

Prüfbericht-Nr.: <i>Test Report No.:</i>	50182725 001	Auftrags-Nr.: <i>Order No.:</i>	114080743	Seite 1 von 24 <i>Page 1 of 24</i>
Kunden-Referenz-Nr.: <i>Client Reference No.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	8-Aug-2018	
Auftraggeber: <i>Client:</i>	PAMEX INC. 4680 VINITA COURT, CHINO, CA, United States 91710			
Prüfgegenstand: <i>Test item:</i>	Wall Reader			
Bezeichnung / Typ-Nr.: <i>Identification / Type No.:</i>	Kapture KA-WR1N			
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 receipt:</i>	07-Sep-2018			
Prüfmuster-Nr.: <i>Test sample No.:</i>	A000797975-003			
Prüfzeitraum: <i>Testing period:</i>	07-Sep-2018 - 12-Sep-2018			
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			
geprüft von / tested by:		kontrolliert von / reviewed by:		
2018-09-20	Mars Y.J. Lin / Project Engineer	2018-09-20	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
<p>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></p>				

Prüfbericht - Nr.: 50182725 001
Test Report No.

Seite 2 von 24
Page 2 of 24

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

Contents

1.	GENERAL REMARKS	4
1.1	COMPLEMENTARY MATERIALS.....	4
2.	TEST SITES	5
2.1	TEST FACILITIES	5
2.2	LIST OF TEST AND MEASUREMENT INSTRUMENTS.....	6
2.3	TRACEABILITY	7
2.4	CALIBRATION	7
2.5	MEASUREMENT UNCERTAINTY	7
3.	GENERAL PRODUCT INFORMATION.....	8
3.1	PRODUCT FUNCTION AND INTENDED USE	8
3.2	RATINGS AND SYSTEM DETAILS.....	9
3.3	INDEPENDENT OPERATION MODES.....	10
3.4	NOISE GENERATING AND NOISE SUPPRESSING PARTS	10
3.5	SUBMITTED DOCUMENTS.....	10
4.	TEST SET-UP AND OPERATION MODES.....	11
4.1	PRINCIPLE OF CONFIGURATION SELECTION	11
4.2	TEST OPERATION AND TEST SOFTWARE.....	11
4.3	SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT	11
4.4	COUNTERMEASURES TO ACHIEVE EMC COMPLIANCE.....	12
4.5	TEST SETUP DIAGRAM	12
5.	TEST RESULTS	14
5.1	TRANSMITTER REQUIREMENT & TEST SUITES	14
5.1.1	<i>Antenna Requirement</i>	<i>14</i>
5.1.2	<i>Field strength of fundamental.....</i>	<i>15</i>
5.1.3	<i>Frequency Stability.....</i>	<i>16</i>
5.1.4	<i>Spurious Emission</i>	<i>18</i>
5.2	MAINS EMISSIONS.....	19
5.2.1	<i>Mains Conducted Emissions.....</i>	<i>19</i>
6.	PHOTOGRAPHS OF THE TEST SET-UP.....	20
7.	LIST OF TABLES	24
8.	LIST OF PHOTOGRAPHS.....	24

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: 50182725 001APPENDIX P)

Appendix D: Test Result of Radiated Emissions

(File Name: 50182725 001APPENDIX D)

Test Specifications

The following standards were applied.

Table 1: Applied Standard and Test Levels

Radio
FCC CFR47 Part 15: Subpart C Section 15.225 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	Manufacturer	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	2017/11/10	2018/11/10
Spectrum Analyzer	R&S	FSV 40	100921	2018/05/02	2019/05/02
EXA Signal Analyzer	KEYSIGHT	N9010A	MY52221334	2018/02/05	2019/02/04
Preamplifier (30MHz -1GHz)	HP	8447F	2805A03335	2018/08/14	2019/08/14
Preamplifier (18 GHz -40 GHz)	COM-POWER	PAM-840	461257	2018/01/18	2019/01/18
Pre-Amplifier (1GHz~18GHz)	EM Electronics	EM01G18G	60558	2017/11/21	2018/11/21
Bilog Antenna	TESEQ	CBL6111D	29804	2018/08/18	2019/08/18
Horn Antenna	ETS-Lindgren	3117	201918	2018/08/18	2019/08/18
Horn Antenna (18GHz~40GHz)	COM-POWER	AH-840	101029	2017/11/28	2018/11/28
Loop Antenna	Schwarzbeck	FMZB 1513	1513-076	2018/06/14	2019/06/14
EMI Test Receiver	R&S	ESR 7	101549	2017/11/10	2018/11/10
Spectrum Analyzer	R&S	FSL3	101943	2018/09/07	2019/09/07
Temp. & Humid. Chamber	Giant Force	GCT-099-40-S	MAF0103-007	2017/03/09	2019/03/09

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
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 %

Prüfbericht - Nr.: 50182725 001
Test Report No.

Seite 8 von 24
Page 8 of 24

3. General Product Information

3.1 Product Function and Intended Use

The EUT is Wall Reader, 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	Wall Reader
Type Identification	Kapture KA-WR1N
Brand Name	Pamex
FCC ID	2AQ8A-KAWR1N

Table 5: Technical Specification of EUT

Technical Specification	Value
Operating Frequency	13.56 MHz
Operation Voltage	DC 12V
Modulation	ASK
Antenna Type	Printed PCB Coil Antenna

3.3 Independent Operation Modes

Basic operation modes are:

- A. Transmitting & Receiver

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 provided with a test mode firmware which makes it possible to transmit and receiver signal when switched on the power.

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

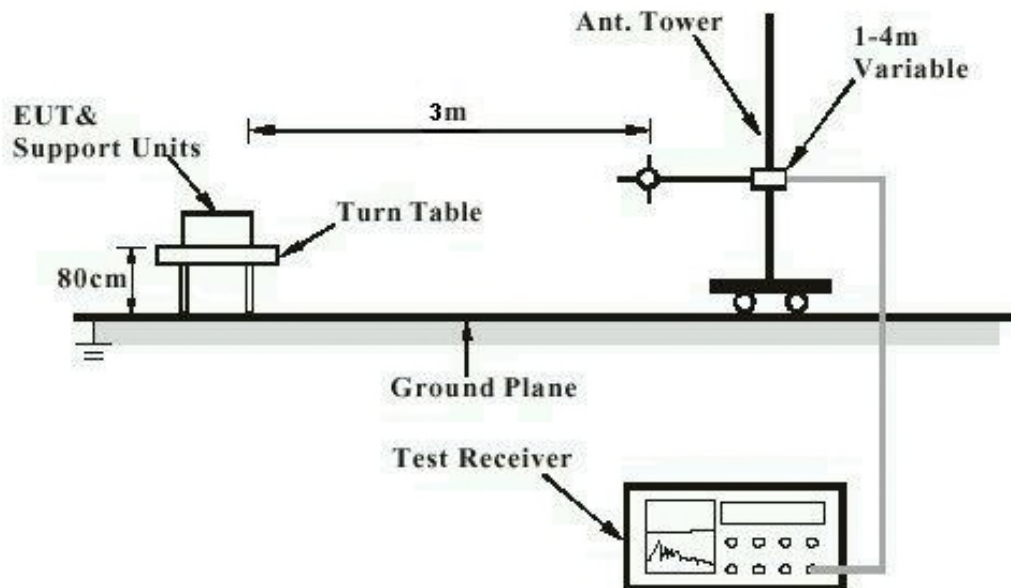
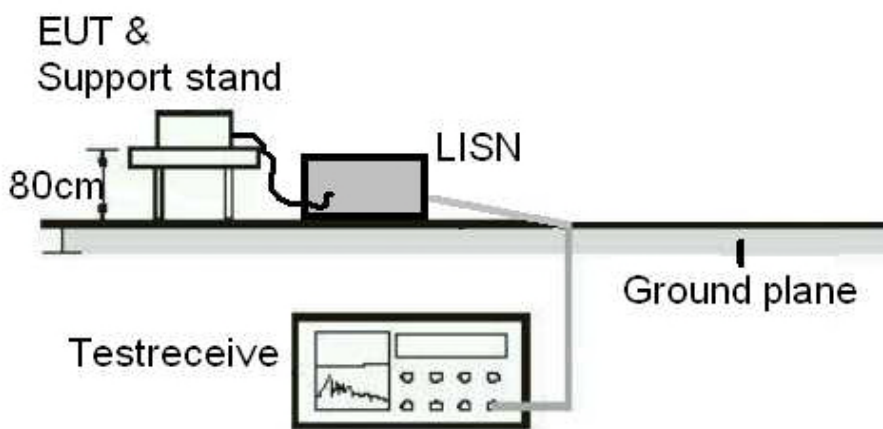


Diagram of Measurement Equipment Configuration for Mains Conduction Measurement (if applicable)

5. Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT: **Passed**

Standard : Part 15.203

Requirement : use of approved antennas only

The antenna is a printed PCB Coil 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 : see Appendix D

Relative humidity : see Appendix D

Atmospheric pressure : see Appendix D

Table 6: Test result of Field strength of fundamental and modulation sidebands

FCC

Frequency (MHz)	Meas. Result	Detector	Test Result	Limits (QP)		Pass/Fail
	dB μ V/m @1.2m		dB μ V/m @30m	dB μ V/m @1.2m	dB μ V/m @30m	
13.110–13.410	61.65	Pk	5.75	96.40	40.50	Pass
13.410–13.553	81.43	Pk	25.53	106.40	50.50	Pass
13.560	88.10	QP	32.20	139.90	84.00	Pass
13.567–13.710	82.16	Pk	26.26	106.40	50.50	Pass
13.710–14.010	61.59	Pk	5.69	96.40	40.50	Pass

For details refer to Appendix D.

Prüfbericht - Nr.: 50182725 001

Test Report No.

Seite 16 von 24

Page 16 of 24

5.1.3 Frequency Stability

RESULT:**Passed**

Test standard : FCC Part 15. 225(e)

Basic standard : ANSI C63.10:2013

Kind of test site : Shielded room

Test setup

Test Frequency : 13.56 MHz

Operation Mode : A

Ambient temperature : N/A

Relative humidity : 50-65 %

Atmospheric pressure : 100-103 kPa

Table 7: Test result of Frequency Stability

Frequency Stability Measurement					
Fundamental frequency (MHz)	Temperature (°C)	Voltage	Measurement frequency (MHz)	Frequency Error (ppm)	Limit ±0.01%
13.5599	-20	Normal	13.559960	4.42	±100ppm
	-10	Normal	13.559940	2.95	
	0	Normal	13.559920	1.47	
	10	Normal	13.559960	4.42	
	20	85%	13.559970	5.16	
	20	Normal	13.559900	0.00	
	20	115%	13.559910	0.74	
	30	Normal	13.559970	5.16	
	40	Normal	13.559850	-3.69	
	50	Normal	13.559820	-5.90	

Maximum Frequency Stability	Limit	Result
-5.9	±100 ppm	Pass

Prüfbericht - Nr.: 50182725 001

Test Report No.

Seite 18 von 24

Page 18 of 24

5.1.4 Spurious Emission

RESULT:**Passed**

Test standard : FCC part 15.225
FCC part 15.209

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 : see Appendix D

Relative humidity : see Appendix D

Atmospheric pressure : see Appendix D

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

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 : Normal link
Operation mode : Normal link

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

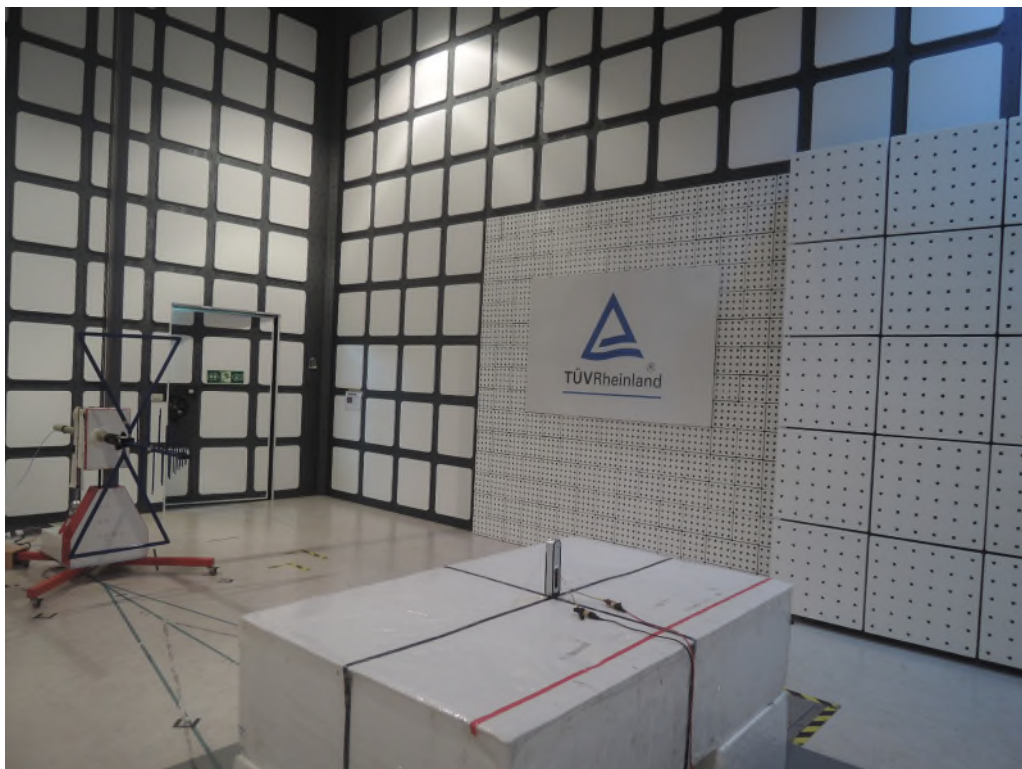
Remark: For details refer to Appendix D.

6. Photographs of the Test Set-Up

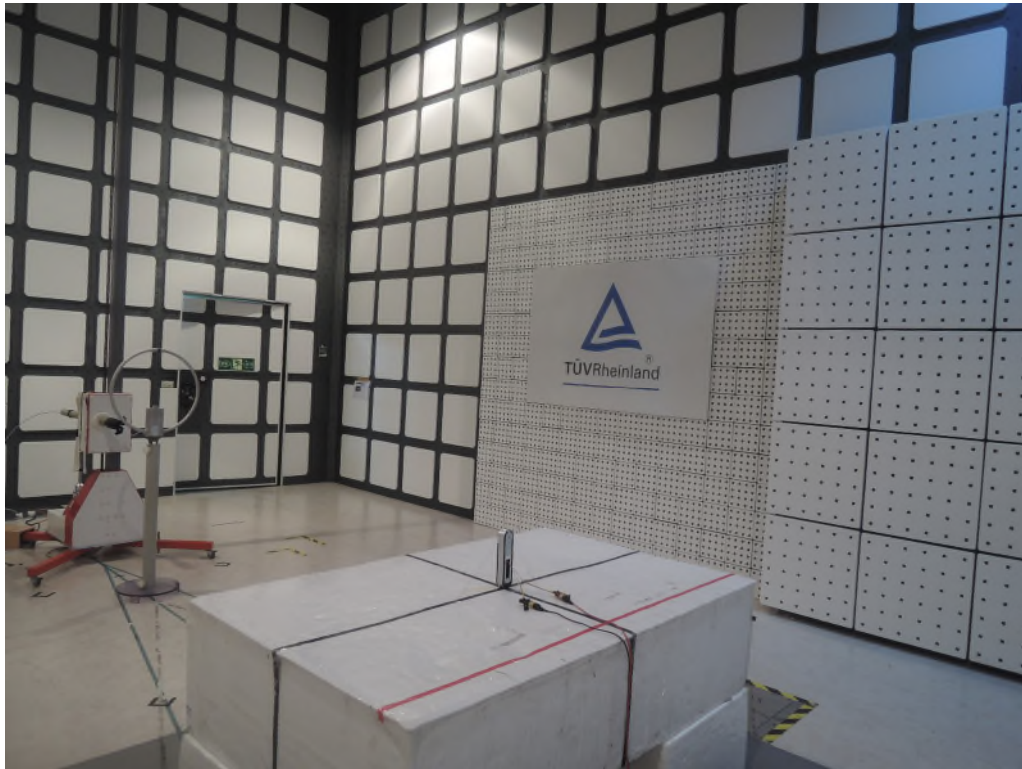
Photograph 1: Set-up for Radiated Emissions (Front View)



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



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



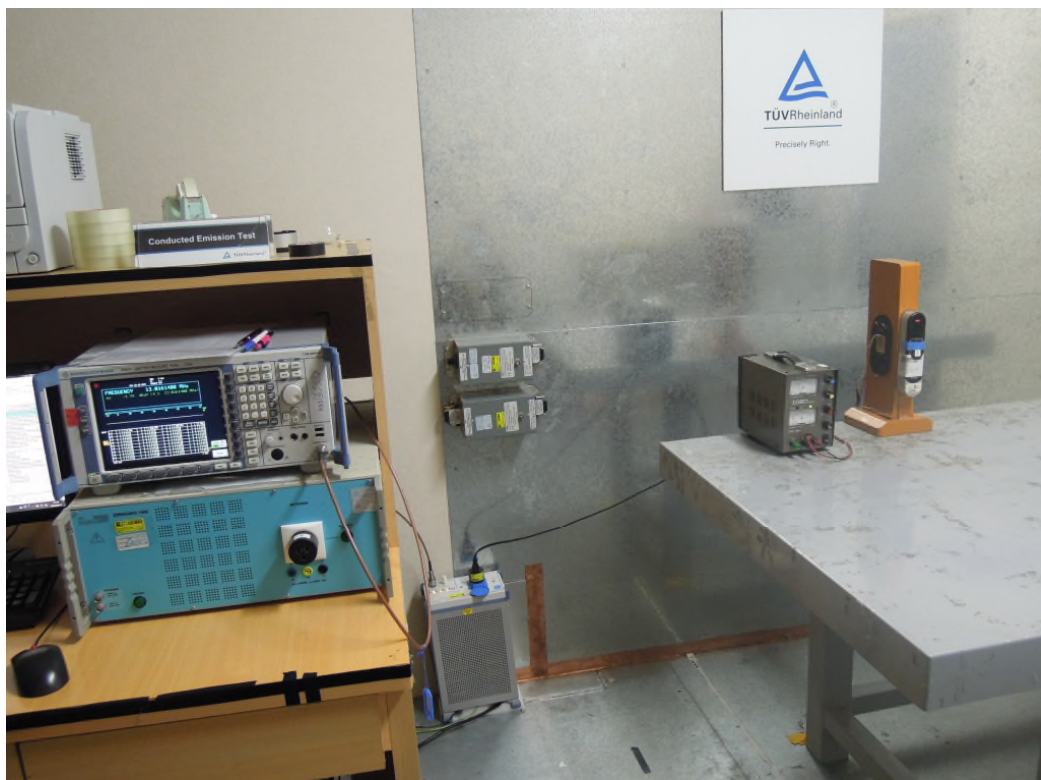
Photograph 4: Set-up for for Conducted testing



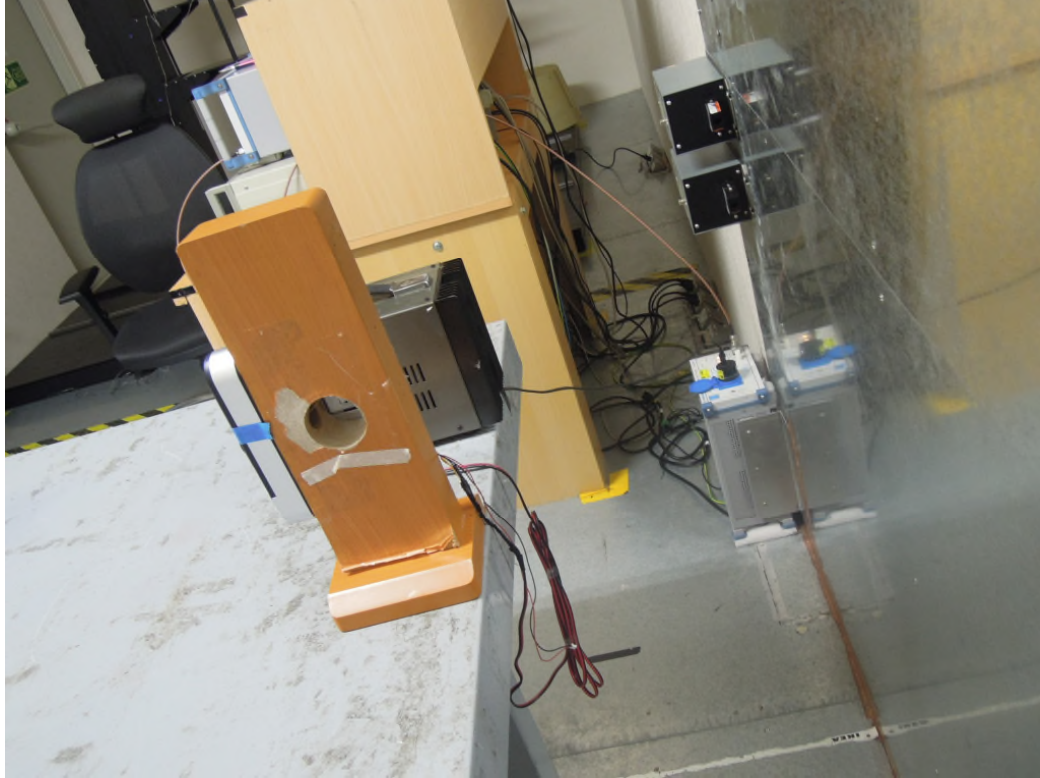
Photograph 5: Set-up for for Conducted testing (View 2)



Photograph 6: Set-up for Main Emissions (Front View)



Photograph 7: Set-up for Main Emissions (Back View)



7. List of Tables

Table 1: Applied Standard and Test Levels	4
Table 2: List of Test and Measurement Equipment	6
Table 3: Emission Measurement Uncertainty.....	7
Table 4: Basic Information of EUT	9
Table 5: Technical Specification of EUT	9
Table 6: Test result of Field strength of fundamental and modulation sidebands.....	15
Table 7: Test result of Frequency Stability	17

8. List of Photographs

Photograph 1: Set-up for Radiated Emissions (Front View)	20
Photograph 2: Set-up for Radiated Emissions (Back View 1).....	20
Photograph 3: Set-up for Radiated Emissions (Back View 2).....	21
Photograph 4: Set-up for for Conducted testing.....	21
Photograph 5: Set-up for for Conducted testing (View 2)	22
Photograph 6: Set-up for Main Emissions (Front View)	22
Photograph 7: Set-up for Main Emissions (Back View)	23