Date : 2004-06-19
No. : HM151298

TEST REPORT

Applicant: Nagi Keung Metal & Plastic Manufactory Ltd.

Description of Samples:

Model name:	1:12 Radio Control Nintendo (Mario/Donkey Kong/Yoshi) (27Mhz)
Model no.:	61201
Brand name:	Nagi Keung Metal & Plastic Manufactory Ltd.
FCC ID:	M8QF61227TX

Date Samples Received: 2004-03-29

Date Tested: 2004-04-13 to 2004-06-03

Investigation Requested: FCC Part 15 Subpart C

Conclusions: The submitted product COMPLIED with the requirements of Federal Communications Commission [FCC] Rules and 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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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

Telephone: 852 2666 1888
Fax: 852 2664 4353

1.2 Applicant Details

Applicant

Ngai Keung Metal & Plastic Manufactory Ltd.
Room 1108-1112 Harbour Crystal Centre,
100 Granville Road, TST., East Kowloon

HKSTC Code Number for Applicant **NGK003**

Manufacturer

Ngai Keung Metal & Plastic Manufactory Ltd.
Room 1108-1112 Harbour Crystal Centre,
100 Granville Road, TST., East Kowloon

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1.3 Equipment Under Test [EUT]

Description of Sample

Model Name:	1:12 Radio Control Nintendo (Mario/Donkey Kong/Yoshi) (27Mhz)
Manufacturer:	Ngai Keung Metal & Plastic Manufactory Ltd.
Brand Name:	Ngai Keung Metal & Plastic Manufactory Ltd.
Model Number:	61201
Input Voltage:	3Vd.c (“AA” size battery x 2)
Additional Model Number:	61202/61203

1.3.1 Description of EUT Operation

The Equipment Under Test (EUT) is a Ngai Keung Metal & Plastic Manufactory Ltd., 1:12 Radio Control Nintendo (Mario/Donkey Kong/Yoshi) (27MHz). The transmitter is a 6 button with 1 Joystick transmitter. The EUT continues to transmit while button is being pressed, Modulation by IC. and type is pulse modulation.

1.4 Date of Order

2004-03-29

1.5 Submitted Sample(s):

3 Samples per model

1.6 Test Duration

2004-04-13 to 2004-06-03

1.7 Country of Origin

China

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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	☒	☐

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2.0 Technical Details

2.1 Investigations Requested

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

2.2 Test Standards and Results Summary Tables

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Results Summary

Test Condition	Test Requirement	Test Method	Class / Severity	Test Result		
				Pass	Failed	N/A
Field Strength of Fundamental Emissions & Spurious Emissions	FCC 47CFR 15.227	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	Class B	☐	☐	☒

Note: N/A - Not Applicable

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3.0 Test Results

3.1 Emission

3.1.1 Radiated Emissions (30 – 1000MHz)

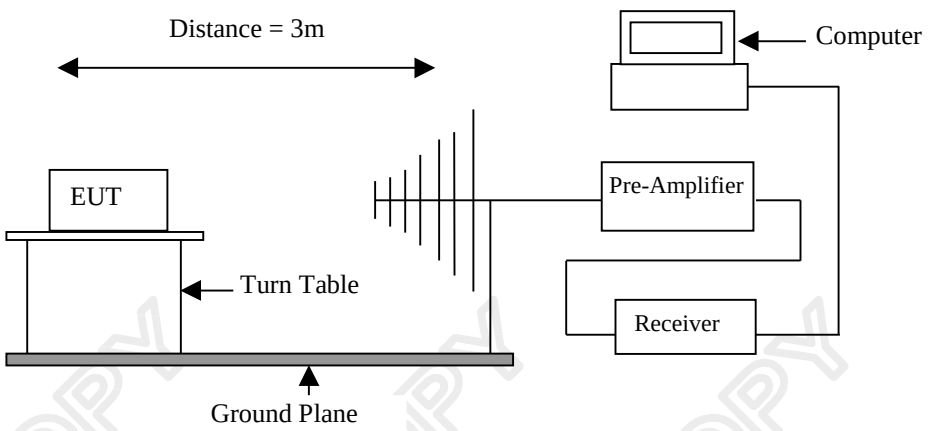
Test Requirement:	FCC 47CFR 15.227
Test Method:	ANSI C63.4:2003
Test Date:	2004-06-03
Mode of Operation:	On mode

Test Method:

The sample was placed 0.8m above the ground plane on the OATS *. Measurements in both horizontal and vertical 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 emissions worst-case 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.

Test Setup:



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Limits for Field Strength of Fundamental Emissions [FCC 47CFR 15.227]:

Frequency Range of Fundamental [MHz]	Field Strength of Fundamental Emission [Peak] [µV/m]	Field Strength of Fundamental Emission [Average] [µV/m]
26.96-27.28	100,000	10,000

Results:

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
27.15	53.40	21.9	75.3	5,821.0	100,000	Vertical

Field Strength of Fundamental Emissions Average							
Frequency MHz	Measured Level @3m dBµV/m	Adjusted by Duty Cycle dB	Correction Factor dBµV/m	Field Strength dBµV/m	Field Strength µV/m	Limit @3m µV/m	E-Field Polarity
27.15	48.3	-5.1	21.9	70.2	3,235.9	10,000	Vertical

According to FCC 47CFR15.35, the limit on the radio frequency emissions as measured using instrumentation with a peak detector function, correspondin g to 20dB above the maximum permitted average limit for the frequency being investigated unless a different peak emission limit is otherwise specified in the rules.

Remarks:

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

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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
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
54.29	26.7	10.1	36.8	69.2	150	Vertical
81.44	< 1.0	9.5	< 10.5	< 3.3	150	Vertical
108.58	< 1.0	11.5	< 12.5	< 4.2	150	Vertical
135.73	< 1.0	15.9	< 16.9	< 7.0	200	Vertical
162.87	< 1.0	11.9	< 12.9	< 4.4	200	Vertical
190.02	< 1.0	12.4	< 13.4	< 4.7	200	Vertical
217.16	< 1.0	13.2	< 14.2	< 5.1	200	Vertical
244.31	< 1.0	15.0	< 16.0	< 6.3	200	Vertical
271.45	< 1.0	16.1	< 17.1	< 7.2	200	Vertical

Remarks:

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

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3.1.2 Conducted Emissions (0.15MHz to 30MHz)

Test Requirement:	FCC 47CFR 15.107
Test Method:	ANSI C63.4:2003
Test Date:	2004-06-03
Mode of Operation:	N/A

Results: N/A

The EUT is operated by a single source of internal battery power [located in the battery compartment], therefore power line conducted emission was deemed unnecessary.

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3.2 20dB Bandwidth of Fundamental Emission

Test Requirement:	FCC 47 CFR 15.227
Test Method:	ANSI C63.4:2003 (Section 13.1.7)
Test Date:	2004-06-03
Mode of Operation:	On mode

Test Method:

The bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst-case (i.e. the widest) bandwidth.

Test Setup:

As Test Setup of clause 3.1.1 in this test report.

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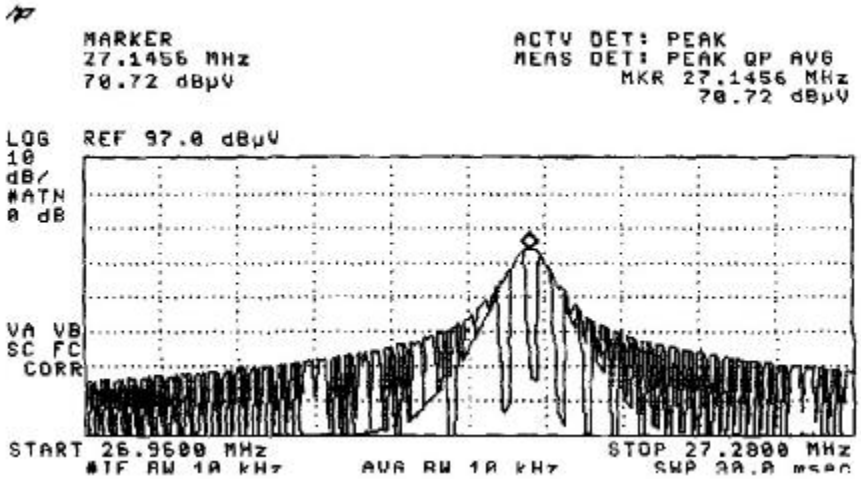
Limits for 20 dB Bandwidth of Fundamental Emission:

Frequency Range [MHz]	20dB Bandwidth [KHz]	FCC Limits [MHz]
27.145	50.2	within 26.96-27.28

20dB Bandwidth of Fundamental Emission



Appendix A

Test Equipment Audit

Radiated Emission

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL
EM007	SPECTRUM ANALYZER	HEWLETT PACKARD	HP85660B	3144A21192	14/03/03
EM008	SPECTRUM ANALYZER DISPLAY	HEWLETT PACKARD	HP85662A	3144A20514	14/03/03
EM009	QUASI PEAK ADAPTOR	HEWLETT PACKARD	HP85650A	3303A01702	14/03/03
EM010	RF PRESELECTOR	HEWLETT PACKARD	HP85685A	3221A01410	14/03/03
EM011	ATTENNUATOR/SWITCH	HEWLETT PACKARD	HP11713A	2508A10595	14/03/03
EM012	PRE-AMPLIFIER	HEWLETT PACKARD	HP8449B	3008A00262	14/03/03
EM013	CONTROLLER (COMPUTER), COLOR MONITOR, KEYBOARD & MOUSE FLOPPY DRIVE	HEWLETT PACKARD HEWLETT PACKARD HEWLETT PACKARD	HP9000 HP A1097C HP9133L	6226A60314 3151J39517 2623A02468	CM
EM020	HORN ANTENNA	EMCO	3115	4032	19/07/00
EM022	LOOP ANTENNA	EMCO	6502	1189-2424	04/08/00
EM072	SIGNAL GENERATOR	HEWLETT PACKARD	8640B	1948A11892	N/A
EM083	HKSTC OPEN AREA TEST SITE	HKSTC	N/A	N/A	08/11/02
EM131	PORTABLE SPECTRUM ANALYSER	HEWLETT PACKARD	8595EM	3710A00155	18/12/01
EM145	EMI TEST RECEIVER	R & S	ESCS 30	830245/021	02/08/03
EM194	BICONILOG ANTENNA	EMCO	3142B	1795	14/05/02
EM195	ANTENNA POSITIONING MAST	EMCO	2075	2368	N/A
EM196	MULTI-DEVICE CONTROLLER	EMCO	2090	1662	N/A

Conducted Emission

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	18/10/02
EM119	LISN	R & S	ESH3-Z5	0831.5518.52	01/10/02
EM127	ISOLATION TRANSFORMER 220 TO 300	WING SUN	N/A	N/A	CM
EM142	PULES LIMITER	R & S	ESH3Z2	357.8810.52	03/07/02
EM181	EMI TEST RECEIVER	R & S	ESIB7	100072	28/11/01
EM154	SHIELDING ROOM	SIEMENA MATSUSHITA COMPONENTS	N/A	803-740-057-99A	18/10/02
EM197	LISN	EMCO	4825/2	1193	08/04/03

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 packet period (19.05msec) never exceeds a series of 4 long (1.5msec) and 10 short (450µsec) pulses. Assuming any combination of short and long pulses may be obtained due to encoding the worst case transmit duty cycle would be considered 4x1.5msec+10x450µsec per 19.05msec =55.1% duty cycle. Figure A through C show the characteristics of the pulse train for one of these functions.

Remarks:

Duty Cycle Correction = 20Log(0.551) =-5.1dB

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

Figure A [Pulse Train]

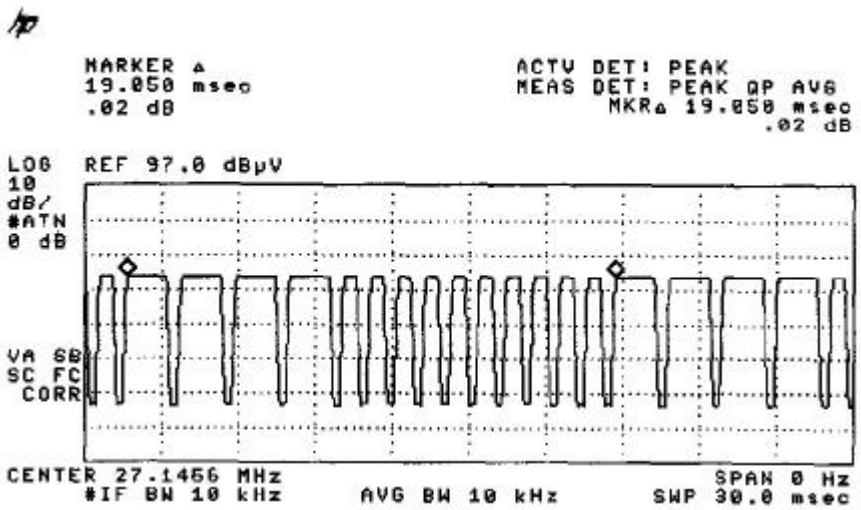


Figure B [Long Pulse]

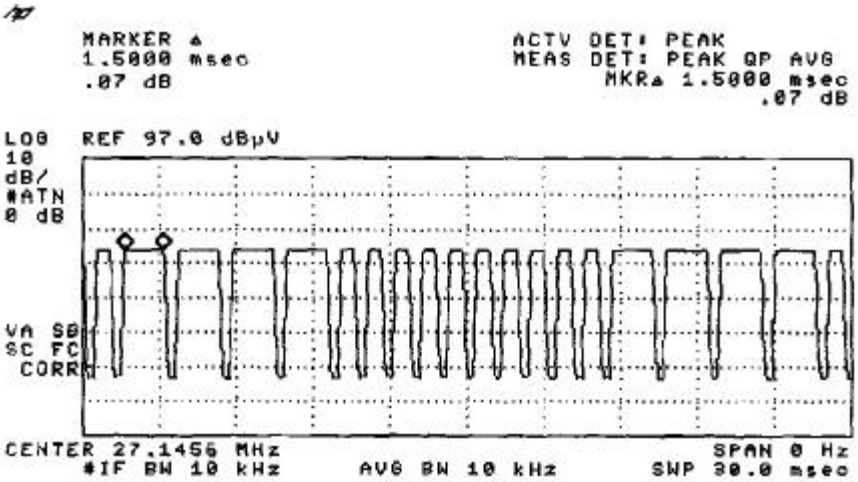
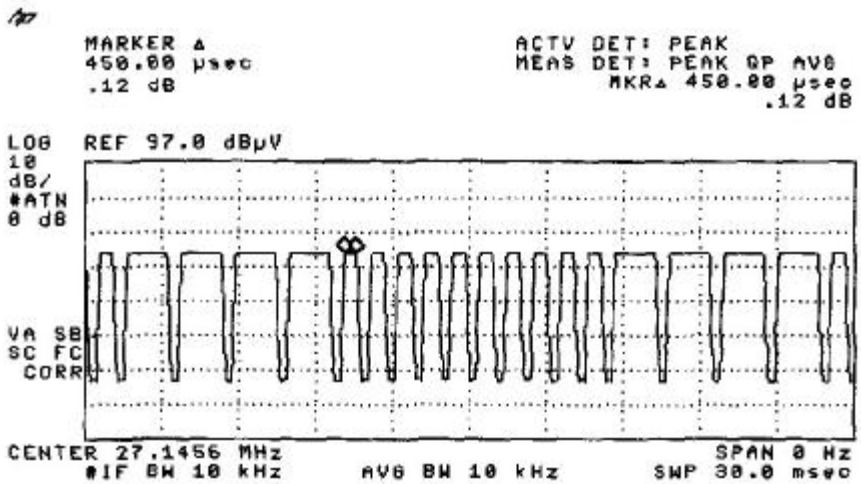


Figure C [Short Pulse]



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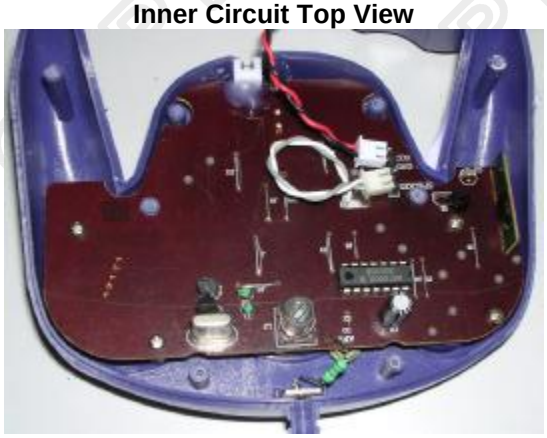
Appendix C

Photographs of EUT

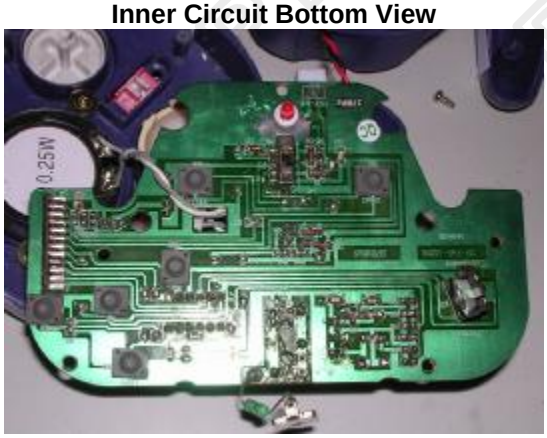
Front View of the product

Rear View of the product

Inner Circuit Top View



Inner Circuit Bottom View



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Photographs of EUT

Measurement of Radiated Emission Test Set Up

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