

EMC TEST REPORT



Report No.: 17070139-FCC-E1-V1

Supersede Report No: N/A

Applicant	Beijing ANTVR Technology Co., LTD	
Product Name	ANTVR CAP	
Model No.	C21	
Serial No.	N/A	
Test Standard	FCC Part 15 Subpart B Class B:2016, ANSI C63.4: 2014	
Test Date	March 04 to March 14, 2017	
Issue Date	April 07, 2017	
Test Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	
Equipment complied with the specification <input checked="" type="checkbox"/>		
Equipment did not comply with the specification <input type="checkbox"/>		
		
Evans He Test Engineer	David Huang 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 (SHENZHEN-CHINA) LABORATORIES

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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.



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

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1. Report Revision History

Report No.	Report Version	Description	Issue Date
17070139-FCC-E1	NONE	Original	March 15, 2017
17070139-FCC-E1-V1	V1	Change the address for Applicant and manufacturers, Change the antenna gain	April 07, 2017

2. Customer information

Applicant Name	Beijing ANTVR Technology Co., LTD
Applicant Add	4th floor of Building C, Lenovo Beijing Innovation Center, No. 6 Shangdi West Rd., Beijing 100085, China
Manufacturer	Beijing ANTVR Technology Co., LTD
Manufacturer Add	4th floor of Building C, Lenovo Beijing Innovation Center, No. 6 Shangdi West Rd., Beijing 100085, China

3. Test site information

Lab performing tests	SIEMIC (Shenzhen-China) LABORATORIES
Lab Address	Zone A, Floor 1, Building 2 Wan Ye Long Technology Park South Side of Zhoushi Road, Bao' an District, Shenzhen, Guangdong China 518108
FCC Test Site No.	718246
IC Test Site No.	4842E-1
Test Software of Radiated Emission	Radiated Emission Program-To Shenzhen v2.0
Test Software of Conducted Emission	EZ-EMC(ver.lcp-03A1)

4. Equipment under Test (EUT) Information

Description of EUT:	ANTVR CAP
Main Model:	C21
Serial Model:	N/A
Antenna Gain:	WiFi: 0.4dBi
Antenna Type:	PIFA Antenna
Input Power:	Adapter: Model: YS-C00 Input: AC100-240V~50/60Hz,0.15A Output: DC 5.0V,1.0A Battery: Model:SD803258PE Spec: 3.7V,2000mAh,7.40Wh
Equipment Category :	JBP
Type of Modulation:	802.11b/g/n: DSSS, OFDM
RF Operating Frequency (ies):	WiFi: 802.11b/g/n(20M): 2412-2462 MHz WiFi: 802.11n(40M): 2422-2452 MHz
Number of Channels:	WiFi :802.11b/g/n(20M): 11CH WiFi :802.11n(40M): 7CH
Port:	USB Port, Mini HDMI Port, TF Port
Trade Name :	ANTVR

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FCC ID: 2ALCABAC21

Date EUT received: March 03, 2017

Test Date(s): March 04 to March 14, 2017

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


Parameter	Uncertainty
AC Power Line Conducted Emissions (150kHz~30MHz)	$\pm 3.71\text{dB}$
Radiated Emission(30MHz~1GHz)	$\pm 5.12\text{dB}$
Radiated Emission(1GHz~6GHz)	$\pm 5.34\text{dB}$

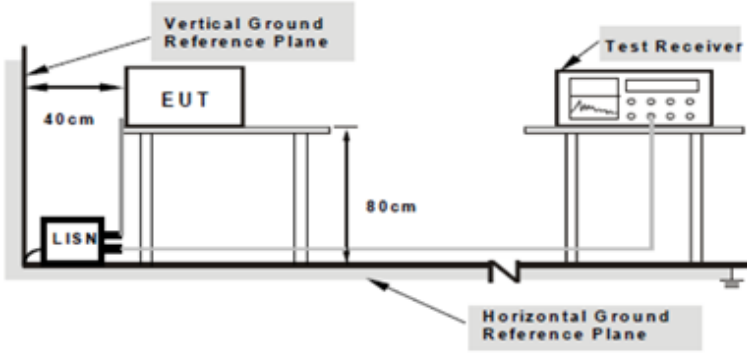
6. Measurements, Examination And Derived Results

6.1 AC Power Line Conducted Emissions

Temperature	23 °C
Relative Humidity	58%
Atmospheric Pressure	1006mbar
Test date :	March 06, 2017
Tested By :	Evans He

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.															
		<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>	Frequency ranges (MHz)	Limit (dBµV)		QP	Average	0.15 ~ 0.5	66 – 56	56 – 46	0.5 ~ 5	56	46	5 ~ 30	60	50	
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	 <p>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.</p>
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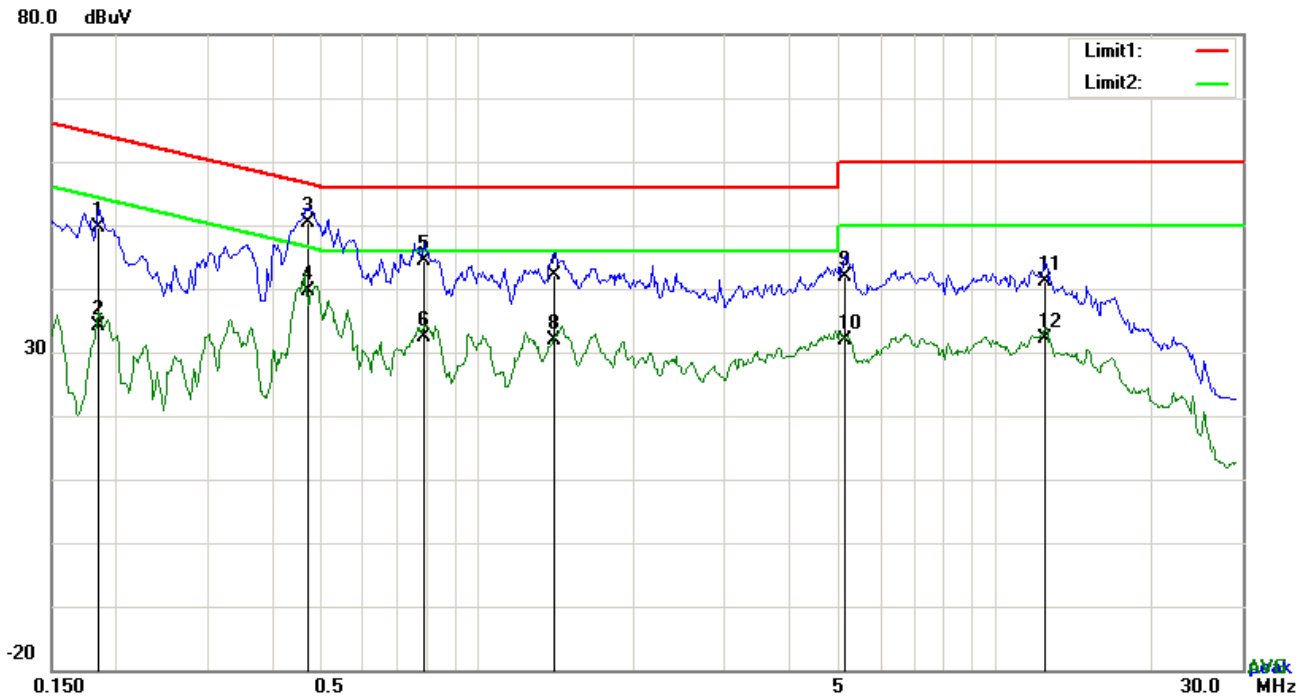
Procedure	<ol style="list-style-type: none"> The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table. The power supply for the EUT was fed through a 50Ω /50mH EUT LISN, connected to filtered mains.
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	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, The EMI test receiver was then tuned to the selected frequencies and the necessary measurements made with a receiver bandwidth setting of 10 kHz. 8. Step 7 was then repeated for the LIVE line (for AC mains) or DC line (for DC power).
Remark	
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test Mode : USB Mode

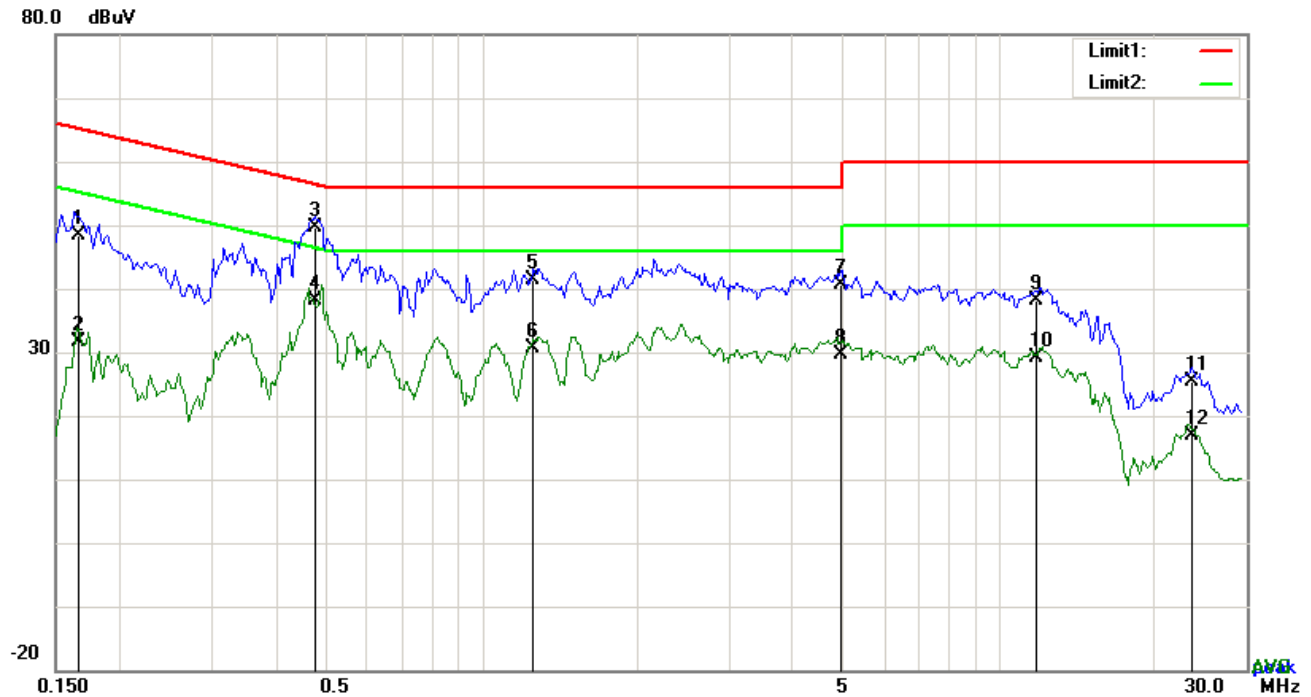


Test Data

Phase Line Plot at 120Vac, 60Hz

No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin
		(MHz)	(dBuV)		(dB)	(dBuV)	(dBuV)	(dB)
1	L1	0.1851	39.63	QP	10.03	49.66	64.25	-14.59
2	L1	0.1851	24.09	AVG	10.03	34.12	54.25	-20.13
3	L1	0.4698	40.45	QP	10.03	50.48	56.52	-6.04
4	L1	0.4698	29.50	AVG	10.03	39.53	46.52	-6.99
5	L1	0.7857	34.36	QP	10.03	44.39	56.00	-11.61
6	L1	0.7857	22.23	AVG	10.03	32.26	46.00	-13.74
7	L1	1.4058	32.05	QP	10.04	42.09	56.00	-13.91
8	L1	1.4058	21.94	AVG	10.04	31.98	46.00	-14.02
9	L1	5.1333	31.79	QP	10.08	41.87	60.00	-18.13
10	L1	5.1333	21.69	AVG	10.08	31.77	50.00	-18.23
11	L1	12.4848	30.83	QP	10.19	41.02	60.00	-18.98
12	L1	12.4848	21.87	AVG	10.19	32.06	50.00	-17.94

Test Mode : USB Mode

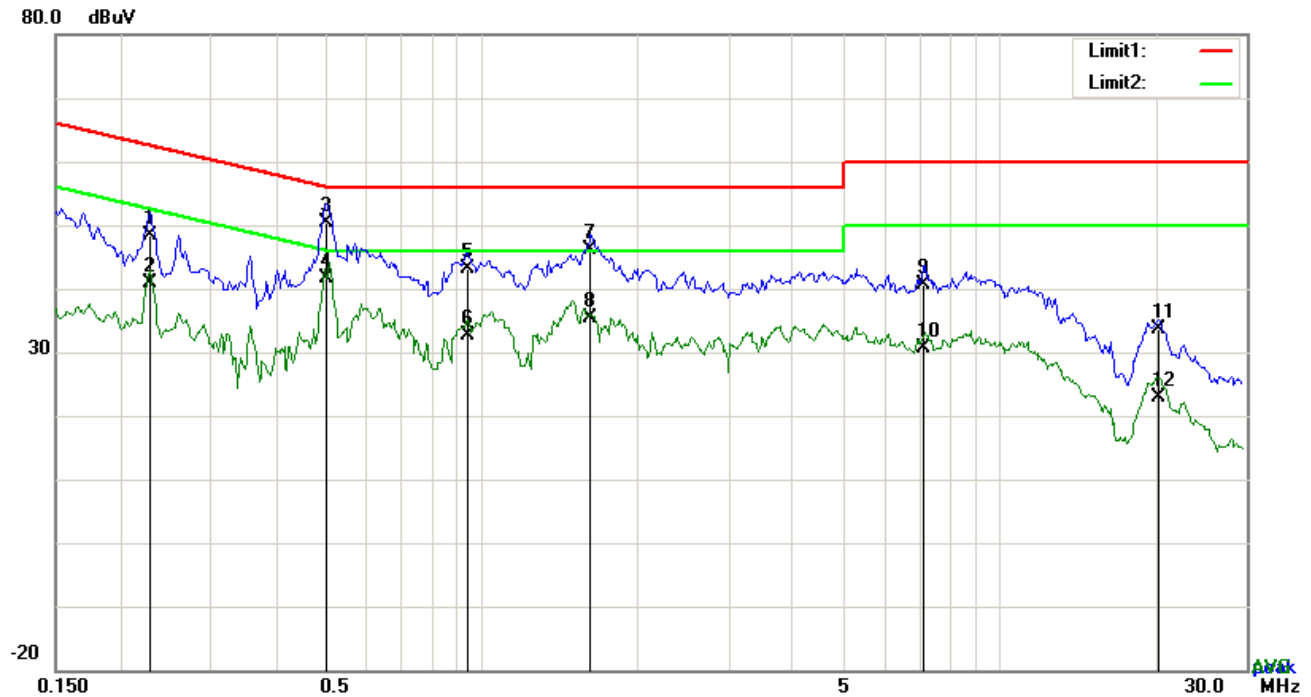


Test Data

Phase Neutral Plot at 120Vac, 60Hz

No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin
		(MHz)	(dBuV)		(dB)	(dBuV)	(dBuV)	(dB)
1	N	0.1659	38.46	QP	10.02	48.48	65.16	-16.68
2	N	0.1659	21.66	AVG	10.02	31.68	55.16	-23.48
3	N	0.4776	39.71	QP	10.02	49.73	56.38	-6.65
4	N	0.4776	28.02	AVG	10.02	38.04	46.38	-8.34
5	N	1.2576	31.38	QP	10.03	41.41	56.00	-14.59
6	N	1.2576	20.63	AVG	10.03	30.66	46.00	-15.34
7	N	4.9500	30.44	QP	10.07	40.51	56.00	-15.49
8	N	4.9500	19.57	AVG	10.07	29.64	46.00	-16.36
9	N	11.7446	27.97	QP	10.16	38.13	60.00	-21.87
10	N	11.7446	19.07	AVG	10.16	29.23	50.00	-20.77
11	N	23.5959	15.01	QP	10.32	25.33	60.00	-34.67
12	N	23.5959	6.45	AVG	10.32	16.77	50.00	-33.23

Test Mode : USB Mode

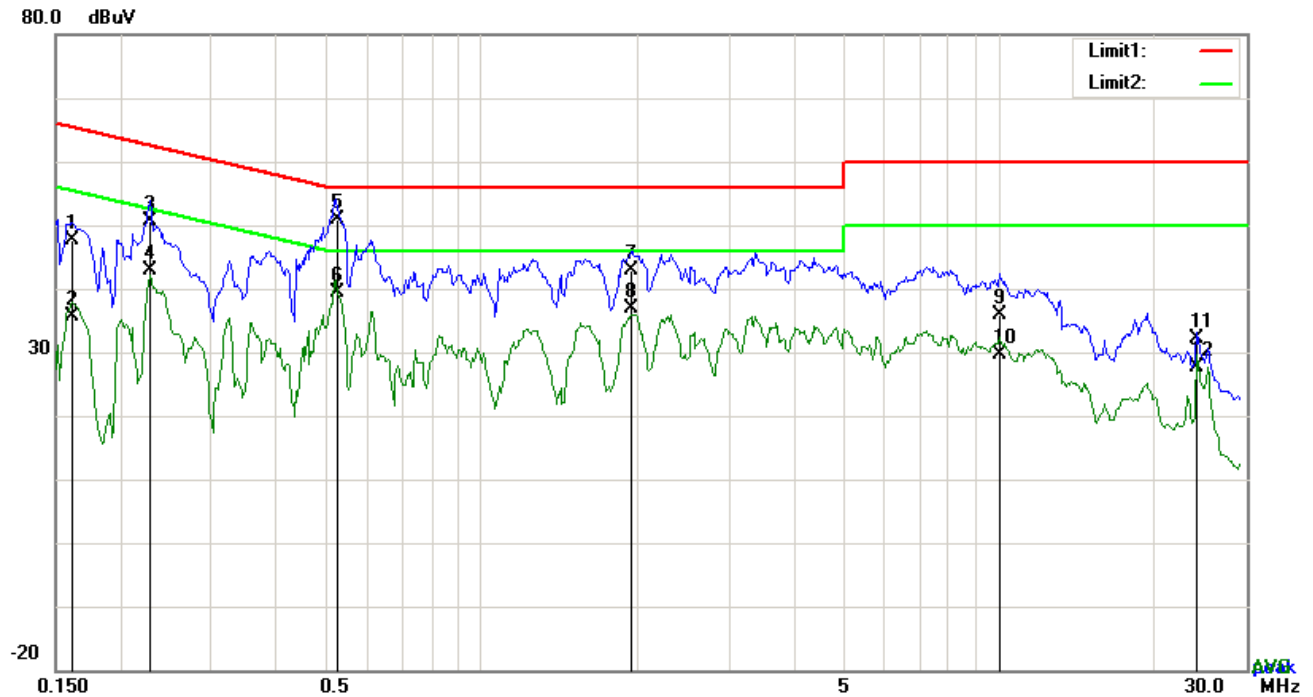


Test Data

Phase Line Plot at 240Vac, 60Hz

No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin
		(MHz)	(dBuV)		(dB}	(dBuV)	(dBuV)	(dB)
1	L1	0.2280	38.28	QP	10.03	48.31	62.52	-14.21
2	L1	0.2280	30.80	AVG	10.03	40.83	52.52	-11.69
3	L1	0.5010	40.34	QP	10.03	50.37	56.00	-5.63
4	L1	0.5010	31.51	AVG	10.03	41.54	46.00	-4.46
5	L1	0.9417	33.16	QP	10.03	43.19	56.00	-12.81
6	L1	0.9417	22.57	AVG	10.03	32.60	46.00	-13.40
7	L1	1.6203	36.14	QP	10.04	46.18	56.00	-9.82
8	L1	1.6203	25.40	AVG	10.04	35.44	46.00	-10.56
9	L1	7.1301	30.42	QP	10.11	40.53	60.00	-19.47
10	L1	7.1301	20.58	AVG	10.11	30.69	50.00	-19.31
11	L1	20.2848	23.22	QP	10.31	33.53	60.00	-26.47
12	L1	20.2848	12.59	AVG	10.31	22.90	50.00	-27.10

Test Mode : USB Mode



Test Data


Phase Neutral Plot at 240Vac, 60Hz

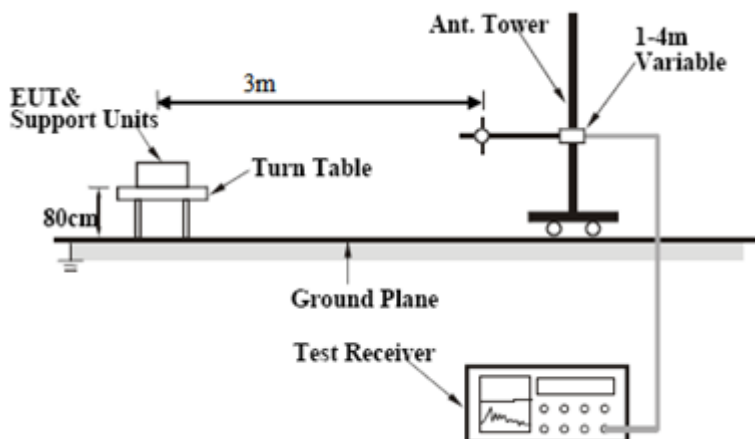
No.	P/L	Frequency	Reading	Detector	Corrected	Result	Limit	Margin
		(MHz)	(dBuV)		(dB)	(dBuV)	(dBuV)	(dB)
1	N	0.1617	37.52	QP	10.02	47.54	65.38	-17.84
2	N	0.1617	25.65	AVG	10.02	35.67	55.38	-19.71
3	N	0.2280	40.61	QP	10.02	50.63	62.52	-11.89
4	N	0.2280	32.77	AVG	10.02	42.79	52.52	-9.73
5	N	0.5244	40.86	QP	10.02	50.88	56.00	-5.12
6	N	0.5244	29.33	AVG	10.02	39.35	46.00	-6.65
7	N	1.9479	32.96	QP	10.04	43.00	56.00	-13.00
8	N	1.9479	26.85	AVG	10.04	36.89	46.00	-9.11
9	N	10.0044	25.86	QP	10.14	36.00	60.00	-24.00
10	N	10.0044	19.57	AVG	10.14	29.71	50.00	-20.29
11	N	24.0210	21.71	QP	10.32	32.03	60.00	-27.97
12	N	24.0210	17.39	AVG	10.32	27.71	50.00	-22.29

6.2 Radiated Emissions

Temperature	23 °C
Relative Humidity	58%
Atmospheric Pressure	1006mbar
Test date :	March 06, 2017
Tested By :	Evans He

Requirement(s):

Spec	Item	Requirement	Applicable	
47CFR§15.109(d)	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	
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Procedure	<ol style="list-style-type: none"> The EUT was switched on and allowed to warm up to its normal operating condition. The test was carried out at the selected frequency points obtained from the EUT characterization. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner: <ol style="list-style-type: none"> Vertical or horizontal polarization (whichever gave the higher emission level
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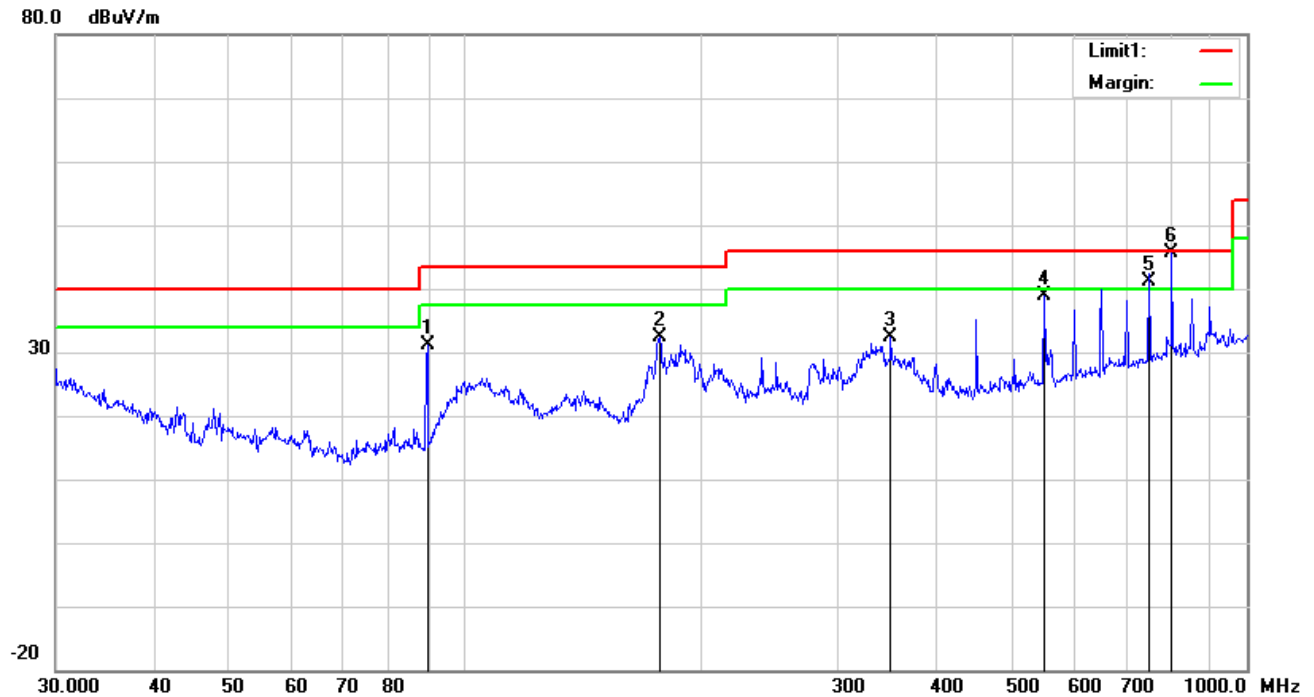
	<p>over a full rotation of the EUT) was chosen.</p> <p>b. The EUT was then rotated to the direction that gave the maximum emission.</p> <p>c. Finally, the antenna height was adjusted to the height that gave the maximum emission.</p> <p>3. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi Peak detection at frequency below 1GHz.</p> <p>4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz with Peak detection for Peak measurement at frequency above 1GHz.</p> <p>The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth with Peak detection for Average Measurement as below at frequency above 1GHz.</p> <p>■ 1 kHz (Duty cycle < 98%) □ 10 Hz (Duty cycle > 98%)</p> <p>5. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.</p>
Remark	
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test Mode : USB Mode

Below 1GHz

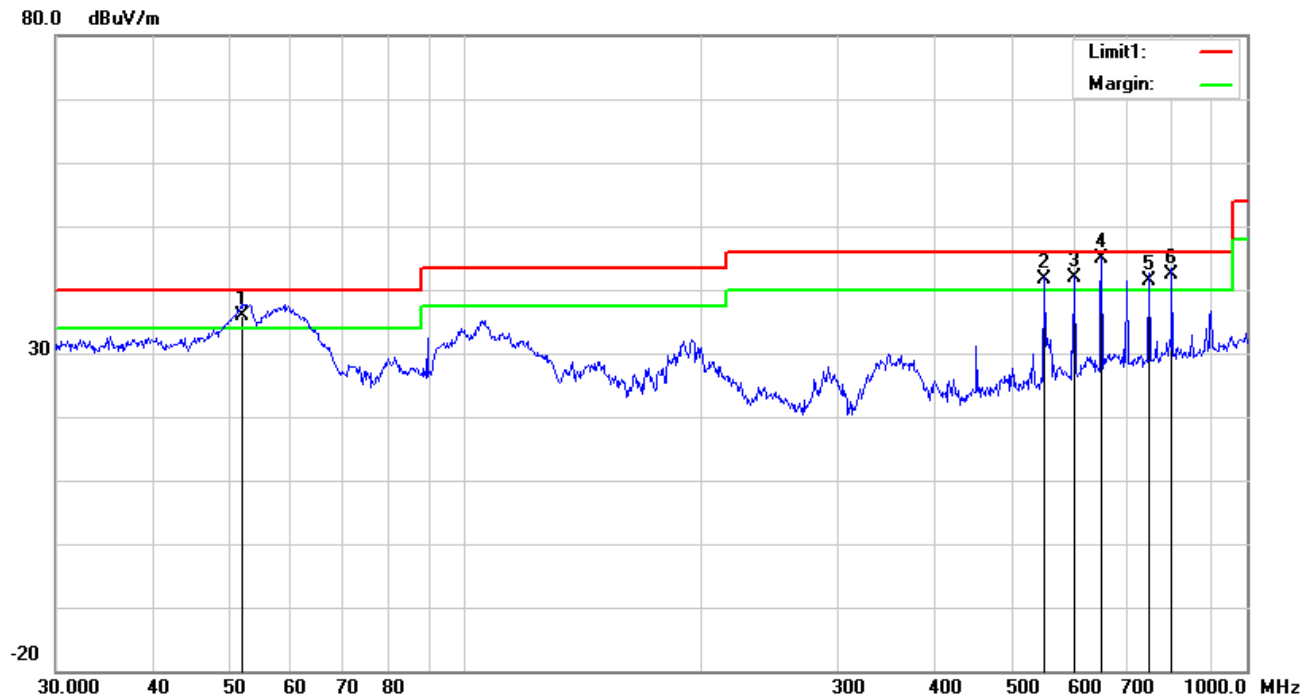


Test Data

Horizontal Polarity Plot @3m

No.	P/L	Frequency	Reading	Detector	Ant_F	PA_G	Cab_L	Result	Limit	Margin	Height	Degree
		(MHz)	(dBuV/m)		(dB/m)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)
1	H	89.5900	44.63	peak	7.98	22.32	0.96	31.25	43.50	-12.25	100	354
2	H	177.5092	42.10	peak	11.20	22.25	1.36	32.41	43.50	-11.09	100	4
3	H	350.4768	37.94	peak	14.66	22.15	2.04	32.49	46.00	-13.51	100	27
4	H	550.9480	39.61	peak	18.41	21.69	2.48	38.81	46.00	-7.19	200	237
5	H	750.1083	38.68	QP	20.80	21.25	2.87	41.10	46.00	-4.90	100	49
6	H	801.7863	42.47	QP	21.42	21.15	2.96	45.70	46.00	-0.30	100	195

Below 1GHz



Test Data

Vertical Polarity Plot @3m

No.	P/L	Frequency	Reading	Detector	Ant_F	PA_G	Cab_L	Result	Limit	Margin	Height	Degree
		(MHz)	(dBuV/m)		(dB/m)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)
1	V	52.0251	49.32	QP	8.18	22.39	0.79	35.90	40.00	-4.10	100	238
2	V	550.9480	42.40	QP	18.41	21.69	2.48	41.60	46.00	-4.40	100	192
3	V	601.4265	41.77	QP	19.12	21.58	2.49	41.80	46.00	-4.20	100	221
4	V	651.9417	44.07	QP	19.67	21.47	2.63	44.90	46.00	-1.10	100	83
5	V	750.1083	39.08	QP	20.80	21.25	2.87	41.50	46.00	-4.50	100	127
6	V	801.7863	39.07	QP	21.42	21.15	2.96	42.30	46.00	-3.70	100	320

Above 1GHz

Frequency (MHz)	Read_level (dBμV/m)	Azimuth	Height (cm)	Polarity (H/V)	Level (dBμV/m)	Factors (dB)	Limit (dBμV/m)	Margin (dB)	Detector (PK/AV)
1191.42	66.07	53	200	V	46.31	-19.76	74	-27.69	PK
1765.38	61.92	134	100	V	45.18	-16.74	74	-28.82	PK
3046.91	62.56	92	200	V	49.76	-12.8	74	-24.24	PK
1643.78	64.72	71	200	H	47.11	-17.61	74	-26.89	PK
3285.13	59.71	111	100	H	46.85	-12.86	74	-27.15	PK
1934.57	65.57	144	200	H	49.93	-15.64	74	-24.07	PK

Note1: The highest frequency of the EUT is 2462 MHz, so the testing has been conformed to $5 \times 2462 \text{ MHz} = 12,310 \text{ MHz}$.

Note2: The frequency that above 3GHz is mainly from the environment noise.

Note3: The AV measurement performed, more than 20dB below limit so AV test data was not presented.

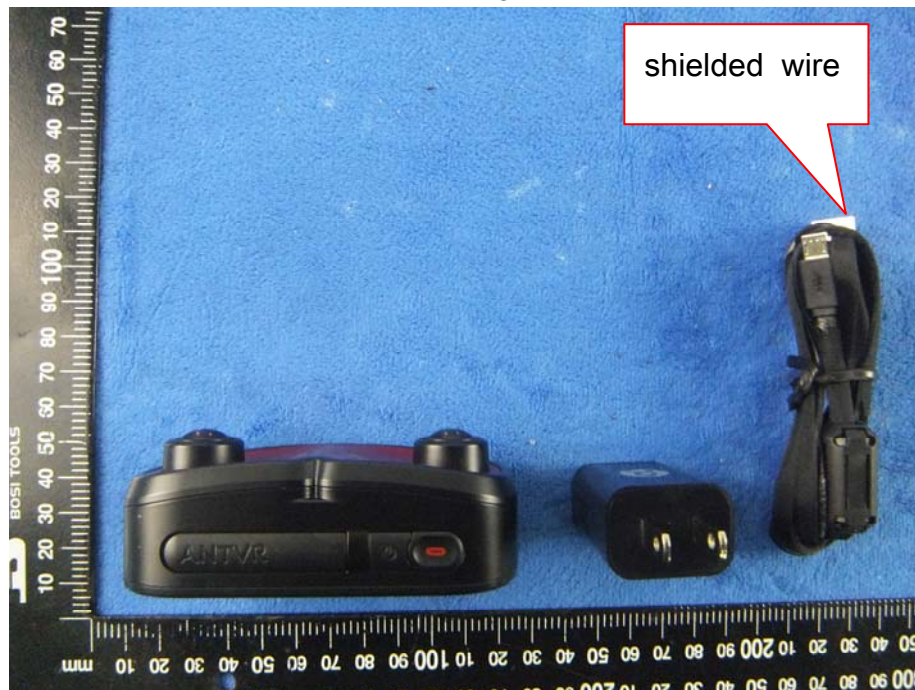
Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Date	Cal Due	In use
AC Line Conducted Emissions					
EMI test receiver	ESCS30	8471241027	09/16/2016	09/15/2017	<input checked="" type="checkbox"/>
Line Impedance Stabilization Network	LI-125A	191106	09/24/2016	09/23/2017	<input checked="" type="checkbox"/>
Line Impedance Stabilization Network	LI-125A	191107	09/24/2016	09/23/2017	<input checked="" type="checkbox"/>
LISN	ISN T800	34373	09/24/2016	09/23/2017	<input checked="" type="checkbox"/>
Transient Limiter	LIT-153	531118	08/31/2016	08/30/2017	<input checked="" type="checkbox"/>
Radiated Emissions					
EMI test receiver	ESL6	100262	09/16/2016	09/15/2017	<input checked="" type="checkbox"/>
OPT 010 AMPLIFIER (0.1-1300MHz)	8447E	2727A02430	08/31/2016	08/30/2017	<input checked="" type="checkbox"/>
Microwave Preamplifier (1 ~ 26.5GHz)	8449B	3008A02402	03/23/2017	03/22/2018	<input checked="" type="checkbox"/>
Bilog Antenna (30MHz~6GHz)	JB6	A110712	09/20/2016	09/19/2017	<input checked="" type="checkbox"/>
Double Ridge Horn Antenna	AH-118	71259	09/23/2016	09/22/2017	<input checked="" type="checkbox"/>

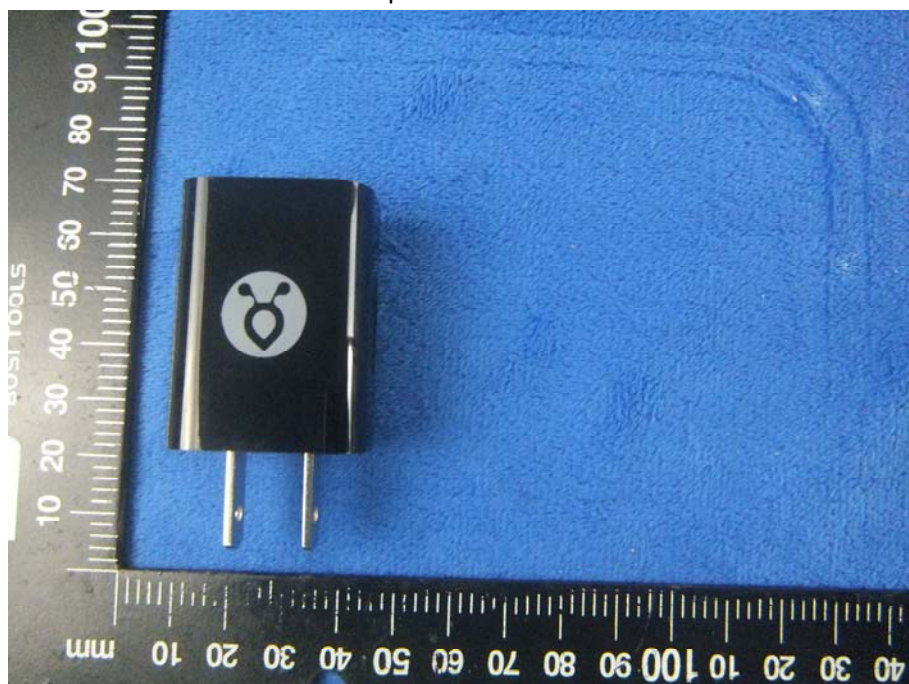
Annex B. EUT And Test Setup Photographs

Annex B.i. Photograph: EUT External Photo

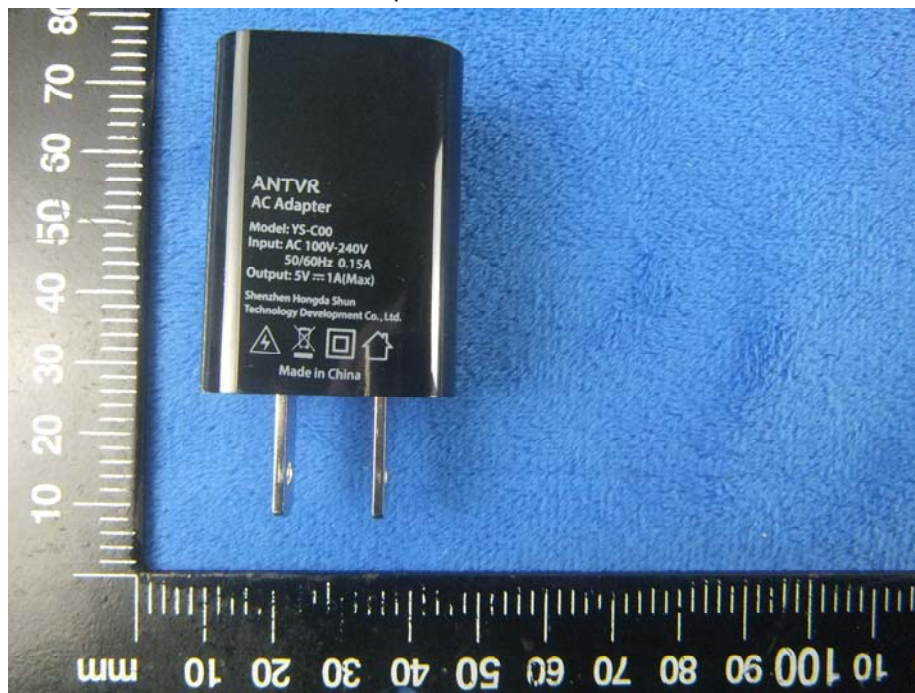
Whole Package View



Adapter - Front View



Adapter - Rear View



EUT - Front View



EUT - Rear View



EUT - Top View



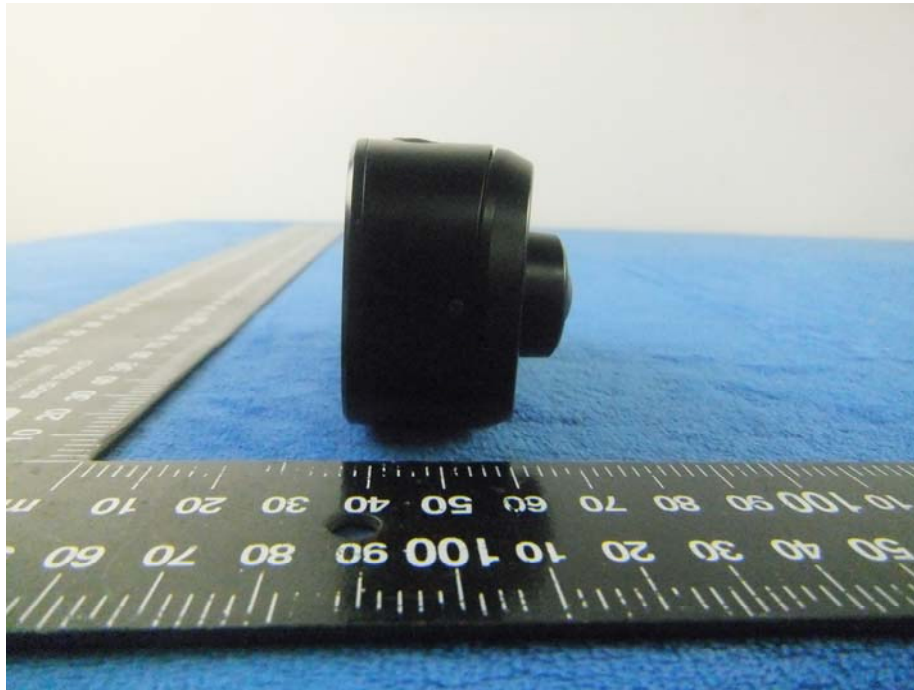
EUT - Bottom View



EUT - Left View



EUT - Right View



Annex B.ii. Photograph: EUT Internal Photo

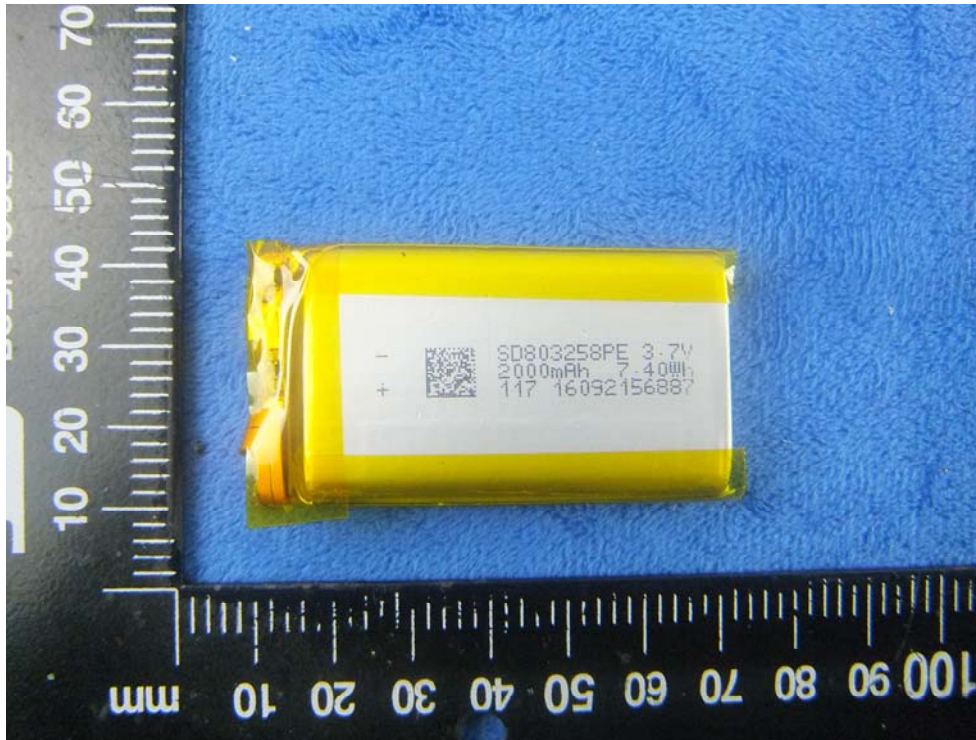
Cover Off - Top View 1



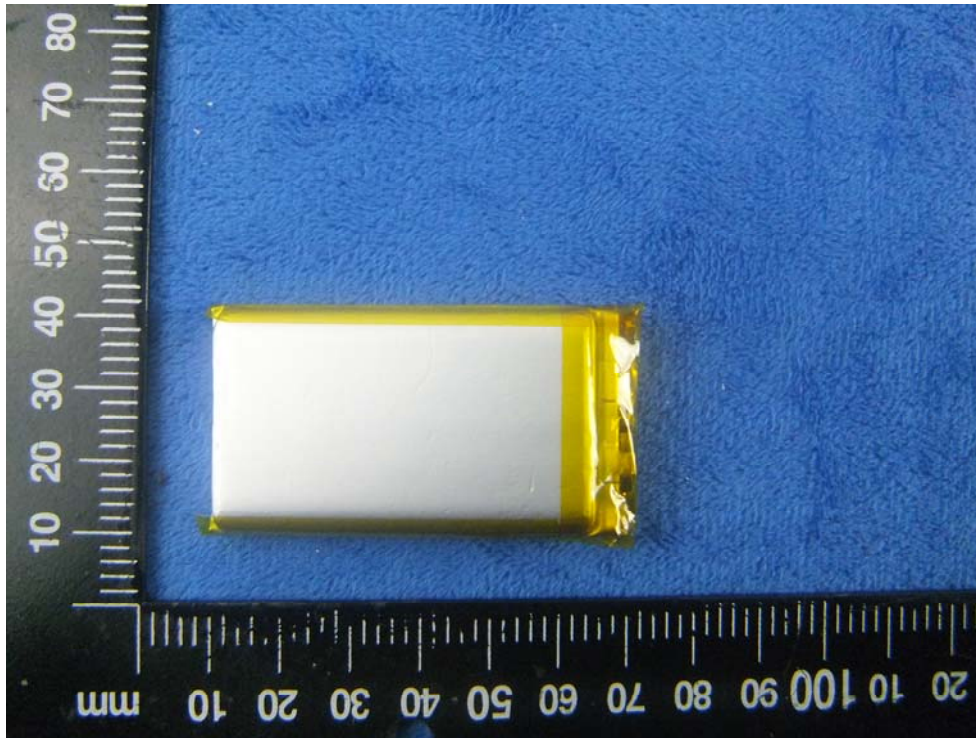
Cover Off - Top View 2



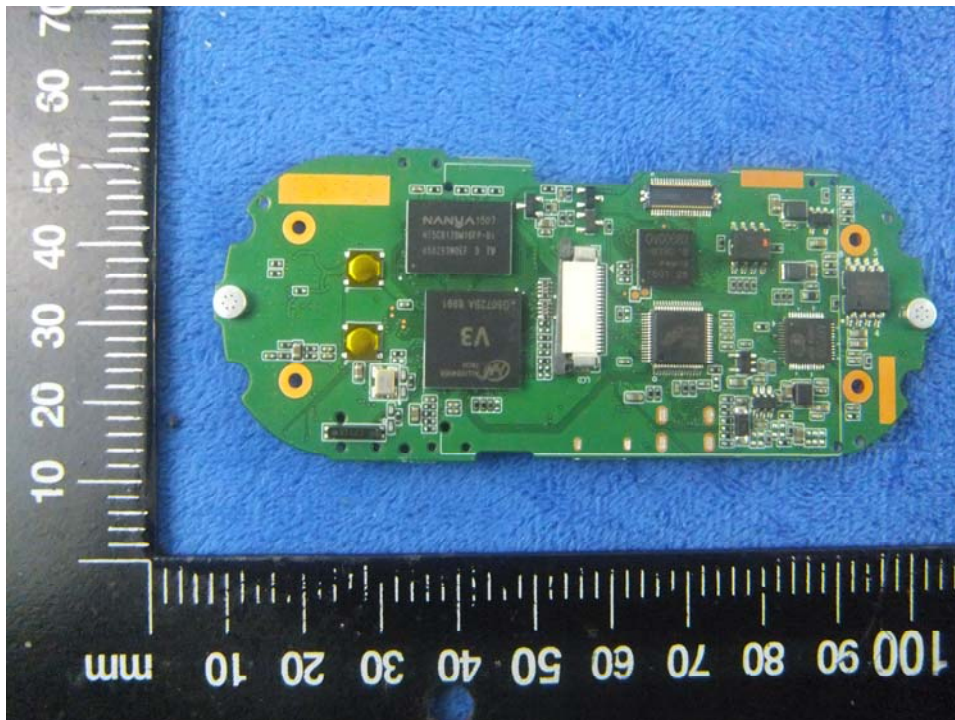
Battery - Front View



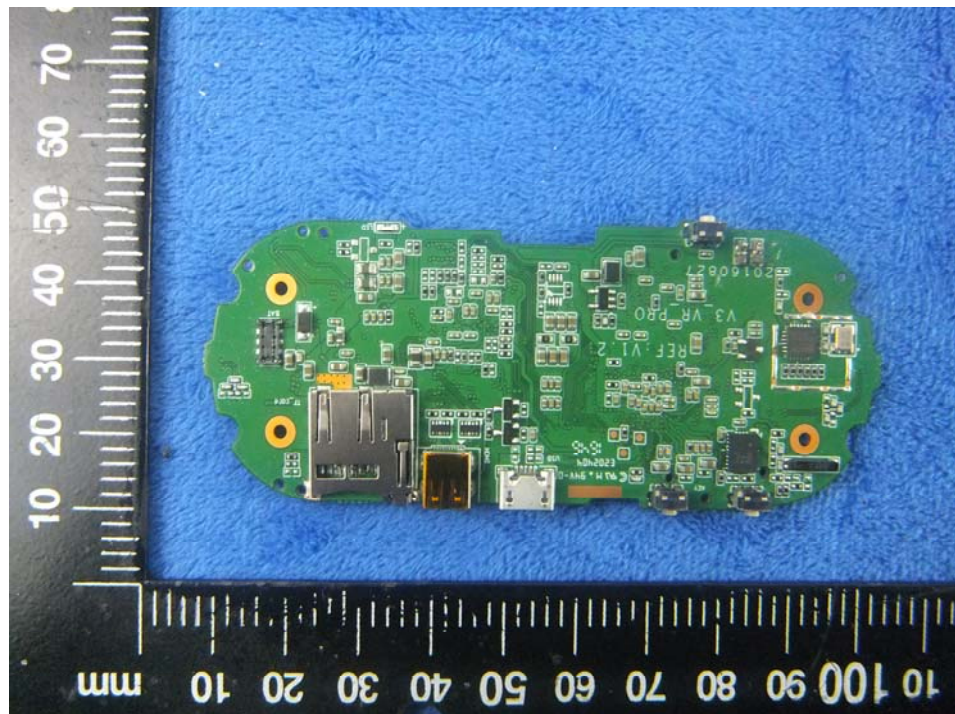
Battery - Rear View



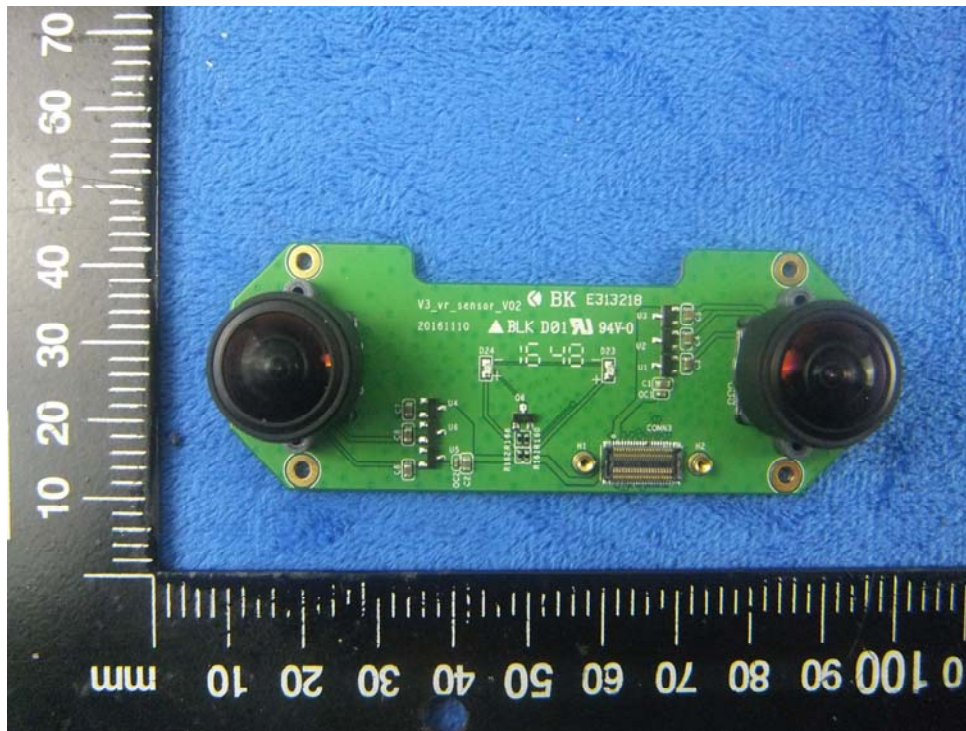
Mainboard - Front View 1



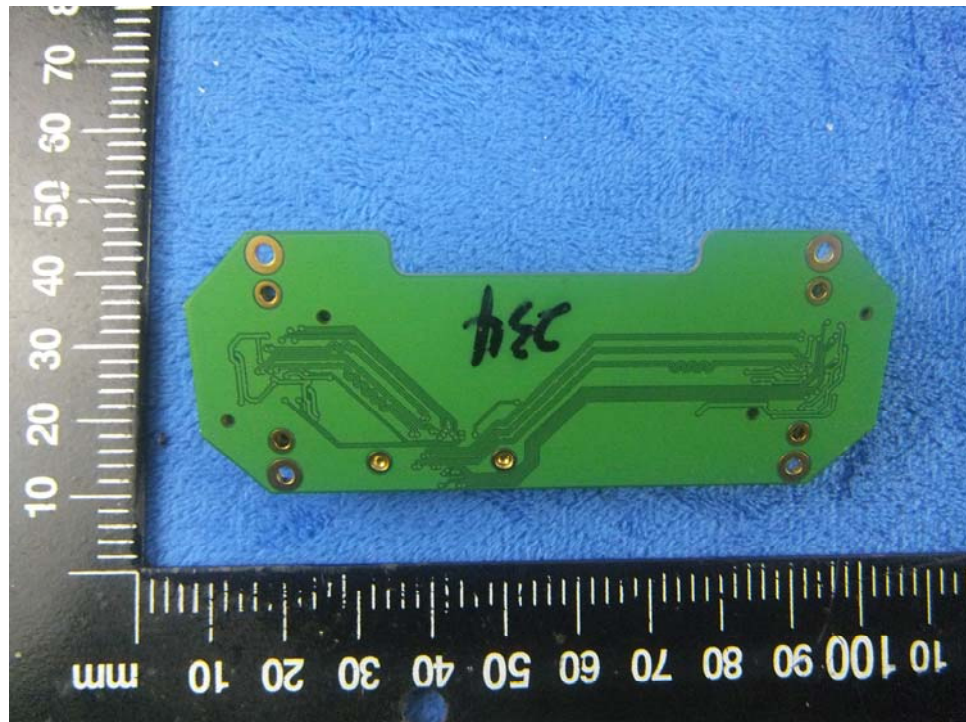
Mainboard - Rear View 1



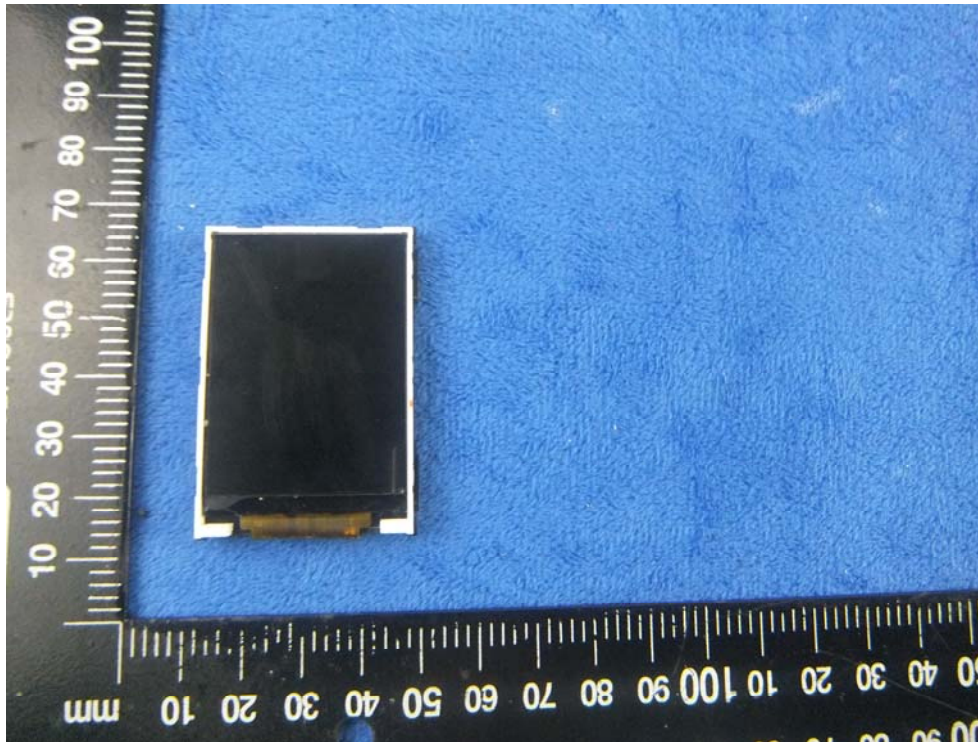
Mainboard – Front View 2



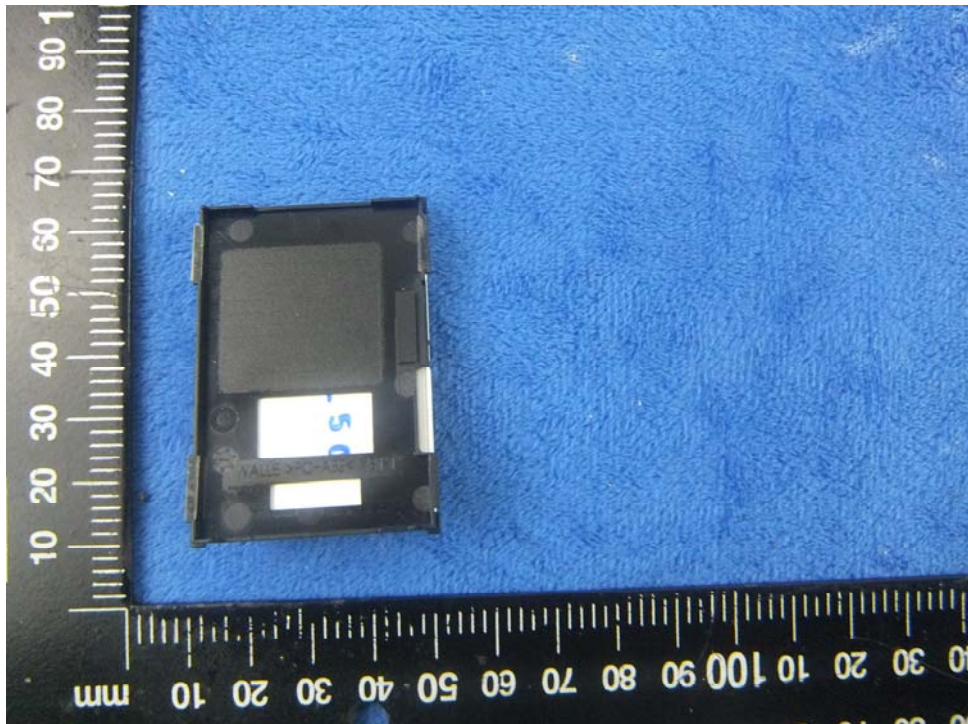
Mainboard - Rear View 2



LCD – Front View



LCD – Rear View



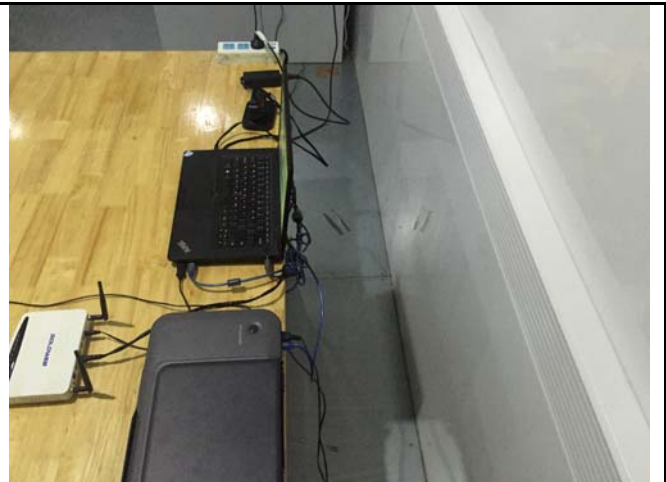
WIFI - Antenna View



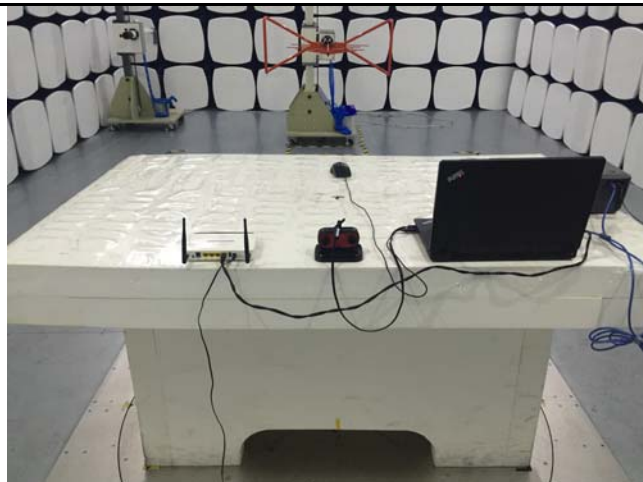
Annex B.iii. Photograph: Test Setup Photo



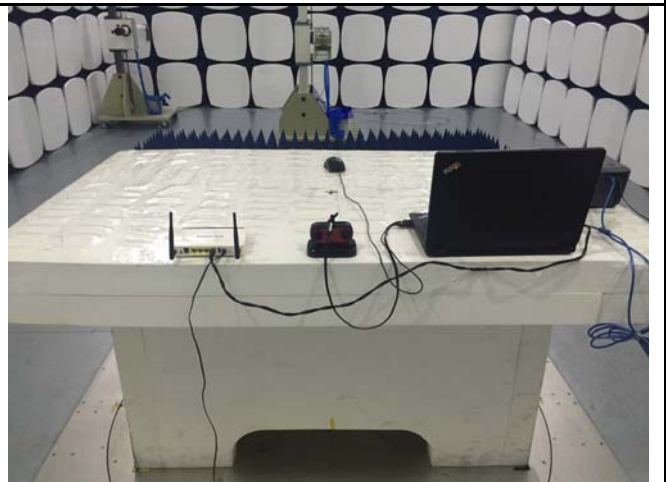
Conducted Emissions Test Setup – Front View



Conducted Emissions Test Setup – Side View



Radiated Emissions Test Setup Below 1GHz



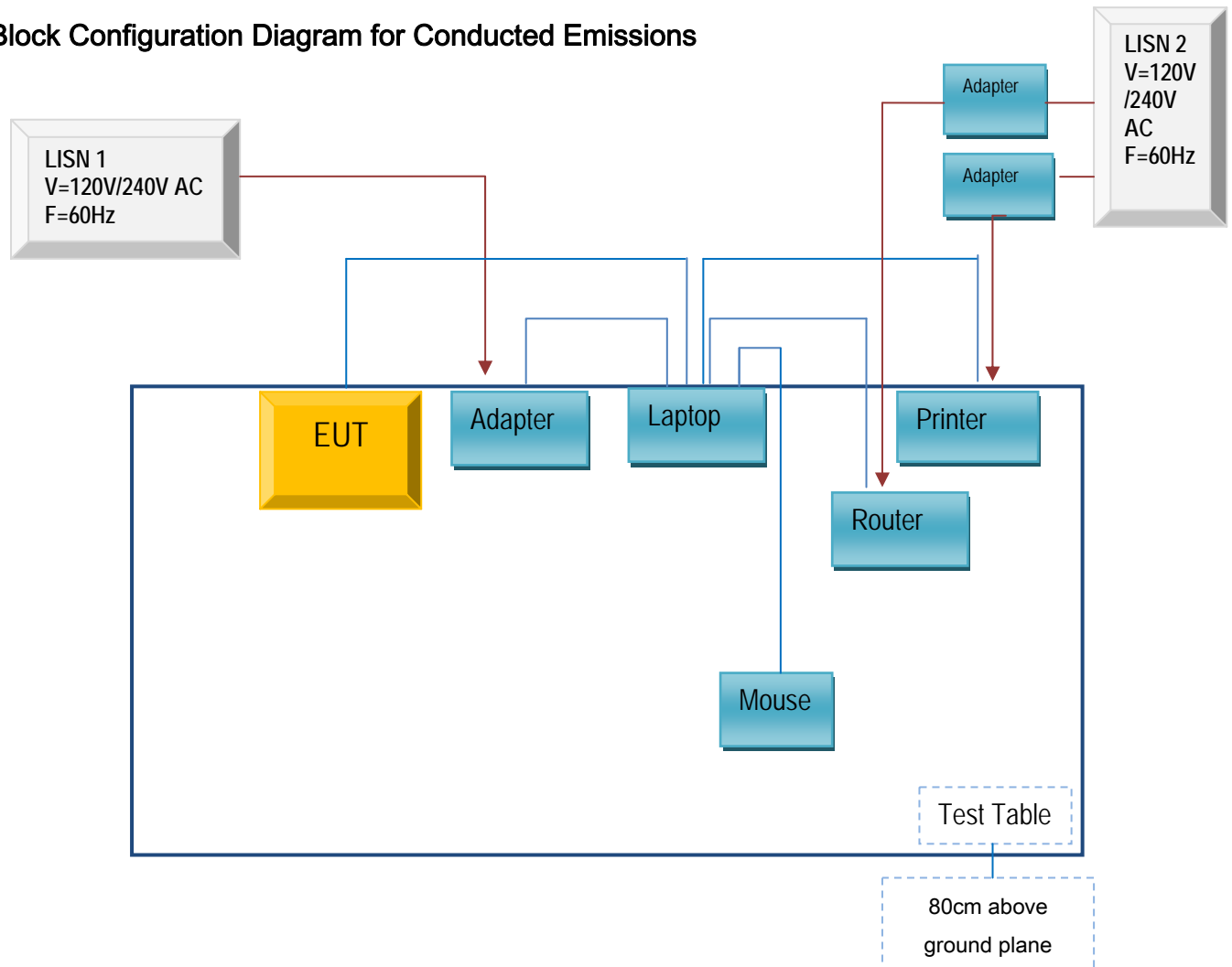
Radiated Emissions Test Setup Above 1GHz

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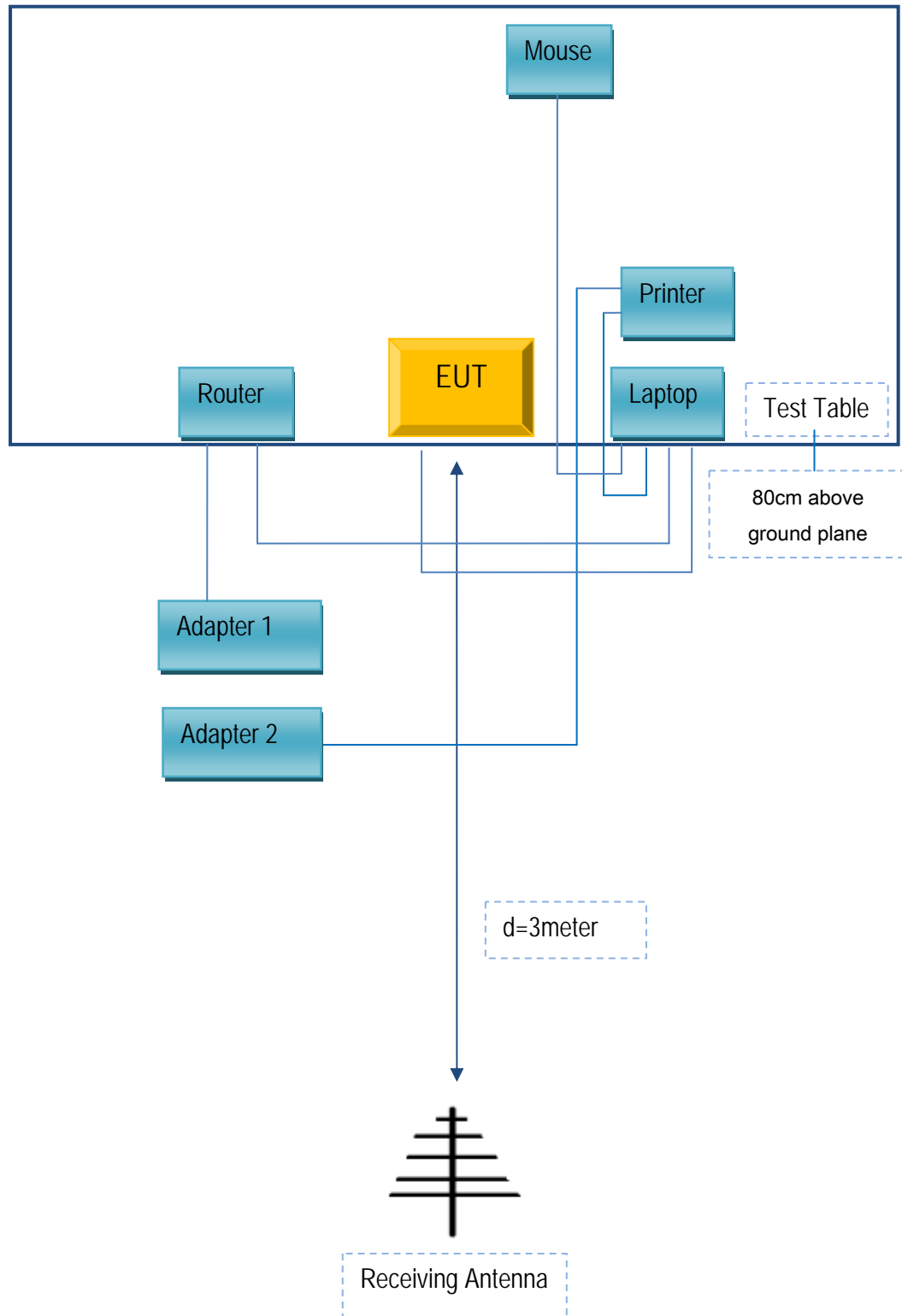
Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

Annex C.ii. 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.

Supporting Equipment:

Manufacturer	Equipment Description	Model	Serial No
Lenovo	Laptop	E40	LR-1EHRX
GOLDWEB	Router	R102	1202032094
Lenovo	AC Adapter	42T4416	21D9JU
HP	Printer	VCVRA-1003	CN36M19JWX
DELL	Mouse	E100	912NMTUT41481
BULL	Socket	GN-403	GN201203

Supporting Cable:

Cable type	Shield Type	Ferrite Core	Length	Serial No
USB Cable	Un-shielding	No	2m	JX120051274
USB Cable	Un-shielding	No	2m	CBA3000AH0C1
RJ45 Cable	Un-shielding	No	2m	KX156327541
Router Power cable	Un-shielding	No	2m	13274630Z
Printer Power cable	Un-shielding	No	2m	127581031
Power Cable	Un-shielding	No	0.8m	GT211032

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

Please see the attachment

Annex E. DECLARATION OF SIMILARITY

N/A