

ltron, Inc.

REVISED TEST REPORT FOR 107652-4

Intelis Gas

Model: ERG-7300-312*

*(See Appendix A for Manufacturers Declaration)

Tested to The Following Standards:

FCC Part 15 Subpart C Section(s)

15.249

Report No.: 107652-4A

Date of issue: May 4, 2023



Test Certificate # 803.01

This test report bears the accreditation symbol indicating that the testing performed herein meets the test and reporting requirements of ISO/IEC 17025 under the applicable scope of testing for CKC Laboratories, Inc.

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.

TABLE OF CONTENTS

Administrative Information	3
Test Report Information	3
Revision History	3
Report Authorization	3
Test Facility Information	4
Software Versions	4
Site Registration & Accreditation Information	4
Summary of Results	5
Modifications During Testing	5
Conditions During Testing	5
Equipment Under Test	6
General Product Information	6
FCC Part 15 Subpart C	8
15.215(c) Occupied Bandwidth (20dB BW)	8
15.249(a) Field Strength of Fundamental	12
15.249(a) Radiated Emissions and Band Edge	17
Appendix A: Manufacturer Declaration	27
Supplemental Information	28
Measurement Uncertainty	28
Emissions Test Details	28

ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

ltron, Inc.
2401 N. State Street
Waseca, MN 56093

Representative: Dan Bomsta
Customer Reference Number: 271433

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

REPORT PREPARED BY:

Lisa Bevington
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Project Number: 107652

January 27, 2023
January 27-28 & 30, 2023
February 4, 2023

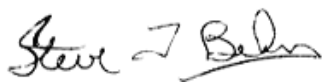
Revision History

Original: Testing of Intelis Gas, Model: : ERG-7300-312 to FCC Part 15 Subpart C, Section 15.249.

Revision A: Update Radiated Emissions test conditions. Added note to Bandedge plots.

Report Authorization

The test data contained in this report documents the observed testing parameters pertaining to and are relevant for only the equipment provided by the client, 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 SE, Suite A
Bothell, WA 98021

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.03.20
EMITest Immunity	5.03.19

Site Registration & Accreditation Information

Location	*NIST CB #	FCC	Canada	Japan
Canyon Park, Bothell, WA	US0103	US1024	3082C	A-0136
Brea, CA	US0103	US1024	3082D	A-0136
Fremont, CA	US0103	US1024	3082B	A-0136
Mariposa, CA	US0103	US1024	3082A	A-0136

*CKC's list of NIST designated countries can be found at: <https://standards.gov/cabs/designations.html>

SUMMARY OF RESULTS

Standard / Specification: FCC Part 15 Subpart C - 15.249

Test Procedure	Description	Modifications	Results
15.215(c)	Occupied Bandwidth	NA	Pass
15.249(a)	Field Strength of Fundamental	NA	Pass
15.249(a)	Field Strength of Spurious Emissions	NA	Pass
15.207	AC Conducted Emissions	NA	NA1

NA = Not Applicable

NA1 = Manufacturer declares EUT is battery powered.

ISO/IEC 17025 Decision Rule

The declaration of pass or fail herein is based upon assessment to the specification(s) listed above, including where applicable, assessment of measurement uncertainties. For performance related tests, equipment was monitored for specified criteria identified in that section of testing.

Modifications During Testing

This list is a summary of the modifications made to the equipment during testing.

Summary of Conditions

No modifications were made during testing.

Modifications listed above must be incorporated into all production units.

Conditions During Testing

This list is a summary of the conditions noted to the equipment during testing.

Summary of Conditions

None

EQUIPMENT UNDER TEST (EUT)

During testing, numerous configurations may have been utilized. The configurations listed below support compliance to the standard(s) listed in the Summary of Results section.

Configuration 1

Equipment Under Test:

Device	Manufacturer	Model #	S/N
Intelis Gas	ltron, Inc.	ERG-7300-312	lgcp-01122023-rad

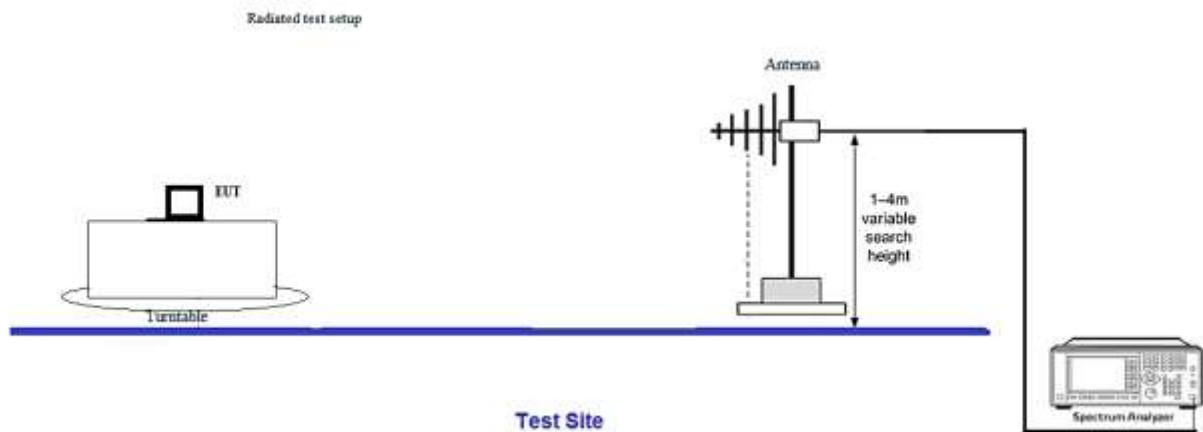
Support Equipment:

Device	Manufacturer	Model #	S/N
Laptop	HP	14-dq1033cl	5CD941CCWS
Laptop PSU	HP	TPN-CA14	WHGRE0AVKCR55T
Adapter Board	ltron, Inc.	None	None

General Product Information:

Product Information	Manufacturer-Provided Details
Equipment Type:	Stand-Alone Equipment
Modulation Type(s):	OOK
Maximum Duty Cycle:	Tested at 100%
Antenna Type(s) and Gain:	Proprietary F / 5dBi
Antenna Connection Type:	Integral (External connector provided to facilitate testing)
Nominal Input Voltage:	Battery (6VDC)
Firmware / Software used for Test:	RAIL: V2 11.3.1
The validity of results is dependent on the stated product details, the accuracy of which the manufacturer assumes full responsibility.	

Block Diagram of Test Setup(s)



FCC Part 15 Subpart C

15.215(c) Occupied Bandwidth (20dB BW)

Test Setup/Conditions			
Test Location:	Canyon Park Lab C3	Test Engineer:	M. Harrison
Test Method:	ANSI C63.10 (2013)	Test Date(s):	2/4/2023
Configuration:	1		

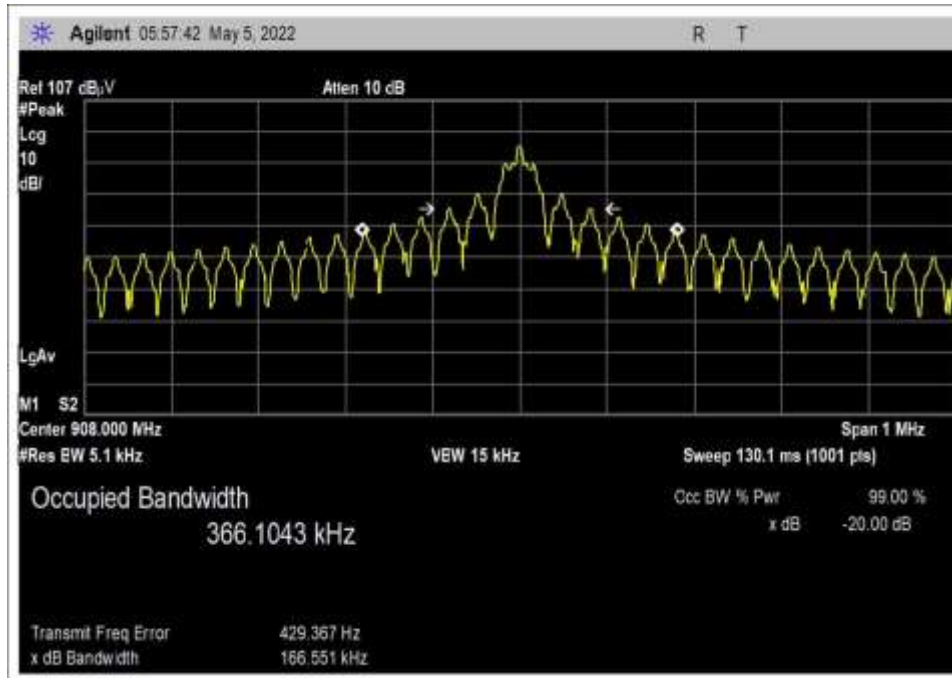
Environmental Conditions			
Temperature (°C)	19	Relative Humidity (%):	40

Test Equipment					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
03807	Spectrum Analyzer	Agilent	E4440A	12/14/2022	12/14/2024
P05503	Attenuator	Narda	766-10	6/8/2021	6/8/2023
P06540	Cable	Andrews	Helix	1/17/2022	1/17/2024

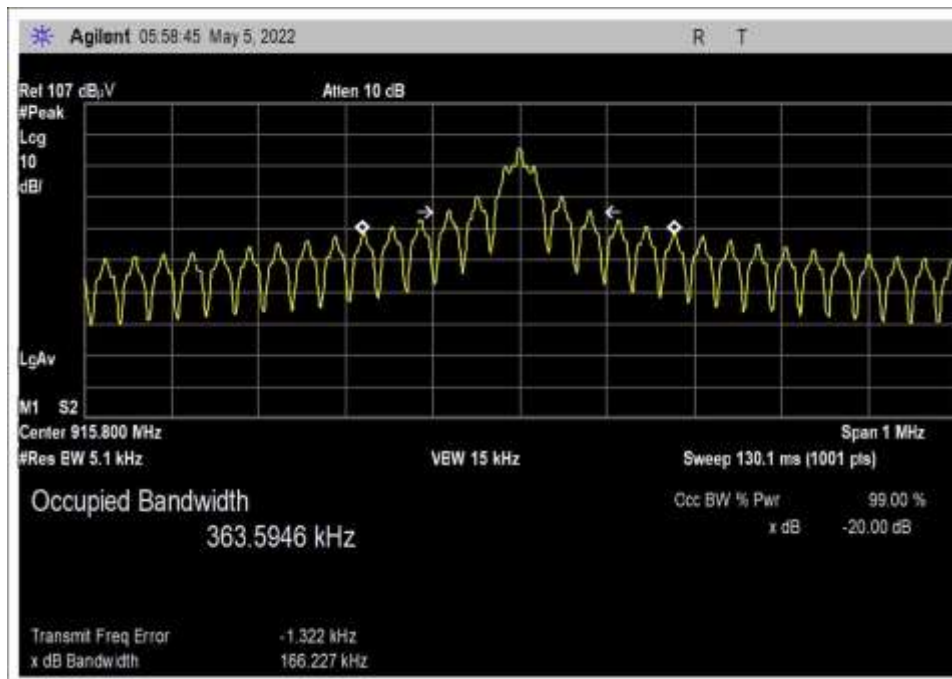
Test Data Summary					
Frequency (MHz)	Antenna Port	Modulation	Measured (kHz)	Limit (kHz)	Results
908.0	1	OOK	166.6	None	N/A
915.8	1	OOK	166.2	None	N/A
923.8	1	OOK	166.5	None	N/A

Plot(s)

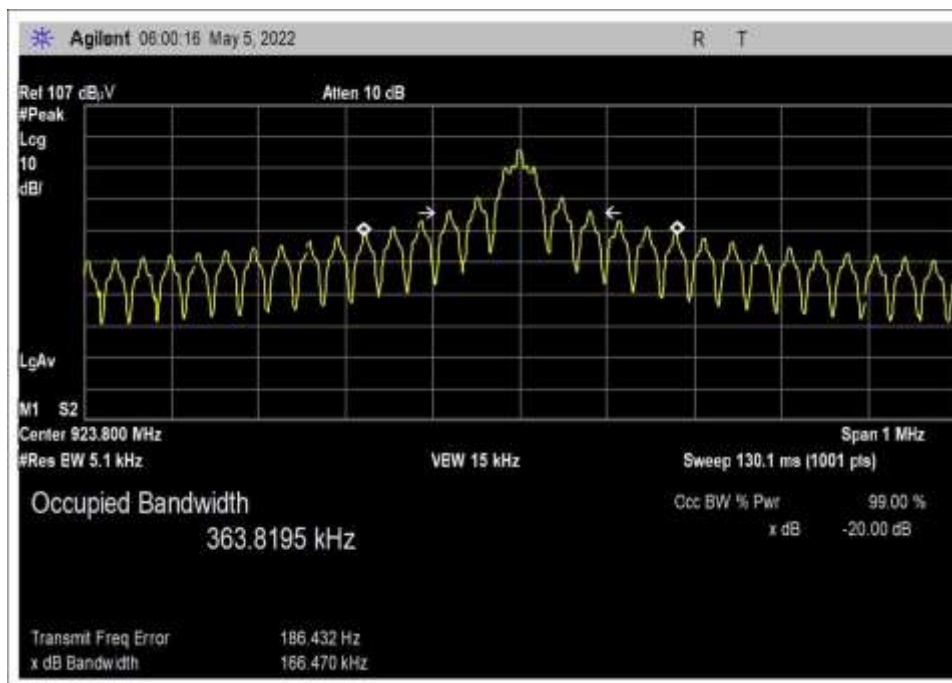
(Note: At the time of the test the spectrum analyzer date and time was not set correctly.)



Low Channel



Middle Channel



High Channel

Test Setup Photo(s)



15.249(a) Field Strength of Fundamental

Test Data Summary - Voltage Variations

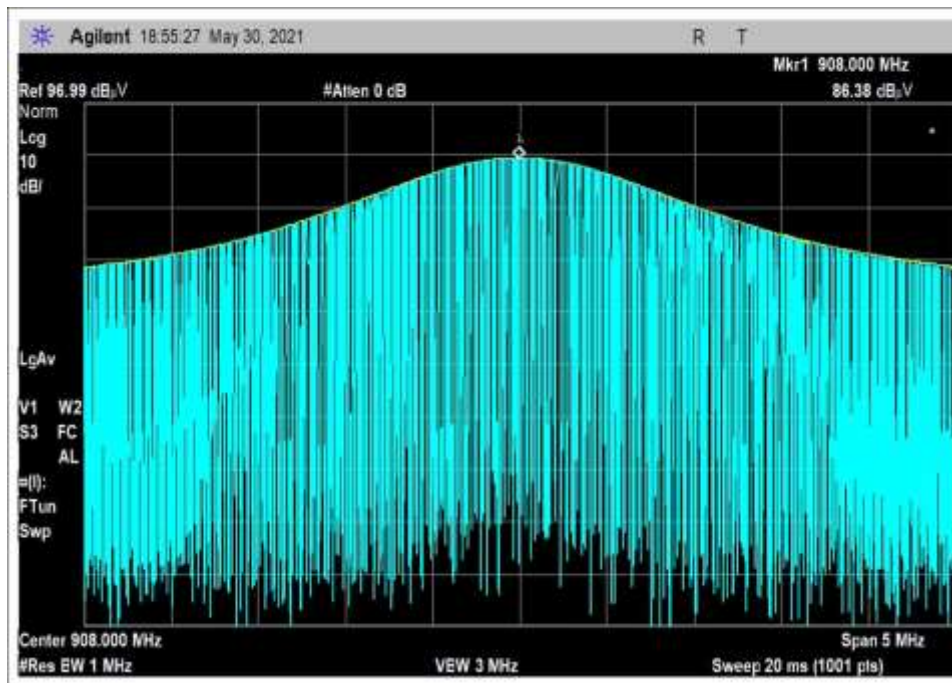
This equipment is battery powered. Power output tests were performed using a fresh battery.

Test Data Summary – Radiated Field Strength Measurement

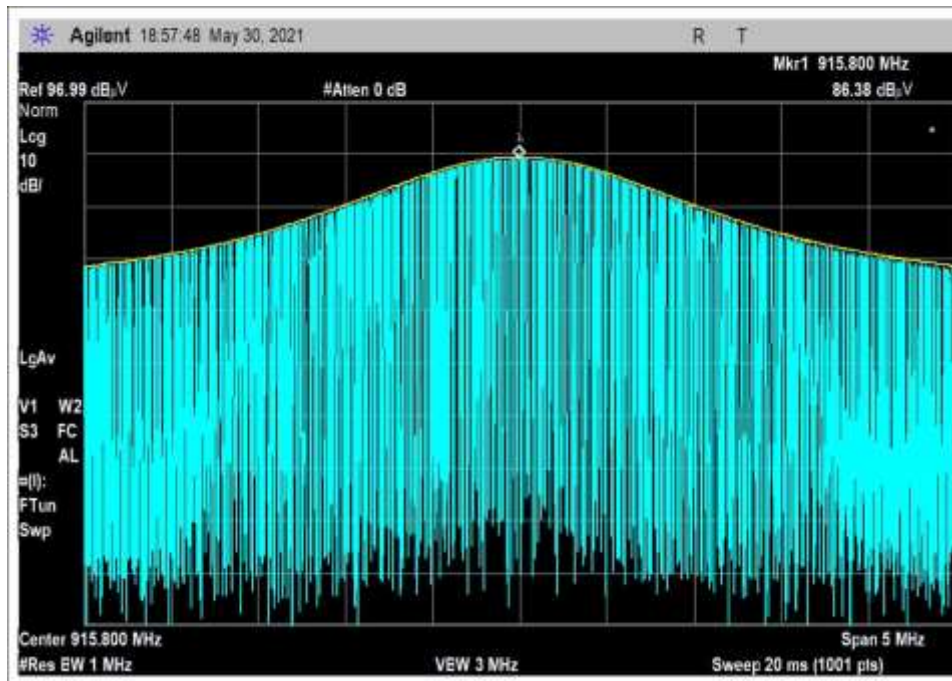
Frequency (MHz)	Modulation	Ant. Type	Measured (dBuV/m @ 3m)	Limit (dBuV/m @ 3m)	Results
908.0	OOK	F	93.0	≤94	Pass
915.8	OOK	F	93.3	≤94	Pass
923.8	OOK	F	92.7	≤94	Pass

Plot(s)

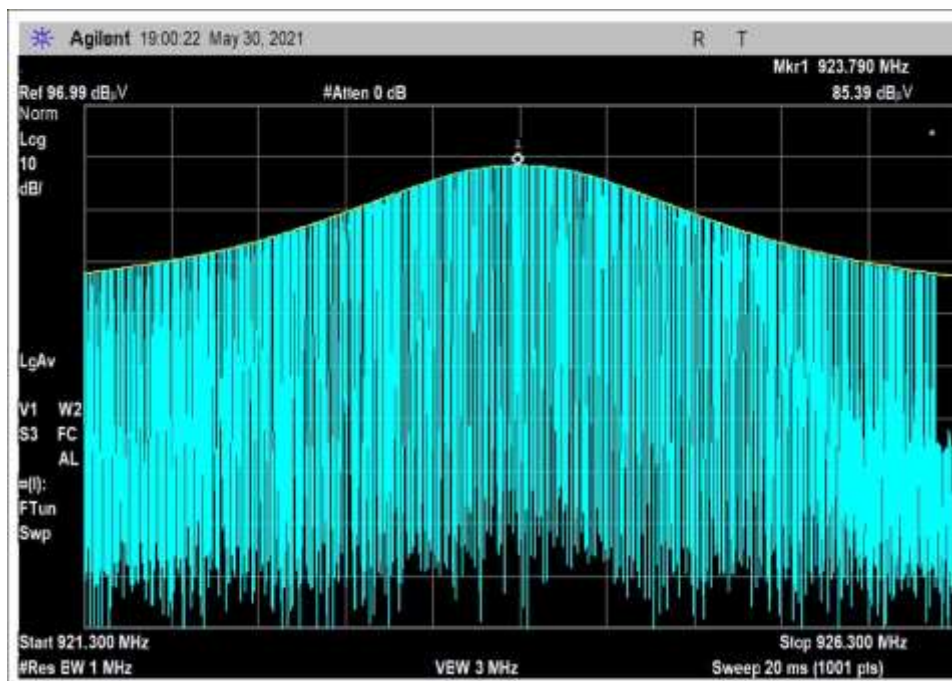
(Note: At the time of the test the spectrum analyzer date and time was not set correctly.)



Low Channel



Middle Channel



High Channel

Test Setup / Conditions / Data

Test Location: CKC Laboratories • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 1-800-500-4EMC (4362)
 Customer: **Itron, Inc.**
 Specification: **15.249 Carrier and Spurious Emissions (902-928 MHz Transmitter)**
 Work Order #: **107652** Date: 1/28/2023
 Test Type: **Radiated Scan** Time: 07:31:43
 Tested By: Matt Harrison Sequence#: 27
 Software: EMITest 5.03.20

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

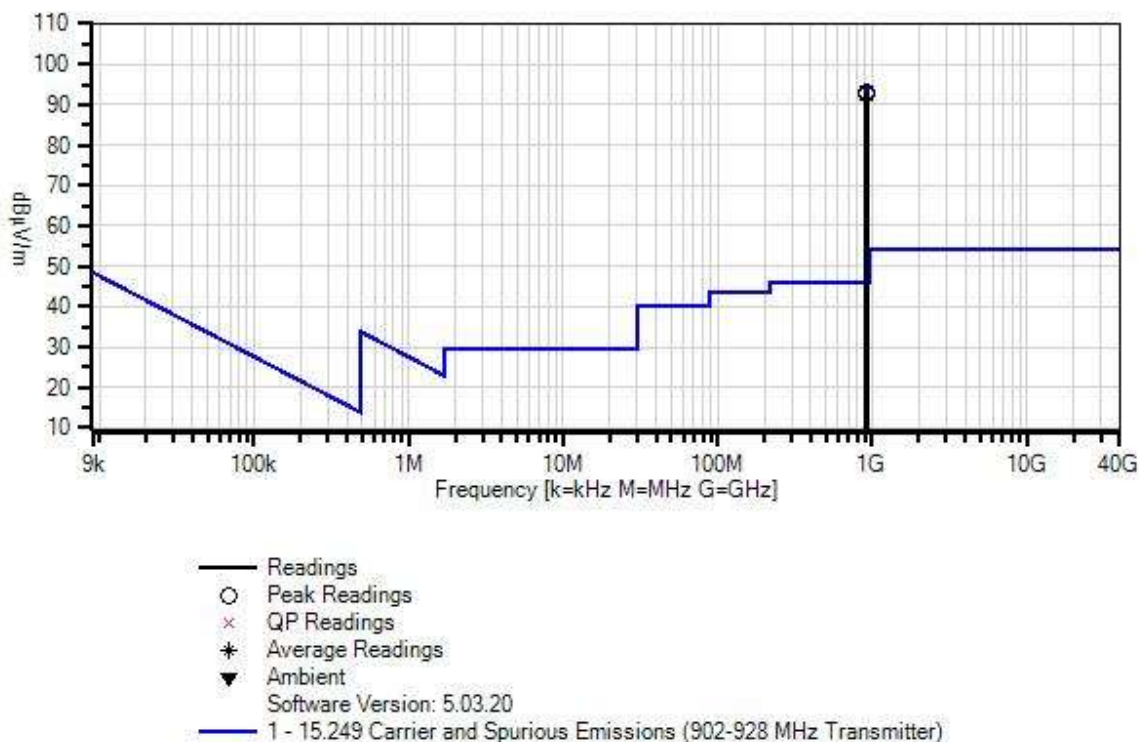
Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Environmental Conditions: Temperature: 18.6°C Pressure: 100.9 kPa Humidity: 40% Frequency Range: Fundamental Frequency tested: 908, 915.8, 923.8 Firmware power setting: Level 0 EUT Firmware: Protocol /MCS/Modulation: OOK Test Method: ANSI C63.10: 2013 Test Mode: Transmitting Test Setup: EUT is setup in a tabletop configuration. It is 80cm high on a Styrofoam table. Modifications Added: None
--

Iron, Inc. WO#: 107652 Sequence#: 27 Date: 1/28/2023
15.249 Carrier and Spurious Emissions (902-928 MHz Transmitter) Test Distance: 3 Meters Horiz



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN03628	Biconilog Antenna	3142E	6/3/2021	6/3/2023
T2	ANP05360	Cable	RG214	2/4/2022	2/4/2024
T3	ANP06540	Cable	Heliac	1/17/2022	1/17/2024
	AN02872	Spectrum Analyzer	E4440A	11/29/2021	11/29/2023
T4	ANP05333	Cable	Heliac	3/14/2022	3/14/2024
T5	AN02307	Preamp	8447D	1/6/2022	1/6/2024

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBμV	dB	dB	dB	dB	Table	dBμV/m	dBμV/m	dB	Ant
1	915.800M	86.4	+29.9 -27.3	+2.4	+0.3	+1.6	+0.0	93.3	94.0	-0.7	Horiz
2	908.000M	86.4	+29.8 -27.4	+2.4	+0.3	+1.5	+0.0	93.0	94.0	-1.0	Horiz
3	923.790M	85.4	+30.3 -27.3	+2.4	+0.3	+1.6	+0.0	92.7	94.0	-1.3	Horiz

Test Setup Photo(s)



15.249(a) Radiated Emissions and Band Edge

Test Setup / Conditions / Data

Test Location: CKC Laboratories • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 1-800-500-4EMC (4362)
 Customer: **Itron, Inc.**
 Specification: **15.249 Carrier and Spurious Emissions (902-928 MHz Transmitter)**
 Work Order #: **107652** Date: 1/30/2023
 Test Type: **Radiated Scan** Time: 08:33:06
 Tested By: Matt Harrison Sequence#: 43
 Software: EMITest 5.03.20

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

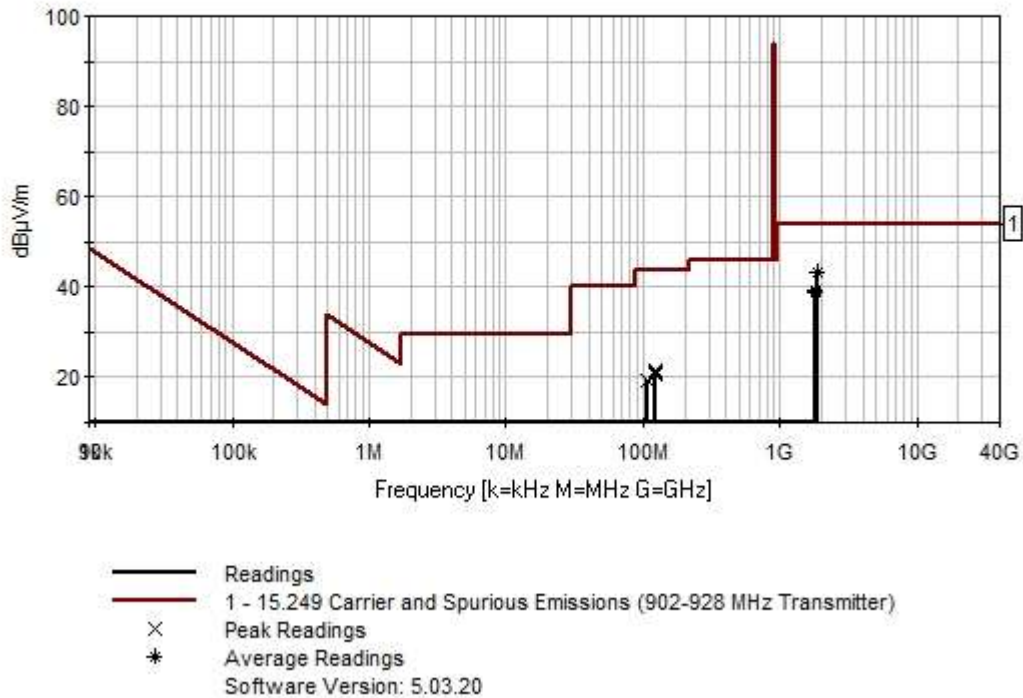
Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Environmental Conditions: Temperature: 18.6°C Pressure: 100.9 kPa Humidity: 40% Frequency Range: Fundamental Frequency tested: 908, 914.8, 923.8 Firmware power setting: Level 0 EUT Firmware: Protocol /MCS/Modulation: OOK Test Method: ANSI C63.10: 2013 Test Mode: Transmitting Test Setup: EUT is setup in a tabletop configuration. It is 80cm high for below 1GHz and 150cm above 1GHz on a Styrofoam table. Modifications Added: None Notes: No EUT emissions found within 20dB of the limit below 30MHz

Iron, Inc. WO#: 107652 Sequence#: 43 Date: 1/30/2023
15.249 Carrier and Spurious Emissions (902-928 MHz Transmitter) Test Distance: 3 Meters Vert



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN03540	Preamp	83017A	5/14/2021	5/14/2023
T2	AN02374ANSI	Horn Antenna	RGA-60	5/25/2021	5/25/2023
T3	ANP06540	Cable	Heliac	1/17/2022	1/17/2024
T4	AN02673	Spectrum Analyzer	E4446A	2/3/2021	2/3/2023
T5	AN03170	High Pass Filter	HM1155-11SS	9/16/2021	9/16/2023
T6	ANP05333	Cable	Heliac	3/14/2022	3/14/2024
T7	ANP07505	Cable	CLU40-KMKM-02.00F	1/24/2023	1/24/2025
	AN02307	Preamp	8447D	1/6/2022	1/6/2024
	AN00052	Loop Antenna	6502	5/11/2022	5/11/2024
	AN03628	Biconilog Antenna	3142E	6/3/2021	6/3/2023
	ANP05360	Cable	RG214	2/4/2022	2/4/2024
	AN03807	Spectrum Analyzer	E4440A	10/6/2022	10/6/2024

Measurement Data: Reading listed by order taken. Test Distance: 3 Meters

#	Freq MHz	Rdng dB μ V	T1 T5 dB	T2 T6 dB	T3 T7 dB	T4 dB	Dist Table	Corr dB μ V/m	Spec dB μ V/m	Margin dB	Polar Ant
1	1816.000M	58.1	-34.7 +0.6	+27.4 +2.3	+0.4 +0.4	+0.0	+0.0	54.5	54.0	+0.5	Vert
2	1816.000M Ave	42.8	-34.7 +0.6	+27.4 +2.3	+0.4 +0.4	+0.0	+0.0	39.2	54.0	-14.8	Vert
3	1831.600M	57.3	-34.7 +0.6	+27.5 +2.3	+0.4 +0.4	+0.0	+0.0	53.8	54.0	-0.2	Vert
4	1831.600M Ave	42.4	-34.7 +0.6	+27.5 +2.3	+0.4 +0.4	+0.0	+0.0	38.9	54.0	-15.1	Vert
5	1847.600M	56.3	-34.7 +0.6	+27.6 +2.3	+0.4 +0.4	+0.0	+0.0	52.9	54.0	-1.1	Vert
6	1847.600M Ave	46.8	-34.7 +0.6	+27.6 +2.3	+0.4 +0.4	+0.0	+0.0	43.4	54.0	-10.6	Vert
7	123.400M	34.5	+13.1 -27.6	+0.7 +0.0	+0.1	+0.7	+0.0	21.5	43.5	-22.0	Horiz
8	122.300M	34.3	+13.1 -27.6	+0.7 +0.0	+0.1	+0.7	+0.0	21.3	43.5	-22.2	Horiz
9	120.780M	33.4	+13.2 -27.6	+0.7 +0.0	+0.1	+0.7	+0.0	20.5	43.5	-23.0	Vert
10	106.500M	31.6	+14.2 -27.7	+0.6 +0.0	+0.1	+0.6	+0.0	19.4	43.5	-24.1	Vert

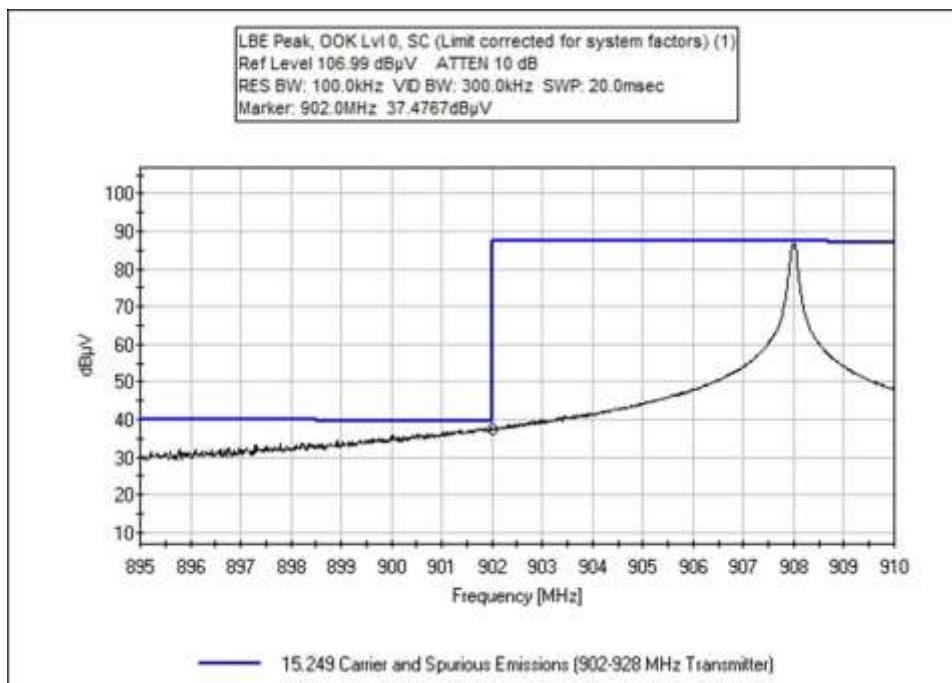
Band Edge

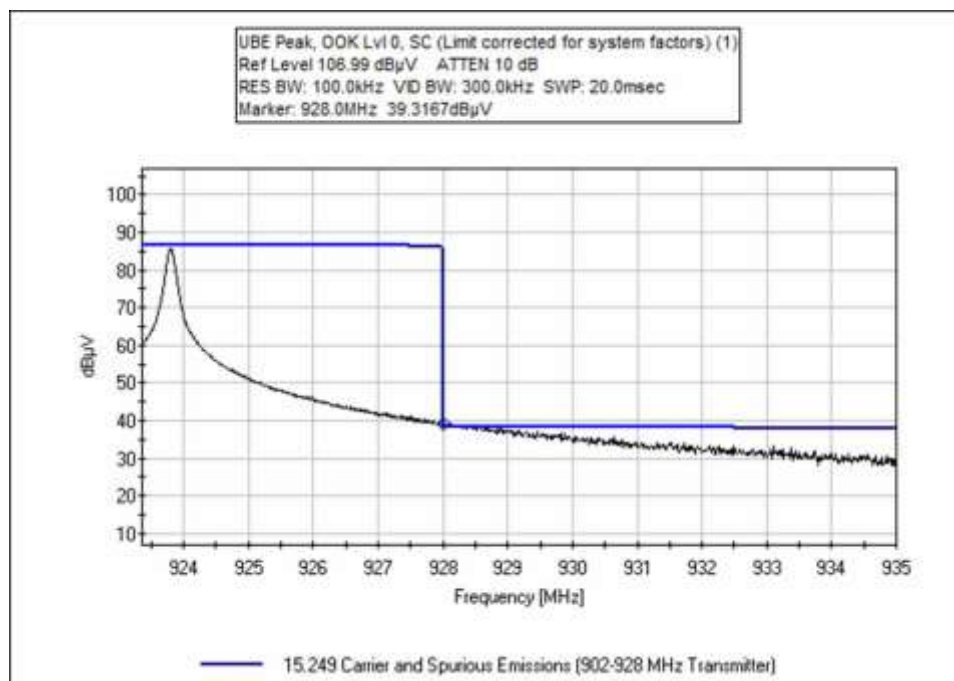
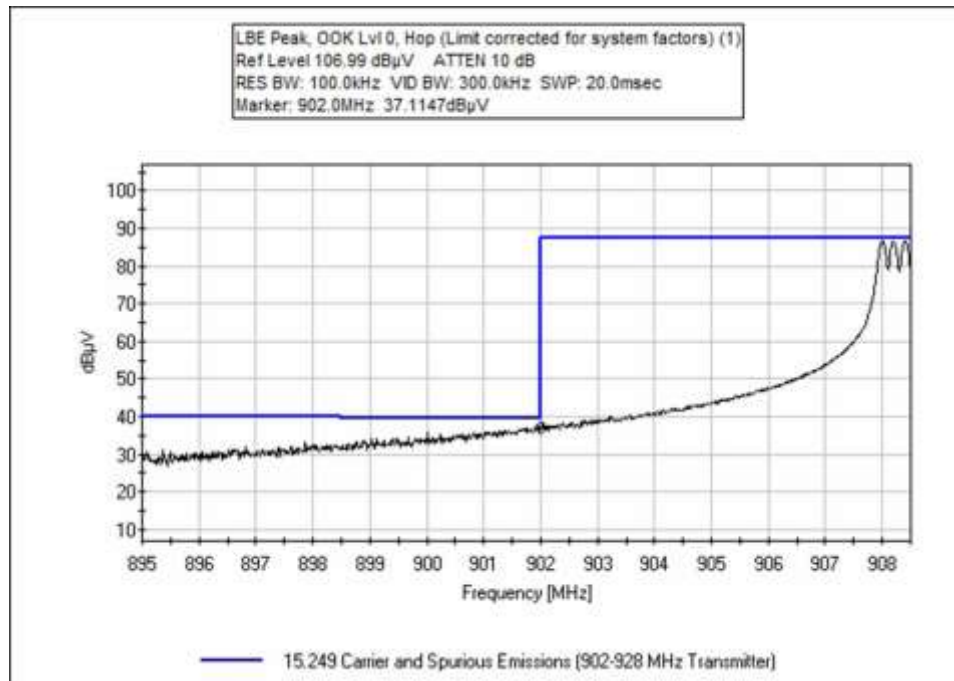
Band Edge Summary

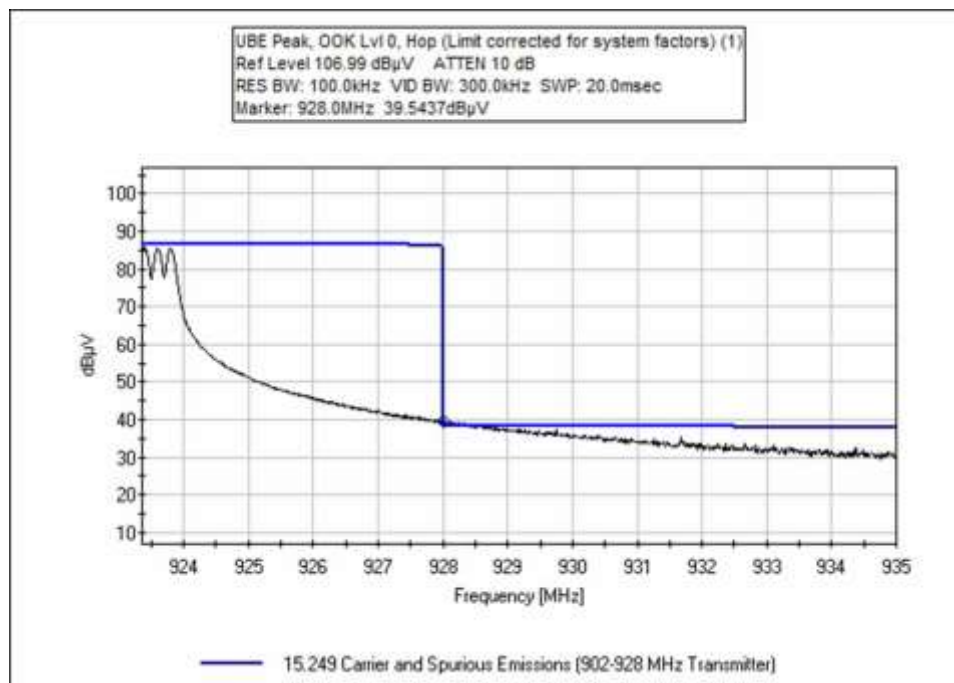
Frequency (MHz)	Modulation	Ant. Type	Field Strength (dBuV/m @3m)	Limit (dBuV/m @3m)	Results
902.0	OOK	F	38.5	<46	Pass
928.0	OOK	F	41.1	<54	Pass

Test performed using operational mode with the highest output power, representing worst case

Band Edge Plots







Note: Please see tabular data for QP measurements.

Test Setup / Conditions / Data

Test Location: CKC Laboratories • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 1-800-500-4EMC (4362)
 Customer: **Itron, Inc.**
 Specification: **15.249 Carrier and Spurious Emissions (902-928 MHz Transmitter)**
 Work Order #: **107652** Date: 1/27/2023
 Test Type: **Radiated Scan** Time: 07:51:34
 Tested By: Matt Harrison Sequence#: 15
 Software: EMITest 5.03.20

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Environmental Conditions: Temperature: 18.6°C Pressure: 100.9 kPa Humidity: 40% Frequency Range: Fundamental Frequency tested: 908, 923.8 Firmware power setting: Level 0 EUT Firmware: Protocol /MCS/Modulation: OOK Test Method: ANSI C63.10: 2013 Test Mode: Transmitting Test Setup: EUT is setup in a tabletop configuration. It is 80cm high on a Styrofoam table. Modifications Added: None

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN03628	Biconilog Antenna	3142E	6/3/2021	6/3/2023
T2	ANP05360	Cable	RG214	2/4/2022	2/4/2024
T3	ANP06540	Cable	Heliast	1/17/2022	1/17/2024
T4	AN02872	Spectrum Analyzer	E4440A	11/29/2021	11/29/2023
T5	ANP05333	Cable	Heliast	3/14/2022	3/14/2024
T6	AN02307	Preamplifier	8447D	1/6/2022	1/6/2024

Measurement Data:

Reading listed by order taken.

Test Distance: 3 Meters

#	Freq	Rdng	T1 T5 dB	T2 T6 dB	T3 dB	T4 dB	Dist	Corr	Spec	Margin	Polar
	MHz	dB μ V					Table	dB μ V/m	dB μ V/m	dB	Ant
1	902.000M	37.5	+29.6 +1.5	+2.3 -27.4	+0.3	+0.0	+0.0	43.8	46.0 SC	-2.2	Horiz
2	902.000M QP	32.2	+29.6 +1.5	+2.3 -27.4	+0.3	+0.0	+0.0	38.5	46.0 SC	-7.5	Horiz
3	902.000M	37.1	+29.6 +1.5	+2.3 -27.4	+0.3	+0.0	+0.0	43.4	46.0 Hop	-2.6	Horiz
4	902.000M QP	32.0	+29.6 +1.5	+2.3 -27.4	+0.3	+0.0	+0.0	38.3	46.0 Hop	-7.7	Horiz
5	928.000M	39.3	+30.6 +1.6	+2.4 -27.3	+0.3	+0.0	+0.0	46.9	46.0 SC	+0.9	Horiz
6	928.000M QP	33.5	+30.6 +1.6	+2.4 -27.3	+0.3	+0.0	+0.0	41.1	46.0 SC	-4.9	Horiz
7	928.000M	39.5	+30.6 +1.6	+2.4 -27.3	+0.3	+0.0	+0.0	47.1	46.0 Hop	+1.1	Horiz
8	928.000M QP	33.3	+30.6 +1.6	+2.4 -27.3	+0.3	+0.0	+0.0	40.9	46.0 Hop	-5.1	Horiz

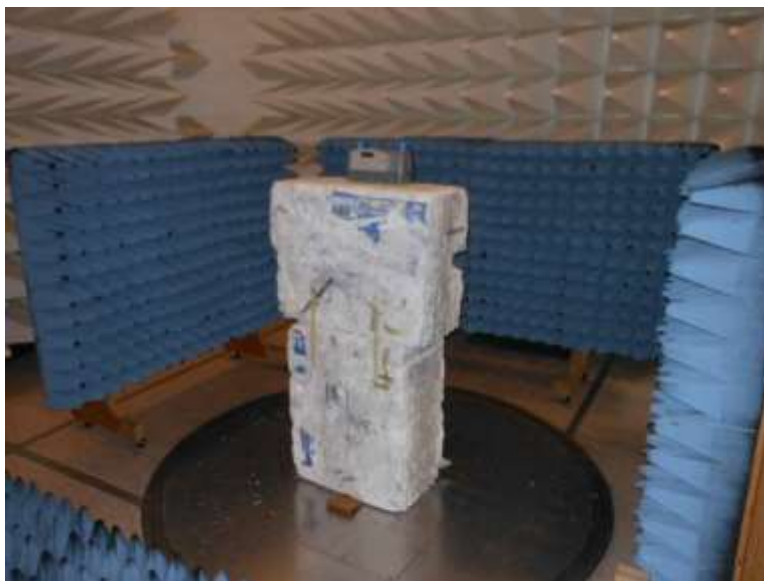
Test Setup Photo(s)



Below 1GHz



Above 1GHz, View #1



Above 1GHz, View #2

Appendix A: Manufacturer Declaration

The following model have been tested by CKC Laboratories:

Device: Intelis Gas

Model: ERG-7300-312

The Intelis Gas, Model: ERG-7300-312 are representative of worst-case testing of the following models per the manufacturer:

The manufacturer declares that the following additional models are identical electrically or any differences between them do not affect their EMC characteristics, and therefore meets the level of testing equivalent to the tested model.

Equivalent Models:

Device	Manufacturer	Model #
Intelis Gas	Itron, Inc.	MTR-7300 (425 – 8.25")
Intelis Gas	Itron, Inc.	MTR-7300 (425-6")
Intelis Gas	Itron, Inc.	MTR-7400 (250)
Intelis Gas	Itron, Inc.	MTR-7500 (250 w/Pressure Sensor)

SUPPLEMENTAL INFORMATION

Measurement Uncertainty

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

Uncertainties reported are worst case for all CKC Laboratories' sites and 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

Unless otherwise indicated, the following configuration parameters are used for equipment setup: 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 dB μ V/m, the spectrum analyzer reading in dB μ V was corrected by using the following formula. This reading was then compared to the applicable specification limit. Individual measurements were compared with the displayed limit value in the margin column. The margin was calculated based on subtracting the limit value from the corrected measurement value; a positive margin represents a measurement exceeding the limit, while a negative margin represents a measurement less than the limit.

SAMPLE CALCULATIONS		
	Meter reading	(dB μ V)
+	Antenna Factor	(dB/m)
+	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. Unless otherwise specified, 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	9 kHz	150 kHz	200 Hz
RADIATED 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 "positive peak" detector mode. Whenever a "quasi-peak" or "average" reading was recorded, the measurement was annotated with a "QP" or an "Ave" on the appropriate rows of the data sheets. In cases where quasi-peak or average limits were employed and data exists for multiple measurement types for the same frequency then the peak measurement was retained in the report for reference, however the numbering for the affected row was removed and an arrow or caret ("^") was placed in the far left-hand column indicating that the row above takes precedence for comparison to the limit. 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 or receiver recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature called "peak hold," the measurement device had the ability to measure intermittent 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

Quasi-peak measurements were taken using the quasi-peak detector when the true peak values exceeded or were within 2 dB of a quasi-peak specification limit. Additional QP measurements may have been taken at the discretion of the operator.

Average

Average measurements were taken using the average detector when the true peak values exceeded or were within 2 dB of an average specification limit. Additional average measurements may have been taken at the discretion of the operator. If the specification or test procedure requires trace averaging, then the averaging was performed using 100 samples or as required by the specification. All other average measurements are performed using video bandwidth averaging. 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.