

FCC Part 15 Subpart C
EMI TEST REPORT
of

E.U.T. : RADIO CONTROL CAR
FCC ID. : DOZ-2225
MODEL : 2225
Working Frequency : 27.188 MHz

for

APPLICANT : JASON TOYS & ELECTRONICS CO., LTD.
ADDRESS : 3F, NO. 174, CHUNG-CHING N. RD., SEC. 4,
TAIPEI, TAIWAN, R.O.C.

Test Performed by

ELECTRONICS TESTING CENTER, TAIWAN
NO. 8 LANE 29, WENMING ROAD,
LOSHAN TSUN, KWEISHAN HSIANG,
TAOYUAN, TAIWAN, R.O.C.

Tel:(03)3280026-32
Fax:(03)3280034
Report Number : ET88R-12-090-01

TEST REPORT CERTIFICATION

Applicant : JASON TOYS & ELECTRONICS CO., LTD.
3F, NO. 174, CHUNG-CHING N. RD., SEC. 4, TAIPEI, TAIWAN,
R.O.C.

Manufacturer : JASON TOYS & ELECTRONICS CO., LTD.
3F, NO. 10, LANE 83, KWANG-FU RD., SEC. 1, SAN CHUNG
CITY, TAIPEI HSIEN, TAIWAN, R.O.C.

Description of EUT :
a) Type of EUT : RADIO CONTROL CAR
b) Trade Name : TRAXXAS
c) Model No. : 2225
d) FCC ID : DOZ-2225
e) Working Frequency : 27.188 MHz
f) Power Supply : DC 12V

Regulation Applied : FCC Rules and Regulations Part 15 Subpart C (1998)

I HEREBY CERTIFY THAT; The data shown in this report were made in accordance with the procedures given in ANSI C63.4 and the energy emitted by the device was founded to be within the limits applicable. I assume full responsibility for accuracy and completeness of these data.

Issued Date : JAN. 13, 2000

Test Engineer : S. S. Liou
(S. S. Liou)

Approve & Authorized Signer : Will Yauo
Will Yauo, Supervisor
EMI Test Site of ELECTRONICS
TESTING CENTER, TAIWAN

| <i>Table of Contents</i> | <i>Page</i> |
|---|-------------|
| 1. GENERAL INFORMATION..... | 1 |
| 1.1 PRODUCT DESCRIPTION..... | 1 |
| 1.2 CHARACTERISTICS OF DEVICE:..... | 1 |
| 1.3 TEST METHODOLOGY..... | 1 |
| 1.4 TEST FACILITY | 1 |
| 2. DEFINITION AND LIMITS..... | 2 |
| 2.1 DEFINITION..... | 2 |
| 2.2 RESTRICTED BANDS OF OPERATION | 2 |
| 2.3 LIMITATION | 2 |
| 2.4 LABELING REQUIREMENT..... | 3 |
| 2.5 USER INFORMATION | 3 |
| 3. RADIATED EMISSION MEASUREMENT | 4 |
| 3.1 APPLICABLE STANDARD | 4 |
| 3.2 MEASUREMENT PROCEDURE..... | 4 |
| 3.3 TEST DATA..... | 6 |
| 3.3.1 <i>Fundamental Emission Measurement</i> | 6 |
| 3.3.2 <i>Harmonics and Other Emission Measurement</i> | 7 |
| 3.4 FIELD STRENGTH CALCULATION | 8 |
| 3.5 RADIATED TEST EQUIPMENT | 8 |
| 3.6 MEASURING INSTRUMENT SETUP..... | 8 |
| 3.7 RADIATED MEASUREMENT PHOTOS | 9 |
| 4 CONDUCTED EMISSION MEASUREMENT..... | 10 |
| 4.1 CONDUCTED TEST RESULTS | 10 |
| 5 ANTENNA REQUIREMENT..... | 11 |
| 5.1 STANDARD APPLICABLE | 11 |
| 5.2 ANTENNA CONSTRUCTION | 11 |

1. GENERAL INFORMATION

1.1 Product Description

| | |
|----------------------|---------------------|
| a) Type of EUT | : RADIO CONTROL CAR |
| b) Trade Name | : TRAXXAS |
| c) Model No. | : 2225 |
| d) FCC ID | : DOZ-2225 |
| e) Working Frequency | : 27.188 MHz |
| f) Power Supply | : DC 12V |

1.2 Characteristics of Device:

The transmitter is the hand-held radio unit which sends RF signals to the receiver for controlling the motor units to operate the steering, shifting and throttle mechanisms.

1.3 Test Methodology

Both conducted and radiated testing were performed according to the procedures in chapter 13 of ANSI C63.4.

The RADIO CONTROL CAR under test was operated in its normal operating mode for the purpose of the measurements.

The receiving antenna polarized horizontally was varied from 1 to 4 meters and the wooden turntable was rotated through 360 degrees to obtain the highest reading on the field strength meter or on the display of the spectrum analyzer. And also, each emission was to be maximized by changing the orientation of the RADIO CONTROL CAR under test.

1.4 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on the roof top of Building at No. 34, Lin 5, Ding Fu Tsun, Linkou Hsiang, Taipei Hsien, Taiwan 244, R.O.C..

This site has been fully described in a report submitted to your office, and accepted in a letter dated Feb. 10, 1997.

2. DEFINITION AND LIMITS

2.1 Definition

Intentional radiator:

A device that intentionally generates and emits radio frequency energy by radiation or induction.

2.2 Restricted Bands of Operation

Only spurious emissions are permitted in any of the frequency bands listed below:

| MHz | MHz | MHz | GHz |
|-------------------|-----------------------|---------------|-------------|
| 0.090 - 0.110 | 16.42-16.423 | 399.9-410 | 4.5-5.25 |
| 0.495 - 0.505 ** | 16.69475 - 16.69525 | 608-614 | 5.35-5.46 |
| 2.1735 - 2.1905 | 16.80425 - 16.80475 | 960-1240 | 7.25-7.75 |
| 4.125-4.128 | 25.5-25.67 | 1300-1427 | 8.025-8.5 |
| 4.17725-4.17775 | 37.5-38.25 | 1435-1626.5 | 9.0-9.2 |
| 4.20725-4.20775 | 73-74.6 | 1645.5-1646.5 | 9.3-9.5 |
| 6.215-6.218 | 74.8-75.2 | 1660-1710 | 10.6-12.7 |
| 6.26775-6.26825 | 108-121.94 | 1718.8-1722.2 | 13.25-13.4 |
| 6.31175-6.31225 | 123-138 | 2200-2300 | 14.47-14.5 |
| 8.291-8.294 | 149.9-150.05 | 2310-2390 | 15.35-16.2 |
| 8.362-8.366 | 156.52475 - 156.52525 | 2483.5-2500 | 17.7-21.4 |
| 8.37625-8.38675 | 156.7-156.9 | 2655-2900 | 22.01-23.12 |
| 8.41425-8.41475 | 162.0125-167.17 | 3260-3267 | 23.6-24.0 |
| 12.29-12.293 | 167.72-173.2 | 3332-3339 | 31.2-31.8 |
| 12.51975-12.52025 | 240-285 | 3345.8-3358 | 36.43-36.5 |
| 12.57675-12.57725 | 322-335.4 | 3360-4400 | Above 38.6 |
| 13.36-13.41 | | | |

Remark “**” : Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz

2.3 Limitation

(1) Conducted Emission Limits :

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the conducted limit is the following:

| Frequency (MHz) | Emission (μ V) | Emission (dB μ V) |
|----------------------|-------------------------|----------------------------|
| 0.45 - 30.0 | 250 | 48.0 |

(2) Radiated Emission Limits :

According to 15.227 the field strength of emissions from intentional radiators operated under these frequency bands shall not exceed the following:

| Fundamental Frequency (MHz) | Field Strength of Fundamental | |
|--------------------------------|-------------------------------|------------|
| | µV/meter | dBµV/meter |
| 26.96 – 27.28 | 10,000 | 80 |

Field strength limits are at the distance of 3 meters, emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209, as following table:

| Other Frequencies (MHz) | Field Strength of Fundamental | |
|----------------------------|-------------------------------|------------|
| | µV/meter | dBµV/meter |
| 30 - 88 | 100 | 40.0 |
| 88 - 216 | 150 | 43.5 |
| 216 - 960 | 200 | 46.0 |
| Above 960 | 500 | 54.0 |

As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any condition of modulation.

(3) Antenna Requirement :

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

2.4 Labeling Requirement

The device shall bear the following statement in a conspicuous location on the device :

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

2.5 User Information

The users manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

3. RADIATED EMISSION MEASUREMENT

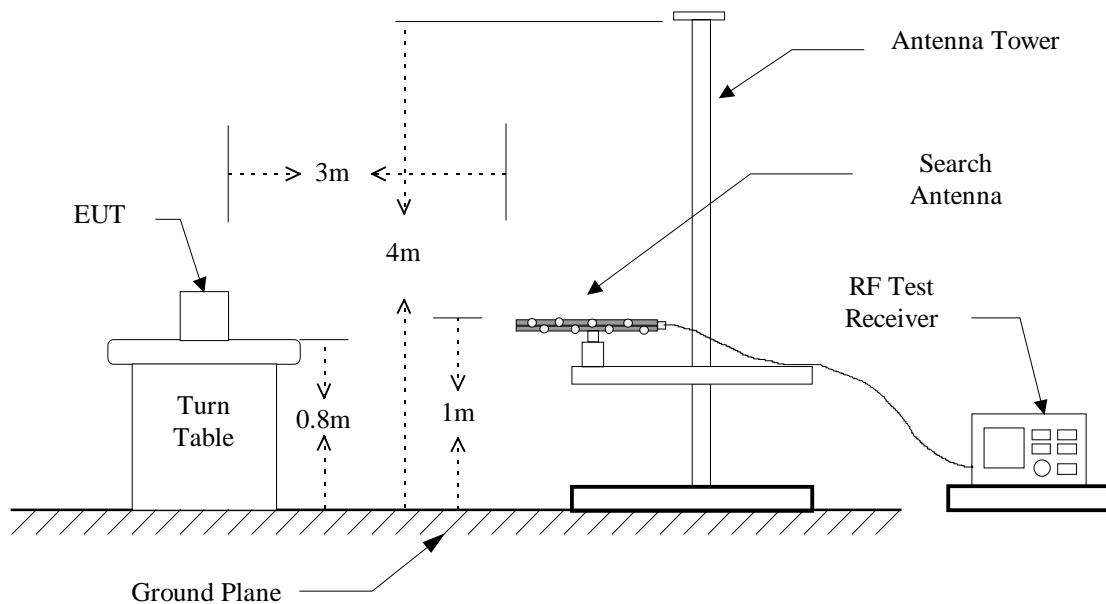
3.1 Applicable Standard

1. The field strength of any emission within this band shall not exceed 10,000 microvolts/meter at 3 meters. The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in Section 15.35 for limiting peak emissions apply.
2. The field strength of any emissions which appear outside of this band shall not exceed the general radiated emission limits in Section 15.209.

3.2 Measurement Procedure

1. Setup the configuration per figure 1 and 2 for frequencies measured below and above 1 GHz respectively. Turn on EUT and make sure that it is in normal function.
2. For emission frequencies measured below 1 GHz, a pre-scan is performed in a shielded chamber to determine the accurate frequencies of higher emissions will be checked on a open test site. As the same purpose, for emission frequencies measured above 1 GHz, a pre-scan also be performed with a 1 meter measuring distance before final test.
3. For emission frequencies measured below and above 1 GHz, set the spectrum analyzer on a 100 kHz and 1 MHz resolution bandwidth respectively for each frequency measured in step 2.
4. The search antenna is to be raised and lowered over a range from 1 to 4 meters in horizontally polarized orientation. Position the highness when the highest value is indicated on spectrum analyzer, then change the orientation of EUT on test table over a range from 0 to 360 with a speed as slow as possible, and keep the azimuth that highest emission is indicated on the spectrum analyzer. Vary the antenna position again and record the highest value as a final reading. A RF test receiver is also used to confirm emissions measured.
5. Repeat step 4 until all frequencies need to be measured were complete.
6. Repeat step 5 with search antenna in vertical polarized orientations.
7. Check the three frequencies of highest emission with varying the placement of cables (if any) associated with EUT to obtain the worse case and record the result.

Figure 1 : Frequencies measured below 1 GHz configuration



3.3 Test Data

3.3.1 Fundamental Emission Measurement

Operation Mode : TX
 Temperature : 27
 Humidity : 65
 Test Date : JAN. 08, 2000

| Frequency (MHz) | Reading (dBuV) | | | | Factor (dB) Corr. | Result @3m (dBuV/m) | | Limit @3m (dBuV/m) | | Margin (dB) | Table Deg. (Deg.) | Ant. High (m) |
|--------------------|----------------|-----|------|-----|-------------------------|------------------------|-----|-----------------------|------|----------------|-------------------------|---------------------|
| | H | | V | | | Peak | Ave | Peak | Ave | | | |
| 27.188 | 90.3 | *** | 89.9 | *** | -12.9 | 77.4 | *** | 100.0 | 80.0 | -2.6 | 0 | 2.50 |

Note :

1. Item of margin shown in above table refer to average limit.
2. It is considered that the results of average comply with average limit when measuring data with a peak function detector meet the average limit. Mark “***” means that Peak result is meet average limit.
3. Remark “---” means that the emissions level is too low to be measured.
4. Item “Margin” referred to Average limit while there is only peak result.

3.3.2 Harmonics and Other Emission Measurement

Operation Mode : TX
 Temperature : 27
 Humidity : 65
 Operated mode : Tx
 Test Date : JAN. 08, 2000

| Frequency (MHz) | Ant-Pol H/V | Meter Reading (dBuV) | Corrected Factor (dB) | Result @3m (dBuV/m) | Limit @3m (dBuV/m) | Margin (dB) | Table Degree (Deg.) | Ant. High (m) |
|--------------------|----------------|----------------------------|-----------------------------|---------------------------|--------------------------|----------------|---------------------------|---------------------|
| 54.457 | H | 34.0 | -15.0 | 19.0 | 40.0 | -21.0 | 0 | 2.10 |
| 81.614 | H | 40.4 | -14.8 | 25.6 | 40.0 | -14.4 | 270 | 2.00 |
| 108.814 | H | 51.6 | -12.0 | 39.6 | 43.5 | -3.9 | 0 | 2.20 |
| 136.050 | H | 49.9 | -11.1 | 38.8 | 43.5 | -4.7 | 270 | 1.90 |
| 163.193 | H | 48.7 | -9.3 | 39.4 | 43.5 | -4.1 | 270 | 2.20 |
| 190.421 | H | 43.5 | -8.3 | 35.2 | 43.5 | -8.3 | 270 | 2.00 |
| 217.558 | H | 48.0 | -6.0 | 42.0 | 46.0 | -4.0 | 0 | 1.80 |
| 244.800 | H | 35.0 | -4.2 | 30.8 | 46.0 | -15.2 | 0 | 1.80 |
| 272.029 | H | 47.6 | -3.4 | 44.2 | 46.0 | -1.8 | 0 | 1.90 |
| 299.129 | H | 38.3 | -0.9 | 37.4 | 46.0 | -8.6 | 270 | 2.00 |
| 326.363 | H | 44.3 | -6.9 | 37.4 | 46.0 | -8.6 | 0 | 1.90 |
| 353.517 | H | 43.1 | -9.9 | 33.2 | 46.0 | -12.8 | 270 | 1.90 |
| 380.726 | H | 38.8 | -6.0 | 32.8 | 46.0 | -13.2 | 0 | 1.70 |

Note : Remark “---” means that the emissions level is too low to be measured.

3.4 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. For the limit is employed average value, therefore the peak value can be transferred to average value by subtracting the duty factor. The basic equation with a sample calculation is as follows:

$$\text{Peak} = \text{Reading} + \text{Corrected Factor}$$

where

$$\text{Corr. Factor} = \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain (if any)}$$

3.5 Radiated Test Equipment

| Equipment | Manufacturer | Model No. | Next Cal. Date |
|----------------------------|-----------------|-----------|----------------|
| Spectrum Analyzer | Hewlett-Packard | 8568B | 01/10/2001 |
| Pre-selector | Hewlett-Packard | 85685A | 01/10/2001 |
| Quasi Peak Detector | Hewlett-Packard | 85650A | 01/10/2001 |
| RF Test Receiver | Rohde & Schwarz | ESVS 30 | 01/10/2001 |
| Log periodic Antenna | EMCO | 3146 | 11/03/2000 |
| Biconical Antenna | EMCO | 3110B | 11/03/2000 |
| Preamplifier | Hewlett-Packard | 8447D | 09/19/2000 |
| Micro Wave EMI Test System | Hewlett-Packard | 84125C | 01/25/2000 |

3.6 Measuring Instrument Setup

Explanation of measuring instrument setup in frequency band measured is as following :

| Frequency Band (MHz) | Instrument | Function | Resolution bandwidth | Video Bandwidth |
|----------------------|-------------------|------------|----------------------|-----------------|
| 30 to 1000 | RF Test Receiver | Quasi Peak | 120 kHz | N/A |
| | Spectrum Analyzer | Peak | 100 kHz | 100 kHz |

3.7 Radiated Measurement Photos

Please see setup photos in Exhibit F.

4 CONDUCTED EMISSION MEASUREMENT

4.1 Conducted Test Results

This EUT is excused from investigation of conducted emission, for it is powered by battery only.

5 ANTENNA REQUIREMENT

5.1 Standard Applicable

According to §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

5.2 Antenna Construction

The antenna is fixed inside the device with a screw, the antenna connector is untocuhable unless the case is opened.