Certification Test Report

FCC ID: SK9CAT1
IC: 864G-CAT1

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

Report Number: AT72151409-2C2

Manufacturer: Itron, Inc.
Model: CAT1

Test Begin Date: July 17, 2019
Test End Date: October 7, 2019

Report Issue Date: October 16, 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 27 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 CAT1 is an electricity metering module which includes a 910 MHz to 921.8 MHz transceiver as well as an 802.11bgn WLAN transceiver. The module operates on AC power which is supplied by a host device.

This test report documents the compliance of the sub-1GHz transceiver mode of operation.

Technical Details:

Detail	Description
Frequency Range	910 – 914.8MHz / 917-921.8 MHz
Number of Channels	50
Channel Spacing	200kHz
Modulation Format	FSK
Data Rates	12.5kbps
Operating Voltage	120Vac, 60Hz
Antenna Type(s) / Gain(s)	PCB Trace / -4.21dBi Max

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

Test Sample Serial Number: Not labeled

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 Y-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 120Vac, 60Hz.

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

Software power setting during test: 63

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 Designation Accreditation Number:	US1233
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.

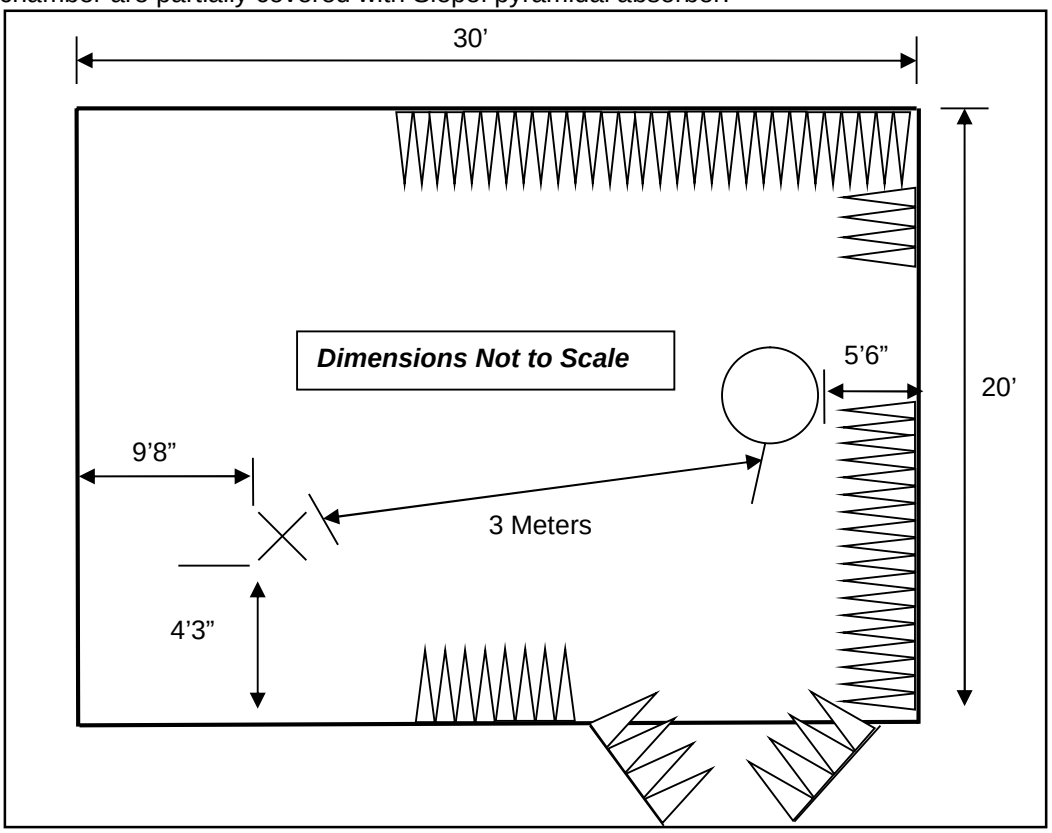


Figure 2.3.1-1: Semi-Anechoic Chamber Test Site – Chamber A

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.

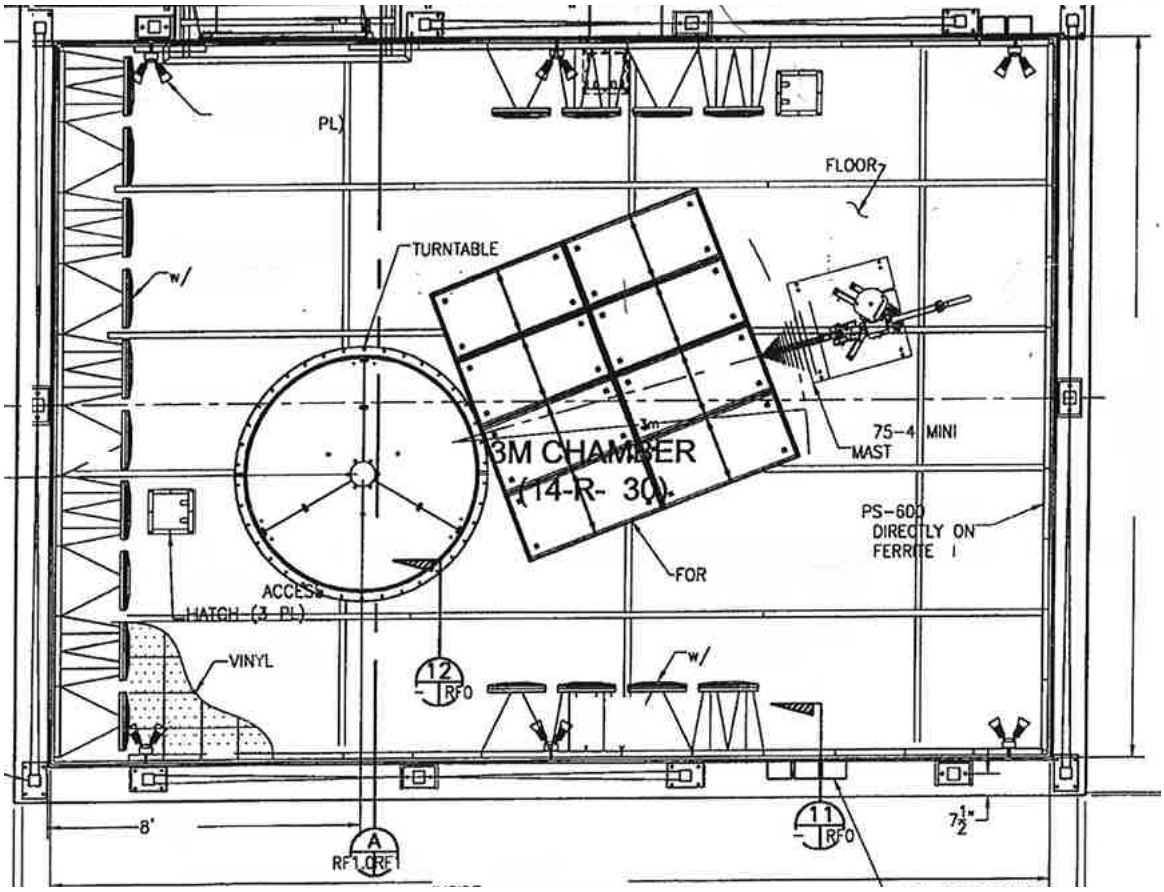


Figure 2.3.2-1: Semi-Anechoic Chamber Test Site – Chamber B

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.

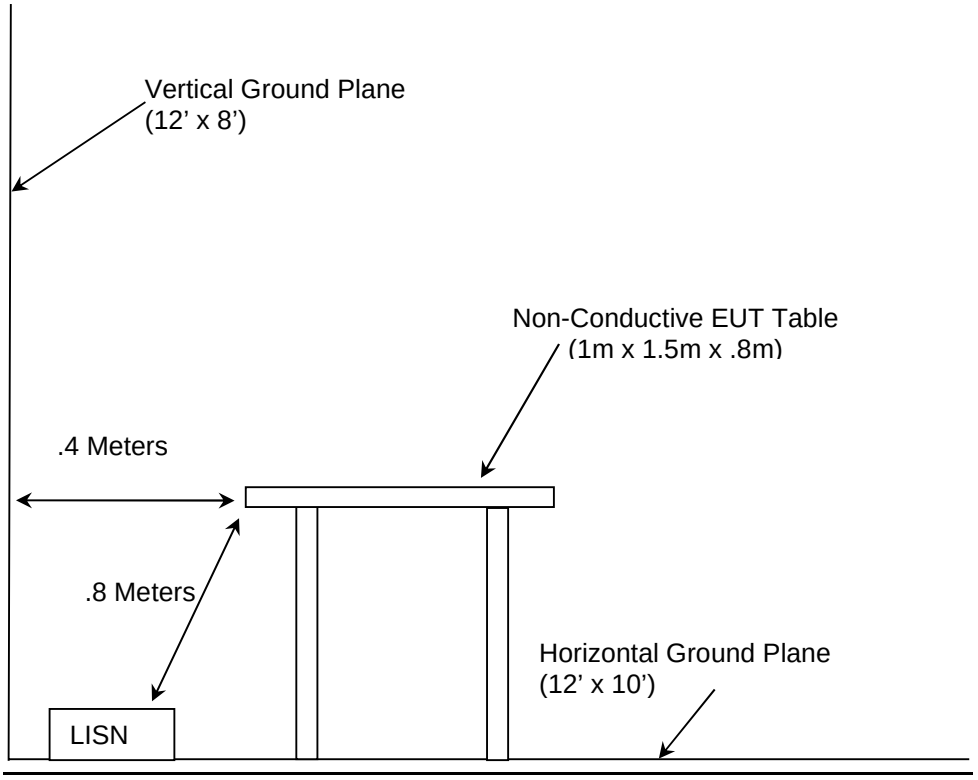


Figure 2.4.1-1: AC Mains Conducted EMI Site

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
- 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
22	Hewlett Packard	8449B	High Frequency Pre-Amp	3008A00526	07/11/2018	07/11/2020
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	05/31/2019	05/31/2020
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	05/01/2019	05/01/2020
836	ETS Lindgren	SAC Cable Set	SAC Cable Set includes 620, 837, 838	N/A	05/01/2019	05/01/2020
853	Teseq	CBL 6112D; 6804.17.A	Bilog Antenna; Attenuator	51616; 20181110A	10/15/2018	10/15/2019
857	ETS Lindgren	3117	Horn Antenna 1-18GHz	00153608	12/13/2017	12/13/2019
3010	Rohde & Schwarz	ENV216	Two-Line V-Network	3010	7/10/2019	7/10/2020

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	Interface Board	Not labeled	Not labeled	N/A
2	AC/DC Adapter	Phihong	PSM08A-052	N/A

Table 5-2: Cable Description

Cable	Cable Type	Length	Shield	Termination
A	DC Power	1.75m	No	Interface Board to AC/DC Adapter
B	AC Power Cable	1.8m	No	EUT to AC Mains

Note: AC power cable only present during radiated measurements and AC port conducted emissions.

6 EQUIPMENT UNDER TEST SETUP BLOCK DIAGRAM

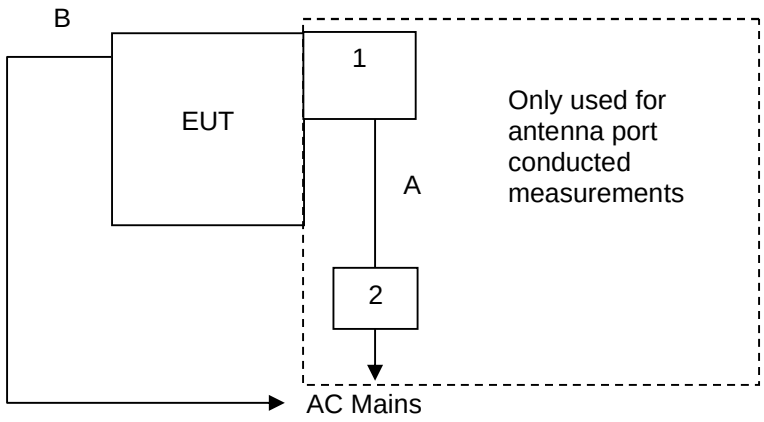


Figure 6-1: Test Setup Block Diagram

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 utilizes a PCB trace antenna. The antenna is integral to the device and cannot be removed or replaced by the end user. The gain of the antenna is -4.21dBi Max.

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 = Corrected Reading - Applicable Limit

7.2.2 Measurement Results

Performed by: Eugene Sello

Table 7.2.2-1: Conducted EMI Results

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	32.84	20.51	66	56	-33.16	-35.49	9.61
0.162	33.02	22.13	65.36	55.36	-32.34	-33.23	9.58
0.182	34.38	22.13	64.39	54.39	-30.01	-32.26	9.58
0.194	37.46	26.81	63.86	53.86	-26.4	-27.05	9.59
0.214	36.06	26.35	63.05	53.05	-26.99	-26.7	9.61
0.266	34.06	23.46	61.24	51.24	-27.18	-27.78	9.62
0.502	25.39	13.91	56	46	-30.61	-32.09	9.66
0.546	25.76	21.55	56	46	-30.24	-24.45	9.66
0.694	31.3	24.73	56	46	-24.7	-21.27	9.71
1.074	28.56	19.97	56	46	-27.44	-26.03	9.78

Table 7.2.2-2: Conducted EMI Results

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	31.04	20.5	66	56	-34.96	-35.5	9.62
0.162	30.2	21.85	65.36	55.36	-35.16	-33.51	9.63
0.19	36.11	21.06	64.04	54.04	-27.93	-32.98	9.63
0.202	39.36	25.08	63.53	53.53	-24.17	-28.45	9.62
0.274	33.36	24.73	61	51	-27.64	-26.27	9.62
0.506	25.39	14.76	56	46	-30.61	-31.24	9.67
0.514	25.38	13.84	56	46	-30.62	-32.16	9.67
0.53	25.35	16.36	56	46	-30.65	-29.64	9.67
0.574	25.27	13.22	56	46	-30.73	-32.78	9.69
2.25	27.44	25.69	56	46	-28.56	-20.31	9.87

7.3 Peak Output Power – FCC: Section 15.247(b)(2); ISED Canada: RSS-247 5.4(a)

7.3.1 Measurement Procedure (Conducted Method)

The maximum conducted peak output power was measured in accordance with Subclause 7.8.5 of ANS 63.10. 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 > 20dB bandwidth of the fundamental emission. The Video Bandwidth (VBW) was set to ≥ 3 times the RBW. The spectrum analyzer was configured with a peak detector and placed in max hold until the trace stabilized. The resulting peak value was recorded.

The device employs 50 channels at any given time therefore the power is limited to 1 Watt.

7.3.2 Measurement Results

Performed by: Jeremy Pickens

Table 7.3.2-1: Maximum Conducted Output Power (Peak)

Frequency (MHz)	Level (dBm)
910	27.5
917	27.2
921.8	27.1

7.4 Channel Usage Requirements

7.4.1 Carrier Frequency Separation – FCC: Section 15.247(a)(1); ISED Canada: RSS-247 5.1(b)

7.4.1.1 Measurement Procedure

The RF output port of the EUT was directly connected to the input of the spectrum analyzer with suitable attenuation. The span of the spectrum analyzer was set wide enough to capture two adjacent peaks and the RBW started at approximately 30% of the channel spacing and adjusted as necessary to best identify the center of each individual channel. The VBW was set to ≥ RBW.

Carrier frequency separation was measured for all modes of operation and data presented in section 7.4.1.2 below.

7.4.1.2 Measurement Results

Performed by: Jeremy Pickens

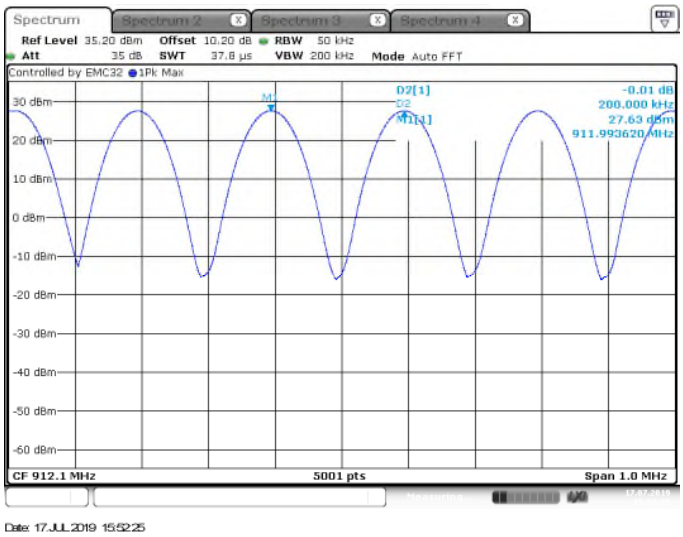


Figure 7.4.1.2-1: Freq. Separation

7.4.2 Number of Hopping Channels – FCC: Section 15.247(a)(1)(i); ISED Canada: RSS-247 5.1(c)

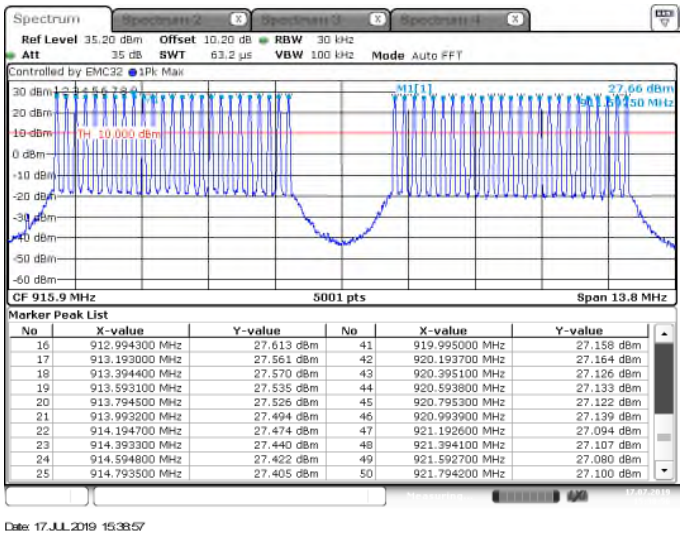
7.4.2.1 Measurement Procedure

The RF output port of the EUT was directly connected to the input of the spectrum analyzer with suitable attenuation. The span of the spectrum analyzer was set wide enough to capture the frequency band of operation. The RBW was set to less than 30% of the channel spacing or the 20dB bandwidth, whichever is smaller. The VBW was set to ≥ RBW.

The number of hopping channels was measured for the modes of operation and data presented in section 7.4.2.2 below.

7.4.2.2 Measurement Results

Performed by: Jeremy Pickens



No	X-value	Y-value	No	X-value	Y-value
16	912.994300 MHz	27.613 dBm	41	919.995000 MHz	27.158 dBm
17	913.193000 MHz	27.561 dBm	42	920.193700 MHz	27.164 dBm
18	913.394400 MHz	27.570 dBm	43	920.395100 MHz	27.126 dBm
19	913.593100 MHz	27.535 dBm	44	920.593800 MHz	27.133 dBm
20	913.794500 MHz	27.526 dBm	45	920.795300 MHz	27.122 dBm
21	913.993200 MHz	27.494 dBm	46	920.993900 MHz	27.139 dBm
22	914.194700 MHz	27.474 dBm	47	921.192600 MHz	27.094 dBm
23	914.393300 MHz	27.440 dBm	48	921.394100 MHz	27.107 dBm
24	914.594800 MHz	27.422 dBm	49	921.592700 MHz	27.080 dBm
25	914.793500 MHz	27.405 dBm	50	921.794200 MHz	27.100 dBm

Figure 7.4.2.2-1: No. of Channels

7.4.3 Channel Dwell Time – FCC: Section 15.247(a)(1)(i); ISED Canada: RSS-247 5.1(c)

7.4.3.1 Measurement Procedure

The RF output port of the EUT was directly connected to the input of the spectrum analyzer with suitable attenuation. The spectrum analyzer was set to zero span and the sweep was adjusted to capture the entire dwell time per hopping channel. A peak detector was used with a max hold trace. The marker delta function was used to determine the dwell time. The measurement was repeated with a 20s sweep time to determine the number of hops within a 20s period.

7.4.3.2 Measurement Results

Performed by: Jeremy Pickens

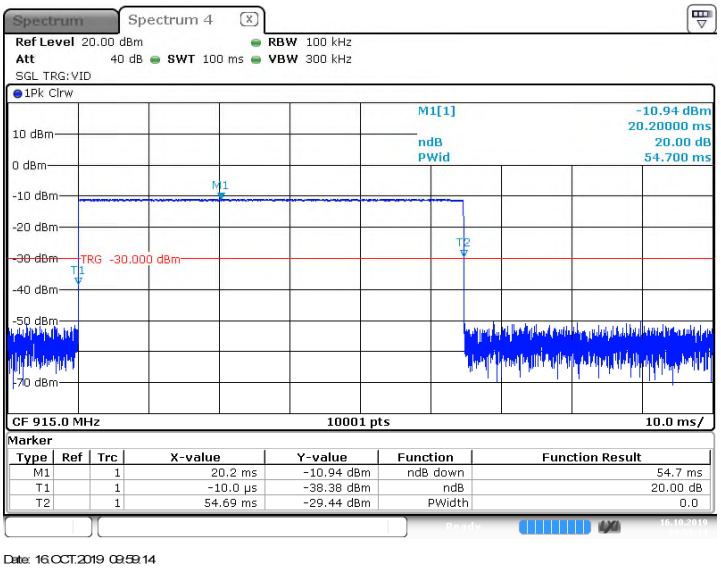


Figure 7.4.3.2-1: Dwell Time 100ms

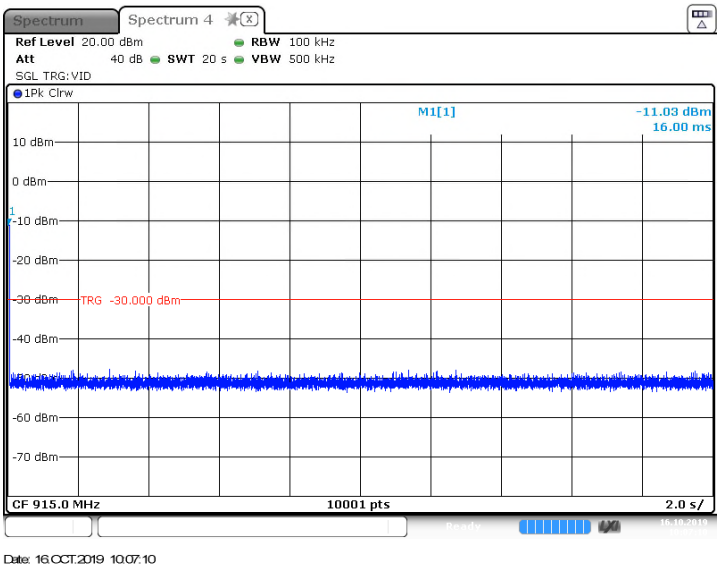


Figure 7.4.3.2-3: Dwell Time 20s Period

7.4.4 20dB / 99% Bandwidth – FCC: Section 15.247(a)(1)(i); ISED Canada: RSS-247 5.1(c) / RSS-GEN 6.7

7.4.4.1 Measurement Procedure

The RF output port of the EUT was directly connected to the input of the spectrum analyzer with suitable attenuation. The span of the spectrum analyzer display was set between two times and five times the occupied bandwidth (OBW) of the emission. The RBW of the spectrum analyzer was set to approximately 1 % to 5 % of the OBW. The trace was set to max hold with a peak detector active. The ndB down function of the analyzer was utilized to determine the 20 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 to 1% to 5% of the occupied bandwidth. The video bandwidth was set to 3 times the resolution bandwidth. A peak detector was used.

7.4.4.2 Measurement Results

Performed by: Jeremy Pickens

Table 7.4.4.2-1: 20dB / 99% Bandwidth

Frequency (MHz)	20dB Bandwidth (kHz)	99% Bandwidth (kHz)
910	160.7	161.7
917	160.8	161.4
921.8	160.7	162.5

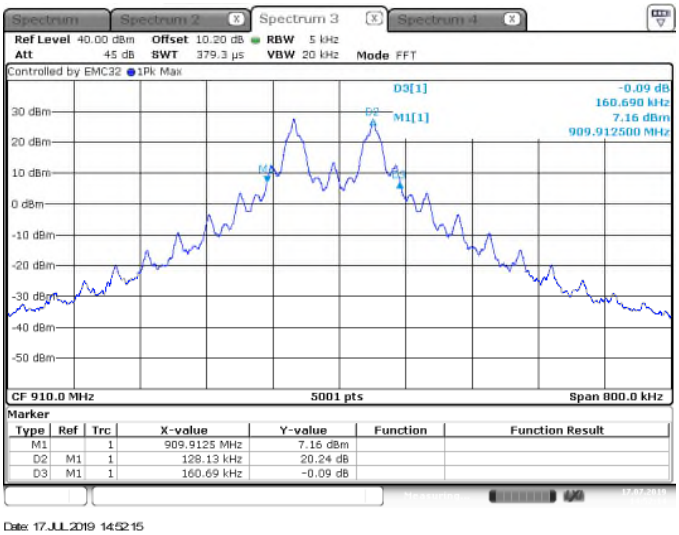


Figure 7.4.4.2-1: 20dB Bandwidth – LCH

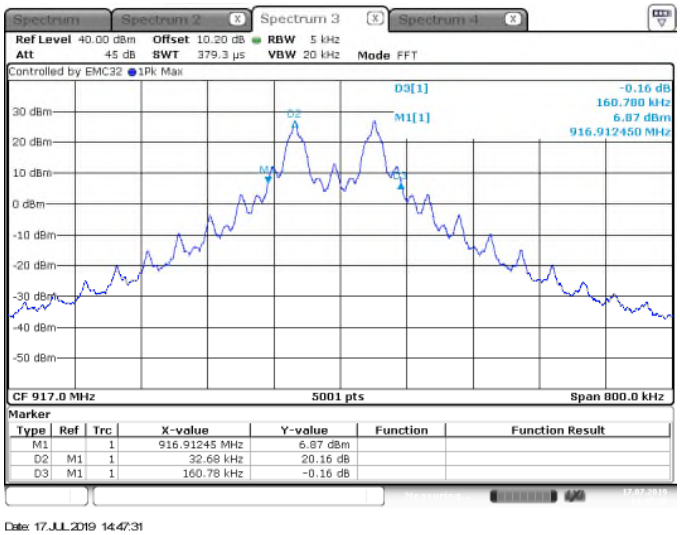


Figure 7.4.4.2-2: 20dB Bandwidth – MCH

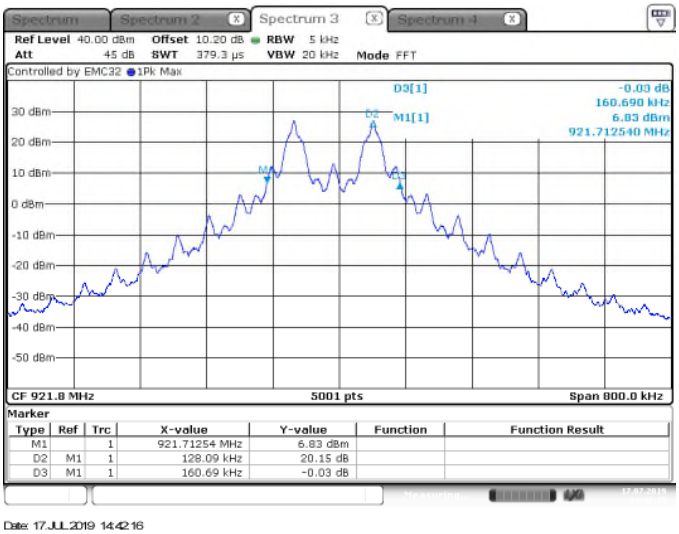


Figure 7.4.4.2-3: 20dB Bandwidth – HCH

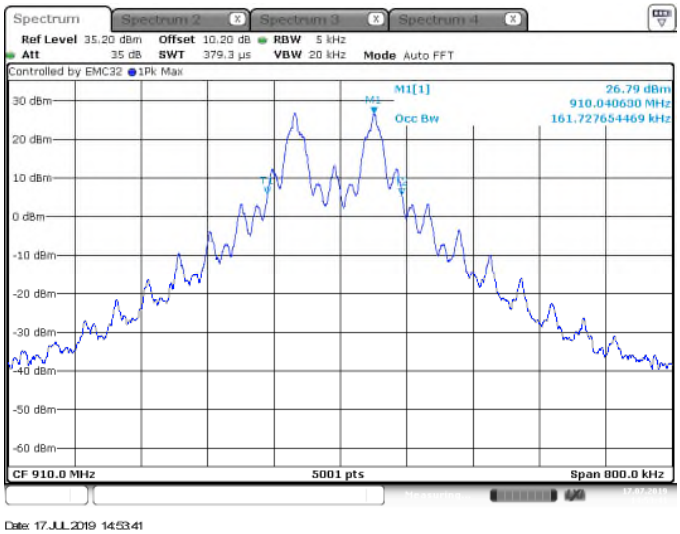


Figure 7.4.4.2-4: 99% Occupied Bandwidth – LCH

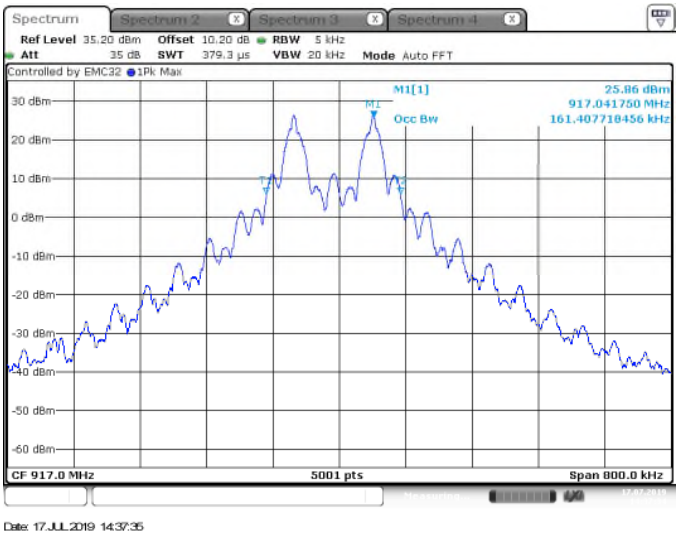


Figure 7.4.4.2-5: 99% Occupied Bandwidth – MCH

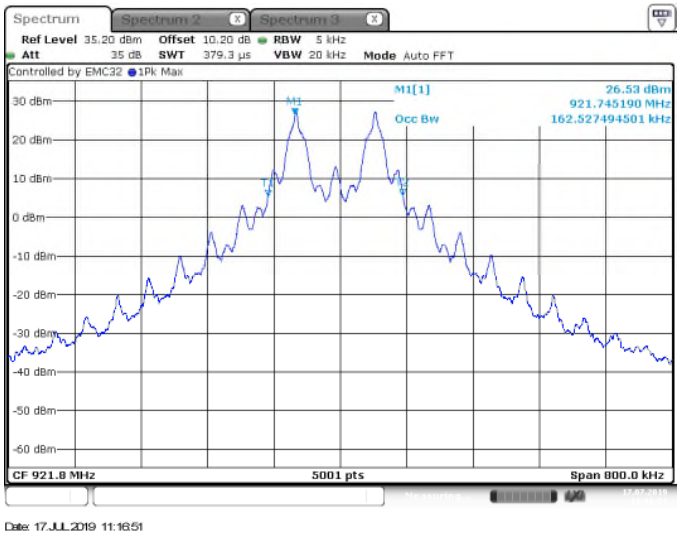


Figure 7.4.4.2-6: 99% Occupied Bandwidth – HCH

7.5 Band-Edge Compliance and Spurious Emissions

7.5.1 Band-Edge Compliance of RF Conducted Emissions – FCC: Section 15.247(d); ISED Canada: RSS-247 5.5

7.5.1.1 Measurement Procedure

The RF output port of the EUT was directly connected to the input of the spectrum analyzer with suitable attenuation. The EUT was investigated at the lowest and highest channel available to determine band-edge compliance. For each measurement, the spectrum analyzer's RBW was set to 100kHz and the VBW was set to 300kHz.

Band-edge was evaluated for all combinations of operating modes and data rates.

7.5.1.2 Measurement Results

Performed by: Jeremy Pickens

NON-HOPPING MODE:

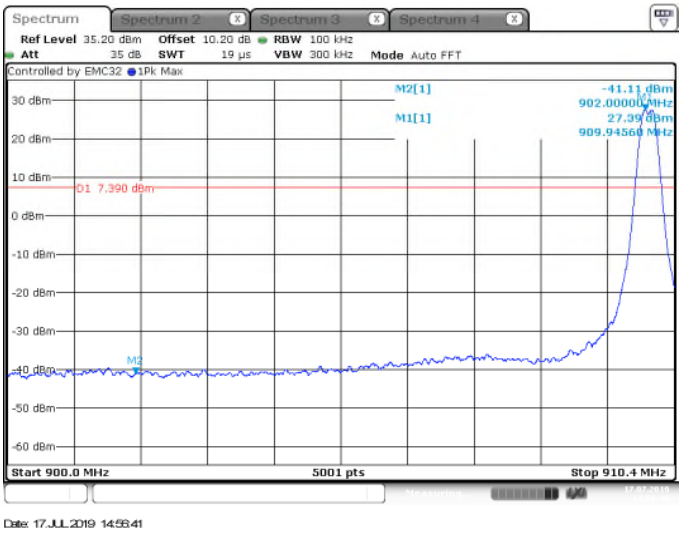


Figure 7.5.1.2-1: Lower Band-edge

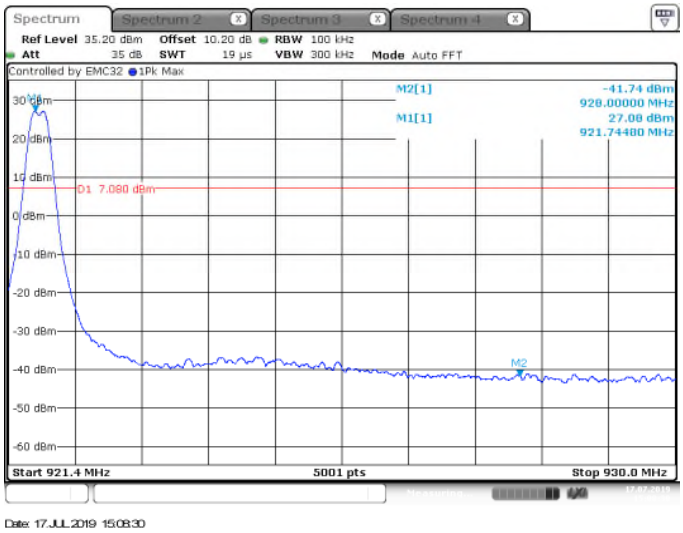


Figure 7.5.1.2-2: Upper Band-edge

HOPPING MODE:

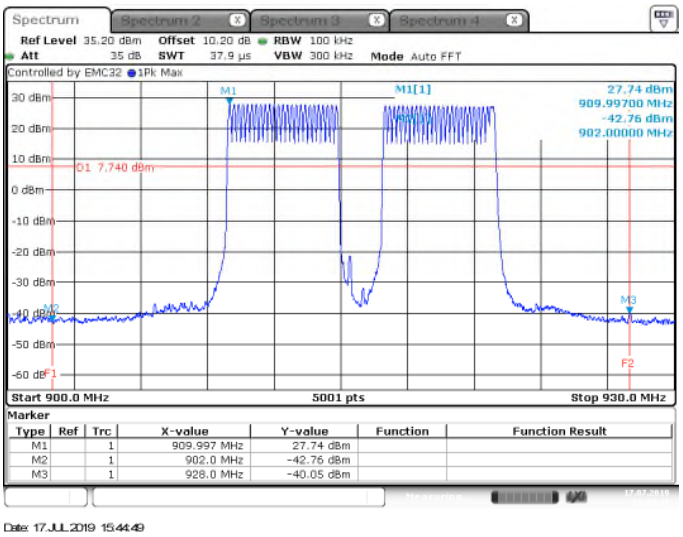


Figure 7.5.1.2-3: Band Edges

7.5.2 RF Conducted Spurious Emissions – FCC: Section 15.247(d); ISED Canada: RSS-247 5.5

7.5.2.1 Measurement Procedure

The RF output port of the EUT was directly connected to the input of the spectrum analyzer. The EUT was investigated for conducted spurious emissions from 30MHz to 10GHz, 10 times the highest fundamental frequency. Measurements were made at the low, center and high channels of the EUT. For each measurement, the spectrum analyzer's RBW was set to 100kHz. A peak detector function was used with the trace set to max hold.

7.5.2.2 Measurement Results

Performed by: Jeremy Pickens

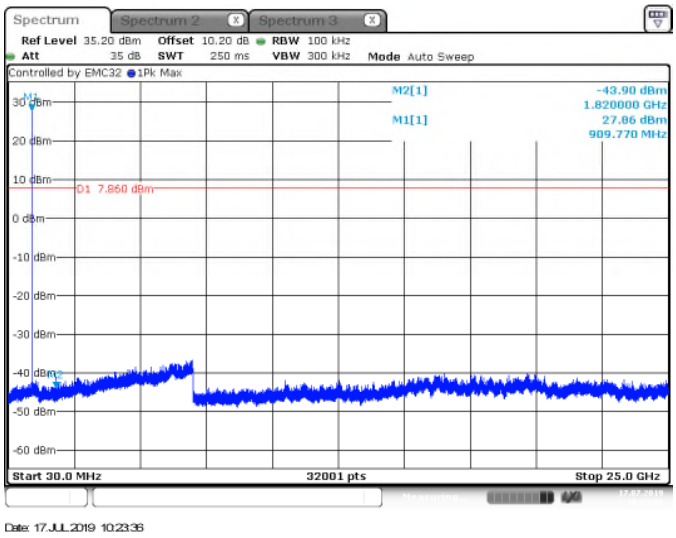


Figure 7.5.2.2-1: 30 MHz – 10 GHz – Low Channel

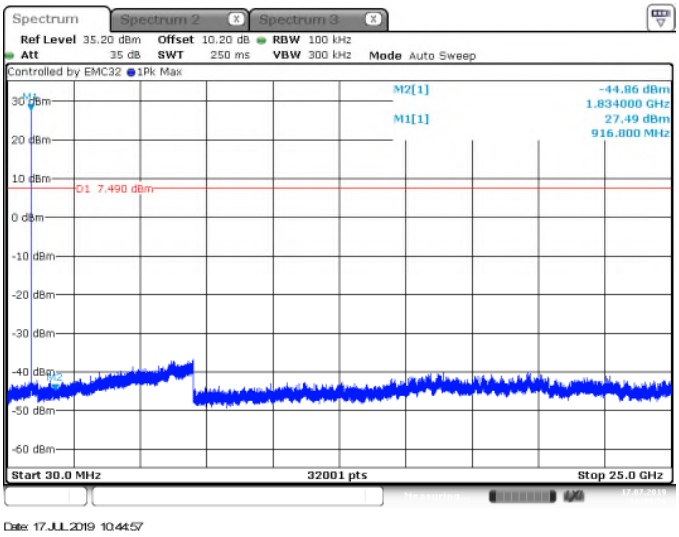


Figure 7.5.2.2-2: 30 MHz – 10 GHz – Middle Channel

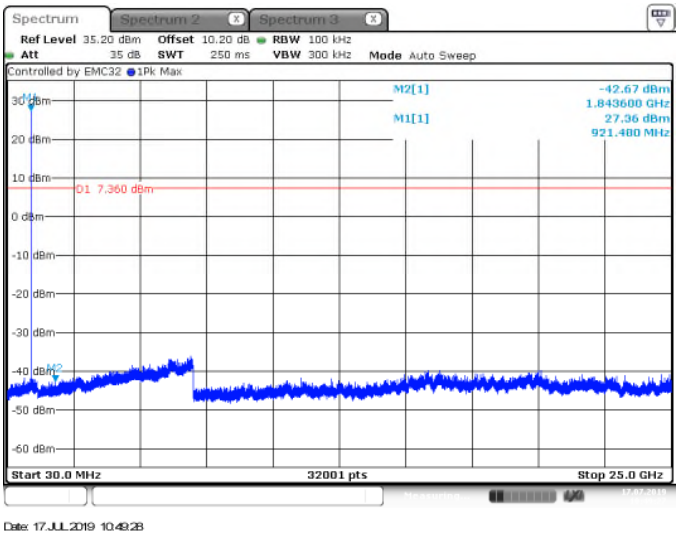


Figure 7.5.2.2-3: 30 MHz – 10 GHz –High Channel

7.5.3 Radiated Spurious Emissions – FCC: Section 15.205, 15.209; ISED Canada: RSS-Gen 8.9/8.10

7.5.3.1 Measurement Procedure

Radiated emissions tests were made over the frequency range of 9kHz to 10GHz, 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.

The EUT was caused to generate a continuous modulated carrier on the hopping channel.

Each emission found to be in a restricted band was compared to the applicable radiated emission limits.

Radiated spurious emissions were evaluated for all combinations of operating modes and data rates with worst case data provided. Emissions not reported were below the noise floor of the measurement system. Peak data below 30MHz was more than 20dB below the applicable limits.

7.5.3.2 Measurement Results

Performed by: Jeremy Pickens

Table 7.5.3.2-1: Radiated Spurious Emissions Tabulated Data

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
910 MHz										
2730	51.90	47.50	H	5.20	57.10	52.70	74.0	54.0	16.9	1.3
2730	50.50	45.90	V	5.20	55.70	51.10	74.0	54.0	18.3	2.9
3640	45.30	34.90	H	7.04	52.34	41.94	74.0	54.0	21.7	12.1
3640	44.50	33.30	V	7.04	51.54	40.34	74.0	54.0	22.5	13.7
917 MHz										
2751	46.98	39.60	H	5.26	52.24	44.86	74.0	54.0	21.8	9.1
2751	46.80	39.10	V	5.26	52.06	44.36	74.0	54.0	21.9	9.6
3668	44.80	33.10	H	7.10	51.90	40.20	74.0	54.0	22.1	13.8
3668	45.40	32.00	V	7.10	52.50	39.10	74.0	54.0	21.5	14.9
921.8 MHz										
2765.4	46.20	38.50	H	5.30	51.50	43.80	74.0	54.0	22.5	10.2
2765.4	46.20	38.60	V	5.30	51.50	43.90	74.0	54.0	22.5	10.1
3687.2	44.20	32.50	H	7.14	51.34	39.64	74.0	54.0	22.7	14.4
3687.2	44.70	34.50	V	7.14	51.84	41.64	74.0	54.0	22.2	12.4

7.5.3.3 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

Corrected Level: 51.90 + 5.20 = 57.10dBuV/m
Margin: 74dBuV/m – 57.10dBuV/m = 16.9dB

Example Calculation: Average

Corrected Level: 47.50 + 5.20 - 0 = 52.70dBuV
Margin: 54dBuV – 52.70dBuV = 1.3dB

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%.

Table 8-1: Estimation of Measurement Uncertainty

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 CAT1, manufactured by Itron, Inc. meets the requirements of FCC Part 15 subpart C and Innovation, Science and Economic Development Canada's Radio Standards Specification RSS-247 for the tests documented herein.

Appendix A: Plots

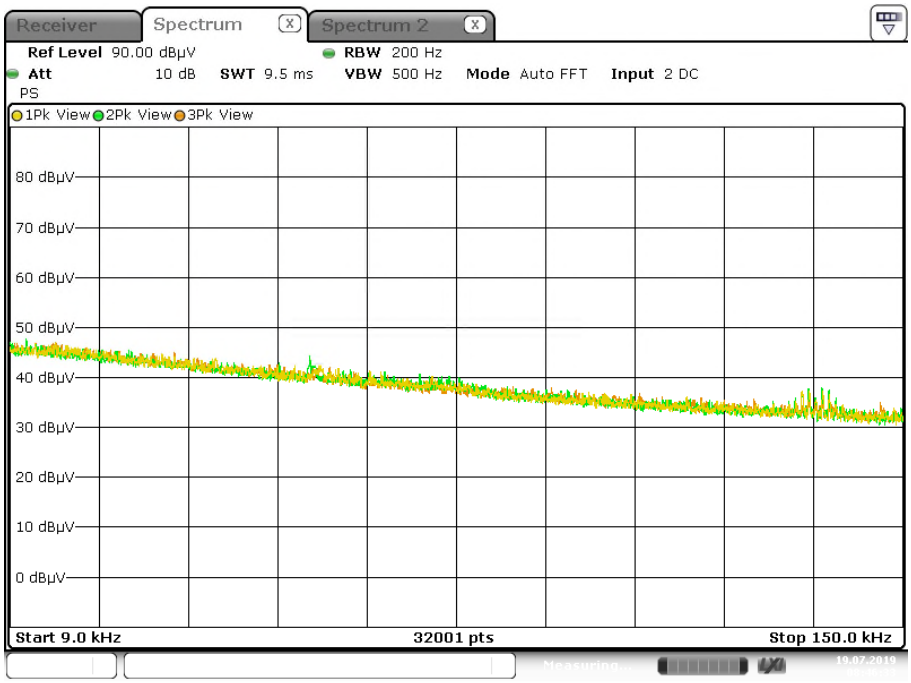
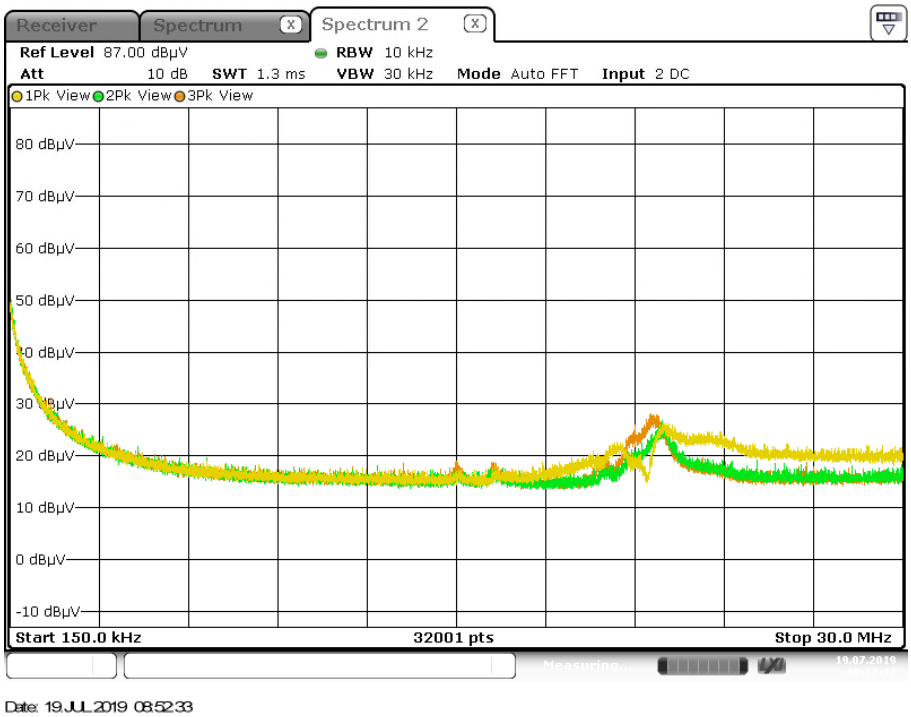
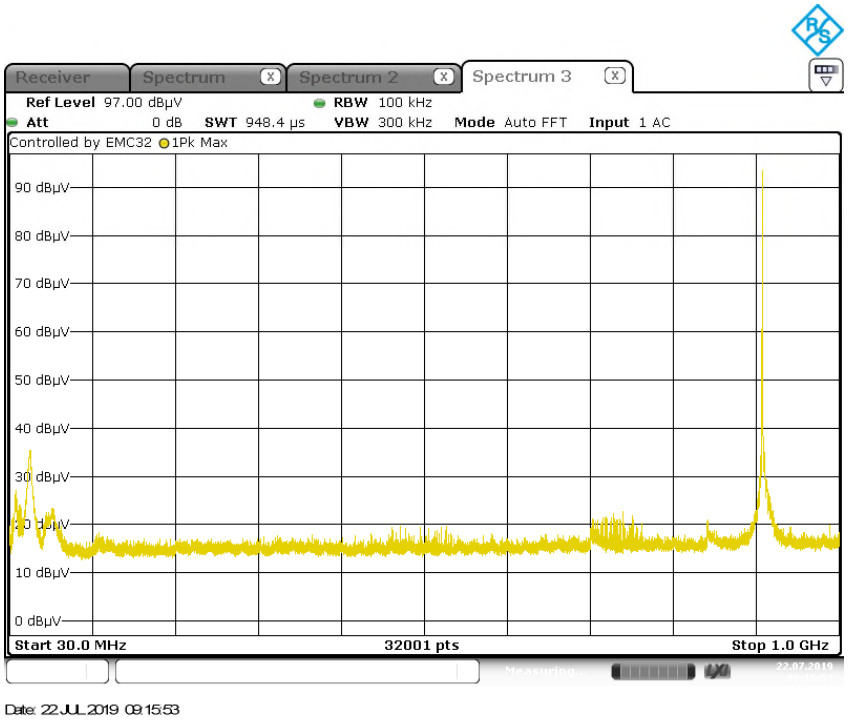


Figure A-1: 9kHz-150kHz



Note: Emissions above the noise floor are ambient not associated with the DUT.

Figure A-2: 150kHz-30MHz



Note: Except for the fundamental, emissions above the noise floor are from the digital sections of the DUT and not associated with the radio.

Figure A-3: 30MHz-1GHz

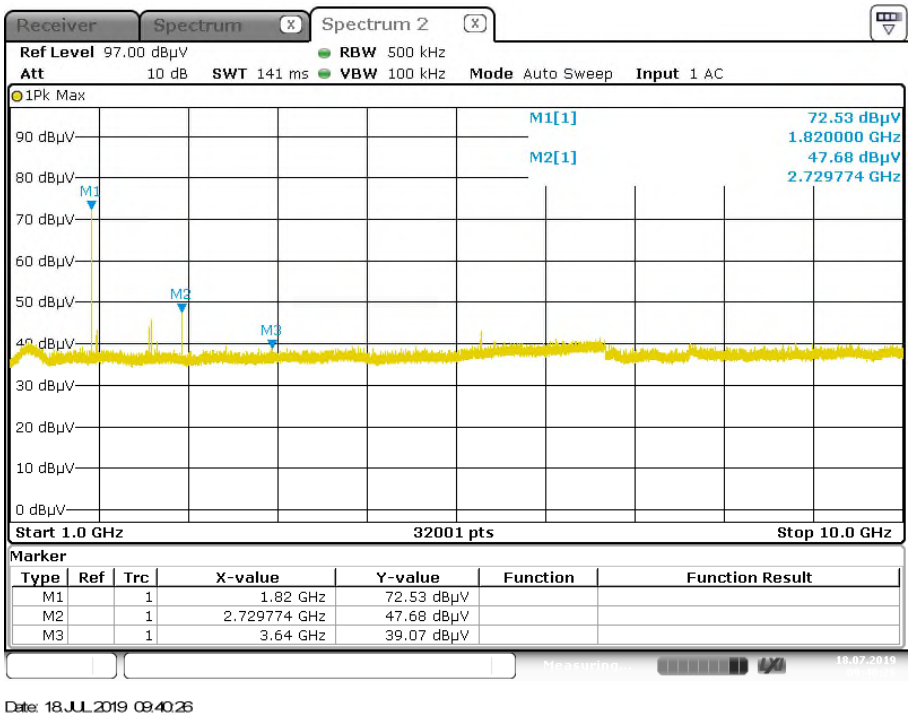


Figure A-4: 1GHz-10GHz

END REPORT