Prüfbericht-Nr.: *Test Report No.*:	**50258015 001**	**Auftrags-Nr.:** *Order No.*:	238101688	Seite 1 von 24 *Page 1 of 24*
Kunden-Referenz-Nr.: *Client Reference No.*:	N/A	**Auftragsdatum:** *Order date*:	27-Feb-2019	
Auftraggeber: *Client*:	Whetron Electronics Co.,Ltd, No.16,Singye Rd.,Ta Fa Ind.,TW-831 Daliao Dist., Kaohsiung City Taiwan,R.O.C.			
Prüfgegenstand: *Test item*:	2Wheel Smart Keyless Remote System_AGE2(KYMCO)			
Bezeichnung / Typ-Nr.: *Identification / Type No.*:	S300068100T			
Auftrags-Inhalt: *Order content*:	FCC Part 15C Test report			
Prüfgrundlage: *Test specification*:	FCC CFR47 Part 15: Subpart C Section 15. 231(a)			

Wareneingangsdatum: *Date of receipt*:	9-Apr-2019
Prüfmuster-Nr.: *Test sample No.*:	A000883601-007
Prüfzeitraum: *Testing period*:	16-Apr-2019 - 30-Apr-2019
Ort der Prüfung: *Place of testing*:	EMC/RF Laboratory Taipei
Prüflaboratorium: *Testing laboratory*:	TUV Rheinland Taiwan Ltd.
Prüfergebnis*: *Test result**:	Pass

Report date / *tested by*:

14-Aug-2019 Mars Y.J. Lin/Project Engineer

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

kontrolliert von / *reviewed by*:

14-Aug-2019 Jack H. C. Chang/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 FIELD STRENGTH OF HARMONICS
RESULT: *Passed*

5.1.4 20DB BANDWIDTH AND 99% BANDWIDTH
RESULT: *Passed*

5.1.5 PULSE WIDTH/TX GAP
RESULT: *Passed*

5.1.6 SPURIOUS EMISSION
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: 50258015APPENDIX P)
Appendix D: Test Result of Radiated Emissions
(File Name: 50258015APPENDIX 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. 231 ANSI C63.10:2013

1.2 Decision Rule of conformity

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.
Taipei Testing Laboratories

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

2.2 Test Facility

TUV Rheinland Taiwan Ltd.

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

FCC RegistrationNo.: 340738
IC Canada Registration No.: TW3567
TAF Accredited NCC Test Lab. No.:3567
TAF ISO17025 Certification effective period: 6th-May-2019 to 05th-May-2022

Testing Laboratory
3567

2.3 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
EMI Test Receiver	R&S	ESR 7	101549	2018/11/12	2019/11/10
Spectrum Analyzer	R&S	FSV 40	101514	2019/02/07	2020/02/07
EXA Signal Analyzer	KEYSIGHT	N9010A	MY52221334	2018/06/04	2019/06/03
Preamplifier (30MHz -1GHz)	Hewlett Packard	8447D	2944A06641	2018/08/31	2019/08/31
Preamplifier (18 GHz -40 GHz)	EMC Instruments	EMC184045SE	980408	2018/06/08	2019/06/08
Pre-Amplifier (1GHz~18GHz)	EM Electronics	EM01G18G	60649	2018/08/24	2019/08/24
Bilog Antenna	TESEQ	CBL6111D	29804	2018/07/02	2019/07/02
Horn Antenna	ETS-Lindgren	3117	138160	2018/06/01	2019/06/01
Horn Antenna (18GHz~40GHz)	COM-POWER	AH-840	101029	2018/12/22	2019/12/22
Loop Antenna	Schwarzbeck	FMZB 1513	1513-076	2018/06/14	2019/06/13
EMI Test Receiver	R&S	ESR 7	101549	2018/11/12	2019/11/10
LISN (1 phase)	R&S	ENV216	101243	2018/06/18	2019/06/17
LISN	R&S	ENV216	101262	2018/06/22	2019/06/21
Spectrum Analyzer	Agilent	N9010A	MY53470241	2018/06/04	2019/06/03
power Meter	Anritsu	ML2495A	1901008	2019/04/29	2020/04/28
Power Sensor	Anritsu	MA2411B	1725269	2019/04/29	2020/04/28

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 basics using in house standards or comparisons.

2.6 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
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 ºC
Humidity	± 10 %

3. General Product Information

3.1 Product Function and Intended Use

The EUT is a Smart Keyless System working in the 433 MHz and 125kHzBand. This report relates to the 433MHz portion of the device.
For details refer to the User Guide, Data Sheet and Circuit Diagram.

3.2 System Details and Ratings

Table 4: Basic Information of EUT

Item	**EUT information**
Kind of Equipment	2Wheel Smart Keyless Remote System_AGE2(KYMCO)
Type Designation	S300068100T
FCC ID	2ABPM-S300068100T
Brand Name	KYMCO

Table 5: Technical Specification of EUT

Technical Specification	Value
Operating Frequency	433.92MHz
Channel number	1
Operation Voltage	3Vdc
Modulation	FSK

3.3 Independent Operation Modes

Basic operation modes are:

A. Transmitting
    1. 433.9MHz
B. Receiving
C. Standby
D. Off
E. Normal operation

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 modified to continuous transmitter mode which makes it possible to transmit when power on.

It was used to enable the operation modes listed in section 3.3 as appropriate.

Full test was applied on all test modes, but only worst case was shown.

4.3 Special Accessories and Auxiliary Equipment

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

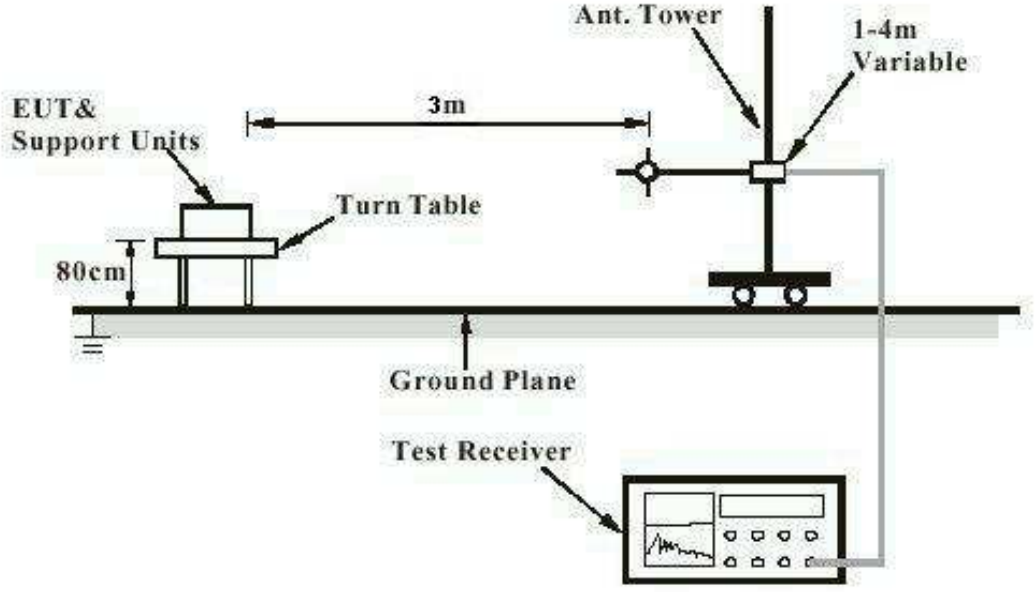
None.

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.

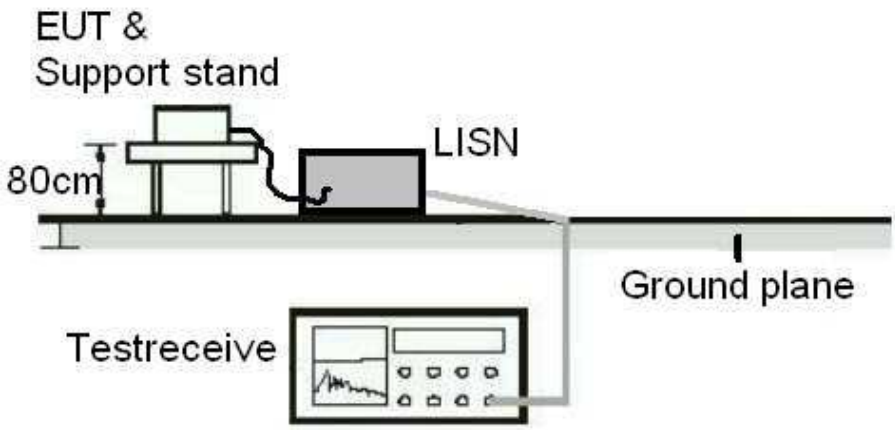
4.5 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test



Note: Measurements above 1 GHz are done with a table height of 1.5m

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 ensure approved antenna is used

The antenna is a printed PCB trace 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. 231(a)
Basic standard	:	ANSI C63.10:2013
Kind of test site	:	3m Semi-Anechoic Chamber

Test setup

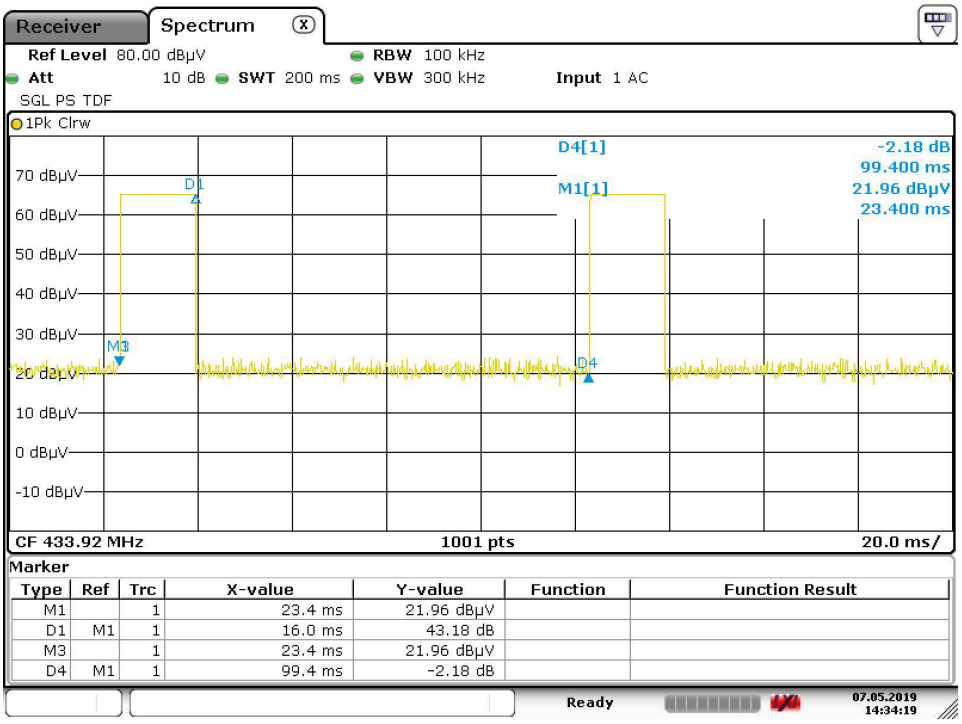
Test Channel	:	433.9MHz
Operation Mode	:	Field strength : A ,Duty Cycle:E
Ambient temperature	:	22-26 °C
Relative humidity	:	50-65 %
Atmospheric pressure	:	100-103 kPa

The EUT employs pulsed operation.
The pulse width is: 16 msec.

The average values noted are calculated through the application of a duty cycle correction, according to part 15.35c

Duty cycle calculation:
Duty cycle correction (dB) = 20 log (16msec / 99 msec) = -15.83 dB.

Test Plot pulse width



Date: 7.MAY.2019 14:34:19

Table 6: Test result of Field strength of fundamental

Frequency (MHz)	Level (dBuV/m	Limit (dBuV/m)	Antenna orientation	Detector or calculated value
433.9	84.47	100.8	Horizontal	Peak
433.9	68.64	80.8		Average
433.9	75.33	100.8	Vertical	Peak
433.9	59.5	80.8		Average

5.1.3 Field strength of harmonics

RESULT: **Passed**

Test standard : FCC Part 15. 231(a)

Basic standard : ANSI C63.10:2013
Kind of test site : 3m Semi-Anechoic Chamber

Test setup

Test Channel : 433.9MHz
Operation Mode : A

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

Table 7: Test result of Field strength of harmonics, maximum

Frequency (MHz)	Test result			
	Level (dBuV/m)	Limit (dBuV/m)	Antenna orientation	Detector
868.08	36.84	46	Horizontal	QP
921.43	31.93	46	Vertical	QP
1735	51.31	74	Horizontal	Peak
3905	52.32	74	Vertical	Peak

Remark: The maximum results found are reported. For detailed results of all frequencies tested, please refer to Appendix D.

5.1.4 20dB Bandwidth and 99% Bandwidth

RESULT: **Passed**

Test standard	:	FCC Part 15.231(c), A1.3, RSS Gen
Basic standard	:	ANSI C63.10:2013,
Kind of test site	:	Shielded room

Test setup

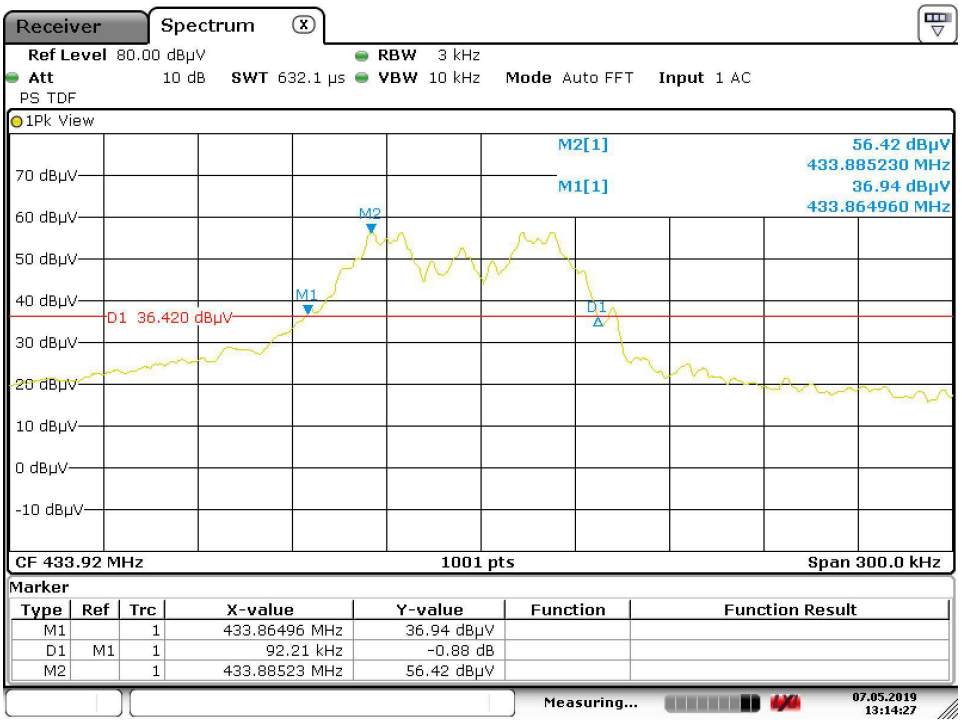
Test Channel	:	433.92MHz
Operation Mode	:	A

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier..

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

Table 8: Test result of 20 dB Bandwidth,

Channel	Channel Frequency (MHz)	-20 dB BW (kHz)	Limit (kHz)	Result
1	433.92	92.21	1084.8	Pass



Date: 7.MAY.2019 13:14:27

5.1.5 Pulse Width/TX gap

RESULT: **Passed**

Test standard	:	FCC Part 15.231(b)
Basic standard	:	ANSI C63.10:2013
Kind of test site	:	Anechoic Chamber

Test setup

Test Channel	:	433.9 MHz
Operation Mode	:	E

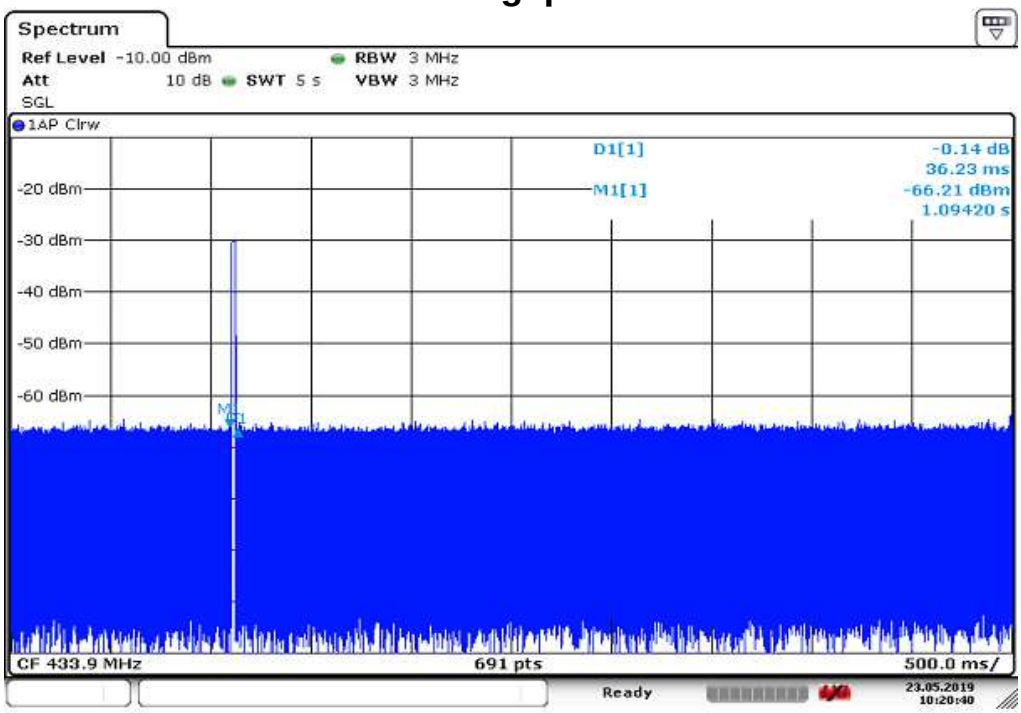
Ambient temperature	:	22-26 °C
Relative humidity	:	50-65 %
Atmospheric pressure	:	100-103 kPa

For operation in 314-316MHz and 433-435MHz: A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds being released. A transmitter activated automatically shall cease transmission within 5 seconds after activation.

Table 9: Test result of Pulse Width

Channel	Channel Frequency (MHz)	Pulse Width (ms)	Limit (ms)	Result
1	433.9	36.23	5000	Pass

Test Plot of Pulse Width/TX gap



5.1.6 Spurious Emission

RESULT: **Passed**

Test standard	:	FCC part 15. 231(b) AND FCC 15.205, FCC 15.209
Basic standard	:	ANSI C63.10: 2013
Limits	:	Radiated emissions which fall in the restricted bands, as defined in FCC 15.205(a);must comply with the radiated emission limits specified in FCC 15.209(a). Emission radiated outside the specified frequency bands must comply with the radiated emission limits specified in FCC 15.209(a).
Kind of test site	:	3m Semi-Anechoic Chamber

Test setup

Test Channel	:	433.9MHz
Operation mode	:	A

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

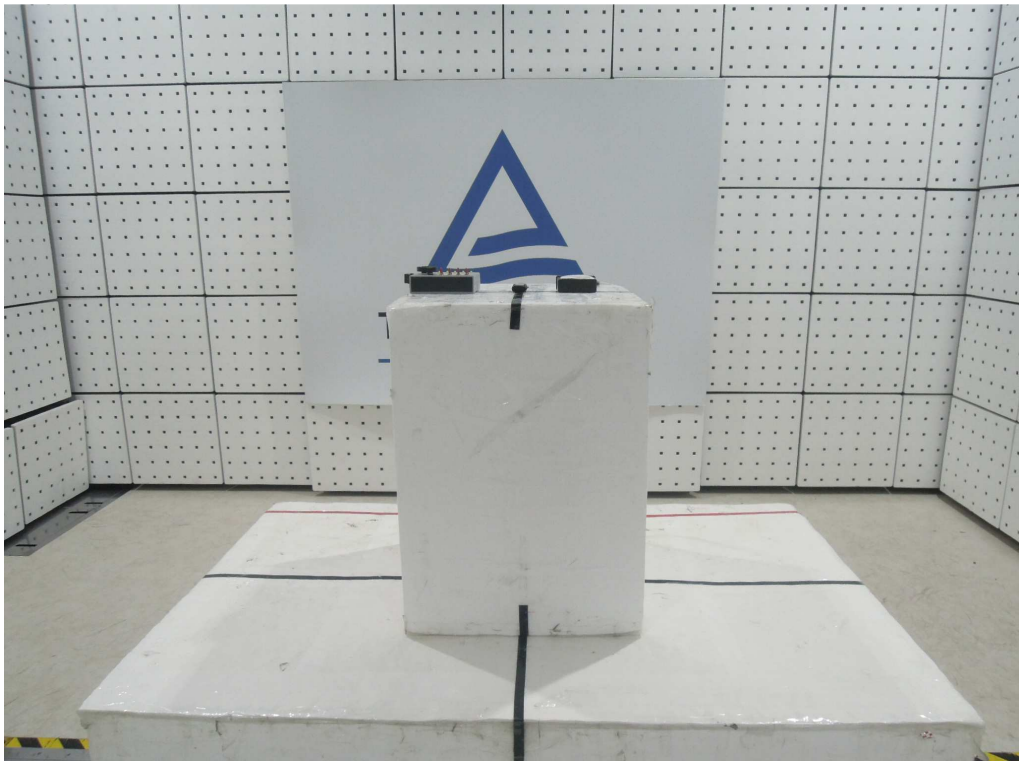
Remark: Testing was carried out within frequency range 30MHz to the tenth harmonic.

For details refer to Appendix D.

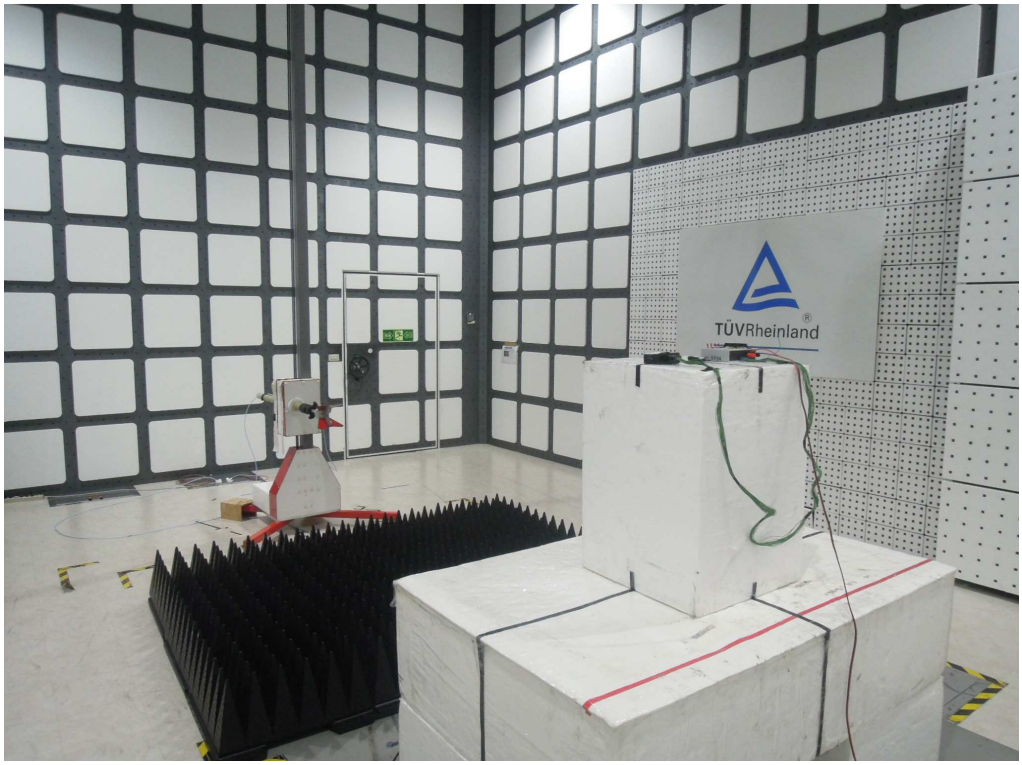
The Radiated Emissions testing was performed in the X, Y and Z axis orientation. The worst-case Axis orientation is recorded in this test report.

6. Photographs of the Test Set-Up

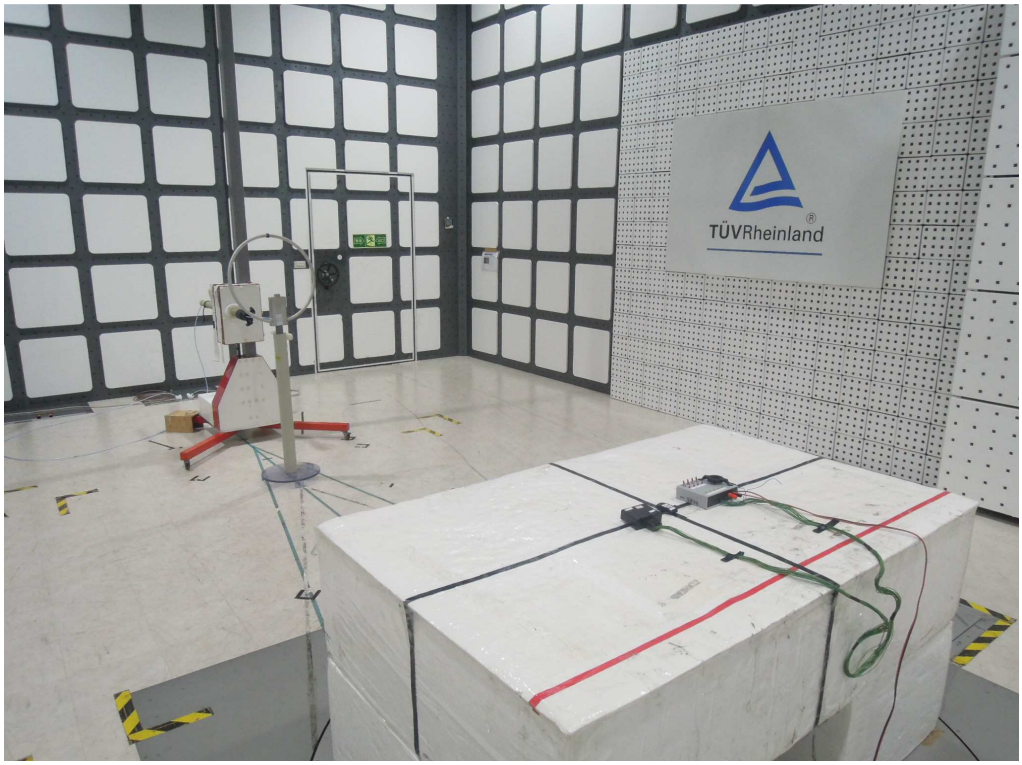
Photograph 1: Set-up for Radiated Emissions (Front View)



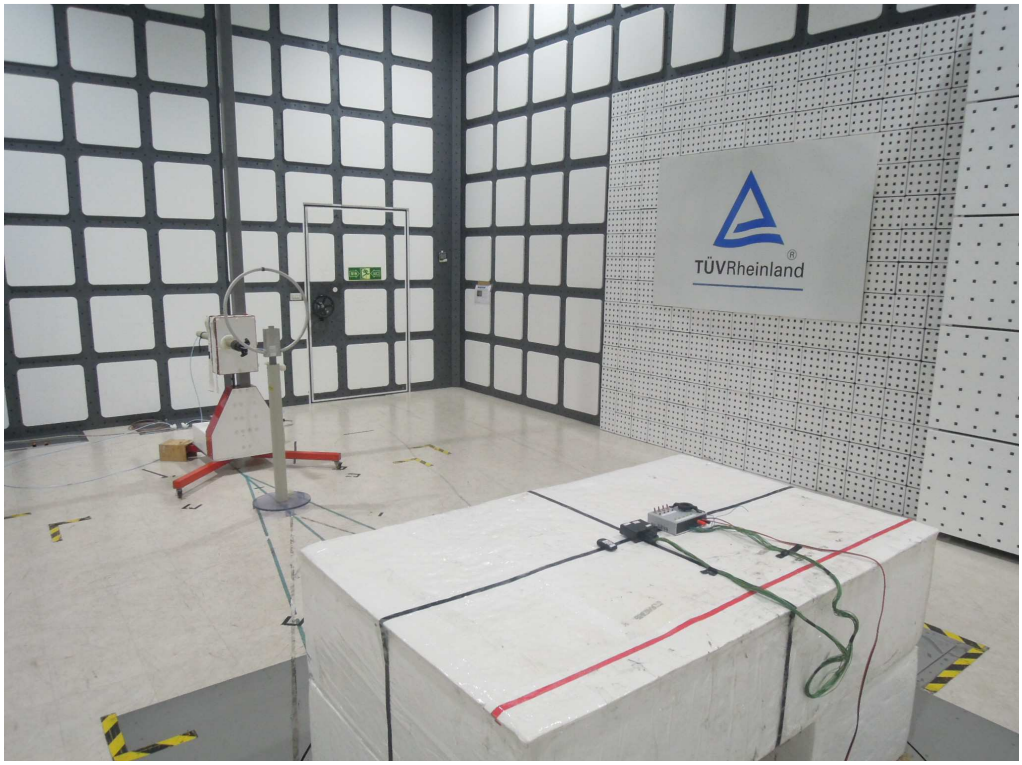
Photograph 2: Set-up for Radiated Emissions (Back View 1 TX)



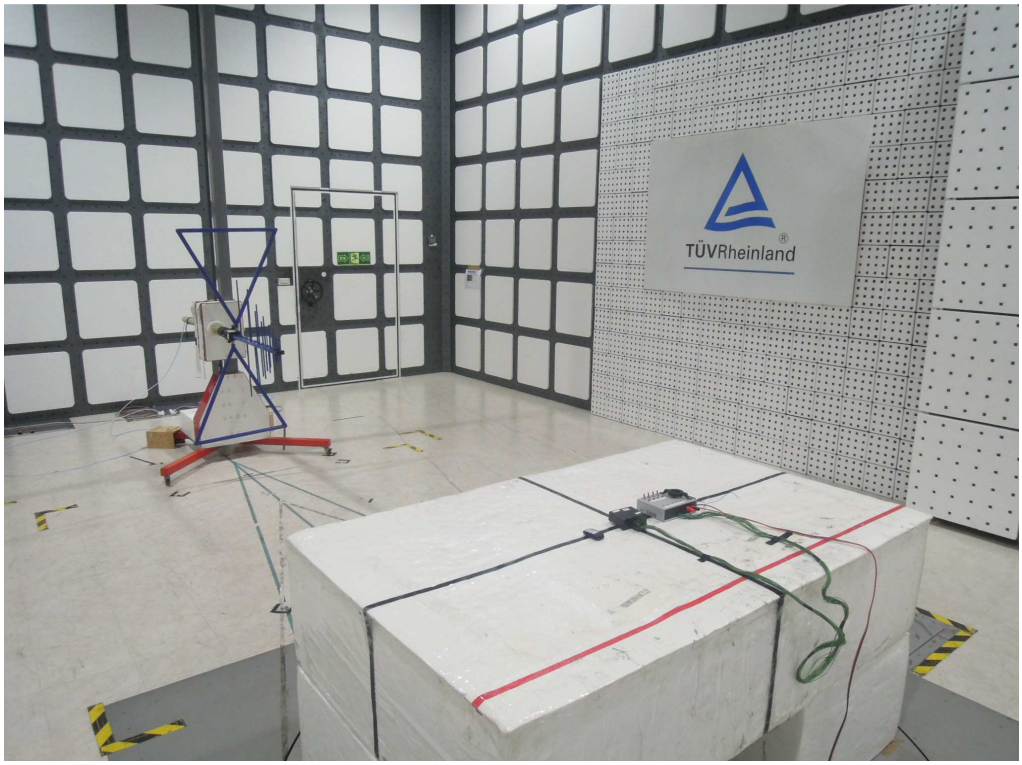
Photograph 3: Set-up for Radiated Emissions (Back View 2 TX)



Photograph 4: Set-up for Radiated Emissions (Back View 1 RX)



Photograph 5: Set-up for Radiated Emissions (Back View 2 RX)



7. List of Tables

8. List of Photographs