

香 港 標 準 及 檢 定 中 心  
**The Hong Kong Standards and Testing Centre Ltd.**

Date: 2005-09-15

No.: HM152715

**TEST REPORT**

Page 1 of 17

**Applicant:** Ngai Keung Metal & Plastic Manufactory Ltd.  
Rm 8-12, 11/F., Harbour Crystal Ctr., 100  
Granville Road, TST East, Kowloon, Hong Kong

**Description of Samples:** Model name: 1:16 Full Function Radio Control  
Car (Transmitter 49MHz)  
Model no.: 81624  
Brand name: NKOK INC  
FCC ID: M8QF81649TX

**Date Samples Received:** 2004-10-18

**Date Tested:** 2004-10-29

**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, EMD  
for Chief Executive

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Date: 2005-09-15  
No.: HM152715

## **TEST REPORT**

**Page 2 of 17**

### **CONTENT:**

Cover	Page 1 of 17
Content	Page 2-3 of 17

#### **1.0 General Details**

1.1	Test Laboratory	Page 4 of 17
1.2	Applicant Details Applicant HKSTC Code Number for Applicant Manufacturer	Page 4 of 17
1.3	Equipment Under Test [EUT] Description of EUT operation	Page 5 of 17
1.4	Date of Order	Page 5 of 17
1.5	Submitted Samples	Page 5 of 17
1.6	Test Duration	Page 5 of 17
1.7	Country of Origin	Page 5 of 17

#### **2.0 Technical Details**

2.1	Investigations Requested	Page 6 of 17
2.2	Test Standards and Results Summary	Page 6 of 17

#### **3.0 Test Results**

3.1	Emission	Page 7-10 of 17
3.2	Bandwidth Measurement	Page 11-12 of 17

Date: 2005-09-15  
No.: HM152715

## **TEST REPORT**

Page 3 of 17

### **Appendix A**

List of Measurement Equipment

Page 13 of 17

### **Appendix B**

Duty Cycle Correction During 100 msec

Page 14-15 of 17

### **Appendix C**

Photographs

Page 16-17 of 17

Date: 2005-09-15

## **TEST REPORT**

Page 4 of 17

No.: HM152715

### **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.  
Rm 8-12, 11/F., Harbour Crystal Ctr., 100 Granville Road, TST East, Kowloon, Hong Kong

**HKSTC Code Number for Applicant**

**NGK002**

##### **Manufacturer**

Ngai Keung Metal & Plastic Manufactory Ltd.  
Rm 8-12, 11/F., Harbour Crystal Ctr., 100 Granville Road, TST East, Kowloon, Hong Kong

Date: 2005-09-15

## **TEST REPORT**

Page 5 of 17

No.: HM152715

### **1.3 Equipment Under Test [EUT]**

#### **Description of Sample**

Model Name:	1:16 Full Function Radio Control Car (Transmitter 49MHz)
Manufacturer:	Ngai Keung Metal & Plastic Manufactory Ltd.
Brand Name:	NKOK INC
Model Number:	81624
Input Voltage:	3Vd.c. ("AA" size battery x 2)

#### **1.3.1 Description of EUT Operation**

The Equipment Under Test (EUT) is a Ngai Keung Metal & Plastic Manufactory Ltd., 1:16 Full Function Radio Control Car (Transmitter 49MHz). The transmitter is a 2 - Joystick transmitter. The EUT continues to transmit while joystick is being pressed. Modulation by IC, and type is pulse modulation.

### **1.4 Date of Order**

2004-10-18

### **1.5 Submitted Sample(s):**

3 Samples per model

### **1.6 Test Duration**

2004-10-29

### **1.7 Country of Origin**

China

Date: 2005-09-15

## **TEST REPORT**

Page 6 of 17

No.: HM152715

### **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**

EMISSION 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 15.235	ANSI C63.4:2003	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Radiated Emissions	FCC 47CFR 15.209	ANSI C63.4:2003	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Conducted Emissions on AC, 0.15MHz to 30MHz	FCC 47CFR 15.207	ANSI C63.4:2003	N/A	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Note: N/A - Not Applicable

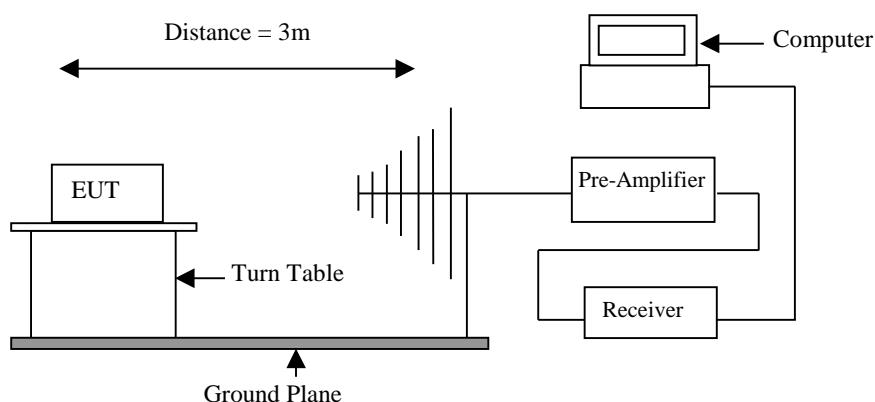
**3.0 Test Results****3.1 Emission****3.1.1 Radiated Emissions (30 – 1000MHz)**

Test Requirement:	FCC 47CFR 15.235
Test Method:	ANSI C63.4:2003
Test Date:	2004-10-29
Mode of Operation:	Tx 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: 607756.

**Test Setup:**

Date: 2005-09-15

## TEST REPORT

Page 8 of 17

No.: HM152715

### Limits for Field Strength of Fundamental Emissions [FCC 47CFR 15.235]:

Frequency Range of Fundamental [MHz]	Field Strength of Fundamental Emission [Peak] [ $\mu$ V/m]	Field Strength of Spurious Emission [Average] [ $\mu$ V/m]
49.82-49.90	100,000	10,000

Results of Tx Mode (Channel A): PASS

Field Strength of Fundamental Emissions Peak Value						
Frequency MHz	Measured Level @3m dB $\mu$ V/m	Correction Factor dB $\mu$ V/m	Field Strength dB $\mu$ V/m	Field Strength $\mu$ V/m	Limit @3m $\mu$ V/m	E-Field Polarity
49.87	65.5	10.2	75.7	6,095.4	100,000	Vertical

Field Strength of Fundamental Emissions Average						
Frequency MHz	Measured Level @3m dB $\mu$ V/m	Correction Factor dB $\mu$ V/m	Field Strength dB $\mu$ V/m	Field Strength $\mu$ V/m	Limit @3m $\mu$ V/m	E-Field Polarity
49.87	61.3	10.2	71.5	3,758.4	10,000	Vertical

#### Remarks:

According to FCC 47CFR15.35, the limit on the radio frequency emissions as measured using instrumentation with a peak detector function, corresponding 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.

For effective averaging, the bandwidth of the video filter must be smaller than the resolution bandwidth. The higher the ratio of resolution bandwidth to video bandwidth, the greater the averaging will be recorded. Below setting for HP8572A EMI Receiver.

Resolution Bandwidth =3MHz  
Video Bandwidth =1Hz

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz  $\pm 4.1$ dB

Date: 2005-09-15

## TEST REPORT

Page 9 of 17

No.: HM152715

### Limits for Radiated Emissions [FCC 47 CFR 15.209]:

Frequency Range [MHz]	Quasi-Peak Limits [ $\mu$ V/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.

### Results :

Radiated Emissions Quasi-Peak						
Frequency MHz	Measured Level @3m dB $\mu$ V/m	Correction Factor dB $\mu$ V/m	Field Strength dB $\mu$ V/m	Field Strength $\mu$ V/m	Limit @3m $\mu$ V/m	E-Field Polarity
99.74	28.2	11.0	39.2	91.2	150	Vertical
149.61	< 1.0	9.8	< 10.8	< 3.5	150	Vertical
199.48	< 1.0	11.5	< 12.5	< 4.2	150	Vertical
249.35	< 1.0	15.2	< 16.2	< 6.5	200	Vertical
299.22	< 1.0	16.9	< 17.9	< 7.9	200	Vertical
349.09	< 1.0	19.0	< 20.0	< 10.0	200	Vertical
398.96	< 1.0	20.6	< 21.6	< 12.0	200	Vertical
448.83	< 1.0	19.7	< 20.7	< 10.8	200	Vertical
498.70	< 1.0	20.6	< 21.6	< 12.0	200	Vertical

**NO OTHER EMISSIONS WERE FOUND WITHIN 20dB OF THE LIMIT LINE.**

Remarks:

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz  $\pm 4.1\text{dB}$

Date: 2005-09-15  
No.: HM152715

## TEST REPORT

Page 10 of 17

### 3.1.1 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

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.

Date: 2005-09-15

## TEST REPORT

Page 11 of 17

No.: HM152715

### 3.2 20dB Bandwidth of Fundamental Emission

Test Requirement:

FCC 47 CFR 15.235

Test Method:

ANSI C63.4:2003 (Section 13.1.7)

Test Date:

2004-10-29

Mode of Operation:

Tx 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.

Date: 2005-09-15

## TEST REPORT

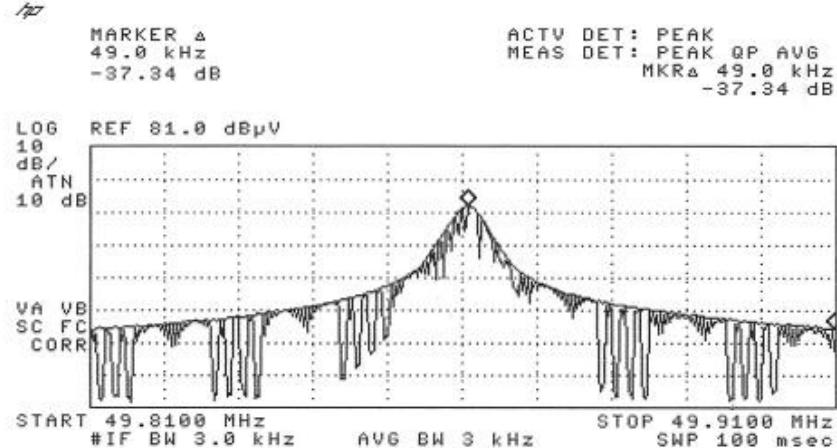
Page 12 of 17

No.: HM152715

### Limits for 20dB Bandwidth of Fundamental Emission:

Frequency Range [MHz]	20dB Bandwidth [KHz]	FCC Limits [MHz]
49.87	42.6	within 49.82-49.90

### 20dB Bandwidth of Fundamental Emission



Date: 2005-09-15

## TEST REPORT

Page 13 of 17

No.: HM152715

### 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
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
EM218	ETS ANECHOIC CHAMBER	EMCO	Fact-3	N/A	15/03/04
EM215	MULTI-DEVICE CONTROLLER	EMCO	2090	00024676	N/A
EM216	ANTENNA POSITIONING MAST	EMCO	2070	00024727	N/A

##### 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**

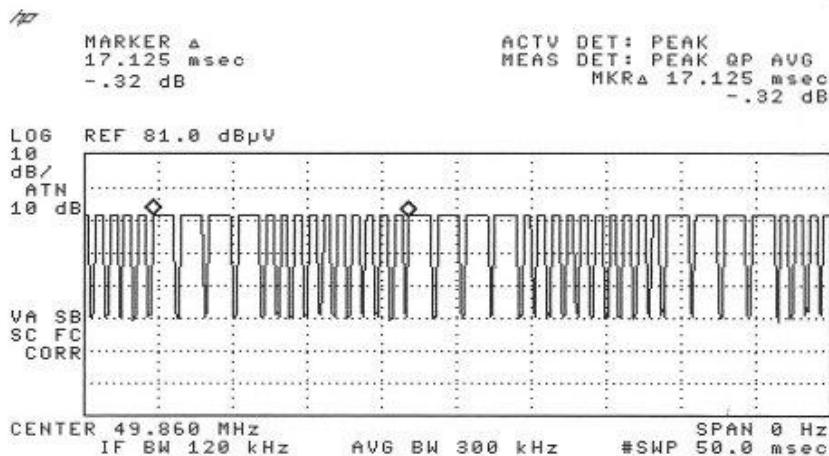
Each function key sends a different series of characters, but each packet period (17.125msec) never exceeds a series of 4 long (1.375msec) and 10 short (500 $\mu$ sec) pulses. Assuming any combination of short and long pulses may be obtained due to encoding the worst case transmit duty cycle would be considered  $4 \times 1.375\text{msec} + 10 \times 500\mu\text{sec} \text{ per } 17.125\text{msec} = 61.3\%$  duty cycle. Figure A through C show the characteristics of the pulse train for one of these functions.

Remarks:

Duty Cycle Correction =  $20\log(0.613) = -4.2\text{dB}$

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

**Figure A [Pulse Train]**



Date: 2005-09-15

## TEST REPORT

Page 15 of 17

No.: HM152715

Figure B [Long Pulse]

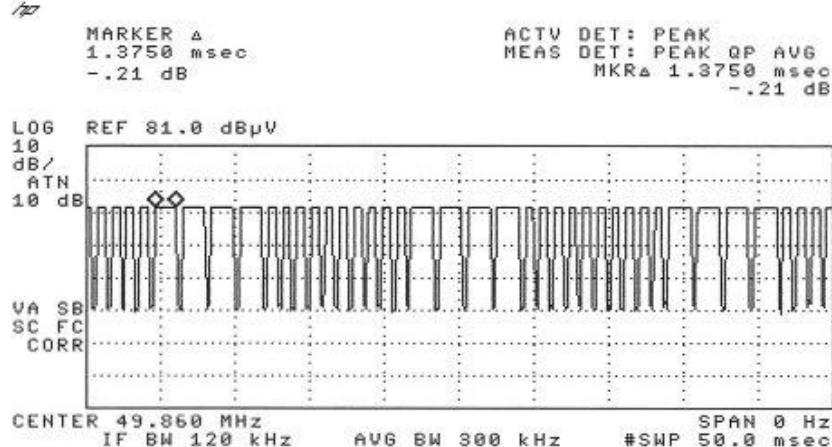
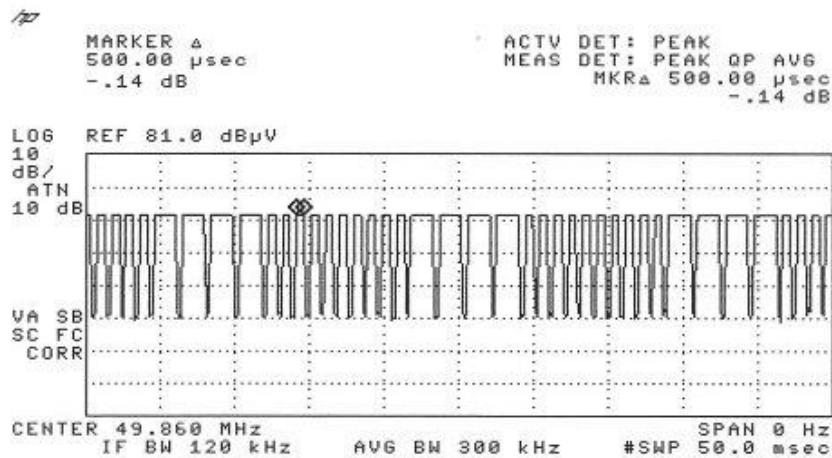


Figure C [Short Pulse]



Date: 2005-09-15  
No.: HM152715

## TEST REPORT

Page 16 of 17

### Appendix C

#### Photographs of EUT

Front View of the product



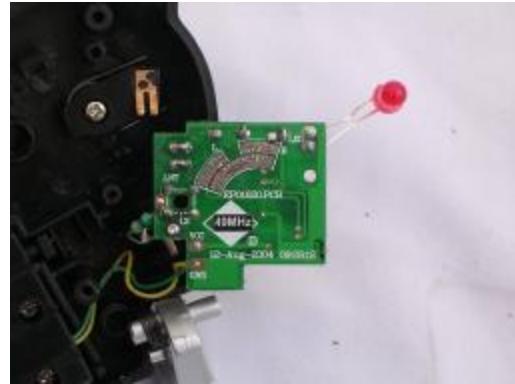
Rear View of the product



Inner Circuit Top View



Inner Circuit Bottom View



Date: 2005-09-15  
No.: HM152715

## TEST REPORT

Page 17 of 17

### Photographs of EUT

Measurement of Radiated Emission Test Set Up



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