Madentec Limited

Application
For
Certification
(FCC ID: VLGINTLSWR)

Wireless Switch Receiver (Receiver Dongle)

07161022
BH/ sl
April 25, 2008

Intertek Testing Services Hong Kong Ltd.
2/F., Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong.
Tel: (852) 2173 8888 Fax: (852) 2785 5487 Website: www.hk.intertek-etlsemko.com

LIST OF EXHIBITS

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MEASUREMENT/TECHNICAL REPORT

Madentec Limited - MODEL: Intelliswitch Receiver Rev. 2.0

FCC ID: VLGINTLSWR

April 25, 2008

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

Equipment Type: DXT - Part 15 Low Power Transceiver, Rx verified

JBP - Part 15 Class B Computing Device Peripheral

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 C for intentional radiator - the new 47 CFR [05-04-07 Edition] provision.

Report prepared by: Ho Wai Kin, Ben
Intertek Testing Services Hong Kong Ltd.
2/F., Garment Center,
576, Castle Peak Road,
Kowloon, Hong Kong.
Phone: 852-2173-8505
Fax: 852-2371-0521

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List of attached file

Exhibit type	File Description	filename
Cover Letter	Letter of Agency	letter.pdf
Test Report	Test Report	report.pdf
Operation Description	Technical Description	descri.pdf
Test Setup Photo	Radiated Emission	radiated photos.pdf
Test Setup Photo	Conducted Emission	conducted photos.pdf
Test Report	Conducted Emission Test Result	conducted.pdf
Test Report	Bandedge Plot	be.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

Summary of Test

2.4GHz Transmitter Portion

TEST	REFERENCE	RESULTS	PAGE
Radiated Emission	15.249(a)	Pass	8-12
AC Conducted Emission	15.209	Pass	14-15
Bandedge Measurement	15.249(d)	Pass	26

USB peripheral Portion

TEST	REFERENCE	RESULTS	PAGE
Radiated Emission	15.109	Pass	13
AC Conducted Emission	15.107	Pass	14-15

EXHIBIT 1

GENERAL DESCRIPTION

1.0 General Description

1.1 Product Description

The Equipment Under Test (EUT) is a Transceiver operating at 2.405 - 2.480GHz, with 16 channels and channel spacing of 5 MHz. It is powered by USB port of computer. The intelliswitch is a wireless switch interface for people with physical disabilities to control their computer and consists two parts: receiver dongle (EUT) and transmitter box unit.

The receiver dongle is possible to pair up to five separate transmitter box units to the same receiver dongle by a pair button. During the normal use, the EUT receives control signal from the corresponding box transmitter and the USB receiver dongle will control the computer through USB port of computer by application software accordingly. The EUT is by default in receiving mode, if too much noise is detected the receiver hops to the clear in the hop sequence. When a signal is detected from the transmitter box unit it sends back an acknowledge signal.

Antenna Type : Internal, Integral

For electronic filing, the brief circuit description is saved with filename: descri.pdf.

1.2 Related Submittal(s) Grants

This is an application for certification of a 2.4GHz transmitter portion and computer peripheral. 2.4GHz receiver portion, associated with this EUT, was exempted from technical requirement of FCC Part 15.

Another unit (transmitter box unit), associated with this EUT, has FCC ID: VLGINTLSWT and has been filed at the same time.

1.3 Test Methodology

Both AC mains line-conducted and 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.

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 (2003).

The EUT was powered from USB port of computer.

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 in system configuration and placed in the rear of the turntable.

The equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). For simplicity of testing, the unit was wired to transmit continuously.

The frequency range from 9kHz to 25GHz was searched for spurious emissions from the device. Only those emissions reported were detected. All other emissions were at least 20 dB below the applicable limits.

2.2 EUT Exercising Software

The EUT exercise program (control panel V3.1) used during radiated testing was designed to exercise the various system components in a manner similar to a typical use.

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 Madentec Limited will be incorporated in each production model sold/leased in the United States.

No modifications were installed by Intertek Testing Services Hong Kong Ltd.

2.5 Measurement Uncertainty

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

2.6 Support Equipment List and Description

This product was tested with transmitter box unit and peripherals. Their descriptions plus descriptions of cables were listed as below:

1. HP Computer
   Model: D530S
   S/N: CNG4110DX
2. Philips LCD Monitor
   Model: 150B4CG
   S/N: CX000409301774
3. HP Keyboard
   Model: SDM4700P
   S/N: 323686-B31
4. HP Mouse
   Model: M-S69
   S/N: 323614-001
5. HP Printer
   Model: C2642A
   S/N: SG67B131RY
6. Hayes Modem
   Model: 6800CN
   S/N: A00900153317
7. Cable
   2 x 1m telephone line with termination
   1 x serial cable with 1 meter long
   1 x parallel cable with 1 meter long

1. HP Computer
   Model: Vectra VL420
   S/N: SG20409996
2. HP Monitor
   Model: D2813
   S/N: TW63600424
3. HP Keyboard
   Model: SK-2502
   S/N: C0205303122
4. Logitech Mouse
   Model: M-S48a
5. HP Printer
   Model: C6431D
   S/N: CN23B 680ZP
6. Genius Modem
   Model: GM56EX
   S/N: ZT5505000355

All the items listed under section 2.0 of this report are

Confirmed by:

Ho Wai Kin, Ben
Senior Supervisor
Intertek Testing Services Hong Kong Ltd.
Agent for Madentec Limited

Signature

April 25, 2008 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 reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

FS = RA + AF + CF - AG + PD + AV

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
PD = Pulse Desensitization in dB
AV = Average Factor in -dB

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

FS = RA + AF + CF - AG + PD + AV

Assume a receiver reading of 62.0 dBµV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0 dB, and the resultant average factor was -10 dB. The net field strength for comparison to the appropriate emission limit is 32 dBµV/m. This value in dBµV/m was converted to its corresponding level in µV/m.

RA = 62.0 dBµV
AF = 7.4 dB
CF = 1.6 dB
AG = 29.0 dB
PD = 0 dB

AV = -10 dB

FS = 62 + 7.4 + 1.6 - 29 + 0 + (-10) = 32 dBµV/m

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

3.2 Radiated Emission Configuration Photograph

Worst Case Radiated Emission
at
7437.000 MHz

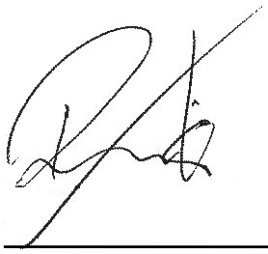
For electronic filing, the worst case radiated emission configuration photograph is saved with filename: radiated photos.pdf.

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 0.4 dB

TEST PERSONNEL:



Signature

Mark Cheung, Compliance Engineer
Typed/Printed Name

April 25, 2008
Date

Applicant: Madentec Limited
Model: Intelliswitch Receiver Rev. 2.0
Mode: TX

Date of Test: July 14, 2007

Table 1

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dBμV)	Antenna Factor (dB)	Pre-Amp Gain (dB)	Net at 3m (dBμV/m)	Limit at 3m (dBμV/m)	Margin (dB)
Channel 01							
V	2405.000	74.1	29.4	33	70.5	94.0	-23.5
V	4810.000	51.3	34.9	33	53.2	54.0	-0.8
V	7215.000	48.6	37.9	33	53.5	54.0	-0.5
H	9620.000	45.1	40.4	33	52.5	54.0	-1.5
H	12025.000	44.5	40.5	33	52.0	54.0	-2.0
Channel 08							
V	2440.000	73.9	29.4	33	70.3	94.0	-23.7
V	4880.000	51.4	34.9	33	53.3	54.0	-0.7
V	7320.000	48.7	37.9	33	53.6	54.0	-0.4
H	9760.000	45.0	40.4	33	52.4	54.0	-1.6
H	12200.000	44.1	40.5	33	51.6	54.0	-2.4
Channel 16							
V	2479.000	74.4	29.4	33	70.8	94.0	-23.2
V	4958.000	51.2	34.9	33	53.1	54.0	-0.9
V	7437.000	48.7	37.9	33	53.6	54.0	-0.4
H	9916.000	45.0	40.4	33	52.4	54.0	-1.6
H	12395.000	44.3	40.5	33	51.8	54.0	-2.2

Notes:
1. Peak Detector Data unless otherwise stated.
2. 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.
3. Negative value in the margin column shows emission below limit.
4. Horn antenna is used for the emission over 1000MHz.

Test Engineer: Mark Cheung

Applicant: Madentec Limited
Model: Intelliswitch Receiver Rev. 2.0
Mode: PC

Date of Test: July 14, 2007

Table 2

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dBμV)	Antenna Factor (dB)	Pre-Amp Gain (dB)	Net at 3m (dBμV/m)	Limit at 3m (dBμV/m)	Margin (dB)
V	36.001	37.6	10.0	16	31.6	40.0	-8.4
V	48.002	37.5	11.0	16	32.5	40.0	-7.5
V	60.002	39.4	10.0	16	33.4	40.0	-6.6
H	120.009	35.3	14.0	16	33.3	43.5	-10.2
H	240.013	31.1	19.0	16	34.1	46.0	-11.9
H	480.015	25.1	26.0	16	35.1	46.0	-10.9

Notes:
1. Peak Detector Data unless otherwise stated.
2. 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.
3. Negative value in the margin column shows emission below limit.
4. Horn antenna is used for the emission over 1000MHz.

Test Engineer: Mark Cheung

3.4 Conducted Emission Configuration Photograph

Worst Case Line-Conducted Configuration
at
23.385 MHz

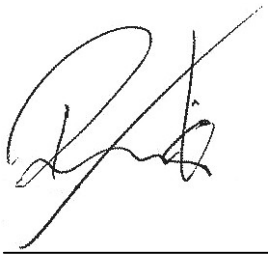
For electronic filing, the worst case line-conducted configuration photograph are saved with filename: conducted photos.pdf.

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 5.2 dB

TEST PERSONNEL:



Signature

Mark Cheung, Compliance Engineer
Typed/Printed Name

April 25, 2008
Date

EXHIBIT 4

EQUIPMENT PHOTOGRAPHS

4.0 **Equipment Photographs**

For electronic filing, the photographs of the tested EUT are saved with filename: external photos.pdf & 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 Technical Specifications

For electronic filing, the block diagram and schematics of the tested EUT 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 measured bandwidth, the test procedure and calculation of factors such as pulse desensitization.

8.1 Bandedge Plot

For electronic filing, the plot shows the fundamental emission when modulated is saved with filename: be.pdf. From the plot, the field strength of any emissions appearing between the band edges and below the band edges are attenuated to the general radiated emission limits in section 15.209. It fulfils the requirement of 15.249(d).

Bandedge compliance is determined by applying marker-delta method, i.e (Bandedge Plot A & B).

Resultant field strength= Fundamental emissions - delta from the plot A

= 70.50dBµV/m - 43.27dB

= 27.23dBµV/m

Resultant field strength= Fundamental emissions - delta from the plot B

= 70.80dBµV/m - 41.68dB

= 29.12dBµV/m

The resultant field strength meets the general radiated emission limit in section 15.209, which does not exceed 54dBµV/m.

8.2 Discussion of Pulse Desensitization

The determination of pulse desensitivity was made in accordance with Hewlett Packard Application Note 150-2, *Spectrum Analysis ... Pulsed RF.*

Pulse desensitivity is not applicable for this device since the transmitter transmits the RF signal continuously.

8.3 Emissions Test Procedures

The following is a description of the test procedure used by Intertek Testing Services in the measurements of transmitters operating under Part 15, Subpart C rules.

The test set-up and procedures described below are designed to meet the requirements of ANSI C63.4 - 2003.

The transmitting equipment under test (EUT) is placed on a wooden turntable which is four feet in diameter and approximately one meter in height above the ground plane. 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 axes to obtain maximum emission levels. The antenna height and polarization are 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.

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 150 kHz to 30 MHz.

8.3 Emissions Test Procedures (cont'd)

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 are made as described in ANSI C63.4 - 2003.

The IF bandwidth used for measurement of radiated signal strength was 100 kHz or greater when frequency is 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.

Transmitter measurements are normally conducted at a measurement distance of three meters. However, to assure low enough noise floor in the forbidden bands and above 1 GHz, signals are acquired at a distance of one meter or less. All measurements are extrapolated to three meters using inverse scaling, unless otherwise reported. Measurements taken at a closer distance are so marked.