EMC TEST REPORT

SIEMIC
GLOBAL TESTING & CERTIFICATIONS
YOUR CHOICE FOR- TCB FCB CB NB CAB RCB

Report No.: 16021116-FCC-E1
Supersede Report No.: N/A

Applicant	Sunpery (Nanjing) Co., Ltd
Product Name	Universal MMC/RS232 Interface
Model No.	C112
Serial Model No.	N/A
Test Standard	FCC Part 15 Subpart B Class B:2015, ANSI C63.4: 2014
Test Date	September 01 to September 07, 2016
Issue Date	September 07, 2016
Test Result	☑ **Pass** ☐ **Fail**
Equipment complied with the specification	☑
Equipment did not comply with the specification	☐

Deon Dai	Miro Bao	
Deon Dai **Test Engineer**	**Miro Bao** **Checked By**	

This test report may be reproduced in full only
Test result presented in this test report is applicable to the tested sample only

Issued by:
SIEMIC (Nanjing-China) Laboratories
2-1 Longcang Avenue Yuhua Economic and
Technology Development Park, Nanjing, China
Tel:+86(25)86730138 Fax:+86(25)86730127 Email: China@siemic.com.cn

Laboratories Introduction

SIEMIC, headquartered in the heart of Silicon Valley, with superior facilities in US and Asia, is one of the leading independent testing and certification facilities providing customers with one-stop shop services for Compliance Testing and Global Certifications.

In addition to testing and certification, SIEMIC provides initial design reviews and compliance management throughout a project. Our extensive experience with China, Asia Pacific, North America, European, and International compliance requirements, assures the fastest, most cost effective way to attain regulatory compliance for the global markets.

Accreditations for Conformity Assessment

Country/Region	Scope
USA	EMC, RF/Wireless, SAR, Telecom
Canada	EMC, RF/Wireless, SAR, Telecom
Taiwan	EMC, RF, Telecom, SAR, Safety
Hong Kong	RF/Wireless, SAR, Telecom
Australia	EMC, RF, Telecom, SAR, Safety
Korea	EMI, EMS, RF, SAR, Telecom, Safety
Japan	EMI, RF/Wireless, SAR, Telecom
Singapore	EMC, RF, SAR, Telecom
Europe	EMC, RF, SAR, Telecom, Safety

This page has been left blank intentionally.

CONTENTS

1. REPORT REVISION HISTORY 5

2. CUSTOMER INFORMATION 5

3. TEST SITE INFORMATION 5

4. EQUIPMENT UNDER TEST (EUT) INFORMATION 6

5. TEST SUMMARY 7

6. MEASUREMENTS, EXAMINATION AND DERIVED RESULTS 8

6.1 AC POWER LINE CONDUCTED EMISSIONS 8

6.2 RADIATED EMISSIONS 14

ANNEX A. TEST INSTRUMENT 18

ANNEX B. EUT AND TEST SETUP PHOTOGRAPHS 19

ANNEX C. TEST SETUP AND SUPPORTING EQUIPMENT 27

ANNEX D. USER MANUAL / BLOCK DIAGRAM / SCHEMATICS / PARTLIST 30

ANNEX E. DECLARATION OF SIMILARITY 31

1. Report Revision History

Report No.	Report Version	Description	Issue Date
16021116-FCC-E1	NONE	Original	September 07, 2016

2. Customer information

Applicant Name	Sunpery (Nanjing) Co., Ltd
Applicant Add	No. 588 Xiaoshan Road, Dachang District, Nanjing 210044
Manufacturer	Sunpery (Nanjing) Co., Ltd
Manufacturer Add	No. 588 Xiaoshan Road, Dachang District, Nanjing 210044

3. Test site information

Lab performing tests	SIEMIC (Nanjing-China) Laboratories
Lab Address	2-1 Longcang Avenue Yuhua Economic and Technology Development Park, Nanjing, China
FCC Test Site No.	986914
IC Test Site No.	4842B-1
Test Software	EZ_EMC

4. Equipment under Test (EUT) Information

Description of EUT:	Universal MMC/RS232 Interface
Main Model:	C112
Serial Model:	N/A
Date EUT received:	August 22, 2016
Test Date(s):	September 01 to September 07, 2016
Antenna Gain:	3dBi
Type of Modulation:	ASK
RF Operating Frequency Band(s):	433.92MHz
Number of Channels:	1 CH
Port:	Power Port, LAN Port
Input Power:	Adapter: Model: T090060-2A1 INPUT: 100-240V~50/60Hz 0.3A OUTPUT: 9Vdc 0.6A
Trade Name :	N/A
FCC ID:	VXC-C112

5. Test Summary

The product was tested in accordance with the following specifications.
All testing has been performed according to below product classification:

FCC Rules	Description of Test	Result
§15.107; ANSI C63.4: 2014	AC Power Line Conducted Emissions	Compliance
§15.109; ANSI C63.4: 2014	Radiated Emissions	Compliance

Measurement Uncertainty

Emissions		
Test Item	**Description**	**Uncertainty**
Conducted Emissions & Radiated Emissions	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	1.634dB / 3.952dB

6. Measurements, Examination And Derived Results

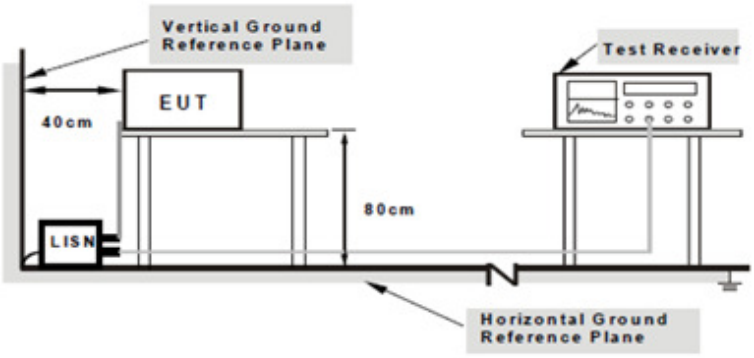
6.1 AC Power Line Conducted Emissions

Temperature	27.9°C
Relative Humidity	61%
Atmospheric Pressure	1019mbar
Test date :	September 06 to September 07, 2016
Tested By :	Deon Dai

Requirement(s):

Spec	Item	Requirement	Applicable
47CFR§15.107	a)	For Low-power radio-frequency devices that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 [mu]H/50 ohms line impedance stabilization network (LISN). The lower limit applies at the boundary between the frequencies ranges.	☑

Frequency ranges (MHz)	Limit (dBμV)	
	QP	Average
0.15 ~ 0.5	66 – 56	56 – 46
0.5 ~ 5	56	46
5 ~ 30	60	50

Test Setup	 Note: 1.Support units were connected to second LISN. 2.Both of LISNs (AMN) are 80cm from EUT and at least 80cm from other units and other metal planes support units.
Procedure	- The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table, as shown in Annex B. - The power supply for the EUT was fed through a 50 [mu]H/50 EUT LISN, connected to filtered mains. - The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable. - All other supporting equipment were powered separately from another main supply.
Remark	
Result	☑ Pass ☐ Fail

Test Data ☑ Yes ☐ N/A

Test Plot ☑ Yes (See below) ☐ N/A

Data sample

No.	Frequency	Reading	Detector	Lisn/Isn	Ps_Lmt	Cab_L	Result	Limit	Margin
	(MHz)	(dBμV)		(dB}	(dB)	(dB)	(dBμV)	(dBμV)	(dB)

Frequency (MHz) = Emission frequency in MHz

Reading (dBμV) = Receiver Reading Value

Detector=Quasi Peak Detector or Average Detector

Lisn/ISN= Insertion loss of LISN

Ps_Lmt= Insertion loss of transient limiter (The transient limiter included 10dB attenuation)

Cab_L= cable loss

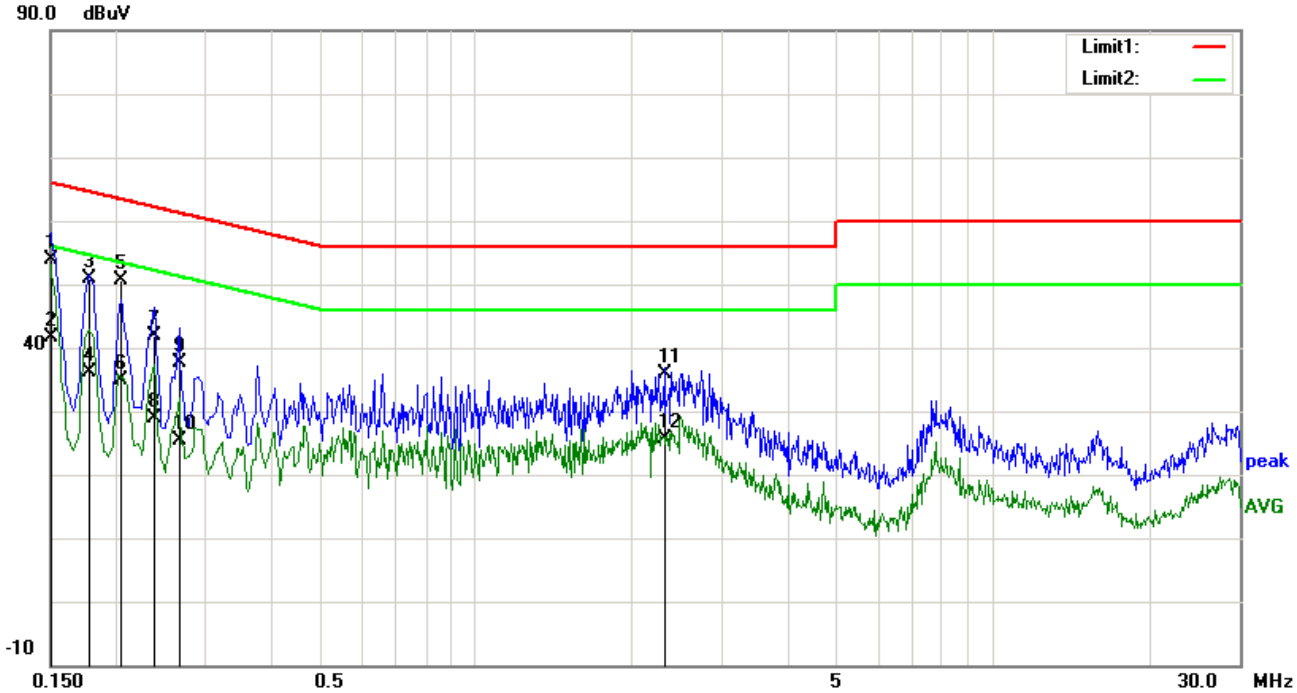
Result (dBμV) = Reading Value + Corrected Value

Limit (dBμV) = Limit stated in standard

Calculation Formula:

Margin (dB) = Result (dBμV) – limit (dBμV)

Test Mode:	Transmitting Mode

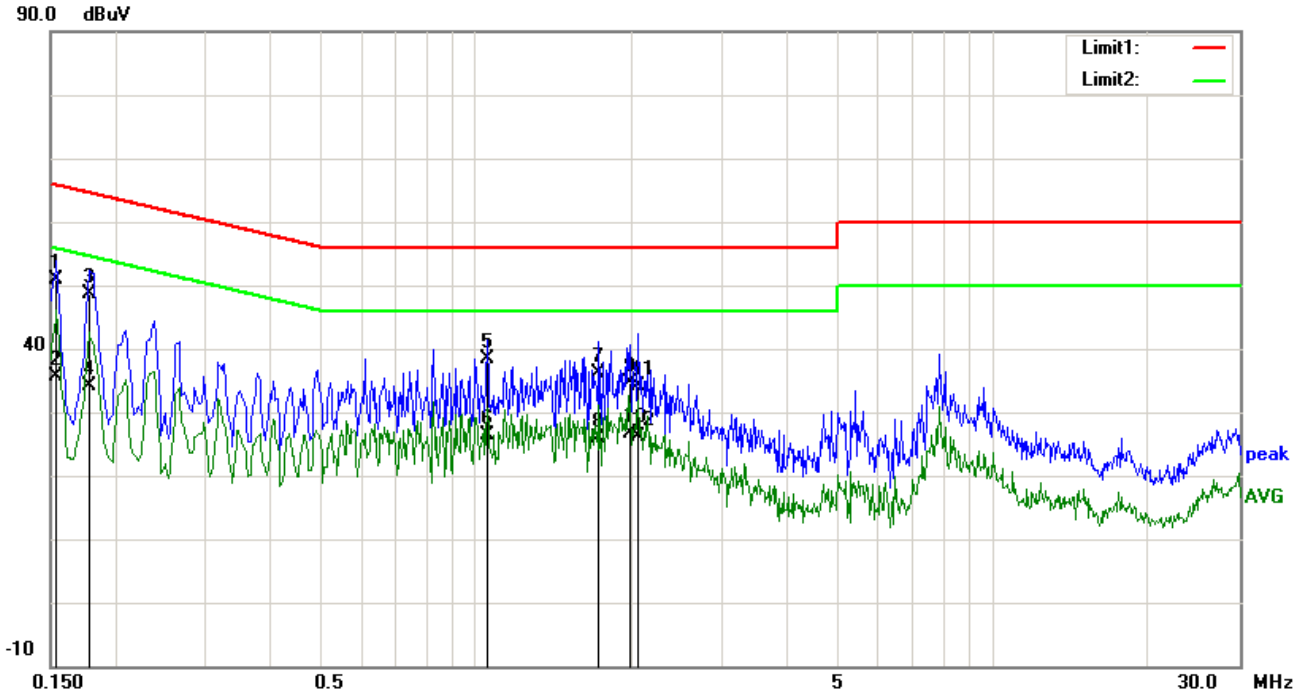


Test Data

Phase Line Plot at 120Vac, 60Hz

No.	Frequency (MHz)	Reading (dBµV)	Detector	Lisn/Isn (dB}	Ps_Lmt (dB)	Cab_L (dB)	Result (dBµV)	Limit (dBµV)	Margin (dB)
1	0.1500	43.38	QP	0.10	-10.00	0.36	53.84	66.00	-12.16
2	0.1500	31.26	AVG	0.10	-10.00	0.36	41.72	56.00	-14.28
3	0.1780	40.36	QP	0.10	-10.00	0.32	50.78	64.58	-13.80
4	0.1780	25.81	AVG	0.10	-10.00	0.32	36.23	54.58	-18.35
5	0.2060	40.14	QP	0.10	-10.00	0.27	50.51	63.37	-12.86
6	0.2060	24.55	AVG	0.10	-10.00	0.27	34.92	53.37	-18.45
7	0.2380	31.45	QP	0.10	-10.00	0.22	41.77	62.17	-20.40
8	0.2380	18.53	AVG	0.10	-10.00	0.22	28.85	52.17	-23.32
9	0.2660	27.31	QP	0.10	-10.00	0.20	37.61	61.24	-23.63
10	0.2660	15.18	AVG	0.10	-10.00	0.20	25.48	51.24	-25.76
11	2.3100	25.60	QP	0.17	-10.00	0.22	35.99	56.00	-20.01
12	2.3100	15.28	AVG	0.17	-10.00	0.22	25.67	46.00	-20.33

Test Mode:	Transmitting Mode

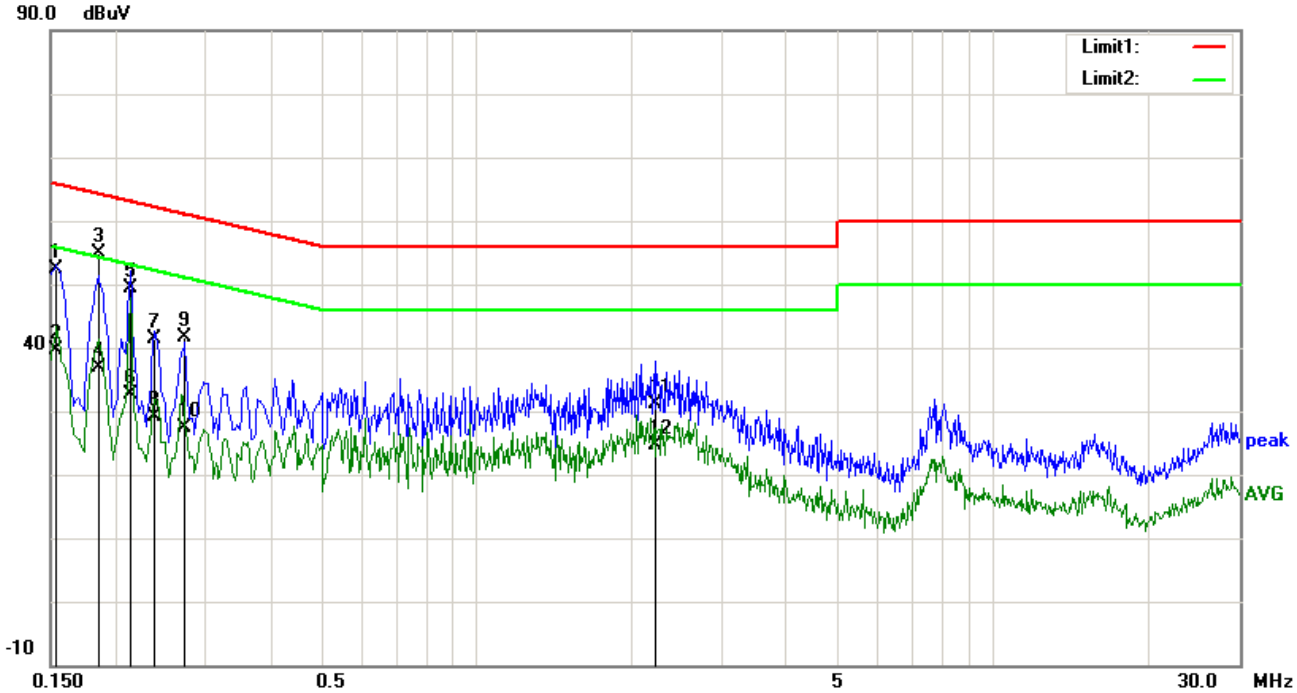


Test Data

Phase Neutral Plot at 120Vac, 60Hz

No.	Frequency (MHz)	Reading (dBμV)	Detector	Lisn/Isn (dB}	Ps_Lmt (dB)	Cab_L (dB)	Result (dBμV)	Limit (dBμV)	Margin (dB)
1	0.1540	40.53	QP	0.11	-10.00	0.35	50.99	65.78	-14.79
2	0.1540	25.17	AVG	0.11	-10.00	0.35	35.63	55.78	-20.15
3	0.1780	38.33	QP	0.10	-10.00	0.32	48.75	64.58	-15.83
4	0.1780	23.60	AVG	0.10	-10.00	0.32	34.02	54.58	-20.56
5	1.0500	28.12	QP	0.13	-10.00	0.19	38.44	56.00	-17.56
6	1.0500	16.08	AVG	0.13	-10.00	0.19	26.40	46.00	-19.60
7	1.7300	25.70	QP	0.16	-10.00	0.21	36.07	56.00	-19.93
8	1.7300	15.56	AVG	0.16	-10.00	0.21	25.93	46.00	-20.07
9	1.9860	24.33	QP	0.17	-10.00	0.18	34.68	56.00	-21.32
10	1.9860	16.36	AVG	0.17	-10.00	0.18	26.71	46.00	-19.29
11	2.0620	23.75	QP	0.17	-10.00	0.19	34.11	56.00	-21.89
12	2.0620	15.72	AVG	0.17	-10.00	0.19	26.08	46.00	-19.92

Test Mode:	Transmitting Mode

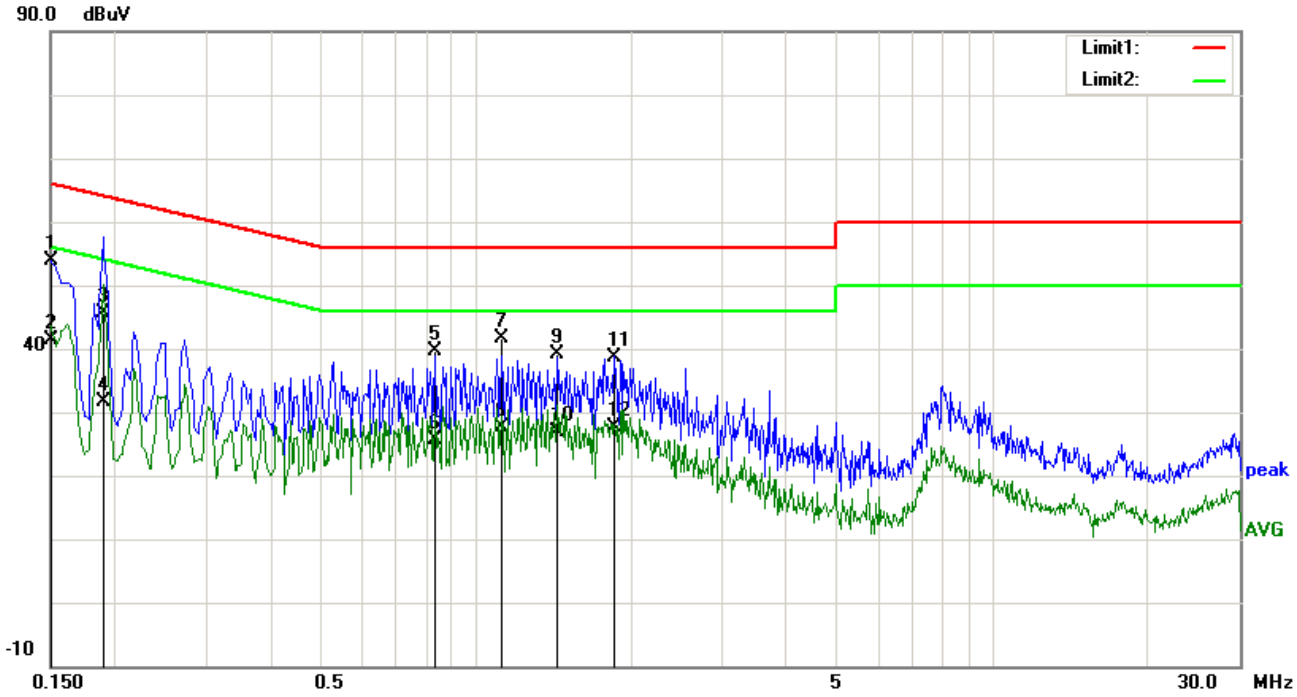


Test Data

Phase Line Plot at 240Vac, 50Hz

No.	Frequency (MHz)	Reading (dBµV)	Detector	Lisn/Isn (dB}	Ps_Lmt (dB)	Cab_L (dB)	Result (dBµV)	Limit (dBµV)	Margin (dB)
1	0.1540	42.00	QP	0.10	-10.00	0.35	52.45	65.78	-13.33
2	0.1540	29.28	AVG	0.10	-10.00	0.35	39.73	55.78	-16.05
3	0.1860	44.49	QP	0.10	-10.00	0.30	54.89	64.21	-9.32
4	0.1860	26.38	AVG	0.10	-10.00	0.30	36.78	54.21	-17.43
5	0.2140	39.02	QP	0.10	-10.00	0.26	49.38	63.05	-13.67
6	0.2140	22.29	AVG	0.10	-10.00	0.26	32.65	53.05	-20.40
7	0.2380	31.09	QP	0.10	-10.00	0.22	41.41	62.17	-20.76
8	0.2380	18.75	AVG	0.10	-10.00	0.22	29.07	52.17	-23.10
9	0.2740	31.22	QP	0.10	-10.00	0.20	41.52	61.00	-19.48
10	0.2740	17.18	AVG	0.10	-10.00	0.20	27.48	51.00	-23.52
11	2.2340	20.82	QP	0.17	-10.00	0.22	31.21	56.00	-24.79
12	2.2340	14.24	AVG	0.17	-10.00	0.22	24.63	46.00	-21.37

Test Mode:	Transmitting Mode



Test Data

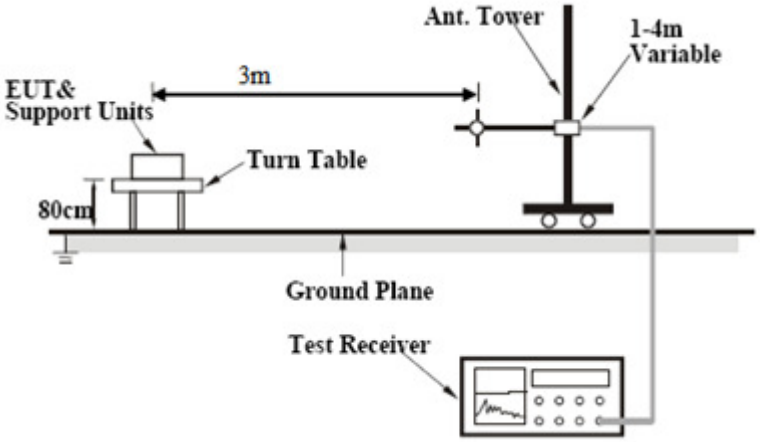
Phase Neutral Plot at 240Vac, 50Hz

No.	Frequency (MHz)	Reading (dBμV)	Detector	Lisn/Isn (dB}	Ps_Lmt (dB)	Cab_L (dB)	Result (dBμV)	Limit (dBμV)	Margin (dB)
1	0.1500	43.49	QP	0.11	-10.00	0.36	53.96	66.00	-12.04
2	0.1500	30.94	AVG	0.11	-10.00	0.36	41.41	56.00	-14.59
3	0.1900	35.30	QP	0.10	-10.00	0.30	45.70	64.04	-18.34
4	0.1900	21.14	AVG	0.10	-10.00	0.30	31.54	54.04	-22.50
5	0.8340	29.38	QP	0.12	-10.00	0.20	39.70	56.00	-16.30
6	0.8340	15.40	AVG	0.12	-10.00	0.20	25.72	46.00	-20.28
7	1.1220	31.23	QP	0.13	-10.00	0.20	41.56	56.00	-14.44
8	1.1220	17.34	AVG	0.13	-10.00	0.20	27.67	46.00	-18.33
9	1.4340	28.73	QP	0.15	-10.00	0.20	39.08	56.00	-16.92
10	1.4340	16.62	AVG	0.15	-10.00	0.20	26.97	46.00	-19.03
11	1.8580	28.25	QP	0.16	-10.00	0.20	38.61	56.00	-17.39
12	1.8580	17.16	AVG	0.16	-10.00	0.20	27.52	46.00	-18.48

6.2 Radiated Emissions

Temperature	26°C
Relative Humidity	60%
Atmospheric Pressure	1019mbar
Test date :	September 01, 2016
Tested By :	Deon Dai

Requirement(s):

Spec	Item	Requirement	Applicable
47CFR§15.109	a)	Except higher limit as specified elsewhere in other section, the emissions from the low-power radio-frequency devices shall not exceed the field strength levels specified in the following table and the level of any unwanted emissions shall not exceed the level of the fundamental emission. The tighter limit applies at the band edges Frequency range (MHz) / Field Strength (μV/m) 30 – 88 / 100 88 – 216 / 150 216 – 960 / 200 Above 960 / 500	☑
Test Setup			
Procedure	1. The EUT was switched on and allowed to warm up to its normal operating condition. 2. The test was carried out at the selected frequency points obtained from the EUT characterisation. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner: a. Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen. b. The EUT was then rotated to the direction that gave the maximum emission. c. Finally, the antenna height was adjusted to the height that gave the maximum emission. 3. A Quasi-peak measurement was then made for that frequency point. 4. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.		
Remark			
Result	☑ Pass ☐ Fail		

Test Data	☑ Yes	☐ N/A
Test Plot	☑ Yes (See below)	☐ N/A

Data sample

No.	Frequency	Reading	Detector	Ant_F	PA_G	Cab_L	Result	Limit	Margin	Height	Degree
	(MHz)	(dBμV/m)		(dB/m)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(cm)	(°)

Frequency (MHz) = Emission frequency in MHz

Reading (dBμV/m) = Receiver Reading Value

Detector= Peak Detector or Quasi Peak Detector

Ant_F=Antenna Factor

PA_G=Pre-Amplifier Gain

Cab_L=Cable Loss

Result (dBμV/m) = Read ing Value + Corrected Value

Limit (dBμV/m) = Limit stated in standard

Height (cm) = Height of Receiver antenna

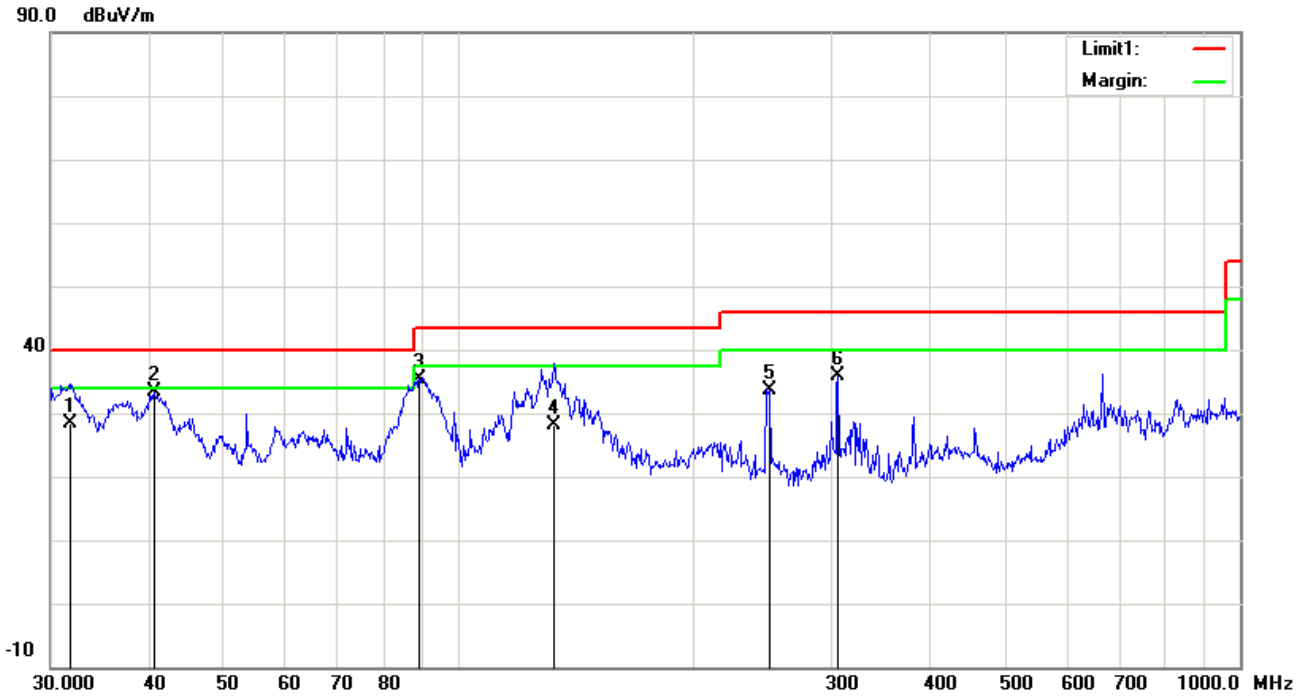
Degree = Turn table degree

Calculation Formula:

Margin (dB) = Result (dBμV/m) – limit (dBμV/m)

Test Mode:	Transmitting Mode

(Below 1GHz)



Test Data

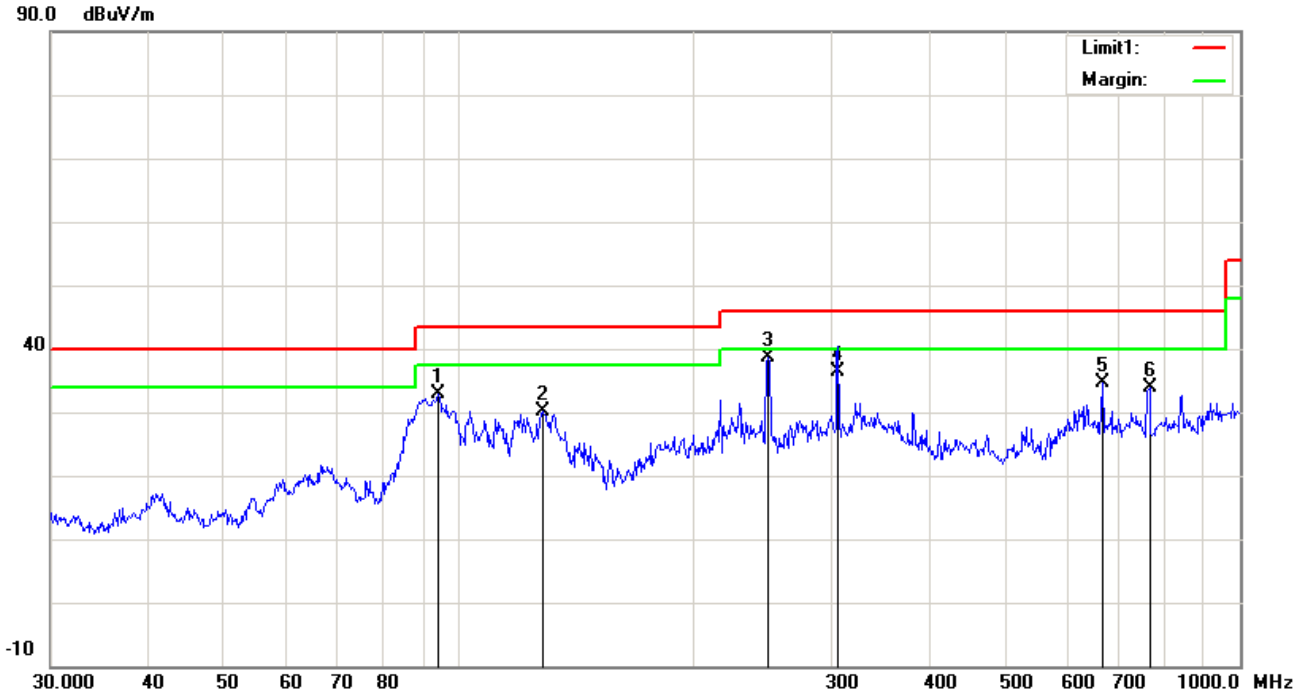
Vertical Polarity Plot @3m

No.	Frequency (MHz)	Reading (dBμV/m)	Detector	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Degree (°)
1	31.8427	47.09	QP	26.02	45.67	0.90	28.34	40.00	-11.66	100	135
2	40.7016	62.37	peak	15.62	45.74	1.06	33.31	40.00	-6.69	100	108
3	88.9639	72.56	peak	8.35	47.12	1.50	35.29	43.50	-8.21	100	142
4	132.2206	58.05	QP	15.53	47.45	1.89	28.02	43.50	-15.48	99	207
5	249.4250	64.87	peak	14.04	47.71	2.51	33.71	46.00	-12.29	100	152
6	305.6800	66.39	peak	15.13	48.39	2.79	35.92	46.00	-10.08	200	159

Note: The data above 1 GHz which below 20 dB to the limit was not recorded.

Test Mode:	Transmitting Mode

(Below 1GHz)



Test Data

Horizontal Polarity Plot @3m

No.	Frequency (MHz)	Reading (dBμV/m)	Detector	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Degree (°)
1	94.0979	67.69	peak	10.33	46.77	1.55	32.80	43.50	-10.70	200	176
2	128.1130	60.19	peak	15.29	47.16	1.84	30.16	43.50	-13.34	200	203
3	248.5519	70.15	peak	13.67	47.67	2.50	38.65	46.00	-7.35	200	132
4	305.6800	64.92	QP	17.04	48.39	2.79	36.36	46.00	-9.64	99	153
5	665.8035	57.08	peak	21.81	48.35	4.14	34.68	46.00	-11.32	200	61
6	766.0572	53.14	peak	21.56	45.30	4.44	33.84	46.00	-12.16	99	133

Note: The data above 1 GHz which below 20 dB to the limit was not recorded.

Annex A. TEST INSTRUMENT

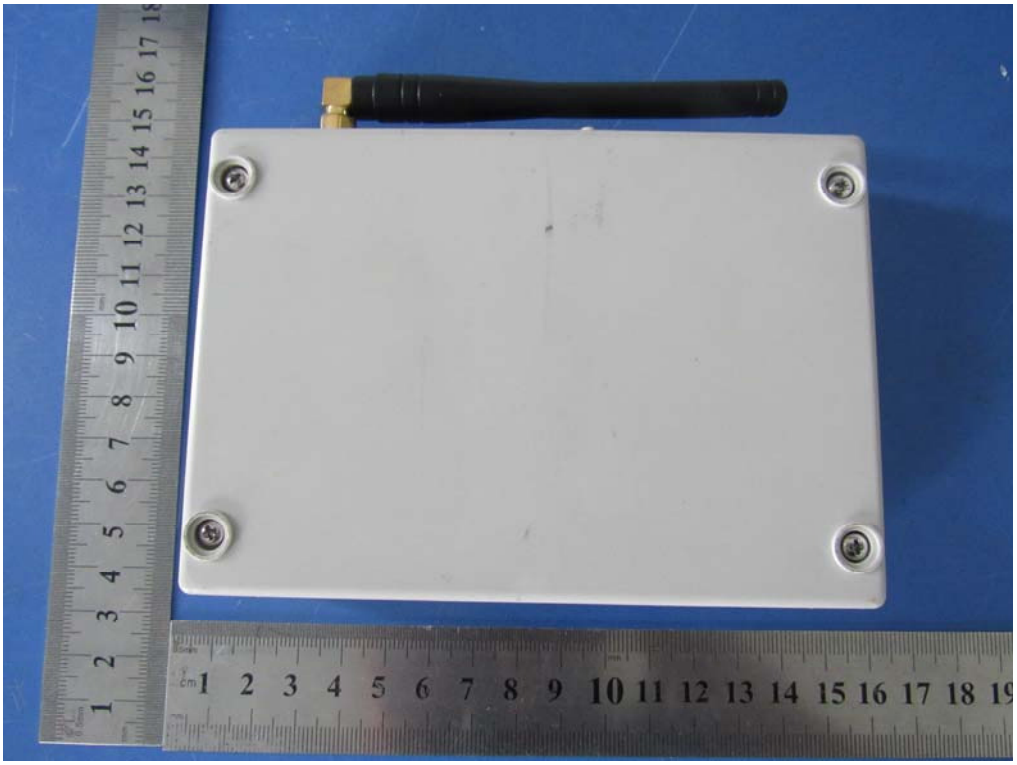
Instrument	Model	Serial #	Cal Date	Cal Due	In use
AC Line Conducted Emissions					
R&S EMI Test Receiver	ESPI3	101216	03/31/2016	03/31/2017	☑
V-LISN	ESH3-Z5	838979/005	03/31/2016	03/31/2017	☑
Com-Power Transient Limiter	LIT-153	531021	10/30/2015	10/30/2016	☑
SIEMIC EZ_EMC Conducted Emissions software	Ver.ICP-03A1	N/A	N/A	N/A	☑
Radiated Emissions					
R&S EMI Receiver	ESPI3	101216	03/31/2016	03/31/2017	☑
Spectrum Analyzer	N9010A	MY47191130	10/09/2015	10/08/2016	☑
Hp Agilent Pre-Amplifier	8447F	1937A01160	10/27/2015	10/26/2016	☑
Antenna (30MHz~6GHz)	JB6	A121411	10/31/2015	10/31/2016	☑
SIEMIC EZ_EMC Radiated Emissions software	Ver.ICP-03A1	N/A	N/A	N/A	☑

Annex B. EUT And Test Setup Photographs

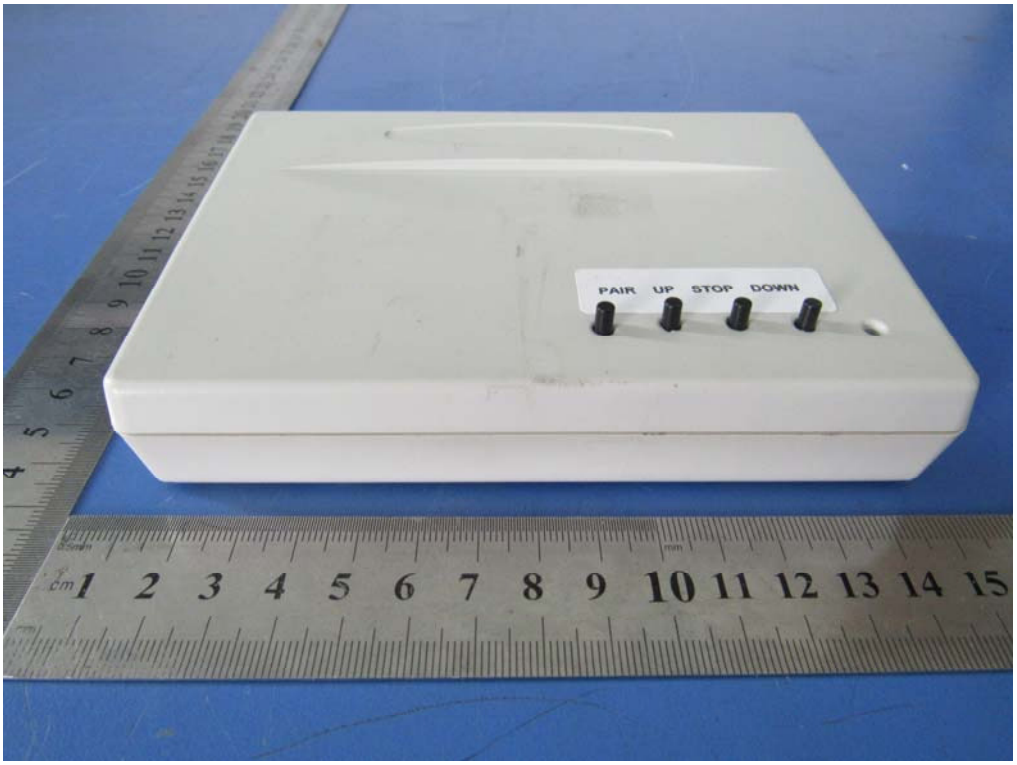
Annex B.i. Photograph: EUT External Photos

All Packages Front View

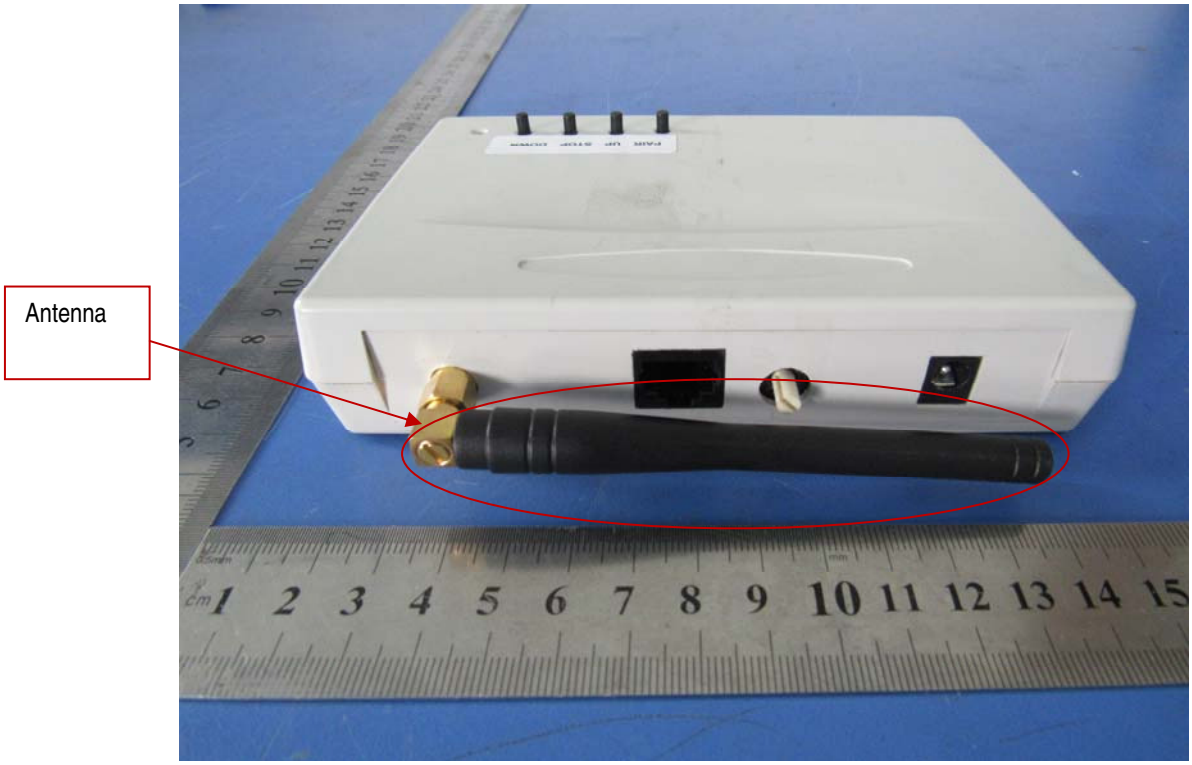
Front View of EUT



Rear View of EUT



Top View of EUT

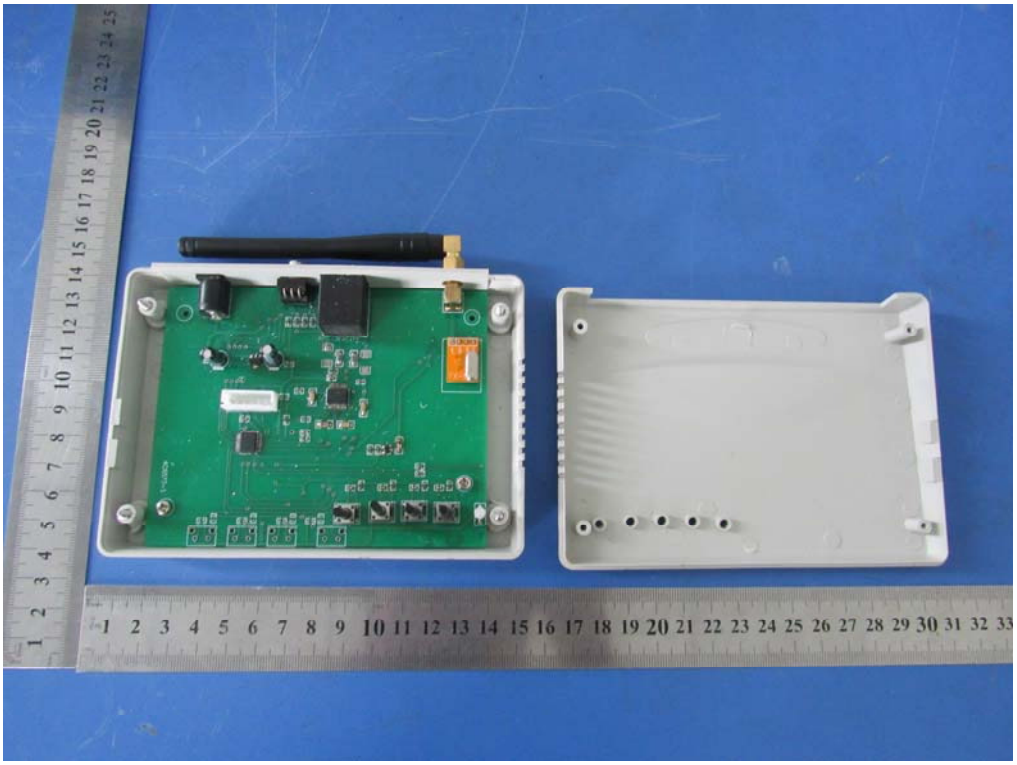


Bottom View of EUT

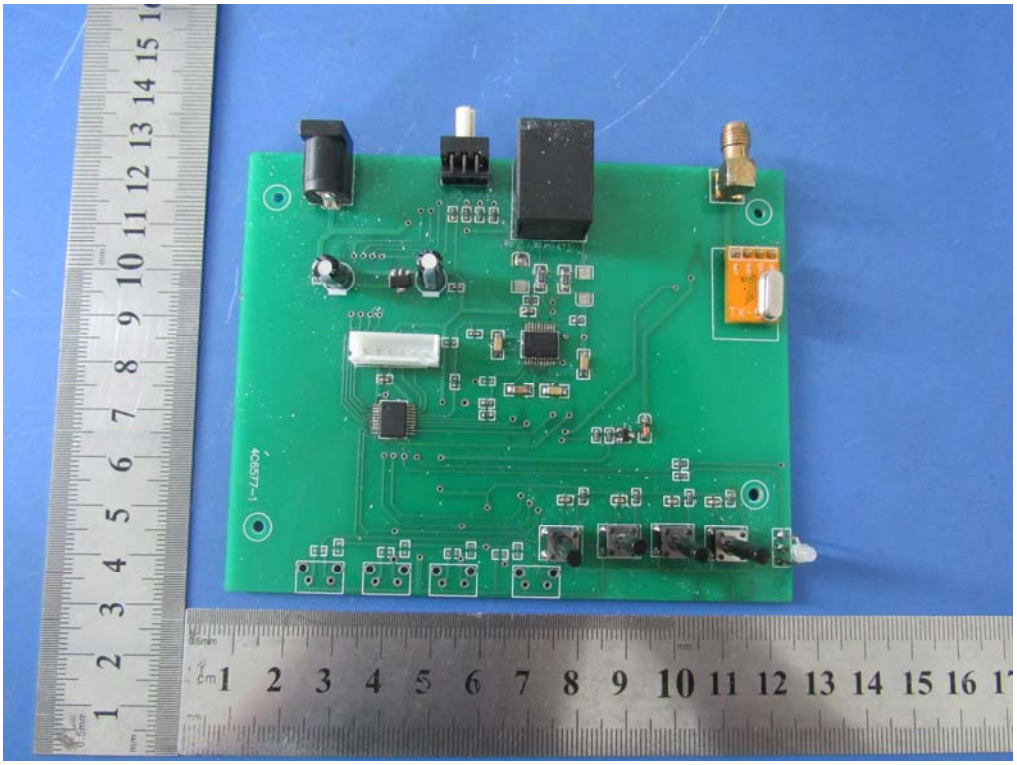
Left View of EUT

Right View of EUT

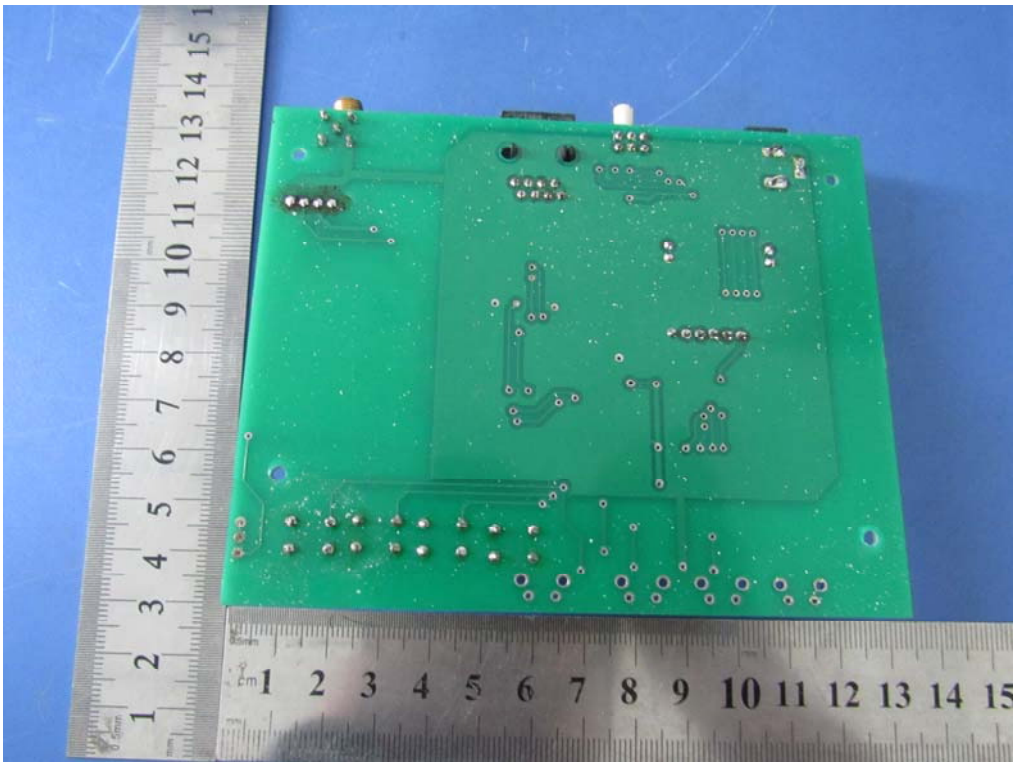
Annex B.ii. Photograph EUT Internal Photos



Uncover - Front View



EUT PCBA – Front View

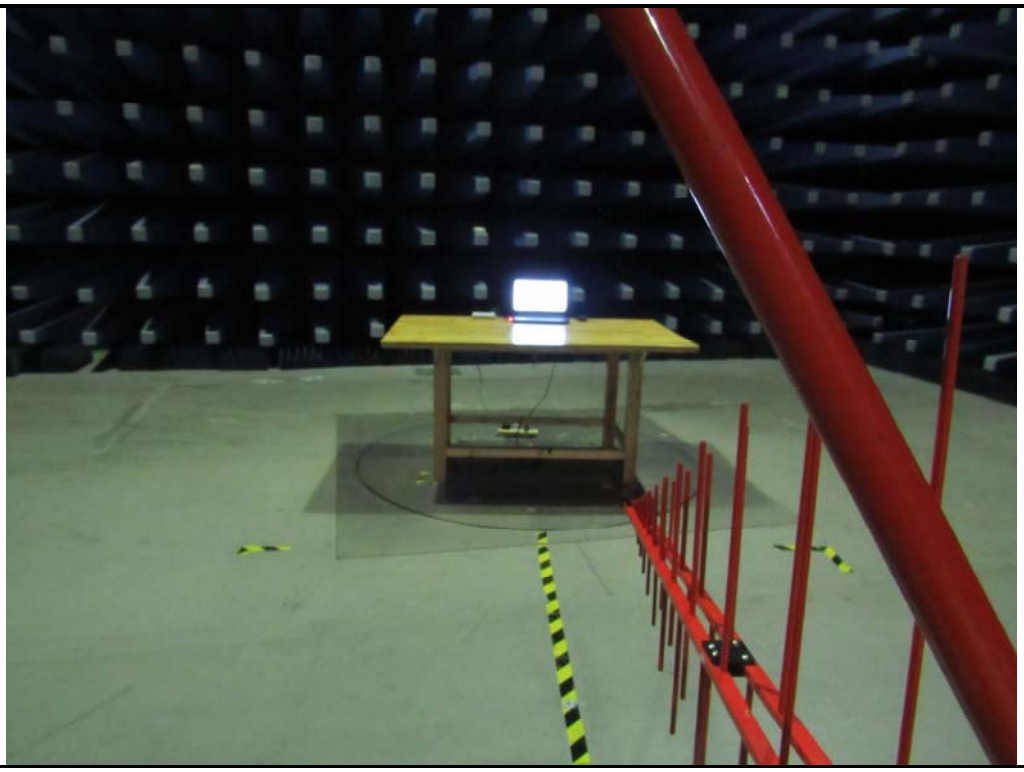


EUT PCBA – Rear View

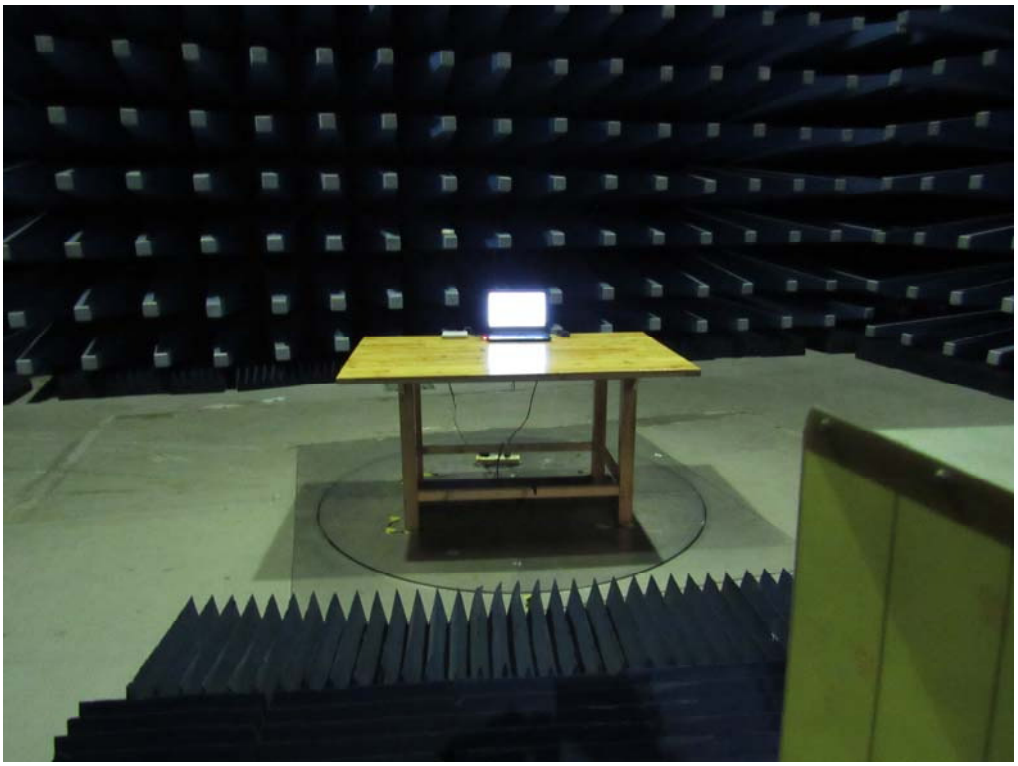
Annex B.iii. Photograph: Test Setup Photo

Conducted Emissions Test Setup – Front View

Conducted Emissions Test Setup –Side View



Radiated Emissions Test Setup Below 1GHz

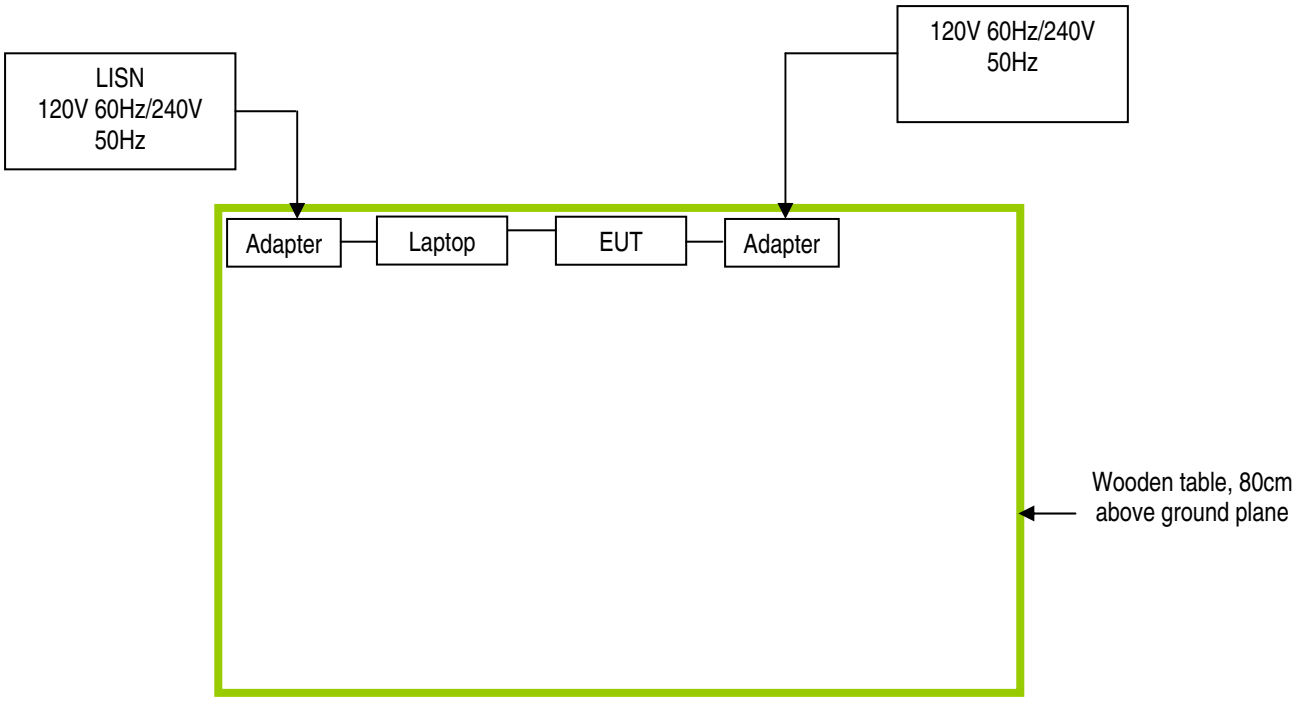


Radiated Emissions Test Setup Above 1GHz

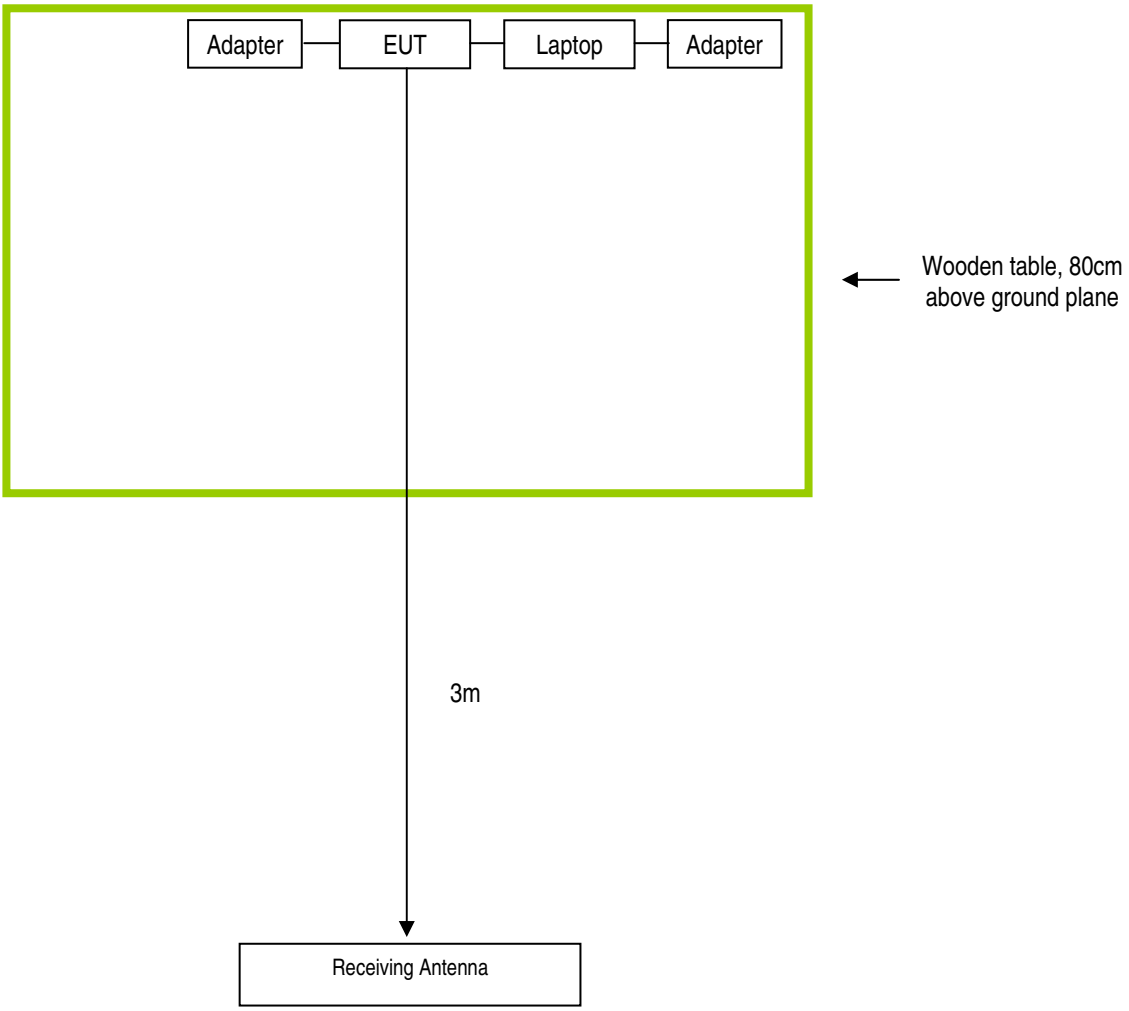
Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

Annex C.i. TEST SET UP BLOCK

Block Configuration Diagram for Conducted Emissions



Block Configuration Diagram for Radiated Emissions



Annex C. ii. SUPPORTING EQUIPMENT DESCRIPTION

The following is a description of supporting equipment and details of cables used with the EUT.

Manufacturer	Equipment Description	Model	Calibration Due Date
DELL	Laptop	INSPIRON14	N/A

Supporting Cable:

Cable type	Shield Type	Ferrite Core	Length	Serial No
Power Cable	Un-shielding	No	0.8m	N/A

Annex D. User Manual / Block Diagram / Schematics / Partlist

Please see Attachment

Annex E. DECLARATION OF SIMILARITY

N/A