Prüfbericht-Nr.: *Test Report No.*:	**50224374 001**	**Auftrags-Nr.:** *Order No.*:	238100815	Seite 1 von 22 *Page 1 of 22*
Kunden-Referenz-Nr.: *Client Reference No.*:	N/A	**Auftragsdatum:** *Order date*:	31-Jan-2019	
Auftraggeber: *Client*:	H.P.B. HI-TECH CORP. 10F., No. 308, Sec. 1, Neihu Rd., Taipei City 114, Taiwan, R.O.C			
Prüfgegenstand: *Test item*:	Hand Gesture Controller			
Bezeichnung / Typ-Nr.: *Identification / Type No.*:	Wave1210			
Auftrags-Inhalt: *Order content*:	FCC Part 15C			
Prüfgrundlage: *Test specification*:	FCC 47CFR Part 15: Subpart C Section 15.209			

Wareneingangsdatum: *Date of receipt*:	31-Jan-2019
Prüfmuster-Nr.: *Test sample No.*:	A000872608-001
Prüfzeitraum: *Testing period*:	31-Jan-2019 ~ 19-Feb-2019
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*:

2019-02-19 Mars Y.J. Lin / Project Engineer

Datum *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*

kontrolliert von / *reviewed by*:

2019-02-19 Ryan W. T. Chen / Project Manager

Datum *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*

Sonstiges / *Other*:

Zustand des Prüfgegenstandes bei Anlieferung: Prüfmuster vollständig und unbeschädigt
Condition of the test item at delivery: *Test item complete and undamaged*

* Legende:	1 = sehr gut	2 = gut	3 = befriedigend	4 = ausreichend	5 = mangelhaft
	P(ass) = entspricht o.g. Prüfgrundlage(n)		F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
Legend:	*1 = very good*	*2 = good*	*3 = satisfactory*	*4 = sufficient*	*5 = poor*
	P(ass) = passed a.m. test specification(s)		*F(ail) = failed a.m. test specification(s)*	*N/A = not applicable*	*N/T = not tested*

TEST SUMMARY

5.1.1 ANTENNA REQUIREMENT
RESULT: Passed

5.1.2 FIELD STRENGTH OF FUNDAMENTAL
RESULT: Passed

5.1.3 20DB BANDWIDTH
RESULT: Passed

5.1.4 SPURIOUS EMISSION
RESULT: Passed

5.2.1 CONDUCTED EMISSIONS LINE AND NEUTRAL
RESULT: Passed

Contents

1. General Remarks

1.1 Complementary Materials

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

Appendix P: Photo Documentation
(File Name: 50224374 001APPENDIX P)
Appendix D: Test Result of Radiated Emissions
(File Name: 50224374 001APPENDIX D)

Test Specifications
The following standards were applied .

Table 1: Applied Standard and Test Levels

Radio
FCC CFR47 Part 15: Subpart C Section 15. 209 ANSI C63.10:2013

1.2 Complementary Materials

The decision rule of conformity of this test report is following the requirements of the requested standard in the quotation, and agreed among testing laboratory and manufacturer (applicant) to exclude the consideration of Measurement Uncertainty, unless it is required by the specific standard.

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
TAF Accredited NCC Test Lab. No.:0759
TAF ISO17025 Certification effective period: 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_EMC	Ver. TUV3A1	N/A	N/A
Spectrum Analyzer	R&S	FSV 40	100921	2018/05/02	2019/05/01
EXA Signal Analyzer	KEYSIGHT	N9010A	MY52221334	2018/04/05	2019/04/04
Preamplifier (30MHz -1GHz)	HP	8447F	2805A03335	2018/08/14	2019/08/13
Bilog Antenna	TESEQ	CBL6111D	29804	2018/08/18	2019/08/17
Loop Antenna	Schwarzbeck	FMZB 1513	1513-076	2018/06/14	2019/06/13
EMI Test Receiver	R&S	ESR 7	101549	2018/11/10	2019/11/19
Spectrum Analyzer	R&S	FSL3	101943	2018/09/07	2019/09/06
Temp. & Humid. Chamber	Giant Force	GCT-099-40-S	MAF0103-007	2017/03/09	2019/03/08
LISN (1 phase)	R&S	ENV216	101243	2018/06/18	2019/06/17
LISN	R&S	ENV216	101262	2018/06/22	2019/06/21

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 basics using in house standards or comparisons.

2.5 Measurement Uncertainty

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

Table 3: Emission Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	± 1 x 10^{-7}
RF power, conducted	± 1.5 dB
RF power density, conducted	± 3 dB
spurious emissions, conducted	± 3 dB
all emissions, radiated	± 6 dB
Temperature	± 1 ºC
Humidity	± 5 %

3. General Product Information

3.1 Product Function and Intended Use

The EUT is a Hand Gesture Controller. It contains a WPC compatible module enabling the user to charge the battery through a Wireless interface.
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	Hand Gesture Controller
Type Identification	Wave1210
FCC ID	2APC5-WAVE1210

Table 5: Technical Specification of EUT

Item	Value
Operating Frequency	112 - 205kHz
Operation Voltage	9Vdc
Modulation	ASK

3.3 Independent Operation Modes

Basic operation modes are:

A. Transmitting and receiving at fundamental frequency
B. Normal

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: Power on the EUT and put Load device on it. EUT will start providing wireless power. Power transmission and load status detection is done simultaneously using the fundamental frequency in the range of 110 - 205kHz.

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
WPC load	N/A	10W	N/A
Fan sensor	N/A	N/A	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

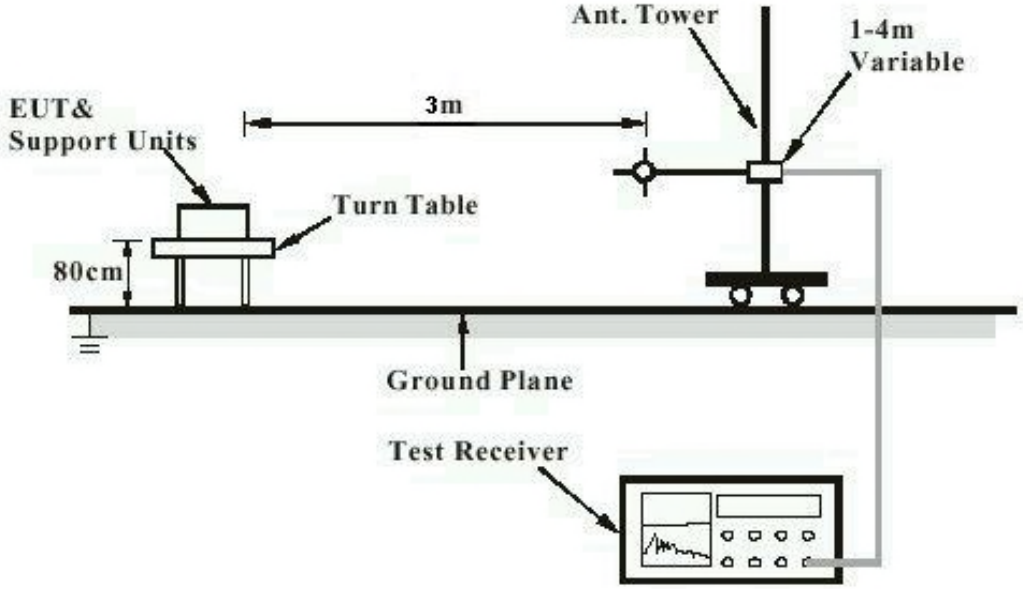
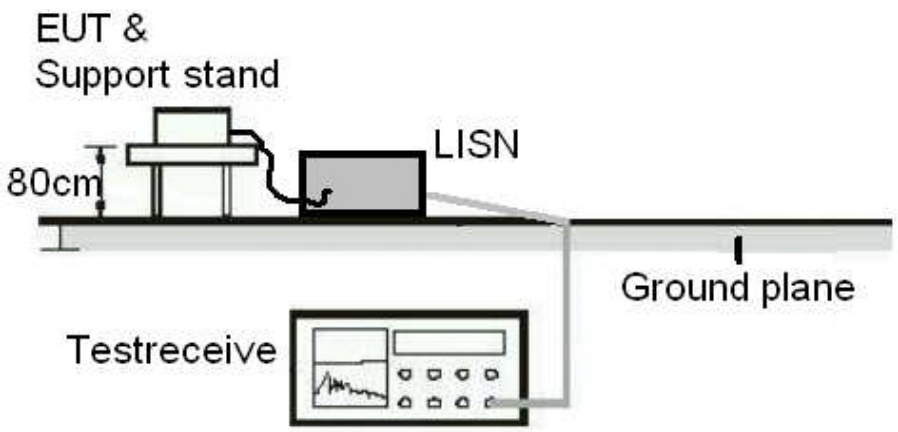


Diagram of Measurement Equipment Configuration for Mains Conduction Measurement (if applicable)



5. Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT: **Passed**

Standard	:	Part 15.203
Requirement	:	Manufacturer must

The antenna is a Loop Antenna with no possibility of replacement with a non-approved antenna by 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 : Part 15.209
Basic standard : ANSI C63.10:2013

Test setup

Test Channel : Fundamental Frequency near Middle of Band
Operation Mode : A

Atmospheric pressure : 100-103 kPa

Table 6: Field strength of fundamental

Frequency (kHz)	Level(3m) (dBuV/m)	Detector	Limit(3m) (dBuV/m)	Level(300m) (dBuV/m)	Limit(300m) (dBuV/m)	Remark	Result
131.1	86.28	Peak	102.77	6.28	22.77	--	Pass
131.1	83.70	Average	102.77	3.70	22.77	--	Pass

6.28dBuV/m@300m = 86.28dBuV/m+40*log(3m/300m)

3.70dBuV/m@300m = 83.70dBuV/m+40*log(3m/300m)

For details refer to Appendix D.

Factor (dB/m)=Antenna Factor(dB/m)+Cable loss (dB)

Level(dBuV/m)=Reading(dBuV)+ Factor(dB/m)

5.1.3 20dB Bandwidth

RESULT: **Passed**

Test standard : FCC Part 15.209--RSS-216
Basic standard : ANSI C63.10:2013

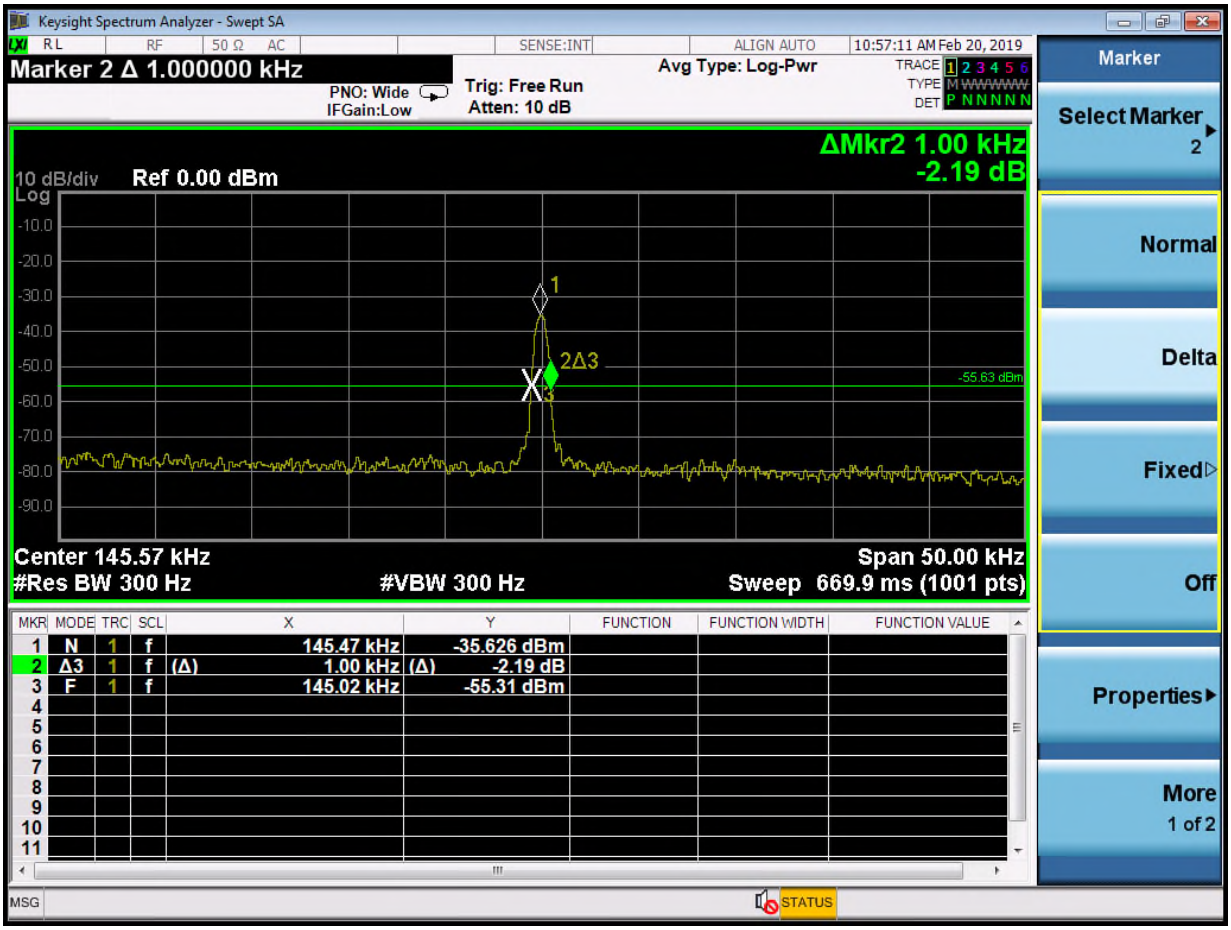
Test setup

Test Channel : Fundamental Frequency near Middle of Band
Operation Mode : A

Table 7: Test result of 20 dB Bandwidth,

Frequency (kHz)	20dB Bandwidth (kHz)
145.47	1

Test Plot of 20 dB Bandwidth



5.1.4 Spurious Emission

RESULT: **Passed**

Test standard	:	FCC Part 15.209
Basic standard	:	ANSI C63.10:2013
Limits	:	Radiated emissions must comply with the radiated emission limits specified in FCC 15.209
Kind of test site	:	3m Semi-Anechoic Chamber

Test setup

Test Channel	:	Fundamental Frequency near Middle of Band
Operation mode	:	A

Factor (dB/m)=Antenna Factor(dB/m)+Cable loss (dB)

Level(dBuV/m)=Reading(dBuV)+ Factor(dB/m)

Remark: Testing was carried out within frequency range 9kHz to the tenth harmonic.

For details refer to Appendix D.

The Radiated Emissions testing was performed in the X, Y and Z axis orientation. The worst-case Axis orientation is recorded in this test report.

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
Limits	:	Mains Conducted emissions as defined in Part 15.107(a), must comply with the mains conducted emission.
Kind of test site	:	Shielded Room

Test setup

Test Channel	:	Fundamental Frequency near Middle of Band
Operation mode	:	B

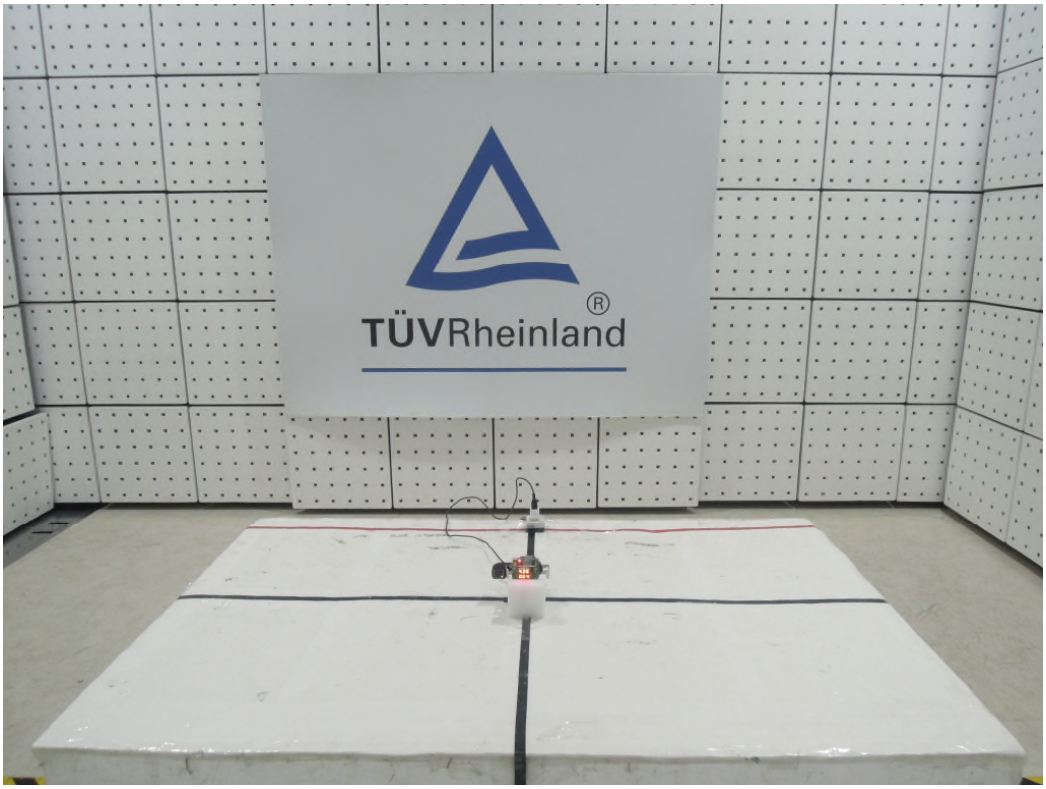
Factor (dB/m)=Antenna Factor(dB/m)+Cable loss (dB)

Level(dBuV/m)=Reading(dBuV)+ Factor(dB/m)

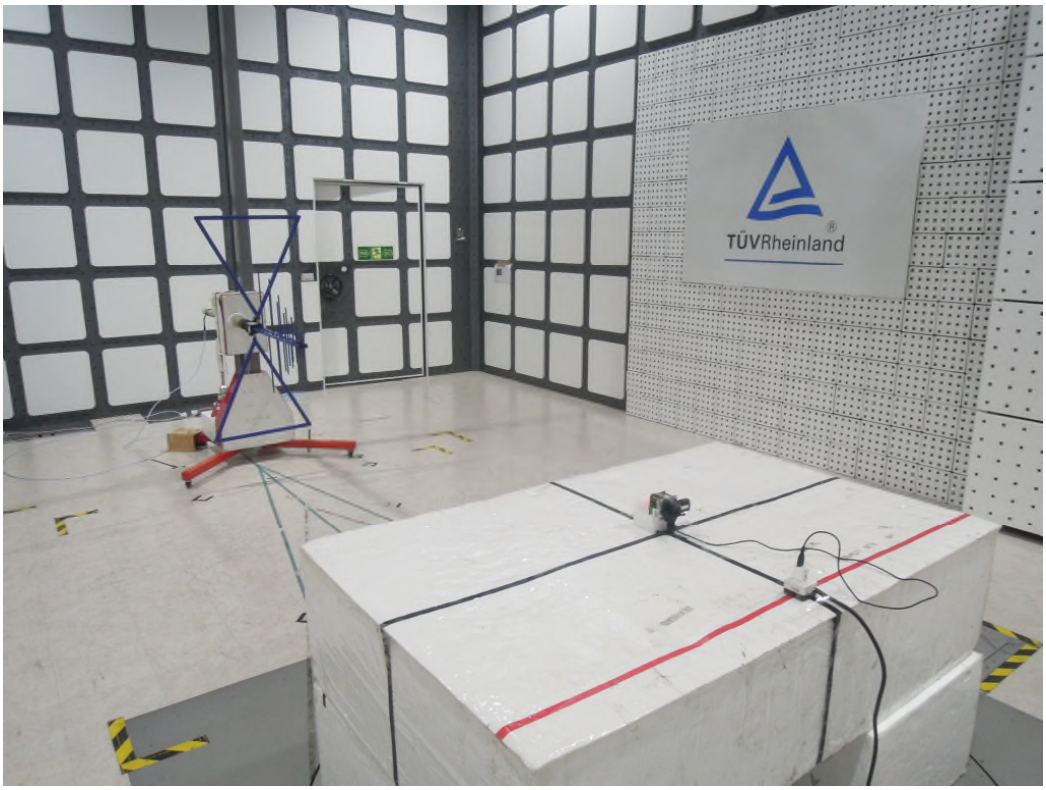
Remark: For details refer to Appendix D.

6. Photographs of the Test Set-Up

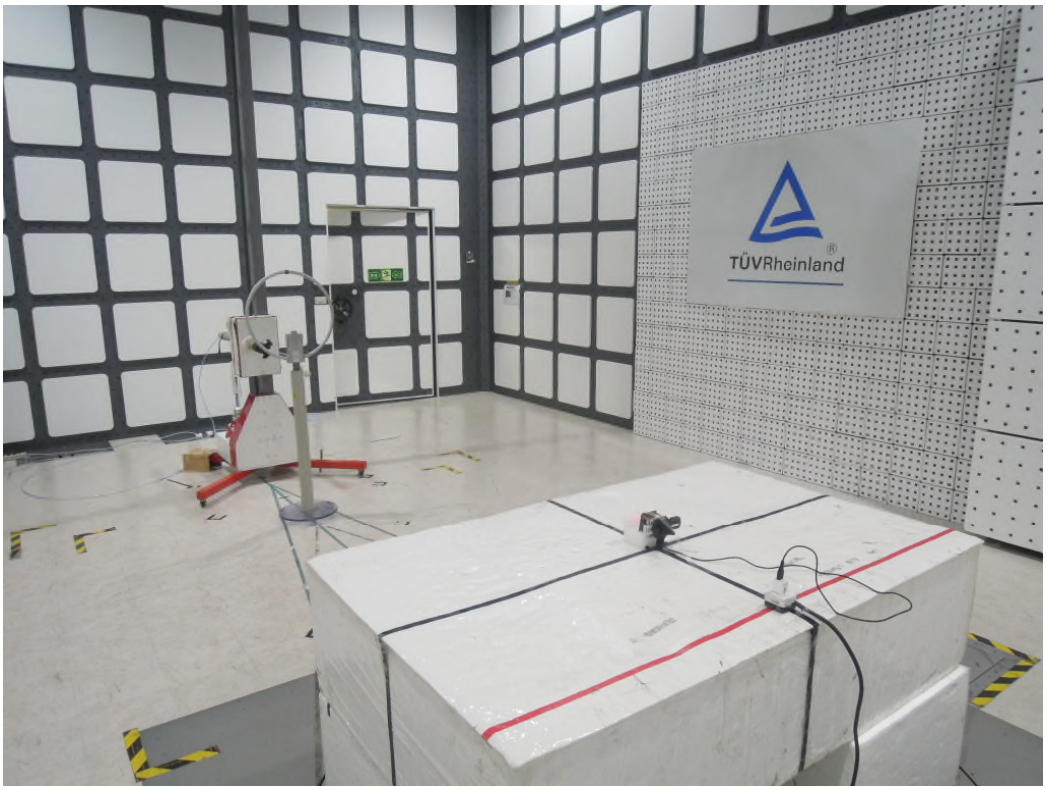
Photograph 1: Set-up for Spurious Emissions (Front View)



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

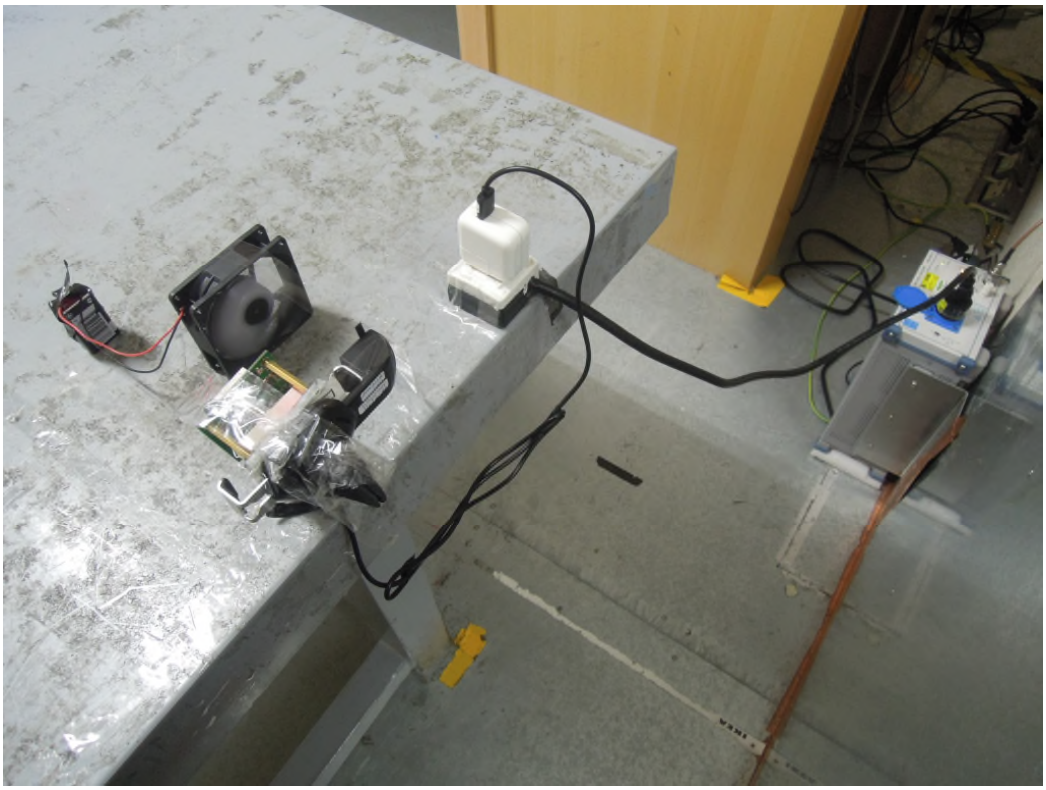


Photograph 3: Set-up for Spurious Emissions (Back View 2)



Photograph 4: Set-up for Spurious Emissions, AC Mains (Front View)

Photograph 5: Set-up for Spurious Emissions, AC Mains (Back View)



7. List of Tables

8. List of Photographs