Itron, Inc.

TEST REPORT FOR

500GB
Models: ERG-7000-005*
***(See Appendix A for Manufacturer's Declaration)**

Tested to The Following Standards:

FCC Part 15 Subpart C Section(s)

15.247
(HYBRID 902-928MHz)

Report No.: 107737-6

Date of issue: March 30, 2023

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.

Test Certificate # 803.01

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ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

Itron, Inc.
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Representative: Dan Bomsta
Customer Reference Number: 271751

REPORT PREPARED BY:

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CKC Laboratories, Inc.
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Mariposa, CA 95338

Project Number: 107737

DATE OF EQUIPMENT RECEIPT: February 7, 2023
DATE(S) OF TESTING: February 7, 13, and 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.
Canyon Park
22116 23rd Drive S.E., Suite A
Bothell, WA 98021

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.03.20

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 = The manufacturer declares the EUT is Battery powered.
NP = CKC Laboratories 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
500GB	Itron, Inc.	ERG-7000-005	112322-500GB-**cond**

Support Equipment:

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

Configuration 2

Equipment Under Test:

Device	Manufacturer	Model #	S/N
500GB	Itron, Inc.	ERG-7000-005	112322-500GB-**rad**

Support Equipment:

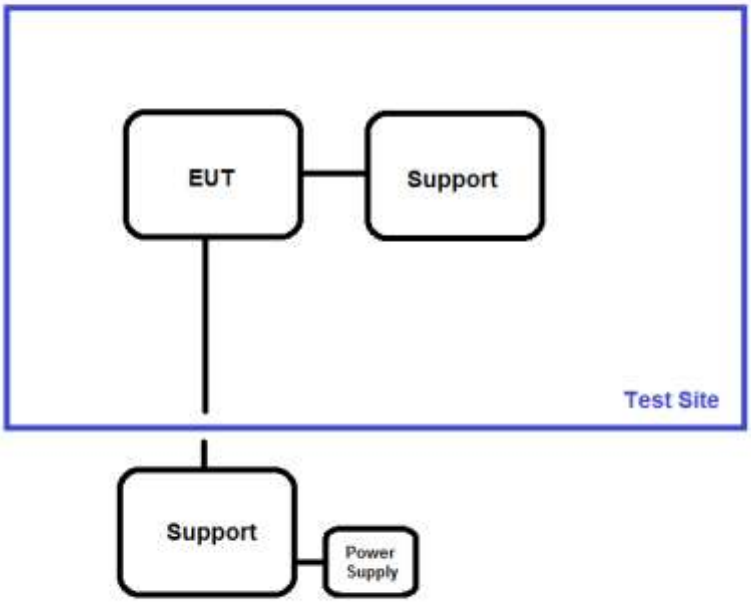
Device	Manufacturer	Model #	S/N
Laptop	HP	14-dq1033cl	5CD941CCWS
Laptop PSU	HP	TPN-CA14	WHGRE0AVKCR55T
Adapter Board	Itron, Inc.	None	None

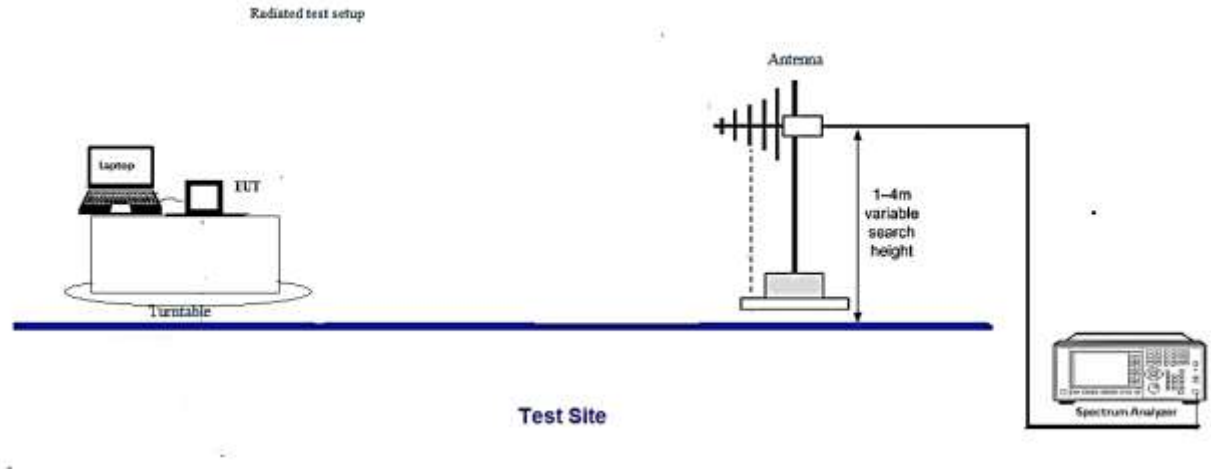
General Product Information:

Product Information	Manufacturer-Provided Details
Equipment Type:	Stand-Alone Equipment
Type of Wideband System:	Hybrid
Operating Frequency Range:	902.4-927.6
Number of Hopping Channels:	64
Modulation Type(s):	The manufacturer declares the receiver input bandwidth matches the transmit channel bandwidth and shifts frequencies in synchronization with the transmitter.
Modulation Type(s):	GFSK 150kbps
Maximum Duty Cycle:	Tested at 100%
Number of TX Chains:	1
Antenna Type(s) and Gain:	Meander / 2.7 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 App Version: 8.0.2.0, CSL Version 9.1.5.0 Hardware Rev. 5
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





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):	2/13/2023
Configuration:	1		
Test Setup:	EUT is setup for conducted measurements. It is directly connected to the analyzer via cable and attenuator.		

Environmental Conditions			
Temperature (ºC)	20	Relative Humidity (%):	42

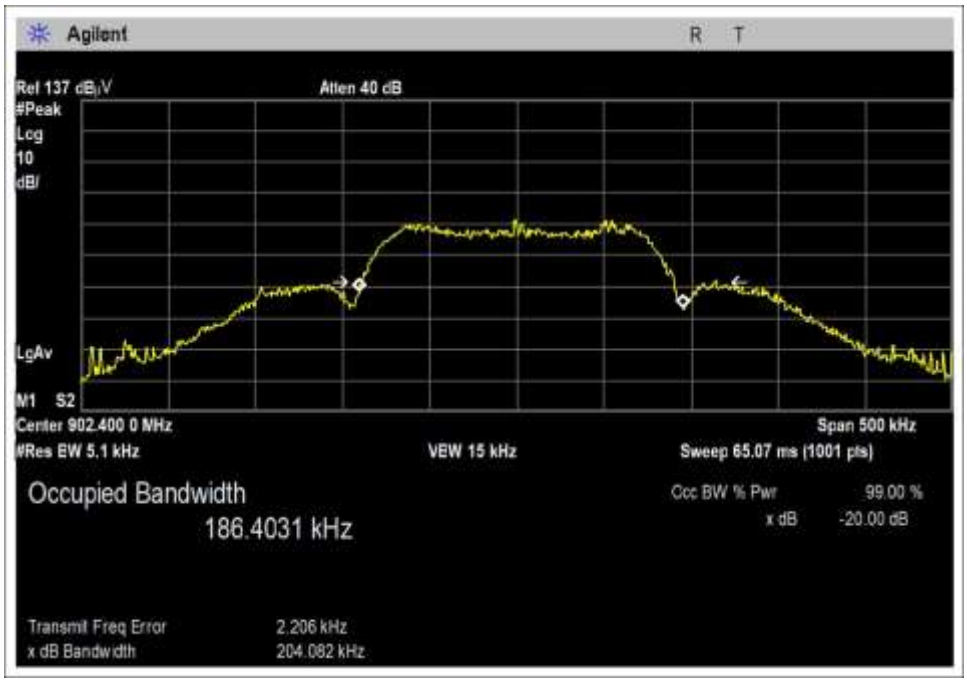
Test Equipment					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
P05503	Attenuator	Narda	766-10	6/8/2021	6/8/2023
P05353	Cable	Andrews	Heliax	2/23/2022	2/23/2024
03807	Spectrum Analyzer	Agilent	E4440A	10/6/2022	10/6/2024

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

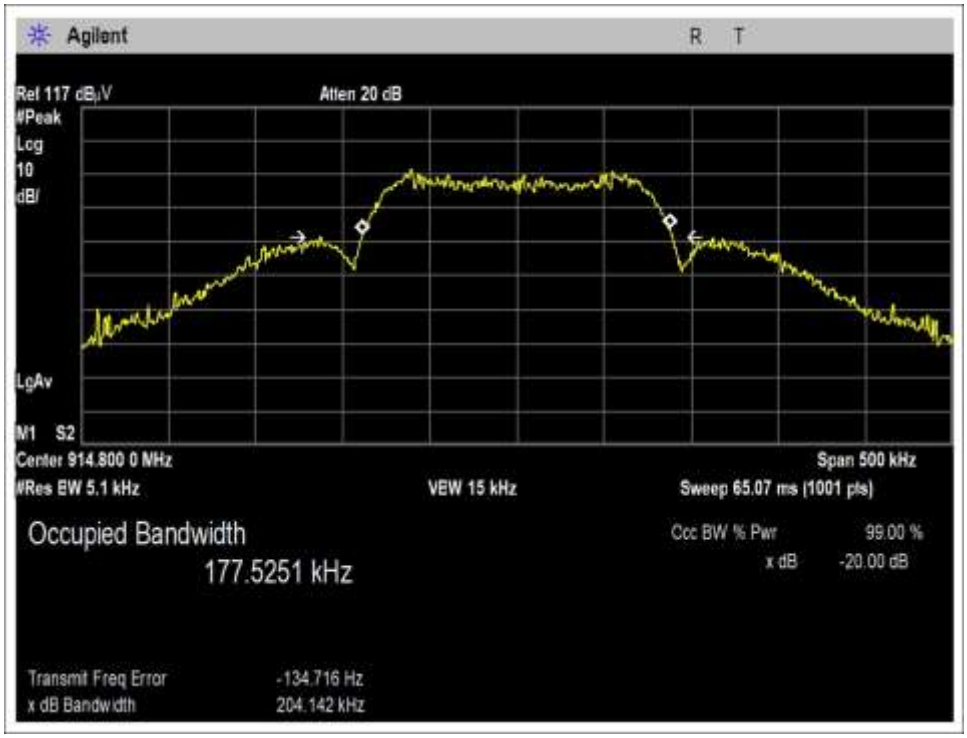
Test Data Summary					
Frequency (MHz)	Antenna Port	Modulation	Measured (kHz)	Limit (kHz)	Results
902.4	1	GFSK	204.1	*See Note	N/A
914.8	1	GFSK	204.1		
927.6	1	GFSK	179.2		

*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.

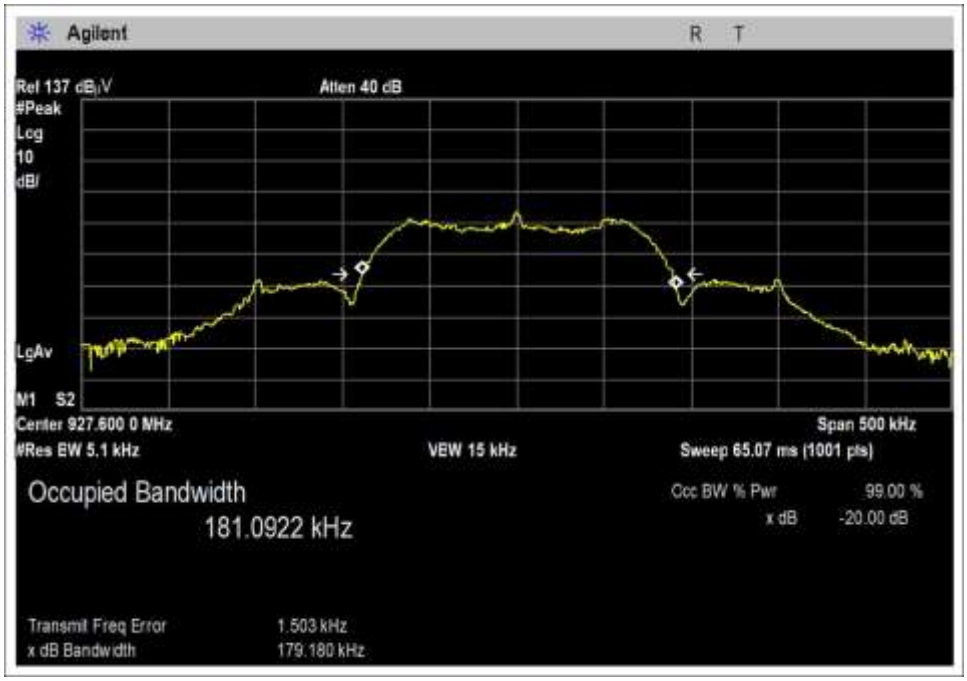
Plot(s)



Low Channel



Middle Channel

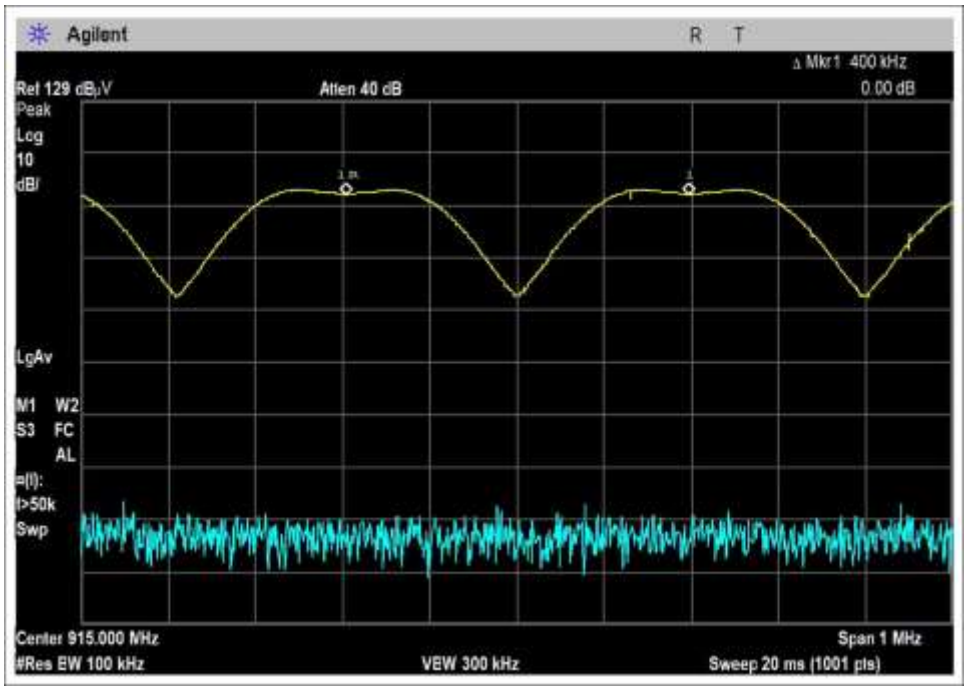


High Channel

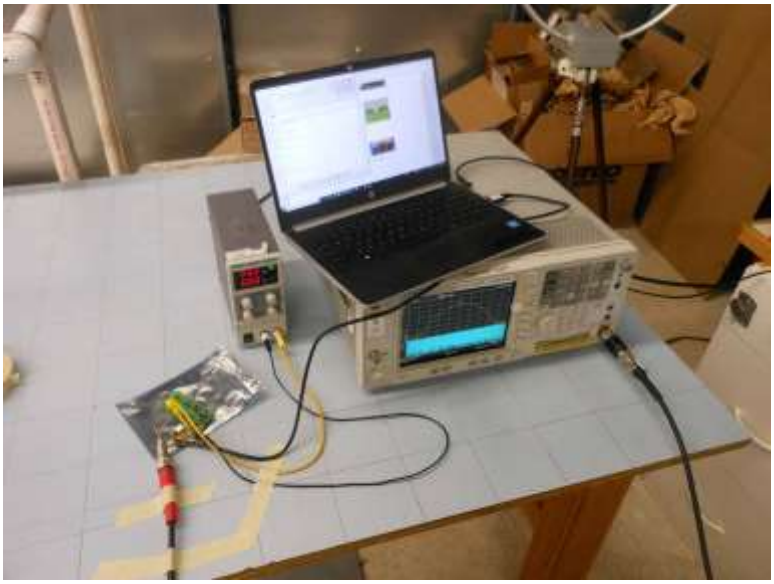
15.247(a)(1) Carrier Separation

Test Data Summary				
Limit applied: 20dB bandwidth of the hopping channel.				
Antenna Port	**Operational Mode**	**Measured (kHz)**	**Limit (kHz)**	**Results**
1	Hopping	400	>204.1	Pass

Plot(s)



Test Setup Photo(s)



15.247(b)(2) Output Power

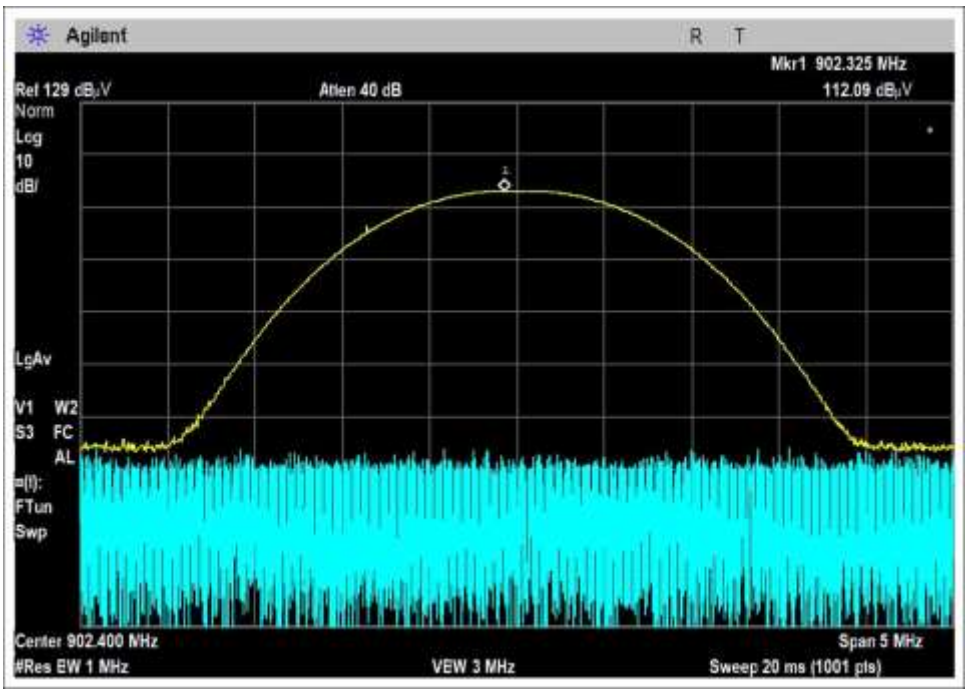
Test Data Summary - RF Conducted Measurement					
$Limit = 30dBm\ Conducted/36dBm\ EIRP$					
Frequency (MHz)	**Modulation**	**Ant. Type / Gain (dBi)**	**Measured (dBm)**	**Limit (dBm)**	**Results**
902.4	GFSK	Integral / 2.7dBi	15.4	≤30	Pass
914.8	GFSK	Integral / 2.7dBi	15.3	≤30	Pass
927.6	GFSK	Integral / 2.7dBi	15.1	≤30	Pass

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

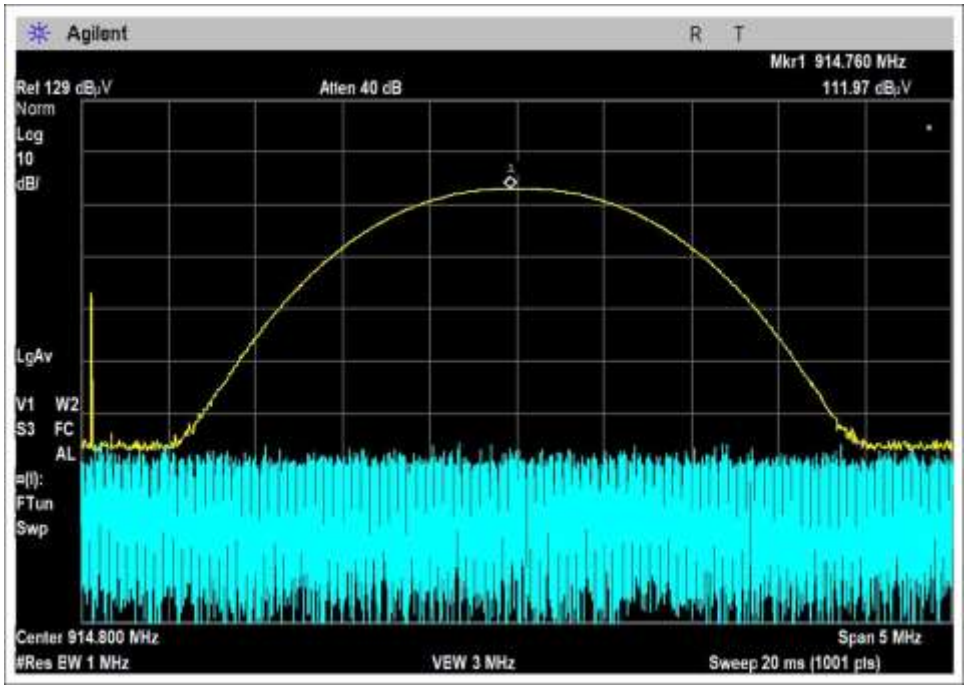
The limit is calculated according to a maximum of 1W (30 dBm) conducted power with a maximum of 6dBi gain antenna in accordance with 15.247(b)

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

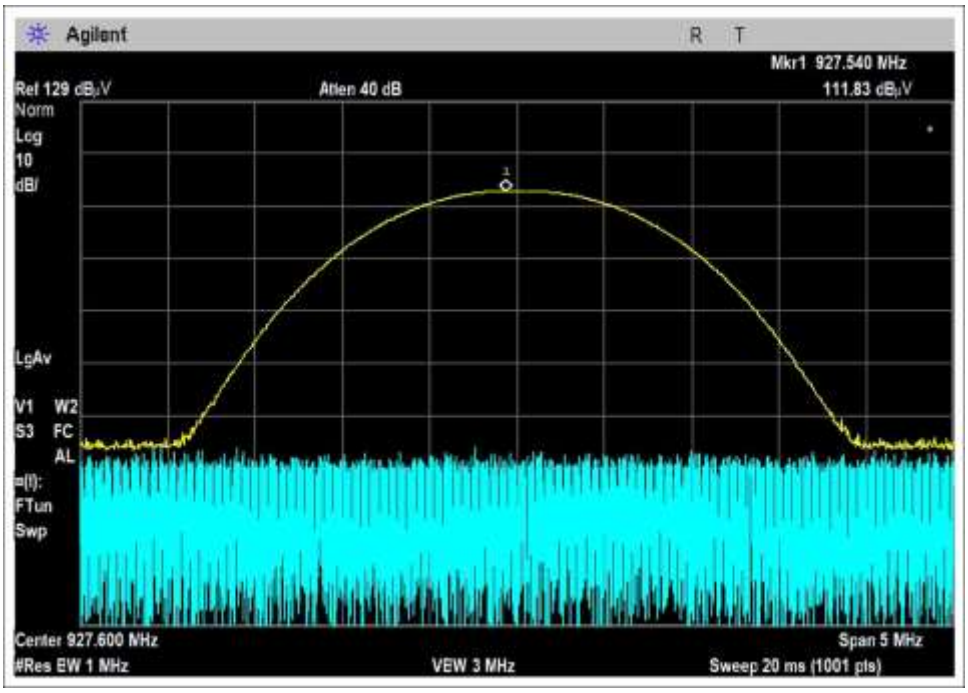
Plots



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 #:	**107737**	Date:	2/13/2023
Test Type:	**Conducted Emissions**	Time:	09:53:25
Tested By:	Matt Harrison	Sequence#:	21
Software:	EMITest 5.03.20		6VDC

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

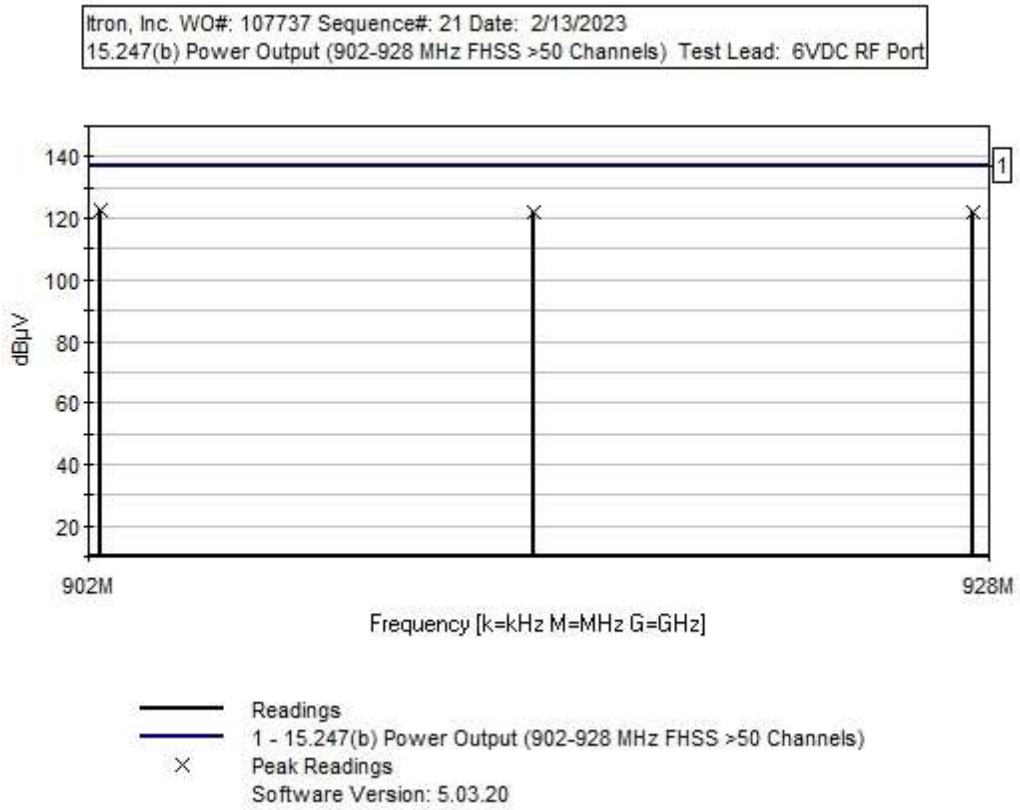
Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Test Environment 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



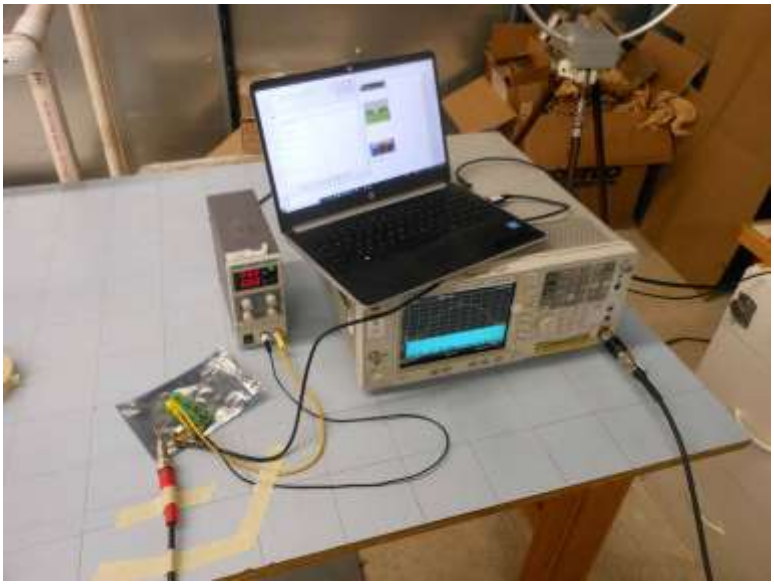
Test Equipment:

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

Measurement Data: Reading listed by frequency. 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	902.325M	112.1	+10.1	+0.2			+0.0	122.4	137.0	-14.6	RF Po
2	914.760M	112.0	+10.1	+0.2			+0.0	122.3	137.0	-14.7	RF Po
3	927.540M	111.8	+10.1	+0.2			+0.0	122.1	137.0	-14.9	RF Po

Test Setup Photo(s)



15.247(d) RF Conducted Emissions

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) Conducted Spurious Emissions**		
Work Order #:	**107737**	Date:	2/13/2023
Test Type:	**Conducted Emissions**	Time:	12:14:48
Tested By:	Matt Harrison	Sequence#:	23
Software:	EMITest 5.03.20		6VDC

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

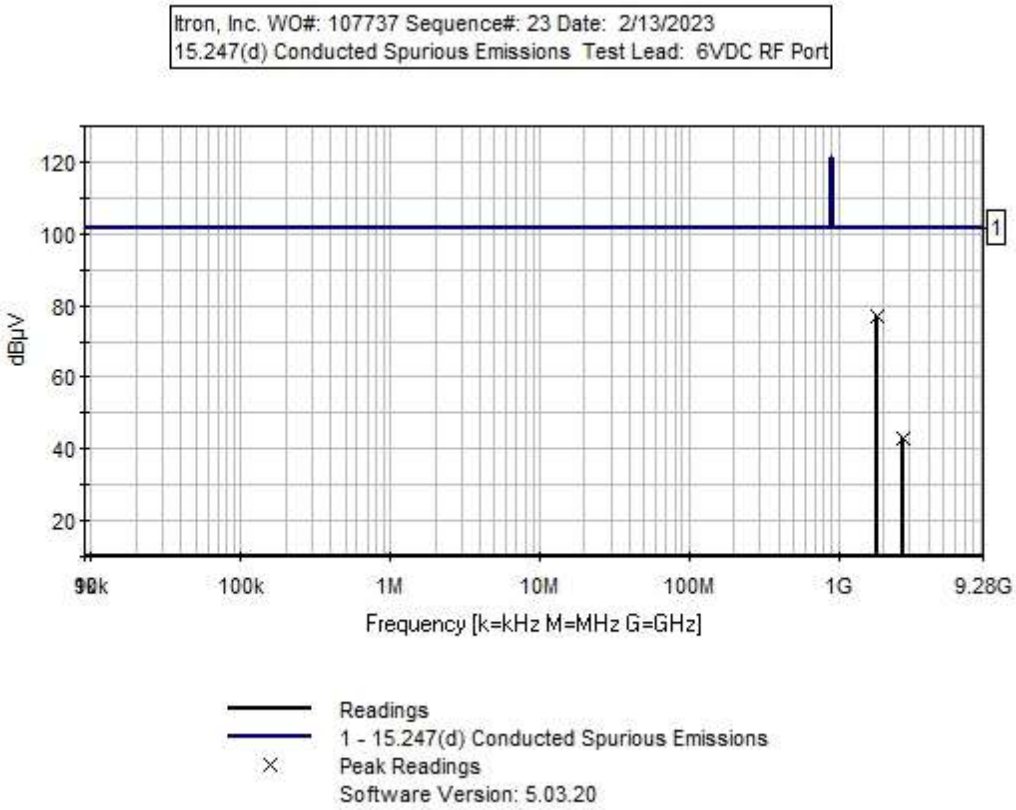
Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

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

Frequency Range: 30M-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 for conducted measurement. It is directly connected to the Analyzer via cable and attenuator
Modifications Added: None



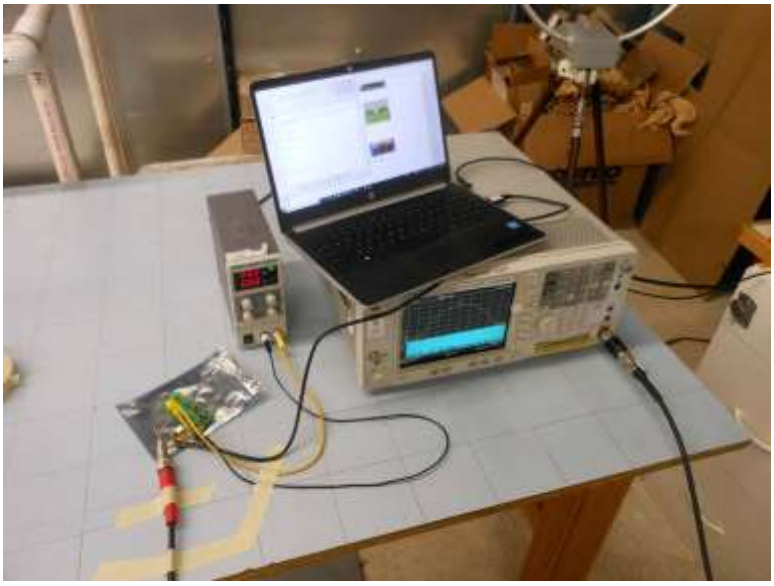
Test Equipment:

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

Measurement Data: Reading listed by frequency. 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	1829.592M	66.3	+10.2	+0.3			+0.0	76.8	101.3	-24.5	RF Po
2	2744.554M	32.5	+10.2	+0.4			+0.0	43.1	101.3	-58.2	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 #:	**107737**	Date:	2/18/2023
Test Type:	**Radiated Scan**	Time:	09:54:37
Tested By:	Matt Harrison	Sequence#:	31
Software:	EMITest 5.03.20		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 2			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 2			

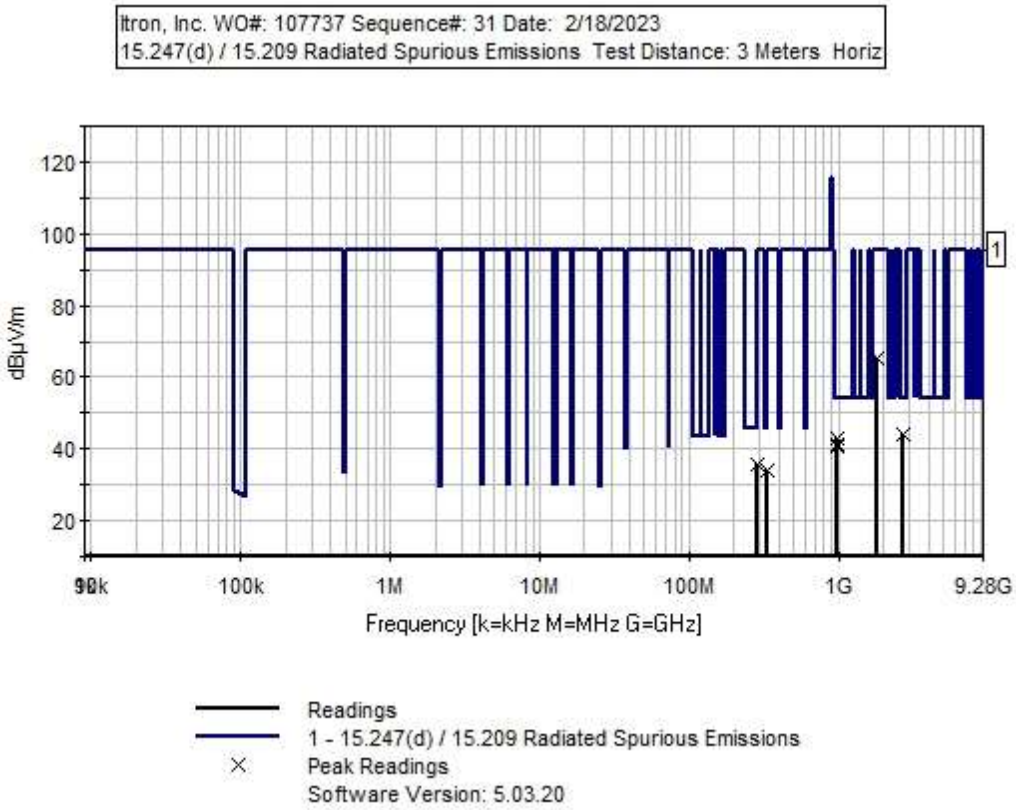
Test Conditions / Notes:

Test Environment 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.



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	Heliax	1/17/2022	1/17/2024
	AN02872	Spectrum Analyzer	E4440A	11/29/2021	11/29/2023
T4	ANP05333	Cable	Heliax	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 order taken. Test Distance: 3 Meters

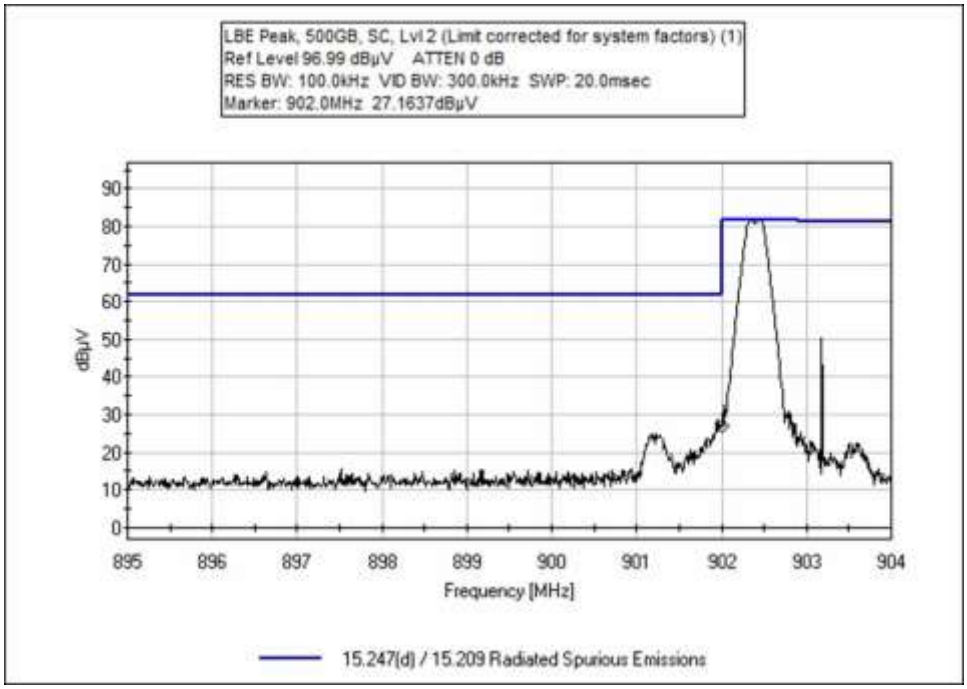
#	Freq	Rdng	T1 T5 T9	T2 T6	T3 T7	T4 T8	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	290.490M	42.4	+18.0 -27.0 +0.0	+1.2 +0.0	+0.2 +0.0	+0.9 +0.0	+0.0	35.7	95.4	-59.7	Horiz
2	336.090M	38.7	+19.8 -27.1 +0.0	+1.2 +0.0	+0.2 +0.0	+1.0 +0.0	+0.0	33.8	95.4	-61.6	Horiz
3	980.320M	33.9	+30.2 -27.2 +0.0	+2.5 +0.0	+0.3 +0.0	+1.6 +0.0	+0.0	41.3	54.0	-12.7	Horiz
4	970.540M	35.1	+30.4 -27.2 +0.0	+2.5 +0.0	+0.3 +0.0	+1.6 +0.0	+0.0	42.7	54.0	-11.3	Horiz
5	992.800M	33.6	+29.9 -27.1 +0.0	+2.5 +0.0	+0.3 +0.0	+1.6 +0.0	+0.0	40.8	54.0	-13.2	Horiz
6	1829.680M	68.7	+0.0 +0.0 +0.6	+0.0 -34.7	+0.4 +27.5	+2.3 +0.4	+0.0	65.2	95.4	-30.2	Horiz
7	2744.475M	44.5	+0.0 +0.0 +0.3	+0.0 -34.1	+0.5 +29.3	+2.8 +0.5	+0.0	43.8	54.0	-10.2	Vert

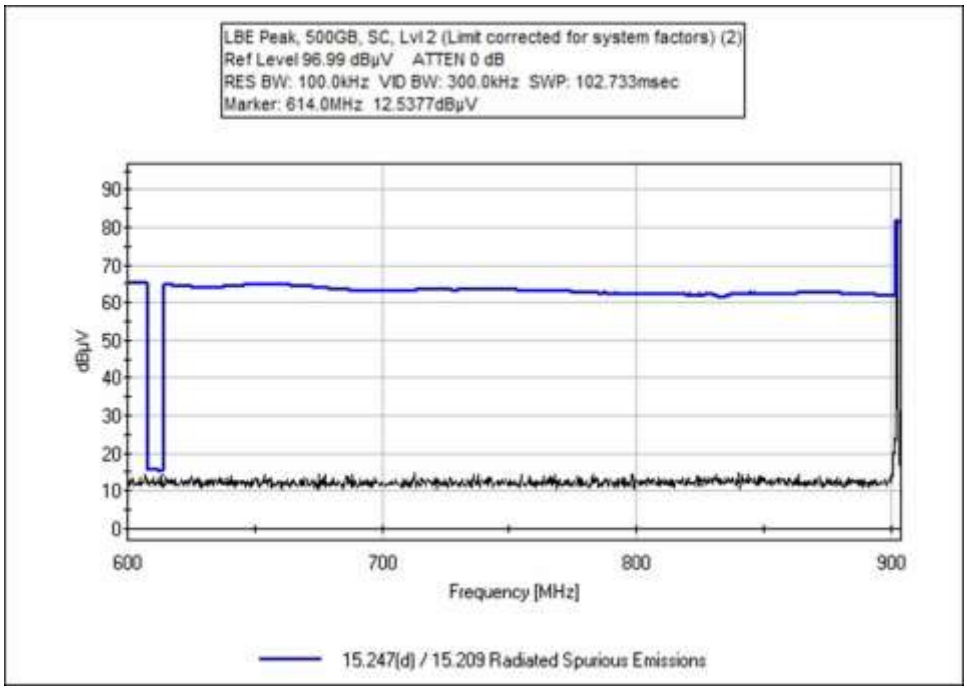
Band Edge

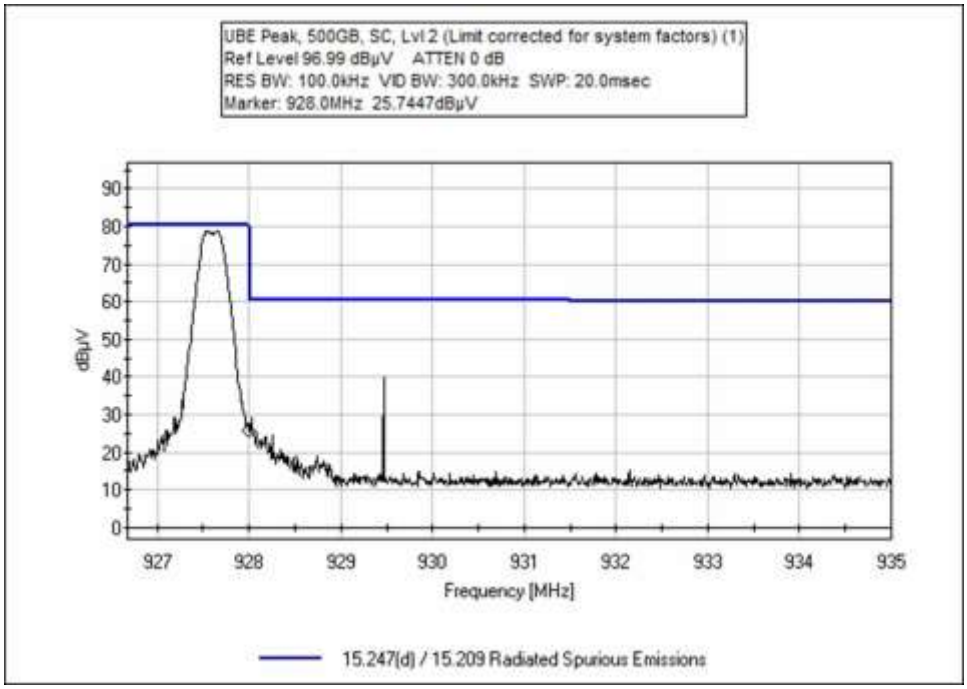
Band Edge Summary					
Operating Mode: Single Channel (Low and High)					
Frequency (MHz)	**Modulation**	**Ant. Type**	**Field Strength (dBuV/m @3m)**	**Limit (dBuV/m @3m)**	**Results**
614	GFSK	Meander	39.9	<46	Pass
902	GFSK	Meander	60.9	<95.4	Pass
928	GFSK	Meander	60.6	<95.4	Pass
960	GFSK	Meander	47.4	<54	Pass

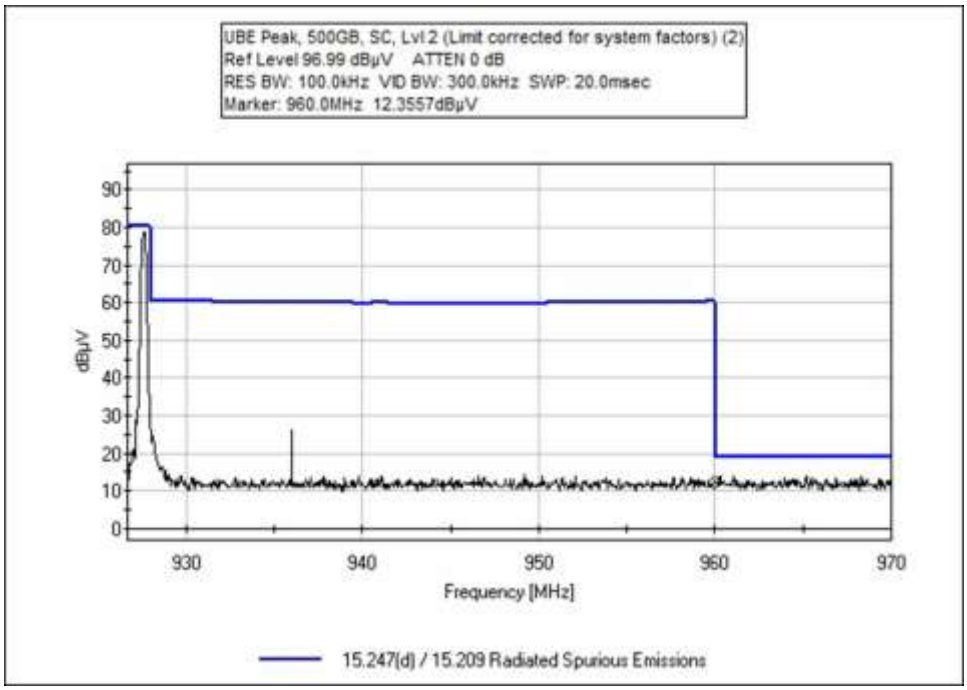
Band Edge Summary					
Operating Mode: Hopping					
Frequency (MHz)	**Modulation**	**Ant. Type**	**Field Strength (dBuV/m @3m)**	**Limit (dBuV/m @3m)**	**Results**
614	GFSK	Meander	39.9	<46	Pass
902	GFSK	Meander	64.7	<95.4	Pass
928	GFSK	Meander	58.9	<95.4	Pass
960	GFSK	Meander	47.5	<54	Pass

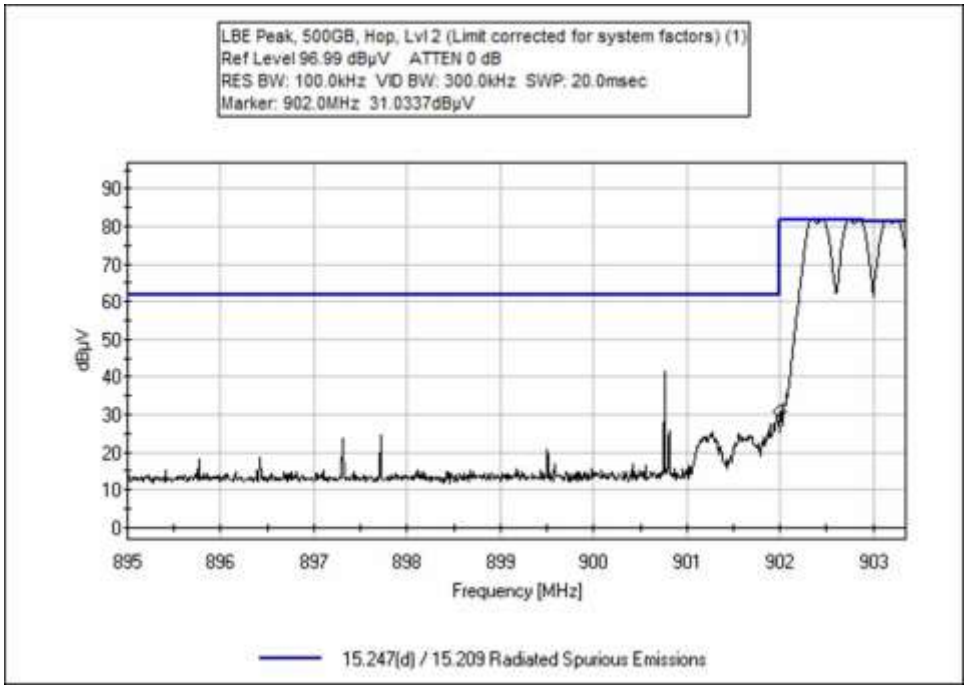
Band Edge Plots

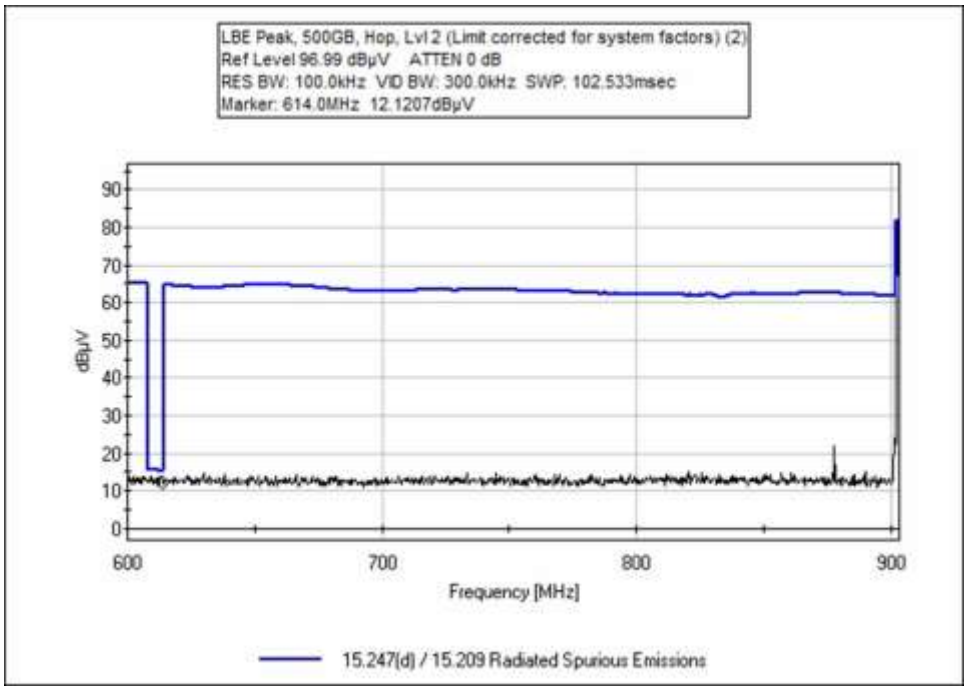


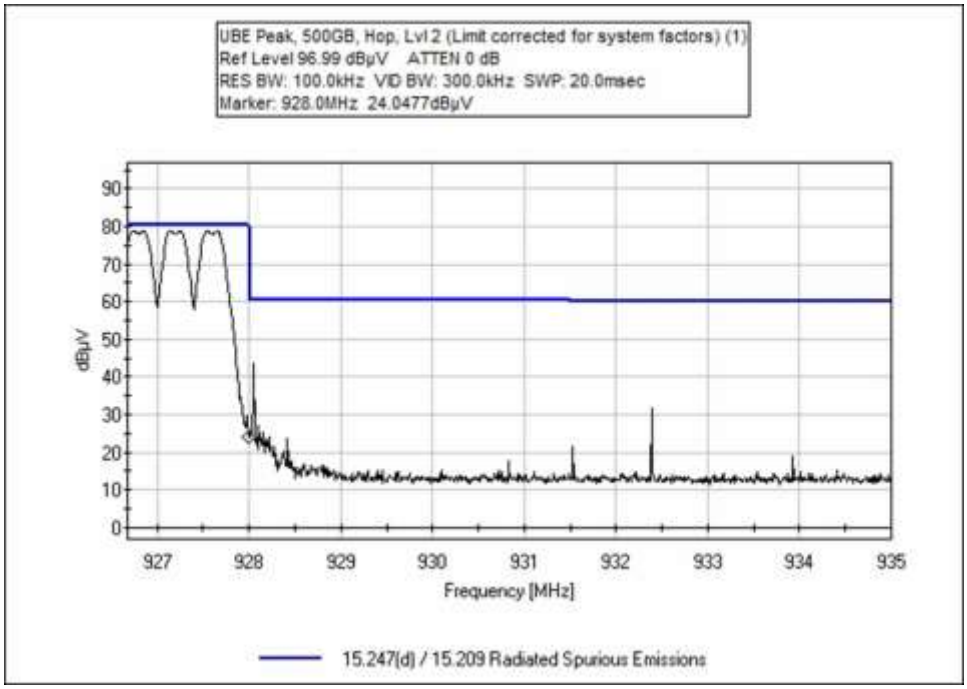


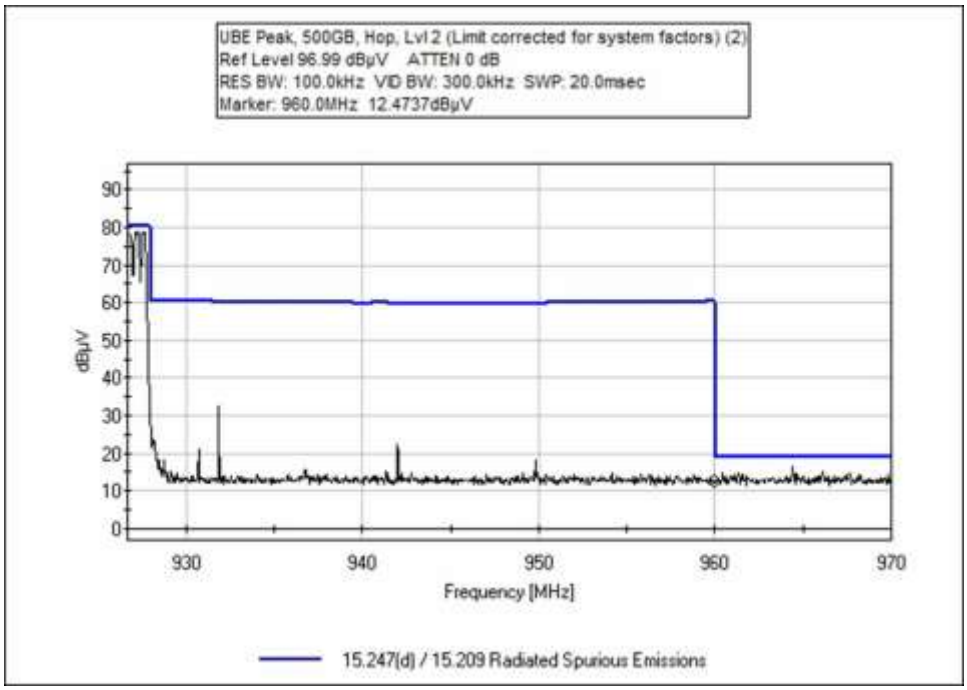

UBE Peak, 500GB, SC, Lvl 2 (Limit corrected for system factors) (1)
Ref Level 96.99 dBµV ATTEN 0 dB
RES BW: 100.0kHz VID BW: 300.0kHz SWP: 20.0msec
Marker: 928.0MHz 25.7447dBµV
dBµV
90
80
70
60
50
40
30
20
10
0
927
928
929
930
931
932
933
934
935
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions


UBE Peak, 500GB, SC, Lvl 2 (Limit corrected for system factors) (2)
Ref Level 96.99 dBµV ATTEN 0 dB
RES BW: 100.0kHz VID BW: 300.0kHz SWP: 20.0msec
Marker: 960.0MHz 12.3557dBµV
dBµV
90
80
70
60
50
40
30
20
10
0
930
940
950
960
970
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions


LBE Peak, 500GB, Hop, Lvl 2 (Limit corrected for system factors) (1)
Ref Level 96.99 dBµV ATTEN 0 dB
RES BW: 100.0kHz VID BW: 300.0kHz SWP: 20.0msec
Marker: 902.0MHz 31.0337dBµV
dBµV
90
80
70
60
50
40
30
20
10
0
895
896
897
898
899
900
901
902
903
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions


LBE Peak, 500GB, Hop, Lvl 2 (Limit corrected for system factors) (2)
Ref Level 96.99 dBµV ATTEN 0 dB
RES BW: 100.0kHz VID BW: 300.0kHz SWP: 102.533msec
Marker: 614.0MHz 12.1207dBµV
dBµV
90
80
70
60
50
40
30
20
10
0
600
700
800
900
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions


UBE Peak, 500GB, Hop, Lvl 2 (Limit corrected for system factors) (1)
Ref Level 96.99 dBµV ATTEN 0 dB
RES BW: 100.0kHz VID BW: 300.0kHz SWP: 20.0msec
Marker: 928.0MHz 24.0477dBµV
dBµV
90
80
70
60
50
40
30
20
10
0
927
928
929
930
931
932
933
934
935
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions


UBE Peak, 500GB, Hop, Lvl 2 (Limit corrected for system factors) (2)
Ref Level 96.99 dBµV ATTEN 0 dB
RES BW: 100.0kHz VID BW: 300.0kHz SWP: 20.0msec
Marker: 960.0MHz 12.4737dBµV
dBµV
90
80
70
60
50
40
30
20
10
0
930
940
950
960
970
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

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 #:	**107737**	Date:	2/9/2023
Test Type:	**Radiated Scan**	Time:	07:31:21
Tested By:	Matt Harrison	Sequence#:	10
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:

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

Frequency Range: 600-970 MHz
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	Heliax	1/17/2022	1/17/2024
T4	AN02872	Spectrum Analyzer	E4440A	11/29/2021	11/29/2023
T5	ANP05333	Cable	Heliax	3/14/2022	3/14/2024

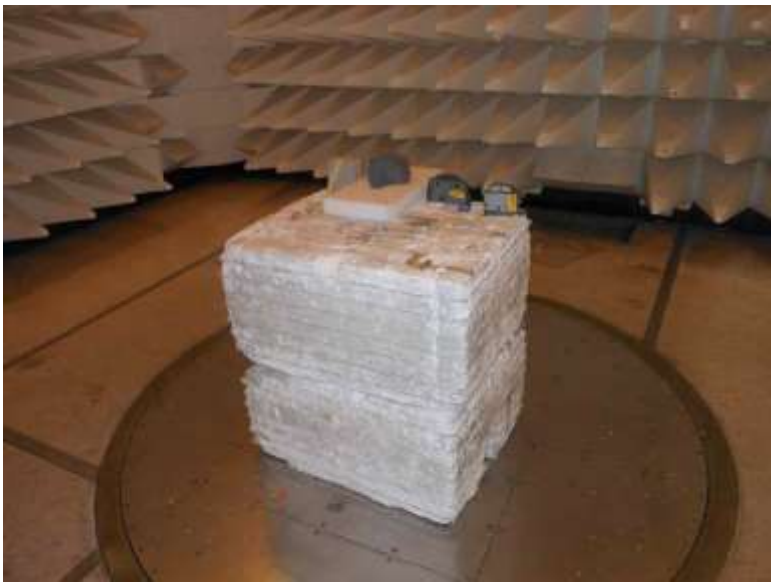
Measurement Data: Reading listed by order taken. Test Distance: 3 Meters

#	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	902.000M	27.2	+29.6 +1.5	+2.3	+0.3	+0.0	+0.0	60.9	95.4 SC	-34.5	Vert
2	614.000M	12.5	+27.2 +1.3	+1.9	+0.3	+0.0	+0.0	43.2	46.0 SC	-2.8	Vert
3	614.000M QP	9.2	+27.2 +1.3	+1.9	+0.3	+0.0	+0.0	39.9	46.0 SC	-6.1	Vert
4	902.000M	31.0	+29.6 +1.5	+2.3	+0.3	+0.0	+0.0	64.7	95.4 Hop	-30.7	Vert
5	614.000M	12.1	+27.2 +1.3	+1.9	+0.3	+0.0	+0.0	42.8	46.0 Hop	-3.2	Vert
6	614.000M QP	9.2	+27.2 +1.3	+1.9	+0.3	+0.0	+0.0	39.9	46.0 Hop	-6.1	Vert
7	928.000M	24.0	+30.6 +1.6	+2.4	+0.3	+0.0	+0.0	58.9	95.4 Hop	-36.5	Vert
8	960.000M	12.5	+30.7 +1.6	+2.4	+0.3	+0.0	+0.0	47.5	54.0 Hop	-6.5	Vert
9	928.000M	25.7	+30.6 +1.6	+2.4	+0.3	+0.0	+0.0	60.6	95.4 SC	-34.8	Vert
10	960.000M	12.4	+30.7 +1.6	+2.4	+0.3	+0.0	+0.0	47.4	54.0 SC	-6.6	Vert

Test Setup Photo(s)

Below 1GHz; 500GB

Below 1GHz, C4, View 1



Below 1GHz, C4, View 2

Above 1GHz, C4, View 1

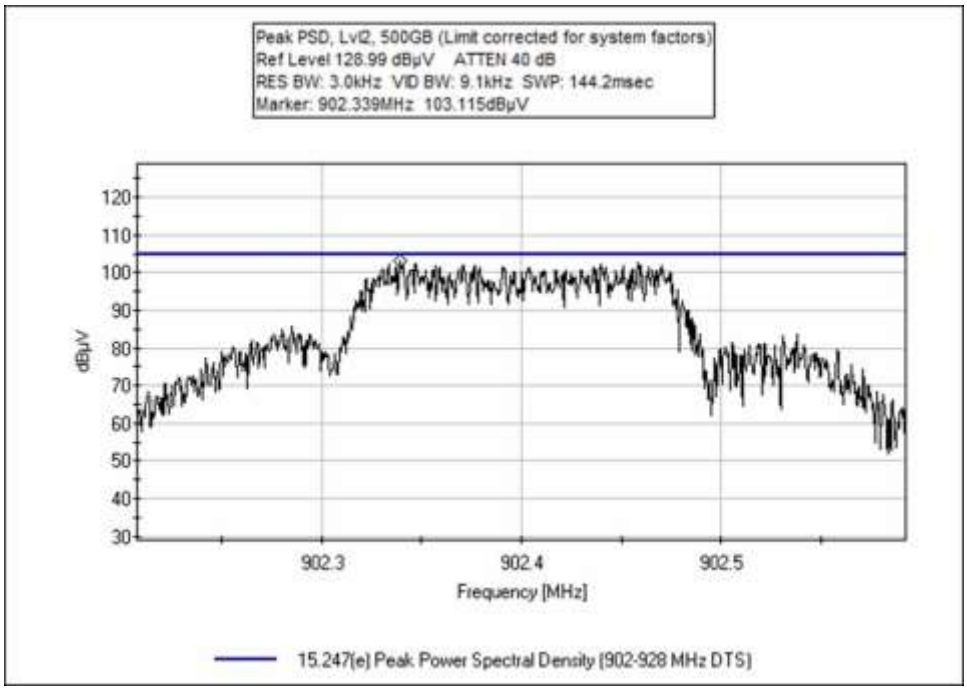
Above 1GHz, C4, View 2

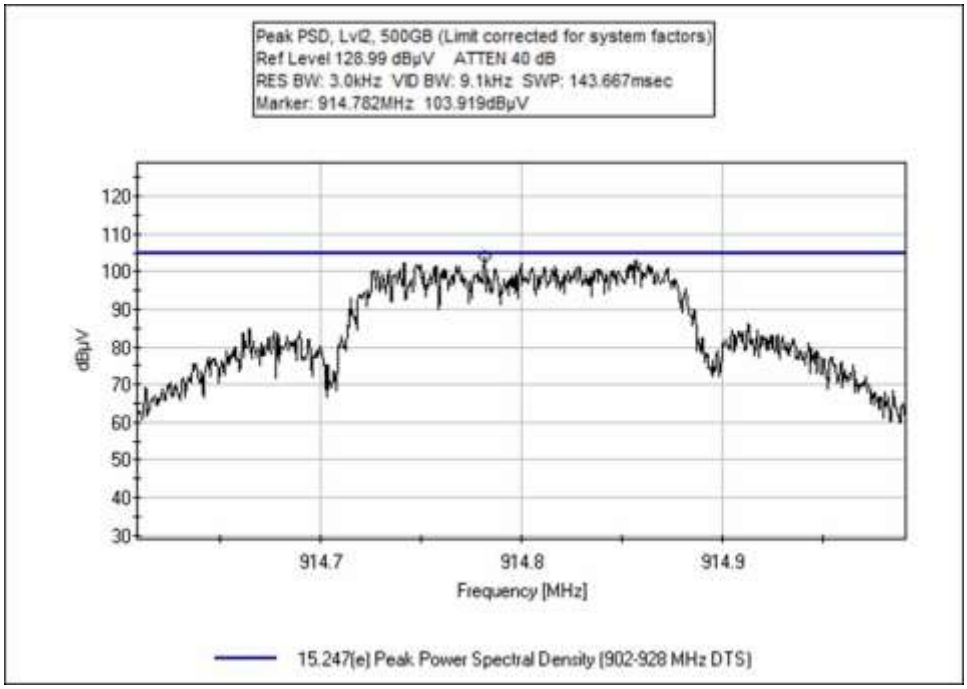
15.247 (f) Hybrid Systems Power Spectral Density

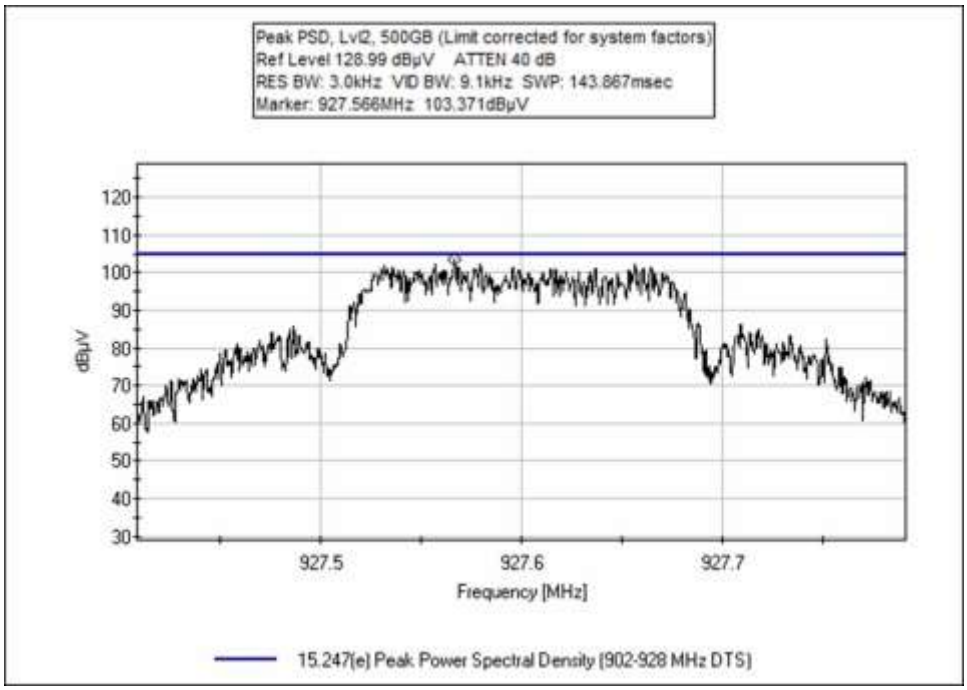
Power Spectral Density

Test Data Summary - RF Conducted Measurement				
Measurement Method: PKPSD				
Frequency (MHz)	**Modulation**	**Measured (dBm/3kHz)**	**Limit (dBm/3kHz)**	**Results**
902.4	GFSK	6.4	≤8	Pass
914.8	GFSK	7.2	≤8	Pass
927.6	GFSK	6.7	≤8	Pass

Plot Data




Peak PSD, Lvl2, 500GB (Limit corrected for system factors)
Ref Level 128.99 dBµV ATTEN 40 dB
RES BW: 3.0kHz VID BW: 9.1kHz SWP: 143.667msec
Marker: 914.782MHz 103.919dBµV
dBµV
120
110
100
90
80
70
60
50
40
30
914.7
914.8
914.9
Frequency [MHz]
15.247(e) Peak Power Spectral Density (902-928 MHz DTS)


Peak PSD, Lvl2, 500GB (Limit corrected for system factors)
Ref Level 128.99 dBµV ATTEN 40 dB
RES BW: 3.0kHz VID BW: 9.1kHz SWP: 143.667msec
Marker: 927.566MHz 103.371dBµV
dBµV
120
110
100
90
80
70
60
50
40
30
927.5
927.6
927.7
Frequency [MHz]
15.247(e) Peak Power Spectral Density (902-928 MHz DTS)

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(e) Peak Power Spectral Density (902-928 MHz DTS)**		
Work Order #:	**107737**	Date:	2/13/2023
Test Type:	**Conducted Emissions**	Time:	11:59:35
Tested By:	Matt Harrison	Sequence#:	22
Software:	EMITest 5.03.20		6VDC

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

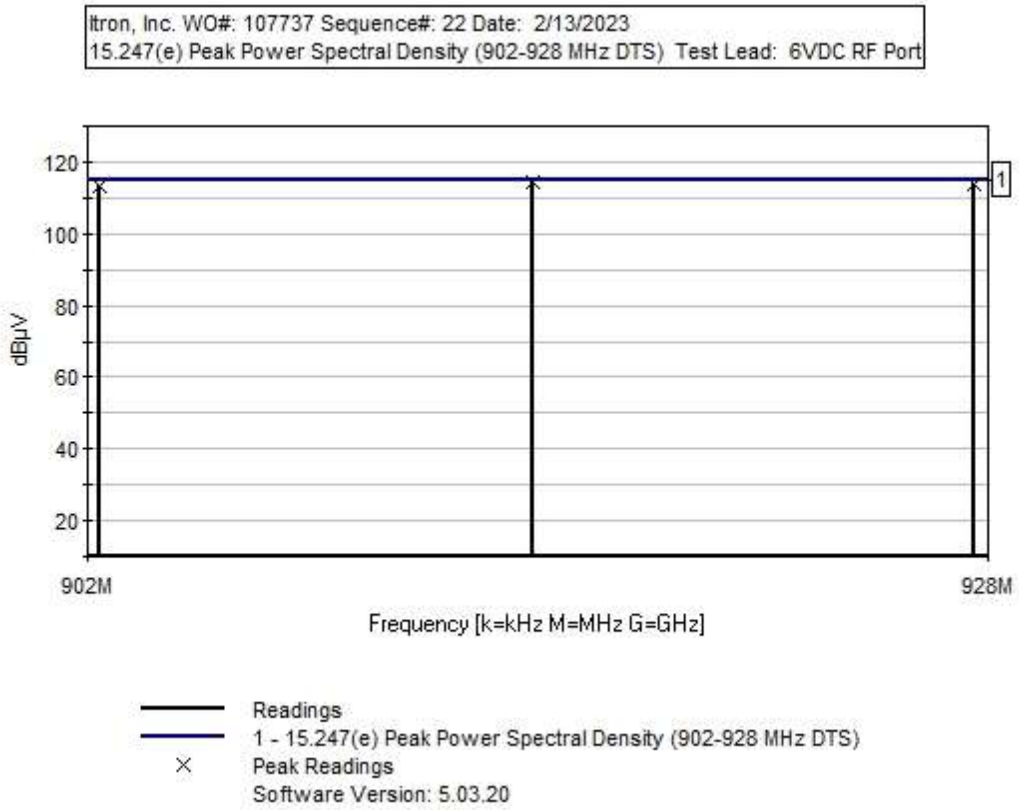
Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Test Environment 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



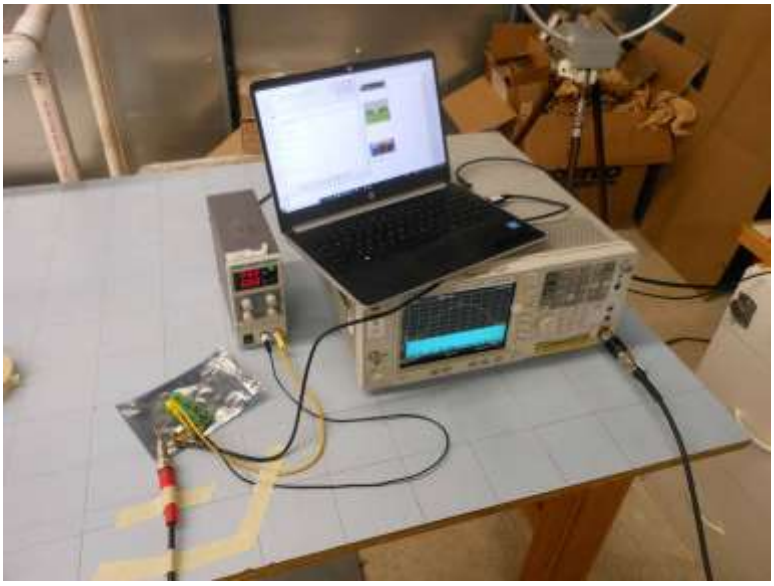
Test Equipment:

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

Measurement Data: Reading listed by frequency. 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	902.339M	103.1	+10.1	+0.2			+0.0	113.4	115.0	-1.6	RF Po
2	914.782M	103.9	+10.1	+0.2			+0.0	114.2	115.0	-0.8	RF Po
3	927.566M	103.4	+10.1	+0.2			+0.0	113.7	115.0	-1.3	RF Po

Test Setup Photo(s)



Appendix A: Manufacturer Declaration

The following Models has been tested by CKC Laboratories:
Model: ERG-7000-005

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 models.

Device	Manufacturer	Model #
500GB	Itron, Inc.	ERG-7000-006

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.