Radio Test Report

Circadia Technologies Ltd

Circadia C300 Contactless Cardiorespiratory Monitor

C300

47 CFR Part 15.255 Effective Date 1st October 2024
FDS: Part 15 Field Disturbance Sensor
Test Date: 13th May 2025 to 22nd May 2025
Report Number: 05-14955-4-25 Issue 01

The testing was carried out by Kiwa Ltd trading as 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
Email: uk.enquiries@kiwa.com

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 14955-4

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:	Circadia C300 Contactless Cardiorespiratory Monitor
Model Number:	C300
Unique Serial Number:	c82b-9689-e79c
Applicant:	Circadia Technologies Ltd 92 Albert Embankment Tintagel House, London SE1 7TY UK
Proposed FCC ID:	2BPIS-C300
Full measurement results are detailed in Report Number:	05-14955-4-25 Issue 01
Test Standards:	47 CFR Part 15.255 Effective Date 1st October 2024 FDS: Part 15 Field Disturbance Sensor

DEVIATIONS:
No deviations have been applied.

Note: This report pertains to the 60 GHz radar functionality of the EUT only. Contains FCC ID 2AC7Z-ESPS3WROOM1.

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: 13th May 2025 to 22nd May 2025

Test Engineer:
Graham Blake

Graham Blake
Digitally signed by: Graham Blake
DN: CN = Graham Blake email = graham.blake@kiwa.com C = GB OU = Kiwa Electrical Compliance
Date: 2025.10.13 16:04:49 Z

Approved By:
Test Development Engineer

Ian Rose
Digitally signed by: Ian Rose
DN: CN = Ian Rose email = ian.rose@kiwa.com C = GB OU = Kiwa Electrical Compliance
Date: 2025.10.13 16:03:19 Z

Customer Representative:

1 Contents

2 Equipment under test (EUT)

2.1 Equipment specification

Applicant	Circadia Technologies Ltd 92 Albert Embankment Tintagel House London SE1 7TY UK	
Manufacturer of EUT	Circadia Technologies Ltd	
Full Name of EUT	Circadia C300 Contactless Cardiorespiratory Monitor	
Model Number of EUT (HVIN)	C300	
Serial Number of EUT	c82b-9689-e79c	
Date Received	13th May 2025	
Date of Test:	13th May 2025 to 22nd May 2025	
Date Report Issued	7th October 2025	
Main Function	The C300 Monitor is a contactless cardiorespiratory monitor that is either wall-mounted above a patient's bed or placed at a bedside table. The Monitor records heart rate and respiratory rate of adult patients in clinical settings such as hospitals and post-acute and long-term care facilities (e.g., nursing homes, skilled nursing facilities, inpatient rehabilitation facilities, long-term care hospitals). In addition, the Circadia C300 System is intended to monitor motion and user presence or absence in the vicinity of the Monitor and exits from the vicinity of the Monitor. The Monitor continuously streams data to the Cloud Service over a Wi-Fi network.	
EUT Specification	Height	130 mm
	Width	130 mm
	Depth	20 mm
	Weight	0.15 kg
	Voltage	5 VDC
	Current	1 Amp
EUT Supplied PSU	Manufacturer	Not stated
	Model number	HNBM050200WU
	Serial number	Not stated
	Input voltage	100-240VAC
	Input current	0.35 Amp
	Output	5 VDC 2.0 Amp

2.2 Applicant declarations for testing

General Parameters	
EUT Normal use position	Desktop
Choice of model(s) for type tests	Sample
Antenna details	Integral on-chip antenna
Antenna port	No
Baseband Data port (yes/no)?	No
Highest Signal generated in EUT	60 GHz
Lowest Signal generated in EUT	100 kHz
Hardware Version (HVIN)	C300
Software Version	Not applicable
Firmware Version (FVIN)	3.0.0.0
Type of Equipment	Multi radio
Technology Type	FMCW Radar
Geo-location (yes/no)	No
TX Parameters	
Alignment range – transmitter	58 - 61.5 GHz
EUT Declared Modulation Parameters	FMCW
EUT Declared Power level	8 dBm
EUT Declared Channel Spacing's	Single channel
Declared frequency stability	+-/ 50 ppm
RX Parameters	
Alignment range – receiver	58 - 61.5 GHz
FCC Parameters	
FCC Transmitter Class	FDS: Part 15 Field Disturbance Sensor

2.3 Functional description

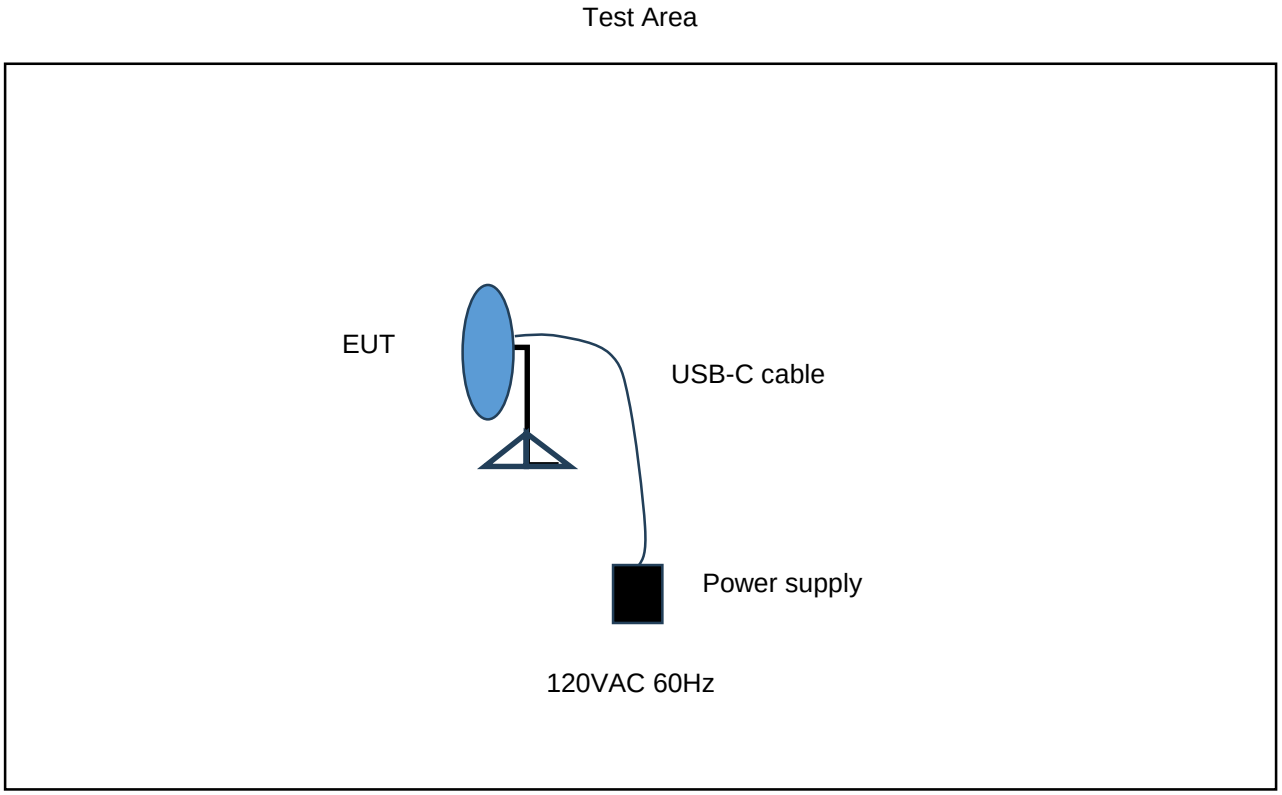
The EUT is a circular disc containing two RF transmitters, speakers, microphone, ambient light sensor, and LEDs. The first transmitter is an MCU with built in BT and Wi-Fi with its original antenna. The second transmitter is an FMCW radar unit, to monitor bio motion signals, also with the original antennae. The microphone and light sensor are used to gather environmental data. Speakers and signalling LEDs are used to provide the user feedback about the current state of the device. The device contains a single USB-C port for power, and one push-button with multiple functionalities, depending on how long it is pressed. Other operation is guided by a companion app over the Wi-Fi network. An AC/DC adapter, with a hardwired USB-C cable is supplied with the EUT.

2.4 Modes of operation

Mode Reference	Description	Used for testing
Mode 1	The EUT is transmitting burst of FMCW radar in a repeated sequence. The Wi-Fi radio is advertising its SSID repeatedly.	Yes

Note: Mode table above refers to the FMCW radar. The EUT also incorporate a WLAN radio. The WLAN radio was active during all testing and was broadcasting its SSID identity.

2.5 Emissions configuration



The unit was powered from the dedicated AC/DC adapter. A 120V AC 60Hz mains source was used. Once powered the EUT repeatedly transmitted a sequence of 60 GHz RADAR pulses in quick succession. The EUT was tested using the end-user firmware pre-configured by the applicant. The EUT incorporates a 2.4 GHz Wi-Fi module which upon start up would broadcast its SSID at regular intervals. This single mode of operation was used throughout testing.

For measurements performed at extremes, the EUTs AC adapter was powered via a variac. This allowed the supply voltage to be adjusted to the extreme voltage levels as stated in section 4.2.

The mode of operation used throughout testing was:

Centre frequency 59.83 GHz, Power level = default (maximum)

2.5.1 Signal leads

Port Name	Cable Type	Connected
Power	USB-C	Yes

3 Summary of test results

The Circadia C300 Contactless Cardiorespiratory Monitor, C300 was tested for compliance to the following standard:

47 CFR Part 15.255 Effective Date 1st October 2024
FDS: Part 15 Field Disturbance Sensor

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
Transmitter Tests		
1. Peak & Average EIRP	47 CFR Part 15C Part 15.255(c)(2)(ii)	PASSED
2. Peak Conducted Power	47 CFR Part 15C Part 15.255	NOT APPLICABLE[1]
3. Radiated emissions 9 - 150 kHz	47 CFR Part 15C Part 15.209	PASSED
4. Radiated emissions 150 kHz - 30 MHz	47 CFR Part 15C Part 15.209	PASSED
5. Radiated emissions 30 MHz -1 GHz	47 CFR Part 15C Part 15.255(d)(1),(2),(4)	PASSED
6. Radiated emissions 1 - 40 GHz	47 CFR Part 15C Part 15.255(d)(1),(2),(4)	PASSED
7. Radiated emissions 40 - 200 GHz	47 CFR Part 15C Part 15.255(d)(1), (3), (4)	PASSED[2]
8. 6dB Occupied bandwidth	47 CFR Part 15C Part 15.255	PASSED
9. Frequency stability	47 CFR Part 15C Part 15.255(f)	PASSED
10. AC power line conducted emissions	47 CFR Part 15C Part 15.207	PASSED
11. Duty cycle	47 CFR Part 15C 15.255 (c)(2)(ii)	PASSED

[1] No test requirement for field disturbance sensors/radars.
[2] Spectrum investigated up to a frequency of 200 GHz based on the highest channel generated in equipment of 61.56 GHz.

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	2024	Federal Communications Commission PART 15 – RADIO FREQUENCY DEVICES
4.1.2	ANSI C63.10	2020	American National Standard for Testing 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
4.1.4	KDB 842590 D01 v01	2019	Federal Communications Commission Office of Engineering and Technology Laboratory Division; Basic certification requirements and measurement procedures for Upper Microwave Flexible Use Service (UMFUS) devices
4.1.5	KDB 364244	D01 v01	RADAR DEVICES CERTIFYING UNDER THE PROVISIONS OF §15.255.

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	20ºC	V nominal	120V AC
T minimum	-20ºC	V minimum	102V AC
T maximum	50ºC	V maximum	138V AC

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

Extremes of temperature are based upon the requirements of 47CFR 15.255.
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:

Tests were performed radiated. To allow the fundamental transmission to pass through the temperature-controlled chamber, a Styrofoam door was used.

5 Tests, Methods and Results

5.1 Peak EIRP

5.1.1 Test methods

Test Requirements:	47 CFR Part 15C Part 15.255(c)(2)(ii) [Reference 4.1.1 of this report]
Test Method:	ANSI C63.10 Clause 9.10 & 9.11 [Reference 4.1.2 of this report]
Limits:	47 CFR Part 15C Part 15.255(c)(2)(ii) [Reference 4.1.1 of this report]

5.1.2 Configuration of EUT

The EUT was placed on a 1.5 metres high turntable. Measurements were performed at a distance of 60 centimetres. The EUT's antenna was positioned and aligned with the measuring antenna. EIRP testing was performed whilst the EUT was powered from the manufacturers power supply.
The EUT was operated in Mode 1.

5.1.3 Test procedure

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

Measurements were made in a semi-anechoic chamber with appropriate absorbing material for use in this range. A Horn antenna was used to align with and measure the radiated power from the EUT. A wideband RF detector was used with a digital oscilloscope to measure the Peak power. The maximum voltage measured from the detector was recorded and then a substitution was performed to determine actual EUT power level in dBm.

Tests were performed using test Site A.

5.1.4 Test equipment

F136, E658, F356, F305, F139, H078, F045, E781, E443, E503, E755, F400, E717

See Section 8 for more details

5.1.5 Test results

Temperature of test environment	20°C
Humidity of test environment	50%
Pressure of test environment	101kPa

Band	57-61.56 GHz
Power Level	Maximum
Channel Spacing	Single Channel
Mod Scheme	FMCW
Single channel	59.83 GHz

Chan Freq (GHz)	Meas distance (m)
59.83	0.6

Mod scheme/rate	Pk EIRP result (dBm)
FMCW	14.88

LIMITS:
15.255 (c)(2)(ii) *57.0-61.56 GHz:* the peak EIRP shall not exceed 3 dBm except that the peak EIRP shall not exceed 20 dBm if the sum of continuous transmitter off-times of at least two milliseconds equals at least 16.5 milliseconds within any contiguous interval of 33 milliseconds

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:
Radiated RF power, 55-64GHz EIRP detector method ±4.56 dB
(UR03B)

5.2 Peak Conducted Power

NOT APPLICABLE: No test requirement for field disturbance sensors/radars.

5.3 Radiated emissions 9 - 150 kHz

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 15.209/15.255(d)(2) [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 EUT was rotated in all three orthogonal planes. Radiated Emissions testing was performed whilst powered from the manufacturers power supply. The EUT was operated in Mode 1.

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 H.

5.3.4 Test equipment

TMS81, ZSW1, E412, F238

See Section 8 for more details

5.3.5 Test results

Temperature of test environment	18°C
Humidity of test environment	47%
Pressure of test environment	101 kPa

Band	57-61.56 GHz
Power Level	Maximum
Channel Spacing	Single Channel
Mod Scheme	FMCW
Single channel	59.83 GHz

Plot refs
14955-4 Rad 1 9k-150kHz Para
14955-4 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.
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 to 30MHz ±3.11dB (UE30)

5.4 Radiated emissions 150 kHz - 30 MHz

5.4.1 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 15.209/15.255(d)(2) [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 whilst powered from the manufacturers power supply. The EUT was operated in Mode 1.

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 (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 H.

5.4.4 Test equipment

TMS81, ZSW1, E412, F238

See Section 8 for more details

5.4.5 Test results

Temperature of test environment	18°C
Humidity of test environment	47%
Pressure of test environment	101 kPa

Band	57-61.56 GHz
Power Level	Maximum
Channel Spacing	Single Channel
Mod Scheme	FMCW
Single channel	59.83 GHz

Plot refs
14955-4 Rad 1 150k-30MHz Para
14955-4 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.
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 to 30MHz ±3.11dB (UE30)

5.5 Radiated emissions 30 MHz -1 GHz

5.5.1 Test methods

Test Requirements:	47 CFR Part 15C Part 15.255(d)(2) [Reference 4.1.1 of this report]
Test Method:	ANSI C63.10 Clause 6.3 & 6.5 [Reference 4.1.2 of this report]
Limits:	47 CFR Part 15C Part 15.209/15.255(d)(2) [Reference 4.1.1 of this report]

5.5.2 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 whilst powered from the manufacturers power supply. The EUT was operated in Mode 1.

5.5.3 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.

5.5.4 Test equipment

E412, E429, E536, E745, E914, E952, F238, F449, NSA-H, ZSW1

See Section 8 for more details

5.5.5 Test results

Temperature of test environment	18°C
Humidity of test environment	47%
Pressure of test environment	100kPa

Band	57-61.56 GHz
Power Level	Maximum
Channel Spacing	Single Channel
Mod Scheme	FMCW
Single channel	59.83 GHz

Plot refs
14955-4 Rad 1 VHF Horiz
14955-4 Rad 1 VHF Vert
14955-4 Rad 1 UHF Horiz
14955-4 Rad 1 UHF Vert

Table of signals measured for Rad 1 Horizontal Signal List

Signal No.	Freq (MHz)	Peak Amp (dBuV/m)	QP Amp (dBuV/m)	QP -Lim (dB)
1	43.450	28.8	23.0	-17.0
2	54.980	29.6	23.6	-16.4
3	100.239	28.3	21.4	-22.1
4	110.430	25.2	19.6	-23.9
5	249.729	26.8	20.6	-25.4
6	651.564	39.6	33.9	-12.1
7	955.649	39.0	32.1	-13.9

Table of signals measured for Rad 1 Vertical Signal List

Signal No.	Freq (MHz)	Peak Amp (dBuV/m)	QP Amp (dBuV/m)	QP -Lim (dB)
1	43.517	29.9	23.6	-16.4
2	51.921	29.5	23.4	-16.6
3	57.821	28.0	20.5	-19.5
4	68.861	27.1	19.4	-20.6
5	92.131	28.0	20.5	-23.0
6	99.191	29.7	22.5	-21.0
7	110.132	28.1	20.6	-22.9
8	119.997	27.6	22.4	-21.1
9	651.505	39.0	33.3	-12.7
10	928.122	37.4	31.7	-14.3

Peak detector “Max held” Analyser plots against the Quasi-Peak 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.

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 to 1GHz ±6.16dB (UE60a & UE 60b)

5.6 Radiated emissions 1 - 40 GHz

5.6.1 Test methods

Test Requirements:	47 CFR Part 15C Part 15.255(d)/(2)/(3)/(4) [Reference 4.1.1 of this report]
Test Method:	ANSI C63.10 Clause 6.3 & 6.6 [Reference 4.1.2 of this report]
Limits:	47 CFR Part 15C Part 15.255(d)(2) [Reference 4.1.1 of this report]

5.6.2 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 whilst powered from the manufacturers power supply.

The EUT was operated in Mode 1.

5.6.3 Test procedure

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

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, and emissions maximised. The EUT was rotated through 360 degrees to record the worst-case emissions. A measurement distance of 3m was used between the test range 1 - 6GHz, 1.2m was used in the test range 6 - 18GHz, 0.3m was used in the test range 18 - 40GHz.

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

Tests were performed using test Site B.

5.6.4 Test equipment

E296-2, E331, E428, E463, E478, E642, E904, E967, E968, F230, F231

See Section 8 for more details

5.6.5 Test results

Temperature of test environment	17°C
Humidity of test environment	60%
Pressure of test environment	101kPa

Setup Table

Band	57-61.56 GHz
Power Level	Maximum
Channel Spacing	Single Channel
Mod Scheme	FMCW
Single channel	59.83 GHz

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
There were no signals observed within 20 dB of the limit.						

Plots
14955-4 Radiated Emissions 1-3 GHz Horizontal
14955-4 Radiated Emissions 1-3 GHz Vertical
14955-4 Radiated Emissions 3-4 GHz Horizontal
14955-4 Radiated Emissions 3-4 GHz Vertical
14955-4 Radiated Emissions 4-6 GHz Horizontal
14955-4 Radiated Emissions 4-6 GHz Vertical
14955-4 Radiated Emissions 6-6.5 GHz Horizontal
14955-4 Radiated Emissions 6-6.5 GHz Vertical
14955-4 Radiated Emissions 6.5-9 GHz Horizontal
14955-4 Radiated Emissions 6.5-9 GHz Vertical
14955-4 Radiated Emissions 9-11.5 GHz Horizontal
14955-4 Radiated Emissions 9-11.5 GHz Vertical
14955-4 Radiated Emissions 11.5-12.5 GHz Horizontal
14955-4 Radiated Emissions 11.5-12.5 GHz Vertical
14955-4 Radiated Emissions 12.5-15 GHz Horizontal
14955-4 Radiated Emissions 12.5-15 GHz Vertical
14955-4 Radiated Emissions 15-18 GHz Horizontal
14955-4 Radiated Emissions 15-18 GHz Vertical
14955-4 Radiated Emissions 18-20 GHz Horizontal
14955-4 Radiated Emissions 18-20 GHz Vertical
14955-4 Radiated Emissions 20-23 GHz Horizontal
14955-4 Radiated Emissions 20-23 GHz Vertical
14955-4 Radiated Emissions 23-26.5 GHz Horizontal
14955-4 Radiated Emissions 23-26.5 GHz Vertical
14955-4 Radiated Emissions 26.5-30.5 GHz Horizontal
14955-4 Radiated Emissions 26.5-30.5 GHz Vertical
14955-4 Radiated Emissions 30.5-34.5 GHz Horizontal
14955-4 Radiated Emissions 30.5-34.5 GHz Vertical
14955-4 Radiated Emissions 34.5-38.5 GHz Horizontal
14955-4 Radiated Emissions 34.5-38.5 GHz Vertical
14955-4 Radiated Emissions 38.5-40 GHz Horizontal
14955-4 Radiated Emissions 38.5-40 GHz Vertical

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. 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:
1GHz to 3GHz ±4.81dB (UE77)
3GHz to 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)

5.7 Radiated emissions 40 - 200 GHz

5.7.1 Test methods

Test Requirements:	47 CFR Part 15C Part 15.255(d)(1)(3)/(4) [Reference 4.1.1 of this report]
Test Method:	ANSI C63.10 Clause 6.3 & 6.6 & 9.12 [Reference 4.1.2 of this report]
Limits:	47 CFR Part 15C Part 15.255(d)(3) [Reference 4.1.1 of this report]

5.7.2 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 distances stated in the procedure. The EUT was rotated in all three orthogonal planes. Radiated Emissions testing was performed whilst powered from the manufacturers power supply.

The EUT was operated in Mode 1.

5.7.3 Test procedure

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

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 EUT was contained within the main beam and emissions maximised, or where this was not possible due to the size of the EUT versus antenna beamwidth, height and lateral scanning of the EUT to maximise emissions was performed. The EUT was rotated through 360 degrees to record any worst-case emissions. A measurement distance of 0.3m was used in the test range 40 - 75GHz, 0.1m was used in the test range 75-110GHz and 0.1/0.03m was used in the test range 110-200 GHz.

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

Tests were performed using test Site A.

5.7.4 Test equipment

E296-4, E520, E580, E717, E718, E720, E722, E755, E760, E941, F190, F400, F419, H070

See Section 8 for more details

5.7.5 Test results

Temperature of test environment	20°C
Humidity of test environment	50%
Pressure of test environment	101kPa

Setup Table

Band	57-61.56 GHz
Power Level	Maximum
Channel Spacing	Single Channel
Mod Scheme	FMCW
Single channel	59.83 GHz

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
No emissions were observed within 20 dB of the limits						

Plots
14955-4 Radiated Emissions 40 - 45 GHz Horizontal
14955-4 Radiated Emissions 40 - 45 GHz Vertical
14955-4 Radiated Emissions 45 - 50 GHz Horizontal
14955-4 Radiated Emissions 45 - 50 GHz Vertical
14955-4 Radiated Emissions 50 - 55 GHz Horizontal
14955-4 Radiated Emissions 50 - 55 GHz Vertical
14955-4 Radiated Emissions 55 - 60 GHz Horizontal
14955-4 Radiated Emissions 55 - 60 GHz Vertical
14955-4 Radiated Emissions 60 - 65 GHz Horizontal
14955-4 Radiated Emissions 60 - 65 GHz Vertical
14955-4 Radiated Emissions 65 - 70 GHz Horizontal
14955-4 Radiated Emissions 65 - 70 GHz Vertical
14955-4 Radiated Emissions 70 - 75 GHz Horizontal
14955-4 Radiated Emissions 70 - 75 GHz Vertical
14955-4 Radiated Emissions 75 - 80 GHz Horizontal
14955-4 Radiated Emissions 75 - 80 GHz Vertical
14955-4 Radiated Emissions 80 - 85 GHz Horizontal
14955-4 Radiated Emissions 80 - 85 GHz Vertical
14955-4 Radiated Emissions 85 - 90 GHz Horizontal
14955-4 Radiated Emissions 85 - 90 GHz Vertical
14955-4 Radiated Emissions 90 - 95 GHz Horizontal
14955-4 Radiated Emissions 90 - 95 GHz Vertical
14955-4 Radiated Emissions 95 - 100 GHz Horizontal
14955-4 Radiated Emissions 95 - 100 GHz Vertical
14955-4 Radiated Emissions 100 - 105 GHz Horizontal
14955-4 Radiated Emissions 100 - 105 GHz Vertical
14955-4 Radiated Emissions 105 - 110 GHz Horizontal
14955-4 Radiated Emissions 105 - 110 GHz Vertical
14955-4 Radiated Emissions 110 - 115 GHz Horizontal
14955-4 Radiated Emissions 110 - 115 GHz Vertical
14955-4 Radiated Emissions 115 - 120 GHz Horizontal
14955-4 Radiated Emissions 115 - 120 GHz Vertical
14955-4 Radiated Emissions 120 - 125 GHz Horizontal
14955-4 Radiated Emissions 120 - 125 GHz Vertical
14955-4 Radiated Emissions 125 - 130 GHz Horizontal
14955-4 Radiated Emissions 125 - 130 GHz Vertical
14955-4 Radiated Emissions 130 - 135 GHz Horizontal
14955-4 Radiated Emissions 130 - 135 GHz Vertical
14955-4 Radiated Emissions 135 - 140 GHz Horizontal
14955-4 Radiated Emissions 135 - 140 GHz Vertical
14955-4 Radiated Emissions 140 - 145 GHz Horizontal
14955-4 Radiated Emissions 140 - 145 GHz Vertical
14955-4 Radiated Emissions 145 - 150 GHz Horizontal
14955-4 Radiated Emissions 145 - 150 GHz Vertical
14955-4 Radiated Emissions 150 - 155 GHz Horizontal
14955-4 Radiated Emissions 150 - 155 GHz Vertical
14955-4 Radiated Emissions 155 - 160 GHz Horizontal
14955-4 Radiated Emissions 155 - 160 GHz Vertical
14955-4 Radiated Emissions 160 - 165 GHz Horizontal
14955-4 Radiated Emissions 160 - 165 GHz Vertical
14955-4 Radiated Emissions 165 - 170 GHz Horizontal
14955-4 Radiated Emissions 165 - 170 GHz Vertical
14955-4 Radiated Emissions 170 - 175 GHz Horizontal
14955-4 Radiated Emissions 170 - 175 GHz Vertical
14955-4 Radiated Emissions 175 - 180 GHz Horizontal

14955-4 Radiated Emissions 175 - 180 GHz Vertical
14955-4 Radiated Emissions 180 - 185 GHz Horizontal
14955-4 Radiated Emissions 180 - 185 GHz Vertical
14955-4 Radiated Emissions 185 - 190 GHz Horizontal
14955-4 Radiated Emissions 185 - 190 GHz Vertical
14955-4 Radiated Emissions 190 - 195 GHz Horizontal
14955-4 Radiated Emissions 190 - 195 GHz Vertical
14955-4 Radiated Emissions 195 - 200 GHz Horizontal
14955-4 Radiated Emissions 195 - 200 GHz Vertical

Peak detector “Max held” Analyser plots against the Average limit line can be found in Section 6 of this report.

LIMITS:
15.255 (d)(3) between 40 GHz and 200 GHz the level of the emissions shall not exceed 90pW/cm2 at a distance of 3m (85.3 dBuV/m @3m). The limits 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:

26.5-40 GHz ±2.72 dB
40-60 GHz ±3.0 dB
50-75 GHz ±3.87 dB
75-110 GHz ±4.06 dB
90-110 GHz ±4.06 dB
110-140 GHz ±3.12 dB
140-150 GHz ±2.18 dB
150-200 GHz ±2.25 dB
(UR09B)

5.8 Occupied bandwidth

5.8.1 Test methods

Test Requirements:	47 CFR Part 15C Part 15.255 [Reference 4.1.1 of this report]
Test Method:	ANSI C63.10 Clause 6.9 / 9.10 [Reference 4.1.2 of this report]
Limits:	47 CFR Part 15C Part 15.255 [Reference 4.1.1 of this report]

5.8.2 Configuration of EUT

The EUT was placed in a temperature-controlled chamber and the measurements were performed radiated. A Styrofoam door was fitted to the temperature-controlled chamber which allowed the fundamental transmission to pass through the door aperture but kept the chamber sealed. The EUT was powered using the manufacturers provided power supply which was connected to a variac. During testing the mains voltage was adjusted to the extreme voltage levels as stated in section 4.3 of this report. The EUT was operated in Mode 1 for this test.

5.8.3 Test procedure

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

Plots were captured at each temperature step and at each voltage level. The 99% Occupied bandwidth was calculated using statistical analysis of the captured spectrum analyser data.

Tests were performed using test Site A.

5.8.4 Test equipment

E717, F400

See Section 8 for more details

5.8.5 Test results

Temperature of test environment	20°C
Humidity of test environment	50%
Pressure of test environment	101kPa

Band	57-61.56 GHz
Power Level	Maximum
Channel Spacing	Single Channel
Mod Scheme	FMCW
Single channel	59.83 GHz

Test conditions		99% Bandwidth (GHz)
-20°C	Volts Nominal (120V)	3.4637
-10°C	Volts Nominal (120V)	3.4609
0°C	Volts Nominal (120V)	3.4648
10°C	Volts Nominal (120V)	3.4609
20ºC°C	Volts Minimum (102V)	3.4403
	Volts Nominal (120V)	3.4609
	Volts Maximum (138V)	3.4403
30°C	Volts Nominal (120V)	3.4475
40°C	Volts Nominal (120V)	3.4498
50°C	Volts Nominal (120V)	3.4603

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

LIMITS:
15.255 (f) Fundamental emissions must be contained within the frequency band specified during all conditions of 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: ± 0.17 % (UR19B)

5.9 Frequency stability

5.9.1 Test methods

Test Requirements:	47 CFR Part 15C Part 15.255(f) [Reference 4.1.1 of this report]
Test Method:	ANSI C63.10 Clause 6.8 / 9.14 [Reference 4.1.2 of this report]
Limits:	47 CFR Part 15C Part 15.255(f) [Reference 4.1.1 of this report]

5.9.2 Configuration of EUT

The EUT was placed in a temperature-controlled chamber and the measurements were performed radiated. A Styrofoam door was fitted to the temperature-controlled chamber which allowed the fundamental transmission to pass through the door aperture but kept the chamber sealed. The EUT was powered using the manufacturers provided power supply which was connected to a variac. During testing the mains voltage was adjusted to the extreme voltage levels as stated in section 4.3 of this report. The EUT was operated in Mode 1 for this test.

5.9.3 Test procedure

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

Temperature stability was achieved at each test temperature level before taking measurements. Plots were captured at each temperature step and at each voltage level. The 99% Occupied bandwidth points were calculated using statistical analysis of the captured spectrum analyser data.

Markers were placed on the plots at the band edges, and a check was performed to ensure that the 99% Occupied bandwidth points remained within the band edges.

Tests were performed using Test Site A.

5.9.4 Test equipment

E187, E503, E755, F400, L264, S032, TMS38

See Section 8 for more details

5.9.5 Test results

Temperature of test environment	20°C
Humidity of test environment	50%
Pressure of test environment	101kPa

Band	57-61.56 GHz
Power Level	Maximum
Channel Spacing	Single Channel
Mod Scheme	FMCW
Single channel	59.83 GHz

Test conditions		FL (GHz)	FH (GHz)
-20°C	Volts Nominal (120V)	58.0119	61.4756
-10°C	Volts Nominal (120V)	58.0114	61.4722
0°C	Volts Nominal (120V)	58.0119	61.4767
10°C	Volts Nominal (120V)	58.0114	61.4722
20ºC°C	Volts Minimum (102V)	58.0102	61.4506
	Volts Nominal (120V)	58.0008	61.4617
	Volts Maximum (138V)	58.0108	61.4511
30°C	Volts Nominal (120V)	58.0097	61.4572
40°C	Volts Nominal (120V)	58.0075	61.4572
50°C	Volts Nominal (120V)	58.0064	61.4667

LIMITS:
15.255 (f) Fundamental emissions must be contained within the frequency band specified during all conditions of 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:
(50-60 GHz) ±0.0018 ppm
(60-66 GHz) ±0.0021 ppm

5.10 AC power line conducted emissions

5.10.1 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]

5.10.2 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.

For final test the EUT was operated in mode Mode 1.

5.10.3 Test procedure

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

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

Tests were performed in Test Site H.

5.10.4 Test equipment

E412, F238, LPE222, LPE373, ZSW1

See Section 8 for more details

5.10.5 Test results

Temperature of test environment	18°C
Humidity of test environment	47%
Pressure of test environment	100kPa

Band	57-61.56 GHz
Power Level	Maximum
Channel Spacing	Single Channel
Mod Scheme	FMCW
Single channel	59.83 GHz

Plot refs
14955-4 Cond 1 AC Live 150k-30M Average
14955-4 Cond 1 AC Live 150k-30M Quasi-Peak
14955-4 Cond 1 AC Neutral 150k-30M Average
14955-4 Cond 1 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	0.183	44.8	41.4	-22.9	25.4	-28.9
2	0.227	41.6	37.6	-25.0	24.7	-27.9
3	0.318	38.8	35.4	-24.4	25.1	-24.7
4	0.480	43.0	40.7	-15.6	33.3	-13.0
5	0.481	43.0	41.1	-15.2	33.1	-13.2
6	0.875	37.5	35.4	-20.6	26.8	-19.2
7	1.174	32.6	27.9	-28.1	20.7	-25.3
8	1.374	36.2	33.6	-22.4	24.9	-21.1
9	2.045	33.7	31.7	-24.3	23.7	-22.3
10	2.541	34.2	31.8	-24.2	23.7	-22.3
11	2.679	33.0	30.3	-25.7	23.1	-22.9
12	3.189	32.8	30.7	-25.3	23.5	-22.5
13	3.839	34.8	33.2	-22.8	27.9	-18.1
14	4.235	31.2	29.2	-26.8	21.9	-24.1
15	4.866	32.1	30.1	-25.9	22.4	-23.6
16	5.376	34.0	30.6	-29.4	25.0	-25.0
17	6.709	32.8	30.5	-29.5	21.4	-28.6
18	16.297	33.8	29.6	-30.4	17.9	-32.1

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	0.151	46.7	43.2	-22.7	26.0	-29.9
2	0.252	39.6	35.5	-26.2	20.0	-31.7
3	0.303	38.4	34.4	-25.8	19.3	-30.9
4	0.427	37.1	34.5	-22.8	22.2	-25.1
5	0.481	41.0	37.6	-18.7	25.8	-20.5
6	0.664	32.1	28.8	-27.2	15.9	-30.1
7	0.930	35.1	29.0	-27.0	16.2	-29.8
8	1.356	31.8	26.9	-29.1	15.9	-30.1
9	2.045	31.9	27.9	-28.1	17.1	-28.9
10	2.548	31.7	28.7	-27.3	17.0	-29.0
11	3.707	33.4	29.8	-26.2	17.3	-28.7
12	4.840	34.2	31.2	-24.8	16.7	-29.3
13	6.130	35.3	31.8	-28.2	17.0	-33.0
14	6.455	34.7	30.5	-29.5	13.9	-36.1
15	15.977	37.9	34.0	-26.0	16.8	-33.2

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:
150kHz to 30MHz ±3.40dB (UE71)

5.11 Duty cycle

5.11.1 Test methods

Test Requirements:	47 CFR Part 15C 15.255 (c)(2)(ii)[Reference 4.1.1 of this report]
Test Method:	ANSI C63.10 Clause 9.10 & 9.11 [Reference 4.1.2 of this report]
Limits:	47 CFR Part 15C 15.255 (c)(2)(ii) [Reference 4.1.1 of this report]

5.11.2 Configuration of EUT

The EUT was placed on a turntable. The front edge of the EUT was positioned facing the antenna. The EUT was measured at a distance of 0.6 metres. The EUT was measured spectrum analyser set to zero span. The EUT was operated in Mode 1.

5.11.3 Test procedure

Tests were made in accordance with FCC Part 15 using the measuring equipment noted below. The centre frequency of the analyser was set to that of the transmitter. The sweep time was adjusted so that either the pulse width or the periodic operation could be observed. Measurements were performed test in site A.

5.11.4 Test equipment

F136, E658, F356, F305, F139, H078, F045, E781, E443, E503, E755, F400, E717

See Section 8 for more details

5.11.5 Test results

Temperature of test environment	20°C
Humidity of test environment	50%
Pressure of test environment	101kPa

Band	57-61.56 GHz
Power Level	Maximum
Channel Spacing	Single Channel
Mod Scheme	FMCW
Single channel	59.83 GHz

	Single channel
TX on time	13.18 ms
TX on Plot filename	14955-4 Duty cycle groups of radar bursts
TX off time	16.93 ms
Duty cycle	43.8 %

Analyser plots for the duty cycle can be found in Section 6 of this report.

LIMITS:
The sum of continuous transmitter off-times of at least two milliseconds equals at least 16.5 milliseconds within any contiguous interval of 33 milliseconds (50 percent)

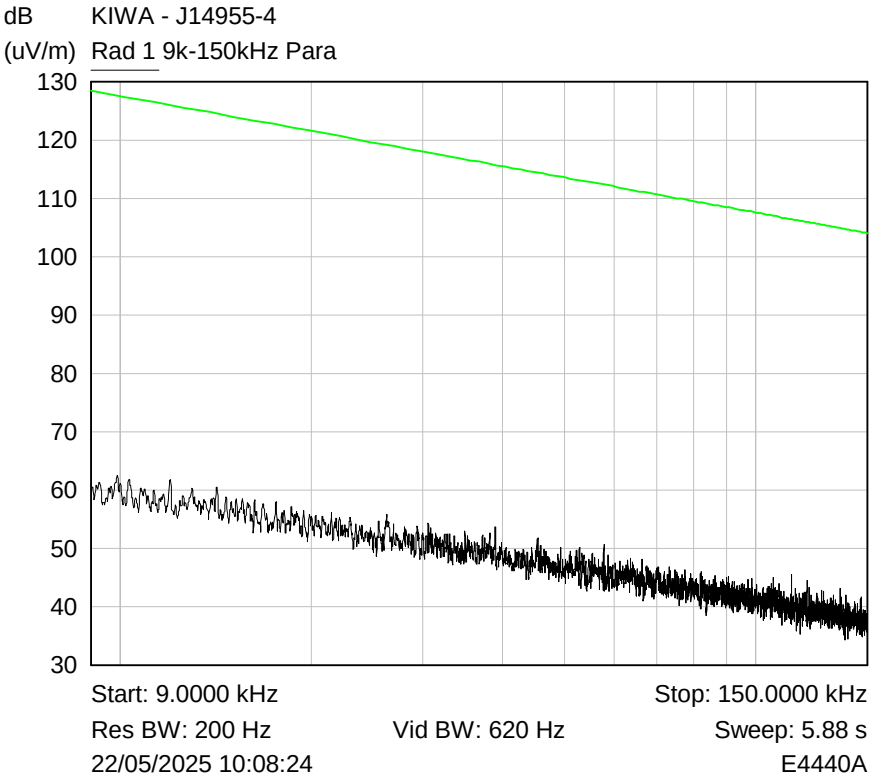
These results show that the EUT has PASSED this test.

The uncertainty gives a 95% confidence interval in the measurement. Expanded uncertainty (K=2) is as follows: ±0.026 % (UR71B)

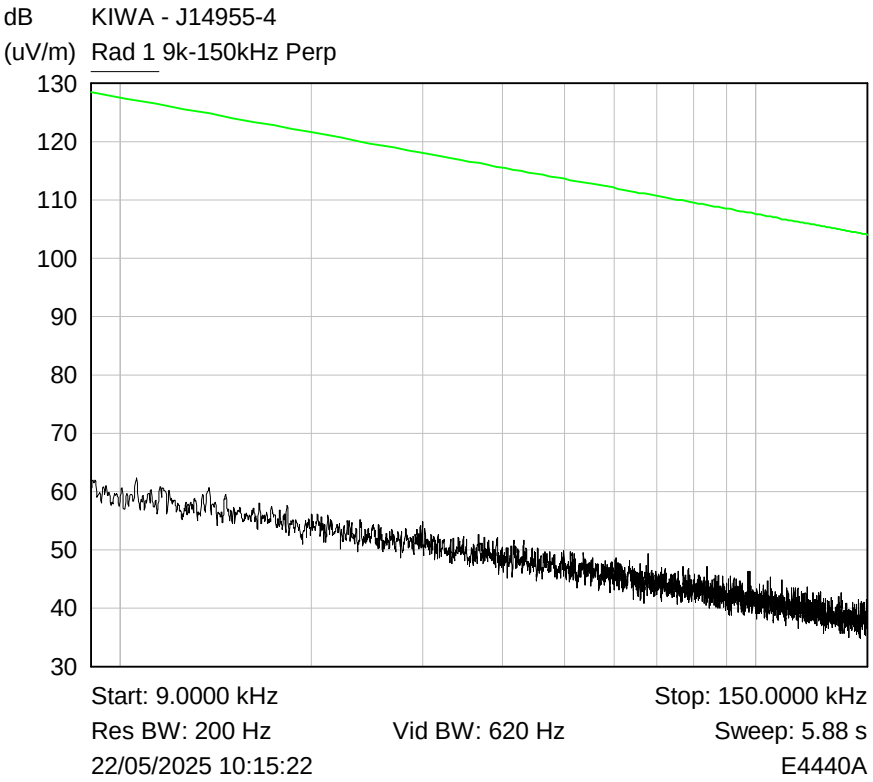
6 Plots/Graphical results

6.1 Radiated emissions 9 - 150 kHz

RF Parameters: Band 57-61.56 GHz, Power Maximum, Channel Spacing Single Channel, Modulation FMCW, Channel 59.83 GHz



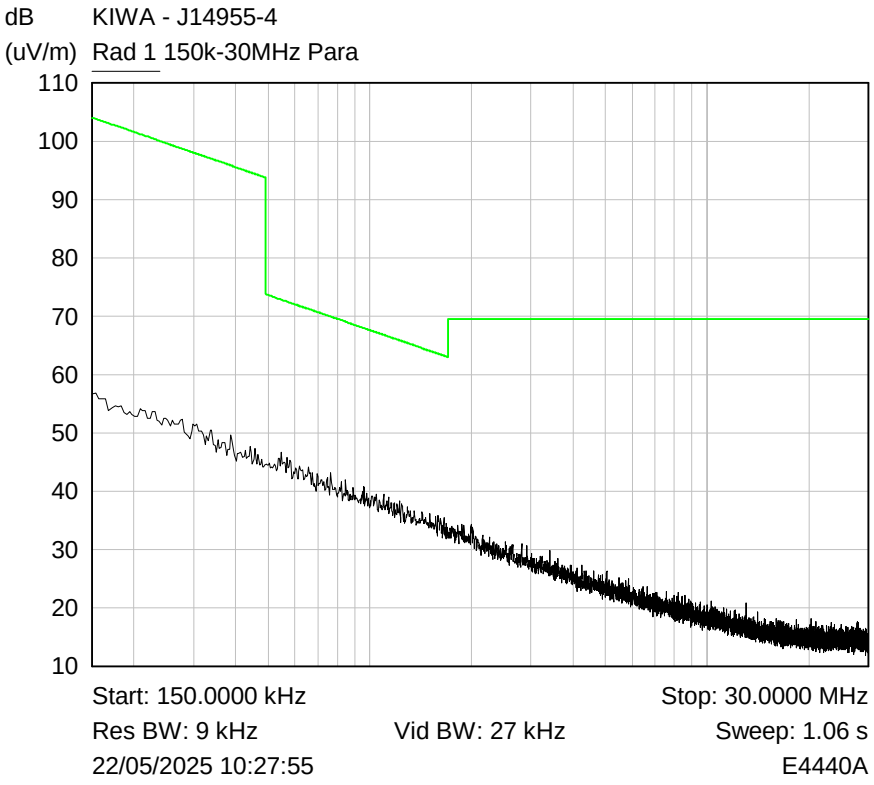
Plot of 9k-150kHz Parallel



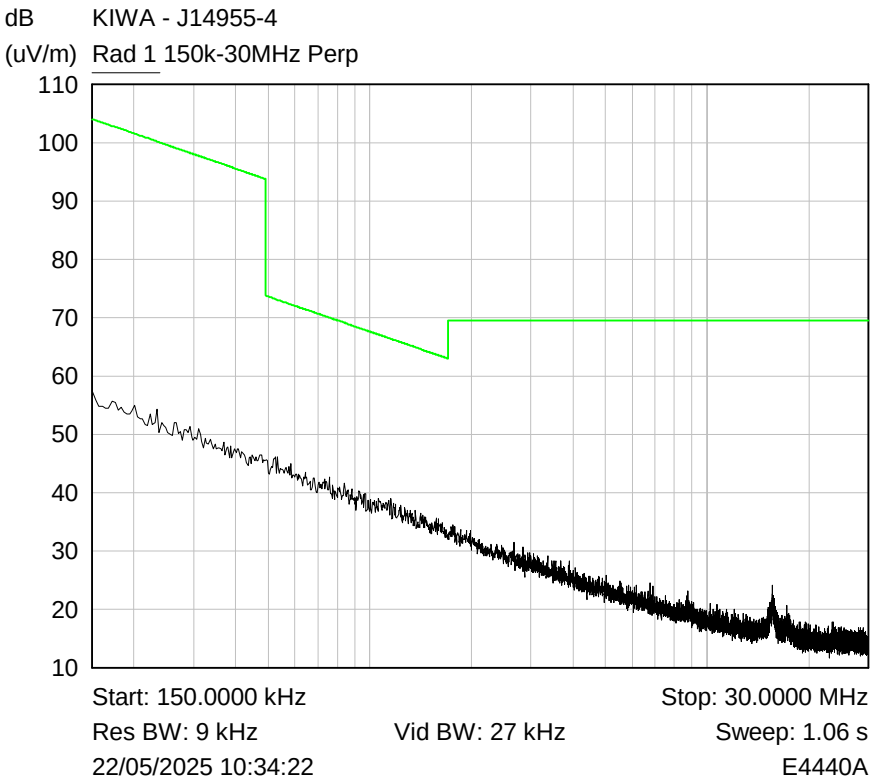
Plot of 9k-150kHz Perpendicular

6.2 Radiated emissions 150 kHz - 30 MHz

RF Parameters: Band 57-61.56 GHz, Power Maximum, Channel Spacing Single Channel, Modulation FMCW, Channel 59.83 GHz



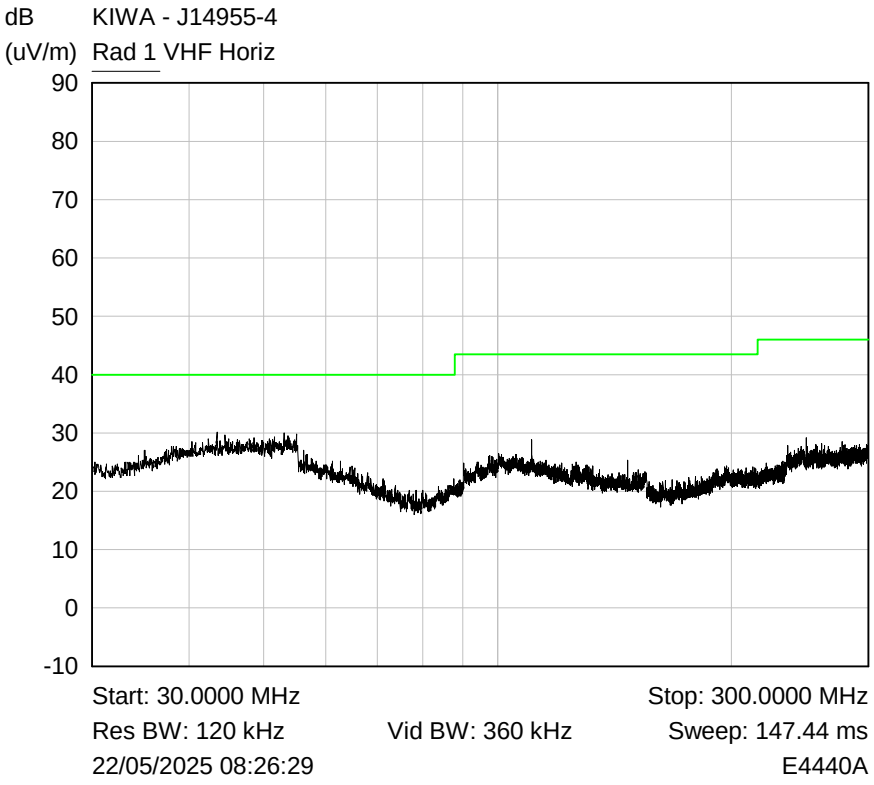
Plot of 150kHz-30MHz Parallel



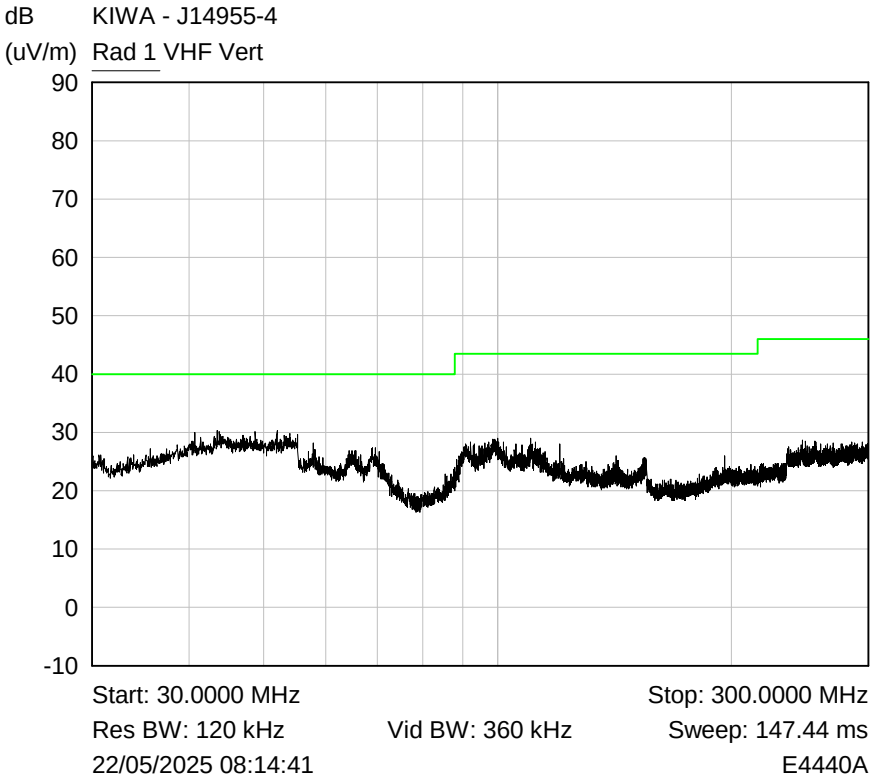
Plot of 150kHz-30MHz Perpendicular

6.3 Radiated emissions 30 MHz -1 GHz

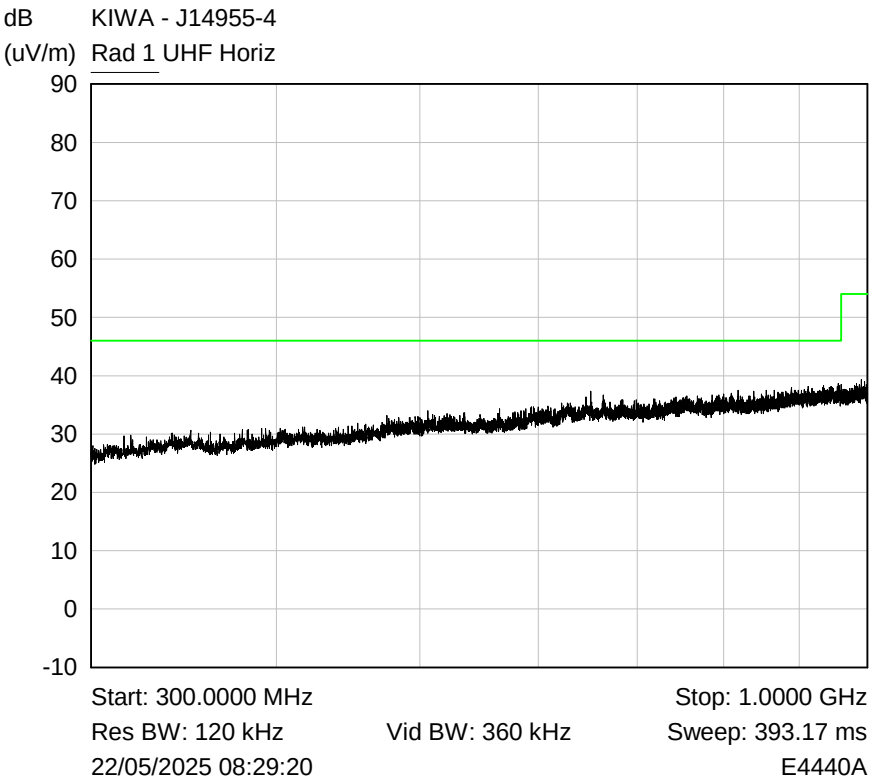
RF Parameters: Band 57-61.56 GHz, Power Maximum, Channel Spacing Single Channel, Modulation FMCW, Channel 59.83 GHz



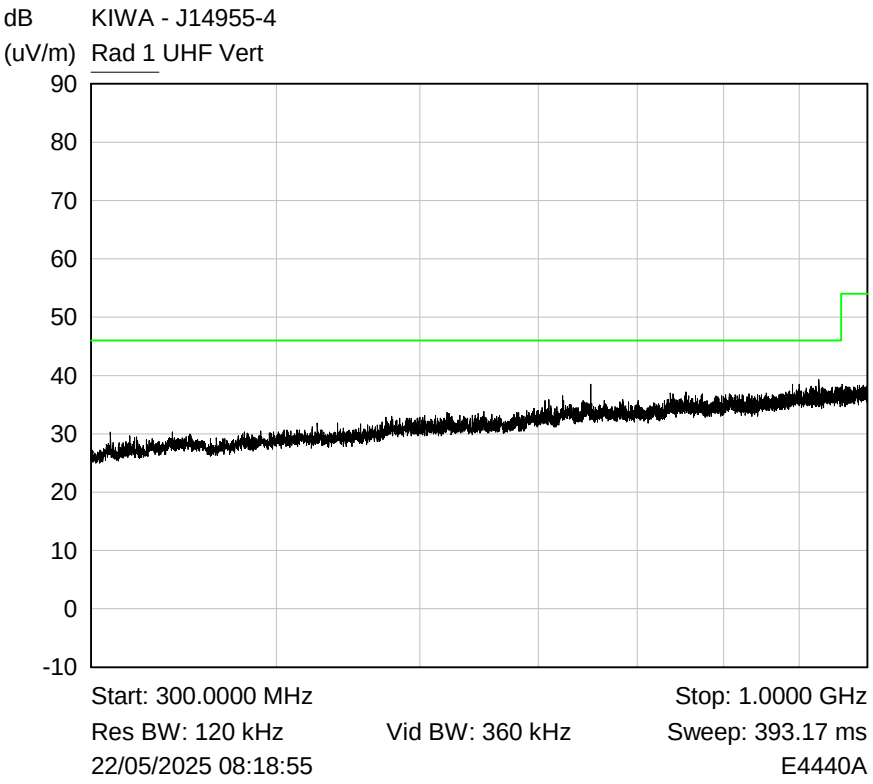
Plot of Peak emissions for VHF Horizontal against the QP limit line.



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



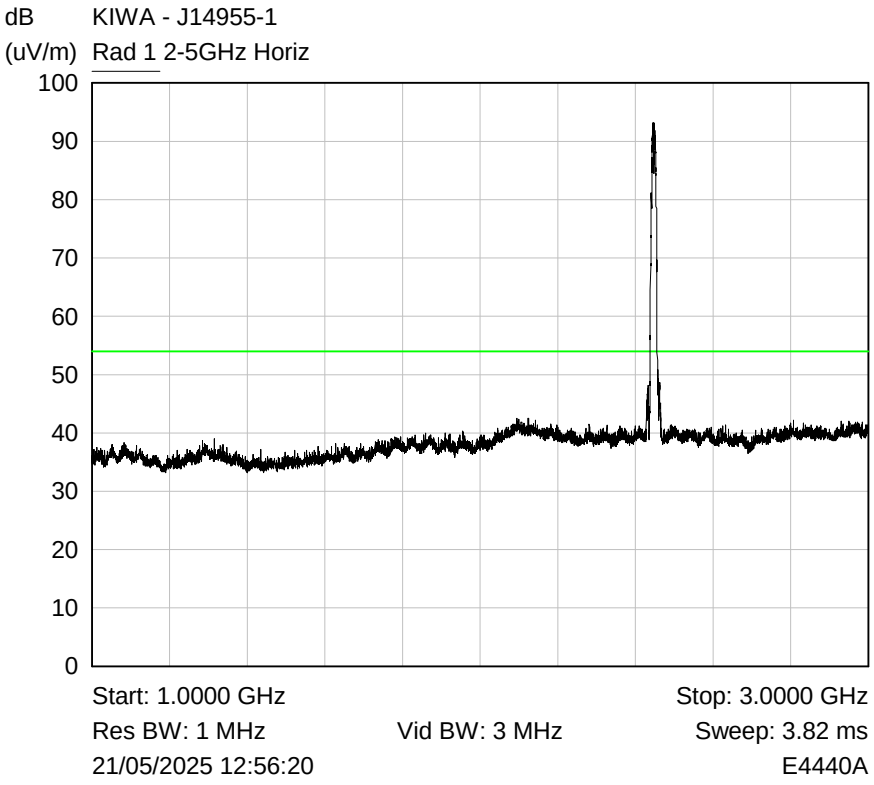
Plot of Peak emissions for UHF Horizontal against the QP limit line.



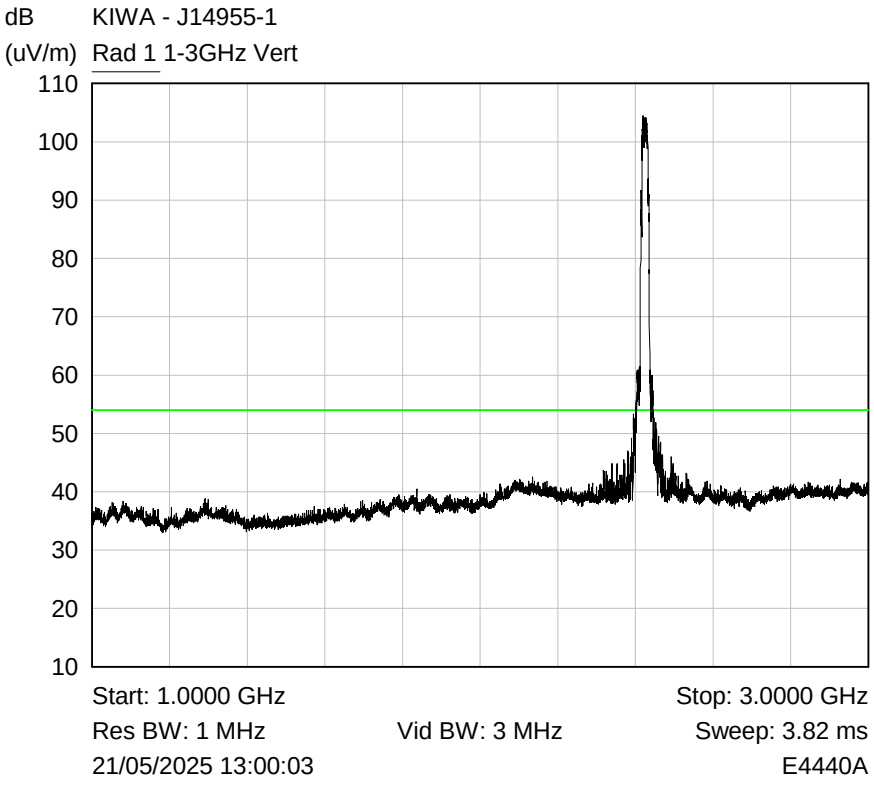
Plot of Peak emissions for UHF Vertical against the QP limit line.

6.4 Radiated emissions 1 - 40 GHz

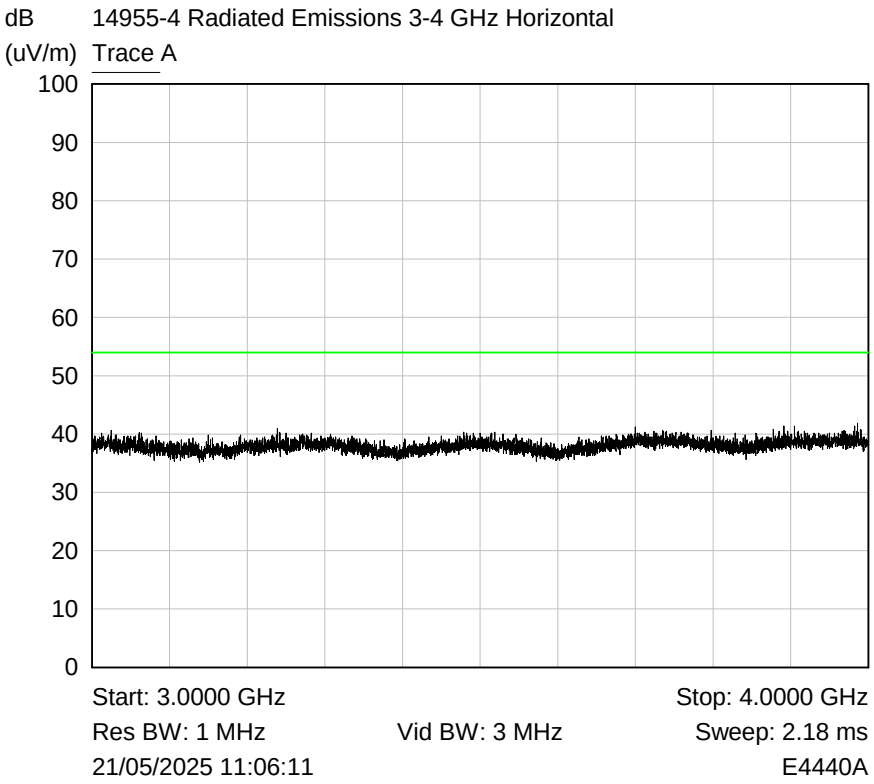
RF Parameters: Band 57-61.56 GHz, Power Maximum, Channel Spacing Single Channel, Modulation FMCW, Channel 60.5 GHz

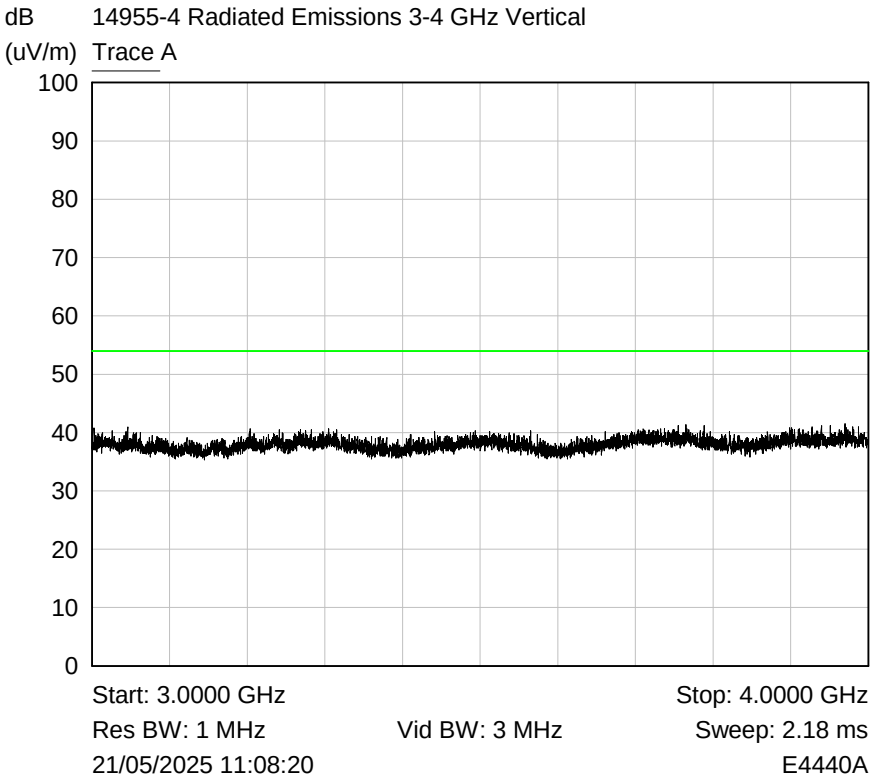


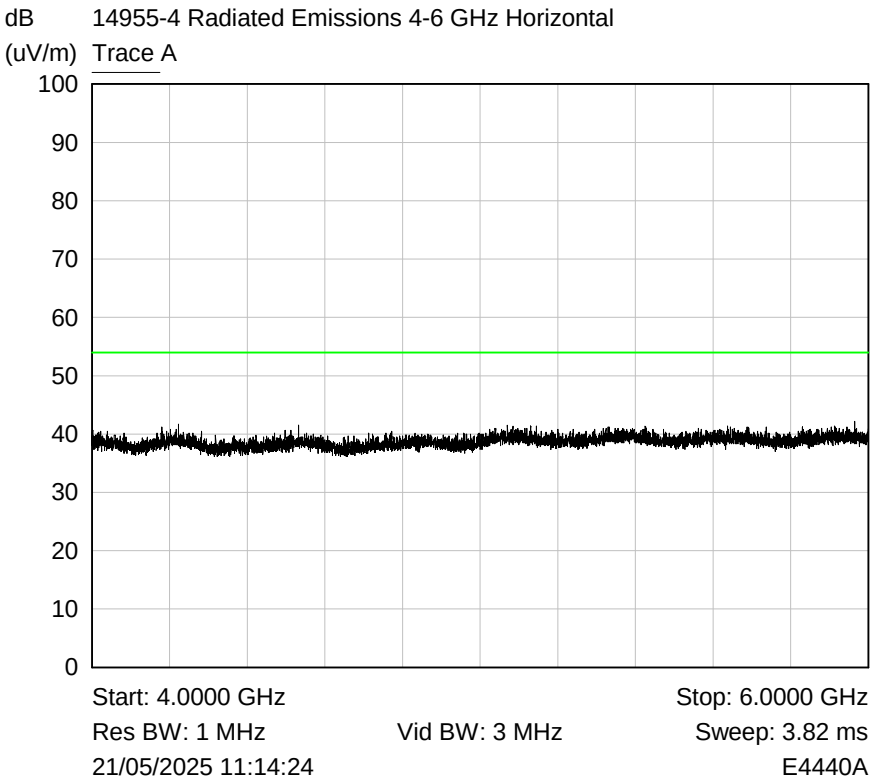
Plot shows the 2.4GHz Wi-Fi transmissions

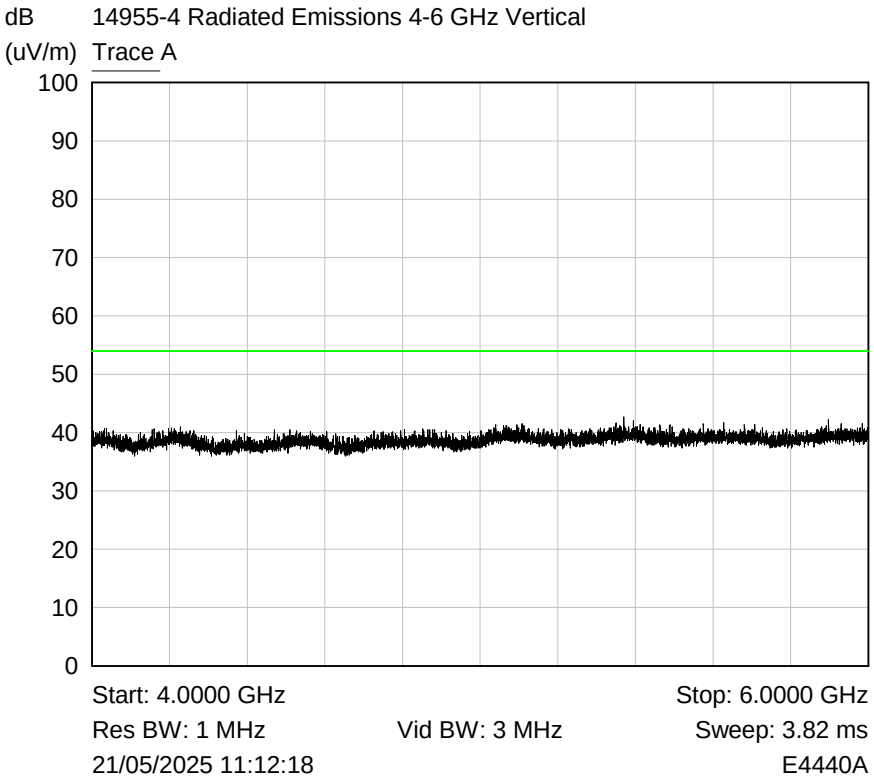


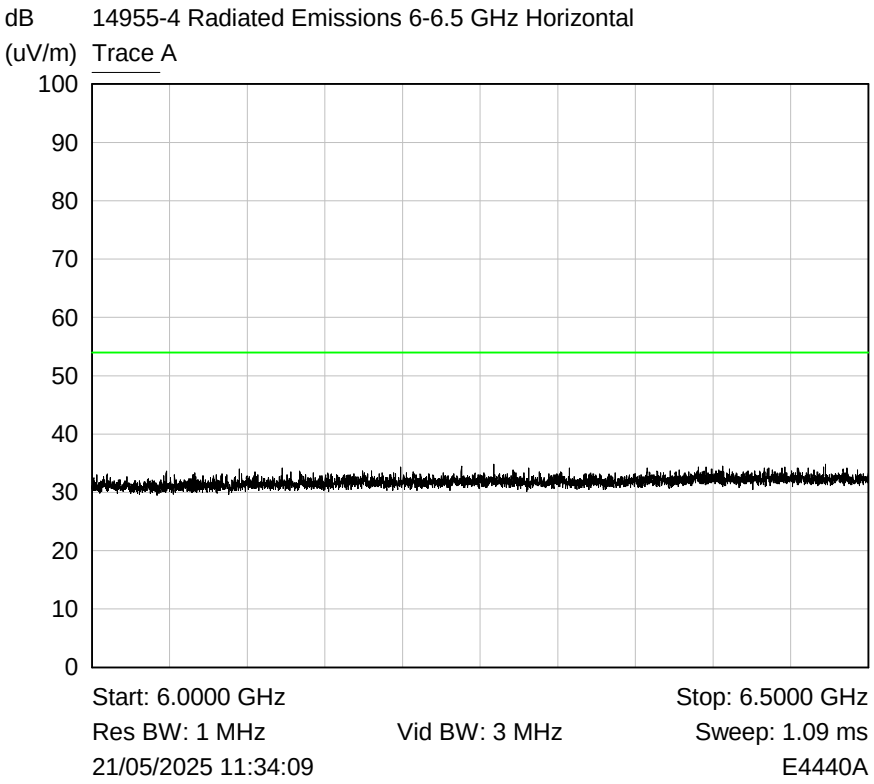
Plot shows the 2.4GHz Wi-Fi transmissions

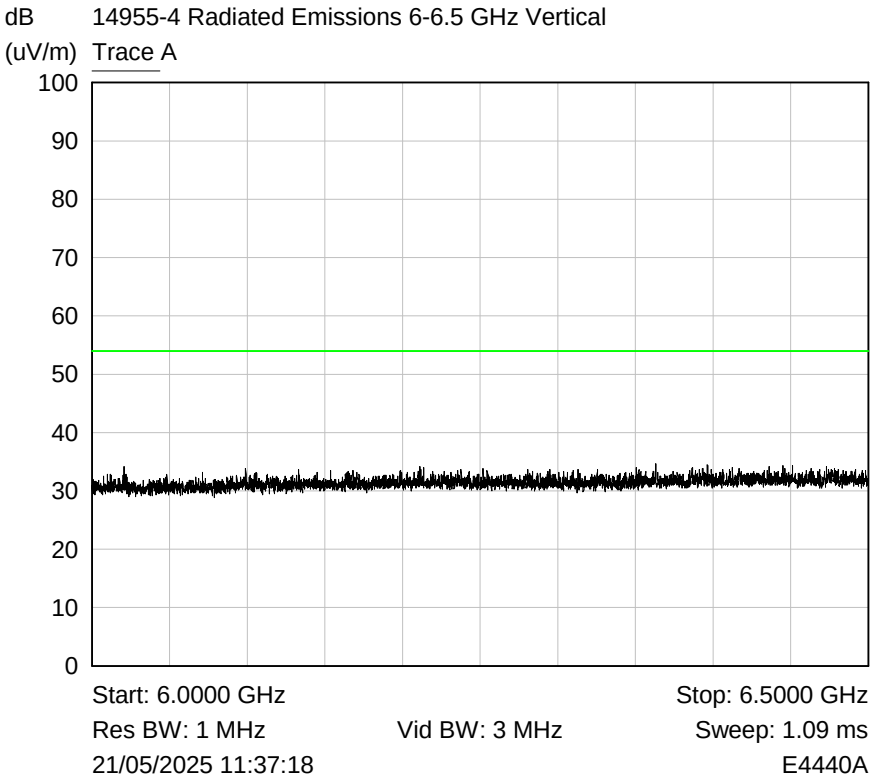


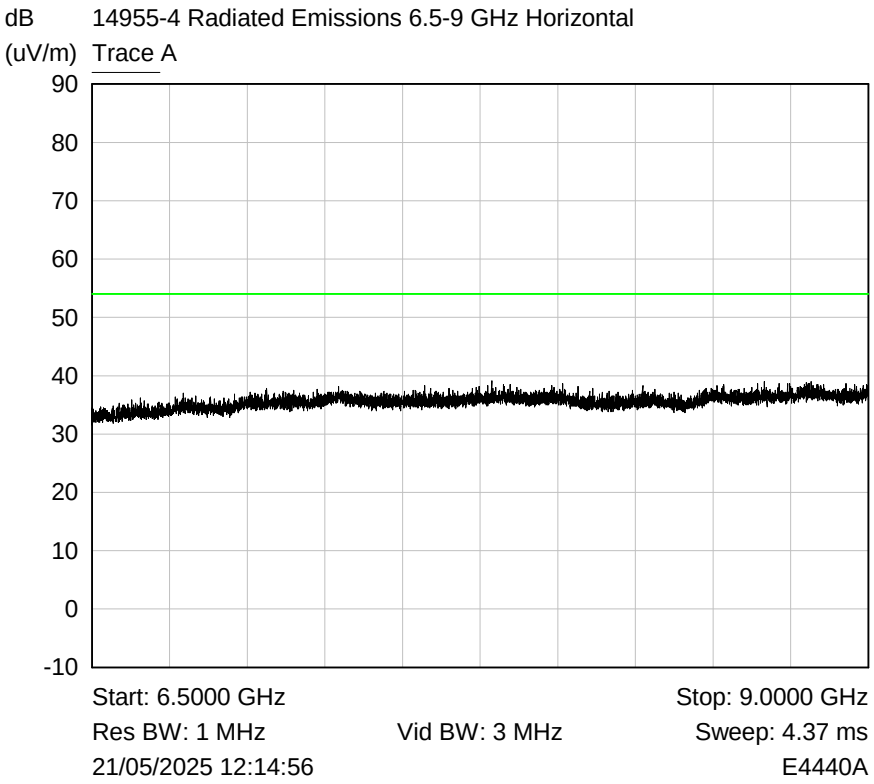


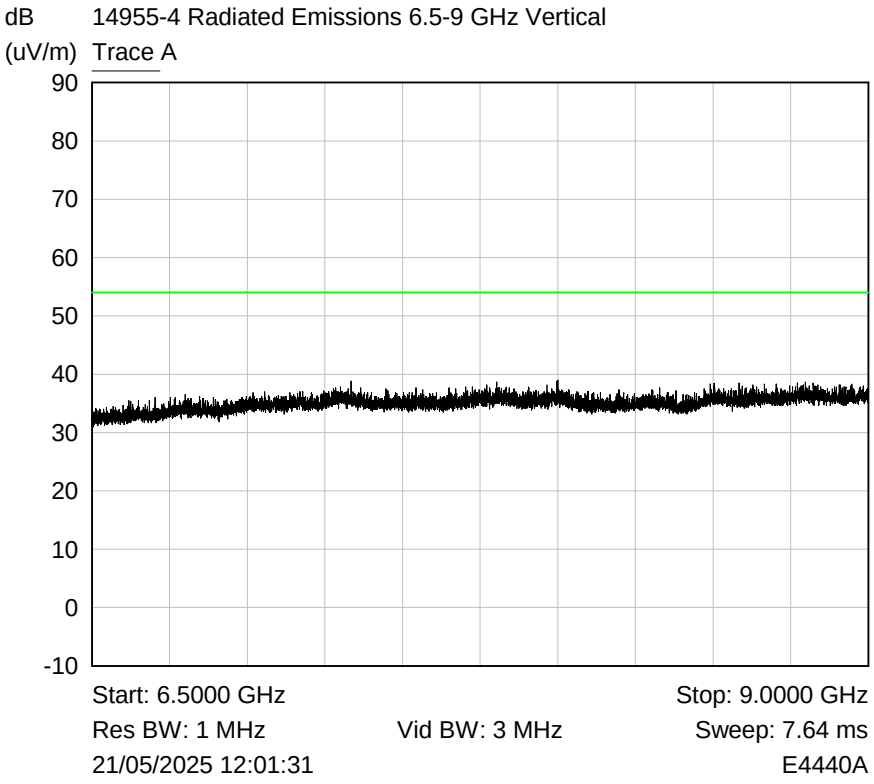


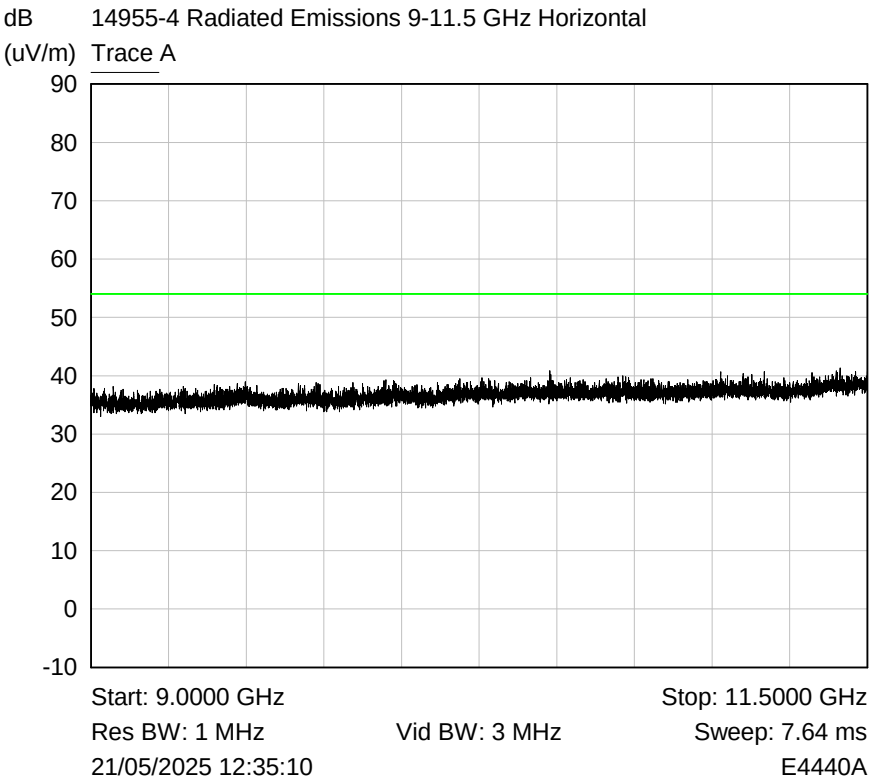


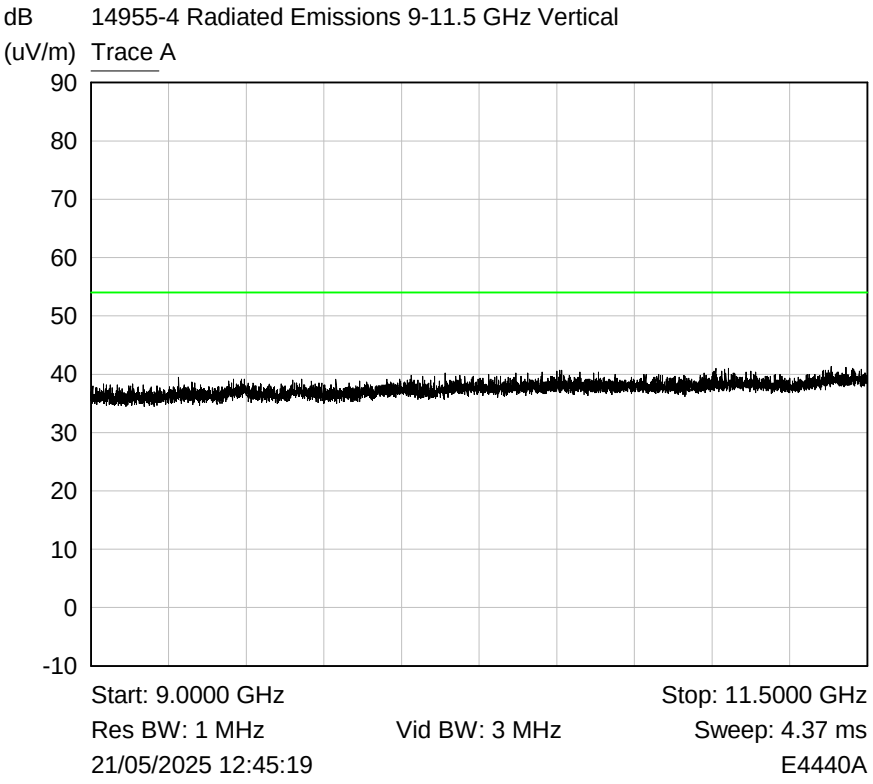


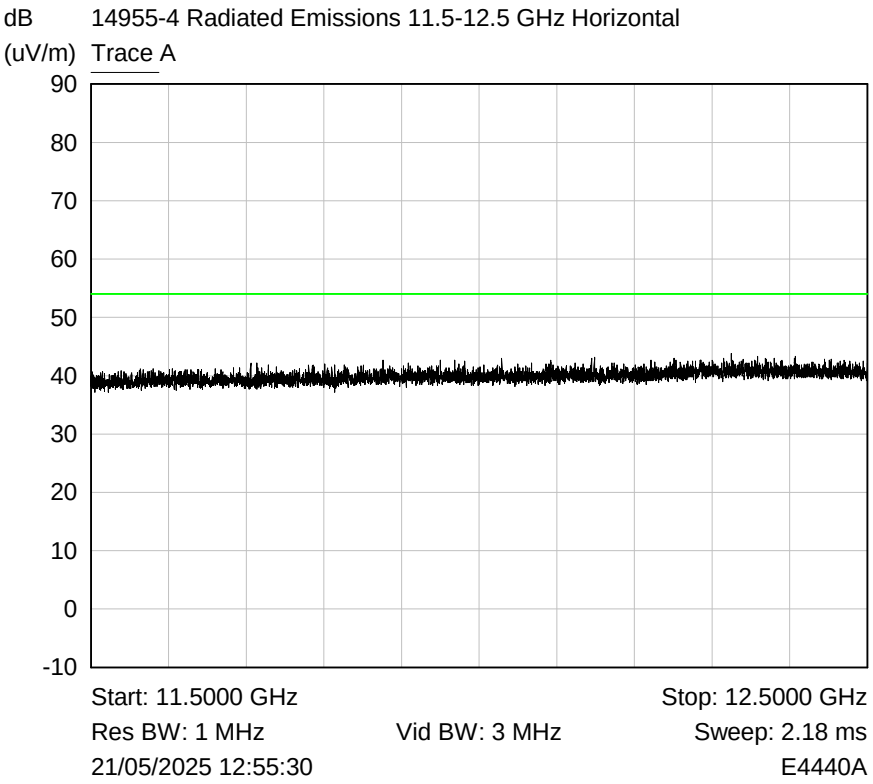


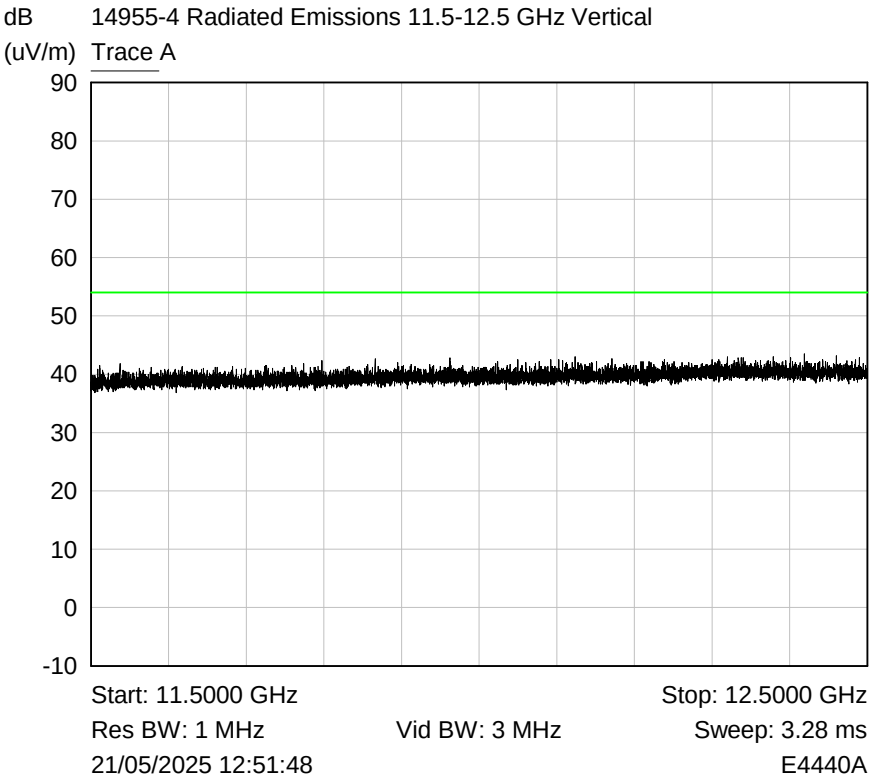


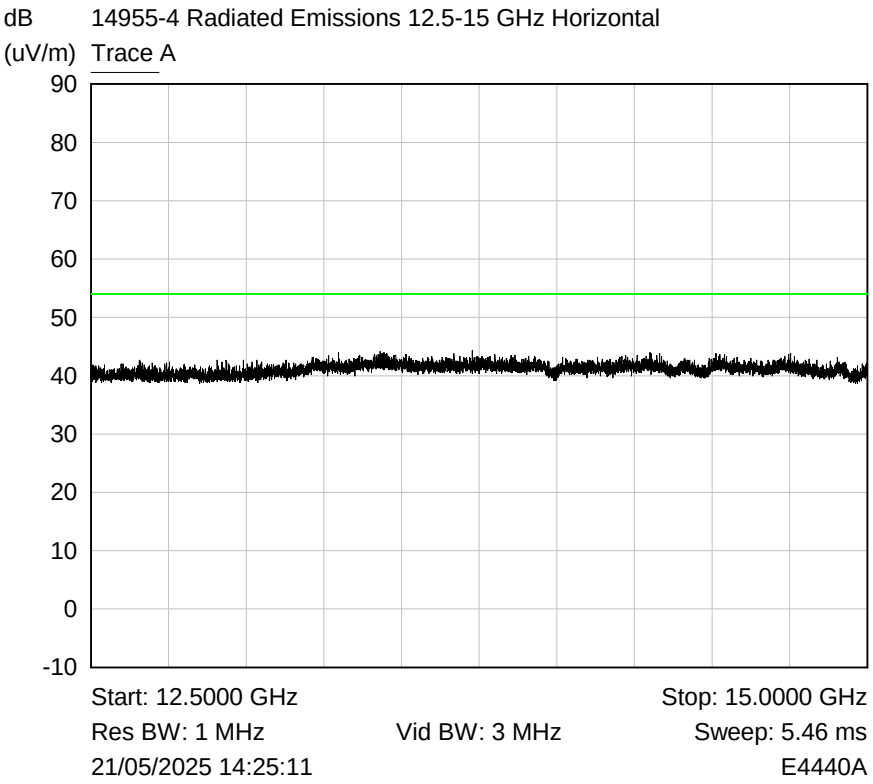


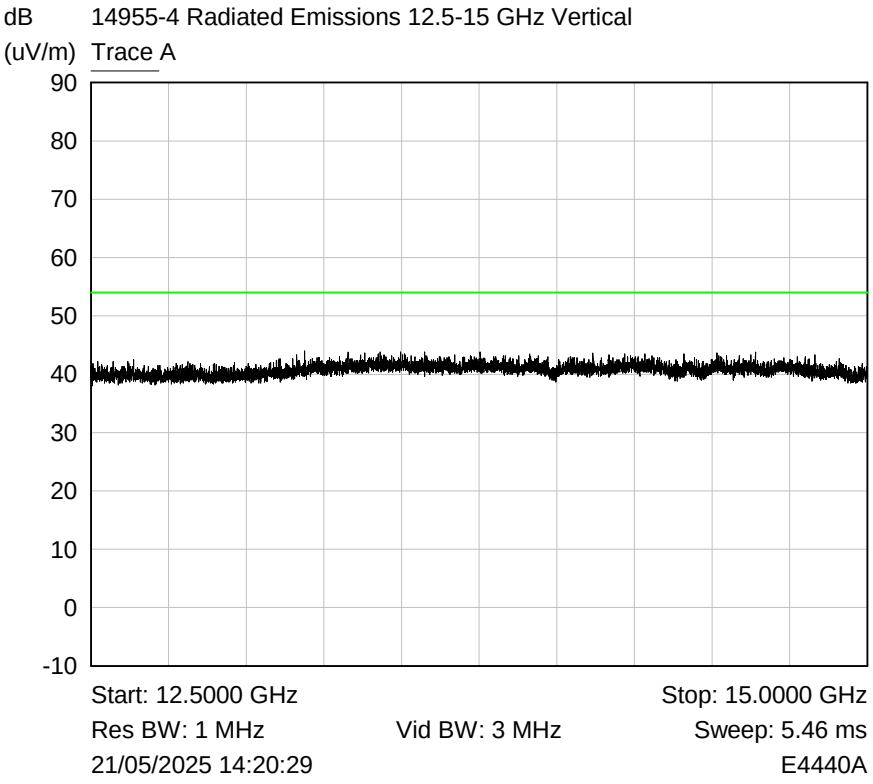


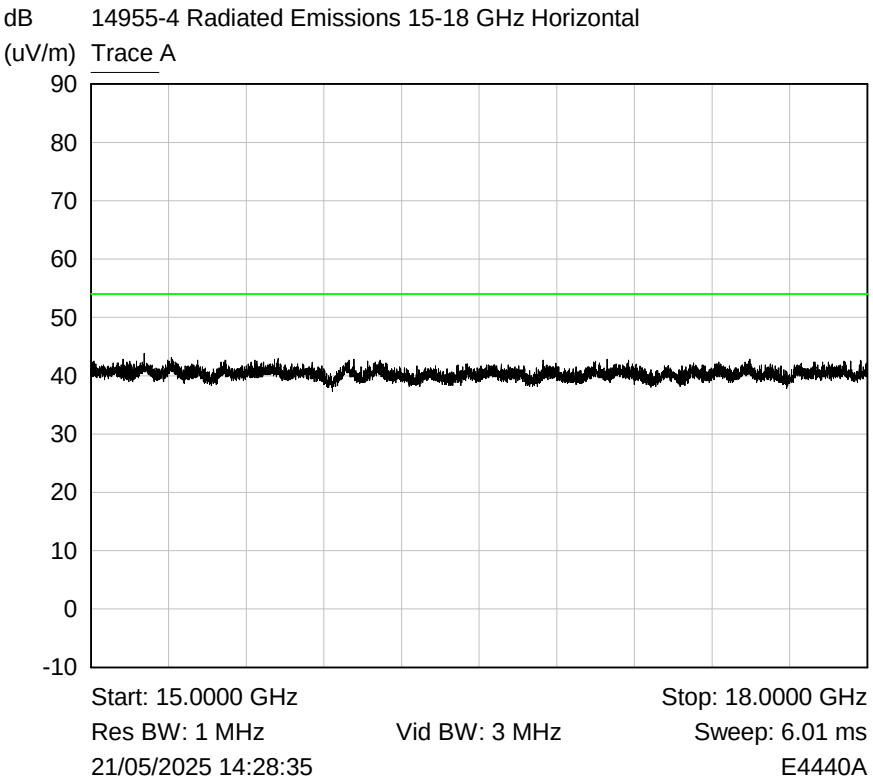


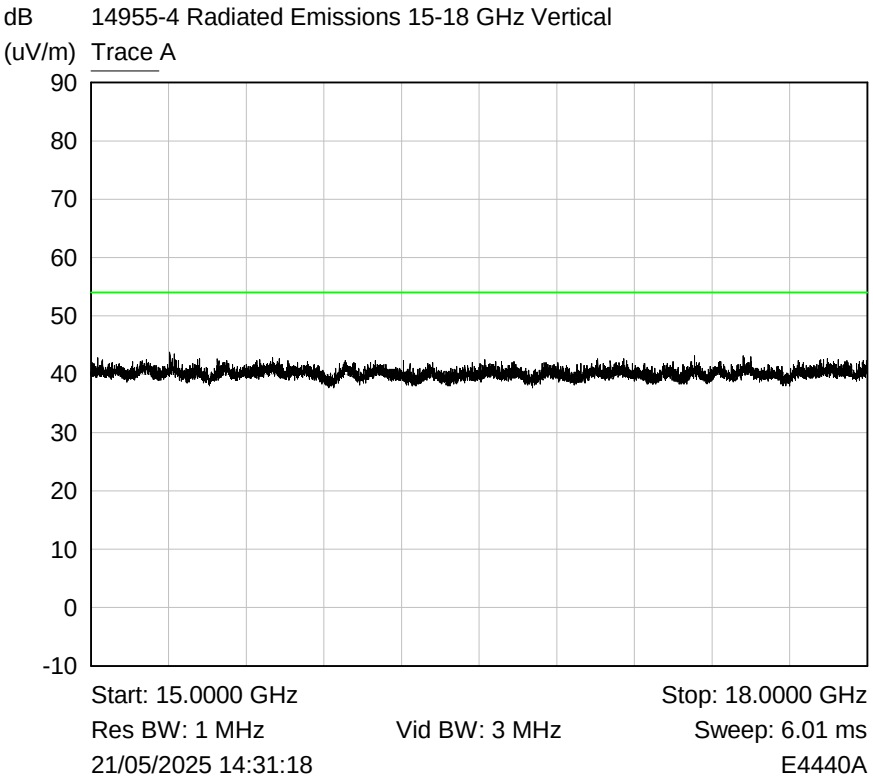




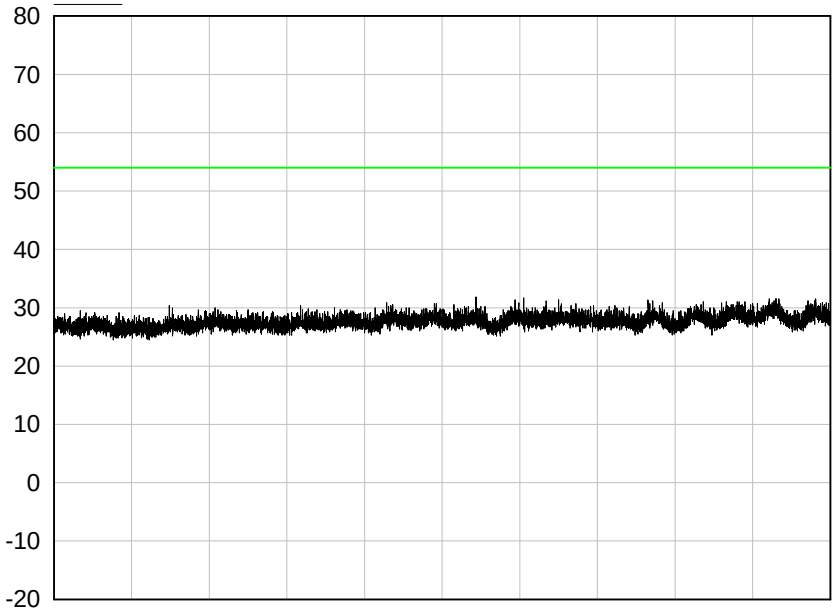






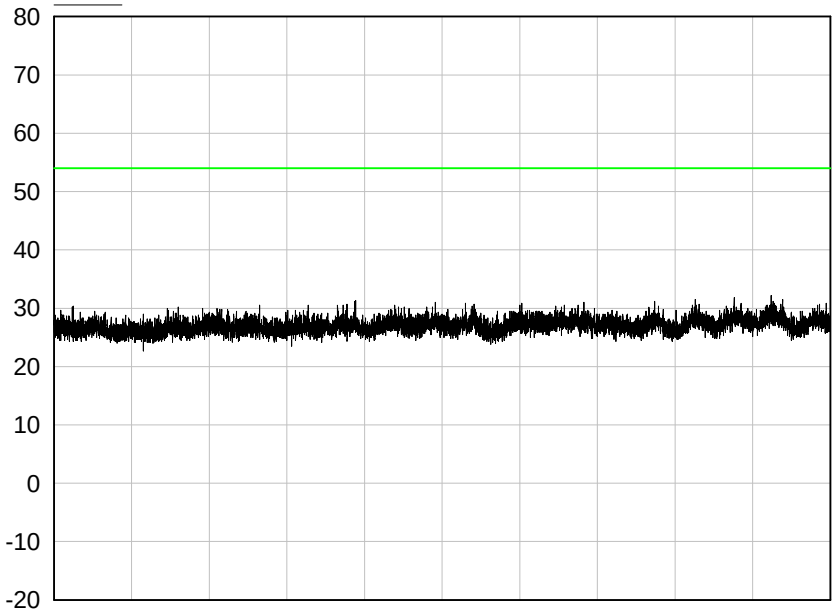


dB 14955-4 Radiated Emissions 18-20 GHz Horizontal
(uV/m) Trace A

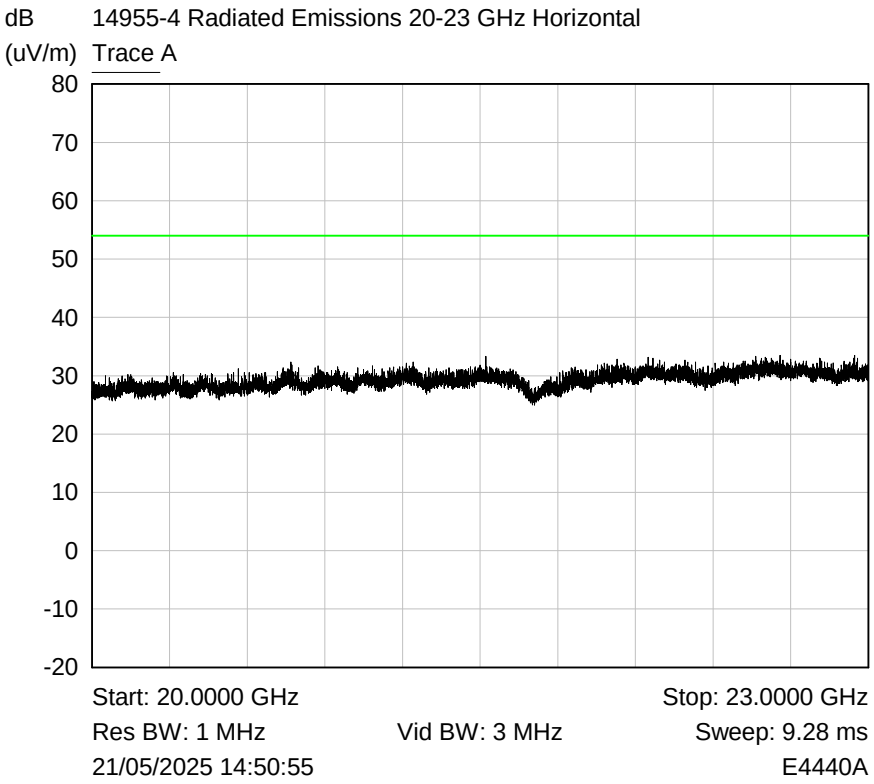


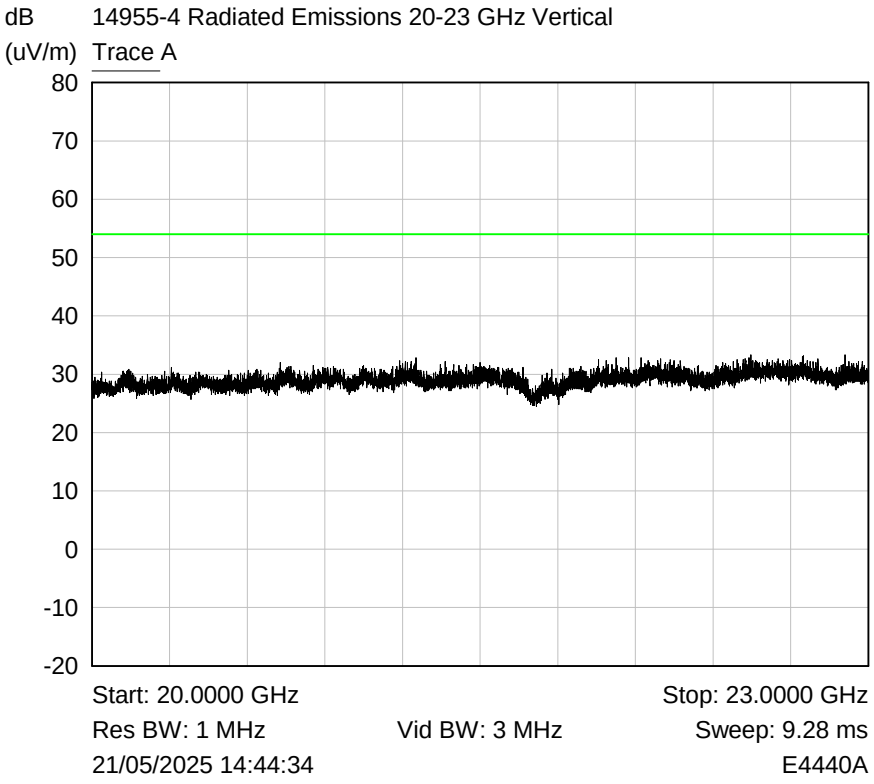
Start: 18.0000 GHz Stop: 20.0000 GHz
Res BW: 1 MHz Vid BW: 3 MHz Sweep: 6.55 ms
21/05/2025 14:53:10 E4440A

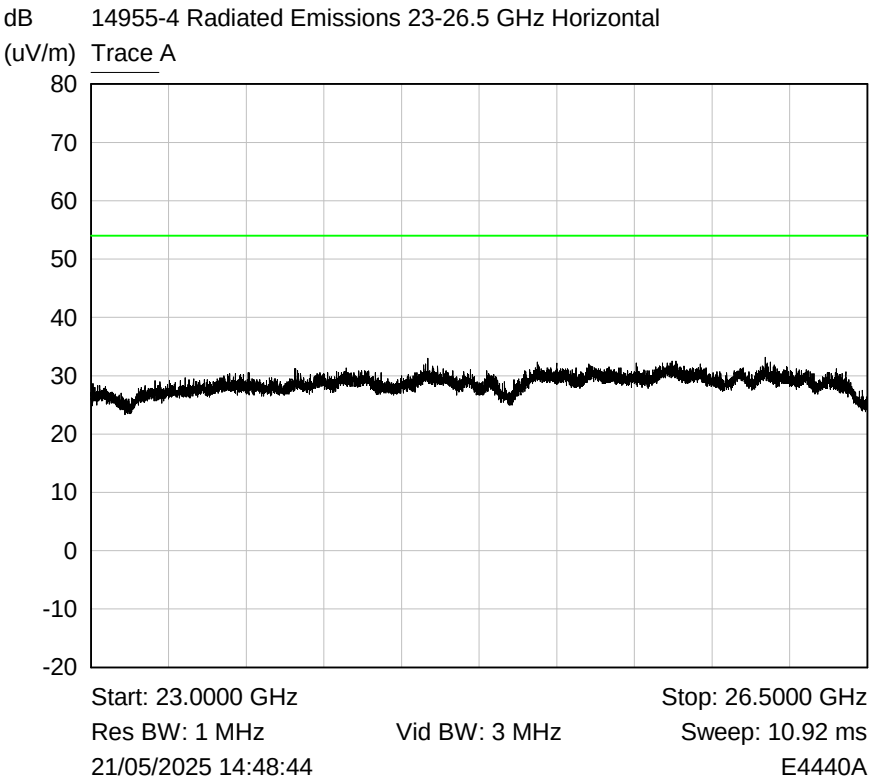
dB 14955-4 Radiated Emissions 18-20 GHz Vertical
(uV/m) Trace A

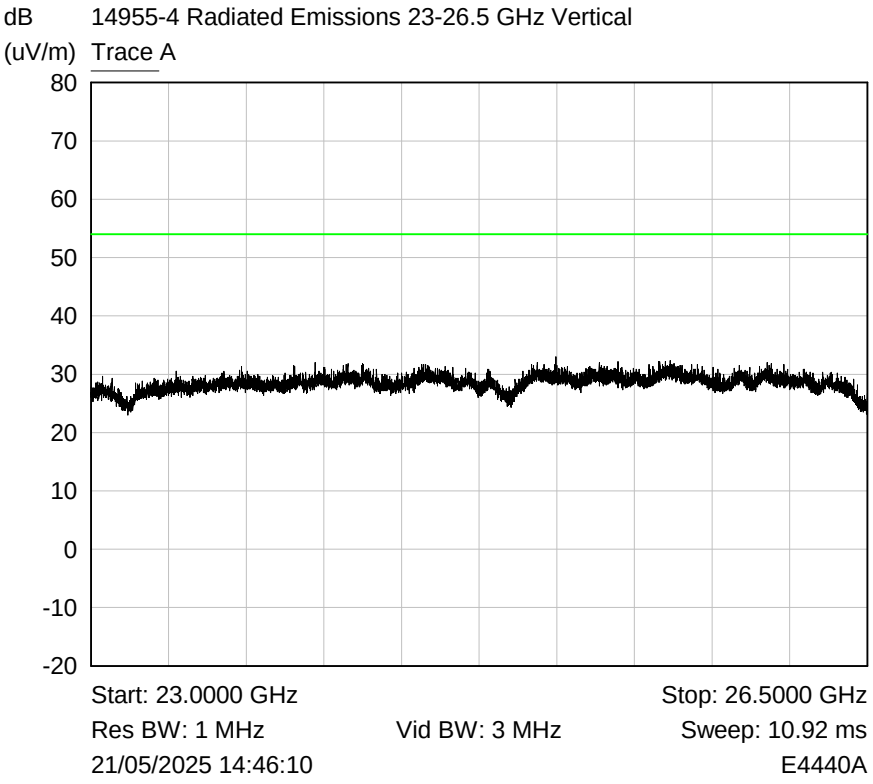


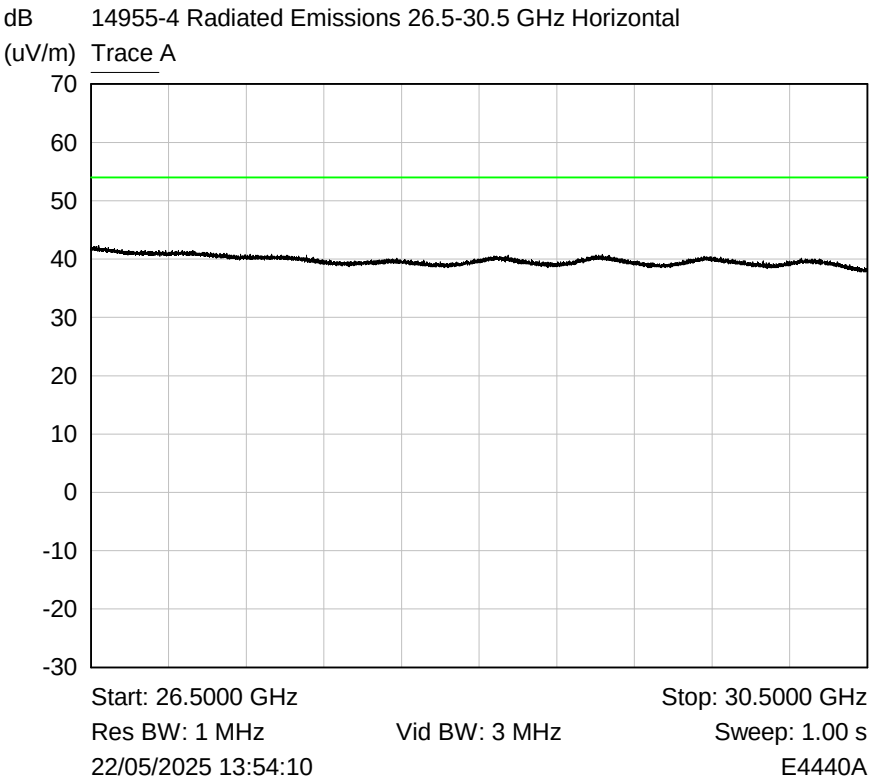
Start: 18.0000 GHz Stop: 20.0000 GHz
Res BW: 1 MHz Vid BW: 3 MHz Sweep: 6.55 ms
21/05/2025 14:43:01 E4440A

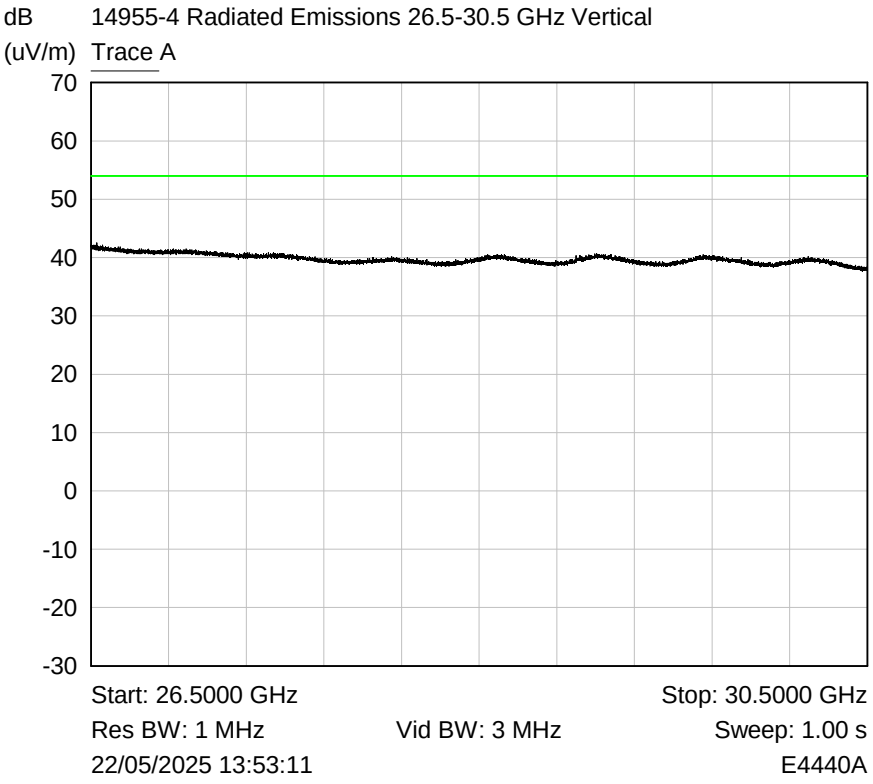


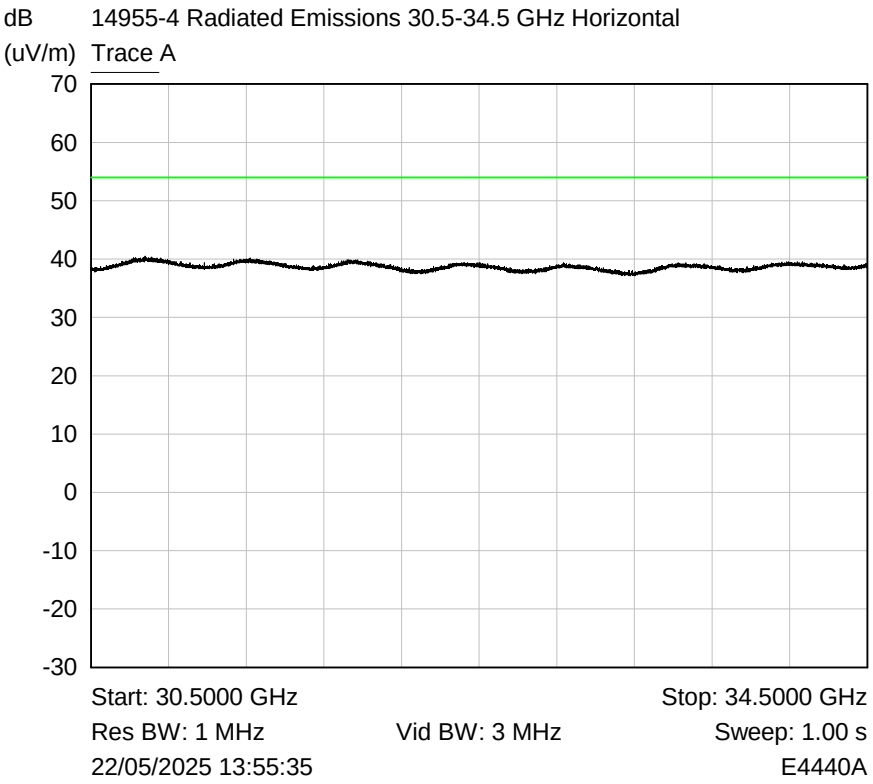


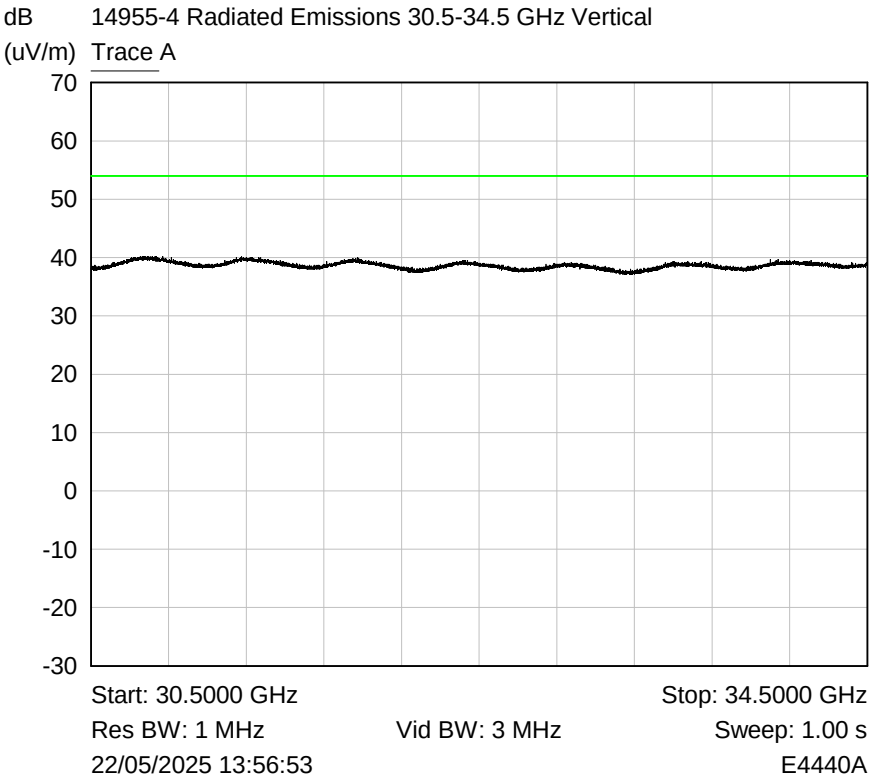


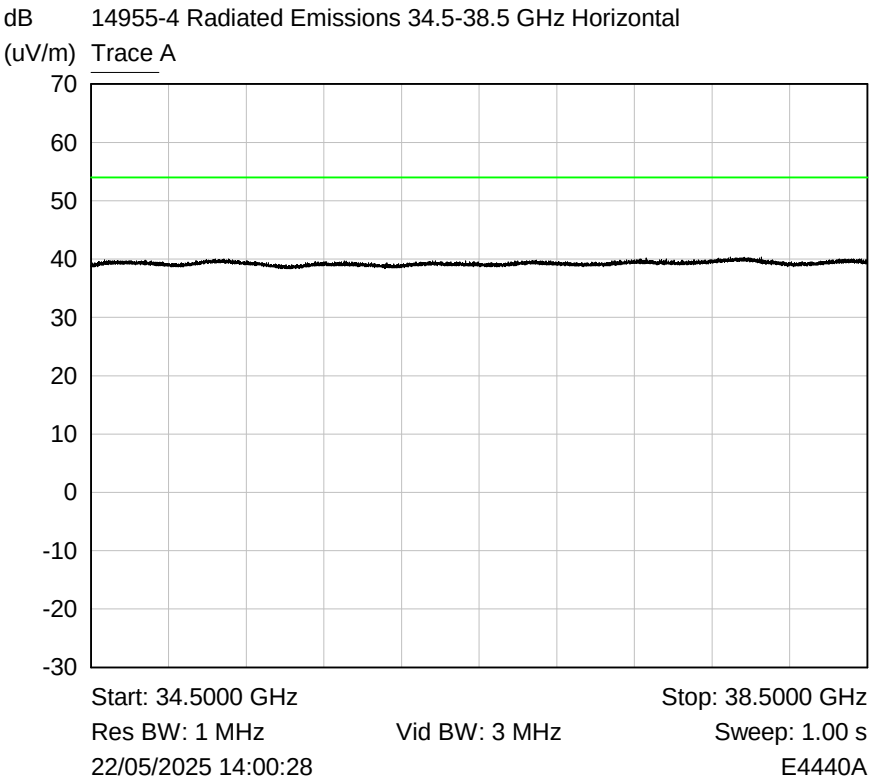


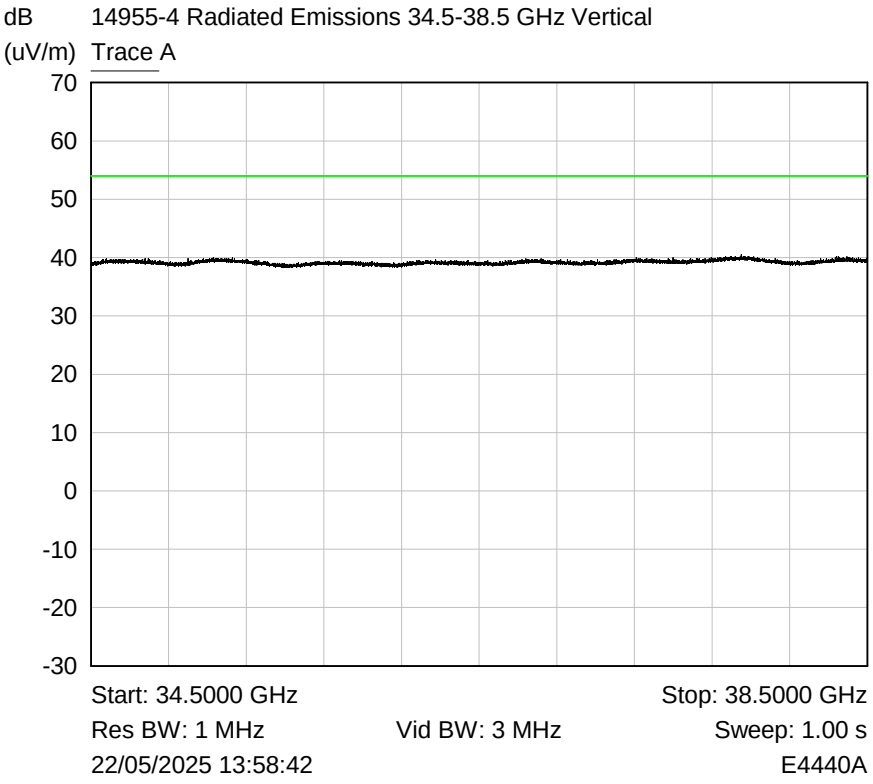


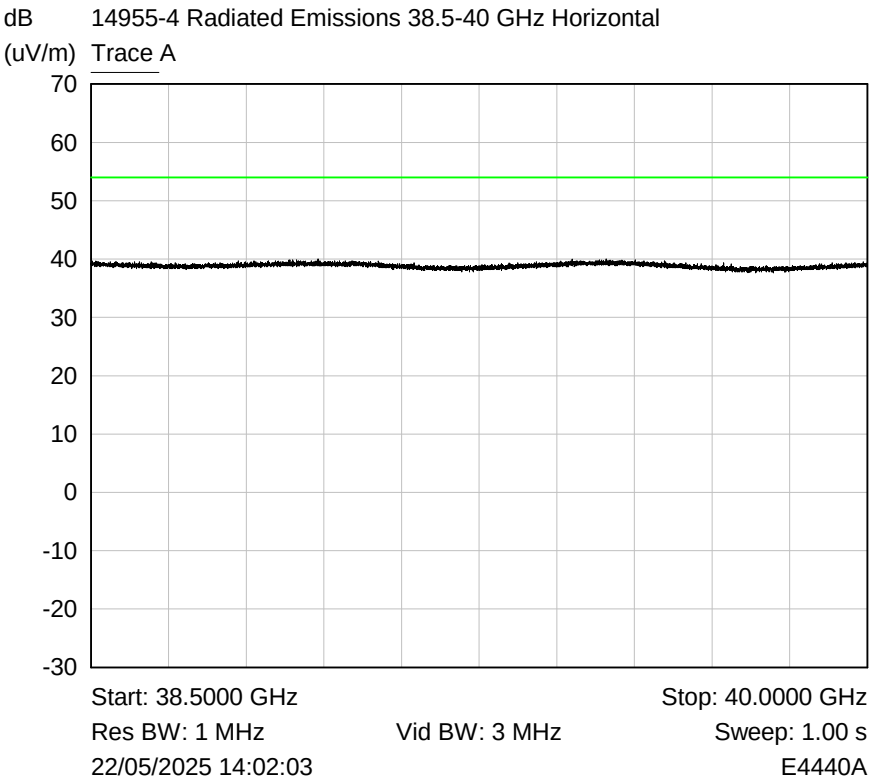


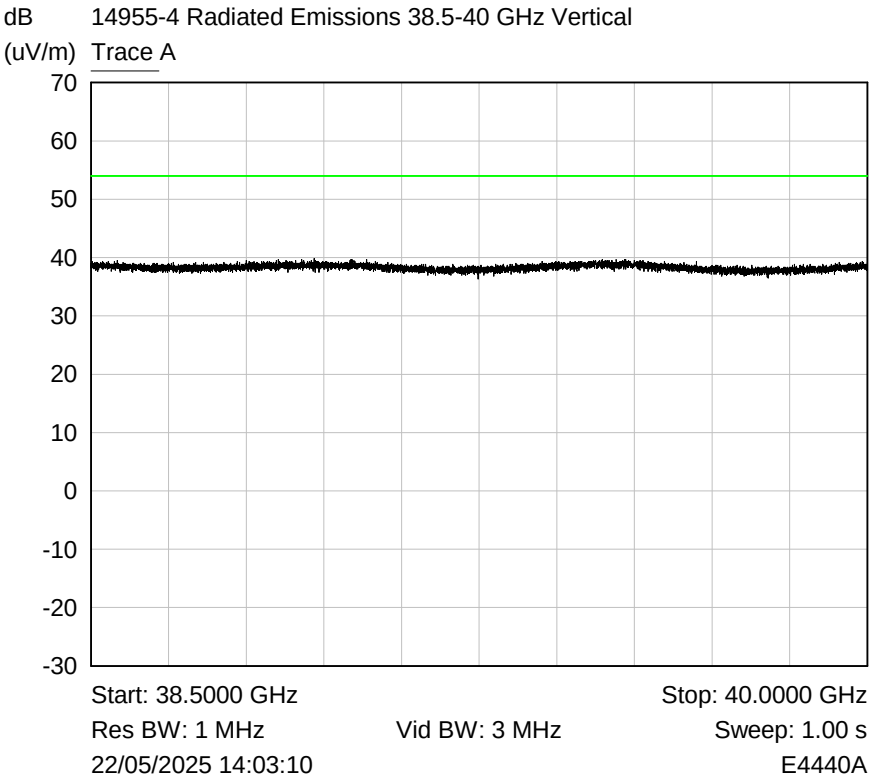






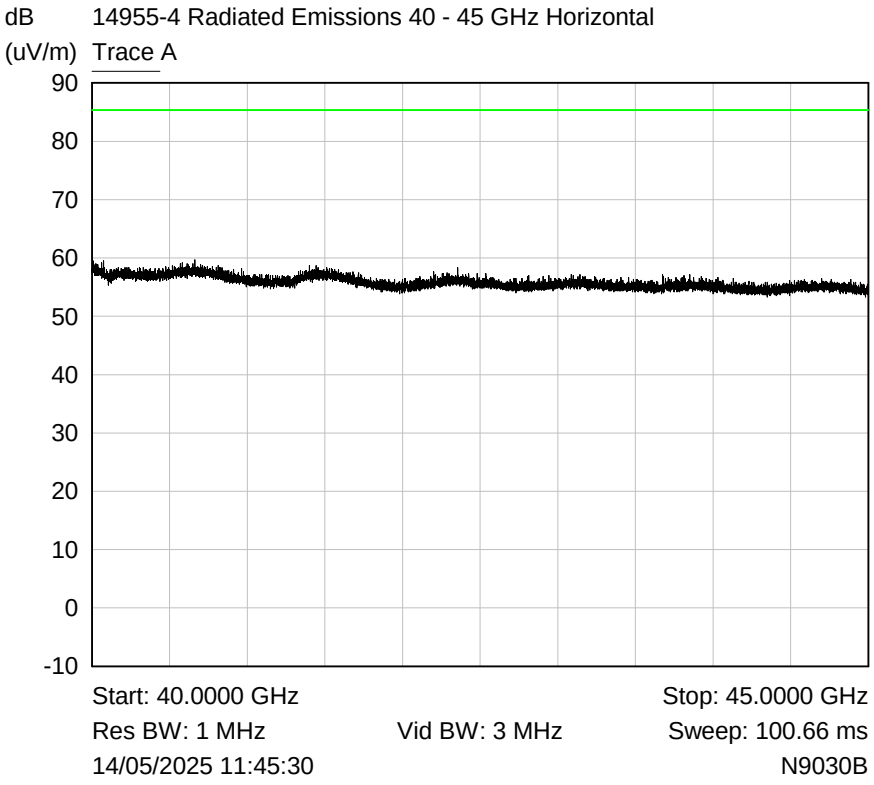


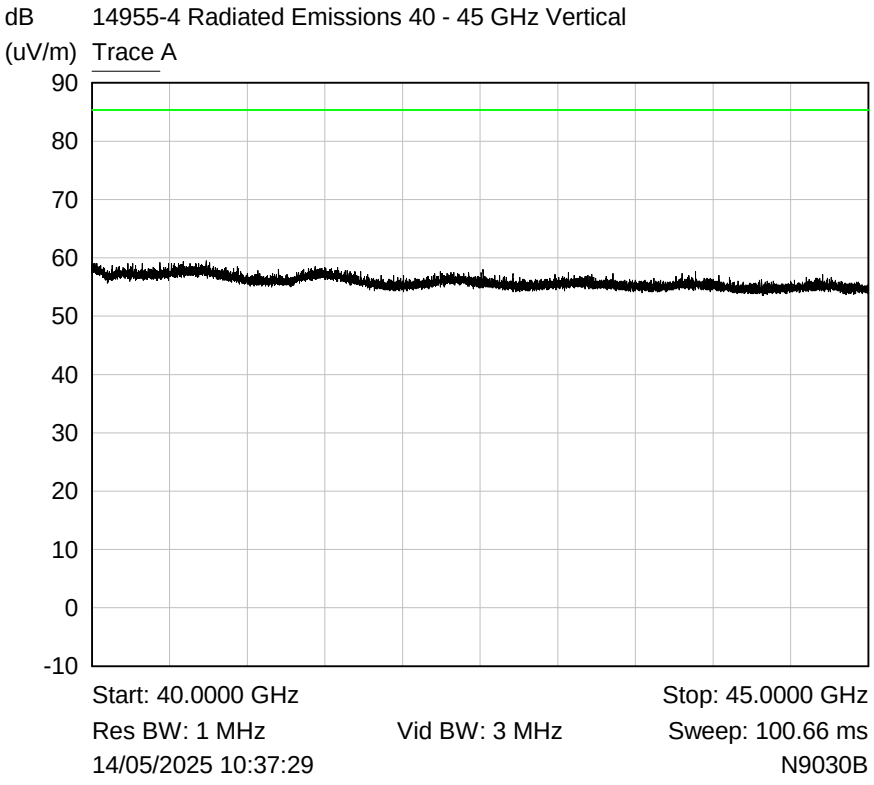


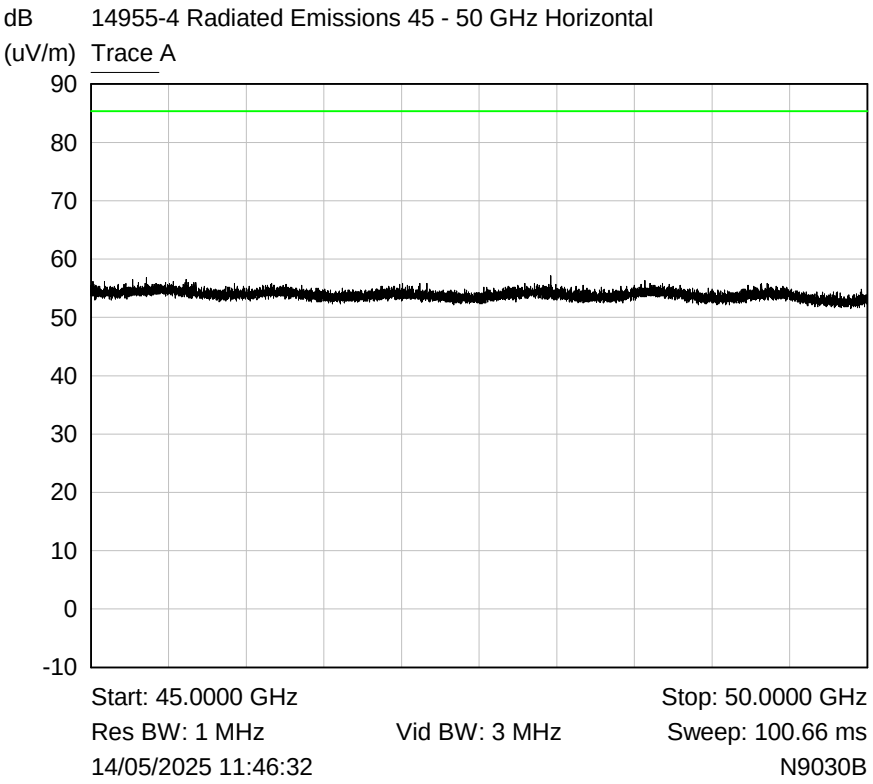


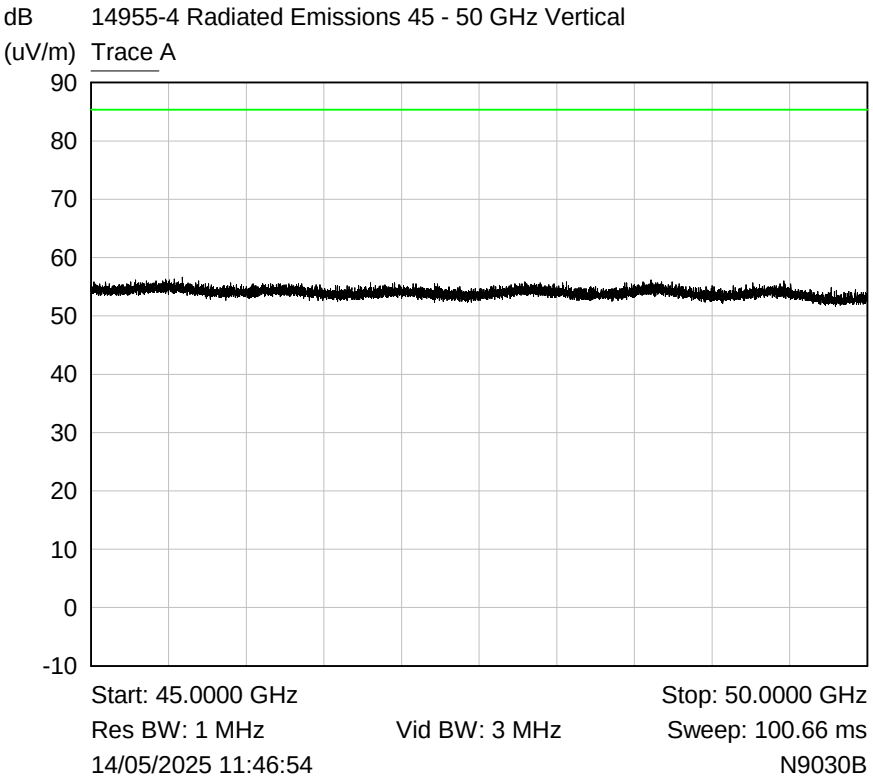
6.5 Radiated emissions 40 - 200 GHz

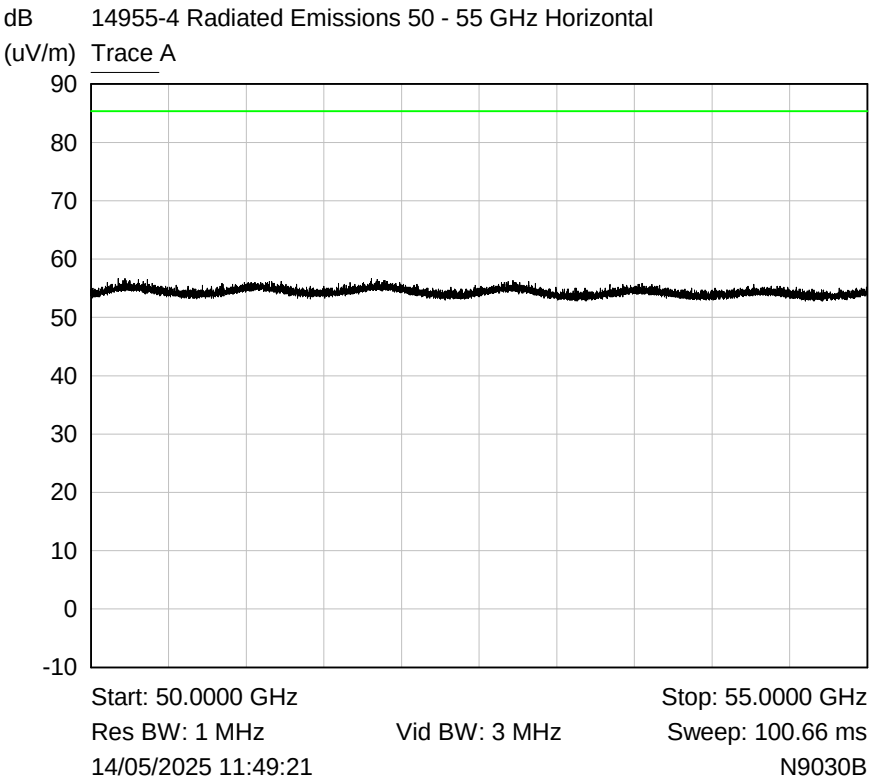
RF Parameters: Band 57-61.56 GHz, Power Maximum, Channel Spacing Single Channel, Modulation FMCW, Channel 59.83 GHz

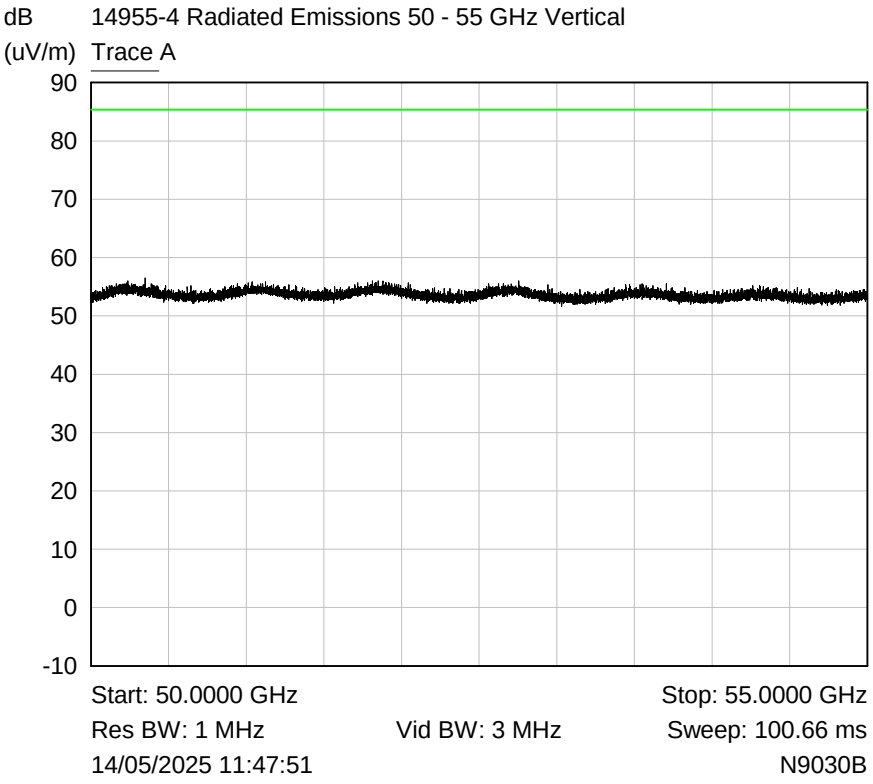


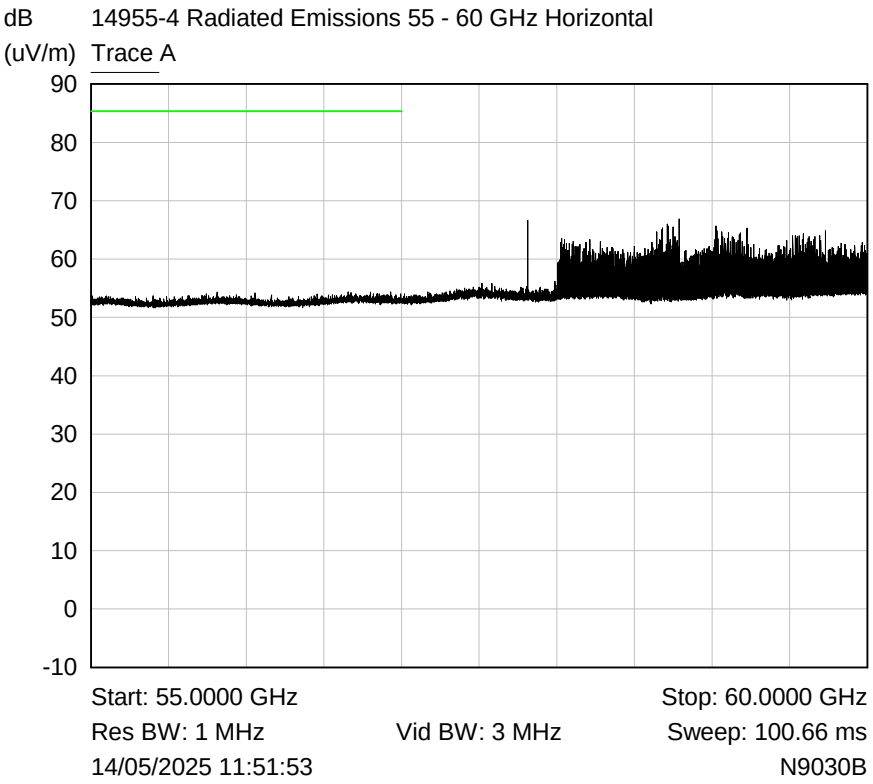




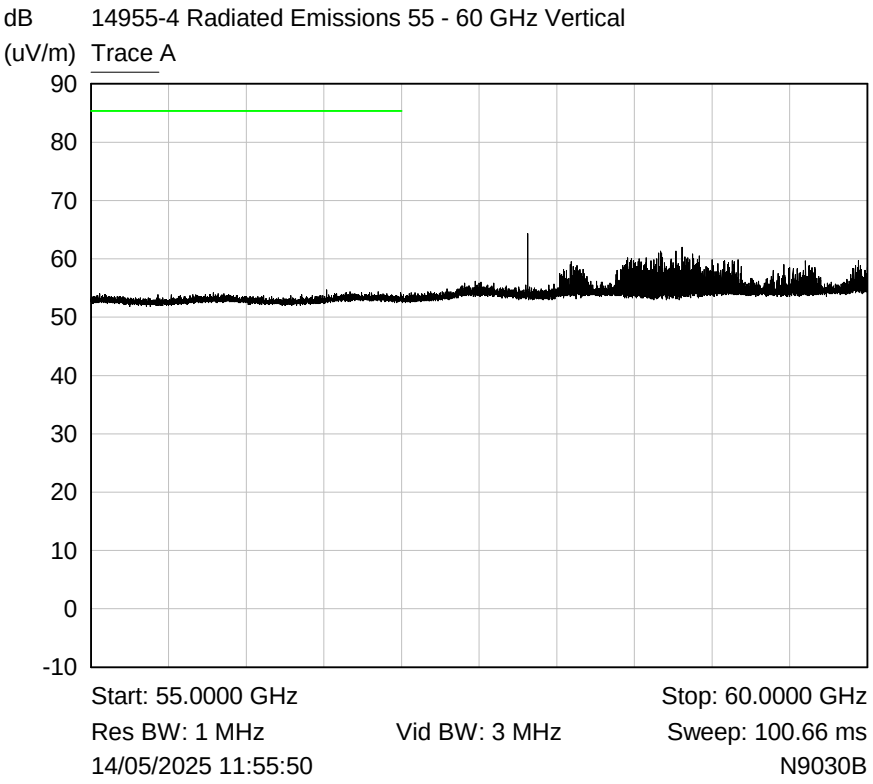




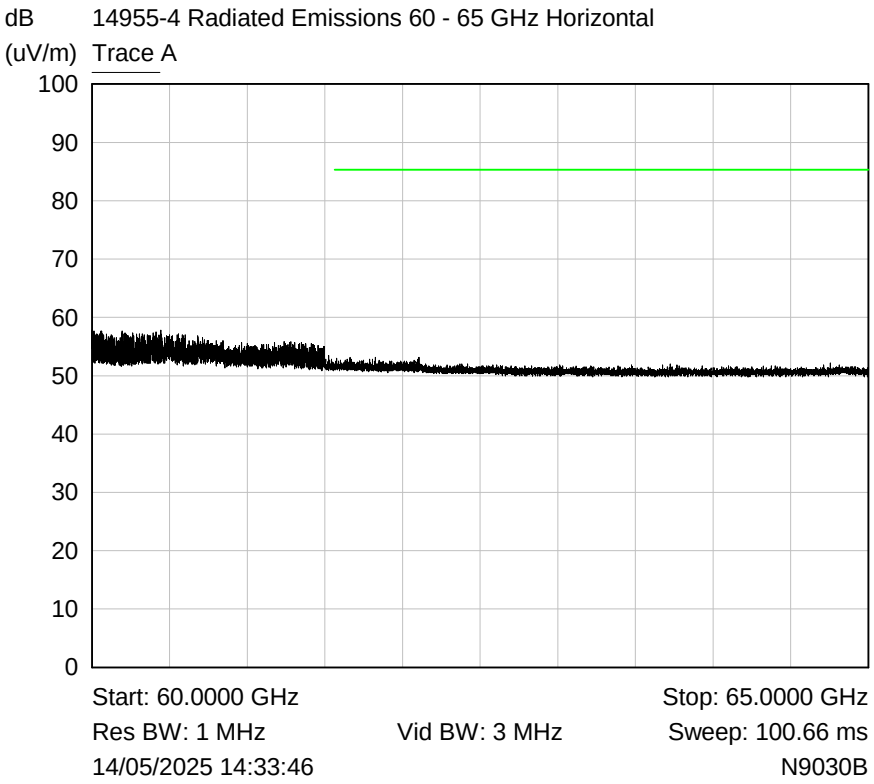




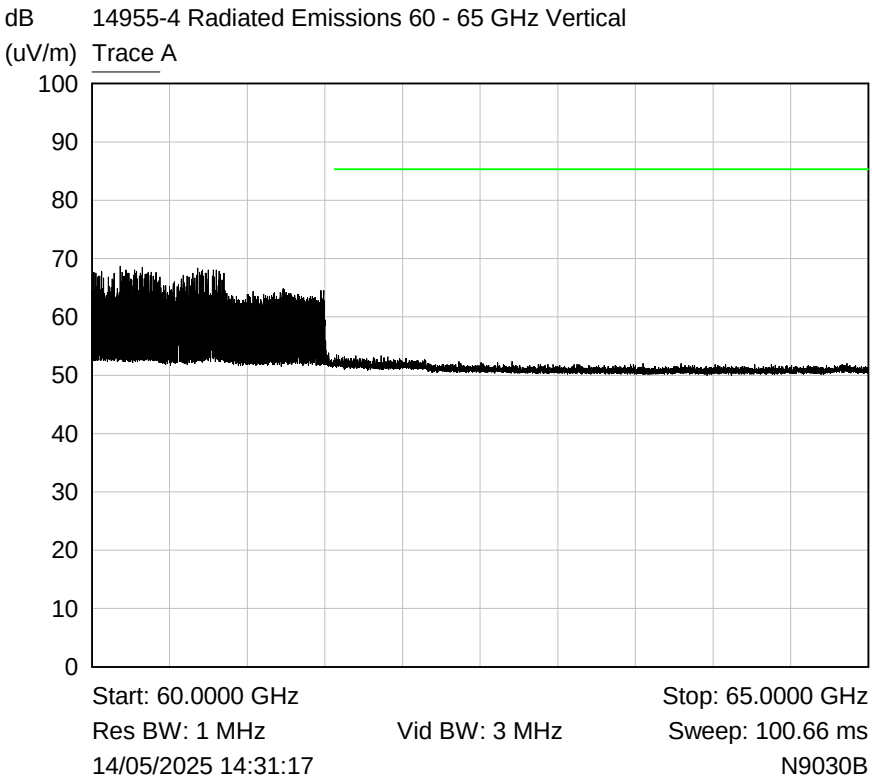
Plot shows the FMCW fundamental



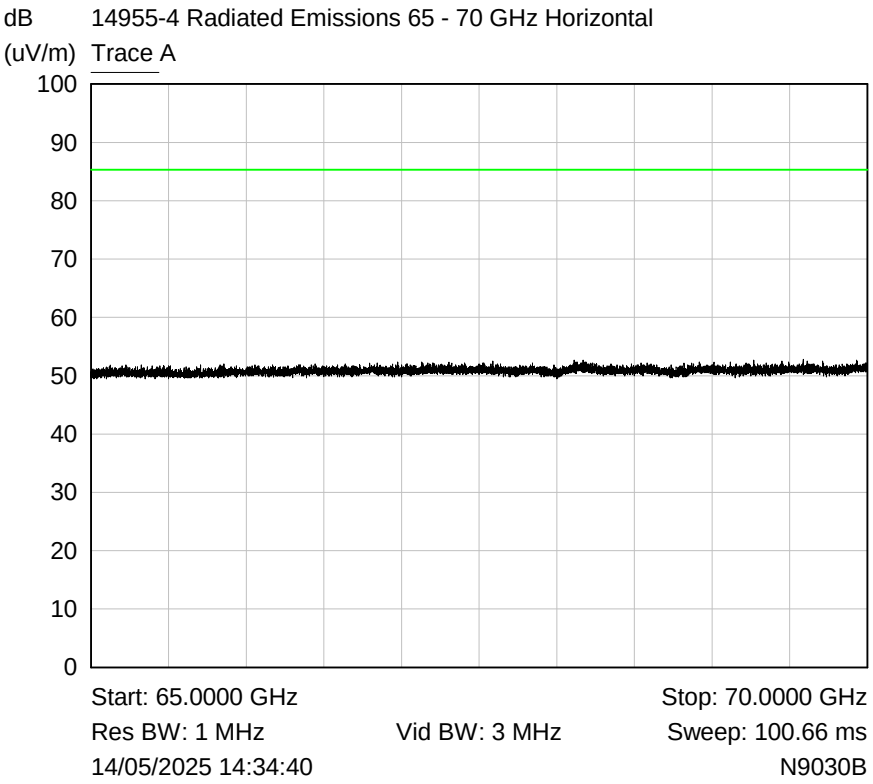
Plot shows the FMCW fundamental

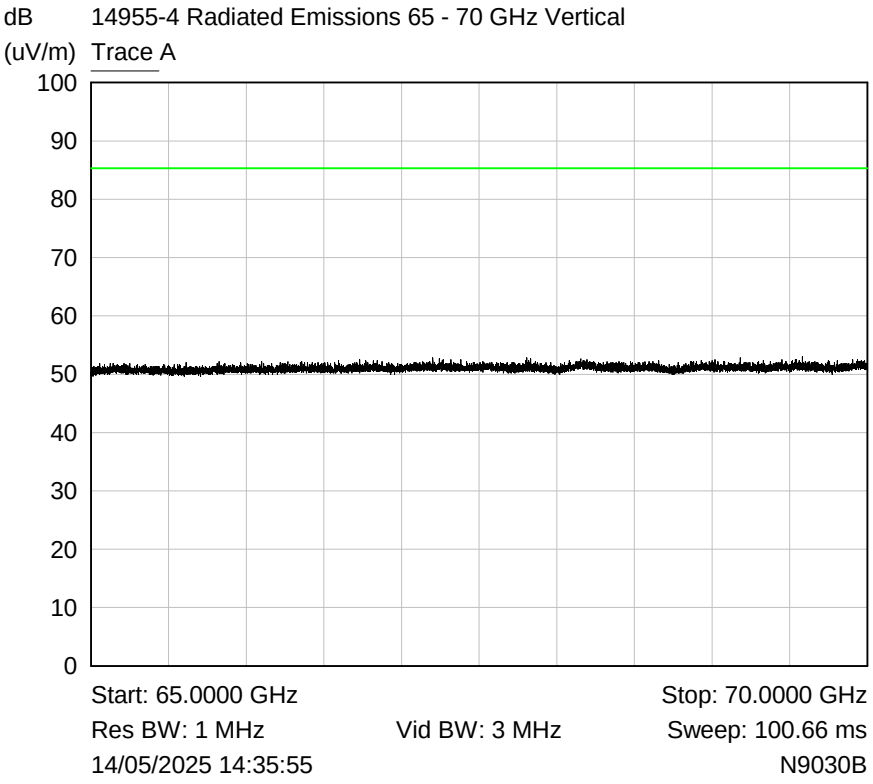


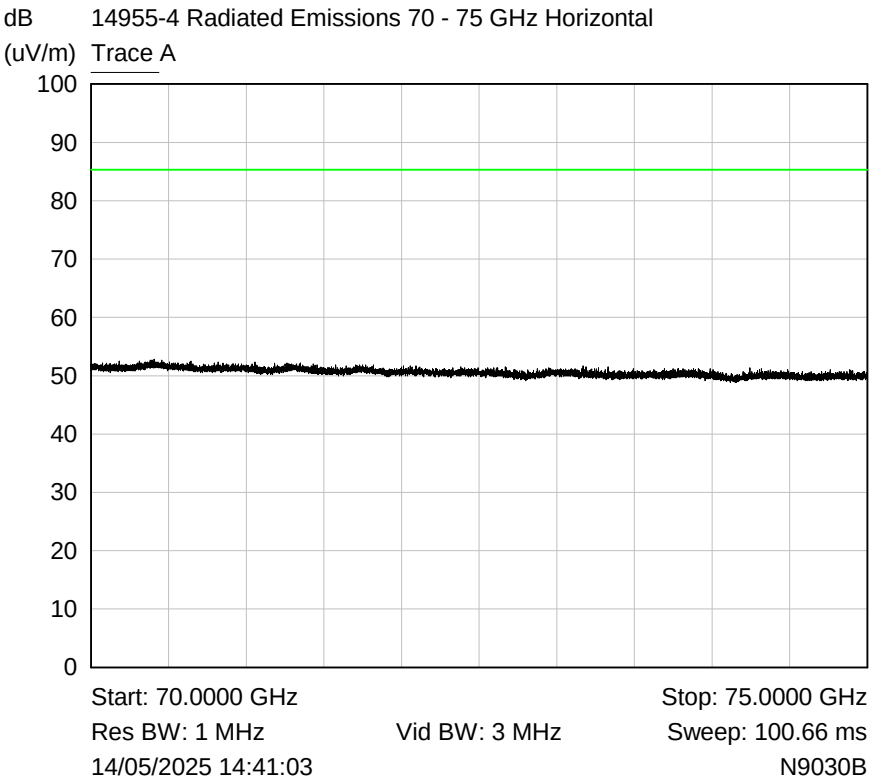
Plot shows the FMCW fundamental

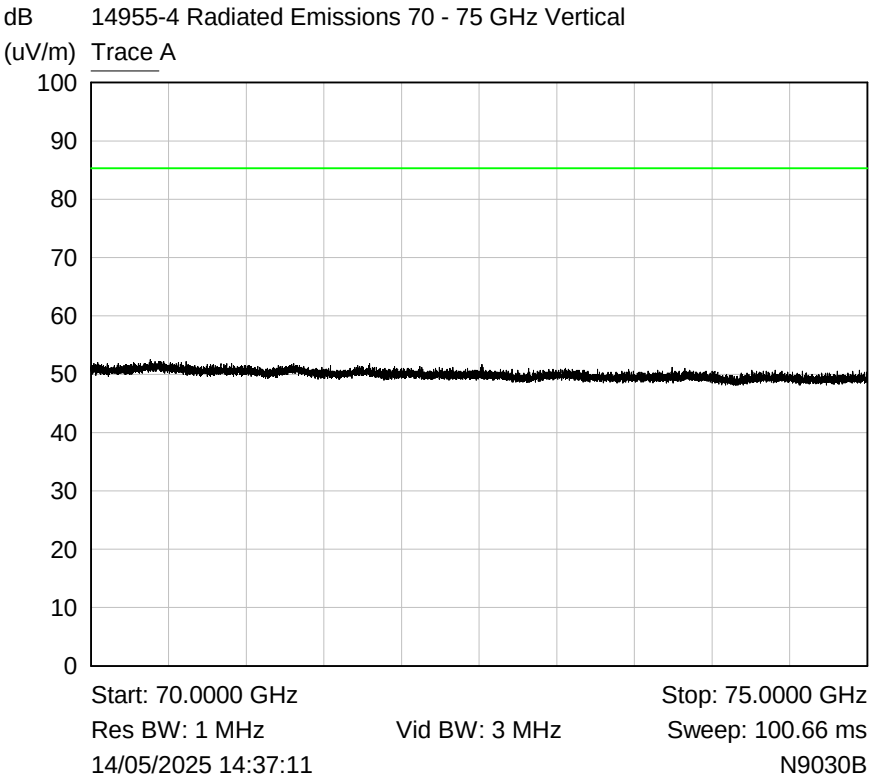


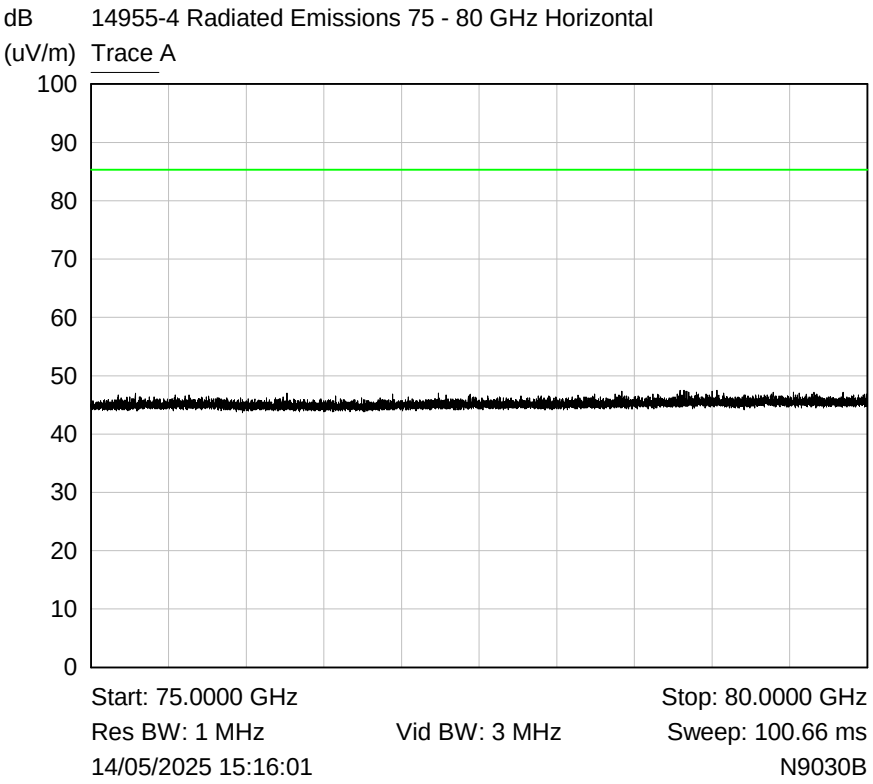
Plot shows the FMCW fundamental

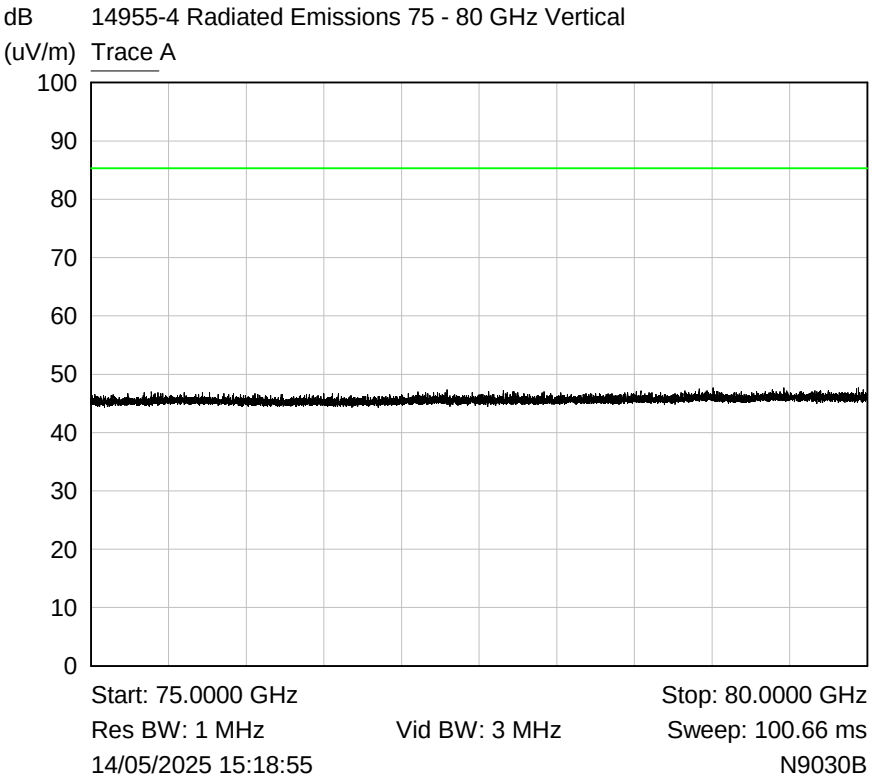


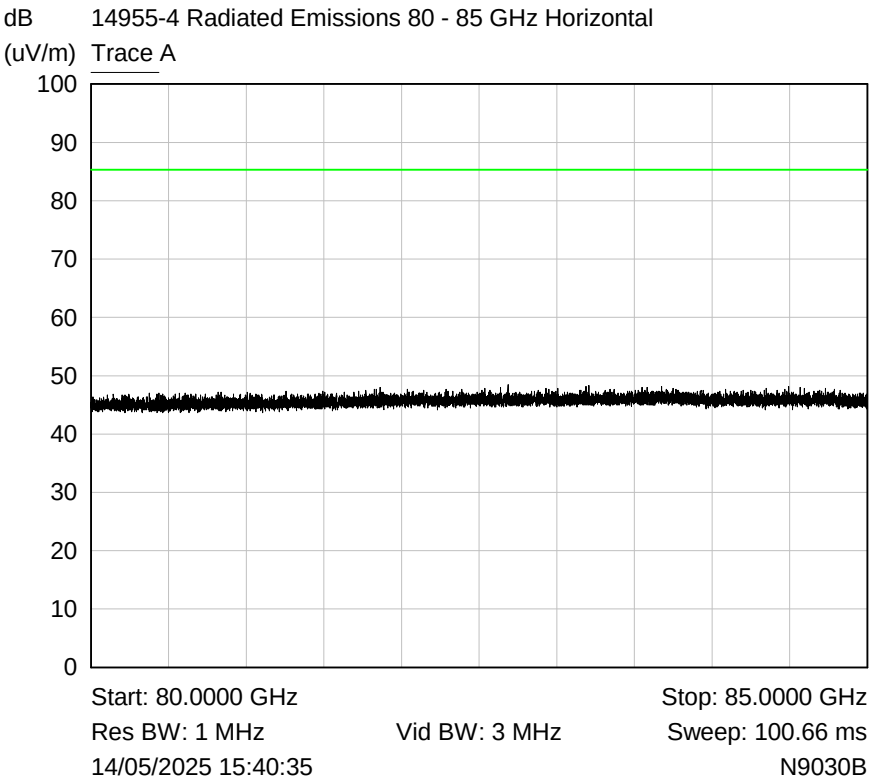


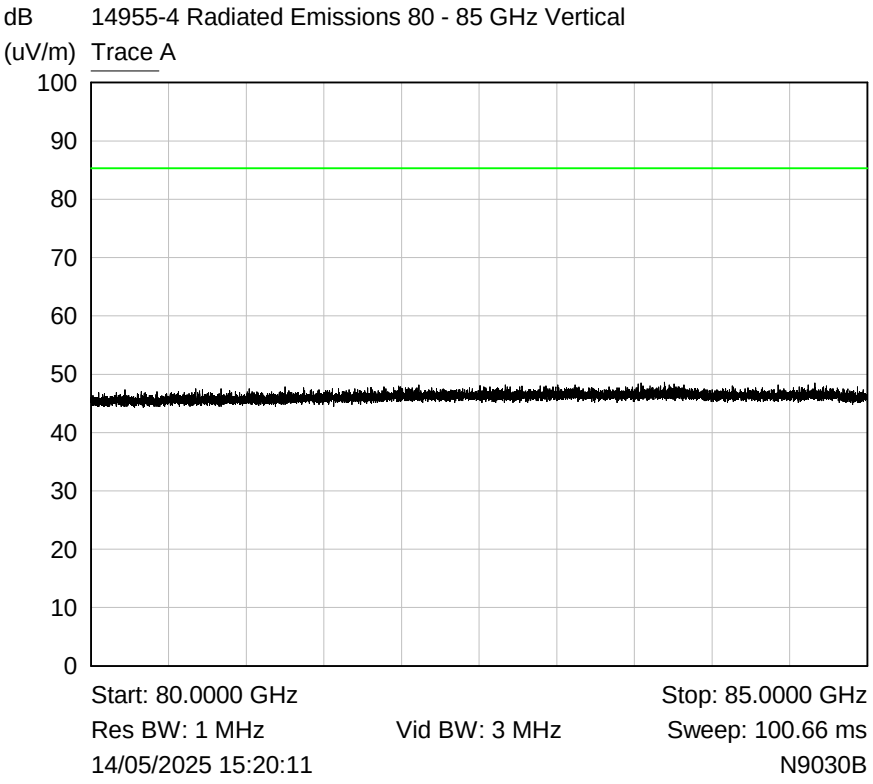


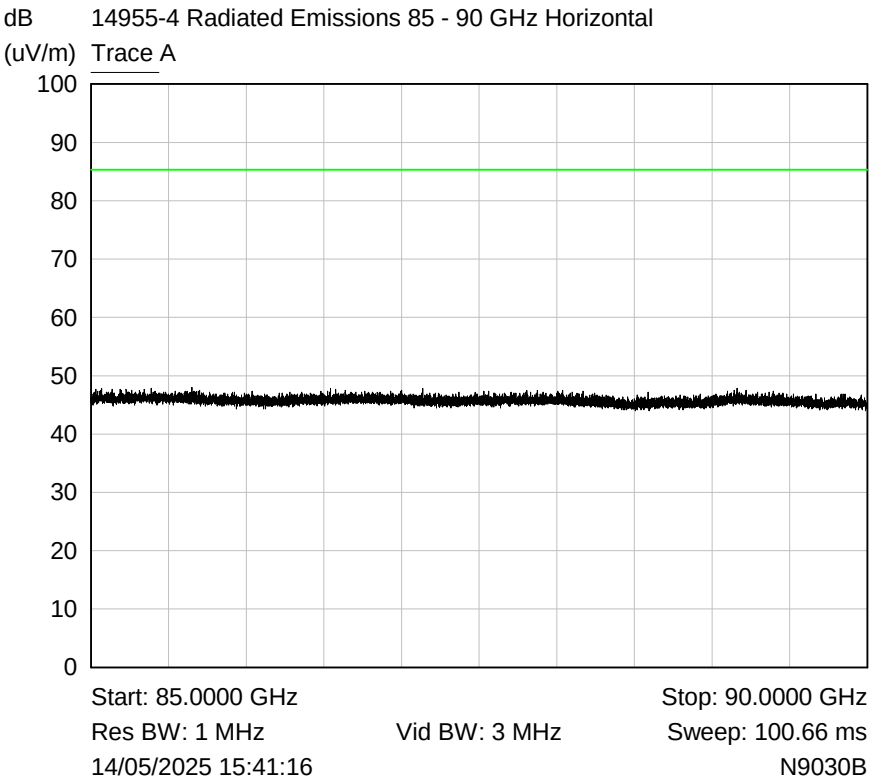


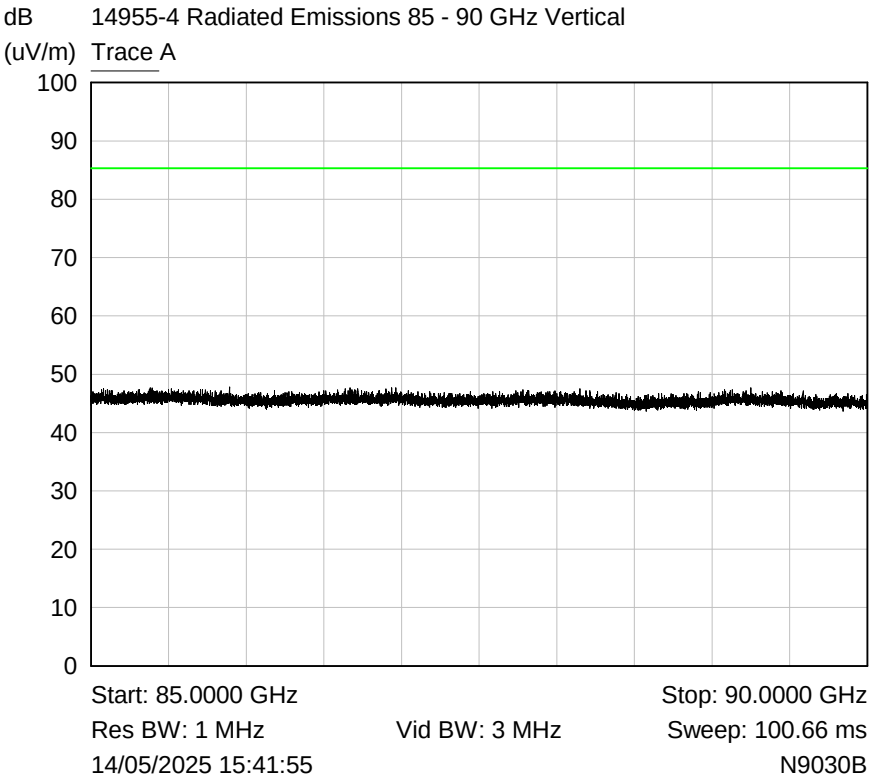


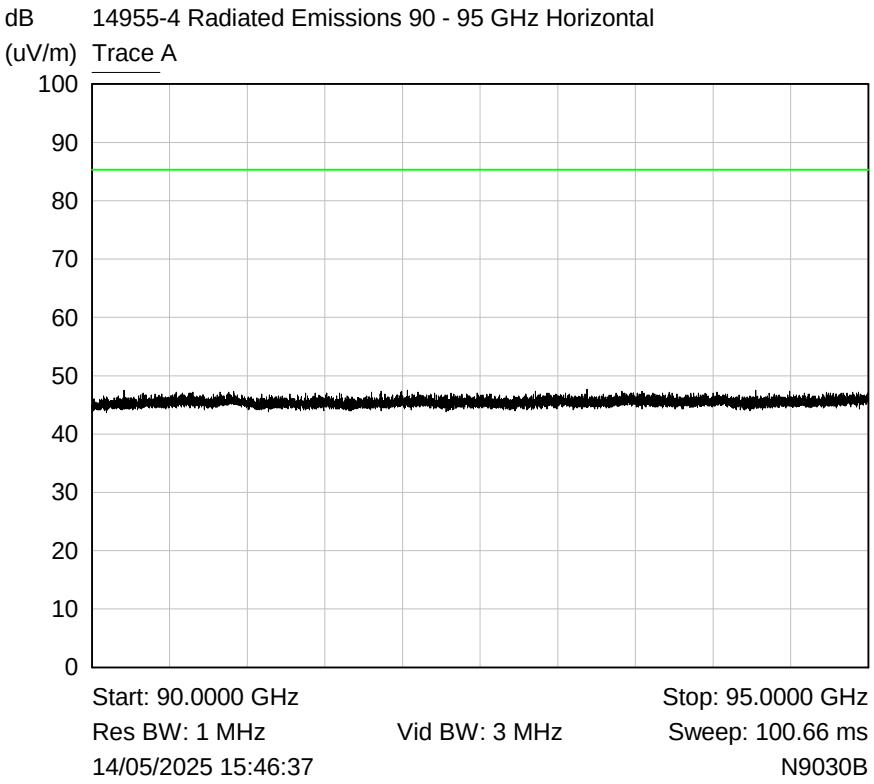


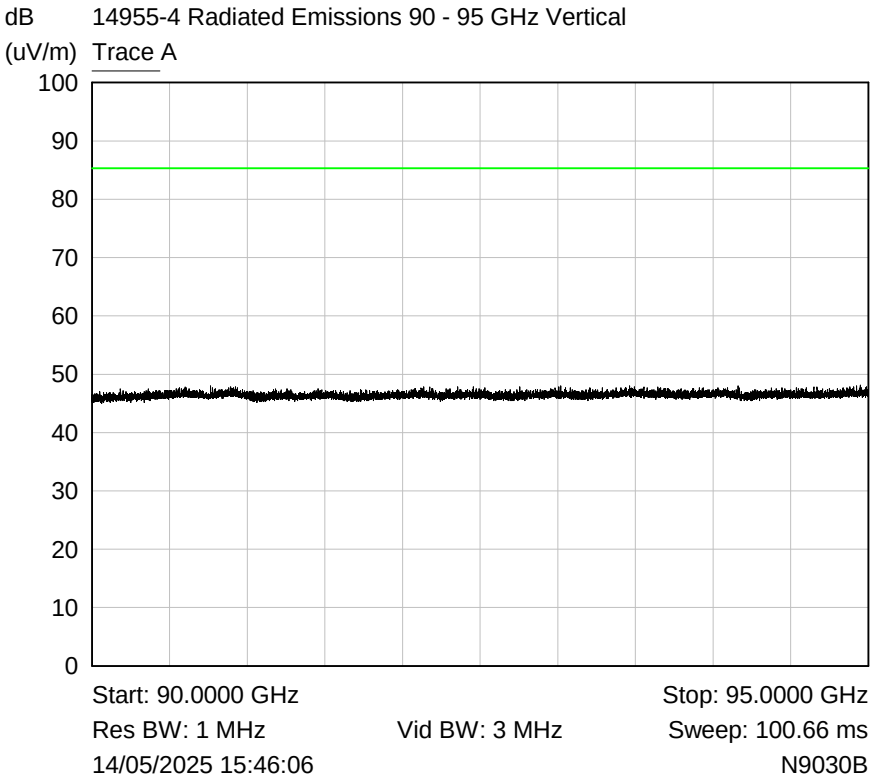


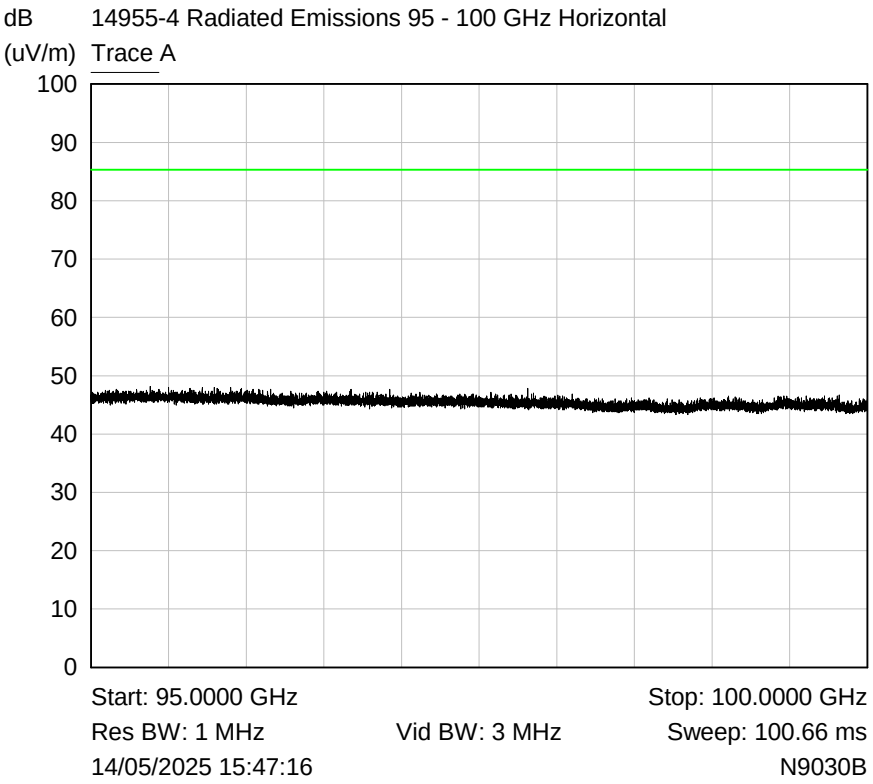


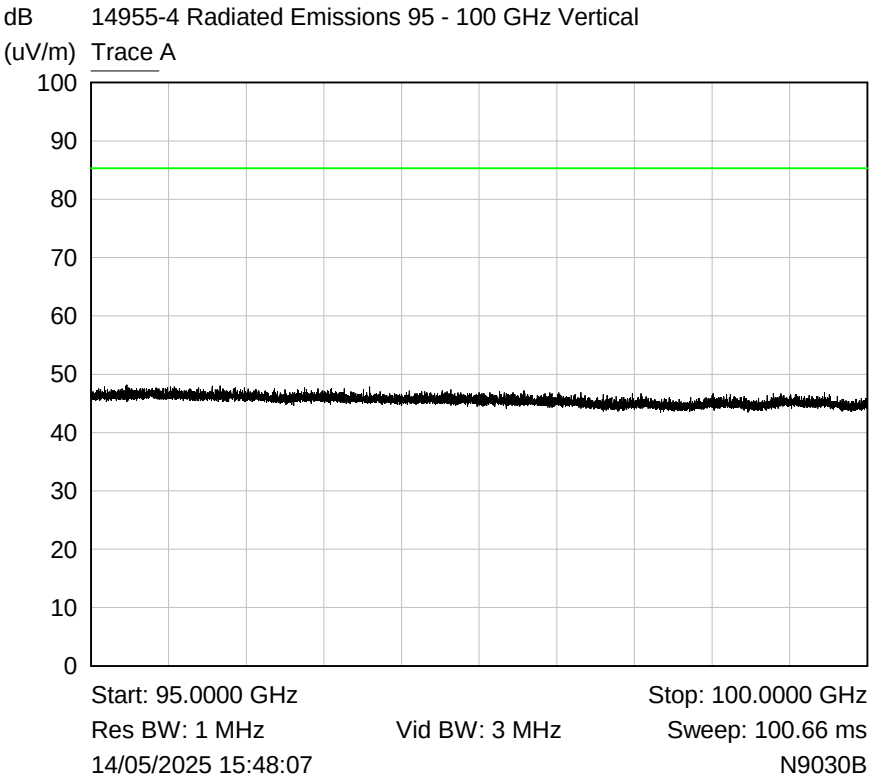


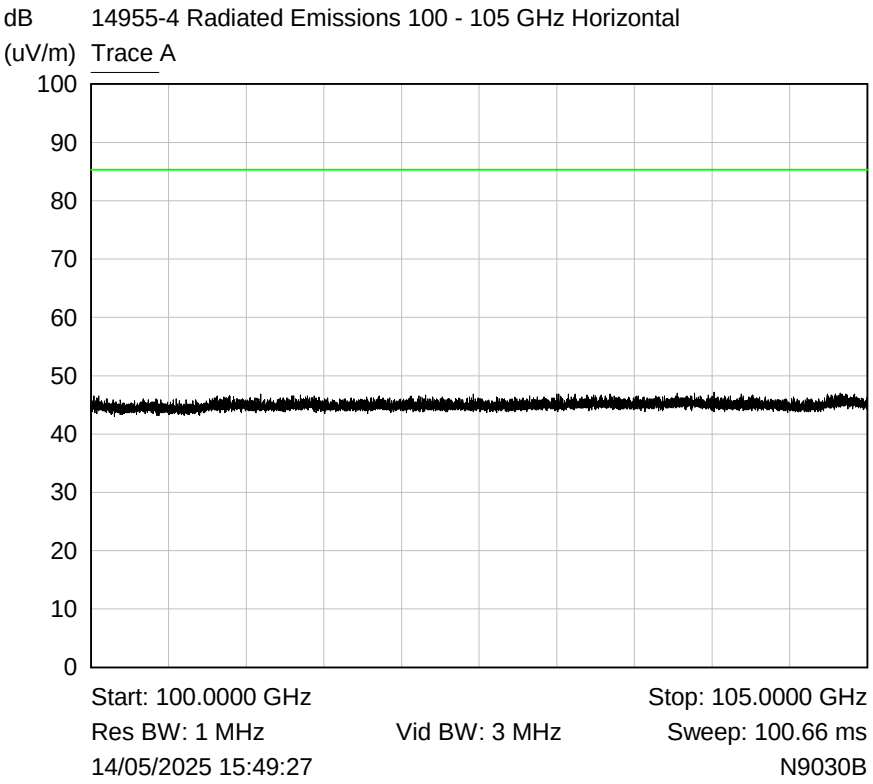


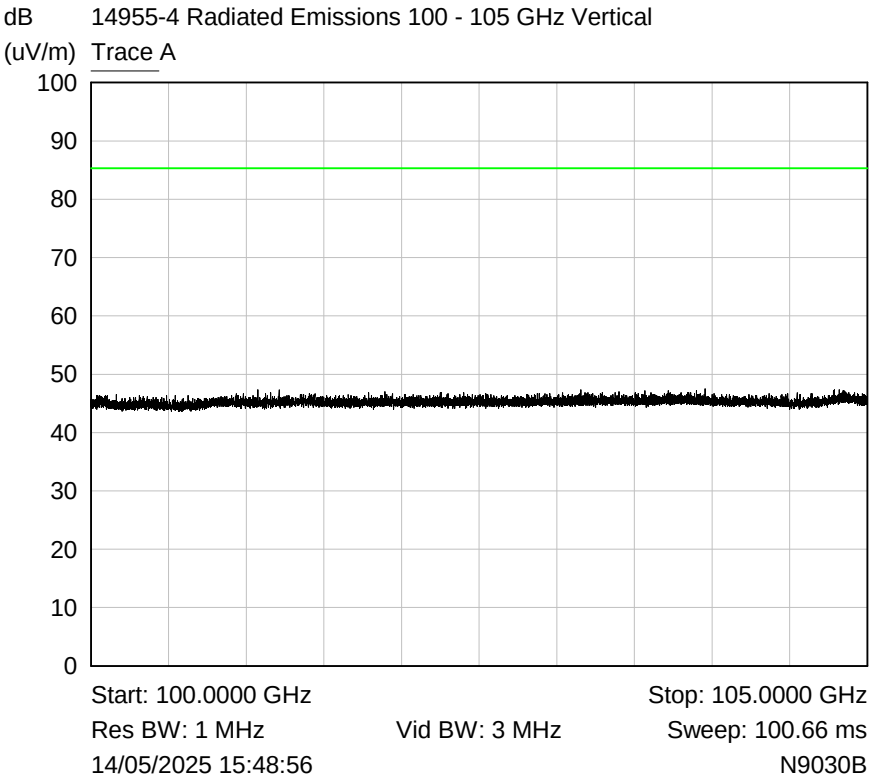


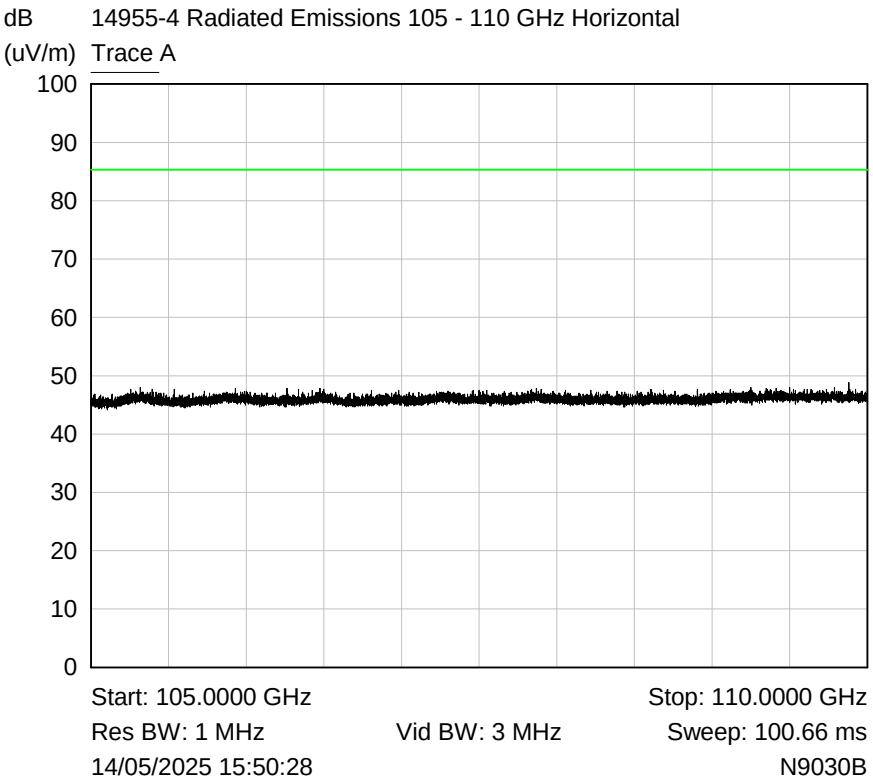


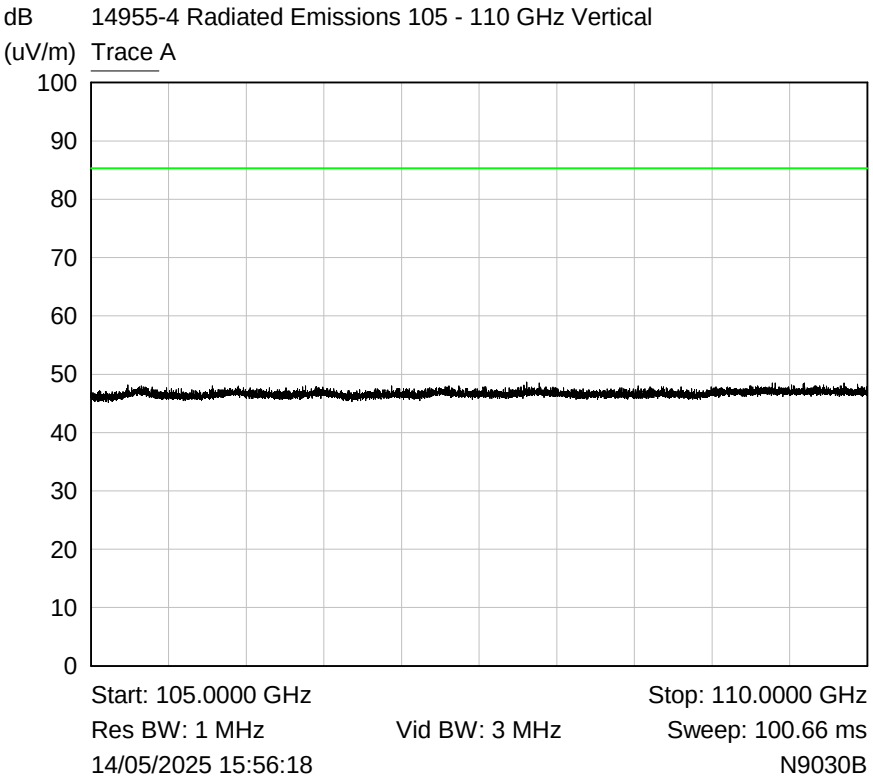


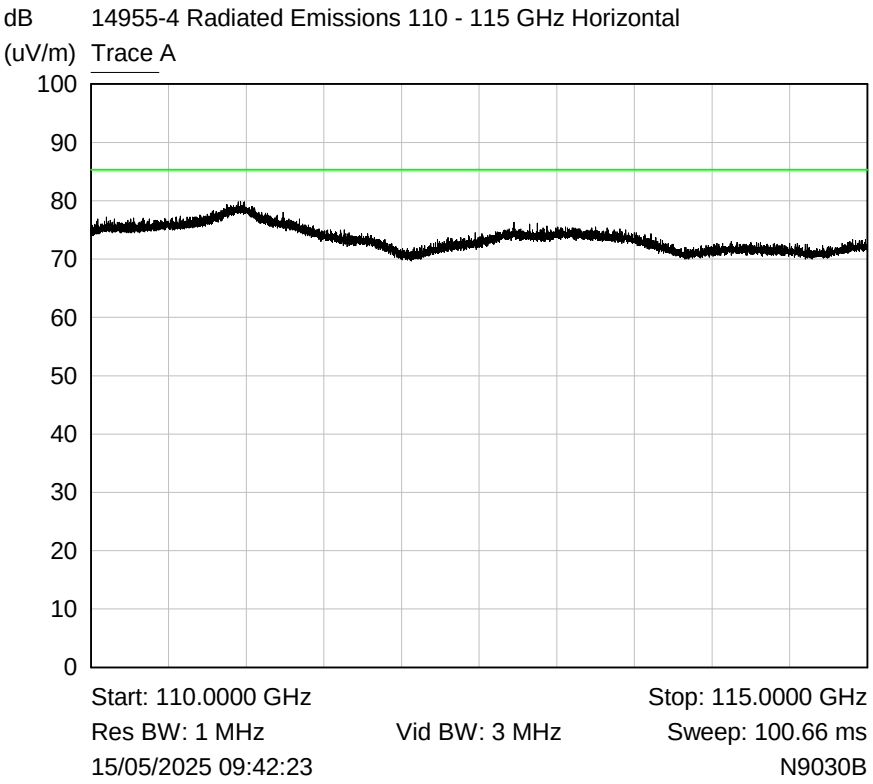


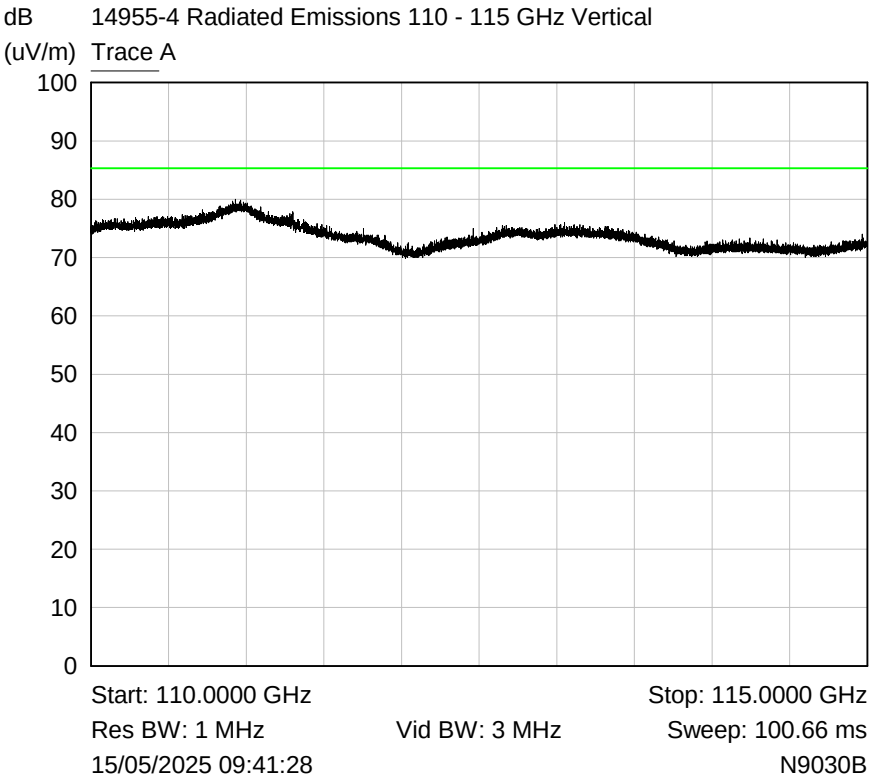


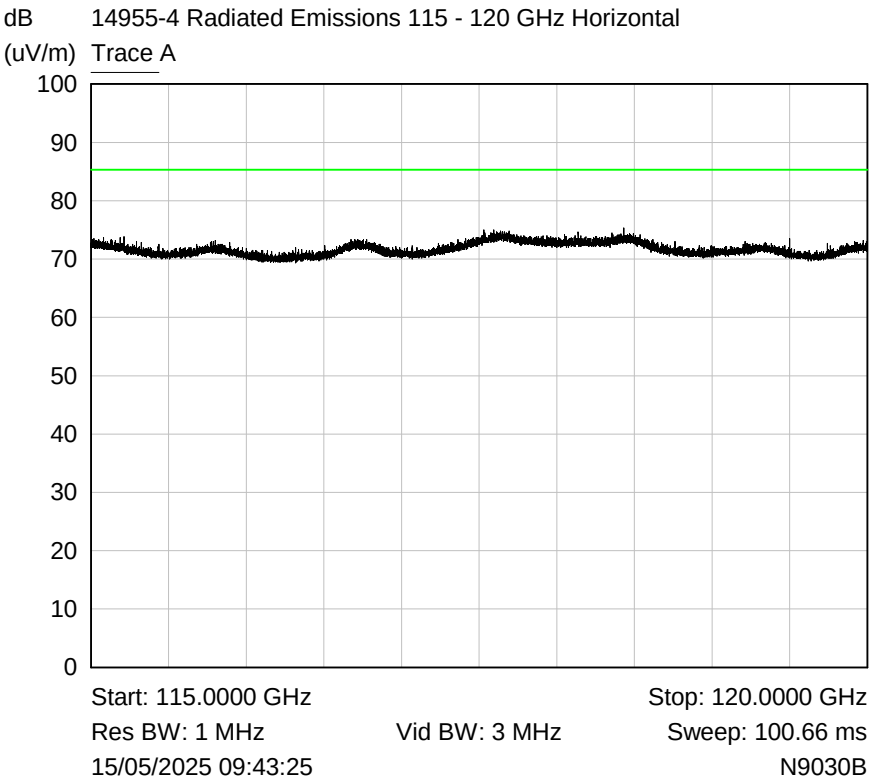


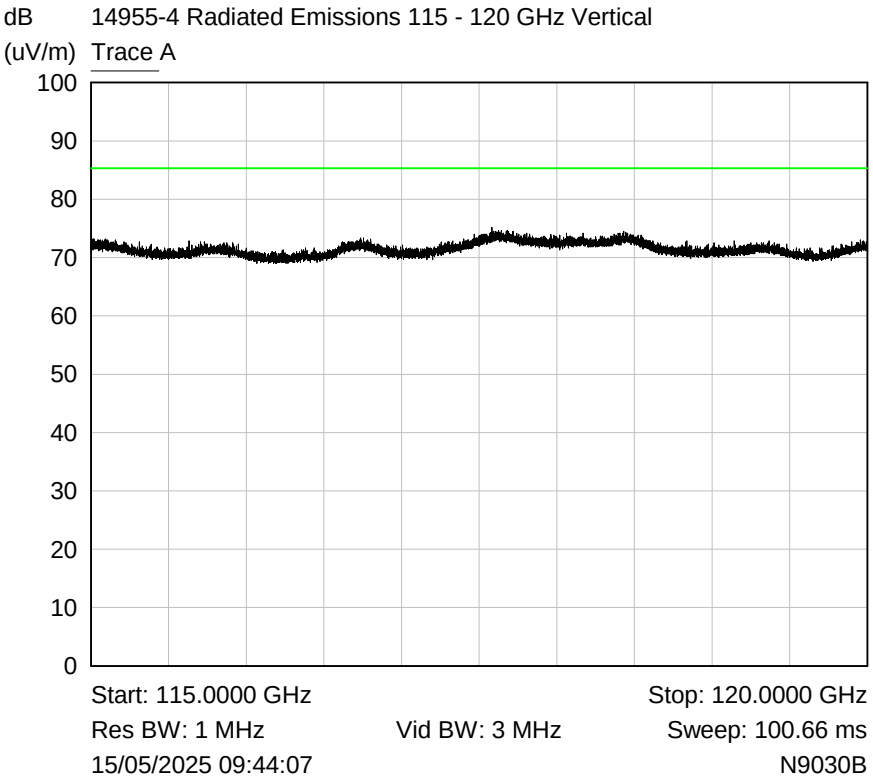


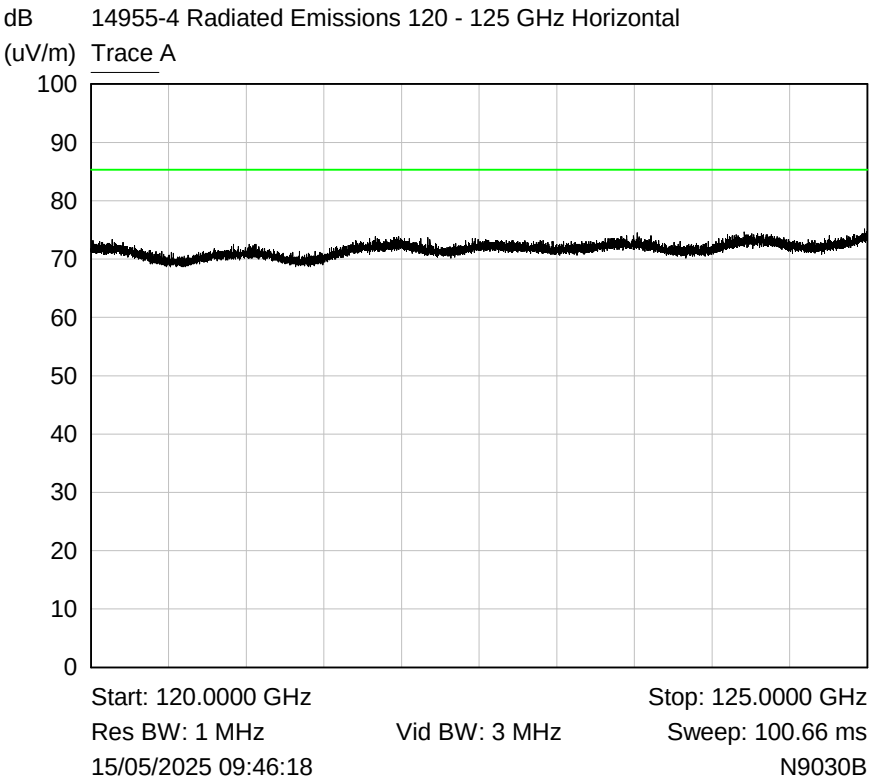


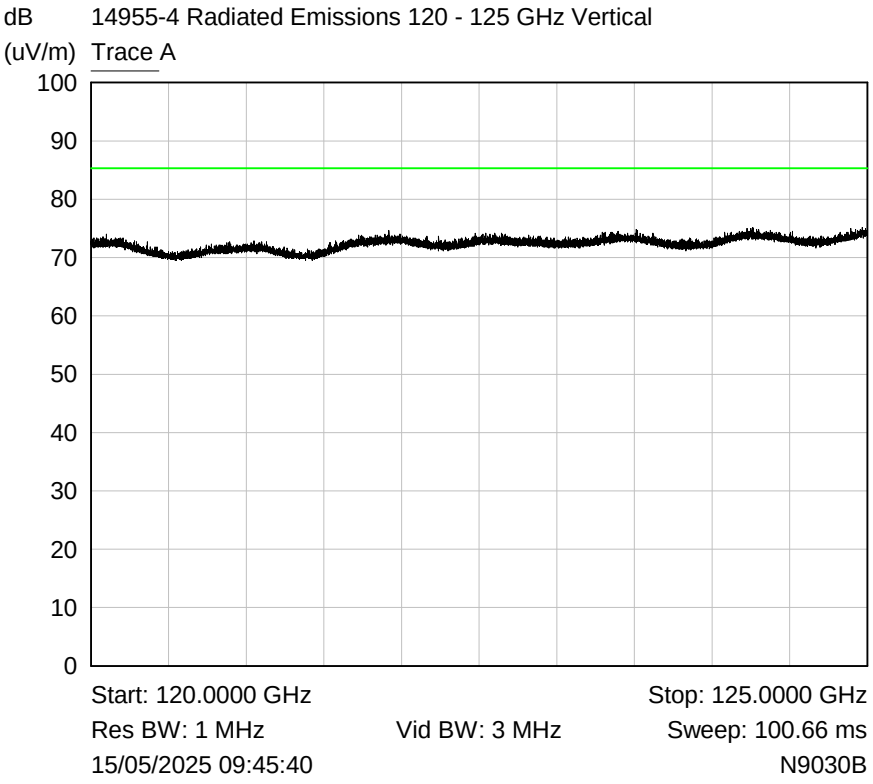


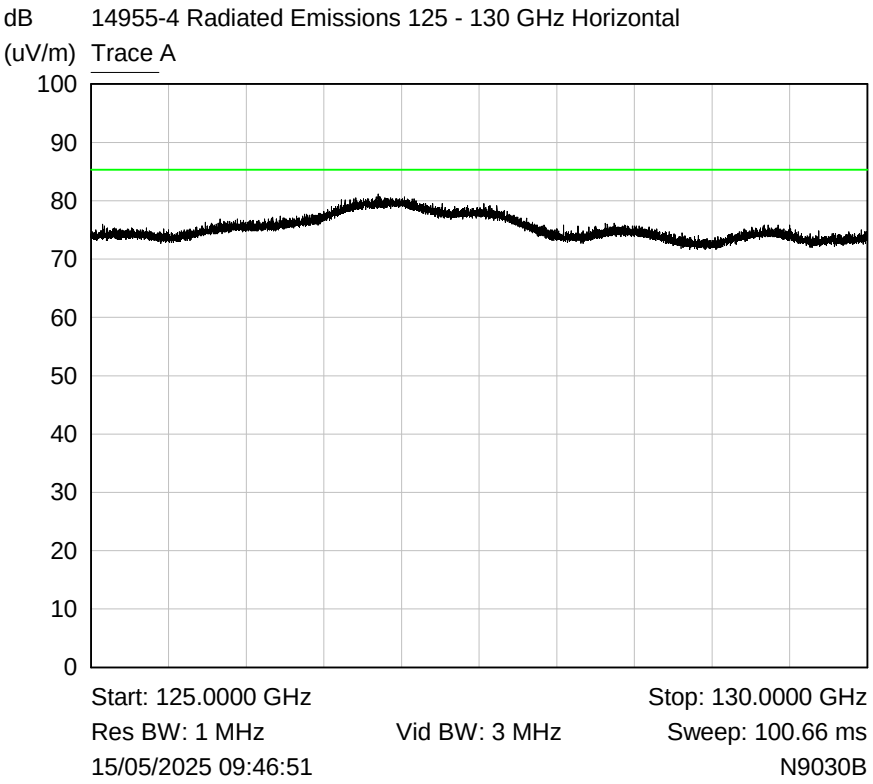


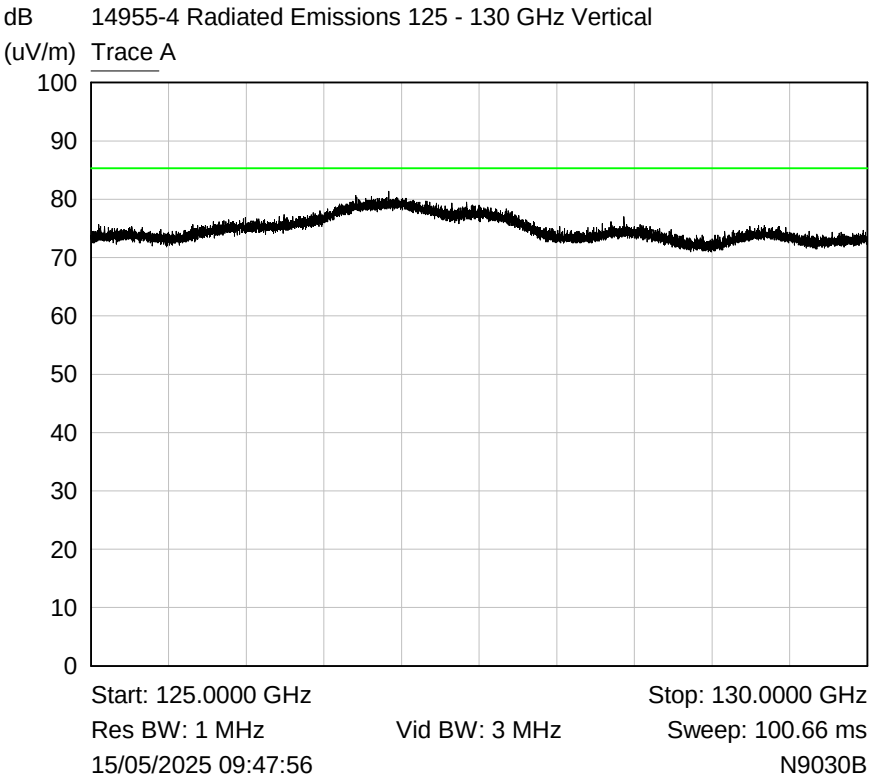


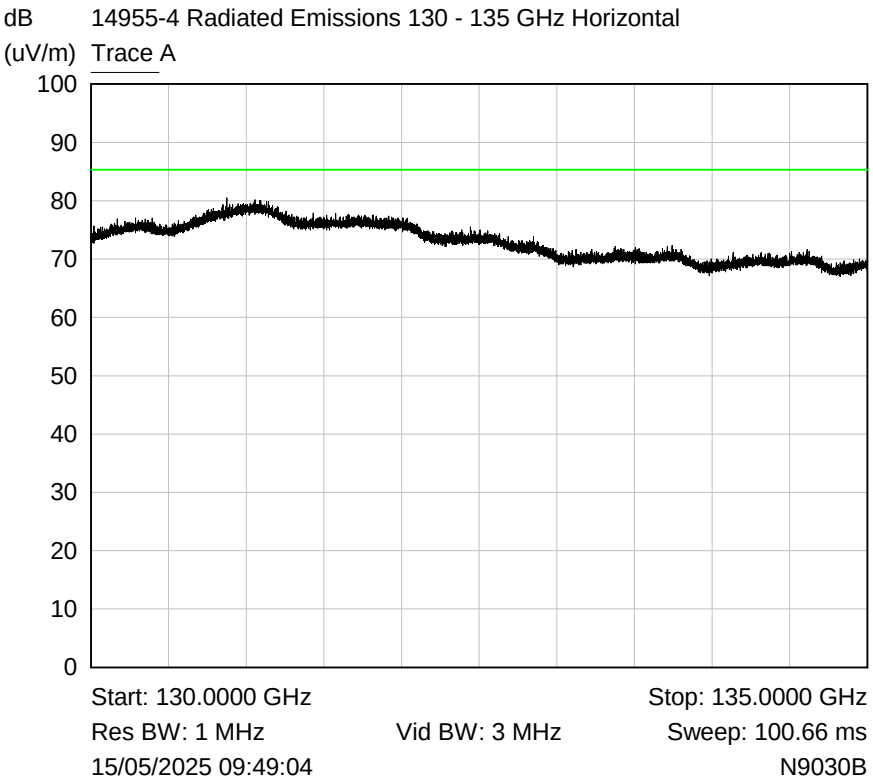


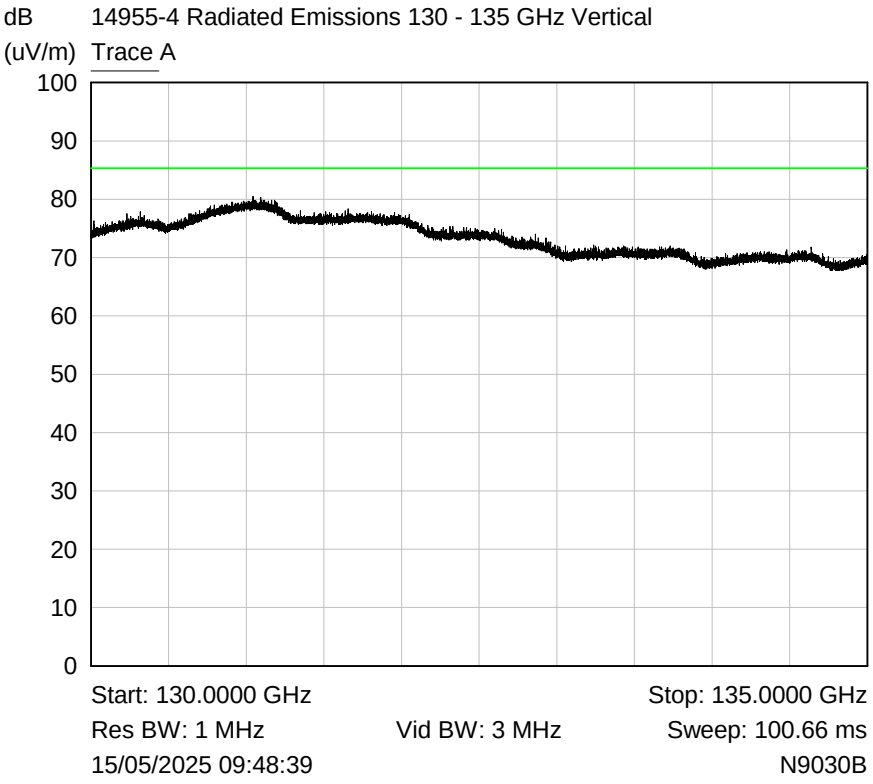


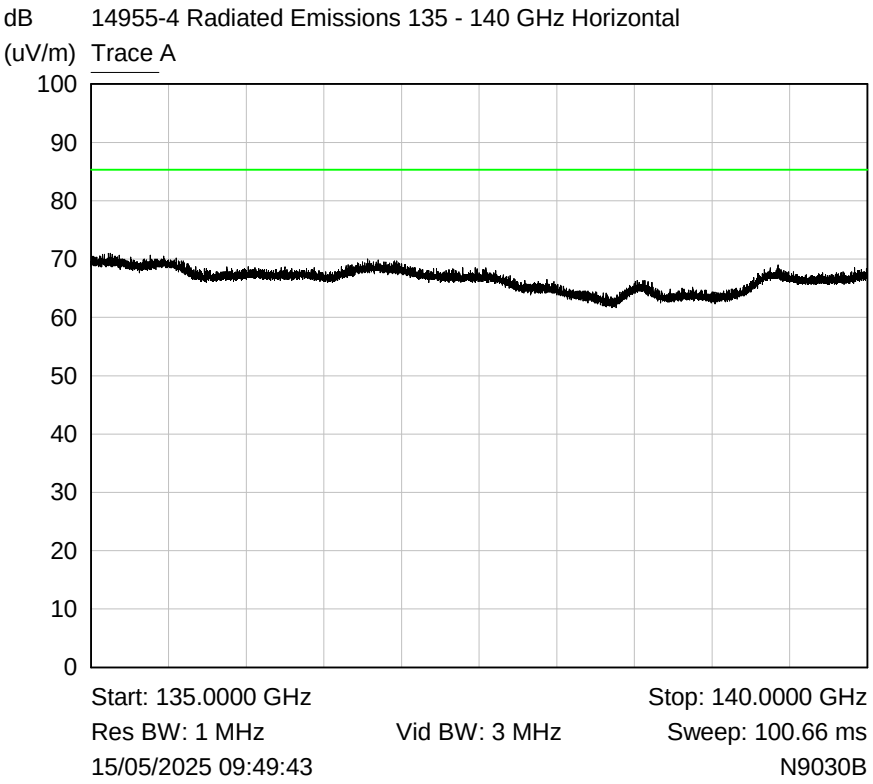


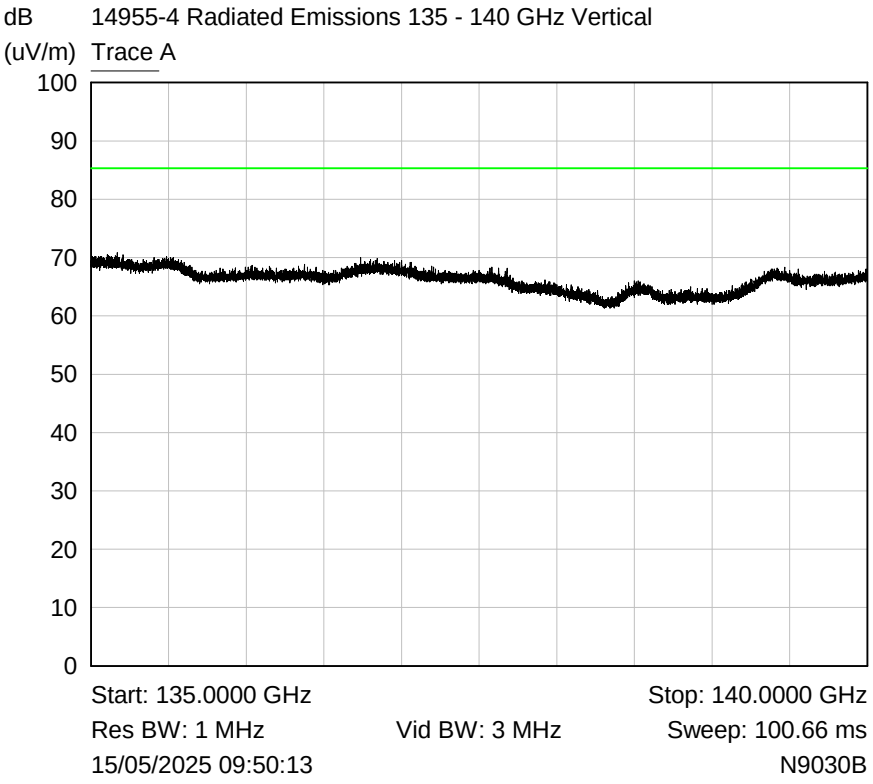


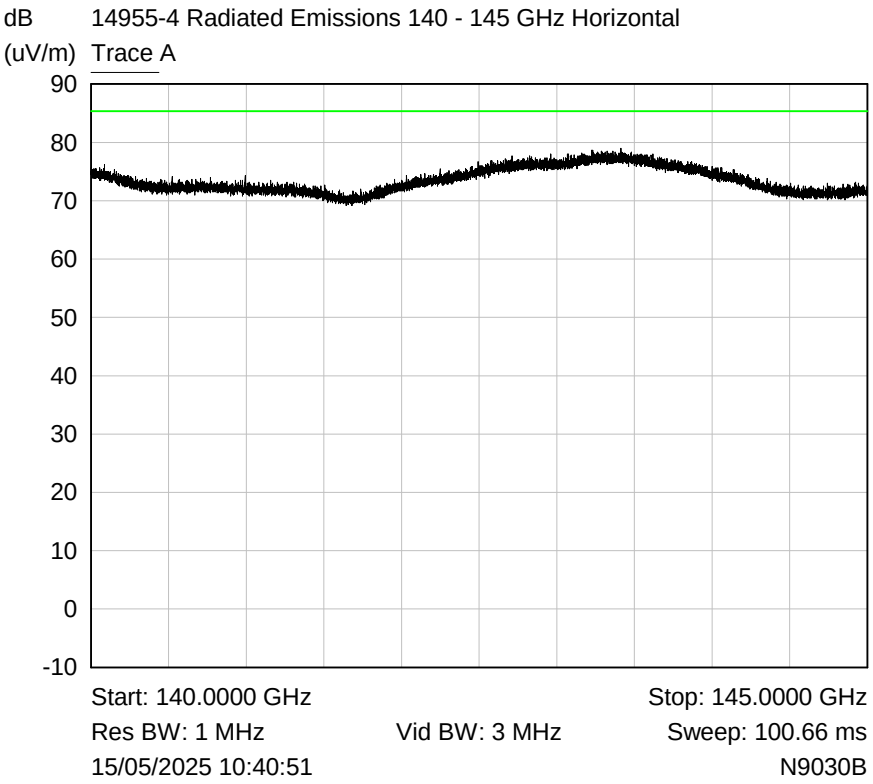


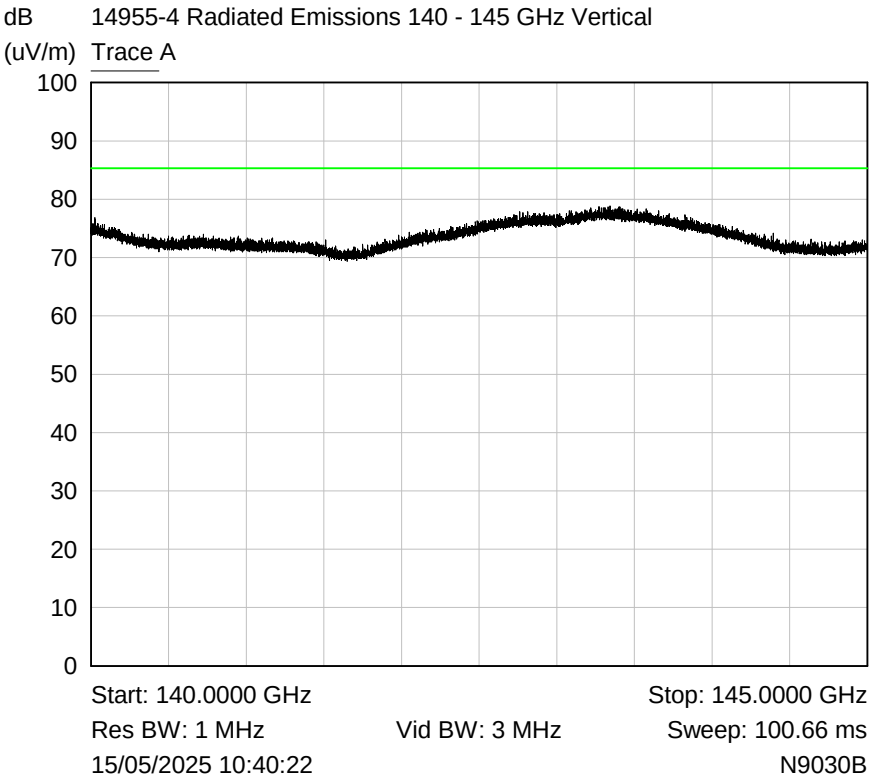


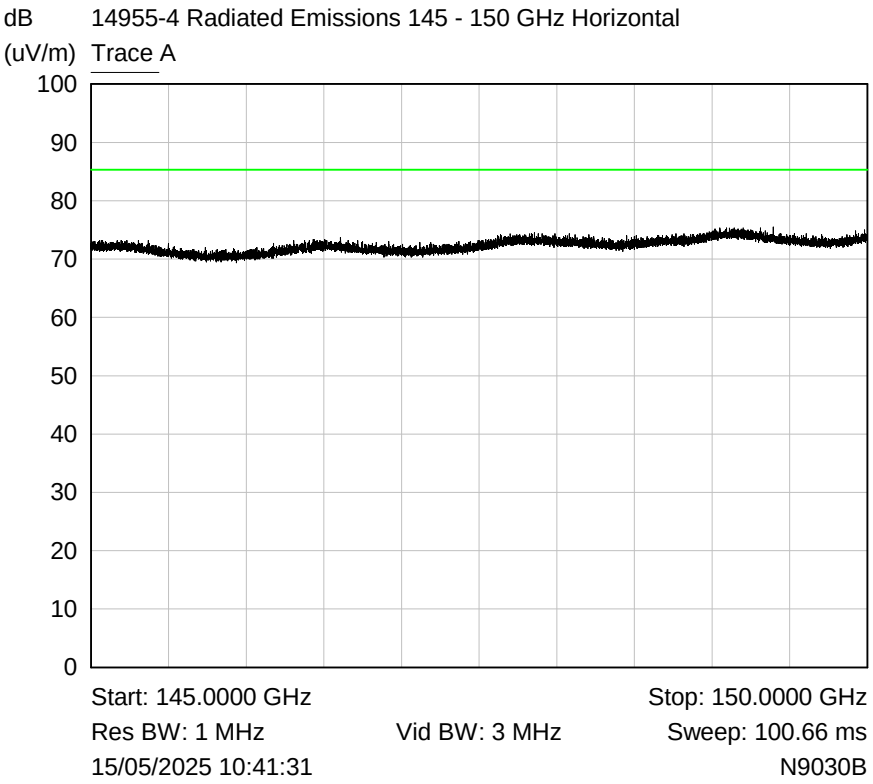


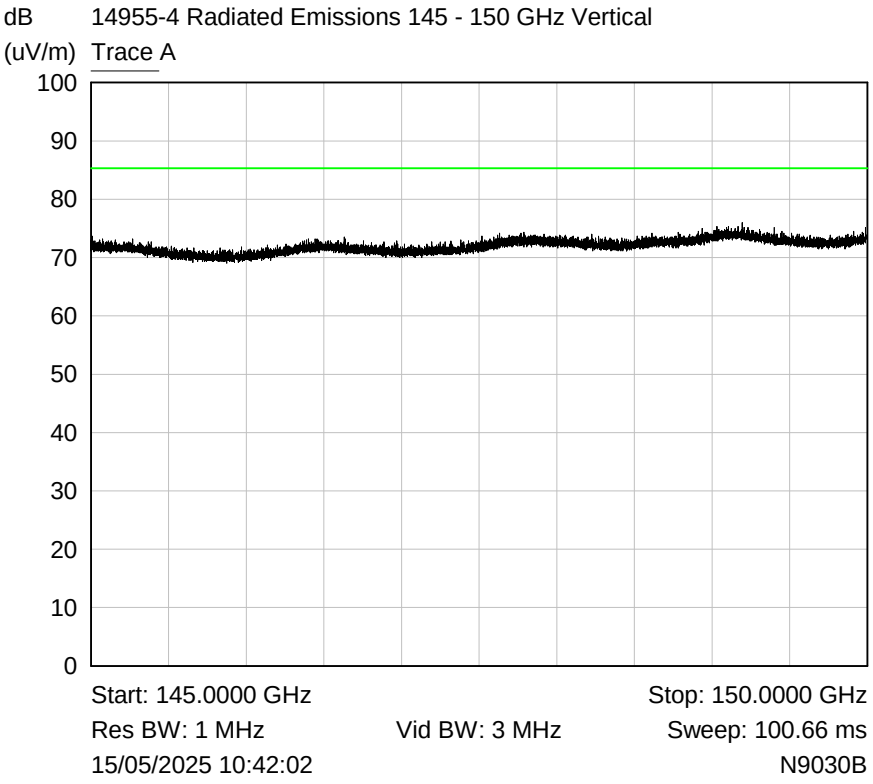


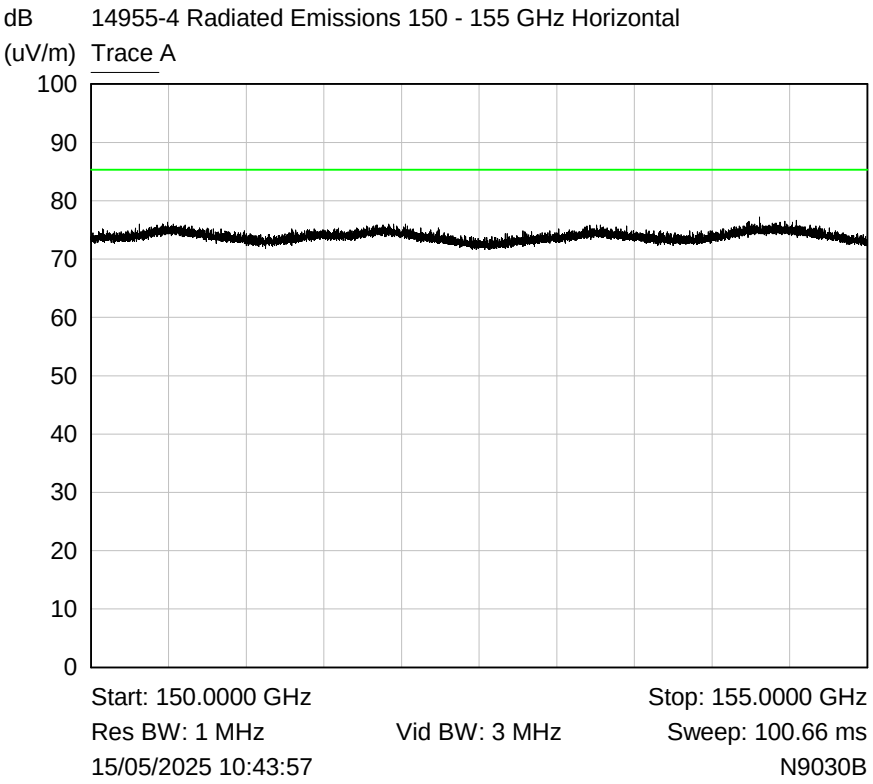


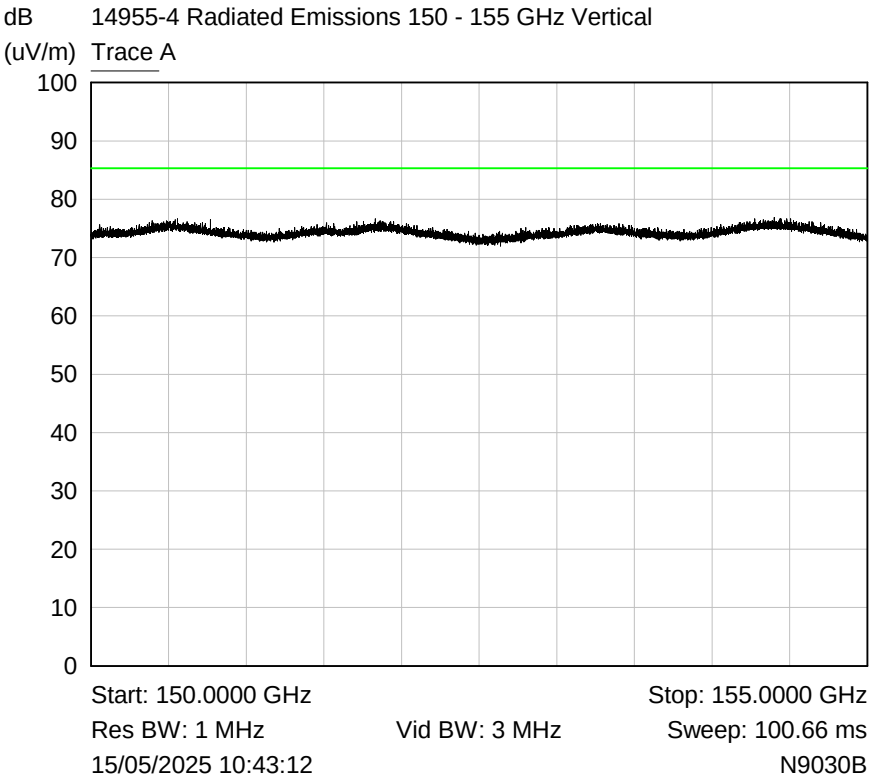


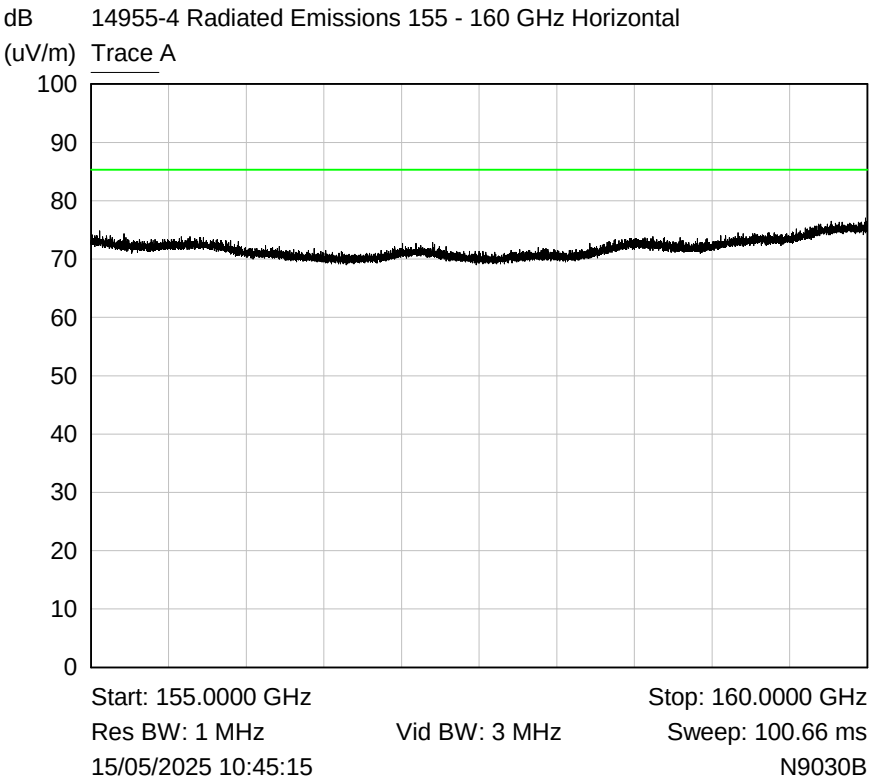


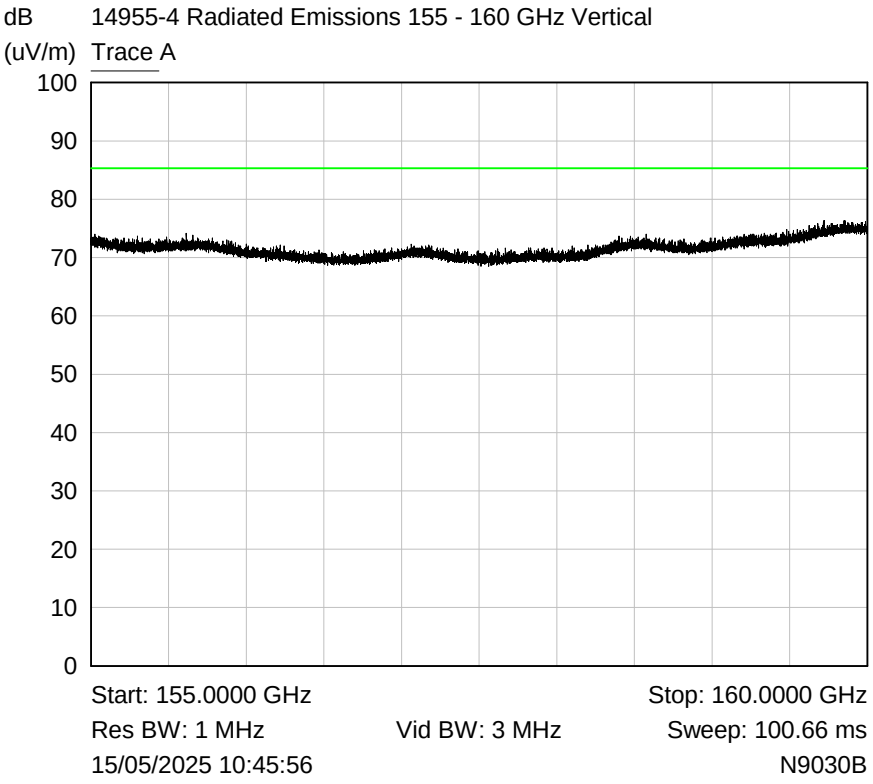


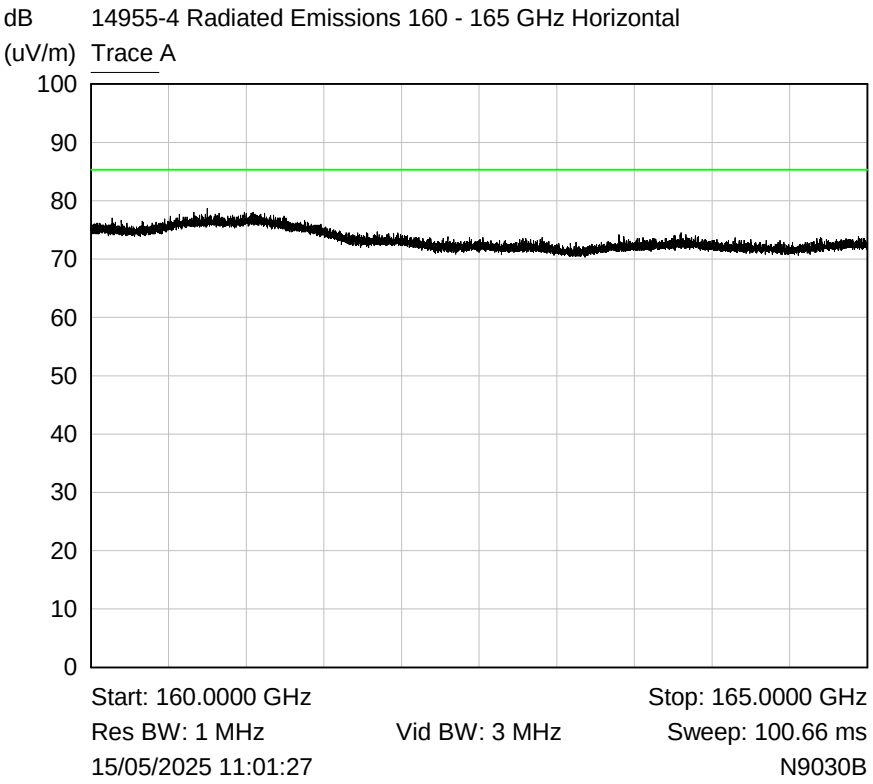


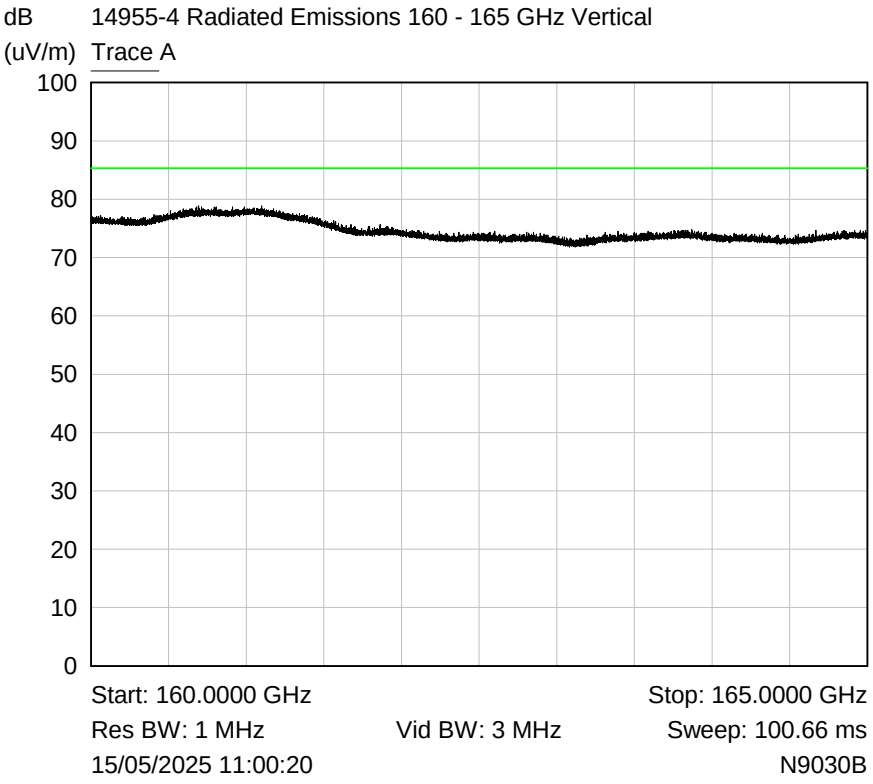


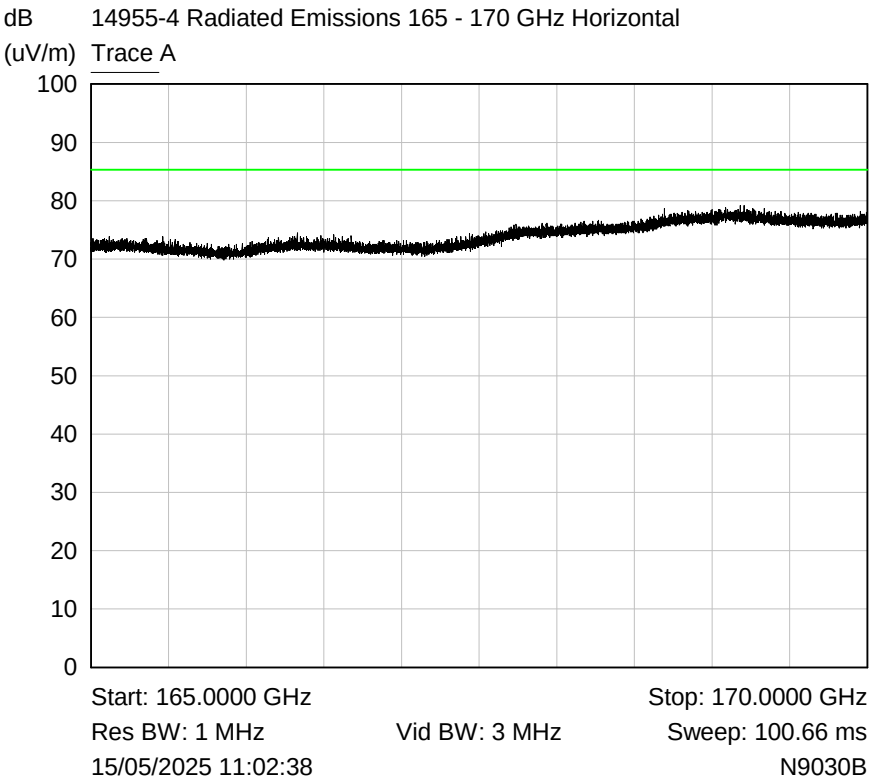


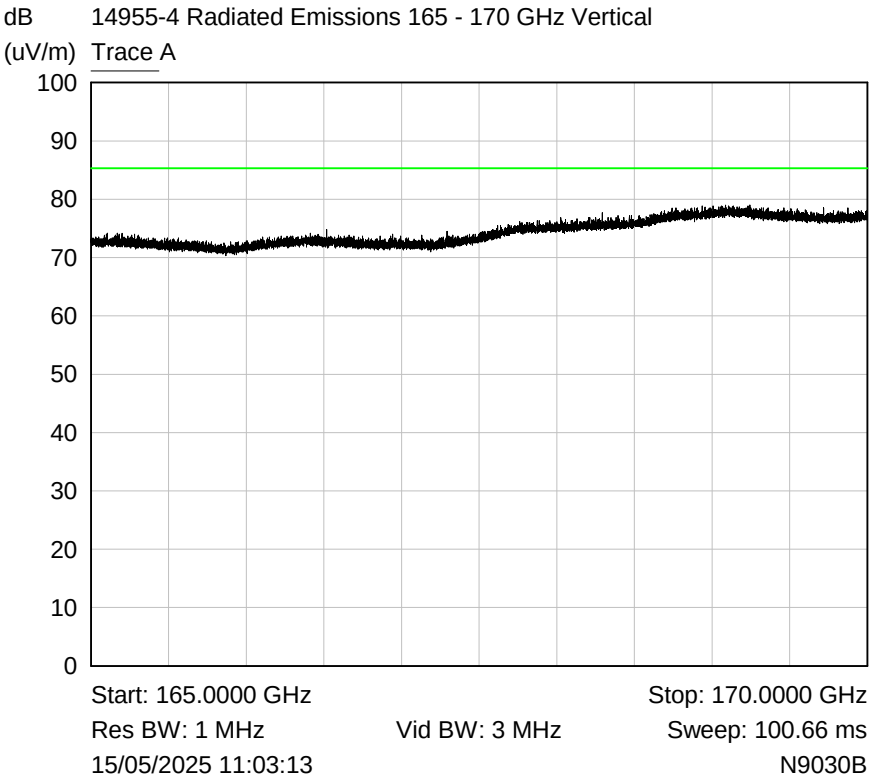


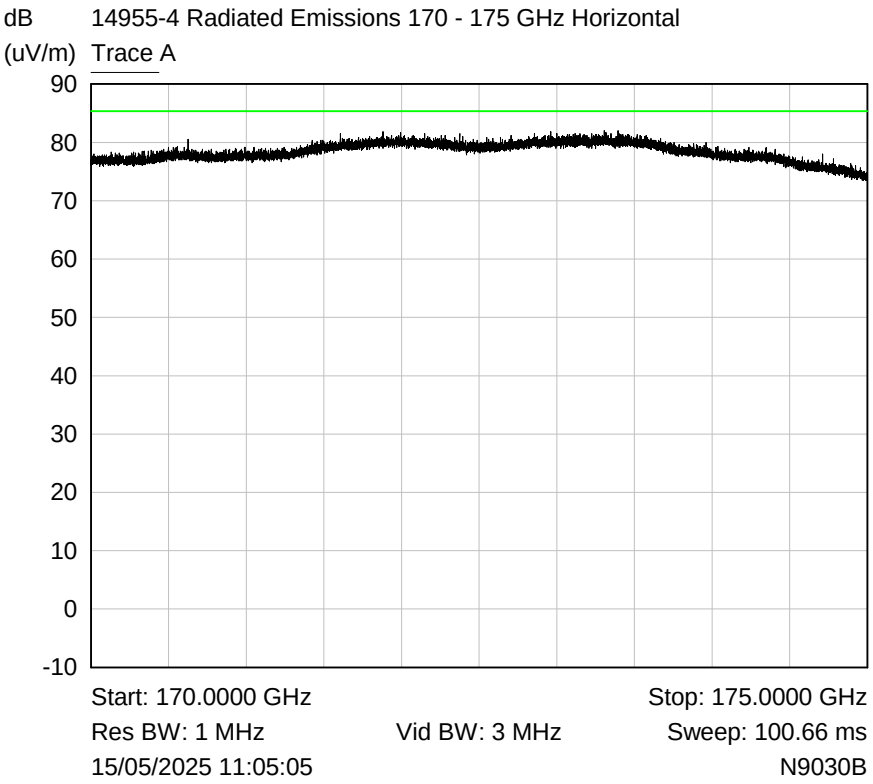


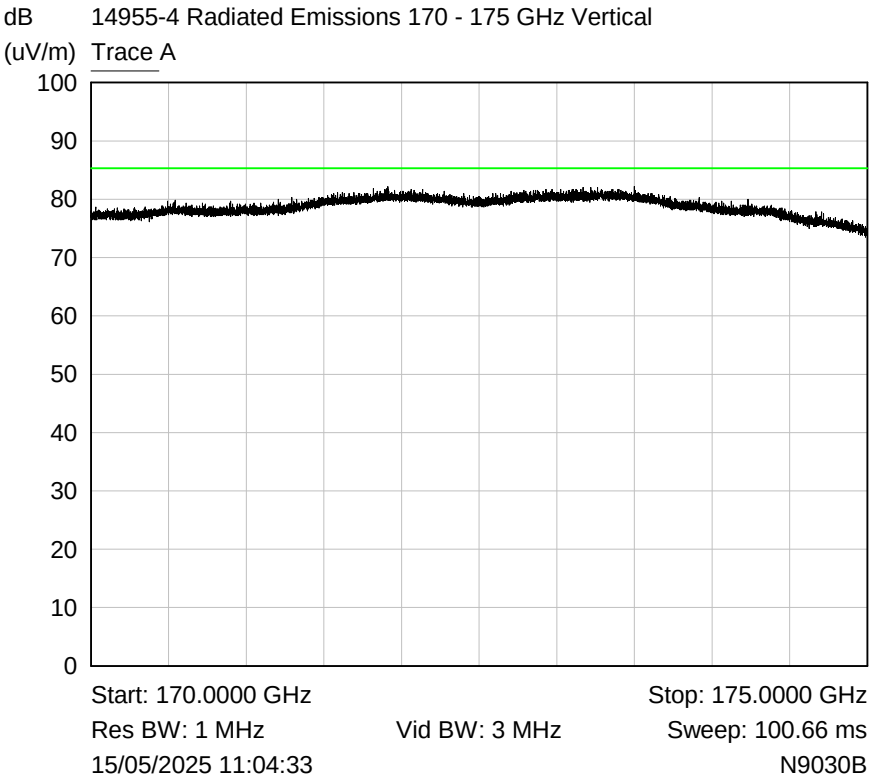


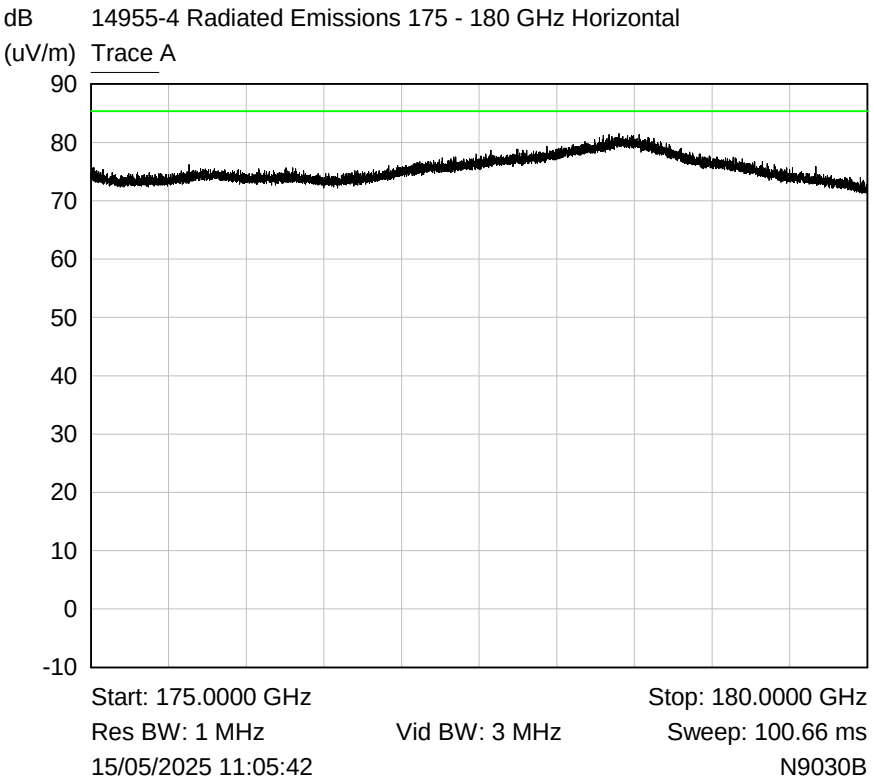


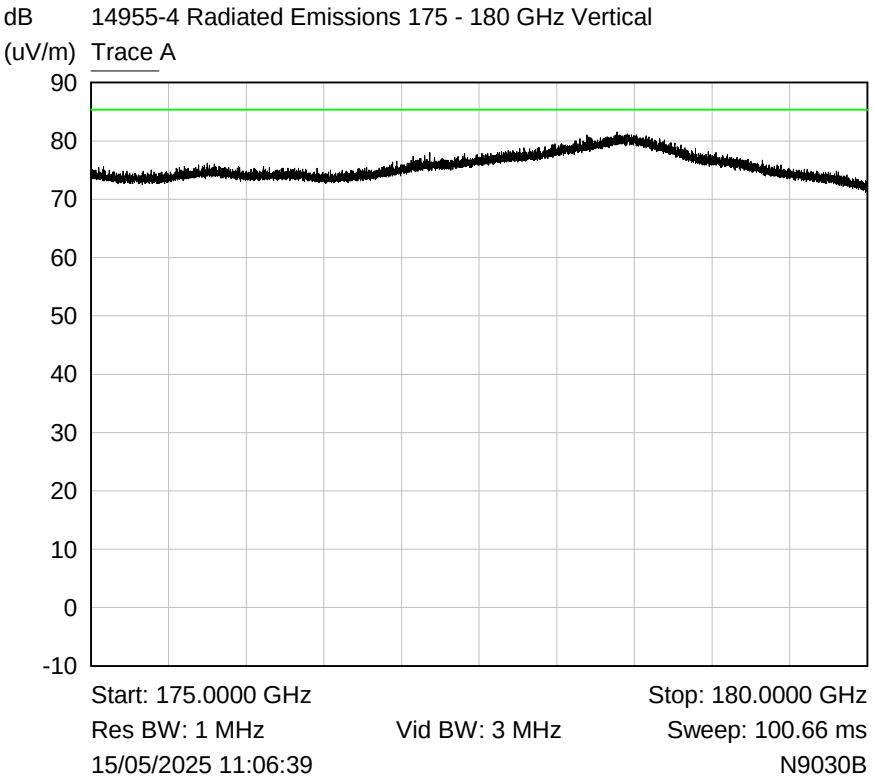


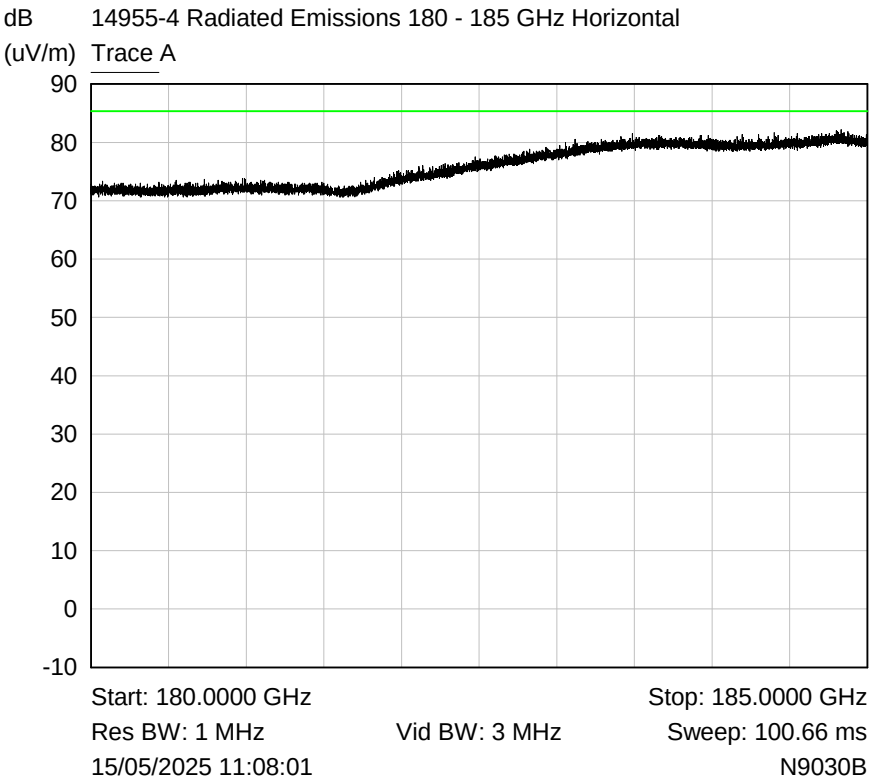


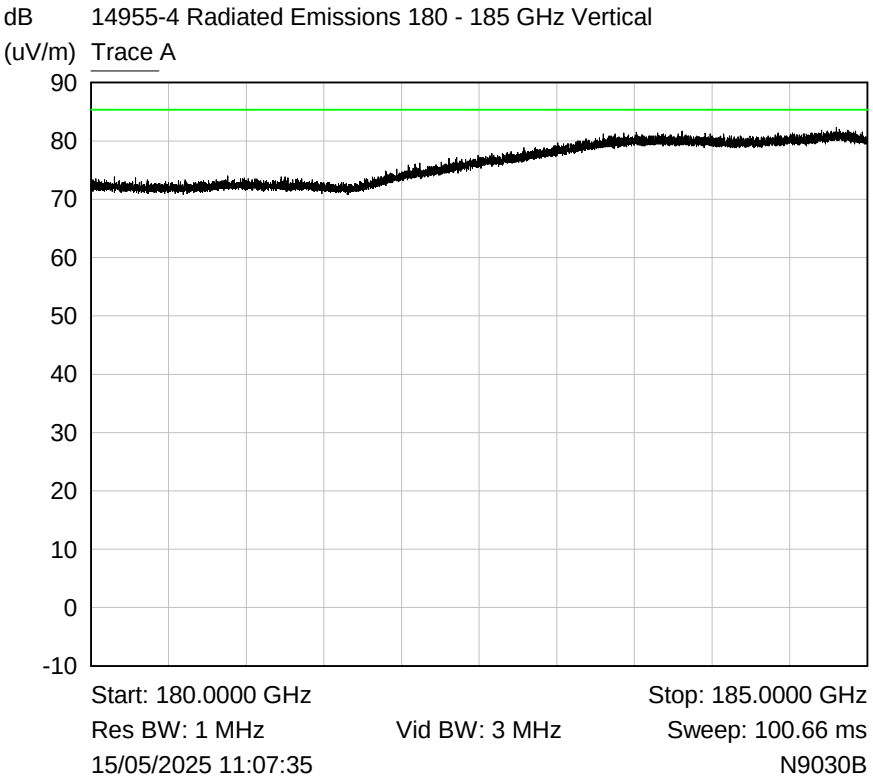


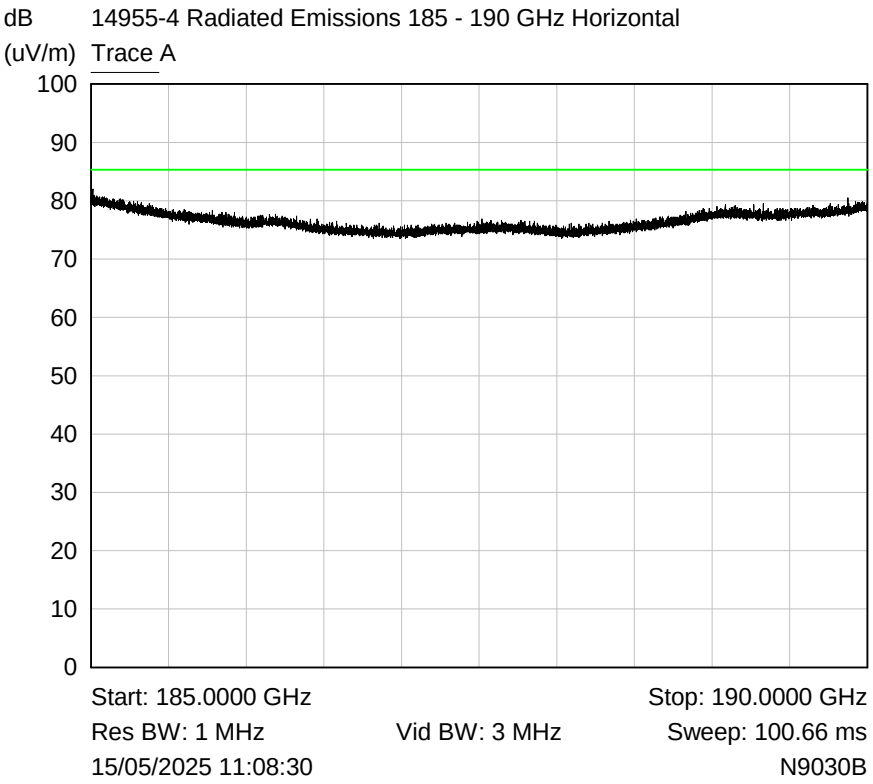


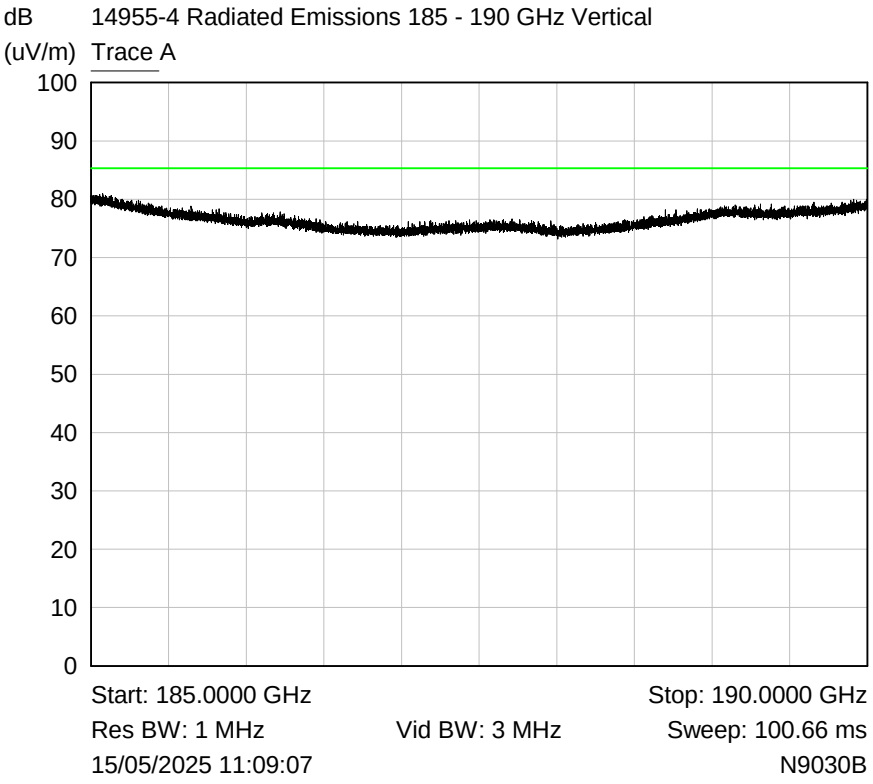


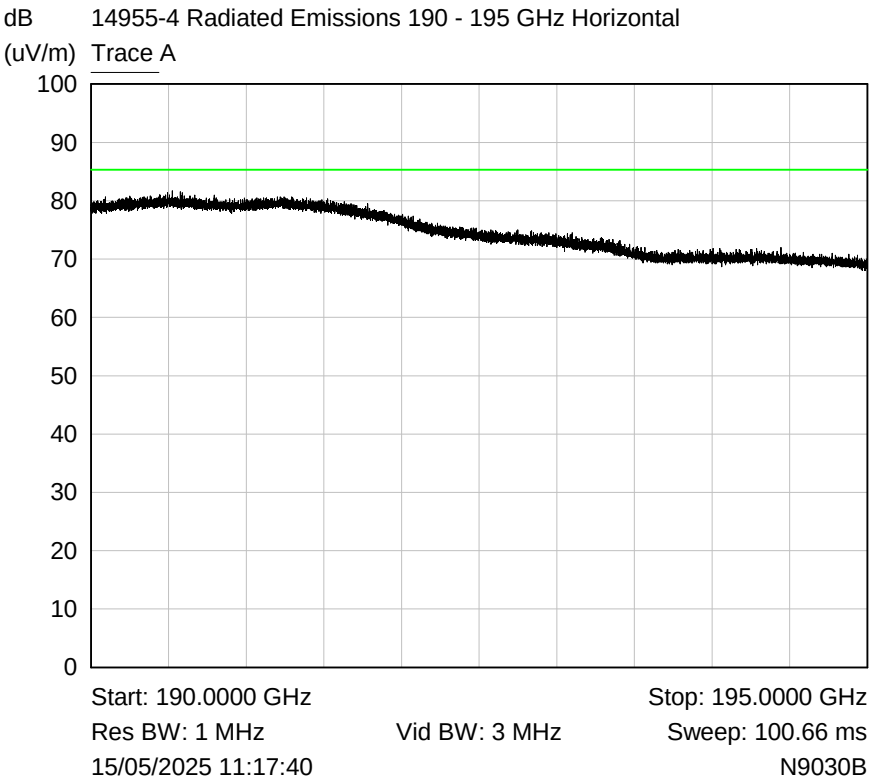


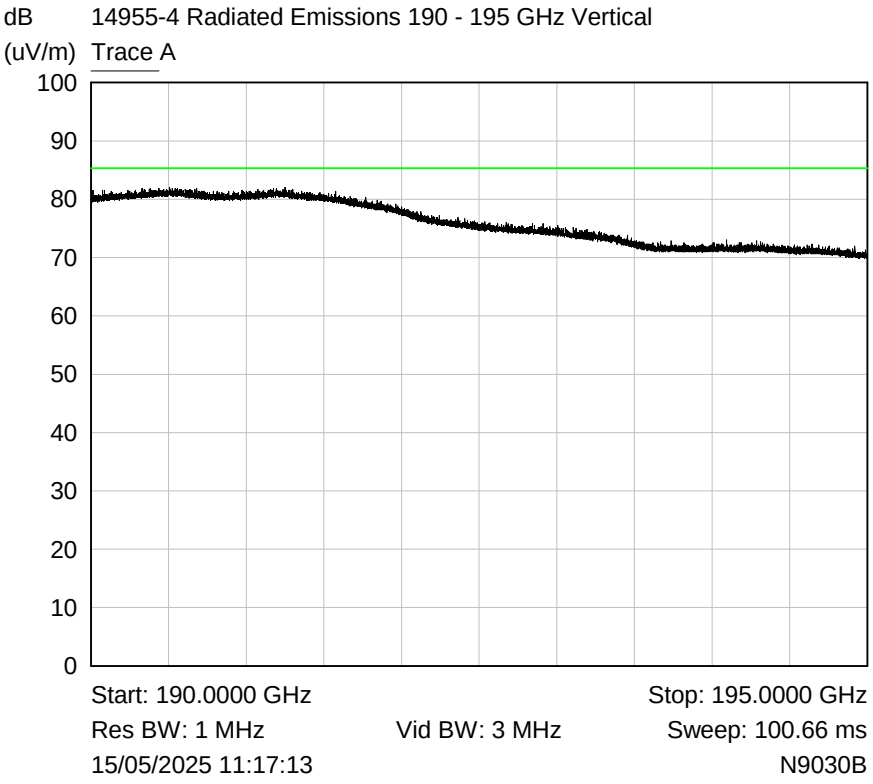


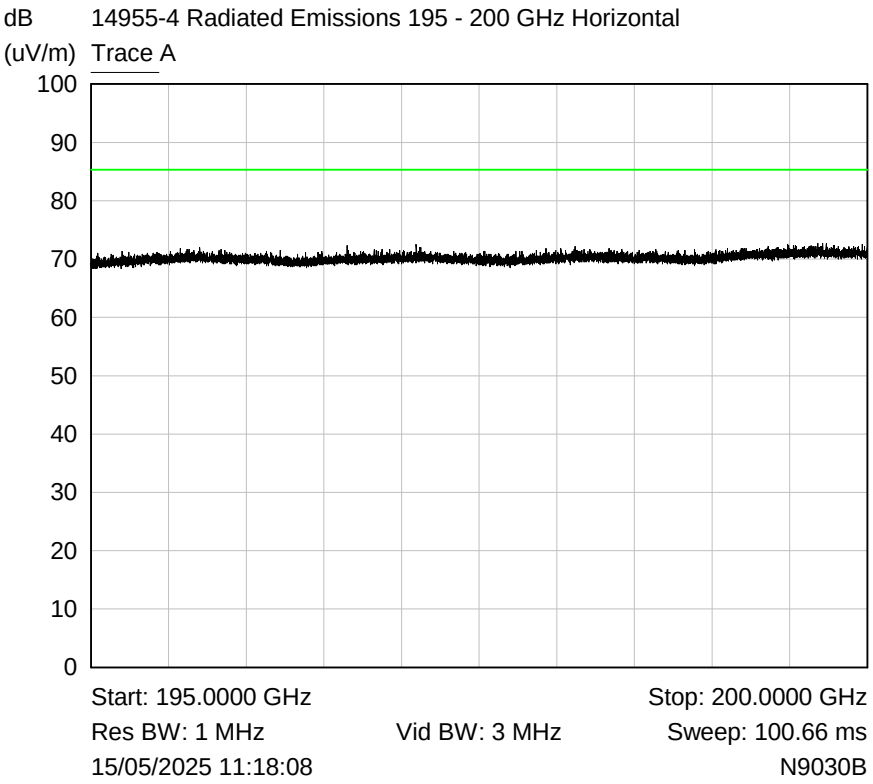


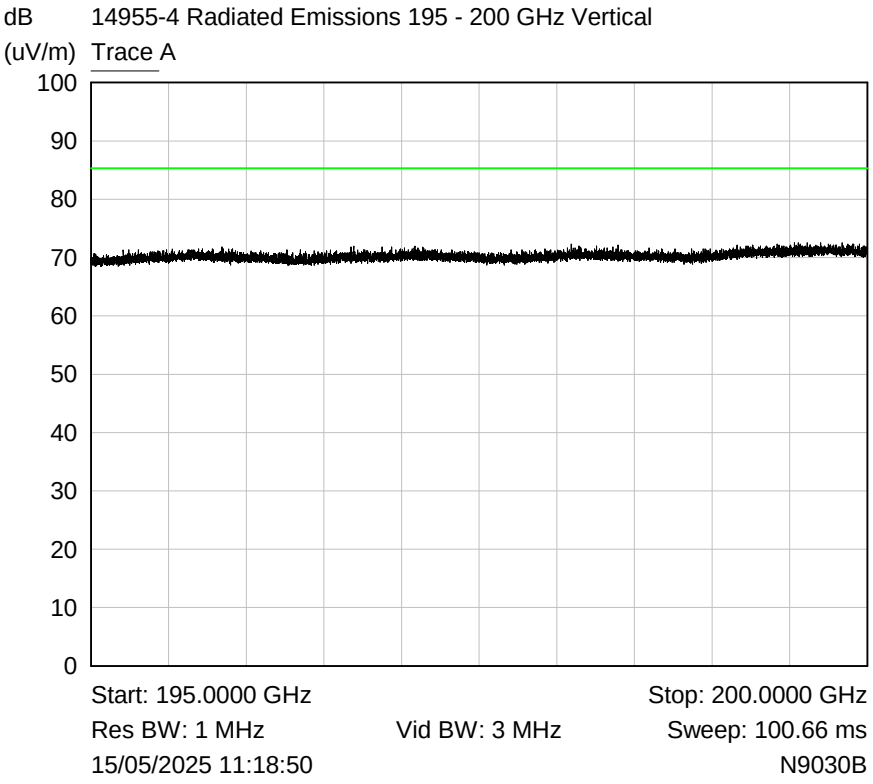






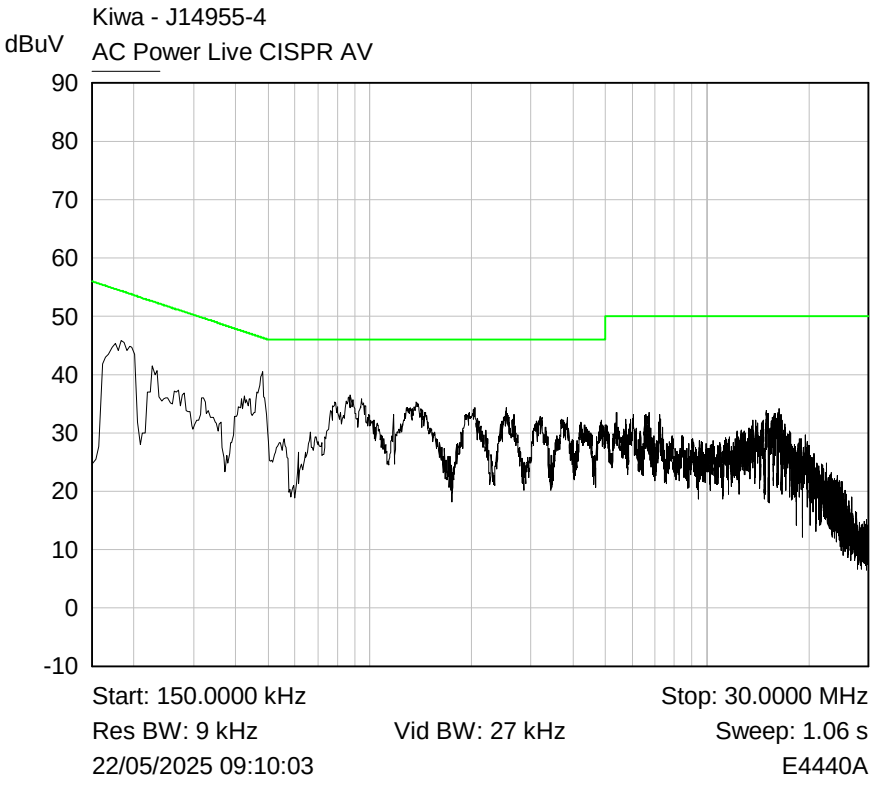




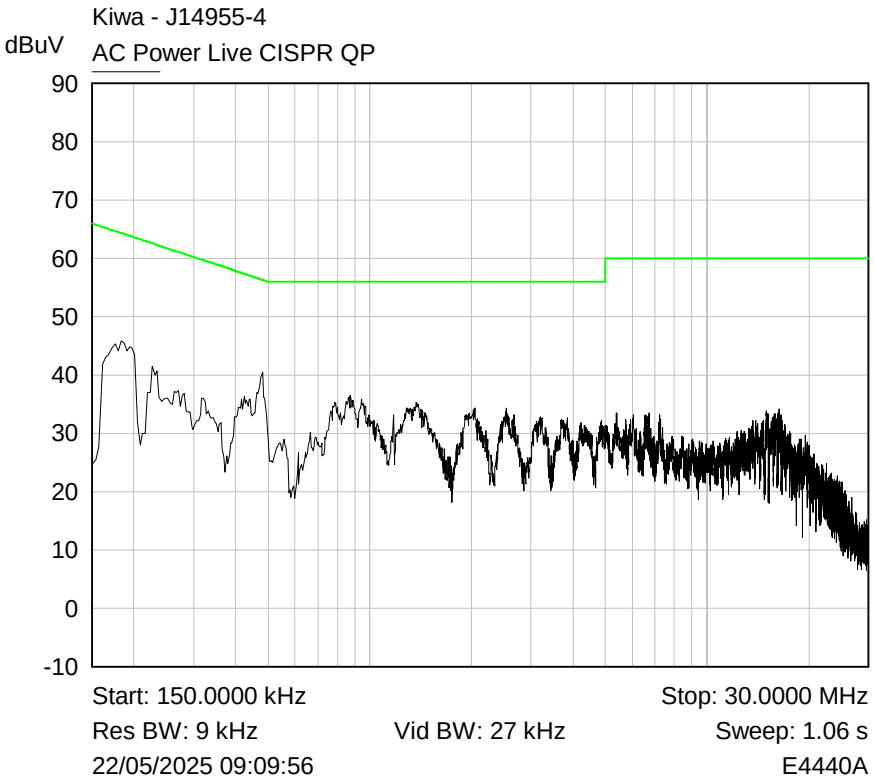


6.6 AC power line conducted emissions

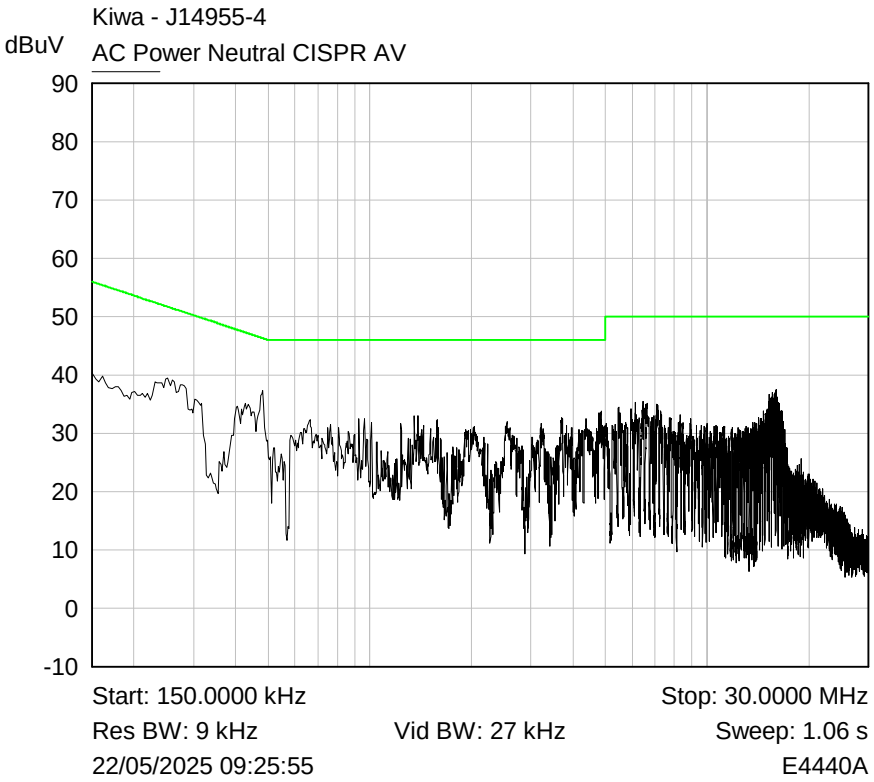
RF Parameters: Band 57-61.56 GHz, Power Maximum, Channel Spacing Single Channel, Modulation FMCW, Channel 59.83 GHz



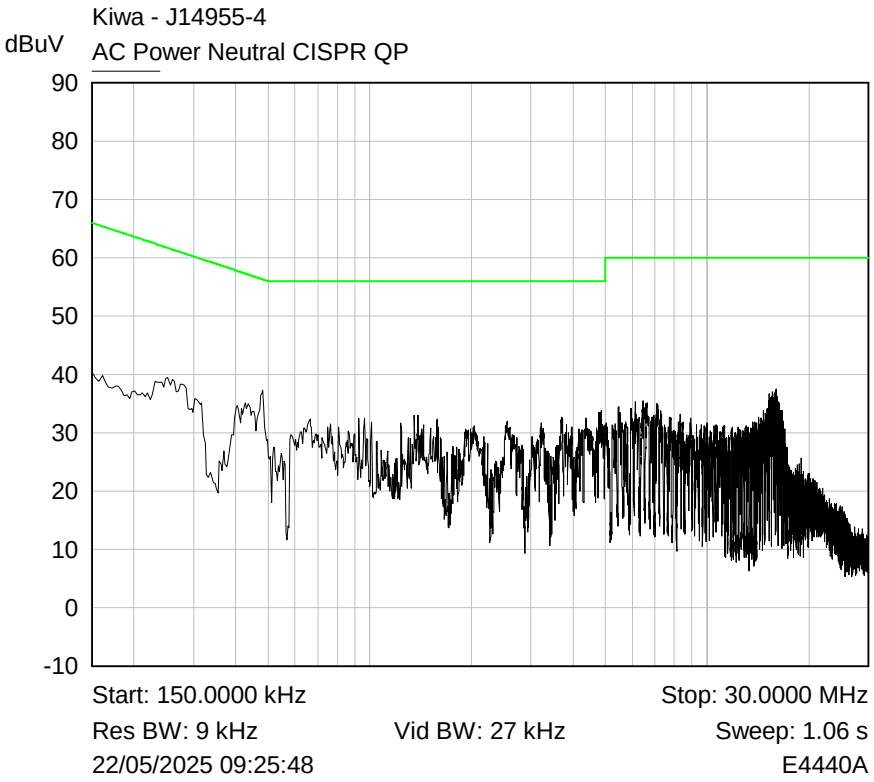
Plot of Live150k-30M Average



Plot of Live150k-30M Quasi-Peak



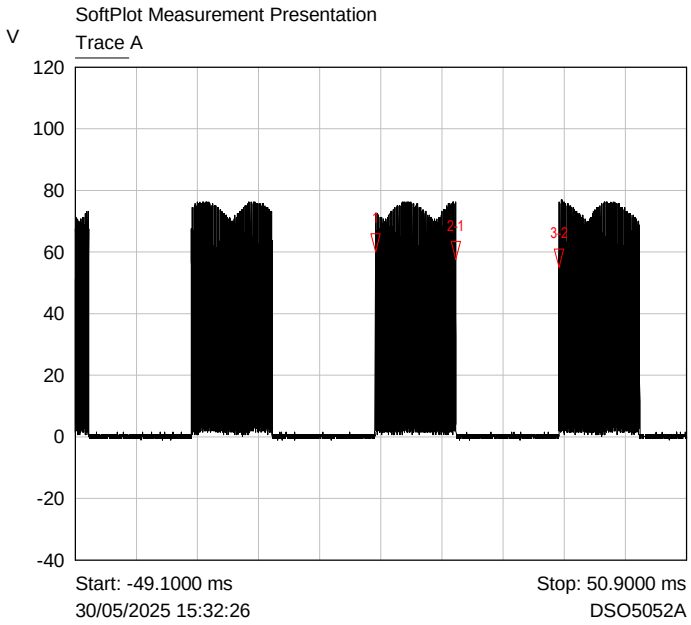
Plot of Neutral150k-30M Average



Plot of Neutral150k-30M Quasi-Peak

6.7 Duty cycle

RF Parameters: Band 57-61.56 GHz, Power Maximum, Channel Spacing Single Channel, Modulation FMCW

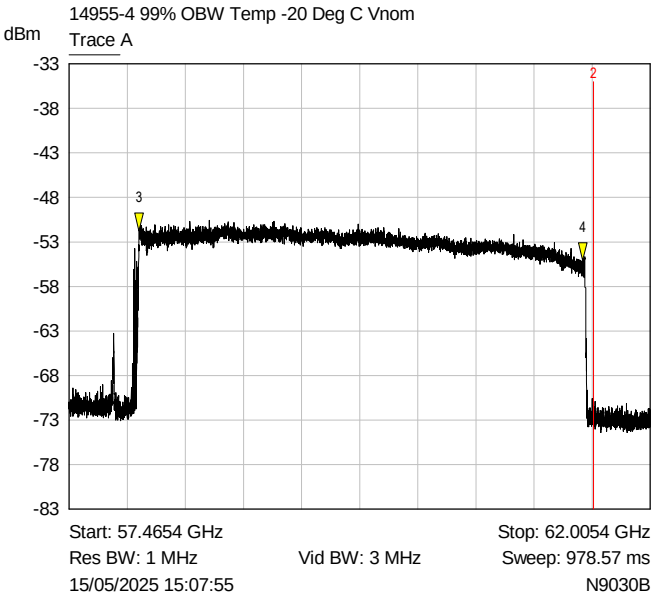


Mkr	Trace	X-Axis	Value	Notes
1	Trace A	-30.6990 us	60.00 V	
2-1	Trace A	13.1807 ms	-2.38 V	On-time
3-2	Trace A	16.9300 ms	-2.50 V	Off-time

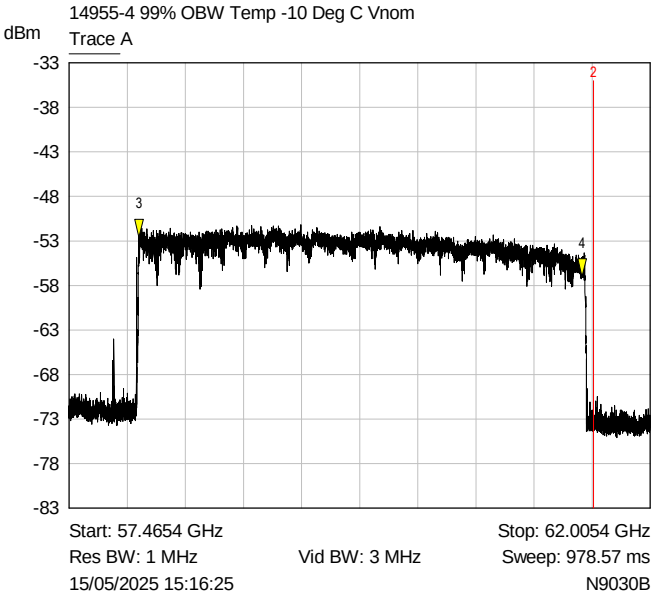
Groups of radar pulses

6.8 Occupied bandwidth

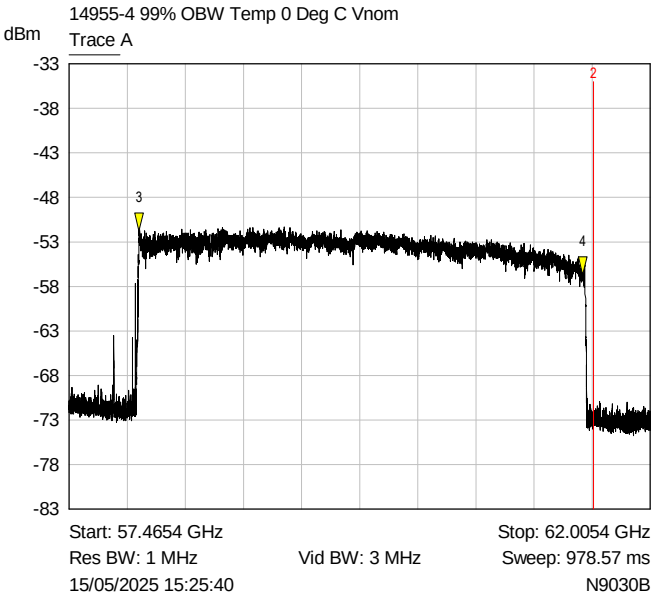
RF Parameters: Band 57-61.56 GHz, Power Maximum, Channel Spacing Single Channel, Modulation FMCW



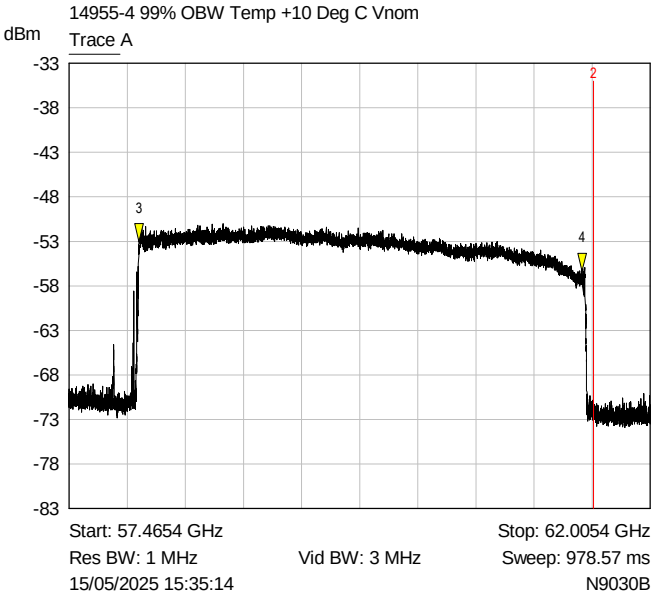
Mkr	Trace	X-Axis	Value	Notes
1	Trace A	57.0000 GHz	-72.52 dBm	Lower band edge
2	Trace A	61.5600 GHz	-72.94 dBm	Upper band edge
3	Trace A	58.0119 GHz	-51.77 dBm	99% OBW
4	Trace A	61.4756 GHz	-55.08 dBm	99% OBW



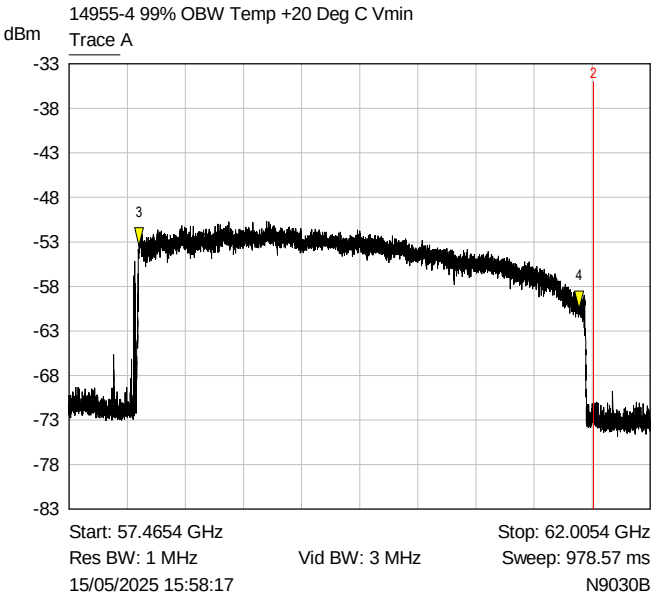
Mkr	Trace	X-Axis	Value	Notes
1	Trace A	57.0000 GHz	-72.39 dBm	Lower band edge
2	Trace A	61.5600 GHz	-72.74 dBm	Upper band edge
3	Trace A	58.0114 GHz	-52.57 dBm	99% OBW
4	Trace A	61.4722 GHz	-56.98 dBm	99% OBW



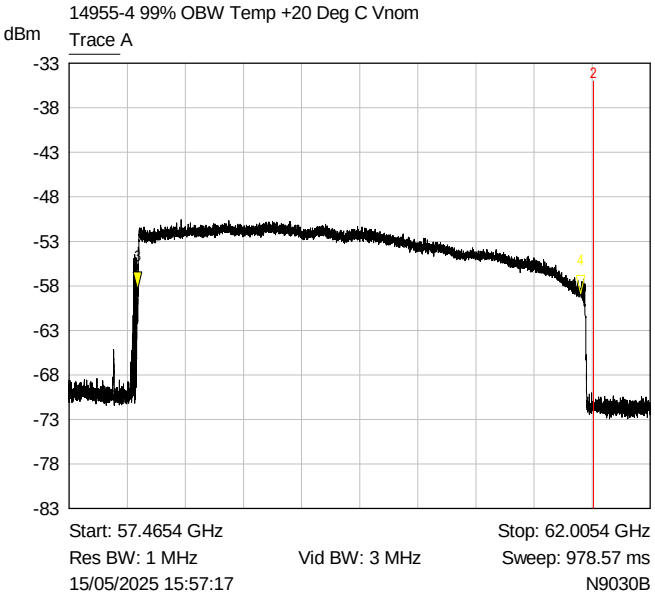
Mkr	Trace	X-Axis	Value	Notes
1	Trace A	57.0000 GHz	-72.29 dBm	Lower band edge
2	Trace A	61.5600 GHz	-72.59 dBm	Upper band edge
3	Trace A	58.0119 GHz	-51.77 dBm	99% OBW
4	Trace A	61.4767 GHz	-56.64 dBm	99% OBW



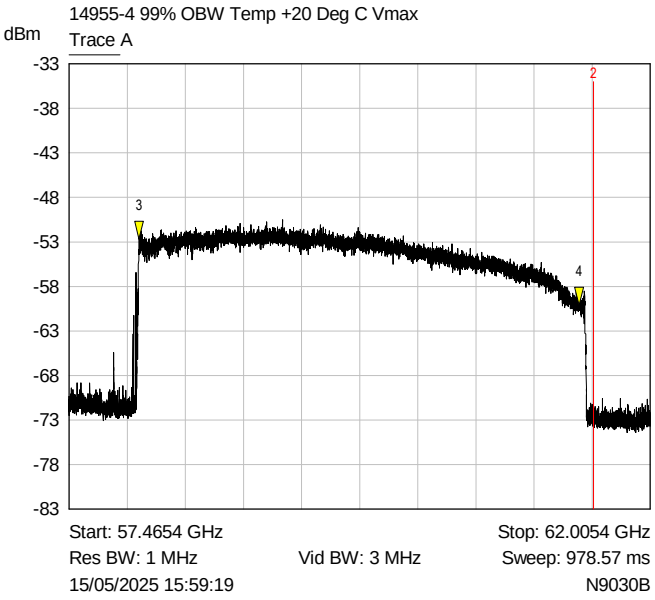
Mkr	Trace	X-Axis	Value	Notes
1	Trace A	57.0000 GHz	-71.79 dBm	Lower band edge
2	Trace A	61.5600 GHz	-72.33 dBm	Upper band edge
3	Trace A	58.0114 GHz	-53.02 dBm	
4	Trace A	61.4722 GHz	-56.30 dBm	



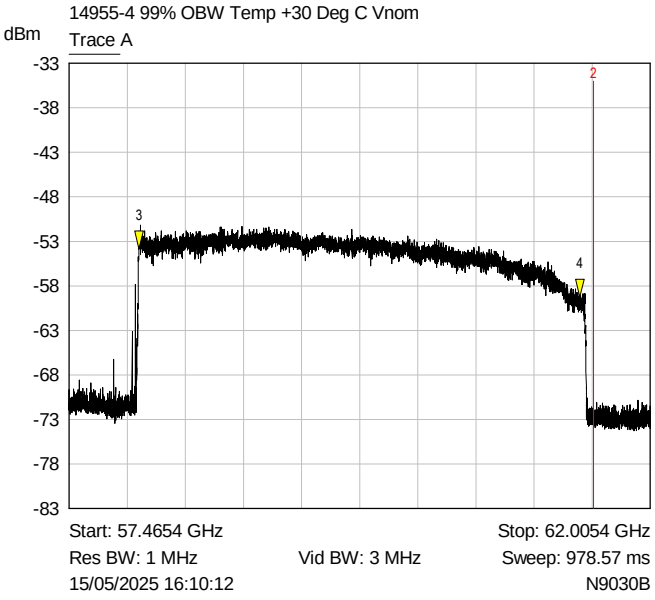
Mkr	Trace	X-Axis	Value	Notes
1	Trace A	57.0000 GHz	-72.17 dBm	Lower band edge
2	Trace A	61.5600 GHz	-72.68 dBm	Upper band edge
3	Trace A	58.0102 GHz	-53.45 dBm	99% OBW
4	Trace A	61.4506 GHz	-60.53 dBm	99% OBW



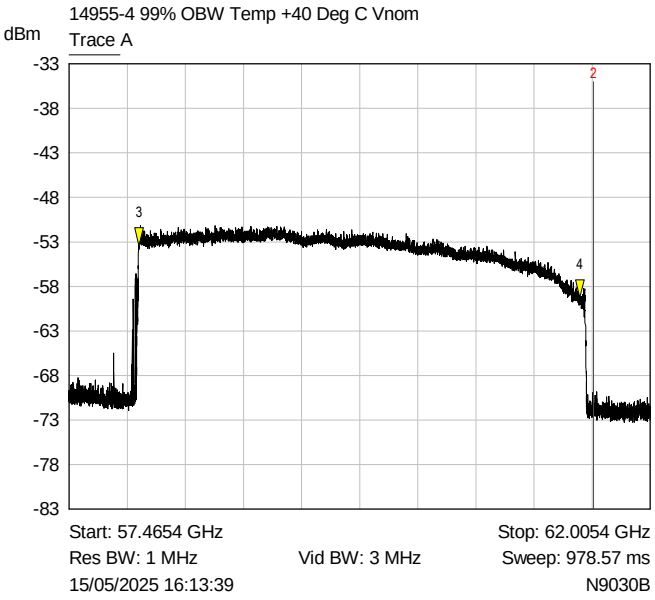
Mkr	Trace	X-Axis	Value	Notes
1	Trace A	57.0000 GHz	-71.16 dBm	Lower band edge
2	Trace A	61.5600 GHz	-71.76 dBm	Upper band edge
3	Trace A	58.0008 GHz	-58.43 dBm	99% OBW
4	Trace A	61.4617 GHz	-58.82 dBm	99% OBW



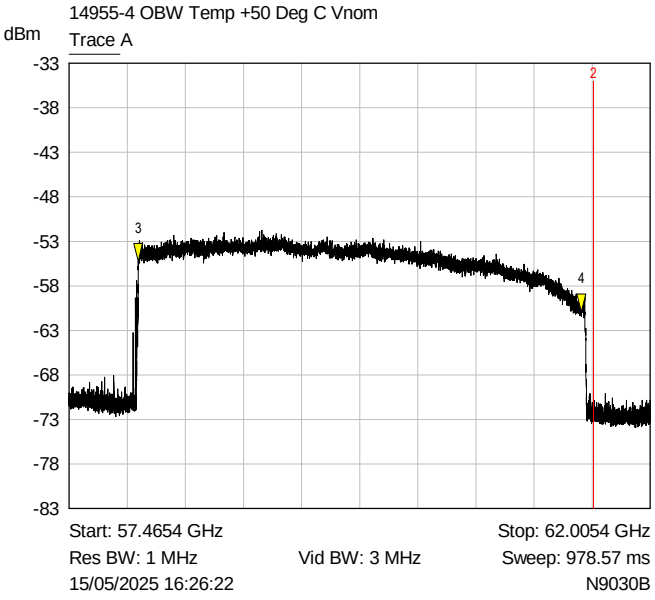
Mkr	Trace	X-Axis	Value	Notes
1	Trace A	57.0000 GHz	-71.21 dBm	Lower band edge
2	Trace A	61.5600 GHz	-72.90 dBm	Upper band edge
3	Trace A	58.0108 GHz	-52.65 dBm	99% OBW
4	Trace A	61.4511 GHz	-60.09 dBm	99% OBW



Mkr	Trace	X-Axis	Value	Notes
1	Trace A	57.0000 GHz	-71.27 dBm	Lower band edge
2	Trace A	61.5600 GHz	-72.59 dBm	Upper band edge
3	Trace A	58.0097 GHz	-53.84 dBm	99% OBW
4	Trace A	61.4572 GHz	-59.21 dBm	99% OBW



Mkr	Trace	X-Axis	Value	Notes
1	Trace A	57.0000 GHz	-71.20 dBm	Lower band edge
2	Trace A	61.5600 GHz	-71.81 dBm	Upper band edge
3	Trace A	58.0075 GHz	-53.38 dBm	99% OBW
4	Trace A	61.4572 GHz	-59.21 dBm	99% OBW



Mkr	Trace	X-Axis	Value	Notes
1	Trace A	57.0000 GHz	-71.19 dBm	Lower band edge
2	Trace A	61.5600 GHz	-72.82 dBm	Upper band edge
3	Trace A	58.0064 GHz	-55.24 dBm	99% OBW
4	Trace A	61.4667 GHz	-60.93 dBm	99% OBW

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 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. 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 500 μV/m equates to 20.log (500) = 54 dB μV/m.

(b) limit of 300 μV/m at 10m equates to 20.log (300 . 10/3) = 60 dB μV/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 dBµV/m at 3m, as extrapolation factor below 30MHz is 40dB/decade per 15.31(f)(2).

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: $E_{Linear} = 10^{((E_{log}-120)/20)}$

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

Where:

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

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

Equation 22: $EIRP = 21.98 - 20\log(\lambda) + 20\log(d_{Meas}) + P-G$

Where:

EIRP is equivalent isotropically radiated power in dBm

λ is the wavelength of the emission under investigation (300/f(MHz)) in m

d_{Meas} is the measurement distance in metres

P is the power measured at the output of the measurement antenna, in dBm

G is the gain of the measurement antenna in dBi

Equation 25: $PD = EIRP_{Linear} / 4\pi d^2$

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

Where:

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

$EIRP_{Linear}$ is the equivalent isotropically radiated power in Watts

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

Equation 26: $PD = E^2_{Speclimit} / 377$

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

Where:

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

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

Example:

Radiated spurious emissions limit at 3metres of $90pW/cm^2$.

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

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

And

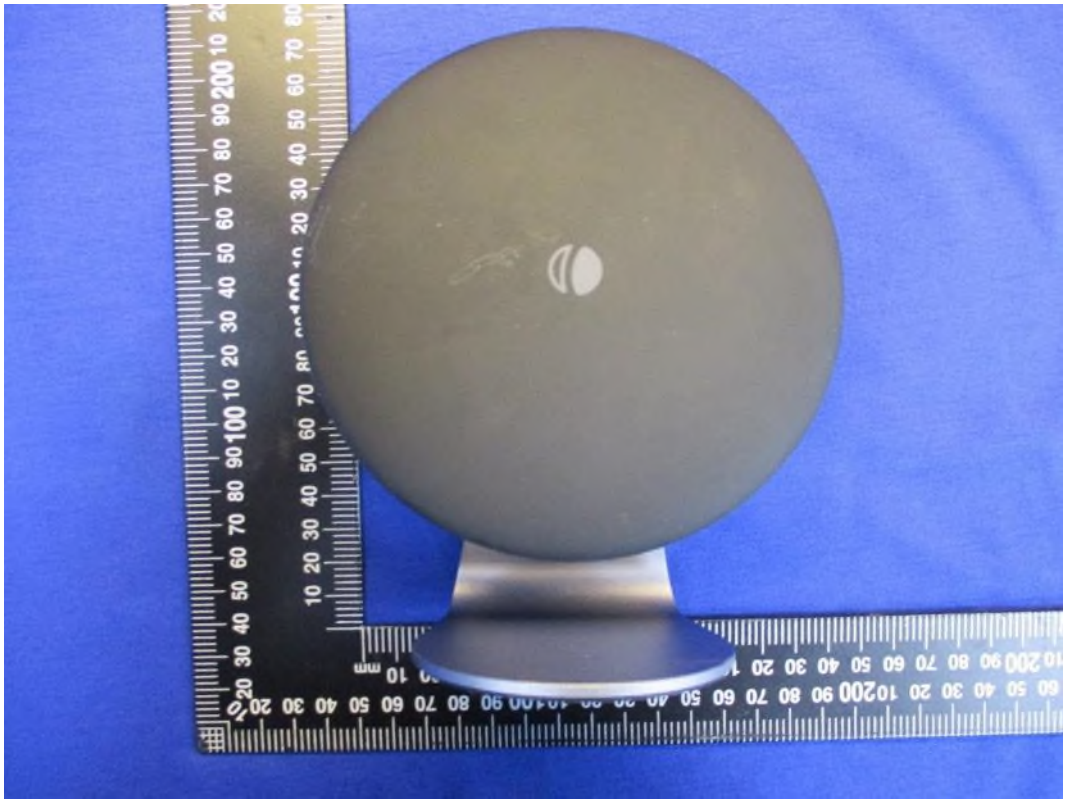
Equation 26 transposed: $E_{Spec\ limit} = \sqrt{(0.9x10^{-6} \times 377)} = 0.01842$ V/m.

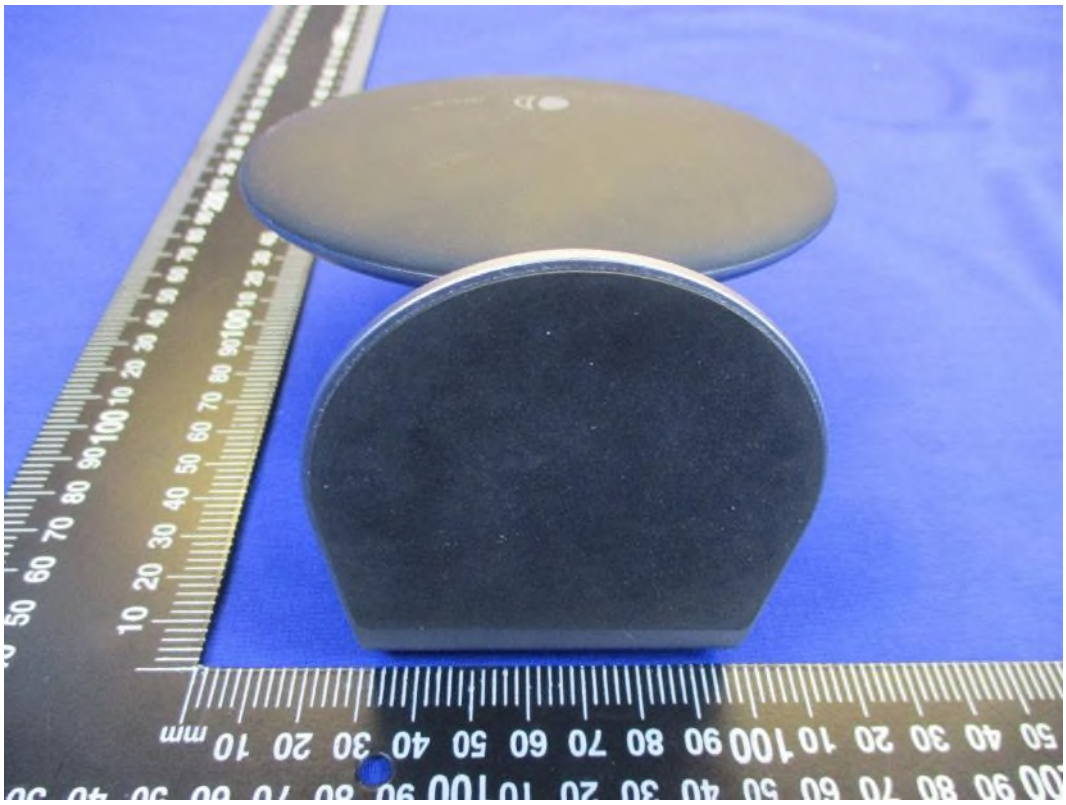
And

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

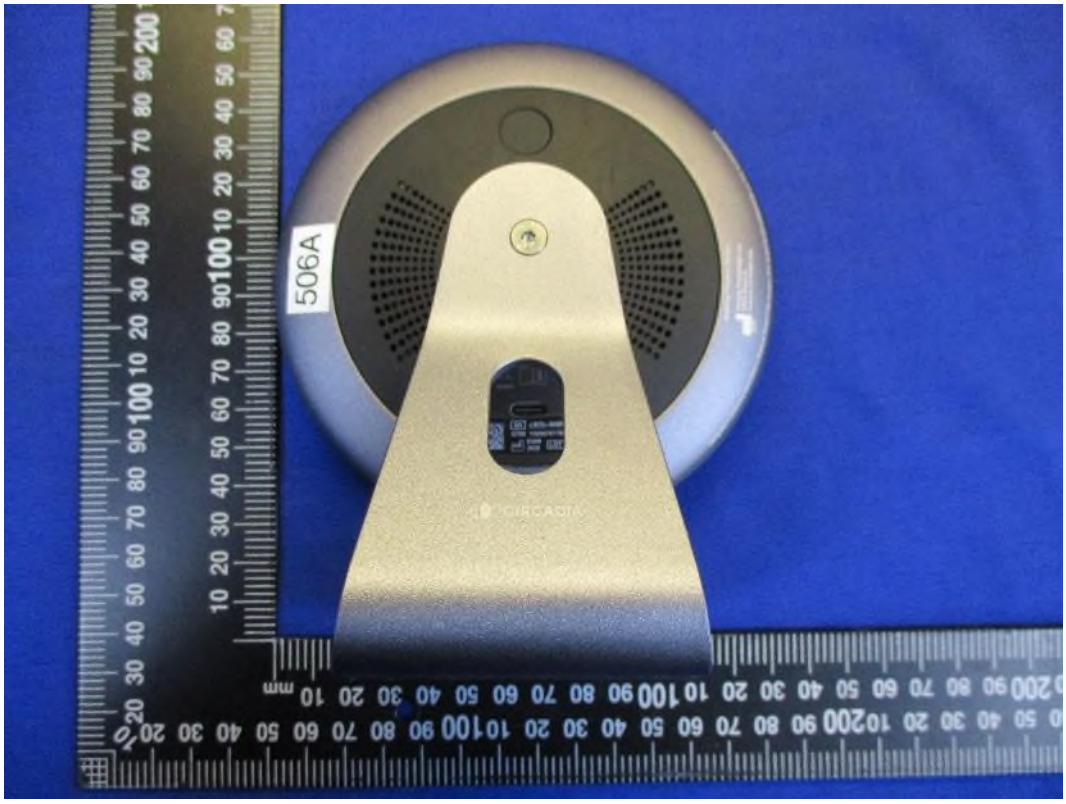
8 Photographs

8.1 EUT Front View

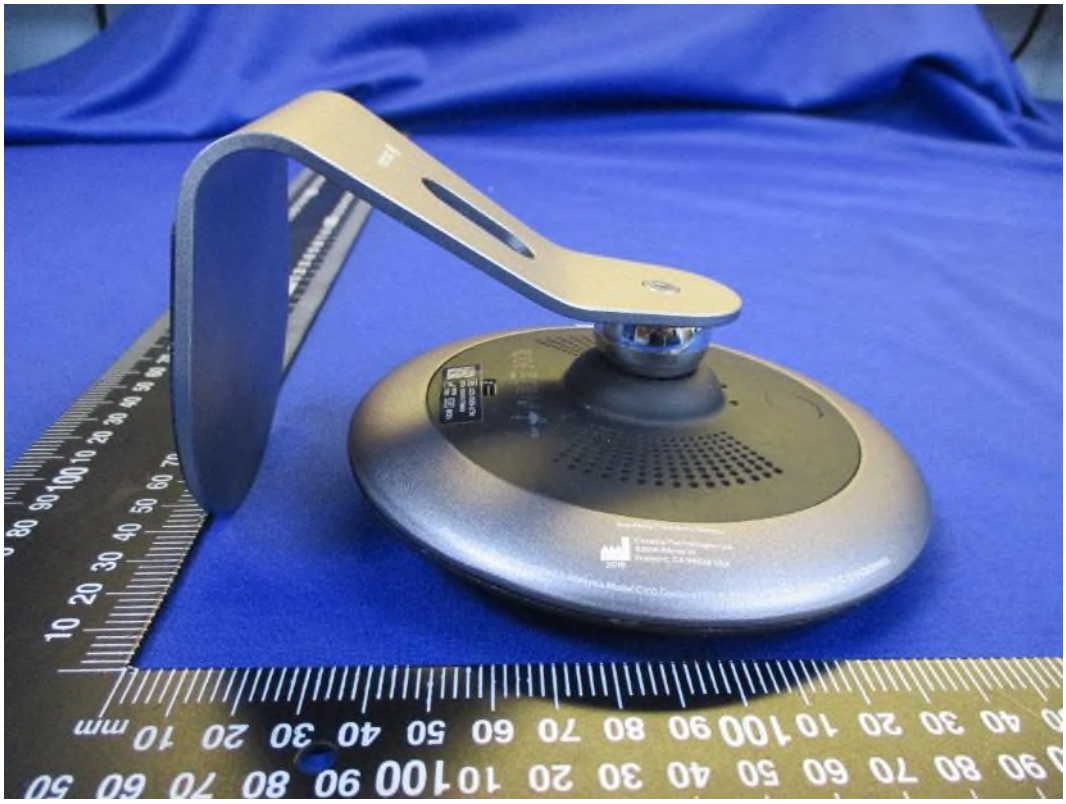




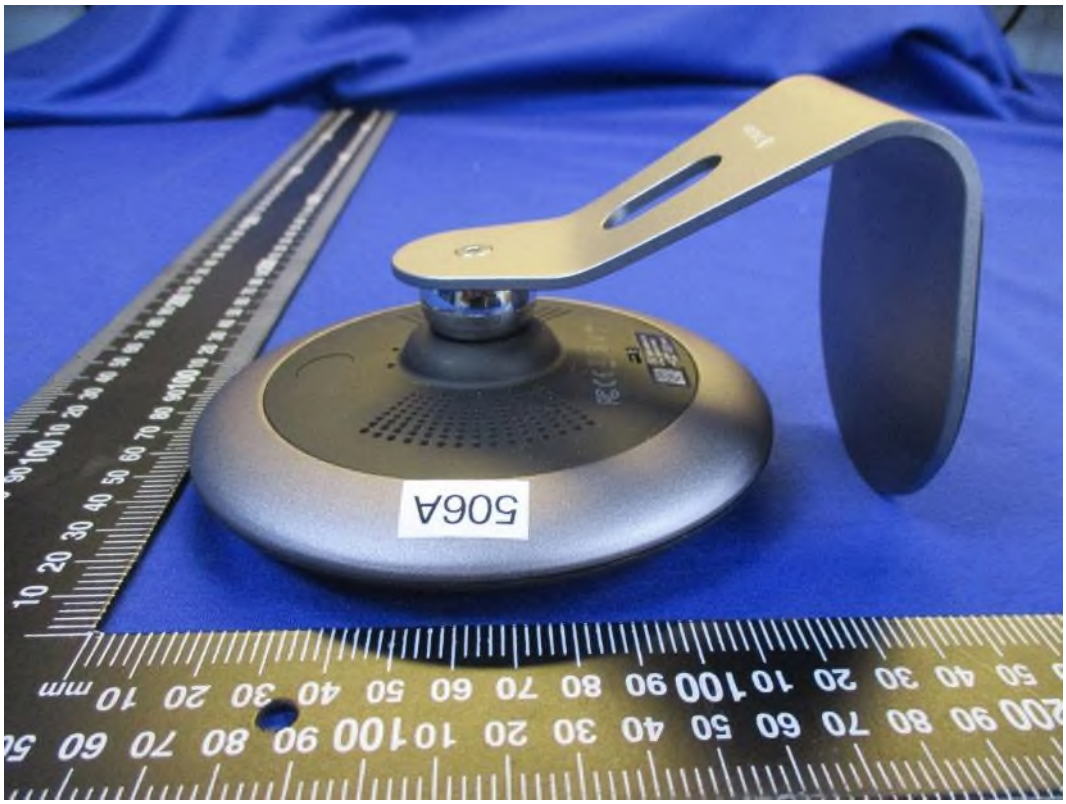
8.2 EUT Reverse Angle



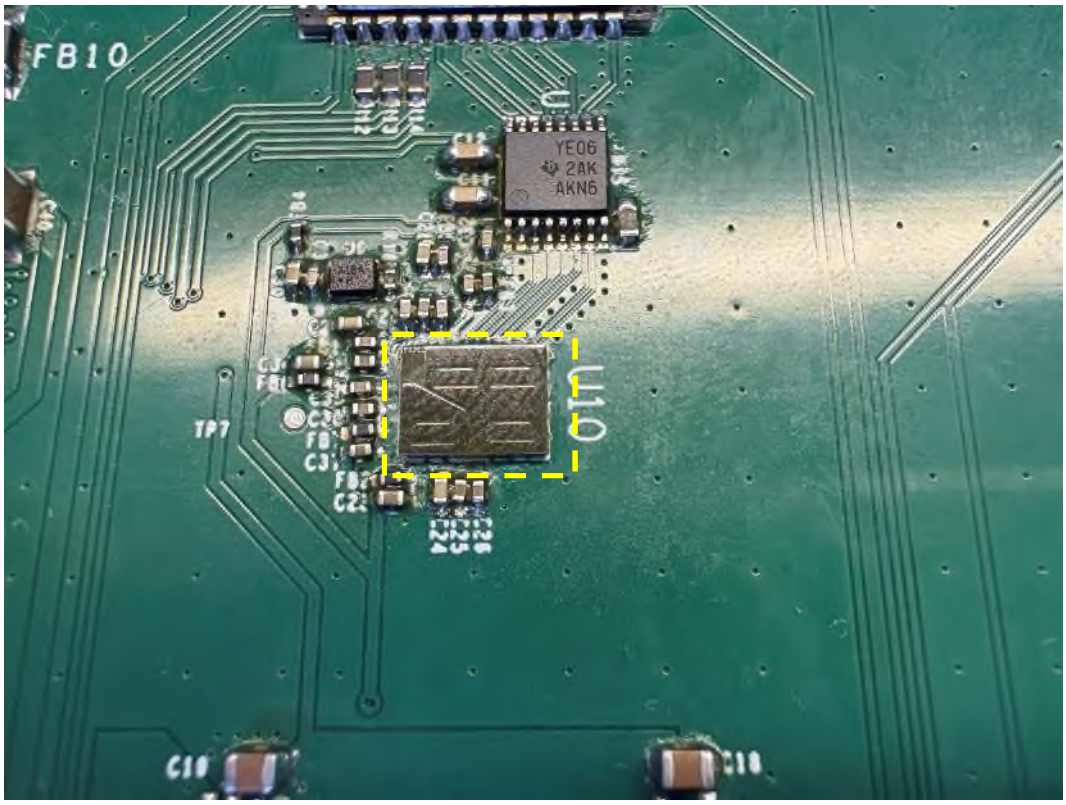
8.3 EUT Left side View



8.4 EUT Right side View



8.5 EUT Antenna

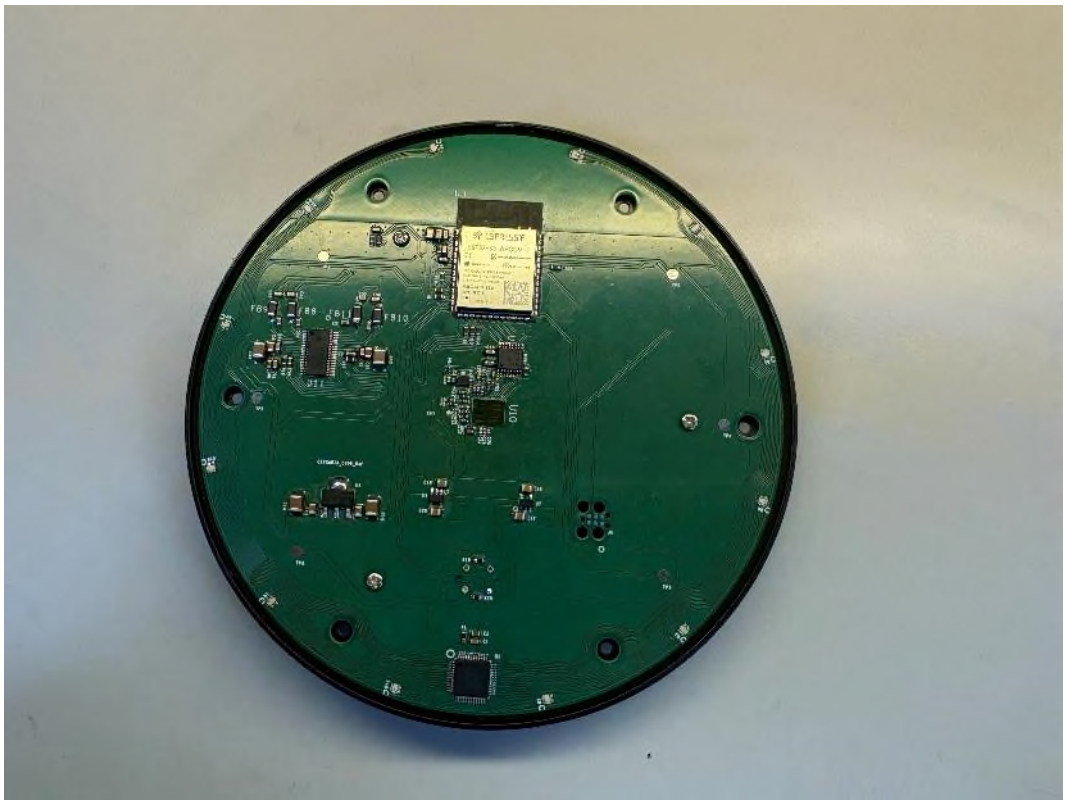


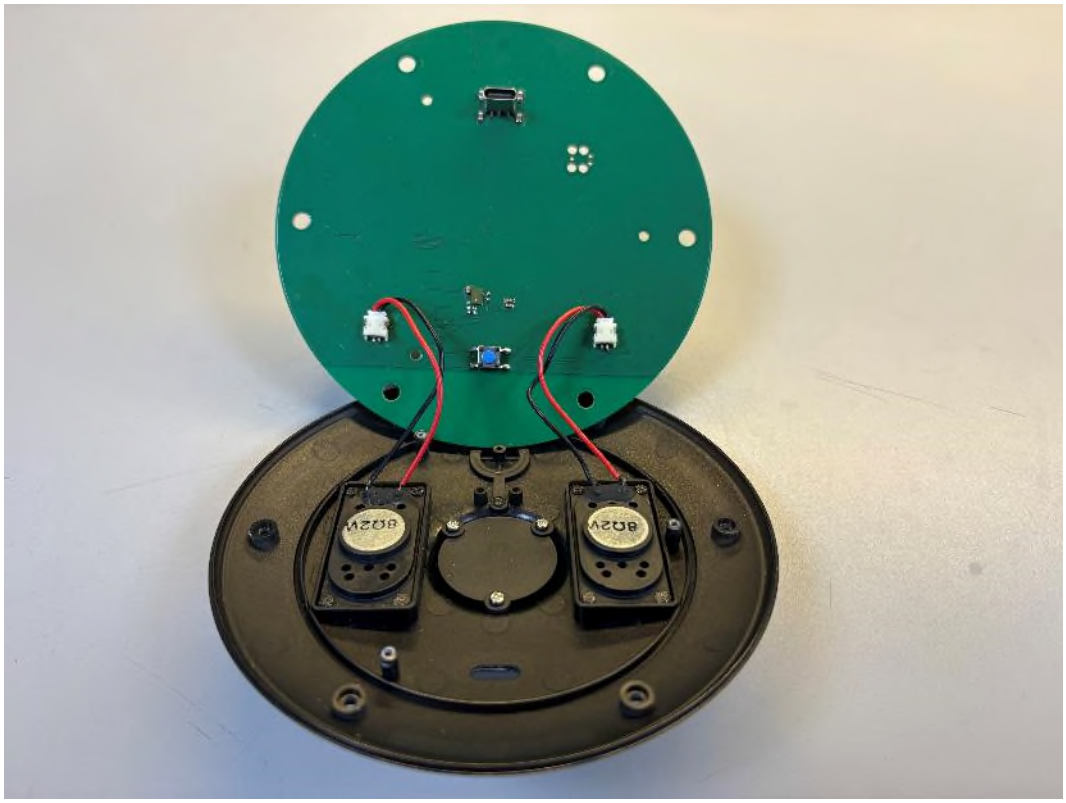
Photograph shows the on-chip radar antennas (highlighted)

8.6 EUT Display & Controls

The EUT has no display or controls

8.7 EUT Internal photos





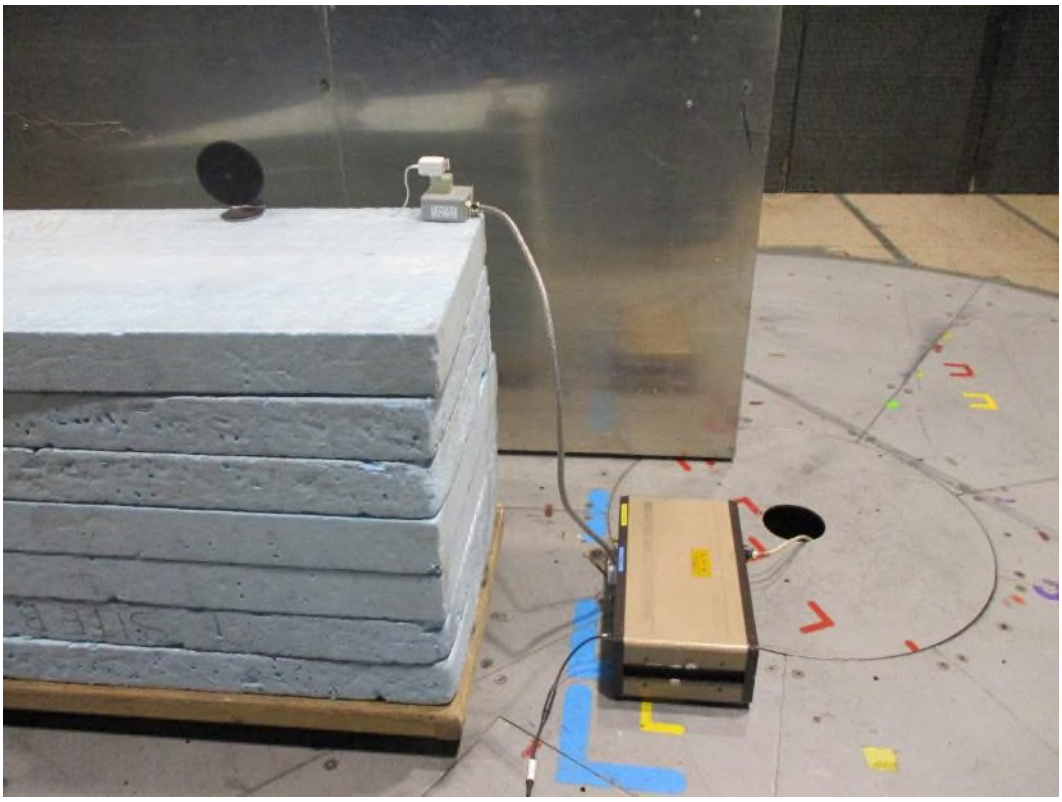
8.8 EUT ID Label

Note: Labelling shown on the product supplied for test above is Example layout labelling only from a prototype casing identical to another product casing; final labelling FCC ID's are noted below and labelling document will be provided in the certification as a separate exhibit.

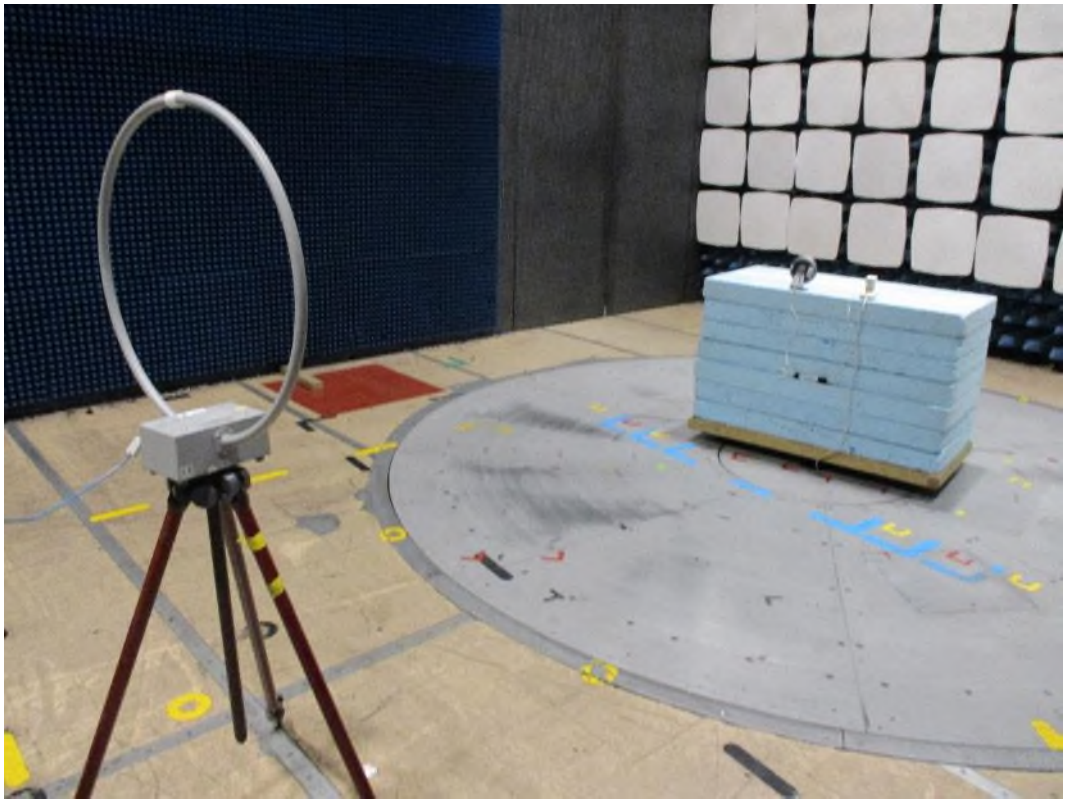
FCC ID:2BPIS-C300

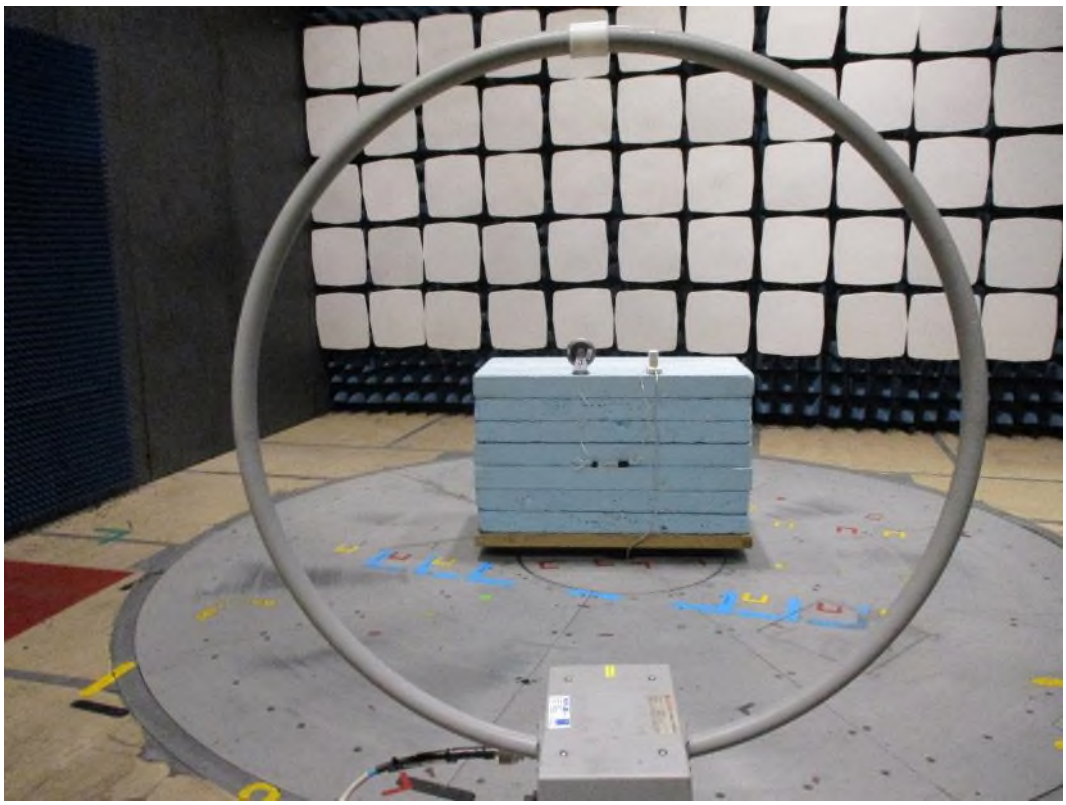
Contains FCC ID:2AC7Z—ESP3WROOM1

8.9 Conducted emissions 150 kHz - 30 MHz

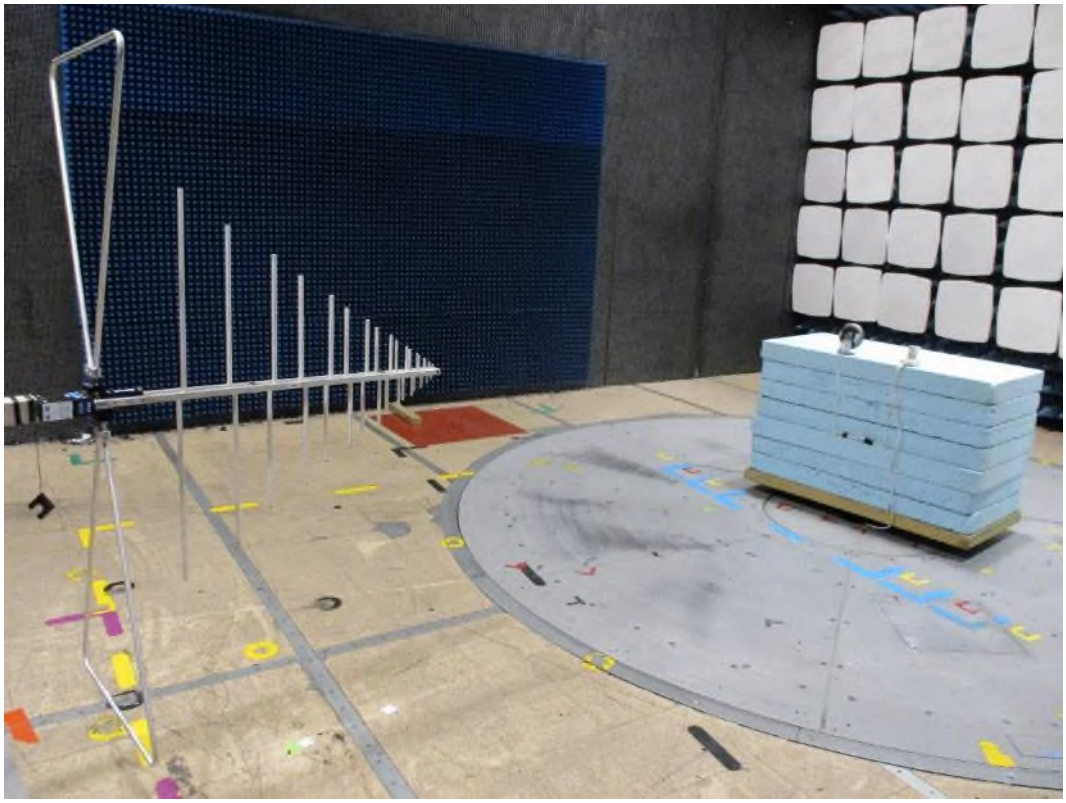


8.10 Radiated emissions 150 kHz - 30 MHz

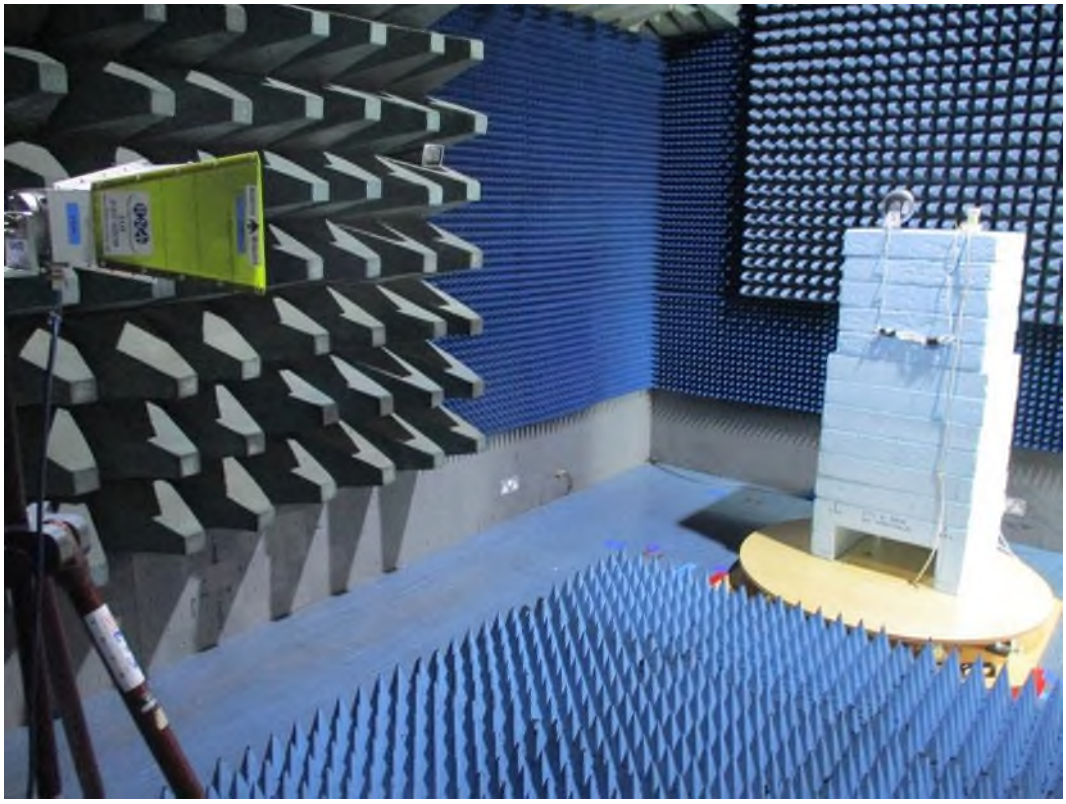


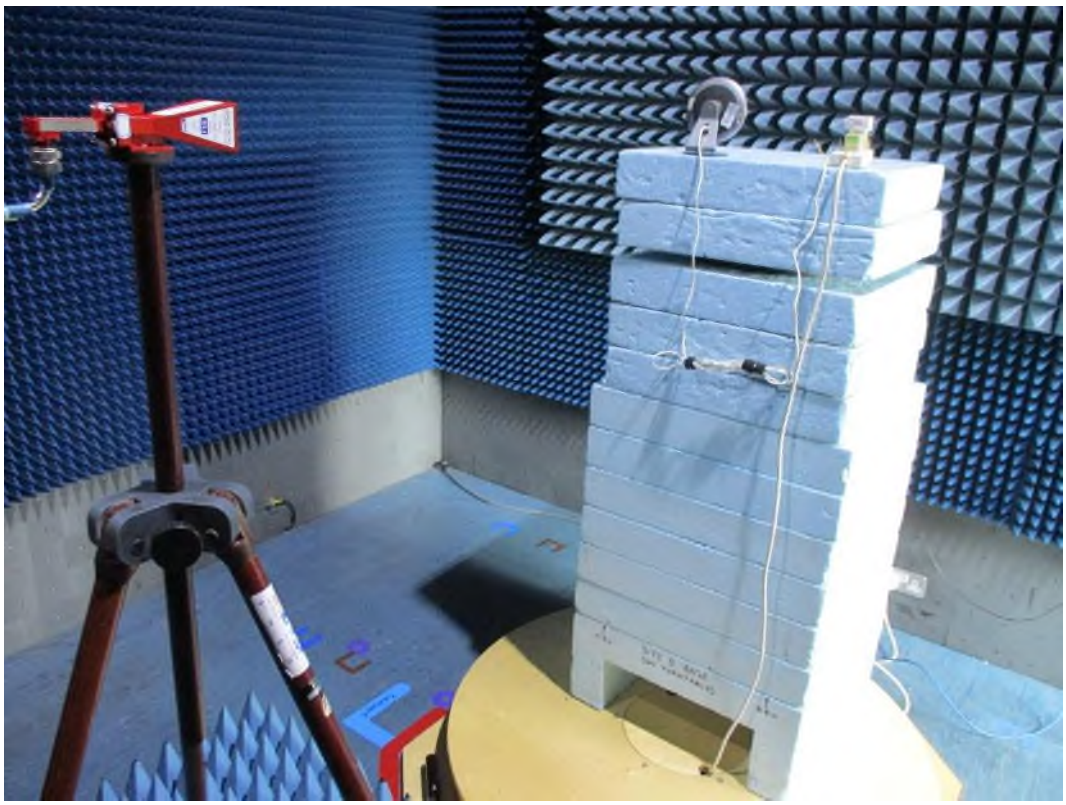


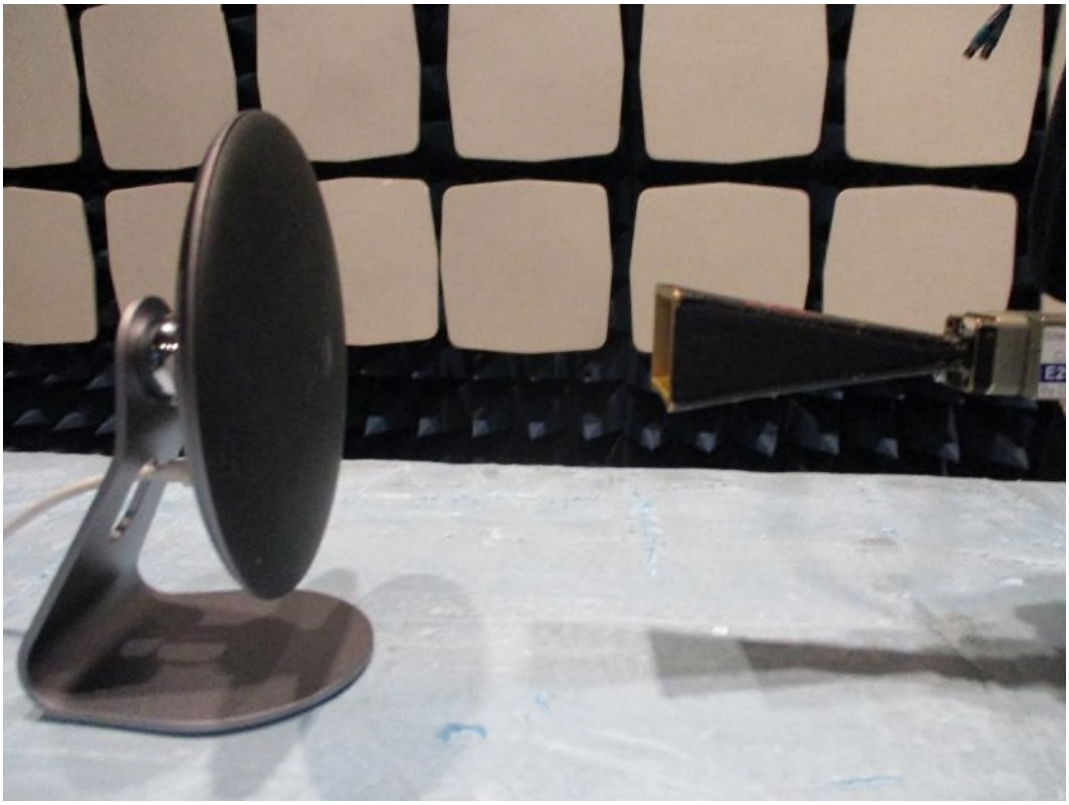
8.11 Radiated emissions 30 MHz -1 GHz

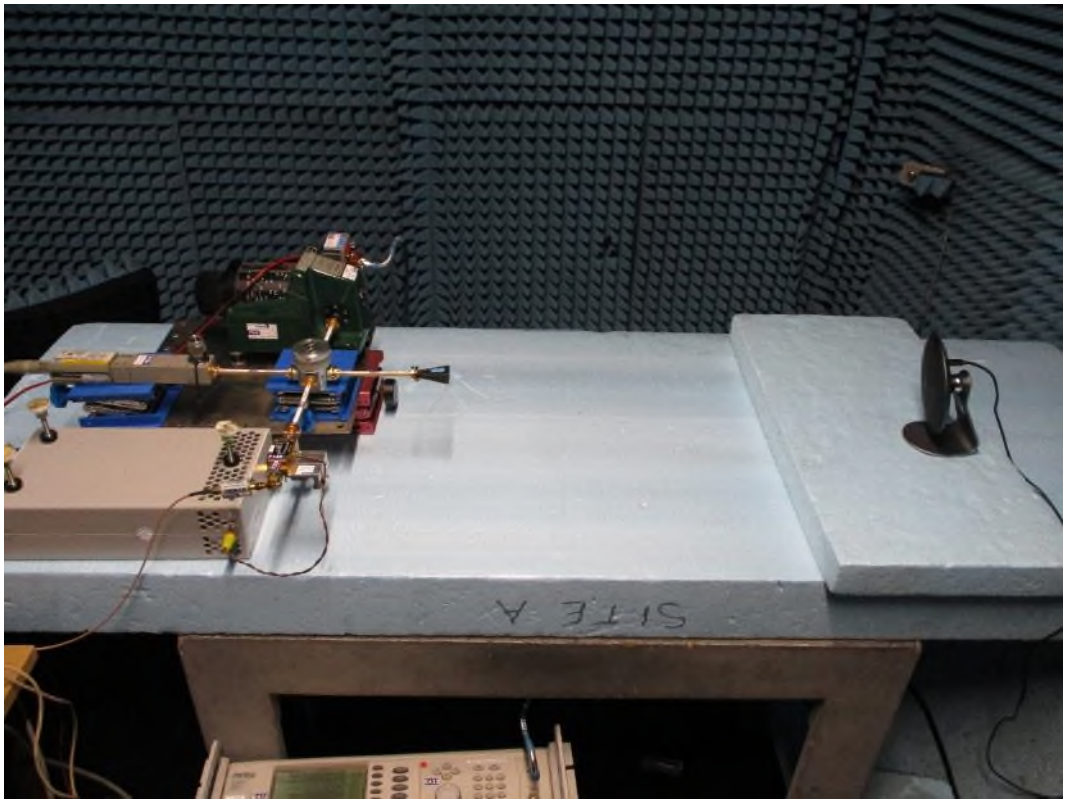


8.12 Radiated emissions 1 - 200 GHz





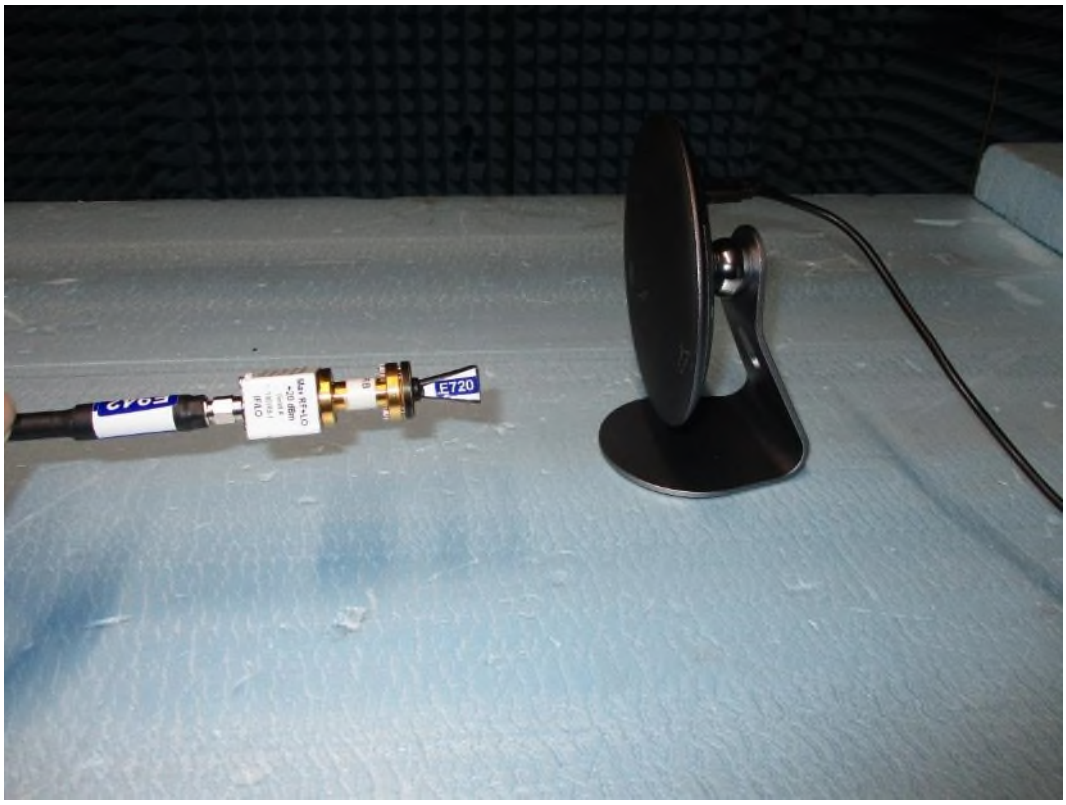


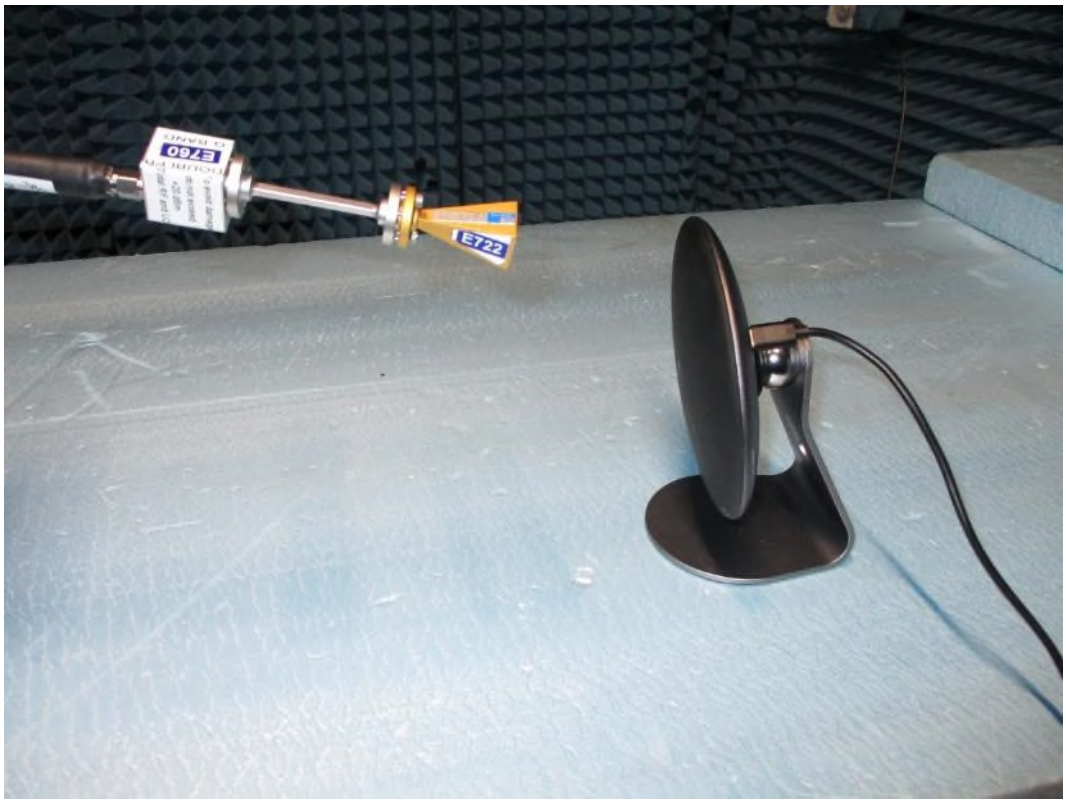

SITE A


1463
40-60G


506A
H070
Agilent Technologies
M1970W


F400
KEYSIGHT
M1970V
Waveguide Harmonic Mixer
50-75 GHz
kiwa
F400
Due Date: 26/11/2026





8.13 Radiated emission diagrams

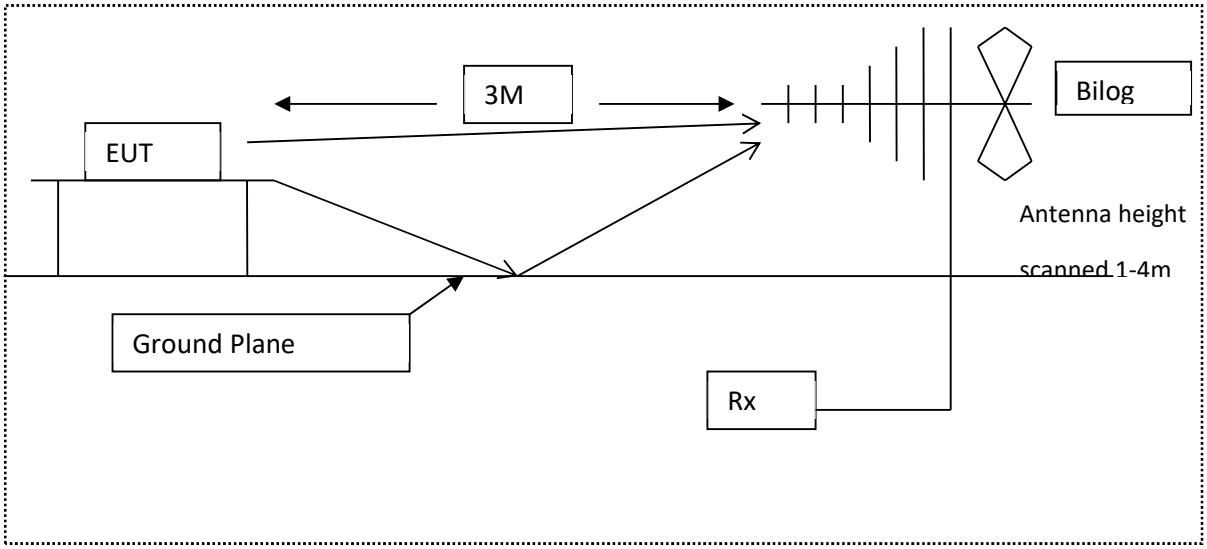


Diagram of the radiated emissions test setup 30 - 1000 MHz

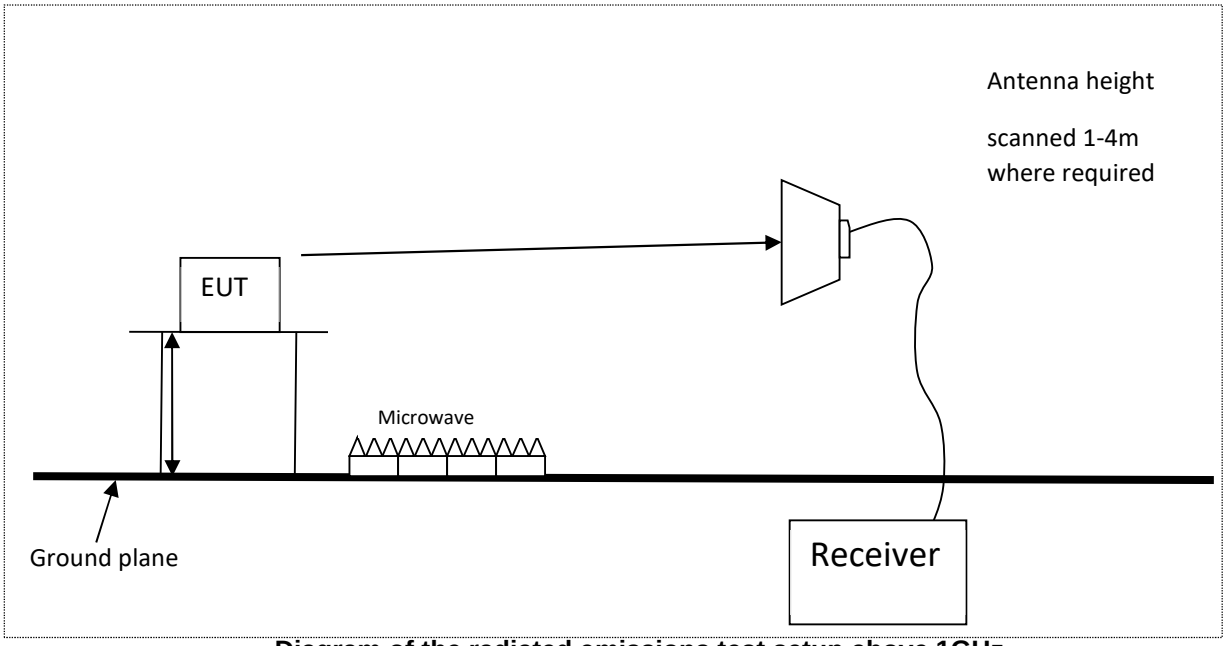


Diagram of the radiated emissions test setup above 1GHz

8.14 AC powerline conducted emission diagram

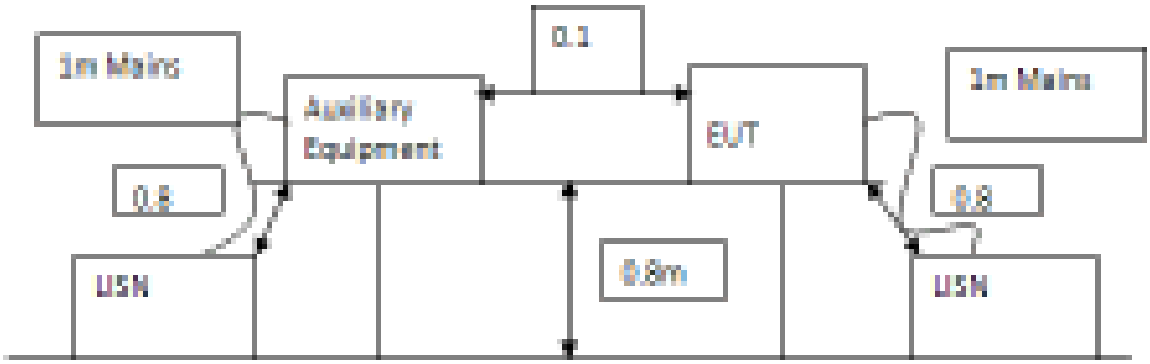


Diagram of the AC conducted emissions test setup

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.

KEC No	Model	Description	Manufacturer	Calibrated Date	Period
E187	84534.01	Variac 0-290VAC, 4A, 50Hz	Marconi Instruments	12/02/2025	12 months
E296-2	11970A	Harmonic Mixer 26.5-40GHz	Hewlett Packard	19/08/2024	12 months
E296-4	11970U	Harmonic Mixer 40-60GHz	Hewlett Packard	07/07/2023	24 months
E331	22093-KF20	Horn Antenna 26.5 - 40 GHz	Flann (FMI)	04/04/2025	12 months
E412	E4440A	PSA 3 Hz - 26.5 GHz	Agilent Technologies	22/09/2023	24 months
E428	HF906	Horn Antenna 1 - 18 GHz	Rohde & Schwarz	23/05/2023	36 months
E429	-	Filter Box 5 Switch Filters 0.91 GHz - 16.3 GHz	RN Electronics	14/08/2024	12 months
E443	07145	Cable RG142 N-N 4m Receiver (M)	Times Fiber Communications	10/08/2024	12 months
E463	8431A	Filter Band pass 2-4 GHz	Hewlett Packard	22/11/2024	12 months
E478	LQ2992/H	Filter Band pass 1-3GHz	RACAL-MESL	#19/05/2025	12 months
E503	2524-20	Horn Antenna 50 - 75 GHz	Flann (FMI)	04/04/2025	12 months
E520	MD4A	Diplexor IF DC-2.5GHz, LO 5-20GHz	Pacific Millimeter Products	13/05/2025	12 months
E536	-	Cable N-N (H)	W.L.Gore (UK)	27/09/2024	24 months
E580	24240	Horn Std Gain 40 - 60 GHz	Flann (FMI)	04/04/2025	12 months
E642	E4440A	PSA 3 Hz - 26.5 GHz	Agilent Technologies	20/02/2024	24 months
E658	E4418B	Power Meter EPM series	Agilent Technologies	25/02/2025	12 months
E717	-	Horn Std Gain 50-75GHz	-	04/04/2025	12 months
E718	-	Horn Std Gain 75-110GHz	-	04/04/2025	12 months
E722	861G/387	Horn Std Gain 140-220GHz	Alpha Industries Inc	04/04/2025	12 months
E745	2017 4/2dB	Attenuator 4/2dB 30-1000MHz	KEC	17/02/2025	12 months
E755	N9030B	PXA Signal Analyser 3 Hz to 50 GHz	Keysight Technologies	13/08/2024	12 months
E760	M05HWDX	Mixer 140-220GHz	OML Inc	06/12/2023	24 months
E781	MX4-15-F	Multiplier 50 - 75GHz X4 WR15	MMWave Group (Quantum)	07/02/2025	24 months
E904	5086-7805	Pre-Amplifier 1GHz - 26.5GHz	Hewlett Packard	#04/07/2025	12 months
E914	VULB 9163	Antenna BiLog 30MHz to 3GHz	Schwarzbeck	28/06/2024	24 months
E941	M08HWDX	Mixer 90-140GHz	OML Inc	06/12/2023	24 months
E952	FB311A2-03-DPAB	Cable N type - N type 2m Shower (H)	Utiflex	27/09/2024	24 months
E967	F-336/UPM-84	Filter Band Pass 3.5 to 6.9GHz	Polarad Electronics	#30/05/2025	12 months
E968	F-335/UPM-84	Filter Band Pass 6.3 to 11.8GHz	Polarad Electronics	#30/05/2025	12 months
F045	2511	Attenuator 50-75GHz Rotary	Flann (FMI)	07/01/2025	24 months
F136	DSO5034A	Oscilloscope 300MHz 4CH	Agilent Technologies	17/12/2024	12 months
F139	ALN-62106025-01	Amplifier WR15	Ducommun	#23/05/2025	12 months
F190	UFA210A	Cable Light blue 92cm(36") SMA m to SMA m	Micro-Coax Utiflex	#09/10/2025	6 months
F230	3160-08	Horn Std Gain 12.4 - 18 GHz	ETS-Lindgren	26/09/2024	12 months
F231	3160-09	Horn Std Gain 18 - 26.5 GHz	ETS-Lindgren	11/07/2024	12 months
F238	N9039A	9 kHz - 1 GHz RF Filter Section	Agilent Technologies	22/08/2024	12 months
F305	DET-15-RPFA0	Detector WR15	Millitech	07/02/2025	12 months
F356	SLP-10.7+	Filter Low Pass 11 MHz	Mini-Circuits	10/10/2024	12 months
F400	M1970V	50-75GHz Smart mixer	Keysight	26/11/2024	24 months
F419	UFA210A-0-0360-300300	Cable SMA m to SMA m		10/04/2025	6 months

F449	MWX221	Cable N-SMA 2m Blue (H)	Junflon	25/09/2024	12 months
H070	M1970W	Waveguide Harmonic Mixer 75 - 110 GHz	Keysight Technologies	09/10/2023	24 months
H078	V530	Waveguide switch 50-75GHz		24/07/2024	12 months
L264	DT75	Digital Thermometer	Instrotech Ltd	28/05/2024	24 months
LPE222	MN2050	LISN Artificial Mains Network	Chase	14/06/2024	12 months
LPE373	11947A	Transient Limiter 9 kHz - 200 MHz	Hewlett Packard	31/07/2024	12 months
NSA-H	NSA - H	NSA - Site H	KEC	17/05/2023	36 months
S032	177	True RMS Multimeter	Fluke	15/07/2024	12 months
TMS38	VMT04/140	Environmental Oven	Heraeus Votsch	22/02/2025	12 months
TMS81	6502	Antenna Active Loop	EMCO	17/08/2023	24 months
ZSW1	V2.5.7	KEC Measurement Software Suite	KEC	Not applicable	

Items marked # have been re-calibrated since/during date of tests.

10 Auxiliary and peripheral equipment

10.1 Customer supplied equipment

No customer supplied equipment was used.

10.2 Kiwa Electrical Compliance supplied equipment

Item No	Model	Description	Manufacturer	Serial No
E465	PCR2000LA	AC Power Source 2kVA	Kikusui	HJ000995

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

13 Abbreviations and units

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

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

13 Revision History

Issue Number	Revision History	Page Reference(s)
01	First Issue	-

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