Beijing InHand Networks Technology Co,. Ltd.

Industrial Cellular Router

Main Model: IR615PH01
Serial Model: Please See Page 5

March 20, 2013
Report No.: 13020108-4-FCC-R1
(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.

RF Test Report

To: FCC Part 22(H) & FCC Part 24(E): 2012

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Country/Region	Accreditation Body	Scope
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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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1. EXECUTIVE SUMMARY & EUT INFORMATION

The purpose of this test programmed was to demonstrate compliance of the Beijing InHand Networks Technology Co,. Ltd. Industrial Cellular Router and model: IR615PH01 against the current Stipulated Standards.The Industrial Cellular Router has demonstrated compliance with the FCC Part 22(H) & FCC Part 24(E): 2012.

EUT Information

EUT Description	:	**Industrial Cellular Router**
Main Model	:	**IR615PH01**
Serial Model	:	**IR605PH01, IR695PH01, IG605PH01, IG615PH01, IG695PH01**
Antenna Gain	:	**GSM850: 0.8 dBi** **PCS1900: 0.8 dBi**
Input Power	:	**Adapter** **Model：AW018WR-1200 100CV** **Input：100-240V 50/60Hz 0.5A** **Output: 12V 1A** **EUT Power supply: 9-26V DC Power Terminal**
Classification Per Stipulated Test Standard	:	**FCC Part 22(H) & FCC Part 24(E): 2012**

2. TECHNICAL DETAILS

Purpose	**Compliance testing of Industrial Cellular Router with stipulated standard**
Applicant / Client	**Beijing InHand Networks Technology Co,. Ltd. West Wing, 11th Floor, Building G, Wang Jing Science Park, Chaoyang District, Beijing, 100102 China**
Manufacturer	**Beijing InHand Networks Technology Co,. Ltd. West Wing, 11th Floor, Building G, Wang Jing Science Park, Chaoyang District, Beijing, 100102 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:info@siemic.com**
Test report reference number	**13020108-4-FCC-R1**
Date EUT received	**March 06, 2013**
Standard applied	**FCC Part 22(H) & FCC Part 24(E): 2012**
Dates of test	**March 18, 2013**
No of Units	**#1**
Equipment Category	**Spread Spectrum System/Device**
Trade Name	**N/A**
RF Operating Frequency (ies)	**GSM850 TX : 824.2 ~ 848.8 MHz; RX : 869.2 ~ 893.8 MHz PCS1900 TX : 1850.2 ~ 1909.8 MHz; RX : 1930.2 ~ 1989.8 MHz**
Number of Channels	**299CH (PCS1900) and 124CH (GSM850)**
Modulation	**GSM / GPRS: GMSK**
FCC ID	**ZAZIR6X5P**

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:

Spread Spectrum System/Device

Test Results Summary

Test Standard	Description	Product Class	Pass / Fail
§ 2.1053 § 22.917 (a); § 24.238 (a)	Field Strength of Spurious Radiation	See Above	Pass

Note: Only tested spurious emission in this report, for other module RF test data (Module FCC ID: QISEM820W), please refer to report: SYBHZ(R)E045112010EB-2;SYBHZ(R)E045112010-3

5. MEASUREMENTS, EXAMINATION AND DERIVED RESULTS

5.1 §2.1053, §22.917 & §24.238 - Spurious Radiated Emissions

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 1GHz – 40GH is ±6.0dB (for EUTs < 0.5m X 0.5m X 0.5m).
4. Environmental Conditions

Temperature	24°C
Relative Humidity	50%
Atmospheric Pressure	1018mbar

5. Test date : March 18, 2013
   Tested By : Deon Dai

Standard Requirement:

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least 43 + 10 log (P) dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

Procedures:

Equipment was setup in a semi-anechoic chamber. For measurements above 1 GHz an average measurement was taken with a 10Hz video bandwidth. The EUT was tested at low, mid and high with the highest output power. An emission was scan up to 10th harmonic of the operating frequency.

Sample Calculation:

EUT Field Strength = Raw Amplitude (dBμV/m) – Amplifier Gain (dB) + Antenna Factor (dB) + Cable Loss (dB) + Filter Attenuation (dB, if used)

Test Result: Pass

For IR615PH01

Cellular Band (Part 22H)

Low channel

Frequency (MHz)	Substituted level (dBm)	Direction (degree)	Height (cm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Amplifier (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
42.23	-53.23	201	100	V	-12.2	0.5	0	-65.93	-13	-52.93
746.71	-55.69	254	199	H	6.4	1.5	0	-50.79	-13	-37.79
1648.4	-41.28	288	120	V	6.3	2.2	0	-37.18	-13	-24.18
1648.4	-44.82	226	111	H	6.3	2.2	0	-40.72	-13	-27.72

Middle channel

Frequency (MHz)	Substituted level (dBm)	Direction (degree)	Height (cm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Amplifier (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
31.25	-55.29	215	102	V	-17.1	0.5	0	-72.89	-13	-59.89
746.71	-57.14	360	200	H	6.4	1.5	0	-52.24	-13	-39.24
1673.2	-44.99	180	120	V	6.3	2.2	0	-40.89	-13	-27.89
1673.2	-47.79	143	200	H	6.3	2.2	0	-43.69	-13	-30.69

High channel

Frequency (MHz)	Substituted level (dBm)	Direction (degree)	Height (cm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Amplifier (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
60.25	-56.39	122	100	V	-1.7	0.5	0	-58.59	-13	-45.59
746.71	-57.66	155	190	H	6.4	1.5	0	-52.76	-13	-39.76
1697.6	-48.25	244	101	V	6.3	2.2	0	-44.15	-13	-31.15
1697.6	-51.25	263	213	H	6.3	2.2	0	-47.15	-13	-34.15

PCS Band (Part 24E)

Low channel

Frequency (MHz)	Substituted level (dBm)	Direction (degree)	Height (cm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Amplifier (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
31.25	-57.25	110	105	V	-17.1	0.5	0	-74.85	-13	-61.85
746.71	-61.27	199	201	H	6.4	1.5	0	-56.37	-13	-43.37
3700.4	-47.68	177	200	V	5.4	3.1	0	-45.38	-13	-32.38
3700.4	-49.33	236	212	H	5.4	3.1	0	-47.03	-13	-34.03

Middle channel

Frequency (MHz)	Substituted level (dBm)	Direction (degree)	Height (cm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Amplifier (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
32.33	-53.14	344	120	V	-17.1	0.5	0	-70.74	-13	-57.74
746.71	-55.12	166	210	H	6.4	1.5	0	-50.22	-13	-37.22
3760	-48.36	184	150	V	5.4	3.1	0	-46.06	-13	-33.06
3760	-50.98	223	200	H	5.4	3.1	0	-48.68	-13	-35.68

High channel

Frequency (MHz)	Substituted level (dBm)	Direction (degree)	Height (cm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Amplifier (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
59.14	-56.98	143	102	V	-1.7	0.67	0	-59.35	-13	-46.35
746.71	-58.93	210	220	H	6.4	1.5	0	-54.03	-13	-41.03
3819.6	-43.32	354	100	V	5.4	3.1	0	-41.02	-13	-28.02
3819.6	-45.87	198	180	H	5.4	3.1	0	-43.57	-13	-30.57

Annex A. TEST INSTRUMENT & METHOD

Annex A.i. TEST INSTRUMENTATION & GENERAL PROCEDURES

Instrument	Model	Serial #	Calibration Date	Calibration Due Date
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	12/28/2012	12/27/2013
ETS-Lindgren Antenna(1 ~18GHz)	3115	N/A	10/29/2012	10/28/2013
A- INFOMW Antenna (1 ~18GHz)	JXTXLB-10180	J2031081120092	06/25/2012	06/24/2013
Horn Antenna (18~40GHz)	AH-840	101013	04/22/2012	04/22/2013
Microwave Pre-Amp (18~40GHz)	PA-840	181250	05/30/2012	05/29/2013
Hp Agilent Pre-Amplifier	8447F	1937A01160	11/03/2012	11/02/2013
MITEQ Pre-Amplifier (0.1 ~ 18GHz)	AMF-7D-00101800-30-10P	1451709	11/03/2012	11/02/2013
Universal Radio Communication Tester	CMU200	104031	10/27/2012	10/26/2013
Chamber	3m	N/A	04/13/2012	04/12/2013

Annex A. ii. RADIATED EMISSIONS TEST DESCRIPTION

EUT Characterisation

EUT characterisation, over the frequency range from 30MHz to 1GHz (for FCC tests, until the 10th harmonic for operating frequencies ≥ 108MHz),, was done in order to minimise radiated emissions testing time while still maintaining high confidence in the test results.

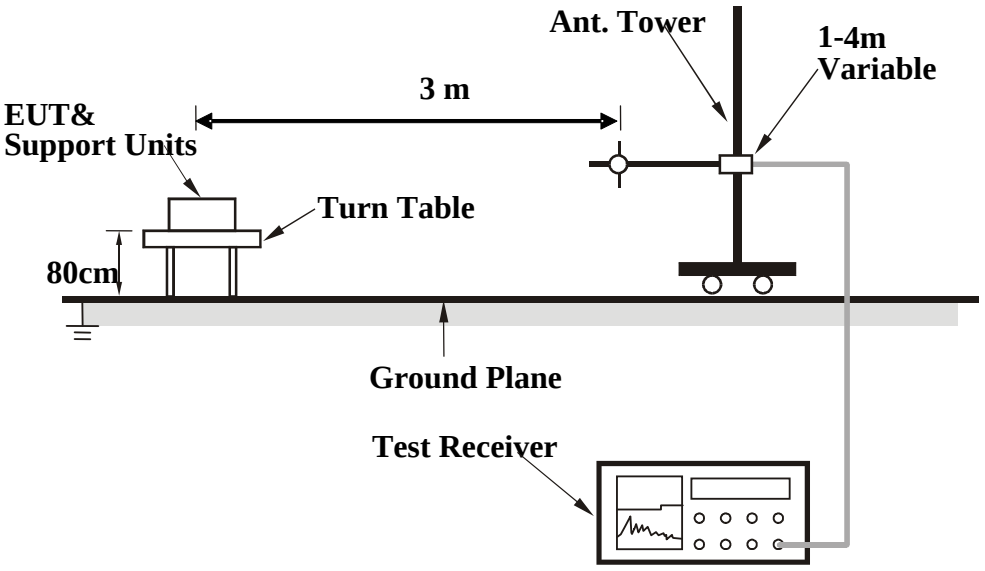
The EUT was placed in the chamber, at a height of about 0.8m on a turntable. Its radiated emissions frequency profile was observed, using a spectrum analyzer /receiver with the appropriate broadband antenna placed 3m or 10m away from the EUT. Radiated emissions from the EUT were maximised by rotating 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 EMC 3m 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 1.5m X 1.0m X 0.8m 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.



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 1 GHz, a pre-scan is performed in a shielded chamber to determine the accurate frequencies of higher emissions will be checked on a open test site or EMC 10m chamber. As the same purpose, for emission frequencies measured above 1 GHz, a pre-scan also be performed with a 1 meter measuring distance before final test.
3. For emission frequencies measured below and above 1 GHz, set the spectrum analyzer on a 100 kHz and 1 MHz 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 were 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	100 kHz	100 kHz
Above 1000	Peak	1 MHz	1 MHz
	Average	1 MHz	10 Hz

Description of Radiated Emission Program

This EMC Measurement software run LabView automation software and offers a common user interface for electromagnetic interference (EMI) measurements. This software is a modern and powerful tool for controlling and monitoring EMI test receivers and EMC test systems. It guarantees reliable collection, evaluation, and documentation of measurement results. Basically, this program will run a pre-scan measurement before it proceeds with the final measurement. The pre-scan routine will run the scan on four different antenna heights, 2 antenna polarity, and 360 degrees table rotation. For example, the program was set to run 30 MHz to 1 GHz scan; the program will first start from a meter antenna height and divide the 30 MHz to 1 GHz into 10 separate parts of maximum hold sweeps. Each parts of maximum hold sweep, the program will collect the data from 0 degree to 360 degrees table rotation. After the program complete the 1m scan, the antenna continues to rise to 2m and continue the scan. The step will repeated for all specified antenna height and polarity. This program will perform the Quasi Peak measurement after the signal maximization process and pre-scan routine. The final measurement will be base on the pre-scan data reduction result.

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.

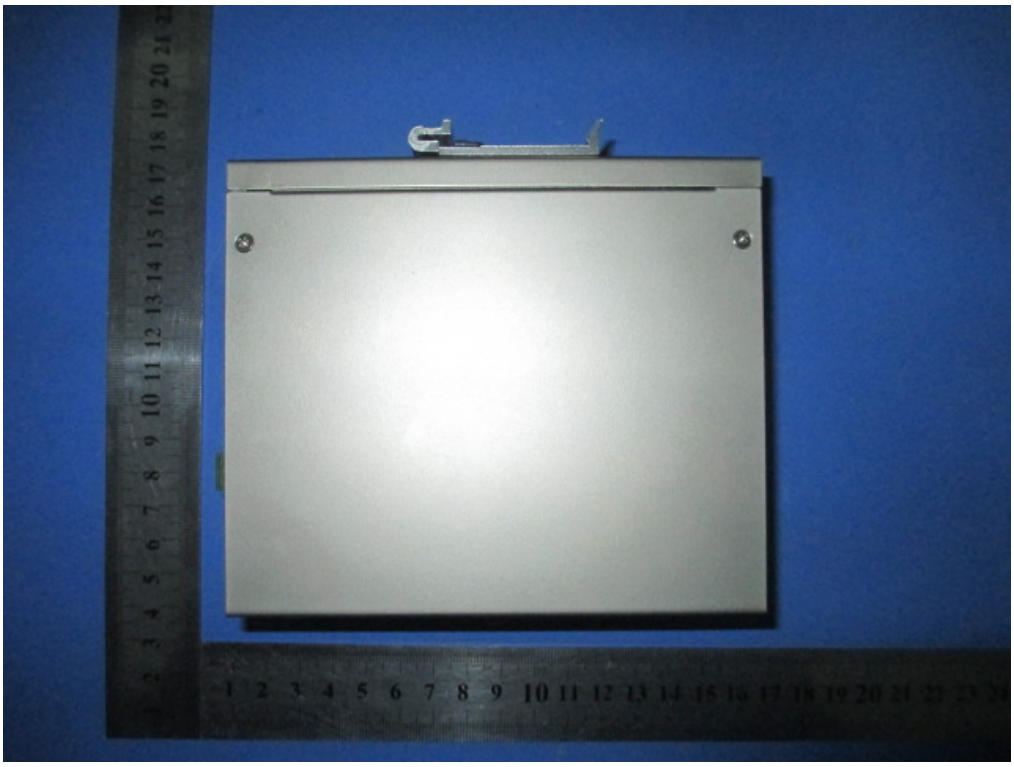
Note:

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 1 GHz. And the measuring instrument is set to quasi peak detector function.

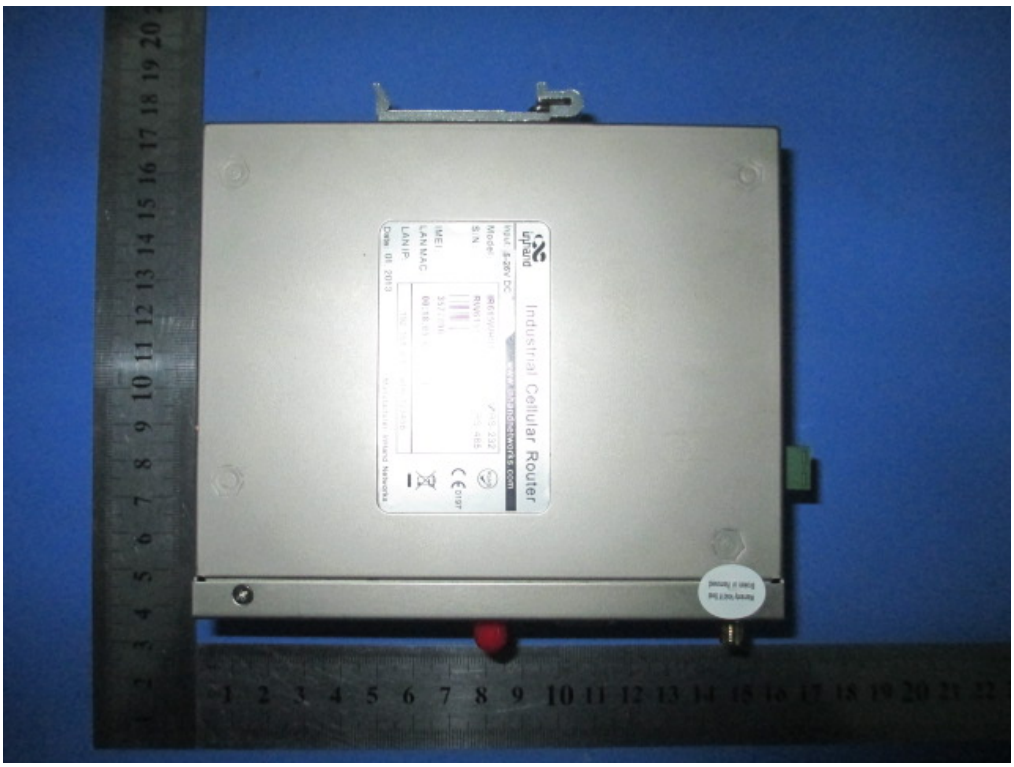
Annex B. EUT AND TEST SETUP PHOTOGRAPHS

Annex B.i. Photograph 1: EUT External Photo

Whole Package View



Top View of EUT



Bottom View of EUT

Front View of EUT

Rear View of EUT

Left View of EUT

Right View of EUT

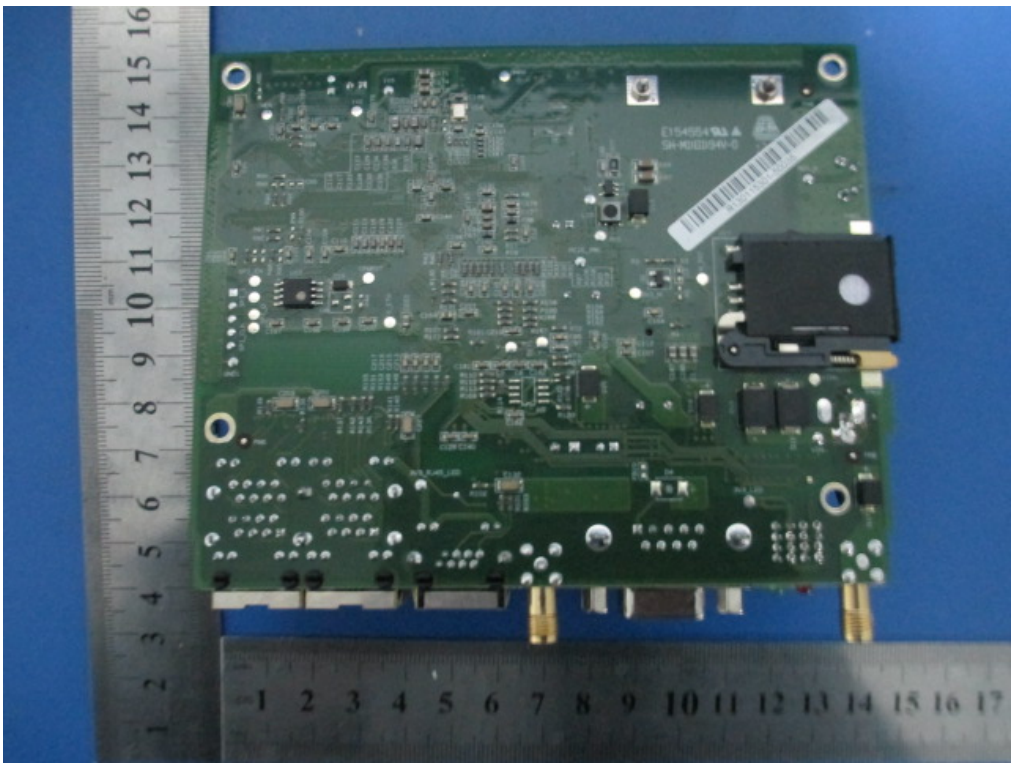
Annex B.ii. Photograph 2: EUT Internal Photo

Cover Off - Front View

Antenna View

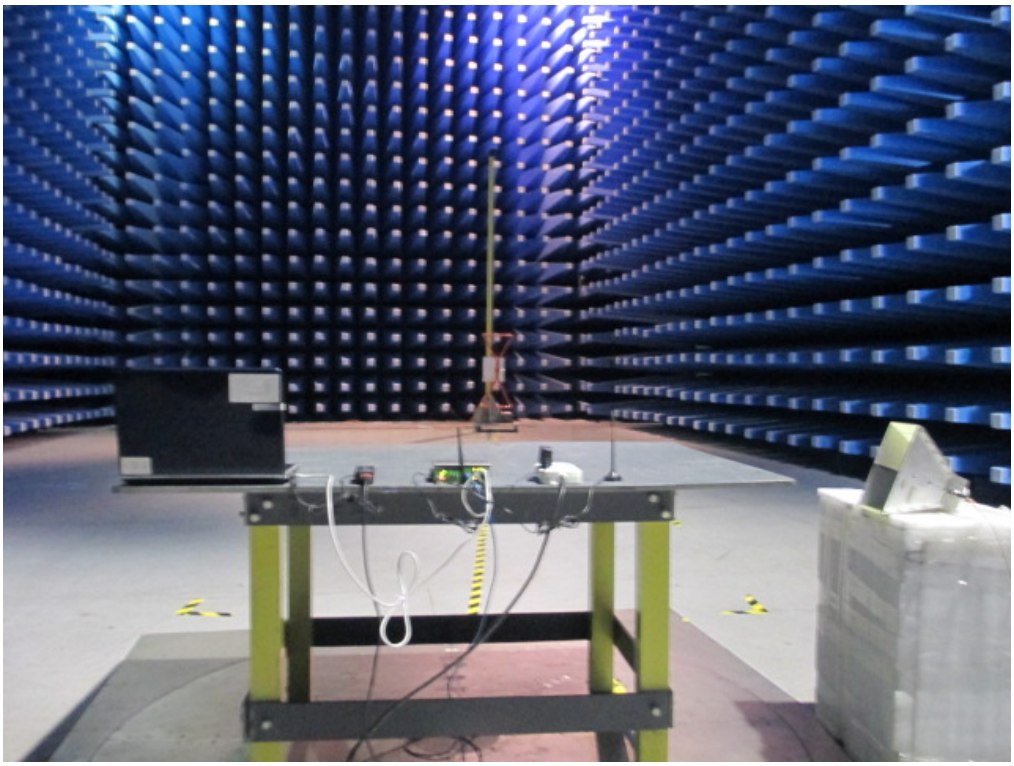
3GModule View for IR615PH01

Main Board Front View

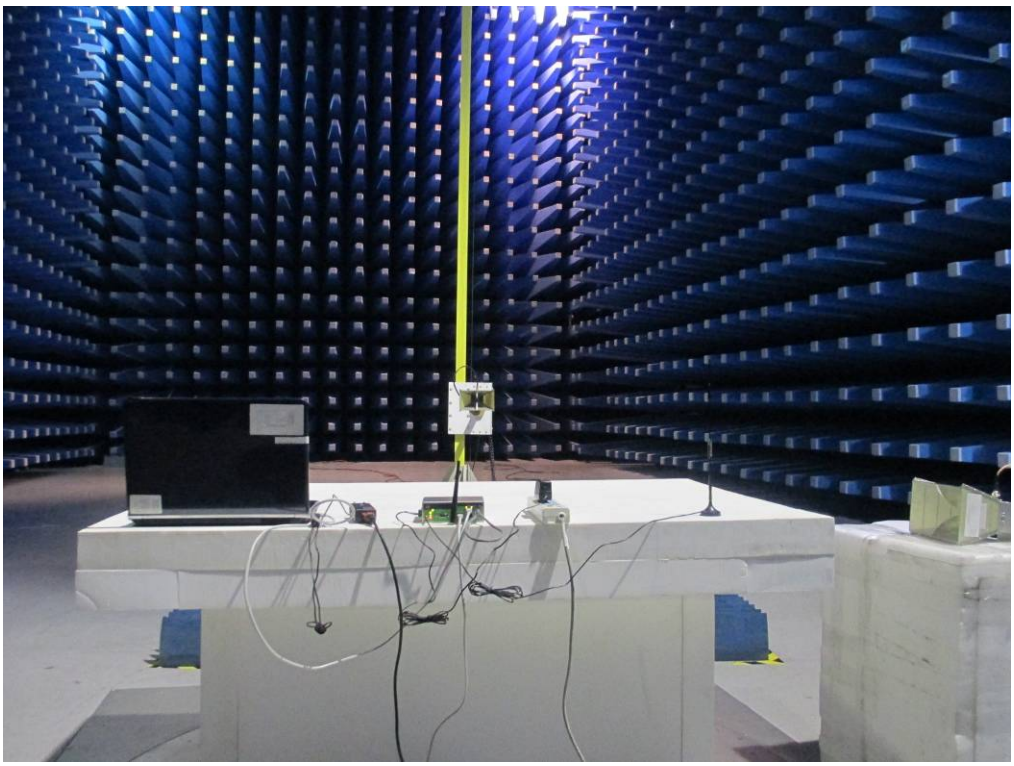


Main Board Rear View

Annex B.iii. Photograph 3: Test Setup Photo



Radiated Emissions Test Setup Below 1GHz - Front View



Radiated Emissions Test Setup Above 1GHz - Front View

Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

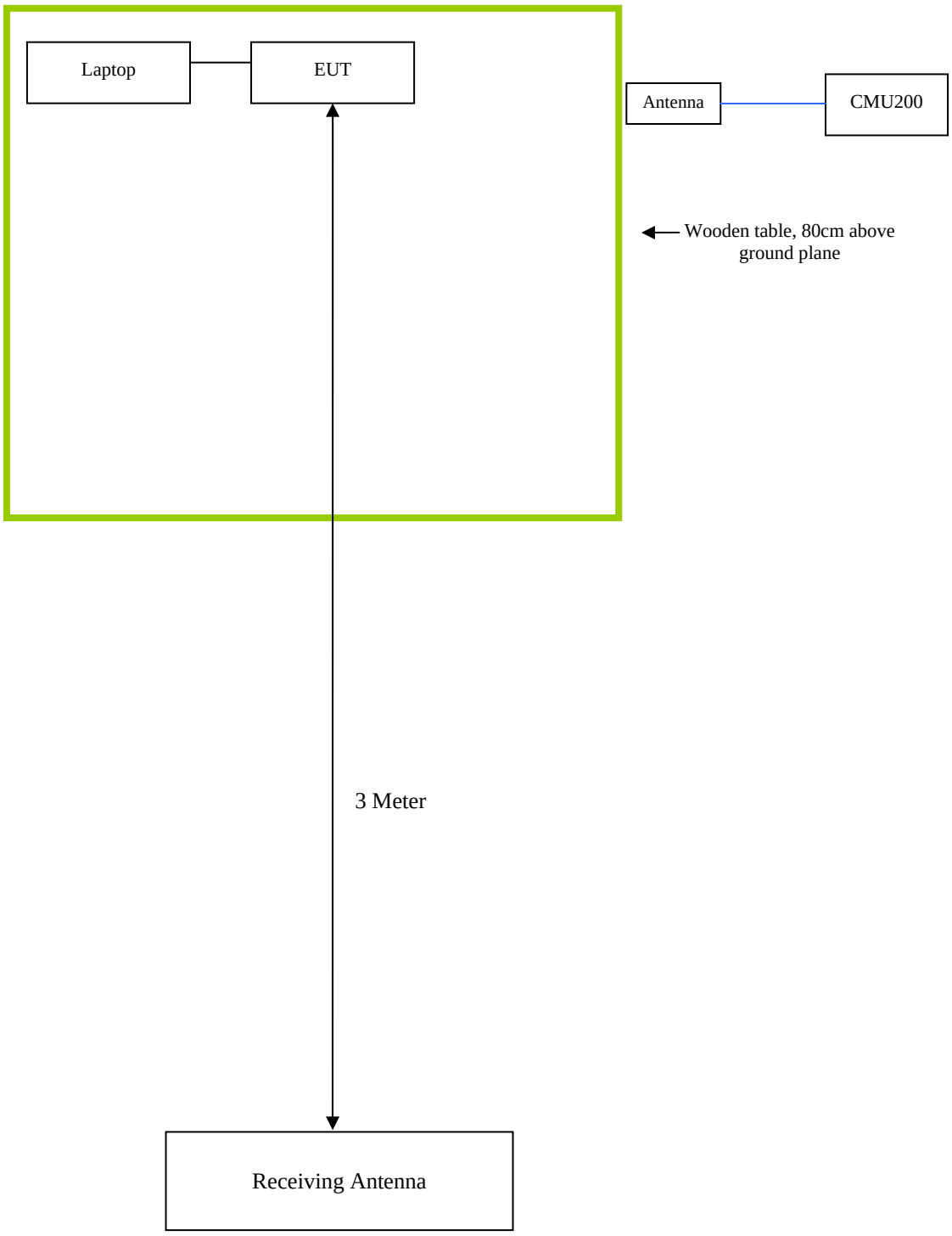
EUT TEST CONDITIONS

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
Universal Radio Communication Tester	CMU200	N/A

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	The EUT was communicating with base station and set to work at maximum output power.

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

Please see attachment

Annex E. DECLARATION OF SIMILARITY

Declaration letter

Beijing InHand Networks Technology Co., Ltd

To: SIEMIC Nanjing (China) Laboratories
No.2-1 Longcang Dadao
Yuhua Economic Development Zone
Nanjing P.R.China

Dear Sir,

For our business issue and marketing requirement, we would like to list different models numbers on the CE/FCC certificates and reports, as following:

Model No.: IR615PH01
IR605PH01
IR695PH01
IG605PH01
IG615PH01
IG695PH01

The six models are the same in these: appearance, PCB layout, and basic software function;The differences are as follows:

Ia6b5PH01	
【a】	【b】
R:router G:gateway	0: basic SW function 1: support VPN (IPsec/PPTP/L2TP) 9: support VPN\CA certificate\SSL

【a】, 【b】 is software different only;

Thank you!

Signature: 王标
Printed name/title:Wangbiao/ EMC engineer
Address: WestWing 11th Floor, Buiding G, Wangjing Science Park, Chaoyang District, Beijing