

## EMC TEST REPORT For FCC



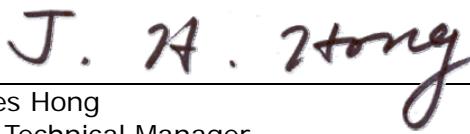
Test Report No. : 2011050074  
Date of Issue : May 22, 2011  
Model/Type No. : STM-8800  
Kind of Product : Industrial PDA  
Applicant : Woongjin Holdings Co., Ltd.  
Applicant Address : 3F. Kukdong Bldg., Chungmuro 3-ga, Jung-gu, Seoul, Korea  
Manufacturer : Woongjin Holdings Co., Ltd.  
Manufacturer Address : 3F. Kukdong Bldg., Chungmuro 3-ga, Jung-gu, Seoul, Korea  
Contact Person : Hyong-Ju Kim / Principal Research Engineer  
Telephone : +82-2-2075-9370  
Received Date : November 27, 2010  
Test Date : January 10, 2011  
Test Results :  **In Compliance**  **Not in Compliance**

The test results presented in this report relate only to the object tested.

*Tested by*

  
Jeong-hwan Kim  
EMC Test Engineer  
Date: May 22, 2011

*Reviewed by*

  
James Hong  
EMC Technical Manager  
Date: May 22, 2011

## REPORT REVISION HISTORY

Date	Revision	Page No
May 22, 2011	Issued (2011050074)	All

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## 1.0 General Product Description

### 1.0.1 Tested Equipment

- Unless otherwise indicated, all tests were conducted on Model STM-8800.
- Tests performed on Model \_\_\_\_\_ were considered to be representative of Model(s) \_\_\_\_\_.

### 1.0.2 Equipment Size, Mobility and Identification

Dimensions: 77.4(W) by 160.5(L) by 26.9(H)   inch  
Mobility:  Hand-held  Table-top  Built-in  
 Portable  
Serial No.: Prototype

### 1.0.3 Electrical Ratings

SWITCHING POWER SUPPLY	Input : 100-240 Vac, 50/60 Hz, 0.3 A Output : 5 Vdc, 2.0 A
EUT	Input : 5 Vdc, 2.0 A Output : -

### 1.0.4 Test Voltage & Frequency

Unless indicated otherwise on the individual data sheet or test results, the test voltage and frequency was as indicated below.

Voltage: 120 Vac (SWITCHING POWER SUPPLY)  
Frequency: 60 Hz

## 1.1 Model Differences

Not applicable

## 1.2 Device Modifications

The following modifications were necessary for compliance:

Not applicable

## 1.3 EUT Configuration(s)

See Appendix A for individual test set-up configuration(s). The following peripheral devices and/or interface cables were connected during the measurement:

### [Without Cradle mode]

Peripheral Devices

Device	Manufacturer	Model No.	Serial No.
Personal Computer	Samsung Electronics Co., Ltd.	DB-A150	ZMSI96BSB00125F
LCD Monitor	VS17	Lite-ON Technology Corp.	CNN5130QMC
Keyboard(PS/2)	Samsung Electro-Mechanics Co., Ltd.	SEM-DT35	33008101
Mouse(USB)	Microsoft Corporation	Optical Mouse USB/PS2 Compatible	69657-492-4974533-40420
Earphone	-	-	-
SD Card	SanDisk	-	-

Cable Description

#	Description	Ferrite Core	Length (m)	Other Details
1	AC power Cable, Unshielded	No	1.8	Connect to AC Power
2	AC power Cable, Unshielded	No	1.8	Connect to AC Power
3	D-SUB Cable, Shielded	Yes	1.8	Between a Personal Computer and a LCD Monitor
4	Keyboard Cable, Shielded	No	1.5	PS/2 type
5	Mouse Cable, Shielded	Yes	1.5	USB type
6	USB Cable, Shielded	Yes	1.0	Between the EUT and a Personal Computer
7	SD Card Port	-	-	Between the EUT and a SD Card
8	Earphone Cable, Unshielded	No	1.8	Between the EUT and an Earphone

### [With Cradle mode]

Peripheral Devices

Device	Manufacturer	Model No.	Serial No.
SWITCHING POWER SUPPLY(for EUT)	Phihong (Dongguan) Electronics Co., Ltd.	PSAA10R-050	P083500389A1
Cradle	Woongjin System & Technology Co., Ltd.	-	-
Personal Computer	Samsung Electronics Co., Ltd.	DB-A150	ZMSI96BSB00125F
LCD Monitor	VS17	Lite-ON Technology Corp.	CNN5130QMC
Keyboard(PS/2)	Samsung Electro-Mechanics Co., Ltd.	SEM-DT35	33008101
Mouse(USB)	Microsoft Corporation	Optical Mouse USB/PS2 Compatible	69657-492-4974533-40420
SD Card	SanDisk	-	-
USB Drive	BMK Technology	MemoRive	-

Cable Description

#	Description	Ferrite Core	Length (m)	Other Details
1	AC power Cable, Unshielded	No	1.8	Connect to AC Power
2	AC power Cable, Unshielded	No	1.8	Connect to AC Power
3	D-SUB Cable, Shielded	Yes	1.8	Between a Personal Computer and a LCD Monitor
4	Keyboard Cable, Shielded	No	1.5	PS/2 type
5	Mouse Cable, Shielded	Yes	1.5	USB type
6	USB Cable, Shielded	Yes	1.0	Between a Cradle and a Personal Computer
7	DC IN Cable, Unshielded	Yes	1.5	Between the EUT and a SWITCHING POWER SUPPLY
8	SD Card Port	-	-	Between the EUT and a SD Card
9	USB Port	-	-	Between the EUT and an USB Drive
10	Cradle Port	-	-	Between the EUT and a Cradle
11	Direct Plug-in	-	-	Connect to AC Power

## 1.4 Test Software

- EMC Test V 1.0
- Spintest.exe (Instead of Display Test Patterns – V1.5)
- Ping.exe
- Not applicable

## 1.5 EUT Operating Mode(s)

Equipment under test was operated during the measurement under the following conditions:

<input type="checkbox"/> Standby	<input type="checkbox"/> Scrolling 'H'
<input type="checkbox"/> Display circles pattern	<input type="checkbox"/> Read / Write
<input checked="" type="checkbox"/> Practice operation – [Without Cradle mode]	
1. During the test, the EUT was connected to a PC via an USB Port. [Data Up/Downloading]	
2. Camera mode	

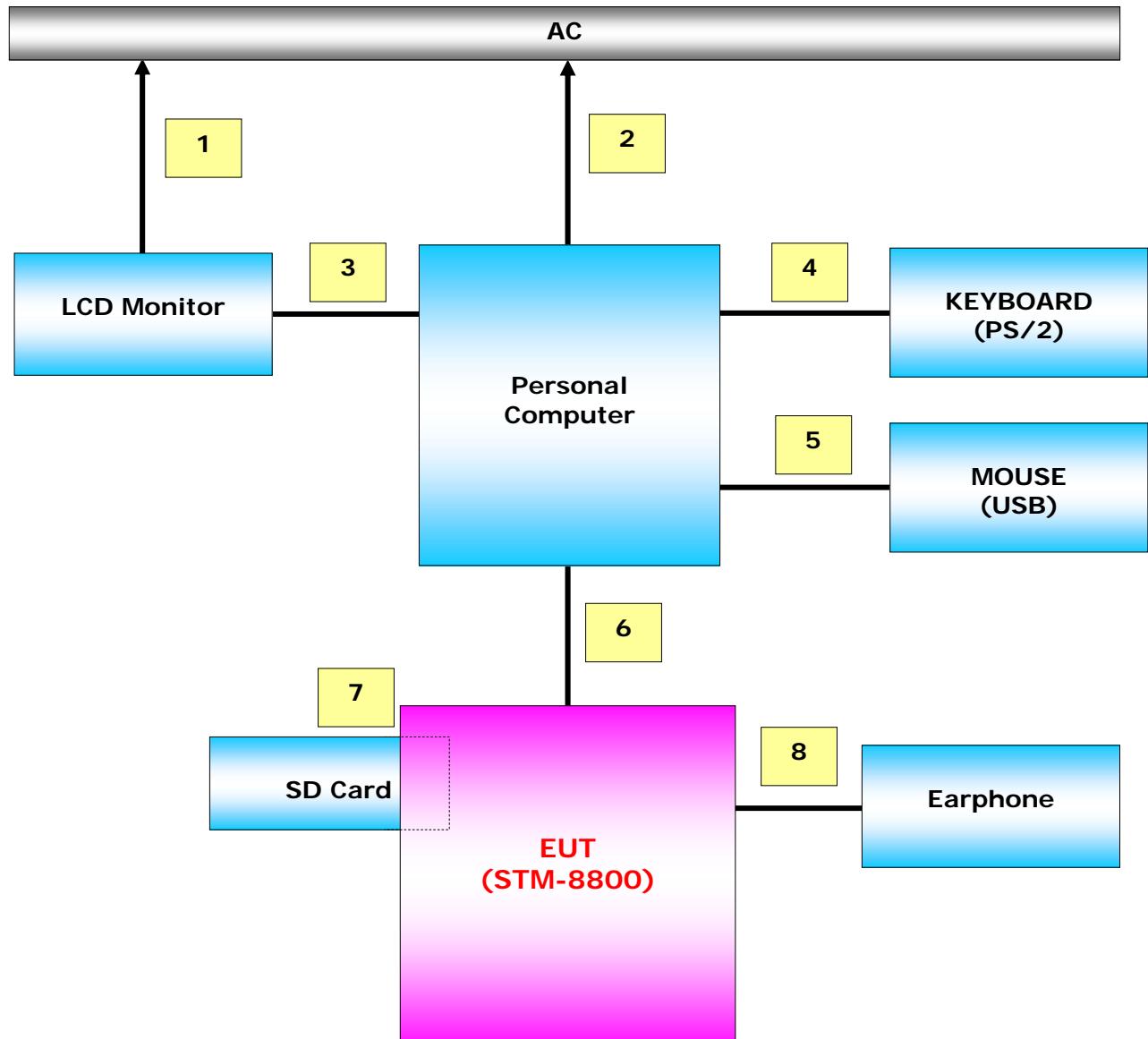
[With Cradle mode]

1. During the test, the EUT was connected to a PC via an USB Port.  
[Data Up/Downloading]
2. During the test, the EUT was connected to an USB Drive.
3. Camera mode

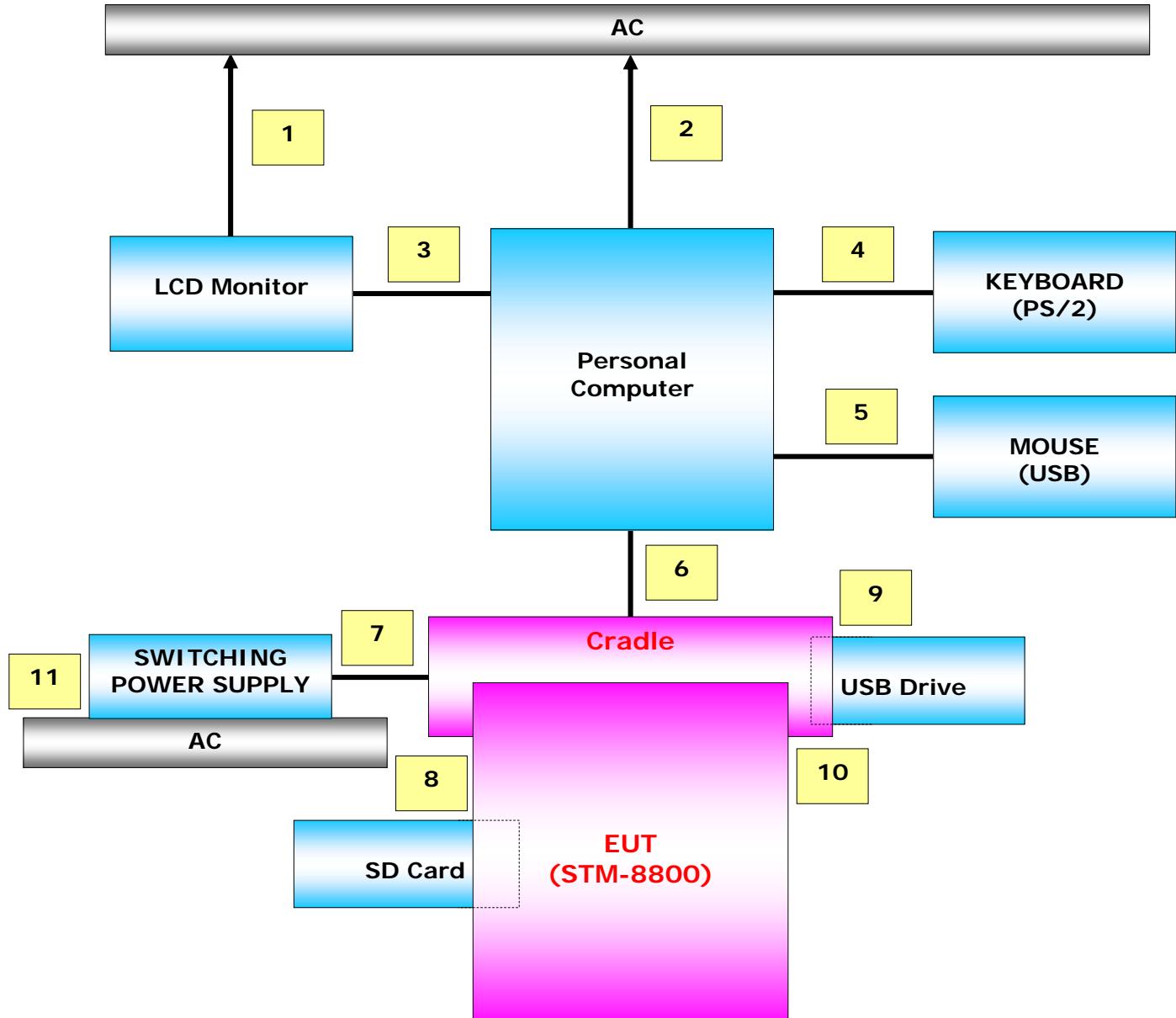
⇒ Because the **With Cradle mode** is the worst case, this report takes the test data and test setup photos of the With Cradle mode.

## 1.6 Configuration

[Without Cradle mode]



[With Cradle mode]



## 1.7 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less. All test equipment calibrations are traceable to the Korea Research Institute of Standards and Science (KRISS), therefore, all test data recorded in this report is traceable to KRISS.

## 1.8 Test Facility

The measurement facility is located at 386-1, Ho-dong, Cheoin-gu, Yongin-si, Gyeonggi-do, 449-100, Korea. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

## 1.9 Measurement Procedure

Preliminary AC power line conducted emissions tests were performed shielded room. To find worst mode, several typical mode and typical cable position were tested. Final AC power line conducted emissions test was performed shielded room. (location is same as Preliminary test) Based on the preliminary tests of the EUT, final test was proceeded worst case test mode and cable configuration.

Preliminary radiated emissions test were performed anechoic chamber (Distance of antenna and EUT was 3 m). To find worst mode, several typical mode and typical cable position were tested and peak level and frequency were recorded.

Final radiated emissions test was performed Open Area Test Site. Based on the preliminary tests of the EUT, final test was proceeded worst case test mode and cable configuration.

\* Measurement procedures was In accordance with ANSI C63.4-2003 7.2.3, 7.2.4, 8.3.1.1, 8.3.1.2

## 1.10 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Logo
USA	FCC	3 m & 10 m OATS, 3 m & 10 m SAC and Conducted Test Site to perform FCC Part 15/18 measurements	 805871
JAPAN	VCCI	10 m OATS and Conducted Test Site	 R-948, C-986, T-1843
KOREA	KCC	EMI (10 m OATS, 10 m SAC and Conducted Test Site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and Interruptions)1	 No. 51, KR0025

## 2.0 Emissions Test Regulations

The emissions tests were performed according to following regulations:

<input type="checkbox"/> EN 61000-6-3:2007		
<input type="checkbox"/> EN 61000-6-4:2007		
<input type="checkbox"/> EN 55011:2007 +A2:2007	<input type="checkbox"/> Group 1 <input type="checkbox"/> Class A	<input type="checkbox"/> Group 2 <input type="checkbox"/> Class B
<input type="checkbox"/> EN 55013:2001 +A1:2003 +A2:2006		
<input type="checkbox"/> EN 55014-1:2006		
<input type="checkbox"/> EN 55014-1:2006 +A1:2009		
<input type="checkbox"/> EN 55015:2006 +A1:2007 +A2:2009		
<input type="checkbox"/> EN 61204-3:2000	<input type="checkbox"/> Class A	<input type="checkbox"/> Class B
<input type="checkbox"/> EN 61131-2:2007		
<input type="checkbox"/> EN 61326-1:2006	<input type="checkbox"/> Class A	<input type="checkbox"/> Class B
<input type="checkbox"/> EN 55022:2006	<input type="checkbox"/> Class A	<input type="checkbox"/> Class B
<input type="checkbox"/> EN 61000-3-2:2006		
<input type="checkbox"/> EN 61000-3-3:1995 +A1:2001 +A2:2005		
<input type="checkbox"/> VCCI V-3/2010.04	<input type="checkbox"/> Class A	<input type="checkbox"/> Class B
<input type="checkbox"/> AS/NZS CISPR22:2006	<input type="checkbox"/> Class A	<input type="checkbox"/> Class B
<input checked="" type="checkbox"/> FCC Part 15 Subpart B	<input type="checkbox"/> Class A	<input checked="" type="checkbox"/> Class B
<input checked="" type="checkbox"/> CISPR 22:2006	<input type="checkbox"/> Class A	<input checked="" type="checkbox"/> Class B

## 2.1 Conducted Voltage Emissions

### Test Date

January 10, 2011

### Test Location

Shielded Room

### Test Equipment

	Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
<input checked="" type="checkbox"/>	EMI Test Receiver	Rohde & Schwarz	ESC13	100032	2011-01-27
<input type="checkbox"/>	EMI Test Receiver	Rohde & Schwarz	ESHS30	828144/002	2011-03-08
<input type="checkbox"/>	LISN	Rohde & Schwarz	ENV216	101150	2011-02-27
<input type="checkbox"/>	LISN	EMCO	3825/2	9409-2246	2011-07-09
<input type="checkbox"/>	EMI Test Receiver	Rohde & Schwarz	ESHS30	862024/001	2011-03-08
<input checked="" type="checkbox"/>	LISN	Rohde & Schwarz	ENV216	101151	2011-02-27
<input checked="" type="checkbox"/>	LISN	Rohde & Schwarz	ESH3-Z5	100207	2011-11-15
<input type="checkbox"/>	ISN	TESEQ GMBH	ISN T8	25191	2011-12-30
<input type="checkbox"/>	ISN	TESEQ GMBH	ENY81-CA6	101553	2011-11-25

### Frequency Range of Measurement

150 kHz to 30 MHz

### Instrument Settings

IF Band Width: 9 kHz

### Test Results

The requirements are:  MET  NOT MET  NOT APPLICABLE

Frequency (MHz)	Measured Data (dB <sub>AV</sub> )	Margin (dB)	Remark
0.546	42.4	3.6	Average

### Remarks

See Appendix A for test data.

## 2.2 Radiated Electric Field Emissions

### Test Date

January 10, 2011

### Test Location

Testing was performed at a test distance of:

<input checked="" type="checkbox"/> 10 m OATS	<input checked="" type="checkbox"/> 3 m OATS
<input type="checkbox"/> 10 m SAC	<input type="checkbox"/> 3 m SAC

### Test Equipment

	Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
<input checked="" type="checkbox"/>	EMI Test Receiver	Rohde & Schwarz	ESVS30	826638/008	2011-07-12
<input type="checkbox"/>	EMI Test Receiver	Rohde & Schwarz	ESCI7	100814	2011-12-13
<input checked="" type="checkbox"/>	ULTRA Broadband Antenna	Rohde & Schwarz	HL562	361324/014	2011-11-18
<input checked="" type="checkbox"/>	AMPLIFIER	Sonoma Instrument Co.	310	291721	2011-03-31
<input checked="" type="checkbox"/>	EMC Analyzer	Agilent	E7405A	MY45110859	2012-01-25
<input checked="" type="checkbox"/>	Double Ridged Guide Antenna	ETS-Lindgren	3115	00078894	2011-12-18
<input checked="" type="checkbox"/>	PREAMPLIFIER	Agilent Technologies	8449B	3008A02307	2011-11-16

### Frequency Range of Measurement

<input checked="" type="checkbox"/> 30 MHz to 1 GHz
<input checked="" type="checkbox"/> 1 GHz to 5 GHz

### Instrument Settings

<input checked="" type="checkbox"/> IF Band Width: 120 kHz
<input checked="" type="checkbox"/> IF Band Width: 1 MHz

### Test Results

The requirements are:  MET  NOT MET  NOT APPLICABLE

Frequency (MHz)	Measured Data (dB $\mu$ N/m)	Margin (dB)	Remark
47.06	26.1	3.9	Quasi-peak

### Remarks

See Appendix A for test data.

## APPENDIX A – TEST DATA

### Conducted Voltage Emissions

**[HOT]**

#### Final Result 1

Frequency (MHz)	QuasiPeak (dB $\mu$ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)
0.150000	48.1	1000.0	9.000	On	L1	10.1	17.9	66.0
0.249000	43.9	1000.0	9.000	On	L1	10.1	17.9	61.8
0.460500	44.9	1000.0	9.000	On	L1	10.2	11.8	56.7
0.514500	47.5	1000.0	9.000	On	L1	10.2	8.5	56.0
0.541500	49.5	1000.0	9.000	On	L1	10.1	6.5	56.0
0.789000	39.5	1000.0	9.000	On	L1	10.0	16.5	56.0
0.892500	41.8	1000.0	9.000	On	L1	10.0	14.2	56.0
1.365000	39.6	1000.0	9.000	On	L1	9.9	16.4	56.0
1.954500	37.8	1000.0	9.000	On	L1	9.9	18.2	56.0
1.977000	38.0	1000.0	9.000	On	L1	9.9	18.0	56.0

#### Final Result 2

Frequency (MHz)	Average (dB $\mu$ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)
0.343500	34.3	1000.0	9.000	On	L1	10.1	14.8	49.1
0.546000	42.4	1000.0	9.000	On	L1	10.1	3.6	46.0
0.550500	42.0	1000.0	9.000	On	L1	10.1	4.0	46.0
0.843000	33.5	1000.0	9.000	On	L1	10.0	12.5	46.0
0.870000	32.7	1000.0	9.000	On	L1	10.0	13.3	46.0
1.333500	31.0	1000.0	9.000	On	L1	9.9	15.0	46.0
1.923000	30.9	1000.0	9.000	On	L1	9.9	15.1	46.0
1.981500	31.3	1000.0	9.000	On	L1	9.9	14.7	46.0
2.467500	30.2	1000.0	9.000	On	L1	9.9	15.8	46.0
3.075000	29.8	1000.0	9.000	On	L1	9.8	16.2	46.0

**[NEUTRAL]**

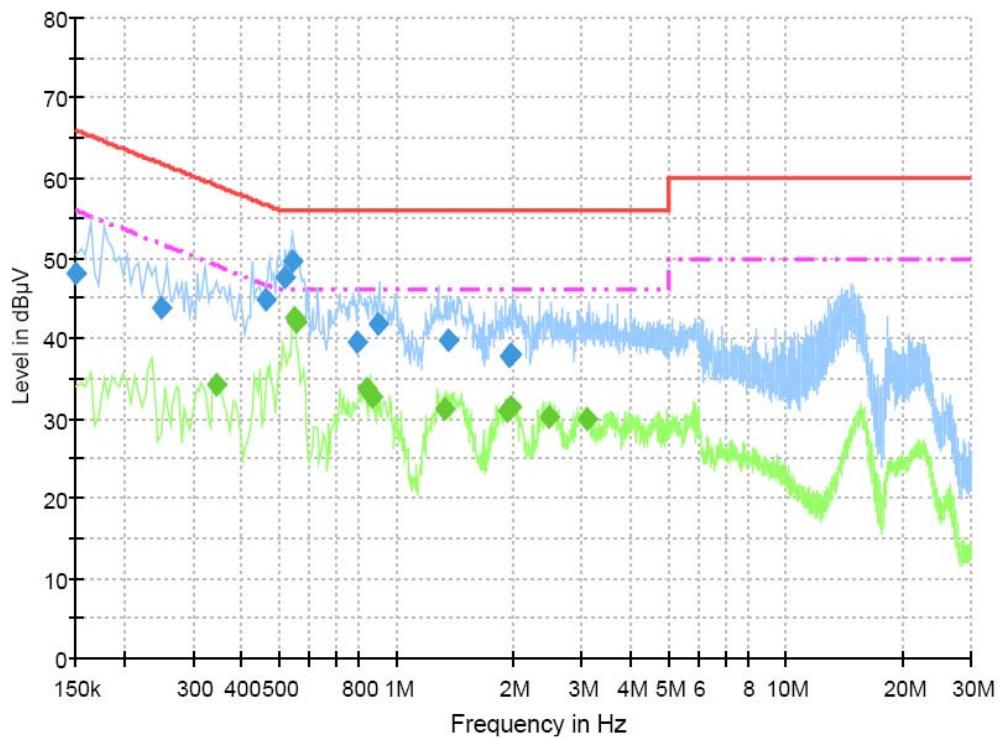
#### Final Result 1

Frequency (MHz)	QuasiPeak (dB $\mu$ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)
0.501000	39.6	1000.0	9.000	On	N	10.2	16.4	56.0
0.505500	41.5	1000.0	9.000	On	N	10.2	14.5	56.0
0.789000	38.3	1000.0	9.000	On	N	10.0	17.7	56.0
0.807000	38.5	1000.0	9.000	On	N	10.0	17.5	56.0
1.266000	35.9	1000.0	9.000	On	N	9.9	20.1	56.0
1.509000	38.3	1000.0	9.000	On	N	9.9	17.7	56.0
1.576500	37.9	1000.0	9.000	On	N	9.9	18.1	56.0
2.040000	37.7	1000.0	9.000	On	N	9.9	18.3	56.0
2.742000	36.1	1000.0	9.000	On	N	9.9	19.9	56.0
3.228000	36.3	1000.0	9.000	On	N	9.9	19.7	56.0

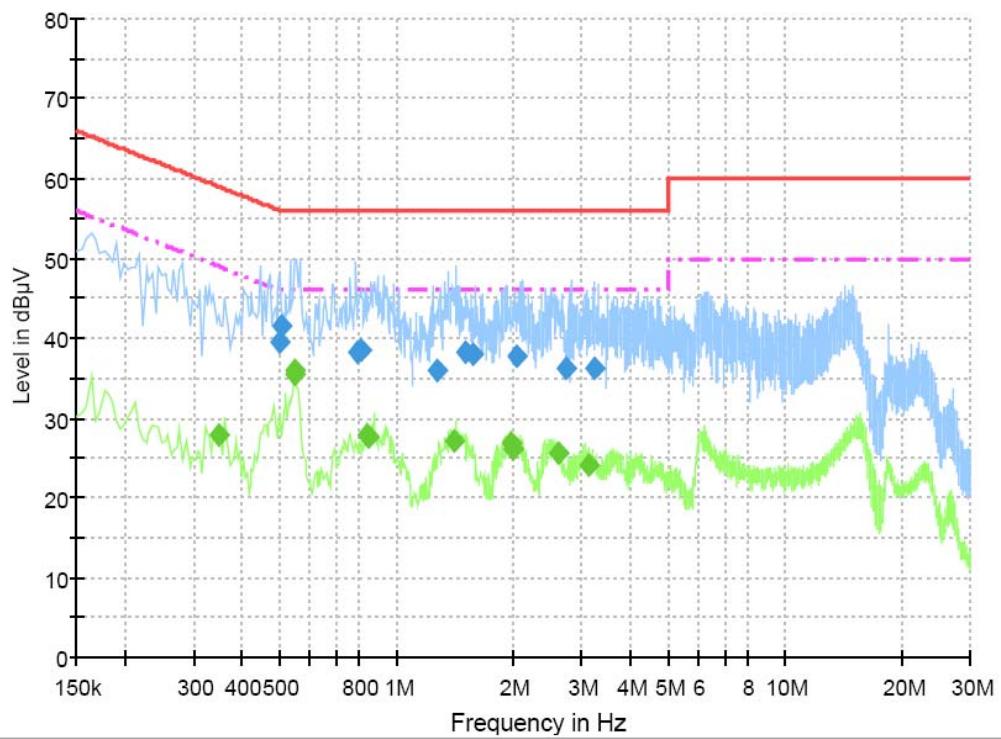
#### Final Result 2

Frequency (MHz)	Average (dB $\mu$ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)
0.348000	27.9	1000.0	9.000	On	N	10.1	21.1	49.0
0.546000	35.9	1000.0	9.000	On	N	10.2	10.1	46.0
0.546000	35.4	1000.0	9.000	On	N	10.2	10.6	46.0
0.843000	27.9	1000.0	9.000	On	N	10.0	18.1	46.0
0.847500	27.7	1000.0	9.000	On	N	10.0	18.3	46.0
1.414500	27.2	1000.0	9.000	On	N	9.9	18.8	46.0
1.981500	26.8	1000.0	9.000	On	N	9.9	19.2	46.0
1.990500	26.0	1000.0	9.000	On	N	9.9	20.0	46.0
2.607000	25.5	1000.0	9.000	On	N	9.9	20.5	46.0
3.133500	24.0	1000.0	9.000	On	N	9.9	22.0	46.0

**[HOT]**



**[NEUTRAL]**



## Radiated Electric Field Emissions

[30 MHz to 1 GHz]

Frequency [MHz]	Reading [dB <sub>ELV</sub> /m]	Pol.	Height [m]	Correction Factor			Limits [dB <sub>ELV</sub> /m]	Result [dB <sub>ELV</sub> /m]	Margin [dB]
				Antenna	Cable	Amp. Gain			
47.06	45.7	V	1.0	9.7	2.1	31.4	30.0	26.1	3.9
241.06	45.6	H	2.0	9.4	5.1	31.3	37.0	28.8	8.2
308.97	44.7	V	1.0	11.7	6.0	31.3	37.0	31.1	5.9
325.97	40.0	H	1.8	12.2	6.1	31.3	37.0	27.0	10.0
393.89	38.4	V	1.2	13.7	6.7	31.3	37.0	27.5	9.5
716.35	32.7	H	2.3	18.8	9.3	31.3	37.0	29.5	7.5

H : Horizontal, V : Vertical

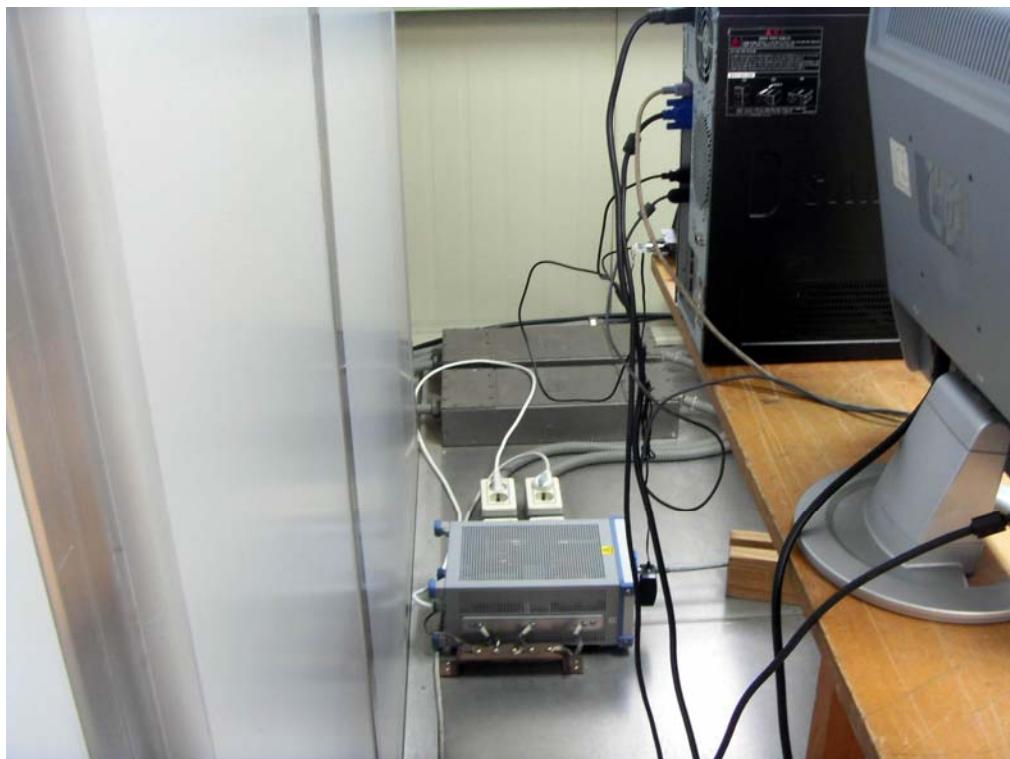
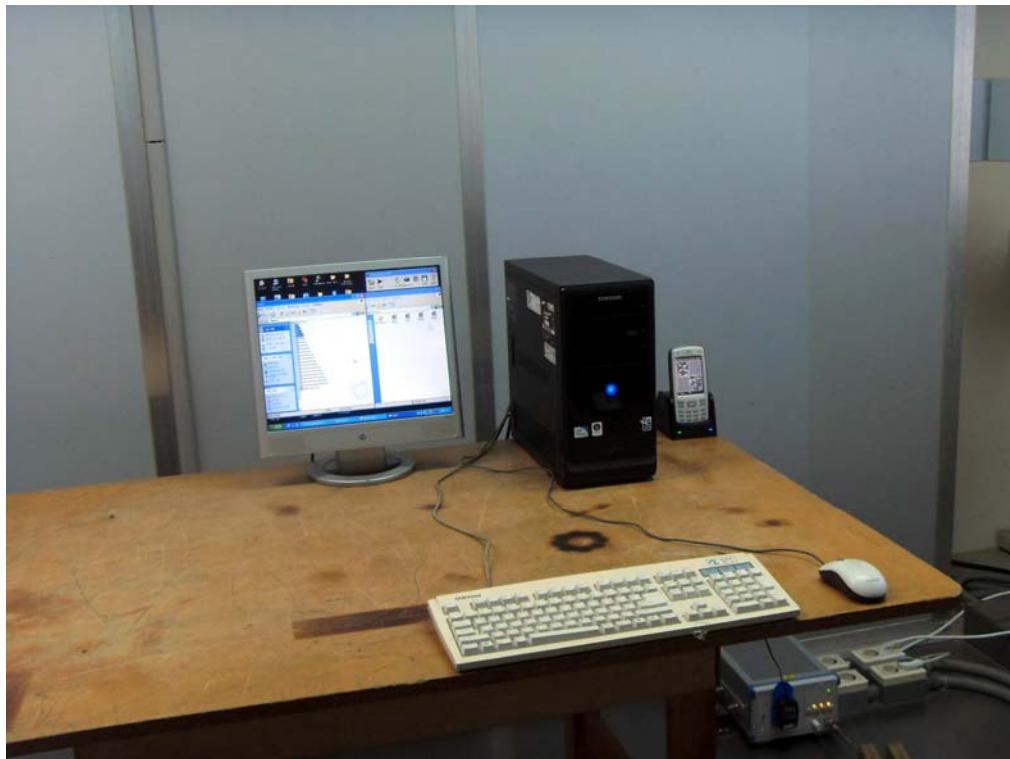
Result = Reading + Antenna + Cable - Amp.Gain

**[1 GHz to 5 GHz]**

Frequency [MHz]	Reading [dB $\mu$ V/m]	Pol.	Height [m]	Correction Factor			Limits [dB $\mu$ V/m]	Result [dB $\mu$ V/m]	Margin [dB]
				Antenna	Cable	Amp. Gain			
No emission were detected at a level greater than 10 dB below limit									

## APPENDIX B - Test Setup Photos and Configuration

### Conducted Voltage Emissions



## Radiated Electric Field Emissions





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[www.e-ctk.com](http://www.e-ctk.com)

## **APPENDIX C – EUT Photographs**

## EUT External Photographs



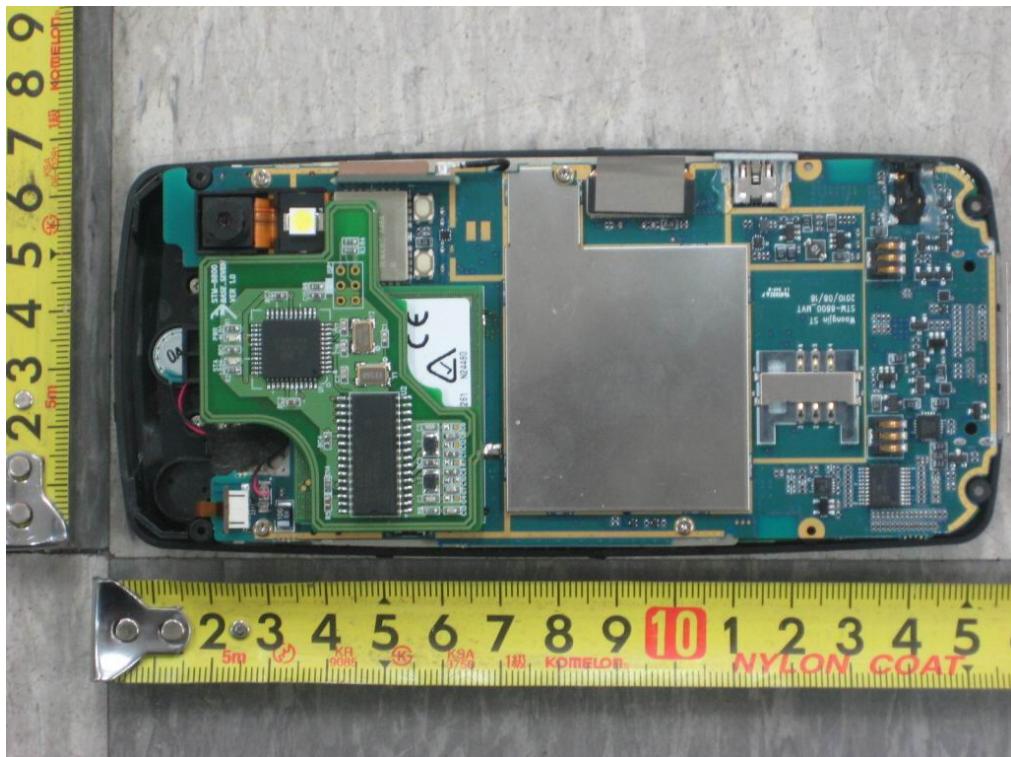
## Cradle



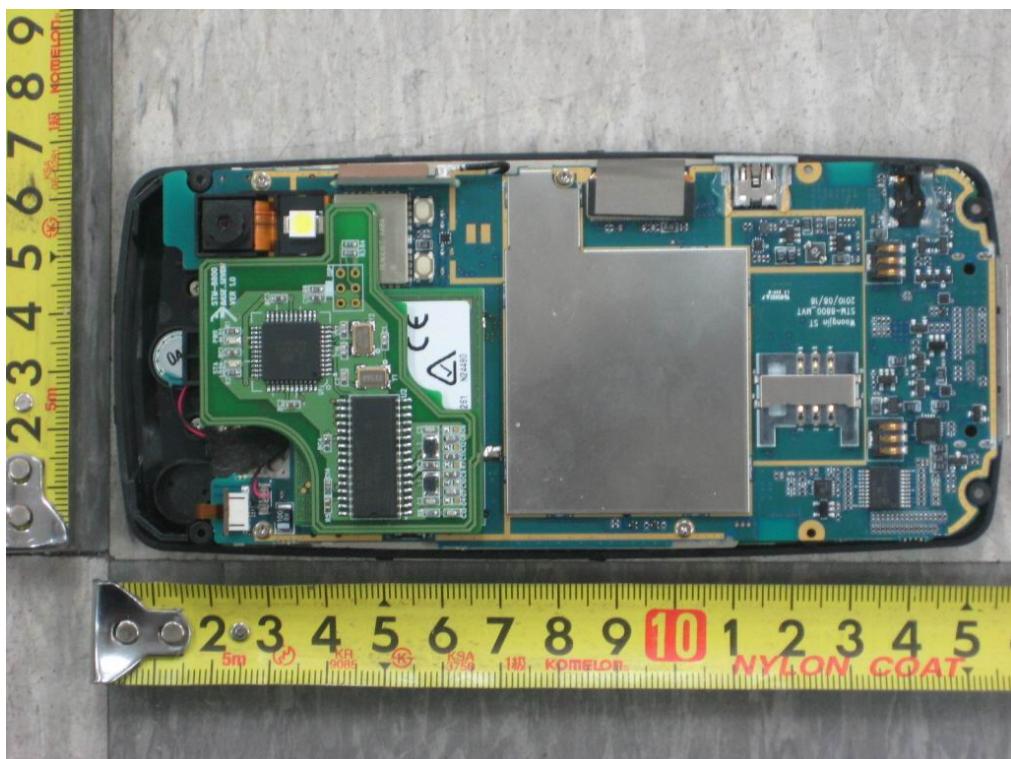
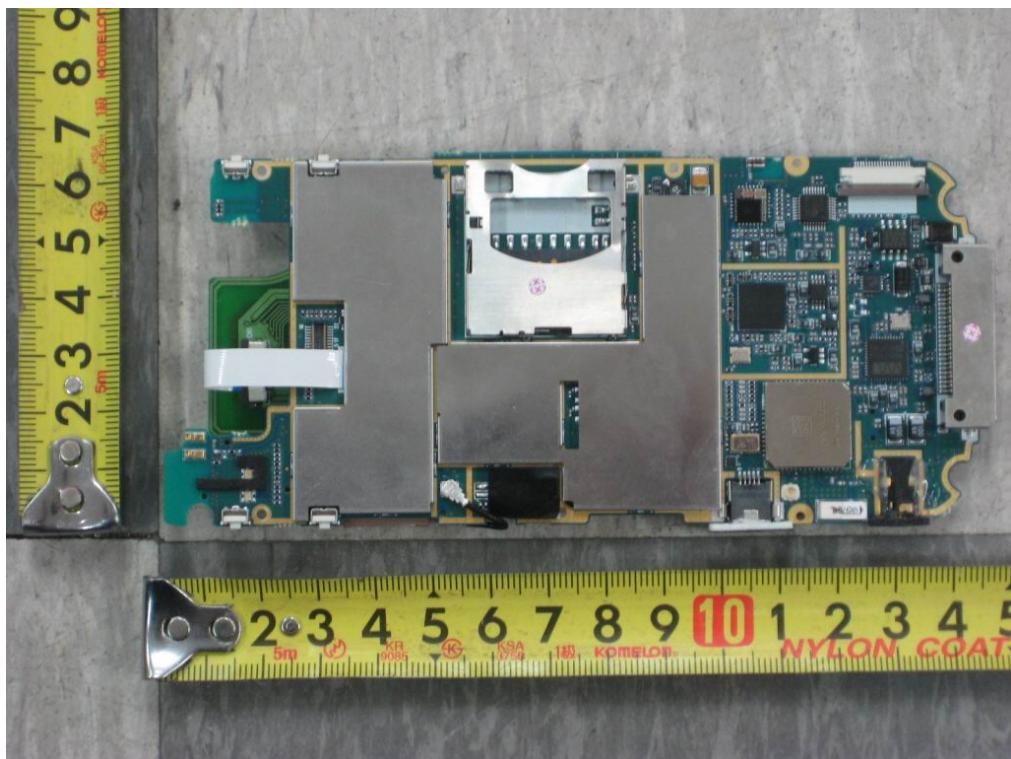
## SWITCHING POWER SUPPLY



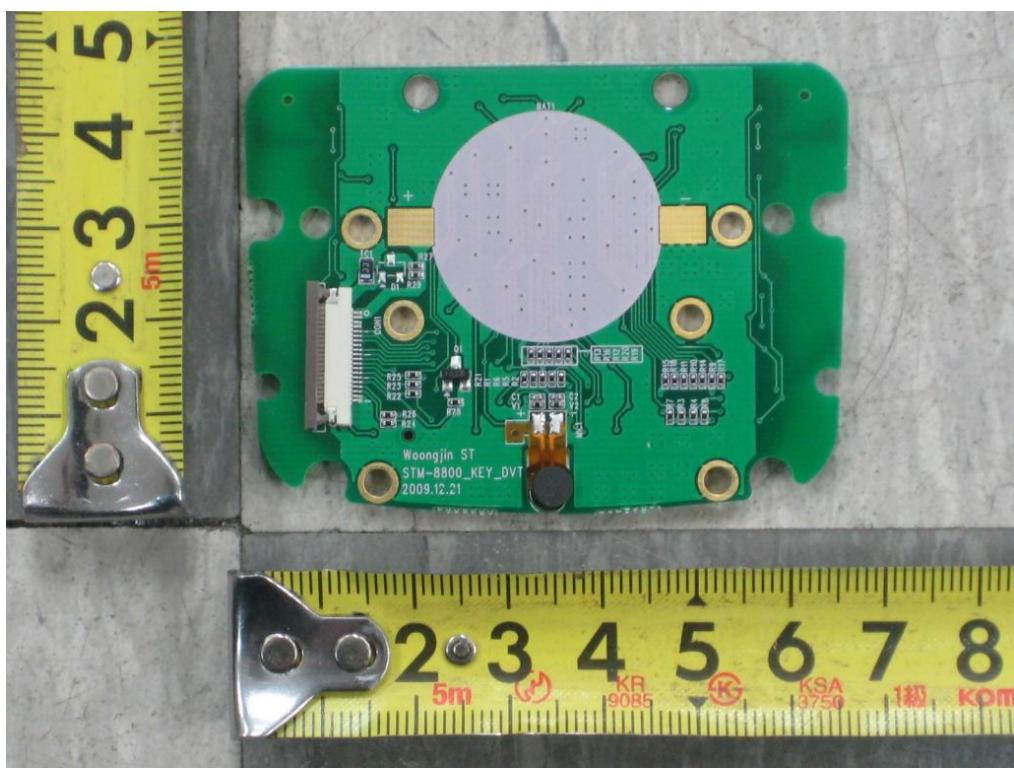
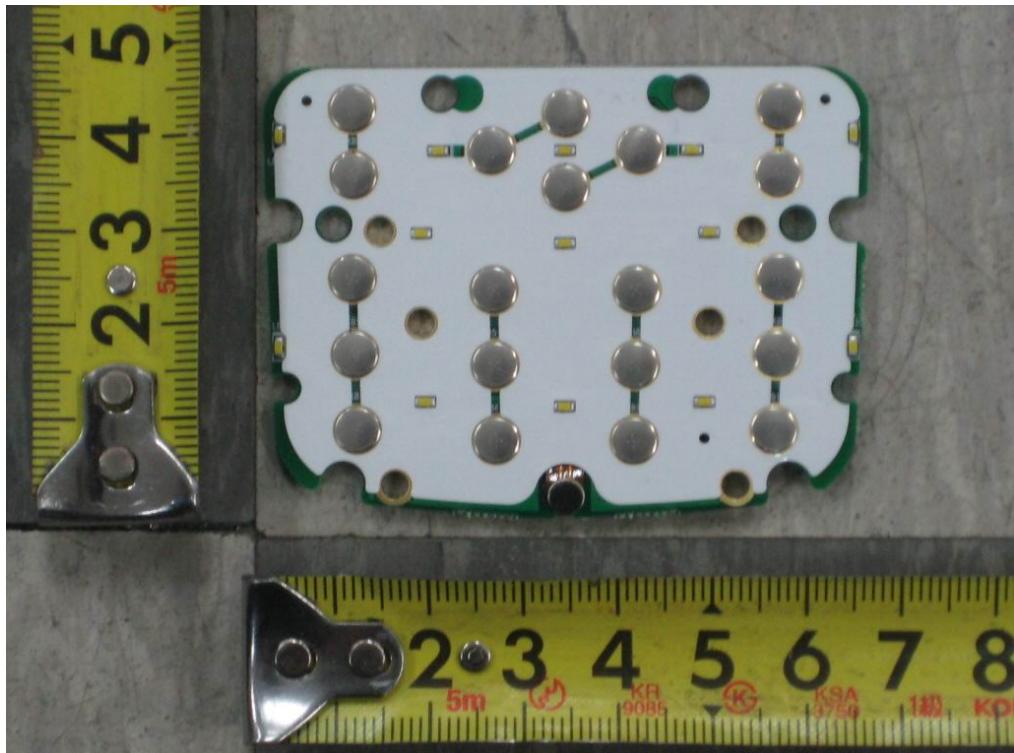
## EUT Internal Photographs



## PCB







## Battery



## Cradle PCB

