Certification Test Report

FCC ID: SK9NIC
IC: 864G-NIC

FCC Rule Part: 15.247
ISED Canada Radio Standards Specification: RSS-247

Report Number: AT72147858-2C0

Manufacturer: Itron, Inc.
Model: NIC

Test Begin Date: April 03, 2019
Test End Date: April 11, 2019

Report Issue Date: May 2, 2019

FOR THE SCOPE OF ACCREDITATION UNDER Certificate Number: 2955.09

This report must not be used by the client to claim product certification, approval, or endorsement by A2LA, NIST, or any agency of the Federal Government.

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This report contains 24 pages

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1 GENERAL

1.1 Purpose

The purpose of this report is to demonstrate compliance with Part 15 Subpart C of the FCC's Code of Federal Regulations and Innovation, Science and Economic Development Canada's Radio Standards Specification RSS-247 Certification for modular approval.

1.2 Product Description

The Itron NIC is an electricity metering module which includes a 902.8 MHz to 926.8 MHz transmitter. The module operates on AC as well as DC voltage which is supplied by a host device.

This test report documents the compliance of the 902.8 to 926.8 MHz transceiver mode of operation.

Technical Information:

Detail	Description
Frequency Range	902.8 – 926.8 MHz
Number of Channels	31
Channel Spacing	800kHz
Modulation Format	OFDM
Data Rates	1200kbps
Operating Voltage	12Vdc
Antenna Type(s) / Gain(s)	1) External Omnidirectional / 3dBi (Laird, P/N: TRA9023P) 2) External Monopole / 2.8dBi (CISCO, P/N: ANT-MP-INT-OUT-M)

Manufacturer Information:
Itron, Inc.
313 N Hwy 11
West Union, SC 29696

Test Sample Serial Number: 110900000671

Test Sample Condition: The test samples were provided in good working order with no visible defects.

1.3 Test Methodology and Considerations

All modes of operation, including all available data rates, were evaluated. The data presented in this report represents the worst case where applicable.

For radiated emissions, the EUT was evaluated in three orthogonal orientations. The worst-case orientation was X-position. The EUT was programmed to generate a continuously modulated signal on each channel evaluated.

For power line conducted emissions, the EUT was powered by a representative wall wart power supply.

For RF Conducted measurements, the EUT was connected to the test equipment with a QMR to SMA adapter. The EUT was programmed to generate a continuously modulated signal on each channel evaluated.

Software power setting during test: RFIC Attn: 9, DMCC Scale 1826

2 TEST FACILITIES

2.1 Location

The radiated and conducted emissions test sites are located at the following addresses:

TÜV SÜD America, Inc.
5945 Cabot Pkwy, Suite 100
Alpharetta, GA 30005
Phone: (678) 341-5900

2.2 Laboratory Accreditations/Recognitions/Certifications

TÜV SÜD America, Inc. is accredited to ISO/IEC 17025 by the American Association for Laboratory Accreditation/A2LA accreditation program and has been issued certificate number 2955.09 in recognition of this accreditation.

Unless otherwise specified, all tests methods described within this report are covered under the ISO/IEC 17025 scopes of accreditation.

The Semi-Anechoic Chamber Test Sites and Conducted Emissions Sites have been fully described, submitted to, and accepted by the FCC, ISED Canada and the Japanese Voluntary Control Council for Interference by information technology equipment.

FCC Registration Number:	967699
ISED Canada Lab Code:	23932
VCCI Member Number:	1831
• VCCI Registration Number	A-0295

2.3 Radiated Emissions Test Site Description

2.3.1 Semi-Anechoic Chamber Test Site – Chamber A

The Semi-Anechoic Chamber Test Site consists of a 20’ x 30’ x 18’ shielded enclosure. The chamber is lined with Toyo Ferrite Grid Absorber, model number FFG-1000. The ferrite tile grid is 101 x 101 x 19mm thick and weighs approximately 550 grams. These tiles are mounted on steel panels and installed directly on the inner walls of the chamber.

The turntable is 5’ in diameter and is located 5’6” from the back wall of the chamber. The chamber is grounded via 1 - 8’ copper ground rod, installed at the center of the back wall, it is bound to the ground plane using 3/4" stainless steel braided cable.

The turntable is all steel, flush mounted EMCO Model 1060 installed in an all steel frame. The table is remotely operated from inside the control room located 25’ from the range. The turntable is electrically bonded to the surrounding ground plane via steel fingers installed on the edge of the turn table. The steel fingers make constant contact with the ground plane during operation.

Behind the turntable is a 3’ x 6’ x 4’ deep shielded pit used for support equipment if necessary. The pit is equipped with 1 - 4” PVC chase from the turntable to the pit that allows for cabling to the EUT if necessary. The underside of the turntable can be accessed from the pit, so cables can be supplied to the EUT from the pit.

The chamber rear wall is covered with a mixture of Siepel pyramidal absorber. The side walls of the chamber are partially covered with Siepel pyramidal absorber.

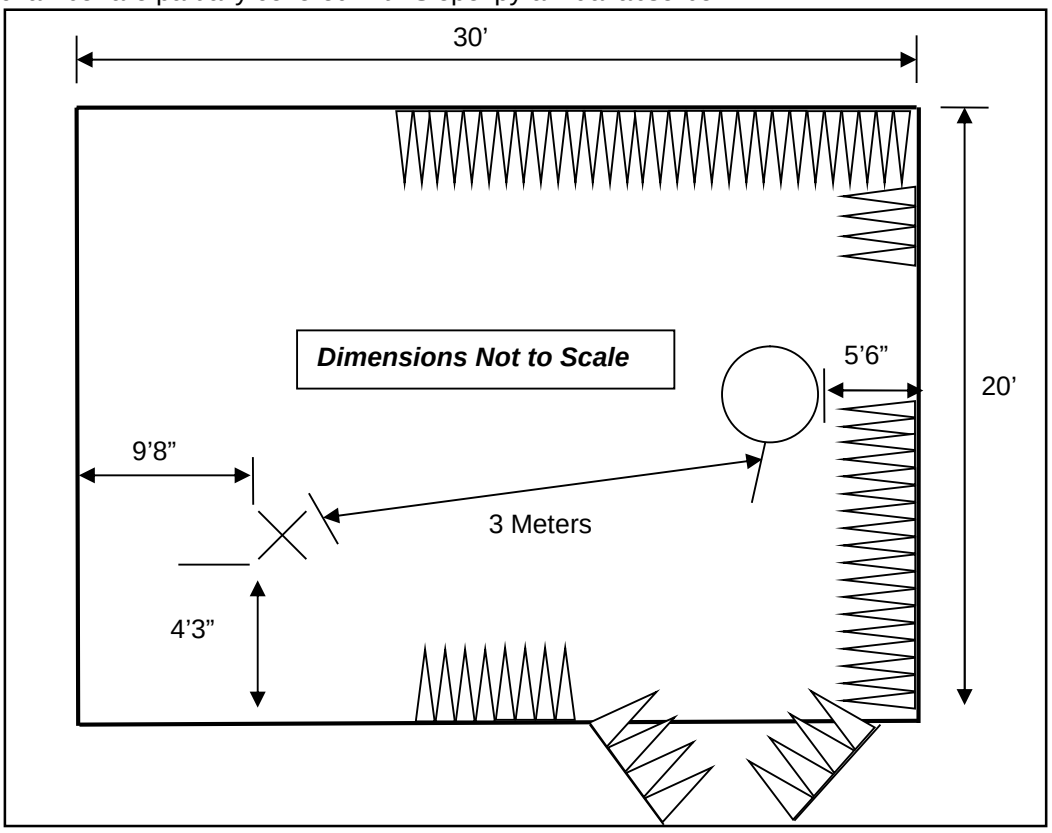

Figure 2.3.1-1: Semi-Anechoic Chamber Test Site – Chamber A

2.3.2 Semi-Anechoic Chamber Test Site – Chamber B

The Semi-Anechoic Chamber Test Site consists of a 20'W x 30'L x 20'H shielded enclosure. The chamber is lined with ETS-Lindgren Ferrite Absorber, model number FT-1500. The ferrite tile 600 mm x 600 mm (2.62 in x 23.62 in) panels and are mounted directly on the inner walls of the chamber shield.

The specular regions of the chamber are lined with additional ETS-Lindgren PS-600 hybrid absorber to extend its frequency range up to 18GHz and beyond.

The turntable is a 2m ETS-Lindgren Model 2170 and installed off the center axis is located 5'6" from the back wall of the chamber. The chamber is grounded via 1 - 8' copper ground rod, installed at the center of the back wall, it is bound to the shield using #8 solid copper wire.

The antenna mast is an EMCO 1060 and is remotely controlled from the control room for both antenna height and polarization.

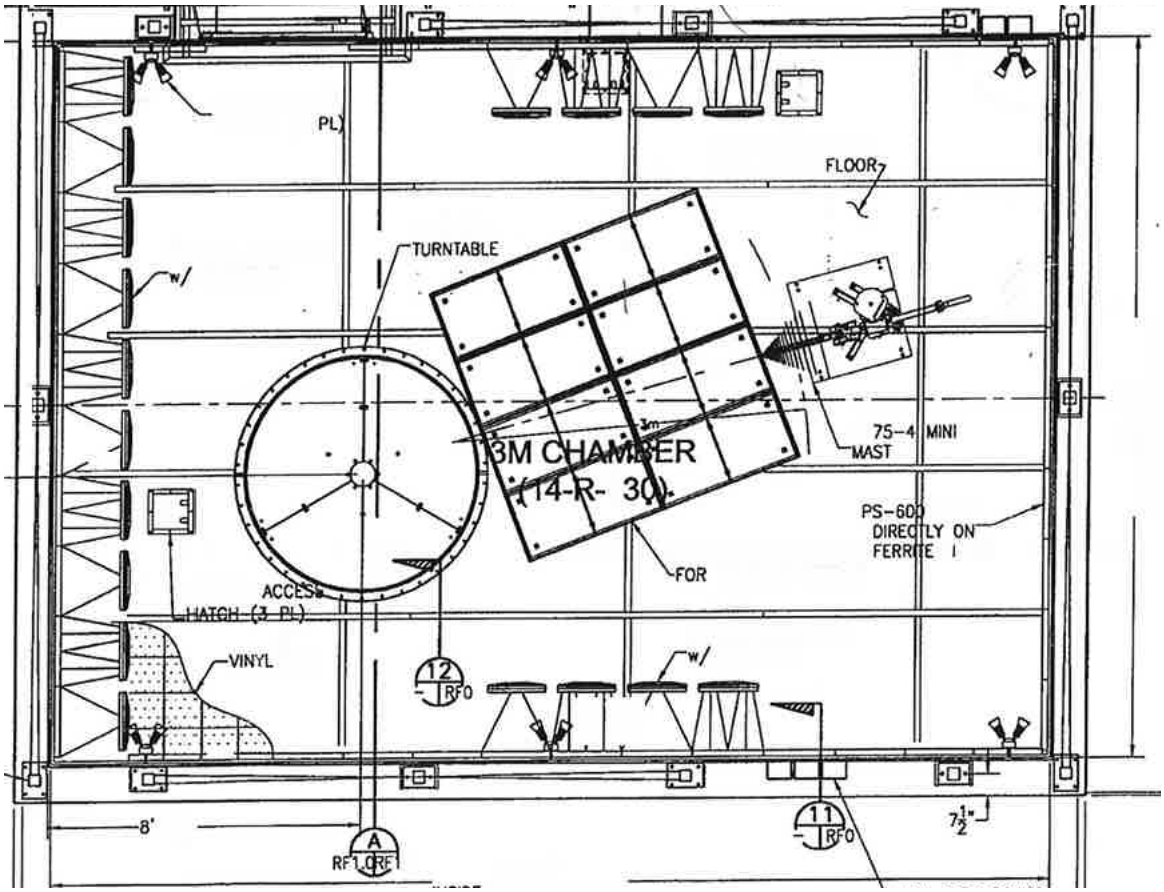

Figure 2.3.2-1: Semi-Anechoic Chamber Test Site – Chamber B

2.4 Conducted Emissions Test Site Description

2.4.1 Conducted Emissions Test Site

The AC mains conducted EMI site is located in the main EMC lab. It consists of a 12' x 10' horizontal coupling plane (HCP) as well as a 12'x8' vertical coupling plane (VCP). The HGP is constructed of 4' x 10' sheets of particle board sandwiched by galvanized steel sheets. These panels are bonded using 11AWG 1/8" x 2" by 10' galvanized sheet steel secured to the panels via by screws. The VCP is constructed of three 4'x8' sheets of 11AWG solid aluminum.

The HCP and VCP are electrically bonded together using 1"x1" angled aluminum secured with screws.

The site is of sufficient size to test table top and floor standing equipment in accordance with section 6.1.4 of ANSI C63.10.

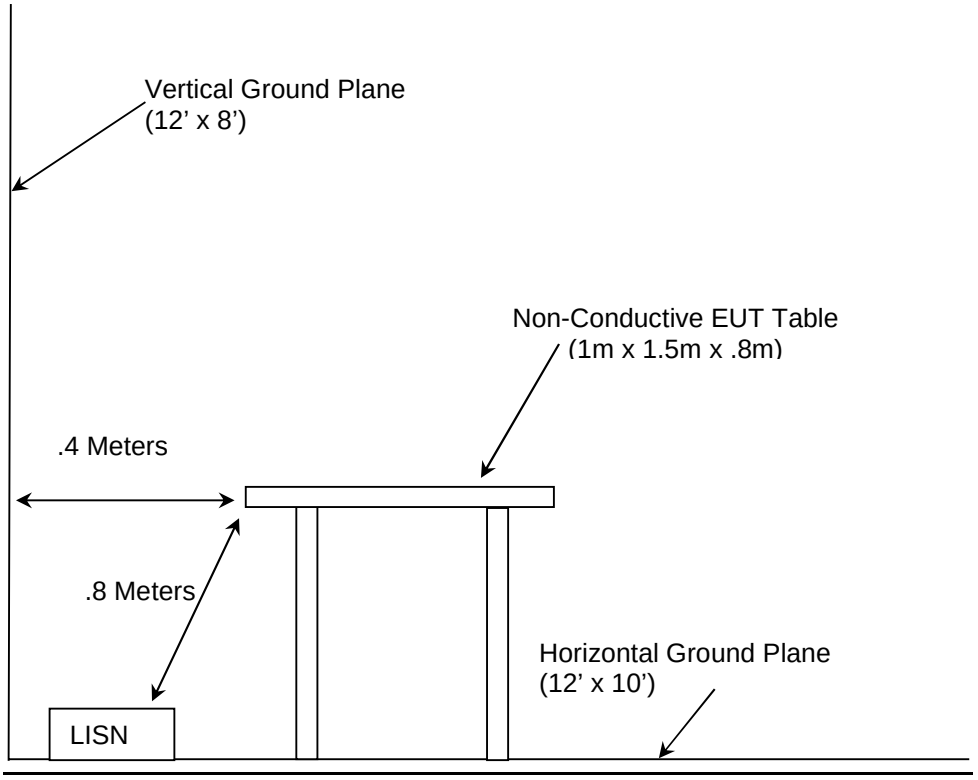

Figure 2.4.1-1: AC Mains Conducted EMI Site

3 APPLICABLE STANDARD REFERENCES

The following standards were used:

- ANSI C63.10-2013: American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.
- US Code of Federal Regulations (CFR): Title 47, Part 2, Subpart J: Equipment Authorization Procedures, 2019
- US Code of Federal Regulations (CFR): Title 47, Part 15, Subpart C: Radio Frequency Devices, Intentional Radiators, 2019
- FCC KDB 558074 D01 DTS Meas Guidance v05r02 - Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247, April 2, 2019
- ISED Canada Radio Standards Specification: RSS-247 – Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices, Issue 2, February 2017.
- ISED Canada Radio Standards Specification: RSS-GEN – General Requirements for Compliance of Radio Apparatus, Issue 5, April 2018 + Amendment 1, March 2019

4 LIST OF TEST EQUIPMENT

The calibration interval of test equipment is annually or the manufacturer's recommendations. Where the calibration interval deviates from the annual cycle based on the instrument manufacturer's recommendations, it shall be stated below.

Table 4-1: Test Equipment

Asset ID	Manufacturer	Model	Equipment Type	Serial Number	Last Calibration Date	Calibration Due Date
30	Spectrum Technologies	DRH-0118	1-18GHz Horn Antenna	970102	05/09/2017	05/09/2019
321	Hewlett Packard	HPC 8447D	Low Freq. Pre-Amp	1937A02809	09/12/2018	09/12/2019
324	ACS	Belden	Conducted EMI Cable	8214	03/19/2019	03/19/2020
337	Microwave Circuits	H1G513G1	Microwave Bandpass Filter	282706	05/16/2018	05/16/2019
338	Hewlett Packard	8449B	High Frequency Pre-Amp	3008A01111	07/11/2017	07/11/2019
622	Rohde & Schwarz	FSV40 (v3.40)	FSV Signal Analyzer 10Hz to 40GHz	101338	07/30/2018	07/30/2020
628	EMCO	6502	Active Loop Antenna 10kHz-30MHz	9407-2877	02/11/2019	11/02/2021
813	PMM	9010	EMI Receiver; RF Input 50ohm; 10Hz-50MHz; 10Hz-30MHz	697WW30606	02/25/2019	02/25/2020
819	Rohde & Schwarz	ESR26	EMI Test Receiver	101345	11/06/2018	11/06/2019
827	(-)	TS8997 Rack Cable Set	TS8997 Rack Cable Set	N/A	08/13/2018	08/13/2019
851	TUV ATLANTA	FMC0101951-100CM	ASAC Cable Set Consisting of 566, 619, and 643	N/A	09/26/2018	09/26/2019
852	Teseq	CBL 6112D	Bilog Antenna; Attenuator	51617	10/15/2018	10/15/2019
3010	Rohde & Schwarz	ENV216	Two-Line V-Network	3010	07/11/2018	07/11/2019

NOTE: All test equipment was used only during active calibration cycles.

5 SUPPORT EQUIPMENT

Table 5-1: Support Equipment

Item	Equipment Type	Manufacturer	Model/Part Number	Serial Number
1	AC/DC Adapter	Triad Magnetics	WSU120-1000	N/A
2	Antenna	Laird	TRA9023P	N/A
		CISCO	ANT-MP-INT-OUT-M	N/A

Table 5-2: Cable Description

Cable	Cable Type	Length	Shield	Termination
A	DC Power Cable	1.75m	No	EUT to Power Supply
B	Coax	0.2m[1] 0.3m[2]	Coax	EUT to Antenna

1) Coax with Laird antenna
2) Coax with CISCO antenna

6 EQUIPMENT UNDER TEST SETUP BLOCK DIAGRAM

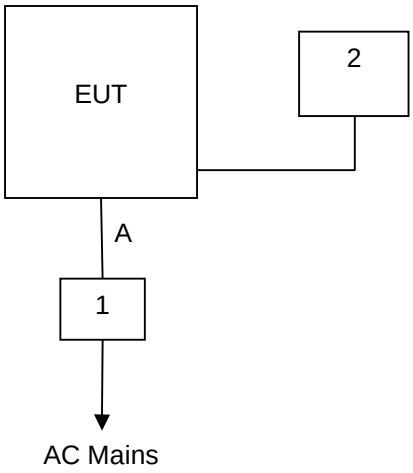

Figure 6-1: Test Setup Block Diagram

7 SUMMARY OF TESTS

Along with the tabular data shown below, plots were taken of all signals deemed important enough to document.

7.1 Antenna Requirement – FCC: Section 15.203

The EUT was evaluated with two separate omnidirectional external / detachable antennas:

1) Laird, P/N: TRA9023P, 3dBi Max
2) CISCO, P/N: ANT-MP-INT-OUT-M, 2.8dBi Max

The NIC module utilizes a female QMR connector which meets the unique antenna connector requirements in 15.203.

7.2 Power Line Conducted Emissions – FCC: Section 15.207; ISED Canada: RSS-Gen 8.8

7.2.1 Measurement Procedure

ANSI C63.10 was the guiding document for this evaluation. Conducted emissions were performed from 150kHz to 30MHz with the spectrum analyzer's resolution bandwidth set to 9kHz and the video bandwidth set to 30kHz. The calculation for the conducted emissions is as follows:

Corrected Reading = Analyzer Reading + LISN Loss + Cable Loss
Margin = Applicable Limit - Corrected Reading

7.2.2 Measurement Results

Performed by: Tyler Leeson

Table 7.2.2-1: Conducted EMI Results – Laird Antenna - Line 1

Frequency (MHz)	Corrected Reading		Limit		Margin		Correction (dB)
	Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average	
	(dBµV)	(dBµV)	(dBµV)	(dBµV)	(dB)	(dB)	
0.154	61.08	32.35	65.78	55.78	4.7	23.43	9.6
0.17	60.92	31.81	64.96	54.96	4.04	23.15	9.56
0.178	59.48	34.5	64.58	54.58	5.1	20.08	9.57
0.194	58.77	29.65	63.86	53.86	5.09	24.21	9.59
0.202	58.29	29.11	63.53	53.53	5.24	24.42	9.6
0.214	57.33	34.21	63.05	53.05	5.72	18.84	9.61
0.234	56.57	26.62	62.31	52.31	5.74	25.69	9.61
0.266	55.43	24.76	61.24	51.24	5.81	26.48	9.62
0.278	53.57	25.71	60.88	50.88	7.31	25.17	9.61
0.298	52.96	23.03	60.3	50.3	7.34	27.27	9.61

Table 7.2.2-2: Conducted EMI Results – Laird Antenna - Line 2

Frequency (MHz)	Corrected Reading		Limit		Margin		Correction (dB)
	Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average	
	(dBµV)	(dBµV)	(dBµV)	(dBµV)	(dB)	(dB)	
0.158	61.57	32.7	65.57	55.57	4.0	22.87	9.63
0.186	61.22	30.59	64.21	54.21	2.99	23.62	9.63
0.198	59.29	30.04	63.69	53.69	4.4	23.65	9.62
0.218	58.58	29.06	62.89	52.89	4.31	23.83	9.62
0.238	57.16	27.6	62.17	52.17	5.01	24.57	9.62
0.258	55.97	26.16	61.5	51.5	5.53	25.34	9.62
0.27	54.95	25.4	61.12	51.12	6.17	25.72	9.62
0.294	54.23	24.02	60.41	50.41	6.18	26.39	9.62
0.314	52.93	23.27	59.86	49.86	6.93	26.59	9.62
0.342	51.69	22.28	59.15	49.15	7.46	26.87	9.64

Table 7.2.2-3: Conducted EMI Results – CISCO Antenna – Line 1

Frequency (MHz)	Corrected Reading		Limit		Margin		Correction (dB)
	Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average	
	(dBµV)	(dBµV)	(dBµV)	(dBµV)	(dB)	(dB)	
0.15	62.53	34.59	66	56	3.47	21.41	9.61
0.162	61.85	32.83	65.36	55.36	3.51	22.53	9.58
0.186	61.38	32.91	64.21	54.21	2.83	21.3	9.58
0.206	59.68	30.03	63.37	53.37	3.69	23.34	9.6
0.218	58.68	35.25	62.89	52.89	4.21	17.64	9.61
0.234	57.9	28	62.31	52.31	4.41	24.31	9.61
0.258	56.54	31.3	61.5	51.5	4.96	20.2	9.62
0.278	55.41	25.45	60.88	50.88	5.47	25.43	9.61
0.294	54.24	25.21	60.41	50.41	6.17	25.2	9.61
0.31	53.43	23.68	59.97	49.97	6.54	26.29	9.61

Table 7.2.2-4: Conducted EMI Results – CISCO Antenna - Line 2

Frequency (MHz)	Corrected Reading		Limit		Margin		Correction (dB)
	Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average	
	(dBµV)	(dBµV)	(dBµV)	(dBµV)	(dB)	(dB)	
0.15	62.62	34.07	66	56	3.38	21.93	9.62
0.162	61.68	32.84	65.36	55.36	3.68	22.52	9.63
0.174	61.49	31.73	64.77	54.77	3.28	23.04	9.64
0.194	60.12	30.82	63.86	53.86	3.74	23.04	9.62
0.206	59.44	29.96	63.37	53.37	3.93	23.41	9.62
0.218	58.64	30.8	62.89	52.89	4.25	22.09	9.62
0.234	57.95	28.17	62.31	52.31	4.36	24.14	9.62
0.246	56.68	27.75	61.89	51.89	5.21	24.14	9.62
0.266	56.1	26.27	61.24	51.24	5.14	24.97	9.62
0.286	55.03	25.4	60.64	50.64	5.61	25.24	9.62

7.3 6dB / 99% Bandwidth – FCC 15.247(a)(2), ISED Canada: RSS-247 5.2(a)

7.3.1 Measurement Procedure

The 6dB bandwidth was measured in accordance with the FCC KDB 558074 D01 Section 8.2 which references Subclause 11.8 of ANSI C63.10. The Resolution Bandwidth (RBW) of the spectrum analyzer was set to 100 kHz. The Video Bandwidth (VBW) was set to ≥ 3 times the RBW. The trace was set to max hold with a peak detector active. The marker-delta function of the spectrum analyzer was utilized to determine the 6 dB bandwidth of the emission.

The occupied bandwidth measurement function of the spectrum analyzer was used to measure the 99% bandwidth. The span of the analyzer was set to capture all products of the modulation process, including the emission sidebands. The resolution bandwidth was set from 1% to 5% of the occupied bandwidth and the video bandwidth set to at least 3 times the resolution bandwidth. A peak detector was used.

7.3.2 Measurement Results

Performed by: Jeremy Pickens

Table 7.3.2-1: 6dB / 99% Bandwidth

Frequency (MHz)	6dB Bandwidth (kHz)	99% Bandwidth (kHz)
902.8	592.68	567.49
914.8	592.68	572.29
926.8	590.28	570.69

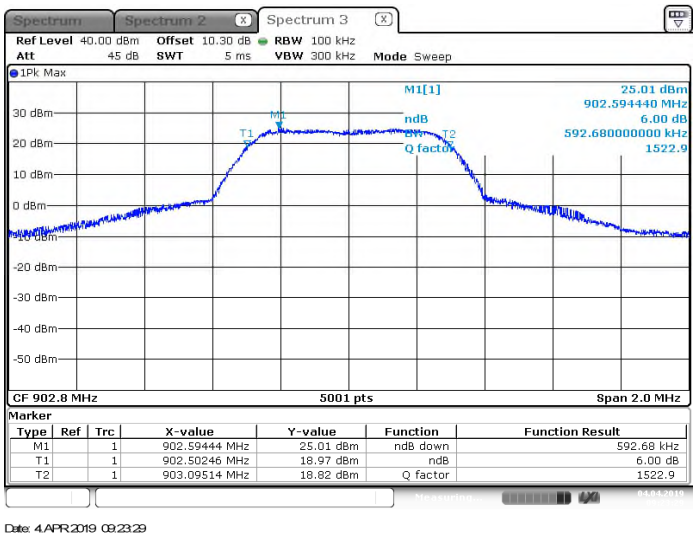

Figure 7.3.2-1: 20dB Bandwidth – LCH

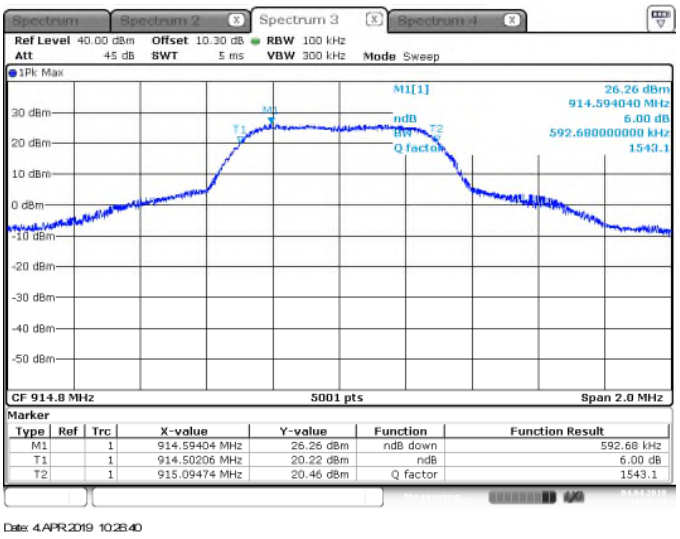

Figure 7.3.2-2: 6dB Bandwidth – MCH

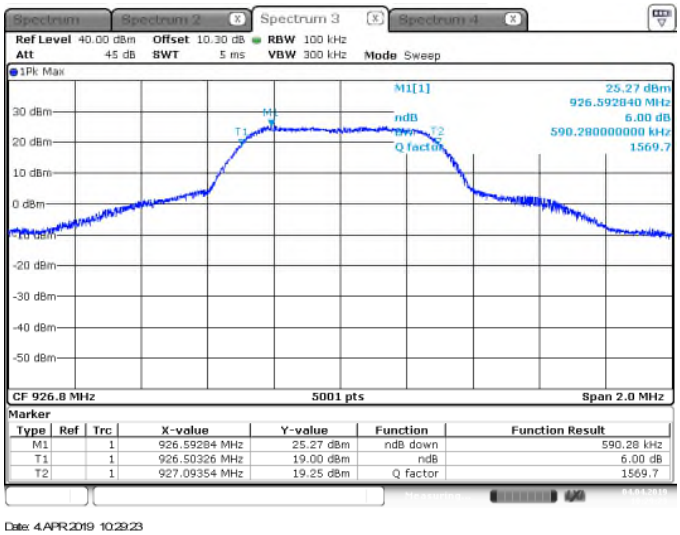

Figure 7.3.2-3: 6dB Bandwidth – HCH

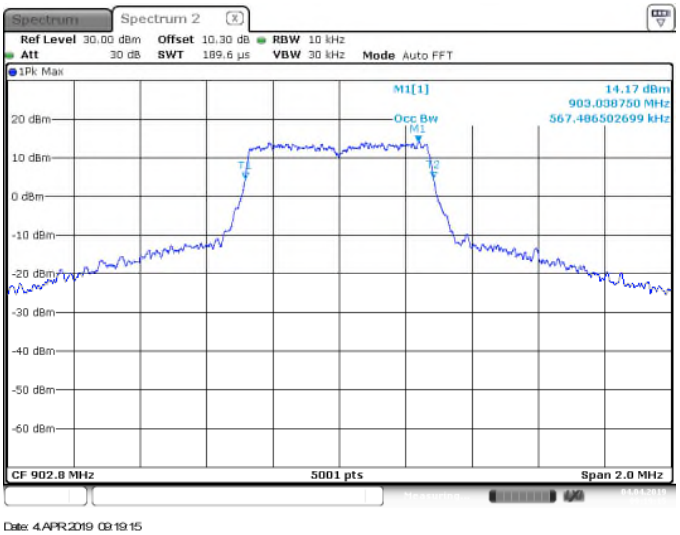

Figure 7.3.2-4: 99% Occupied Bandwidth – LCH

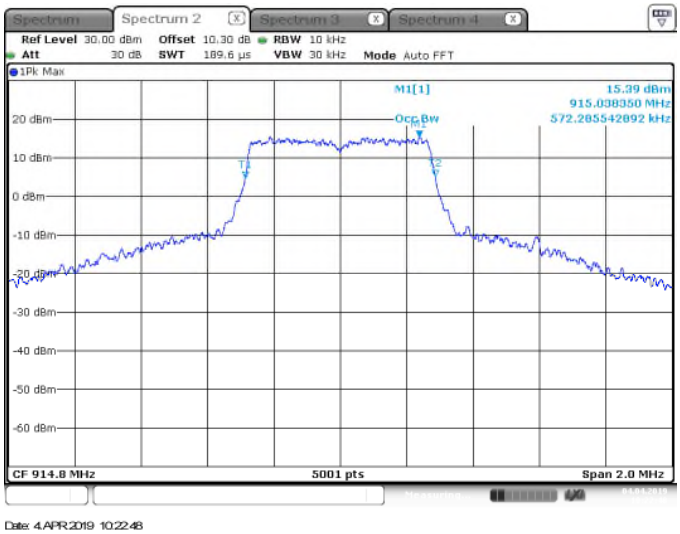

Figure 7.3.2-5: 99% Occupied Bandwidth – MCH

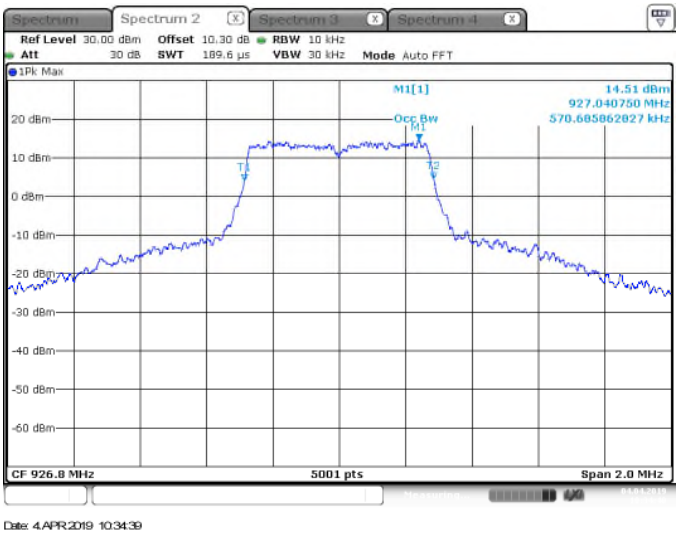

Figure 7.3.2-6: 99% Occupied Bandwidth – HCH

7.4 Fundamental Emission Output Power – FCC: Section 15.247(b)(3); ISED Canada: RSS-247 5.4(d)

7.4.1 Measurement Procedure

The maximum conducted output power was measured in accordance with FCC KDB 558074 D01 DTS Meas Guidance utilizing an average power meter with a video bandwidth of 30MHz. The RF output of the equipment under test was directly connected to the input of the power meter applying suitable attenuation.

7.4.2 Measurement Results

Performed by: Jeremy Pickens

Table 7.4.2-1: Maximum Conducted Output Power (AVG)

Frequency (MHz)	Level (dBm)
902.8	23.4
914.8	25.0
926.8	24.0

7.5 Emission Levels

7.5.1 Emissions into Non-Restricted Frequency Bands – FCC: Section 15.247(d); ISED Canada: RSS-247 5.5

7.5.1.1 Measurement Procedure

The unwanted emissions into non-restricted bands were measured conducted in accordance with FCC KDB 558074 D01 DTS Meas Guidance. The RF output of the equipment under test was directly connected to the input of the spectrum analyzer applying suitable attenuation. The Resolution Bandwidth (RBW) of the spectrum analyzer was set to 100 kHz. The Video Bandwidth (VBW) was set to ≥ 300 kHz. Span was set to 1.5 times the DTS bandwidth centered on each channel evaluated. The trace was set to max hold with a peak detector active. The resulting spectrum analyzer peak level was used to determine the reference level with respect to the 30 dBc limit. The spectrum span was then adjusted for the measurement of spurious emissions from 30 MHz to 10 GHz, 10 times the highest fundamental frequency.

Band-edge compliance was determined using the conducted marker-delta method in which the radio frequency power that is produced by the EUT is at least 30 dB below that in the 100 kHz bandwidth within the band that contains the highest level of desired power.

7.5.1.2 Measurement Results

Performed by: Jeremy Pickens

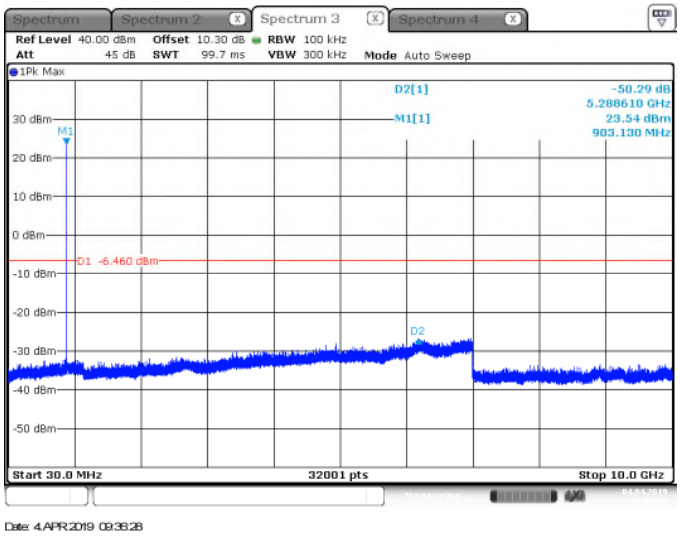

Figure 7.5.1.2-1: 30 MHz – 10 GHz – Low Channel

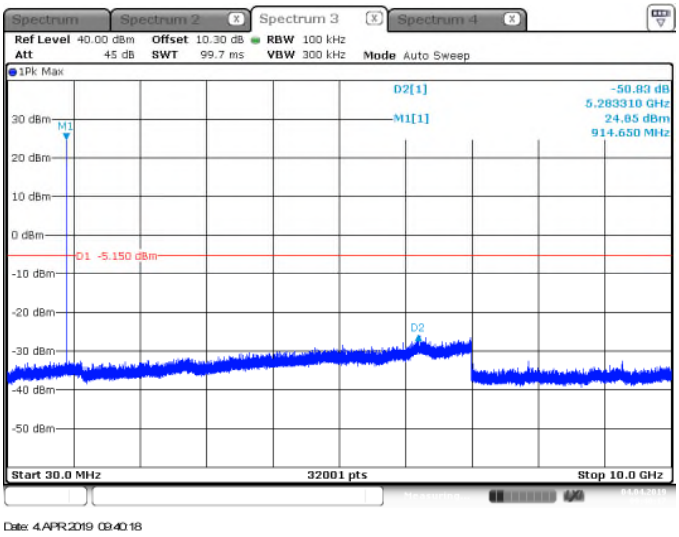

Figure 7.5.1.2-2: 30 MHz – 10 GHz – Middle Channel

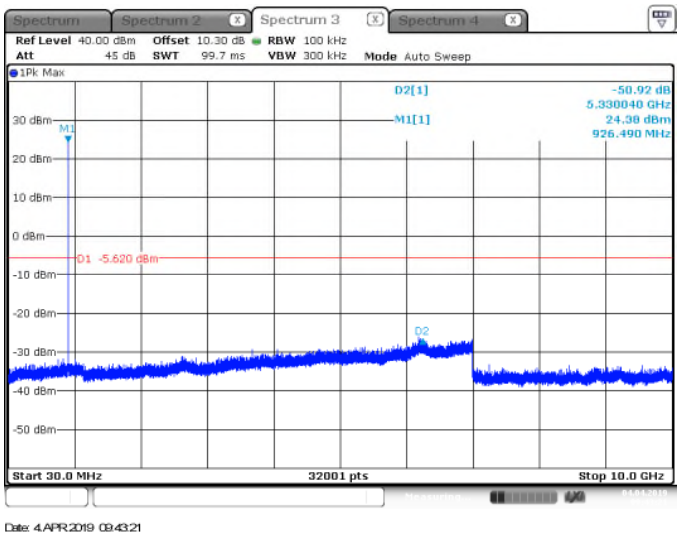

Figure 7.5.1.2-3: 30 MHz – 10 GHz –High Channel

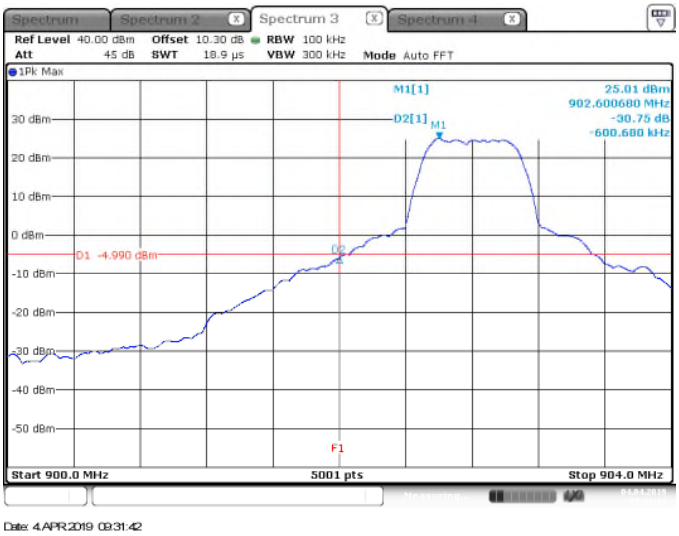

Figure 7.5.1.2-4: Lower Band-edge

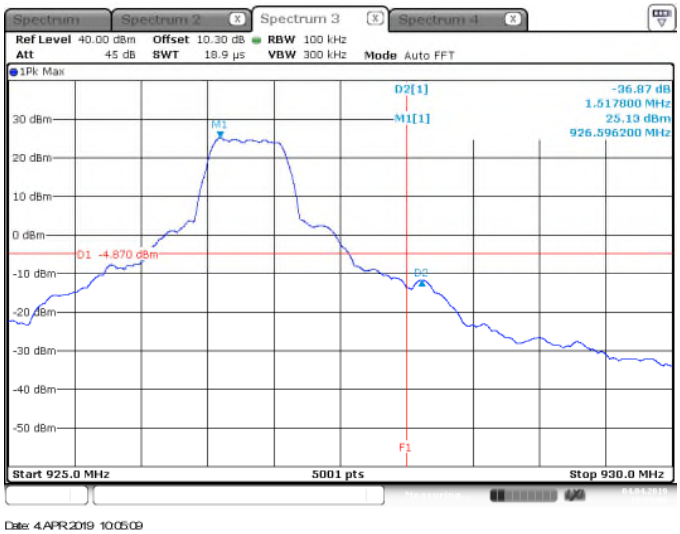

Figure 7.5.1.2-5: Upper Band-edge

7.5.2 Emissions into Restricted Frequency Bands – FCC: Sections 15.205, 15.209; ISED Canada: RSS-Gen 8.9 / 8.10

7.5.2.1 Measurement Procedure

The unwanted emissions into restricted bands were measured radiated over the frequency range of 9 kHz to 10 GHz, 10 times the highest fundamental frequency.

The EUT was rotated through 360° and the receive antenna height was varied from 1 meter to 4 meters so that the maximum radiated emissions level would be detected. For frequencies below 1000 MHz, quasi-peak measurements were made using a resolution bandwidth RBW of 120 kHz and a video bandwidth VBW of 300 kHz. For frequencies above 1000 MHz, peak and average measurements were made with RBW and VBW of 1 MHz and 3 MHz respectively.

Each emission found to be in a restricted band as defined by section 15.205, including any emission at the operational band-edge, was compared to the radiated emission limits as defined in section 15.209. Emissions not reported were below the noise floor of the measurement system. Peak data below 30MHz was more than 20dB below the applicable limits.

7.5.2.2 Measurement Results

Performed by: Jeremy Pickens

Table 7.5.2.2-1: Radiated Spurious Emissions Tabulated Data – Laird Antenna

Frequency (MHz)	Level (dBuV)		Antenna Polarity	Correction Factors	Corrected Level (dBµV/m)		Limit (dBµV/m)		Margin (dB)	
	pk	Qpk/Avg	(H/V)	(dB)	pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
902.8 MHz										
1805.6	48.40	34.30	H	-6.22	42.18	28.08	74.0	54.0	31.8	25.9
1805.6	48.20	34.30	V	-6.22	41.98	28.08	74.0	54.0	32.0	25.9
3610.4	48.00	34.20	H	1.18	49.18	35.38	74.0	54.0	24.8	18.6
3610.4	47.80	33.70	V	1.18	48.98	34.88	74.0	54.0	25.0	19.1
914.8 MHz										
1829.6	48.40	34.20	H	-6.08	42.32	28.12	74.0	54.0	31.7	25.9
1829.6	48.30	34.20	V	-6.08	42.22	28.12	74.0	54.0	31.8	25.9
3659.2	47.40	33.50	H	1.43	48.83	34.93	74.0	54.0	25.2	19.1
3659.2	47.20	33.40	V	1.43	48.63	34.83	74.0	54.0	25.4	19.2
926.8 MHz										
1853.6	48.40	34.00	H	-5.94	42.46	28.06	74.0	54.0	31.5	25.9
1853.6	47.90	34.30	V	-5.94	41.96	28.36	74.0	54.0	32.0	25.6
3707.2	47.60	34.20	H	1.67	49.27	35.87	74.0	54.0	24.7	18.1
3707.2	47.60	34.00	V	1.67	49.27	35.67	74.0	54.0	24.7	18.3

Table 7.5.2.2-2: Radiated Spurious Emissions Tabulated Data – CISCO Antenna

Frequency (MHz)	Level (dBuV)		Antenna Polarity	Correction Factors	Corrected Level (dBµV/m)		Limit (dBµV/m)		Margin (dB)	
	pk	Qpk/Avg	(H/V)	(dB)	pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
902.8 MHz										
1805.2	47.60	34.30	H	-6.46	41.14	27.84	74.0	54.0	32.9	26.2
1805.2	47.70	34.60	V	-6.46	41.24	28.14	74.0	54.0	32.8	25.9
3610.4	48.00	34.20	H	0.88	49.28	35.08	74.0	54.0	24.7	18.9
3610.4	47.80	33.70	V	0.88	48.58	34.98	74.0	54.0	25.4	19.0
914.8 MHz										
1829.6	47.90	34.10	H	-6.32	41.58	27.78	74.0	54.0	32.4	26.2
1829.6	47.50	34.30	V	-6.32	41.18	27.98	74.0	54.0	32.8	26.0
3659.2	47.70	34.00	H	1.11	48.81	35.11	74.0	54.0	25.2	18.9
3659.2	47.90	34.00	V	1.11	49.01	35.11	74.0	54.0	25.0	18.9
926.8 MHz										
1853.6	47.40	34.20	H	-6.18	41.22	28.02	74.0	54.0	32.8	26.0
1853.6	48.10	34.60	V	-6.18	41.92	28.42	74.0	54.0	32.1	25.6
3707.2	48.10	34.50	H	1.35	49.45	35.85	74.0	54.0	24.6	18.2
3707.2	48.10	34.40	V	1.35	49.45	35.75	74.0	54.0	24.6	18.3

7.5.2.3 Sample Calculation:

$R_C = R_U + CF_T$

Where:

CF_T = Total Correction Factor (AF+CA+AG)-DC (Average Measurements Only)
R_U = Uncorrected Reading
R_C = Corrected Level
AF = Antenna Factor
CA = Cable Attenuation
AG = Amplifier Gain
DC = Duty Cycle Correction Factor

Example Calculation: Peak – Antenna 1 High Channel

Corrected Level: 47.60 + 1.67 = 49.27dBuV/m
Margin: 74dBuV/m – 49.27dBuV/m = 24.7dB

Example Calculation: Average – Antenna 1 High Channel

Corrected Level: 34.20 + 1.67 - 0 = 35.87dBuV
Margin: 54dBuV – 35.87dBuV = 18.1dB

7.6 Maximum Power Spectral Density – FCC: Section 15.247(e) ISED Canada: RSS-247 5.2(b)

7.6.1 Measurement Procedure

The power spectral density was measured in accordance with the FCC KDB 558074 D01 DTS Meas Guidance utilizing the AVGPSD method. The RF output of the equipment under test was directly connected to the input of the spectrum analyzer applying suitable attenuation. The Resolution Bandwidth (RBW) of the spectrum analyzer was set to 3 kHz. The Video Bandwidth (VBW) was set to 10 kHz. Span was set to 1.5 times the DTS Bandwidth. The detector was set to RMS and trace averaging was employed over a minimum of 100 sweeps. The marker to peak function was then used to find the highest average PSD within the emission envelope.

7.6.2 Measurement Results

Performed by: Jeremy Pickens

Table 7.6.2-1: Power Spectral Density

Frequency (MHz)	PSD Level (dBm)
902.8	1.22
914.8	2.68
926.8	1.59

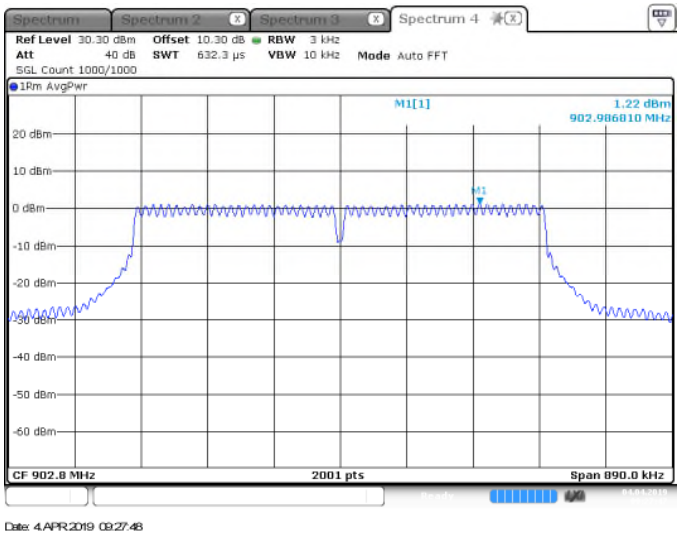

Figure 7.6.2-1: Power Spectral Density – LCH

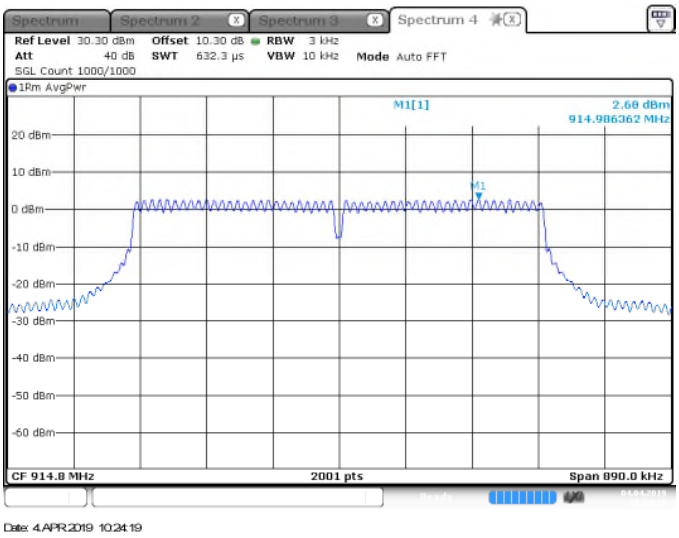

Figure 7.6.2-2: Power Spectral Density – MCH

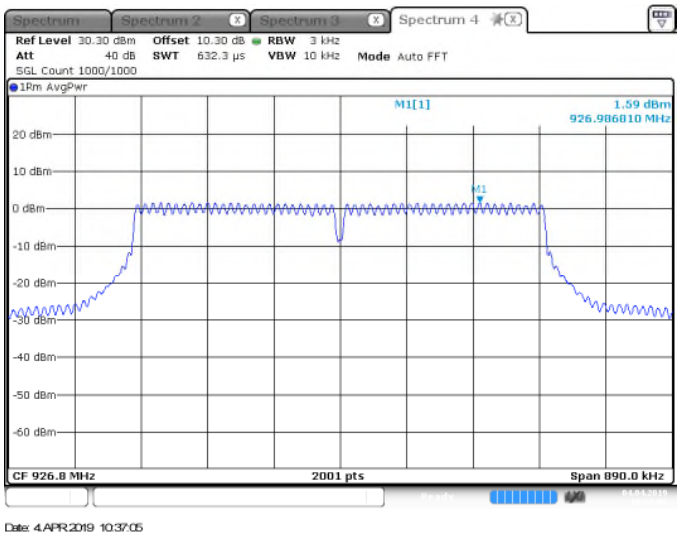

Figure 7.6.2-3: Power Spectral Density – HCH

8 ESTIMATION OF MEASUREMENT UNCERTAINTY

The expanded laboratory measurement uncertainty figures (U_{Lab}) provided below correspond to an expansion factor (coverage factor) k = 1.96 which provide confidence levels of 95%.

Parameter	U_{lab}
Occupied Channel Bandwidth	± 0.009 %
RF Conducted Output Power	± 0.349 dB
Power Spectral Density	± 0.372 dB
Antenna Port Conducted Emissions	± 1.264 dB
Radiated Emissions ≤ 1 GHz	± 5.814 dB
Radiated Emissions > 1 GHz	± 4.318 dB
Temperature	± 0.860 °C
Radio Frequency	± 2.832 x 10^{-8}
AC Power Line Conducted Emissions	± 3.360 dB

9 CONCLUSION

In the opinion of TÜV SÜD America, Inc. the NIC, manufactured by Itron, Inc. meets the requirements of FCC Part 15 subpart C and ISED Canada's Radio Standards Specification RSS-247 for the tests documented in this test report.

END REPORT