Report No.: DDT-R15Q0420-4E1

Issued Date: May. 10, 2015

FCC TEST REPORT
FOR

Applicant	**:**	**Capricorn Electronics Ltd**
Address	**:**	**SUITE 1011, 10/FL., METRO CENTRE 1, 32 LAM HING STREET KOWLOON BAY, KOWLOON, HONG KONG**
Equipment under Test	**:**	**RAM 3G CELLULAR GATEWAY**
Model No.	**:**	**RAM 3G**
Trade Mark	**:**	N/A
Manufacturer	**:**	**Capricorn Electronics Ltd**
Address	**:**	**Suite 1012, 10/FL, Metro Centre I, 32 Lam Hing Str Kowloon, Hong Kong, Hong Kong**
FCC ID	**:**	**WXLRAM3G**
Hardware version	**:**	**Hw_v15_5_0**
Software version	**:**	**Sw_v15_5_0**

Issued By: Dongguan Dongdian Testing Service Co., Ltd.

Add: No. 17, Zongbu Road 2, Songshan Lake Sci&Tech, Industry Park, Dongguan City, Guangdong Province, China, 523808

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REPORT

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TEST REPORT DECLARE

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Software version	**:**	**Sw_v15_5_0**

Test Standard Used:

FCC Rules and Regulations Part 15 Subpart B Class B 2014; ANSI C63.4:2009.

We Declare:

The equipment described above is tested by Dongguan Dongdian Testing Service Co., Ltd. and in the configuration tested the equipment complied with the standards specified above (class B). The test results are contained in this test report and Dongguan Dongdian Testing Service Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

After test and evaluation, our opinion is that the equipment provided for test compliance with the requirement of the above FCC standards.

Report No.:	DDT-R15Q0420-1E1		
Date of Test:	May. 04, 2015 - May. 05, 2015	**Date of Report**:	May. 10, 2015

Prepared By: ***Approved By:***

Leo Liu /Engineer ***Kevin Feng/EMC Manager***

Note: This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Dongguan Dongdian Testing Service Co., Ltd.

1. Summary of test results

Description of Test Item	Standard	Limits	Results
Power Line Conducted Emission Test	FCC Part 15: 2014 ANSI C63.4: 2009	Class B	PASS
Radiated Emission Test	FCC Part 15: 2014 ANSI C63.4: 2009	Class B	PASS

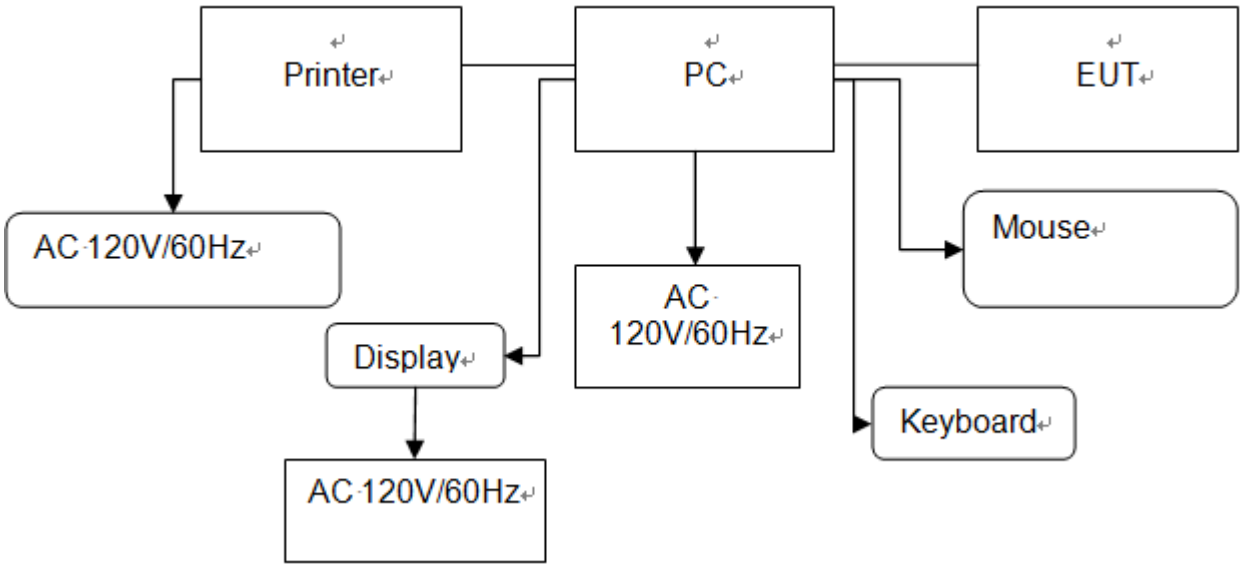
2. General test information

2.1. Description of EUT

EUT* Name	:	RAM 3G CELLULAR GATEWAY
Model Number	:	RAM 3G
EUT function description	:	Please reference user manual of this device
Power supply	:	DC 3.70V
Trade mark	:	N/A
EUT Class	:	Class B, intended primarily for use in the domestic environment
Maximum work frequency	:	<512MHz (3G modular operate frequency was depending on 3G modular test report)
Date of Receipt	:	May. 04, 2015
Sample Type	:	Series production

Note: EUT is the ab. of equipment under test.

2.2. Block diagram EUT configuration for test



Equipment Used in Tested System

Items	Equipment	Manufacturer	Model number or Type	Serial No	Length	shielded/ unshielded	Notes
1	PC	HP	A6T13PA#AB2	CNG2099YXD	/	/	FCC DOC
2	LCD COLOR DISPLAY	HP	GV537A	CNC745Q42R	/	/	FCC DOC
3	USB Cable (EUT to PC)	ITALCOM GROUP	USB 2.0	/	0.80m	unshielded	/
4	Power line	HP	/	/	1.5m	unshielded	/
5	VGA line	HP	/	/	1.5m	unshielded	/
6	Keyboard	HP	KB-0316	BAUEK0OVB 2B0VB	1.5m	unshielded	FCC DOC
7	Mouse	HP	M-SBF96	417441-001	1.5m	unshielded	FCC DOC
8	Printer	HP	LaserJet 1020 plus	CNCFV90866	N/A	N/A	FCC DOC
9	USB Cable (Printer to PC)	HP	/	/	1.8m	unshielded without core	/

2.3. Test environment conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature range:	21-25℃
Humidity range:	40-75%
Pressure range:	86-106kPa

2.4. Test laboratory

Dongguan Dongdian Testing Service Co., Ltd.

Add: No. 17, Zongbu Road 2, Songshan Lake Sci&Tech, Industry Park, Dongguan City, Guangdong Province, China, 523808 Tel: +86-0769-22891499 http://www.dgddt.com

FCC Registration Number: 270092

2.5. Measurement uncertainty

Test Item	Uncertainty
Uncertainty for Conduction emission test	2.44dB
Uncertainty for Radiation Emission test	3.14 dB (Polarize: V)
	3.16 dB (Polarize: H)

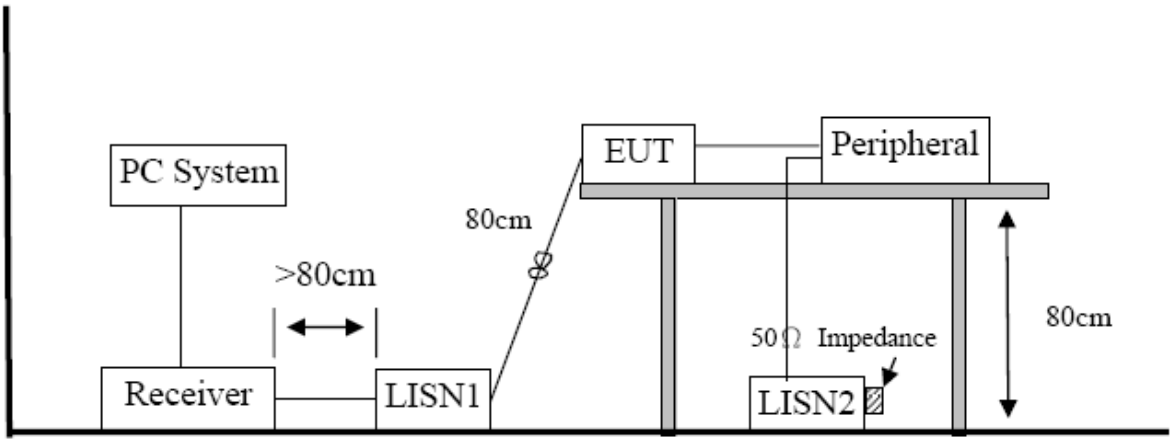
Note：This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3. Power Line Conducted Emission Test

3.1. Test equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	Test Receiver	R&S	ESU8	100316	2014/10/25	1 Year
2	LISN 1	R&S	ENV216	101109	2014/10/25	1 Year
3	LISN 2	R&S	ESH2-Z5	100309	2014/10/25	1 Year
4	Pulse Limiter	R&S	ESH3-Z2	101242	2014/10/25	1 Year
5	Cable	HUBSER	RG214/U	534971	2014/10/25	1 Year
6	EMC Test Software	Audix	E3	N/A	N/A	N/A

3.2. Block diagram of test setup



3.3. Power Line Conducted Emission Limits(Class B)

Frequency	Quasi-Peak Level dB(μV)	Average Level dB(μV)
150kHz ~ 500kHz	66 ~ 56*	56 ~ 46*
500kHz ~ 5MHz	56	46
5MHz ~ 30MHz	60	50

Note 1: * Decreasing linearly with logarithm of frequency.

Note 2: The lower limit shall apply at the transition frequencies.

3.4. Test Procedure

The EUT and Support equipment, if needed, were put placed on a non-metallic table, 80cm above the ground plane.

Configuration EUT to simulate typical usage as described in clause 2.3 and test equipment as described in clause 3.1 of this report.

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

All support equipment power received from a second LISN.

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 150 kHz 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 clause 2.3 were scanned during the preliminary test.

After the preliminary scan, we found the test mode producing the highest emission level.

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

EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test.

A scan was taken on both power lines, Neutral and Line, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit.

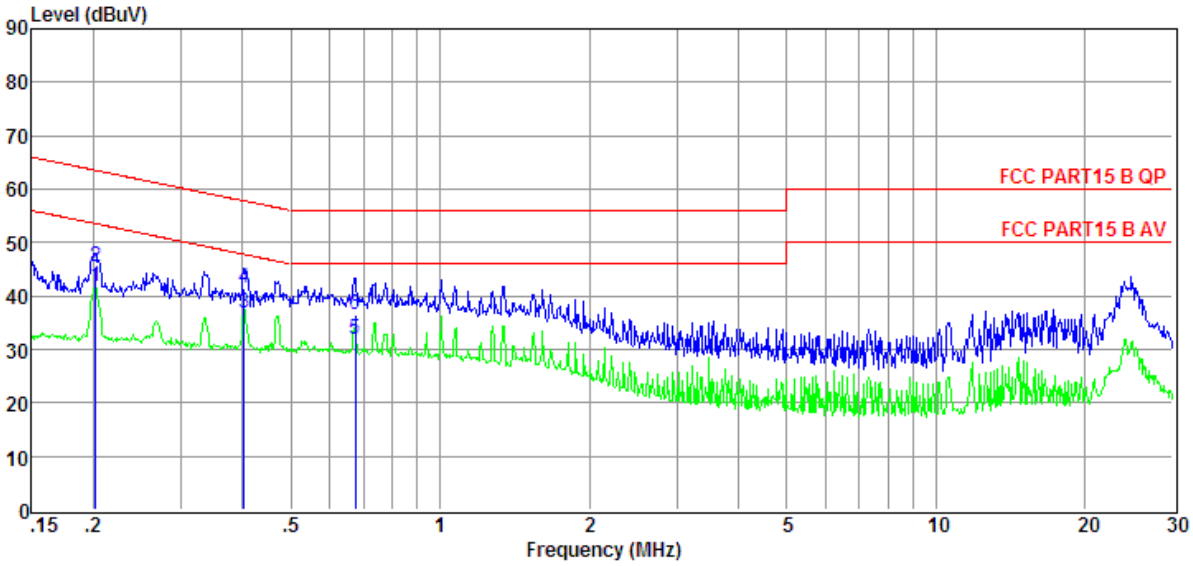
The test data of the worst-case condition(s) was recorded.

The bandwidth of test receiver is set at 9 KHz.

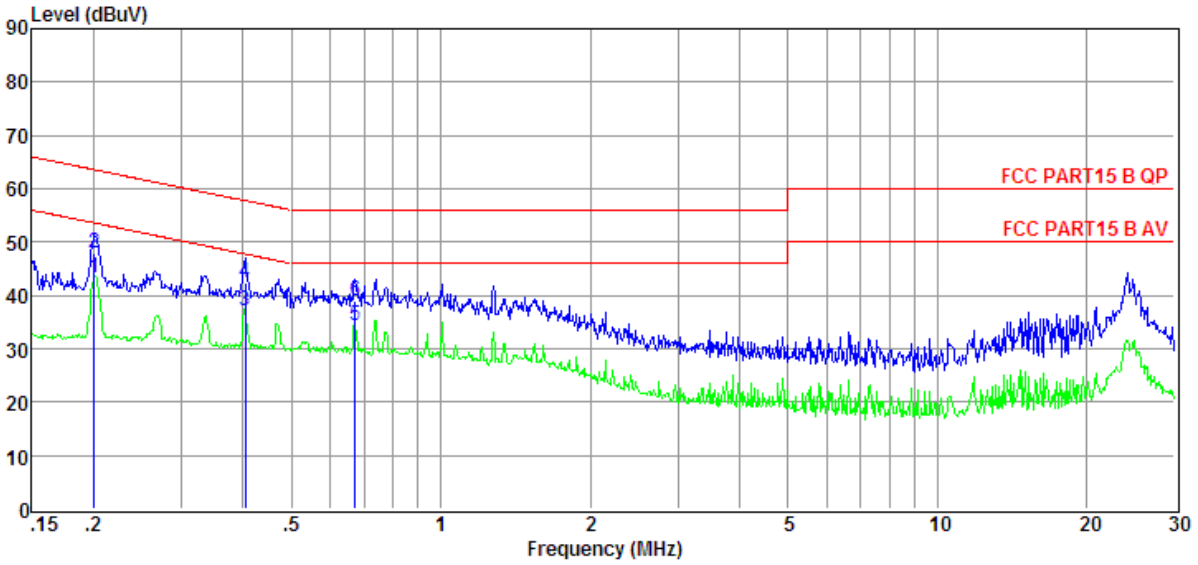
3.5. Test Result

PASS. (See below detailed test result)

Note1: All emissions not reported below are too low against the prescribed limits.
Note2: "-----" means Peak detection; "-----" mans Average detection



Item (Mark)	Freq (MHz)	Read Level (dBµV)	LISN Factor (dB)	Cable Loss (dB)	Pulse Limiter Factor (dB)	Result Level (dBµV)	Limit Line (dBµV)	Over Limit (dB)	Detector	Phase
1	0.20	22.18	9.59	0.02	9.85	41.64	53.54	-11.90	Average	NEUTRAL
2	0.20	26.12	9.59	0.02	9.85	45.58	63.54	-17.96	QP	NEUTRAL
3	0.40	17.31	9.61	0.03	9.86	36.81	47.81	-11.00	Average	NEUTRAL
4	0.40	21.84	9.61	0.03	9.86	41.34	57.81	-16.47	QP	NEUTRAL
5	0.68	12.44	9.62	0.06	9.85	31.97	46.00	-14.03	Average	NEUTRAL
6	0.68	16.93	9.62	0.06	9.85	36.46	56.00	-19.54	QP	NEUTRAL



Item (Mark)	Freq (MHz)	Read Level (dBµV)	LISN Factor (dB)	Cable Loss (dB)	Pulse Limiter Factor (dB)	Result Level (dBµV)	Limit Line (dBµV)	Over Limit (dB)	Detector	Phase
1	0.20	23.83	9.62	0.02	9.85	43.32	53.58	-10.26	Average	LINE
2	0.20	28.52	9.62	0.02	9.85	48.01	63.58	-15.57	QP	LINE
3	0.40	17.64	9.63	0.03	9.86	37.16	47.77	-10.61	Average	LINE
4	0.40	22.90	9.63	0.03	9.86	42.42	57.77	-15.35	QP	LINE
5	0.67	14.81	9.62	0.06	9.85	34.34	46.00	-11.66	Average	LINE
6	0.67	19.45	9.62	0.06	9.85	38.98	56.00	-17.02	QP	LINE

Note:
1. Result Level = Read Level +LISN Factor + Pulse Limiter Factor + Cable loss.
2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 200 Hz (9 kHz—150 kHz), 9 kHz (150 kHz—30 MHz), Step size: 4 kHz, Scan time: auto.

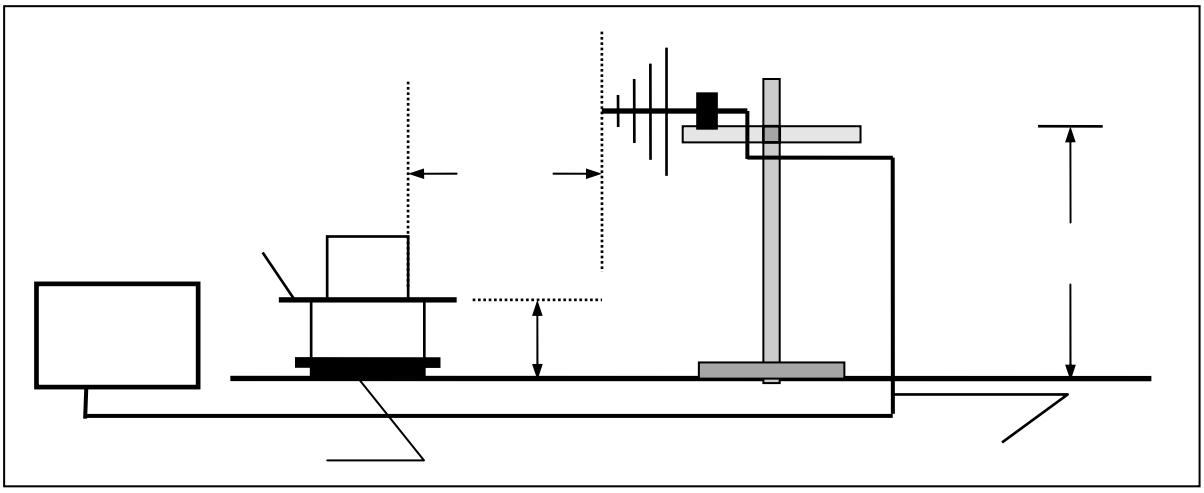
4. Radiated emission test

4.1. Test equipment

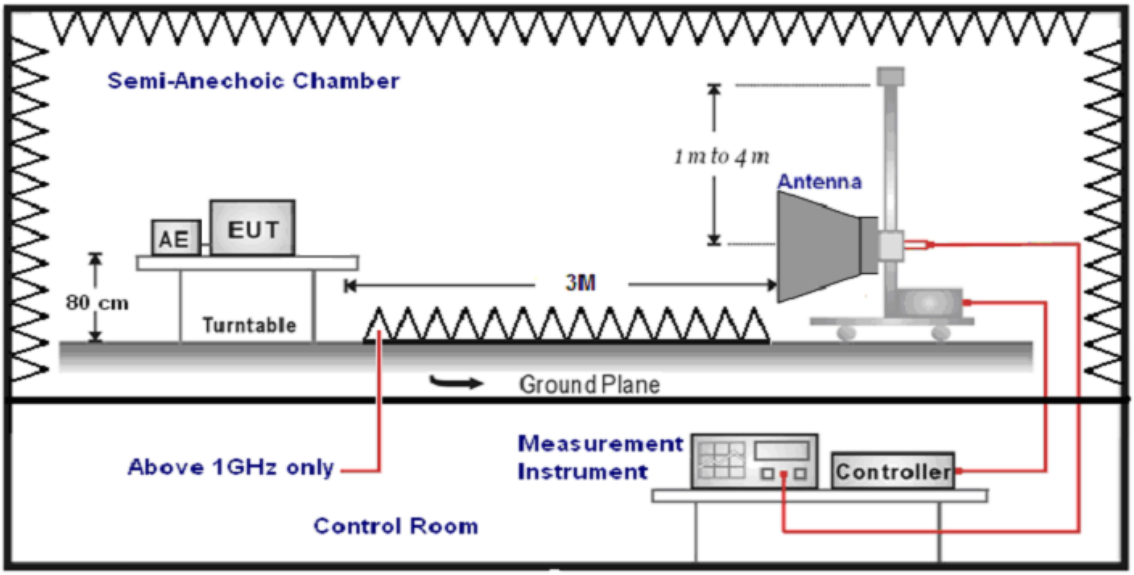
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	EMI Test Receiver	R&S	ESU8	100316	2014/10/25	1 Year
2	Trilog Broadband Antenna	Schwarzbeck	VULB9163	9163-462	2015/04/12	1 Year
3	EMC Test Software	Audix	E3	N/A	N/A	N/A
4	RF Cable	R&S	R01	10403	2014/10/25	1 Year
5	Pre-Amplifer	A.H	PAM0-0118	360	2014/10/25	1 Year
6	Double Ridged Horn Antenna	R&S	HF907	100265	2015/04/12	1 Year

4.2. Block diagram of test setup

Frequency range 30MHz – 1000MHz



Frequency range above 1GHz-25GHz



4.3. Radiated emission limit(Class B)

Frequency (MHz)	Distance (Meters)	Field Strengths Limits dB(μV)/m
30--88	3	40.0
88--216	3	43.5
216--960	3	46.0
960--1000	3	54.0

Note: (1) The smaller limit shall apply at the cross point between two frequency bands.

(2)Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

4.4. Test Procedure

Procedure of Preliminary Test

The EUT and Support equipment, if needed, were put placed on a non-metallic table, 80cm above the ground plane.

Configuration EUT to simulate typical usage as described in clause 2.3 and test equipment as described in clause 4.1 of this report.

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

Mains cables, telephone lines or other connections to auxiliary equipment located outside the test are shall drape to the floor, be fitted with ferrite clamps or ferrite tubes placed on the floor at the point where the cable reaches the floor and then routed to the place where they leave the turntable. No extension cords shall be used to mains receptacle.

The antenna was placed at 3 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 1000MHz. 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 clause 2.3 were scanned during the preliminary test:

After the preliminary scan, we found the test mode producing the highest emission level. The EUT and cable configuration, antenna position, polarization and turntable position of the above highest emission level were recorded for the final test.

Procedure of Final Test

EUT and support equipment were set up on the turntable as per the configuration with highest emission level in the preliminary test.

The Analyzer / Receiver scanned from 30MHz to 1000MHz. Emissions were scanned and measured rotating the EUT to 360 degrees, varying cable placement 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.

Recorded at least the six highest emissions. Emission frequency, amplitude, antenna position, polarization and turntable position were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit and only Q.P. reading is presented.

The test data of the worst-case condition(s) was recorded.

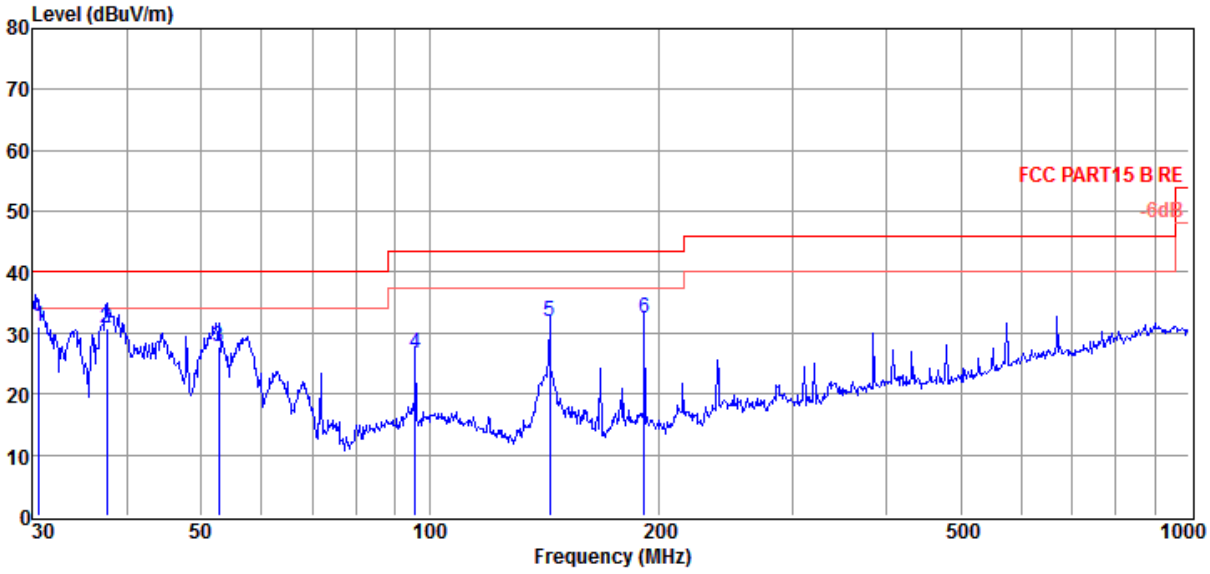
The bandwidth setting of the test receiver is 120 kHz.

4.5. Test result

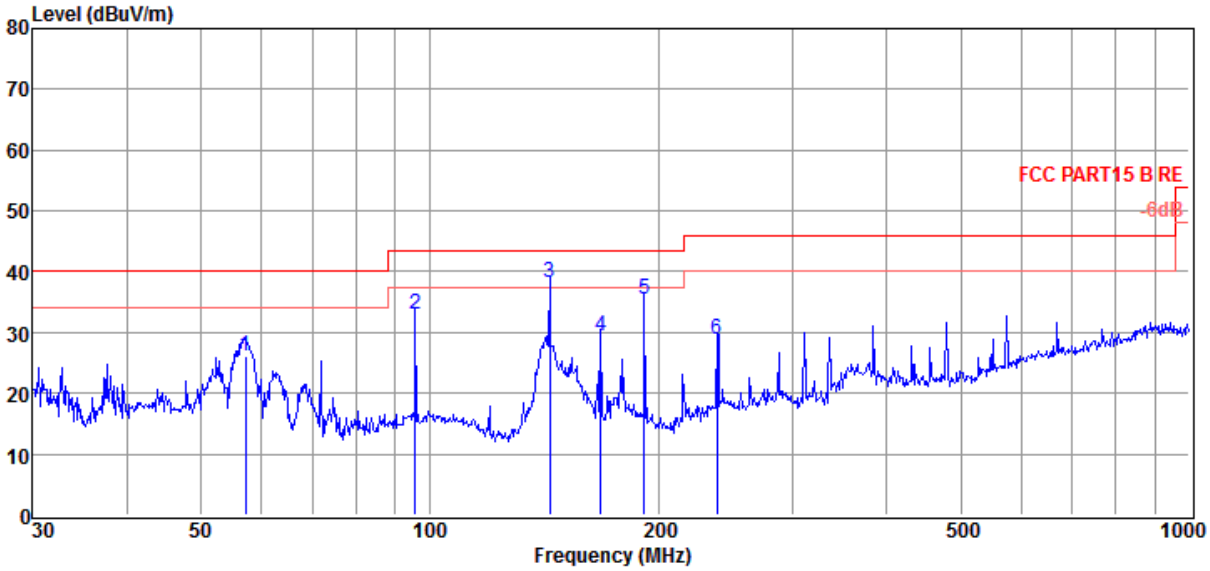
PASS. (See below detailed test result)

Note1: All emissions not reported below are too low against the prescribed limits.

For 30 MHz - 1 GHz



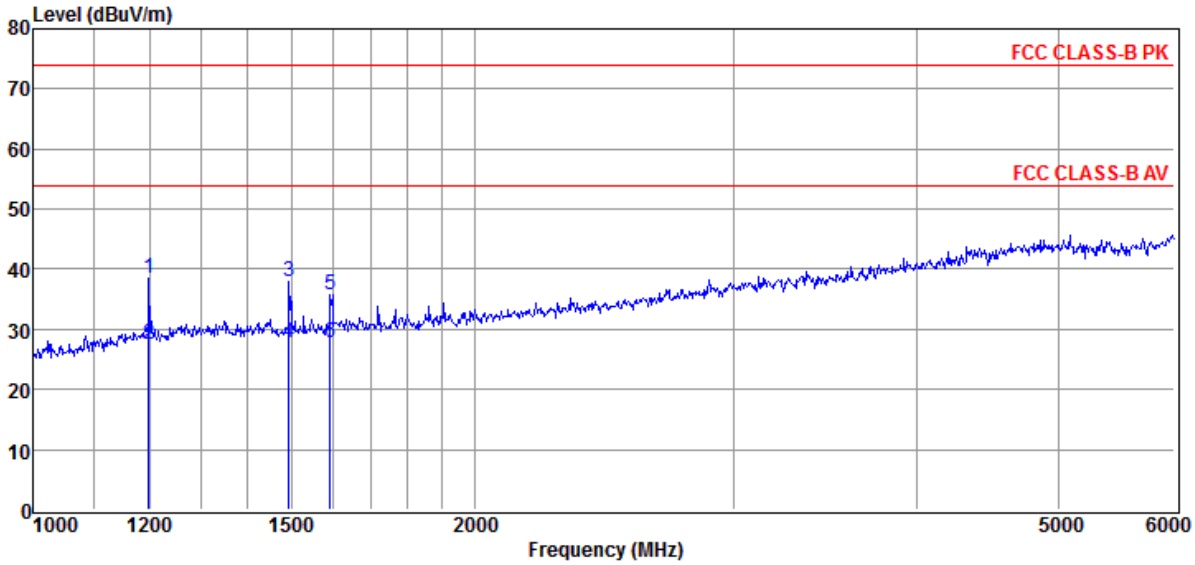
Item (Mark)	Freq (MHz)	Read Level (dBµV/m)	Antenna Factor (dB/m)	Cable Loss (dB)	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	30.60	18.20	11.95	0.92	31.07	40.00	-8.93	QP	VERTICAL
2	37.55	16.68	13.15	0.97	30.80	40.00	-9.20	QP	VERTICAL
3	52.76	12.36	14.20	1.09	27.65	40.00	-12.35	QP	VERTICAL
4	95.76	13.25	12.00	1.47	26.72	43.50	-16.78	QP	VERTICAL
5	143.83	21.43	8.75	1.73	31.91	43.50	-11.59	QP	VERTICAL
6	191.75	19.83	10.53	2.12	32.48	43.50	-11.02	QP	VERTICAL



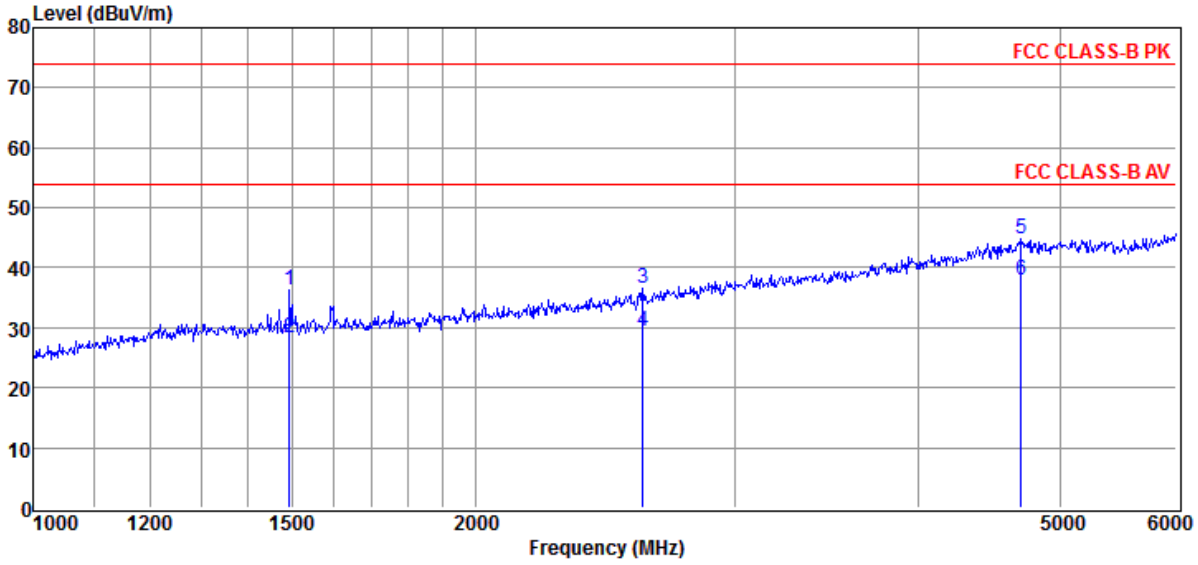
Item (Mark)	Freq (MHz)	Read Level (dBμV/m)	Antenna Factor (dB/m)	Cable Loss (dB)	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	57.19	11.12	13.90	1.11	26.13	40.00	-13.87	QP	HORIZONTAL
2	95.76	19.44	12.00	1.47	32.91	43.50	-10.59	QP	HORIZONTAL
3	143.83	27.85	8.75	1.73	38.33	43.50	-5.17	QP	HORIZONTAL
4	167.82	18.97	8.50	2.01	29.48	43.50	-14.02	QP	HORIZONTAL
5	191.75	22.79	10.53	2.12	35.44	43.50	-8.06	QP	HORIZONTAL
6	239.15	14.76	11.70	2.31	28.77	46.00	-17.23	QP	HORIZONTAL

Note:
1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

For 1 GHz - 6 GHz



Item (Mark)	Freq (MHz)	Read Level (dBµV/m)	Antenna Factor (dB/m)	PRM Factor (dB)	Cable Loss (dB)	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	1198.38	34.66	25.30	27.55	5.95	38.36	74.00	-35.64	Peak	VERTICAL
2	1198.38	23.66	25.30	27.55	5.95	27.36	54.00	-26.64	Average	VERTICAL
3	1493.85	33.37	26.30	28.43	6.60	37.84	74.00	-36.16	Peak	VERTICAL
4	1493.85	23.37	26.30	28.43	6.60	27.84	54.00	-26.16	Average	VERTICAL
5	1593.38	31.13	26.80	28.94	6.81	35.80	74.00	-38.20	Peak	VERTICAL
6	1593.38	23.13	26.80	28.94	6.81	27.80	54.00	-26.20	Average	VERTICAL



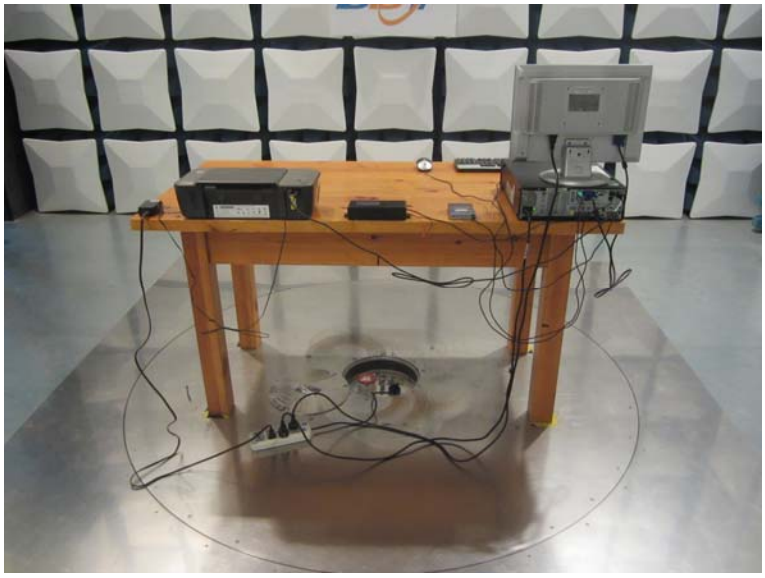
Item (Mark)	Freq (MHz)	Read Level (dBµV/m)	Antenna Factor (dB/m)	PRM Factor (dB)	Cable Loss (dB)	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	1493.85	31.73	26.30	28.43	6.60	36.20	74.00	-37.80	Peak	HORIZONTAL
2	1493.85	23.73	26.30	28.43	6.60	28.20	54.00	-25.80	Average	HORIZONTAL
3	2598.69	27.42	30.64	30.30	8.68	36.44	74.00	-37.56	Peak	HORIZONTAL
4	2598.69	20.42	30.64	30.30	8.68	29.44	54.00	-24.56	Average	HORIZONTAL
5	4702.43	26.78	35.23	29.21	12.11	44.91	74.00	-29.09	Peak	HORIZONTAL
6	4702.43	19.78	35.23	29.21	12.11	37.91	54.00	-16.09	Average	HORIZONTAL

Note:
1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

5. Test setup photograph

5.1. Photos of power line conducted emission test

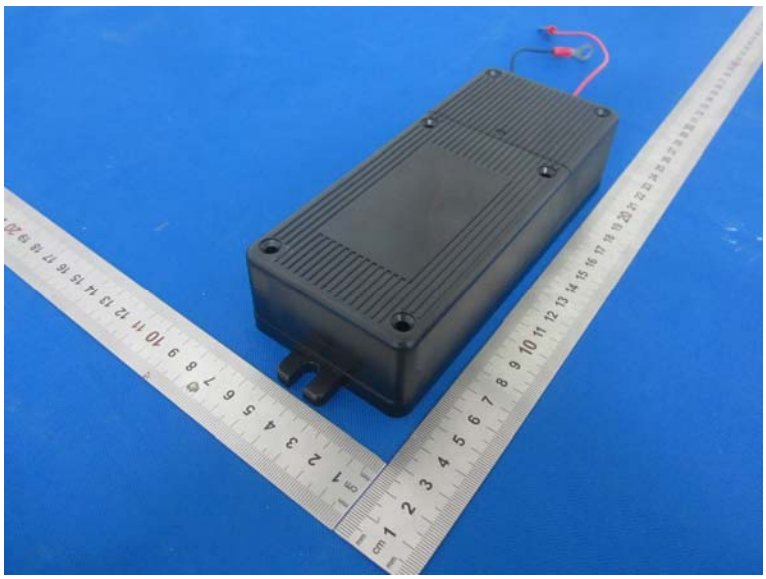
5.2. Photos of radiated emission test (30 MHz – 1 GHz)

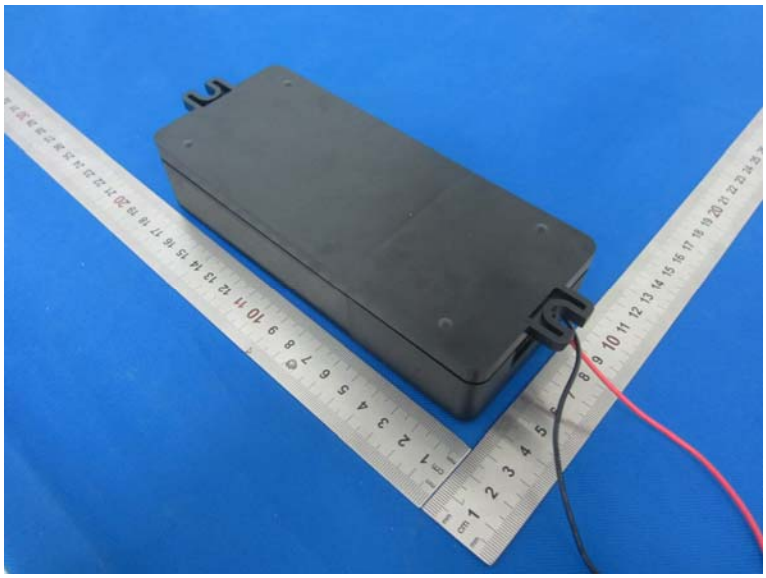


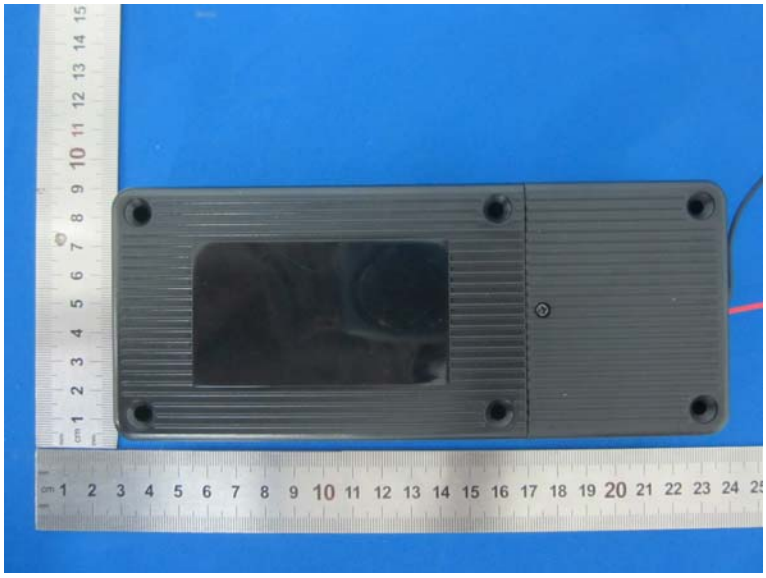
5.3. Photos of radiated emission test (1 GHz – 6 GHz)

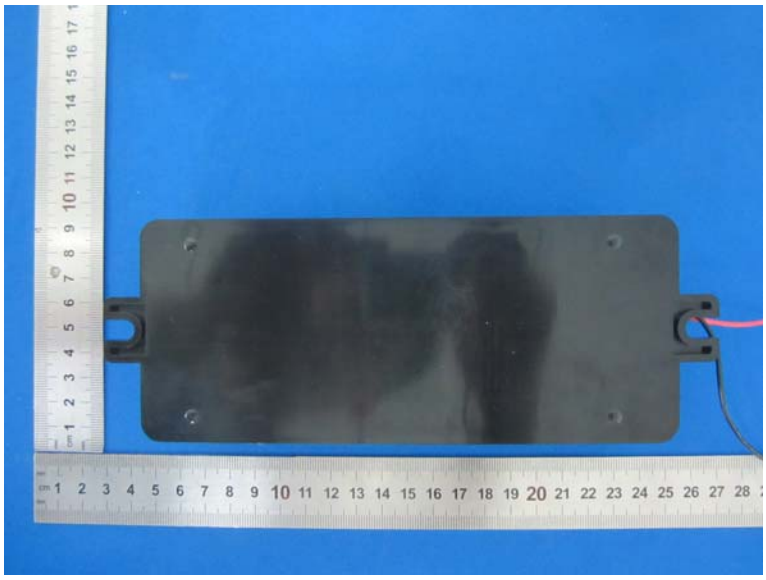
6. Photos of the EUT

6.1. External photos of the EUT

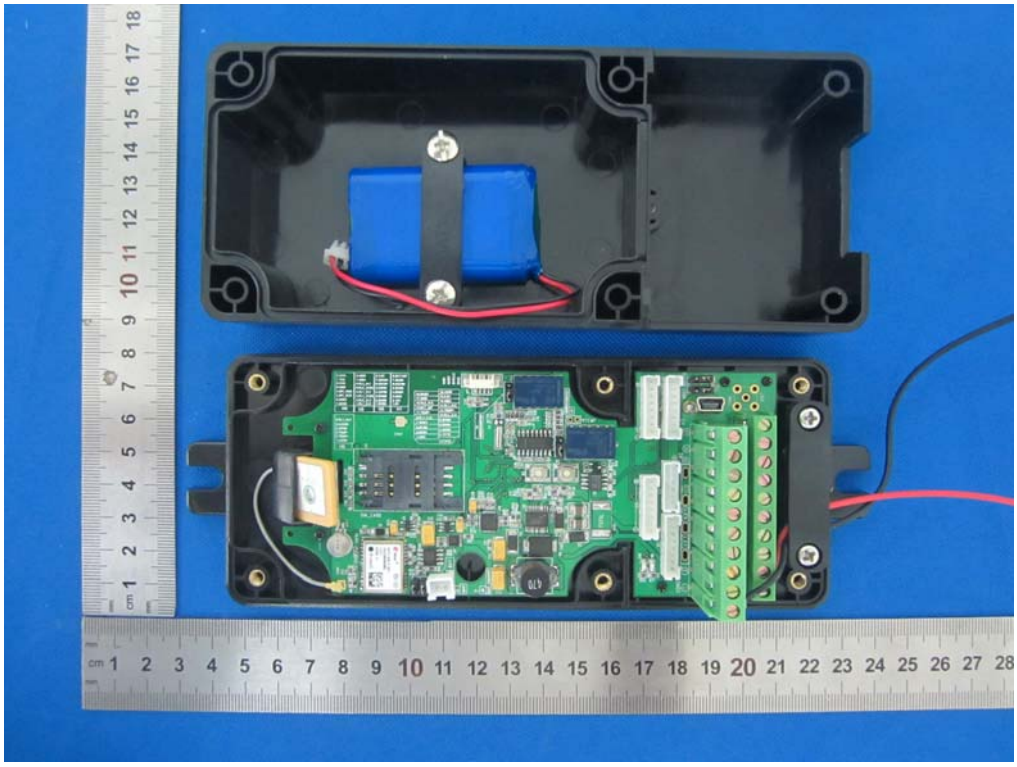


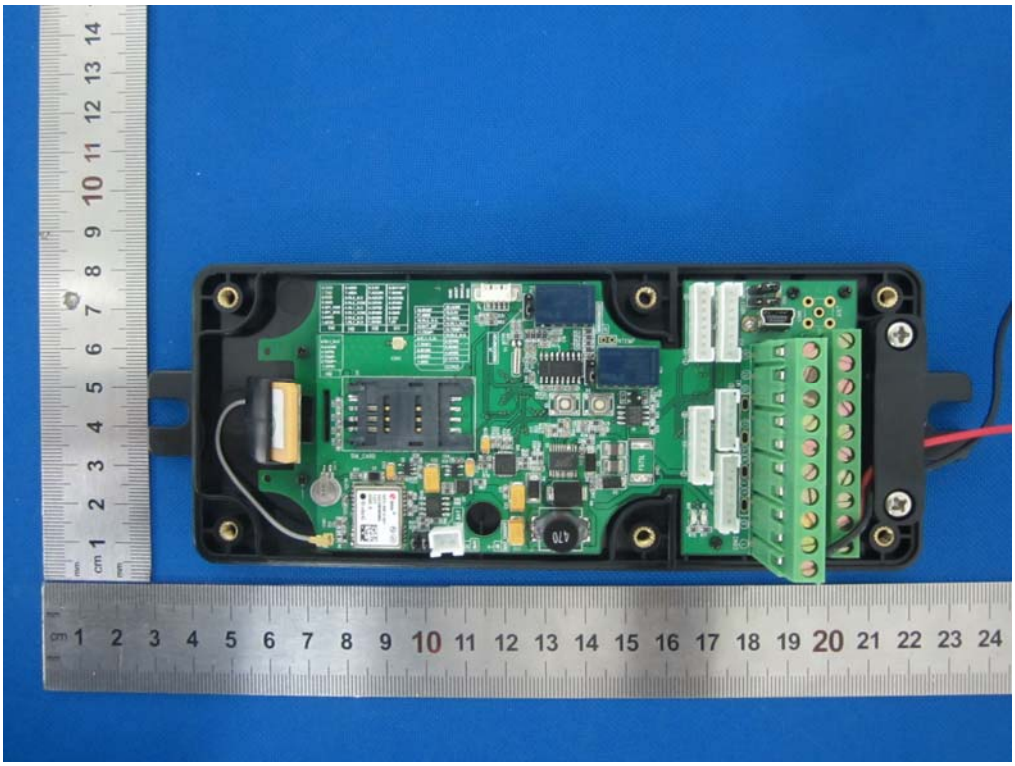


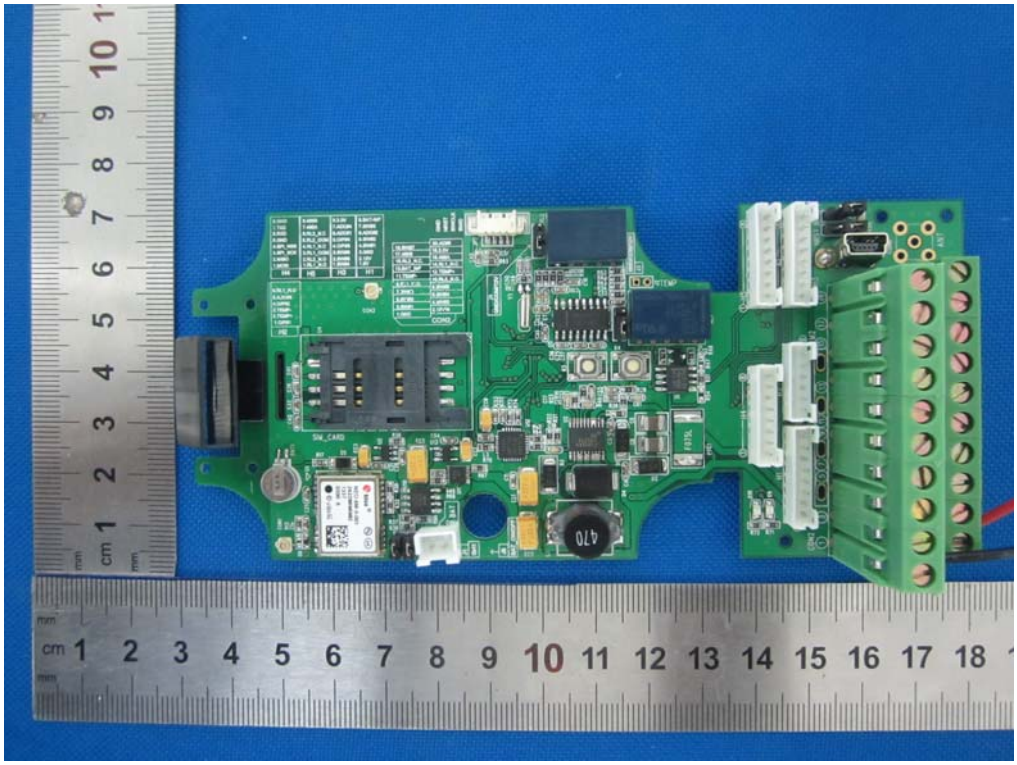


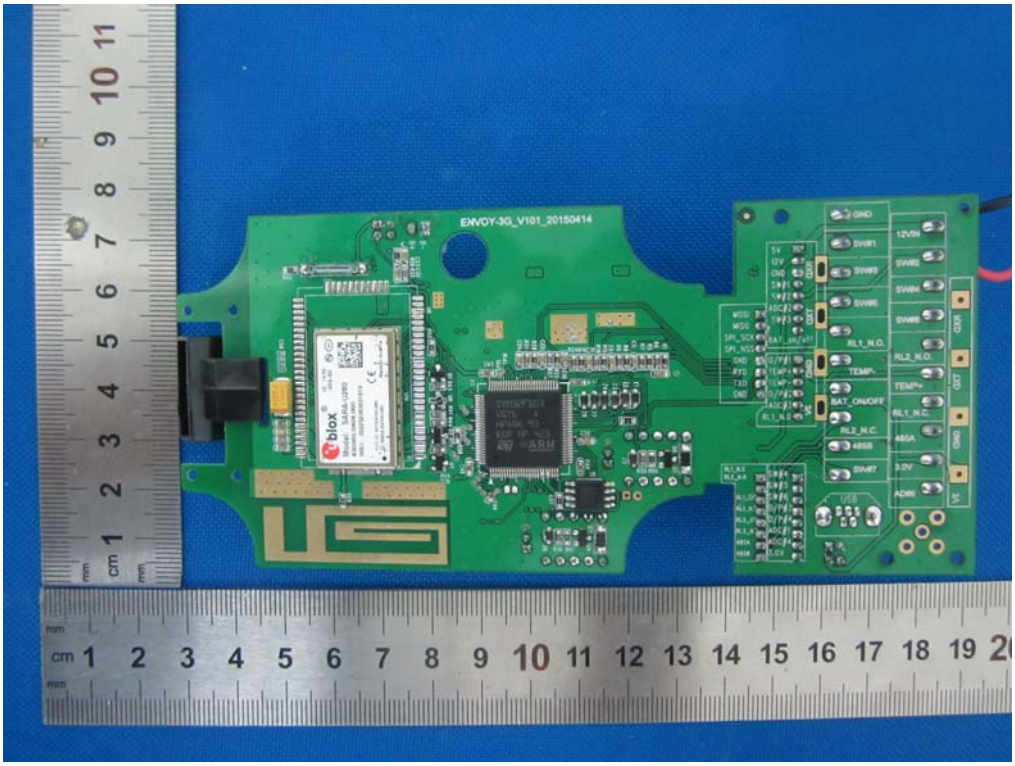


6.2. Internal photos of the EUT





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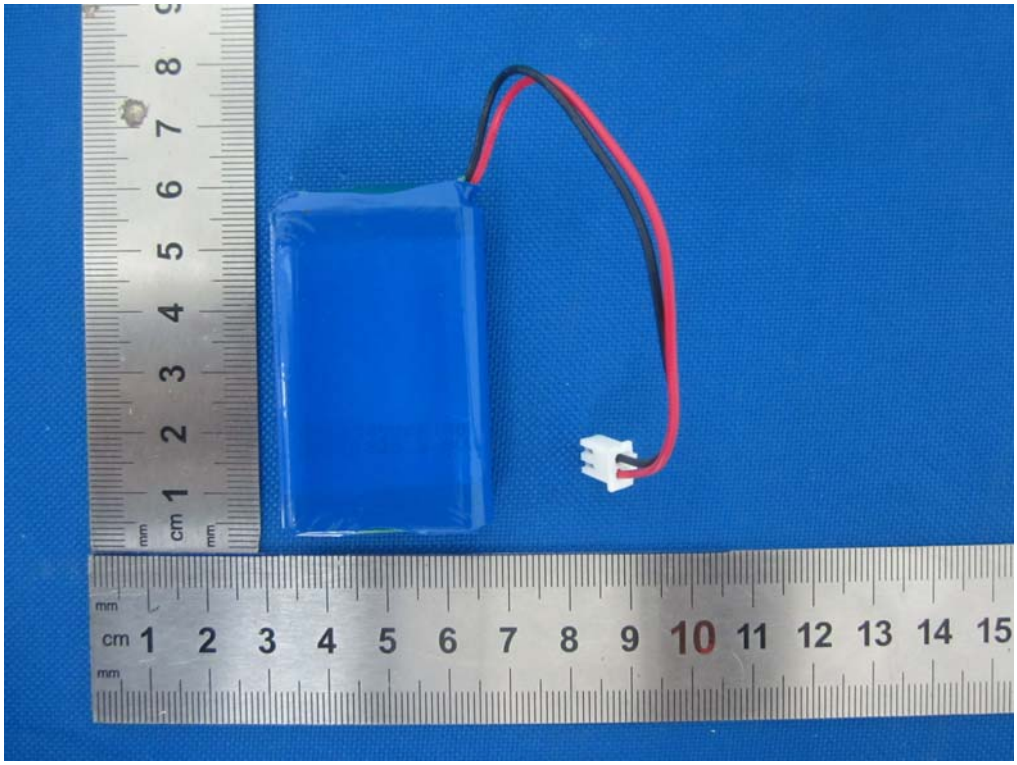

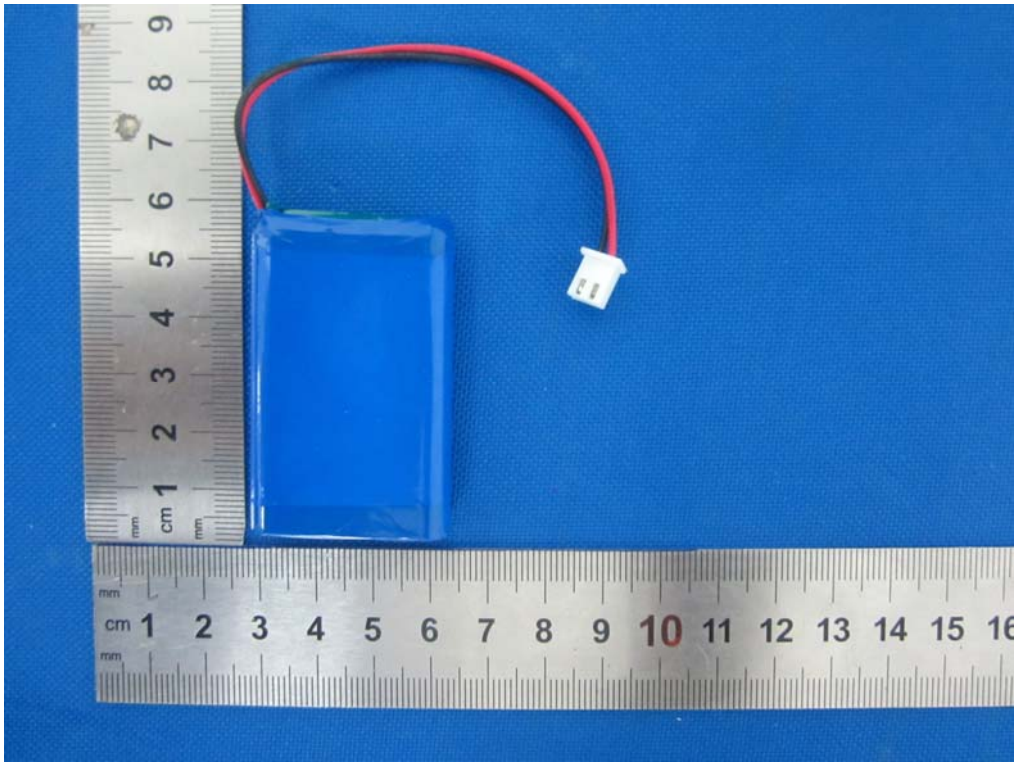

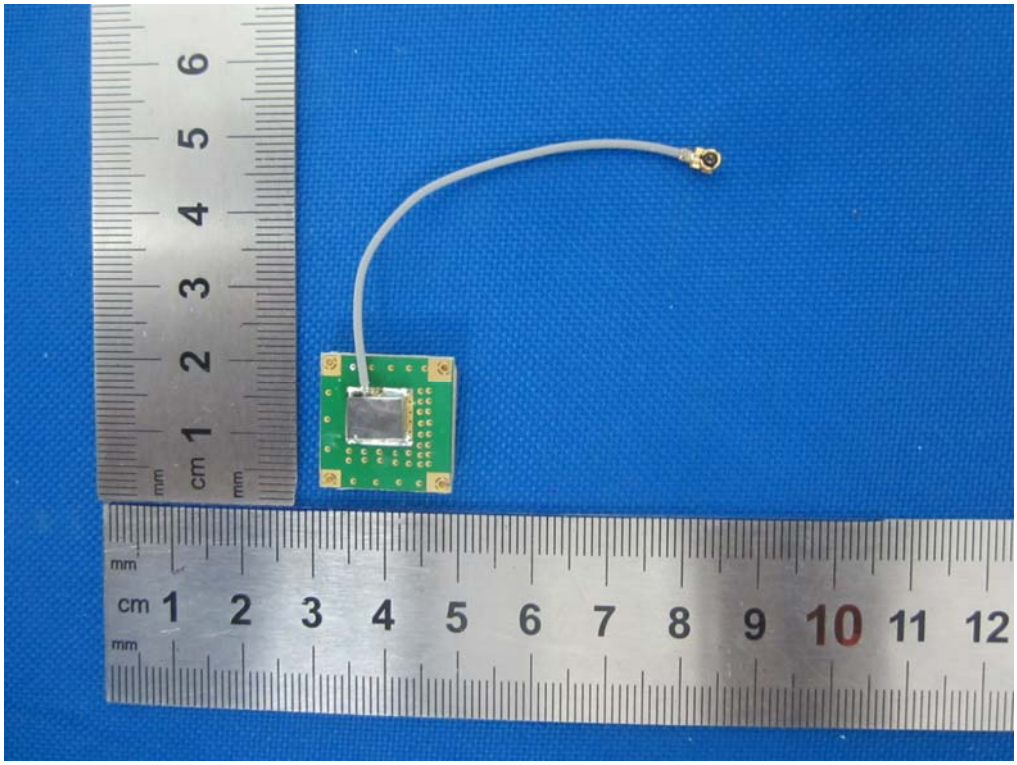

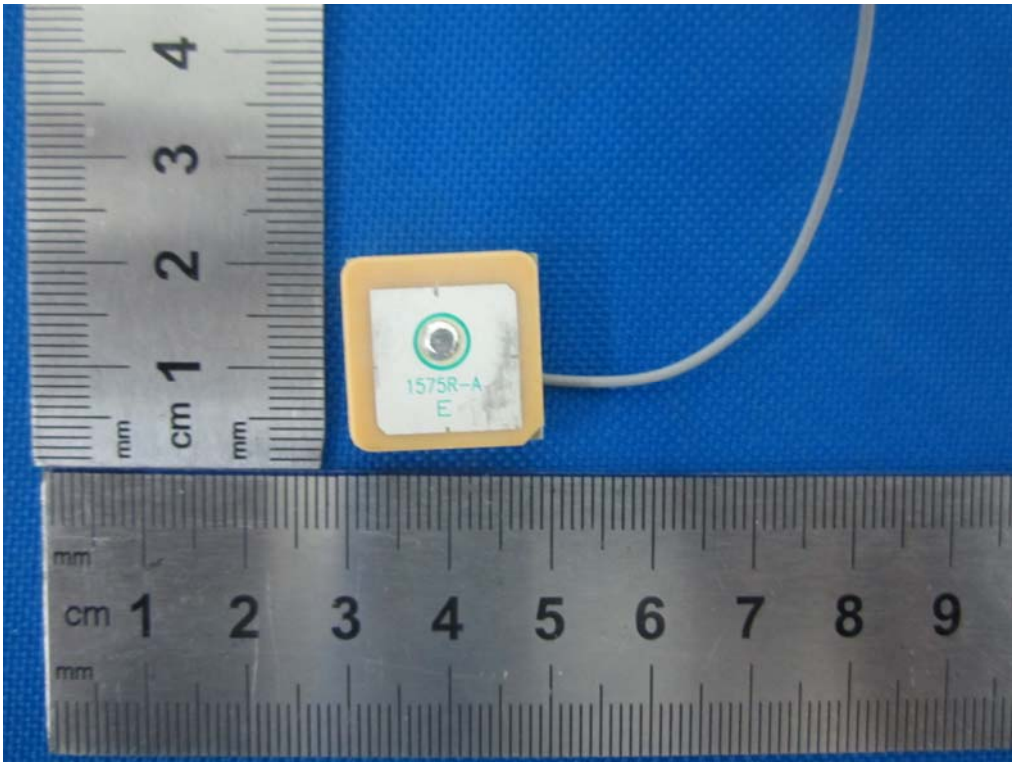

END OF REPORT