EMC TEST REPORT

Report No.: 17021361-FCC-E
Supersede Report No.: N/A

Applicant	Shanghai Smarfid Security Equipment Co., Ltd.
Product Name	433MHz Remote Module
Main Model	REM3040
Serial Model	N/A
Test Standard	FCC Part 15 Subpart B:2017, ANSI C63.4:2014
Test Date	October 09, 2017
Issue Date	October 09, 2017
Test Result	☒ Pass ☐ Fail
Equipment complied with the specification	☒
Equipment did not comply with the specification	☐

Trety Lu	Deon Dai	
Trety Lu Test Engineer	Deon Dai Engineer Reviewer	

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Test result presented in this test report is applicable to the tested sample only

Issued by:
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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.

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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

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1. Report Revision History

Report No.	Report Version	Description	Issue Date
17021361-FCC-E	NONE	Original	October 09, 2017

2. Customer information

Applicant Name	Shanghai Smarfid Security Equipment Co., Ltd.
Applicant Add	No. 88, Lane 600, XinLi Road, Minhang District, Shanghai, China
Manufacturer	Shenzhen Aoution Technology Development Co.,Ltd.
Manufacturer Add	The second floor of aost science and technology park, no.129 new and road, pingshan new district, shenzhen city, guangdong province

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.	694825
IC Test Site No.	4842B-1
Test Software	EZ_EMC

4. Equipment under Test (EUT) Information

Description of EUT:	433MHz Remote Module
Main Model:	REM3040
Serial Model:	N/A
Date EUT received:	September 26, 2017
Test Date(s):	October 09, 2017
Operating Frequency :	433MHz(Rx)
Antenna Gain	2dBi
Type of Modulation:	ASK/OOK
Number of Channels:	1 CH
Trade Name :	N/A
FCC ID:	X3A-REM3040

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

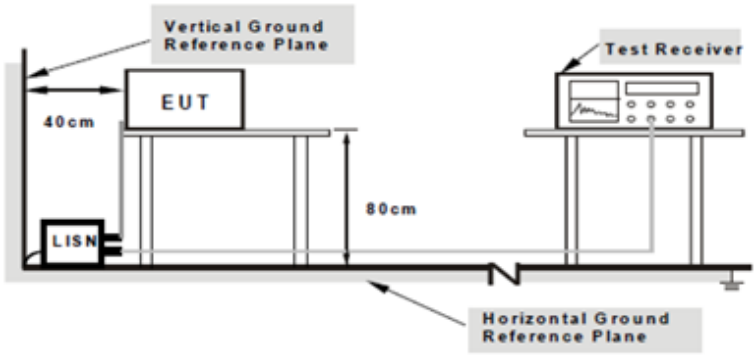
Emissions		
Test Item	Description	Uncertainty
Conducted Emissions &Radiated Emissions	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	4.73&3.952dB

6. Measurements, Examination And Derived Results

6.1 AC Power Line Conducted Emissions

Temperature	24°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar
Test date :	October 09, 2017
Tested By :	Trety Lu

Requirement(s):

<table>
<tr><th>Spec</th><th>Requirement</th><th>Applicable</th></tr>
<tr><td>§15.107</td><td>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.
<table>
<tr><th rowspan="2">Frequency ranges (MHz)</th><th colspan="2">Limit (dBµV)</th></tr>
<tr><th>QP</th><th>Average</th></tr>
<tr><td>0.15 ~ 0.5</td><td>66 – 56</td><td>56 – 46</td></tr>
<tr><td>0.5 ~ 5</td><td>56</td><td>46</td></tr>
<tr><td>5 ~ 30</td><td>60</td><td>50</td></tr>
</table></td><td>☒</td></tr>
<tr><td>Test Setup</td><td> 

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.</td><td></td></tr>
<tr><td>Procedure</td><td>1. 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.
2. The power supply for the EUT was fed through a 50W/50mH EUT LISN, connected to filtered mains.
3. The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable.
4. All other supporting equipment were powered separately from another main supply.
5. The EUT was switched on and allowed to warm up to its normal operating condition.
6. A scan was made on the NEUTRAL line (for AC mains) or Earth line (for DC power) over the required frequency range using an EMI test receiver.
7. High peaks, relative to the limit line, were then selected, The EMI test receiver was then tuned to the selected frequencies and the necessary measurements made with a receiver bandwidth setting of 10kHz.
8. Steps 6-7 were repeated for the LIVE line (for AC mains) or DC line (for DC power).</td><td></td></tr>
<tr><td>Remark</td><td></td><td></td></tr>
<tr><td>Result</td><td>☒Yes ☐N/A</td><td></td></tr>
</table>

Test Data	☒Yes	☐N/A
Test Plot	☒Yes	☐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

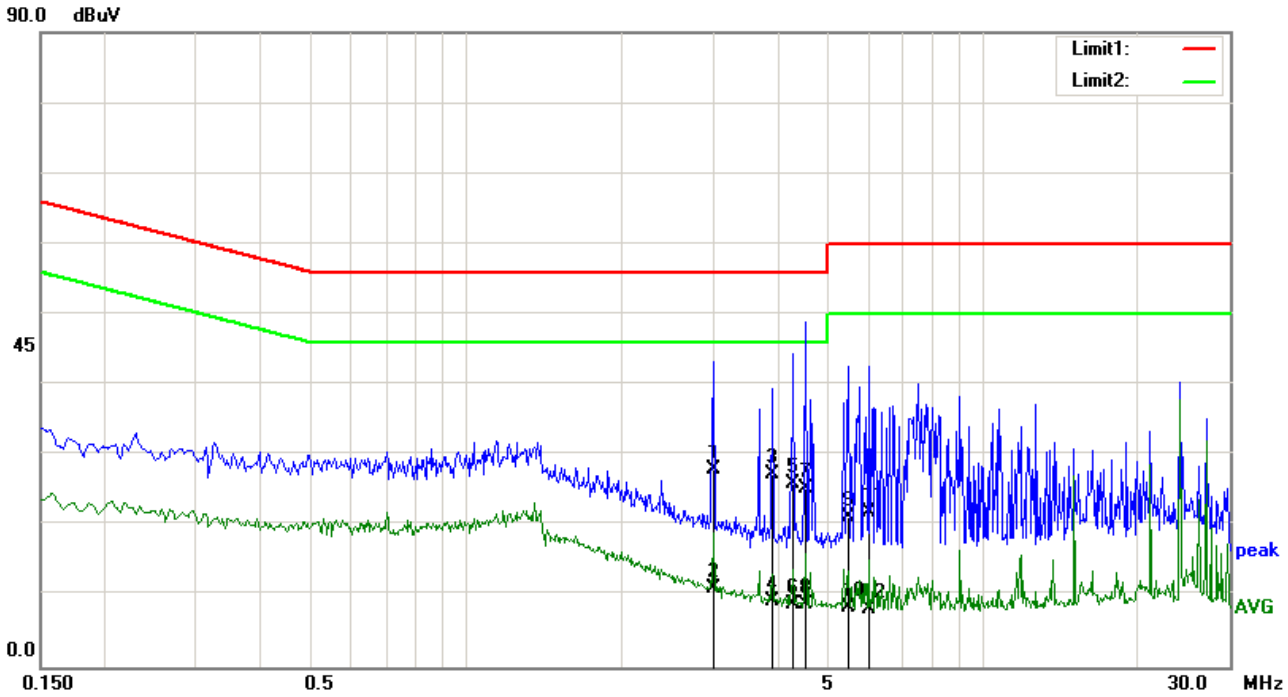
Result (dBμV) = Reading Value + Corrected Value

Limit (dBμV) = Limit stated in standard

Calculation Formula:

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

Test Mode:	Receiving Mode

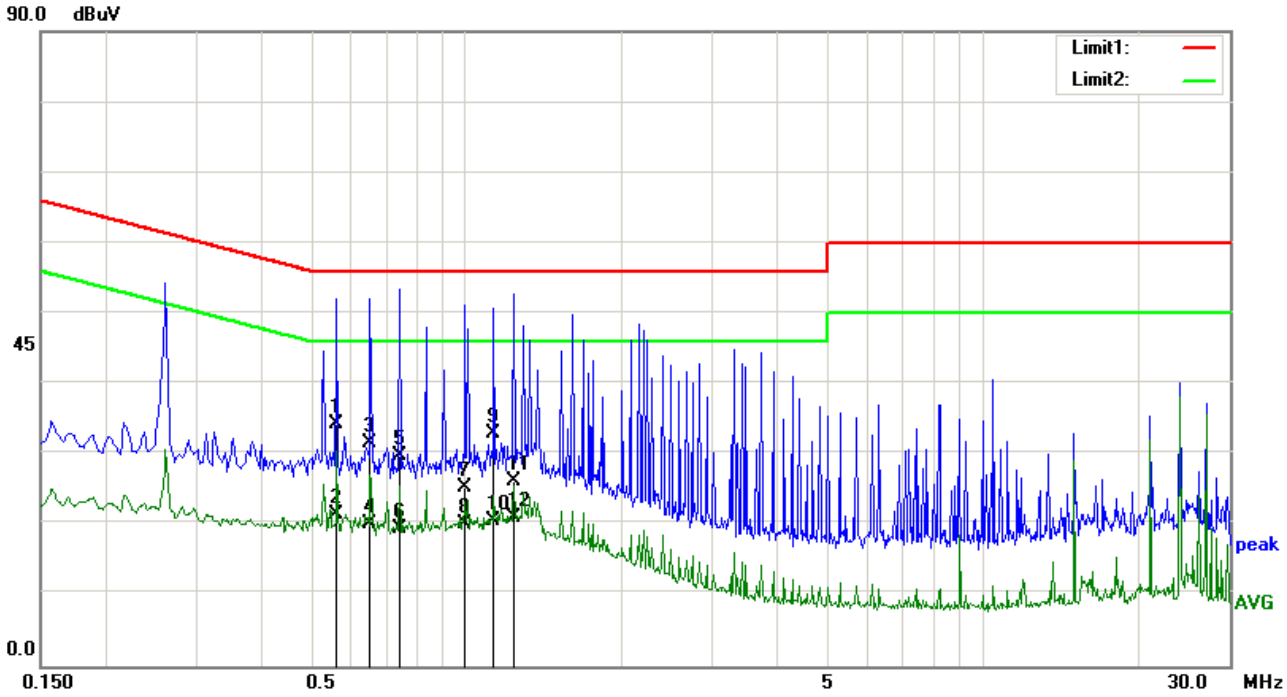


Test Data

Phase Line Plot at DC12V

No.	Frequency (MHz)	Reading (dBµV)	Detector	Lisn/Isn (dB}	Ps_Lmt (dB)	Cab_L (dB)	Result (dBµV)	Limit (dBµV)	Margin (dB)
1	3.0220	17.57	QP	0.20	-10.00	0.25	28.02	56.00	-27.98
2	3.0220	0.64	AVG	0.20	-10.00	0.25	11.09	46.00	-34.91
3	3.9220	16.74	QP	0.23	-10.00	0.26	27.23	56.00	-28.77
4	3.9220	-1.11	AVG	0.23	-10.00	0.26	9.38	46.00	-36.62
5	4.3100	15.57	QP	0.24	-10.00	0.27	26.08	56.00	-29.92
6	4.3100	-1.58	AVG	0.24	-10.00	0.27	8.93	46.00	-37.07
7	4.5260	14.73	QP	0.25	-10.00	0.28	25.26	56.00	-30.74
8	4.5260	-1.57	AVG	0.25	-10.00	0.28	8.96	46.00	-37.04
9	5.4940	10.67	QP	0.30	-10.00	0.30	21.27	60.00	-38.73
10	5.4940	-2.23	AVG	0.30	-10.00	0.30	8.37	50.00	-41.63
11	6.0140	11.37	QP	0.33	-10.00	0.31	22.01	60.00	-37.99
12	6.0140	-2.45	AVG	0.33	-10.00	0.31	8.19	50.00	-41.81

Test Mode:	Receiving Mode



Test Data

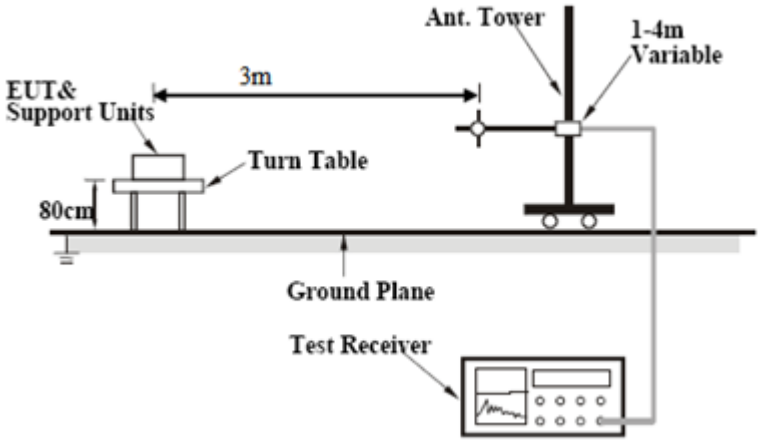
Phase Neutral Plot at DC12V

No.	Frequency (MHz)	Reading (dBµV)	Detector	Lisn/Isn (dB}	Ps_Lmt (dB)	Cab_L (dB)	Result (dBµV)	Limit (dBµV)	Margin (dB)
1	0.5620	23.95	QP	0.11	-10.00	0.21	34.27	56.00	-21.73
2	0.5620	11.19	AVG	0.11	-10.00	0.21	21.51	46.00	-24.49
3	0.6540	21.40	QP	0.12	-10.00	0.20	31.72	56.00	-24.28
4	0.6540	9.81	AVG	0.12	-10.00	0.20	20.13	46.00	-25.87
5	0.7460	19.50	QP	0.12	-10.00	0.20	29.82	56.00	-26.18
6	0.7460	9.17	AVG	0.12	-10.00	0.20	19.49	46.00	-26.51
7	0.9980	14.89	QP	0.13	-10.00	0.19	25.21	56.00	-30.79
8	0.9980	9.77	AVG	0.13	-10.00	0.19	20.09	46.00	-25.91
9	1.1300	22.54	QP	0.14	-10.00	0.20	32.88	56.00	-23.12
10	1.1300	10.30	AVG	0.14	-10.00	0.20	20.64	46.00	-25.36
11	1.2380	15.80	QP	0.14	-10.00	0.21	26.15	56.00	-29.85
12	1.2380	10.66	AVG	0.14	-10.00	0.21	21.01	46.00	-24.99

6.2 Radiated Emissions

Temperature	22°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar
Test date :	October 09, 2017
Tested By :	Trety Lu

Requirement(s):

Spec	Requirement	Applicable
§15.109	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. For emission frequencies measured below and above 1GHz, set the spectrum analyzer on a 100kHz and 1MHz resolution bandwidth respectively for each frequency measured. 4. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.	
Remark		
Result	☒Yes ☐N/A	
Test Data	☒Yes ☐N/A	

Test Plot	☒Yes ☐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

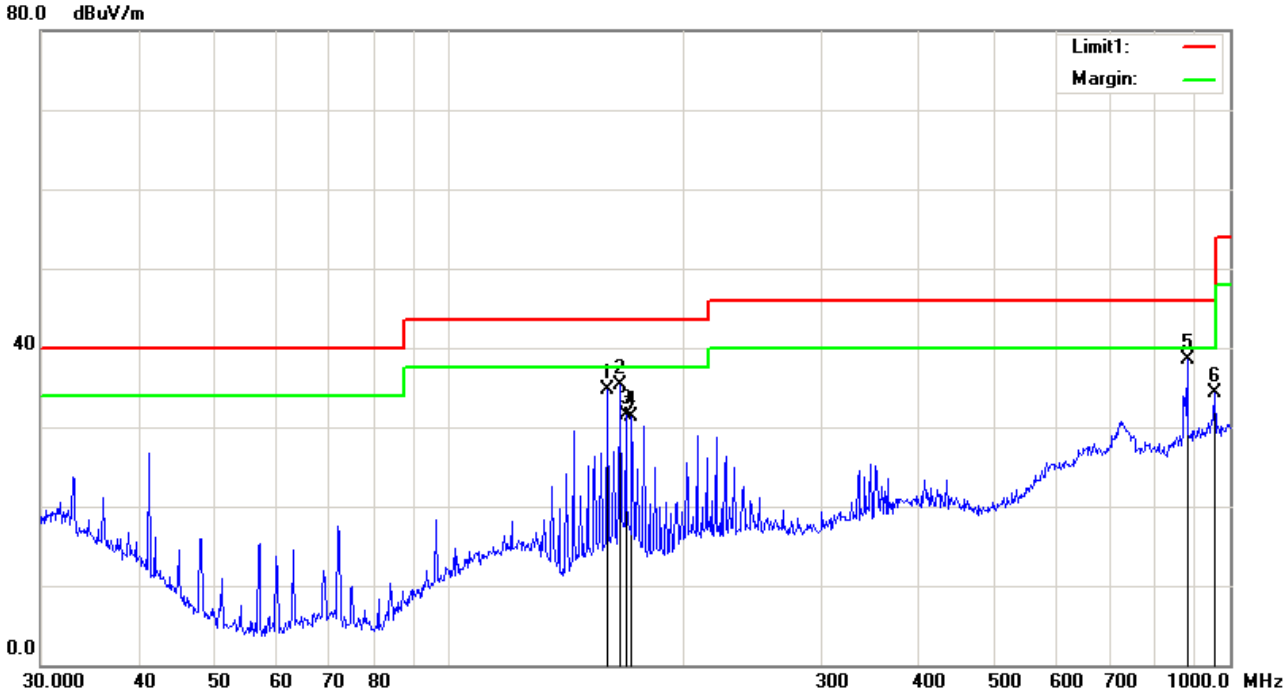
Degree = Turn table degree

Calculation Formula:

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

Test Mode:	Receiving Mode

(30MHz - 1GHz)



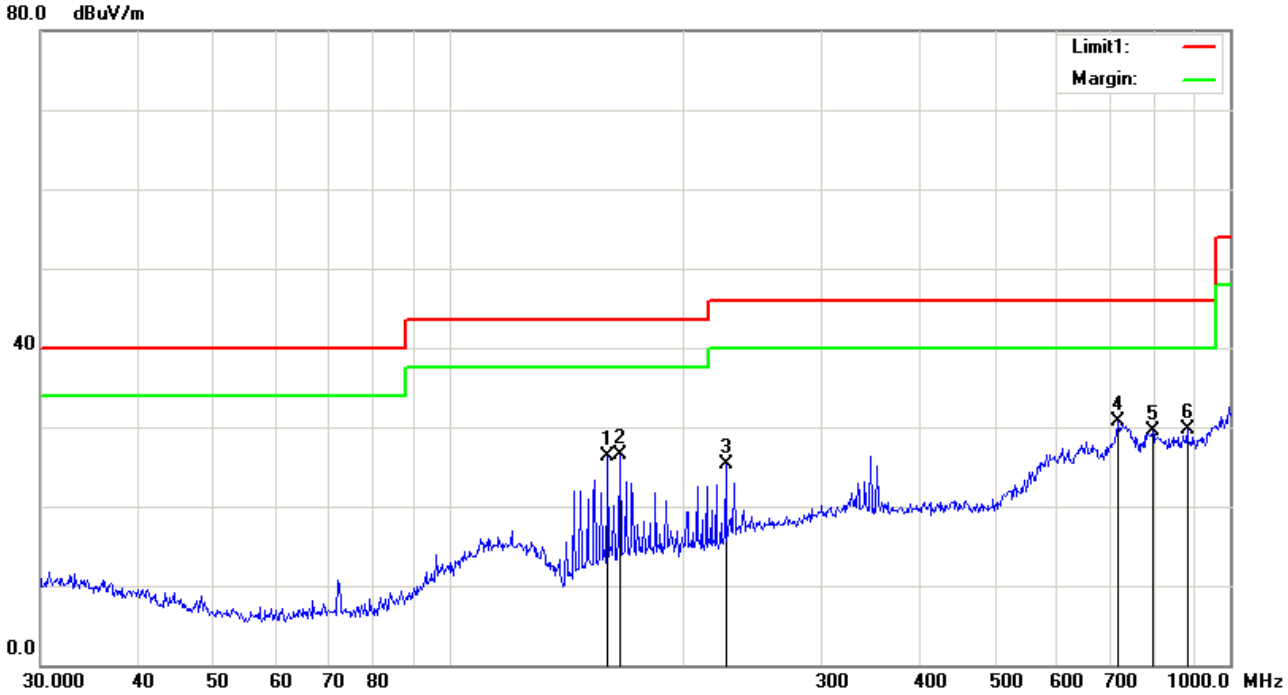
Test Data

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	159.2251	66.66	QP	13.38	47.34	2.07	34.77	43.50	-8.73	100	235
2	165.4867	66.12	QP	13.92	46.85	2.08	35.27	43.50	-8.23	100	232
3	168.4138	61.79	QP	14.23	46.62	2.09	31.49	43.50	-12.01	100	212
4	171.3926	61.60	QP	14.11	46.46	2.10	31.35	43.50	-12.15	200	1
5	881.4067	56.42	QP	23.28	45.95	4.80	38.55	46.00	-7.45	100	56
6	955.4381	51.91	QP	23.64	46.16	4.97	34.36	46.00	-11.64	100	292

Test Mode:	Receiving Mode

(30MHz - 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	159.7844	59.08	QP	12.51	47.30	2.07	26.36	43.50	-17.14	200	82
2	165.4867	59.01	QP	12.34	46.85	2.08	26.58	43.50	-16.92	200	85
3	226.0994	56.36	QP	14.31	47.67	2.39	25.39	46.00	-20.61	200	82
4	719.1995	49.56	QP	22.52	45.75	4.31	30.64	46.00	-15.36	200	82
5	796.1830	48.29	QP	22.98	46.33	4.53	29.47	46.00	-16.53	232	360
6	881.4067	48.14	QP	22.76	45.95	4.80	29.75	46.00	-16.25	208	360

Test Mode:	Receiving Mode

(Above 1GHz)

Vertical Polarity Plot @3m

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)	(°)
1	1420.000	65.84	peak	24.65	52.11	2.83	41.21	74	-32.79	200	150
2	1230.000	63.46	peak	24.75	51.06	2.81	39.96	74	-34.04	200	142
3	1580.000	58.29	peak	25.88	50.79	3.97	37.35	74	-36.65	200	187
4	2340.000	59.39	peak	27.89	52.38	4.18	39.08	74	-34.92	300	211
5	2520.00	57.17	peak	28.57	52.5	4.12	37.36	74	-36.64	300	71
6	3540.000	58.28	peak	32.24	52.96	5.51	43.07	74	-30.93	100	310

Horizontal Polarity Plot @3m

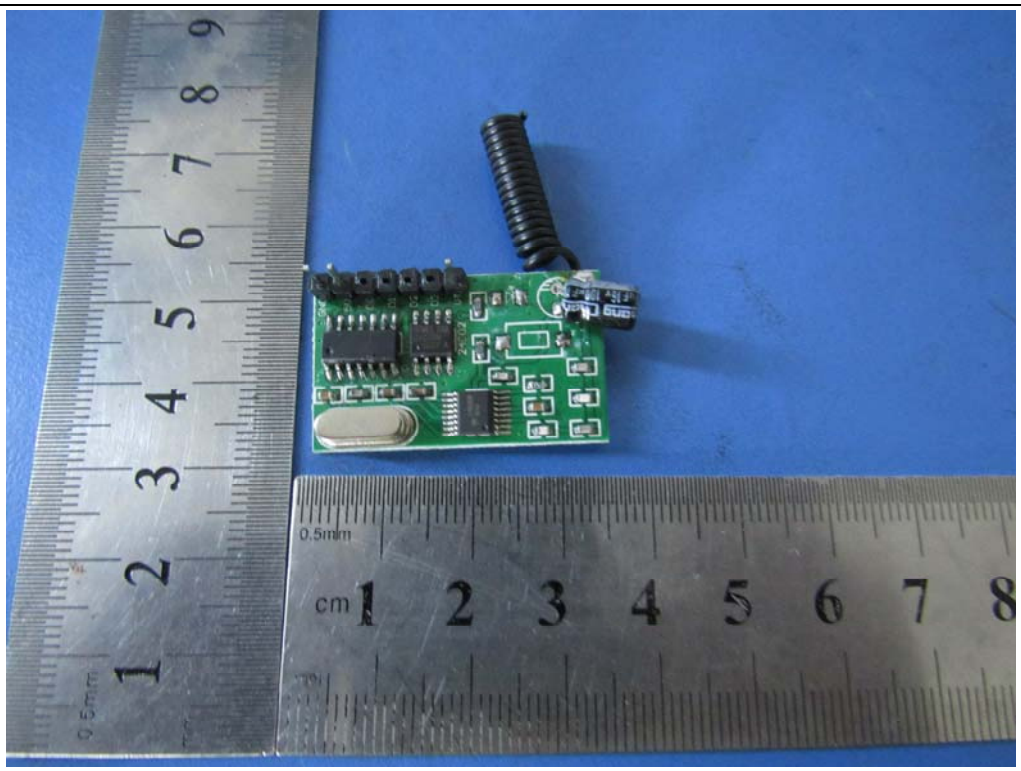
No.	Frequency	Reading	Detector	Ant_F	PA_G	Cab_L	Result	Limit	Margin	Height	Degree
	(MHz)	(dBμV/m)		(dB/m)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(cm)	(°)
1	1240.000	65.94	peak	24.31	53.42	2.6	39.43	74	-34.57	300	76
2	1225.000	63.71	peak	24.47	52.48	2.76	38.46	74	-35.54	200	233
3	1270.000	70.28	peak	24.58	52.09	2.8	45.57	74	-28.43	100	251
4	2360.000	59.99	peak	28.53	52.49	4.09	40.12	74	-33.88	100	140
5	2520.000	60.48	peak	29.27	52.66	4.11	41.2	74	-32.80	300	189
6	3235.000	55.48	peak	33.71	53.92	6.32	41.59	74	-32.41	300	228

Annex A. TEST INSTRUMENT

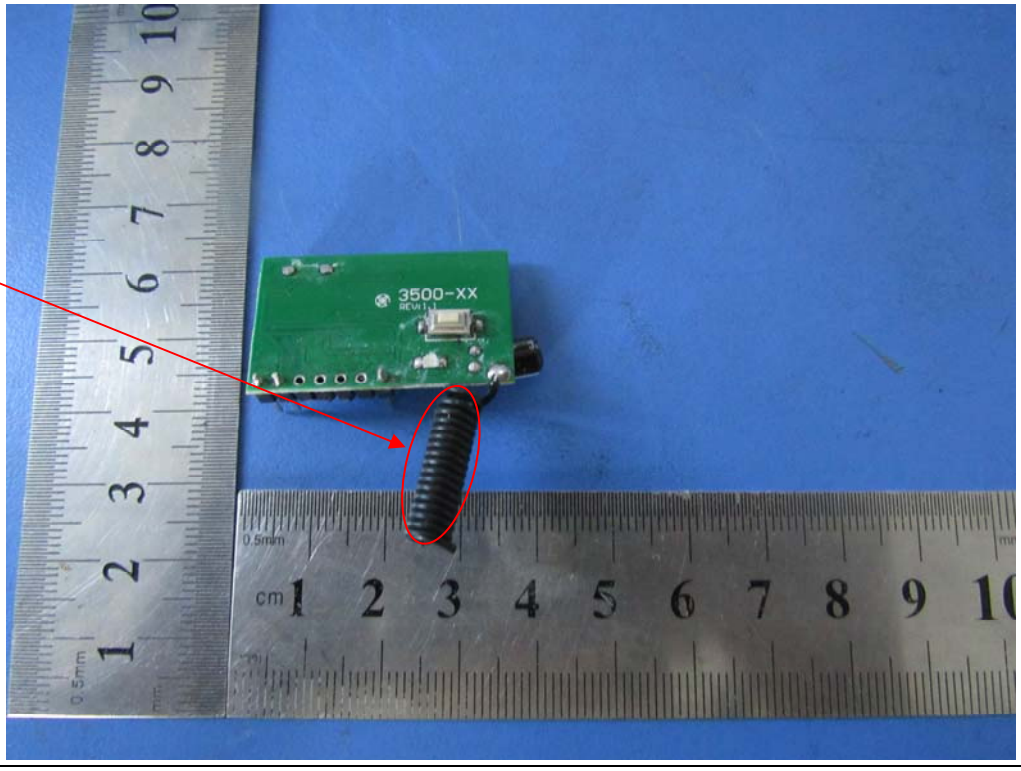
Instrument	Model	Serial #	Cal Date	Cal Due	In use
AC Line Conducted Emissions					
R&S EMI Test Receiver	ESPI3	101216	05/03/2017	05/03/2018	☒
V-LISN	ESH3-Z5	838979/005	05/15/2017	05/15/2018	☒
SIEMIC EZ_EMC Conducted Emissions software	Ver.ICP-03A1	N/A	N/A	N/A	☒
Radiated Emissions					
Agilent Technologies Spectrum Analyzer	N9010A	MY47191130	05/03/2017	05/03/2018	☒
R&S EMI Receiver	ESPI3	101216	05/03/2017	05/03/2018	☒
Antenna (30MHz~6GHz)	JB6	A121411	10/31/2016	10/31/2017	☒
EMCO Horn Antenna (1 ~18GHz)	3115	N/A	10/09/2017	10/09/2018	☒
Pre-Amplifier	8449B	3008A02224	10/30/2016	10/30/2017	☒
Hp Agilent Pre-Amplifier	8447F	1937A01160	10/27/2016	10/27/2017	☒
SIEMIC EZ_EMC software Radiated Emissions	Ver.ICP-03A1	N/A	N/A	N/A	☒

Annex B. EUT And Test Setup Photographs

Annex B.i. Photograph: EUT Photo



EUT – PCBA Front View

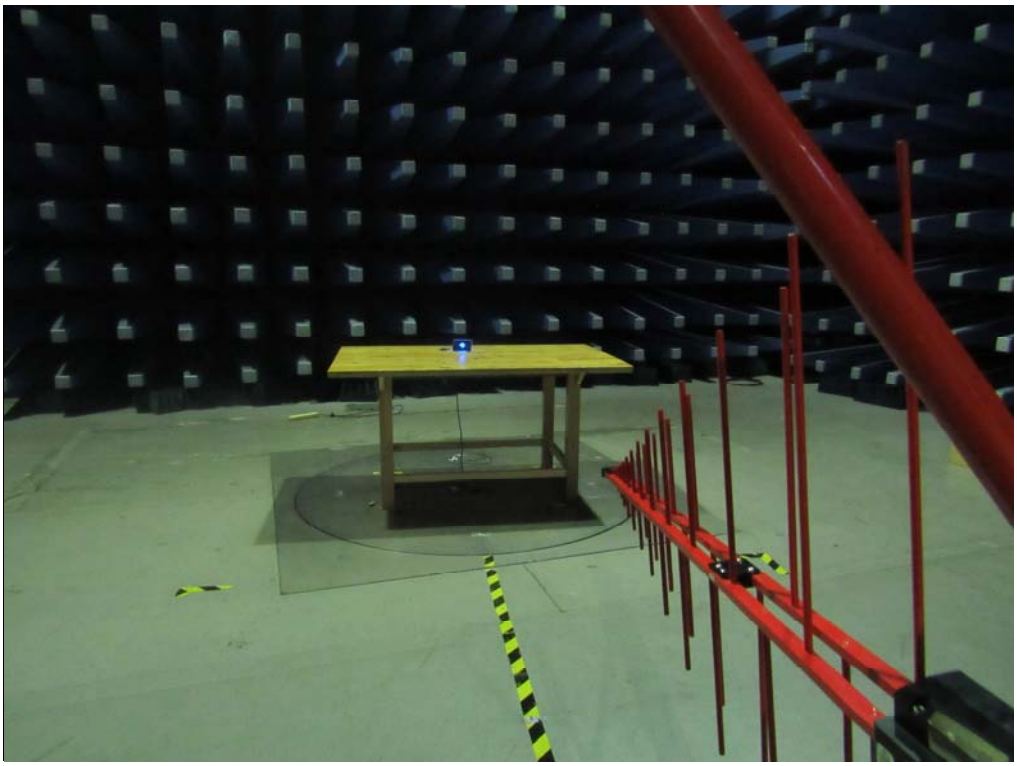


EUT – PCBA Rear View

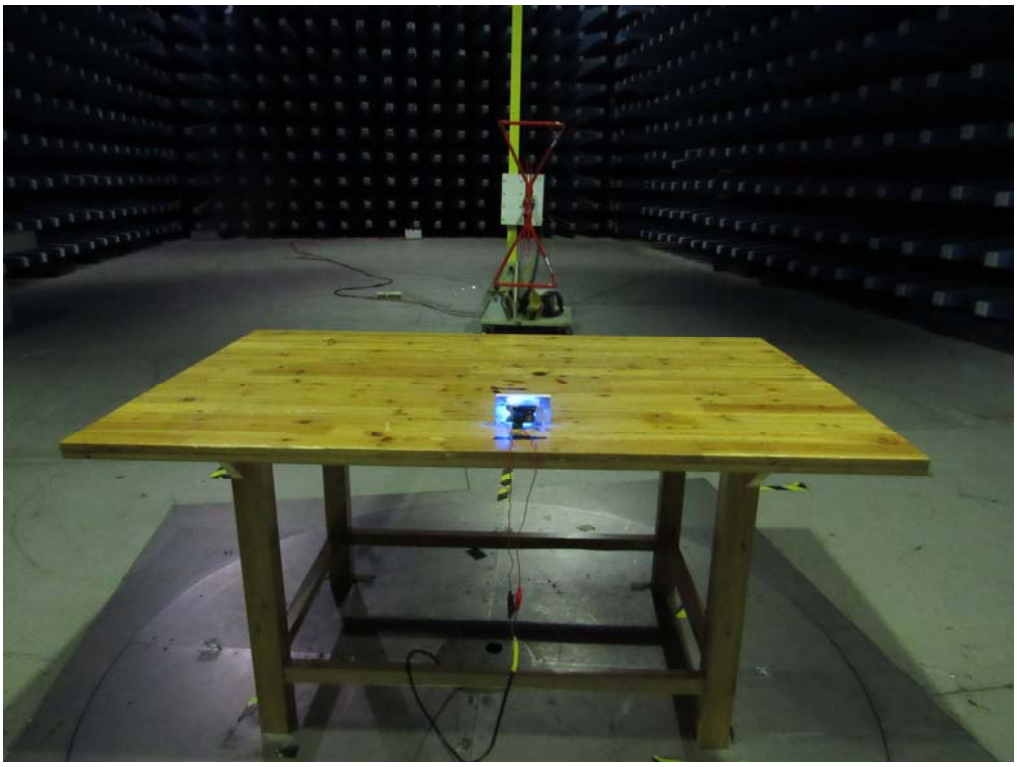
Annex B.ii. Photograph Test Setup Photo

Conducted Emissions Setup Front View

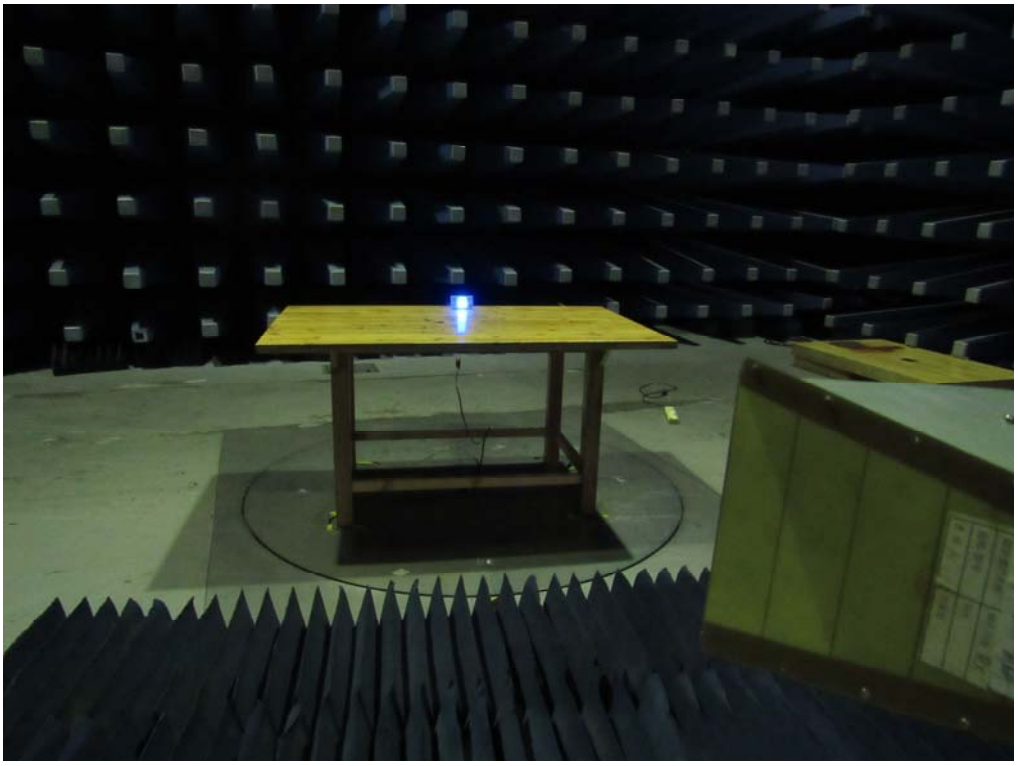
Conducted Emissions Setup Side View



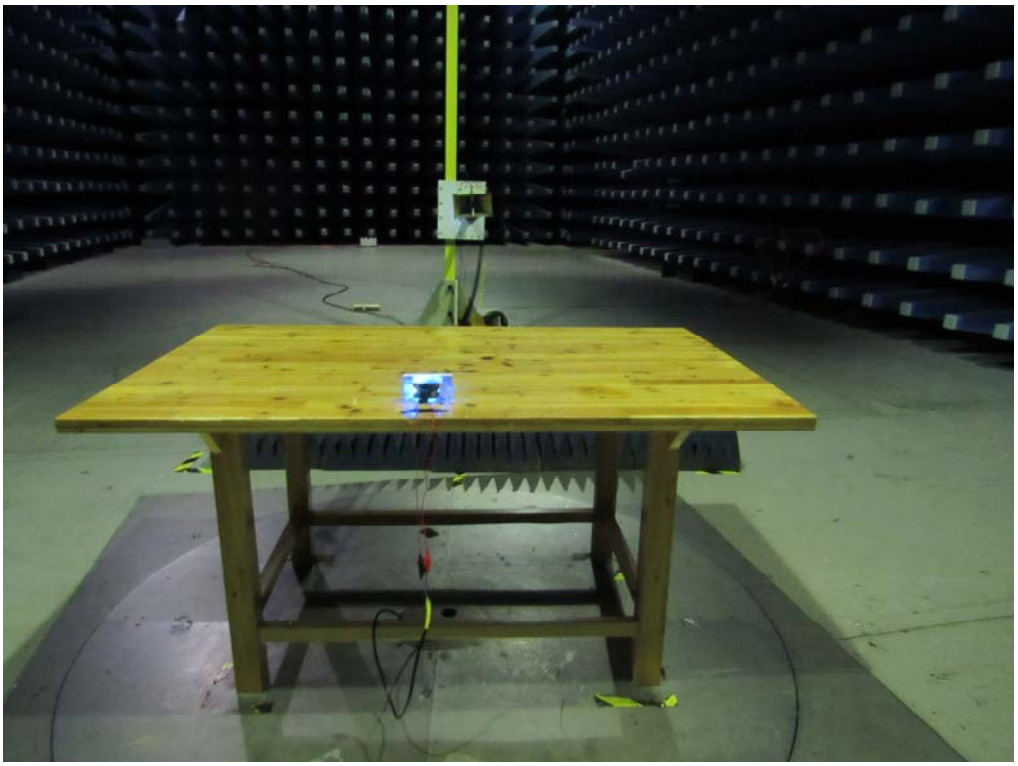
Radiated Emissions Setup Below 1GHz Front View



Radiated Emissions Setup Below 1GHz Rear View



Radiated Emissions Setup Above 1GHz Front View

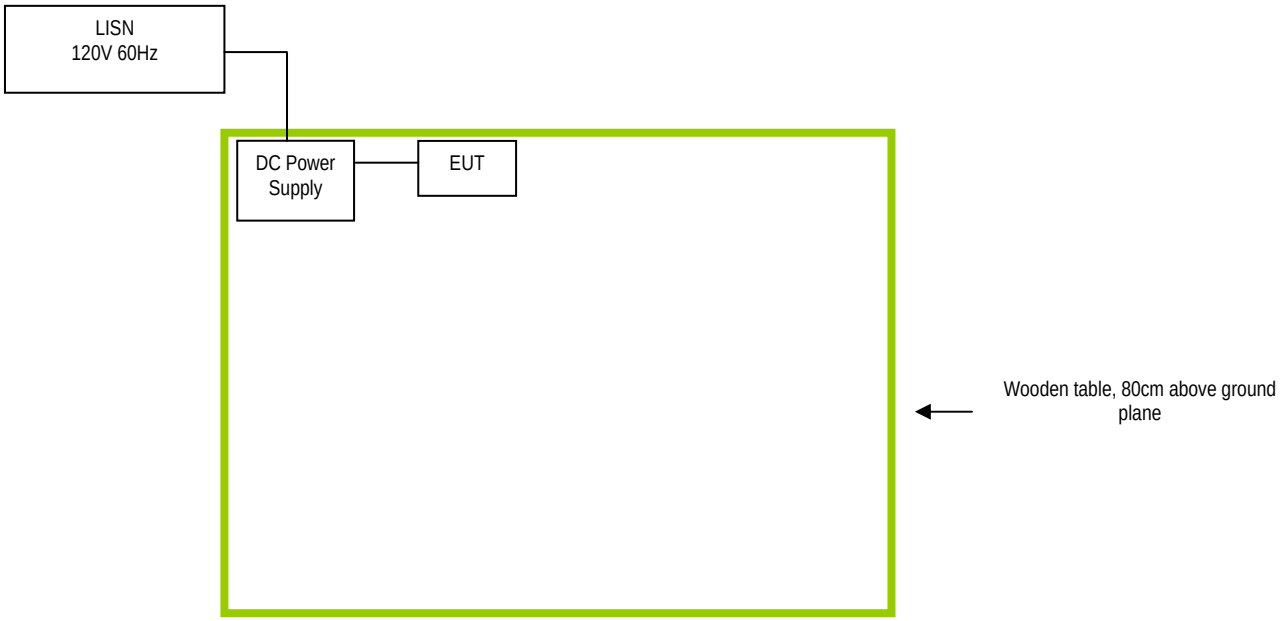


Radiated Emissions Setup Above 1GHz Rear View

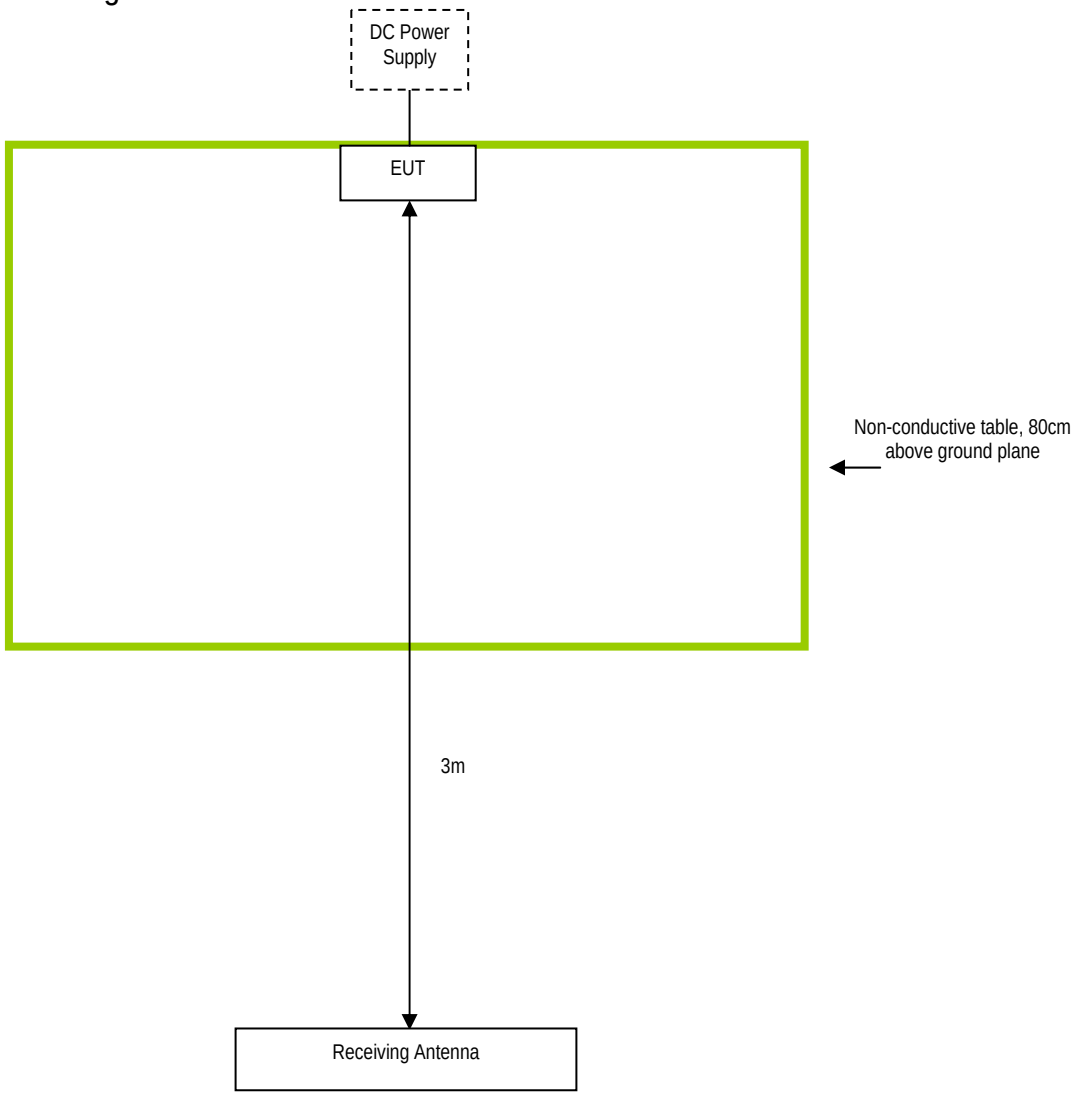
Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

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
BK PRECISION	DC Power Supply	1786B
Shanghai Smarfid Security Equipment Co.,Ltd.	Contactless Door Egress Device	REX2140-c

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

Please see Attachment

Annex E. DECLARATION OF SIMILARITY

N/A