

Itron, Inc.

TEST REPORT FOR

Intelis Gas 250

Model: MTR-7200-002*

*(See Appendix A for Manufacturers Declaration)

Tested to The Following Standards:

FCC Part 15 Subpart C Section(s)

15.247

(HYBRID 902-928MHz)

Report No.: 107749-2

Date of issue: March 30, 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.

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ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

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

Representative: Dan Bomsta
Customer Reference Number: 271751

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: 107749

January 30, 2023
January 30-31, 2023
February 1, 13-15 & 18, 2023

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 - 15.247 (Hybrid 902-928MHz)

Test Procedure	Description	Modifications	Results
15.247(a)(1)(i)	Occupied Bandwidth	NA	Pass
15.247(a)(1)	Carrier Separation	NA	Pass
15.247(a)(1)(i)	Number of Hopping Channels	NA	NA1
15.247(a)(1)(i)	Average Time of Occupancy	NA	NA1
15.247(b)(2)	Output Power	NA	Pass
15.247(d)	RF Conducted Emissions	NA	Pass
15.247(d)	Radiated Emissions & Band Edge	NA	Pass
15.247 (f)	Hybrid Systems Time of Occupancy	NA	NP
15.247 (f)	Hybrid Systems Power Spectral Density	NA	Pass
15.207	AC Conducted Emissions	NA	NA2

NA = Not Applicable

NA1 = This test is not applicable under Hybrid System requirements section 15.247 (f).

NA2 = Manufacturer declares EUT is battery powered.

NP = CKC Laboratories Inc. was not contracted to perform test.

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 250	Itron, Inc.	MTR-7200-002	105334- Cond

Support Equipment:

Device	Manufacturer	Model #	S/N
Laptop	HP	14-dq1033cl	5CD941CCWS
Laptop PSU	HP	TPN-CA14	WHGRE0AVKCR55T
Adapter Board	Itron, Inc.	NA	NA

Configuration 2

Equipment Under Test:

Device	Manufacturer	Model #	S/N
Intelis Gas 250	Itron, Inc.	MTR-7200-002	105334- Rad

Support Equipment:

Device	Manufacturer	Model #	S/N
Laptop	HP	14-dq1033cl	5CD941CCWS
Laptop PSU	HP	TPN-CA14	WHGRE0AVKCR55T
Adapter Board	Itron, Inc.	NA	NA

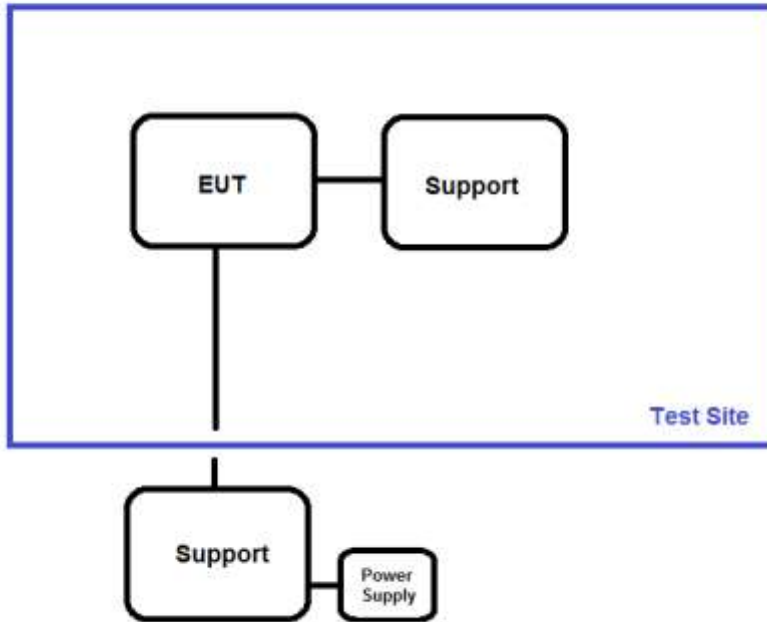
General Product Information:

Product Information	Manufacturer-Provided Details
Equipment Type:	Stand-Alone Equipment
Type of Wideband System:	FHSS
Operating Frequency Range:	902.4-927.6
Number of Hopping Channels:	64
Modulation Type(s):	GFSK 150kbps
Maximum Duty Cycle:	Tested at 100%
Number of TX Chains:	1
Antenna Type(s) and Gain:	Type F 3.9 dBi
Beamforming Type:	NA
Antenna Connection Type:	Integral (External connector provided to facilitate testing)
Nominal Input Voltage:	Battery (6VDC)
Firmware / Software used for Test:	CLI Tool V.8.02.0 CSL V.9.1.5.0

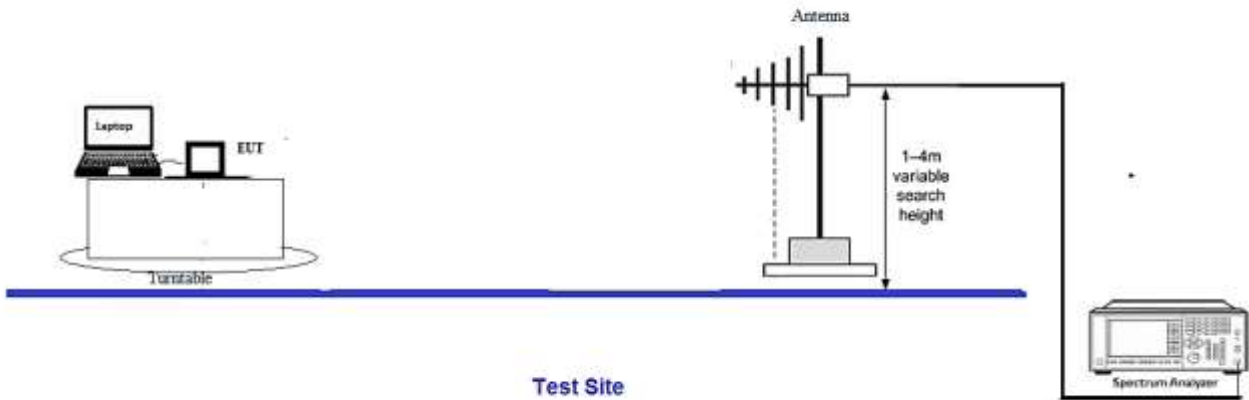
The validity of results is dependent on the stated product details, the accuracy of which the manufacturer assumes full responsibility.

Block Diagram of Test Setup(s)

Test Setup Block Diagram



Radiated test setup



FCC Part 15 Subpart C

15.247(a) Transmitter Characteristics

Test Setup/Conditions			
Test Location:	Bothell Lab C3	Test Engineer:	M. Harrison
Test Method:	ANSI C63.10 (2013)	Test Date(s):	2/14/2023
Configuration:	1		
Test Setup:	EUT is setup for conducted measurements. It is directly connected to the analyzer via cable and attenuator.		

Environmental Conditions			
Temperature (°C)	21	Relative Humidity (%):	38

Test Equipment					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
P05503	Attenuator	Narda	766-10	6/8/2021	6/8/2023
P05353	Cable	Andrews	Heliac	2/23/2022	2/23/2024
03807	Spectrum Analyzer	Agilent	E4440A	10/6/2022	10/6/2024

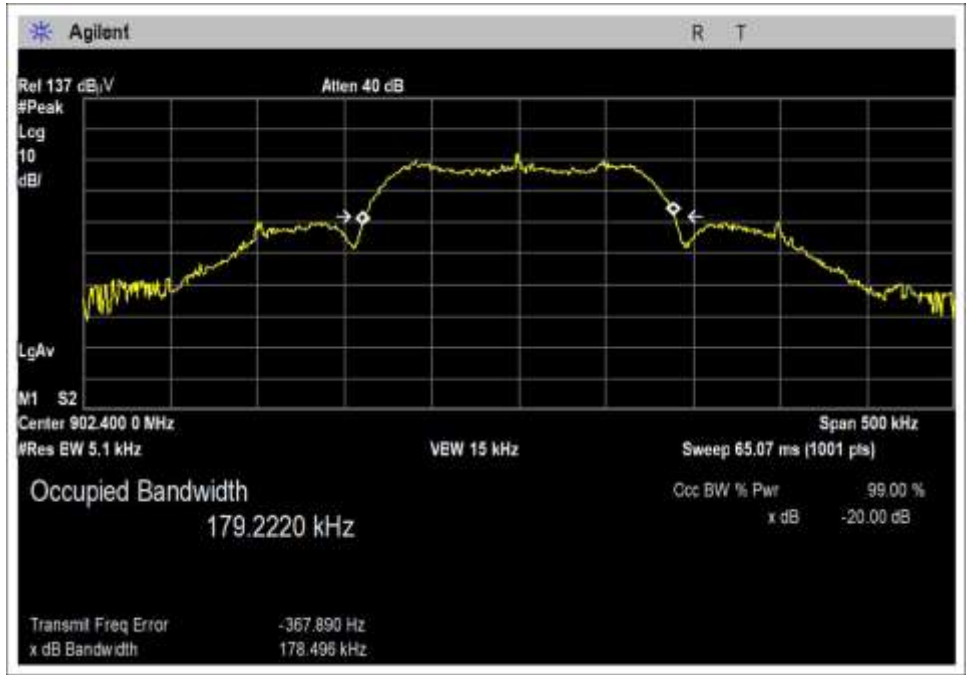
15.247(a)(1)(i) 20 dB Bandwidth

20dB Occupied Bandwidth

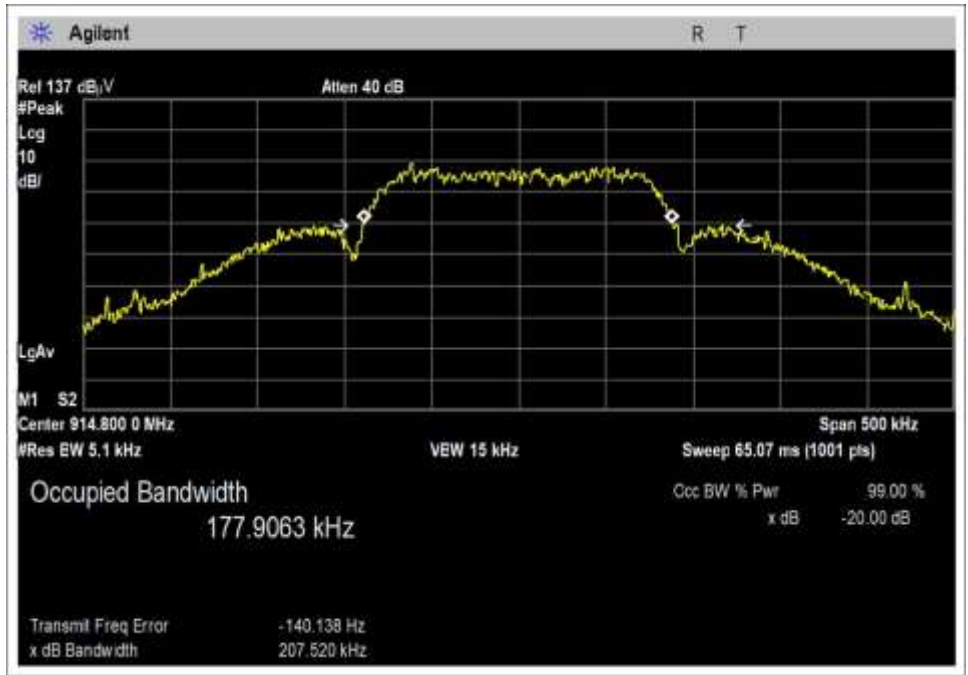
Test Data Summary					
Frequency (MHz)	Antenna Port	Modulation	Measured (kHz)	Limit (kHz)	Results
902.4	1	GFSK	178.5	*See Note	N/A
914.8	1	GFSK	207.5		
927.6	1	GFSK	263.8		

*For this Hybrid mode there is no requirement to meet the FHSS or DTS bandwidth limits. See Supplemental Section of data in 15.247 (f) Hybrid Systems.

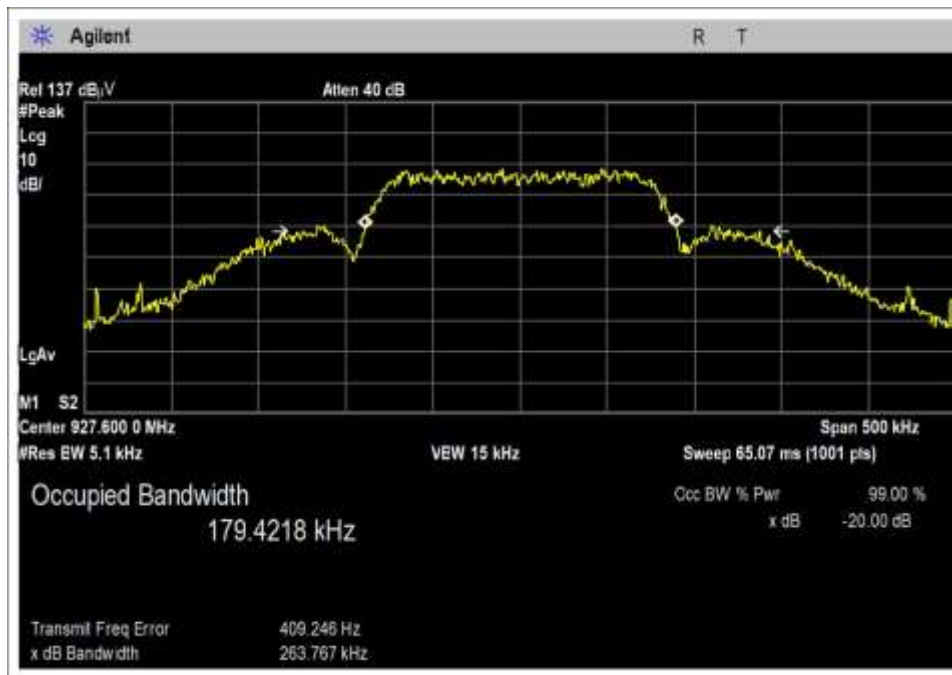
Plot(s)



Low Channel



Middle Channel

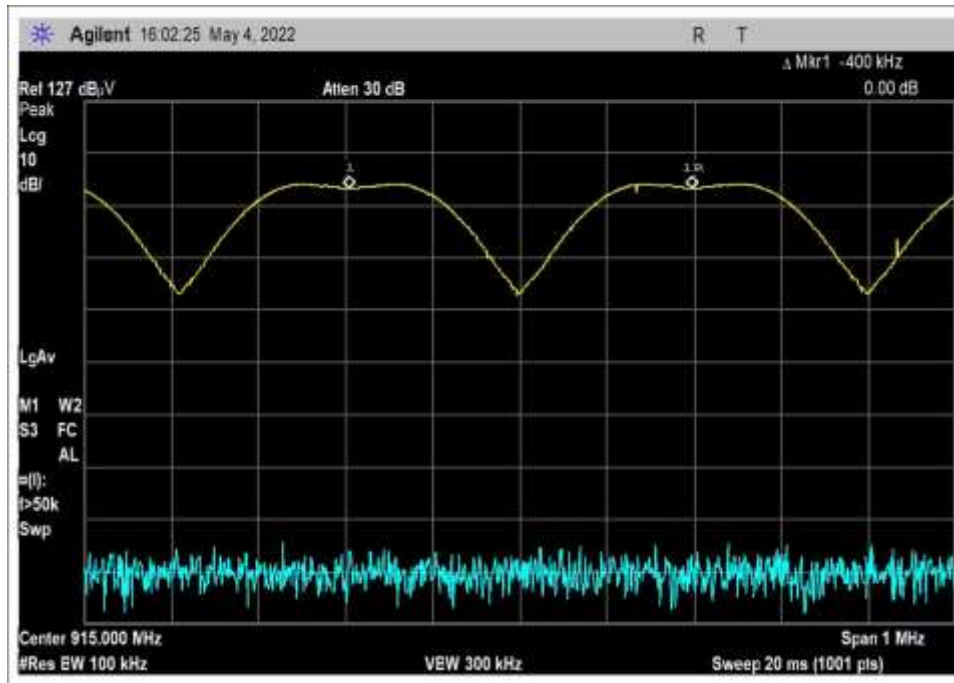


High Channel

15.247(a)(1) Carrier Separation

Test Data Summary				
Limit applied: 20dB bandwidth of the hopping channel.				
Antenna Port	Operational Mode	Measured (kHz)	Limit (kHz)	Results
1	Hopping	400	>263.8	Pass

Plot(s)



Test Setup Photo(s)



15.247(b)(2) Output Power

Test Setup/Conditions			
Test Location:	Bothell Lab C3	Test Engineer:	M. Harrison
Test Method:	ANSI C63.10 (2013)	Test Date(s):	2/14/2023
Configuration:	1		
Test Setup:	EUT is setup for conducted measurements. It is directly connected to the analyzer via cable and attenuator.		

Test Data Summary - Voltage Variations

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

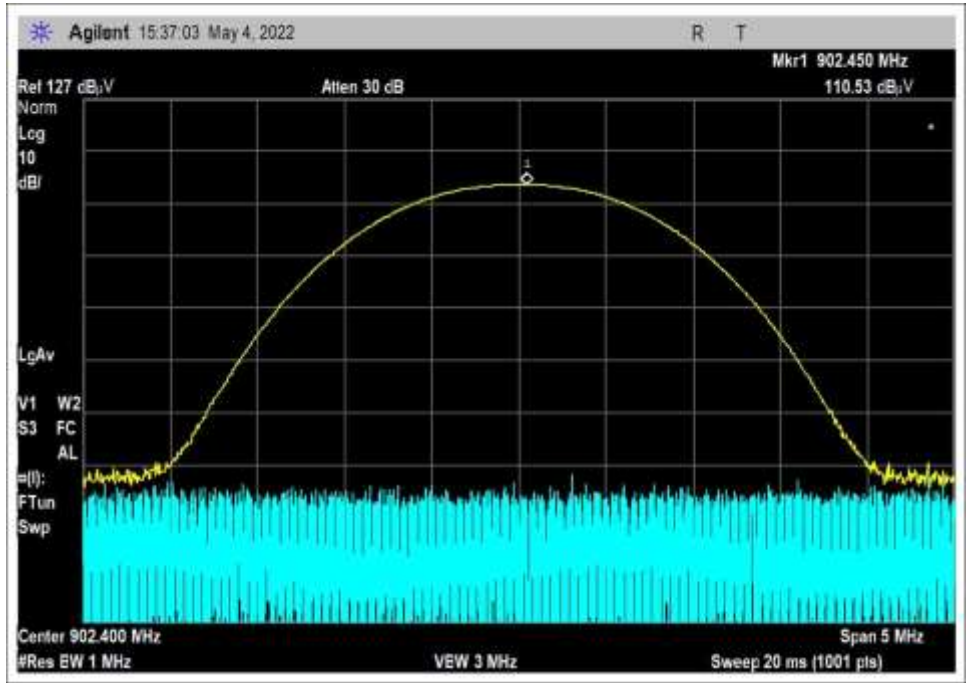
Test Data Summary - RF Conducted Measurement					
<i>Limit = 30dBm Conducted/36dBm EIRP</i>					
Frequency (MHz)	Modulation	Ant. Type / Gain (dBi)	Measured (dBm)	Limit (dBm)	Results
902.4	GFSK	Type F / 3.9	13.8	≤30	Pass
914.8	GFSK	Type F / 3.9	14.3	≤30	Pass
927.6	GFSK	Type F / 3.9	14.8	≤30	Pass

For this Hybrid Mode there is no minimum number of hopping channels required for the 1 Watt (30dBm) limit.

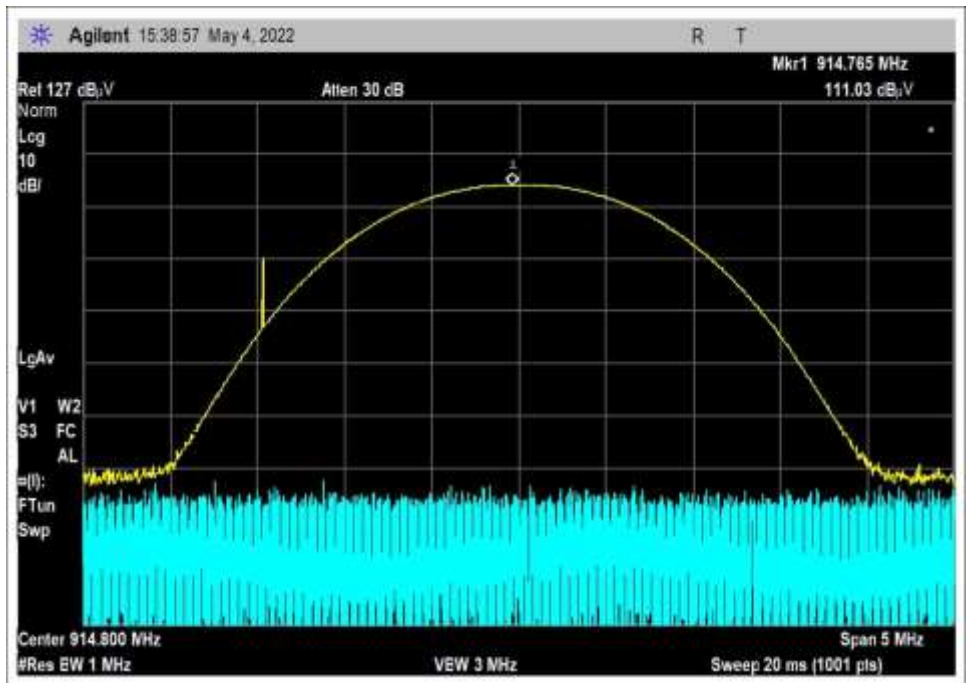
The limit is calculated according to a maximum of 1W (30 dBm) conducted power with a maximum of 6dBi gain antenna in accordance with 15.247(b)

$$Limit = 30 - Roundup(G - 6)$$

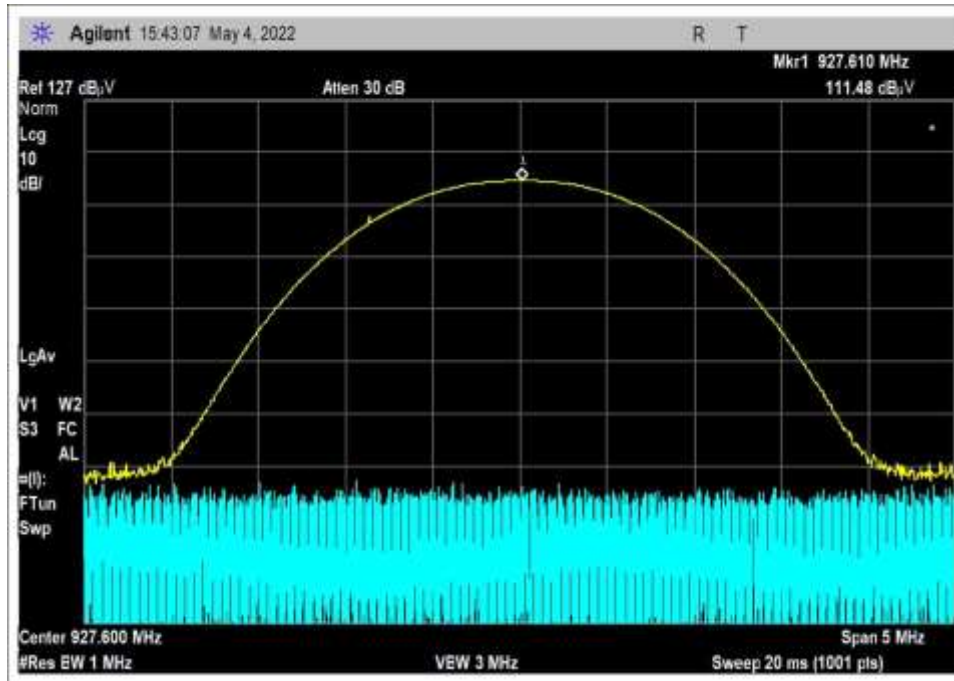
Plots



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: **15.247(b) Power Output (902-928 MHz FHSS >50 Channels)**
 Work Order #: **107749** Date: 2/1/2023
 Test Type: **Conducted Emissions** Time: 09:14:47
 Tested By: Matt Harrison Sequence#: 6
 Software: EMITest 5.03.20 6VDC

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

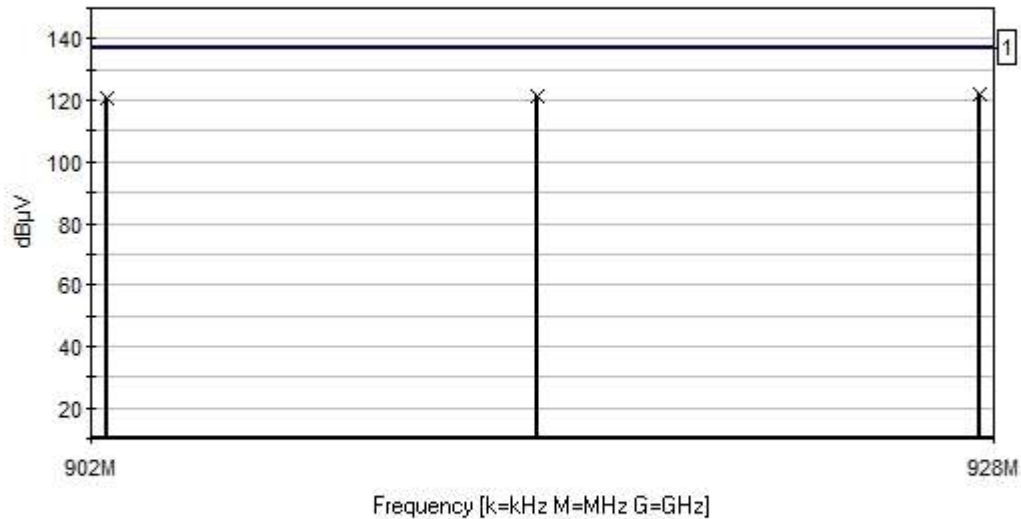
Test Conditions / Notes:

Environmental Conditions:
 Temperature: 18.6°C
 Pressure: 100.9 kPa
 Humidity: 40%

 Frequency Range: Fundamental
 Frequency tested: 902.4, 914.8, 927.6
 Firmware power setting: Level 2
 EUT Firmware:
 Protocol /MCS/Modulation: GFSK 150kbps

 Test Method: ANSI C63.10: 2013
 Test Mode: Transmitting
 Test Setup: EUT is setup for conducted measurement. It is directly connected to the Analyzer via cable and attenuator
 Modifications Added: None

Iron, Inc. WO#: 107749 Sequence#: 6 Date: 2/1/2023
 15.247(b) Power Output (902-928 MHz FHSS >50 Channels) Test Lead: 6VDC RF Port



— Readings
 1 - 15.247(b) Power Output (902-928 MHz FHSS >50 Channels)
 × Peak Readings
 Software Version: 5.03.20

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02872	Spectrum Analyzer	E4440A	11/29/2021	11/29/2023
T1	ANP05503	Attenuator	766-10	6/8/2021	6/8/2023
T2	ANP05353	Cable	Heliac	2/23/2022	2/23/2024

Measurement Data:

Reading listed by margin.

Test Lead: RF Port

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	927.610M	111.5	+10.1	+0.2			+0.0	121.8	137.0	-15.2	RF Po
2	914.765M	111.0	+10.1	+0.2			+0.0	121.3	137.0	-15.7	RF Po
3	902.450M	110.5	+10.1	+0.2			+0.0	120.8	137.0	-16.2	RF Po

Test Setup Photo(s)



15.247(d) RF Conducted Emissions

Test Data

Test Location: CKC Laboratories • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 1-800-500-4EMC (4362)
 Customer: **Itron, Inc.**
 Specification: **15.247(d) Conducted Spurious Emissions**
 Work Order #: **107749** Date: 2/1/2023
 Test Type: **Conducted Emissions** Time: 09:59:29
 Tested By: Matt Harrison Sequence#: 7
 Software: EMITest 5.03.20 6VDC

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

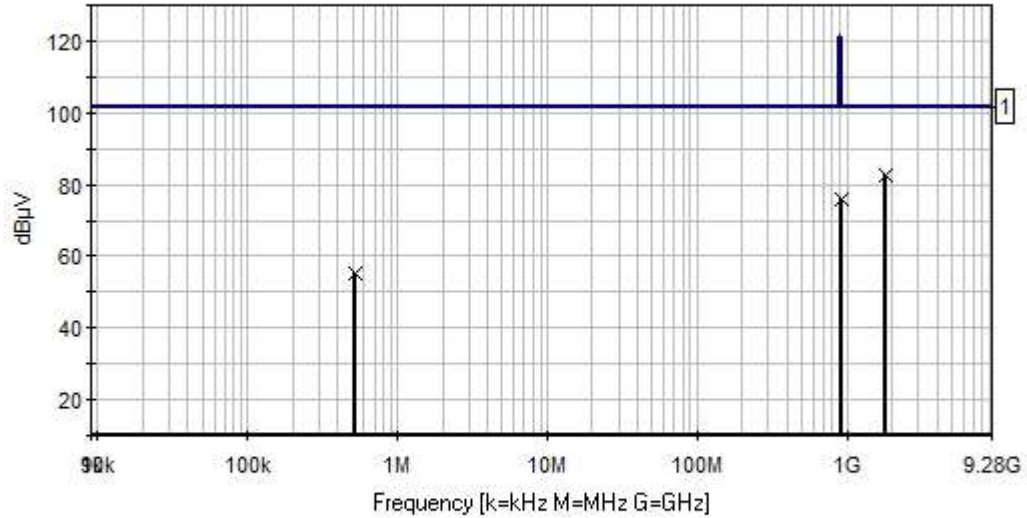
Test Conditions / Notes:

Environmental Conditions:
 Temperature: 18.6°C
 Pressure: 100.9 kPa
 Humidity: 40%

 Frequency Range: 30M-10 GHz
 Frequency tested: 902.4, 914.8, 927.6
 Firmware power setting: Level 2
 EUT Firmware:
 Protocol /MCS/Modulation: GFSK, 150kbps

 Test Method: ANSI C63.10: 2013
 Test Mode: Transmitting
 Test Setup: EUT is setup for conducted measurement. It is directly connected to the Analyzer via cable and attenuator
 Modifications Added: None

Ittron, Inc. WO#: 107749 Sequence#: 7 Date: 2/1/2023
 15.247(d) Conducted Spurious Emissions Test Lead: 6VDC RF Port



— Readings
 — 1 - 15.247(d) Conducted Spurious Emissions
 x Peak Readings
 Software Version: 5.03.20

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02872	Spectrum Analyzer	E4440A	11/29/2021	11/29/2023
T1	ANP05503	Attenuator	766-10	6/8/2021	6/8/2023
T2	ANP05353	Cable	Heliacx	2/23/2022	2/23/2024

Measurement Data:

Reading listed by margin.

Test Lead: RF Port

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	1829.707M	71.8	+10.2	+0.3			+0.0	82.3	101.3	-19.0	RF Po
2	910.800M	65.8	+10.1	+0.2			+0.0	76.1	121.3	-45.2	RF Po
3	519.000k	45.1	+10.1	+0.0			+0.0	55.2	101.3	-46.1	RF Po

Test Setup Photo(s)



15.247(d) Radiated Emissions & 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: **15.247(d) / 15.209 Radiated Spurious Emissions**
 Work Order #: **107749** Date: 2/18/2023
 Test Type: **Radiated Scan** Time: 12:56:50
 Tested By: Matt Harrison Sequence#: 9
 Software: EMITest 5.03.20

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 2			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 2			

Test Conditions / Notes:

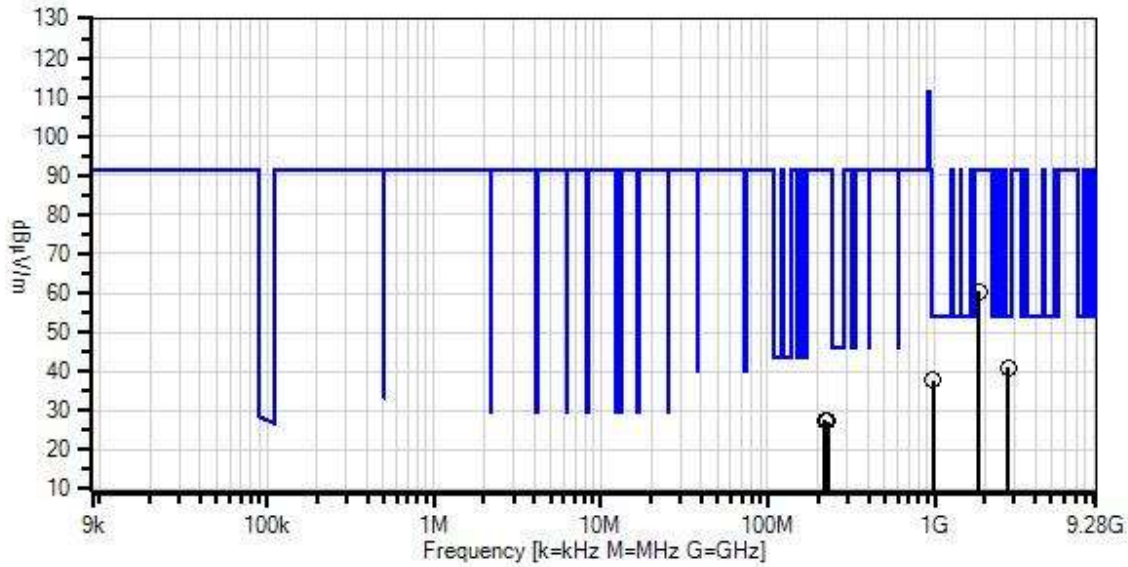
Environmental Conditions:
 Temperature: 18.6°C
 Pressure: 100.9 kPa
 Humidity: 40%

Frequency Range: 9k-10GHz
 Frequency tested: 914.8 (Low, Middle, and High channels were investigated, and worst case is represented)
 Firmware power setting: Level 2
 EUT Firmware:
 Protocol /MCS/Modulation: GFSK 150kbps

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 emissions found within 20dB of the limit below 30MHz.

Itron, Inc. WO#: 107749 Sequence#: 9 Date: 2/18/2023
 15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Horiz



— Readings
 × QP Readings
 ▼ Ambient
 — 1 - 15.247(d) / 15.209 Radiated Spurious Emissions

○ Peak Readings
 * Average Readings
 Software Version: 5.03.20

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
	AN00052	Loop Antenna	6502	5/11/2022	5/11/2024
T6	AN03540	Preamp	83017A	5/14/2021	5/14/2023
T7	AN02374ANSI	Horn Antenna	RGA-60	5/25/2021	5/25/2023
T8	ANP07505	Cable	CLU40-KMKM-02.00F	1/24/2023	1/24/2025
T9	AN03170	High Pass Filter	HM1155-11SS	9/16/2021	9/16/2023

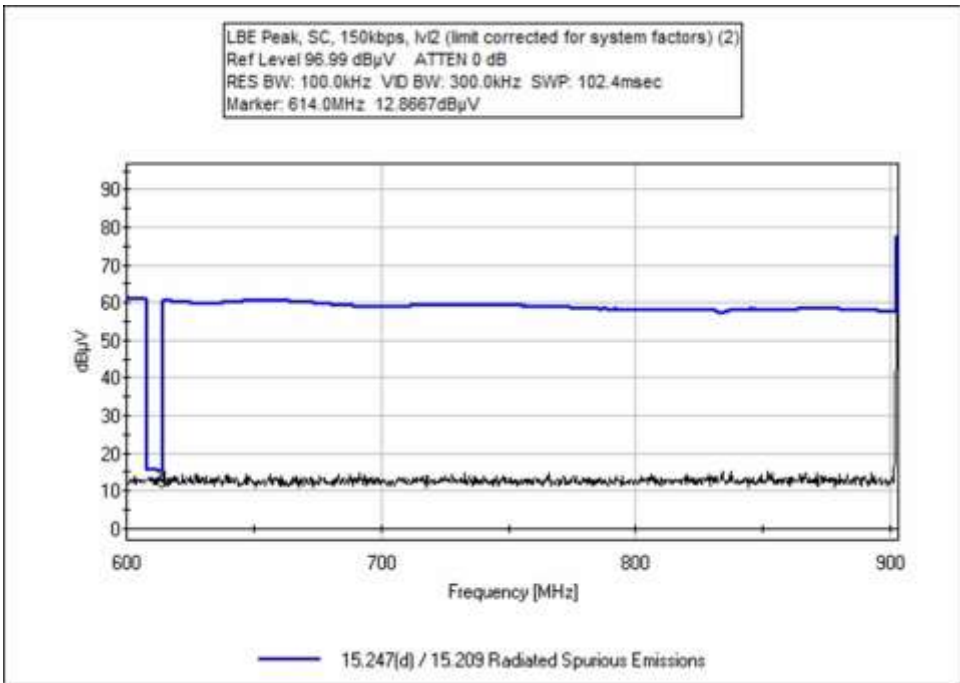
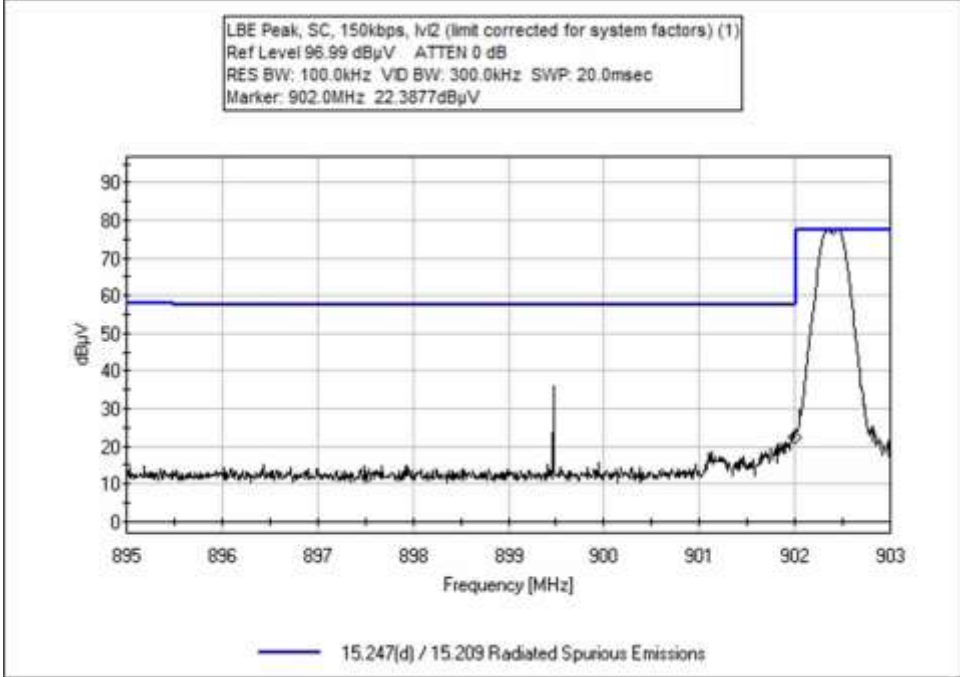
Measurement Data: Reading listed by margin. Test Distance: 3 Meters

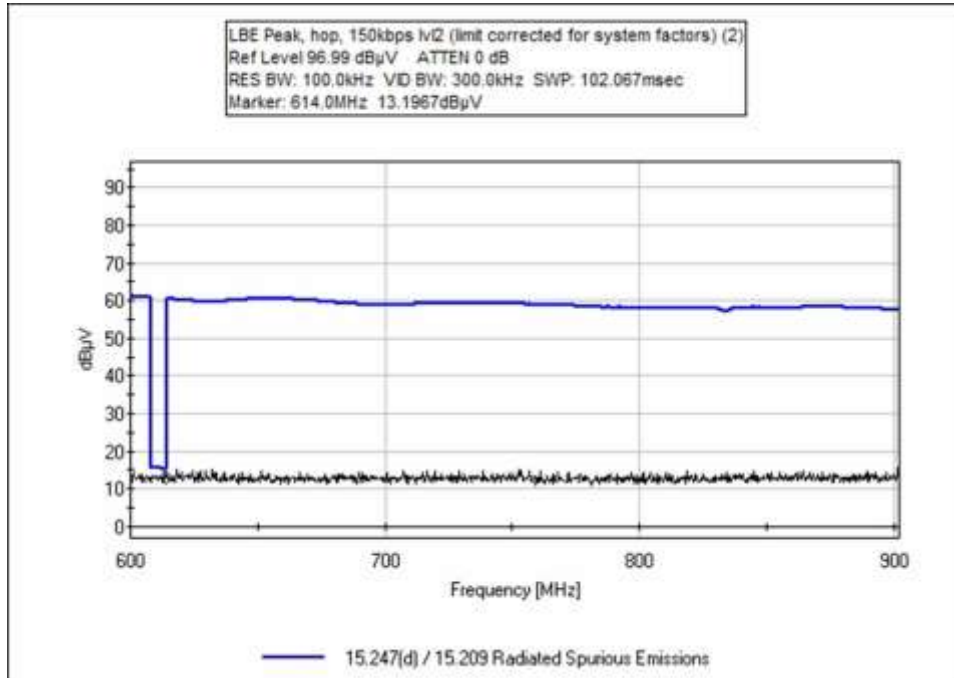
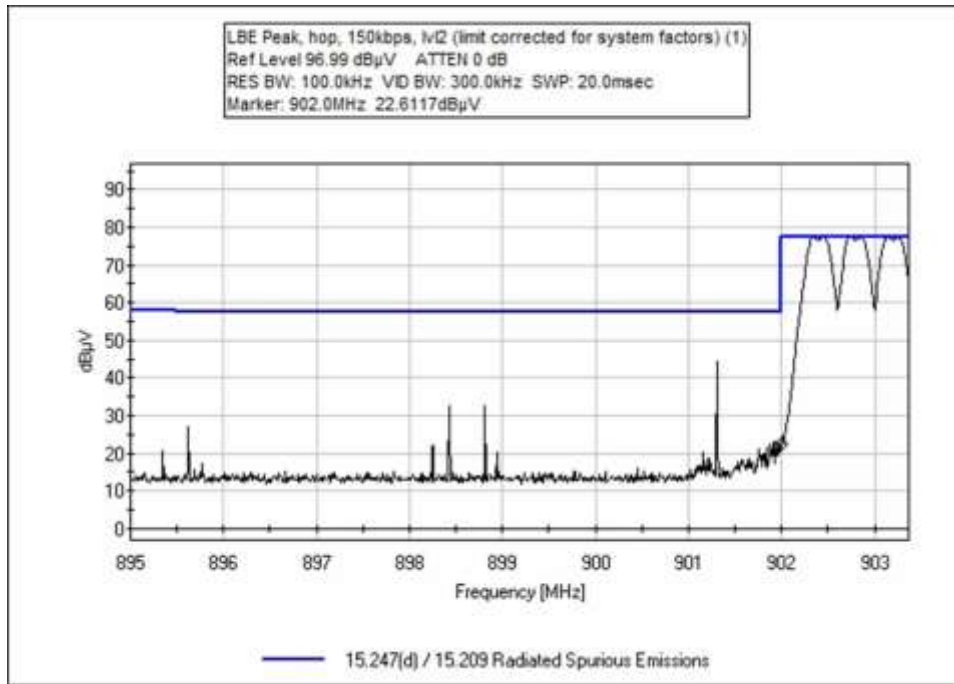
#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
			T5	T6	T7	T8					
	MHz	dB μ V	T9				Table	dB μ V/m	dB μ V/m	dB	Ant
1	2745.690M	41.8	+0.0	+0.0	+0.5	+2.8	+0.0	41.1	54.0	-12.9	Horiz
			+0.0	-34.1	+29.3	+0.5					
			+0.3								
2	974.110M	30.2	+30.3	+2.5	+0.3	+1.6	+0.0	37.7	54.0	-16.3	Horiz
			-27.2	+0.0	+0.0	+0.0					
			+0.0								
3	1829.525M	64.0	+0.0	+0.0	+0.4	+2.3	+0.0	60.5	91.2	-30.7	Horiz
			+0.0	-34.7	+27.5	+0.4					
			+0.6								
4	218.670M	36.3	+16.5	+1.0	+0.1	+0.8	+0.0	27.5	91.2	-63.7	Horiz
			-27.2	+0.0	+0.0	+0.0					
			+0.0								
5	229.500M	35.4	+17.1	+1.0	+0.1	+0.8	+0.0	27.3	91.2	-63.9	Horiz
			-27.1	+0.0	+0.0	+0.0					
			+0.0								

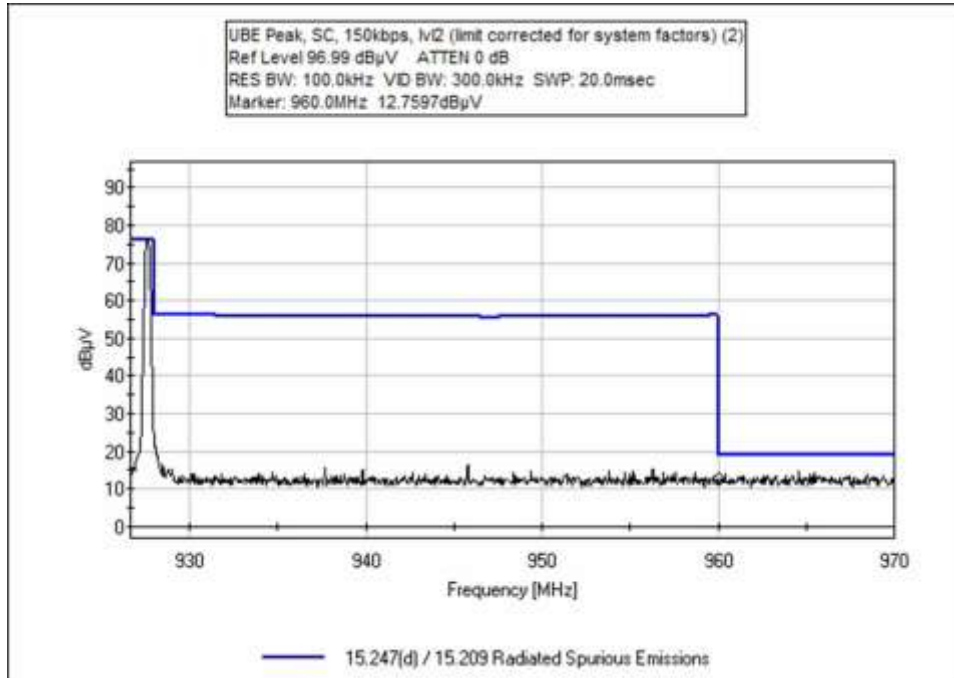
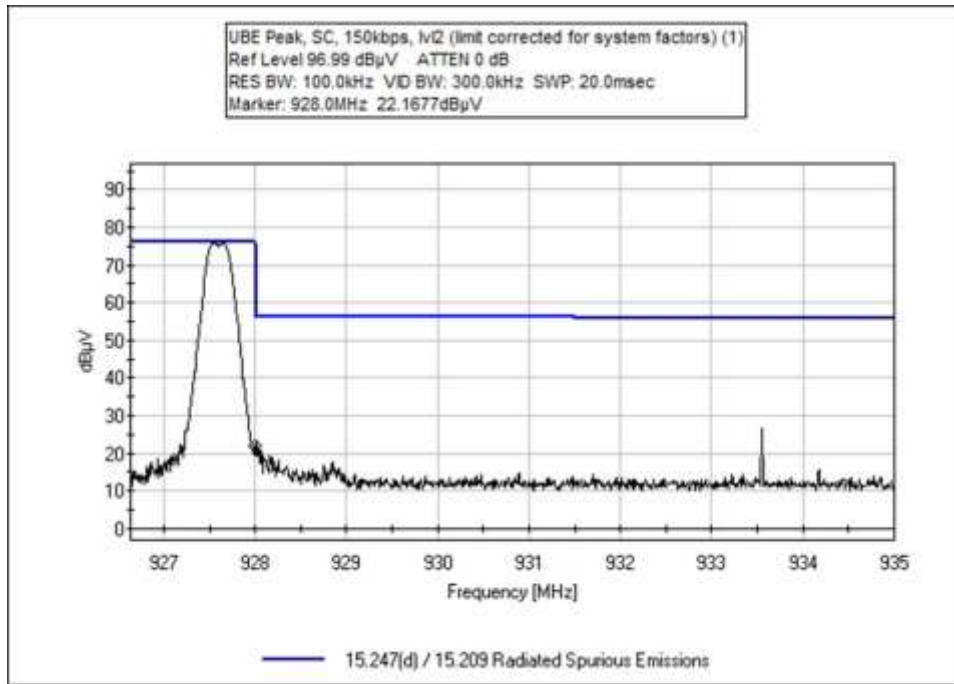
Band Edge

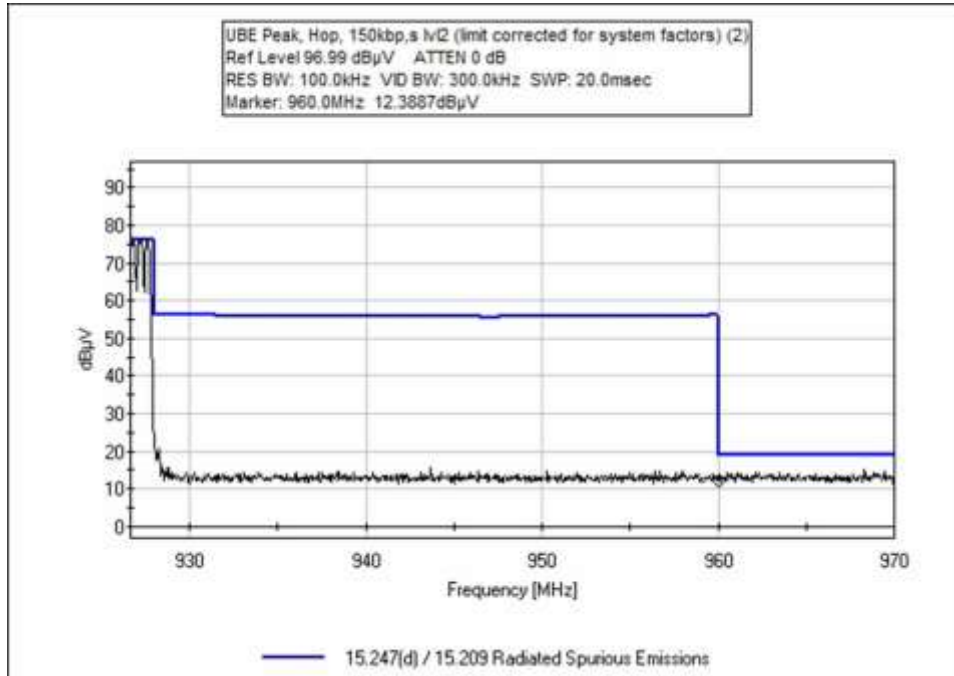
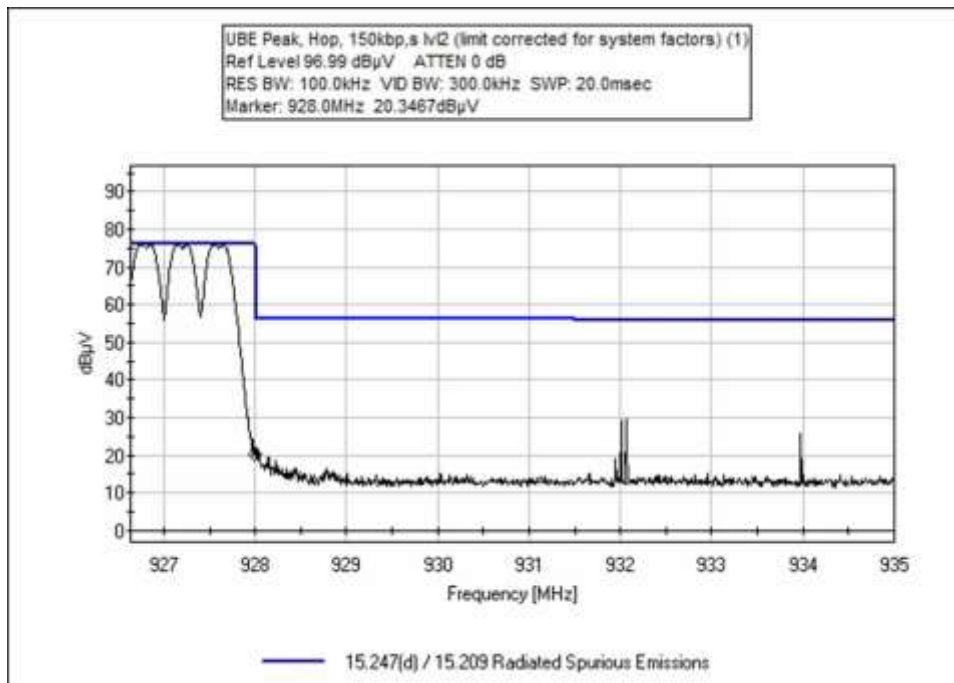
Band Edge Summary					
Frequency (MHz)	Modulation	Ant. Type	Field Strength (dBuV/m @3m)	Limit (dBuV/m @3m)	Results
614	GFSK	Type F	40.0	<46	Pass
902			56.1	<91.2	Pass
928			57.1	<91.2	Pass
960			47.8	<54	Pass
614	GFSK	Type F	40.0	<46	Pass
902			56.3	<91.2	Pass
928			55.2	<91.2	Pass
960			47.4	<54	Pass

Band Edge Plots









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: **15.247(d) / 15.209 Radiated Spurious Emissions**
 Work Order #: **107749** Date: 1/31/2023
 Test Type: **Radiated Scan** Time: 12:39:58
 Tested By: Matt Harrison Sequence#: 3
 Software: EMITest 5.03.20

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 2			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 2			

Test Conditions / Notes:

Environmental Conditions:
 Temperature: 18.6°C
 Pressure: 100.9 kPa
 Humidity: 40%

 Frequency Range: 600-970MHz
 Frequency tested: 902.4, 927.6
 Firmware power setting: Level 2
 EUT Firmware:
 Protocol /MCS/Modulation: GFSK 150kbps

 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	Heliac	1/17/2022	1/17/2024
T4	AN02872	Spectrum Analyzer	E4440A	11/29/2021	11/29/2023
T5	ANP05333	Cable	Heliac	3/14/2022	3/14/2024
	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	614.000M QP	9.3	+27.2 +1.3	+1.9	+0.3	+0.0	+0.0	40.0	46.0 hop	-6.0	Horiz
2	614.000M QP	9.3	+27.2 +1.3	+1.9	+0.3	+0.0	+0.0	40.0	46.0 SC	-6.0	Horiz
^	614.000M	13.2	+27.2 +1.3	+1.9	+0.3	+0.0	+0.0	43.9	46.0 hop	-2.1	Horiz
^	614.000M	12.9	+27.2 +1.3	+1.9	+0.3	+0.0	+0.0	43.6	46.0 SC	-2.4	Horiz
5	960.000M	12.8	+30.7 +1.6	+2.4	+0.3	+0.0	+0.0	47.8	54.0 SC	-6.2	Horiz
6	960.000M	12.4	+30.7 +1.6	+2.4	+0.3	+0.0	+0.0	47.4	54.0 Hop	-6.6	Horiz
7	928.000M	22.2	+30.6 +1.6	+2.4	+0.3	+0.0	+0.0	57.1	91.2 SC	-34.1	Horiz
8	902.000M	22.6	+29.6 +1.5	+2.3	+0.3	+0.0	+0.0	56.3	91.2 hop	-34.9	Horiz
9	902.000M	22.4	+29.6 +1.5	+2.3	+0.3	+0.0	+0.0	56.1	91.2 SC	-35.1	Horiz
10	928.000M	20.3	+30.6 +1.6	+2.4	+0.3	+0.0	+0.0	55.2	91.2 Hop	-36.0	Horiz

Test Setup Photo(s)



Below 1GHz



Above 1GHz, View #1



Above 1GHz, View #2

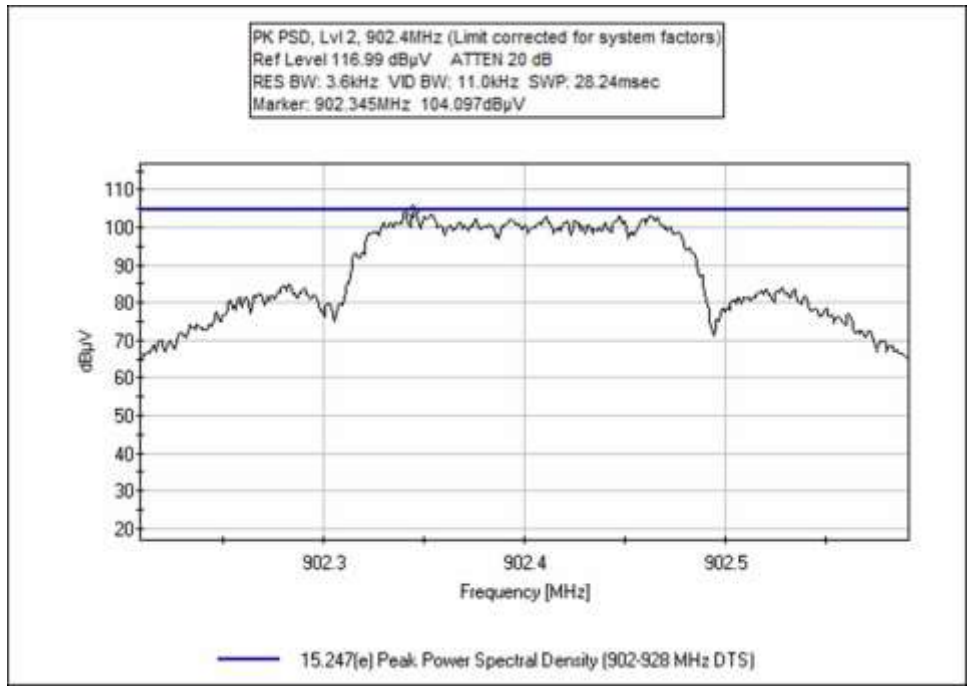
15.247 (f) Hybrid Systems Power Spectral Density

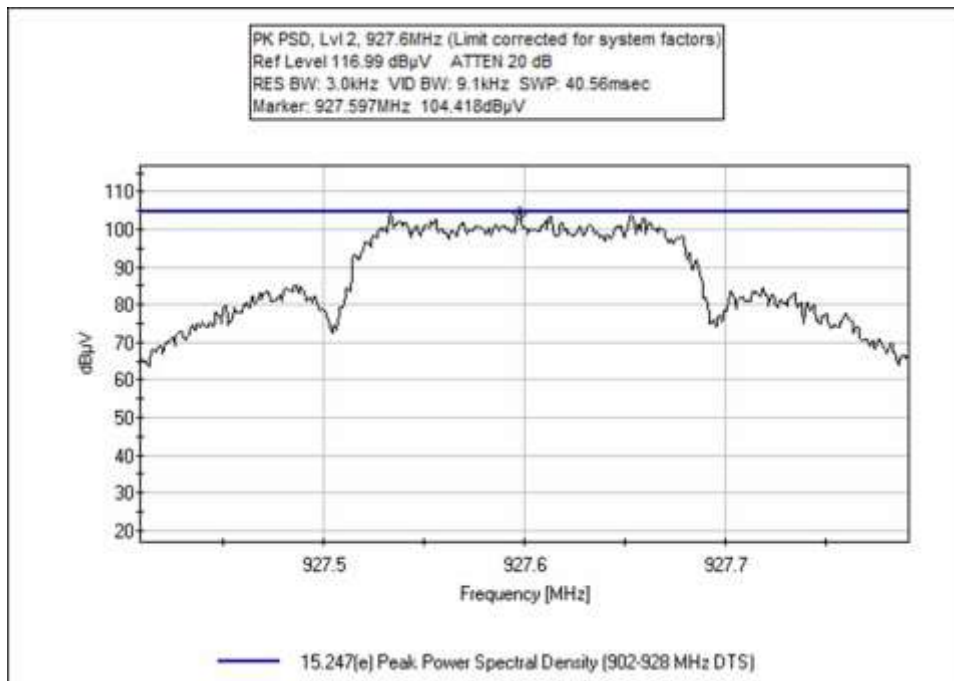
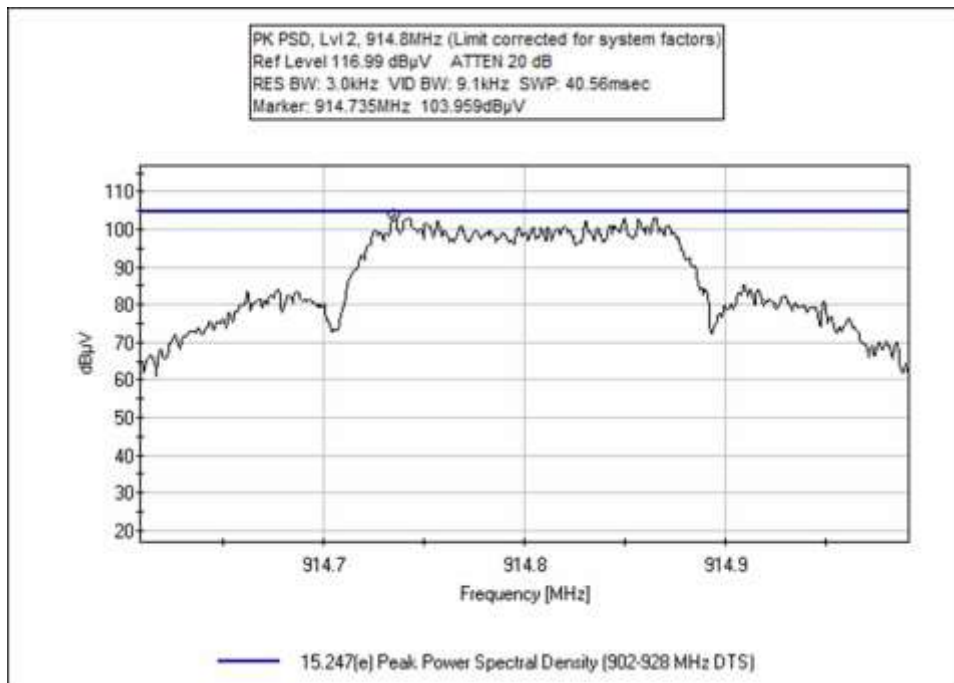
15.247 (f) Power Spectral Density

Power Spectral Density

Test Data Summary - RF Conducted Measurement				
Measurement Method: PKPSD				
Frequency (MHz)	Modulation	Measured (dBm/3kHz)	Limit (dBm/3kHz)	Results
902.4	GFSK	7.5	≤8	Pass
914.8	GFSK	7.5	≤8	Pass
927.6	GFSK	7.9	≤8	Pass

Plot Data





Test Data

Test Location: CKC Laboratories • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 1-800-500-4EMC (4362)
 Customer: **Itron, Inc.**
 Specification: **15.247(e) Peak Power Spectral Density (902-928 MHz DTS)**
 Work Order #: **107749** Date: 2/27/2023
 Test Type: **Conducted Emissions** Time: 13:19:36
 Tested By: Matt Harrison Sequence#: 6
 Software: EMITest 5.03.20 6VDC

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

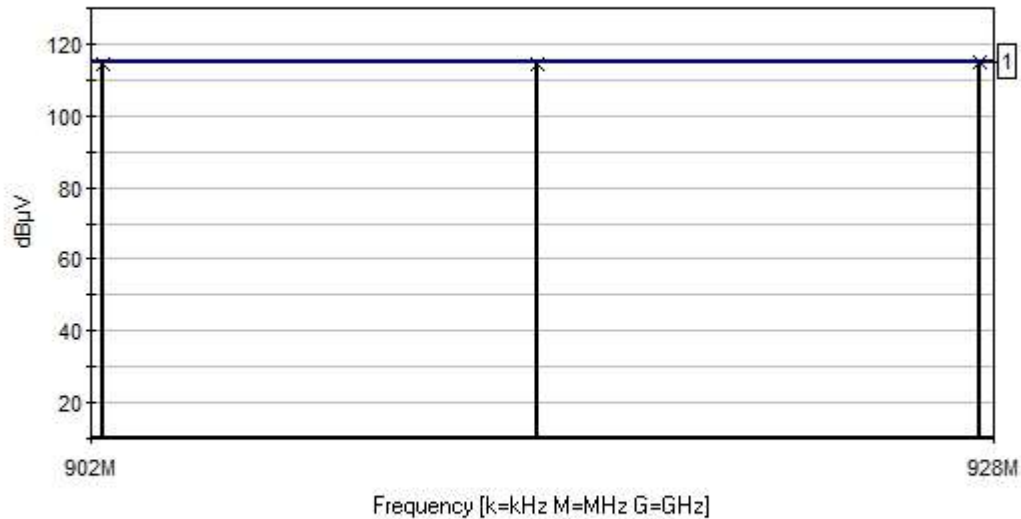
Test Conditions / Notes:

Environmental Conditions:
 Temperature: 18.6°C
 Pressure: 100.9 kPa
 Humidity: 40%

 Frequency Range: Fundamental
 Frequency tested: 902.4, 914.8, 927.6
 Firmware power setting: Level 2
 EUT Firmware:
 Protocol /MCS/Modulation: GFSK 150kbps

 Test Method: ANSI C63.10: 2013
 Test Mode: Transmitting
 Test Setup: EUT is setup for conducted measurement. It is directly connected to the Analyzer via cable and attenuator
 Modifications Added: None

Ittron, Inc. WO#: 107749 Sequence#: 6 Date: 2/27/2023
 15.247(e) Peak Power Spectral Density (902-928 MHz DTS) Test Lead: 6VDC RF Port



— Readings
 — 1 - 15.247(e) Peak Power Spectral Density (902-928 MHz DTS)
 × Peak Readings
 Software Version: 5.03.20

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP05503	Attenuator	766-10	6/8/2021	6/8/2023
T2	ANP06007	Cable	Heliac	3/14/2022	3/14/2024
	AN03807	Spectrum Analyzer	E4440A	12/14/2022	12/14/2024

Measurement Data:

Reading listed by margin.

Test Lead: RF Port

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	927.597M	104.4	+10.1	+0.4			+0.0	114.9	115.0	-0.1	RF Po
2	914.735M	104.0	+10.1	+0.4			+0.0	114.5	115.0	-0.5	RF Po
3	902.345M	104.1	+10.1	+0.3			+0.0	114.5	115.0	-0.5	RF Po

Test Setup Photo(s)



Appendix A: Manufacturer Declaration

The following model have been tested by CKC Laboratories:

Device: Intelis Gas 250

Model: MTR-7200-002

The Intelis Gas 250, Model: MTR-7200-002 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 250	Itron, Inc.	MTR-7200-003
Intelis Gas 250	Itron, Inc.	MTR-7200-004
Intelis Gas 250	Itron, Inc.	MTR-7200-005
Intelis Gas 250	Itron, Inc.	MTR-7200-006
Intelis Gas 250	Itron, Inc.	MTR-7200-007
Intelis Gas 250	Itron, Inc.	MTR-7200-102
Intelis Gas 250	Itron, Inc.	MTR-7200-103
Intelis Gas 250	Itron, Inc.	MTR-7200-104
Intelis Gas 250	Itron, Inc.	MTR-7200-105
Intelis Gas 250	Itron, Inc.	MTR-7200-106
Intelis Gas 250	Itron, Inc.	MTR-7200-107

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 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. 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	(dBµV)
+	Antenna Factor	(dB/m)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	(dBµV/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.