ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT

OF

XBOX WIRELESS CONTROLLER

FCC ID: RDDCYG80899192H

MODEL No.: G8089

BRAND NAME: N/A

REPORT NO: TR05070023

ISSUE DATE: September 08, 2005

Prepared for

INTEC INC.
5255 NW 159TH STREET MIAMI, FL 33014

Prepared by

SHENZHEN HUATONGWEI INTERNATIONAL INSPECTION CO., LTD

d.b.a.

SHENZHEN HUATONGWEI INTERNATIONAL INSPECTION CO., LTD
HUATONGWEI BUILDING, KEJI RD. 12 S., HIGH-TECH PARK,
NANSHAN DISTRICT, SHENZHEN,
GUANGDONG , P.R.CHINA

TEL: 86-755-26748099
FAX: 86-755-26748089

VERIFICATION OF COMPLIANCE

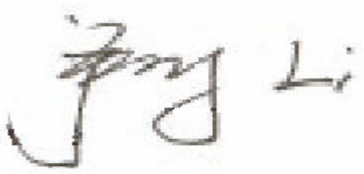
Applicant:	INTEC INC. 5255 NW 159TH STREET MIAMI, FL 33014
Manufacturer	SHENZHEN CHUYAR ELECTRONICS CO., LTD BLDG 3, BAOZHOU IND. ESTATE 117 JIUWEI RD. BAO'AN, SHENZHEN
Product Description:	XBOX WIRELESS CONTROLLER
Brand Name:	N/A
Model Number:	G8092; G8089; G8091
Serial Number:	N/A
File Number:	SQE05070023
Date of Test:	July 25, 2005 ~ September 08, 2005

We hereby certify that:

The above equipment was tested by SHENZHEN HUA TONG WEI INTERNATIONAL INSPECTION CO., LTD. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (2003) and the energy emitted by the sample EUT tested as described in this report is in compliance with radiated emission limits of FCC Rules Part 15.247.

The test results of this report relate only to the tested sample identified in this report.

Reviewed By



Jimmy Li / Technical Manager
SHENZHEN HUA TONG WEI
INTERNATIONAL INSPECTION CO., LTD

Table of Contents

1 GENERAL INFORMATION

1.1 Product Description

The EUT is an short range, lower power, wireless controller designed as an " Input Device". It is designed by way of utilizing the FHSS technology to achieve the system operation.

A major technical descriptions of EUT is described as following:

A). Operation Frequency: Form 2402.784MHz - 2479.680MHz
total 91 channels with 864 KHz channel separation
B). Modulation: FHSS
C). Antenna Designation: Non-User Replaceable (Integrated in the PCB)
D). Power Supply: 3 V DC by battery.

1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: RDDCYG80899192H filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

1.3 Test Methodology

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

1.4 Test Facility

The fully anechoic chamber test site and conducted measurement facility used to collect the radiated data is located on the address of SHENZHEN HUA TONG WEI INTERNATIONAL INSPECTION CO., LTD Huatongwei Building, Keji Rd. 12 S., High-tech Park, Nanshan District, Shenzhen, Guangdong, P.R.China

The fully anechoic chamber Test Sites and the Line Conducted labs are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2003 and CISPR 22/EN 55022 requirements.

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 Configuration of Tested System

Fig. 2-1 Configuration of Tested System For Gamepad

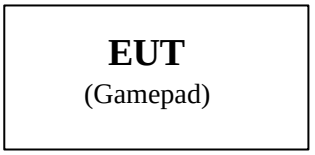


Fig. 2-2 Configuration of Tested System For Host

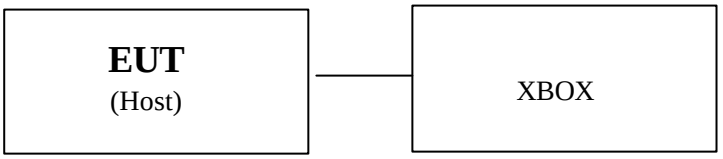


Fig. 2-3 Configuration of Tested System For Normal Operation

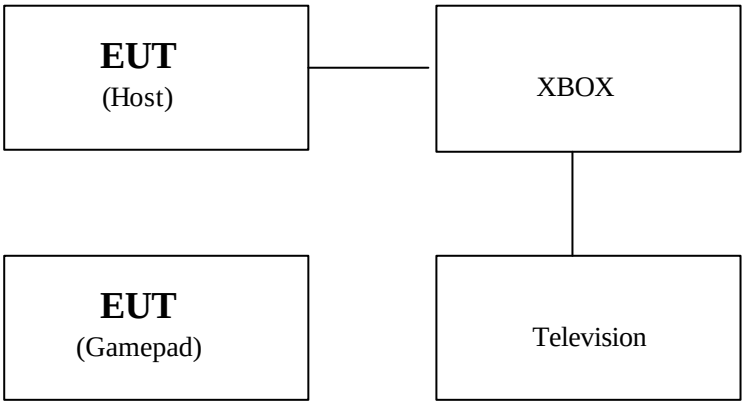


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.	Note
E-1	XBOX Wireless Controller	N/A	G8089	RDDCYG80899192H	N/A	***EUT***
	XBOX	Microsoft	N/A	N/A	308156521202	
	Television	KONKA	T1476A	N/A	N/A	
	Adapter	DN-Li	YL41-3000600A	N/A	N/A	

3 Summary Of Test Results

FCC Rules	Description Of Test	EUT	Result
§ 15.247	Conduction Emission	Game Pad / Host	Compliant
§ 15.247	Hopping Channels	Game Pad / Host	Compliant
§ 15.247	Channel Separation	Game Pad / Host	Compliant
§ 15.247	20 dB Bandwidth	Game Pad / Host	Compliant
§ 15.247	Operation Frequency	Game Pad / Host	Compliant
§ 15.247	Peak Output Power	Game Pad / Host	Compliant
§ 15.247	Spurious Emission	Game Pad / Host	Compliant
§ 15.247	Band Edge	Game Pad / Host	Compliant
§ 15.247	Dwell Time	Game Pad / Host	Compliant

4 Description of test modes

4.1 Game pad

4.1.1 Continuous Transmitting Mode

1. The EUT (Game pad) has been set to operate continuously on the lowest, the middle and the highest operation frequency individually.
2. The EUT stays in continuous transmitting mode on the operation frequency being set.

4.1.2 Continuous Receiving Mode

1. The EUT (Game pad) has been set to operate continuously on the lowest, the middle and the highest operation frequency individually.
2. The EUT stays in continuous receiving mode on the operation frequency being set.

4.2 Host

4.2.1 Continuous Transmitting Mode for Host

1. The EUT (Host) has been set to operate continuously on the lowest, the middle and the highest operation frequency individually.
2. The EUT stays in continuous transmitting mode on the operation frequency being set.

4.2.2 Continuous Transmitting Mode for Host

1. The EUT (Host) has been set to operate continuously on the lowest, the middle and the highest operation frequency individually.
2. The EUT stays in continuous receiving mode on the operation frequency being set.

4.3 System

4.3.1 Normal Operation for Game pad and Host

1. The EUT (Game pad and Host) has been set to normal operating condition.
2. The EUT stays in normal operation mode using the FHSS method.

4.3.2 Normal Operation for Game pad and Host

1. The EUT (Game pad and Host) has been set to normal operating condition.
2. The EUT stays in normal operation mode using the FHSS method.

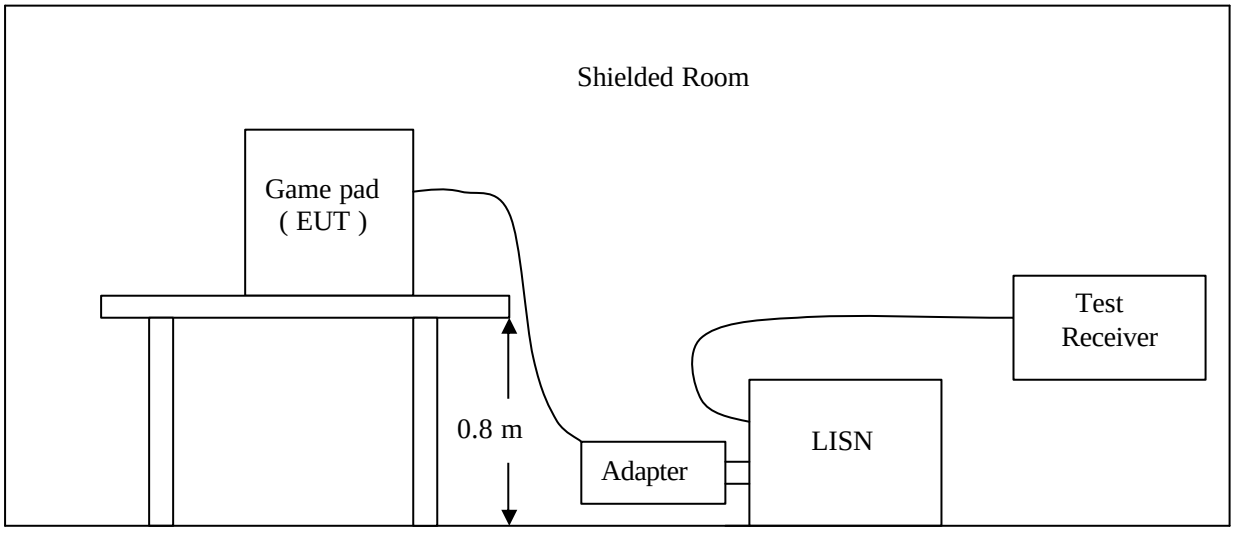
5 Parameters For Game Pad

5.1 Conduction Emissions

5.1.1 Measurement Procedure:

1 The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.4.
2 Support equipment, if needed, was placed as per ANSI C63.4.
3 All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.
4 The EUT received DC3V power from the adapter, the adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5 All support equipments received AC power from a second LISN, if any.
6 The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7 Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
8 During the above scans, the emissions were maximized by cable manipulation.

5.1.2 Test SET-UP (Block Diagram of Configuration)



5.1.3 Measurement Equipment Used:

Conducted Emission Test Site # 3					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
EMI TEST RECEIVER	ROHDE & SCHWARZ	ESCS30	100038	2004/11	2005/11
ARTIFICIAL MAINS	ROHDE & SCHWARZ	ESH2-Z5	100028	2004/11	2005/11
PULSE LIMITER	ROHDE & SCHWARZ	ESHSZ2	100044	2004/11	2005/11
EMI TEST SOFTWARE	ROHDE & SCHWARZ	ESK1	N/A	N/A	N/A

5.1.4 Limits And Measurement Result:

Limits and Measurement Result Of Hopping Channel		
Applicable Limits	**Measurement Result**	
	Test Data	Criteria
Per 15.207 Conducted Emission Limit	See as the chart below	PASS

(The chart below shows the highest readings taken from the final data)

FREQ MHz	PEAK RAW dBuV	Q.P. RAW dBuV	AVG RAW dBuV	Q.P. Limit dBuV	AVG Limit dBuV	Q.P. Margin dB	AVG Margin dB	NOTE
0.423	43.21	---	---	58.76	48.76	---	-5.55	L1
0.469	40.87	---	---	57.12	47.12	---	-6.25	L1
0.573	38.35	---	---	56.00	46.00	---	-7.65	L1
0.716	36.24	---	---	56.00	46.00	---	-9.76	L1
0.966	40.02	---	---	56.00	46.00	---	-5.98	L1
1.125	37.14	---	---	56.00	46.00	---	-8.86	L1
0.617	42.56	---	---	56.00	46.00	---	-3.44	L2
0.685	39.91	---	---	56.00	46.00	---	-6.09	L2
0.933	39.73	---	---	56.00	46.00	---	-6.27	L2
1.431	37.20	---	---	56.00	46.00	---	-8.80	L2
2.028	36.33	---	---	56.00	46.00	---	-9.67	L2
2.879	38.87	---	---	56.00	46.00	---	-7.13	L2

L1 = Line One (Hot side) / L2 = Line Two (Neutral side)

****NOTE:** "---" denotes the peak emission level was or more than 2dB below the Average limit, so no re-check anymore.

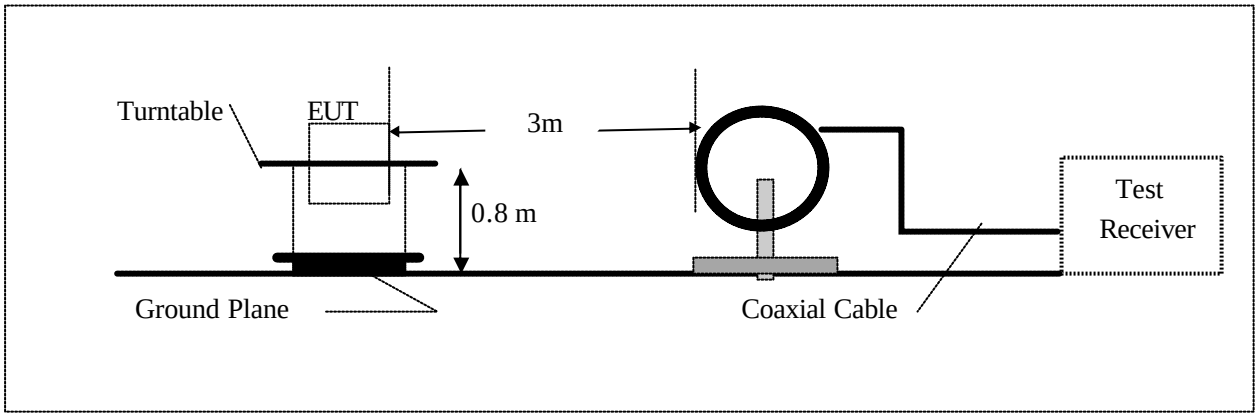
5.2 Hopping Channels

5.2.1 Measurement Procedure:

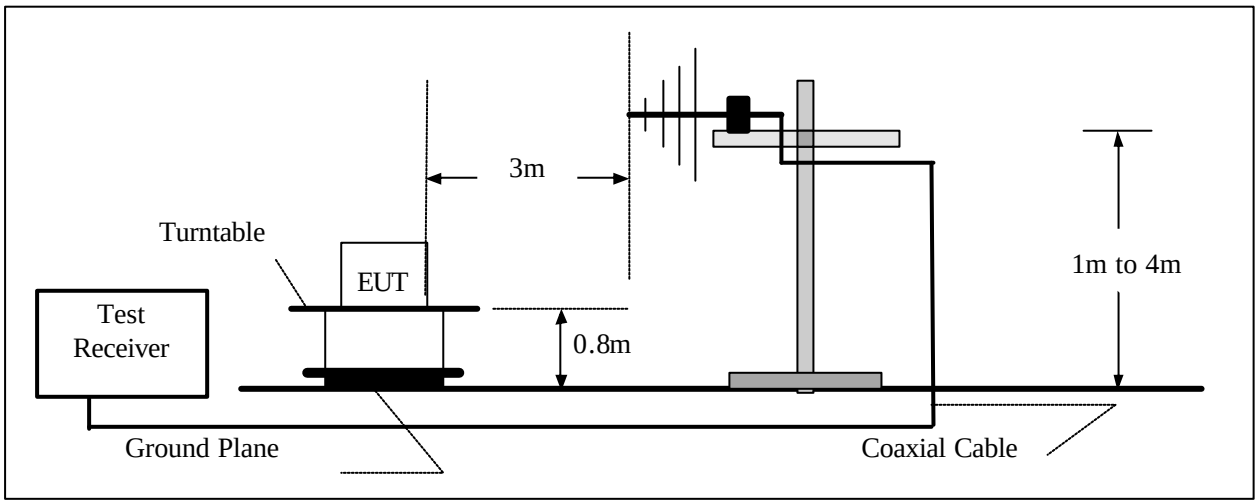
1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set EUT as Normal Operation mode
3. Set SPA Start Frequency = 2.4 GHz, Stop Frequency= 2.4835 GHz, RBW= 10 KHz, VBW= 10 KHz.
4. Set SPA Trace 1 Max hold, then View.

5.2.2 Test SET-UP (Block Diagram of Configuration)

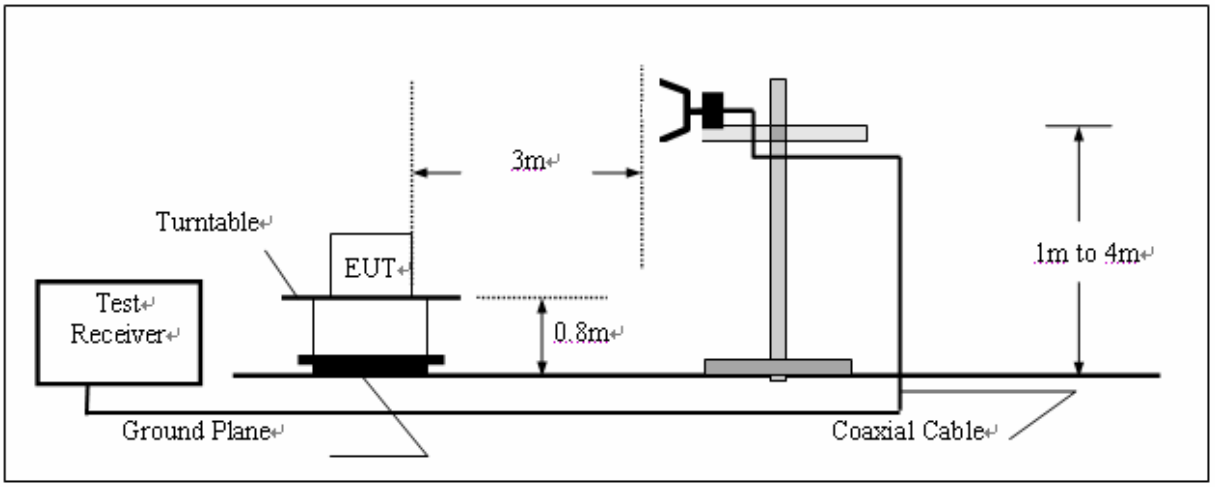
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



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



(C) Radiated Emission Test Set-Up, Frequency Above 1000MHz



5.2.3 Measurement Equipment Used:

3/5 Anechoic Chamber Radiation Test Site # 4					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
ULTRA-BROADBAND ANTENNA	ROHDE & SCHWARZ	HL562	100015	2004/11	2005/11
EMI TEST RECEIVER	ROHDE & SCHWARZ	ESI 26	100009	2004/11	2005/11
RF TEST PANEL	ROHDE & SCHWARZ	TS / RSP	335015/ 0017	N/A	N/A
TURNTABLE	ETS	2088	2149	N/A	N/A
ANTENNA MAST	ETS	2075	2346	N/A	N/A
EMI TEST SOFTWARE	ROHDE & SCHWARZ	ESK1	NA	N/A	N/A

5.2.4 Limits And Measurement Result:

Limits and Measurement Result Of Hopping Channel		
Applicable Limits	**Measurement Result**	
	Test Data	Criteria
Per 15.247 (a)(1)(**ii**) At least 75 hopping Frequencies	Total 91 Channel	PASS

5.3 Channel Separation

5.3.1 Measurement Procedure:

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set EUT as Normal Operation mode
3. Set SPA Span= 5 MHz, RBW= 10 KHz, VBW= 10 KHz
4. Set SPA Trace 1 Max hold, then View.

5.3.2 Test SET-UP (Block Diagram of Configuration)

The same as described in Section 5.2.2

5.3.3 Measurement Equipment Used:

The same as described in Section 5.2.3

5.3.4 Limits And Measurement Result:

Limits and Measurement Result Of Channel Separation		
Applicable Limits	**Measurement Result**	
	Test Data	Criteria
Per 15.247 (a)(1) At least 25 KHz or 20 dB bandwidth of the hopping Channel, whichever is greater.	875 KHz	PASS

5.4 20 dB Bandwidth

5.4.1 Measurement Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set EUT as continuous transmitting mode
3. Set SPA Center Frequency = Operation Frequency, RBW, VBW= 10 KHz, Span =5 MHz.
4. Set SPA Trace 1 Max hold, then View.

5.4.2 Test SET-UP (Block Diagram of Configuration)

The Same as described in Section 5.2.2

5.4.3 Measurement Equipment Used:

The same as described in Section 5.2.3

5.4.4 Limits And Measurement Results:

Limits and Measurement Result Of 20 dB Bandwidth For The Top Channel		
Applicable Limits	**Measurement Result**	
	Test Data	Criteria
Per 15.247 (a)(1)(**ii**) The maximum 20 dB bandwidth of the hopping channel is 1 MHz	768 KHz	PASS

Limits and Measurement Result Of 20 dB Bandwidth For The Middle Channel		
Applicable Limits	**Measurement Result**	
	Test Data	Criteria
Per 15.247 (a)(1)(**ii**) The maximum 20 dB bandwidth of the hopping channel is 1 MHz	772 KHz	PASS

Limits and Measurement Result Of 20 dB Bandwidth For The Middle Channel		
Applicable Limits	**Measurement Result**	
	Test Data	Criteria
Per 15.247 (a)(1)(**ii**) The maximum 20 dB bandwidth of the hopping channel is 1 MHz	773 KHz	PASS

5.5 Operation Frequency

5.5.1 Measurement Procedure:

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set EUT as Continuous Transmitting Mode.
3. Set SPA Center Frequency = Bottom Channel for Fl measurement (Top Channel for Ft measurement, RBW= 10 KHz, VBW= 10 KHz, Span= 5 MHz
4. Set SPA Trace 1 Max hold, then View.

5.5.2 Test SET-UP (Block Diagram of Configuration)

The same as described in Section 5.2.2

5.5.3 Measurement Equipment Used:

The same as described in Section 5.2.3

5.5.4 Limits And Measurement Result:

Limits and Measurement Result Of Operation Frequency		
Applicable Limits	**Measurement Result**	
	Test Data	Criteria
Per 15.247 The operation frequencies shall lie wholly within 2.4 GHz to 2.4835 GHz	Fl=2.40210 GHz Ft=2.47966 GHz	PASS

Notes:

Fl means the lowest band edge frequency of the bottom channel; Ft means the highest band edge frequency of the top channel

5.6 Peak Output Power

5.6.1 Measurement Procedure:

1 On a test site, the EUT shall be placed on a turntable

2 The test antenna shall be oriented initially for vertical polarization located 3m from the EUT to correspond to the transmitter.

3 The output of the antenna shall be connected to the measuring receiver and either a peak or quasi-peak detector was used for the measurement as indicated on the report. The detector selection is based on how close the emission level was approaching the limit.

4 The transmitter shall be switched on; if possible, without the modulation and the measurement receiver shall be tuned to the frequency of the transmitter under test.

5 The test antenna shall be raised and lowered through the specified range of height until the measuring receiver detects a maximum signal level.

6 The transmitter shall than be rotated through 360 ° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.

7 The test antenna shall be raised and lowered again through the specified range of height until the measuring receiver detects a maximum signal level.

8 The maximum signal level detected by the measuring receiver shall be noted.

9 Replace the antenna with a proper Antenna (substitution antenna).

10 The substitution antenna shall be oriented for vertical polarization and, if necessary, the length of the substitution antenna shall be adjusted to correspond to the frequency of transmitting.

11 The substitution antenna shall be connected to a calibrated signal generator.

12 If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.

13 The test antenna shall be raised and lowered through the specified range of the height to ensure that the maximum signal is received.

14 The input signal to substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuation setting of the measuring receiver.

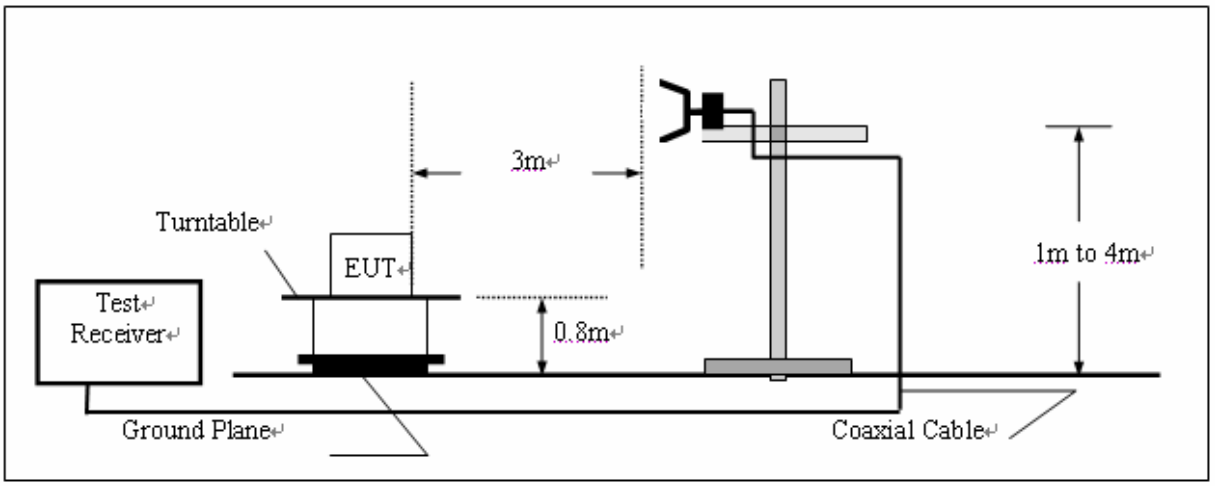
15 The input level ɒ the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.

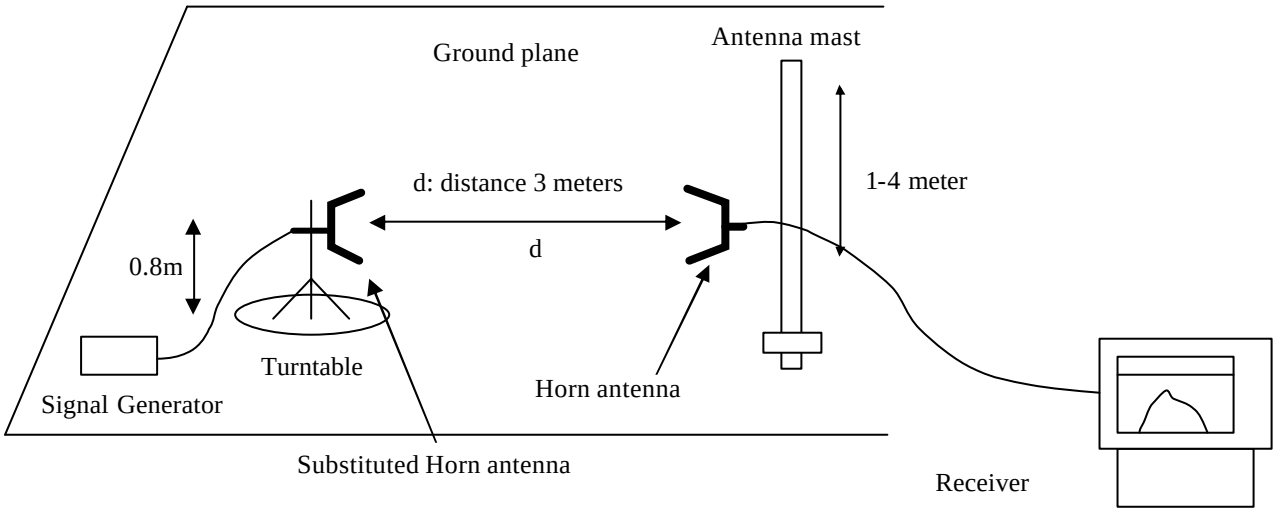
16 The measurement shall be repeated with the test antenna and the substitution antenna oriented for horizontal polarization.

17 The measure of the effective radiated power is the larger of the two levels recorded, at the input to the substitution antenna, corrected for the gain of the substitution antenna .

5.6.2 Test SET-UP (Block Diagram of Configuration)

Substitution Method (Radiated Emission)





5.6.3 Measurement Equipment Used:

3/5 Anechoic Chamber Radiation Test Site # 4					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
ULTRA-BROADBAND ANTENNA	ROHDE & SCHWARZ	HL562	100015	2004/11	2005/11
EMI TEST RECEIVER	ROHDE & SCHWARZ	ESI 26	100009	2004/11	2005/11
RF TEST PANEL	ROHDE & SCHWARZ	TS / RSP	335015/ 0017	N/A	N/A
TURNTABLE	ETS	2088	2149	N/A	N/A
ANTENNA MAST	ETS	2075	2346	N/A	N/A
EMI TEST SOFTWARE	ROHDE & SCHWARZ	ESK1	NA	N/A	N/A

5.6.4 Limits And Measurement Result:

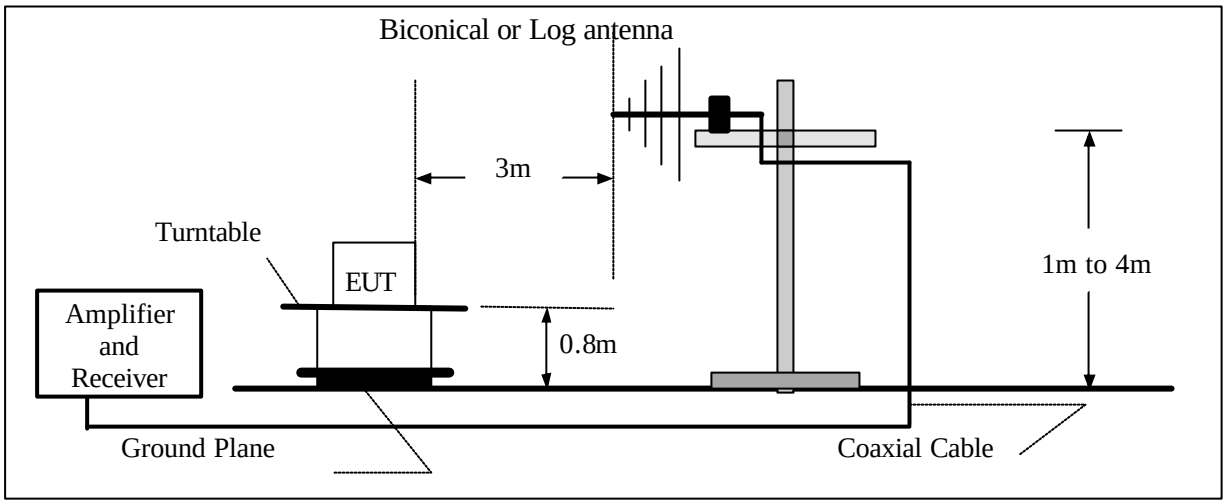
Limits and Measurement Result Of Peak Output Power		
Applicable Limits	**Measurement Result**	
	Test Data	Criteria
Per 15.247 (b)(1) The maximum peak output power is 1 W (30 dBm)	Pt= 11.78 dBm	PASS
	Pm=11.43 dBm	PASS
	Pl=11.25 dBm	PASS

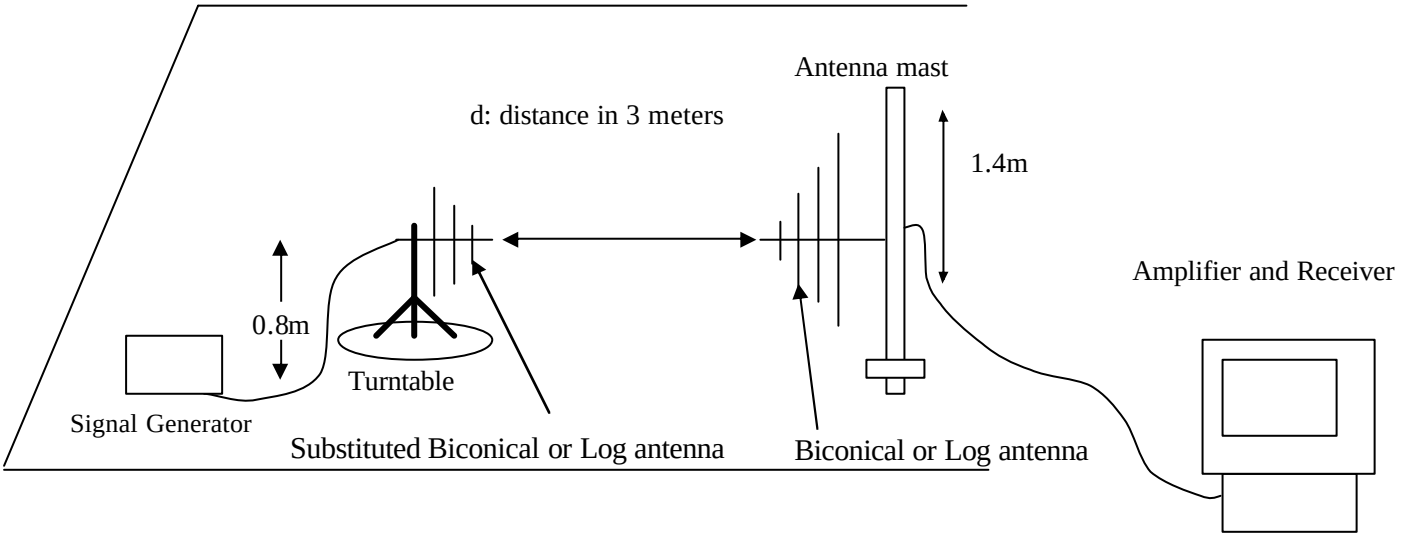
5.7 Spurious Emission At Transmitting mode

5.7.1 Measurement Procedure:
The same as described in section 5.6.1

5.7.2 Test SET-UP (Block Diagram of Configuration)

Substitution method (Radiation Emission below 1 GHz)





Substitution method (Radiation Emission Above 1 GHz)

The same as described in section 5.6.2

5.7.3 Measurement Equipment Used:

3/5 Anechoic Chamber Radiation Test Site # 4					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
ULTRA-BROADBAND ANTENNA	ROHDE & SCHWARZ	HL562	100015	2004/11	2005/11
EMI TEST RECEIVER	ROHDE & SCHWARZ	ESI 26	100009	2004/11	2005/11
RF TEST PANEL	ROHDE & SCHWARZ	TS / RSP	335015/ 0017	N/A	N/A
TURNTABLE	ETS	2088	2149	N/A	N/A
ANTENNA MAST	ETS	2075	2346	N/A	N/A
EMI TEST SOFTWARE	ROHDE & SCHWARZ	ESK1	NA	N/A	N/A

5.7.4 Limits And Measurement Result:

Limits and Measurement Result Of Spurious Emission		
Applicable Limits	**Measurement Result**	
	Test Data	Criteria
Per 15.247 (c) In any 100 KHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produce by the intentional radiator shall be at least 20 dB below that in 100KHz bandwidth within the band that contains the highest level of the desired power. In addition, radiation emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in§15.209(a)	See as the chart Below	PASS

Transmitting Mode On The Top Channel---2479.15 MHz								
Frequency (MHz)	**Reading level (dBuV)**	**Antenna Polarization**	**S.G. (dBm)**	**Cable loss (dB)**	**Ant.Gain (dB)**	**Emission level (dBm)**	**Limit (dBm)**	**Margin (dB)**
4958.43	46.74	V	-27.1	3.9	6.3	-24.7	-8.22	-16.48
4958.43	37.85	H	-35.3	3.9	6.3	-32.9	-8.22	-24.68
Others	--	V	--					
Others	--	H	--					

Transmitting Mode On The Middle Channel---2440.85 MHz								
Frequency (MHz)	**Reading level (dBuV)**	**Antenna Polarization**	**S.G. (dBm)**	**Cable loss (dB)**	**Ant.Gain (dB)**	**Emission level (dBm)**	**Limit (dBm)**	**Margin (dB)**
4881.75	46.49	V	-27.6	3.9	6.3	-25.2	-8.22	-16.98
4881.75	37.30	H	-35.9	3.9	6.3	-33.5	-8.22	-25.28
Others	--	V	--					
Others	--	H	--					

Transmitting Mode On The Bottom Channel---2402.54 MHz								
Frequency (MHz)	**Reading level (dBuV)**	**Antenna Polarization**	**S.G. (dBm)**	**Cable loss (dB)**	**Ant.Gain (dB)**	**Emission level (dBm)**	**Limit (dBm)**	**Margin (dB)**
4805.12	46.03	V	-27.9	3.9	6.3	-25.5	-8.22	-17.28
4805.12	37.11	H	-36.3	3.9	6.3	-33.9	-8.22	-25.68
Others	--	V	--					
Others	--	H	--					

Remark:

(1) Corrected Power (dBm) = SG O/P-Cable + Ant Gain
(2) Measuring frequencies from 30 MHz to the 25 GHz.
(3) Data of measurement within this frequency range shown " -- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

5.8 BAND EDGE

5.8.1 Measurement Procedure:

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set EUT as Continuous Transmitting Mode.
3. Set SPA Center Frequency = Bottom Channel for lowest frequency band edge (Top Channel for highest frequency band edge) RBW= 10 KHz, VBW= 10 KHz, Span= 5 MHz
4. Set SPA Trace 1 Max hold, then View.

5.8.2 Test SET-UP (Block Diagram of Configuration)

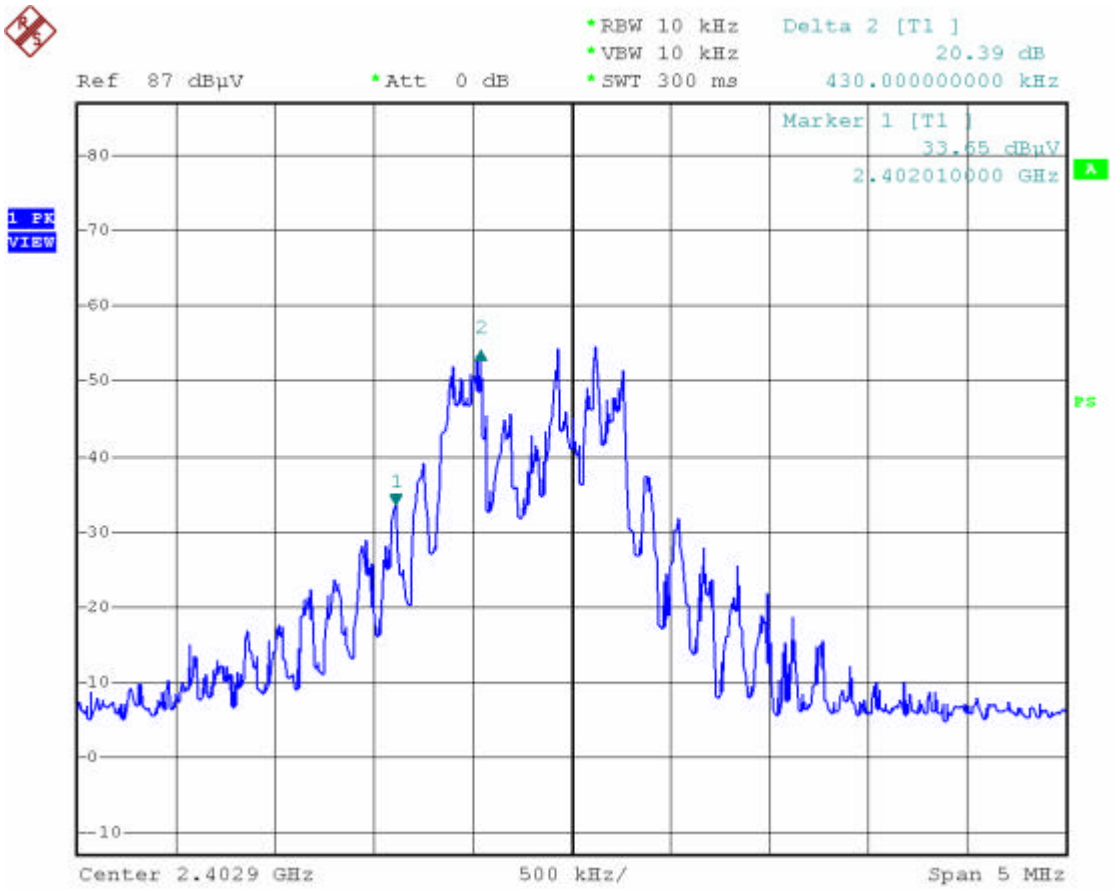
The same as described in section 5.2.2

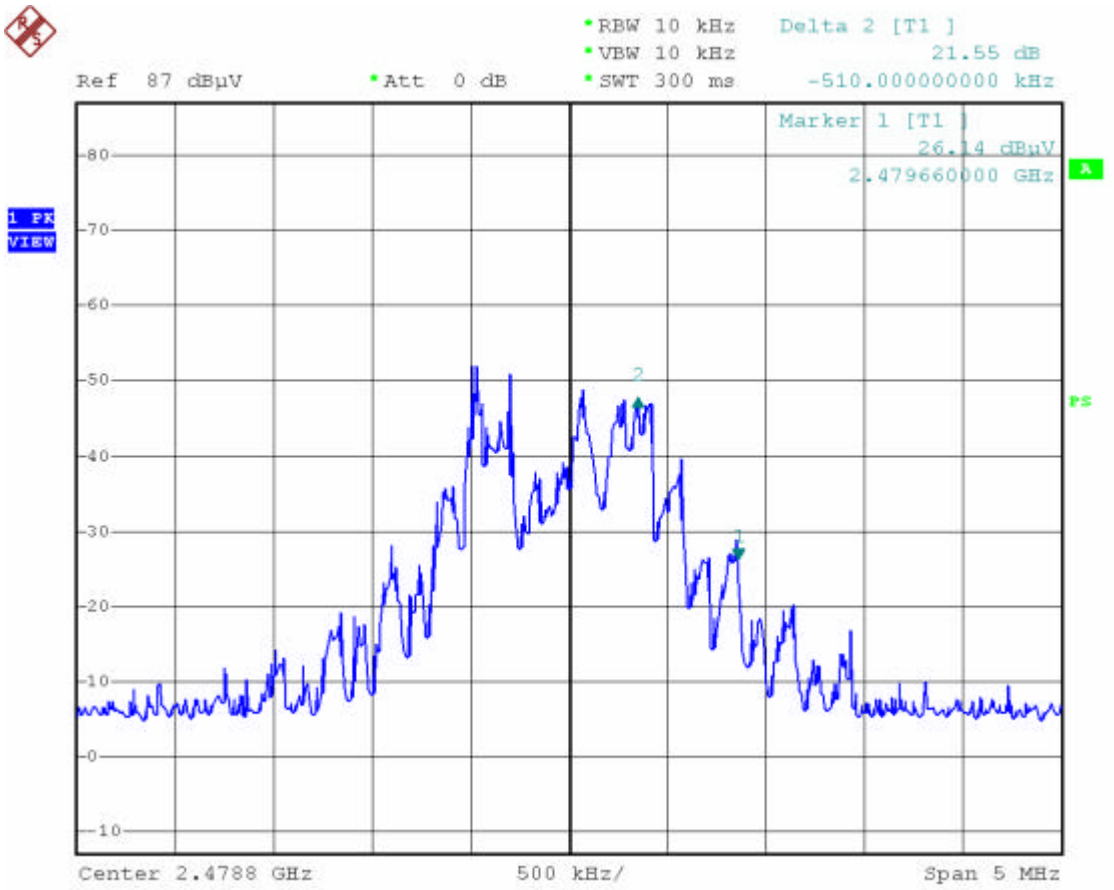
5.8.3 Measurement Equipment Used:

The same as described in section 5.2.3

5.8.4 Limits And Measurement Result:

Limits and Measurement Result Of Band Edge		
Applicable Limits	**Measurement Result**	
	Test Data	Criteria
Per 15.247 (c) In any 100 KHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produce by the intentional radiator shall be at least 20 dB below that in 100 KHz bandwidth within the band that contains the highest level of the desired power.	See the test plots attached below	PASS


RBW 10 kHz
VBW 10 kHz
SWT 300 ms
Delta 2 [T1]
20.39 dB
430.000000000 kHz
Ref 87 dBµV
Att 0 dB
Marker 1 [T1]
33.65 dBµV
2.402010000 GHz
1 PK VIEW
80
70
60
50
40
30
20
10
0
-10
Center 2.4029 GHz
500 kHz/
Span 5 MHz


RBW 10 kHz
VBW 10 kHz
SWT 300 ms
Delta 2 [T1]
21.55 dB
-510.000000000 kHz
Ref 87 dBµV
Att 0 dB
Marker 1 [T1]
26.14 dBµV
2.479660000 GHz
1 PK VIEW
80
70
60
50
40
30
20
10
0
-10
Center 2.4788 GHz
500 kHz/
Span 5 MHz

5.9 Spurious Emission At Receiving Mode

5.9.1 Measurement Procedure:

1 The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden turntable with a height of 0.8 meters is used which is placed on the ground plane as per ANSI C63.4 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.

2 Support equipment, if needed, was placed as per ANSI C63.4.

3 All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.

4 The EUT received DC3V from the adapter, and the adapter received AC120V/60Hz power through the outlet socket under the turntable. All support equipments received AC 120V/60Hz power from socket under the turntable, if any.

5 The antenna was placed at 10 meter away from the EUT as stated in CISPR 22. The antenna connected to the Analyzer via a cable and at times a pre-amplifier would be used.

6 The Analyzer / Receiver quickly scanned from 30MHz to 1000MHz. The EUT test program was started. Emissions were scanned and measured rotating the EUT to 360 degrees and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.

5.9.2 Test SET-UP (Block Diagram of Configuration)

The same as described in section 5.2.2

5.9.3 Measurement Equipment Used:

3/5 Anechoic Chamber Radiation Test Site # 4					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
ULTRA-BROADBAND ANTENNA	ROHDE & SCHWARZ	HL562	100015	2004/11	2005/11
EMI TEST RECEIVER	ROHDE & SCHWARZ	ESI 26	100009	2004/11	2005/11
RF TEST PANEL	ROHDE & SCHWARZ	TS / RSP	335015/ 0017	N/A	N/A
TURNTABLE	ETS	2088	2149	N/A	N/A
ANTENNA MAST	ETS	2075	2346	N/A	N/A
EMI TEST SOFTWARE	ROHDE & SCHWARZ	ESK1	NA	N/A	N/A

5.9.4 Limits And Measurement Result:

Limits and Measurement Result Of Spurious Emission		
Applicable Limits	**Measurement Result**	
	Test Data	Criteria
§ 15.209 shall apply	See as the chart below	PASS

Operation Mode:	Receiving Mode On The Top Channel --- 2479.15 MHz	Test Date :	August 10, 2005
Temperature :	25 ℃	Test By:	Jimmy Zhang
Humidity :	59 %	Pol:	Vertical & Horizontal

Freq. (MHz)	Ant.Pol. H/V	DetectorMode (PK/AV)	Reading (dBuV)	Ant./CL/ Amp. CF(dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margin (dB)
Below 1 GHz	V	Peak	---				At least 20
Below 1 GHz	H	Peak	---				dB down
Above 1 GHz	V	Peak	---				than the
Above 1 GHz	H	Peak	---				Limit

Operation Mode:	Receiving Mode On The Middle Channel --- 2440.85 MHz	Test Date :	August 10, 2005
Temperature :	25 ℃	Test By:	Jimmy Zhang
Humidity :	59 %	Pol:	Vertical & Horizontal

Freq. (MHz)	Ant.Pol. H/V	DetectorMode (PK/AV)	Reading (dBuV)	Ant./CL/ Amp. CF(dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margin (dB)
Below 1 GHz	V	Peak	---				At least 20
Below 1 GHz	H	Peak	---				dB down
Above 1 GHz	V	Peak	---				than the
Above 1 GHz	H	Peak	---				Limit

Operation Mode:	Receiving Mode On The Bottom Channel --- 2402.54 MHz	Test Date :	August 10, 2005
Temperature :	25 ℃	Test By:	Jimmy Zhang
Humidity :	59 %	Pol:	Vertical & Horizontal

Freq. (MHz)	Ant.Pol. H/V	DetectorMode (PK/AV)	Reading (dBuV)	Ant./CL/ Amp. CF(dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margin (dB)
Below 1 GHz	V	Peak	---				At least 20
Below 1 GHz	H	Peak	---				dB down
Above 1 GHz	V	Peak	---				than the
Above 1 GHz	H	Peak	---				Limit

Remark：

(1) Measuring frequencies from 25 MHz to the 25 GHz。

(2) Datum of measurement within this frequency range shown "--- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

(3) The IF bandwidth of EMI Test Receiver between 25MHz to 1GHz was 120KHz and 1 MHz for above 1 GHz

5.10 Dwell Time

5.10.1 Measurement Procedure:

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set EUT as Normal Operation mode
3. Set SPA Span= 0 Hz, RBW= 1 MHz, VBW= 1 MHz
4. Set SPA Trace 1 Max hold, then View.

5.10.2 Test SET-UP (Block Diagram of Configuration)

The same as described in Section 5.2.2

5.10.3 Measurement Equipment Used:

The same as described in Section 5.2.3

5.10.4 Limits And Measurement Result:

Limits and Measurement Result Of Dwell Time		
Applicable Limits	**Measurement Result**	
	Test Data	Criteria
Per 15.247 (a)(1)(ii) The average time of occupancy on any frequency shall not be greater than 0.4 seconds	325 ms	PASS

Notes:

The Dwell Time(Td) for each channel is 3.431314 ms and the Reap Time(Tr) for each channel is 384 ms. So the total Occupation Time(To) for each channel during 0.4 s × total number of the channels (Nc)' observation time is calculated by the following formula:

To = Td *(400 * Nc)/Tr = 3.431314 * (400 * 91)/ 384 = 325.26 ms

6 Parameters For Host

6.1 Conducted Emissions

6.1.1 Measurement Procedure:
The same as described in section 5.1.1

6.1.2 Test SET-UP (Block Diagram of Configuration)
The same as described in section 5.1.2

6.1.3 Measurement Equipment Used:

6.1.4 Limits And Measurement Result:

Limits and Measurement Result Of Hopping Channel		
Applicable Limits	**Measurement Result**	
	Test Data	Criteria
Per 15.207 Conducted Emission Limit	See as the chart below	PASS

(The chart below shows the highest readings taken from the final data)

FREQ MHz	PEAK RAW dBuV	Q.P. RAW dBuV	AVG RAW dBuV	Q.P. Limit dBuV	AVG Limit dBuV	Q.P. Margin dB	AVG Margin dB	NOTE
0.195	40.38	---	---	64.84	54.84		-14.46	L1
0.263	42.45	---	---	62.93	52.93		-10.48	L1
0.331	46.73	---	---	61.08	51.08		-4.35	L1
0.674	39.22	---	---	56.00	46.00		-6.78	L1
17.082	38.71	---	---	60.00	50.00		-11.29	L1
19.885	45.58	---	---	60.00	50.00		-4.42	L1
0.197	41.63	---	---	64.84	54.84		-13.21	L2
0.268	42.89	---	---	62.83	52.83		-9.94	L2
0.329	47.71	---	---	61.08	51.08		-3.37	L2
0.371	47.35	---	---	59.34	49.34		-1.99	L2
16.626	39.26	---	---	60.00	50.00		-10.74	L2
19.934	44.92	---	---	60.00	50.00		-5.08	L2

L1 = Line One (Hot side) / L2 = Line Two (Neutral side)
****NOTE:** "---" denotes the emission level was or more than 2dB below the Average limit, so no re-check anymore.

6.2 Hopping Channels

6.2.1 Measurement Procedure:
The same as described in section 5.2.1

6.2.2 Test SET-UP (Block Diagram of Configuration)
The same as described in section 5.2.2

6.2.3 Measurement Equipment Used:
The same as described in section 5.2.3

6.2.4 Limits And Measurement Result:

Limits and Measurement Result Of Hopping Channel		
Applicable Limits	**Measurement Result**	
	Test Data	Criteria
Per 15.247 (a)(1)(**ii**) At least 75 hopping Frequencies	91	PASS

6.3 Channel Separation

6.3.1 Measurement Procedure:
The same as described in section 5.3.1

6.3.2 Test SET-UP (Block Diagram of Configuration)
The same as described in section 5.3.2

6.3.3 Measurement Equipment Used:
The same as described in section 5.3.3

6.3.4 Limits And Measurement Result:

Limits and Measurement Result Of Channel Separation		
Applicable Limits	**Measurement Result**	
	Test Data	Criteria
Per 15.247 (a)(1) At least 25 KHz or 20 dB bandwidth of the hopping Channel, whichever is greater.	877 KHz	PASS

6.4 20 dB Bandwidth

6.4.1 Measurement Procedure
The same as described in section 5.4.1

6.4.2 Test SET-UP (Block Diagram of Configuration)
The same as described in section 5.4.2

6.4.3 Measurement Equipment Used:
The same as described in section 5.4.3

6.4.4 Limits And Measurement Results:

Limits and Measurement Result Of 20 dB Bandwidth For The Top Channel		
Applicable Limits	**Measurement Result**	
	Test Data	Criteria
Per 15.247 (a)(1)(**ii**) The maximum 20 dB bandwidth of the hopping channel is 1 MHz	779 KHz	PASS

Limits and Measurement Result Of 20 dB Bandwidth For The Middle Channel		
Applicable Limits	**Measurement Result**	
	Test Data	Criteria
Per 15.247 (a)(1)(**ii**) The maximum 20 dB bandwidth of the hopping channel is 1 MHz	776 KHz	PASS

Limits and Measurement Result Of 20 dB Bandwidth For The Bottom Channel		
Applicable Limits	**Measurement Result**	
	Test Data	Criteria
Per 15.247 (a)(1)(**ii**) The maximum 20 dB bandwidth of the hopping channel is 1 MHz	774 KHz	PASS

6.5 Operation Frequency

6.5.1 Measurement Procedure:
The same as described in section 5.5.1

6.5.2 Test SET-UP (Block Diagram of Configuration)
The same as described in section 5.5.2

6.5.3 Measurement Equipment Used:
The same as described in section 5.5.3

6.5.4 Limits And Measurement Result:

Limits and Measurement Result Of Operation Frequency		
Applicable Limits	**Measurement Result**	
	Test Data	Criteria
Per 15.247 The operation frequencies shall lie wholly within 2.4 GHz to 2.4835 GHz	Fl=2.40201 GHz	PASS
	Ft=2.47966 GHz	PASS

6.6 Peak Output Power

6.6.1 Measurement Procedure:
The same as described in section 5.6.1

6.6.2 Test SET-UP (Block Diagram of Configuration)
The same as described in section 5.6.2

6.6.3 Measurement Equipment Used:
The same as described in section 5.6.3

6.6.4 Limits And Measurement Result:

Limits and Measurement Result Of Peak Output Power		
Applicable Limits	**Measurement Result**	
	Test Data	Criteria
Per 15.247 (b)(1) The maximum peak output power is 1 W	Pt= 11.23dBm	PASS
	Pm=10.89 dBm	PASS
	Pl=10.76 dBm	PASS

6.7 Spurious Emission At Transmitting mode

6.7.1 Measurement Procedure:
The same as described in section 5.7.1

6.7.2 Test SET-UP (Block Diagram of Configuration)
The same as described in section 5.7.2

6.7.3 Measurement Equipment Used:
The same as described in section 5.7.3

6.7.4 Limits And Measurement Result:

Limits and Measurement Result Of Spurious Emission		
Applicable Limits	**Measurement Result**	
	Test Data	Criteria
Per 15.247 (c) In any 100 KHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produce by the intentional radiator shall be at least 20 dB below that in 100KHz bandwidth within the band that contains the highest level of the desired power. In addition, radiation emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in§15.209(a)	See as the chart below	PASS

Transmitting Mode On The Top Channel--- 2479.15 MHz								
Frequency (MHz)	**Reading level (dBuV)**	**Antenna Polarization**	**S.G. (dBm)**	**Cable loss (dB)**	**Ant.Gain (dB)**	**Emission level (dBm)**	**Limit (dBm)**	**Margin (dB)**
4958.45	46.48	V	-26.8	3.9	6.3	-24.4	-8.77	-15.63
4958.45	37.27	H	-35.0	3.9	6.3	-32.6	-8.77	-23.83
Others	--	V	--					
Others	--	H	--					

Transmitting Mode On The Middle Channel--- 2440.85 MHz								
Frequency (MHz)	**Reading level (dBuV)**	**Antenna Polarization**	**S.G. (dBm)**	**Cable loss (dB)**	**Ant.Gain (dB)**	**Emission level (dBm)**	**Limit (dBm)**	**Margin (dB)**
4881.76	46.27	V	-27.1	3.9	6.3	-24.7	-8.77	-15.93
4881.76	37.04	H	-35.2	3.9	6.3	-32.8	-8.77	-24.03
Others	--	V	--					
Others	--	H	--					

Transmitting Mode On The Bottom Channel--- 2402.54 MHz								
Frequency (MHz)	**Reading level (dBuV)**	**Antenna Polarization**	**S.G. (dBm)**	**Cable loss (dB)**	**Ant.Gain (dB)**	**Emission level (dBm)**	**Limit (dBm)**	**Margin (dB)**
4805.14	46.13	V	-27.2	3.9	6.3	-24.8	-8.77	-16.03
4805.14	36.88	H	-35.4	3.9	6.3	-33.0	-8.77	-24.23
Others	--	V	--					
Others	--	H	--					

Remark:

(1) Corrected Power (dBm) = SG O/P-Cable + Ant Gain
(2) Measuring frequencies from 30 MHz to the 25 GHz.
(3) Data of measurement within this frequency range shown " -- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

6.8 BAND EDGE

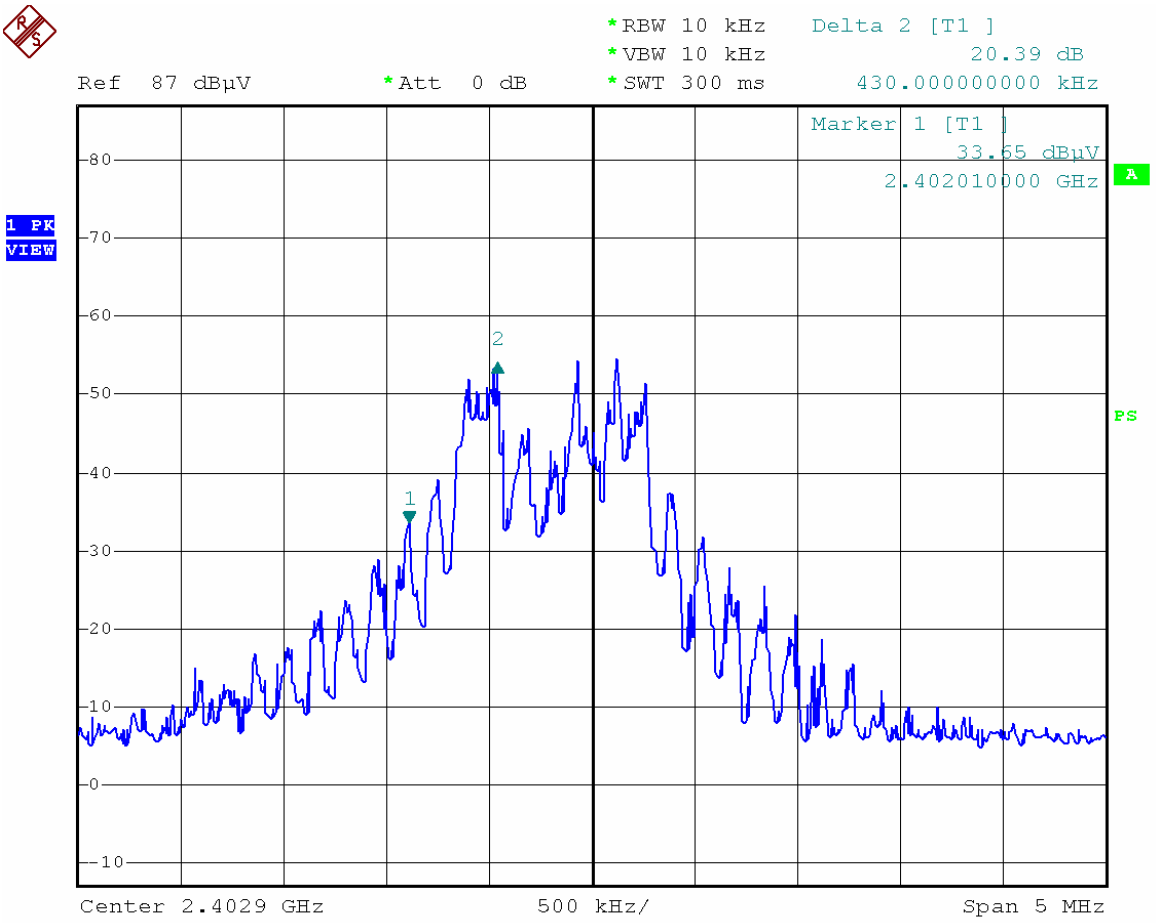
6.8.1 Measurement Procedure:
The same as described in section 5.8.1

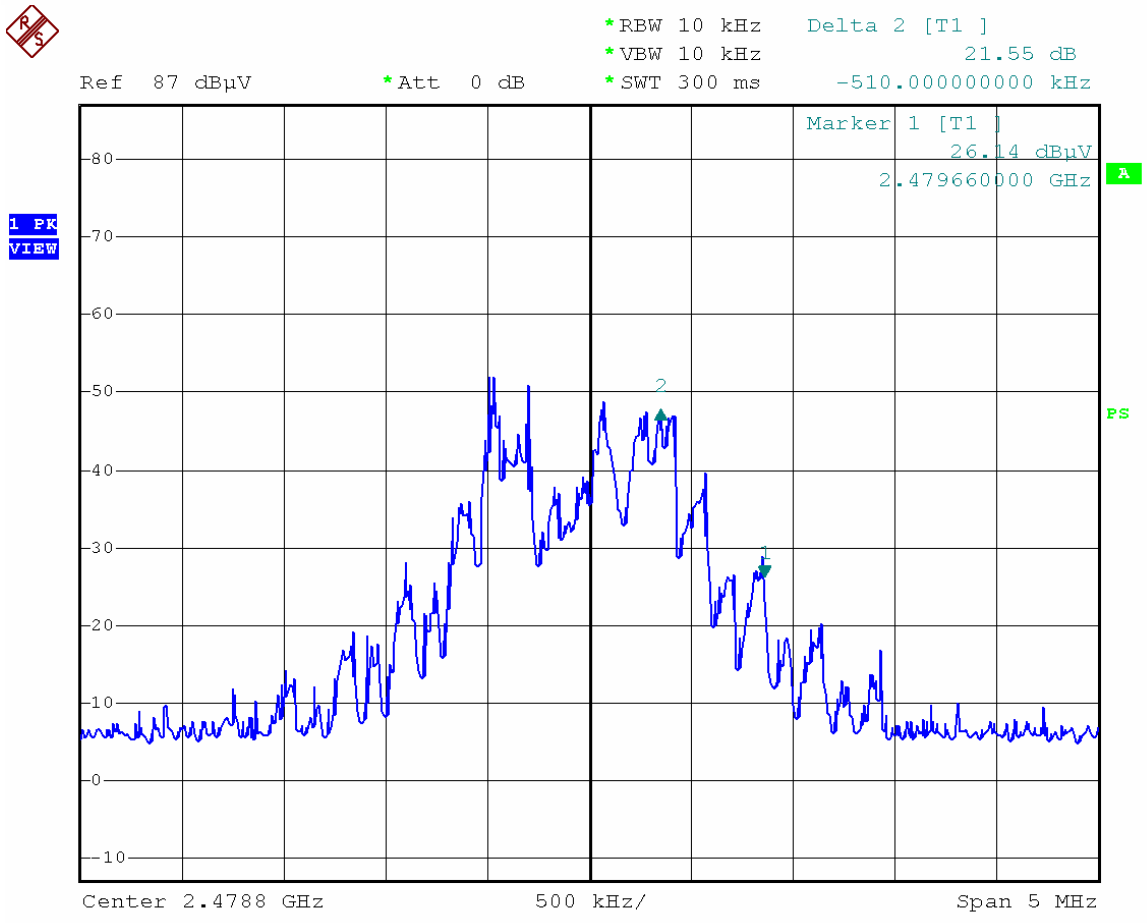
6.8.2 Test SET-UP (Block Diagram of Configuration)
The same as described in section 5.8.2

6.8.3 Measurement Equipment Used:
The same as described in section 5.8.3

6.8.4 Limits And Measurement Result:

Limits and Measurement Result Of Band Edge		
Applicable Limits	**Measurement Result**	
	Test Data	Criteria
Per 15.247 (c) In any 100 KHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produce by the intentional radiator shall be at least 20 dB below that in 100KHz bandwidth within the band that contains the highest level of the desired power.	See the test plot attached below	PASS


*RBW 10 kHz
*VBW 10 kHz
*SWT 300 ms
Delta 2 [T1]
20.39 dB
430.000000000 kHz
Ref 87 dBµV
*Att 0 dB
Marker 1 [T1]
33.55 dBµV
2.402010000 GHz
1 PK
VIEW
A
PS
80
70
60
50
40
30
20
10
0
-10
Center 2.4029 GHz
500 kHz/
Span 5 MHz


*RBW 10 kHz
*VBW 10 kHz
*SWT 300 ms
Delta 2 [T1]
21.55 dB
-510.000000000 kHz
Ref 87 dBµV
*Att 0 dB
Marker 1 [T1]
26.14 dBµV
2.479660000 GHz
1 PK
VIEW
A
PS
80
70
60
50
40
30
20
10
0
-10
Center 2.4788 GHz
500 kHz/
Span 5 MHz

6.9 Spurious Emission At Receiving Mode

6.9.1 Measurement Procedure:
The same as described in section 5.9.1

6.9.2 Test SET-UP (Block Diagram of Configuration)
The same as described in section 5.9.2

6.9.3 Measurement Equipment Used:
The same as described in section 5.9.3

6.9.4 Limits And Measurement Result:

Limits and Measurement Result Of Spurious Emission		
Applicable Limits	**Measurement Result**	
	Test Data	Criteria
§ 15.209 shall apply	See as the chart below	PASS

Operation Mode: Receiving Mode On the Top Channel--- 2479.15 MHz
Test Date : August 10, 2005
Temperature : 25 ℃
Test By: Jimmy Zhang
Humidity : 59 %
Pol: Vertical & Horizontal

Freq. (MHz)	Ant.Pol. H/V	DetectorMode (PK/AV)	Reading (dBuV)	Ant./CL/ Amp. CF(dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margin (dB)
Below 1 GHz	V	Peak	---				At least 20
Below 1 GHz	H	Peak	---				dB down
Above 1 GHz	V	Peak	---				the
Above 1 GHz	H	Peak	---				Limit

Operation Mode: Receiving Mode On the Middle Channel--- 2440.85 MHz
Test Date : August 10, 2005
Temperature : 25 ℃
Test By: Jimmy Zhang
Humidity : 59 %
Pol: Vertical & Horizontal

Freq. (MHz)	Ant.Pol. H/V	DetectorMode (PK/AV)	Reading (dBuV)	Ant./CL/ Amp. CF(dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margin (dB)
Below 1 GHz	V	Peak	---				At least 20
Below 1 GHz	H	Peak	---				dB down
Above 1 GHz	V	Peak	---				the
Above 1 GHz	H	Peak	---				Limit

Operation Mode:	Receiving Mode On the Bottom Channel--- 2402.54 MHz	Test Date :	August 10, 2005
Temperature :	25 ℃	Test By:	Jimmy Zhang
Humidity :	59 %	Pol:	Vertical & Horizontal

Freq. (MHz)	Ant.Pol. H/V	DetectorMode (PK/AV)	Reading (dBuV)	Ant./CL/ Amp. CF(dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margin (dB)
Below 1 GHz	V	Peak	---				At least 20
Below 1 GHz	H	Peak	---				dB down
Above 1 GHz	V	Peak	---				the
Above 1 GHz	H	Peak	---				Limit

Remark：

(1) Measuring frequencies from 25 MHz to the 25 GHz。

(2) Datas of measurement within this frequency range shown "--- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

(3) The IF bandwidth of EMI Test Receiver between 25MHz to 1GHz was 120KHz and 1 MHz for frequencies above 1 GHz

6.10 Dwell Time

6.10.1 Measurement Procedure:

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set EUT as Normal Operation mode
3. Set SPA Span= 0 Hz, RBW= 1 MHz, VBW= 1 MHz
4. Set SPA Trace 1 Max hold, then View.

6.10.2 Test SET-UP (Block Diagram of Configuration)

The same as described in Section 5.2.2

6.10.3 Measurement Equipment Used:

The same as described in Section 5.2.3

6.10.4 Limits And Measurement Result:

Limits and Measurement Result Of Dwell Time		
Applicable Limits	**Measurement Result**	
	Test Data	Criteria
Per 15.247 (a)(1)(ii) The average time of occupancy on any frequency shall not be greater than 0.4 seconds	326 ms	PASS

Notes:

The Dwell Time(Td) for each channel is 3.431314 ms and the Reap Time(Tr) for each channel is 384 ms. So the total Occupation Time(To) for each channel during 0.4 s × total number of the channels (Nc)' observation time is calculated by the following formula:

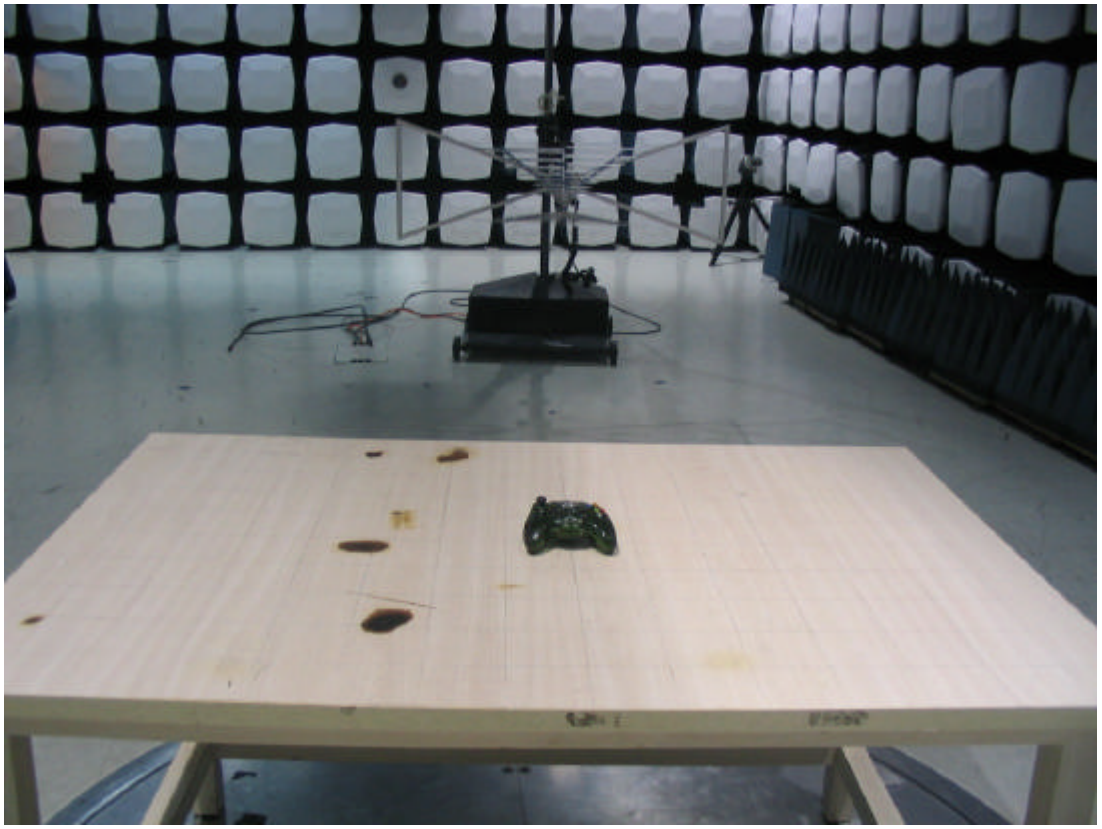
To = Td *(400 * Nc)/Tr = 3.437433 * (400 * 91)/ 384 = 325.84 ms

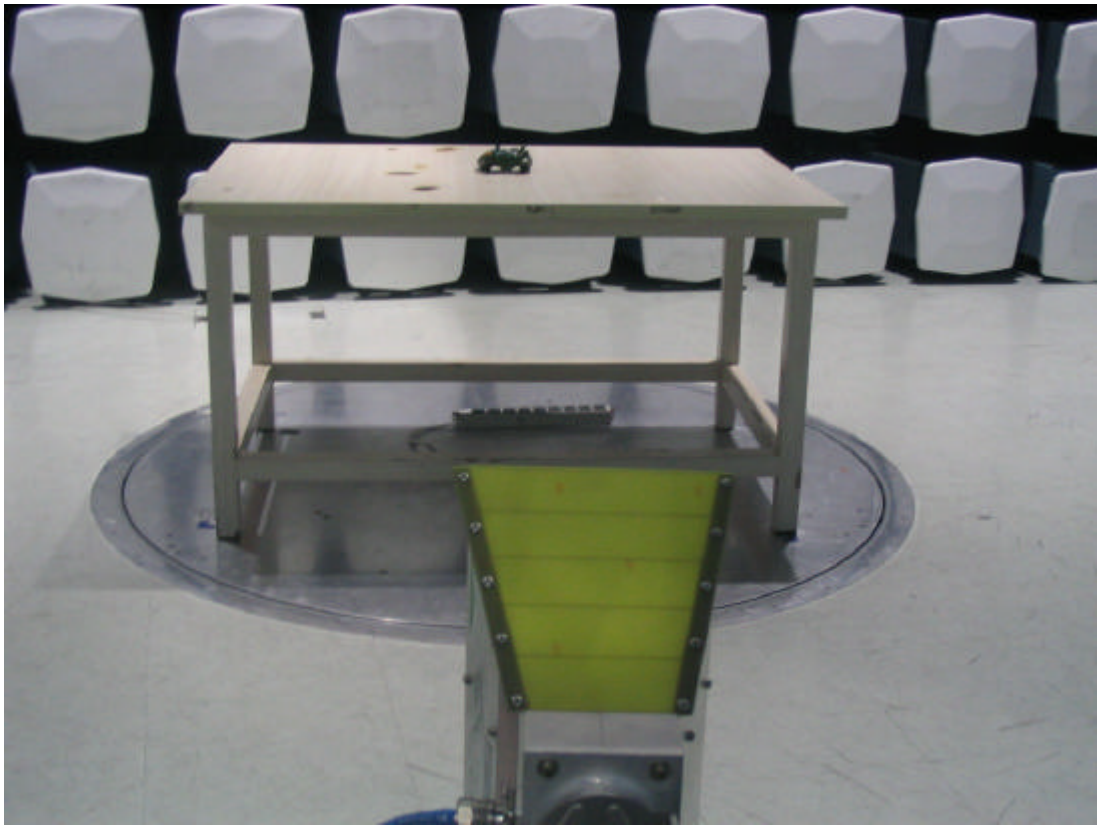
APPENDIX 1

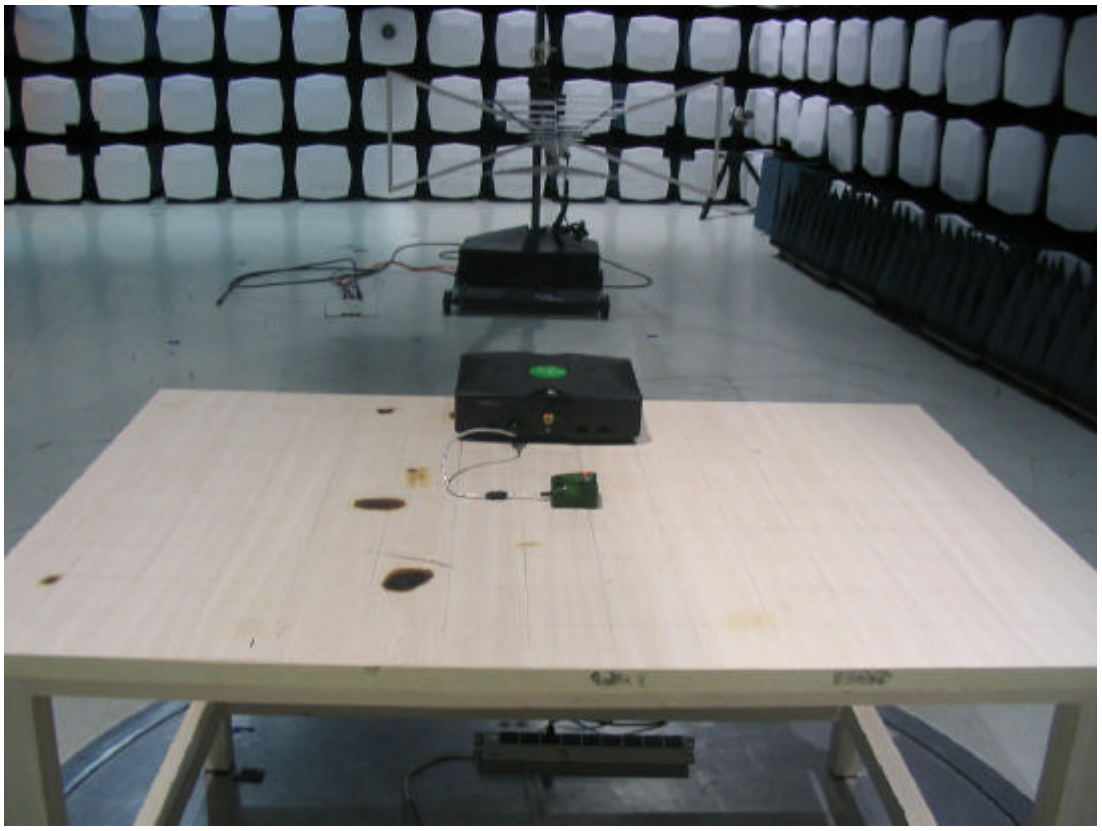
PHOTOGRAPHS OF SET UP

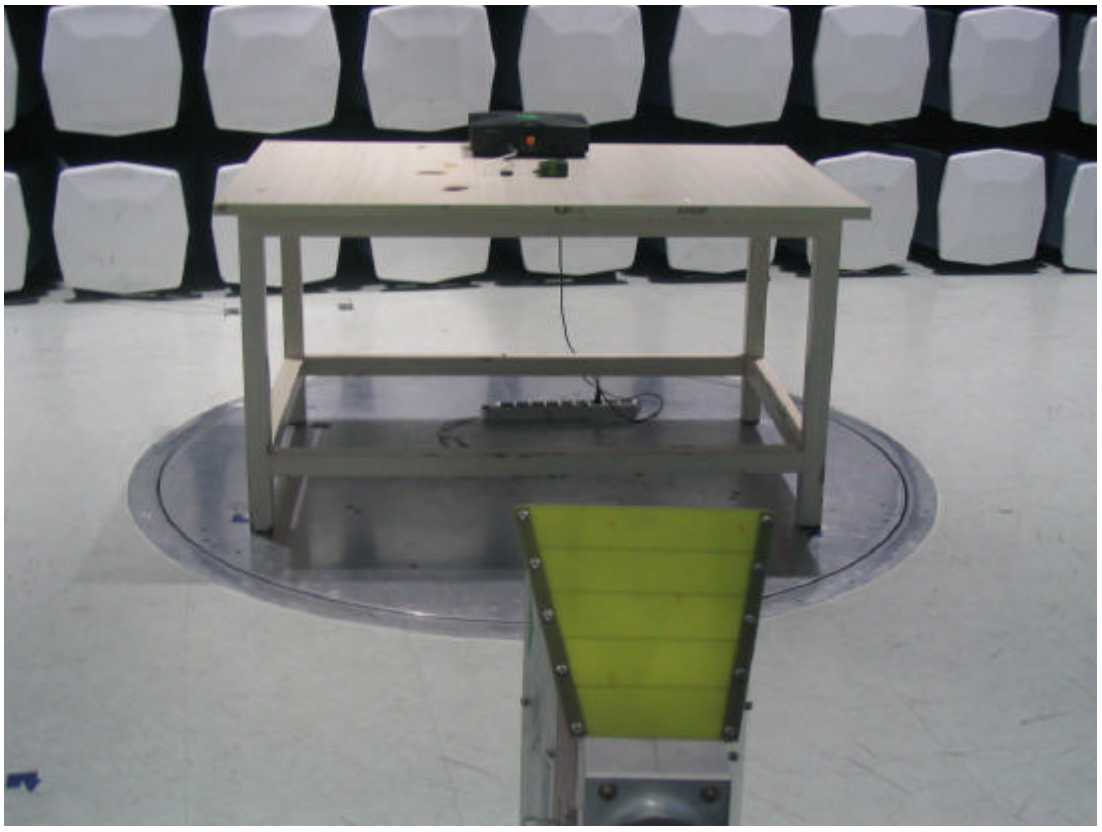
Conducted Emission Setup Photos

Radiated Emission Setup Photos









APPENDIX 2

PHOTOGRAPHS OF EUT

Top View of Game Pad

Bottom View of Game Pad

Front View of Game Pad

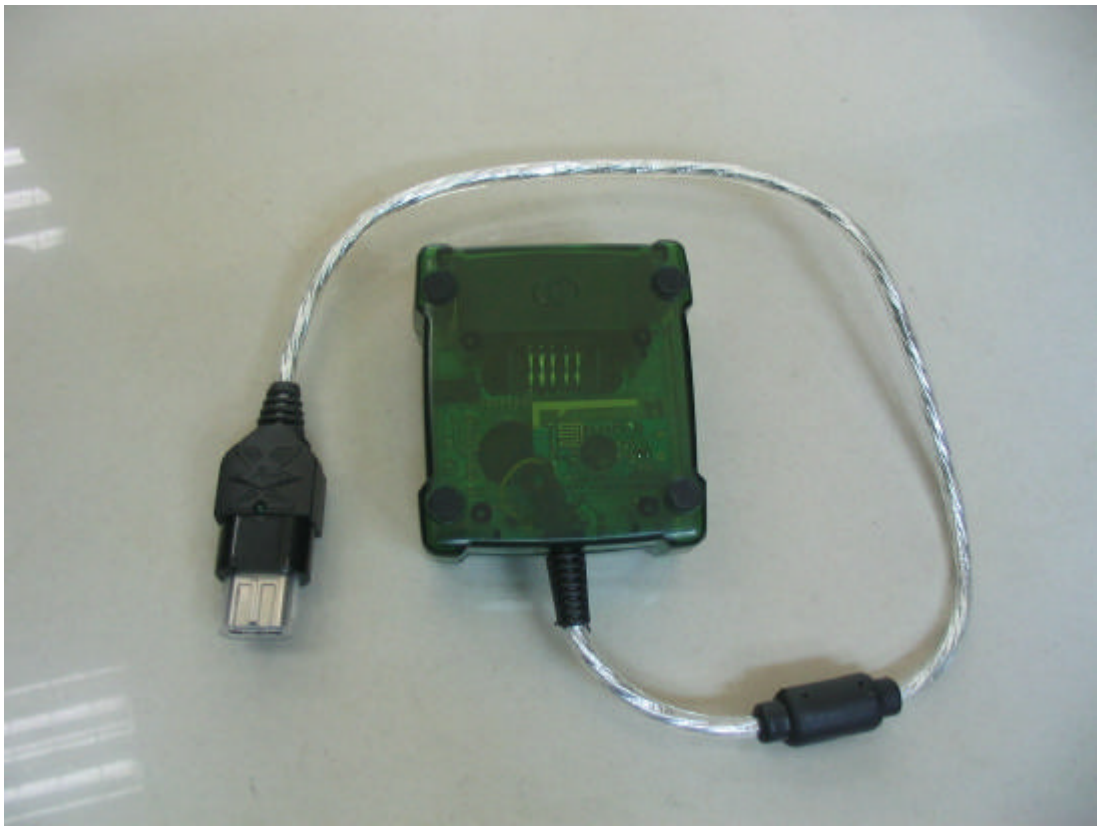
Back View of Game Pad

Left View of Game Pad

Right View of Game Pad

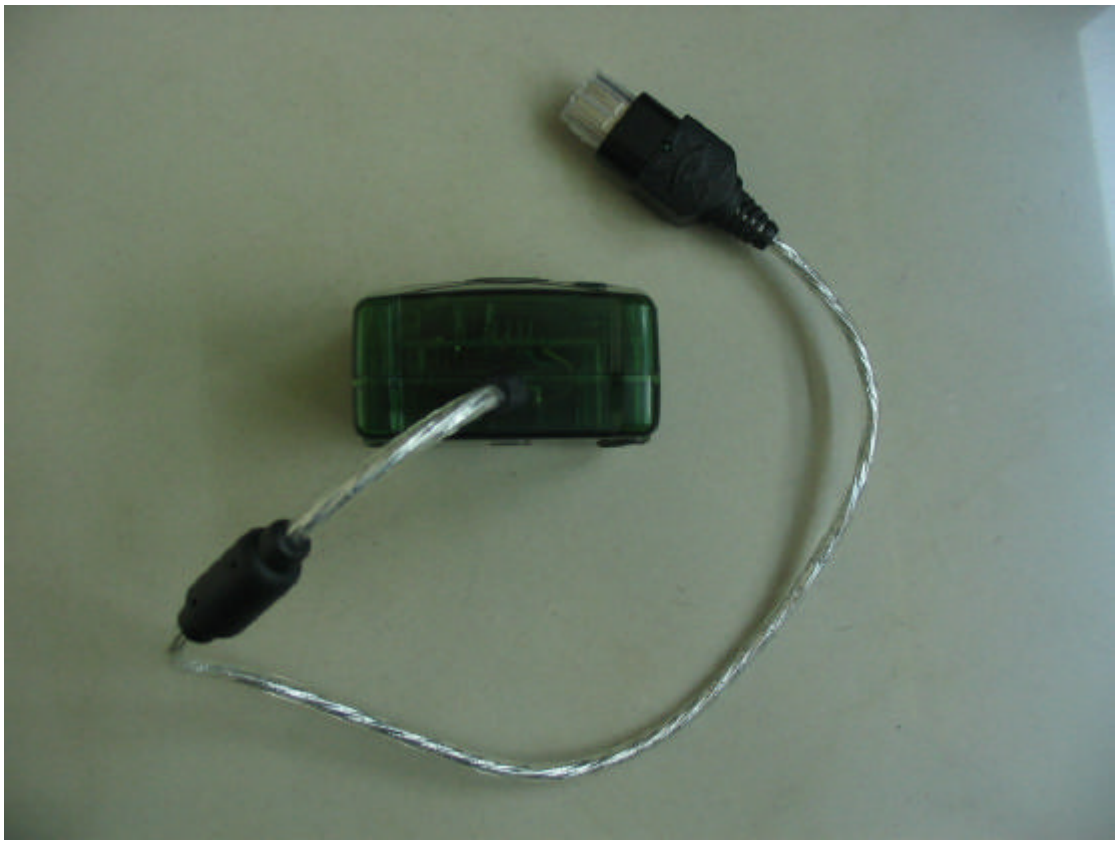
Top View of Host

Bottom View of Host



Front View of Host

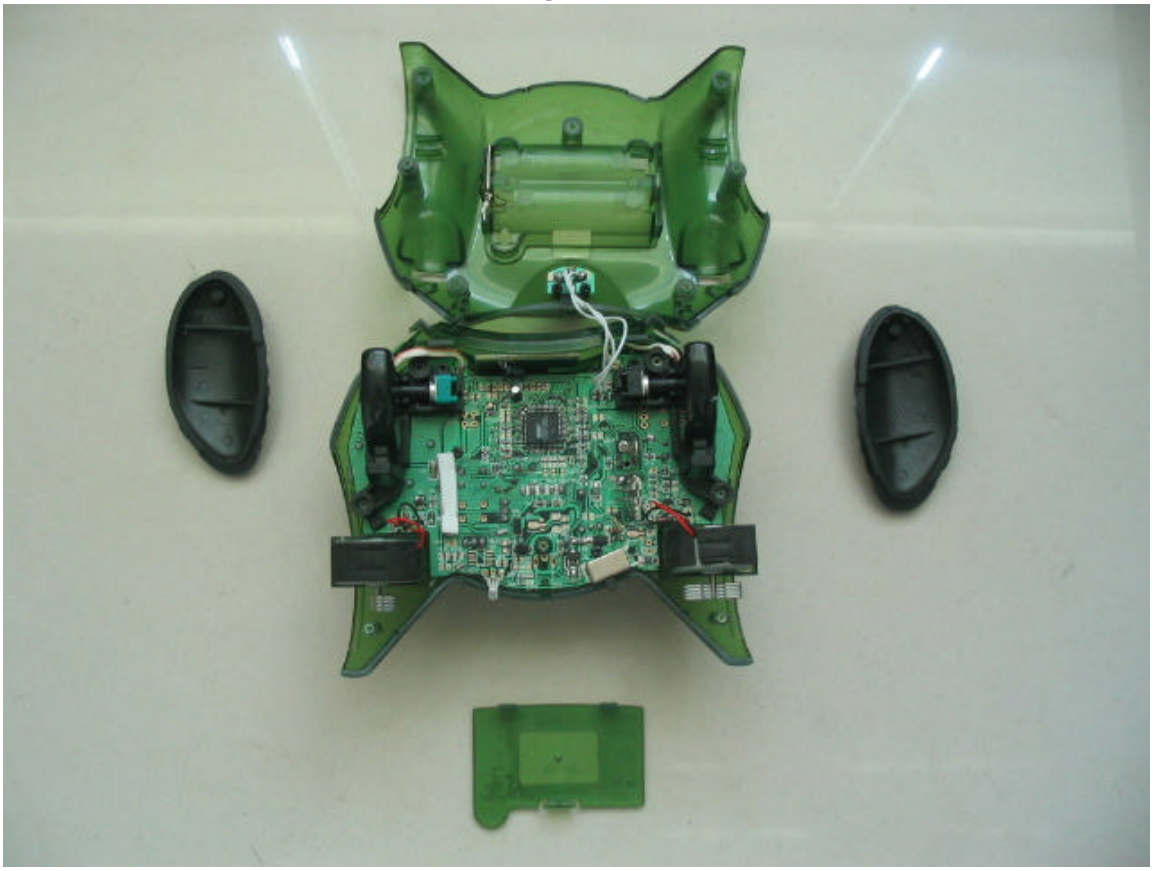
Back View of Host



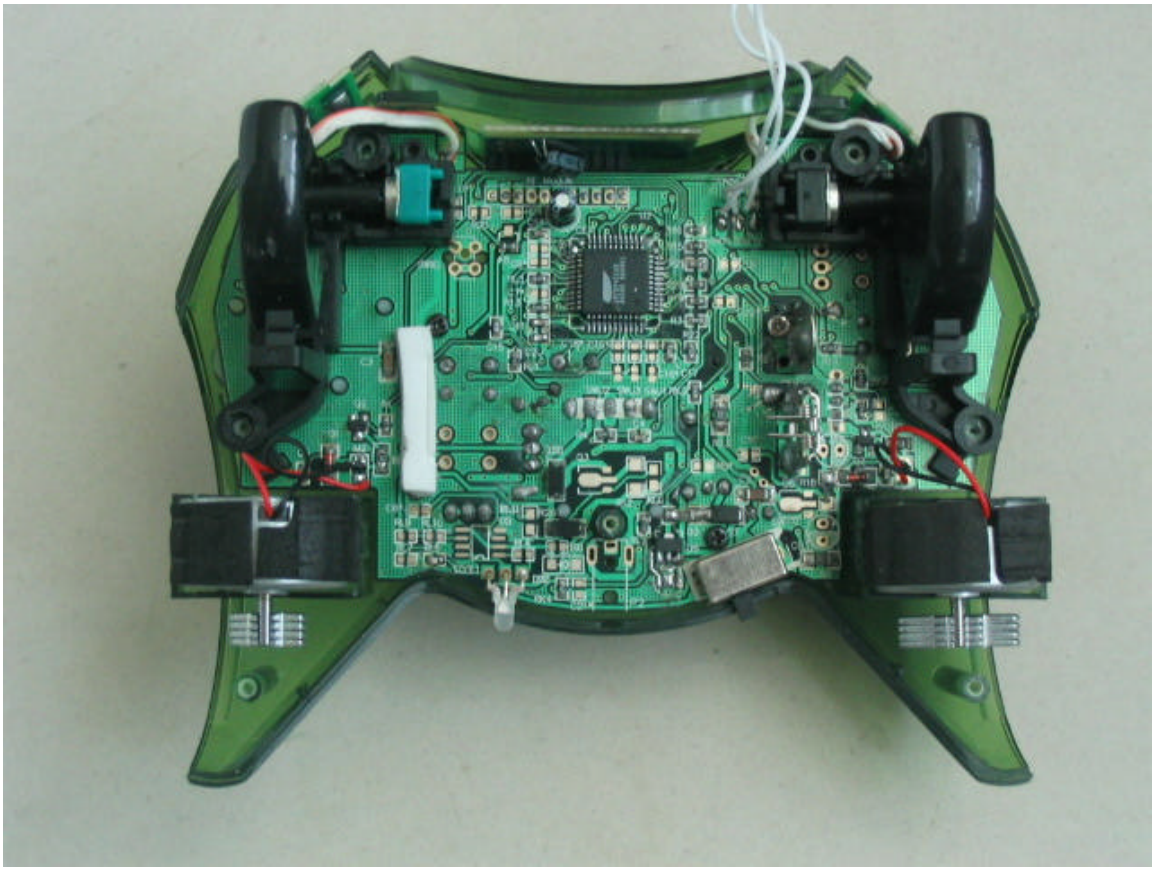
Left View of Host

Right View of Host

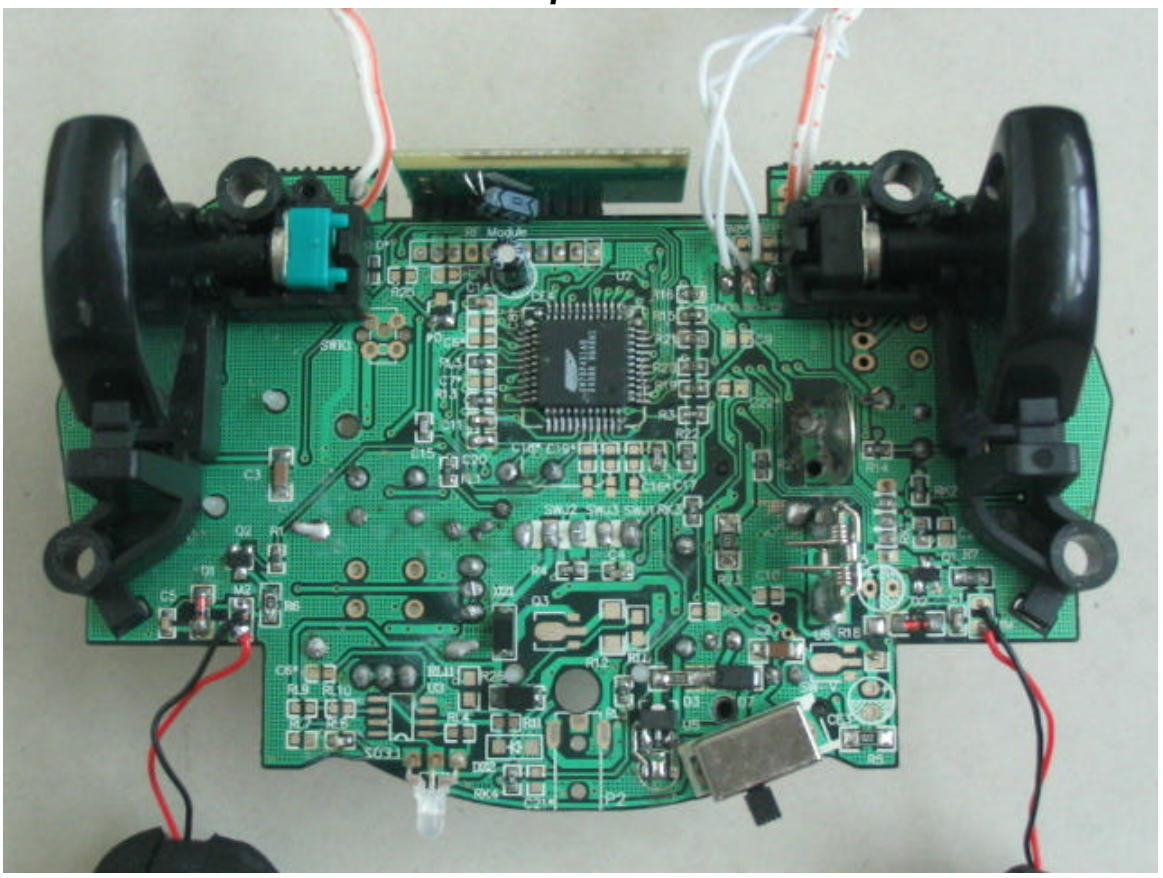
Internal of Game Pad-1



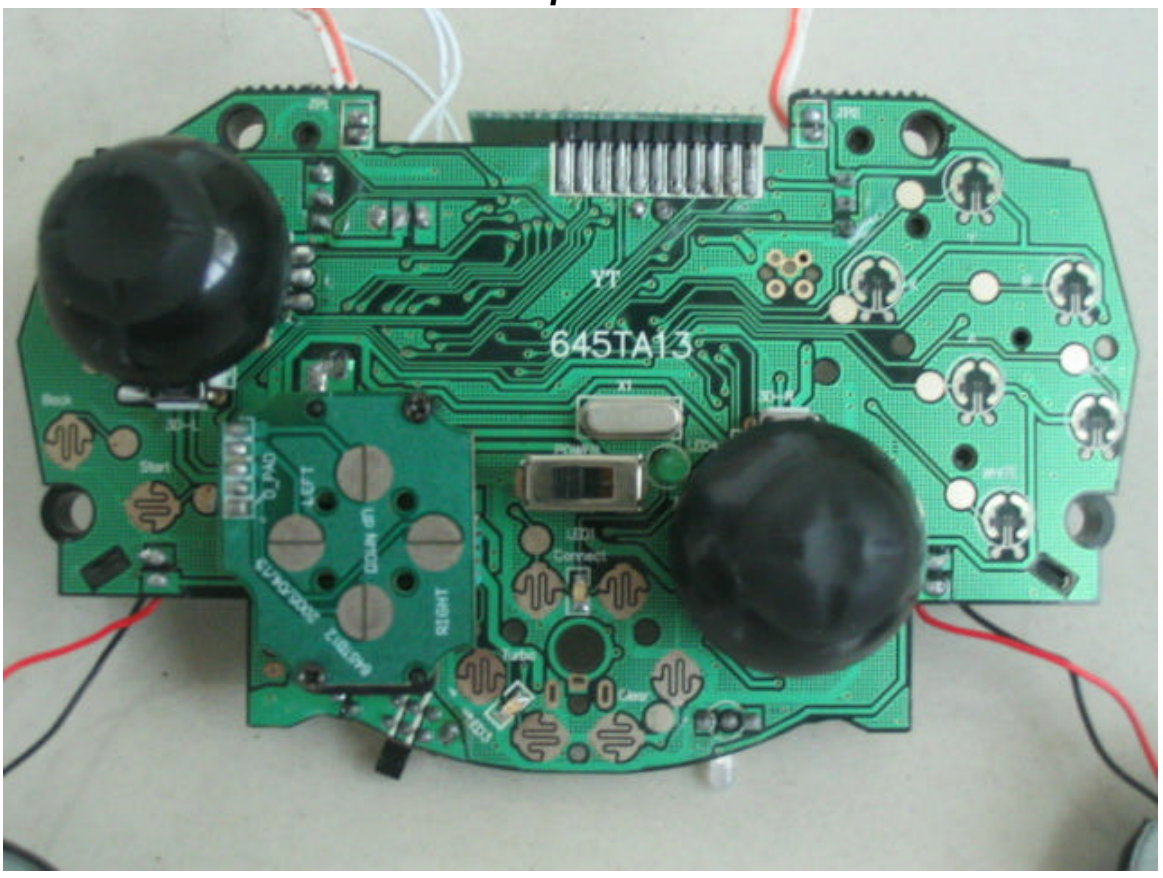
Internal of Game Pad-2



Internal of Game Pad-3

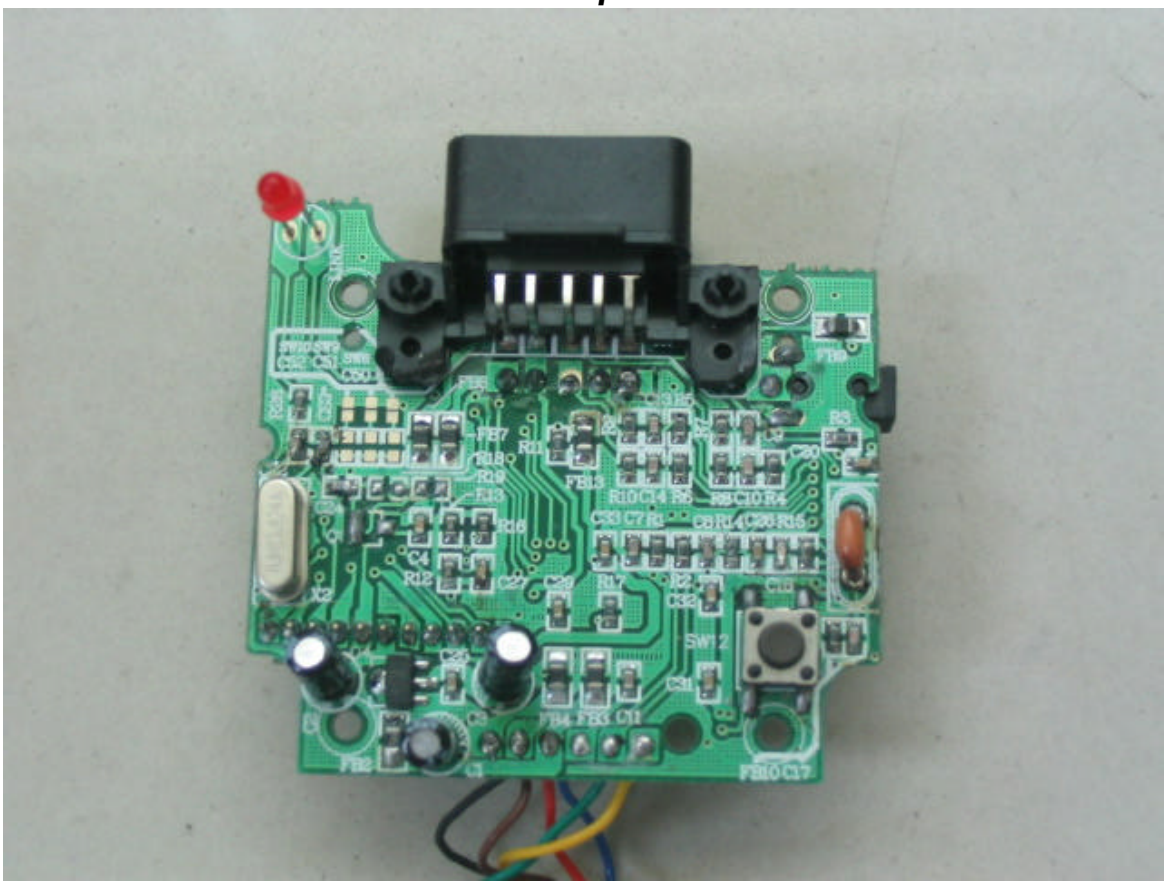


Internal of Game Pad-4



Internal of Host-1

Internal of Host-2



Internal of Host-3