Total Quality. Assured.

Zhong Shan City Richsound Electronic Industrial Ltd.

Application
For
Certification

FCC ID: Z8M-TB236DWW

2.1 CH Soundbar with Wireless Subwoofer

Model: TB236DWW
Additional Models: TB230WW, TB230DWW, TB231WW, TB231DWW, TB232WW, TB232DWW, TB234WW, TB234DWW, TB235WW, TB235DWW, TB236WW, TB238DWW, TB280WW, TB280DWW, TB281WW, TB281DWW, TB282WW, TB282DWW, TB341WW, TB341DWW, TB343WW, TB343DWW, TH-M337B
Brand Name: RSR, JVC

2.4GHz Transmitter

Report No.: 170908004SZN-002

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:

Sign on file

Powell Bao
Engineer

Approved by:

Digitally signed by Kidd Yang
Location: Intertek Testing Services

Kidd Yang
Senior Project Engineer
Date: September 15, 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.
- 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.

Intertek Testing Services Shenzhen Ltd. Longhua Branch
1F/2F, Building B, QiaoAn Scientific Technology Park, Shangkeng Community, Guanhu Subdistrict, Longhua District,
Shenzhen, P.R. China China
Tel: (86 755) 8601 6288 Fax: (86 755) 8601 6751

LIST OF EXHIBITS

MEASUREMENT/TECHNICAL REPORT

Zhong Shan City Richsound Electronic Industrial Ltd.

MODEL: TB236DWW
Additional Models: TB230WW, TB230DWW, TB231WW, TB231DWW, TB232WW, TB232DWW, TB234WW, TB234DWW, TB235WW, TB235DWW, TB236WW, TB238DWW, TB280WW, TB280DWW, TB281WW, TB281DWW, TB282WW, TB282DWW, TB341WW, TB341DWW, TB343WW, TB343DWW, TH-M337B
FCC ID: Z8M-TB236DWW

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:

Powell Bao
Intertek Testing Services Shenzhen Ltd.
Longhua Branch

1F/2F, Building B, QiaoAn Scientific Technology Park, Shangkeng Community, Guanhu Subdistrict, Longhua District, Shenzhen, P.R. China China

Phone: (86 755) 8614 0682
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Table of Contents

List of attached file

Exhibit type	File Description	Filename
Test Report	Test Report	report.pdf
Test Setup Photo	Radiated Emission	radiated photos.pdf
Test Setup Photo	Conducted Emission	conducted photos.pdf
Test Report	Bandedge Plot	bandedge.pdf
Test Report	20dB BW Plot	bw.pdf
Test Report	Timing Plot	af.pdf
External Photo	External Photo	external photos.pdf
Internal Photo	Internal Photo	internal photos.pdf
Block Diagram	Block Diagram	block.pdf
Schematics	Circuit Diagram	circuit.pdf
Operation Description	Technical Description	descri.pdf
ID Label/Location	Label Artwork and Location	label.pdf
User Manual	User Manual	manual.pdf
Cover Letter	Confidentiality Letter	request.pdf
Cover Letter	Letter of Agency	agency.pdf

EXHIBIT 1

GENERAL DESCRIPTION

1.0 General Description

1.1 Product Description

The equipment under test (EUT) is a 2.1 CH Soundbar with Wireless Subwoofer with 2.4GHz transmitter module operating at 2404.5-2479.5MHz, 16 channels with 5MHz channel spacing. The EUT was powered by AC 120V, 60Hz. For more detail information pls. refer to the user manual.

Antenna Type: Integral antenna
Modulation Type: FSK

The Model: TB230WW, TB230DWW, TB231WW, TB231DWW, TB232WW, TB232DWW, TB234WW, TB234DWW, TB235WW, TB235DWW, TB236WW, TB238DWW, TB280WW, TB280DWW, TB281WW, TB281DWW, TB282WW, TB282DWW, TB341WW, TB341DWW, TB343WW, TB343DWW, TH-M337B are the same as the Model: TB236DWW in hardware aspect except partial functions are difference, pls. refer list as below. The models are difference in packaging and marketing purpose.

Model / Function	TB230WW	TB230DWW	TB231WW	TB231DWW	TB232WW	TB232DWW	TB234WW	TB234DWW
AUX	☐	☐	☐	☐	☐	☐	☐	☐
AUX 1	☑	☑	☑	☑	☑	☑	☑	☑
AUX 2	☑	☑	☑	☑	☑	☑	☑	☑
Optical	☑	☑	☑	☑	☑	☑	☑	☑
Coaxial	☑	☑	☑	☑	☑	☑	☑	☑
Bluetooth function	☑	☑	☑	☑	☑	☑	☑	☑
NFC	☑	☑	☑	☑	☑	☑	☑	☑
HDMI	☑	☑	☑	☑	☑	☑	☑	☑
HDMI ARC	☑	☑	☑	☑	☑	☑	☑	☑
USB PLAY	☑	☑	☑	☑	☑	☑	☑	☑
Wireless Subwoofer	☑	☑	☑	☑	☑	☑	☑	☑
Support Dolby	☐	☑	☐	☑	☐	☑	☐	☑
.Flat plastic side panel	☑	☑	☐	☐	☐	☐	☐	☐
Oval plastic side panel.	☐	☐	☑	☑	☑	☑	☑	☑
Small size speak grill and house	☑	☑	☑	☑	☐	☐	☐	☐
Bigger size speak grill and house	☐	☐	☐	☐	☑	☑	☑	☑

Model / Function	TB235WW	TB235DWW	TB236WW	TB236DWW	TB280WW	TB280DWW	TB281WW	TB281DWW
AUX	☐	☐	☐	☐	☐	☐	☐	☐
AUX 1	☑	☑	☑	☑	☑	☑	☑	☑
AUX 2	☑	☑	☑	☑	☑	☑	☑	☑
Optical	☑	☑	☑	☑	☑	☑	☑	☑
Coaxial	☑	☑	☑	☑	☑	☑	☑	☑
Bluetooth function	☑	☑	☑	☑	☑	☑	☑	☑
NFC	☑	☑	☑	☑	☑	☑	☑	☑
HDMI	☑	☑	☑	☑	☑	☑	☑	☑
HDMI ARC	☑	☑	☑	☑	☑	☑	☑	☑
USB PLAY	☑	☑	☑	☑	☑	☑	☑	☑
Wireless Subwoofer	☑	☑	☑	☑	☑	☑	☑	☑
Support Dolby	☐	☑	☐	☑	☐	☑	☐	☑
.Flat plastic side panel	☐	☐	☐	☐	☑	☑	☐	☐
Oval plastic side panel.	☑	☑	☑	☑	☐	☐	☑	☑
Small size speak grill and house	☐	☐	☐	☐	☐	☐	☐	☐
Bigger size speak grill and house	☑	☑	☑	☑	☑	☑	☑	☑

Model / Function	TB282WW	TB282DWW	TB341WW	TB341DWW	TB343WW	TB343DWW	TB238DWW	TH-M337B
AUX	☐	☐	☐	☐	☐	☐	☐	☑
AUX 1	☑	☑	☑	☑	☑	☑	☑	☐
AUX 2	☑	☑	☑	☑	☑	☑	☑	☐
Optical	☑	☑	☑	☑	☑	☑	☑	☑
Coaxial	☑	☑	☑	☑	☑	☑	☑	☑
Bluetooth function	☑	☑	☑	☑	☑	☑	☑	☑
NFC	☑	☑	☑	☑	☑	☑	☑	☐
HDMI	☑	☑	☑	☑	☑	☑	☐	☐
HDMI ARC	☑	☑	☑	☑	☑	☑	☑	☐
USB PLAY	☑	☑	☑	☑	☑	☑	☑	☑
Wireless Subwoofer	☑	☑	☑	☑	☑	☑	☑	☑
Support Dolby	☐	☑	☐	☑	☐	☑	☑	☑
.Flat plastic side panel	☐	☐	☐	☐	☐	☐	☐	☐
Oval plastic side panel.	☑	☑	☑	☑	☑	☑	☑	☑
Small size speak grill and house	☐	☐	☐	☐	☐	☐	☐	☐
Bigger size speak grill and house	☑	☑	☑	☑	☑	☑	☑	☑

Note: Symbol ☑ indicates with this function;
Symbol ☐ indicates without this function.

For electronic filing, the brief circuit description is saved with filename: descri.pdf.

1.2 Related Submittal(s) Grants

This is an application of 2.4GHz transmitter function for the 2.1 CH Soundbar with Wireless Subwoofer, and the Bluetooth function is subject to the report 170908004SZN -001.

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.

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 File Number: CN1188.

EXHIBIT 2

SYSTEM TEST CONFIGURATION

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 AC 120V, 60Hz during the test. All modes were tested, and simultaneously transmitting with Bluetooth module was considered, only the worst data was reported in this report.

All kinds of models were tested respectively, 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 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 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 Zhong Shan City Richsound Electronic Industrial 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.

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.
iPod	Apple	A1446
Audio In Cable	N/A	Unshielded, Length 120cm
HDMI In Cable *3	N/A	Unshielded, Length 150cm
USB Disk	TOSHIBA	UHYBS-004G-BL
Detached AC power cord	Richsound	Unshielded, Length 150cm
Optical Cable with Load	N/A	Unshielded, Length 120cm
Coaxial Cable	N/A	Unshielded, Length 120cm
Dummy Load	N/A	N/A
Remote Controller	Richsound	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).

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 dBµV/m
RA = Receiver Amplitude (including preamplifier) in dBµV
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 dBµV 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 dBµV/m. This value in dBµV/m was converted to its corresponding level in µV/m.

RA = 62.0 dBµV
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 dBµV/m

Level in µV/m = Common Antilogarithm [(32 dBµV/m)/20] = 39.8 µV/m

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, and simultaneous transmissions were considered. Numbers with a minus sign are below the limit.

Worst Case Radiated Emission
at
39.700 MHz

Judgement: Passed by 7.3 dB

TEST PERSONNEL:

Sign on file

Powell Bao Engineer
Typed/Printed Name

September 15, 2017
Date

Applicant: Zhong Shan City Richsound Electronic Industrial Ltd.
Date of Test: September 15, 2017
Model: TB236DWW
Sample: 1/1
Worst Case Operating Mode: Transmit

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	173.560	38.6	20.0	10.9	29.5	43.5	-14.0
Horizontal	281.715	40.1	20.0	14.6	34.7	46.0	-11.3
Horizontal	492.205	34.2	20.0	19.9	34.1	46.0	-11.9
Vertical	39.700	45.4	20.0	7.3	32.7	40.0	-7.3
Vertical	231.275	27.6	20.0	19.2	26.8	46.0	-19.2
Vertical	895.240	40.0	20.0	13.0	33.0	46.0	-13.0

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.

3.1.4 Transmitter Spurious Emissions (Radiated)

Worst Case Radiated Emission
at
7333.500 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, and simultaneous transmissions were considered. Numbers with a minus sign are below the limit.

Judgement: Passed by 5.5 dB

TEST PERSONNEL:

Sign on file

Powell Bao Engineer
Typed/Printed Name

September 15, 2017
Date

Applicant: Zhong Shan City Richsound Electronic Industrial Ltd.
Date of Test: September 15, 2017
Model: TB236DWW
Sample: 1/1
Worst Case Operating Mode: Transmit

Table 2

Radiated Emissions

(2404.5MHz)

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	2404.500	100.3	36.7	28.1	91.7	114.0	-22.3
Horizontal	4809.000	54.1	36.7	35.5	52.9	74.0	-21.1
Horizontal	7213.500	55.4	36.1	36.5	55.8	74.0	-18.2

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	2404.500	100.3	36.7	28.1	9.3	82.4	94.0	-11.6
Horizontal	4809.000	54.1	36.7	35.5	9.3	43.6	54.0	-10.4
Horizontal	7213.500	55.4	36.1	36.5	9.3	46.5	54.0	-7.5

Notes: 1. Peak detector is used for the emission measurement.

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: Powell Bao

Applicant: Zhong Shan City Richsound Electronic Industrial Ltd.
Date of Test: September 15, 2017
Model: TB236DWW
Sample: 1/1
Worst Case Operating Mode: Transmit

Table 3

Radiated Emissions

(2444.5MHz)

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	2444.500	101.6	36.7	28.1	93.0	114.0	-21.0
Horizontal	4889.000	55.4	36.7	35.5	54.2	74.0	-19.8
Horizontal	7333.500	56.7	36.1	37.2	57.8	74.0	-16.2

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	2444.500	101.6	36.7	28.1	9.3	83.7	94.0	-10.3
Horizontal	4889.000	55.4	36.7	35.5	9.3	44.9	54.0	-9.1
Horizontal	7333.500	56.7	36.1	37.2	9.3	48.5	54.0	-5.5

Notes: 1. Peak detector is used for the emission measurement.

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: Powell Bao

Applicant: Zhong Shan City Richsound Electronic Industrial Ltd.
Date of Test: September 15, 2017
Model: TB236DWW
Sample: 1/1
Worst Case Operating Mode: Transmit

Table 4

Radiated Emissions

(2479.5MHz)

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	2479.500	104.2	36.7	28.1	95.6	114.0	-18.4
Horizontal	4959.000	57.2	36.7	35.5	56.0	74.0	-18.0
Horizontal	7439.500	56.1	36.1	37.2	57.2	74.0	-16.8

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	2479.500	104.2	36.7	28.1	9.3	86.3	94.0	-7.7
Horizontal	4959.000	57.2	36.7	35.5	9.3	46.7	54.0	-7.3
Horizontal	7439.500	56.1	36.1	37.2	9.3	47.9	54.0	-6.1

Notes: 1. Peak detector is used for the emission measurement.

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: Powell Bao

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

0.402 MHz

Judgement: Passed by 10.7 dB margin

TEST PERSONNEL:

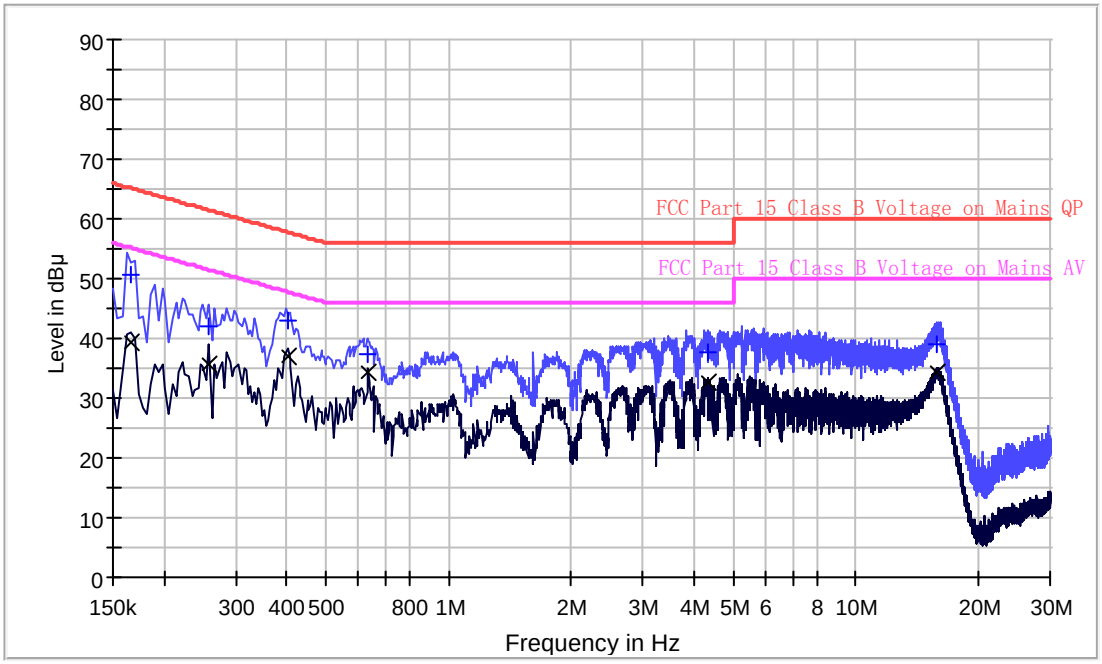
Sign on file

Powell Bao Engineer
Typed/Printed Name

September 15, 2017
Date

Applicant: Zhong Shan City Richsound Electronic Industrial Ltd.
Date of Test: September 15, 2017
Model: TB236DWW
Sample: 1/1
Worst Case Operating Mode: Transmit
Phase: Live

Conducted Emission Test - FCC



Result Table QP

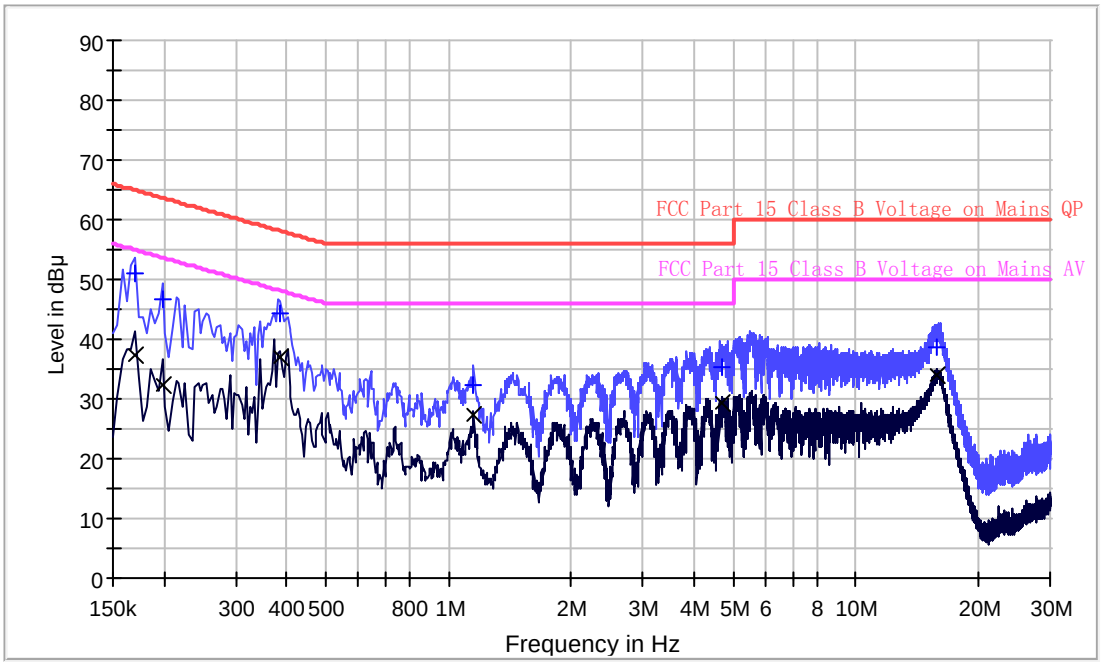
Frequency (MHz)	QuasiPeak (dB µ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB µ V)
0.166	50.5	L1	9.6	14.7	65.2
0.258	42.1	L1	9.7	19.4	61.5
0.402	43.0	L1	9.7	14.8	57.8
0.634	37.3	L1	9.7	18.7	56.0
4.330	37.8	L1	9.8	18.2	56.0
15.810	38.9	L1	10.1	21.1	60.0

Result Table AV

Frequency (MHz)	Average (dB µ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB µ V)
0.166	39.2	L1	9.6	16.0	55.2
0.258	35.6	L1	9.7	15.9	51.5
0.402	37.1	L1	9.7	10.7	47.8
0.634	34.4	L1	9.7	11.6	46.0
4.330	32.8	L1	9.8	13.2	46.0
15.810	34.3	L1	10.1	15.7	50.0

Applicant: Zhong Shan City Richsound Electronic Industrial Ltd.
Date of Test: September 15, 2017
Model: TB236DWW
Sample: 1/1
Worst Case Operating Mode: Transmit
Phase: Neutral

Conducted Emission Test - FCC



Result Table QP

Frequency (MHz)	QuasiPeak (dB µ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB µ V)
0.170	51.0	N	9.6	14.0	65.0
0.198	46.6	N	9.7	17.1	63.7
0.386	44.3	N	9.7	13.8	58.1
1.154	32.5	N	9.7	23.5	56.0
4.706	35.4	N	9.8	20.6	56.0
15.818	38.6	N	10.1	21.4	60.0

Result Table AV

Frequency (MHz)	Average (dB µ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB µ V)
0.170	37.4	N	9.6	17.6	55.0
0.198	32.4	N	9.7	21.3	53.7
0.386	37.0	N	9.7	11.1	48.1
1.154	27.4	N	9.7	18.6	46.0
4.706	29.2	N	9.8	16.8	46.0
15.818	34.0	N	10.1	16.0	50.0

EXHIBIT 4

EQUIPMENT PHOTOGRAPHS

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

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

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

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

8.0 **Miscellaneous Information**

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

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 2404.5MHz:

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

= 91.7 dBµv/m-45.5 dB
= 46.2 dBµv/m

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

= 82.4 dBµv/m–45.5 dB
= 36.9 dBµv/m

(ii) Upper channel 2479.5MHz:

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

= 95.6 dBµv/m-46.7 dB
= 48.9 dBµv/m

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

= 86.3 dBµv/m–46.7 dB
= 39.6 dBµv/m

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

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

8.2 Discussion of Pulse Desensitization

Pulse desensitivity is not applicable for this device. The effective period (T_{eff}) is approximately 1.0ms. With a resolution bandwidth (3dB) of 1MHz, so the pulse desensitivity factor is 0dB.

8.3 Calculation of Average Factor

Averaging factor in dB = 20 log (duty cycle)

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

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

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

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

The duration of one cycle = 1.0ms

Effective period of the cycle = 2.9275ms

DC = 1.0ms / 2.9275ms = 0.3416 or 34.16%

Therefore, the averaging factor is found by $20 \log_{10} 0.3416 = -9.3$ dB

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 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.

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

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

9.0 Confidentiality Request

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

EXHIBIT10
TEST EQUIPMENT LIST

10.0 **Test Equipment List**

Equipment No.	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
SZ061-03	BiConiLog Antenna	ETS	3142C	00078828	12-Oct-2016	12-Oct-2017
SZ185-01	EMI Receiver	R&S	ESCI	100547	9-Feb-2017	9-Feb-2018
SZ061-07	Pyramidal Horn Antenna	ETS	3160-09	00083067	27-Oct-2016	27-Oct-2017
SZ061-08	Horn Antenna	ETS	3115	00092346	26-May-2017	26-May-2018
SZ061-06	Active Loop Antenna	Electro-Metrics	EM-6876	217	7-Jul-2017	7-Jul-2018
SZ056-03	Spectrum Analyzer	R&S	FSP 30	101148	9-Feb-2017	9-Feb-2018
SZ181-04	Preamplifier	Agilent	8449B	3008A02474	16-Apr-2016	16-Apr-2018
SZ188-01	Anechoic Chamber	ETS	RFD-F/A-100	4102	8-Jul-2017	8-Jan-2018
SZ062-02	RF Cable	RADIALL	RG 213U	--	16-Mar-2017	16-Sep-2017
SZ062-05	RF Cable	RADIALL	0.04-26.5GHz	--	16-Mar-2017	16-Sep-2017
SZ062-12	RF Cable	RADIALL	0.04-26.5GHz	--	14-Jun-2017	14-Jun-2018
SZ067-04	Notch Filter	Micro-Tronics	BRM50702-02	--	1-Nov-2016	1-Nov-2017
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	12-Jul-2017	12-Jul-2018
SZ187-02	Two-Line V-Network	R&S	ENV216	100073	12-Jul-2017	12-Jul-2018
SZ188-03	Shielding Room	ETS	RFD-100	4100	17-Aug-2016	17-Aug-2018