

THRU Lab & Engineering.

**RM1105,11FL, ACE TECHNO TOWER
197-22, GURO-DONG GURO-GU SEOUL KOREA
T81221095059F81221095056 email thrukang@kornet.net**



Test Report

Product Name: 26.96-27.28 MHz Wireless R/C Toy - TX

FCC ID: QW70202

Applicant:

HOBBYENGINE MODEL INDUSTRIAL LTD.

**ROOM 619, 6/F., PENINSULA CENTRE, 67 MODY ROAD,
TSIMSHATSUI EAST
KOWLOON
HONG KONG**

Date Receipt: 04/20/2004

Date Tested: 04/21/2004

**APPLICANT: HOBBYENGINE MODEL INDUSTRIAL LTD.
FCC ID: QW70202
REPORT #: THRU-404006**

COVER SHEET

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FCC ID: QW70202

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EXHIBITS CONTAINING:

BLOCK DIAGRAM
SCHEMATIC
PARTS LIST
INSTRUCTION MANUAL
SAMPLE OF FCC ID LABEL
LOCATION OF FCC ID LABEL
EXTERNAL PHOTO - FRONT SIDE
EXTERNAL PHOTO - BACK SIDE
INTERNAL PHOTO - COMPONENT SIDE
INTERNAL PHOTO - COPPER SIDE
CIRCUIT DESCRIPTION

APPLICANT: HOBBYENGINE MODEL INDUSTRIAL LTD.

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Test Equipment List

DEVICE	MODEL	MFGR	SERNO	DUE.CAL
EMI Test Receiver	ESVS 10	Rohde & Schwarz	830489/001	2005.04.07.
Spectrum Analyzer	8566B	Hewlett Packard	2311A02394	2005.04.07.
Spectrum Display	85662A	Hewlett Packard	2542A12429	2005.04.07.
Quasi-Peak Adapter	85650A	Hewlett Packard	2521A00887	2005.04.07.
RF Preselector	85685A	Hewlett Packard	2648A00504	2005.04.07.
Pre-Amplifier	8449B	Hewlett Packard	3008A00375	2005.04.07.
Pre-Amplifier	8447F	Hewlett Packard	3113A05367	2005.04.07.
Spectrum Monitor	EZM	Rohde & Schwarz	862304/007	2005.04.07.
Bico-Antenna	94455-1	Eaton	977	2005.03.17.
Log-Periodic Antenna	3146	EMCO	2051	2005.03.17.
Dipole Antenna	TDA25/1/2	Electro Metrics	176/200/200	2005.03.17.
Horn Antenna	SAS-571	A.H Systems	414	2005.03.17.
Spectrum Analyzer	R3261C	Advantest	71720189	2005.04.07.
LISN	KNW-242	Kyoritsu	8-923-2	2004.07.17.
LISN	8012-50-R-24	Solar	8379121	2004.07.17.
Loop Ant	6507	EMCO	1435	2004.10.06.
Signal Generator	SMS	Rohde & Schwarz	872165/100	2005.04.07.
Modulation Analyzer	8901B	Hewlett Packard	3438A05094	2005.04.07.
Frequency Counter	CMC251	Tektronic	CMC-251TW52489	2005.04.07.

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TEST PROCEDURE

GENERAL: This report shall NOT be reproduced except in full without the written approval of Thrulab & Engineering.

RADIATION INTERFERENCE: The test procedure used was ANSI STANDARD C63.4-1992 using a HEWLETT PACKARD spectrum analyzer with a preselector. The bandwidth of the spectrum analyzer was 100 kHz with an appropriate sweep speed. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The resolution bandwidth was 100 kHz and the video bandwidth was 300 kHz. The ambient temperature of the UUT was 25°C with a humidity of 75%.

FORMULA OF CONVERSION FACTORS: The Field Strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBuV) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stated in terms of dB. The gain of the Preselector was accounted for in the Spectrum Analyzer Meter Reading.

Example:

$$\begin{aligned} \text{Freq (MHz) METER READING + ACF} &= \text{FS} \\ 33 & \quad 20 \text{ dBuV} + 10.36 \text{ dB} = 30.36 \text{ dBuV/m @ 3m} \end{aligned}$$

ANSI STANDARD C63.4-1992 10.1.7 MEASUREMENT PROCEDURES: The unit under test was placed on a table 80 cm high and with dimensions of 1m by 1.5m. The table used for radiated measurements is capable of continuous rotation.

When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes.

The situation was similar for the conducted measurement except that the table did not rotate. The EUT was setup as described in ANSIC63.4-1992 with the EUT 40 cm from the vertical ground wall.

Not Applicable, battery operated.

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APPLICANT: HOBBYENGINE MODEL INDUSTRIAL LTD.

FCC ID: QW70202

NAME OF TEST: RADIATION INTERFERENCE

RULES PART NO.: 15.227(a)

REQUIREMENTS: CARRIER FREQUENCY SHALL NOT EXCEEDS 10,000 microvolts/meter AT 3M.

Frequency (MHz)	Meter Reading dBuV/m PK	Meter Reading dBuV/m AV	Polar	Ant Height m	Antenna Factor dB	Cable Loss dB	Result dBuV PK	Result dBuV AV	Limit dBuV/m PK	Limit dBuV/m AV	Margin dBuV/m PK	Margin dBuV/m AV
27.095	35.3	33.6	H	2.4	16.1	0.9	52.3	50.6	100	80	-47.7	-29.4
27.095	54.4	51.6	V	2.20	16.1	0.9	71.4	68.6	100	80	-28.6	-11.4

SAMPLE CALCULATION: $FSdBuV/m = MR (dBuV) + ACFdB$.

TEST PROCEDURE: The procedure used was ANSI STANDARD C63.4-1992. The spectrum was scanned from 30 MHz to 1000 MHz. When an emission was found, the table was rotated to produce the maximum signal strength. The antenna was placed in both the horizontal and vertical planes and the worse case emissions were reported. The UUT was tested in 3 orthogonal planes.

TEST RESULTS: THE UNIT DOES MEET THE FCC REQUIREMENTS.

PERFORMED BY: K.M CHOI

DATE: 04/21/2004

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FCC ID: QW70202

NAME OF TEST: RADIATION INTERFERENCE

RULES PART NO.: 15.227(b)

REQUIREMENTS: OUT-OF-BAND EMISSIONS SHALL NOT EXCEED:

30 - 88 MHz	40.0 dBuV/M	MEASURED AT 3 METERS
88 - 216 MHz	43.5 dBuV/M	
216 - 960 MHz	46.0 dBuV/m	
ABOVE 960 MHz	54.0 dBuV/m	

TEST DATA:

No	Emission Frequency (MHz)	Meter Reading dBuV	Ant. Polarity	Correction Factor dB	Cable Loss dB	Field Strength (dBuV/m)	Margin (dBuv)	Limit (dBuv/m)
1	54.19	4.2	H	9.4	1.1	14.7	-25.3	40.0
2	81.28	14.4	H	8.4	1.4	24.1	-15.9	40.0
3	108.38	11.0	H	11.0	1.7	23.7	-19.8	43.5
4	135.48	11.4	H	14.0	2.0	27.4	-16.1	43.5
5	162.57	7.2	H	16.9	2.2	26.3	-17.2	43.5
6	189.67	7.6	H	13.6	2.4	23.6	-19.9	43.5
7	216.76	8.3	H	10.7	2.7	21.7	-21.8	46.0
8	243.86	15.0	H	11.6	3.1	29.6	-16.4	46.0
9	270.96	4.6	H	14.5	3.2	22.3	-23.7	46.0
10	298.05	8.5	H	16.5	3.4	28.4	-17.6	46.0
11	325.15	13.7	H	16.2	3.6	33.5	-12.5	46.0
12	352.91	4.8	H	14.8	3.8	23.5	-22.5	46.0
13	379.33	7.9	H	15.1	4.0	27.0	-19.0	46.0
14	487.71	4.1	H	18.7	4.8	27.6	-18.4	46.0

SAMPLE CALCULATION: FSdBuV/m = MR (dBuV) + ACFdB.

TEST PROCEDURE: The procedure used was ANSI STANDARD C63.4-1992. The spectrum was scanned from 30 MHz to 1000 MHz. When an emission was found, the table was rotated to produce the maximum signal strength. The antenna was placed in both the horizontal and vertical planes and the worse case emissions were reported. The UUT was tested in 3 orthogonal planes.

TEST RESULTS: THE UNIT DOES MEET THE FCC REQUIREMENTS.

PERFORMED BY: K.M CHOI

DATE: 04/21/2004

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NAME OF TEST: RADIATION INTERFERENCE

RULES PART NO.: 15.227(b)

REQUIREMENTS: OUT-OF-BAND EMISSIONS SHALL NOT EXCEED:

30 - 88 MHz	40.0 dBuV/M MEASURED AT 3 METERS
88 - 216 MHz	43.5 dBuV/M
216 - 960 MHz	46.0 dBuV/m
ABOVE 960 MHz	54.0 dBuV/m

TEST DATA:

No	Emission Frequency (MHz)	Meter Reading dBuV	Ant. Polarity	Correction Factor dB	Cable Loss dB	Field Strength (dBuV/m)	Margin (dBuv)	Limit (dBuv/m)
1	54.19	12.4	V	9.4	1.1	22.9	-17.1	40.0
2	81.28	20.7	V	8.4	1.4	30.4	-9.6	40.0
3	108.38	8.6	V	11.0	1.7	21.3	-22.2	43.5
4	135.48	21.4	V	14.0	2.0	37.4	-6.1	43.5
5	162.57	13.9	V	16.9	2.2	33.0	-10.5	43.5
6	189.67	12.9	V	13.6	2.4	28.9	-14.6	43.5
7	216.76	5.8	V	10.7	2.7	19.2	-24.3	43.5
8	243.86	17.7	V	11.6	3.1	32.3	-13.7	46.0
9	270.96	7.5	V	14.5	3.2	25.2	-20.8	46.0
10	298.05	9.4	V	16.5	3.4	29.3	-16.7	46.0
11	325.15	23.8	V	16.2	3.6	43.6	-2.4	46.0
12	352.23	14.3	V	14.8	3.8	33.0	-13.0	46.0
13	379.33	20.7	V	15.1	4.0	39.8	-6.2	46.0
14	406.43	11.2	V	15.5	4.3	31.0	-15.0	46.0
15	433.53	3.7	V	16.0	4.5	24.1	-21.9	46.0
16	460.62	5.8	V	18.2	4.6	28.7	-17.3	46.0
17	487.71	10.4	V	18.7	4.8	33.9	-12.1	46.0
18	541.91	6.4	V	18.1	5.2	29.6	-16.4	46.0
19	758.67	5.0	V	21.0	6.5	32.5	-13.5	46.0
20	812.84	6.0	V	22.0	6.8	34.8	-11.2	46.0

SAMPLE CALCULATION: FSdBuV/m = MR (dBuV) + ACFdB.

TEST PROCEDURE: The procedure used was ANSI STANDARD C63.4-1992. The spectrum was scanned from 30 MHz to 1000 MHz. When an emission was found, the table was rotated to produce the maximum signal strength. The antenna was placed in both the horizontal and vertical planes and the worse case emissions were reported. The UUT was tested in 3 orthogonal planes.

TEST RESULTS: THE UNIT DOES MEET THE FCC REQUIREMENTS.

PERFORMED BY: K.M CHOI

DATE: 04/21/2004

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APPLICANT: HOBBYENGINE MODEL INDUSTRIAL LTD

FCC ID: QW70202

NAME OF TEST: Occupied Bandwidth

RULES PART NO.: 15.227

REQUIREMENTS: The field strength of any emissions appearing between the band edges and up to 10 kHz above and below the band edges shall be attenuated to the general limits of 15.209.

1.705-30 MHz	69.54 dBuV/M MEASURED AT 3 METERS
30 - 88 MHz	40.0 dBuV/M
88 - 216 MHz	43.5 dBuV/M
216 - 960 MHz	46.0 dBuV/m
ABOVE 960 MHz	54.0 dBuV/m

THE GRAPH ON THE NEXT PAGE REPRESENTS THE EMISSIONS TAKEN FOR THE DEVICE.

METHOD OF MEASUREMENT: A small sample of the transmitter output was fed into the spectrum analyzer and the attached plot was taken. The vertical scale is set to 10 dB per division.

TEST RESULTS: The unit DOES meet the FCC requirements.

PERFORMED BY: K.M CHOI

DATE: 04/21/2004

APPLICANT: HOBBYENGINE MODEL INDUSTRIAL LTD.

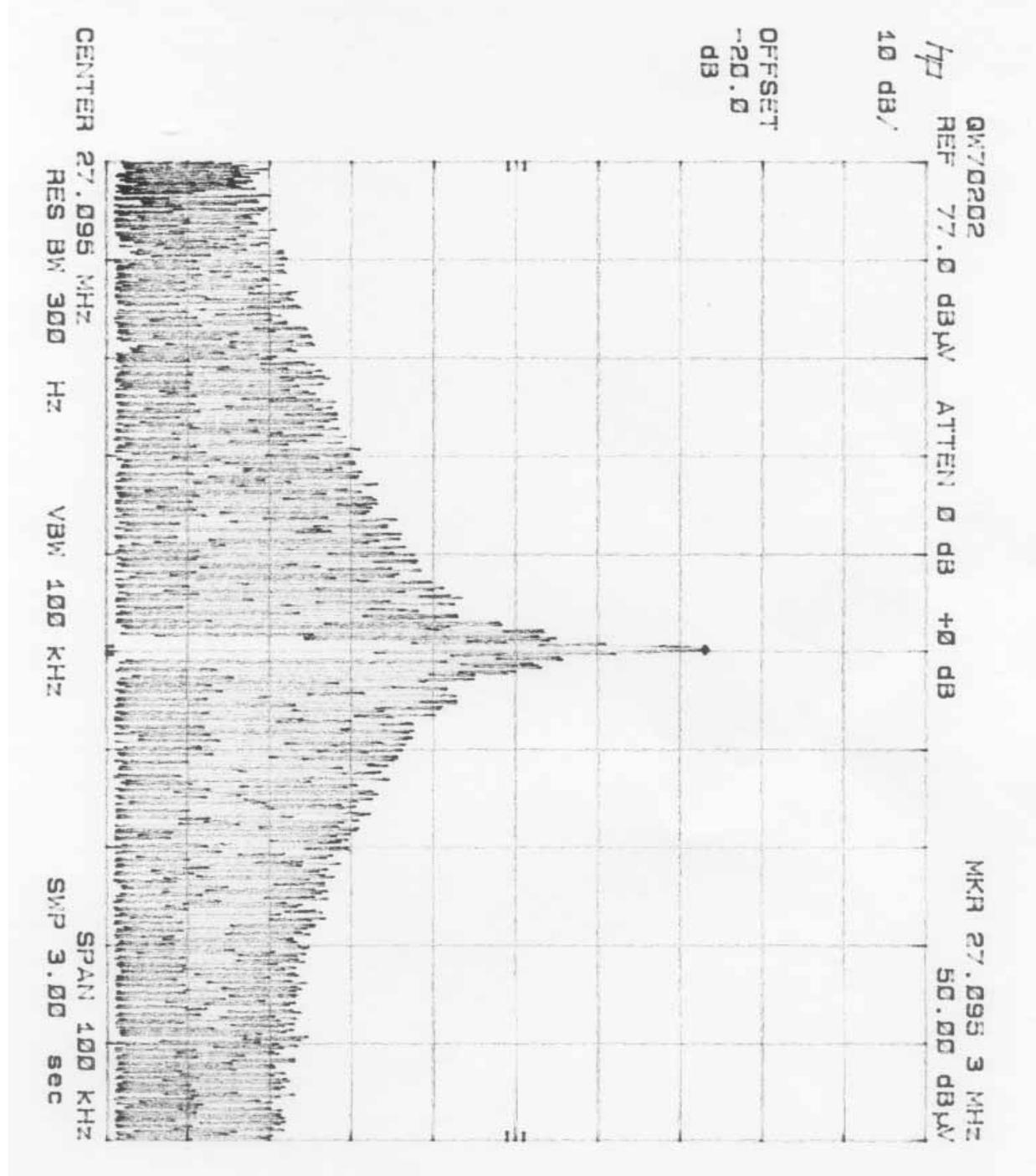
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OCCUPIED BANDWIDTH PLOT



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