

Prüfbericht-Nr.: Test Report No.:	50096220 001	Auftrags-Nr.: Order No.:	114067578-22	Seite 1 von 24 Page 1 of 24
Kunden-Referenz-Nr.: Client Reference No.:	N/A	Auftragsdatum: Order date:	31-Jul-2017	
Auftraggeber: Client:	N.V. Nederlandsche Apparatenfabriek "Nedap" , Parallelweg 2, 7141 DC Groenlo, The Netherlands			
Prüfgegenstand: Test item:	Lumen iL45			
Bezeichnung / Typ-Nr.: Identification / Type No.:	ASSY AD46R RF+MD+RFID ASSY AD46R RF+RFID			
Auftrags-Inhalt: Order content:	IC/FCC Part 15C Test report for 8.2 MHz portion			
Prüfgrundlage: Test specification:	FCC 47CFR Part 15: Subpart C Section 15.223 RSS-210 (08-2016) B.4			
Wareneingangsdatum: Date of receipt:	1-Aug-2017			
Prüfmuster-Nr.: Test sample No.:	A000593200-003, A000593200-004			
Prüfzeitraum: Testing period:	1-Aug-2017 - 10-Aug-2017			
Ort der Prüfung: Place of testing:	EMC/RF Laboratory Taipei			
Prüflaboratorium: Testing laboratory:	TUV Rheinland Taiwan Ltd.			
Prüfergebnis*: Test result*:	Pass			
geprüft von / tested by:		kontrolliert von / reviewed by:		
2017-10-25 Datum Date	Sam Kuo / Project Engineer Name / Stellung Name / Position		2017-10-25 Datum Date	Rene Charton/Senior Project Manager Name / Stellung Name / Position
	Unterschrift Signature		Unterschrift Signature	
Sonstiges / Other:				
Zustand des Prüfgegenstandes bei Anlieferung: Condition of the test item at delivery:		Prüfmuster vollständig und unbeschädigt Test item complete and undamaged		
* 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 6dB BANDWIDTH

RESULT: Passed

5.1.4 99% BANDWIDTH

RESULT: Passed

5.1.5 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

These attachments are integral parts of this test report.:

Appendix P: Photo Documentation

(File Name: 50096220APPENDIX P)

Appendix D: Test Result of Radiated Emissions

(File Name: 50096220APPENDIX D)

Test Specifications

The following standards were applied.

Table 1: Applied Standard and Test Levels

Radio
FCC CFR47 Part 15: Subpart C Section 15.223 RSS-210 Issue 9 August 2016 ANSI C63.4:2014, ANSI C63.10:2013

2. Test Sites

2.1 Test Laboratory

TUV Rheinland Taiwan Ltd.
Taichung Branch Office

No.9, Lane 36, Minsheng Rd., Sec. 3, Daya District,
Taichung City 428
Taiwan (R.O.C.)

2.2 Test Facility

TUV Rheinland Taiwan Ltd.
Taipei Office

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

2.3 List of Test and Measurement Instruments

Table 2: List of Test and Measurement Equipment

Kind of Equipment	Manufacturer	Type	S/N	Last Calibration	Next Calibration
Test Software	Farad	EZ_EMC	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	8447D	2944A06641	2016/12/28	2017/12/28
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	2017/07/12	2018/07/12
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	WISEWIND	1509	509Q24R	2017/05/24	2018/05/24
LISN (1 phase)	R&S	ENV216	101243	2017/06/18	2018/06/18
LISN	R&S	ENV216	101262	2017/06/22	2018/06/21

2.4 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.

2.5 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.

2.6 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements are $\pm 3\text{dB}$.

Table 3: Emission Measurement Uncertainty

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

3. General Product Information

3.1 Product Function and Intended Use

The model ASSY AD46R RF+MD+RFID is an Electronic Article Surveillance System. There are 2 versions, with different features implemented. The fully featured version incorporates a Tag detector working in the 7-8 MHz Band, an RFID Tag reader working in the 902-928MHz UHF band and a metal detector that works at a frequency of 125 kHz. The alternative version model ASSY AD46R RF+RFID does not have the 125 kHz current generator and field sensing module for the metal detector installed, but the antenna system is the same for both versions.

This test report relates to the 7-8 MHz portion of the device.

For details refer to the User Guide.

3.2 Ratings and System Details

Table 4: Basic Information of EUT

Item	EUT information	
Kind of Equipment	Lumen iL45	
Type Designation	ASSY AD46R RF+MD+RFID ASSY AD46R RF+RFID	
	with metal detector	without metal detector
FCC ID	CGDADRRFMDRFID	CGDADRRFRFID
Canada ID	1444A-ADRRFMDRFID	1444A-ADRRFRFID
HVIN	ASSY AD46R RF+MD+RFID	AD46R RF+RFID

Table 5: Technical Specification of EUT

Technical Specification	Value
Operating Frequency	7565 kHz to 8571.25 kHz
Channel number	24
Operation Voltage	120V (PoE adapter)
Modulation	Hopping

No operation in restricted bands:

Nr.	Frequency (kHz)	Nr.	Frequency (kHz)	Nr.	Frequency (kHz)
1	7565.00	9	7915.00	17	8265.00
2	7608.75	10	7958.75	18	8308.75
3	7652.50	11	8002.50	19	8352.50
4	7696.25	12	8046.25	20	8396.25
5	7740.00	13	8090.00	21	8440.00
6	7783.75	14	8133.75	22	8483.75
7	7827.50	15	8177.50	23	8527.50
8	7871.25	16	8221.25	24	8571.25

So the fundamental emission are outside of the bands listed in Section 15.205 (a).

3.3 Independent Operation Modes

Basic operation modes are:

- A. Transmitting
 - 1. Low channel
 - 2. Middle channel
 - 3. High channel

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: Test samples are set to continuous transmitter mode before the test is performed, which makes it possible to transmit when power on.

Both alarming and non-alarming have been evaluated; only the worst case situation is shown.

4.3 Special Accessories and Auxiliary Equipment

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

Kind of Equipment	Manufacturer	Model Name	S/N
--	--	--	--

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.

5. Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT:**Passed**

Standard : Part 15.203 and RSS-Gen 7.1.4
Requirement : use of approved antennas only

The antenna and the transmitter are one assembly 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 15.223
RSS-210 B.3

Basic standard : ANSI C63.10:2013

Test setup

Test Frequency : Low. High
Operation Mode : A

Atmospheric pressure : 100-103 kPa

Applicable Limit:

Frequency (MHz)	Field strength AV (μV/m)	Field strength AV (dBμV/m)	Field strength Pk (dBμV/m)	Measurement Distance (m)
1.705 - 10	100	40	60	30
1.705 - 10	10000	80	100	3

The center frequency is 8068 kHz.
The 6 dB BW is more than 810 kHz

Table 6: Field strength of fundamental, maximal level found

Frequency (MHz)	Level(3m) (dBuV/m)	Detector	Limit(3m) (dBuV/m)	Level(30m) (dBuV/m)	Limit(30m) (dBuV/m)	Remark	Result
7.6	<86	PK	100	<46	60	Same PAP as 8.218 MHz	Pass
8.4920	85.60	PK	100	45.60	60	--	Pass
8.4920	68.90	AV	80	28.90	40	--	Pass
8.6	<86	PK	100	<46	60	Same PAP as 8.218 MHz	Pass

Remark: For details refer to Appendix D

5.1.3 6dB Bandwidth

RESULT:**Passed**

Test standard : FCC Part 15.223
RSS-210 B.3
Basic standard : ANSI C63.10:2013,
Kind of test site : Shielded room

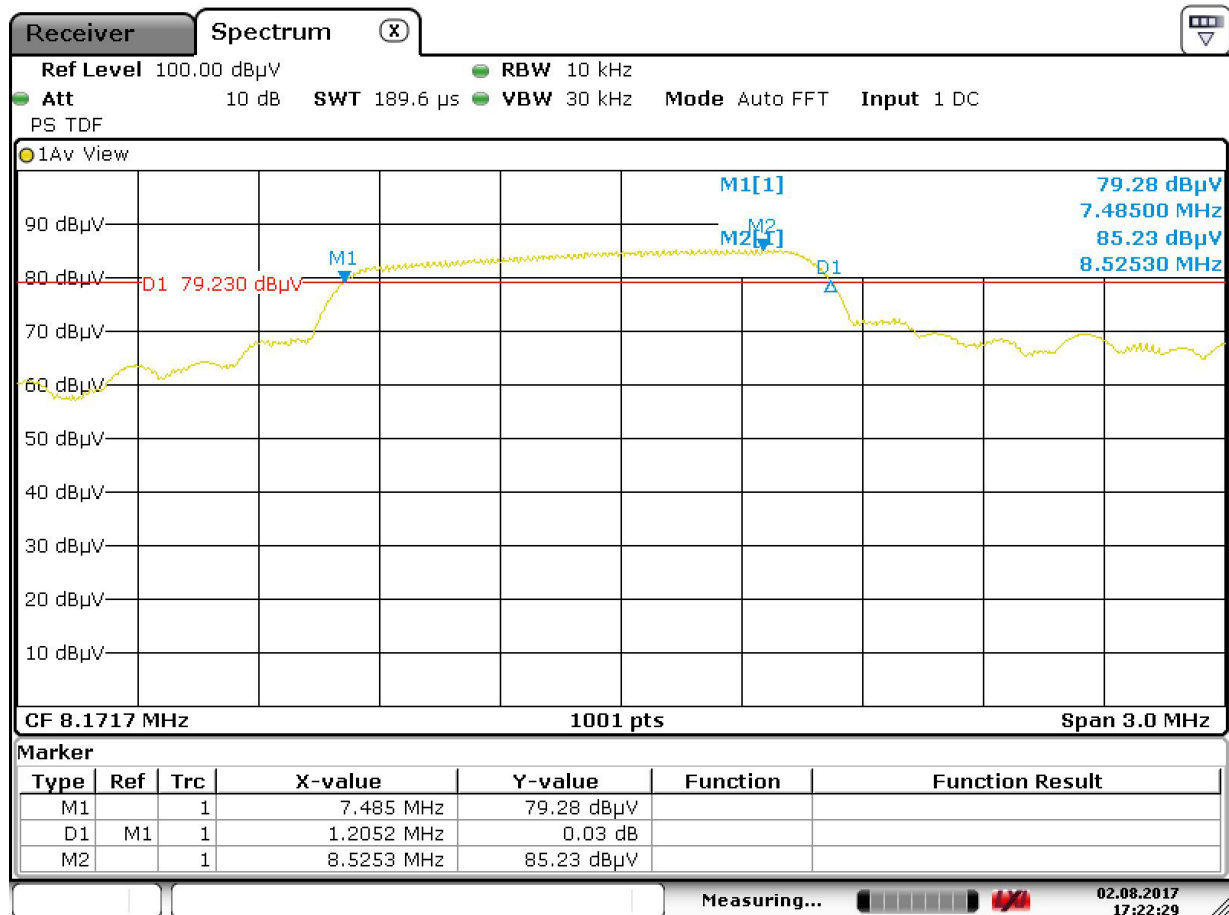
Test setup

Test Channel : Low/ High
Operation Mode : A

Ambient temperature : 22-26 °C
Relative humidity : 50-65 %
Atmospheric pressure : 100-103 kPa

Table 7: Test result of 6dB Bandwidth

Antenna type	Channel Frequency low(MHz)	Channel Frequency high(MHz)	6dB Bandwidth (MHz)
integrated	7.485	8.525	1.2052

6dB Bandwidth Measurement:


Date: 2.AUG.2017 17:22:29

5.1.4 99% Bandwidth**RESULT:****Passed**

Test standard : RSS-Gen
Basic standard : ANSI C63.10:2013
Kind of test site : Shielded room

Test setup

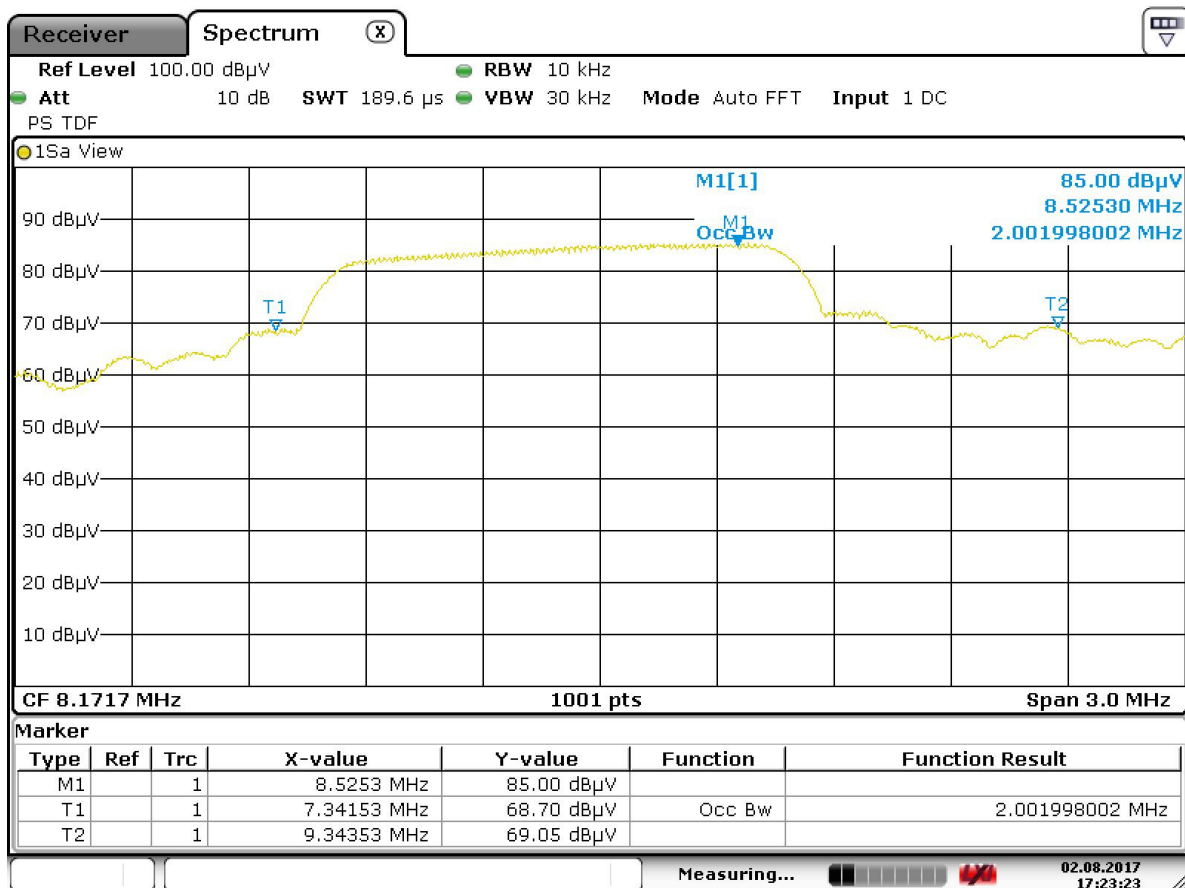
Test Channel : Sweep on
Operation Mode : A

Ambient temperature : 22-26 °C
Relative humidity : 50-65 %
Atmospheric pressure : 100-103 kPa

Table 8: Test result of 99% Bandwidth

Antenna type	99% Bandwidth (MHz)
Inductive Loop	2.002

Test Plot of 99% Bandwidth,



Date: 2.AUG.2017 17:23:24

5.1.5 Spurious Emission

RESULT:**Passed**

Test standard	:	FCC Part 15.223 RSS-Gen
Basic standard	:	ANSI C63.10: 2013
Limits	:	The field strength of emissions outside of the band 1.705–10.0 MHz shall not exceed the general radiated emission limits in § 15.209 Outside of the swept frequency band, the out-of-band emission limits in sections A2.5 and A2.6, or the general field strength limits listed in RSS-Gen apply, whichever are less stringent. This test is to be carried out with the frequency sweep in operation
Kind of test site	:	3m Semi-Anechoic Chamber

Test setup

Test Channel	:	Sweep on
Operation mode	:	A

Remark: Testing was carried out within frequency range 30MHz to more than the tenth harmonic.

For details refer to Appendix D.

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5.2 Mains Conducted Emissions

5.2.1 Conducted Emissions Line and Neutral

RESULT:**Passed**

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

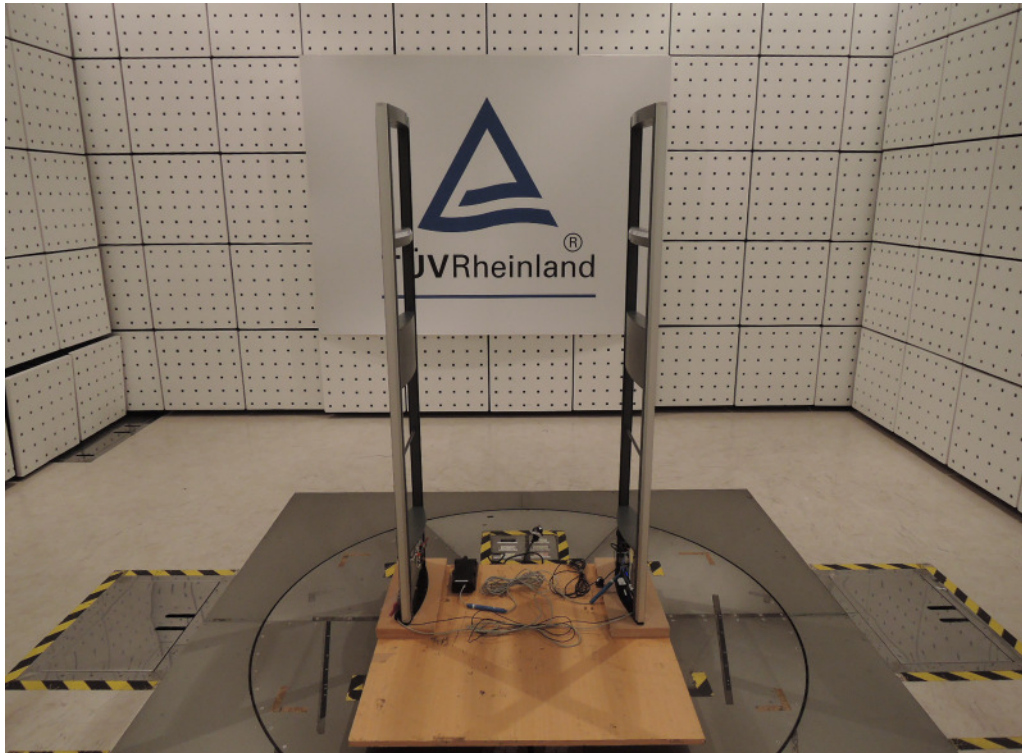
Test setup

Test Channel	:	Sweep on
Operation mode	:	Normal

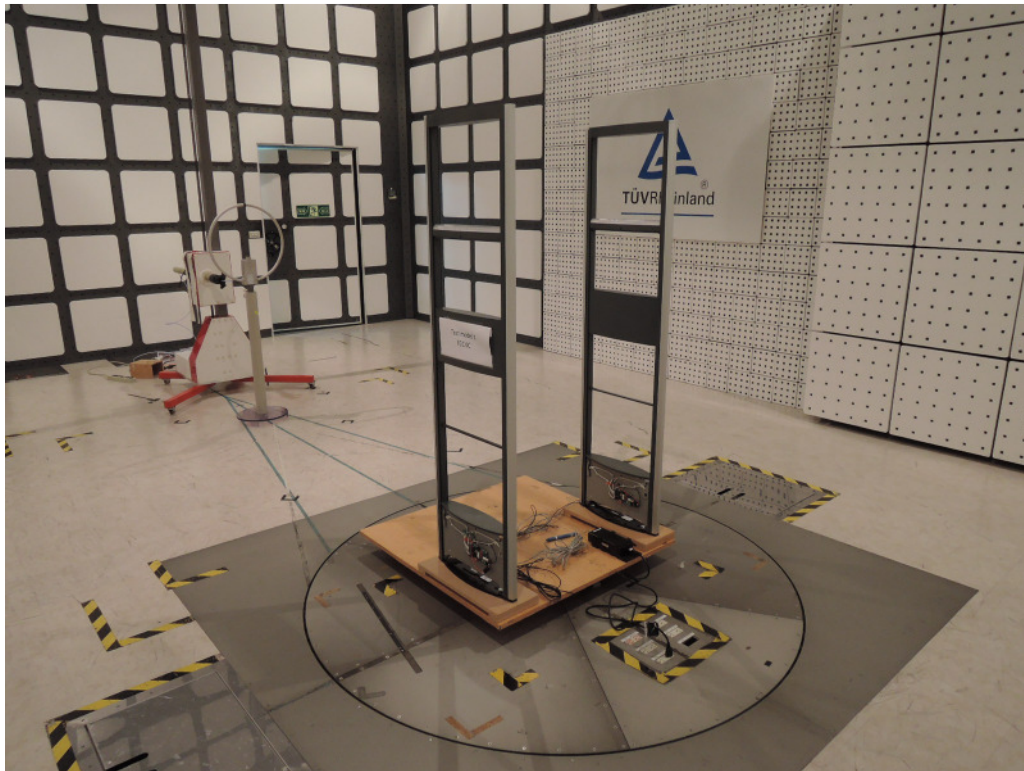
Remark: For details refer to Appendix D.

6. Photographs of the Test Set-Up

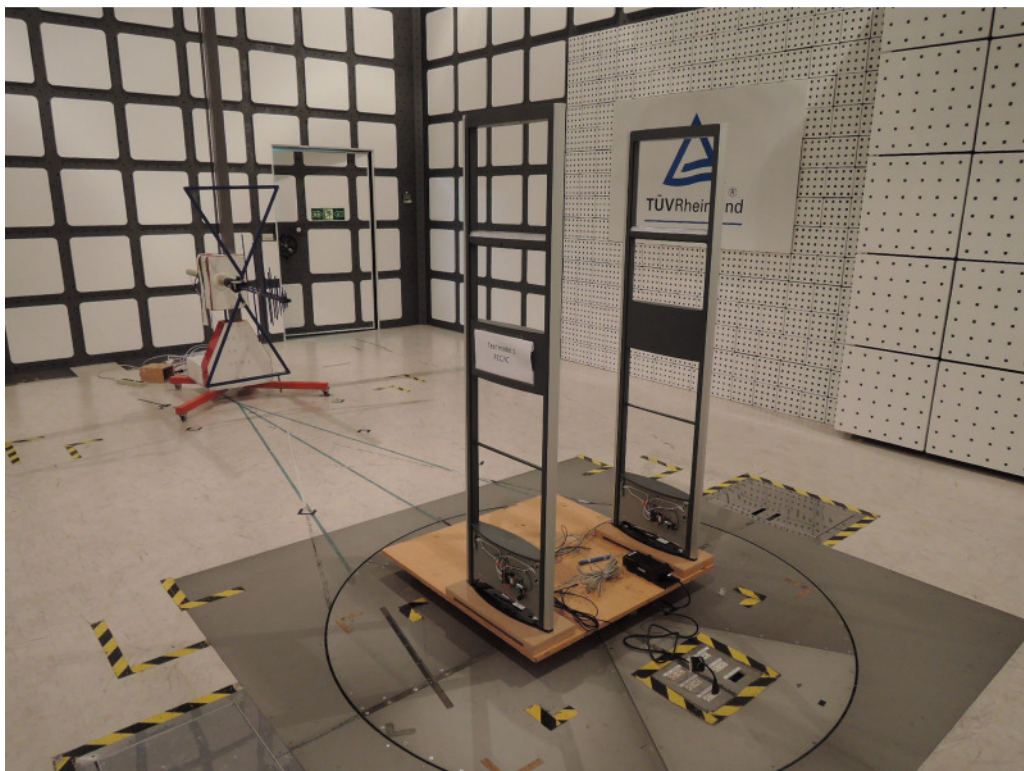
Photograph 1: Set-up for Radiated Emissions TX (Front View)



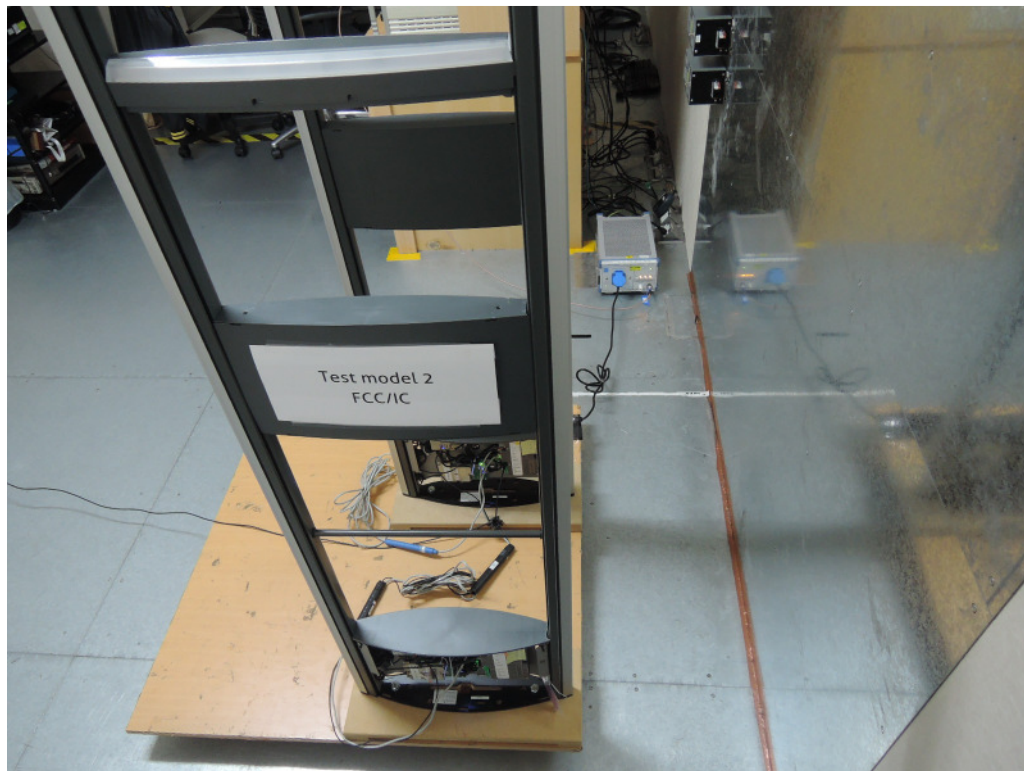
Photograph 2: Set-up for Radiated Emissions (Back View 1)



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



Photograph 4: Set-up for for Mains Conducted testing Back



Photograph 5: Set-up for for Mains Conducted testing Front



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