SHENZHEN 3NOD DIGITAL TECHNOLOGY CO., LTD

TEST REPORT

SCOPE OF WORK
FCC TESTING–100002634

REPORT NUMBER
191104028SZN-002

ISSUE DATE **[REVISED DATE]**

December 5, 2019 [----------]

PAGES
26

DOCUMENT CONTROL NUMBER
FCC ID 249_C

SHENZHEN 3NOD DIGITAL TECHNOLOGY CO., LTD

Application
For
Certification

FCC ID: 2AA3H-S6064

Onn. 5.1.2 Atmos Soundbar, onn. 5.1.2 Atmos Soundbar

Model: 100002634

Brand Name: onn.

2.4GHz Transceiver

Report No.: 191104028SZN-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 [10-1-18]

Prepared and Checked by:

Leo Li
Project Engineer

Approved by:

Kidd Yang
Technical Supervisor
Date: December 5, 2019

Intertek Testing Services Shenzhen Ltd. Longhua Branch
101, 201, Building B, No. 308 Wuhe Avenue, Zhangkengjing Community, GuanHu Subdistrict, LongHua District, ShenZhen, P.R. China
Tel: (86 755) 8601 6288 Fax: (86 755) 8601 6751

MEASUREMENT/TECHNICAL REPORT

This report concerns (check one:) Original Grant X Class II Change _____

Equipment Type: DXX - Part 15 Low Power Communication Device Transmitter

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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 [10-1-18 Edition] provision.

Report prepared by:

Leo Li
Intertek Testing Services Shenzhen Ltd. Longhua Branch
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Table of Contents

1.0 Summary of Test Result

Applicant: SHENZHEN 3NOD DIGITAL TECHNOLOGY CO., LTD
Applicant Address: No.15, Zhongfu road, Tangxiayong community, Yanluo street, Bao 'an district, Shenzhen city, Guangdong, China

MODEL: 100002634
FCC ID: 2AA3H-S6064

Test Specification	Reference	Results
Transmitter Radiated Emission	15.249 &15.209 &15.205	Pass
Conducted Emission	15.207	Pass
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.

2.0 General Description

2.1 Product Description

The equipment under test (EUT) is a Soundbar with Bluetooth, 2.4G SRD, and WiFi functions. The 2.4G SRD module carry with double antennas, but they can`t transmit at the same time. Bluetooth and Wi-Fi transmitters are share one antenna while they cannot transmit simultaneously. The EUT is powered by AC 120V/60Hz. For more detailed features description, please refer to the user's manual.

Antenna Type: Integral antenna
Modulation Type: GFSK
Antenna Gain: 3.4dBi Max
Bluetooth Version: 5.0 BLE (dual-mode)

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 Onn. 5.1.2 Atmos Soundbar/ onn. 5.1.2 Atmos Soundbar BT 5.0 BLE mode.
For the BT 5.0 EDR mode was tested and demonstrated in report 191104028SZN-001.
For the 2.4GHz WIFI function was tested and demonstrated in report 191104028SZN-003.
For the 5GHz WIFI function was tested and demonstrated in report 191104028SZN-004.
For the 2.4GHz SRD function was tested and demonstrated in report 191104028SZN-005.
For other functions were reported in the SDOC report: 191104030SZN-001.

2.3 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.

2.4 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).

3.0 System Test Configuration

3.1 Justification

For emissions testing, the equipment under test (EUT) setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, all cables were manipulated to produce worst case emissions. The EUT was powered by AC 120V/60Hz during the test, only the worst data was reported in this report.

For maximizing emissions, the EUT was rotated through 360°, the EUT was placed on the styrene turntable with 0.8m up to 1GHz and 1.5 m above 1GHz. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance.

All readings are extrapolated back to the equivalent three meters reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000 MHz. The resolution is 1 MHz or greater for frequencies above 1000 MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

The rear of unit was flushed with the rear of the table.

Radiated emission measurement was performed 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 to 40 GHz, whichever is lower.

3.2 EUT Exercising Software

The EUT exercise program (provided by client) used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use. The worst case configuration is used in all specified testing.

The parameters of test software setting:
During the test, Channel and power controlling software provided by the applicant was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the application and is going to be fixed on the firmware of the end product.

Test software: SecureCRT

3.3 Special Accessories

HDMI cable (Shielded, Length 6ft)

3.4 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.

3.5 Measurement Uncertainty

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

3.6 Support Equipment List and Description

Description	Manufacturer	Remark
LED TV (Provided by Intertek)	Sony	KDL-24EX520
iPod (Provided by Intertek)	Apple	A1367
USB flash disk (Provided by Intertek)	Kingston	DTSE9G2
Detachable AC Cord for Soundbar (Provided by applicant)	SHENZHEN 3NOD DIGITAL TECHNOLOGY CO., LTD	without core, Length 4.92ft
Optical cable (Provided by applicant)	SHENZHEN 3NOD DIGITAL TECHNOLOGY CO., LTD	Length 6ft
LAN cable (Provided by applicant)	SHENZHEN 3NOD DIGITAL TECHNOLOGY CO., LTD	unshielded, Length 6ft
3.5mm to 3.5mm stereo audio cable (Provided by applicant)	SHENZHEN 3NOD DIGITAL TECHNOLOGY CO., LTD	unshielded, Length 6ft
HDMI cable (Provided by applicant)	SHENZHEN 3NOD DIGITAL TECHNOLOGY CO., LTD	Shielded, without core, Length 6ft
HDMI cable*3 (Provided by Intertek)	UGREEN	Shielded, without core, Length 6ft
Remote control (Provided by applicant)	SHENZHEN 3NOD DIGITAL TECHNOLOGY CO., LTD	100002634
Dummy load 1 (Provided by Intertek)	N/A	100 Ω
Dummy load 2 (Provided by Intertek)	N/A	100 Ω

4.0 Emission Results

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

4.1 Radiated Test Results

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 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

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. Simultaneous transmission was considered during the test, but only worst-case is reported.

Worst Case Radiated Emission
at
791.999 MHz

Judgement: Passed by 7.7 dB

TEST PERSONNEL:

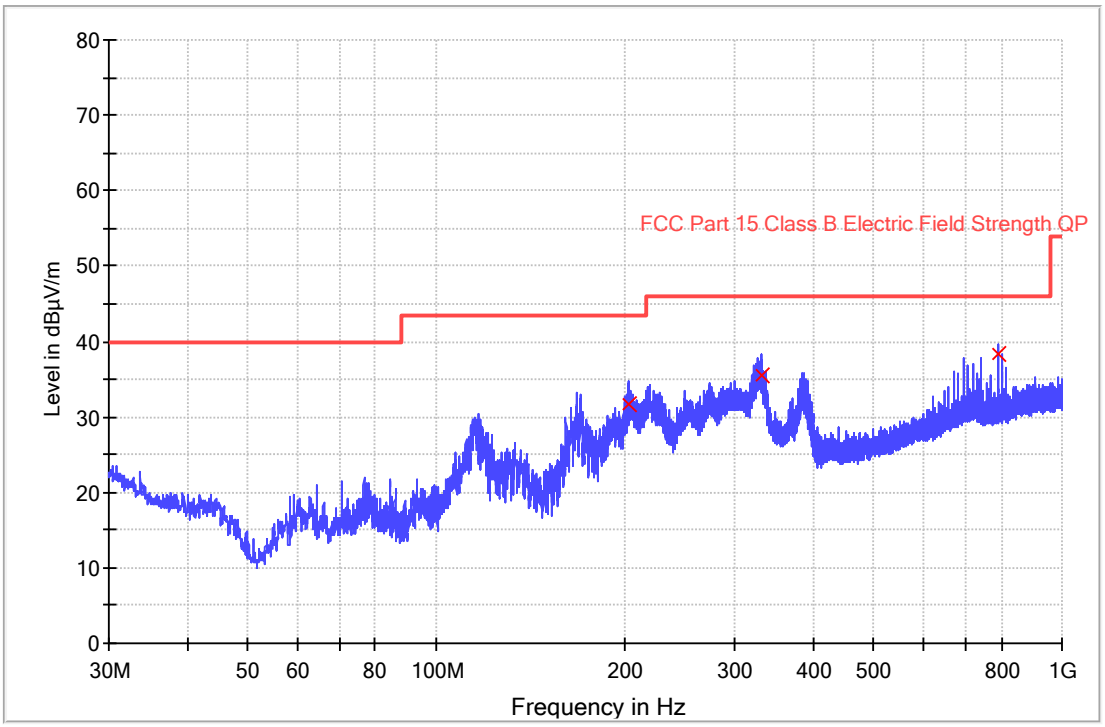
Sign on file

Leo Li, Project Engineer
Typed/Printed Name

15 November 2019
Date

Applicant: SHENZHEN 3NOD DIGITAL TECHNOLOGY CO., LTD
Date of Test: 15 November 2019 Model: 100002634
Worst Case Operating Mode: Simultaneous transmission(2.4G SRD & Bluetooth)

ANT Polarity: Horizontal

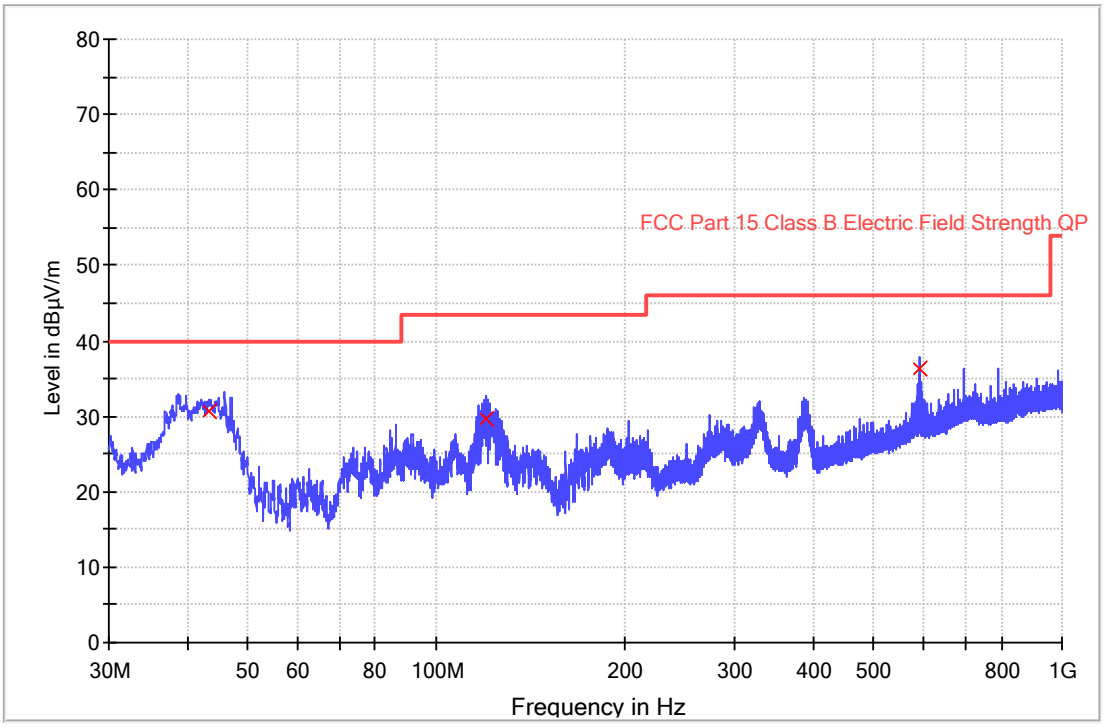


Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Polarization	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
202.563000	31.8	1000.0	120.000	H	12.8	11.7	43.5
330.344333	35.6	1000.0	120.000	H	17.5	10.4	46.0
791.999000	38.3	1000.0	120.000	H	26.3	7.7	46.0

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(dBµV/m) – Level (dBµV/m)

Applicant: SHENZHEN 3NOD DIGITAL TECHNOLOGY CO., LTD
Date of Test: 15 November 2019 Model: 100002634
Worst Case Operating Mode: Simultaneous transmission(2.4G SRD & Bluetooth)

ANT Polarity: Vertical



Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Polarization	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
43.321333	30.8	1000.0	120.000	V	11.7	9.2	40.0
120.533333	29.6	1000.0	120.000	V	9.8	13.9	43.5
594.022667	36.3	1000.0	120.000	V	23.6	9.7	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(dBµV/m) – Level (dBµV/m)

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 5.0 dB

TEST PERSONNEL:

Sign on file

Leo Li, Project Engineer
Typed/Printed Name

15 November 2019
Date

Applicant: SHENZHEN 3NOD DIGITAL TECHNOLOGY CO., LTD
Date of Test: 15 November 2019 Model: 100002634
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	101.8	36.7	28.1	93.2	114.0	-20.8
Vertical	4804.000	50.9	36.7	35.5	49.7	74.0	-24.3
Vertical	7206.000	55.8	36.1	36.5	56.2	74.0	-17.8
Vertical	9608.000	56.9	36.2	37.0	57.7	74.0	-16.3

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m	Margin (dB)
Vertical	2402.000	96.7	36.7	28.1	88.1	94.0	-5.9
Vertical	4804.000	41.5	36.7	35.5	40.3	54.0	-13.7
Vertical	7206.000	46.2	36.1	36.5	46.6	54.0	-7.4
Vertical	9608.000	48.2	36.2	37.0	49.0	54.0	-5.0

Notes:
1. Peak detector is used for the emission measurement (RBW=1MHz / VBW=3MHz for Peak value, and RBW=1MHz / VBW=10Hz for Average value; RBW=3MHz is used for fundamental 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

Applicant: SHENZHEN 3NOD DIGITAL TECHNOLOGY CO., LTD
Date of Test: 15 November 2019 Model: 100002634
Worst Case Operating Mode: Transmitting

Table 2

Radiated Emissions

(2440MHz)

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	2440.000	101.7	36.7	28.1	93.1	114.0	-20.9
Vertical	4880.000	49.8	36.7	35.5	48.6	74.0	-25.4
Vertical	7320.000	55.0	36.1	37.2	56.1	74.0	-17.9
Vertical	9760.000	56.9	36.2	37.0	57.7	74.0	-16.3

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Vertical	2440.000	96.8	36.7	28.1	88.2	94.0	-5.8
Vertical	4880.000	40.5	36.7	35.5	39.3	54.0	-14.7
Vertical	7320.000	46.1	36.1	37.2	47.2	54.0	-6.8
Vertical	9760.000	47.8	36.2	37.0	48.6	54.0	-5.4

Notes:
1. Peak detector is used for the emission measurement (RBW=1MHz / VBW=3MHz for Peak value, and RBW=1MHz / VBW=10Hz for Average value; RBW=3MHz is used for fundamental 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

Applicant: SHENZHEN 3NOD DIGITAL TECHNOLOGY CO., LTD
Date of Test: 15 November 2019 Model: 100002634
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)
Vertical	2480.000	101.8	36.7	28.1	93.2	114.0	-20.8
Vertical	4960.000	48.8	36.7	35.5	47.6	74.0	-26.4
Vertical	7440.000	56.9	36.1	37.2	58.0	74.0	-16.0
Vertical	9920.000	53.0	36.3	38.9	55.6	74.0	-18.4

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Vertical	2480.000	96.9	36.7	28.1	88.3	94.0	-5.7
Vertical	4960.000	38.9	36.7	35.5	37.7	54.0	-16.3
Vertical	7440.000	46.7	36.1	37.2	47.8	54.0	-6.2
Vertical	9920.000	43.8	36.3	38.9	46.4	54.0	-7.6

Notes:
1. Peak detector is used for the emission measurement (RBW=1MHz / VBW=3MHz for Peak value, and RBW=1MHz / VBW=10Hz for Average value; RBW=3MHz is used for fundamental 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

4.2 Conducted Emission Configuration Photograph

For electronic filing, the worst case radiated emission configuration photographs are saved with filename: conducted photos.pdf.

4.2.1 Conducted Emission

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, but only worst-case is reported.

Worst Case Conducted Configuration
at
0.450MHz

Judgement: Passed by 11.9dB margin

TEST PERSONNEL:

Sign on file

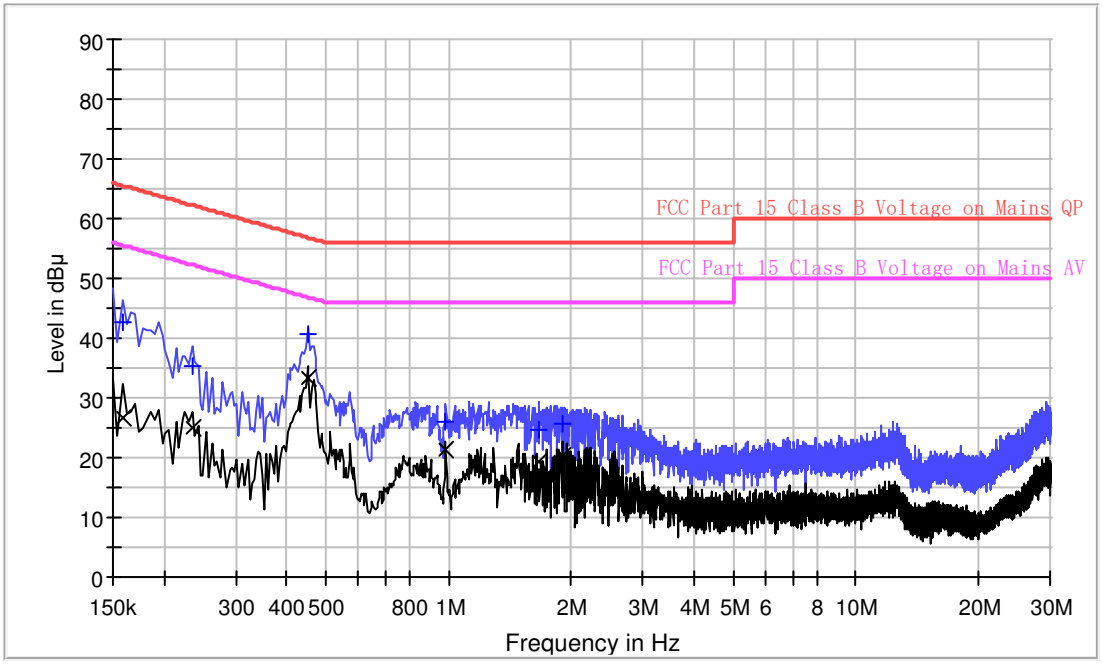
Leo Li, Project Engineer
Typed/Printed Name

30 November 2019
Date

Applicant: SHENZHEN 3NOD DIGITAL TECHNOLOGY CO., LTD
Date of Test: 30 November 2019 Model: 100002634
Worst Case Operating Mode: Simultaneous transmission (2.4G SRD & Bluetooth)
Phase: Live

Graphic / Data Table

Conducted Emissions
Pursuant to FCC 15.207: Emissions Requirement



Limit and Margin QP

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.158000	42.8	9.000	L1	9.7	22.8	65.6
0.234000	35.2	9.000	L1	9.7	27.1	62.3
0.450000	40.5	9.000	L1	9.7	16.4	56.9
0.982000	25.9	9.000	L1	9.7	30.1	56.0
1.666000	24.5	9.000	L1	9.7	31.5	56.0
1.910000	25.7	9.000	L1	9.7	30.3	56.0

Limit and Margin AV

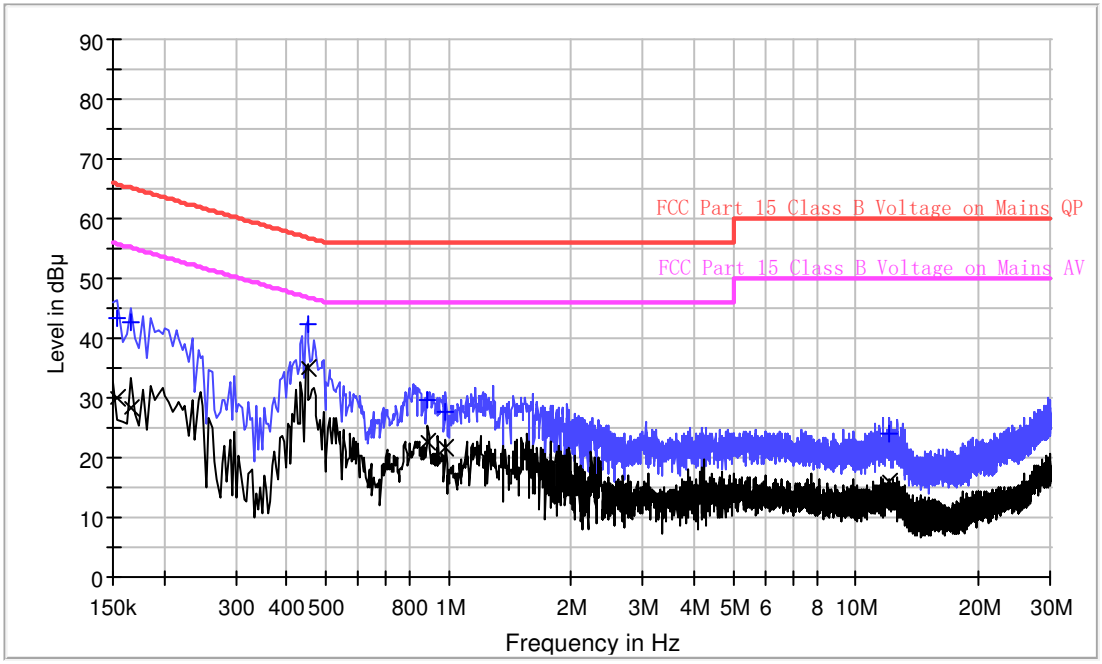
Frequency (MHz)	Average (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.158000	26.8	9.000	L1	9.7	28.8	55.6
0.234000	25.0	9.000	L1	9.7	27.3	52.3
0.450000	33.5	9.000	L1	9.7	13.4	46.9
0.982000	21.4	9.000	L1	9.7	24.6	46.0
1.666000	19.2	9.000	L1	9.7	26.8	46.0
1.910000	20.3	9.000	L1	9.7	25.7	46.0

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: 30 November 2019 Model: 100002634
Worst Case Operating Mode: Simultaneous transmission (2.4G SRD & Bluetooth)
Phase: Neutral

Graphic / Data Table

Conducted Emissions
Pursuant to FCC 15.207: Emissions Requirement



Limit and Margin QP

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.154000	43.3	9.000	N	9.7	22.5	65.8
0.166000	42.5	9.000	N	9.7	22.7	65.2
0.450000	42.4	9.000	N	9.7	14.5	56.9
0.890000	29.6	9.000	N	9.7	26.4	56.0
0.986000	27.8	9.000	N	9.7	28.2	56.0
12.006000	24.0	9.000	N	10.1	36.0	60.0

Limit and Margin AV

Frequency (MHz)	Average (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.154000	30.0	9.000	N	9.7	25.8	55.8
0.166000	28.5	9.000	N	9.7	26.7	55.2
0.450000	35.0	9.000	N	9.7	11.9	46.9
0.890000	22.5	9.000	N	9.7	23.5	46.0
0.986000	21.6	9.000	N	9.7	24.4	46.0
12.006000	16.1	9.000	N	10.1	33.9	50.0

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

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 Technical Specifications

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.

9.0 Miscellaneous Information

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

= 93.2 dBµv/m-58.96 dB
= 34.24 dBµv/m

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

= 88.1 dBµv/m-58.96 dB
= 29.14 dBµv/m

(ii) Highest frequency channel (2480MHz):

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

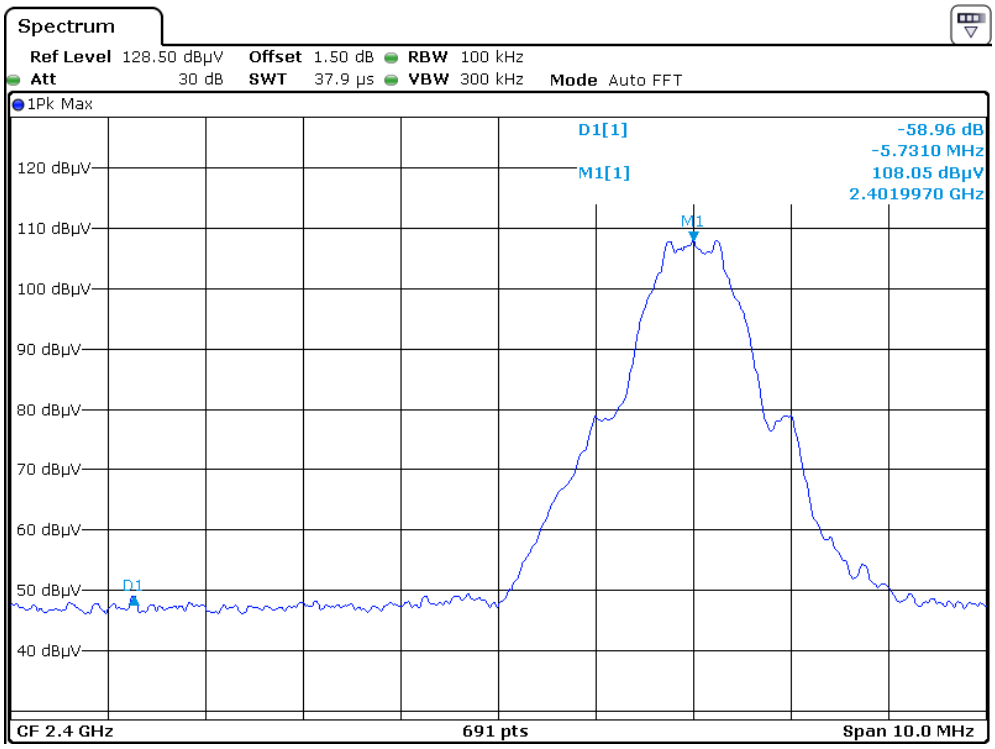
= 93.2 dBµv/m-59.22 dB
= 33.98 dBµv/m

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

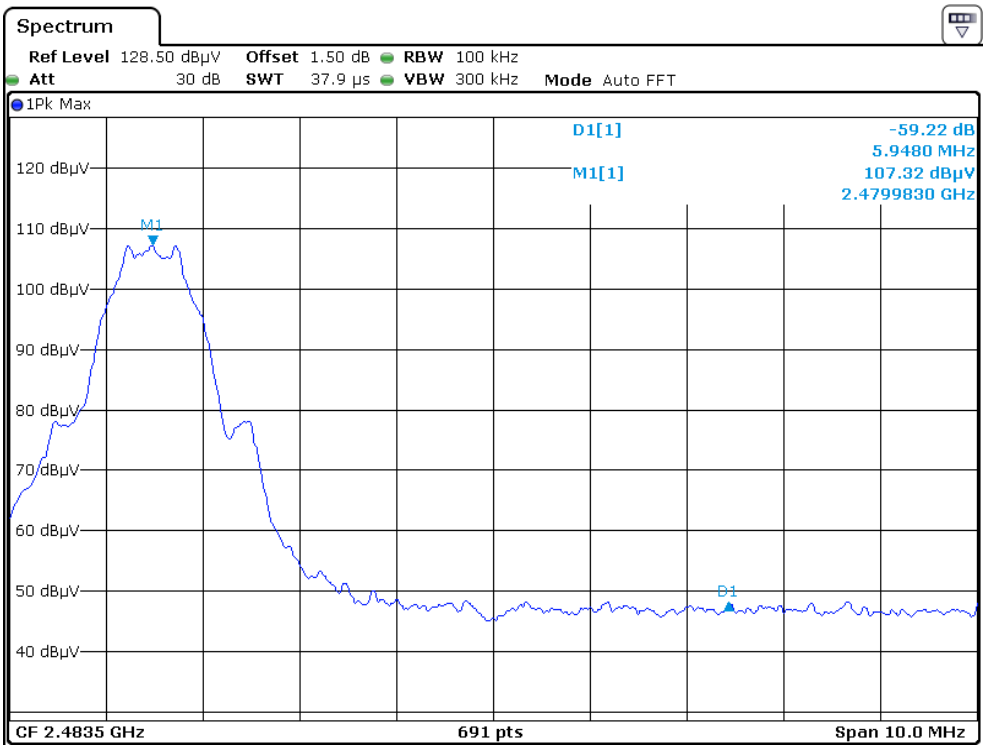
= 88.3 dBµv/m-59.22 dB
= 29.08 dBµv/m

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).

Lowest frequency Channel

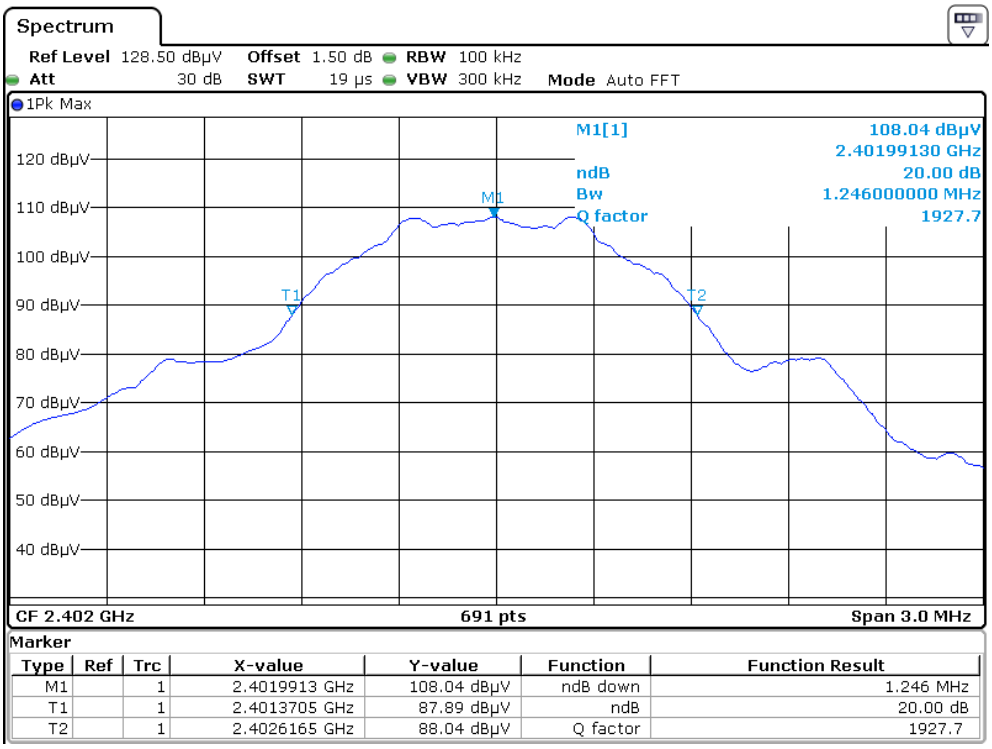


Highest frequency Channel



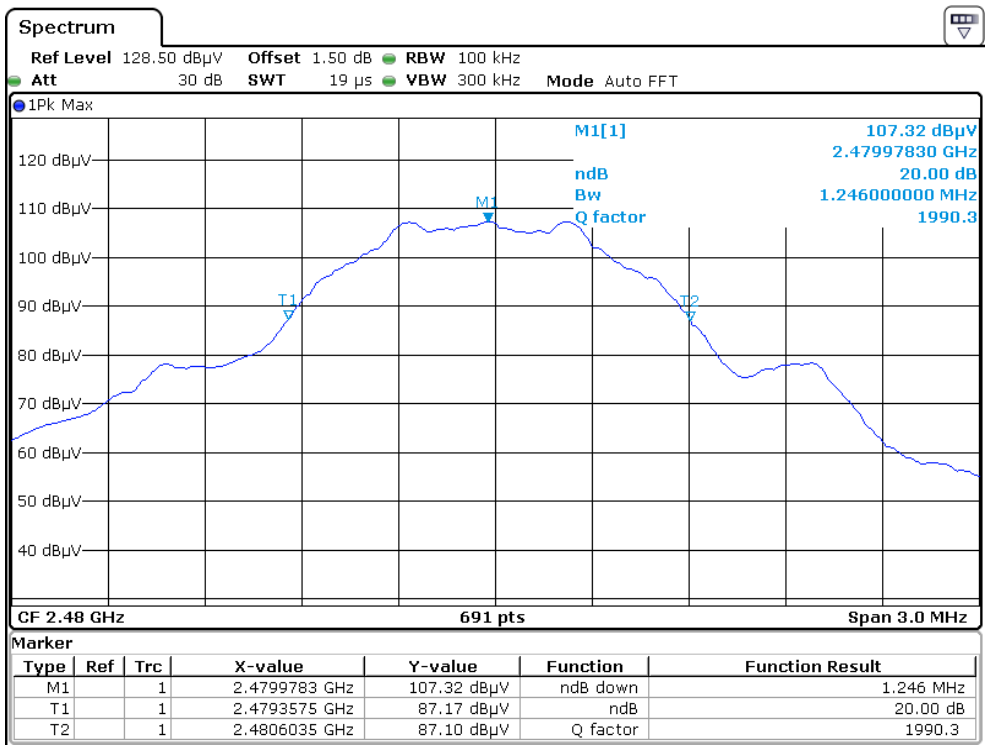
9.2 20dB bandwidth

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.



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.4019913 GHz	108.04 dBµV	ndB down	1.246 MHz
T1		1	2.4013705 GHz	87.89 dBµV	ndB	20.00 dB
T2		1	2.4026165 GHz	88.04 dBµV	Q factor	1927.7



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.4799783 GHz	107.32 dBµV	ndB down	1.246 MHz
T1		1	2.4793575 GHz	87.17 dBµV	ndB	20.00 dB
T2		1	2.4806035 GHz	87.10 dBµV	Q factor	1990.3

9.3 Discussion of Pulse Desensitization

Pulse desensitivity is not applicable for this device since the transmitter transmits the RF signal continuously.

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

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

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

9.5 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 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.

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

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.

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.

10.0 Test Equipment List

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	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	--	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	BRM50702-02	--	28-May-2019	28-May-2020
SZ185-02	EMI Test Receiver	R&S	ESCI	100692	29-Oct-2019	29-Oct-2020
SZ187-01	Two-Line V-Network	R&S	ENV216	100072	29-Oct-2019	29-Oct-2020
SZ187-02	Two-Line V-Network	R&S	ENV216	100073	28-May-2019	28-May-2020
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	30-Oct-2019	30-Oct-2020

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