



Sunway Electronics Company

Application
For
Certification
FCC ID: 2AB3UDG022A
Computer Peripheral

Report No.: 140318003SZN-003

Prepared and Checked by:

Approved by:

Sign on file

Benson Wang
Assistant Engineer

Andy Yan
Project Engineer
Date: July 1, 2014

- The test results reported in this test report shall refer only to the sample actually tested and shall not refer or be deemed to refer to bulk from which such a sample may be said to have been obtained.
- This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to copy or distribute this report. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results referenced from this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.
- For Terms And Conditions of the services, it can be provided upon request.
- The evaluation data of the report will be kept for 3 years from the date of issuance.

TRF No.: FCC 15C_PC_b
FCC ID: 2AB3UDG022A

Intertek Testing Services Shenzhen Ltd. Kejiyuan Branch
6F, D Block, Huahan Building, Langshan Road, Nanshan District, Shenzhen, P. R. China
Tel: (86 755) 8601 6288 Fax: (86 755) 8601 6751 Website: www.china.intertek-etlsemko.com

INTERTEK TESTING SERVICES

LIST OF EXHIBITS

INTRODUCTION

<i>EXHIBIT 1:</i>	General Description
<i>EXHIBIT 2:</i>	System Test Configuration
<i>EXHIBIT 3:</i>	Emission Results
<i>EXHIBIT 4:</i>	Equipment Photographs
<i>EXHIBIT 5:</i>	Product Labeling
<i>EXHIBIT 6:</i>	Technical Specifications
<i>EXHIBIT 7:</i>	Instruction Manual
<i>EXHIBIT 8:</i>	Miscellaneous Information
<i>EXHIBIT 9:</i>	Test Equipment List

INTERTEK TESTING SERVICES

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 ☒ Class II Change ☐

Equipment Type: JBP-Class B Computing Device Peripheral

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 unintentional radiator – the new 47 CFR [10-01-13 Edition] provision.

Report prepared by:

Benson Wang
Intertek Testing Services Shenzhen Ltd.
Kejiyuan Branch
6F, D Block, Huahan Building, Langshan Road
Nanshan District, Shenzhen, P. R. China
Phone: (86 755) 8614 0743
Fax: (86 755) 8601 6751

INTERTEK TESTING SERVICES

Table of Contents

1.0	<u>General Description</u>	2
1.1	Product Description.....	2
1.2	Related Submittal(s) Grants.....	2
1.3	Test Methodology.....	3
1.4	Test Facility.....	3
2.0	<u>System Test Configuration</u>	5
2.1	Justification.....	5
2.2	EUT Exercising Software.....	5
2.3	Special Accessories.....	5
2.4	Equipment Modification.....	5
2.5	Measurement Uncertainty.....	6
2.6	Support Equipment List and Description.....	6
3.0	<u>Emission Results</u>	8
3.1	Field Strength Calculation.....	9
3.2	Radiated Emission Configuration Photograph.....	11
3.3	Radiated Emission Data.....	12
3.4	Conducted Emission Configuration Photograph.....	14
3.5	Conducted Emission Data.....	15
4.0	<u>Equipment Photographs</u>	19
5.0	<u>Product Labelling</u>	21
6.0	<u>Technical Specifications</u>	23
7.0	<u>Instruction Manual</u>	25
8.0	<u>Miscellaneous Information</u>	27
9.0	<u>Test Equipment List</u>	31

INTERTEK TESTING SERVICES

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

INTERTEK TESTING SERVICES

EXHIBIT 1

GENERAL DESCRIPTION

INTERTEK TESTING SERVICES

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.

INTERTEK TESTING SERVICES

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

INTERTEK TESTING SERVICES

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.

INTERTEK TESTING SERVICES

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

INTERTEK TESTING SERVICES

EXHIBIT 3

EMISSION RESULTS

INTERTEK TESTING SERVICES

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.

INTERTEK TESTING SERVICES

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 dB μ V/m

RA = Receiver Amplitude (including preamplifier) in dB μ V

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:

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

INTERTEK TESTING SERVICES

3.1 Field Strength Calculation (cont'd)

Example

Assume a receiver reading of 62.0dB μ V 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 32dB μ V/m. This value in dB μ V/m was converted to its corresponding level in μ V/m.

$$RA = 62.0\text{dB}\mu\text{V}$$

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

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

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

$$PD = 0\text{dB}$$

$$AV = -10\text{dB}$$

$$FS = 62 + 7.4 + 1.6 - 29 + 0 + (-10) = 32\text{dB}\mu\text{V/m}$$

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

INTERTEK TESTING SERVICES

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.

INTERTEK TESTING SERVICES

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

INTERTEK TESTING SERVICES

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

Date of Test: June 27, 2014

Table 1

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Limit at 3m (dB μ V/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

INTERTEK TESTING SERVICES

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.

INTERTEK TESTING SERVICES

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

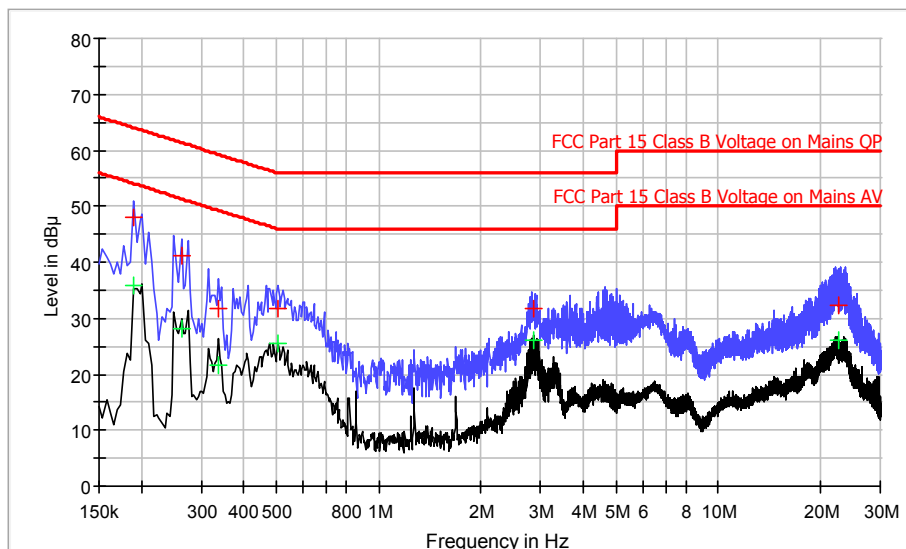
June 27, 2014
Date

INTERTEK TESTING SERVICES

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

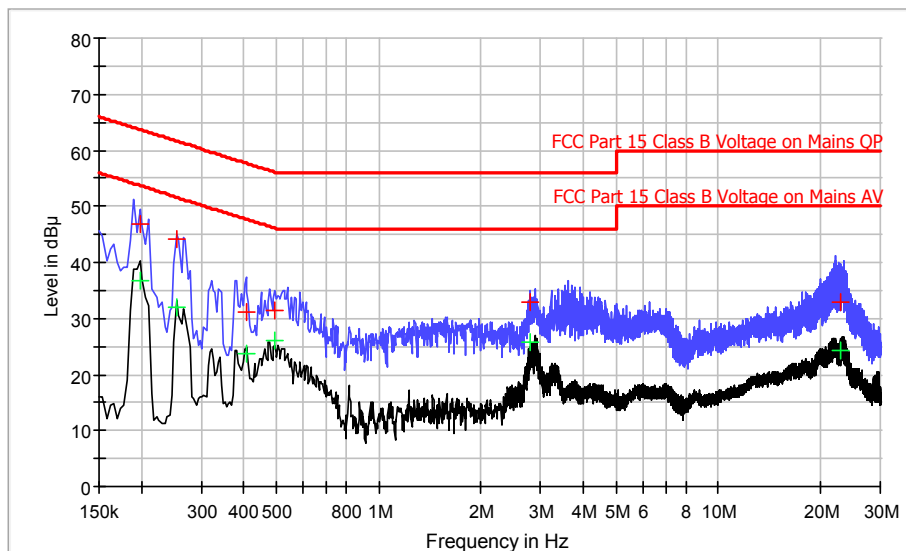
TRF No.: FCC 15C_PC_b
FCC ID: 2AB3UDG022A

INTERTEK TESTING SERVICES

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

TRF No.: FCC 15C_PC_b
FCC ID: 2AB3UDG022A

INTERTEK TESTING SERVICES

EXHIBIT 4

EQUIPMENT PHOTOGRAPHS

INTERTEK TESTING SERVICES

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

INTERTEK TESTING SERVICES

5.0 **Product Labelling**

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

INTERTEK TESTING SERVICES

EXHIBIT 6

TECHNICAL SPECIFICATIONS

INTERTEK TESTING SERVICES

6.0 Technical Specifications

For electronic filing, the block diagram of the tested EUT is saved with filename: block.pdf.

INTERTEK TESTING SERVICES

EXHIBIT 7

INSTRUCTION MANUAL

INTERTEK TESTING SERVICES

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.

INTERTEK TESTING SERVICES

EXHIBIT 8

MISCELLANEOUS INFORMATION

INTERTEK TESTING SERVICES

8.0 **Miscellaneous Information**

This miscellaneous information includes emission measuring procedure.

INTERTEK TESTING SERVICES

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.

INTERTEK TESTING SERVICES

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.

INTERTEK TESTING SERVICES

EXHIBIT 9

TEST EQUIPMENT LIST

INTERTEK TESTING SERVICES

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	RADIAL	RG 213U	--	08-Jan-2014	08-Jul-2014
SZ062-06	RF Cable	RADIAL	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