

Ittron, Inc.

TEST REPORT FOR

MC3

Model: MC3B*

*(See Appendix A for Manufacturer's Declaration)

Tested to The Following Standards:

FCC Part 15 Subpart C Section(s)

**15.247
(FHSS 902-928 MHz)**

Report No.: 109570-1

Date of issue: April 30, 2024



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:

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Liberty Lake, WA 99019

Representative: Jack McPeck
Customer Reference Number: 294642

REPORT PREPARED BY:

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Project Number: 109570

DATE OF EQUIPMENT RECEIPT:

April 8, 2024

DATE(S) OF TESTING:

April 8 and 14, 2024 and June 17, 2024

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

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 (FHSS 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	Pass
15.247(a)(1)(i)	Average Time of Occupancy	NA	Pass
15.247(b)(2)	Output Power	NA	Pass
15.247(d)	RF Conducted Emissions & Band Edge	NA	Pass
15.247(d)	Radiated Emissions & Band Edge	NA	Pass
15.207	AC Conducted Emissions	NA	NA1

NA = Not Applicable

NA1 = Not applicable because EUT is battery powered.

ISO/IEC 17025 Decision Rule

The equipment sample utilized for testing is selected by the manufacturer. The declaration of pass or fail herein is a binary statement for simple acceptance rule (ILAC G8) based upon assessment to the specification(s) listed above, without consideration 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
MC3	Ittron, Inc.	MC3B	74005590

Support Equipment:

Device	Manufacturer	Model #	S/N
Laptop	Panasonic	CF-VEK33	T1126Z
Laptop PSU	Panasonic	CF-AA5713A M3	5713AM317811923D
EUT Power Source	RadioShack	Switching Power Supply	10A08

Configuration 2

Equipment Tested:

Device	Manufacturer	Model #	S/N
MC3	Ittron, Inc.	MC3B	74005590

Support Equipment:

Device	Manufacturer	Model #	S/N
Laptop	Panasonic	CF-VEK33	T1126Z
Laptop PSU	Panasonic	CF-AA5713A M3	5713AM317811923D
EUT Power Source	RadioShack	Switching Power Supply	10A08
5dBi Antenna	PCTEL	Generic	NA
Receiver Antenna	PCTEL	SUB-0275-001/H	S15180005

Configuration 3

Equipment Tested:

Device	Manufacturer	Model #	S/N
MC3	Ittron, Inc.	MC3B	74005590

Support Equipment:

Device	Manufacturer	Model #	S/N
Tablet	Panasonic	FZ-G1	IMEI: 990005071111034
Automobile Adapter (Tablet PSU)	Lind Electronics, inc.	PA1580-3262 FA	1331
Laptop Dock	Ittron, Inc.	Laptop Dock	NA
EUT Power Source	RadioShack	Switching Power Supply	10A08
5dBi Antenna	PCTEL	Generic	NA
Receiver Antenna	PCTEL	SUB-0275-001/H	S15180005

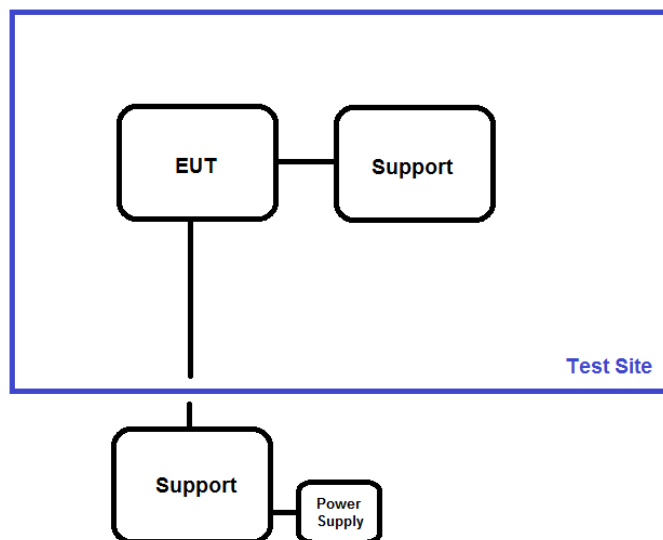
General Product Information:

Description of EUT	
Mobile Collection System	
Product Information	Manufacturer-Provided Details
Operating Frequencies Tested:	904.8-924.4 MHz
Equipment Type:	Stand-Alone Equipment
Type of Wideband System:	FHSS
Maximum Duty Cycle:	Tested at 100%
Modulation Type(s):	FSK 150kbps
Number of TX Chains:	1
Beamforming Type:	NA
Antenna Type(s) and Gain:	Omni / 5 dBi
Antenna Connection Type:	External Connector
Nominal Input Voltage:	Battery / 13.8VDC
Firmware / Software Version(s):	ARM version: 8.00.00.19 DSP version: 7.00.00.57 FPGA version: 3.08 TX version: 0.00 PSoC version: 0.00 MC3 SuperRaptor Test 4.2.0.0
Firmware / Software Description:	<ul style="list-style-type: none"> Radio Firmware consists of 3 separate files - <ul style="list-style-type: none"> ARM code for the ARM Cortex processor contained within the OMAP application processor. DSP code for the Digital Signal Processor contained within the OMAP application processor. FPGA code for the Field Programmable Gate Array Software for testing the EUT consists of MC3Test running on a PC. MC3Test is used to set the transmitter power, frequency, modulation, and data rate during testing. This software is not available to the end user and the end user has no control over transmitter settings.
Firmware / Software Setting(s):	TXDAC: 10 PA: 29
Tune-up or Adjustment(s):	None
Receiver Bandwidth and Synchronization:	The manufacturer declares the receiver input bandwidth matches the transmit channel bandwidth and shifts frequencies in synchronization with the transmitter.
The validity of results is dependent on the stated product details, the accuracy of which the manufacturer assumes full responsibility.	

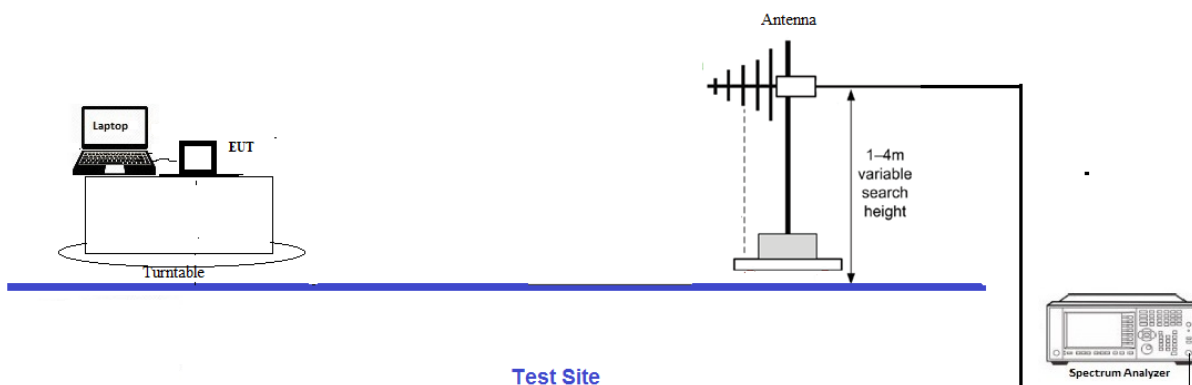
Block Diagram of Test Setup(s)

Config#	Setup Description of Block Diagram
1	EUT is setup for conducted measurements. The antenna port is directly connected to a spectrum analyzer via cable and attenuator.
2	EUT is setup for radiated measurements. Radio is connected to a laptop.
3	EUT is setup for radiated measurements. Radio is connected to a tablet.

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:	S. Pittsford
Test Method:	ANSI C63.10 (2020)	Test Date(s):	6/17/2024
Configuration:	1		
Test Setup:	EUT is setup for conducted measurements. The antenna port is directly connected to a spectrum analyzer via cable and attenuator.		

Environmental Conditions			
Temperature (°C)	21	Relative Humidity (%):	42

Test Equipment					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
03803	Spectrum Analyzer	Agilent	E4440A	2/12/2024	2/12/2026
P05748	Attenuator	Pasternack	PE7004-20	2/26/2024	2/26/2026
P06452	Cable	Andrews	Heliac	2/8/2023	2/8/2025

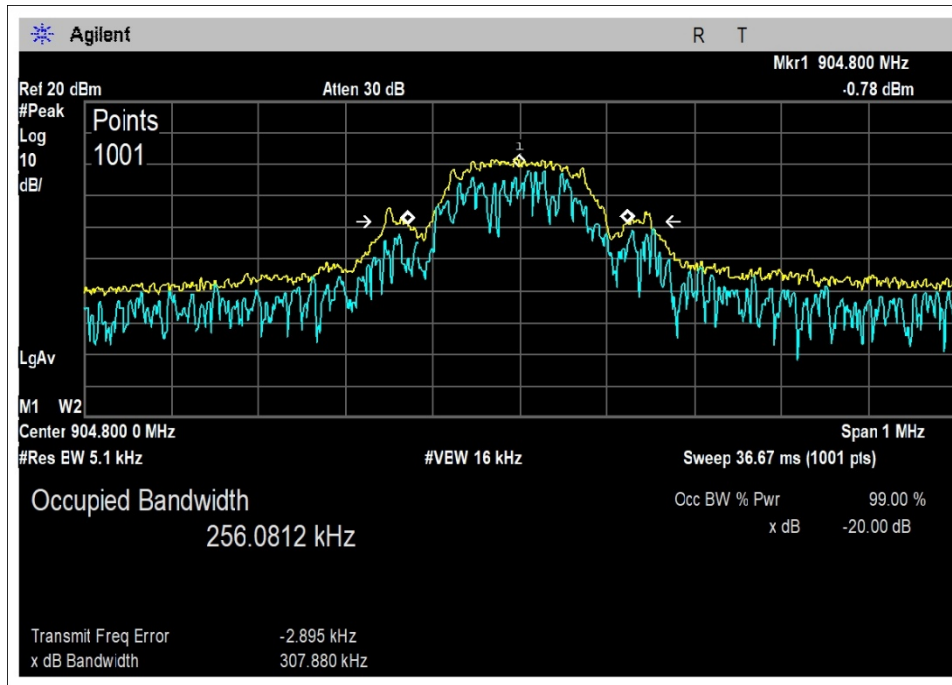
15.247(a)(1)(i) 20 dB Bandwidth

Test Data Summary					
Frequency (MHz)	Antenna Port	Modulation	Measured (kHz)	Limit (kHz)	Results
904.8	1	150kbps	307.9	≤500	Pass
914	1	150kbps	305.9	≤500	Pass
924.4	1	150kbps	198.9	≤500	Pass

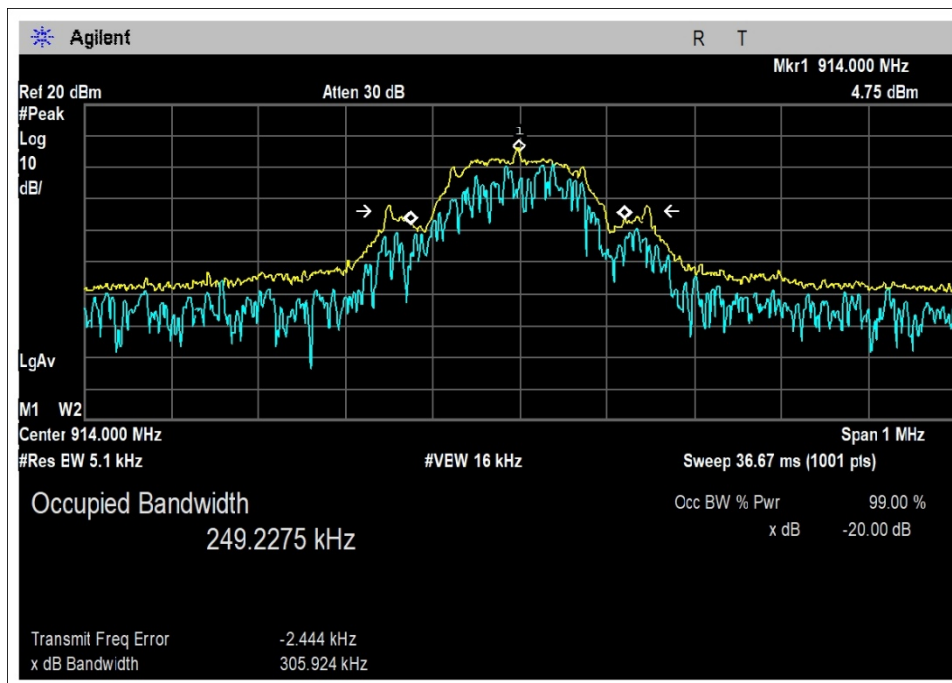
15.247(a)(1)(i) 99% Occupied Bandwidth

Test Data Summary					
Frequency (MHz)	Antenna Port	Modulation	Measured (kHz)	Limit (kHz)	Results
904.8	1	150kbps	256.1	None	N/A
914	1	150kbps	249.2		
924.4	1	150kbps	202.3		

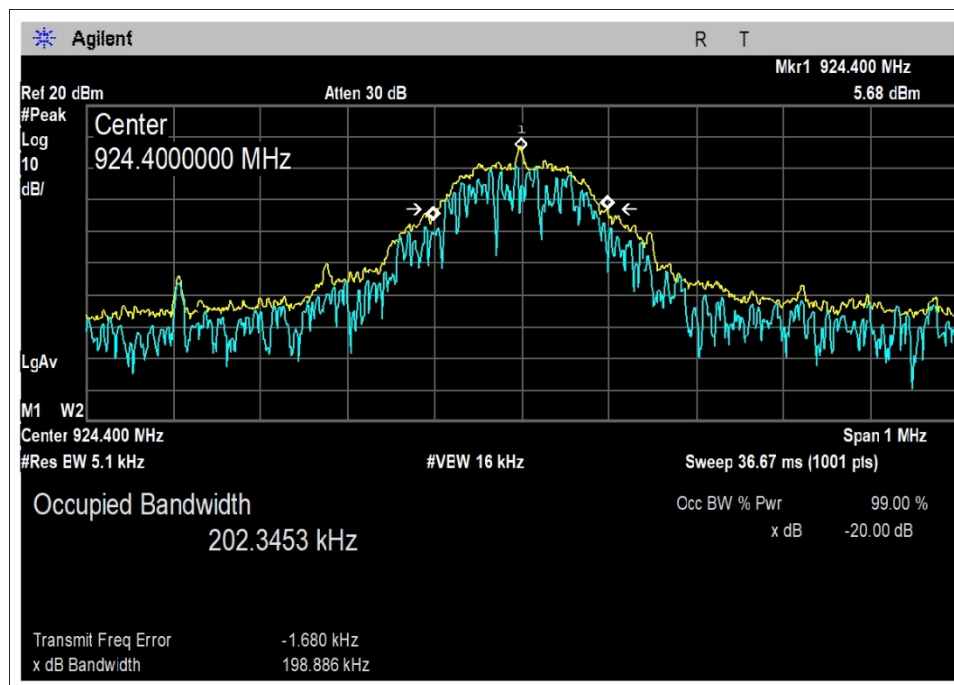
Plot(s)



Low Channel



Middle Channel



High Channel

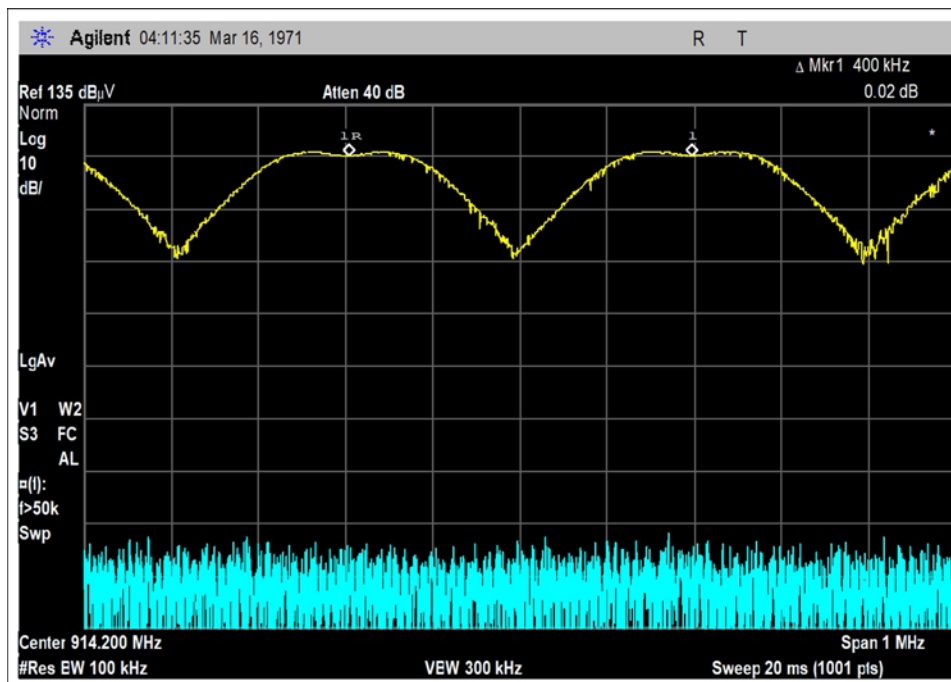
15.247(a)(1) Carrier Separation

Test Data Summary

Limit applied: 20dB bandwidth of the hopping channel.

Antenna Port	Operational Mode	Measured (kHz)	Limit (kHz)	Results
1	Hopping	400	>307.9	Pass

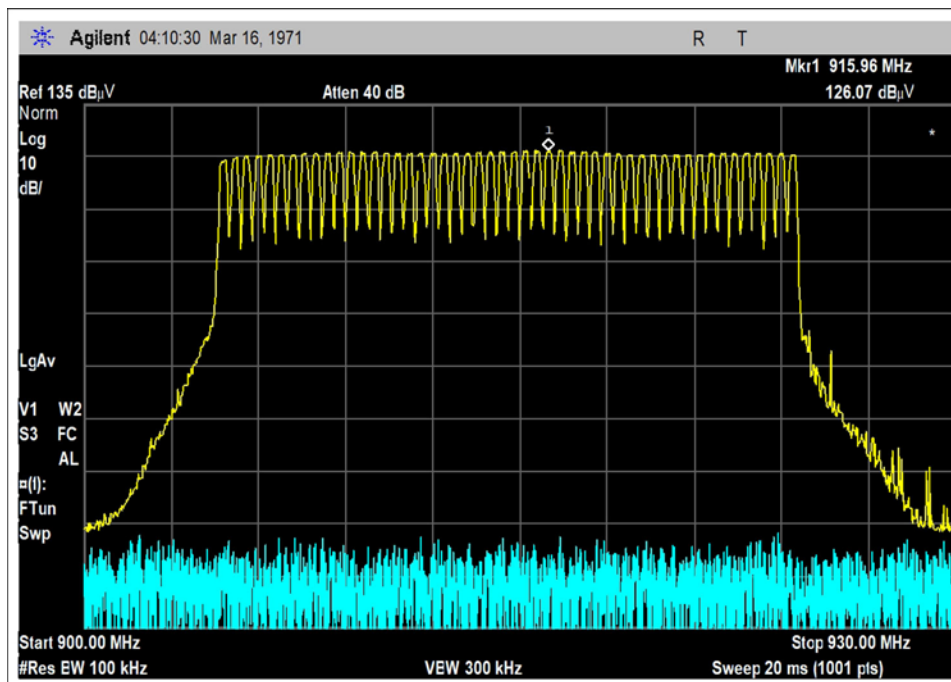
Plot(s)



15.247(a)(1)(i) Number of Channels

Test Data Summary				
$\text{Limit} = \begin{cases} 50 \text{ Channels} & 20 \text{ dB BW} < 250 \text{ kHz} \\ 25 \text{ Channels} & 20 \text{ dB BW} \geq 250 \text{ kHz} \end{cases}$				
Antenna Port	Operational Mode	Measured (Channels)	Limit (Channels)	Results
1	Hopping	50	≥ 50	Pass

Plot(s)



15.247(a)(1)(i) Time of Occupancy

Test Data Summary				
Observation Period, P_{obs} is derived from the following: $P_{obs} = \begin{cases} 20 \text{ Seconds} & 20 \text{ dB BW} < 250\text{kHz} \\ 10 \text{ Seconds} & 20 \text{ dB BW} \geq 250\text{kHz} \end{cases}$				
Antenna Port	Operational Mode	Measured (ms)	Limit (ms/ P_{obs})	Results
1	Hopping	100	≤ 400	Pass

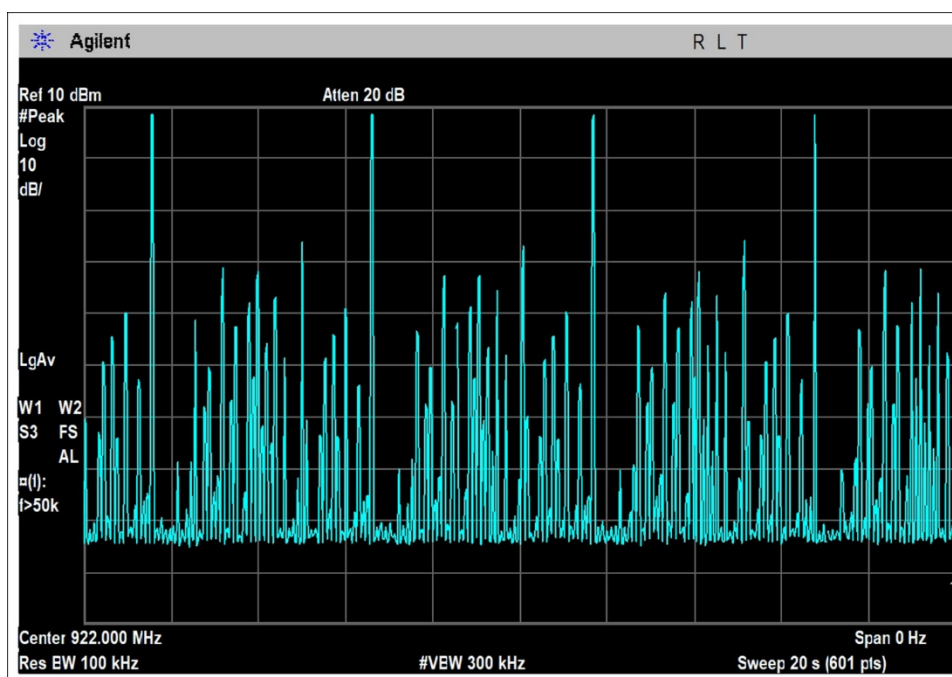
Measured results are calculated as follows:

$$Dwell \text{ time} = \left(\sum_{Bursts} RF \text{ Burst On Time} + \sum_{Control} Control \text{ Signal On time} \right) \Bigg|_{P_{obs}}$$

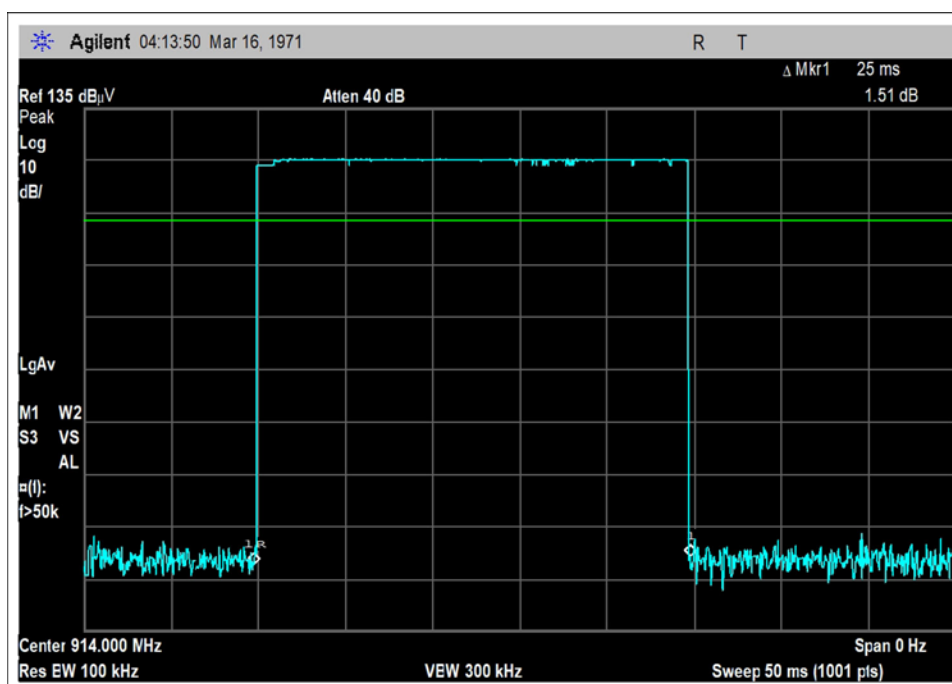
Actual Calculated Values:

Parameter	Value
Observation Period (P_{obs}):	20s
Number of RF Bursts / P_{obs} :	4
On time of RF Burst:	25ms
Number of Control or other signals / P_{obs} :	0
On time of Control or other Signals:	0
Total Measured On Time:	100ms

Plot(s)



20s



Pulse 25ms

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 (2020)	Test Date(s):	4/8/2024
Configuration:	1		
Test Setup:	EUT is setup for conducted measurements. The antenna port is directly connected to a spectrum analyzer via cable and attenuator.		

Environmental Conditions			
Temperature (°C)	21	Relative Humidity (%):	42

Test Equipment					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
02673	PSA Series Spectrum Analyzer	Agilent	E4446A	3/8/2024	3/8/2026
P05503	Attenuator	Narda	766-10	4/28/2023	4/28/2025
P06009	Cable	Andrew	Helix	3/7/2024	3/7/2026

Test Data Summary - Voltage Variations

This equipment is battery powered. Power output tests were performed using an external power supply to simulate a fresh battery (13.8VDC).

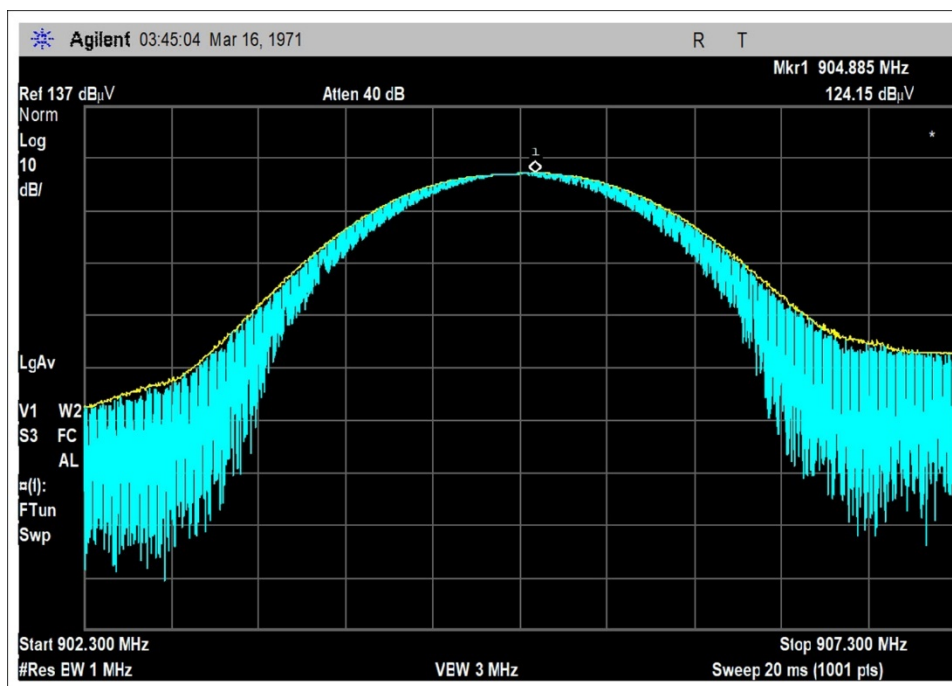
Test Data Summary - RF Conducted Measurement							
$\text{Limit} = \begin{cases} 30\text{dBm Conducted}/36\text{dBm EIRP} & \geq 50 \text{ Channels} \\ 24\text{dBm Conducted}/30\text{dBm EIRP} & < 50 \text{ Channels (min 25)} \end{cases}$							
Frequency (MHz)	Modulation	Ant. Type / Gain (dBi)	RF Conducted (dBm)		EIRP (dBm)		Results
			Measured	Limit	Calculated	Limit	
904.8	150kbps	Omni / 5 dBi	29.0	≤ 30	34.0	≤ 36	Pass
914	150kbps	Omni / 5 dBi	29.3	≤ 30	34.3	≤ 36	Pass
924.4	150kbps	Omni / 5 dBi	27.9	≤ 30	32.9	≤ 36	Pass

EIRP is calculated as RF conducted power (dBm) + antenna gain (dBi)

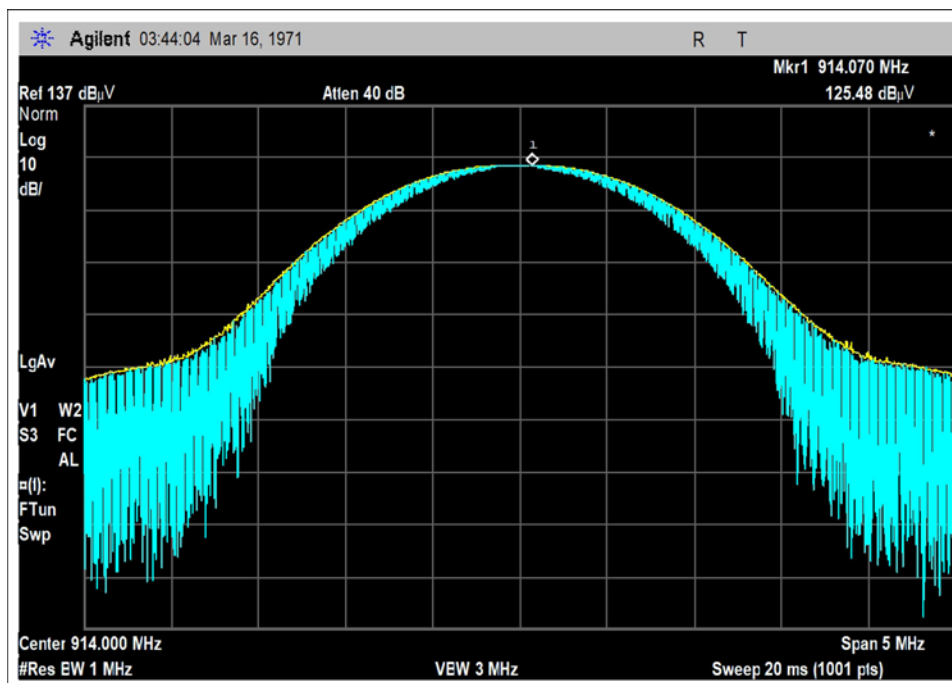
The RF conducted power limit is calculated according to the maximum allowed RF conducted power with a maximum of 6dBi gain antenna in accordance with 15.247(b):

$$\text{Limit} = 30 \text{ (or 24)} - \text{Roundup}(G - 6)$$

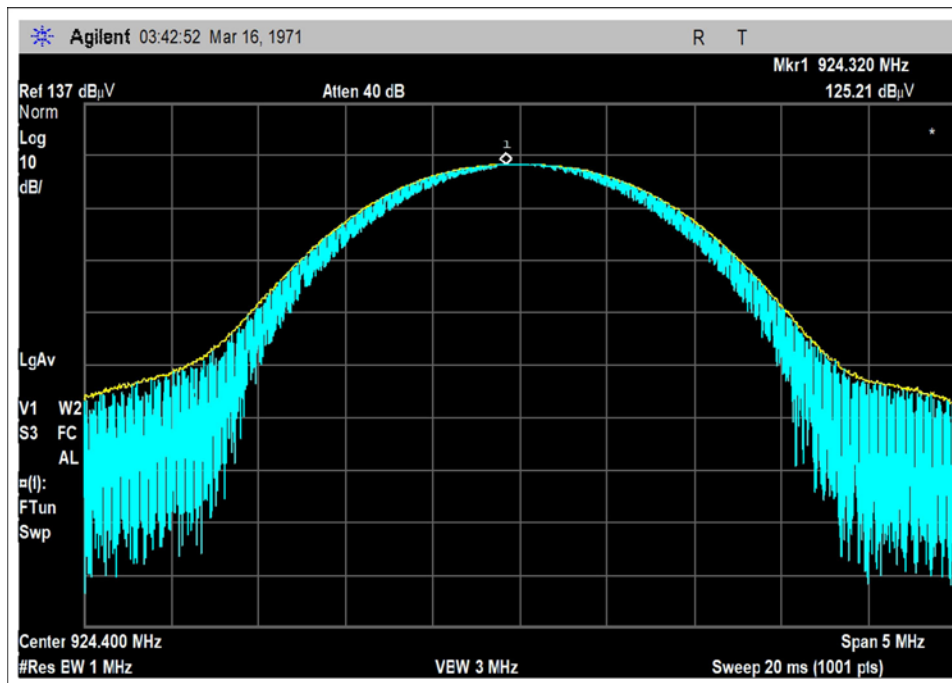
Plots



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 #: **109570** Date: 4/8/2024
 Test Type: **Conducted Emissions** Time: 07:52:09
 Tested By: Matt Harrison Sequence#: 1
 Software: EMITest 5.03.20 13.8VDC

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

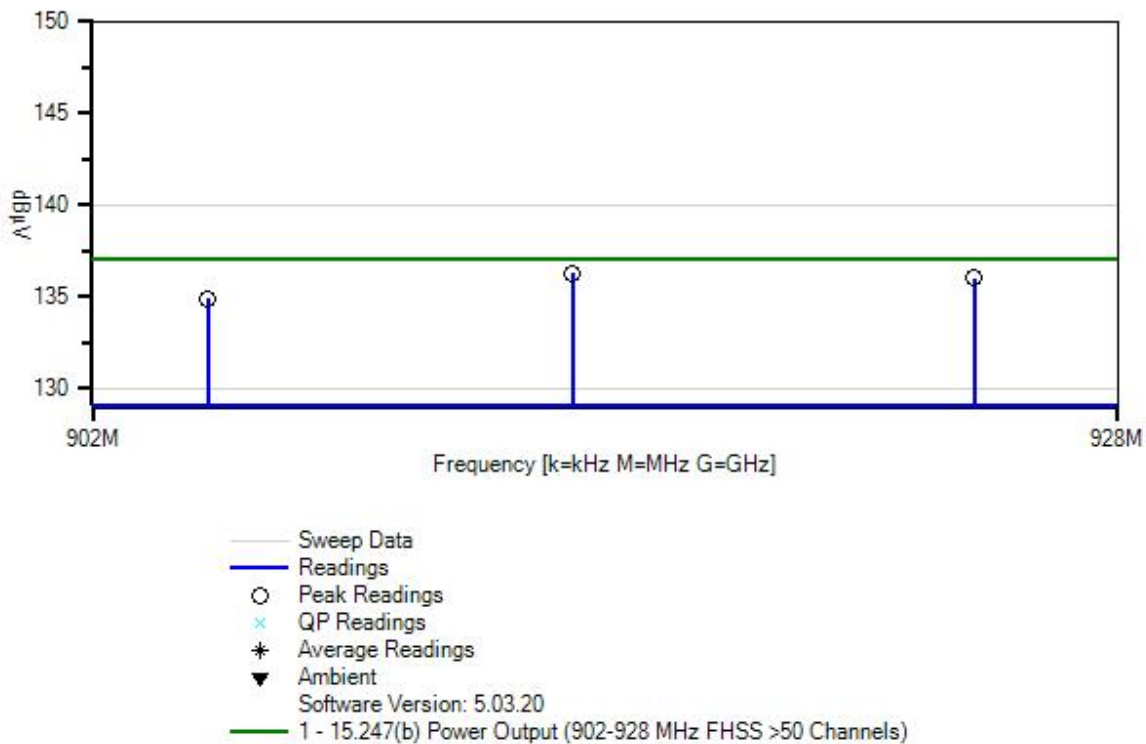
Test Environment Conditions:
 Temperature: 20°C
 Humidity: 42%
 Pressure: 100.3kPa

 Test Method: ANSI C63.10
 Test Mode: Modulated Tx
 Test Setup: EUT is setup for conducted measurements. The antenna port is directly connected to a spectrum analyzer via cable and attenuator.

 Band of Operation: 902-928 MHz
 Frequency Tested: 904.8, 914, 924.4 MHz
 Firmware Power Setting: 06 01 30
 Protocol /MCS/Modulation: FSK 150kbps
 Duty Cycle: 100%

 Antenna Type: External Omni
 Antenna Gain : 5 dBi.
 EUT Firmware: See Report Details
 Modifications: None

Itron, Inc. WO#: 109570 Sequence#: 1 Date: 4/8/2024
15.247(b) Power Output (902-928 MHz FHSS >50 Channels) Test Lead: 13.8VDC RF Port



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP05503	Attenuator	766-10	4/28/2023	4/28/2025
T2	ANP06009	Cable	Heliac	3/7/2024	3/7/2026
	AN02673	Spectrum Analyzer	E4446A	3/8/2024	3/8/2026

Measurement Data:

Reading listed by margin.

Test Lead: RF Port

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	Dist dB	Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	914.070M	125.5	+10.2	+0.6		+0.0	136.3	137.0	-0.7	RF Po
2	924.320M	125.2	+10.2	+0.6		+0.0	136.0	137.0	-1.0	RF Po
3	904.885M	124.2	+10.2	+0.5		+0.0	134.9	137.0	-2.1	RF Po

Test Setup Photo(s)



15.247(d) RF Conducted 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) Conducted Spurious Emissions**
 Work Order #: **109570** Date: 4/8/2024
 Test Type: **Conducted Emissions** Time: 08:14:53
 Tested By: Matt Harrison Sequence#: 3
 Software: EMITest 5.03.20 13.8VDC

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

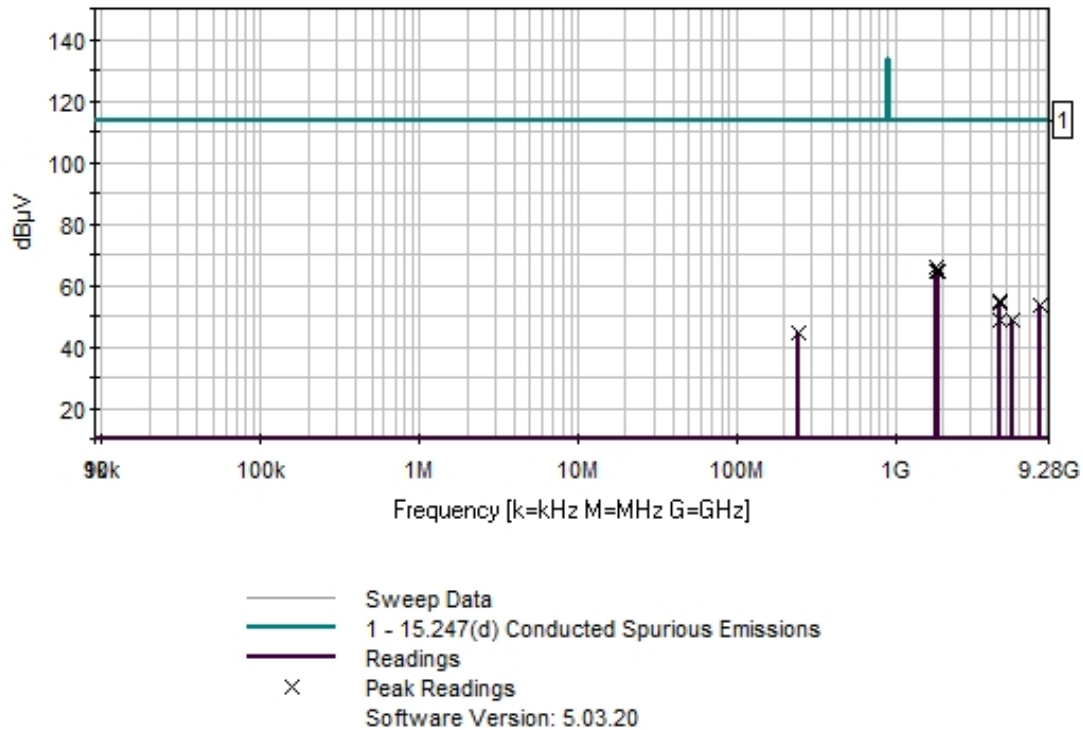
Test Environment Conditions:
 Temperature: 20°C
 Humidity: 42%
 Pressure: 100.3kPa

Test Method: ANSI C63.10
 Test Mode: Modulated Tx
 Test Setup: EUT is setup for conducted measurements. The antenna port is directly connected to a spectrum analyzer via cable and attenuator.

Band of Operation: 902-928 MHz
 Frequency Tested: 904.8, 914, 924.4 MHz
 Firmware Power Setting: 06 01 30
 Protocol /MCS/Modulation: FSK 150kbps
 Duty Cycle: 100%

Antenna Type: External Omni
 Antenna Gain: 5 dBi.
 EUT Firmware: See Report Details
 Modifications: None

Ittron, Inc. WO#: 109570 Sequence#: 3 Date: 4/8/2024
15.247(d) Conducted Spurious Emissions Test Lead: 13.8VDC RF Port



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP05503	Attenuator	766-10	4/28/2023	4/28/2025
T2	ANP06009	Cable	Heliac	3/7/2024	3/7/2026
	AN02673	Spectrum Analyzer	E4446A	3/8/2024	3/8/2026

Measurement Data:

Reading listed by margin.

Test Lead: RF Port

#	Freq MHz	Rdng dB μ V	T1 dB	T2 dB			Dist Table	Corr dB μ V	Spec dB μ V	Margin dB	Polar Ant
1	1827.918M	54.6	+10.2	+0.8			+0.0	65.6	113.5	-47.9	RF Po
2	1809.680M	53.7	+10.2	+0.8			+0.0	64.7	113.5	-48.8	RF Po
3	1848.692M	53.3	+10.2	+0.8			+0.0	64.3	113.5	-49.2	RF Po
4	4621.802M	53.8	+0.0	+1.3			+0.0	55.1	113.5	-58.4	RF Po
5	4569.800M	53.1	+0.0	+1.3			+0.0	54.4	113.5	-59.1	RF Po
6	8319.898M	53.5	+0.0	+0.0			+0.0	53.5	113.5	-60.0	RF Po
7	5429.092M	47.1	+0.0	+1.6			+0.0	48.7	113.5	-64.8	RF Po
8	4523.792M	47.3	+0.0	+1.3			+0.0	48.6	113.5	-64.9	RF Po
9	245.800M	33.7	+10.2	+0.3			+0.0	44.2	113.5	-69.3	RF Po

Band Edge

Band Edge Summary – Single Channel Mode

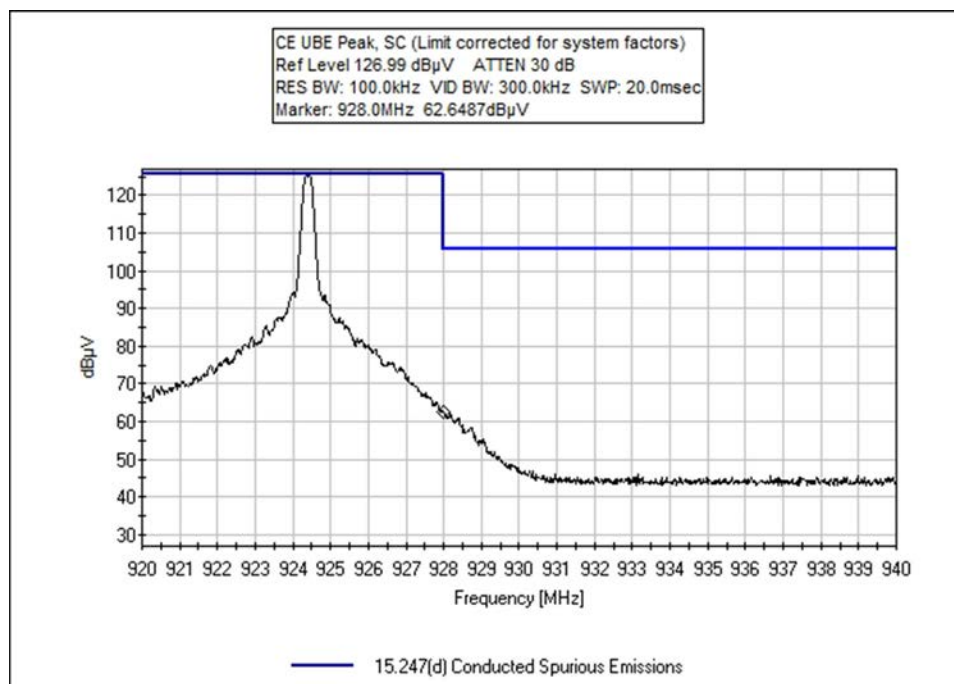
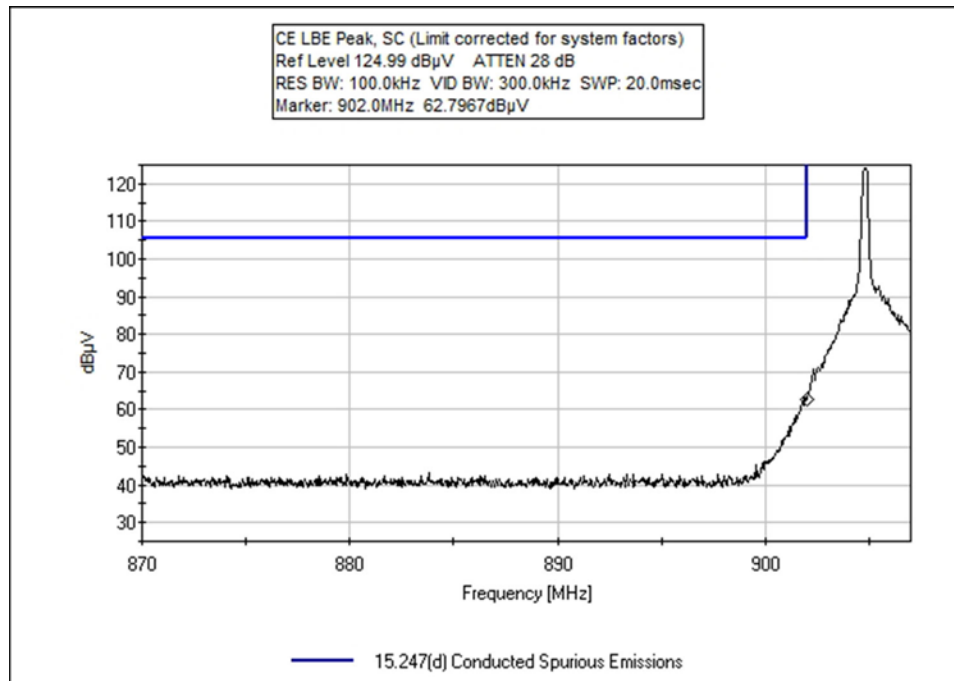
Frequency (MHz)	Modulation	Measured (dBμV)	Limit (dBμV)	Results
902	150kbps	73.5	< 116.4	Pass
928	150kbps	73.4	< 116.4	Pass

Band Edge Summary – Hopping Mode

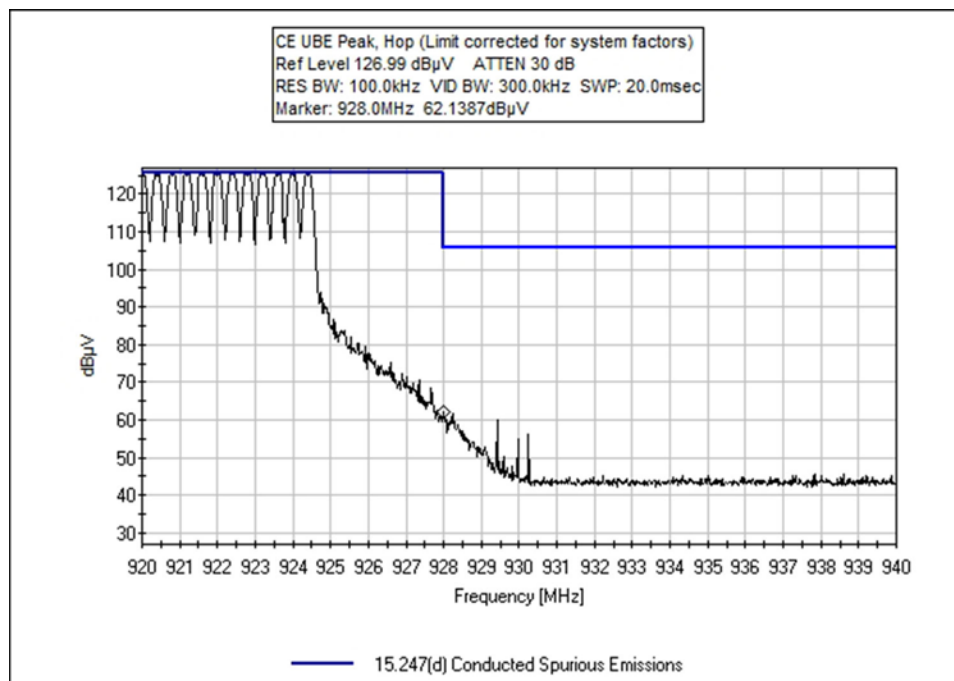
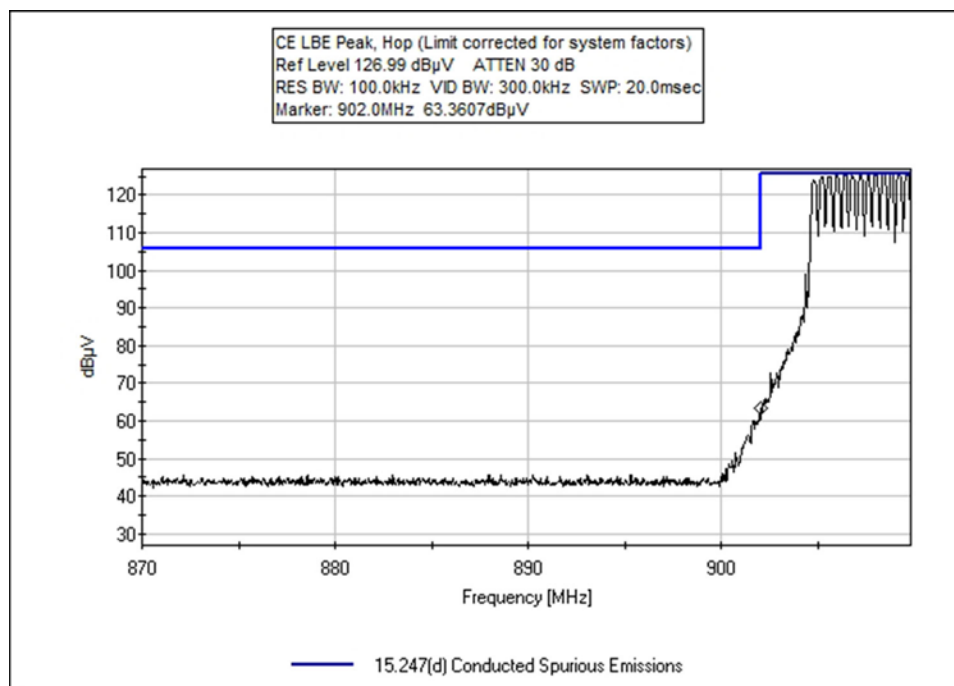
Frequency (MHz)	Modulation	Measured (dBμV)	Limit (dBμV)	Results
902	150kbps	74.1	< 116.4	Pass
928	150kbps	72.9	< 116.4	Pass

Band Edge Plots

Single Channel



Hopping



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 #: **109570** Date: 4/8/2024
 Test Type: **Conducted Emissions** Time: 08:07:54
 Tested By: Matt Harrison Sequence#: 2
 Software: EMITest 5.03.20 13.8VDC

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: 20°C Humidity: 42% Pressure: 100.3kPa Test Method: ANSI C63.10 Test Mode: Modulated Tx Test Setup: EUT is setup for conducted measurements. The antenna port is directly connected to a spectrum analyzer via cable and attenuator. Band of Operation: 902-928 MHz Frequency Tested: 904.8, 914, 924.4 MHz Firmware Power Setting: 06 01 30 Protocol /MCS/Modulation: FSK 150kbps Duty Cycle: 100% Antenna Type: External Omni Antenna Gain: 5 dBi. EUT Firmware: See Report Details Modifications: None

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP05503	Attenuator	766-10	4/28/2023	4/28/2025
T2	ANP06009	Cable	Heliac	3/7/2024	3/7/2026
T3	AN02673	Spectrum Analyzer	E4446A	3/8/2024	3/8/2026

Measurement Data:

Reading listed by margin.

Test Lead: RF Port

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	T3 dB	Dist dB	Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	902.000M	63.4	+10.2	+0.5	+0.0		+0.0	74.1	116.4 Hop	-42.3	RF Po
2	902.000M	62.8	+10.2	+0.5	+0.0		+0.0	73.5	116.4 SC	-42.9	RF Po
3	928.000M	62.6	+10.2	+0.6	+0.0		+0.0	73.4	116.4 SC	-43.0	RF Po
4	928.000M	62.1	+10.2	+0.6	+0.0		+0.0	72.9	116.4 Hop	-43.5	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 #: **109570** Date: 4/8/2024
 Test Type: **Radiated Scan** Time: 14:05:14
 Tested By: Matt Harrison Sequence#: 4
 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: 20°C
 Humidity: 42%
 Pressure: 100.3kPa

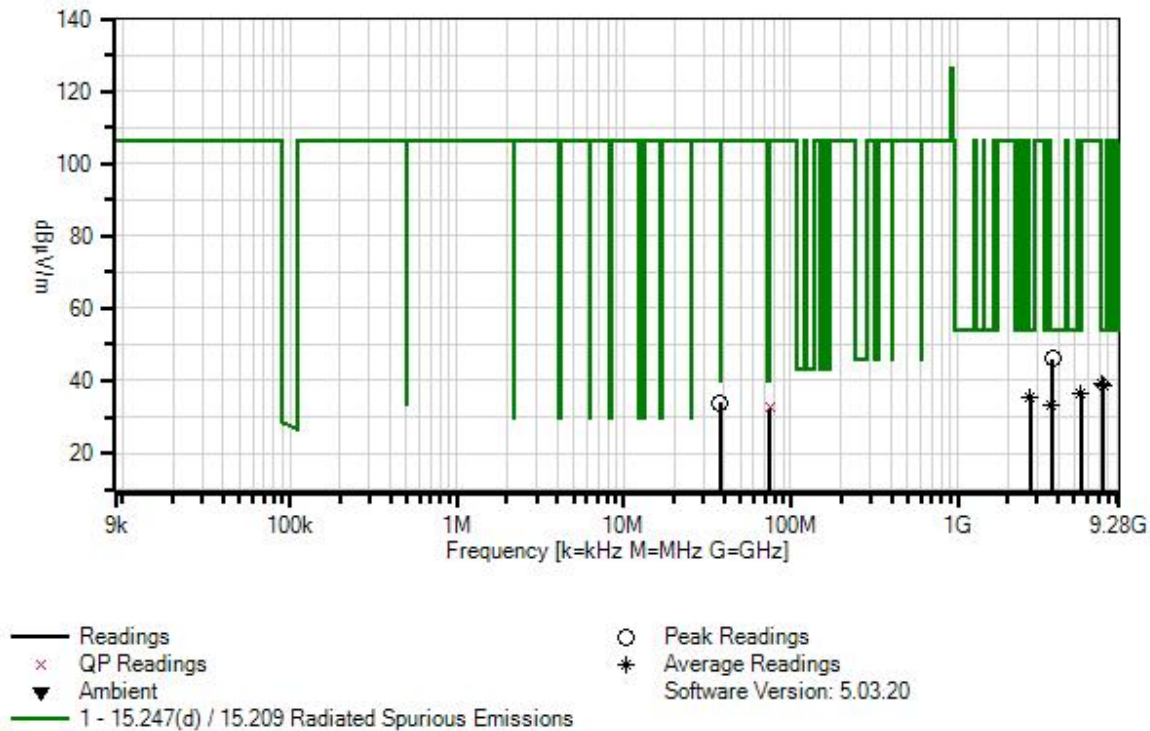
Test Method: ANSI C63.10
 Test Mode: Modulated Tx
 Test Setup: EUT is setup in a tabletop configuration. It is connected to 2 RX antennas, 1Tx/GPS RX antenna, a laptop, and a power supply. X, Y, Z and both polarities were explored, worst-case data provided.

Frequency Range: 9k-10GHz

Band of Operation: 902-928 MHz
 Frequency Tested: 904.8, 914, 924.4 MHz
 Firmware Power Setting: 06 01 30
 Protocol /MCS/Modulation: FSK 150kbps
 Duty Cycle: 100%

Antenna Type: External Omni
 Antenna Gain: 5 dBi.
 EUT Firmware: See Report Details
 Modifications: None

Ittron, Inc. WO#: 109570 Sequence#: 4 Date: 4/8/2024
15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Vert



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP06011	Cable	Heliac	11/16/2023	11/16/2025
T2	ANP05333	Cable	Heliac	8/8/2023	8/8/2025
T3	ANP05360	Cable	RG214	8/8/2023	8/8/2025
T4	AN02673	Spectrum Analyzer	E4446A	3/8/2024	3/8/2026
T5	AN03824	Biconilog Antenna	3142E	5/9/2023	5/9/2025
T6	AN03540	Preamp	83017A	3/24/2023	3/24/2025
T7	AN02374ANSI	Horn Antenna	RGA-60	5/26/2023	5/26/2025
T8	ANP07746	Attenuator	PE7004-6	2/16/2023	2/16/2025
T9	ANP06515	Cable	Heliac	2/28/2024	2/28/2026
T10	ANP07504	Cable	CLU40-KMKM-02.00F	1/19/2024	1/19/2026
T11	AN03170	High Pass Filter	HM1155-11SS	9/27/2023	9/27/2025
T12	AN02307	Preamp	8447D	8/9/2023	8/9/2025
T13	ANP08072	Band Reject Filter	BRC50722	10/3/2023	10/3/2025

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1 T5 T9 T13	T2 T6 T10	T3 T7 T11	T4 T8 T12	Dist	Corr	Spec	Margin	Polar
	MHz	dB μ V	dB	dB	dB	dB	Table	dB μ V/m	dB μ V/m	dB	Ant
1	37.511M	43.1	+0.0 +17.6 +0.0 +0.1	+0.3 +0.0 +0.0	+0.4 +0.0 +0.0	+0.0 +0.0 -27.7	+0.0	33.8	40.0	-6.2	Vert
2	74.931M QP	46.2	+0.1 +12.9 +0.0 +0.1	+0.4 +0.0 +0.0	+0.6 +0.0 +0.0	+0.0 +0.0 -27.6	+0.0	32.7	40.0	-7.3	Vert
^	74.931M	54.6	+0.1 +12.9 +0.0 +0.1	+0.4 +0.0 +0.0	+0.6 +0.0 +0.0	+0.0 +0.0 -27.6	+0.0	41.1	40.0	+1.1	Vert
4	3697.600M	37.4	+0.9 +0.0 +3.4 +0.0	+0.0 -33.9 +0.5	+0.0 +31.6 +0.3	+0.0 +5.9 +0.0	+0.0	46.1	54.0 924.4	-7.9	Vert
5	7312.000M Ave	23.6	+1.5 +0.0 +5.0 +0.0	+0.0 -35.0 +0.6	+0.0 +37.1 +0.5	+0.0 +5.9 +0.0	+0.0	39.2	54.0 914	-14.8	Vert
^	7312.000M	36.9	+1.5 +0.0 +5.0 +0.0	+0.0 -35.0 +0.6	+0.0 +37.1 +0.5	+0.0 +5.9 +0.0	+0.0	52.5	54.0 914	-1.5	Vert
7	7395.200M Ave	23.2	+1.5 +0.0 +5.0 +0.0	+0.0 -35.1 +0.6	+0.0 +37.3 +0.5	+0.0 +5.9 +0.0	+0.0	38.9	54.0 924.4	-15.1	Vert
^	7395.200M	38.0	+1.5 +0.0 +5.0 +0.0	+0.0 -35.1 +0.6	+0.0 +37.3 +0.5	+0.0 +5.9 +0.0	+0.0	53.7	54.0 924.4	-0.3	Vert
9	5428.420M Ave	24.0	+1.2 +0.0 +4.2 +0.0	+0.0 -33.8 +0.5	+0.0 +34.4 +0.4	+0.0 +5.8 +0.0	+0.0	36.7	54.0 904.8	-17.3	Vert
^	5428.420M	39.2	+1.2 +0.0 +4.2 +0.0	+0.0 -33.8 +0.5	+0.0 +34.4 +0.4	+0.0 +5.8 +0.0	+0.0	51.9	54.0 904.8	-2.1	Vert

11	2714.400M	30.1	+0.8	+0.0	+0.0	+0.0	+0.0	35.2	54.0	-18.8	Vert
	Ave		+0.0	-34.5	+29.3	+5.9			904.8		
			+2.8	+0.5	+0.3	+0.0					
			+0.0								
^	2714.400M	42.8	+0.8	+0.0	+0.0	+0.0	+0.0	47.9	54.0	-6.1	Vert
			+0.0	-34.5	+29.3	+5.9			904.8		
			+2.8	+0.5	+0.3	+0.0					
			+0.0								
13	3656.000M	25.1	+0.9	+0.0	+0.0	+0.0	+0.0	33.4	54.0	-20.6	Vert
	Ave		+0.0	-34.0	+31.4	+5.9			914		
			+3.4	+0.4	+0.3	+0.0					
			+0.0								
^	3656.000M	39.7	+0.9	+0.0	+0.0	+0.0	+0.0	48.0	54.0	-6.0	Vert
			+0.0	-34.0	+31.4	+5.9			914		
			+3.4	+0.4	+0.3	+0.0					
			+0.0								

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 #: **109570** Date: 4/14/2024
 Test Type: **Radiated Scan** Time: 10:33:34
 Tested By: Steven Pittsford Sequence#: 4
 Software: EMITest 5.03.20

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 3			

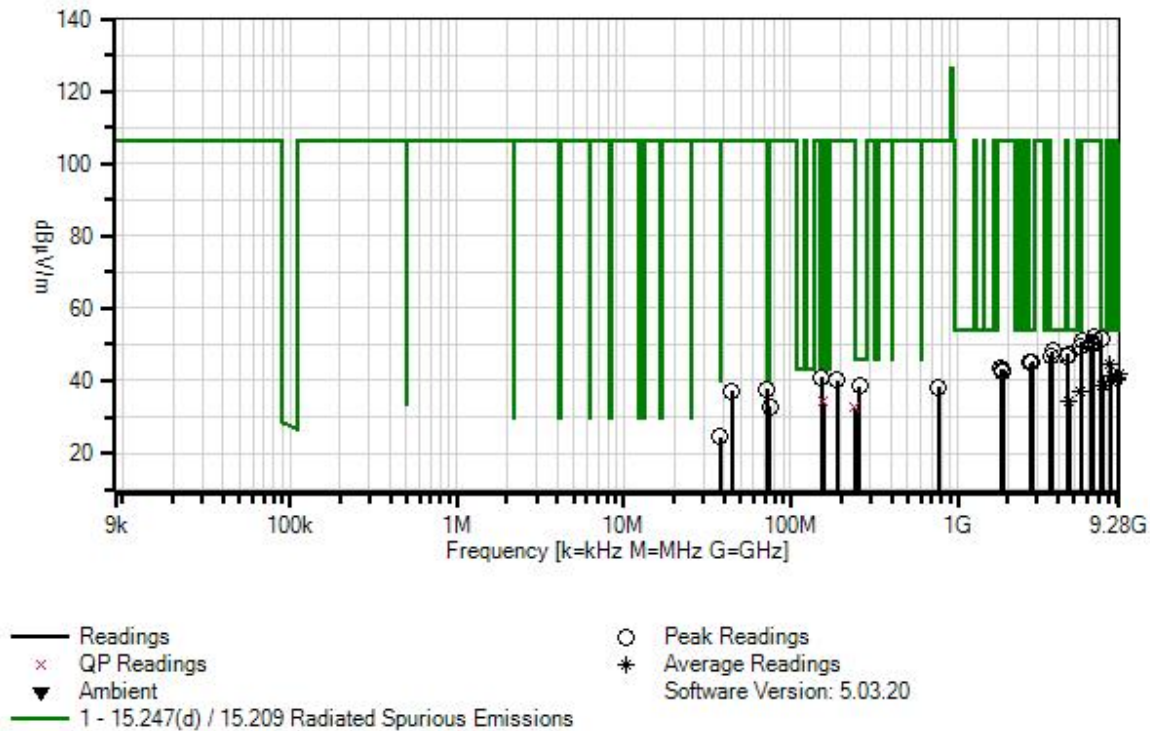
Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 3			

Test Conditions / Notes:

Test Environment Conditions: Temperature: 20°C Humidity: 42% Pressure: 100.3kPa Test Method: ANSI C63.10 Test Mode: Modulated Tx Test Setup: EUT is setup in a tabletop configuration. It is connected to 2 RX antennas, 1Tx/GPS RX antenna, a Tablet, and a power supply. X, Y, Z and both polarities were explored, worst-case data provided. Frequency Range: 9k-10GHz Band of Operation: 902-928 MHz Frequency Tested: 904.8, 914, 924.4 MHz Firmware Power Setting: 06 01 30 Protocol /MCS/Modulation: FSK 150kbps Duty Cycle: 100% Antenna Type: External Omni Antenna Gain: 5 dBi. EUT Firmware: See Report Details Modifications: None
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Ittron, Inc. WO#: 109570 Sequence#: 4 Date: 4/14/2024
15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Vert



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP06011	Cable	Heliacx	11/16/2023	11/16/2025
T2	ANP05333	Cable	Heliacx	8/8/2023	8/8/2025
T3	ANP05360	Cable	RG214	8/8/2023	8/8/2025
	AN02673	Spectrum Analyzer	E4446A	3/8/2024	3/8/2026
T4	AN03824	Biconilog Antenna	3142E	5/9/2023	5/9/2025
T5	AN03540	Preamp	83017A	3/24/2023	3/24/2025
T6	AN02374ANSI	Horn Antenna	RGA-60	5/26/2023	5/26/2025
T7	ANP07746	Attenuator	PE7004-6	2/16/2023	2/16/2025
T8	ANP06515	Cable	Heliacx	2/28/2024	2/28/2026
T9	ANP07504	Cable	CLU40-KMKM-02.00F	1/19/2024	1/19/2026
T10	AN03170	High Pass Filter	HM1155-11SS	9/27/2023	9/27/2025
T11	AN02307	Preamp	8447D	8/9/2023	8/9/2025
T12	ANP08072	Band Reject Filter	BRC50722	10/3/2023	10/3/2025

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1 T5 T9	T2 T6 T10	T3 T7 T11	T4 T8 T12	Dist	Corr	Spec	Margin	Polar
	MHz	dBμV	dB	dB	dB	dB	Table	dBμV/m	dBμV/m	dB	Ant
1	3698.420M	39.4	+0.9 -33.9 +0.5	+0.0 +31.6 +0.3	+0.0 +5.9 +0.0	+0.0 +3.4 +0.0	+0.0	48.1	54.0 924.4	-5.9	Vert 192
2	4570.000M	37.0	+1.1 -33.8 +0.6	+0.0 +32.2 +0.4	+0.0 +5.9 +0.0	+0.0 +3.9 +0.0	+0.0	47.3	54.0 914	-6.7	Vert 192
3	3619.900M	38.5	+0.9 -34.0 +0.4	+0.0 +31.4 +0.4	+0.0 +5.9 +0.0	+0.0 +3.4 +0.0	+0.0	46.9	54.0 904.8	-7.1	Vert 192
4	4523.660M	36.8	+1.0 -33.8 +0.7	+0.0 +32.1 +0.4	+0.0 +5.9 +0.0	+0.0 +3.8 +0.0	+0.0	46.9	54.0 904.8	-7.1	Vert 192
5	75.080M	46.3	+0.1 +0.0 +0.0	+0.4 +0.0 +0.0	+0.6 +0.0 -27.6	+12.9 +0.0 +0.1	+0.0	32.8	40.0	-7.2	Vert
6	3656.000M	38.3	+0.9 -34.0 +0.4	+0.0 +31.4 +0.3	+0.0 +5.9 +0.0	+0.0 +3.4 +0.0	+0.0	46.6	54.0 914	-7.4	Vert 192
7	256.400M	44.2	+0.2 +0.0 +0.0	+0.8 +0.0 +0.0	+1.2 +0.0 -26.8	+18.6 +0.0 +0.2	+0.0	38.4	46.0	-7.6	Vert
8	2771.570M	40.2	+0.8 -34.5 +0.5	+0.0 +29.3 +0.3	+0.0 +5.9 +0.0	+0.0 +2.8 +0.0	+0.0	45.3	54.0 924.4	-8.7	Vert 192
9	2714.595M	39.9	+0.8 -34.5 +0.5	+0.0 +29.3 +0.3	+0.0 +5.9 +0.0	+0.0 +2.8 +0.0	+0.0	45.0	54.0 904.8	-9.0	Vert 192
10	2742.000M	39.8	+0.8 -34.5 +0.5	+0.0 +29.3 +0.3	+0.0 +5.9 +0.0	+0.0 +2.8 +0.0	+0.0	44.9	54.0 914	-9.1	Vert 192
11	156.800M QP	43.1	+0.1 +0.0 +0.0	+0.6 +0.0 +0.0	+0.9 +0.0 -27.2	+16.6 +0.0 +0.2	+0.0	34.3	43.5	-9.2	Vert
^	156.800M	48.9	+0.1 +0.0 +0.0	+0.6 +0.0 +0.0	+0.9 +0.0 -27.2	+16.6 +0.0 +0.2	+0.0	40.1	43.5	-3.4	Vert
13	8142.860M Ave	26.9	+1.8 -35.4 +0.8	+0.0 +38.8 +0.5	+0.0 +6.0 +0.0	+0.0 +5.3 +0.0	+0.0	44.7	54.0 904.8	-9.3	Vert 192
^	8142.860M	36.0	+1.8 -35.4 +0.8	+0.0 +38.8 +0.5	+0.0 +6.0 +0.0	+0.0 +5.3 +0.0	+0.0	53.8	54.0 904.8	-0.2	Vert 192

15	8321.365M Ave	23.5	+1.8 -35.3 +1.0	+0.0 +38.3 +0.7	+0.0 +5.9 +0.0	+0.0 +5.3 +0.0	+0.0 360	41.2 924.4	54.0	-12.8	Vert 192
^	8321.365M	40.1	+1.8 -35.3 +1.0	+0.0 +38.3 +0.7	+0.0 +5.9 +0.0	+0.0 +5.3 +0.0	+0.0 314	57.8 924.4	54.0	+3.8	Vert 192
17	9140.000M Ave	22.5	+1.6 -34.7 +0.9	+0.0 +37.7 +0.9	+0.0 +5.9 +0.0	+0.0 +6.1 +0.0	+0.0	40.9 914	54.0	-13.1	Vert 192
^	9140.000M	36.7	+1.6 -34.7 +0.9	+0.0 +37.7 +0.9	+0.0 +5.9 +0.0	+0.0 +6.1 +0.0	+0.0	55.1 914	54.0	+1.1	Vert 192
19	240.400M QP	39.0	+0.2 +0.0 +0.0	+0.8 +0.0 +0.0	+1.1 +0.0 -26.9	+18.1 +0.0 +0.2	+0.0	32.5	46.0	-13.5	Vert
^	240.400M	46.1	+0.2 +0.0 +0.0	+0.8 +0.0 +0.0	+1.1 +0.0 -26.9	+18.1 +0.0 +0.2	+0.0	39.6	46.0	-6.4	Vert
21	9046.830M Ave	22.1	+1.7 -34.8 +0.8	+0.0 +37.9 +0.6	+0.0 +5.9 +0.0	+0.0 +6.0 +0.0	+0.0	40.2 904.8	54.0	-13.8	Vert 192
^	9046.830M	35.3	+1.7 -34.8 +0.8	+0.0 +37.9 +0.6	+0.0 +5.9 +0.0	+0.0 +6.0 +0.0	+0.0	53.4 904.8	54.0	-0.6	Vert 192
23	8226.000M Ave	22.3	+1.8 -35.4 +0.9	+0.0 +38.5 +0.5	+0.0 +5.9 +0.0	+0.0 +5.3 +0.0	+0.0	39.8 914	54.0	-14.2	Vert 192
^	8226.000M	36.1	+1.8 -35.4 +0.9	+0.0 +38.5 +0.5	+0.0 +5.9 +0.0	+0.0 +5.3 +0.0	+0.0	53.6 914	54.0	-0.4	Vert 192
25	7395.070M Ave	22.9	+1.5 -35.1 +0.6	+0.0 +37.3 +0.5	+0.0 +5.9 +0.0	+0.0 +5.0 +0.0	+0.0 360	38.6 924.4	54.0	-15.4	Vert 192
^	7395.070M	40.2	+1.5 -35.1 +0.6	+0.0 +37.3 +0.5	+0.0 +5.9 +0.0	+0.0 +5.0 +0.0	+0.0 222	55.9 924.4	54.0	+1.9	Vert 192
27	7312.000M Ave	23.0	+1.5 -35.0 +0.6	+0.0 +37.1 +0.5	+0.0 +5.9 +0.0	+0.0 +5.0 +0.0	+0.0	38.6 914	54.0	-15.4	Vert 192
^	7312.000M	36.3	+1.5 -35.0 +0.6	+0.0 +37.1 +0.5	+0.0 +5.9 +0.0	+0.0 +5.0 +0.0	+0.0	51.9 914	54.0	-2.1	Vert 192
29	37.910M	34.0	+0.0 +0.0 +0.0	+0.3 +0.0 +0.0	+0.4 +0.0 -27.7	+17.4 +0.0 +0.1	+0.0	24.5	40.0	-15.5	Vert
30	5426.605M Ave	24.6	+1.2 -33.8 +0.5	+0.0 +34.4 +0.4	+0.0 +5.8 +0.0	+0.0 +4.2 +0.0	+0.0 360	37.3 904.8	54.0	-16.7	Vert 192
^	5426.605M	36.2	+1.2 -33.8 +0.5	+0.0 +34.4 +0.4	+0.0 +5.8 +0.0	+0.0 +4.2 +0.0	+0.0	48.9 904.8	54.0	-5.1	Vert 192

32	4622.225M	23.8	+1.1	+0.0	+0.0	+0.0	+0.0	34.3	54.0	-19.7	Vert
	Ave		-33.8	+32.4	+5.9	+3.9	360		924.4		192
			+0.5	+0.5	+0.0	+0.0					
^	4622.225M	38.6	+1.1	+0.0	+0.0	+0.0	+0.0	49.1	54.0	-4.9	Vert
			-33.8	+32.4	+5.9	+3.9			924.4		192
			+0.5	+0.5	+0.0	+0.0					
34	6472.120M	38.2	+1.3	+0.0	+0.0	+0.0	+0.0	52.1	106.4	-54.3	Vert
			-34.3	+34.7	+5.9	+5.2	102		924.4		192
			+0.5	+0.6	+0.0	+0.0					
35	7239.345M	36.4	+1.4	+0.0	+0.0	+0.0	+0.0	51.5	106.4	-54.9	Vert
			-35.0	+36.9	+5.9	+4.9			904.8		192
			+0.5	+0.5	+0.0	+0.0					
36	5545.200M	38.3	+1.2	+0.0	+0.0	+0.0	+0.0	51.0	106.4	-55.4	Vert
			-33.8	+34.4	+5.8	+4.2			924.4		192
			+0.4	+0.5	+0.0	+0.0					
37	6398.000M	36.7	+1.3	+0.0	+0.0	+0.0	+0.0	50.6	106.4	-55.8	Vert
			-34.2	+34.7	+5.9	+5.1			914		192
			+0.6	+0.5	+0.0	+0.0					
38	6333.000M	36.2	+1.2	+0.0	+0.0	+0.0	+0.0	49.9	106.4	-56.5	Vert
			-34.2	+34.7	+5.9	+5.0			904.8		192
			+0.6	+0.5	+0.0	+0.0					
39	5484.000M	36.7	+1.2	+0.0	+0.0	+0.0	+0.0	49.4	106.4	-57.0	Vert
			-33.8	+34.4	+5.8	+4.2			914		192
			+0.4	+0.5	+0.0	+0.0					
40	1811.160M	41.5	+0.6	+0.0	+0.0	+0.0	+0.0	43.4	106.4	-63.0	Vert
			-35.1	+27.4	+5.9	+2.3			904.8		192
			+0.4	+0.4	+0.0	+0.0					
41	1849.480M	40.9	+0.6	+0.0	+0.0	+0.0	+0.0	43.2	106.4	-63.2	Vert
			-35.0	+27.7	+5.9	+2.3			924.4		192
			+0.4	+0.4	+0.0	+0.0					
42	1828.000M	40.2	+0.6	+0.0	+0.0	+0.0	+0.0	42.2	106.4	-64.2	Vert
			-35.1	+27.5	+5.9	+2.3			914		192
			+0.4	+0.4	+0.0	+0.0					
43	9245.025M	23.6	+1.6	+0.0	+0.0	+0.0	+0.0	42.0	106.4	-64.4	Vert
	Ave		-34.7	+37.8	+5.9	+6.2	360		924.4		192
			+1.0	+0.6	+0.0	+0.0					
^	9245.025M	41.1	+1.6	+0.0	+0.0	+0.0	+0.0	59.5	106.4	-46.9	Vert
			-34.7	+37.8	+5.9	+6.2	360		924.4		192
			+1.0	+0.6	+0.0	+0.0					
45	153.600M	50.4	+0.1	+0.6	+0.9	+16.1	+0.0	41.0	106.4	-65.4	Vert
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	-27.3	+0.2					

46	190.400M	49.8	+0.2 +0.0 +0.0	+0.7 +0.0 +0.0	+1.0 +0.0 -27.1	+15.4 +0.0 +0.2	+0.0	40.2	106.4	-66.2	Vert
47	764.900M	32.4	+0.4 +0.0 +0.0	+1.4 +0.0 +0.0	+2.5 +0.0 -27.6	+28.7 +0.0 +0.5	+0.0	38.3	106.4	-68.1	Vert
48	71.930M	51.1	+0.1 +0.0 +0.0	+0.4 +0.0 +0.0	+0.6 +0.0 -27.6	+13.0 +0.0 +0.1	+0.0	37.7	106.4	-68.7	Vert
49	44.420M	49.9	+0.0 +0.0 +0.0	+0.3 +0.0 +0.0	+0.4 +0.0 -27.7	+14.1 +0.0 +0.1	+0.0	37.1	106.4	-69.3	Vert

Band Edge

Band Edge Summary – Single Channel Mode Configuration 2

Frequency (MHz)	Modulation	Ant. Type	Field Strength (dBuV/m @3m)	Limit (dBuV/m @3m)	Results
614	150kbps	Omni	40.4	<46	Pass
902			62.6	<109.3	Pass
928			63.8	<109.3	Pass
960			49.4	<54	Pass

Band Edge Summary – Hopping Mode Configuration 2

Frequency (MHz)	Modulation	Ant. Type	Field Strength (dBuV/m @3m)	Limit (dBuV/m @3m)	Results
614	150kbps	Omni	40.7	<46	Pass
902			62.5	<109.3	Pass
928			61.3	<109.3	Pass
960			49.8	<54	Pass

Band Edge Summary – Single Channel Mode Configuration 3

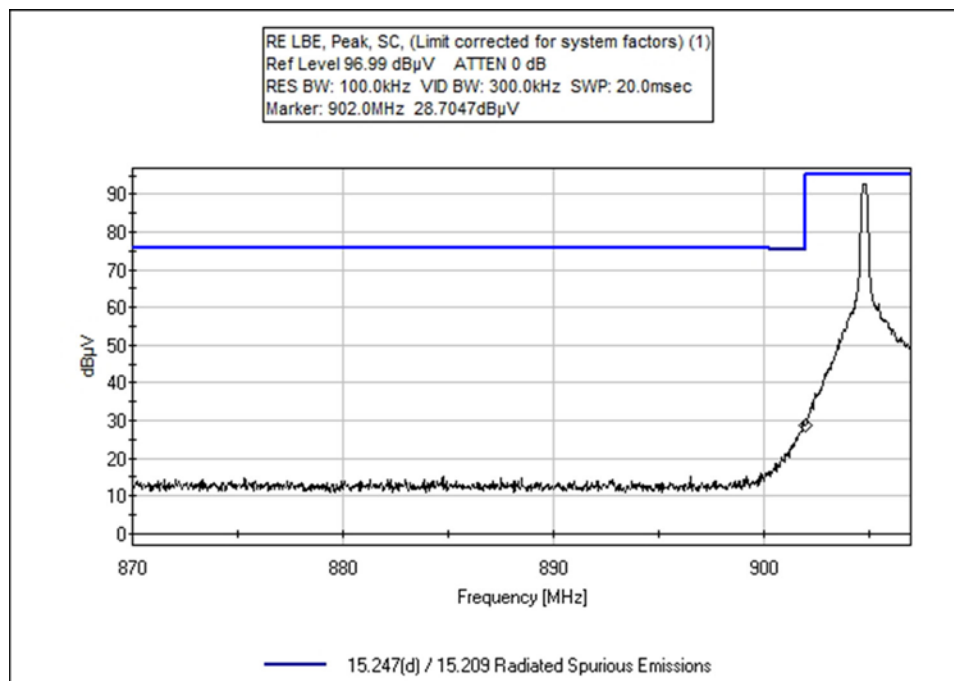
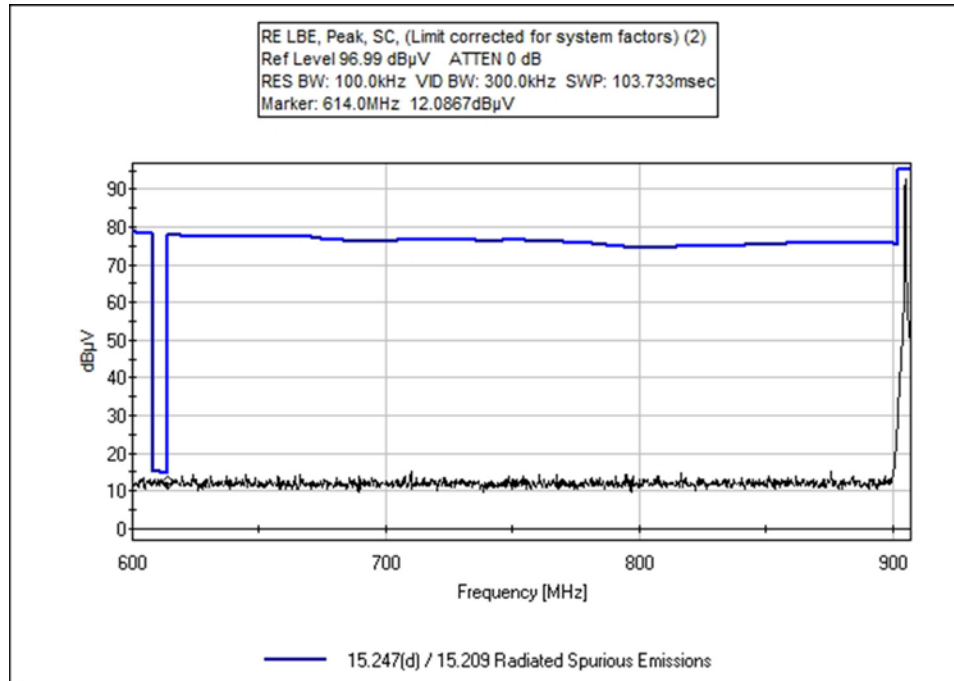
Frequency (MHz)	Modulation	Ant. Type	Field Strength (dBuV/m @3m)	Limit (dBuV/m @3m)	Results
614	150kbps	Omni	40.7	<46	Pass
902			62.5	<109.3	Pass
928			61.3	<109.3	Pass
960			49.8	<54	Pass

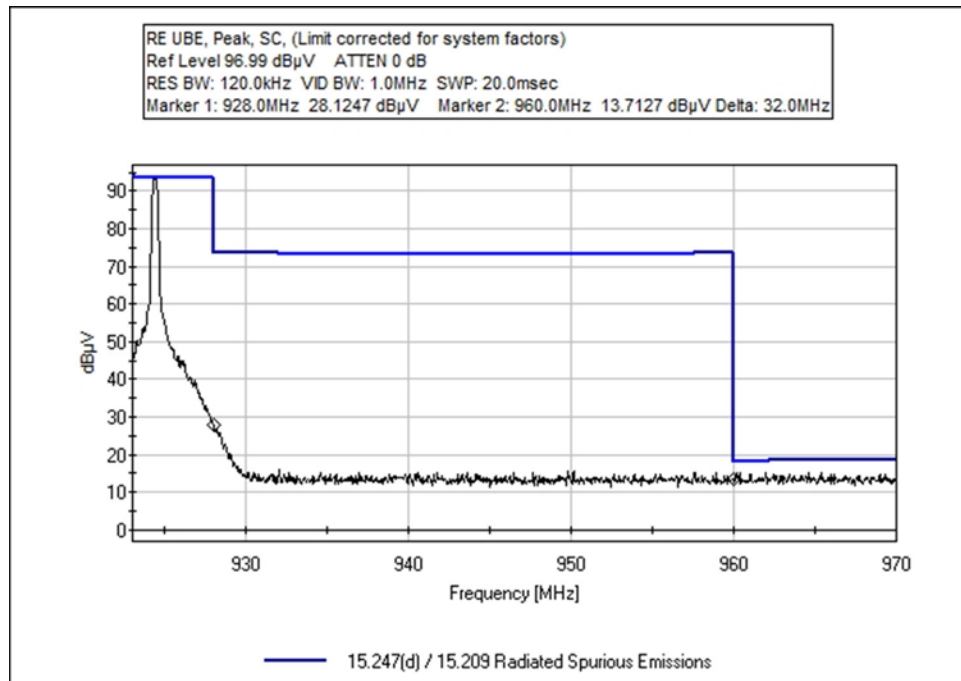
Band Edge Summary – Hopping Mode Configuration 3

Frequency (MHz)	Modulation	Ant. Type	Field Strength (dBuV/m @3m)	Limit (dBuV/m @3m)	Results
614	150kbps	Omni	40.7	<46	Pass
902			60.5	<109.3	Pass
928			64.2	<109.3	Pass
960			49.0	<54	Pass

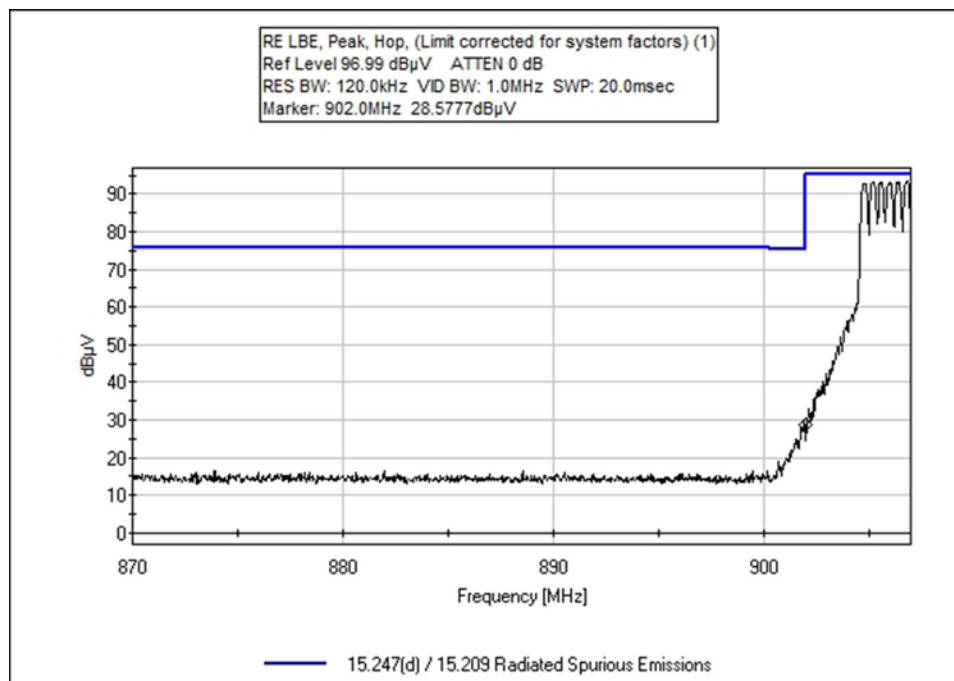
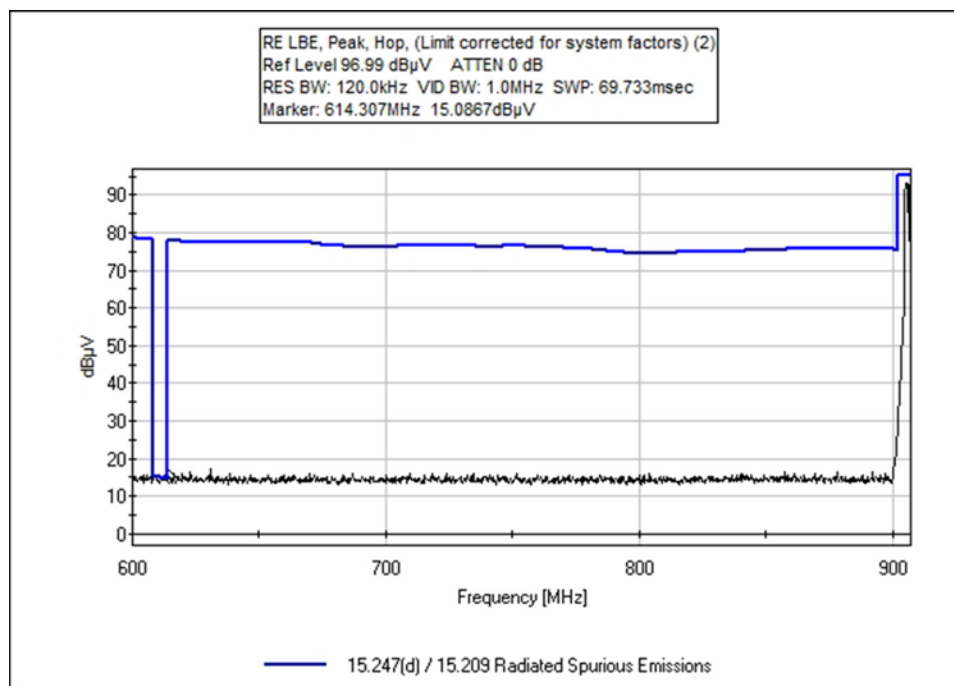
Band Edge Plots

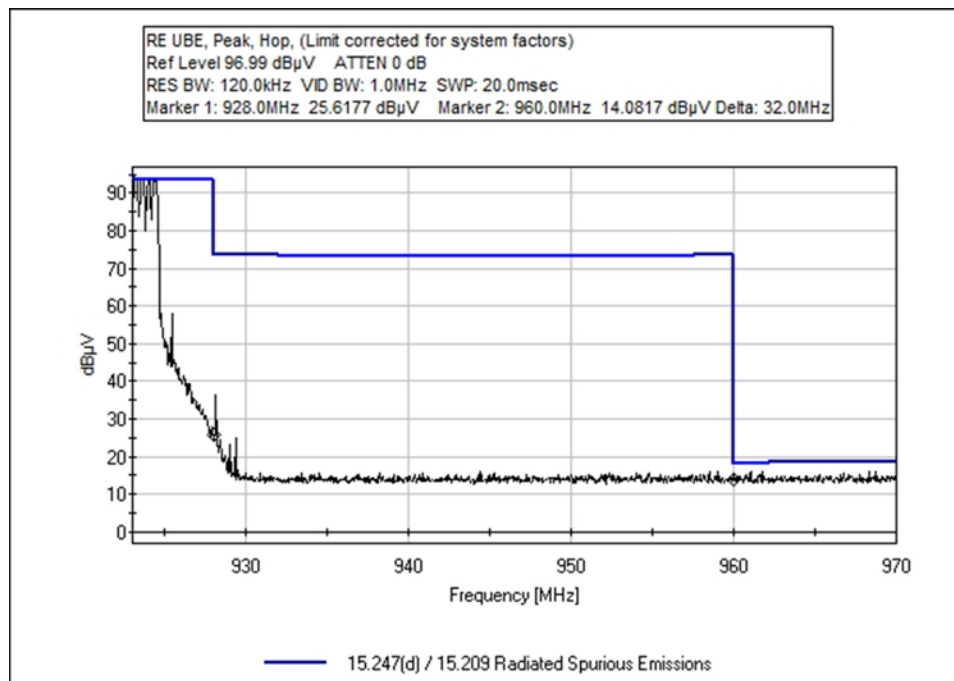
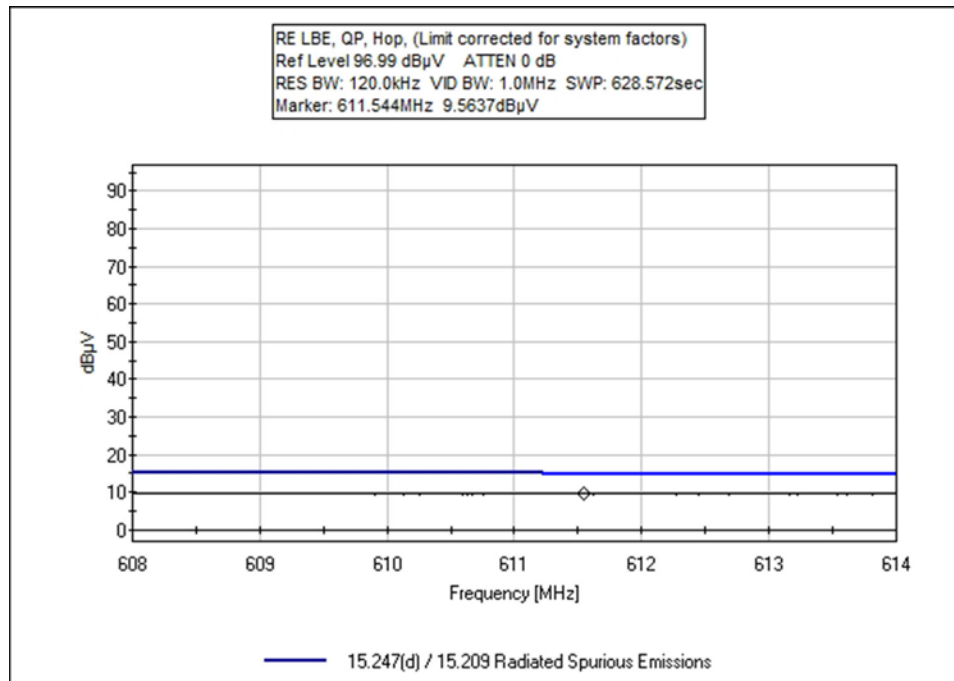
Configuration 2 Single Channel



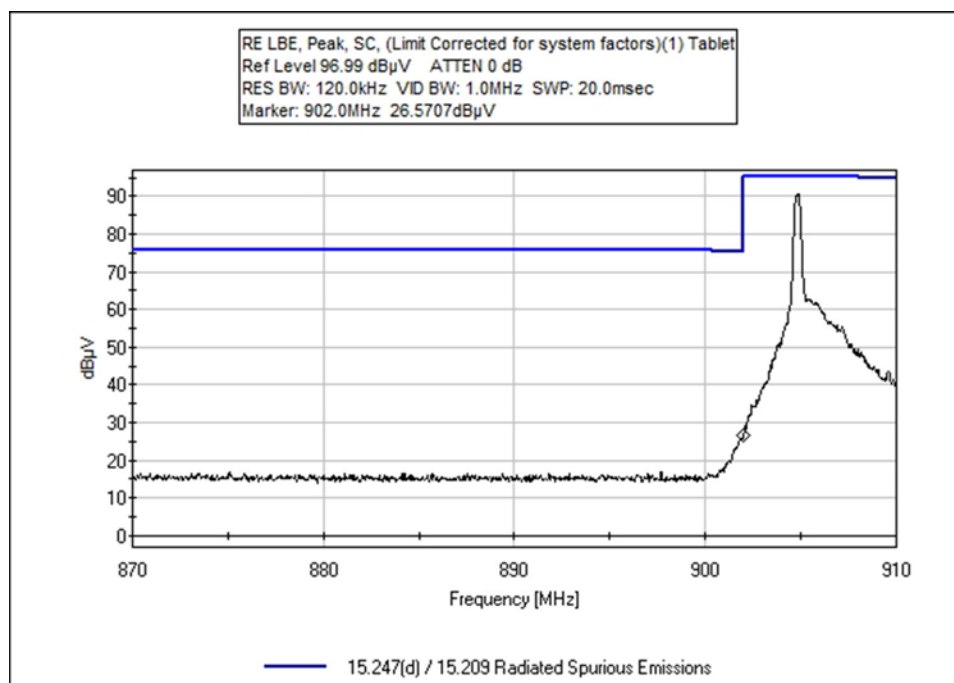
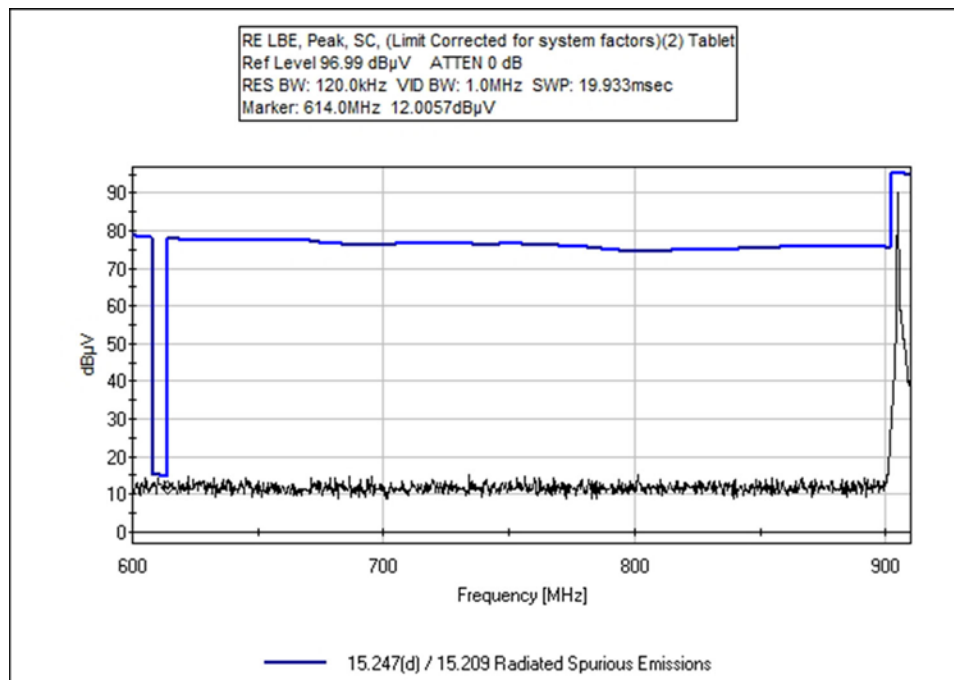


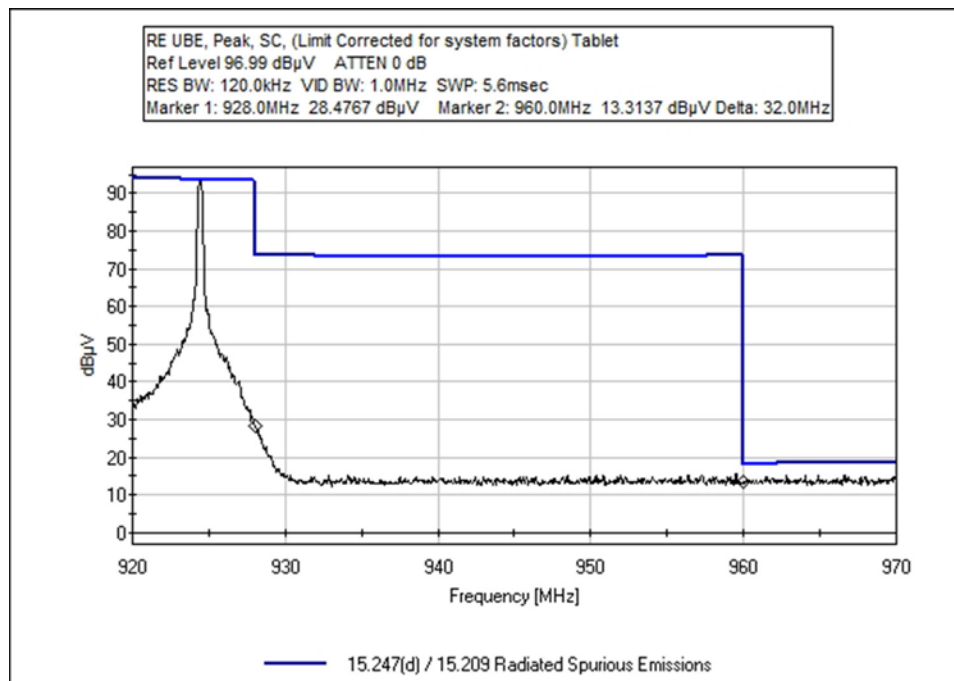
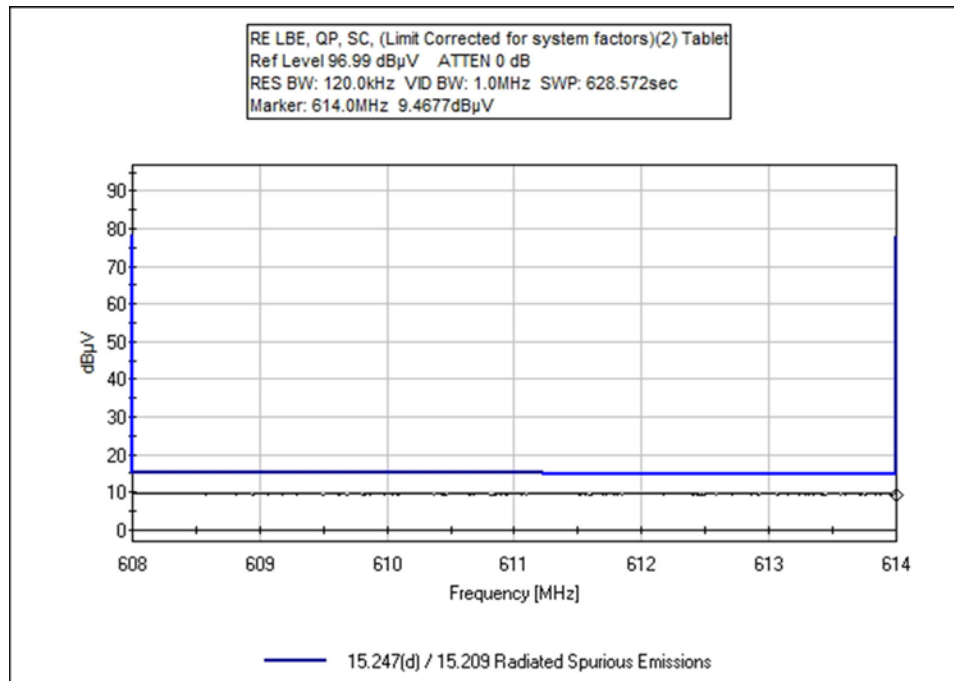
Hopping



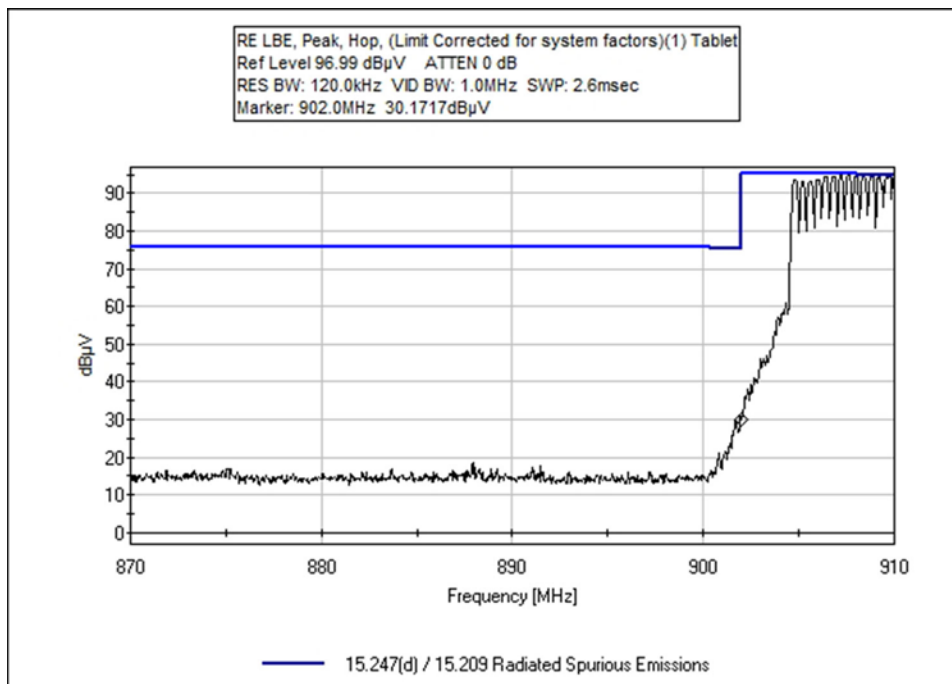
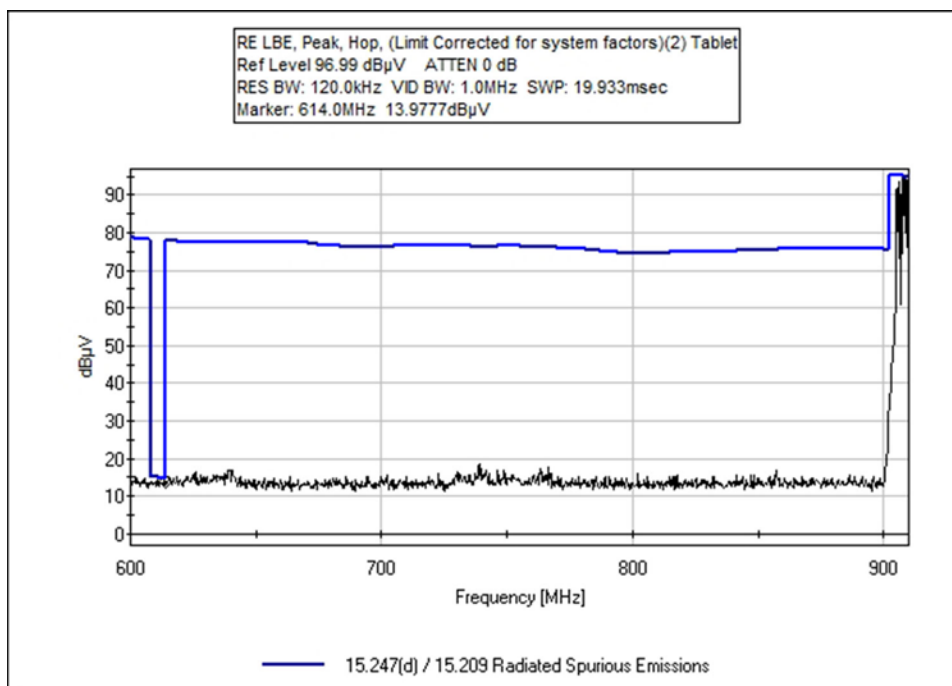


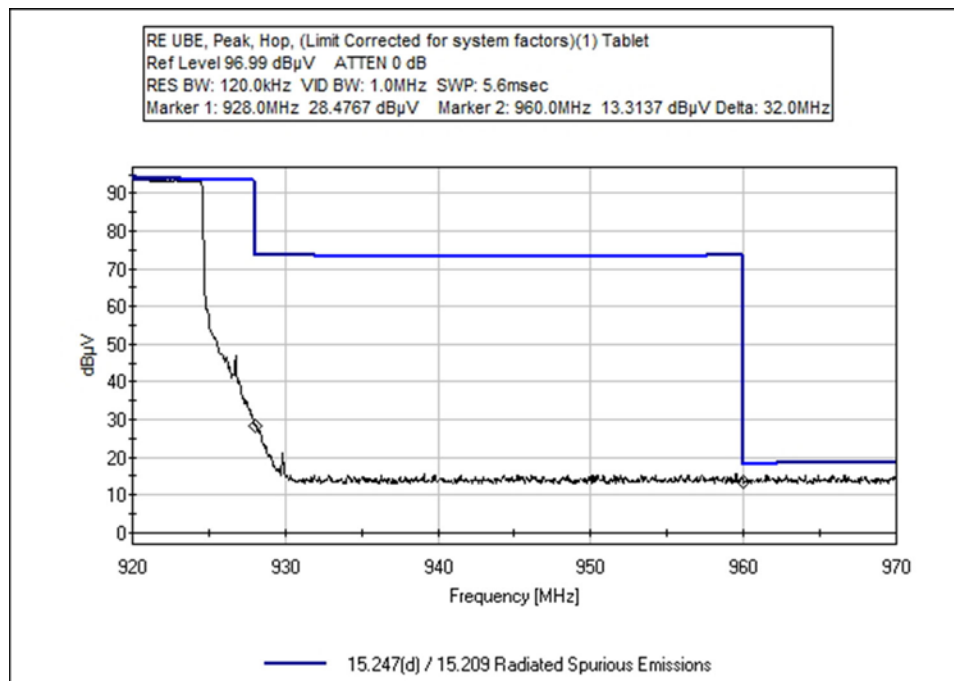
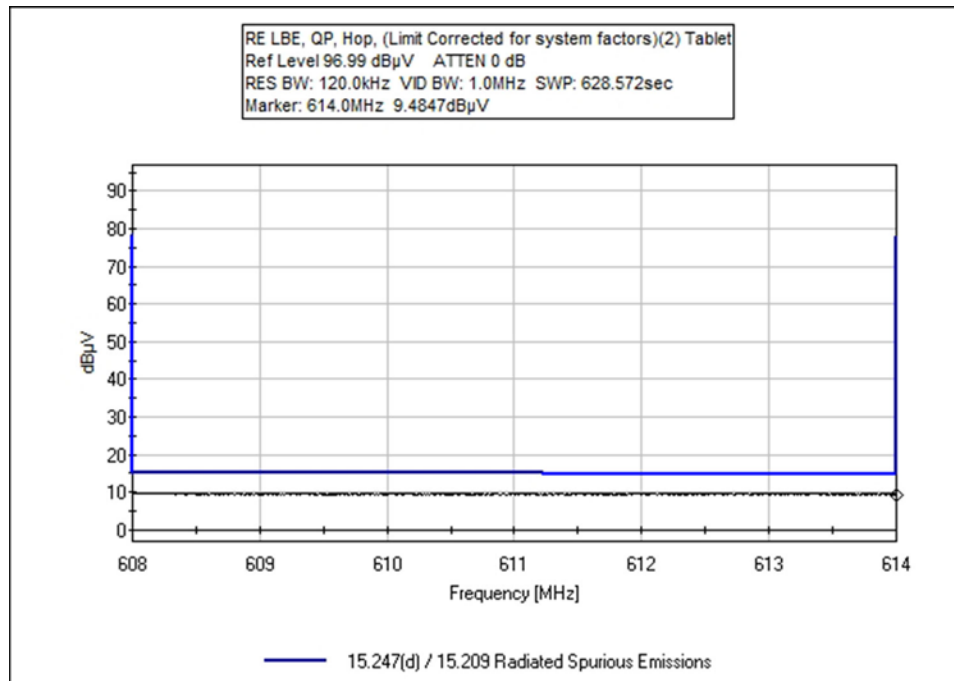
Configuration 3 **Single Channel**





Hopping





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 #: **109570** Date: 4/8/2024
 Test Type: **Radiated Scan** Time: 13:49:00
 Tested By: Matt Harrison Sequence#: 5
 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:

<p>Test Environment Conditions: Temperature: 20°C Humidity: 42% Pressure: 100.3kPa</p> <p>Test Method: ANSI C63.10 Test Mode: Modulated Tx Test Setup: EUT is setup in a tabletop configuration. It is connected to 2 RX antennas, 1Tx/GPS RX antenna, a laptop, and a power supply. X, Y, Z and both polarities were explored, worst-case data provided.</p> <p>Frequency Range: 600-980MHz</p> <p>Band of Operation: 902-928 MHz Frequency Tested: 904.8, 914, 924.4 MHz Firmware Power Setting: 06 01 30 Protocol /MCS/Modulation: FSK 150kbps Duty Cycle: 100%</p> <p>Antenna Type: External Omni Antenna Gain: 5 dBi. EUT Firmware: See Report Details Modifications: None</p>

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP06011	Cable	Heliac	11/16/2023	11/16/2025
T2	ANP05333	Cable	Heliac	8/8/2023	8/8/2025
T3	ANP05360	Cable	RG214	8/8/2023	8/8/2025
T4	AN02673	Spectrum Analyzer	E4446A	3/8/2024	3/8/2026
T5	AN03824	Biconilog Antenna	3142E	5/9/2023	5/9/2025

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	960.000M	14.1	+0.4 +31.1	+1.6	+2.6	+0.0	+0.0	49.8	54.0	-4.2	Vert
2	960.000M	13.7	+0.4 +31.1	+1.6	+2.6	+0.0	+0.0	49.4	54.0 SC	-4.6	Vert
3	611.544M QP	9.6	+0.3 +27.3	+1.2	+2.3	+0.0	+0.0	40.7	46.0 Hop	-5.3	Vert
^	611.544M	15.8	+0.3 +27.3	+1.2	+2.3	+0.0	+0.0	46.9	46.0 Hop	+0.9	Vert
5	614.000M QP	9.2	+0.3 +27.4	+1.2	+2.3	+0.0	+0.0	40.4	46.0 SC	-5.6	Vert
^	614.000M	12.1	+0.3 +27.4	+1.2	+2.3	+0.0	+0.0	43.3	46.0 SC	-2.7	Vert
7	928.000M	28.1	+0.4 +31.2	+1.5	+2.6	+0.0	+0.0	63.8	109.3 SC	-45.5	Vert
8	902.000M	28.7	+0.4 +29.5	+1.5	+2.5	+0.0	+0.0	62.6	109.3 SC	-46.7	Vert
9	902.000M	28.6	+0.4 +29.5	+1.5	+2.5	+0.0	+0.0	62.5	109.3 Hop	-46.8	Vert
10	928.000M	25.6	+0.4 +31.2	+1.5	+2.6	+0.0	+0.0	61.3	109.3 Hop	-48.0	Vert

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 #: **109570** Date: 4/14/2024
 Test Type: **Radiated Scan** Time: 08:32:06
 Tested By: Steven Pittsford Sequence#: 5
 Software: EMITest 5.03.20

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 3			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 3			

Test Conditions / Notes:

<p>Test Environment Conditions:</p> <p>Temperature: 19°C</p> <p>Humidity: 43%</p> <p>Pressure: 101kPa</p> <p>Test Method: ANSI C63.10</p> <p>Test Mode: Modulated Tx</p> <p>Test Setup: EUT is setup in a tabletop configuration. It is connected to 2 RX antennas, 1Tx/GPS RX antenna, a Tablet and a power supply. X, Y, Z and both polarities were explored, worst-case data provided.</p> <p>Frequency Range: 600-980MHz</p> <p>Band of Operation: 902-928 MHz</p> <p>Frequency Tested: 904.8, 914, 924.4 MHz</p> <p>Firmware Power Setting: 06 01 30</p> <p>Protocol /MCS/Modulation: FSK 150kbps</p> <p>Duty Cycle: 100%</p> <p>Antenna Type: External Omni</p> <p>Antenna Gain: 5 dBi.</p> <p>EUT Firmware: See Report Details</p> <p>Modifications: None</p>
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Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP06011	Cable	Heliac	11/16/2023	11/16/2025
T2	ANP05333	Cable	Heliac	8/8/2023	8/8/2025
T3	ANP05360	Cable	RG214	8/8/2023	8/8/2025
	AN02673	Spectrum Analyzer	E4446A	3/8/2024	3/8/2026
T4	AN03824	Biconilog Antenna	3142E	5/9/2023	5/9/2025

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	960.000M	13.3	+0.4	+1.6	+2.6	+31.1	+0.0	49.0	54.0 SC	-5.0	Vert
2	960.000M	13.3	+0.4	+1.6	+2.6	+31.1	+0.0	49.0	54.0 Hop	-5.0	Vert
3	614.000M QP	9.5	+0.3	+1.2	+2.3	+27.4	+0.0	40.7	46.0 Hop	-5.3	Vert
4	614.000M QP	9.5	+0.3	+1.2	+2.3	+27.4	+0.0	40.7	46.0 SC	-5.3	Vert
^	614.000M	14.0	+0.3	+1.2	+2.3	+27.4	+0.0	45.2	46.0 Hop	-0.8	Vert
^	614.000M	12.0	+0.3	+1.2	+2.3	+27.4	+0.0	43.2	46.0 SC	-2.8	Vert
7	928.000M	28.5	+0.4	+1.5	+2.6	+31.2	+0.0	64.2	109.3 Hop	-45.1	Vert
8	928.000M	28.5	+0.4	+1.5	+2.6	+31.2	+0.0	64.2	109.3 SC	-45.1	Vert
9	902.000M	30.2	+0.4	+1.5	+2.5	+29.5	+0.0	64.1	109.3 Hop	-45.2	Vert
10	902.000M	26.6	+0.4	+1.5	+2.5	+29.5	+0.0	60.5	109.3 SC	-48.8	Vert

Test Setup Photo(s)

Configuration 2



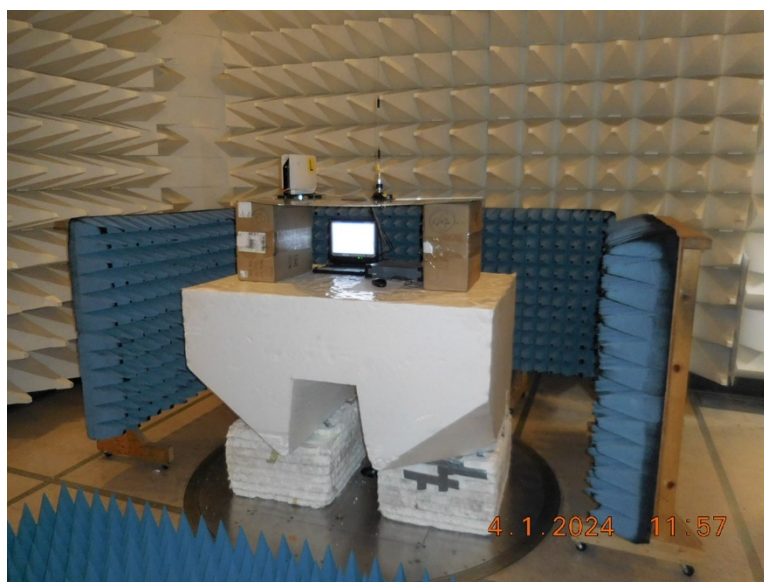
Below 1GHz; View 1



Below 1GHz; View 2



Above 1GHz; View 1

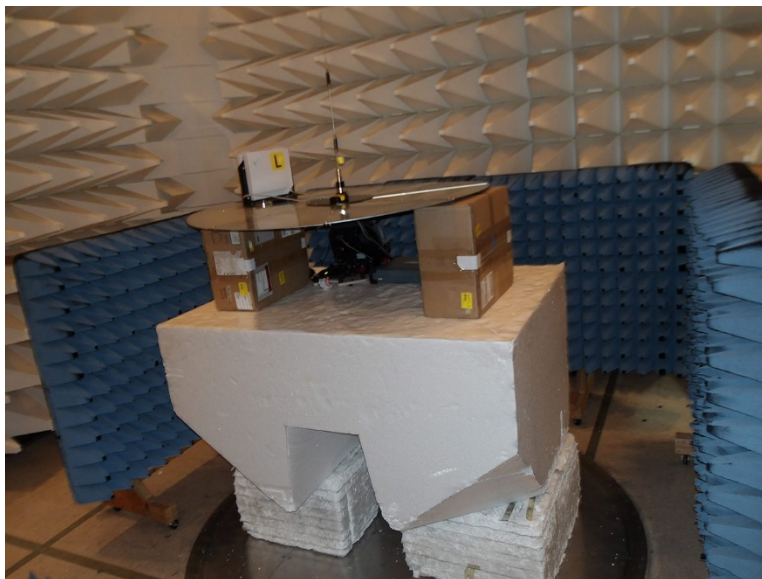


Above 1GHz; View 2

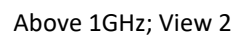
Configuration 3



Below 1GHz



Above 1GHz; View 1



Appendix A: Manufacturer Declaration

The manufacturer declares that the **MC3** model: **MC3B** tested is representative of the **MC3Lite** model: **MC3Lite**.

Supplemental Information

Measurement Uncertainty

Uncertainty Value	Parameter
5.77 dB	Radiated Emissions
0.673 dB	RF Conducted Measurements
5.77×10^{-10}	Frequency Deviation
0.00005 s	Time Deviation
3.18 dB	Mains Conducted Emissions

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 $\text{dB}\mu\text{V}/\text{m}$, the spectrum analyzer reading in $\text{dB}\mu\text{V}$ was corrected by using the following formula. This reading was then compared to the applicable specification limit. Individual measurements were compared with the displayed limit value in the margin column. The margin was calculated based on subtracting the limit value from the corrected measurement value; a positive margin represents a measurement exceeding the limit, while a negative margin represents a measurement less than the limit.

SAMPLE CALCULATIONS		
	Meter reading	($\text{dB}\mu\text{V}$)
+	Antenna Factor	(dB/m)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	($\text{dB}\mu\text{V}/\text{m}$)

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.

End of Report