



香港標準及檢定中心
Hong Kong Standards and Testing Centre

Date : 2005-12-02

No. : HM155303

TEST REPORT

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Applicant:

E-Core Technology (China) Co., Ltd.
3rd Building, Wei Dong Long Industry,
He Ping East Long Hua Town, Shenzhen City,
Guang Dong, Shenzhen City, China

Description of Samples:

Model name: DG-NGC WIRELESS I.GLOW
CONTROLLER WITH LEDS
Model no.: DGNC-696A
Brand name: dreamGEAR
FCC ID: SIWNC696A

Date Samples Received:

2005-10-06

Date Tested:

2005-12-13

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:

LEE Kam Chuen, EMD
For and on behalf of
The Hong Kong Standards and Testing Centre Ltd.

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Appendix A

List of Measurement Equipment

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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

E-Core Technology (China) Co., Ltd.
3rd Building, Wei Dong Long Industry,
He Ping East Long Hua Town, Shenzhen City, Guang Dong,
Shenzhen City, China

Manufacturer

E-Core Technology (China) Co., Ltd.
3rd Building, Wei Dong Long Industry,
He Ping East Long Hua Town, Shenzhen City, Guang Dong,
Shenzhen City, China

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**1.3 Equipment Under Test [EUT]
Description of Sample**

Model Name: DG-NGC WIRELESS I.GLOW CONTROLLER WITH LEDS
Manufacturer: E-Core Technology (China) Co., Ltd.
Brand Name: dreamGEAR
Model Number: DGNC-696A
Input Voltage: The product draws power from the signal port of the console.

1.3.1 Description of EUT Operation

The Equipment Under Test (EUT) is a DG-NGC WIRELESS I.GLOW CONTROLLER WITH LEDS, the transmission signal is frequency hopping with channel frequency range 2.410-2.470 GHz.

1.4 Date of Order

2005-10-06

1.5 Submitted Sample(s):

3 Samples per model

1.6 Test Duration

2005-12-13

1.7 Country of Origin

China

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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	FCC 47CFR 15.209	ANSI C63.4:2003	N/A	☒	☐	☐
Conducted Emissions on AC, 0.15MHz to 30MHz	FCC 47CFR 15.207	ANSI C63.4:2003	N/A	☐	☐	☒

Note: N/A - Not Applicable

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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:	2005-12-13
Mode of Operation:	Tx mode (Receiver unit and connected to GC)

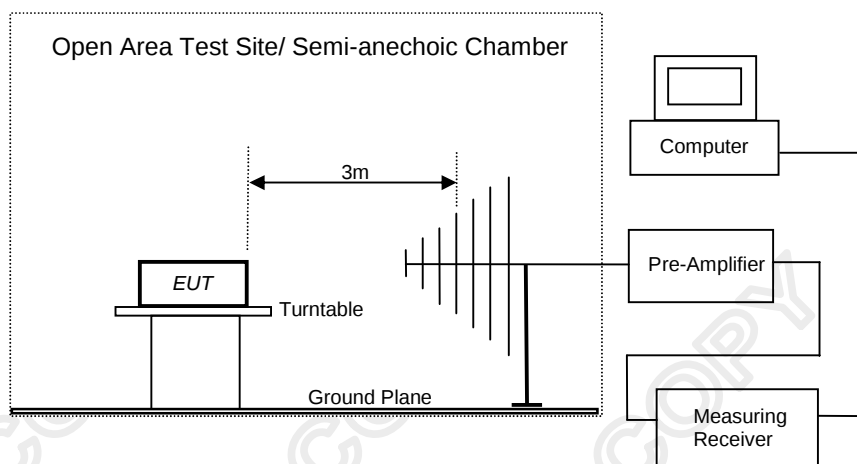
Test Method:

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:



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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]
902-928	50,000 [Average]	500 [Average]
2400-2483.5	50,000 [Average]	500 [Average]

Results of Lowest Channel Frequency : Pass

Field Strength of Fundamental Emissions Peak Value						
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
2410.0	39.4	34.3	73.7	4,841.7	50,000	Horizontal
* 4820.0	18.6	40.8	59.4	933.3	500	Horizontal
7230.0	No Emission Detected				500	Vertical
9640.0					500	Vertical
* 12050.0					500	Vertical
14460.0					500	Vertical
16870.0					500	Vertical
* 19280.0					500	Vertical
21690.0					500	Vertical
24100.0					500	Vertical

Field Strength of Fundamental Emissions Average Value						
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
2410.0	10.8	34.3	45.1	179.9	50,000	Horizontal
* 4820.0	-10.0	40.8	30.8	34.7	500	Horizontal

Remarks:

*: 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

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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]
902-928	50,000 [Average]	500 [Average]
2400-2483.5	50,000 [Average]	500 [Average]

Results of Mid Channel Frequency : Pass

Field Strength of Fundamental Emissions Peak Value						
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
2440.0	37.7	34.3	72.0	3,981.1	50,000	Vertical
* 4880.0	20.1	41.1	61.2	1,148.2	500	Horizontal
* 7320.0	No Emission Detected				500	Vertical
9760.0					500	Vertical
* 12200.0					500	Vertical
14640.0					500	Vertical
17080.0					500	Vertical
* 19520.0					500	Vertical
21960.0					500	Vertical
24400.0					500	Vertical

Field Strength of Fundamental Emissions Average Value						
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
2440.0	9.1	34.3	43.4	147.9	50,000	Horizontal
* 4880.0	-8.5	41.1	32.6	42.7	500	Horizontal

Remarks:

*: 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

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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]
902-928	50,000 [Average]	500 [Average]
2400-2483.5	50,000 [Average]	500 [Average]

Results of Highest Channel Frequency : Pass

Field Strength of Fundamental Emissions Peak Value						
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
2470.0	40.7	34.3	75.0	5,623.4	50,000	Vertical
* 4940.0	19.2	41.1	60.3	1,035.1	500	Vertical
* 7410.0	No Emission Detected				500	Vertical
9880.0					500	Vertical
* 12350.0					500	Vertical
14820.0					500	Vertical
17290.0					500	Vertical
* 19760.0					500	Vertical
* 22230.0					500	Vertical
24700.0					500	Vertical

Field Strength of Fundamental Emissions Average Value						
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
2470.0	12.1	34.3	46.4	208.9	50,000	Vertical
* 4940.0	-9.4	41.1	31.7	38.5	500	Vertical

Remarks:

*: 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

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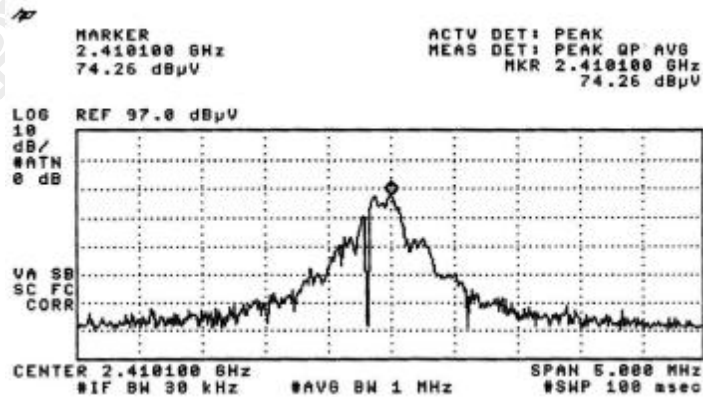
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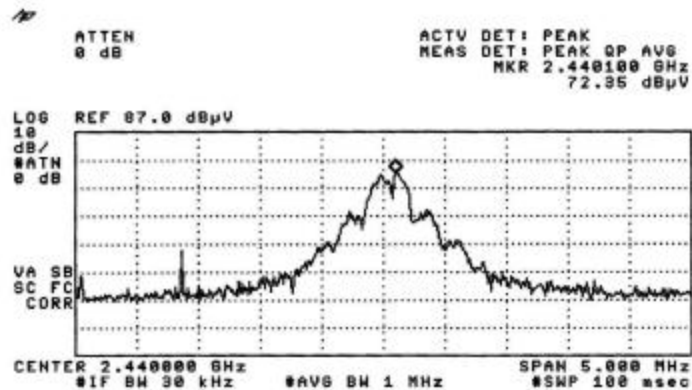
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Lowest Channel Frequency



Mid Channel Frequency



Highest Channel Frequency



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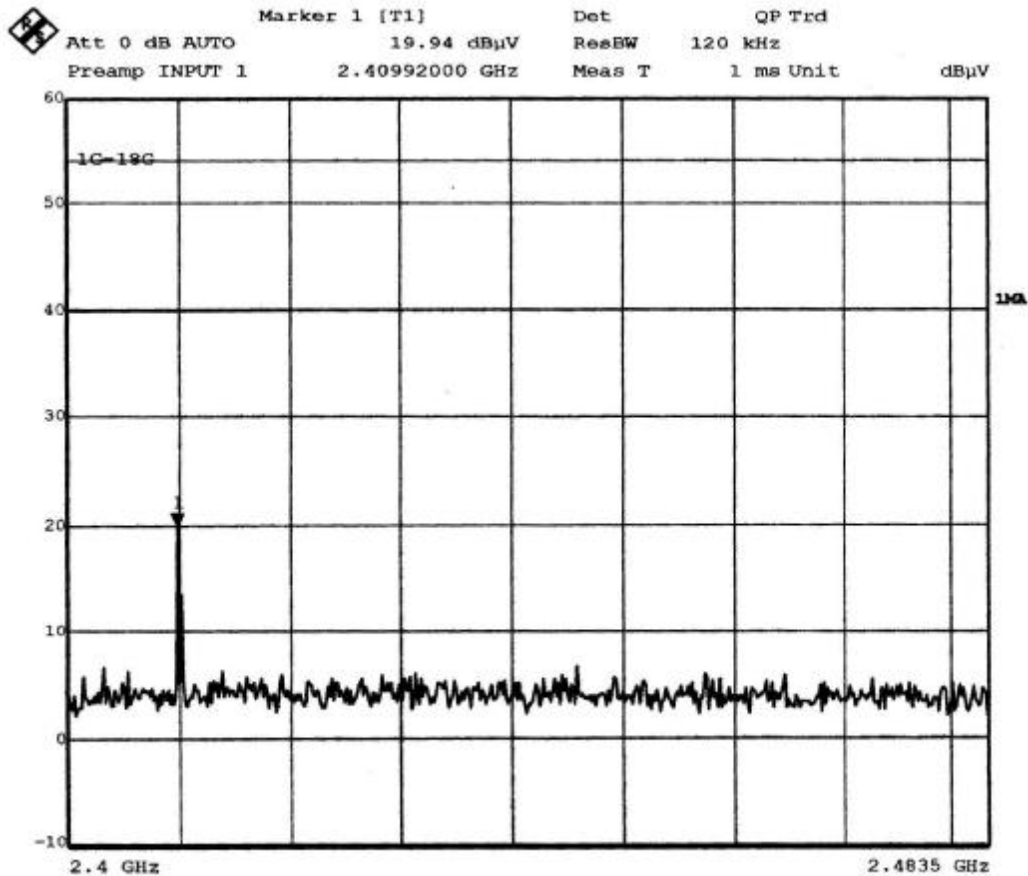
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Lowest Frequency



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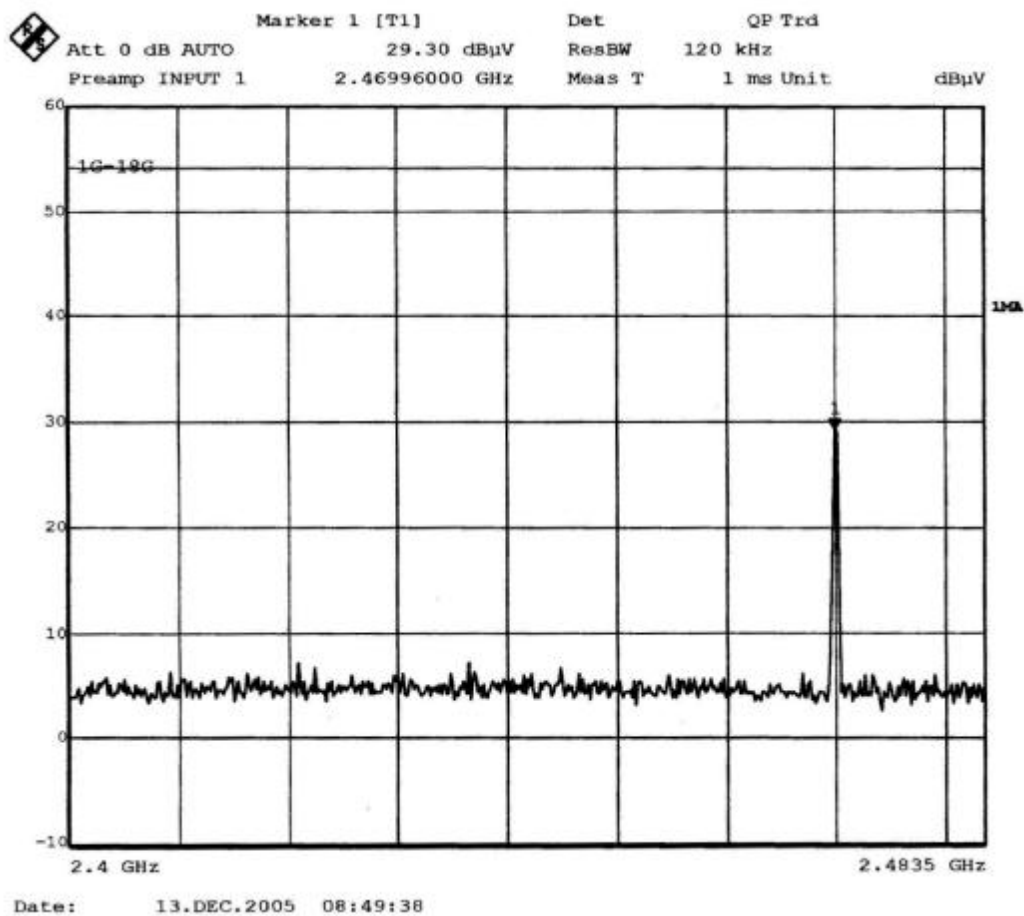
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Highest Frequency



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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
Above 960	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.

Radiated Emissions Peak					
Emission Frequency MHz	E-Field Polarity	Level @3m dBμV/m	Limit @3m dBμV/m	Level @3m @3m μV/m	Limit @3m μV/m
2400.0	Vertical	35.9	54	62.4	501
2483.5	Horizontal	36.8	54	69.2	501

Remarks:

Correction Factor included Antenna Factor and Cable Attenuation.

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

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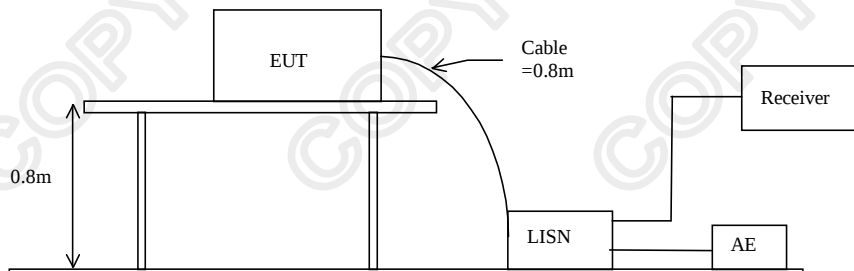
3.1.2 Conducted Emissions (0.15MHz to 30MHz)

Test Requirement:	FCC 47CFR 15.207
Test Method:	ANSI C63.4:2003
Test Date:	2005-12-13
Mode of Operation:	On Mode

Test Method:

The test was performed in accordance with ANSI C63.4: 2003, with the following: initial measurements were performed in peak and average detection modes on the live line, any emissions recorded within 30dB of the relevant limit lines were re-measured using quasi-peak and average detection on the live and neutral lines with the worst case recorded in the table of results.

Test Setup:



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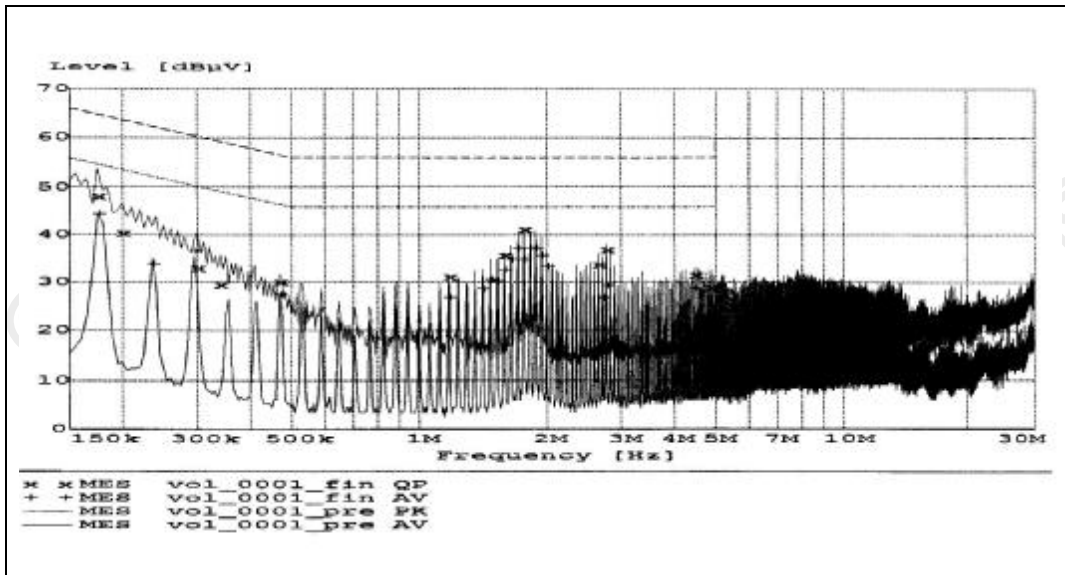
Limits for Conducted Emissions (FCC 47 CFR 15.107):

Frequency Range [MHz]	Quasi-Peak Limits [dB μ V]	Average [dB μ V]
0.15-0.5	66 to 56*	56 to 46*
0.5-5.0	56	46
5.0-30.0	60	50

* Decreases with the logarithm of the frequency.

Limits for Conducted Emissions Test, please refer to limit lines (Quasi-Peak and Average) in the following diagram.

Results of On Mode (2410MHz): PASS



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Results of On Mode (2410MHz): PASS

Conductor	Frequency	Quasi-Peak		Average	
		Level	Limit	Level	Limit
Live or Neutral	MHz	dB μ V	dB μ V	dB μ V	dB μ V
Live	0.175	48.1	65	44.4	55
Live	0.235	-*-	-*-	34.0	52
Live	0.300	32.9	60	-*-	-*-
Live	0.470	30.1	57	-*-	-*-
Live	1.180	31.2	56	27.0	46
Live	1.415	-*-	-*-	28.7	46
Live	1.475	-*-	-*-	30.8	46
Live	1.530	-*-	-*-	30.4	46
Live	1.590	35.8	56	32.8	46
Live	1.710	-*-	-*-	37.4	46
Live	1.765	-*-	-*-	35.0	46
Live	1.770	41.2	56	-*-	-*-
Live	2.715	-*-	-*-	27.0	46
Live	2.770	36.9	56	-*-	-*-
Live	4.890	29.0	56	-*-	-*-
Neutral	0.200	40.4	64	-*-	-*-
Neutral	0.295	-*-	-*-	36.5	50
Neutral	0.340	29.4	59	-*-	-*-
Neutral	0.470	-*-	-*-	27.5	47.0
Neutral	1.650	-*-	-*-	35.0	46.0
Neutral	1.825	-*-	-*-	37.4	46.0
Neutral	1.885	-*-	-*-	37.4	46.0
Neutral	1.945	-*-	-*-	35.8	46.0
Neutral	2.005	-*-	-*-	33.5	46.0
Neutral	2.650	33.8	56	-*-	-*-
Neutral	2.770	-*-	-*-	29.6	46.0
Neutral	4.480	31.6	56	28.8	46.0
Neutral	4.890	-*-	-*-	22.7	46.0

Remarks:

Calculated measurement uncertainty: ± 2.8 dB

-*- Emission(s) that is far below the corresponding limit line.

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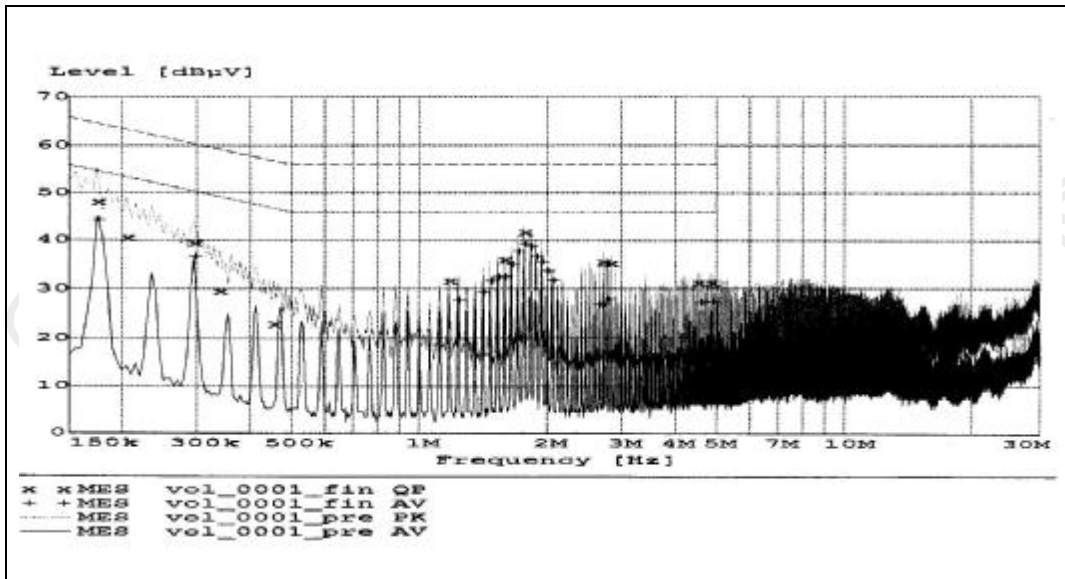
Limits for Conducted Emissions (FCC 47 CFR 15.107):

Frequency Range [MHz]	Quasi-Peak Limits [dB μ V]	Average [dB μ V]
0.15-0.5	66 to 56*	56 to 46*
0.5-5.0	56	46
5.0-30.0	60	50

* Decreases with the logarithm of the frequency.

Limits for Conducted Emissions Test, please refer to limit lines (Quasi-Peak and Average) in the following diagram.

Results of On Mode (2440MHz): PASS



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Results of On Mode (2440MHz): PASS

Conductor	Frequency	Quasi-Peak		Average	
		Level	Limit	Level	Limit
Live or Neutral	MHz	dB μ V	dB μ V	dB μ V	dB μ V
Live	0.175	48.1	65	44.2	55
Live	0.295	39.4	60	36.5	50
Live	0.340	29.6	59	-*-	-*-
Live	0.455	22.9	57	-*-	-*-
Live	1.180	31.7	56	-*-	-*-
Live	1.240	-*-	-*-	27.7	46
Live	1.535	-*-	-*-	32.5	46
Live	1.590	-*-	-*-	32.6	46
Live	1.710	-*-	-*-	37.8	46
Live	1.770	41.8	56	39.4	46
Live	1.830	-*-	-*-	38.8	46
Live	1.945	-*-	-*-	35.6	46
Live	2.005	-*-	-*-	33.7	46
Live	2.065	-*-	-*-	31.8	46
Live	2.715	35.5	56	-*-	-*-
Live	2.770	-*-	-*-	28.0	46
Live	2.830	35.3	56	-*-	-*-
Live	4.600	-*-	-*-	27.2	46
Live	4.895	-*-	-*-	27.4	46
Neutral	0.205	40.5	63	-*-	-*-
Neutral	1.415	-*-	-*-	29.3	46.0
Neutral	1.475	-*-	-*-	31.7	46.0
Neutral	1.590	36.0	56	-*-	-*-
Neutral	1.650	-*-	-*-	35.1	46.0
Neutral	1.885	-*-	-*-	36.7	46.0
Neutral	2.655	-*-	-*-	26.9	46.0
Neutral	2.710	-*-	-*-	26.9	46.0
Neutral	4.540	31.4	56	-*-	-*-
Neutral	4.895	31.4	56	-*-	-*-

Remarks:

Calculated measurement uncertainty: ± 2.8 dB

-*- Emission(s) that is far below the corresponding limit line.

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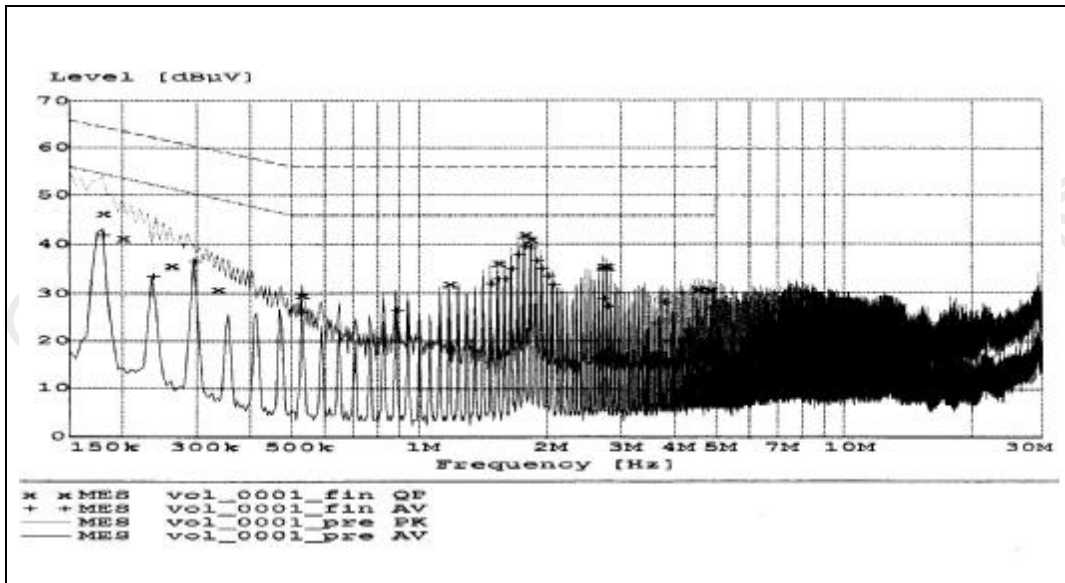
Limits for Conducted Emissions (FCC 47 CFR 15.107):

Frequency Range [MHz]	Quasi-Peak Limits [dB μ V]	Average [dB μ V]
0.15-0.5	66 to 56*	56 to 46*
0.5-5.0	56	46
5.0-30.0	60	50

* Decreases with the logarithm of the frequency.

Limits for Conducted Emissions Test, please refer to limit lines (Quasi-Peak and Average) in the following diagram.

Results of On Mode (2470MHz): PASS



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Results of On Mode (2470MHz): PASS

Conductor	Frequency	Quasi-Peak		Average	
		Level	Limit	Level	Limit
Live or Neutral	MHz	dB μ V	dB μ V	dB μ V	dB μ V
Live	0.200	41.2	64	-*-	-*-
Live	0.180	-*-	-*-	41.9	55
Live	0.235	-*-	-*-	33.5	52
Live	0.295	-*-	-*-	36.5	50
Live	0.885	-*-	-*-	26.5	46
Live	1.535	-*-	-*-	33.0	46
Live	1.595	-*-	-*-	32.9	46
Live	1.650	-*-	-*-	35.1	46
Live	1.710	-*-	-*-	37.9	46
Live	1.770	42.0	56	39.6	46
Live	1.830	41.1	56	-*-	-*-
Live	1.890	-*-	-*-	36.6	46
Live	2.005	-*-	-*-	33.6	46
Live	2.715	-*-	-*-	29.0	46
Live	2.770	-*-	-*-	27.4	46
Live	4.835	30.7	56	-*-	-*-
Live	4.955	-*-	-*-	27.2	46
Neutral	0.180	46.3	65	-*-	-*-
Neutral	0.260	35.7	61	-*-	-*-
Neutral	0.335	30.8	59	-*-	-*-
Neutral	0.530	29.7	56	26.2	46
Neutral	1.180	31.9	56	-*-	-*-
Neutral	1.475	-*-	-*-	32.0	46
Neutral	1.535	36.2	56	-*-	-*-
Neutral	1.830	-*-	-*-	39.3	46
Neutral	1.945	-*-	-*-	35.1	46
Neutral	2.065	-*-	-*-	31.8	46
Neutral	2.715	35.5	56	-*-	-*-
Neutral	2.770	35.4	56	-*-	-*-
Neutral	3.775	-*-	-*-	28.2	46
Neutral	4.540	30.8	56	-*-	-*-

Remarks:

Calculated measurement uncertainty: ± 2.8 dB

-*- Emission(s) that is far below the corresponding limit line.

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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 PRESECTOR	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 HEWLETT PACKARD HEWLETT PACKARD	HP9000 HP A1097C HP9133L	6226A60314 3151J39517 2623A02468	15/06/04
EM020	HORN ANTENNA	EMCO	3115	4032	30/07/03
EM022	LOOP ANTENNA	EMCO	6502	1189-2424	30/07/03
EM072	SIGNAL GENERATOR	HEWLETT PACKARD	8640B	1948A11892	N/A
EM083	HKSTC OPEN AREA TEST SITE	HKSTC	N/A	N/A	08/02/03
EM131	PORTABLE SPECTRUM ANALYSER	HEWLETT PACKARD	8595EM	3710A00155	13/01/04
EM145	EMI TEST RECEIVER	R & S	ESCS 30	830245/021	04/10/04
EM219	BICONILOG ANTENNA	EMCO	3142C	00029071	28/10/03
EM195	ANTENNA POSITIONING MAST	EMCO	2075	2368	N/A
EM196	MULTI-DEVICE CONTROLLER	EMCO	2090	1662	N/A
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	17/10/03
EM119	LISN	R & S	ESH3-Z5	0831.5518.52	14/10/04
EM127	ISOLATION TRANSFORMER 220 TO 300	WING SUN	N/A	N/A	CM
EM142	PULSES LIMITER	R & S	ESH3Z2	357.8810.52	04/08/04
EM181	EMI TEST RECEIVER	R & S	ESIB7	100072	06/01/04
EM154	SHIELDING ROOM	SIEMENA MATSUSHITA COMPONENTS	N/A	803-740-057- 99A	17/10/03
EM197	LISN	EMCO	4825/2	1193	05/06/04

Remarks:-

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

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Appendix B

Duty Cycle Correction During 100msec

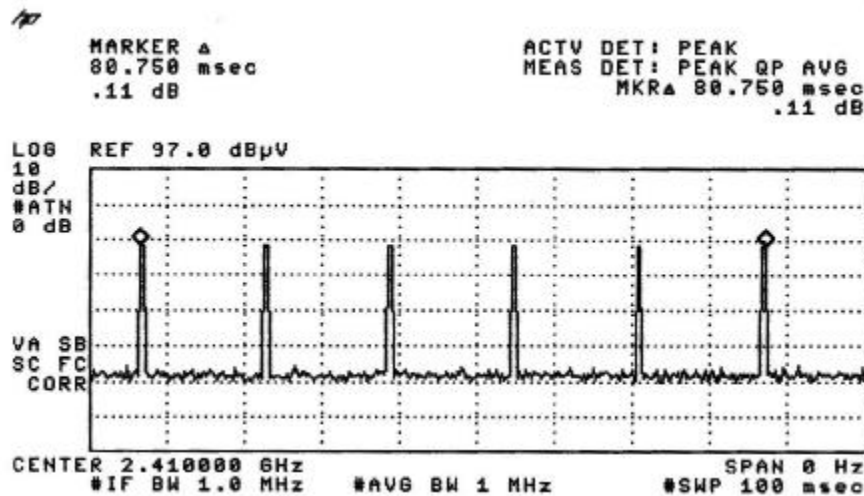
Each function key sends a different series of characters, but each pulse period (80.75msec) never exceeds a series of 6 long (500μsec) or short (250μsec) pulses. Assuming any combination of short and long pulses may be obtained due to encoding the worst case transmit duty cycle would be considered $6 \times 500\mu\text{sec}$ per 80.75msec = 3.7% duty cycle. Figure A through C show the characteristics of the pulse train for one of these functions.

Remarks:

Duty Cycle Correction = $20\text{Log}(0.037) = -28.6\text{dB}$

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

Figure A [Pulse Train]



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Figure B [Long Pulse]

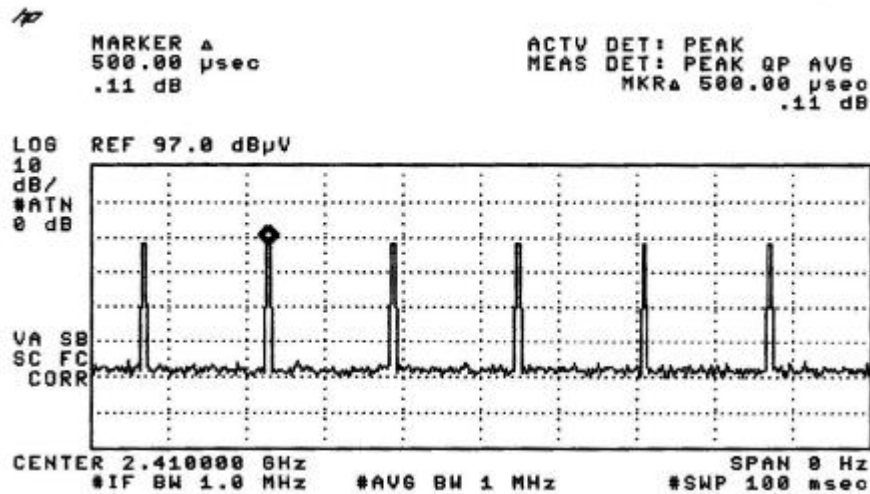
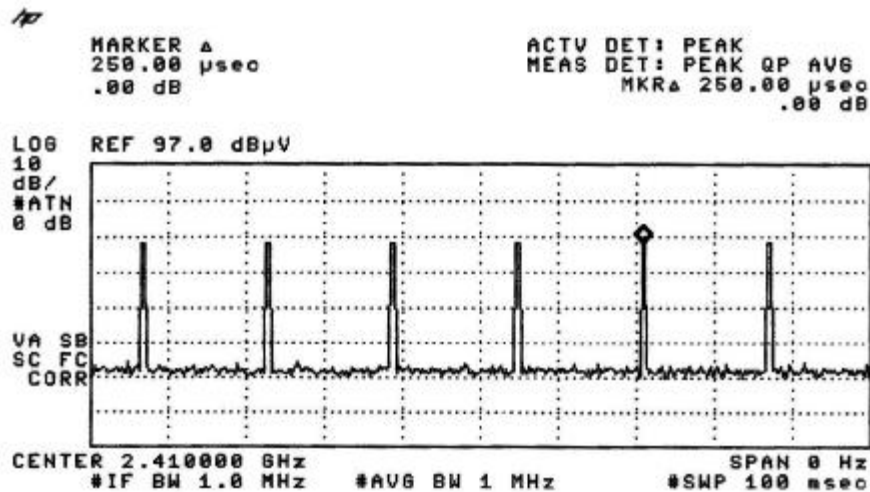


Figure C [Short Pulse]



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Appendix C

Photographs of EUT

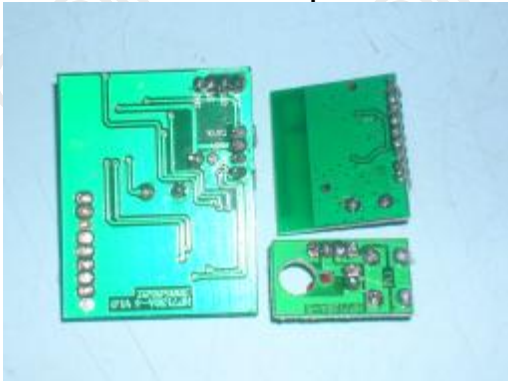
Front View of the product



Rear View of the product



Inner Circuit Top View



Inner Circuit Bottom View



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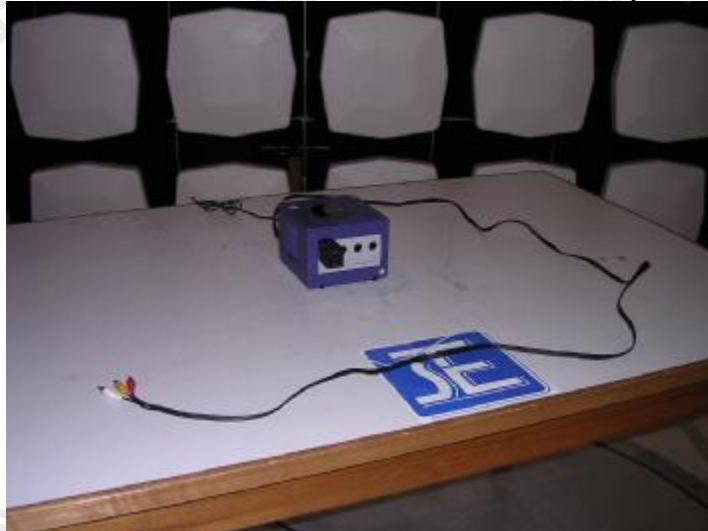
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Photographs of EUT

Measurement of Radiated Emission Test Set Up



Measurement of Conducted Emission Test Set Up



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