

FCC TEST REPORT
for
TOY EAST INTERNATIONAL LIMITED
R/C SPORTS CAR SERI
Model Number : IWAVR-02

Prepared for : TOY EAST INTERNATIONAL LIMITED
Address : FLAT/RB 902B 9/F SUN BEAM CENTRE 27 SHIHG
YIP STREET KWUN TONG KL

Prepared By : NS Electromagnetic Technology Co., Ltd.
Address : Chenwu Industrial Zone(old 107 Road), Houjie Town,
Dongguan City, Guangdong, China

Tel: 86-769-5935656
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Report Number : 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:	TOY EAST INTERNATIONAL LIMITED		
Address:	FLAT/RB 902B 9/F SUN BEAM CENTRE 27 SHIHG YIP STREETKWUN TONG KL		
Manufacturer:	TOY EAST INTERNATIONAL LIMITED		
Address:	FLAT/RB 902B 9/F SUN BEAM CENTRE 27 SHIHG YIP STREETKWUN 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 applicable 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

2.2.1. For Radiation Disturbance Test

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

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.

4.2. Radiation Disturbance Test (Fundamental Emission Test)

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

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	Temperature	:	25°C
Model No.	:	IWAVER-02	Humidity	:	58%
Test Mode	:	Tx	Test Engineer	:	Kelly

Frequency	Antenna	Cable	Meter Reading	Emission Level	Over	Limits	Detector
MHz	Factor	Loss	Horizontal	Horizontal	Limits	dBμV/m	Type
	dB	dB	dBμV	dBμV/m	dB		
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
MHz	Factor	Loss	Vertical	Vertical	Limits	dBμV/m	Type
	dB	dB	dBμV	dBμV/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.

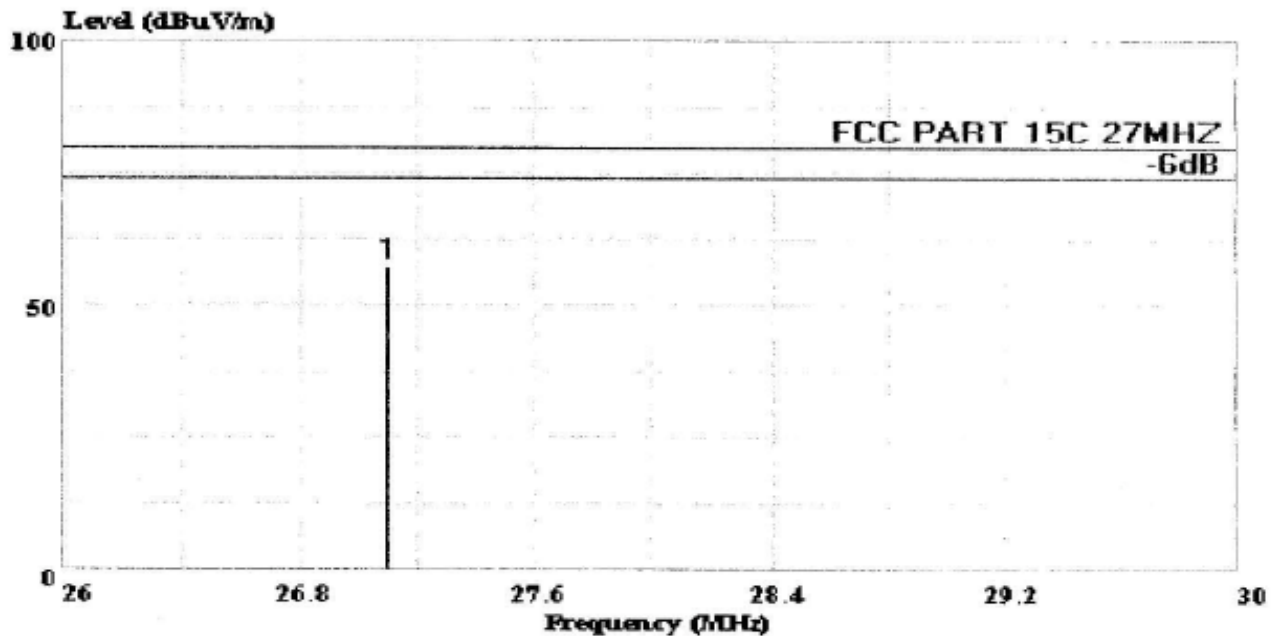
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Data#: 30 File#: D:\Radiation\T\TOY EAST.EMI

Date: 2004-12-20 Time: 09:03:52



Site : 966 Chamber
Condition : FCC PART 15C 27MHZ 3m 3142B HORIZONTAL
EUT : R/C SPORTS CAR SERI
Power : DC 12V
M/N : IWAVER-02
Test Engineer: Kelly
Comment : Temp:25°C Humi:58%
Memo : Tx

Page: 1

	Freq	Level	Over Limit	Limit Line	Read Level	Factor	Cable Loss	Probe 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

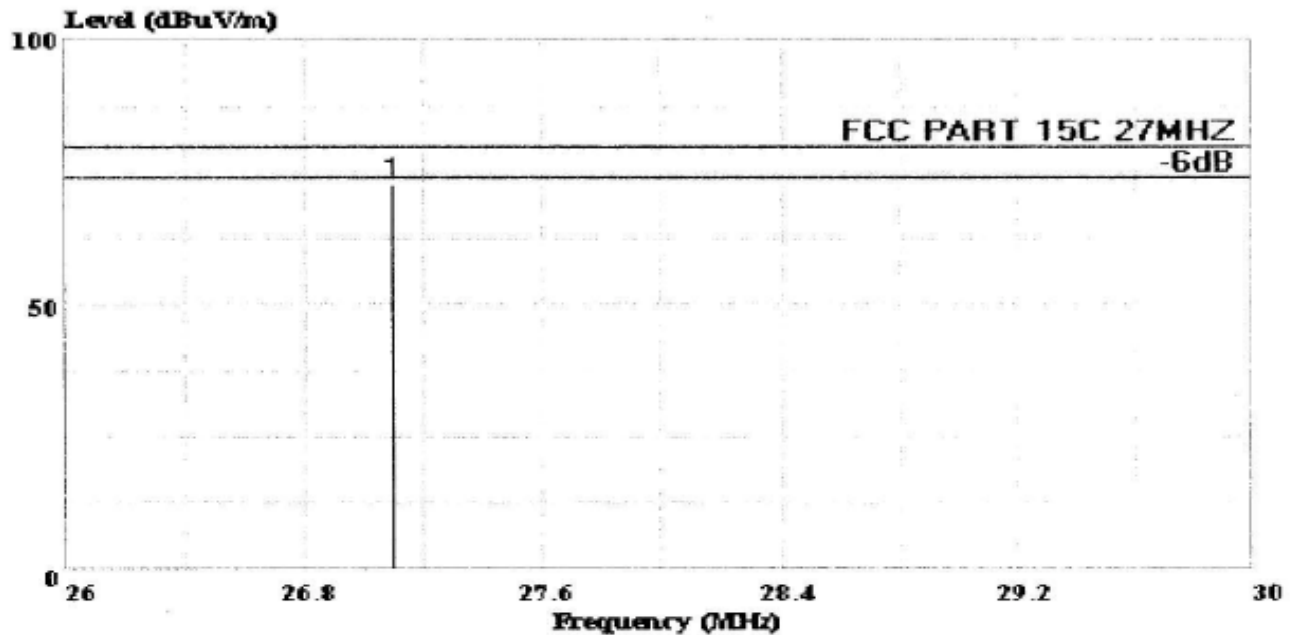
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Date: 2004-12-20 Time: 09:00:10



Site : 966 Chamber
Condition : FCC PART 15C 27MHZ 3m 3142B VERTICAL
EUT : R/C SPORTS CAR SERI
Power : DC 12V
M/N : IWAVER-02
Test Engineer: Kelly
Comment : Temp:25'C Humi:58%
Memo : Tx

Page: 1

	Freq	Level	Over Limit	Limit Line	Read Level	Factor	Cable Loss	Probe 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

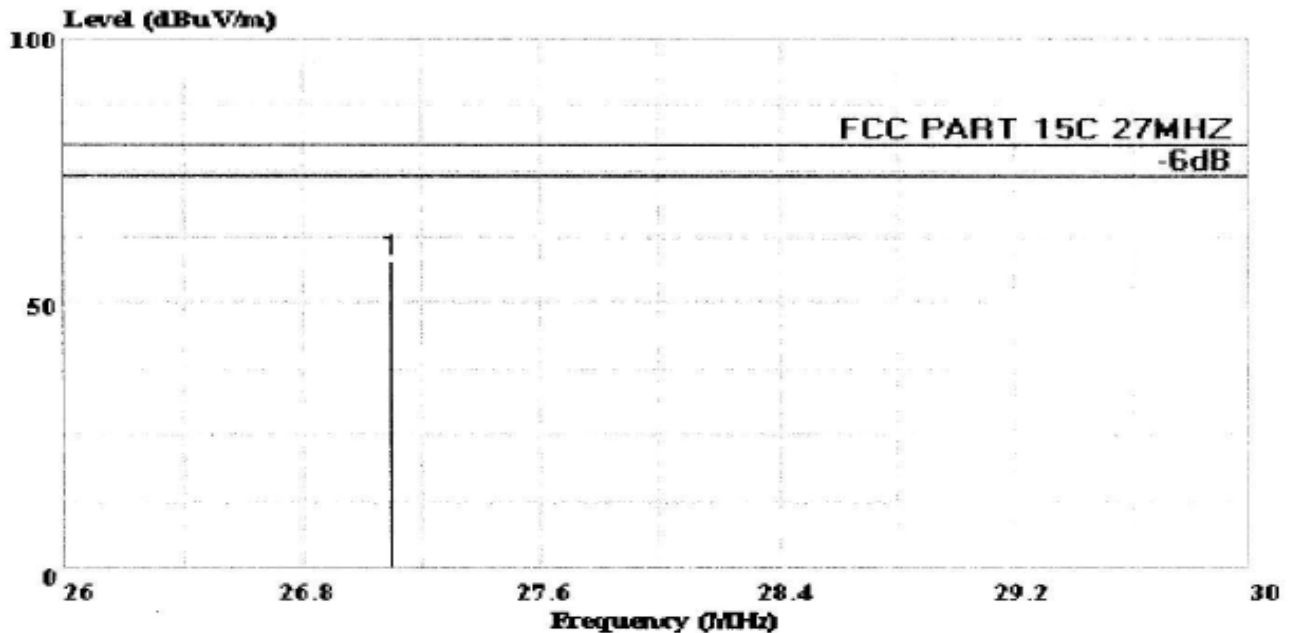
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Date: 2004-12-20 Time: 09:03:13



Site : 966 Chamber
Condition : FCC PART 15C 27MHz 3m 3142B HORIZONTAL
EUT : R/C SPORTS CAR SERI
Power : DC 12V
M/N : IWAVER-02
Test Engineer: Kelly
Comment : Temp:25'C Humi:58%
Memo : Tx

Page: 1

	Freq	Level	Over Limit	Limit Line	Read Level	Factor	Cable Loss	Probe Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB	
1	27.095	57.69	-22.31	80.00	34.50	23.19	0.72	22.47	QP

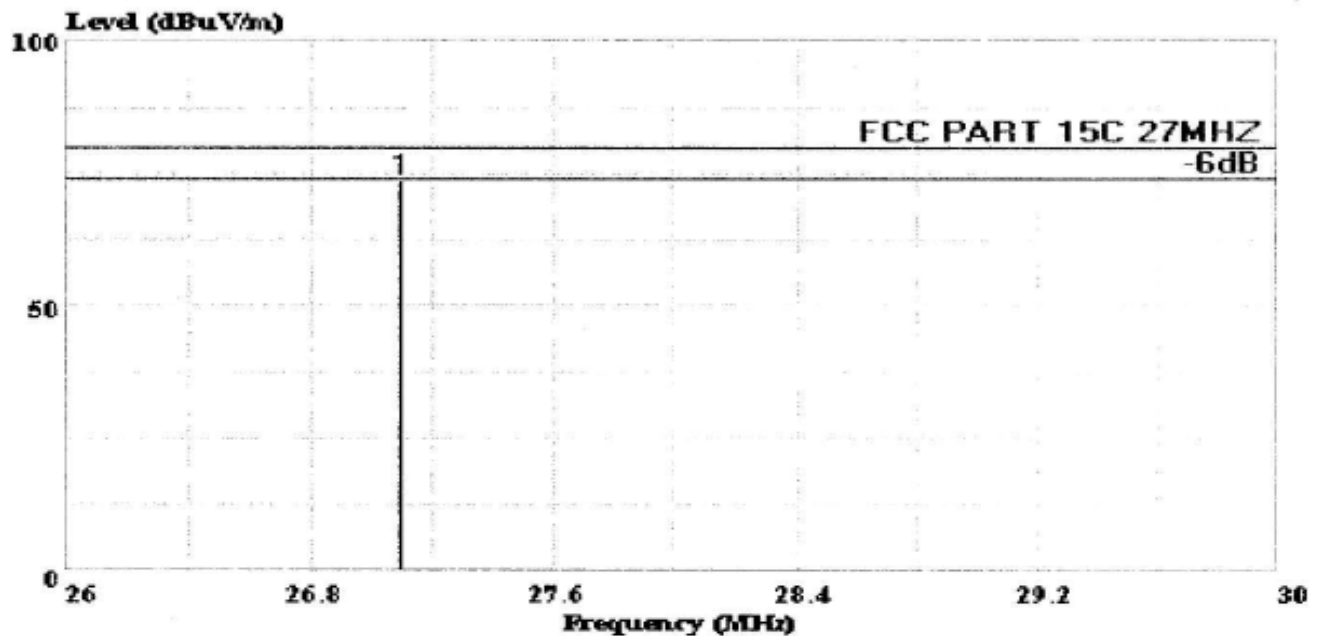
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Data#: 27 File#: D:\Radiation\T\TOY EAST.EMI

Date: 2004-12-20 Time: 08:59:26



Site : 966 Chamber
Condition : FCC PART 15C 27MHz 3m 3142B VERTICAL
EUT : R/C SPORTS CAR SERI
Power : DC 12V
M/N : IWAVR-02
Test Engineer: Kelly
Comment : Temp:25°C Humi:58%
Memo : Tx

Page: 1

	Freq	Level	Over Limit	Limit Line	Read Level	Factor	Cable Loss	Probe Factor	Remark
	MHz	dBUV/m	dB	dBUV/m	dBUV	dB	dB	dB	
1	27.095	73.39	-6.61	80.00	50.20	23.19	0.72	22.47	QE

4.3. Radiation Disturbance Test (Spurious Emission Test)

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

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.

Test Conditions

EUT	:	R/C SPORTS CAR SERI	Temperature	:	25°C
Model No.	:	IWAVER-02	Humidity	:	58%
Test Mode	:	Tx	Test Engineer	:	Kelly

Frequency MHz	Antenna Factor dB	Cable Loss dB	Meter Reading Horizontal dBμV	Emission Level Horizontal dBμV/m	Over Limits dB	Limits dBμV/m
32.818	20.19	0.77	2.44	23.40	-16.60	40.00
110.738	11.20	1.58	8.82	21.60	-21.90	43.50
136.500	10.52	1.81	9.27	21.60	-21.90	43.50
163.334	12.10	1.98	5.22	19.30	-24.20	43.50
216.800	13.32	2.31	5.77	21.40	-24.60	46.00

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

Frequency MHz	Antenna Factor dB	Cable Loss dB	Meter Reading Vertical dBμV	Emission Level Vertical dBμV/m	Over Limits dB	Limits dBμV/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 ° was the table front facing the antenna. Degree was calculated from 0 ° clockwise facing the antenna.

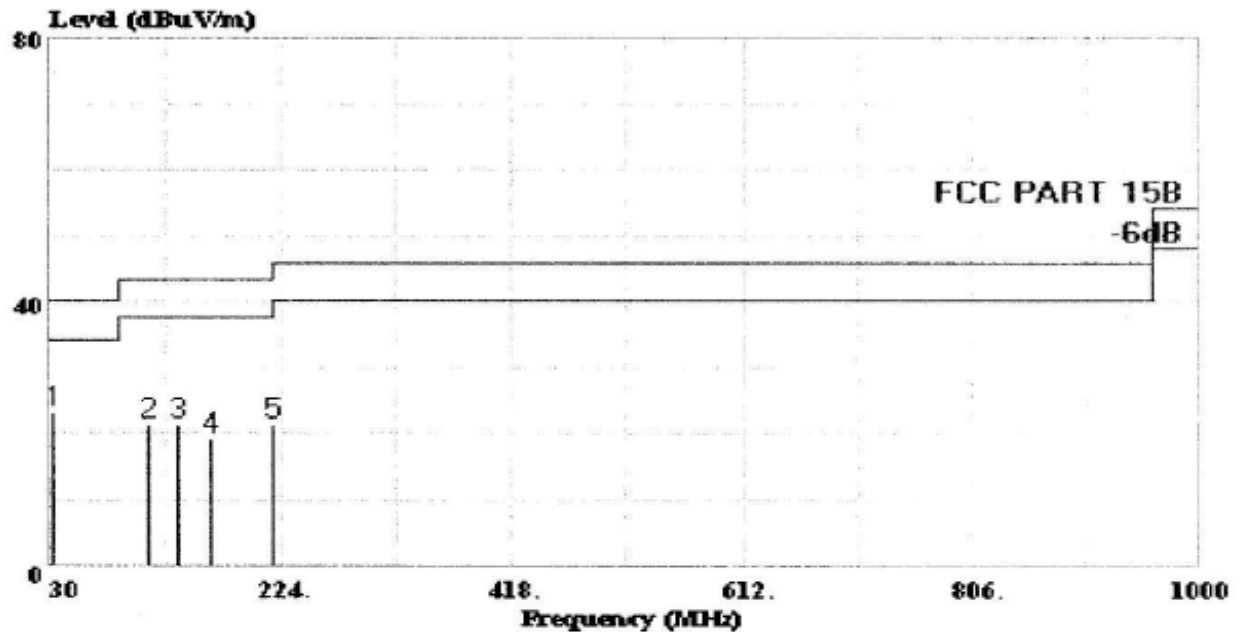
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Data#: 36 File#: D:\Radiation\T\TOY EAST.EMI

Date: 2004-12-20 Time: 09:327:1



Site : 966 Chamber
Condition : FCC PART 15B 3m 3142B HORIZONTAL
EUT : R/C SPORTS CAR SERI
Power : DC 12V
M/N : NWAVER-02
Test Engineer: Kelly
Comment : Temp:25'C Humi:58%
Memo : Tx
: Ant High:1.85m Table Angle:89°

Page: 1

	Freq	Level	Over	Limit	Read		Cable	Probe
	MHz	dBuV/m	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

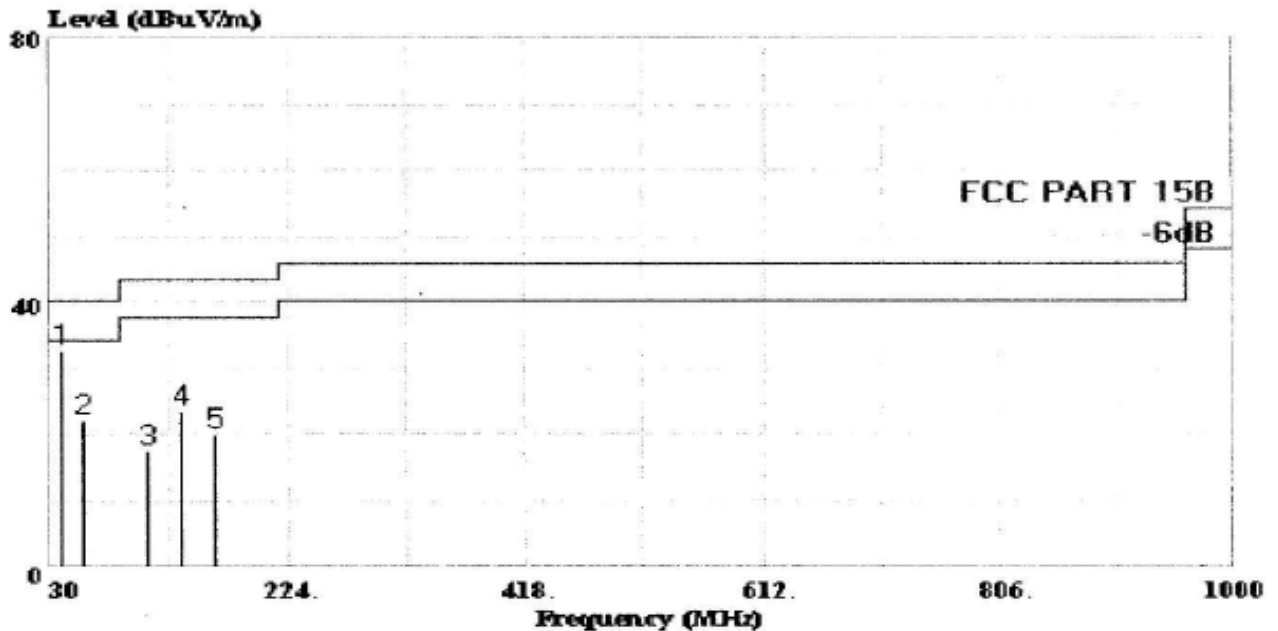
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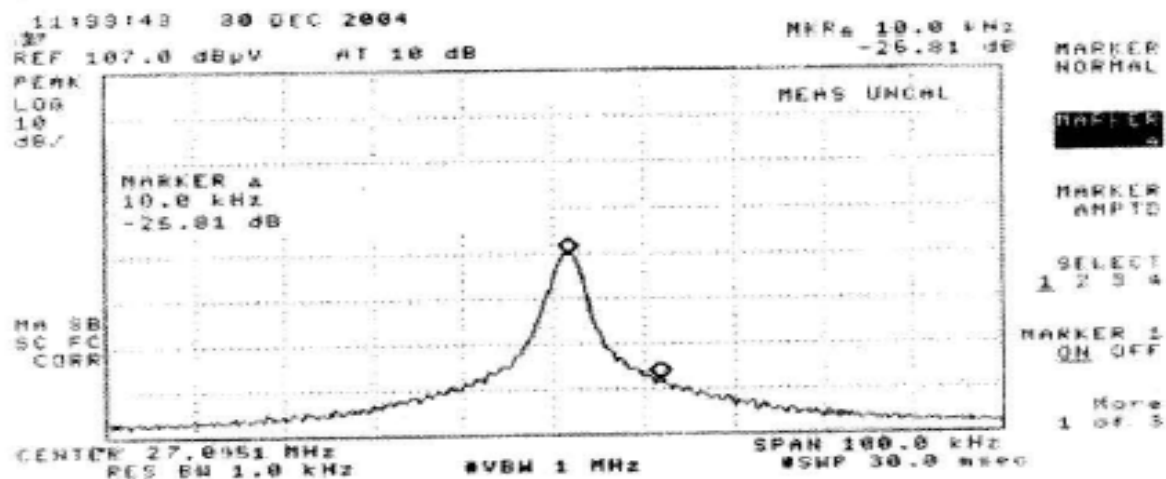
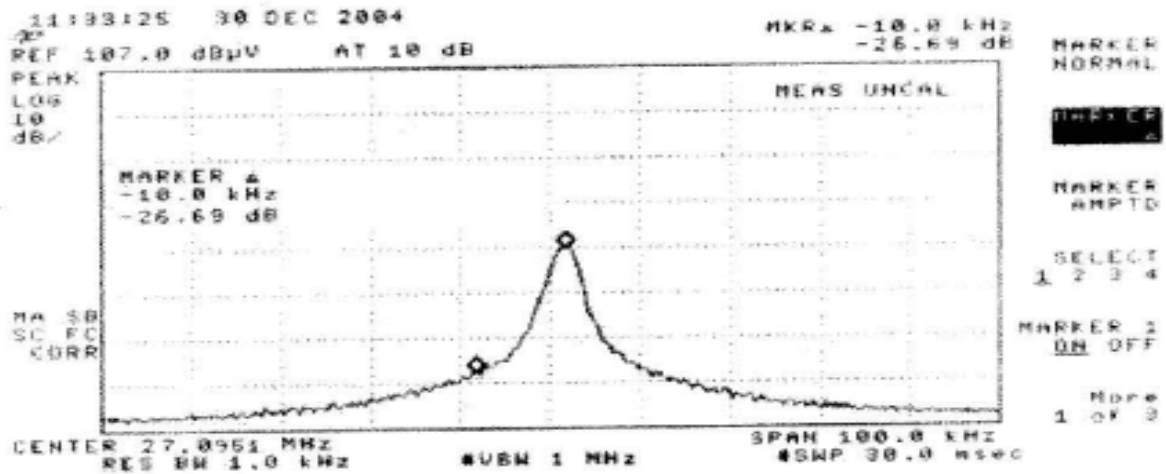
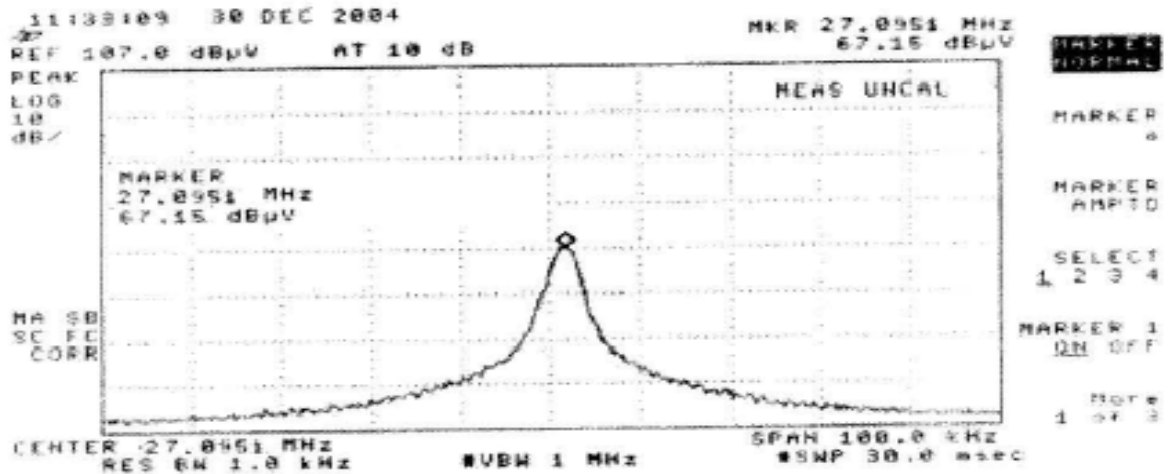
Site : 966 Chamber
 Condition : FCC PART 15B 3m 3142B VERTICAL
 EUT : R/C SPORTS CAR SERI
 Power : DC 12V
 M/N : JWAVER-02
 Test Engineer: Kelly
 Comment : Temp:25'C Humi:58%
 Memo : Tx
 : Ant High:1.0m Table Angle:256'

Page: 1

	Freq	Level	Over	Limit	Read		Cable	Probe
	MHz	dBuV/m	Limit	Line	Level	Factor	Loss	Factor
			dB	dBuV/m	dBuV	dB	dB	dB
1	39.636	32.80	-7.20	40.00	15.10	17.70	0.85	16.85
2	56.800	22.10	-17.90	40.00	10.59	11.51	1.07	10.44
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	12.33	1.81	10.52
5	164.308	20.00	-23.50	43.50	5.91	14.09	1.99	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.



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

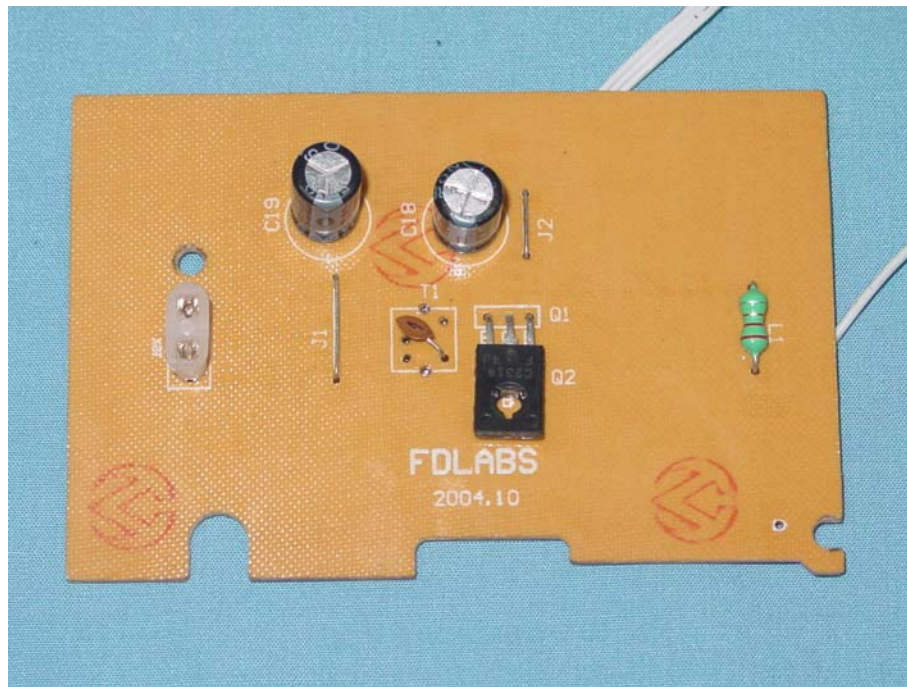


Figure 8
General Appearance of the PCB

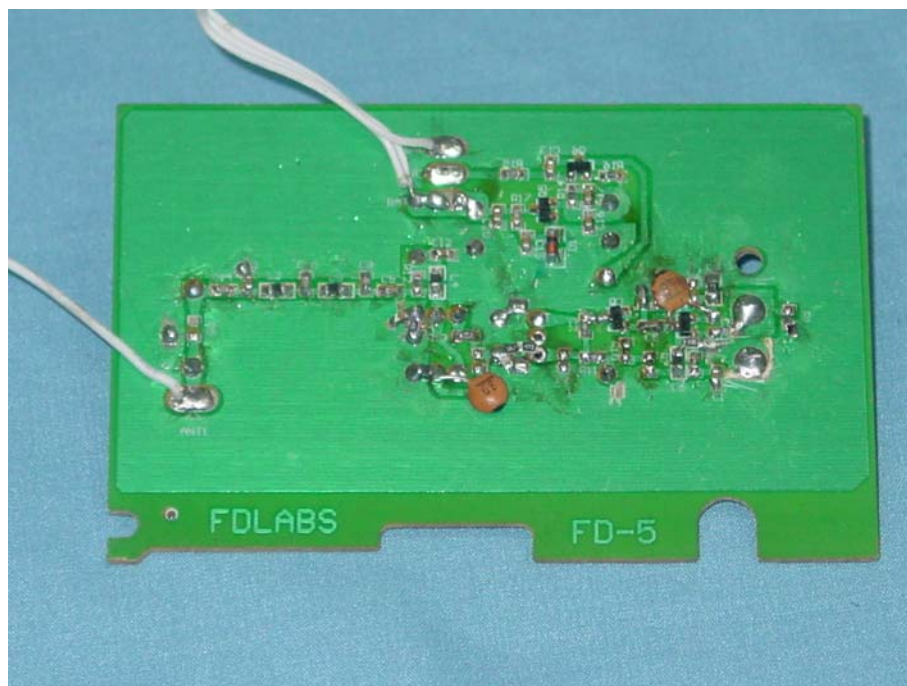


Figure 9
General Appearance of the PCB

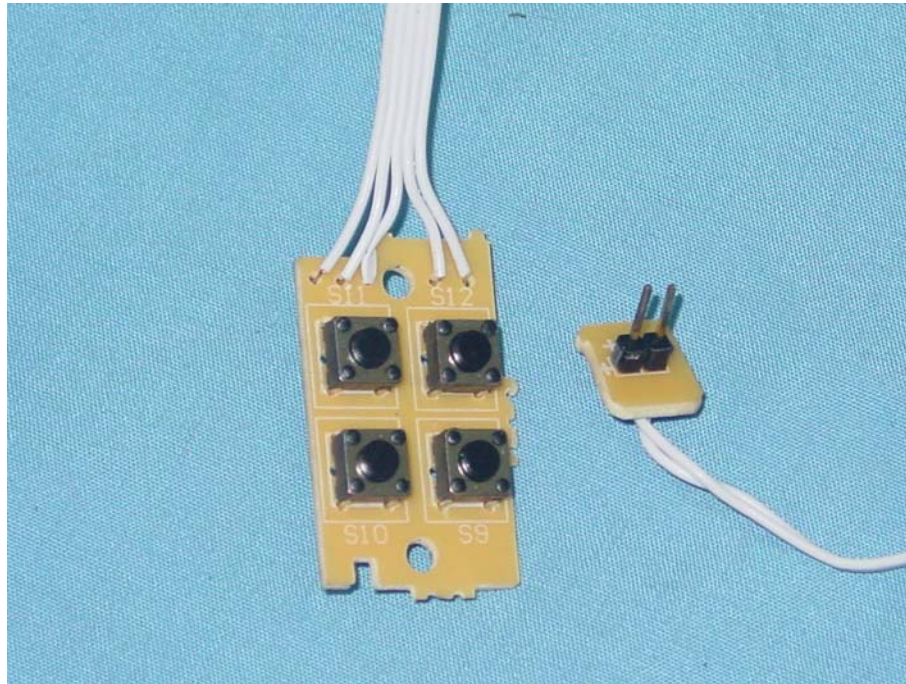


Figure 10
General Appearance of the PCB

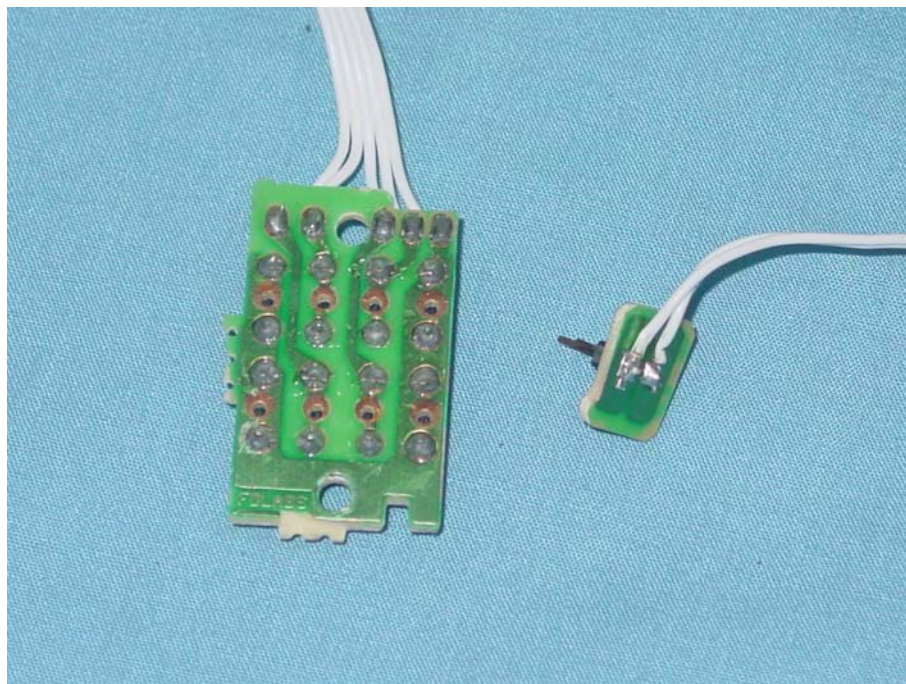


Figure 11
General Appearance of the PCB

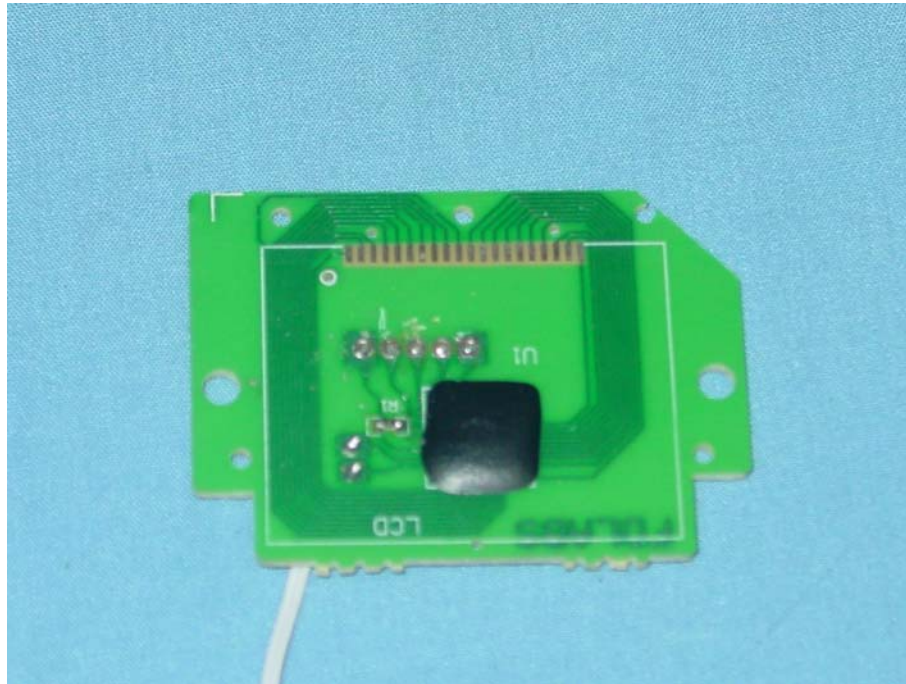


Figure 12
General Appearance of the PCB



Figure 13
General Appearance of the PCB

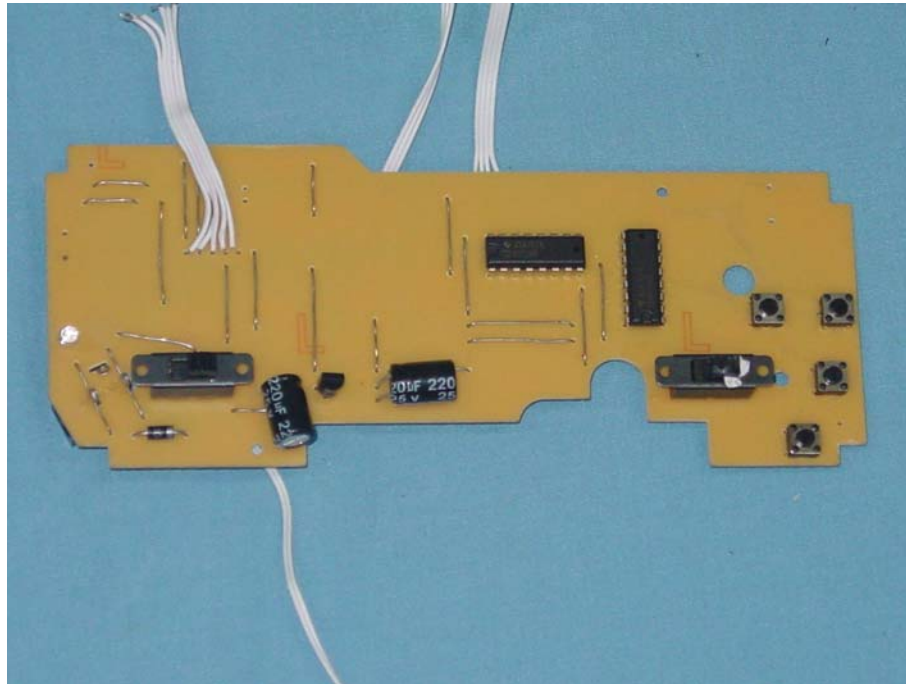


Figure 14
General Appearance of the PCB

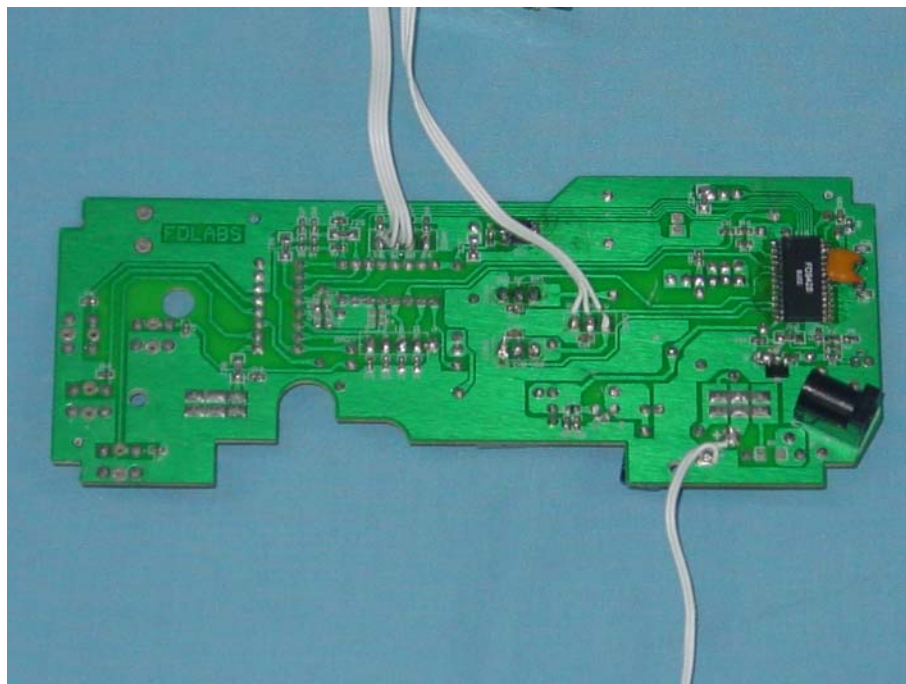


Figure 15
General Appearance of the PCB

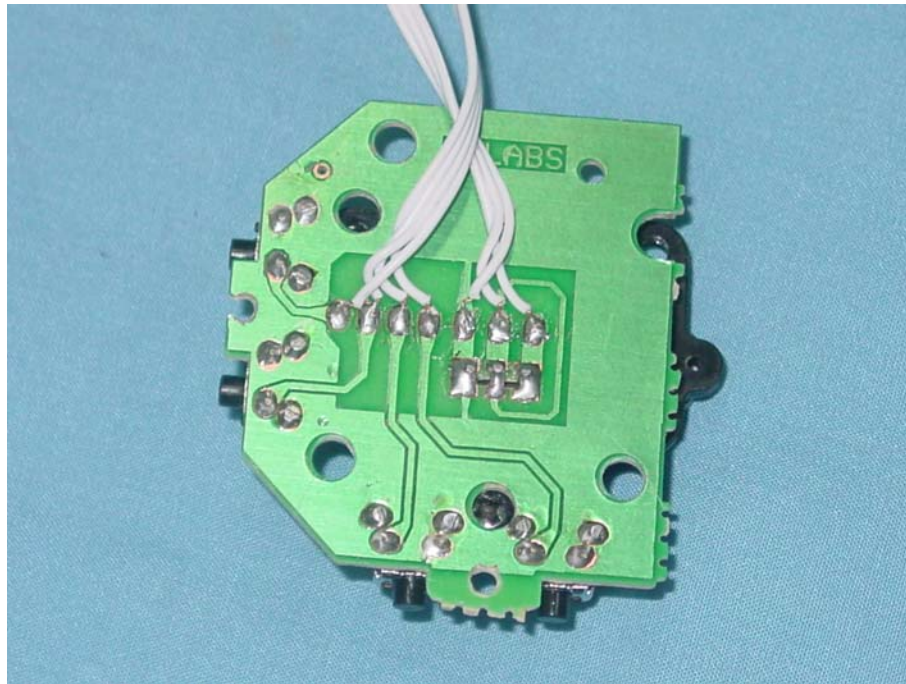


Figure 16
General Appearance of the PCB

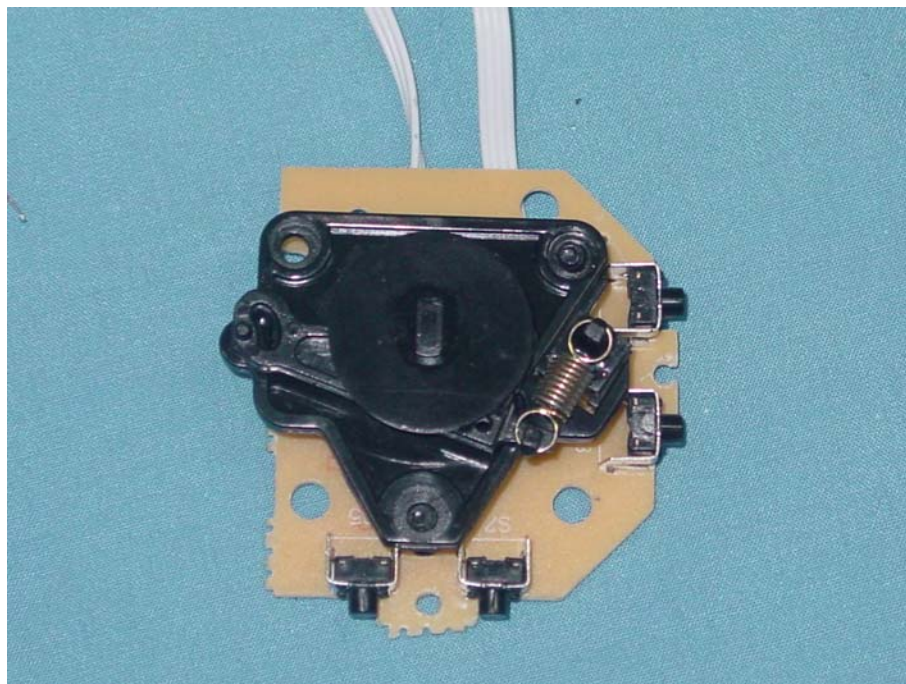
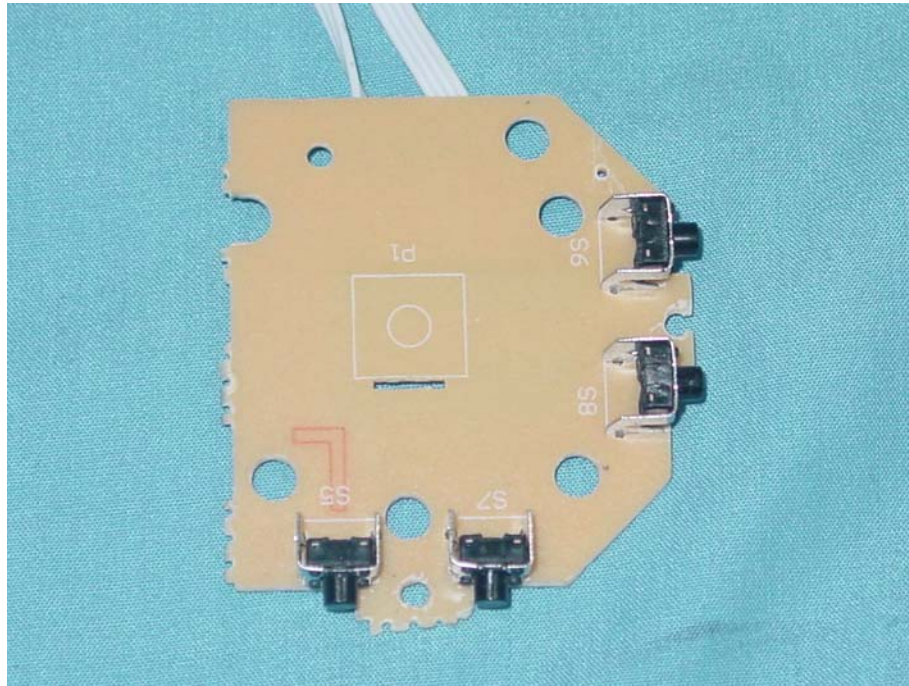


Figure 17
General Appearance of the PCB



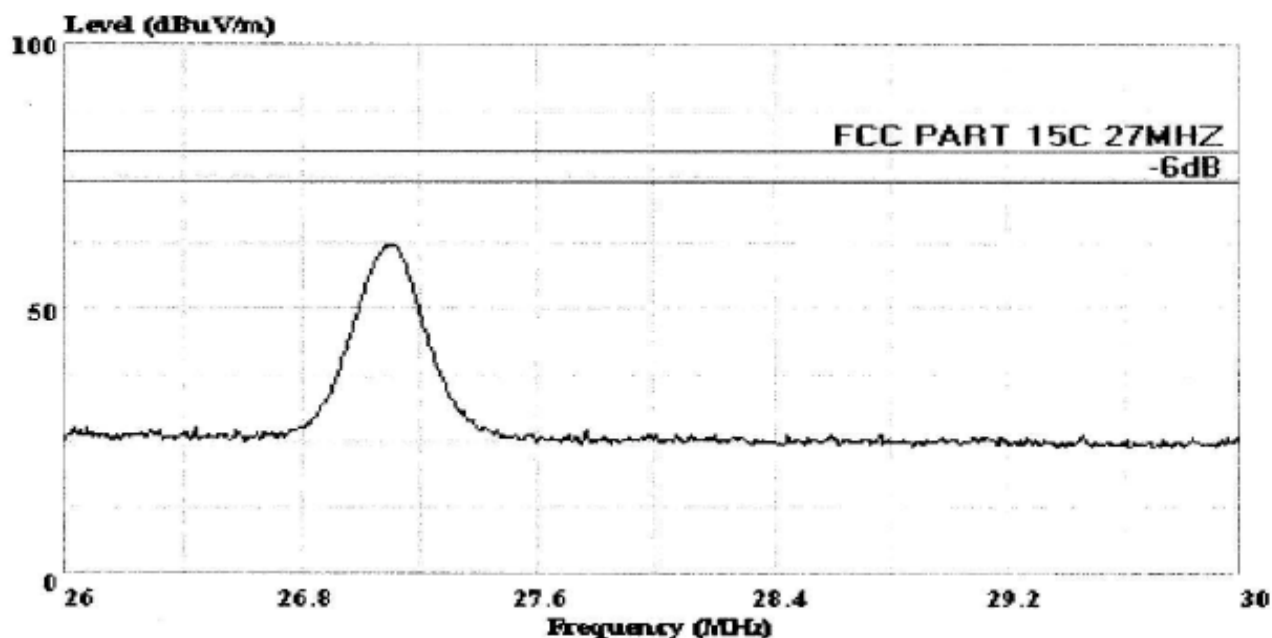
APPENDIX I

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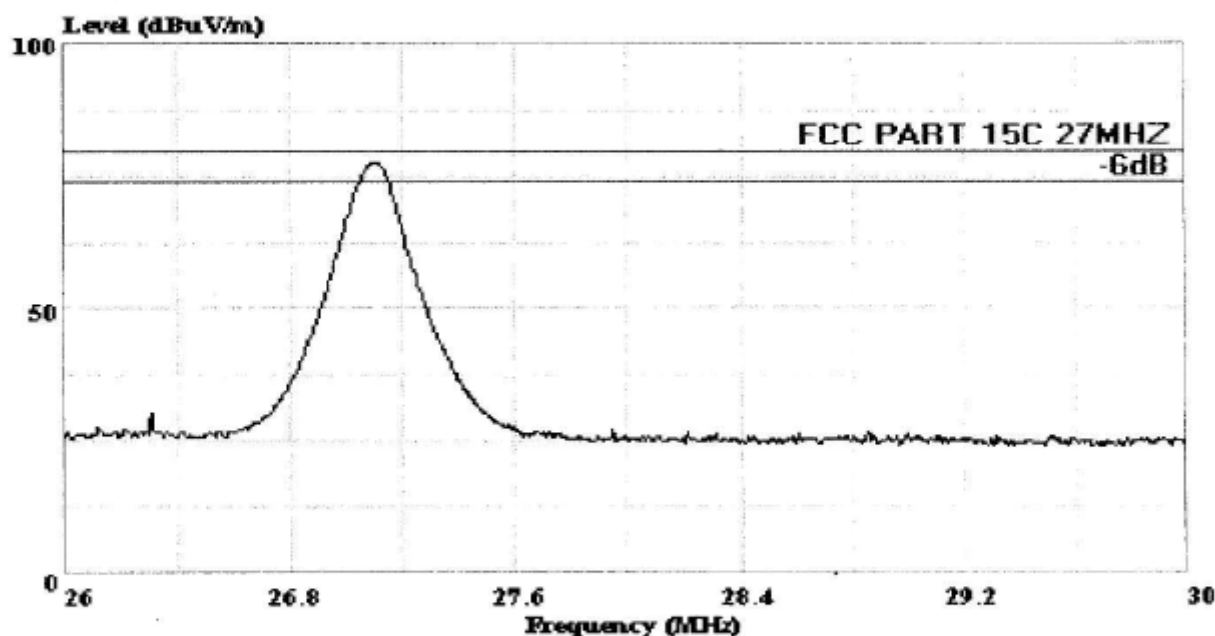
Site : 966 Chamber
Condition : FCC PART 15C 27MHZ 3m 3142B HORIZONTAL
EUT : R/C SPORTS CAR SERI
Power : DC 12V
M/N : IWAVER-02
Test Engineer: Kelly
Comment : Temp:25'C Humi:58%
Memo : Tx

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Data#: 26 File#: D:\Radiation\T\TOY EAST.EMI

Date: 2004-12-20 Time: 08:56:30



Site : 966 Chamber
Condition : FCC PART 15C 27MHZ 3m 3142B VERTICAL
EUT : R/C SPORTS CAR SERI
Power : DC 12V
M/N : IWAVER-02
Test Engineer: Kelly
Comment : Temp:25'C Humi:58%
Memo : TX

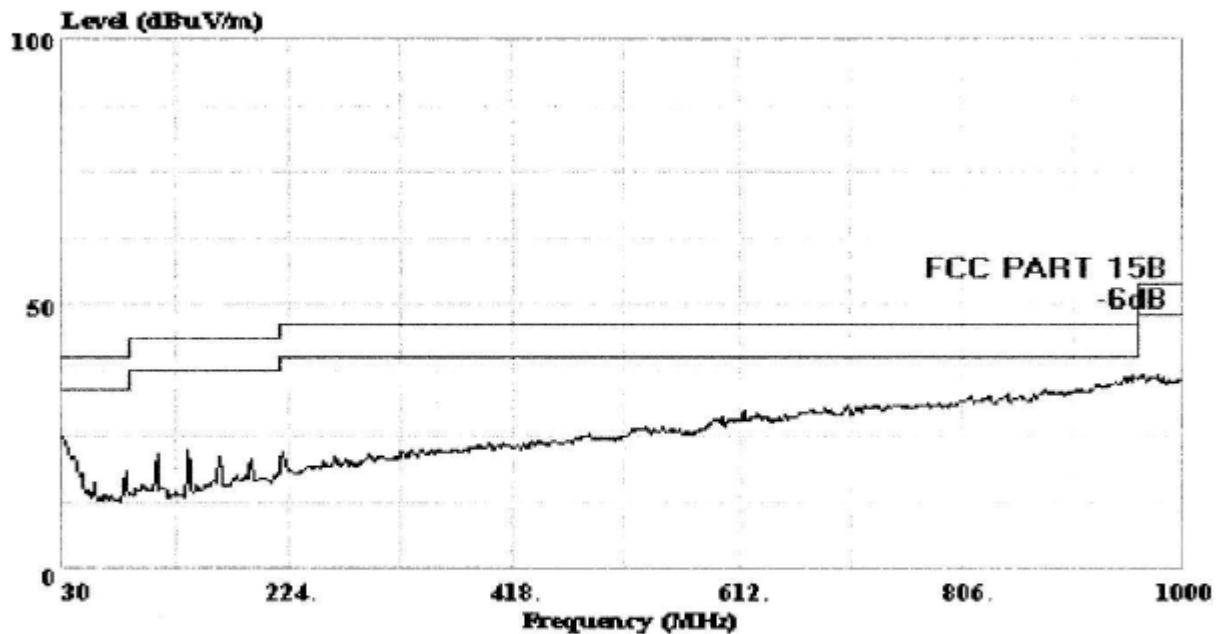
APPENDIX II

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Data#: 34 File#: D:\Radiation\T\TOY EAST.EMI

Date: 2004-12-20 Time: 09:327:1



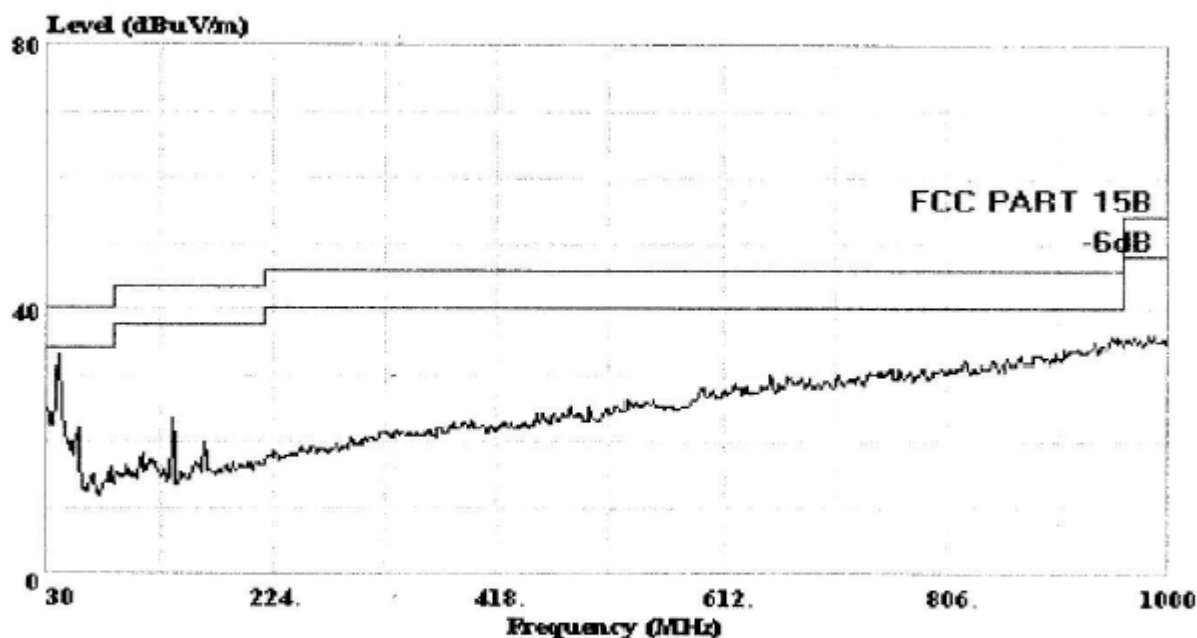
Site : 966 Chamber
Condition : FCC PART 15B 3m 3142B HORIZONTAL
EUT : R/C SPORTS CAR SERI
Power : DC 12V
M/N : IWAVER-02
Test Engineer: Kelly
Comment : Temp:25'C Humi:58%
Memo : Tx

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Data#: 33 File#: D:\Radiation\T\TOY EAST.EMI

Date: 2004-12-20 Time: 09:28:28



Site : 966 Chamber
Condition : FCC PART 15B 3m 3142B VERTICAL
EUT : R/C SPORTS CAR SERI
Power : DC 12V
M/N : IWAVER-02
Test Engineer: Kelly
Comment : Temp:25°C Humi:58%
Memo : Tx