

**Test Report No. S08EEC00423/02B**  
dated 03 Jan 2009



PSB Singapore

**Note:** This report is issued subject to TÜV SÜD PSB's "Terms and Conditions Governing Technical Services". The terms and conditions governing the issue of this report are set out as attached within this report.

FORMAL REPORT ON TESTING IN ACCORDANCE WITH  
FCC Part 15B : 2008 (CLASS B)  
OF AN  
eGenKit  
[ Model : Logger 1.0 ]  
[ FCC ID : W6FPIDEL010901900 ]

Choose certainty.  
Add value.

**TEST FACILITY**

TÜV SÜD PSB Pte Ltd,  
Electrical & Electronics Centre (EEC), Product Services,  
1 Science Park Drive, Singapore 118221

**FCC REG. NO.**

99142 (3m and 10m Semi-Anechoic Chambers)  
871638 (3m Semi-Anechoic Chamber)

**IND. CANADA REG. NO.**

IC 4257 (3m and 10m Semi-Anechoic Chambers)

**PREPARED FOR**

Mark Tan  
Power Instruments Pte Ltd  
Block 40 Toh Guan Road East #01-62 Enterprise Hub  
Singapore 608582

Tel : (65) 62881183

Fax : (65) 62809923

**QUOTATION NUMBER**

Q08EEC00301

**JOB NUMBER**

S08EEC00423

**TEST PERIOD**

22 Apr 2008 – 26 Dec 2008

**PREPARED BY**

Quek Keng Huat  
Associate Engineer

**APPROVED BY**

Lim Cher Hwee  
Assistant Vice President



Laboratory:  
TÜV SÜD PSB Pte. Ltd.  
Testing Services  
No.1 Science Park Drive  
Singapore 118221

Phone : +65-6885 1333  
Fax : +65-6776 8670  
E-mail: testing@tuv-sud-psb.sg  
www.tuv-sud-psb.sg  
Co. Reg : 199002667R



LA-2007-0380-A  
LA-2007-0380-A-1  
LA-2007-0381-F  
LA-2007-0382-B  
LA-2007-0383-G  
LA-2007-0384-G  
LA-2007-0385-E  
LA-2007-0386-C

The results reported herein have been performed in accordance with the laboratory's terms of accreditation under the Singapore Accreditation Council - Singapore Laboratory Accreditation Scheme. Tests/Calibrations marked "Not SAC-SINGLAS Accredited" in this Report are not included in the SAC-SINGLAS Accreditation Schedule for our laboratory.

Regional Head Office:  
TÜV SÜD Asia Pacific Pte. Ltd.  
3 Science Park Drive, #04-01/05  
The Franklin, Singapore 118223  
**TÜV**



## **TABLE OF CONTENTS**

---

TEST SUMMARY

PRODUCT DESCRIPTION

SUPPORTING EQUIPMENT DESCRIPTION

EUT OPERATING CONDITIONS

CONDUCTED EMISSION TEST

RADIATED EMISSION TEST

ANNEX A

- EUT PHOTOGRAPHS / DIAGRAMS

ANNEX B

- FCC LABEL & POSITION

ANNEX C

- USER MANUAL, TECHNICAL  
DESCRIPTION, BLOCK & CIRCUIT  
DIAGRAMS



## **TEST SUMMARY**

The product was tested in accordance with the customer's specifications.

### **Test Results Summary**

<b>Test Standard</b>	<b>Description</b>	<b>Pass / Fail</b>
FCC Part 15B : 2008		
15.107	Conducted Emissions (Class B)	Not Applicable *See Note 2
15.109	Radiated Emissions (Class B)	Pass
1.1310	Maximum Permissible Exposure	Pass

### **Notes**

1. All test measurement procedures are according to ANSI C63.4: 2003.
2. The Equipment Under Test (EUT) is a DC operated device and contains no provision for public utility connections.
3. The RF module (GSM/GPRS) of the Equipment Under Test (EUT) is a qualified RF module, which bears the FCC ID: Q9EQ24AU001. The RF module was integrated into the product without modification. As such, only the spurious emissions of non-RF portions were evaluated.

### **Modifications**

1. No modifications were made.



## **PRODUCT DESCRIPTION**

---

Description : The Equipment Under Test (EUT) is an **eGenKit**. It is a DATA LOGGER which equips with GSM, GPRS and GPS capabilities.

Manufacturer : Power Instruments Pte Ltd  
Block 40 Toh Guan Road East #01-62 Enterprise Hub  
Singapore 608582

Model Number : Logger 1.0

FCC ID : W6FPIDEL010901900

Serial Number : Nil

Microprocessor : Motorola MPC8241

Operating Frequency : 850MHz, 900MHz, 1800MHz and 1900MHz

Clock / Oscillator Frequency : 200.0MHz

Transmission Protocols : GSM, GPRS, GPS

Port / Connectors : RS485, SMA female with reverse polarity

Rated Input Power : 9VDC – 32VDC (24VDC Nominal)

Accessories : Nil



**SUPPORTING EQUIPMENT DESCRIPTION**

<b>Equipment Description (Including Brand Name)</b>	<b>Model, Serial &amp; FCC ID Number</b>	<b>Cable Description (List Length, Type &amp; Purpose)</b>
Speed Touch ADSL LAN Hub	M/N: Nil S/N: CP0627DTE4R FCC ID: DoC	3.0 m Shielded LAN cable
AC Power Adaptor	M/N: AA-181AD S/N: Nil FCC ID: Nil	1.80m unshielded AC power cable
Billion Router Modem	M/N: Nil S/N: 0004ED4250E FCC ID: DoC	3.0 m Shielded LAN cable
AC Power Adaptor	M/N: AD-121AD S/N: Nil FCC ID: Nil	1.80m unshielded AC power cable
Kenwood DC Power Supply	M/N: PA36-2A S/N: 7100025 FCC ID: Nil	2.6m DC power cable
AGC-GS-3 Automatic Gen-Set Controller	M/N: 10040055.10 S/N: Nil FCC ID: Nil	
Topward DC Power Supply	M/N: TPS-4000 S/N: 947541 FCC ID: Nil	1.8m DC power cable
R&S Radio Comm Tester	M/N: CMU 200 S/N: 837728/071 FCC ID: Nil	2.3m AC power cable
Teseq Horn Antenna	M/N: 3115 S/N: 0003-6088 FCC ID: Nil	3.0m RF cable



PSB Singapore

### **EUT OPERATING CONDITIONS**

#### **FCC Part 15B**

- 1. Conducted Emissions**
- 2. Radiated Emissions**

The EUT was exercised in the following manner during the tests:

#### GSM and GRPS

- a. The transmitter was allowed to transmit in its intended operating condition, i.e intended modulation with modulating signal of 1kHz audio tone at maximum transmission power.
- b. The receiver was allowed to receive the intended modulated signal, i.e wanted signal (1kHz modulating signal modulated with intended modulation) with the received signal strength was at minimum 40dB above the threshold sensitivity of the receiver.

#### GPS

- a. The receiver was allowed to receive the intended modulated signal, i.e wanted signal with the received signal strength was at least 30dB above the manufacturer declared receiver's sensitivity.



**RADIATED EMISSION TEST**

**FCC Part 15.109 Radiated Emission Limits (Class B)**

Frequency Range (MHz)	Quasi-Peak Limit Values (dB $\mu$ V/m) @ 3m
30 - 88	40.0
88 - 216	43.5
216 - 960	46.0
Above 960	54.0*

\* Above 1GHz, average detector was used. A peak limit of 20dB above the average limit does apply.

**FCC Part 15.109 Radiated Emission Test Instrumentation**

Instrument	Model	S/No	Cal Due Date
R&S Test Receiver (20Hz–26.5GHz) – ESMI2	ESMI	829214/006 829550/001	12 May 2009
Schaffner Preamplifier (9kHz-2GHz) – PA19	CPA9231A	18763	11 Jan 2009
MITEQ Preamplifier (0.1-26.5GHz) – PA4	NSP2650-N	604879	26 Jan 2009
Schaffner Bilog Antenna –BL	CBL6112D	22020	19 May 2009
EMCO Horn Antenna – H14	3115	0003-6087	14 May 2009



## RADIATED EMISSION TEST

### **FCC Part 15.109 Radiated Emission Test Setup**

1. The EUT and supporting equipment were set up in accordance with the requirements of the standard as shown in the setup photos.
2. The filtered power supply for the EUT and supporting equipment were tapped from the appropriate power sockets located on the turntable.
3. The relevant broadband antenna was set at the required test distance away from the EUT and supporting equipment boundary.

### **FCC Part 15.109 Radiated Emission Test Method**

1. The EUT was switched on and allowed to warm up to its normal operating condition.
2. A prescan was carried out to pick the worst emission frequencies from the EUT. For EUT which is a portable device, the prescan was carried out by rotating the EUT through three orthogonal axes to determine which altitude and equipment arrangement produces such emissions.
3. The test was carried out at the selected frequency points obtained from the prescan in step 2. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner:
  - a. Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen.
  - b. The EUT was then rotated to the direction that gave the maximum emission.
  - c. Finally, the antenna height was adjusted to the height that gave the maximum emission.
4. A Quasi-peak measurement was made for that frequency point if it was less than or equal to 1GHz. For frequency point that above 1GHz, both Peak and Average measurements were carried out.
5. Steps 3 and 4 were repeated for the next frequency point, until all selected frequency points were measured.
6. The frequency range covered was from 30MHz to 5<sup>th</sup> harmonic of the highest frequency used or generated by the EUT, using the Bi-log antenna for frequencies from 30MHz up to 1GHz, and the Horn antenna above 1GHz.

### **Sample Calculation Example**

At 300 MHz

Q-P limit (Class B) = 70.8  $\mu$ V/m = 37.0 dB $\mu$ V/m

Log-periodic antenna factor & cable loss at 300 MHz = 18.5 dB

Q-P reading obtained directly from EMI Receiver = 31.0 dB $\mu$ V/m  
(Calibrated level including antenna factors & cable losses)

Therefore, Q-P margin = 31.0 - 37.0 = -6.0

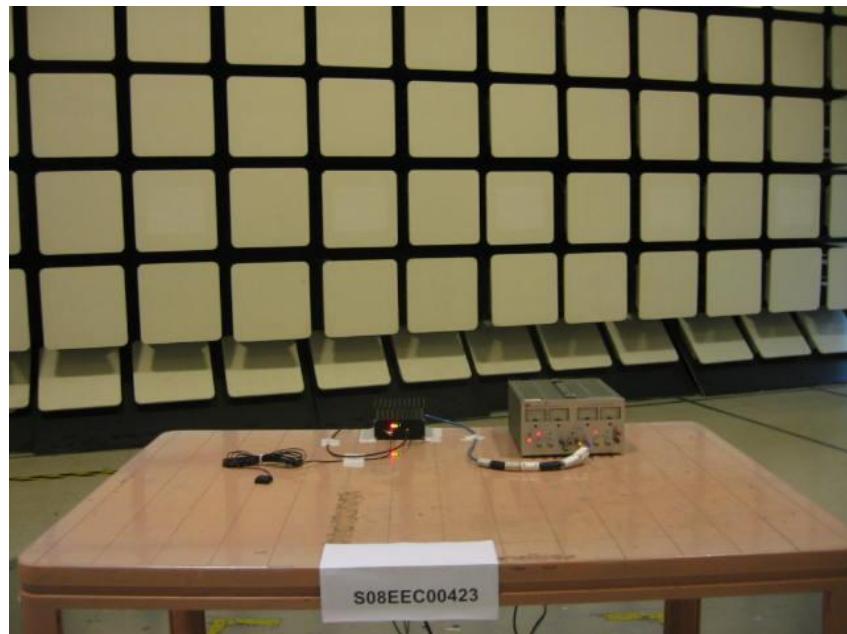
i.e. 6 dB below Q-P limit



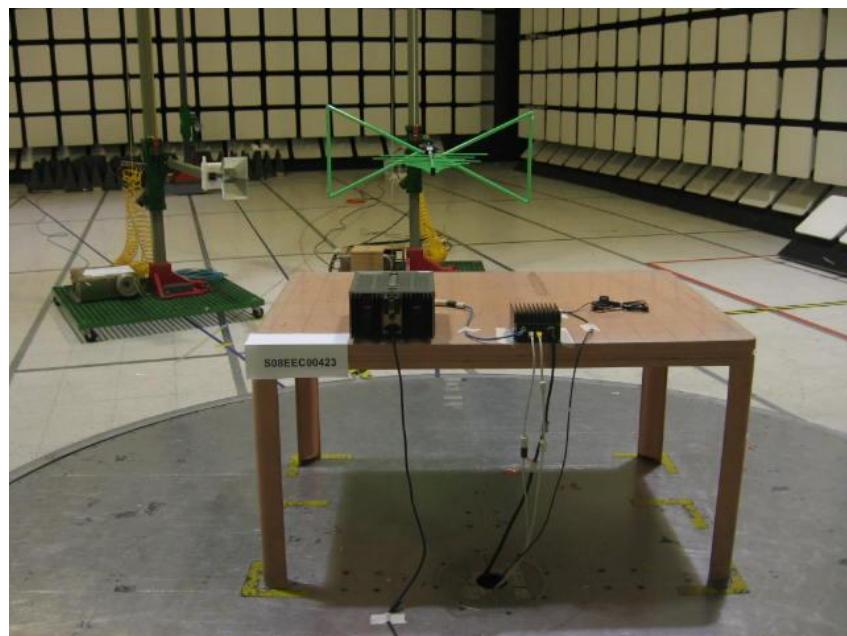
PSB Singapore

---

**RADIATED EMISSION TEST**



**Radiated Emissions Test Setup (Front View)**



**Radiated Emissions Test Setup (Rear View)**



PSB Singapore

**RADIATED EMISSION TEST**

**FCC Part 15.109 Radiated Emission Results**

Operating Mode	Test Communication (850MHz Transmit Band)	Temperature	23°C
Test Input Power	24 VDC	Relative Humidity	60%
Test Distance	3m	Atmospheric Pressure	1030mbar
Class	B	Tested By	Vijoy Simon

Emissions ranging from 30MHz – 1GHz

Frequency (MHz)	Q-P Value (dB $\mu$ V/m)	Q-P Margin (dB)	Azimuth (Degrees)	Height (cm)	Polarisation (H/V)
34.3540	32.5	-7.5	356	100	V
384.8690	39.2	-6.8	306	100	H
415.9940	43.6	-2.4	321	200	H
450.1820	38.0	-8.0	321	200	H
913.6260	14.1	-31.9	27	143	V
994.4600	41.9	-12.1	356	100	V

Emissions above 1GHz

Frequency (GHz)	Peak Value (dB $\mu$ V/m)	Average Value (dB $\mu$ V/m)	Average Margin (dB)	Azimuth (Degrees)	Height (cm)	Pol (H/V)
2692.4200	34.9	21.8	-32.2	279	205	V
9623.3700	50.5	36.1	-17.9	359	400	V
13839.8100	62.9	49.3	-4.7	98	100	V
--	--	--	--	--	--	--
--	--	--	--	--	--	--
--	--	--	--	--	--	--



**RADIATED EMISSION TEST**

**FCC Part 15.109 Radiated Emission Results**

Operating Mode	Test Communication (1900MHz Transmit Band)	Temperature	23°C
Test Input Power	24 VDC	Relative Humidity	60%
Test Distance	3m	Atmospheric Pressure	1030mbar
Class	B	Tested By	Vijoy Simon

Emissions ranging from 30MHz – 1GHz

Frequency (MHz)	Q-P Value (dB $\mu$ V/m)	Q-P Margin (dB)	Azimuth (Degrees)	Height (cm)	Polarisation (H/V)
34.3540	32.2	-7.8	356	100	V
384.8690	38.9	-7.1	304	100	H
415.9780	44.4	-1.6	315	206	H
416.4370	44.7	-1.3	314	100	H
450.1820	37.6	-8.4	330	200	H
834.4430	36.6	-9.4	279	100	H

Emissions above 1GHz

Frequency (GHz)	Peak Value (dB $\mu$ V/m)	Average Value (dB $\mu$ V/m)	Average Margin (dB)	Azimuth (Degrees)	Height (cm)	Pol (H/V)
3216.3950	36.9	23.8	-30.2	237	100	H
4063.6710	39.2	25.8	-28.2	175	380	V
11548.4000	50.8	36.8	-17.2	288	395	H
13797.2000	63.4	50.3	-3.7	260	299	H
14239.9800	59.6	46.6	-7.4	196	199	H
--	--	--	--	--	--	--

**Notes**

1. All possible modes of operation were investigated. Only the worst case emissions measured, using the correct CISPR detectors, are reported. All other emissions were relatively insignificant.
2. A "ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
3. EMI receiver Resolution Bandwidth (RBW) and Video Bandwidth (VBW) settings:  
30MHz - 1GHz  
RBW: 120kHz      VBW: 1MHz  
>1GHz  
RBW: 1MHz      VBW: 1MHz
4. "--" indicates no emissions were found and shows compliance to the limits.
5. **Radiated Emissions Measurement Uncertainty**  
All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95%, with a coverage factor of 2, in the range 30MHz – 25.0GHz is  $\pm 4.6$ dB.



### **MAXIMUM PERMISSIBLE EXPOSURE (MPE) TEST**

#### **FCC Part 1.1310 Maximum Permissible Exposure (MPE) Limits**

The EUT shows compliance to the requirements of this section, which states the MPE limits for general population / uncontrolled exposure are as shown below:

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm <sup>2</sup> )	Average Time (min)
0.3 - 1.34	614	1.63	100 <sup>Note 2</sup>	30
1.34 - 30	824 / f	2.19 / f	180 / f <sup>2</sup> <sup>Note 2</sup>	30
30 - 300	27.5	0.073	0.2	30
300 - 1500	-	-	f / 1500	30
1500 - 100000	-	-	1.0	30

Notes

1. f = frequency in MHz

2. Plane wave equivalent power density

#### **FCC Part 1.1310 Maximum Permissible Exposure (MPE) Test Instrumentation**

Instrument	Model	S/No	Cal Due Date
PMM 8053 Portable Field Meter	8053	0220J10308	19 Mar 2010
PMM Electric Field Probe	EP330	1010J10301	13 Mar 2010

#### **FCC Part 1.1310 Maximum Permissible Exposure (MPE) Test Setup**

1. The EUT and supporting equipment were set up as shown on the setup photo.
2. The relevant field probe was positioned at least 20cm away from the EUT and supporting equipment boundary.

#### **FCC Part 1.1310 Maximum Permissible Exposure (MPE) Test Method**

1. The EUT was switched on and allowed to warm up to its normal operating condition.
2. The test was first carried out at one of the positions / sides of the EUT.
3. Power density measurement (mW/cm<sup>2</sup>) was made using the field meter set to the required averaging time.
4. Steps 2 and 3 were repeated for the next position and its associate EUT operating mode, until all possible positions and modes were measured.

#### **Sample Calculation Example**

At 2400 MHz, limit = 1.0 mW/cm<sup>2</sup>

Power density reading obtained directly from field meter = 0.3 mW/cm<sup>2</sup> averaged over the required 30 minutes.

Therefore, margin = 0.3 – 1.0 = -0.7 mW/cm<sup>2</sup> i.e. 0.7 mW/cm<sup>2</sup> below limit



PSB Singapore

---

**MAXIMUM PERMISSIBLE EXPOSURE (MPE) TEST**

---



**Maximum Permissible Exposure (MPE) Test Setup**

**FCC Part 1.1310 Maximum Permissible Exposure (MPE) Results**

Test Input Power	24 VDC	Temperature	23°C
Test Distance	20cm	Relative Humidity	60%
		Atmospheric Pressure	1030mbar
		Tested By	Anthony Toh

Channel Frequency (MHz)	Power Density Value (mW/cm <sup>2</sup> )	Margin (mW/cm <sup>2</sup> )	Averaging Time (min)	Limit (mW/cm <sup>2</sup> )
850	0.21	-0.35	30	0.56
1900	0.16	-0.84	30	1.00

**Notes**

1. All possible modes of operation were investigated. Only the worst case highest radiation levels were measured. Measurements were taken at the required averaging time. All other radiation levels were relatively insignificant.
2. A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
3. **Maximum Permissible Exposure Measurement Uncertainty**  
All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95%, with a coverage factor of 2, in the range 0.1MHz – 3GHz is ±15.0%.



This Report is issued under the following conditions:

1. Results of the testing/calibration in the form of a report will be issued immediately after the service has been completed or terminated.
2. Unless otherwise requested, a report shall contain only technical results. Analysis and interpretation of the results and professional opinion and recommendations expressed thereupon, if required, shall be clearly indicated and additional fee paid for, by the Client.
3. This report applies to the sample of the specific product/equipment given at the time of its testing/calibration. The results are not used to indicate or imply that they are applicable to other similar items. In addition, such results must not be used to indicate or imply that TÜV SÜD PSB approves, recommends or endorses the manufacturer, supplier or user of such product/equipment, or that TÜV SÜD PSB in any way "guarantees" the later performance of the product/equipment.
4. The sample/s mentioned in this report is/are submitted/supplied/manufactured by the Client. TÜV SÜD PSB therefore assumes no responsibility for the accuracy of information on the brand name, model number, origin of manufacture, consignment or any information supplied.
5. Additional copies of the report are available to the Client at an additional fee. No third party can obtain a copy of this report through TÜV SÜD PSB, unless the Client has authorised TÜV SÜD PSB in writing to do so.
6. TÜV SÜD PSB may at its sole discretion add to or amend the conditions of the report at the time of issue of the report and such report and such additions or amendments shall be binding on the Client.
7. All copyright in the report shall remain with TÜV SÜD PSB and the Client shall, upon payment of TÜV SÜD PSB's fees for the carrying out of the tests/calibrations, be granted a license to use or publish the report to the third parties subject to the terms and conditions herein, provided always that TÜV SÜD PSB may at its absolute discretion be entitled to impose such conditions on the license as it sees fit.
8. Nothing in this report shall be interpreted to mean that TÜV SÜD PSB has verified or ascertained any endorsement or marks from any other testing authority or bodies that may be found on that sample.
9. This report shall not be reproduced wholly or in parts and no reference shall be made by the Client to TÜV SÜD PSB or to the report or results furnished by TÜV SÜD PSB in any advertisements or sales promotion.
10. Unless otherwise stated, the tests are carried out in TÜV SÜD PSB Pte Ltd, No.1 Science Park Drive Singapore 118221.

January 2008



PSB Singapore

**EUT PHOTOGRAPHS / DIAGRAMS**

**ANNEX A**

**ANNEX A**

**EUT PHOTOGRAPHS / DIAGRAMS**



PSB Singapore

## EUT PHOTOGRAPHS / DIAGRAMS

## ANNEX A

### EUT PHOTOGRAPHS



Front View

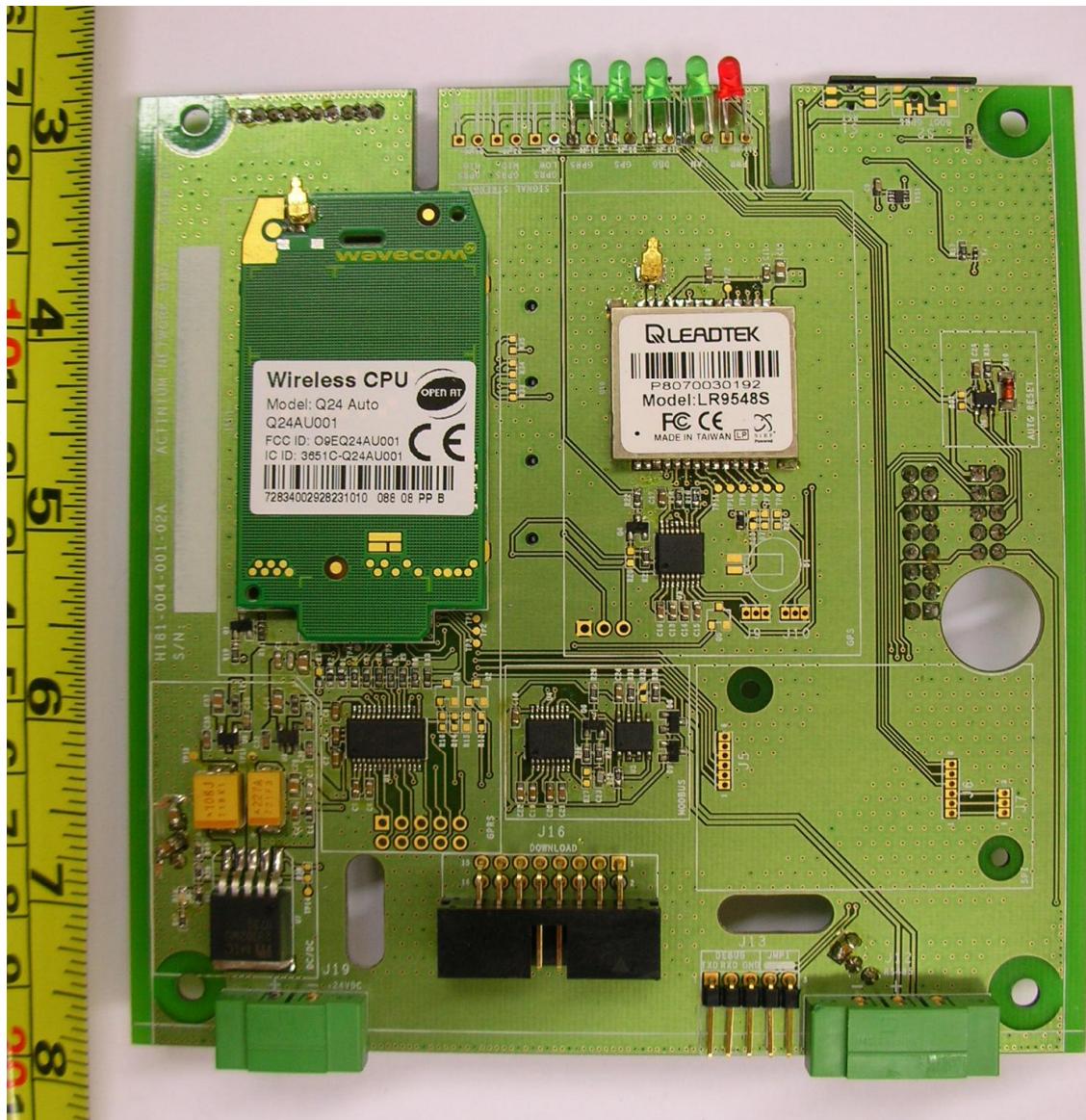


Rear View

## EUT PHOTOGRAPHS / DIAGRAMS

## ANNEX A

### EUT PHOTOGRAPHS



EUT PCB Component Side – RF Board

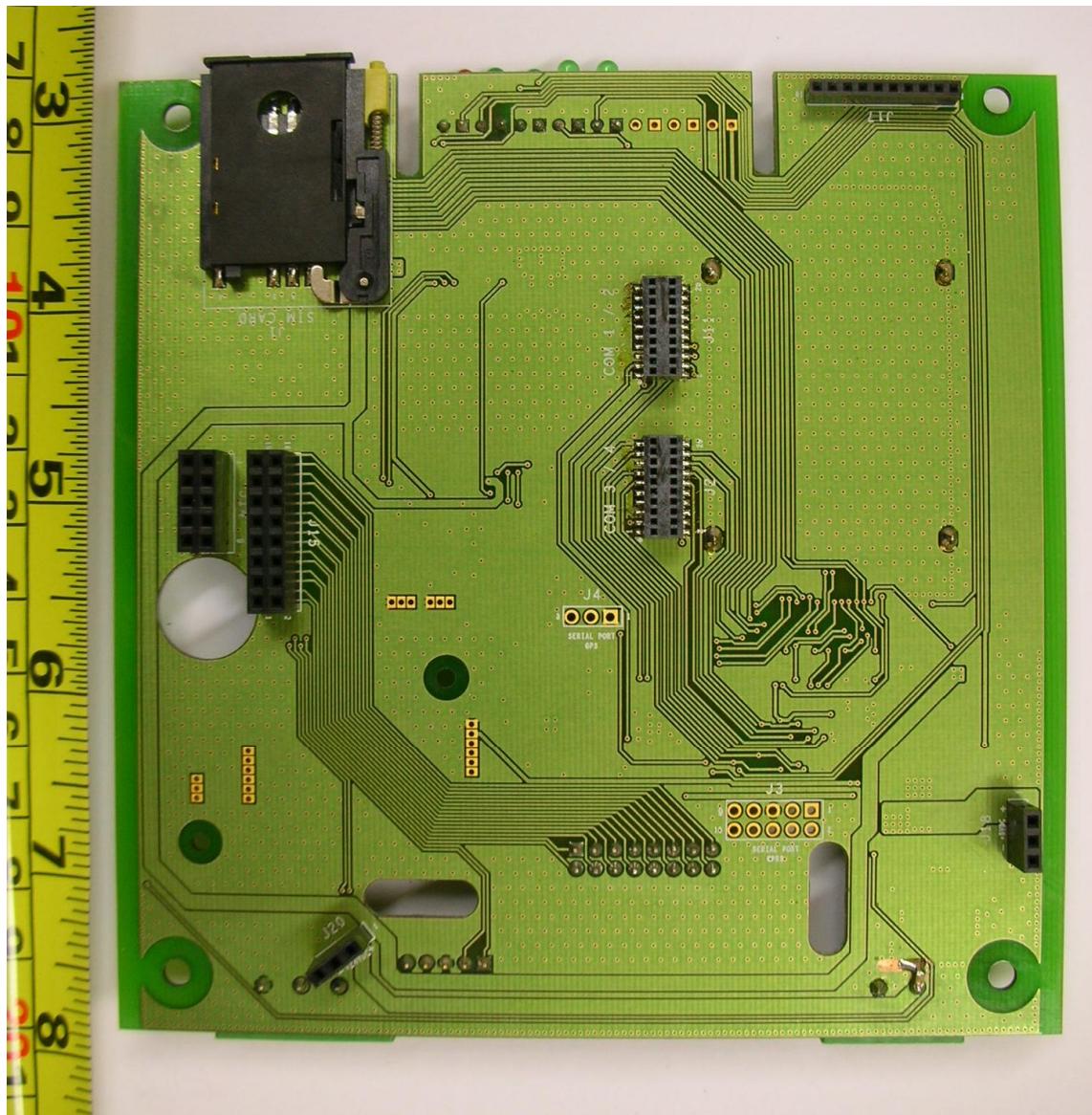


PSB Singapore

## EUT PHOTOGRAPHS / DIAGRAMS

## ANNEX A

### EUT PHOTOGRAPHS

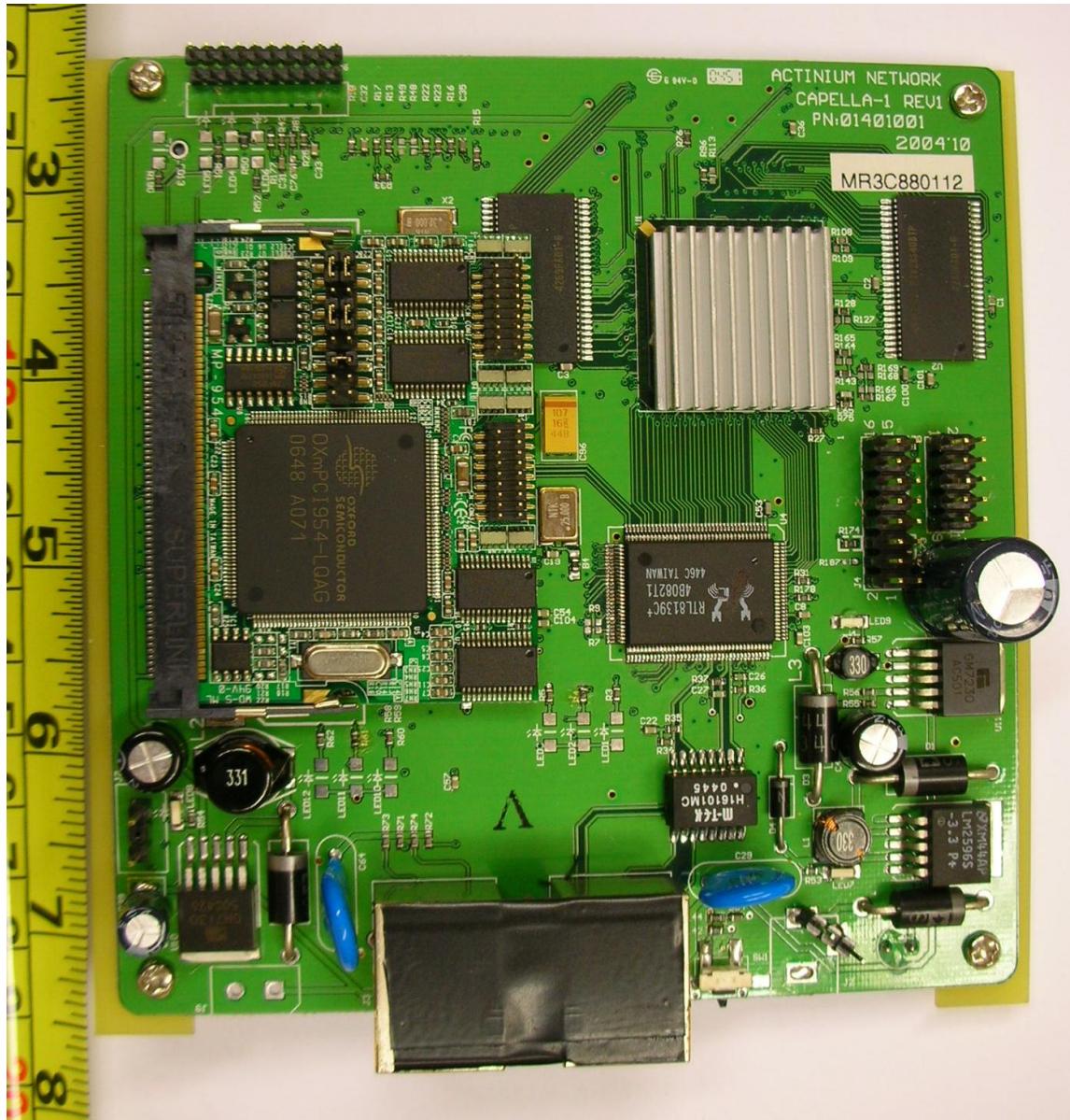


**EUT PCB Trace Side – RF Board**

## EUT PHOTOGRAPHS / DIAGRAMS

## ANNEX A

### EUT PHOTOGRAPHS



EUT PCB Component Side – Mother Board

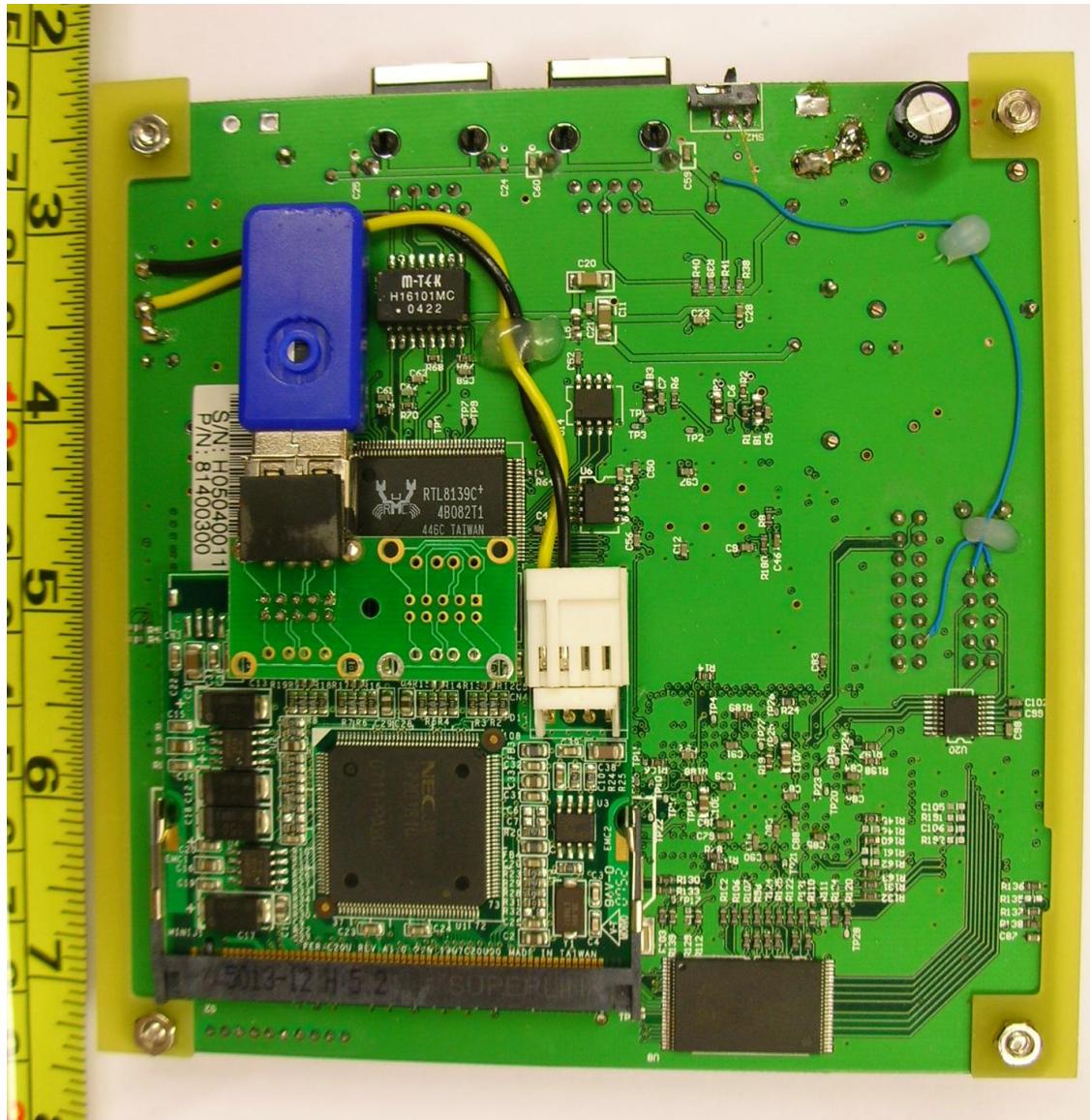


PSB Singapore

## **EUT PHOTOGRAPHS / DIAGRAMS**

## ANNEX A

## EUT PHOTOGRAPHS



EUT PCB Trace Side – Mother Board



PSB Singapore

**FCC LABEL & POSITION**

**ANNEX B**

**ANNEX B**

**FCC LABEL & POSITION**



PSB Singapore

## FCC LABEL & POSITION

## ANNEX B

Labeling requirements per Section 2.925 & 15.19

The label shown will be permanently affixed at a conspicuous location on the device and be readily visible to the user at the time of purchase.



Sample Label



Physical Location of FCC Label on EUT



PSB Singapore

**USER MANUAL TECHNICAL DESCRIPTION & BLOCK  
& CIRCUIT DIAGRAMS**

**ANNEX C**

**ANNEX C**

**USER MANUAL  
TECHNICAL DESCRIPTION  
BLOCK & CIRCUIT DIAGRAMS**

(Please refer to manufacturer for details)