Shanghai Sand Information Technology System Co., Ltd

EFT-POS Terminal

Main Model: IPS420
Serial Model: N/A

September 12, 2013
Report No.: 13050018-FCC-E-V1
(This report supersedes NONE)

Modifications made to the product : None

This Test Report is Issued Under the Authority of:		
Deon Dai	Alex Liu	
Deon Dai **Compliance Engineer**	**Alex Liu** **Technical Manager**	

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Test result presented in this test report is applicable to the representative sample only.

EMC Test Report

To: FCC Part 15 Subpart B Class A: 2012, ANSI C 63.4: 2009

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Mexico	NOM, COFETEL, Caniety	Safety, EMC , RF/Wireless, Telecom
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Country/Region	Accreditation Body	Scope
USA	FCC TCB, NIST	EMC , RF , Telecom
Canada	IC FCB , NIST	EMC , RF , Telecom
Singapore	iDA, NIST	EMC , RF , Telecom
EU	NB	EMC & R&TTE Directive
Japan	MIC, (RCB 208)	RF , Telecom
Hong Kong	OFTA (US002)	RF , Telecom

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CONTENTS

1 EXECUTIVE SUMMARY & EUT INFORMATION

The purpose of this test programme was to demonstrate compliance of the Shanghai Sand Information Technology System Co., Ltd. The EFT-POS Terminal and model: IPS420 against the current Stipulated Standards. The EFT-POS Terminal has demonstrated compliance with the FCC Part 15 Subpart B Class B: 2012, ANSI C 63.4: 2009.

EUT Information

EUT Description	:	**EFT-POS Terminal**
Main Model	:	**IPS420**
Serial Model	:	**N/A**
Antenna Gain	:	**GPRS850: -6 dBi** **GPRS1900: -2 dBi** **RFID: 2 dBi**
Rated	:	**Adapter:** **Model: ADP046-094B** **Input: AC 100V-240V, 1.0A 50/60 Hz** **Output: DC 9V 4A** **Li-Polymer Battery:** **Model: IPS420** **Voltage: 7.4V 2000mAh 14.8Wh**
Classification Per Stipulated Test Standard	:	**Class B Emission Product Per FCC Part 15 Subpart B Class B: 2012**

2 TECHNICAL DETAILS

Purpose	**Compliance testing of EFT-POS Terminal with stipulated standard**
Applicant / Client	**Shanghai Sand Information Technology System Co., Ltd Building 22,Germs Park,NO. 487 Tianlin Road, Shanghai China**
Manufacturer	**Shanghai Sand Information Technology System Co., Ltd Building 22,Germs Park,NO. 487 Tianlin Road, Shanghai China**
Laboratory performing the tests	**SIEMIC (Nanjing-China) Laboratories NO.2-1,Longcang Dadao, Yuhua Economic Development Zone, Nanjing, China Tel:+86(25)86730128/86730129 Fax:+86(25)86730127 Email: China@siemic.com.cn**
Test report reference number	**13050018-FCC-E-V1**
Date EUT received	**July 19, 2013**
Standard applied	**FCC Part 15 Subpart B Class B: 2012, ANSI C 63.4: 2009**
Dates of test	**August 26, 2013**
No of Units	**#1**
Equipment Category	**Class B Emission Product**
Trade Name	SAND
Highest Operated Frequency (ies)	**GPRS850 TX : 824.2 ~ 848.8 MHz; RX : 869.2 ~ 893.8 MHz GPRS1900 TX : 1850.2 ~ 1909.8 MHz; RX : 1930.2 ~ 1989.8 MHz RFID: 13.56MHz**
Number of Channels	**299CH (GPRS1900) 124CH (GPRS850) RFID: 1CH (ASK)**
Modulation	**GPRS: GMSK RFID: ASK**
GPRS Multi-slot class	**8/10**
Port	**USB Port, Power Port, COM Port, T-FLASH Port**
FCC ID	**XLHIPS420-1305**

3 MODIFICATION

NONE

4 TEST SUMMARY

The product was tested in accordance with the following specifications.
All testing has been performed according to below product classification:

Class B Emission Product

Test Results Summary

Emissions			
Test Standard	**Description**	**Product Class**	**Pass / Fail**
FCC Part 15 Subpart B Class B: 2012, ANSI C 63.4: 2009	AC Line Conducted Emissions	See Above	Pass
FCC Part 15 Subpart B Class B: 2012, ANSI C 63.4: 2009	Radiated Emissions	See Above	Pass

All measurement uncertainty is not taken into consideration for all presented test result.

5 MEASUREMENTS, EXAMINATION AND DERIVED RESULTS

5.1 AC Line Conducted Emissions Test Result

Note:

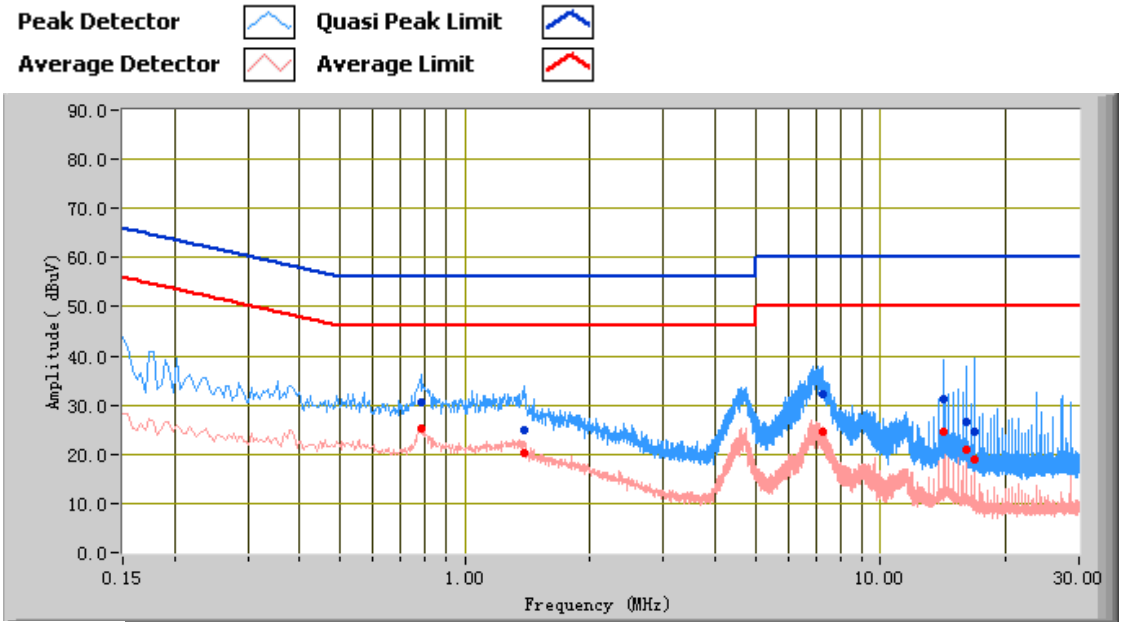
1. All possible modes of operation were investigated. Only the 6 worst case emissions measured, using the correct CISPR and Average detectors, are reported. All other emissions were relatively insignificant.
2. A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
3. Conducted 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% (in the case where distributions are normal), with a coverage factor of 2, in the range 9kHz – 30MHz (Average & Quasi-peak) is±3.86dB.
4. Environmental Conditions

Temperature	25ºC
Relative Humidity	50%
Atmospheric Pressure	1009 mbar

5. Test date : August 26, 2013
   Tested By : Chris Bi

Test Result: Pass

Test Mode:	Charging and Printing Mode (Worse Case)

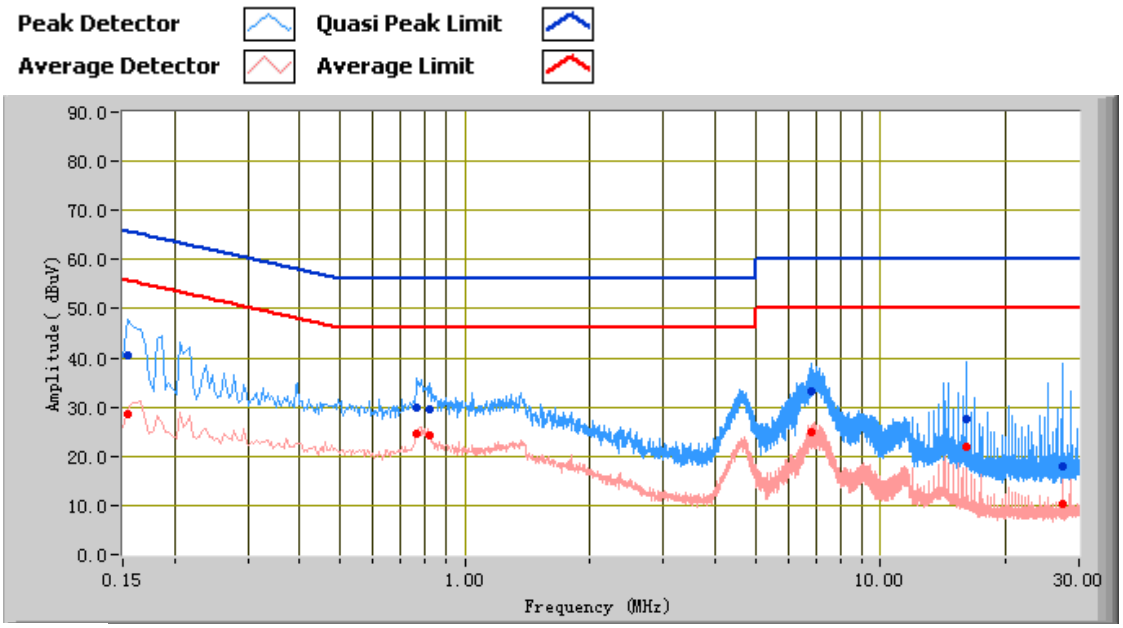


Test Data

Phase Line Plot at 120V AC, 60Hz

Frequency (MHz)	Quasi Peak (dBµV)	Limit (dBµV)	Margin (dB)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Factors (dB)
0.78	30.60	56.00	-25.40	25.24	46.00	-20.76	10.86
16.88	24.61	60.00	-35.39	18.79	50.00	-31.21	11.46
14.21	31.09	60.00	-28.91	24.63	50.00	-25.37	11.36
16.11	26.61	60.00	-33.39	20.82	50.00	-29.18	11.44
1.39	24.95	56.00	-31.05	20.11	46.00	-25.89	10.76
7.24	32.37	60.00	-27.63	24.58	50.00	-25.42	10.95

Test Mode:	Charging and Printing Mode (Worse Case)



Test Data

Phase Neutral Plot at 120V AC, 60Hz

Frequency (MHz)	Quasi Peak (dBµV)	Limit (dBµV)	Margin (dB)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Factors (dB)
0.15	40.60	65.78	-25.18	28.50	55.78	-27.28	12.15
0.77	29.80	56.00	-26.20	24.48	46.00	-21.52	10.87
16.11	27.66	60.00	-32.34	21.93	50.00	-28.07	11.43
27.49	18.04	60.00	-41.96	10.13	50.00	-39.87	11.81
6.83	33.13	60.00	-26.87	24.82	50.00	-25.18	10.97
0.82	29.42	56.00	-26.58	24.09	46.00	-21.91	10.83

5.2 Radiated Emissions Test Result

Note:

1. All possible modes of operation were investigated. Only the 6 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. 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% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 1GHz (QP only @ 3m & 10m) is +5.6dB/-4.5dB (for EUT s < 0.5m X 0.5m X 0.5m), in the range 1GHz – 6GHz (PK & AV only @3m) is +4dB/-4dB (for EUT s < 0.5m X 0.5m X 0.5m).
4. Environmental Conditions

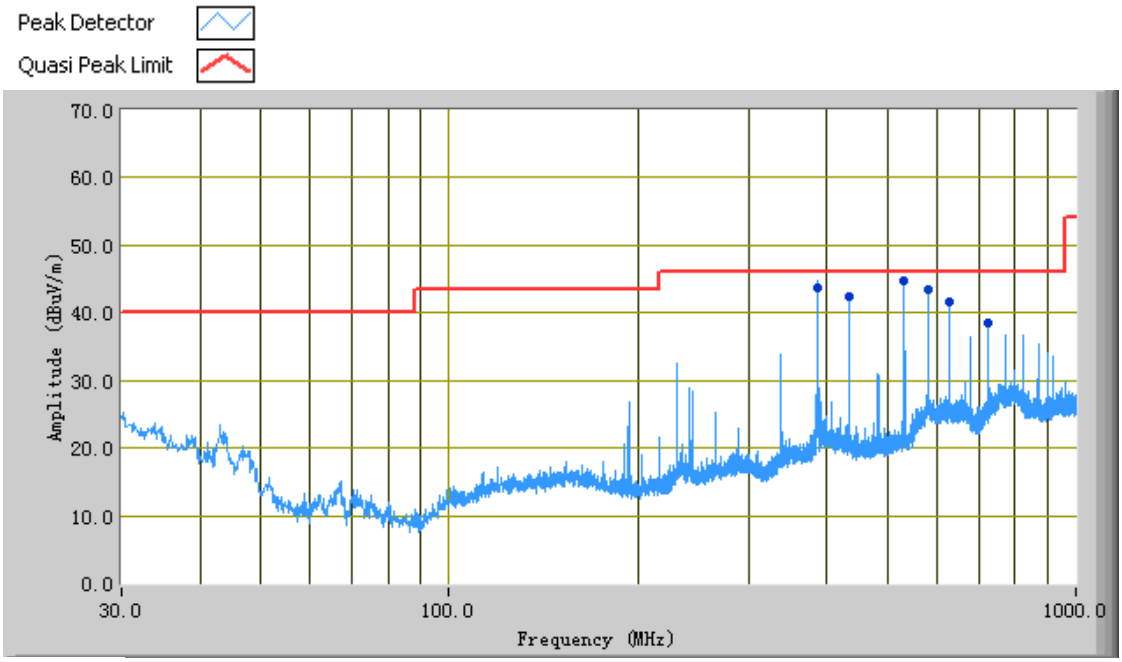
Temperature	26ºC
Relative Humidity	50%
Atmospheric Pressure	1009mbar

5. Test date: August 26, 2013
   Tested By: Deon Dai

Test Result: Pass

Test Mode:	Charging and Printing Mode (Worse Case)

Below 1GHz



Test Data

Vertical& Horizontal Polarity Plot at 3m

Frequency (MHz)	Quasi Peak (dBµV/m)	Azimuth	Polarity (H/V)	Height (cm)	Factors (dB)	Limit (dBµV/m)	Margin (dB)
531.99	45.14	287.00	H	194.00	-27.85	46.00	-0.86
386.90	43.75	278.00	H	100.00	-29.97	46.00	-2.25
580.35	43.63	297.00	H	170.00	-23.27	46.00	-2.37
435.25	42.35	278.00	H	102.00	-28.87	46.00	-3.65
628.72	41.67	202.00	V	112.00	-21.05	46.00	-4.33
725.45	41.51	248.00	H	122.00	-21.50	46.00	-4.49

Note: The data above 1 GHz which below 20 dB to the limit was not recorded.

Annex A. TEST INSTRUMENT & METHOD

Annex A.i. TEST INSTRUMENTATION & GENERAL PROCEDURES

Instrument	Model	Serial #	Calibration Date	Calibration Due Date
AC Line Conducted Emissions				
R&S EMI Test Receiver	ESPI3	101216	10/27/2012	10/26/2013
V-LISN	ESH3-Z5	838979/005	10/27/2012	10/26/2013
Com-Power LISN	LI-115	241091	05/26/2013	05/25/2014
Com-Power Transient Limiter	LIT-153	531021	11/03/2012	11/02/2013
SIEMIC Labview Conducted Emissions software	V1.0	N/A	N/A	N/A
Radiated Emissions				
Hp Spectrum Analyzer	8563E	3821A09023	01/10/2013	01/09/2014
R&S EMI Receiver	ESPI3	101216	10/27/2012	10/26/2013
Antenna (30MHz~6GHz)	JB6	A121411	03/27/2013	03/26/2014
ETS-Lindgren Antenna (1 ~18GHz)	3115	N/A	10/29/2012	10/28/2013
A- INFOMW Antenna (1 ~18GHz)	JXTXLB-10180	J2031081120092	06/25/2013	06/24/2014
Horn Antenna (18~40GHz)	AH-840	101013	04/22/2013	04/22/2014
Microwave Pre-Amp (18~40GHz)	PA-840	181250	05/30/2013	05/29/2014
Hp Agilent Pre-Amplifier	8447F	1937A01160	11/03/2012	11/02/2013
MITEQ Pre-Amplifier (0.1 ~ 18GHz)	AMF-7D-00101800-30-10P	1451710	11/03/2012	11/02/2013
Chamber	3m	N/A	04/13/2013	04/12/2014
SIEMIC Labview Radiated Emissions software	V1.0	N/A	N/A	N/A

Annex A.ii. CONDUCTED EMISSIONS TEST DESCRIPTION

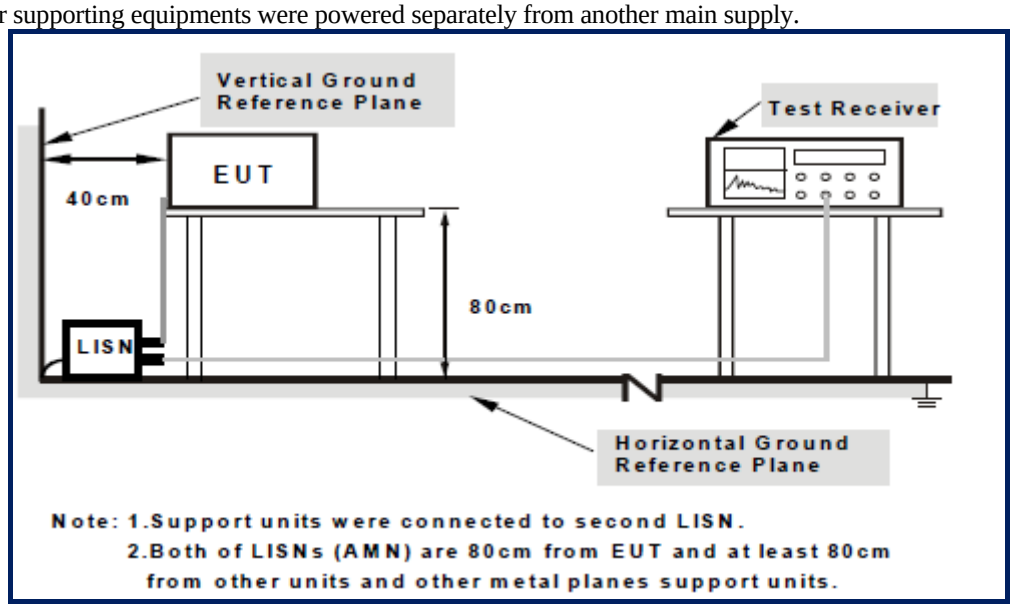
Test Set-up

1. The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table, as shown in Annex B.

2. The power supply for the EUT was fed through a 50Ω/50μH EUT LISN, connected to filtered mains.

3. The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable.

4. All other supporting equipments were powered separately from another main supply.



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration1

Test Method

1. The EUT was switched on and allowed to warm up to its normal operating condition.

2. A scan was made on the NEUTRAL line (for AC mains) or Earth line (for DC power) over the required frequency range using an EMI test receiver.

3. High peaks, relative to the limit line, were then selected.

4. The EMI test receiver was then tuned to the selected frequencies and the necessary measurements made with a receiver bandwidth setting of 10kHz. For FCC tests, only Quasi-peak measurements were made; while for CISPR/EN tests, both Quasi-peak and Average measurements were made.

5. Steps 2 to 4 were then repeated for the LIVE line (for AC mains) or DC line (for DC power).

Sample Calculation Example

At 20MHz	limit = 250μV = 47.96dBμV
Transducer factor of LISN, pulse limiter & cable loss at 20MHz = 11.20dB	
Q-P reading obtained directly from EMI Receiver = 40.00dBμV (Calibrated for system losses)	
Therefore, Q-P margin = 40.00-47.96 = -7.96	i.e. **7.96 dB below limit**

Annex A.iii. RADIATED EMISSIONS TEST DESCRIPTION

EUT Characterisation

EUT characterisation, over the frequency range from 30MHz to 10th Harmonic, was done in order to minimise radiated emissions testing time while still maintaining high confidence in the test results.

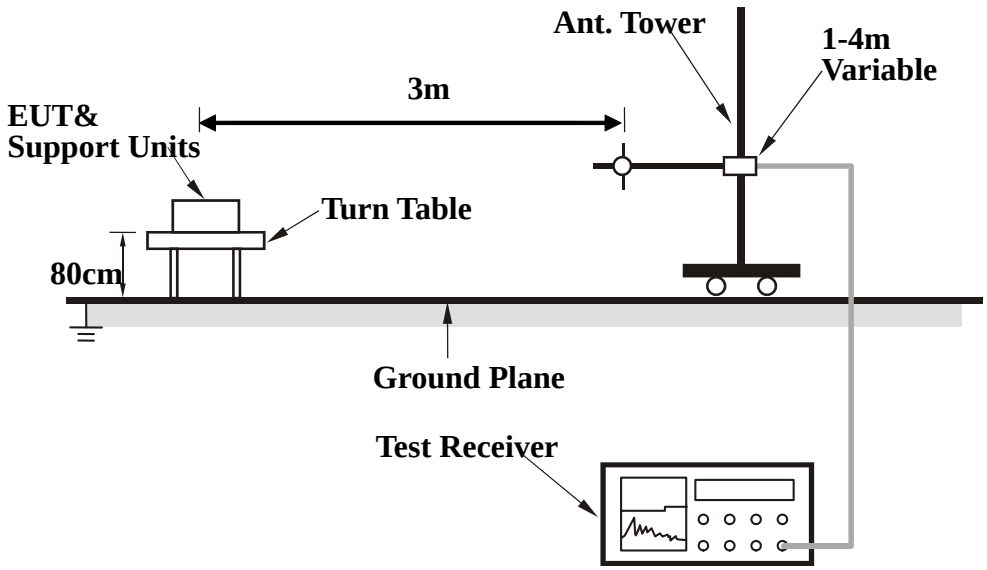
The EUT was placed in the chamber, at a height of about 0.8m on a turntable. Its radiated emissions frequency profile was observed, using a spectrum analyzer /receiver with the appropriate broadband antenna placed 3m away from the EUT. Radiated emissions from the EUT were maximised by rotating the turntable manually, changing the antenna polarisation and manipulating the EUT cables while observing the frequency profile on the spectrum analyzer / receiver. Frequency points at which maximum emissions occurred; clock frequencies and operating frequencies were then noted for the formal radiated emissions test at the Open Area Test Site (OATS) or 3m EMC chamber.

Test Set-up

1. The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5mX1.0mX0.8m high, non-metallic table.

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.



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration2

Test Method

The following procedure was performed to determine the maximum emission axis of EUT:
1. With the receiving antenna is H polarization, rotate the EUT in turns with three orthogonal axes to determine the axis of maximum emission.
2. With the receiving antenna is V polarization, rotate the EUT in turns with three orthogonal axes to determine the axis of maximum emission.
3. Compare the results derived from above two steps. So, the axis of maximum emission from EUT was determined and the configuration was used to perform the final measurement.

Final Radiated Emission Measurement
1. Setup the configuration according to figure 1. Turn on EUT and make sure that it is in normal function.

2. For emission frequencies measured below 1GHz, a pre-scan is performed in a shielded chamber to determine the accurate frequencies of higher emissions will be checked on an open test site. As the same purpose, for emission frequencies measured above 1GHz, a pre-scan also be performed with a 1 meter measuring distance before final test.

3. For emission frequencies measured below and above 1GHz, set the spectrum analyzer on a 100kHz and 1MHz resolution bandwidth respectively for each frequency measured in step 2.

4. The search antenna is to be raised and lowered over a range from 1 to 4 meters in horizontally polarized orientation. Position the highness when the highest value is indicated on spectrum analyzer, then change the orientation of EUT on test table over a range from 0° to 360° with a speed as slow as possible, and keep the azimuth that highest emission is indicated on the spectrum analyzer. Vary the antenna position again and record the highest value as a final reading.

5. Repeat step 4 until all frequencies need to be measured was complete.

6. Repeat step 5 with search antenna in vertical polarized orientations.

During the radiated emission test, the Spectrum Analyzer was set with the following configurations:

Frequency Band (MHz)	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	Peak	100kHz	100kHz
Above 1000	Peak	1MHz	1MHz
	Average	1MHz	10Hz

Sample Calculation Example

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. For the limit is employed average value, therefore the peak value can be transferred to average value by subtracting the duty factor. The basic equation with a sample calculation is as follows:

Peak = Reading + Corrected Factor

where
Corr. Factor = Antenna Factor + Cable Factor - Amplifier Gain (if any)
And the average value is

Average = Peak Value + Duty Factor or
Set RBW = 1MHz, VBW = 10Hz.

Note:
If the measured frequencies are fall in the restricted frequency band, the limit employed must be quasi peak value when frequencies are below or equal to 1GHz. And the measuring instrument is set to quasi peak detector function.

Annex B. EUT AND TEST SETUP PHOTOGRAPHS

Annex B.i. Photograph 1: EUT External Photo

Whole Package - Top View

EUT - Front View

EUT - Rear View

EUT - Top View

EUT - Bottom View

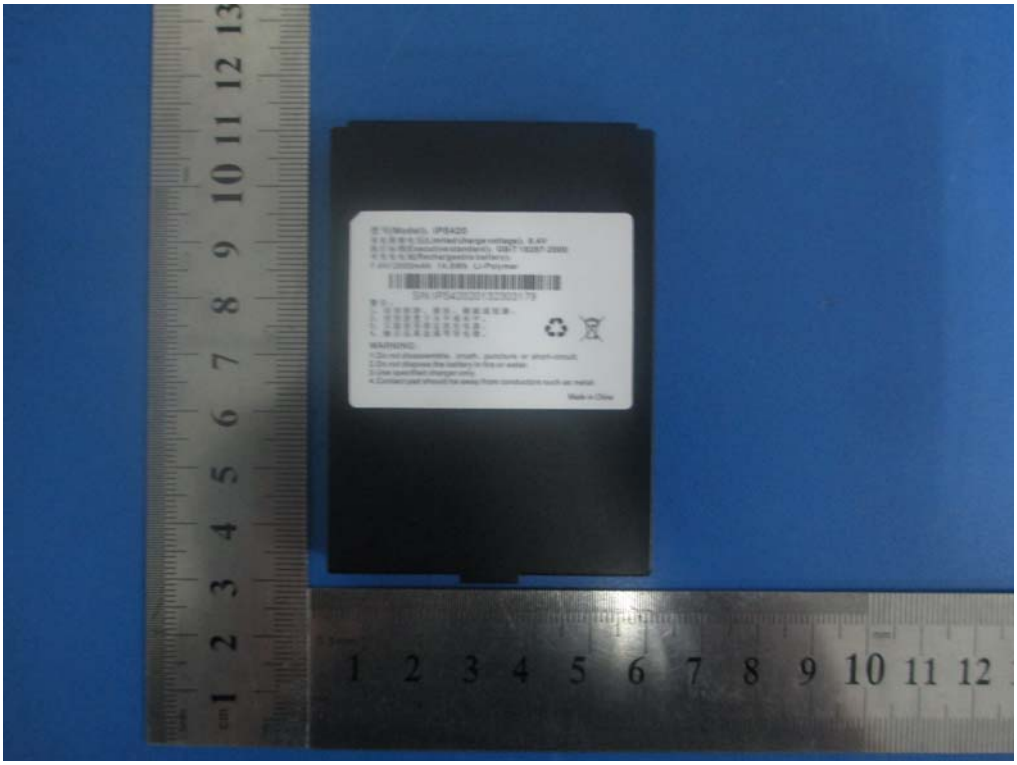
EUT - Left View

EUT - Right View

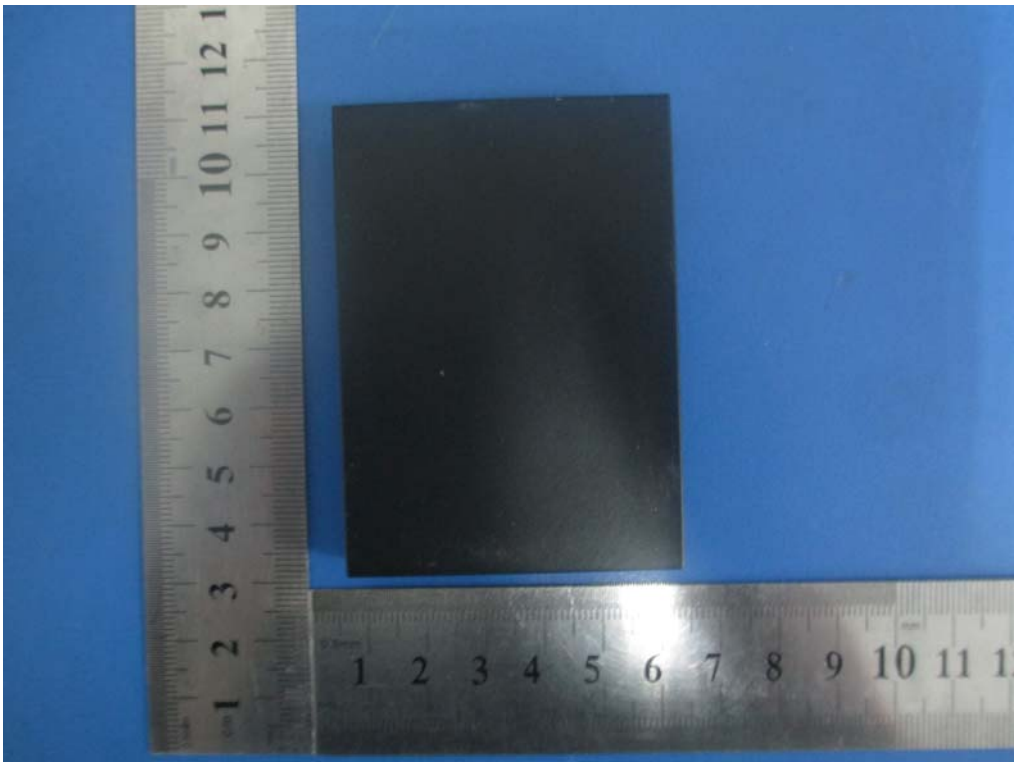
Annex B.ii. Photograph 2: EUT Internal Photo

Cover Off – Top View 1

Cover Off – Top View 2

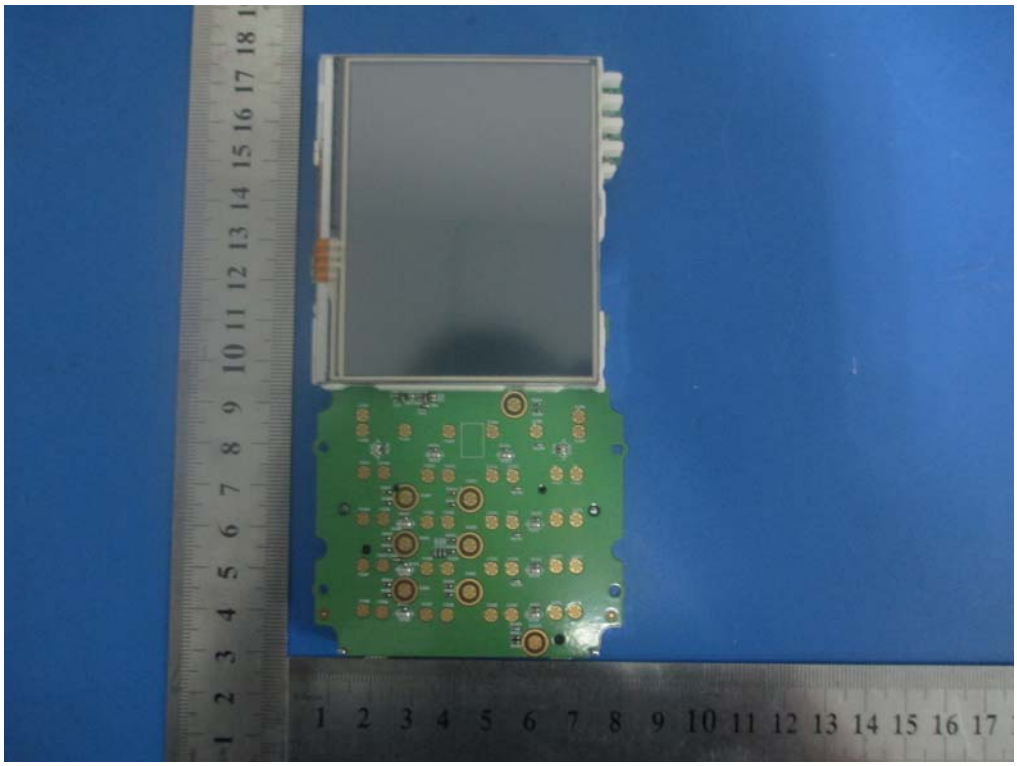


Battery - Top View

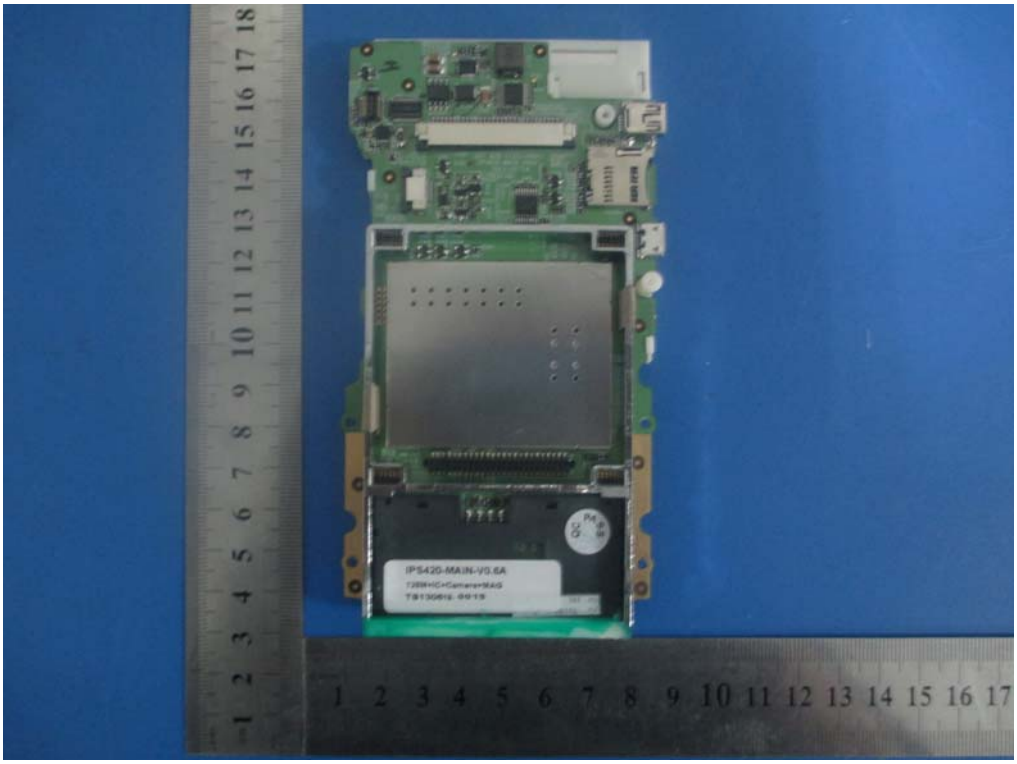


Battery - Bottom View

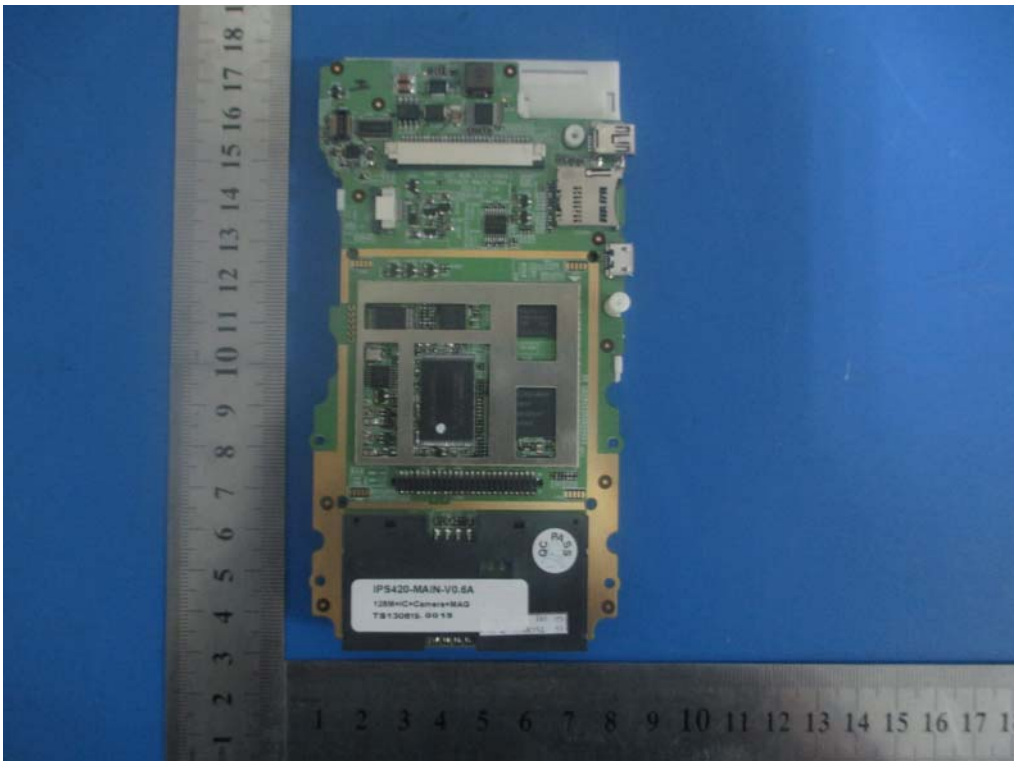
Uncover - Front View 1



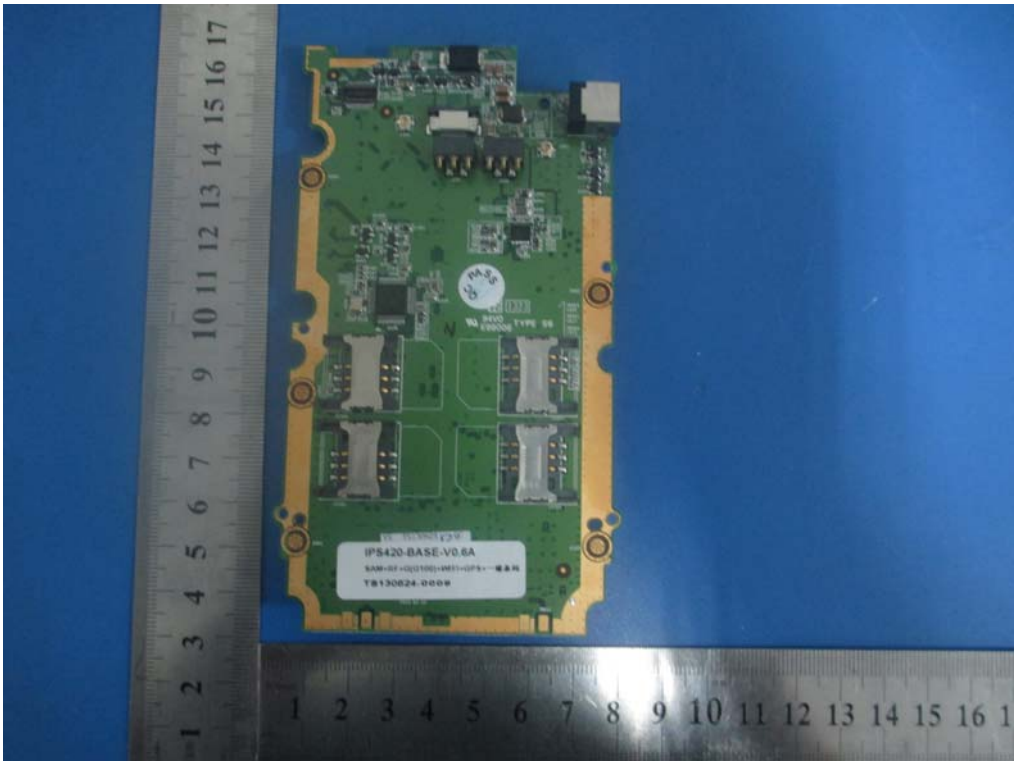
PCB 1 With LCD - Top View



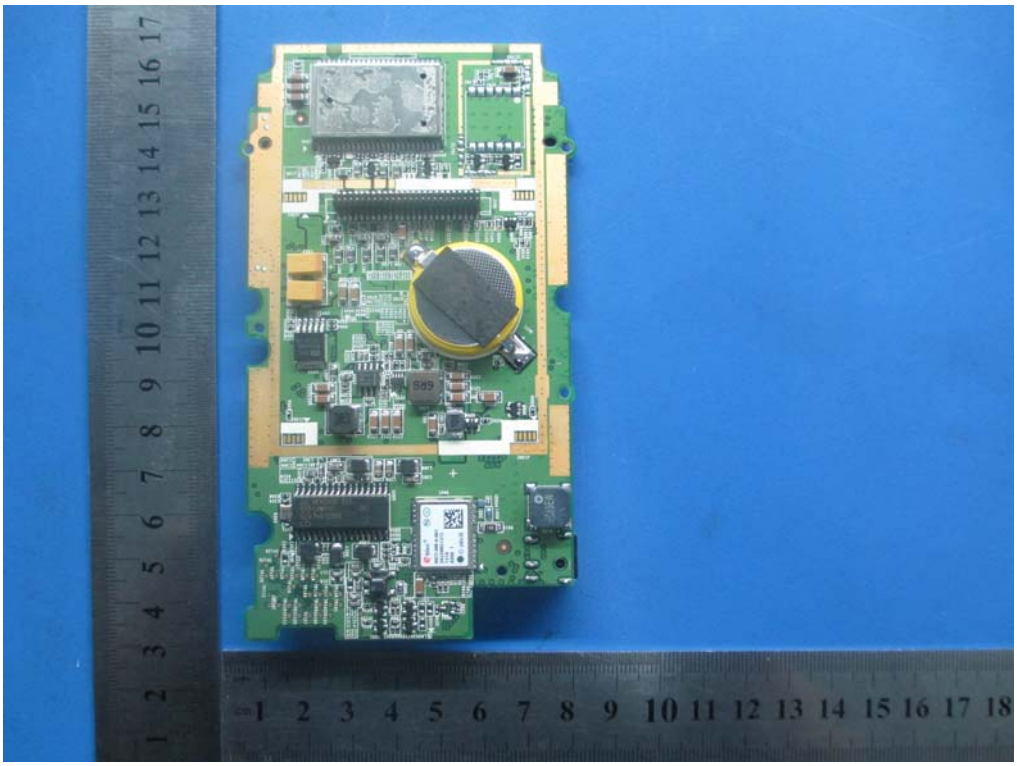
PCB 1 With LCD - Bottom View



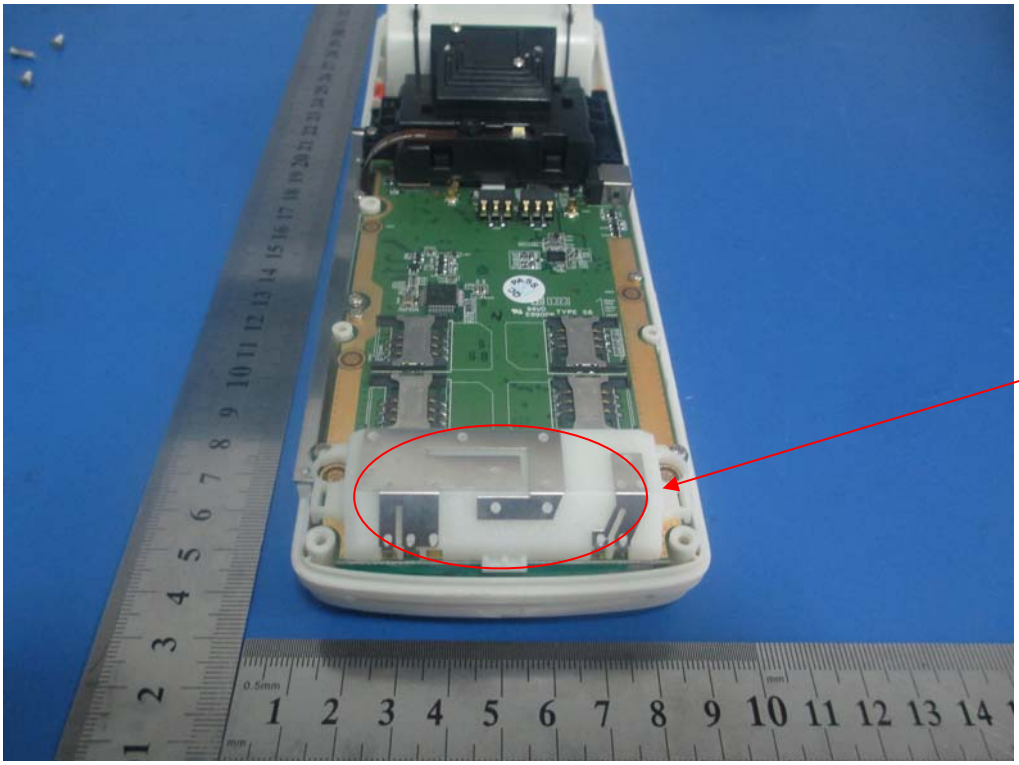
PCB 1 Shielding off - Bottom View



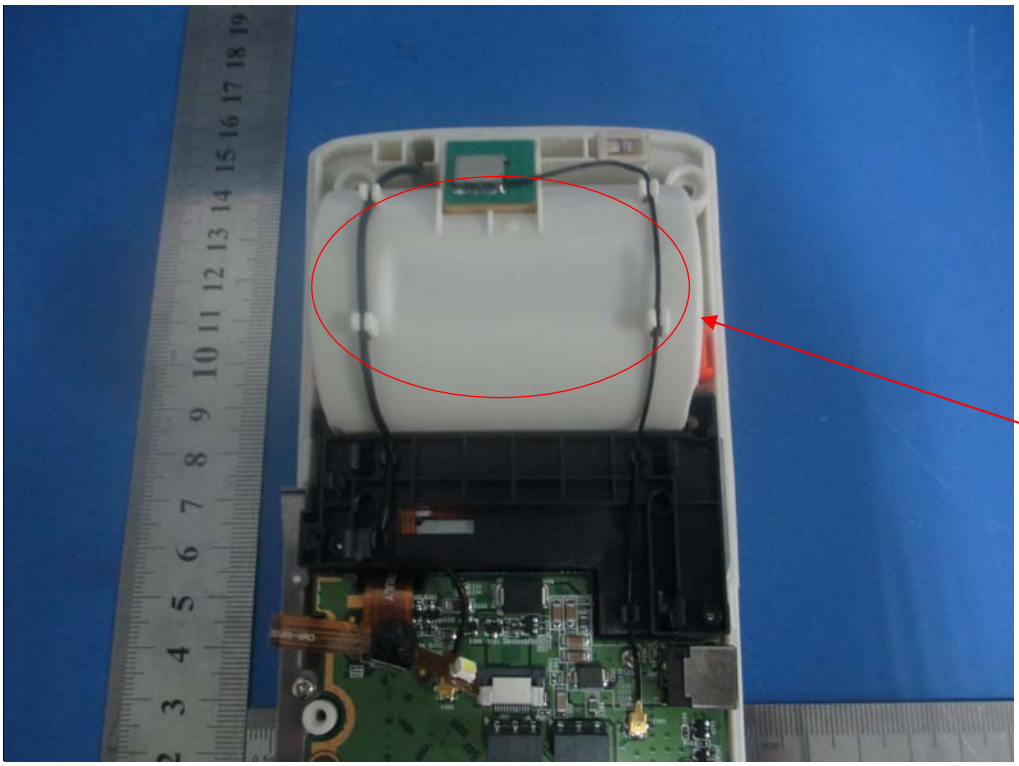
PCB 2 Front View



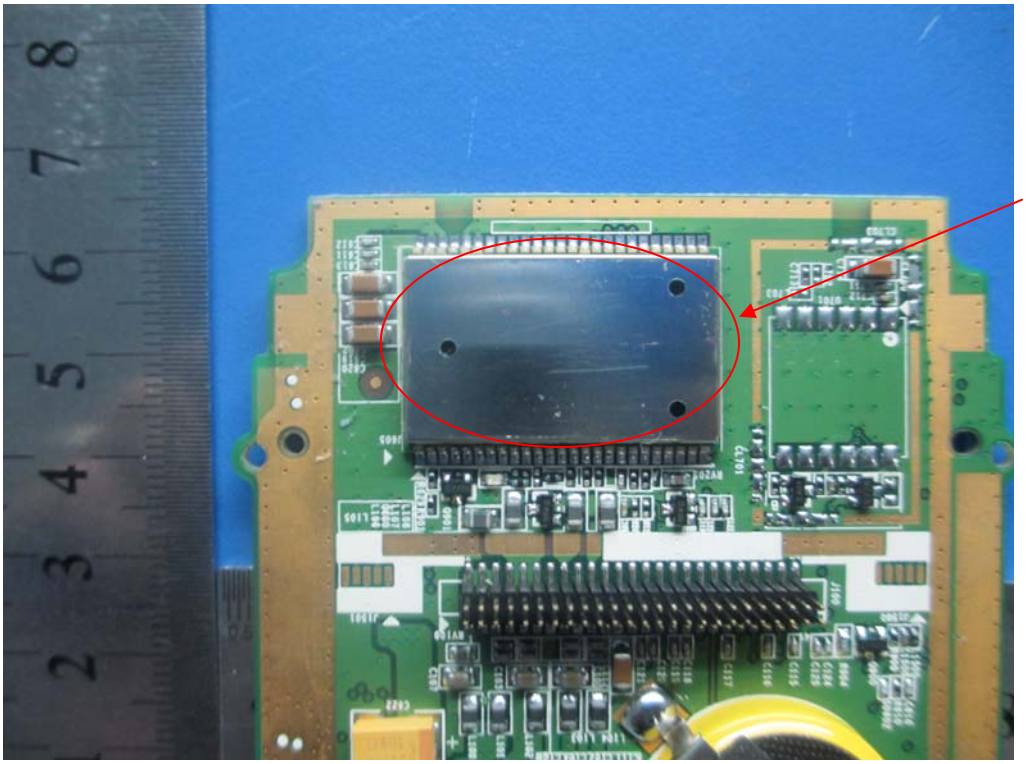
PCB 2 Rear View



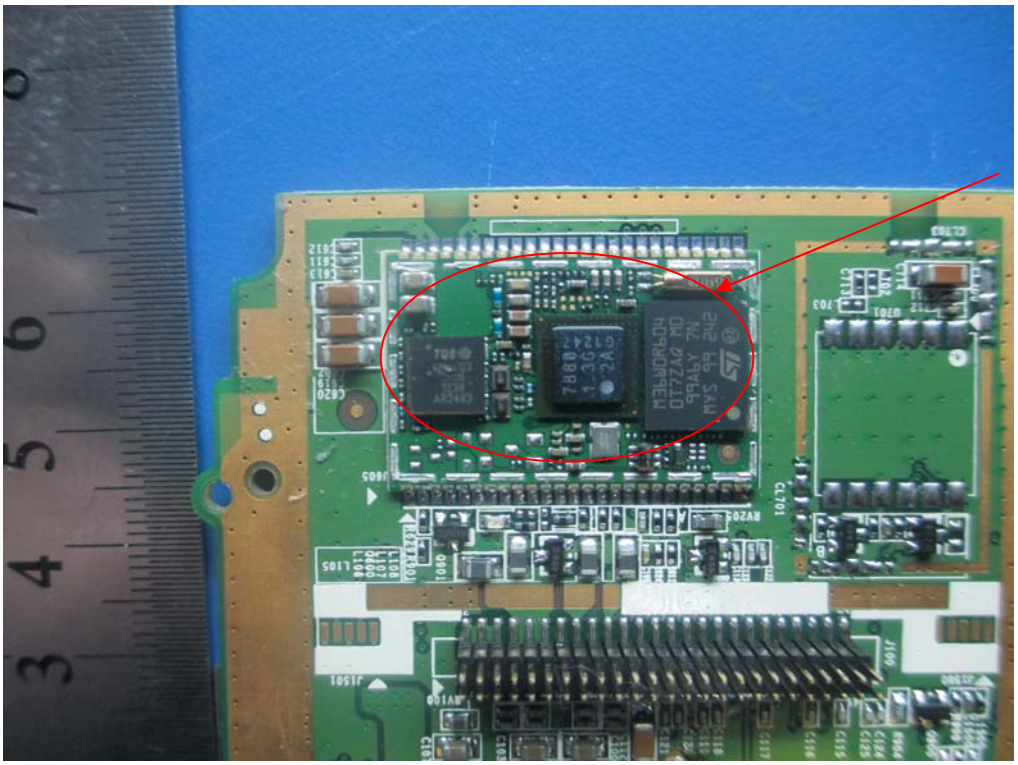
GPRS Antenna Front View



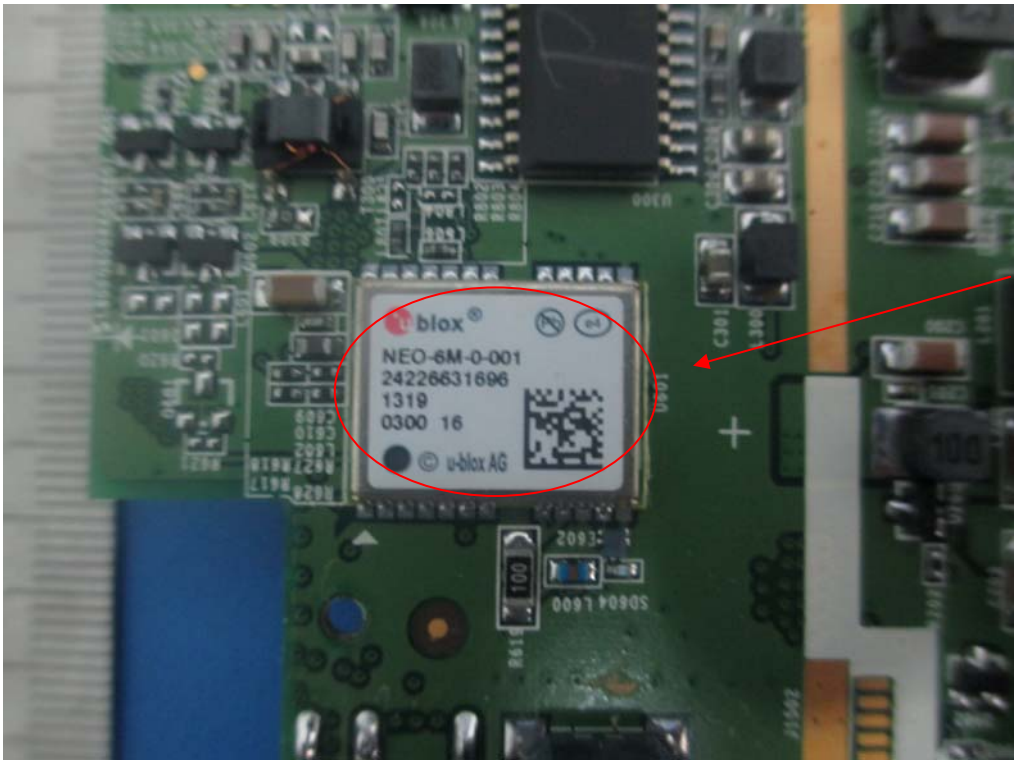
RFID Antenna Front View



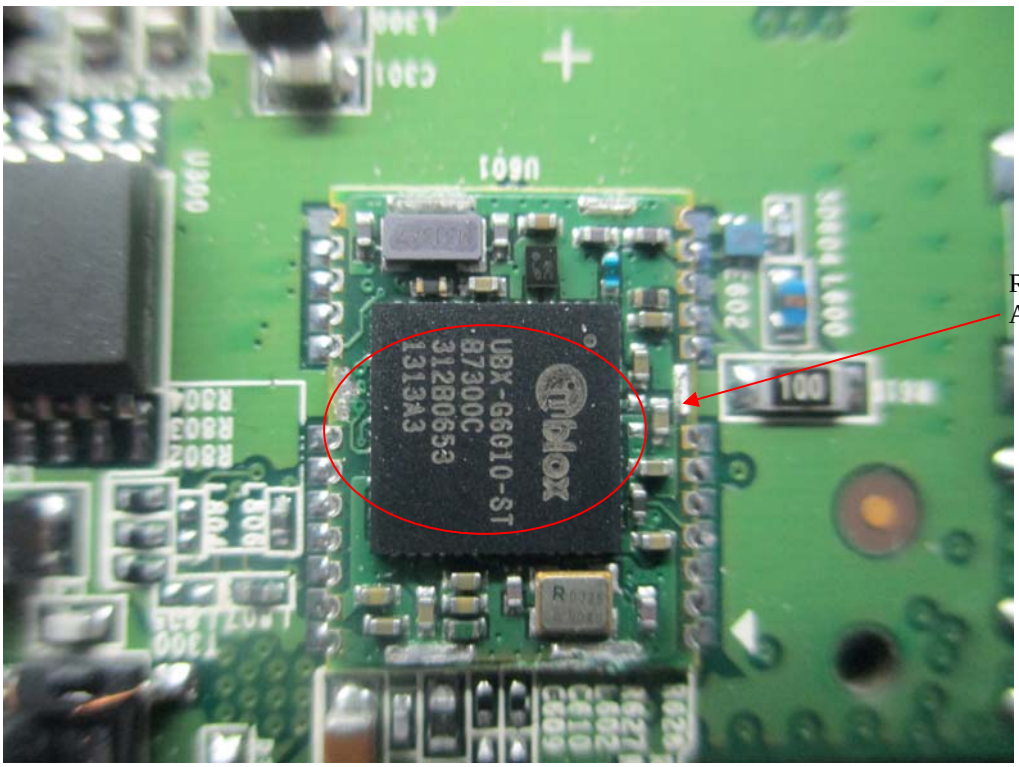
GPRS Antenna Module Front View



GPRS Antenna Module Shielding off Front View



RFID Antenna Module Front View

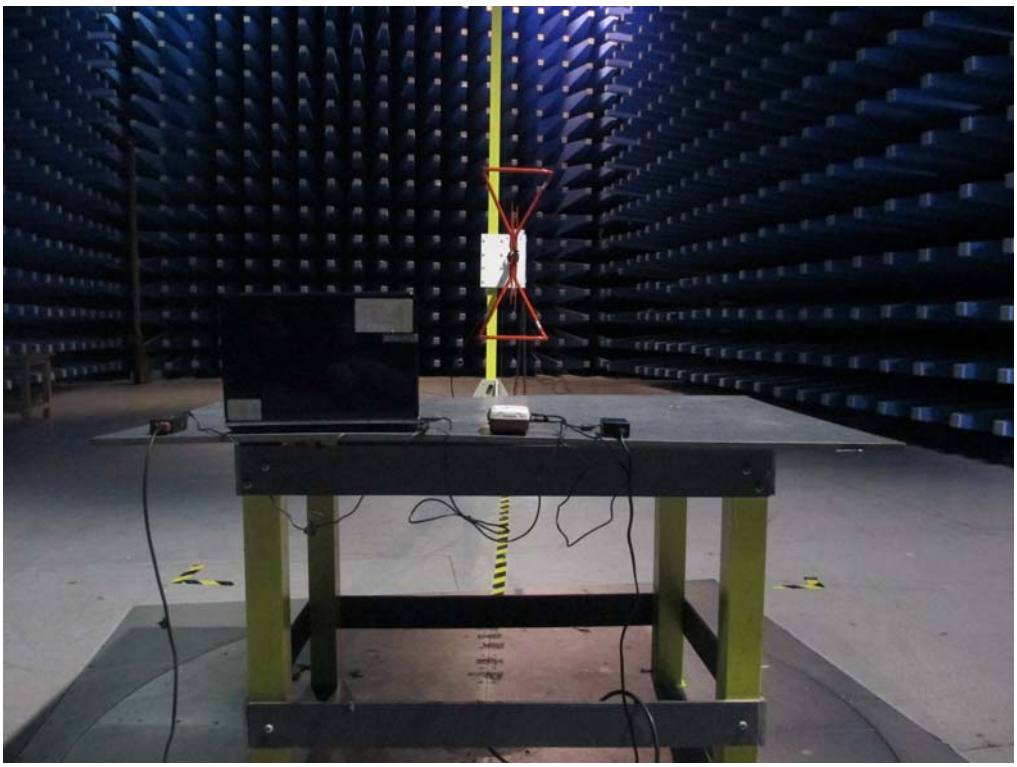


RFID Antenna Module Shielding off Front View

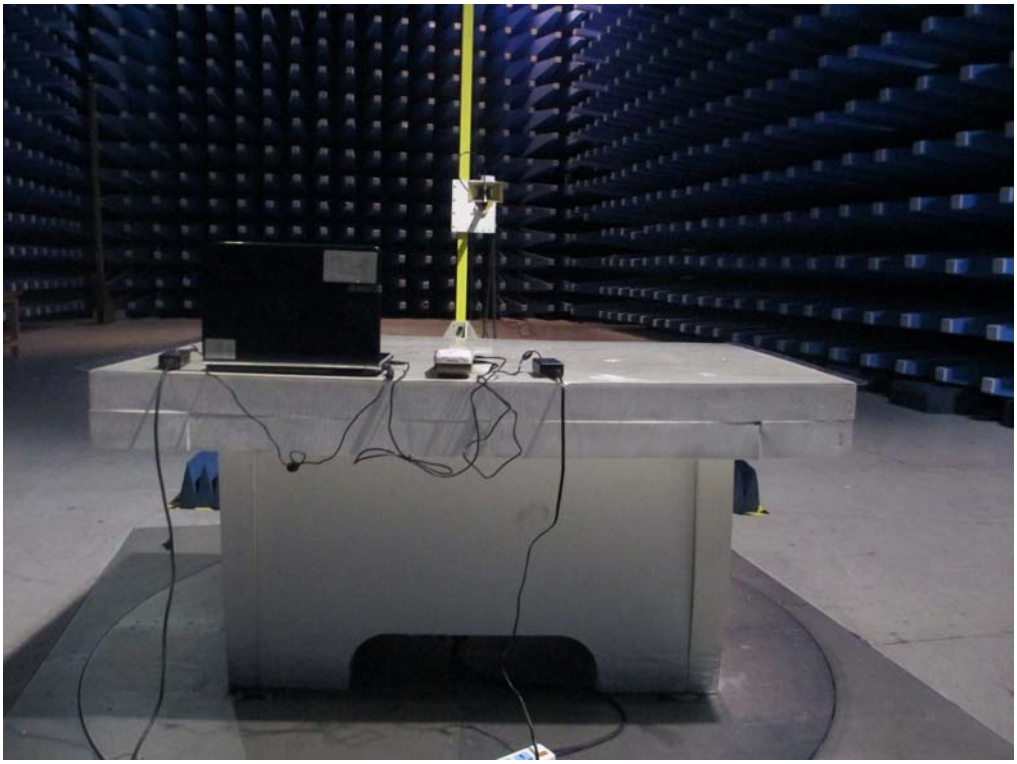
Annex B.iii. Photograph 3: Test Setup Photo

Conducted Emissions Test Setup Front View

Conducted Emissions Test Setup Side View



Radiated Emissions Setup Below 1GHz Rear View



Radiated Emissions Setup Above 1GHz Rear View

Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

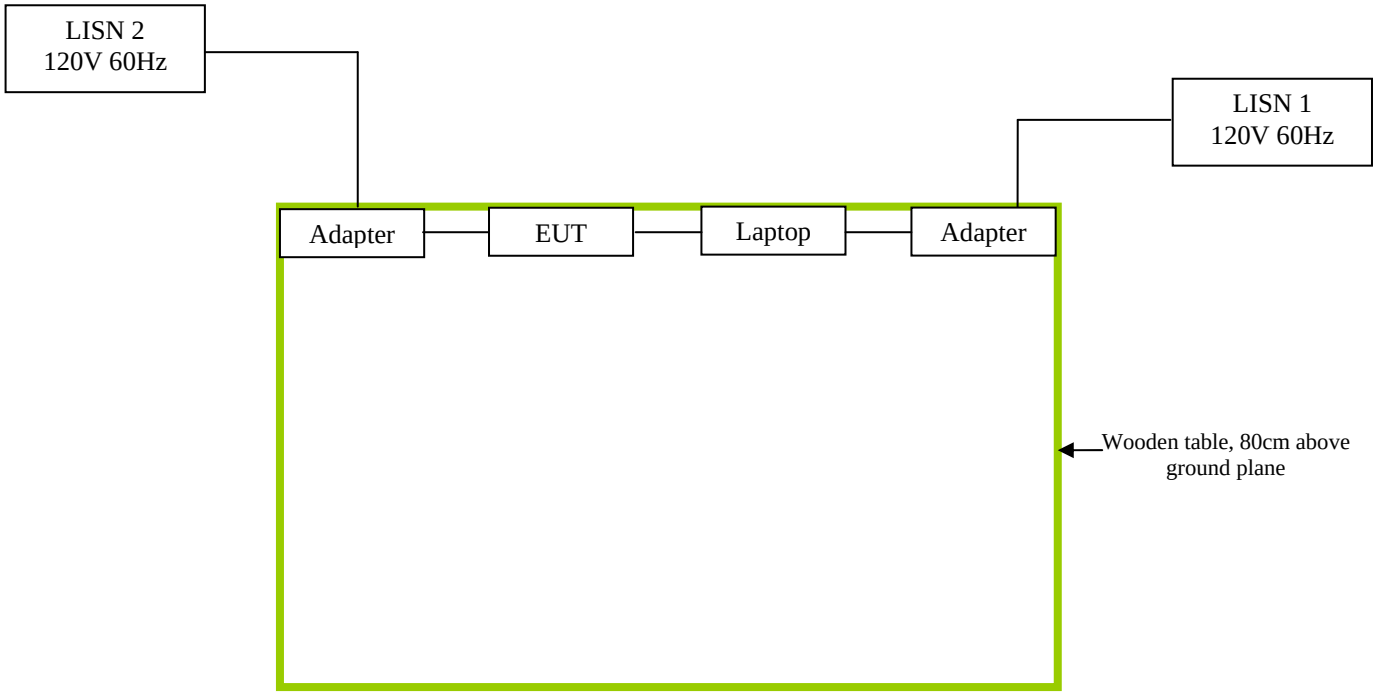
EUT TEST CONDITIONS

Annex C. i. SUPPORTING EQUIPMENT DESCRIPTION

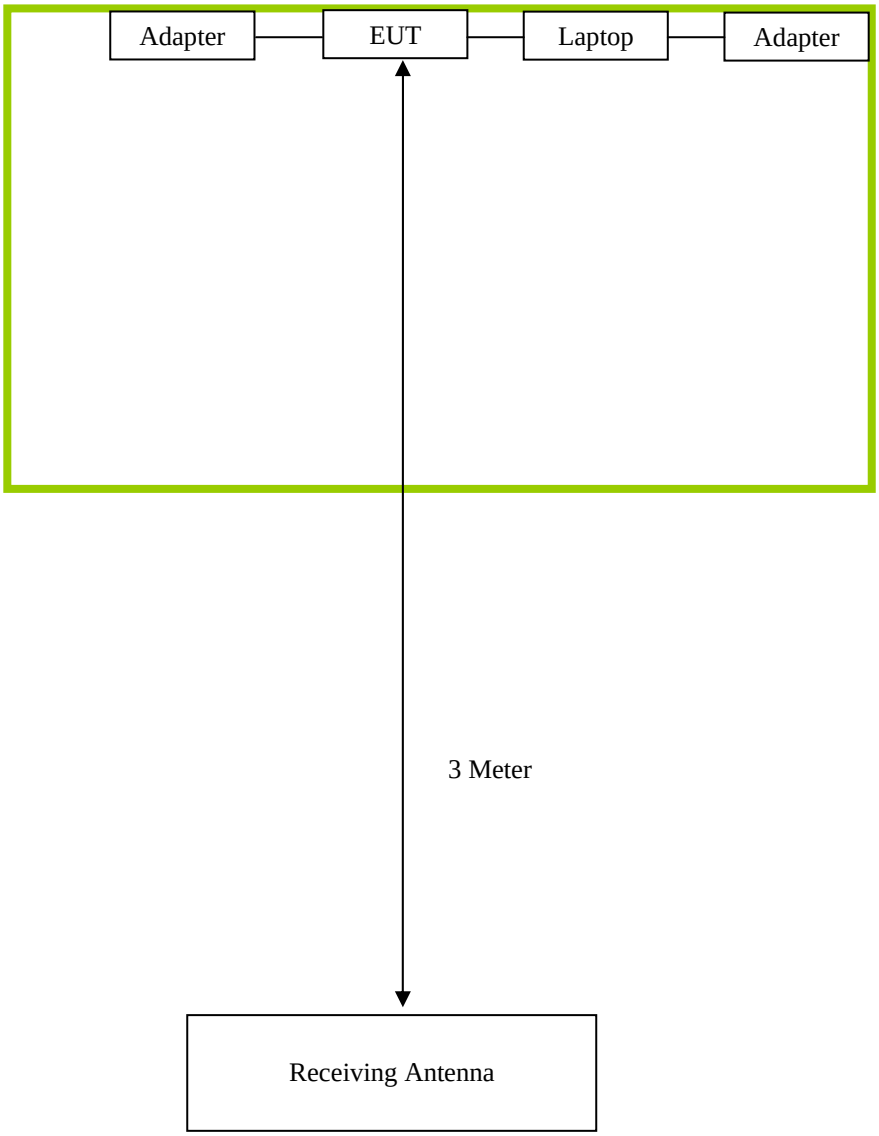
The following is a description of supporting equipment and details of cables used with the EUT.

Equipment Description (Including Brand Name)	Model & Serial Number	Cable Description (List Length, Type & Purpose)
Gateway Laptop	MS2288 & LXWHF02013951C3CA92200	N/A

Block Configuration Diagram for Conducted Emissions



Block Configuration Diagram for Radiated Emissions



Annex C.ii. EUT OPERATING CONDITIONS

The following is the description of how the EUT is exercised during testing.

Test	Description Of Operation
Emissions Testing	**Normal Working**

Annex D. USER MANUAL / BLOCK DIAGRAM / SCHEMATICS / PART LIST

Please see attachment

Annex E. DECLARATION OF SIMILARITY

N/A