

## TRONICO TECHNOLOGY COMPANY LIMITED

Application  
For  
Certification

**FCC ID: 2ADPEDA011**

Dimming Switch Mini module

Model: DA011

Additional Model: 9613+06500-1UOP, NND030, 9613+06500-2UOP, NND031, 9613+06500-3UOP, F-BW8130US-0001, ZDS-200NA, F-BW8131US-0001, ZDS-210NA

Report No.: 150120028SZN-001

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 [10-1-13]

Prepared and Checked by:

Approved by:

Sign on file

*Vincent Chen*  
Engineer

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*Andy Yan*  
Senior Project Engineer  
Date: January 28, 2015

- 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.
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- 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\_TX\_

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## INTERTEK TESTING SERVICES

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### LIST OF EXHIBITS

#### *INTRODUCTION*

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<i>EXHIBIT 2:</i>	System Test Configuration
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# INTERTEK TESTING SERVICES

## MEASUREMENT/TECHNICAL REPORT

TRONICO TECHNOLOGY COMPANY LIMITED - Model: DA011  
Additional Model: 9613+06500-1UOP, NND030, 9613+06500-2UOP, NND031,  
9613+06500-3UOP, F-BW8130US-0001, ZDS-200NA, F-BW8131US-0001, ZDS-210NA

FCC ID: 2ADPEDA011

January 28, 2015

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 [10-1-13 Edition] provision.

Report prepared by:

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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 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
Cover Letter	Letter of Agreement	agreement.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 Dimming Switch Mini module transceiver connected directly to AC 120V/60Hz main line. 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 Models: 9613+06500-1UOP, NND030, 9613+06500-2UOP, NND031, 9613+06500-3UOP, F-BW8130US-0001, ZDS-200NA, F-BW8131US-0001, ZDS-210NA are the same as the Models: DA011 in hardware and electronic aspect. The models are difference in plastic color, packaging and marketing purpose only.

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 Dimming Switch Mini module. The verification procedure of the receiver portion of this transceiver has processed with report number: 150120028SZN-002.

## 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 (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 **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.



**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 (2009).

The EUT was powered by AC 120V/60Hz 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 Special Accessories

No special accessories used.

#### 2.3 Equipment Modification

Any modifications installed previous to testing by TRONICO TECHNOLOGY COMPANY LIMITED 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.

#### 2.4 Measurement Uncertainty

When determining the test conclusion, the Measurement Uncertainty of test has been considered.

## INTERTEK TESTING SERVICES

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### 2.5 Support Equipment List and Description

Description	Manufacturer	Model No.
Lighting Load	Airline Mechanical Co., Ltd	330W, 120Vac/60Hz, 2.75A 43.6 $\Omega$
Resistance Load	Airline Mechanical Co., Ltd	500W, 120Vac/60Hz, 4.16A, 28.9 $\Omega$

**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.

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

Level in  $\mu$ V/m = 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  
908.42 MHz

Judgement: Passed by 6.1 dB

### **TEST PERSONNEL:**

*Sign on file*

Vincent Chen Engineer  
*Typed/Printed Name*

January 28, 2015  
*Date*

## INTERTEK TESTING SERVICES

Applicant: TRONICO TECHNOLOGY COMPANY LIMITED

Date of Test: January 28, 2015

Model: DA011

Sample: 1/1

Worst Case Operating Mode: Transmit with Resistance Load

### Radiated Emissions

#### Spurious Emission up to 1GHz

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	56.675	44.5	20.0	5.6	30.1	40.0	-9.9
Horizontal	60.555	38.8	20.0	8.4	27.2	40.0	-12.8
Horizontal	613.455	35.9	20.0	11.7	27.6	46.0	-18.4
Vertical	56.190	33.0	20.0	18.3	31.3	40.0	-8.7
Vertical	101.780	21.8	20.0	15.7	17.5	43.5	-26.0
Vertical	143.975	33.8	20.0	5.4	19.2	43.5	-24.3

#### Fundamental Emission

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	QP Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Vertical	908.420	64.9	0.0	23.0	87.9	94.0	-6.1

#### Spurious Emission above 1GHz

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	1816.840	53.0	36.8	27.2	43.4	74.0	-30.6
Vertical	2725.260	52.9	36.7	29.6	45.8	74.0	-28.2
Vertical	3633.680	51.8	36.5	31.8	47.1	74.0	-26.9

- Notes:
1. QP Detector for emission up to 1GHz and Peak Detector for emission above 1GHz 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.
  5. All the Peak Value above 1GHz are below the average Limit 54dB $\mu$ V/m



## 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 Conducted Configuration  
at  
0.150 MHz

Judgement: Passed by 7.6 dB margin

### ***TEST PERSONNEL:***

*Sign on file*

Vincent Chen Engineer  
*Typed/Printed Name*

January 28, 2015  
*Date*

## INTERTEK TESTING SERVICES

Applicant: TRONICO TECHNOLOGY COMPANY LIMITED

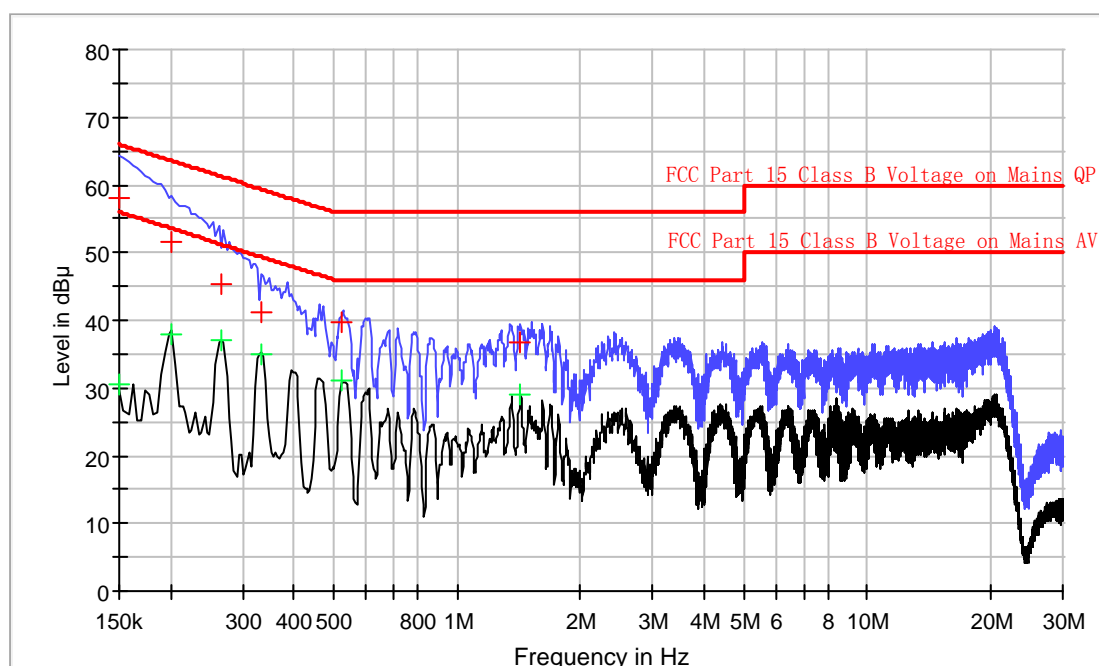
Date of Test: January 28, 2015

Model: DA011

Sample: 1/1

Worst Case Operating Mode: Transmit with Resistance Load

### Conducted Emission Test FCC Part 15



### Result Table QP

Frequency (MHz)	QuasiPeak (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.150	58.1	L	9.8	7.9	66.0
0.202	51.6	L	9.8	11.9	63.5
0.266	45.4	L	9.8	15.8	61.2
0.334	41.1	L	9.8	18.3	59.4
0.522	39.7	L	9.8	16.3	56.0
1.430	36.7	L	9.9	19.3	56.0

### Result Table AV

Frequency (MHz)	CAverage (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.150	30.5	L	9.8	25.5	56.0
0.202	37.8	L	9.8	15.7	53.5
0.266	37.2	L	9.8	14.0	51.2
0.334	35.0	L	9.8	14.4	49.4
0.522	31.1	L	9.8	14.9	46.0
1.430	29.1	L	9.9	16.9	46.0

Test Engineer: Vincent Chen

TRF No.: FCC 15C\_TXb

FCC ID: 2ADPEDA011

## INTERTEK TESTING SERVICES

Applicant: TRONICO TECHNOLOGY COMPANY LIMITED

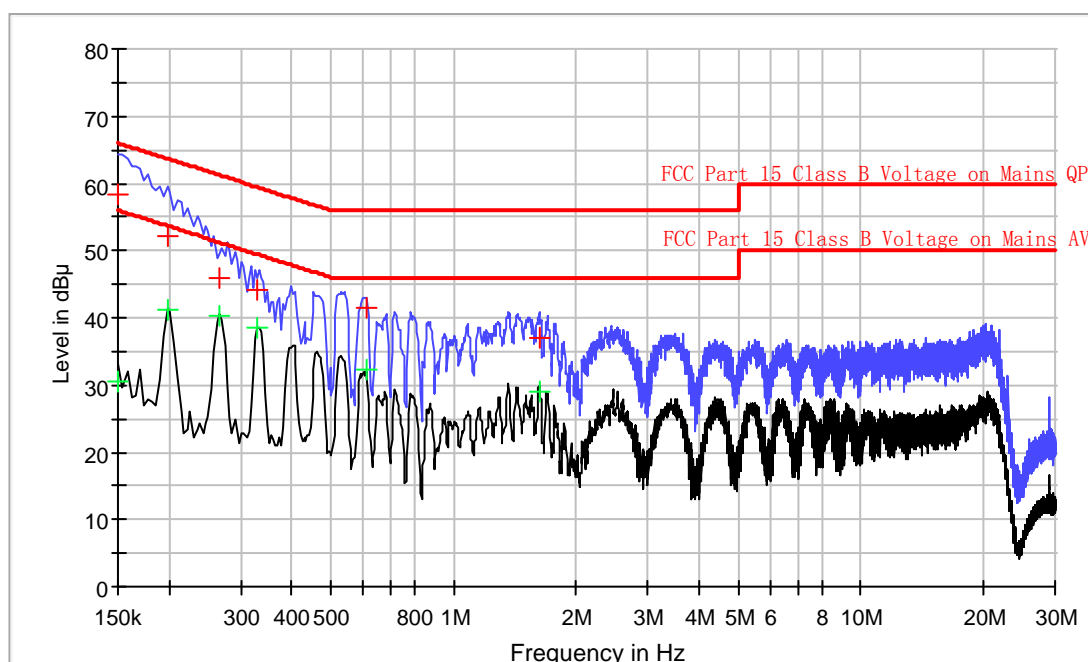
Date of Test: January 28, 2015

Model: DA011

Sample: 1/1

Worst Case Operating Mode: Transmit with Resistance Load

### Conducted Emission Test - FCC



### Result Table QP

Frequency (MHz)	QuasiPeak (dB μ V)	Line	Corr .	Margin (dB)	Limit (dB μ V)
0.150	58.4	N	10.0	7.6	66.0
0.198	52.1	N	10.0	11.6	63.7
0.266	45.8	N	10.1	15.4	61.2
0.330	44.1	N	10.1	15.4	59.5
0.610	41.6	N	10.2	14.4	56.0
1.622	37.2	N	10.3	18.8	56.0

### Result Table AV

Frequency (MHz)	Average (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.150	30.5	N	10.0	25.5	56.0
0.198	41.1	N	10.0	12.6	53.7
0.266	40.4	N	10.1	10.8	51.2
0.330	38.4	N	10.1	11.1	49.5
0.610	32.2	N	10.2	13.8	46.0
1.622	29.0	N	10.3	17.0	46.0

Test Engineer: Vincent Chen

TRF No.: FCC 15C\_TXb

FCC ID: 2ADPEDA011

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## **INTERTEK TESTING SERVICES**

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### **EXHIBIT 4**

### **EQUIPMENT PHOTOGRAPHS**

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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**

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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**

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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 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

$$\begin{aligned} &= 87.9\text{dB}\mu\text{v/m} - 57.8\text{dB} \\ &= 30.1\text{dB}\mu\text{v/m} \end{aligned}$$

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

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

$$\begin{aligned} &= 87.9\text{dB}\mu\text{v/m} - 46.4\text{dB} \\ &= 41.5\text{dB}\mu\text{v/m} \end{aligned}$$

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

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### 8.2 Transmitter Duty Cycle Calculation and Measurements

The EUT antenna output port was connected to the input of the spectrum analyzer. The analyzer center frequency was set to EUT RF channel carrier. The SWEEP function on the analyzer was set to ZERO SPAN. The Transmitter ON time was determined from the resultant time-amplitude display:

	See attached spectrum analyzer chart (s) for Transmitter timing
	See Transmitter timing diagram provided by manufacturer
x	Not applicable, duty cycle was not used.



## INTERTEK TESTING SERVICES

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### 8.3 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 peak measurement and average detector is used for average 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.

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### 8.3 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 – 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. 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.

## **INTERTEK TESTING SERVICES**

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### **EXHIBIT 9**

### **TEST EQUIPMENT LIST**

## INTERTEK TESTING SERVICES

### 9.0 Test Equipment List

Equipment No.	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
SZ061-03	BiConiLog Antenna	ETS	3142C	00066460	28-Jun-14	28-Jun-15
SZ185-01	EMI Receiver	R&S	ESCI	100547	10-Mar-14	10-Mar-15
SZ061-07	Pyramidal Horn Antenna	ETS	3160-09	00083067	03-Sep-14	03-Sep-15
SZ061-08	Horn Antenna	ETS	3115	00092346	19-Oct-14	19-Oct-15
SZ061-06	Active Loop Antenna	Electro-Metrics	EM-6876	217	29-Apr-14	29-Apr-15
SZ056-03	Spectrum Analyzer	R&S	FSP 30	101148	10-Mar-14	10-Mar-15
SZ181-04	Preamplifier	Agilent	8449B	3008A02474	10-Mar-14	10-Mar-15
SZ188-01	Anechoic Chamber	ETS	RFD-F/A-100	4102	19-Apr-14	19-Apr-15
SZ062-02	RF Cable	RADIAL	RG 213U	--	05-Jan-15	05-Jul-15
SZ062-05	RF Cable	RADIAL	0.04-26.5GHz	--	09-Oct-14	09-Apr-15
SZ062-12	RF Cable	RADIAL	0.04-26.5GHz	--	09-Oct-14	09-Apr-15
SZ067-04	Notch Filter	Micro-Tronics	BRM5070 2-02	--	21-May-14	21-May-15
SZ185-02	EMI Test Receiver	R&S	ESCI	100692	01-Nov-14	01-Nov-15
SZ187-01	Two-Line V-Network	R&S	ENV216	100072	01-Nov-14	01-Nov-15
SZ187-02	Two-Line V-Network	R&S	ENV216	100073	16-Jun-14	16-Jun-15
SZ188-03	Shielding Room	ETS	RFD-100	4100	23-Aug-14	23-Aug-15