Mattel Asia Pacific Sourcing Limited (MAPS)

Application
For
Certification
(FCC ID: PIYB4141-02A4R)

Superregenerative Receiver

Model : B2220-0720 (B4141)

WO# 0213448
WN/at
November 7, 2002

FCC ID : PIYB4141-02A4R

INTERTEK TESTING SERVICES

LIST OF EXHIBITS

INTRODUCTION

INTERTEK TESTING SERVICES

MEASUREMENT/TECHNICAL REPORT

Mattel Asia Pacific Sourcing Limited (MAPS) - MODEL: B2220-0720 (B4141)
FCC ID: PIYB4141-02A4R

November 7, 2002

This report concerns (check one:)   Original Grant_ X _   Class II Change_____

Equipment Type: _Superregenerative Receiver _(example: computer, printer, modem, etc.)
_____

Deferred grant requested per 47 CFR 0.457(d)(1)(ii)?   Yes___   No_ X _

                                             If yes, defer until: _____
                                                                                date
Company Name agrees to notify the Commission by: _____
                                                                         date

of the intended date of announcement of the product so that the grant can be issued on that date.

Transition Rules Request per 15.37?   Yes___   No_ X _

If no, assumed Part 15, Subpart B for intentional radiator
_____

Report prepared by: Wilbur Ng
                                                       Intertek Testing Services
                                                       2/F., Garment Center,
                                                       576, Castle Peak Road,
                                                       HONG KONG
                                                       Phone: 852-2173-8502
                                                       Fax: 852-2742-9149

INTERTEK TESTING SERVICES

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List of attached file

Exhibit type	File Description	filename
Test Report	Test Report	report.pdf
Operation Description	Technical Description	descri.pdf
Test Setup Photo	Radiated Emission	radiated photos.pdf
Test Report	Bandwidth Plot	bw.pdf
External Photo	External Photo	external photos.pdf
Internal Photo	Internal Photo	internal photos.pdf
Block Diagram	Block Diagram	block.pdf
Schematics	Circuit Diagram	circuit.pdf
ID Label/Location	Label Artwork and Location	label.pdf
User Manual	User Manual	manual.pdf

INTERTEK TESTING SERVICES

EXHIBIT 1

GENERAL DESCRIPTION

1.0   **General Description**

1.1   Product Description

The equipment under test (EUT) is a receiver for a RC Toy including Car, Track & Boat operating at 49.860 MHz. The receiver unit is powered by two 1.2V rechargeable batteries. The batteries should be recharged by a specific charger. The receiver unit can be installed in the Car, Track & Boat to control these three kind of toys. The EUT can be controlled to move forward or backward and to turn left or right when the transmitter to transmit the desired signed for the controlling.

The brief circuit description is saved with filename: descri.pdf

1.2   Related Submittal(s) Grants

This is a single application for certification of a receiver. The transmitter for this receiver is authorized by Certification procedure.

1.3   Test Methodology

The radiated emission measurements were performed according to the procedures in ANSI C63.4 (1992). All measurements were performed in Open Area Test Sites. Preliminary scans were performed in the Open Area Test Sites only to determine worst case modes. All Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application.

1.4   Test Facility

The open area test site and conducted measurement facility used to collect the emission data is located at Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong. This test facility and site measurement data have been fully placed on file with the FCC.

EXHIBIT 2

SYSTEM TEST CONFIGURATION

2.0   **System Test Configuration**

2.1   Justification

The system was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in ANSI C63.4 (1992.). The charging mode & receiving mode were tested & reported. The receiver with Car, Track & Boat were tested, the worst case of the car recorded.

The EUT was powered by two fully charged 1.2V rechargeable batteries during test.

For maximizing emissions, the EUT was rotated through 360°, the antenna height was varied from 1 meter to 4 meters above the ground plane, and the antenna polarization was changed. This step by step procedure for maximizing emissions led to the data reported in Exhibit 3.0.

The unit was operated standalone and placed in the center of the turntable.

The equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). The EUT was mounted to a cardboard box, which enabled the engineer to maximize emissions through its placement in the three orthogonal axes.

2.2   EUT Exercising Software

There was no special software to exercise the device.

2.3   Special Accessories

There are no special accessories necessary for compliance of this product.

2.4   Equipment Modification

Any modifications installed previous to testing by Mattel Asia Pacific Sourcing Limited (MAPS) will be incorporated in each production model sold/leased in the United States.

No modifications were installed by Intertek Testing Services.

2.5   Support Equipment List and Description

This product was tested in a standalone configuration.

All the items listed under section 2.0 of this report are

Confirmed by:

> *Wilbur Ng*
> *Manager*
> *Intertek Testing Services*
> *Agent for Mattel Asia Pacific Sourcing Limited (MAPS)*

 _____ Signature

 November 7, 2002 _____ Date

EXHIBIT 3

EMISSION RESULTS

3.0   **Emission Results**

Data is included worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

3.1   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. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF - AG

where   FS = Field Strength in dBμV/m
                 RA = Receiver Amplitude (including preamplifier) in dBμV
                 CF = Cable Attenuation Factor in dB
                 AF = Antenna Factor in dB
                 AG = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows:

FS = RR + LF

where   FS = Field Strength in dBμV/m
                 RR = RA - AG in dBμV
                 LF = CF + AF in dB

Assume a receiver reading of 52.0 dBμV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB are added. The amplifier gain of 29 dB is subtracted, giving a field strength of 32 dBμV/m. This value in dBμV/m was converted to its corresponding level in μV/m.

RA = 52.0 dBμV/m
AF = 7.4 dB   RR = 23.0 dBμV
CF = 1.6 dB   LF = 9.0 dB
AG = 29.0 dB
FS = RR + LF
FS = 23 + 9 = 32 dBμV/m

Level in mV/m = Common Antilogarithm [(32 dBμV/m)/20] = 39.8 μV/m

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3.2   Radiated Emission Configuration Photograph

Worst Case Radiated Emission

49.635 MHz

For electronic filing, the worst case radiated emission configuration photograph is saved with filename: radiated photos.pdf

3.3   Radiated Emission Data

The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Judgement: Passed by 0.6 dB

TEST PERSONNEL:

_____
Signature

Anthony K. M. Chan, Compliance Engineer
Typed/Printed Name

 November 7, 2002_____
Date

INTERTEK TESTING SERVICES

Company: Mattel Asia Pacific Sourcing Limited (MAPS)   Date of Test: September 24, 2002
Model: B2220-0720 (B4141)
Worst-case operating mode: RX (Charger)

Table 1

Radiated Emissions

Polarity	Frequency (MHz)	Reading (dBμV)	Antenna Factor (dB)	Pre-Amp Gain (dB)	Net at 3m (dBμV/m)	Limit at 3m (dBμV/m)	Margin (dB)
V	47.373	36.6	11	16	31.6	40.0	-8.4
V	48.885	41.5	11	16	36.5	40.0	-3.5
V	49.635	44.4	11	16	39.4	40.0	-0.6
V	50.373	43.0	11	16	38.0	40.0	-2.0
V	50.785	39.1	11	16	34.1	40.0	-5.9
V	97.863	35.6	11	16	30.6	43.5	-12.9
V	98.076	35.3	11	16	30.3	43.5	-13.2
V	98.941	35.6	11	16	30.6	43.5	-12.9

Notes: 1. Negative sign in the column shows value below limit.

2. Peak Detector Data unless otherwise stated.

3. All measurements were made at 3 meter. Harmonic emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.

Test Engineer: Anthony K. M. Chan

FCC ID: PIYB4141-02A4R

Company: Mattel Asia Pacific Sourcing Limited (MAPS)   Date of Test: September 24, 2002
Model: B2220-0720 (B4141)
Worst-case operating mode: RX (Car)

Table 1

Radiated Emissions

Polarity	Frequency (MHz)	Reading (dBμV)	Antenna Factor (dB)	Pre-Amp Gain (dB)	Net at 3m (dBμV/m)	Limit at 3m (dBμV/m)	Margin (dB)
V	48.513	35.8	11	16	30.8	40.0	-9.2
V	48.900	35.4	11	16	30.4	40.0	-9.6
V	49.650	37.9	11	16	32.9	40.0	-7.1
V	50.413	40.1	11	16	35.1	40.0	-4.9
V	51.163	35.3	11	16	30.3	40.0	-9.7
V	97.135	34.6	11	16	29.6	43.5	-13.9
V	97.641	35.6	11	16	30.6	43.5	-12.9
V	98.450	35.9	11	16	30.9	43.5	-12.6

Notes: 1. Negative sign in the column shows value below limit.

2. Peak Detector Data unless otherwise stated.

3. All measurements were made at 3 meter. Harmonic emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.

Test Engineer: Anthony K. M. Chan

FCC ID: PIYB4141-02A4R

EXHIBIT 4

EQUIPMENT PHOTOGRAPHS

4.0   **Equipment Photographs**

For electronic filing, the photographs are saved with filename:
external photos.pdf and internal photos.pdf

EXHIBIT 5

PRODUCT LABELLING

5.0 **Product Labelling**

For electronic filing, the FCC ID label artwork and the label location are saved with filename: label.pdf

EXHIBIT 6

TECHNICAL SPECIFICATIONS

6.0 <u>**Technical Specifications**</u>

For electronic filing, the block diagram and schematics are saved with filename: block.pdf and circuit.pdf respectively.

EXHIBIT 7

INSTRUCTION MANUAL

7.0   **Instruction Manual**

For electronic filing, a preliminary copy of the Instruction Manual is saved with filename: manual.pdf

This manual will be provided to the end-user with each unit sold/leased in the United States.

EXHIBIT 8

MISCELLANEOUS INFORMATION

8.0   **Miscellaneous Information**

This miscellaneous information includes details of the stabilizing process (including a plot of the stabilized waveform), the test procedure and calculation of factors such as pulse desensitization and averaging factor.

8.1   Stabilization Waveform

Previous to the testing, the superregenerative receiver was stabilized as outlined in the test procedure. The plot saved on the filename : bw.pdf shows the fundamental emission when a signal generator was used to stabilize the receiver. Please note that the antenna was placed as close as possible to the EUT for clear demonstration of the waveform and that accurate readings are not possible from this plot.

8.2   Emissions Test Procedures

The following is a description of the test procedure used by Intertek Testing Services Hong Kong Ltd. in the measurements of superregenerative receivers operating under the Part 15, Subpart B rules.

The test set-up and procedures described below are designed to meet the requirements of ANSI C63.4 - 1992. Superregenerative receivers are stabilized prior to measurement by generating a signal well above the receiver threshold whose frequency is tuned until the emissions stabilize into a line spectrum. The signal is usually generated as CW with a Marconi 2022D signal generator and a short whip antenna and is at a level of several hundred to several thousand mV/m. Plots of the stabilized signal will be shown. If a modulated signal is used, it will be noted.

The equipment under test (EUT) is attached to a cardboard box and placed on a wooden turntable which is four feet in diameter and approximately one meter in height above the groundplane. During the radiated emissions test, the turntable is rotated and any cables leaving the EUT are manipulated to find the configuration resulting in maximum emissions. The cardboard box is adjusted through all three orthogonal axis to obtain maximum emission levels. The antenna height and polarization are also varied during the testing to search for maximum signal levels. The height of the antenna is varied from one to four meters.

Detector function for radiated emissions is in peak mode. Average readings, when required, are taken by measuring the duty cycle of the equipment under test and subtracting the corresponding amount in dB from the measured peak readings. A detailed description for the calculation of the average factor can be found in Exhibit 8.3.

The frequency range scanned is from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or 40 GHz, whichever is lower. For line conducted emissions, the range scanned is 450 kHz to 30 MHz.

8.2   Emissions Test Procedures (cont)

The EUT is warmed up for 15 minutes prior to the test.

AC power to the unit is varied from 85% to 115% nominal and variation in the fundamental emission field strength is recorded. If battery powered, a new, fully charged battery is used.

Conducted measurements were made as described in ANSI C63.4 - 1992.

The IF bandwidth used for measurement of radiated signal strength was 100 kHz or greater below 1000 MHz. Where pulsed transmissions of short enough pulse duration warrant, a greater bandwidth is selected according to the recommendations of Hewlett Packard Application Note 150-2. A discussion of whether pulse desensitivity is applicable to this unit is included in this report (See Exhibit 8.2). Above 1000 MHz, a resolution bandwidth of 1 MHz is used.

Measurements are normally conducted at a measurement distance of three meters. All measurements are extrapolated to three meters using inverse scaling, unless otherwise reported. Measurements taken at a closer distance are so marked.

When determining of the test conclusion, the Measurement Uncertainty of test has been considered.