

TEST REPORT

of

FCC Part 15 Subpart B & INDSTRY CANADA ICES-003

New Application; Class I PC; Class II PC

Product : **BT 4.0 Low Energy Single Mode Module**

Brand: **BlueRadios**

Model: **BR-SS-S2A**

Model Difference: **N/A**

FCC Rule Part: **Part 15 B, DoC**

IC Rule Part: **ICES-003: Issue 4, 2004**

Applicant: **BlueRadios, Inc.**

Address: **7173 S. Hanava Street, Suite 600, Englewood,
CO/USA**

Test Performed by:

International Standards Laboratory

<Lung-Tan LAB>

*Site Registration No.

BSMI: SL2-IN-E-0013; MRA TW1036; TAF: 0997; IC: IC4067B-3;

*Address:

No. 120, Lane 180, San Ho Tsuen, Hsin Ho Rd.

Lung-Tan Hsiang, Tao Yuan County 325, Taiwan

*Tel : 886-3-407-1718; Fax: 886-3-407-1738

Report No.: **ISL-13LR037FB**

Issue Date : **2013/04/18**



Test results given in this report apply only to the specific sample(s) tested and are traceable to national or international standard through calibration of the equipment and evaluating measurement uncertainty herein.

This report MUST not be used to claim product endorsement by TAF, NVLAP or any agency of the Government.

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DOC OF COMPLIANCE

Applicant: BlueRadios, Inc.
Product Description: BT 4.0 Low Energy Single Mode Module
Brand Name: BlueRadios
Model No.: BR-SS-S2A
Model Difference: N/A
FCC Rule Part: Part 15 B, DoC
IC Rule Part: ICES-003: Issue 4, 2004
Date of test: 2013/03/04 ~ 2013/04/10
Date of EUT Received: 2013/03/04

We hereby certify that:

All the tests in this report have been performed and recorded in accordance with the standards described above and performed by an independent electromagnetic compatibility consultant, International Standards Laboratory.

The test results contained in this report accurately represent the measurements of the characteristics and the energy generated by sample equipment under test at the time of the test. The sample equipment tested as described in this report is in compliance with the limits of above standards.

Test By:



Date:

2013/04/18

Jason Chao / Engineer

Prepared By:



Date:

2013/04/18

Eva Kao / Technical Supervisor

Approved By:



Date:

2013/04/18

Vincent Su / Technical Manager

Version

Version No.	Date	Description
00	2013/04/18	Initial creation of document

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1. GENERAL INFORMATION

1.1. Product Description

General:

Product Name	BT 4.0 Low Energy Single Mode Module
Brand Name	BlueRadios
Model Name	BR-SS-S2A
Model Difference	N/A
Power Supply	5Vdc from USB of host

Bluetooth:

Frequency Range:	2402 – 2480MHz
Bluetooth Version:	V4.0
Channel number:	40 channels, 2MHz step
Modulation type:	GFSK
Transmit Power:	3.24 dBm Peak
Dwell Time:	N/A
Antenna Designation:	Chip Antenna, 0.9dBi
Type of Emission:	2M40FXD

Remark: The above DUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.2. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for Part15 Subpart B, is authorized under DoC procedure and Industry Canada ICES-003: Issue 4, 2004 procedure.

1.3. Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4: 2003) and RSS-Gen. Radiated testing was performed at an antenna to EUT distance 3 meters.

1.4. Test Facility

The measurement facilities used to collect the 3m Radiated Emission and AC power line conducted data are located on the address of **International Standards Laboratory** <Lung-Tan LAB> No. 120, Lane 180, San Ho Tsuen, Hsin Ho Rd., Lung-Tan Hsiang, Tao Yuan County 325, Taiwan which are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2003. FCC Registration Number is: TW1036, Canada Registration Number: 4067B-3.

1.5. Special Accessories

Not available for this EUT intended for grant.

1.6. Equipment Modifications

Not available for this EUT intended for grant.

2. System Test Configuration

2.1. EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2. EUT Exercise

The EUT was operated in the normal mode.

2.3. Test Procedure

2.3.1 Conducted Emissions

The EUT is placed on a turn table which is 0.8 m above ground plane. According to the requirements in Section 7 of ANSI C63.4: 2003. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and average detector mode.

2.3.2 Radiated Emissions

The EUT is placed on a turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” is still within the 3dB illumination BW of the measurement antenna. according to the requirements in Section 8 of ANSI C63.4: 2003.

2.4. Limitation

(1) Conducted Emission

According to section 15.107(a), ICES-003, RSS-GEN, Section 7.2.2. Conducted Emission Limits is as following.

Frequency range MHz	Class B Limits	
	dB (uV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Note

- 1.The lower limit shall apply at the transition frequencies
- 2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

(2) Radiated Emission

According to section 15.109(a), ICES-003, RSS-GEN, Section 7.2.3. Radiated Emission Class B Limits is as following:

Frequency (MHz)	Field strength μV/m	Distance (m)	Field strength at 3m dB _{μV/m}
30-88	100	3	40
88-216	150	3	43.5
216-960	200	3	46
Above 960	500	3	54

Standard	Date	Description
EN55022	2006	Limits and methods of measurement of radio interference characteristics of information technology equipment.

EN55022 Limit:

Frequency range MHz	Limits dBuV/m (10m)	
	Quasi-peak	
30 to 230		30
230 to 1000		37

Remark: 1. Emission level in dBuV/m=20 log (uV/m)
2. Measurement was performed at an antenna to the closed point of EUT distance of 3 meters.

2.5. Configuration of Tested System

Fig. 1-2 Configuration 1

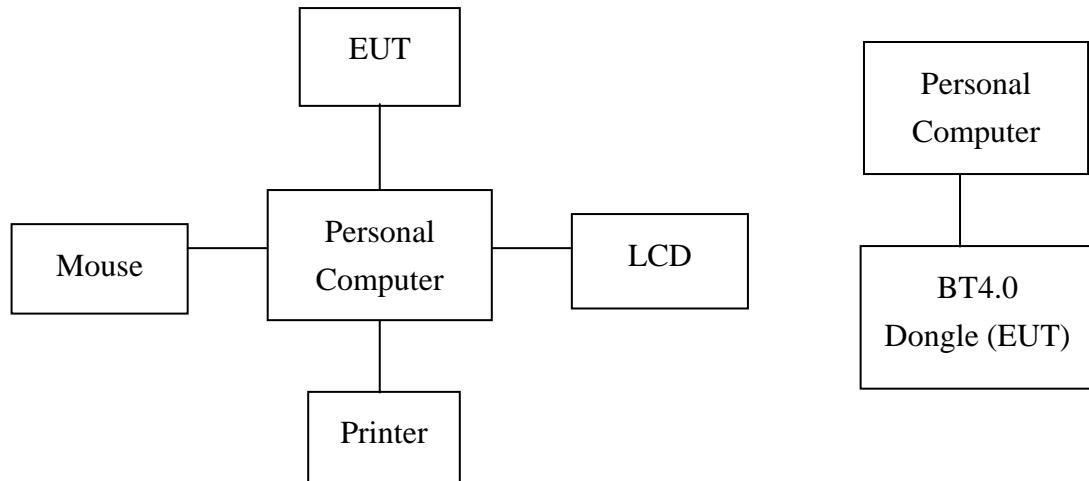


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mrf/Brand	Model name	Series No	Data Cable	Power Cable
1	Personal Computer	DELL	P18S	6VWSKT1	N/A	Non-shield /1.8M
2	Personal Computer	Lenovo	TP00018A	R9-KD8WD	N/A	Non-shield /1.8M
3	Mouse	DELL	MOC5UO	10O00KY1	Non-shield / 1.8M	N/A
4	LCD	Dell	2408FPW	N/A	Non-shield / 1.8M	Non-shield / 1.8M
5	Printer	LEXMARK	Z43	4101002	shield / 1.8M	Non-shield / 1.8M

I/O Cable Condition of EUT and Support Units

Description	Path	Cable Length	Cable Type	Connector Type
AC Power Cable	110V (~240V) to Personal Compute SPS	1.8M	Non-shielded	Plastic Head
Monitor Data Cable	24" LCD Monitor D-SUB Port to Personal Compute D-SUB Port	1.8M	Shielded (with core)	Metal Head
Mouse Data Cable	Mouse to Personal Compute USB Port	1.8M	Non-shielded	Metal Head
Printer Data Cable	Printer to Personal Computer USB Port	1.8M	Shielded	Metal Head

3. Summary of Test Results

Rules	Description Of Test	Result
§15.107/ICES-003	Conducted Emission Class B	Compliant
§15.109/ICES-003 /EN55022	Radiated Emission(Below 1GHz) Class B	Compliant
§15.109/ICES-003	Radiated Emission(above 1GHz) Class B	Compliant

4. Description of test modes

This is a modular application and the EUT was stayed in normal operation mode.

Test Plan

Config 1	
Applicable standard	Part 15 B / ICES-003: Issue 4
Accessories	UE + PC
Description	BT4.0 Link
radiated emission (30M-1GHz) (1-6GHz)	Measured
conducted emission (AC Power)	Measured

Config 1:

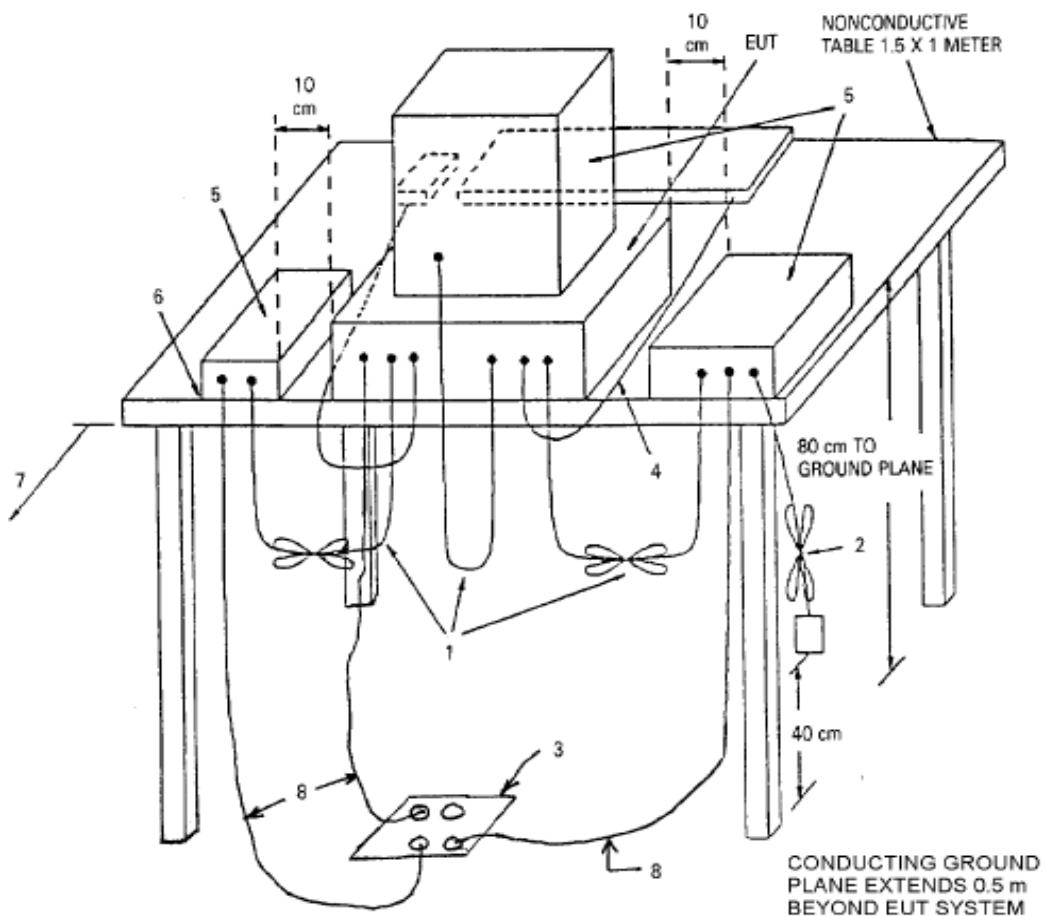
1. Send H pattern to the portable computer LCD monitor.
2. Send H pattern to the LCD monitor
3. Send signal from PC through Printer USB port.
4. Send signal from EUT through BT4.0 dongle.
5. Repeat the above steps.

5. Conducted Emissions Test

5.1. Measurement Procedure:

1. The EUT was placed on a table which is 0.8m above ground plane.
2. The EUT was connected to 110V/60Hz AC power supply through LISN.
3. The Peripherals were connected to another LISN.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. Repeat above procedures until all frequency measured were complete.

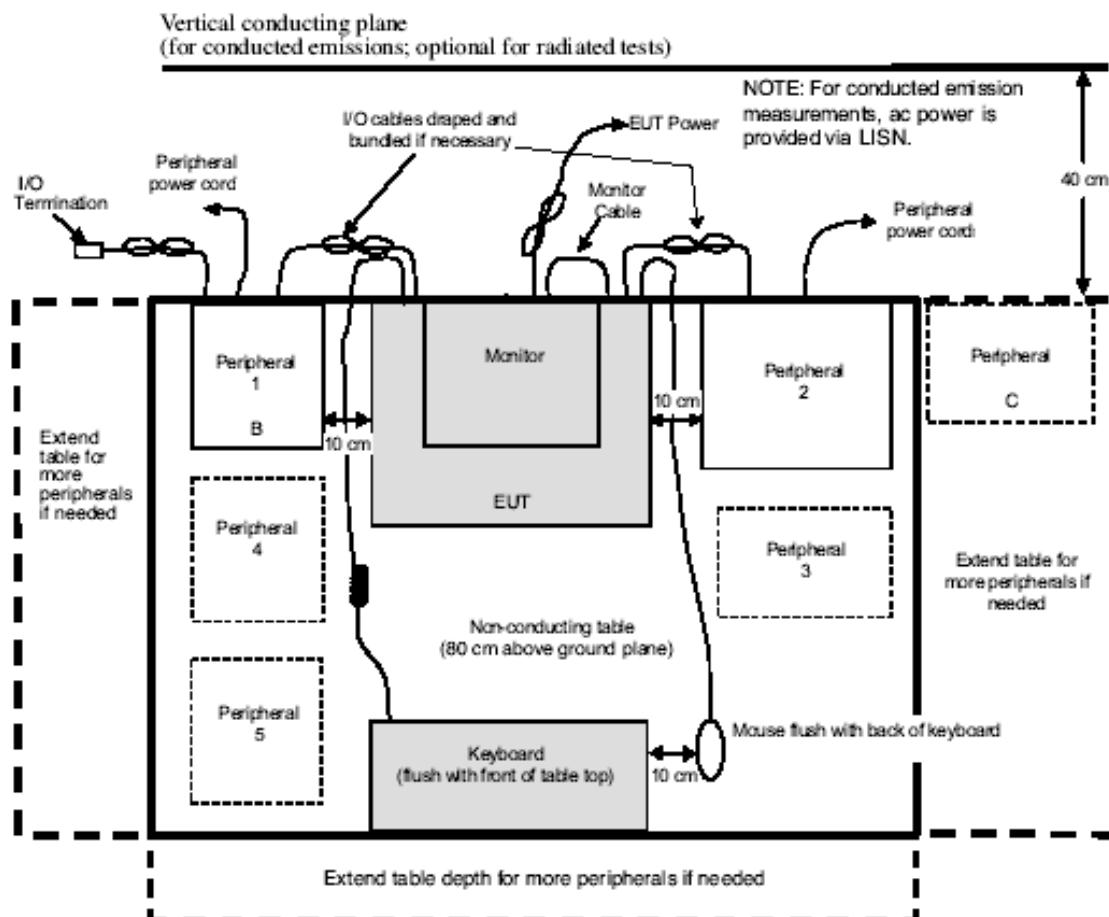
5.2. Test SET-UP (Block Diagram of Configuration)



LEGEND:

- 1) Interconnecting cables that hang closer than 40 cm to the groundplane shall be folded back and forth in the center, forming a bundle 30 to 40 cm long (see 6.1.4 and 11.2.4).
- 2) I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated if required using the correct terminating impedance. The total length shall not exceed 1 m (see 6.1.4).
- 3) If LISNs are kept in the test setup for radiated emissions, it is preferred that they be installed under the groundplane with the receptacle flush with the groundplane (see 6.1.4).
- 4) Cables of hand-operated devices, such as keyboards, mice, etc., shall be placed as for normal use (see 6.2.1.3 and 11.2.4).
- 5) Non-EUT components of EUT system being tested (see also Figure 13).
- 6) Rear of EUT, including peripherals, shall all be aligned and flush with rear of tabletop (see 6.2.1.1 and 6.2.1.2).
- 7) No vertical conducting plane used (see 5.2.2).

Figure 11a—Test arrangement for radiated emissions tabletop equipment



5.3. Measurement Equipment Used:

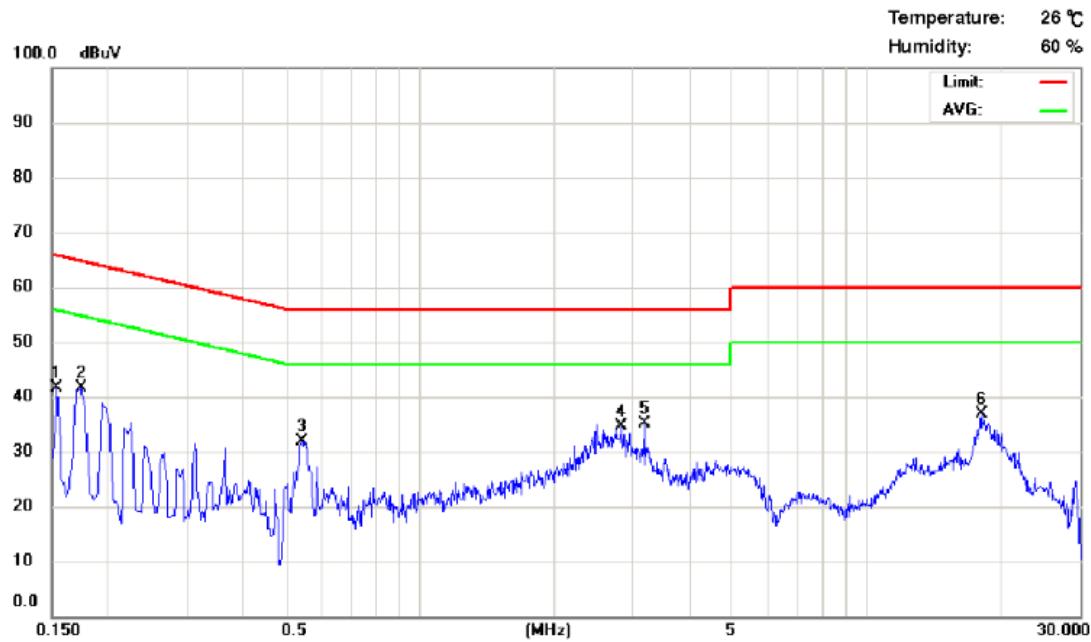
Location Con02	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Conduction 03	EMI Receiver 11	ROHDE & SCHWARZ	ESCI	100568	07/16/2012	07/16/2013
Conduction 03	ISNT2-02	FCC	FCC-TLISN-T 2-02	20413	07/22/2012	07/22/2013
Conduction 03	ISNT4-02	FCC	FCC-TLISN-T 4-02	20575	07/22/2012	07/22/2013
Conduction 03	ISNT8-04	FCC	FCC-TLISN-T 8-09	101192	09/29/2012	09/29/2013
Conduction 03	LISN 07	FCC Inc.	FCC-LISN-50-100-4-02	07040	07/23/2012	07/23/2013
Conduction 03	LISN 08	FCC	FCC-LISN50-25-2-01	07039	07/23/2012	07/23/2013
Conduction 03	Conduction 03 -1 Cable	WOKEN	CFD 300-NL	Conduction 03 -1	06/28/2012	06/28/2013

5.4. Measurement Result:

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Config 1	Test Date:	2013/04/09
Test By:	Jason	Pol.:	L



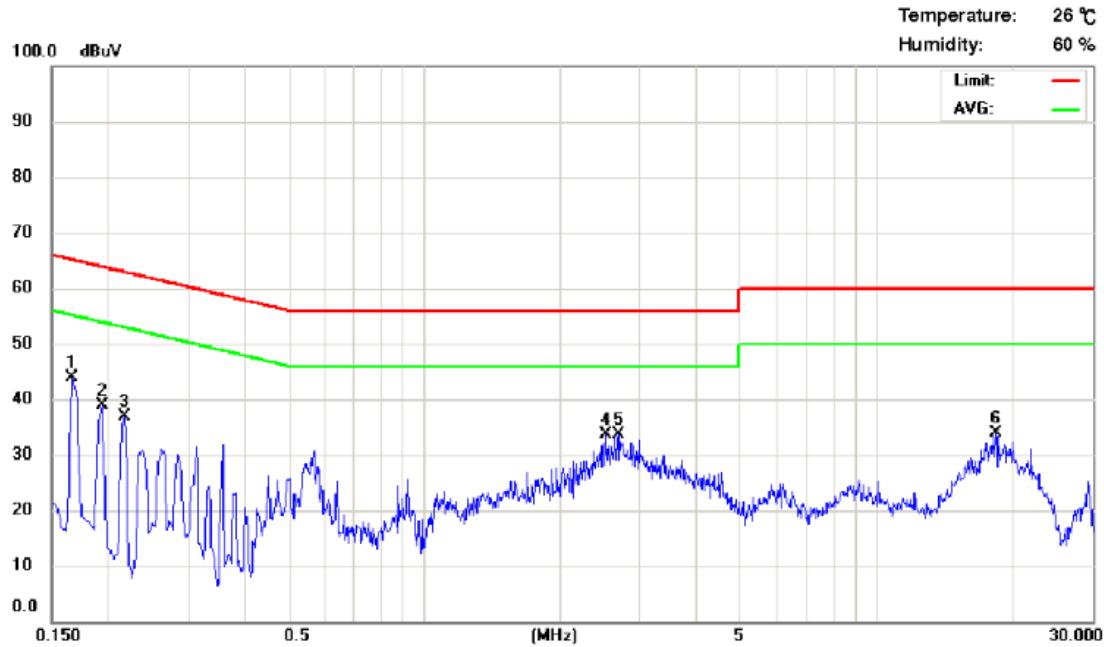
Site: Conduction 03

Phase: L1

Limit: CISPR22 Class B Conduction

No.	Frequency (MHz)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)	Note
1	0.15	0.15	43.00	65.78	-22.78	27.23	55.78	-28.55	
2	0.17	0.15	39.31	64.85	-25.54	24.57	54.85	-30.28	
3	0.55	0.14	29.56	56.00	-26.44	25.17	46.00	-20.83	
4	2.83	0.20	29.85	56.00	-26.15	24.22	46.00	-21.78	
5	3.18	0.21	26.26	56.00	-29.74	20.56	46.00	-25.44	
6	18.13	0.46	30.43	60.00	-29.57	25.32	50.00	-24.68	

Operation Mode:	Config 1	Test Date:	2013/04/09
Test By:	Jason	Pol.:	N



Site: Conduction 03

Phase: N

Limit: CISPR22 Class B Conduction

No.	Frequency (MHz)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	Avg Emission (dBuV)	Avg Limit (dBuV)	Avg Margin (dB)	Note
1	0.17	0.08	40.40	65.16	-24.76	23.34	55.16	-31.82	
2	0.19	0.07	36.32	63.86	-27.54	19.70	53.86	-34.16	
3	0.22	0.07	33.11	62.89	-29.78	16.10	52.89	-36.79	
4	2.53	0.11	29.38	56.00	-26.62	23.94	46.00	-22.06	
5	2.68	0.11	29.81	56.00	-26.19	24.24	46.00	-21.76	
6	18.33	0.33	27.93	60.00	-32.07	19.94	50.00	-30.06	

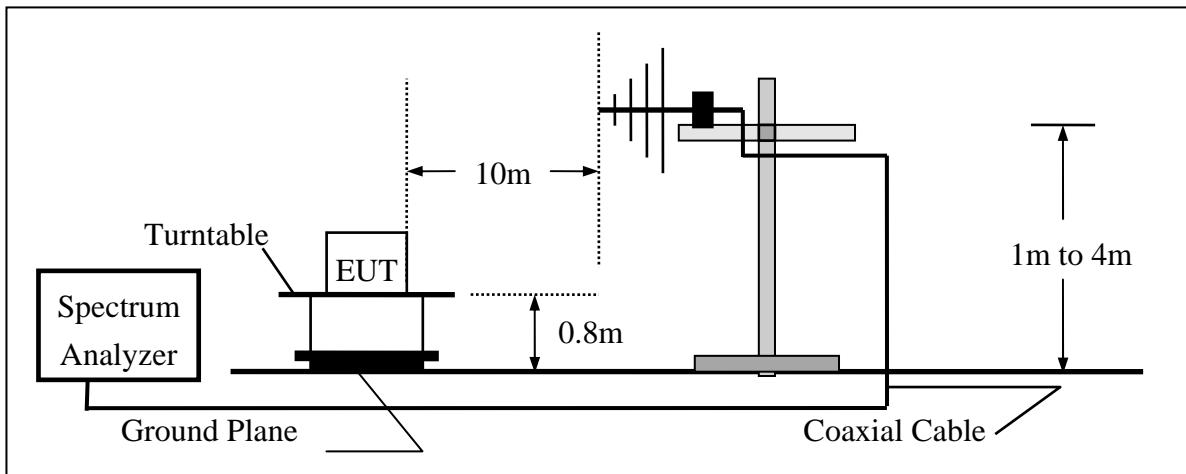
6. Radiated Emission Test

6.1. Measurement Procedure

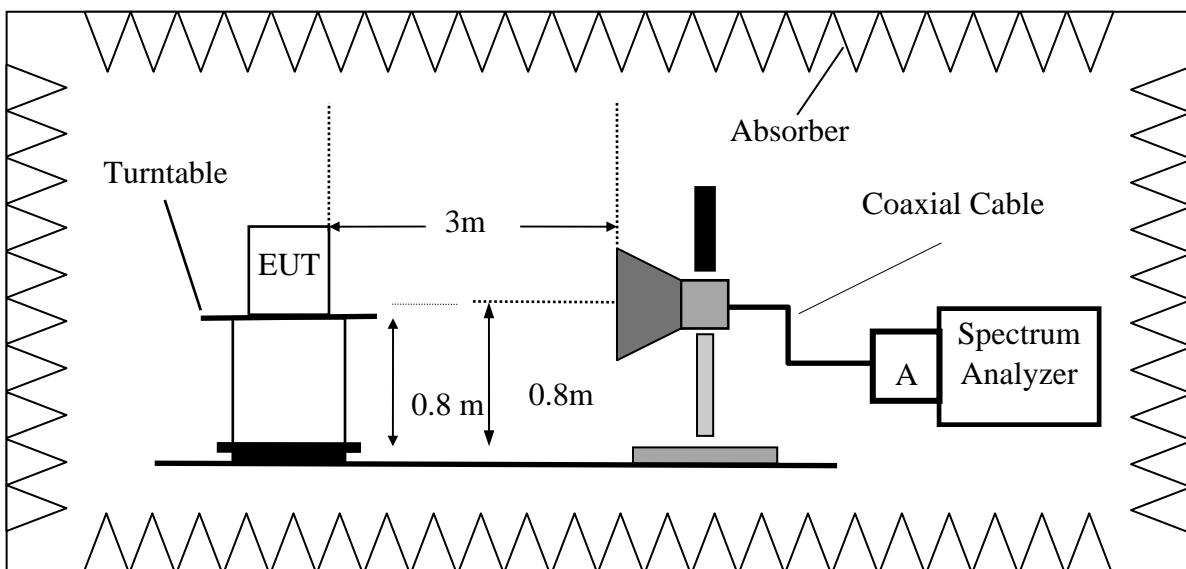
1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. The EUT/Peripherals was connected to 110V/60Hz AC power supply.
3. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
4. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
5. Repeat above procedures until all frequency measured were complete.

6.2. Test SET-UP (Block Diagram of Configuration)

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(B) Radiated Emission Test Set-UP Frequency Over 1 GHz



6.3. Measurement Equipment Used:

Location Chamber02	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Radiation (Chamber12)	BILOG Antenna 04	Schaffner	CBL6112B	2764	02/25/2013	02/25/2014
Radiation (Chamber12)	Coaxial Cable Chmb 12-10M-01	PEWC	CFD400-NL	Chmb 12-10M-01	06/28/2012	06/28/2013
Radiation (Chamber12)	Coaxial Cable Chmb 12-10M-02	PEWC	CFD400-NL	Chmb 12-10M-02	10/08/2012	10/08/2013
Radiation (Chamber12)	EMI Receiver 10	ROHDE & SCHWARZ	ESCI	100567	07/20/2012	07/20/2013

Location Chmb14	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Rad. Above 1GHz	Spectrum Analyzer 24 (1G~26.5GHz)	Agilent	N9010A	MY49060537	07/17/2012	07/17/2013
Rad. Above 1GHz	Spectrum Analyzer 22	R&S	FSU43	100143	04/26/2012	04/26/2013
Rad. Above 1GHz	Horn Antenna 06 (1G~18G)	ETS	3117	00066665	10/15/2012	10/15/2013
Rad. Above 1GHz	Horn Antenna 04 (18G~26G)	Com-Power	AH-826	081-001	05/04/2011	05/04/2013
Rad. Above 1GHz	Horn Antenna 05 (26G~40G)	Com-Power	AH-640	100A	01/09/2013	01/09/2015
Rad. Above 1GHz	Microwave Cable 20 (1G~18G)	HUBER SUHNER	Sucoflex 106	67618/6 and 67619/6	02/06/2013	02/06/2014
Rad. Above 1GHz	Preamplifier 13	MITEQ	JS44-0010180 0-25-10P-44	1329256	07/23/2012	07/23/2013
Rad. Above 1GHz	Microwave Cable-01_2010	HUBER SUHNER	Sucoflex 102	35145/2	09/07/2012	09/07/2013
Rad. Above 1GHz	Microwave Cable-08	HUBER SUHNER	Sucoflex 102	35633/2	09/07/2012	09/07/2013

6.4. Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

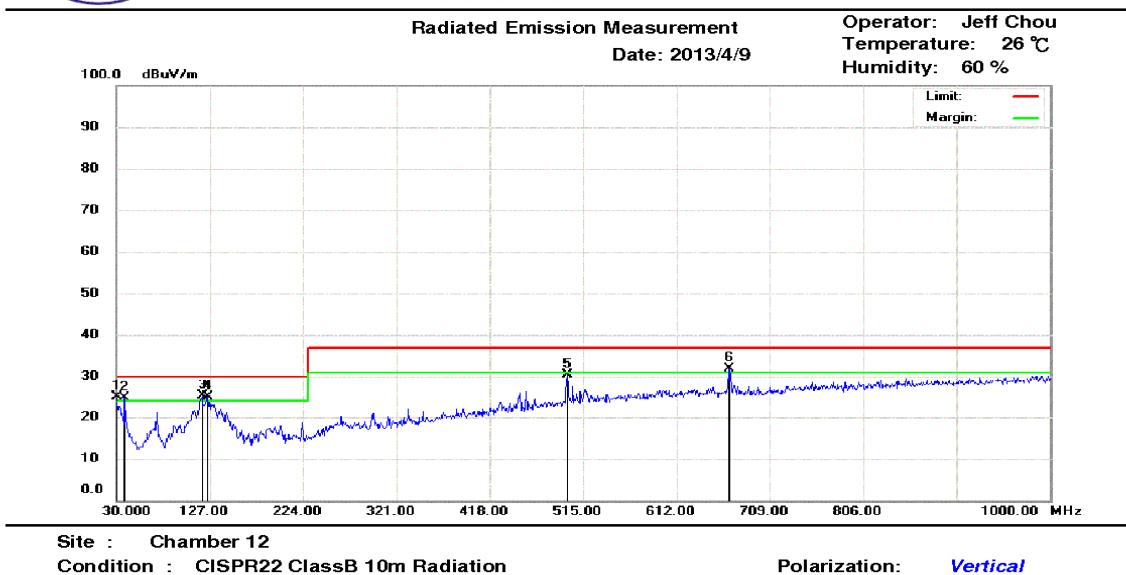
Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

Measurement Result:

Operation Mode	Config 1	Test Date	2013/04/09
Test by	Jason	Pol	Vertical



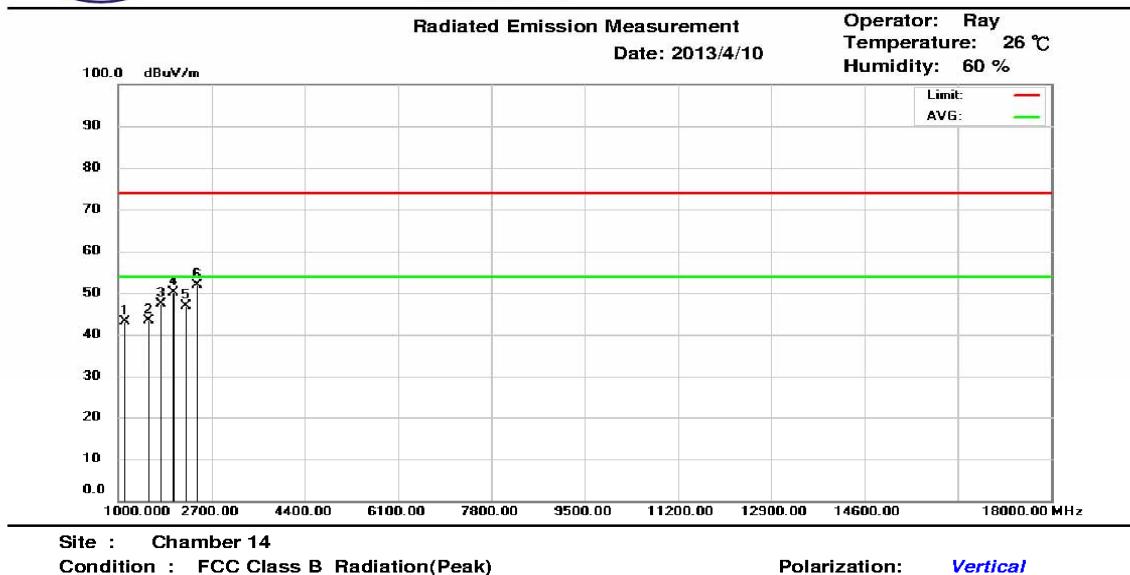
Address: No.120, Lane 180, San Ho Tsuen, Hsin Ho Road
 , Lung-Tan Hsiang, Tao Yuan Conty, Taiwan R.O.C.
 Tel: 03-4071718



Mk.	Frequency (MHz)	RX_R (dBuV)	Correct Factor(dB/m)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	30.00	5.03	19.76	24.79	30.00	-5.21	325	179	peak
2	38.73	9.22	15.30	24.52	30.00	-5.48	106	1	peak
3	119.24	11.12	13.90	25.02	30.00	-4.98	358	287	peak
4	125.06	11.21	13.72	24.93	30.00	-5.07	358	118	peak
5	498.51	9.42	21.01	30.43	37.00	-6.57	386	296	peak
6	666.32	8.67	23.11	31.78	37.00	-5.22	234	349	peak



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Mk.	Frequency (MHz)	RX_R (dBuV)	Correct Factor(dB/m)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	1119.00	59.29	-16.06	43.23	74.00	-30.77	100	239	peak
2	1561.00	58.75	-15.39	43.36	74.00	-30.64	232	313	peak
3	1782.00	61.11	-13.72	47.39	74.00	-26.61	118	264	peak
4	2003.00	62.20	-12.08	50.12	74.00	-23.88	316	48	peak
5	2241.00	58.59	-11.59	47.00	74.00	-27.00	370	144	peak
6	2445.00	63.09	-11.19	51.90	74.00	-22.10	207	102	peak

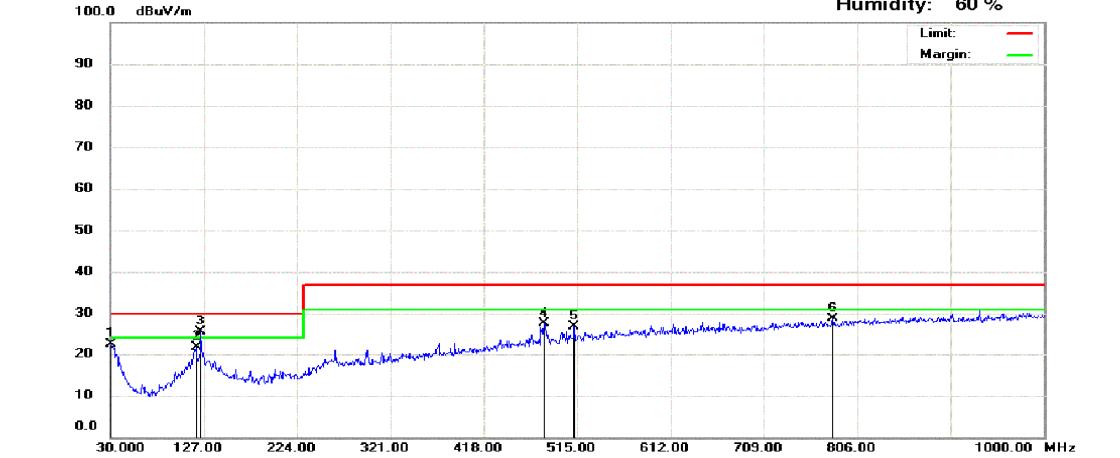
Operation Mode	Config 1	Test Date	2013/04/09
Test by	Jason	Pol	Horizontal



Address: No.120, Lane 180, San Ho Tsuen, Hsin Ho Road
 , Lung-Tan Hsiang, Tao Yuan Conty, Taiwan R.O.C.
 Tel: 03-4071718

Radiated Emission Measurement
 Date: 2013/4/9

Operator: Jeff Chou
 Temperature: 26 °C
 Humidity: 60 %



Site : Chamber 12

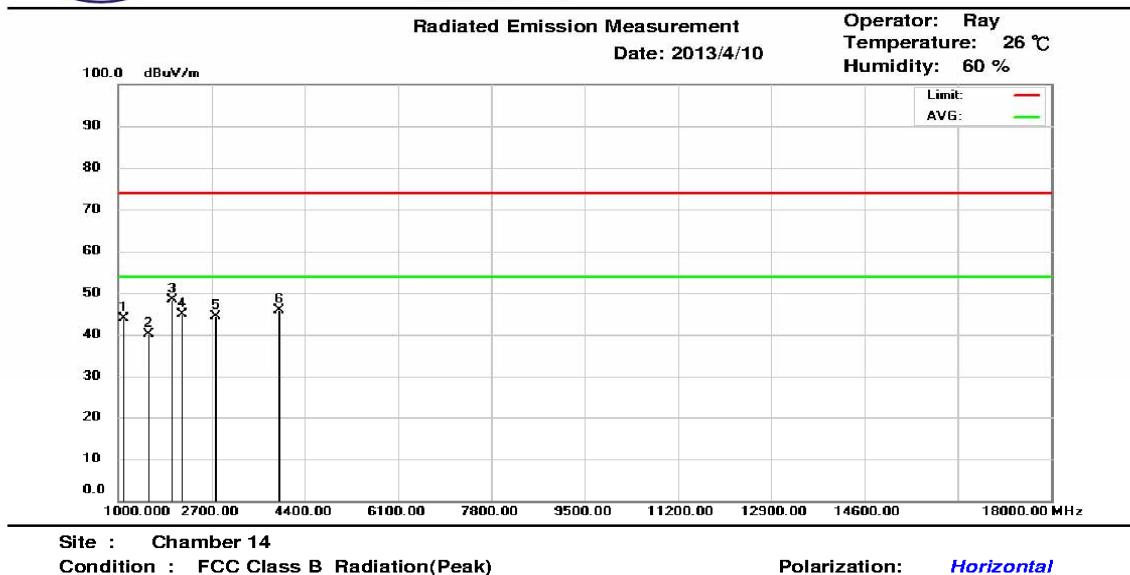
Condition : CISPR22 ClassB 10m Radiation

Polarization: *Horizontal*

Mk.	Frequency (MHz)	RX_R (dBuV)	Correct Factor(dB/m)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	30.00	2.72	19.76	22.48	30.00	-7.52	100	174	peak
2	119.24	7.85	13.90	21.75	30.00	-8.25	100	116	peak
3	124.09	11.68	13.76	25.44	30.00	-4.56	185	9	peak
4	480.08	6.78	20.63	27.41	37.00	-9.59	123	69	peak
5	512.09	5.39	21.31	26.70	37.00	-10.30	100	228	peak
6	780.78	4.30	24.37	28.67	37.00	-8.33	111	152	peak



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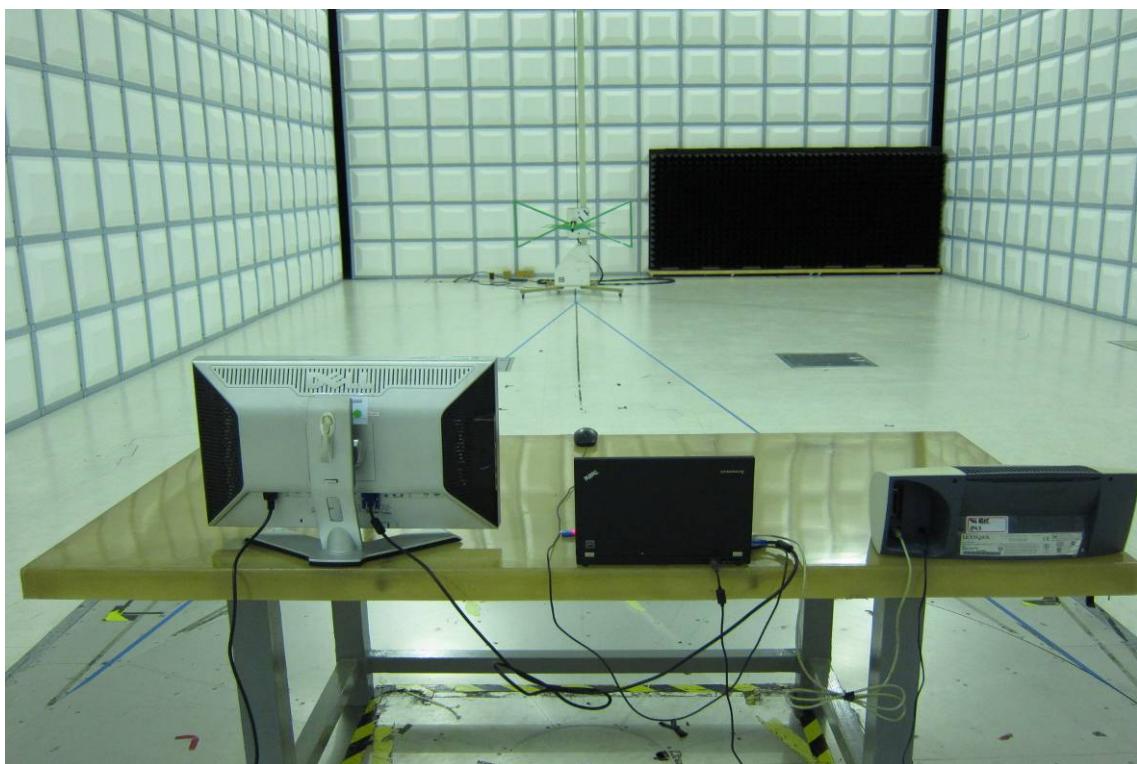


Mk.	Frequency (MHz)	RX_R (dBuV)	Correct Factor(dB/m)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	1102.00	59.87	-16.07	43.80	74.00	-30.20	100	328	peak
2	1561.00	55.60	-15.39	40.21	74.00	-33.79	100	240	peak
3	1986.00	60.49	-12.19	48.30	74.00	-25.70	398	145	peak
4	2156.00	56.57	-11.76	44.81	74.00	-29.19	322	296	peak
5	2785.00	54.92	-10.48	44.44	74.00	-29.56	381	67	peak
6	3941.00	54.99	-9.14	45.85	74.00	-28.15	100	83	peak

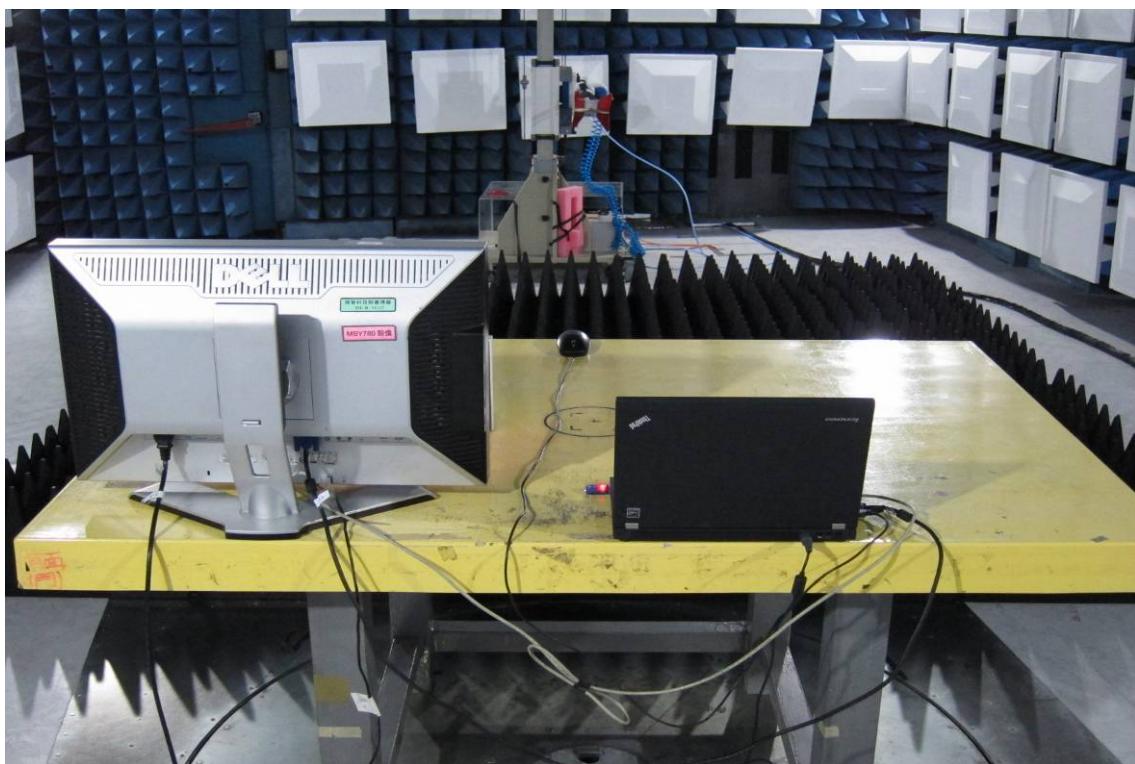
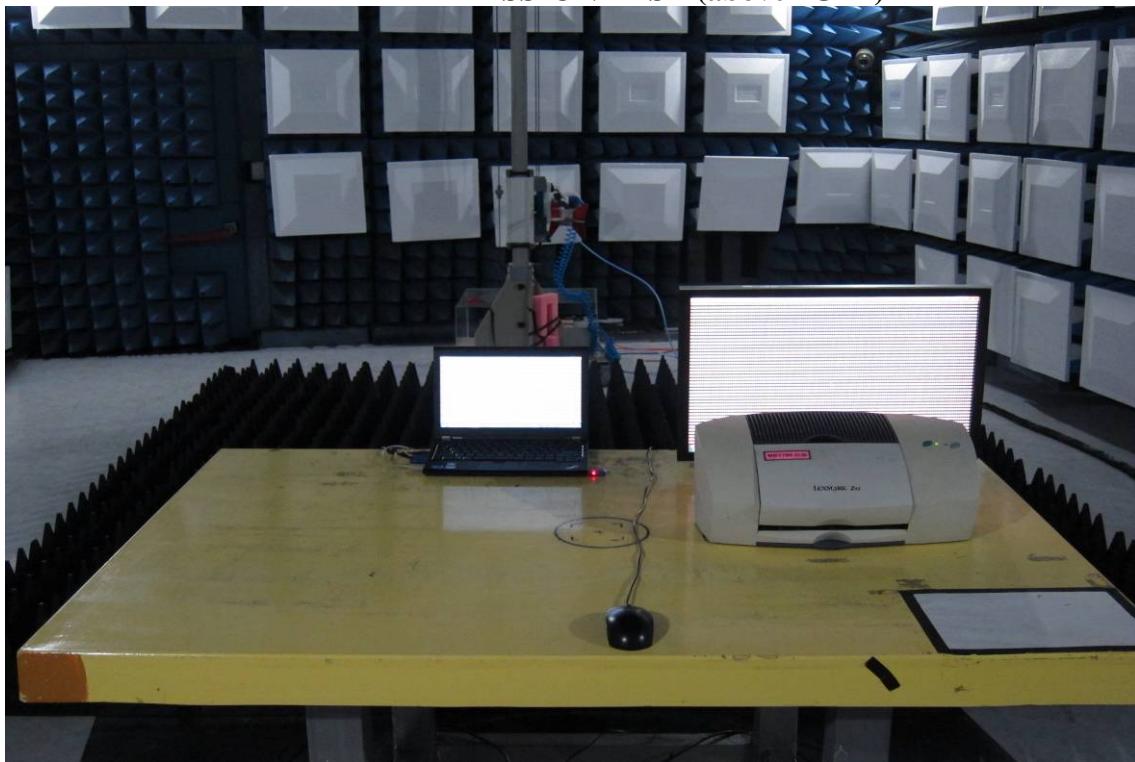
APPENDIX 1

PHOTOGRAPHS OF SET UP

RADIATED EMISSION TEST (under 1GHz)

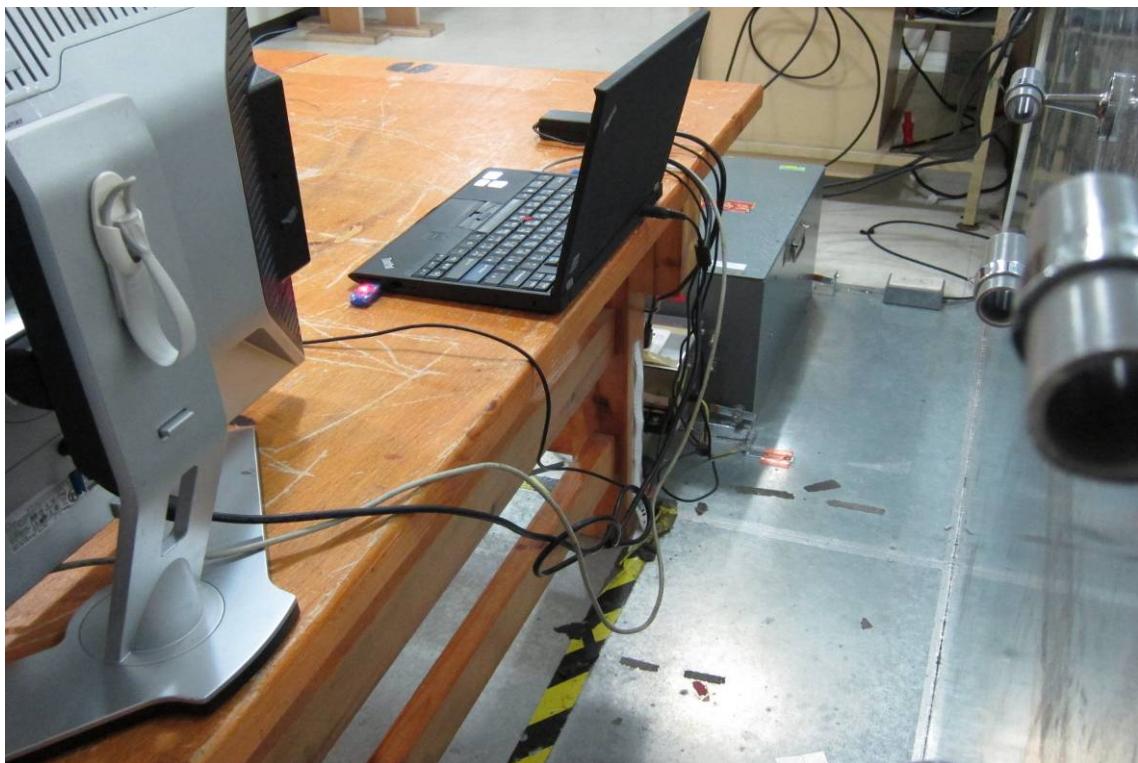


RADIATED EMISSION TEST (above 1GHz)



AC POWER LINE CONDUCTED EMISSION TEST





APPENDIX 2

PHOTOGRAPHS OF EUT

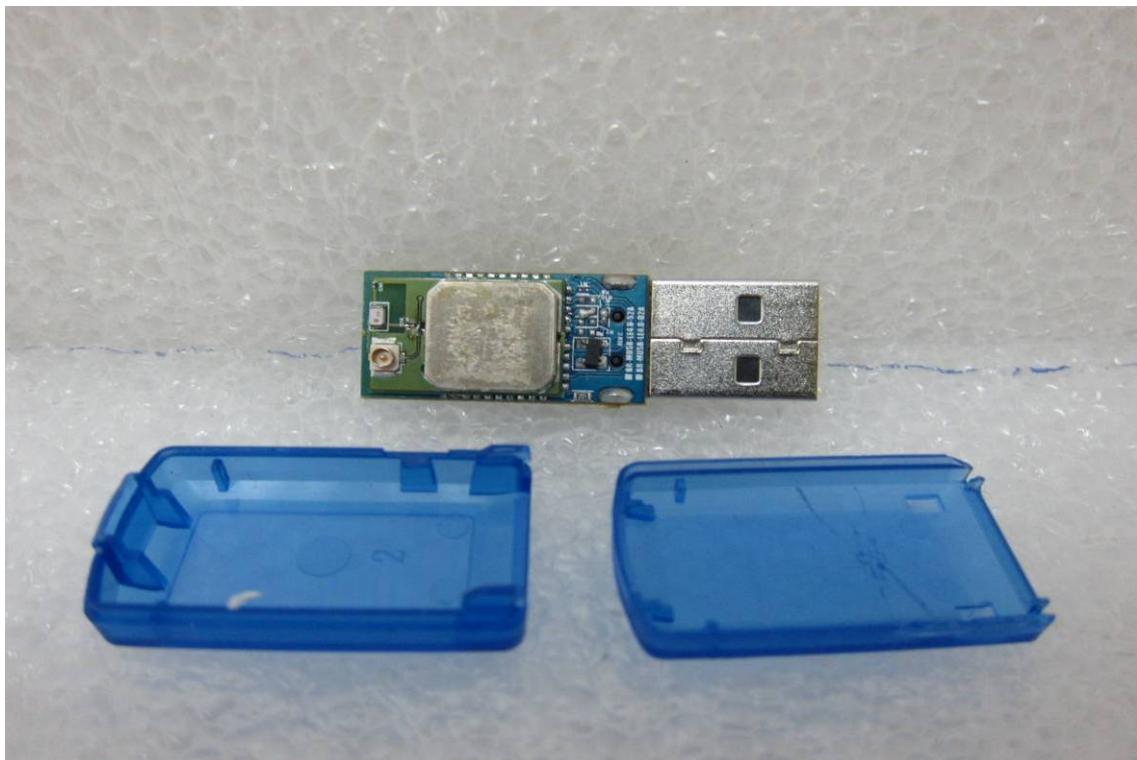
EUT 1



EUT 2



EUT 3



EUT 4



EUT 5

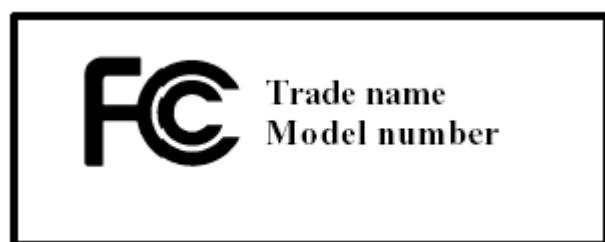


APPENDIX 3

LABELING REQUIREMENTS

§15.19 Labeling requirements.

- (a) In addition to the requirements in part 2 of this chapter, a device subject to certification, or DoC, or DoC shall be labeled as follows:
 - (1) Receivers associated with the operation of a licensed radio service, e.g., FM broadcast under part 73 of this chapter, land mobile operation under part 90, etc., shall bear the following statement in a conspicuous location on the device:
This device complies with part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference.
 - (2) A stand-alone cable input selector switch, shall bear the following statement in a conspicuous location on the device:
This device is verified to comply with the part 15 of the FCC Rules for use with cable television service.
 - (3) All other devices shall bear the following statement in a conspicuous location on the device:
This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received including interference that may cause undesired operation.
 - (4) Where a device is constructed in two or more sections connected by wires and marketed together, the statement specified under paragraph (a) of this section is required to be affixed only to the main control unit.
 - (5) When the device is so small or for such use that it is not practicable to place the statement specified under paragraph (a) of this section on it, the information required by this paragraph shall be placed in a prominent location in the instruction manual or pamphlet supplied to the user or, alternatively, shall be placed on the container in which the device is marketed. However, the FCC identifier or the unique identifier, as appropriate, must be displayed on the device.
- (b) Products subject to authorization under a Declaration of Conformity shall be labeled as follows:
 - (1) The label shall be located in a conspicuous location on the device and shall contain the unique identification described in §2.1074 of this chapter and the following logo:
 - (i) If the product is authorized based on testing of the product or system; or



(ii) If a personal computer is authorized based on assembly using separately authorized components, in accordance with §15.101(c) (2) or (c)(3), and the resulting product is not separately tested:



- (2) Label text information should be in a size of type large enough to be readily legible, consistent with the dimensions of the equipment and the label. However, the type size for the text is not required to be larger than eight points.
- (3) When the device is so small or for such use that it is not practicable to place the statement specified under paragraph (b)(1) of this section on it, such as for a CPU board or a plug-in circuit board peripheral device, the text associated with the logo may be placed in a prominent location in the instruction manual or pamphlet supplied to the user. However, the unique identification (trade name and model number) and the logo must be displayed on the device.
- (4) The label shall not be a stick-on, paper label. The label on these products shall be permanently affixed to the product and shall be readily visible to the purchaser at the time of purchase, as, described in §2.925(d) of this chapter. "Permanently affixed" means that the label is etched, engraved, stamped, silk screen, indelibly printed, or otherwise permanently marked on a permanently attached part of the equipment or on a nameplate of metal, plastic, or other material fastened to the equipment by welding, riveting, or a permanent adhesive. The label must be designed to last the expected lifetime of the equipment in the environment in which the equipment may be operated and must not be readily detachable.

~ *End of Report* ~