

May 06, 2009

In-Tech Electronics Ltd  
Unit A, 13/F, Wing Tai Centre 12 Hing Yip Street, Kwun Tong  
Kowloon, Hong Kong

Dear Jacky Tsang :

Enclosed you will find your file copy of a Part 15 Certification (FCC ID: NV6-CS8141).

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,



Shawn Xing  
Assistant Manager

Enclosure

**In-Tech Electronics Ltd**

Application  
For  
Certification  
**(FCC ID: NV6-CS8141)**

Bluetooth Hearing Enhancer

**MODEL: CS8141**

2.4GHz Transceiver

*Billy li*

SZ09040146-2

Billy Li

May 06, 2009

- 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\_TXa  
FCC ID: NV6-CS8141

**Intertek Testing Services Shenzhen Ltd. Kejiyuan Branch**  
6F, D Block, Huahan Building, Langshan Road, Nanshan District, Shenzhen, P. R. China

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# INTERTEK TESTING SERVICES

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## LIST OF EXHIBITS

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# INTERTEK TESTING SERVICES

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## MEASUREMENT/TECHNICAL REPORT

In-Tech Electronics Ltd - MODEL: CS8141

FCC ID: NV6-CS8141

May 06, 2009

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

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

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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.

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Report prepared by:



Shawn Xing  
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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	bendedge.pdf
Test Report	20dB BW Plot	bw.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	Confidentiality Letter	request.pdf

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## INTERTEK TESTING SERVICES

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### EXHIBIT 1

### GENERAL DESCRIPTION

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TRF no.: FCC 15C\_TXa  
FCC ID: NV6-CS8141

# INTERTEK TESTING SERVICES

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## 1.0 General Description

### 1.1 Product Description

The Equipment Under Test (EUT) is a Bluetooth Hearing Enhancer model: CS8141. It is powered by an internal 3.7V rechargeable battery or an external adaptor (Input: 100-240V AC, 50/ 60Hz, output: DC 5.0V, 500mA). The main function of EUT is to improve senior hearing experience under during mobile phone conversation. Its built-in personal amplifier also enhance one-to-one basis conversation or in small group situations, listening to your favorite TV or radio programs.

Antenna Type: PCB 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.

## INTERTEK TESTING SERVICES

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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-Anechoic chamber and shield room used to collect the radiated data and conducted data is **Intertek 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.

**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 fully charged 3.7V internal rechargeable battery and an external adaptor (Input: 100-240V AC, 50/ 60Hz, output: DC 5.0V, 500mA) in 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 as well as the output power level.

#### 2.3 Special Accessories

No special accessories used.

## INTERTEK TESTING SERVICES

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### 2.4 Equipment Modification

Any modifications installed previous to testing by In-Tech Electronics Ltd will be incorporated in each production model sold / leased in the United States.

No modifications were installed by 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.
Mobile phone	NOKIA	N73

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 In-Tech Electronics Ltd*



Signature

May 06, 2009

Date

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**INTERTEK TESTING SERVICES**

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**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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### 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 $\mu$ 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.

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

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

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

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

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

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

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

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

## INTERTEK TESTING SERVICES

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### 3.2 Radiated Emission Configuration Photograph

Worst Case Radiated Emission  
at  
2441 MHz

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

## INTERTEK TESTING SERVICES

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### 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 11.5 dB

#### **TEST PERSONNEL:**



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*Signature*

Billy Li, Compliance Engineer

*Typed/Printed Name*

May 06, 2009

*Date*

# INTERTEK TESTING SERVICES

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Applicant: In-Tech Electronics Ltd

Date of Test: May 06, 2009

Model: CS8141

Sample:1/2

Worst Case Operating Mode: Link with Mobile Phone

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)
Vertical	31.940	27.5	20.0	18.4	25.9	40.0	-14.1
Vertical	36.790	31.0	20.0	15.4	26.4	40.0	-13.6
Vertical	43.580	32.7	20.0	12.2	24.9	40.0	-15.1
Vertical	48.430	35.2	20.0	10.7	25.9	40.0	-14.1
Vertical	55.220	37.5	20.0	8.3	25.8	40.0	-14.2
Vertical	477.170	35.7	20.0	17.1	32.8	46.0	-13.2

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

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TRF no.: FCC 15C\_TXa

FCC ID: NV6-CS8141

# INTERTEK TESTING SERVICES

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Applicant: In-Tech Electronics Ltd

Date of Test: May 06, 2009

Model: CS8141

Sample:2/2

Worst Case Operating Mode: Transmit

Table 2

## Radiated Emissions

(2402MHz)

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Vertical	2402.000	109.9	36.7	28.5	101.7	114.0	-12.3
Horizontal	2402.000	106.3	36.7	28.5	98.1	114.0	-15.9
Vertical	4804.000	52.6	36.1	33.1	49.6	74.0	-24.4
Vertical	7206.000	48.5	36.2	37.8	50.1	74.0	-23.9
Vertical	9608.000	47.5	36.3	38.6	49.8	74.0	-24.2

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)
Vertical	2402.000	109.9	36.7	28.5	43.9	57.8	94.0	-36.2
Horizontal	2402.000	106.3	36.7	28.5	43.9	54.2	94.0	-39.8
Vertical	4804.000	52.6	36.1	33.1	43.9	5.7	54.0	-48.3
Vertical	7206.000	48.5	36.2	37.8	43.9	6.2	54.0	-47.8
Vertical	9608.000	47.5	36.3	38.6	43.9	5.9	54.0	-48.1

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

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TRF no.: FCC 15C\_Txa  
FCC ID: NV6-CS8141

# INTERTEK TESTING SERVICES

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Applicant: In-Tech Electronics Ltd

Date of Test: May 06, 2009

Model: CS8141

Sample:2/2

Worst Case Operating Mode: Transmit

Table 3

## Radiated Emissions

(2441MHz)

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)
Vertical	2441.000	110.7	36.7	28.5	102.5	114.0	-11.5
Horizontal	2441.000	106.1	36.7	28.5	97.9	114.0	-16.1
Vertical	4882.000	57.9	36.1	33.3	55.1	74.0	-18.9
Vertical	7323.000	51.7	36.3	37.9	53.3	74.0	-20.7
Vertical	9764.000	51.6	36.3	38.7	54.0	74.0	-20.0

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Average Factor (-dB)	Net at 3m (dB $\mu$ V/m)	Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Vertical	2441.000	110.7	36.7	28.5	43.9	58.6	94.0	-35.4
Horizontal	2441.000	106.1	36.7	28.5	43.9	54.0	94.0	-40.0
Vertical	4882.000	57.9	36.1	33.3	43.9	11.2	54.0	-42.8
Vertical	7323.000	51.7	36.3	37.9	43.9	9.4	54.0	-44.6
Vertical	9764.000	51.6	36.3	38.7	43.9	10.1	54.0	-43.9

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

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TRF no.: FCC 15C\_Txa  
FCC ID: NV6-CS8141

# INTERTEK TESTING SERVICES

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Applicant: In-Tech Electronics Ltd

Date of Test: May 06, 2009

Model: CS8141

Sample:2/2

Worst Case Operating Mode: Transmit

Table 4

## Radiated Emissions

(2480MHz)

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)
Vertical	2480.000	109.6	36.7	28.6	101.5	114.0	-12.5
Horizontal	2480.000	106.2	36.7	28.6	98.1	114.0	-15.9
Vertical	4960.000	52.3	36.1	33.4	49.6	74.0	-24.4
Vertical	7440.000	48.2	36.3	38.2	50.1	74.0	-23.9
Vertical	9920.000	47.3	36.3	38.8	49.8	74.0	-24.2

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Average Factor (-dB)	Net at 3m (dB $\mu$ V/m)	Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Vertical	2480.000	109.6	36.7	28.6	43.9	57.6	94.0	-36.4
Horizontal	2480.000	106.2	36.7	28.6	43.9	54.2	94.0	-39.8
Vertical	4960.000	52.3	36.1	33.4	43.9	5.7	54.0	-48.3
Vertical	7440.000	48.2	36.3	38.2	43.9	6.2	54.0	-47.8
Vertical	9920.000	47.3	36.3	38.8	43.9	5.9	54.0	-48.1

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

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TRF no.: FCC 15C\_Txa  
FCC ID: NV6-CS8141

## **INTERTEK TESTING SERVICES**

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### **3.4 Conducted Emission Configuration Photograph**

**Worst Case Line-Conducted Configuration  
at  
0.326 MHz**

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

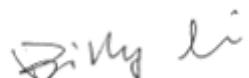
## INTERTEK TESTING SERVICES

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### 3.5 Conducted Emission Data

Judgement: Passed by 9.3 dB margin

#### **TEST PERSONNEL:**



*Signature*

Billy Li, Compliance Engineer  
*Typed/Printed Name*

May 06, 2009

*Date*

# INTERTEK TESTING SERVICES

Company: In-Tech Electronics Ltd

Date of Test: May 06, 2009

Model: CS8141

Sample:1/2

Worst Case Operating Mode: Link with Mobile Phone

**Table 5**

## Conducted Emissions

### Live Line Data

Frequency (MHz)	Quasi-Peak		Average	
	Disturbance level dB(µV)	Permitted limit dB(µV)	Disturbance level dB(µV)	Permitted limit dB(µV)
0.326	47.7	59.6	40.3	49.6
0.465	45.1	56.6	36.3	46.6
0.510	44.4	56.0	35.7	46.0
0.650	43.8	56.0	34.7	46.0
1.347	40.2	56.0	27.5	46.0
1.437	42.5	56.0	31.4	46.0

### Neutral Line Data

Frequency (MHz)	Quasi-Peak		Average	
	Disturbance level dB(µV)	Permitted limit dB(µV)	Disturbance level dB(µV)	Permitted limit dB(µV)
0.321	43.2	59.7	36.0	49.7
0.414	41.5	57.6	34.4	47.6
0.462	41.1	56.7	34.5	46.7
0.554	39.7	56.0	33.1	46.0
1.294	36.8	56.0	28.0	46.0
1.338	36.7	56.0	29.9	46.0

Test Engineer: Billy Li

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TRF no.: FCC 15C\_TXa

FCC ID: NV6-CS8141

**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.

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**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.

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**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.

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**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.

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**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.

## 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 2402MHz:**

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

$$\begin{aligned} &= 101.7 \text{dB}\mu\text{v/m} - 36.7 \text{dB} \\ &= 65 \text{dB}\mu\text{v/m} \end{aligned}$$

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

$$\begin{aligned} &= 57.8 \text{dB}\mu\text{v/m} - 36.7 \text{dB} \\ &= 21.1 \text{dB}\mu\text{v/m} \end{aligned}$$

##### **(ii) Upper channel 2480MHz:**

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

$$\begin{aligned} &= 101.5 \text{dB}\mu\text{v/m} - 52.1 \text{dB} \\ &= 49.4 \text{dB}\mu\text{v/m} \end{aligned}$$

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

$$\begin{aligned} &= 57.6 \text{dB}\mu\text{v/m} - 52.1 \text{dB} \\ &= 5.5 \text{dB}\mu\text{v/m} \end{aligned}$$

The resultant field strength meets the general radiated emission limit in section 15.209, which does not exceed 74 dB $\mu$ 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 ( $T_{eff}$ ) is approximately 625 $\mu$ s for Bluetooth. With a resolution bandwidth (3dB) of 1MHz, so the pulse desensitivity factor is 0dB.

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### 8.3 Transmitter Duty Cycle Calculation, FCC Rule 15.35(b, c)

Based on the Bluetooth Specification Version 2.1+ EDR, transmitter ON time is independent of packet type (DH1, DH3 and DH5) and packet length (single-slot and multi-slot). The maximum transmitter ON time for the Bluetooth is 625 $\mu$ s.

Each TX and RX time slot is 625 $\mu$ s in length. A TDD scheme is used where master and slave alternately transmit. For one period for a pseudo-random hopping through all 79 RF channels, it takes:  $79 \times (0.625 \times 2)\text{ms} = 98.75\text{ms}$ .

Therefore,

$$\begin{aligned}\text{Average Factor (AF) of Bluetooth in dB} &= 20 \log_{10} (0.625/98.75) \text{ dB} \\ &= 20 \log_{10} (0.00633) \text{ dB} \\ &= -43.9 \text{ dB}\end{aligned}$$

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

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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 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 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.