

Test Report

| | |
|--|---|
| Product | Multipurpose VHF Airband Radio |
| Name and address of the applicant | Jotron AS Ringdalskogen 8 3270 Larvik, Norway |
| Name and address of the manufacturer | Jotron AS Ringdalskogen 8 3270 Larvik, Norway |
| Model | TR-910 |
| Rating | 12.0 – 28.0 V _{DC} |
| Trademark | JOTRON |
| Serial number | 107 |
| Additional information | VHF, AM |
| Tested according to | FCC Part 15, subpart B Other Class B Digital Device Industry Canada ICES-003, Issue 7 Information Technology Equipment (ITE) |
| Order number | 438026 |
| Tested in period | 2021-06-04 to 2021-06-16 |
| Issue date | 2021-09-09 |
| Name and address of the testing laboratory | <div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="text-align: center;">  Instituttveien 6 Kjeller, Norway www.nemko.com </div> <div style="text-align: center;"> CAB Number: FCC: NO0001 ISED: NO0470 TEL: +47 22 96 03 30 FAX: +47 22 96 05 50 </div> <div style="text-align: center;">   </div> </div> <p style="text-align: center; color: red; font-weight: bold;">An accredited technical test executed under the Norwegian accreditation scheme</p> |
| <div style="display: flex; justify-content: space-around; margin-top: 20px;"> <div style="text-align: center;">  Prepared by [Frode Sveinsen] </div> <div style="text-align: center;">  Approved by [G.Suhanthakumar] </div> </div> | |
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1 INFORMATION

1.1 Tested Item

| | |
|------------------|--|
| Name | JOTRON |
| Model name | TR-910 |
| FCC ID | RA9TR-910 |
| FCC / ISED Class | B |
| Serial number | 107 |
| Hardware version | Main Board: X102634:R2107 |
| Software version | 6.03 |
| Power Supply | 12.0 – 28.0 V DC (external power supply) or AC Adaptor Model: TRH70A150 (Input: 100-240V~1.5A, 47-63Hz; Output: 15.0V _{DC} 4.65A, 69.7W) |
| Interfaces | Mic/Headset Connector (RJ45) I/O connector (RJ45) LAN connector (RJ45) |

Description of Tested Device(s)

The EUT is a VHF transceiver for AM modulated ground to air communications in the aeronautical VHF band.

1.2 Test Environment

| | |
|----------------------|---|
| Temperature: | 20 – 25 °C |
| Relative humidity: | 30 – 50 % |
| Normal test voltage: | 15.0 V DC (Radiated Emissions Test) 120V 60Hz (Conducted Emissions Test) |

The values are the limit registered during the test period.

1.3 Test Engineer(s)

Frode Sveinsen / Thanh Tran

1.4 Test Equipment

See list of test equipment in clause 6.

1.5 Test Configurations

| | |
|-------------------|--|
| Test Mode | All tests were performed with the EUT operating in normal mode. |
| EUT Configuration | Radiated Emissions were performed with the antenna port terminated into 50 Ohms. |

1.6 Other Comments

All tests were performed with all ports populated and operating.

2 TEST REPORT SUMMARY

2.1 General

All measurements are traceable to national standards.

All tests were performed in accordance with ANSI C63.4-2014 where applicable. Radiated emissions are made in a 10m semi-anechoic chamber at 3m measuring distance. A description of the test facility is on file with FCC and Industry Canada.

New Submission

Production Unit

Class II Permissive Change

Pre-production Unit

JAB Equipment Code

Family Listing



THIS TEST REPORT APPLIES ONLY TO THE ITEM(S) AND CONFIGURATIONS TESTED.

Deviations from, additions to, or exclusions from the test specifications are described in "Summary of Test Data".

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2.2 Test Summary

| Name of test | FCC CFR 47, Paragraph # | ISED RSS-GEN, Issue 5, Paragraph # | ISED ICES-003, Issue 7, Paragraph # | Verdict |
|-------------------------------|----------------------------|--|---|----------|
| Power Line Conducted Emission | 15.107(a) 15.207(a) | 7.2 | 3.2.1 | Complies |
| Spurious Emissions (Radiated) | 15.109 | 7.3 | 3.2.2 | Complies |
| Labelling Requirements | 15.19 | 4 | 4.2 | Complies |

3 TEST RESULTS

3.1 Power Line Conducted Emissions

FCC Part 15.107 (a)

ISED RSS-Gen Issue 5, Clause 7.2

ISED ICES-003 Issue 7, Clause 3.2.1

Measurement procedure: ANSI C63.4-2014 using 50 μ H/50 ohms LISN.

Test Results: **Complies**

Measurement Data: **See attached plots.**
This test was performed with the supplied AC adaptor and 120V 60Hz.

Highest measured value (L1 and N):

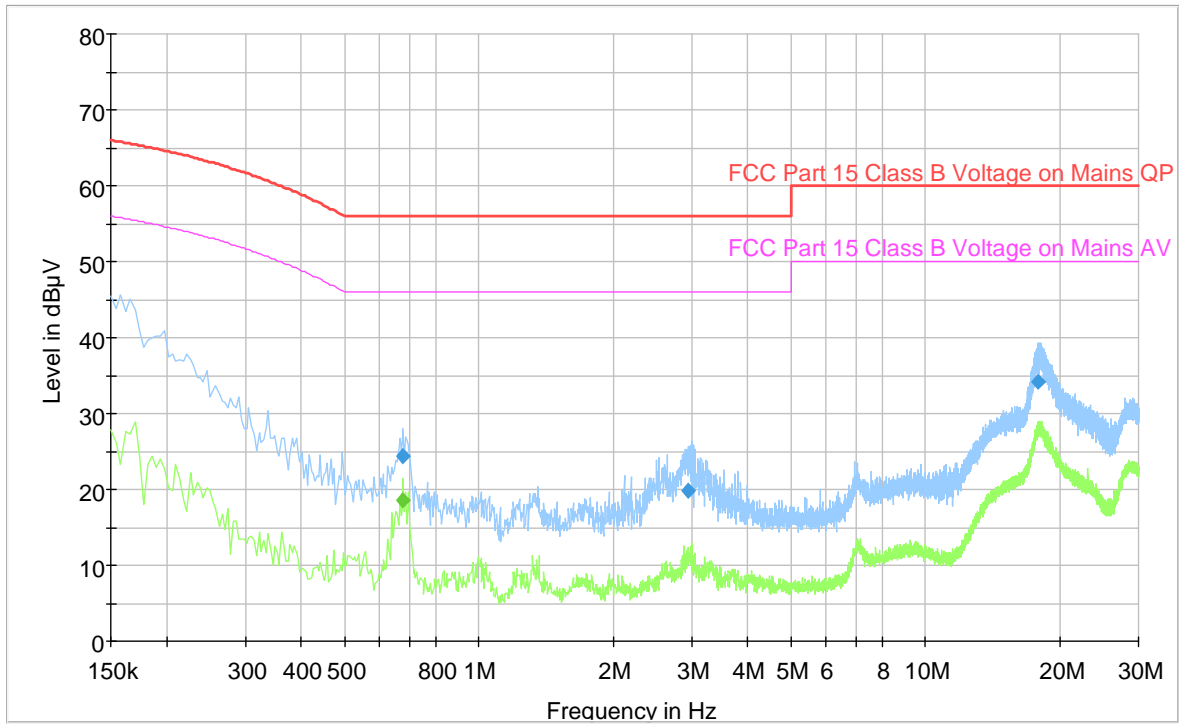
Receive Mode:

| Frequency (MHz) | QuasiPeak (dB μ V) | Average (dB μ V) | Limit (dB μ V) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Filter |
|-----------------|------------------------|----------------------|--------------------|-------------|-----------------|-----------------|------|--------|
| 0.676 | --- | 18.57 | 46.00 | 27.43 | 1000 | 9 | N | OFF |
| 0.676 | 24.45 | --- | 56.00 | 31.55 | 1000 | 9 | L1 | OFF |
| 2.932 | 19.84 | --- | 56.00 | 36.16 | 1000 | 9 | N | OFF |
| 17.876 | 34.10 | --- | 60.00 | 25.90 | 1000 | 9 | L1 | OFF |

Transmit Mode:

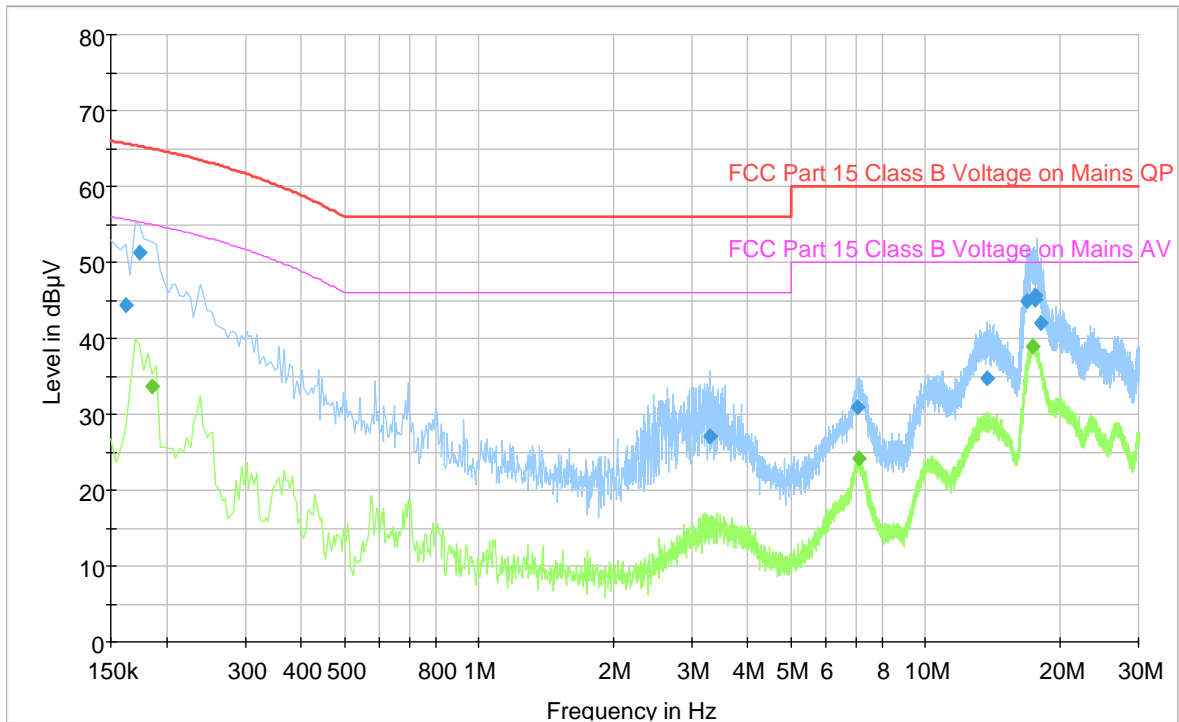
| Frequency (MHz) | QuasiPeak (dB μ V) | Average (dB μ V) | Limit (dB μ V) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Filter |
|-----------------|------------------------|----------------------|--------------------|-------------|-----------------|-----------------|------|--------|
| 0.162 | 44.38 | --- | 65.66 | 21.28 | 1000 | 9 | N | OFF |
| 0.174 | 51.35 | --- | 65.31 | 13.97 | 1000 | 9 | N | OFF |
| 0.186 | --- | 33.72 | 54.97 | 21.25 | 1000 | 9 | N | OFF |
| 3.284 | 27.08 | --- | 56.00 | 28.92 | 1000 | 9 | N | OFF |
| 7.052 | 30.83 | --- | 60.00 | 29.17 | 1000 | 9 | N | OFF |
| 7.104 | --- | 24.14 | 50.00 | 25.86 | 1000 | 9 | L1 | OFF |
| 13.740 | 34.71 | --- | 60.00 | 25.29 | 1000 | 9 | L1 | OFF |
| 16.900 | 44.84 | --- | 60.00 | 15.16 | 1000 | 9 | L1 | OFF |
| 17.424 | --- | 38.92 | 50.00 | 11.08 | 1000 | 9 | N | OFF |
| 17.560 | 45.65 | --- | 60.00 | 14.35 | 1000 | 9 | N | OFF |
| 17.660 | 45.05 | --- | 60.00 | 14.95 | 1000 | 9 | N | OFF |
| 18.120 | 42.08 | --- | 60.00 | 17.92 | 1000 | 9 | L1 | OFF |

Full Spectrum



Receive Mode

Full Spectrum



Transmit Mode

3.2 Spurious Emissions (Radiated)

FCC Part 15.109

ISED RSS-Gen Issue 5, Clause 7.3

ISED ICES-003 Issue 7, Clause 3.2.2

Test Results:

Radiated Emissions 30 - 2000 MHz

Detector: Quasi-Peak

Measuring distance 3m

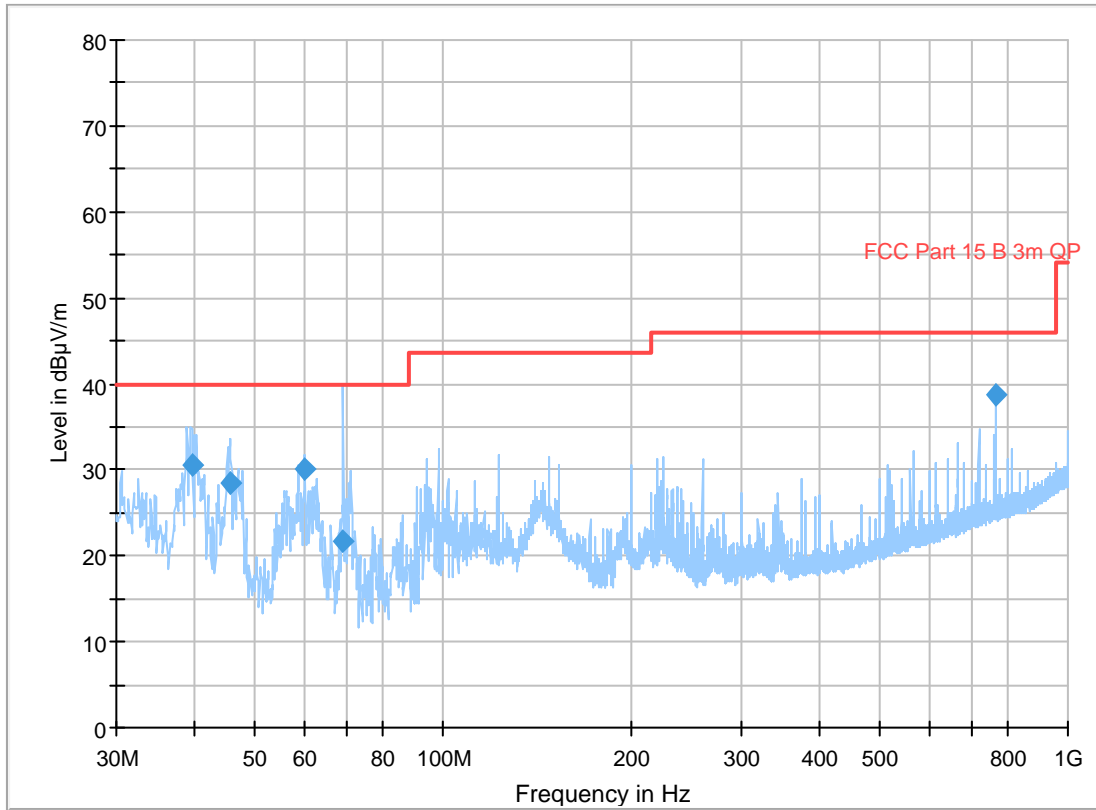
The EUT was rotated 360 degrees and antenna height varied between 1m and 4m, with Vertical and Horizontal Polarisation.

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) |
|-----------------|--------------------|----------------|-------------|-----------------|-----------------|-------------|-----|---------------|
| 39.677050 | 30.58 | 40.00 | 9.42 | 1000.0 | 120.000 | 100.0 | V | 78.0 |
| 45.569450 | 28.39 | 40.00 | 11.61 | 1000.0 | 120.000 | 100.0 | V | 1.0 |
| 60.225100 | 30.08 | 40.00 | 9.92 | 1000.0 | 120.000 | 104.0 | V | 236.0 |
| 69.110300 | 21.65 | 40.00 | 18.35 | 1000.0 | 120.000 | 160.0 | V | 235.0 |
| 765.000550 | 38.60 | 46.00 | 7.40 | 1000.0 | 120.000 | 116.0 | H | 255.0 |

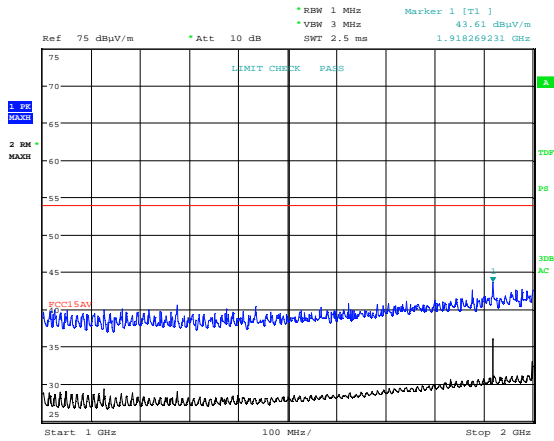
Requirements/Limit

| | | |
|--|--|---------------------|
| FCC | Part 15.209 @ frequencies defined in §15.205 | |
| ISED | RSS-GEN Issue 4, Clause 8.9 @ frequencies defined in clause 8.10 | |
| Radiated emission limit @3 meters | | |
| Frequency (MHz) | Quasi Peak (µV/m) | Quasi Peak (dBµV/m) |
| 30 – 88 | 100 | 40.0 |
| 88 – 216 | 150 | 43.5 |
| 216 – 960 | 200 | 46.0 |
| Above 960 | 500 | 54.0 |

Full Spectrum

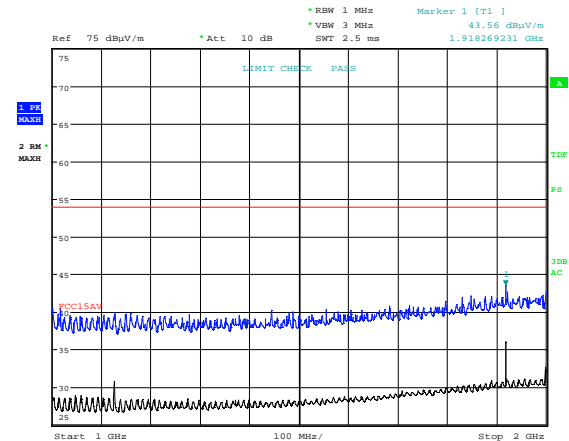


Receive Mode



Date: 4.JUN.2021 14:42:07

V Pol



Date: 4.JUN.2021 14:44:23

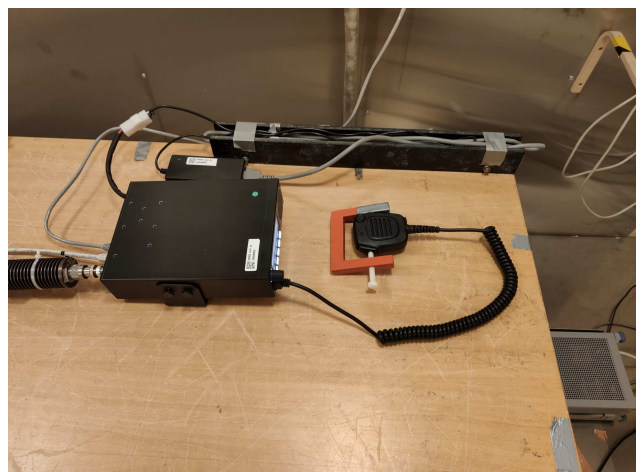
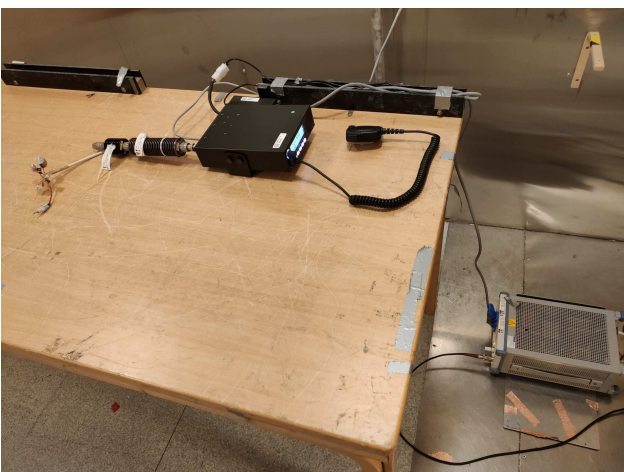
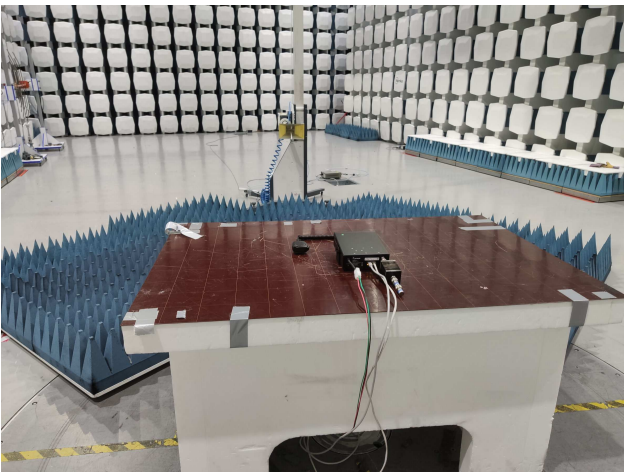
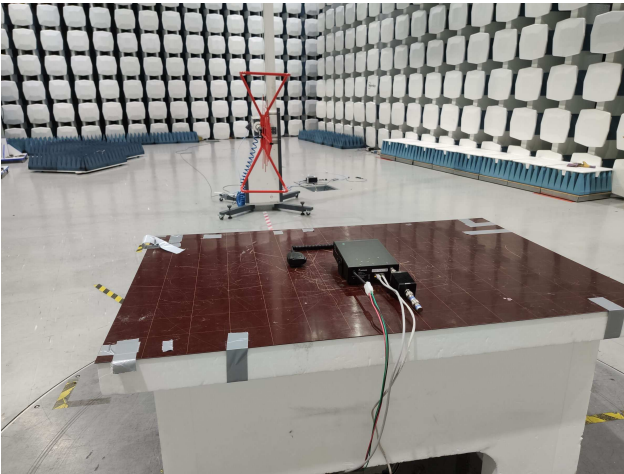
H Pol

4 Measurement Uncertainty

| Measurement Uncertainty Values | | |
|--------------------------------|---------|----------------|
| Test Item | | Uncertainty |
| Spurious Emissions, Radiated | < 1 GHz | ±2.5 dB |
| | > 1 GHz | ±2.2 dB |
| Power Line Conducted Emissions | | +2.9 / -4.1 dB |
| Temperature Uncertainty | | ±1 °C |

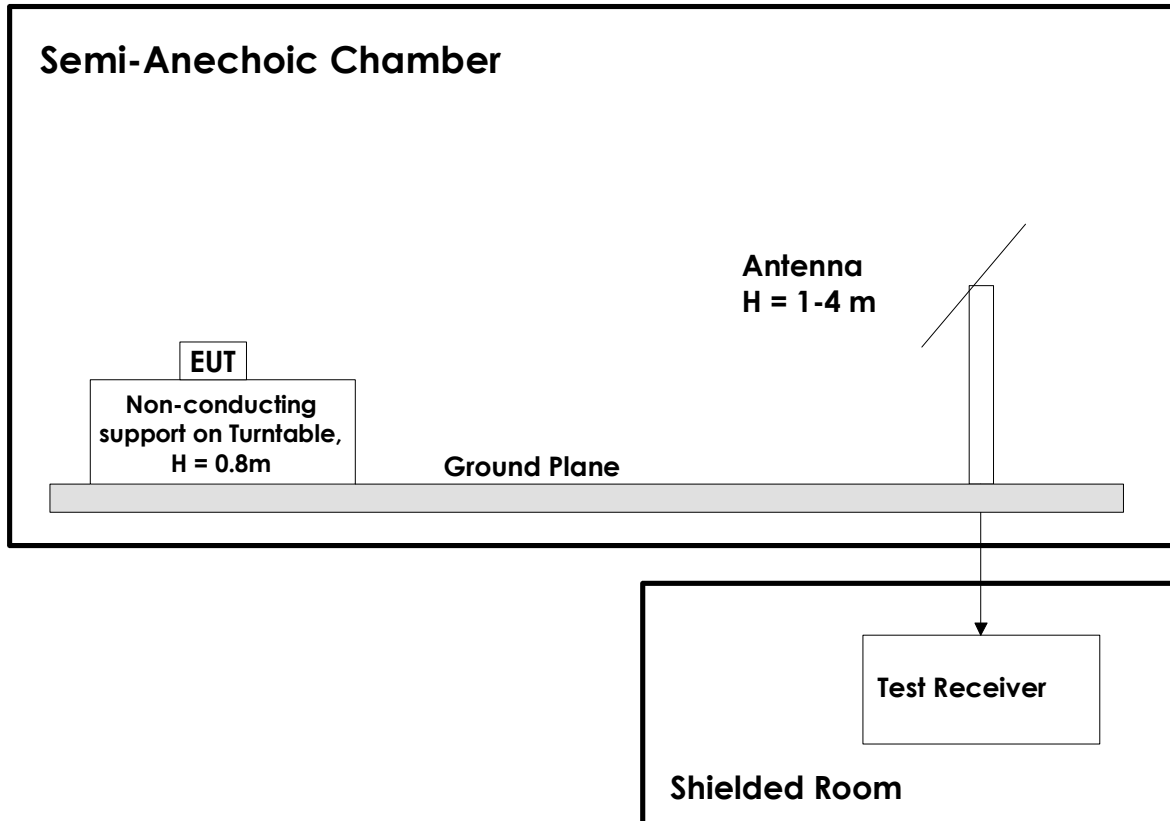
All uncertainty values are expanded standard uncertainty to give a confidence level of 95%, based on coverage factor $k=2$

5 Test Set-up Photos



6 Test Setups

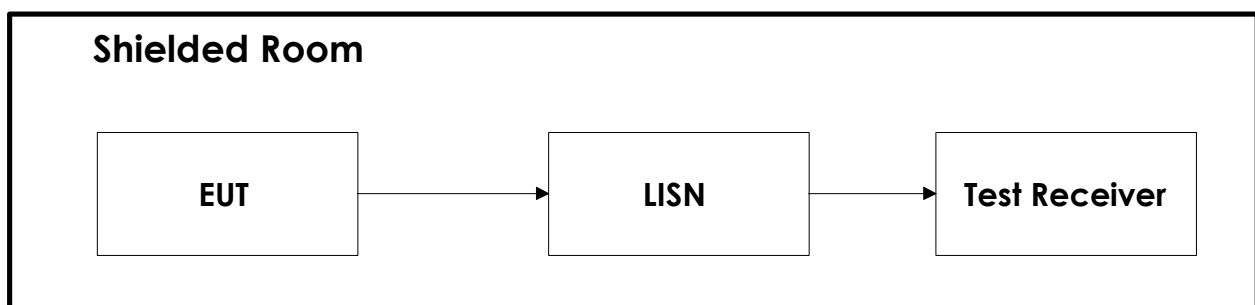
6.1 Radiated Emissions Test



Test Set-Up 1

This test setup is used for all radiated emissions tests. Emissions above 1 GHz are measured with a Spectrum Analyzer and Horn Antenna. Measurements at 1GHz and above were performed with the ground plane covered by absorbers. A pre-amplifier is used for all measurements above 30 MHz.

6.2 Power Line Conducted Emissions Test



Test Set-Up 2

7 Test Equipment Used

To facilitate inclusion on each page of the test equipment used for related tests, each item of test equipment and ancillaries are identified (numbered) by the Testhouse.

| No. | Model number | Description | Manufacturer | Ref. no. | Cal. date | Cal. Due |
|-----|--------------|--------------------|-----------------|----------|-----------|----------|
| 1 | ESU40 | Measuring Receiver | Rohde & Schwarz | LR 1639 | 2021-02 | 2022-02 |
| 2 | JB3 | BiLog Antenna | Sunol | N-4525 | 2020-03 | 2023-03 |
| 3 | 317 | Preamplifier | Sonoma Inst. | LR 1687 | 2020-08 | 2021-08 |
| 4 | 6032A | Power Supply | Hewlett Packard | LR 1062 | COU | |
| 5 | Model 87 | Multimeter | Fluke | LR 1599 | 2021-01 | 2023-01 |
| 6 | ESC13 | Measuring Receiver | Rohde & Schwarz | N-4259 | 2019-10 | 2021-10 |
| 7 | ENV216 | Two Line V-Network | Rohde & Schwarz | LR 1665 | 2019-11 | 2021-11 |
| 8 | 6812B | AC Power Source | Agilent | LR 1515 | COU | |

COU = Calibrate on Use

The software listed below has been used for one or more tests.

| No. | Manufacturer | Name | Version | Comment |
|-----|-----------------|--------|----------|---|
| 1 | Rohde & Schwarz | EMC32 | 10.50.10 | Power Line Conducted test software |
| 2 | Nemko AS | RSPlot | 1.0.8.0 | Screenshots from R&S Spectrum Analyzers |
| | | | | |

Revision history

| Revision | Date | Comment | Sign |
|----------|------------|---------------|------|
| 00 | 2021-09-08 | First edition | FS |
| | | | |