

TEST REPORT

Reference No. : WTS14S0211298E
FCC ID : AZQKP90S
Applicant : Shenzhen KOHO Technology Co., Ltd
Address : Building 3, Jin Yuda Industrial Park, ShangLiao, Shajin, Baoan ,
Shenzhen
Manufacturer : Shenzhen Kanghai Electronics CO.,LTD
Address : 2 nd, 3rd Floor A, 3 Building, jinyudaindustrial park(I,II,3), 107 State
Road, Shajing Street, Baoan District, Shenzhen
Product Name : pico projector
Model No. : KP90S
Standards : FCC CFR47 Part 15 Section 15.109:2012
Date of Receipt sample..... : Feb.17, 2014
Date of Test..... : Feb.18-20, 2014
Date of Issue : Mar.06, 2014
Test Result : **Pass ***

***Remarks:**

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

Prepared By:

Waltek Services (Shenzhen) Co., Ltd.

Address: 1/F., Fukangtai Building, West Baima Road, Songgang Street, Baoan District, Shenzhen,
Guangdong, China

Testing location: The same as above

Tel :+86-755-83551033

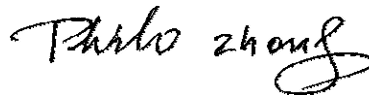
Fax:+86-755-83552400

Compiled by:



Zero Zhou / Project Engineer

Approved by:



Philo Zhong / Manager

2 Test Summary

Test Items	Test Requirement	Test Method	Result
Radiated Emissions	Part 15.109	ANSI C63.4: 2003	PASS
Conducted Emissions	Part 15.107	ANSI C63.4:2003	PASS
Remark: PASS Test item meets the requirement FAIL Test item does not meet the requirement N/A Test case does not apply to the test object			

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4 General Information

4.1 General Description of E.U.T.

Product Name : pico projector
Model No. : KP90S
Model Description : N/A
Operation Frequency : 300MHz

4.2 Details of E.U.T.

Technical Data : (1)DC 7.4V by build-in battery(Capacity: 2000mAh)
(2)DC 12V, 1500mA by adapter
(Adapter Input: AC 100-240V, 50/60Hz, 0.6A max)
Adapter : Manufacturer: SHENZHEN FUJIA APPLIANCE CO.,LTD
M/N: FJ-SW1201500N

4.3 Test Facility

The test facility has a test site registered with the following organizations:

- **IC – Registration No.: 7760A-1**

Waltek Services(Shenzhen) Co., Ltd. has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files.
Registration No.:7760A-1, July 12, 2012.

- **FCC – Registration No.: 880581**

Waltek Services(Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 880581, May 26, 2011.

4.4 Test Location

All the tests were performed at:
Waltek Services(Shenzhen) Co., Ltd. at 1/F, Fukangtai Building, West Baima Rd., Songgang Street, Baoan District, Shenzhen, China

5 Equipment Used during Test

5.1 Equipments List

Conducted Emissions at Mains Terminals Disturbance Voltage						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	EMI Test Receiver	R&S	ESCI	100947	Sep.18,2013	Sep.17,2014
2.	LISN	R&S	ENV216	101215	Nov. 29,2013	Nov. 28,2014
3.	Cable	Top	TYPE16(3.5M)	-	Sep.18,2013	Sep.17,2014
3m Semi-anechoic Chamber for Radiation						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	EMC Analyzer	Agilent	E7405A	MY4511494 3	Sep.18,2013	Sep.17,2014
2	Active Loop Antenna	Beijing Dazhi	ZN30900A	-	Sep.18,2013	Sep.17,2014
3	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	336	Apr.20,2013	Apr.19,2014
4	Coaxial Cable (below 1GHz)	Top	TYPE16(13M)	-	Sep.18,2013	Sep.17,2014
5	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	Apr.20,2013	Apr.19,2014
6	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	Apr.07,2013	Apr.06,2014
7	Coaxial Cable (above 1GHz)	Top	1GHz-25GHz	EW02014-7	Apr.20,2013	Apr.19,2014

5.2 Description of Support Units

Equipment	Manufacturer	Model No.	Series No.
MacBook Air	APPLE	A1465	C17KTQDNF5N7

Measurement Uncertainty

Parameter	Uncertainty
Conducted Emissions	$\pm 3.64\text{dB}$ (150kHz~30MHz)
Radiated Spurious Emissions test	$\pm 5.03\text{ dB}$ (Bilog antenna 30M~1000MHz)
	$\pm 5.47\text{ dB}$ (Horn antenna 1000M~25000MHz)

5.3 Test Equipment Calibration

All the test equipments used are valid and calibrated by CEPREI Certification Body that address is No.110 Dongguan Zhuang RD. Guangzhou, P.R.China.

6 Conducted Emissions

Test Requirement:	FCC CFR47 Part 15 Section 15.107
Test Method:	ANSI C63.4:2003
Frequency Range:	150kHz to 30MHz
Class:	Class B
Limit:	66-56 dB μ V between 0.15MHz & 0.5MHz 56 dB μ V between 0.5MHz & 5MHz 60 dB μ V between 5MHz & 30MHz
Detector:	Peak for pre-scan (9kHz Resolution Bandwidth) Quasi-Peak & Average if maximised peak within 6dB of Average Limit

6.1 E.U.T. Operation

Operating Environment:

Temperature:	25.5 °C
Humidity:	51 % RH
Atmospheric Pressure:	101.2 kPa

EUT Operation:

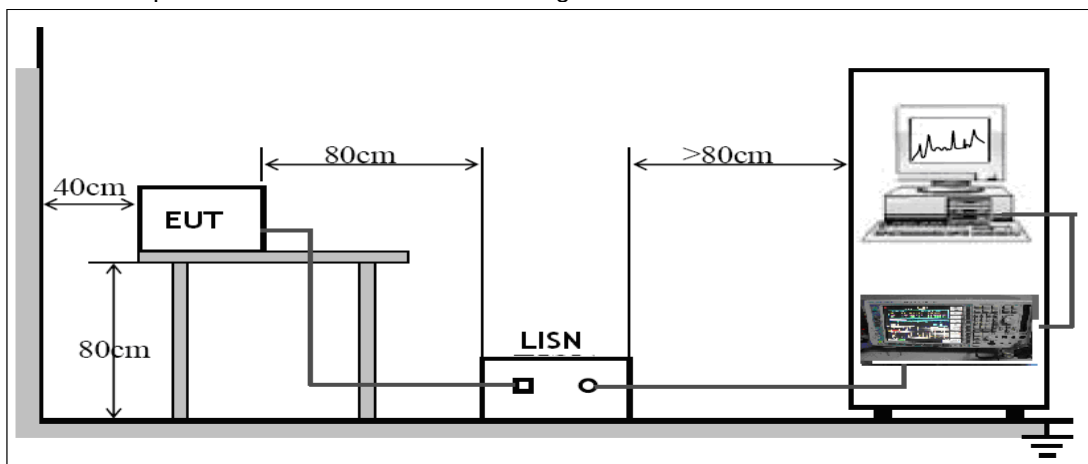
The pre-test was performed in data transmitting and SD card playing mode, and the test data is show in the report.

The EUT was tested according to ANSI C63.4:2003. The frequency spectrum from 150kHz to 30MHz was investigated.

The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

6.2 EUT Setup

The EUT was placed on the test table in shielding room.

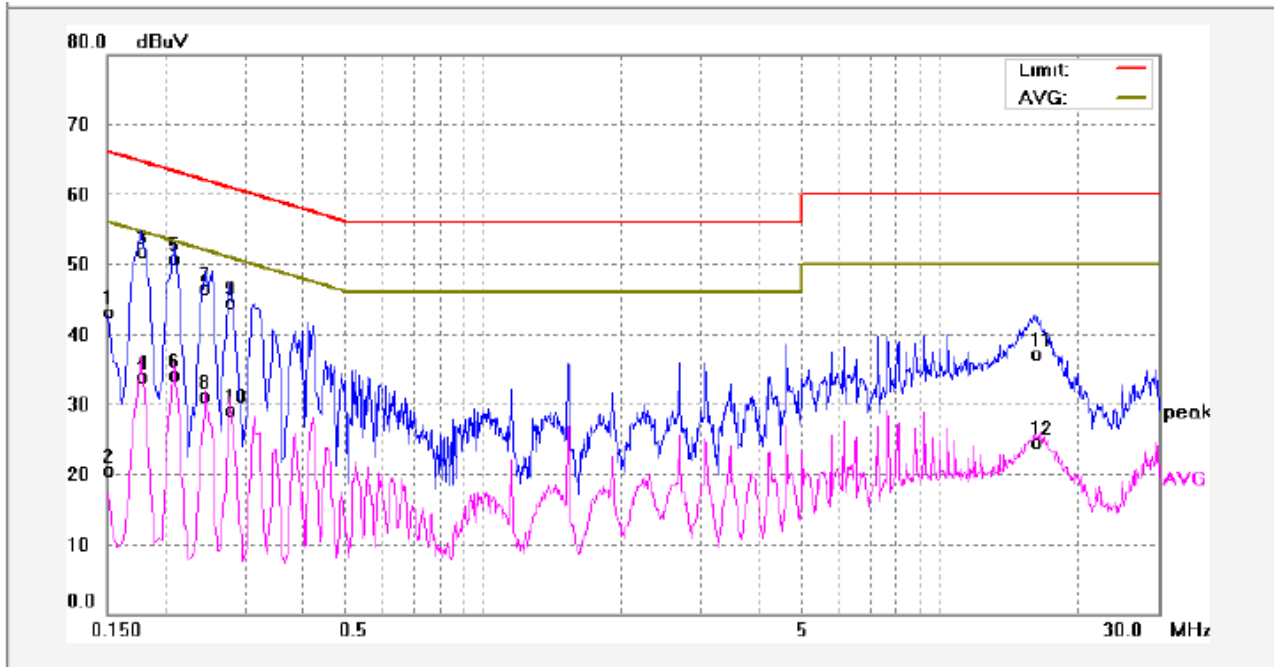


6.3 Conducted Emission Test Result

An initial pre-scan was performed on the live and neutral lines.

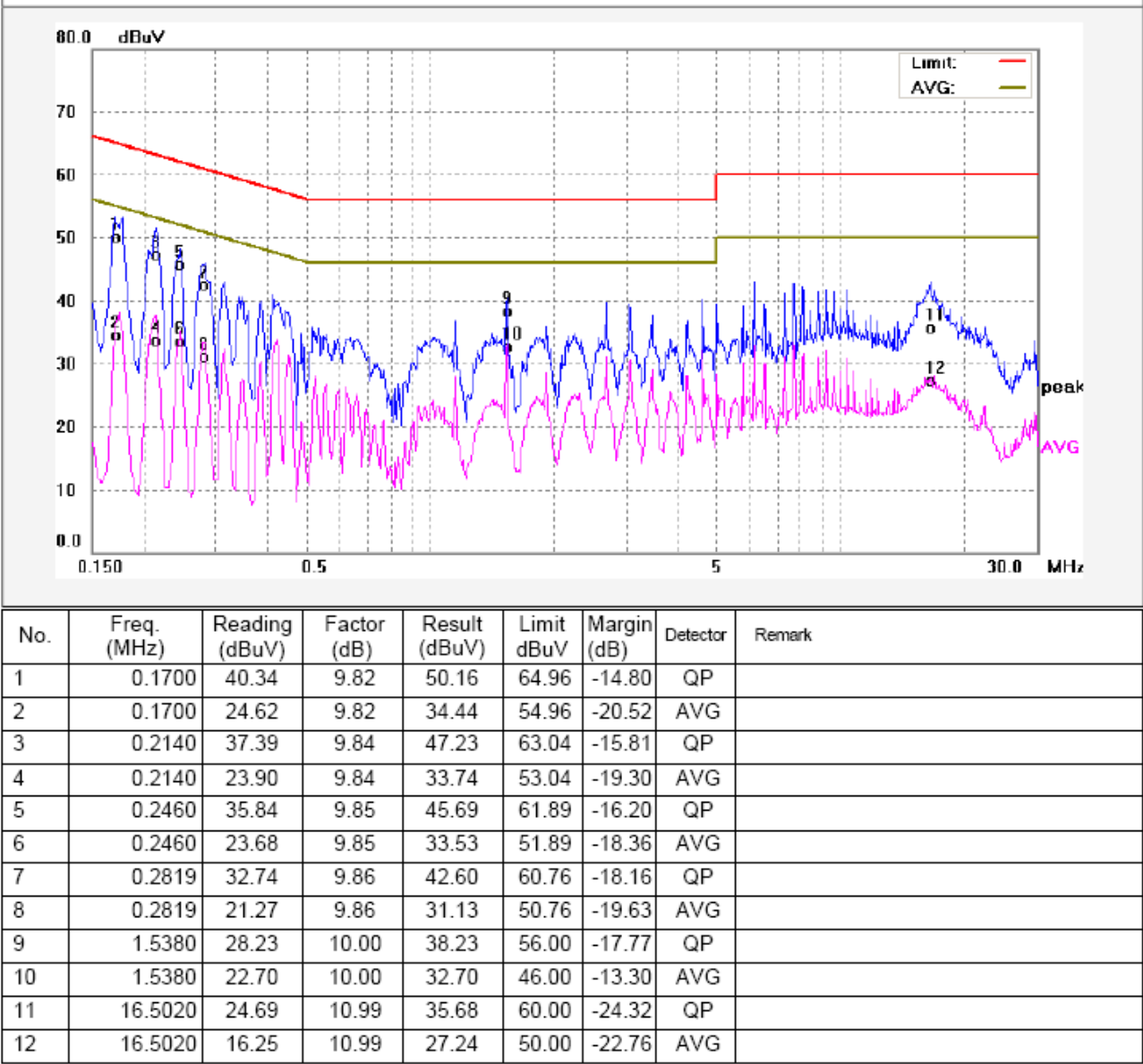
Test mode: data transmitting

Live line:



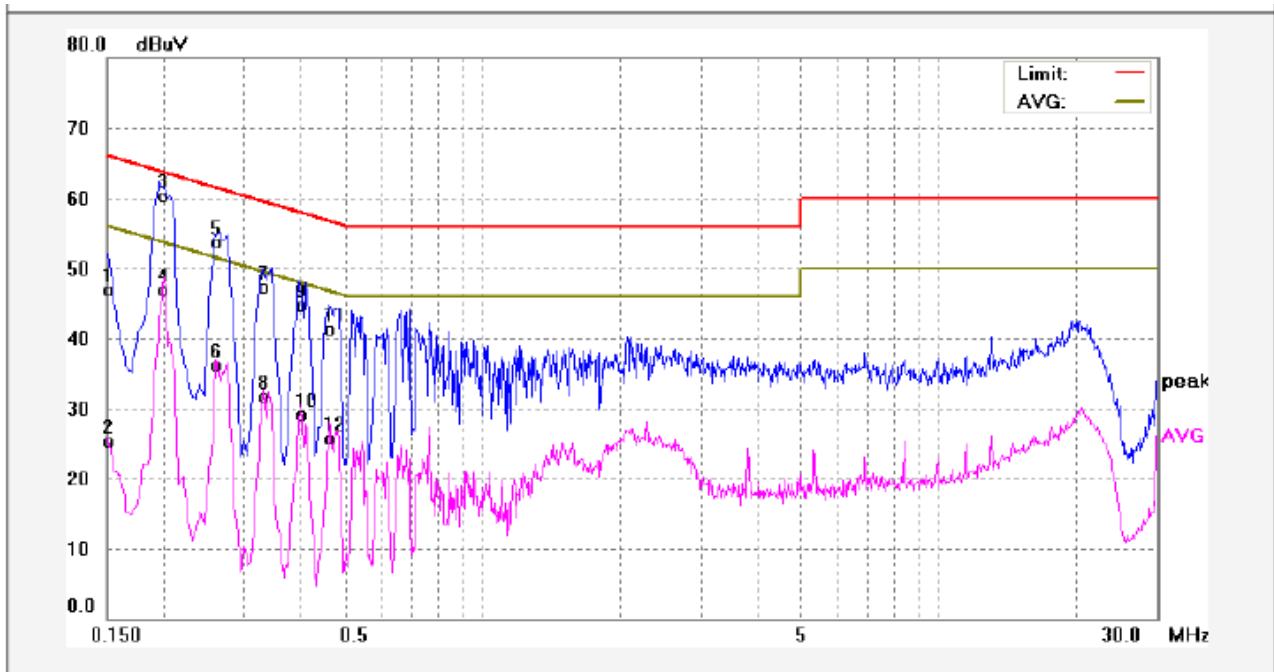
No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1500	33.40	9.80	43.20	65.99	-22.79	QP	
2	0.1500	10.76	9.80	20.56	55.99	-35.43	AVG	
3	0.1780	41.92	9.82	51.74	64.57	-12.83	QP	
4	0.1780	24.03	9.82	33.85	54.57	-20.72	AVG	
5	0.2100	40.86	9.84	50.70	63.20	-12.50	QP	
6	0.2100	24.18	9.84	34.02	53.20	-19.18	AVG	
7	0.2460	36.73	9.85	46.58	61.89	-15.31	QP	
8	0.2460	21.30	9.85	31.15	51.89	-20.74	AVG	
9	0.2779	34.65	9.86	44.51	60.88	-16.37	QP	
10	0.2779	19.33	9.86	29.19	50.88	-21.69	AVG	
11	16.2139	26.12	10.97	37.09	60.00	-22.91	QP	
12	16.2139	13.55	10.97	24.52	50.00	-25.48	AVG	

Neutral line:



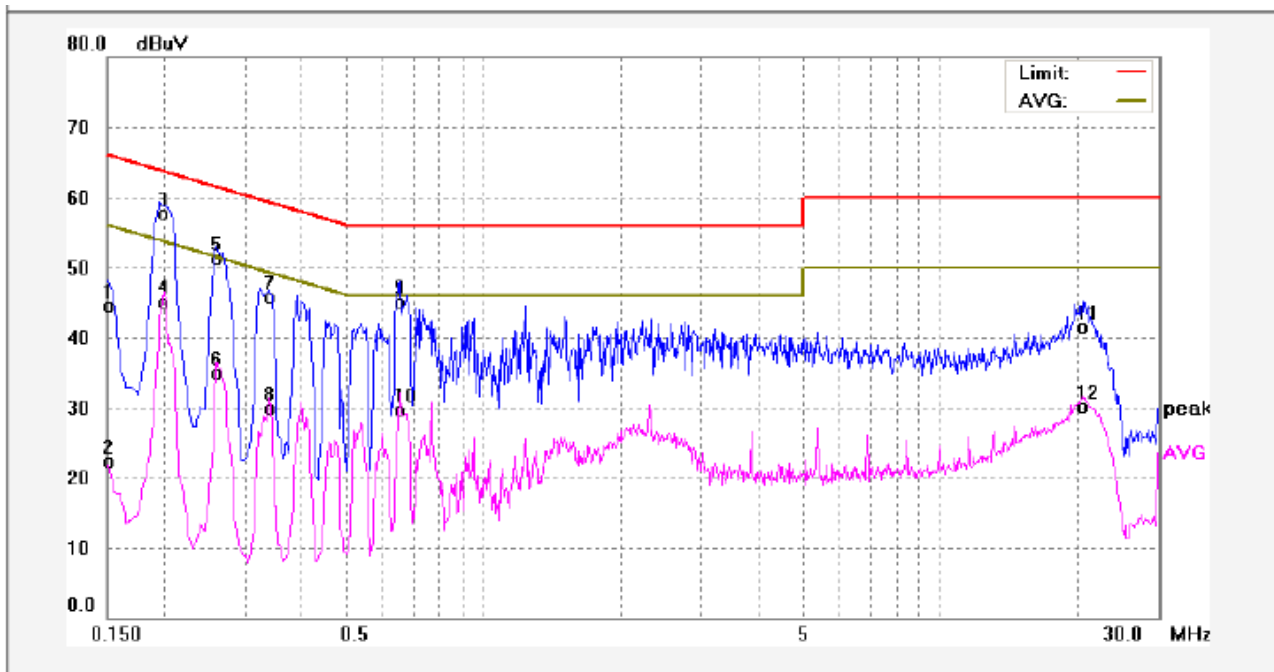
Test mode: SD playing

Live line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1500	37.14	9.80	46.94	65.99	-19.05	QP	
2	0.1500	15.45	9.80	25.25	55.99	-30.74	AVG	
3	0.2000	50.49	9.84	60.33	63.61	-3.28	QP	
4	0.2000	37.05	9.84	46.89	53.61	-6.72	AVG	
5	0.2600	43.75	9.86	53.61	61.43	-7.82	QP	
6	0.2600	26.24	9.86	36.10	51.43	-15.33	AVG	
7	0.3300	37.34	9.88	47.22	59.45	-12.23	QP	
8	0.3300	21.74	9.88	31.62	49.45	-17.83	AVG	
9	0.4000	34.76	9.90	44.66	57.85	-13.19	QP	
10	0.4000	19.12	9.90	29.02	47.85	-18.83	AVG	
11	0.4600	31.44	9.92	41.36	56.69	-15.33	QP	
12	0.4600	15.72	9.92	25.64	46.69	-21.05	AVG	

Neutral line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1500	34.62	9.80	44.42	65.99	-21.57	QP	
2	0.1500	12.57	9.80	22.37	55.99	-33.62	AVG	
3	0.2000	47.96	9.84	57.80	63.61	-5.81	QP	
4	0.2000	35.28	9.84	45.12	53.61	-8.49	AVG	
5	0.2600	41.48	9.86	51.34	61.43	-10.09	QP	
6	0.2600	25.06	9.86	34.92	51.43	-16.51	AVG	
7	0.3400	35.80	9.88	45.68	59.20	-13.52	QP	
8	0.3400	20.12	9.88	30.00	49.20	-19.20	AVG	
9	0.6549	35.16	9.95	45.11	56.00	-10.89	QP	
10	0.6549	19.75	9.95	29.70	46.00	-16.30	AVG	
11	20.4300	30.26	11.23	41.49	60.00	-18.51	QP	
12	20.4300	18.78	11.23	30.01	50.00	-19.99	AVG	

7 Radiated Emissions

Test Requirement: FCC CFR47 Part 15 Section 15.109
 Test Method: ANSI C63.4:2003
 Test Result: PASS
 Frequency Range: 30MHz to 4GHz
 Measurement Distance: 3m
 Limit:

Frequency (MHz)	Field Strength		Field Strength Limit at 3m Measurement Dist	
	uV/m	Distance (m)	uV/m	dBuV/m
0.009 ~ 0.490	$2400/F(\text{kHz})$	300	$10000 * 2400/F(\text{kHz})$	$20\log^{(2400/F(\text{kHz}))} + 80$
0.490 ~ 1.705	$24000/F(\text{kHz})$	30	$100 * 24000/F(\text{kHz})$	$20\log^{(24000/F(\text{kHz}))} + 40$
1.705 ~ 30	30	30	$100 * 30$	$20\log^{(30)} + 40$
30 ~ 88	100	3	100	$20\log^{(100)}$
88 ~ 216	150	3	150	$20\log^{(150)}$
216 ~ 960	200	3	200	$20\log^{(200)}$
Above 960	500	3	500	$20\log^{(500)}$

Note:

- a) The tighter limit applies at the band edges.
 For example: F.S limit at 88MHz is 100uV/m
- b) If measurement is made at 3m distance, then F.S Limit at 3m distance is adjusted by using the formula of $L_{d1} = L_{d2} * (d2/d1)^2$.
 For example:
 F.S Limit at 30m(d2) distance is 30uV/m(L_{d2}), then F.S Limit at 3m(d1) distance is
 $L_{d1} = 30\text{uV/m} * (30/3)^2 = 100 * 30\text{uV/m}$

7.1 EUT Operation :

Operating Environment:

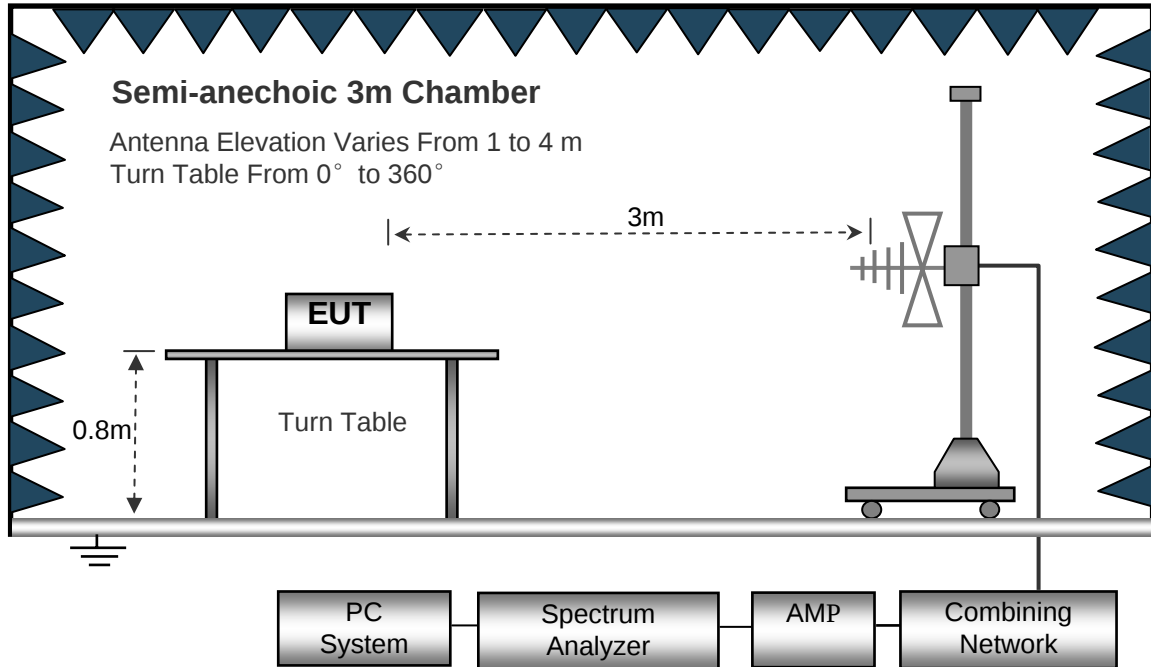
Temperature: 25.5 °C
 Humidity: 51 % RH
 Atmospheric Pressure: 101.3 kPa

EUT Operation:

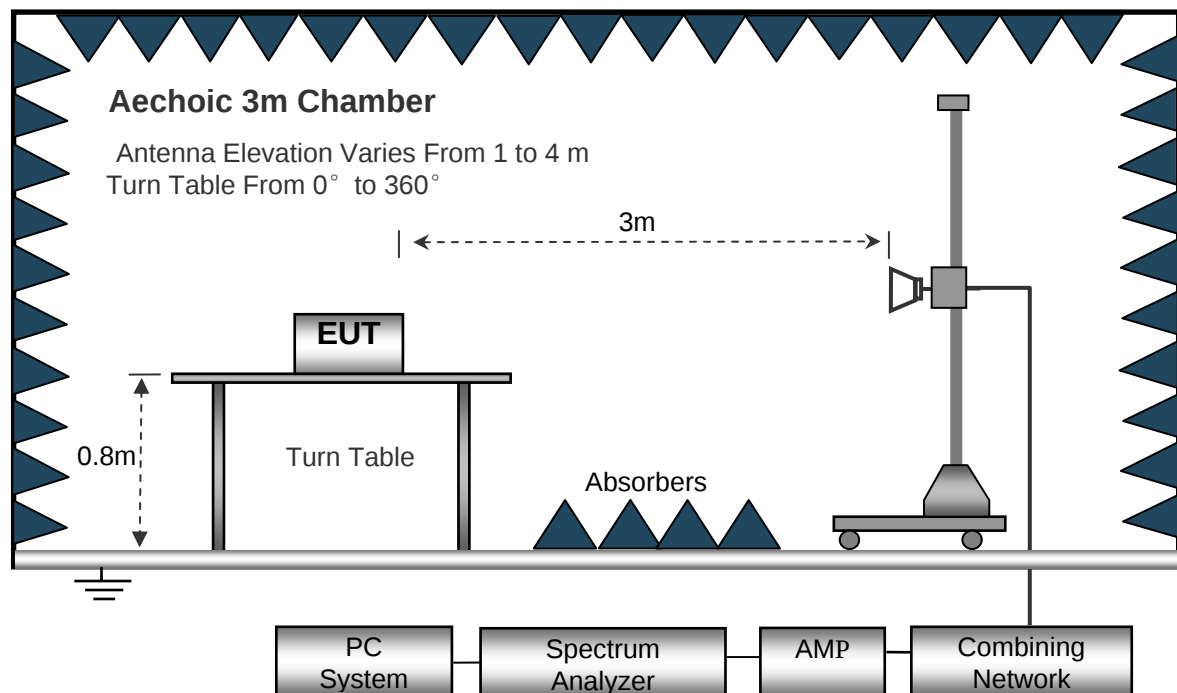
The pre-test was performed in data transmitting and SD card playing mode, and the test date is show in the report.

7.2 EUT Setup

The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz.



7.3 Spectrum Analyzer Setup

According to FCC Part15 Rules, the system was tested 30MHz to 4GHz.

Below 30MHz

Sweep Speed Auto
 IF Bandwidth10kHz
 Video Bandwidth.....10kHz
 Resolution Bandwidth.....10kHz

30MHz ~ 1GHz

Sweep SpeedAuto
 DetectorPK
 Resolution Bandwidth100kHz
 Video Bandwidth.....300kHz

Above 1GHz

Sweep SpeedAuto
 DetectorPK
 Resolution Bandwidth1MHz
 Video Bandwidth.....3MHz
 DetectorAve
 Resolution Bandwidth1MHz
 Video Bandwidth.....10Hz

7.4 Test Procedure

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The radiation measurements are performed in X(normal uses) axis positioning. And all the modes was tested in the report.
8. The EUT was tested in receive mode. According to ANSI STANDARD C63.4-2003 12.1.1.2
 OTHER TYPES OF RECEIVERS: In receive mode, a typical signal or an unmodulated CW signal at the operating frequency of the EUT shall be supplied to the EUT for all measurements. Such a signal may be supplied by either a signal generator and an antenna in close proximity to the EUT or directly conducted into the antenna terminals of the EUT. The signal level shall be sufficient to the local oscillator of the EUT. In this report, the antenna of the signal generator is under the turntable.

7.5 Test Result

Formula of conversion factors:the field strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBuV/m) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stored in terms of dB. The gain of the pressletor was accounted for in the spectrum analyser meter reading.

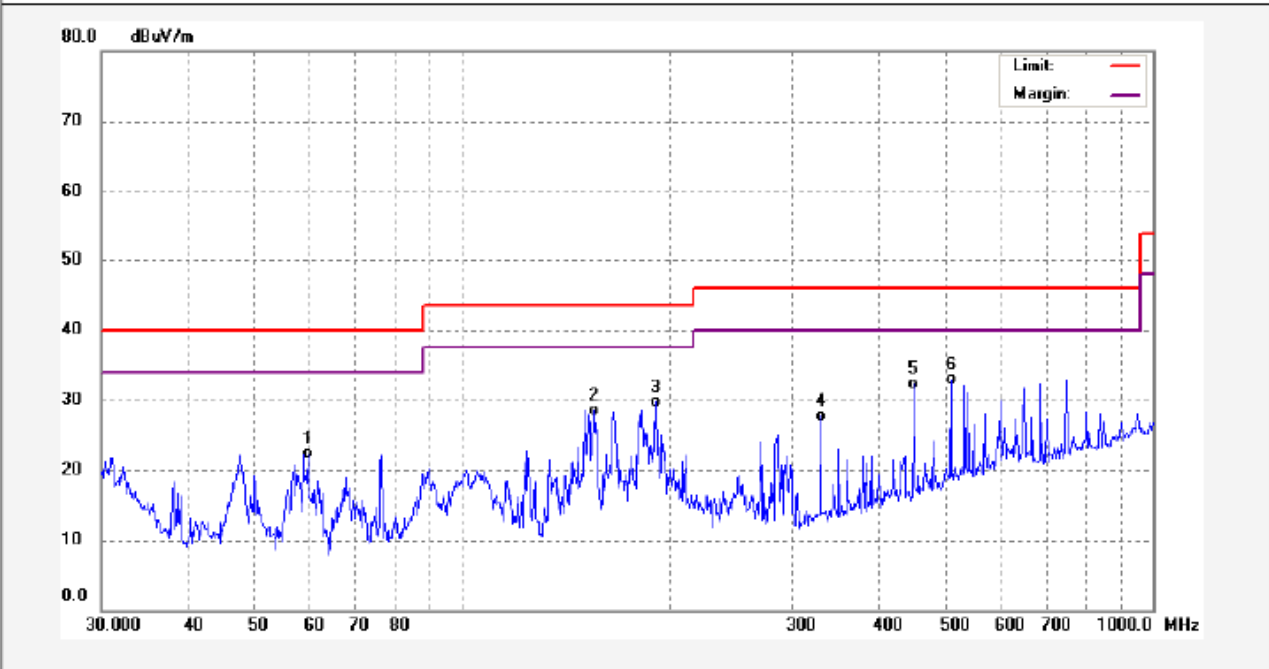
Example:

Freq(MHz) Meter Reading +ACF=FS
33 20dBuV+10.36dB=30.36dBuV/m @3m

Test Data: 30MHz ~ 1000MHz

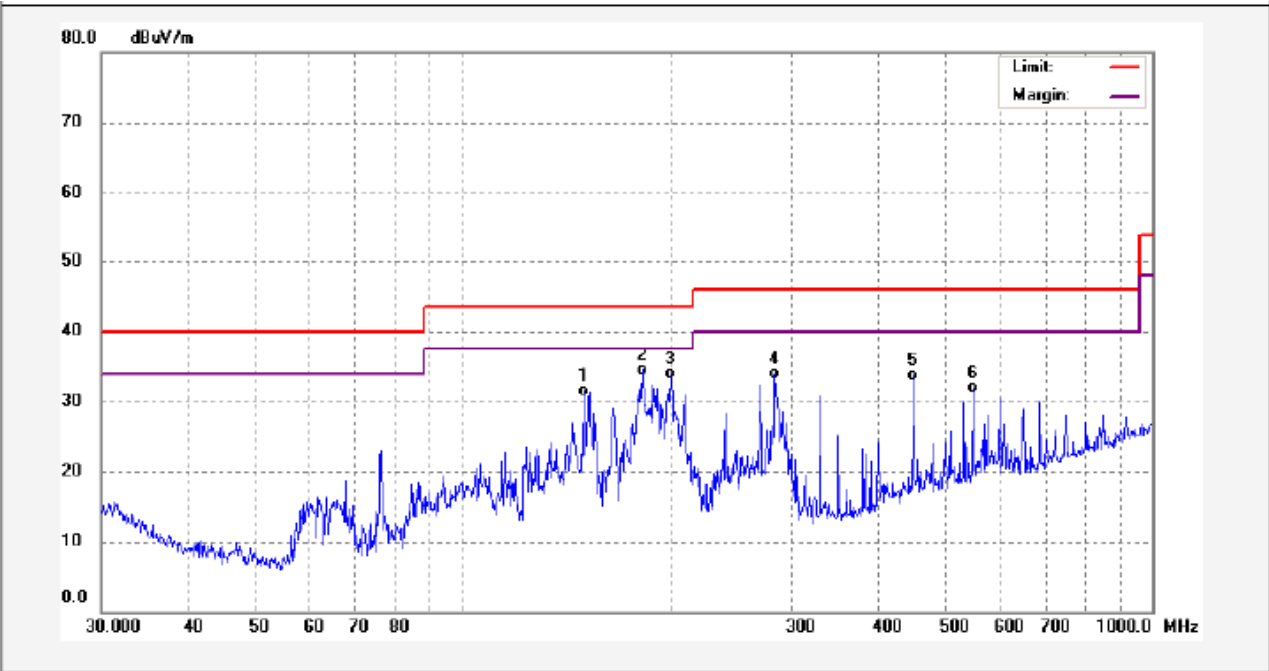
Test mode: data transmitting

Antenna Porlarization: Vertical



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	59.6493	46.32	-24.04	22.28	40.00	-17.72	QP	
2	155.3644	49.62	-21.06	28.56	43.50	-14.94	QP	
3	190.4050	53.00	-23.21	29.79	43.50	-13.71	QP	
4	330.1949	46.51	-18.77	27.74	46.00	-18.26	QP	
5	451.1350	47.77	-15.46	32.31	46.00	-13.69	QP	
6	510.0436	46.90	-14.07	32.83	46.00	-13.17	QP	

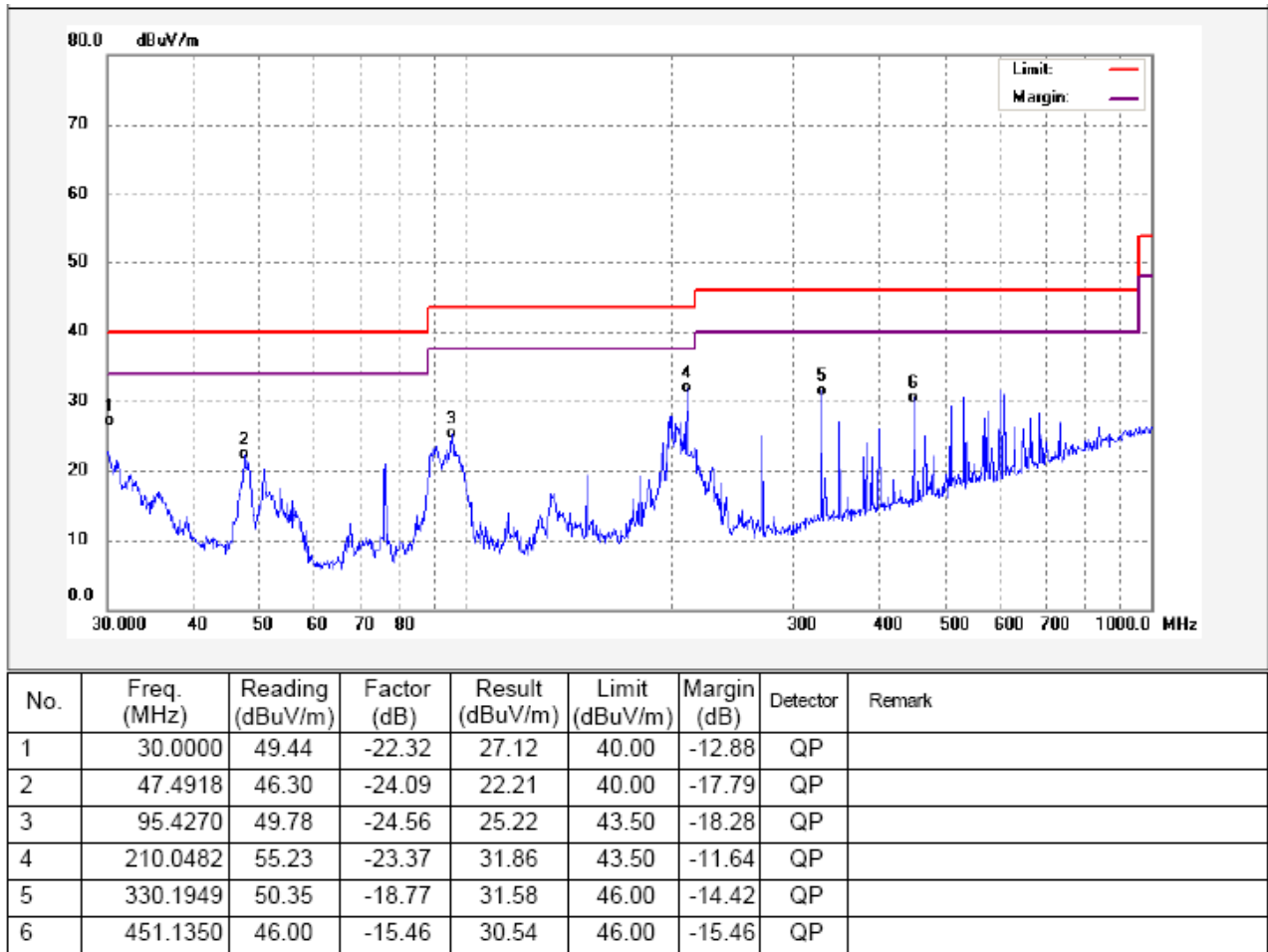
Antenna Porlarization: Horizontal



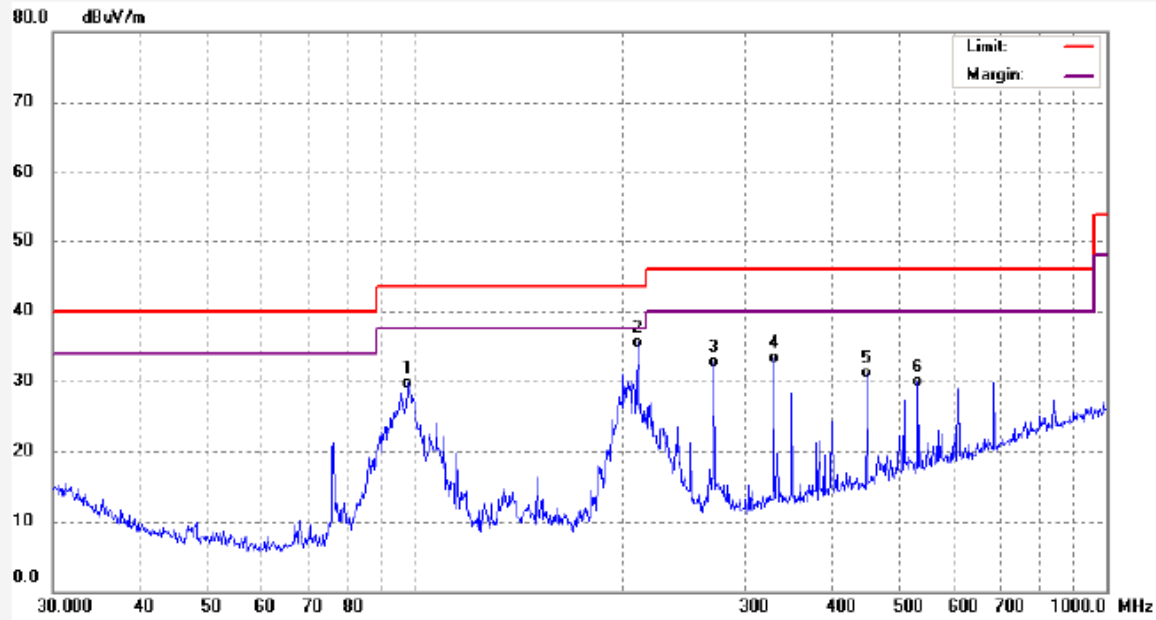
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	150.0108	52.15	-20.73	31.42	43.50	-12.08	QP	
2	182.5592	56.83	-22.35	34.48	43.50	-9.02	QP	
3	200.6881	57.73	-23.79	33.94	43.50	-9.56	QP	
4	283.9791	54.02	-20.15	33.87	46.00	-12.13	QP	
5	451.1350	49.05	-15.29	33.76	46.00	-12.24	QP	
6	550.9480	44.95	-13.04	31.91	46.00	-14.09	QP	

Test mode: SD Card playing

Antenna Polarization: Vertical



Antenna Porlarization: Horizontal

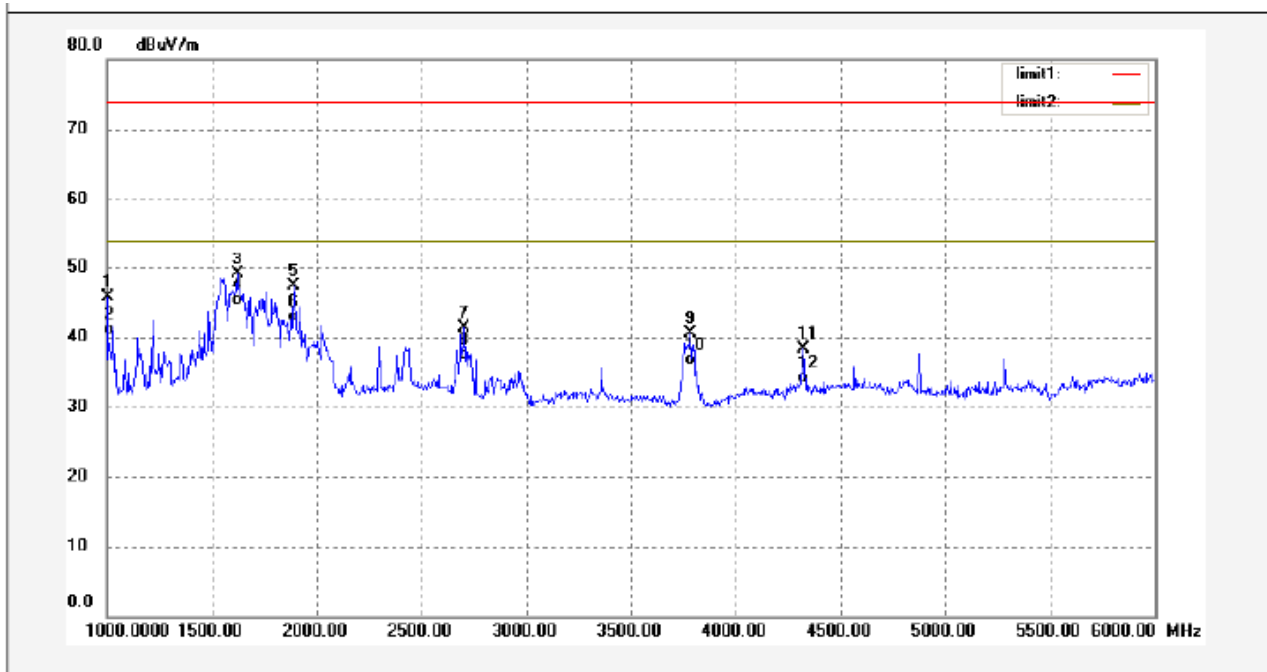


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	97.7983	54.58	-24.88	29.70	43.50	-13.80	QP	
2	210.0482	59.02	-23.46	35.56	43.50	-7.94	QP	
3	270.3748	53.42	-20.73	32.69	46.00	-13.31	QP	
4	330.1949	51.97	-18.72	33.25	46.00	-12.75	QP	
5	451.1350	46.49	-15.29	31.20	46.00	-14.80	QP	
6	533.8321	43.53	-13.56	29.97	46.00	-16.03	QP	

Test Data: 1GHz ~ 4GHz

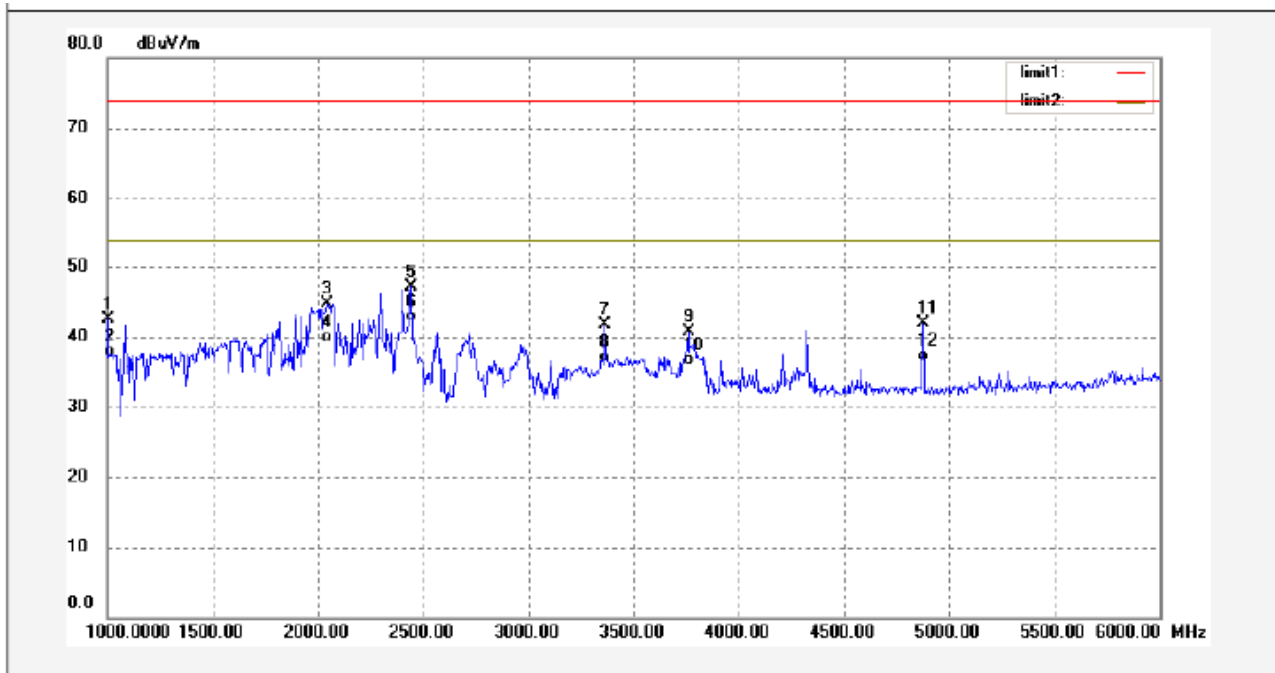
Test mode: data transmitting

Antenna Polarization: Vertical



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	1000.0000	63.71	-18.08	45.63	74.00	-28.37	peak	
2	1000.0000	58.42	-18.08	40.34	54.00	-13.66	AVG	
3	1620.000	67.05	-17.92	49.13	74.00	-24.87	peak	
4	1620.000	62.34	-17.92	44.42	54.00	-9.58	AVG	
5	1890.000	64.48	-17.26	47.22	74.00	-26.78	peak	
6	1890.000	59.36	-17.26	42.10	54.00	-11.90	AVG	
7	2705.000	56.36	-15.03	41.33	74.00	-32.67	peak	
8	2705.000	51.74	-15.03	36.71	54.00	-17.29	AVG	
9	3785.000	54.24	-13.81	40.43	74.00	-33.57	peak	
10	3785.000	49.81	-13.81	36.00	54.00	-18.00	AVG	
11	4325.000	51.20	-12.98	38.22	74.00	-35.78	peak	
12	4325.000	46.22	-12.98	33.24	54.00	-20.76	AVG	

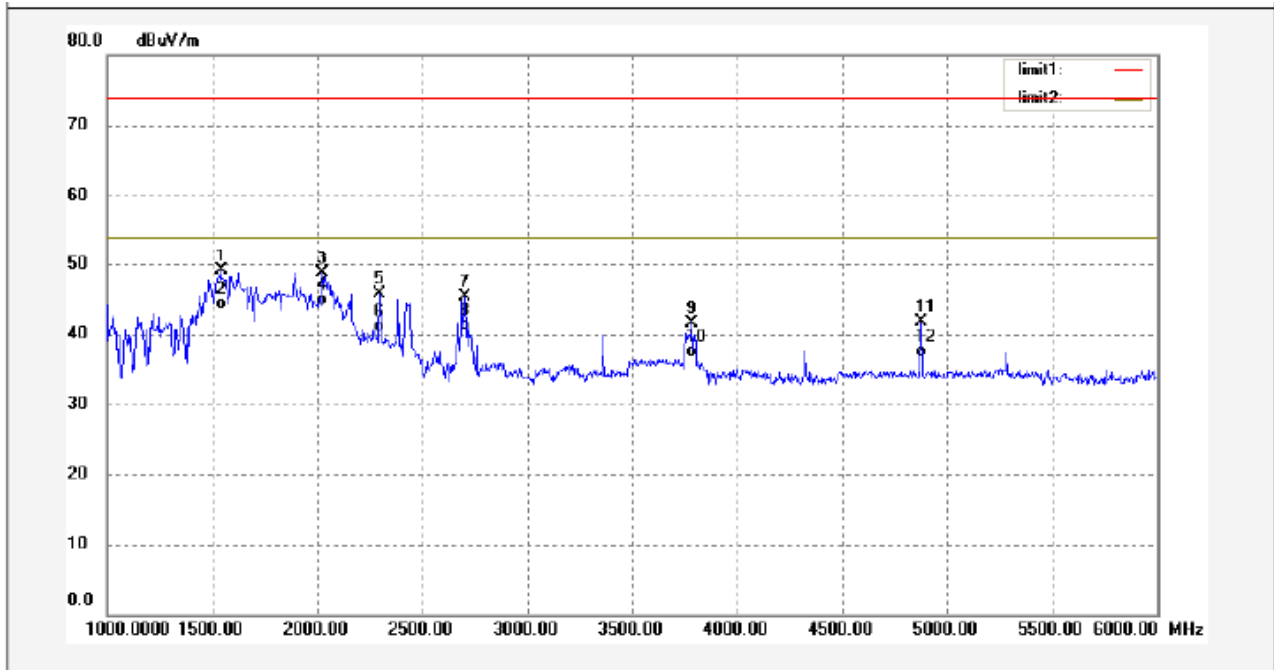
Antenna Polarization: Horizontal



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	1000.0000	60.51	-18.08	42.43	74.00	-31.57	peak	
2	1000.0000	55.14	-18.08	37.06	54.00	-16.94	AVG	
3	2045.000	60.84	-16.13	44.71	74.00	-29.29	peak	
4	2045.000	55.26	-16.13	39.13	54.00	-14.87	AVG	
5	2440.000	62.82	-15.70	47.12	74.00	-26.88	peak	
6	2440.000	57.86	-15.70	42.16	54.00	-11.84	AVG	
7	3360.000	56.67	-14.95	41.72	74.00	-32.28	peak	
8	3360.000	51.29	-14.95	36.34	54.00	-17.66	AVG	
9	3760.000	54.55	-13.87	40.68	74.00	-33.32	peak	
10	3760.000	49.87	-13.87	36.00	54.00	-18.00	AVG	
11	4875.000	53.89	-11.93	41.96	74.00	-32.04	peak	
12	4875.000	48.35	-11.93	36.42	54.00	-17.58	AVG	

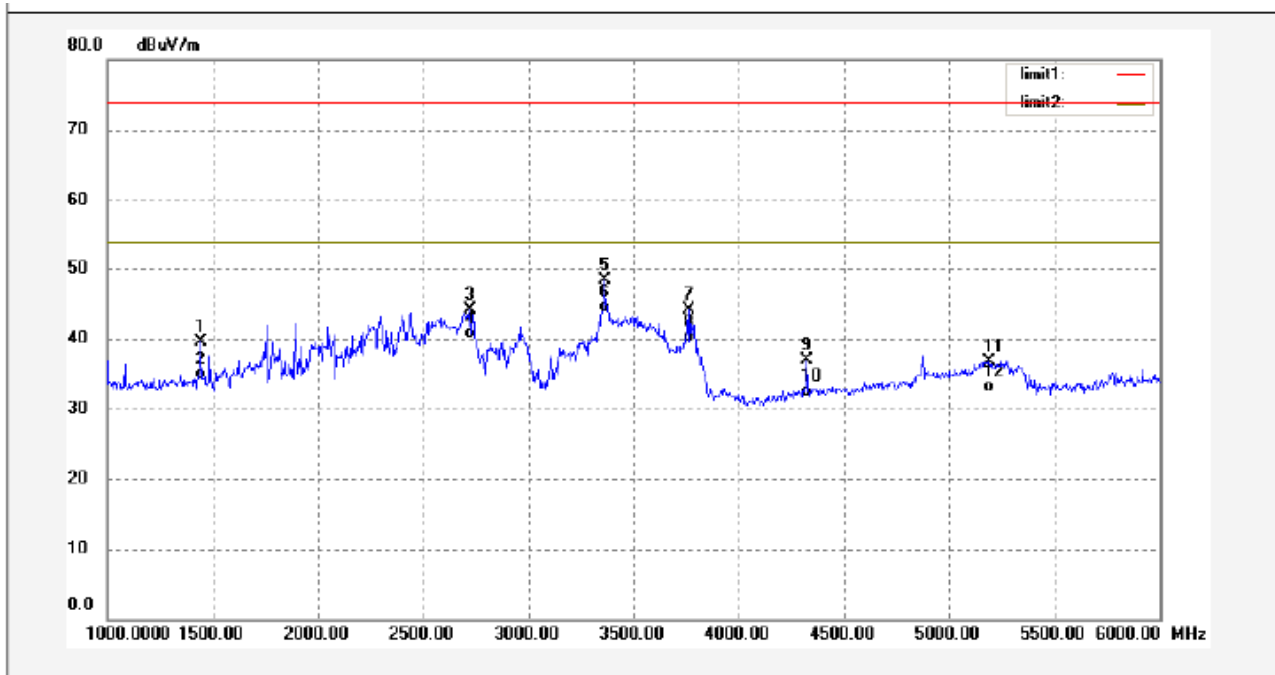
Test mode: SD Card playing

Antenna Polarization: Vertical



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	1540.000	66.72	-17.69	49.03	74.00	-24.97	peak	
2	1540.000	61.15	-17.69	43.46	54.00	-10.54	AVG	
3	2025.000	65.16	-16.46	48.70	74.00	-25.30	peak	
4	2025.000	60.47	-16.46	44.01	54.00	-9.99	AVG	
5	2295.000	60.91	-15.14	45.77	74.00	-28.23	peak	
6	2295.000	55.43	-15.14	40.29	54.00	-13.71	AVG	
7	2705.000	60.36	-15.03	45.33	74.00	-28.67	peak	
8	2705.000	55.48	-15.03	40.45	54.00	-13.55	AVG	
9	3785.000	55.24	-13.81	41.43	74.00	-32.57	peak	
10	3785.000	50.48	-13.81	36.67	54.00	-17.33	AVG	
11	4875.000	53.66	-11.93	41.73	74.00	-32.27	peak	
12	4875.000	48.66	-11.93	36.73	54.00	-17.27	AVG	

Antenna Polarization: Horizontal



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	1440.000	56.97	-17.37	39.60	74.00	-34.40	peak	
2	1440.000	51.42	-17.37	34.05	54.00	-19.95	AVG	
3	2720.000	59.09	-15.00	44.09	74.00	-29.91	peak	
4	2720.000	54.87	-15.00	39.87	54.00	-14.13	AVG	
5	3360.000	63.17	-14.95	48.22	74.00	-25.78	peak	
6	3360.000	58.63	-14.95	43.68	54.00	-10.32	AVG	
7	3760.000	58.05	-13.87	44.18	74.00	-29.82	peak	
8	3760.000	53.47	-13.87	39.60	54.00	-14.40	AVG	
9	4325.000	49.88	-12.98	36.90	74.00	-37.10	peak	
10	4325.000	44.74	-12.98	31.76	54.00	-22.24	AVG	
11	5190.000	48.41	-11.65	36.76	74.00	-37.24	peak	
12	5190.000	43.87	-11.65	32.22	54.00	-21.78	AVG	

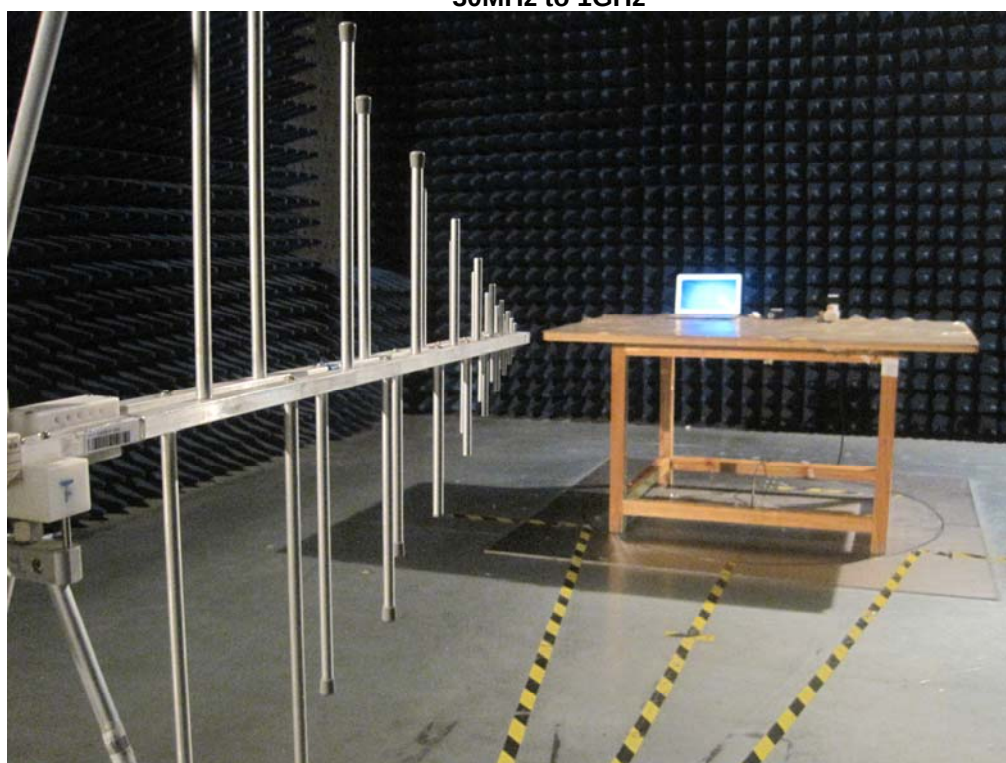
8 Photographs – Test Setup

8.1 Photograph –Conducted Emissions Test Setup

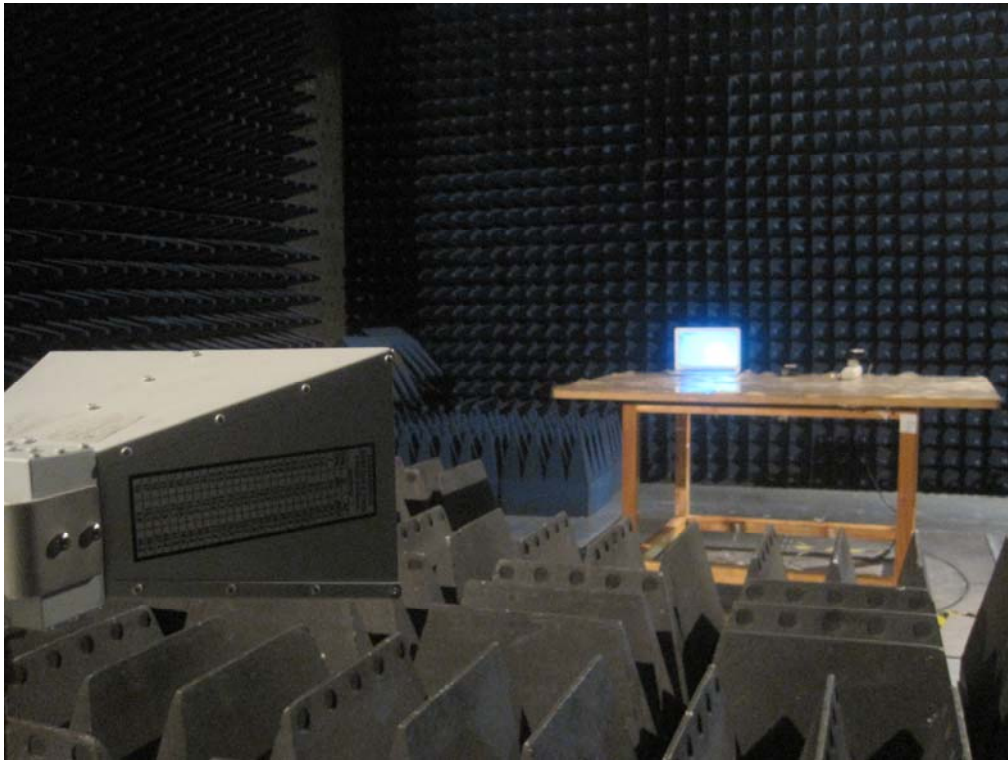


8.2 Photograph – Radiation Emission Test Setup

30MHz to 1GHz



Above 1GHz

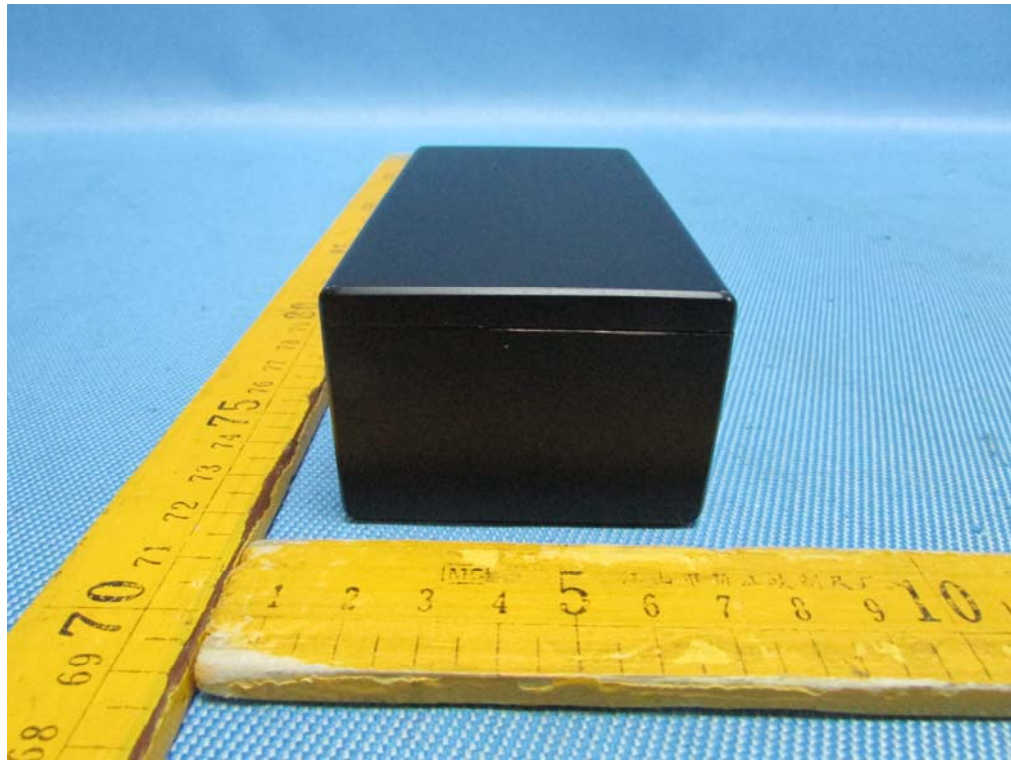


9 Photographs - Constructional Details

9.1 EUT –Appearance View



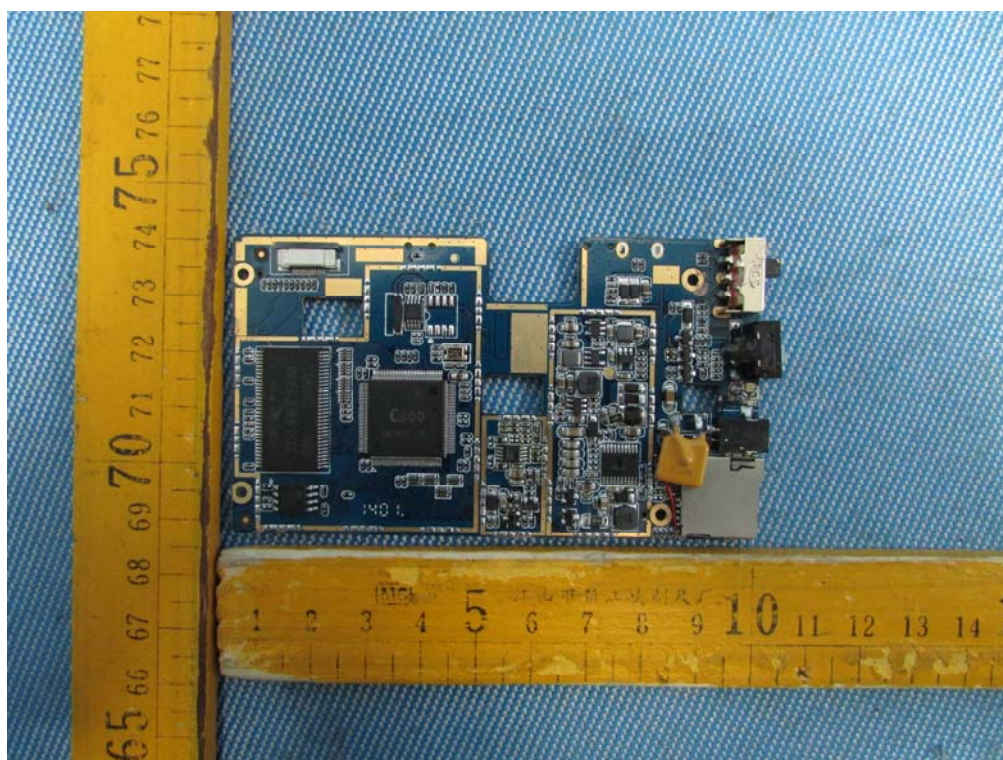
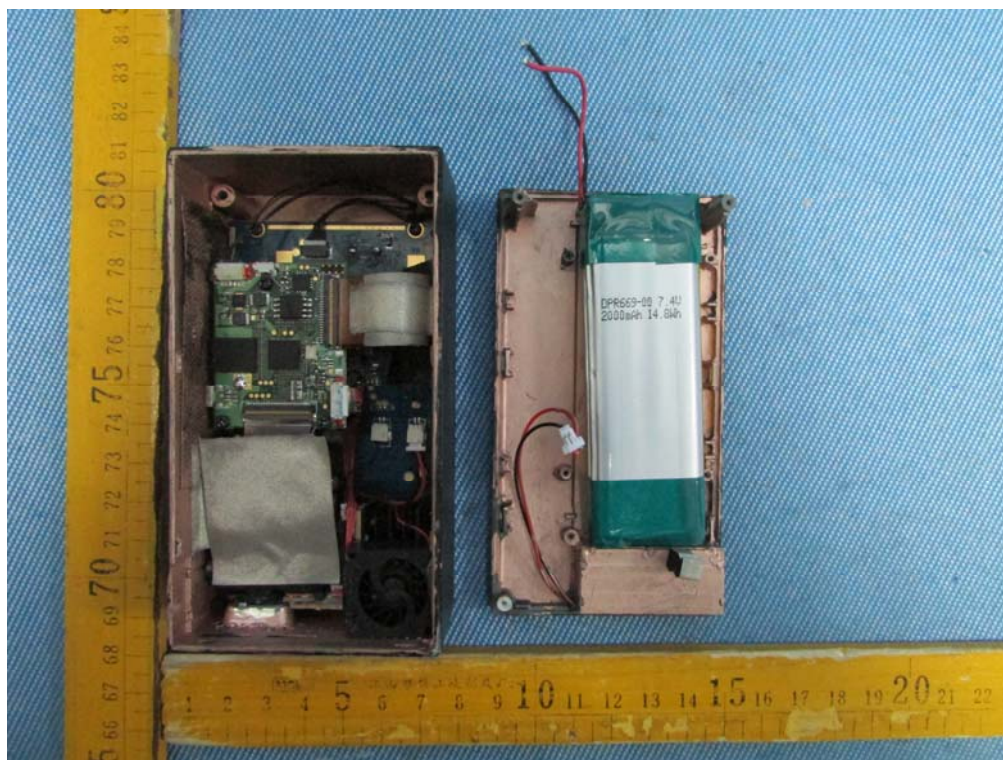


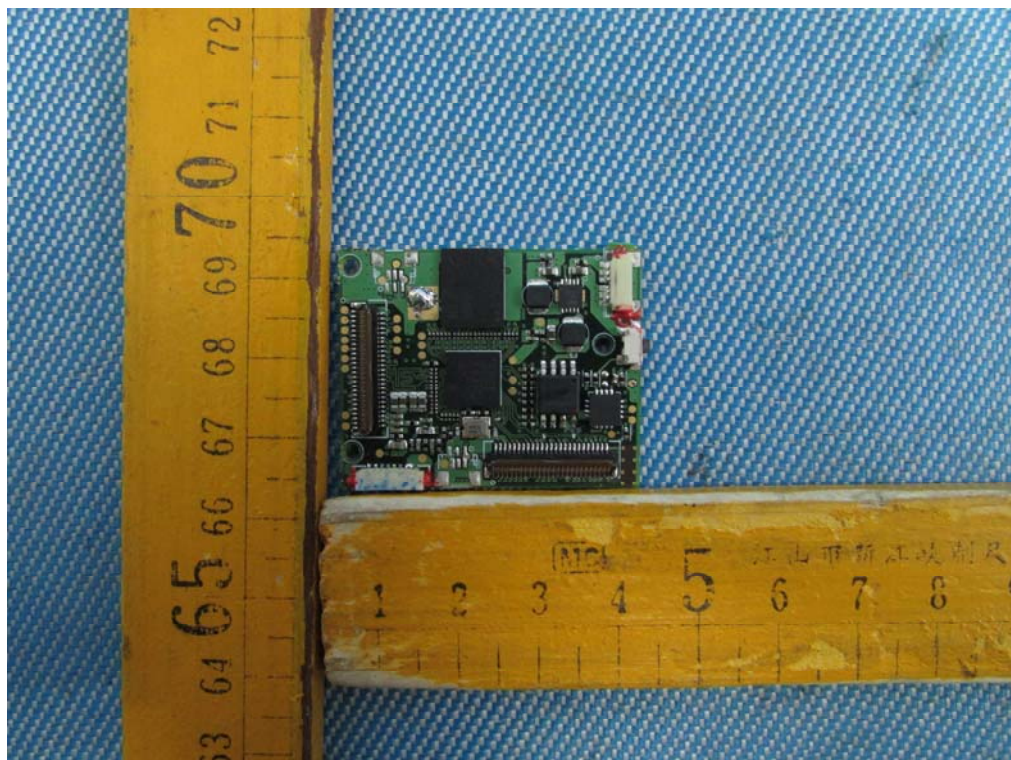
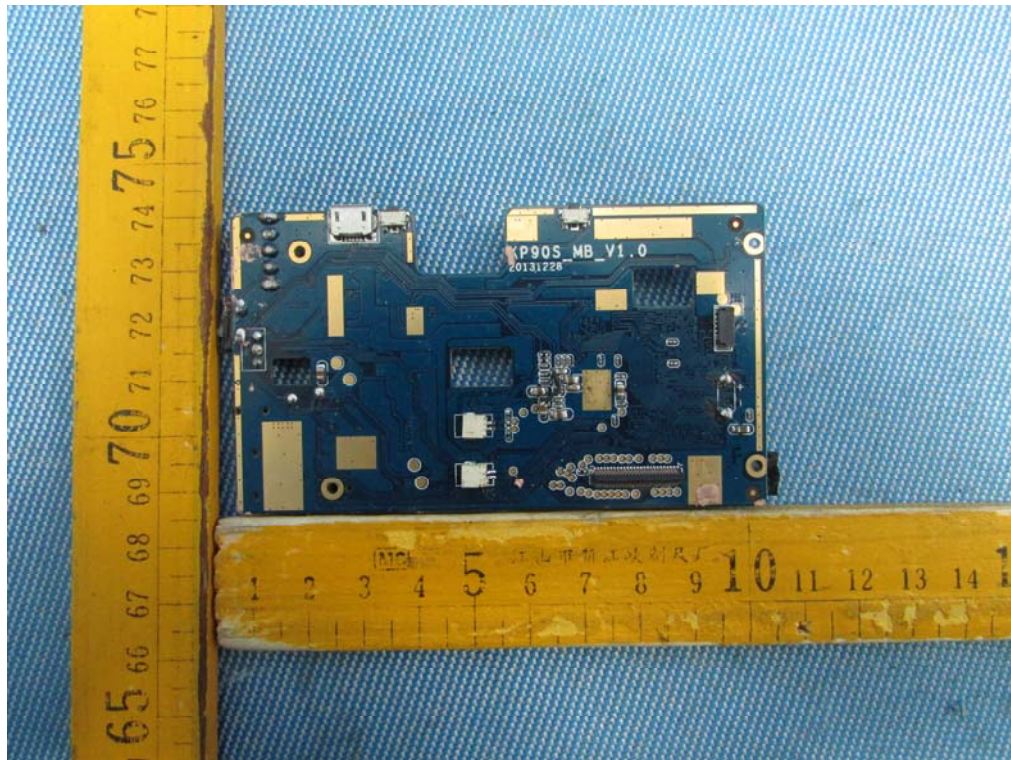


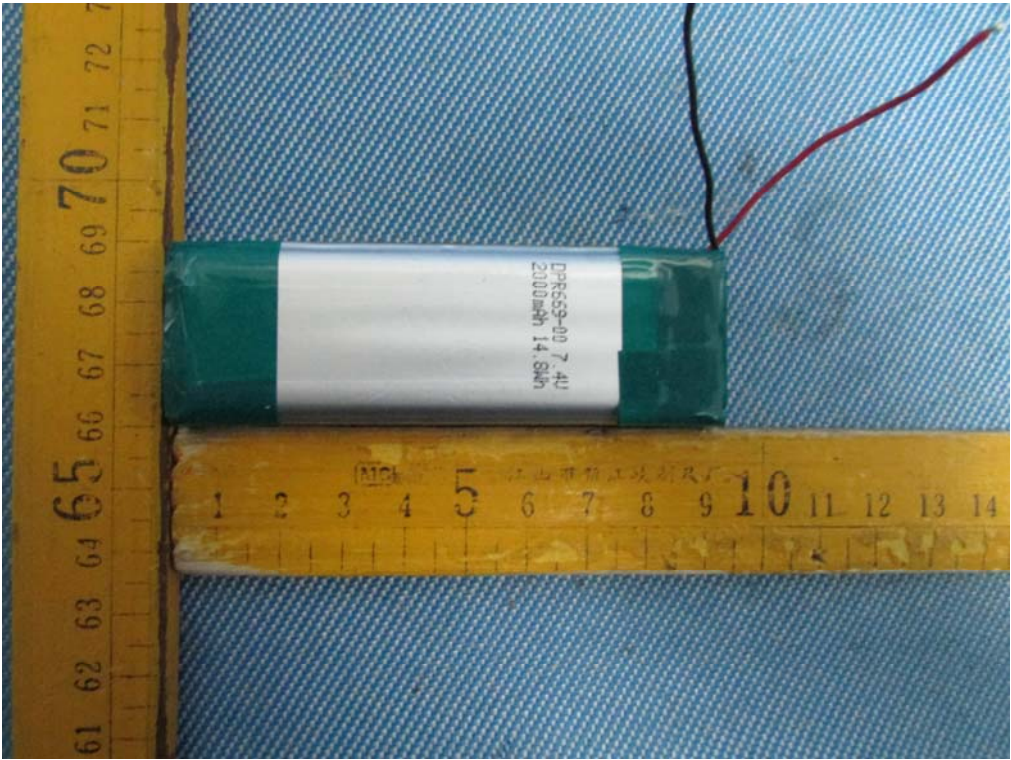
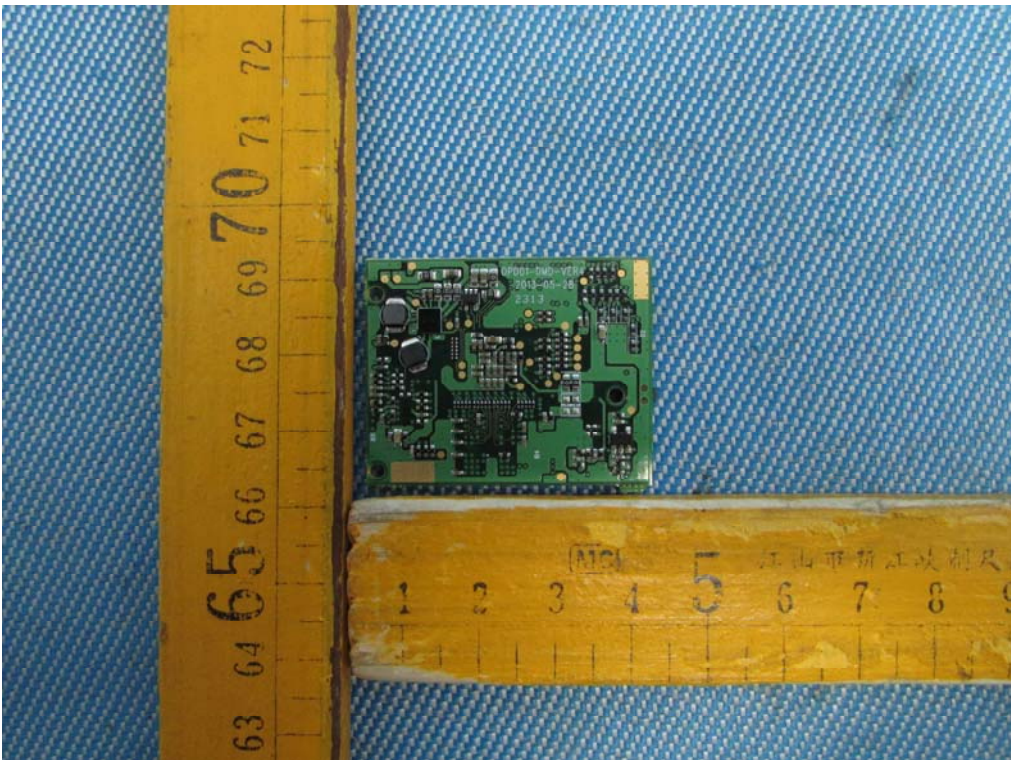
9.2 EUT – Adapter View



9.3 EUT – Open View







=====End of Report=====