香 港 標 準 及 檢 定 中 心
Hong Kong Standards and Testing Centre

Date : 2005-03-04
No. : HM151412

TEST REPORT

Applicant: SHENZHEN HAIS ELECTRONICS CO., LTD
14 Building, Chentian Industrial Zone,
Baomin 2/R, Bao'an, Shenzhen, China

Description of Samples:

Model name:	2.4G Game Controller
Model no.:	HS-2303B
Brand name:	N/A
FCC ID:	SSL2303B

Date Samples Received: 2004-06-08

Date Tested: 2004-07-02 to 2004-11-18

Investigation Requested: FCC Part 15 Regulations-Subpart C

Conclusions: The submitted product COMPLIED with the requirements of Federal Communications Commission [FCC] Regulations Part 15. The tests were performed in accordance with the standards described above and on Section 2.2 in this Test Report.

Remarks: ----

K C Lee, EMC
for Chief Executive

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Tel: (852) 2666 1888 Fax: (852) 2664 4353 Homepage: www.hkstc.org E-mail: hkstc@hkstc.org

Date : 2005-03-04
No. : HM151412

TEST REPORT

CONTENT:

1.0 General Details

1.1 Test Laboratory

The Hong Kong Standards and Testing Centre Ltd.
EMC Laboratory
10 Dai Wang Street, Taipo Industrial Estate
New Territories, Hong Kong

1.2 Applicant Details

Applicant

SHENZHEN HAIS ELECTRONIC CO., LTD
14 Building, Chentian Industrial Zone,
Baomin 2/R, Bao'an, Shenzhen, China

HKSTC Code Number for Applicant **SZH001**

Manufacturer

SHENZHEN HAIS ELECTRONIC CO., LTD
14 Building, Chentian Industrial Zone,
Baomin 2/R, Bao'an, Shenzhen, China

1.3 Equipment Under Test [EUT]

Description of Sample

Product:	2.4G Game Controller
Manufacturer:	Shenzhen Hais Electronic Co., Ltd.
Brand Name:	N/A
Model Number:	HS-2303B
Input Voltage:	6Vd.c. (“AAA” size battery x 4)

1.3.1 Description of EUT Operation

The Equipment Under Test (EUT) is a 2.4G Game Controller, the transmission signal is frequency hopping with channel frequency range 2.402-2.480 GHz.

1.4 Date of Order

2004-06-08

1.5 Submitted Sample(s):

10 Samples per model

1.6 Test Duration

2004-07-02 to 2004-11-18

1.7 Country of Origin

China

1.8 Additional Information of EUT

	Submitted	Not Available
User Manual	☒	☐
Part List	☒	☐
Circuit Diagram	☒	☐
Printed Circuit Board [PCB] Layout	☒	☐
Block diagram	☒	☐
FCC ID Label	☒	☐

2.0 Technical Details

2.1 Investigations Requested

Perform Electromagnetic Interference measurements in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15 Regulations and ANSI C63.4:2003 for FCC Certification.

2.2 Test Standards and Results Summary Tables

EMISSION Results Summary						
Test Condition	Test Requirement	Test Method	Class / Severity	Test Result		
				Pass	Fail	N/A
Field Strength of Fundamental & Harmonics Emissions	FCC 47CFR 15.249	ANSI C63.4:2003	N/A	☒	☐	☐
Radiated Emissions, 30MHz to 1GHz	FCC 47CFR 15.209	ANSI C63.4:2003	Class B	☒	☐	☐
Conducted Emissions on AC, 0.15MHz to 30MHz	FCC 47CFR 15.207	ANSI C63.4:2003	N/A	☐	☐	☒

Note: N/A - Not Applicable

3.0 Test Results

3.1 Emission

3.1.1 Radiated Emissions

Test Requirement:	FCC 47CFR 15.249
Test Method:	ANSI C63.4:2003
Test Date:	2004-11-18
Mode of Operation:	Tx mode

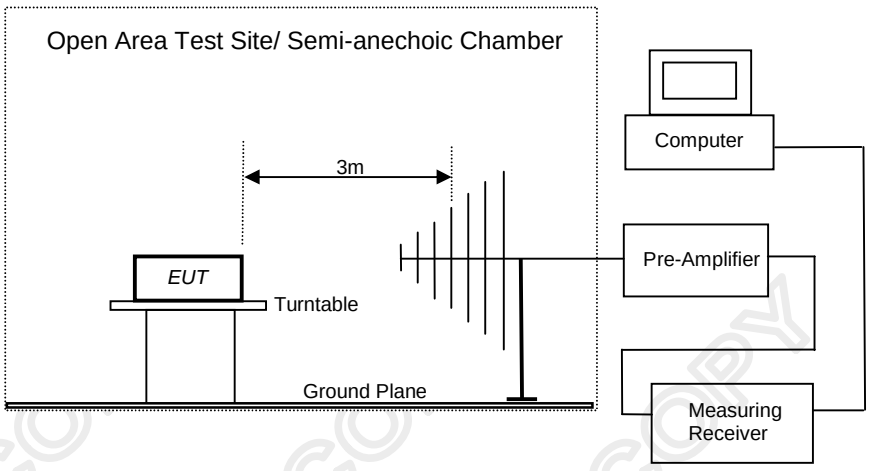
Test Method:

The sample was placed 0.8m above the ground plane on the *OATS / **Semi-anechoic Chamber, measurements in both horizontal and vertical antenna polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The worst case(s) of emission is/are shown in Test Results of the following pages.

* OATS [Open Area Test Site] located at HKSTC with a metal ground plane filed with the FCC pursuant to section 2.948 of the FCC rules, with Registration Number: 90657.

** Semi-anechoic chamber located at HKSTC filed with the FCC pursuant to section 2.948 of the FCC rules, with Registration Number: 607756. (This has been used in the report)

Test Setup:



Date : 2005-03-04
No. : HM151412

TEST REPORT

Limits for Field Strength of Fundamental & Harmonics Emissions [FCC 47CFR 15.249]:

Frequency Range of Fundamental [MHz]	Field Strength of Fundamental Emission [microvolts/meter]	Field Strength of Harmonics Emission [microvolts/meter]
2400-2483.5	50,000 [average]	500 [Average]

Results of Lowest Channel Frequency : Pass

Field Strength of Fundamental & Harmonics Emissions
Peak Value

	Frequency MHz	EMI Receiver Reading dBuV	Antenna factor dB/m	Cable Loss dB	Preamplifier Gain dB	Field Strength dBuV/m	Field Strength uV/m	Limit @ 3meter µV/m	E-Field Polarity
	2402	88.4	30.6	3.3	34.9	87.4	23,442.0	50,000	Horizontal
*	4804	50.5	35.3	5.3	34.2	56.9	699.8	5,000	H & V
	7206	30.8	38.2	7.4	33.6	42.8	138.0	500	H & V
	9608	30.4	40.1	8.2	33.6	45.1	179.9	500	H & V
*	12010	32.6	40.5	10	32.5	50.6	338.8	500	H & V
	14412	31.7	42.4	9.6	30.6	53.1	451.8	500	H & V
	16814	30.6	41.1	10.2	31.6	50.3	327.3	500	H & V
*	19216	30.4	42.3	11.3	31.5	52.5	398.1	500	H & V
	21618	30.5	42.6	12.5	32.3	53.3	462.3	500	H & V
	24020	30.5	42.8	12.9	32.5	53.7	484.1	500	H & V

Field Strength of Fundamental & Harmonics Emissions
Average Value

	Frequency MHz	EMI Receiver Reading dBuV	Antenna factor dB/m	Cable Loss dB	Preamplifier Gain dB	Field Strength dBuV/m	Field Strength uV/m	Limit @ 3meter µV/m	E-Field Polarity
#	2402	68.4	30.6	3.3	34.9	67.4	55.6	50,000	Horizontal
#*	4804	30.5	35.3	5.3	34.2	36.9	51.3	5,000	H & V

Remarks:

Field Strength (dBuV/m) = EMI receiver reading (dbuV)+Antenna factor (dB/m)+cable loss (dB)-Preamplifier.
#: Adjusted by Duty Cycle = -20dB
*: Denotes restricted band of operation.
Measurements were made using a peak detector. Any emission less than 1000 MHz and falling within the restricted bands of FCC Rules Part 15 Section 15.205 and the limits of FCC Rules Part 15 Section 15.209 were applied.

Calculated measurement uncertainty : 30MHz to 1GHz ±4.1dB
1GHz to 18GHz ±4.4dB

Date : 2005-03-04
No. : HM151412

TEST REPORT

Results of Middle Channel Frequency: Pass

Field Strength of Fundamental & Harmonics Emissions Peak Value								
Frequency MHz	EMI Receiver Reading dBuV	Antenna factor dB/m	Cable Loss dB	Preamplifier Gain dB	Field Strength dBuV/m	Field Strength uV/m	Limit @ 3meter µV/m	E-Field Polarity
2440	87.2	30.6	3.3	34.9	86.2	20,417.0	50,000	Horizontal
* 4880	48.6	35.3	5.3	33.8	55.4	588.8	5,000	H & V
* 7320	30.7	38.2	7.4	33.8	42.5	133.4	500	H & V
9760	30.4	40.1	8.2	33.4	45.3	184.1	500	H & V
* 12200	31.9	40.5	10	32.9	49.5	298.5	500	H & V
14640	31.5	42.4	9.6	31.3	52.2	398.1	500	H & V
17080	30.3	41.1	10.2	31.6	50.0	316.2	500	H & V
* 19520	30.1	42.3	11.3	31.5	52.2	407.3	500	H & V
* 21960	30.3	42.6	12.5	32.3	53.1	451.8	500	H & V
24400	30.2	42.8	12.9	32.5	53.4	467.7	500	H & V

Field Strength of Fundamental & Harmonics Emissions Average Value								
Frequency MHz	EMI Receiver Reading dBuV	Antenna factor dB/m	Cable Loss dB	Preamplifier Gain dB	Field Strength dBuV/m	Field Strength uV/m	Limit @ 3meter µV/m	E-Field Polarity
# 2440	67.2	30.6	3.3	34.9	66.2	55.6	50,000	Horizontal
#* 4880	28.6	35.3	5.3	33.8	35.4	49.0	5,000	H & V

Remarks:
Field Strength (dBuV/m) = EMI receiver reading (dbuV)+Antenna factor (dB/m)+cable loss (dB)-Preamplifier.
#: Adjusted by Duty Cycle = -20dB
*: Denotes restricted band of operation.
Measurements were made using a peak detector. Any emission less than 1000 MHz and falling within the restricted bands of FCC Rules Part 15 Section 15.205 and the limits of FCC Rules Part 15 Section 15.209 were applied.

Calculated measurement uncertainty : 30MHz to 1GHz ±4.1dB
1GHz to 18GHz ±4.4dB

Date : 2005-03-04
No. : HM151412

TEST REPORT

Results of Highest Channel Frequency: Pass

Field Strength of Fundamental & Harmonics Emissions Peak Value								
Frequency MHz	EMI Receiver Reading dBuV	Antenna factor dB/m	Cable Loss dB	Preamplifier Gain dB	Field Strength dBuV/m	Field Strength uV/m	Limit @ 3meter µV/m	E-Field Polarity
2480	86.2	30.6	3.3	34.6	85.5	18,836.0	50,000	Horizontal
* 4960	45.8	35.9	5.4	33.7	53.4	467.7	5,000	H & V
* 7440	30.8	39.1	7.4	33.8	43.5	149.6	500	H & V
9920	30.5	40.6	8.2	33.3	46.0	199.5	500	H & V
* 12400	30.8	41.0	10.1	32.2	49.7	305.5	500	H & V
14880	31.4	42.9	9.7	30.8	53.2	457.1	500	H & V
17360	30.6	44.0	10.3	31.0	53.9	495.5	500	H & V
* 19840	30.3	42.3	11.3	31.5	52.4	416.8	500	H & V
* 22320	29.8	42.6	12.5	32.3	52.6	426.5	500	H & V
24800	30.3	42.8	12.9	32.5	53.5	473.1	500	H & V

Field Strength of Fundamental & Harmonics Emissions Average Value								
Frequency MHz	EMI Receiver Reading dBuV	Antenna factor dB/m	Cable Loss dB	Preamplifier Gain dB	Field Strength dBuV/m	Field Strength uV/m	Limit @ 3meter µV/m	E-Field Polarity
# 2480	66.2	30.6	3.3	34.6	65.5	53.7	500,000	Horizontal
#* 4960	25.8	35.9	5.4	33.7	33.4	48.4	5,000	H & V

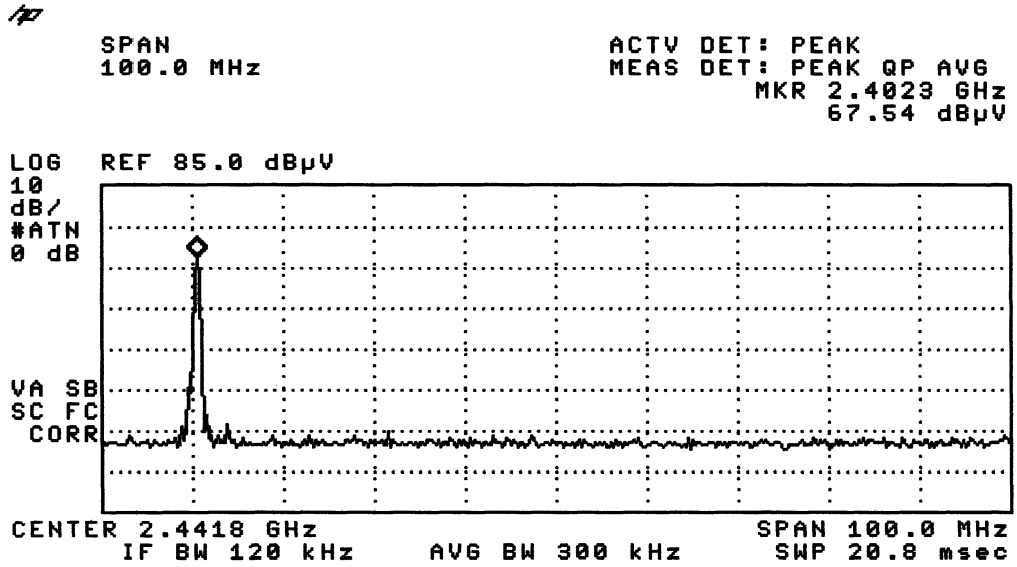
Remarks:
Field Strength (dBuV/m) = EMI receiver reading (dbuV)+Antenna factor (dB/m)+cable loss (dB)-Preamplifier.
#: Adjusted by Duty Cycle = -20dB
*: Denotes restricted band of operation.
Measurements were made using a peak detector. Any emission less than 1000 MHz and falling within the restricted bands of FCC Rules Part 15 Section 15.205 and the limits of FCC Rules Part 15 Section 15.209 were applied.

Calculated measurement uncertainty : 30MHz to 1GHz ±4.1dB
1GHz to 18GHz ±4.4dB

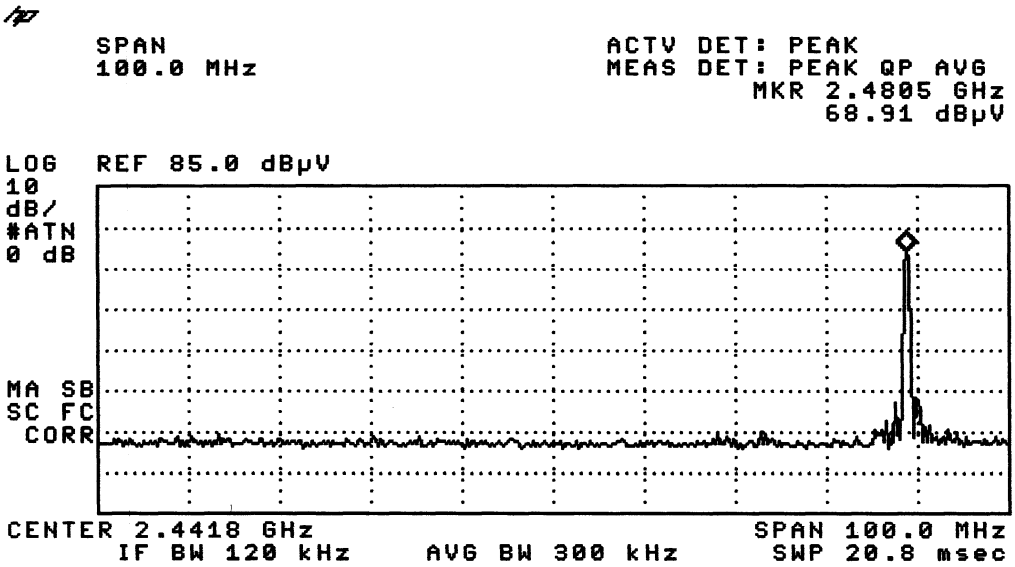
Date : 2005-03-04
No. : HM151412

TEST REPORT

Lower Frequency



Highest Frequency



Date : 2005-03-04
No. : HM151412

TEST REPORT

Limits for Radiated Emissions [FCC 47 CFR 15.209 Class B]:

Frequency Range [MHz]	Quasi-Peak Limits [µV/m]
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

Results :

Radiated Emissions Quasi-Peak						
Frequency MHz	Measured Level @3m dBµV/m	Correction Factor dBµV/m	Field Strength dBµV/m	Field Strength µV/m	Limit @3m µV/m	E-Field Polarity
NO EMISSION DETECTED WITHIN 20dB OF THE FCC LIMITS						

Remarks:

Correction Factor included Antenna Factor and Cable Attenuation.
Calculated measurement uncertainty : 30MHz to 1GHz ±4.1dB

3.2 Conducted Emissions (0.15MHz to 30MHz)

Test Requirement:	FCC 47CFR 15.207
Test Method:	ANSI C63.4:2003
Test Date:	N/A
Mode of Operation:	N/A

Results: N/A

There is no provision for operating the EUT from AC mains power, therefore, this test is not applicable.

Date : 2005-03-04
No. : HM151412

TEST REPORT

Appendix A

LIST OF MEASUREMENT EQUIPMENT

Radiated Emission

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL
EM007	SPECTRUM ANALYZER	HEWLETT PACKARD	HP85660B	3144A21192	15/06/04
EM008	SPECTRUM ANALYZER DISPLAY	HEWLETT PACKARD	HP85662A	3144A20514	15/06/04
EM009	QUASI PEAK ADAPTOR	HEWLETT PACKARD	HP85650A	3303A01702	15/06/04
EM010	RF PRESELECTOR	HEWLETT PACKARD	HP85685A	3221A01410	15/06/04
EM011	ATTENUATOR/SWITCH	HEWLETT PACKARD	HP11713A	2508A10595	15/06/04
EM012	PRE-AMPLIFIER	HEWLETT PACKARD	HP8449B	3008A00262	15/06/04
EM013	CONTROLLER (COMPUTER), COLOR MONITOR, KEYBOARD , MOUSE & FLOPPY DRIVE	HEWLETT PACKARD	HP9000 HP A1097C HP9133L	6226A60314 3151J39517 2623A02468	15/06/04
EM020	HORN ANTENNA	ETS-Linggren	3115	4032	30/07/03
EM022	LOOP ANTENNA	ETS-Linggren	6502	1189-2424	19/09/03
EM072	SIGNAL GENERATOR	HEWLETT PACKARD	8640B	1948A11892	N/A
EM083	OPEN AREA TEST SITE	HKSTC	N/A	N/A	08/02/03
EM131	EMC ANALYZER	HEWLETT PACKARD	8595EM	3710A00155	13/01/04
EM145	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESCS 30	830245/021	04/10/04
EM195	ANTENNA POSITIONING MAST	ETS-Linggren	2075	2368	N/A
EM196	MULTI-DEVICE CONTROLLER	ETS-Linggren	2090	1662	N/A
EM215	MULTIDEVICE CONTROLER	ETS-Linggren	2090	00024676	N/A
EM216	MINI MAST SYSTEM	ETS-Linggren	2075	00026842	N/A
EM217	ELECTRIC POWERED TURNTABLE	ETS-Linggren	2088	00029144	N/A
EM218	ANECHOIC CHAMBER	ETS-Linggren	FACT-3	--	19/03/04
EM219	BICONILOG ANTENNA	ETS-Linggren	3142C	00029071	28/10/03
EM223	HORN ANTENNA	EMCO	3160-09	08163126	18/06/04
EM224	HORN ANTENNA	EMCO	3160-09	08198430	20/06/04

Line Conducted

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL
EM078	VARIAC	SHANGHAI VOLTAGE	TDGC-3/0.5	N/A	CM
EM081	SMALL SCREENED ROOM	MIKO INST HK	N/A	N/A	27/01/05
EM119	LISN	ROHDE & SCHWARZ	ESH3-Z5	0831.5518.52	14/10/04
EM127	ISOLATION TRANSFORMER 220 TO 300V	WING SUN	N/A	N/A	CM
EM142	PULSE LIMITER	ROHDE & SCHWARZ	ESH3Z2	357.8810.52	04/08/04
EM181	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESIB7	100072	06/01/04
EM154	SHIELDING ROOM	SIEMENA MATSUSHITA COMPONENTS	N/A	803-740-057-99A	27/01/05
EM197	LISN	ETS-Linggren	4825/2	1193	05/06/04
EM213	DIGITAL POWER METER	VICNOBL	VIP120	00277	14/09/04

Remarks:-
CM Corrective Maintenance
N/A Not Applicable or Not Available
TBD To Be Determined

Appendix B

Duty Cycle Correction During 100msec

Each function key sends a different series of characters, but each packet period (90msec) never exceeds a series of 9 long (1msec) or short (750µsec) pulses. Assuming any combination of short and long pulses may be obtained due to encoding the worst case transmit duty cycle would be considered 9x1msec per 90msec=10% duty cycle. Figure A through C show the characteristics of the pulses train for one of these functions.

Remarks:

Duty Cycle Correction = 20Log(0.1) =-20dB

The following figures [Figure A to Figure C] showed the characteristics of the pulse train for one of these functions.

Figure A [Pulse Train]

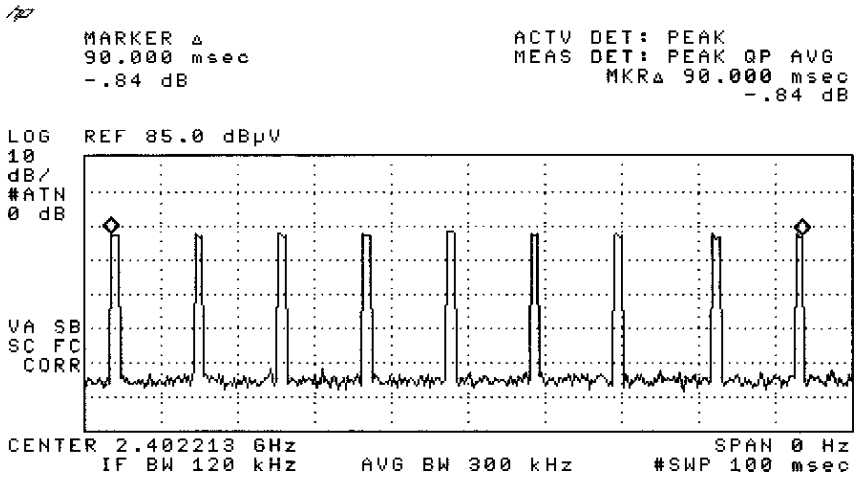


Figure B [Long Pulse]

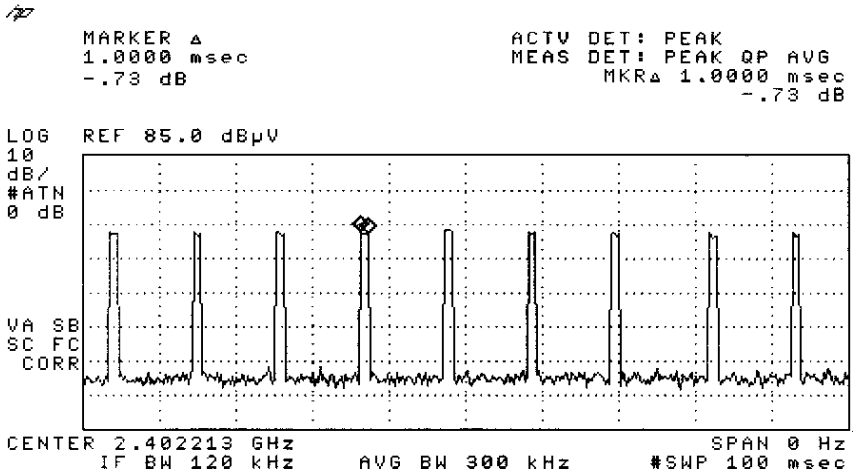
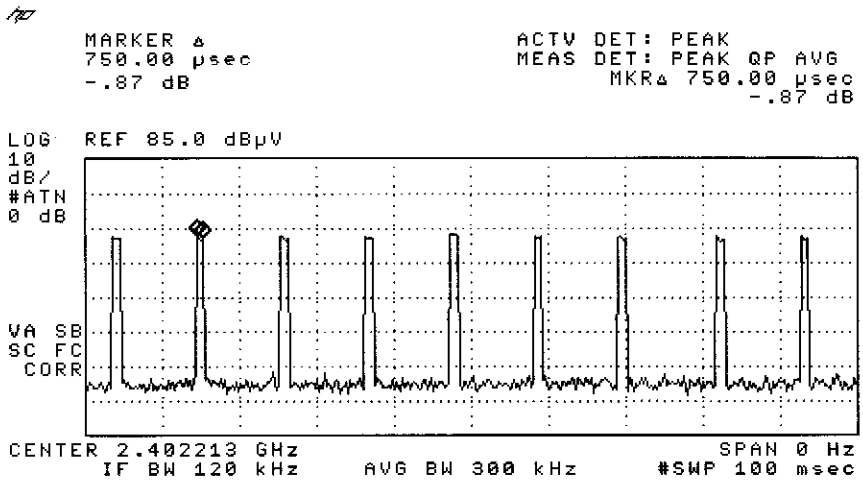


Figure C [Short Pulse]



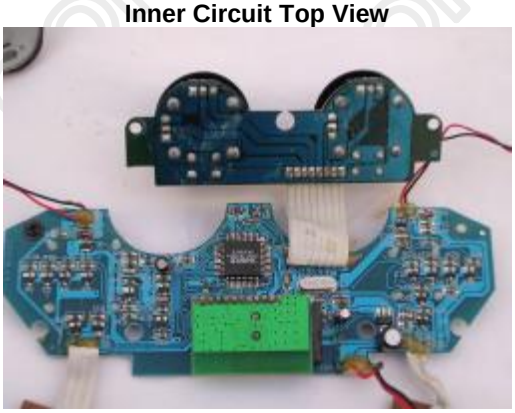
Appendix C

Photographs of EUT

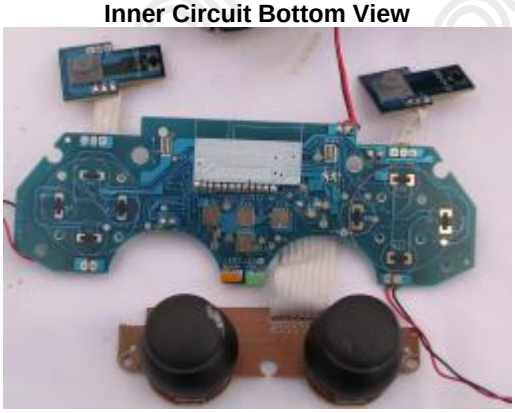
Front View of the product

Rear View of the product

Inner Circuit Top View



Inner Circuit Bottom View



Photographs of EUT

Measurement of Radiated Emission Test Set Up

******* End of Test Report *******