



July 16, 2008

Liquid Image Co. LLC
7909 Walerga Road, Suite 112-206,
Antelope, CA 95843
United States

Dear Kent Pearson,

Enclosed you will find your file copy of a Part 15 report (FCC ID: WGI302).

For your reference, TCB will normally take another 15-20 days for reviewing the report. Approval will then be granted when no query is sorted.

Please contact me if you have any questions regarding the enclosed material.

Sincerely,

A handwritten signature in black ink, appearing to read "Shawn Xing", with a long horizontal stroke extending to the right.

Shawn Xing
Assistant Manager

Enclosure



Liquid Image Co. LLC

Application
For
Certification
(FCC ID: WGI302)

Computer Peripheral

Billy Li

SZ08070004-1

Billy Li

July 16, 2008

- 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_a

Intertek Testing Services Shenzhen Ltd. Kejiyuan Branch

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INTERTEK TESTING SERVICES

LIST OF EXHIBITS

INTRODUCTION

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MEASUREMENT / TECHNICAL REPORT

Liquid Image Co. LLC – MODEL: #302

FCC ID: WGI302

July 16, 2008

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

Equipment Type: Class B Computing Device 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 C for intentional radiator – the new 47 CFR [09-20-07 Edition] provision.

Report prepared by:

Shawn Xing
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List of attached file

Exhibit Type	File Description	Filename
Test Report	Test Report	report.pdf
Test Setup Photo	Radiated Emission	radiated photos.pdf
Test Setup Photo	Conducted Emission	conducted photos.pdf
External Photo	External Photo	external photos.pdf
Internal Photo	Internal Photo	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	Letter of Agency	agency.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 an Underwater Digital Camera Mask with 16MB internal memory size, model: #302. The main function of the EUT is to take picture and record video underwater. #302 has a image resolution of 5.0 megapixels. There is Micro SD card slit of the EUT which can be used to increase the memory with a micro SD card up to 2GB additionally. The picture and the video can transfer to computer via the USB cable attached. The device is powered by DC 3.0V (2 AAA batteries) for picture and video recording mode and powered from PC USB port for data transfer mode.

1.2 Related Submittal(s) Grants

This is an application for certification of a computer peripheral.

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1.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.4 (2003). 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-chamber facility used to collect the radiated data is **Interterk 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.

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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 from PC USB port when data transfer mode and was powered by DC 3.0V (2 AAA batteries) when pictures taking and video recording.

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

There was no special software to exercise the device.

2.3 Special Accessories

The device is tested with an USB extended cable with ferrite bead attached. They are marked together with the device.

2.4 Equipment Modification

Any modifications installed previous to testing by Liquid Image Co. LLC will be incorporated in each production model sold / leased in the United States.

No modifications were installed by Intertek Testing Services.

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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.
Test PC`	Lenovo	T61
Micro SD Card	SanDisk	30987-001
Hard Disk	Smart.drive	HD3-SU2FW

All the items listed under section 2.0 of this report are

Confirmed by:

*Shawn Xing
Assistant Manager
Intertek Testing Services Shenzhen Ltd.
Kejiyuan Branch
Agent for Liquid Image Co. LLC*



Signature

July 16, 2008

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 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

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:

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

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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 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.

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

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

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

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

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

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

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

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

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3.2 Radiated Emission Configuration Photograph

Worst Case Radiated Emission

At

256.007MHz (Data transfer Mode)

384.105MHz (Video recording 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 4.1dB margin (Data transfer Mode)
Passed by 2.7dB margin (Video recording Mode)

TEST PERSONNEL:



Signature

Billy Li, Engineer
Typed / Printed Name

July 16, 2008
Date

INTERTEK TESTING SERVICES

Company: Liquid Image Co. LLC
Model: #302
Worst Case Operating Mode: Data transfer

Date of Test: July 16, 2008

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	192.014	45.7	20.0	11.0	36.7	43.5	-6.8
Horizontal	224.000	46.3	20.0	12.3	38.6	46.0	-7.4
Horizontal	256.007	48.5	20.0	13.4	41.9	46.0	-4.1
Horizontal	288.016	42.8	20.0	14.6	37.4	46.0	-8.6
Horizontal	320.011	39.7	20.0	15.9	35.6	46.0	-10.4
Horizontal	336.015	44.5	20.0	16.3	40.8	46.0	-5.2

- NOTES: 1. 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.
2. Negative value in the margin column shows emission below limit.
3. All emissions are below the QP limit.

Test Engineer: Billy Li

INTERTEK TESTING SERVICES

Company: Liquid Image Co. LLC

Date of Test: July 16, 2008

Model: #302

Worst Case Operating Mode: Video recording Mode

Table 2

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	256.010	39.9	20.0	13.4	33.3	46.0	-12.7
Horizontal	288.017	37.6	20.0	14.6	32.2	46.0	-13.8
Horizontal	336.012	40.6	20.0	16.3	36.9	46.0	-9.1
Horizontal	384.105	45.8	20.0	17.5	43.3	46.0	-2.7
Horizontal	398.630	41.6	20.0	17.7	39.3	46.0	-6.7
Horizontal	432.025	40.7	20.0	17.9	38.6	46.0	-7.4

NOTES: 1. 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.

4. Negative value in the margin column shows emission below limit.

5. All emissions are below the QP limit.

Test Engineer: Billy Li

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3.4 Conducted Emission Configuration Photograph

Worst Case Neutral-Conducted Configuration
at
0.150 MHz

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 9.5 dB margin

TEST PERSONNEL:



Signature

Billy Li, Engineer
Typed/Printed Name

July 16, 2008
Date

INTERTEK TESTING SERVICES

Company: Liquid Image Co. LLC
Model: #302
Worst Case Operating Mode: Data transfer

Date of Test: July 16, 2008

Table 3
Conducted Emissions

Live Line Data

Frequency (MHz)	Quasi-Peak		Average	
	Disturbance level dB(μ V)	Permitted limit dB(μ V)	Disturbance level dB(μ V)	Permitted limit dB(μ V)
0.155	50.7	65.7	40.7	55.7
0.205	45.3	63.4	41.1	53.4
3.387	33.6	56.0	23.1	46.0
3.923	35.1	56.0	24.1	46.0
13.392	33.9	60.0	25.5	50.0
16.452	36.8	60.0	28.7	50.0

Neutral Line Data

Frequency (MHz)	Quasi-Peak		Average	
	Disturbance level dB(μ V)	Permitted limit dB(μ V)	Disturbance level dB(μ V)	Permitted limit dB(μ V)
0.150	56.5	66.0	37.6	56.0
0.203	47.2	63.5	41.4	53.5
2.781	29.7	56.0	25.9	46.0
3.393	32.6	56.0	21.3	46.0
13.654	34.7	60.0	25.9	50.0
17.066	35.8	60.0	31.7	50.0

Test Engineer: Billy Li

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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.

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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.

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EXHIBIT 6

TECHNICAL SPECIFICATIONS

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6.0 **Technical Specifications**

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

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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.

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EXHIBIT 8

MISCELLANEOUS INFORMATION

INTERTEK TESTING SERVICES

8.0 **Miscellaneous Information**

This miscellaneous information includes emission measuring procedure.

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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 – 2003.

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 is in QP mode from the frequency band 30MHz to 1GHz and RBW setting is 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.

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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 – 2003.