

**Airline Mechanical Co., Ltd**

Application  
For  
Certification  
**FCC ID: ZGIDA065**

Remote wall switch with Z-WAVE

Model: DB038  
Additional Model: DA065, ZFM-80US, ZFM-M80US

Transceiver

Report No.: SZ12060359-1

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 [10-1-11]

Prepared and Checked by:

Approved by:

Sign on file

Andy Yan  
Engineer

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Billy Li  
Supervisor  
Date: July 14, 2012

- 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.
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TRF No.: FCC 15C\_Tx\_b

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## INTERTEK TESTING SERVICES

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### 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 Labelling
<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

Airline Mechanical Co., Ltd - Model: DB038  
Additional Model: DA065, ZFM-80US, ZFM-M80US  
FCC ID: ZGIDA065

July 14, 2012

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

Equipment Type: DXT - Part 15 Low Power Transceiver, RX Verified

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 [10-1-11 Edition] provision.

Report prepared by:

Billy Li  
Intertek Testing Services Shenzhen Ltd.  
Kejiyuan Branch  
6F, Block D, Huahan Building, Langshan Road,  
Nanshan District, Shenzhen, P. R. China  
Phone: (86 755) 8601 6288  
Fax: (86 755) 8601 6751

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# INTERTEK TESTING SERVICES

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## Table of Contents

1.0 <b><u>General Description</u></b> .....	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 <b><u>System Test Configuration</u></b> .....	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 <b><u>Emission Results</u></b> .....	8
3.1 Radiated Test Results .....	9
3.1.1 Field Strength Calculation .....	9
3.1.2 Radiated Emission Configuration Photograph .....	10
3.1.3 Radiated Emissions .....	10
3.1.4 Transmitter Spurious Emissions (Radiated) .....	12
3.2 Conducted Emission at Mains Terminal .....	14
3.2.1 Conducted Emissions Configuration Photograph .....	14
3.2.2 Conducted Emissions .....	14
4.0 <b><u>Equipment Photographs</u></b> .....	18
5.0 <b><u>Product Labelling</u></b> .....	20
6.0 <b><u>Technical Specifications</u></b> .....	22
7.0 <b><u>Instruction Manual</u></b> .....	24
8.0 <b><u>Miscellaneous Information</u></b> .....	26
8.1 Bandedge Plot .....	27
8.2 Emissions Test Procedures .....	29
9.0 <b><u>Test Equipment List</u></b> .....	32

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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 Photos	radiated photos.pdf
Test Setup Photo	Conducted Photos	conducted photos.pdf
Test Report	Bandedge Plot	bandedge.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	Letter of Agency	agency.pdf

**EXHIBIT 1**

**GENERAL DESCRIPTION**

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## INTERTEK TESTING SERVICES

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### 1.0 General Description

#### 1.1 Product Description

The Equipment Under Test (EUT) is a Remote wall switch with Z-WAVE transceiver connected directly to AC 120V/60Hz main line. The EUT is a remote controlled On/Off switch for household appliance and it is designed to act as a repeater, which will re-transmit the 908.42MHz RF signal (when receive a command signal from the remote controller) to ensure that the signal is received. It also has manual function. For more detail, please refer to the user manual.

The Model: ZFM-M80US is the same as the Model: DB038 in hardware aspect. The models are difference in plastic colour, packaging and marketing purpose only.

The Models: DA065, ZFM-80US are the same as the Models: DB038 in hardware aspect of RF portion. The difference between the models is as below.

DB038, ZFM-M80US with power meter function.  
DA065, ZFM-80US without power meter function.

Antenna Type: Integral antenna  
Modulation Type: FSK

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 Remote wall switch with Z-WAVE. The verification procedure of the receiver portion of this transceiver is being processed at the same time.

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### 1.3 Test Methodology

Both AC mains line-conducted and Radiated emission measurement 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, 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 (Registration Number: 242492).



**EXHIBIT 2**  
**SYSTEM TEST CONFIGURATION**

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## 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 (2009).

The EUT was powered by AC 120V/60Hz during the testing.

The models DB038 and DA065 have been tested for radiated emission and AC conducted emission, only the worst case is shown on this report.

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, 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 Airline Mechanical Co., Ltd 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

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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.
Lighting Load	Airline Mechanical Co., Ltd	1800W, 120Vac/60Hz, 15A
External Switch	Airline Mechanical Co., Ltd	N/A

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

### 3.0 Emission Results

Data is included worst-case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

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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. A sample calculation is included below.

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

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

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:

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

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 dB $\mu$ V  
AF = 7.4 dB  
CF = 1.6 dB  
AG = 29.0 dB

$$FS = 62 + 7.4 + 1.6 - 29 = 42 \text{ dB}\mu\text{V/m}$$

$$\text{Level in } \mu\text{V/m} = \text{Common Antilogarithm } [(42 \text{ dB}\mu\text{V/m})/20] = 125.9 \mu\text{V/m}$$

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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  
96.074 MHz

Judgement: Passed by 5.3 dB

#### **TEST PERSONNEL:**

*Sign on file*

Andy Yan, Engineer  
*Typed/Printed Name*

July 14, 2012  
*Date*

## INTERTEK TESTING SERVICES

Company: Airline Mechanical Co., Ltd  
Model: DB038  
Sample: 1/1  
Worst Case Operating Mode: Transmit

Date of Test: July 14, 2012

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	114.684	44.4	20.0	7.4	31.8	43.5	-11.7
Horizontal	168.119	43.9	20.0	10.0	33.9	43.5	-9.6
Horizontal	396.302	38.0	20.0	16.5	34.5	46.0	-11.5
Vertical	36.016	37.2	20.0	14.4	31.6	40.0	-8.4
Vertical	96.074	50.0	20.0	8.2	38.2	43.5	-5.3
Vertical	444.322	35.7	20.0	17.7	33.4	46.0	-12.6

- 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  
1816.840 MHz

Judgement: Passed by 7.9 dB

#### **TEST PERSONNEL:**

*Sign on file*

Andy Yan, Engineer  
*Typed/Printed Name*

July 14, 2012  
*Date*

## INTERTEK TESTING SERVICES

Applicant: Airline Mechanical Co., Ltd  
Model: DB038  
Sample: 1/1  
Worst Case Operating Mode: Transmit

Date of Test: July 14, 2012

Table 2

### Radiated Emissions

(908.420MHz)

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	QP Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	908.420	60.9	0.0	24.8	85.7	94.0	-8.3

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	1816.840	55.7	36.8	27.2	46.1	54.0	-7.9
Horizontal	2725.260	49.3	36.7	29.6	42.2	54.0	-11.8
Horizontal	3633.680	49.8	36.5	31.8	45.1	54.0	-8.9

- Notes: 1. Quasi-Peak detector is used for frequency up to 1GHz and Peak detector is used for frequency over 1GHz.
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 1GHz.

Test Engineer: Andy Yan

## 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 Neutral-Conducted Configuration  
at  
24.018 MHz

Judgement: Passed by 4.7 dB margin

#### **TEST PERSONNEL:**

*Sign on file*

Andy Yan, Engineer  
*Typed/Printed Name*

July 14, 2012  
*Date*

## INTERTEK TESTING SERVICES

Applicant: Airline Mechanical Co., Ltd

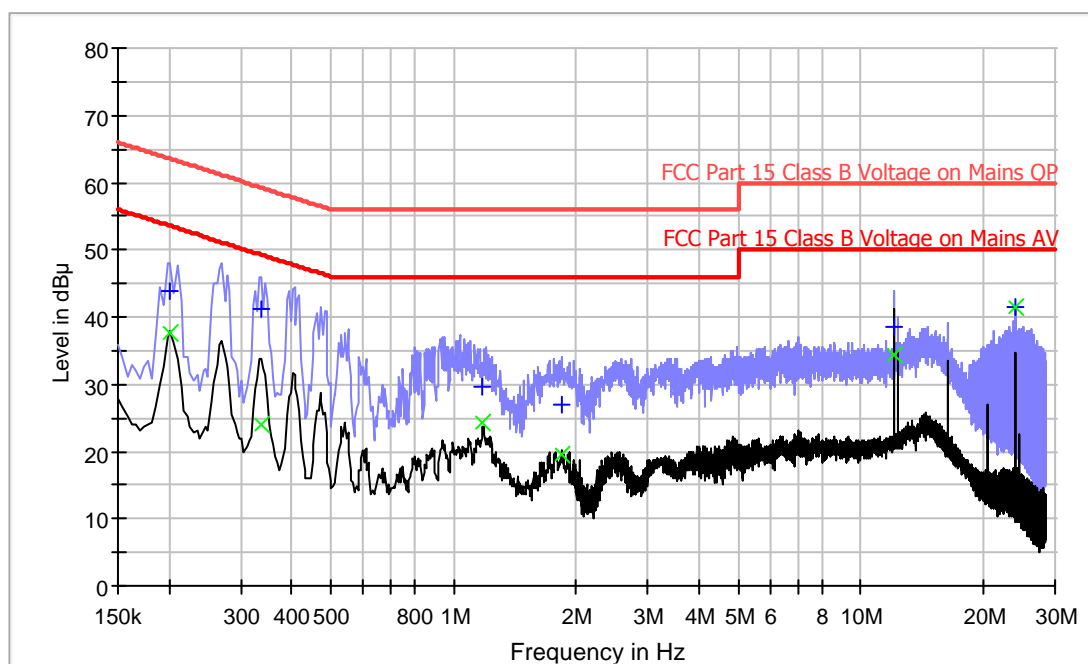
Date of Test: July 14, 2012

Model: DB038

Sample: 1/1

Worst Case Operating Mode: Transmit With Full Load

### Conducted Emission Test - FCC



### Result Table-QP

Frequency (MHz)	QuasiPeak (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.202000	43.8	L1	9.6	19.7	63.5
0.338000	41.2	L1	9.6	18.1	59.3
1.178000	29.8	L1	9.7	26.2	56.0
1.846000	26.8	L1	9.7	29.2	56.0
12.010000	38.6	L1	10.1	21.4	60.0
24.018000	41.6	L1	10.6	18.4	60.0

### Result Table-AV

Frequency (MHz)	Average (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.202000	37.6	L1	9.6	15.9	53.5
0.338000	24.1	L1	9.6	25.2	49.3
1.178000	24.2	L1	9.7	21.8	46.0
1.846000	19.6	L1	9.7	26.4	46.0
12.010000	34.3	L1	10.1	15.7	50.0
24.018000	41.3	L1	10.6	8.7	50.0

Report No: SZ12060359-1

FCC ID: ZGIDA065

TRF No.: FCC 15C\_TX\_b

## INTERTEK TESTING SERVICES

Applicant: Airline Mechanical Co., Ltd

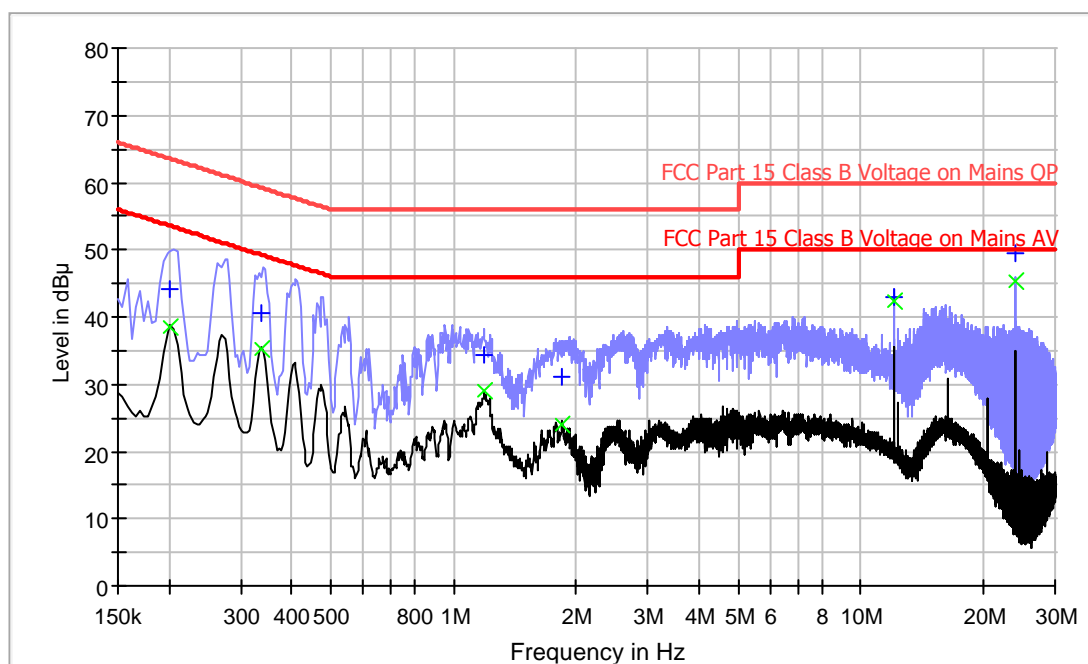
Date of Test: July 14, 2012

Model: DB038

Sample: 1/1

Worst Case Operating Mode: Transmit With Full Load

### Conducted Emission Test - FCC



### Result Table-QP

Frequency (MHz)	QuasiPeak (dB $\mu$ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)
0.202000	44.2	N	9.6	19.3	63.5
0.338000	40.6	N	9.6	18.7	59.3
1.190000	34.3	N	9.8	21.7	56.0
1.850000	31.1	N	9.8	24.9	56.0
12.010000	43.0	N	10.1	17.0	60.0
24.018000	49.6	N	10.7	10.4	60.0

### Result Table-AV

Frequency (MHz)	Average (dB $\mu$ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)
0.202000	38.5	N	9.6	15.0	53.5
0.338000	35.2	N	9.6	14.1	49.3
1.190000	29.2	N	9.8	16.8	46.0
1.850000	24.0	N	9.8	22.0	46.0
12.010000	42.3	N	10.1	7.7	50.0
24.018000	45.3	N	10.7	4.7	50.0

Report No: SZ12060359-1

FCC ID: ZGIDA065

TRF No.: FCC 15C\_TX\_b

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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.

**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 and the test procedure.

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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 fulfils the requirement of 15.249(d).

#### Peak Measurement

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

#### **(i) Left bandedge:**

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

$$\begin{aligned} &= 85.7\text{dB}\mu\text{v/m} - 54.0\text{dB} \\ &= 31.7\text{dB}\mu\text{v/m} \end{aligned}$$

#### **(ii) Right bandedge:**

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

$$\begin{aligned} &= 85.7\text{dB}\mu\text{v/m} - 47.1\text{dB} \\ &= 38.6\text{dB}\mu\text{v/m} \end{aligned}$$

The resultant field strength meets the general radiated emission limit in section 15.209, which does not exceed 46dB $\mu$ v/m (QP Limit).



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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 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 - 2009.

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.

Above 1000 MHz, peak detector is used for measurement.

On any frequency or frequencies below or equal to 1000 MHz, the limits shown are based on measuring equipment employing a CISPR quasi-peak detector function and related measurement bandwidths.

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.

## INTERTEK TESTING SERVICES

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### 8.2 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 - 2009.

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. 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**

## 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	02-Jul-11	02-Jan-13
SZ185-01	EMI Receiver	R&S	ESCI	100547	11-Mar-12	11-Mar-13
SZ061-08	Horn Antenna	ETS	3115	00092346	15-Oct-11	15-Oct-12
SZ061-06	Active Loop Antenna	Electro-Metrics	EM-6876	217	11-Mar-12	11-Mar-13
SZ056-03	Spectrum Analyzer	R&S	FSP 30	101148	11-Mar-12	11-Mar-13
SZ067-14	Highpass Filter	Mini-Circuits	VHF-1500+	1022	11-Jun-12	11-Jun-13
SZ181-04	Preamplifier	Agilent	8449B	3008A02474	11-Mar-12	11-Mar-13
SZ188-01	Anechoic Chamber	ETS	RFD-F/A-100	4102	03-Mar-12	03-Mar-13
SZ062-02	RF Cable	RADIAL	RG 213U	--	17-Mar-12	17-Sep-12
SZ062-06	RF Cable	RADIAL	0.04-26.5GHz	--	01-Nov-11	01-Nov-12
SZ062-12	RF Cable	RADIAL	0.04-26.5GHz	--	25-Feb-12	25-Aug-12
SZ185-02	EMI Test Receiver	R&S	ESCI	100692	05-Nov-11	05-Nov-12
SZ187-01	Two-Line V-Network	R&S	ENV216	100072	05-Nov-11	05-Nov-12
SZ187-02	Two-Line V-Network	R&S	ENV216	100073	05-Nov-11	05-Nov-12
SZ188-03	Shielding Room	ETS	RFD-100	4100	16-Sep-10	16-Sep-13