FCC TEST REPORT for

TOY EAST INTERNATIONAL LIMITED

R/C SPORTS CAR SERI

Model Number : IWAVER-02

Prepared for	:	TOY EAST INTERNATIONAL LIMITED
Address	:	FLAT/RB 902B 9/F SUN BEAM CENTRE 27 SHIHG
		YIP STREETKWUN TONG KL
Prepared By	:	NS Electromagnetic Technology Co., Ltd.
Address	:	Chenwu Industrial Zone(old 107 Road), Houjie Town,
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Report	t Nui	mber : NS-F0501017

Date of Test : Dec.20~30,2004 Date of Report : Jan.4, 2005

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NS Electromagnetic Technology Co., Ltd.

Applicant: Address:	TOY EAST INTERNATIONA FLAT/RB 902B 9/F SUN STREETKWUN TONG KL	L LIMITED BEAM CENTRE 27 SHIHG YIP							
Manufacturer: Address:	OY EAST INTERNATIONAL LIMITED LAT/RB 902B 9/F SUN BEAM CENTRE 27 SHIHG YIP TREETKWUN TONG KL								
E.U.T:	R/C SPORTS CAR SERI								
Model Number:	IWAVER-02								
Trade Name:		Serial No.:							
Date of Receipt:	Dec.8, 2004	Date of Test: Dec.20~30, 2004							
Test Specification:	FCC Part 15 Subpart B Class B: April, 2004 ANSI C63.4:2001								
Test Result:	The equipment under test was found to be compliance with the requirements of the standards applied.								
		Issue Date: Jan.4, 2005							
Tested by:	Reviewed by:	Approved by:							
Kelly/ Engineer	Chris Du / Supervisor Steven Lee / Manager								
Other Aspects: None.									
Abbreviations: OK/P=passed	fail/F=failed n.a/N=not appli	cable E.U.T=equipment under tested							
This test report is based on a single evaluation of one sample of above mentioned products, It is not permitted to be duplicated in extracts without written approval of NS Electromagnetic Technology Co., Ltd.									

1. GENERAL PRODUCT INFORMATION

1.1. Product Function

Refer to Technical Construction Form and User Manual.

1.2. Description of Device (EUT)

Description	:	R/C SPORTS CAR SERI
Model No.	:	IWAVER-02
System Input Voltage	:	DC 12V
Rated Current	:	160mA

1.3. Independent Operation Modes

The basic operation modes are:

1.3.1. Tx

2. TEST SITES

2.1. Test Facilities

EMC Lab	:	Certificated by TUV Rheinland, Germany. Date of registration: August 11, 2004 Valid Until August 11, 2005
		Certificated by FCC, USA Registration No.: 897109 Date of registration: October 10, 2003 Valid Until October 9, 2006
		Certificated by VCCI, Japan Registration No.: R-1798 & C-1926 Date of registration: January 30, 2004 Valid Until January 29, 2007
		Certificated by CNAL, CHINA Registration No.: L1744 Date of registration: November 25, 2004 Valid Until November 24, 2009
Name of Firm	:	NS Electromagnetic Technology Co., Ltd.
Site Location	:	Chenwu Industrial Zone(old 107Road), Houjie Town,Dongguan City, Guangdong, China

2.2. List of Test and Measurement Instruments

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Test Receiver	Rohde & Schwarz	ESCS30	100340	May 4,04	May 3,05
Spectrum Analyzer	HP	8590L	3412A00251	May 9,04	May 8,05
Amplifier	Agilent	8447D	2944A10488	May 2,04	May 1,05
Bilog Antenna	EMCO	3142B	00022050	May 2,04	May 1,05

2.2.1. For Radiation Disturbance Test

3. TEST SET-UP AND OPERATION MODES

- 3.1. Principle of Configuration Selection
 - **Emission:** The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the Operating Instructions.
- 3.2. Block Diagram of Test Set-up

System Diagram of Connections Between EUT and Simulators



(EUT: R/C SPORTS CAR SERI)

- 3.3. Test Operation Mode and Test Software Refer to Test Setup in clause 4 & 5.
- 3.4. Special Accessories and Auxiliary Equipment None.
- 3.5. Countermeasures to Achieve EMC Compliance None.

4. EMISSION TEST RESULTS

4.1. Power Line Conducted Measurement

According to FCC Part 15 Section 15.207, measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation, and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines.

RESULT	:	Pass
Test procedure	:	ANSI C63.4:2001
Frequency range	:	26~30MHz
Test Site	:	966 Chamber
Limits	:	FCC Part 15 Subpart B Class B: April, 2004

4.2. Radiation Disturbance Test (Fundamental Emission Test)

Test Setup

Date of testing	:	Dec.20,2004
Input Voltage	:	DC 12V
Operation Mode	:	Tx

According to FCC Part 15 Section 15.227(a), the field strength of any emission within the band 26.96-27.28MHz shall not exceed 10,000 microvolts/meter at 3 meters.

The EUT was placed on a turn table which is 0.8 meter above ground. The turn table put degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna which is mounted on a antenna tower. The antenna can move up and down between 1 to 4 meters to find out the maximum emission level. Broadband antenna (calibrated by dipole antenna) were used as a receiving antenna. Both horizontal and vertical polarization of the antenna were set on test.

The bandwidth setting on the test receiver (R&S TEST RECEIVER ESCS30) was 9 KHz.

The EUT was tested in Chamber Site. The scanning waveform were attached within Appendix I.

Test Conditions

EUT	:	R/C	SPORTS CAR	SERI	Temp	erature	:	25°C
Model No.	:		IWAVER-02		Humi	dity	:	58%
Test Mode	:	Tx			Test l	Engineer	:	Kelly
Frequency	Antenna Factor	Cable Loss	Meter Reading Horizontal	Emission Horizo	Level ntal	Over Limits	Limits dBµV/m	Detector Type
MHZ	uБ	uБ	αΒμν	άβμν	/m	uБ		
27.095	22.47	0.72	34.50	57.	69	-22.31	80.00	Quasi-Peak
27.095	22.47	0.72	34.00	57.	19	-22.81	80.00	Average

Frequency	Antenna	Cable	Meter Reading	Emission Level	Over	Limits	Detector
	Factor	Loss	Vertical	Vertical	Limits	dBµV/m	Туре
MHz	dB	dB	dBµV	$dB\mu V/m$	dB	·	
27.095	22.47	0.72	50.20	73.39	-6.61	80.00	Quasi-Peak
27.095	22.47	0.72	49.60	72.79	-7.21	80.00	Average

Note: 1. Emission Level = Antenna Factor + Cable Loss + Meter Reading.

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	Freq	Level	Limit	Line	Level	Factor	Loss	Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB	
1	27.095	57.19	-22.81	80.00	34.00	23.19	0.72	22.47	Average

Chenwu Industrial Zone,



	Freq Leve		Limit Lin		Level Factor		Loss	Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB	
1	27.095	72.79	-7.21	80.00	49.60	23.19	0.72	22.47	Average

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27.095 57.69 -22.31 80.00 34.50 23.19 0.72 22.47 OF

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27.095 73.39 -6.61 80.00 50.20 23.19 0.72 22.47 QF

RESULT	:	Pass
Test procedure	:	ANSI C63.4:2001
Frequency range	:	30~1000MHz
Test Site	:	966 Chamber
Limits	:	FCC Part 15 Subpart B Class B: April, 2004

4.3. Radiation Disturbance Test (Spurious Emission Test)

Test Setup

Date of testing	:	Dec.20,2004
Input Voltage	:	DC 12V
Operation Mode	:	Tx

According to FCC Part 15 Section 15. 227 (b), the field strength of any emission which appear outside of the band 26.96-27.28MHz shall not exceed the general radiated emission limits in Section 15. 209.

The EUT was placed on a turn table which is 0.8 meter above ground. The turn table put degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna which is mounted on a antenna tower. The antenna can move up and down between 1 to 4 meters to find out the maximum emission level. Broadband antenna (calibrated by dipole antenna) were used as a receiving antenna. Both horizontal and vertical polarization of the antenna were set on test.

The bandwidth setting on the test receiver (R&S TEST RECEIVER ESCS30) was 120 KHz.

The EUT was tested in Chamber Site. The scanning waveform were attached within Appendix II.

EUT	:	R/C SPC	ORTS CAR SERI	Temperature	:	25°C
Model No.	:	IWA	Humidity	:	58%	
Test Mode	:	Tx		Test Enginee	r :	Kelly
Frequency	Antenna Factor	Cable Loss	Meter Reading Horizontal	Emission Level Horizontal	Ove Limi	er Limits Its
MHz	dB	dB	dBµV	dBµV/m	dB	dBµV/m
32.818	20.19	0.77	2.44	23.40	-16.6	60 40.00
110.738	11.20	1.58	8.82	21.60	-21.9	43.50
136.500	10.52	1.81	9.27	21.60	-21.9	90 43.50
163.334	12.10	1.98	5.22	19.30	-24.2	43.50
216.800	13.32	2.31	5.77	21.40	-24.6	60 46.00

Test Conditions

Remark: The worst emission was detected at **32.818MHz** with corrected signal level of **23.40dB\muV/m**(Limit is **40.00 dB\muV/m**) when the antenna was at **Horizontal** polarization and at **1.85m** high and the turn table was at **89**°.

Frequency	Antenna	Cable	Meter Reading	Emission Level	Over	Limits
	Factor	Loss	Vertical	Vertical	Limits	
MHz	dB	dB	dBµV	dBµV/m	dB	$dB\mu V/m$
39.636	16.85	0.85	15.10	32.80	-7.20	40.00
56.800	10.44	1.07	10.59	22.10	-17.90	40.00
109.764	11.25	1.56	4.60	17.41	-26.09	43.50
137.036	10.52	1.81	11.17	23.50	-20.00	43.50
164.308	12.10	1.99	5.91	20.00	-23.50	43.50

Remark: The worst emission was detected at **39.636MHz** with corrected signal level of **32.80dBµV**/m (Limit is **40.00 dBµV**/m) when the antenna was at **Vertical** polarization and at **1.0m** high and the turn table was at **256°**.

Note: 1. All readings were Quasi-Peak values.

- 2. Emission Level = Antenna Factor + Cable Loss + Meter Reading
- 3. 0 $\,^\circ\,$ was the table front facing the antenna. Degree was calculated from 0 $\,^\circ\,$ clockwise facing the antenna.

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	Freq	Level	Limit	Line	Level	Factor	Loss	Factor
	MHz	dBuV/m	dB	dBuV/m	dBuV	· dB	dB	dB
1	32.818	23.40	-16.60	40.00	2.44	20.96	0.77	20.19
2	110.738	21.60	-21.90	43.50	8.82	12.78	1.58	11.20
3	136.500	21.60	-21.90	43.50	9.27	12.33	1.81	10.52
4	163.334	19.30	-24.20	43.50	5.22	14.08	1.98	12.10
5	216.800	21.40	-24.60	46.00	5.77	15.63	2.31	13.32

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	Freq	Level	Over Limit	Limit Line	Read Level	Factor	Cable Loss	Probe Factor
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB
1 2	39.636 56.800	32.80	-7.20	40.00	15.10	17.70 11.51	0.85	16.85
3	109.764	17.41	-26.09	43.50	4.60	12.81	1.56	11.25
4	137.036	23.50	-20.00	43.50	11.17 5.91	12.33 14.09	1.81	10.52 12.10

5. TEST BANDWIDTH

The plot on the following page shows the fundamental frequency is 27.095MHz when modulated. From the plot the emission is observed between the band edge and up to 10KHz had attenuated at least 26dB. The unit meets the FCC bandwidth requirements. Please see the attached waveform.







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6. PHOTOGRAPHS OF TEST SET-UP



7.1. Set-up for Radiation Disturbance Test



7. PHOTOGRAPHS OF THE EUT



Figure 1 General Appearance of the EUT

Figure 2 General Appearance of the EUT



Figure 3 Inside View of the EUT



Figure 4 Inside View of the EUT



Figure 5 Inside View of the EUT



Figure 6 Inside View of the EUT



Figure 7 General Appearance of the PCB



Figure 8 General Appearance of the PCB



Figure 9 General Appearance of the PCB



Figure 10 General Appearance of the PCB



Figure 11 General Appearance of the PCB



Figure 12 General Appearance of the PCB



Figure 13 General Appearance of the PCB



Figure 14 General Appearance of the PCB





Figure 15 General Appearance of the PCB

Figure 16 General Appearance of the PCB



Figure 17 General Appearance of the PCB



FCC ID:S2HIWAVER-02

APPENDIX I

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APPENDIX II

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