EMC Test Report

Sensys Gatso Netherlands

T-Series + RT4.1

19-900555

47 CFR Part 15B Class A Digital Device
Effective Date October 2022
Test Date: 10th May 2024
Report Number: 05-14250-2-24 Issue 01

The testing was carried out by Kiwa Electrical Compliance, an independent test house, at their test facility located at:

Kiwa Electrical Compliance
Arnolds Court
Arnolds Farm Lane
Mountnessing
Essex
CM13 1UT
U.K.

www.Kiwa.com

Telephone: +44 (0) 1277 352219

This laboratory is accredited in accordance with the recognised International Standard ISO/IEC 17025. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer joint ISO-ILAC-IAF communiqué dated April 2017).

Arnolds Court, Arnolds Farm Lane, Mountnessing, Brentwood Essex, CM13 1UT

Certificate of Test 14250-2

The equipment noted below has been fully tested by Kiwa Electrical Compliance and, where appropriate, conforms to the relevant subpart of 47 CFR Part 15B. This is a certificate of test only and should not be confused with an equipment authorisation. Other standards may also apply.

Equipment:	T-Series + RT4.1
Model Number:	19-900555
Unique Serial Number:	202008008907
Applicant:	Sensys Gatso Netherlands Claes Tillyweg 2 Haarlem Noord-Holland Netherlands 2031 CW
Full measurement results are detailed in Report Number:	05-14250-2-24 Issue 01
Test Standards:	47 CFR Part 15B Class A Digital Device Effective Date October 2022 ↪ ANSI C63.4:2014

NOTE:
Certain tests were not performed based upon applicant's declarations. For details refer to section 3 of this report.

DEVIATIONS:
No deviations have been applied.

This certificate relates only to the unit tested as identified by a unique serial number and in the condition at the time it was tested. It does not relate to any other similar equipment and performance of the product before or after the test cannot be guaranteed. Whilst every effort is made to assure quality of testing, type tests are not exhaustive and although no non-conformances may be found, this doesn't exclude the possibility of unit not meeting the intentions of the standard or the requirements of the Federal Regulations, particularly under different conditions to those during testing. Any compliance statements are made reliant on (a) the application of the product and use of the assigned band being acceptable to the FCC and (b) the modes of operation as instructed to us by the Customer based on their specific knowledge of the application and functionality of the EUT. Statements of compliance, where measurements were made, do not include the measurement uncertainty. The measurement uncertainty, where stated, is the expanded uncertainty based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.

Date of Test: 10th May 2024

Test Engineer:
Shay Dunne

Shay Dunne
Digitally signed by: Shay Dunne
DN: CN = Shay Dunne email = shay.dunne@kiwa.com C = GB OU = Kiwa Electrical Compliance
Date: 2024.05.16 14:53:20 Z

Approved By:
Quality Manager

Clint Hilling
Digitally signed by: Clint Hilling
DN: CN = Clint Hilling email = clint.hilling@kiwa.com C = GB OU = Kiwa Electrical Compliance
Date: 2024.05.16 14:50:03 Z

Authorised
Representative:

ilac-MRA

UKAS TESTING
2360

1 Contents

2 Equipment under test (EUT)

2.1 Equipment specification

Applicant	Sensys Gatso Netherlands Claes Tillyweg 2 Haarlem Noord-Holland Netherlands 2031 CW	
Manufacturer of EUT	Sensys Gatso Netherlands	
Full Name of EUT	T-Series + RT4.1	
Model Number of EUT	19-900555	
Serial Number of EUT	202008008907	
Hardware Version	Not Applicable	
Software Version	US-RD160038-6.4	
Firmware Version	Not Applicable	
Date Received	26th April 2024	
Date of Test:	10th May 2024	
Purpose of Test	To demonstrate design compliance to relevant rules of Title 47 of the Code of Federal Regulations.	
Date Report Issued	13th May 2024	
Main Function	Traffic enforcement system.	
Information Specification	Height	375 mm
	Width	375 mm
	Depth	210 mm
	Weight	14 kg
	Voltage	12 VDC
	Current	6.5
	Highest Signal	24 GHz
EUT Supplied PSU	Manufacturer	Mean Well
	Model number	GST90A12
	Serial number	GST90A12-P1M
	Input voltage	100-140 VAC
	Input current	1.3 A

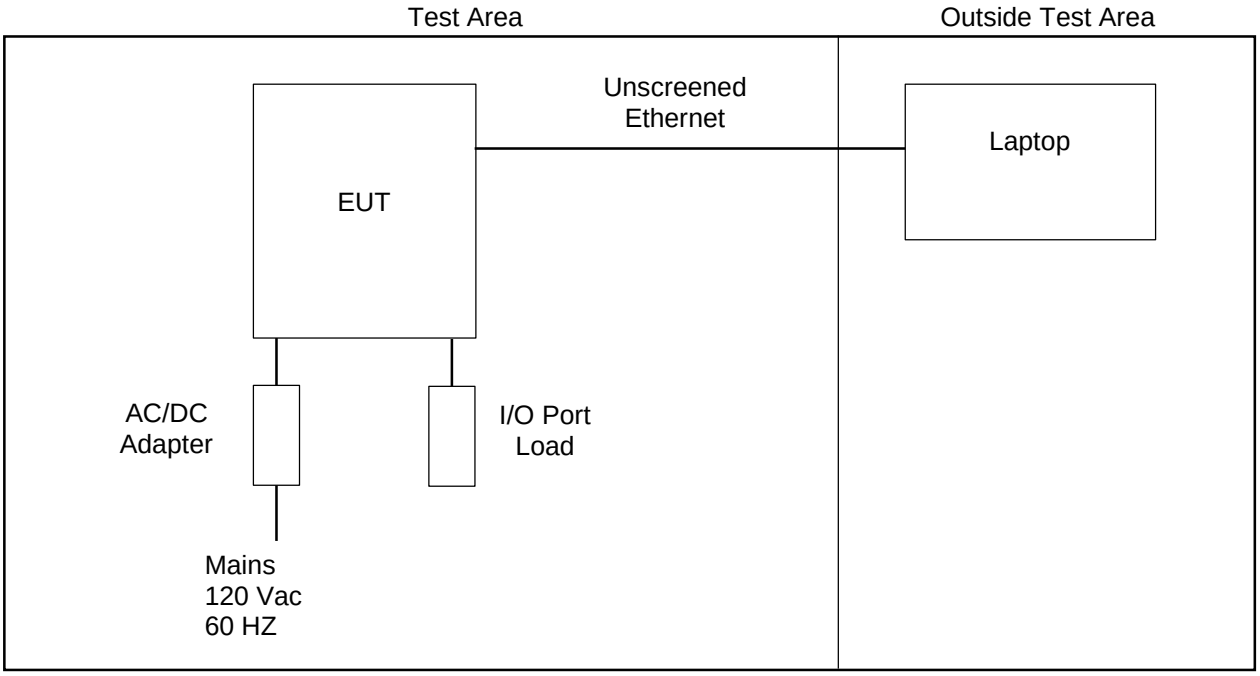
2.2 Functional description

System included a RF module (RT4.1)
Two connection cables, DC voltage and network connection for interface to laptop.

2.3 Modes of operation

Mode Reference	Description	Used for testing
Enforcement	The system is enforcing traffic. The FMCW stopped & not transmitting. The EUT is in a receive mode, where the radar is not transmitting. The EUT is powered and fully functional in the receive mode. CAN BUS communications are active during testing.	Yes

2.4 Emissions configuration



The equipment under test was supplied by 120V 60 Hz AC mains, via an ac/dc adaptor normally supplied with the EUT.

AC input/ DC Input – 3 Core – 2m – Connected to Mains power and the AC/DC adapter supplied by the applicant.
I/O Port – Multicore – 3m – Connected to a Load
Ethernet – Unscreened Ethernet – Connected to an ancillary laptop, listed in Section 10.

For the purposes of conducted emissions the support equipment was placed on the table adjacent to the EUT, but supplied by a separate LISN. For radiated emissions the support equipment was situated outside the chamber.

Only one operational test mode was supplied by the applicant, which was therefore used for testing.

3 Summary of test results

The T-Series + RT4.1, 19-900555 was tested for compliance to the following standard(s):

47 CFR Part 15B Class A Digital Device
Effective Date October 2022

Any compliance statements are made reliant on the modes of operation and the failure criteria as instructed to us by the applicant based on their specific knowledge of the application and functionality of the equipment tested. Whilst every effort is made to assure quality of testing, type tests are not exhaustive and although no non-conformances may be found, this doesn't exclude the possibility of equipment not meeting the intentions of the standard or the relevant rules, particularly under different conditions to those during testing. Statements of compliance, where measurements were made, do not include the measurement uncertainty.

Title	References	Results
1. AC powerline conducted emission	ANSI C63.4 Class - A	PASSED
2. Antenna power conducted emission	ANSI C63.4	NOT APPLICABLE[1]
3. Radiated emissions 30 MHz - 1 GHz	ANSI C63.4 Class - A	PASSED
4. Radiated Emissions above 1 GHz	ANSI C63.4 Class - A	PASSED[2]

1 The EUT does not have an Antenna Port.
2 Applicant declares highest internal source of the EUT to be 24 GHz. The measurement is therefore required to be made up to 40 GHz.

3.1 Electromagnetic Environment

Emissions categories as described in 47 CFR Part 15B

Class A digital device.

A digital device that is marketed for use in a commercial, industrial or business environment, exclusive of a device which is marketed for use by the general public or is intended to be used in the home.

Class B digital device.

A digital device that is marketed for use in a residential environment notwithstanding use in commercial, business and industrial environments. Examples of such devices include, but are not limited to, personal computers, calculators, and similar electronic devices that are marketed for use by the general public.

NOTE: The responsible party may also qualify a device intended to be marketed in a commercial, business or industrial environment as a Class B device, and in fact is encouraged to do so, provided the device complies with the technical specifications for a Class B digital device. In the event that a particular type of device has been found to repeatedly cause harmful interference to radio communications, the Commission may classify such a digital device as a Class B digital device, regardless of its intended use.

The T-Series + RT4.1 was deemed by Sensys Gatso Netherlands to be tested as Class A Digital Device.

4 Specifications

The tests were performed and operated in accordance with Kiwa Electrical Compliance procedures and the relevant standards listed below.

4.1 Relevant standards

Ref.	Standard Number	Version	Description
4.1.1	47 CFR Part 15B	2022	Part 15: Radio frequency devices. Sub part B: Unintentional Radiators.
4.1.2	ANSI C63.4	2014	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

4.2 Deviations

No deviations were applied.

5 Tests, methods and results

5.1 AC powerline conducted emission

5.1.1 Test methods

Test Requirements: 47 CFR Part 15B [Reference 4.1.1 of this report]
Test Method: ANSI C63.4 [Reference 4.1.2 of this report]

5.1.2 Configuration of EUT

The EUT was placed on a wooden table 0.8m above the ground plane with the ac/dc adaptor at 100mm separation from it. The adaptor was connected to a LISN via a 1 metre mains cable.

Refer to section 8 for a photograph and diagram of this test set-up.

Details of the peripheral and ancillary equipment connected for this test is listed in section 10.

Enforcement mode (refer to section 2.3) was the only operational mode available and was used for this test.

Port Name	Cable Type	Connected
AC Mains / DC Input	3 Core to PSU	Yes
Ethernet	Unscreened	Yes
IO	Multicore	Yes

5.1.3 Test procedure

Measurements were made via a LISN on the live and neutral conductors using both average and quasi-peak detectors.

At least 6 signals within 20dB and/or all signals within 10dB of the limit were investigated.

Tests were performed in Test Site F.

5.1.4 Test equipment

E035, E150, E642, E856, ZSW1

See Section 9 for more details.

5.1.5 Test results

Temperature of test environment 20°C
Humidity of test environment 50%

Cond 1 AC

Plot References
Peak emissions 150 kHz - 30 MHz on the live terminal against the average limit line.
Peak emissions 150 kHz - 30 MHz on the live terminal against the quasi-peak limit line.
Peak emissions 150 kHz - 30 MHz on the neutral terminal against the average limit line.
Peak emissions 150 kHz - 30 MHz on the neutral terminal against the quasi-peak limit line.

These results show that the EUT has PASSED this test.

Receiver plots showing peak values can be found in Section 6 of this report along with tables of peak / quasi-peak and peak / average values.

The uncertainty gives a 95% confidence interval in which the emissions from the EUT fall. Expanded uncertainty (K=2) is as follows:

150kHz to 30MHz ±3.40dB (UE71)

5.2 Antenna power conducted emission

NOT APPLICABLE: The EUT does not have an Antenna Port.

5.3 Radiated emissions 30 MHz - 1 GHz

5.3.1 Test methods

Test Requirements: 47 CFR Part 15B [Reference 4.1.1 of this report]
Test Method: ANSI C63.4 [Reference 4.1.2 of this report]

5.3.2 Configuration of EUT

The EUT was placed on a turntable, 0.8m above the ground plane and connected to the mains supply via the applicant's presented adaptor and mains lead. The front edge of the EUT was initially positioned facing the antenna. The horizontal projection onto the ground plane of the front edge of the EUT and the measuring point of the antenna were 3m apart.

Refer to section 8 for a photograph and diagram of this test set-up.

Details of the peripheral and ancillary equipment connected for this test is listed in section 10.

Enforcement mode (refer to section 2.3) was the only operational mode available and was used for this test.

Port Name	Cable Type	Connected
AC Mains / DC Input	3 Core to PSU	Yes
Ethernet	Unscreened	Yes
IO	Multicore	Yes

5.3.3 Test procedure

Tests were made in accordance with FCC Part 15 using the measuring equipment listed below. Measurements were made on a site listed with the FCC. The equipment was rotated 360 degrees and the antenna scanned 1 – 4 metres in both horizontal and vertical polarisations to record the worst case emissions.

At least 6 signals within 20dB and all signals within 10dB of the limit were investigated.

Tests were performed using Test Site H.

5.3.4 Test equipment

E412, E745, E914, F238, NSA-H, ZSW1

See Section 9 for more details.

5.3.5 Test results

Temperature of test environment 18°C
Humidity of test environment 61%

Rad 1

Plot References
Peak Horizontal emissions 30 MHz - 300 MHz against the quasi-peak limit line.
Peak Vertical emissions 30 MHz - 300 MHz against the quasi-peak limit line.
Peak Horizontal emissions 300 MHz - 1 GHz against the quasi-peak limit line.
Peak Vertical emissions 300 MHz - 1 GHz against the quasi-peak limit line.

These results show that the EUT has PASSED this test.

Receiver plots showing peak values can be found in Section 6 of this report along with tables of peak / quasi-peak values.

The uncertainty gives a 95% confidence interval in which the emissions from the EUT fall. Expanded uncertainty (K=2) is as follows:

30MHz to 1GHz ±6.16dB (UE60a & UE 60b)

5.4 Radiated Emissions above 1 GHz

5.4.1 Test methods

Test Requirements: 47 CFR Part 15B [Reference 4.1.1 of this report]
Test Method: ANSI C63.4 [Reference 4.1.2 of this report]

5.4.2 Configuration of EUT

The EUT was placed on a 0.8 metre high turntable. The front edge of the EUT was initially positioned facing the antenna.

Refer to section 8 for a photograph and diagram of this test set-up.

Details of the peripheral and ancillary equipment connected for this test is listed in section 10.

Enforcement mode (refer to section 2.3) was the only operational mode available and was used for this test.

Port Name	Cable Type	Connected
AC Mains / DC Input	3 Core to PSU	Yes
Ethernet	Unscreened	Yes
IO	Multicore	Yes

5.4.3 Test procedure

Tests were made in accordance with FCC Part 15 using the measuring equipment listed below.

The frequency range of the test was chosen as per Section 15.33 of FCC Part 15. This was limited to 40 GHz based on the supplier declared highest internal source frequency of 24 GHz.

Measurements were made in a semi-anechoic chamber with appropriate absorbing material for use in this range. Horn antennas were used at heights where the whole of the EUT was contained within the main beam in both horizontal and vertical polarisations. The EUT was rotated through 360 degrees to record the worst case emissions.

A measurement distance of 3m was used for the test range 1 - 6GHz, 1.2m was used for the test range 6 - 18GHz and 0.3m was used for the test range 18 - 40GHz.

Where measurement distances other than 3 metres are specified, the appropriate correction factor has been determined and applied in the measurement software, corrected for a 3 metre measurement distance.

At least 6 signals within 20dB and all signals within 10dB of the limit were investigated.

Tests were performed using test Site H.

5.4.4 Test equipment

E296-2, E330, E412, F230, F231, F238, LPE261, LPE333, VSWR-H, ZSW1

See Section 9 for more details.

5.4.5 Test results

Temperature of test environment	18°C
Humidity of test environment	61%

Rad 1

Plot References
Peak Horizontal emissions 1 - 2 GHz against the average limit line
Peak Vertical emissions 1 - 2 GHz against the average limit line
Peak Horizontal emissions 2 - 5 GHz against the average limit line
Peak Vertical emissions 2 - 5 GHz against the average limit line
Peak Horizontal emissions 5 - 6 GHz against the average limit line
Peak Vertical emissions 5 - 6 GHz against the average limit line
Peak Horizontal emissions 6 - 10 GHz against the average limit line
Peak Vertical emissions 6 - 10 GHz against the average limit line
Peak Horizontal emissions 10 – 12.5 GHz against the average limit line
Peak Vertical emissions 10 – 12.5 GHz against the average limit line
Peak Horizontal emissions 12-15 GHz against the average limit line
Peak Vertical emissions 12-15 GHz against the average limit line
Peak Horizontal emissions 15-18 GHz against the average limit line
Peak Vertical emissions 15-18 GHz against the average limit line
Peak Horizontal emissions 18-22 GHz against the average limit line
Peak Vertical emissions 18-22 GHz against the average limit line
Peak Horizontal emissions 22-25 GHz against the average limit line
Peak Vertical emissions 22-25 GHz against the average limit line
Peak Horizontal emissions 25-26.5 GHz against the average limit line
Peak Vertical emissions 25-26.5 GHz against the average limit line
Peak Horizontal emissions 26.5-30 GHz against the average limit line
Peak Vertical emissions 26.5-30 GHz against the average limit line
Peak Horizontal emissions 30-33 GHz against the average limit line
Peak Vertical emissions 30-33 GHz against the average limit line
Peak Horizontal emissions 33-36 GHz against the average limit line
Peak Vertical emissions 30-36GHz against the average limit line
Peak Horizontal emissions 36-40 GHz against the average limit line
Peak Vertical emissions 36-40 GHz against the average limit line

These results show that the EUT has PASSED this test.

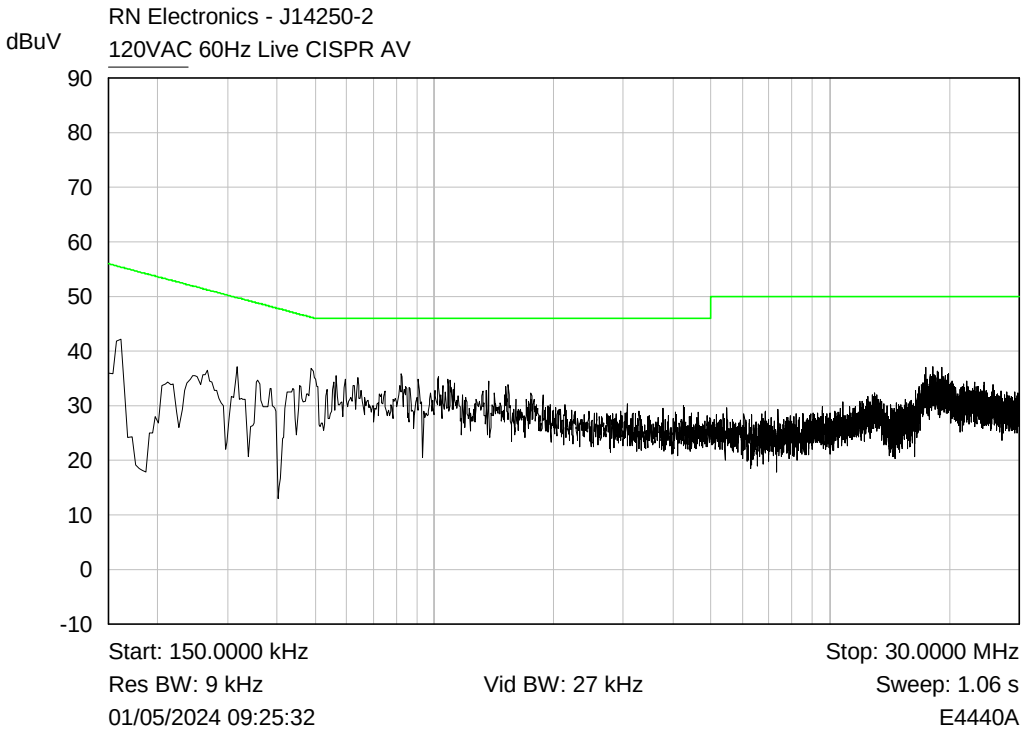
Receiver plots showing peak values can be found in Section 6 of this report along with tables of peak & average values.

The uncertainty gives a 95% confidence interval in which the emissions from the EUT fall. Expanded uncertainty (K=2) is as follows:

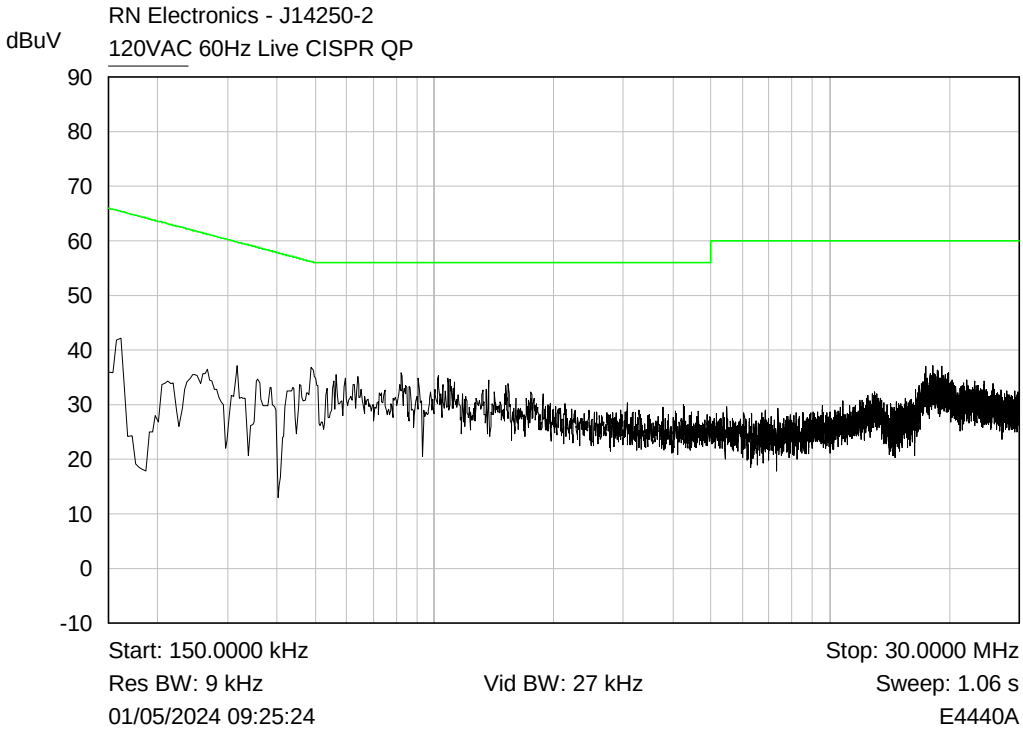
1GHz to 3GHz ±4.81dB (UE77)
3GHz to 6.6GHz ±4.81dB (UE78)
6GHz to 12.5GHz ±5.39dB (UE79)
12GHz to 18GHz ±5.38dB (UE80)
18GHz to 26.5GHz ±6.02dB (UE110)
26.5GHz to 40GHz ±4.20 dB (UE33)

6 Plots/Graphical results

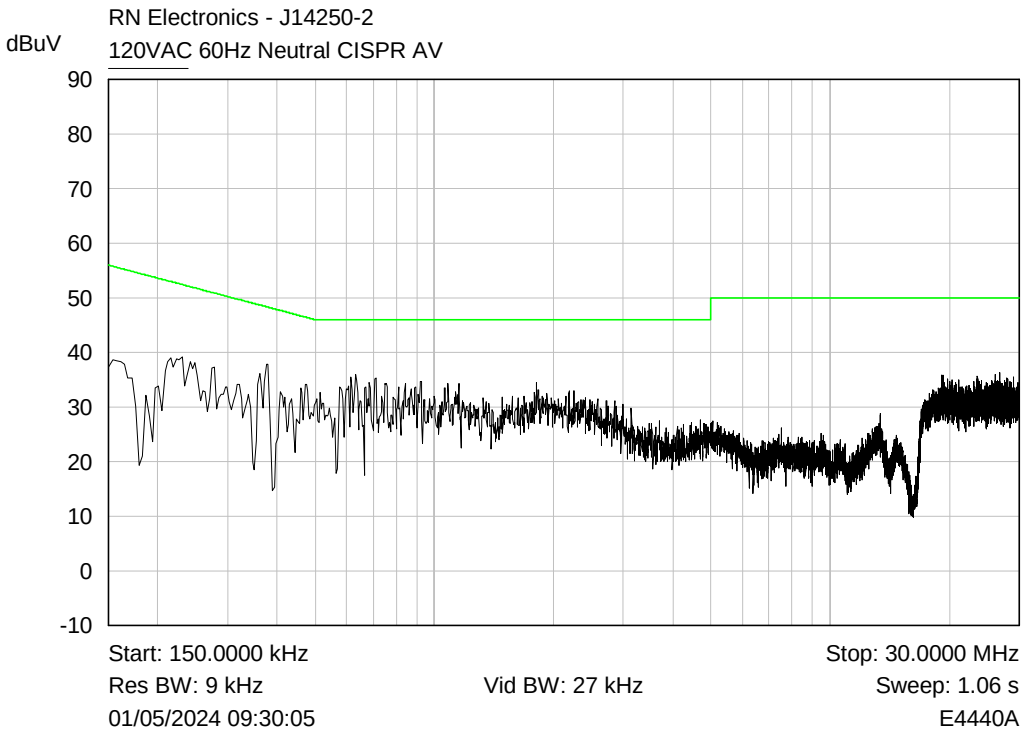
6.1 AC powerline conducted emission



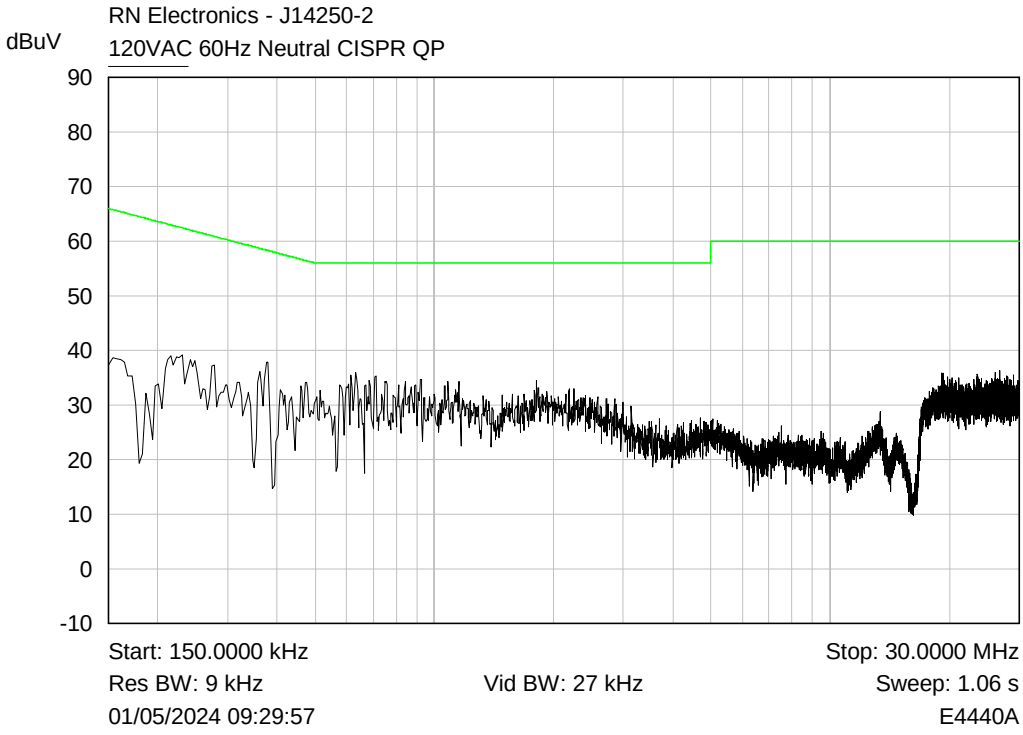
Peak emissions 150 kHz - 30 MHz on the live terminal against the average limit line.



Peak emissions 150 kHz - 30 MHz on the live terminal against the quasi-peak limit line.



Peak emissions 150 kHz - 30 MHz on the neutral terminal against the average limit line.



Peak emissions 150 kHz - 30 MHz on the neutral terminal against the quasi-peak limit line.

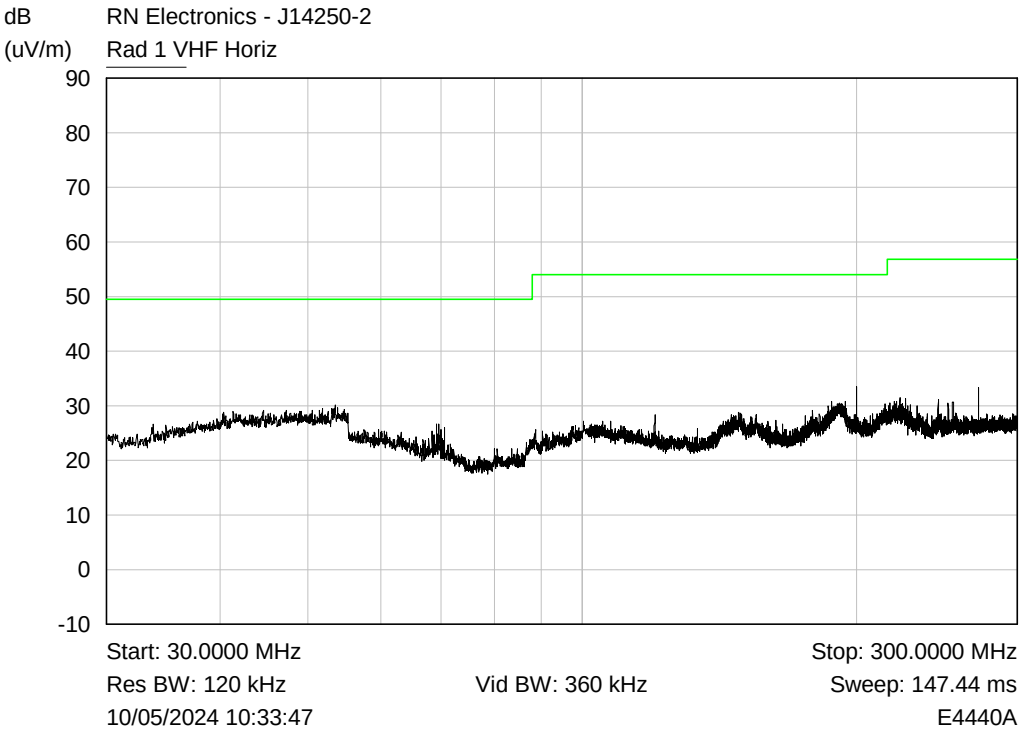
Table of signals measured for Live 150k-30M

Signal No.	Freq (MHz)	Peak Amp (dBuV)	QP Amp (dBuV)	QP -Lim (dB)	AV Amp (dBuV)	AV -Lim (dB)
1	0.162	43.1	38.5	-26.9	23.1	-32.3
2	0.375	38.7	34.5	-23.9	24.1	-24.3
3	0.539	35.5	29.2	-26.8	19.7	-26.3
4	0.911	35.9	30.6	-25.4	21.3	-24.7
5	1.014	35.1	30.6	-25.4	21.0	-25.0
6	1.014	33.6	30.2	-25.8	21.0	-25.0

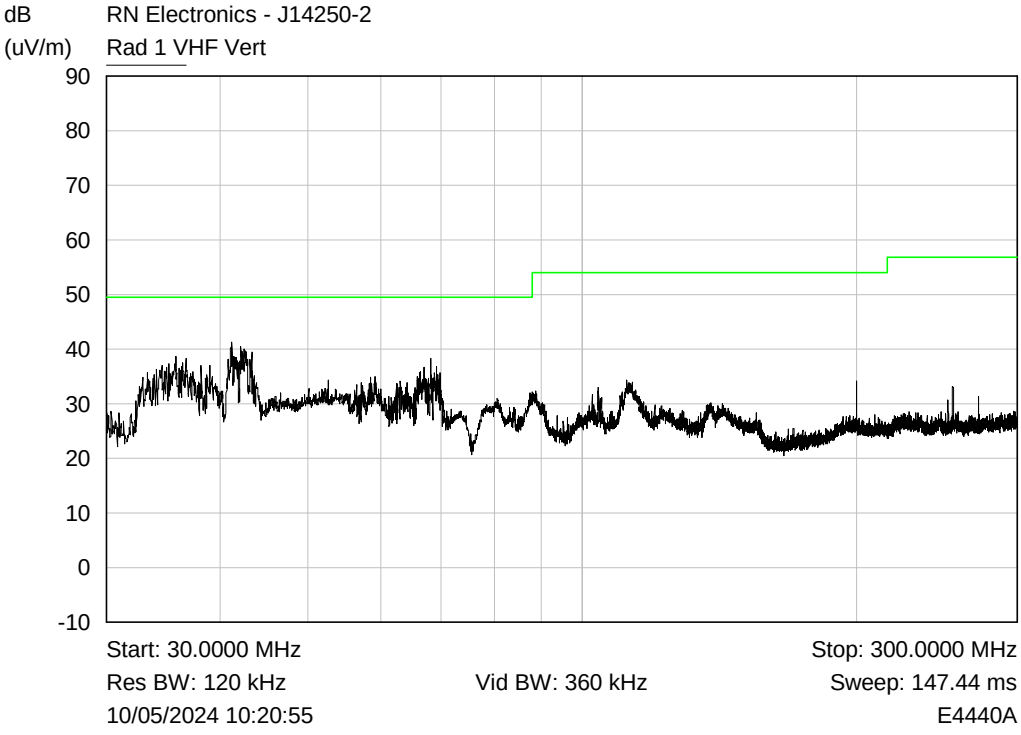
Table of signals measured for Neutral 150k-30M

Signal No.	Freq (MHz)	Peak Amp (dBuV)	QP Amp (dBuV)	QP -Lim (dB)	AV Amp (dBuV)	AV -Lim (dB)
1	0.157	44.8	41.6	-24.0	34.8	-20.8
2	0.248	40.3	37.4	-24.4	23.4	-28.4
3	0.378	39.9	36.8	-21.5	23.9	-24.4
4	0.632	38.1	33.9	-22.1	20.8	-25.2

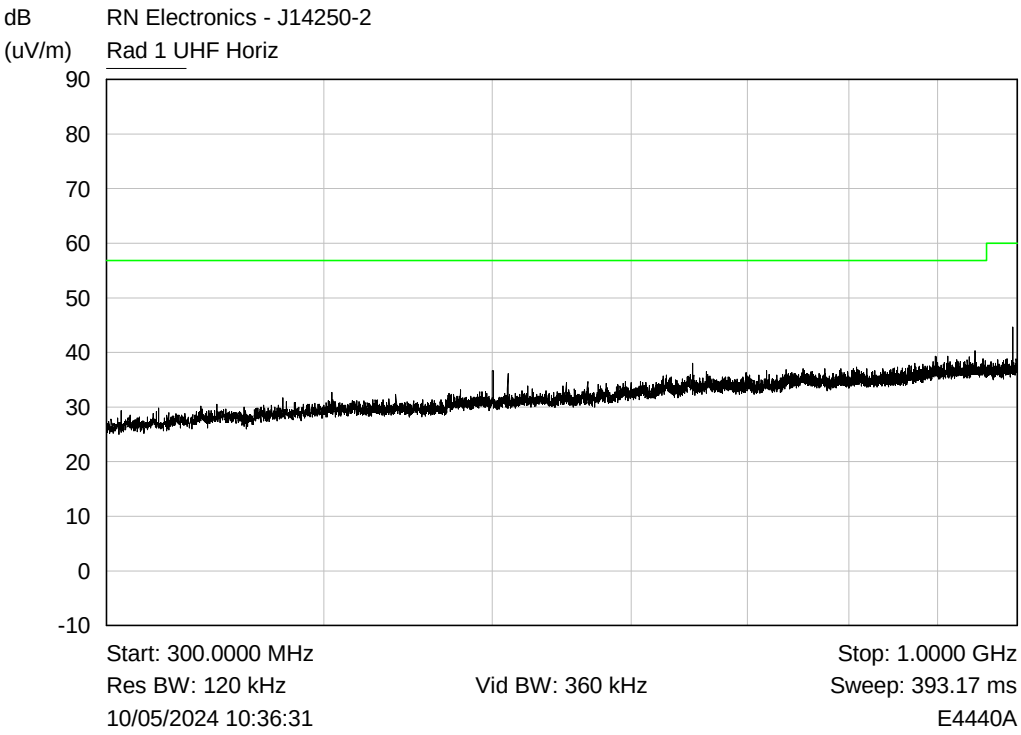
6.2 Radiated emissions 30 MHz - 1 GHz



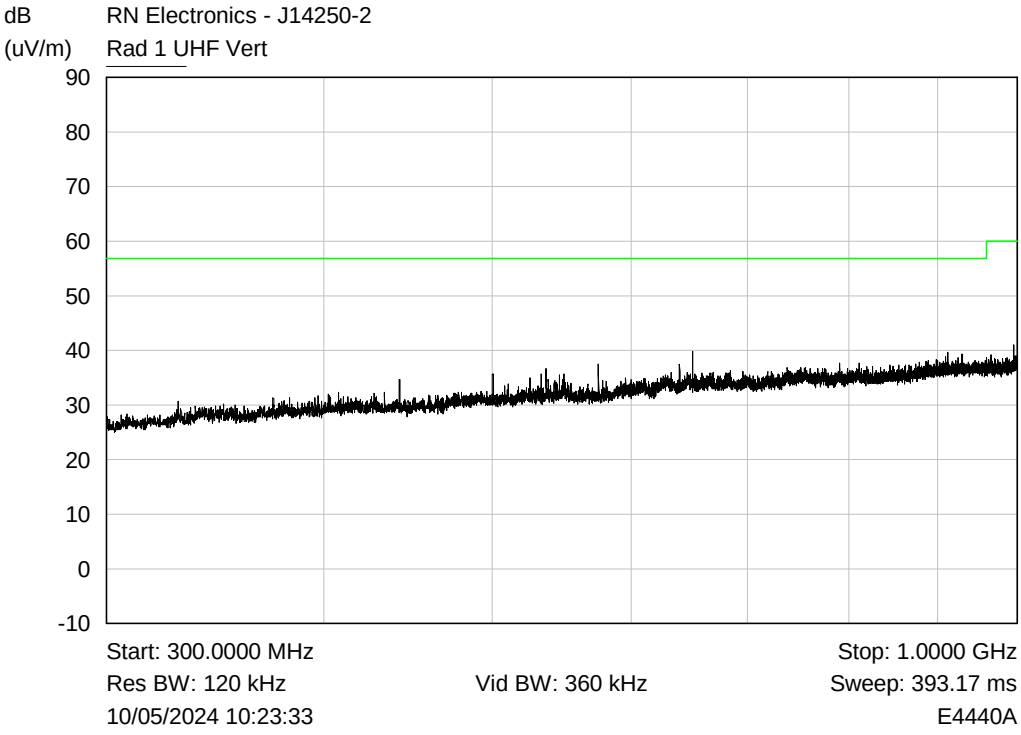
Peak Horizontal emissions 30 MHz - 300 MHz against the quasi-peak limit line.



Peak Vertical emissions 30 MHz - 300 MHz against the quasi-peak limit line.



Peak Horizontal emissions 300 MHz - 1 GHz against the quasi-peak limit line.



Peak Vertical emissions 300 MHz - 1 GHz against the quasi-peak limit line.

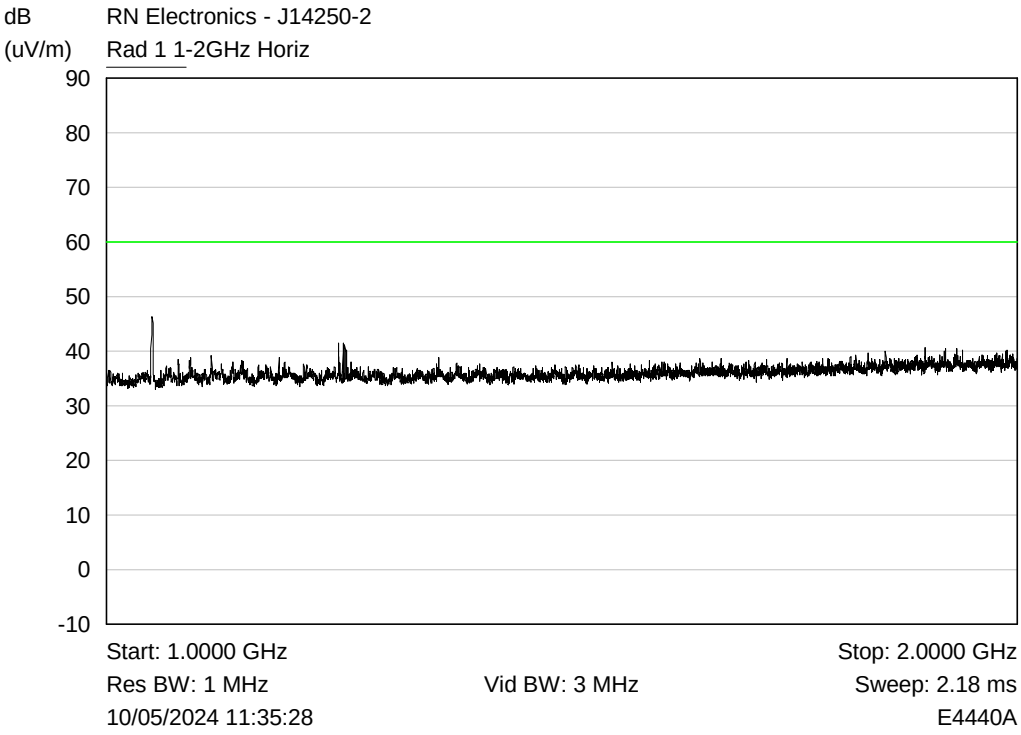
Table of signals measured for Horizontal Signal List

The plots show that no signals were required to be measured.

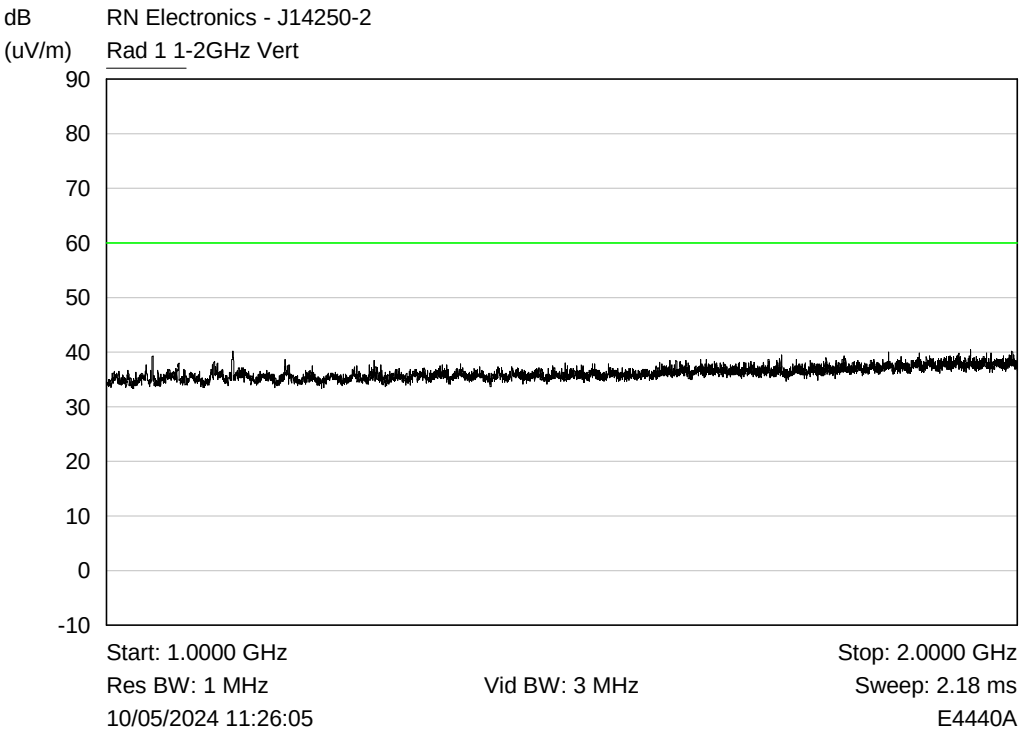
Table of signals measured for Vertical Signal List

Signal No.	Freq (MHz)	Peak Amp (dBuV/m)	QP Amp (dBuV/m)	QP -Lim (dB)
1	36.495	39.1	28.9	-20.6
2	37.214	37.6	27.0	-22.5
3	41.856	39.7	30.8	-18.7
4	42.129	40.2	29.9	-19.6
5	42.572	39.7	30.3	-19.2
6	68.072	36.9	27.5	-22.0

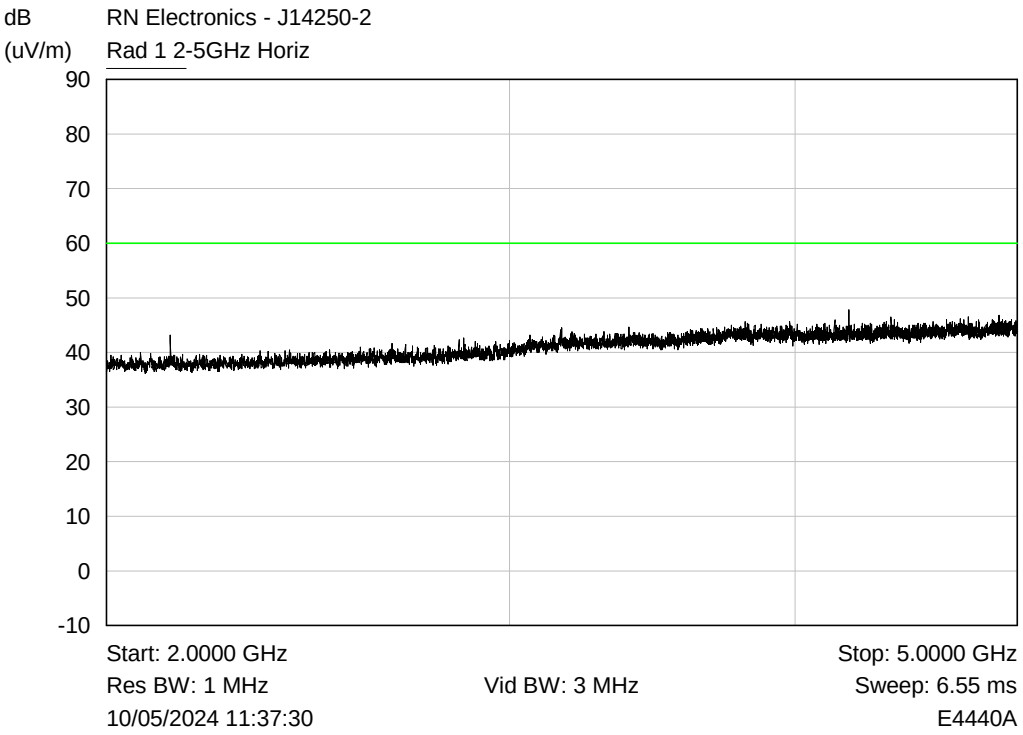
6.3 Radiated Emissions above 1 GHz



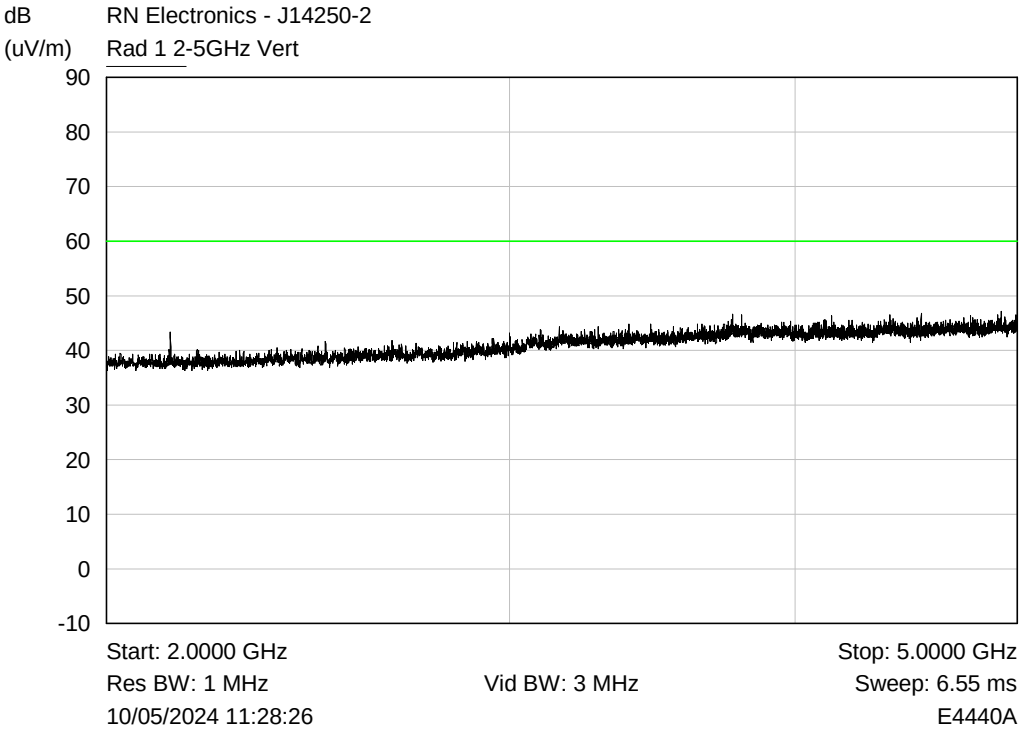
Peak Horizontal emissions 1 - 2 GHz against the average limit line



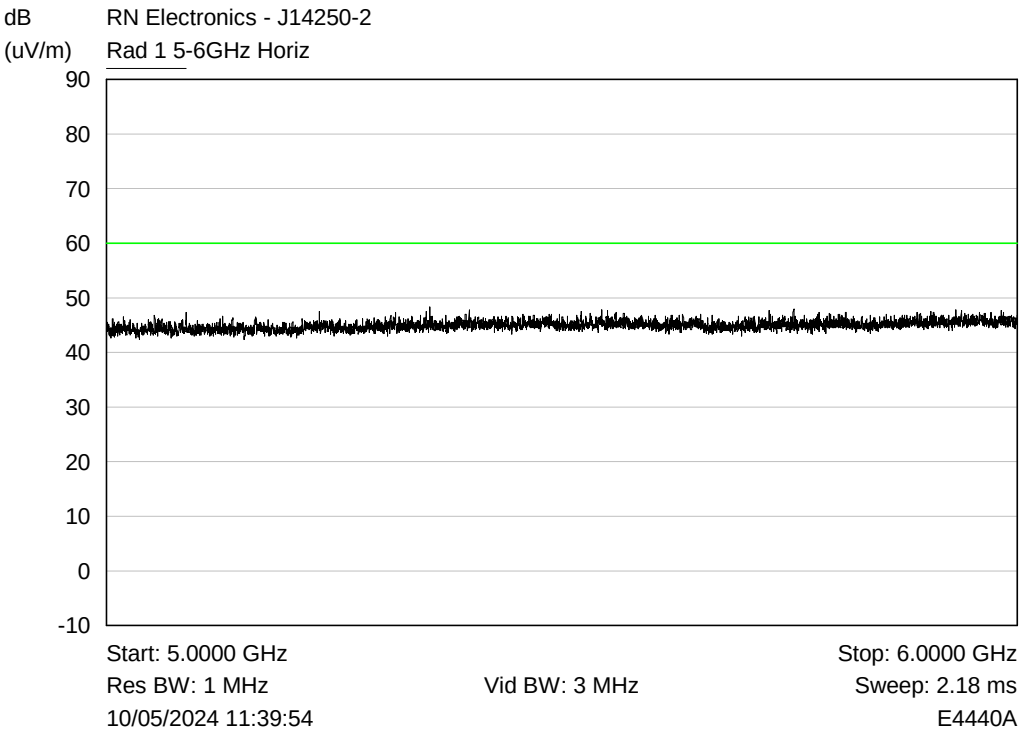
Peak Vertical emissions 1 - 2 GHz against the average limit line



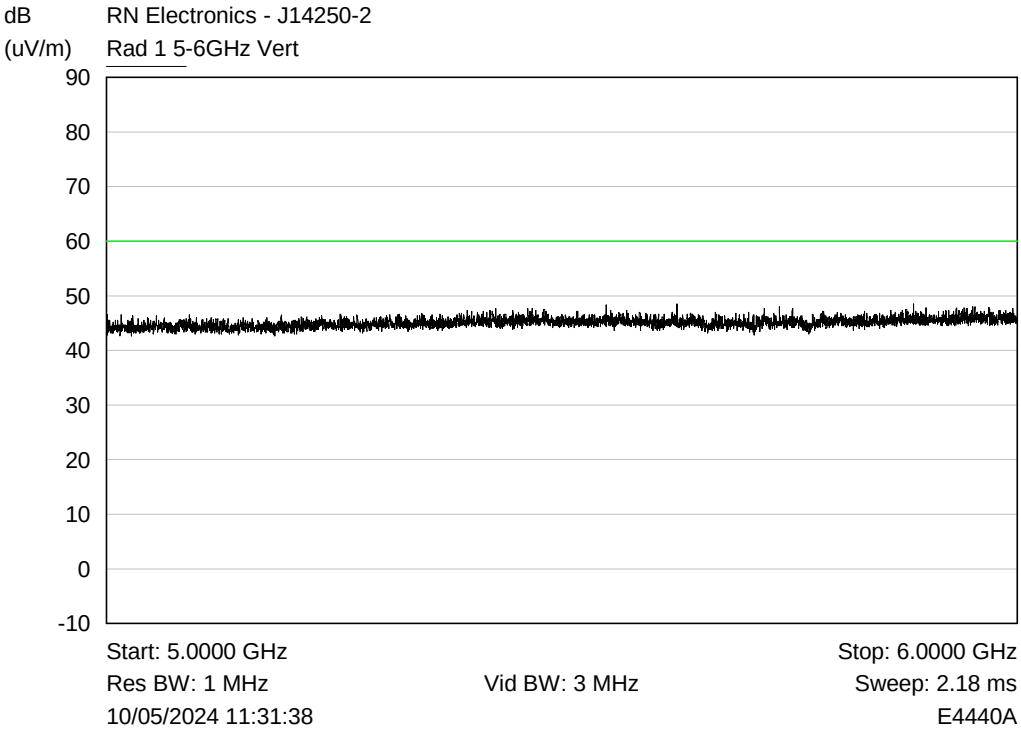
Peak Horizontal emissions 2 - 5 GHz against the average limit line



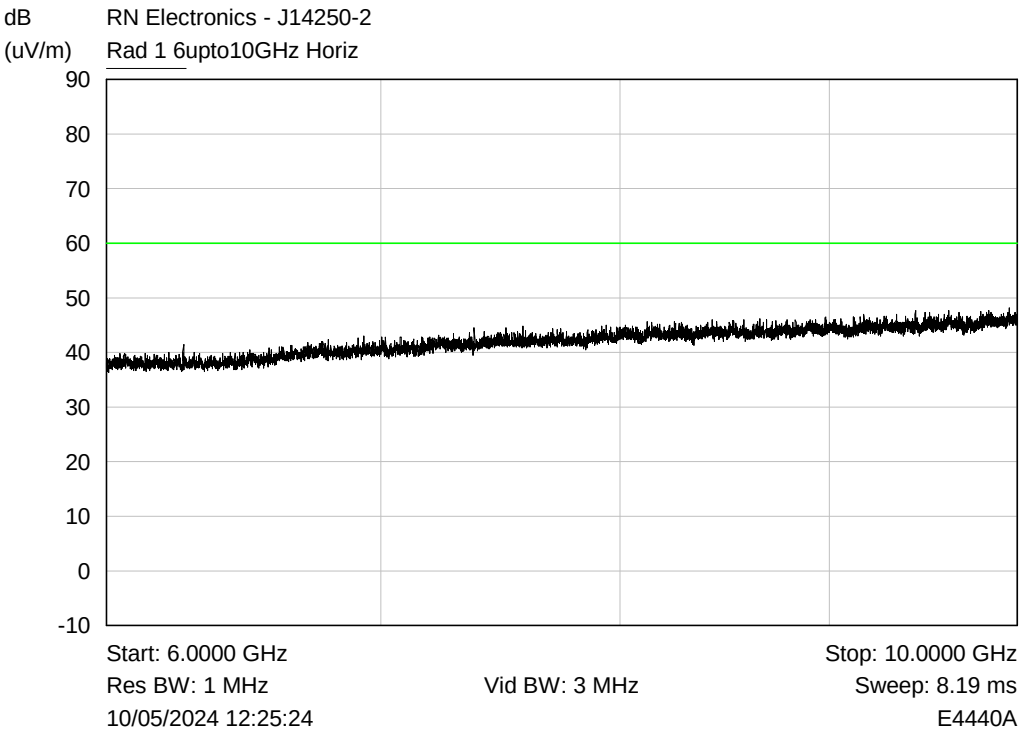
Peak Vertical emissions 2 - 5 GHz against the average limit line



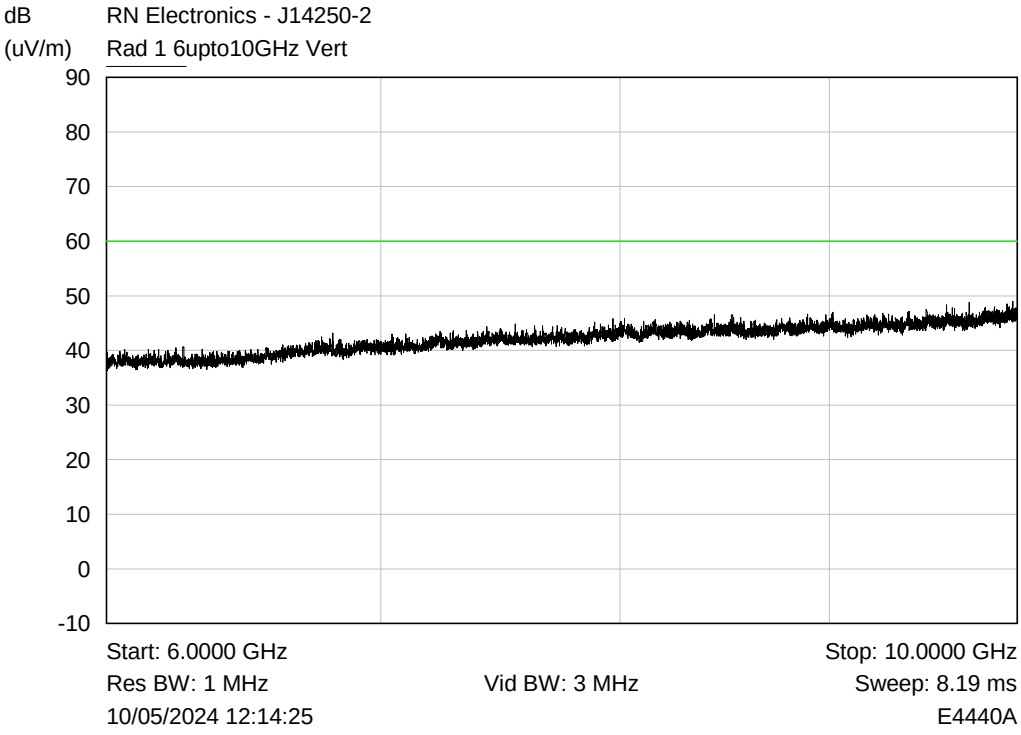
Peak Horizontal emissions 5 - 6 GHz against the average limit line



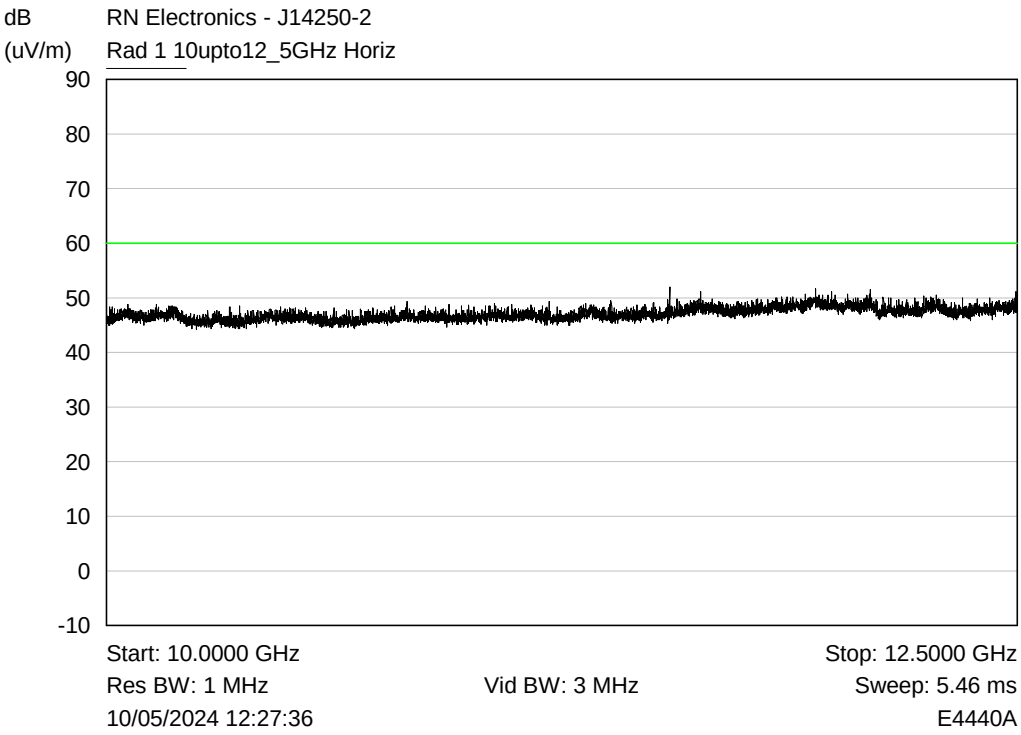
Peak Vertical emissions 5 - 6 GHz against the average limit line



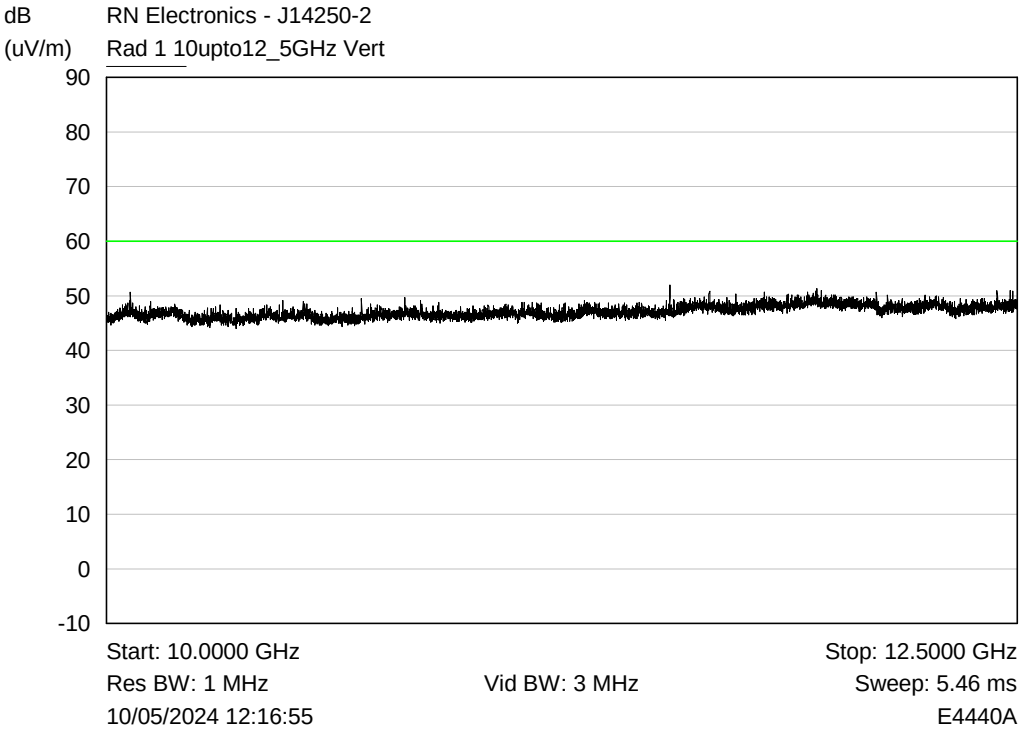
Peak Horizontal emissions 6 - 10 GHz against the average limit line



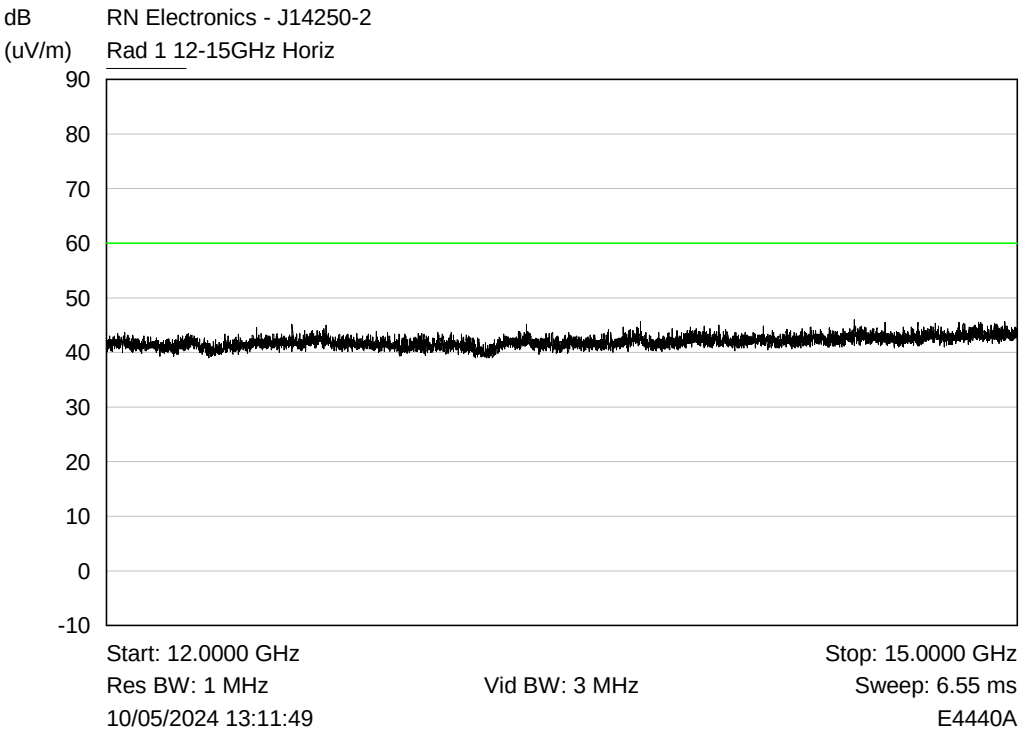
Peak Vertical emissions 6 – 10 GHz against the average limit line



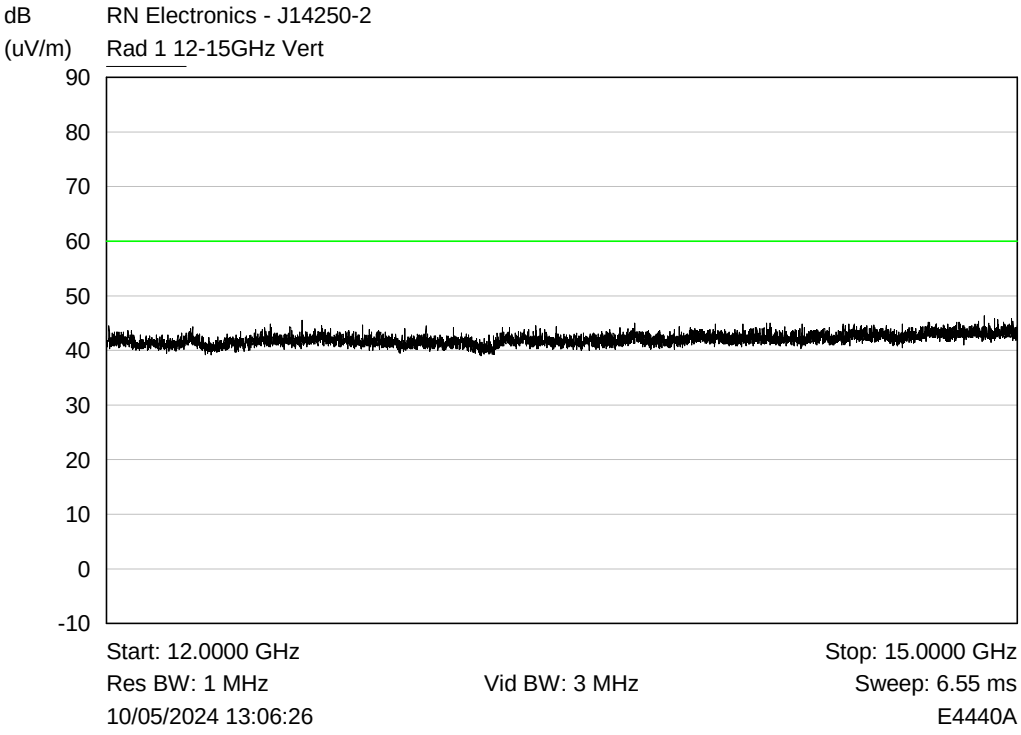
Peak Horizontal emissions 10 – 12.5 GHz against the average limit line



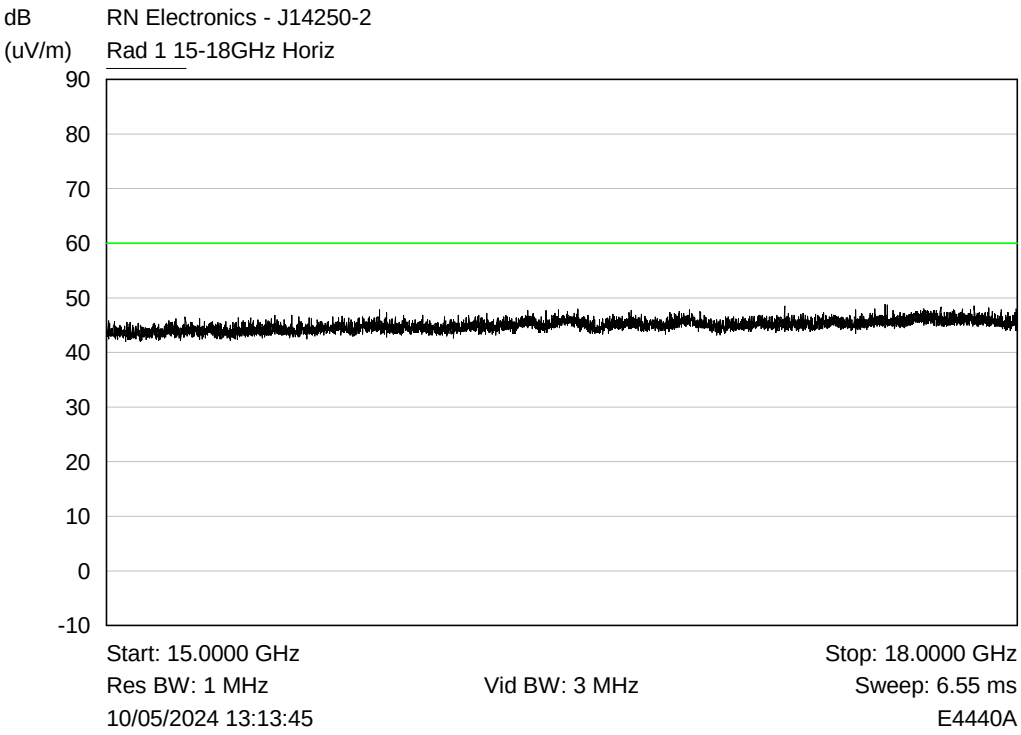
Peak Vertical emissions 10 – 12.5 GHz against the average limit line



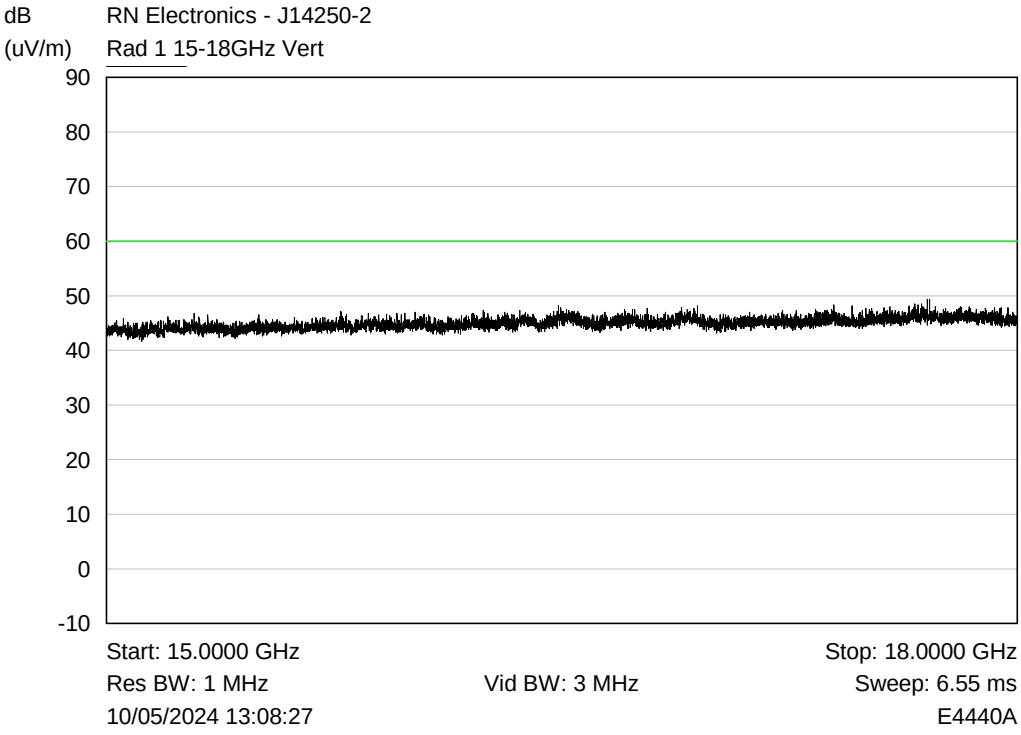
Peak Horizontal emissions 12-15 GHz against the average limit line



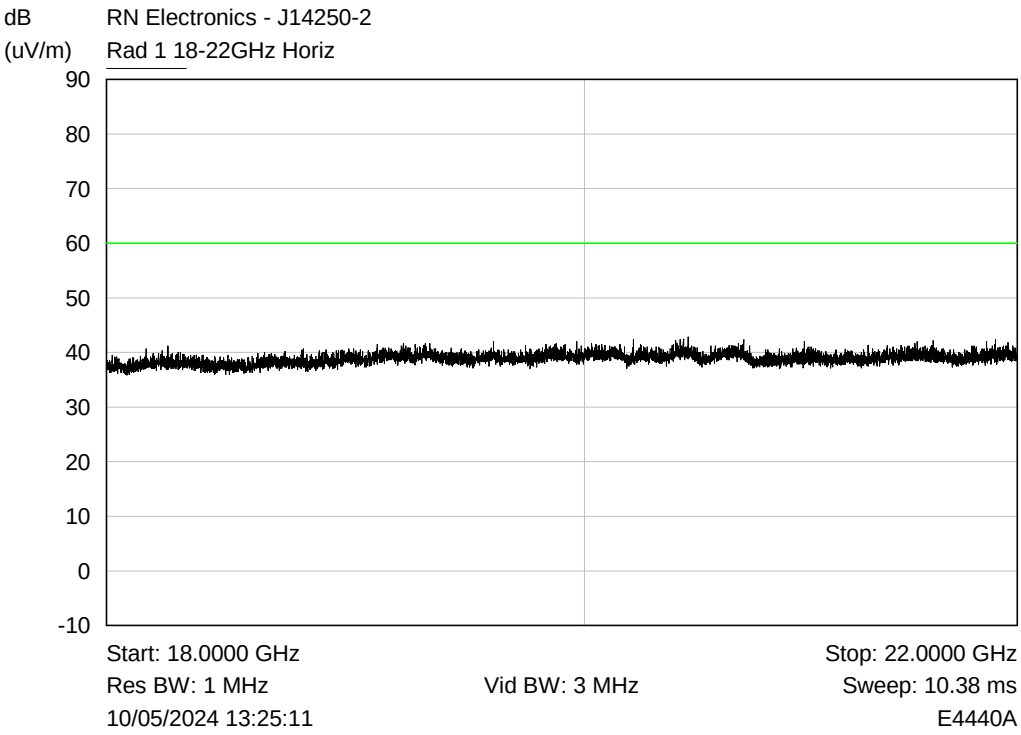
Peak Vertical emissions 12-15 GHz against the average limit line



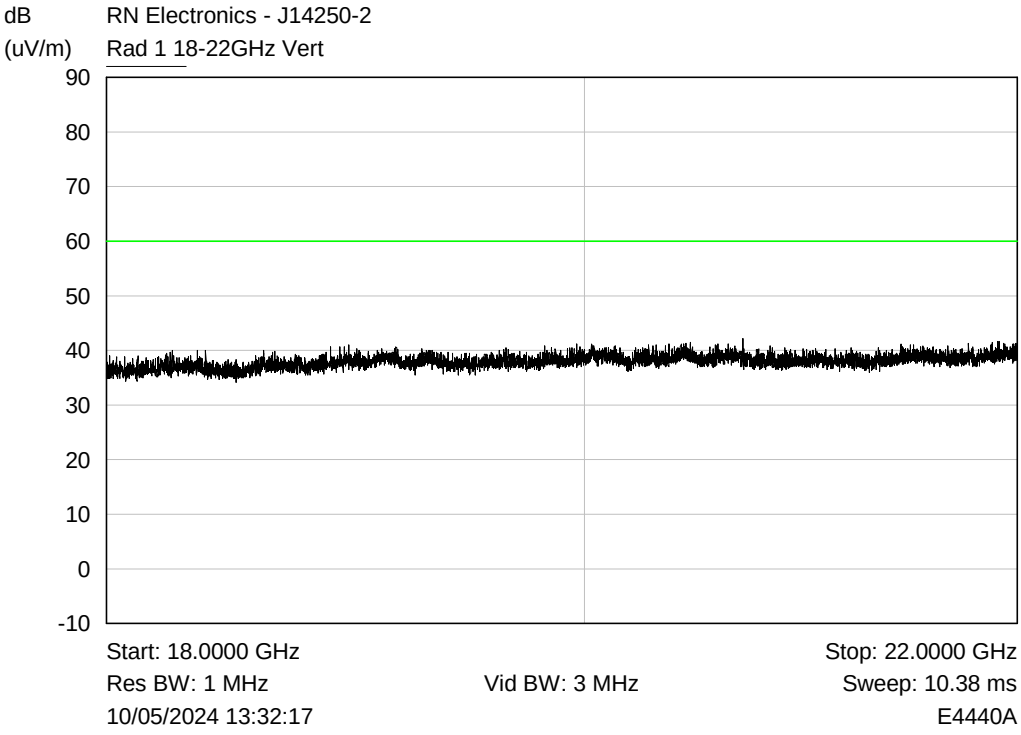
Peak Horizontal emissions 15-18 GHz against the average limit line



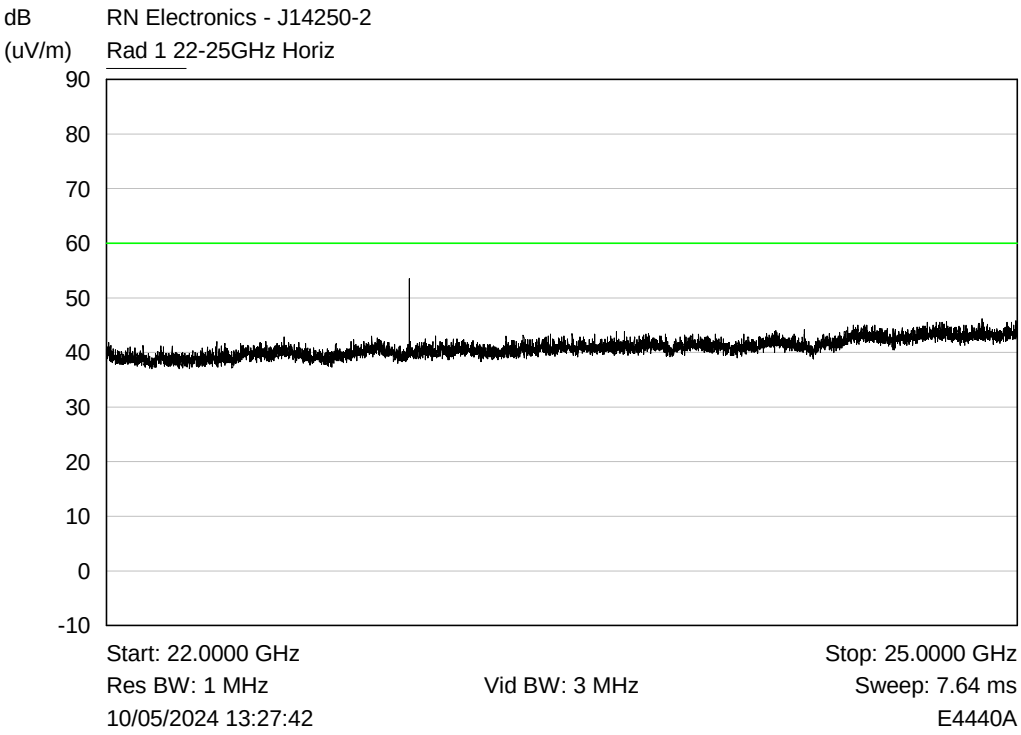
Peak Vertical emissions 15-18 GHz against the average limit line



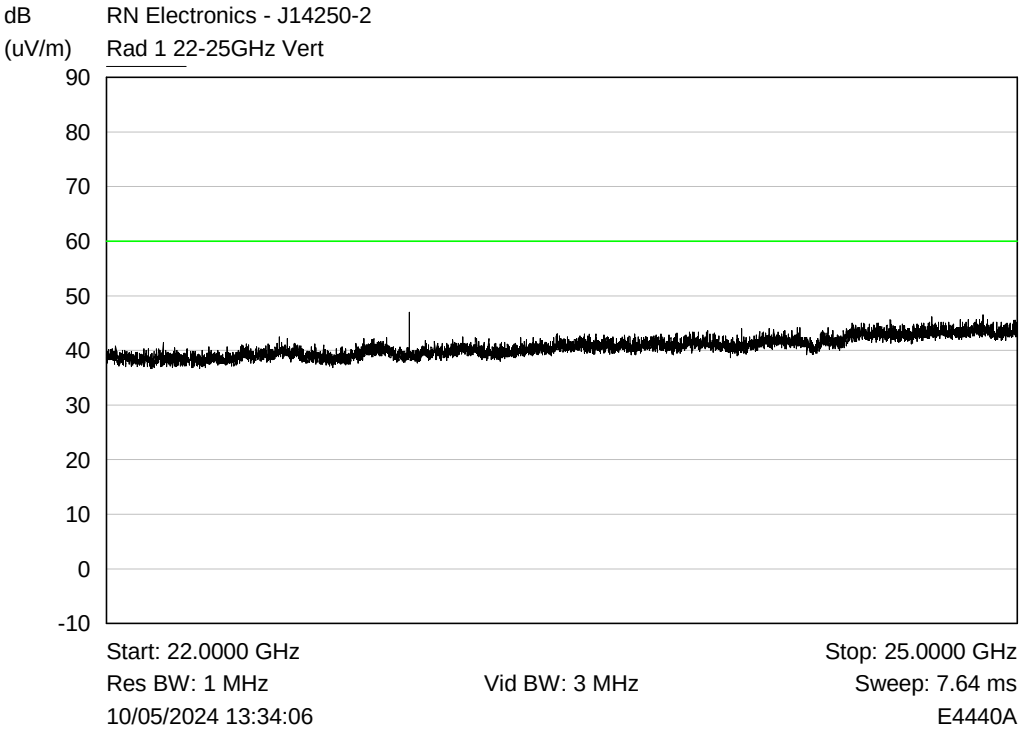
Peak Horizontal emissions 18-22 GHz against the average limit line



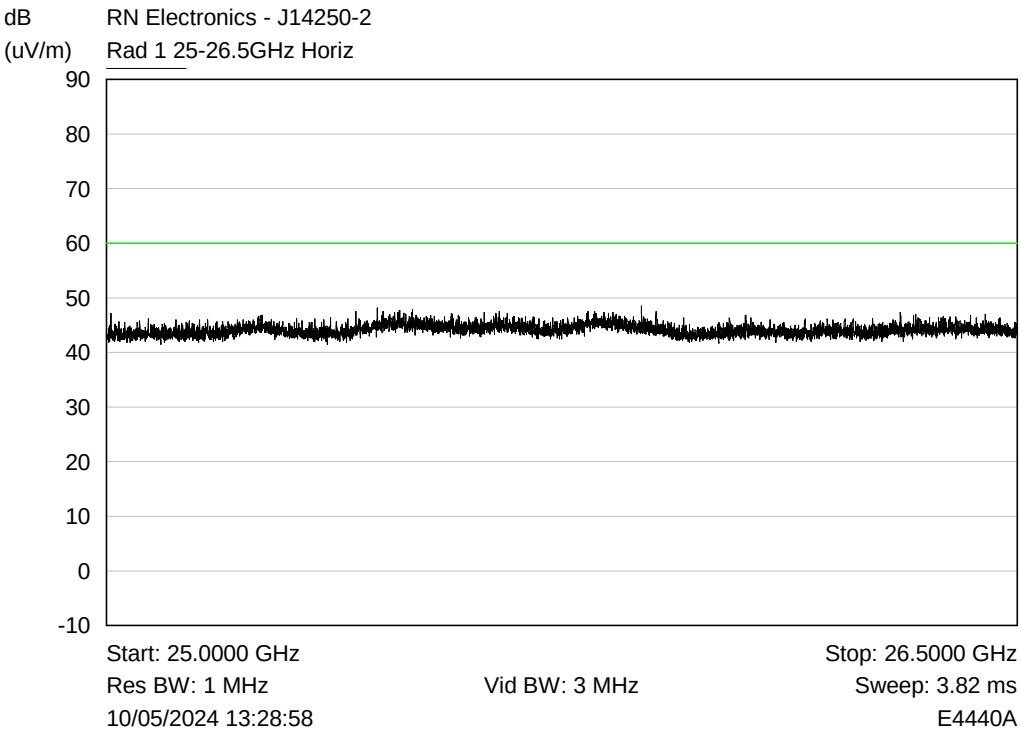
Peak Vertical emissions 18-22 GHz against the average limit line



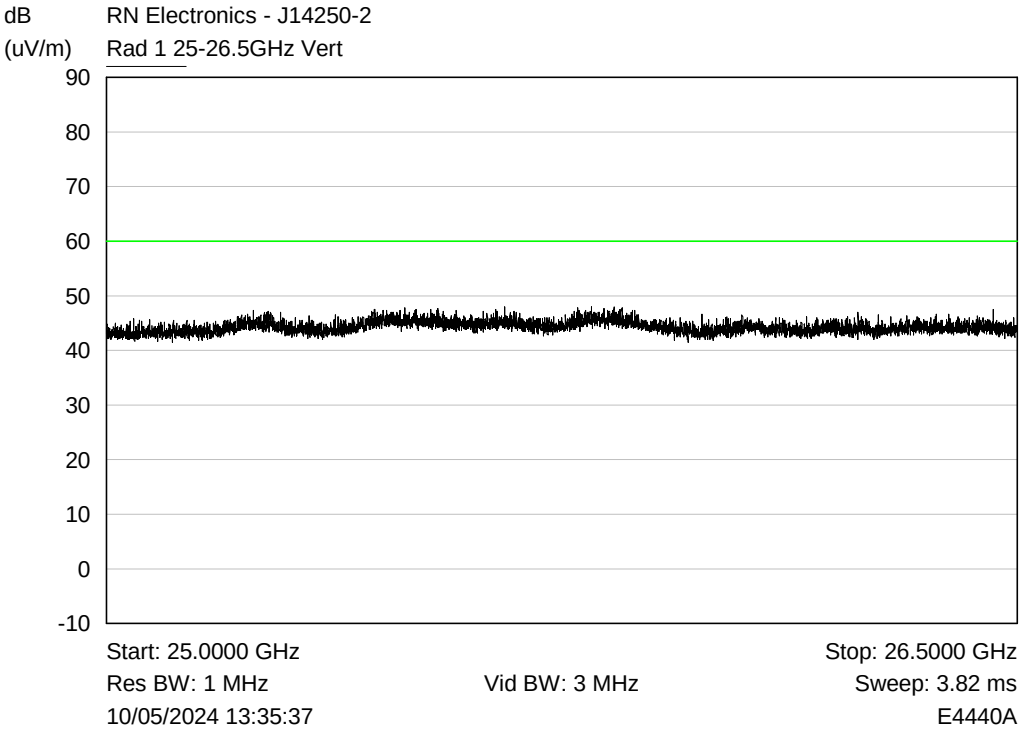
Peak Horizontal emissions 22-25 GHz against the average limit line



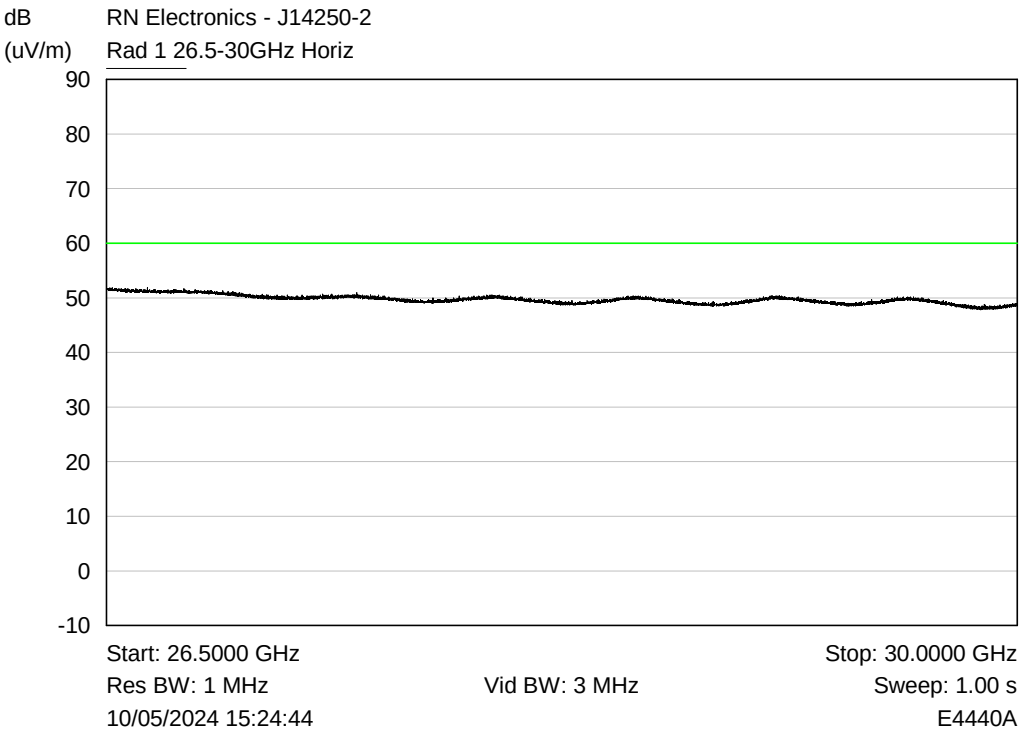
Peak Vertical emissions 22-25 GHz against the average limit line



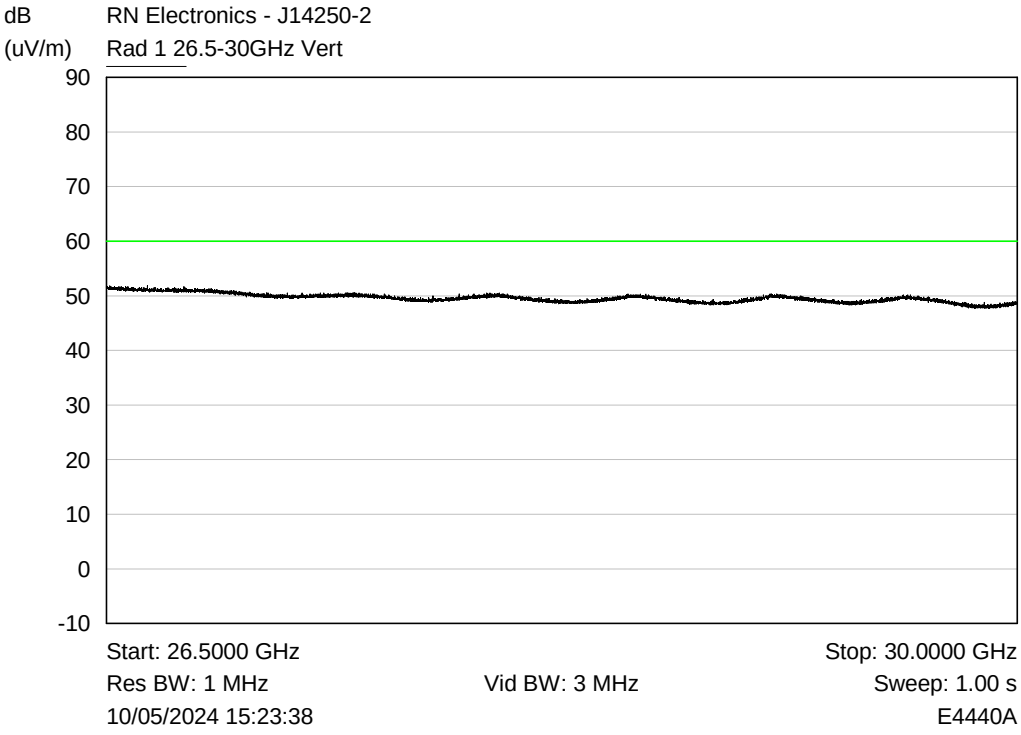
Peak Horizontal emissions 25-26.5 GHz against the average limit line



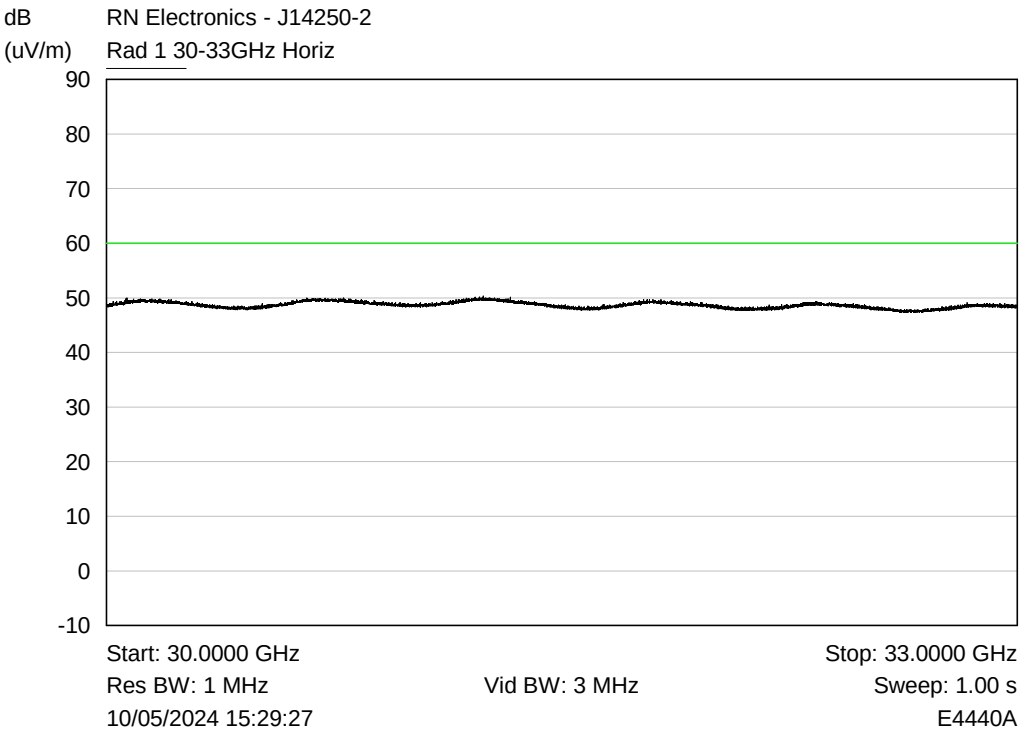
Peak Vertical emissions 25-26.5 GHz against the average limit line



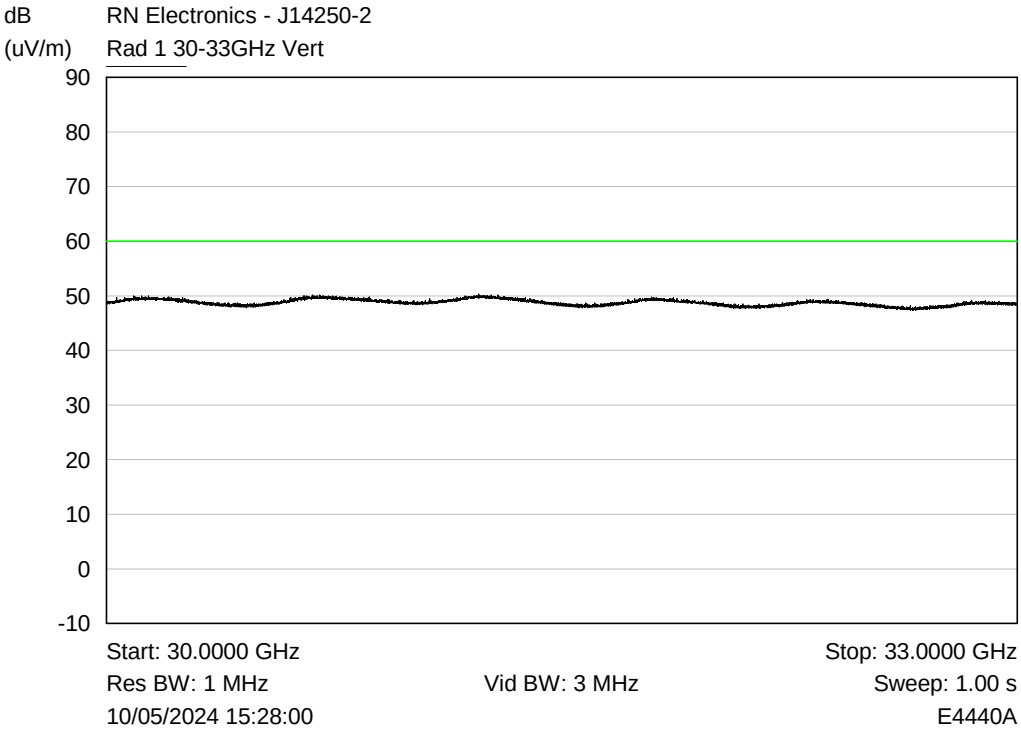
Peak Horizontal emissions 26.5-30 GHz against the average limit line



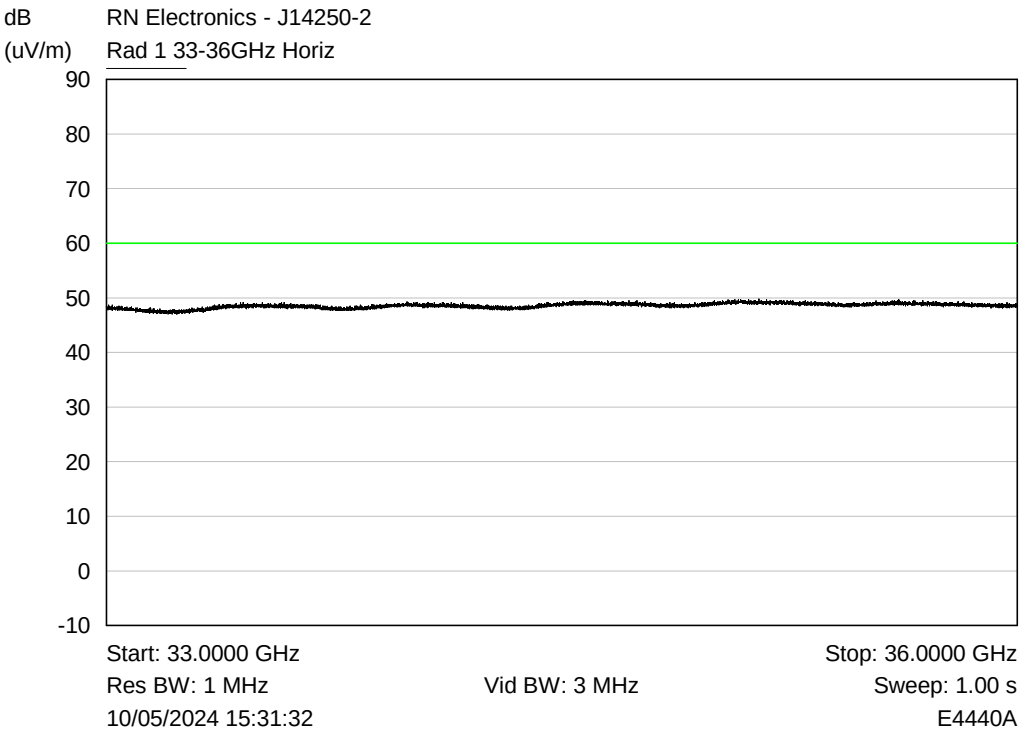
Peak Vertical emissions 26.5-30 GHz against the average limit line



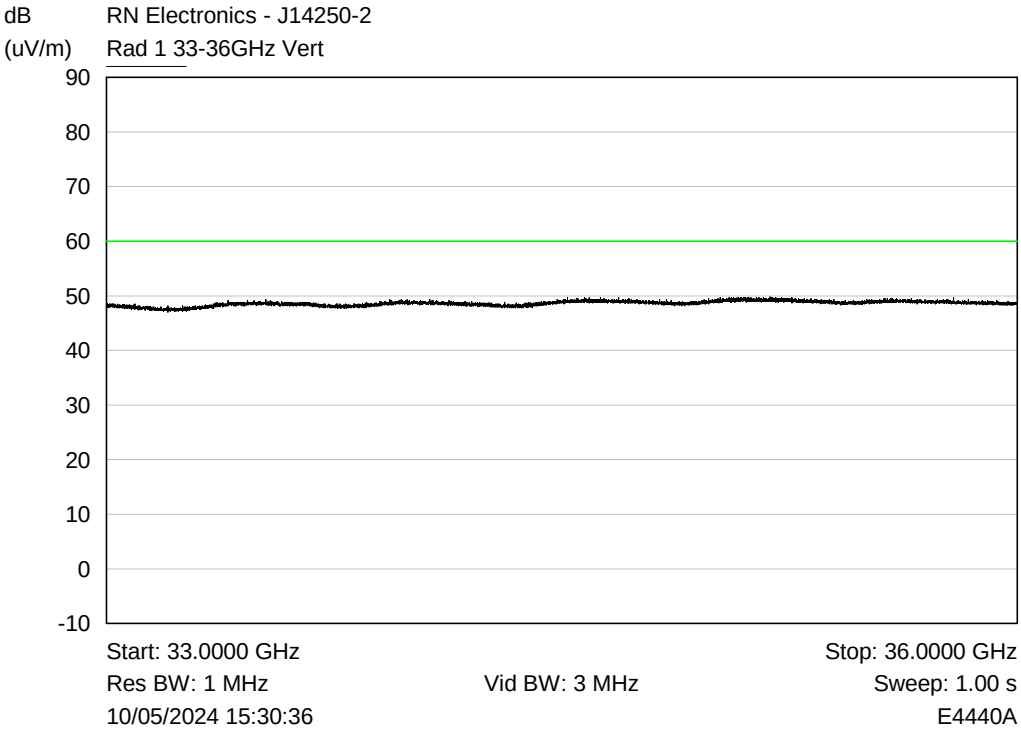
Peak Horizontal emissions 30-33 GHz against the average limit line



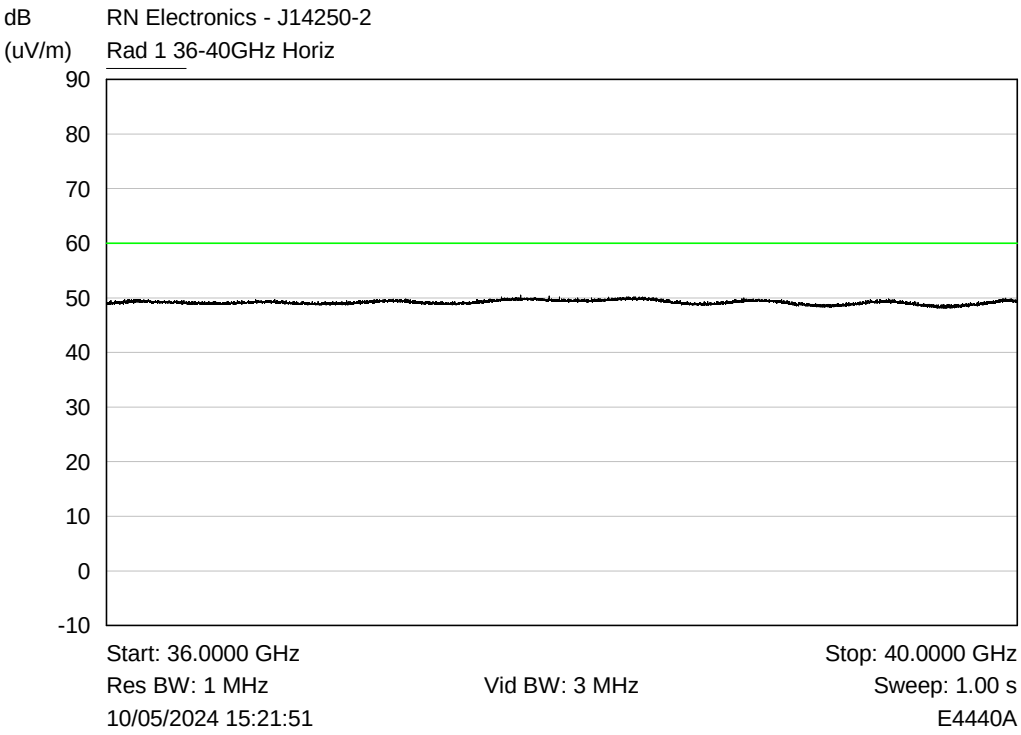
Peak Vertical emissions 30-33 GHz against the average limit line



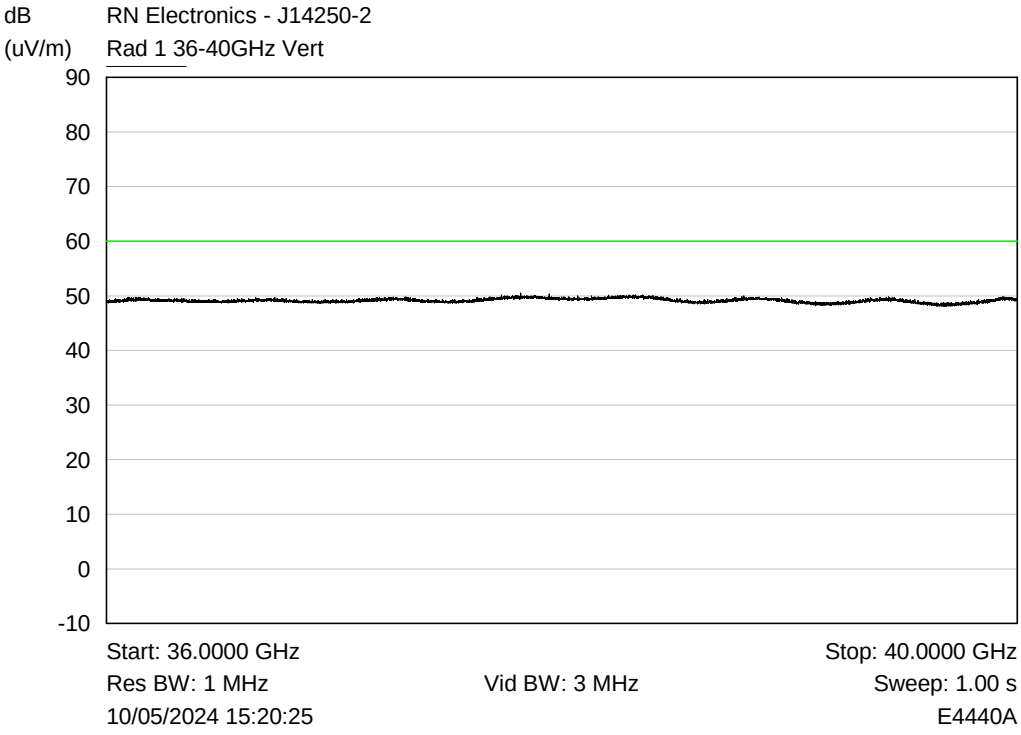
Peak Horizontal emissions 33-36 GHz against the average limit line



Peak Vertical emissions 33-36 GHz against the average limit line



Peak Horizontal emissions 36-40 GHz against the average limit line



Peak Vertical emissions 36-40 GHz against the average limit line

Table of signals measured for Horizontal signal list above 1GHz

Signal No.	Freq (MHz)	Peak Amp (dBuV/m)	Pk -Lim (dB)	AV Amp (dBuV/m)	AV -Lim (dB)
1	1035.540	46.4	-33.6	43.3	-16.7
2	1190.354	37.1	-42.9	24.9	-35.1
3	1197.168	37.5	-42.5	24.0	-36.0
4	2133.305	45.8	-34.2	40.5	-19.5
5	4226.991	45.7	-34.3	32.9	-27.1
6	5054.774	47.4	-32.6	34.4	-25.6
7	11479.423	52.9	-27.1	45.7	-14.3
8	22955.329	49.1	-30.9	44.7	-15.3
9	25866.921	48.2	-31.8	36.0	-24.0

Table of signals measured for Vertical signal list above 1GHz

Signal No.	Freq (MHz)	Peak Amp (dBuV/m)	Pk -Lim (dB)	AV Amp (dBuV/m)	AV -Lim (dB)
1	11479.521	54.1	-25.9	47.3	-12.7
2	20712.833	42.1	-37.9	29.2	-30.8
3	22954.941	48.9	-31.1	44.5	-15.5
4	25834.032	48.9	-31.1	36.4	-23.6

7 Explanatory Notes

7.1 Explanation of Table of Signals Measured

Measurements are made as required by the standard. These measurements are made and recorded using detectors, either peak, quasi peak or average dependant on the test. A table of results has been given following the relevant plots. This table looks similar to the one illustrated below dependant on the measurements required by the test: -

Signal No.	Freq (MHz)	Peak Amp (dBuV)	Pk – Lim 1 (dB)	QP Amp (dBuV)	QP - Lim1 (dB)	Av Amp (dBuV)	Av - Lim1 (dB)
1	12345	54.9	-10.5	48	-12.6	37.6	-14.4

Column One - Labelled Signal No. is an incremental number that the receiver has given to each signal that has been measured.

Column Two - Labelled Freq (MHz) is the approximate frequency of the signal received.

Column Three - Labelled Peak Amp (dBμV) is the level of received signal that was measured in dB above 1μV using the peak detector.

Column Four - Labelled Pk - Lim1 (dB) is the difference in level from the peak signal given to the active limit line. If this column appears in the table the peak detector measurement is required by the standard for this test. The results entered in this column indicate the signal level relative to the compliance limit required. Negative numbers indicate that the product is compliant.

Column Five - Labelled QP Amp (dBμV) is the level of received signal that was measured in dB above 1μV using the quasi-peak detector.

Column Six - Labelled QP - Lim1 (dB) is the difference in level from the quasi-peak signal given to the active limit line. If this column appears in the table the quasi-peak detector measurement is required by the standard for this test. The results entered in this column indicate the signal level relative to the compliance limit required. Negative numbers indicate that the product is compliant.

Column Seven - Labelled Av Amp (dBμV) is the level of received signal that was measured in dB above 1μV using the average detector.

Column Eight - Labelled Av - Lim1 (dB) is the difference in level from the average signal given to the active limit line. If this column appears in the table the average detector measurement is required by the standard for this test. The results entered in this column indicate the signal level relative to the compliance limit required. Negative numbers indicate that the product is compliant.

Only signals highlighted in red are deemed to exceed the limit of the detector required.

7.2 Limit line calculations for radiated measurements

The limits given in the test standard are normally expressed as absolute values (e.g. in mV/m at a specified distance), whereas the measured values are expressed in dBmV referenced to the measuring instrument inputs. Kiwa Electrical Compliance calibrate the test set-up to account for any path losses, antenna gains, etc. so that the value read at the receiver relates directly to the absolute value required, except that it is expressed in dB relative to one microvolt and may need to take account of any alternative measuring distance used.
Examples:
(a) Limit of 500mV/m equates to 20.log (500) = 54 dBmV/m.

(b) Limit of 300mV/m at 10m equates to 20.log (300 . 10/3) = 60 dBmV/m at 3m.

7.3 Example Calculation

The measurement receiver used for emissions testing, performs the field strength (FS) calculations automatically. The receiver combines the signal amplitude (RA), Antenna Factor (AF) and Cable Loss (CL) factors for the frequency to be measured.

Example calculation: - FS = RA + AF + CL.

Receiver amplitude (RA)	Antenna factor (3m) (AF)	Cable loss	Field strength result (3m) (FS)
20dBuV/m	25 dB	3 dB	48dBuV/m

8 Photographs

8.1 EUT Front View

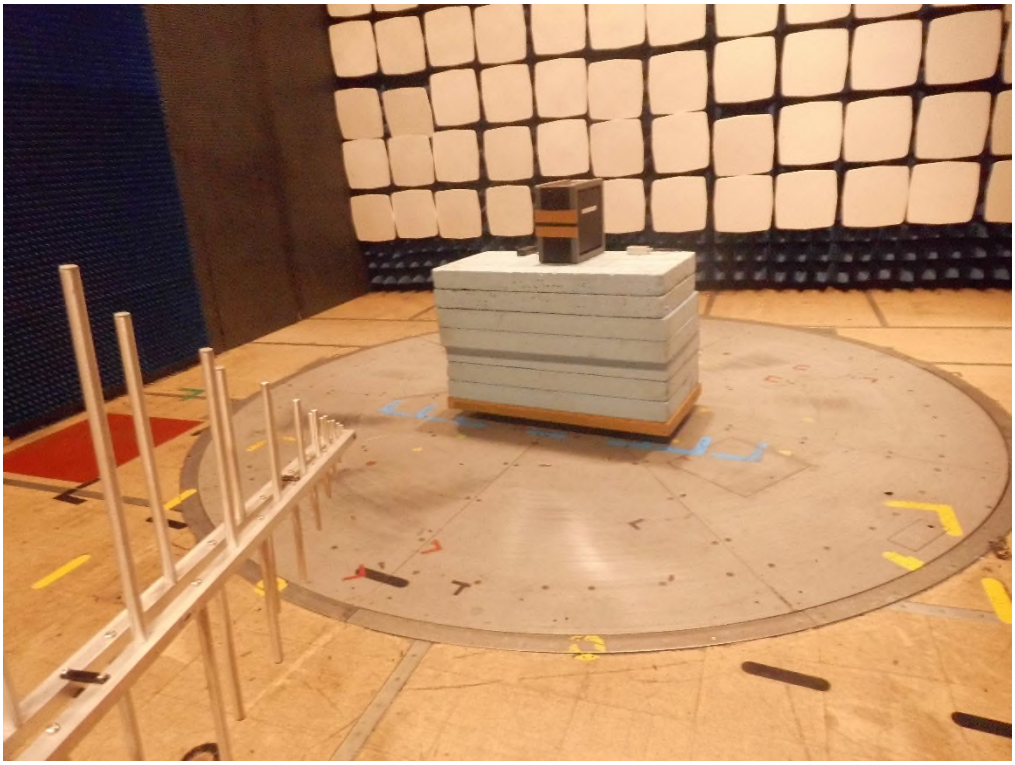
8.2 EUT Back View

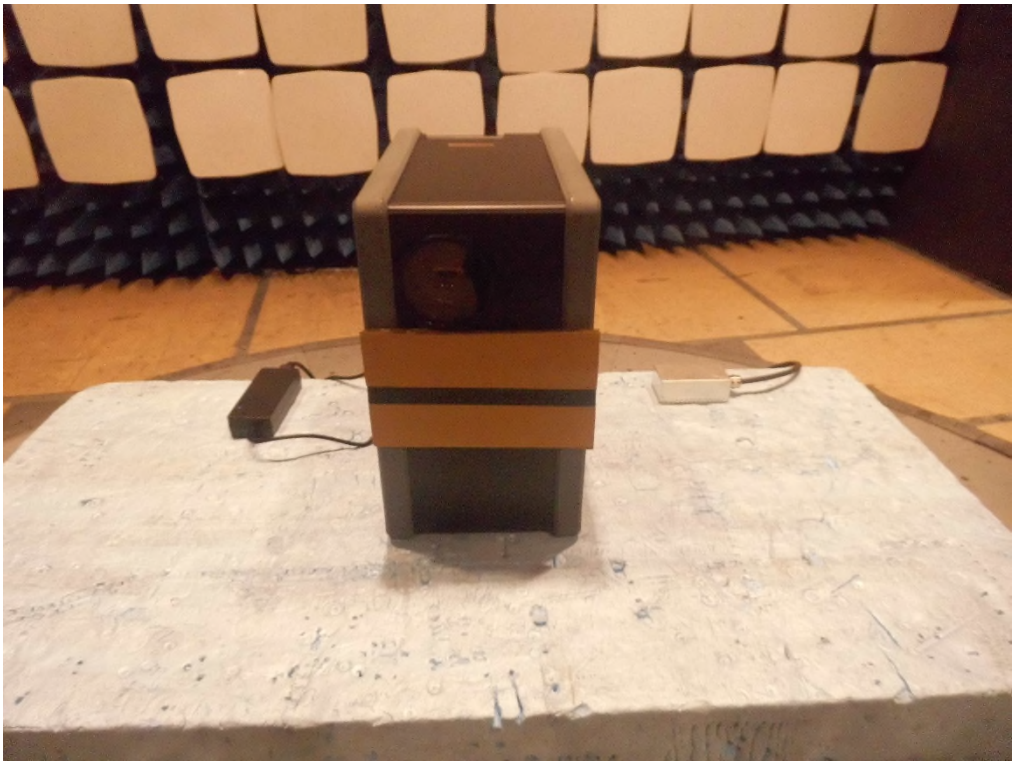
8.3 EUT Left Side Angle

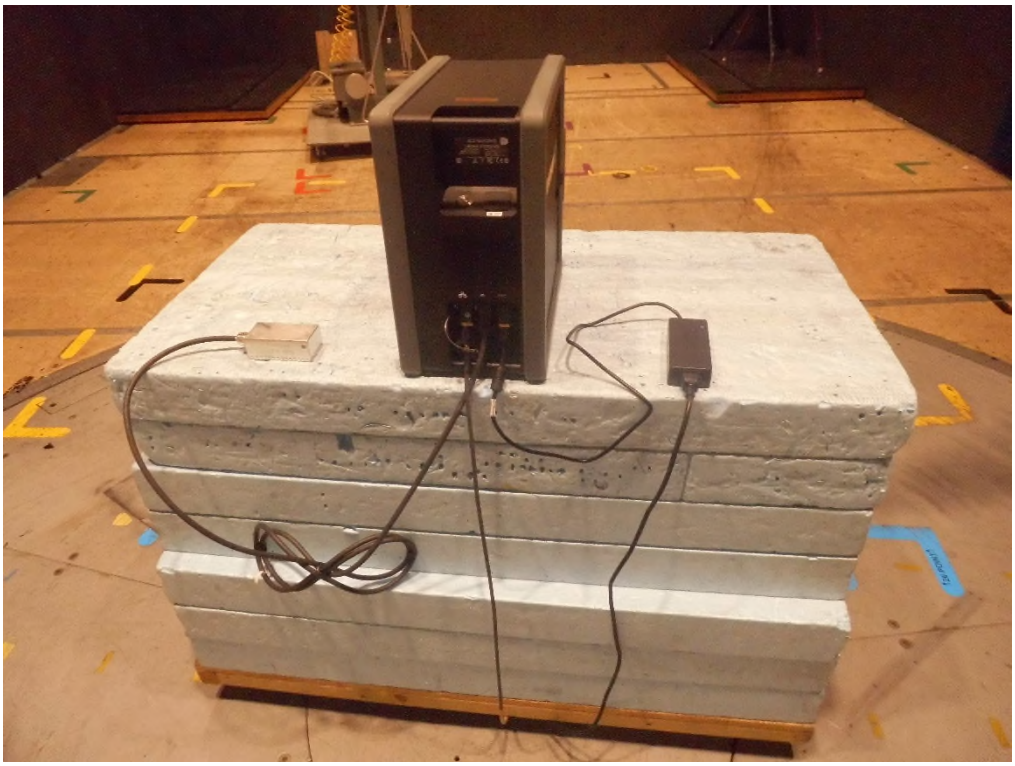
8.4 EUT Right Side Angle

8.5 AC powerline conducted emission

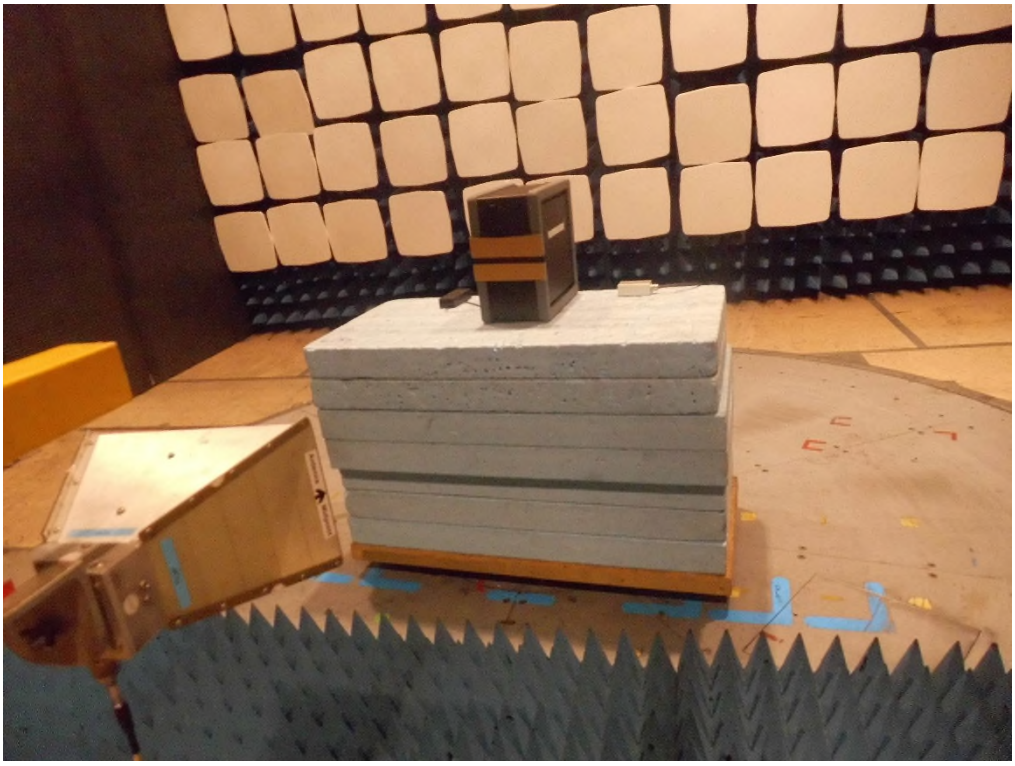
8.6 Radiated emissions 30 MHz - 1 GHz

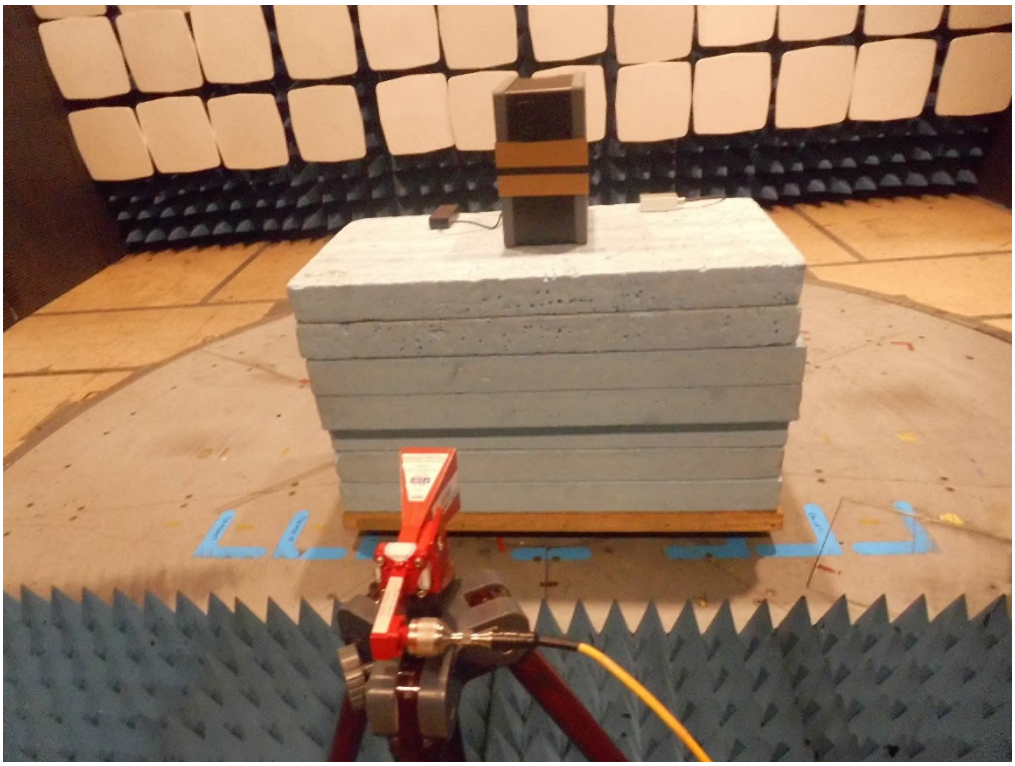


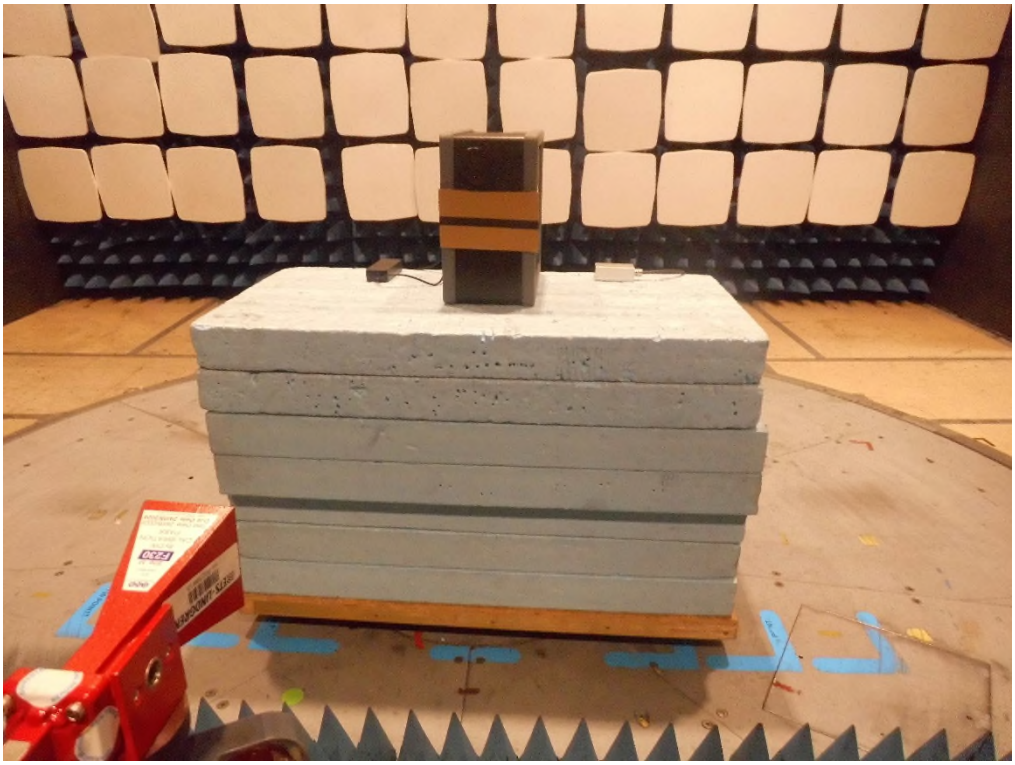


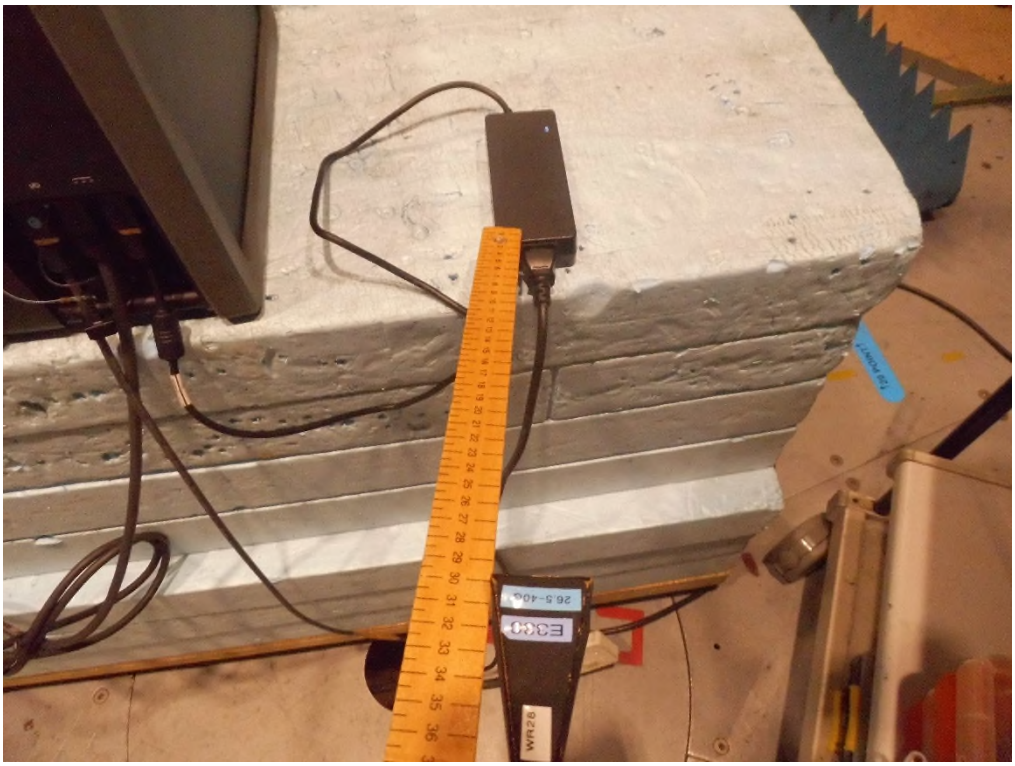


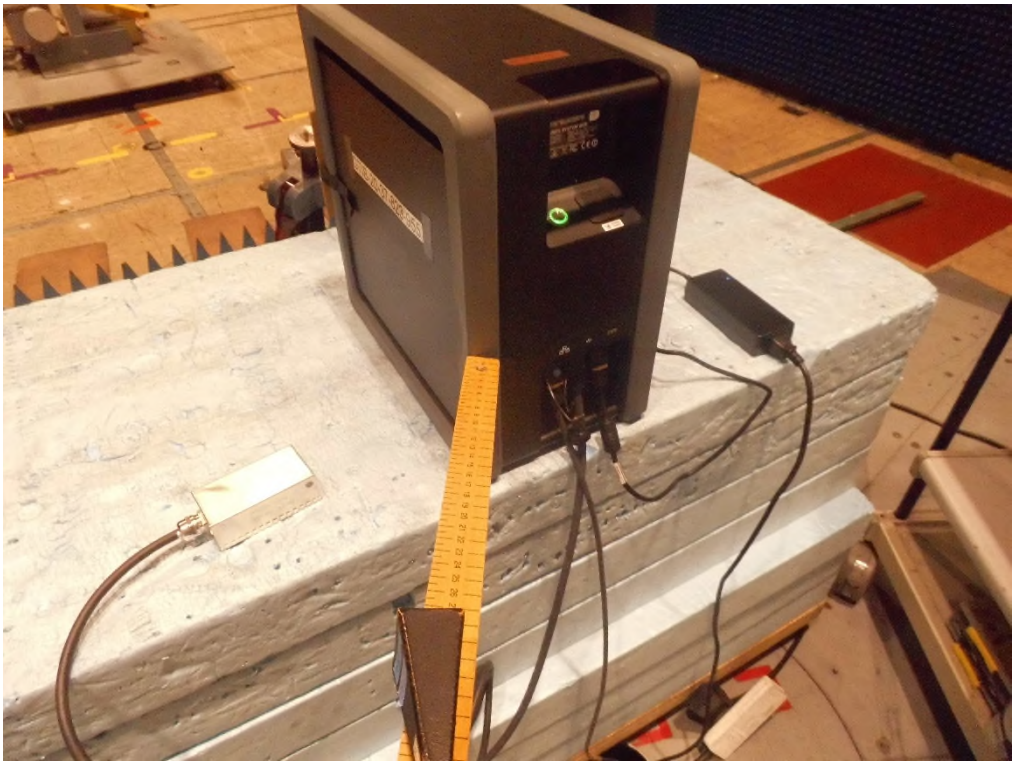
8.6 Radiated Emissions above 1 GHz



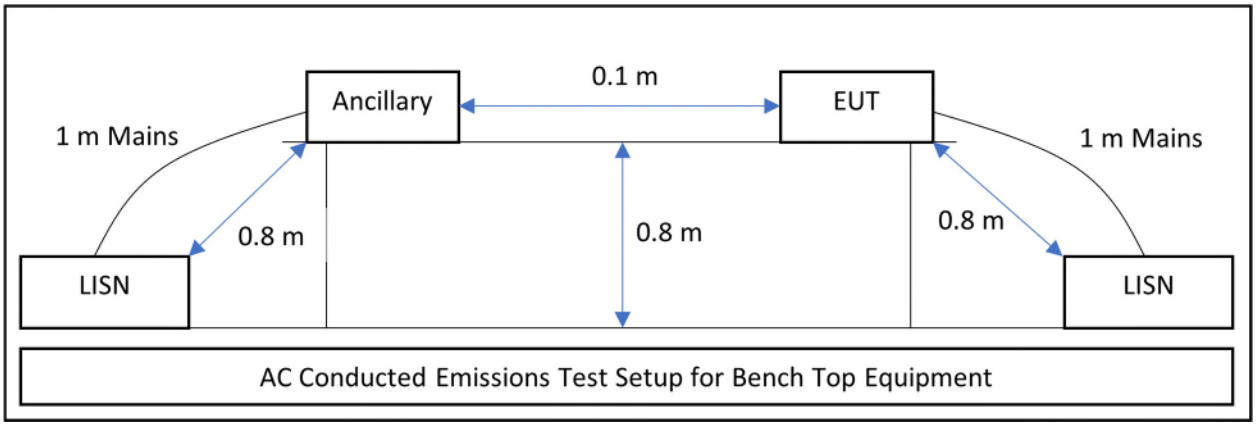


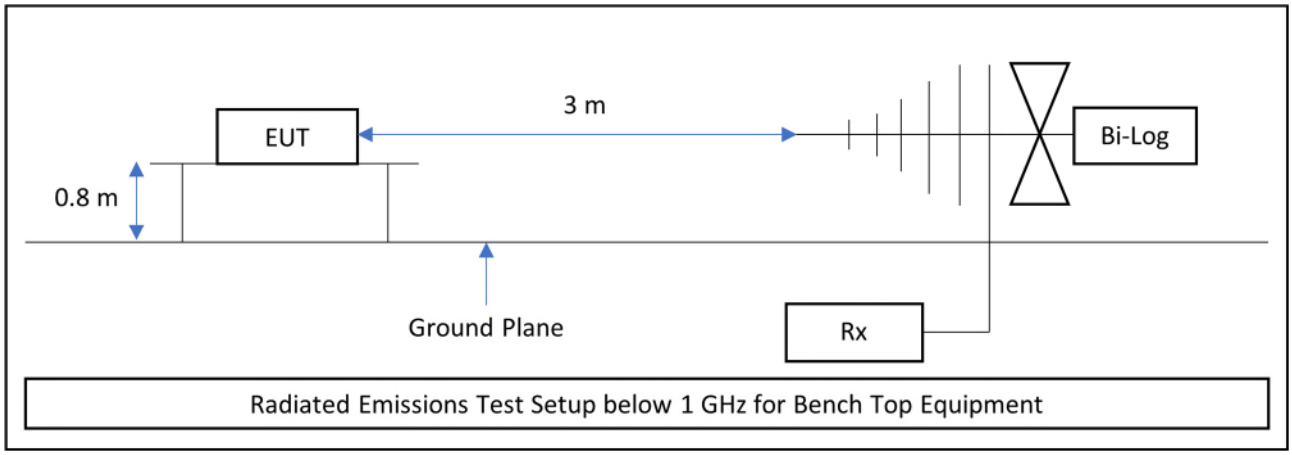


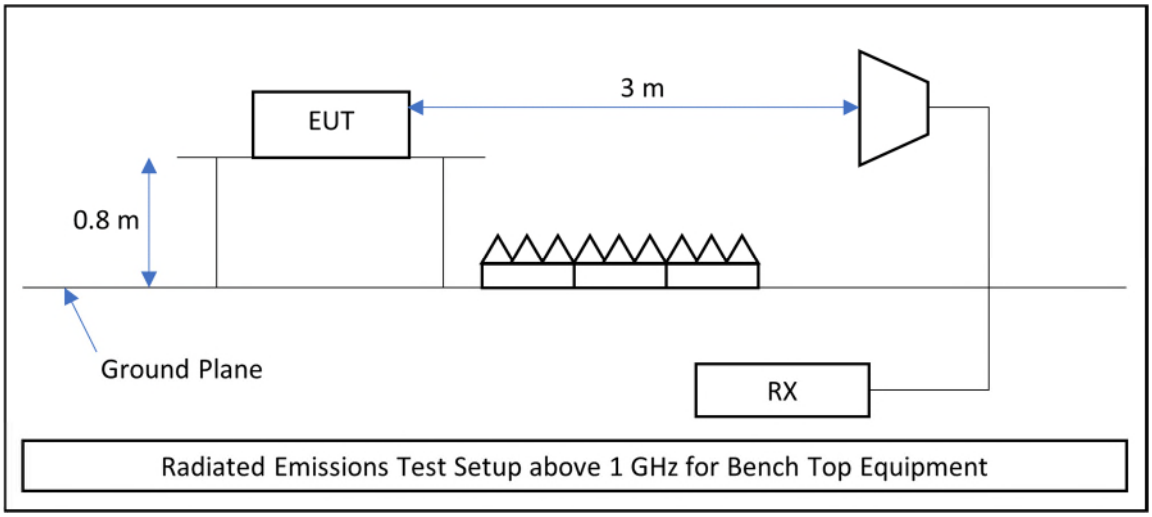




8.7 Set-up diagrams







9 Test equipment calibration list

The following is a list of the test equipment used by Kiwa Electrical Compliance to test the unit detailed within this report. In line with our procedures, the equipment was within calibration for the period during which testing was carried out.

KEC No	Model	Description	Manufacturer	Calibrated Date	Period
E035	11947A	Transient Limiter 9kHz - 200MHz	Hewlett Packard	03/01/2024	12 months
E150	MN2050	LISN 13A	Chase	03/05/2023	12 months
E296-2	11970A	Harmonic Mixer 26.5-40GHz	Hewlett Packard	20/06/2023	12 months
E330	2224-20	Horn Antenna 26.5-40GHz	Flann (FMI)	04/04/2024	12 months
E412	E4440A	PSA 3 Hz - 26.5 GHz	Agilent Technologies	22/09/2023	24 months
E642	E4440A	PSA 3 Hz - 26.5 GHz	Agilent Technologies	20/02/2024	24 months
E745	2017 4/2dB	Attenuator 4/2dB 30-1000MHz	RN Electronics	22/02/2024	12 months
E856	N9039A	9 kHz - 1 GHz RF Filter Section	Agilent Technologies	22/03/2024	12 months
E914	VULB 9163	Antenna BiLog 30MHz to 3GHz	Schwarzbeck	23/04/2022	24 months
F230	3160-08	Horn Std Gain 12.4 - 18 GHz	ETS-Lindgren	24/05/2023	12 months
F231	3160-09	Horn Std Gain 18 - 26.5 GHz	ETS-Lindgren	23/05/2023	12 months
F238	N9039A	9 kHz - 1 GHz RF Filter Section	Agilent Technologies	23/08/2023	12 months
LPE261	3115	Horn Antenna 1 - 18 GHz	EMCO	05/05/2023	12 months
LPE333	8449B	Pre-Amplifier 1GHz - 26.5GHz	Hewlett Packard	01/06/2023	12 months
NSA-H	NSA - H	NSA - Site H	RN Electronics	17/05/2023	36 months
VSWR-H	VSWR	VSWR 1-18GHz	RN Electronics	08/01/2023	36 months
ZSW1	V2.5.2	Measurement Software Suite	RN Electronics	Not Applicable	

10 Support equipment

10.1 Customer supplied equipment

No customer support equipment was supplied.

10.2 Kiwa Electrical Compliance supplied equipment

Item No.	Model No.	Description	Manufacturer	Serial No
I262	N16C2	Laptop Aspire ES1-523/524 series	Acer	NXGKYEK001635069F93400

11 Condition of the equipment tested

In order for the EUT to produce the results shown within this report the following modifications, if any, were implemented.

11.1 Modifications before test

No modifications were made before test by Kiwa Electrical Compliance.

11.2 Modifications during test

No modifications were made during test by Kiwa Electrical Compliance.

12 Description of test sites

Site A Radio Laboratory and Anechoic Chamber

Site B Semi-Anechoic Chamber and Control Room
FCC Registration No. 654321, ISED Registration No. 5612A-4

Site C Transient Laboratory

Site D Screened Room (Conducted Immunity)

Site E Screened Room (Control Room for Site D)

Site F Screened Room (Conducted Emissions)

Site G Screened Room (Control Room for Site H)

Site H 3m Semi-Anechoic Chamber (indoor OATS)
FCC Registration No. 654321, ISED Registration No. 5612A-2, VCCI Registration No. 4065

Site J Transient Laboratory

Site K Screened Room (Control Room for Site M)

Site M 3m Semi-Anechoic Chamber (indoor OATS)
FCC Registration No. 654321, ISED Registration No. 5612A-3

Site N Radio Laboratory

Site Q Fully-Anechoic Chamber

Site OATS 3m and 10m Open Area Test Site
FCC Registration No. 654321, ISED Registration No. 5612A-1

Site R Screened Room (Conducted Immunity)

Site S Safety Laboratory

Site T Transient Laboratory

CAB identifier as issued by Innovation, Science and Economic Development Canada is UK0002
CAB identifier as issued by FCC is UK2015