Itron, Inc.

TEST REPORT FOR

Field Configuration Tool
Model: FCT

Tested to The Following Standards:

FCC Part 15 Subpart C Section(s)

15.207 & 15.249

Report No.: 106617-2

Date of issue: April 13, 2022

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

TABLE OF CONTENTS

ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

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

Representative: Jay Holcomb
Customer Reference Number: 256343

REPORT PREPARED BY:

Darcy Thompson
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Project Number: 106617

DATE OF EQUIPMENT RECEIPT: March 16, 2022
DATE(S) OF TESTING: March 16 - 21, 2022

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 - 15.249

Test Procedure	Description	Modifications	Results
15.215(c)	Occupied Bandwidth	NA	Pass
15.249(a)	Field Strength of Fundamental	NA	Pass
15.249(a)	Radiated Emissions and Band Edge	NA	Pass
15.207	AC Conducted Emissions	NA	Pass

NA = Not Applicable

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 Tested:

Device	Manufacturer	Model #	S/N
Field Configuration Tool	Itron, Inc.	FCT	79BBGGSTHAC

Support Equipment:

Device	Manufacturer	Model #	S/N
Laptop	HP	14-dq1033cl	NA
AC Adapter (for Laptop)	HP	TPN-CA14	NA

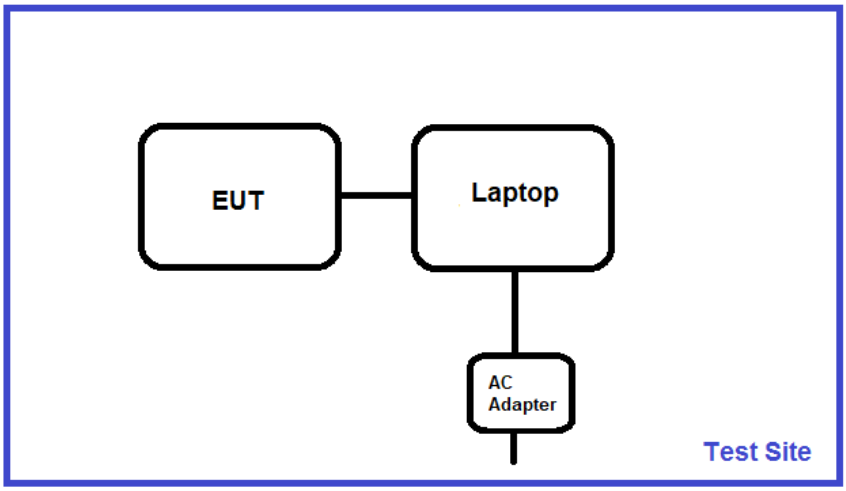
General Product Information:

Product Information	Manufacturer-Provided Details
Equipment Type:	Stand-Alone Equipment
Modulation Type(s):	FSK
Maximum Duty Cycle:	Assume 100% as worst case
Antenna Type(s) and Gain:	Trace, estimated 6.8dBi gain
Antenna Connection Type:	Integral
Nominal Input Voltage:	5V USB
Firmware / Software used for Test:	Firmware v8.35 CLITool v3.0.0.14
The validity of results is dependent on the stated product details, the accuracy of which the manufacturer assumes full responsibility.	

EUT and Accessory Photo(s)

Support Equipment Photo(s)

Block Diagram of Test Setup(s)



AC Power

FCC Part 15 Subpart C

15.215(c) Occupied Bandwidth (20dB BW)

Test Setup/Conditions			
Test Location:	Canyon Park Lab C3	Test Engineer:	M. Atkinson
Test Method:	ANSI C63.10 (2013)	Test Date(s):	3/21/2022
Configuration:	1		
Test Conditions:	EUT is on foam table. EUT is connected to support laptop. EUT is transmitting using test software on support tablet to control EUT.		

Environmental Conditions			
Temperature (ºC)	22	Relative Humidity (%):	42

Test Equipment

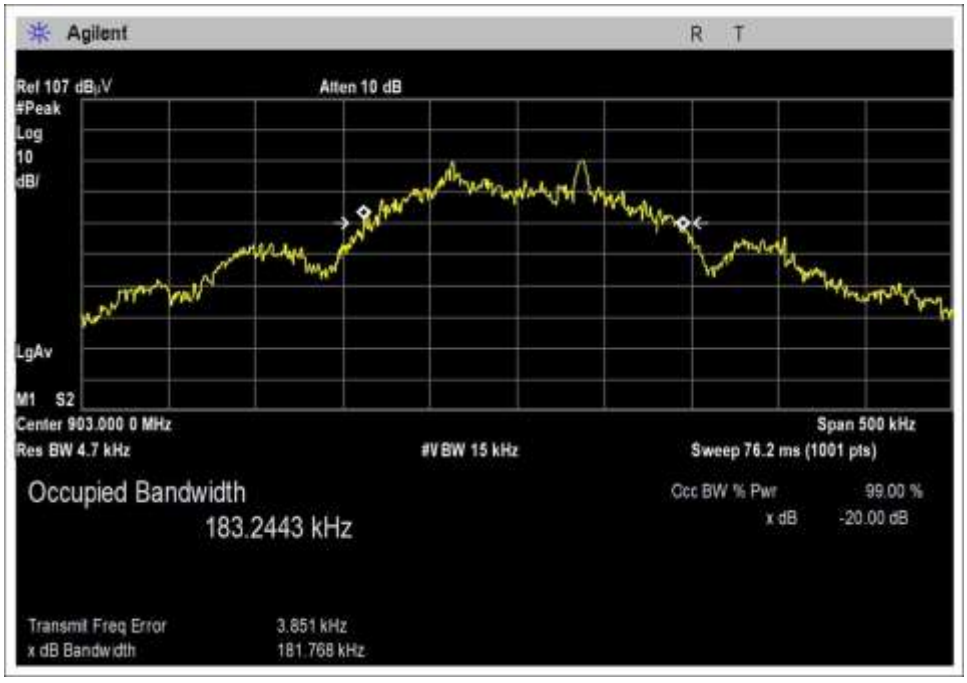
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
02673	Spectrum Analyzer	Agilent	E4446A	2/3/2021	2/3/2023
P06540	Cable	Andrews	Heliax	1/17/2022	1/17/2024
P06515	Cable	Andrews	Heliax	7/1/2020	7/1/2022
02307	Preamp	HP	8447D	1/6/2022	1/6/2024
P05360	Cable	Belden	RG214	2/4/2022	2/4/2024
03628	Biconilog Antenna (factor includes 6dB pad)	ETS	3142E	6/3/2021	6/3/2023

Test Data Summary

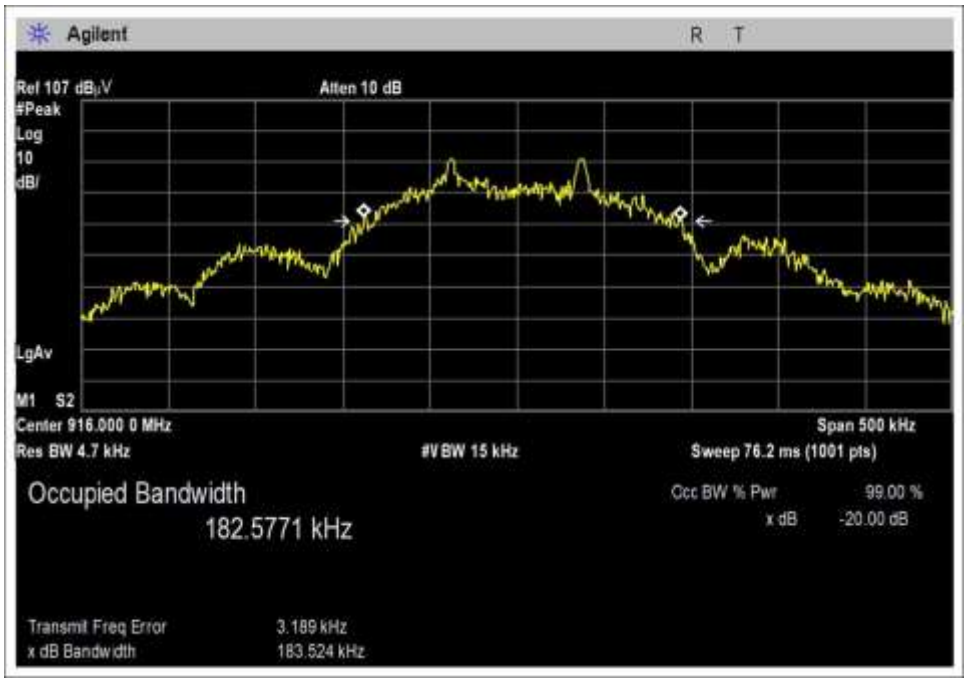
Frequency (MHz)	Antenna Port	Modulation	Measured (kHz)	Limit (kHz)	Results
903	1	150k FSK	181.768	None	NA
916	1	150k FSK	183.524	None	NA
926.8	1	150k FSK	179.316	None	NA
903	1	12.5 FSK	119.318	None	NA
916	1	12.5 FSK	119.023	None	NA
926.8	1	12.5 FSK	139.023	None	NA

Plot(s)

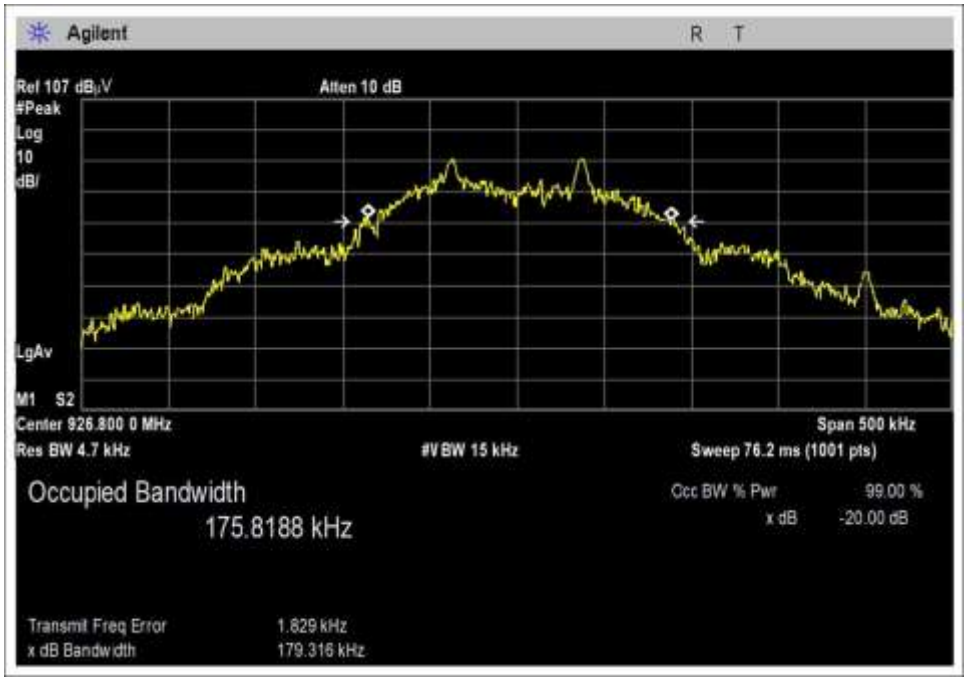
150k FSK



Low Channel

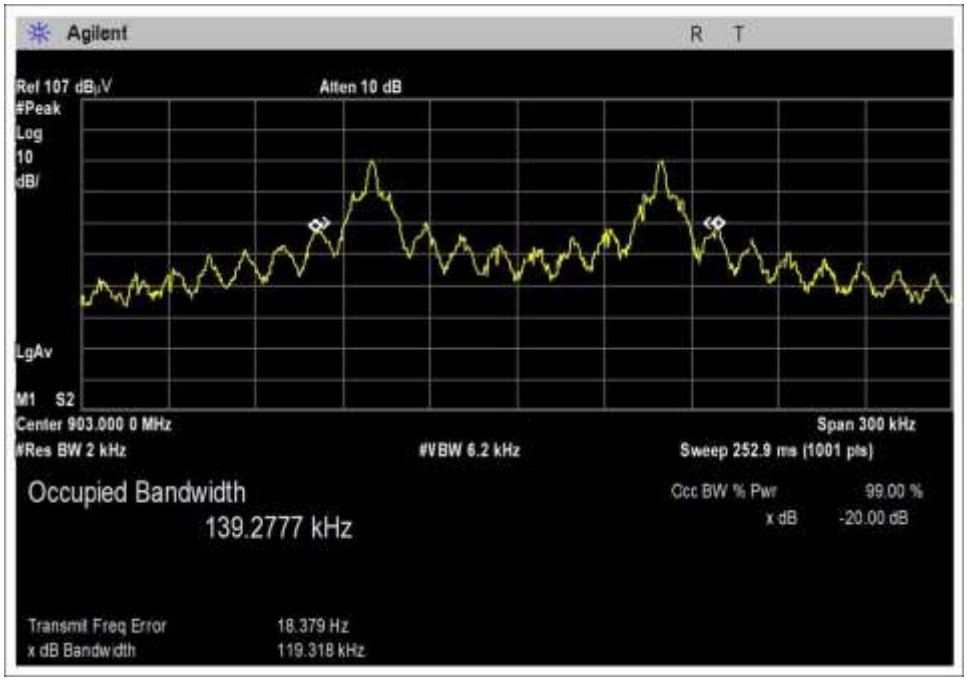


Middle Channel

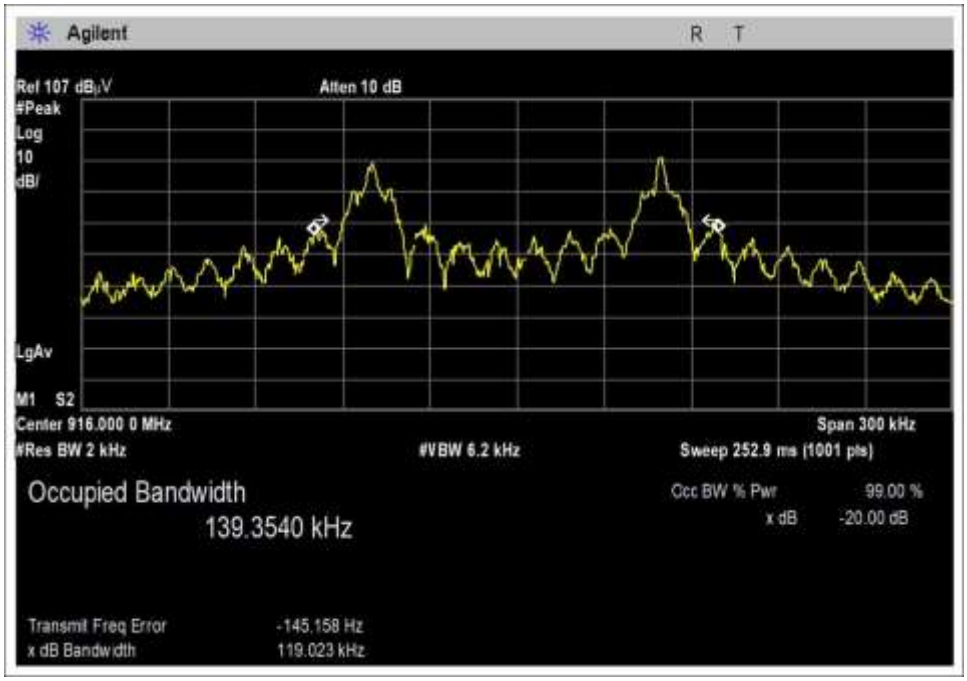


High Channel

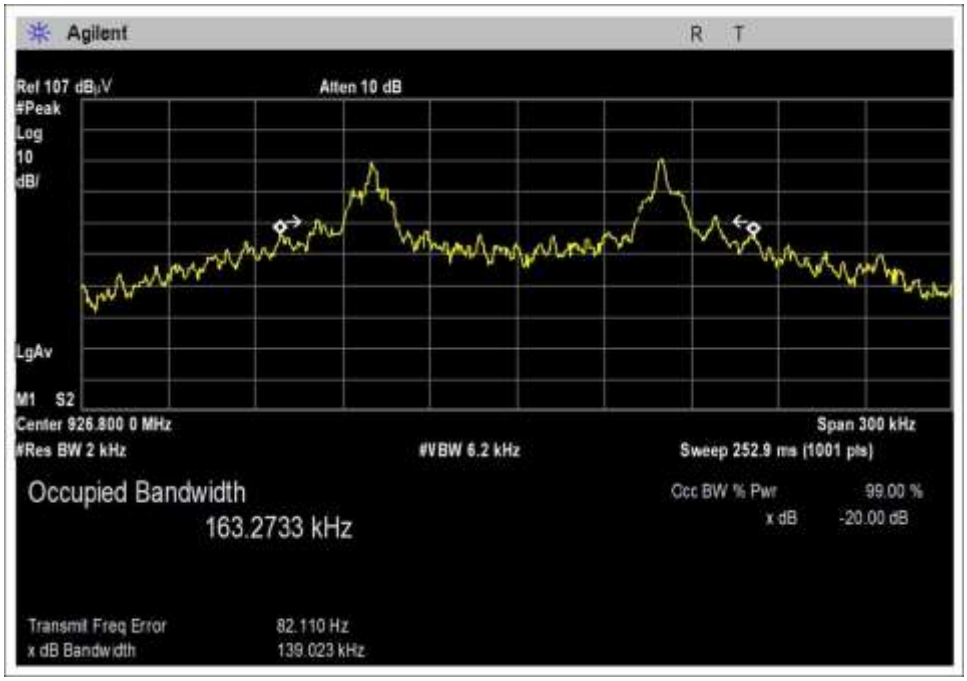
12.5 FSK



Low Channel



Middle Channel



High Channel

Test Setup Photo(s)

15.249(a) Field Strength of Fundamental

Test Data Summary - Voltage Variations					
Frequency (MHz)	Modulation / Ant Port	$V_{Minimum}$ (dBuV/m)	$V_{Nominal}$ (dBuV/m)	$V_{Maximum}$ (dBuV/m)	Max Deviation from $V_{Nominal}$ (dB)
903	150k FSK	92.9	92.9	92.9	0.0
916	150k FSK	92.9	92.9	92.9	0.0
926.8	150k FSK	93.3	93.3	93.3	0.0
903	12.5k FSK	92.8	92.8	92.8	0.0
916	12.5k FSK	92.9	92.9	92.9	0.0
926.8	12.5k FSK	93.1	93.1	93.1	0.0

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

Parameter Definitions:

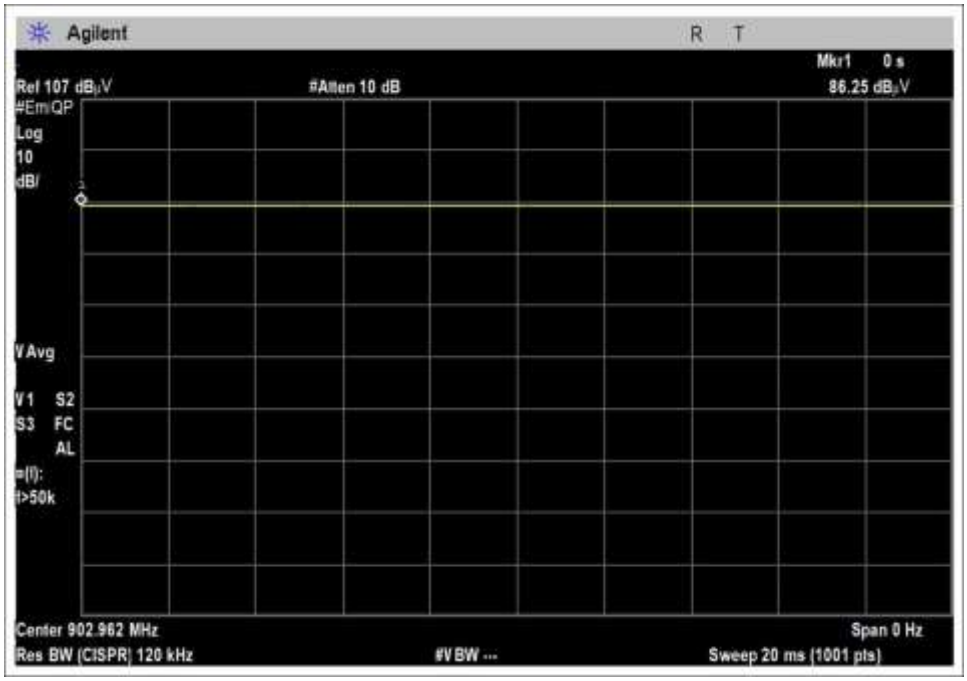
Measurements performed at input voltage Vnominal ± 15%.

Parameter	Value
$V_{Nominal}$:	5V
$V_{Minimum}$:	4.25V
$V_{Maximum}$:	5.75V

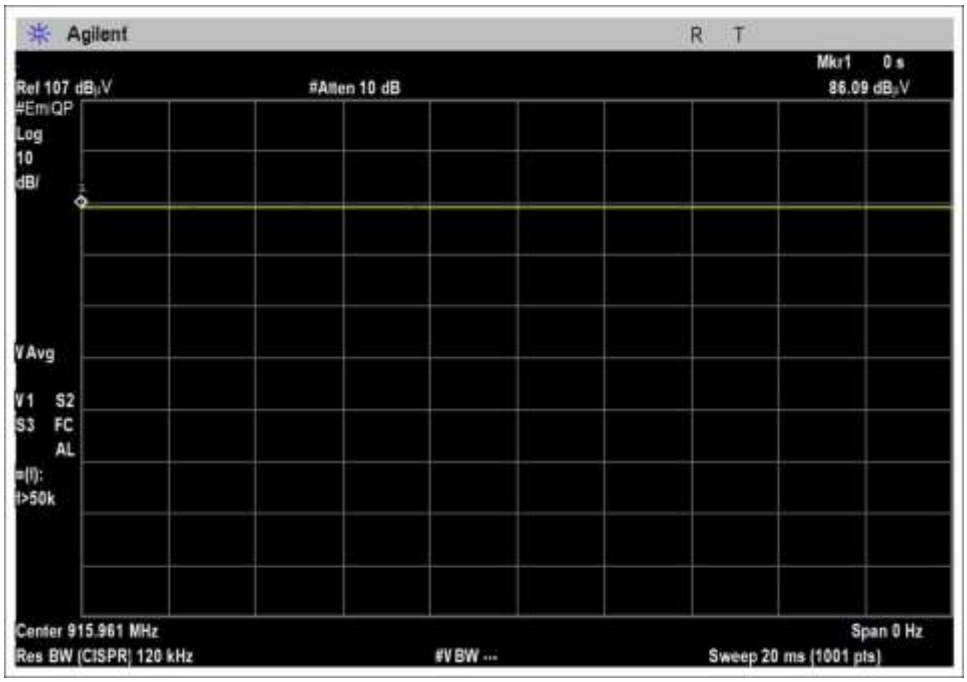
Test Data Summary – Radiated Field Strength Measurement					
Frequency (MHz)	Modulation	Ant. Type	Measured (dBuV/m @ 3m)	Limit (dBuV/m @ 3m)	Results
903	150k FSK	Trace	92.9	≤94	Pass
916	150k FSK	Trace	92.9	≤94	Pass
926.8	150k FSK	Trace	93.3	≤94	Pass
903	12.5k FSK	Trace	92.8	≤94	Pass
916	12.5k FSK	Trace	92.9	≤94	Pass
926.8	12.5k FSK	Trace	93.1	≤94	Pass

Plot(s)

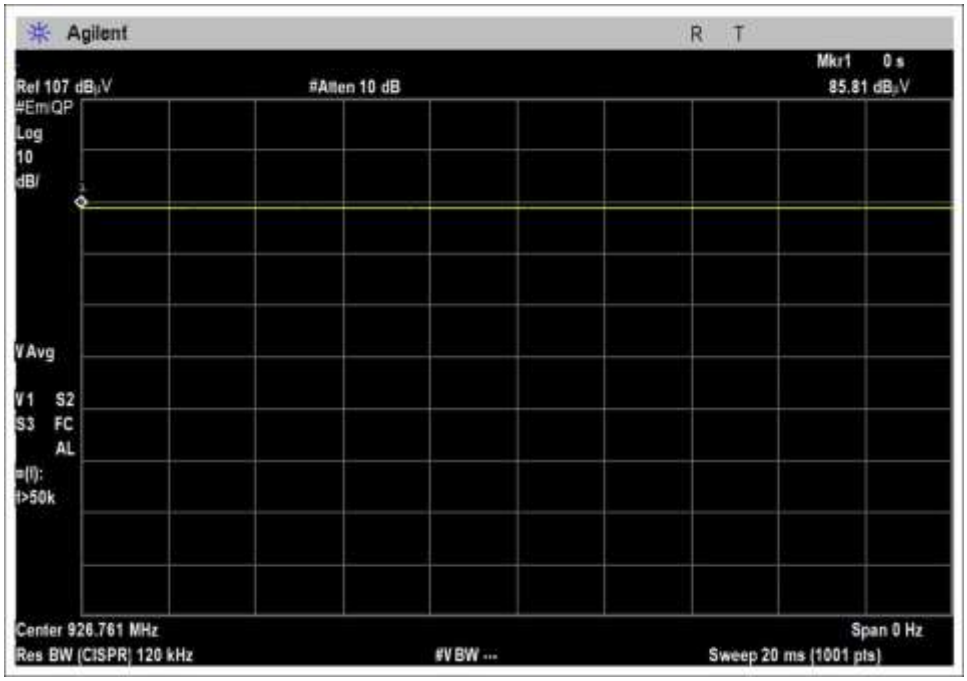
150k FSK



Low Channel

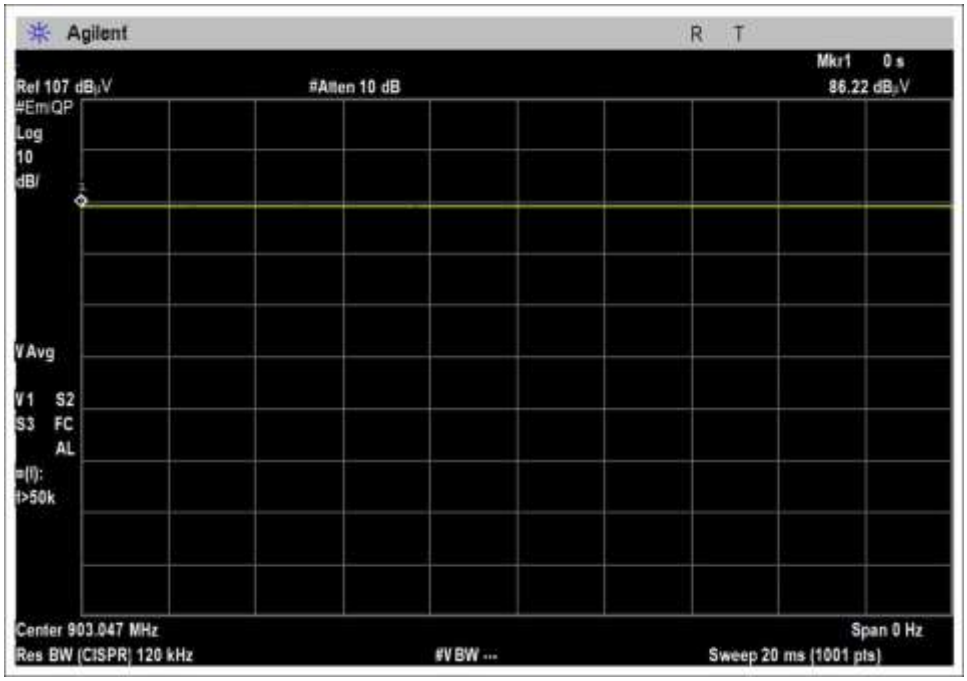


Middle Channel

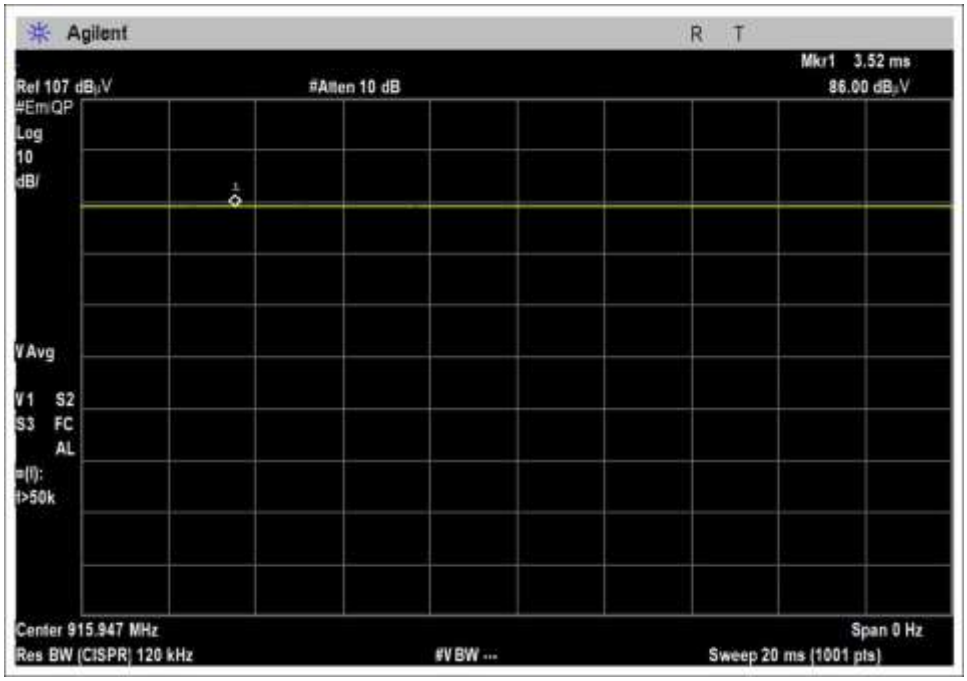


High Channel

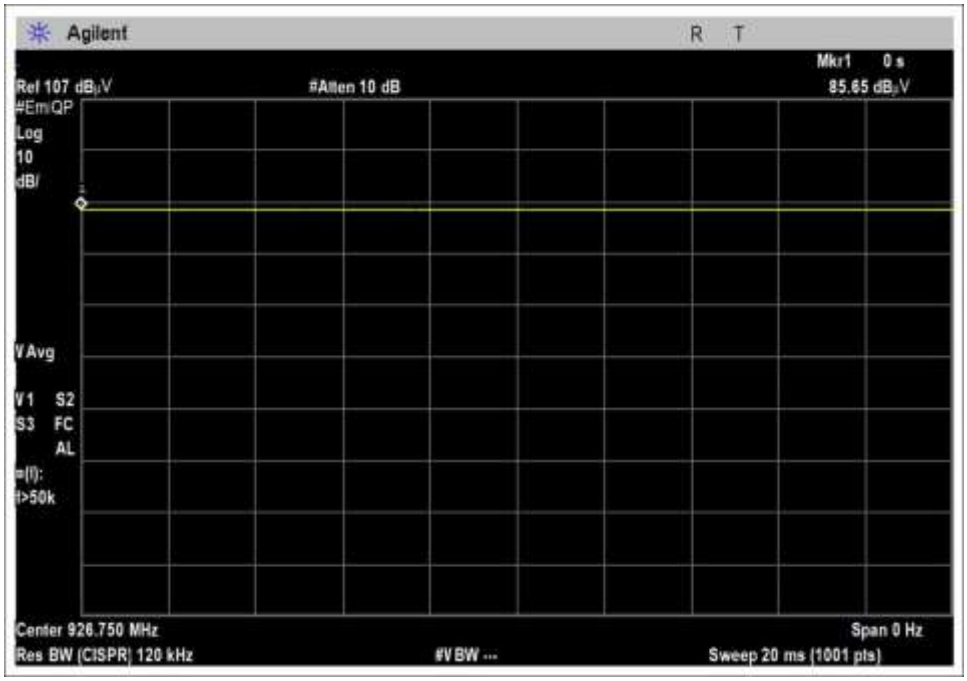
12.5 FSK



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 #:	**106617**	Date:	3/16/2022
Test Type:	**Maximized Emissions**	Time:	11:26:36
Tested By:	Michael Atkinson	Sequence#:	3
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:

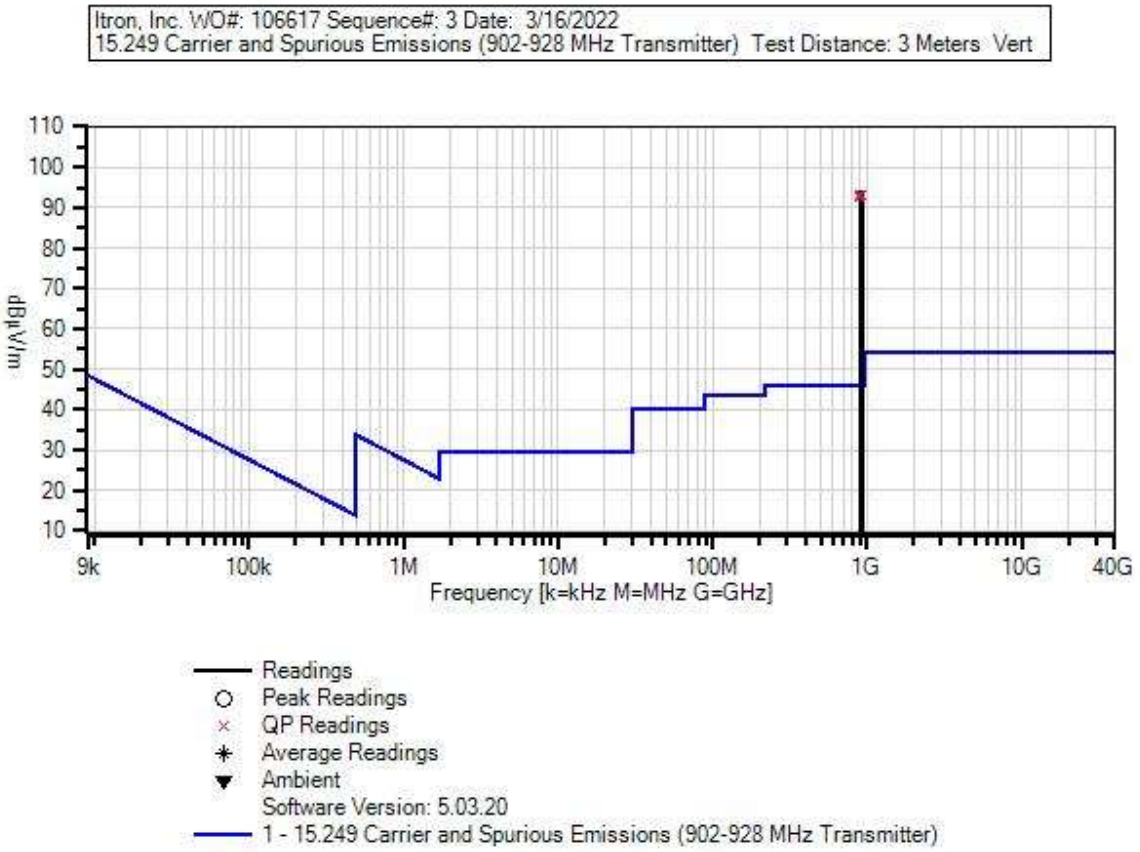
Environmental Conditions:
Temperature: 21°C
Humidity: 40%
Pressure: 102.5kPa

Method: ANSI C63.10 (2013)

Frequency: Fundamental

Setup:
EUT is on foam table.
EUT is connected to support laptop.
EUT is transmitting using test software on support tablet to control EUT.

XYZ axes investigated, horizontal and vertical antenna polarities investigated, worst case reported.



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02673	Spectrum Analyzer	E4446A	2/3/2021	2/3/2023
T1	ANP06540	Cable	Heliax	1/17/2022	1/17/2024
T2	ANP06515	Cable	Heliax	7/1/2020	7/1/2022
T3	AN02307	Preamp	8447D	1/6/2022	1/6/2024
T4	ANP05360	Cable	RG214	2/4/2022	2/4/2024
T5	AN03628	Biconilog Antenna	3142E	6/3/2021	6/3/2023

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

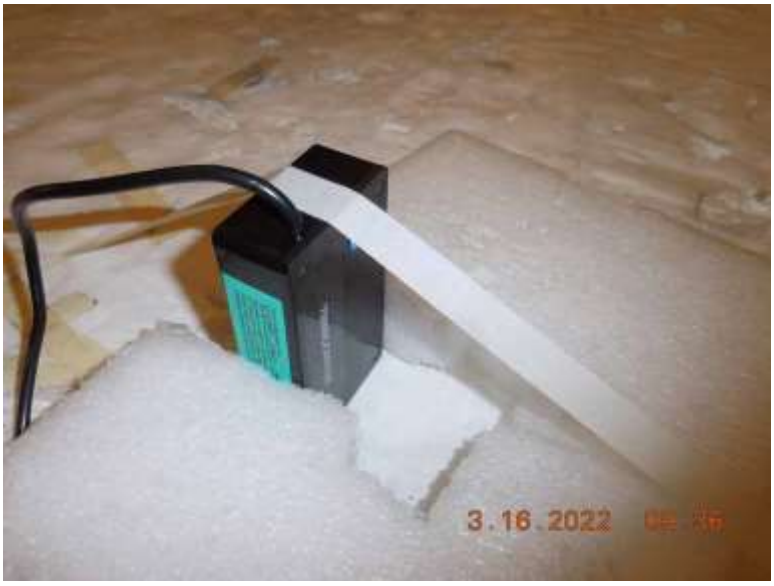
#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
			T5								
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	926.761M	85.8	+0.3	+1.6	-27.3	+2.4	+0.0	93.3	94.0	-0.7	Vert
	QP		+30.5						150k		
2	926.750M	85.6	+0.3	+1.6	-27.3	+2.4	+0.0	93.1	94.0	-0.9	Vert
	QP		+30.5						12.5k		
3	915.961M	86.0	+0.3	+1.6	-27.3	+2.4	+0.0	92.9	94.0	-1.1	Vert
	QP		+29.9						150k		
4	902.962M	86.3	+0.3	+1.6	-27.4	+2.4	+0.0	92.9	94.0	-1.1	Vert
	QP		+29.7						150k		
5	915.947M	86.0	+0.3	+1.6	-27.3	+2.4	+0.0	92.9	94.0	-1.1	Vert
	QP		+29.9						12.5k		
6	903.047M	86.2	+0.3	+1.6	-27.4	+2.4	+0.0	92.8	94.0	-1.2	Vert
	QP		+29.7						12.5k		

Test Setup Photo(s)

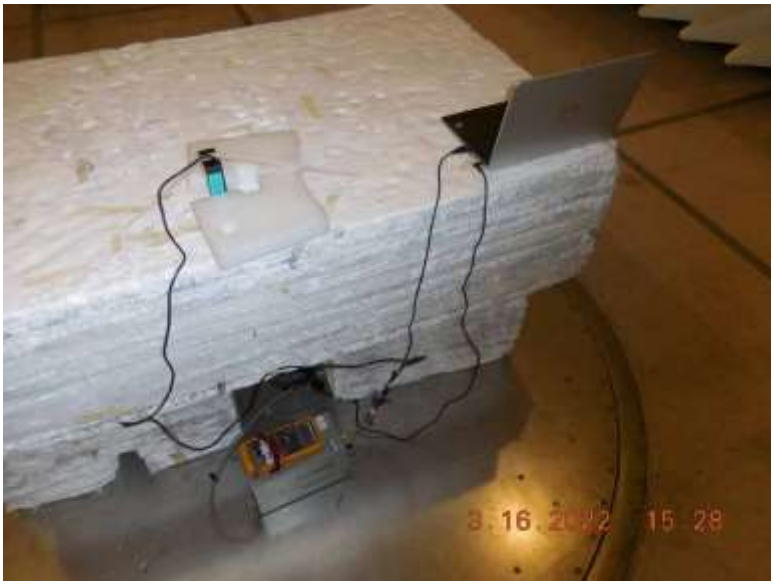
Below 1GHz

X-Axis

Y-Axis



Z-Axis



Voltage Variations

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 #:	**106617**	Date:	3/21/2022
Test Type:	**Maximized Emissions**	Time:	16:03:08
Tested By:	Michael Atkinson	Sequence#:	12
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: 22°C
Humidity: 42%
Pressure: 102.4kPa

Method: ANSI C63.10 (2013)

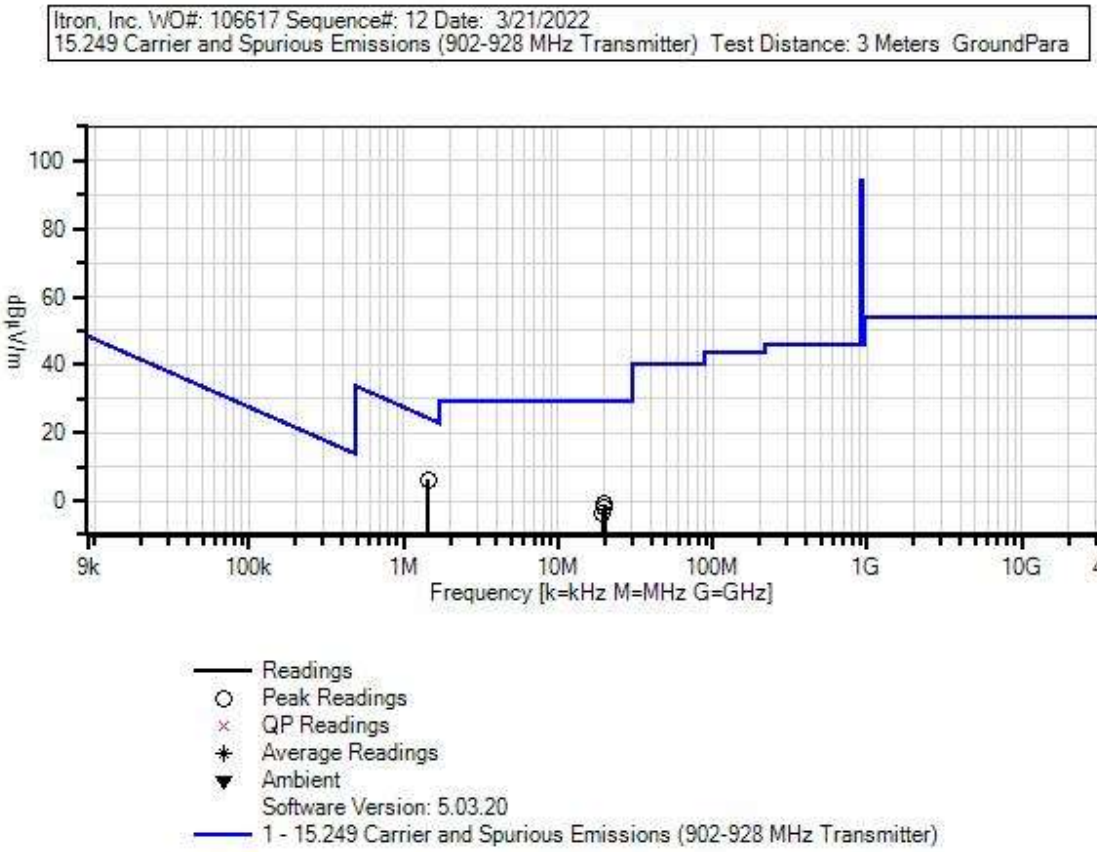
Frequency: 9kHz-30MHz

Modulation: 150k FSK

Setup:
EUT is on foam table.
EUT is connected to support laptop.
EUT is transmitting using test software on support tablet to control EUT.

XYZ axes investigated, worst case reported.

3 orthogonal axes investigated, worst case reported.



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02673	Spectrum Analyzer	E4446A	2/3/2021	2/3/2023
T2	ANP06540	Cable	Heliax	1/17/2022	1/17/2024
T3	ANP06515	Cable	Heliax	7/1/2020	7/1/2022
T4	AN00052	Loop Antenna	6502	5/4/2020	5/4/2022

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

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	1.435M	36.6	+0.0	+0.1	+0.0	+9.6	-40.0	6.3	24.4	-18.1	Para
2	19.821M	31.3	+0.0	+0.1	+0.2	+7.4	-40.0	-1.0	29.5	-30.5	Groun
3	19.589M	30.3	+0.0	+0.1	+0.2	+7.4	-40.0	-2.0	29.5	-31.5	Para
4	19.444M	28.3	+0.0	+0.1	+0.2	+7.5	-40.0	-3.9	29.5	-33.4	Perp
5	28.985M	22.4	+0.0	+0.1	+0.3	+4.6	-40.0	-12.6	29.5	-42.1	Groun

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 #:	**106617**	Date:	3/21/2022
Test Type:	**Maximized Emissions**	Time:	16:01:22
Tested By:	Michael Atkinson	Sequence#:	13
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: 22°C
Humidity: 42%
Pressure: 102.4kPa

Method: ANSI C63.10 (2013)

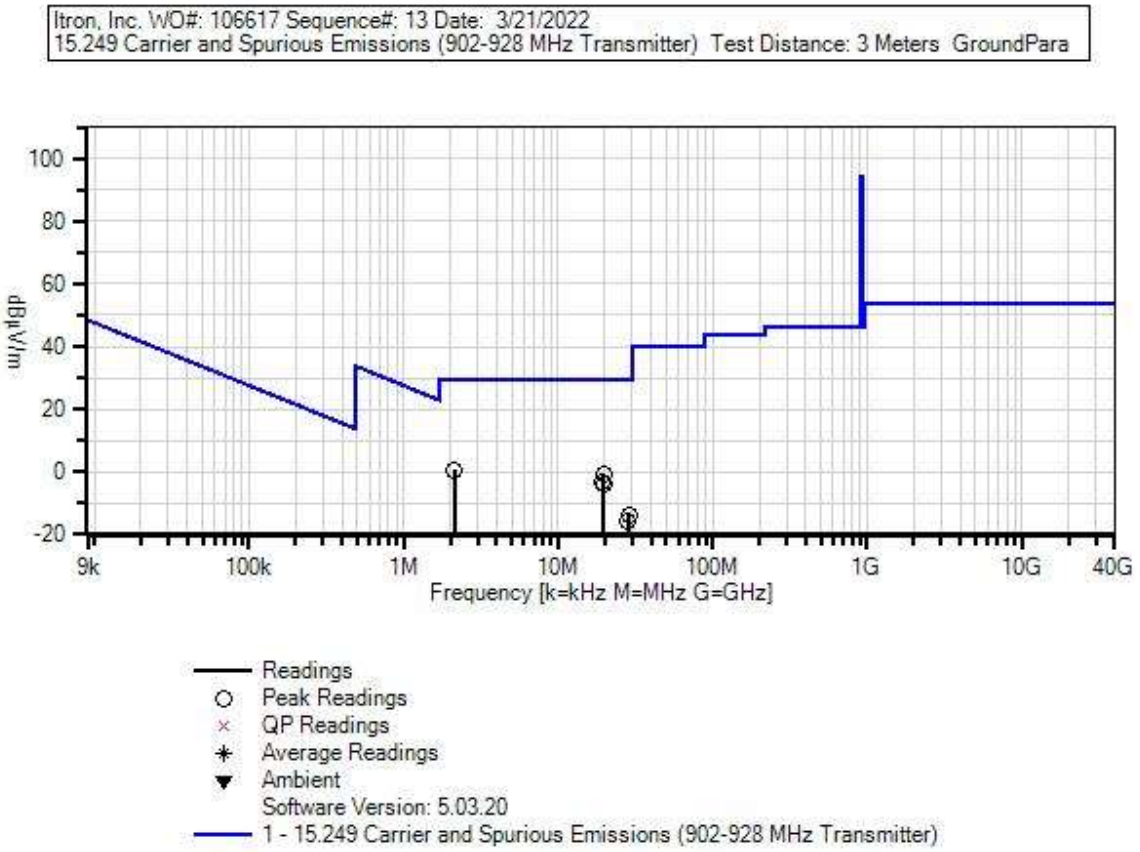
Frequency: 9kHz-30MHz

Modulation: 12.5k FSK

Setup:
EUT is on foam table.
EUT is connected to support laptop.
EUT is transmitting using test software on support tablet to control EUT.

XYZ axes investigated, worst case reported.

3 orthogonal axes investigated, worst case reported.



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02673	Spectrum Analyzer	E4446A	2/3/2021	2/3/2023
T1	ANP06540	Cable	Heliax	1/17/2022	1/17/2024
T2	ANP06515	Cable	Heliax	7/1/2020	7/1/2022
T3	AN00052	Loop Antenna	6502	5/4/2020	5/4/2022

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

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	2.131M	31.0	+0.1	+0.1	+9.5		-40.0	0.7	29.5	-28.8	Para
2	19.705M	31.6	+0.1	+0.2	+7.4		-40.0	-0.7	29.5	-30.2	Groun
3	19.328M	29.1	+0.1	+0.2	+7.5		-40.0	-3.1	29.5	-32.6	Perp
4	19.589M	28.6	+0.1	+0.2	+7.4		-40.0	-3.7	29.5	-33.2	Para
5	28.608M	21.2	+0.1	+0.3	+4.8		-40.0	-13.6	29.5	-43.1	Groun
6	28.434M	19.3	+0.1	+0.3	+4.9		-40.0	-15.4	29.5	-44.9	Para

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 #:	**106617**	Date:	3/18/2022
Test Type:	**Maximized Emissions**	Time:	19:05:00
Tested By:	Michael Atkinson	Sequence#:	8
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: 21°C
Humidity: 40%
Pressure: 102.5kPa

Method: ANSI C63.10 (2013)

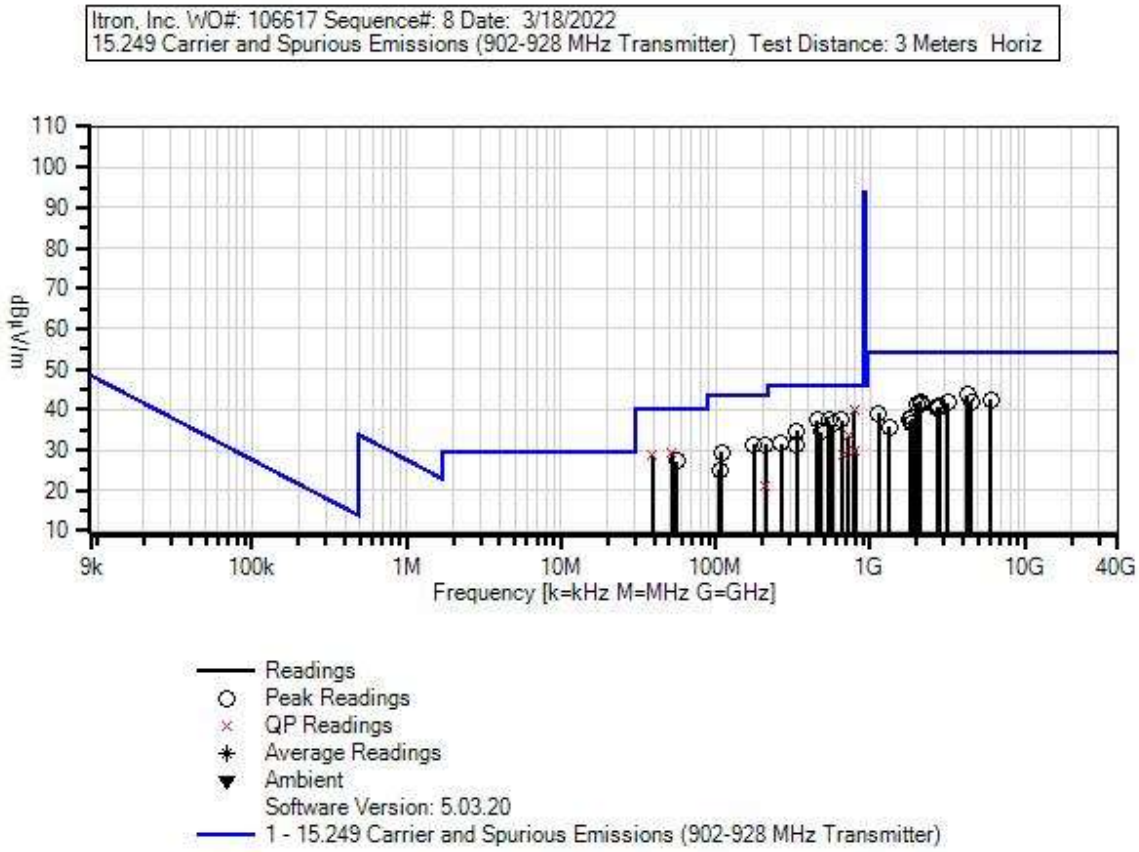
Frequency: 30MHz to 10GHz

Modulation: 150k FSK

Setup:
EUT is on foam table.
EUT is connected to support laptop.
EUT is transmitting using test software on support tablet to control EUT.

XYZ axes investigated, worst case reported.

Horizontal and vertical antenna polarities investigated, worst case reported.



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02673	Spectrum Analyzer	E4446A	2/3/2021	2/3/2023
T2	ANP06540	Cable	Heliax	1/17/2022	1/17/2024
T3	ANP06515	Cable	Heliax	7/1/2020	7/1/2022
T4	AN03540	Preamp	83017A	5/14/2021	5/14/2023
T5	ANP07504	Cable	CLU40-KMKM-02.00F	1/26/2021	1/26/2023
T6	AN02374ANSI	Horn Antenna	RGA-60	5/25/2021	5/25/2023
T7	AN03170	High Pass Filter	HM1155-11SS	9/16/2021	9/16/2023
T8	AN02307	Preamp	8447D	1/6/2022	1/6/2024
T9	ANP05360	Cable	RG214	2/4/2022	2/4/2024
T10	AN03628	Biconilog Antenna	3142E	6/3/2021	6/3/2023

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

#	Freq	Rdng	T1 T5 T9	T2 T6 T10	T3 T7	T4 T8	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	784.700M	34.5	+0.0	+0.3	+1.5	+0.0	+0.0	39.7	46.0	-6.3	Vert
	QP		+0.0	+0.0	+0.0	-27.7					
			+2.2	+28.9							
^	784.700M	42.9	+0.0	+0.3	+1.5	+0.0	+0.0	48.1	46.0	+2.1	Vert
			+0.0	+0.0	+0.0	-27.7					
			+2.2	+28.9							
3	543.100M	35.6	+0.0	+0.2	+1.3	+0.0	+0.0	37.5	46.0	-8.5	Vert
			+0.0	+0.0	+0.0	-28.2					
			+1.7	+26.9							
4	452.900M	39.3	+0.0	+0.2	+1.1	+0.0	+0.0	37.5	46.0	-8.5	Vert
			+0.0	+0.0	+0.0	-27.9					
			+1.5	+23.3							
5	653.700M	34.9	+0.0	+0.3	+1.3	+0.0	+0.0	37.4	46.0	-8.6	Vert
			+0.0	+0.0	+0.0	-28.1					
			+2.0	+27.0							
6	573.200M	35.8	+0.0	+0.2	+1.3	+0.0	+0.0	36.5	46.0	-9.5	Vert
			+0.0	+0.0	+0.0	-28.2					
			+1.8	+25.6							
7	4258.000M	39.9	+0.0	+0.6	+3.5	-33.4	+0.0	43.6	54.0	-10.4	Vert
			+0.5	+32.1	+0.4	+0.0					
			+0.0	+0.0							
8	52.300M	43.8	+0.0	+0.1	+0.4	+0.0	+0.0	29.3	40.0	-10.7	Vert
	QP		+0.0	+0.0	+0.0	-27.8					
			+0.5	+12.3							
^	52.300M	53.3	+0.0	+0.1	+0.4	+0.0	+0.0	38.8	40.0	-1.2	Vert
			+0.0	+0.0	+0.0	-27.8					
			+0.5	+12.3							
10	332.600M	39.9	+0.0	+0.2	+0.9	+0.0	+0.0	34.8	46.0	-11.2	Horiz
			+0.0	+0.0	+0.0	-27.0					
			+1.2	+19.6							
11	38.700M	39.0	+0.0	+0.1	+0.3	+0.0	+0.0	28.7	40.0	-11.3	Vert
	QP		+0.0	+0.0	+0.0	-27.8					
			+0.4	+16.7							
^	38.700M	49.3	+0.0	+0.1	+0.3	+0.0	+0.0	39.0	40.0	-1.0	Vert
			+0.0	+0.0	+0.0	-27.8					
			+0.4	+16.7							
13	5995.000M	34.8	+0.0	+0.8	+4.6	-33.8	+0.0	42.5	54.0	-11.5	Vert
			+0.7	+34.8	+0.6	+0.0					
			+0.0	+0.0							
14	483.000M	35.6	+0.0	+0.2	+1.2	+0.0	+0.0	34.4	46.0	-11.6	Vert
			+0.0	+0.0	+0.0	-28.0					
			+1.6	+23.8							

15	4474.000M	38.1	+0.0 +0.3 +0.0	+0.6 +32.3 +0.0	+3.7 +0.5	-33.5 +0.0	+0.0	42.0	54.0	-12.0	Vert
16	2125.000M	44.5	+0.0 +0.2 +0.0	+0.5 +28.2 +0.0	+2.6 +0.4	-34.5 +0.0	+0.0	41.9	54.0	-12.1	Vert
17	177.400M	41.4	+0.0 +0.0 +0.9	+0.1 +0.0 +15.7	+0.7 +0.0	+0.0 -27.4	+0.0	31.4	43.5	-12.1	Vert
18	209.400M	40.3	+0.0 +0.0 +0.9	+0.1 +0.0 +16.5	+0.7 +0.0	+0.0 -27.2	+0.0	31.3	43.5	-12.2	Vert
19	3187.000M	40.4	+0.0 +0.3 +0.0	+0.5 +30.9 +0.0	+3.2 +0.3	-33.9 +0.0	+0.0	41.7	54.0	-12.3	Vert
20	723.600M QP	29.5	+0.0 +0.0 +2.1	+0.3 +0.0 +28.2	+1.4 +0.0	+0.0 -27.9	+0.0	33.6	46.0	-12.4	Vert
^	723.600M	35.2	+0.0 +0.0 +2.1	+0.3 +0.0 +28.2	+1.4 +0.0	+0.0 -27.9	+0.0	39.3	46.0	-6.7	Vert
22	1990.000M	44.1	+0.0 +0.3 +0.0	+0.4 +28.4 +0.0	+2.5 +0.4	-34.6 +0.0	+0.0	41.5	54.0	-12.5	Horiz
23	2125.000M	44.0	+0.0 +0.2 +0.0	+0.5 +28.2 +0.0	+2.6 +0.4	-34.5 +0.0	+0.0	41.4	54.0	-12.6	Horiz
24	56.200M	41.7	+0.0 +0.0 +0.5	+0.1 +0.0 +12.4	+0.4 +0.0	+0.0 -27.8	+0.0	27.3	40.0	-12.7	Horiz
25	2780.470M	41.4	+0.0 +0.5 +0.0	+0.5 +29.3 +0.0	+2.9 +0.3	-34.1 +0.0	+0.0	40.8	54.0 Y 926.8	-13.2	Horiz
26	2748.010M	41.1	+0.0 +0.5 +0.0	+0.5 +29.3 +0.0	+2.9 +0.3	-34.1 +0.0	+0.0	40.5	54.0 Y 916	-13.5	Horiz
27	2709.100M	40.9	+0.0 +0.5 +0.0	+0.5 +29.5 +0.0	+2.9 +0.2	-34.1 +0.0	+0.0	40.4	54.0 Y 903	-13.6	Horiz
28	109.500M	41.7	+0.0 +0.0 +0.7	+0.1 +0.0 +14.2	+0.5 +0.0	+0.0 -27.7	+0.0	29.5	43.5	-14.0	Vert
29	266.700M	37.1	+0.0 +0.0 +1.1	+0.2 +0.0 +19.4	+0.9 +0.0	+0.0 -27.0	+0.0	31.7	46.0	-14.3	Vert
30	332.600M	36.4	+0.0 +0.0 +1.2	+0.2 +0.0 +19.6	+0.9 +0.0	+0.0 -27.0	+0.0	31.3	46.0	-14.7	Vert

31	1135.000M	46.7	+0.0	+0.3	+1.8	-36.4	+0.0	39.0	54.0	-15.0	Horiz
			+0.2	+24.9	+1.5	+0.0					
			+0.0	+0.0							
32	798.200M	24.5	+0.0	+0.3	+1.5	+0.0	+0.0	29.9	46.0	-16.1	Horiz
	QP		+0.0	+0.0	+0.0	-27.7					
			+2.2	+29.1							
^	798.200M	35.9	+0.0	+0.3	+1.5	+0.0	+0.0	41.3	46.0	-4.7	Horiz
			+0.0	+0.0	+0.0	-27.7					
			+2.2	+29.1							
34	1853.530M	41.1	+0.0	+0.4	+2.4	-34.7	+0.0	37.8	54.0	-16.2	Vert
			+0.3	+27.7	+0.6	+0.0			X 926.8		
			+0.0	+0.0							
35	1806.000M	41.2	+0.0	+0.4	+2.3	-34.7	+0.0	37.4	54.0	-16.6	Vert
			+0.3	+27.3	+0.6	+0.0			X 903		
			+0.0	+0.0							
36	660.500M	26.4	+0.0	+0.3	+1.3	+0.0	+0.0	29.0	46.0	-17.0	Horiz
	QP		+0.0	+0.0	+0.0	-28.1					
			+2.1	+27.0							
^	660.500M	37.4	+0.0	+0.3	+1.3	+0.0	+0.0	40.0	46.0	-6.0	Horiz
			+0.0	+0.0	+0.0	-28.1					
			+2.1	+27.0							
38	1832.060M	40.2	+0.0	+0.4	+2.4	-34.7	+0.0	36.7	54.0	-17.3	Vert
			+0.3	+27.5	+0.6	+0.0			X 916		
			+0.0	+0.0							
39	1333.000M	42.8	+0.0	+0.3	+2.0	-35.6	+0.0	35.8	54.0	-18.2	Horiz
			+0.2	+25.4	+0.7	+0.0					
			+0.0	+0.0							
40	106.600M	37.3	+0.0	+0.1	+0.5	+0.0	+0.0	25.0	43.5	-18.5	Horiz
			+0.0	+0.0	+0.0	-27.7					
			+0.6	+14.2							
41	209.400M	30.1	+0.0	+0.1	+0.7	+0.0	+0.0	21.1	43.5	-22.4	Horiz
	QP		+0.0	+0.0	+0.0	-27.2					
			+0.9	+16.5							
^	209.400M	45.9	+0.0	+0.1	+0.7	+0.0	+0.0	36.9	43.5	-6.6	Horiz
			+0.0	+0.0	+0.0	-27.2					
			+0.9	+16.5							

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 #:	**106617**	Date:	3/18/2022
Test Type:	**Maximized Emissions**	Time:	19:24:28
Tested By:	Michael Atkinson	Sequence#:	9
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: 21°C
Humidity: 40%
Pressure: 102.5kPa

Method: ANSI C63.10 (2013)

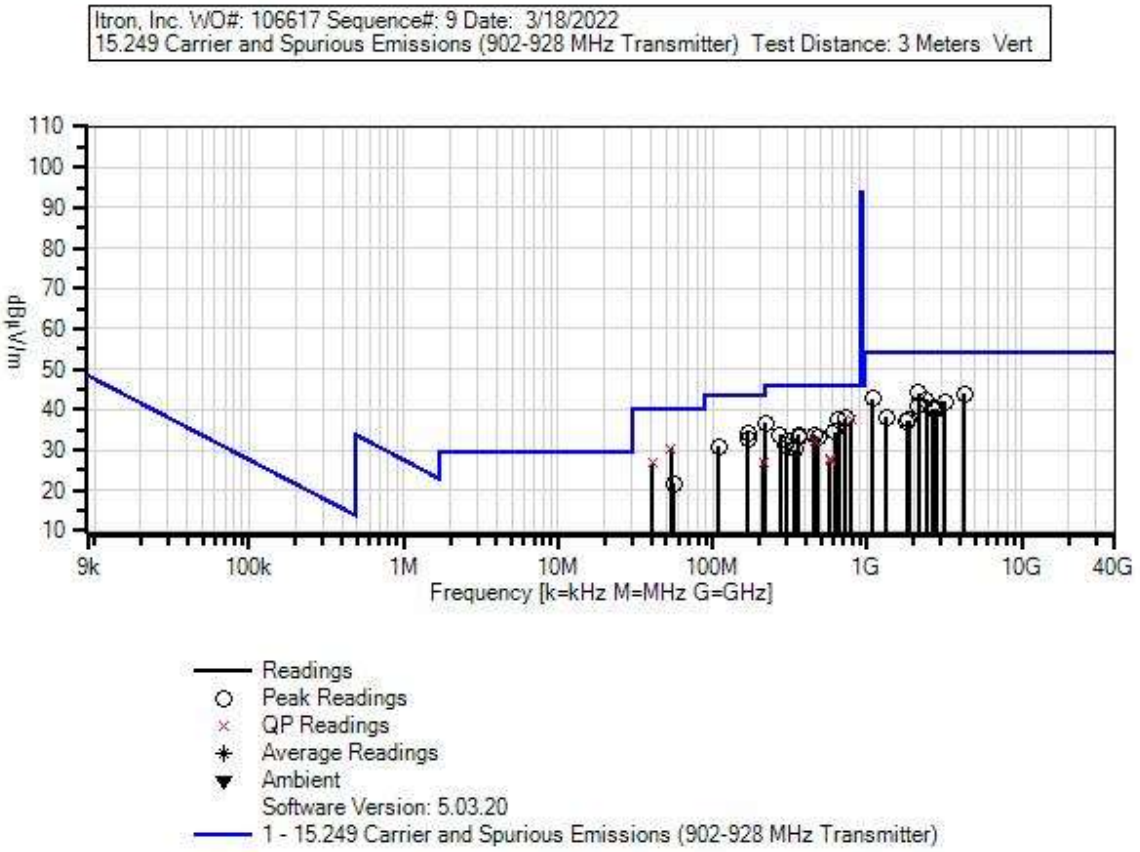
Frequency: 30MHz to 10GHz

Modulation: 12.5k FSK

Setup:
EUT is on foam table.
EUT is connected to support laptop.
EUT is transmitting using test software on support tablet to control EUT.

XYZ axes investigated, worst case reported.

Horizontal and vertical antenna polarities investigated, worst case reported.



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02673	Spectrum Analyzer	E4446A	2/3/2021	2/3/2023
T2	ANP06540	Cable	Heliax	1/17/2022	1/17/2024
T3	ANP06515	Cable	Heliax	7/1/2020	7/1/2022
T4	AN03540	Preamp	83017A	5/14/2021	5/14/2023
T5	ANP07504	Cable	CLU40-KMKM-02.00F	1/26/2021	1/26/2023
T6	AN02374ANSI	Horn Antenna	RGA-60	5/25/2021	5/25/2023
T7	AN03170	High Pass Filter	HM1155-11SS	9/16/2021	9/16/2023
T8	AN02307	Preamp	8447D	1/6/2022	1/6/2024
T9	ANP05360	Cable	RG214	2/4/2022	2/4/2024
T10	AN03628	Biconilog Antenna	3142E	6/3/2021	6/3/2023

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

#	Freq	Rdng	T1 T5 T9	T2 T6 T10	T3 T7	T4 T8	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	724.500M	33.8	+0.0 +0.0 +2.1	+0.3 +0.0 +28.2	+1.4 +0.0	+0.0 -27.9	+0.0	37.9	46.0	-8.1	Vert
2	654.700M	35.0	+0.0 +0.0 +2.0	+0.3 +0.0 +27.0	+1.3 +0.0	+0.0 -28.1	+0.0	37.5	46.0	-8.5	Vert
3	784.700M QP	32.2	+0.0 +0.0 +2.2	+0.3 +0.0 +28.9	+1.5 +0.0	+0.0 -27.7	+0.0	37.4	46.0	-8.6	Horiz
^	784.700M	41.1	+0.0 +0.0 +2.2	+0.3 +0.0 +28.9	+1.5 +0.0	+0.0 -27.7	+0.0	46.3	46.0	+0.3	Horiz
5	168.700M	44.8	+0.0 +0.0 +0.9	+0.1 +0.0 +15.3	+0.7 +0.0	+0.0 -27.5	+0.0	34.3	43.5	-9.2	Horiz
6	220.100M	45.3	+0.0 +0.0 +1.0	+0.1 +0.0 +16.6	+0.8 +0.0	+0.0 -27.1	+0.0	36.7	46.0	-9.3	Vert
7	53.300M QP	44.8	+0.0 +0.0 +0.5	+0.1 +0.0 +12.3	+0.4 +0.0	+0.0 -27.8	+0.0	30.3	40.0	-9.7	Vert
^	53.300M	59.9	+0.0 +0.0 +0.5	+0.1 +0.0 +12.3	+0.4 +0.0	+0.0 -27.8	+0.0	45.4	40.0	+5.4	Vert
9	2134.000M	46.7	+0.0 +0.2 +0.0	+0.5 +28.2 +0.0	+2.6 +0.4	-34.5 +0.0	+0.0	44.1	54.0	-9.9	Vert
10	4258.000M	40.2	+0.0 +0.5 +0.0	+0.6 +32.1 +0.0	+3.5 +0.4	-33.4 +0.0	+0.0	43.9	54.0	-10.1	Vert
11	169.700M	43.1	+0.0 +0.0 +0.9	+0.1 +0.0 +15.4	+0.7 +0.0	+0.0 -27.5	+0.0	32.7	43.5	-10.8	Vert
12	1090.000M	46.7	+0.0 +0.2 +0.0	+0.3 +24.5 +0.0	+1.8 +5.9	-36.6 +0.0	+0.0	42.8	54.0	-11.2	Horiz
13	613.000M	32.1	+0.0 +0.0 +1.9	+0.3 +0.0 +27.1	+1.3 +0.0	+0.0 -28.1	+0.0	34.6	46.0	-11.4	Horiz
14	2395.000M	44.2	+0.0 +0.3 +0.0	+0.5 +28.8 +0.0	+2.7 +0.3	-34.3 +0.0	+0.0	42.5	54.0	-11.5	Vert

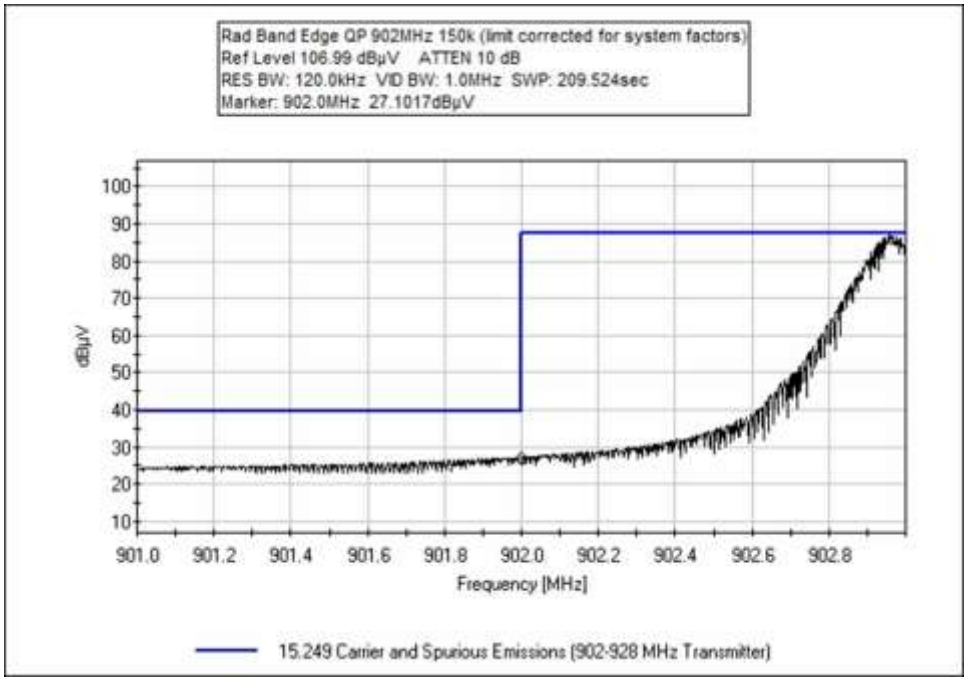
15	3196.000M	40.9	+0.0 +0.3 +0.0	+0.5 +30.9 +0.0	+3.2 +0.2	-33.9 +0.0	+0.0	42.1	54.0	-11.9	Vert
16	271.500M	39.5	+0.0 +0.0 +1.1	+0.2 +0.0 +19.1	+0.9 +0.0	+0.0 -27.0	+0.0	33.8	46.0	-12.2	Horiz
17	361.700M	36.9	+0.0 +0.0 +1.3	+0.2 +0.0 +21.6	+1.0 +0.0	+0.0 -27.3	+0.0	33.7	46.0	-12.3	Vert
18	452.900M	35.5	+0.0 +0.0 +1.5	+0.2 +0.0 +23.3	+1.1 +0.0	+0.0 -27.9	+0.0	33.7	46.0	-12.3	Horiz
19	361.700M	36.6	+0.0 +0.0 +1.3	+0.2 +0.0 +21.6	+1.0 +0.0	+0.0 -27.3	+0.0	33.4	46.0	-12.6	Horiz
20	483.000M	34.5	+0.0 +0.0 +1.6	+0.2 +0.0 +23.8	+1.2 +0.0	+0.0 -28.0	+0.0	33.3	46.0	-12.7	Horiz
21	109.500M	43.0	+0.0 +0.0 +0.7	+0.1 +0.0 +14.2	+0.5 +0.0	+0.0 -27.7	+0.0	30.8	43.5	-12.7	Vert
22	2134.000M	43.6	+0.0 +0.2 +0.0	+0.5 +28.2 +0.0	+2.6 +0.4	-34.5 +0.0	+0.0	41.0	54.0	-13.0	Horiz
23	40.700M QP	38.1	+0.0 +0.0 +0.5	+0.1 +0.0 +15.6	+0.3 +0.0	+0.0 -27.8	+0.0	26.8	40.0	-13.2	Vert
^	40.700M	54.0	+0.0 +0.0 +0.5	+0.1 +0.0 +15.6	+0.3 +0.0	+0.0 -27.8	+0.0	42.7	40.0	+2.7	Vert
25	452.900M QP	34.2	+0.0 +0.0 +1.5	+0.2 +0.0 +23.3	+1.1 +0.0	+0.0 -27.9	+0.0	32.4	46.0	-13.6	Vert
^	452.900M	39.7	+0.0 +0.0 +1.5	+0.2 +0.0 +23.3	+1.1 +0.0	+0.0 -27.9	+0.0	37.9	46.0	-8.1	Vert
27	2780.290M	40.9	+0.0 +0.5 +0.0	+0.5 +29.3 +0.0	+2.9 +0.3	-34.1 +0.0	+0.0	40.3	54.0 Y Horz	-13.7	Horiz
28	2683.000M	40.8	+0.0 +0.4 +0.0	+0.5 +29.6 +0.0	+2.9 +0.3	-34.2 +0.0	+0.0	40.3	54.0	-13.7	Horiz
29	2708.960M	40.6	+0.0 +0.5 +0.0	+0.5 +29.5 +0.0	+2.9 +0.2	-34.1 +0.0	+0.0	40.1	54.0 Y Horz	-13.9	Horiz
30	300.600M	38.2	+0.0 +0.0 +1.2	+0.2 +0.0 +18.6	+0.9 +0.0	+0.0 -27.0	+0.0	32.1	46.0	-13.9	Horiz

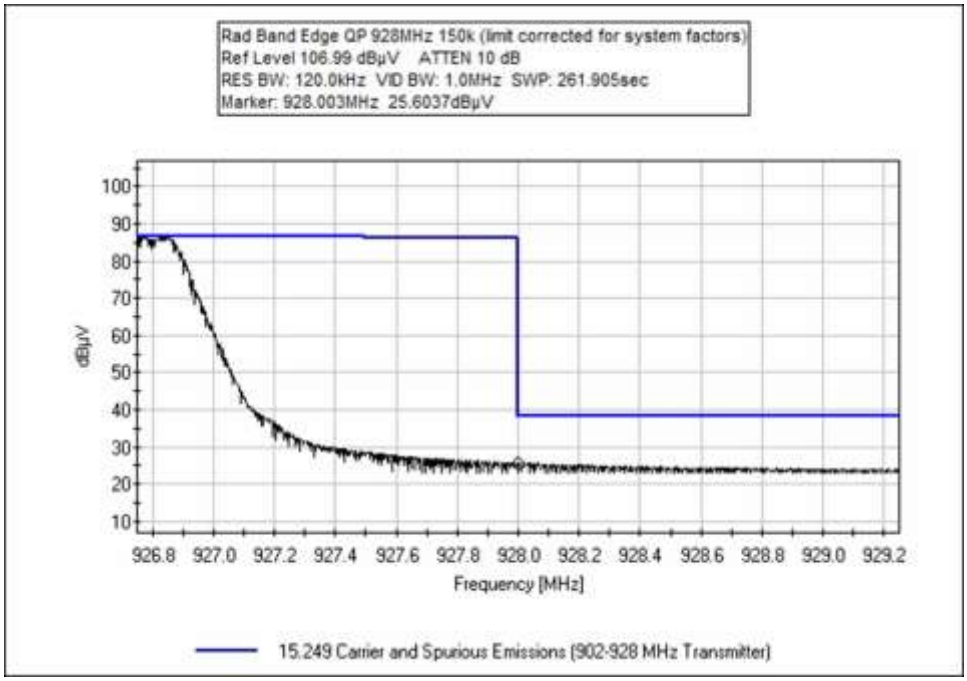
31	2747.930M	40.7	+0.0 +0.5 +0.0	+0.5 +29.3 +0.0	+2.9 +0.3	-34.1 +0.0	+0.0	40.1	54.0 Y Horz	-13.9	Horiz
32	298.700M	37.5	+0.0 +0.0 +1.2	+0.2 +0.0 +18.5	+0.9 +0.0	+0.0 -27.0	+0.0	31.3	46.0	-14.7	Vert
33	336.500M	35.0	+0.0 +0.0 +1.2	+0.2 +0.0 +19.9	+1.0 +0.0	+0.0 -27.1	+0.0	30.2	46.0	-15.8	Horiz
34	1324.000M	45.3	+0.0 +0.2 +0.0	+0.3 +25.4 +0.0	+2.0 +0.7	-35.7 +0.0	+0.0	38.2	54.0	-15.8	Horiz
35	1831.940M	41.0	+0.0 +0.3 +0.0	+0.4 +27.5 +0.0	+2.4 +0.6	-34.7 +0.0	+0.0	37.5	54.0 X Vert	-16.5	Horiz
36	1853.600M	40.8	+0.0 +0.3 +0.0	+0.4 +27.7 +0.0	+2.4 +0.6	-34.7 +0.0	+0.0	37.5	54.0 X Vert	-16.5	Horiz
37	213.300M QP	35.8	+0.0 +0.0 +0.9	+0.1 +0.0 +16.5	+0.8 +0.0	+0.0 -27.2	+0.0	26.9	43.5	-16.6	Horiz
^	213.300M	46.1	+0.0 +0.0 +0.9	+0.1 +0.0 +16.5	+0.8 +0.0	+0.0 -27.2	+0.0	37.2	43.5	-6.3	Horiz
39	1806.080M	40.7	+0.0 +0.3 +0.0	+0.4 +27.3 +0.0	+2.3 +0.6	-34.7 +0.0	+0.0	36.9	54.0 X Vert	-17.1	Vert
40	56.200M	36.2	+0.0 +0.0 +0.5	+0.1 +0.0 +12.4	+0.4 +0.0	+0.0 -27.8	+0.0	21.8	40.0	-18.2	Horiz
41	573.200M QP	27.0	+0.0 +0.0 +1.8	+0.2 +0.0 +25.6	+1.3 +0.0	+0.0 -28.2	+0.0	27.7	46.0	-18.3	Vert
42	573.200M QP	26.6	+0.0 +0.0 +1.8	+0.2 +0.0 +25.6	+1.3 +0.0	+0.0 -28.2	+0.0	27.3	46.0	-18.7	Vert
^	573.200M	38.1	+0.0 +0.0 +1.8	+0.2 +0.0 +25.6	+1.3 +0.0	+0.0 -28.2	+0.0	38.8	46.0	-7.2	Vert

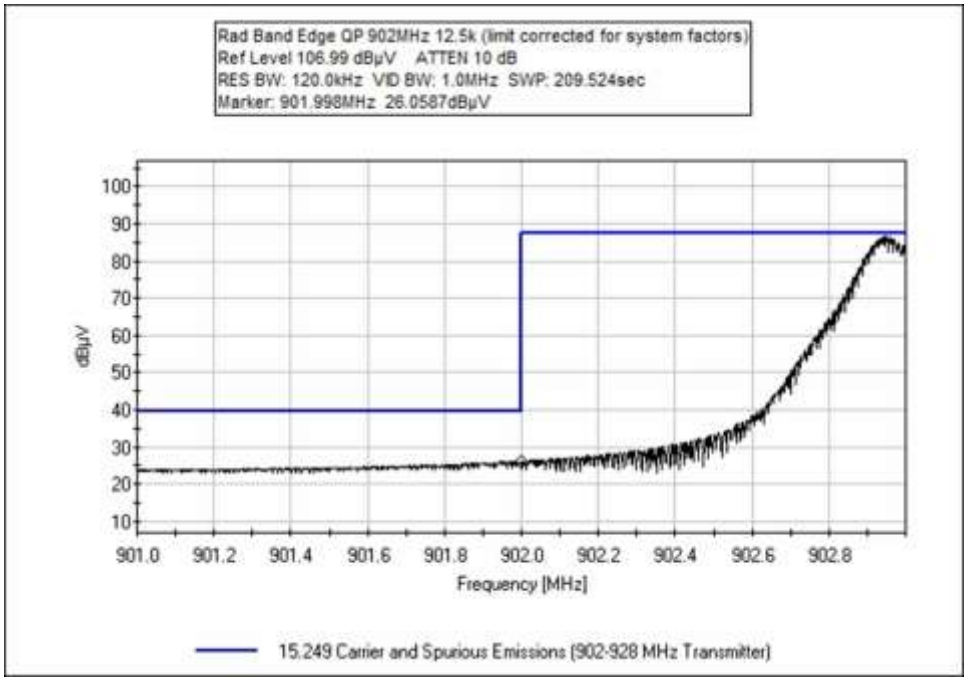
Band Edge

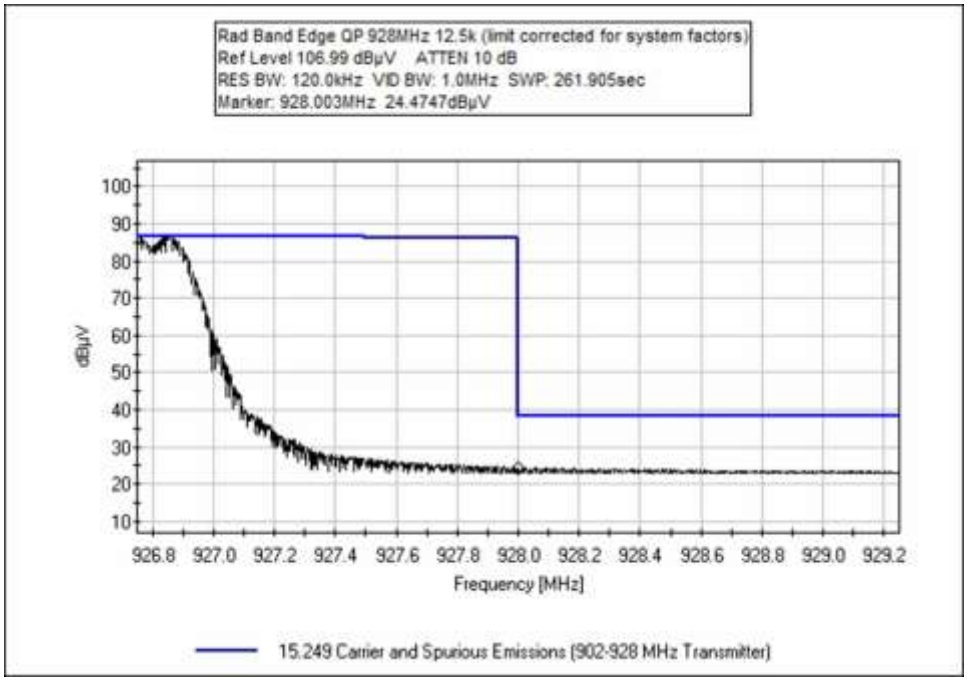
Band Edge Summary					
Frequency (MHz)	**Modulation**	**Ant. Type**	**Field Strength (dBuV/m @3m)**	**Limit (dBuV/m @3m)**	**Results**
902MHz	FSK 150k	Trace	33.5	<46	Pass
928MHz	FSK 150k	Trace	33.2	<46	Pass
902MHz	FSK 12.5k	Trace	32.5	<46	Pass
928MHz	FSK 12.5k	Trace	32.1	<46	Pass

Band Edge Plots






Rad Band Edge QP 902MHz 12.5k (limit corrected for system factors)
Ref Level 106.99 dBµV ATTEN 10 dB
RES BW: 120.0kHz VID BW: 1.0MHz SWP: 209.524sec
Marker: 901.998MHz 26.0587dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
901.0
901.2
901.4
901.6
901.8
902.0
902.2
902.4
902.6
902.8
Frequency [MHz]
15.249 Carrier and Spurious Emissions (902-928 MHz Transmitter)


Rad Band Edge QP 928MHz 12.5k (limit corrected for system factors)
Ref Level 106.99 dBµV ATTEN 10 dB
RES BW: 120.0kHz VID BW: 1.0MHz SWP: 261.905sec
Marker: 928.003MHz 24.4747dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
926.8
927.0
927.2
927.4
927.6
927.8
928.0
928.2
928.4
928.6
928.8
929.0
929.2
Frequency [MHz]
15.249 Carrier and Spurious Emissions (902-928 MHz Transmitter)

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 #:	**106617**	Date:	3/16/2022
Test Type:	**Maximized Emissions**	Time:	13:36:36
Tested By:	Michael Atkinson	Sequence#:	4
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: 21°C
Humidity: 40%
Pressure: 102.5kPa

Method: ANSI C63.10 (2013)

Frequency: Band Edge

Setup:
EUT is on foam table.
EUT is connected to support laptop.
EUT is transmitting using test software on support tablet to control EUT.

XYZ axes investigated, horizontal and vertical antenna polarities investigated, worst case reported.

Test Equipment:

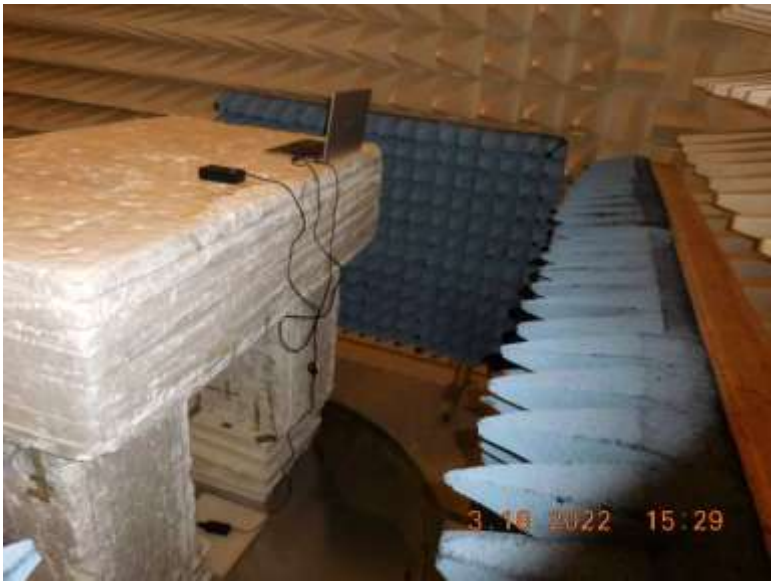
ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02673	Spectrum Analyzer	E4446A	2/3/2021	2/3/2023
T2	ANP06540	Cable	Heliax	1/17/2022	1/17/2024
T3	ANP06515	Cable	Heliax	7/1/2020	7/1/2022
T4	AN02307	Preamp	8447D	1/6/2022	1/6/2024
T5	ANP05360	Cable	RG214	2/4/2022	2/4/2024
T6	AN03628	Biconilog Antenna	3142E	6/3/2021	6/3/2023

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

#	Freq	Rdng	T1 T5	T2 T6	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	902.000M	27.1	+0.0	+0.3	+1.6	-27.4	+0.0	33.5	46.0	-12.5	Vert
	QP		+2.3	+29.6					150k		
2	928.003M	25.6	+0.0	+0.3	+1.6	-27.3	+0.0	33.2	46.0	-12.8	Vert
	QP		+2.4	+30.6					150k		
3	901.998M	26.1	+0.0	+0.3	+1.6	-27.4	+0.0	32.5	46.0	-13.5	Vert
	QP		+2.3	+29.6					12.5k		
4	928.003M	24.5	+0.0	+0.3	+1.6	-27.3	+0.0	32.1	46.0	-13.9	Vert
	QP		+2.4	+30.6					12.5k		

Test Setup Photo(s)

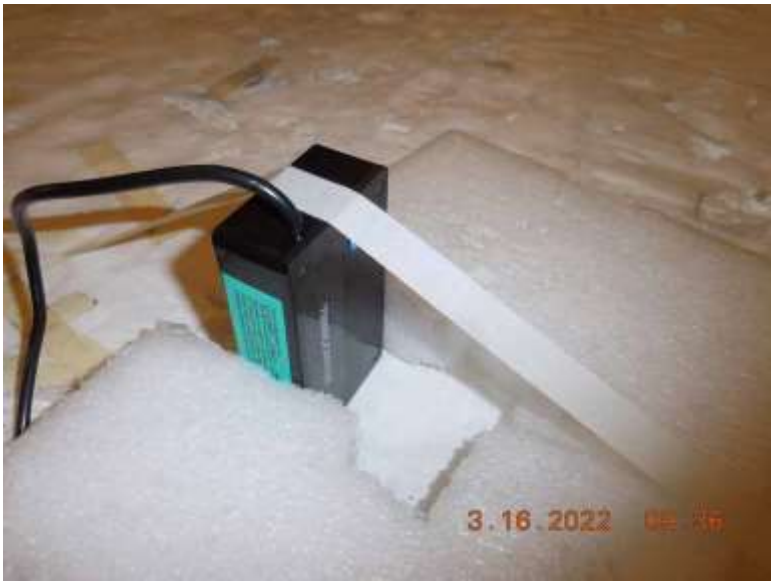
Below 1GHz



Below 1GHz

X-Axis

Y-Axis



Z-Axis

15.207 AC 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:	**15.207 AC Mains - Average**		
Work Order #:	**106617**	Date:	3/21/2022
Test Type:	**Conducted Emissions**	Time:	16:28:39
Tested By:	Michael Atkinson	Sequence#:	14
Software:	EMITest 5.03.20		120V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

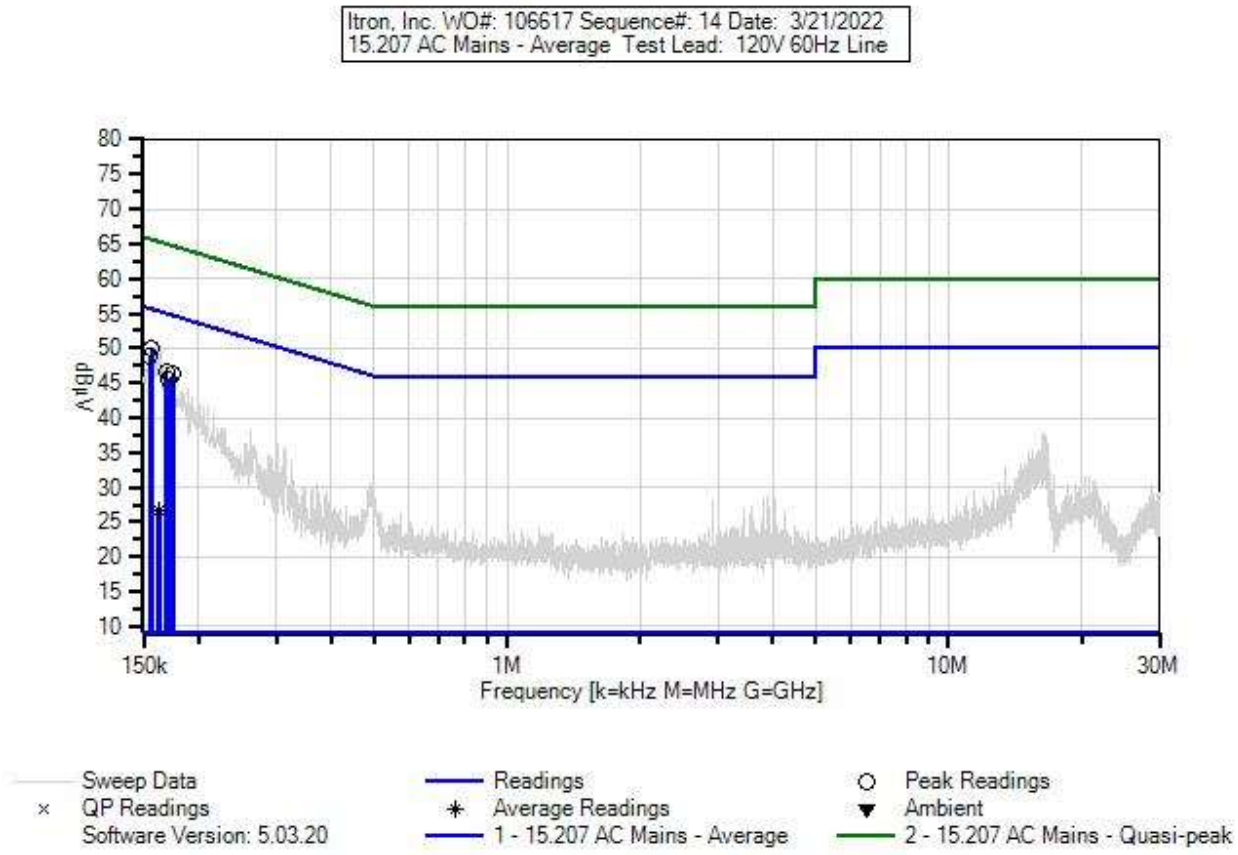
Environmental Conditions:
Temperature: 22°C
Humidity: 42%
Pressure: 102.4kPa

Method: ANSI C63.10 (2013)

Frequency: 150kHz-30MHz

Setup:
EUT is on foam table.
EUT is connected to support laptop.
EUT is transmitting using test software on support tablet to control EUT.
Support laptop is representative host device connected to AC mains through measurement LISN.

12.5k and 150k modulations investigated, worst case reported.



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02673	Spectrum Analyzer	E4446A	2/3/2021	2/3/2023
T1	AN02611	High Pass Filter	HE9615-150K-50-720B	1/5/2022	1/5/2024
T2	ANP06540	Cable	Heliax	1/17/2022	1/17/2024
T3	ANP06515	Cable	Heliax	7/1/2020	7/1/2022
T4	ANP06219	Attenuator	768-10	4/7/2020	4/7/2022
T5	AN01311	50uH LISN-Line1 (L)	3816/2	2/23/2022	2/23/2024
	AN01311	50uH LISN-Line2 (N)	3816/2	2/23/2022	2/23/2024

Measurement Data: Reading listed by margin. Test Lead: Line

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV	dBµV	dB	Ant
1	156.497k	40.1	+0.7 +0.1	+0.1	+0.0	+9.1	+0.0	50.1	55.6	-5.5	Line
2	155.135k	38.8	+0.7 +0.1	+0.1	+0.0	+9.1	+0.0	48.8	55.7	-6.9	Line
3	174.837k	36.8	+0.3 +0.1	+0.1	+0.0	+9.1	+0.0	46.4	54.7	-8.3	Line
4	169.178k	36.9	+0.3 +0.1	+0.1	+0.0	+9.1	+0.0	46.5	55.0	-8.5	Line
5	171.693k	35.9	+0.3 +0.1	+0.1	+0.0	+9.1	+0.0	45.5	54.9	-9.4	Line
6	162.995k Ave	17.0	+0.4 +0.1	+0.1	+0.0	+9.1	+0.0	26.7	55.3	-28.6	Line
7	161.947k Ave	16.8	+0.5 +0.1	+0.1	+0.0	+9.1	+0.0	26.6	55.4	-28.8	Line
^	161.946k	40.8	+0.5 +0.1	+0.1	+0.0	+9.1	+0.0	50.6	55.4	-4.8	Line
^	162.994k	40.8	+0.4 +0.1	+0.1	+0.0	+9.1	+0.0	50.5	55.3	-4.8	Line
^	158.383k	39.8	+0.6 +0.1	+0.1	+0.0	+9.1	+0.0	49.7	55.5	-5.8	Line
^	165.405k	37.9	+0.4 +0.1	+0.1	+0.0	+9.1	+0.0	47.6	55.2	-7.6	Line
^	166.872k	36.4	+0.4 +0.1	+0.1	+0.0	+9.1	+0.0	46.1	55.1	-9.0	Line

Test Location:	CKC Laboratories • 22116 23rd Drive SE, Suite A • Bothell, WA. 98021 • 1-800-500-4EMC (4362)		
Customer:	**Itron, Inc.**		
Specification:	**15.207 AC Mains - Average**		
Work Order #:	**106617**	Date:	3/21/2022
Test Type:	**Conducted Emissions**	Time:	16:32:02
Tested By:	Michael Atkinson	Sequence#:	15
Software:	EMITest 5.03.20		120V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

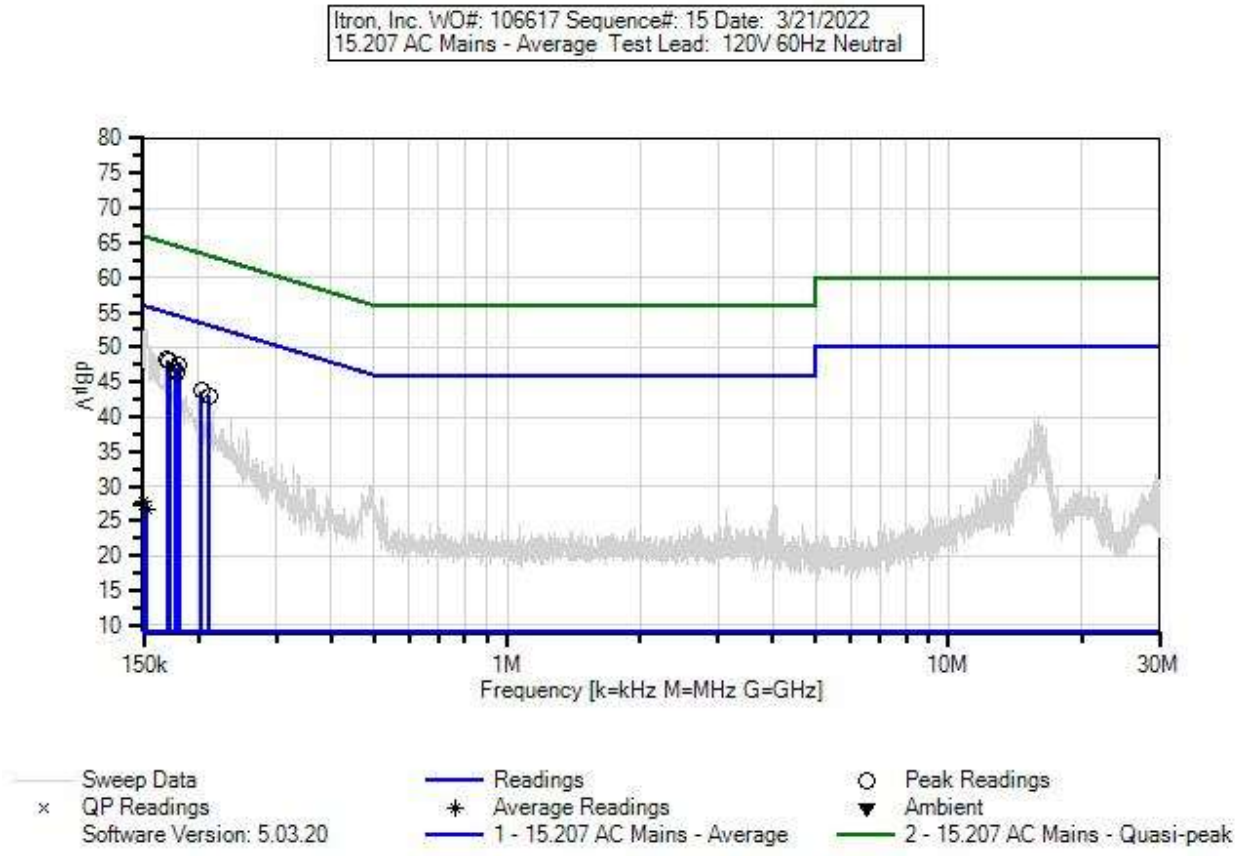
Environmental Conditions:
Temperature: 22°C
Humidity: 42%
Pressure: 102.4kPa

Method: ANSI C63.10 (2013)

Frequency: 150kHz-30MHz

Setup:
EUT is on foam table.
EUT is connected to support laptop.
EUT is transmitting using test software on support tablet to control EUT.
Support laptop is representative host device connected to AC mains through measurement LISN.

12.5k and 150k modulations investigated, worst case reported.



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02673	Spectrum Analyzer	E4446A	2/3/2021	2/3/2023
T1	AN02611	High Pass Filter	HE9615-150K-50-720B	1/5/2022	1/5/2024
T2	ANP06540	Cable	Heliax	1/17/2022	1/17/2024
T3	ANP06515	Cable	Heliax	7/1/2020	7/1/2022
T4	ANP06219	Attenuator	768-10	4/7/2020	4/7/2022
	AN01311	50uH LISN-Line1 (L)	3816/2	2/23/2022	2/23/2024
T5	AN01311	50uH LISN-Line2 (N)	3816/2	2/23/2022	2/23/2024

Measurement Data: Reading listed by margin. Test Lead: Neutral

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV	dBµV	dB	Ant
1	169.910k	38.6	+0.3 +0.1	+0.1	+0.0	+9.1	+0.0	48.2	55.0	-6.8	Neutr
2	171.272k	38.3	+0.3 +0.1	+0.1	+0.0	+9.1	+0.0	47.9	54.9	-7.0	Neutr
3	180.390k	37.8	+0.3 +0.1	+0.1	+0.0	+9.1	+0.0	47.4	54.5	-7.1	Neutr
4	176.932k	37.4	+0.3 +0.1	+0.1	+0.0	+9.1	+0.0	47.0	54.6	-7.6	Neutr
5	178.294k	36.7	+0.3 +0.1	+0.1	+0.0	+9.1	+0.0	46.3	54.6	-8.3	Neutr
6	203.131k	34.3	+0.1 +0.1	+0.1	+0.0	+9.1	+0.0	43.7	53.5	-9.8	Neutr
7	211.725k	33.6	+0.1 +0.1	+0.1	+0.0	+9.1	+0.0	43.0	53.1	-10.1	Neutr
8	150.628k Ave	16.6	+1.8 +0.1	+0.1	+0.0	+9.1	+0.0	27.7	56.0	-28.3	Neutr
9	152.829k Ave	16.7	+0.7 +0.1	+0.1	+0.0	+9.1	+0.0	26.7	55.8	-29.1	Neutr
^	152.828k	42.5	+0.7 +0.1	+0.1	+0.0	+9.1	+0.0	52.5	55.8	-3.3	Neutr
^	150.627k	41.3	+1.8 +0.1	+0.1	+0.0	+9.1	+0.0	52.4	56.0	-3.6	Neutr
^	156.810k	40.0	+0.6 +0.1	+0.1	+0.0	+9.1	+0.0	49.9	55.6	-5.7	Neutr

Test Setup Photo(s)

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.