

Shenzhen 3Nod Digital Technology Co., Ltd.

TEST REPORT

SCOPE OF WORK

FCC TESTING-100004118

REPORT NUMBER

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Intertek Report No.: 190118045SZN-005

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-005

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**
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Kidd Yang
Technical Supervisor
Date: May 8, 2019

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MEASUREMENT/TECHNICAL REPORT

Shenzhen 3Nod Digital Technology Co., Ltd.

Model: 100004118

FCC ID: 2AA3H-S3049

This report concerns (check one) Original Grant ☒ Class II Change ☐

Equipment Type: DTS - Part 15 Digital Transmission Systems

Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? Yes ☐ No ☒

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 ☒

If no, assumed Part 15, Subpart C for intentional radiator - the new 47 CFR [10-1-17] Edition] provision.

Report prepared by:

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List of attached file

Exhibit type	File Description	Filename
Test Report	Test Report	report.pdf
Test Setup Photo	Conducted Emission	conducted photos.pdf
Test Setup Photo	Radiated Emission	radiated photos.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

SUMMARY OF TEST RESULTS

1.0 Summary of Test results

ONN 32" 2.1 Soundbar

Model: 100004118

FCC ID: 2AA3H-S3049

TEST ITEM	REFERENCE	RESULTS
Max. Output power	15.247(b)(3)	Pass
6 dB Bandwidth	15.247(a)(2)	Pass
Max. Power Density	15.247(e)	Pass
Out of Band Antenna Conducted Emission	15.247(d)	Pass
Radiated Emission in Restricted Bands	15.247(d)	Pass
AC Conducted Emission	15.207	Pass
Antenna Requirement	15.203	Pass (See Notes)

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.

EXHIBIT 2

GENERAL DESCRIPTION

2.0 General Description

2.1 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 2.4G SRD module carry with double antenna, but they can't transmit at the same time. The EUT is powered by DC 18V/2A through an adapter. For more detailed features description, please refer to the user's manual.

Antenna Type: Integral antenna

Modulation Type: GFSK

Antenna Gain: 4.8 dBi Max

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 cable, 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.

2.2 Related Submittal(s) Grants

This is an application for certification of DTS- Part 15 Digital Transmission Systems (2.4GHz SRD transmitter portion).

For the BT 4.2 EDR mode was tested and demonstrated in report 190118045SZN-001.

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 other functions were reported in the SDOC report: 190118043SZN-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 and KDB 558074 D01 v05r02. 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).

EXHIBIT 3

SYSTEM TEST CONFIGURATION

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, both designing schemes have been considered, 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 meter 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 were 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: VMldebug v1.1.6.48

3.3 Special Accessories

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

3.4 Measurement Uncertainty

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

Uncertainty and Compliance - Unless the standard specifically states that measured values are to be extended by the measurement uncertainty in determining compliance, all compliance determinations are based on the actual measured value.

3.5 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.

3.6 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 4

MEASUREMENT RESULTS

Applicant: Shenzhen 3Nod Digital Technology Co., Ltd.

Date of Test: April 8, 2019

Model: 100004118

4.0 Measurement Results

4.1 Maximum Conducted Output Power at Antenna Terminals, FCC Rules 15.247(b)(3):

The antenna power of the EUT was connected to the input of a broadband peak RF power meter. The power meter has a video bandwidth that is greater than DTS bandwidth and utilize a fast-responding diode detector. Power was read directly at the EUT antenna terminals with cable loss added.

For antennas with gains of 6 dBi or less, maximum allowed Transmitter output is 1 watt (+30 dBm).

ANT 0:

Frequency (MHz)	Output in dBm (Peak reading)	Output in mWatt
Low Channel: 2403.35	2.55	1.80
Middle Channel: 2440.35	2.55	1.80
High Channel: 2477.35	2.61	1.82

ANT 1:

Frequency (MHz)	Output in dBm (Peak reading)	Output in mWatt
Low Channel: 2403.35	3.56	2.27
Middle Channel: 2440.35	3.21	2.09
High Channel: 2477.35	3.06	2.02

Cable loss: 1.0 dB External Attenuation: 0 dB

Cable loss, external attenuation has been included in OFFSET function

EUT max. output level = 3.56dBm

EUT max. radiated output level = 3.56dBm + 4.8dBi = 8.36dBm

For RF Exposure, the information is saved with filename: RF exposure.pdf.

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Model: 100004118

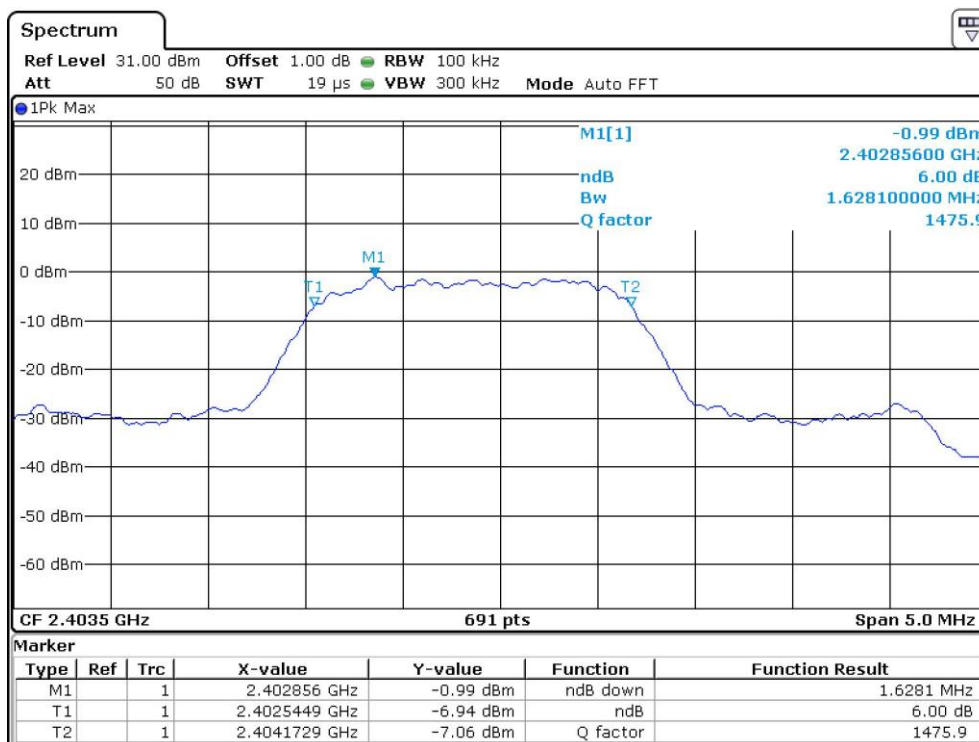
4.2 Minimum 6 dB RF Bandwidth, FCC Rule 15.247(a) (2):

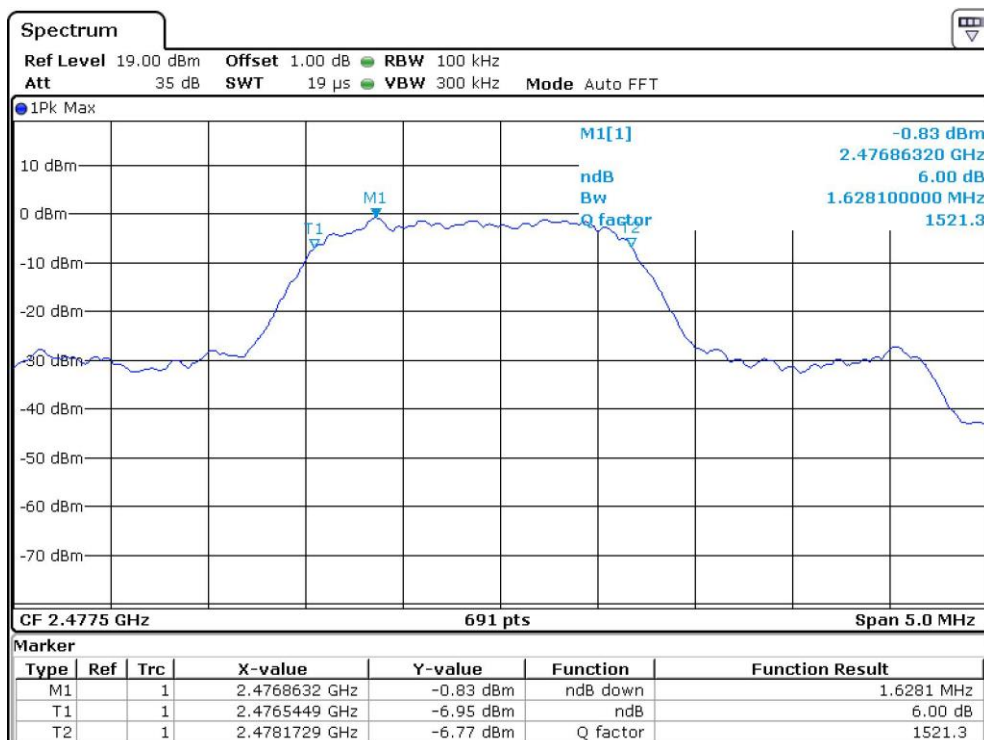
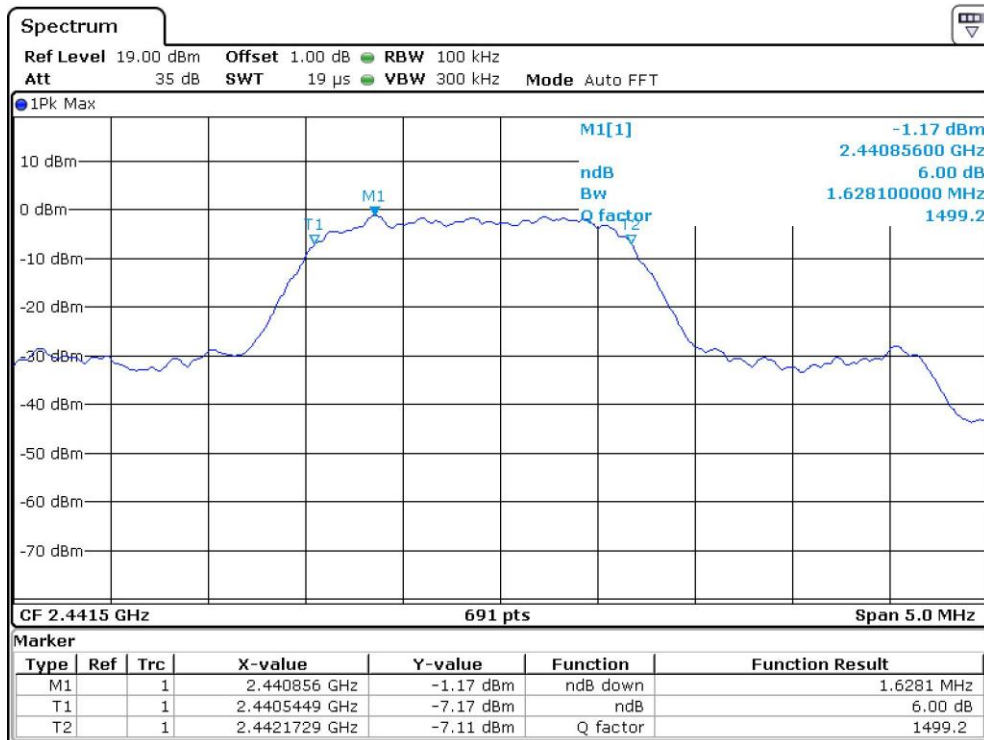
The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer RES BW was set to 100 KHz according to FCC KDB 558074 D01 v05r02. For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. A PEAK output reading was taken, a DISPLAY line was drawn 6 dB lower than PEAK level. The 6dB bandwidth was determined from where the channel output spectrum intersected the display line.

Limit: The 6 dB Bandwidth is at least 500 kHz.

Frequency (MHz)	6 dB Bandwidth (KHz)
2403.35	1628.1
2440.35	1628.1
2477.35	1628.1

The test plots are attached as below.





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Date of Test: April 8, 2019

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4.3 Maximum Power Density Reading, FCC Rule 15.247(e):

The Measurement Procedure PKPSD was set according to the FCC KDB 558074 D01 v05r02.

Antenna output of the EUT was coupled directly to spectrum analyzer; if an external attenuator and/or cable was used, these losses are compensated for with the analyzer OFFSET function.

For antennas with gains of 6 dBi or less, maximum allowed Power Density is 8dBm/3 kHz.

ANT 0:

Frequency (MHz)	Power Density with RBW 100KHz
2403.35	-1.07
2440.35	-1.22
2477.35	-1.22

ANT 1:

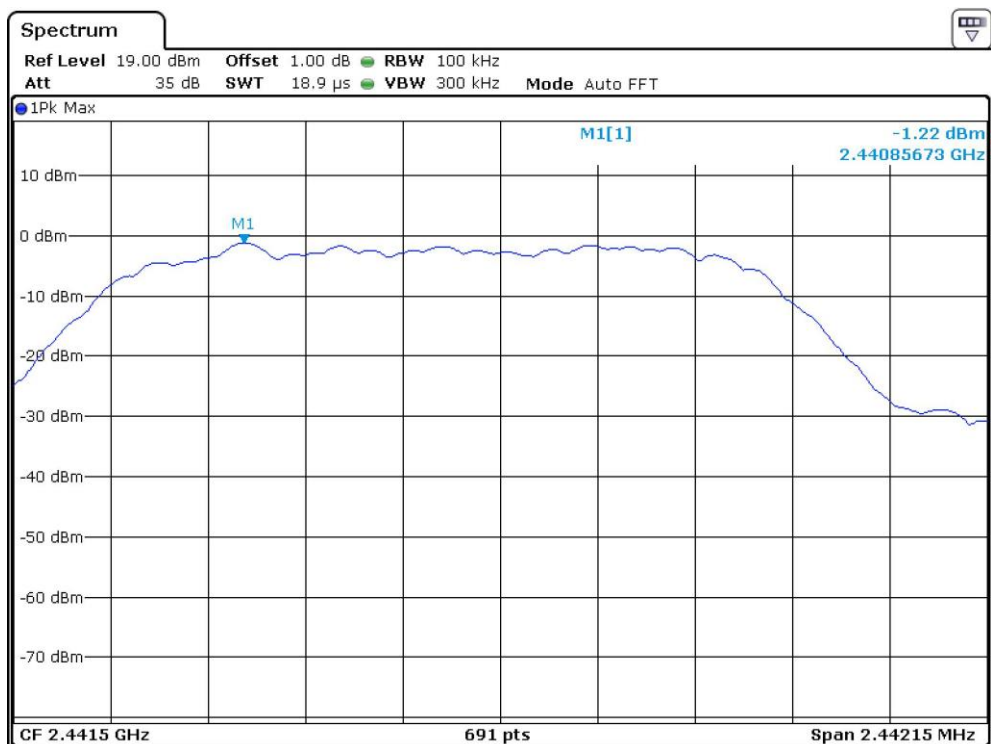
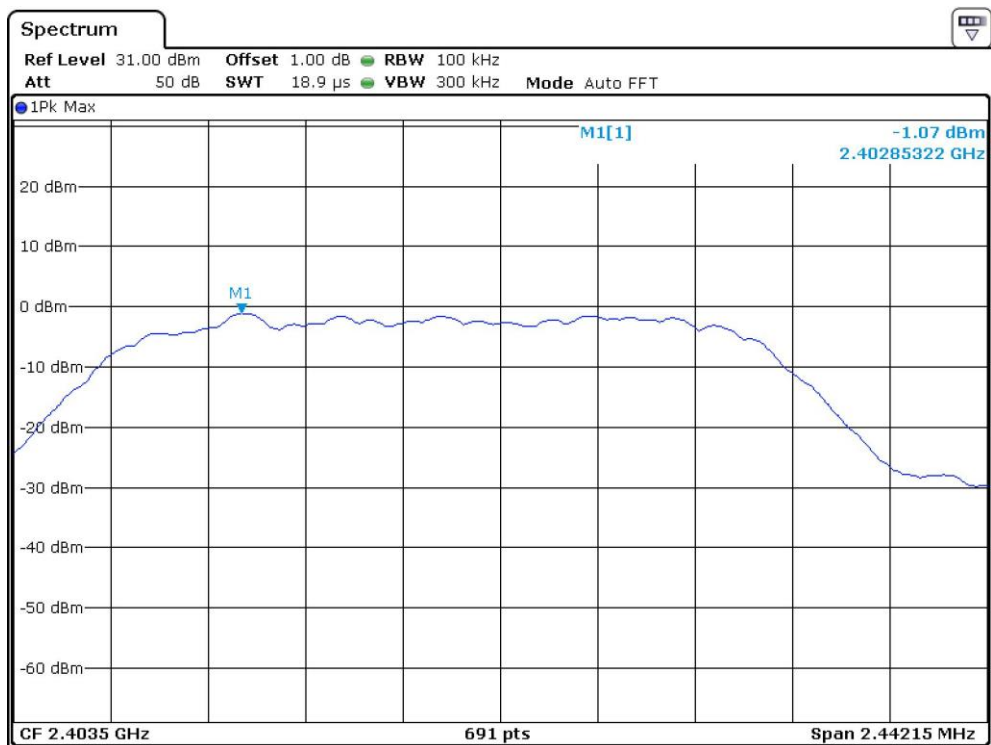
Frequency (MHz)	Power Density with RBW 100KHz
2403.35	-0.05
2440.35	-0.47
2477.35	-0.56

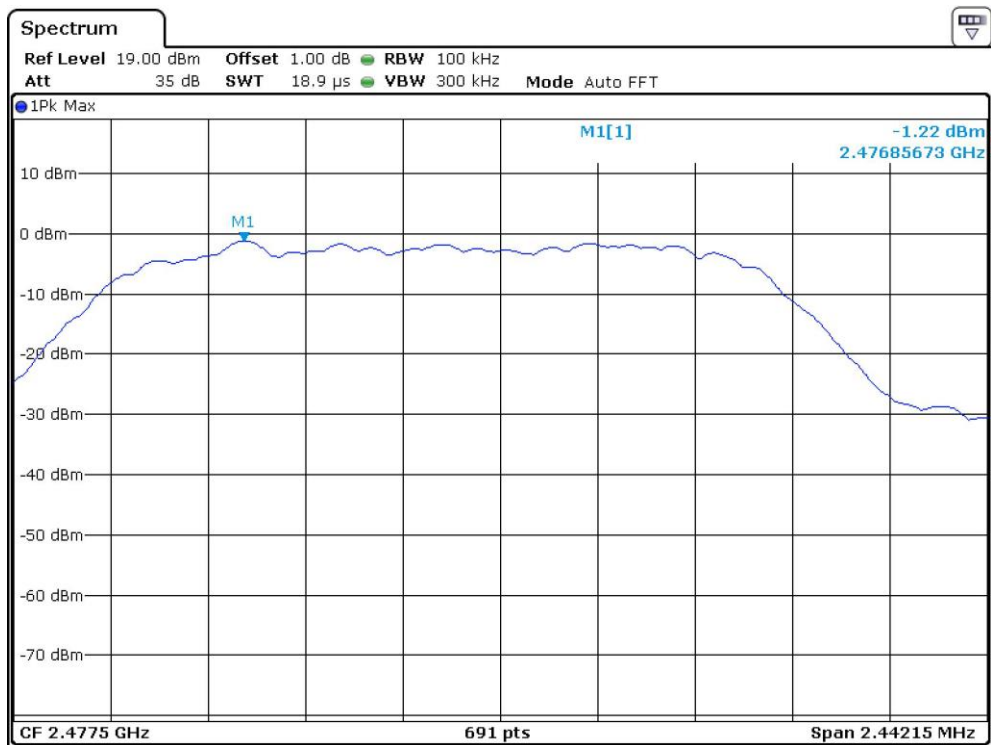
Cable loss: 1.0 dB External Attenuation: 0 dB

Cable loss, external attenuation has been included in OFFSET function

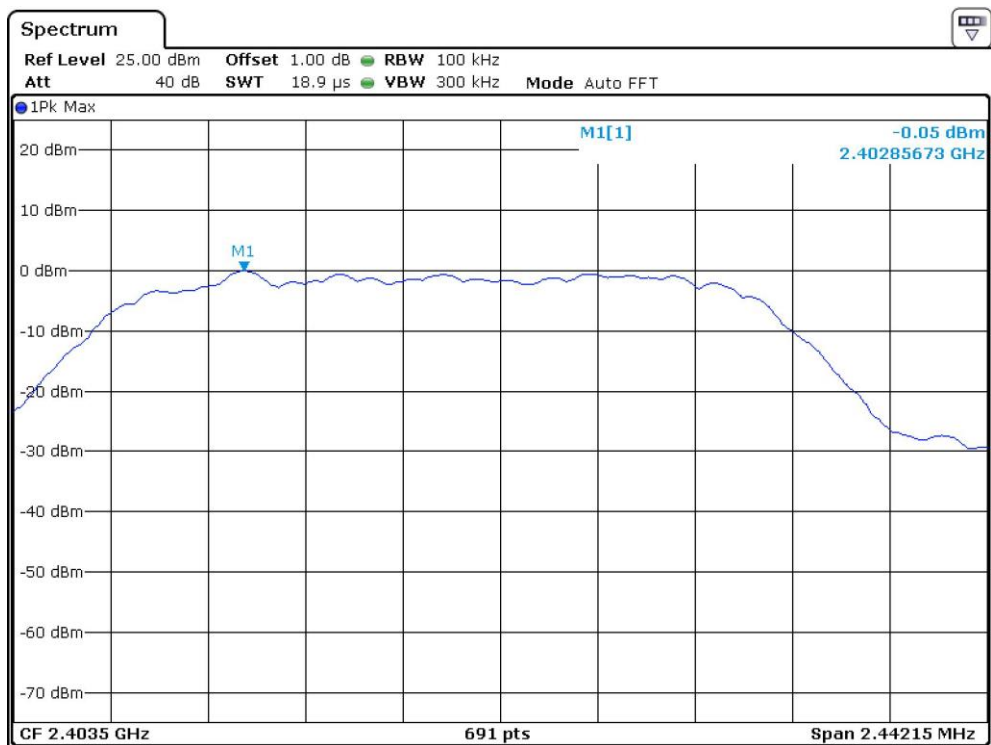
The test plots are attached as below.

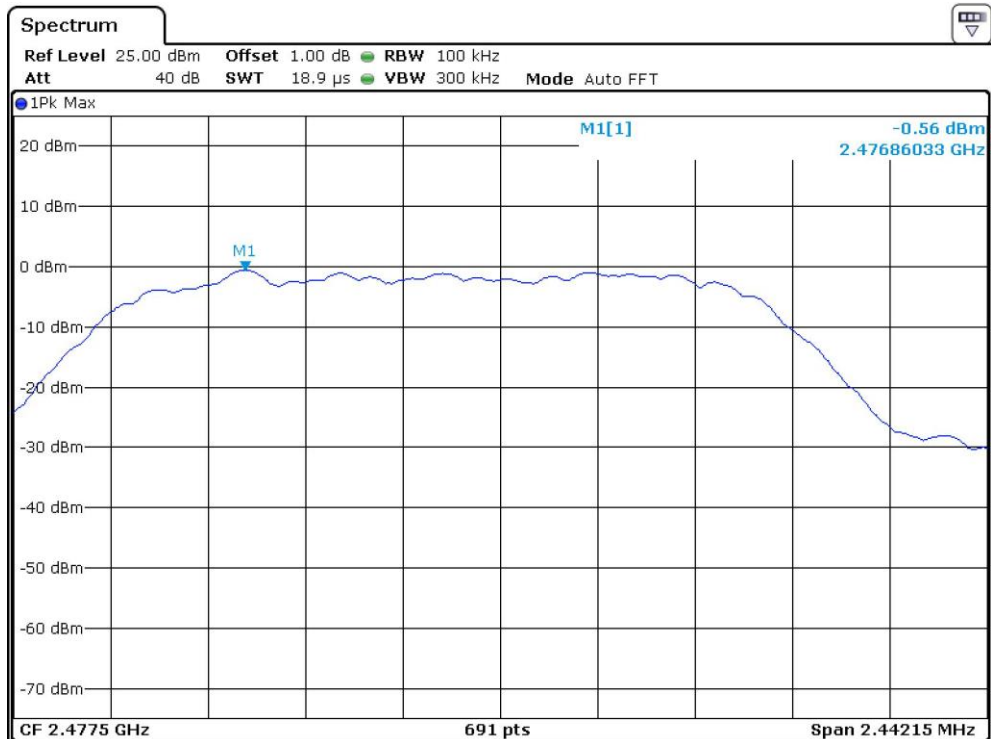
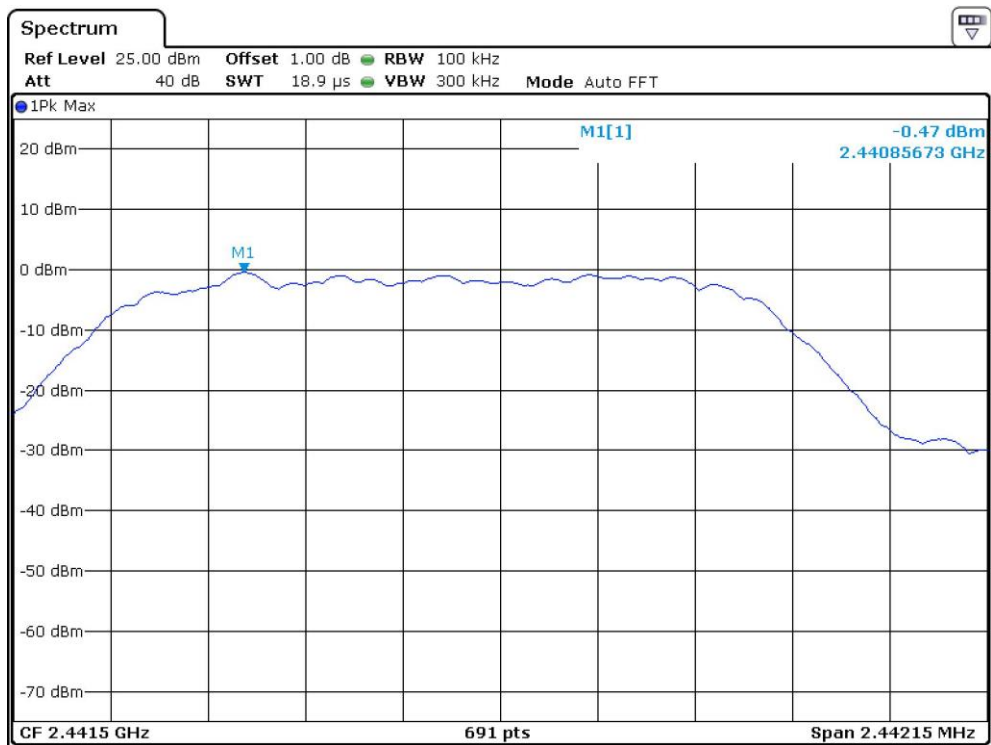
ANT 0:





ANT 1:





Applicant: Shenzhen 3Nod Digital Technology Co., Ltd.

Date of Test: April 8, 2019

Model: 100004118

4.4 Out of Band Conducted Emissions, FCC Rule 15.247(d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. The Measurement Procedure was set according to the FCC KDB 558074 D01 v05r02.

All other types of emissions from the EUT shall meet the general limits for radiated frequencies outside the passband.

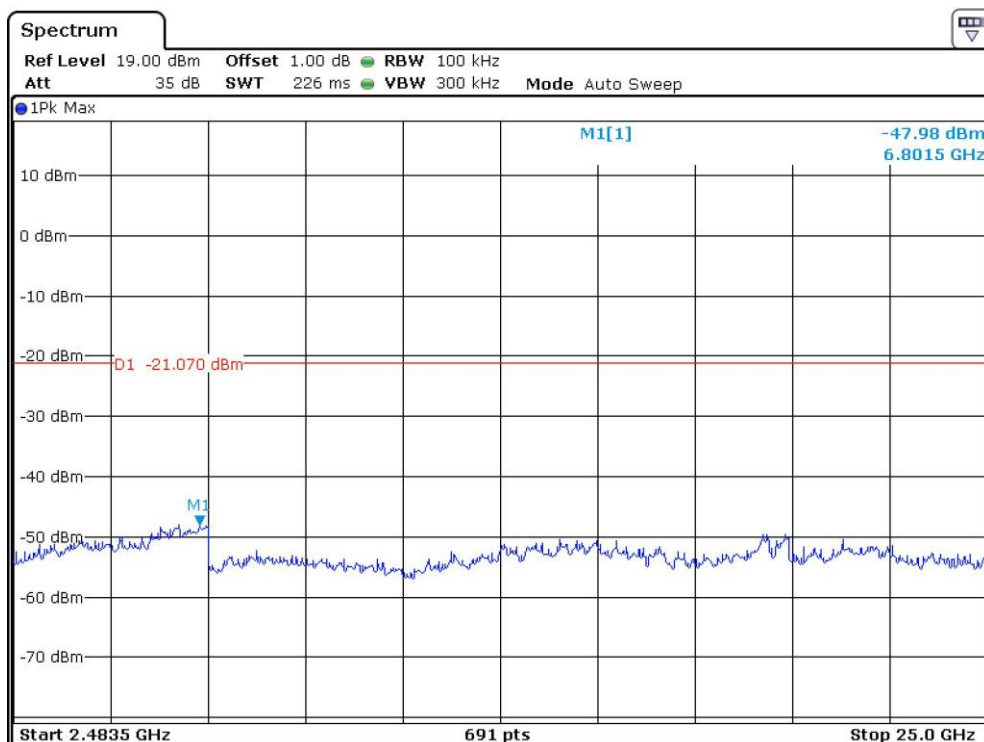
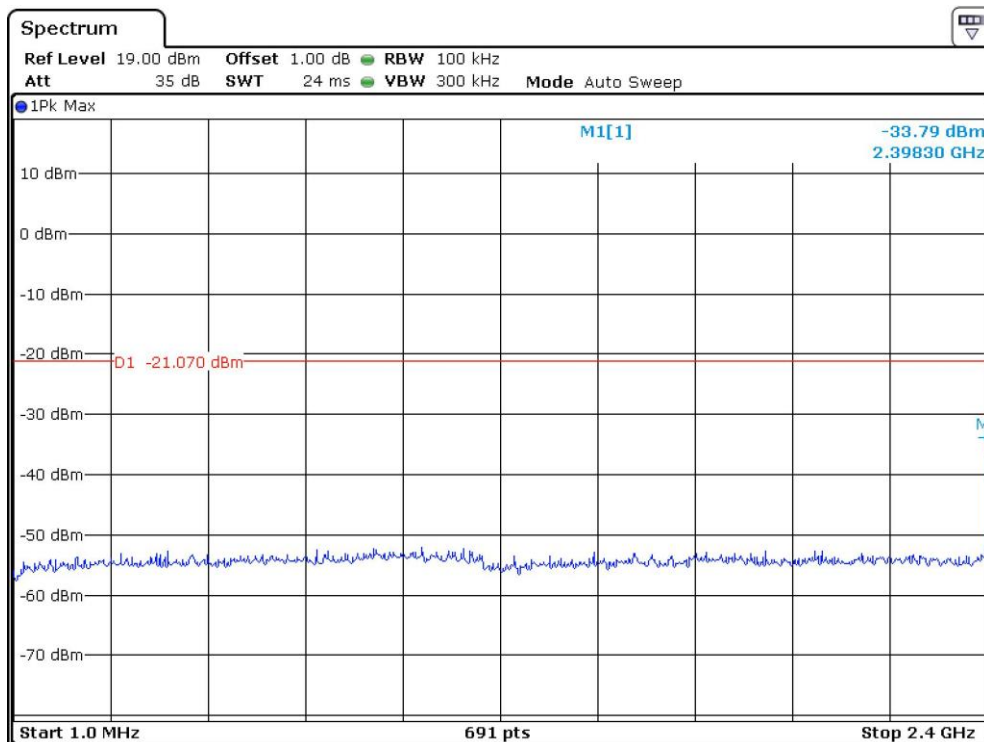
Refer to the attached test plots for out of band conducted emissions data.

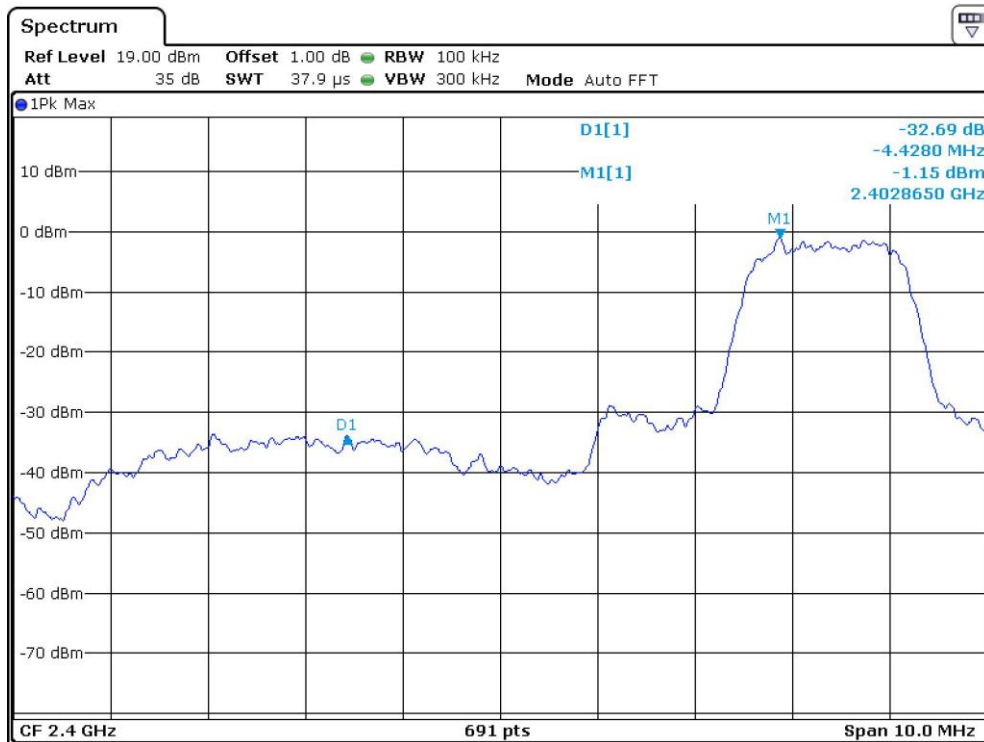
The test plots showed all spurious emission up to the tenth harmonic were measured and they were found to be at least 20 dB below the highest level of the desired power in the passband.

The test plots are attached as below.

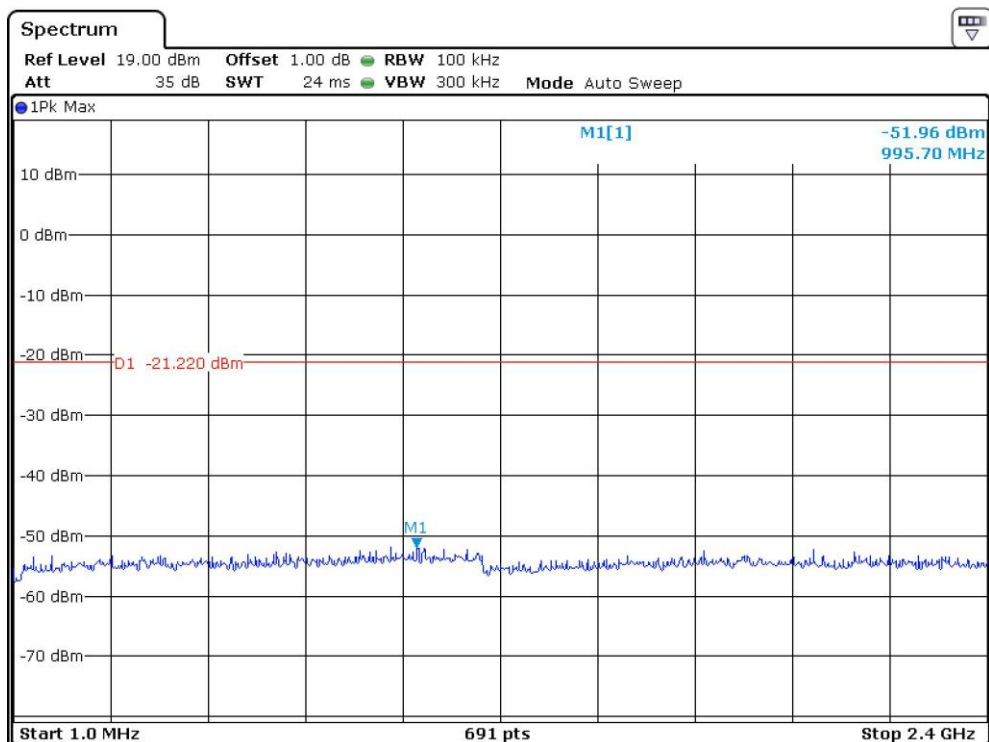
ANT 0:

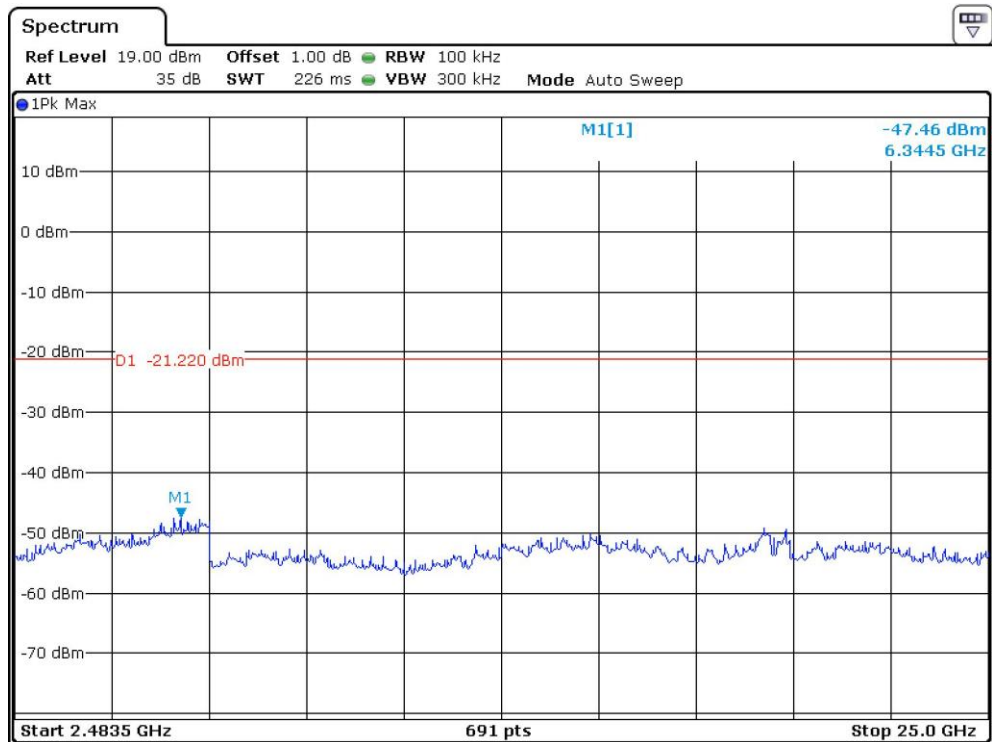
Channel 1 (2403.35MHz) Reference Level: -1.07dBm



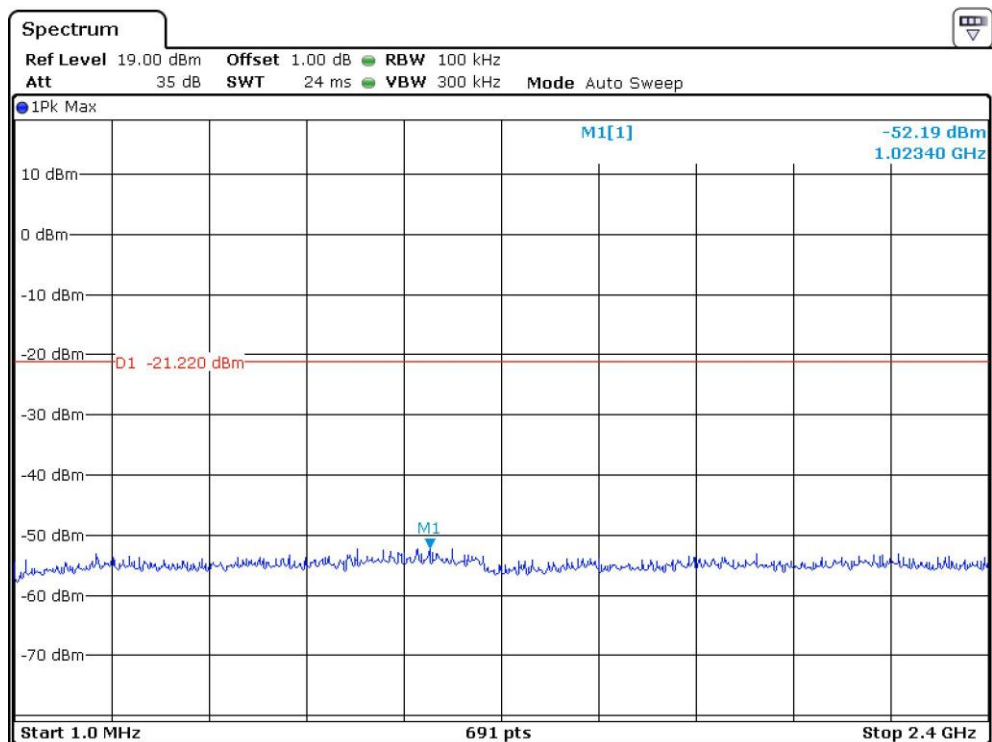


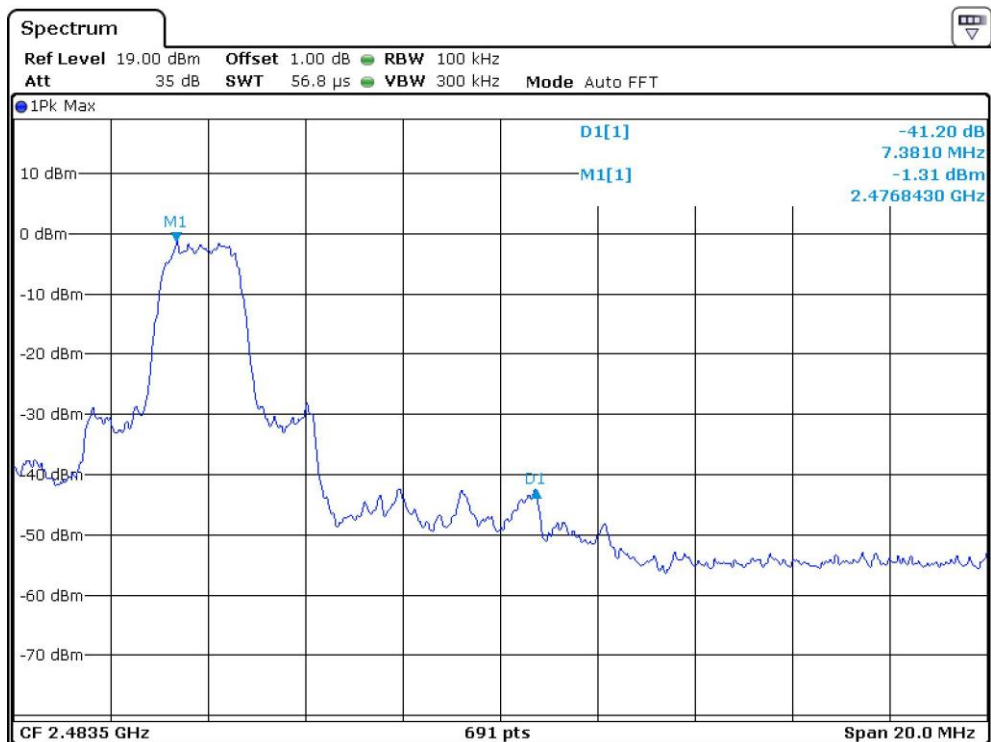
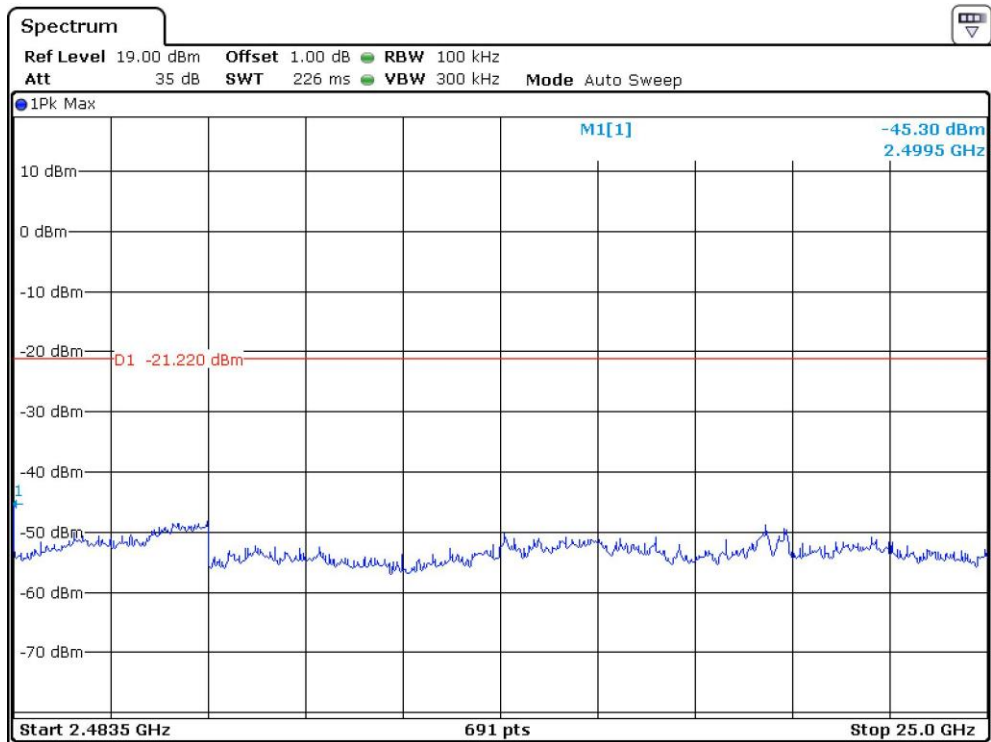
Channel 19 (2440.35MHz) Reference Level: -1.22dBm





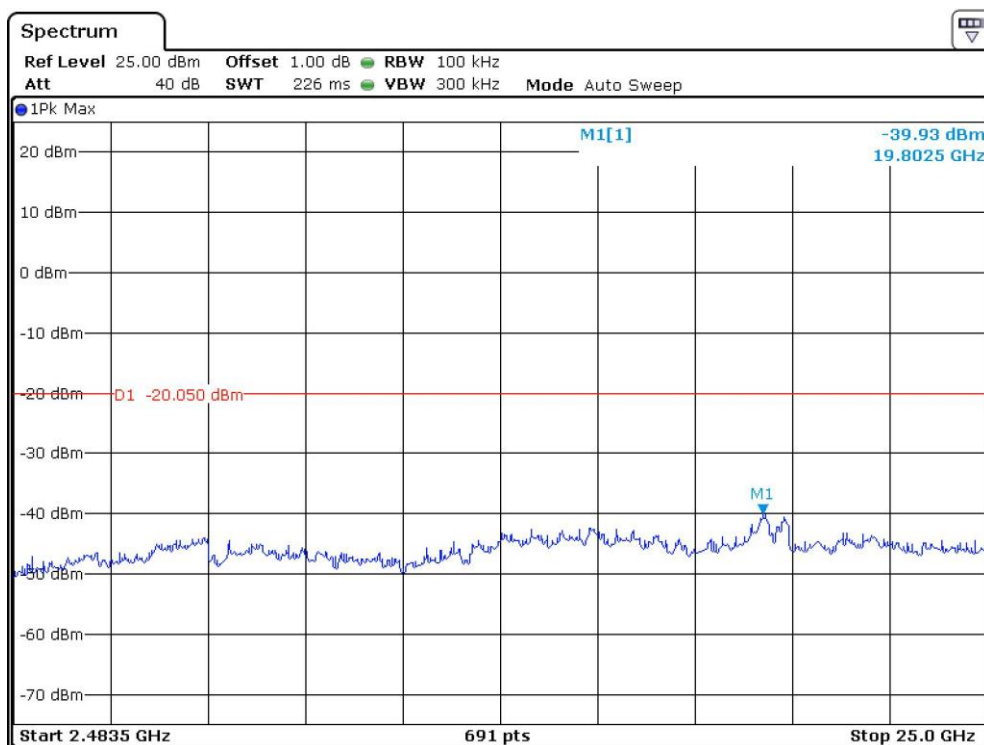
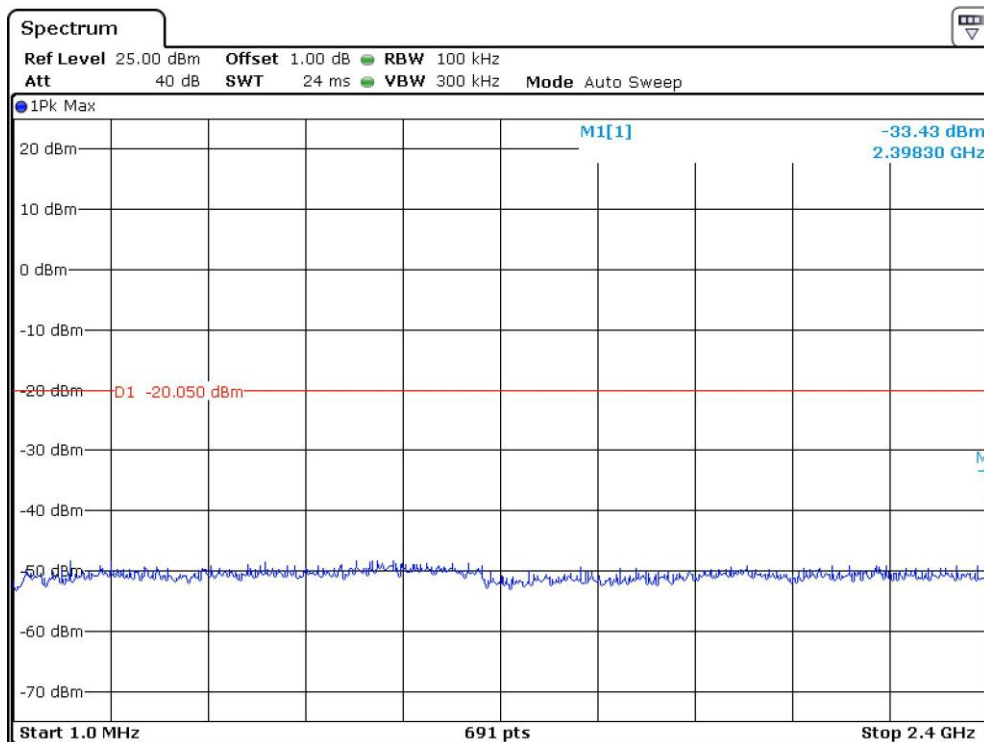
Channel 38 (2477.35MHz) Reference Level: -1.22dBm

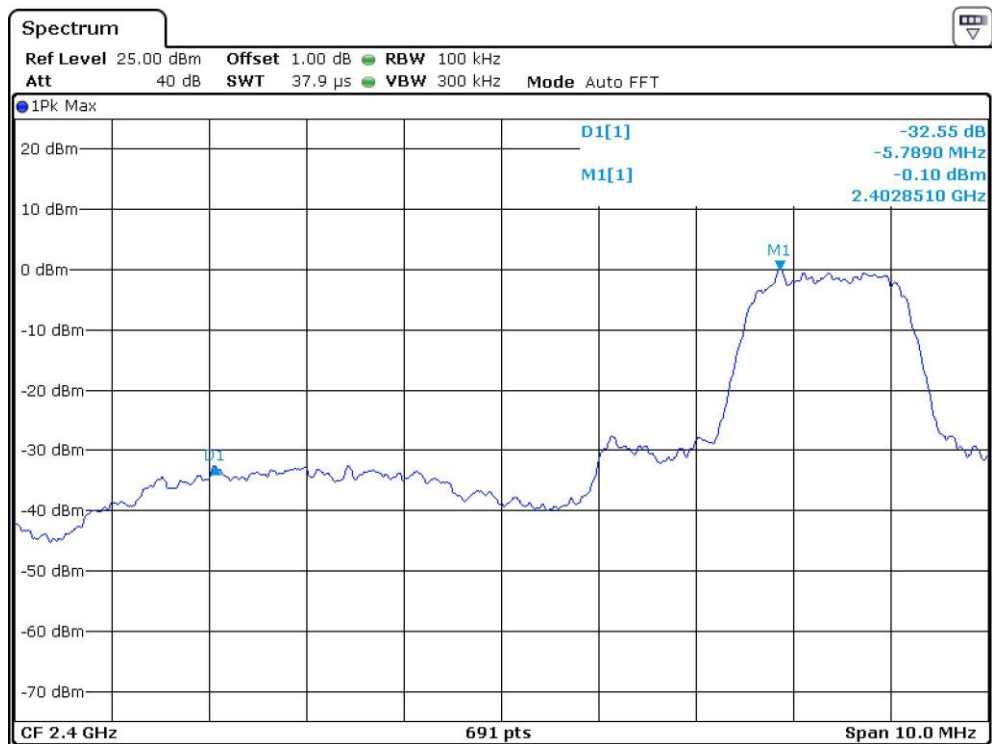




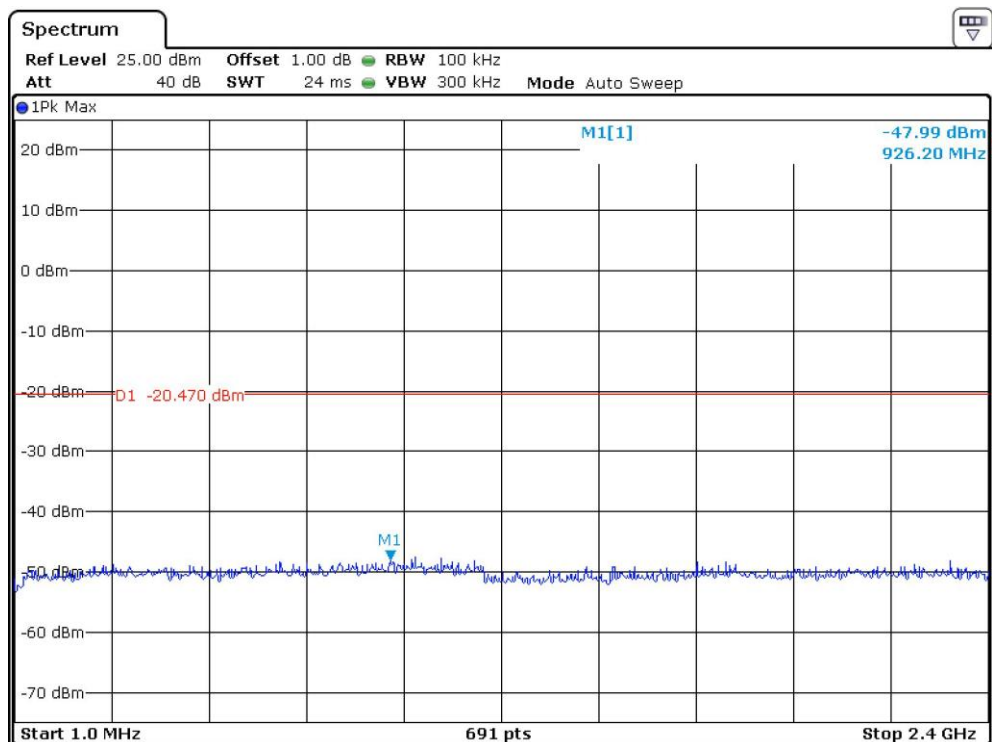
ANT 1:

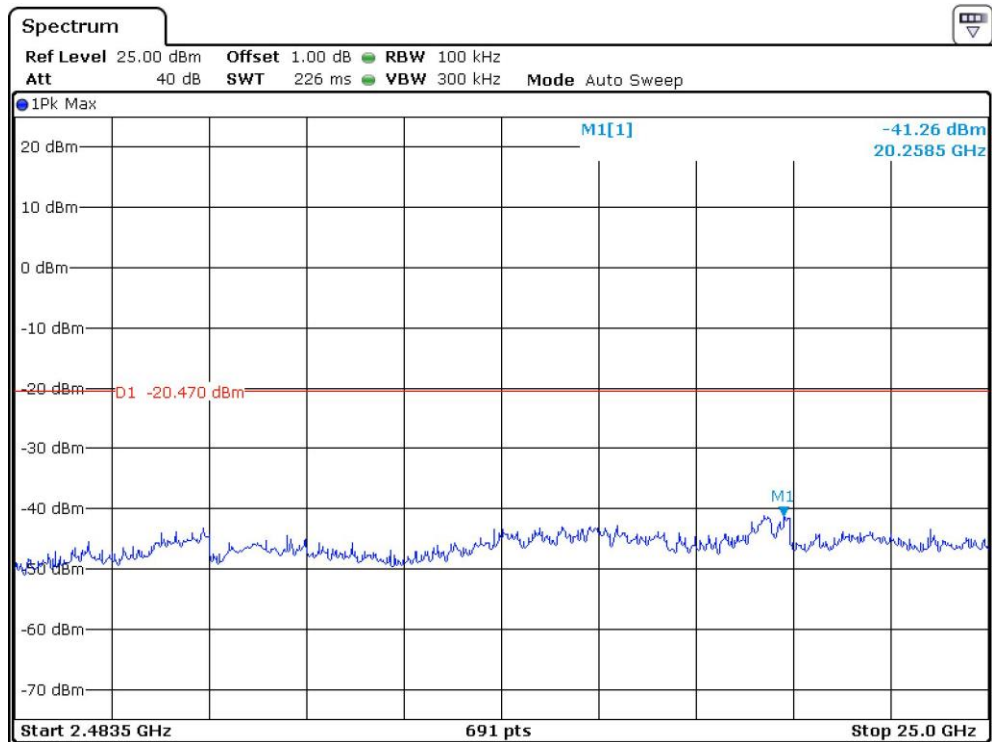
Channel 1 (2403.35MHz) Reference Level: -0.05dBm



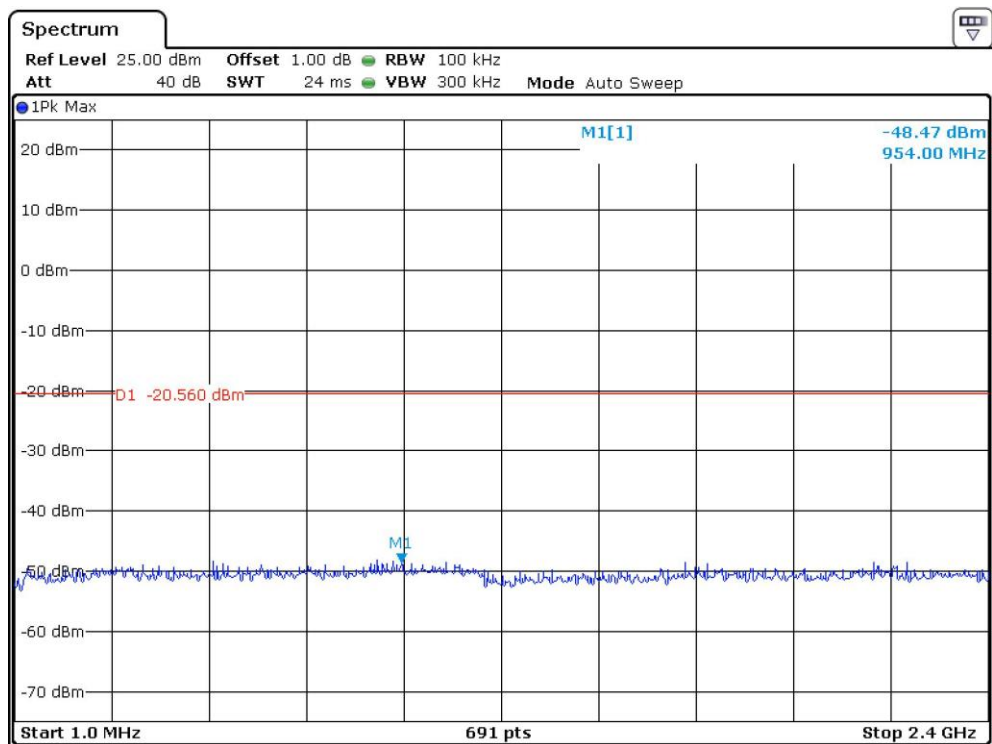


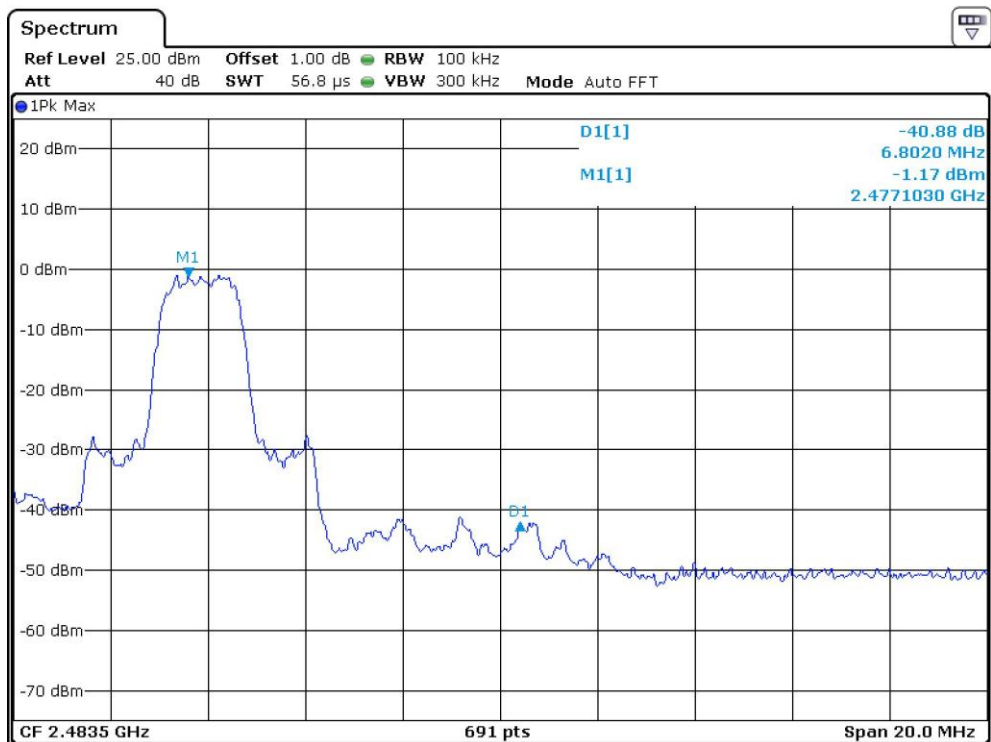
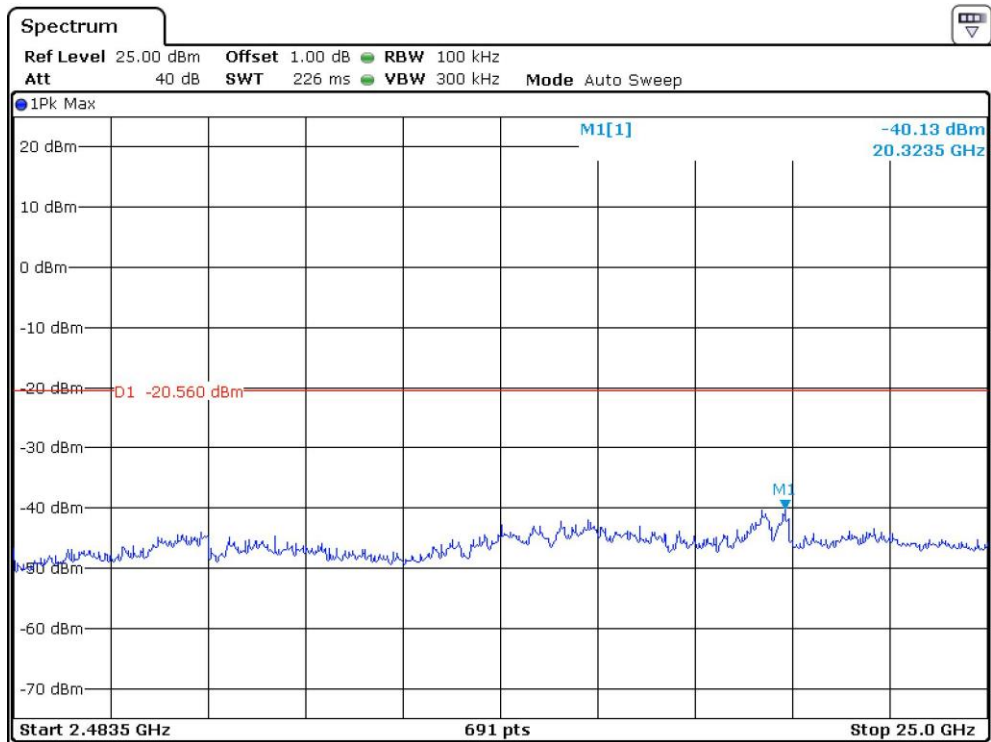
Channel 19 (2440.35MHz) Reference Level: -0.47dBm





Channel 38 (2477.35MHz) Reference Level: -0.56dBm





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4.5 Out of Band Radiated Emissions (for emissions in 4.4 above that are less than 20dB below carrier), FCC Rule 15.247(d):

For out of band emissions that are close to or that exceed the 20dB attenuation requirement described in the specification, radiated measurements were performed at a 3m separation distance to determine whether these emissions complied with the general radiated emission requirement.

☒ Not required, since all emissions are more than 20dB below fundamental

☐ See attached data sheet

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4.6 Transmitter Radiated Emissions in Restricted Bands, FCC Rule 15.35(b) (c):

Data is included of the worst-case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included. All measurements were performed with peak detection unless otherwise specified. Simultaneous transmission was considered during the test.

The data on the following pages list the significant emission frequencies, the limit and the margin of compliance.

Applicant: Shenzhen 3Nod Digital Technology Co., Ltd.

Date of Test: May 6, 2019

Model: 100004118

4.7 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.

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

Where FS = Field Strength in dB μ V/m
 RA = Receiver Amplitude (including preamplifier) in dB μ V
 CF = Cable Attenuation Factor in dB
 AF = Antenna Factor in dB
 AG = Amplifier Gain in dB
 PD = Pulse Desensitization 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:

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

Example

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. The net field strength for comparison to the appropriate emission limit is 42 dB μ V/m. This value in dB μ V/m was converted to its corresponding level in μ V/m.

$$\begin{aligned} RA &= 62.0 \text{ dB}\mu\text{V} \\ AF &= 7.4 \text{ dB} \\ CF &= 1.6 \text{ dB} \\ AG &= 29.0 \text{ dB} \\ PD &= 0 \text{ dB} \\ FS &= 62 + 7.4 + 1.6 - 29 + 0 = 42 \text{ dB}\mu\text{V/m} \end{aligned}$$

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

Applicant: Shenzhen 3Nod Digital Technology Co., Ltd.

Date of Test: May 6, 2019

Model: 100004118

4.8 Radiated Spurious Emission

Worst Case Radiated Spurious Emission
at 162.890MHz
is passed by 5.3dB margin.

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

Applicant: Shenzhen 3Nod Digital Technology Co., Ltd.

Date of Test: May 6, 2019

Model: 100004118 (Carry with adapter 2 and HDMI cable 1)

Worst Case Operating Mode: 2.4G SRD Link

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	39.4	20.0	9.5	28.9	43.5	-14.6
Horizontal	163.000	42.0	20.0	10.0	32.0	43.5	-11.5
Horizontal	371.925	37.4	20.0	15.7	33.1	46.0	-12.9
Vertical	64.435	41.2	20.0	7.4	28.6	40.0	-11.4
Vertical	150.280	47.7	20.0	9.5	37.2	43.5	-6.3
Vertical	162.890	48.2	20.0	10.0	38.2	43.5	-5.3

- NOTES:
1. Quasi-Peak detector is used for frequency below 1GHz.
 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.

Applicant: Shenzhen 3Nod Digital Technology Co., Ltd.

Date of Test: April 8, 2019

Model: 100004118

Worst Case Operating Mode:

Transmitting (2403.35MHz)

ANT 0:

Radiated Emissions

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	*4806.700	52.15	36.3	33.4	49.25	74.0	-24.75
Horizontal	*2389.520	65.11	36.4	27.5	56.21	74.0	-17.79

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)
Horizontal	*4806.700	41.11	36.3	33.4	38.21	54.0	-15.79
Horizontal	*2389.520	53.23	36.4	27.5	44.33	54.0	-9.67

- NOTES:
1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz/VBW=10Hz for average value.
 2. All measurements were made at 3 meters. Radiated 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 radiated 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 used for the emission over 1000MHz.
- * Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Applicant: Shenzhen 3Nod Digital Technology Co., Ltd.

Date of Test: April 8, 2019

Model: 100004118

Worst Case Operating Mode:

Transmitting (2440.35MHz)

ANT 0:

Radiated Emissions

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	*4880.700	49.55	36.3	33.5	46.75	74.0	-27.25
Horizontal	*7321.050	51.58	36.3	37.7	52.98	74.0	-21.02

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)
Horizontal	*4880.700	40.18	36.3	33.5	37.38	54.0	-16.62
Horizontal	*7321.050	42.35	36.3	37.7	43.75	54.0	-10.25

- NOTES: 1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz / VBW=10Hz for average value.
2. All measurements were made at 3 meters. Radiated 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 radiated 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 used for the emission over 1000MHz.
- * Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Applicant: Shenzhen 3Nod Digital Technology Co., Ltd.

Date of Test: April 8, 2019

Model: 100004118

Worst Case Operating Mode:

Transmitting (2477.35MHz)

ANT 0:

Radiated Emissions

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	*4954.700	50.70	36.3	33.5	47.90	74.0	-26.10
Horizontal	*7432.050	53.84	36.3	37.8	55.34	74.0	-18.66
Horizontal	*2484.250	60.28	36.4	27.5	51.38	74.0	-22.62

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)
Horizontal	*4954.700	40.23	36.3	33.5	37.43	54.0	-16.57
Horizontal	*7432.050	43.28	36.3	37.8	44.78	54.0	-9.22
Horizontal	*2484.250	51.05	36.4	27.5	42.15	54.0	-11.85

NOTES: 1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz / VBW=10Hz for average value.

2. All measurements were made at 3 meters. Radiated 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 radiated 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 used for the emission over 1000MHz.

* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Applicant: Shenzhen 3Nod Digital Technology Co., Ltd.

Date of Test: April 8, 2019

Model: 100004118

Worst Case Operating Mode:

Transmitting (2403.35MHz)

ANT 1:

Radiated Emissions

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	*4806.700	50.47	36.3	33.4	47.57	74.0	-26.43
Horizontal	*2389.520	63.86	36.4	27.5	54.96	74.0	-19.04

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)
Horizontal	*4806.700	40.23	36.3	33.4	37.33	54.0	-16.67
Horizontal	*2389.520	54.29	36.4	27.5	45.39	54.0	-8.61

- NOTES: 1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz/VBW=10Hz for average value.
2. All measurements were made at 3 meters. Radiated 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 radiated 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 used for the emission over 1000MHz.
- * Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Applicant: Shenzhen 3Nod Digital Technology Co., Ltd.

Date of Test: April 8, 2019

Model: 100004118

Worst Case Operating Mode:

Transmitting (2440.35MHz)

ANT 1:

Radiated Emissions

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	*4880.700	50.21	36.3	33.5	47.41	74.0	-26.59
Horizontal	*7321.050	52.83	36.3	37.7	54.23	74.0	-19.77

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)
Horizontal	*4880.700	40.39	36.3	33.5	37.59	54.0	-16.41
Horizontal	*7321.050	41.66	36.3	37.7	43.06	54.0	-10.94

- NOTES: 1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz / VBW=10Hz for average value.
2. All measurements were made at 3 meters. Radiated 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 radiated 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 used for the emission over 1000MHz.
- * Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Applicant: Shenzhen 3Nod Digital Technology Co., Ltd.

Date of Test: April 8, 2019

Model: 100004118

Worst Case Operating Mode:

Transmitting (2477.35MHz)

ANT 1:

Radiated Emissions

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	*4954.700	49.55	36.3	33.5	46.75	74.0	-27.25
Horizontal	*7432.050	53.54	36.3	37.8	55.04	74.0	-18.96
Horizontal	*2484.250	64.78	36.4	27.5	55.88	74.0	-18.12

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)
Horizontal	*4954.700	40.52	36.3	33.5	37.72	54.0	-16.28
Horizontal	*7432.050	43.16	36.3	37.8	44.66	54.0	-9.34
Horizontal	*2484.250	54.34	36.4	27.5	45.44	54.0	-8.56

- NOTES: 1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz / VBW=10Hz for average value.
2. All measurements were made at 3 meters. Radiated 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 radiated 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 used for the emission over 1000MHz.
- * Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

4.9 Conducted Emission at Mains Terminal

4.9.1 Conducted Emissions Configuration Photograph

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

4.9.2 Conducted Emissions

Worst Case Neutral-Conducted Configuration

At

0.392 MHz

Judgement: Passed by 9.2 dB margin

TEST PERSONNEL:

Sign on file

Leo Li, Project Engineer
Typed/Printed Name

8 April 2019
Date

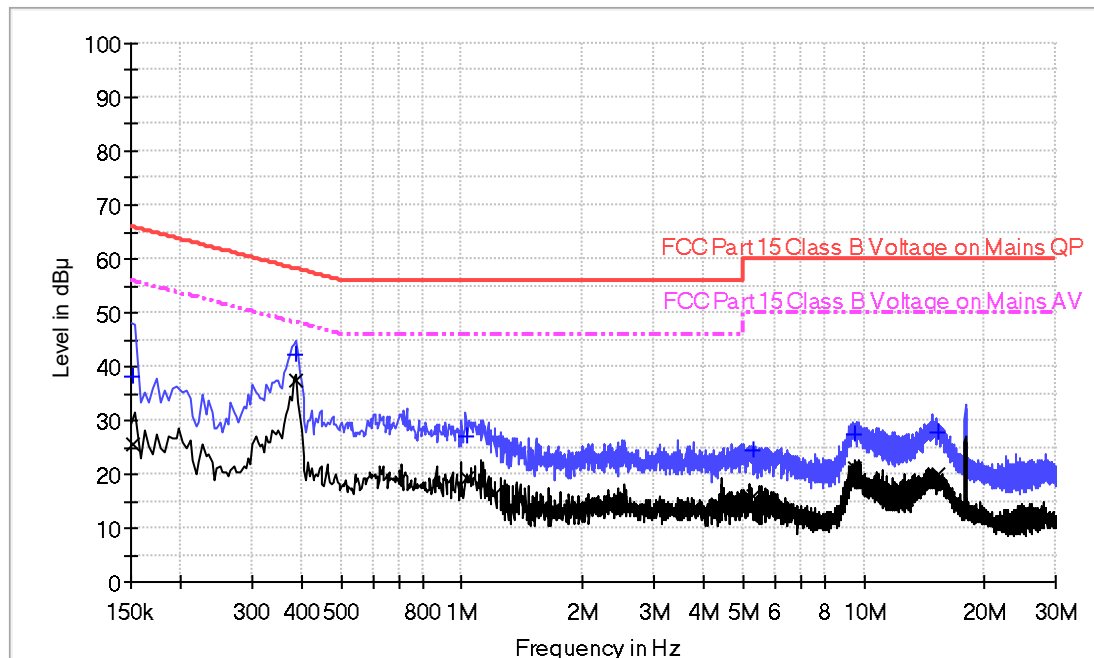
Applicant: Shenzhen 3Nod Digital Technology Co., Ltd.

Date of Test: April 8, 2019

Model: 100004118 (Carry with adapter 1 and HDMI cable 1)

Worst Case Operating Mode: 2.4G SRD Link

Conducted Emission Test - FCC



Result Table QP

Frequency (MHz)	QuasiPeak (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.152000	38.2	L1	9.6	27.7	65.9
0.385000	42.3	L1	9.6	15.9	58.2
1.032000	27.1	L1	9.7	28.9	56.0
5.280000	24.5	L1	9.8	35.5	60.0
9.474000	27.4	L1	9.9	32.6	60.0
15.334000	27.6	L1	10.0	32.4	60.0

Result Table AV

Frequency (MHz)	Average (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.152000	25.5	L1	9.6	30.4	55.9
0.385000	37.3	L1	9.6	10.9	48.2
1.032000	19.2	L1	9.7	26.8	46.0
5.280000	15.9	L1	9.8	34.1	50.0
9.474000	21.2	L1	9.9	28.8	50.0
15.334000	20.1	L1	10.0	29.9	50.0

Remark:

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

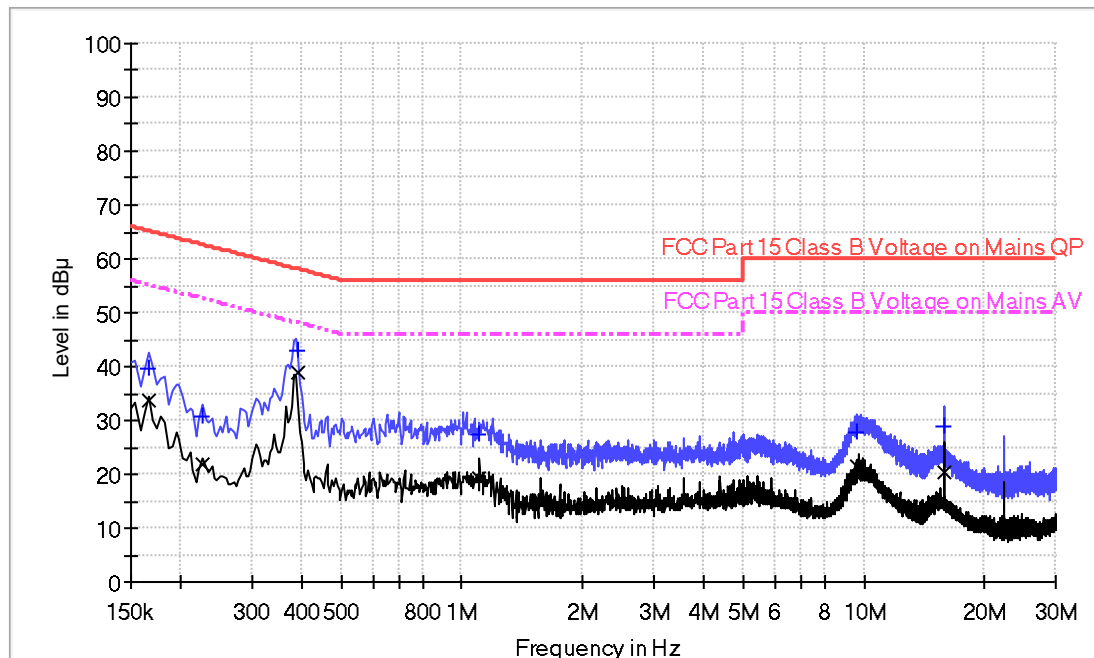
Applicant: Shenzhen 3Nod Digital Technology Co., Ltd.

Date of Test: April 8, 2019

Model: 100004118 (Carry with adapter 1 and HDMI cable 1)

Worst Case Operating Mode: 2.4G SRD Link

Conducted Emission Test - FCC



Result Table QP

Frequency (MHz)	QuasiPeak (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.166000	39.5	N	9.6	25.7	65.2
0.227000	30.7	N	9.6	31.9	62.6
0.392000	43.1	N	9.6	14.9	58.0
1.106000	27.3	N	9.7	28.7	56.0
9.594000	27.7	N	9.9	32.3	60.0
15.912000	28.8	N	10.0	31.2	60.0

Result Table AV

Frequency (MHz)	Average (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.166000	33.7	N	9.6	21.5	55.2
0.227000	21.9	N	9.6	30.7	52.6
0.392000	38.8	N	9.6	9.2	48.0
1.106000	19.1	N	9.7	26.9	46.0
9.594000	21.4	N	9.9	28.6	50.0
15.912000	20.4	N	10.0	29.6	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: 4 April 2019

Model: 100004118

4.10 Radiated Emissions from Digital Section of Transceiver, FCC Ref: 15.109

☐ Not required - No digital part

☐ Test results are attached

☒ Included in the separated report.

Applicant: Shenzhen 3Nod Digital Technology Co., Ltd.

Date of Test: 8 April 2019

Model: 100004118

4.11 Transmitter Duty Cycle Calculation and Measurements, 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.

EXHIBIT 5

EQUIPMENT PHOTOGRAPHS

5.0 Equipment Photographs

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

EXHIBIT 6

PRODUCT LABELLING

6.0 Product Labeling

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

EXHIBIT 7

TECHNICAL SPECIFICATIONS

7.0 Technical Specifications

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

EXHIBIT 8

INSTRUCTION MANUAL

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.

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

MISCELLANEOUS INFORMATION

10.0 Discussion of Pulse Desensitization

The determination of pulse desensitivity was made in accordance with Hewlett Packard Application Note 150-2, *Spectrum Analysis ... Pulsed RF*.

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

EXHIBIT 11

TEST EQUIPMENT LIST

11.0 Test Equipment List

Equipment No.	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
SZ182-02	RF Power Meter	Anritsu	ML2496A	1302005	5-Jun-2018	5-Jun-2019
SZ182-02-01	Power Sensor	Anritsu	MA2411B	1207429	5-Jun-2018	5-Jun-2019
SZ061-04	Biconilog Antenna	ETS	3142C	00078828	16-Oct-2018	16-Oct-2019
SZ185-01	EMI Receiver	R & S	ESCI	100547	4-Jan-2019	4-Jan-2020
SZ061-08	Horn Antenna	ETS	3115	00092346	14-Sep-2018	14-Sep-2019
SZ061-07	Pyramidal Horn Antenna	ETS	3160-09	00083067	10-Mar-2019	10-Mar-2020
SZ061-06	Active Loop Antenna	Electro-Metrics	EM-6876	217	11-May-2018	11-May-2019
SZ056-03	Spectrum Analyzer	R&S	FSP 30	101148	05-Jun-2018	05-Jun-2019
SZ056-06	Signal Analyzer	R&S	FSV 40	101101	05-Jun-2018	05-Jun-2019
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	RADIAL	RG 213U	--	16 Jan 2019	16 Jul 2019
SZ062-05	RF Cable	RADIAL	0.04-26.5GHz	--	16 Jan 2019	16 Jul 2019
SZ062-12	RF Cable	RADIAL	0.04-26.5GHz	--	16 Jan 2019	16 Jul 2019
SZ067-04	Notch Filter	Micro-Tronics	BRM5070 2-02	--	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 *****