Certification Test Report

FCC ID: SK9ITR9002

FCC Rule Part: 15.247

Report Number: AT72148094-3P0

Manufacturer: Itron Inc
Model: ITR9002

Test Begin Date: April 22, 2019
Test End Date: April 22, 2019

Report Issue Date: May 20, 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 13 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 for the tests documented herein.

1.2 Applicant Information

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

1.3 Product Description

The Itron ITR9002 is a transmitter module that operates in the 902 MHz to 928 MHz unlicensed band. The module operates on direct current voltage which is supplied by a host device.

Technical Details

Detail	Description
Frequency Range	902.25 – 927.75
Operating Voltage	12VDC
Antenna Type / Gain	External Omnidirectional / 3dBi (Laird, P/N: TRA9023P)
Manufacturer	Itron Inc
FCC ID	SK9ITR9002

Test Sample Serial Number(s): Not Labeled

Test Sample Condition: The equipment was provided in good condition without any physical damage.

1.4 Test Methodology and Considerations

This is a Class 2 Permissive Change to add a new antenna (Laird, P/N: TRA9023P).

For radiated emissions, the EUT was evaluated in a fixed orientation as intended during normal installation.

For power line conducted emissions, the EUT was evaluated in the host using the provided AC cable.

Power setting during test: 20

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.

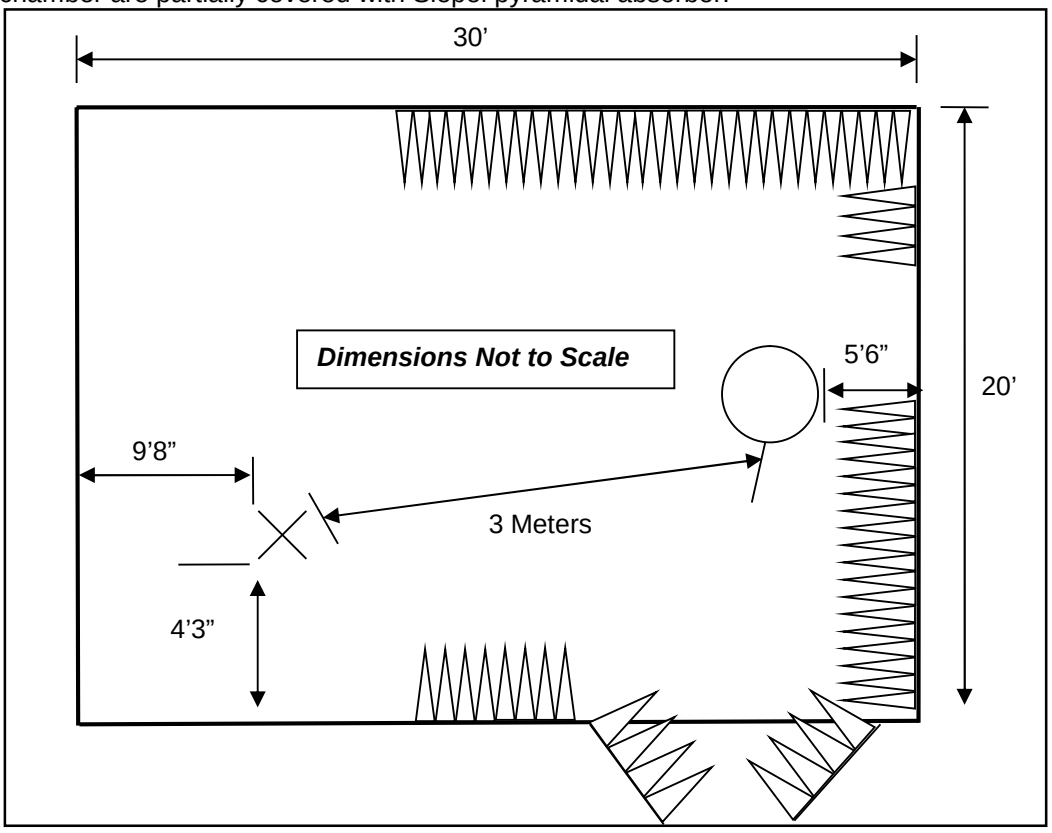

Figure 2.3.1-1: Semi-Anechoic Chamber Test Site – Chamber A

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.

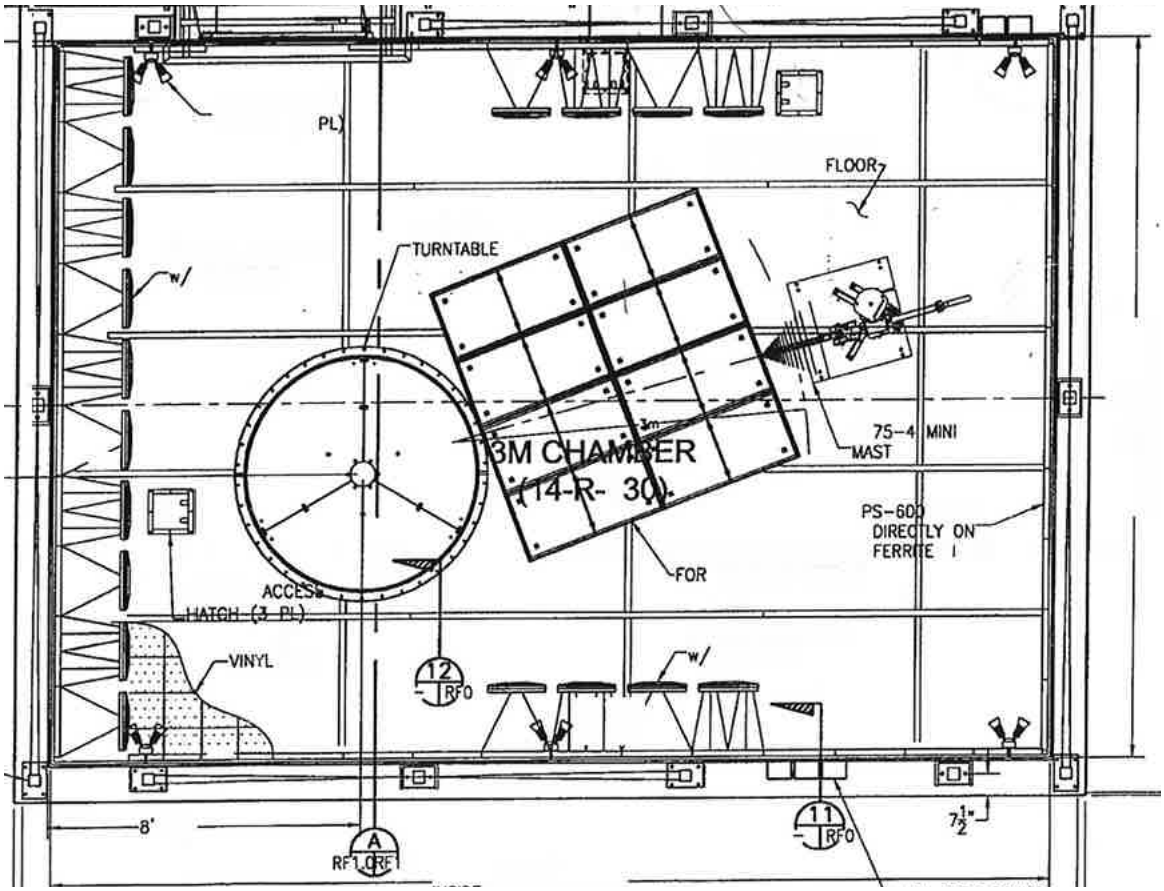

Figure 2.3.2-1: Semi-Anechoic Chamber Test Site – Chamber B

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.

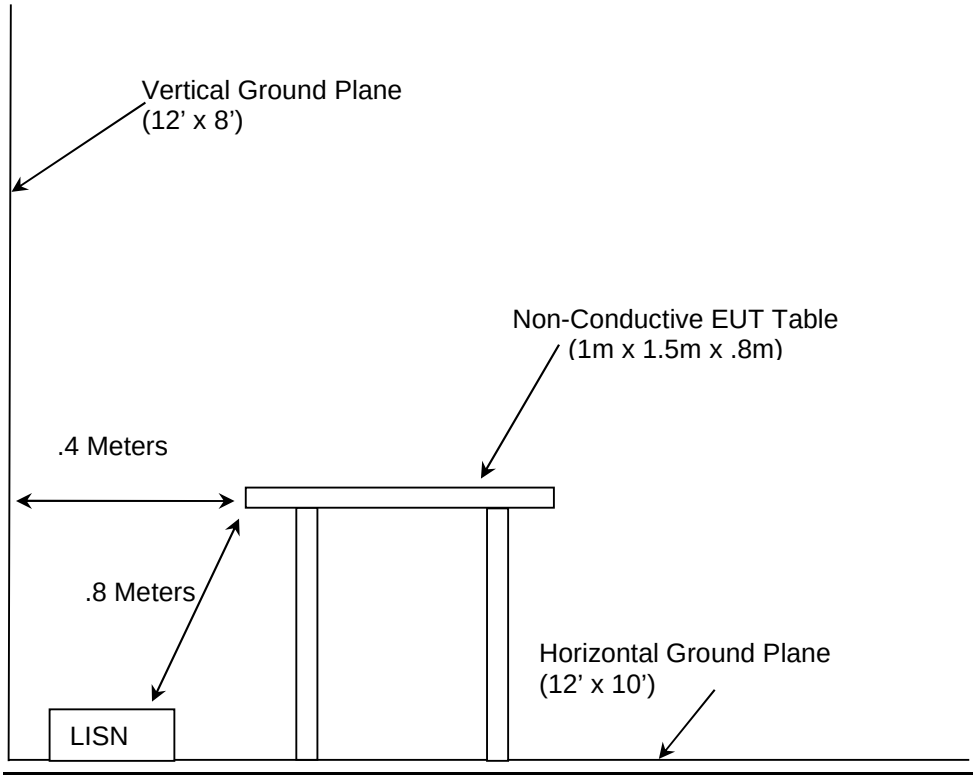

Figure 2.4.1-1: AC Mains Conducted EMI Site

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

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
213	TEC	PA 102	Amplifier	44927	07/19/2018	07/19/2019
324	ACS	Belden	Conducted EMI Cable	8214	3/19/2019	3/19/2020
331	Microwave Circuits	H1G513G1	Microwave Bandpass Filter	31417	05/16/2018	05/16/2019
338	Hewlett Packard	8449B	High Frequency Pre-Amp	3008A01111	07/11/2017	07/11/2019
432	Microwave Circuits	H3G020G4	Highpass Filter	264066	05/16/2018	05/16/2019
654	Micro-Tronics	BRC50722	Band Reject Filter	-10	4/23/2019	4/23/2020
813	PMM	9010	EMI Receiver; RF Input 50ohm; 10Hz-50MHz; 10Hz-30MHz	697WW30606	02/12/2018	02/12/2019
819	Rohde & Schwarz	ESR26	EMI Test Receiver	101345	11/06/2018	11/06/2019
836	ETS Lindgren	SAC Cable Set	SAC Cable Set includes 620, 837, 838	N/A	05/01/2018	05/01/2019
853	Teseq	CBL 6112D; 6804.17.A	Bilog Antenna; Attenuator	51616; 20181110A	10/15/2018	10/15/2019
3010	Rohde & Schwarz	ENV216	Two-Line V-Network	3010	07/11/2018	07/11/2019

NCR = No Calibration Required

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

5 SUPPORT EQUIPMENT

Table 5-1: Support Equipment

Item	Equipment Type	Manufacturer	Model Number	Serial Number
1	Host	Itron Inc	PMR	FCC1/FCC2
2	EUT	Itron Inc	ITR9002	N/A

Table 5-2: Cable Description

Item	Cable Type	Length	Shield	Termination
A	AC Power	150 cm	No	1 - AC

6 EQUIPMENT UNDER TEST SETUP BLOCK DIAGRAM

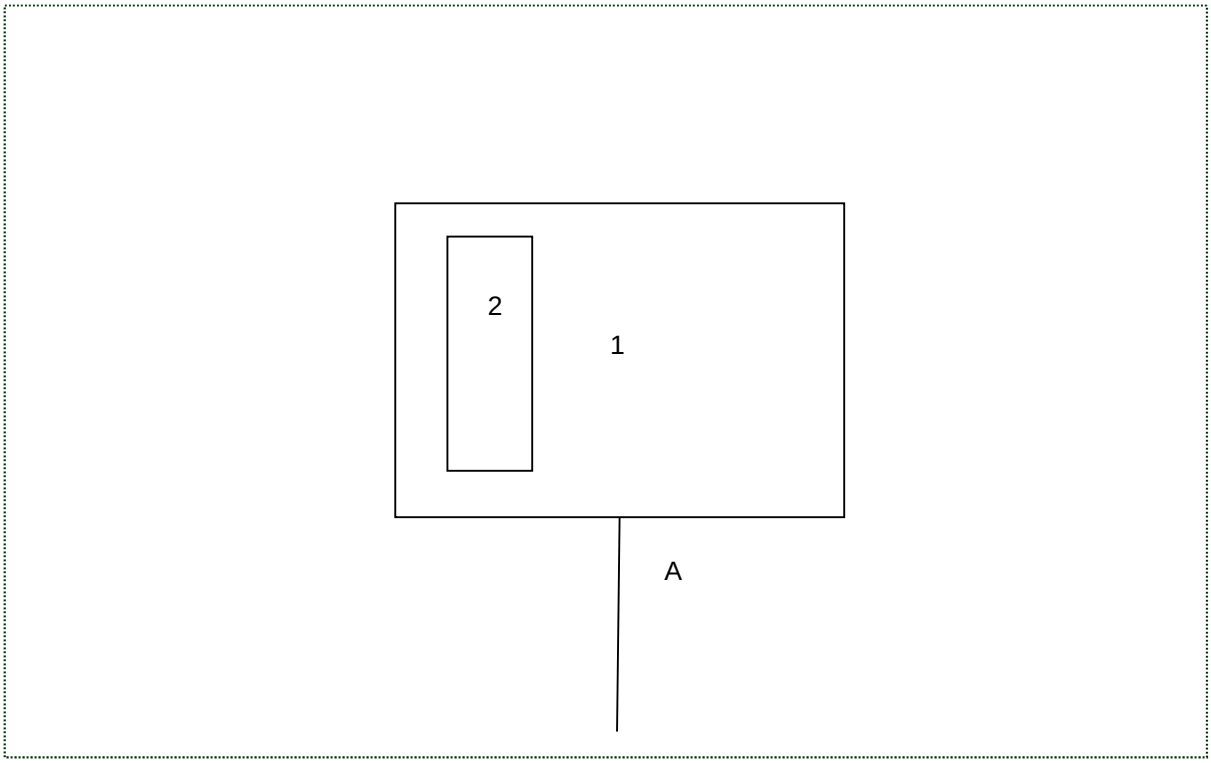

Figure 6-1: Test Setup Block Diagram

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 15.203

The EUT utilizes an external omnidirectional antenna (Laird, P/N TRA9023P). When installed, the antenna is external to the host and is non-detachable. The gain of the antenna is +3dBi.

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

7.2.1 Measurement Procedure

ANSI C63.10 section 6 was the guiding documents 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: Tyler Leeson

Table 7.2.2-1: Conducted EMI Results Line 1

Frequency (MHz)	Corrected Reading		Limit		Margin		
	Quasi-Peak (dBuV)	Average (dBuV)	Quasi-Peak (dBuV)	Average (dBuV)	Quasi-Peak (dB)	Average (dB)	Correction (dB)
0.15	25.07	13.53	66	56	-40.93	-42.47	9.61
2.63	19.27	10.93	56	46	-36.73	-35.07	9.94
2.67	19.29	10.95	56	46	-36.71	-35.05	9.94
2.718	19.31	10.97	56	46	-36.69	-35.03	9.94
2.802	19.33	10.99	56	46	-36.67	-35.01	9.94
2.906	19.37	11.03	56	46	-36.63	-34.97	9.96
2.95	19.38	11.04	56	46	-36.62	-34.96	9.96
2.986	19.4	11.06	56	46	-36.6	-34.94	9.96
9.59	19.27	10.93	60	50	-40.73	-39.07	9.94
29.982	25.02	13.41	60	50	-34.98	-36.59	9.96

Table 7.2.2-2: Conducted EMI Results Line 2

Frequency (MHz)	Corrected Reading		Limit		Margin		
	Quasi-Peak (dBuV)	Average (dBuV)	Quasi-Peak (dBuV)	Average (dBuV)	Quasi-Peak (dB)	Average (dB)	Correction (dB)
0.15	25.09	13.11	66	56	-40.91	-42.89	9.62
0.154	25.64	13.92	65.78	55.78	-40.14	-41.86	9.62
2.558	19.21	10.87	56	46	-36.79	-35.13	9.89
2.634	19.23	10.89	56	46	-36.77	-35.11	9.89
2.682	19.25	10.91	56	46	-36.75	-35.09	9.89
2.826	19.53	10.94	56	46	-36.47	-35.06	9.89
2.854	20.24	10.95	56	46	-35.76	-35.05	9.9
2.878	19.3	10.96	56	46	-36.7	-35.04	9.9
2.986	19.34	11	56	46	-36.66	-35	9.9
29.998	24.51	13.5	60	50	-35.49	-36.5	10.05

7.3 Emission Levels

7.3.1 Emissions into Restricted Frequency Bands – FCC: 15.205, 15.209

7.3.1.1 Measurement Procedure

The unwanted emissions into restricted bands were measured radiated over the frequency range of 30MHz 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.

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.

7.3.1.2 Measurement Results

Performed by: Tyler Leeson

Table 7.3.1.2-1: Radiated Spurious Emissions Tabulated Data

Frequency (MHz)	Level (dBuV)		Antenna Polarity (H/V)	Correction Factors (dB)	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg			pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
902.25 MHz										
5413.5	48.65	36.75	V	5.87	54.52	42.62	74.0	54.0	19.5	11.4
914.75										
2744.25	48.80	35.94	V	-2.37	46.43	33.57	74.0	54.0	27.6	20.4
4573.75	49.26	37.16	V	3.05	52.31	40.21	74.0	54.0	21.7	13.8
927.75										
4638.75	49.33	36.37	V	3.34	52.67	39.71	74.0	54.0	21.3	14.3

7.3.2 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 – Horizontal Polarity – 5413.5 MHz

Corrected Level: 48.65 + 5.87 = 54.52dBuV/m
Margin: 74dBuV/m – 54.52dBuV/m = 19.5dB

Example Calculation: Average –Horizontal Polarity – 5413.5 MHz

Corrected Level: 36.75 + 5.87 - 0 = 42.62dBuV
Margin: 54dBuV – 42.62dBuV = 11.4dB

8 CONCLUSION

In the opinion of TUV SUD the ITR9002, manufactured by Itron Inc meets the requirements of FCC Part 15 subpart C for the tests documented herein.

END REPORT