

Lung Cheong Toys Limited

Application
For
Certification
(FCC ID: P73VEXRX)

Superheterodyne Receiver and Computer Peripheral

Sample Description : Vex Robot Kit
Model : 276-2151
Additional Model : 276-2153

Supersede Report No. 0423488(S1) dated October 5, 2005

0423488(S2)
WN/at
October 6, 2005

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FCC ID : P73VEXRX

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MEASUREMENT/TECHNICAL REPORT

Lung Cheong Toys Limited - MODEL: 276-2151
FCC ID: P73VEXRX

October 6, 2005

This report concerns (check one): Original Grant Class II Change

Equipment Type: Superheterodyne Receiver, Computer Peripheral (example: computer, printer, modem, etc.)

Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? Yes No

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

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

Report prepared by:

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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.doc
Test Setup Photo	Conducted Emission	conducted photos.doc
Test Report	Conducted Emission Test Result	conducted.pdf
External Photo	External Photo	external photos.doc
Internal Photo	Internal Photo	internal photos.doc
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
Cover Letter	Confidentiality Request	confidentiality.pdf

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EXHIBIT 1

GENERAL DESCRIPTION

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1.0 **General Description**

1.1 Product Description

The equipment under test (EUT) is a receiver for a RC Robot operating at 75.865 MHz to 76.455 MHz which is controlled by a crystal. The EUT is powered by 6 x 1.5V AA size batteries or 1 x 7.2V battery pack. There is a ON/OFF switch to control the ON/OFF status of receiver. A motor slot is used to connect to the motor server. A serial port is used to connect to the computer for program download mode.

In Receiver mode, when switch on the ON/OF switch, the EUT can be under controlled by the transmitter.

In download mode, the user can connect the Receiver to a computer, then the user can download the movement instruction to the receiver.

In test mode, the receiver can be connected to the transmitter by a cord, then the user can control the movement of receiver by the transmitter.

The Model: 276-2153 is the same as the tested Model: 276-2151 in hardware and software aspect. The models are difference in packing only.

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 Part 95 Certification procedure with FCC ID : P73VEXTX.

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1.3 Test Methodology

The radiated emission measurements were performed according to the procedures in ANSI C63.4 (2003). 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.

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EXHIBIT 2

SYSTEM TEST CONFIGURATION

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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 (2003).

The EUT was powered by 6 new AA batteries during test.

For maximizing the Radiated 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.

For Radiated emission, the unit was operated standalone, connected to a PC and connected to the corresponding transmitter.

For Conducted emission, the unit was operated as a system which connected with a PC.

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

2.2 EUT Exercising Software

A software “IFI loader program” is used to exercise the device, which is provided by the manufacturer.

2.3 Special Accessories

- 1) One 32 cm RJ14 Cable with a RSS232 adaptor.
- 2) One 20 cm RJ11 Cable.

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2.4 Equipment Modification

Any modifications installed previous to testing by Lung Cheong Toys Limited 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

Compaq :	Model: D510S S/N: 3Z2AKN9ZJ024 (Tested to comply with FCC standards)
TopVision:	Model: 03761428 S/N: M0034H02390020 (Tested to comply with FCC standards)
HP Mouse:	Model: M-S34 S/N: LZE937078518 (Tested to comply with FCC standards)
HP Printer:	Model: C4224A S/N: SGGJ085319 (Tested to comply with FCC standards)
HP Keyboard:	Model: SK-2502C S/N: M91112642 (Tested to comply with FCC standards)

- Three AC Power (2m, unshielded) computer, printer and monitor
- One parallel port cable (1.5m, shielded, metal hook)
- One monitor cable (1m shielded, ferrite)

This product was tested in a system and standalone configurations.

All the items listed under section 2.0 of this report are

Confirmed by:

*Wilbur Ng
Manager
Intertek Testing Services
Agent for Lung Cheong Toys Limited*



Signature

October 6, 2005

Date

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EXHIBIT 3

EMISSION RESULTS

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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.

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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 $\text{dB}\mu\text{V}/\text{m}$

RA = Receiver Amplitude (including preamplifier) in $\text{dB}\mu\text{V}$

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 $\text{dB}\mu\text{V}/\text{m}$

RR = RA - AG in $\text{dB}\mu\text{V}$

LF = CF + AF in dB

Assume a receiver reading of 52.0 $\text{dB}\mu\text{V}$ 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 $\text{dB}\mu\text{V}/\text{m}$. This value in $\text{dB}\mu\text{V}/\text{m}$ was converted to its corresponding level in $\mu\text{V}/\text{m}$.

$$RA = 52.0 \text{ dB}\mu\text{V}/\text{m}$$

$$AF = 7.4 \text{ dB}$$

$$CF = 1.6 \text{ dB}$$

$$AG = 29.0 \text{ dB}$$

$$FS = RR + LF$$

$$FS = 23 + 9 = 32 \text{ dB}\mu\text{V}/\text{m}$$

$$RR = 23.0 \text{ dB}\mu\text{V}$$

$$LF = 9.0 \text{ dB}$$

$$\text{Level in } \mu\text{V}/\text{m} = \text{Common Antilogarithm } [(32 \text{ dB}\mu\text{V}/\text{m})/20] = 39.8 \mu\text{V}/\text{m}$$

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3.2 Radiated Emission Configuration Photograph

Worst Case Radiated Emission

76.166 MHz

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

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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 3.9 dB

TEST PERSONNEL:



Signature

Gary M. K. Li, Compliance Engineer
Typed/Printed Name

October 6, 2005
Date

INTERTEK TESTING SERVICES

Applicant: Lung Cheong Toys Limited

Date of Test: January 1, 2005

Model: 276-2151

Mode: RX

Sample: 1/1

Table 1

Radiated Emissions

Polarization	Frequency (MHz)	Net at 3m (dB μ V/m)	Limit at 3m (dB μ V/m)	Margin (dB)
V	76.166	36.1	40.0	-3.9
V	152.352	34.7	43.5	-8.8
V	228.518	28.4	46.0	-17.6
V	304.684	29.4	46.0	-16.6
V	380.850	29.8	46.0	-16.2
V	457.016	28.8	46.0	-17.2

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: Gary M. K. Li

INTERTEK TESTING SERVICES

Applicant: Lung Cheong Toys Limited

Date of Test: January 1, 2005

Model: 276-2151

Mode: RX Connected TX (Test Mode)

Sample: 1/1

Table 2

Radiated Emissions

Polarization	Frequency (MHz)	Net at 3m (dB μ V/m)	Limit at 3m (dB μ V/m)	Margin (dB)
H	120.346	32.8	43.5	-10.7
H	150.424	33.5	43.5	-10.0
H	170.856	33.1	43.5	-10.4
H	270.023	32.5	46.0	-13.5
H	310.280	33.9	46.0	-12.1
H	340.872	40.5	46.0	-5.5
H	360.596	32.0	46.0	-14.0

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: Gary M. K. Li

INTERTEK TESTING SERVICES

Applicant: Lung Cheong Toys Limited

Date of Test: January 1, 2005

Model: 276-2151

Mode: connected to PC (Run Diagnostics from IFI Loader Program)

Sample: 1/1

Table 3

Radiated Emissions

Polarization	Frequency (MHz)	Net at 3m (dB μ V/m)	Limit at 3m (dB μ V/m)	Margin (dB)
V	56.985	29.6	40.0	-10.4
V	63.254	29.8	40.0	-10.2
V	68.456	30.5	40.0	-9.5
H	110.026	31.8	43.5	-11.7
H	160.012	31.6	43.5	-11.9
H	280.025	32.4	46.0	-13.6
H	300.025	34.5	46.0	-11.5
H	320.023	35.1	46.0	-10.9
H	340.025	37.9	46.0	-8.1
H	360.025	35.1	46.0	-10.9
H	380.026	34.6	46.0	-11.4
H	400.025	33.5	46.0	-12.5

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: Gary M. K. Li

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3.4 Conducted Emission Configuration Photograph

Worst Case Line-Conducted Configuration
at
15.920 MHz (QP)
15.920 MHz (AV)

For electronic filing, the worst case line-conducted configuration photograph are saved with filename: conducted photos.doc.

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3.5 Conducted Emission Data

For electronic filing, the graph and data table of conducted emission is saved with filename: conducted.pdf.

Judgement: Passed by 11.4 dB (QP)

Judgement: Passed by 2.2 dB (AV)

TEST PERSONNEL:



Signature

Gary M. K. Li, Compliance Engineer

Typed/Printed Name

October 6, 2005

Date

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EXHIBIT 4

EQUIPMENT PHOTOGRAPHS

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4.0 Equipment Photographs

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

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EXHIBIT 5

PRODUCT LABELLING

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5.0 Product Labelling

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

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EXHIBIT 6

TECHNICAL SPECIFICATIONS

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6.0 Technical Specifications

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

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EXHIBIT 7

INSTRUCTION MANUAL

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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.

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EXHIBIT 8

MISCELLANEOUS INFORMATION

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8.0 Miscellaneous Information

This miscellaneous information includes details of the test procedure.

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8.1 Emissions Test Procedures

The following is a description of the test procedure used by Intertek Testing Services Hong Kong Ltd. in the measurements of superheterodyne 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 - 2003. A typical or an modulated CW signal at the operating frequency of the EUT has been supplied to the EUT for all measurements. Such a signal is supplied by a signal generator and an antenna in close proximity to the EUT. The signal level is sufficient to stabilize the local oscillator of the EUT.

The equipment under test (EUT) is 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 EUT 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.

For radiated emissions, the frequency range scanned is 30 MHz to 1000 MHz. For line conducted emission, the frequency range scanned is 150 kHz to 30 MHz.

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8.1 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 - 2003.

The IF bandwidth used for measurement of radiated signal strength was 10 kHz for emission below 30 MHz and 120 kHz for emission from 30 MHz to 1000 MHz. 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 the test result, the Measurement Uncertainty of the test has been considered.

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EXHIBIT 9

CONFIDENTIALITY REQUEST

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9.0 Confidentiality Request

The applicant would like to have confidential protection of the following documents:

- Schematic
- Block Diagram
- Operational Description

For electronic filing, the request letter is saved with filename: request.pdf.