

Shenzhen Cannice Technology Co., Ltd.

TEST REPORT

SCOPE OF WORK

FCC TESTING-AAABLK100002898

REPORT NUMBER

191210004SZN-001

ISSUE DATE

[REVISED DATE]

December 18, 2019

[-----]

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Test Report No.: 191210004SZN-001

Shenzhen Cannice Technology Co., Ltd.

Application For Certification

FCC ID: 2ADTV-02898

WIRELESS ON-EAR HEADPHONES

Model: AAABLK100002898

Brand Name: Onn.™

2.4GHz Transceiver

Report No.: 191210004SZN-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 [10-1-18]

Prepared and Checked by: Approved by:

Leo Li Project Engineer Kidd Yang Technical Supervisor Date: December 18, 2019

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Intertek Testing Services Shenzhen Ltd. Longhua Branch

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Version: 01-November-2017 Page: 1 of 24 FCC ID 249_C



MEASUREMENT/TECHNICAL REPORT

This report concerns (chec	k one:)	Original Grant <u>X</u>	Cla	ss II Change	
Equipment Type: <u>DXX - Par</u>	t 15 Low Power Co	ommunication Devi	ce Transmitter		
Deferred grant requested	per 47 CFR 0.457(d	l)(1)(ii)?	Yes	No _	X
		If yes, defe	r until:	date	
Company Name agrees to	notify the Commis	sion by:			_
of the intended date of an	nouncement of the	e product so that th	date e grant can be is		t date.
Transition Rules Request p	er 15.37?		Yes	No _	X
If no, assumed Part 15, sprovision.	Subpart C for inte	entional radiator –	the new 47 C	FR [10-1-18	Edition]
Report prepared by:					
	101, 201, Buildi Zhangkengjing LongHua Distric	g Services Shenzhen ing B, No. 308 Wuh Community, GuanH ct, ShenZhen, P.R. C 5-8614 0743/86-75	e Avenue, Iu Subdistrict, ihina	ranch	

Version: 01-November-2017 Page: 2 of 24 FCC ID 249_C



Table of Contents

1.0 Summary of Test Result	4
2.0 General Description	5
2.1 Product Description 2.2 Related Submittal(s) Grants 2.3 Test Methodology 2.4 Test Facility	5 5
3.0 System Test Configuration	6
3.1 Justification 3.2 EUT Exercising Software 3.3 Special Accessories 3.4 Equipment Modification 3.5 Measurement Uncertainty 3.6 Support Equipment List and Description	6 6 7
4.0 Emission Results	8
4.1 Radiated Test Results 4.1.1 Field Strength Calculation 4.1.2 Radiated Emission Configuration Photograph 4.1.3 Radiated Emissions 4.1.4 Transmitter Spurious Emissions	8 9 9
5.0 Equipment Photographs	. 16
6.0 Product Labelling	. 16
7.0 Technical Specifications	
9.0 Miscellaneous Information	
9.1 Bandedge Plot 9.2 20dB Bandwidth 9.3 Discussion of Pulse Desensitization 9.4 Calculation of Average Factor. 9.5 Emissions Test Procedures	. 20 . 21 . 21 . 22
10 0 Test Equipment List	24



1.0 Summary of Test Result

Applicant: Shenzhen Cannice Technology Co., Ltd.

Applicant Address: 20/F, Tower A, Building 7, Baoneng Science and Technology Park, Qingxiang

Road #1,Longhua New District,Shenzhen, China

MODEL: AAABLK100002898 FCC ID: 2ADTV-02898

Test Specification	Reference	Results
Transmitter Radiated Emission Bandedge	15.249 &15.209 &15.205	Pass
20dB Bandwidth	15.215(c)	Pass

Notes: The EUT uses an Integral Antenna which in accordance to Section 15.203 is considered sufficient to comply with the provisions of this section.

Version: 01-November-2017 Page: 4 of 24 FCC ID 249_C



2.0 General Description

2.1 Product Description

The equipment under test (EUT) is a WIRELESS ON-EAR HEADPHONES with Bluetooth 5.0 (Single Mode EDR) function operating in 2402-2480MHz. The EUT is powered by DC 3.7V by rechargeable battery. The EUT cannot transmit during charging. Once a 3.5mm audio jack is inserted into the Aux in port, the device will automatically be switched to Aux-in function. For more detail information pls. refer to the user manual.

Intertek Report No.: 191210004SZN-001

Antenna Type: Integral antenna

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

Antenna Gain: 2.94dBi Max

Bluetooth Version: 5.0 (Single Mode EDR)

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

2.2 Related Submittal(s) Grants

This is an application for certification of a transceiver for the WIRELESS ON-EAR HEADPHONES which has Bluetooth function, and related report for FCC SDOC is subjected to report number: 191210004SZN-002.

2.3 Test Methodology

Radiated emission measurements were performed according to the procedures in ANSI C63.10 (2013). Radiated emission measurement was performed in Semi-anechoic chamber. 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.

2.4 Test Facility

The Semi-Anechoic chamber used to collect the radiated data is **Intertek Testing Services Shenzhen Ltd. Longhua Branch** and located at 101, 201, Building B, No. 308 Wuhe Avenue, Zhangkengjing 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).

Version: 01-November-2017 Page: 5 of 24 FCC ID 249 C



3.0 System Test Configuration

3.1 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).

Intertek Report No.: 191210004SZN-001

The EUT is powered by DC 3.7V full rechargeable battery during the test, only the worst data was reported in this report.

All packets DH1, DH3 & DH5 mode in modulation type GFSK, π /4-DQPSK and 8-DPSK were tested and only the worst data was reported in this report.

For maximizing emissions below 30 MHz, the EUT was rotated through 360°, the centre of the loop antenna was placed 1 meter above the ground, and the antenna polarization was changed. 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 Section 4.

The unit was operated standalone and placed at the center of turntable.

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.

3.2 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.

Test software: Non Signaling Test Tool

3.3 Special Accessories

No special accessories used.

3.4 Equipment Modification

Any modifications installed previous to testing by Shenzhen Cannice Technology 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.

Version: 01-November-2017 Page: 6 of 24 FCC ID 249 C



3.5 Measurement Uncertainty

Intertek Report No.: 191210004SZN-001

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

3.6 Support Equipment List and Description

Description	Manufacturer	Remark
Mobile Phone (Provided by Intertek)	SAMSUNG	S7

Version: 01-November-2017 Page: 7 of 24 FCC ID 249_C



4.0 Emission Results

Data is included worst-case configuration (the configuration which resulted in the

Intertek Report No.: 191210004SZN-001

4.1 Radiated Test Results

highest emission levels).

A sample calculation, configuration photographs and data tables of the emissions are included.

4.1.1 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 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 dB μ 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 μ V/m. This value in dB μ V/m was converted to its corresponding level in μ 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

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

Level in $\mu V/m = Common Antilogarithm [(42 dB<math>\mu V/m)/20] = 125.9 \mu V/m$

Version: 01-November-2017 Page: 8 of 24 FCC ID 249_C



Intertek Report No.: 191210004SZN-001
4.1.2 Radiated Emission Configuration Photograph

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

4.1.3 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 276.865 MHz

Judgement: Passed by 13.1 dB

TEST PERSONNEL:

Sign on file

<u>Leo Li, Project Engineer</u> Typed/Printed Name

18 December 2019

Date

Version: 01-November-2017 Page: 9 of 24 FCC ID 249_C

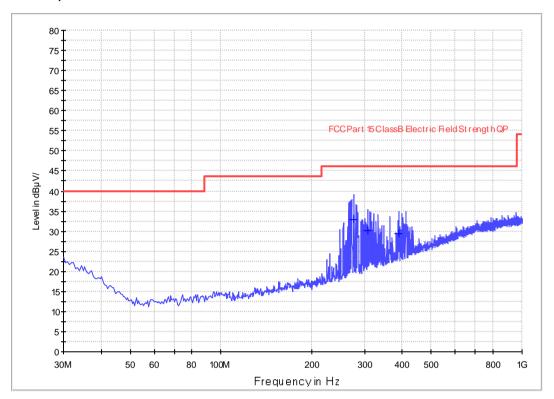


Applicant: Shenzhen Cannice Technology Co., Ltd.

Date of Test: 18 December 2019 Model: AAABLK100002898

Worst Case Operating Mode: BT Link

ANT Polarity: Horizontal



Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Polarization	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
276.865000	32.9	1000.0	120.000	Н	15.9	13.1	46.0
307.420000	30.1	1000.0	120.000	Н	17.0	15.9	46.0
389.870000	29.3	1000.0	120.000	Н	19.5	16.7	46.0

Remark:

- 1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
- 2. QuasiPeak (dBμV/m)= Corr. (dB/m)+ Read Level (dBμV)
- 3. Margin (dB) = Limit Line(dB μ V/m) Level (dB μ V/m)

Version: 01-November-2017 Page: 10 of 24 FCC ID 249_C

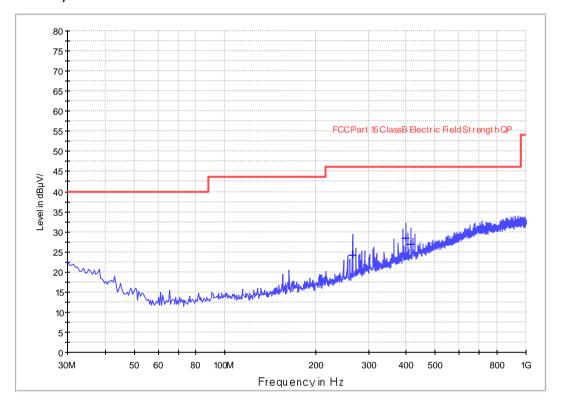


Applicant: Shenzhen Cannice Technology Co., Ltd.

Date of Test: 18 December 2019 Model: AAABLK100002898

Worst Case Operating Mode: BT Link

ANT Polarity: Vertical



Frequency	QuasiPeak	Meas.	Bandwidth	Height	Polarization	Corr.	Margin -	Limit - QPK
(MHz)	(dBuV/m)	Time	(kHz)	(cm)		(dB)	QPK	(dBuV/m)
		(ms)					(dB)	
265.225000	24.1	1000.0	120.000	0.0	V	15.5	21.9	46.0
398.600000	28.5	1000.0	120.000	0.0	V	19.7	17.5	46.0
415.575000	27.0	1000.0	120.000	0.0	V	20.2	19.0	46.0

Remark:

- 1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
- 2. QuasiPeak (dB μ V/m)= Corr. (dB/m)+ Read Level (dB μ V)
- 3. Margin (dB) = Limit Line(dB μ V/m) Level (dB μ V/m)

Version: 01-November-2017 Page: 11 of 24 FCC ID 249_C



4.1.4 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.

Judgement: Passed by 17.8 dB

TEST PERSONNEL:

Sign on file

<u>Leo Li, Project Engineer</u> Typed/Printed Name

18 December 2019
Date

Version: 01-November-2017 Page: 12 of 24 FCC ID 249_C



Applicant: Shenzhen Cannice Technology Co., Ltd.

Date of Test: 18 December 2019 Model: AAABLK100002898

Worst Case Operating Mode: Transmitting

Table 1

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)
Vertical	2402.000	101.2	36.7	28.1	92.6	114.0	-21.4
Vertical	4804.000	50.7	36.7	35.5	49.5	74.0	-24.5
Vertical	7206.000	53.1	36.1	36.5	53.5	74.0	-20.5
Vertical	9608.000	54.5	36.3	38.0	56.2	74.0	-17.8

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)
Vertical	2402.000	101.2	36.7	28.1	22.5	70.1	94.0	-23.9
Vertical	4804.000	50.7	36.7	35.5	22.5	27.0	54.0	-27.0
Vertical	7206.000	53.1	36.1	36.5	22.5	31.0	54.0	-23.0
Vertical	9608.000	54.5	36.3	38.0	22.5	33.7	54.0	-20.3

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: Leo Li

Version: 01-November-2017 Page: 13 of 24 FCC ID 249_C



Applicant: Shenzhen Cannice Technology Co., Ltd.

Date of Test: 18 December 2019 Model: AAABLK100002898

Worst Case Operating Mode: Transmitting

Table 2

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	100.3	36.7	28.1	91.7	114.0	-22.3
Horizontal	4882.000	50.3	36.7	35.5	49.1	74.0	-24.9
Horizontal	7323.000	51.8	36.1	37.2	52.9	74.0	-21.1
Horizontal	9764.000	54.4	36.2	37.0	55.2	74.0	-18.8

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	100.3	36.7	28.1	22.5	69.2	94.0	-24.8
Horizontal	4882.000	50.3	36.7	35.5	22.5	26.6	54.0	-27.4
Horizontal	7323.000	51.8	36.1	37.2	22.5	30.4	54.0	-23.6
Horizontal	9764.000	54.4	36.2	37.0	22.5	32.7	54.0	-21.3

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: Leo Li

Version: 01-November-2017 Page: 14 of 24 FCC ID 249_C



Applicant: Shenzhen Cannice Technology Co., Ltd.

Date of Test: 18 December 2019 Model: AAABLK100002898

Worst Case Operating Mode: Transmitting

Table 3

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	101.0	36.7	28.1	92.4	114.0	-21.6
Horizontal	4960.000	51.3	36.7	35.5	50.1	74.0	-23.9
Horizontal	7440.000	51.8	36.1	37.2	52.9	74.0	-21.1
Horizontal	9920.000	53.2	36.3	38.9	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	2480.000	101.0	36.7	28.1	22.5	69.9	94.0	-24.1
Horizontal	4960.000	51.3	36.7	35.5	22.5	27.6	54.0	-26.4
Horizontal	7440.000	51.8	36.1	37.2	22.5	30.4	54.0	-23.6
Horizontal	9920.000	53.2	36.3	38.9	22.5	33.3	54.0	-20.7

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: Leo Li

Version: 01-November-2017 Page: 15 of 24 FCC ID 249_C



5.0 Equipment Photographs

For electronic filing, the photographs of the tested EUT are saved with filename: external photos.pdf & internal photos.pdf.

6.0 Product Labelling

For electronic filing, the FCC ID label artwork and the label location are saved with filename: label.pdf.

7.0 <u>Technical Specifications</u>

For electronic filing, the block diagram and schematics of the tested EUT are saved with filename: block.pdf and circuit.pdf respectively.

8.0 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.

Version: 01-November-2017 Page: 16 of 24 FCC ID 249_C



9.0 <u>Miscellaneous Information</u>

This miscellaneous information includes details of the measured bandedge, 20dB Bandwidth, the test procedure and calculation of factor such as pulse desensitization.

9.1 Bandedge Plot

The test plots are attached as below. From the below plots, 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) Lowest frequency channel (2402MHz):

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

= $92.6 \text{ dB}\mu\text{v/m}$ -43.83 dB= $48.77 \text{ dB}\mu\text{v/m}$

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

= $70.1 \text{ dB}\mu\text{v/m}$ -43.83 dB= $26.27 \text{ dB}\mu\text{v/m}$

(ii) Highest frequency channel (2480MHz):

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

= $92.4 \text{ dB}\mu\text{v/m}$ -45.3 dB= $47.1 \text{ dB}\mu\text{v/m}$

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

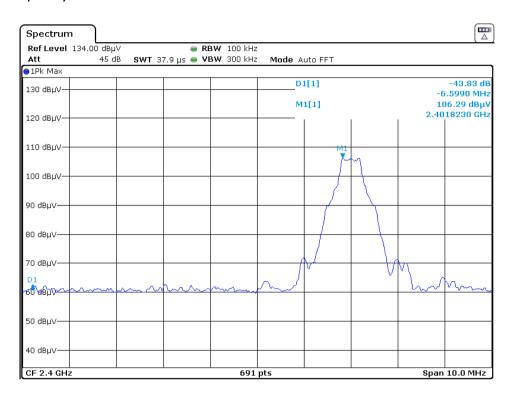
= $69.9 \text{ dB}\mu\text{v/m}$ -45.3 dB= $24.6 \text{ dB}\mu\text{v/m}$

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).

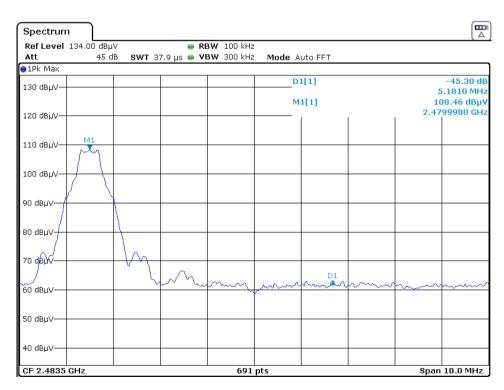
Version: 01-November-2017 Page: 17 of 24 FCC ID 249 C



Hopping function off Lowest frequency Channel



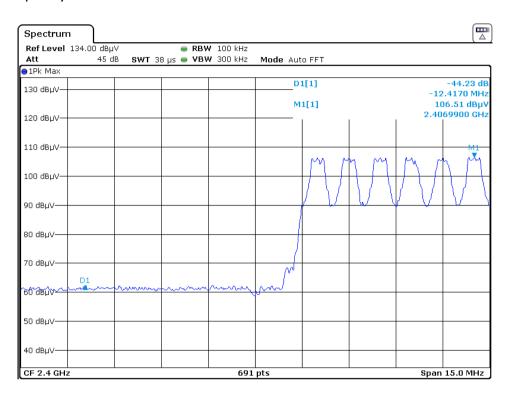
Highest frequency Channel



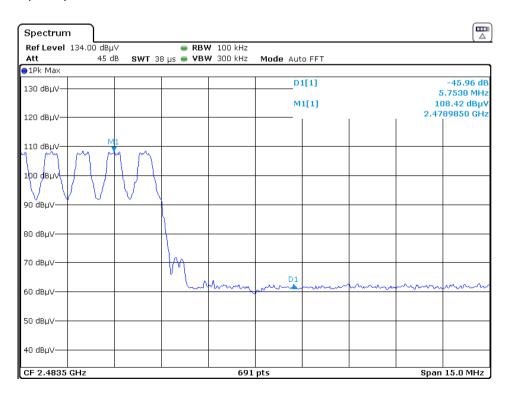
Version: 01-November-2017 Page: 18 of 24 FCC ID 249_C



Hopping function on Lowest frequency Channel



Highest frequency Channel

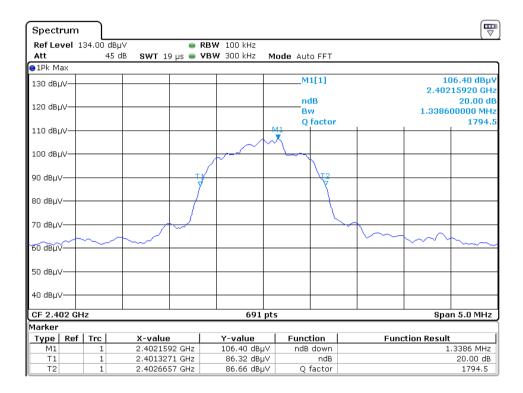


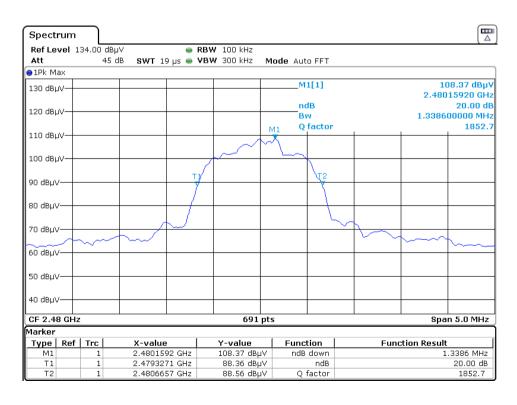
Version: 01-November-2017 Page: 19 of 24 FCC ID 249_C



9.2 20dB bandwidth

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. The test plots are reported as below.





Version: 01-November-2017 Page: 20 of 24 FCC ID 249 C



9.3 Discussion of Pulse Desensitization

Intertek Report No.: 191210004SZN-001

Pulse desensitivity is not applicable for this device. The effective period (Teff) is approximately $625\mu s$ for Bluetooth. With a resolution bandwidth (3dB) of 1MHz, so the pulse desensitivity factor is 0dB.

9.4 Calculation of Average Factor

Based on the Bluetooth Specification Version 5.0 (without BLE) and worst case AFH mode, transmitter ON time is independent of packet type (DH1, DH3 and 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 hops/second = 7.5 ms

Time to cycle through all channels = 7.5 x 20 channels = 150 ms

Number of times transmitter hits on one channel = 100 ms / 150 ms = 1 time(s)

Worst case dwell time = 7.5 ms

Duty cycle connection factor = 20log10 (7.5ms / 100ms) = -22.5 dB

Version: 01-November-2017 Page: 21 of 24 FCC ID 249_C



9.5 Emissions Test Procedures

Intertek Report No.: 191210004SZN-001

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 and approximately 0.8 meter up to 1GHz and 1.5 meter above 1GHz 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. A detailed description for the calculation of the average factor can be found in section 9.4.

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.

Version: 01-November-2017 Page: 22 of 24 FCC ID 249 C



9.5 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.

Intertek Report No.: 191210004SZN-001

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 (RBW 3MHz used for fundamental emission).

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.

Version: 01-November-2017 Page: 23 of 24 FCC ID 249 C



10.0 <u>Test Equipment List</u>

Equipment No.	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
SZ061-12	Biconilog Antenna	ETS	3142E	00166158	14-Sep-2018	14-Sep-2020
SZ061-06	Active Loop Antenna	Electro-Metrics	EM-6876	217	24-May-2019	24-May-2020
SZ061-08	Horn Antenna	ETS	3115	00092346	7-Sep-2019	7-Sep-2021
SZ061-07	Pyramidal Horn Antenna	ETS	3160-09	00083067	13-Aug-2019	13-Aug-2021
SZ056-03	Spectrum Analyzer	R&S	FSP30	101148	28-May-2019	28-May-2020
SZ185-01	EMI Receiver	R & S	ESCI	100547	4-Jan-2019	4-Jan-2020
SZ181-04	Preamplifier	Agilent	8449B	3008A024 74	15-Jan-2019	15-Jan-2020
SZ188-01	Anechoic Chamber	ETS	RFD-F/A- 100	4102	15-Dec-2018	15-Dec-2020
SZ062-02	RF Cable	RADIALL	RG 213U		19-Jun-2019	19-Dec-2019
SZ062-05	RF Cable	RADIALL	0.04- 26.5GHz		14-Aug-2019	14-Aug-2020
SZ062-12	RF Cable	RADIALL	0.04- 26.5GHz		14-Aug-2019	14-Aug-2020
SZ067-04	Notch Filter	Micro-Tronics	BRM5070 2-02		28-May-2019	28-May-2020

Version: 01-November-2017 Page: 24 of 24 FCC ID 249_C