



FCC Part 15, Subpart C, Section 15.247

Test Report

On

Wireless Sensor Node
FCC ID: 2ADEPWSN4-A

Customer Name: IONX, LLC

Customer P.O.: 4500555857

Date of Report: June 11, 2019

Test Report No: R-2876P

Test Start Date: February 22, 2019

Test Finish Date: June 6, 2019

Test Technician: M. Nowak, S. Macdonald, T. Ingram

Approved By: D. Rybicki

Report Prepared By: P. Harris



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Technical Information

Report Number:	R-2876P
Customer:	IONX, LLC
Address:	300 Willowbrook Lane, Suite 320 West Chester, PA 19382
Manufacturer:	IONX, LLC
Manufacturer Address:	300 Willowbrook Lane, Suite 320 West Chester, PA 19382
Test Sample:	Wireless Sensor Node
Model Numbers:	WSN-401, WSN-407, WSN-408, WSN-413, WSN-414, WSN-415
FCC ID:	2ADEPWSN4-A
Type:	2.408 to 2.48 Frequency Hopping Spread Spectrum Transceiver
Power Requirements:	7.2 V Provided by 2 AA Lithium Thionyl Chloride Batteries in Series
Frequency of Operation:	2408-2480 MHz
Equipment Class:	DSS
Equipment Use:	Mobile

Test Specification:

FCC Rules and Regulations Part 15, Subpart C, Section 15.247

Applicable Documents:

ANSI C63.4:2014

ANSI C63.10:2013

Test Facility:

Retlif Testing Laboratories

3131 Detwiler Road

Harleysville, PA 19438

FCC Designation Number: US2321

Tests Performed

FCC Part 15, Subpart C	Test Method
15.247(a)(1)	Channel Separation
15.247(a)(1)	20 dB Bandwidth
15.247(a)(1) (i) (ii) or (iii)	Number of Channels and Occupancy Time
15.247(b)(1) and (4)	Peak Conducted Output Power
15.247(d)	Spurious Emissions, 30 MHz to 25 GHz
15.247(a)/15.209(a)	Field Strength of Spurious Emissions (Digital Device)

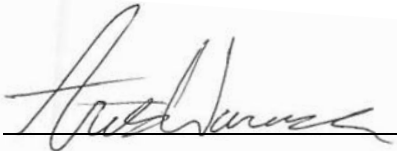


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Report No. R-2876P

Certification and Signatures

We certify that this report is a true representation of the results obtained from the tests of the equipment stated. We further certify that the measurements shown in this report were made in accordance with the procedures indicated and vouch for the qualifications of all Retlif Testing Laboratories personnel taking them.



Arik L. Warwick
Senior Test Technician



David M. Rybicki
Laboratory Supervisor

Non-Warranty Provision

The testing services have been performed, findings obtained and reports prepared in accordance with generally accepted laboratory principles and practices. This warranty is in lieu of all others, either expressed or implied.

Non-Endorsement

This test report contains only findings and results arrived at after employing the specific test procedures and standards listed herein. It is not intended to constitute a recommendation, endorsement or certification of the product or material tested. This report must not be used by the client to claim product endorsement by ANSI National Accreditation Board (ANAB).



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Report No. R-2876P

Requirements and Test Results

Requirement:

FCC Section 15.247 (a)(1)

Channel Separation and 20 dB Bandwidth

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

- Results:
The carrier frequencies were separated by greater than 25 kHz which complies with the requirements specified above.

FCC Section 15.247 (a)(1)(iii)

Number of Channels and Occupancy Time

Frequency hopping systems operating in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

- The Frequency Hopping System used 15 channels of operation and had an average time of occupancy on any channel less than 0.4 seconds within a period of six (6) seconds.



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Report No. R-2876P

Requirements and Test Results (con't)

FCC Section 15.247 (b)(1) and (4) Peak Conducted Output Power

(1) For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

(4) The conducted output power limit specified in Paragraph (b) of Section 15.247 is based on the use of antenna with directional gains that do not exceed 6 dBi. Except as shown in Paragraph (c) of Section 15.247, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in Paragraph (b)(1), (b)(2) and (b)(3) of Section 15.247, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

- Results:
The peak conducted output power was less than 0.125 W and contains an antenna with a directional gain of 6 dBi or less.

FCC Section 15.247 (d) Spurious Emissions

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 RFconducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits base don the use of RMS averaging over a time interval, as permitted under Paragraph (b)(3) of Section 15.247, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a) must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

FCC Section 15.247 (a) Field Strength of Spurious Radiation

Operation under the provisions of Section 15.247 is limited to frequency hopping and digitally modulated intentional radiators that comply with the provisions stated in Section 15.247(a)(1).



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Report No. R-2876P

Requirements and Test Results (con't)

FCC Section 15.209(a)

Radiated Emission Limits, General Requirements

Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in Table 1.

Table 1 - Radiated Emission Limits

Frequency of Emission (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
30 to 88	100	3
88 to 216	150	3
216 to 960	200	3
Above 960	500	3

- Results:
The field strength of spurious radiated emissions did not exceed the limits specified in Table 1.



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Report No. R-2876P

Requirements and Test Results (con't)

FCC Section 15.247 (i)

RF Exposure Limits

Spread Spectrum Transmitters operating under 15.247 are categorically excluded from routine environmental evaluation for demonstrating RF exposure compliance with respect to MPE or SAR limits however per 15.247(i) must be operated in a manner that ensures the public is not exposed to RF energy levels in excess of the commission's guidelines. The user/installation manual contains the proper cautionary statements and specifies that the device be installed and operated so that a minimum separation distance of 15 cm will be maintained. Based on the transmitter power and maximum antenna gain (see calculation below) the 15 cm separation distance exceeds the calculated distance for acceptable MPE power density levels to meet both the Occupational/Controlled Exposure and the General Population/Uncontrolled Exposure requirements of FCC Part 1.1310. The calculation below uses the more stringent General Population MPE Limits.

$$S = \frac{PG}{4\pi D^2}$$

D = Minimum Separation Distance in cm

S = Max Allowed Power Density = 1.63 mW/cm²

P = Max Power Input to Antenna = 8 dBm = 6.31mW

G = Max Power Gain of Antenna = 5 dBi = 3.16 numeric

Solving for S:

Per 1.1310 for the frequency of 2445MHz

$$S = \frac{2445}{1500} = 1.63 \text{ mW/cm}^2$$

Solving for D:

$$1.63 = \frac{6.31 \times 3.16}{4\pi D^2} = \frac{19.94}{12.57 D^2}$$

$$D^2 = \frac{19.94}{12.57 \times 1.63}$$

$$D = \sqrt{\frac{6.31 \times 3.16}{20.49}} = \sqrt{0.973}$$

$$D = 1 \text{ cm}$$



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Report No. R-2876P

Equipment List

FCC Section 15.247(a)(1) Channel Separation

EN	Manufacturer	Description	Range	Model No.	Cal Date	Due Date
713	ROHDE & SCHWARZ	RECEIVER, EMI	20 Hz - 26.5 GHz	ESIB26	3/25/2019	3/31/2020
713E	MICRO-COAX	CABLE, COAXIAL	6 FEET	UFB311A1-0720-50U50U	10/9/2018	10/31/2019
8445	UNIVERSAL SHIELDING	SHIELDED ENCLOSURE, TEST CHAMBER	26 MHz to 6 GHz	20X15X12	No Calibration Required	
8515	ETS / EMCO	ANTENNA, DOUBLE RIDGED GUIDE	1 - 18 GHz	3117	2/13/2018	8/30/2019

FCC Section 15.247(a)(1) 20 dB Bandwidth

EN	Manufacturer	Description	Range	Model No.	Cal Date	Due Date
8018	ETS / EMCO	ANTENNA, DOUBLE RIDGED GUIDE	1 - 18 GHz	3115	5/11/2018	11/30/2019
8750	RIGOL	ANALYZER, SPECTRUM	9 kHz - 3.2 GHz	DSA832E	5/21/2019	5/31/2020

FCC Section 15.247 (a)(1) (iii) Number of Channels and Occupancy Time

EN	Manufacturer	Description	Range	Model No.	Cal Date	Due Date
713	ROHDE & SCHWARZ	RECEIVER, EMI	20 Hz - 26.5 GHz	ESIB26	3/25/2019	3/31/2020
713E	MICRO-COAX	CABLE, COAXIAL 50U50U	6 FEET	UFB311A1-0720-	10/9/2018	10/31/2019
8445	UNIVERSAL SHIELDING	SHIELDED ENCLOSURE, TEST CHAMBER	26 MHz to 6 GHz	20X15X12	No Calibration Required	
8515	ETS / EMCO	ANTENNA, DOUBLE RIDGED GUIDE	1 - 18 GHz	3117	2/13/2018	8/30/2019



Retlif Testing Laboratories

Report No. R-2876P

Equipment List (con't)

FCC Section 15.247 (b)(1) Peak Conducted Output Power

EN	Manufacturer	Description	Range	Model No.	Cal Date	Due Date
7043	OMEGA	DATA LOGGER, THERMOCOUPLE	-200 - 1372 deg. C	RDXL6SD	6/11/2018	6/30/2019
713D	MICRO-COAX	CABLE, COAXIAL	3 FT.	UFB311A1-0360-50U50U	10/5/2018	10/31/2019
713E	MICRO-COAX	CABLE, COAXIAL	6 FEET	UFB311A1-0720-50U50U	10/9/2018	10/31/2019
8018	ETS / EMCO	ANTENNA, DOUBLE RIDGED GUIDE	1 - 18 GHz	3115	5/11/2018	11/30/2019
8109	AEROFLEX / WEINSCHTEL	ATTENUATOR, COAXIAL	20 dB, DC - 18 GHz	46-20-34	5/3/2018	5/31/2019
8300	RETLIF	OPEN AREA TEST SITE, ATTENUATION	3/10 Meter OATS	RPA	3/28/2018	3/31/2020
8317	AGILENT / HP	PRE-AMPLIFIER	1 - 26.5 GHz, 30 dB	8449B	5/16/2018	5/31/2019
8320	ASSOCIATED ENVIRONMENTAL	CHAMBER, TEMPERATURE	- 50 - 150 deg. C	ZFD-531	12/6/2018	12/31/2019
8557	NARDA MICROWAVE	ATTENUATOR, COAXIAL	10 dB, DC - 11 GHz, 20 W	768-10	6/5/2018	6/30/2019
8644	AGILENT / HP	ANALYZER, SPECTRUM	100 Hz - 22 GHz	85662A	9/18/2018	9/30/2019
8644A	AGILENT / HP	ANALYZER, SPECTRUM	100 Hz - 22.5 GHz	8566B	9/18/2018	9/30/2019
8644B	AGILENT / HP	ANALYZER, RF PRESELECTOR	20 Hz - 2 GHz	85685A	9/28/2018	9/30/2019
8644C	AGILENT / HP	ANALYZER, QUASI-PEAK ADAPTOR	100 Hz - 22 GHz	85650A	9/24/2018	9/30/2019

FCC Section 15.247 (d) Out of Band / Band Edge Emissions, 30 MHz to 25 GHz

EN	Manufacturer	Description	Range	Model No.	Cal Date	Due Date
713D	MICRO-COAX	CABLE, COAXIAL	3 FT.	UFB311A1-0360-50U50U	10/5/2018	10/31/2019
713E	MICRO-COAX	CABLE, COAXIAL	6 FEET	UFB311A1-0720-50U50U	10/9/2018	10/31/2019
8017	ETS / EMCO	ANTENNA, DOUBLE RIDGED GUIDE	1 - 18 GHz	3115	No Calibration Required	
8109	AEROFLEX / WEINSCHTEL	ATTENUATOR, COAXIAL	20 dB, DC - 18 GHz	46-20-34	5/3/2018	5/31/2019
8300	RETLIF	OPEN AREA TEST SITE, ATTENUATION	3/10 Meter OATS	RPA	3/28/2018	3/31/2020
8317	AGILENT / HP	PRE-AMPLIFIER	1 - 26.5 GHz, 30 dB	8449B	5/16/2018	5/31/2019
8335A	AGILENT / HP	DIRECTIONAL COUPLER, WAVEGUIDE	8 - 12 GHz	X752C	No Calibration Required	
8336A	AGILENT / HP	DIRECTIONAL COUPLER, WAVEGUIDE	12.4 GHz - 18 GHz	P752C	No Calibration Required	
8337	MICROLAB / FXR	ANTENNA, HIGH GAIN HORN	18 - 26.5 GHz	K638AF	No Calibration Required	
8557	NARDA MICROWAVE	ATTENUATOR, COAXIAL	10 dB, DC - 11 GHz, 20 W	768-10	6/5/2018	6/30/2019
8637	AGILENT/HP	ANALYZER, SPECTRUM	30 Hz - 26.5 GHz	8563E	6/21/2018	6/30/2019
8644	AGILENT / HP	ANALYZER, SPECTRUM	100 Hz - 22 GHz	85662A	9/18/2018	9/30/2019
8644A	AGILENT / HP	ANALYZER, SPECTRUM	100 Hz - 22.5 GHz	8566B	9/18/2018	9/30/2019
8644B	AGILENT / HP	ANALYZER, RF PRESELECTOR	20 Hz - 2 GHz	85685A	9/28/2018	9/30/2019
8644C	AGILENT / HP	ANALYZER, QUASI-PEAK ADAPTOR	100 Hz - 22 GHz	85650A	9/24/2018	9/30/2019



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Report No. R-2876P

Equipment List (con't)

FCC Section 15.247 (a) / 15.209(a) Field Strength of Spurious Emissions

EN	Manufacturer	Description	Range	Model No.	Cal Date	Due Date
8016	ETS / EMCO	ANTENNA, LOG PERIODIC	200 MHz - 1 GHz	3146	2/7/2018	8/31/2019
8300	RETLIF	OPEN AREA TEST SITE, ATTENUATION	3/10 Meter OATS	RPA	3/28/2018	3/31/2020
8300C	UNKNOWN	CABLE, COAXIAL	3/10 METER	3 METER CABLE	10/30/2018	10/31/2019
8398	ETS / EMCO	ANTENNA, BICONICAL	20 - 200 MHz	3104C	2/13/2018	8/31/2019
8644	AGILENT / HP	ANALYZER, SPECTRUM	100 Hz - 22 GHz	85662A	9/18/2018	9/30/2019
8644A	AGILENT / HP	ANALYZER, SPECTRUM	100 Hz - 22.5 GHz	8566B	9/18/2018	9/30/2019
8644B	AGILENT / HP	ANALYZER, RF PRESELECTOR	20 Hz - 2 GHz	85685A	9/28/2018	9/30/2019
8644C	AGILENT / HP	ANALYZER, QUASI-PEAK ADAPTOR	100 Hz - 22 GHz	85650A	9/24/2018	9/30/2019



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Report No. R-2876P

**FCC Section 15.247(a)(1)
Channel Separation
Test Data**

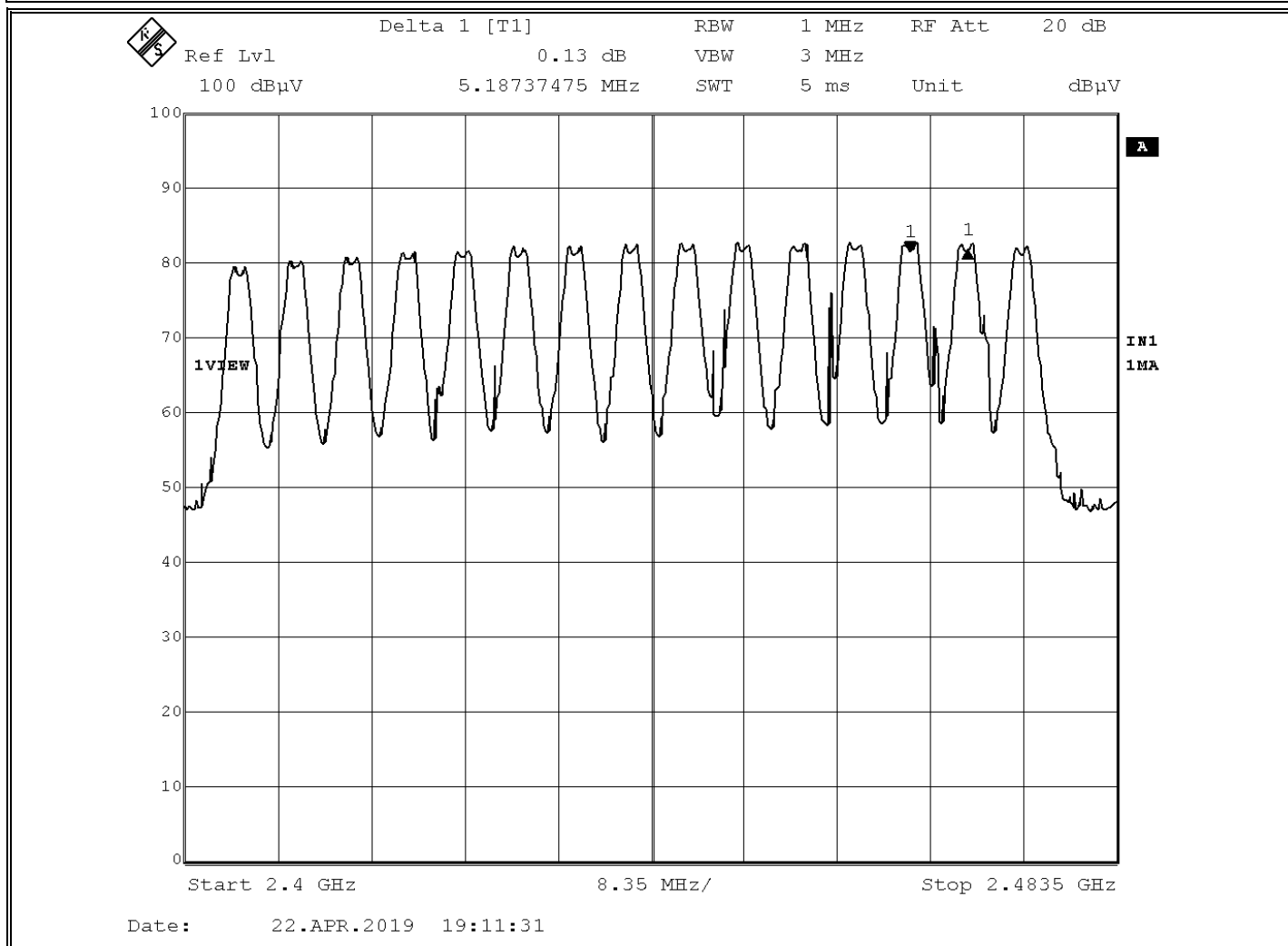


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Report No. R-2876P

EMISSIONS TEST DATA SHEET

Test Specification:	CFR Title 47, Chapter I, Subchapter A, Part 15.247(a)(1)
Method:	Channel Separation
Job Number/Customer:	R-2876P-1 / IONX, LLC
Test Sample:	Wireless Sensor Node
Model Number:	WSN4XX
Operating Mode:	Continuously Transmitting a RF Signal
Technician:	D. Rybicki
Date(s):	04/22/19
Temperature:	21.0 °C
Relative Humidity:	40 %
Detector:	Max Hold
Test Condition:	Normal



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Report No. R-2876P

**FCC Section 15.247(a)(1)
20 dB Bandwidth
Test Data**

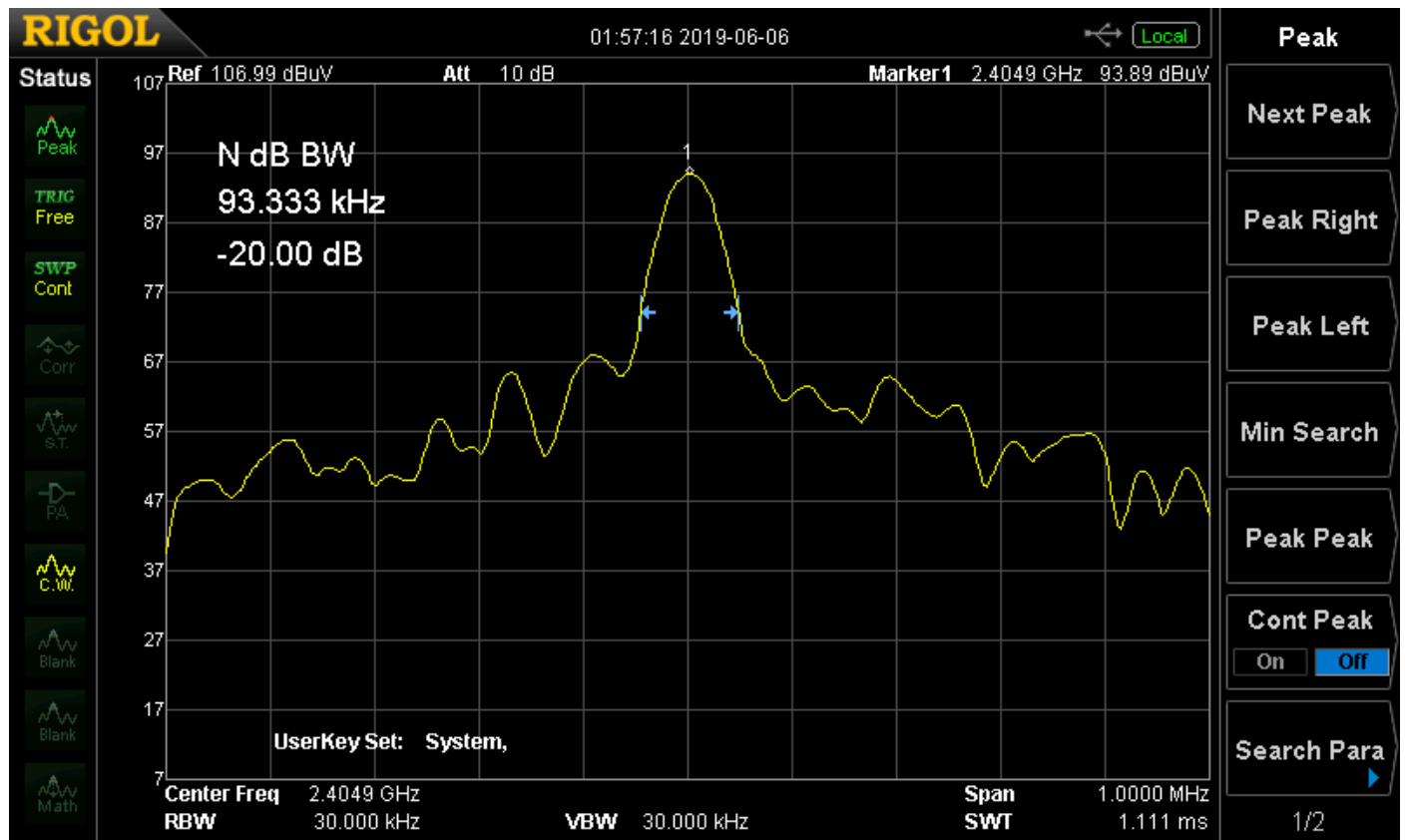


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Report No. R-2876P

EMISSIONS TEST DATA SHEET

Test Specification:	CFR Title 47, Chapter I, Subchapter A, Part 15.247(a)(1)(iii)
Method:	20dB Bandwidth
Job Number/Customer:	R-2876P-1 / IONX LLC
Test Sample:	Wireless Sensor Node
Model Number:	WSN4XX
Serial Number:	1842
Operating Mode:	Continuously transmitting a single frequency at 2.405 GHz
Technician:	M. Nowak
Date(s):	06/05/19
Temperature:	23.4 °C
Relative Humidity:	47.0 %



Measured 20 dB bandwidth: 93.33 kHz

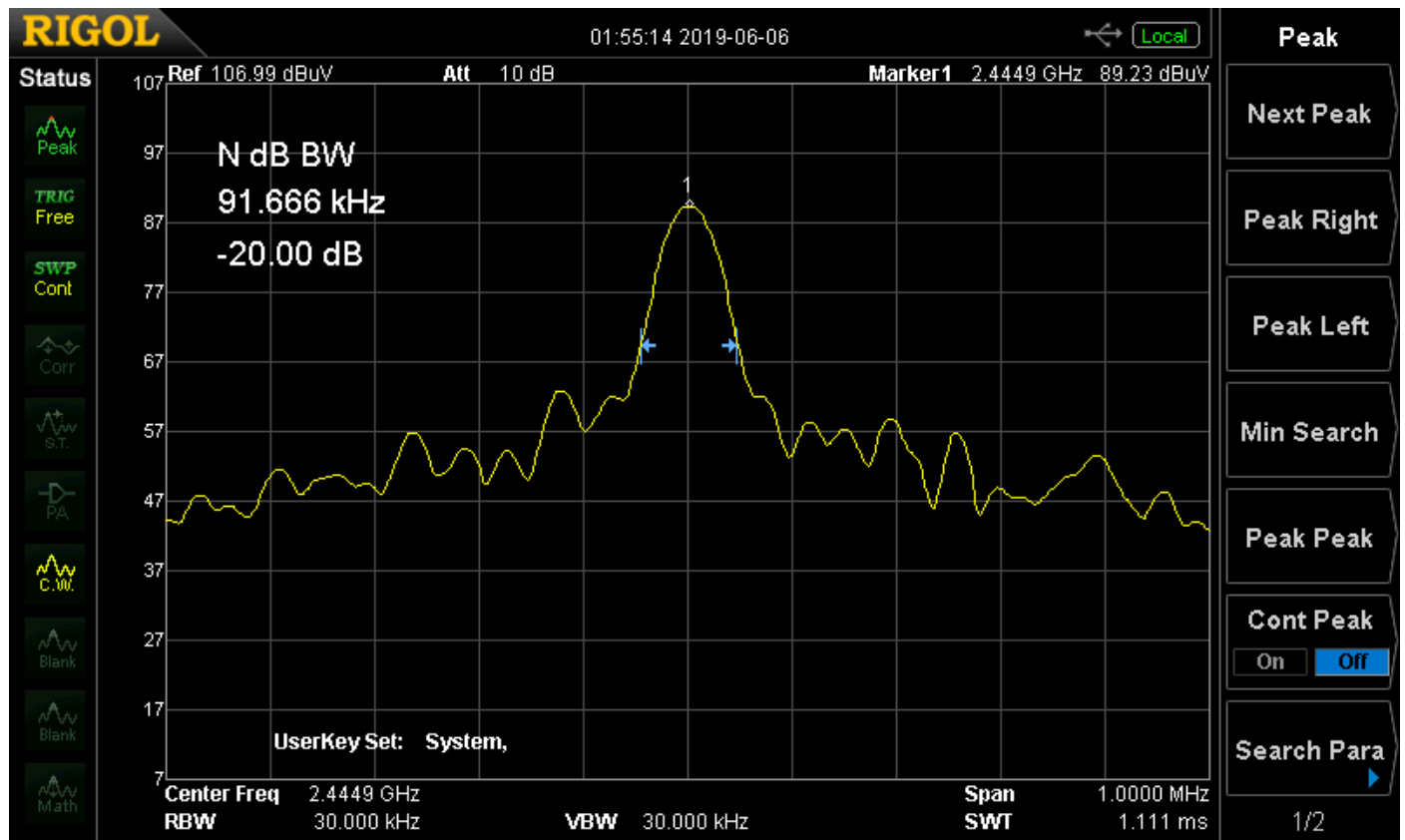


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Report No. R-2876P

EMISSIONS TEST DATA SHEET

Test Specification:	CFR Title 47, Chapter I, Subchapter A, Part 15.247(a)(1)(iii)
Method:	20dB Bandwidth
Job Number/Customer:	R-2876P-1 / IONX LLC
Test Sample:	Wireless Sensor Node
Model Number:	WSN4XX
Serial Number:	1842
Operating Mode:	Continuously transmitting a single frequency at 2.445 GHz
Technician:	M. Nowak
Date(s):	06/05/19
Temperature:	23.4 °C
Relative Humidity:	47.0 %



Measured 20 dB bandwidth: 91.67 kHz

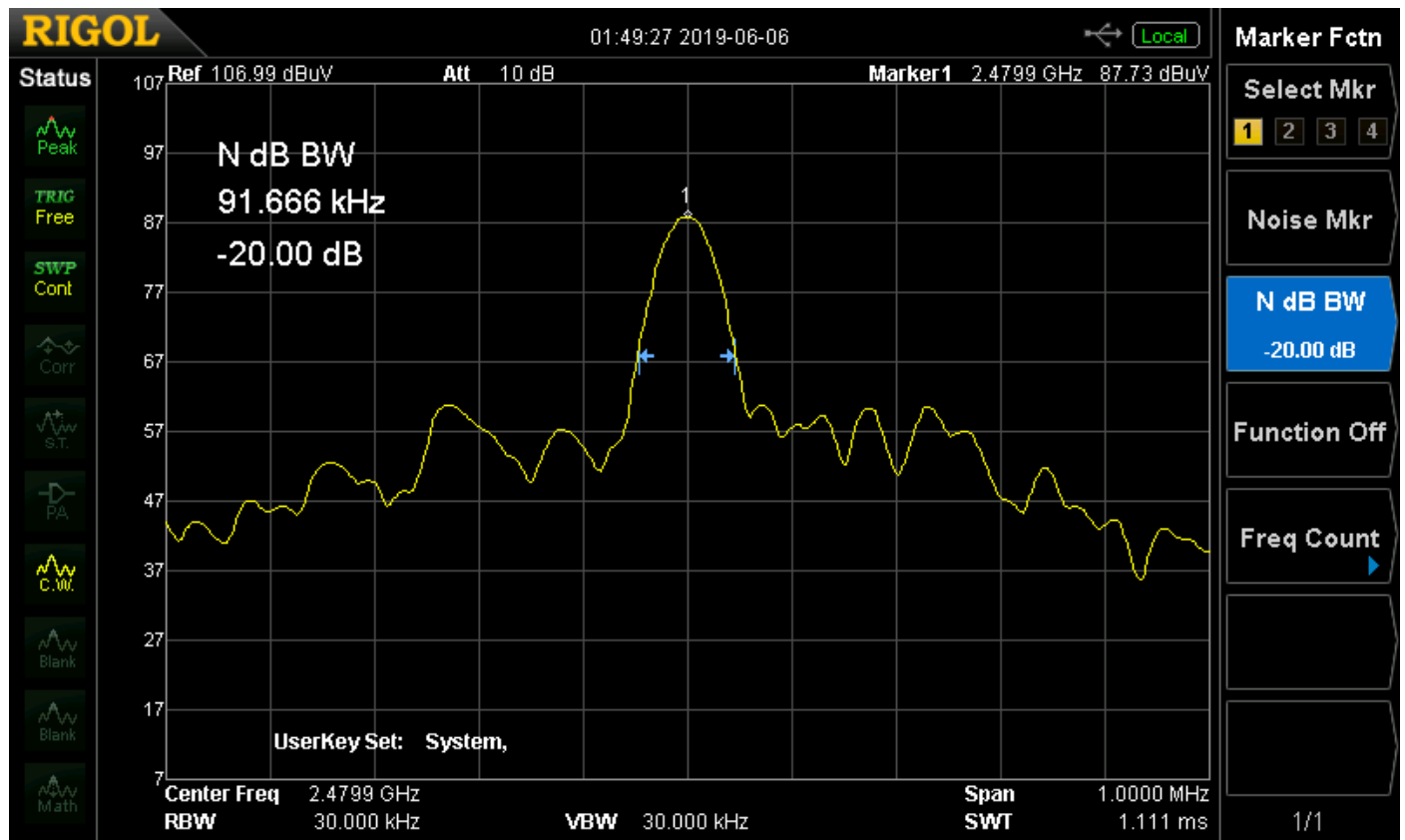


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Report No. R-2876P

EMISSIONS TEST DATA SHEET

Test Specification:	CFR Title 47, Chapter I, Subchapter A, Part 15.247(a)(1)(iii)
Method:	20dB Bandwidth
Job Number/Customer:	R-2876P-1 / IONX LLC
Test Sample:	Wireless Sensor Node
Model Number:	WSN4XX
Serial Number:	1842
Operating Mode:	Continuously transmitting a single frequency at 2.485 GHz
Technician:	M. Nowak
Date(s):	06/05/19
Temperature:	23.4 °C
Relative Humidity:	47.0 %



Measured 20 dB bandwidth: 91.67 kHz



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Report No. R-2876P

FCC Section 15.247 (a)(1) (iii)
Number of Channels and Occupancy Time
Test Data

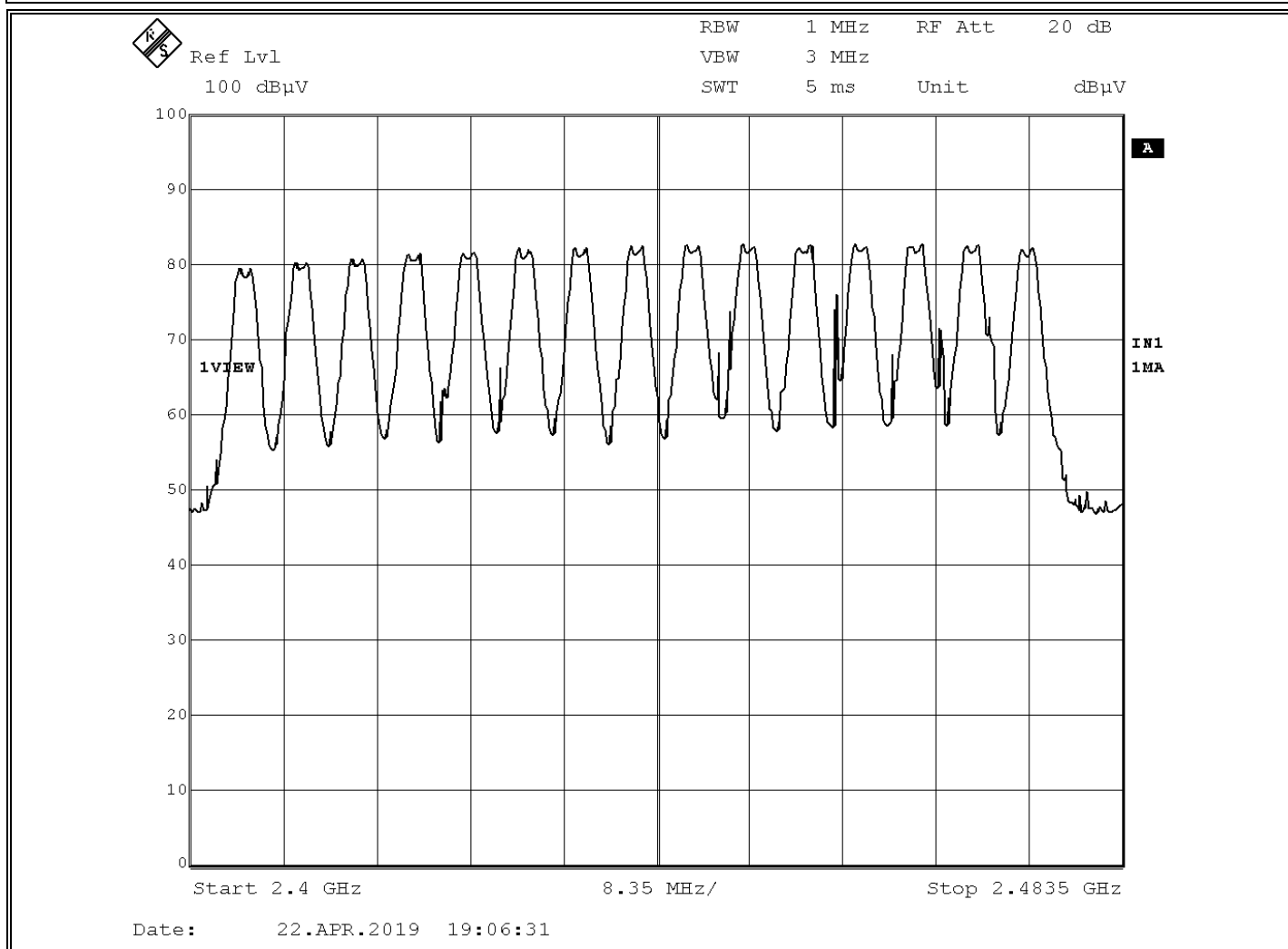


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Report No. R-2876P

EMISSIONS TEST DATA SHEET

Test Specification:	CFR Title 47, Chapter I, Subchapter A, Part 15.247(a)(1)(iii)
Method:	Number of Channels
Job Number/Customer:	R-2876P-1 / IONX, LLC
Test Sample:	Wireless Sensor Node
Model Number:	WSN4XX
Operating Mode:	Continuously Transmitting a RF Signal
Technician:	D. Rybicki
Date(s):	04/22/19
Temperature:	21.0 °C
Relative Humidity:	40 %
Detector:	Max Hold
Test Condition:	Normal

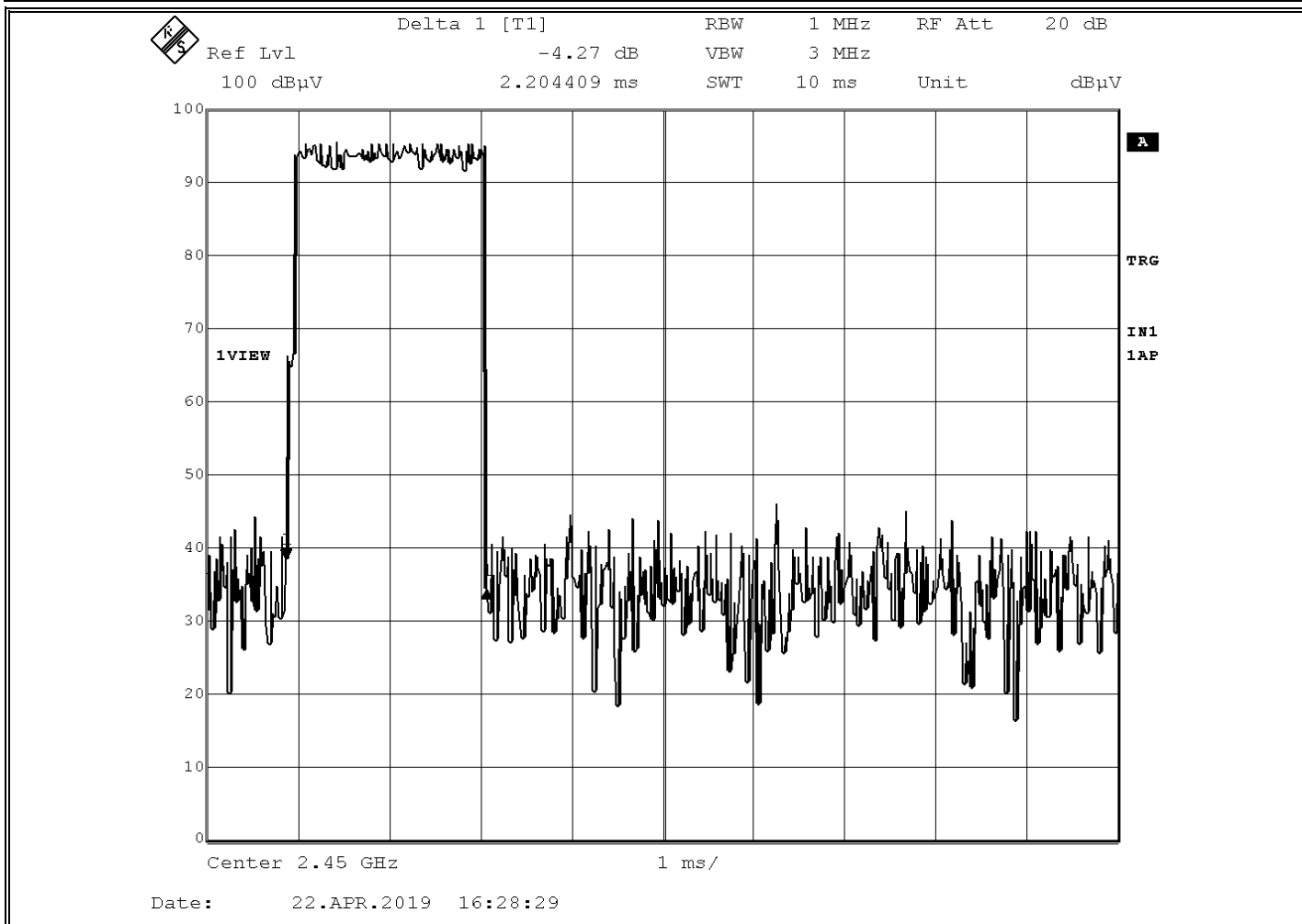


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Report No. R-2876P

EMISSIONS TEST DATA SHEET

Test Specification:	CFR Title 47, Chapter I, Subchapter A, Part 15.247(a)(1)(iii)
Method:	Occupancy Time
Job Number/Customer:	R-2876P-1 / IONX, LLC
Test Sample:	Wireless Sensor Node
Model Number:	WSN4XX
Operating Mode:	Continuously Transmitting a RF Signal
Technician:	D. Rybicki
Date(s):	04/22/19
Temperature:	21.0 °C
Relative Humidity:	40 %
Detector:	Max Hold
Test Condition:	Normal



Retlif Testing Laboratories

Report No. R-2876P

**FCC Section 15.247 (b)(1)
Peak Conducted Output Power
Test Data**



Retlif Testing Laboratories

Report No. R-2876P

EMISSIONS TEST DATA SHEET

Test Specification:	CFR Title 47, Chapter I, Subchapter A, Part 15.247(b)(1)
Method:	Peak Conducted Output Power
Job Number/Customer:	R-2876P-1 / IONX, LLC
Test Sample:	Wireless Sensor Node
Model Number:	WSN4XX
Operating Mode:	Continuously Transmitting a RF Signal
Technician:	M. Nowak
Date(s):	03/19/2019
Temperature:	4.3 °C
Relative Humidity:	40 %
Detector:	Peak
Test Distance:	3m
Test Condition:	Normal

Frequency	Antenna Pol /Height	EUT Orientation	Meter Reading	Correction Factor	Corrected Reading	RF Output Power (EIRP)
MHz	(V/H) / (m)	Degrees	dBuV	dB	dBuV/m	dBm
2445.00	H / 1.34	Y / 304.5	110.7	-5.6	105.1	9.94

EIRP Calculation

EIRP = Worst Case Corrected Reading + 20Log(3) – 104.7

Peak Conducted Output Power Calculation

Peak Conducted Output Power = EIRP (dBm) - Antenna Gain (dBi)

Peak Conducted Output Power = 9.94 dBm – 5 dBi

Peak Conducted Output Power = **4.94 dBm = 3.12 mW**



Retlif Testing Laboratories

Report No. R-2876P

FCC Section 15.247 (d)
Out of Band / Band Edge Radiated Emissions (Restricted Bands)
Test Data



Retlif Testing Laboratories

Report No. R-2876P

EMISSIONS TEST DATA SHEET

Test Specification:	FCC Part 15 Subpart C, Out of Band / Band Edge Radiated Emissions (Restricted Bands), Paragraph 15.247(d)
Job Number/Customer:	R-2876P-1 / IONX, LLC
Test Sample:	Wireless Sensor Node
Model Number:	WSN4XX
Operating Mode:	Continuously Transmitting a RF Signal
Technician:	M. Nowak
Date(s):	03/19/2019, 04/04/2019-04/05/2019
Temperature:	4.3 °C
Relative Humidity:	40 %
Detector:	Peak, Unless otherwise specified
Test Distance:	3m

Frequency	Antenna Pol /Height	EUT Orientation	Meter Reading	Correction Factor	Corrected Reading	Converted Reading	Limit
MHz	(V/H) / (m)	Degrees	dBuV	dB	dBuV/m	uV/m	uV/m
4810.00	V / 1.00	X / 358.0	40.8	-0.3	40.5	105.93	500
4810.00	V / 1.00	Y / 89.3	39.9	-0.3	39.6	95.50	
4810.00	V / 1.00	Z / 193.3	45.9	-0.3	45.6	190.55	
4810.00	H / 1.00	X / 124.6	48.3	-0.3	48.0	251.19	
4810.00	H / 1.00	Y / 268.3	49.8	-0.3	49.5	298.54	
4810.00	H / 1.12	Z / 311.5	46.3	-0.3	46.0	199.53	500
4890.00	V / 1.38	X / 237.2	40.2	-0.1	40.1	101.16	500
4890.00	V / 1.17	Y / 342.9	38.4	-0.1	38.3	82.23	
4890.00	V / 1.17	Z / 313.3	41.1	-0.1	41.0	112.21	
4890.00	H / 1.17	X / 135.9	45.5	-0.1	45.4	186.21	
4890.00	H / 1.10	Y / 231.0	44.8	-0.1	44.7	171.80	
4890.00	H / 1.00	Z / 281.8	39.4	-0.1	39.3	92.25	
4960.00	V / 1.27	X / 255.6	43.2	-0.1	43.1	142.89	
4960.00	V / 1.32	Y / 329.4	44.2	-0.1	44.1	160.33	
4960.00	V / 1.32	Z / 220.5	50.0	-0.1	49.9	312.61	
4960.00	H / 1.36	X / 122.2	51.0	-0.1	50.9	350.76	
4960.00	H / 1.40	Y / 230.0	51.1	-0.1	51.0	354.82	
4960.00	H / 1.38	Z / 232.2	47.1	-0.1	47.0	223.88	
7215.00	V / 1.00	X / 231.7	39.0	3.1	42.1	127.36	
7215.00	V / 1.00	Y / 96.4	38.5	3.1	41.6	120.23	
7215.00	V / 1.05	Z / 3.9	37.8	3.1	40.9	110.92	
7215.00	H / 1.00	X / 316.2	37.8	3.1	40.9	110.92	
7215.00	H / 1.00	Y / 358.0	39.1	3.1	42.2	128.83	
7215.00	H / 1.00	Z / 250.2	36.9	3.1	40.0	100.00	
7335.00	V / 1.26	X / 304.2	38.7	3.5	42.2	128.83	
7335.00	V / 1.12	Y / 147.5	38.3	3.5	41.8	123.03	
7335.00	V / 1.05	Z / 259.8	38.9	3.5	42.4	131.83	500



Retlif Testing Laboratories

Report No. R-2876P

Frequency	Antenna Pol /Height	EUT Orientation	Meter Reading	Correction Factor	Corrected Reading	Converted Reading	Limit
MHz	(V/H) / (m)	Degrees	dBuV	dB	dBuV/m	uV/m	uV/m
7335.00	H / 1.26	X / 304.2	38.8	3.5	42.3	130.32	500
7335.00	H / 1.00	Y / 266.9	38.4	3.5	41.9	124.46	
7335.00	H / 1.00	Z / 275.7	37.0	3.5	40.5	105.93	
7440.00	V / 1.10	X / 358.0	37.5	3.5	41.0	112.21	
7440.00	V / 1.00	Y / 258.2	35.7	3.5	39.2	91.21	
7440.00	V / 1.00	Z / 256.6	37.0	3.5	40.5	105.93	
7440.00	H / 1.00	X / 286.0	37.0	3.5	40.5	105.93	
7440.00	H / 1.00	Y / 358.0	37.9	3.5	41.4	117.49	
7440.00	H / 1.00	Z / 281.1	36.8	3.5	40.3	103.52	
9620.00	V / 1.62	X / 168.1	46.8	-4.8	42.0	125.89	
9620.00	V / 1.66	Y / 258.9	47.4	-4.8	42.6	134.90	
9620.00	V / 1.64	Z / 358.0	46.9	-4.8	42.1	127.35	
9620.00	H / 1.39	X / 233.6	50.7	-4.8	45.9	197.24	
9620.00	H / 1.32	Y / 284.9	47.5	-4.8	42.7	136.46	
9620.00	H / 1.59	Z / 358.0	46.3	-4.8	41.5	118.85	
9780.00	V / 1.56	X / 241.8	46.8	-4.8	42.0	125.89	
9780.00	V / 1.55	Y / 325.9	46.5	-4.8	41.7	121.62	
9780.00	V / 1.62	Z / 347.6	47.6	-4.8	42.8	138.04	
9780.00	H / 1.46	X / 244.8	46.8	-4.8	42.0	125.89	
9780.00	H / 1.57	Y / 318.4	48.0	-4.8	43.2	144.54	
9780.00	H / 1.59	Z / 242.9	46.7	-4.8	41.9	124.45	500
9920.00	V / 1.60	X / 238.5	47.6	-4.8	42.8	138.04	500
9920.00	V / 1.58	Y / 328.0	47.6	-4.8	42.8	138.04	
9920.00	V / 1.56	Z / 358.0	49.7	-4.8	44.9	175.79	
9920.00	H / 1.49	X / 228.0	49.1	-4.8	44.3	164.06	
9920.00	H / 1.51	Y / 318.3	48.9	-4.8	44.1	160.32	
9920.00	H / 1.44	Z / 244.4	48.5	-4.8	43.7	153.11	
12025.00	V / 1.40	X / 272.2	45.1	-2.1	43.0	141.25	
12025.00	V / 1.56	Y / 164.8	44.8	-2.1	42.7	136.46	
12025.00	V / 1.70	Z / 262.1	47.0	-2.1	44.9	175.79	
12025.00	H / 1.33	X / 339.9	46.1	-2.1	44.0	158.49	
12025.00	H / 1.44	Y / 358.0	45.6	-2.1	43.5	149.62	
12025.00	H / 1.63	Z / 222.1	45.6	-2.1	43.5	149.62	
12225.00	V / 1.59	X / 232.2	46.2	-2.1	44.1	160.32	
12225.00	V / 1.62	Y / 262.1	46.4	-2.1	44.3	164.06	
12225.00	V / 1.54	Z / 324.4	46.7	-2.1	44.6	169.82	
12225.00	H / 1.52	X / 253.7	46.4	-2.1	44.3	164.06	
12225.00	H / 1.52	Y / 340.8	46.9	-2.1	44.8	173.78	
12225.00	H / 1.46	Z / 220.7	47.9	-2.1	45.8	194.98	500



Retlif Testing Laboratories

Report No. R-2876P

Frequency	Antenna Pol /Height	EUT Orientation	Meter Reading	Correction Factor	Corrected Reading	Converted Reading	Limit
MHz	(V/H) / (m)	Degrees	dBuV	dB	dBuV/m	uV/m	uV/m
12400.00	V / 1.42	X / 192.1	46.0	-2.1	43.9	156.68	500
12400.00	V / 1.62	Y / 286.5	46.2	-2.1	44.1	160.32	
12400.00	V / 1.46	Z / 319.0	45.4	-2.1	43.3	146.22	
12400.00	H / 1.48	X / 344.3	46.4	-2.1	44.3	164.06	
12400.00	H / 1.58	Y / 342.3	46.1	-2.1	44.0	158.49	
12400.00	H / 1.42	Z / 229.8	46.5	-2.1	44.4	165.96	
*14670.00	H / 1.00	X / 180.0	45.1	-1.6	43.5	149.62	
*17115.00	H / 1.00	X / 180.0	44.5	-0.2	44.3	164.06	
*19560.00	H / 1.00	X / 180.0	49.0	1.77	50.77	345.54	
*22005.00	H / 1.00	X / 180.0	47.5	2.18	49.68	304.79	
*24450.00	H / 1.00	X / 180.0	48.6	1.00	49.6	302.00	500



Retlif Testing Laboratories

Report No. R-2876P

**FCC Section 15.209(a)
Field Strength of Spurious Emissions
Test Data**



Retlif Testing Laboratories

Report No. R-2876P

EMISSIONS TEST DATA SHEET

Test Specification:	FCC Part 15, Subpart B, Section 15.209(a), Radiated Emissions, Class B
Method:	ANSI C63.4, Section 8, Radiated Emission Measurements, 30MHz to 1GHz
Job Number/Customer:	R-2876P / IONX, LLC
Test Sample:	Wireless Sensor Node
Model Number:	WSN4XX
Operating Mode:	Continuously Transmitting a RF Signal
Technician:	M. Nowak
Date(s):	04/05/2019, 04/08/2019
Temperature:	4.3 °C
Relative Humidity:	40 %
Detector:	Quasi-Peak
Test Distance:	3m

Notes: The frequency range was scanned from 30 MHz to 1 GHz

The emissions observed from the EUT do not exceed the specified limits. The six highest readings relative to the limit are presented.

Frequency	Antenna Pol /Height	EUT Orientation	Meter Reading	Correction Factor	Corrected Reading	Converted Reading	
MHz	(V/H) / (m)	Degrees	dBuV	dB	dBuV/m	uV/m	uV/m
30.00							100
*35.00	H / 1.00	180.0	-1.6	11.8	10.2	3.24	
88.00							100
88.00							150
*110.00	H / 1.00	180.0	7.0	13.9	20.9	11.10	
*195.00	H / 1.00	180.0	4.1	19.9	24.0	15.85	
*215.00	H / 1.00	180.0	2.9	13.1	16.0	6.31	
216.00							150
216.00							200
*605.00	H / 1.00	180.0	3.8	22.6	26.4	20.90	
960.00							200
960.00							500
*995.00	H / 1.00	180.0	-2.0	29.6	27.6	23.99	
1000.00							500



Retlif Testing Laboratories

Report No. R-2876P