

**Shenzhen Chuangwei-RGB Electronics Co., Ltd.**

Application  
For  
Certification

**FCC ID: 2ANM3NTUDB10**

**WIFI USB DONGLE**

**Model: NTUD-B10**

**Brand name: Skyworth**

**2.4GHz Transceiver**

**Report No.: 170830013SZN-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 [10-1-16]

Prepared and Checked by:

Approved by:

Sign on file

*Leo Li*  
*Engineer*

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*Kidd Yang*  
*Senior Project Engineer*  
*Date: September 28, 2017*

- 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\_b

**Intertek Testing Services Shenzhen Ltd. Longhua Branch**

1F/2F, Building B, QiaoAn Scientific Technology Park, ShangKeng Community, GuanHu Subdistrict, LongHua District, ShenZhen

Tel: (86 755) 8601 6288 Fax: (86 755) 8601 6751 Website: [www.china.intertek-etlsemko.com](http://www.china.intertek-etlsemko.com)

# INTERTEK TESTING SERVICES

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## INTERTEK TESTING SERVICES

### MEASUREMENT/TECHNICAL REPORT

**Shenzhen Chuangwei-RGB Electronics Co., Ltd. - MODEL:  
NTUD-B10**

**Brand name: Skyworth**

**FCC ID: 2ANM3NTUDB10**

This report concerns (check one:)      Original Grant X      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 X

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 X

If no, assumed Part 15, Subpart C for intentional radiator – the new 47 CFR [10-1-16 Edition] provision.

Report prepared by:

Leo Li  
Intertek Testing Services Shenzhen Ltd.  
Longhua Branch  
1F/2F, Building B, QiaoAn Scientific Technology  
Park, Shangheng Community, Guanhu  
Subdistrict, Longhua District, Shenzhen, P.R.  
China  
Phone: (86 755) 8601 0639  
Fax: (86 755) 8601 6751

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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               |
| 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          |
| 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 WIFI USB DONGLE which has Bluetooth function operating in 2402MHz to 2480MHz band. The EUT was powered by USB port(DC 5V). For more detail information pls. refer to the user manual.

Bluetooth Version: 3.0, 2.1+ EDR

Antenna Type: Integral antenna

Modulation Type: GFSK,  $\pi/4$ DQPSK, 8DPSK

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 WIFI USB DONGLE BT 3.0, 2.1+EDR.

For the BT 4.0 BLE mode was tested and demonstrated in report 170830013SZN-002.

For the 2.4GHz WiFi function was tested and demonstrated in report 170830013SZN-003.

For the 5GHz WiFi function was tested and demonstrated in report 170830013SZN-004.

For other digital functions were tested and demonstrated in report 170830013SZN-005.

#### 1.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.10 (2013). 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. All other measurements were made in accordance with the procedures in part 2 of CFR 47.

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### 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. Longhua Branch** and located at 1F/2F, Building B, QiaoAn Scientific Technology Park, Shangkeng Community, Guanhu Subdistrict, Longhua District, Shenzhen, P.R. China. This test facility and site measurement data have been fully placed on file with the FCC (Registration Number: CN1188).

**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 C63.10 (2013).

The EUT was powered by USB port(DC 5V) through laptop with 120V/60Hz input during the test. The EUT contains three types of antennas. Each antenna installed with the EUT was tested and only the worst data was reported in this report.

All packets DH1, DH3 & DH5 mode in modulation type GFSK,  $\pi/4$ DQPSK, 8DPSK were tested, only the worst data was reported in 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.

The rear of unit was 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 testing was designed to exercise the various system components in a manner similar to a typical use.

#### 2.3 Special Accessories

No special accessories used.

#### 2.4 Equipment Modification

Any modifications installed previous to testing by Shenzhen Chuangwei-RGB Electronics 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 Longhua Branch.

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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.               |
|----------------------------------------------|--------------|-------------------------|
| Laptop<br>(Provided by Intertek)             | Lenovo       | T420                    |
| USB Cable<br>(Provided by Chuangwei)         | N/A          | Unshielded, Length 13cm |
| Extended USB Cable<br>(Provided by Intertek) | N/A          | Unshielded, Length 80cm |

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

### 3.0 **Emission Results**

Data is included worst-case configuration (the configuration which resulted in the highest emission levels).

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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.

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

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 net field strength for comparison to the appropriate emission limit is 42 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

$$FS = 62 + 7.4 + 1.6 - 29 + 0 = 42 \text{ dB}\mu\text{V/m}$$

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

## 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. Simultaneous transmission was considered.

Worst Case Radiated Emission  
at  
463.000 MHz

Judgement: Passed by 15.2 dB

#### **TEST PERSONNEL:**

*Sign on file*

Leo Li Engineer  
*Typed/Printed Name*

September 28, 2017  
*Date*

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## INTERTEK TESTING SERVICES

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Applicant: Shenzhen Chuangwei-RGB Electronics Co., Ltd.

Date of Test: September 28, 2017

Model: NTUD-B10

Worst Case Operating Mode: BT Link and Powered via Laptop USB port

Table 1

### Radiated Emissions

| Polarization | Frequency (MHz) | Reading (dBμV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBμV/m) | Limit at 3m (dBμV/m) | Margin (dB) |
|--------------|-----------------|----------------|-------------------|---------------------|--------------------|----------------------|-------------|
| Horizontal   | 99.000          | 36.4           | 20.0              | 8.9                 | 25.3               | 43.5                 | -18.2       |
| Horizontal   | 122.000         | 37.1           | 20.0              | 8.4                 | 25.5               | 43.5                 | -18.0       |
| Horizontal   | 482.000         | 31.8           | 20.0              | 18.5                | 30.3               | 46.0                 | -15.7       |
| Vertical     | 67.000          | 37.0           | 20.0              | 7.4                 | 24.4               | 40.0                 | -15.6       |
| Vertical     | 94.000          | 37.2           | 20.0              | 8.5                 | 25.7               | 43.5                 | -17.8       |
| Vertical     | 463.000         | 32.9           | 20.0              | 17.9                | 30.8               | 46.0                 | -15.2       |

- 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)

Worst Case Radiated Emission  
at  
9608.000 MHz

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

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. Simultaneous transmission was considered.

Judgement: Passed by 9.3 dB

#### **TEST PERSONNEL:**

*Sign on file*

Leo Li Engineer  
*Typed/Printed Name*

September 28, 2017  
*Date*

## INTERTEK TESTING SERVICES

Applicant: Shenzhen Chuangwei-RGB Electronics Co., Ltd.

Date of Test: September 28, 2017

Model: NTUD-B10

Worst Case Operating Mode: Transmitting and Powered via Laptop USB port

Table 2

### Radiated Emissions

(2402MHz)

| 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   | 2402.000        | 108.3          | 36.7              | 28.1                | 99.7               | 114.0                     | -14.3       |
| Horizontal   | 4804.000        | 63.3           | 36.7              | 35.5                | 62.1               | 74.0                      | -11.9       |
| Horizontal   | 7206.000        | 59.9           | 36.1              | 36.5                | 60.3               | 74.0                      | -13.7       |
| Horizontal   | 9608.000        | 63.9           | 36.2              | 37.0                | 64.7               | 74.0                      | -9.3        |

| 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   | 2402.000        | 108.3          | 36.7              | 28.1                | 22.5                 | 77.2               | 94.0                         | -16.8       |
| Horizontal   | 4804.000        | 63.3           | 36.7              | 35.5                | 22.5                 | 39.6               | 54.0                         | -14.4       |
| Horizontal   | 7206.000        | 59.9           | 36.1              | 36.5                | 22.5                 | 37.8               | 54.0                         | -16.2       |
| Horizontal   | 9608.000        | 63.9           | 36.2              | 37.0                | 22.5                 | 42.2               | 54.0                         | -11.8       |

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: Leo Li

TRF No.: FCC 15C\_TX\_b

FCC ID: 2ANM3NTUDB10

Report No.: 170830013SZN-001.doc

## INTERTEK TESTING SERVICES

Applicant: Shenzhen Chuangwei-RGB Electronics Co., Ltd.

Date of Test: September 28, 2017

Model: NTUD-B10

Worst Case Operating Mode: Transmitting and Powered via Laptop USB port

Table 3

### Radiated Emissions

(2441MHz)

| 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   | 2441.000        | 107.5          | 36.7              | 28.1                | 98.9               | 114.0                     | -15.1       |
| Horizontal   | 4882.000        | 63.9           | 36.7              | 35.5                | 62.7               | 74.0                      | -11.3       |
| Horizontal   | 7323.000        | 60.0           | 36.1              | 37.2                | 61.1               | 74.0                      | -12.9       |
| Horizontal   | 9764.000        | 62.4           | 36.2              | 37.0                | 63.2               | 74.0                      | -10.8       |

| 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   | 2441.000        | 107.5          | 36.7              | 28.1                | 22.5                 | 76.4               | 94.0                         | -17.6       |
| Horizontal   | 4882.000        | 63.9           | 36.7              | 35.5                | 22.5                 | 40.2               | 54.0                         | -13.8       |
| Horizontal   | 7323.000        | 60.0           | 36.1              | 37.2                | 22.5                 | 38.6               | 54.0                         | -15.4       |
| Horizontal   | 9764.000        | 62.4           | 36.2              | 37.0                | 22.5                 | 40.7               | 54.0                         | -13.3       |

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: Leo Li

TRF No.: FCC 15C\_TX\_b

FCC ID: 2ANM3NTUDB10

Report No.: 170830013SZN-001.doc

## INTERTEK TESTING SERVICES

Applicant: Shenzhen Chuangwei-RGB Electronics Co., Ltd.

Date of Test: September 28, 2017

Model: NTUD-B10

Worst Case Operating Mode: Transmitting and Powered via Laptop USB port

Table 4

### Radiated Emissions

(2480MHz)

| 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   | 2480.000        | 109.8          | 36.7              | 28.1                | 101.2              | 114.0                     | -12.8       |
| Horizontal   | 4960.000        | 64.9           | 36.7              | 35.5                | 63.7               | 74.0                      | -10.3       |
| Horizontal   | 7440.000        | 60.1           | 36.1              | 37.2                | 61.2               | 74.0                      | -12.8       |
| Horizontal   | 9920.000        | 61.5           | 36.3              | 38.9                | 64.1               | 74.0                      | -9.9        |

| 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   | 2480.000        | 109.8          | 36.7              | 28.1                | 22.5                 | 78.7               | 94.0                         | -15.3       |
| Horizontal   | 4960.000        | 64.9           | 36.7              | 35.5                | 22.5                 | 41.2               | 54.0                         | -12.8       |
| Horizontal   | 7440.000        | 60.1           | 36.1              | 37.2                | 22.5                 | 38.7               | 54.0                         | -15.3       |
| Horizontal   | 9920.000        | 61.5           | 36.3              | 38.9                | 22.5                 | 41.6               | 54.0                         | -12.4       |

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: Leo Li

TRF No.: FCC 15C\_TX\_b

FCC ID: 2ANM3NTUDB10

Report No.: 170830013SZN-001.doc

## 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 Live-Conducted Configuration  
At

0.182 MHz

Judgement: Passed by 9.2 dB margin

#### **TEST PERSONNEL:**

*Sign on file*

Leo Li Engineer  
*Typed/Printed Name*

September 28, 2017  
*Date*

## INTERTEK TESTING SERVICES

Applicant: Shenzhen Chuangwei-RGB Electronics Co., Ltd.

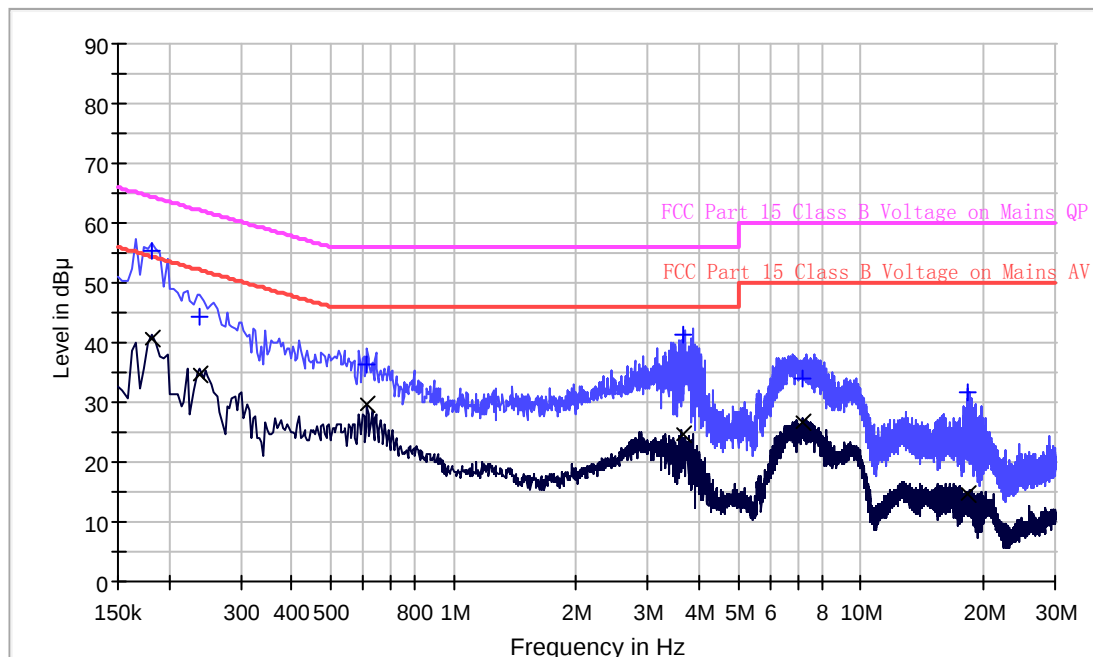
Date of Test: September 28, 2017

Model: NTUD-B10

Worst Case Operating Mode: BT Link and Powered via Laptop USB port

Phase: Live

### Conducted Emission Test - FCC



#### Result Table QP

| Frequency (MHz) | QuasiPeak (dB μ V) | Line | Corr. (dB) | Margin (dB) | Limit (dB μ V) |
|-----------------|--------------------|------|------------|-------------|----------------|
| 0.182000        | 55.2               | L1   | 9.7        | 9.2         | 64.4           |
| 0.237000        | 44.5               | L1   | 9.7        | 17.7        | 62.2           |
| 0.614000        | 36.4               | L1   | 9.7        | 19.6        | 56.0           |
| 3.680000        | 41.2               | L1   | 9.8        | 14.8        | 56.0           |
| 7.174000        | 34.1               | L1   | 9.9        | 25.9        | 60.0           |
| 18.340000       | 31.7               | L1   | 10.3       | 28.3        | 60.0           |

#### Result Table AV

| Frequency (MHz) | Average (dB μ V) | Line | Corr. (dB) | Margin (dB) | Limit (dB μ V) |
|-----------------|------------------|------|------------|-------------|----------------|
| 0.182000        | 40.6             | L1   | 9.7        | 13.8        | 54.4           |
| 0.237000        | 34.8             | L1   | 9.7        | 17.4        | 52.2           |
| 0.614000        | 29.5             | L1   | 9.7        | 16.5        | 46.0           |
| 3.680000        | 24.6             | L1   | 9.8        | 21.4        | 46.0           |
| 7.174000        | 26.8             | L1   | 9.9        | 23.2        | 50.0           |
| 18.340000       | 14.8             | L1   | 10.3       | 35.2        | 50.0           |

TRF No.: FCC 15C\_TX\_b

FCC ID: 2ANM3NTUDB10

Report No.: 170830013SZN-001.doc

## INTERTEK TESTING SERVICES

Applicant: Shenzhen Chuangwei-RGB Electronics Co., Ltd.

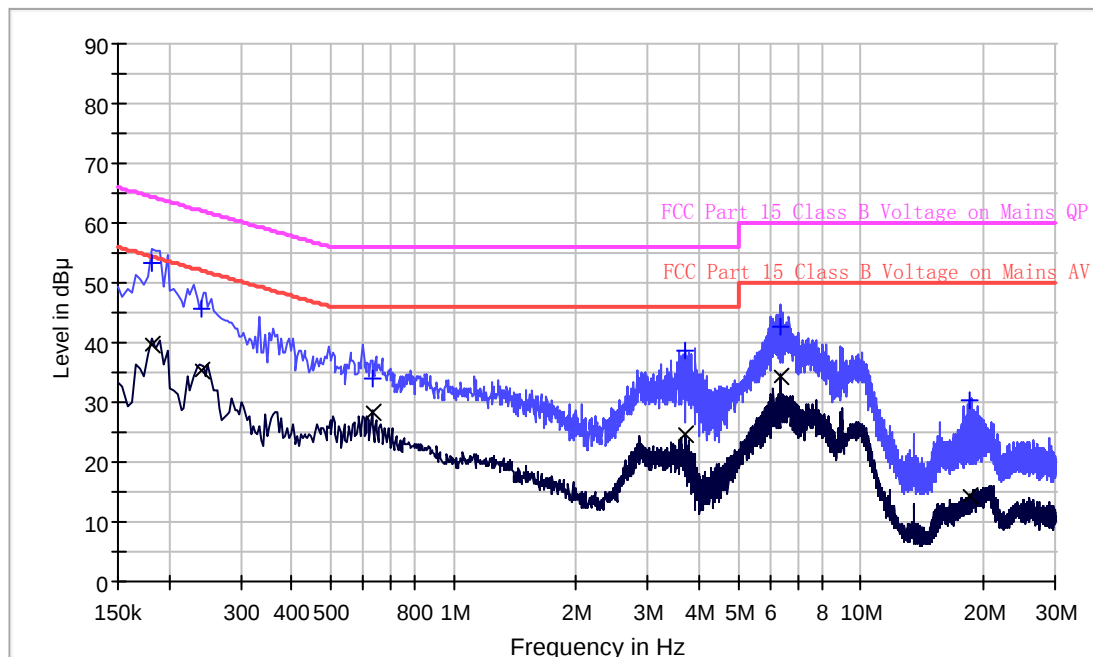
Date of Test: September 28, 2017

Model: NTUD-B10

Worst Case Operating Mode: BT Link and Powered via Laptop USB port

Phase: Neutral

### Conducted Emission Test - FCC



Result Table QP

| Frequency (MHz) | QuasiPeak (dB $\mu$ V) | Line | Corr. (dB) | Margin (dB) | Limit (dB $\mu$ V) |
|-----------------|------------------------|------|------------|-------------|--------------------|
| 0.182000        | 53.5                   | N    | 9.7        | 10.9        | 64.4               |
| 0.241000        | 45.8                   | N    | 9.7        | 16.3        | 62.1               |
| 0.630000        | 33.9                   | N    | 9.7        | 22.1        | 56.0               |
| 3.711000        | 38.7                   | N    | 9.8        | 17.3        | 56.0               |
| 6.322000        | 42.7                   | N    | 9.8        | 17.3        | 60.0               |
| 18.560000       | 30.2                   | N    | 10.2       | 29.8        | 60.0               |

Result Table AV

| Frequency (MHz) | Average (dB $\mu$ V) | Line | Corr. (dB) | Margin (dB) | Limit (dB $\mu$ V) |
|-----------------|----------------------|------|------------|-------------|--------------------|
| 0.182000        | 39.6                 | N    | 9.7        | 14.8        | 54.4               |
| 0.241000        | 35.3                 | N    | 9.7        | 16.8        | 52.1               |
| 0.630000        | 28.3                 | N    | 9.7        | 17.7        | 46.0               |
| 3.711000        | 24.6                 | N    | 9.8        | 21.4        | 46.0               |
| 6.322000        | 34.2                 | N    | 9.8        | 15.8        | 50.0               |
| 18.560000       | 14.5                 | N    | 10.2       | 35.5        | 50.0               |

TRF No.: FCC 15C\_TX\_b

FCC ID: 2ANM3NTUDB10

Report No.: 170830013SZN-001.doc

**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.

**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.

**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.

**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: bandedge.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) Lower channel 2402MHz:**

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

$$\begin{aligned} &= 99.70 \text{ dB}\mu\text{V/m} - 56.45 \text{ dB} \\ &= 43.25 \text{ dB}\mu\text{V/m} \end{aligned}$$

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

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

$$\begin{aligned} &= 101.20 \text{ dB}\mu\text{V/m} - 57.70 \text{ dB} \\ &= 43.5 \text{ dB}\mu\text{V/m} \end{aligned}$$

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

## INTERTEK TESTING SERVICES

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

Based on the Bluetooth Specification Version 3.0, 2.1+EDR, and worst case AFH mode, transmitter ON time is independent of packet type (DH5) and packet length, the AFH mode Duty cycle connection factor as below:

Channel hop rate = 800 hops/second (AFH Mode)

Adjusted channel hop rate for DH5 mode = 133.33 hops/second

Time per channel hop =  $1 / 133.33 \text{ hops/second} = 7.5 \text{ ms}$

Time to cycle through all channels =  $7.5 \times 20 \text{ channels} = 150 \text{ ms}$

Number of times transmitter hits on one channel =  $100 \text{ ms} / 150 \text{ ms} = 1 \text{ time(s)}$

Worst case dwell time = 7.5 ms

Duty cycle connection factor =  $20\log_{10}(7.5\text{ms} / 100\text{ms}) = -22.5 \text{ dB}$

## 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 C63.10 - 2013.

The transmitting equipment under test (EUT) is placed on a styrene turntable which is four feet in diameter, up to 1GHz 0.8m and above 1GHz 1.5m 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.

## 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 charged battery is used.

Conducted measurements are made as described in ANSI C63.10 - 2013.

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 (RBW 3MHz for fundamental emission) 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.

**EXHIBIT 9**  
**CONFIDENTIALITY REQUEST**

## INTERTEK TESTING SERVICES

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### 9.0 **Confidentiality Request**

For electronic filing, the confidentiality request of the tested EUT is saved with filename: request.pdf.

**EXHIBIT10  
TEST EQUIPMENT LIST**

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## INTERTEK TESTING SERVICES

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### 10.0 Test Equipment List

| Equipment No. | Equipment           | Manufacturer    | Model No.       | Serial No.     | Cal. Date   | Due Date    |
|---------------|---------------------|-----------------|-----------------|----------------|-------------|-------------|
| SZ185-01      | EMI Receiver        | R&S             | ESCI            | 100547         | 9-Feb-2017  | 9-Feb-2018  |
| SZ061-08      | Horn Antenna        | ETS             | 3115            | 00092346       | 20-Sep-2017 | 20-Sep-2018 |
| SZ061-06      | Active Loop Antenna | Electro-Metrics | EM-6876         | 217            | 26-May-2017 | 26-May-2018 |
| SZ061-03      | BiConiLog Antenna   | ETS             | 3142C           | 00078828       | 12-Oct-2016 | 12-Oct-2017 |
| SZ056-03      | Spectrum Analyzer   | R&S             | FSP 30          | 101148         | 1-Jun-2017  | 1-Jun-2018  |
| SZ056-06      | Signal Analyzer     | R&S             | FSV 40          | 101101         | 7-Jul-2017  | 7-Jul-2018  |
| SZ181-04      | Preamplifier        | Agilent         | 8449B           | 3008A0247<br>4 | 9-Feb-2017  | 9-Feb-2018  |
| SZ188-01      | Anechoic Chamber    | ETS             | RFD-F/A-100     | 4102           | 16-Jan-2017 | 16-Jan-2019 |
| SZ062-02      | RF Cable            | RADIAL          | RG 213U         | --             | 30-Jun-2017 | 30-Dec-2017 |
| SZ062-05      | RF Cable            | RADIAL          | 0.04-26.5GHz    | --             | 6-Apr-2017  | 6-Oct-2017  |
| SZ062-12      | RF Cable            | RADIAL          | 0.04-26.5GHz    | --             | 6-Apr-2017  | 6-Oct-2017  |
| SZ067-04      | Notch Filter        | Micro-Tronics   | BRM5070<br>2-02 | --             | 14-Jun-2017 | 14-Jun-2018 |
| SZ185-02      | EMI Test Receiver   | R&S             | ESCI            | 100692         | 1-Nov-2016  | 1-Nov-2017  |
| SZ187-01      | Two-Line V-Network  | R&S             | ENV216          | 100072         | 1-Nov-2016  | 1-Nov-2017  |
| SZ188-03      | Shielding Room      | ETS             | RFD-100         | 4100           | 16-Jan-2017 | 16-Jan-2019 |