

Itron, Inc.

TEST REPORT FOR

ISM Transmitter, MC3-DL and MC LITE DL

Engineering Data Showing Co-Location Test Results

Report No.: 91226-14

Date of issue: November 1, 2010

We strive to create long-term, trust based relationships by providing sound, adaptive, customer first testing services. We embrace each of our customers' unique EMC challenges, not as an interruption to set processes, but rather as the reason we are in business.



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ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

ltron, Inc.
2111 N. Molter Road
Liberty Lake, WA 99019

REPRESENTATIVE: Jay Holcomb
Customer Reference Number: 21853

DATE OF EQUIPMENT RECEIPT:
DATE(S) OF TESTING:

REPORT PREPARED BY:

Joyce Walker
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Project Number: 91226

October 13 , 2010
October 13 - 20, 2010

Report Authorization

The test data contained in this report documents the observed testing parameters pertaining to and are relevant for only the sample equipment tested in the agreed upon operational mode(s) and configuration(s) as identified herein. Compliance assessment remains the client's responsibility. This report may not be used to claim product endorsement by A2LA or any government agencies. This test report has been authorized for release under quality control from CKC Laboratories, Inc.



Steve Behm
Director of Quality Assurance & Engineering Services
CKC Laboratories, Inc.

Test Facility Information



Our laboratories are configured to effectively test a wide variety of product types. CKC utilizes first class test equipment, anechoic chambers, data acquisition and information services to create accurate, repeatable and affordable test results.

TEST LOCATION(S):
 CKC Laboratories, Inc.
 22116 23rd Drive S.E., Suite A
 Bothell, WA 98021-4413

Site Registration & Accreditation Information

Location	JAPAN	CANADA	FCC
Bothell	R-2296, C-2506, T-1489 & G-284	3082C-1	318736

EQUIPMENT UNDER TEST (EUT)

The following model has been tested by CKC Laboratories: **ISM Transmitter, MCLite Upgrade Kit**

Since the time of testing the manufacturer has chosen to use the following model names in its place. Any differences between the names does not affect their EMC characteristics and therefore meets the level of testing equivalent to the tested model name shown on the data sheets: **ISM Transmitter, MC3-DL and MC LITE DL**

The EUT contains 4 receiver ports; 1GPS and 3 ISM. The following explains the configurations for each model:

The MC3-DL

- 4 receiver ports; 3 ISM & GPS

The MC LITE DL

- 2 receiver ports; ISM & GPS

The other two ports are not used

ISM Transmitter

Manuf: Itron, Inc.

Model: MC3-DL and MC LITE DL

Serial: NA

PERIPHERAL DEVICES

The EUT was tested with the following peripheral device(s):

Laptop

Manuf: General Dynamics

Model: IX270

Serial: ZZGEG7201ZZ7266

12VDC Deep Cycle Marine Battery

Manuf: Interstate

Model: HD-24-DP

Serial: NA

Co-Location Emissions

Test Data Sheets

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • (425) 402-1717

Customer:	Itron, Inc.		
Specification:	15.209 Radiated Emissions	Date:	10/13/2010
Work Order #:	91226	Time:	12:29:46 PM
Test Type:	Maximized Emissions	Sequence#:	30
Equipment:	ISM Transmitter	Tested By:	Jeff Gilbert
Manufacturer:	Itron, Inc.		
Model:	MCLite Upgrade Kit		
S/N:	n/a		

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN00052	Loop Antenna	6502	6/8/2010	6/8/2012
T2	ANP05366	Cable	RG-214	10/20/2009	10/20/2011
T3	ANP05360	Cable	RG214	11/10/2008	11/10/2010
T4	AN03121	Cable	32026-2-29080-84	10/23/2009	10/23/2011
T5	AN01717	High Pass Filter	F3440-P005	5/27/2010	5/27/2012
	AN02872	Spectrum Analyzer	E4440A	8/25/2009	8/25/2011

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
ISM Transmitter*	Itron, Inc.	MCLite Upgrade Kit	n/a

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop	General Dynamics	IX270	ZZGEG7201ZZ7266
12VDC Deep Cycle Marine Battery	Interstate	HD-24-DP	n/a

Test Conditions / Notes:

Frequency Range Investigated: 30 kHz - 30 MHz
 Temp: 23° C
 Humidity: 37%
 Pressure: 102.4 kPa

Co-Location Testing
 The EUT is transmitting on 923.8 MHz, FM (ISM) & 952.5 MHz (MAS)
 The antenna of the EUT is mounted to a 52" diameter aluminum plate to represent a vehicle roof.
 The aluminum plate is supported by foam blocks on the 80cm test table; the plate is ~ 129cm above the ground plane.
 The EUT is directly below the plate, on the test table.
 The battery powering the EUT is on the turntable, under the test table.
 The USB port of the EUT is connected to a support laptop which is outside the chamber.

Ext Attn: 0 dB

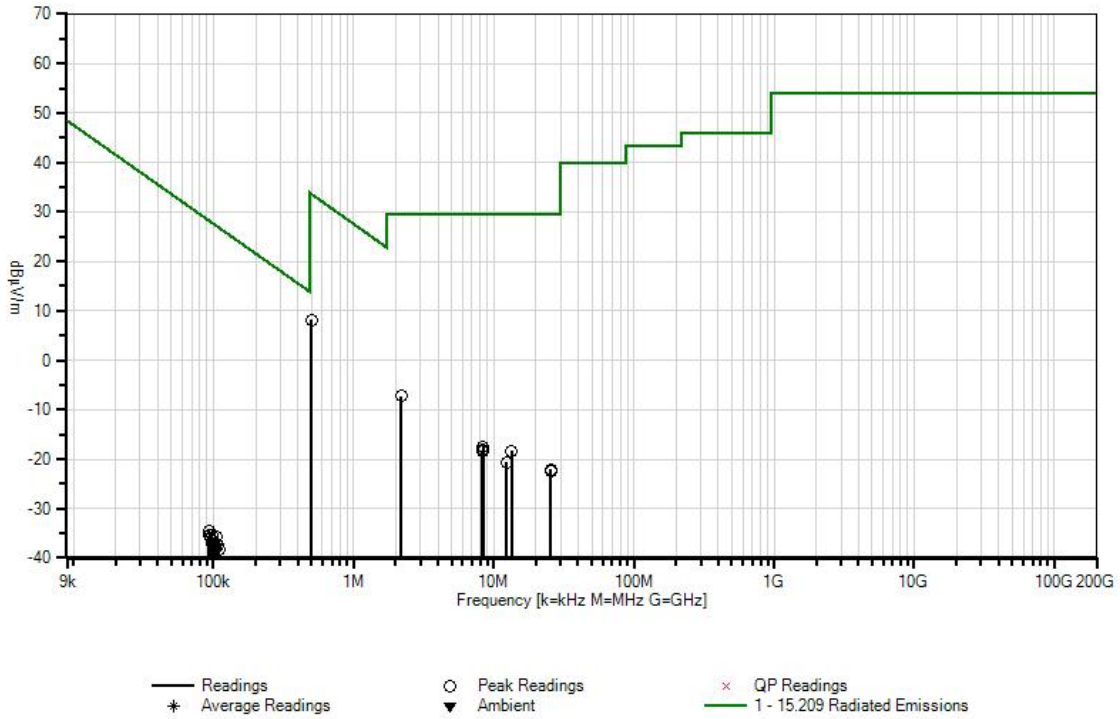
Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dB μ V	T1 T5 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dB μ V/m	Spec dB μ V/m	Margin dB	Polar Ant
1	501.000k	38.4	+9.4 +0.1	+0.1	+0.1	+0.0	-40.0	8.1	33.6	-25.5	Verti 100
2	2.185M	22.9	+9.7 +0.0	+0.1	+0.1	+0.0	-40.0	-7.2	29.5	-36.7	Verti 100
3	8.383M	12.5	+9.5 +0.1	+0.2	+0.2	+0.0	-40.0	-17.5	29.5	-47.0	Verti 100
4	8.293M	11.8	+9.5 +0.1	+0.2	+0.2	+0.0	-40.0	-18.2	29.5	-47.7	Verti 100
5	13.374M	11.7	+9.3 +0.1	+0.3	+0.2	+0.0	-40.0	-18.4	29.5	-47.9	Verti 100
6	8.365M	11.5	+9.5 +0.1	+0.2	+0.2	+0.0	-40.0	-18.5	29.5	-48.0	Verti 100
7	12.293M	9.5	+9.3 +0.1	+0.2	+0.2	+0.0	-40.0	-20.7	29.5	-50.2	Verti 100
8	25.626M	10.7	+6.3 +0.1	+0.4	+0.3	+0.1	-40.0	-22.1	29.5	-51.6	Verti 100
9	25.554M	10.5	+6.3 +0.1	+0.4	+0.3	+0.1	-40.0	-22.3	29.5	-51.8	Verti 100
10	94.320k	35.5	+9.7 +0.1	+0.1	+0.0	+0.0	-80.0	-34.6	28.1	-62.7	Verti 100
11	104.520k	34.5	+9.7 +0.1	+0.1	+0.0	+0.0	-80.0	-35.6	27.2	-62.8	Verti 100
12	97.080k	34.7	+9.7 +0.1	+0.1	+0.0	+0.0	-80.0	-35.4	27.9	-63.3	Verti 100
13	93.240k	34.6	+9.7 +0.1	+0.1	+0.0	+0.0	-80.0	-35.5	28.2	-63.7	Verti 100
14	95.760k	34.2	+9.7 +0.1	+0.1	+0.0	+0.0	-80.0	-35.9	28.0	-63.9	Verti 100
15	105.480k	33.1	+9.7 +0.1	+0.1	+0.0	+0.0	-80.0	-37.0	27.1	-64.1	Verti 100
16	107.520k	32.6	+9.7 +0.1	+0.1	+0.0	+0.0	-80.0	-37.5	27.0	-64.5	Verti 100
17	98.640k	33.1	+9.7 +0.1	+0.1	+0.0	+0.0	-80.0	-37.0	27.7	-64.7	Verti 100
18	102.240k	32.6	+9.7 +0.1	+0.1	+0.0	+0.0	-80.0	-37.5	27.4	-64.9	Verti 100
19	109.920k	31.7	+9.7 +0.1	+0.1	+0.0	+0.0	-80.0	-38.4	26.8	-65.2	Verti 100
20	102.840k	31.9	+9.7 +0.1	+0.1	+0.0	+0.0	-80.0	-38.2	27.4	-65.6	Verti 100

CKC Laboratories, Inc. Date: 10/13/2010 Time: 12:29:46 PM Itron, Inc. WO#: 91226
 15.209 Radiated Emissions Test Distance: 3 Meters Vertical Sequence#: 30 Ext ATTN: 0 dB



Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • (425) 402-1717

Customer: **Itron, Inc.**
 Specification: **15.247(d) Radiated Spurious Emissions**
 Work Order #: **91226** Date: 10/20/2010
 Test Type: **Maximized Emissions** Time: 12:59:32
 Equipment: **ISM Transmitter** Sequence#: 39
 Manufacturer: Itron, Inc. Tested By: Jeff Gilbert
 Model: MCLite Upgrade Kit
 S/N: n/a

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN01993	Biconilog Antenna	CBL6111C	10/9/2009	10/9/2011
T2	ANP05356	Cable	Heliacx	4/17/2009	4/17/2011
T3	ANC00028	Adjustable Filter		10/19/2010	10/19/2012
T4	ANC00027	Band Pass Filter		5/27/2009	5/27/2011
T5	ANP05366	Cable	RG-214	10/20/2009	10/20/2011
T6	AN01517	Preamp	8447D	5/21/2010	5/21/2012
T7	ANP05360	Cable	RG214	11/10/2008	11/10/2010
T8	AN03121	Cable	32026-2-29080-84	10/23/2009	10/23/2011
	AN02872	Spectrum Analyzer	E4440A	8/25/2009	8/25/2011

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
ISM Transmitter*	Itron, Inc.	MCLite Upgrade Kit	n/a

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop	General Dynamics	IX270	ZZGEG7201ZZ7266
12VDC Deep Cycle Marine Battery	Interstate	HD-24-DP	n/a

Test Conditions / Notes:

Frequency Range Investigated: 30 - 1000 MHz
 Temp: 22° C
 Humidity: 35%
 Pressure: 101.9 kPa

Co-Location Testing
 The EUT is transmitting on 923.8 MHz, FM (ISM) & 952.5 MHz (MAS)
 The antenna of the EUT is mounted to a 52" diameter aluminum plate to represent a vehicle roof.
 The aluminum plate is supported by foam blocks on the 80cm test table; the plate is ~ 129cm above the ground plane.
 The EUT is directly below the plate, on the test table.
 The battery powering the EUT is on the turntable, under the test table.
 The USB port of the EUT is connected to a support laptop which is outside the chamber.

All emissions between 902 & 928 MHz are the result of the FHSS transmitter and do not change when the MAS transmitter is on.

***Emissions below 100 MHz are unaffected by the status of the transmitters (on or off). Client considers these to be digital emissions that are exempt per Part 15.
 In addition, the noise floor is very high below 300 MHz due to the large attenuation of one of the notch filters at these frequencies.***

Ext Attn: 0 dB

Measurement Data:

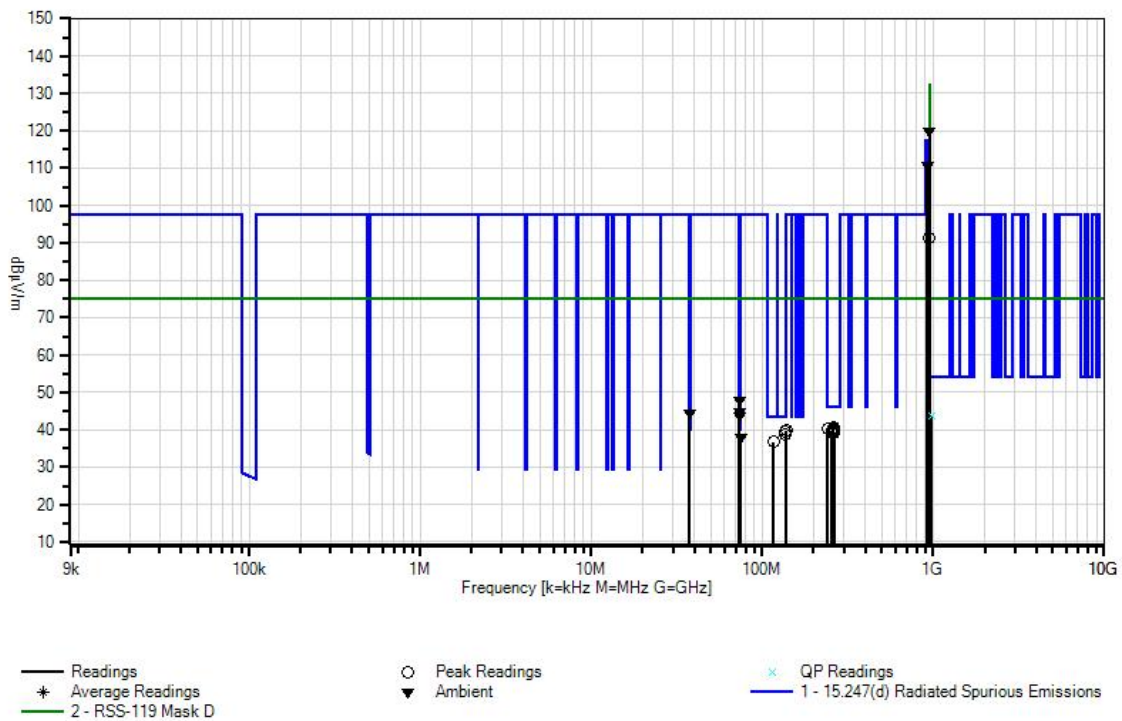
Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dB μ V	T1 T5 dB	T2 T6 dB	T3 T7 dB	T4 T8 dB	Dist Table	Corr dB μ V/m	Spec dB μ V/m	Margin dB	Polar Ant
1	952.478M Ambient	56.7	+23.8 +2.3	+0.4 -29.1	+60.1 +1.9	+3.0 +0.8	+0.0	119.9	97.6 MAS TX	+22.3	Horiz 130
2	73.252M Ambient	41.6	+7.4 +0.6	+0.1 -28.9	+26.3 +0.5	+0.0 +0.2	+0.0 314	47.8	40.0 Digital	+7.8	Horiz 250
3	73.323M Ambient	38.8	+7.4 +0.6	+0.1 -28.9	+26.3 +0.5	+0.0 +0.2	+0.0	45.0	40.0 Digital	+5.0	Horiz 130
4	37.520M Ambient	27.1	+12.4 +0.5	+0.1 -28.9	+32.9 +0.4	+0.0 +0.1	+0.0	44.6	40.0 Digital	+4.6	Horiz 130
5	73.282M Ambient	37.4	+7.4 +0.6	+0.1 -28.9	+26.3 +0.5	+0.0 +0.2	+0.0 314	43.6	40.0 Digital	+3.6	Horiz 250
6	74.854M Ambient	31.5	+7.7 +0.6	+0.1 -28.9	+26.1 +0.5	+0.0 +0.2	+0.0	37.8	40.0 Digital	-2.2	Horiz 130
7	951.977M	27.1	+23.8 +2.3	+0.4 -29.1	+61.1 +1.9	+3.1 +0.8	+0.0	91.4	97.6	-6.2	Horiz 130
8	116.369M	30.0	+11.0 +0.7	+0.1 -28.8	+22.9 +0.6	+0.0 +0.2	+0.0	36.7	43.5	-6.8	Horiz 130
9	923.695M Ambient	68.4	+23.4 +2.4	+0.4 -29.1	+0.3 +2.0	+42.0 +0.8	+0.0	110.6	117.6 FHSS TX	-7.0	Horiz 130
10	981.238M QP	41.5	+24.2 +2.3	+0.4 -29.0	+0.4 +1.9	+1.1 +0.8	+0.0 70	43.6	54.0 Co-Lo	-10.4	Horiz 130
^	981.147M	42.6	+24.2 +2.3	+0.4 -29.0	+0.4 +1.9	+1.1 +0.8	+0.0 70	44.7	54.0 Co-Lo	-9.3	Horiz 130
12	260.513M	38.3	+12.9 +1.1	+0.2 -28.2	+14.8 +1.0	+0.0 +0.4	+0.0	40.5	75.2 MAS	-34.7	Horiz 130
13	260.272M	38.1	+12.9 +1.1	+0.2 -28.2	+14.8 +1.0	+0.0 +0.4	+0.0	40.3	75.2 MAS	-34.9	Horiz 130
14	259.792M	38.1	+12.9 +1.1	+0.2 -28.2	+14.8 +1.0	+0.0 +0.4	+0.0	40.3	75.2 MAS	-34.9	Horiz 130
15	240.212M	37.9	+12.1 +1.1	+0.2 -28.2	+15.6 +1.0	+0.0 +0.4	+0.0	40.1	75.2 MAS	-35.1	Horiz 130
16	260.993M	37.6	+12.9 +1.1	+0.2 -28.2	+14.8 +1.0	+0.0 +0.4	+0.0	39.8	75.2 MAS	-35.4	Horiz 130
17	259.071M	37.6	+12.9 +1.1	+0.2 -28.2	+14.8 +1.0	+0.0 +0.4	+0.0	39.8	75.2 MAS	-35.4	Horiz 130
18	137.990M	33.3	+12.1 +0.8	+0.1 -28.7	+21.1 +0.7	+0.0 +0.3	+0.0	39.7	75.2 MAS	-35.5	Horiz 130
19	137.510M	33.0	+12.1 +0.8	+0.1 -28.7	+21.2 +0.7	+0.0 +0.3	+0.0	39.5	75.2 MAS	-35.7	Horiz 130
20	263.035M	37.3	+12.9 +1.1	+0.2 -28.2	+14.7 +1.0	+0.0 +0.4	+0.0	39.4	75.2 MAS	-35.8	Horiz 130

21	257.510M	37.0	+12.8	+0.2	+14.9	+0.0	+0.0	39.2	75.2	-36.0	Horiz
			+1.1	-28.2	+1.0	+0.4			MAS		130
22	256.669M	36.9	+12.8	+0.2	+14.9	+0.0	+0.0	39.1	75.2	-36.1	Horiz
			+1.1	-28.2	+1.0	+0.4			MAS		130
23	262.194M	36.9	+12.9	+0.2	+14.7	+0.0	+0.0	39.0	75.2	-36.2	Horiz
			+1.1	-28.2	+1.0	+0.4			MAS		130
24	137.270M	32.1	+12.1	+0.1	+21.2	+0.0	+0.0	38.6	75.2	-36.6	Horiz
			+0.8	-28.7	+0.7	+0.3			MAS		130

CKC Laboratories, Inc. Date: 10/20/2010 Time: 12:59:32 Itron, Inc. WO#: 91226
 15.247(d) Radiated Spurious Emissions Test Distance: 3 Meters Horizontal Sequence#: 39 Ext ATTN: 0 dB



Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • (425) 402-1717

Customer: **Itron, Inc.**
 Specification: **15.247(d) Radiated Spurious Emissions**
 Work Order #: **91226** Date: 10/20/2010
 Test Type: **Maximized Emissions** Time: 12:05:04
 Equipment: **ISM Transmitter** Sequence#: 38
 Manufacturer: Itron, Inc. Tested By: Jeff Gilbert
 Model: MCLite Upgrade Kit
 S/N: n/a

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN01993	Biconilog Antenna	CBL6111C	10/9/2009	10/9/2011
T2	ANP05356	Cable	Heliacx	4/17/2009	4/17/2011
T3	ANC00028	Adjustable Filter		10/19/2010	10/19/2012
T4	ANC00027	Band Pass Filter		5/27/2009	5/27/2011
T5	ANP05366	Cable	RG-214	10/20/2009	10/20/2011
T6	AN01517	Preamp	8447D	5/21/2010	5/21/2012
T7	ANP05360	Cable	RG214	11/10/2008	11/10/2010
T8	AN03121	Cable	32026-2-29080-84	10/23/2009	10/23/2011
	AN02872	Spectrum Analyzer	E4440A	8/25/2009	8/25/2011

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Support Devices:

Function	Manufacturer	Model #	S/N
Laptop	General Dynamics	IX270	ZZGEG7201ZZ7266
12VDC Deep Cycle Marine Battery	Interstate	HD-24-DP	n/a

Test Conditions / Notes:

Frequency Range Investigated: 30 - 1000 MHz
 Temp: 22° C
 Humidity: 35%
 Pressure: 101.9 kPa

Co-Location Testing
 The EUT is transmitting on 923.8 MHz, FM (ISM) & 952.5 MHz (MAS)
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 The USB port of the EUT is connected to a support laptop which is outside the chamber.

All emissions between 902 & 928 MHz are the result of the FHSS transmitter and do not change when the MAS transmitter is on.

***Emissions below 100 MHz are unaffected by the status of the transmitters (on or off). Client considers these to be digital emissions that are exempt per Part 15.
 In addition, the noise floor is very high below 300 MHz due to the large attenuation of one of the notch filters at these frequencies.***

Ext Attn: 0 dB

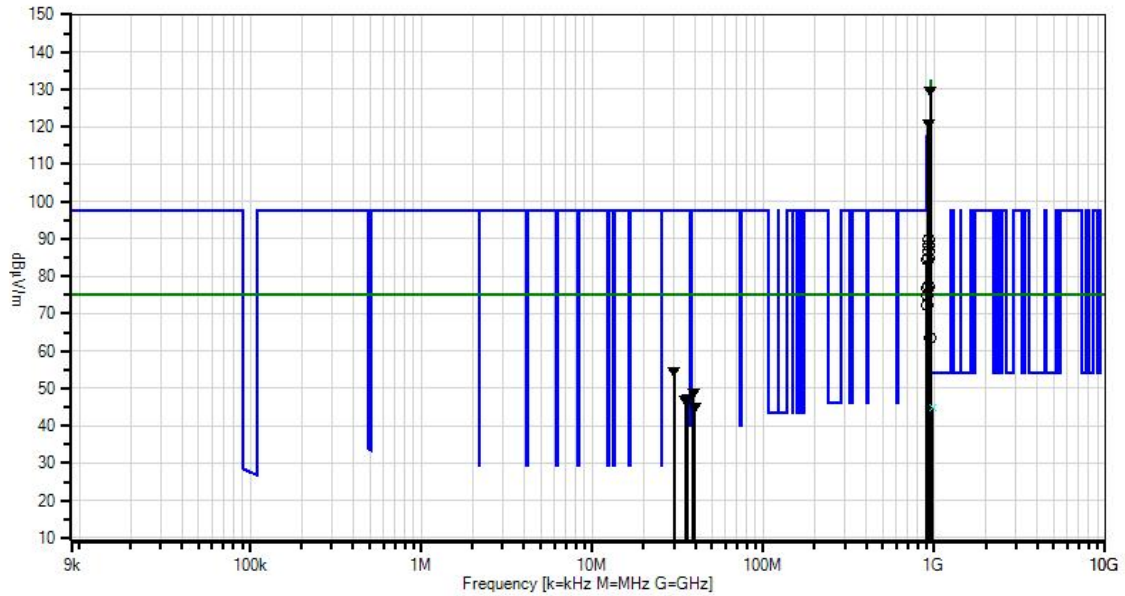
Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	T1 T5 dB	T2 T6 dB	T3 T7 dB	T4 T8 dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	952.478M Ambient	66.5	+23.8 +2.3	+0.4 -29.1	+60.1 +1.9	+3.0 +0.8	+0.0	129.7	75.2 MAS TX	+54.5	Verti 130
2	923.695M Ambient	78.9	+23.4 +2.4	+0.4 -29.1	+0.3 +2.0	+42.0 +0.8	+0.0	121.1	117.6 FHSS TX	+3.5	Verti 130
3	981.239M QP	42.9	+24.2 +2.3	+0.4 -29.0	+0.4 +1.9	+1.1 +0.8	+0.0 245	45.0	54.0 Co-Lo	-9.0	Verti 130
^	981.238M	44.4	+24.2 +2.3	+0.4 -29.0	+0.4 +1.9	+1.1 +0.8	+0.0 245	46.5	54.0 Co-Lo	-7.5	Verti 130
5	954.544M	27.0	+23.8 +2.3	+0.4 -29.1	+33.9 +1.9	+2.6 +0.8	+0.0	63.6	75.2	-11.6	Verti 130
6	928.260M	37.1	+23.5 +2.4	+0.4 -29.1	+0.3 +2.0	+40.0 +0.8	+0.0	77.4	97.6 FHSS	-20.2	Verti 130
7	30.067M Ambient	27.2	+20.6 +0.4	+0.0 -28.9	+35.0 +0.3	+0.0 +0.1	+0.0	54.7	75.2 Digital	-20.5	Verti 130
8	38.851M Ambient	32.5	+11.8 +0.5	+0.1 -28.9	+32.6 +0.4	+0.0 +0.1	+0.0	49.1	75.2 Digital	-26.1	Verti 130
9	35.989M Ambient	28.8	+13.3 +0.5	+0.1 -28.9	+33.3 +0.4	+0.0 +0.1	+0.0	47.6	75.2 Digital	-27.6	Verti 130
10	922.254M	44.2	+23.4 +2.4	+0.4 -29.1	+0.3 +2.0	+45.5 +0.8	+0.0	89.9	117.6 FHSS	-27.7	Verti 130
11	34.991M Ambient	27.8	+13.8 +0.4	+0.1 -28.9	+33.6 +0.3	+0.0 +0.1	+0.0	47.2	75.2 Digital	-28.0	Verti 130
12	921.773M	41.4	+23.4 +2.4	+0.4 -29.1	+0.3 +2.0	+46.5 +0.8	+0.0	88.1	117.6 FHSS	-29.5	Verti 130
13	39.849M Ambient	29.3	+11.3 +0.5	+0.1 -28.9	+32.3 +0.4	+0.0 +0.1	+0.0	45.1	75.2 Digital	-30.1	Verti 130
14	925.257M	46.9	+23.4 +2.4	+0.4 -29.1	+0.3 +2.0	+39.8 +0.8	+0.0	86.9	117.6 FHSS	-30.7	Verti 130
15	921.173M	39.2	+23.4 +2.4	+0.4 -29.1	+0.3 +2.0	+47.3 +0.8	+0.0	86.7	117.6 FHSS	-30.9	Verti 130
16	919.251M	40.7	+23.4 +2.3	+0.4 -29.1	+0.3 +1.9	+44.2 +0.8	+0.0	84.9	117.6 FHSS	-32.7	Verti 130
17	919.731M	39.6	+23.4 +2.3	+0.4 -29.1	+0.3 +1.9	+45.3 +0.8	+0.0	84.9	117.6 FHSS	-32.7	Verti 130
18	906.999M	26.6	+23.2 +2.3	+0.4 -29.1	+0.2 +1.9	+58.0 +0.8	+0.0	84.3	117.6 FHSS	-33.3	Verti 130
19	916.248M	37.0	+23.3 +2.3	+0.4 -29.1	+0.2 +1.9	+40.2 +0.8	+0.0	77.0	117.6 FHSS	-40.6	Verti 130
20	915.767M	35.2	+23.3 +2.3	+0.4 -29.1	+0.2 +1.9	+40.0 +0.8	+0.0	75.0	117.6 FHSS	-42.6	Verti 130
21	911.803M	31.7	+23.3 +2.3	+0.4 -29.1	+0.2 +1.9	+43.3 +0.8	+0.0	74.8	117.6 FHSS	-42.8	Verti 130
22	904.356M	27.7	+23.2 +2.3	+0.4 -29.1	+0.1 +1.9	+45.0 +0.8	+0.0	72.3	117.6 FHSS	-45.3	Verti 130

CKC Laboratories, Inc. Date: 10/20/2010 Time: 12:05:04 Itron, Inc. WO#: 91226
15.247(d) Radiated Spurious Emissions Test Distance: 3 Meters Vertical Sequence#: 38 Ext ATTN: 0 dB



— Readings
 * Average Readings
 — 2 - RSS-119 Mask D
 ○ Peak Readings
 ▼ Ambient
 x QP Readings
 — 1 - 15.247(d) Radiated Spurious Emissions

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • (425) 402-1717

Customer: **Itron, Inc.**
 Specification: **15.209 Radiated Emissions**
 Work Order #: **91226** Date: 10/13/2010
 Test Type: **Maximized Emissions** Time: 14:14:27
 Equipment: **ISM Transmitter** Sequence#: 32
 Manufacturer: Itron, Inc. Tested By: Jeff Gilbert
 Model: MCLite Upgrade Kit
 S/N: n/a

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN01467	Horn Antenna-ANSI C63.5 Calibration	3115	5/7/2010	5/7/2012
T2	AN03170	High Pass Filter	HM1155-11SS	9/14/2009	9/14/2011
T3	AN03123	Cable	32026-2-29801-12	10/23/2009	10/23/2011
T4	AN01271	Preamp	83017A	9/17/2009	9/17/2011
T5	ANP05542	Cable	Heliacx	10/23/2009	10/23/2011
T6	AN03121	Cable	32026-2-29080-84	10/23/2009	10/23/2011
	AN02872	Spectrum Analyzer	E4440A	8/25/2009	8/25/2011

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
ISM Transmitter*	Itron, Inc.	MCLite Upgrade Kit	n/a

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop	General Dynamics	IX270	ZZGEG7201ZZ7266
12VDC Deep Cycle Marine Battery	Interstate	HD-24-DP	n/a

Test Conditions / Notes:

Frequency Range Investigated: 1 - 9.54 GHz
 Temp: 23° C
 Humidity: 37%
 Pressure: 102.4 kPa

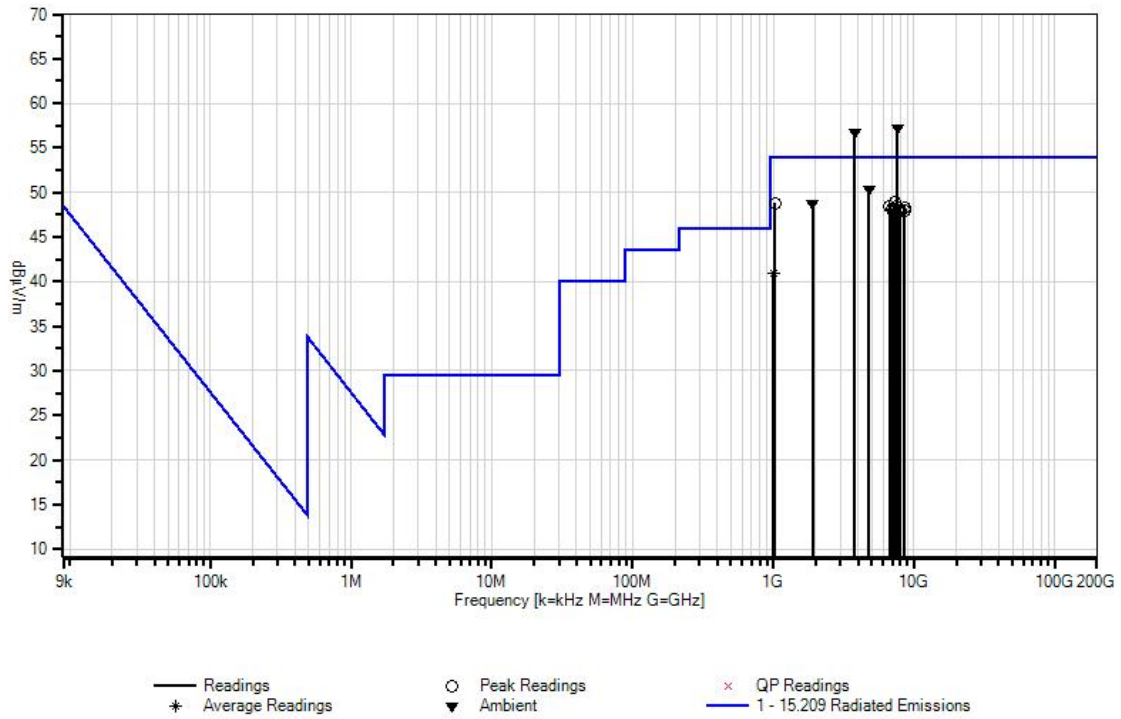
Co-Location Testing
 The EUT is transmitting on 923.8 MHz, FM (ISM) & 952.5 MHz (MAS)
 The antenna of the EUT is mounted to a 52" diameter aluminum plate to represent a vehicle roof.
 The aluminum plate is supported by foam blocks on the 80cm test table; the plate is ~ 129cm above the ground plane.
 The EUT is directly below the plate, on the test table.
 The battery powering the EUT is on the turntable, under the test table.
 The USB port of the EUT is connected to a support laptop which is outside the chamber.

Ext Attn: 0 dB

Measurement Data:		Reading listed by margin.						Test Distance: 3 Meters				
#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar	
	MHz	dBµV	T5	T6			Table	dBµV/m	dBµV/m	dB	Ant	
1	7615.609M	47.3	+36.2	+0.2	+0.4	-34.9	+0.0	57.2	54.0	+3.2	Horiz	
	Ambient		+5.4	+2.6			360		MAS transmitter -		141	
									ISM has no effect			

2	3807.805M Ambient	53.0	+31.2 +3.8	+0.2 +1.9	+0.3	-33.7	+0.0 360	56.7	54.0 MAS transmitter - ISM has no effect	+2.7	Horiz 141
3	4759.756M Ambient	44.3	+32.9 +4.3	+0.3 +2.0	+0.4	-33.8	+0.0 360	50.4	54.0 MAS transmitter - ISM has no effect	-3.6	Horiz 141
4	7281.275M	39.1	+36.1 +5.2	+0.2 +2.4	+0.5	-34.6	+0.0 360	48.9	54.0	-5.1	Horiz 141
5	1032.032M	44.7	+23.6 +1.8	+14.7 +0.8	+0.2	-37.0	+0.0 360	48.8	54.0	-5.2	Horiz 141
6	1903.903M Ambient	51.7	+27.7 +2.5	+0.3 +1.2	+0.3	-34.9	+0.0 360	48.8	54.0 MAS transmitter - ISM has no effect	-5.2	Horiz 141
7	6663.658M	39.5	+35.3 +5.1	+0.2 +2.4	+0.4	-34.4	+0.0 360	48.5	54.0	-5.5	Horiz 141
8	7499.493M	38.4	+36.2 +5.4	+0.2 +2.5	+0.4	-34.6	+0.0 360	48.5	54.0	-5.5	Horiz 141
9	8597.590M	38.1	+36.0 +5.6	+0.2 +2.6	+0.4	-34.6	+0.0 360	48.3	54.0	-5.7	Horiz 141
10	7009.003M	38.2	+35.9 +5.2	+0.2 +2.6	+0.5	-34.5	+0.0 360	48.1	54.0	-5.9	Horiz 141
11	7672.666M	38.0	+36.2 +5.4	+0.1 +2.5	+0.5	-34.7	+0.0 360	48.0	54.0	-6.0	Horiz 141
12	7608.602M	38.1	+36.2 +5.4	+0.2 +2.6	+0.4	-34.9	+0.0 360	48.0	54.0	-6.0	Horiz 141
13	8008.001M	38.0	+36.2 +5.5	+0.2 +2.4	+0.4	-34.7	+0.0 360	48.0	54.0	-6.0	Horiz 141
14	7823.817M	38.0	+36.2 +5.4	+0.2 +2.4	+0.5	-34.7	+0.0 360	48.0	54.0	-6.0	Horiz 141
15	7271.265M	38.1	+36.1 +5.2	+0.2 +2.4	+0.5	-34.6	+0.0 360	47.9	54.0	-6.1	Horiz 141
16	7195.189M	38.1	+36.0 +5.2	+0.2 +2.5	+0.5	-34.6	+0.0 360	47.9	54.0	-6.1	Horiz 141
17	7636.630M	37.9	+36.2 +5.4	+0.2 +2.6	+0.4	-34.8	+0.0 360	47.9	54.0	-6.1	Horiz 141
18	8553.546M	37.8	+35.9 +5.6	+0.2 +2.6	+0.4	-34.6	+0.0 360	47.9	54.0	-6.1	Horiz 141
19	7898.892M	37.9	+36.2 +5.5	+0.2 +2.4	+0.4	-34.7	+0.0 360	47.9	54.0	-6.1	Horiz 141
20	1000.084M Ave	31.5	+23.4 +1.8	+20.5 +0.8	+0.1	-37.2	+0.0 65	40.9	54.0	-13.1	Horiz 140
^	1000.065M	45.0	+23.4 +1.8	+20.5 +0.8	+0.1	-37.2	+0.0 65	54.4	54.0	+0.4	Horiz 140
^	1000.000M	44.8	+23.4 +1.8	+20.5 +0.8	+0.1	-37.2	+0.0 360	54.2	54.0	+0.2	Horiz 141

CKC Laboratories, Inc. Date: 10/13/2010 Time: 14:14:27 Itron, Inc. WO#: 91226
15.209 Radiated Emissions Test Distance: 3 Meters Horizontal Sequence#: 32 Ext ATTN: 0 dB



Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • (425) 402-1717

Customer: **Itron, Inc.**
 Specification: **15.209 Radiated Emissions**
 Work Order #: **91226** Date: 10/13/2010
 Test Type: **Maximized Emissions** Time: 13:59:12
 Equipment: **ISM Transmitter** Sequence#: 31
 Manufacturer: Itron, Inc. Tested By: Jeff Gilbert
 Model: MCLite Upgrade Kit
 S/N: n/a

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN01467	Horn Antenna-ANSI C63.5 Calibration	3115	5/7/2010	5/7/2012
T2	AN03170	High Pass Filter	HM1155-11SS	9/14/2009	9/14/2011
T3	AN03123	Cable	32026-2-29801-12	10/23/2009	10/23/2011
T4	AN01271	Preamp	83017A	9/17/2009	9/17/2011
T5	ANP05542	Cable	Heliac	10/23/2009	10/23/2011
T6	AN03121	Cable	32026-2-29080-84	10/23/2009	10/23/2011
	AN02872	Spectrum Analyzer	E4440A	8/25/2009	8/25/2011

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
ISM Transmitter*	Itron, Inc.	MCLite Upgrade Kit	n/a

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop	General Dynamics	IX270	ZZGEG7201ZZ7266
12VDC Deep Cycle Marine Battery	Interstate	HD-24-DP	n/a

Test Conditions / Notes:

Frequency Range Investigated: 1 - 9.54 GHz
 Temp: 23° C
 Humidity: 37%
 Pressure: 102.4 kPa

Co-Location Testing
 The EUT is transmitting on 923.8 MHz, FM (ISM) & 952.5 MHz (MAS)
 The antenna of the EUT is mounted to a 52" diameter aluminum plate to represent a vehicle roof.
 The aluminum plate is supported by foam blocks on the 80cm test table; the plate is ~ 129cm above the ground plane.
 The EUT is directly below the plate, on the test table.
 The battery powering the EUT is on the turntable, under the test table.
 The USB port of the EUT is connected to a support laptop which is outside the chamber.

Ext Attn: 0 dB

Measurement Data:

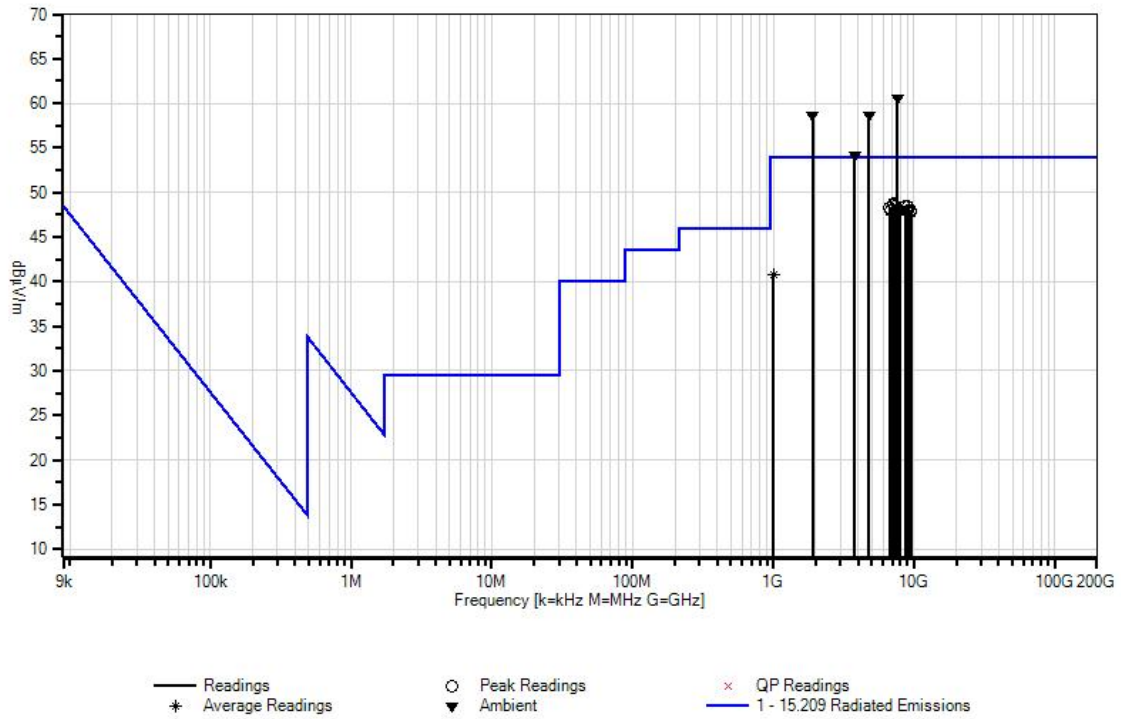
Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	T5	T6			Table	dBµV/m	dBµV/m	dB	Ant
1	7615.609M	50.6	+36.2	+0.2	+0.4	-34.9	+0.0	60.5	54.0	+6.5	Verti
	Ambient		+5.4	+2.6			360		MAS transmitter -		130
									ISM has no effect		

2	4759.756M Ambient	52.6	+32.9 +4.3	+0.3 +2.0	+0.4	-33.8	+0.0 360	58.7	54.0	+4.7	Verti 130
									MAS transmitter - ISM has no effect		
3	1903.903M Ambient	61.5	+27.7 +2.5	+0.3 +1.2	+0.3	-34.9	+0.0 360	58.6	54.0	+4.6	Verti 130
									MAS transmitter - ISM has no effect		
4	3807.805M Ambient	50.5	+31.2 +3.8	+0.2 +1.9	+0.3	-33.7	+0.0 360	54.2	54.0	+0.2	Verti 130
									MAS transmitter - ISM has no effect		
5	7082.076M	39.0	+36.0 +5.2	+0.2 +2.5	+0.5	-34.6	+0.0 360	48.8	54.0	-5.2	Verti 130
6	7169.163M	38.7	+36.0 +5.2	+0.3 +2.5	+0.5	-34.6	+0.0 360	48.6	54.0	-5.4	Verti 130
7	7329.323M	38.6	+36.1 +5.2	+0.2 +2.4	+0.5	-34.6	+0.0 360	48.4	54.0	-5.6	Verti 130
8	8647.640M	37.9	+36.1 +5.6	+0.2 +2.8	+0.4	-34.6	+0.0 360	48.4	54.0	-5.6	Verti 130
9	9044.176M	37.3	+36.6 +5.7	+0.2 +2.6	+0.3	-34.3	+0.0 360	48.4	54.0	-5.6	Verti 130
10	6664.659M	39.3	+35.3 +5.1	+0.2 +2.4	+0.4	-34.4	+0.0 360	48.3	54.0	-5.7	Verti 130
11	7621.615M	38.2	+36.2 +5.4	+0.2 +2.6	+0.4	-34.8	+0.0 360	48.2	54.0	-5.8	Verti 130
12	6854.849M	38.7	+35.6 +5.1	+0.2 +2.4	+0.4	-34.4	+0.0 360	48.0	54.0	-6.0	Verti 130
13	7717.711M	37.9	+36.2 +5.4	+0.1 +2.5	+0.5	-34.6	+0.0 360	48.0	54.0	-6.0	Verti 130
14	7846.840M	37.9	+36.2 +5.4	+0.2 +2.4	+0.5	-34.7	+0.0 360	47.9	54.0	-6.1	Verti 130
15	7781.775M	37.9	+36.2 +5.4	+0.2 +2.4	+0.5	-34.7	+0.0 360	47.9	54.0	-6.1	Verti 130
16	9519.784M	36.6	+36.2 +5.8	+0.2 +2.9	+0.3	-34.1	+0.0 360	47.9	54.0	-6.1	Verti 130
17	9039.388M	36.8	+36.6 +5.7	+0.2 +2.6	+0.3	-34.3	+0.0 360	47.9	54.0	-6.1	Verti 130
18	9476.160M	36.5	+36.2 +5.8	+0.2 +2.9	+0.3	-34.1	+0.0 360	47.8	54.0	-6.2	Verti 130
19	9503.292M	36.5	+36.2 +5.8	+0.2 +2.9	+0.3	-34.1	+0.0 360	47.8	54.0	-6.2	Verti 130
20	1001.483M Ave	31.7	+23.4 +1.8	+20.2 +0.8	+0.1	-37.2	+0.0	40.8	54.0	-13.2	Verti 130
^	1001.457M	44.9	+23.4 +1.8	+20.2 +0.8	+0.1	-37.2	+0.0	54.0	54.0	+0.0	Verti 130
^	1001.450M	43.5	+23.4 +1.8	+20.2 +0.8	+0.1	-37.2	+0.0 360	52.6	54.0	-1.4	Verti 130

CKC Laboratories, Inc. Date: 10/13/2010 Time: 13:59:12 Itron, Inc. WO#: 91226
15.209 Radiated Emissions Test Distance: 3 Meters Vertical Sequence#: 31 Ext ATTN: 0 dB



Test Setup Photos



30 kHz – 30 MHz Test Setup



30-1000 MHz Test Setup



1-9.54 GHz Test Setup

SUPPLEMENTAL INFORMATION

Measurement Uncertainty

Uncertainty Value	Parameter
4.73 dB	Radiated Emissions
3.34 dB	Mains Conducted Emissions
3.30 dB	Disturbance Power

The reported measurement uncertainties are calculated based on the worst case of all laboratory environments from CKC Laboratories, Inc. test sites. Only those parameters which require estimation of measurement uncertainty are reported. The reported worst case measurement uncertainty is less than the maximum values derived in CISPR 16-4-2. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k=2. Compliance is deemed to occur provided measurements are below the specified limits.

Emissions Test Details

TESTING PARAMETERS

The cables were routed consistent with the typical application by varying the configuration of the test sample. Interface cables were connected to the available ports of the test unit. The effect of varying the position of the cables was investigated to find the configuration that produced maximum emissions. Cables were of the type and length specified in the individual requirements. The length of cable that produced maximum emissions was selected.

The equipment under test (EUT) was set up in a manner that represented its normal use, as shown in the setup photographs. Any special conditions required for the EUT to operate normally are identified in the comments that accompany the emissions tables.

The emissions data was taken with a spectrum analyzer or receiver. Incorporating the applicable correction factors for distance, antenna, cable loss and amplifier gain, the data was reduced as shown in the table below. The corrected data was then compared to the applicable emission limits. Preliminary and final measurements were taken in order to ensure that all emissions from the EUT were found and maximized.

CORRECTION FACTORS

The basic spectrum analyzer reading was converted using correction factors as shown in the highest emissions readings in the tables. For radiated emissions in dBμV/m, the spectrum analyzer reading in dBμV was corrected by using the following formula. This reading was then compared to the applicable specification limit.

SAMPLE CALCULATIONS		
	Meter reading	(dB μ V)
+	Antenna Factor	(dB)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	(dB μ V/m)

TEST INSTRUMENTATION AND ANALYZER SETTINGS

The test instrumentation and equipment listed were used to collect the emissions data. A spectrum analyzer or receiver was used for all measurements. The following table shows the measuring equipment bandwidth settings that were used in designated frequency bands. For testing emissions, an appropriate reference level and a vertical scale size of 10 dB per division were used.

MEASURING EQUIPMENT BANDWIDTH SETTINGS PER FREQUENCY RANGE			
TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING
CONDUCTED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	30 MHz	1000 MHz	120 kHz
RADIATED EMISSIONS	1000 MHz	>1 GHz	1 MHz

SPECTRUM ANALYZER/RECEIVER DETECTOR FUNCTIONS

The notes that accompany the measurements contained in the emissions tables indicate the type of detector function used to obtain the given readings. Unless otherwise noted, all readings were made in the "Peak" mode. Whenever a "Quasi-Peak" or "Average" reading is listed as one of the highest readings, this is indicated as a "QP" or an "Ave" on the appropriate rows of the data sheets. The following paragraphs describe in more detail the detector functions and when they were used to obtain the emissions data.

Peak

In this mode, the spectrum analyzer/receiver readings recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature of the measuring device called "peak hold," the measuring device had the ability to measure transients or low duty cycle transient emission peak levels. In this mode the measuring device made a slow scan across the frequency band selected and measured the peak emission value found at each frequency across the band.

Quasi-Peak

When the true peak values exceeded or were within 2 dB of the specification limit, quasi-peak measurements were taken using the quasi-peak detector.

Average

For certain frequencies, average measurements may be made using the spectrum analyzer/receiver. To make these measurements, the test engineer reduces the video bandwidth on the measuring device until the modulation of the signal is filtered out. At this point the measuring device is set into the linear mode and the scan time is reduced.