Top Channel

Fundamental Frequency MHz	Detector	Result dBuV/m	Average Limit* dBuV/m	Margin dB	Result
2480	Peak	87.32	93.98	6.66	Pass

*An average measurement has not been performed as the Peak measurement meets the Average limit.

4.4.11 Profile; Field Strength of Fundamental, 2402MHz, 2MHz Channel Bandwidth, Bottom Advertising Channel

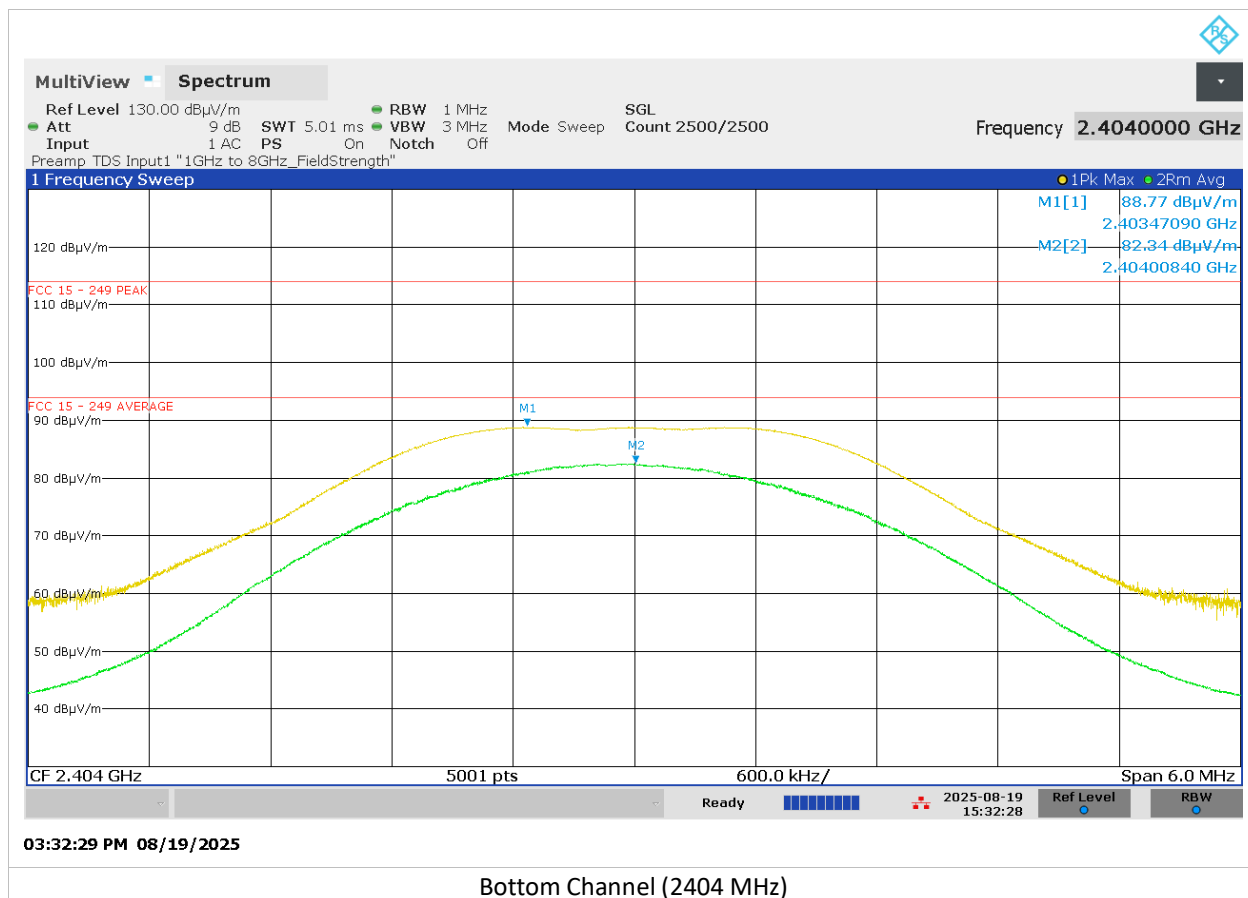


4.4.12 Data; Field Strength of Fundamental, 2402MHz, 2MHz Channel Bandwidth, Bottom Advertising Channel

Fundamental Frequency MHz	Detector	Result dBuV/m	Average Limit* dBuV/m	Margin dB	Result
2402	Peak	88.80	93.98	5.18	Pass

*An average measurement has not been performed as the Peak measurement meets the Average limit.

4.4.13 Profile; Field Strength of Fundamental, 2404MHz, 2MHz Channel Bandwidth, Bottom Channel

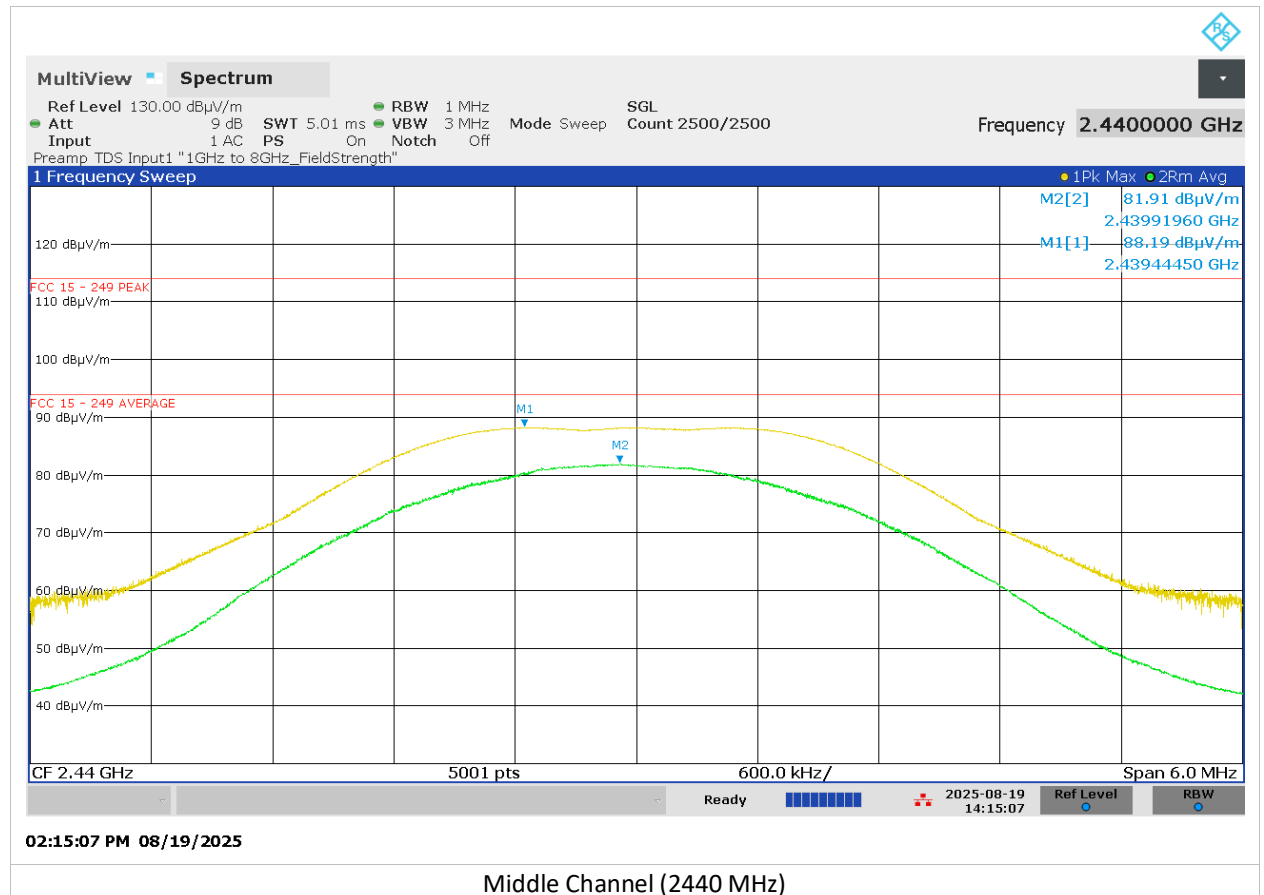


4.4.14 Data; Field Strength of Fundamental, 2404MHz, 2MHz Channel Bandwidth, Bottom Channel

Fundamental Frequency MHz	Detector	Result dBuV/m	Average Limit* dBuV/m	Margin dB	Result
2404	Peak	88.71	93.98	5.27	Pass

*An average measurement has not been performed as the Peak measurement meets the Average limit.

4.4.15 Profile; Field Strength of Fundamental, 2440MHz, 2MHz Channel Bandwidth, Middle Channel



4.4.16 Data; Field Strength of Fundamental, 2440MHz, 2MHz Channel Bandwidth, Middle Channel

Fundamental Frequency MHz	Detector	Result dBuV/m	Average Limit dBuV/m	Margin dB	Result
2440	Peak	88.19	93.98	5.79	Pass

*An average measurement has not been performed as the Peak measurement meets the Average limit.

4.4.17 Profile; Field Strength of Fundamental, 2480MHz, 2MHz Channel Bandwidth, Top Channel



4.4.18 Data; Field Strength of Fundamental, 2480MHz, 2MHz Channel Bandwidth, Top Channel

Fundamental Frequency MHz	Detector	Result dBuV/m	Average Limit dBuV/m	Margin dB	Result
2480	Peak	87.98	93.98	6.00	Pass

*An average measurement has not been performed as the Peak measurement meets the Average limit.

4.5 Radiated H-Field Emissions (150 kHz to 30 MHz)

4.5.1 Test Parameters

A profile scan was taken at a distance of three metres with a 360° azimuth scan of the EUT in a semi-anechoic chamber. The tests were repeated for two orientations of the loop antenna 90° apart.

The measurements reported are the highest emissions relative to the FCC 15.209 limit and take into account the antenna and cable loss factors.

Test Equipment						
#ID	CP	Manufacturer	Type	Serial Number	Description	Calibration Due Date
047	3	Rohde & Schwarz	HFH2-Z2	879021/22	Loop Antenna (9kHz - 30MHz)	15/12/2025
788	1	Rohde & Schwarz	ESW44	101799	EMI Test Receiver (44GHz)	05/09/2025
750	1	Global	CISPR16	-	11 x 7 x 6.2m, Chamber (Jupiter)	20/12/2025
788	1	Rohde & Schwarz	ESW44	101799	EMI Test Receiver (44GHz)	05/09/2025
877	1	Huber & Suhner	SUCOTEST_18A	602608/18A	ST_18A/Nm/Nm (3m)	08/11/2025
Test Equipment Software						
#ID	CP	Manufacturer	Type		Description	Calibration Due Date
856	0	Rohde & Schwarz	Software	0	EMC32 v11.50.0 (Pluto)	Not required

Environmental Test Conditions	
Temperature	23° Celsius
Relative Humidity	46 %
Atmospheric Pressure	1020.9 millibars
Test Date:	21 st August 2025
Test Engineer:	Richard Pennell

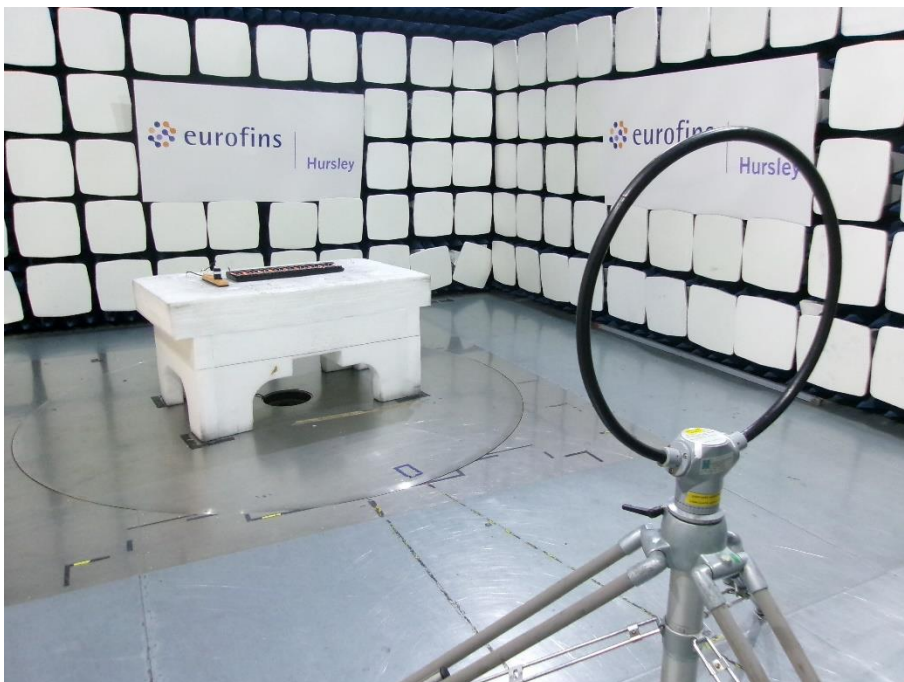
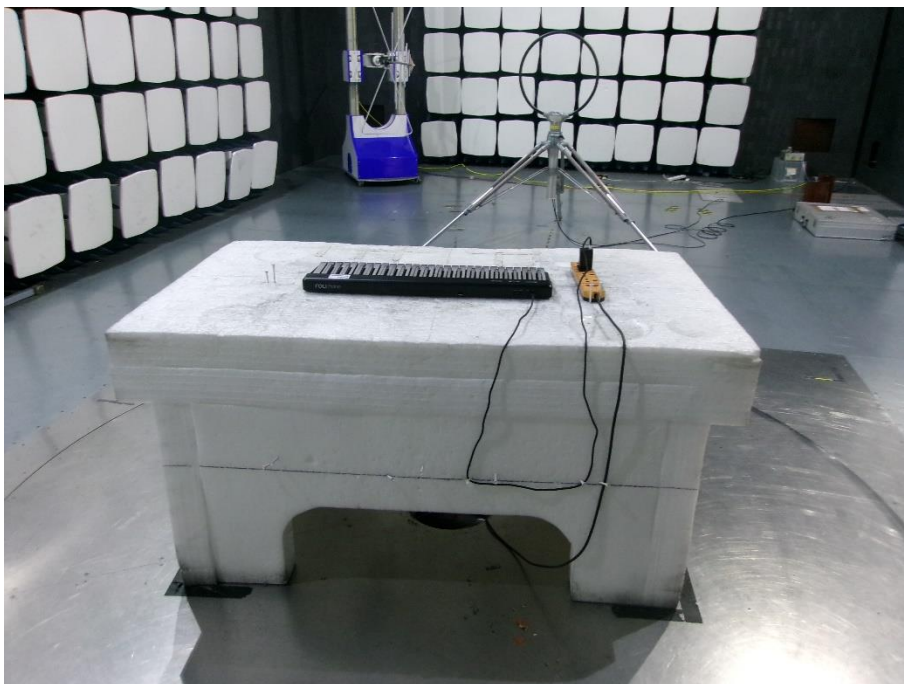
Note: "Calibration due date" means the instrument is certified within UKAS or traceable calibration certificate. "Internal" means the instrument is calibrated using Eurofins E&E UK procedures. "Not required" means the asset does not require calibration. "CP" is the interval period [year] prescribed for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

4.5.2 Test Configuration

Please refer to EUT Test Configuration #1.

4.5.3 Set-up Photos

Radiated H-Field Emissions (150 kHz to 30 MHz)

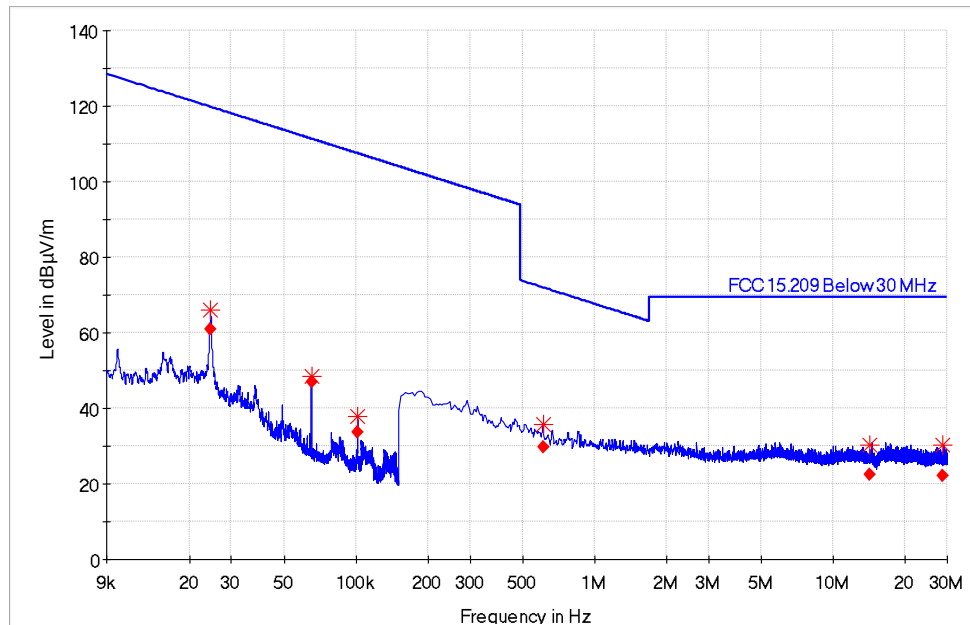


4.5.4 Profile; Bottom Channel

Maximum peak hold trace with quasi-peak values (◆)

Peak measurements (✱)

150 kHz to 30 MHz

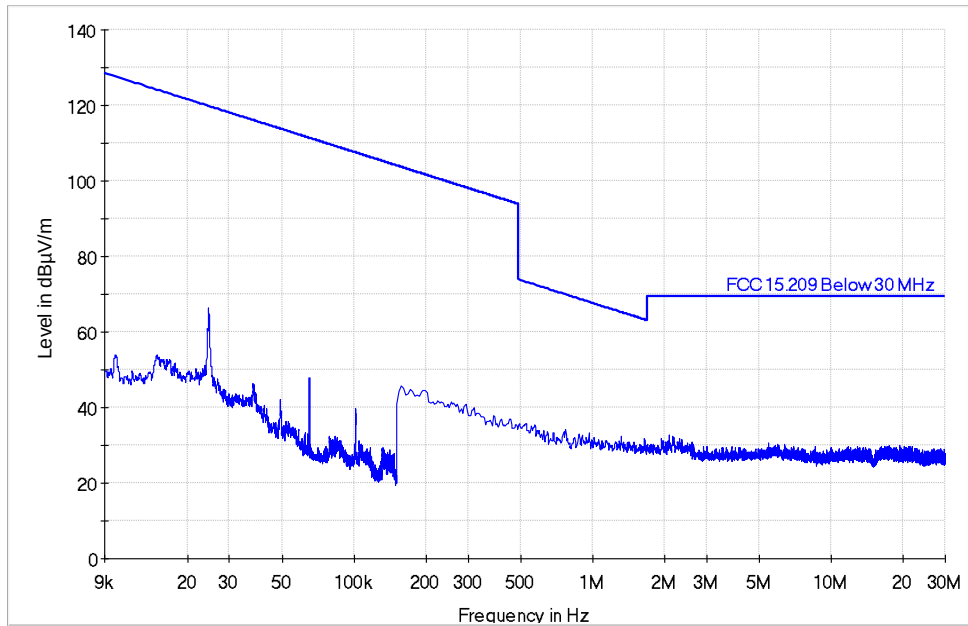


4.5.5 Data; Bottom Channel

Frequency	Measured Quasi-Peak	Limit Quasi-Peak	Margin	Antenna Polarisation	
MHz	dBµV/m	dBµV/m	dB	H/V	Status
0.024602	61.05	119.77	58.72	V	Pass
0.064951	46.89	111.34	64.45	V	Pass
0.101340	33.49	107.48	74.00	V	Pass
0.608061	29.67	71.93	42.25	H	Pass
14.224720	22.43	69.50	47.07	H	Pass
28.556735	22.18	69.50	47.32	V	Pass

4.5.6 Profile; Middle Channel

150 kHz to 30 MHz

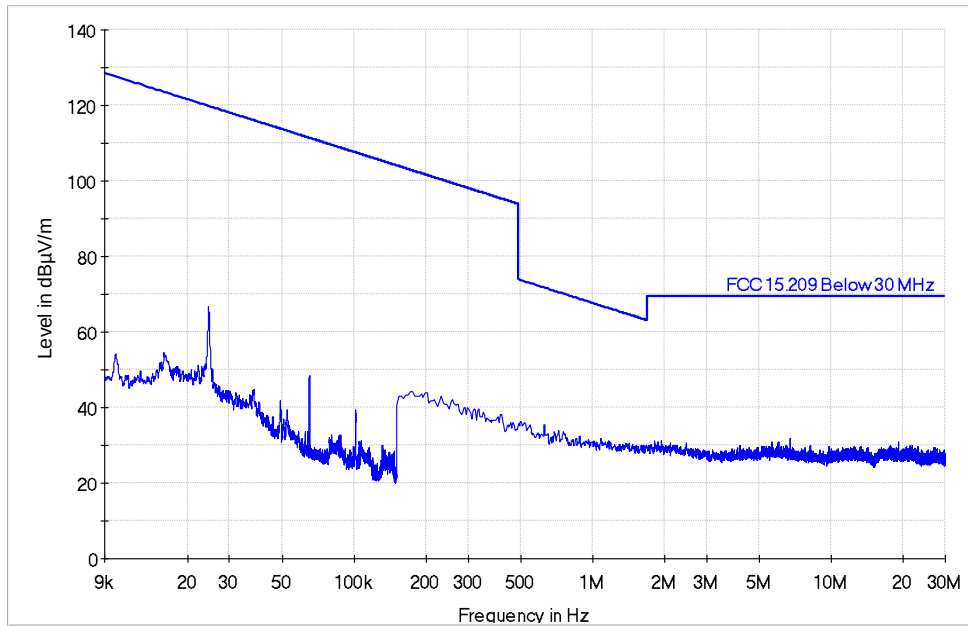


4.5.7 Data; Middle Channel

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

4.5.8 Profile; Top Channel

150 kHz to 30 MHz



4.5.9 Data; Top Channel

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

4.6 Conducted Emissions; FCC 15.107 (110 V 60 Hz)

4.6.1 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 E&E UK test procedure CON-03.

Test Equipment						
#ID	CP	Manufacturer	Type	Serial Number	Description	Calibration Due Date
147	1	Rohde & Schwarz	ESH3 Z5	846695/011	Single phase (LISN / AMN) CISPR only	05/09/2025
189	1	Rohde & Schwarz	ESH3-Z2	-	Pulse Limiter (N-Type)	12/12/2025
480	1	-	Cable BNC	-	Cable BNC 10m	11/02/2026
679	1	Gauss	TDEIM30M	1510003	Time Domain Conducted Receiver	30/04/2026
787	0	Eurofins E&E	Ground plane	Saturn	Ground Plane Work Area	Not Required
Test Equipment Software						
#ID	CP	Manufacturer	Type		Description	Calibration Due Date
857	0	Gauss	Software	0	TDMI 30 v5.00	Not required

Environmental Test Conditions	
Temperature	24.4° Celsius
Relative Humidity	43 %
Atmospheric Pressure	1022 millibars
Test Date:	21 st August 2025
Test Engineer:	Richard Pennell

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

4.6.2 Test Configuration

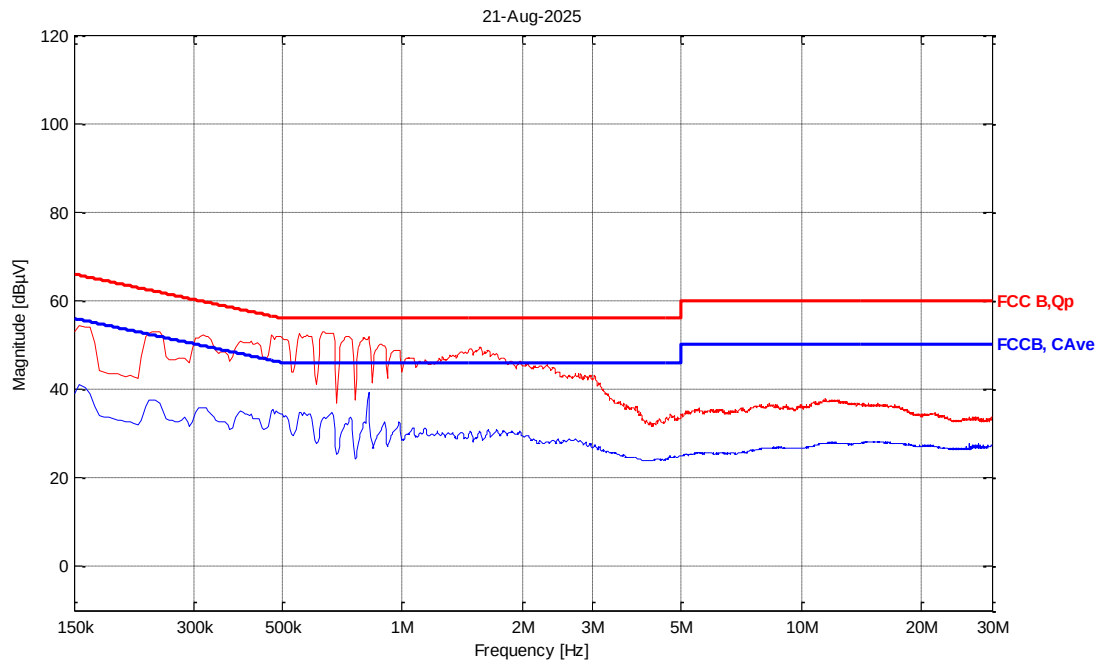
Please refer to EUT Test Configuration #2.

4.6.3 Set-up Photos

Conducted Emissions



4.6.4 Profile; Mains Neutral, FCC 15.107 (110 V 60 Hz)



4.6.5 Data; Mains Neutral, FCC 15.109 (110 V 60 Hz)

Quasi-peak value (dBμV)				
Frequency	Measured	Class B Limit	Margin	Status
636.578 kHz	52.95	56.00	3.05	Pass
8.285 MHz	36.61	60.00	23.39	Pass
11.470 MHz	37.84	60.00	22.16	Pass
15.519 MHz	36.66	60.00	23.34	Pass
21.131 MHz	34.60	60.00	25.40	Pass
27.044 MHz	33.74	60.00	26.26	Pass

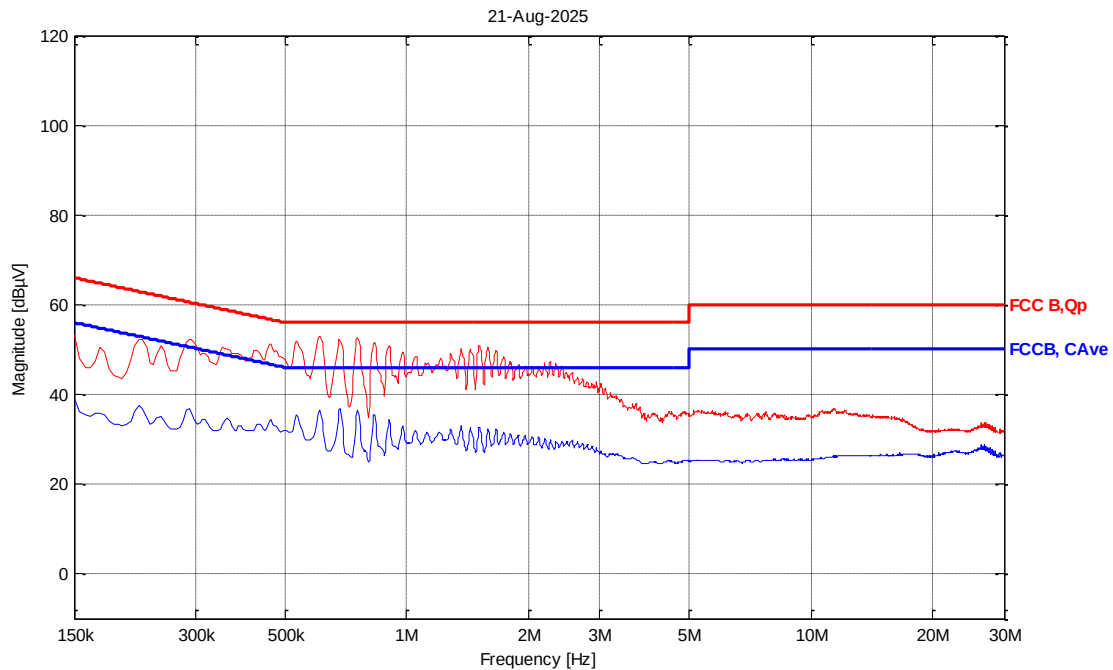
CISPR Average value (dBμV)				
Frequency	Measured	Class B Limit	Margin	Status
822.544 kHz	39.13	46.00	6.87	Pass
8.733 MHz	26.90	50.00	23.10	Pass
14.923 MHz	28.14	50.00	21.86	Pass
15.075 MHz	28.25	50.00	21.75	Pass
20.769 MHz	27.42	50.00	22.58	Pass
26.462 MHz	27.50	50.00	22.50	Pass

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).

4.6.6 Profile; Mains Line, FCC 15.107 (110 V 60 Hz)



4.6.7 Data; Mains Line, FCC 15.107 (110 V 60 Hz)

Quasi-peak value (dBμV)				
Frequency	Measured	Class B Limit	Margin	Status
607.967 kHz	52.85	56.00	3.15	Pass
5.291 MHz	36.56	60.00	23.44	Pass
11.418 MHz	36.82	60.00	23.18	Pass
15.261 MHz	35.07	60.00	24.93	Pass
21.384 MHz	32.24	60.00	27.76	Pass
26.462 MHz	33.68	60.00	26.32	Pass

CISPR Average value (dBμV)				
Frequency	Measured	Class B Limit	Margin	Status
684.261 kHz	36.63	46.00	9.37	Pass
8.504 MHz	25.51	50.00	24.49	Pass
14.460 MHz	26.65	50.00	23.35	Pass
16.615 MHz	26.82	50.00	23.18	Pass
22.771 MHz	27.30	50.00	22.70	Pass
26.462 MHz	28.78	50.00	21.22	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).

4.7 Conducted Emissions; FCC 15.207 (110 V 60 Hz)

4.7.1 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 E&E UK test procedure CON-03.

Test Equipment						
#ID	CP	Manufacturer	Type	Serial Number	Description	Calibration Due Date
147	1	Rohde & Schwarz	ESH3 Z5	846695/011	Single phase (LISN / AMN) CISPR only	05/09/2025
189	1	Rohde & Schwarz	ESH3-Z2	-	Pulse Limiter (N-Type)	12/12/2025
480	1	-	Cable BNC	-	Cable BNC 10m	11/02/2026
679	1	Gauss	TDEIM30M	1510003	Time Domain Conducted Receiver	30/04/2026
787	0	Eurofins E&E	Ground plane	Saturn	Ground Plane Work Area	Not Required
Test Equipment Software						
#ID	CP	Manufacturer	Type		Description	Calibration Due Date
857	0	Gauss	Software	0	TDMI 30 v5.00	Not required

Environmental Test Conditions	
Temperature	24.4° Celsius
Relative Humidity	43 %
Atmospheric Pressure	1022 millibars
Test Date:	21 st August 2025
Test Engineer:	Richard Pennell

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

4.7.2 Test Configuration

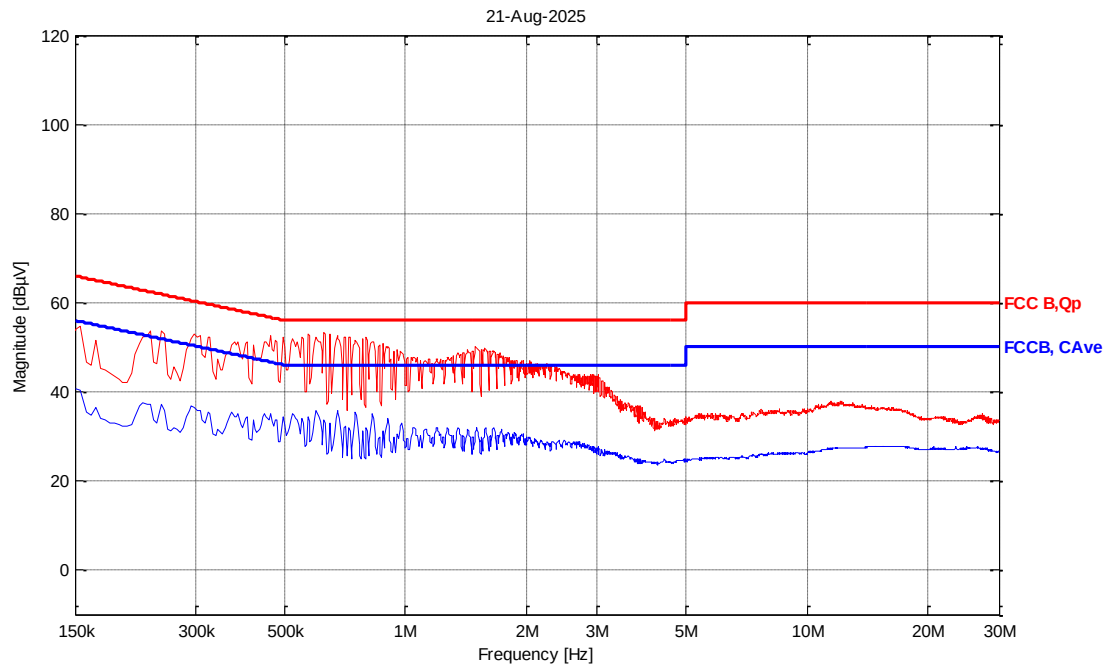
Please refer to EUT Test Configuration #1.

4.7.3 Set-up Photos

Conducted Emissions



4.7.4 Profile; Mains Neutral, FCC 15. 207 (110 V 60 Hz)



4.7.5 Data; Mains Neutral, FCC 15. 207 (110 V 60 Hz)

Quasi-peak value (dBμV)				
Frequency	Measured	Class B Limit	Margin	Status
627.041 kHz	53.24	56.00	2.76	Pass
9.816 MHz	36.17	60.00	23.83	Pass
12.143 MHz	37.76	60.00	22.24	Pass
15.328 MHz	36.45	60.00	23.55	Pass
21.193 MHz	34.37	60.00	25.63	Pass
27.277 MHz	34.88	60.00	25.12	Pass

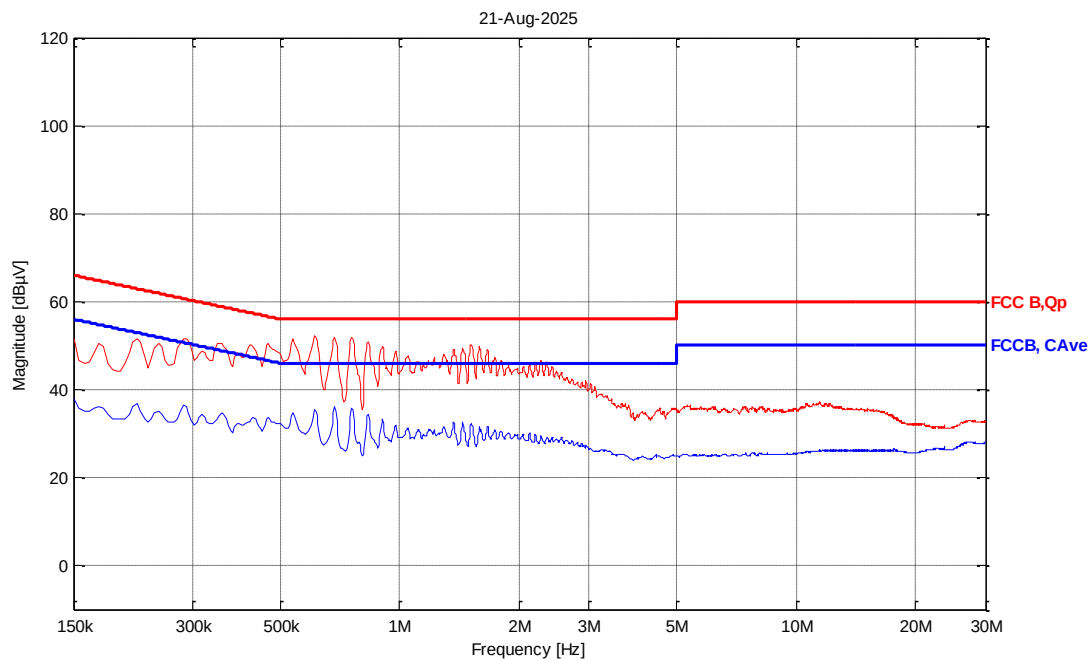
CISPR Average value (dBμV)				
Frequency	Measured	Class B Limit	Margin	Status
674.725 kHz	35.61	46.00	10.39	Pass
9.749 MHz	26.35	50.00	23.65	Pass
14.722 MHz	27.89	50.00	22.11	Pass
15.337 MHz	27.94	50.00	22.06	Pass
23.534 MHz	27.65	50.00	22.35	Pass
26.476 MHz	27.74	50.00	22.26	Pass

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).

4.7.6 Profile; Mains Line, FCC 15. 207 (110 V 60 Hz)



4.7.7 Data; Mains Line, FCC 15. 207 (110 V 60 Hz)

Quasi-peak value (dBμV)				
Frequency	Measured	Class B Limit	Margin	Status
607.967 kHz	52.17	56.00	3.83	Pass
5.391 MHz	36.42	60.00	23.58	Pass
11.437 MHz	37.20	60.00	22.80	Pass
15.156 MHz	35.56	60.00	24.44	Pass
20.254 MHz	32.40	60.00	27.60	Pass
27.335 MHz	33.01	60.00	26.99	Pass

CISPR Average value (dBμV)				
Frequency	Measured	Class B Limit	Margin	Status
684.261 kHz	36.09	46.00	9.91	Pass
7.370 MHz	25.70	50.00	24.30	Pass
14.741 MHz	26.36	50.00	23.64	Pass
17.688 MHz	26.53	50.00	23.47	Pass
23.582 MHz	27.04	50.00	22.96	Pass
27.373 MHz	28.08	50.00	21.92	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).

5.0 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 U_{lab}) are equal to or are less than the expected uncertainty values contained in CISPR 16-4-2 (known as U_{cispr}). 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:	±2.79 dB (150 kHz – 30 MHz)
Harmonics:	±1.50 % (100 Hz – 2 kHz)
Flicker:	±1.24 % (worst case for all parameters)

Radiated emissions:

H-Field:	±2.84 dB (9 kHz – 3 MHz), ±2.92 dB (3 MHz – 30 MHz)
D = 3.0 m (Horizontal):	±4.02 dB (30 MHz – 1 GHz SAC), ±3.82 dB (30 MHz – 1 GHz FAC)
D = 3.0 m (Vertical):	±3.92 dB (30 MHz – 1 GHz SAC), ±3.82 dB (30 MHz – 1 GHz FAC)
D = 3.0 m:	±5.04 dB (1 GHz – 6 GHz SAC), ±5.16 dB (1 GHz – 10 GHz SAC), ±3.64 dB (10 GHz – 18 GHz SAC), ±3.15 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)

Conducted RF Measurements:

±3.11 dB (30 MHz – 40 GHz)

Immunity Tests

Radiated Fields in Close Proximity (EN 61000-4-39): ±1.93 dB (30 kHz & 134.2 kHz)

Radiated Fields in Close Proximity (EN 61000-4-39): ± 2.02 dB (13.56 MHz)

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.

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