



# Radio Test Report

## Eptura Inc.

### Meeting Room Screen Room V3.0

47 CFR Part 15.225 Effective Date 1st October 2023  
DXX: Part 15 Low Power Communication Device Transmitter  
Test Date: 10th January 2024 to 29th February 2024  
Report Number: 02-14529-6-24 Issue 01

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

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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).

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

## Certificate of Test 14529-6

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

Equipment:	Meeting Room Screen
Model Number:	Room V3.0
Unique Serial Number:	201702R01245000134A. 201702R01235000115A (for AC powerline conducted emissions)
Applicant:	Eptura Inc. 950 East Paces Ferry Road NE, Suite 800 Atlanta, GA 30326 USA
Proposed FCC ID:	2BGPFV3ROOMSCREEN
Full measurement results are detailed in Report Number:	02-14529-6-24 Issue 01
Test Standards:	47 CFR Part 15.225 Effective Date 1st October 2023 DXX: Part 15 Low Power Communication Device Transmitter

### NOTE:

Certain tests were not performed based upon applicant's declarations. Certain other requirements are subject to applicant's declaration only and have not been tested/verified. For details refer to section 3 of this report. This report pertains to the 13.56 MHz RFID functionality of the device only.

### 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 January 2024 to 29th February 2024

Test Engineer:  
Chee-Wah Yeung

Approved By:  
Radio Approvals  
Manager

Customer  
Representative:



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## 2 Equipment under test (EUT)

### 2.1 Equipment specification

Applicant	Eptura Inc. 950 East Paces Ferry Road NE, Suite 800 Atlanta, GA 30326 USA	
Manufacturer of EUT	Eptura Inc.	
Full Name of EUT	Meeting Room Screen	
Model Number of EUT	Room V3.0	
Serial Number of EUT	201702R01245000134A 201702R01235000115A (Used for AC Conducted Emission (RFID Antenna Disconnected) only	
Date Received	3rd January 2024	
Date of Test:	10th January 2024 to 29th February 2024	
Purpose of Test	To demonstrate design compliance to the relevant rules of Chapter 47 of the Code of Federal Regulations.	
Date Report Issued	29th February 2024	
Main Function	Meeting room touch screen device	
Information Specification	Height	182 mm
	Width	247 mm
	Depth	30 mm
	Weight	798 g
	Voltage	Not Specified
	Current	Not Specified
EUT Supplied PSU	Manufacturer	KSPower
	Model number	KS39DU-1200300CB
	Serial number	E1-20230603006
	Input voltage	100-240 V 50/60 Hz
	Input current	2.0 A
	Output	12 Vdc, 3.0 A

## 2.2 Configurations for testing

General Parameters	
EUT Normal use position	Wall mount/kiosk mount
Choice of model(s) for type tests	Room V3.0
Antenna details	2 internal antennas: -WiFi/ BT (Gain: 2 dBi) -RFID 125 kHz & 13.56 MHz (Gain: 0 dBi)
Antenna port	No
Baseband Data port (yes/no)?	No
Highest Signal generated in EUT	2480 MHz
Lowest Signal generated in EUT	10 kHz
Hardware Version (HVIN)	1.1
Software Version	Settings App: V2.0.40 HAL App: 1.6.22 Room App: 3.0.0.1
Firmware Version (FVIN)	11.24.01.24
Type of Equipment	Standalone
Technology Type	RFID (125 kHz & 13.56 MHz) / WiFi/ BT
Geo-location (yes/no)	No
TX Parameters	
Alignment range – transmitter	13.110-14.010 MHz
EUT Declared Modulation Parameters	ASK
EUT Declared Power level	Not Specified
EUT Declared Signal Bandwidths	Not Specified
EUT Declared Channel Spacing's	Not Channelized
EUT Declared Duty Cycle	Not Specified
Unmodulated carrier available?	No
Declared frequency stability	Not Specified
RX Parameters	
Alignment range – receiver	13.110-14.010 MHz
EUT Declared RX Signal Bandwidth	Not Specified
Receiver Signal Level (RSL)	Not Specified
Method of Monitoring Receiver BER	Not Specified
FCC Parameters	
FCC Transmitter Class	DXX: Part 15 Low Power Communication Device Transmitter

## 2.3 Functional description

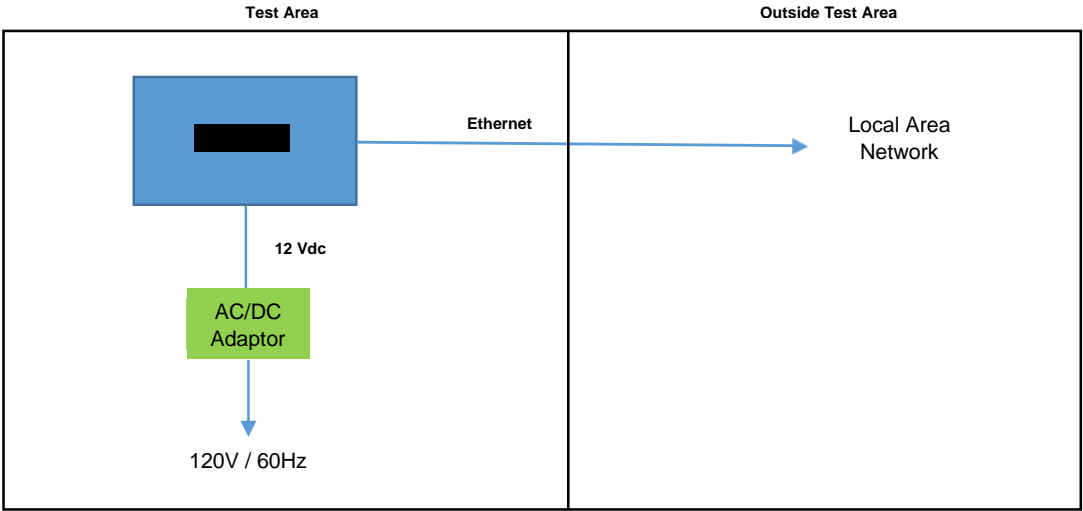
The V3 is a Wall Mounted Android Touch Screen Terminal in an ABS/PC plastic housing with 10.1" 1280x800 dot IPS TFT LCD and multitouch projected capacitive touch screen with toughened glass. It has an internal 2.4GHz Wi-Fi/BT module and an internal RFID Card Reader operating at both 13.56MHz and 125kHz. The low voltage directive compliant V3 is powered by POE via the RJ45 LAN port (with option of 12Vdc jack plug power input when Wi-Fi is used not LAN). Its average power consumption is 7W. A metal plate covers I/O ports, with only the RJ45 LAN and DC ports exposed for use. There is a diffused LED light guide to denote unit availability status.

## 2.4 Modes of operation

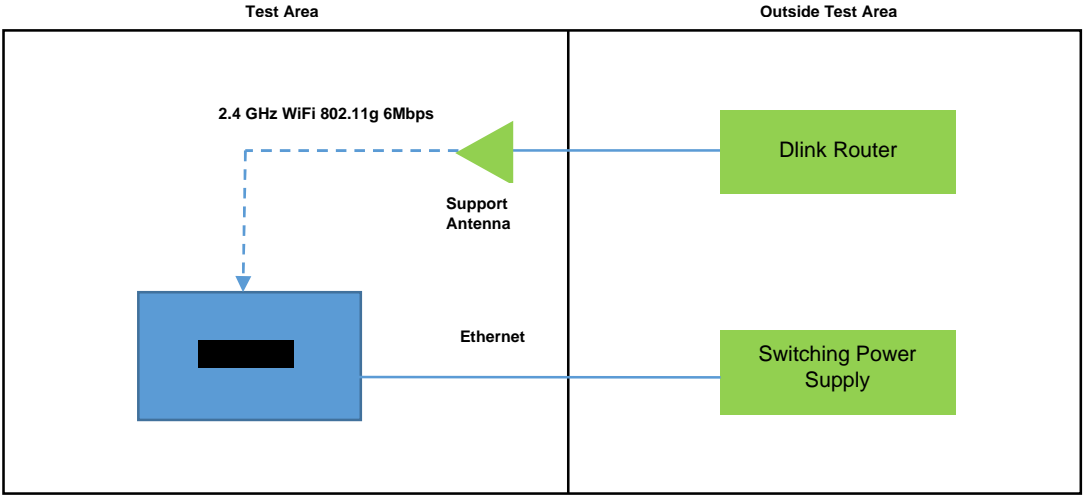
Mode Reference	Description	Used for testing
Mode 1	Repeatedly Transmitting 125kHz & 13.56MHz RFID (13.56MHz Card 1) and 2.4 GHz Wi-Fi CH6 (2437 MHz) 802.11g 6Mbps	Yes
Mode 2	Repeatedly Transmitting 125kHz & 13.56MHz RFID (13.56MHz Card 2) and 2.4 GHz Wi-Fi CH6 (2437 MHz) 802.11g 6Mbps	Yes
Mode 3	Repeatedly Transmitting 125kHz & 13.56MHz RFID (No 125kHz or 13.56MHz Card Present) and 2.4 GHz Wi-Fi CH6 (2437 MHz) 802.11g 6Mbps	Yes
Mode 4	Repeatedly Transmitting 125kHz & 13.56MHz RFID (13.56MHz Card 2) AC/DC Adaptor with Ethernet to KEC Network playing Video via YouTube	Yes
Mode 5	Repeatedly Transmitting 125kHz & 13.56MHz RFID (13.56MHz Card 2) PoE with Ethernet to KEC Network playing Video via YouTube	Yes
Mode 6	Repeatedly Transmitting 125kHz & 13.56MHz RFID (No Card present) AC/DC Adaptor - RFID Antenna Dis-Connected.	Yes
Mode 7	Repeatedly Transmitting 125kHz & 13.56MHz RFID (No Card present) PoE - RFID Antenna Dis-Connected.	Yes
Mode 8	Repeatedly Transmitting 125kHz & 13.56MHz RFID (No Card present) AC/DC Adaptor - RFID Antenna Connected.	Yes

2.5 Emissions configuration

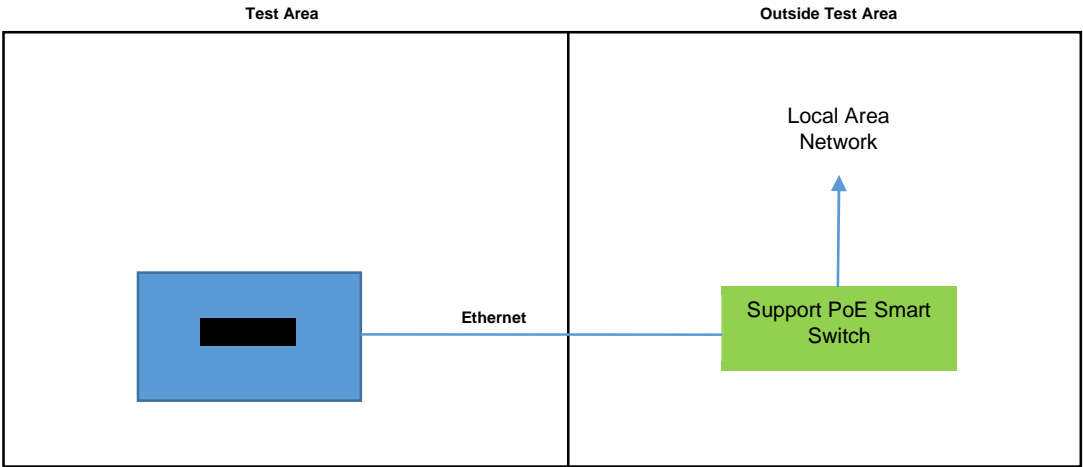
2.5.1 AC/DC Adaptor Emissions configuration



2.5.2 PoE Emissions configuration (Radiated)



2.5.3 PoE Emissions configuration (Conducted)



The EUT could be powered 2 ways. 'PoE' or using the supplied 'AC/DC Adaptor'. The AC/DC Adaptor supplied 12 Vdc to the EUT and when used during testing the Ethernet port was connect to the LAN.

Two RFID cards were provided for testing. The 'Haltest' App was opened and 'Loop Test' started and with card presented and not-present initially. The 'HID iCLASS DG' card (Card 2) had higher emissions than the other 13.56 MHz card (Plane – Card 1) and without card and was therefore used during emissions testing. The EUT also had 125 kHz RFID, the 125 kHz and 13.56 MHz was repeatedly transmitting even in the absence of their respective RFID cards. When the card(s) were present the amplitude and duty cycle of the signals changed.

The 'YouTube' App was also running during testing with a video streaming. When testing with the AC/DC Adaptor configuration it was streaming via direct connection to LAN and for the PoE configuration in the chamber it was streaming via Wi-Fi to router outside of the chamber. The Wi-Fi was set to the middle channel (2437 MHz) 802.11g 6Mbps which was worst case.

For conducted tests when the EUT was powered by PoE, the PoE was via support smart PoE switch connected to the LAN.

#### 2.5.4 Signal leads

Port Name	Cable Type	Connected
DC Power	2 core, unscreened	Yes
Ethernet (PoE)	8 core, unscreened	Yes



### 3 Summary of test results

The Meeting Room Screen, Room V3.0 was tested for compliance to the following standard(s):

47 CFR Part 15.225  
Effective Date 1st October 2023  
DXX: Part 15 Low Power Communication Device Transmitter

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. 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 essential requirements of the directive, particularly under different conditions to those during testing. 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%.

Title	References	Results
<b>Transmitter Tests</b>		
1. AC power line conducted emissions	47 CFR Part 15C Part 15.207	PASSED
2. Radiated emissions 9 - 150 kHz	47 CFR Part 15C Part 15.209	PASSED
3. Radiated emissions 150 kHz - 30 MHz	47 CFR Part 15C Part 15.209	PASSED
4. Radiated emissions 30 MHz -1 GHz	47 CFR Part 15C Part 15.225(d)	PASSED
5. Radiated emissions above 1 GHz	47 CFR Part 15C Part 15.209	PASSED <sup>1</sup>
6. Intentional radiator field strength	47 CFR Part 15C Part 15.225(a)	PASSED
7. Occupied bandwidth	47 CFR Part 15C Part 15.215	PASSED
8. Spectrum mask	47 CFR Part 15C Part 15.225	PASSED
9. Frequency stability	47 CFR Part 15C Part 15.225(e)	PASSED

<sup>1</sup> Frequency range investigated up to 25 GHz based on ten times the highest frequency internally generated of 2480 MHz.

## 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 15C	2023	Federal Communications Commission PART 15 – RADIO FREQUENCY DEVICES
4.1.2	ANSI C63.10	2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
4.1.3	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.

### 4.3 Tests at extremes of temperature & voltage

The following test conditions were used to simulate testing at nominal or extremes.

Temperature Test Conditions		Voltage Test Conditions	
T nominal	20 °C	V nominal	12V DC
T minimum	-20 °C	V minimum	10.2V DC
T maximum	50 °C	V maximum	13.8V DC

Extremes of voltage are based on nominal +/-15%.

The ambient test conditions of humidity and pressure in the laboratory were as specified in each specific test section within this report

### 4.4 Test fixtures

In order to measure RF parameters at temperature extremes, the EUT was tested in a temperature-controlled chamber as follows:

A test fixture was used for testing.

## 5 Tests, methods and results

### 5.1 AC power line conducted emissions

#### 5.1.1 Test methods

Test Requirements: 47 CFR Part 15C Part 15.207 [Reference 4.1.1 of this report]  
Test Method: ANSI C63.10 Clause 6.2 [Reference 4.1.2 of this report]  
Limits: 47 CFR Part 15C Part 15.207 [Reference 4.1.1 of this report]

#### 5.1.2 Configuration of EUT

The EUT was placed on a wooden table 0.8m above the ground plane and connected to a LISN via a 1m mains cable.

Details of the Peripheral and Ancillary Equipment connected for this test are listed in section 10.

During the initial scan, Mode 4, Mode 5, Mode 6, Mode 7 and Mode 8 were found to be worst case mode of operation.

#### 5.1.3 Test procedure

Tests were made in accordance with FCC Part 15 using the measuring equipment noted in the 'Test Equipment' Section. Measurements were made on the live and neutral conductors using both average and quasi-peak detection.

All signals within 10dB of the limit were investigated.

Tests were performed in Test Site H.

#### 5.1.4 Test equipment

E035, E150, E411, E624, E642, F238, LPE222, LPE373, ZSW1

See Section 9 for more details

#### 5.1.5 Test results

Temperature of test environment 16°C  
Humidity of test environment 57%  
Pressure of test environment 100kPa

Band	13.110-14.010 MHz
Power Setting	AC/DC Adaptor RFID Antenna Connected
Channel Spacing	Non Channelized
Mod Scheme	Card 2
Single channel	13.56 MHz

Plot refs
14529-6 Cond 1 AC Live 150k-30M Average
14529-6 Cond 1 AC Live 150k-30M Quasi-Peak
14529-6 Cond 1 AC Neutral 150k-30M Average
14529-6 Cond 1 AC Neutral 150k-30M Quasi-Peak

Band	13.110-14.010 MHz
Power Setting	PoE RFID Antenna Connected
Channel Spacing	Non Channelized
Mod Scheme	Card 2
Single channel	13.56 MHz

Plot refs	
14529-6 Cond 2 AC Live 150k-30M Average	
14529-6 Cond 2 AC Live 150k-30M Quasi-Peak	
14529-6 Cond 2 AC Neutral 150k-30M Average	
14529-6 Cond 2 AC Neutral 150k-30M Quasi-Peak	

Band	13.110-14.010 MHz
Power Setting	AC/DC Adaptor RFID Antenna Connected
Channel Spacing	Non Channelized
Mod Scheme	Without Card
Single channel	13.56 MHz

Plot refs	
14529-6 Cond 3 AC Live 150k-30M Average	
14529-6 Cond 3 AC Live 150k-30M Quasi-Peak	
14529-6 Cond 3 AC Neutral 150k-30M Average	
14529-6 Cond 3 AC Neutral 150k-30M Quasi-Peak	

Band	13.110-14.010 MHz
Power Setting	AC/DC Adaptor RFID Antenna Dis-Connected
Channel Spacing	Non Channelized
Mod Scheme	Without Card
Single channel	13.56 MHz

Plot refs	
14529-6 Cond 4 AC Live 150k-30M Average	
14529-6 Cond 4 AC Live 150k-30M Quasi-Peak	
14529-6 Cond 4 AC Neutral 150k-30M Average	
14529-6 Cond 4 AC Neutral 150k-30M Quasi-Peak	

Band	13.110-14.010 MHz
Power Setting	PoE RFID Antenna Dis-Connected
Channel Spacing	Non Channelized
Mod Scheme	Without Card
Single channel	13.56 MHz

Plot refs	
14529-6 Cond 5 AC Live 150k-30M Average	
14529-6 Cond 5 AC Live 150k-30M Quasi-Peak	
14529-6 Cond 5 AC Neutral 150k-30M Average	
14529-6 Cond 5 AC Neutral 150k-30M Quasi-Peak	

**Table of signals measured for Cond 1 AC Live 150k-30M**

Signal No.	Freq (MHz)	Peak Amp (dBuV)	QP Amp (dBuV)	QP -Lim (dB)	AV Amp (dBuV)	AV -Lim (dB)
1	9.796	40.4	36.5	-23.5	29.6	-20.4

**Table of signals measured for Cond 1 AC Neutral 150k-30M**

Signal No.	Freq (MHz)	Peak Amp (dBuV)	QP Amp (dBuV)	QP -Lim (dB)	AV Amp (dBuV)	AV -Lim (dB)
1	0.441	39.1	36.6	-20.4	28.4	-18.6
2	9.188	38.2	35.9	-24.1	30.2	-19.8
3	9.410	39.8	36.8	-23.2	30.8	-19.2

**Table of signals measured for Cond 2 AC Live 150k-30M**

Signal No.	Freq (MHz)	Peak Amp (dBuV)	QP Amp (dBuV)	QP -Lim (dB)	AV Amp (dBuV)	AV -Lim (dB)
1	0.176	49.9	49.4	-15.3	44.4	-10.3
2	0.528	39.4	36.9	-19.1	30.7	-15.3
3	0.617	39.7	38.9	-17.1	35.2	-10.8
4	0.705	38.1	37.3	-18.7	32.2	-13.8
5	1.057	38.9	37.6	-18.4	28.8	-17.2
6	19.709	40.2	41.7	-18.3	37.9	-12.1
7	24.351	48.5	46.8	-13.2	42.4	-7.6
8	26.547	51.0	49.7	-10.3	44.8	-5.2
9	29.953	42.8	41.1	-18.9	40.7	-9.3

**Table of signals measured for Cond 2 AC Neutral 150k-30M**

Signal No.	Freq (MHz)	Peak Amp (dBuV)	QP Amp (dBuV)	QP -Lim (dB)	AV Amp (dBuV)	AV -Lim (dB)
1	0.176	49.2	48.6	-16.1	44.3	-10.4
2	0.529	41.5	37.9	-18.1	31.5	-14.5
3	0.617	39.6	38.9	-17.1	34.6	-11.4
4	0.705	36.8	36.1	-19.9	30.6	-15.4
5	18.243	45.9	44.4	-15.6	38.8	-11.2
6	23.129	45.8	46.2	-13.8	43.2	-6.8
7	27.024	48.8	49.6	-10.4	45.3	-4.7
8	29.221	50.3	45.1	-14.9	41.8	-8.2

**Table of signals measured for Cond 3 AC Live 150k-30M**

Signal No.	Freq (MHz)	Peak Amp (dBuV)	QP Amp (dBuV)	QP -Lim (dB)	AV Amp (dBuV)	AV -Lim (dB)
1	9.622	37.2	34.6	-25.4	28.8	-21.2

**Table of signals measured for Cond 3 AC Neutral 150k-30M**

Signal No.	Freq (MHz)	Peak Amp (dBuV)	QP Amp (dBuV)	QP -Lim (dB)	AV Amp (dBuV)	AV -Lim (dB)
1	0.438	40.1	37.0	-20.1	28.9	-18.2
2	9.465	39.5	36.7	-23.3	30.9	-19.1

**Table of signals measured for Cond 4 AC Live 150k-30M**

Signal No.	Freq (MHz)	Peak Amp (dBuV)	QP Amp (dBuV)	QP -Lim (dB)	AV Amp (dBuV)	AV -Lim (dB)
1	9.566	40.1	38.2	-21.8	32.8	-17.2

**Table of signals measured for Cond 4 AC Neutral 150k-30M**

Signal No.	Freq (MHz)	Peak Amp (dBuV)	QP Amp (dBuV)	QP -Lim (dB)	AV Amp (dBuV)	AV -Lim (dB)
1	0.158	51.9	48.9	-16.7	36.5	-19.1
2	0.184	50.5	47.0	-17.3	35.4	-18.9
3	0.455	39.6	37.8	-19.0	29.5	-17.3
4	9.316	41.6	39.4	-20.6	33.5	-16.5

**Table of signals measured for Cond 5 AC Live 150k-30M**

Signal No.	Freq (MHz)	Peak Amp (dBuV)	QP Amp (dBuV)	QP -Lim (dB)	AV Amp (dBuV)	AV -Lim (dB)
1	0.176	47.9	45.3	-19.4	41.3	-13.4
2	0.528	44.1	42.8	-13.2	31.4	-14.6
3	0.617	39.9	38.8	-17.2	31.3	-14.7
4	0.705	42.2	40.6	-15.4	36.5	-9.5
5	16.228	41.3	39.5	-20.5	33.0	-17.0
6	18.425	41.7	39.6	-20.4	35.3	-14.7
7	20.258	49.2	47.5	-12.5	44.7	-5.3
8	26.348	50.4	49.6	-10.4	44.5	-5.5
9	29.402	51.9	50.6	-9.4	47.0	-3.0

**Table of signals measured for Cond 5 AC Neutral 150k-30M**

Signal No.	Freq (MHz)	Peak Amp (dBuV)	QP Amp (dBuV)	QP -Lim (dB)	AV Amp (dBuV)	AV -Lim (dB)
1	0.176	48.2	46.3	-18.4	42.2	-12.5
2	0.528	47.5	44.7	-11.3	33.1	-12.9
3	0.704	42.9	41.8	-14.2	36.9	-9.1
4	14.031	40.0	38.3	-21.7	33.5	-16.5
5	16.228	42.5	39.8	-20.2	35.9	-14.1
6	18.424	42.1	40.2	-19.8	35.9	-14.1
7	19.709	42.8	43.8	-16.2	40.5	-9.5
8	20.381	47.8	47.0	-13.0	44.4	-5.6
9	20.808	50.6	49.3	-10.7	45.3	-4.7
10	25.679	51.0	50.6	-9.4	47.3	-2.7
11	28.734	51.7	50.3	-9.7	45.2	-4.8

For modes 4, 5 and 6 the 13.56 MHz RFID signal was present and measurements were above their respective limits. To prove the signals were radiated pick up and not genuine conducted emissions from the EUT the 13.56 MHz antenna was disconnected and testing was repeated in modes 7 & 8 where the 13.56 MHz signal was not present.

Peak detector "Max held" Analyser plots against the Quasi-Peak / Average limit line(s) can be found in Section 6 of this report. Only results within 20dB of limits have been reported.

#### LIMITS:

15.207: as given in the above tables / drawn on the respective plots.

These results show that the EUT has PASSED this test.

The uncertainty gives a 95% confidence interval in the measurement. Expanded uncertainty (K=2) is as follows:

UE70 9kHz to 150kHz  $\pm 3.76$ dB, UE71 150kHz to 30MHz  $\pm 3.4$ dB

## 5.2 Radiated emissions 9 - 150 kHz

### 5.2.1 Test methods

Test Requirements: 47 CFR Part 15C Part 15.209 [Reference 4.1.1 of this report]  
Test Method: ANSI C63.10 Clause 6.4 [Reference 4.1.2 of this report]  
Limits: 47 CFR Part 15C Part 15.225(d) [Reference 4.1.1 of this report]

### 5.2.2 Configuration of EUT

The EUT was placed on a 0.8 metres high turntable. The front edge of the EUT was initially positioned facing the antenna. The EUT was measured at a distance of 3 metres. The antenna was orientated in both Parallel and Perpendicular polarisations. The EUT was rotated in all three orthogonal planes. Radiated Emissions testing was performed whilst powered via and using the mains power supply connected to a 120 VAC 60 Hz power source. The EUT was operated in Mode 2.

### 5.2.3 Test procedure

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

Measurements were made in a semi-anechoic chamber (pre-scan) with any final measurements required performed on an OATS without a ground plane. The antenna was placed 1m above the ground. The equipment was rotated 360 degrees 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 M.

### 5.2.4 Test equipment

E411, E624, TMS81, ZSW1

See Section 9 for more details

### 5.2.5 Test results

Temperature of test environment 16°C  
Humidity of test environment 61%  
Pressure of test environment 101kPa

Band	13.110-14.010 MHz
Power Setting	Default
Channel Spacing	Non Channelized
Mod Scheme	Card 2
Single channel	13.56 MHz

Plot refs
14529-6 Rad 1 9k-150kHz Para
14529-6 Rad 1 9k-150kHz Perp

Peak detector "Max held" Analyser plots against the Quasi-Peak / Average limit line(s) can be found in Section 6 of this report.

#### LIMITS:

15.209 limits are applicable in the restricted bands of 15.205 with the relevant detector.

n.b. the general limits of 15.209 are as drawn on the respective plots.

These results show that the EUT has PASSED this test.

The uncertainty gives a 95% confidence interval in the measurement. Expanded uncertainty (K=2) is as follows:  
9kHz - 30MHz ±3.9dB

## 5.3 Radiated emissions 150 kHz - 30 MHz

### 5.3.1 Test methods

Test Requirements: 47 CFR Part 15C Part 15.209 [Reference 4.1.1 of this report]  
Test Method: ANSI C63.10 Clause 6.4 [Reference 4.1.2 of this report]  
Limits: 47 CFR Part 15C Part 15.225(d) [Reference 4.1.1 of this report]

### 5.3.2 Configuration of EUT

The EUT was placed on a 0.8 metres high turntable. The front edge of the EUT was initially positioned facing the antenna. The EUT was measured at a distance of 3 metres. The antenna was orientated in both Parallel and Perpendicular polarisations. The EUT was rotated in all three orthogonal planes. Radiated Emissions testing was performed via PoE and powered using the mains power supply connected to a 120 VAC 60 Hz power source. The EUT was operated in Mode 2.

### 5.3.3 Test procedure

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

Measurements were made in a semi-anechoic chamber (pre-scan) with any final measurements required performed on an OATS without a ground plane. The antenna was placed 1m above the ground. The equipment was rotated 360 degrees 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 M.

### 5.3.4 Test equipment

E411, E624, TMS81, ZSW1

See Section 9 for more details

### 5.3.5 Test results

Temperature of test environment 16°C  
Humidity of test environment 61%  
Pressure of test environment 101kPa

Band	13.110-14.010 MHz
Power Setting	Default
Channel Spacing	Non Channelized
Mod Scheme	Card 2
Single channel	13.56 MHz

Plot refs
14529-6 Rad 1 150k-30MHz Para
14529-6 Rad 1 150k-30MHz Perp

Peak detector "Max held" Analyser plots against the Quasi-Peak / Average limit line(s) can be found in Section 6 of this report.

#### LIMITS:

15.209 limits are applicable in the restricted bands of 15.205 with the relevant detector.

n.b. the general limits of 15.209 are as drawn on the respective plots.

These results show that the EUT has PASSED this test.

The uncertainty gives a 95% confidence interval in the measurement. Expanded uncertainty (K=2) is as follows:  
9kHz - 30MHz  $\pm 3.9$ dB



## 5.4 Radiated emissions 30 MHz -1 GHz

### 5.4.1 Test methods

Test Requirements: 47 CFR Part 15C Part 15.225(d) [Reference 4.1.1 of this report]  
Test Method: ANSI C63.10 Clause 6.4 [Reference 4.1.2 of this report]  
Limits: 47 CFR Part 15C Part 15.225(d) [Reference 4.1.1 of this report]

### 5.4.2 Configuration of EUT

The EUT was placed on a 0.8 metres high turntable. The front edge of the EUT was initially positioned facing the antenna. The EUT was measured at a distance of 3 metres. The EUT was rotated in all three orthogonal planes. Radiated Emissions testing was performed via PoE and was powered using the mains power supply connected to a 120 VAC 60 Hz power source. The EUT was operated in Mode 2.

### 5.4.3 Test procedure

Tests were made in accordance with FCC Part 15 using the measuring equipment noted below. Measurements were made in a semi-anechoic chamber. The antenna was height scanned between 1 and 4metres and the equipment was rotated 360 degrees to record the worst case emissions. Both Horizontal and vertical polarisations of measuring antenna were tested.

Tests were performed in Test Site M.

### 5.4.4 Test equipment

E411, E624, E743, LPE364, NSA-M, ZSW1

See Section 9 for more details

### 5.4.5 Test results

Temperature of test environment 16°C  
Humidity of test environment 67%  
Pressure of test environment 102kPa

Band	13.110-14.010 MHz
Power Setting	Default
Channel Spacing	Non Channelized
Mod Scheme	Card 2
Single channel	13.56 MHz

Plot refs
14529-6 Rad 1 VHF Horiz
14529-6 Rad 1 VHF Vert
14529-6 Rad 1 UHF Horiz
14529-6 Rad 1 UHF Vert

**Table of signals measured for Horizontal Signal List**

Signal No.	Freq (MHz)	Peak Amp (dBuV/m)	QP Amp (dBuV/m)	QP -Lim (dB)
1	51.450	30.4	24.3	-15.7
2	72.004	24.4	20.4	-19.6
3	125.004	29.5	25.7	-17.8
4	192.102	31.9	24.1	-19.4
5	204.041	33.6	27.0	-16.5
6	216.029	33.1	26.4	-19.6
7	226.774	35.3	31.8	-14.2
8	250.005	32.7	28.6	-17.4
9	375.013	42.5	41.0	-5.0
10	468.006	38.2	31.6	-14.4
11	479.973	38.3	31.3	-14.7

12	492.027	37.9	31.2	-14.8
13	499.997	35.9	31.7	-14.3
14	504.062	36.1	27.4	-18.6
15	529.143	37.3	34.1	-11.9
16	576.075	37.7	29.6	-16.4
17	588.075	37.1	28.8	-17.2
18	604.690	34.7	28.9	-17.1
19	612.223	33.4	27.6	-18.4
20	624.994	40.6	37.4	-8.6
21	646.997	36.0	29.6	-16.4
22	651.512	39.2	34.0	-12.0
23	720.740	35.7	29.3	-16.7
24	750.017	40.9	36.2	-9.8
25	755.917	42.7	39.6	-6.4
26	854.889	36.5	30.6	-15.4
27	874.992	46.3	44.1	-1.9

**Table of signals measured for Vertical Signal List**

Signal No.	Freq (MHz)	Peak Amp (dBuV/m)	QP Amp (dBuV/m)	QP -Lim (dB)
1	67.794	41.1	36.9	-3.1
2	70.450	38.5	33.4	-6.6
3	71.833	40.9	36.1	-3.9
4	72.912	37.5	32.0	-8.0
5	75.591	41.0	36.1	-3.9
6	77.530	37.1	31.7	-8.3
7	79.509	35.8	29.8	-10.2
8	81.445	36.1	30.4	-9.6
9	84.052	35.2	30.6	-9.4
10	87.590	33.6	28.8	-11.2
11	94.884	32.0	25.7	-17.8
12	99.984	35.0	29.2	-14.3
13	102.943	37.3	30.7	-12.8
14	105.402	34.1	28.8	-14.7
15	109.104	35.6	29.4	-14.1
16	121.721	31.5	25.2	-18.3
17	144.002	34.1	27.4	-16.1
18	151.184	43.6	38.6	-4.9
19	156.004	37.1	30.4	-13.1
20	168.074	39.9	34.0	-9.5
21	176.155	31.2	25.3	-18.2
22	179.999	42.5	37.2	-6.3
23	189.827	37.0	32.9	-10.6
24	191.993	46.3	40.7	-2.8
25	199.313	35.3	30.2	-13.3
26	203.962	44.7	38.6	-4.9
27	211.646	34.3	27.8	-15.7
28	215.989	41.4	35.1	-8.4
29	222.911	31.8	26.8	-19.2
30	226.772	40.1	36.7	-9.3
31	228.143	33.6	26.8	-19.2
32	240.061	34.1	26.8	-19.2
33	250.013	32.9	28.6	-17.4
34	375.007	35.0	31.7	-14.3

35	604.740	39.0	35.1	-10.9
36	625.013	42.6	40.3	-5.7
37	651.536	40.2	34.6	-11.4
38	680.322	37.9	33.9	-12.1
39	750.016	40.4	36.6	-9.4
40	755.919	41.9	38.0	-8.0
41	859.591	36.9	30.6	-15.4
42	875.017	37.9	32.9	-13.1
43	933.251	37.9	32.0	-14.0
44	957.396	37.2	31.8	-14.2

Peak detector "Max held" Analyser plots against the Quasi-Peak / Average limit line(s) can be found in Section 6 of this report.

**LIMITS:**

15.209 limits are applicable in the restricted bands of 15.205 with the relevant detector.

n.b. the general limits of 15.209 are as drawn on the respective plots.

These results show that the EUT has PASSED this test.

The uncertainty gives a 95% confidence interval in the measurement. Expanded uncertainty (K=2) is as follows:  
30MHz - 1000MHz  $\pm 6.1$ dB

## 5.5 Radiated emissions above 1 GHz

### 5.5.1 Test methods

Test Requirements: 47 CFR Part 15C Part 15.209 [Reference 4.1.1 of this report]  
Test Method: ANSI C63.10 Clause 6.6 [Reference 4.1.2 of this report]  
Limits: 47 CFR Part 15C Part 15.209/15.225(d) [Reference 4.1.1 of this report]

### 5.5.2 Configuration of EUT

The EUT was placed on a 1.5 metres high turntable. The front edge of the EUT was initially positioned facing the antenna. The EUT was measured at a distance of 3 metres. The EUT was rotated in all three orthogonal planes. Radiated Emissions testing was performed via PoE and powered using the mains power supply connected to a 120 VAC 60 Hz power source.

The EUT was operated in Mode 1 and Mode 2.

### 5.5.3 Test procedure

Tests were made in accordance with FCC Part 15 using the measuring equipment noted below. Measurements were made in a semi-anechoic chamber with appropriate absorbing material for use in this range. The EUT was raised and antenna was placed 1.5m above the ground in line with the EUT, which was rotated through 360 degrees to record the worst case emissions. A measurement distance of 3m was used between the test range 1GHz - 6GHz, 1.2m was used in the test range 6-18GHz and 0.3m was used in the test range 18-25GHz. Tests were performed in Test Site B.

### 5.5.4 Test equipment

E412, E428, E429, E856, E904, E972, TMS78, TMS79

See Section 9 for more details

### 5.5.5 Test results

Temperature of test environment 16°C  
Humidity of test environment 69%  
Pressure of test environment 104kPa

Setup Table

Band	13.110-14.010 MHz
Power Setting	Default
Channel Spacing	Non Channelized
Mod Scheme	Without Card
Single channel	13.56 MHz

Spurious Frequency (MHz)	Measured Peak Level (dBµV/m)	Difference to Peak Limit (dB)	Measured Average Level (dBµV/m)	Difference to Average Limit (dB)	EUT Polarisation	Antenna Polarisation
1124.99	45.1	-28.9	39.3	-14.7	Upright	Horizontal
1360.674	51.2	-22.8	38.2	-15.8	Upright	Vertical
1436.241	47.4	-26.6	34.8	-19.2	Upright	Horizontal
1436.247	55.1	-18.9	43.2	-10.8	Upright	Vertical
1511.841	50	-24	41.6	-12.4	Upright	Vertical
1511.847	49.1	-24.9	35.7	-18.3	Upright	Horizontal
1587.431	43.5	-30.5	35.7	-18.3	Upright	Horizontal
1587.431	46.5	-27.5	36.4	-17.6	Upright	Vertical
1663.024	47	-27	37.9	-16.1	Upright	Horizontal
1663.024	53.2	-20.8	47.5	-6.5	Upright	Vertical
3888.063	49.04	-24.96	37.14	-16.86	Upright	Horizontal
3888.162	47.84	-26.16	35.24	-18.76	Upright	Vertical
11755.096	50.12	-23.88	37.22	-16.78	Upright	Horizontal

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12128.398	48.11	-25.89	36.41	-17.59	Upright	Vertical
12271.995	50.17	-23.83	37.37	-16.63	Upright	Horizontal

Plots						
14529-6 Rad 1 1-2GHz Horiz						
14529-6 Rad 1 1-2GHz Vert						
14529-6 Rad 1 2-3GHz Horiz						
14529-6 Rad 1 2-3GHz Vert						
14529-6 Rad 1 3-5GHz Horiz						
14529-6 Rad 1 3-5GHz Vert						
14529-6 Rad 1 5-6GHz Horiz						
14529-6 Rad 1 5-6GHz Vert						
14529-6 Rad 1 6-7.77GHz Horiz						
14529-6 Rad 1 6-7.77GHz Vert						
14529-6 Rad 1 7.77-10GHz Horiz						
14529-6 Rad 1 7.77-10GHz Vert						
14529-6 Rad 1 10-12_4GHz Horiz						
14529-6 Rad 1 10-12_4GHz Vert						
14529-6 Rad 1 12-15GHz Horiz						
14529-6 Rad 1 12-15GHz Vert						
14529-6 Rad 1 15-18GHz Horiz						
14529-6 Rad 1 15-18GHz Vert						
14529-6 Rad 1 18-22GHz Horiz						
14529-6 Rad 1 18-22GHz Vert						
14529-6 Rad 1 22-25GHz Horiz						
14529-6 Rad 1 22-25GHz Vert						

Note: Only signals within 20dB of limits using the applicable detector are reported. Peak detector "Max held" Analyser plots against the Average limit line can be found in Section 6 of this report.

#### LIMITS:

15.209 limits are applicable in the restricted bands of 15.205 with the relevant detector.

15.247(d) other emissions, outside the intentional band, must be attenuated by at least 20/30dB from the level of the fundamental / meet the general limits of 15.209.

The general limits of 15.209 are as drawn on the respective plots.

These results show that the EUT has PASSED this test.

The uncertainty gives a 95% confidence interval in the measurement. Expanded uncertainty (K=2) is as follows:

1 - 6 GHz  $\pm 4.7$ dB, 6 – 18 GHz  $\pm 4.95$ dB, 18 – 25 GHz  $\pm 3.1$ dB.

## 5.6 Intentional radiator field strength

### 5.6.1 Test methods

Test Requirements: 47 CFR Part 15C Part 15.225(a) [Reference 4.1.1 of this report]  
Test Method: ANSI C63.10 Clause 6.4 [Reference 4.1.2 of this report]  
Limits: 47 CFR Part 15C Part 15.225(a)/(b)/(c)/(d) [Reference 4.1.1 of this report]

### 5.6.2 Configuration of EUT

The EUT was placed on a 0.8 metres high turntable. The front edge of the EUT was initially positioned facing the antenna. The EUT was measured at a distance of 3 metres. The antenna was orientated in both Parallel and Perpendicular polarisations. The EUT was rotated in all three orthogonal planes. The EUT was operated in Mode 2.

### 5.6.3 Test procedure

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

Measurements were made in a semi-anechoic chamber (pre-scan) with final measurements performed on an OATS without a ground plane. The antenna was placed 1m above the ground. Both the equipment and the antenna were rotated 360 degrees to record the maximised emission.

Measurements were made at Sites M and OATS.

### 5.6.4 Test equipment

E411, E624, TMS81, ZSW1

See Section 9 for more details

### 5.6.5 Test results

Temperature of test environment 16°C  
Humidity of test environment 61%  
Pressure of test environment 101kPa

Band	13.110-14.010 MHz
Power Setting	Default
Channel Spacing	Non Channelized
Mod Scheme	Card 2
Single channel	13.56 MHz

	Single channel
Peak Level (dBµV/m@3m)	52.00
Plot reference	14529-6 Radiated H-Field 13.56 MHz
Antenna Polarisation	Vert
EUT Polarisation	Upright

Analyser plots can be found in Section 6 of this report.

The above 3 m worst case measurement is extrapolated to 30 m using ANSI C63.10:2013 clause 6.4.4 as follows: -

Using clause 6.4.4.1 Equation (1)

$$\begin{aligned} d_{\text{near field}} &= 47.77 / f_{\text{MHz}} \\ &= 47.77 / 13.56 \\ &= 3.523 \text{ m} \end{aligned}$$

Using clause 6.4.4.2 Equation (2)

$$\begin{aligned} FS_{\text{limit}} &= FS_{\text{max}} - 40 \log(d_{\text{near field}} / d_{\text{measure}}) - 20 \log(d_{\text{limit}} / d_{\text{near field}}) \\ &= 52.00 - 40 \log(3.523 / 3) - 20 \log(30 / 3.523) \end{aligned}$$

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= 30.61 dB $\mu$ V/m @ 30 m.

**LIMITS:**

15.225(a) QP/Peak = the field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848  $\mu$ V/m @ 30m = 84 dB $\mu$ V/m @ 30m.

15.225(b) QP/Peak = within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334  $\mu$ V/m @ 30m = 50.5 dB $\mu$ V/m @ 30m.

15.225(c) QP/Peak = within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106  $\mu$ V/m @ 30m = 40.5 dB $\mu$ V/m @ 30m.

15.225(d) QP/Peak = outside of the 13.110-14.010 MHz band shall not exceed the general radiated emissions limits of 15.209.

These results show that the EUT has PASSED this test.

The uncertainty gives a 95% confidence interval in the measurement. Expanded uncertainty (K=2) is as follows:  
< $\pm$  3.9 dB

## 5.7 Occupied bandwidth

### 5.7.1 Test methods

Test Requirements: 47 CFR Part 15C Part 15.215 [Reference 4.1.1 of this report]  
Test Method: ANSI C63.10 Clause 6.9 [Reference 4.1.2 of this report]  
Limits: 47 CFR Part 15C Part 15.215 [Reference 4.1.1 of this report]

### 5.7.2 Configuration of EUT

The EUT was placed on a 0.8 metres high turntable. The front edge of the EUT was initially positioned facing the antenna. The EUT was measured at a distance of 3 metres. The EUT was tested whilst connected to the AC power for maximised emissions. The EUT was operated in Mode 1, Mode 2 and Mode 3.

### 5.7.3 Test procedure

Tests were made in accordance with FCC Part 15 using the measuring equipment noted below. A 10kHz RBW, 3x VBW, auto sweep time and max hold settings were used for the 20 dB bandwidth.

Measurements were made in a semi-anechoic chamber.

Tests were performed using Test Site M.

### 5.7.4 Test equipment

E411, E624, TMS81, ZSW1

See Section 9 for more details

### 5.7.5 Test results

Temperature of test environment 16°C  
Humidity of test environment 61%  
Pressure of test environment 101kPa

Band	13.110-14.010 MHz
Power Setting	Default
Channel Spacing	Non Channelized
Mod Scheme	Card 1
Single channel	13.56 MHz

Single channel	
20 dB Bandwidth (MHz) Nominal Temp & Volts	0.430973
Plot for 20 dB Bandwidth (MHz) Nominal Temp & Volts	14529-8 20dB BW with 13.56 MHz Card 1
FLOW Worst case (MHz)	13.3445135
FHIGH Worst case (MHz)	13.7754865

Band	13.110-14.010 MHz
Power Setting	Default
Channel Spacing	Non Channelized
Mod Scheme	Card 2 (HID iCLASS DG)
Single channel	13.56 MHz

Single channel	
20 dB Bandwidth (MHz) Nominal Temp & Volts	0.215863
Plot for 20 dB Bandwidth (MHz) Nominal Temp & Volts	14529-8 20dB BW with 13.56 MHz Card 2
FLOW Worst case (MHz)	13.4520685
FHIGH Worst case (MHz)	13.6679315



Band	13.110-14.010 MHz
Power Setting	Default
Channel Spacing	Non Channelized
Mod Scheme	Without Card
Single channel	13.56 MHz

	Single channel
20 dB Bandwidth (MHz) Nominal Temp & Volts	0.184067
Plot for 20 dB Bandwidth (MHz) Nominal Temp & Volts	14529-8 20dB BW without 13.56 MHz Card
FLOW Worst case (MHz)	13.4679665
FHIGH Worst case (MHz)	13.6520335

Analyser plots can be found in Section 6 of this report.

#### LIMITS:

No limits apply however, per 15.215, the 20dB bandwidth of the emission is to remain within the band over expected variations in temperature and supply voltage. It is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimise the possibility of out-of-band operation.

These results show that the EUT has PASSED this test.

The uncertainty gives a 95% confidence interval in the measurement. Expanded uncertainty (K=2) is as follows:  
<± 1.9 %

## 5.8 Spectrum mask

### 5.8.1 Test methods

Test Requirements: 47 CFR Part 15C Part 15.225 [Reference 4.1.1 of this report]  
Test Method: ANSI C63.10 Clause 6.4 [Reference 4.1.2 of this report]  
Limits: 47 CFR Part 15C Part 15.225(a)/(b)/(c)/(d) [Reference 4.1.1 of this report]

### 5.8.2 Configuration of EUT

The EUT was placed on a 0.8 metres high turntable. The EUT was measured at a distance of 3 metres. The EUT and antenna were positioned for maximum field strength and referenced to the field strength measured on the OATS. The EUT was operated in Mode 2.

### 5.8.3 Test procedure

Tests were made in accordance with FCC Part 15 using the measuring equipment noted below. Measurements were made at Site N.

### 5.8.4 Test equipment

E602, E623, E755, E890, N607

See Section 9 for more details

### 5.8.5 Test results

Temperature of test environment 17°C  
Humidity of test environment 56%  
Pressure of test environment 101kPa

Band	13.110-14.010 MHz
Power Setting	Default
Channel Spacing	Non Channelized
Mod Scheme	Card 2 (HID iCLASS DG)
Single channel	13.56 MHz

	Single channel
Nominal, Maximised RF Output / field strength (dBµV/m)	52.0
Nominal plot reference	Mask Tnom Vnom

Analyser plots can be found in Section 6 of this report.

The above 3 m worst case measurement is extrapolated to 30 m using ANSI C63.10:2013 clause 6.4.4 as follows: -

Using clause 6.4.4.1 Equation (1)

$$\begin{aligned}
 d_{\text{near field}} &= 47.77 / f_{\text{MHz}} \\
 &= 47.77 / 13.56 \\
 &= 3.523 \text{ m}
 \end{aligned}$$

Using clause 6.4.4.2 Equation (2)

$$\begin{aligned}
 FS_{\text{limit}} &= FS_{\text{max}} - 40 \log(d_{\text{near field}} / d_{\text{measure}}) - 20 \log(d_{\text{limit}} / d_{\text{near field}}) \\
 &= 52.00 - 40 \log(3.523 / 3) - 20 \log(30 / 3.523) \\
 &= 30.61 \text{ dBµV/m @ 30 m.}
 \end{aligned}$$

#### LIMITS:

15.225(a) QP/Peak = the field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 µV/m @ 30m = 84 dBµV/m @ 30m.

15.225(b) QP/Peak = within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 µV/m @ 30m = 50.5 dBµV/m @ 30m.

15.225(c) QP/Peak = within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any

emissions shall not exceed  $106 \mu\text{V/m}$  @ 30m =  $40.5 \text{ dB}\mu\text{V/m}$  @ 30m.

15.225(d) QP/Peak = outside of the 13.110-14.010 MHz band shall not exceed the general radiated emissions limits of 15.209.

These results show that the EUT has PASSED this test.

The uncertainty gives a 95% confidence interval in the measurement. Expanded uncertainty (K=2) is as follows:  
<± 4.1 dB

## 5.9 Frequency stability

### 5.9.1 Test methods

Test Requirements: 47 CFR Part 15C Part 15.225(e) [Reference 4.1.1 of this report]  
Test Method: ANSI C63.10 Clause 6.8 [Reference 4.1.2 of this report]  
Limits: 47 CFR Part 15C Part 15.225(e) [Reference 4.1.1 of this report]

### 5.9.2 Configuration of EUT

The EUT's DC power port was connected to a variable power supply. This allowed the voltage end points to be set as declared by the required by the specification.

The EUT was placed in a temperature controlled chamber. The EUT emissions were observed by means of a test fixture. The EUT was operated in Mode 2.

### 5.9.3 Test procedure

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

Temperature stability was achieved at each test level before taking measurements. A frequency count was made on the signal. At nominal temperature the EUT supply was varied by +/-15%.

A spectrum analyser was used and connected to an off-air frequency standard. The Analyser's frequency counter function was used to monitor the frequency of the carrier. The analyser was set with a suitable span, RBW and VBW to allow for a measurement resolution of 1Hz.

Tests were performed using Test Site N.

### 5.9.4 Test equipment

E602, E623, E755, E843, E890, N607

See Section 9 for more details

### 5.9.5 Test results

Temperature of test environment 17°C  
Humidity of test environment 56%  
Pressure of test environment 101kPa

Band	13.110-14.010 MHz
Power Setting	Default
Channel Spacing	Non Channelized
Mod Scheme	PoE (Card 2)
Single channel	13.56 MHz

Test conditions		Frequency Error (MHz) Single channel
-20°C	Volts Nominal (48)	13.559974
-10°C	Volts Nominal (48)	13.559972
0°C	Volts Nominal (48)	13.559987
10°C	Volts Nominal (48)	13.559866
20°C	Volts Minimum (48)	13.559849
30°C	Volts Nominal (48)	13.559794
40°C	Volts Nominal (48)	13.559756
50°C	Volts Nominal (48)	13.559738
Max Frequency Error per chan (Hz)		+193 / -128
Max Frequency Error observed (MHz)		0.000193

Band	13.110-14.010 MHz
Power Setting	Default
Channel Spacing	Non Channelized
Mod Scheme	DC Power (Card 2)
Single channel	13.56 MHz

Test conditions		Frequency Error (MHz) Single channel
-20°C	Volts Nominal (12)	13.560112
-10°C	Volts Nominal (12)	13.560112
0°C	Volts Nominal (12)	13.560012
10°C	Volts Nominal (12)	13.560072
20°C	Volts Minimum (10.2)	13.559890
	Volts Nominal (12)	13.559890
	Volts Maximum (13.8)	13.559870
30°C	Volts Nominal (12)	13.559932
40°C	Volts Nominal (12)	13.559952
50°C	Volts Nominal (12)	13.559852
Max Frequency Error per chan (Hz)		+222 / -38
Max Frequency Error observed (MHz)		0.000222

Maximum variation observed was 222 Hz.

#### LIMITS:

+/- 0.01%. (+/- 1.356kHz)

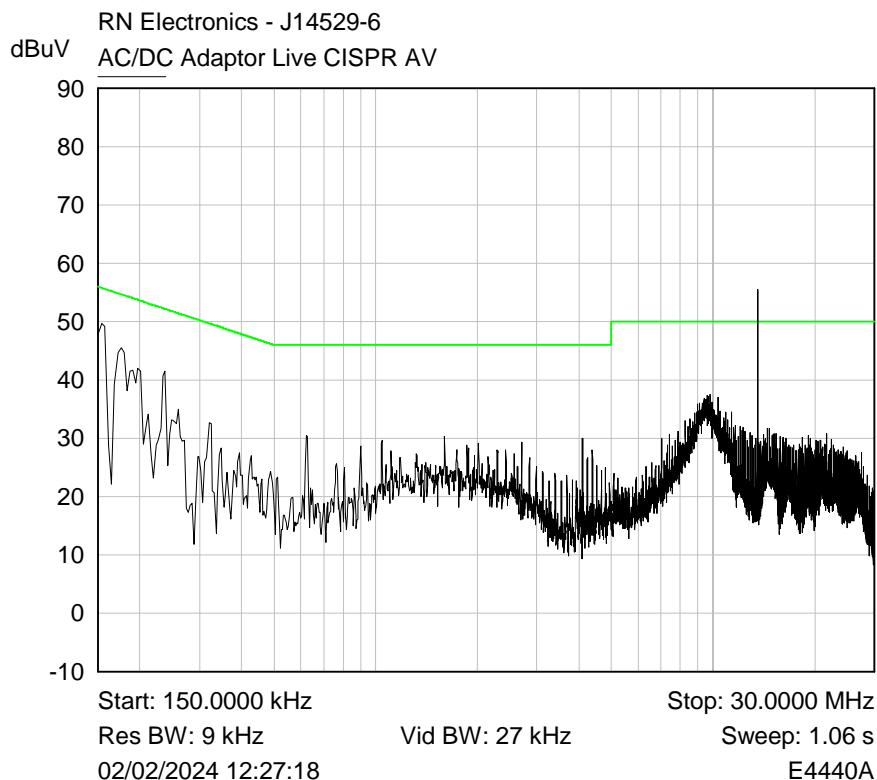
These results show that the EUT has PASSED this test.

The uncertainty gives a 95% confidence interval in the measurement. Expanded uncertainty (K=2) is as follows:  
<± 0.0002 ppm (PSA Ext Ref)

## 6 Plots/Graphical results

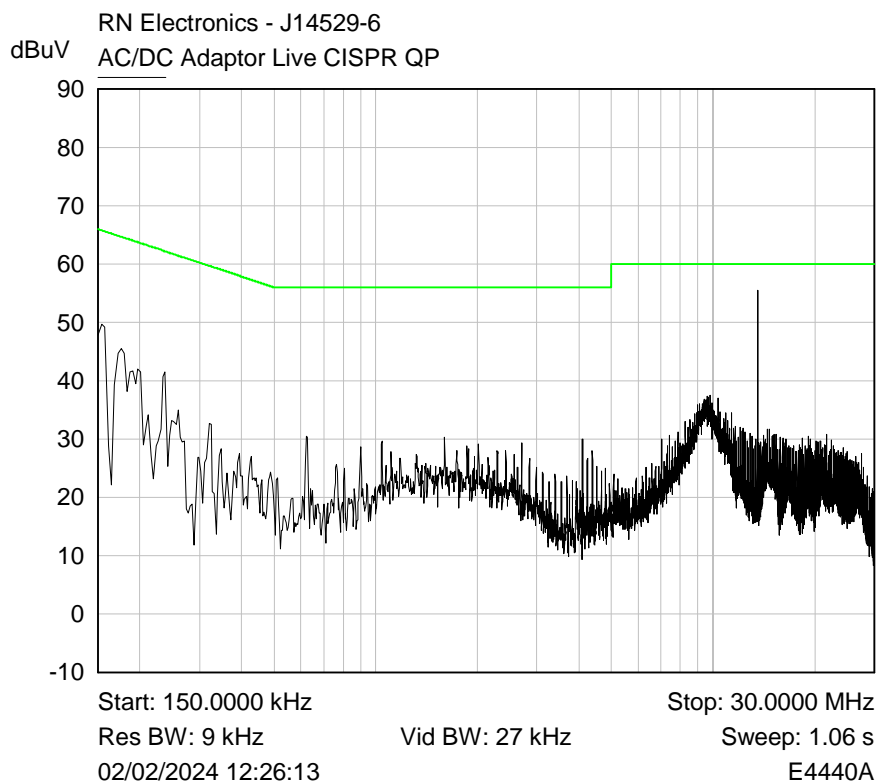
### 6.1 AC power line conducted emissions

RF Parameters: Band 13.110-14.010 MHz, Power AC/DC Adaptor RFID Antenna Connected,  
Channel Spacing Non Channelized, Modulation with Card 2, Channel 13.56 MHz



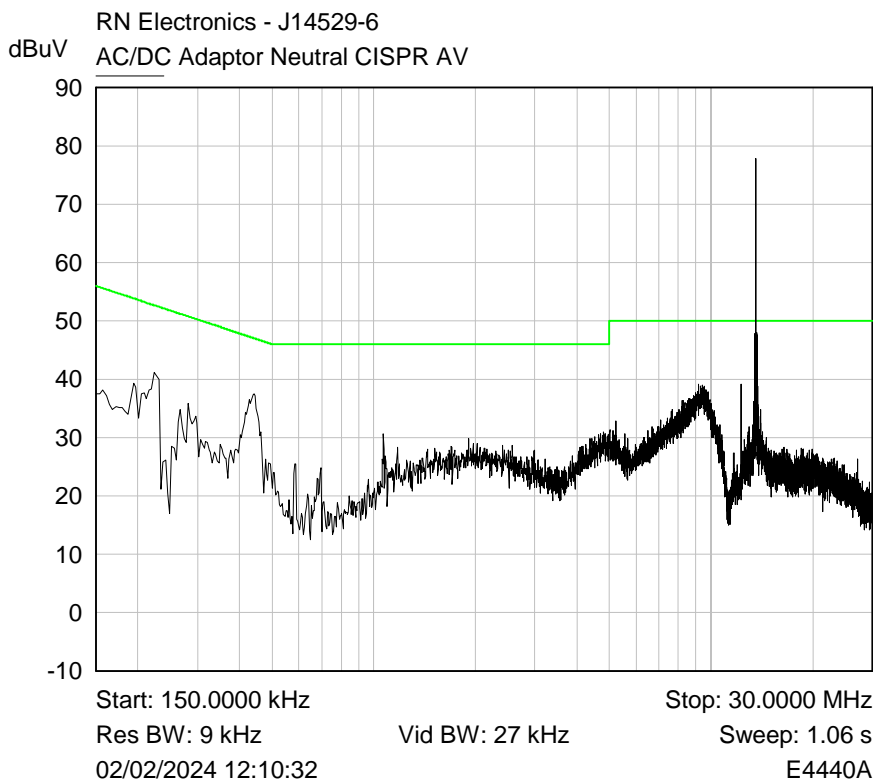
Plot of Live150k-30M Average

Note: Signal on plot is 13.56 MHz intentional transmission with antenna connected



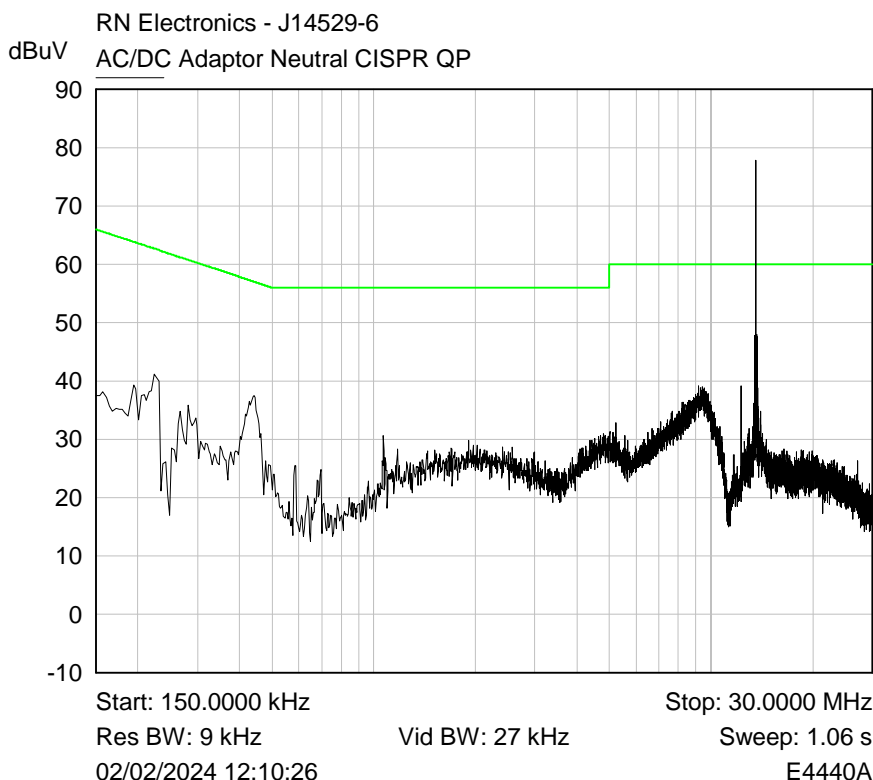
Plot of Live150k-30M Quasi-Peak

Note: Signal on plot is 13.56 MHz intentional transmission with antenna connected



Plot of Neutral150k-30M Average

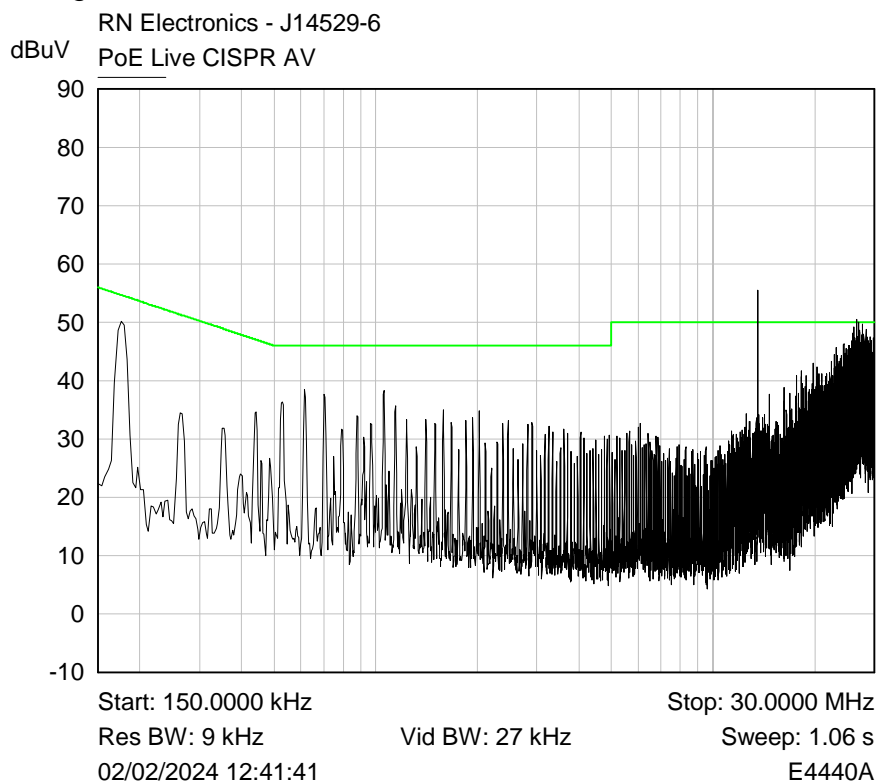
Note: Signal on plot is 13.56 MHz intentional transmission with antenna connected



Plot of Neutral150k-30M Quasi-Peak

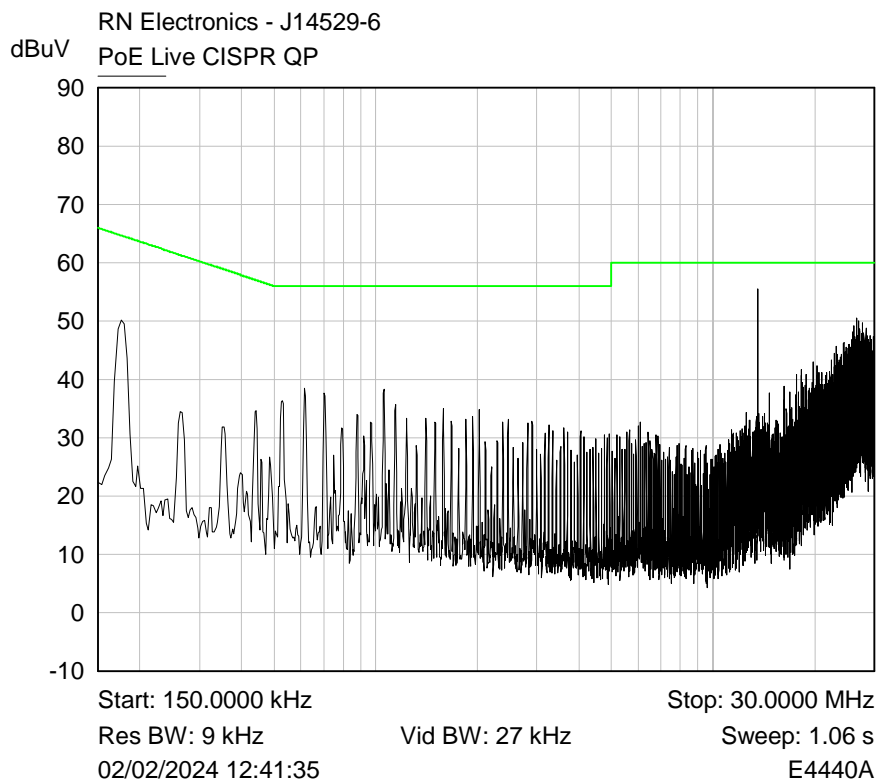
Note: Signal on plot is 13.56 MHz intentional transmission with antenna connected

RF Parameters: Band 13.110-14.010 MHz, Power PoE RFID Antenna Connected, Channel Spacing Non Channelized, Modulation with Card 2, Channel 13.56 MHz



Plot of Live150k-30M Average

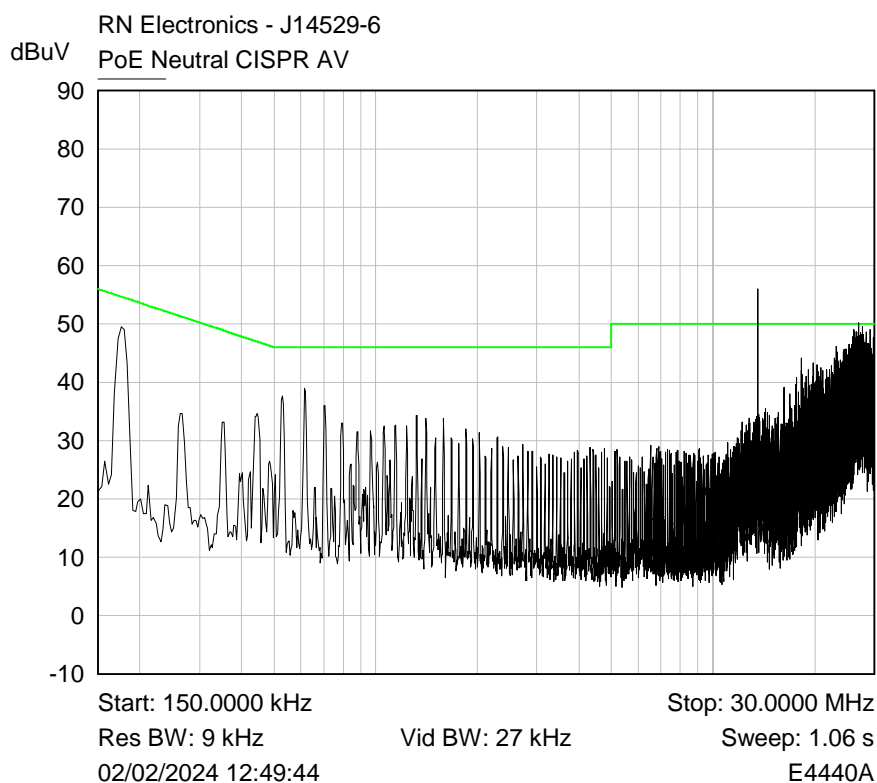
Note: Signal on plot is 13.56 MHz intentional transmission with antenna connected



Plot of Live150k-30M Quasi-Peak

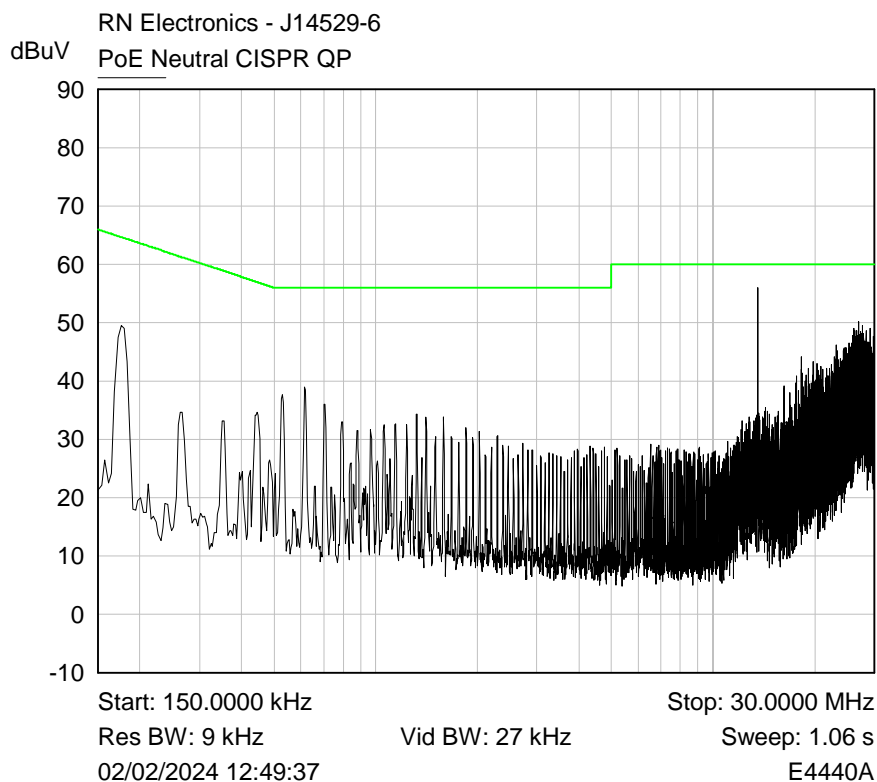
Note: Signal on plot is 13.56 MHz intentional transmission with antenna connected





Plot of Neutral150k-30M Average

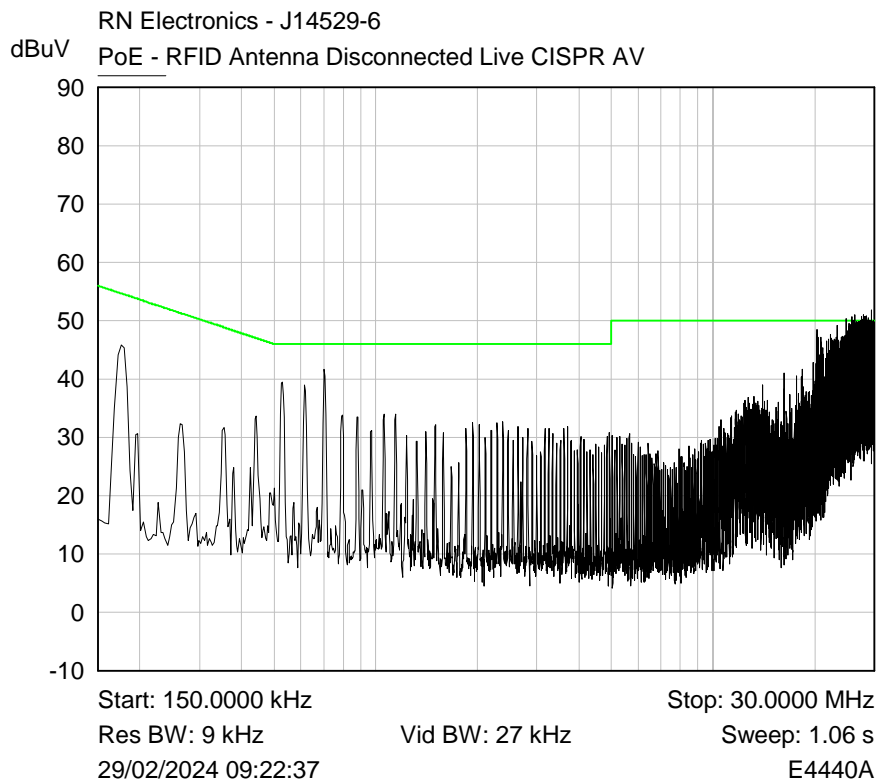
Note: Signal on plot is 13.56 MHz intentional transmission with antenna connected



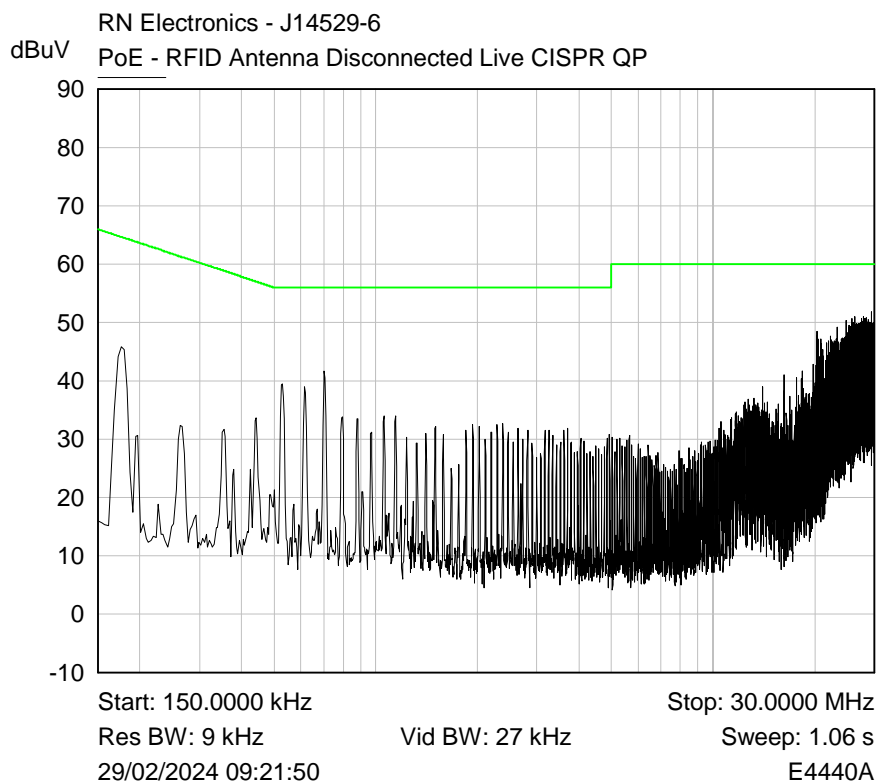
Plot of Neutral150k-30M Quasi-Peak

Note: Signal on plot is 13.56 MHz intentional transmission with antenna connected

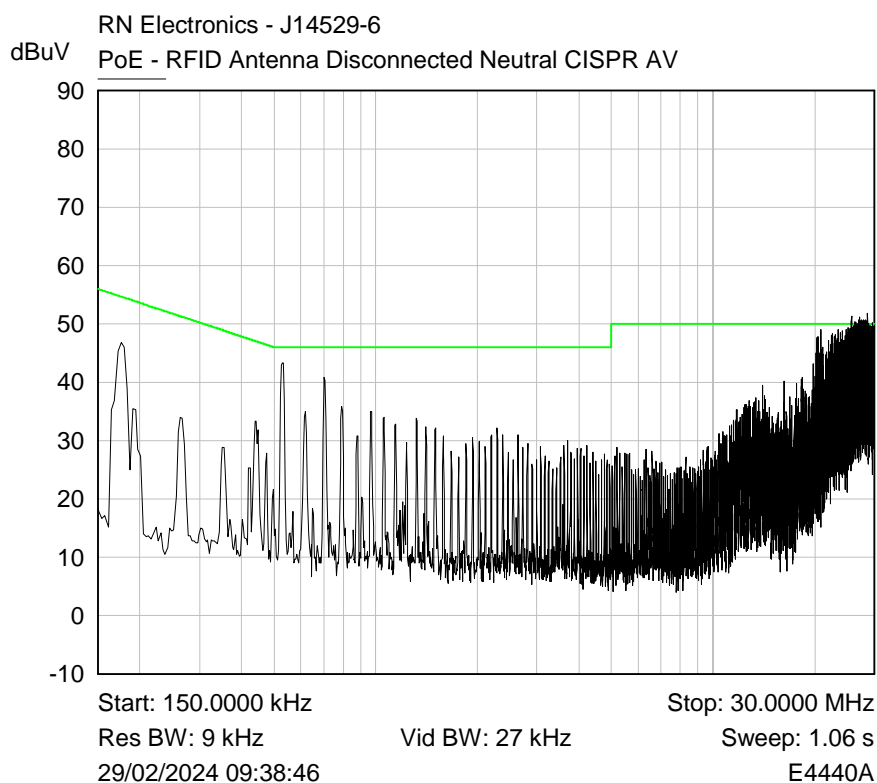
RF Parameters: Band 13.110-14.010 MHz, Power AC/DC Adaptor RFID Antenna Dis-  
Connected, Channel Spacing Non Channelized, Modulation without Card, Channel 13.56 MHz



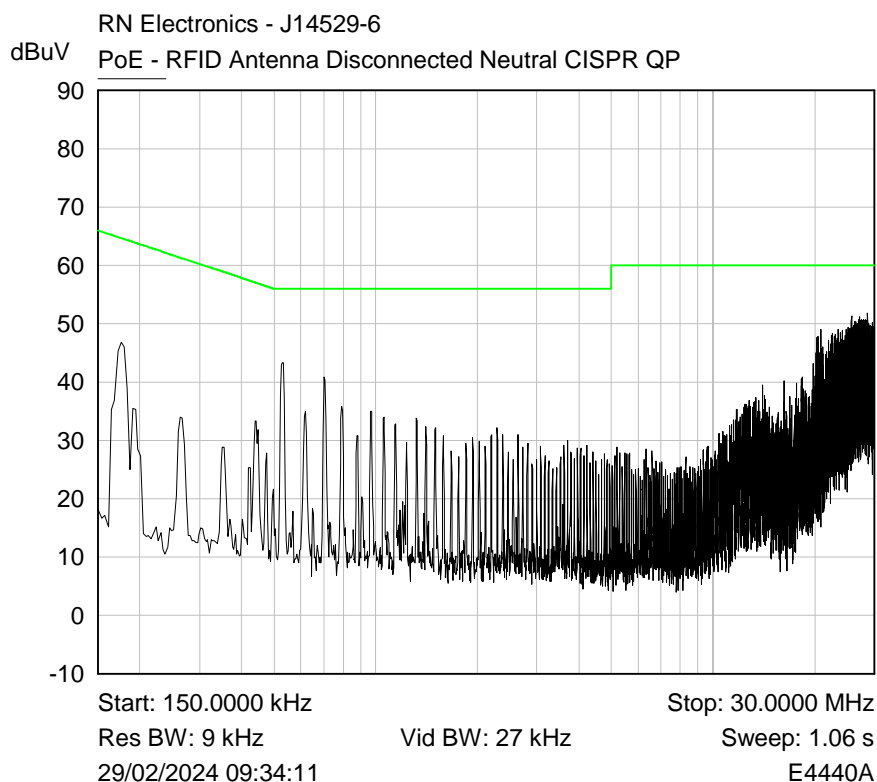
Plot of Live150k-30M Average



Plot of Live150k-30M Quasi-Peak



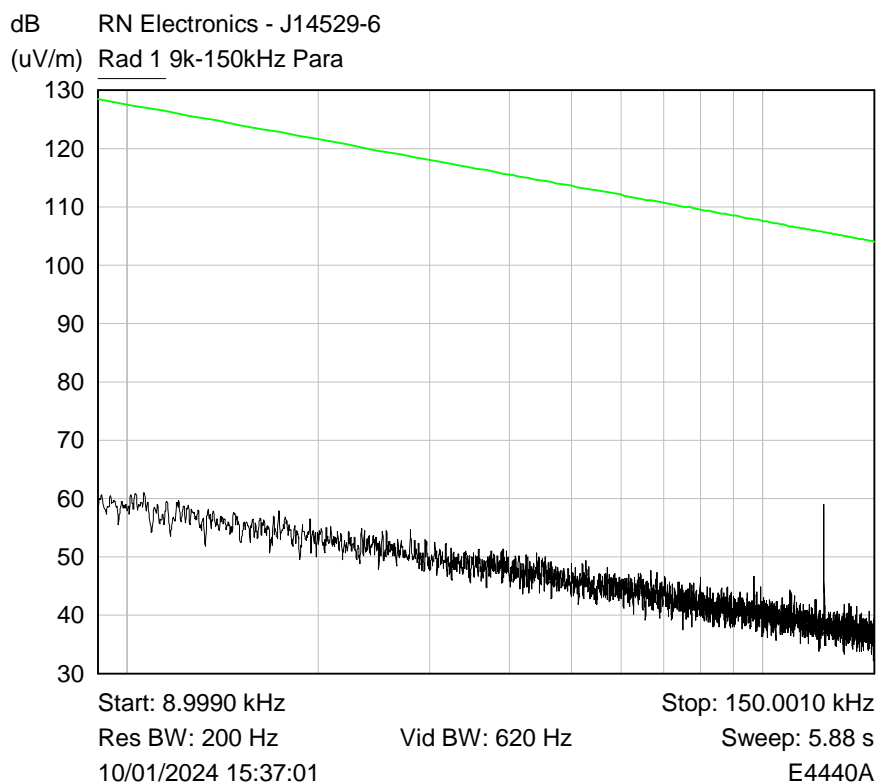
Plot of Neutral150k-30M Average



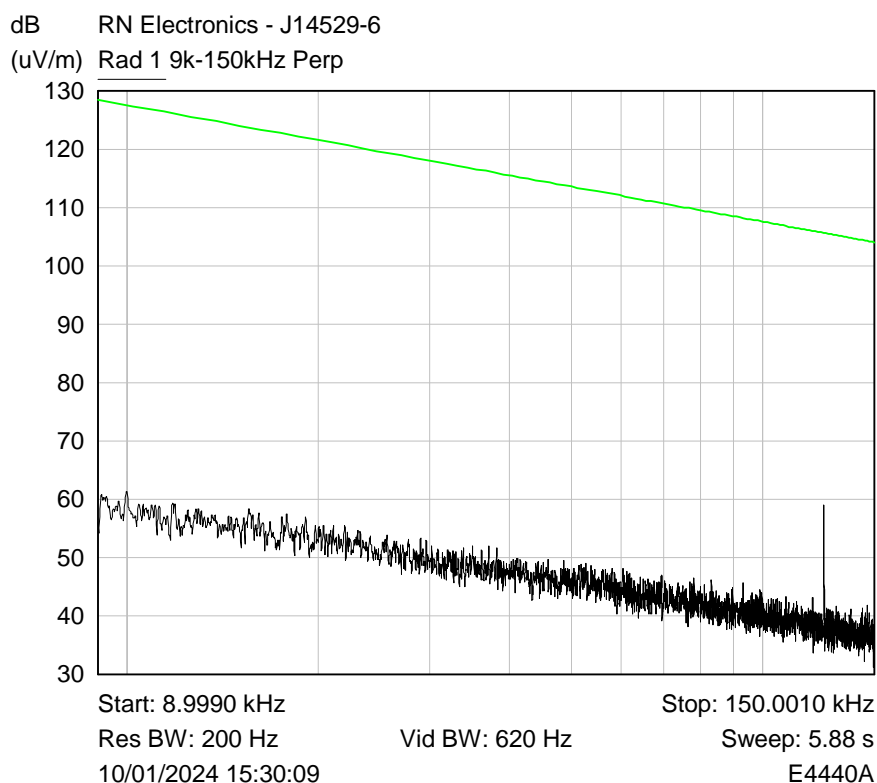
Plot of Neutral150k-30M Quasi-Peak

## 6.2 Radiated emissions 9 - 150 kHz

RF Parameters: Band 13.110-14.010 MHz, Power default, Channel Spacing Non Channelized,  
Modulation Card 2, Channel 13.56 MHz



Plot of 9k-150kHz Parallel  
Note: Signal on plot is 125 kHz intentional transmission

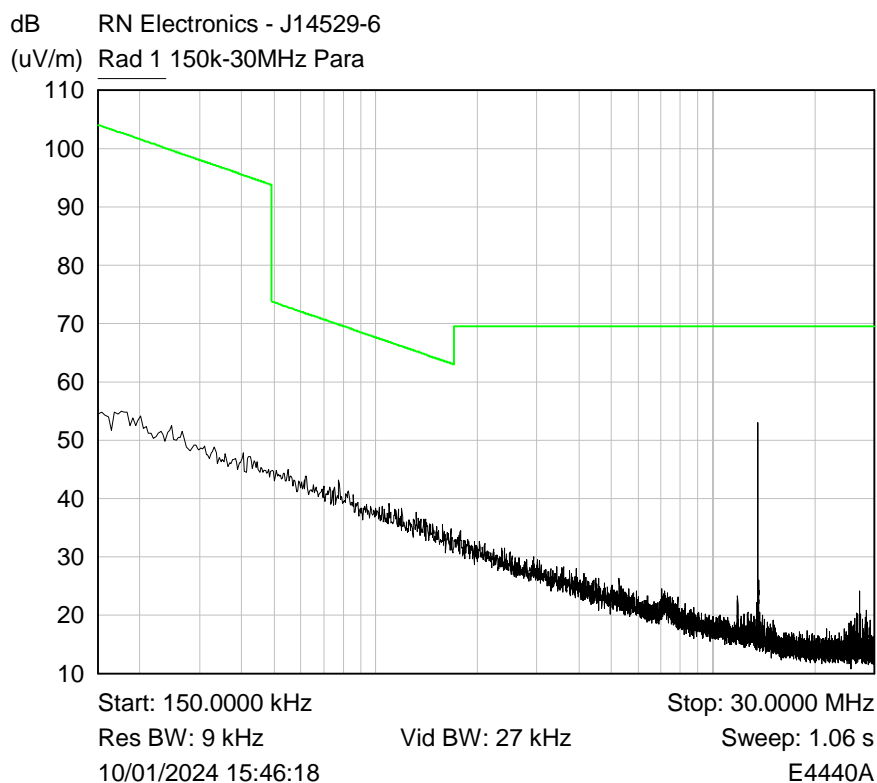


Plot of 9k-150kHz Perpendicular  
Note: Signal on plot is 125 kHz intentional transmission



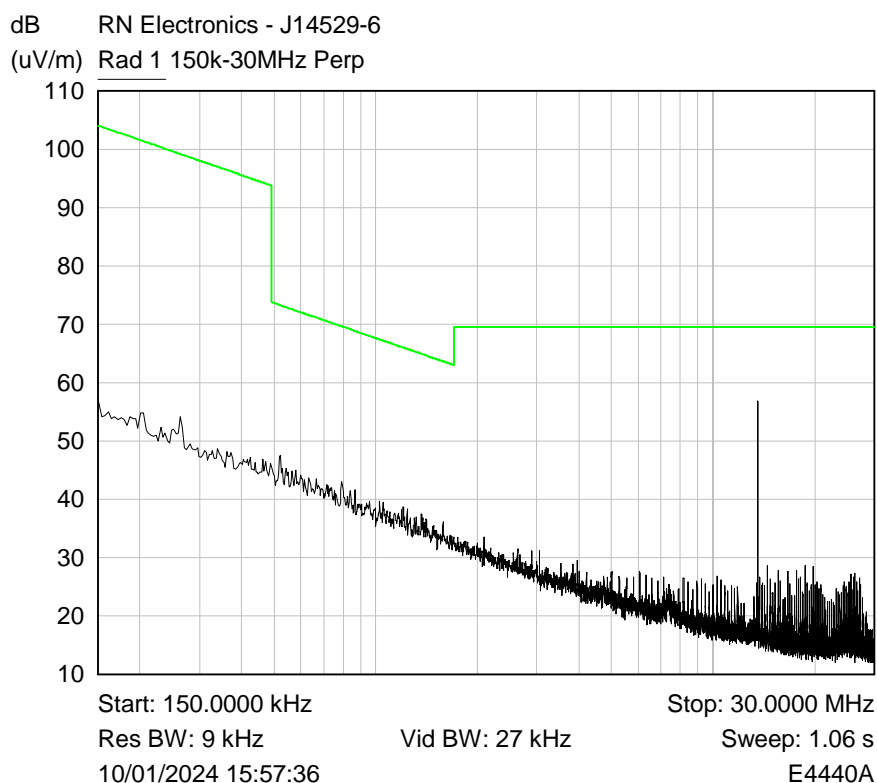
### 6.3 Radiated emissions 150 kHz - 30 MHz

RF Parameters: Band 13.110-14.010 MHz, Power default, Channel Spacing Non Channelized,  
Modulation Card 2, Channel 13.56 MHz



Plot of 150kHz-30MHz Parallel

Note: Signal on plot is 13.56 MHz intentional transmission



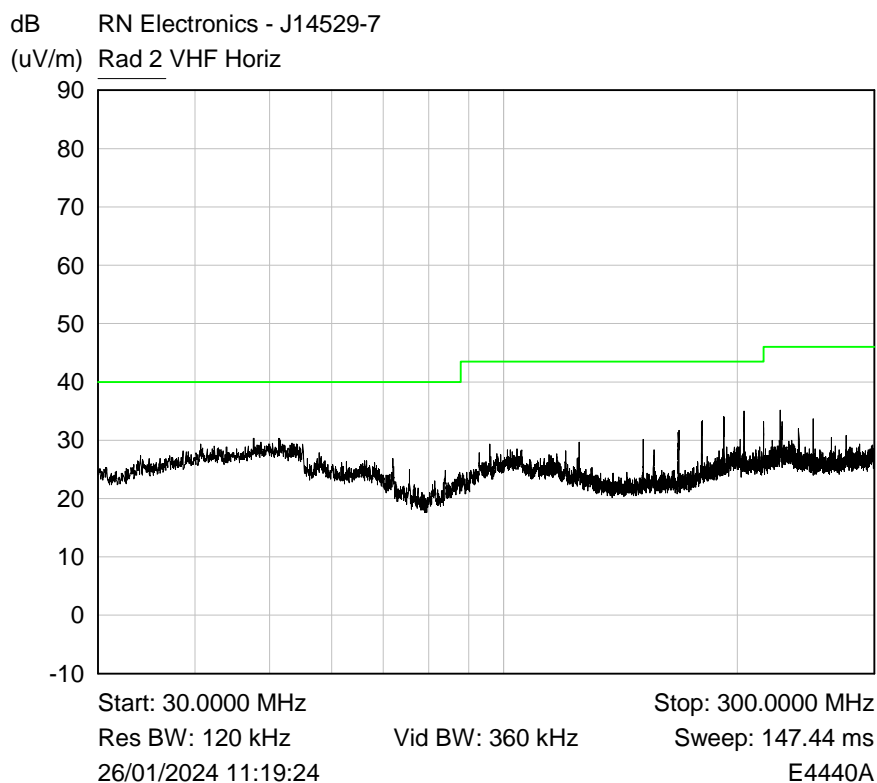
Plot of 150kHz-30MHz Perpendicular

Note: Signal on plot is 13.56 MHz intentional transmission

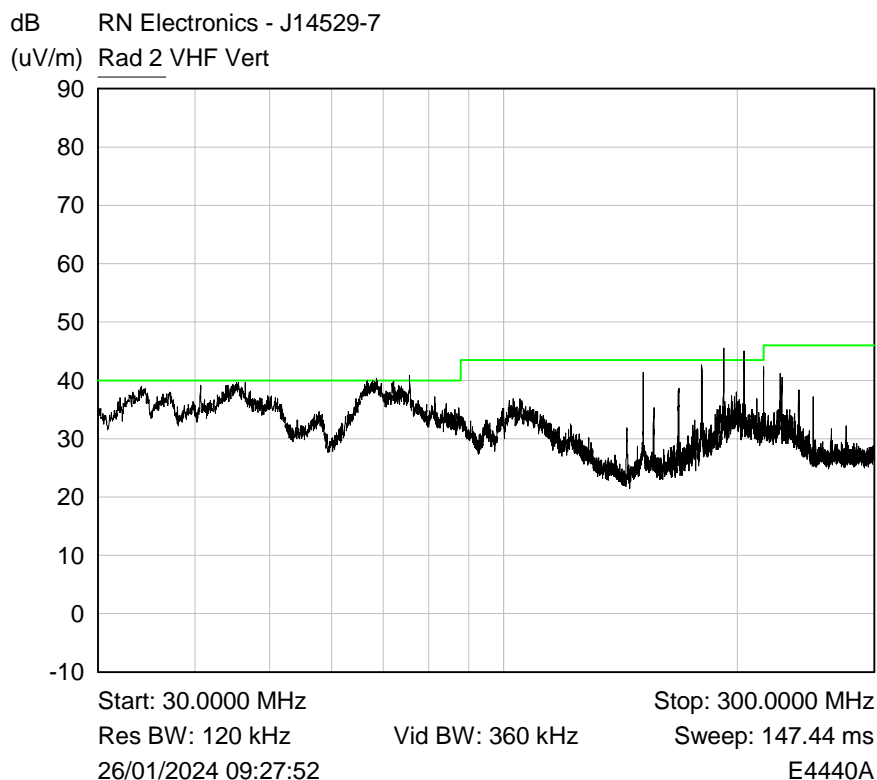


## 6.4 Radiated emissions 30 MHz -1 GHz

RF Parameters: Band 13.110-14.010 MHz, Power default, Channel Spacing Non Channelized,  
Modulation Card 2, Channel 13.56 MHz

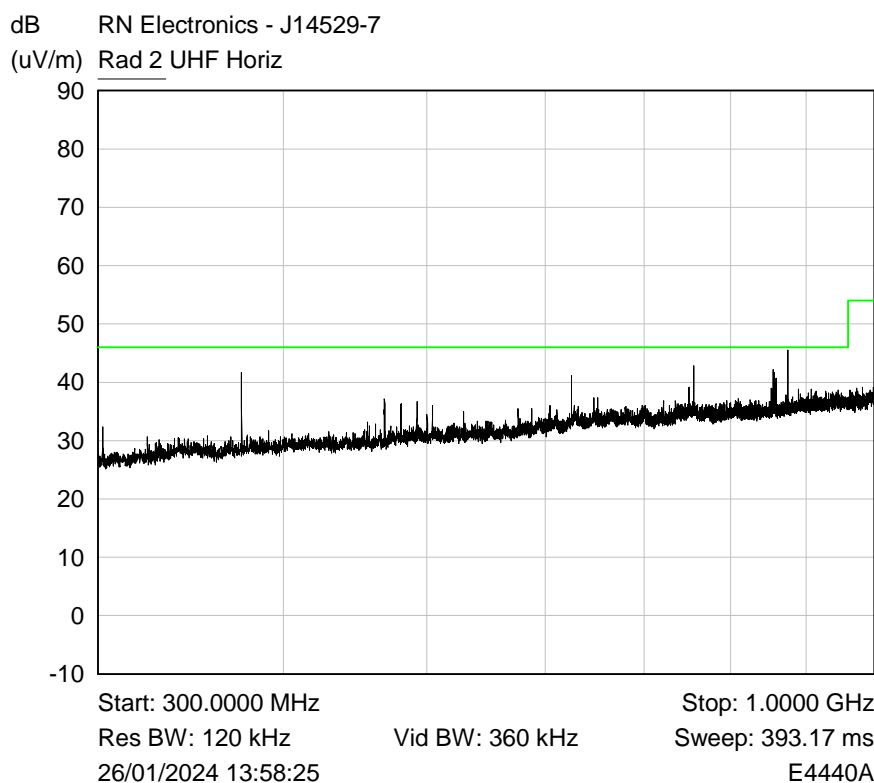


Plot of Peak emissions for VHF Horizontal against the QP limit line.

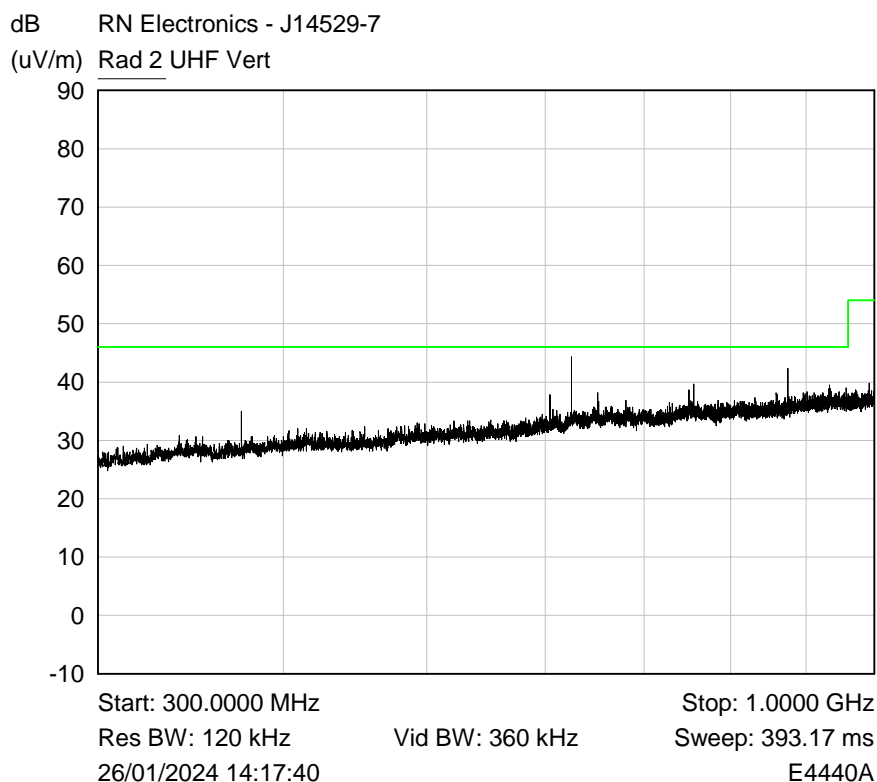


Plot of Peak emissions for VHF Vertical against the QP limit line.





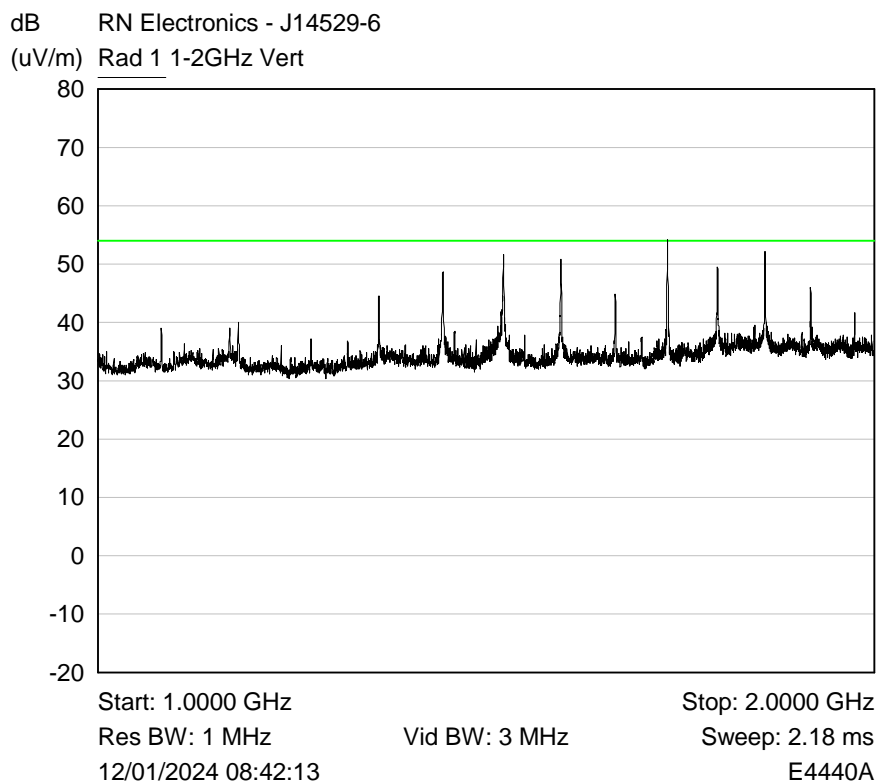
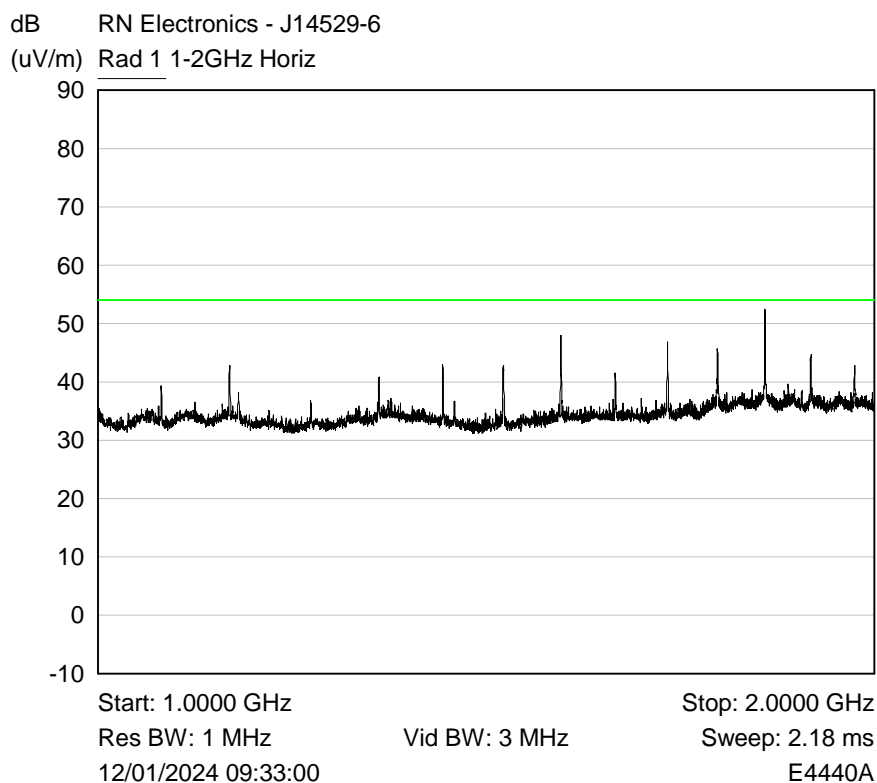
Plot of Peak emissions for UHF Horizontal against the QP limit line.

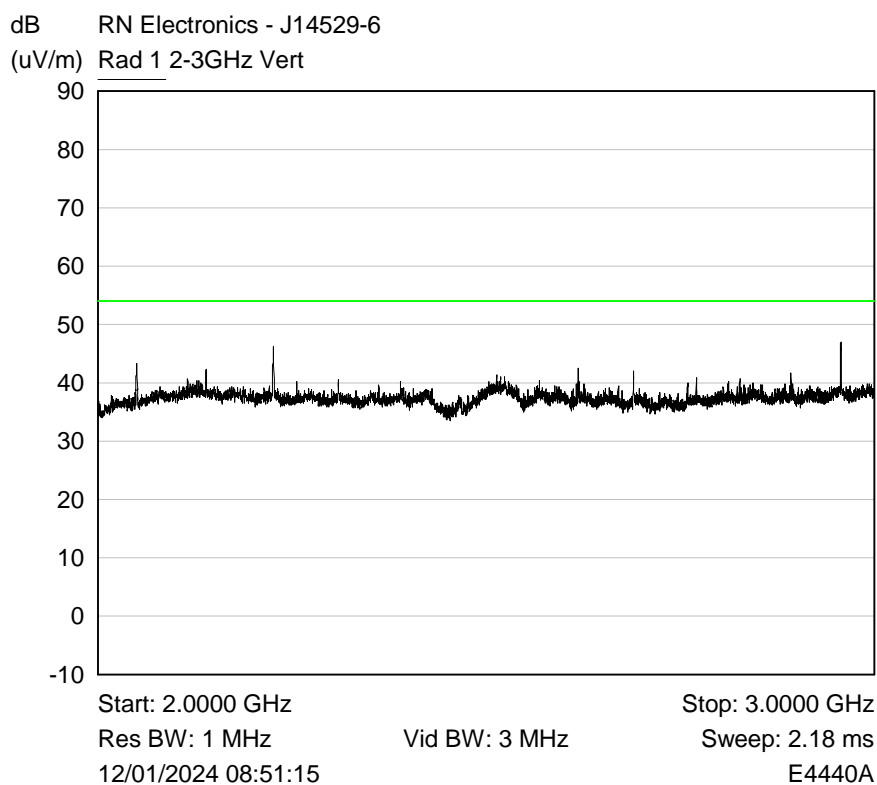
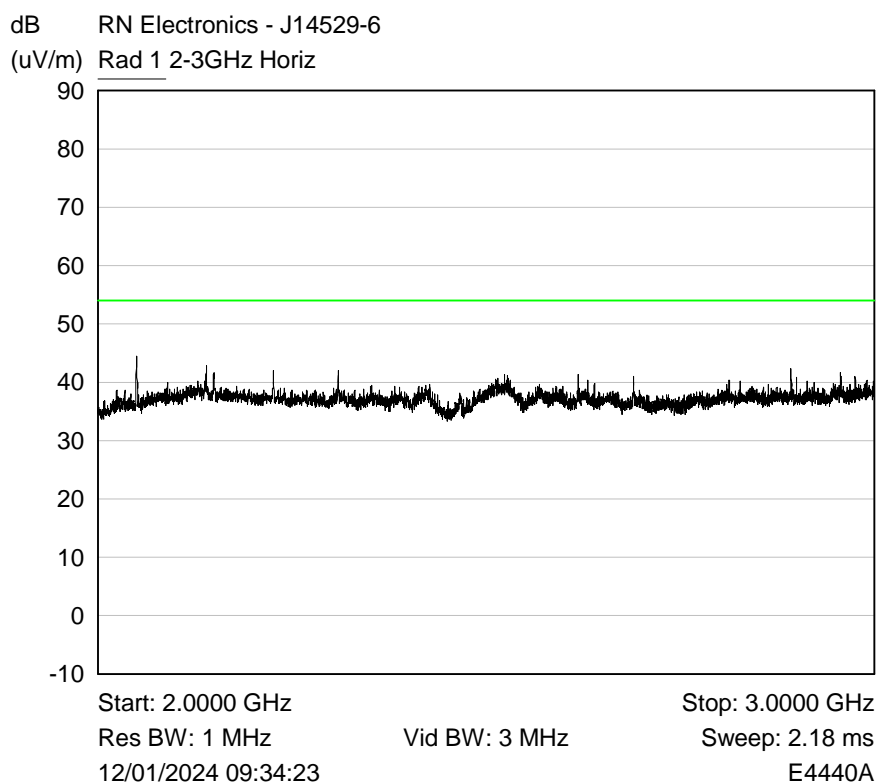


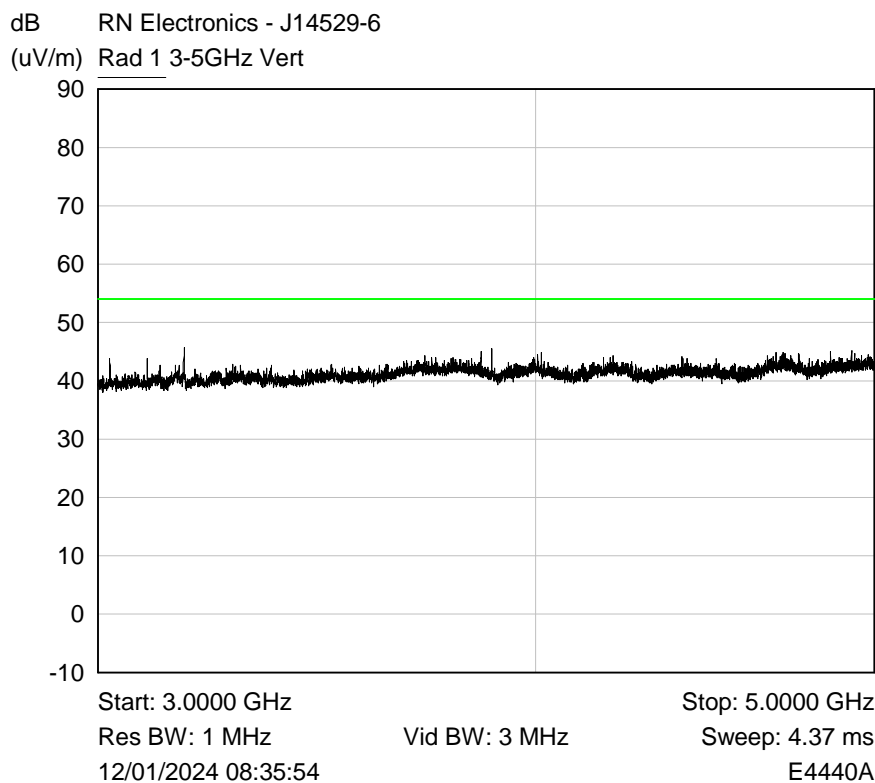
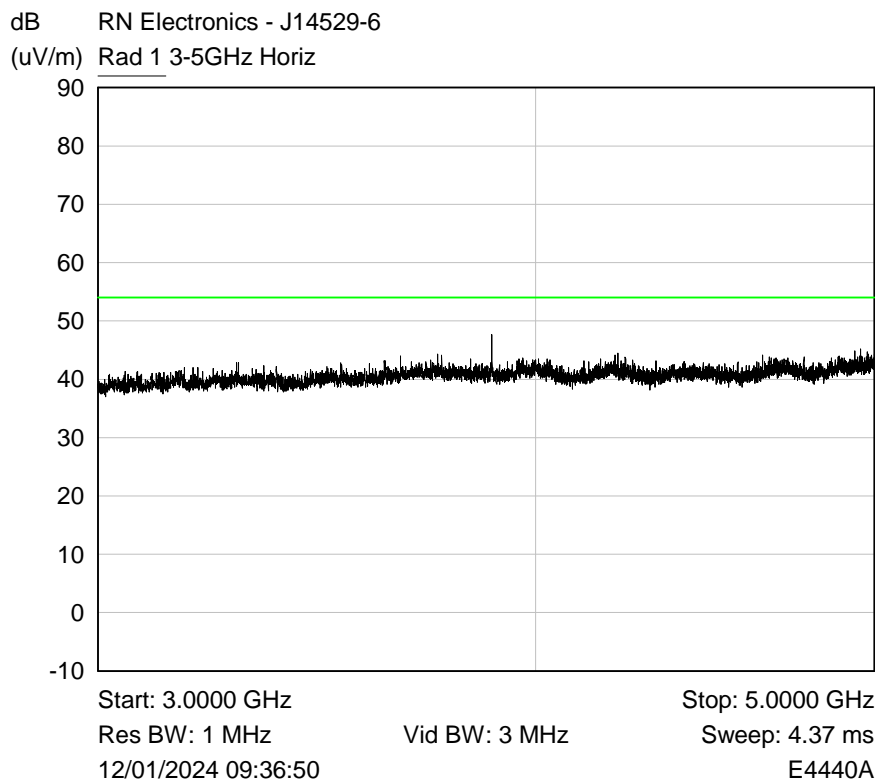
Plot of Peak emissions for UHF Vertical against the QP limit line.

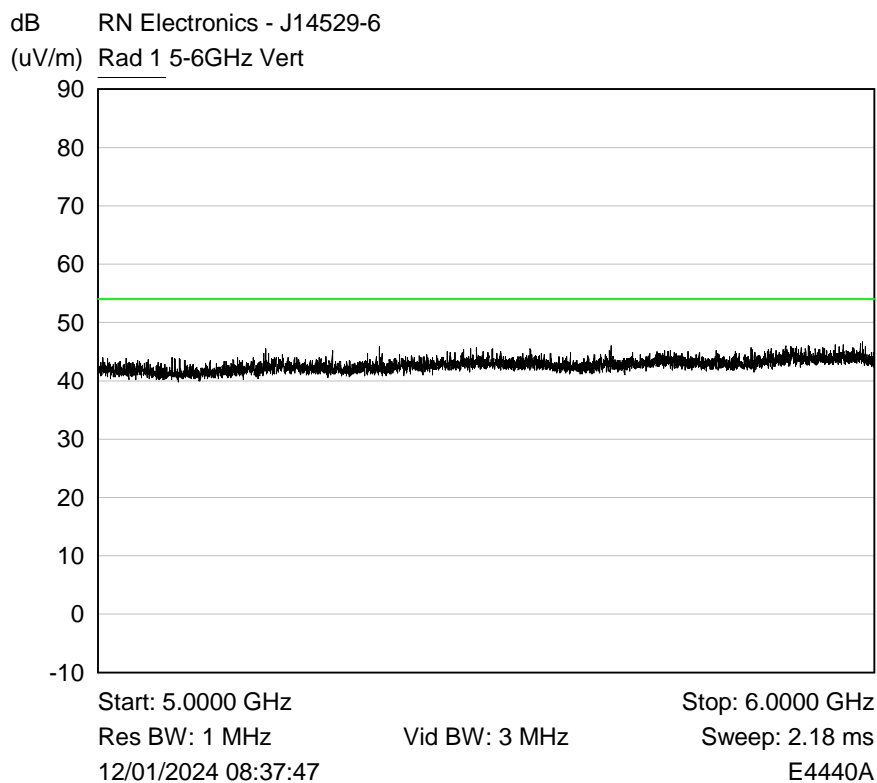
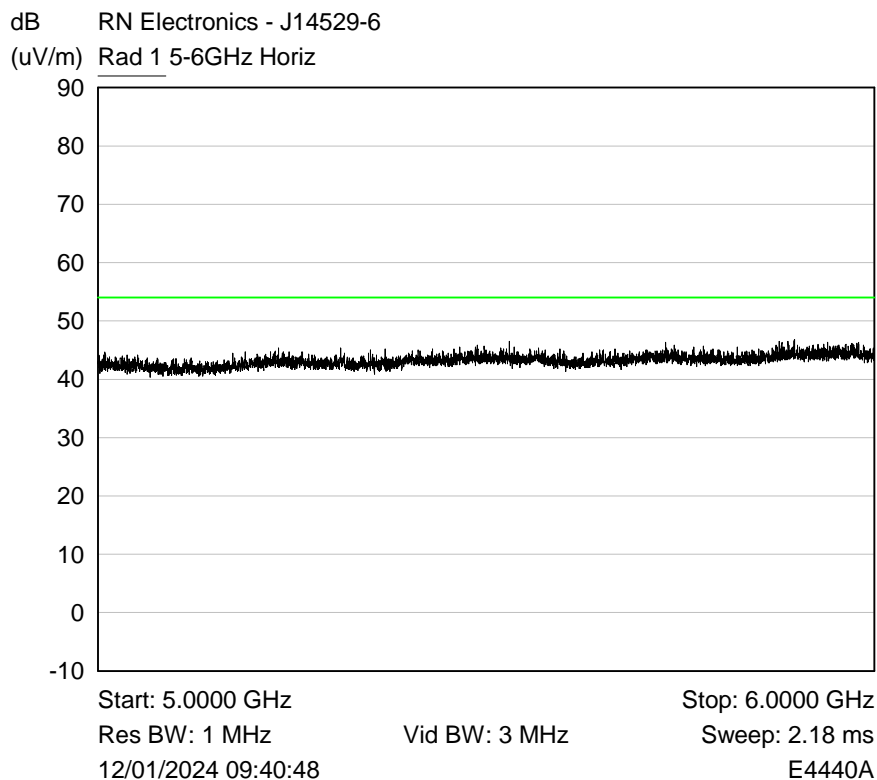
## 6.5 Radiated emissions above 1 GHz

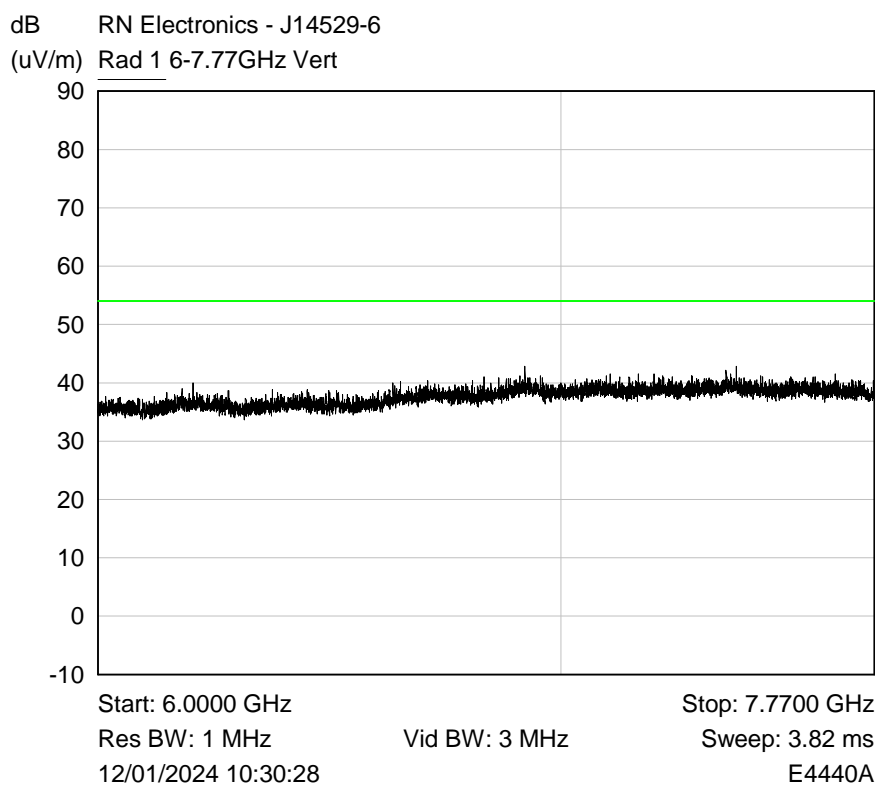
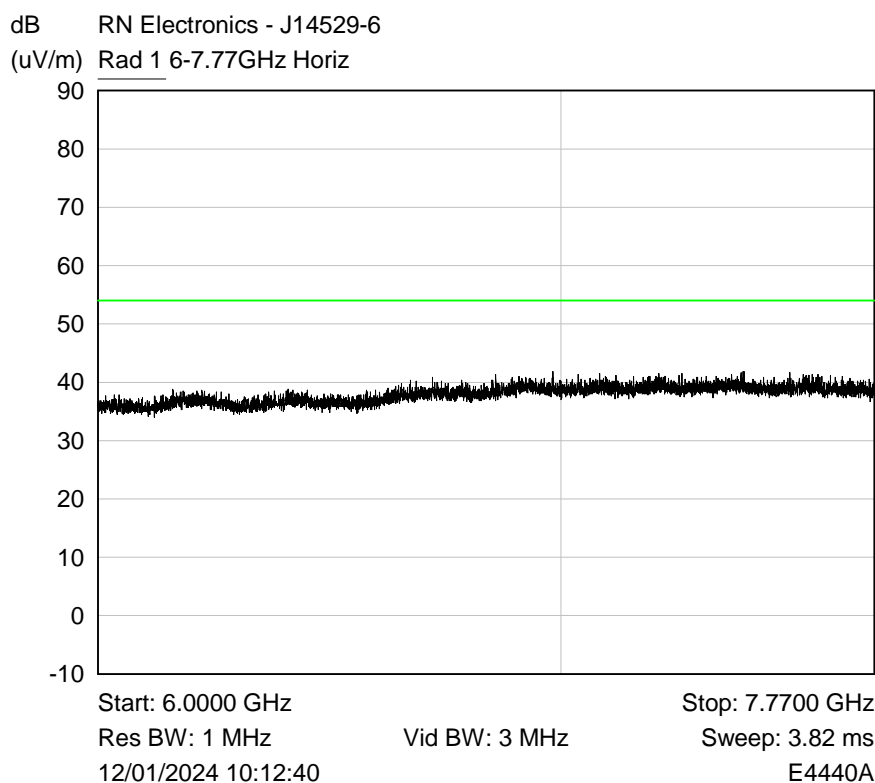
RF Parameters: Band 13.110-14.010 MHz, Power default, Channel Spacing Non Channelized,  
Modulation Card 2, Channel 13.56 MHz

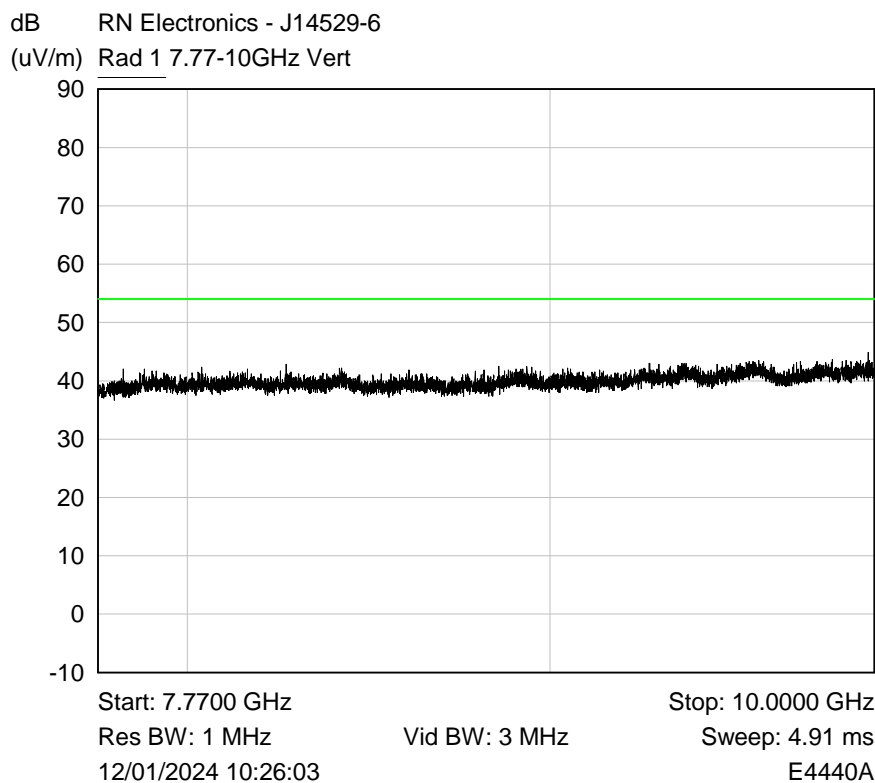
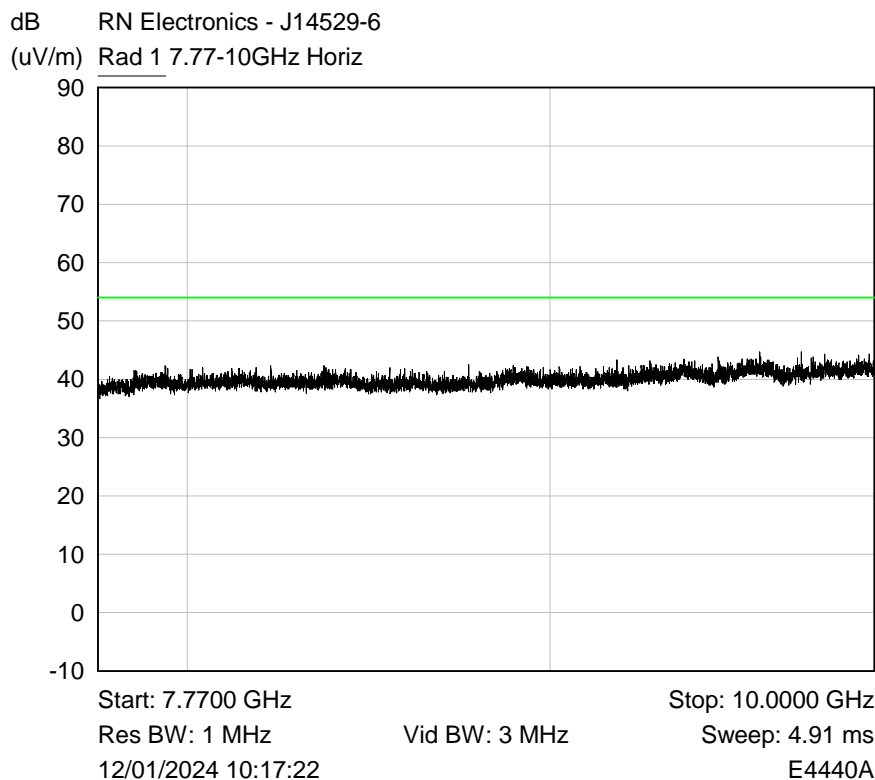


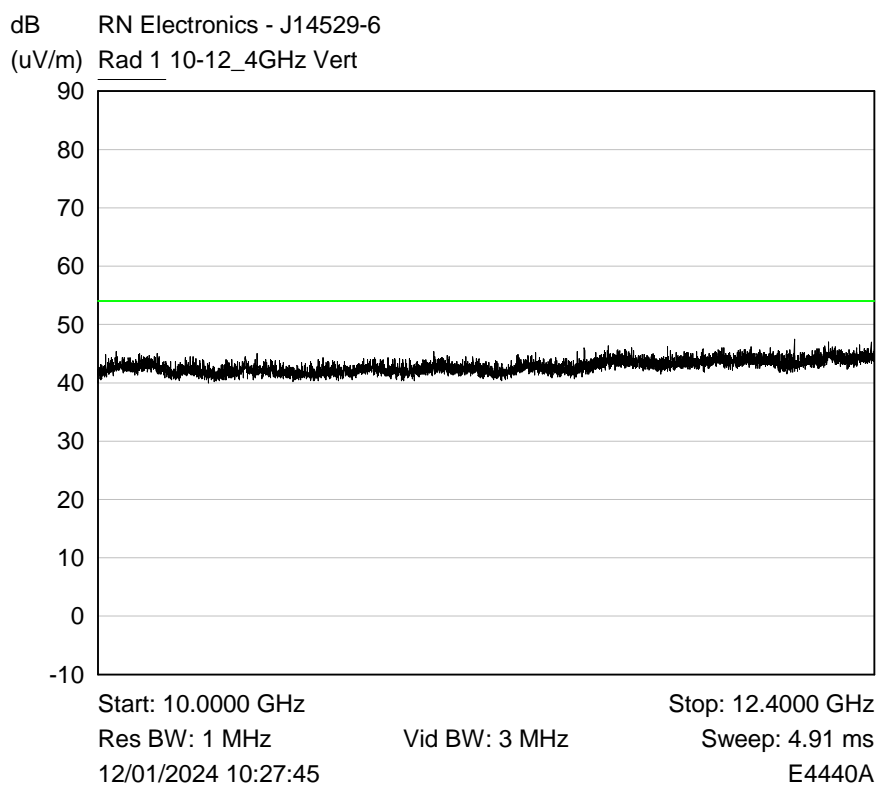
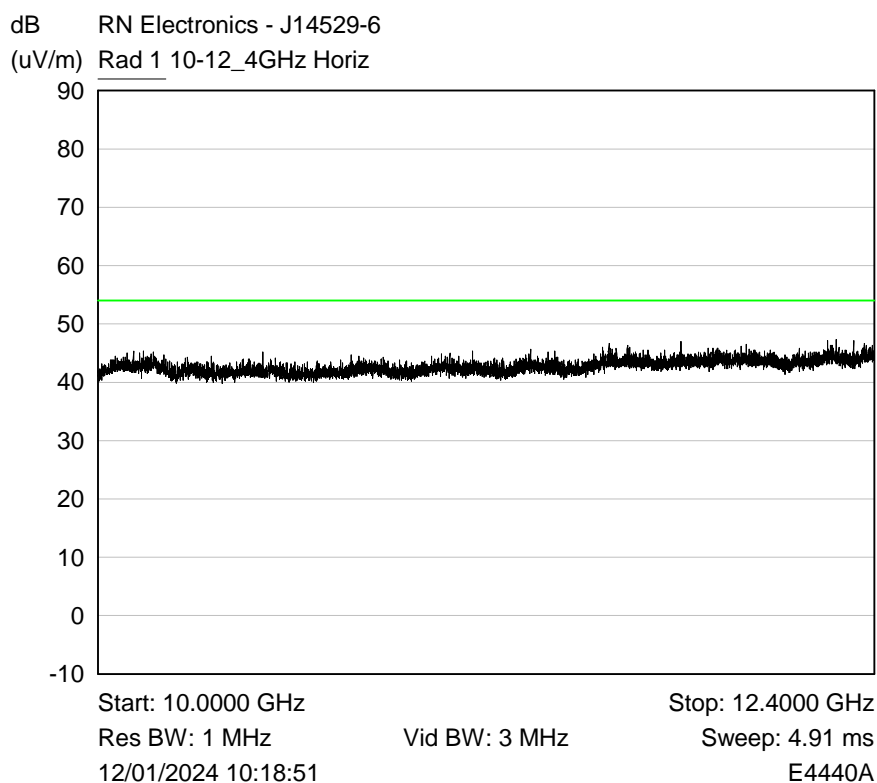




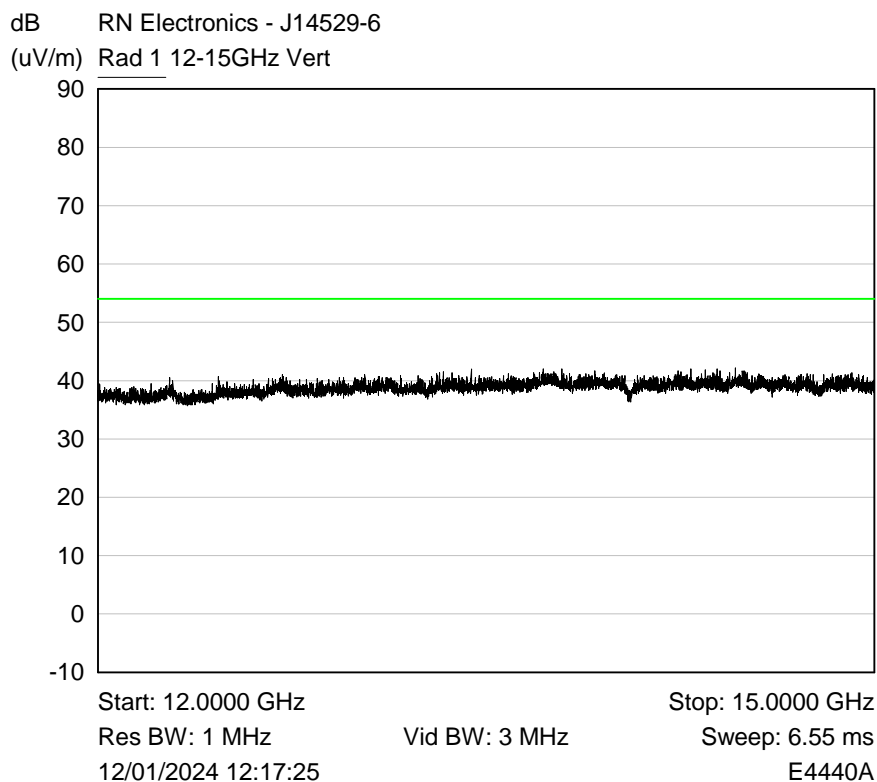
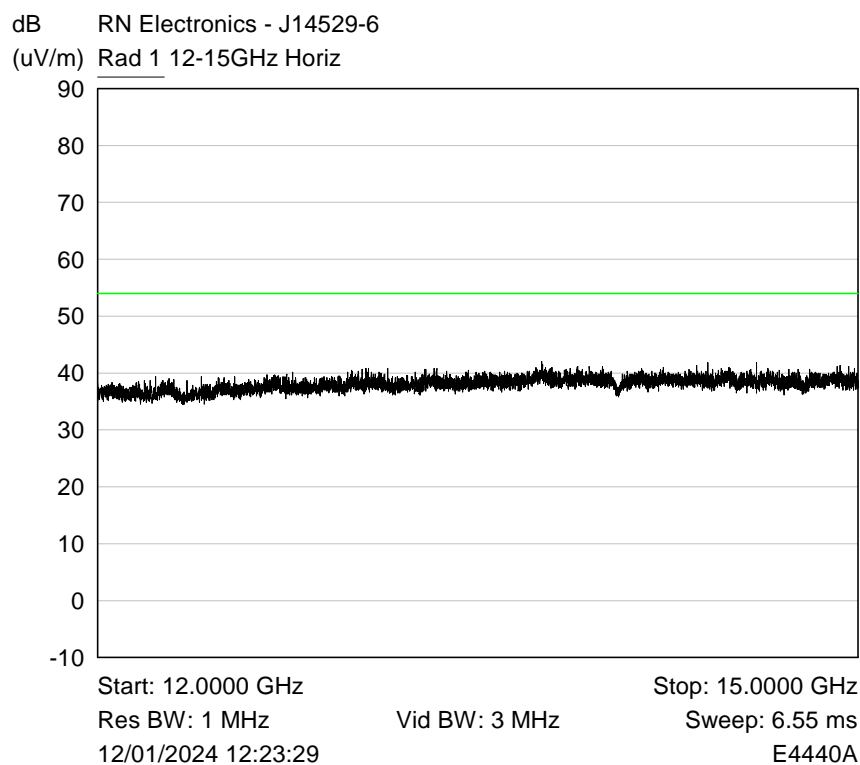


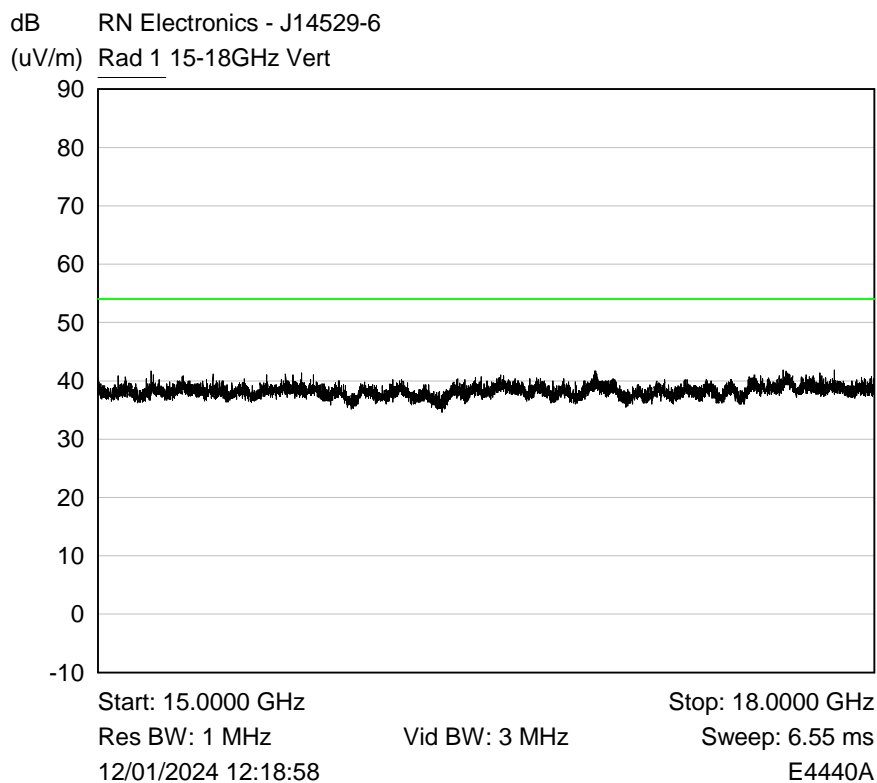
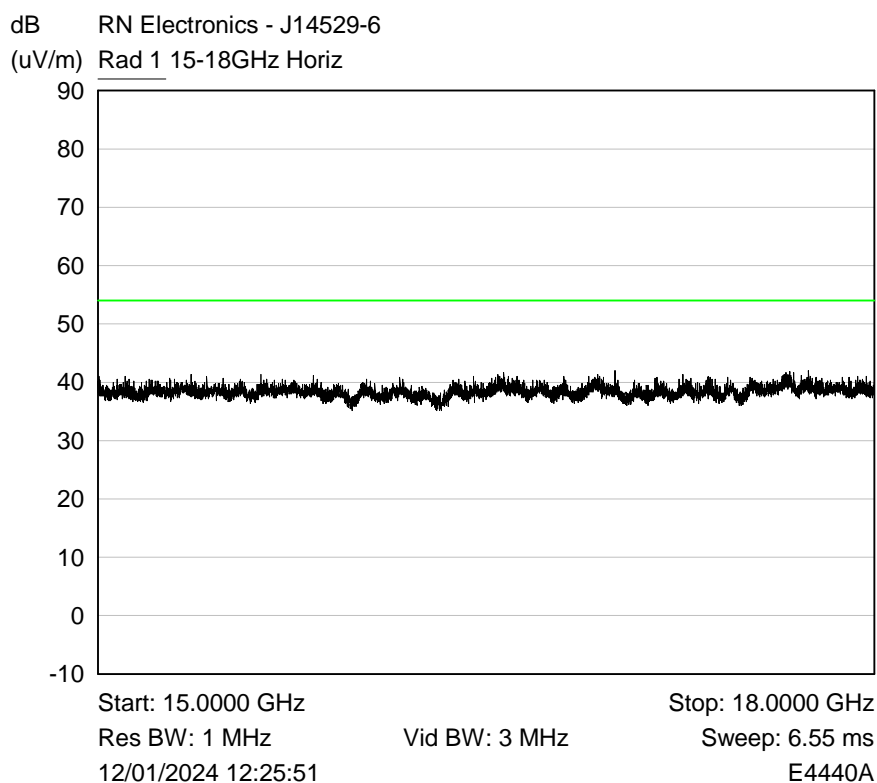






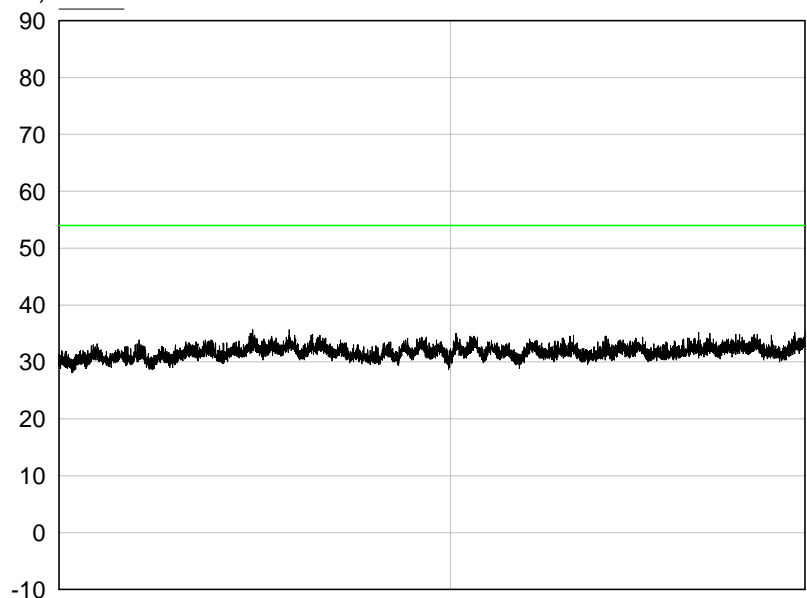






dB RN Electronics - J14529-6

(uV/m) Rad 1 18-22GHz Horiz



Start: 18.0000 GHz

Stop: 22.0000 GHz

Res BW: 1 MHz

Vid BW: 3 MHz

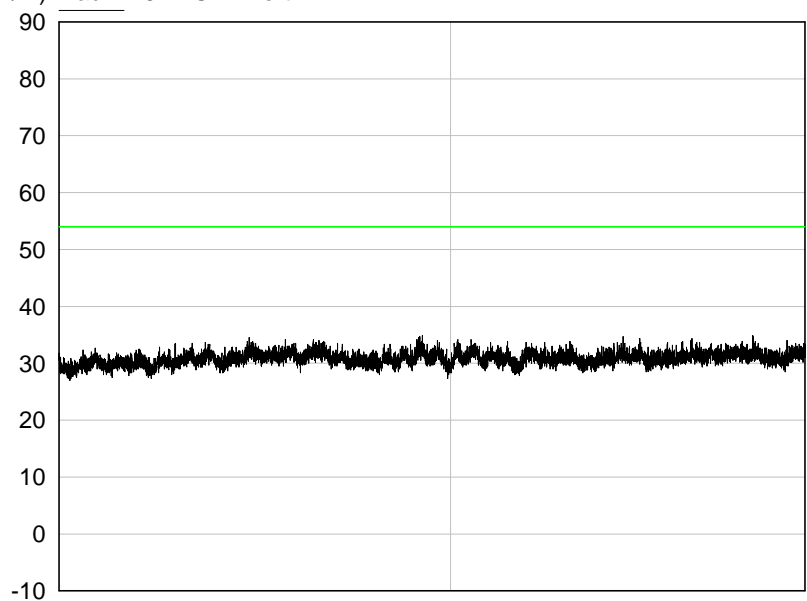
Sweep: 10.38 ms

12/01/2024 14:13:03

E4440A

dB RN Electronics - J14529-6

(uV/m) Rad 1 18-22GHz Vert



Start: 18.0000 GHz

Stop: 22.0000 GHz

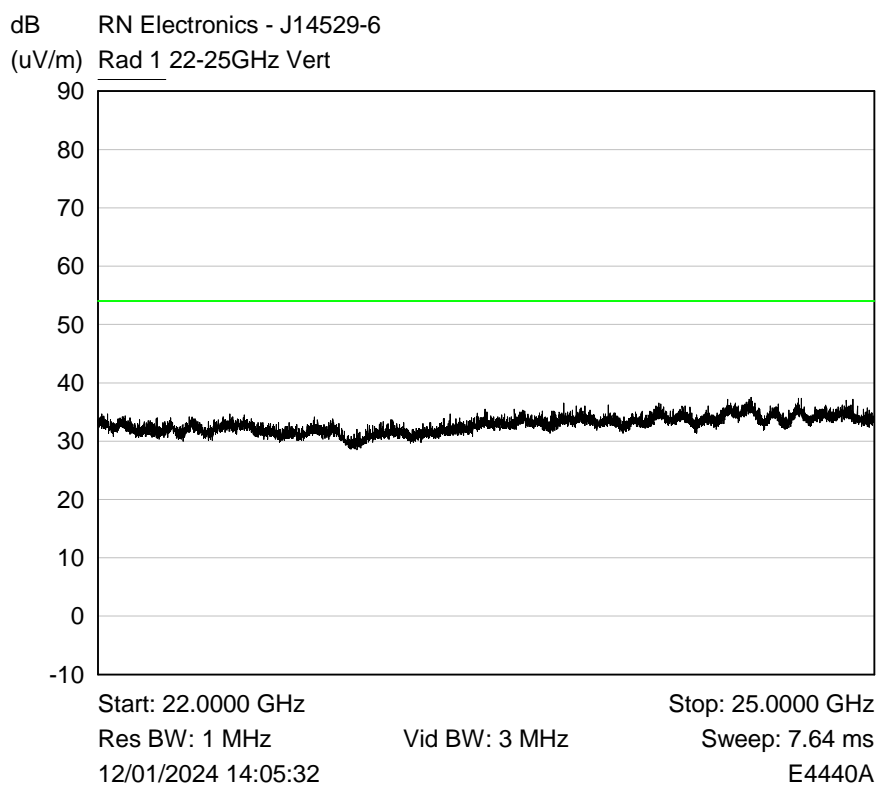
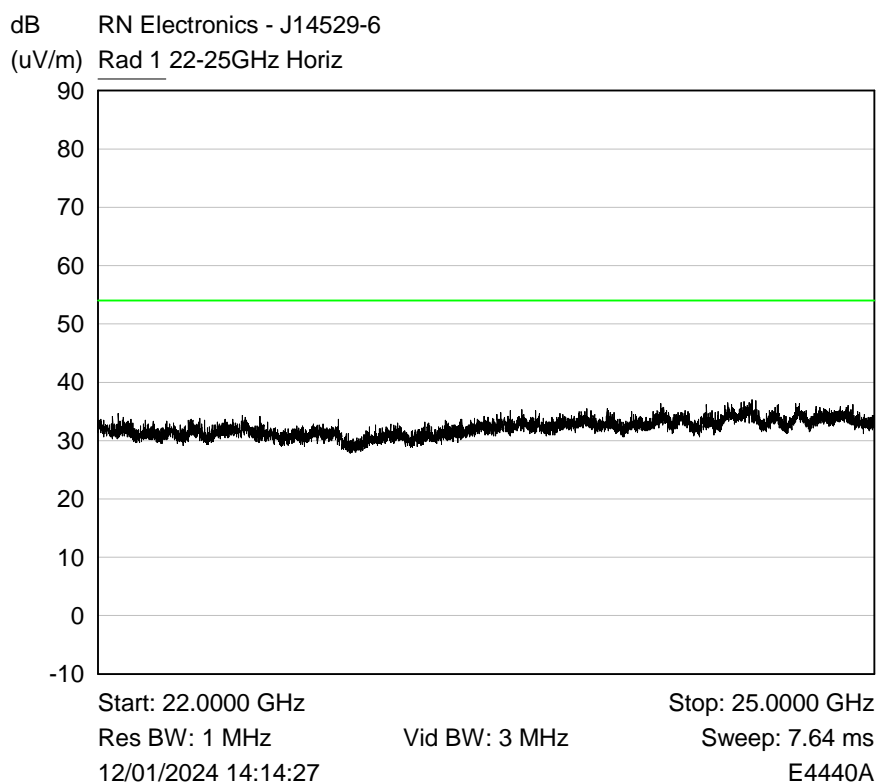
Res BW: 1 MHz

Vid BW: 3 MHz

Sweep: 10.38 ms

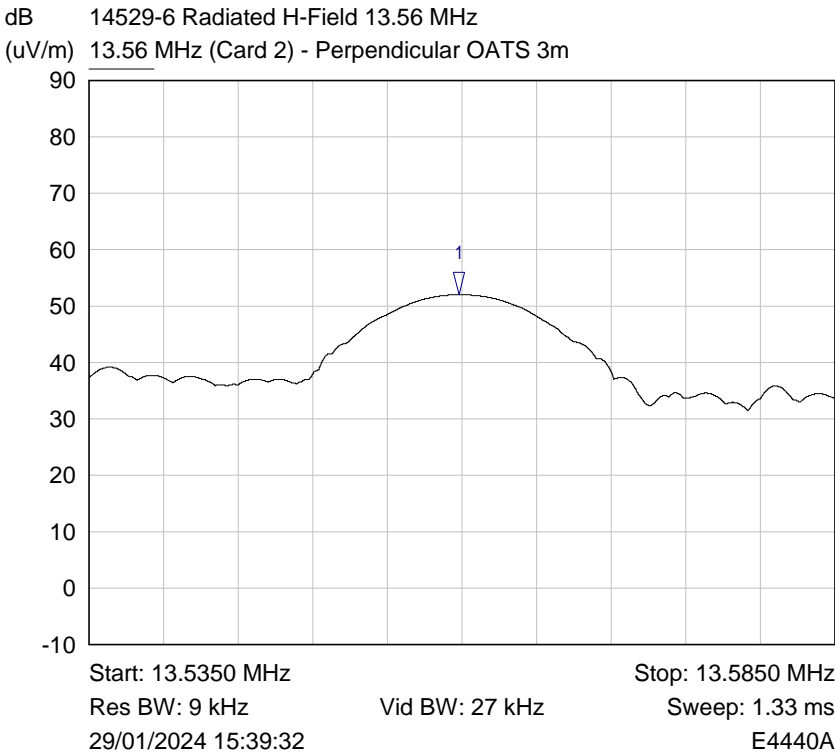
12/01/2024 13:58:12

E4440A



6.6 Transmitter H-Field

RF Parameters: Band 13.110-14.010 MHz, Power default, Channel Spacing Non Channelized,  
Modulation Card 2, Channel 13.56 MHz

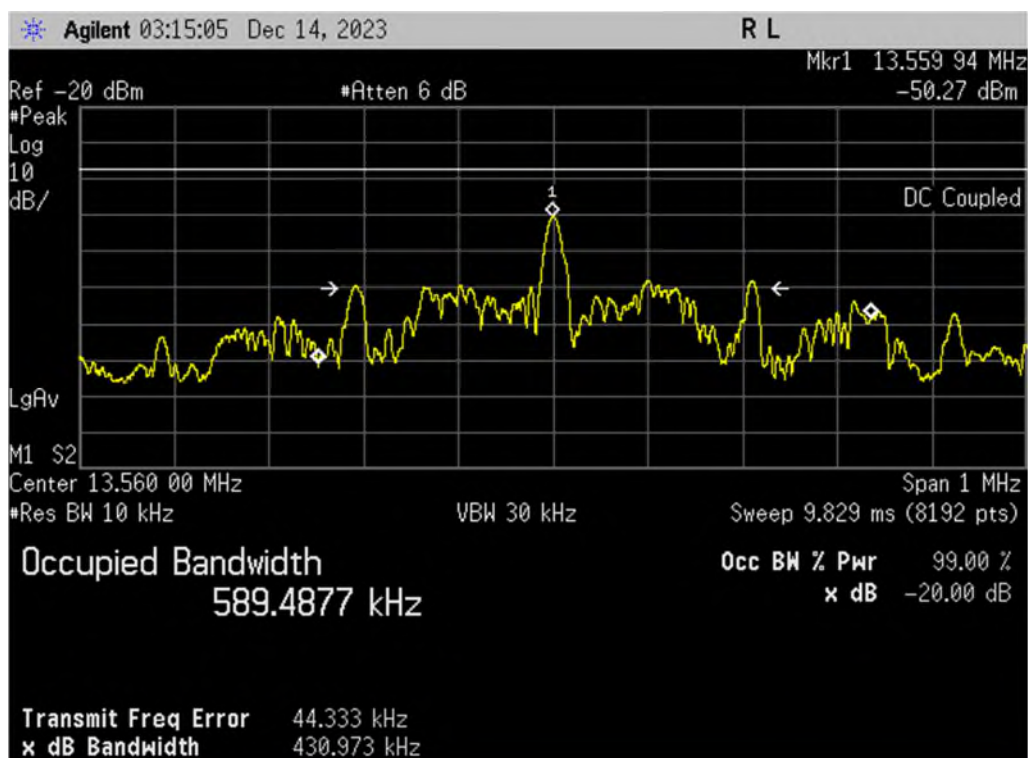


Mkr	Trace	X-Axis	Value	Notes
1 ▽	13.56 MHz (Card 2) - Perpendicular OATS 3m	13.5598 MHz	52.00 dB(uV/m)	

Maximised field strength plot reference at 3 metre distance

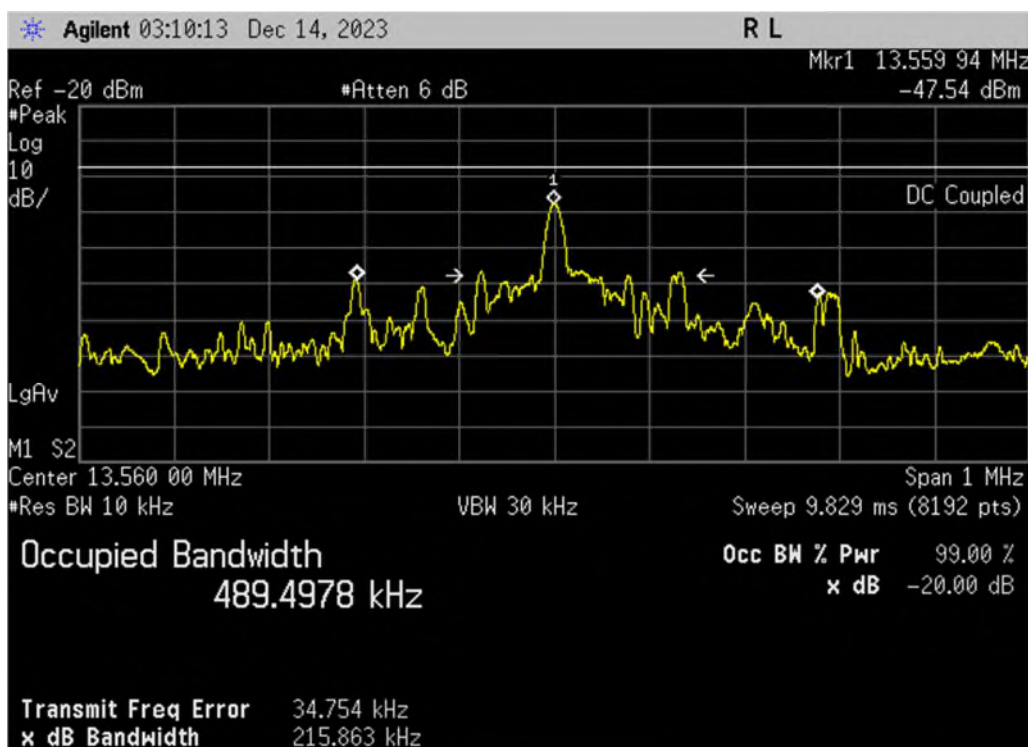
## 6.7 Occupied bandwidth

RF Parameters: Band 13.110-14.010 MHz, Power default, Channel Spacing Non Channelized,  
Modulation Card 1, Channel 13.56 MHz



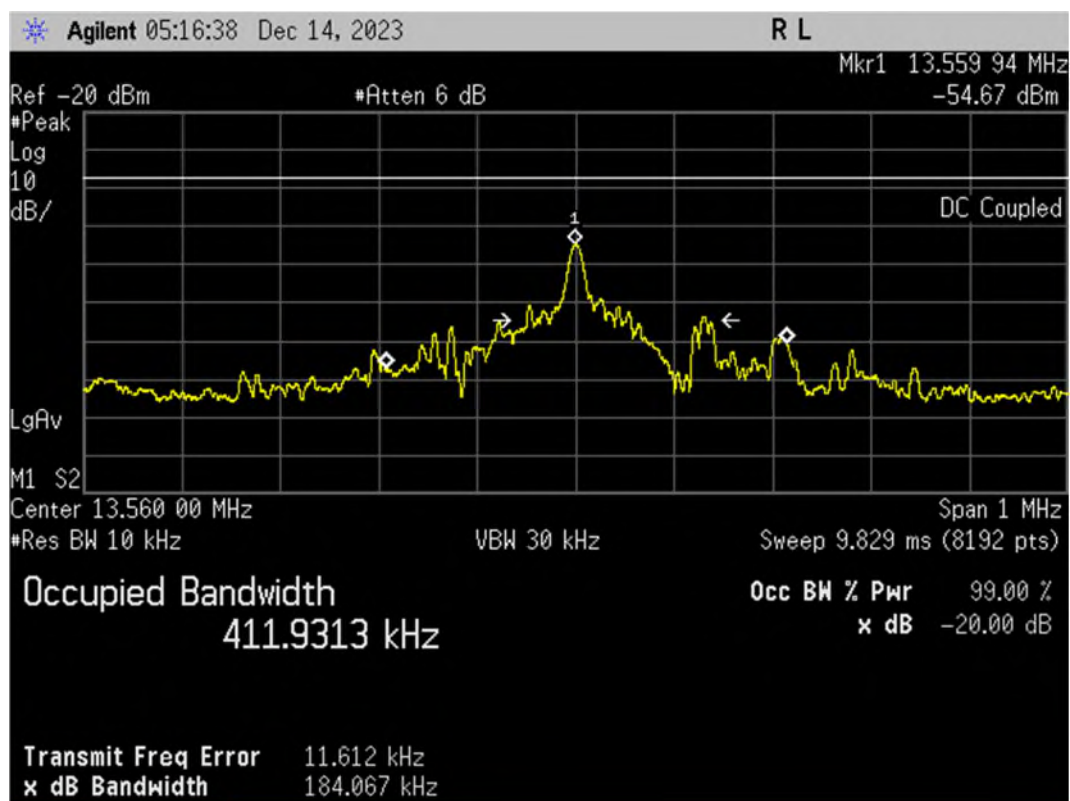
Plot for 20 dB Bandwidth (MHz) Nominal Temp & Volts

RF Parameters: Band 13.11-14.01 MHz, Power default, Channel Spacing Non Channelized,  
Modulation Card 2 (HID iCLASS DG), Channel 13.56 MHz



Plot for 20 dB Bandwidth (MHz) Nominal Temp & Volts

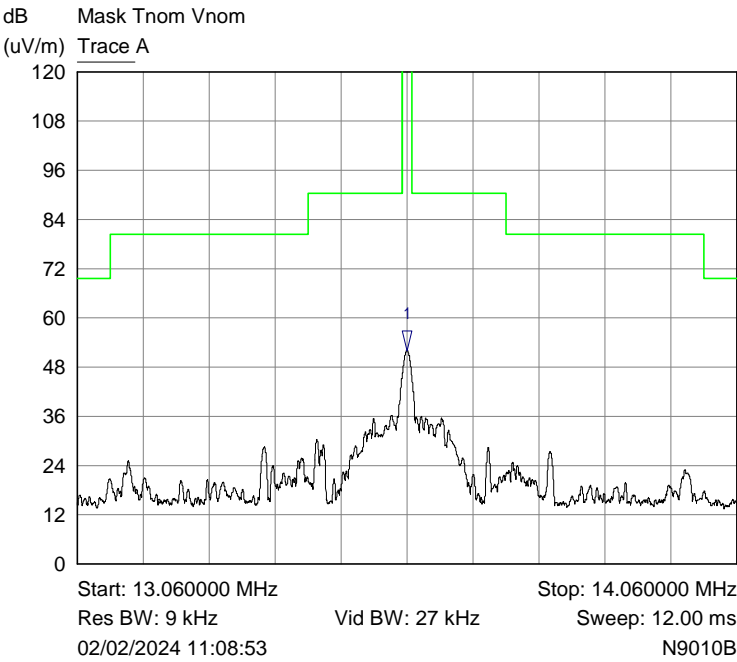
RF Parameters: Band 13.110-14.010 MHz, Power default, Channel Spacing Non Channelized,  
Modulation No Card, Channel 13.56 MHz



Plot for 20 dB Bandwidth (MHz) Nominal Temp & Volts

6.8 Spectrum Mask

RF Parameters: Band 13.110-14.010 MHz, Power default, Channel Spacing Non Channelized,  
Modulation Card 2, Channel 13.56 MHz



Mkr	Trace	X-Axis	Value	Notes
1 ▽	Trace A	13.559850 MHz	52.0000 dB(uV/m)	

Plot for Spectrum Mask



## 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 (dBμV)	Pk – Lim 1 (dB)	QP Amp (dBμV)	QP - Lim1 (dB)	Av Amp (dBμV)	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 Explanation of limit line calculations for radiated measurements

The limits given in the test standard are normally expressed as absolute values (e.g. in μV/m at a specified distance), whereas the measured values are expressed as peak, quasi peak or average values in dBμV/m referenced to the measuring instrument inputs. RN Electronics 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 500 μV/m equates to  $20.\log(500) = 54 \text{ dB } \mu\text{V/m}$ .

(b) limit of 300 μV/m at 10m equates to  $20.\log(300 \cdot 10/3) = 60 \text{ dB } \mu\text{V/m at 3m}$

(c) limit of 30 μV/m at 30m, but below 30MHz, equates to  $20.\log(30) + 40.\log(30/3) = 69.5 \text{ dB}\mu\text{V/m at 3m}$ , as extrapolation factor below 30MHz is 40dB/decade per 15.31(f)(2).

File Name: Eptura Inc.14529-6 Issue 01

**QMF21J - Issue 05 - KEC Issue 03; 47 CFR Part 15C 2022**

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 (CL)	Field strength result (3m) (FS)
20dBuV	25 dB	3 dB	48dBuV/m

**Additional calculation examples per ANSI C63.10 clause 9.4 – 9.6 equations 21, 22, 25 & 26:**

**Equation 21:**  $E_{\text{Linear}} = 10^{((E_{\text{Log}} - 120)/20)}$

And therefore equation 21 transposed is:  $E_{\text{Log}} = 20 \times \text{Log}(E_{\text{Linear}}) + 120$

Where:

$E_{\text{Linear}}$  is the field strength of the emission in V/m

$E_{\text{Log}}$  is the field strength of the emissions in dBμV/m

**Equation 22:**  $\text{EIRP} = E_{\text{Meas}} + 20 \log(d_{\text{Meas}}) - 104.7$

Where:

EIRP is equivalent isotropically radiated power in dBm

$E_{\text{Meas}}$  is the field strength of the emission at the measurement distance in dBμV/m

$d_{\text{Meas}}$  is the measurement distance in metres

**Equation 25:**  $\text{PD} = \text{EIRP}_{\text{Linear}} / 4\pi d^2$

And therefore equation 25 transposed is:  $\text{EIRP}_{\text{Linear}} = \text{PD} \times 4\pi d^2$

Where:

PD is the power density at distance specified by the limit, in W/m<sup>2</sup>

$\text{EIRP}_{\text{Linear}}$  is the equivalent isotropically radiated power in Watts

d is the distance at which the power density limit is specified in metres

**Equation 26:**  $\text{PD} = E_{\text{Spec limit}}^2 / 377$

And therefore equation 26 transposed is:  $E_{\text{Spec limit}} = \sqrt{\text{PD} \times 377}$

Where:

PD is the power density at distance specified by the limit, in W/m<sup>2</sup>

$E_{\text{Spec limit}}$  is the field strength at the distance specified by the limit in V/m

**Example:**

Radiated spurious emissions limit at 3metres of 90pW/cm<sup>2</sup>.

$$90\text{pW/cm}^2 \times 100^2 = 0.9 \mu\text{W/m}^2 = (\text{EIRP Linear})$$

$$\text{Equation 25 transposed: } 0.9 \times 10^{-6} \times 4 \times \pi \times 3^2 = 0.0001017876 \text{ W}$$

And

$$\text{Equation 26 transposed: } E_{\text{Spec limit}} = \sqrt{(0.9 \times 10^{-6} \times 377)} = 0.01842 \text{ V/m.}$$

And

$$\text{Equation 21 transposed: } E_{\text{Log}} = 20 \text{Log}(0.01842) + 120 = 85.3 \text{dB}\mu\text{V/m @ 3m.}$$

## 8 Photographs

### 8.1 EUT Front View

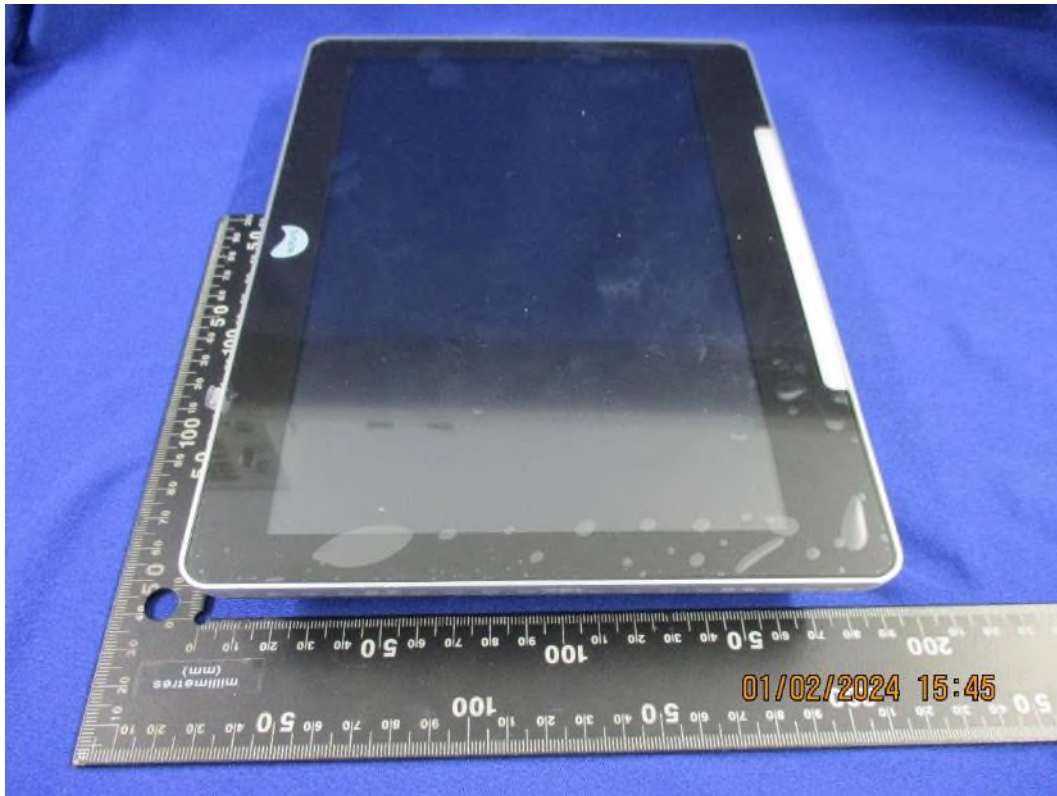


## 8.2 EUT Reverse Angle





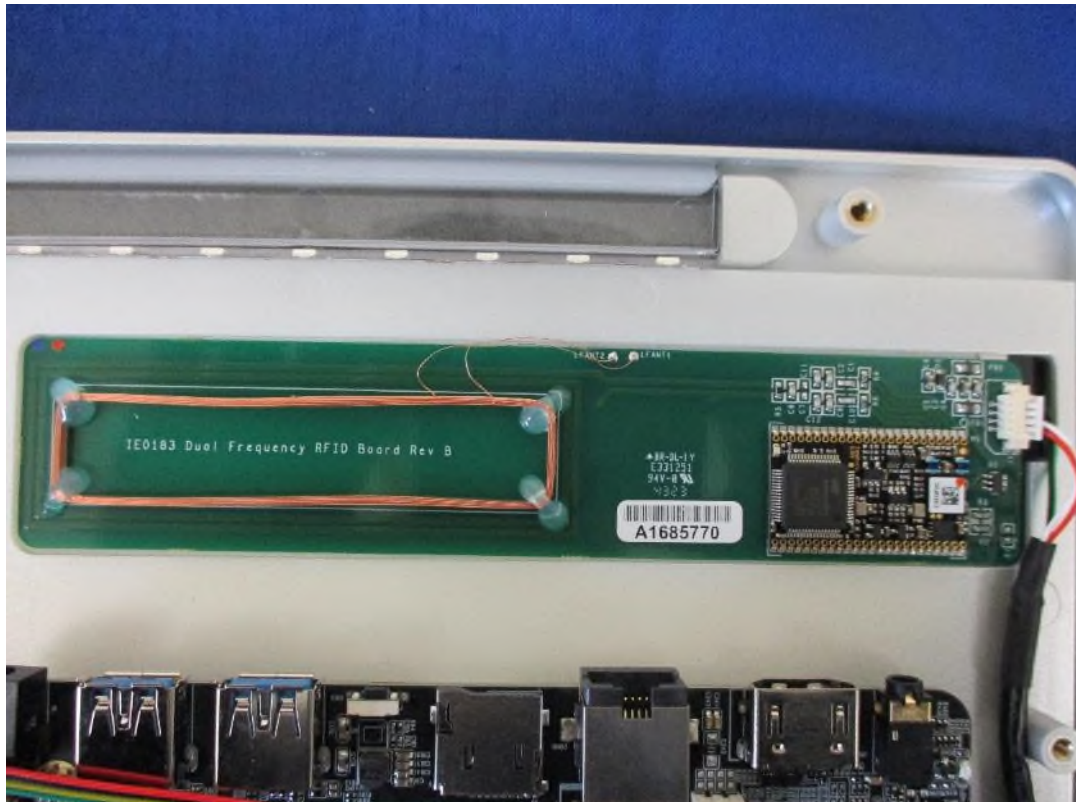
### 8.3 EUT Left side View



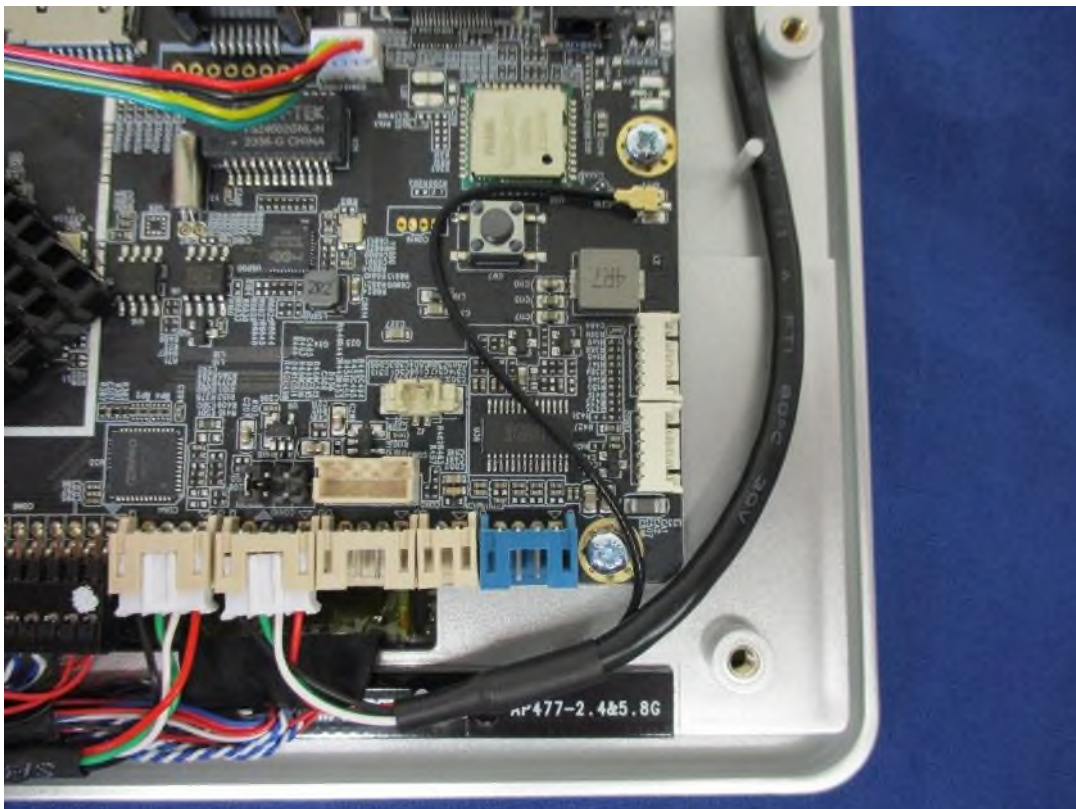
### 8.4 EUT Right side View



## 8.5 EUT Antenna Port



125 kHz & 13.56 MHz Antenna





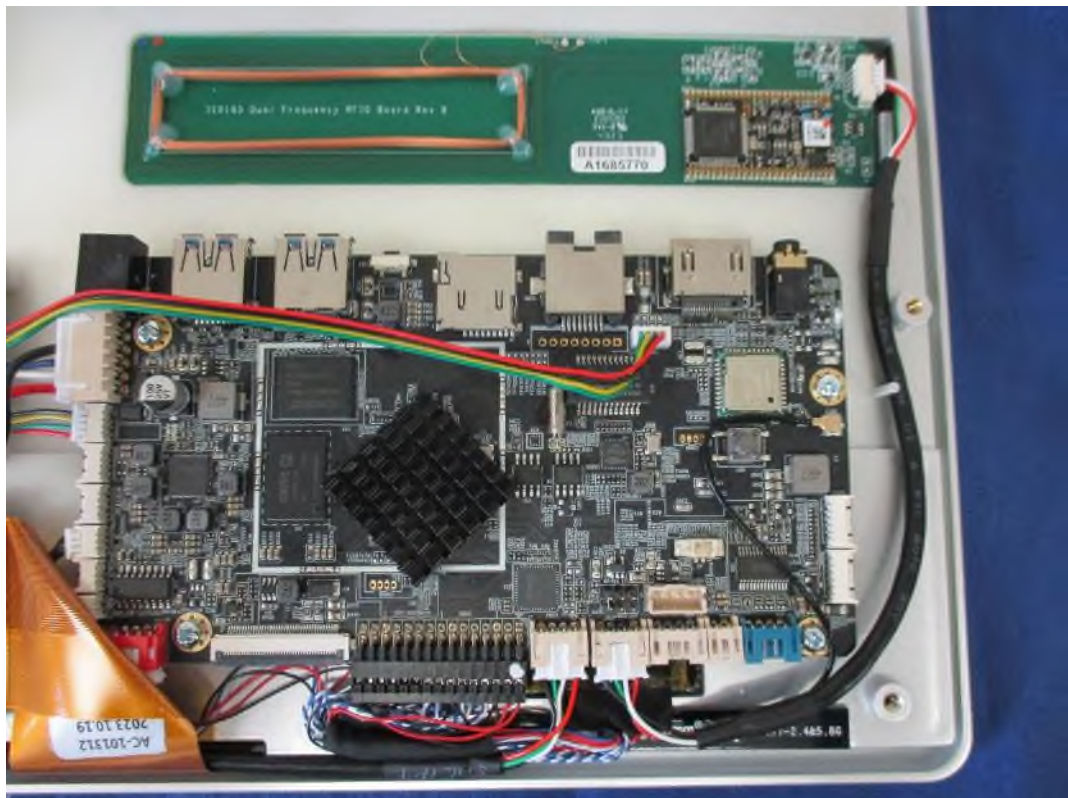
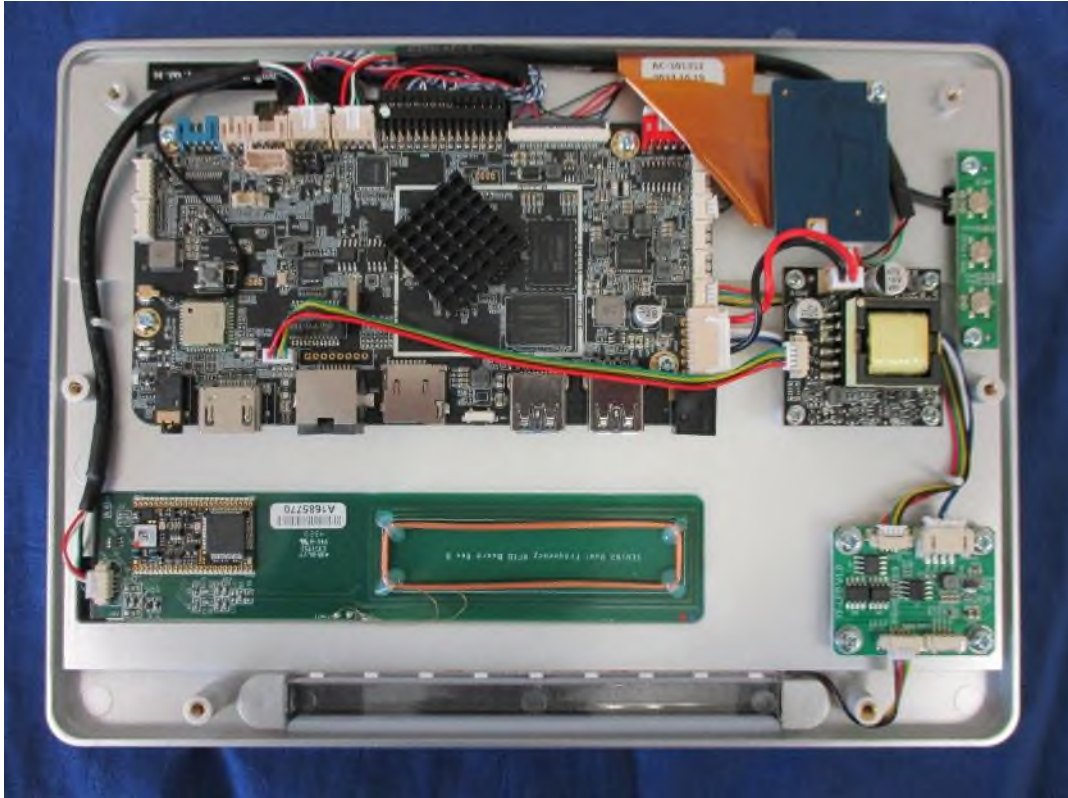


2.4 GHz Antenna

## 8.6 EUT Display & Controls



## 8.7 EUT Internal photos





## 8.8 EUT ID Label



Used for AC Conducted Emissions (RFID Antenna Disconnected) Only

## 8.9 EUT Chassis





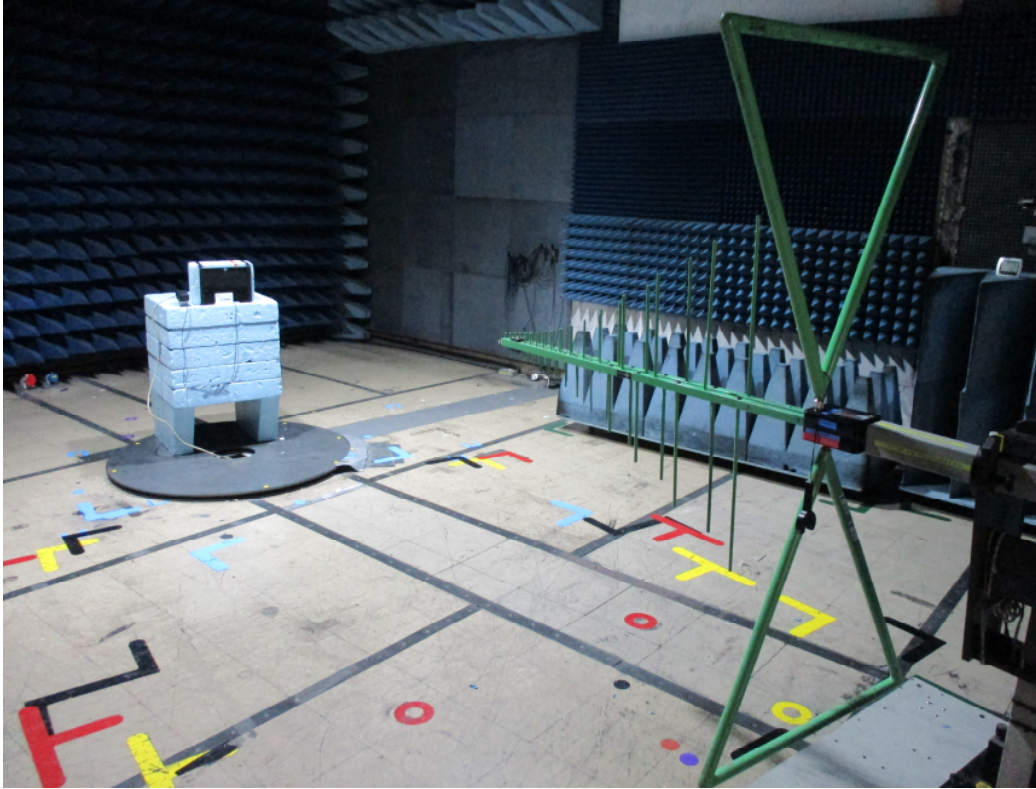
## 8.10 Radiated emissions 9 - 150 kHz



## 8.11 Radiated emissions 150 kHz - 30 MHz

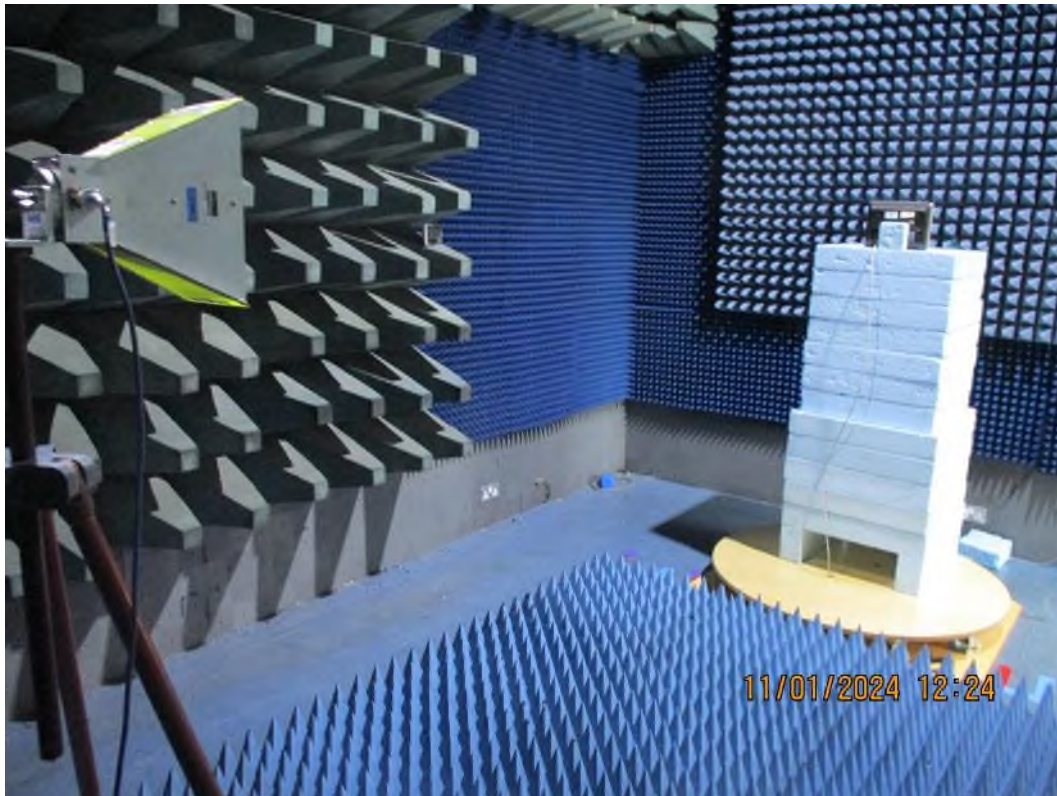


## 8.12 Radiated emissions 30 MHz -1 GHz





### 8.13 Radiated emissions above 1 GHz



Upright Position

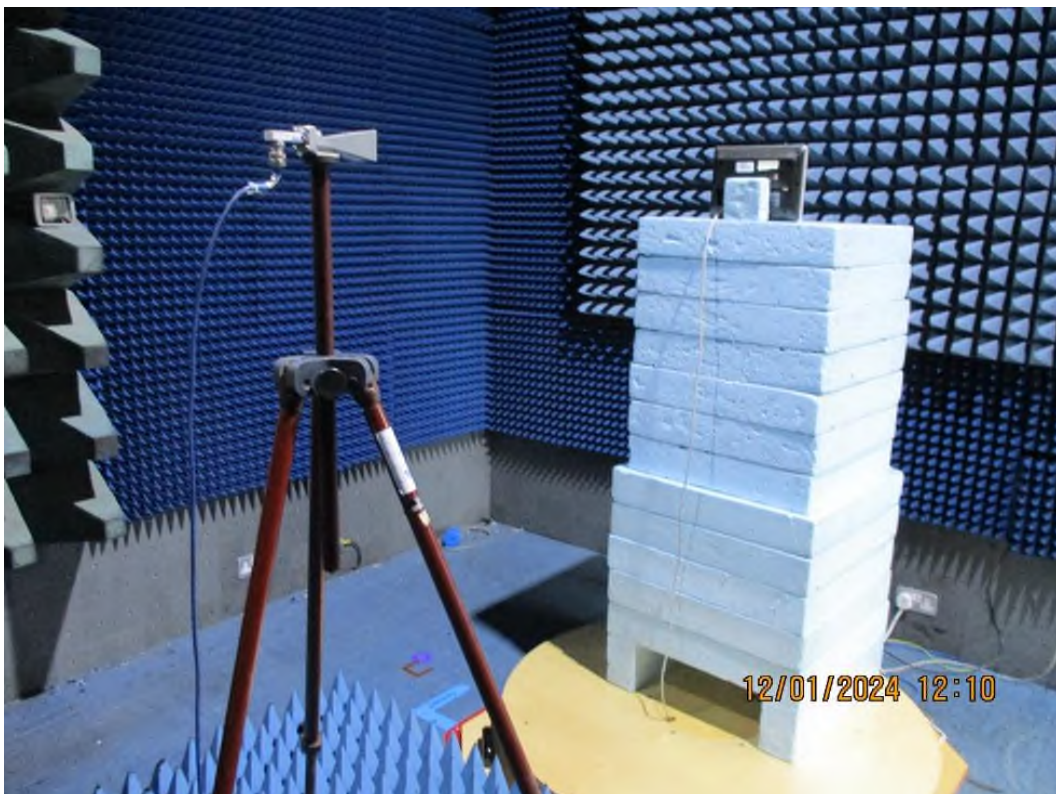
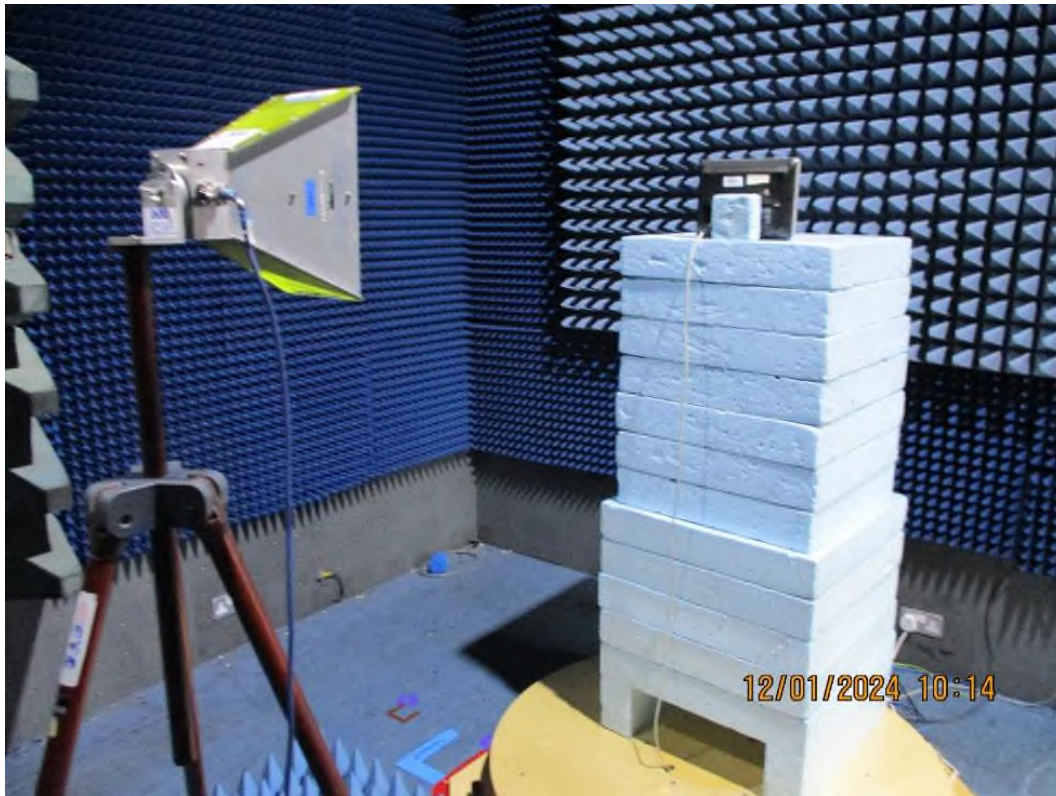


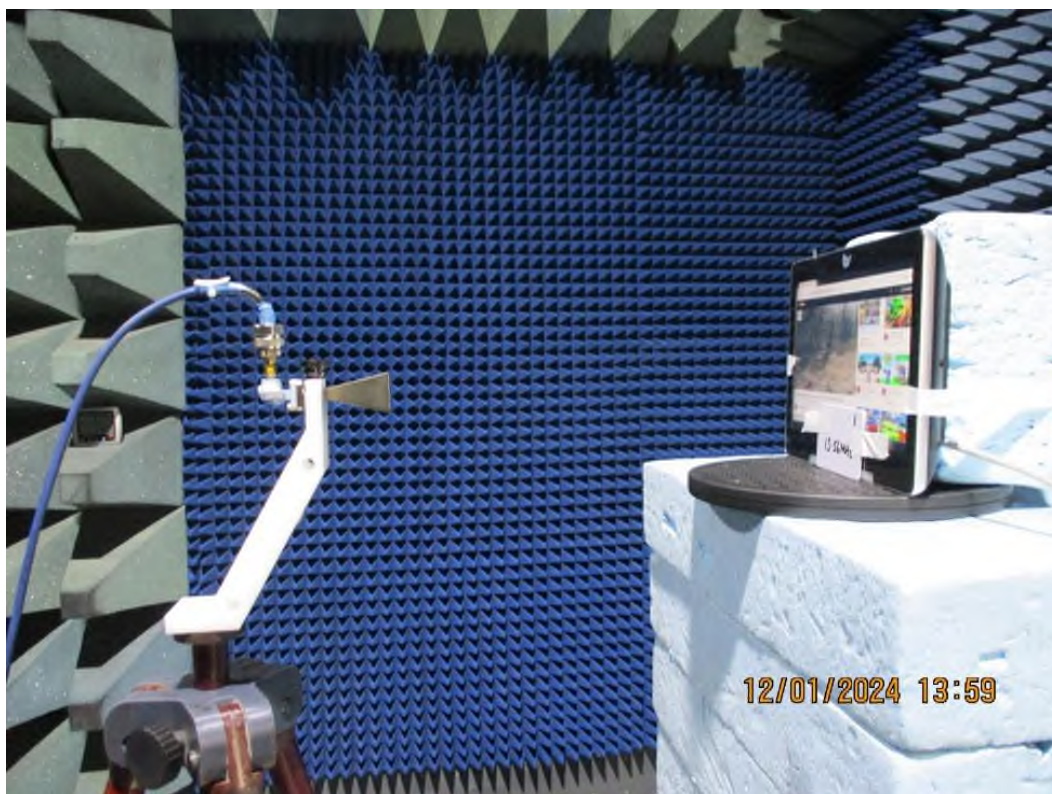
Side Position



Flat Position









## 8.14 Radiated emission diagrams

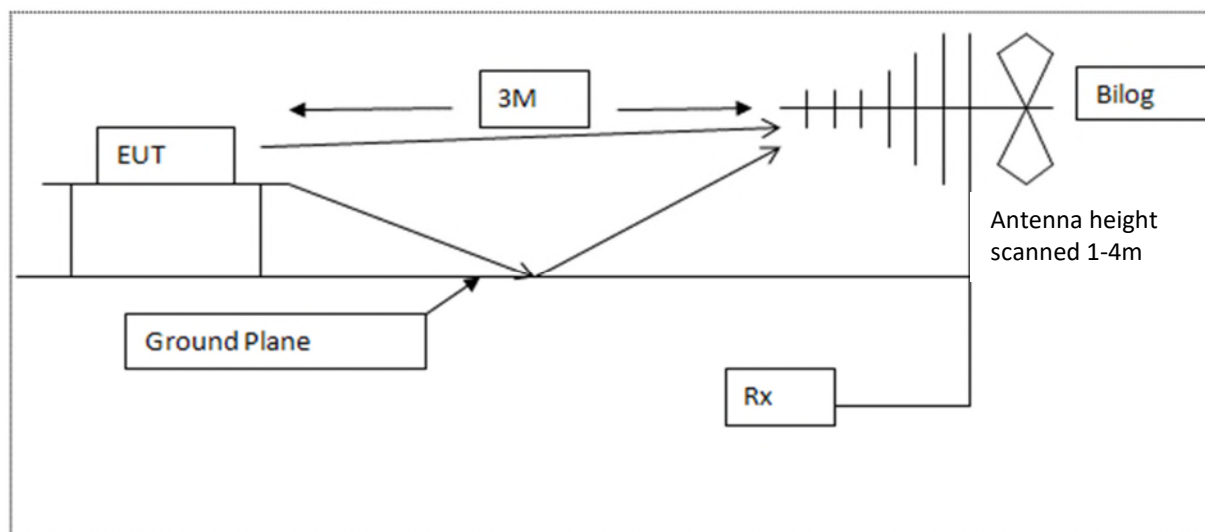


Diagram of the radiated emissions test setup 30 - 1000 MHz

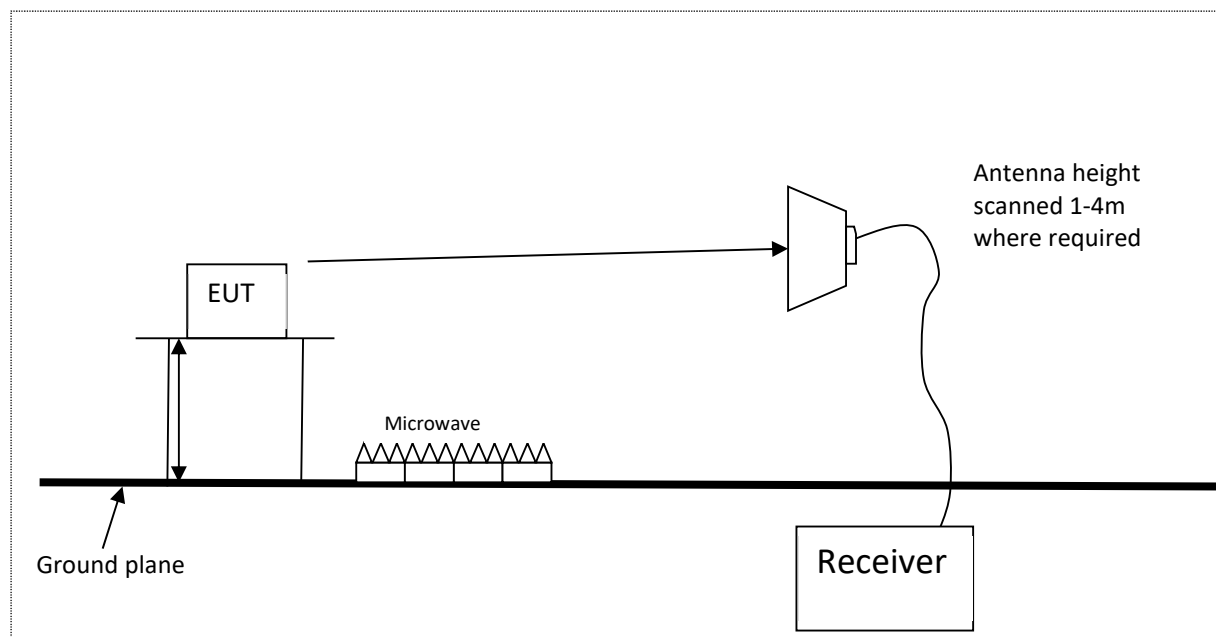


Diagram of the radiated emissions test setup above 1GHz

## 8.15 AC powerline conducted emission diagram

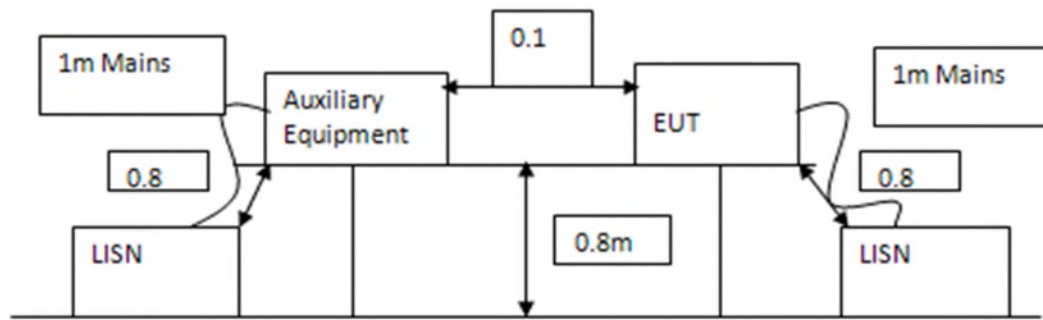


Diagram of the AC conducted emissions test setup

## 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.

RN No.	Model No.	Description	Manufacturer	Calibration date	Cal period
E035	11947A	Transient Limiter 9kHz - 200MHz	Hewlett Packard	03-Jan-2024	12 months
E150	MN2050	LISN 13A	Chase	03-May-2023	12 months
E411	N9039A	9 kHz - 1 GHz RF Filter Section	Agilent Technologies	05-Jul-2023	12 months
E412	E4440A	PSA 3 Hz - 26.5 GHz	Agilent Technologies	22-Sep-2023	24 months
E428	HF906	Horn Antenna 1 - 18 GHz	Rohde & Schwarz	23-May-2023	36 months
E429	-	Filter Box 5 Switch Filters 0.91 GHz - 16.3 GHz	RN Electronics	21-Aug-2023	12 months
E602	MG3692A	Signal Generator 10 MHz - 20 GHz	Anritsu	02-Mar-2023	12 months
E623	72-7715	Thermometer	Tenma	31-May-2023	12 months
E624	E4440A	PSA 3 Hz - 26.5 GHz	Agilent Technologies	06-Jul-2023	24 months
E642	E4440A	PSA 3 Hz - 26.5 GHz	Agilent Technologies	24-Nov-2023	24 months
E743	2017 4/2dB	Attenuator 4/2dB 30-1000MHz	RN Electronics	#22-Feb-2024	12 months
E755	N9030B	PXA Signal Analyser 3 Hz to 50 GHz	Keysight Technologies	14-Aug-2023	12 months
E843	G3RUH	10 MHz GPS Disciplined Oscillator	G3RUH-James Miller	11-Jan-2024	12 months
E856	N9039A	9 kHz - 1 GHz RF Filter Section	Agilent Technologies	24-Nov-2023	12 months
E890	BW-S20-2W263+	Attenuator SMA 20dB 26GHz	Mini-Circuits	#26-Feb-2024	12 months
E904	5086-7805	Pre-Amplifier 1GHz - 26.5GHz	Hewlett Packard	03-May-2023	12 months
E972	WRCGV10	Filter Band Reject 2400 to 2483.5 MHz	Wainwright Instruments	03-Apr-2023	12 months
F238	N9039A	9 kHz - 1 GHz RF Filter Section	Agilent Technologies	23-Aug-2023	12 months
LPE222	MN2050	LISN Artificial Mains Network	Chase	15-May-2023	12 months
LPE364	CBL6112A	Antenna BiLog 30MHz - 2GHz	Chase Electronics Ltd	28-Mar-2022	36 months
LPE373	11947A	Transient Limiter 9kHz - 200MHz	Hewlett Packard	30-Jun-2023	12 months
N607	HSGDW-50B	Environmental Oven	Shanghai Hasuc Instrument	N/A	N/A
NSA-M	NSA - M	NSA - Site M	RN Electronics	29-Nov-2021	36 months
TMS78	3160-08	Horn Std Gain 12.4 - 18 GHz	ETS Systems	05-Oct-2023	12 months
TMS79	3160-09	Horn Std Gain 18 - 26.5 GHz	ETS Systems	23-May-2023	12 months
TMS81	6502	Antenna Active Loop	EMCO	17-Aug-2023	24 months
ZSW1	V2.5.2	Measurement Software Suite	RN Electronics	N/A	N/A

# Equipment was within calibration dates for tests and has been re-calibrated since/during date of tests.

## 10 Auxiliary and peripheral equipment

### 10.1 Customer supplied equipment

Item No.	Model No.	Description	Manufacturer	Serial No.
1	PSA16U-480(POR)	Switch Power Supply	Phihong	P04805817B1

### 10.2 Kiwa Electrical Compliance supplied equipment

RN No.	Model No.	Description	Manufacturer	Serial No
N473	DIR-855	Wireless N Quadband Gigabit Router	D-Link	F3RR29B003035
None	FS728TP	24 port PoE smart switch	Netgear	0026F2905125

## **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. 293246, 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. 293246, 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. 293246, 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. 293246, 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

## 13 Abbreviations and units

%	Percent	dBμV	decibelBels relative to 1μV
λ	Wavelength	dBμV/m	decibelBels relative to 1μV/m
μA/m	microAmps per metre	dBc	decibelBels relative to Carrier
μV	microVolts	dBd	decibelBels relative to dipole gain
μW	microWatts	dBi	decibelBels relative to isotropic gain
AC	Alternating Current	dBm	decibelBels relative to 1mW
ACK	ACKnowledgement	dBm	decibelBels relative to a maximum value
ACP	Adjacent Channel Power	dBW	decibelBels relative to 1W
AFA	Adaptive Frequency Agility	DC	Direct Current
ALSE	Absorber Lined Screened Enclosure	DFS	Dynamic Frequency Selection
AM	Amplitude Modulation	DMO	Dynamic Modulation Order
Amb	Ambient	DSSS	Direct Sequence Spread Spectrum
ANSI	American National Standards Institute	DTA	Digital Transmission Analyser
ATPC	Automatic Transmit Power Control	EIRP	Equivalent Isotropic Radiated Power
AVG	Average	emf	electromotive force
AWGN	Additive White Gaussian Noise	ERC	European Radiocommunications Committee
BER	Bit Error Rate	ERP	Effective Radiated Power
BPSK	Binary Phase Shift Keying	ETSI	European Telecommunications Standards Institute
BT	Bluetooth	EU	European Union
BLE	Bluetooth Low Energy	EUT	Equipment Under Test
BW	Bandwidth	FCC	Federal Communications Commission
°C	Degrees Celsius	FER	Frame Error Rate
C/I	Carrier / Interferer	FHSS	Frequency Hopping Spread Spectrum
CAC	Channel Availability Check	FM	Frequency Modulation
CCA	Clear Channel Assessment	FSK	Frequency Shift Keying
CEPT	European Conference of Postal and Telecommunications Administrations	FSS	Fixed Satellite Service
CFR	Code of Federal Regulations	g	Grams
CISPR	Comité International Spécial des Perturbations Radioélectriques	GHz	GigaHertz
cm	centimetre	GNSS	Global Navigation Satellite System
COFDM	Coherent OFDM	GPS	Global Positioning System
COT	Channel Occupancy Time	Hz	Hertz
CS	Channel Spacing	IEEE	Institute of Electrical and Electronics Engineers
CW	Continuous Wave	IF	Intermediate Frequency
DAA	Detect And Avoid	ISED	Innovation Science and Economic Development
dB	decibelBels	ITU	International Telecommunications Union
dBμA/m	decibelBels relative to 1μA/m	KDB	Knowledge DataBase

kg	kilogram	pW	picoWatts
kHz	kiloHertz	QAM	Quadrature Amplitude Modulation
kPa	Kilopascal	QP	Quasi Peak
LBT	Listen Before Talk	QPSK	Quadrature Phase Shift Keying
LISN	Line Impedance Stabilisation Network	RBW	Resolution Band Width
LNA	Low Noise Amplifier	RED	Radio Equipment Directive
LNB	Low Noise Block	R&TTE	Radio and Telecommunication Terminal Equipment
LO	Local Oscillator	Ref	Reference
m	metre	RF	Radio Frequency
mA	milliAmps	RFC	Remote Frequency Control
max	maximum	RFID	Radio Frequency IDentification
Mbit/s	MegaBits per second	RLAN	Radio Local Area Network
MCS	Modulation and Coding Scheme	RMS	Root Mean Square
MHz	MegaHertz	RNSS	Radio Navigation Satellite Service
mic	Microphone	RSL	Received Signal Level
MIMO	Multiple Input, Multiple Output	RSSI	Received Signal Strength Indicator
min	minimum	RTP	Room Temperature and Pressure
mm	millimetres	RTPC	Remote Transmit Power Control
ms	milliseconds	Rx	Receiver
mW	milliWatts	s	Seconds
NA	Not Applicable	SINAD	Signal to Noise And Distortion
NFC	Near Field Communications	SRD	Short Range Device
nom	Nominal	Tx	Transmitter
nW	nanoWatt	UKAS	United Kingdom Accreditation Service
OATS	Open Area Test Site	UKCA	United Kingdom Conformity Assessed
OBW	Occupied Band Width	UKRER	United Kingdom Radio Equipment Regulations
OCW	Occupied Channel Width	UHF	Ultra High Frequency
OFDM	Orthogonal Frequency Division Multiplexing	U-NII	Unlicensed National Information Infrastructure
OOB	Out Of Band	USB	Universal Serial Bus
ppm	Parts per million	UWB	Ultra Wide Band
PER	Packet Error Rate	V	Volts
PK	Peak	V/m	Volts per metre
PMR	Private Mobile Radio	VBW	Video Band Width
PRBS	Pseudo Random Bit Sequence	VHF	Very High Frequency
PRF	Pulse Repetition Frequency	VSAT	Very Small Aperture Terminal
PSD	Power Spectral Density	W	Watts
PSU	Power Supply Unit		

===== END OF TEST REPORT =====