

Ittron, Inc.

TEST REPORT FOR

CCU100

Models: CCU100B and CCU100RB*

(*See Appendix B for Manufacturer Declaration)

Tested to The Following Standards:

FCC Part 15 Subpart C Section(s)

15.207 & 15.247
(FHSS 902-928 MHz)

Report No.: 103220-2

Date of issue: November 4, 2020



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:

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

Representative: Jay Holcomb
Customer Reference Number: 192996

DATE OF EQUIPMENT RECEIPT:**DATE(S) OF TESTING:****REPORT PREPARED BY:**

Terri Rayle
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Project Number: 103220

September 24, 2020

September 24, 2020 – October 1-12, 2020

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.

A handwritten signature in black ink that reads "Steve Behm".

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 S.E., Suite A
Canyon Park, Bothell, WA 98021

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.03.19

Site Registration & Accreditation Information

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

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

SUMMARY OF RESULTS

Standard / Specification: FCC Part 15 Subpart C - 15.247 (FHSS 902-928MHz)

Test Procedure	Description	Modifications	Results
15.247(a)(1)(i)	Occupied Bandwidth	NA	Pass
15.247(a)(1)	Carrier Separation	Mod. #1	Pass
15.247(a)(1)(i)	Number of Hopping Channels	Mod. #1	Pass
15.247(a)(1)(i)	Average Time of Occupancy	NA	NP
15.247(b)(2)	Output Power	Mod. #1	Pass
15.247(d)	RF Conducted Emissions & Band Edge	Mod. #1	Pass
15.247(d)	Radiated Emissions & Band Edge	Mod. #1	Pass
15.207	AC Conducted Emissions	Mod. #1	Pass

NA = Not Applicable

NP = CKC Laboratories was not contracted to perform test. See Appendix B for Manufacturer Declaration.

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

Modification #1: Updated back cover and front cover for internal GPS antenna, both with conductive spray coating.

The updated front and back covers used during test allowed for an internal GPS antenna and an externally connected optical port. These options require openings in the conductive coating which is considered worst case. Other covers will have these areas coated with the conductive coating.

See Appendix A for photos of modifications 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

Prior to testing: DSP ISM Power set to 140 for middle channel.

Manufacturer declares setting this level is normal, e.g. during production the power level is set to stay under limits as the setting will vary from unit to unit. In the test application used for compliance testing, this level is manually set to the correct level, to allow for unit to unit variations. So, the request to turn down the DSP power to 140 in the test application is expected and normal in order to set the power level during test.

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
CCU100	Itron, Inc.	CCU100B	103220-RAD1

Support Equipment:

Device	Manufacturer	Model #	S/N
Omnidirectional Antenna	PCTEL	BOA9025NM-ITR	208
Omnidirectional Antenna*	PCTEL	MH03G4G02NM	NA

*Antenna Cellular Ports are terminated during testing.

Configuration 2

Equipment Tested:

Device	Manufacturer	Model #	S/N
CCU100	Itron, Inc.	CCU100B	103220-RAD1

Support Equipment:

Device	Manufacturer	Model #	S/N
Omnidirectional Antenna	PCTEL	BOA9028	NA
Omnidirectional Antenna*	PCTEL	MH03G4G02NM	NA

*Antenna Cellular Ports are terminated during testing.

Configuration 3

Equipment Tested:

Device	Manufacturer	Model #	S/N
CCU100	Itron, Inc.	CCU100B	103220-AC1

Support Equipment:

Device	Manufacturer	Model #	S/N
Omnidirectional Antenna	PCTEL	BOA9025NM-ITR	208

Configuration 4

Equipment Tested:

Device	Manufacturer	Model #	S/N
CCU100	Ittron, Inc.	CCU100RB	103220-RAD1

Support Equipment:

Device	Manufacturer	Model #	S/N
Omnidirectional Antenna	PCTEL	BOA9025NM-ITR	208
Omnidirectional Antenna*	Taoglas	OMB.6912.03F21	NA
GPS Antenna	Trimble	57861-00	213100611

*Antenna Cellular Ports are terminated during testing.

Configuration 5

Equipment Tested:

Device	Manufacturer	Model #	S/N
CCU100	Ittron, Inc.	CCU100RB	103220-RAD1

Support Equipment:

Device	Manufacturer	Model #	S/N
Omnidirectional Antenna	PCTEL	BOA9028	NA
Omnidirectional Antenna*	Taoglas	OMB.6912.03F21	NA
GPS Antenna	Trimble	57861-00	213100611

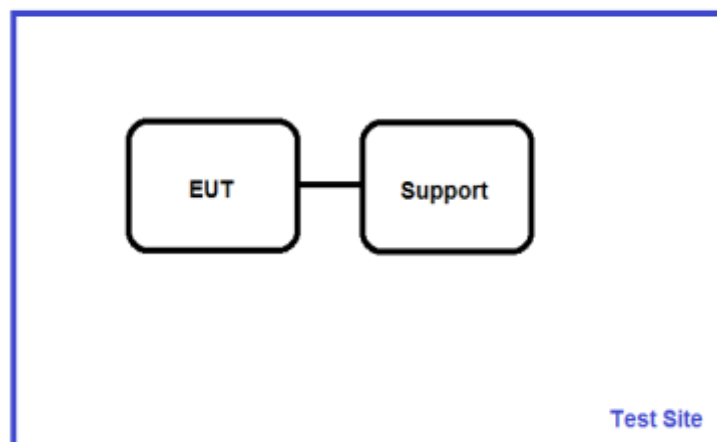
*Antenna Cellular Ports are terminated during testing.

General Product Information:

Product Information	Manufacturer-Provided Details
Equipment Type:	Stand-Alone Equipment
Type of Wideband System:	FHSS
Operating Frequency Range:	903-926.8 MHz
Number of Hopping Channels:	120 (FSK 12.5kbit and FSK 37.5kbit) 80 (AM)
Receiver Bandwidth and Synchronization:	The manufacturer declares the receiver input bandwidth matches the transmit channel bandwidth and shifts frequencies in synchronization with the transmitter.
Modulation Type(s):	37.5kbit/sec FM (FSK) 12.5kbit/sec FM (FSK) 16.384kbit/sec AM (OOK)
Maximum Duty Cycle:	100% (Tested Worst-Case)
Number of TX Chains:	1
Antenna Type(s) and Gain:	Omnidirectional / 5.5dBi Omnidirectional / 8.15dBi with 2dB attenuation
Beamforming Type:	NA
Antenna Connection Type:	External Connector
Nominal Input Voltage:	115VAC
Firmware / Software used for Test:	ARM = Version 2.27.0.0, DSP = Version 7.22.0.0 and FPGA = Version 4.14, SR Test 100 version 4.11.1.42

Block Diagram of Test Setup(s)

Test Setup Block Diagram



FCC Part 15 Subpart C

15.247(a) Transmitter Characteristics

Test Setup/Conditions			
Test Location:	Bothell Lab Bench	Test Engineer:	M. Harrison
Test Method:	ANSI C63.10 (2013)	Test Date(s):	9/24/2020
Configuration:	1		
Test Setup:	<p>The equipment under test (EUT) is placed on the tabletop.</p> <p>The output of the EUT is connected to the spectrum analyzer using a coaxial cable and attenuator.</p> <p>The EUT is transmitting at its rated output power.</p>		

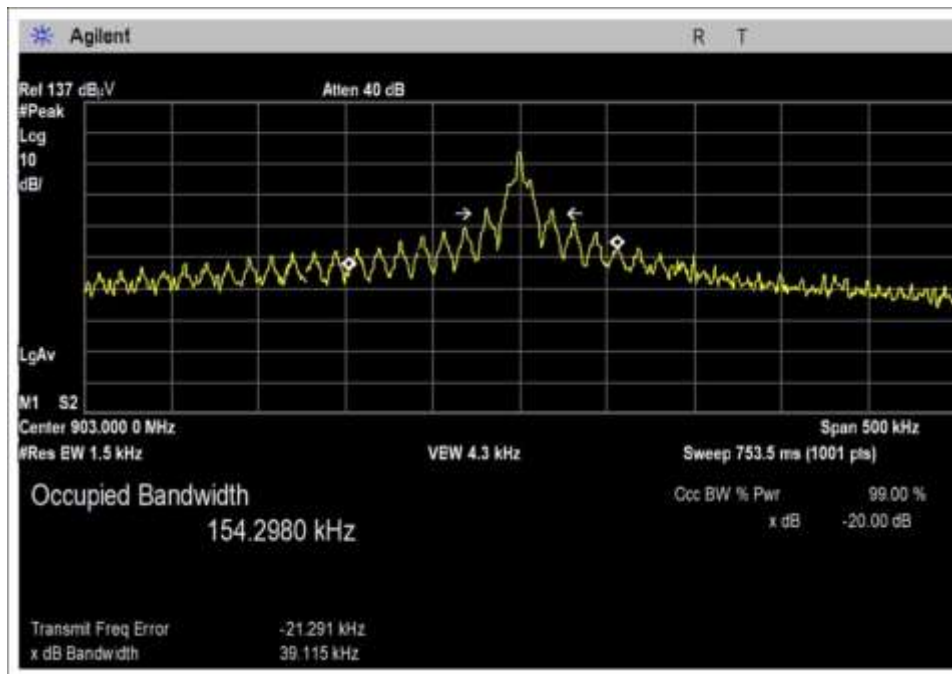
Environmental Conditions			
Temperature (°C)	25	Relative Humidity (%):	45

Test Equipment					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
02673	Spectrum Analyzer	Agilent	E4446A	2/22/2019	2/22/2021
P05503	Attenuator	Narda	766-10	7/30/2019	7/30/2021

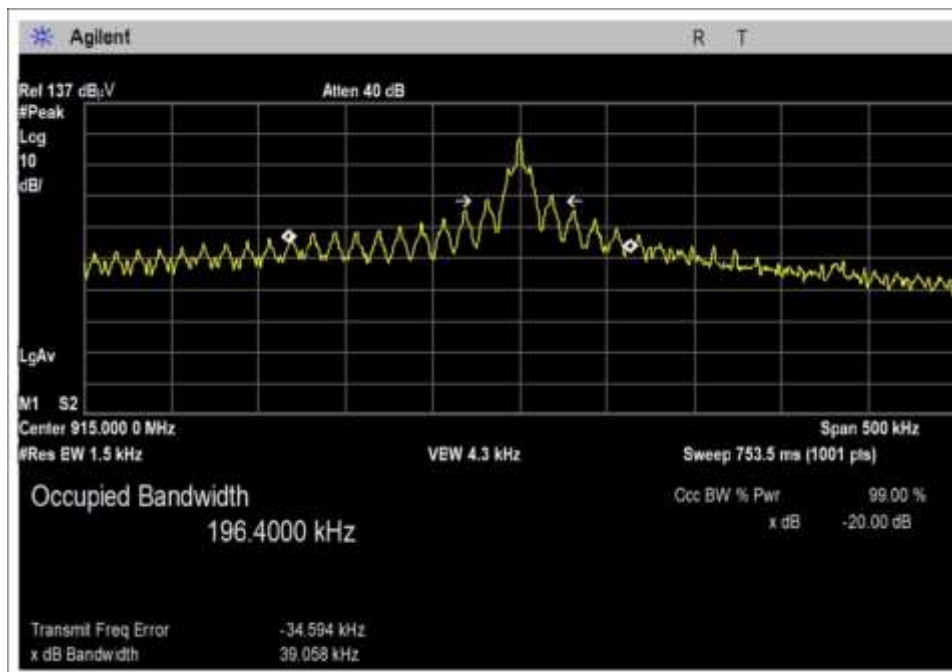
15.247(a)(1) 20 dB Bandwidth

Test Data Summary					
Frequency (MHz)	Antenna Port	Modulation	Measured (kHz)	Limit (kHz)	Results
903	1	FM 12.5kbit	142.5	≤500	Pass
915	1	FM 12.5kbit	142.8	≤500	Pass
926.8	1	FM 12.5kbit	142.1	≤500	Pass
903	1	FM 37.5kbit	53.1	≤500	Pass
915	1	FM 37.5kbit	53	≤500	Pass
926.8	1	FM 37.5kbit	53.2	≤500	Pass
903	1	AM	39.1	≤500	Pass
915	1	AM	39.1	≤500	Pass
926.8	1	AM	39	≤500	Pass

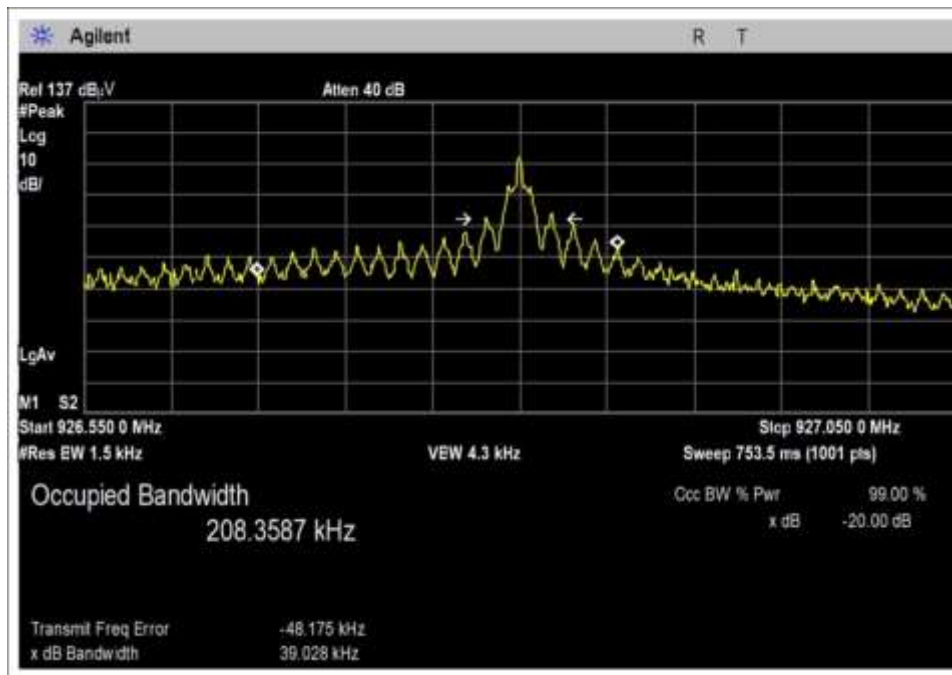
Plot(s)



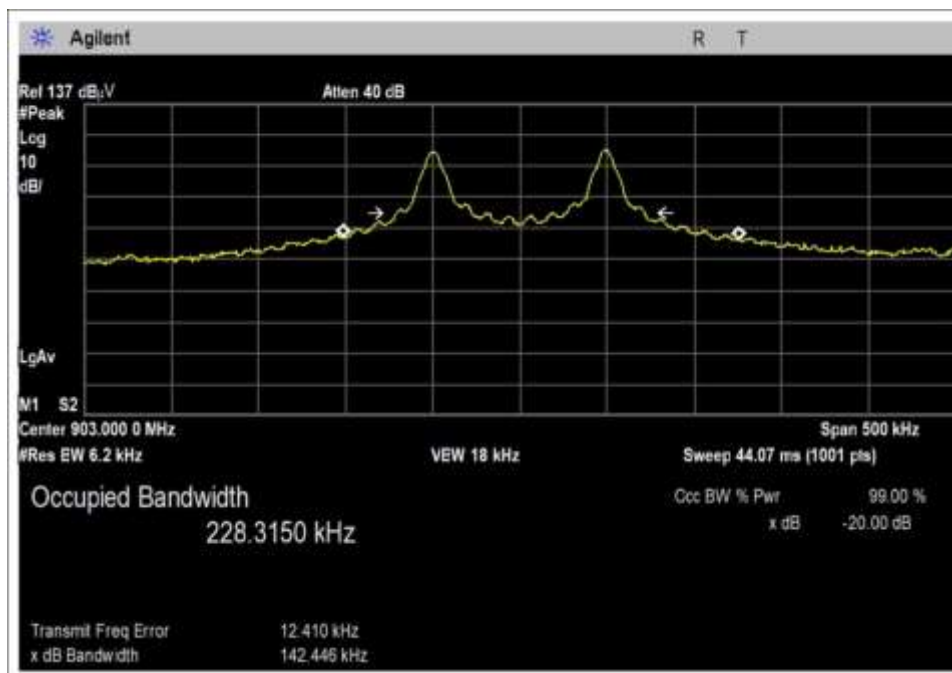
Low Channel, AM



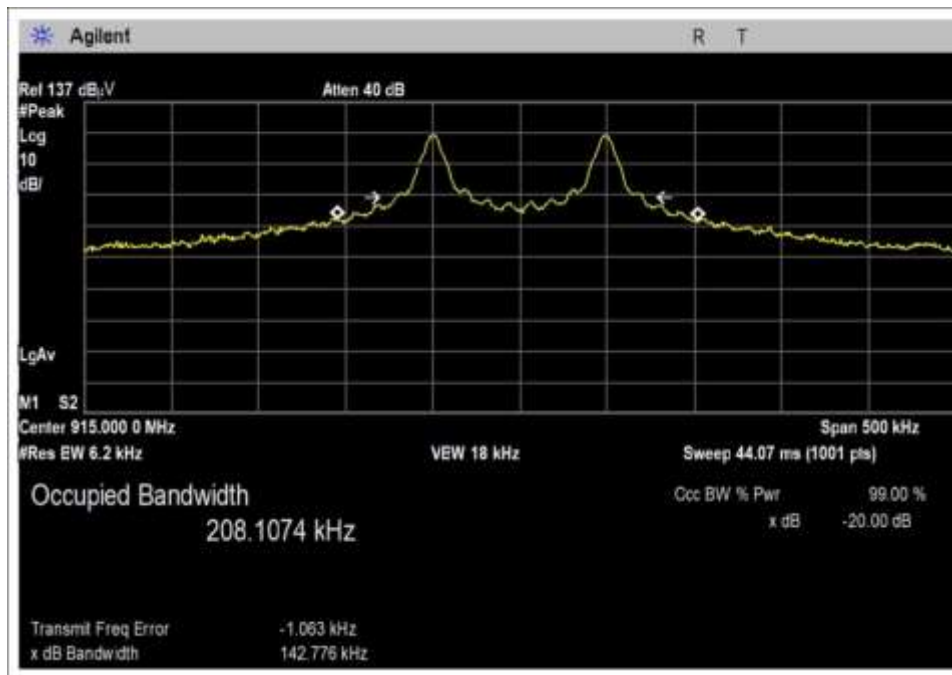
Middle Channel, AM



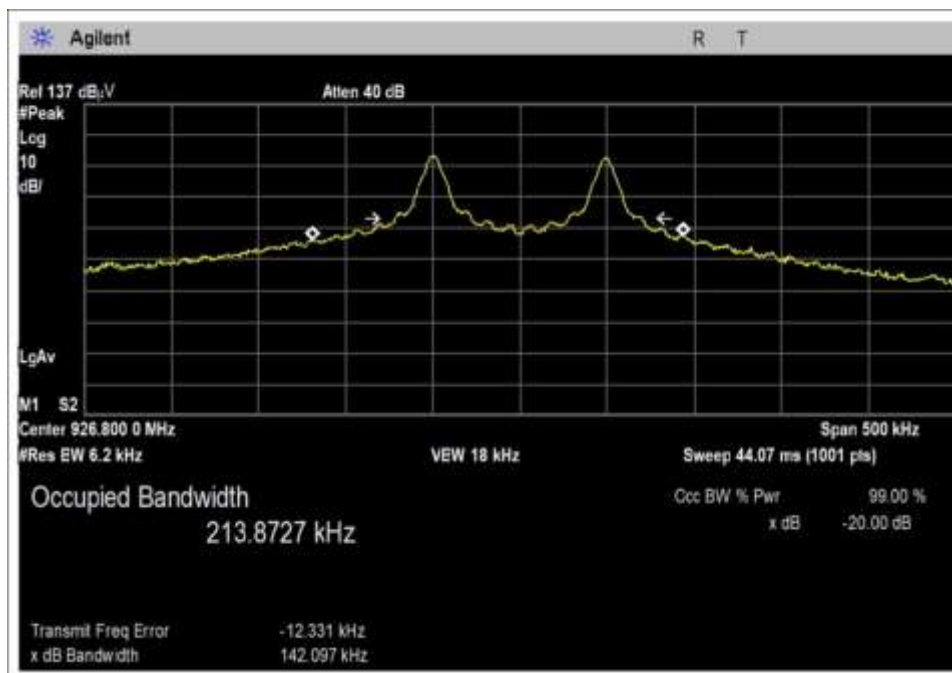
High Channel, AM



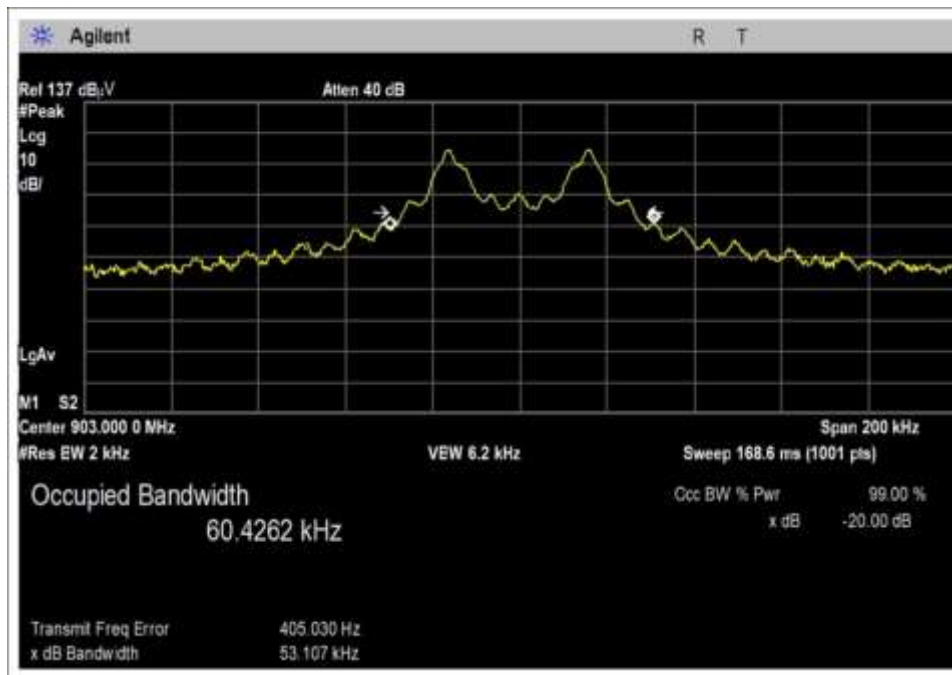
Low Channel, FM12.5kbit



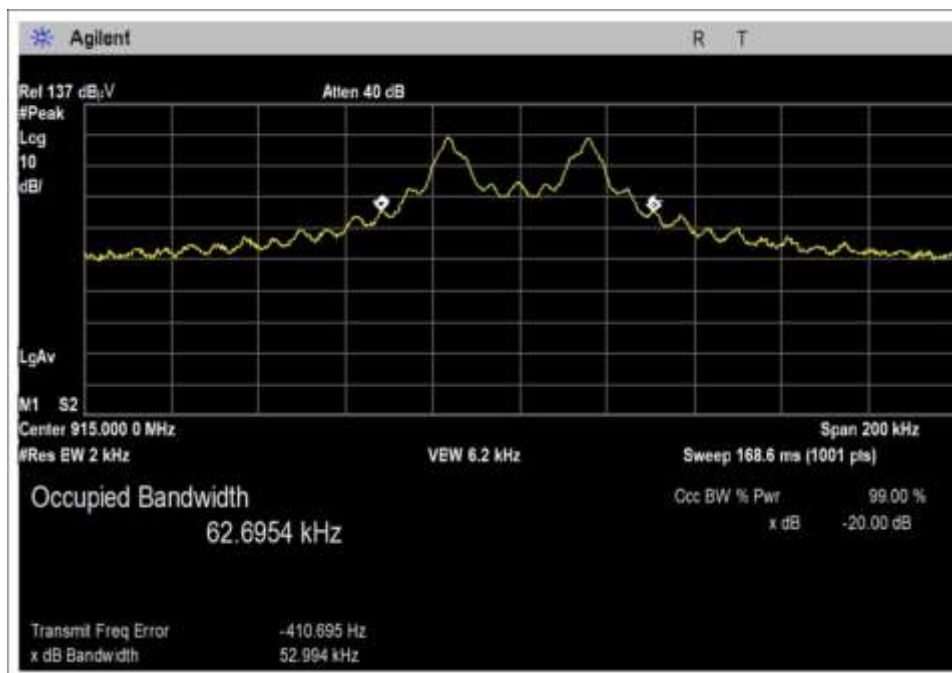
Middle Channel, FM12.5kbit



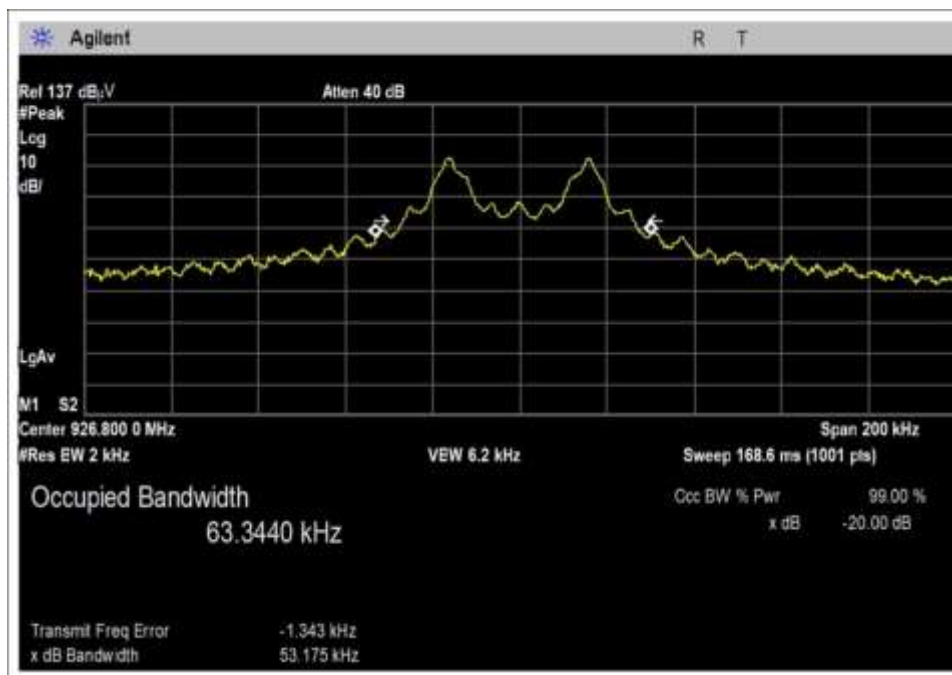
High Channel, FM12.5kbit



Low Channel, FM37.5kbit



Middle Channel, FM37.5kbit

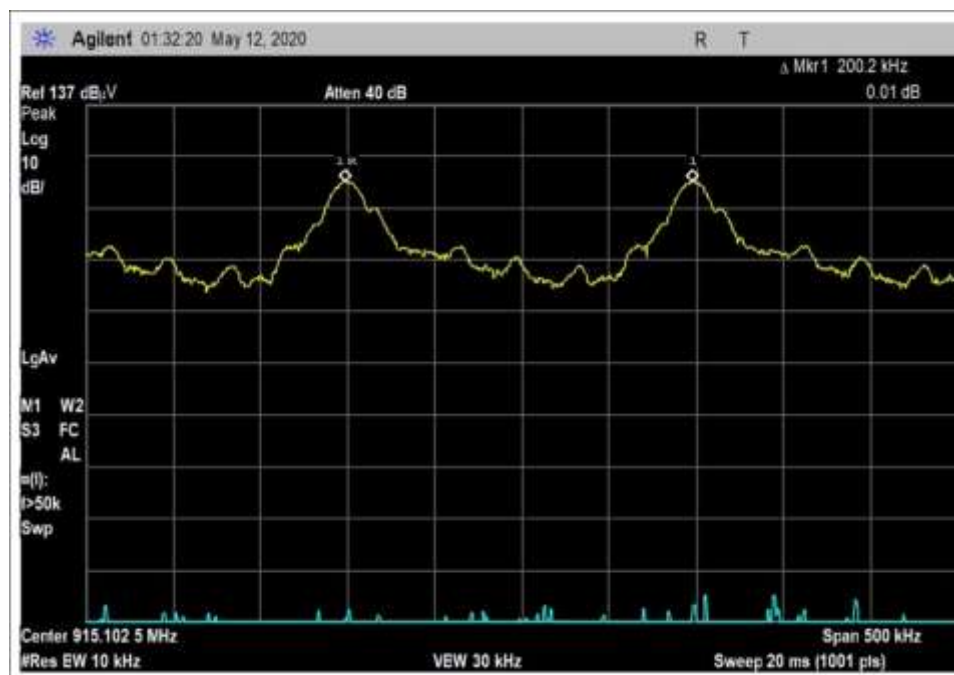


High Channel, FM37.5kbit

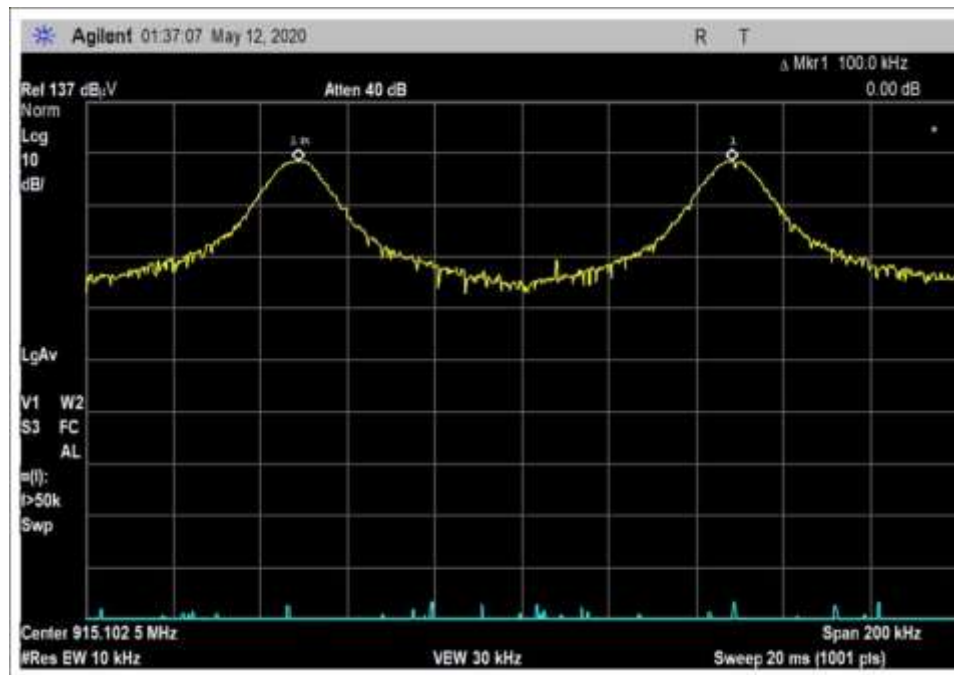
15.247(a)(1) Carrier Separation

Test Data Summary				
Limit applied: minimum 25kHz.				
Antenna Port	Operational Mode	Measured (kHz)	Limit (kHz)	Results
1	Transmitting, FSK Channel Plan	100	>25	Pass
1	Transmitting, AM Channel Plan	200.2	>25	Pass

Plot(s)



AM

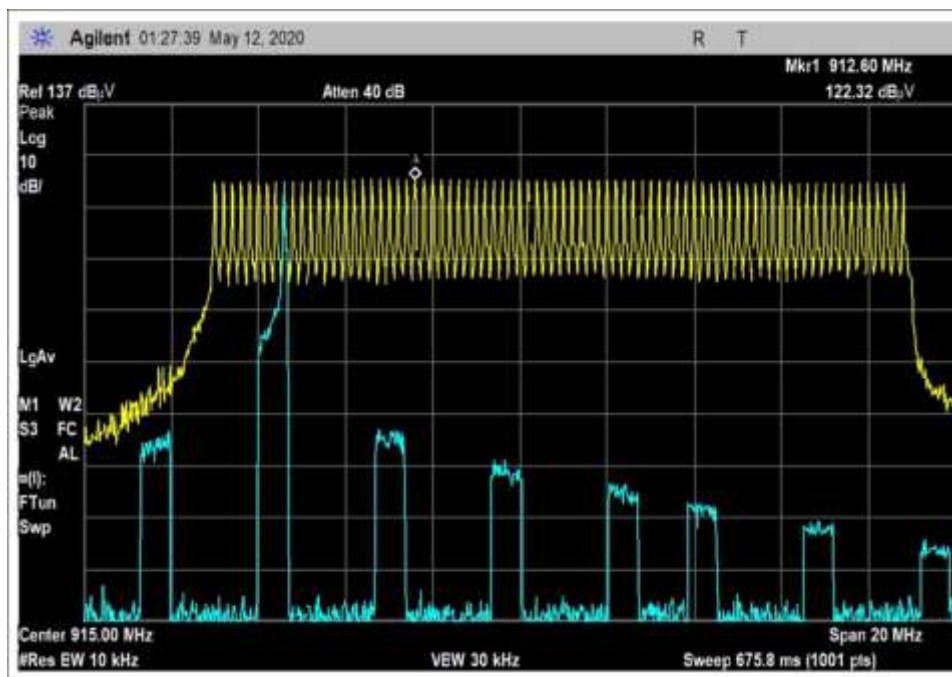


FM

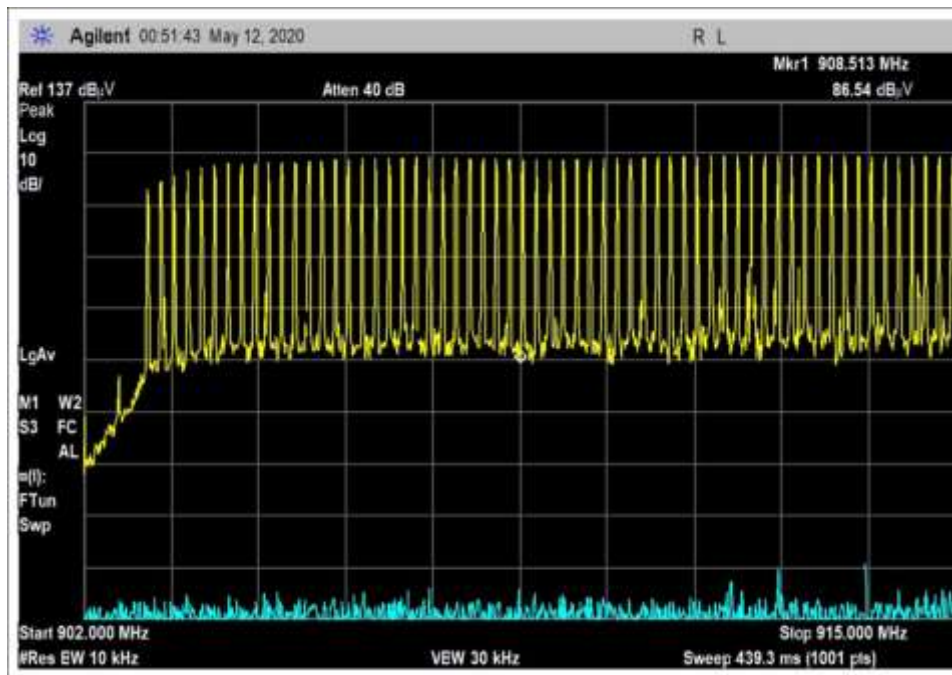
15.247(a)(1)(i) Number of Hopping Channels

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	Transmitting, FSK Channel Plan	120	≥ 25	Pass
1	Transmitting, AM Channel Plan	80	≥ 25	Pass

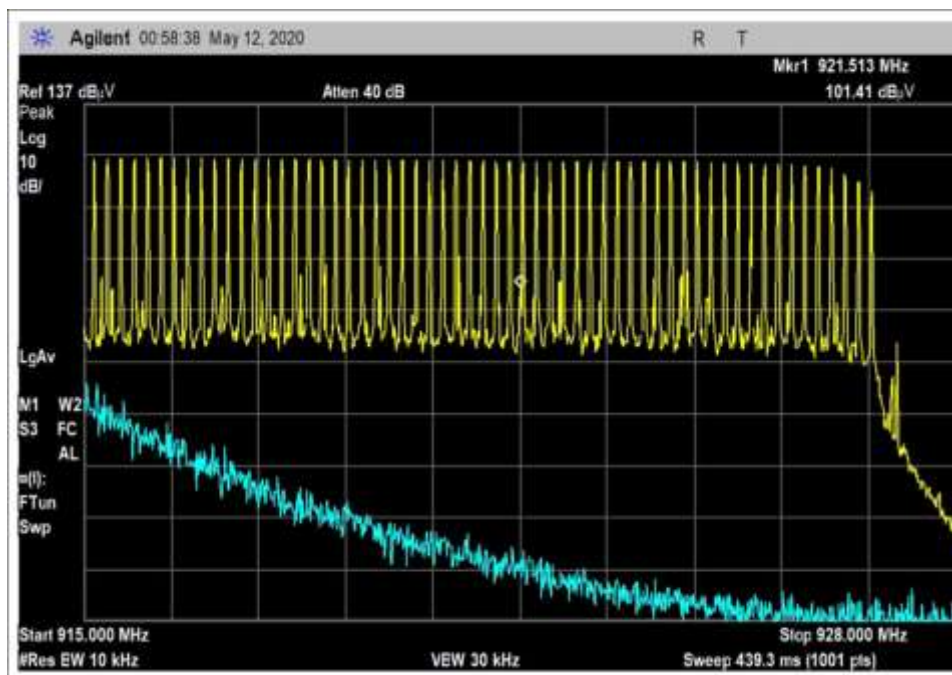
Plot(s)



AM

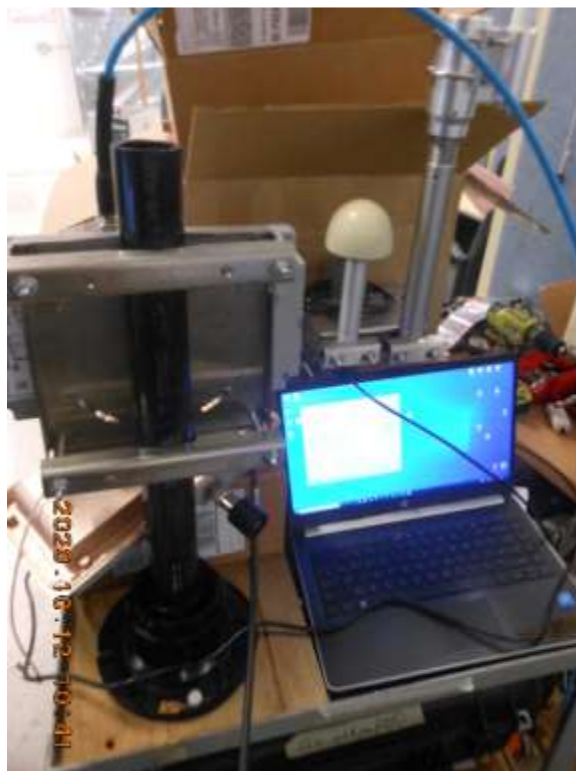


FM



FM

Test Setup Photo(s)



15.247(b)(2) Output Power

Test Setup/Conditions			
Test Location:	Bothell Lab Bench	Test Engineer:	M. Harrison
Test Method:	ANSI C63.10 (2013)	Test Date(s):	10/5/2020
Configuration:	1		
Test Setup:	<p>The equipment under test (EUT) is placed on the tabletop. The output of the EUT is connected to the spectrum analyzer using a coaxial cable and attenuator. The EUT is transmitting at its rated output power. Modification #1 was in place during testing.</p>		

Environmental Conditions			
Temperature (°C)	26	Relative Humidity (%):	44

Test Equipment					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
02673	Spectrum Analyzer	Agilent	E4446A	2/22/2019	2/22/2021
P05503	Attenuator	Narda	766-10	7/30/2019	7/30/2021
01359	AC Power Source: Variac	Superior Electric	1256D	4/15/2020	4/15/2022

Test Data Summary - Voltage Variations					
Frequency (MHz)	Modulation / Ant Port	V _{Minimum} (dBm)	V _{Nominal} (dBm)	V _{Maximum} (dBm)	Max Deviation from V _{Nominal} (dB)
903	FM 12.5kbit as worst case / 1	26.6	26.7	26.5	0.2
915	FM 12.5kbit as worst case / 1	29.6	29.6	29.6	0.0
926.8	FM 12.5kbit as worst case / 1	24.5	24.6	24.5	0.1

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

Parameter Definitions:

Measurements performed at input voltage V_{Nominal} ± 15%.

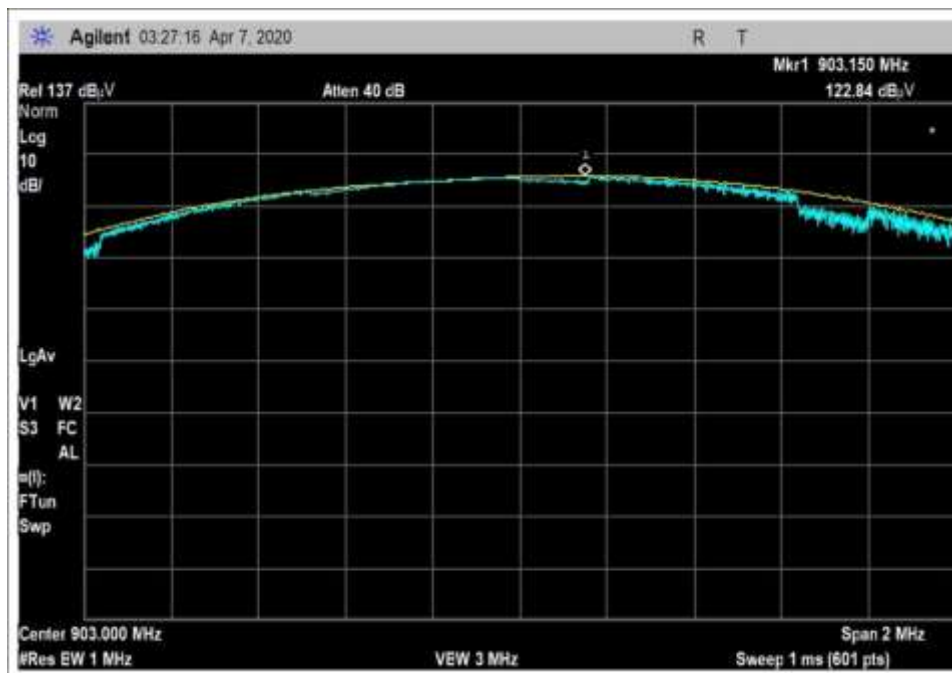
Parameter	Value
V _{Nominal} :	115
V _{Minimum} :	98
V _{Maximum} :	132

Test Data Summary - RF Conducted Measurement					
$\text{Limit} = \begin{cases} 30\text{dBm Conducted}/36\text{dBm EIRP} & \geq 50 \text{ Channels} \\ 24\text{dBm Conducted}/30\text{dBm EIRP} & < 50 \text{ Channels (min 25)} \end{cases}$					
Configuration 1					
Frequency (MHz)	Modulation / Ant Port	Ant. Type / Gain (dBi)	Measured (dBm)	Limit (dBm)	Results
903	FM 12.5kbit as worst case / 1	Omnidirectional/5.5	26.7	≤ 30	Pass
915	FM 12.5kbit as worst case / 1	Omnidirectional/5.5	29.6	≤ 30	Pass
926.8	FM 12.5kbit as worst case / 1	Omnidirectional/5.5	24.6	≤ 30	Pass

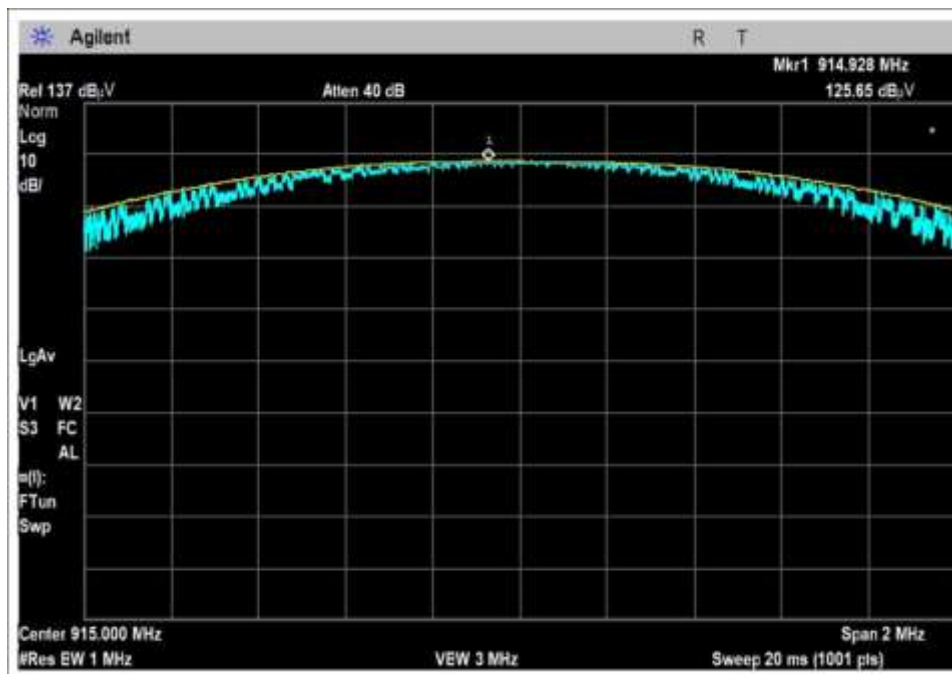
Test Data Summary - RF Conducted Measurement					
$\text{Limit} = \begin{cases} 30\text{dBm Conducted}/36\text{dBm EIRP} & \geq 50 \text{ Channels} \\ 24\text{dBm Conducted}/30\text{dBm EIRP} & < 50 \text{ Channels (min 25)} \end{cases}$					
Configuration 2					
Frequency (MHz)	Modulation / Ant Port	Ant. Type / Gain (dBi)	Measured (dBm)	Limit (dBm)	Results
903	FM 12.5kbit as worst case / 1	Omnidirectional/8.15	26.7	≤ 30	Pass
915	FM 12.5kbit as worst case / 1	Omnidirectional/8.15	29.6	≤ 30	Pass
926.8	FM 12.5kbit as worst case / 1	Omnidirectional/8.15	24.6	≤ 30	Pass

*Manufacturer declares 2 dB of system loss via cable and attenuators to be attached before antenna.

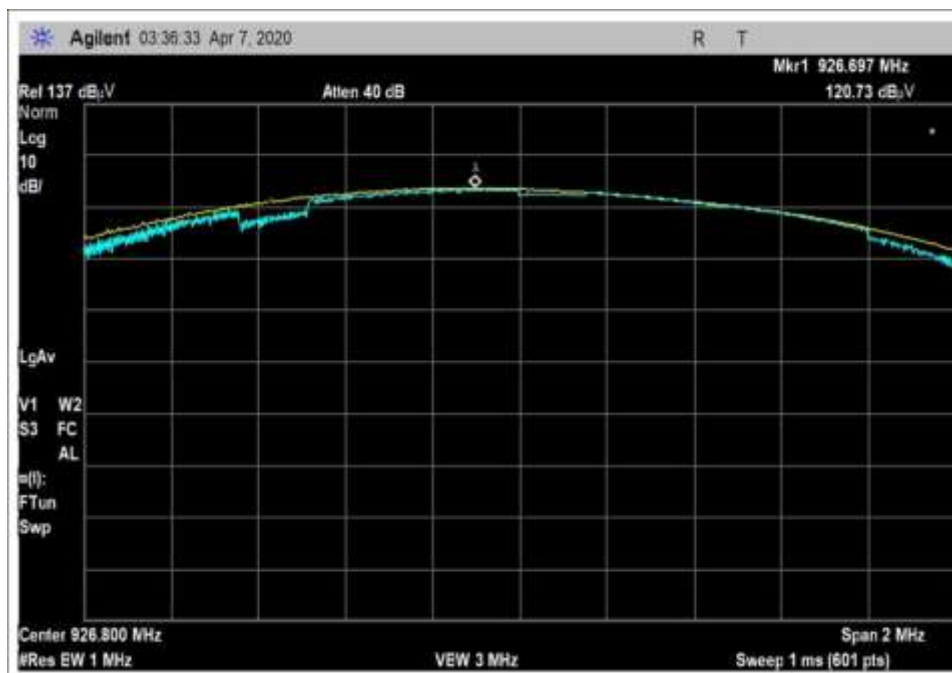
Plots



Low Channel



Middle Channel



High Channel

Test Setup / Conditions / Data

Test Location: CKC Laboratories, Inc. • 22116 23rd Dr SE • Bothell, WA 98021 • 800-500-4362
 Customer: Itron, Inc.
 Specification: 15.247(b) Power Output (902-928 MHz FHSS >50 Channels)
 Work Order #: 103220 Date: 10/5/2020
 Test Type: Conducted Emissions Time: 13:40:23
 Tested By: Matthew Harrison Sequence#: 1
 Software: EMITest 5.03.19 120V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

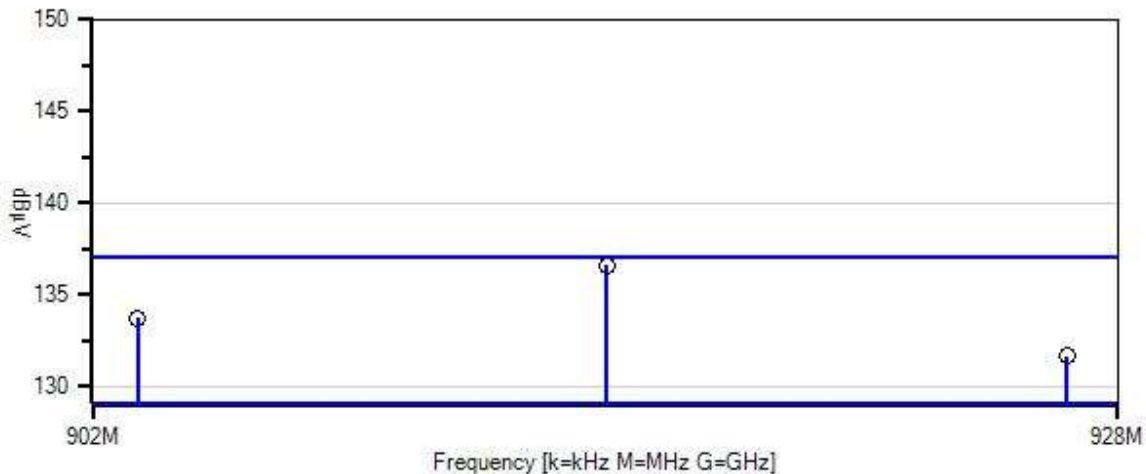
Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Temperature: 23° C Humidity: 39% Pressure: 101.1 kPa Frequency Range: 903-926.8MHz Frequency tested: 903, 915, 926.8 MHz Firmware power setting: Max Antenna type: Omni-Directional Antenna Gain: 5.5 dBi. Duty Cycle: 100% Modulated Test Method: ANSI C63.10: 2015 Test Mode: Transmitting Test Setup: EUT is setup in for conducted measurements. Modifications #1 was in place during testing.
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Itron, Inc. WO#: 103220 Sequence#: 1 Date: 10/5/2020
15.247(b) Power Output (902-928 MHz FHSS >50 Channels) Test Lead: 120V 60Hz Antenna Port



— Sweep Data
— Readings
○ Peak Readings
× QP Readings
* Average Readings
▼ Ambient
Software Version: 5.03.19
1 - 15.247(b) Power Output (902-928 MHz FHSS >50 Channels)

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP05503	Attenuator	766-10	7/30/2019	7/30/2021
T2	ANP06008	Cable	Helix	1/22/2019	1/22/2021
T3	AN02872	Spectrum Analyzer	E4440A	11/18/2019	11/18/2021

Measurement Data:

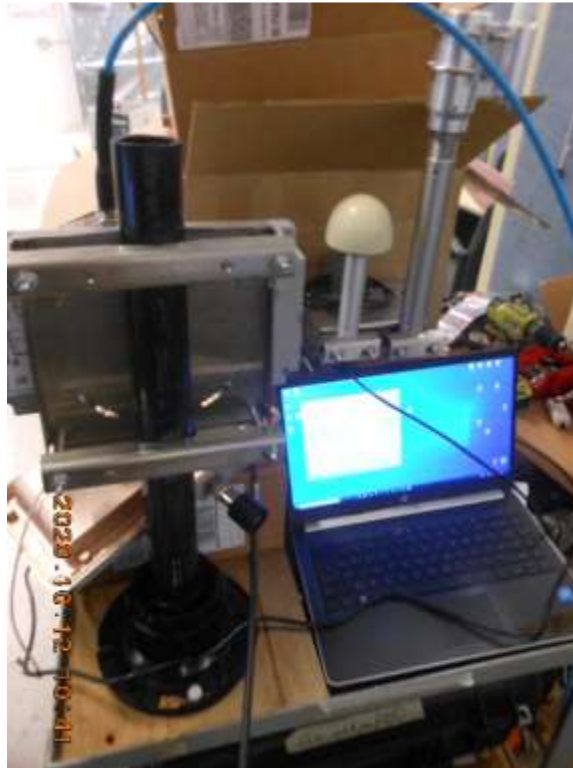
Reading listed by margin.

Test Lead: Antenna Port

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	T3 dB	Dist dB	Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	914.950M	125.7	+10.1	+0.8	+0.0	+0.0	+0.0	136.6	137.0	-0.4	Anten
2	903.137M	122.8	+10.1	+0.8	+0.0	+0.0	+0.0	133.7	137.0	-3.3	Anten
3	926.697M	120.7	+10.1	+0.8	+0.0	+0.0	+0.0	131.6	137.0	-5.4	Anten

DSP ISM Power
Setting 140

Test Setup Photo(s)



15.35(c) Duty Cycle Correction Factor

Test Data Summary			
Antenna Port	Operational Mode	Measured On Time (mS / P _{obs})	Calculated DCCF (dB)
1	Normal	23.8	12.5

Observation Period, P_{obs} is the duration of the pulse train or maximum 100mS

15.247(d) RF Conducted Emissions & Band Edge

Test Setup / Conditions / Data

Test Location: CKC Laboratories, Inc. • 22116 23rd Dr SE • Bothell, WA 98021 • 800-500-4362
 Customer: Itron, Inc.
 Specification: 15.247(d) Conducted Spurious Emissions
 Work Order #: 103220
 Test Type: Conducted Emissions
 Tested By: Matthew Harrison
 Software: EMITest 5.03.19

Date: 10/12/2020
 Time: 12:39:41
 Sequence#: 2
 120V 60Hz

Equipment Tested:

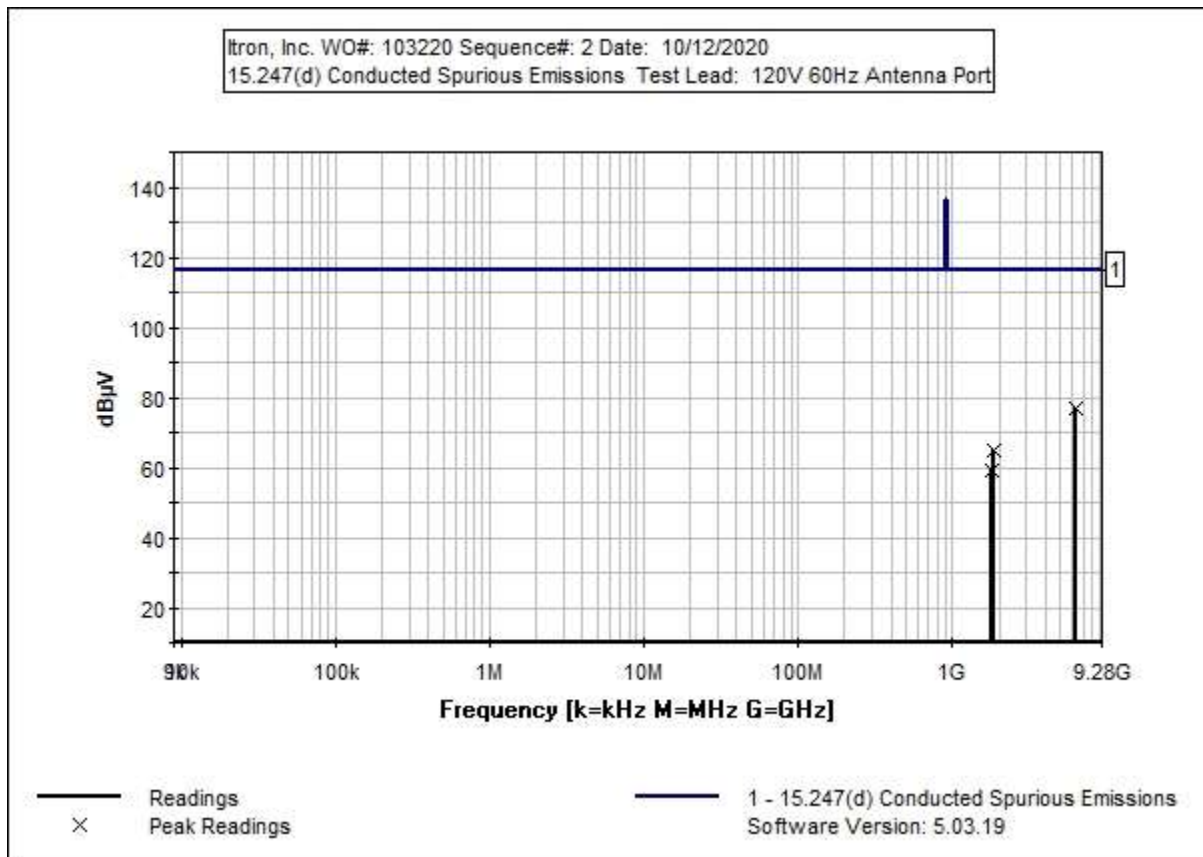
Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Temperature: 23° C Humidity: 39% Pressure: 101.1 kPa Frequency Range: 9kHz-10GHz Frequency tested: 903, 926.8 MHz Firmware power setting: Max Antenna type: Omni-Directional Antenna Gain: NA dBi. Duty Cycle: 100% Modulated Test Method: ANSI C63.10: 2015 Test Mode: Transmitting Test Setup: EUT is setup in for conducted measurements. Modifications #1 was in place during testing.
--



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP05503	Attenuator	766-10	7/30/2019	7/30/2021
T2	ANP06008	Cable	Helix	1/22/2019	1/22/2021
	AN02872	Spectrum Analyzer	E4440A	11/18/2019	11/18/2021

Measurement Data:

Reading listed by margin.

Test Lead: Antenna Port

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB			Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	6321.000M	74.2	+0.0	+2.7			+0.0	76.9	116.2	-39.3	Anten
2	1832.000M	53.6	+10.2	+1.1			+0.0	64.9	116.2	-51.3	Anten
3	1802.000M	47.8	+10.2	+1.1			+0.0	59.1	116.2	-57.1	Anten

Band Edge

Band Edge Summary

Limit applied: Max Power/100kHz - 20dB.

Operating Mode: Single Channel (Low and High)

Frequency (MHz)	Modulation	Measured (dBm)	Limit (dBm)	Results
902	FM 12.5kbit	94.9	< 116.2	Pass
928	FM 12.5kbit	81.6	< 116.2	Pass
902	FM 37.5kbit	93.8	< 116.2	Pass
928	FM 37.5kbit	81.4	< 116.2	Pass
902	AM	81.3	< 116.2	Pass
928	AM	80	< 116.2	Pass

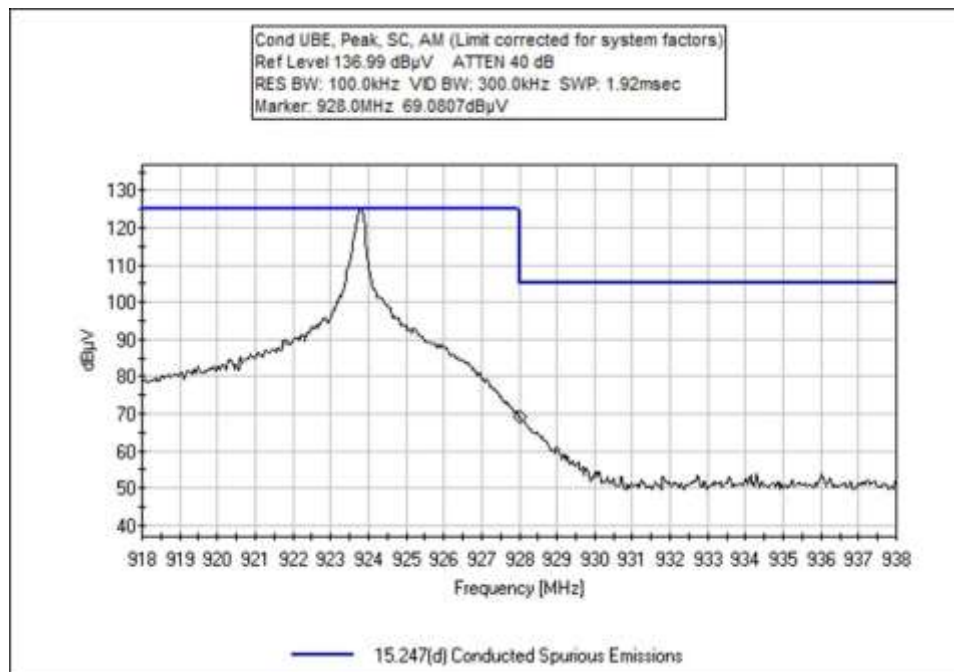
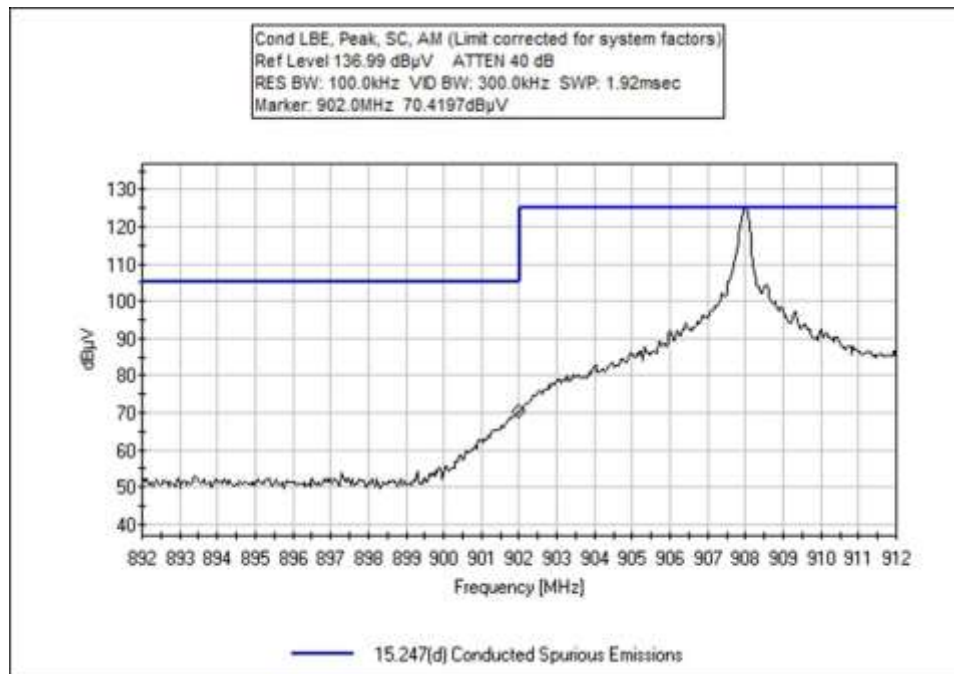
Band Edge Summary

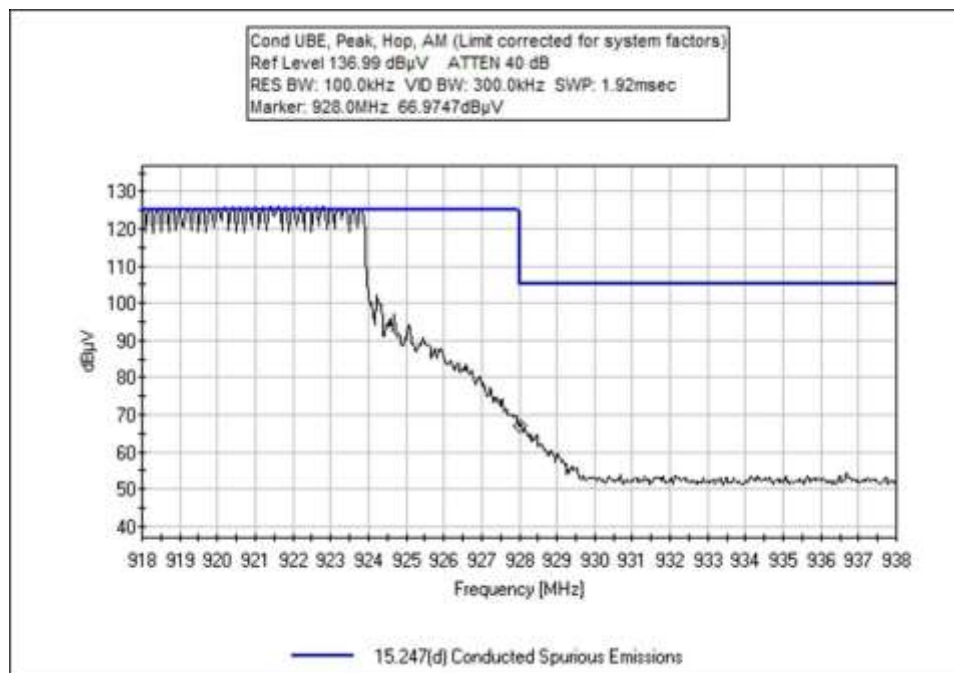
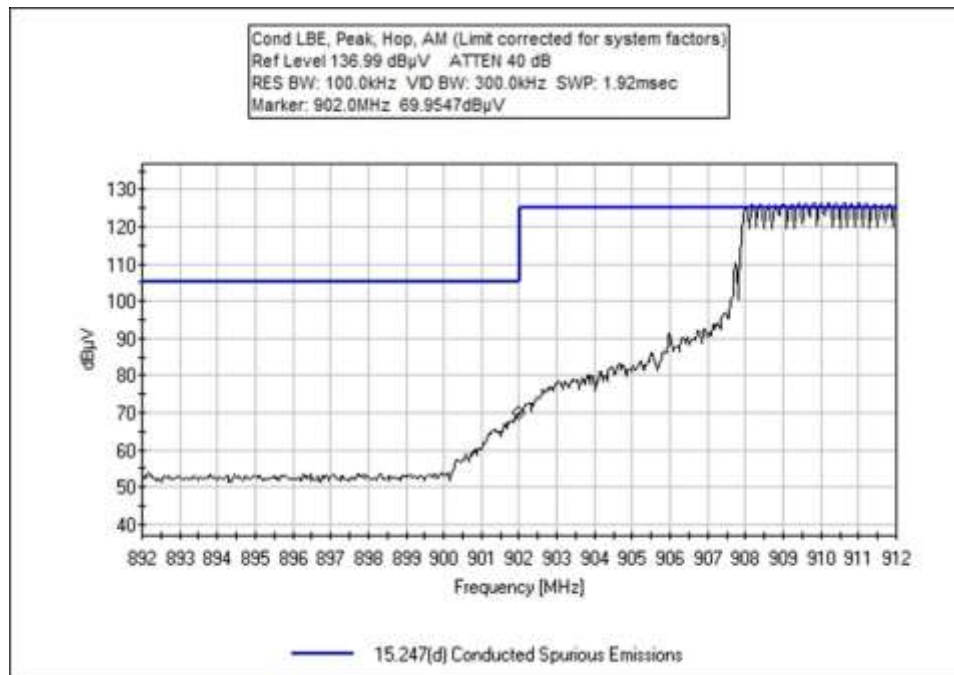
Limit applied: Max Power/100kHz - 20dB.

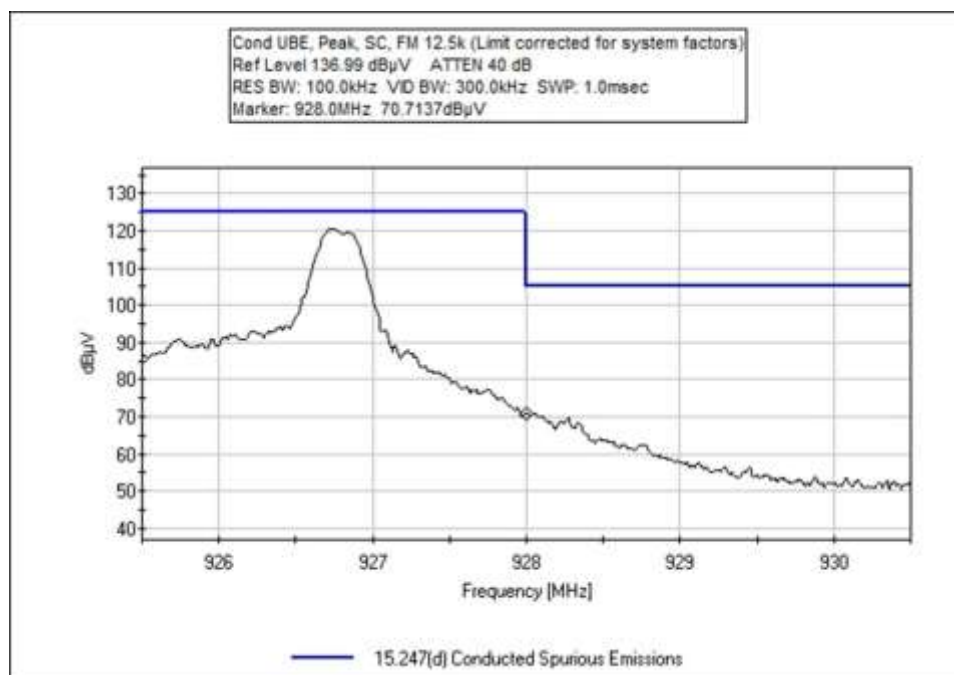
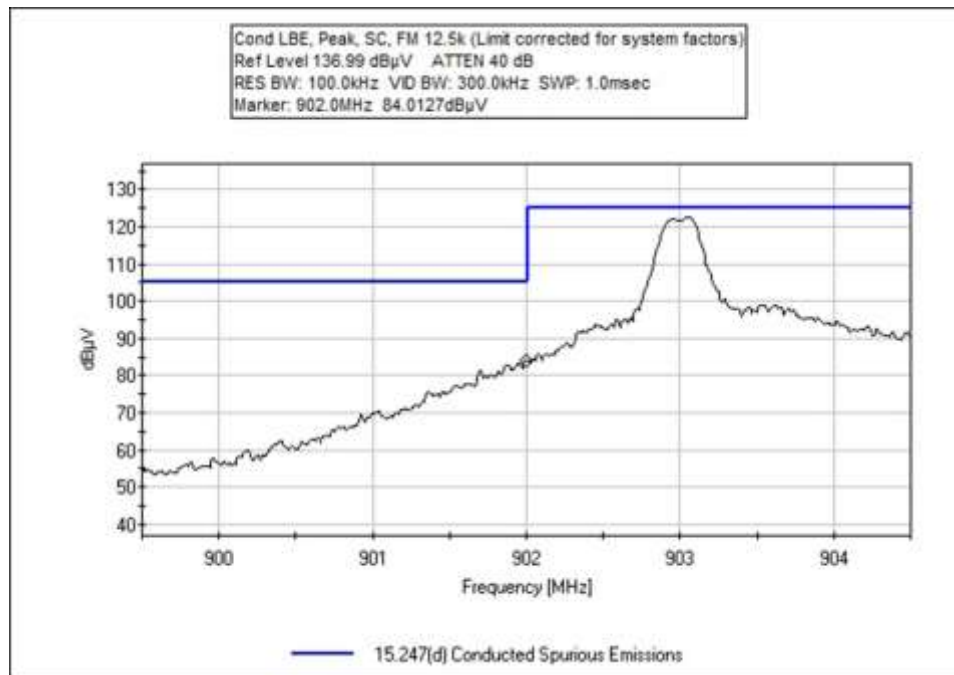
Operating Mode: Hopping

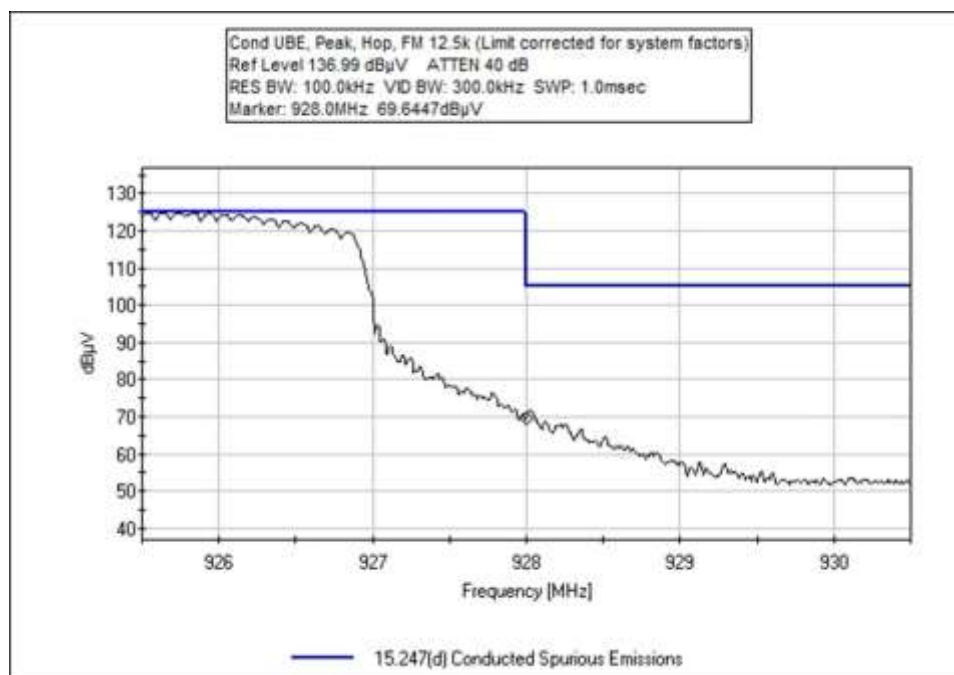
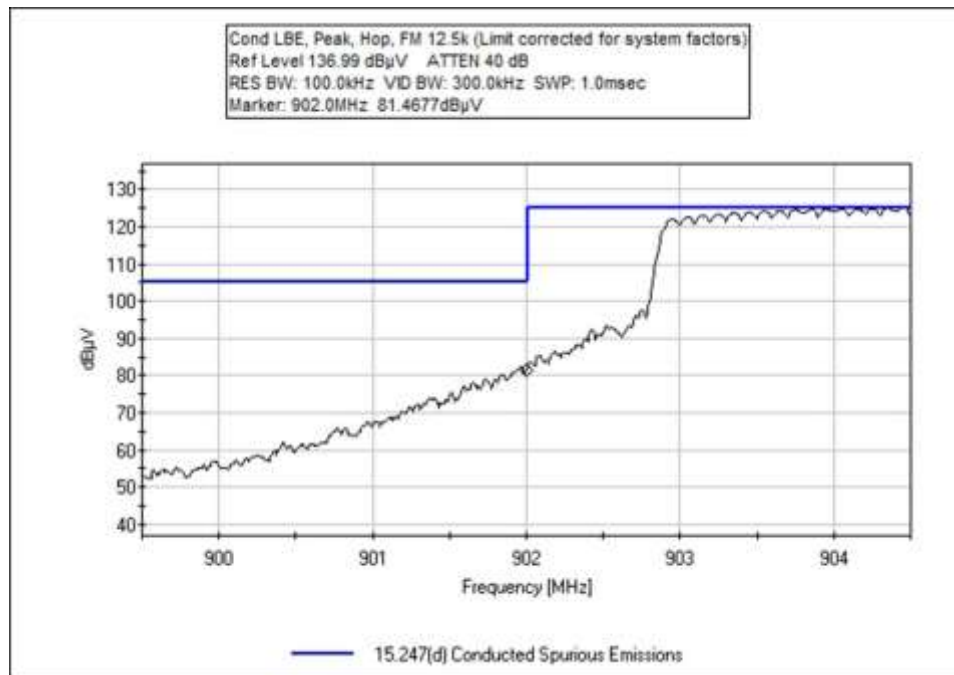
Frequency (MHz)	Modulation	Measured (dBm)	Limit (dBm)	Results
902	FM 12.5kbit	91	< 116.2	Pass
928	FM 12.5kbit	80.5	< 116.2	Pass
902	FM 37.5kbit	91.6	< 116.2	Pass
928	FM 37.5kbit	81.5	< 116.2	Pass
902	AM	80.9	< 116.2	Pass
928	AM	77.9	< 116.2	Pass

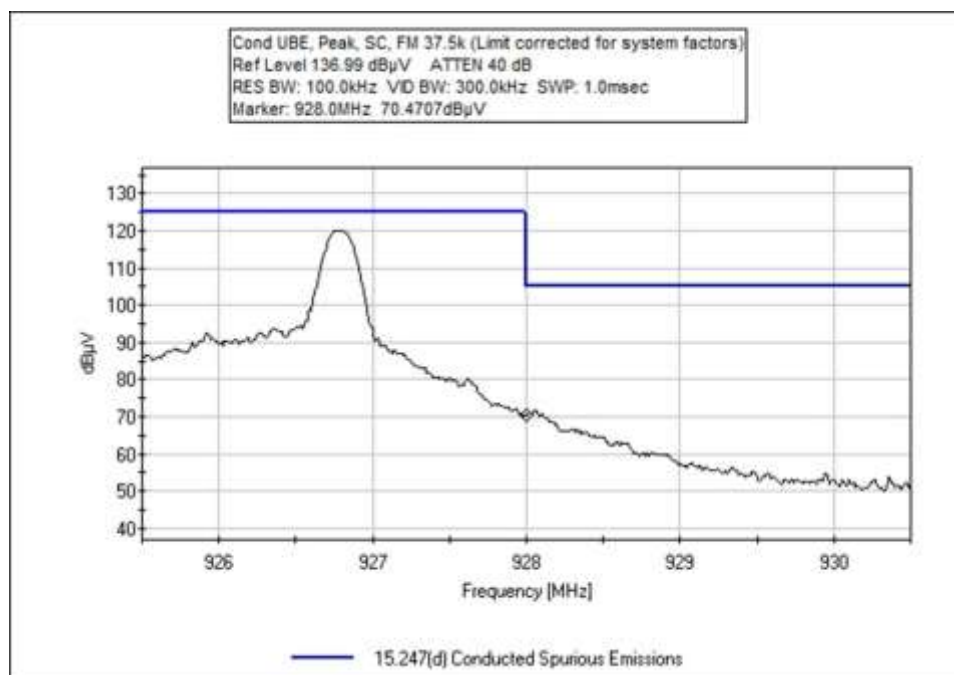
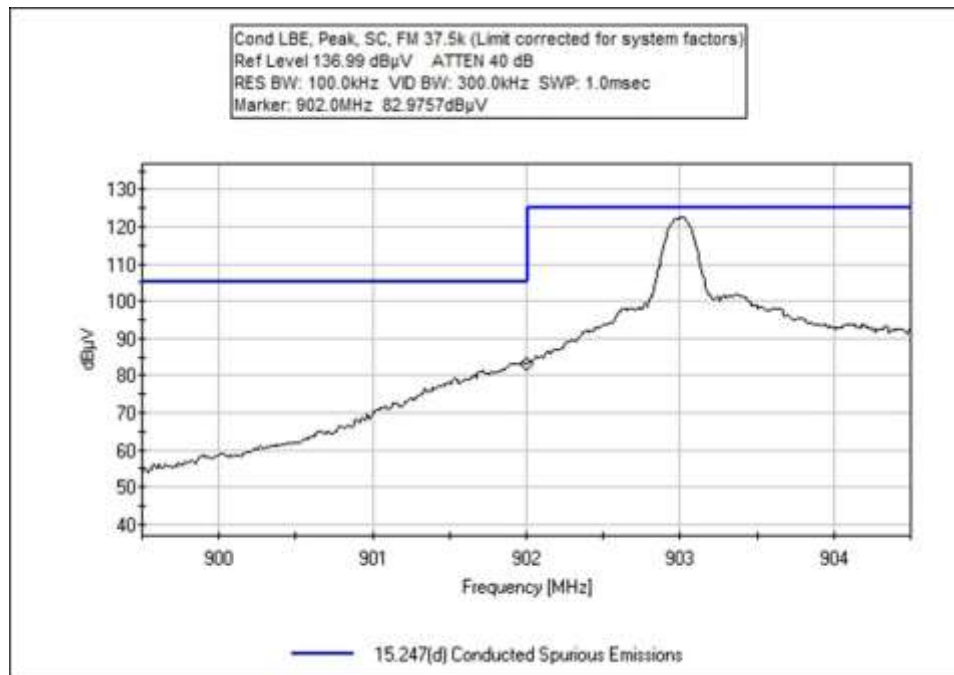
Band Edge Plots

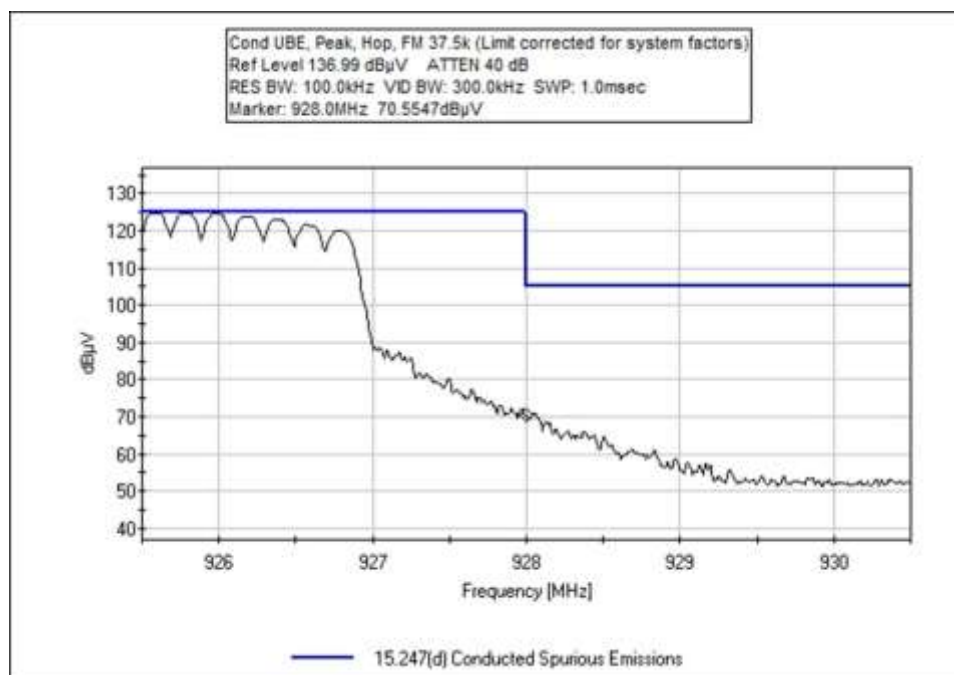
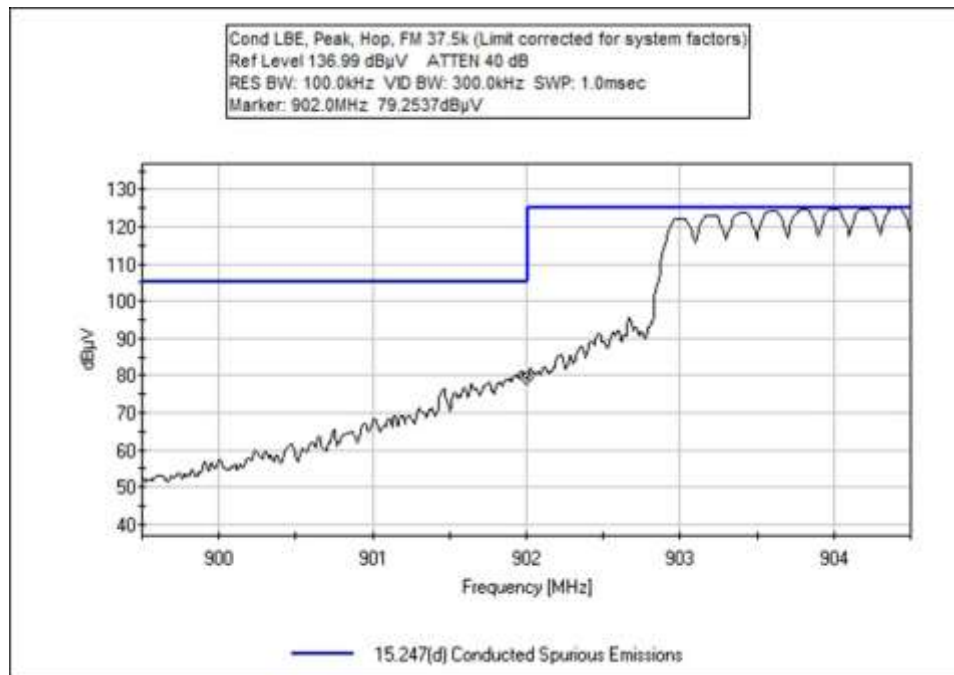












Test Setup / Conditions / Data

Test Location: CKC Laboratories, Inc. • 22116 23rd Dr SE • Bothell, WA 98021 • 800-500-4362
 Customer: **Itron, Inc.**
 Specification: **15.247(d) Conducted Spurious Emissions**
 Work Order #: **103220** Date: 10/1/2020
 Test Type: **Conducted Emissions** Time: 16:12:46
 Tested By: Matthew Harrison Sequence#: 2
 Software: EMITest 5.03.19 120V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Temperature: 23° C Humidity: 39% Pressure: 101.1 kPa Frequency Range: 902-928MHz Frequency tested: 903, 926.8 MHz Firmware power setting: Max Antenna type: Omni-Directional Antenna Gain: 5.5 dBi. Duty Cycle: 100% Modulated Test Method: ANSI C63.10: 2015 Test Mode: Transmitting Test Setup: EUT is setup in for conducted measurements. Modifications #1 was in place during testing.

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP05503	Attenuator	766-10	7/30/2019	7/30/2021
T2	ANP06008	Cable	Helix	1/22/2019	1/22/2021
T3	AN02872	Spectrum Analyzer	E4440A	11/18/2019	11/18/2021

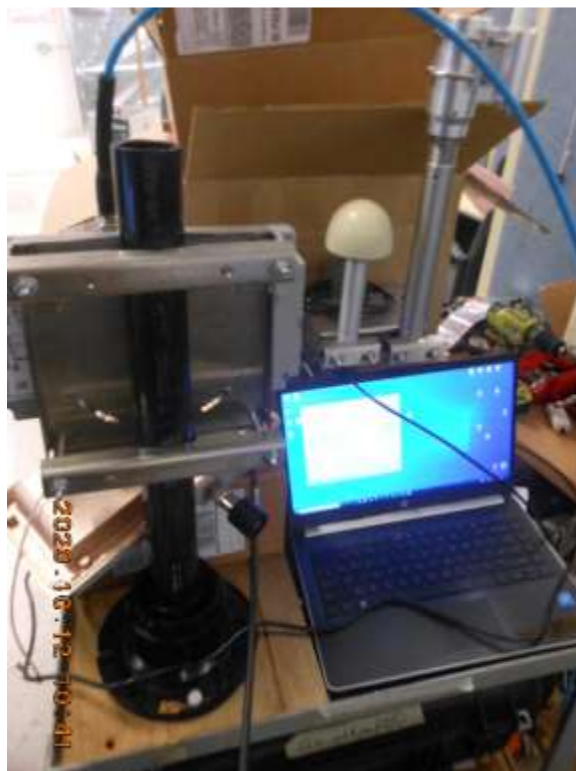
Measurement Data:

Reading listed by margin.

Test Lead: Antenna Port

#	Freq MHz	Rdng dB μ V	T1 dB	T2 dB	T3 dB		Dist Table	Corr dB μ V	Spec dB μ V	Margin dB	Polar Ant
1	902.000M	84.0	+10.1	+0.8	+0.0		+0.0	94.9	116.2 FM 12.5k, SC	-21.3	Anten
2	902.000M	82.9	+10.1	+0.8	+0.0		+0.0	93.8	116.2 FM 37.5k, SC	-22.4	Anten
3	902.000M	80.7	+10.1	+0.8	+0.0		+0.0	91.6	116.2 FM 37.5k, Hop	-24.6	Anten
4	902.000M	80.1	+10.1	+0.8	+0.0		+0.0	91.0	116.2 FM 12.5k, Hop	-25.2	Anten
5	928.000M	70.7	+10.1	+0.8	+0.0		+0.0	81.6	116.2 FM 12.5k, SC	-34.6	Anten
6	928.000M	70.6	+10.1	+0.8	+0.0		+0.0	81.5	116.2 FM 37.5k, Hop	-34.7	Anten
7	928.000M	70.5	+10.1	+0.8	+0.0		+0.0	81.4	116.2 FM 37.5k, SC	-34.8	Anten
8	902.000M	70.4	+10.1	+0.8	+0.0		+0.0	81.3	116.2 AM, SC	-34.9	Anten
9	902.000M	70.0	+10.1	+0.8	+0.0		+0.0	80.9	116.2 AM, Hop	-35.3	Anten
10	928.000M	69.6	+10.1	+0.8	+0.0		+0.0	80.5	116.2 FM 12.5k, Hop	-35.7	Anten
11	928.000M	69.1	+10.1	+0.8	+0.0		+0.0	80.0	116.2 AM, SC	-36.2	Anten
12	928.000M	67.0	+10.1	+0.8	+0.0		+0.0	77.9	116.2 AM, Hop	-38.3	Anten

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 #: **103220** Date: 10/10/2020
 Test Type: **Radiated Scan** Time: 10:59:02
 Tested By: Matthew Harrison Sequence#: 1
 Software: EMITest 5.03.19

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1, 4 and 5			

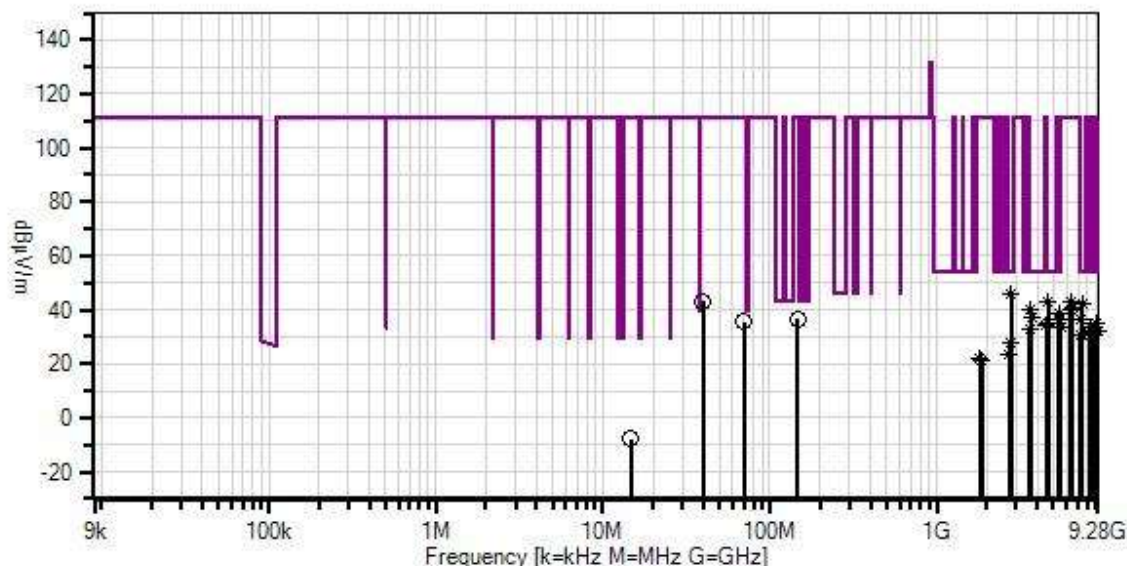
Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1, 4 and 5			

Test Conditions / Notes:

Temperature: 23° C Humidity: 39% Pressure: 101.1 kPa Frequency Range: 9kHz-10GHz Frequency tested: Low, Mid High Firmware power setting: Max Modulation: FSK 12.5, FSK 37.5, and AM investigated, overall worst case reported. Antenna type: Omnidirectional Antenna Gain: 5.5 dBi. Duty Cycle: 100% Modulated Test Method: ANSI C63.10: 2013 Test Mode: Transmitting Test Setup: EUT is setup in a tabletop configuration on a Styrofoam table. Below 1GHz set 80cm high. Above 1GHz set 1.5m high Modification #1 was in place during testing.

Itron, Inc. WD#: 103220 Sequence#: 1 Date: 10/10/2020
15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Horz + Vert



— Readings
× QP Readings
▼ Ambient
— 1 - 15.247(d) / 15.209 Radiated Spurious Emissions
○ Peak Readings
* Average Readings
Software Version: 5.03.19

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN03540	Preamp	83017A	5/13/2019	5/13/2021
T2	AN01467	Horn Antenna-ANSI C63.5 Calibration	3115	7/5/2019	7/5/2021
T3	ANP06243	Attenuator	54A-10	1/27/2020	1/27/2022
T4	ANP06515	Cable	Helix	7/1/2020	7/1/2022
T5	ANP06540	Cable	Helix	8/23/2019	8/23/2021
T6	ANP07504	Cable	CLU40-KMKM-02.00F	1/17/2019	1/17/2021
	AN02872	Spectrum Analyzer	E4440A	11/18/2019	11/18/2021
T7	AN03170	High Pass Filter	HM1155-11SS	10/23/2019	10/23/2021
T8	ANDCCF	Duty Cycle Correction Factor	Multiple	10/1/2019	10/1/2021
T9	AN00052	Loop Antenna	6502	5/4/2020	5/4/2022
	AN02871	Spectrum Analyzer	E4440A	3/12/2020	3/12/2022
T10	AN03628	Biconilog Antenna	3142E	6/11/2019	6/11/2021
T11	ANP06123	Attenuator	18N-6	4/5/2019	4/5/2021
T12	ANP05305	Cable	ETSI-50T	9/6/2019	9/6/2021
T13	ANP05360	Cable	RG214	2/3/2020	2/3/2022

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	dBμV	dB	dB	dB	dB	Table	dBμV/m	dBμV/m	dB	Ant
1	2780.235M Ave	49.6	-34.1 +0.7 +0.0 +0.0	+28.5 +0.2 +0.0	+10.0 +0.4 +0.0	+2.9 +12.5 +0.0	+0.0	45.7	54.0	-8.3	Horz
^	2780.235M	53.1	-34.1 +0.7 +0.0 +0.0	+28.5 +0.2 +0.0	+10.0 +0.4 +0.0	+2.9 +0.0 +0.0	+0.0	61.7	54.0	+7.7	Horz
3	4634.360M Ave	41.6	-33.6 +0.9 +0.0 +0.0	+32.1 +0.6 +0.0	+9.8 +0.6 +0.0	+3.8 +12.5 +0.0	+0.0	43.3	54.0	-10.7	Horz
^	4634.360M	48.7	-33.6 +0.9 +0.0 +0.0	+32.1 +0.6 +0.0	+9.8 +0.6 +0.0	+3.8 +0.0 +0.0	+0.0	62.9	54.0	+8.9	Horz
5	7414.235M Ave	34.5	-34.6 +1.5 +0.0 +0.0	+37.1 +0.4 +0.0	+9.9 +0.6 +0.0	+5.3 +12.5 +0.0	+0.0	42.2	54.0	-11.8	Horz
^	7414.235M	45.1	-34.6 +1.5 +0.0 +0.0	+37.1 +0.4 +0.0	+9.9 +0.6 +0.0	+5.3 +0.0 +0.0	+0.0	65.3	54.0	+11.3	Horz
7	3659.660M Ave	41.0	-33.7 +0.9 +0.0 +0.0	+30.5 +0.5 +0.0	+9.8 +0.5 +0.0	+3.4 +12.5 +0.0	+0.0	40.4	54.0	-13.6	Horz
^	3659.660M	47.5	-33.7 +0.9 +0.0 +0.0	+30.5 +0.5 +0.0	+9.8 +0.5 +0.0	+3.4 +0.0 +0.0	+0.0	59.4	54.0	+5.4	Horz
9	3707.635M Ave	37.6	-33.7 +0.9 +0.0 +0.0	+30.6 +0.5 +0.0	+9.8 +0.5 +0.0	+3.5 +12.5 +0.0	+0.0	37.2	54.0	-16.8	Horz
^	3707.635M	47.0	-33.7 +0.9 +0.0 +0.0	+30.6 +0.5 +0.0	+9.8 +0.5 +0.0	+3.5 +0.0 +0.0	+0.0	59.1	54.0	+5.1	Horz
11	5418.345M Ave	33.6	-33.7 +1.0 +0.0 +0.0	+33.4 +0.4 +0.0	+9.9 +0.4 +0.0	+4.3 +12.5 +0.0	+0.0	36.8	54.0	-17.2	Horz

^ 5418.345M	43.6	-33.7 +1.0 +0.0 +0.0	+33.4 +0.4 +0.0 +0.0	+9.9 +0.4 +0.0 +0.0	+4.3 +0.0 +0.0 +0.0	+0.0	59.3	54.0	+5.3	Horz
13 7320.570M Ave	29.6	-34.6 +1.3 +0.0 +0.0	+36.8 +0.4 +0.0 +0.0	+9.9 +0.6 +0.0 +0.0	+5.2 +12.5 +0.0 +0.0	+0.0	36.7	54.0	-17.3	Horz
^ 7320.570M	40.5	-34.6 +1.3 +0.0 +0.0	+36.8 +0.4 +0.0 +0.0	+9.9 +0.6 +0.0 +0.0	+5.2 +0.0 +0.0 +0.0	+0.0	60.1	54.0	+6.1	Horz
15 4574.955M Ave	33.6	-33.7 +0.9 +0.0 +0.0	+31.9 +0.7 +0.0 +0.0	+9.8 +0.6 +0.0 +0.0	+3.8 +12.5 +0.0 +0.0	+0.0	35.1	54.0	-18.9	Horz
^ 4574.955M	42.4	-33.7 +0.9 +0.0 +0.0	+31.9 +0.7 +0.0 +0.0	+9.8 +0.6 +0.0 +0.0	+3.8 +0.0 +0.0 +0.0	+0.0	56.4	54.0	+2.4	Horz
17 9150.890M Ave	25.8	-34.2 +1.5 +0.0 +0.0	+37.5 +0.4 +0.0 +0.0	+9.9 +0.5 +0.0 +0.0	+5.8 +12.5 +0.0 +0.0	+0.0	34.7	54.0	-19.3	Horz
^ 9150.890M	39.2	-34.2 +1.5 +0.0 +0.0	+37.5 +0.4 +0.0 +0.0	+9.9 +0.5 +0.0 +0.0	+5.8 +0.0 +0.0 +0.0	+0.0	60.6	54.0	+6.6	Horz
19 4514.885M Ave	33.0	-33.7 +0.9 +0.0 +0.0	+31.8 +0.7 +0.0 +0.0	+9.8 +0.6 +0.0 +0.0	+3.7 +12.5 +0.0 +0.0	+0.0	34.3	54.0	-19.7	Horz
^ 4514.885M	42.7	-33.7 +0.9 +0.0 +0.0	+31.8 +0.7 +0.0 +0.0	+9.8 +0.6 +0.0 +0.0	+3.7 +0.0 +0.0 +0.0	+0.0	56.5	54.0	+2.5	Horz
21 8235.890M Ave	25.6	-35.0 +1.7 +0.0 +0.0	+37.0 +0.5 +0.0 +0.0	+9.8 +0.9 +0.0 +0.0	+5.3 +12.5 +0.0 +0.0	+0.0	33.3	54.0	-20.7	Horz
^ 8235.890M	40.9	-35.0 +1.7 +0.0 +0.0	+37.0 +0.5 +0.0 +0.0	+9.8 +0.9 +0.0 +0.0	+5.3 +0.0 +0.0 +0.0	+0.0	61.1	54.0	+7.1	Horz
23 3611.575M Ave	33.6	-33.8 +0.8 +0.0 +0.0	+30.3 +0.6 +0.0 +0.0	+9.8 +0.5 +0.0 +0.0	+3.4 +12.5 +0.0 +0.0	+0.0	32.7	54.0	-21.3	Horz
^ 3611.575M	43.7	-33.8 +0.8 +0.0 +0.0	+30.3 +0.6 +0.0 +0.0	+9.8 +0.5 +0.0 +0.0	+3.4 +0.0 +0.0 +0.0	+0.0	55.3	54.0	+1.3	Horz

25	9030.255M Ave	23.3	-34.2 +1.4 +0.0 +0.0	+37.5 +0.3 +0.0 +0.0	+10.0 +0.5 +0.0 +0.0	+5.9 +12.5 +0.0 +0.0	+0.0	32.2	54.0	-21.8	Horz
^	9030.255M	36.5	-34.2 +1.4 +0.0 +0.0	+37.5 +0.3 +0.0 +0.0	+10.0 +0.5 +0.0 +0.0	+5.9 +0.0 +0.0 +0.0	+0.0	57.9	54.0	+3.9	Horz
27	8127.255M Ave	23.9	-35.0 +1.4 +0.0 +0.0	+37.0 +0.5 +0.0 +0.0	+9.8 +0.8 +0.0 +0.0	+5.3 +12.5 +0.0 +0.0	+0.0	31.2	54.0	-22.8	Horz
^	8127.255M	36.9	-35.0 +1.4 +0.0 +0.0	+37.0 +0.5 +0.0 +0.0	+9.8 +0.8 +0.0 +0.0	+5.3 +0.0 +0.0 +0.0	+0.0	56.7	54.0	+2.7	Horz
29	8341.200M Ave	23.3	-34.9 +1.7 +0.0 +0.0	+37.0 +0.5 +0.0 +0.0	+9.8 +0.8 +0.0 +0.0	+5.3 +12.5 +0.0 +0.0	+0.0	31.0	54.0	-23.0	Horz
^	8341.200M	35.5	-34.9 +1.7 +0.0 +0.0	+37.0 +0.5 +0.0 +0.0	+9.8 +0.8 +0.0 +0.0	+5.3 +0.0 +0.0 +0.0	+0.0	55.7	54.0	+1.7	Horz
31	2744.965M Ave	32.2	-34.1 +0.7 +0.0 +0.0	+28.4 +0.2 +0.0 +0.0	+10.0 +0.4 +0.0 +0.0	+2.9 +12.5 +0.0 +0.0	+0.0	28.2	54.0	-25.8	Horz
^	2744.965M	44.5	-34.1 +0.7 +0.0 +0.0	+28.4 +0.2 +0.0 +0.0	+10.0 +0.4 +0.0 +0.0	+2.9 +0.0 +0.0 +0.0	+0.0	53.0	54.0	-1.0	Horz
33	2709.265M Ave	27.5	-34.1 +0.7 +0.0 +0.0	+28.3 +0.2 +0.0 +0.0	+10.0 +0.4 +0.0 +0.0	+2.9 +12.5 +0.0 +0.0	+0.0	23.4	54.0	-30.6	Horz
^	2709.265M	43.0	-34.1 +0.7 +0.0 +0.0	+28.3 +0.2 +0.0 +0.0	+10.0 +0.4 +0.0 +0.0	+2.9 +0.0 +0.0 +0.0	+0.0	51.4	54.0	-2.6	Horz
35	39.700M	24.3	+0.0 +0.1 +0.0 +0.3	+0.0 +0.0 +12.3 +5.8	+0.0 +0.0 +0.0 +0.3	+0.0 +0.0 +0.0 +0.0	+0.0	43.1	111.3	-68.2	Horz
36	6320.105M Ave	37.6	-34.1 +1.0 +0.0 +0.0	+34.6 +0.5 +0.0 +0.0	+10.0 +0.5 +0.0 +0.0	+5.1 +12.5 +0.0 +0.0	+0.0	42.7	111.3	-68.6	Horz
^	6320.105M	50.3	-34.1 +1.0 +0.0 +0.0	+34.6 +0.5 +0.0 +0.0	+10.0 +0.5 +0.0 +0.0	+5.1 +0.0 +0.0 +0.0	+0.0	67.9	111.3	-43.4	Horz

38	6487.955M Ave	35.7	-34.2 +1.2 +0.0 +0.0	+34.5 +0.6 +0.0 +0.0	+10.0 +0.5 +0.0 +0.0	+5.4 +12.5 +0.0 +0.0	+0.0	41.2	111.3	-70.1	Horz
^	6487.955M	45.4	-34.2 +1.2 +0.0 +0.0	+34.5 +0.6 +0.0 +0.0	+10.0 +0.5 +0.0 +0.0	+5.4 +0.0 +0.0 +0.0	+0.0	63.4	111.3	-47.9	Horz
40	6404.770M Ave	34.8	-34.2 +1.1 +0.0 +0.0	+34.6 +0.6 +0.0 +0.0	+10.0 +0.5 +0.0 +0.0	+5.3 +12.5 +0.0 +0.0	+0.0	40.2	111.3	-71.1	Horz
^	6404.770M	43.4	-34.2 +1.1 +0.0 +0.0	+34.6 +0.6 +0.0 +0.0	+10.0 +0.5 +0.0 +0.0	+5.3 +0.0 +0.0 +0.0	+0.0	61.3	111.3	-50.0	Horz
42	5489.630M Ave	35.2	-33.7 +1.0 +0.0 +0.0	+33.5 +0.4 +0.0 +0.0	+9.8 +0.4 +0.0 +0.0	+4.4 +12.5 +0.0 +0.0	+0.0	38.5	111.3	-72.8	Horz
^	5489.630M	43.6	-33.7 +1.0 +0.0 +0.0	+33.5 +0.4 +0.0 +0.0	+9.8 +0.4 +0.0 +0.0	+4.4 +0.0 +0.0 +0.0	+0.0	59.4	111.3	-51.9	Horz
44	146.400M	20.7	+0.0 +0.2 +0.0 +0.7	+0.0 +0.0 +8.8 +0.0	+0.0 +0.0 +5.8 +0.6	+0.0 +0.0 +0.0 +0.0	+0.0	36.8	111.3	-74.5	Horz
45	69.800M	21.5	+0.0 +0.1 +0.0 +0.5	+0.0 +0.0 +7.4 +0.0	+0.0 +0.0 +5.8 +0.4	+0.0 +0.0 +0.0 +0.0	+0.0	35.7	111.3	-75.6	Horz
46	5560.650M Ave	30.0	-33.7 +1.0 +0.0 +0.0	+33.7 +0.4 +0.0 +0.0	+9.8 +0.4 +0.0 +0.0	+4.4 +12.5 +0.0 +0.0	+0.0	33.5	111.3	-77.8	Horz
^	5560.650M	42.7	-33.7 +1.0 +0.0 +0.0	+33.7 +0.4 +0.0 +0.0	+9.8 +0.4 +0.0 +0.0	+4.4 +0.0 +0.0 +0.0	+0.0	58.7	111.3	-52.6	Horz
48	9268.000M Ave	23.1	-34.1 +1.5 +0.0 +0.0	+37.6 +0.4 +0.0 +0.0	+9.8 +0.5 +0.0 +0.0	+5.7 +12.5 +0.0 +0.0	+0.0	32.0	111.3	-79.3	Horz
^	9268.000M	37.3	-34.1 +1.5 +0.0 +0.0	+37.6 +0.4 +0.0 +0.0	+9.8 +0.5 +0.0 +0.0	+5.7 +0.0 +0.0 +0.0	+0.0	58.7	111.3	-52.6	Horz
50	7224.255M Ave	24.1	-34.5 +1.1 +0.0 +0.0	+36.5 +0.5 +0.0 +0.0	+9.9 +0.4 +0.0 +0.0	+5.1 +12.5 +0.0 +0.0	+0.0	30.6	111.3	-80.7	Horz

^ 7224.255M	39.7	-34.5	+36.5	+9.9	+5.1	+0.0	58.7	111.3	-52.6	Horz
		+1.1	+0.5	+0.4	+0.0					
		+0.0	+0.0	+0.0	+0.0					
		+0.0								
52 1806.265M Ave	30.1	-34.8	+26.1	+10.0	+2.3	+0.0	22.4	111.3	-88.9	Horz
		+0.5	+0.2	+0.5	+12.5					
		+0.0	+0.0	+0.0	+0.0					
		+0.0								
^ 1806.265M	44.0	-34.8	+26.1	+10.0	+2.3	+0.0	48.8	111.3	-62.5	Horz
		+0.5	+0.2	+0.5	+0.0					
		+0.0	+0.0	+0.0	+0.0					
		+0.0								
54 1853.470M Ave	28.8	-34.7	+26.5	+10.0	+2.4	+0.0	21.6	111.3	-89.7	Horz
		+0.5	+0.2	+0.4	+12.5					
		+0.0	+0.0	+0.0	+0.0					
		+0.0								
^ 1853.470M	44.1	-34.7	+26.5	+10.0	+2.4	+0.0	49.4	111.3	-61.9	Horz
		+0.5	+0.2	+0.4	+0.0					
		+0.0	+0.0	+0.0	+0.0					
		+0.0								
56 1830.250M Ave	29.0	-34.8	+26.3	+10.0	+2.4	+0.0	21.5	111.3	-89.8	Horz
		+0.5	+0.2	+0.4	+12.5					
		+0.0	+0.0	+0.0	+0.0					
		+0.0								
^ 1830.250M	42.7	-34.8	+26.3	+10.0	+2.4	+0.0	47.7	111.3	-63.6	Horz
		+0.5	+0.2	+0.4	+0.0					
		+0.0	+0.0	+0.0	+0.0					
		+0.0								
58 14.776M	22.8	+0.0	+0.0	+0.0	+0.2	-40.0	-7.6	111.3	-118.9	Horz
		+0.1	+0.0	+0.0	+0.0					
		+9.3	+0.0	+0.0	+0.0					
		+0.0								
59 79.218k	36.1	+0.0	+0.0	+0.0	+0.0	-80.0	-34.3	111.3	-145.6	Horz
		+0.0	+0.0	+0.0	+0.0					
		+9.6	+0.0	+0.0	+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 #: **103220** Date: 10/10/2020
Test Type: **Radiated Scan** Time: 10:39:38
Tested By: Matthew Harrison Sequence#: 1
Software: EMITest 5.03.19

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 2, 4 and 5			

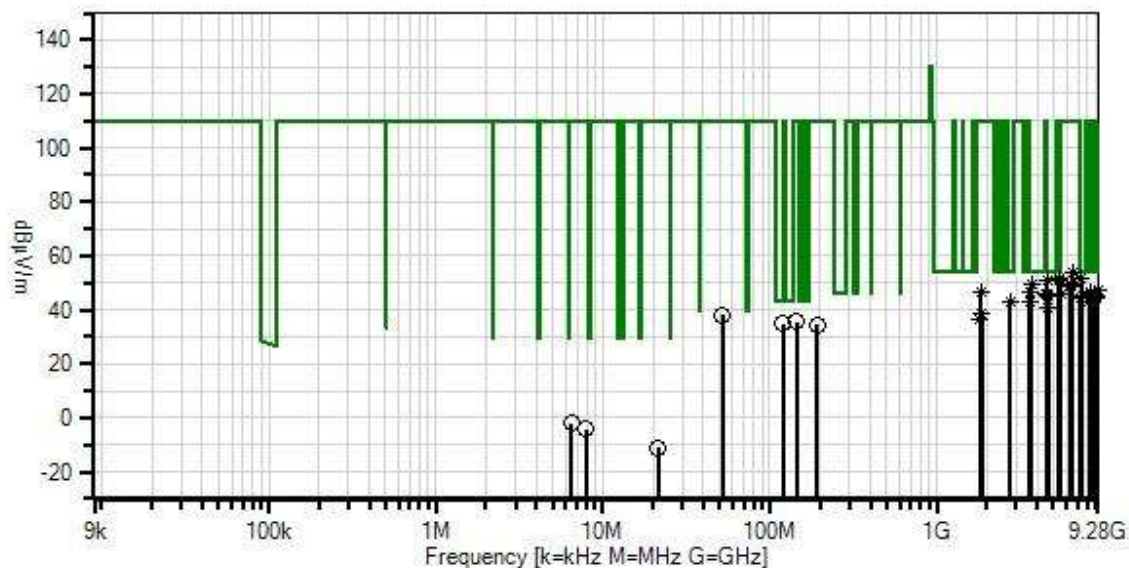
Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 2, 4 and 5			

Test Conditions / Notes:

Temperature: 22-23° C Humidity: 39-41% Pressure: 101.1-103.3 kPa Frequency Range: 9kHz-10GHz Frequency tested: Low, Mid High Firmware power setting: Max Modulation: FSK 12.5, FSK 37.5, and AM investigated, overall worst case reported. Worst case spur for each modulation type noted in table. Antenna type: Omnidirectional Antenna Gain: 8.15 dBi. Duty Cycle: 100% Modulated Test Method: ANSI C63.10: 2013 Test Mode: Transmitting Test Setup: EUT is setup in a tabletop configuration on a Styrofoam table. Below 1GHz set 80cm high. Above 1GHz set 1.5m high Modification #1 was in place during testing.

Itron, Inc. WD#: 103220 Sequence#: 1 Date: 10/10/2020
15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Horz + Vert



— Readings
× QP Readings
▼ Ambient

○ Peak Readings
* Average Readings
Software Version: 5.03.19

— 1 - 15.247(d) / 15.209 Radiated Spurious Emissions

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN03540	Preamp	83017A	5/13/2019	5/13/2021
T2	AN01467	Horn Antenna-ANSI C63.5 Calibration	3115	7/5/2019	7/5/2021
T3	ANP06243	Attenuator	54A-10	1/27/2020	1/27/2022
T4	ANP06515	Cable	Helix	7/1/2020	7/1/2022
T5	ANP06540	Cable	Helix	8/23/2019	8/23/2021
T6	ANP07504	Cable	CLU40-KMKM- 02.00F	1/17/2019	1/17/2021
T7	AN02872	Spectrum Analyzer	E4440A	11/18/2019	11/18/2021
T8	AN03170	High Pass Filter	HM1155-11SS	10/23/2019	10/23/2021
T9	ANDCCF	Duty Cycle Correction Factor	Multiple	10/1/2019	10/1/2021
T10	AN03628	Biconilog Antenna	3142E	6/11/2019	6/11/2021
T11	ANP06123	Attenuator	18N-6	4/5/2019	4/5/2021
T12	ANP05305	Cable	ETSI-50T	9/6/2019	9/6/2021
T13	ANP05360	Cable	RG214	2/3/2020	2/3/2022
	AN02871	Spectrum Analyzer	E4440A	3/12/2020	3/12/2022
T14	AN00052	Loop Antenna	6502	5/4/2020	5/4/2022

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1 T5 T9 T13	T2 T6 T10 T14	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	5418.180M Ave	36.1	-33.7 +1.0 +0.0 +0.0	+33.4 +0.4 +0.0 +0.0	+9.9 +0.0 +0.0 +0.0	+4.3 +0.4 +0.0 +0.0	+0.0	51.8	54.0	-2.2	Horz
^	5418.180M	44.6	-33.7 +1.0 +0.0 +0.0	+33.4 +0.4 +0.0 +0.0	+9.9 +0.0 +0.0 +0.0	+4.3 +0.4 +0.0 +0.0	+0.0	60.3	54.0	+6.3	Horz
3	7320.405M Ave	32.2	-34.6 +1.3 +0.0 +0.0	+36.8 +0.4 +0.0 +0.0	+9.9 +0.0 +0.0 +0.0	+5.2 +0.6 +0.0 +0.0	+0.0	51.8	54.0	-2.2	Horz
^	7320.397M	39.4	-34.6 +1.3 +0.0 +0.0	+36.8 +0.4 +0.0 +0.0	+9.9 +0.0 +0.0 +0.0	+5.2 +0.6 +0.0 +0.0	+0.0	59.0	54.0	+5.0	Horz
5	4574.945M Ave	37.2	-33.7 +0.9 +0.0 +0.0	+31.9 +0.7 +0.0 +0.0	+9.8 +0.0 +0.0 +0.0	+3.8 +0.6 +0.0 +0.0	+0.0	51.2	54.0	-2.8	Horz
^	4574.945M	45.5	-33.7 +0.9 +0.0 +0.0	+31.9 +0.7 +0.0 +0.0	+9.8 +0.0 +0.0 +0.0	+3.8 +0.6 +0.0 +0.0	+0.0	59.5	54.0	+5.5	Horz
7	3707.230M Ave	37.7	-33.7 +0.9 +0.0 +0.0	+30.6 +0.5 +0.0 +0.0	+9.8 +0.0 +0.0 +0.0	+3.5 +0.5 +0.0 +0.0	+0.0	49.8	54.0	-4.2	Horz
^	3707.230M	46.3	-33.7 +0.9 +0.0 +0.0	+30.6 +0.5 +0.0 +0.0	+9.8 +0.0 +0.0 +0.0	+3.5 +0.5 +0.0 +0.0	+0.0	58.4	54.0	+4.4	Horz
9	3612.325M Ave	35.1	-33.8 +0.8 +0.0 +0.0	+30.3 +0.6 +0.0 +0.0	+9.8 +0.0 +0.0 +0.0	+3.4 +0.5 +0.0 +0.0	+0.0	46.7	54.0	-7.3	Horz
^	3612.325M	44.3	-33.8 +0.8 +0.0 +0.0	+30.3 +0.6 +0.0 +0.0	+9.8 +0.0 +0.0 +0.0	+3.4 +0.5 +0.0 +0.0	+0.0	55.9	54.0	+1.9	Horz
11	8341.935M Ave	26.4	-34.9 +1.7 +0.0 +0.0	+37.0 +0.5 +0.0 +0.0	+9.8 +0.0 +0.0 +0.0	+5.3 +0.8 +0.0 +0.0	+0.0	46.6	54.0	-7.4	Horz

^ 8341.935M	39.0	-34.9 +1.7 +0.0 +0.0	+37.0 +0.5 +0.0 +0.0	+9.8 +0.0 +0.0 +0.0	+5.3 +0.8 +0.0 +0.0	+0.0	59.2	54.0	+5.2	Horz
13 4633.960M Ave	44.4	-33.6 +0.9 +12.5 +0.0	+32.1 +0.6 +0.0 +0.0	+9.8 +0.0 +0.0 +0.0	+3.8 +0.6 +0.0 +0.0	+0.0	46.1	54.0 FM 37.5K	-7.9	Horz
14 8233.505M Ave	25.8	-35.0 +1.7 +0.0 +0.0	+37.0 +0.5 +0.0 +0.0	+9.8 +0.0 +0.0 +0.0	+5.3 +0.9 +0.0 +0.0	+0.0	46.0	54.0	-8.0	Horz
^ 8233.505M	38.1	-35.0 +1.7 +0.0 +0.0	+37.0 +0.5 +0.0 +0.0	+9.8 +0.0 +0.0 +0.0	+5.3 +0.9 +0.0 +0.0	+0.0	58.3	54.0	+4.3	Horz
16 4514.650M Ave	32.0	-33.7 +0.9 +0.0 +0.0	+31.8 +0.7 +0.0 +0.0	+9.8 +0.0 +0.0 +0.0	+3.7 +0.6 +0.0 +0.0	+0.0	45.8	54.0	-8.2	Horz
^ 4514.650M	42.2	-33.7 +0.9 +0.0 +0.0	+31.8 +0.7 +0.0 +0.0	+9.8 +0.0 +0.0 +0.0	+3.7 +0.6 +0.0 +0.0	+0.0	56.0	54.0	+2.0	Horz
18 119.800M	19.9	+0.0 +0.1 +0.0 +0.6	+0.0 +0.0 +8.0 +0.0	+0.0 +0.0 +5.8 +0.5	+0.0 +0.0 +0.0 +0.0	+0.0	34.9	43.5	-8.6	Horz
19 4633.960M Ave	43.6	-33.6 +0.9 +12.5 +0.0	+32.1 +0.6 +0.0 +0.0	+9.8 +0.0 +0.0 +0.0	+3.8 +0.6 +0.0 +0.0	+0.0	45.3	54.0 FM 12.5K	-8.7	Horz
20 9147.570M Ave	23.6	-34.2 +1.5 +0.0 +0.0	+37.5 +0.4 +0.0 +0.0	+9.9 +0.0 +0.0 +0.0	+5.8 +0.5 +0.0 +0.0	+0.0	45.0	54.0	-9.0	Horz
^ 9147.570M	38.4	-34.2 +1.5 +0.0 +0.0	+37.5 +0.4 +0.0 +0.0	+9.9 +0.0 +0.0 +0.0	+5.8 +0.5 +0.0 +0.0	+0.0	59.8	54.0	+5.8	Horz
22 7414.418M Ave	37.2	-34.6 +1.5 +12.5 +0.0	+37.1 +0.4 +0.0 +0.0	+9.9 +0.0 +0.0 +0.0	+5.3 +0.6 +0.0 +0.0	+0.0	44.9	54.0	-9.1	Horz
^ 7414.481M	45.0	-34.6 +1.5 +0.0 +0.0	+37.1 +0.4 +0.0 +0.0	+9.9 +0.0 +0.0 +0.0	+5.3 +0.6 +0.0 +0.0	+0.0	65.2	54.0	+11.2	Horz
24 9030.535M Ave	23.4	-34.2 +1.4 +0.0 +0.0	+37.5 +0.3 +0.0 +0.0	+10.0 +0.0 +0.0 +0.0	+5.9 +0.5 +0.0 +0.0	+0.0	44.8	54.0	-9.2	Horz

^ 9030.535M	35.4	-34.2 +1.4 +0.0 +0.0	+37.5 +0.3 +0.0 +0.0	+10.0 +0.0 +0.0 +0.0	+5.9 +0.5 +0.0 +0.0	+0.0	56.8	54.0	+2.8	Horz
26 8127.535M Ave	23.5	-35.0 +1.4 +0.0 +0.0	+37.0 +0.5 +0.0 +0.0	+9.8 +0.0 +0.0 +0.0	+5.3 +0.8 +0.0 +0.0	+0.0	43.3	54.0	-10.7	Horz
^ 8127.535M	39.5	-35.0 +1.4 +0.0 +0.0	+37.0 +0.5 +0.0 +0.0	+9.8 +0.0 +0.0 +0.0	+5.3 +0.8 +0.0 +0.0	+0.0	59.3	54.0	+5.3	Horz
28 3659.855M Ave	43.6	-33.7 +0.9 +12.5 +0.0	+30.5 +0.5 +0.0 +0.0	+9.8 +0.0 +0.0 +0.0	+3.4 +0.5 +0.0 +0.0	+0.0	43.0	54.0	-11.0	Horz
^ 3659.855M	48.9	-33.7 +0.9 +0.0 +0.0	+30.5 +0.5 +0.0 +0.0	+9.8 +0.0 +0.0 +0.0	+3.4 +0.5 +0.0 +0.0	+0.0	60.8	54.0	+6.8	Horz
30 2744.930M Ave	34.3	-34.1 +0.7 +0.0 +0.0	+28.4 +0.2 +0.0 +0.0	+10.0 +0.0 +0.0 +0.0	+2.9 +0.4 +0.0 +0.0	+0.0	42.8	54.0	-11.2	Horz
^ 2744.930M	45.9	-34.1 +0.7 +0.0 +0.0	+28.4 +0.2 +0.0 +0.0	+10.0 +0.0 +0.0 +0.0	+2.9 +0.4 +0.0 +0.0	+0.0	54.4	54.0	+0.4	Horz
32 4633.960M Ave	39.1	-33.6 +0.9 +12.5 +0.0	+32.1 +0.6 +0.0 +0.0	+9.8 +0.0 +0.0 +0.0	+3.8 +0.6 +0.0 +0.0	+0.0	40.8	54.0 AM	-13.2	Horz
^ 4633.960M	48.7	-33.6 +0.9 +0.0 +0.0	+32.1 +0.6 +0.0 +0.0	+9.8 +0.0 +0.0 +0.0	+3.8 +0.6 +0.0 +0.0	+0.0	62.9	54.0 AM	+8.9	Horz
^ 4633.960M	48.7	-33.6 +0.9 +0.0 +0.0	+32.1 +0.6 +0.0 +0.0	+9.8 +0.0 +0.0 +0.0	+3.8 +0.6 +0.0 +0.0	+0.0	62.9	54.0 FM 12.5K	+8.9	Horz
^ 4633.960M	48.6	-33.6 +0.9 +0.0 +0.0	+32.1 +0.6 +0.0 +0.0	+9.8 +0.0 +0.0 +0.0	+3.8 +0.6 +0.0 +0.0	+0.0	62.8	54.0 FM 37.5K	+8.8	Horz
36 6487.841M Ave	35.6	-34.2 +1.2 +0.0 +0.0	+34.5 +0.6 +0.0 +0.0	+10.0 +0.0 +0.0 +0.0	+5.4 +0.5 +0.0 +0.0	+0.0	53.6	109.9	-56.3	Horz
^ 6487.930M	43.3	-34.2 +1.2 +0.0 +0.0	+34.5 +0.6 +0.0 +0.0	+10.0 +0.0 +0.0 +0.0	+5.4 +0.5 +0.0 +0.0	+0.0	61.3	109.9	-48.6	Horz

38	5489.867M Ave	34.9	-33.7 +1.0 +0.0 +0.0	+33.5 +0.4 +0.0 +0.0	+9.8 +0.0 +0.0 +0.0	+4.4 +0.4 +0.0 +0.0	+0.0	50.7	109.9	-59.2	Horz
^	5489.867M	44.8	-33.7 +1.0 +0.0 +0.0	+33.5 +0.4 +0.0 +0.0	+9.8 +0.0 +0.0 +0.0	+4.4 +0.4 +0.0 +0.0	+0.0	60.6	109.9	-49.3	Horz
40	6404.966M Ave	31.9	-34.2 +1.1 +0.0 +0.0	+34.6 +0.6 +0.0 +0.0	+10.0 +0.0 +0.0 +0.0	+5.3 +0.5 +0.0 +0.0	+0.0	49.8	109.9	-60.1	Horz
^	6404.966M	44.2	-34.2 +1.1 +0.0 +0.0	+34.6 +0.6 +0.0 +0.0	+10.0 +0.0 +0.0 +0.0	+5.3 +0.5 +0.0 +0.0	+0.0	62.1	109.9	-47.8	Horz
42	6321.345M Ave	31.1	-34.1 +1.0 +0.0 +0.0	+34.6 +0.5 +0.0 +0.0	+10.0 +0.0 +0.0 +0.0	+5.1 +0.5 +0.0 +0.0	+0.0	48.7	109.9	-61.2	Horz
^	6321.345M	41.9	-34.1 +1.0 +0.0 +0.0	+34.6 +0.5 +0.0 +0.0	+10.0 +0.0 +0.0 +0.0	+5.1 +0.5 +0.0 +0.0	+0.0	59.5	109.9	-50.4	Horz
44	9267.065M Ave	25.8	-34.1 +1.5 +0.0 +0.0	+37.6 +0.4 +0.0 +0.0	+9.8 +0.0 +0.0 +0.0	+5.7 +0.5 +0.0 +0.0	+0.0	47.2	109.9	-62.7	Horz
^	9267.065M	38.0	-34.1 +1.5 +0.0 +0.0	+37.6 +0.4 +0.0 +0.0	+9.8 +0.0 +0.0 +0.0	+5.7 +0.5 +0.0 +0.0	+0.0	59.4	109.9	-50.5	Horz
46	1829.835M Ave	41.9	-34.8 +0.5 +0.0 +0.0	+26.3 +0.2 +0.0 +0.0	+10.0 +0.0 +0.0 +0.0	+2.4 +0.4 +0.0 +0.0	+0.0	46.9	109.9	-63.0	Horz
^	1829.835M	45.3	-34.8 +0.5 +0.0 +0.0	+26.3 +0.2 +0.0 +0.0	+10.0 +0.0 +0.0 +0.0	+2.4 +0.4 +0.0 +0.0	+0.0	50.3	109.9	-59.6	Horz
48	5560.905M Ave	29.6	-33.7 +1.0 +0.0 +0.0	+33.7 +0.4 +0.0 +0.0	+9.8 +0.0 +0.0 +0.0	+4.4 +0.4 +0.0 +0.0	+0.0	45.6	109.9	-64.3	Horz
^	5560.905M	43.2	-33.7 +1.0 +0.0 +0.0	+33.7 +0.4 +0.0 +0.0	+9.8 +0.0 +0.0 +0.0	+4.4 +0.4 +0.0 +0.0	+0.0	59.2	109.9	-50.7	Horz
50	7224.535M Ave	25.7	-34.5 +1.1 +0.0 +0.0	+36.5 +0.5 +0.0 +0.0	+9.9 +0.0 +0.0 +0.0	+5.1 +0.4 +0.0 +0.0	+0.0	44.7	109.9	-65.2	Horz

^	7224.535M	39.9	-34.5	+36.5	+9.9	+5.1	+0.0	58.9	109.9	-51.0	Horz
			+1.1	+0.5	+0.0	+0.4					
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0							
52	1853.595M Ave	33.4	-34.7	+26.5	+10.0	+2.4	+0.0	38.7	109.9	-71.2	Horz
			+0.5	+0.2	+0.0	+0.4					
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0							
^	1853.595M	44.5	-34.7	+26.5	+10.0	+2.4	+0.0	49.8	109.9	-60.1	Horz
			+0.5	+0.2	+0.0	+0.4					
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0							
54	51.800M	24.1	+0.0	+0.0	+0.0	+0.0	+0.0	38.2	109.9	-71.7	Horz
			+0.1	+0.0	+0.0	+0.0					
			+0.0	+7.4	+5.8	+0.4					
			+0.4	+0.0							
55	1806.005M Ave	31.6	-34.8	+26.1	+10.0	+2.3	+0.0	36.4	109.9	-73.5	Horz
			+0.5	+0.2	+0.0	+0.5					
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0							
56	144.200M	19.7	+0.0	+0.0	+0.0	+0.0	+0.0	35.5	109.9	-74.4	Horz
			+0.1	+0.0	+0.0	+0.0					
			+0.0	+8.7	+5.8	+0.5					
			+0.7	+0.0							
57	192.200M	17.3	+0.0	+0.0	+0.0	+0.0	+0.0	34.7	109.9	-75.2	Horz
			+0.2	+0.0	+0.0	+0.0					
			+0.0	+9.9	+5.8	+0.7					
			+0.8	+0.0							
58	6.508M	28.7	+0.0	+0.0	+0.0	+0.1	-40.0	-1.9	109.9	-111.8	Horz
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+9.3							
59	7.971M	26.5	+0.0	+0.0	+0.0	+0.1	-40.0	-4.2	109.9	-114.1	Horz
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+9.2							
60	21.552M	21.8	+0.0	+0.0	+0.0	+0.2	-40.0	-10.9	109.9	-120.8	Horz
			+0.1	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+7.0							
61	72.450k	39.6	+0.0	+0.0	+0.0	+0.0	-80.0	-30.7	109.9	-140.6	Horz
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+9.7							

Band Edge

Band Edge Summary

Configuration 1

Operating Mode: Single Channel (Low and High)

Frequency (MHz)	Modulation	Ant. Type	Field Strength (dBuV/m @3m)	Limit (dBuV/m @3m)	Results
614	FM 12.5kbit	Omnidirectional	38.3	<46	Pass
902	FM 12.5kbit	Omnidirectional	88.1	<111.3	Pass
928	FM 12.5kbit	Omnidirectional	72.9	<111.3	Pass
960	FM 12.5kbit	Omnidirectional	45.7	<54	Pass
614	FM 37.5kbit	Omnidirectional	38.3	<46	Pass
902	FM 37.5kbit	Omnidirectional	88.2	<111.3	Pass
928	FM 37.5kbit	Omnidirectional	74.7	<111.3	Pass
960	FM 37.5kbit	Omnidirectional	45.2	<54	Pass
614	AM	Omnidirectional	38.3	<46	Pass
902	AM	Omnidirectional	75.8	<111.3	Pass
928	AM	Omnidirectional	72.3	<111.3	Pass
960	AM	Omnidirectional	46.6	<54	Pass

Band Edge Summary

Configuration 1

Operating Mode: Hopping

Frequency (MHz)	Modulation	Ant. Type	Field Strength (dBuV/m @3m)	Limit (dBuV/m @3m)	Results
614	FM 12.5kbit	Omnidirectional	38.2	<46	Pass
902	FM 12.5kbit	Omnidirectional	89	<111.3	Pass
928	FM 12.5kbit	Omnidirectional	73.2	<111.3	Pass
960	FM 12.5kbit	Omnidirectional	47.3	<54	Pass
614	FM 37.5kbit	Omnidirectional	38.3	<46	Pass
902	FM 37.5kbit	Omnidirectional	87.2	<111.3	Pass
928	FM 37.5kbit	Omnidirectional	73.5	<111.3	Pass
960	FM 37.5kbit	Omnidirectional	47.1	<54	Pass
614	AM	Omnidirectional	38.2	<46	Pass
902	AM	Omnidirectional	74.2	<111.3	Pass
928	AM	Omnidirectional	72.5	<111.3	Pass
960	AM	Omnidirectional	47	<54	Pass

Band Edge Summary

Configuration 2

Operating Mode: Single Channel (Low and High)

Frequency (MHz)	Modulation	Ant. Type	Field Strength (dBuV/m @3m)	Limit (dBuV/m @3m)	Results
614	FM 12.5kbit	Omnidirectional	40.9	<46	Pass
902	FM 12.5kbit	Omnidirectional	87.1	<109.9	Pass
928	FM 12.5kbit	Omnidirectional	74.4	<109.9	Pass
960	FM 12.5kbit	Omnidirectional	45.2	<54	Pass
614	FM 37.5kbit	Omnidirectional	38.5	<46	Pass
902	FM 37.5kbit	Omnidirectional	85.6	<109.9	Pass
928	FM 37.5kbit	Omnidirectional	74.1	<109.9	Pass
960	FM 37.5kbit	Omnidirectional	46.9	<54	Pass
614	AM	Omnidirectional	41.9	<46	Pass
902	AM	Omnidirectional	74.3	<109.9	Pass
928	AM	Omnidirectional	73.6	<109.9	Pass
960	AM	Omnidirectional	46.3	<54	Pass

Band Edge Summary

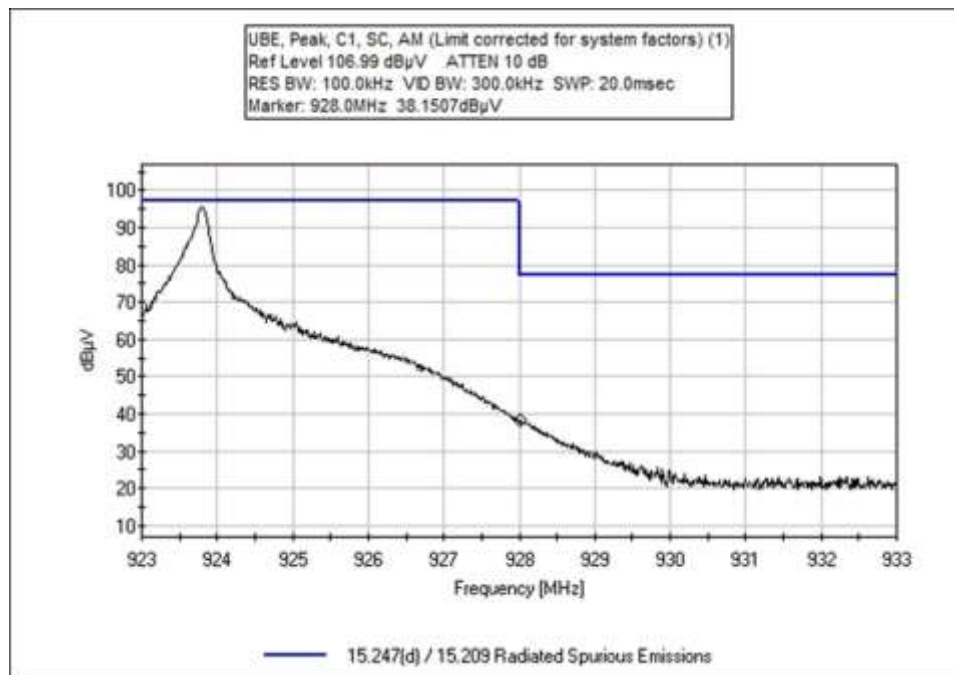
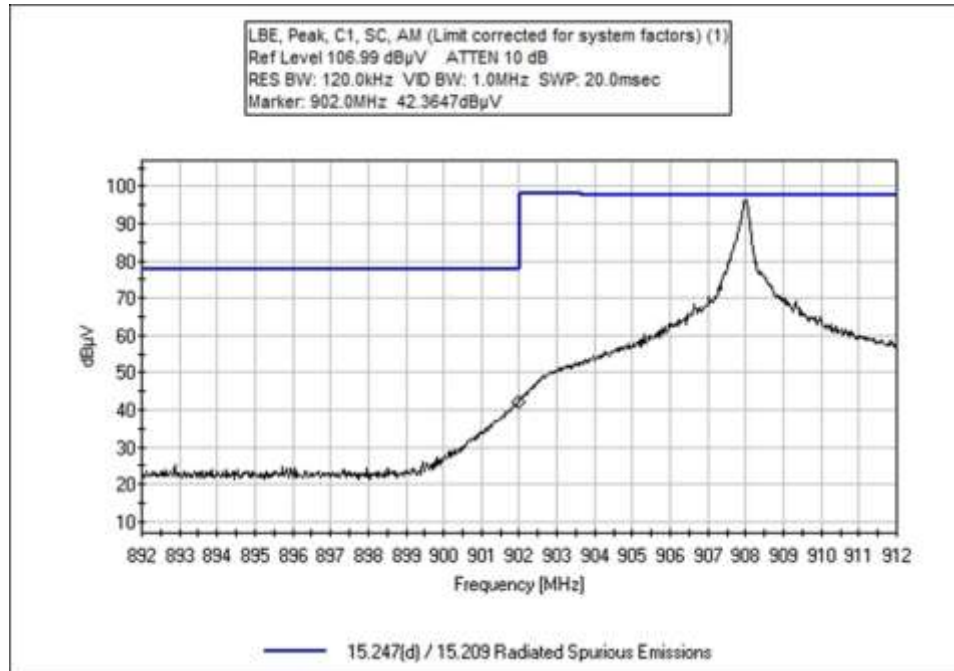
Configuration 2

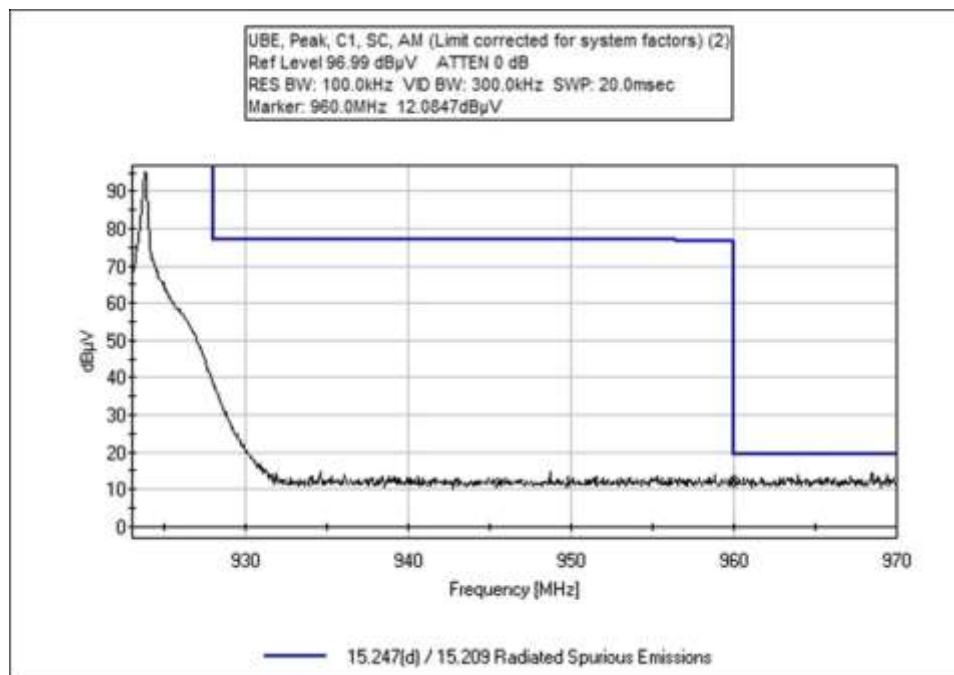
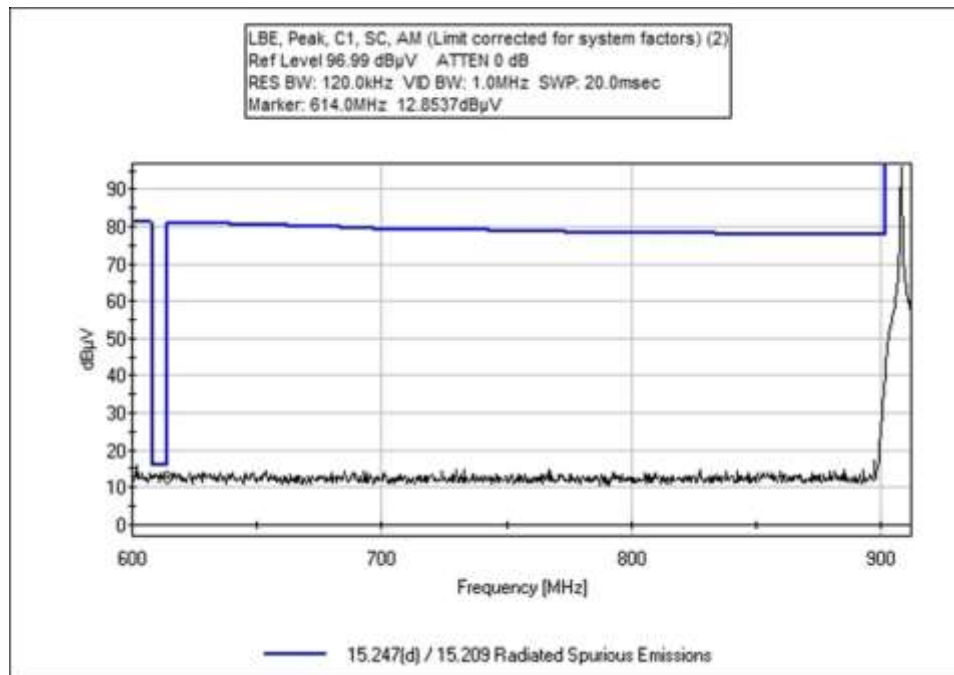
Operating Mode: Hopping

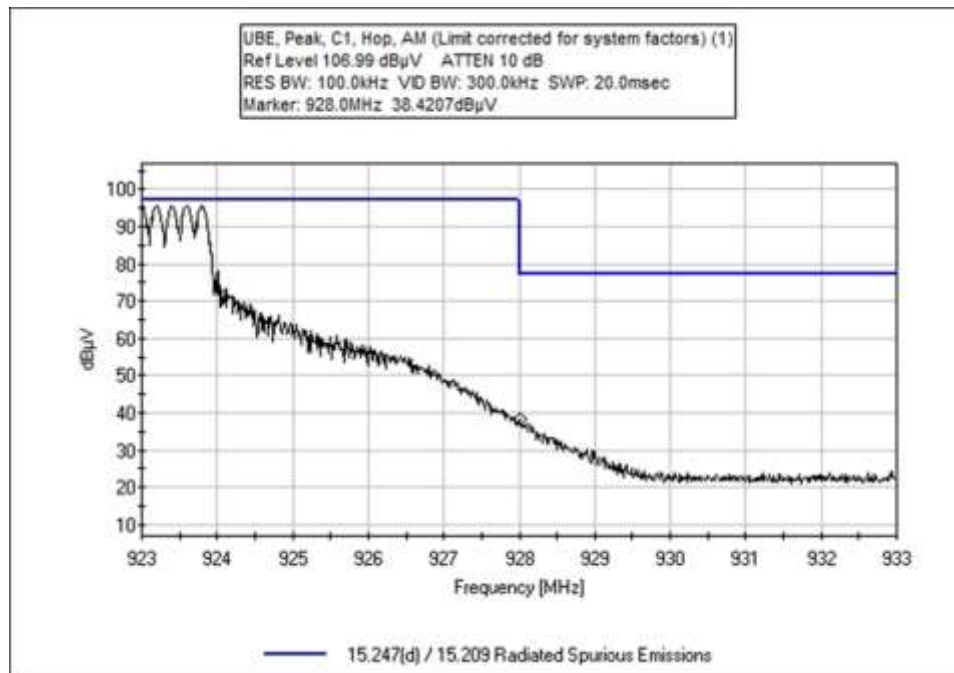
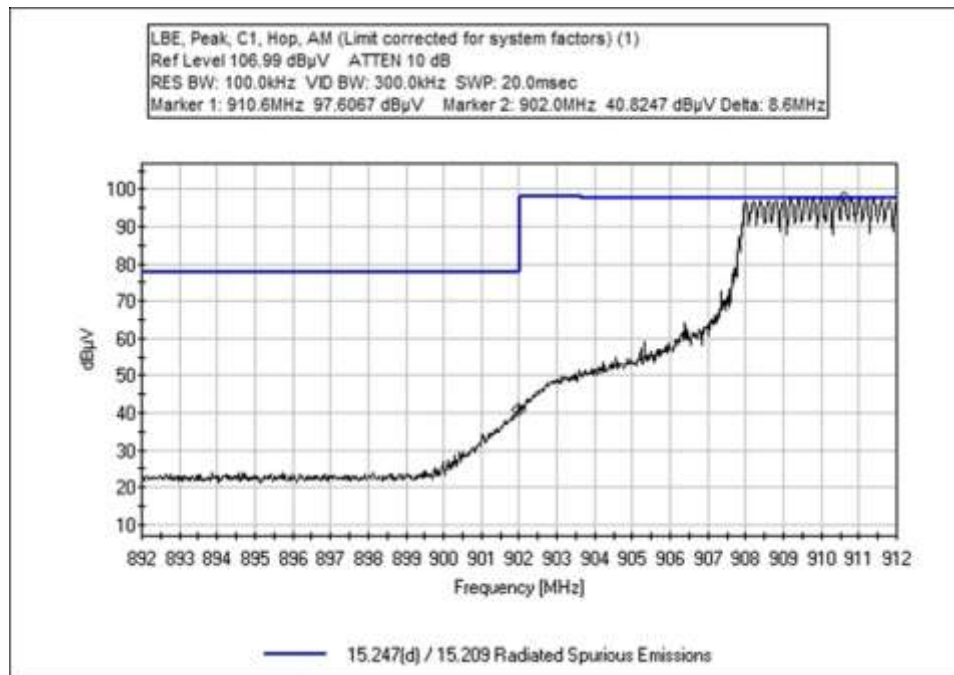
Frequency (MHz)	Modulation	Ant. Type	Field Strength (dBuV/m @3m)	Limit (dBuV/m @3m)	Results
614	FM 12.5kbit	Omnidirectional	42	<46	Pass
902	FM 12.5kbit	Omnidirectional	83.1	<109.9	Pass
928	FM 12.5kbit	Omnidirectional	75.2	<109.9	Pass
960	FM 12.5kbit	Omnidirectional	47.3	<54	Pass
614	FM 37.5kbit	Omnidirectional	42	<46	Pass
902	FM 37.5kbit	Omnidirectional	84.6	<109.9	Pass
928	FM 37.5kbit	Omnidirectional	74	<109.9	Pass
960	FM 37.5kbit	Omnidirectional	47.2	<54	Pass
614	AM	Omnidirectional	38.5	<46	Pass
902	AM	Omnidirectional	73.1	<109.9	Pass
928	AM	Omnidirectional	72.2	<109.9	Pass
960	AM	Omnidirectional	45.8	<54	Pass

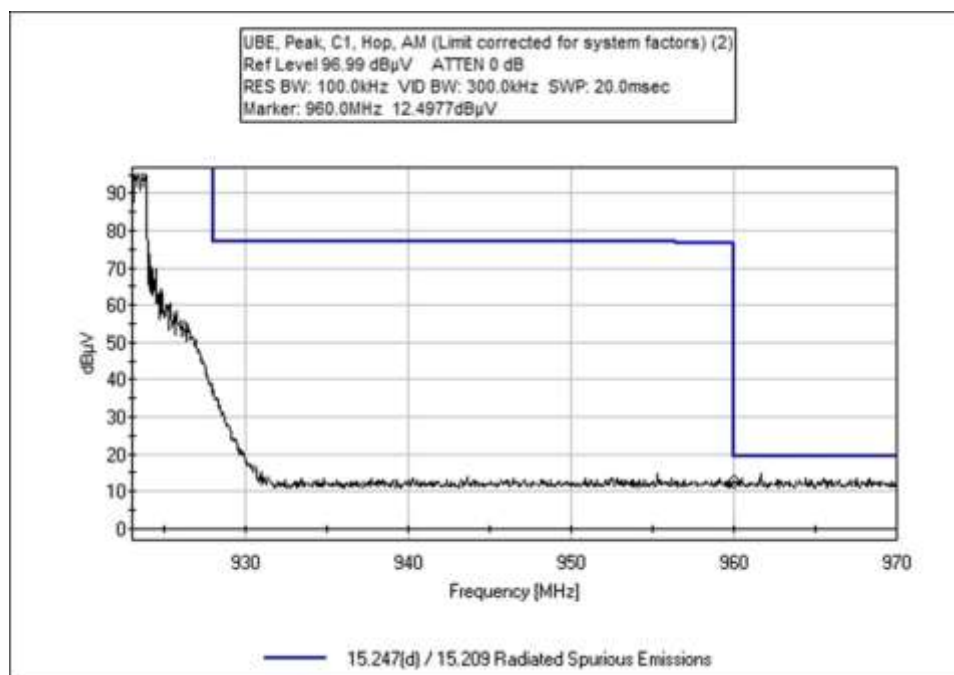
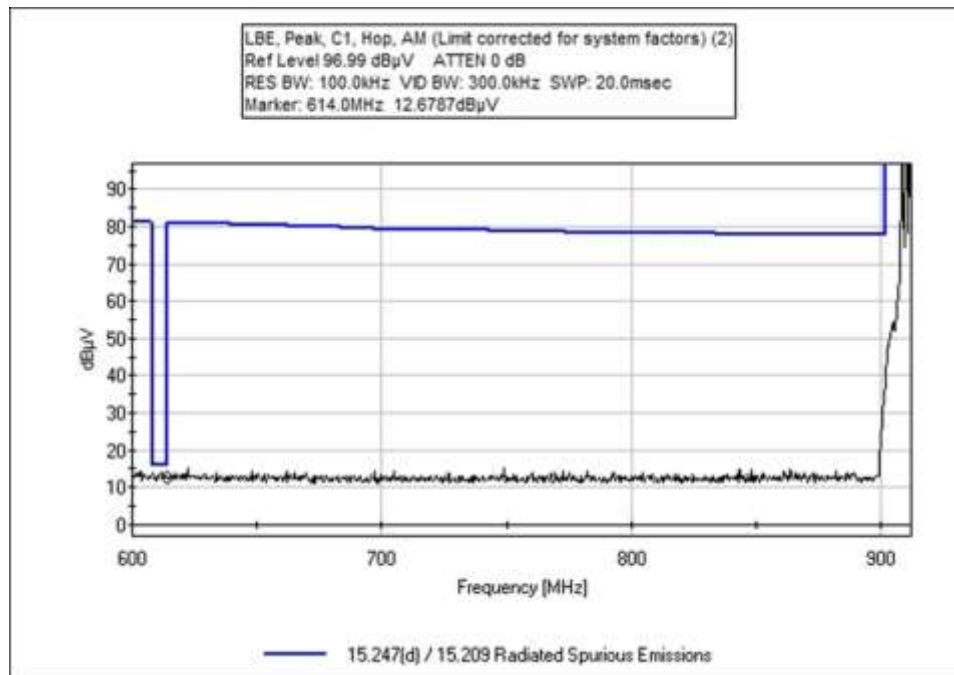
Band Edge Plots

Configuration 1 AM

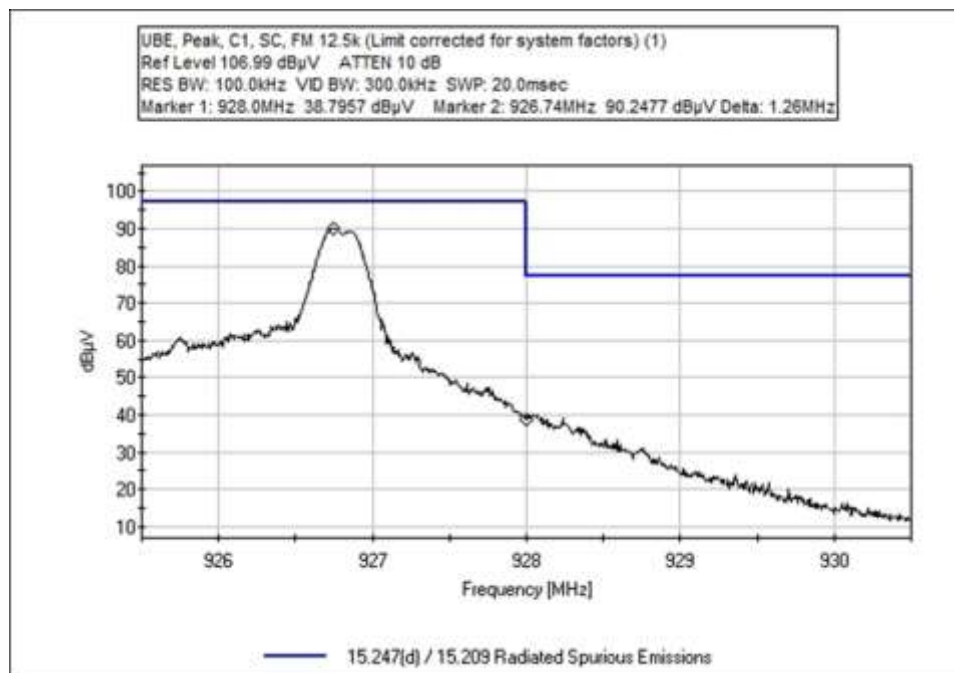
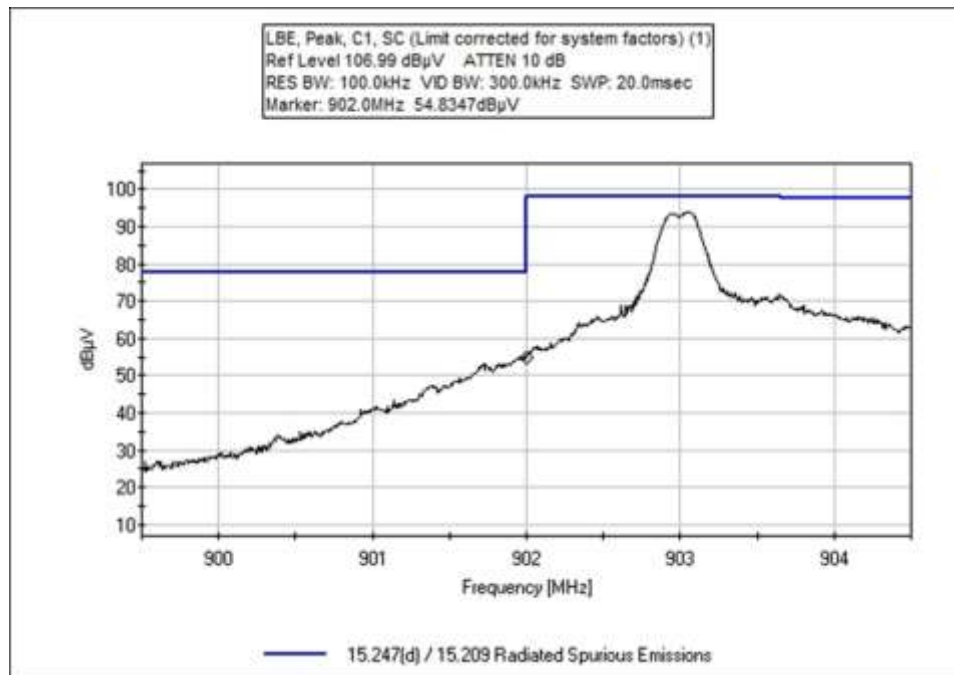


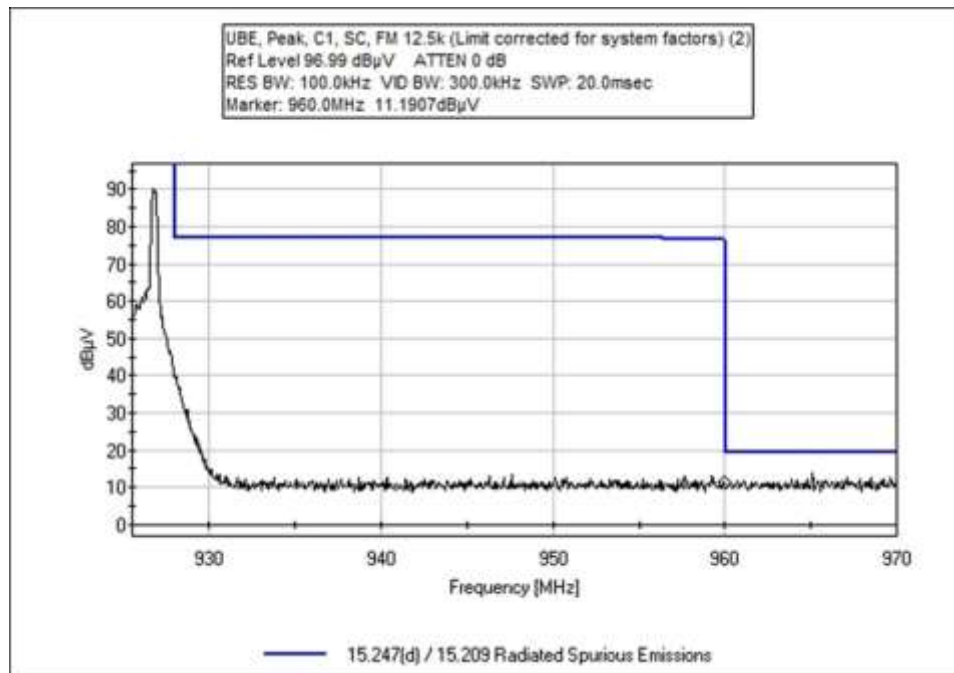
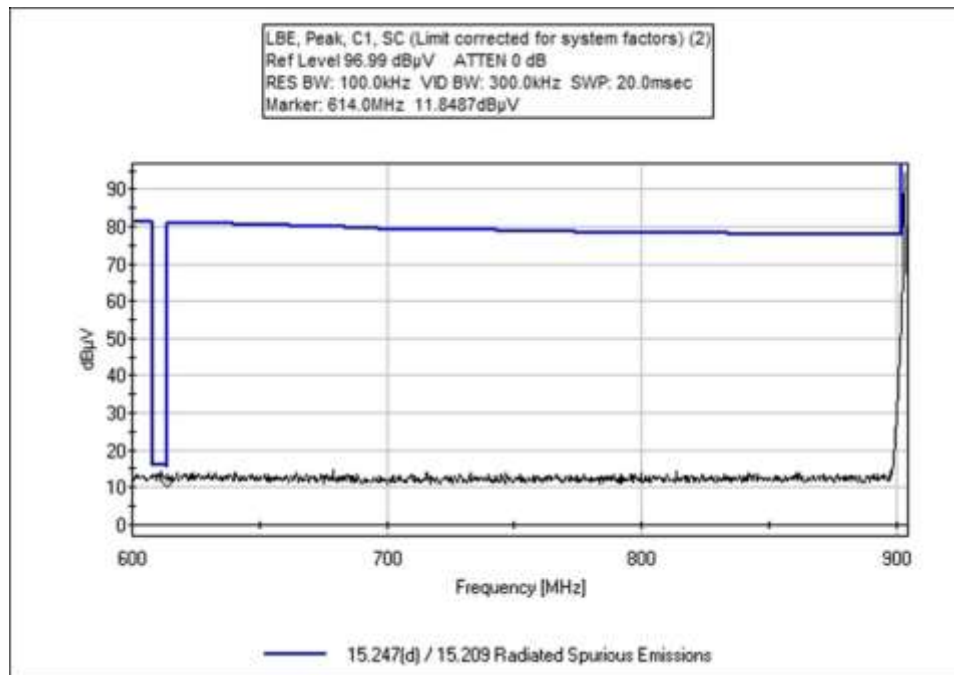


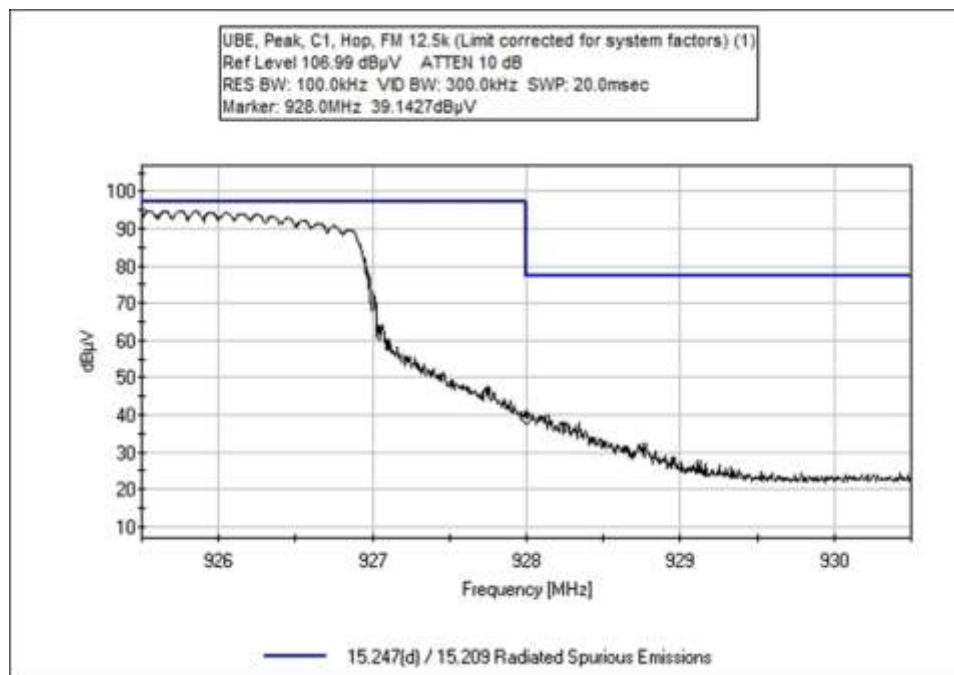
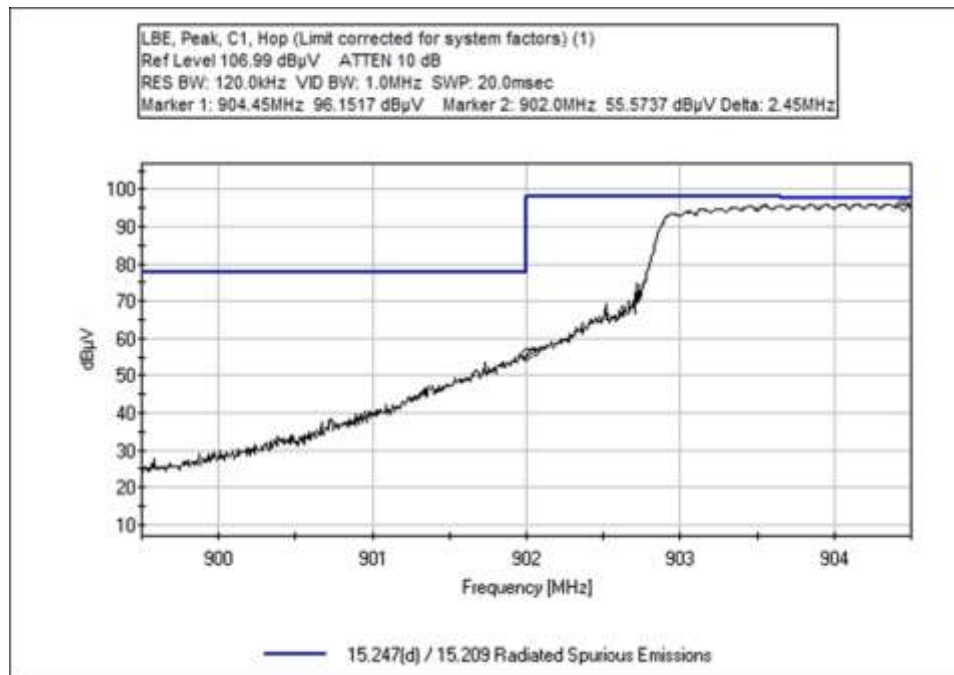


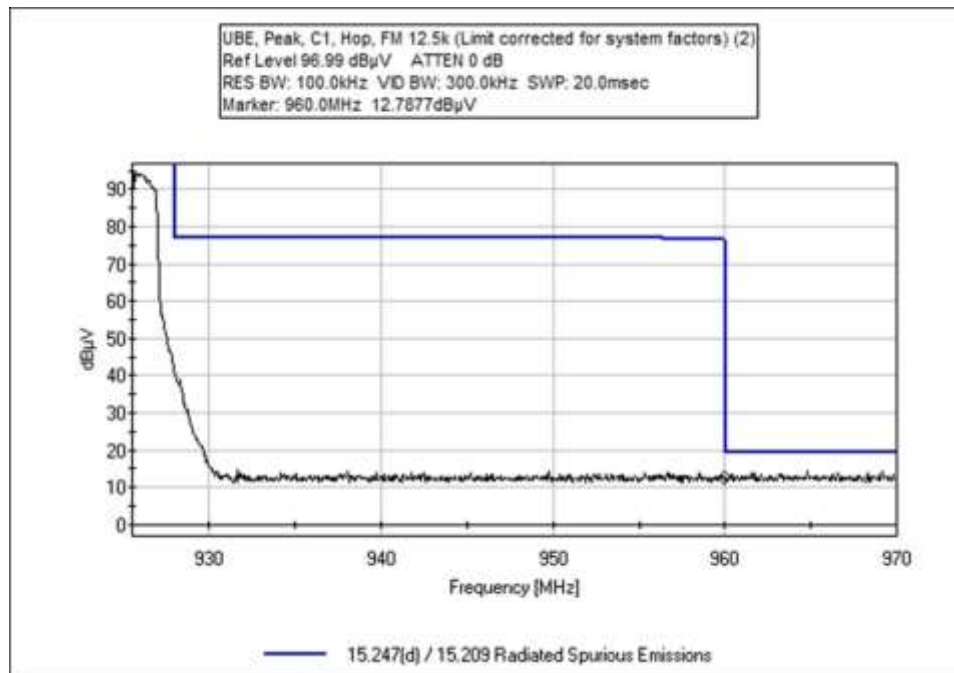
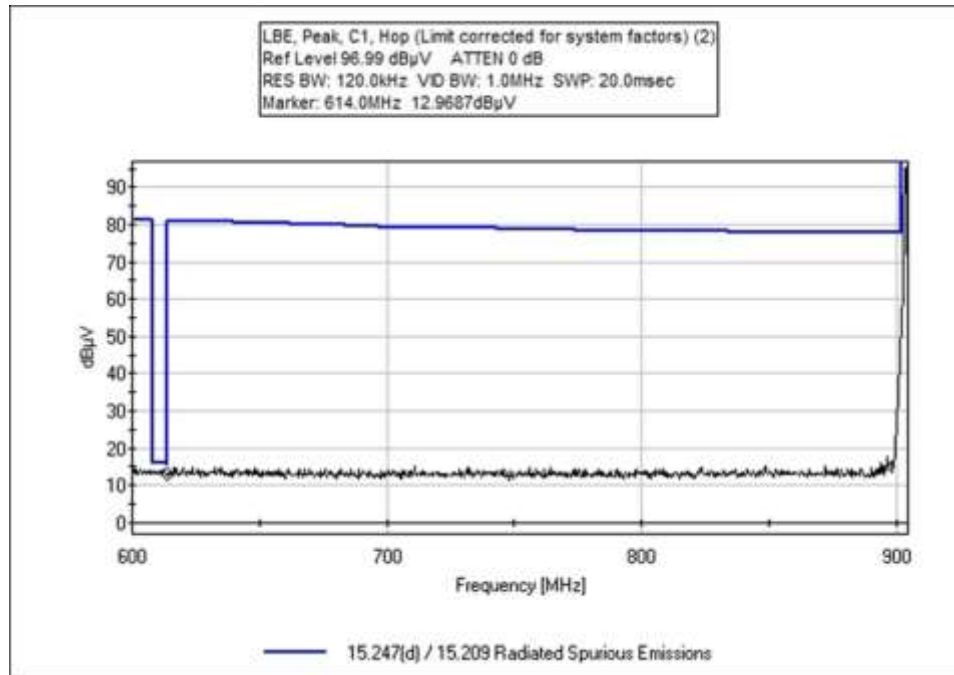


Configuration 1 FM 12.5kbit

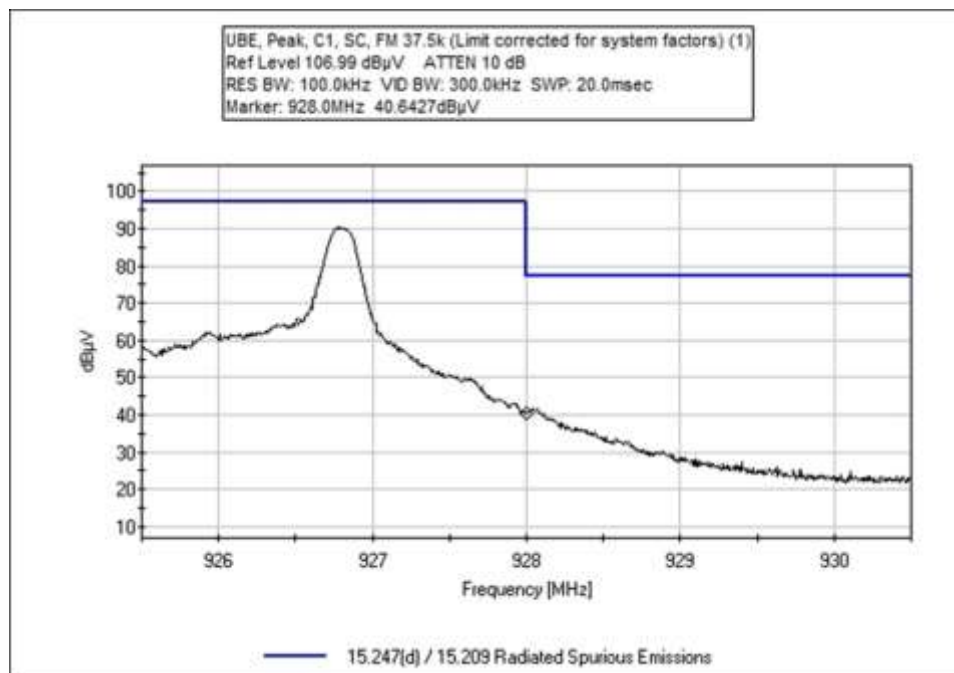
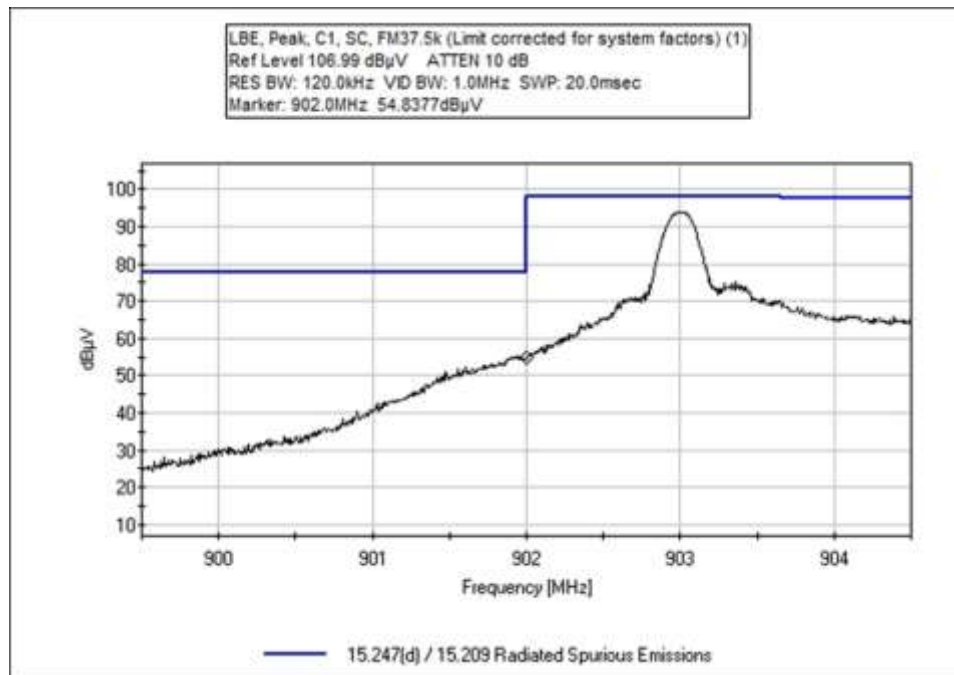


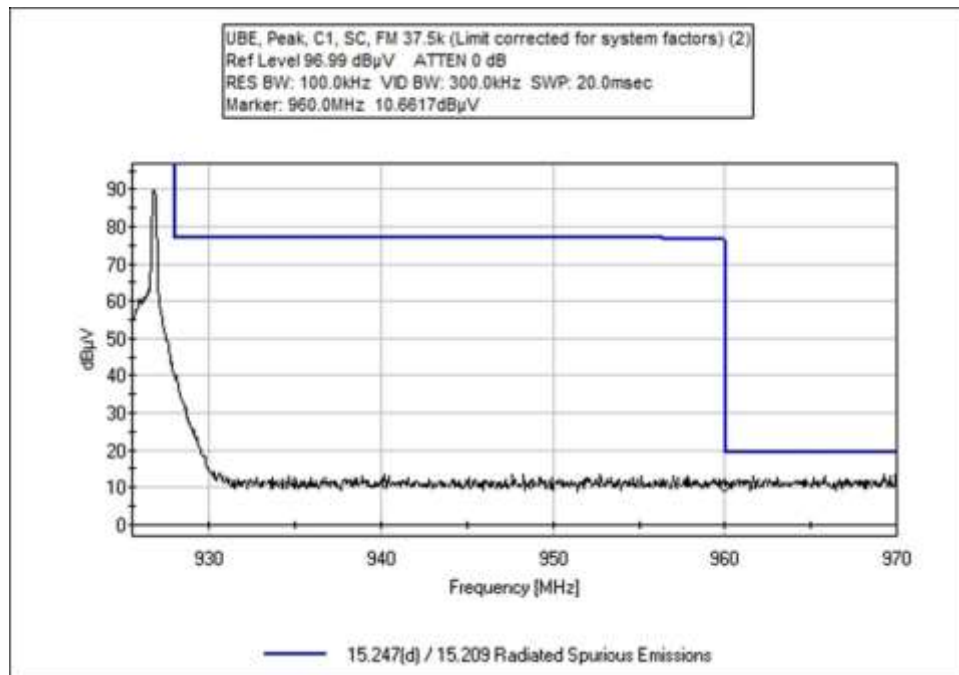
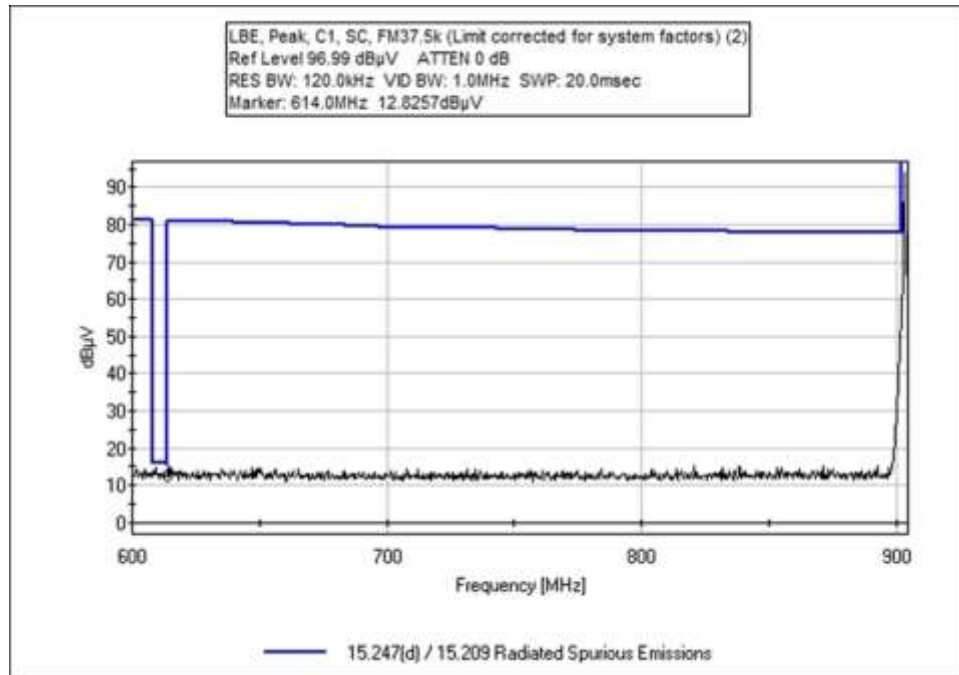


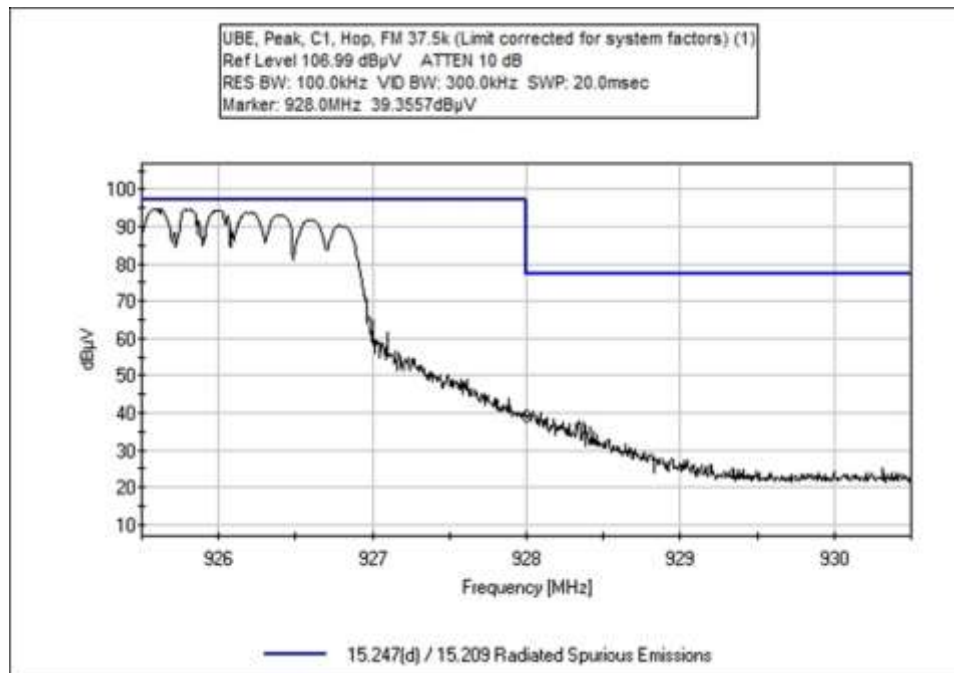
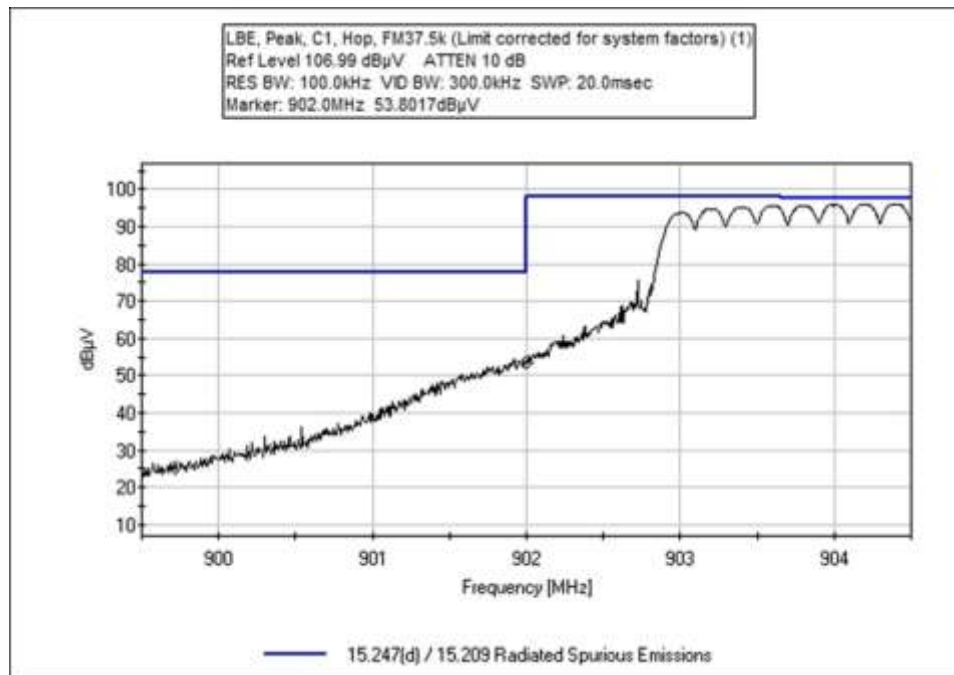


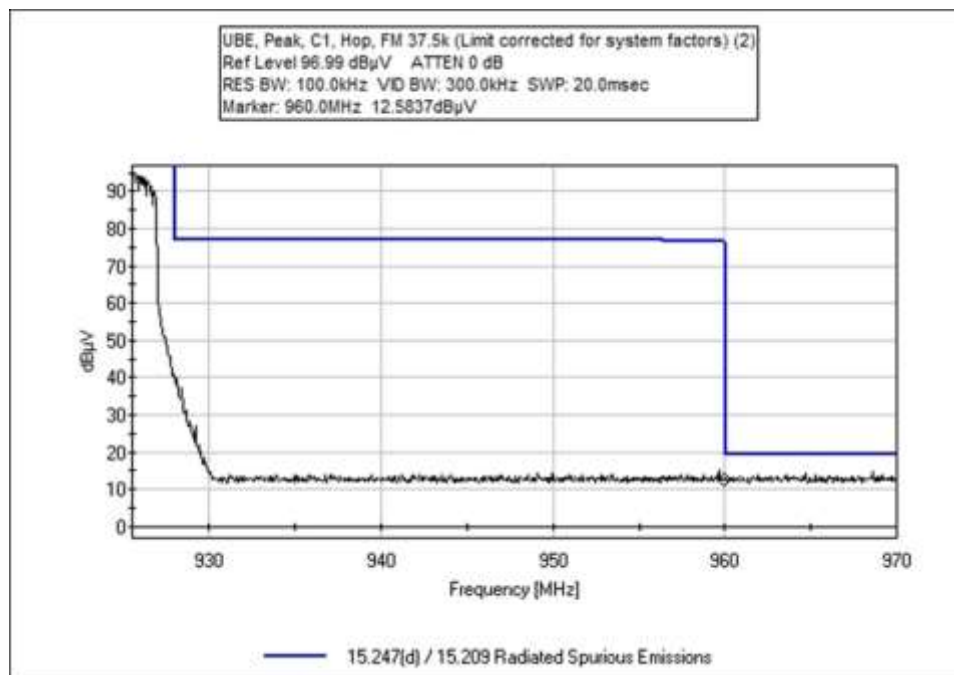
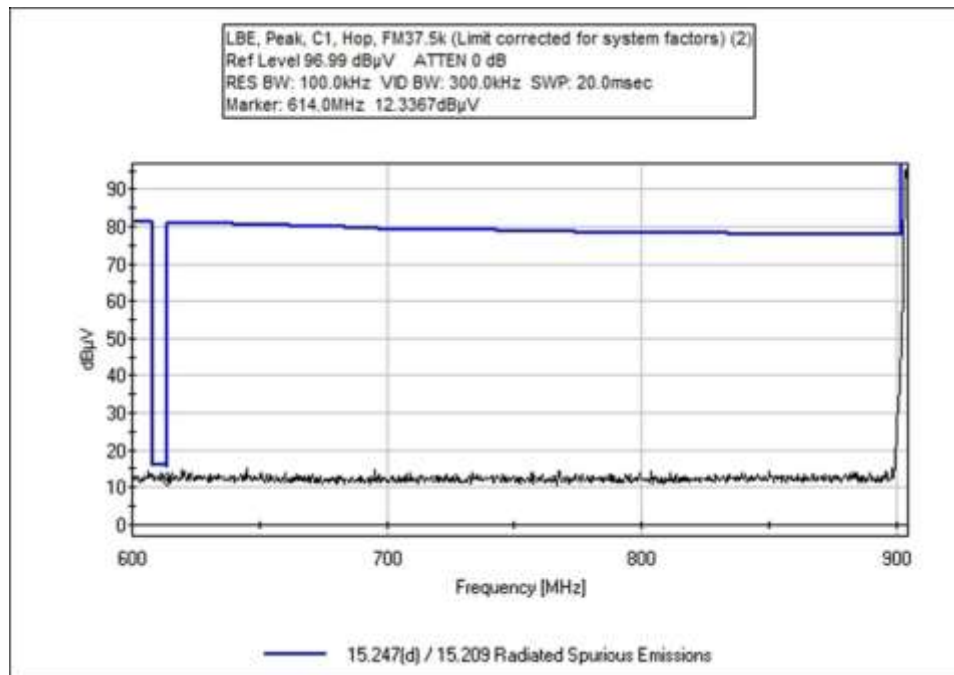


Configuration 1 FM 37.5kbit

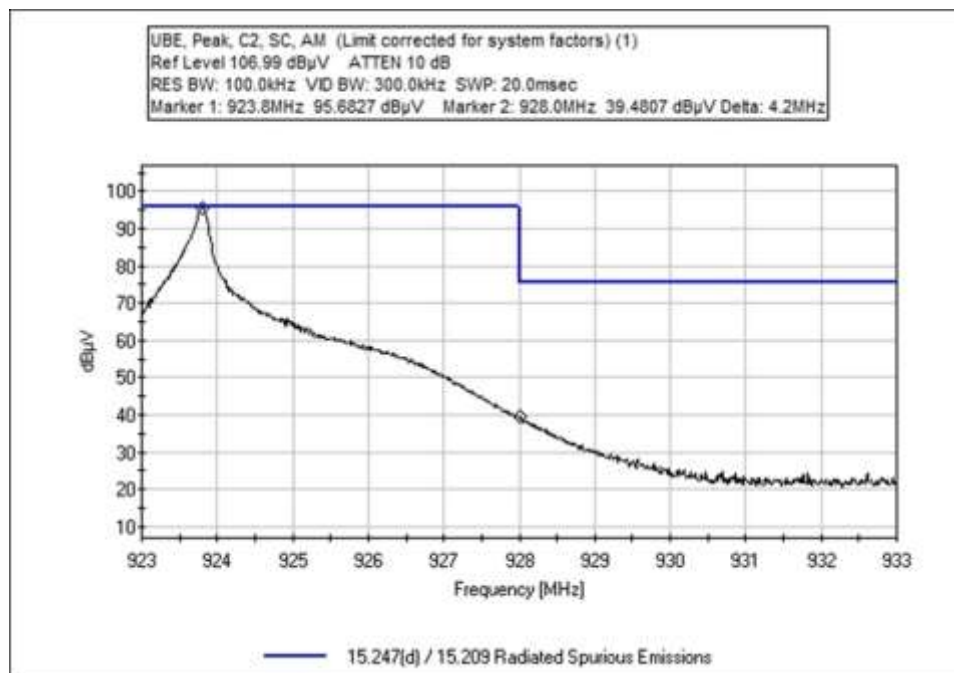
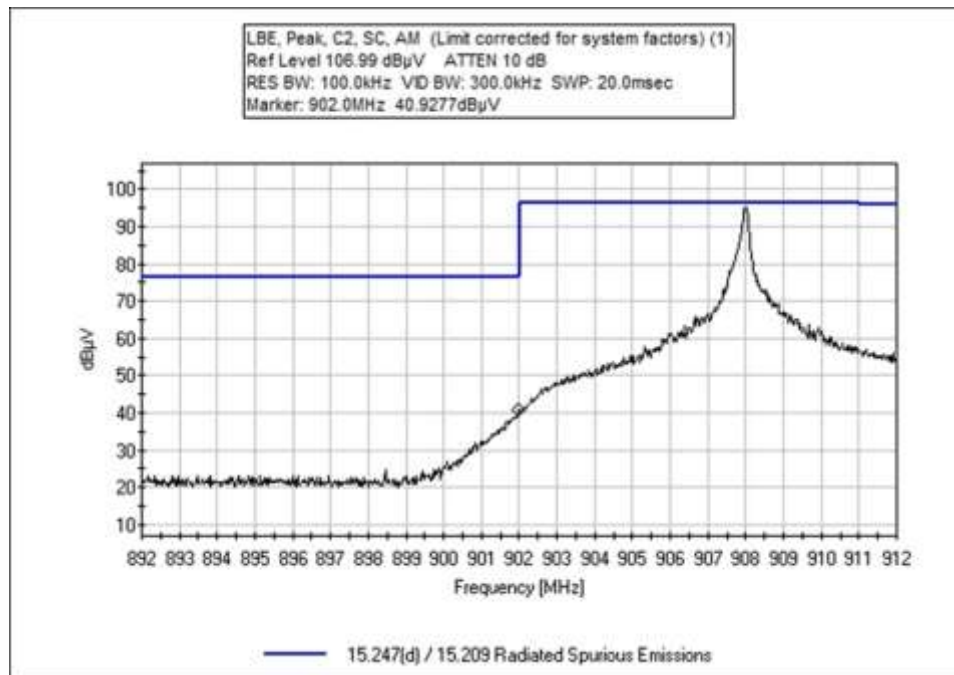


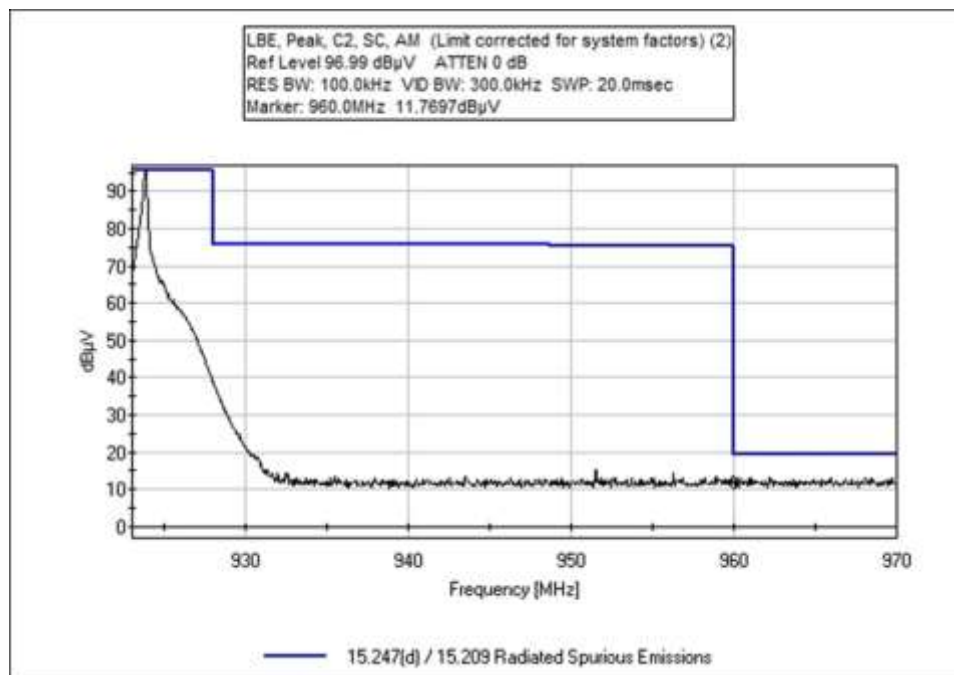
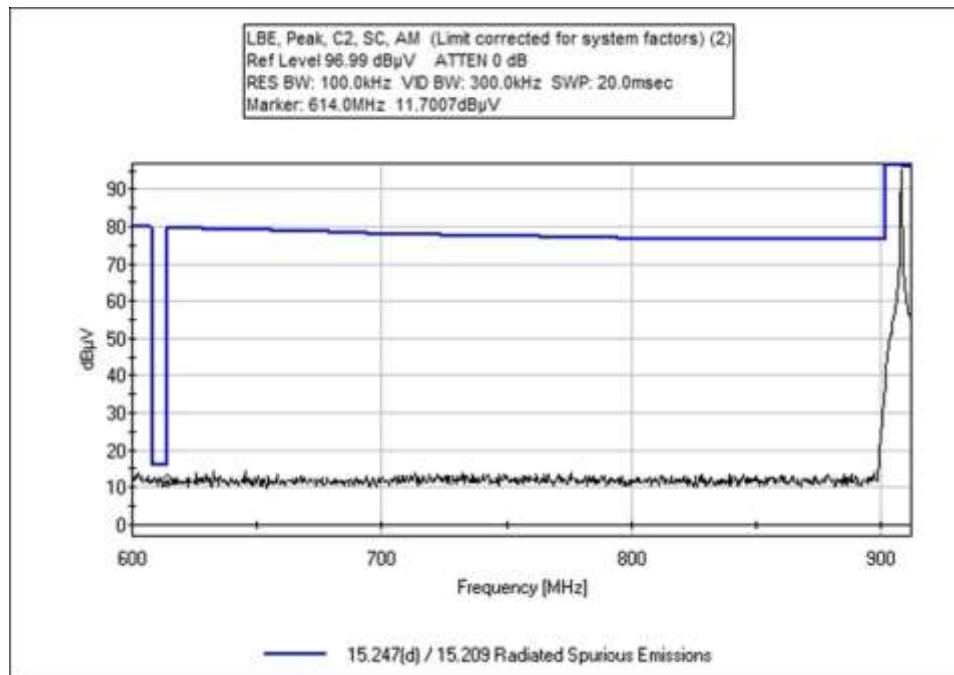


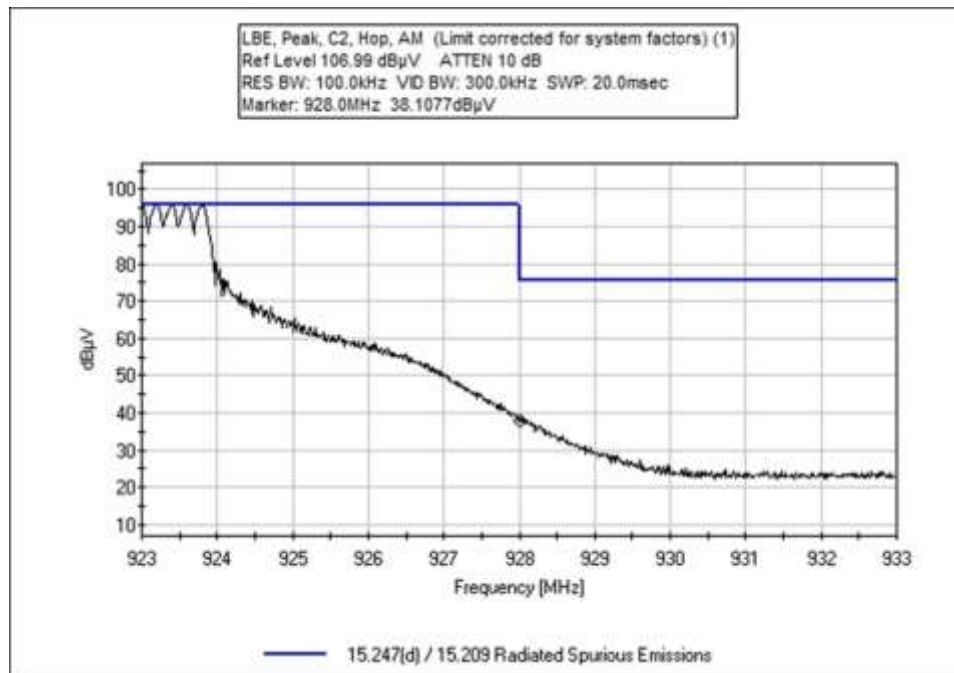
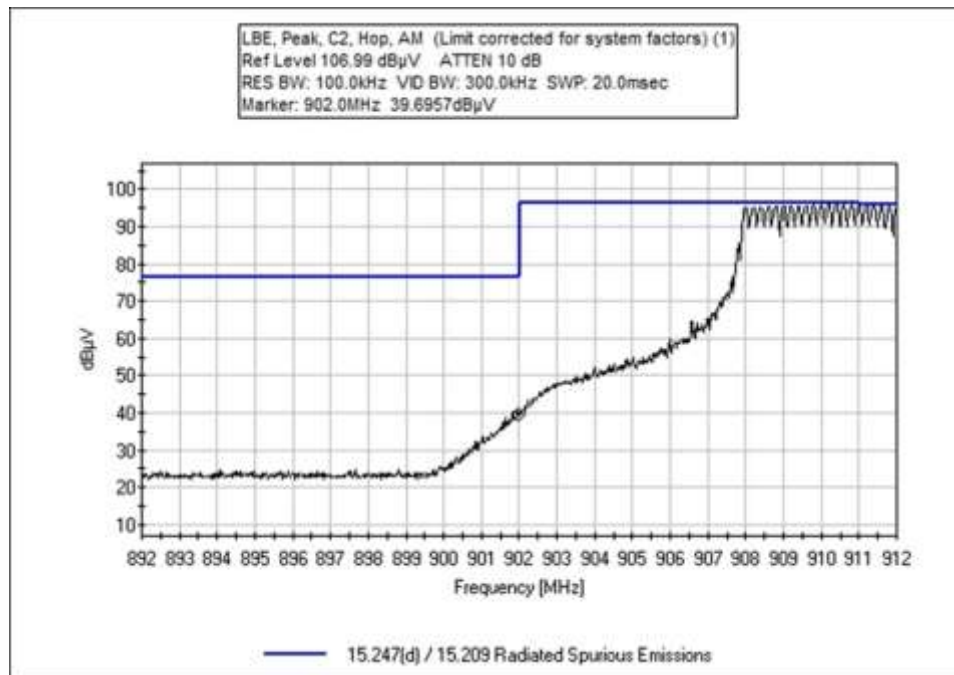


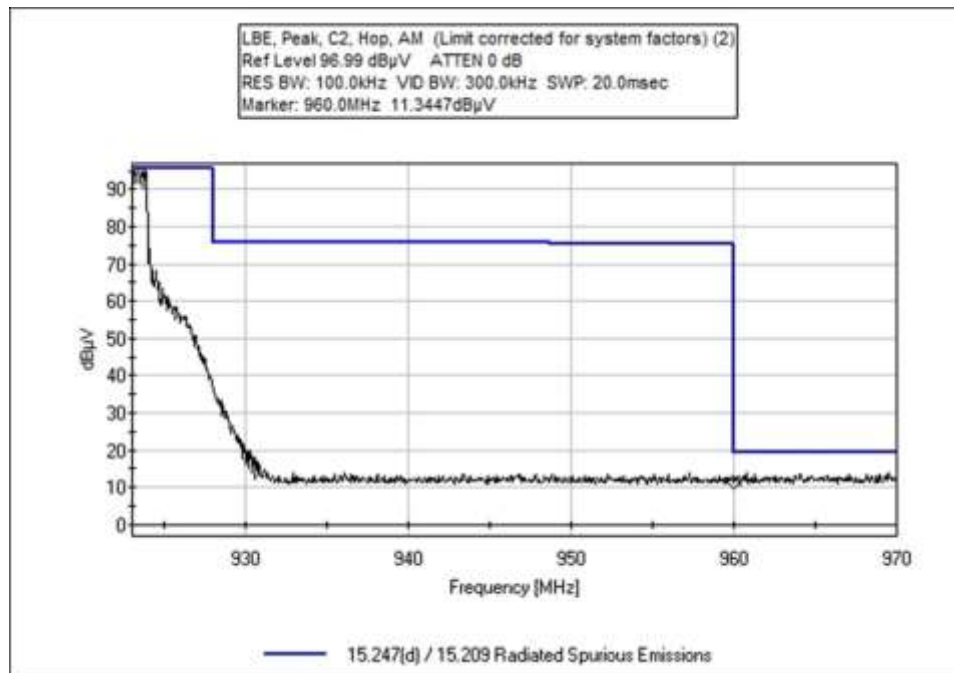
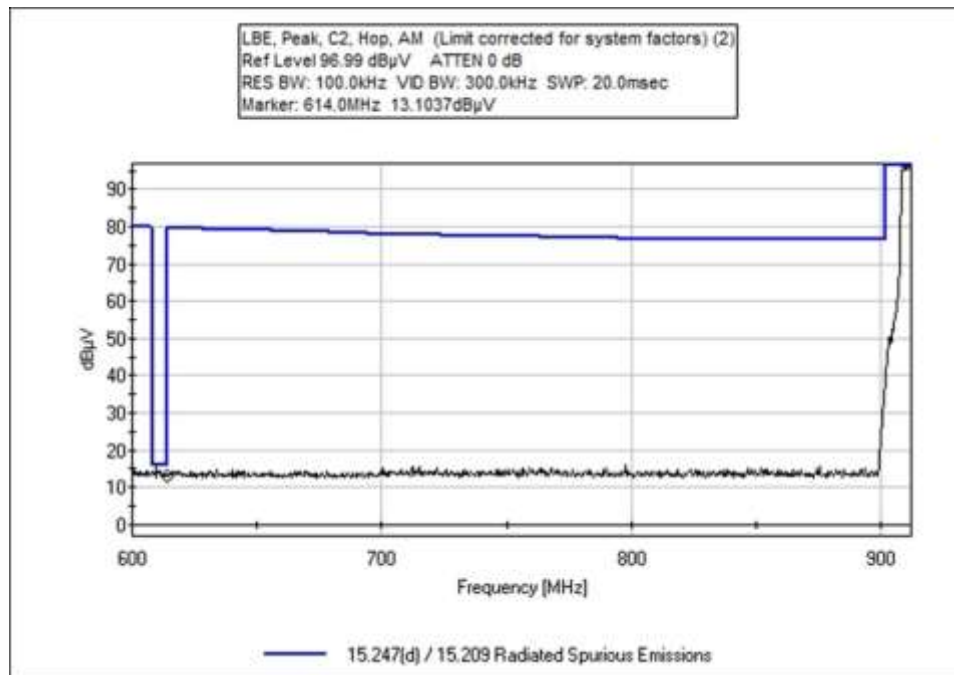


Configuration 2 AM

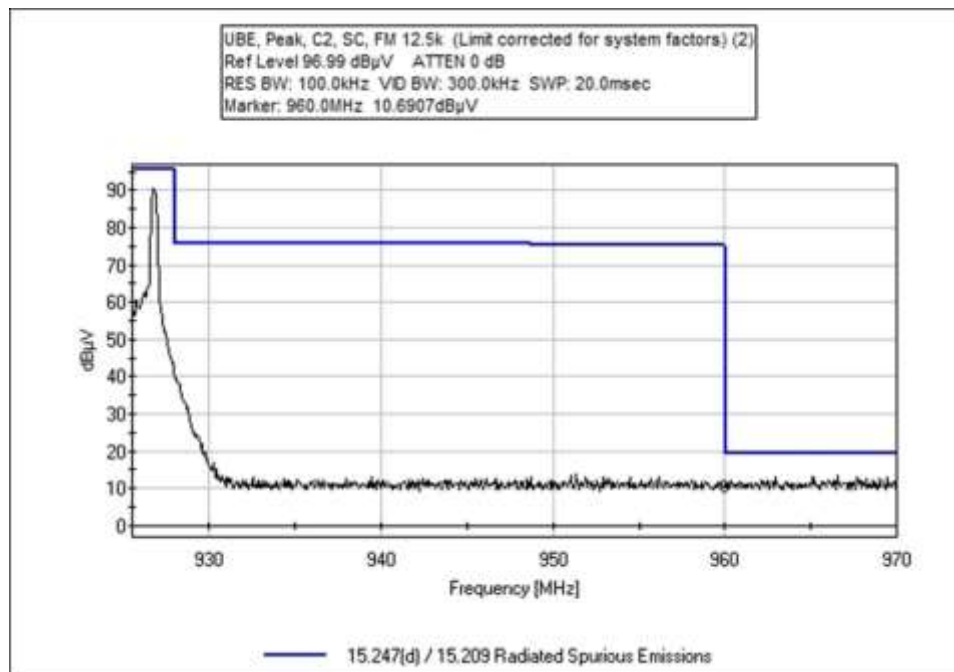
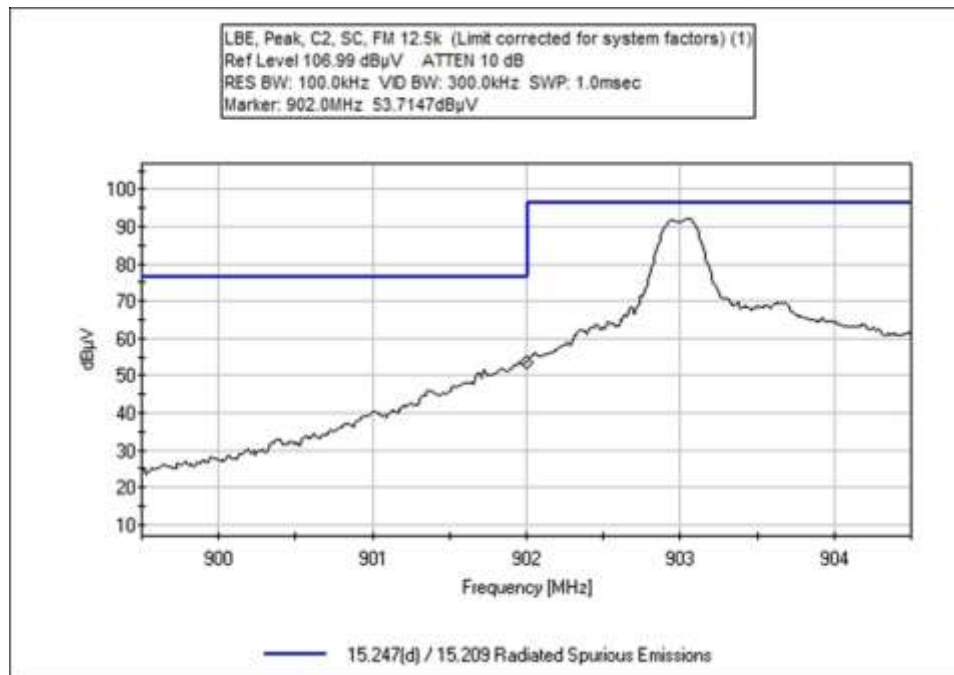


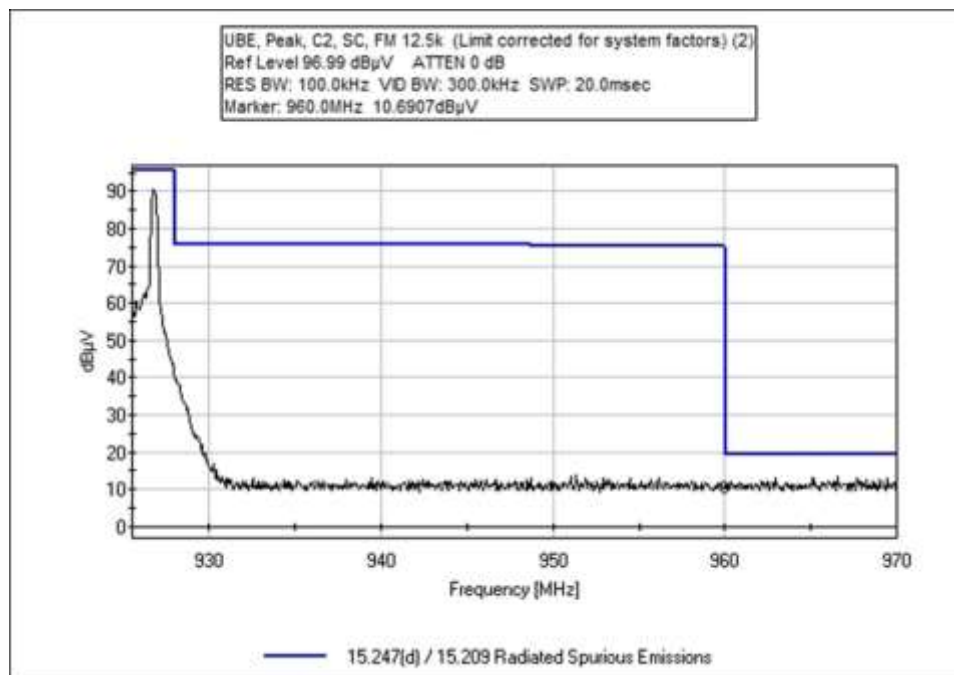
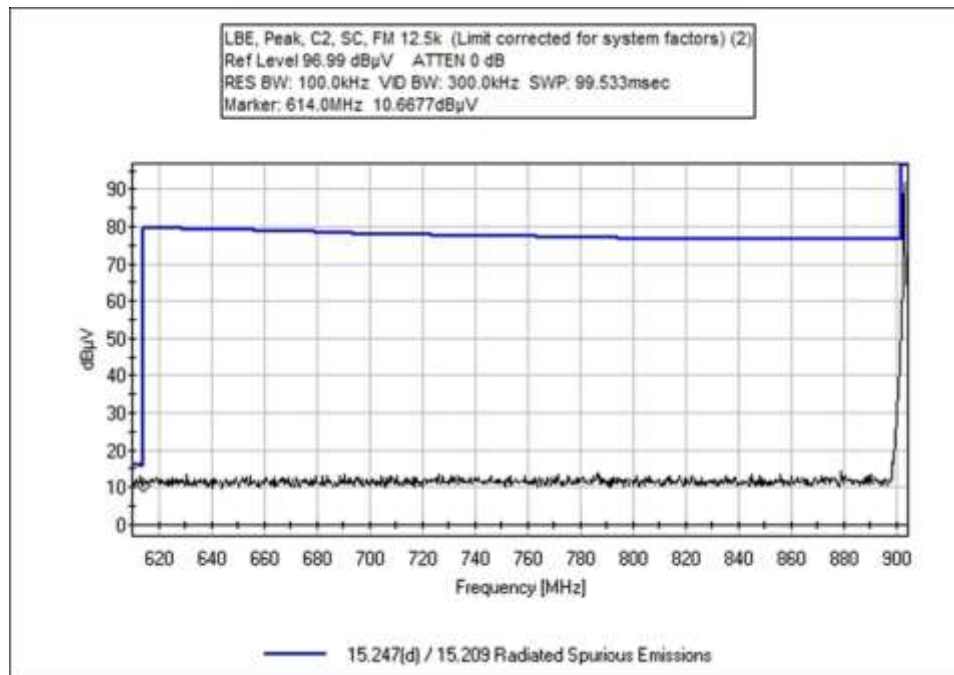


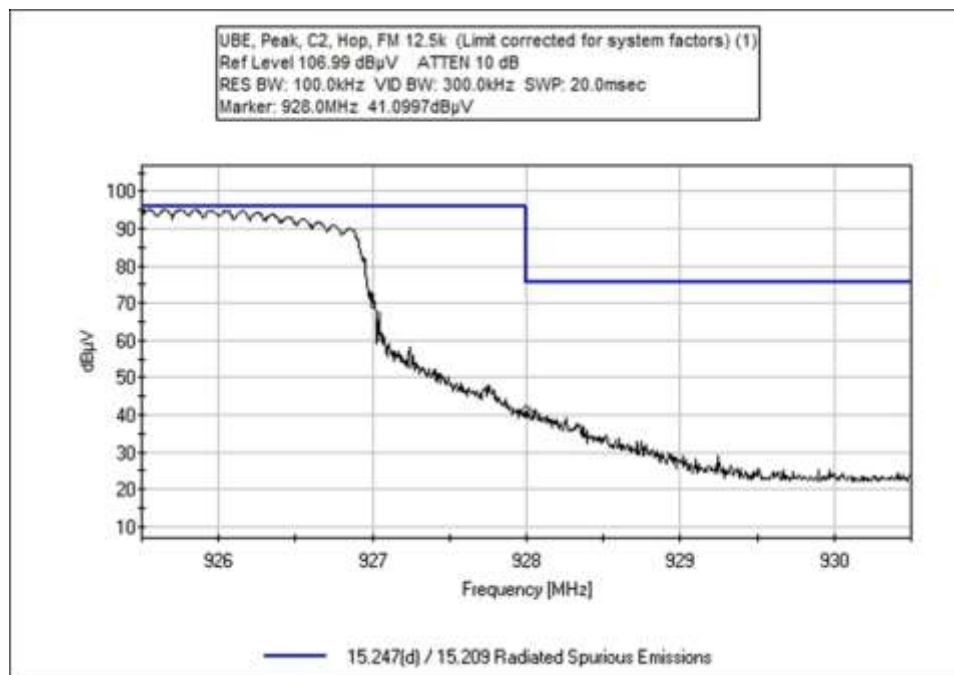
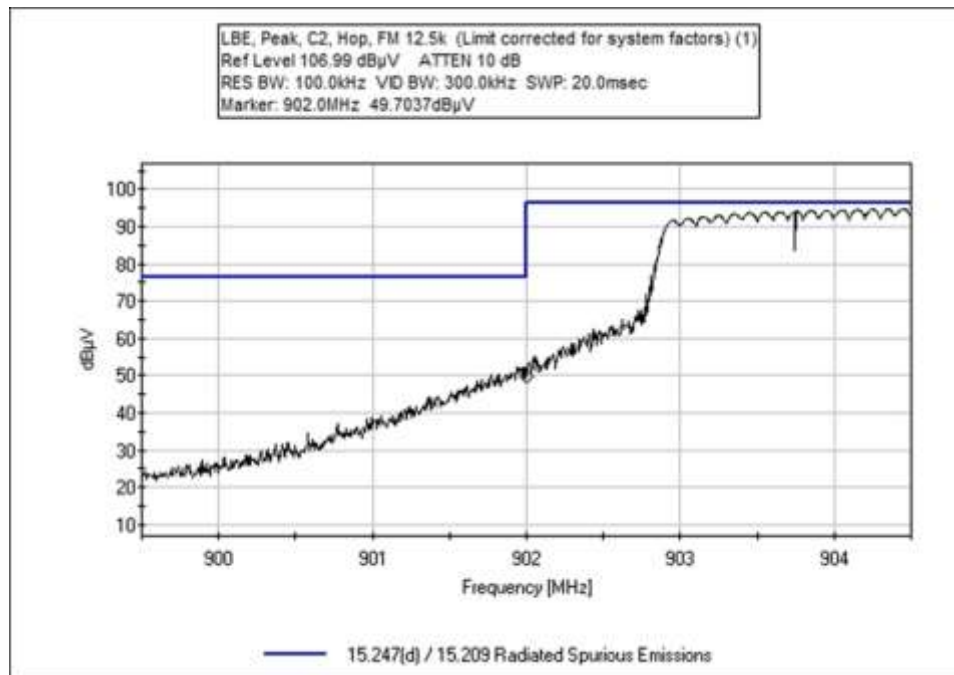


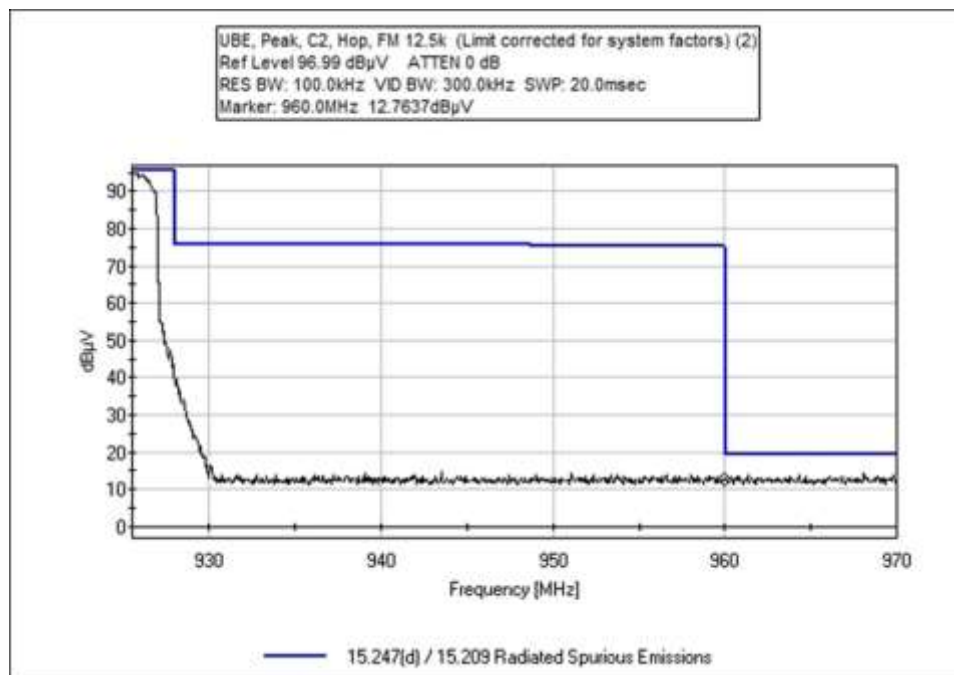
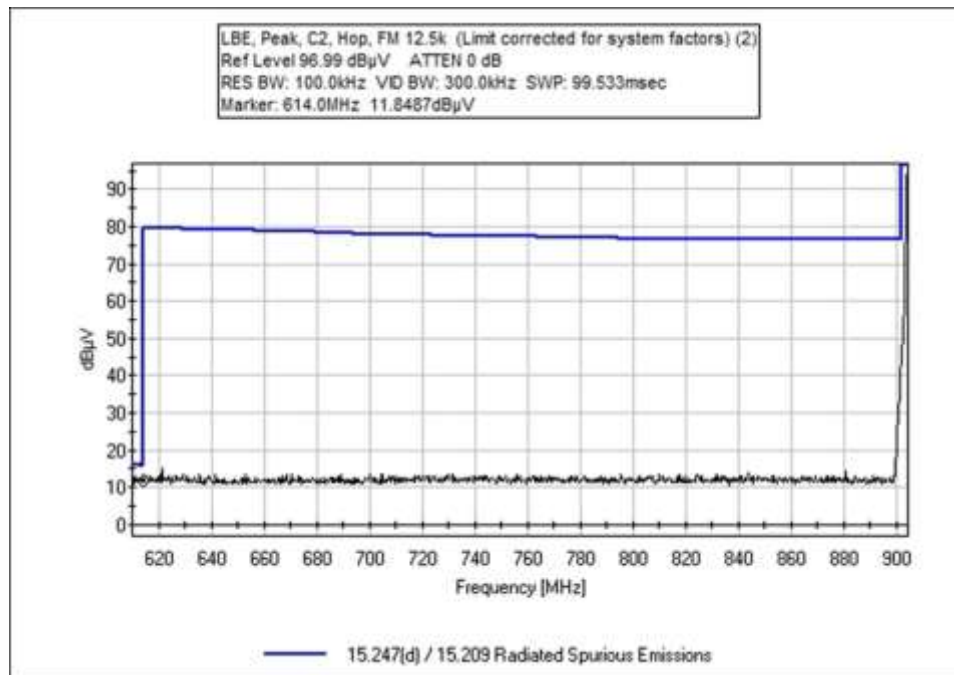


Configuration 2 FM 12.5kbit

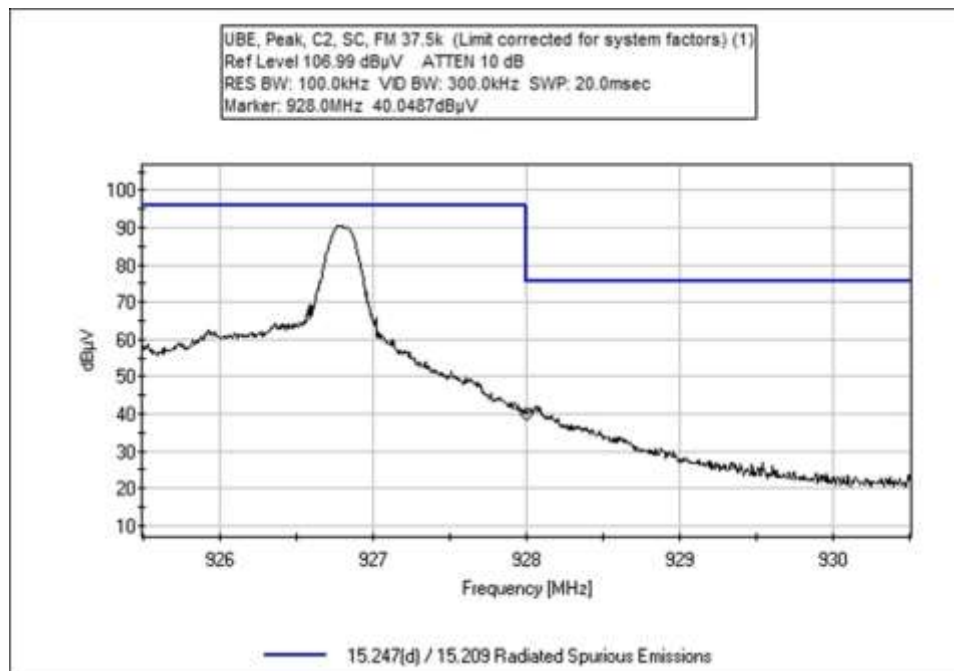
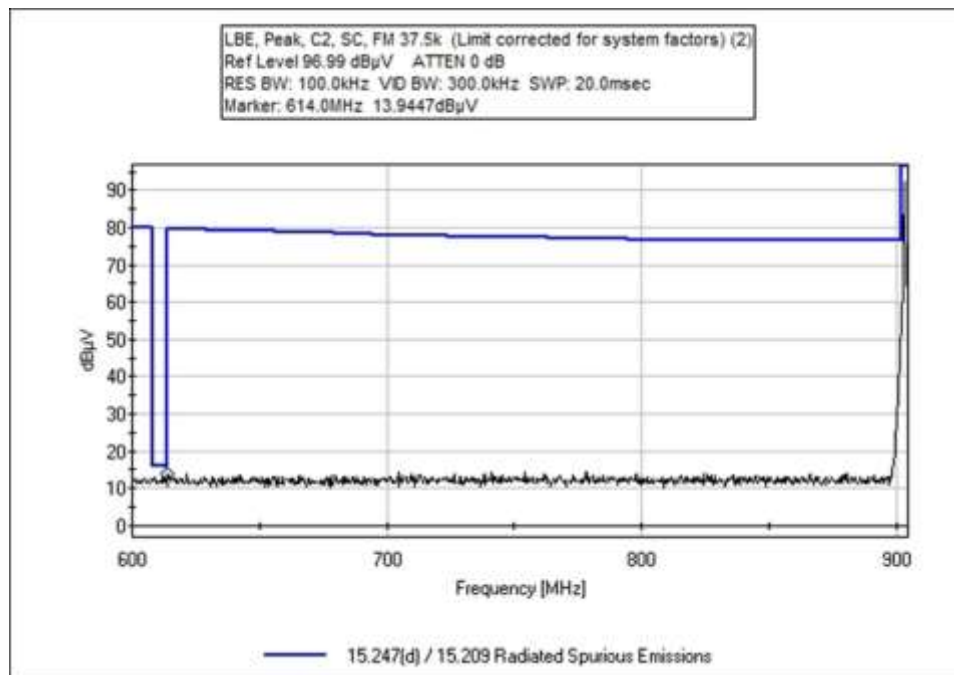


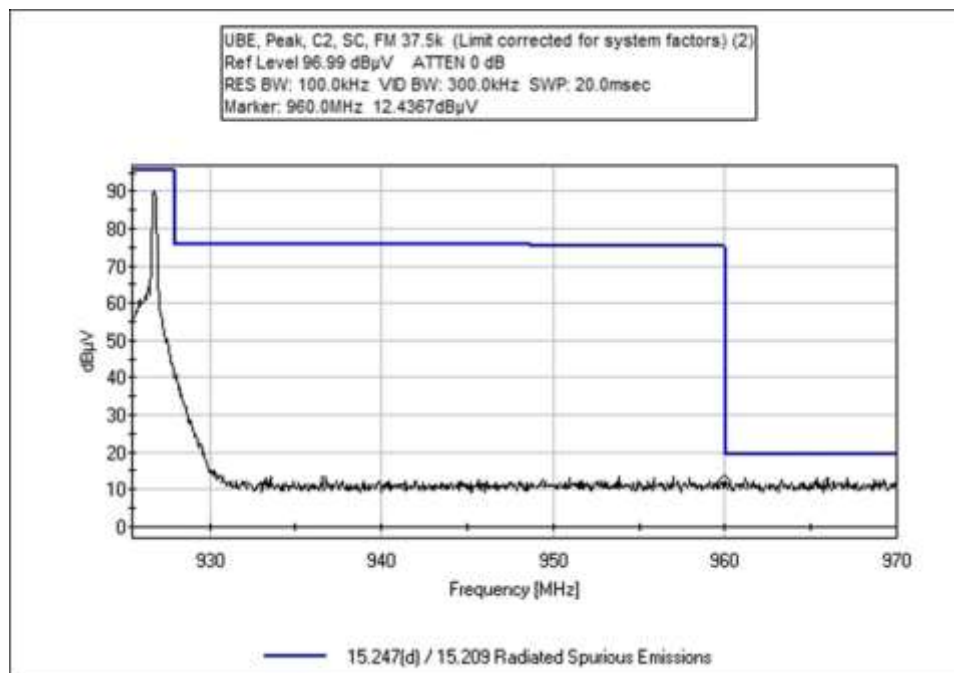
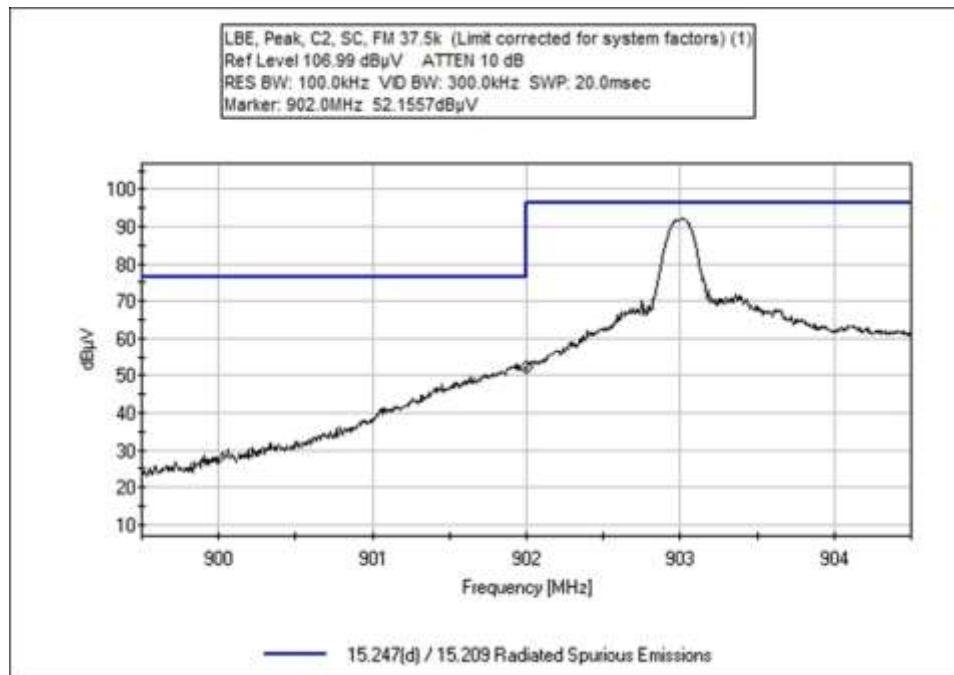


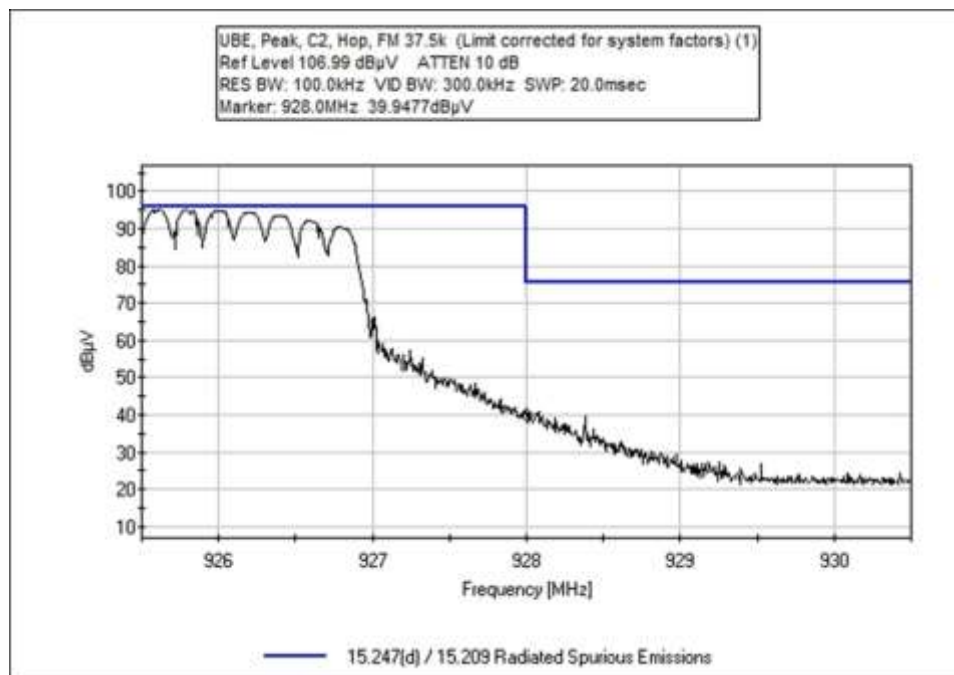
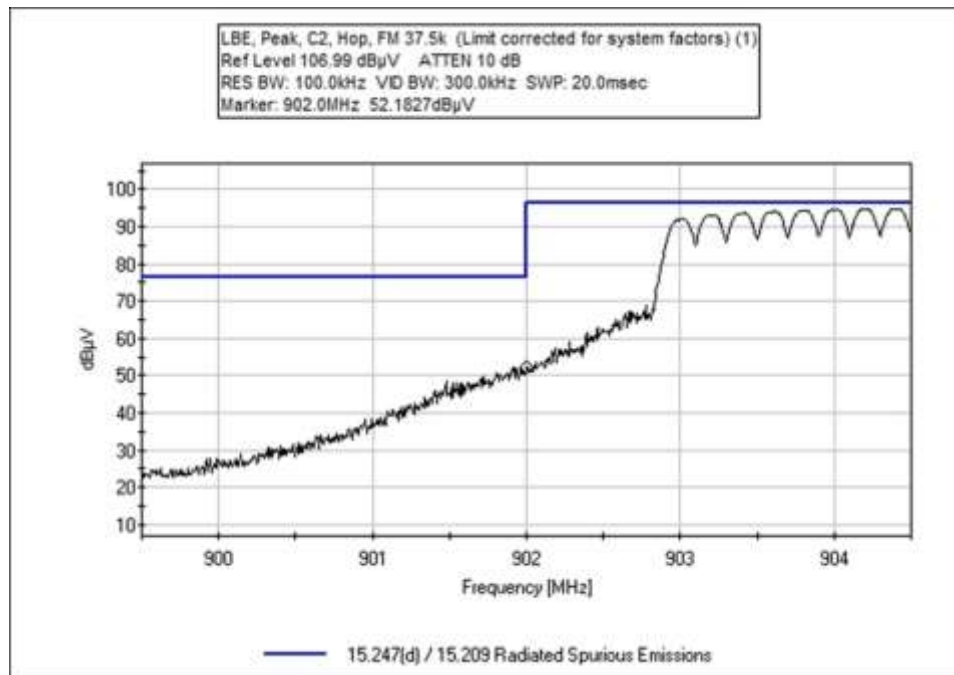


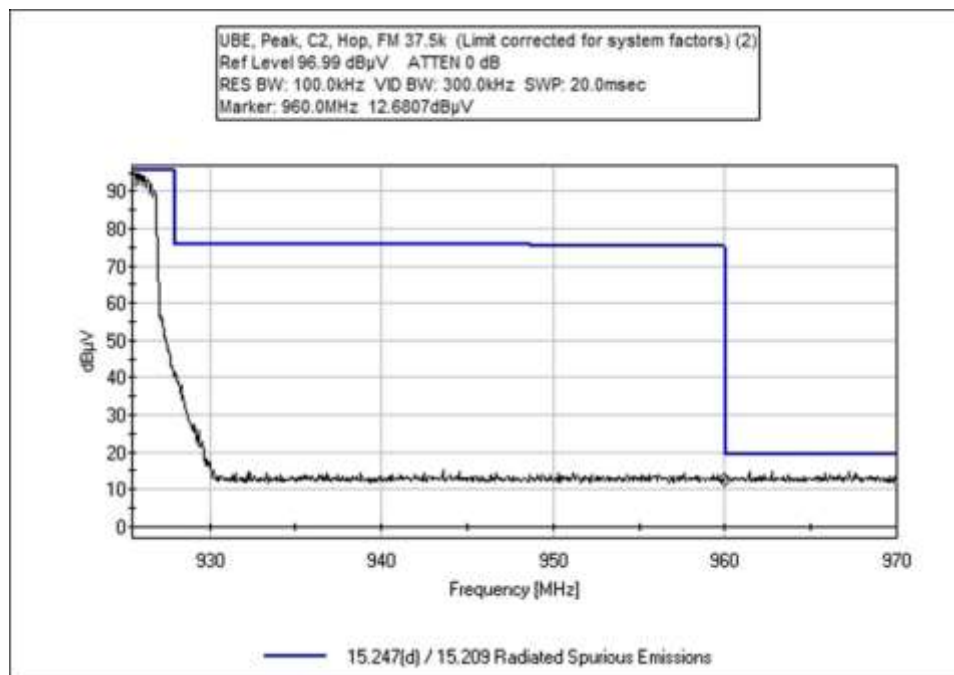
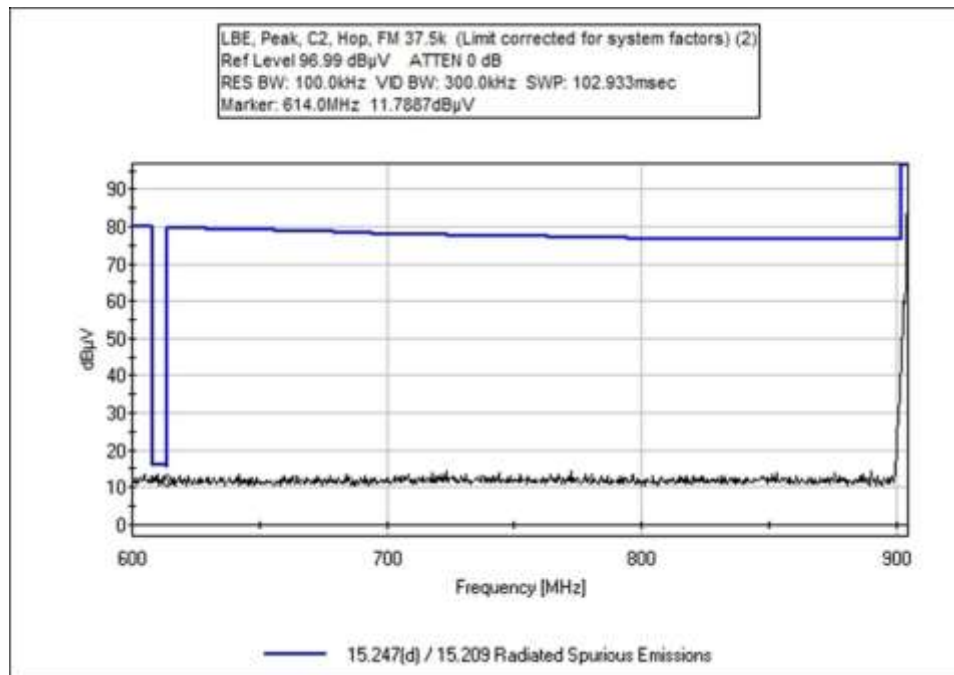


Configuration 2 FM 37.5kbit









Test Setup / Conditions / Data

Test Location: CKC Laboratories, Inc. • 22116 23rd Dr SE • Bothell, WA 98021 • 800-500-4362
 Customer: **Itron, Inc.**
 Specification: **15.247(d) / 15.209 Radiated Spurious Emissions**
 Work Order #: **103220** Date: 10/7/2020
 Test Type: **Radiated Scan** Time: 15:55:32
 Tested By: Matthew Harrison Sequence#: 4
 Software: EMITest 5.03.19

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Temperature: 23° C Humidity: 39% Pressure: 101.1 kPa Frequency Range: 600-970MHz Frequency tested: 903.0-926.8 MHz Firmware power setting: Max Antenna type: Omnidirectional Antenna Gain: 5.5 dBi. Duty Cycle: 100% Modulated Test Method: ANSI C63.10: 2015 Test Mode: Transmitting Test Setup: EUT is setup in a tabletop configuration 80cm high on a Styrofoam table. Modifications #1 was in place during testing.
--

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN03628	Biconilog Antenna	3142E	6/11/2019	6/11/2021
T2	ANP06123	Attenuator	18N-6	4/5/2019	4/5/2021
T3	ANP05305	Cable	ETSI-50T	9/6/2019	9/6/2021
T4	ANP05360	Cable	RG214	2/3/2020	2/3/2022
T5	ANP06540	Cable	Helix	8/23/2019	8/23/2021
T6	AN02872	Spectrum Analyzer	E4440A	11/18/2019	11/18/2021

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2 T6	T3	T4	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	910.600M	97.6	+23.9 +0.4	+5.8 +0.0	+1.5	+2.1	+0.0	131.3	131.3 Hop	+0.0	Vert
2	907.980M	96.6	+23.9 +0.3	+5.8 +0.0	+1.4	+2.1	+0.0	130.1	131.3 Hop	-1.2	Vert
3	960.000M	12.5	+24.6 +0.4	+5.8 +0.0	+1.5	+2.2	+0.0	47.0	54.0 Hop	-7.0	Vert
4	960.000M	12.1	+24.6 +0.4	+5.8 +0.0	+1.5	+2.2	+0.0	46.6	54.0 SC	-7.4	Vert
5	614.000M QP	8.1	+21.2 +0.3	+5.8 +0.0	+1.2	+1.7	+0.0	38.3	46.0 SC	-7.7	Vert
6	614.000M QP	8.0	+21.2 +0.3	+5.8 +0.0	+1.2	+1.7	+0.0	38.2	46.0 Hop	-7.8	Vert
^	614.000M	12.9	+21.2 +0.3	+5.8 +0.0	+1.2	+1.7	+0.0	43.1	46.0 SC	-2.9	Vert
^	614.000M	12.7	+21.2 +0.3	+5.8 +0.0	+1.2	+1.7	+0.0	42.9	46.0 Hop	-3.1	Vert
9	902.000M	42.4	+23.8 +0.3	+5.8 +0.0	+1.4	+2.1	+0.0	75.8	111.3 SC	-35.5	Vert
10	902.000M	40.8	+23.8 +0.3	+5.8 +0.0	+1.4	+2.1	+0.0	74.2	111.3 Hop	-37.1	Vert
11	928.000M	38.4	+24.2 +0.4	+5.8 +0.0	+1.5	+2.2	+0.0	72.5	111.3 Hop	-38.8	Vert
12	928.000M	38.2	+24.2 +0.4	+5.8 +0.0	+1.5	+2.2	+0.0	72.3	111.3 SC	-39.0	Vert



Test Location: CKC Laboratories, Inc. • 22116 23rd Dr SE • Bothell, WA 98021 • 800-500-4362
 Customer: **Itron, Inc.**
 Specification: **15.247(d) / 15.209 Radiated Spurious Emissions**
 Work Order #: **103220** Date: 10/7/2020
 Test Type: **Radiated Scan** Time: 15:17:56
 Tested By: Matthew Harrison Sequence#: 2
 Software: EMITest 5.03.19

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Temperature: 23° C Humidity: 39% Pressure: 101.1 kPa Frequency Range: 600-970MHz Frequency tested: 903.0-926.8 MHz Firmware power setting: Max Antenna type: Omnidirectional Antenna Gain: 5.5 dBi. Duty Cycle: 100% Modulated Test Method: ANSI C63.10: 2015 Test Mode: Transmitting Test Setup: EUT is setup in a tabletop configuration 80cm high on a Styrofoam table. Modifications #1 was in place during testing.
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Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN03628	Biconilog Antenna	3142E	6/11/2019	6/11/2021
T2	ANP06123	Attenuator	18N-6	4/5/2019	4/5/2021
T3	ANP05305	Cable	ETSI-50T	9/6/2019	9/6/2021
T4	ANP05360	Cable	RG214	2/3/2020	2/3/2022
T5	ANP06540	Cable	Helix	8/23/2019	8/23/2021
T6	AN02872	Spectrum Analyzer	E4440A	11/18/2019	11/18/2021

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2 T6	T3	T4	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	904.450M	96.2	+23.9 +0.3	+5.8 +0.0	+1.4	+2.1	+0.0	129.7	131.3 Hop	-1.6	Vert
2	903.055M	94.0	+23.8 +0.3	+5.8 +0.0	+1.4	+2.1	+0.0	127.4	131.3 SC	-3.9	Vert
3	902.960M	93.5	+23.8 +0.3	+5.8 +0.0	+1.4	+2.1	+0.0	126.9	131.3 Hop	-4.4	Vert
4	960.000M	12.8	+24.6 +0.4	+5.8 +0.0	+1.5	+2.2	+0.0	47.3	54.0 Hop	-6.7	Vert
5	926.740M	90.2	+24.2 +0.4	+5.8 +0.0	+1.5	+2.2	+0.0	124.3	131.3 SC	-7.0	Vert
6	614.000M QP	8.1	+21.2 +0.3	+5.8 +0.0	+1.2	+1.7	+0.0	38.3	46.0 SC	-7.7	Vert
7	614.000M QP	8.0	+21.2 +0.3	+5.8 +0.0	+1.2	+1.7	+0.0	38.2	46.0 Hop	-7.8	Vert
^	614.000M	13.0	+21.2 +0.3	+5.8 +0.0	+1.2	+1.7	+0.0	43.2	46.0 Hop	-2.8	Vert
^	614.000M	10.5	+21.2 +0.3	+5.8 +0.0	+1.2	+1.7	+0.0	40.7	46.0 SC	-5.3	Vert
10	960.000M	11.2	+24.6 +0.4	+5.8 +0.0	+1.5	+2.2	+0.0	45.7	54.0 SC	-8.3	Vert
11	902.000M	55.6	+23.8 +0.3	+5.8 +0.0	+1.4	+2.1	+0.0	89.0	111.3 Hop	-22.3	Vert
12	902.000M	54.7	+23.8 +0.3	+5.8 +0.0	+1.4	+2.1	+0.0	88.1	111.3 SC	-23.2	Vert
13	928.000M	39.1	+24.2 +0.4	+5.8 +0.0	+1.5	+2.2	+0.0	73.2	111.3 Hop	-38.1	Vert
14	928.000M	38.8	+24.2 +0.4	+5.8 +0.0	+1.5	+2.2	+0.0	72.9	111.3 SC	-38.4	Vert



Test Location: CKC Laboratories, Inc. • 22116 23rd Dr SE • Bothell, WA 98021 • 800-500-4362
 Customer: **Itron, Inc.**
 Specification: **15.247(d) / 15.209 Radiated Spurious Emissions**
 Work Order #: **103220** Date: 10/7/2020
 Test Type: **Radiated Scan** Time: 15:37:19
 Tested By: Matthew Harrison Sequence#: 3
 Software: EMITest 5.03.19

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Temperature: 23° C Humidity: 39% Pressure: 101.1 kPa Frequency Range: 600-970MHz Frequency tested: 903.0-926.8 MHz Firmware power setting: Max Antenna type: Omnidirectional Antenna Gain: 5.5 dBi. Duty Cycle: 100% Modulated Test Method: ANSI C63.10: 2015 Test Mode: Transmitting Test Setup: EUT is setup in a tabletop configuration 80cm high on a Styrofoam table. Modifications #1 was in place during testing.
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Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN03628	Biconilog Antenna	3142E	6/11/2019	6/11/2021
T2	ANP06123	Attenuator	18N-6	4/5/2019	4/5/2021
T3	ANP05305	Cable	ETSI-50T	9/6/2019	9/6/2021
T4	ANP05360	Cable	RG214	2/3/2020	2/3/2022
T5	ANP06540	Cable	Helix	8/23/2019	8/23/2021
T6	AN02872	Spectrum Analyzer	E4440A	11/18/2019	11/18/2021

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2 T6	T3	T4	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	904.415M	96.1	+23.9 +0.3	+5.8 +0.0	+1.4	+2.1	+0.0	129.6	131.3 Hop	-1.7	Vert
2	903.015M	93.8	+23.8 +0.3	+5.8 +0.0	+1.4	+2.1	+0.0	127.2	131.3 Hop	-4.1	Vert
3	960.000M	12.6	+24.6 +0.4	+5.8 +0.0	+1.5	+2.2	+0.0	47.1	54.0 Hop	-6.9	Vert
4	614.000M QP	8.1	+21.2 +0.3	+5.8 +0.0	+1.2	+1.7	+0.0	38.3	46.0 Hop	-7.7	Vert
5	614.000M QP	8.1	+21.2 +0.3	+5.8 +0.0	+1.2	+1.7	+0.0	38.3	46.0 SC	-7.7	Vert
^	614.000M	12.8	+21.2 +0.3	+5.8 +0.0	+1.2	+1.7	+0.0	43.0	46.0 SC	-3.0	Vert
^	614.000M	12.3	+21.2 +0.3	+5.8 +0.0	+1.2	+1.7	+0.0	42.5	46.0 Hop	-3.5	Vert
8	960.000M	10.7	+24.6 +0.4	+5.8 +0.0	+1.5	+2.2	+0.0	45.2	54.0 SC	-8.8	Vert
9	902.000M	54.8	+23.8 +0.3	+5.8 +0.0	+1.4	+2.1	+0.0	88.2	111.3 SC	-23.1	Vert
10	902.000M	53.8	+23.8 +0.3	+5.8 +0.0	+1.4	+2.1	+0.0	87.2	111.3 Hop	-24.1	Vert
11	928.000M	40.6	+24.2 +0.4	+5.8 +0.0	+1.5	+2.2	+0.0	74.7	111.3 SC	-36.6	Vert
12	928.000M	39.4	+24.2 +0.4	+5.8 +0.0	+1.5	+2.2	+0.0	73.5	111.3 Hop	-37.8	Vert



Test Location: CKC Laboratories, Inc. • 22116 23rd Dr SE • Bothell, WA 98021 • 800-500-4362
 Customer: **Itron, Inc.**
 Specification: **15.247(d) / 15.209 Radiated Spurious Emissions**
 Work Order #: **103220** Date: 10/10/2020
 Test Type: **Radiated Scan** Time: 09:12:15
 Tested By: Matthew Harrison Sequence#: 4
 Software: EMITest 5.03.19

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 2			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 2			

Test Conditions / Notes:

Temperature: 23° C Humidity: 39% Pressure: 101.1 kPa Frequency Range: 600-970MHz Frequency tested: 903.0-926.8 MHz Firmware power setting: Max Antenna type: Omnidirectional Antenna Gain: 8.15 dBi. Duty Cycle: 100% Modulated Test Method: ANSI C63.10: 2015 Test Mode: Transmitting Test Setup: EUT is setup in a tabletop configuration 80cm high on a Styrofoam table. Modifications #1 was in place during testing.

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN03628	Biconilog Antenna	3142E	6/11/2019	6/11/2021
T2	ANP06123	Attenuator	18N-6	4/5/2019	4/5/2021
T3	ANP05305	Cable	ETSI-50T	9/6/2019	9/6/2021
T4	ANP05360	Cable	RG214	2/3/2020	2/3/2022
T5	ANP06540	Cable	Helix	8/23/2019	8/23/2021
T6	AN02872	Spectrum Analyzer	E4440A	11/18/2019	11/18/2021

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2 T6	T3	T4	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	923.200M	95.9	+24.1 +0.4	+5.8 +0.0	+1.5	+2.2	+0.0	129.9	129.9 Hop	+0.0	Vert
2	923.800M	95.7	+24.1 +0.4	+5.8 +0.0	+1.5	+2.2	+0.0	129.7	129.9 SC	-0.2	Vert
3	910.200M	95.9	+23.9 +0.4	+5.8 +0.0	+1.5	+2.1	+0.0	129.6	129.9 Hop	-0.3	Vert
4	614.000M QP	8.3	+21.2 +0.3	+5.8 +0.0	+1.2	+1.7	+0.0	38.5	46.0 Hop	-7.5	Vert
^	614.000M	13.1	+21.2 +0.3	+5.8 +0.0	+1.2	+1.7	+0.0	43.3	46.0 Hop	-2.7	Vert
^	614.000M	11.7	+21.2 +0.3	+5.8 +0.0	+1.2	+1.7	+0.0	41.9	46.0 SC	-4.1	Vert
7	960.000M	11.8	+24.6 +0.4	+5.8 +0.0	+1.5	+2.2	+0.0	46.3	54.0 SC	-7.7	Vert
8	960.000M	11.3	+24.6 +0.4	+5.8 +0.0	+1.5	+2.2	+0.0	45.8	54.0 Hop	-8.2	Vert
9	902.000M	40.9	+23.8 +0.3	+5.8 +0.0	+1.4	+2.1	+0.0	74.3	109.9 SC	-35.6	Vert
10	928.000M	39.5	+24.2 +0.4	+5.8 +0.0	+1.5	+2.2	+0.0	73.6	109.9 SC	-36.3	Vert
11	902.000M	39.7	+23.8 +0.3	+5.8 +0.0	+1.4	+2.1	+0.0	73.1	109.9 Hop	-36.8	Vert
12	928.000M	38.1	+24.2 +0.4	+5.8 +0.0	+1.5	+2.2	+0.0	72.2	109.9 Hop	-37.7	Vert



Test Location: CKC Laboratories, Inc. • 22116 23rd Dr SE • Bothell, WA 98021 • 800-500-4362
 Customer: **Itron, Inc.**
 Specification: **15.247(d) / 15.209 Radiated Spurious Emissions**
 Work Order #: **103220** Date: 10/10/2020
 Test Type: **Radiated Scan** Time: 10:10:19
 Tested By: Matthew Harrison Sequence#: 2
 Software: EMITest 5.03.19

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 2			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 2			

Test Conditions / Notes:

Temperature: 23° C Humidity: 39% Pressure: 101.1 kPa Frequency Range: 600-970MHz Frequency tested: 903.0-926.8 MHz Firmware power setting: Max Antenna type: Omnidirectional Antenna Gain: 8.15 dBi. Duty Cycle: 100% Modulated Test Method: ANSI C63.10: 2015 Test Mode: Transmitting Test Setup: EUT is setup in a tabletop configuration 80cm high on a Styrofoam table. Modifications #1 was in place during testing.

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN03628	Biconilog Antenna	3142E	6/11/2019	6/11/2021
T2	ANP06123	Attenuator	18N-6	4/5/2019	4/5/2021
T3	ANP05305	Cable	ETSI-50T	9/6/2019	9/6/2021
T4	ANP05360	Cable	RG214	2/3/2020	2/3/2022
T5	ANP06540	Cable	Helix	8/23/2019	8/23/2021
T6	AN02872	Spectrum Analyzer	E4440A	11/18/2019	11/18/2021

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dB μ V	T1 T5 dB	T2 T6 dB	T3 dB	T4 dB	Dist Table	Corr dB μ V/m	Spec dB μ V/m	Margin dB	Polar Ant
1	904.450M	94.7	+23.9 +0.3	+5.8 +0.0	+1.4	+2.1	+0.0	128.2	129.9 Hop	-1.7	Vert
2	614.000M	11.8	+21.2 +0.3	+5.8 +0.0	+1.2	+1.7	+0.0	42.0	46.0 Hop	-4.0	Vert
3	903.050M	92.2	+23.8 +0.3	+5.8 +0.0	+1.4	+2.1	+0.0	125.6	129.9 SC	-4.3	Vert
4	614.000M	10.7	+21.2 +0.3	+5.8 +0.0	+1.2	+1.7	+0.0	40.9	46.0 SC	-5.1	Vert
5	960.000M	12.8	+24.6 +0.4	+5.8 +0.0	+1.5	+2.2	+0.0	47.3	54.0 Hop	-6.7	Vert
6	960.000M	10.7	+24.6 +0.4	+5.8 +0.0	+1.5	+2.2	+0.0	45.2	54.0 SC	-8.8	Vert
7	902.000M	53.7	+23.8 +0.3	+5.8 +0.0	+1.4	+2.1	+0.0	87.1	109.9 SC	-22.8	Vert
8	902.000M	49.7	+23.8 +0.3	+5.8 +0.0	+1.4	+2.1	+0.0	83.1	109.9 Hop	-26.8	Vert
9	928.000M	41.1	+24.2 +0.4	+5.8 +0.0	+1.5	+2.2	+0.0	75.2	109.9 Hop	-34.7	Vert
10	928.000M	40.3	+24.2 +0.4	+5.8 +0.0	+1.5	+2.2	+0.0	74.4	109.9 SC	-35.5	Vert



Test Location: CKC Laboratories, Inc. • 22116 23rd Dr SE • Bothell, WA 98021 • 800-500-4362
 Customer: **Itron, Inc.**
 Specification: **15.247(d) / 15.209 Radiated Spurious Emissions**
 Work Order #: **103220** Date: 10/10/2020
 Test Type: **Radiated Scan** Time: 09:52:58
 Tested By: Matthew Harrison Sequence#: 3
 Software: EMITest 5.03.19

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 2			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 2			

Test Conditions / Notes:

Temperature: 23° C Humidity: 39% Pressure: 101.1 kPa Frequency Range: 600-970MHz Frequency tested: 903.0-926.8 MHz Firmware power setting: Max Antenna type: Omnidirectional Antenna Gain: 8.15 dBi. Duty Cycle: 100% Modulated Test Method: ANSI C63.10: 2015 Test Mode: Transmitting Test Setup: EUT is setup in a tabletop configuration 80cm high on a Styrofoam table. Modifications #1 was in place during testing.

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN03628	Biconilog Antenna	3142E	6/11/2019	6/11/2021
T2	ANP06123	Attenuator	18N-6	4/5/2019	4/5/2021
T3	ANP05305	Cable	ETSI-50T	9/6/2019	9/6/2021
T4	ANP05360	Cable	RG214	2/3/2020	2/3/2022
T5	ANP06540	Cable	Helix	8/23/2019	8/23/2021
T6	AN02872	Spectrum Analyzer	E4440A	11/18/2019	11/18/2021

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2 T6	T3	T4	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	904.415M	94.8	+23.9 +0.3	+5.8 +0.0	+1.4	+2.1	+0.0	128.3	129.9 Hop	-1.6	Vert
2	960.000M	12.7	+24.6 +0.4	+5.8 +0.0	+1.5	+2.2	+0.0	47.2	54.0 Hop	-6.8	Vert
3	960.000M	12.4	+24.6 +0.4	+5.8 +0.0	+1.5	+2.2	+0.0	46.9	54.0 SC	-7.1	Vert
4	614.000M QP	8.3	+21.2 +0.3	+5.8 +0.0	+1.2	+1.7	+0.0	38.5	46.0 SC	-7.5	Vert
^	614.000M	13.9	+21.2 +0.3	+5.8 +0.0	+1.2	+1.7	+0.0	44.1	46.0 SC	-1.9	Vert
^	614.000M	11.8	+21.2 +0.3	+5.8 +0.0	+1.2	+1.7	+0.0	42.0	46.0 Hop	-4.0	Vert
7	902.000M	52.2	+23.8 +0.3	+5.8 +0.0	+1.4	+2.1	+0.0	85.6	109.9 SC	-24.3	Vert
8	902.000M	51.2	+23.8 +0.3	+5.8 +0.0	+1.4	+2.1	+0.0	84.6	109.9 Hop	-25.3	Vert
9	928.000M	40.0	+24.2 +0.4	+5.8 +0.0	+1.5	+2.2	+0.0	74.1	109.9 SC	-35.8	Vert
10	928.000M	39.9	+24.2 +0.4	+5.8 +0.0	+1.5	+2.2	+0.0	74.0	109.9 Hop	-35.9	Vert

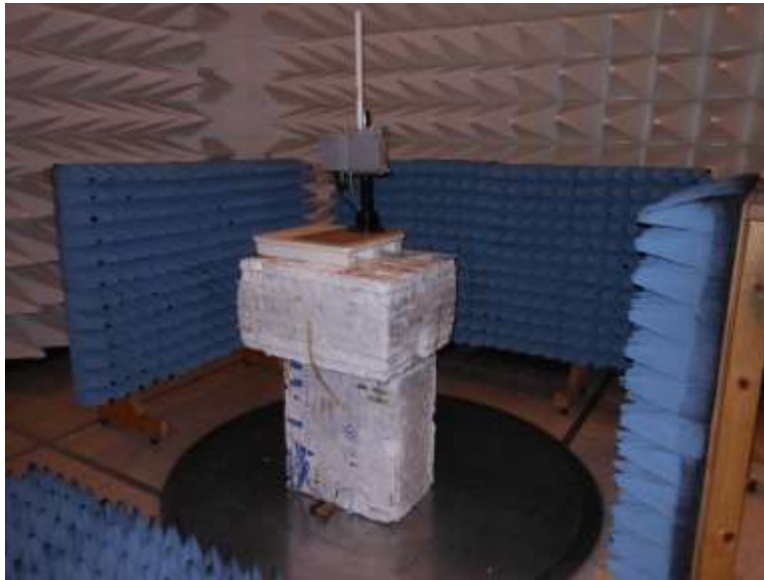
Test Setup Photo(s)



Configuration 1, Below 1GHz



Configuration 1, Below 1GHz



Configuration 1, Above 1GHz



Configuration 1, Above 1GHz



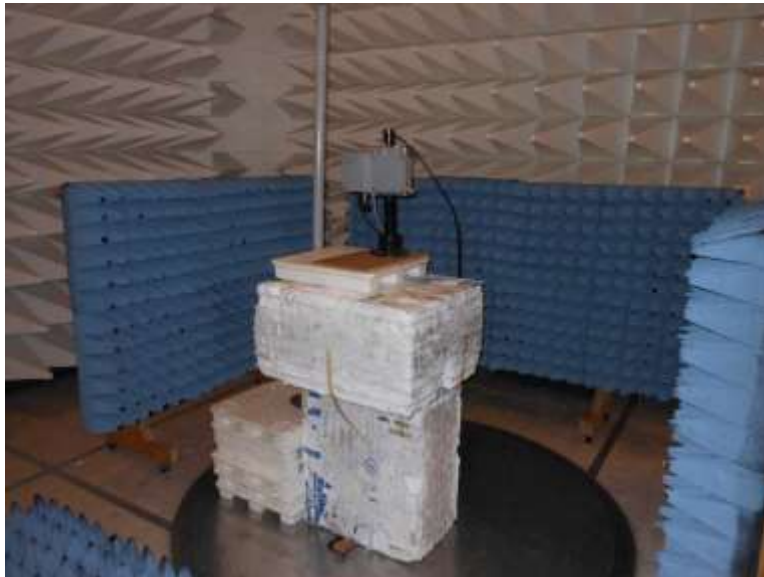
Configuration 2, Below 1GHz



Configuration 2, Below 1GHz



Configuration 2, Above 1GHz



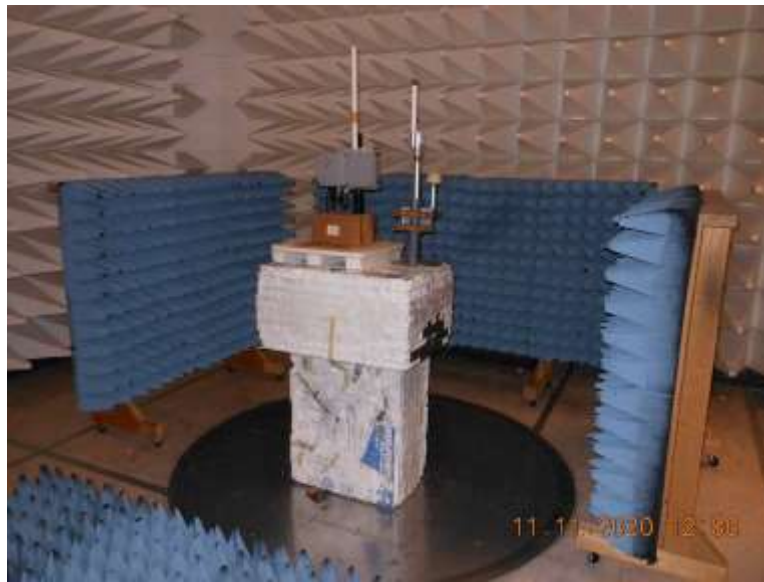
Configuration 2, Above 1GHz



Configuration 4, Below 1GHz



Configuration 4, Below 1GHz



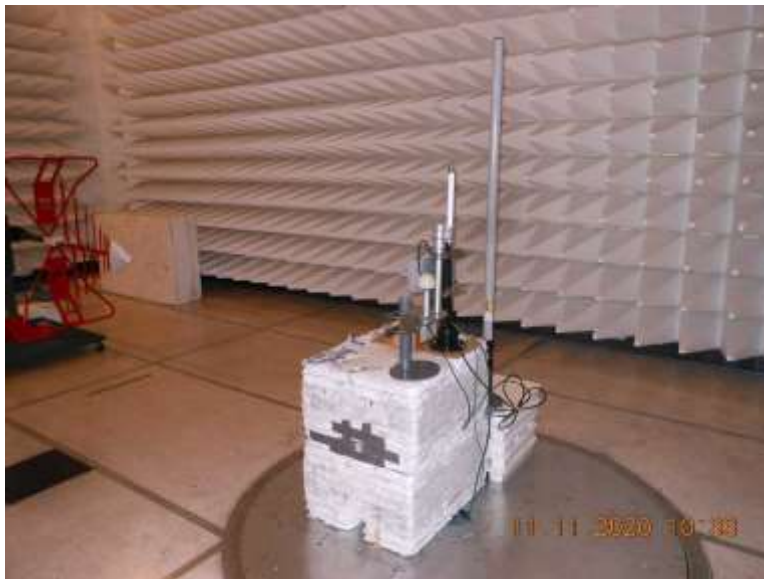
Configuration 4, Above 1GHz



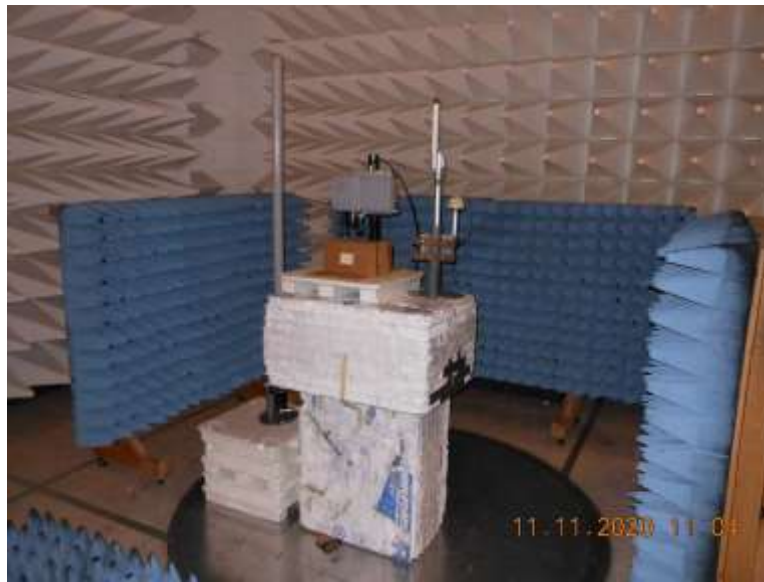
Configuration 4, Above 1GHz



Configuration 5, Below 1GHz



Configuration 5, Below 1GHz



Configuration 5, Above 1GHz



Configuration 5, Above 1GHz

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 #: **103220** Date: 10/7/2020
 Test Type: **Conducted Emissions** Time: 13:21:58
 Tested By: Matthew Harrison Sequence#: 13
 Software: EMITest 5.03.19 115V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 3			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 3			

Test Conditions / Notes:

Temperature: 23° C
 Humidity: 41%
 Pressure: 103.3 kPa

 Frequency Range: 150kHz-30MHz

 Firmware power setting: Max
 Modulation: FSK 12.5kbit, FSK 37.5kbit, and AM investigated, overall worst case reported.

 Antenna type: Omnidirectional
 Antenna Gain: 5.5 dBi. (Worst-Case)

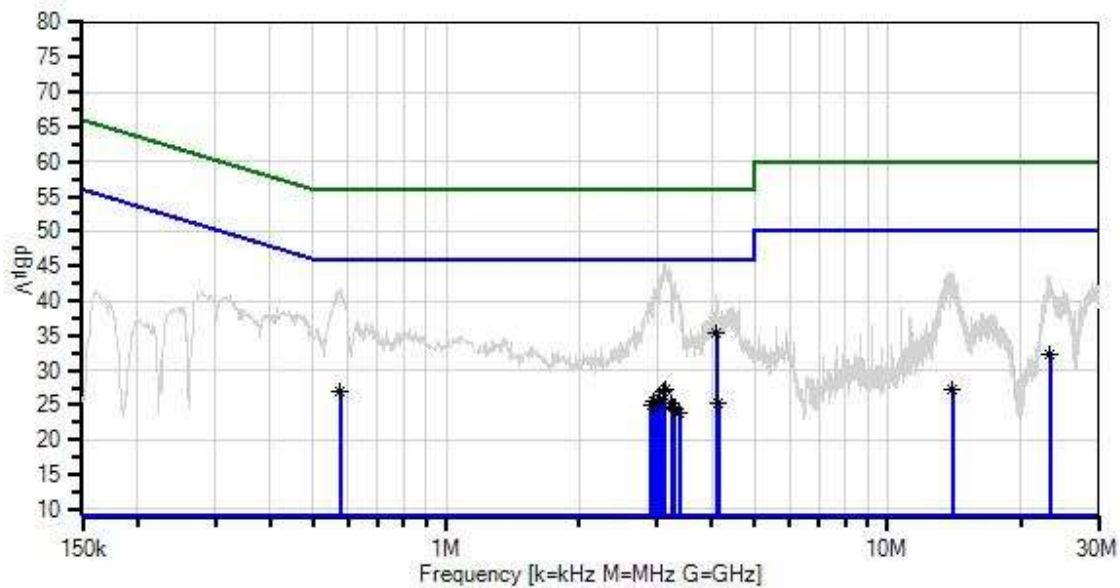
 Duty Cycle: 100% Modulated

 Test Method: ANSI C63.10: 2013

 Test Mode: Transmitting
 Test Setup: EUT is setup in a tabletop configuration on an 80cm Styrofoam table.

 Modifications #1 was in place during testing.

Itron, Inc. W/O#: 103220 Sequence#: 13 Date: 10/7/2020
15.207 AC Mains - Average Test Lead: 115V 60Hz Line



— Sweep Data
× QP Readings
Software Version: 5.03.19
— Readings
* Average Readings
— 1 - 15.207 AC Mains - Average
○ Peak Readings
▼ Ambient
— 2 - 15.207 AC Mains - Quasi-peak

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP06219	Attenuator	768-10	4/7/2020	4/7/2022
T2	ANP06515	Cable	Heliac	7/1/2020	7/1/2022
T3	ANP06540	Cable	Heliac	8/23/2019	8/23/2021
T4	AN01492	50uH LISN-Line (L1)	3816/2NM	10/14/2019	10/14/2021
	AN01492	50uH LISN-Neutral (L2)	3816/2NM	10/14/2019	10/14/2021
	AN02872	Spectrum Analyzer	E4440A	11/18/2019	11/18/2021
T5	AN02611	High Pass Filter	HE9615-150K-50-720B	1/10/2020	1/10/2022

Measurement Data:

Reading listed by margin.

Test Lead: Line

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dB μ V	dB	dB	dB	dB	Table	dB μ V	dB μ V	dB	Ant
1	4.088M	25.6	+9.1	+0.1	+0.0	+0.5	+0.0	35.4	46.0	-10.6	Line
Ave			+0.1								
^	4.088M	31.2	+9.1	+0.1	+0.0	+0.5	+0.0	41.0	46.0	-5.0	Line
			+0.1								
3	23.333M	22.1	+9.1	+0.2	+0.1	+0.6	+0.0	32.3	50.0	-17.7	Line
Ave			+0.2								
^	23.333M	33.5	+9.1	+0.2	+0.1	+0.6	+0.0	43.7	50.0	-6.3	Line
			+0.2								
5	3.127M	17.4	+9.1	+0.1	+0.0	+0.5	+0.0	27.2	46.0	-18.8	Line
Ave			+0.1								
^	3.127M	35.6	+9.1	+0.1	+0.0	+0.5	+0.0	45.4	46.0	-0.6	Line
			+0.1								
7	3.114M	17.3	+9.1	+0.1	+0.0	+0.5	+0.0	27.1	46.0	-18.9	Line
Ave			+0.1								
^	3.114M	35.6	+9.1	+0.1	+0.0	+0.5	+0.0	45.4	46.0	-0.6	Line
			+0.1								
9	576.870k	17.2	+9.1	+0.0	+0.0	+0.5	+0.0	27.1	46.0	-18.9	Line
Ave			+0.3								
^	576.869k	31.7	+9.1	+0.0	+0.0	+0.5	+0.0	41.6	46.0	-4.4	Line
			+0.3								
11	3.046M	16.1	+9.1	+0.1	+0.0	+0.5	+0.0	25.9	46.0	-20.1	Line
Ave			+0.1								
^	3.046M	33.4	+9.1	+0.1	+0.0	+0.5	+0.0	43.2	46.0	-2.8	Line
			+0.1								
13	2.944M	15.6	+9.1	+0.1	+0.0	+0.5	+0.0	25.4	46.0	-20.6	Line
Ave			+0.1								
^	2.944M	32.2	+9.1	+0.1	+0.0	+0.5	+0.0	42.0	46.0	-4.0	Line
			+0.1								
15	3.246M	15.6	+9.1	+0.1	+0.0	+0.4	+0.0	25.3	46.0	-20.7	Line
Ave			+0.1								
^	3.246M	34.0	+9.1	+0.1	+0.0	+0.4	+0.0	43.7	46.0	-2.3	Line
			+0.1								
17	4.131M	15.5	+9.1	+0.1	+0.0	+0.5	+0.0	25.3	46.0	-20.7	Line
Ave			+0.1								
^	4.131M	30.4	+9.1	+0.1	+0.0	+0.5	+0.0	40.2	46.0	-5.8	Line
			+0.1								
19	3.012M	15.5	+9.1	+0.1	+0.0	+0.4	+0.0	25.2	46.0	-20.8	Line
Ave			+0.1								
^	3.012M	33.3	+9.1	+0.1	+0.0	+0.4	+0.0	43.0	46.0	-3.0	Line
			+0.1								
21	2.919M	15.3	+9.1	+0.1	+0.0	+0.5	+0.0	25.1	46.0	-20.9	Line
Ave			+0.1								
^	2.919M	30.6	+9.1	+0.1	+0.0	+0.5	+0.0	40.4	46.0	-5.6	Line
			+0.1								
23	3.267M	15.1	+9.1	+0.1	+0.0	+0.4	+0.0	24.8	46.0	-21.2	Line
Ave			+0.1								
^	3.267M	32.5	+9.1	+0.1	+0.0	+0.4	+0.0	42.2	46.0	-3.8	Line
			+0.1								

25	3.293M	14.8	+9.1	+0.1	+0.0	+0.4	+0.0	24.5	46.0	-21.5	Line
Ave			+0.1								
^	3.293M	33.0	+9.1	+0.1	+0.0	+0.4	+0.0	42.7	46.0	-3.3	Line
			+0.1								
27	3.382M	14.3	+9.1	+0.1	+0.0	+0.4	+0.0	24.0	46.0	-22.0	Line
Ave			+0.1								
^	3.382M	30.5	+9.1	+0.1	+0.0	+0.4	+0.0	40.2	46.0	-5.8	Line
			+0.1								
29	14.058M	17.1	+9.1	+0.2	+0.0	+0.6	+0.0	27.2	50.0	-22.8	Line
Ave			+0.2								
^	14.058M	34.1	+9.1	+0.2	+0.0	+0.6	+0.0	44.2	50.0	-5.8	Line
			+0.2								



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 #: **103220** Date: 10/7/2020
Test Type: **Conducted Emissions** Time: 13:42:16
Tested By: Matthew Harrison Sequence#: 14
Software: EMITest 5.03.19 115V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 3			

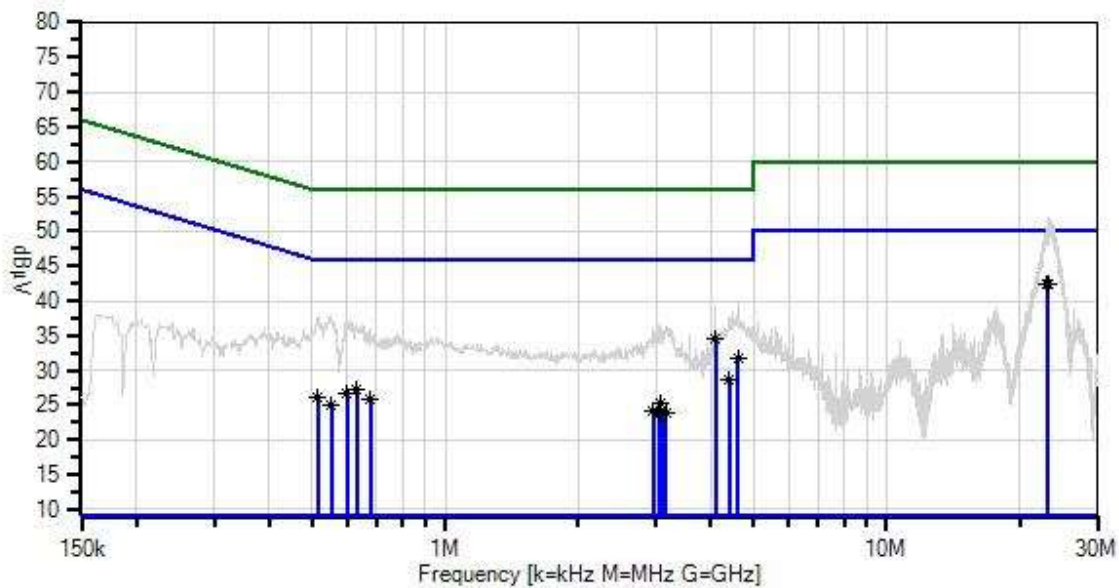
Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 3			

Test Conditions / Notes:

Temperature: 23° C Humidity: 41% Pressure: 103.3 kPa Frequency Range: 150kHz-30MHz Firmware power setting: Max Modulation: FSK 12.5kbit, FSK 37.5kbit, and AM investigated, overall worst case reported. Antenna type: Omnidirectional Antenna Gain: 5.5 dBi. (Worst-Case) Duty Cycle: 100% Modulated Test Method: ANSI C63.10: 2013 Test Mode: Transmitting Test Setup: EUT is setup in a tabletop configuration on an 80cm Styrofoam table. Modifications #1 was in place during testing.

Itron, Inc. WD#: 103220 Sequence#: 14 Date: 10/7/2020
15.207 AC Mains - Average Test Lead: 115V 60Hz Neutral



— Sweep Data
x QP Readings
Software Version: 5.03.19
— Readings
* Average Readings
— 1 - 15.207 AC Mains - Average
o Peak Readings
v Ambient
— 2 - 15.207 AC Mains - Quasi-peak

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP06219	Attenuator	768-10	4/7/2020	4/7/2022
T2	ANP06515	Cable	Heliac	7/1/2020	7/1/2022
T3	ANP06540	Cable	Heliac	8/23/2019	8/23/2021
	AN01492	50uH LISN-Line (L1)	3816/2NM	10/14/2019	10/14/2021
T4	AN01492	50uH LISN-Neutral (L2)	3816/2NM	10/14/2019	10/14/2021
	AN02872	Spectrum Analyzer	E4440A	11/18/2019	11/18/2021
T5	AN02611	High Pass Filter	HE9615-150K-50-720B	1/10/2020	1/10/2022

Measurement Data:

Reading listed by margin.

Test Lead: Neutral

#	Freq MHz	Rdng dB μ V	T1 T5 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dB μ V	Spec dB μ V	Margin dB	Polar Ant
1	23.210M	31.8	+9.1 +0.2	+0.2	+0.1	+1.1	+0.0	42.5	50.0	-7.5	Neutr
^	23.210M	41.2	+9.1 +0.2	+0.2	+0.1	+1.1	+0.0	51.9	50.0	+1.9	Neutr
3	23.094M	31.6	+9.1 +0.2	+0.2	+0.1	+1.1	+0.0	42.3	50.0	-7.7	Neutr
^	23.094M	39.9	+9.1 +0.2	+0.2	+0.1	+1.1	+0.0	50.6	50.0	+0.6	Neutr
5	4.092M	24.8	+9.1 +0.1	+0.1	+0.0	+0.5	+0.0	34.6	46.0	-11.4	Neutr
^	4.092M	29.6	+9.1 +0.1	+0.1	+0.0	+0.5	+0.0	39.4	46.0	-6.6	Neutr
7	4.607M	21.8	+9.1 +0.1	+0.1	+0.0	+0.5	+0.0	31.6	46.0	-14.4	Neutr
^	4.607M	30.1	+9.1 +0.1	+0.1	+0.0	+0.5	+0.0	39.9	46.0	-6.1	Neutr
9	4.411M	18.9	+9.1 +0.1	+0.1	+0.0	+0.4	+0.0	28.6	46.0	-17.4	Neutr
^	4.411M	28.1	+9.1 +0.1	+0.1	+0.0	+0.4	+0.0	37.8	46.0	-8.2	Neutr
11	631.410k	17.4	+9.1 +0.3	+0.0	+0.0	+0.5	+0.0	27.3	46.0	-18.7	Neutr
^	631.410k	26.6	+9.1 +0.3	+0.0	+0.0	+0.5	+0.0	36.5	46.0	-9.5	Neutr
13	598.686k	16.9	+9.1 +0.3	+0.0	+0.0	+0.5	+0.0	26.8	46.0	-19.2	Neutr
^	598.686k	27.5	+9.1 +0.3	+0.0	+0.0	+0.5	+0.0	37.4	46.0	-8.6	Neutr
15	515.057k	16.3	+9.1 +0.2	+0.0	+0.0	+0.5	+0.0	26.1	46.0	-19.9	Neutr
^	515.057k	28.0	+9.1 +0.2	+0.0	+0.0	+0.5	+0.0	37.8	46.0	-8.2	Neutr
17	676.497k	15.8	+9.1 +0.3	+0.0	+0.0	+0.5	+0.0	25.7	46.0	-20.3	Neutr
^	676.497k	26.2	+9.1 +0.3	+0.0	+0.0	+0.5	+0.0	36.1	46.0	-9.9	Neutr
19	3.072M	15.5	+9.1 +0.1	+0.1	+0.0	+0.4	+0.0	25.2	46.0	-20.8	Neutr
20	551.418k	15.1	+9.1 +0.3	+0.0	+0.0	+0.5	+0.0	25.0	46.0	-21.0	Neutr
^	551.417k	27.9	+9.1 +0.3	+0.0	+0.0	+0.5	+0.0	37.8	46.0	-8.2	Neutr
22	2.953M	14.3	+9.1 +0.1	+0.1	+0.0	+0.5	+0.0	24.1	46.0	-21.9	Neutr
^	2.953M	26.2	+9.1 +0.1	+0.1	+0.0	+0.5	+0.0	36.0	46.0	-10.0	Neutr
24	3.059M	14.2	+9.1 +0.1	+0.1	+0.0	+0.4	+0.0	23.9	46.0	-22.1	Neutr

^	3.059M	27.0	+9.1 +0.1	+0.1	+0.0	+0.4	+0.0	36.7	46.0	-9.3	Neutr
26	3.169M	14.2	+9.1 +0.1	+0.1	+0.0	+0.4	+0.0	23.9	46.0	-22.1	Neutr
Ave											
^	3.169M	26.5	+9.1 +0.1	+0.1	+0.0	+0.4	+0.0	36.2	46.0	-9.8	Neutr
28	3.080M	14.1	+9.1 +0.1	+0.1	+0.0	+0.4	+0.0	23.8	46.0	-22.2	Neutr
Ave											
^	3.080M	26.6	+9.1 +0.1	+0.1	+0.0	+0.4	+0.0	36.3	46.0	-9.7	Neutr
^	3.072M	26.6	+9.1 +0.1	+0.1	+0.0	+0.4	+0.0	36.3	46.0	-9.7	Neutr

Test Setup Photo(s)



Appendix A: Modifications Photos



Modification 1

Appendix B: Manufacturer Declaration

The following models have been tested by CKC Laboratories: **CCU100B** and **CCU100RB**

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

CCU100B Repeater

CCU100RB Repeater

The manufacturer declares these permissive changes do not change any modulations, channels or protocol and therefore Time of Occupancy remains compliant.

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 $\text{dB}\mu\text{V}/\text{m}$, 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.