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|---|---|---|---|--|
| Prüfbericht-Nr.: <i>Test Report No.:</i> | 50092679 001 | Auftrags-Nr.: <i>Order No.:</i> | 114064116 | Seite 1 von 34 Page 1 of 34 |
| Kunden-Referenz-Nr.: <i>Client Reference No.:</i> | N/A | Auftragsdatum: <i>Order date:</i> | 26-Apr-2017 | |
| Auftraggeber: <i>Client:</i> | N.V. Nederlandsche Apparatenfabriek "Nedap" , Parallelweg 2, 7141 DC Groenlo, The Netherlands | | | |
| Prüfgegenstand: <i>Test item:</i> | Transceiver HDP/FDP operating on 134.2 kHz | | | |
| Bezeichnung / Typ-Nr.: <i>Identification / Type No.:</i> | VP1801 | | | |
| Auftrags-Inhalt: <i>Order content:</i> | FCC/ISED Test Report Class II Permissive Change | | | |
| Prüfgrundlage: <i>Test specification:</i> | FCC 47CFR Part 15: Subpart C Section 15.207 and 15.209 RSS-210 (08-2016) 4.4 | | | |
| Wareneingangsdatum: <i>Date of receipt:</i> | 9-Mar-2017 | | | |
| Prüfmuster-Nr.: <i>Test sample No.:</i> | A000509942-001 – A000509942-004 | | | |
| Prüfzeitraum: <i>Testing period:</i> | 01-Jul-2017 – 25-Jul-2017 | | | |
| Ort der Prüfung: <i>Place of testing:</i> | EMC Laboratory Taipei | | | |
| Prüflaboratorium: <i>Testing laboratory:</i> | TUV Rheinland Taiwan Ltd. | | | |
| Prüfergebnis*: <i>Test result*:</i> | Pass | | | |
| geprüft von / tested by: | | kontrolliert von / reviewed by: | | |
| 8-Jul-2017 | Sam C.J. Kuo / Engineer |  | 8-Jul-2017 | Ryan W.T. Chen / Project Manager |
| Datum <i>Date</i> | Name / Stellung <i>Name / Position</i> | Unterschrift <i>Signature</i> | Datum <i>Date</i> | Name / Stellung <i>Name / Position</i> |
| | | | | Unterschrift <i>Signature</i> |
| Sonstiges / Other: | | | | |
| Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i> | | Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i> | | |
| * Legende: | 1 = sehr gut P(ass) = entspricht o.g. Prüfgrundlage(n) | 2 = gut F(ail) = entspricht nicht o.g. Prüfgrundlage(n) | 3 = befriedigend N/A = nicht anwendbar | 4 = ausreichend N/T = nicht getestet |
| Legend: | 1 = very good P(ass) = passed a.m. test specification(s) | 2 = good F(ail) = failed a.m. test specification(s) | 3 = satisfactory N/A = not applicable | 4 = sufficient N/T = not tested |
| Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i> | | | | |

TEST SUMMARY

5.1.1 ANTENNA REQUIREMENT

RESULT: Passed

5.1.2 FIELD STRENGTH OF FUNDAMENTAL

RESULT: Passed

5.1.3 20dB AND 99% BANDWIDTH

RESULT: Passed

5.1.4 SPURIOUS EMISSION

RESULT: Passed

5.2.1 CONDUCTED EMISSIONS LINE AND NEUTRAL

RESULT: Passed

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1. General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix 1: Photo Documentation

(File Name: 50092679 001APPENDIX P)

Appendix D: Test Result of Radiated Emissions

(File Name: 50092679 001APPENDIX D)

Test Specifications

Table 1: Applied Standard and Test Levels

| Radio |
|---|
| FCC CFR47 Part 15: Subpart C Section 15.207 and 15.209 RSS-210 Issue 9, August 2016 RSS-Gen, Issue 4, November 2014 ANSI C63.10:2013 |

2. Test Sites

2.1 Test Facilities

TUV Rheinland Taiwan Ltd.

11F. No.758, Sec. 4, Bade Rd., Songshan Dist.
Taipei City 105
Taiwan (R.O.C.)

FCC Registration No.: 340738
IC Canada Registration No.: 9465A-1
TAF Accredited NCC Test Lab. No.:0759
TAF ISO17025 Certification effective periods: 2016-Jul-1st to 2019-Jun-30th



Testing Laboratory
0759

2.2 List of Test and Measurement Instruments

Table 2: List of Test and Measurement Equipment

| Kind of Equipment | Manu-facturer | Type | S/N | Last Calibration | Next Calibration |
|-------------------------------|----------------|--------------|-------------|------------------|------------------|
| Test Software | Farad | EZ_EMG | Ver. TUV3A1 | N/A | N/A |
| EMI Test Receiver | R&S | ESR7 | 101062 | 2016/09/12 | 2017/09/12 |
| Spectrum Analyzer | R&S | FSV 40 | 100921 | 2017/05/02 | 2018/05/01 |
| Spectrum Analyzer | Agilent | N9010A | MY53470241 | 2017/05/23 | 2018/05/22 |
| Preamplifier (30MHz -1GHz) | HP | 8447F | 2805A03335 | 2016/07/29 | 2017/07/29 |
| Preamplifier (18 GHz -40 GHz) | COM-POWER | PAM-840 | 461257 | 2016/12/01 | 2017/12/01 |
| Pre-Amplifier (1GHz~18GHz) | EM Electronics | EM01G18G | 060558 | 2016/11/17 | 2017/11/17 |
| Bilog Antenna | TESEQ | CBL6111D | 29802 | 2016/08/10 | 2017/08/10 |
| Horn Antenna | ETS-Lindgren | 3117 | 138160 | 2017/05/25 | 2018/05/25 |
| Horn Antenna (18GHz~40GHz) | COM-POWER | AH-840 | 101031 | 2016/11/22 | 2017/11/22 |
| Loop Antenna | Schwarzbeck | FMZB 1513 | 1513-076 | 2017/06/14 | 2018/06/14 |
| EMI Test Receiver | R&S | ESC17 | 100797 | 2016/12/30 | 2017/12/30 |
| Spectrum Analyzer | R&S | FSL3 | 101943 | 2015/09/07 | 2017/09/07 |
| Temp. & Humid. Chamber | Giant Force | GCT-099-40-S | MAF0103-007 | 2015/07/13 | 2017/07/12 |
| LISN (1 phase) | R&S | ENV216 | 101243 | 2017/06/18 | 2018/06/18 |
| LISN | R&S | ENV216 | 101262 | 2017/06/22 | 2018/06/21 |

2.3 Traceability

All measurement equipment calibrations are traceable to NML(Taiwan)/NIST(USA) or where calibration is performed outside Taiwan, to equivalent nationally recognized standards organizations.

2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basis using in house standards or comparisons.

2.5 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements are ± 3 dB.

Table 3: Emission Measurement Uncertainty

| Parameter | Uncertainty |
|--|------------------------|
| Radio Frequency | $\pm 1 \times 10^{-7}$ |
| RF power, conducted | ± 1.5 dB |
| Adjacent channel power | ± 3 dB |
| Radiated emission of transmitter, valid up to 26 GHz | ± 6 dB |
| Radiated emission of receiver, valid up to 26 GHz | ± 6 dB |
| Temperature | ± 2 °C |
| Humidity | ± 10 % |

3. General Product Information

3.1 Product Function and Intended Use

The EUT is a unit that provides electronic animal identification through RFID at 134.2 kHz .
There are three different types of antennas which are tested in this report.

For details refer to the User Guide, Data Sheet and Circuit Diagram.

3.2 Ratings and System Details

Table 4: Basic Information of EUT

| Item | EUT information |
|-------------------|--|
| Kind of Equipment | 134 kHz Inductive proximity tag reader |
| Type Designation | VP1801 |
| Type Designation | Antenna type 1: VP6040 |
| Type Designation | Antenna type 1: VP6041 and VP6042 |
| Type Designation | Antenna type 1: VP6050 |
| FCC ID | CGDVP1801 |
| Canada ID | 1444A-VP1801 |

Table 5: Technical Specification of EUT

| Item | Value |
|-----------------------|--|
| Operating Frequencies | 134.2 kHz |
| Channel number | 1 |
| Operation Voltage | 24-27 Vdc |
| Modulation | No modulation Emission designator 1K03 P0N |

3.3 Independent Operation Modes

Basic operation modes are:

- A. Transmitting

3.4 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram.

3.5 Submitted Documents

- Circuit Diagram
- Instruction Manual
- Rating Label
- Technical Description

4. Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

The equipment under test (EUT) was configured to measure its maximum emission level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Setup for testing: The Antennae are connected to the Control Box and there is a Quasi-CW signal applied to the antennae

4.3 Special Accessories and Auxiliary Equipment

The product has been tested together with the following additional accessories:

N/A

4.4 Countermeasures to achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Constructional Data Form or the Technical Construction File. No additional measures were employed to achieve compliance.

4.5 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test

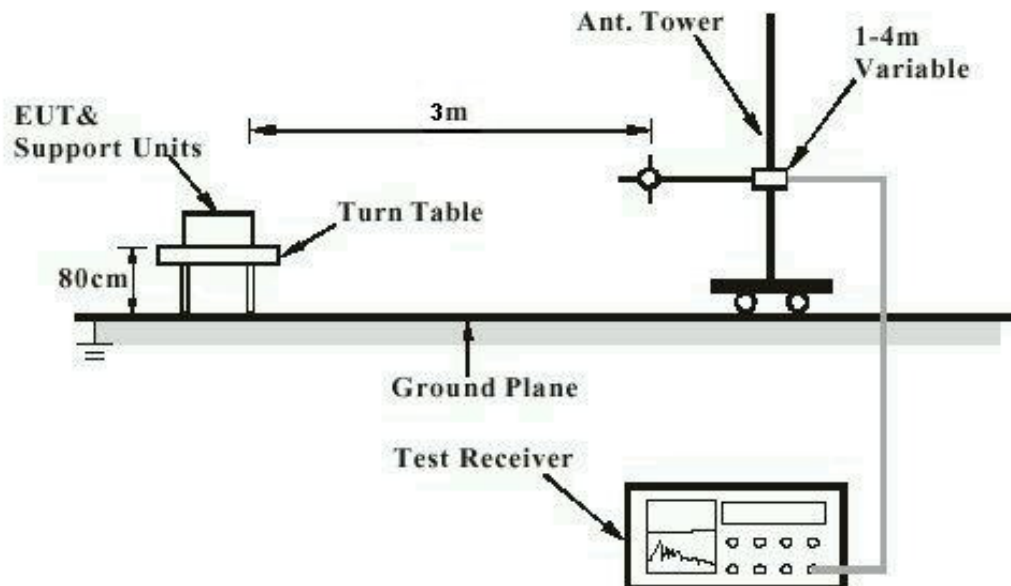
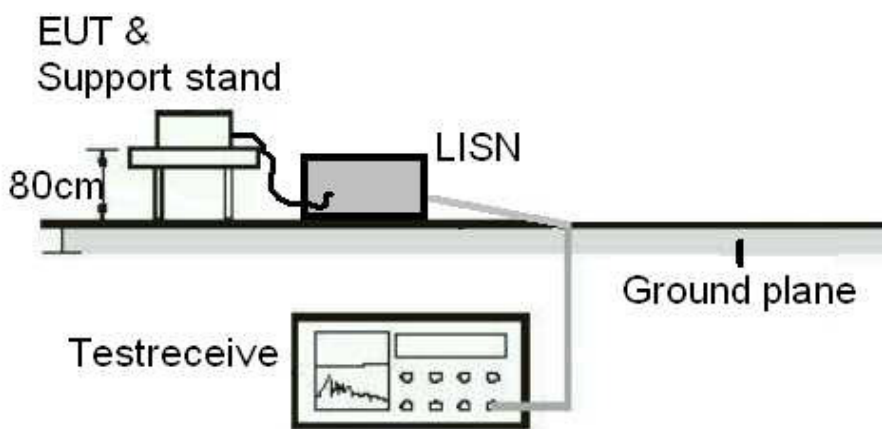


Diagram of Measurement Equipment Configuration for Mains Conduction Measurement (if applicable)



5. Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT:**Passed**

Standard : LP0002(2016): 2.2
Part 15.203 and RSS-Gen 7.1.4
Requirement : use of approved antennas only

The antenna cable has a proprietary connector with no possibility of replacement with a non-approved antenna by a normal the end-user. Therefore, the EUT is considered to comply with this provision.

Refer to EUT photo for details.

5.1.2 Field strength of fundamental

RESULT:
Passed

Test standard : FCC Part 15.209
 RSS-210 (08-2016) 4.4
 LP0002(2016) 3.3.1
 Basic standard : ANSI C63.10:2013

Test setup

Test Channel : 134.2 kHz
 Operation Mode : A
 Atmospheric pressure : 100-103 kPa

The Distance Attenuation Factor was determined to be 56.8 dB/decade as follows:

For the fundamental frequency of 134.2 kHz the level at a distance of 300m would be calculated as follows:

EUT in combination with antenna

$d_1 = 3\text{m}$ $E_{d1} = 137.6\text{ dB}\mu\text{V/m} = 7585776\ \mu\text{V/m}$
 $d_2 = 10\text{m}$ $E_{d2} = 107.9\text{ dB}\mu\text{V/m} = 248313.3\ \mu\text{V/m}$

Calculation for n:

$n = \log(E_{d2}/E_{d1}) / \log(d_1/d_2) > n = \log(7585776 / 248313.3) / \log(3\text{m}/10\text{m}) > n = 2.84$

Table 6: Field strength of fundamental, maximal level found
Antenna VP6040

| Frequency (kHz) | Level(3m) (dBuV/m) | Detector | Limit(3m) (dBuV/m) | Level(300m) (dBuV/m) | Limit(300m) (dBuV/m) | Remark | Result |
|-----------------|--------------------|----------|--------------------|----------------------|----------------------|--------|--------|
| 134.2 | 116.38 | peak | 158.65 | 2.78 | 45.05 | -- | Pass |
| 134.2 | <116.38 | average | 138.65 | <2.78 | 25.05 | -- | Pass |

Antenna VP6042

| Frequency (kHz) | Level(3m) (dBuV/m) | Detector | Limit(3m) (dBuV/m) | Level(300m) (dBuV/m) | Limit(300m) (dBuV/m) | Remark | Result |
|-----------------|--------------------|----------|--------------------|----------------------|----------------------|--------|--------|
| 134.2 | 118.15 | peak | 158.65 | 4.55 | 45.05 | -- | Pass |
| 134.2 | <118.15 | average | 138.65 | <4.55 | 25.05 | -- | Pass |

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Antenna VP6050

| Frequency (kHz) | Level(3m) (dBuV/m) | Detector | Limit(3m) (dBuV/m) | Level(300m) (dBuV/m) | Limit(300m) (dBuV/m) | Remark | Result |
|-----------------|--------------------|----------|--------------------|----------------------|----------------------|--------|--------|
| 134.2 | 137.72 | peak | 158.65 | 24.12 | 45.05 | -- | Pass |
| 134.2 | <137.72 | average | 138.65 | <24.12 | 25.05 | -- | Pass |

Remark: For details refer to Appendix D

Limits:

| Frequency | Electric Field Strength ($\mu\text{V/m}$) | Measurement Distance (m) |
|---------------|---|--------------------------|
| 9-490 kHz | 2,400/F (F in kHz) | 300 |
| 490-1,705 kHz | 24,000/F (F in kHz) | 30 |
| 1,705-30 MHz | 30 | 30 |

9-90 kHz and 110-490 kHz: Average detector.

5.1.3 20dB and 99% Bandwidth

RESULT:**Passed**

Test standard : RSS Gen
Basic standard : ANSI C63.10:2013,

Test setup

Operation Mode : A

Atmospheric pressure : 100-103 kPa

Table 7: Test result of 20dB Bandwidth (worst case)

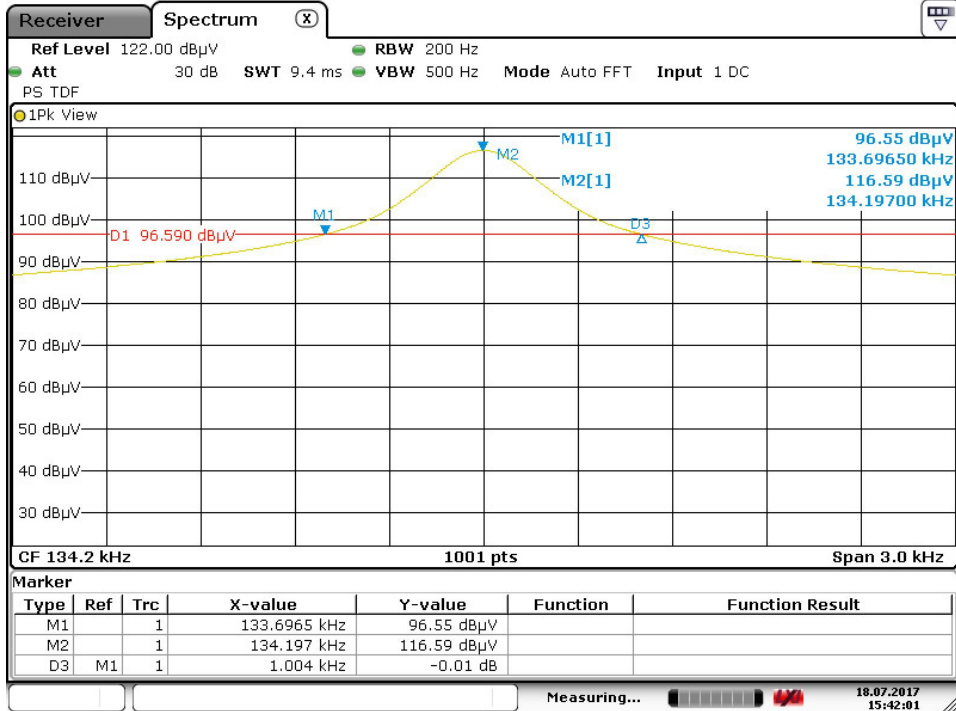
| Frequency | 20dB Bandwidth | |
|-----------|----------------|--|
| 134.2 kHz | 1.004 kHz | |

Table 8: Test result of 99% Bandwidth (worst case)

| Frequency | 99% Bandwidth | |
|-----------|---------------|--|
| 134.2 kHz | 1.669 kHz | |

Test Plot of 20dB BW

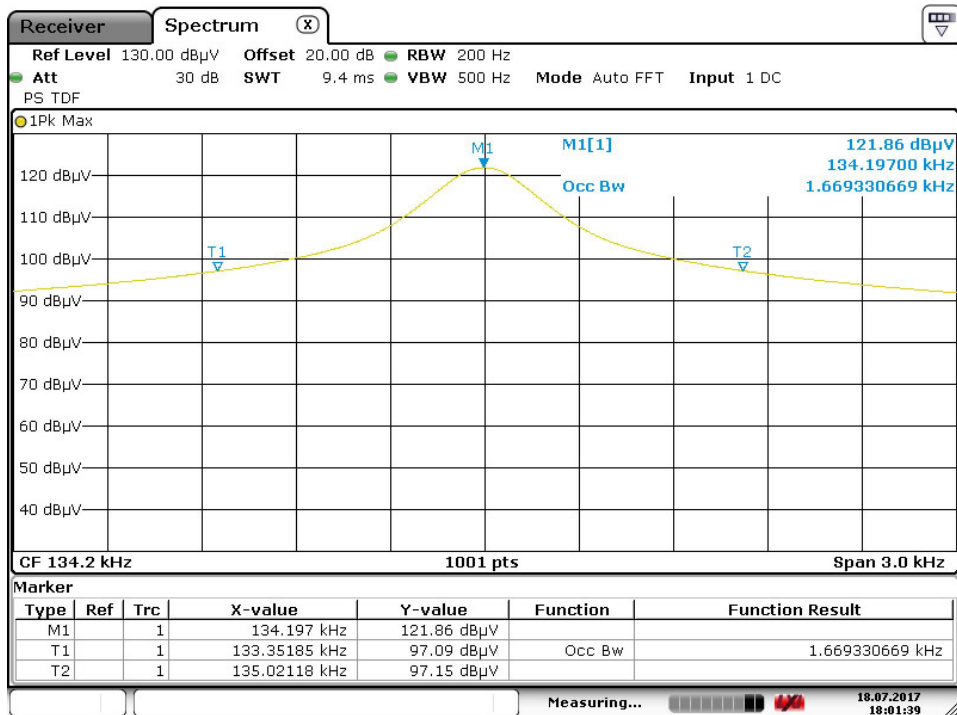
Antenna VP6040



Date: 18.JUL.2017 15:42:01

Test Plot of 99% BW

Antenna VP6042



Date: 18.JUL.2017 18:01:40

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5.1.4 Spurious Emission

RESULT:**Passed**

Test standard : FCC part 15. 209
RSS-Gen
LP0002(2016) 2.8

Basic standard : ANSI C63.10: 2013

Limits : Radiated emissions must comply with the
radiated emission limits specified in FCC
15.209(a) AND 2.8

Kind of test site : 3m Semi-Anechoic Chamber

Test setup

Test Channel : 134.2 kHz

Operation mode : A

Remark: Testing was carried out within frequency range 9kHz to 1 GHz.

For details refer to Appendix D.

5.2 Mains Conducted Emissions

5.2.1 Conducted Emissions Line and Neutral

RESULT:**Passed**

Test standard : FCC Part 15.207
FCC Part 15.107
RSS-Gen
LP0002: 2.3

Limits : Mains Conducted emissions as defined in
LP0002: 2.3 , must comply with the mains
conducted emission limits specified in LP0002:
2.3

Kind of test site : Shielded Room

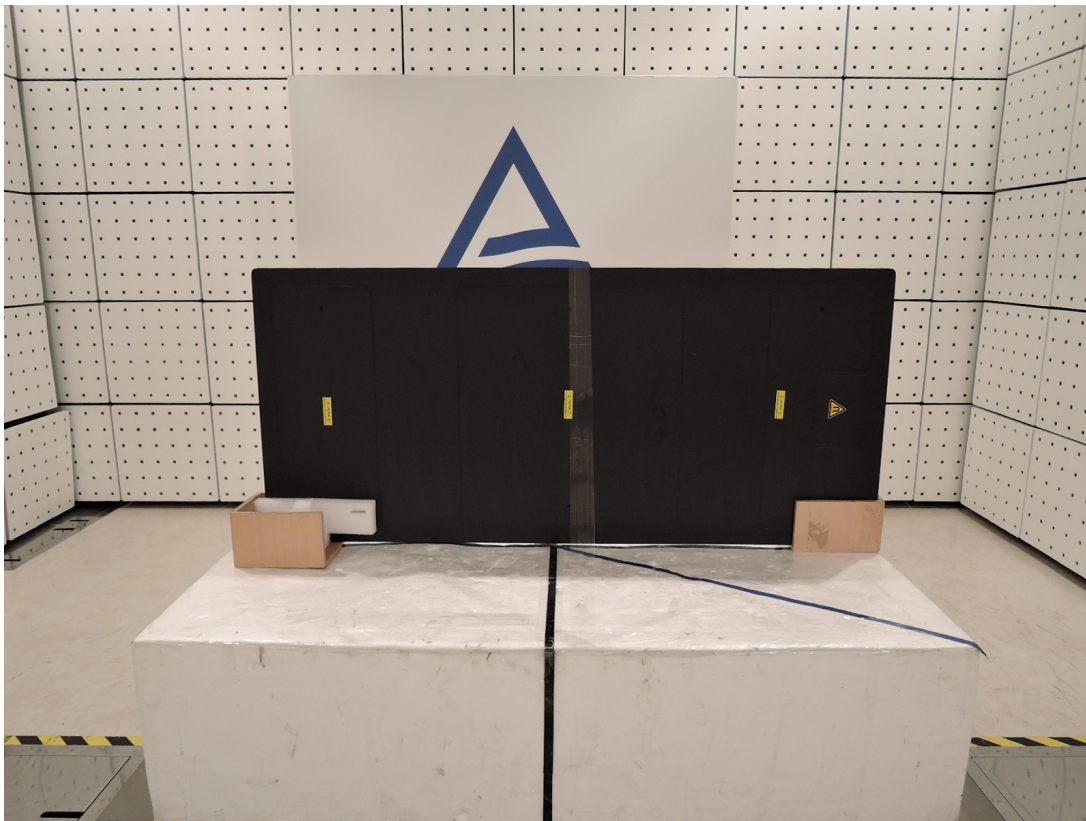
Test setup

Test Channel : 134.2 kHz
Operation mode : On

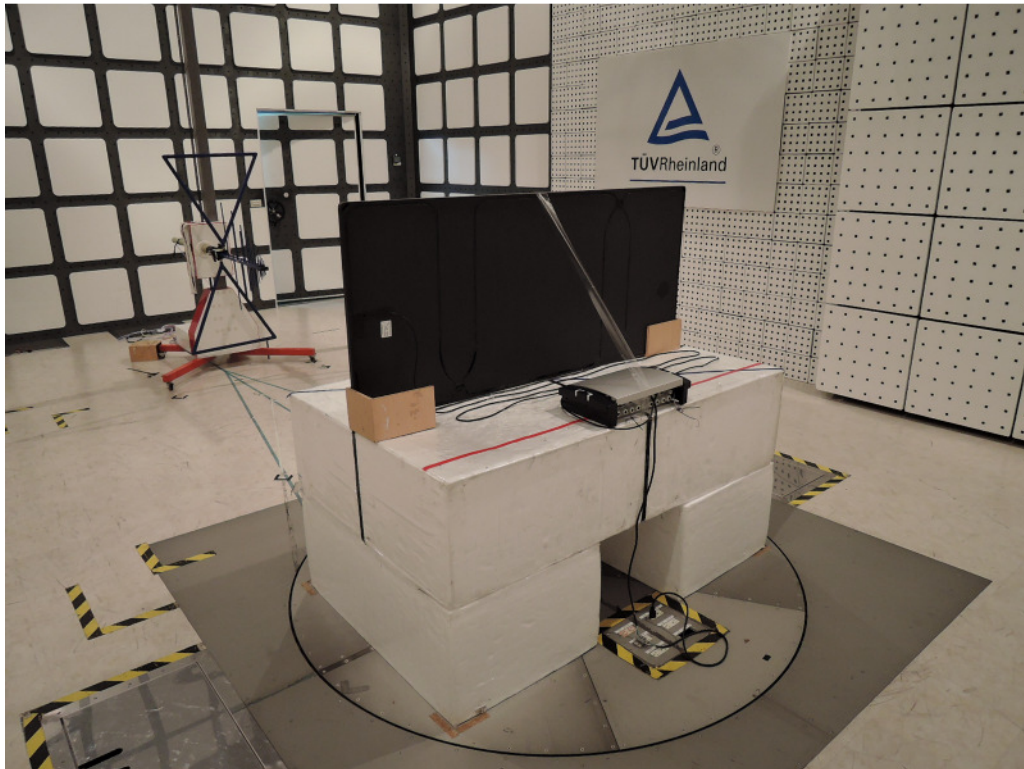
Remark: For details refer to Appendix D.

6. Photographs of the Test Set-Up

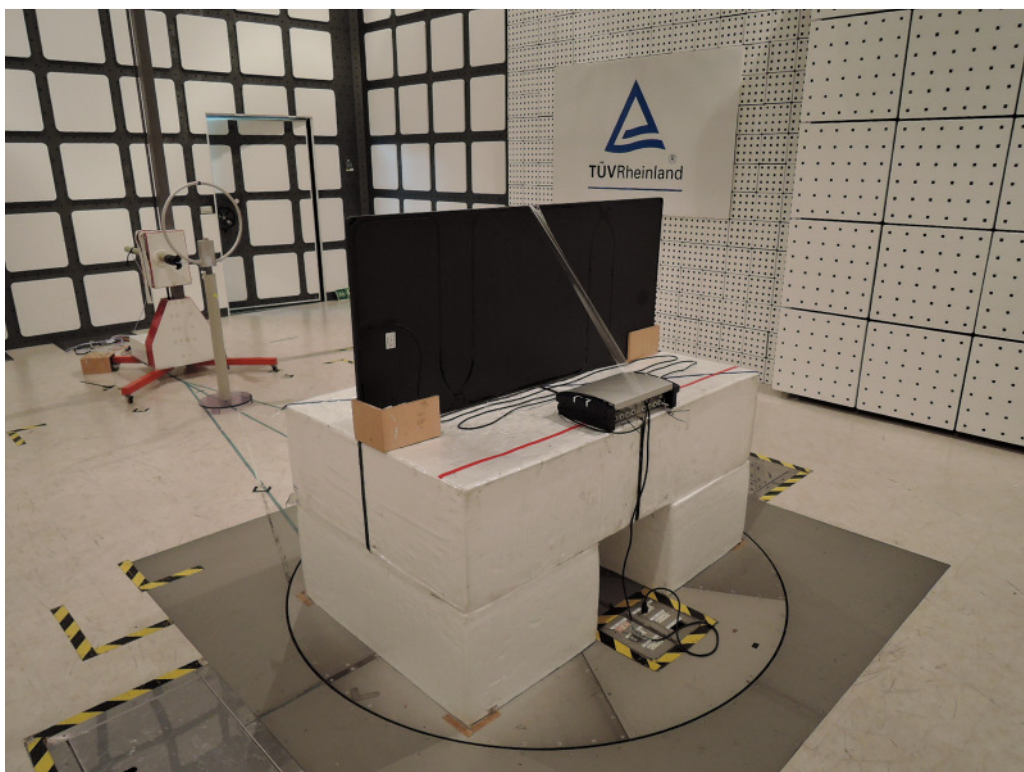
Photograph 1: Set-up for Spurious Emissions TX (Front View) Chamber_VP6040



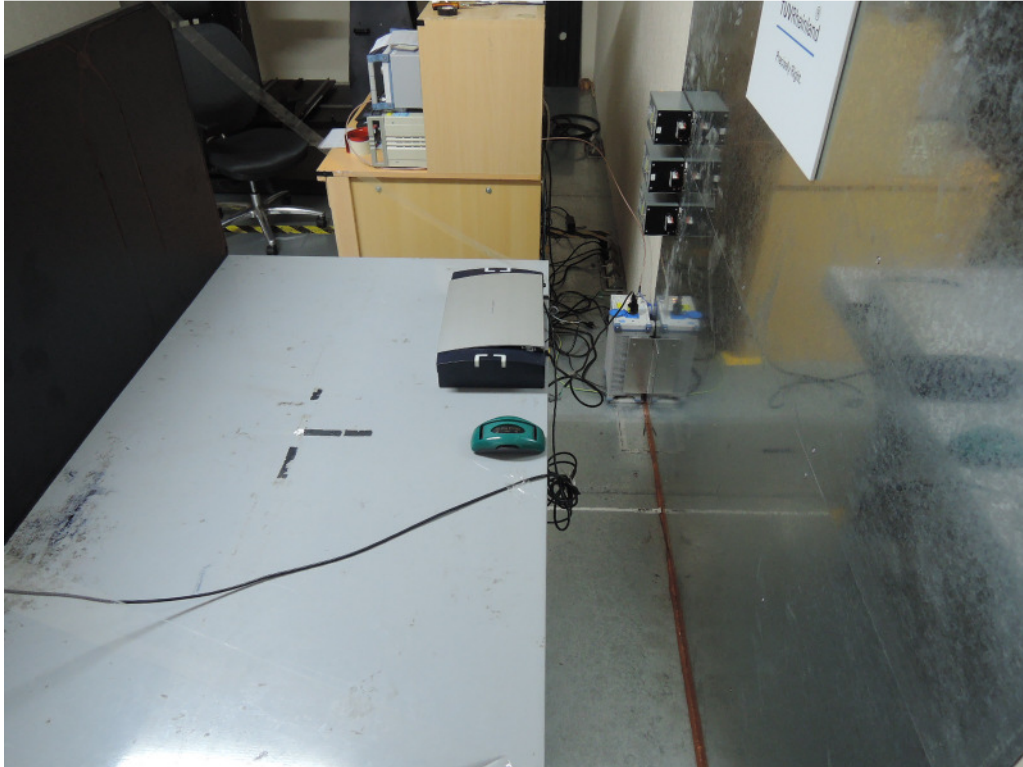
Photograph 2: Set-up for Spurious Emissions (Back View 1) _VP6040



Photograph 3: Set-up for Spurious Emissions (Back View 2)_VP6040



Photograph 4: Set-up for Mains Conducted testing Back_VP6040



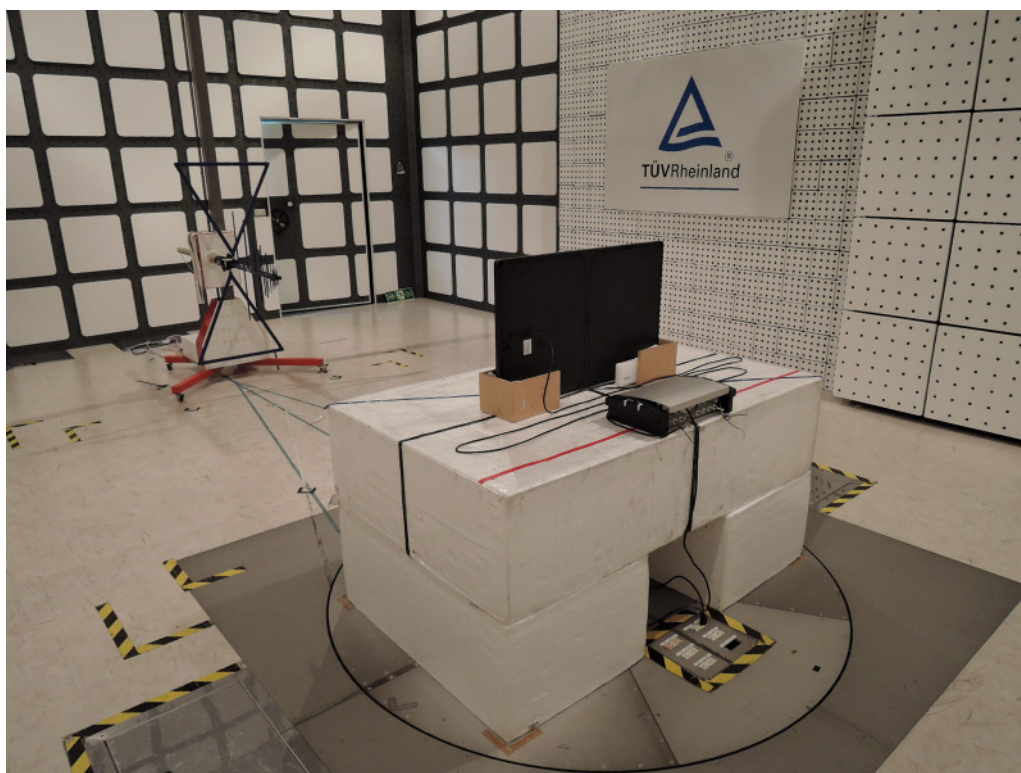
Photograph 5: Set-up for Mains Conducted testing Front_VP6040



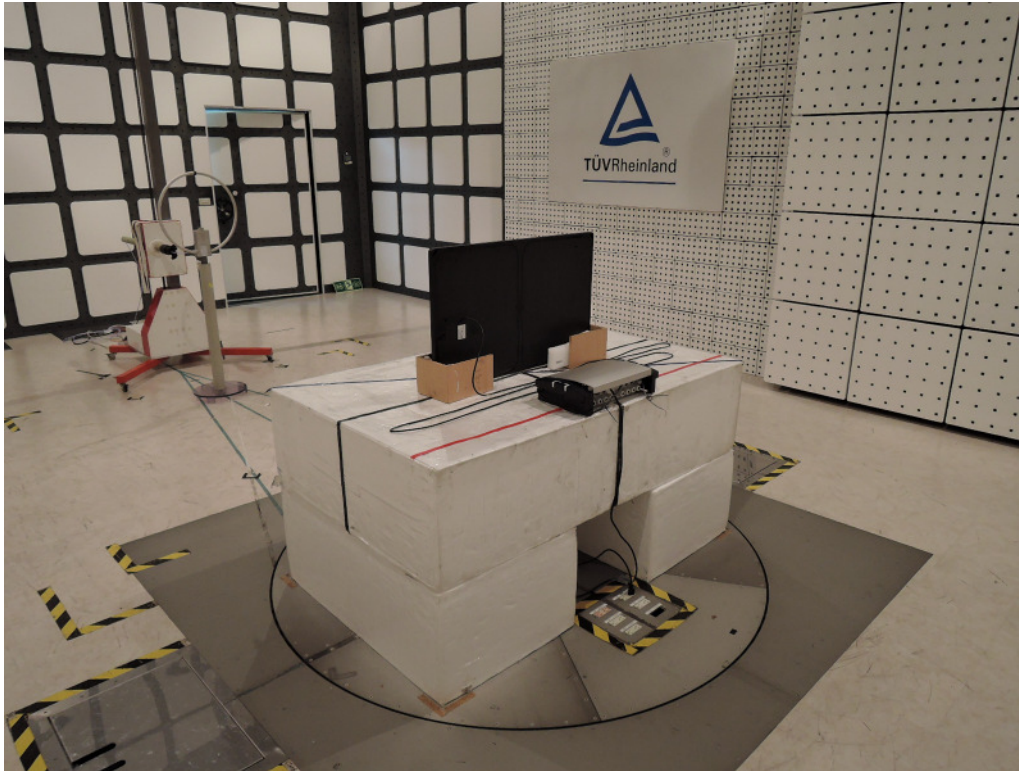
Photograph 6: Set-up for Spurious Emissions TX (Front View) Chamber_VP6042



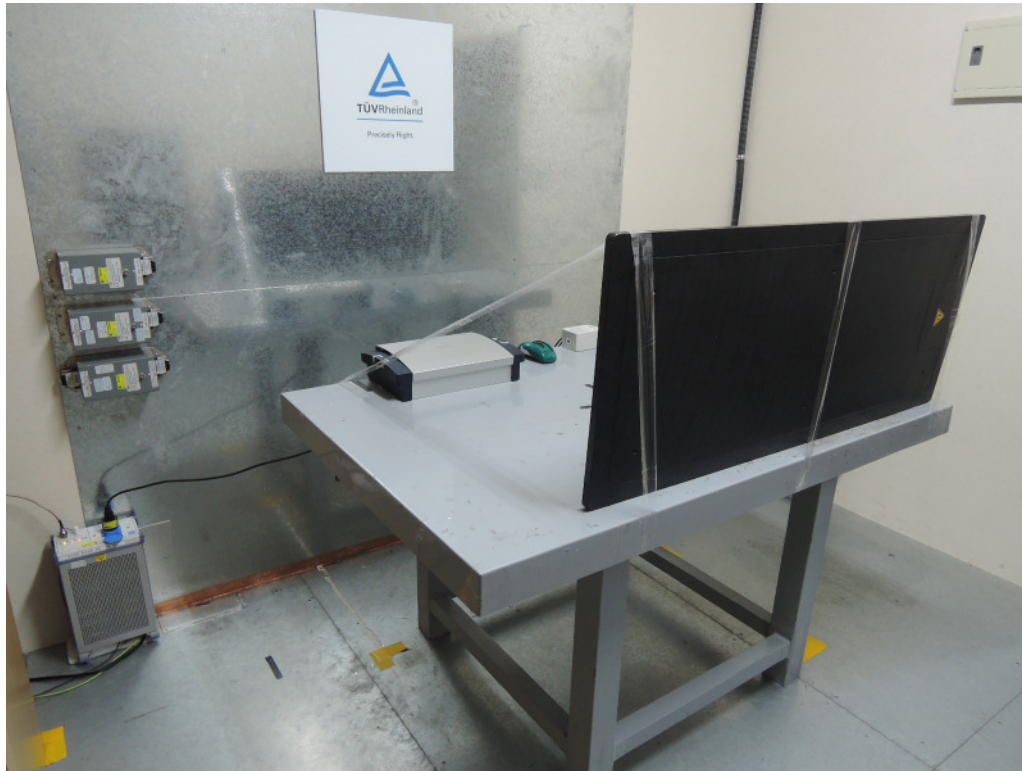
Photograph 7: Set-up for Spurious Emissions TX (Back View 1) Chamber_VP6042



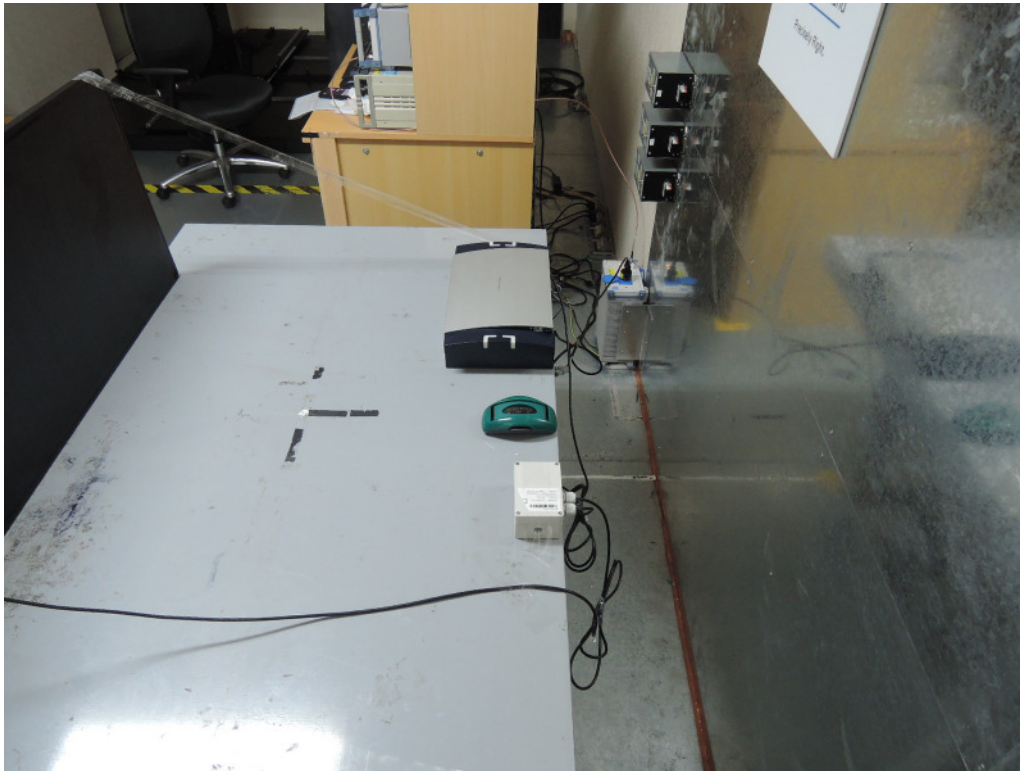
Photograph 8: Set-up for Spurious Emissions TX (Back View 2)
Chamber_VP6042



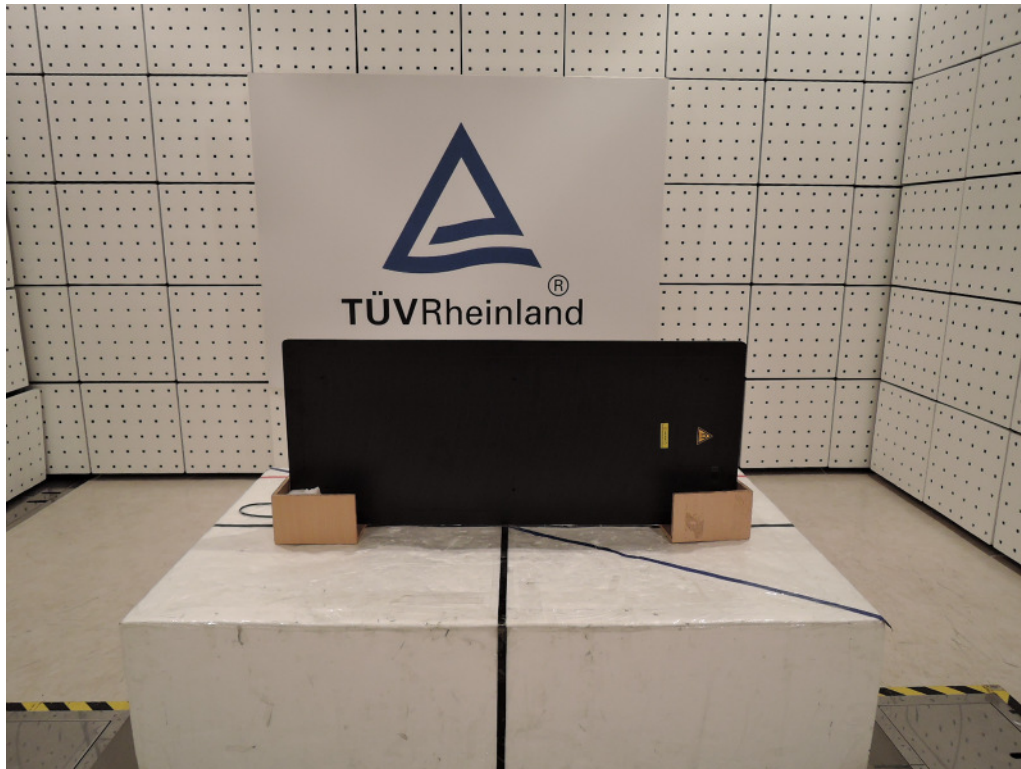
Photograph 9: Set-up for Mains Conducted testing Front_VP6042



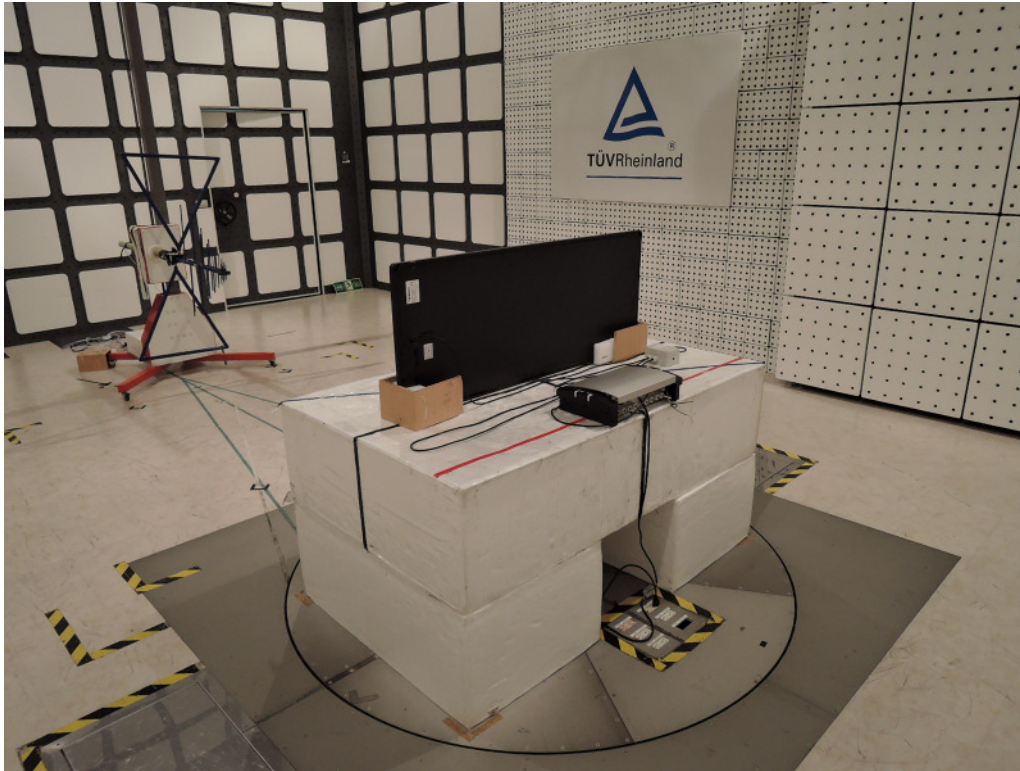
Photograph 10: Set-up for Mains Conducted testing Back_VP6042



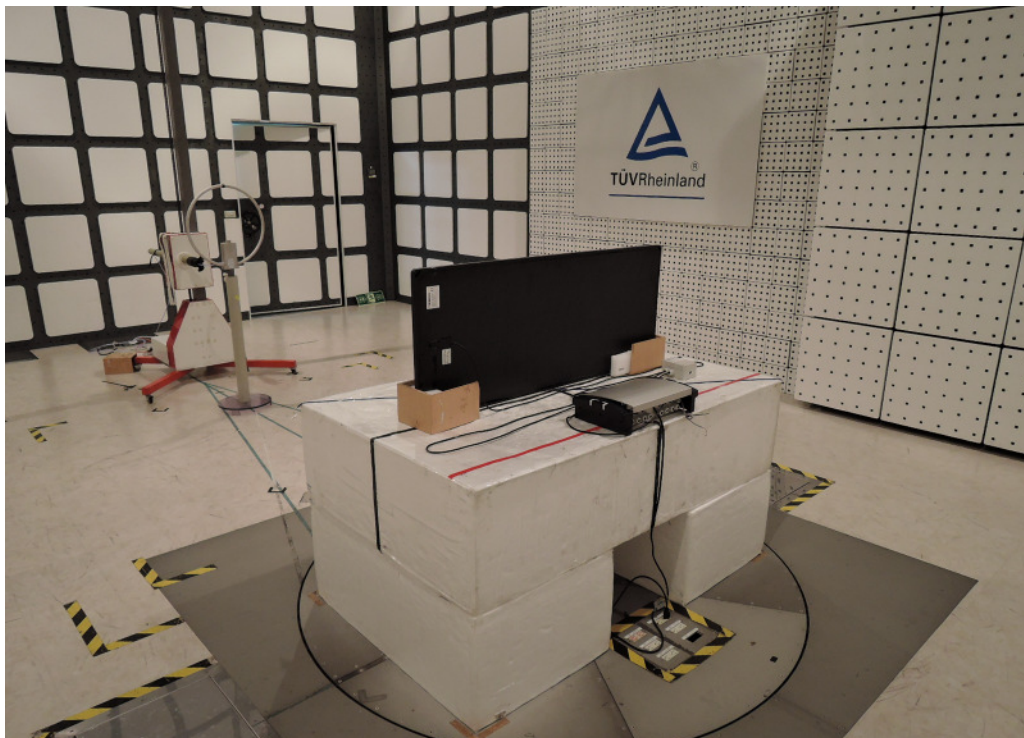
Photograph 11: Set-up for Spurious Emissions TX (Front View)
Chamber_VP6050



Photograph 12: Set-up for Spurious Emissions TX (Back View 1)
Chamber_VP6050



Photograph 13: Set-up for Spurious Emissions TX (Back View 1)
Chamber_VP6050



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