Sunway Electronics Company

Application
For
Certification
FCC ID: 2AB3UDG022A

Computer Peripheral

Report No.: 140318003SZN-003

Prepared and Checked by:

Sign on file

Benson Wang
Assistant Engineer

Approved by:

Digitally signed by Andy Yan
Location: Intertek Testing Services

Andy Yan
Project Engineer
Date: July 1, 2014

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LIST OF EXHIBITS

MEASUREMENT / TECHNICAL REPORT

Sunway Electronics Company
Model: HE7722
Additional Model: M-22
Brand Name: Sunway

FCC ID: 2AB3UDG022A

July 1, 2014

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

Equipment Type: JBP-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 B for unintentional radiator – the new 47 CFR [10-01-13 Edition] provision.

Report prepared by:

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List of attached file

Exhibit Type	File Description	Filename
Test Report	Test Report	report.pdf
Test Setup Photo	Radiated photos	radiated photos.pdf
Test Setup Photo	Conducted photos	conducted photos.pdf
External Photo	External Photos	external photos.pdf
Internal Photo	Internal Photos	internal photos.pdf
Block Diagram	Block Diagram	block.pdf
ID Label / Location	Label Artwork and Location	label.pdf
User Manual	User Manual	manual.pdf
Cover Letter	Confidential Letter	request.pdf
Cover Letter	Letter of Agency	agency.pdf

EXHIBIT 1

GENERAL DESCRIPTION

1.0 General Description

1.1 Product Description

The Equipment Under Test (EUT) is a wireless optical mouse (Dongle Unit). The device can be used to connect PC by USB port. The EUT is powered by USB port.

1.2 Related Submittal(s) Grants

This is an application for certification of a computer peripheral. Other the corresponding Mouse unit (2.4GHz transceiver) is subjected to FCC report No.: 140318003SZN-001, and related report for Dongle unit (2.4GHz transceiver) is subjected to FCC Report No.: 140318003SZN-002.

1.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.4 (2009). Radiated emission measurement was performed in Semi-anechoic chamber and conducted emission measurement was performed in shield room. For radiated emission measurement, preliminary scans were performed in the semi-anechoic chamber only to determine the 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 Semi-anechoic chamber and shielding room used to collect the radiated data and conducted data are **Intertek Testing Services Shenzhen Ltd. Kejiyuan Branch** and located at 6F, D Block, Huahan Building, Langshan Road, Nanshan District, Shenzhen, P. R. China. This test facility and site measurement data have been fully placed on file with the FCC (Registration Number: 242492).

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 (2009).

The EUT was powered by PC USB port(PC is powered through AC 120V/60Hz) during the test. Only the worst case data was reported.

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. The step by step procedure for maximizing emissions led to the data reported in Exhibit 3.0.

The rear of unit shall be flushed with the rear of the table.

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 turntable, which enabled the engineer to maximize emissions through its placement in the three orthogonal axes.

The frequency range from 30MHz to 1GHz 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

N/A

2.3 Special Accessories

N/A

2.4 Equipment Modification

Any modifications installed previous to testing by Sunway Electronics Company will be incorporated in each production model sold / leased in the United States.

No modifications were installed by Intertek Testing Services Shenzhen Ltd. Kejiyuan Branch.

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 in the following configuration:

Refer List:

Description	Manufacturer	Model No.
Laptop	Lenovo	T420
Hard Disk	N/A	Smart. drive
1394 Cable	N/A	unshielded, Length: 120cm
USB Cable	N/A	unshielded, Length: 120cm
Mouse unit	Sunway	HE7722

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/m
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:

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

3.1 Field Strength Calculation (cont'd)

Example

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

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

AV = −10dB

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

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

3.2 Radiated Emission Configuration Photograph

Worst Case Radiated Emission
At
37.760MHz (Normal Operation Mode)

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 11.7dB margin (Normal Operation Mode)

TEST PERSONNEL:

Sign on file

Benson Wang, Assistant Engineer
Typed/Printed Name

June 27, 2014
Date

Company: Sunway Electronics Company Date of Test: June 27, 2014
Model: HE7722
Operating Mode: Normal Operation

Table 1

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	30.485	33.2	26.0	14.0	21.2	40.0	-18.8
Horizontal	273.470	35.9	26.0	16.9	26.8	46.0	-19.2
Horizontal	300.660	33.7	26.0	20.4	28.1	46.0	-17.9
Vertical	30.960	37.1	26.0	14.0	25.1	40.0	-14.9
Vertical	37.760	36.4	26.0	17.9	28.3	40.0	-11.7
Vertical	165.315	34.7	26.0	19.9	28.6	43.5	-14.9

NOTES:

1. Quasi-Peak detector is used for frequency up to 1GHz.

2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3 meter distances 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.

Test Engineer: Benson Wang

3.4 Conducted Emission Configuration Photograph

Worst Case Conducted Configuration
at
0.1905 MHz (Normal Operation Mode)

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

3.5 Conducted Emission Data

Judgement: Passed by 16.1 dB margin(Normal Operation Mode)

TEST PERSONNEL:

Sign on file

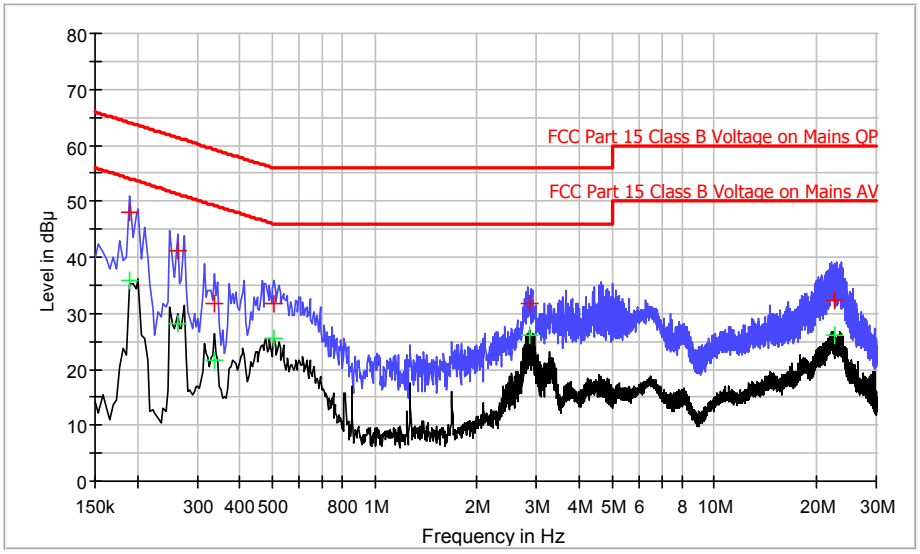
Benson Wang, Assistant Engineer
Typed/Printed Name

June 27, 2014
Date

Company: Sunway Electronics Company
Model: HE7722
Operating Mode: Normal Operation
Phase: Live

Date of Test: June 27, 2014

Conducted Emission Test - FCC



Result Table QP

Frequency (MHz)	QuasiPeak (dB µ V)	Bandwidth (kHz)	Line	Margin (dB)	Limit (dB µ V)
0.190500	47.9	9.000	L1	16.1	64.0
0.262500	41.1	9.000	L1	20.3	61.4
0.339000	31.8	9.000	L1	27.4	59.2
0.505500	31.7	9.000	L1	24.3	56.0
2.863500	31.6	9.000	L1	24.4	56.0
22.704000	32.3	9.000	L1	27.7	60.0

Result Table AV

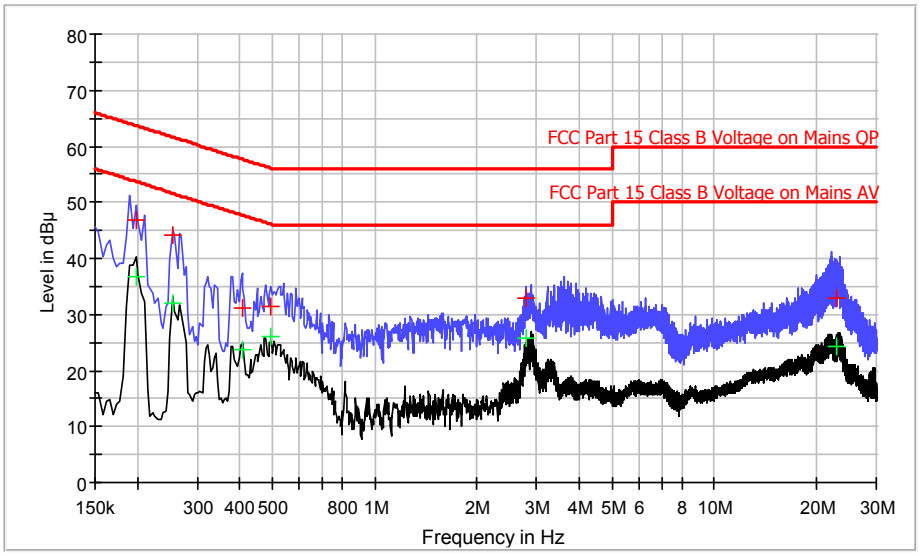
Frequency (MHz)	CAverage (dB µ V)	Bandwidth (kHz)	Line	Margin (dB)	Limit (dB µ V)
0.190500	35.8	9.000	L1	18.2	54.0
0.262500	28.2	9.000	L1	23.2	51.4
0.339000	21.6	9.000	L1	27.6	49.2
0.505500	25.5	9.000	L1	20.5	46.0
2.863500	26.0	9.000	L1	20.0	46.0
22.704000	26.1	9.000	L1	23.9	50.0

Test Engineer: Benson Wang

Company: Sunway Electronics Company
Model: HE7722
Operating Mode: Normal Operation
Phase: Neutral

Date of Test: June 27, 2014

Conducted Emission Test - FCC



Result Table QP

Frequency (MHz)	QuasiPeak (dB µ V)	Bandwidth (kHz)	Line	Margin (dB)	Limit (dB µ V)
0.199500	46.7	9.000	N	16.9	63.6
0.253500	44.1	9.000	N	17.5	61.6
0.406500	31.2	9.000	N	26.5	57.7
0.492000	31.4	9.000	N	24.7	56.1
2.800500	32.8	9.000	N	23.2	56.0
22.929000	32.9	9.000	N	27.1	60.0

Result Table AV

Frequency (MHz)	CAverage (dB µ V)	Bandwidth (kHz)	Line	Margin (dB)	Limit (dB µ V)
0.199500	36.6	9.000	N	17.0	53.6
0.253500	32.1	9.000	N	19.5	51.6
0.406500	23.6	9.000	N	24.1	47.7
0.492000	26.0	9.000	N	20.1	46.1
2.800500	25.7	9.000	N	20.3	46.0
22.929000	24.4	9.000	N	25.6	50.0

Test Engineer: Benson Wang

EXHIBIT 4

EQUIPMENT PHOTOGRAPHS

4.0 Equipment Photographs

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

EXHIBIT 5

PRODUCT LABELLING

5.0 Product Labelling

For electronics 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 of the tested EUT is saved with filename: block.pdf.

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 emission measuring procedure.

8.1 Emissions Test Procedures

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

The test set-up and procedures described below are designed to meet the requirements of ANSI C63.4 – 2009.

The computer peripheral 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 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 are in QP mode from the frequency band 30MHz to 1GHz with RBW setting 120kHz. Detector function for conducted emissions are in QP & AV mode and IFBW setting is 9kHz from the frequency band 150kHz to 30MHz.

For radiated emission, the frequency range scanned is 30MHz to 1GHz. For line-conducted emissions, the range scanned is 150kHz to 30MHz.

8.1 Emissions Test Procedures (cont'd)

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

Conducted measurements are made as described in ANSI C63.4 – 2009.

EXHIBIT 9

TEST EQUIPMENT LIST

9.0 Test Equipment List

Equipment No.	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
SZ061-03	Biconilog Antenna	ETS	3142C	00078828	28-Jun-2013	28-Jun-2015
SZ185-01	EMI Receiver	R & S	ESCI	100547	10-Mar-2014	10-Mar-2015
SZ188-01	Anechoic Chamber	ETS	RFD-F/A-100	4102	19-Apr-2014	19-Apr-2015
SZ062-04	RF Cable	RADIALL	RG 213U	--	08-Jan-2014	08-Jul-2014
SZ062-06	RF Cable	RADIALL	0.04-26.5GHz	083388	09-Nov-2013	09-Nov-2014
SZ185-02	EMI Test Receiver	R&S	ESCI	100692	09-Nov-2013	09-Nov-2014
SZ187-01	Two-Line V-Network	R&S	ENV216	100072	09-Nov-2013	09-Nov-2014
SZ187-02	Two-Line V-Network	R&S	ENV216	100073	23-Aug-2013	23-Aug-2014
SZ188-03	Shielding Room	ETS	RFD-100	4100	23-Aug-2013	23-Aug-2014