LABCODE: 500069-0

FCC PART 15B

TEST REPORT

For

Shanghai Huace Navigation Technology LTD.

Building C, 599 Gaojing Road, Qingpu District, Shanghai. China

FCC ID: SY4-B01004

Report Type:	**Product Type:**
Original Report	Handheld GNSS Data Collector

Test Engineer:	Dean Liu
Report Number:	R1SH140603004-00A
Report Date:	2014-10-13
Reviewed By:	Jerry Zhang EMC Manager
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Dongguan) No.69 Pulongcun, Puxinhu Industrial Zone, Tangxia, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 www.baclcorp.com.cn

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Shanghai Huace Navigation Technology LTD.*'s product, model number: *LT500H (FCC ID: SY4-B01004)* (the "EUT") in this report was a *Handheld GNSS Data Collector ,* which was measured approximately: 23.6 cm (L) x 9.7cm (W) x 7.7 cm (H), rated input voltage: DC15 V from lithium battery or DC15V charging from adapter. The highest operating frequency is 806 MHz.

Adapter information: HuaceNav
Model:GM26-150150-1A
Output:AC100-240V,50/60Hz,1.0A
Input:DC15V,1.5A

Note: The series product, model LT500XYZ are electrically identical, the difference between them is just the model name and colour, we selected LT500H for fully testing, the details was explained in the attached declaration letter.

** All measurement and test data in this report was gathered from production sample serial number: 140603004. (Assigned by BACL.Dongguan). The EUT was received on 2014-06-05.*

Objective

This report is prepared on behalf of *Shanghai Huace Navigation Technology LTD.* in accordance with Part 2, Subpart J, Part 15, Subparts A and B of the Federal Communication Commissions' rules.

The objective of the manufacturer is to determine compliance with FCC Part 15B, Class B.

Related Submittal(s)/Grant(s)

1.FCC Part 22H & 24E PCB submissions with FCC ID: *SY4-B01004.*
2.FCC Part15C DSS submissions with FCC ID: SY4-B01004 *for BDR, EDR mode.*
3.FCC Part15C DTS submissions with FCC ID: SY4-B01004.

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industrial Zone, Tangxia, Dongguan, Guangdong, China

Test site at Bay Area Compliance Laboratories Corp. (Dongguan) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 02, 2012. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 273710. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Laboratories Corp. (Dongguan) is an ISO/IEC 17025 accredited laboratory, and is accredited by National Voluntary Laboratory Accredited Program (Lab Code 500069-0).

The current scope of accreditations can be found at http://ts.nist.gov/standards/scopes/5000690.htm

SYSTEM TEST CONFIGURATION

Justification

The system was configured for testing in a typical fashion (as normally used by a typical user).

EUT Exercise Software

"BurnIn test v5.3" exercise software was used.

Equipment Modifications

No modification was made to the EUT.

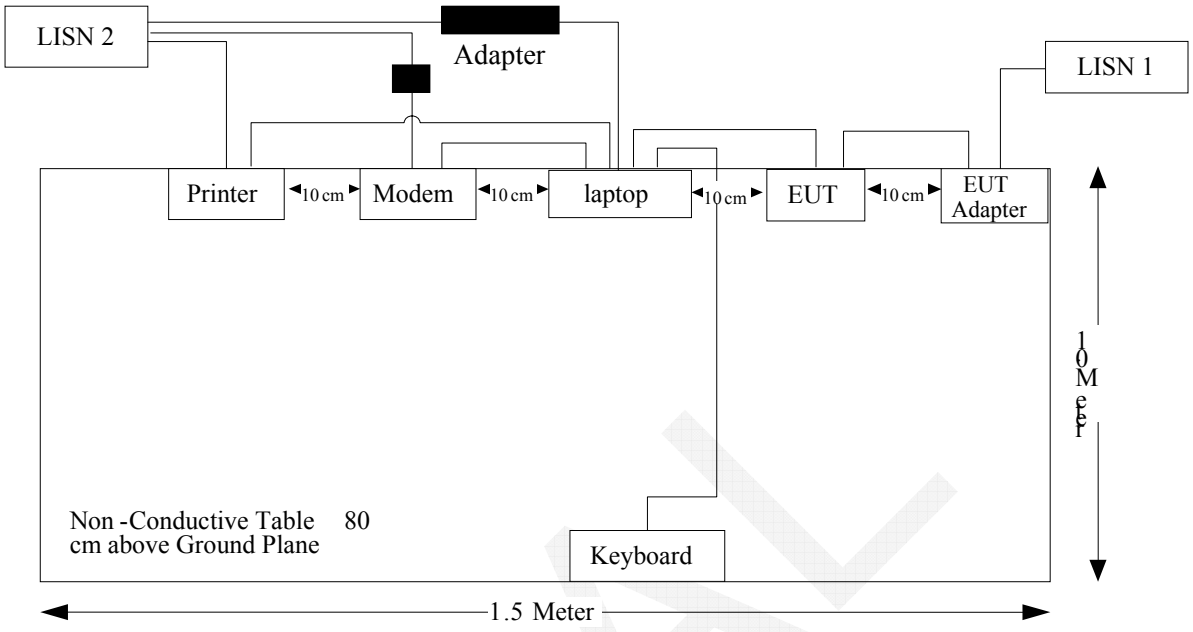
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
DELL	Laptop	PP11L	QDS-BRCM1017
HP	Printer	C3941A	JPTVOB2337
DELL	Keyboard	L100	CNORH656658907BL05DC
SAST	Modem	AEM-2100	0293

External I/O Cable

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
Serial Cable	Yes	No	1.2	Serial Port of Laptop	Modem
Parallel Cable	Yes	No	1.2	Parallel Port of Laptop	Printer
USB	Yes	No	1.0	EUT	Laptop
Adapter	Yes	Yes	1.6	EUT	Adapter
Keyboard Cable	Yes	No	1.5	USB Port of Laptop	Keyboard

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
§15.107	AC Line Conducted Emissions	Compliance
§15.109	Radiated Emissions	Compliance

FCC §15.107 – AC LINE CONDUCTED EMISSIONS

Measurement Uncertainty

Compliance or non- compliance with a disturbance limit shall be determined in the following manner:

If U_{lab} is less than or equal to U_{cispr} of Table 1, then:
- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non - compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

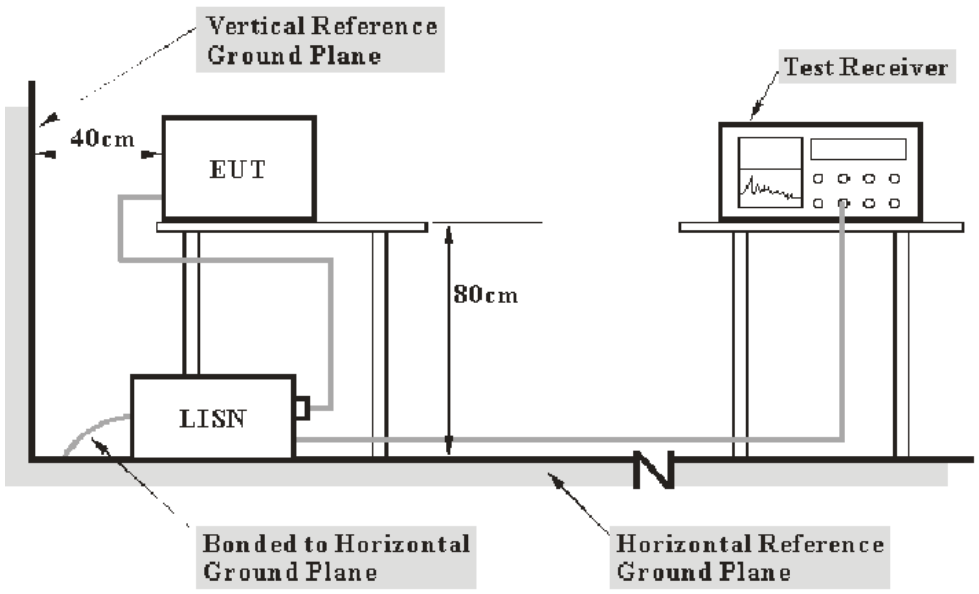
If U_{lab} is greater than U_{cispr} of Table 1, then:
- compliance is deemed to occur if no measured disturbance level, increased by ($U_{lab} - U_{cispr}$), exceeds the disturbance limit;
- non - compliance is deemed to occur if any measured disturbance level, increased by ($U_{lab} - U_{cispr}$), exceeds the disturbance limit.

Based on CISPR 16-4-2: 2011, measurement uncertainty of conducted disturbance at mains port using AMN at Bay Area Compliance Laboratories Corp. (Dongguan) is 3.46 dB (150 kHz to 30 MHz).

Table 1 – Values of U_{cispr}

Measurement	U_{cispr}
Conducted disturbance at mains port using AMN (150 kHz to 30 MHz)	3.4 dB

EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.4-2003 measurement procedure. The specification used was with the FCC Part 15.107 Class B limits.

The spacing between the peripherals was 10 cm.

The adapter of EUT was connected to a 120 VAC/60 Hz power source

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

During the conducted emission test, the adapter of EUT was connected to the outlet of the first LISN and the other support equipments were connected to the outlet of the second LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

Corrected Amplitude & Margin Calculation

The basic equation is as follows:

$V_C = V_R + A_C + VDF$
$C_f = A_C + VDF$

Herein,
V_C (cord. Reading): corrected voltage amplitude
V_R: reading voltage amplitude
A_c: attenuation caused by cable loss
VDF: voltage division factor of AMN
C_f: Correction Factor

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of 7dB means the emission is 7dB below the maximum limit. The equation for margin calculation is as follows:

Margin = Limit – Corrected Amplitude

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCS 30	830245/006	2013-11-20	2014-11-20
R&S	L.I.S.N	ESH3-Z5	843331/015	2013-09-25	2014-09-25
R&S	Two-line V-network	ENV 216	3560.6550.12	2014-01-22	2015-01-22
R&S	Test Software	EMC32	Version8.53.0	N/A	N/A

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to National Primary Standards and International System of Units (SI).

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.107, with the worst margin reading of:

7.6 dB at**0.614619 MHz** in the **Neutral** conducted mode

Test Data

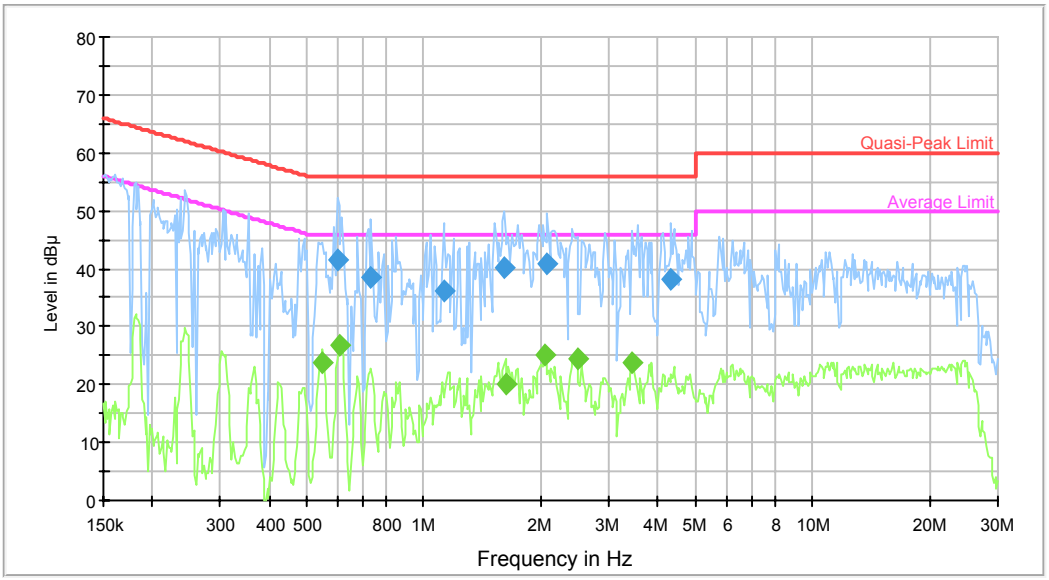
Environmental Conditions

Temperature:	27.3 °C
Relative Humidity:	57 %
ATM Pressure:	99.7 kPa

The testing was performed by Dean Liu on 2014-06-12.

Test mode: Charging &Downloading

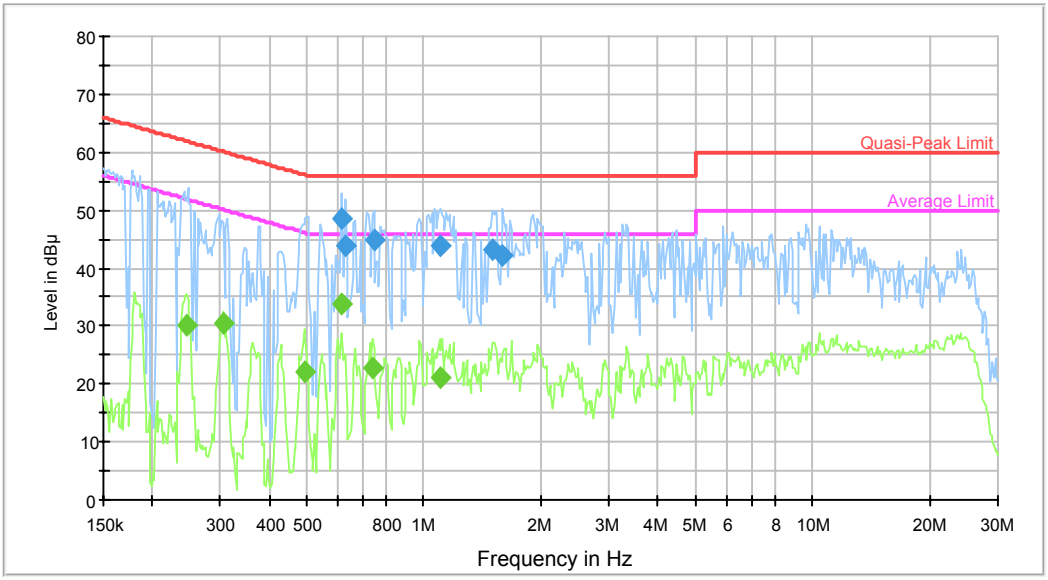
AC120 V, 60 Hz, Line:



Frequency (MHz)	Corrected Quasi-Peak (dBµV)	Bandwidth (kHz)	Line	Corr. Factor (dB)	Margin (dB)	Limit (dBµV)	Comment
0.600101	41.3	9.000	L1	10.5	14.7	56.0	Compliance
0.732382	38.6	9.000	L1	10.6	17.4	56.0	Compliance
1.126176	36.1	9.000	L1	10.4	19.9	56.0	Compliance
1.611870	40.1	9.000	L1	10.5	15.9	56.0	Compliance
2.080018	40.8	9.000	L1	10.5	15.2	56.0	Compliance
4.329484	38.1	9.000	L1	10.7	17.9	56.0	Compliance

Frequency (MHz)	Corrected Average (dBµV)	Bandwidth (kHz)	Line	Corr. Factor (dB)	Margin (dB)	Limit (dBµV)	Comment
0.549741	23.7	9.000	L1	10.4	22.3	46.0	Compliance
0.604902	26.9	9.000	L1	10.5	19.1	46.0	Compliance
1.624765	20.1	9.000	L1	10.5	25.9	46.0	Compliance
2.047133	25.2	9.000	L1	10.5	20.8	46.0	Compliance
2.478557	24.4	9.000	L1	10.5	21.6	46.0	Compliance
3.436218	23.8	9.000	L1	10.7	22.2	46.0	Compliance

AC120 V, 60 Hz, Neutral:



Frequency (MHz)	Corrected Quasi-Peak (dBµV)	Bandwidth (kHz)	Line	Corr. Factor (dB)	Margin (dB)	Limit (dBµV)	Comment
0.614619	48.4	9.000	N	10.5	7.6	56.0	Compliance
0.629488	43.8	9.000	N	10.5	12.2	56.0	Compliance
0.744147	44.9	9.000	N	10.6	11.1	56.0	Compliance
1.108371	44.0	9.000	N	10.5	12.0	56.0	Compliance
1.512328	43.3	9.000	N	10.5	12.7	56.0	Compliance
1.599078	42.3	9.000	N	10.5	13.7	56.0	Compliance

Frequency (MHz)	Corrected Average (dBµV)	Bandwidth (kHz)	Line	Corr. Factor (dB)	Margin (dB)	Limit (dBµV)	Comment
0.245835	30.2	9.000	N	11.2	21.7	51.9	Compliance
0.304845	30.5	9.000	N	11.1	19.6	50.1	Compliance
0.491712	22.1	9.000	N	10.4	24.1	46.1	Compliance
0.614619	33.7	9.000	N	10.5	12.3	46.0	Compliance
0.738241	22.7	9.000	N	10.6	23.3	46.0	Compliance
1.099574	21.1	9.000	N	10.5	24.9	46.0	Compliance

FCC §15.109 - RADIATED EMISSIONS

Measurement Uncertainty

Compliance or non- compliance with a disturbance limit shall be determined in the following manner：

If U_{lab} is less than or equal to U_{cispr} of Table 2, then:
- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non - compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

If U_{lab} is greater than U_{cispr} of Table 1, then:
- compliance is deemed to occur if no measured disturbance level, increased by ($U_{lab} - U_{cispr}$), exceeds the disturbance limit;
- non - compliance is deemed to occur if any measured disturbance level, increased by ($U_{lab} - U_{cispr}$), exceeds the disturbance limit.

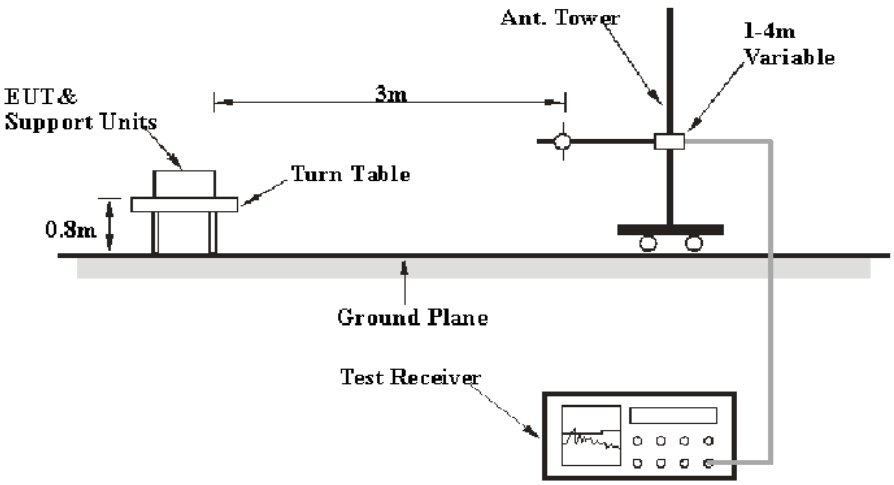
Based on CISPR 16-4-2: 2011, measurement uncertainty of radiated emission at a distance of 3m at Bay Area Compliance Laboratories Corp. (Dongguan) is:
30M~200MHz: 5.0 dB
200M~1GHz: 6.2 dB
1G~6GHz: 4.45 dB
6G~18GHz: 5.23 dB

Table 2 – Values of U_{cispr}

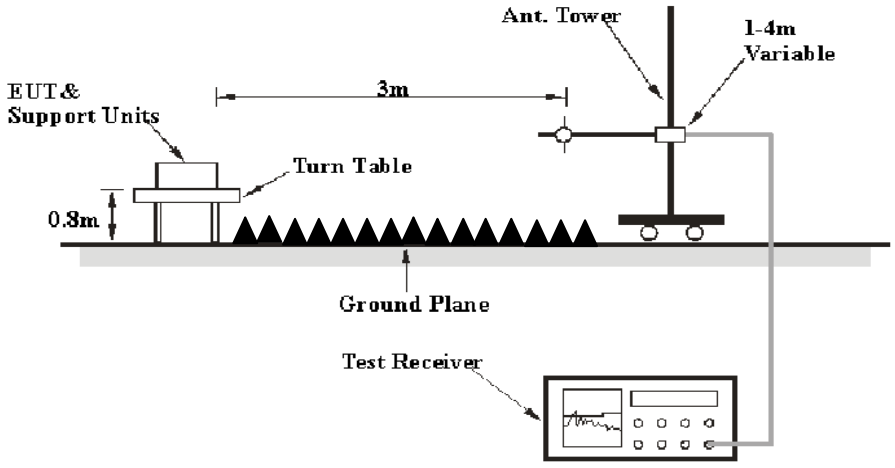
Measurement	U_{cispr}
Radiated disturbance (electric field strength at an OATS or in a SAC) (30 MHz to 1000 MHz)	6.3 dB
Radiated disturbance (electric field strength in a FAR) (1 GHz to 6 GHz)	5.2 dB
Radiated disturbance (electric field strength in a FAR) (6 GHz to 18 GHz)	5.5 dB

EUT Setup

Below 1 GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC Part 15.109, Class B limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

The adapter of EUT was connected to a 120 VAC/60 Hz power source

EMI Test Receiver Setup

According to FCC 15.33 requirements, the system was measured from 30 MHz to 5 GHz.

During the radiated emission test, the EMI test receiver was set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30MHz – 1000 MHz	120 kHz	300 kHz	120kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	Ave.

Test Procedure

For the radiated emissions test, the adapter of EUT was connected to the first AC floor outlet and the other support equipments were connected to the second AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

The data was recorded in Quasi-peak detection mode for 30 MHz to 1 GHz, Peak and average detection mode above 1 GHz.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Loss and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

Corrected Amplitude = Meter Reading + Antenna Loss + Cable Loss - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

Margin = Limit – Corrected Amplitude

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2014-05-09	2015-05-09
Sunol Sciences	Antenna	JB3	A060611-3	2014-07-28	2017-07-27
HP	Amplifier	8447E	2434A02181	2014-09-01	2015-09-01
R&S	Spectrum Analyzer	FSEM	DE31388	2014-05-09	2015-05-09
ETS-Lindgren	Horn Antenna	3115	000 527 35	2012-09-06	2015-09-06
Mini-Circuit	Amplifier	ZVA-213-S+	054201245	2014-02-19	2015-02-19
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to National Primary Standards and International System of Units (SI).

Test Results Summary

According to the data in the following table, the EUT complied with the FCC §15.109, Class B, with the worst margin reading of:

3.60 dB at **57.1600 MHz** in the **Horizontal** polarization

Test Data

Environmental Conditions

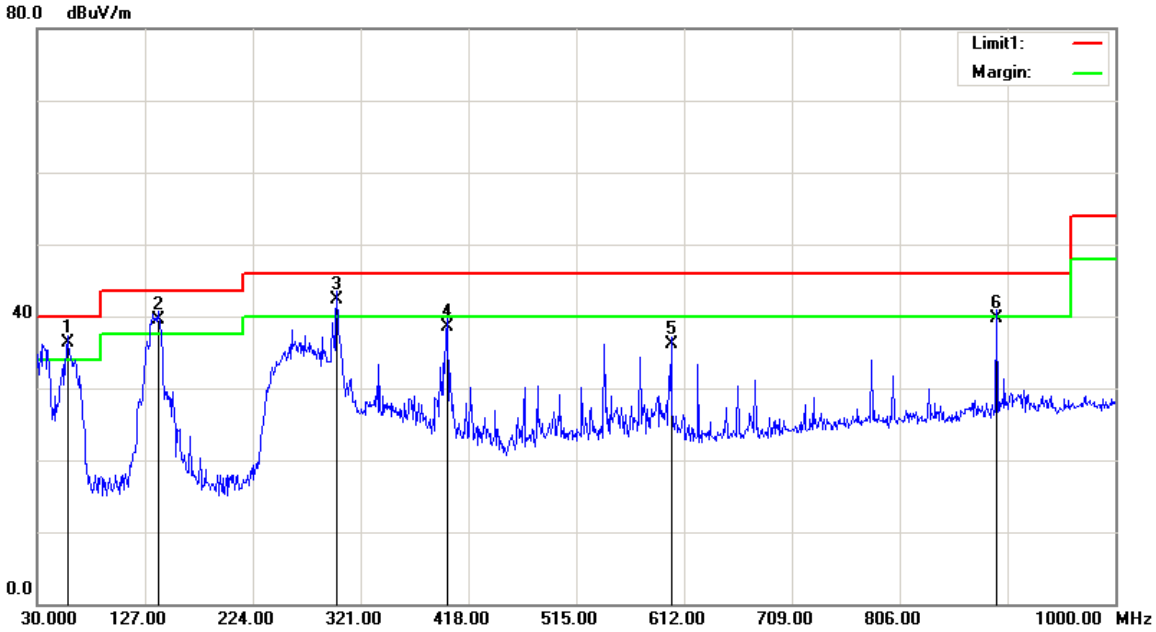
Temperature:	26.4 °C-25.4°C
Relative Humidity:	63 %-50%
ATM Pressure:	99.7 kPa-100.2 kPa

The testing was performed by Dean Liu on 2014-06-13&2014-09-09.

Test mode: Charging &Downloading

1) Below 1G:

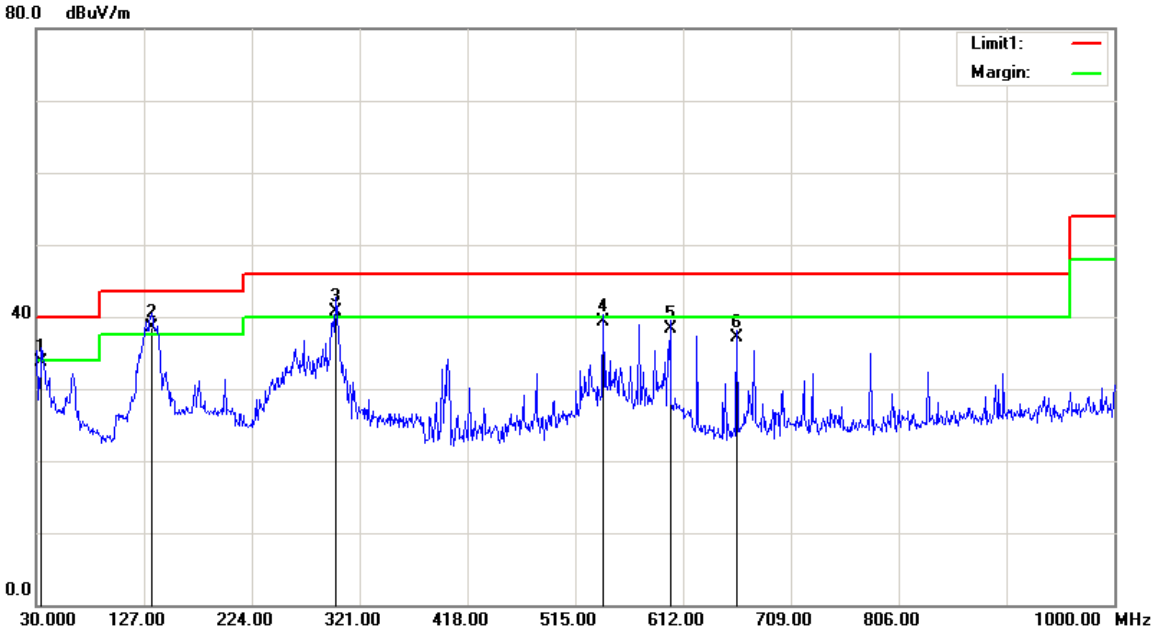
Horizontal:



Frequency (MHz)	Receiver Reading (dBuV)	Detector (PK/QP/Ave)	Correction Factor (dB/m)	Cord. Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
57.1600	49.48	QP	-13.08	36.40	40.00	3.60*
138.6400	46.31	QP	-6.71	39.60	43.50	3.90*
299.6600	48.15	QP	-5.75	42.40	46.00	3.60*
399.5700	42.01	QP	-3.41	38.60	46.00	7.40
600.3600	36.33	QP	-0.23	36.10	46.00	9.90
893.3000	35.81	QP	3.99	39.80	46.00	6.20

*Within measurement uncertainty!

Vertical:

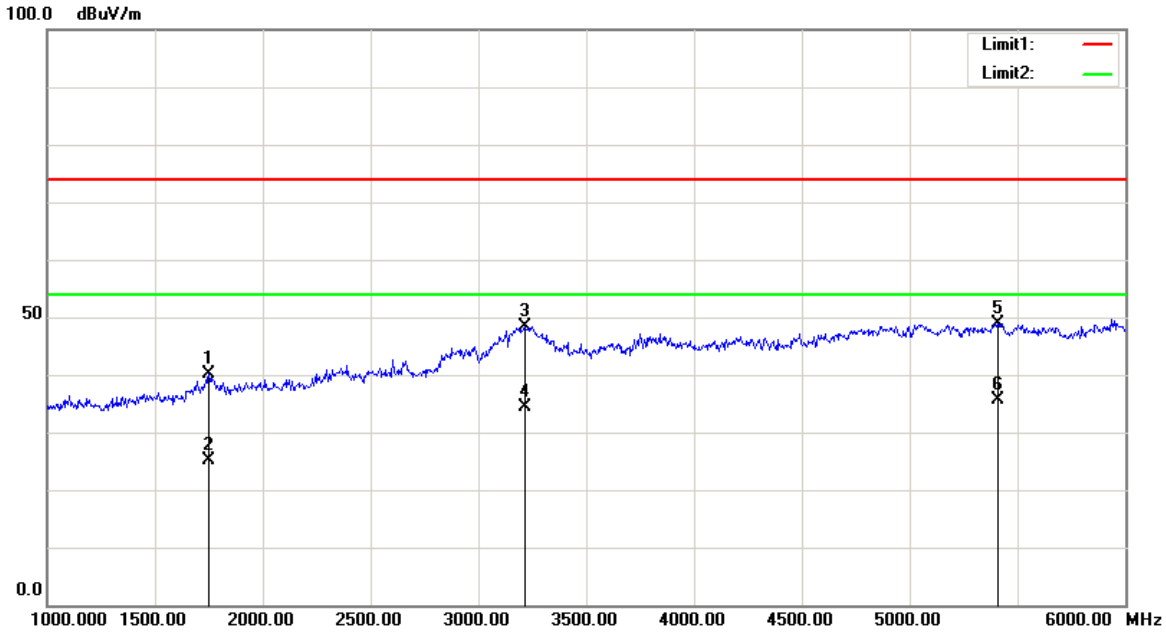


Frequency (MHz)	Receiver Reading (dBuV)	Detector (PK/QP/Ave)	Correction Factor (dB/m)	Cord. Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
34.8500	35.89	QP	-2.19	33.70	40.00	6.30
133.7900	44.82	QP	-6.32	38.50	43.50	5.00
299.6600	46.45	QP	-5.75	40.70	46.00	5.30*
540.2200	40.30	QP	-0.90	39.40	46.00	6.60
600.3600	38.63	QP	-0.23	38.40	46.00	7.60
660.5000	36.58	QP	0.62	37.20	46.00	8.80

*Within measurement uncertainty!

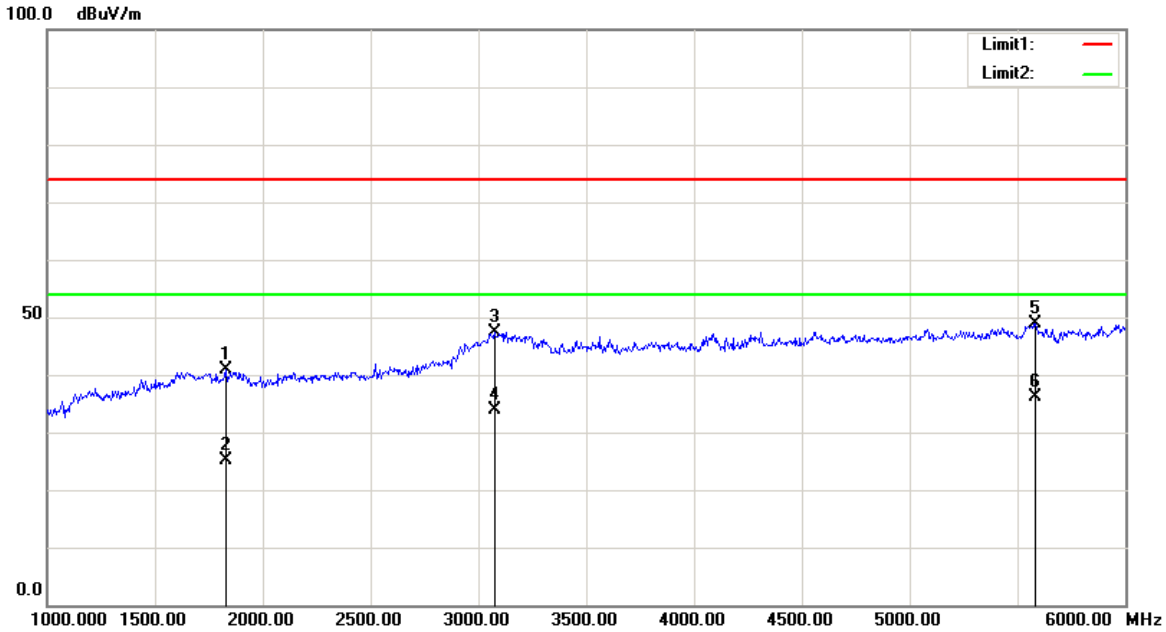
2) Above 1G:

Horizontal:



Frequency (MHz)	Receiver Reading (dBuV)	Detector (PK/QP/Ave)	Correction Factor (dB/m)	Cord. Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1751.503	39.28	peak	0.79	40.07	74.00	33.93
1751.503	24.39	AVG	0.79	25.18	54.00	28.82
3214.429	41.51	peak	6.93	48.44	74.00	25.56
3214.429	27.35	AVG	6.93	34.28	54.00	19.72
5408.818	38.28	peak	10.66	48.94	74.00	25.06
5408.818	25.01	AVG	10.66	35.67	54.00	18.33

Vertical:



Frequency (MHz)	Receiver Reading (dBuV)	Detector (PK/QP/Ave)	Correction Factor (dB/m)	Cord. Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1831.663	39.98	peak	0.89	40.87	74.00	33.13
1831.663	24.24	AVG	0.89	25.13	54.00	28.87
3074.148	40.13	peak	7.25	47.38	74.00	26.62
3074.148	26.70	AVG	7.25	33.95	54.00	20.05
5584.168	37.65	peak	11.18	48.83	74.00	25.17
5584.168	24.89	AVG	11.18	36.07	54.00	17.93

EXHIBIT A - EUT PHOTOGRAPHS

EUT—All View

EUT—Adapter View

EUT—Adapter Label View

EUT - Top View

EUT - Bottom View

EUT – Side View

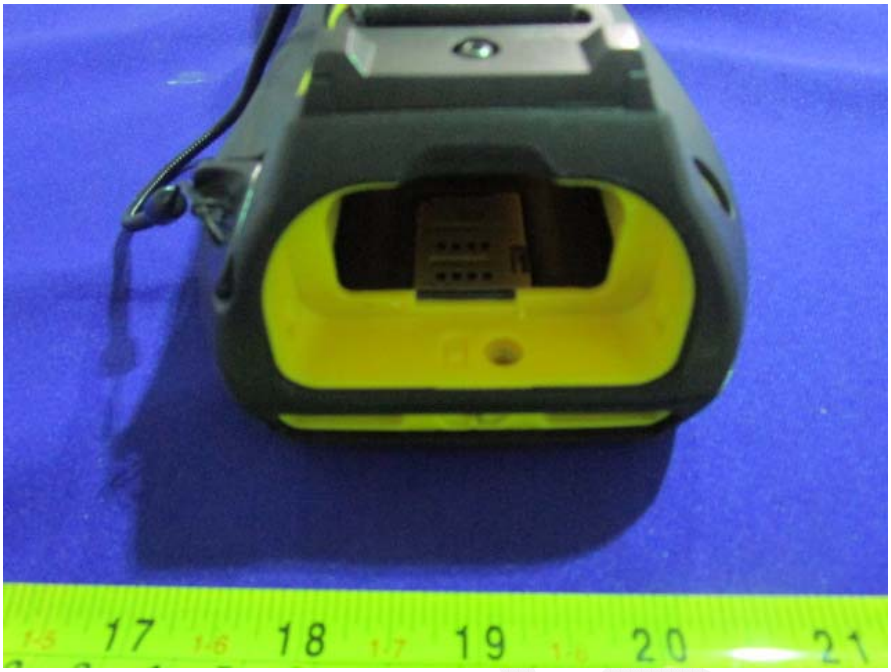
EUT – Side View

EUT – Side View

EUT – Side View

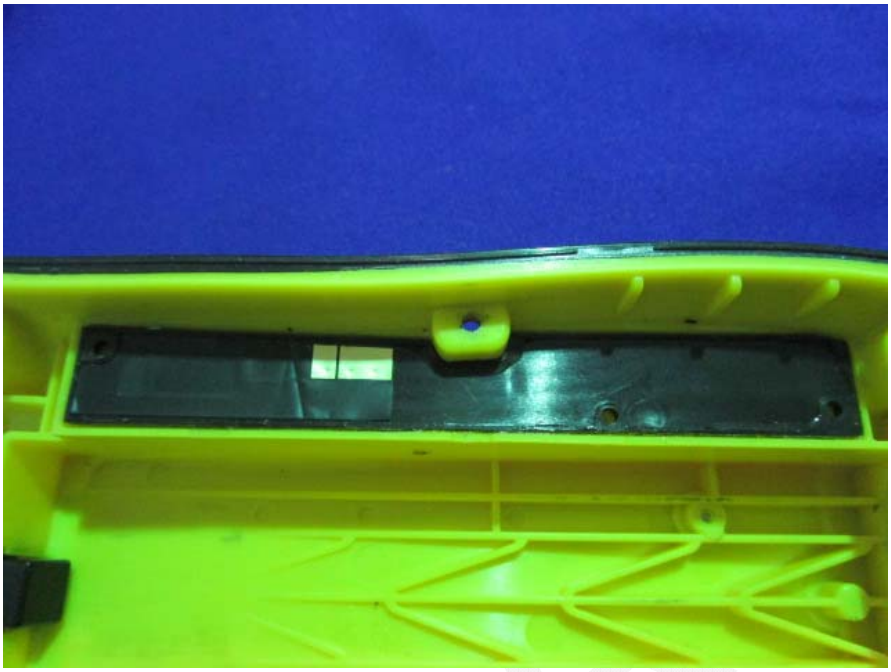
EUT – Battery off View

EUT – Battery Slot View

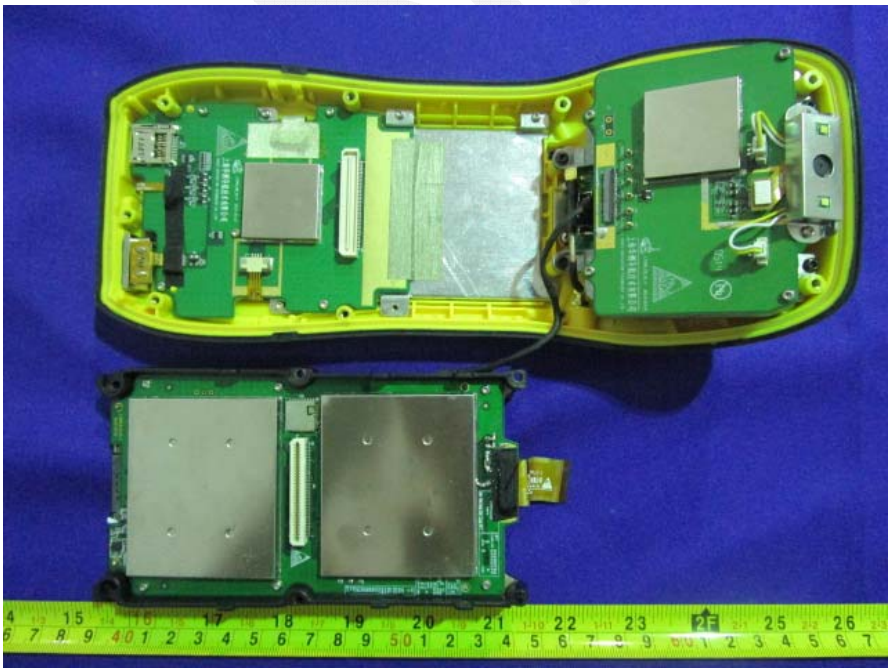


EUT – Uncover View

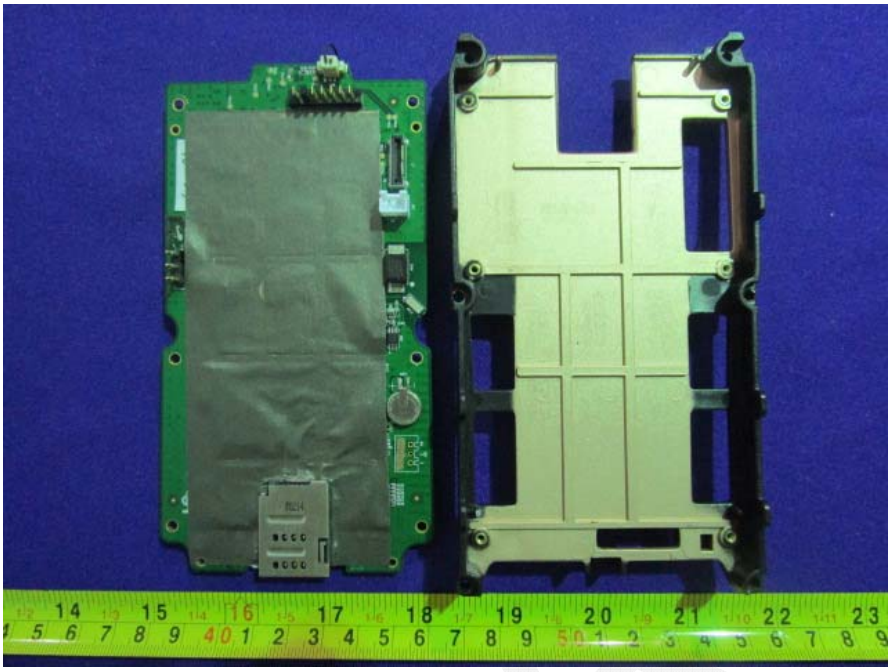
EUT – GSM and WCDMA Antenna View



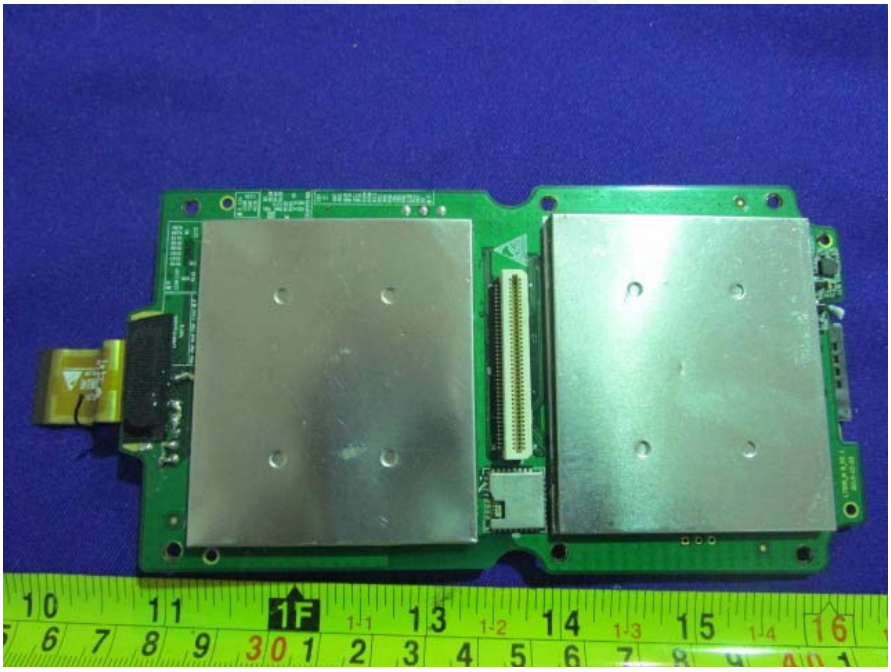
EUT – Uncover View



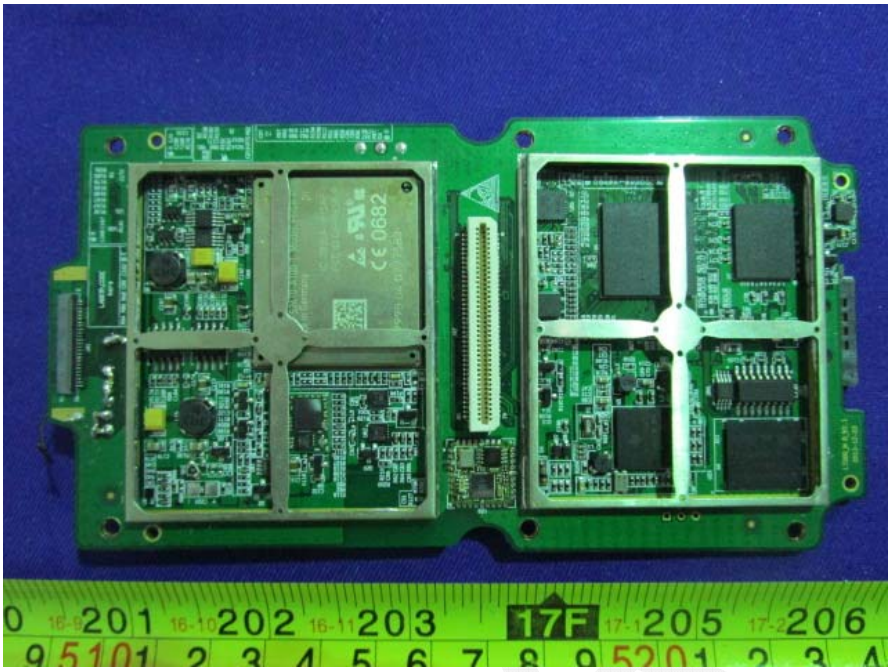
EUT – Main Board Uncover View



EUT – Main Board Top View

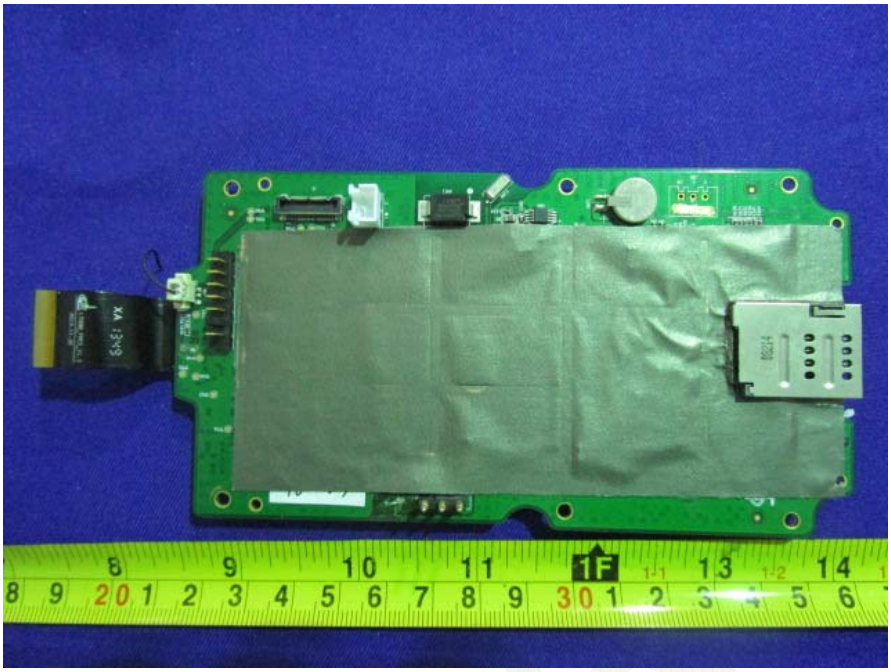


EUT – Main Board Top without ShieldingView

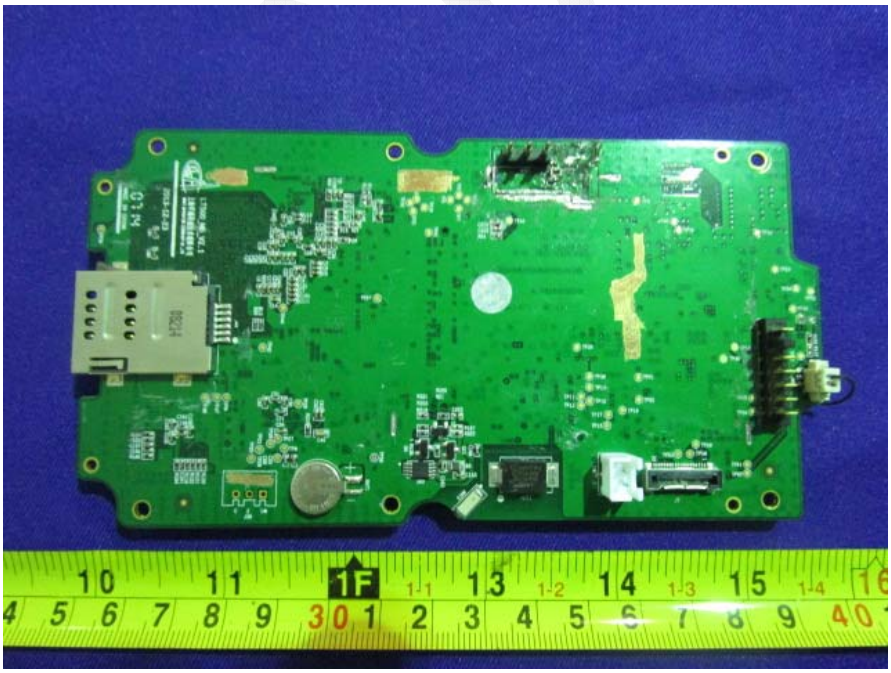


EUT – RF Chip View

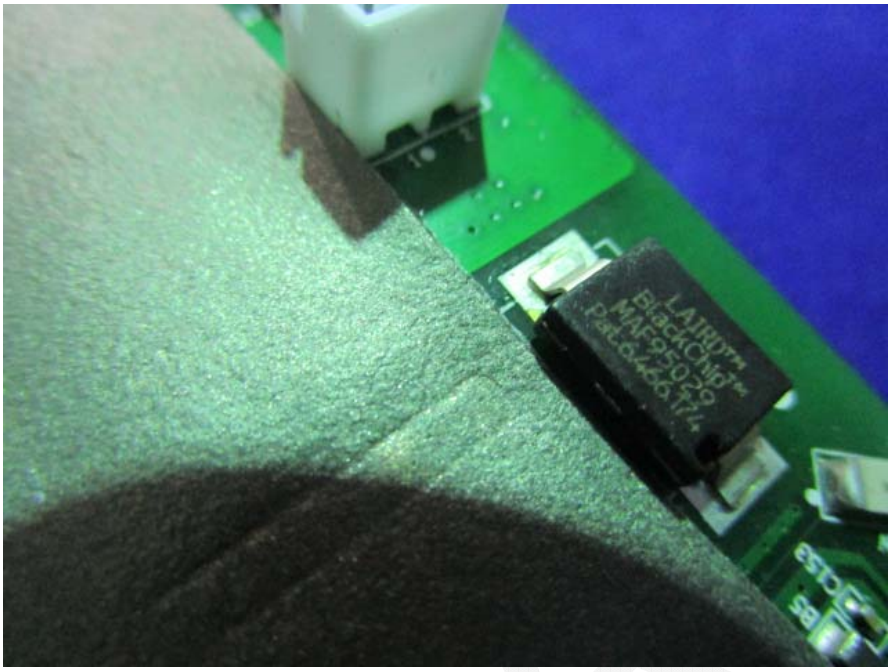
EUT – Main Board Bottom View



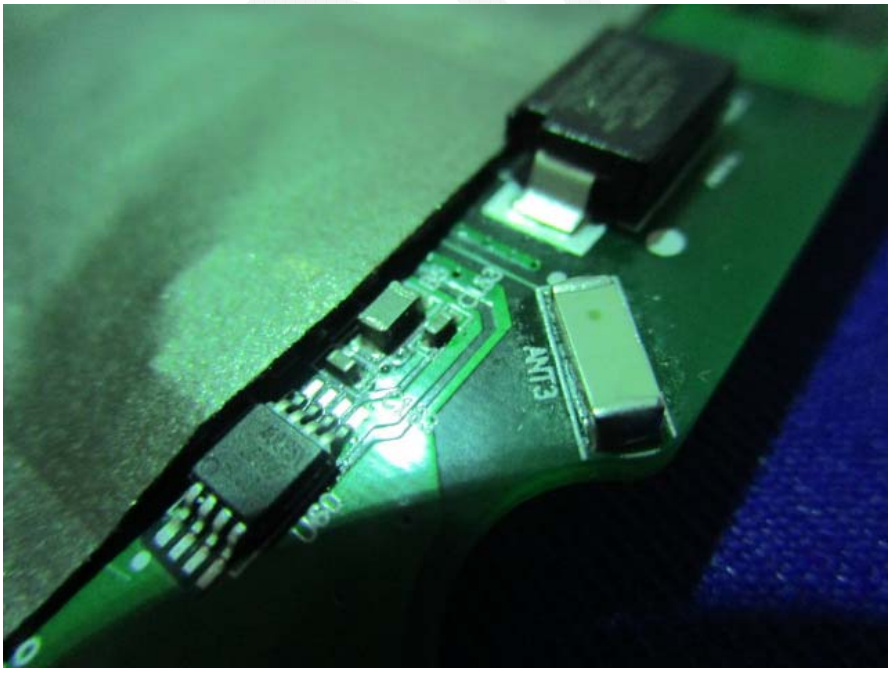
EUT – Main Board Bottom without Shielding View



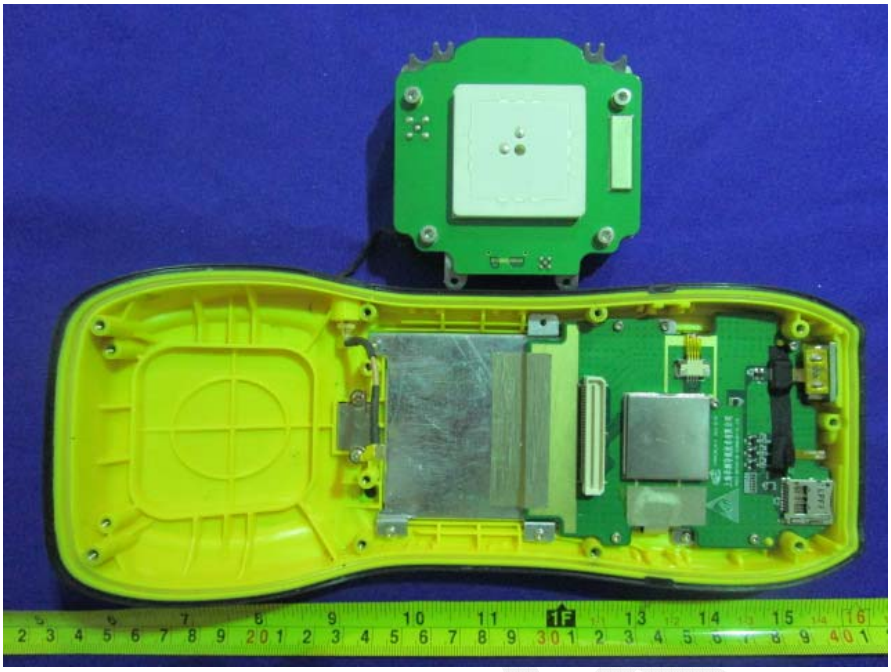
EUT – Wi-Fi Antenna View



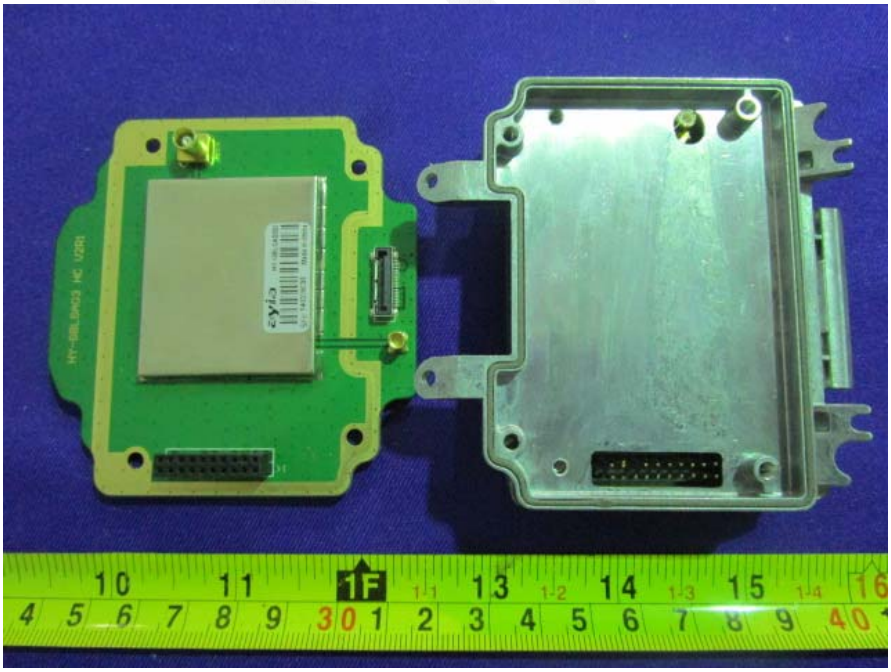
EUT – BT Antenna View



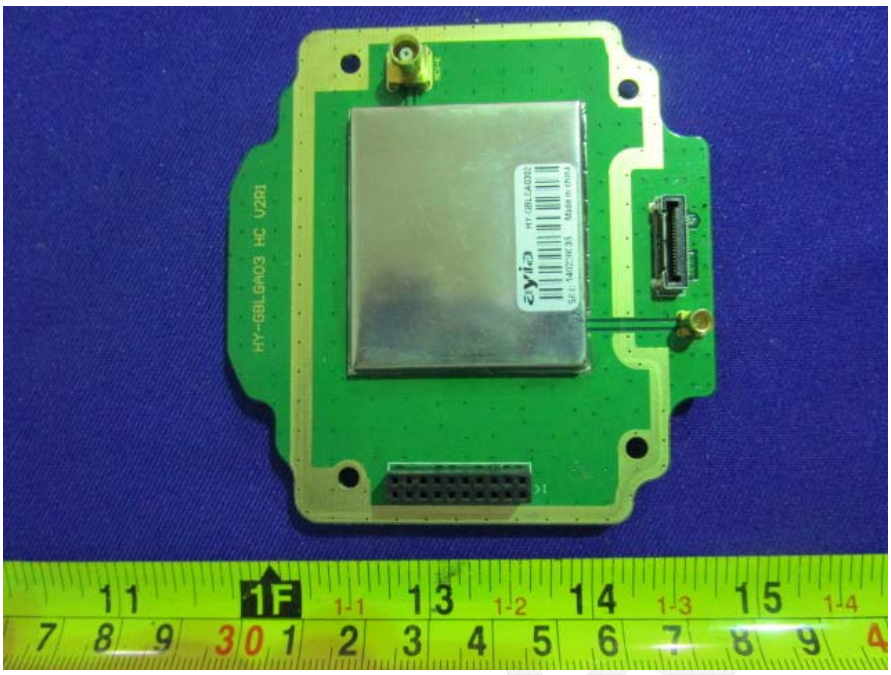
EUT – GPS Board Off View



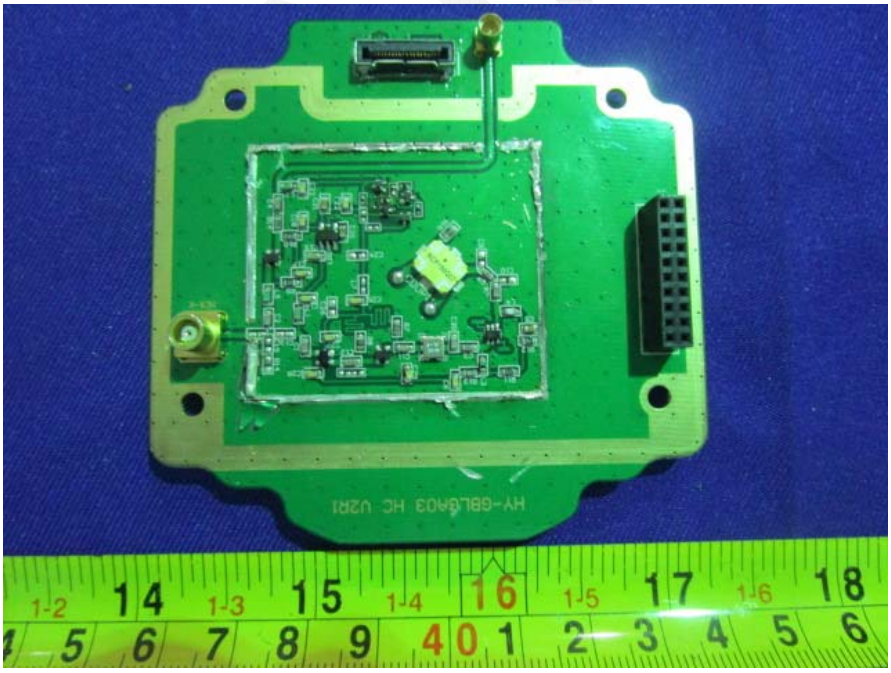
EUT – GPS Board Cover Off View



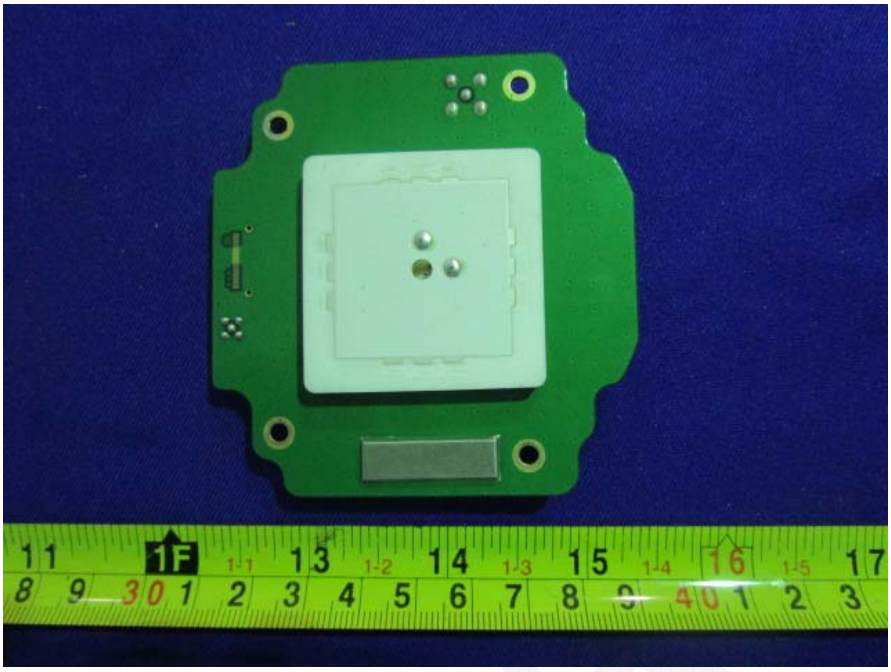
EUT – GPS Board Top View



EUT – GPS Board Top without Shielding View

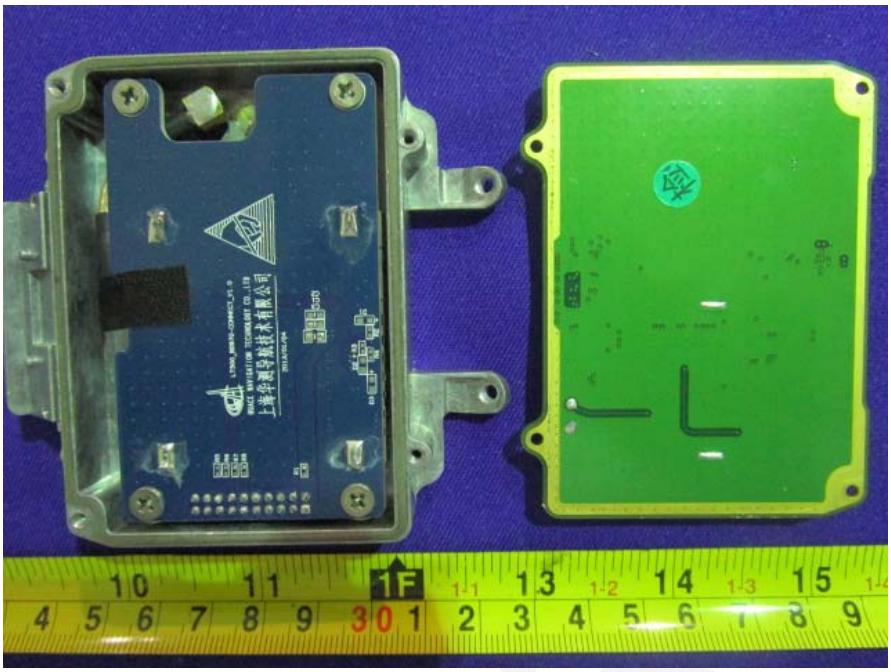


EUT – GPS Board Bottom View

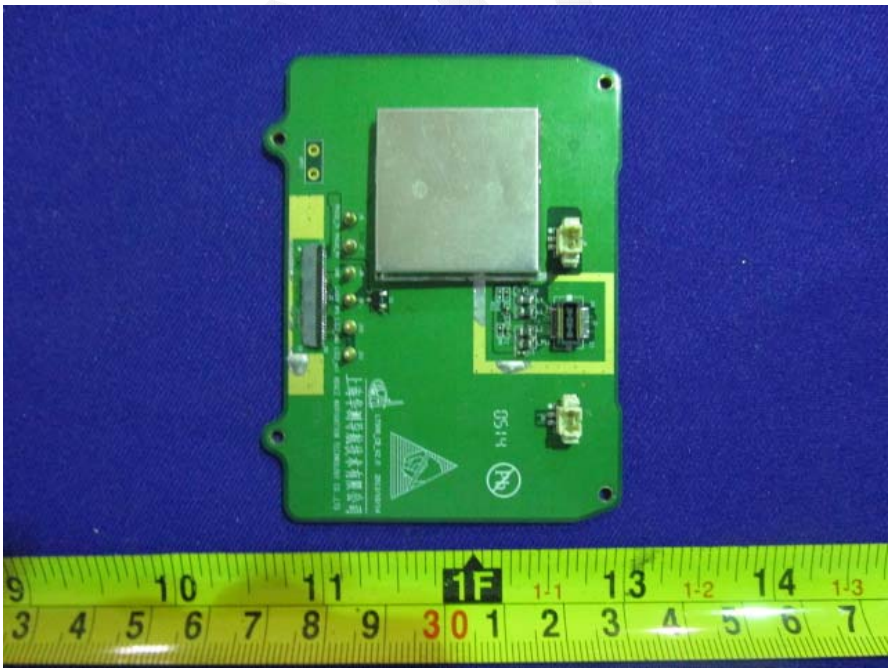


EUT – GPS Antenna View

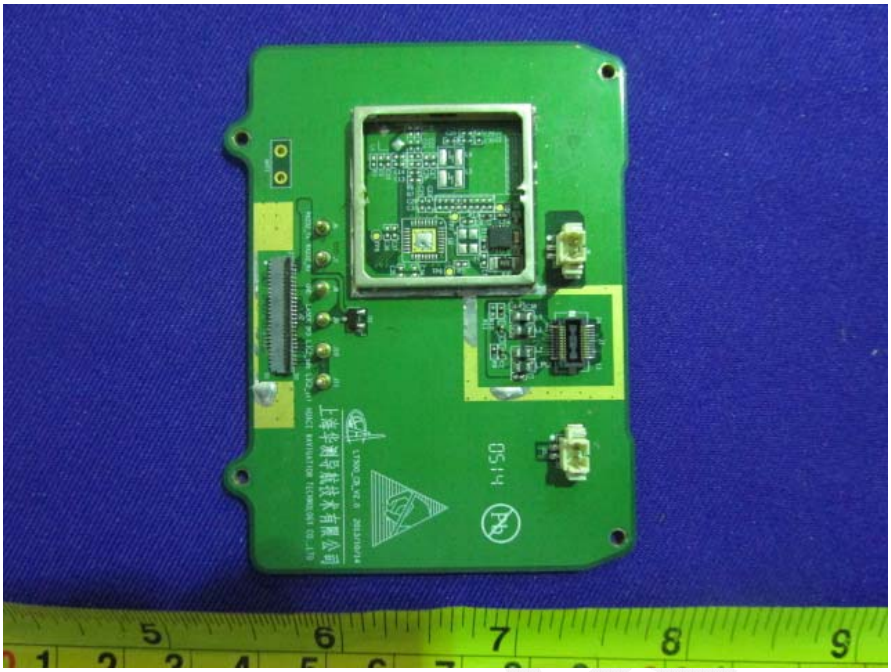
EUT – Sub Board 1 Uncover View



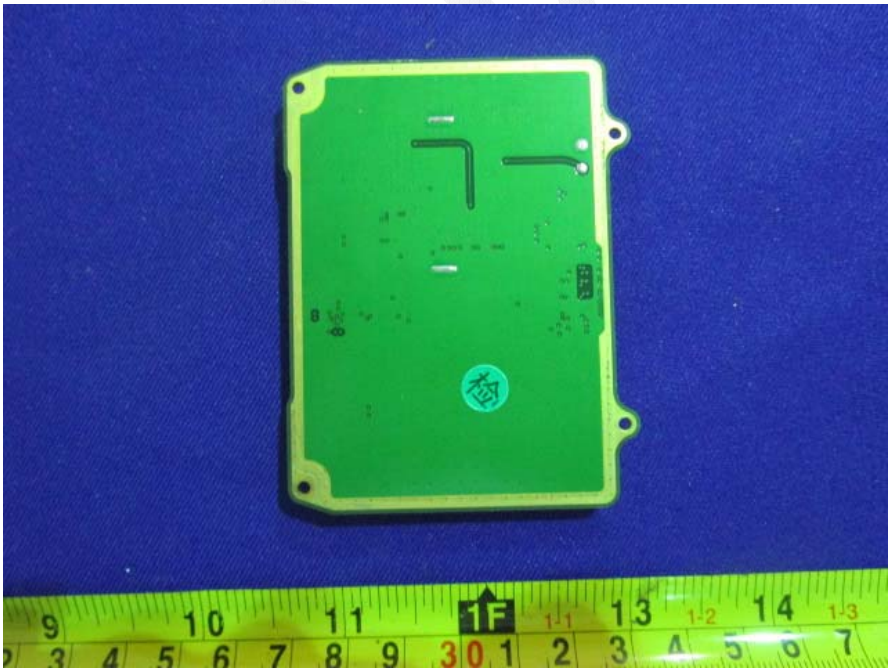
EUT – Sub Board 1 Top View



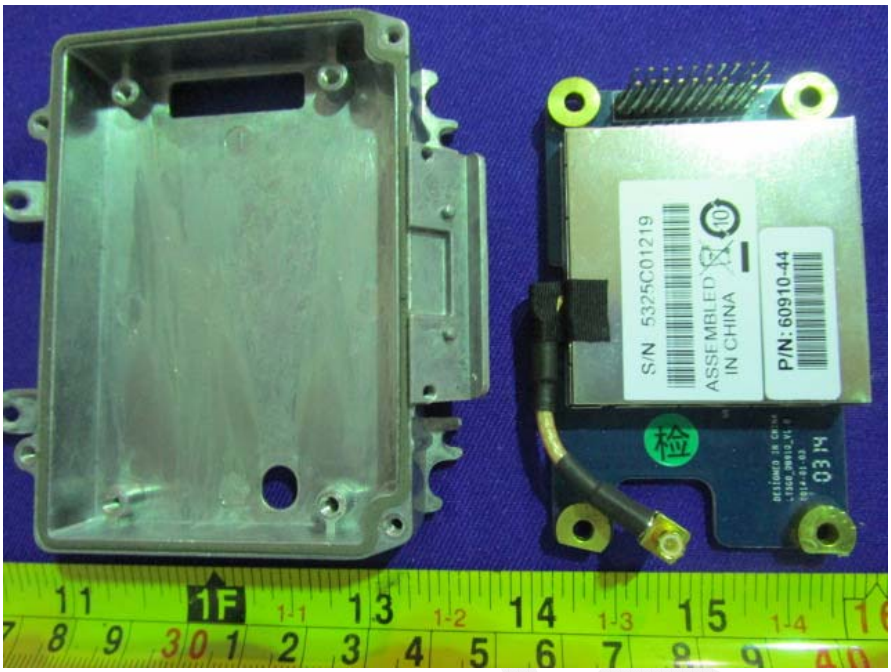
EUT – Sub Board 1 Top without Shielding View



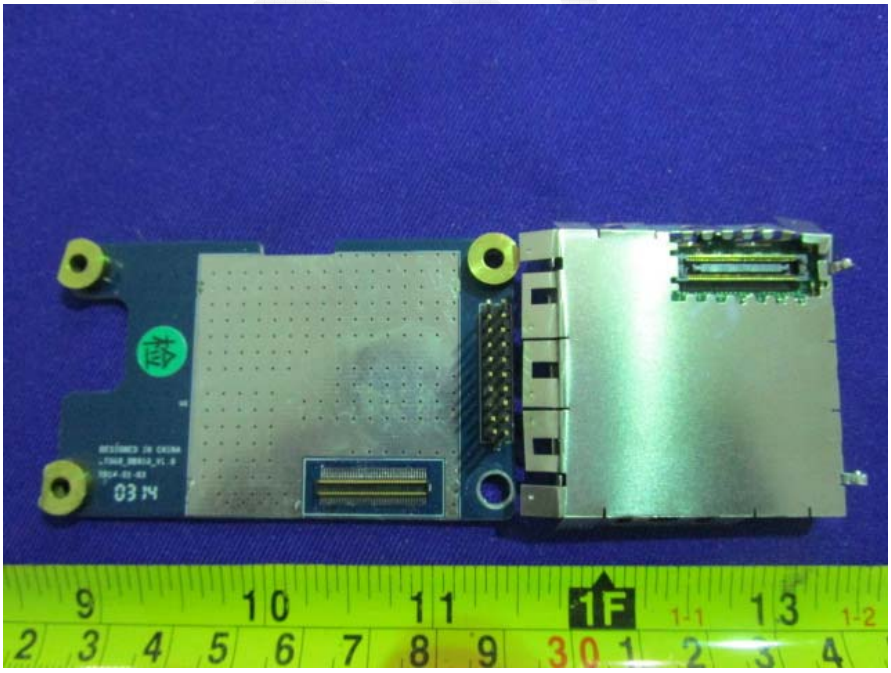
EUT – Sub Board 1 Bottom View



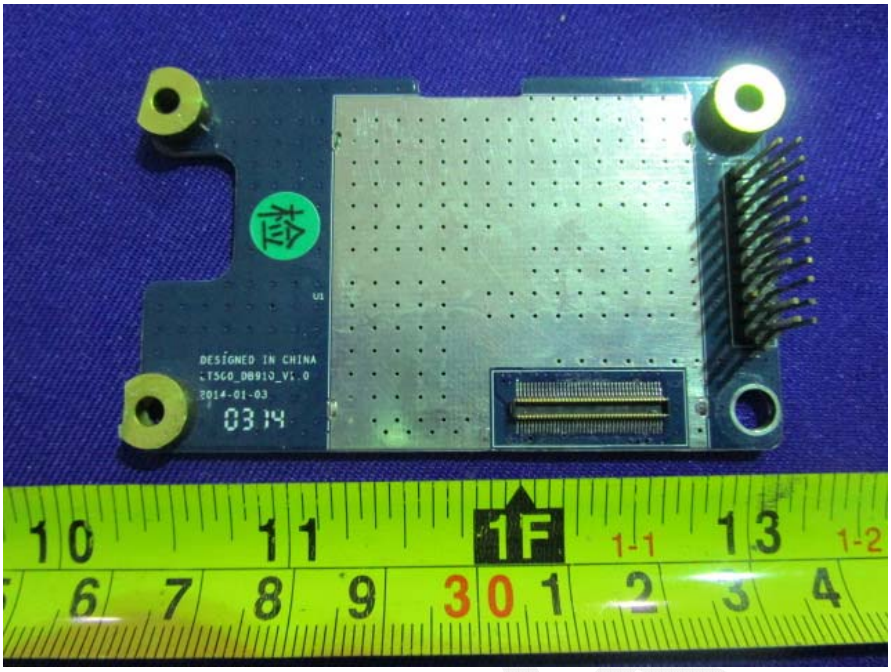
EUT – Sub Board 2 Uncover View



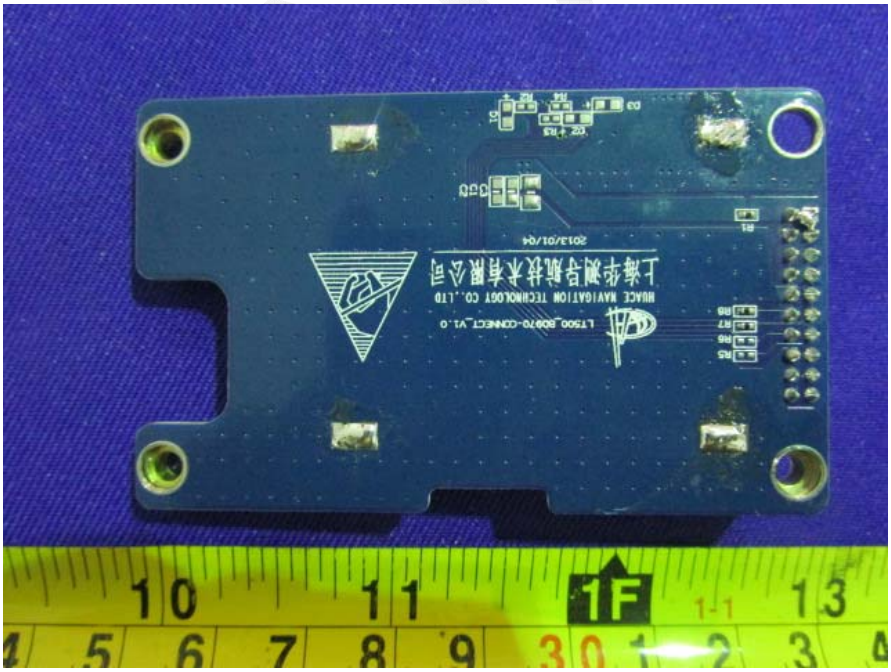
EUT – Sub Board 2 Uncover View



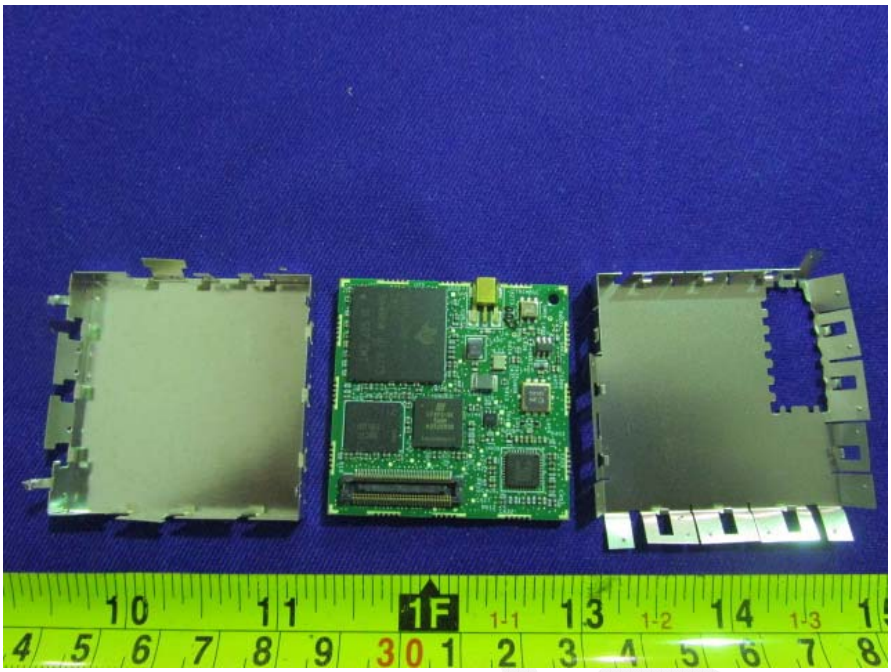
EUT – Sub Board 2 Top View



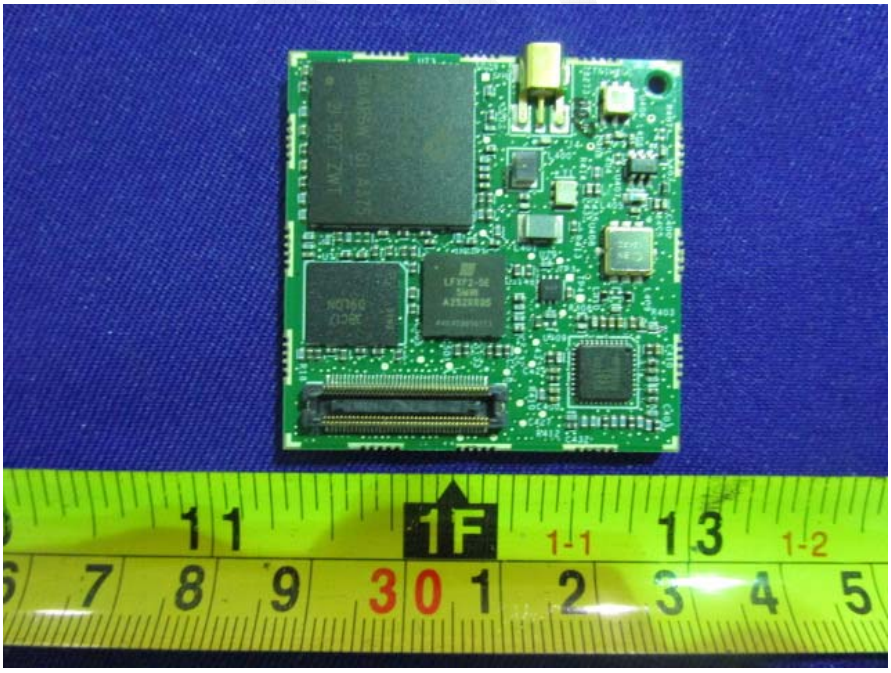
EUT – Sub Board 2 Bottom View



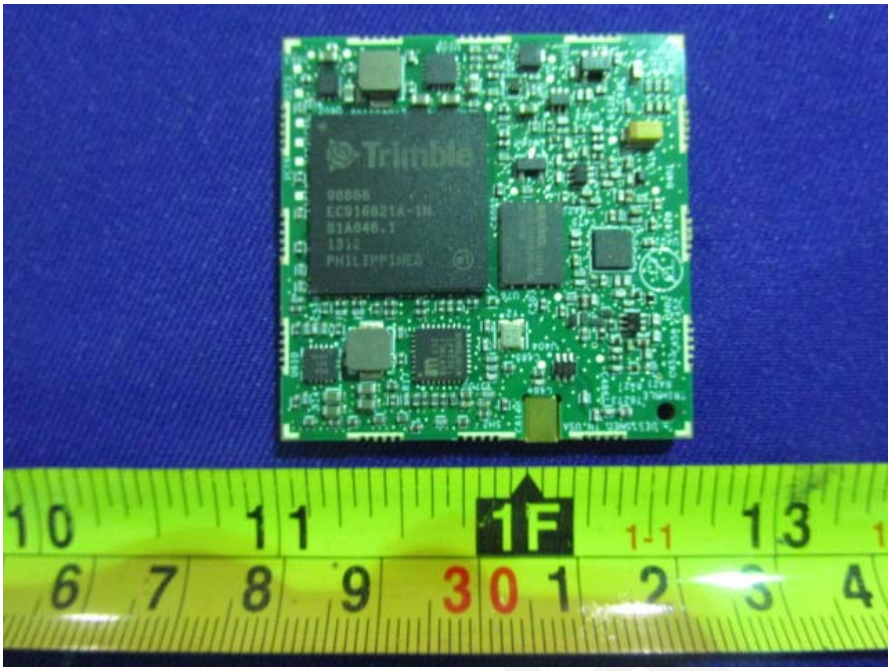
EUT – Sub Board 3 Uncover View



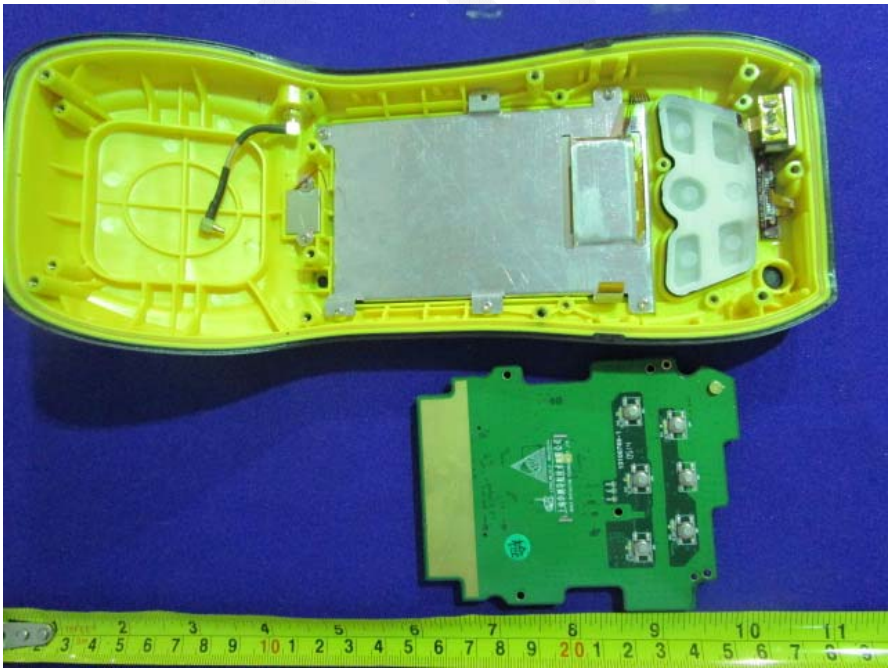
EUT – Sub Board 3 Top View



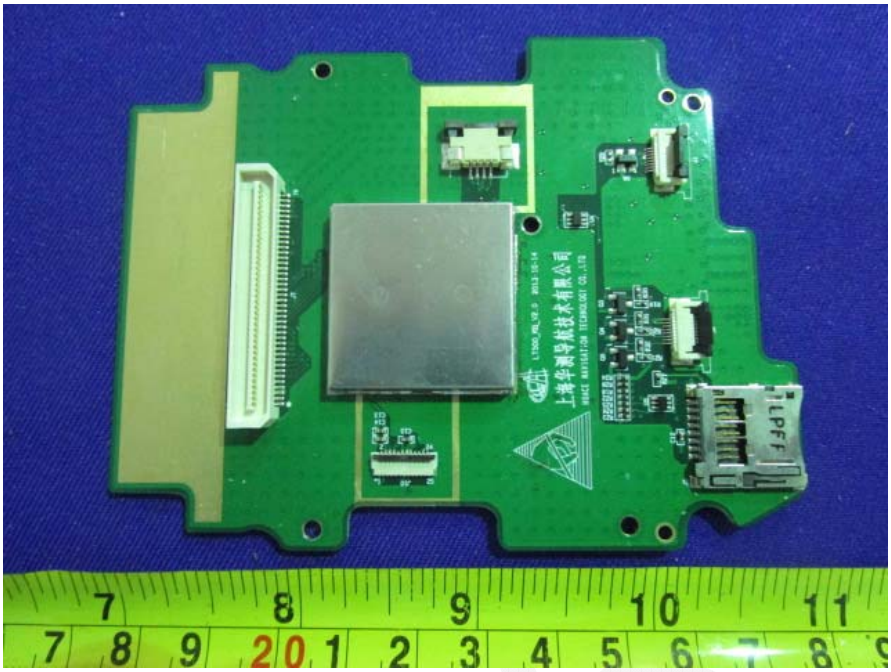
EUT – Sub Board 3 Bottom View



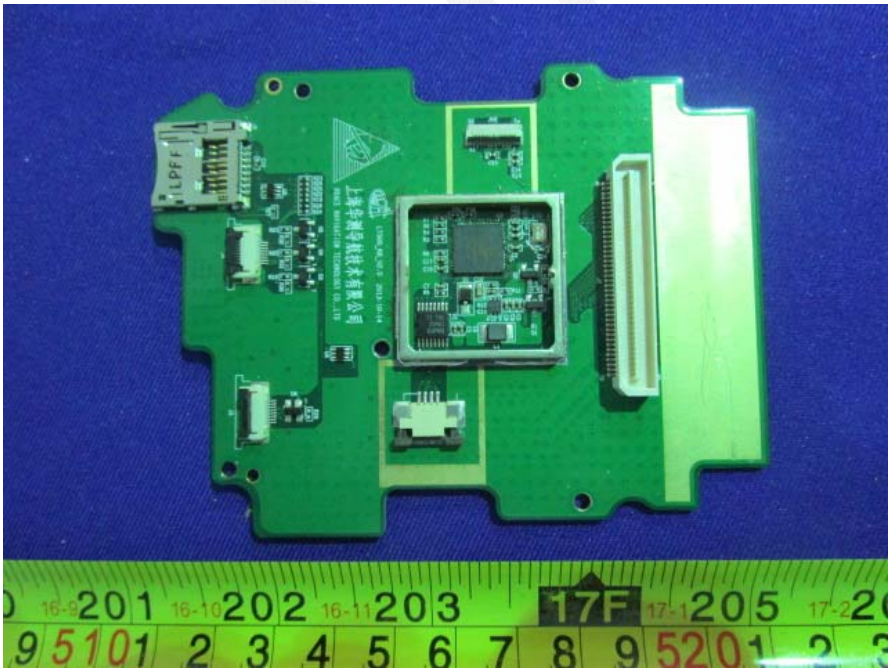
EUT – Sub Board 4 Off View



EUT – Sub Board 4 Top View



EUT – Sub Board 4 Top without ShieldingView



EUT – Sub Board 4 Bottom View

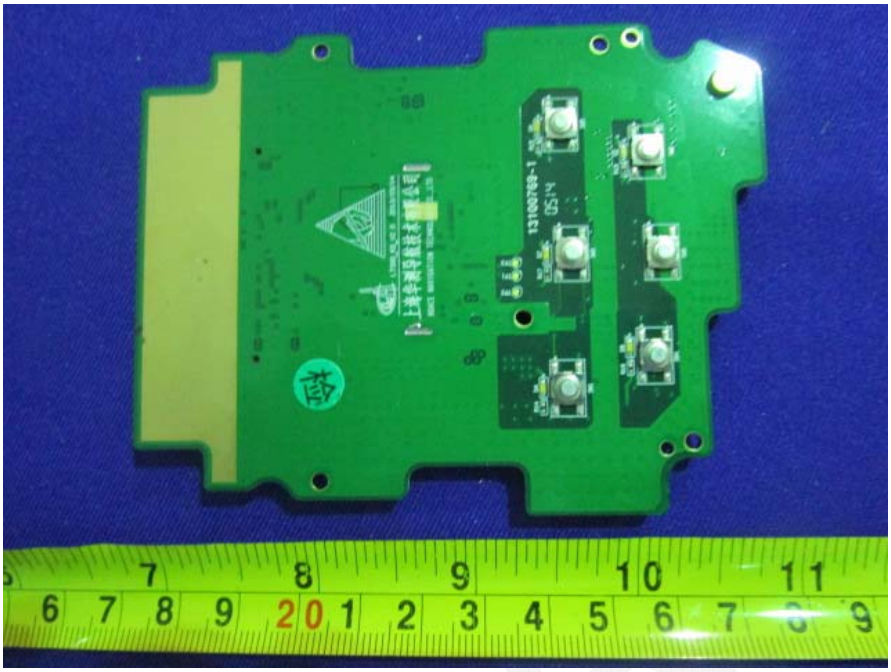
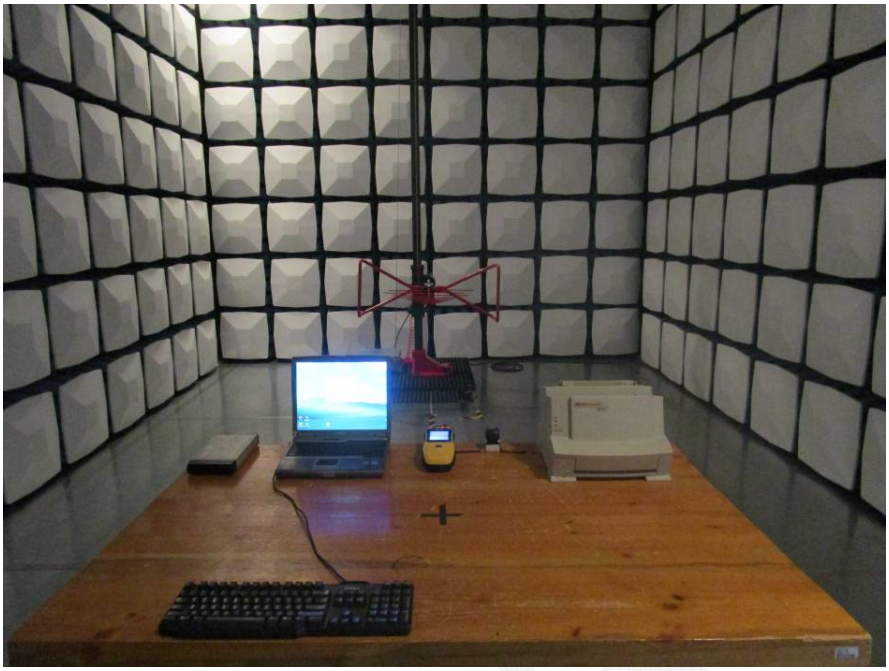


EXHIBIT B - TEST SETUP PHOTOGRAPHS

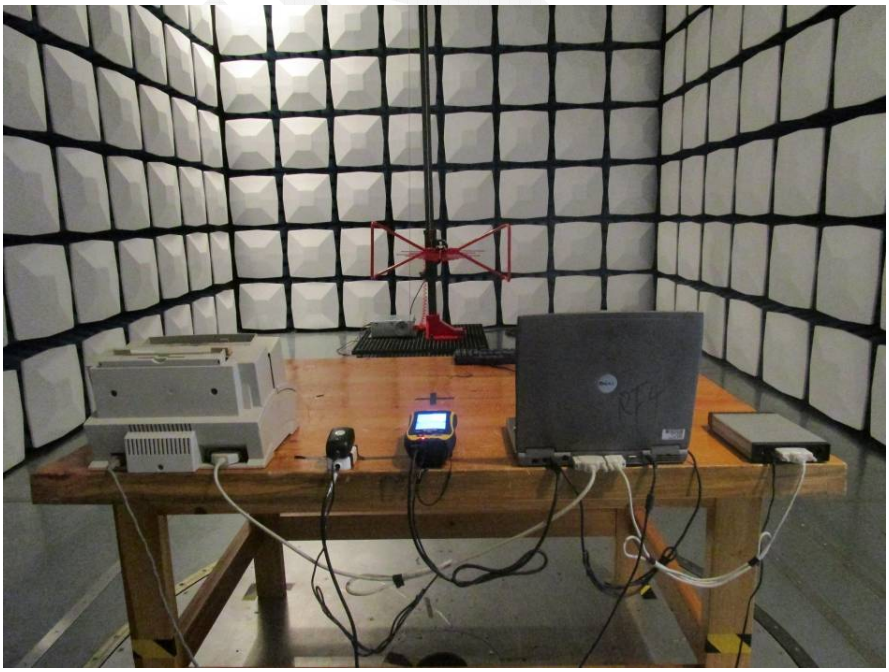
Conducted Emissions - Front View

Conducted Emissions – Side View

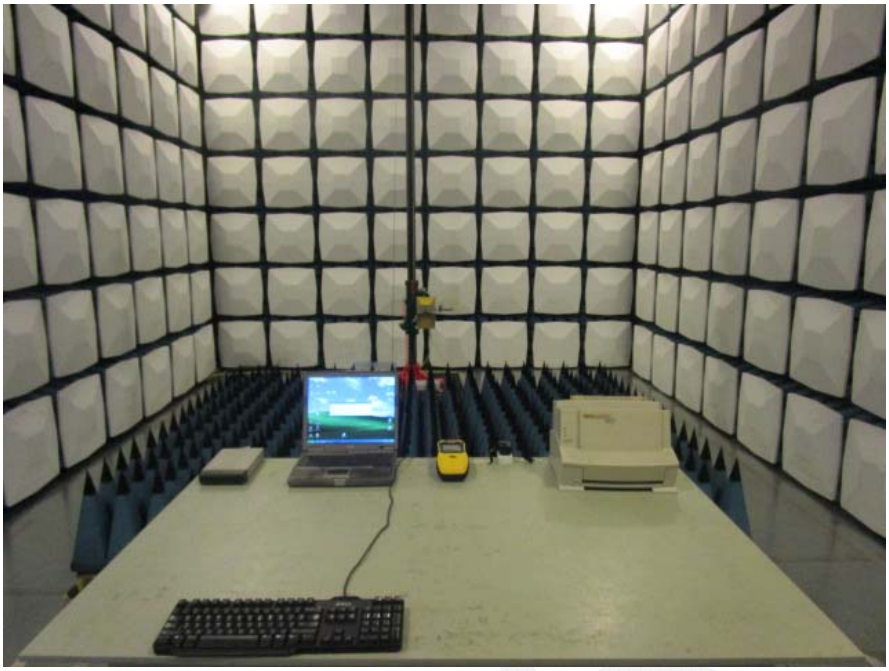
Radiated Emission -Front View (Below 1GHz)



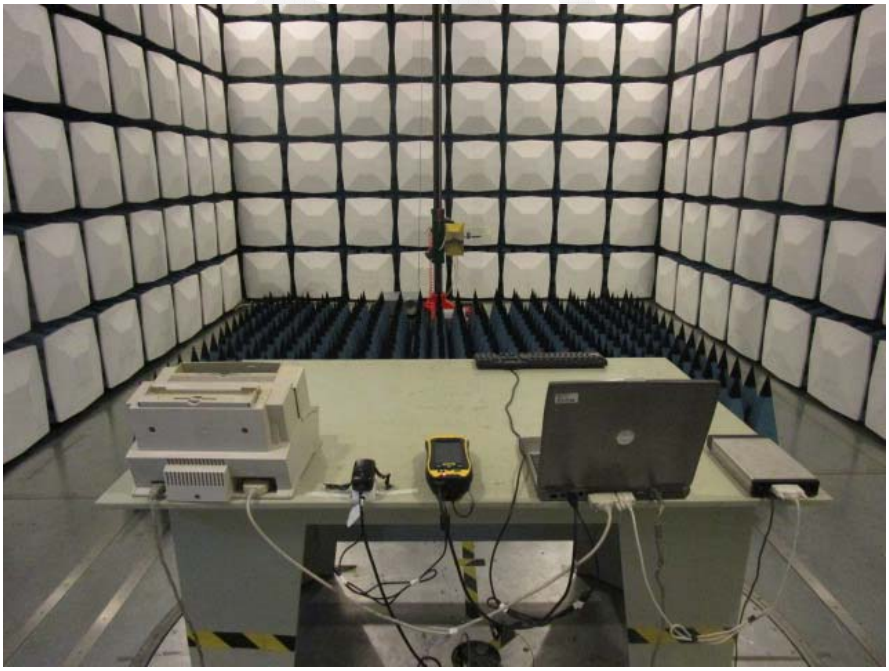
Radiated Emission - Rear View (Below 1GHz)



Radiated Emission -Front View (Above 1GHz)



Radiated Emission - Rear View (Above 1GHz)



DECLARATION LETTER

CHC

Product Model Declaration

Dear Officer,
We Here represent Shanghai Huace Mavigation Technology LTD declare:

The Applicant declares that the model LT500XYZ , X is variable, it indicated A-Z or 0-9, Y is variable, it indicated A-Z, 0-9 or blank. Z is variable, it indicated A-Z, 0-9 or blank. due to sales purpose in different countries or regions.

The internal PCB design are no difference, but only distinct in colours and model names.

The test model name is LT500H.

The Declaration For Your Consideration.

Signature/Stamp:
Date:

Zheng Dan

******* END OF REPORT *******