

Prüfbericht-Nr.: <i>Test report no.:</i>	50349158 001	Auftrags-Nr.: <i>Order no.:</i>	238133847	Seite 1 von 23 Page 1 of 23
Kunden-Referenz-Nr.: <i>Client reference no.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	03-Feb-2020	
Auftraggeber: <i>Client:</i>	BIONIME CORPORATION No. 100, Sec. 2, Daqing St., South Dist., Taichung City 40242 Taiwan			
Prüfgegenstand: <i>Test item:</i>	Receiver for CGM			
Bezeichnung / Typ-Nr.: <i>Identification / Type no.:</i>	HR310			
Auftrags-Inhalt: <i>Order content:</i>	FCC Part 15C Test report (RFID)			
Prüfgrundlage: <i>Test specification:</i>	FCC 47CFR Part 15: Subpart C Section 15.225			
Wareneingangsdatum: <i>Date of sample receipt:</i>	19-Feb-2020			
Prüfmuster-Nr.: <i>Test sample no:</i>	A001062566-002			
Prüfzeitraum: <i>Testing period:</i>	19-Feb-2020 – 17-Mar-2020			
Ort der Prüfung: <i>Place of testing:</i>	EMC/RF Laboratory Taipei			
Prüflaboratorium: <i>Testing laboratory:</i>	TUV Rheinland Taiwan Ltd.			
Prüfergebnis*: <i>Test result*:</i>	Pass			
überprüft von: <i>reviewed by:</i>	genehmigt von <i>authorized by:</i>			
Datum: 20-Mar-2020 <i>Date:</i>			Datum: 20-Mar-2020 <i>Date:</i>	
Stellung / Position:	Mars Y.J. Lin/Project Engineer		Stellung / Position:	Brenda S.H. Chen/Project Manager
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 FREQUENCY STABILITY

RESULT: *Passed*

5.1.4 SPURIOUS EMISSION

RESULT: *Passed*

5.2.1 MAINS CONDUCTED EMISSIONS

RESULT: *Passed*

6.1.1 ELECTROMAGNETIC FIELDS

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 P: Photo Documentation

(File Name: 50349155 001, 50349158 001 APPENDIX P)

Appendix D: Test Result of Radiated Emissions

(File Name: 50349158 001 APPENDIX D)

Test Specifications

The following standards were applied (in bold: product standards, otherwise: basic standards).

Table 1: Applied Standard and Test Levels

Radio
FCC CFR47 Part 15: Subpart C Section 15.225 FCC CFR47 Part 2: Subpart J Section 2.1091 KDB447498 D01 General RF Exposure Guidance v06 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 Laboratory

TUV Rheinland Taiwan Ltd.

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

2.2 Test Facility

TUV Rheinland Taiwan Ltd.

Radiated/Conducted test at below facility:
No. 458-18, Sec 2, Fenliao., Linkou Dist.
New Taipei City 244
Taiwan (R.O.C.)
FCC Registration No.: 226631
IC Canada Registration No.: 25563

Mains Conduction tested at below facility:
11F. No.758, Sec. 4, Bade Rd., Songshan Dist.
Taipei City 105
Taiwan (R.O.C.)

FCC Registration No.: 180491
IC Canada Registration No.: 9465A
TAF Accredited NCC Test Lab. No.:3567
TAF ISO17025 Certification effective period: 6th-May-2019 to 05th-May-2022



2.3 List of Test and Measurement Instruments

Table 2: List of Test and Measurement Equipment

Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due Date
EMI Test Receiver	R&S	ESR7	102109	2019/4/17	2020/4/16
Spectrum Analyzer	R&S	FSV40	101112	2019/10/15	2020/10/15
Pre-Amplifier	Agilent	8447D	2727A05146	2020/2/17	2021/2/16
Pre-Amplifier	EMCI	EMC051845SE	980635	2020/2/11	2021/2/10
Pre-Amplifier	EMCI	EMC184045SE	980656	2020/2/11	2021/2/10
Bilog Antenna	SCHWARZBECK	VULB-9168	00950	2020/1/20	2021/1/19
Horn Antenna	ETS-Lindgren	3117	00218929	2019/11/27	2020/11/26
Horn Antenna	SCHWARZBECK	BBHA 9170	00890	2019/4/12	2020/4/11
Loop Antenna	EMCI	LPA600	287	2019/12/20	2020/12/19
Test Software	Audix	e3	Ver. 9	N/A	N/A
Test Cable	HUBER+SUHNER	SUCOFLEX 104EA	800057/4EA	2019/4/11	2020/4/10
Test Cable	HUBER+SUHNER	SUCOFLEX 104	802244/4	2019/4/11	2020/4/10
Test Cable	HUBER+SUHNER	SUCOFLEX 104	MY37203/4	2019/4/11	2020/4/10
Test Cable	HUBER+SUHNER	SUCOFLEX 102EA	800897/2EA	2019/4/11	2020/4/10
Test Cable	HUBER+SUHNER	SUCOFLEX 102EA	800902/2EA	2019/4/11	2020/4/10
Test Cable	HUBER+SUHNER	SUCOFLEX 102EA	801026/2EA	2019/4/11	2020/4/10
Thermo Chamber	Giant Force	GHT-150-40-CP-SD	MAA1902-010	2020/2/1	2021/2/1
Signal Generator	R&S	SMB100A03	181335	2020/1/23	2021/1/23
Power Meter	Anritsu	ML2495A	1901008	2019/4/29	2020/4/28
Power Sensor	Anritsu	MA2411B	1725269	2019/4/29	2020/4/28
EMI Test Receiver	Rohde & Schwarz	ESR 7	101062	2019/10/15	2020/10/15
Two-Line V-Network (for EUT)	Rohde & Schwarz	ENV216	101243	2019/06/23	2020/06/23
Two-Line V-Network	Rohde & Schwarz	ENV216	101262	2019/07/16	2020/07/16
Telecom ISN 4 Line	Fischer Custom Communications	FFCC-TLISN-T4-02-09	101168	2020/02/03	2021/02/03
Impedance Stabilization Network (for Conduction)	TESEQ	ISN T800	51949	2019/02/25	2020/02/25
				2020/02/25	2021/02/25
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	0357.8810.54-102102-HN	2019/07/25	2020/07/25
Wireless Tester	Rohde & Schwarz	CMW270	101929	2020/01/18	2021/01/17
Test Software	Audix	e3	Ver. 9	N/A	N/A

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	$\pm 1.5 \text{ dB}$
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 EUT is a receiver for CGM working at 13.56 MHz with RFID function.
For details refer to the User Guide, Data Sheet and Block Diagram.

3.2 Ratings and System Details

Table 4: Basic Information of EUT

Item	EUT information
Kind of Equipment/Test Item	Receiver for CGM
Type Identification	HR310
FCC ID	ADU-HR310

Table 5: Technical Specification of EUT

Technical Specification	Value
Operating Frequency	13.56 MHz
Operation Voltage	120Vac from Adapter, 3.7Vdc from Battery
Modulation	ASK
Antenna Type	Loop antenna

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: EUT has a screen that can setting RFID on the screen, let RFID continue to transmit.

4.3 Special Accessories and Auxiliary Equipment

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

Accessory of EUT

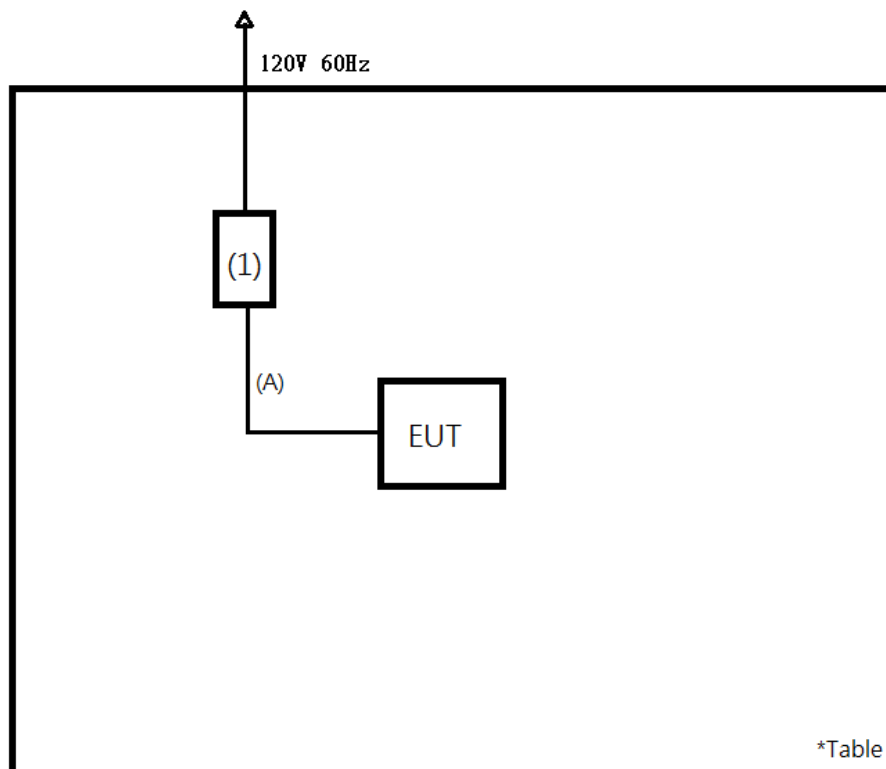
No.	Product	Brand	Model	Description
1	AC Adapter	SWITCHING	UES06WNCPU-050100SPA	I/P: 100-240 Vac, 50/60 Hz, O/P: 5.0 Vdc, 1.0 A
A	USB Cable	-	-	1m

4.4 Countermeasures to achieve EMC Compliance

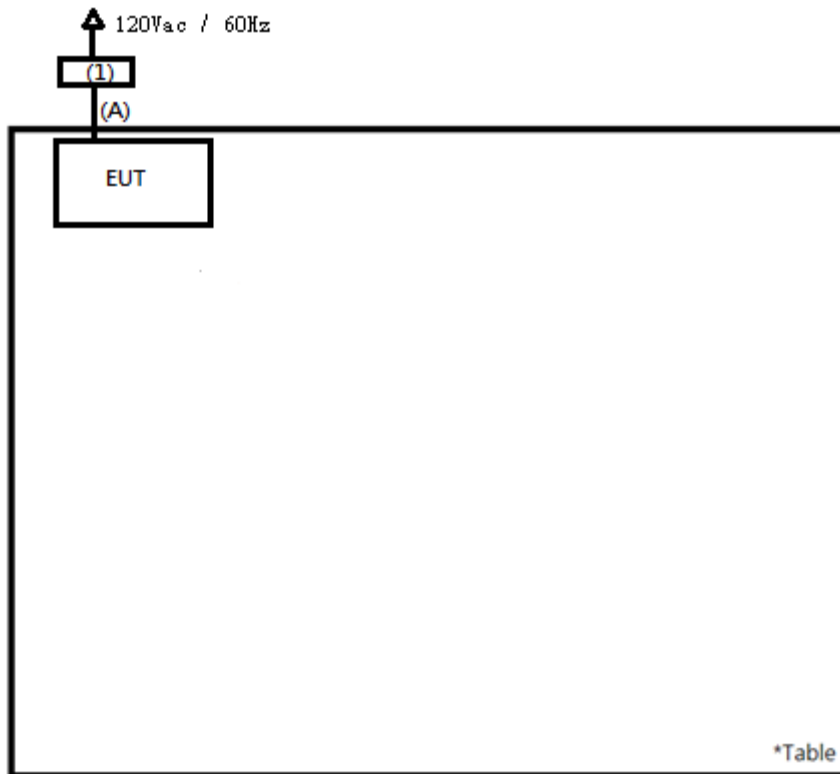
The test sample which has been tested contained the noise suppression parts as described in the Constructional Data Form or the Technical Construction File. No additional measures were employed to achieve compliance.

4.5 Test Setup Diagram

< Diagram of Measurement Equipment Configuration for Radiated Spurious Emissions >



< Diagram of Measurement Equipment Configuration for Mains Conducted Emission mode >



5. Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT:**Passed**

Standard : Part 15.203

Requirement : use of approved antennas only

The antenna is 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 : FCC Part 15.225

Basic standard : ANSI C63.10:2013

Test setup

Test Frequency : 13.56 MHz

Operation Mode : A

Ambient temperature : 23°C

Relative humidity : 53.1%

Atmospheric pressure : 100-103 kPa

Test Results

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

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

Limit at 30m = 15848 (uV/m)

**Limit at 3m = $20 \cdot \log(15848) + 40 \log(30\text{m}/3\text{m})$ (dBuV/m) = 84 + 40 (dBuV/m) = 124 (dBuV/m)

For details refer to Appendix D.

Frequency Stability Measurement								
Fundamental frequency (MHz)	Temperature (°C)	Voltage	Measurement frequency (MHz)				Frequency Error-MAX (ppm)	Limit ±0.01%
			0 Min	2 Min	5 Min	10 Min		
13.56	-20	Normal	13.560203	13.560232	13.560203	13.560203	17.11	±100ppm
	-10	Normal	13.560232	13.560232	13.560232	13.560232		
	0	Normal	13.560203	13.560203	13.560203	13.560203		
	10	Normal	13.560174	13.560174	13.560145	13.560145		
	20	Normal	13.560116	13.560116	13.560116	13.560116		
	30	Normal	13.560058	13.560058	13.560058	13.560058		
	40	Normal	13.560029	13.560029	13.560000	13.560000		
	50	Normal	13.559971	13.559971	13.559971	13.559971		

5.1.4 Spurious Emission

RESULT:**Passed**

Test standard : FCC part 15.209
FCC part 15.225

Basic standard : ANSI C63.10:2013
Limits : The field strength of any emissions appearing outside
of the 13.110–14.010 MHz band shall not exceed the
general radiated emission limits in § 15.209.

Kind of test site : 3m Semi-Anechoic Chamber

Test setup

Operation mode : A

Ambient temperature : 20-24 °C
Relative humidity : 50-65 %
Atmospheric pressure : 100-103 kPa

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

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

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.

Emission test data 9kHz-30MHz. Except for the main frequency, all other signals are back ground.

5.2 Mains Emissions

5.2.1 Mains Conducted Emissions

RESULT:**Passed**

Test standard	:	FCC Part 15.207 FCC Part 15.107
Limits	:	Mains Conducted emissions as defined in above test standards must comply with the mains conducted emission limits specified
Kind of test site	:	Shielded Room

Test setup

Test Channel	:	Middle
Operation mode	:	A

Remark: For details refer to Appendix D.

6. Safety Human exposure

6.1 Radio Frequency Exposure Compliance

6.1.1 Electromagnetic Fields

RESULT:**Passed**

Test standard : FCC KDB Publication 447498 D01 Appendix C

The Power calculation formula is as follows:

$$EIRP = p_t \times g_t = (E \times d)^2 / 30$$

 p_t is the transmitter output power in watts g_t is the numeric gain of the transmitting antenna (dimensionless) E is the electric field strength in V/m d is the measurement distance in meters (m)

The electric field strength in V/m is 57.47dBuV/m@3m = 0.000747V/m@3m

The d is 3m

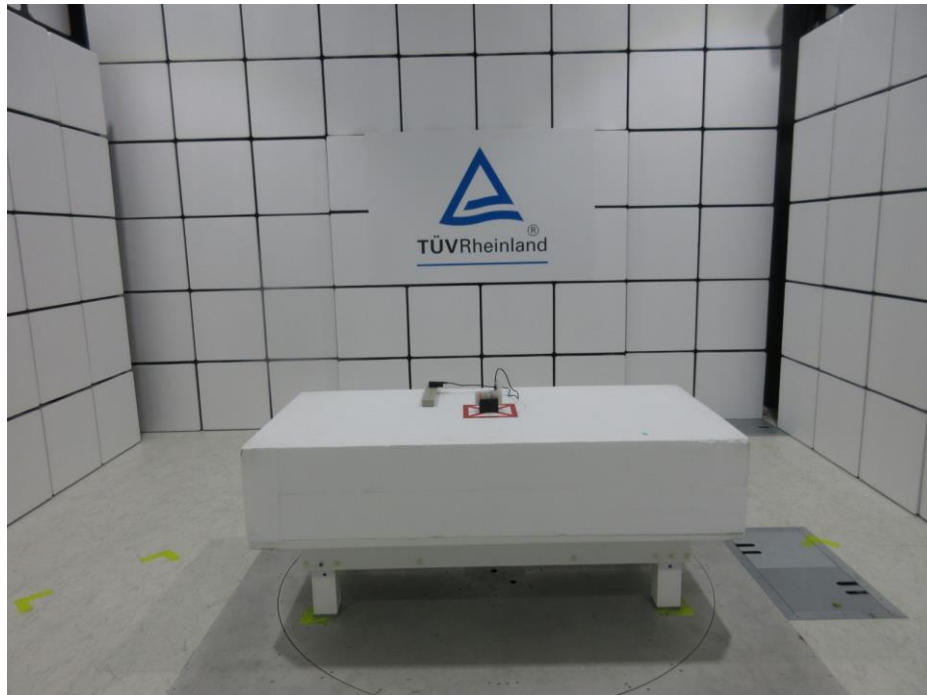
$$(0.000747 \times 3)^2 / 30 = 1.675E-07W = 1.675E-04mW$$

FCC:

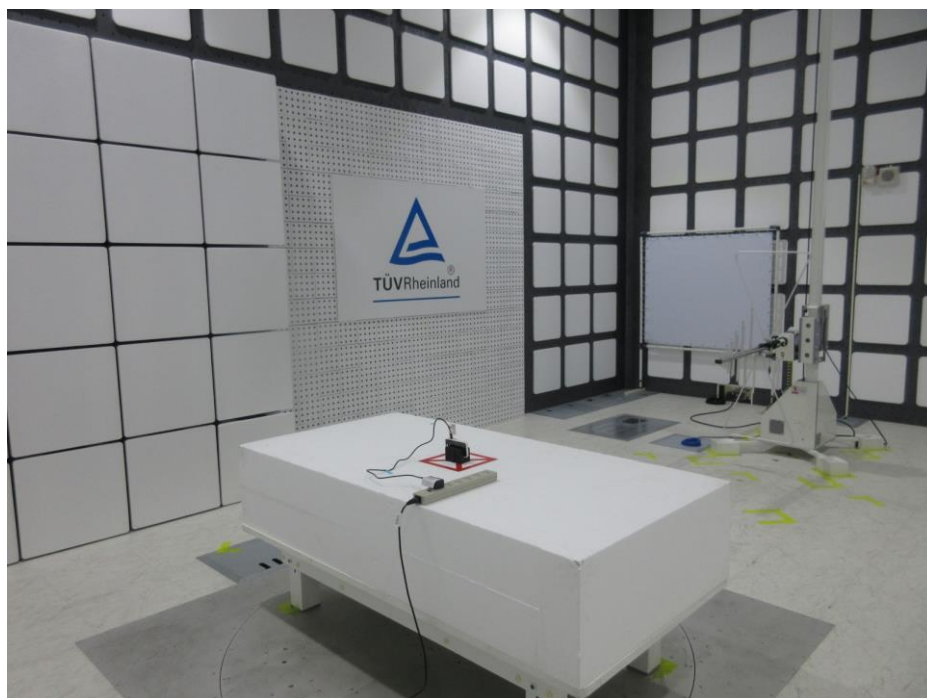
Since the transmitter's maximum peak output power is 1.675E-04mW is much less than the limit, the EUT is excluded from the SAR assessment according to FCC KDB publication 447498: Mobile Portable RF Exposure.

7. Photographs of the Test Set-Up

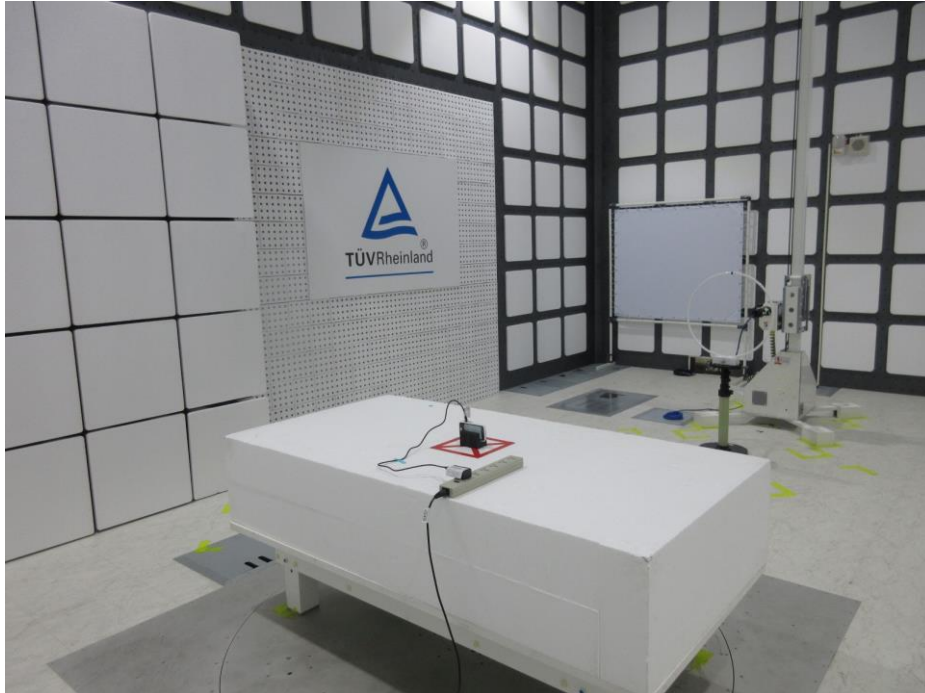
Photograph 1: Set-up for Spurious Emissions (Front View)



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 Mains Conducted testing (Front View)



Photograph 5: Set-up for Mains Conducted testing (Back View)



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