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Test Report for the FCC and ISED Testing of an ATR SE Reader Core to FCC Rules 47CFR 15.225 and RSS-210 for Access Ltd

Test Report number: C16103TR2
Project number: C9608v3

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Issue	Description						Issue by	Date
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CONTENTS

List of Figures

List of Tables

Test Report Change History

Issue	Date	Modification Details
1	24th November 2025	First Issue
2	4th December 2025	Customer address amended
3		
4		
5		
6		
7		
8		
9		
10		

Section 1 Test Location

All testing was performed at;

Eurofins E&E UK	Unit 5
	Speedwell Road
	Castleford
	WF10 5PY
Tel:	01977 731173
Website	http://www.yorkemc.co.uk
UKAS Testing No.	1574

1.1 UKAS Accreditation

Opinions and interpretations expressed herein are outside the scope of UKAS Accreditation.

Eurofins E&E UK latest accreditation schedule can be found at:
UKAS Scope of accreditation

Eurofins E&E UK Castleford Laboratory, is an Accredited facility recognised by the Federal Communications Commission (FCC) for certification testing. The appropriate FCC Designation Number is UK2013, dated 1st March 2021.

Eurofins E&E UK Castleford Laboratory is recognised by ISED for certification testing.
ISED Assigned Code: 22959

Section 2 Customer Information

Company name	Access Ltd
Address	18 – 19 Suttons Business Park
	Reading
	RG6 1AZ
	United Kingdom
Contact	Tanya Newell
Email	Tanya.newell@hidglobal.com

Section 3 Equipment Details

3.1 Equipment Under Test (EUT)

Date received:	10th September 2025		
EUT name:	ATR SE Reader Core		
PMN:	ATR SE Reader Core		
Hardware version:	ATR215-ITR-U		
Firmware version:	V1.1.14		
FCC ID:	ZERSEC01		
Serial no:	999909002 of ATR215 unit		
EUT description:	The EUT is an NFC radio module for the incorporation into the ATR215 series devices. The ATR215 reads 2D barcodes from mobile devices and paper, and reads and writes to contactless smart cards, NFC labels and NFC-enabled mobile devices.		
Antenna	Integral Antenna 7114.5mm^2 loop area		
Transmission	13.56MHz RFID		
Modulation schemes	ASK		
Operating frequency band	13.11 to 14.01MHz		
No of units tested:	One		
EUT power:	Nominal 12Vdc via customer suppled 120Vac PSU		
Highest internal frequency:	13.56MHz		
Size of EUT (mm)	Length: 43	Width: 43	Height: 10
Mode/s of operation:	Continuous transmission of a modulated signal		
Test software:	None		
Modifications incorporated during testing:	22pF capacitor added to antenna PCB to give antenna VSWR of 1:2		

Ports and Cables	Cable Length	Screened/ unscreened	Connected to
DC Power	1.8m	Unscreened	Representative 12Vdc PSU
USB	1.8m	Screened	Dell Laptop

Note: For radiated tests, the RFID module has been tested in a worst-case representative host. This host was a ATR215 Halo USB.

3.2 EUT Photographs

Photographs are supplied separately.

3.3 Configuration of EUT

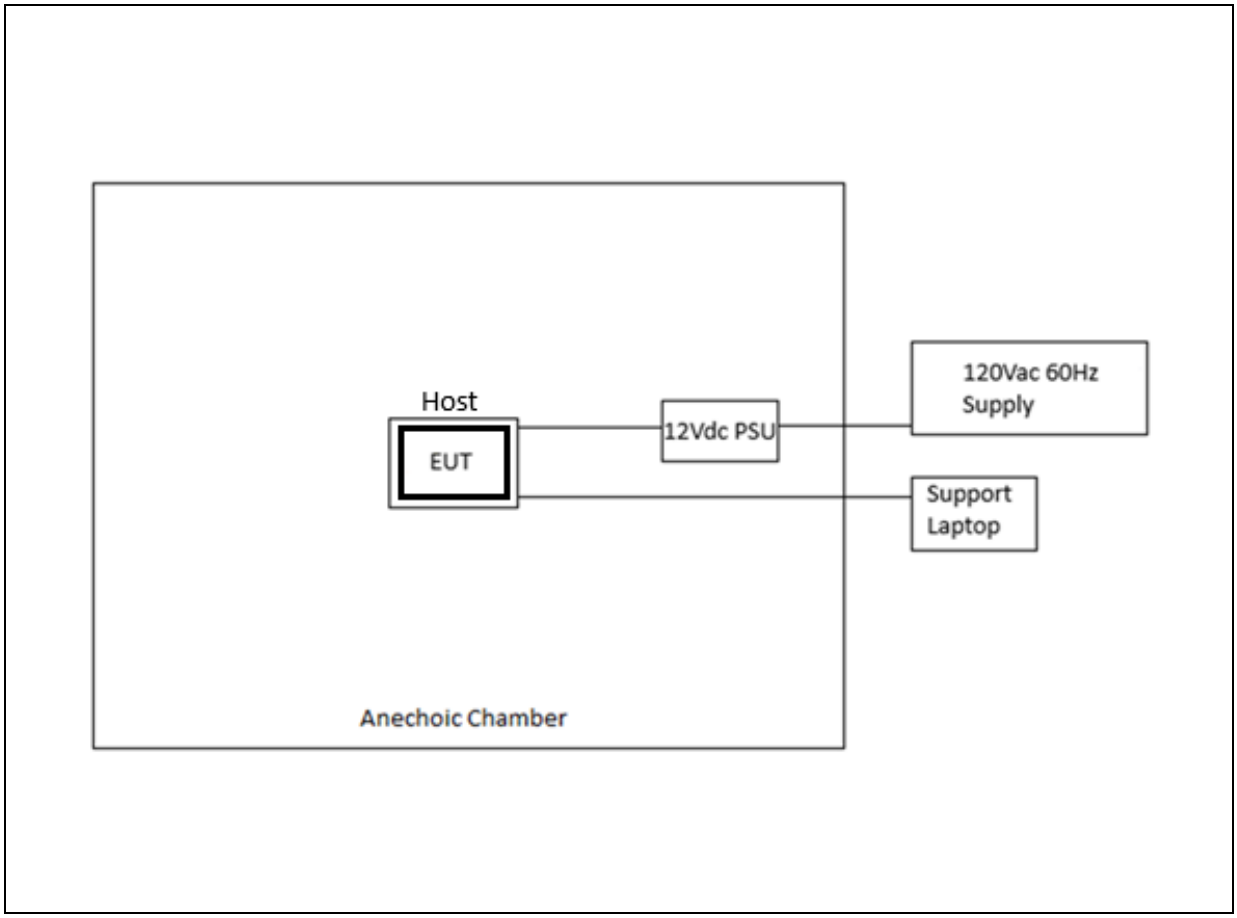


Figure 1 Diagram of EUT.

3.4 EUT Monitoring/Auxiliary Equipment

Equipment name	Type no.	Serial no
Dell Laptop	Latitude E7450	ZU12073-13004

3.5 Monitoring Software

None.

Section 4 Test Specifications

The tests were performed in accordance with Eurofins E&E UK Quotation C9608v3

For USA:

Test Standard	Relevant Section	Class/limit	Status
CFR 47 Part 15C & ANSIC63.10-2020/Cor1-2023	Section 15.225(a) Field strength within the band 13.553MHz-13.567MHz	As specified in Section 15.225(a)	Pass
	Section 15.225(a) Field strength within the bands 13.410MHz-13.552MHz and 13.567MHz to 13.710MHz	As specified in Section 15.225(b)	Pass
	15.225(b) Field strength within the bands 13.110MHz-13.410MHz and 13.710MHz to 14.010MHz	As specified in Section 15.225(c)	Pass
	Section 15.225(d) Field Strength outside the band 13.110MHz-14.010MHz	As specified in Section 15.209	Pass
	Section 15.225(e) Frequency tolerance of the carrier signal	As specified in Section 15.225(e)	Pass
	Section 15.31(e) Field strength variation with operating voltage	As specified in Section 15.31(e)	Pass
	15.215 (c) 20dB bandwidth	As specified in Section 15.215 (c)	Pass
	Section 15.207 Mains conducted emissions	As specified in Section 15.207(a) Test not applicable	Pass

Note 1 :All testing was carried out at a test distance of 3m and the limits adjusted accordingly.

Note 2 : Applies to carrier current systems see reference 47CFR Part 15Clause 15.109(e).

For Canada:

Regulation / Test Standard	RSS-210 Licence-Exempt Radio Apparatus: Category I Equipment Issue 11 June 2024 And, RSS-Gen — General Requirements for Compliance of Radio Apparatus Issue 5 April 2018 +A1 March 2019 +A2 February 2021

Requirement	ISED Regulation	Comments	Results Summary
Radiated Emissions Magnetic Field Measurements (Expressed as electric field) (9kHz to 30MHz) And Electric Field Measurements (30MHz – 1000MHz)	ISED RSS-210 § B.6 Referencing ISED RSS-Gen	Applies	Pass
Frequency tolerance of the carrier signal	ISED RSS-210 § B.6 (b)	Applies	Pass
AC Power-line conducted emissions	ISED RSS-Gen 8.8	Applies	Pass

4.1 Knowledge Database References

The following KDBs were referenced during the testing.
The latest knowledge database references are available via the FCC KDB website at:

https://apps.fcc.gov/kdb

4.1.1 Conducted Emissions

Publication Number	Keyword	Publication Date
174176	Section 15.107, 15.207,18.307, C63.4, C63.10, Suitable Dummy Load, AC Power Line Conducted Measurement	08/07/2025

4.1.2 Radiated Emissions (9kHz to 30MHz)

Publication Number	Keyword	Publication Date
414788	Test Site Requirements for Part 15 and 18 Devices	07/12/2018
460108	Radiated emission measurements below 30 MHz	07/12/2018

4.1.3 Radiated Emissions (30MHz to 1000MHz)

414788	Test Site Requirements for Part 15 and 18 Devices	07/12/2018

4.2 Compliance Statement

The ATR SE Reader Core, as tested, was shown to meet requirements of the standards listed in Section 4 of this report.

4.3 Decision Rule Statement

The Decision Rule is applied on the basis of the ILAC-G8:09/2019

This guidance document has been prepared to assist laboratories in the use of decision rules when declaring statements of conformity to a specification or standard as required by ISO/IEC 17025:2017

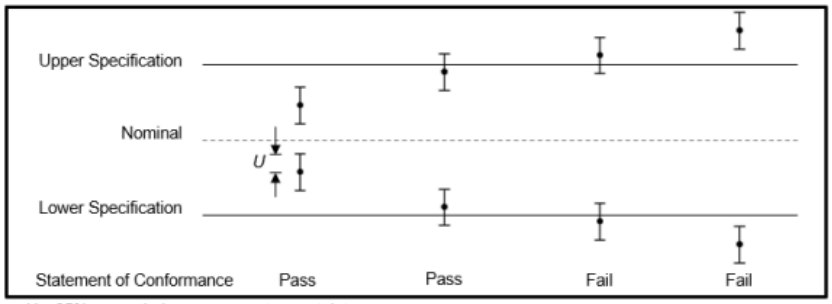
Where a result is considered marginal in respect of its proximity to the limit line, for example, the customer would be made aware of situation so that they can make an informed decision on how to proceed.

A binary decision rule exists when the result is limited to two choices (pass or fail). A non-binary decision rule exists when multiple terms may express the result (pass, conditional pass, conditional fail, fail). These are further explained below.

The laboratory recommends to use Binary Statement for Simple Acceptance Rule (w = 0)

Statements of conformity are reported as:

- Pass - the measured value is below the acceptance limit, AL = TL.
- Fail - the measured value is above the acceptance limit, $AL = TL$



U = 95% expanded measurement uncertainty

Section 5 Radiated Emission Results

5.1 Test Specification

FCC Rule Part	47CFR 15.225 Operation in the band 13.110-14.010MHz
RSS Rule Part	ISED RSS-210 § B.6 Referencing ISED RSS-Gen
Standard	ANSI C63.10-2020/Cor1-2023
Measurement Uncertainty Radiated tests	The reported uncertainty of measurement y ± U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95% is +/- 4.94dB for the frequency range from 9kHz to 30MHz +/- 6.26dB for the frequency range 30MHz to 1GHz

5.2 Procedure and Test Software Version

Radiated tests:- 47CFR15.205 and 47CFR15.209

Eurofins E&E UK Test procedure (9kHz to 30MHz)	CEP22 Issue 9
Eurofins E&E UK test procedure (30MHz to 1GHz)	CEP23 Issue 12
Test software	RadiMation Version 2023.1.6

5.3 Magnetic Field Radiated Emissions (9kHz to 30MHz)

5.3.1 Limits

Frequency	Limits (dBµV/m)
9kHz to 490kHz	2400/F(kHz) at 300m
490kHz to 1.705MHz	24000/F(kHz) at 30m
1,705MHz to 30MHz	30 at 30m

Note 1: FCC 47 CFR Part 15 Section 15.209 has different test limits from 300m to 30m depending upon the measurement frequency range. The measured was adjusted for a measurement distance of 3m.
Distance Correction Factor = 40log(test distance /specific distance).

5.3.2 Receiver Settings

Receiver Parameters	Setting
Detector Function	Peak
Start Frequency	9kHz
Stop Frequency	150kHz
Resolution Bandwidth	200Hz
Video Bandwidth	Auto

Receiver Parameters	Setting
Detector Function	Peak
Start Frequency	150kHz
Stop Frequency	30MHz
Resolution Bandwidth	10kHz
Video Bandwidth	Auto

5.3.3 Date of Test

17th November 2025

5.3.4 Test Area

LAB 5 (FAR)

5.3.5 Tested by

L Trickett

5.3.6 SAC Test Setup

The EUT was configured in the FAR on an 80cm high table.

The measurement was then performed with an antenna to EUT separation distance of 3m within the semi-anechoic chamber based upon the highest emissions results recorded on the outside test site.

The centre of the loop antenna was 1m above the ground and results were obtained with it parallel to the EUT, perpendicular to the EUT and then parallel to the ground plane.

The results are maximised in orientation 0-360 degrees.

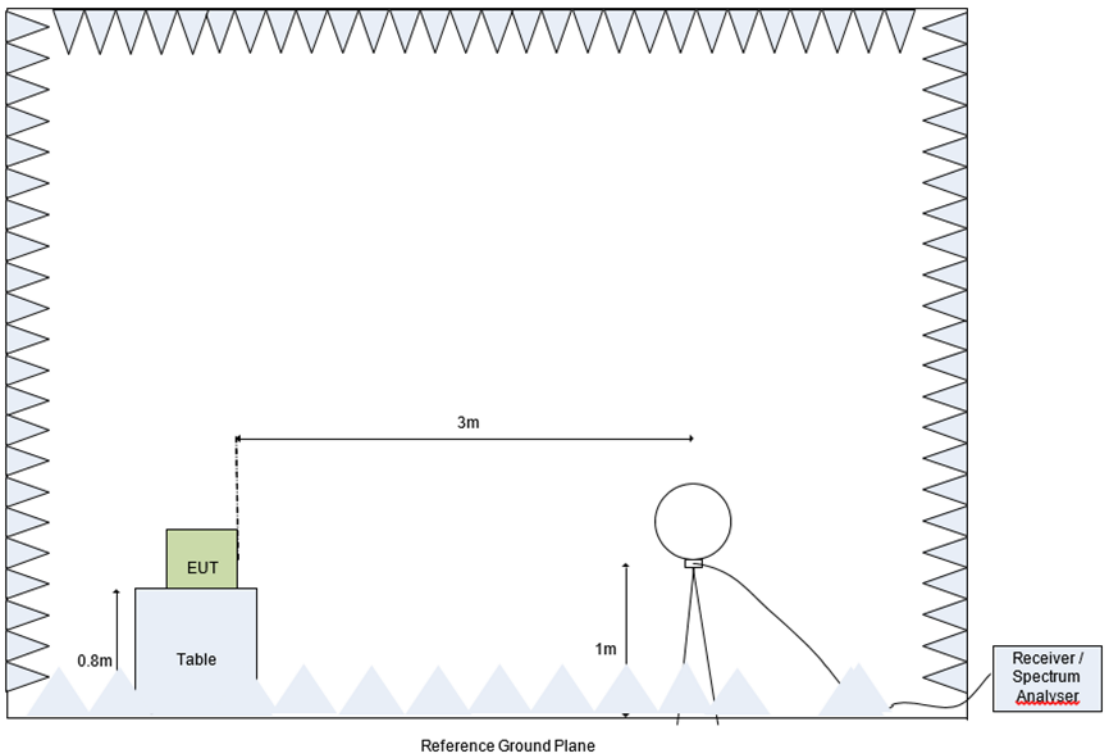


Figure 2: Test Setup for H-Field Measurements from 9kHz to 30MHz

Note 1 : With the EUT de-energized the ambient radio noise and signals met the 6dB peak detection requirement of ANSI C63.4-2014 Clause 5.1.3.

Note 2 : There were no significant environmental temperature changes during the test duration and hence it was not considered necessary to consider any variation in cable loss.

5.3.7 Magnetic field emissions

The field strength is split into sub-bands as defined below in Section 47CFR 15.225:

a) Section 15.225(a) Field strength within the band 13.553MHz-13.567MHz

Limit: 15848μV/m at 30m = 84dBμV/m at 30m

b) Section 15.225(b) Field strength within the bands 13.410MHz-13.552MHz and 13.567MHz to 13.710MHz

Limit: 3348μV/m at 30m = 50.5dBμV/m at 3m

c) Section 15.225(c) Field strength within the bands 13.110MHz-13.410MHz and 13.710MHz to 14.010MHz

Limit: 106μV/m at 30m = 40.5dBμV/m at 3m

The results of peak detector max-hold emission measurements are presented below. The measurements were taken using a FAR for initial measurements.

Measurements were performed at a 3m measurement distance.
The detector used was a peak detector.

For measurements in the band 0.009MHz to 0.490MHz the specified measurement distance is 300m. The distance correction will be:

Correction = 40*log (3/300) = -80dB

For measurements in the band 0.490MHz to 30MHz the specified measurement distance is 30m. The distance correction will be:

Correction = 40*log (3/30) = -40dB

5.3.8 Magnetic field emissions, 9kHz to 30MHz and outside the band 13.110MHz to 14.010MHz

The results of peak detector max-hold emission measurements are presented below. The measurements were taken using a SAR as initial measurements.

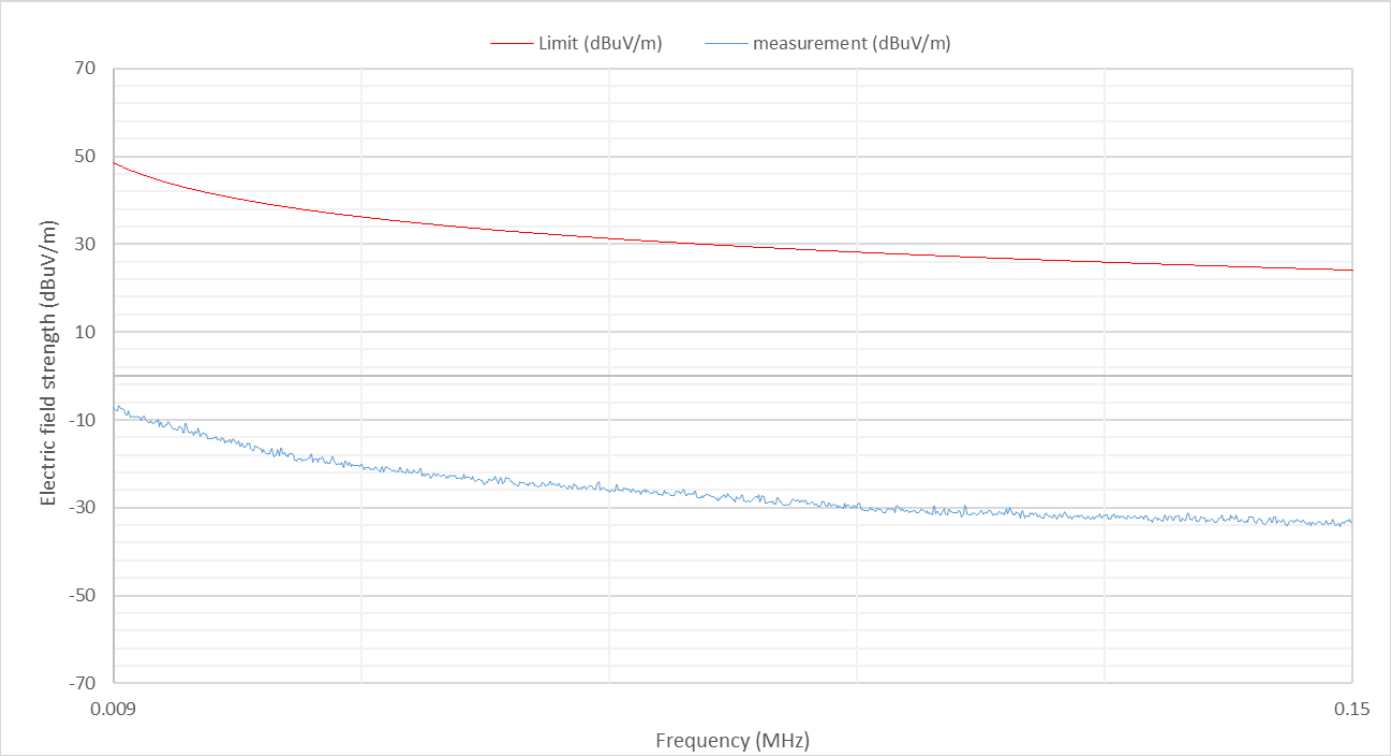


Figure 3 Magnetic field emissions Plot, 9kHz to 150kHz. Parallel to EUT

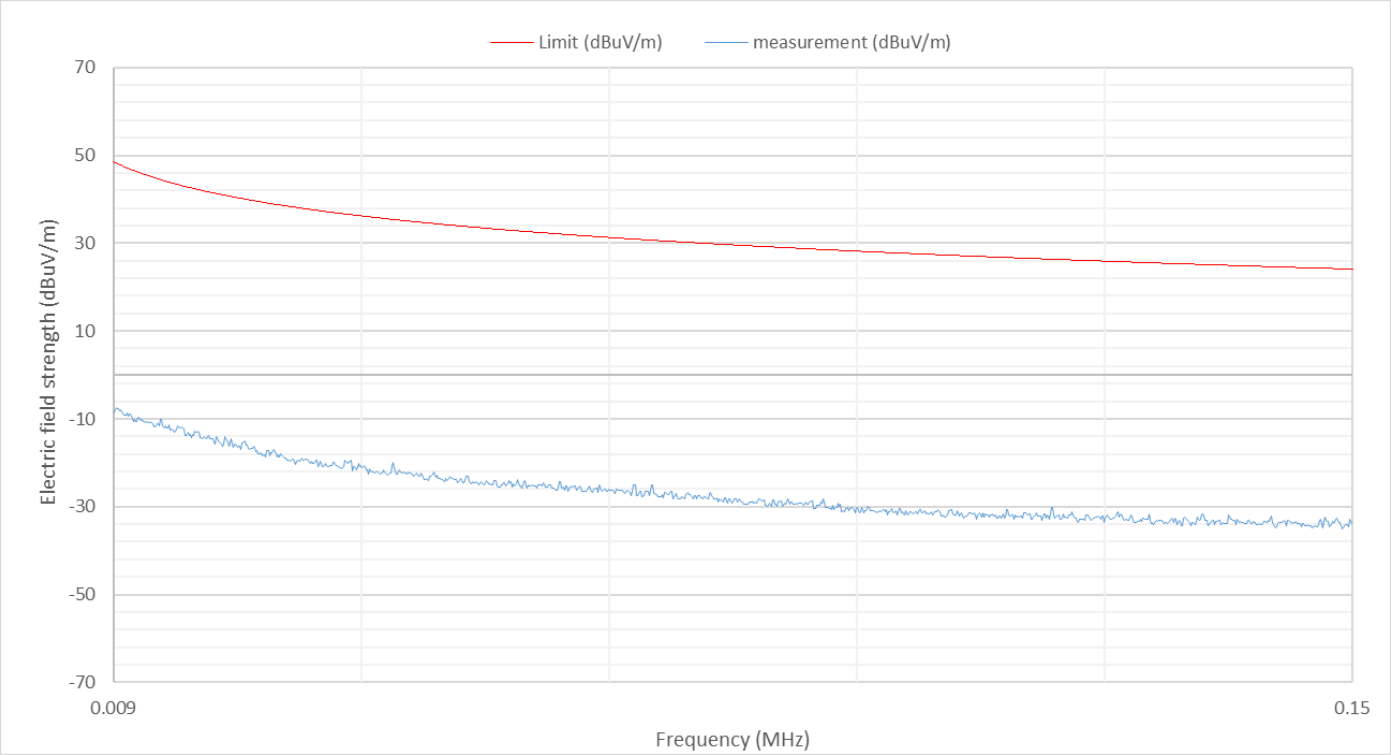


Figure 4 Magnetic field emissions Plot, 9kHz to 150kHz. Perpendicular to EUT

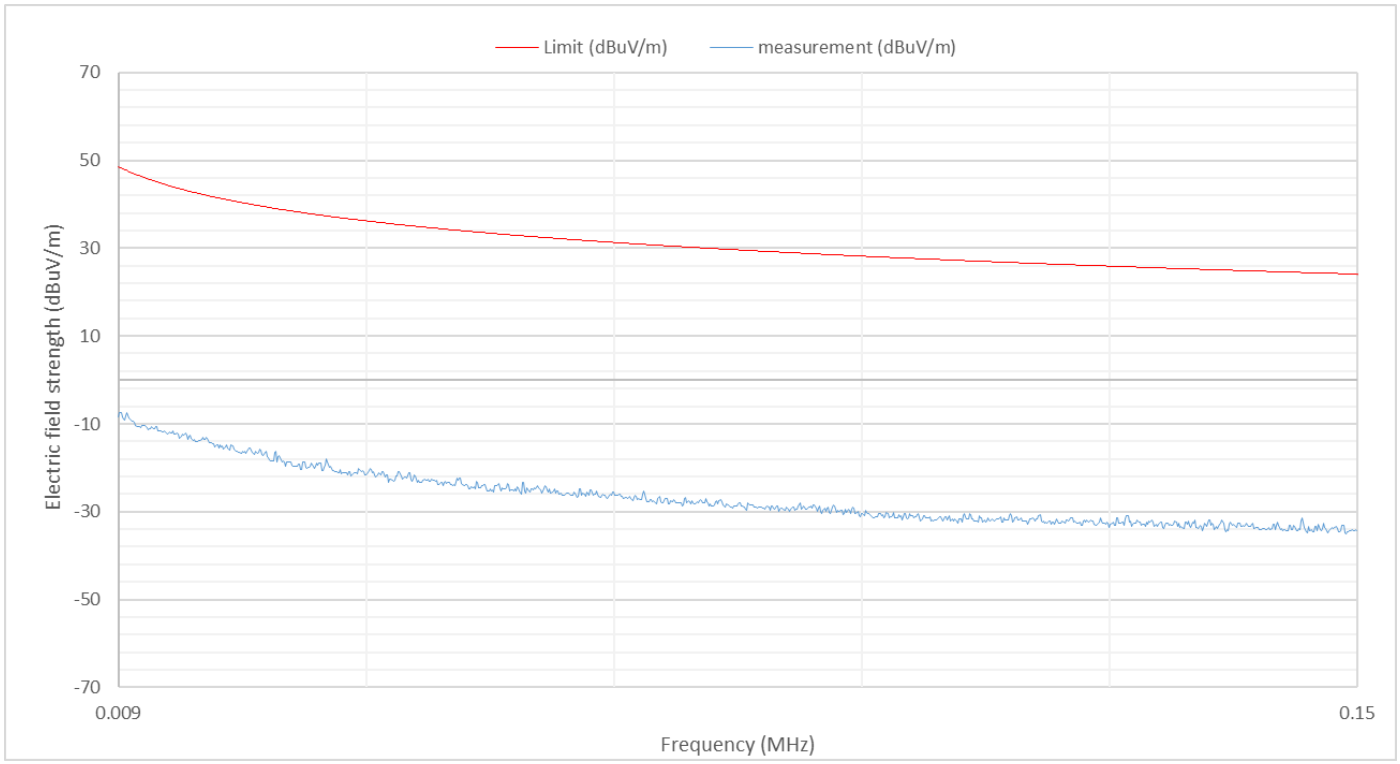


Figure 5 Magnetic field emissions Plot, 9kHz to 150kHz. Parallel to ground plane

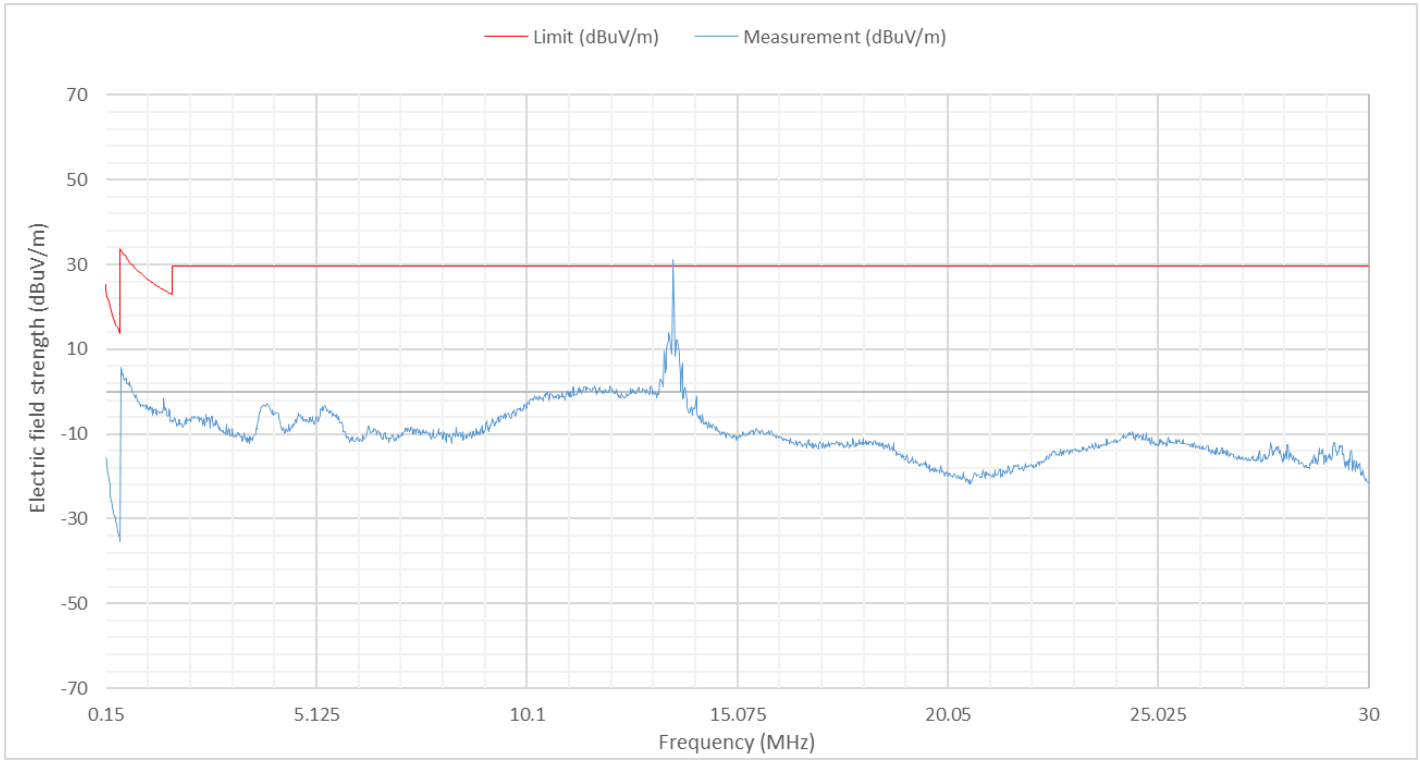


Figure 6 Magnetic field emissions Plot, 150kHz to 30MHz. Parallel to EUT

Note: The emission present at 13.56MHz is the intentional transmission and not subject to the spurious emissions limits.

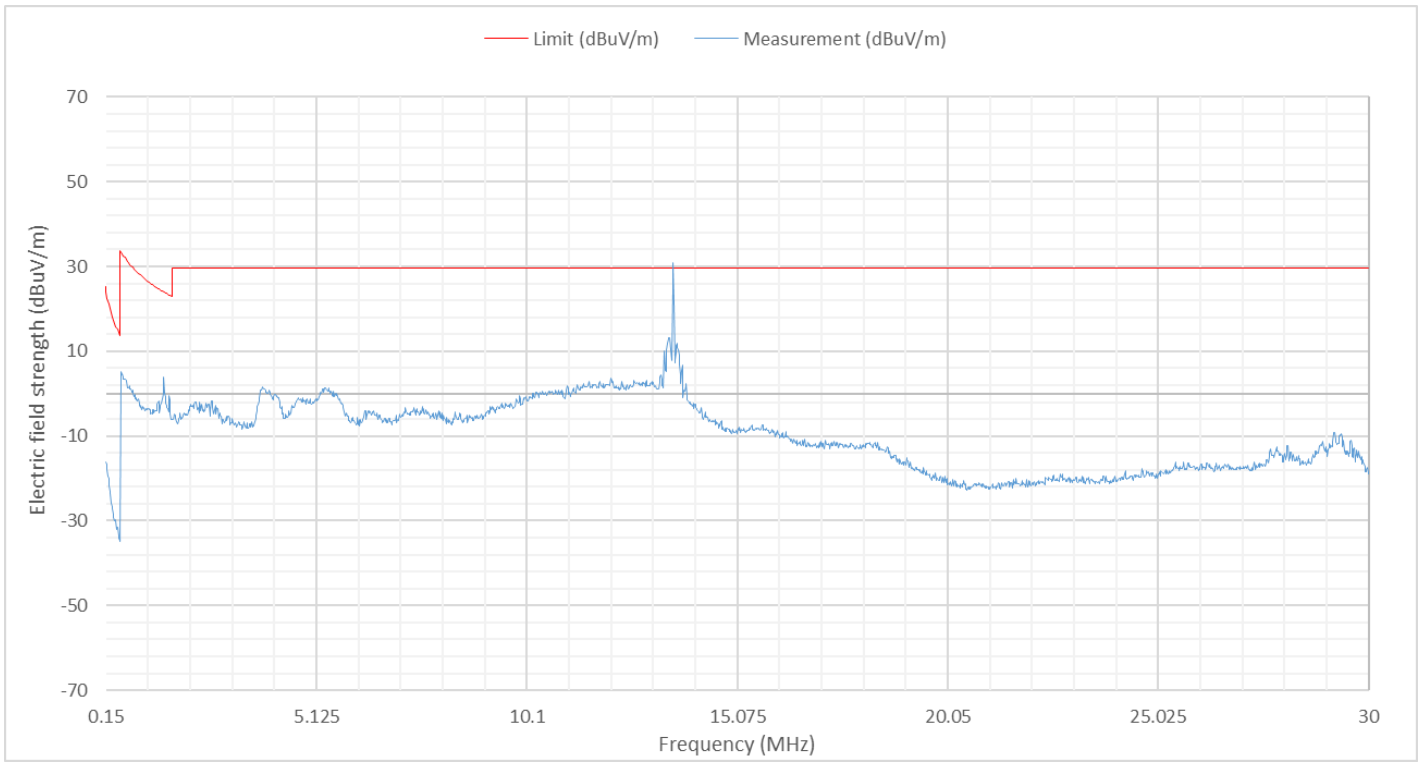


Figure 7 Magnetic field emissions Plot, 150kHz to 30MHz. Perpendicular to EUT

Note: The emission present at 13.56MHz is the intentional transmission and not subject to the spurious emissions limits.

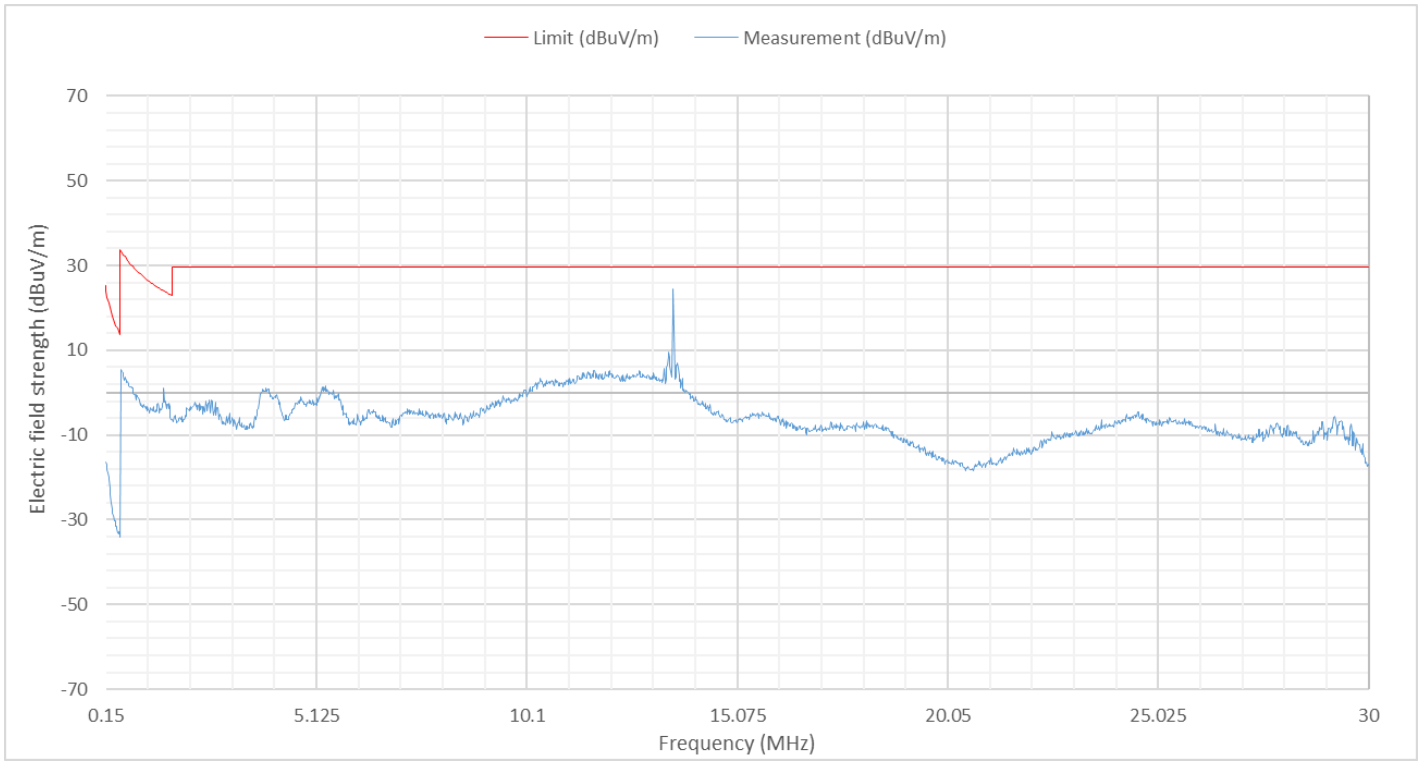


Figure 8 Magnetic field emissions Plot, 150kHz to 30MHz. Parallel to ground plane

5.3.9 Field strength inside the band 13.110MHz to 14.010MHz

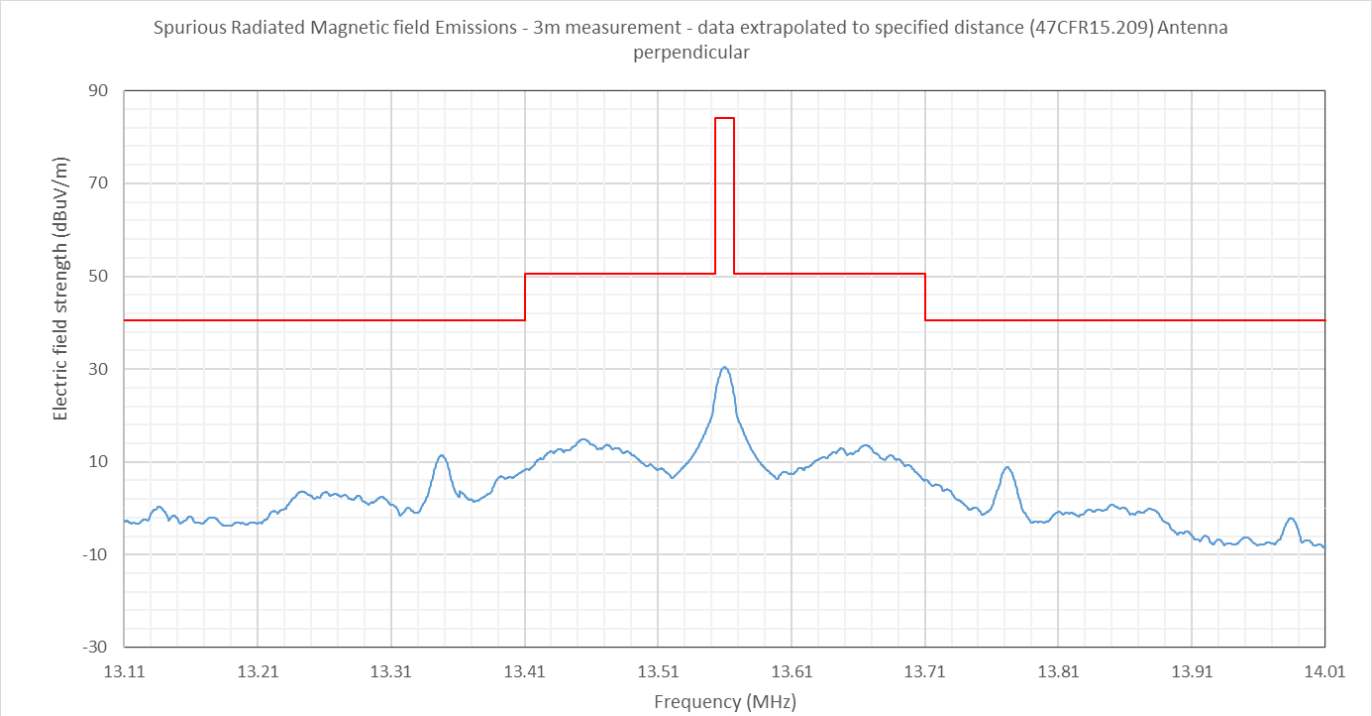


Figure 9 Magnetic field emissions Plot, 13.11MHz to 14.01MHz – Spectrum Mask – Parallel to EUT – 102V

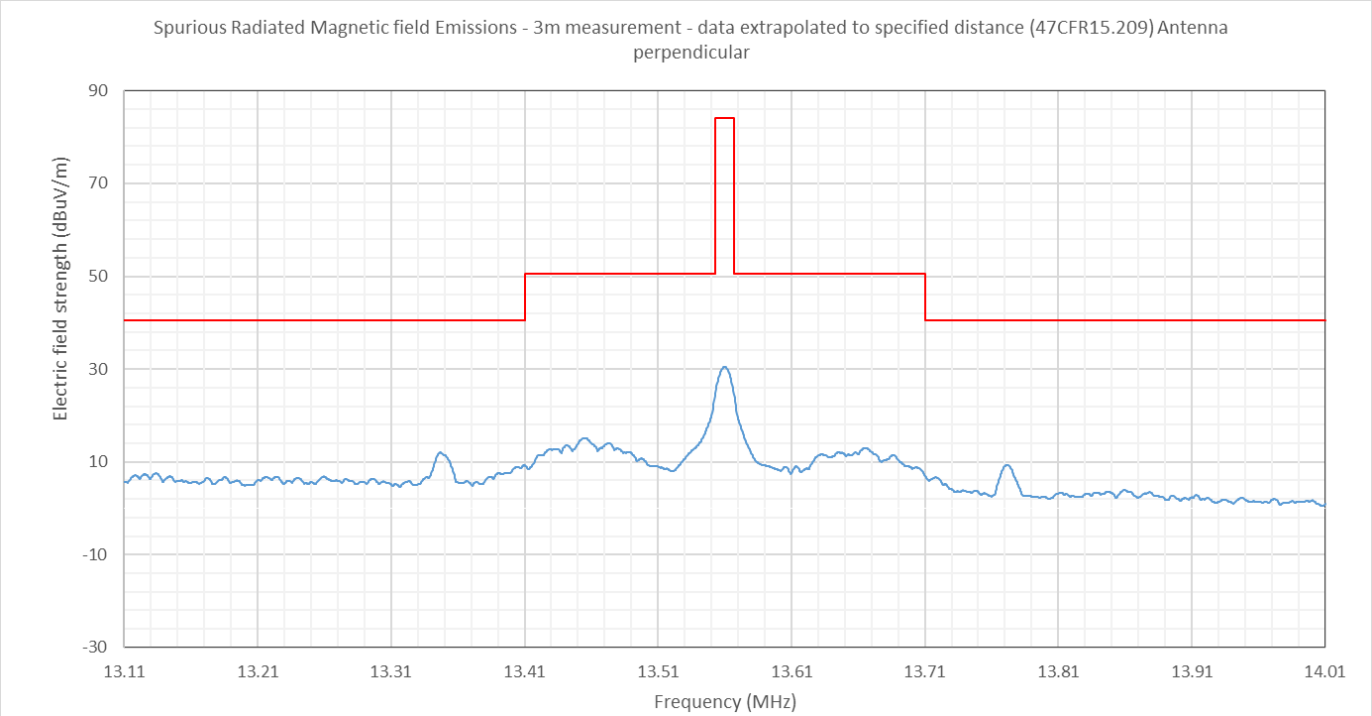


Figure 10 Magnetic field emissions Plot, 13.11MHz to 14.01MHz – Spectrum Mask – Perpendicular to EUT – 102V

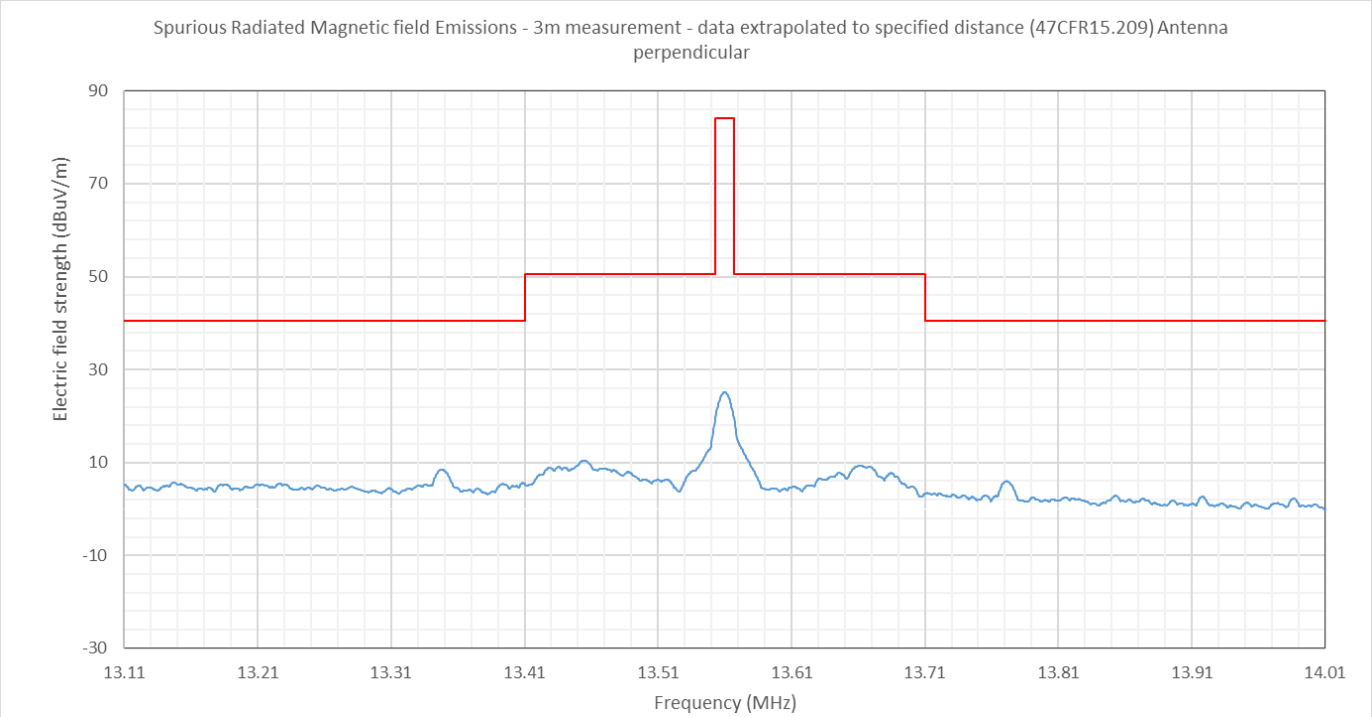


Figure 11 Magnetic field emissions Plot, 13.11MHz to 14.01MHz – Spectrum Mask – Parallel to ground plane – 102V

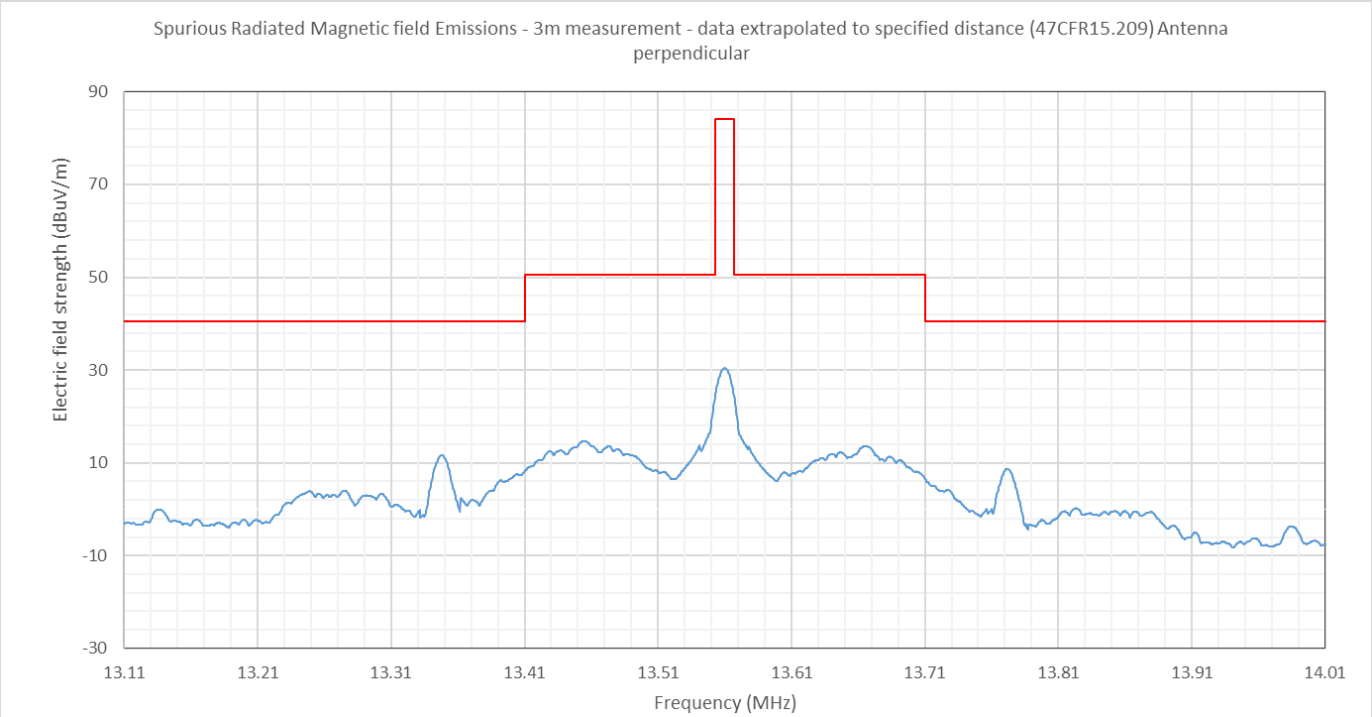


Figure 12 Magnetic field emissions Plot, 13.11MHz to 14.01MHz – Spectrum Mask – Parallel to EUT – 138V

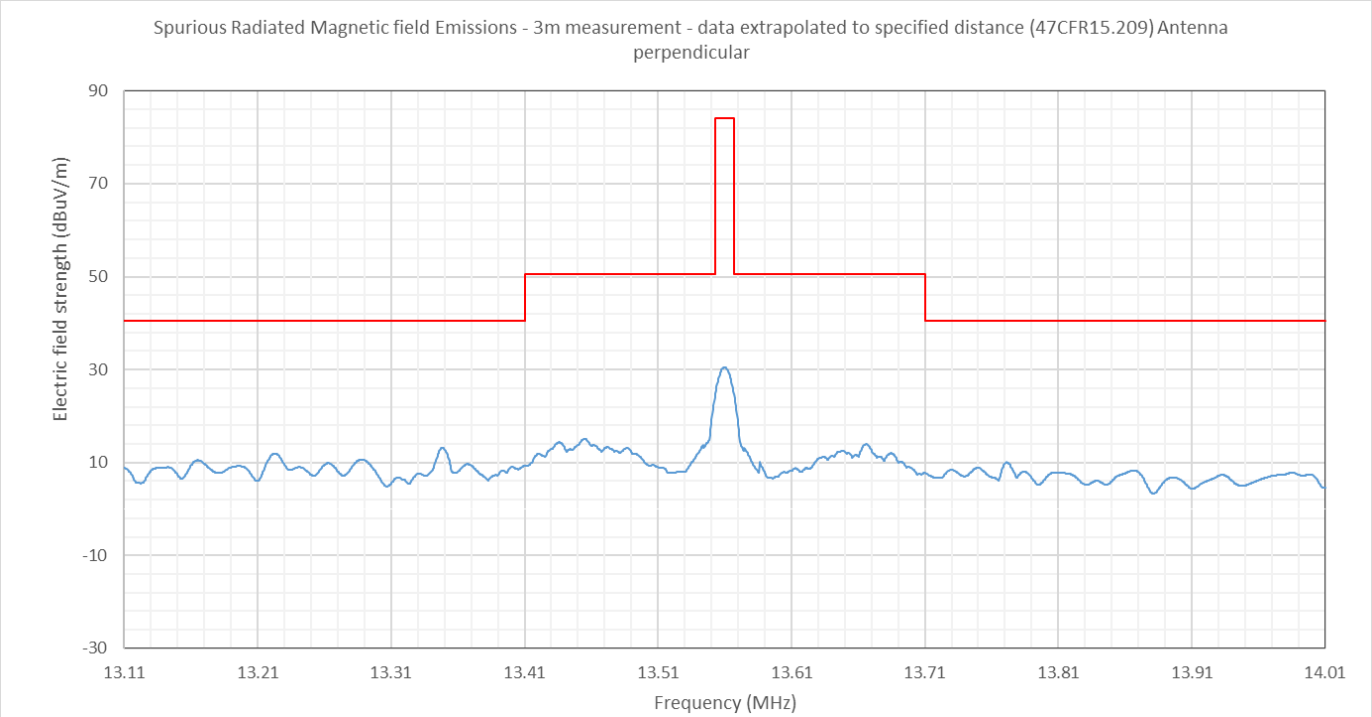


Figure 13 Magnetic field emissions Plot, 13.11MHz to 14.01MHz – Spectrum Mask – Perpendicular to EUT – 138V

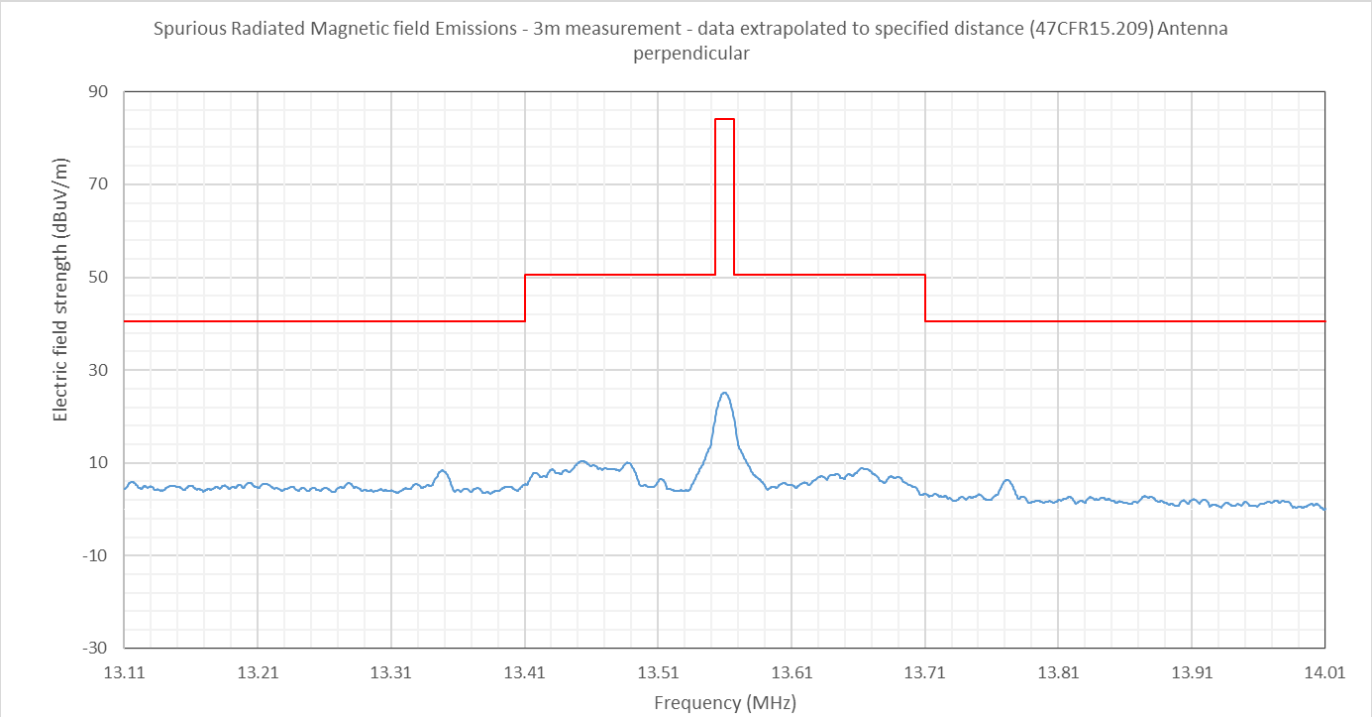


Figure 14 Magnetic field emissions Plot, 13.11MHz to 14.01MHz – Spectrum Mask – Parallel to ground plane – 138V

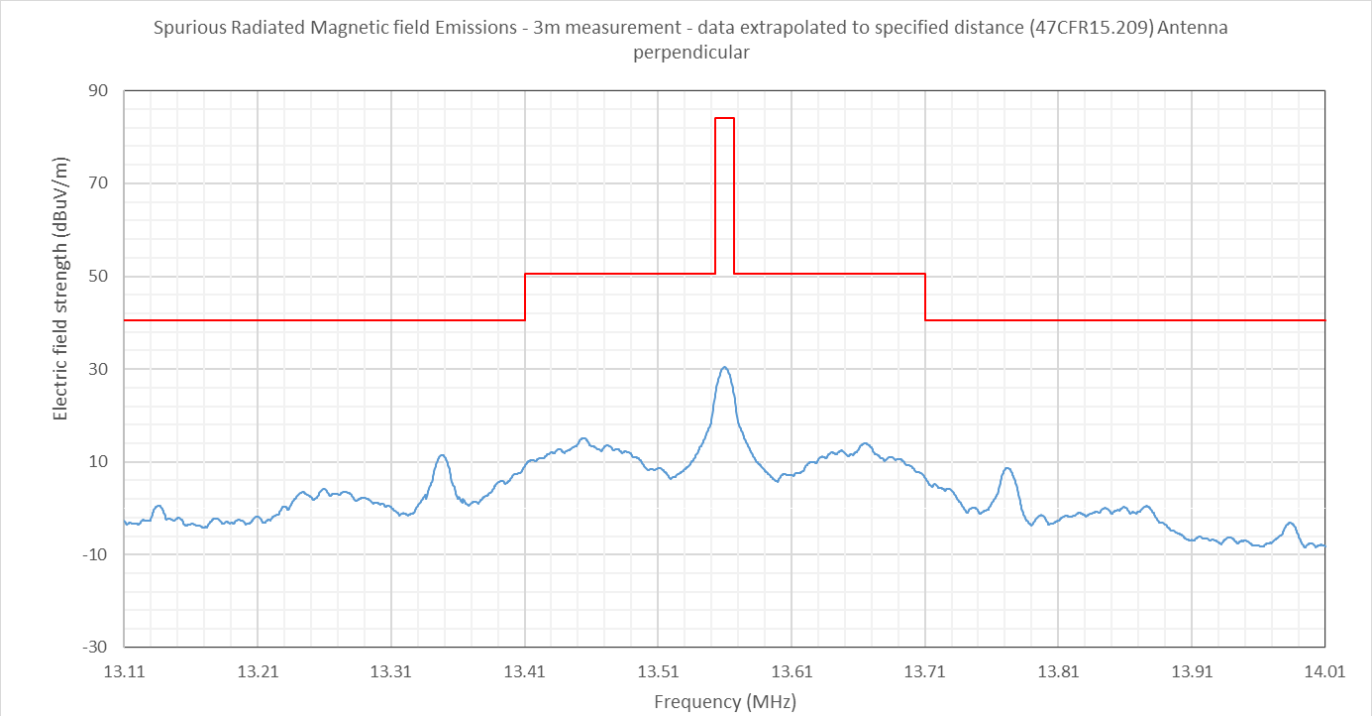


Figure 15 Magnetic field emissions Plot, 13.11MHz to 14.01MHz – Spectrum Mask – Parallel to EUT – 120V

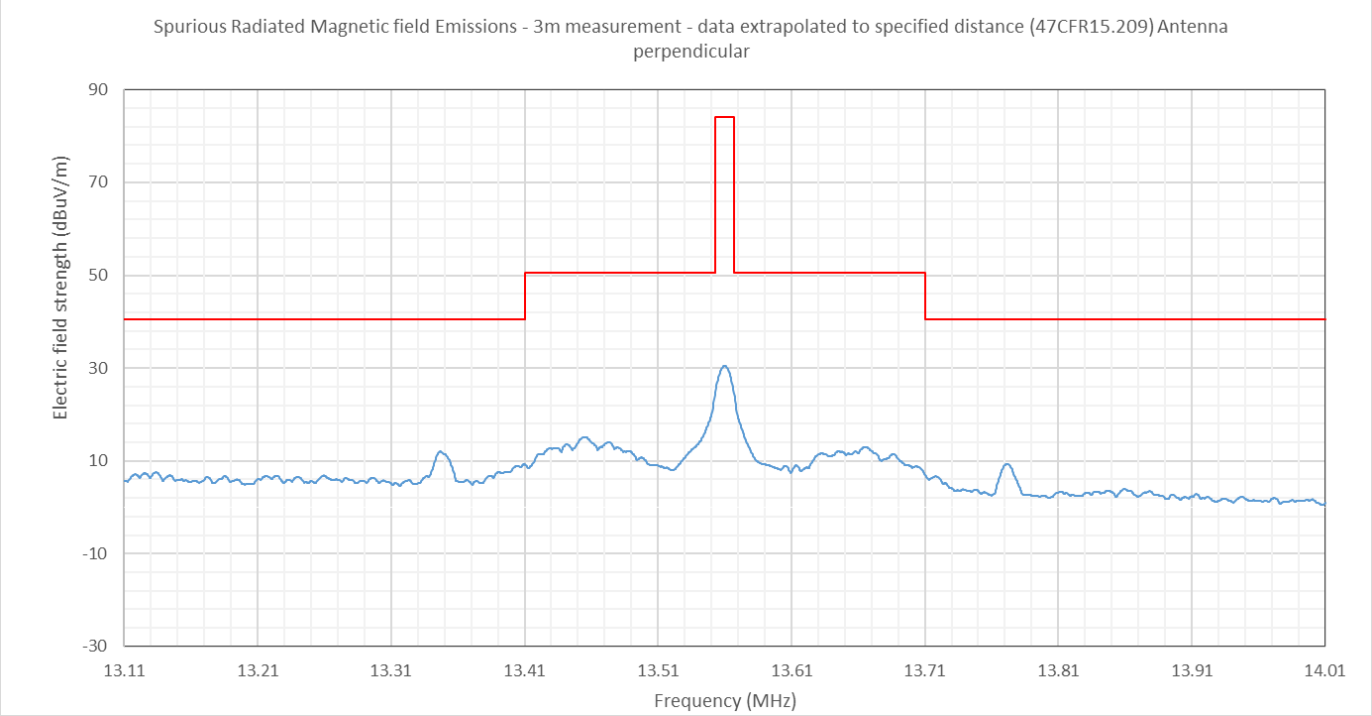


Figure 16 Magnetic field emissions Plot, 13.11MHz to 14.01MHz – Spectrum Mask – Perpendicular to EUT – 120V

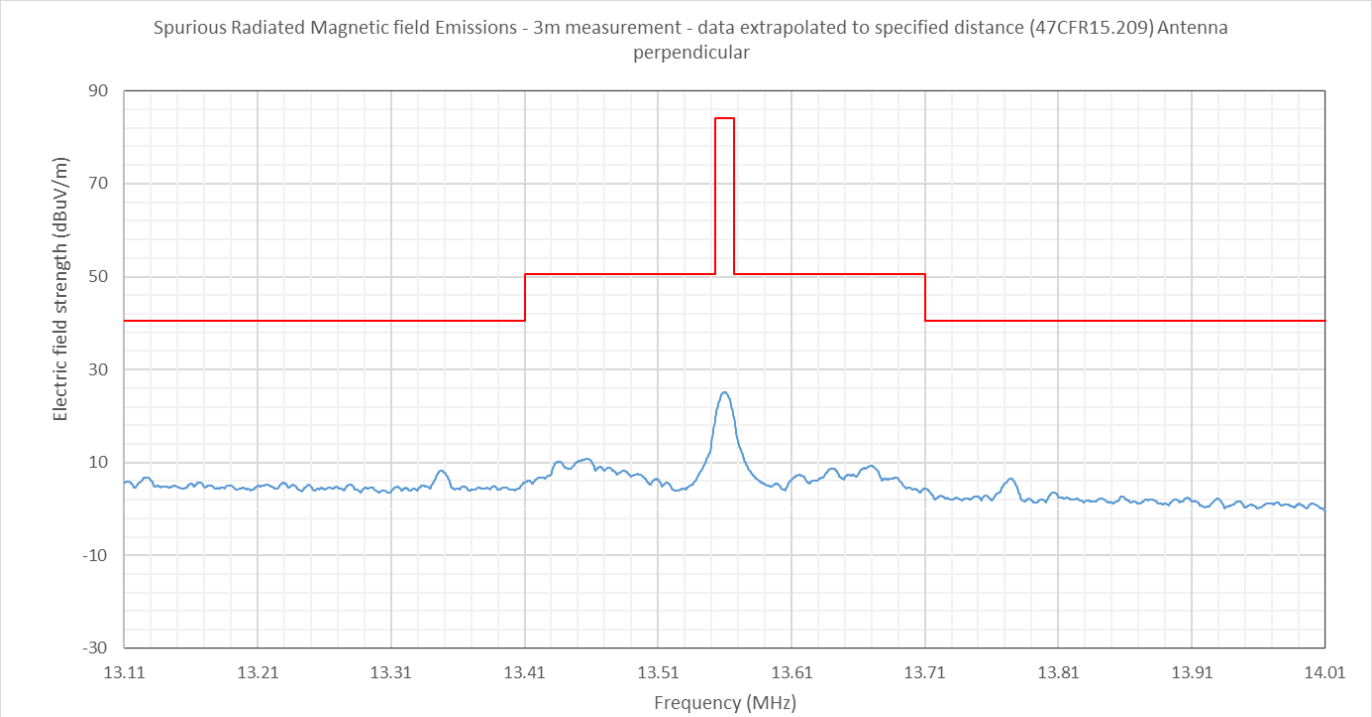


Figure 17 Magnetic field emissions Plot, 13.11MHz to 14.01MHz – Spectrum Mask – Parallel to ground plane – 120V

5.3.10 Calculation of result

Field strength (FS) is calculated as follows from the receiver reading, Antenna factor (AF) in dB/m; Cable loss (CL) and pre-amplifier gain (G).

FS (dBµV/m) = Indicated Signal Level (dBµV) + AF(dB/m) – G(dB) + CL(dB)

Cable loss was considered to have no influence on the measurement result in this case.

Freq (MHz)	Rx (dBµV)	Preamp gain G (dB)	Antenna factor (dB/m)	Result at 3m (dBµV /m)	Distance correction factor (40dB/decade)	Result at 30m (dBµV/m)	Limit At 30m (dBµV/m)	Margin (dB)	Result
13.56	67.7	30.8	33.5	70.4	-40	30.4	84.0	53.6	Below limit

13.56MHz result calculation – Measurement antenna parallel – 102V

Freq (MHz)	Rx (dBµV)	Preamp gain G (dB)	Antenna factor (dB/m)	Result at 3m (dBµV /m)	Distance correction factor (40dB/decade)	Result at 30m (dBµV/m)	Limit At 30m (dBµV/m)	Margin (dB)	Result
13.56	67.8	30.8	33.5	70.5	-40	30.5	84.0	53.5	Below limit

13.56MHz result calculation – Measurement antenna perpendicular – 102V

Freq (MHz)	Rx (dBµV)	Preamp gain G (dB)	Antenna factor (dB/m)	Result at 3m (dBµV /m)	Distance correction factor (40dB/decade)	Result at 30m (dBµV/m)	Limit At 30m (dBµV/m)	Margin (dB)	Result
13.56	62.5	30.8	33.5	65.2	-40	25.2	84.0	58.8	Below limit

13.56MHz result calculation – Measurement antenna parallel to ground – 102V

5.3.11 Data Extrapolation

Measurements were made at a 3m measurement distance since the NFC 13.56MHz signal was not detected at 10m. The data was extrapolated to the required specified distance as follows:

Between 9kHz and 490kHz the measurement distance according to 47CFR15.209 (a) is 300m:

$$\text{measurement at } 300\text{m} = \text{measurement at } 3\text{m} + 40\log\left(\frac{3}{300}\right)$$

$$\text{measurement at } 300\text{m} = \text{measurement at } 3\text{m} - 80\text{dB}$$

Between 490kHz and 30MHz the measurement distance according to 47CFR15.209 (a) is 30m:

$$\text{measurement at } 30\text{m} = \text{measurement at } 3\text{m} + 40\log\left(\frac{3}{30}\right)$$

$$\text{measurement at } 30\text{m} = \text{measurement at } 3\text{m} - 40\text{dB}$$

5.3.12 Measurement Summary

No further emissions were identified as being within 20dB of the specification limit using a peak detector. No further measurements were taken.

5.4 Radiated Emissions (30MHz to 1GHz)

Radiated electric field emission measurements are applied as defined in 47CFR15.205 and 47CFR15.209.

5.4.1 Limits at 3m

Frequency (MHz)	Electric Field Strength Limit (dBµV/m) at 3m measurement distance
	Quasi Peak
30 - 88	40.0
88 -216	43.5
216 - 960	46.0
960- 1000	54.0

Note: FCC 47 CFR Part 15 Section 15.209 and 15.205 specifies test limits at 3m

Receiver Settings

Receiver Parameters	Setting
Detector Function	Quasi Peak
Start Frequency	30MHz
Stop Frequency	1000MHz
Resolution Bandwidth	120kHz
Video Bandwidth	Auto

5.4.2 Date of Test

23rd September 2025

5.4.3 Test Area

LAB 1 (SAC)

5.4.4 Tested by

L Trickett

5.4.5 Test Setup

The EUT was configured in the SAC on an 80cm high polystyrene table.

The measurement was performed with an antenna to EUT separation distance of 3m. The results were maximised in orientation 0-360 degrees and height 1-4m.

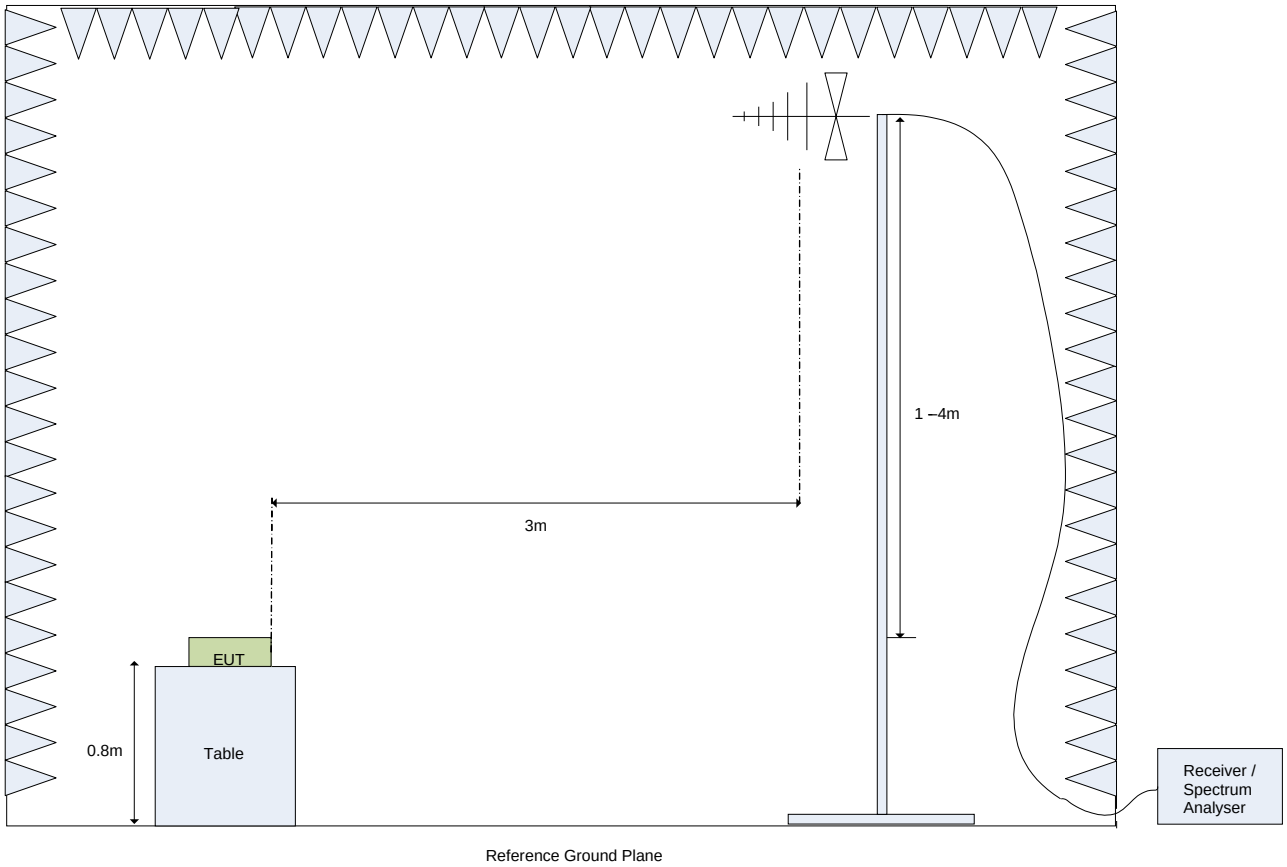


Figure 18 Test Setup for E-Field Measurements from 30MHz to 1GHz

Note 1 : With the EUT de-energized the ambient radio noise and signals met the 6dB peak detection requirement of ANSIC63.10-2020/Cor1-2023.

Note 2 : There were no significant environmental temperature changes during the test duration and hence it was not considered necessary to consider any variation in cable loss.

5.4.6 Electric field emissions, 30MHz to 1GHz

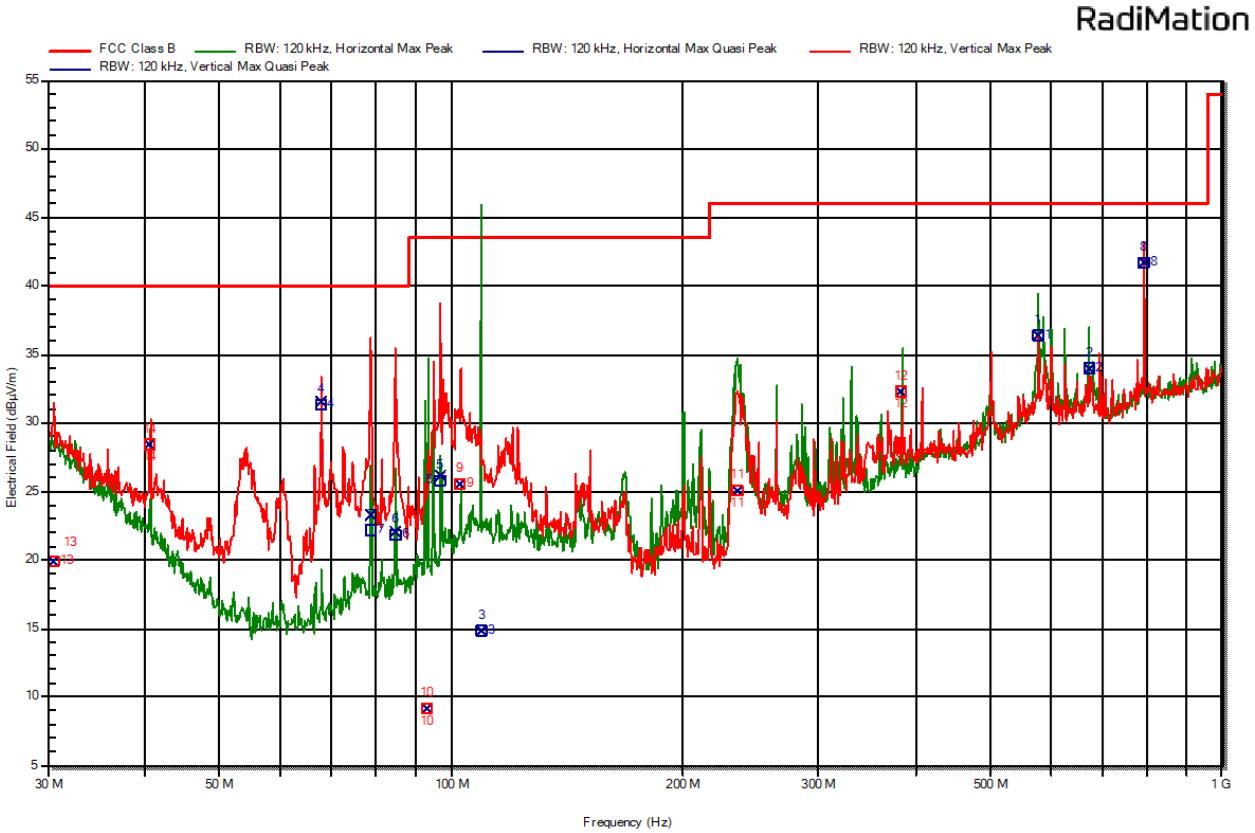


Figure 19 Electric field emissions Plot, 30MHz to 1GHz

Frequency MHz	Quasi-Peak dBµV/m	Quasi Peak Limit dBµV/m	Quasi-Peak Difference dB	Quasi-Peak Status	Angle degrees	Height m	Polarization
576.00	36.4	46.0	-9.6	Pass	10	1.5	Horizontal
672.00	34.0	46.0	-12.0	Pass	360	1.2	Horizontal
109.26	14.8	43.5	-28.7	Pass	20	2.7	Horizontal
67.80	31.3	40.0	-8.7	Pass	290	1.7	Vertical
96.66	25.8	43.5	-17.7	Pass	270	1.1	Vertical
84.60	21.9	40.0	-18.1	Pass	230	1.4	Vertical
78.54	22.1	40.0	-17.9	Pass	140	1.9	Vertical
792.00	41.7	46.0	-4.3	Pass	190	1.5	Vertical
102.72	25.5	43.5	-18.0	Pass	290	1.0	Vertical
93.24	9.1	43.5	-34.4	Pass	5	3.1	Horizontal
234.78	25.1	46.0	-20.9	Pass	40	1.3	Horizontal
384.00	32.3	46.0	-13.7	Pass	210	1.5	Horizontal
30.54	19.9	40.0	-20.1	Pass	125	1.0	Vertical
40.68	28.5	40.0	-11.5	Pass	95	1.0	Vertical

Table 1 Electric Field Emissions Peaks, 30MHz to 1GHz.

5.4.7 Quasi Peak correction factors

The quasi peak correction is shown in the above table. This correction figure consists of), Antenna factor (AF); Attenuator loss (AL) and Cable loss (CL).

Field strength (FS) is calculated as follows:

FS (dBµV/m) = Indicated Signal Level (dBµV) + AF (dB) + AL (dB) + CL (dB)

5.4.8 Sample Data

The Quasi-Peak level at 576.0MHz

FS (dBµV/m) = 9.8(dBmV) + 24.7(dB/m) +1.9(dB) = 36.4 (dBµV/m)

Section 6 Frequency Stability

6.1 Test Specification

FCC Rule	47CFR 15.225 (e) – Frequency tolerance with temperature and supply voltage variation
ISED Rule Part	ISED RSS-210 § B.6
Standard	ANSI C63.10-2020/Cor1-2023
Measurement Uncertainty	The reported uncertainty of measurement y ± U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95% is ±1x10^{-8}

6.1.1 Date of Test

25th September 2025

6.1.2 Test Area

LAB 7 (Environmental chamber)

6.1.3 Tested by

L Trickett

6.1.4 Procedure

For frequency stability with respect to supply voltage the procedures of ANSIC63.10 Section 6.8.2 were followed. The measurements were performed at ambient room temperature.

For frequency stability with respect to ambient temperature the procedure of ANSI C63.10 Section 6.8.1 was followed.

6.1.5 Test Setup

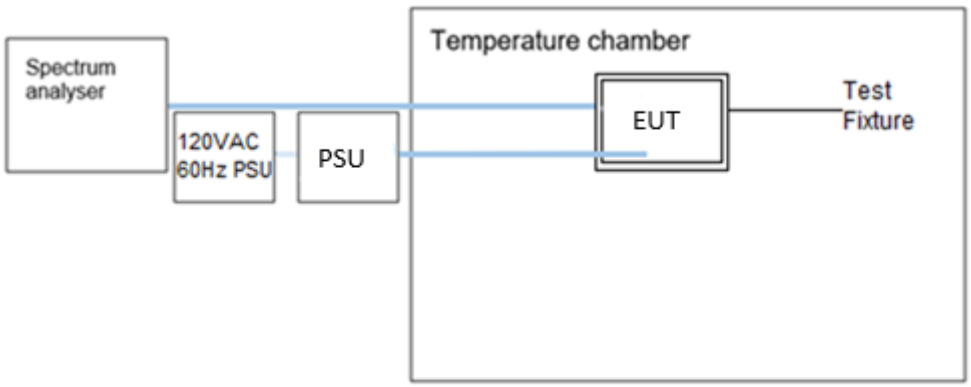


Figure 20 Test arrangement for frequency stability testing

6.2 Test Results. Frequency tolerance with temperature variation

Temperature (°C)	Time	Frequency (MHz)	Nominal	Deviation (%)	Limit 47CFR15.225 (%)	Result
50	Startup	13.5599747	13.56	0.0001866	0.01	Within Limit
	2min	13.5599480	13.56	0.0003835	0.01	Within Limit
	5min	13.5596332	13.56	0.0027051	0.01	Within Limit
	10min	13.5598066	13.56	0.0014263	0.01	Within Limit
40	Startup	13.5599312	13.56	0.0005074	0.01	Within Limit
	2min	13.5600745	13.56	0.0005494	0.01	Within Limit
	5min	13.5600642	13.56	0.0004734	0.01	Within Limit
	10min	13.5602694	13.56	0.0019867	0.01	Within Limit
30	Startup	13.5596693	13.56	0.0024389	0.01	Within Limit
	2min	13.5596969	13.56	0.0022353	0.01	Within Limit
	5min	13.5599354	13.56	0.0004764	0.01	Within Limit
	10min	13.5599978	13.56	0.0000162	0.01	Within Limit
20	Startup	13.5599067	13.56	0.0006881	0.01	Within Limit
	2min	13.5600490	13.56	0.0003614	0.01	Within Limit
	5min	13.5598877	13.56	0.0008282	0.01	Within Limit
	10min	13.5598596	13.56	0.0010354	0.01	Within Limit
10	Startup	13.5599635	13.56	0.0002692	0.01	Within Limit
	2min	13.5602051	13.56	0.0015125	0.01	Within Limit
	5min	13.5600100	13.56	0.0000737	0.01	Within Limit
	10min	13.5599663	13.56	0.0002485	0.01	Within Limit
0	Startup	13.5599750	13.56	0.0001844	0.01	Within Limit
	2min	13.5601407	13.56	0.0010376	0.01	Within Limit
	5min	13.5600279	13.56	0.0002058	0.01	Within Limit
	10min	13.5596460	13.56	0.0026107	0.01	Within Limit
-10	Startup	13.5599629	13.56	0.0002736	0.01	Within Limit
	2min	13.5594758	13.56	0.0038659	0.01	Within Limit
	5min	13.5602942	13.56	0.0021696	0.01	Within Limit
	10min	13.5600668	13.56	0.0004926	0.01	Within Limit
-20	Startup	13.5599432	13.56	0.0004189	0.01	Within Limit
	2min	13.5602134	13.56	0.0015737	0.01	Within Limit
	5min	13.5598406	13.56	0.0011755	0.01	Within Limit
	10min	13.5599111	13.56	0.0006556	0.01	Within Limit

Table 2 Frequency stability with temperature Results

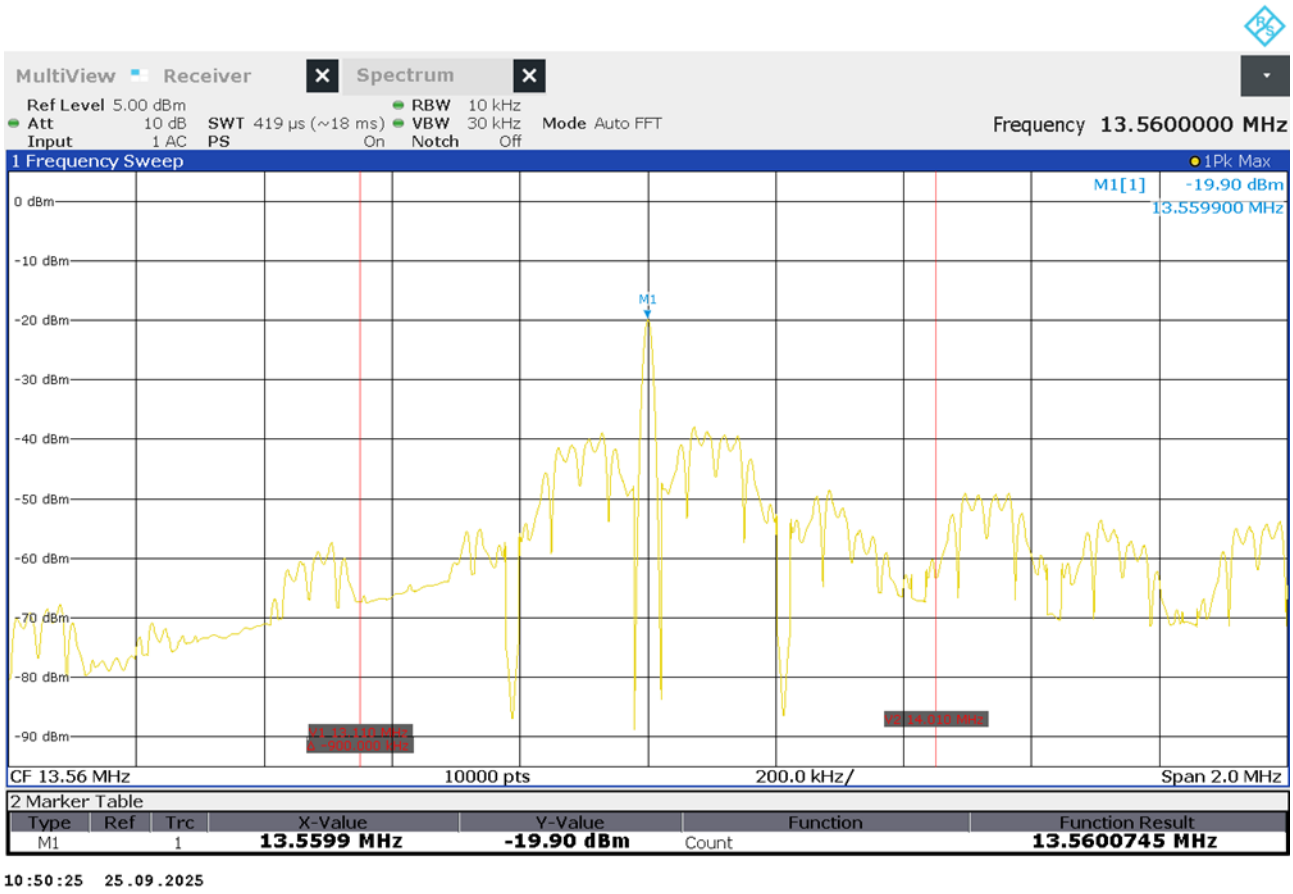


Figure 21 Example measurement of frequency stability at 40˚C after 2 minutes

6.3 Test Results. Frequency tolerance with voltage variation

Temperature (ºC)	Voltage (VAC)	Frequency (MHz)	Nominal	Deviation (%)	Limit 47CFR15.225 (%)	Result
20	102	13.5599907	13.56	0.0000686	0.01	Within Limit
	120	13.5598473	13.56	0.0011261	0.01	Within Limit
	138	13.5599604	13.56	0.0002920	0.01	Within Limit

Table 3 Frequency stability with voltage Results

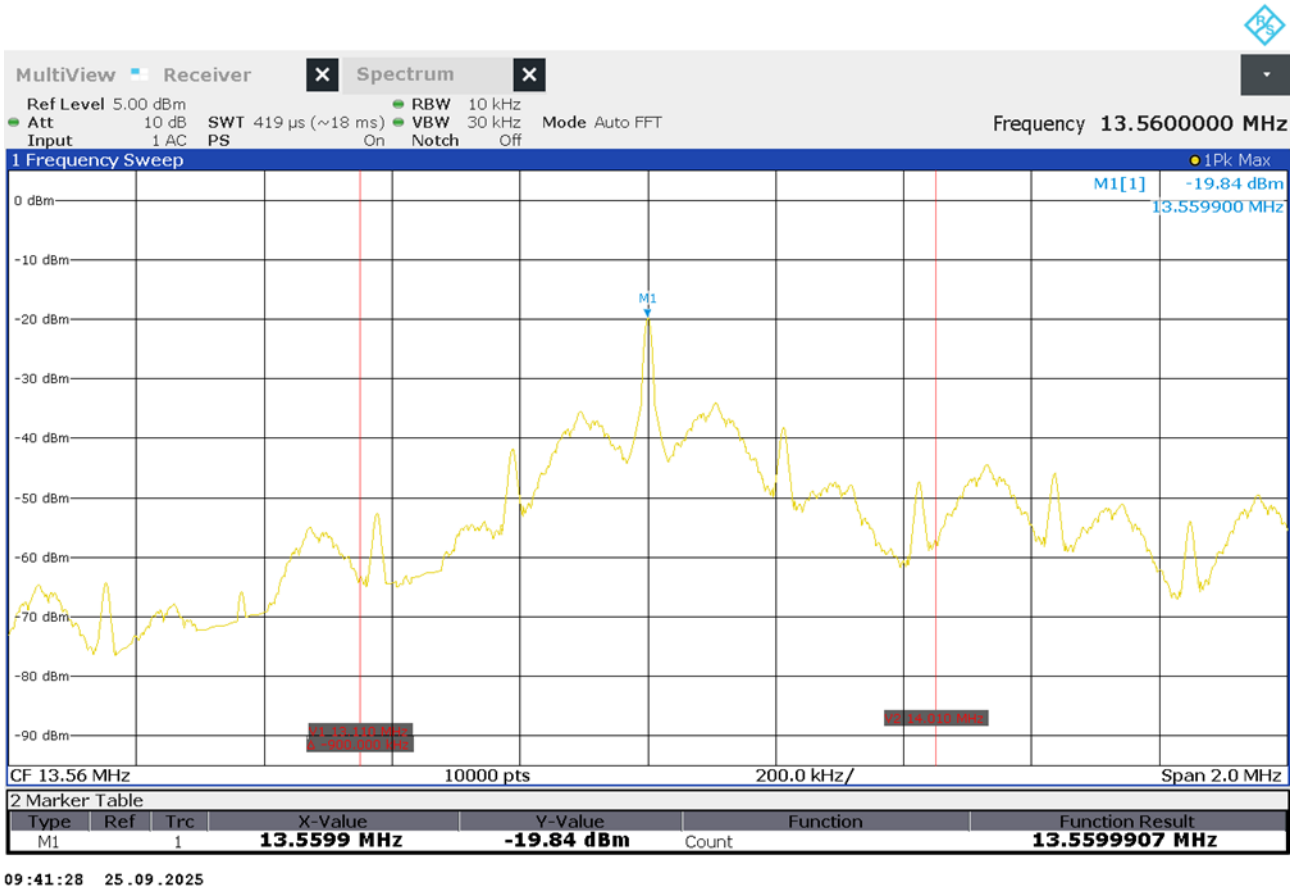


Figure 22 Example measurement of frequency stability at 102VAC

Section 7 20dB Bandwidth

7.1 Test Specification

FCC Rule	47CFR 15.215 (c) – 20dB Bandwidth
Standard	ANSIC63.10-2020/Cor1-2023
ISED Rule Part	ISED RSS-Gen section 6.7
Measurement Uncertainty	The reported uncertainty of measurement y ± U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95% is ±1x10^{-8}

7.1.1 Date of Test

26th September 2025

7.1.2 Test Area

LAB 1

7.1.3 Tested by

L Trickett

7.2 Procedure

For 20dB bandwidth the procedures of ANSIC63.10 Section 6.9.2 were followed.

Receiver Parameters	Setting
Detector Function	Peak
Span	2MHz
Resolution Bandwidth	10kHz
Video Bandwidth	30kHz
Sweep rate	Auto couple
Trace mode	Max hold

7.3 Test Results.

The 20dB bandwidth was measured using the bandwidth function of the signal analyser and the procedures of Clause 6.9.2 of ANSIC63.10-2020/Cor1-2023.

The measured 20dB bandwidth was 357.6kHz which was contained within the operating band 13.110 to 14.01MHz.

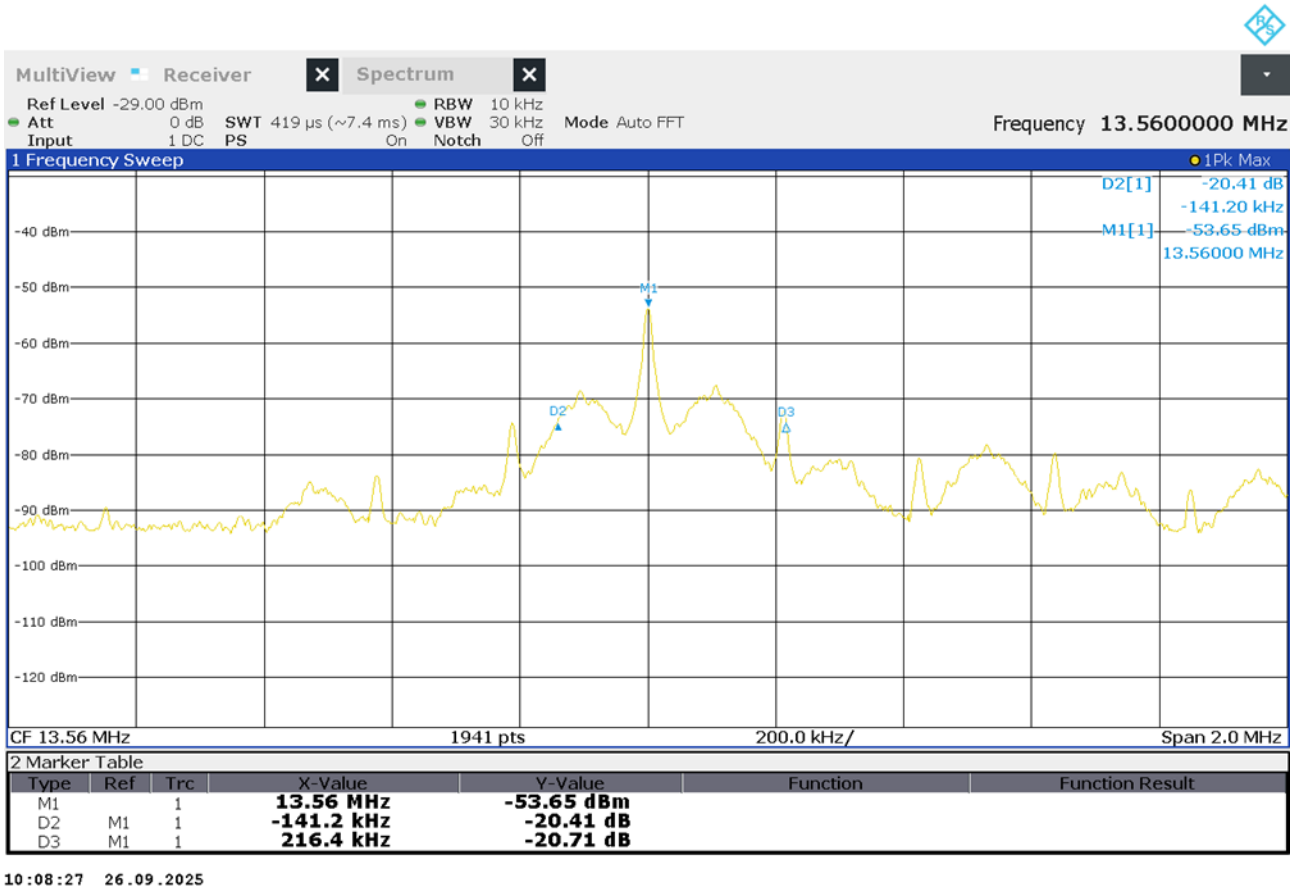


Figure 23 Bandwidth at 20dB Point.

Section 8 AC Mains Conducted Emissions

8.1 Test Specification

Regulation (USA)	47CFR15.207
Standard	ANSIC63.10-2020/Cor1-2023
Measurement Uncertainty	The reported uncertainty of measurement y ± U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 % is +/- 3.44dB

8.2 Power Line Emission Limits

Frequency (MHz)	Limits (dBµV)	
	Quasi Peak	Average
0.15 – 0.5	66 – 56*	56 – 46*
0.5 – 5.0	56.0	46.0
5.0 - 30	60.0	50.0

Note: * The limit decreases linearly with the logarithm of the frequency in the range

8.3 Receiver Settings

Receiver Parameters	Setting
Detector Function	Quasi Peak and Average
Start Frequency	150kHz
Stop Frequency	30MHz
Resolution Bandwidth	10kHz
Video Bandwidth	Auto

8.4 Procedure and Test Software Version

Eurofins E&E UK test procedure	CEP19 Issue 10
Test software	RadiMation Version 2023.1.6

8.4.1 Date of Test

2nd November 2025

8.4.2 Test Area

LAB 2

8.4.3 Tested by

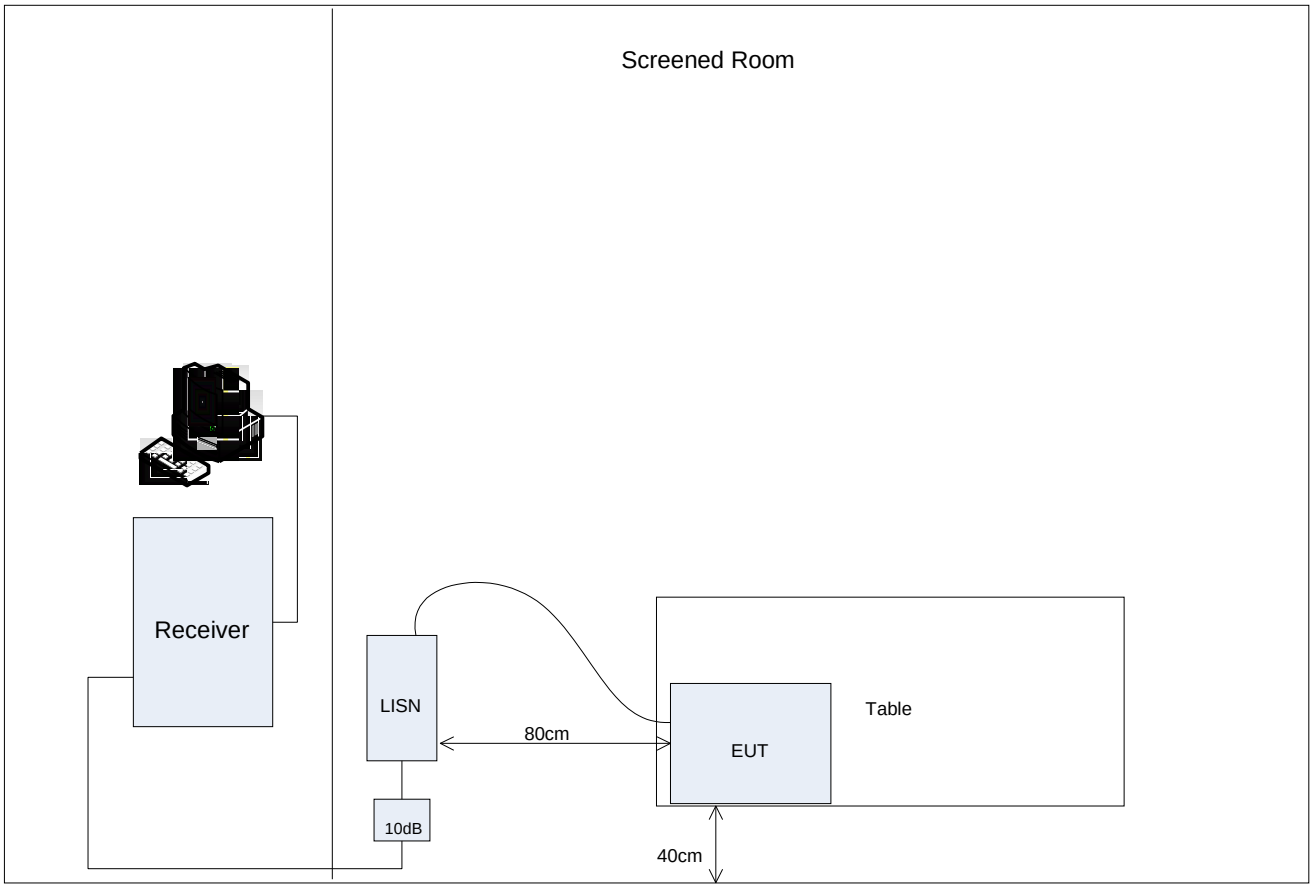
L Trickett

8.4.4 Test Setup

This test was applied to the EUT's Live and Neutral lines. The EUT was configured in the screened room on an 80cm high table was positioned 40cm from the room wall.

A calibrated mains extension lead was used to ensure a known impedance was presented to the EUT

The EUT was then powered from the mains supply via a Line Impedance Stabilisation Network (LISN).



8.5 Test Results

This section contains graphical and tabulated data. The following data is presented

Mode of Operation	Conductor	Result summary
RFID active operating at 13.56MHz	Live	Pass*
RFID active operating at 13.56MHz	Neutral	Pass*
RFID active operating at 13.56MHz with dummy load	Live	Pass*
RFID active operating at 13.56MHz with dummy load	Neutral	Pass*

*Note: FCC KDB publication number 174176 states:

"Devices Operating Below 30 MHz

For a device with a permanent or detachable antenna operating at or below 30 MHz, the FCC will accept measurements performed with a suitable dummy load in lieu of the antenna under the following conditions: (1) perform the AC power-line conducted tests with the antenna connected to determine compliance with Section 15.207 limits outside the transmitter's fundamental emission band; (2) retest with a dummy load in lieu of the antenna to determine compliance with Section 15.207 limits within the transmitter's fundamental emission band. For a detachable antenna, remove the antenna and connect a suitable dummy load to the antenna connector. For a permanent antenna, remove the antenna and terminate the RF output with a dummy load or network which simulates the antenna in the fundamental frequency band."

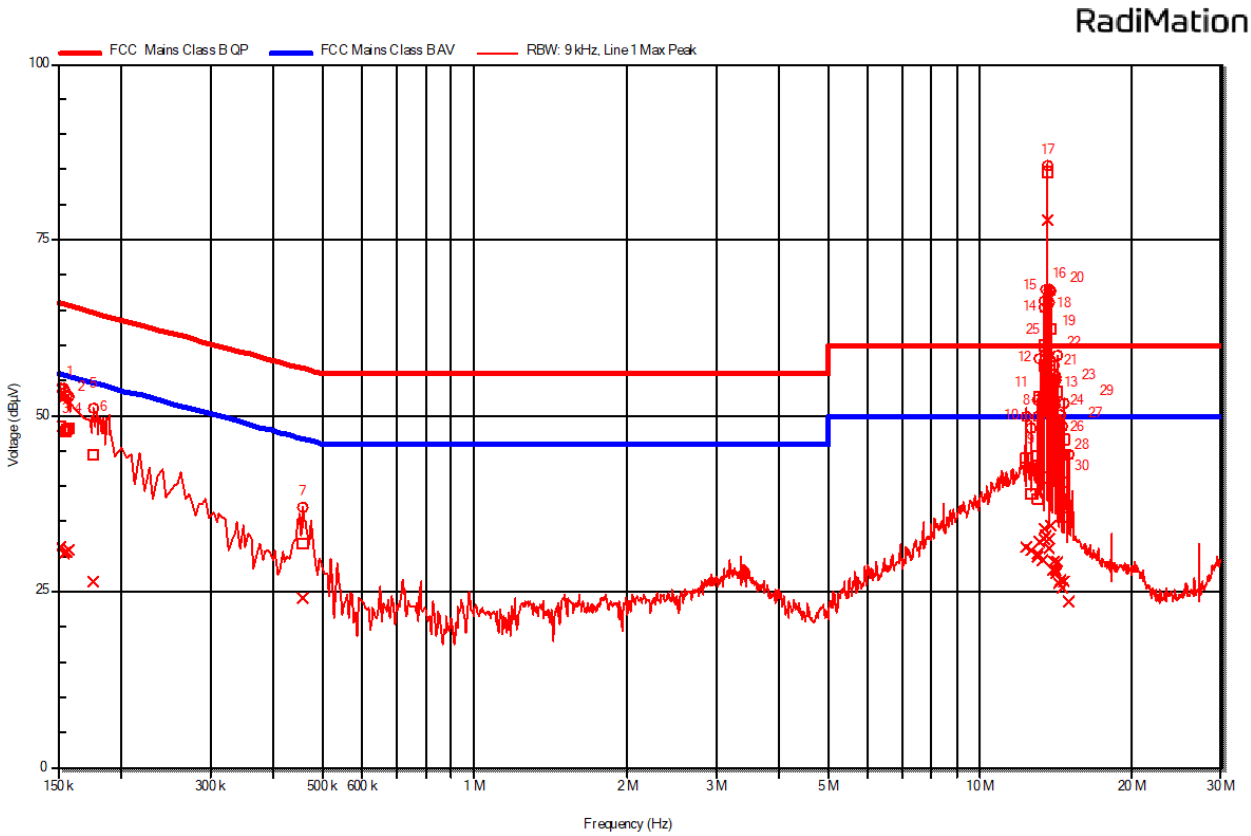


Figure 24: AC mains conducted emissions – Live

Frequency (MHz)	Average (dBµV)	Average Limit (dBµV)	Average Difference (dB)	Average Status	Quasi-Peak (dBµV)	Quasi-Peak Limit (dBµV)	Quasi-Peak Difference (dB)	Quasi-Peak Status
0.151	31.4	55.9	-24.6	Pass	48.5	65.9	-17.4	Pass
0.154	30.4	55.8	-25.3	Pass	47.9	65.8	-17.9	Pass
0.155	30.6	55.7	-25.1	Pass	47.7	65.7	-18.0	Pass
0.156	30.7	55.7	-25.0	Pass	48.1	65.7	-17.6	Pass
0.157	30.8	55.6	-24.8	Pass	48.2	65.6	-17.4	Pass
0.177	26.5	54.6	-28.2	Pass	44.4	64.6	-20.2	Pass
0.457	24.0	46.7	-22.7	Pass	31.9	56.7	-24.8	Pass
12.289	31.4	50.0	-18.6	Pass	44.1	60.0	-15.9	Pass
12.605	30.8	50.0	-19.2	Pass	38.9	60.0	-21.1	Pass
14.078	28.0	50.0	-22.0	Pass	47.1	60.0	-12.9	Pass
14.113	27.6	50.0	-22.4	Pass	45.5	60.0	-14.5	Pass
14.195	29.3	50.0	-20.7	Pass	53.4	60.0	-6.6	Pass
14.294	26.1	50.0	-23.9	Pass	40.7	60.0	-19.3	Pass
14.407	26.5	50.0	-23.5	Pass	44.5	60.0	-15.5	Pass
14.503	25.5	50.0	-24.6	Pass	40.6	60.0	-19.4	Pass
14.620	26.4	50.0	-23.6	Pass	46.5	60.0	-13.5	Pass
14.930	23.6	50.0	-26.4	Pass	35.6	60.0	-24.4	Pass

Table 4: Electric Field Emissions Peaks, 150kHz to 30MHz – Live

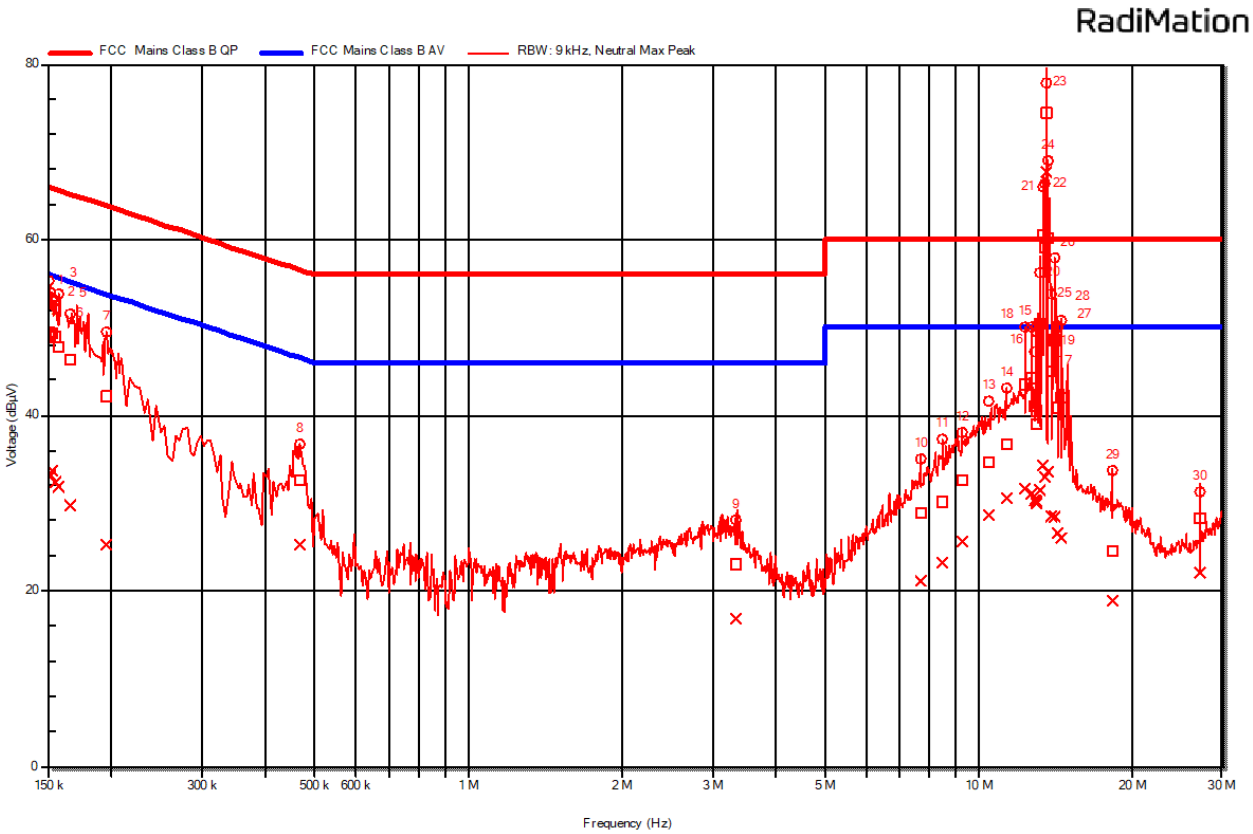


Figure 25: AC mains conducted emissions – Neutral

Frequency (MHz)	Average (dBµV)	Average Limit (dBµV)	Average Difference (dB)	Average Status	Quasi-Peak (dBµV)	Quasi-Peak Limit (dBµV)	Quasi-Peak Difference (dB)	Quasi-Peak Status
0.150	33.3	56.0	-22.7	Pass	49.4	66.0	-16.5	Pass
0.151	33.1	55.9	-22.8	Pass	49.2	65.9	-16.7	Pass
0.153	33.6	55.8	-22.2	Pass	49.3	65.8	-16.6	Pass
0.155	32.4	55.7	-23.3	Pass	48.9	65.7	-16.9	Pass
0.157	31.8	55.6	-23.9	Pass	47.8	65.6	-17.8	Pass
0.166	29.7	55.1	-25.5	Pass	46.2	65.1	-18.9	Pass
0.195	25.3	53.8	-28.5	Pass	42.2	63.8	-21.6	Pass
0.468	25.2	46.6	-21.4	Pass	32.6	56.6	-24.0	Pass
3.354	16.9	46.0	-29.1	Pass	23.0	56.0	-33.1	Pass
7.709	21.1	50.0	-28.9	Pass	28.8	60.0	-31.2	Pass
8.477	23.1	50.0	-26.9	Pass	30.1	60.0	-29.9	Pass
9.258	25.7	50.0	-24.3	Pass	32.7	60.0	-27.3	Pass
10.478	28.6	50.0	-21.4	Pass	34.7	60.0	-25.3	Pass
11.312	30.5	50.0	-19.5	Pass	36.7	60.0	-23.3	Pass
12.287	31.7	50.0	-18.3	Pass	43.5	60.0	-16.5	Pass
12.712	31.0	50.0	-19.0	Pass	44.2	60.0	-15.8	Pass
12.924	30.3	50.0	-19.7	Pass	41.1	60.0	-18.9	Pass
13.01	29.9	50.0	-20.1	Pass	39.0	60.0	-21.0	Pass
13.007	30.1	50.0	-19.9	Pass	40.5	60.0	-19.5	Pass
14.09	28.4	50.0	-21.6	Pass	48.5	60.0	-11.5	Pass
14.299	26.6	50.0	-23.4	Pass	40.9	60.0	-19.1	Pass
14.514	26.0	50.0	-24.0	Pass	41.9	60.0	-18.1	Pass
18.213	18.8	50.0	-31.2	Pass	24.6	60.0	-35.4	Pass
27.12	22.0	50.0	-28.0	Pass	28.2	60.0	-31.8	Pass

Table 5: Electric Field Emissions Peaks, 150kHz to 30MHz – Neutral

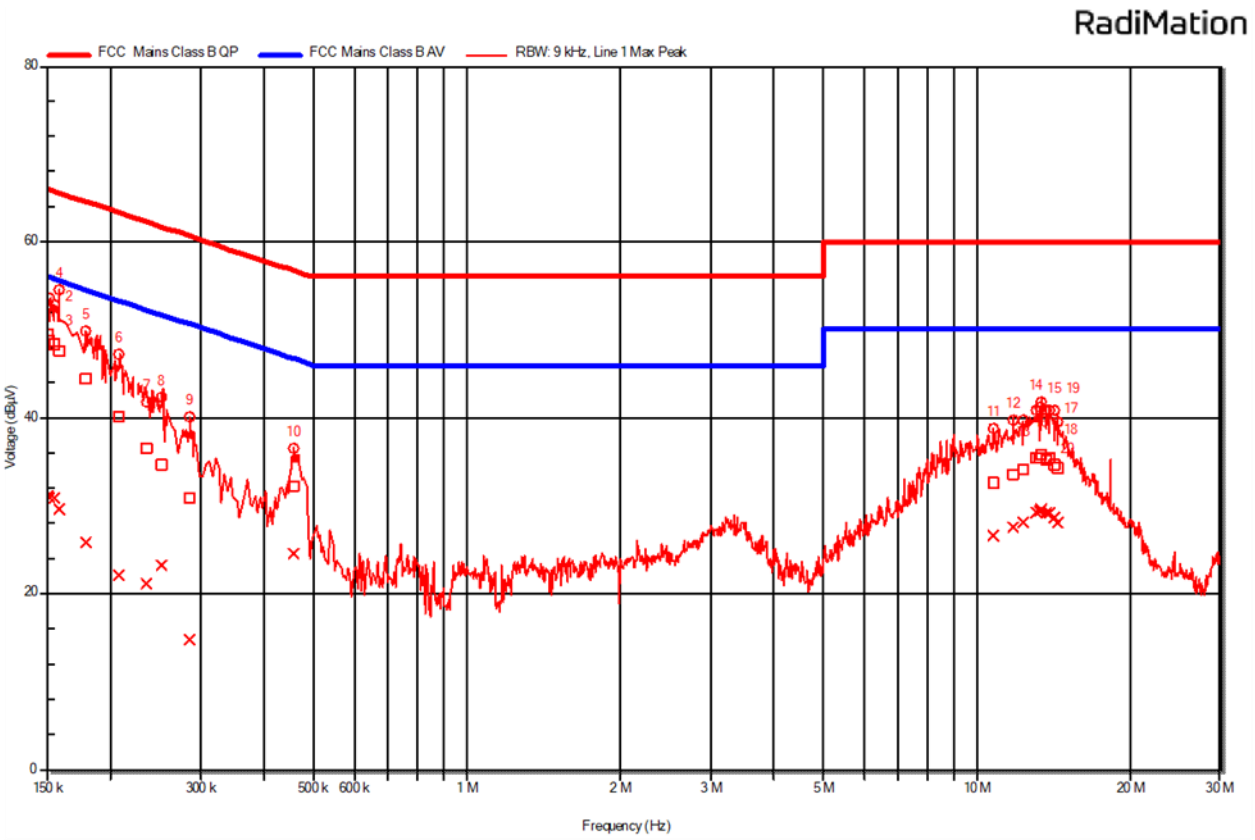


Figure 26: AC mains conducted emissions – Live with dummy load

Frequency (MHz)	Average (dBµV)	Average Limit (dBµV)	Average Difference (dB)	Average Status	Quasi-Peak (dBµV)	Quasi-Peak Limit (dBµV)	Quasi-Peak Difference (dB)	Quasi-Peak Status
0.150	31.1	56.0	-24.9	Pass	49.5	66.0	-16.5	Pass
0.152	30.9	55.9	-25.0	Pass	48.8	65.9	-17.1	Pass
0.155	30.9	55.7	-24.8	Pass	48.3	65.7	-17.4	Pass
0.159	29.6	55.5	-25.9	Pass	47.6	65.5	-18.0	Pass
0.179	25.9	54.5	-28.6	Pass	44.4	64.5	-20.2	Pass
0.208	22.0	53.3	-31.2	Pass	40.1	63.3	-23.2	Pass
0.236	21.1	52.3	-31.1	Pass	36.5	62.3	-25.7	Pass
0.252	23.3	51.7	-28.4	Pass	34.7	61.7	-27.0	Pass
0.285	14.7	50.7	-35.9	Pass	30.8	60.7	-29.8	Pass
0.456	24.6	46.8	-22.2	Pass	32.3	56.8	-24.5	Pass
10.795	26.6	50.0	-23.4	Pass	32.6	60.0	-27.4	Pass
11.801	27.5	50.0	-22.5	Pass	33.5	60.0	-26.5	Pass
12.318	28.1	50.0	-21.9	Pass	34.1	60.0	-25.9	Pass
13.070	29.3	50.0	-20.7	Pass	35.3	60.0	-24.7	Pass
13.266	29.3	50.0	-20.7	Pass	35.4	60.0	-24.6	Pass
13.349	29.6	50.0	-20.4	Pass	35.8	60.0	-24.2	Pass
13.704	29.2	50.0	-20.8	Pass	35.2	60.0	-24.8	Pass
13.848	29.3	50.0	-20.8	Pass	35.5	60.0	-24.5	Pass
14.181	28.6	50.0	-21.4	Pass	34.7	60.0	-25.3	Pass
14.388	28.0	50.0	-22.0	Pass	34.3	60.0	-25.7	Pass

Table 6: Electric Field Emissions Peaks, 150kHz to 30MHz – Live with dummy load

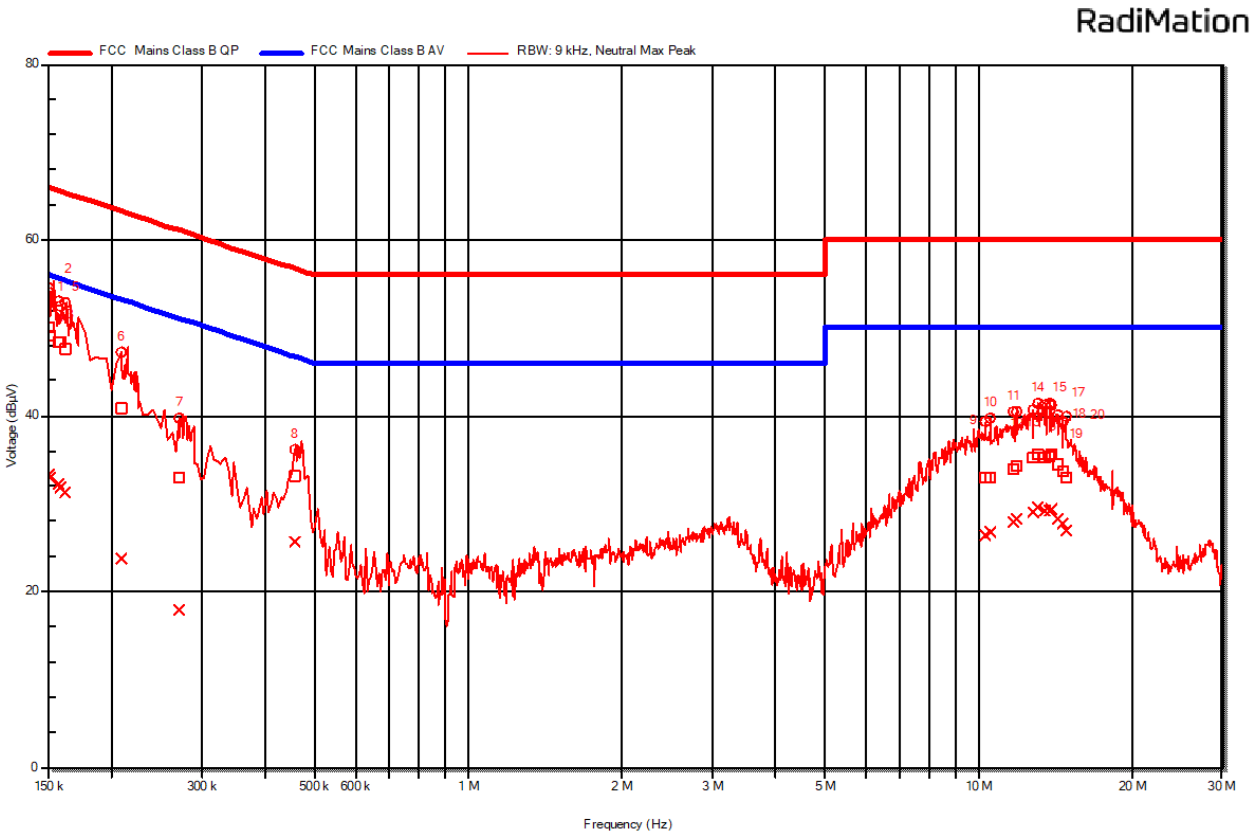


Figure 27: AC mains conducted emissions – Neutral with dummy load

Frequency (MHz)	Average (dBµV)	Average Limit (dBµV)	Average Difference (dB)	Average Status	Quasi-Peak (dBµV)	Quasi-Peak Limit (dBµV)	Quasi-Peak Difference (dB)	Quasi-Peak Status
0.150	33.4	56.0	-22.6	Pass	50.0	66.0	-16.0	Pass
0.152	33.0	55.9	-22.9	Pass	49.1	65.9	-16.8	Pass
0.157	32.2	55.6	-23.4	Pass	48.3	65.6	-17.3	Pass
0.159	31.8	55.5	-23.7	Pass	48.4	65.5	-17.1	Pass
0.163	31.3	55.3	-24.1	Pass	47.6	65.3	-17.7	Pass
0.209	23.7	53.3	-29.5	Pass	40.8	63.3	-22.4	Pass
0.272	17.9	51.1	-33.2	Pass	32.9	61.1	-28.2	Pass
0.456	25.7	46.8	-21.1	Pass	33.2	56.8	-23.6	Pass
10.280	26.4	50.0	-23.7	Pass	33.0	60.0	-27.0	Pass
10.505	26.7	50.0	-23.3	Pass	32.9	60.0	-27.1	Pass
11.729	27.9	50.0	-22.1	Pass	33.9	60.0	-26.1	Pass
11.830	28.2	50.0	-21.8	Pass	34.3	60.0	-25.7	Pass
12.800	29.1	50.0	-20.9	Pass	35.2	60.0	-24.8	Pass
13.113	29.5	50.0	-20.5	Pass	35.7	60.0	-24.3	Pass
13.511	29.3	50.0	-20.8	Pass	35.3	60.0	-24.7	Pass
13.812	29.3	50.0	-20.7	Pass	35.3	60.0	-24.7	Pass
13.898	29.4	50.0	-20.6	Pass	35.5	60.0	-24.5	Pass
14.271	28.3	50.0	-21.7	Pass	34.4	60.0	-25.6	Pass
14.600	27.7	50.0	-22.3	Pass	33.7	60.0	-26.3	Pass
14.856	26.9	50.0	-23.1	Pass	32.9	60.0	-27.1	Pass

Table 7: Electric Field Emissions Peaks, 150kHz to 30MHz – Neutral with dummy load

8.5.1 Example calculation

This correction factors required consists of LISN Insertion loss (IL), and Cable loss (CL).

The Actual Signal Level (ASL) is calculated as follows:

ASL (dBµV) = Indicated Signal Level (dBµV) + IL (dB) + CL (dB) + TL (dB)

8.5.2 Sample Data

The Quasi-Peak level at 0.150MHz

ASL (dBµV) = 33.4dBµV = 23.8dBµV + 9.6dB + 0.0dB

Appendix A EUT Test Photos

Test set up photographs are supplied separately.

Appendix B Test Equipment List

Radiated Emissions 30MHz to 1GHz Equipment

Item	Serial No.	Last Calibration Date	Calibration Interval
Laboratory 1 Semi-Anechoic Chamber	C0471	6th December 2022	36 Months
ETS Lindgren 2017B Mast (1 – 4m) with tilting mechanism	--	N/A	N/A
R&S ESW44 EMI Receiver	C0751	30th October 2024	12 Months
Teseq CBL6112D Bilog Antenna	C0506	22nd August 2024	36 Months
RF Cable HF32	19149.01.09.003	3rd October 2024	13 Months
RF Cable HF52	22293.01.30.002	22nd January 2025	12 Months
RF Cable HF47	E44808	3rd October 2024	13 Months
Kikasui PCR2000M AC Power Supply	C0198	-	-

Radiated Emissions 9kHz to 30MHz Equipment

Item	Serial No.	Last Calibration Date	Calibration Interval
Lab 5 Fully Anechoic Room	C0578	10th July 2024	36 Months
R&S ESW 44 EMI Test Receiver	C0658	6th May 2025	36 Months
ETS Lindgren 6512 Passive Loop Antenna 9kHz – 30MHz	C0753	21st August 2023	36 Months
RF Cable 18	20748.04.14.002	3rd October 2024	13 Months
RF Cable HF10	HF10	4th October 2024	13 Months
Kikasui PCR2000M AC Power Supply	C0198	-	-

Frequency stability measurement equipment

Item	Serial No.	Last Calibration Date	Calibration Interval
R&S ESW 44 EMI Test Receiver	C0658	6th May 2025	36 Months
ETS Lindgren Loop Antenna 7604	79206	-	-
Chroma Programmable AC Source 61602	C0341	-	-
Weisstechnik Environmental Chamber	B1669		
RS Pro 1319A K-Type Thermometer	C0487		
RF Cable 18	20748.04.14.002	3rd October 2024	13 Months

AC Mains conducted emissions equipment

Item	Serial No.	Last Calibration Date	Calibration Interval
Rohde & Schwarz ESR26 Test receiver	C0502	30th October 2023	24 Months
RF Cable J7A	J7A	17th September 2024	13 Months
RF Cable J9A	J9A	17th September 2024	13 Months
RF Cable LF3	LF3	7th October 2024	13 Months
Rohde & Schwarz ENV216 LISN	C0592	11th November 2024	12 Months
Kikusui PCR2000M power supply	C0198	-	-

----------END OF REPORT----------