Shenzhen 3Nod Digital Technology Co., Ltd.

TEST REPORT

SCOPE OF WORK
FCC TESTING–100004118

REPORT NUMBER
190118045SZN-001

ISSUE DATE **[REVISED DATE]**

May 8, 2019 [----------]

PAGES
44

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Shenzhen 3Nod Digital Technology Co., Ltd.

Application
For
Certification

FCC ID: 2AA3H-S3049

ONN 32'' 2.1 Soundbar

Model: 100004118

Brand Name: ONN

2.4GHz Transceiver

Report No.: 190118045SZN-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 [10-1-17]

Prepared and Checked by:	Approved by:
Leo Li	*Kidd Yang*
Project Engineer	*Technical Supervisor*
	Date: May 8, 2019

Intertek Testing Service Shenzhen Ltd. Longhua Branch
101, 201, Building B, No. 308 Wuhe Avenue, Zhangkengjing Community, GuanHu Subdistrict, LongHua District, Shenzhen, P.R. China.
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LIST OF EXHIBITS

MEASUREMENT/TECHNICAL REPORT

Shenzhen 3Nod Digital Technology Co., Ltd.

Model: 100004118

FCC ID: 2AA3H-S3049

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 [10-1-17 Edition] provision.

Report prepared by:

Leo Li
Intertek Testing Services Shenzhen Ltd. Longhua Branch
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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

1.0 General Description

1.1 Product Description

The equipment under test (EUT) is a ONN 32" 2.1 Soundbar with Bluetooth 4.2 (dual-mode) function operating in 2402-2480MHz, 2.4G SRD function operating in 2403.35-2477.35MHz, 2.4G WIFI function operating in 2412-2462MHz and 5G WIFI function operating in 5180-5240& 5747-5825MHz. The EUT is powered by DC 18V/2A through an adapter. Bluetooth and Wi-Fi transmitters are share one antenna while they cannot transmit simultaneously. For more detail information pls. refer to the user manual.

Antenna Type: Integral antenna
Modulation Type: GFSK, π/4-DQPSK and 8-DPSK
Antenna Gain: 5.5dBi Max
Bluetooth Version: 4.2 (dual-mode)

The ONN 32" 2.1 Soundbar, Model: 100004118 has two designing schemes. It would be placed on the market with two different adapters and two different HDMI cables, Power Model: BI36-180200-AdU or Power Model: MAUH-1802004200, HDMI cable Model: CFA10B08SN183 or HDMI cable Model: KFH119041303. All tests are required to both designing schemes after evaluation, but only worst-case is reflected in the report.

Adapter	Model	Electrical parameters
Adapter 1	BI36-180200-AdU	Input: AC 100-240V, 50/60Hz Output: DC 18V/2A
Adapter 2	MAUH-1802004200	Input: AC 100-240V, 50/60Hz Output: DC 18V/2A

HDMI cable	Model	Manufacturer
HDMI cable 1	CFA10B08SN183	GuangXinKe
HDMI cable 2	KFH119041303	LianJi

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 ONN 32" 2.1 Soundbar BT 4.2 EDR mode.
For the BT 4.2 BLE mode was tested and demonstrated in report 190118045SZN-002.
For the 2.4GHz WiFi function was tested and demonstrated in report 190118045SZN-003.
For the 5GHz WiFi function was tested and demonstrated in report 190118045SZN-004.
For the 2.4GHz SRD function was tested and demonstrated in report 190118045SZN-005.
For other functions were reported in the SDOC report: 190118043SZN-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 shield room used to collect the radiated data and conducted data are **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).

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. Both designing schemes have been considered, 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 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.

Test software: PuTTY release 0.63

2.3 Special Accessories

DC cable of adapter (with core)
HDMI cable (Shielded)

2.4 Equipment Modification

Any modifications installed previous to testing by Shenzhen 3Nod Digital 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.

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	A1367
iPhone	Apple	A1303
Dummy load	provided by Intertek	/
DC adapter	provided by applicant	BI36-180200-AdU (Cable length 1.5m, unshielded, with core)
DC adapter	provided by applicant	MAUH-1802004200 (Cable length 1.45m, unshielded, with core)
3.5mm to 3.5mm audio in cable	provided by Intertek	unshielded, length 110cm
3.5mm to RCA stereo audio in cable	provided by applicant	unshielded, length 147cm
Optical cable	provided by applicant	unshielded, Length 115cm
HDMI cable 1	GuangXinKe	Shielded, Length 175cm
HDMI cable 2	LianJi	Shielded, Length 175cm
HDMI right angle adapter	provided by applicant	/
Subwoofer	provided by applicant	/
Remove control	provided by applicant	/

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 = 42 dBµV/m

Level in µV/m = Common Antilogarithm [(42 dBµV/m)/20] = 125.9 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. Numbers with a minus sign are below the limit. Simultaneous transmission was considered during the test.

Worst Case Radiated Emission
at
150.280 MHz

Judgement: Passed by 4.9 dB

TEST PERSONNEL:

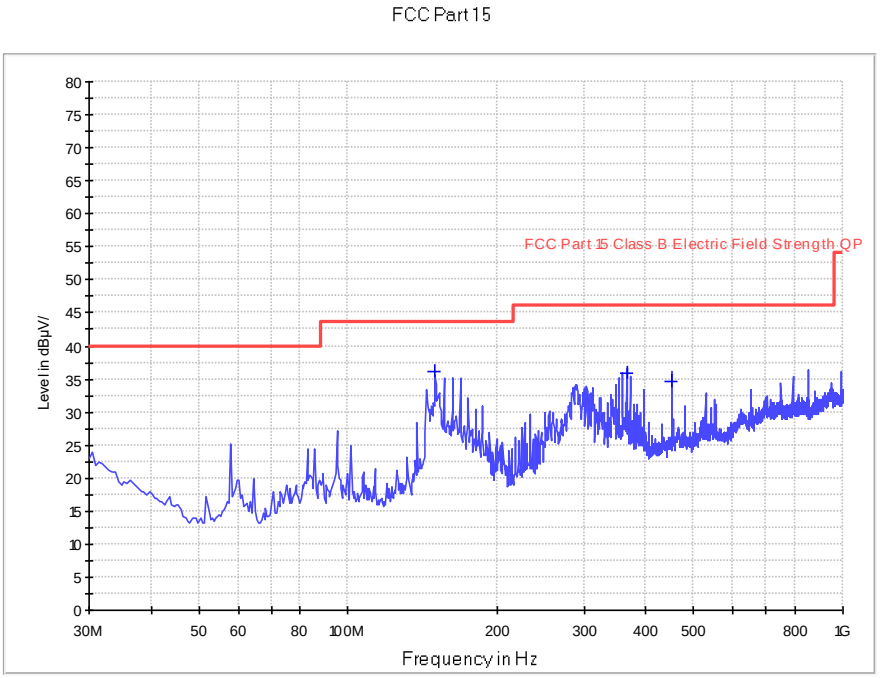
Sign on file

Leo Li, Project Engineer
Typed/Printed Name

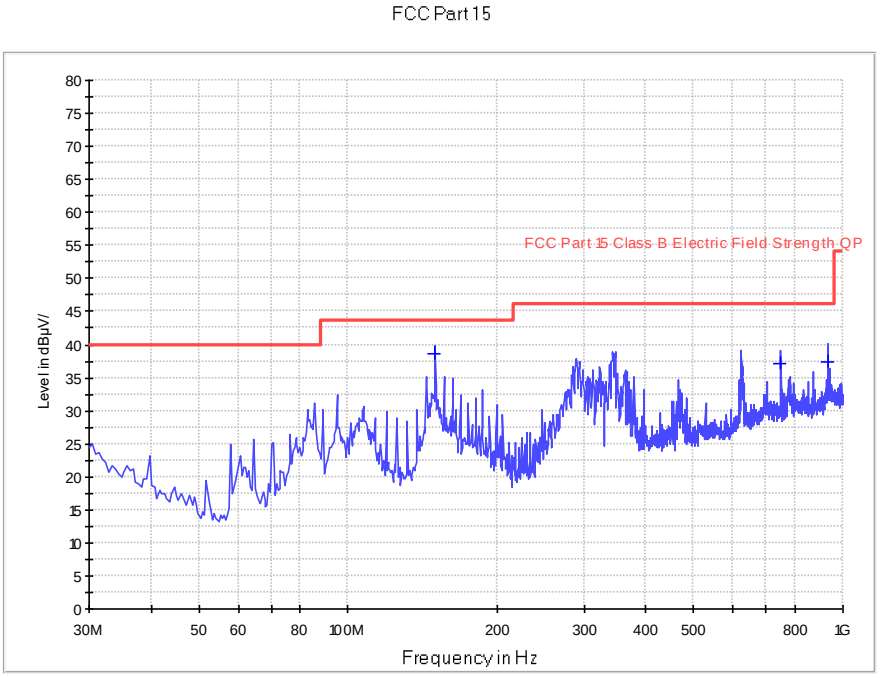
6 May 2019
Date

Applicant: Shenzhen 3Nod Digital Technology Co., Ltd.
Date of Test: 6 May 2019 Model: 100004118
Worst Case Operating Mode: BT Link (Carry with adapter 2 and HDMI cable 1)

ANT Polarity: Horizontal



ANT Polarity: Vertical



Applicant: Shenzhen 3Nod Digital Technology Co., Ltd.
Date of Test: 6 May 2019 Model: 100004118
Worst Case Operating Mode: BT Link (Carry with adapter 2 and HDMI cable 1)

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	150.280	46.8	20.0	9.5	36.3	43.5	-7.2
Horizontal	365.620	40.2	20.0	15.7	35.9	46.0	-10.1
Horizontal	450.010	37.2	20.0	17.4	34.6	46.0	-11.4
Vertical	150.280	49.1	20.0	9.5	38.6	43.5	-4.9
Vertical	750.225	34.6	20.0	22.6	37.2	46.0	-8.8
Vertical	936.465	32.7	20.0	24.8	37.5	46.0	-8.5

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
2402.000 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 8.6 dB

TEST PERSONNEL:

Sign on file

Leo Li, Project Engineer
Typed/Printed Name

6 May 2019
Date

Applicant: Shenzhen 3Nod Digital Technology Co., Ltd.
Date of Test: 6 May 2019 Model: 100004118
Worst Case Operating Mode: Transmitting

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	114.3	36.4	27.5	105.4	114.0	-8.6
Horizontal	4804.000	52.1	36.3	33.4	49.2	74.0	-24.8
Horizontal	7206.000	52.4	36.3	37.6	53.7	74.0	-20.3
Horizontal	9608.000	52.5	36.3	38.0	54.2	74.0	-19.8

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	2402.000	114.3	36.4	27.5	22.5	82.9	94.0	-11.1
Horizontal	4804.000	52.1	36.3	33.4	22.5	26.7	54.0	-27.3
Horizontal	7206.000	52.4	36.3	37.6	22.5	31.2	54.0	-22.8
Horizontal	9608.000	52.5	36.3	38.0	22.5	31.7	54.0	-22.3

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

Applicant: Shenzhen 3Nod Digital Technology Co., Ltd.
Date of Test: 6 May 2019 Model: 100004118
Worst Case Operating Mode: Transmitting

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	110.8	36.4	27.5	101.9	114.0	-12.1
Horizontal	4882.000	50.3	36.3	33.5	47.5	74.0	-26.5
Horizontal	7323.000	50.8	36.3	37.7	52.2	74.0	-21.8
Horizontal	9764.000	52.9	36.3	37.6	54.2	74.0	-19.8

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	110.8	36.4	27.5	22.5	79.4	94.0	-14.6
Horizontal	4882.000	50.3	36.3	33.5	22.5	25.0	54.0	-29.0
Horizontal	7323.000	50.8	36.3	37.7	22.5	29.7	54.0	-24.3
Horizontal	9764.000	52.9	36.3	37.6	22.5	31.7	54.0	-22.3

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

Applicant: Shenzhen 3Nod Digital Technology Co., Ltd.
Date of Test: 6 May 2019 Model: 100004118
Worst Case Operating Mode: Transmitting

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	108.2	36.4	27.5	99.3	114.0	-14.7
Horizontal	4960.000	49.6	36.3	33.5	46.8	74.0	-27.2
Horizontal	7440.000	54.0	36.3	37.8	55.5	74.0	-18.5
Horizontal	9920.000	54.0	36.3	37.0	54.7	74.0	-19.3

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	2480.000	108.2	36.4	27.5	22.5	76.8	94.0	-17.2
Horizontal	4960.000	49.6	36.3	33.5	22.5	24.3	54.0	-29.7
Horizontal	7440.000	54.0	36.3	37.8	22.5	33.0	54.0	-21.0
Horizontal	9920.000	54.0	36.3	37.0	22.5	32.2	54.0	-21.8

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

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

0.382 MHz

Judgement: Passed by 9.9 dB margin

TEST PERSONNEL:

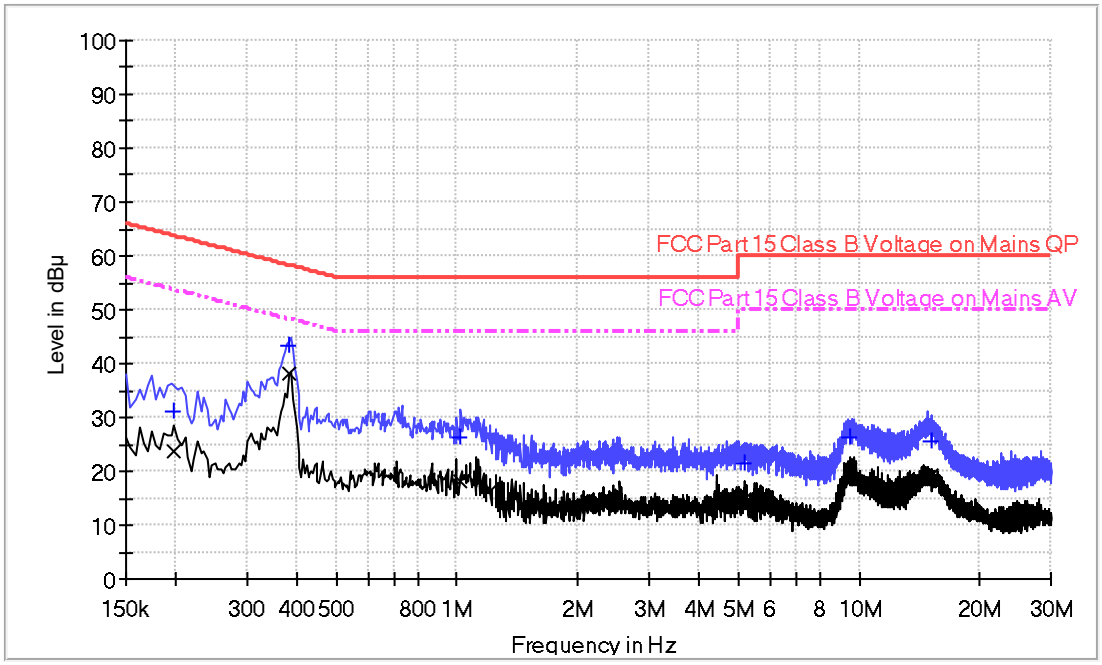
Sign on file

Leo Li, Project Engineer
Typed/Printed Name

1 April 2019
Date

Applicant: Shenzhen 3Nod Digital Technology Co., Ltd.
Date of Test: 1 April 2019 Model: 100004118
Worst Case Operating Mode: BT Link (Carry with adapter 1 and HDMI cable 1)

Conducted Emission Test - FCC



Result Table QP

Frequency (MHz)	QuasiPeak (dB µ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB µ V)
0.198000	31.2	L1	9.6	32.5	63.7
0.382000	43.3	L1	9.6	14.9	58.2
1.022000	26.1	L1	9.7	29.9	56.0
5.198000	21.5	L1	9.8	38.5	60.0
9.474000	26.4	L1	9.9	33.6	60.0
15.214000	25.6	L1	10.0	34.4	60.0

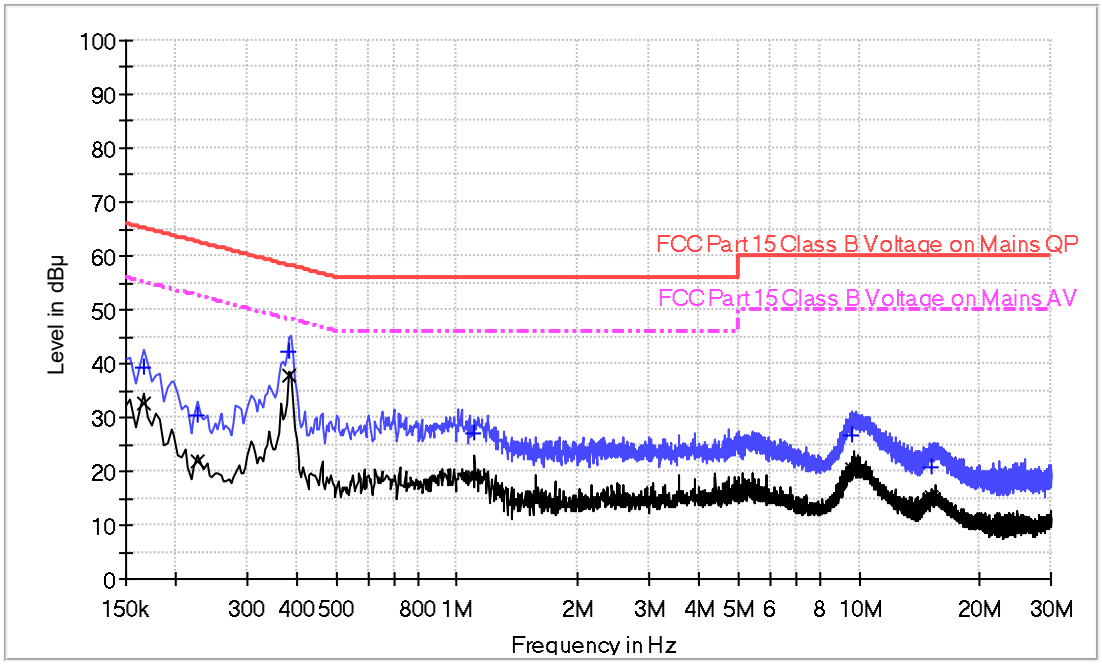
Result Table AV

Frequency (MHz)	Average (dB µ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB µ V)
0.198000	23.5	L1	9.6	30.2	53.7
0.382000	38.3	L1	9.6	9.9	48.2
1.022000	18.2	L1	9.7	27.8	46.0
5.198000	14.9	L1	9.8	35.1	50.0
9.474000	20.3	L1	9.9	29.7	50.0
15.214000	19.3	L1	10.0	30.7	50.0

Remark:
1. Corr. Factor (dB) = LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Limit (dBuV) – Level (dBuV)

Applicant: Shenzhen 3Nod Digital Technology Co., Ltd.
Date of Test: 1 April 2019 Model: 100004118
Worst Case Operating Mode: BT Link (Carry with adapter 1 and HDMI cable 1)

Conducted Emission Test - FCC



Result Table QP

Frequency (MHz)	QuasiPeak (dB µ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB µ V)
0.166000	39.1	N	9.6	26.1	65.2
0.226000	30.5	N	9.6	32.1	62.6
0.382000	42.1	N	9.6	16.1	58.2
1.106000	27.0	N	9.7	29.0	56.0
9.574000	26.7	N	9.9	33.3	60.0
15.142000	20.8	N	10.0	39.2	60.0

Result Table AV

Frequency (MHz)	Average (dB µ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB µ V)
0.166000	32.7	N	9.6	22.5	55.2
0.226000	21.8	N	9.6	30.8	52.6
0.382000	37.8	N	9.6	10.4	48.2
1.106000	19.0	N	9.7	27.0	46.0
9.574000	20.4	N	9.9	29.6	50.0
15.142000	15.4	N	10.0	34.6	50.0

Remark:
1. Corr. Factor (dB) = LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Limit (dBuV) – Level (dBuV)

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 2402MHz:

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

= 105.4 dBµv/m-42.73dB
= 62.67 dBµv/m

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

= 82.9 dBµv/m-42.73dB
= 40.17 dBµv/m

(ii) Upper channel 2480MHz:

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

= 99.3 dBµv/m-43.37 dB
= 55.93 dBµv/m

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

= 76.8 dBµv/m-43.37 dB
= 33.43 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 625µs for Bluetooth. With a resolution bandwidth (3dB) of 1MHz, so the pulse desensitivity factor is 0dB.

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

Based on the Bluetooth Specification Version 4.2 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 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 = $20\log_{10}(7.5\text{ms} / 100\text{ms}) = -22.5$ 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 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.

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 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.

EXHIBIT 9

CONFIDENTIALITY REQUEST

9.0 Confidentiality Request

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

EXHIBIT 10

TEST EQUIPMENT LIST

10.0 Test Equipment List

Equipment No.	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
SZ061-04	Biconilog Antenna	ETS	3142C	00078828	16-Oct-2018	16-Oct-2019
SZ061-08	Horn Antenna	ETS	3115	00092346	14-Sep-2018	14-Sep-2019
SZ061-06	Active Loop Antenna	Electro-Metrics	EM-6876	217	11-May-2018	11-May-2019
SZ061-07	Pyramidal Horn Antenna	ETS	3160-09	00083067	10-Mar-2019	10-Mar-2020
SZ056-03	Spectrum Analyzer	R&S	FSP30	101148	05-Jun-2018	05-Jun-2019
SZ185-01	EMI Receiver	R & S	ESCI	100547	4-Jan-2019	4-Jan-2020
SZ181-04	Preamplifier	Agilent	8449B	3008A02474	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	--	16 Jan 2019	16 Jul 2019
SZ062-05	RF Cable	RADIALL	0.04-26.5GHz	--	16 Jan 2019	16 Jul 2019
SZ062-12	RF Cable	RADIALL	0.04-26.5GHz	--	16 Jan 2019	16 Jul 2019
SZ067-04	Notch Filter	Micro-Tronics	BRM50702-02	--	5-Jun-2018	5-Jun-2019
SZ185-02	EMI Test Receiver	R&S	ESCI	100692	26-Oct-2018	26-Oct-2019
SZ187-01	Two-Line V-Network	R&S	ENV216	100072	26-Oct-2018	26-Oct-2019
SZ187-02	Two-Line V-Network	R&S	ENV216	100073	04-Jul-2018	04-Jul-2019
SZ188-03	Shielding Room	ETS	RFD-100	4100	16-Jan-2017	16-Jan-2020
SZ062-16	RF Cable	HUBER+SUHNER	CBL2-BN-1m	110127-2231000	29-Oct-2018	29-Oct-2019

********** End of Report**********