

August 31, 2010

Shenzhen Win's Tech Co., Ltd.  
Building Five, Liaokeng Industrial Zone,  
Shiyan Town, Bao'an District, Shenzhen City,  
Guangdong Province, China

Dear Yongzhong Deng :

Enclosed you will find your file copy of a Part 15 Certification (FCC ID: YP5VCL-24D).

For your reference, TCB will normally take another 5 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 stylized flourish at the end.

Shawn Xing  
Assistant Manager

Enclosure

**Shenzhen Win's Tech Co., Ltd.**

Application  
For  
Certification  
**(FCC ID: YP5VCL-24D)**

2.4G wireless mouse

Model: VCL-24

2.4GHz Transceiver

We hereby certify that the sample of the above item is considered to comply with the requirements of FCC Part 15, Subpart C for Intentional Radiator, Mention 47 CFR [10-1-09]



SZ10080203-2  
Billy Li  
August 31, 2010

- 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.

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TRF No.: FCC 15C\_TXa  
FCC ID: YP5VCL-24D

# INTERTEK TESTING SERVICES

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## LIST OF EXHIBITS

### *INTRODUCTION*

<i>EXHIBIT 1:</i>	General Description
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<i>EXHIBIT 3:</i>	Emission Results
<i>EXHIBIT 4:</i>	Equipment Photographs
<i>EXHIBIT 5:</i>	Product Labelling
<i>EXHIBIT 6:</i>	Technical Specifications
<i>EXHIBIT 7:</i>	Instruction Manual
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<i>EXHIBIT 9:</i>	Test Equipment List

# INTERTEK TESTING SERVICES

## MEASUREMENT/TECHNICAL REPORT

Shenzhen Win's Tech Co., Ltd. - Model: VCL-24D

FCC ID: YP5VCL-24D

August 31, 2010

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

Equipment Type: DXX - Part 15 Low Power Communication Device Transmitter

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 [10-1-09 Edition] provision.

Report prepared by:

Shawn Xing  
Intertek Testing Services Shenzhen Ltd.  
Kejiyuan Branch  
6F, Block D, Huahan Building, Langshan Road,  
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# INTERTEK TESTING SERVICES

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## INTERTEK TESTING SERVICES

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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
Test Report	Bandedge Plot	bandedge.pdf
Test Report	20dB BW Plot	bw.pdf
Test Report	Timing Plot	af.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
Operation Description	Technical Description	descri.pdf
ID Label/Location	Label Artwork and Location	label.pdf
User Manual	User Manual	manual.pdf
Cover Letter	Letter of Agency	agency.pdf

# **INTERTEK TESTING SERVICES**

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## **EXHIBIT 1**

### **GENERAL DESCRIPTION**

## INTERTEK TESTING SERVICES

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### 1.0 **General Description**

#### 1.1 Product Description

The Equipment Under Test (EUT) is a 2.4GHz Wireless USB dongle unit and is powered by PC USB Port.

Antenna Type: Integral antenna

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 transceiver for the USB Dongle unit, and the corresponding Remote Controller unit (2.4GHz transceiver) is subjected to FCC certification with FCC ID: YP5VCL-24M



## INTERTEK TESTING SERVICES

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### 1.3 Test Methodology

Both AC mains line-conducted and Radiated emission measurement was 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-Anechoic chamber used to collect the radiated data and conducted data is **Interterk Testing Services Shenzhen Ltd. Kejiyuan Branch** and located at 6F, Block D, 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.

## **INTERTEK TESTING SERVICES**

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### **EXHIBIT 2**

### **SYSTEM TEST CONFIGURATION**

## INTERTEK TESTING SERVICES

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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 PC USB Port during the testing.

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

#### 2.2 EUT Exercising Software

The EUT exercise program (provided by client) used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use.

The parameters of test software setting:

During the test, Channel and power controlling software provided by the applicant was used to control the operating channel.

#### 2.3 Special Accessories

No special accessories used.

#### 2.4 Equipment Modification

Any modifications installed previous to testing by Intertek Testing Services Shenzhen Ltd. kejiyuan Branch will be incorporated in each production model sold / leased in the United States.

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## 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

Description	Manufacturer	Model No.
Test PC	HP	2510P
Hard Disk	Smart.drive	HD3-SU2FW
USB Cable	Smart.drive	Length 155cm
1394 Cable	Smart.drive	Length 180cm

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 Shenzhen Win's Tech Co., Ltd.*



Signature

August 31, 2010

Date

**EXHIBIT 3**  
**EMISSION RESULTS**

## INTERTEK TESTING SERVICES

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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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## INTERTEK TESTING SERVICES

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### 3.1 **Radiated Test Results**

A sample calculation, configuration photographs and data tables of the emissions are included.

#### 3.1.1 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 $\mu$ V/m  
                    RA = Receiver Amplitude (including preamplifier) in dB $\mu$ 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:

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

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

$$\begin{aligned} RA &= 62.0 \text{ dB}\mu\text{V} \\ AF &= 7.4 \text{ dB} \\ CF &= 1.6 \text{ dB} \\ AG &= 29.0 \text{ dB} \\ PD &= 0 \text{ dB} \\ AV &= -10 \text{ dB} \\ FS &= 62 + 7.4 + 1.6 - 29 + 0 + (-10) = 32 \text{ dB}\mu\text{V/m} \end{aligned}$$

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

## INTERTEK TESTING SERVICES

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### 3.1.2 Radiated Emission Configuration Photograph

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

### 3.1.3 Radiated Emissions

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.

Worst Case Radiated Emission  
at  
69.217 MHz

Judgement: Passed by 3.5 dB

#### **TEST PERSONNEL:**



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*Signature*

Billy Li, Compliance Engineer

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*Typed/Printed Name*

August 31, 2010

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*Date*



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## INTERTEK TESTING SERVICES

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Company: Shenzhen Win's Tech Co., Ltd.

Date of Test: August 31, 2010

Model: VLC-24

Worst Case Operating Mode: Transmit

Table 1

### Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	65.325	44.7	20.0	7.4	32.1	40.0	-7.9
Horizontal	69.217	49.3	20.0	7.2	36.5	40.0	-3.5
Horizontal	78.280	46.2	20.0	7.0	33.2	40.0	-6.8
Vertical	109.387	41.2	20.0	8.7	29.9	43.5	-13.6
Vertical	114.238	42.0	20.0	8.7	30.7	43.5	-12.8
Vertical	193.287	39.8	20.0	10.4	30.2	43.5	-13.3

- NOTES:
1. Quasi-Peak detector is used except for others stated.
  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.
  4. All emissions are below the QP limit.

## INTERTEK TESTING SERVICES

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### 3.1.4 Transmitter Spurious Emissions (Radiated)

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.

Worst Case Radiated Emission  
at  
9756.000 MHz

Judgement: Passed by 16.7 dB

#### **TEST PERSONNEL:**



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*Signature*

Billy Li, Compliance Engineer  
*Typed/Printed Name*

August 31, 2010  
*Date*

## INTERTEK TESTING SERVICES

Applicant: Shenzhen Win's Tech Co., Ltd.  
Model: VLC-24  
Sample: 1/1  
Worst Case Operating Mode: Transmit

Date of Test: August 31, 2010

Table 2

### Radiated Emissions

(2405.0000MHz)

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Peak Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	2405.000	87.3	36.7	28.5	79.1	114.0	-34.9
Horizontal	4810.000	59.7	36.7	28.5	51.5	74.0	-22.5
Horizontal	7215.000	53.7	36.1	33.1	50.7	74.0	-23.3
Horizontal	9620.000	54.1	36.2	37.8	55.7	74.0	-18.3

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Average Factor (-dB)	Net at 3m (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	2405.000	87.3	36.7	28.5	24.9	54.2	94.0	-39.8
Horizontal	4810.000	59.7	36.1	33.1	24.9	31.8	54.0	-22.2
Vertical	7215.000	53.7	36.1	33.1	24.9	25.8	54.0	-28.2
Vertical	9620.000	54.1	36.2	37.8	24.9	30.8	54.0	-23.2

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: Billy Li

## INTERTEK TESTING SERVICES

Applicant: Shenzhen Win's Tech Co., Ltd.  
Model: VLC-24  
Sample: 1/1  
Worst Case Operating Mode: Transmit

Date of Test: August 31, 2010

Table 3

### Radiated Emissions

(2439.000MHz)

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	2439.000	88.4	36.7	28.5	80.2	114.0	-33.8
Horizontal	4878.000	59.1	36.7	28.5	50.9	74.0	-23.1
Horizontal	7317.000	55.9	36.1	33.3	53.1	74.0	-20.9
Horizontal	9756.000	55.7	36.3	37.9	57.3	74.0	-16.7

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Average Factor (-dB)	Net at 3m (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	2439.000	88.4	36.7	28.5	24.9	55.3	94.0	-38.7
Horizontal	4878.000	59.1	36.1	33.1	24.9	31.2	54.0	-22.8
Vertical	7317.000	55.9	36.1	33.1	24.9	28.0	54.0	-26.0
Vertical	9756.000	55.7	36.2	37.8	24.9	32.4	54.0	-21.6

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: Billy Li

## INTERTEK TESTING SERVICES

Applicant: Shenzhen Win's Tech Co., Ltd.  
Model: VLC-24  
Sample: 1/1  
Worst Case Operating Mode: Transmit

Date of Test: August 31, 2010

Table 4

### Radiated Emissions

(2476.0000MHz)

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	2476.000	87.8	36.7	28.6	79.7	114.0	-34.3
Horizontal	4952.000	60.8	36.7	28.6	52.7	74.0	-21.3
Horizontal	7428.000	55.3	36.1	33.4	52.6	74.0	-21.4
Horizontal	9904.000	54.4	36.3	38.2	56.3	74.0	-17.7

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Average Factor (-dB)	Net at 3m (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	2476.000	87.8	36.7	28.6	24.9	54.8	94.0	-39.2
Horizontal	4952.000	60.8	36.1	33.4	24.9	33.2	54.0	-20.8
Horizontal	7428.000	55.3	36.3	38.2	24.9	32.3	54.0	-21.7
Vertical	9904.000	54.4	36.2	37.8	24.9	31.1	54.0	-22.9

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: Billy Li

TRF No.: FCC 15C\_TXa  
FCC ID: YP5VCL-24D

## INTERTEK TESTING SERVICES

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### 3.2 Conducted Emission at Mains Terminal

#### 3.2.1 Conducted Emissions Configuration Photograph

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

#### 3.2.2 Conducted Emissions

Worst Case Line-Conducted Configuration  
at  
0.194 MHz

Judgement: Passed by 14.6 dB margin

#### **TEST PERSONNEL:**



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*Signature*

Billy Li, Compliance Engineer  
*Typed/Printed Name*

August 31 , 2010  
*Date*

## INTERTEK TESTING SERVICES

Applicant: Shenzhen Win's Tech Co., Ltd.  
Model: VLC-24  
Sample: 1/1  
Worst Case Operating Mode: Transmit  
Channel: 2476.000MHz

Date of Test: August 31, 2010

**Table 5**  
**Conducted Emissions**

### Live Line Data

Frequency (MHz)	Quasi-Peak		Average	
	Disturbance level dB( $\mu$ V)	Permitted limit dB( $\mu$ V)	Disturbance level dB( $\mu$ V)	Permitted limit dB( $\mu$ V)
0.194	47.1	63.9	34.1	53.9
0.198	46.9	63.7	33.8	53.7
0.206	45.9	63.4	33.1	53.4
0.258	40.4	61.5	26.9	51.5
0.266	39.9	61.2	25.3	51.2
3.962	33.7	56.0	22.5	46.0

### Neutral Line Data

Frequency (MHz)	Quasi-Peak		Average	
	Disturbance level dB( $\mu$ V)	Permitted limit dB( $\mu$ V)	Disturbance level dB( $\mu$ V)	Permitted limit dB( $\mu$ V)
0.194	49.3	63.9	34.4	53.9
0.198	45.8	63.7	36.1	53.7
0.210	48.0	63.2	32.4	53.2
0.254	43.1	61.6	27.0	51.6
0.534	31.8	56.0	28.7	46.0
2.398	30.8	56.0	25.3	46.0

Test Engineer: Billy Li

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## **INTERTEK TESTING SERVICES**

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### **EXHIBIT 4**

### **EQUIPMENT PHOTOGRAPHS**



## INTERTEK TESTING SERVICES

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### 4.0 **Equipment Photographs**

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

## **INTERTEK TESTING SERVICES**

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### **EXHIBIT 5**

### **PRODUCT LABELLING**

## INTERTEK TESTING SERVICES

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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.

## **INTERTEK TESTING SERVICES**

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### **EXHIBIT 6**

### **TECHNICAL SPECIFICATIONS**

## INTERTEK TESTING SERVICES

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### 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.

# **INTERTEK TESTING SERVICES**

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## **EXHIBIT 7**

### **INSTRUCTION MANUAL**

## INTERTEK TESTING SERVICES

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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.

## **INTERTEK TESTING SERVICES**

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### **EXHIBIT 8**

### **MISCELLANEOUS INFORMATION**



## INTERTEK TESTING SERVICES

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### 8.0 **Miscellaneous Information**

This miscellaneous information includes details of the measured bandedge, the test procedure and calculation of factor such as pulse desensitization.

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## INTERTEK TESTING SERVICES

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### 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 outside of the specified frequency band are attenuated to the general radiated emission limits in section 15.209. It fulfil the requirement of 15.249(d).

#### Peak Measurement

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

#### **(i) Lower channel 2405.0000MHz:**

Peak Resultant field strength = Fundamental emissions (peak value) – delta  
from the bandedge plot

$$\begin{aligned} &= 79.1 \text{ dB}\mu\text{v/m} - 29.4\text{dB} \\ &= 49.7\text{dB}\mu\text{v/m} \end{aligned}$$

#### **(ii) Upper channel 2476.0000MHz:**

Peak Resultant field strength = Fundamental emissions (peak value) – delta  
from the bandedge plot

$$\begin{aligned} &= 79.7 \text{ dB}\mu\text{v/m} - 42.4 \text{ dB} \\ &= 37.3 \text{ dB}\mu\text{v/m} \end{aligned}$$

The resultant field strength meets the general radiated emission limit in section 15.209, which does not exceed 74dB $\mu$ v/m (Peak Limit) and 54dB $\mu$ v/m (Average Limit).

## INTERTEK TESTING SERVICES

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### 8.1 Bandedge Plot (cont'd)

Pursuant to FCC part 15 Section 15.215(c), the 20dB bandwidth of the emission was contained within the frequency band designated (mentioned as above) which the EUT operated. The effects, if any, from frequency sweeping, frequency hopping, other modulation techniques and frequency stability over excepted variations in temperature and supply voltage were considered.

Figure 8.1 Bandwidth

## INTERTEK TESTING SERVICES

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### 8.2 Discussion of Pulse Desensitization

Pulse desensitivity is not applicable for this device. The effective period ( $T_{\text{eff}}$ ) is approximately 240  $\mu\text{s}$  for a digital "1" bit, as shown in the plots of Exhibit 8.3. With a resolution bandwidth (3 dB) of 100 kHz, the pulse desensitivity factor was 0 dB.

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## INTERTEK TESTING SERVICES

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### 8.3 Calculation of Average Factor

Averaging factor in dB =  $20 \log (\text{duty cycle})$

The specification for output field strengths in accordance with the FCC rules specify measurements with an average detector. During testing, a spectrum analyzer incorporating a peak detector was used. Therefore, a reduction factor can be applied to the resultant peak signal level and compared to the limit for measurement instrumentation incorporating an average detector.

The time period over which the duty cycle is measured is 100 milliseconds, or the repetition cycle, whichever is a shorter time frame. The worst case (highest percentage on) duty cycle is used for the calculation. The duty cycle is measured by placing the spectrum analyzer in zero scan (receiver mode) and linear mode at maximum bandwidth (3 MHz at 3 dB down) and viewing the resulting time domain signal output from the analyzer on a Tektronix oscilloscope. The oscilloscope is used because of its superior time base and triggering facilities.

A plot of the worst-case duty cycle as detected in this manner are saved with filename: af.pdf

The duty cycle is simply the on-time divided by the period:

The duration of one cycle = 240us  
Effective period of the cycle = 4.22ms

$DC = 0.24\text{ms} / 4.22\text{ms} = 0.05687$  or 5.687%

Therefore, the averaging factor is found by  $20 \log_{10} 0.05687 = -24.9 \text{ dB}$

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## INTERTEK TESTING SERVICES

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### 8.4 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.

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.

Detector function for conducted emissions is in QP & AV mode and IFBW setting is 9 kHz from the frequency band 150 kHz to 30MHz.

For line-conducted emissions, the range scanned is 150 kHz to 30 MHz.

## INTERTEK TESTING SERVICES

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### 8.4 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 Normal Link d 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 10 kHz for emission below 30 MHz and 120 kHz for emission from 30 MHz to 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. 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 restricted 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, but those measurements taken at a closer distance are so marked.

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## **INTERTEK TESTING SERVICES**

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### **EXHIBIT 9**

### **TEST EQUIPMENT LIST**



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## INTERTEK TESTING SERVICES

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### 9.0 Test Equipment List

Equipment No.	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
SZ061-03	BiConiLog Antenna	ETS	3142C	00066460	25-Nov-09	25-May-11
SZ185-01	EMI Receiver	R&S	ESCI	100547	08-Mar-10	08-Mar-11
SZ061-08	Horn Antenna	ETS	3115	00092346	15-Mar-10	15-Sep-11
SZ056-03	Spectrum Analyzer	R&S	FSP 30	101148	18-Mar-10	18-Mar-11
SZ181-04	Preamplifier	Agilent	8449B	3008A02474	18-Mar-10	18-Mar-11
SZ188-01	Anechoic Chamber	ETS	RFD-F/A-100	4102	09-Jan-10	09-Jan-11
SZ062-02	RF Cable	RADIAL	RG 213U	--	09-Jan-10	19-Oct-10
SZ062-06	RF Cable	RADIAL	0.04-26.5GHz	--	09-Jan-10	19-Oct-10
SZ062-12	RF Cable	RADIAL	0.04-26.5GHz	--	09-Jan-10	19-Oct-10
SZ185-02	EMI Test Receiver	R&S	ESCI	100692	23-Nov-09	23-Nov-10
SZ187-01	Two-Line V-Network	R&S	ENV216	100072	23-Nov-09	23-Nov-10
SZ187-02	Two-Line V-Network	R&S	ENV216	100073	23-Nov-09	23-Nov-10
SZ188-03	Shielding Room	ETS	RFD-100	4100	15-Sep-07	15-Sep-10
SZ067-04	Notch Filter	Micro-Tronics	BRM5070 2-02	--	19-Apr-10	19-Oct-10