



Report No.SH15120054E01

FCC EMC TEST REPORT

Issued to

esky wireless Inc

For

GPS Tracker

Model Name : ES620
Trade Name : esky
Brand Name : esky
Standard : 47 CFR Part 15 Subpart B
Test date : Jan.04,2016 to Jan.22,2016
Issue date : Jan.27,2016

Shanghai MORLAB Communication Technology Co., Ltd.



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LAB CODE 20081223-00
IEEE 1725

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DIRECTORY

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Change History

Issue	Date	Reason for change
1.0	Jan.27,2016	First edition

1. General Information

1.1 Applicant

esky wireless Inc

22-303 #328 street Xinghu, Suzhou, China

1.2 Manufacturer

esky wireless Inc

22-303 #328 street Xinghu, Suzhou, China

1.3 Description of EUT

EUT Type	GPS Tracker
Brand Name.....	esky
Trade Name	esky
Model Name	ES620
Hardware Version	ES620-MB-H102
Software Version	ES620_V1.5_B03_160105
Antenna type.....	Internal
Antenna gain.....	GSM 850: 2 dBi GSM 1900: 2 dBi
Frequency Range.....	GSM 850MHz: Tx: 824.20-848.80 MHz (at intervals of 200kHz); Rx: 869.20-893.80 MHz (at intervals of 200kHz) GSM 1900MHz Tx: 1850.20-1909.80 MHz (at intervals of 200kHz); Rx: 1930.20-1989.80 MHz (at intervals of 200kHz)
Modulation Type	GPRS/GSM mode with GMSK modulation
Battery	
Mode No.....	603448
Capacitance	1000mAh
Rated Voltages	3.7V
Charge Limit.....	4.2V
Other Accessories	Data Line
Power Adapter	
Brand Name.....	SUNSHINE
Mode No.....	XS-1205000
Input.....	100-240V, 50/60Hz, 0.3A
Output.....	5V, 500mA
Manufacturer	SHENZHEN SUNSHINE
Manufacturer Address	XingQuan Industrial Park No.1 ,Zhuang Village,ShaJing Town, BaoAn District,ShenZhen City,GuangDong Provice,China

For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

2. Facilities and Accreditations

2.1 Test Facility

Shanghai Morlab Communications Technology Co., Ltd. Morlab Laboratory is a third party testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L6644. A 9*6*6(m) fully anechoic chamber was used for the radiated spurious emissions test.

2.2 Environmental Conditions

Ambient temperature: 15~35°C

Relative humidity: 30~60%

Atmosphere pressure: 86-106kPa

2.3 Measurement Uncertainty

The uncertainty is calculated using the methods suggested in the "Guide to the Expression of Uncertainty in Measurement" (GUM) published by ISO.

Uncertainty of Conducted Emission: $\pm 1.76\text{dB}$

Uncertainty of Radiated Emission: $\pm 3.16\text{dB}$

2.4 List of Equipments Used

Description	Manufacturer	Model	Serial No.	Expiry Date	In Use
Shielding Room	CHENGYU	5m×4m×3m	CR	2017.09.13	<input checked="" type="checkbox"/>
EMI Test Receiver	R&S	ESCI7	100787	2016.02.24	<input checked="" type="checkbox"/>
Artificial Mains Network	TESEQ	NNB 51	33285	2016.02.24	<input checked="" type="checkbox"/>
3m Semi-anechoic Chamber	CHENGYU	9.2×6.25×6.15m	SAR	2017.09.13	<input checked="" type="checkbox"/>
Broadband Log Antenna	Schwarzbeck	VULB 9163	9163-561	2017.07.24	<input checked="" type="checkbox"/>
Broadband Horn Antenna	Schwarzbeck	BBHA 9120 D	9120D-1033	2017.07.24	<input checked="" type="checkbox"/>
Power Supplier	NF	ES2000S	9087735	2016.09.25	<input checked="" type="checkbox"/>
Laptop	ACER	Aspire 4376ZG	LXPFY0C004935291221601	/	<input checked="" type="checkbox"/>
Laptop Adapter	LITEON	PA-1650-22	9801016502	/	<input checked="" type="checkbox"/>
USB Data Cable	/	/	/	/	<input checked="" type="checkbox"/>

NOTE:

Equipments listed above have been calibrated and are in the period of validation.

2.5 Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart B:

No.	Identity	Document Title
1	47 CFR Part 15 (10-1-13 Edition)	Radio Frequency Devices

Test detailed items/section required by FCC rules and results are as below:

No.	Section	Description	Result
1	15.107	Conducted Emission	PASS
2	15.109	Radiated Emission	PASS
3	ANSI C63.4-2014	Radiated Emission	PASS

3. Test Conditions Setting

3.1 Test Mode

Mode 1: Transferring and Charging Mode

During the measurement of traffic operating mode, a communication link was established between the EUT and PC, and maintained during the measurement.

NOTE:

All configurations and test modes are performed, only the worst case is recorded in this report.

4. Emission Tests

4.1 Conducted Emission Measurement

4.1.1 Limits of Conducted Emission:

According to FCC section 15.107, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 Ω line impedance stabilization network (LISN).

Frequency (MHz)	CLASS B (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

NOTE:

- (1) The limit subjects to the Class B digital device.
- (2) The lower limit shall apply at the band edges.
- (3) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

4.1.2 Test Procedure

The EUT and support equipment, if needed, were set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.4 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor standing equipment, it is placed on the ground plane, which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.

All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.

EUT connected to Class B Computer/Laptop via USB data cable and data exchange mode. The Computer/Laptop installed by US power 120V/60Hz, through a Line Impedance Stabilization Network (LISN), which was supplied power source and was grounded to the ground plane.

The test program of the EUT was started. Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.

The Receiver scanned from 150kHz to 30MHz for emissions in each of the test modes.

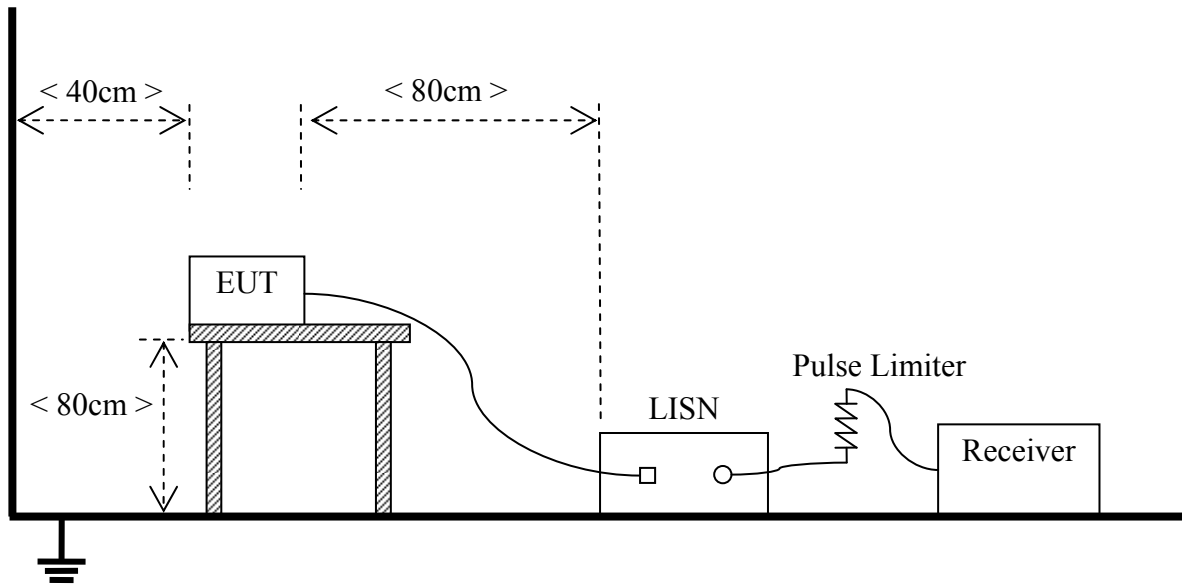
During the above scans, the emissions were maximized by cable manipulation.

The test mode(s) described in Item 3.1 were scanned during the preliminary test.

After the preliminary scan, we found the test mode described in Item 3.1 producing the highest emission level.

The worst configuration of EUT and cable of the above highest emission level were recorded for reference of the final test.

4.1.3 Test Setup



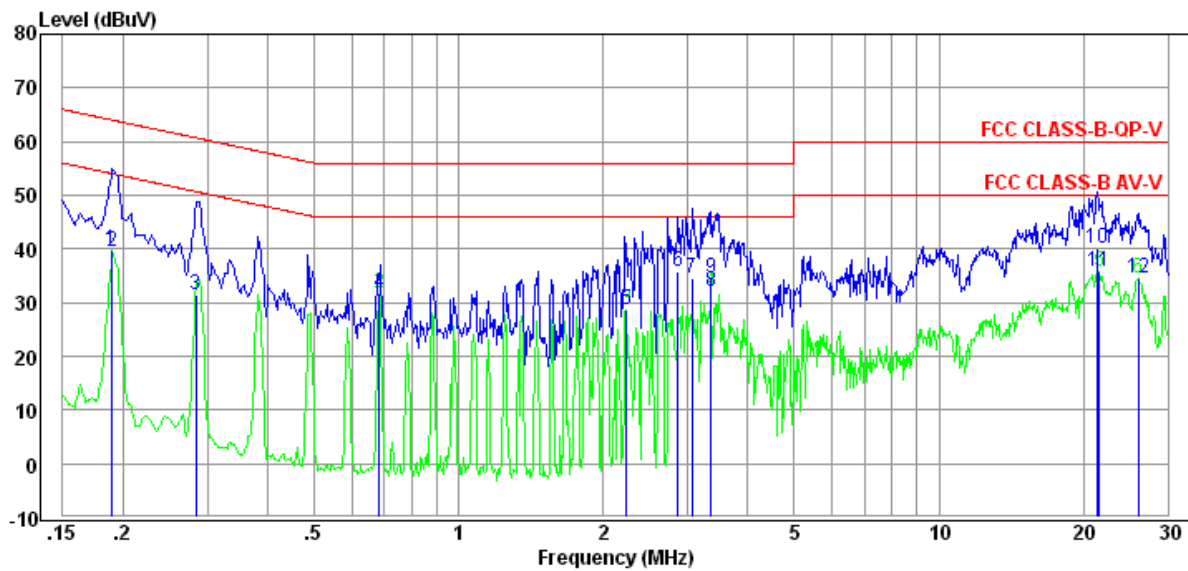
4.1.4 Test Result

Test Verdict Recorded for Suspicious Points:

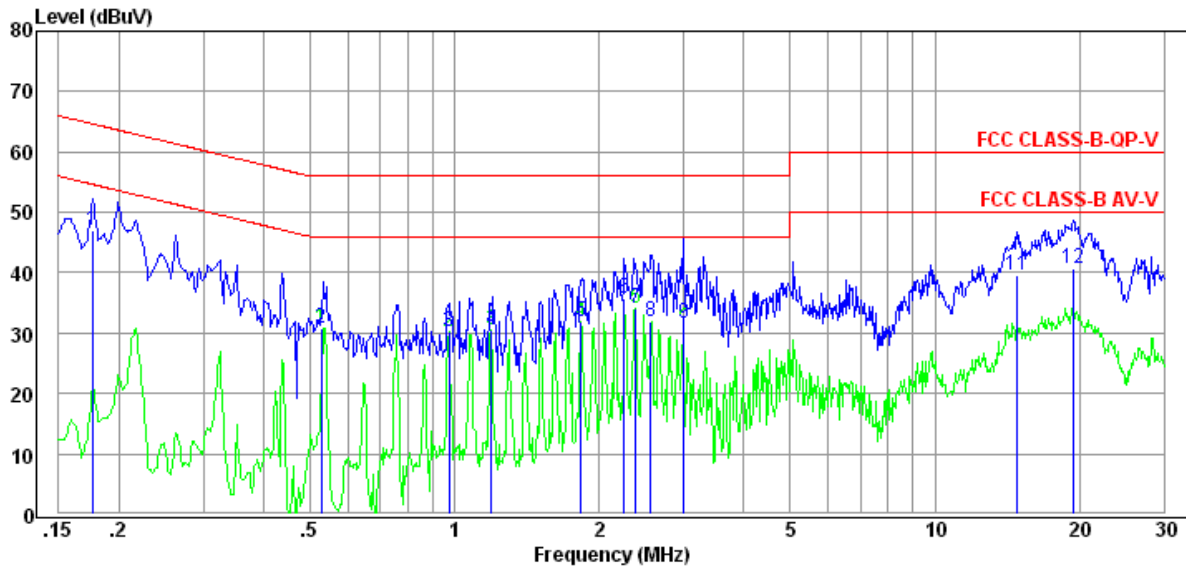
Line	Freq MHz	Result dBuV	Limit dBuV	Margin dB
Average	0.19	39.67	54.05	14.38
QP	0.19	39.45	64.03	24.58
QP	0.28	31.46	60.70	29.24
Average	0.68	31.71	46.00	14.29
Average	2.24	28.52	46.00	17.48
QP	2.87	35.76	56.00	20.24
QP	3.07	34.64	56.00	21.36
Average	3.35	31.93	46.00	14.07
QP	3.36	34.57	56.00	21.43
QP	21.40	40.23	60.00	19.77
Average	21.62	35.65	50.00	14.35
Average	26.06	34.56	50.00	15.44

Neutral	Freq MHz	Result dBuV	Limit dBuV	Margin dB
QP	46.89	64.65	17.76	20.14
Average	30.78	46.00	15.22	17.07
Average	30.27	46.00	15.73	15.03
Average	30.44	46.00	15.56	16.97
Average	31.88	46.00	14.12	17.87
QP	35.73	56.00	20.27	15.91
Average	34.09	46.00	11.91	9.41
QP	32.02	56.00	23.98	12.50
Average	31.66	46.00	14.34	12.04
QP	33.09	56.00	22.91	13.18
QP	39.60	60.00	20.40	10.54
QP	40.76	60.00	19.24	12.63

Test Plot:



(Plot A: L Phase)



(Plot B: N Phase)

4.2 Radiated Emission Measurement

4.2.1 Limits of Radiated Emission

According to FCC section 15.109, the field strength of radiated emissions from unintentional radiators at a certain distance shall not exceed the following values:

Frequency (MHz)	Field Strength CLASS B (at 3m)	
	$\mu\text{V/m}$	$\text{dB}\mu\text{V/m}$
30 - 88	100	40.0
88 - 216	150	43.5
216 - 960	200	46.0
Above 960	500	54.0

NOTE:

- (1) *Field Strength ($\text{dB}\mu\text{V/m}$) = $20 \cdot \log[\text{Field Strength } (\mu\text{V/m})]$.*
- (2) *In the emission tables above, the tighter limit applies at the band edges.*

Frequency range of radiated measurements (For unintentional radiators)

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 1.705	30.
1.705-108	1000.
108-500	2000.
500-1000	5000.
Above 1000	5th harmonic of the highest frequency or 40 GHz, whichever is lower.

Note:

The highest frequency is 1989.80MHz (GSM 1900), So 5th harmonic is 9949MHz, the frequency range is from 30MHz to 10GHz

4.2.2 Test Procedure

The equipment was set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden turntable with a height of 0.8 meters is used which is placed on the ground plane. When the EUT is a floor standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.

Support equipment, if needed, was placed as per ANSI C63.4.

All I/O cables were positioned to simulate typical usage as per ANSI C63.4.

The EUT received AC power source from the outlet socket under the turntable. All support equipment power received from another socket under the turntable.

The antenna was placed at 3 or 10 meter away from the EUT as stated in ANSI C63.4. The antenna connected to the Spectrum Analyzer via a cable and at times a pre-amplifier would be used.

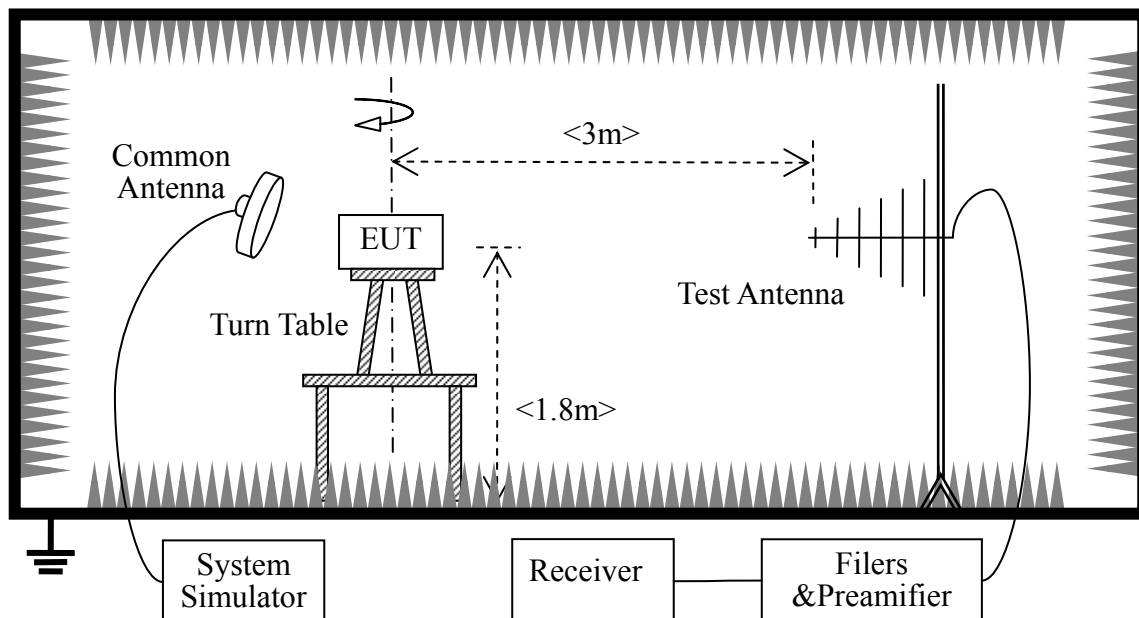
The Analyzer / Receiver quickly scanned from 30MHz to 40GHz. The EUT test program was started. Emissions were scanned and measured rotating the EUT to 360 degrees and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.

The test mode(s) described in Item 3.1 were scanned during the preliminary test:

After the preliminary scan, we found the test mode described in Item 3.1 producing the highest emission level.

The worst configuration of EUT and cable of the above highest emission level were recorded for reference of the final test

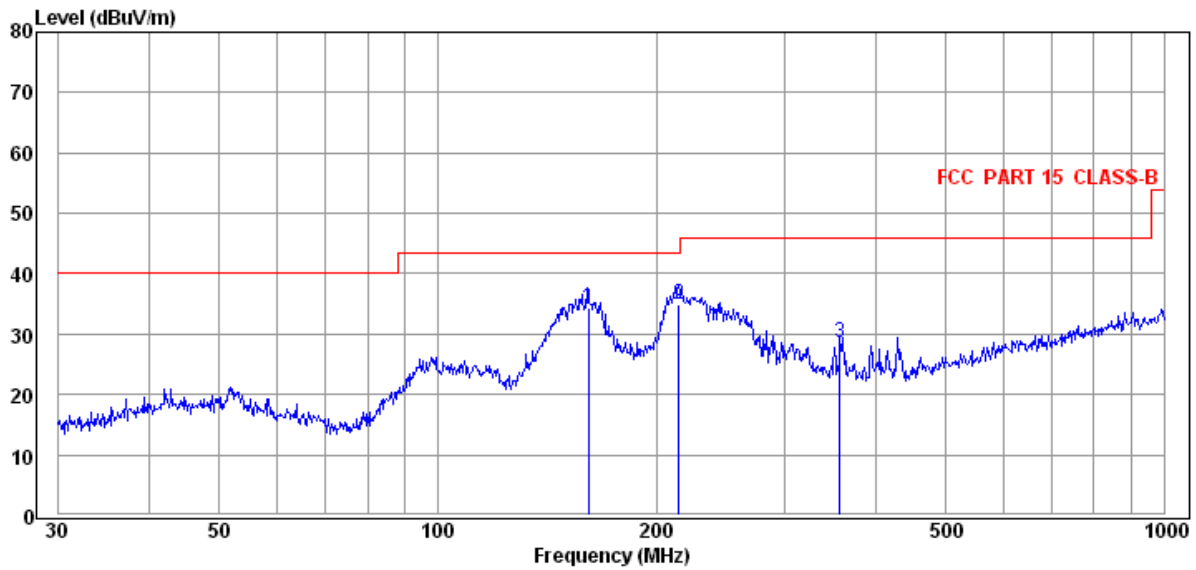
4.2.3 Test Setup



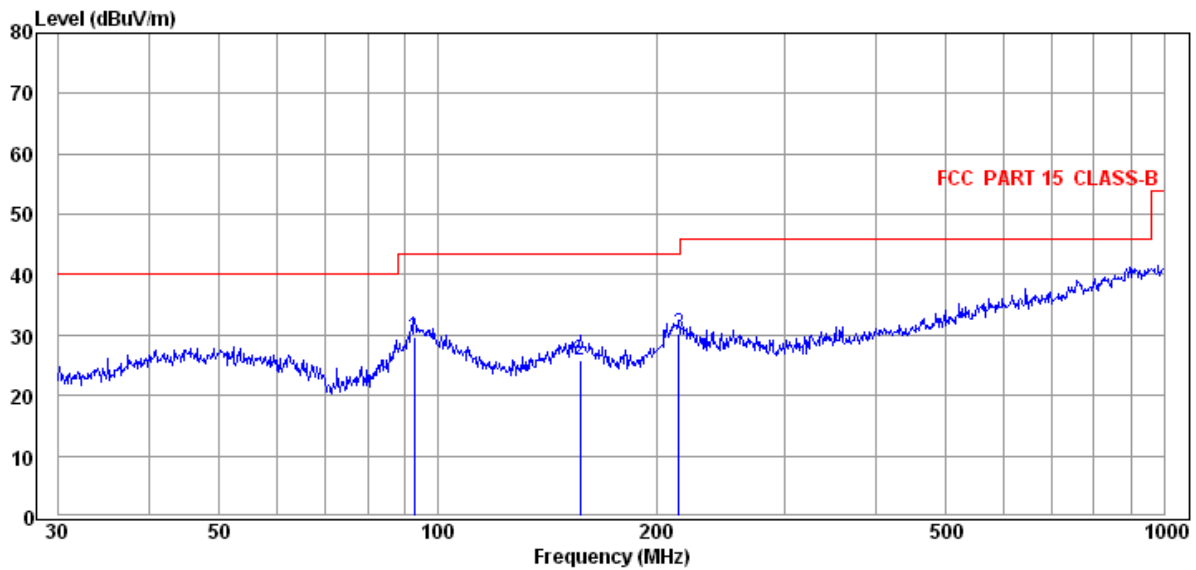
Test Verdict Recorded for Suspicious Points (30MHz~10GHz):

Frequency (MHz)	Level (dBuV)	Limit Line (dBuV)	Margin (dB)	Antenna Polarization	Result
160.91	34.31	43.50	9.19	Horizontal	PASS
214.51	34.83	43.50	8.67	Horizontal	PASS
357.93	28.50	46.00	17.50	Horizontal	PASS
92.79	29.77	43.50	13.73	Vertical	PASS
157.01	25.87	43.50	17.63	Vertical	PASS
214.51	30.29	43.50	13.21	Vertical	PASS

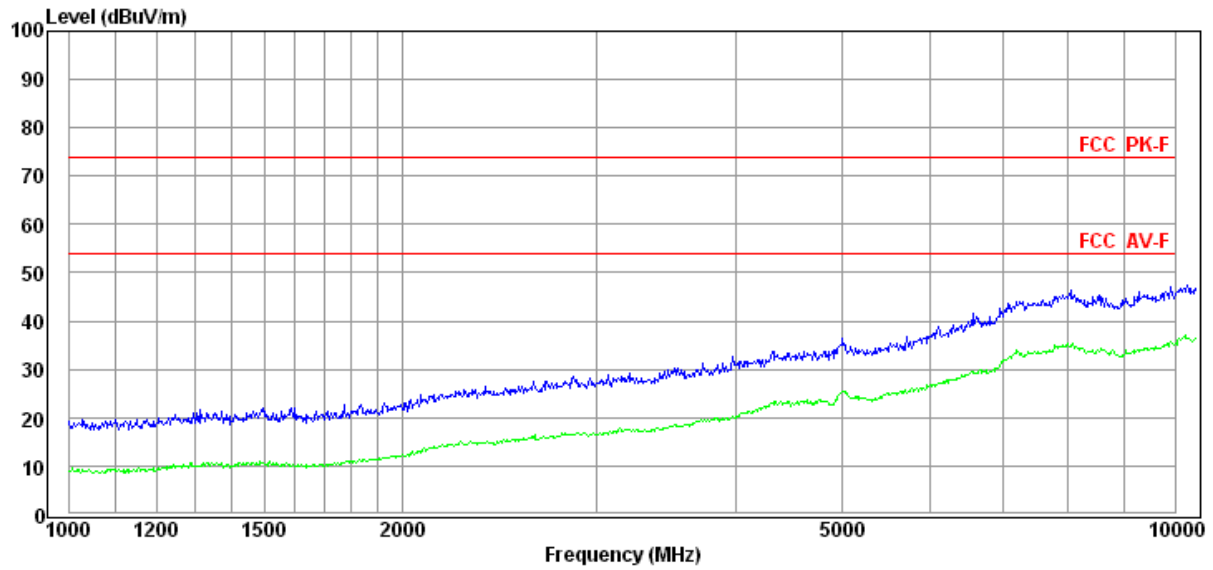
Test Plot:



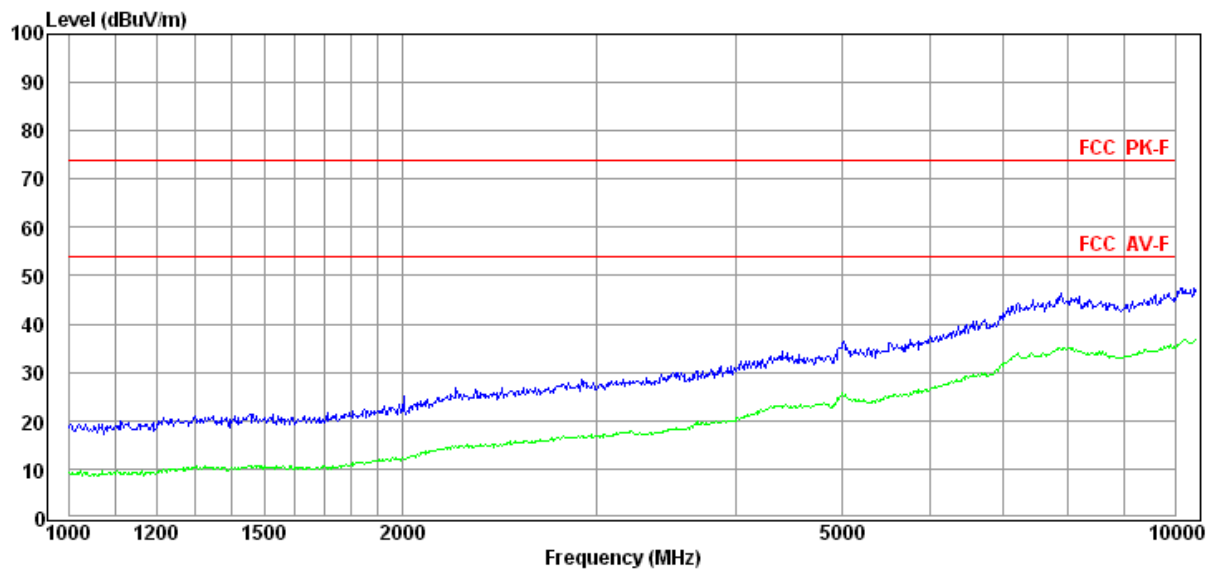
(Plot A: Test Antenna Vertical Frequency from 30MHz to 1GHz)



(Plot B: Test Antenna Horizontal Frequency from 30MHz to 1GHz)



(Plot C: Test Antenna Vertical Frequency from 1GHz to 10 GHz)



(Plot D: Test Antenna Horizontal Frequency from 1GHz to 10 GHz)

Annex A Photos of the EUT



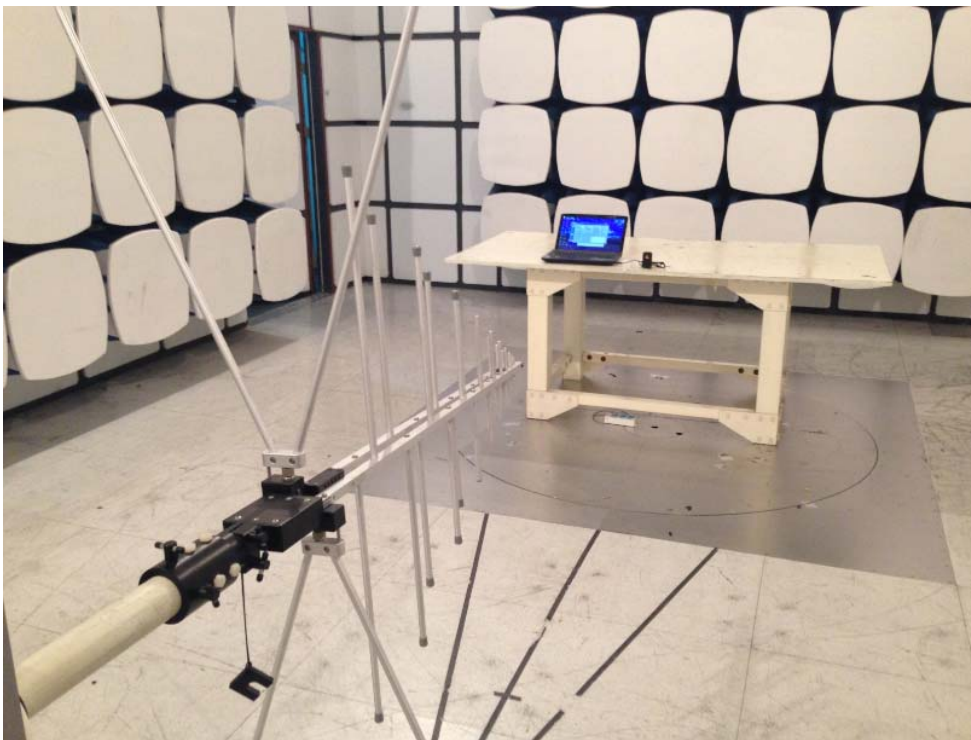


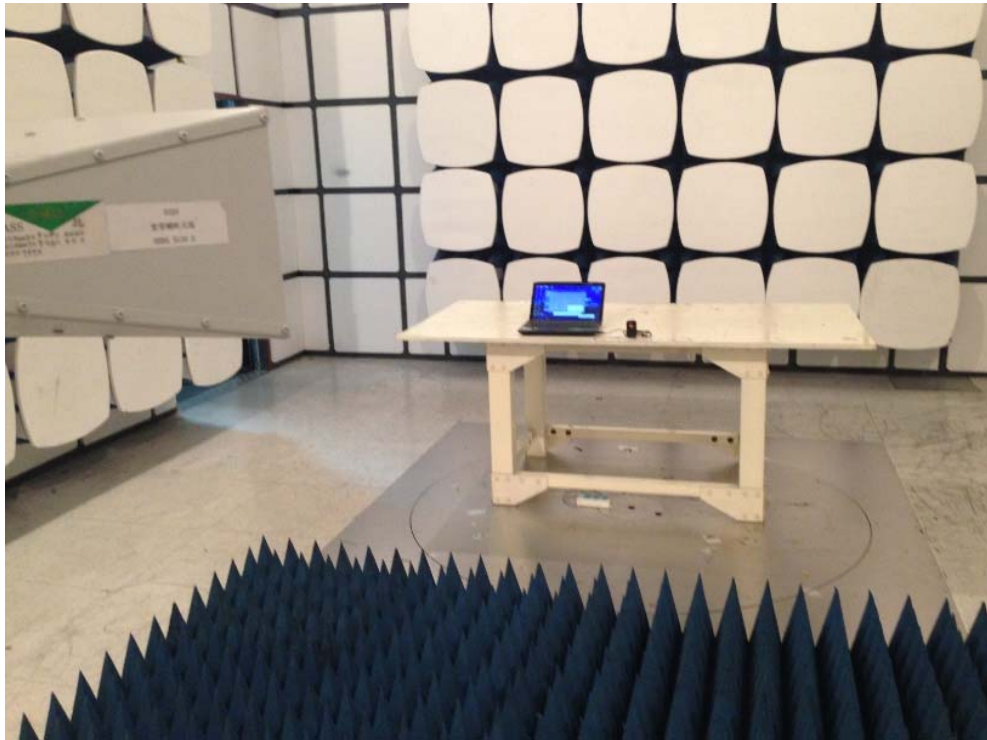
Annex B Photos of Test Setup

1. Conducted Emission



2. Radiated Emission





** END OF REPORT **