

Ittron, Inc.

TEST REPORT FOR

500C

Models: WPITC0, WRMTC0 and GRMTC0

Tested to The Following Standards:

FCC Part 15 Subpart C Section(s)

15.249

Report No.: 104621-18

Date of issue: February 9, 2021



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: 223674

DATE OF EQUIPMENT RECEIPT:

DATE(S) OF TESTING:

REPORT PREPARED BY:

Dianne Dudley
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Project Number: 104621

December 21, 2020

December 21, 22, 30 and 31, 2020

January 7, 2021

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". The signature is written in a cursive style and is positioned above a horizontal line.

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.
110 Olinda Place
Brea, CA 92823

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 - 15.249

| Test Procedure | Description | Modifications | Results |
|----------------|----------------------------------|---------------|---------|
| 15.215(c) | Occupied Bandwidth | NA | PASS |
| 15.249(a) | Field Strength of Fundamental | NA | PASS |
| 15.249(a) | Radiated Emissions and Band Edge | NA | PASS |
| 15.207 | AC Conducted Emissions | NA | NA1 |

NA = Not Applicable

NA1 = Not applicable, the manufacturer declares the EUT is battery operated.

ISO/IEC 17025 Decision Rule

The declaration of pass or fail herein is based upon assessment to the specification(s) listed above, including where applicable, assessment of measurement uncertainties. For performance related tests, equipment was monitored for specified criteria identified in that section of testing.

Modifications During Testing

This list is a summary of the modifications made to the equipment during testing.

Summary of Conditions

No modifications were made during testing.

Modifications listed above must be incorporated into all production units.

Conditions During Testing

This list is a summary of the conditions noted to the equipment during testing.

Summary of Conditions

None

EQUIPMENT UNDER TEST (EUT)

During testing, numerous configurations may have been utilized. The configurations listed below support compliance to the standard(s) listed in the Summary of Results section.

Configuration 1 ((GAS REMOTE)

Equipment Tested:

| Device | Manufacturer | Model # | S/N |
|--------|--------------|---------|------|
| 500C | Ittron, Inc. | GRMTC0 | RAD1 |

Support Equipment:

| Device | Manufacturer | Model # | S/N |
|---------------------|--------------|----------------|---------|
| Laptop | Dell | Latitude E6420 | 8P954R1 |
| Laptop Power Supply | Dell | ADP-65JB | None |

Configuration 2 (WATER REMOTE)

Equipment Tested:

| Device | Manufacturer | Model # | S/N |
|--------|--------------|---------|------|
| 500C | Ittron, Inc. | WRMTC | RAD1 |

Support Equipment:

| Device | Manufacturer | Model # | S/N |
|---------------------|--------------|----------------|---------|
| Laptop | Dell | Latitude E6420 | 8P954R1 |
| Laptop Power Supply | Dell | ADP-65JB | None |

Configuration 3 (PIT)

Equipment Tested:

| Device | Manufacturer | Model # | S/N |
|--------|--------------|---------|------|
| 500C | Ittron, Inc. | WPITC0 | RAD1 |

Support Equipment:

| Device | Manufacturer | Model # | S/N |
|---------------------|--------------|----------------|---------|
| Laptop | Dell | Latitude E6420 | 8P954R1 |
| Laptop Power Supply | Dell | ADP-65JB | None |

General Product Information:

| Product Information | Manufacturer-Provided Details |
|------------------------------------|--|
| Equipment Type: | Stand-Alone Equipment |
| Operating Frequency Range: | 908 – 923.8MHz |
| Modulation Type(s): | OOK |
| Maximum Duty Cycle: | 100% |
| Antenna Type(s) and Gain: | PCB Trace/ 1.1dBi |
| Antenna Connection Type: | Integral |
| Nominal Input Voltage: | 3.6Vdc battery |
| Firmware / Software used for Test: | App Version: 0.0.25.0, CSL version: 8.1.3.0 Hardware Rev: 9 |

EUT and Accessory Photo(s)



GRMTC0



WPITCO



WRMTCO

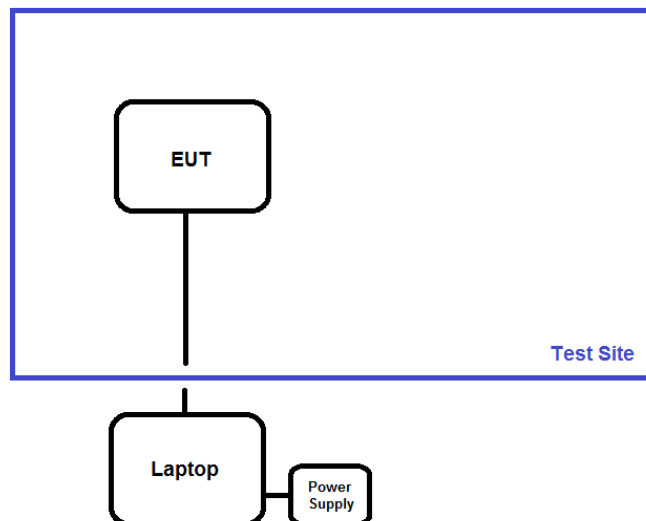
Support Equipment Photo(s)



Laptop and Laptop PSU

Block Diagram of Test Setup(s)

Test Setup Block Diagram



FCC Part 15 Subpart C

15.215(c) Occupied Bandwidth (20dB BW)

| Test Setup/Conditions | | | |
|-----------------------|---|----------------|------------|
| Test Location: | Brea Lab B | Test Engineer: | Don Nguyen |
| Test Method: | ANSI C63.10 (2013) | Test Date(s): | 12/21/2020 |
| Configuration: | 1 | | |
| Test Setup: | <p>The EUT is placed on Styrofoam platform and powered from 3.6V fresh battery. The EUT is connected to a remote located laptop running CLI Tool ver.2.0.1.24.</p> <p>EUT has fixed orientation per manufacture's specification.</p> <p>Operating frequency range/ mode</p> <p>908 - 923.8MHz, 200kHz steps, 80 channels, 16384 OOK LVO</p> <p>Frequency of measurement: 908-923.8MHz</p> <p>RBW=3.9kHz, VBW=12kHz</p> <p>Note: Three EUTs have the same internal hardware. Data measured on one EUT represents for all three EUTs.</p> | | |

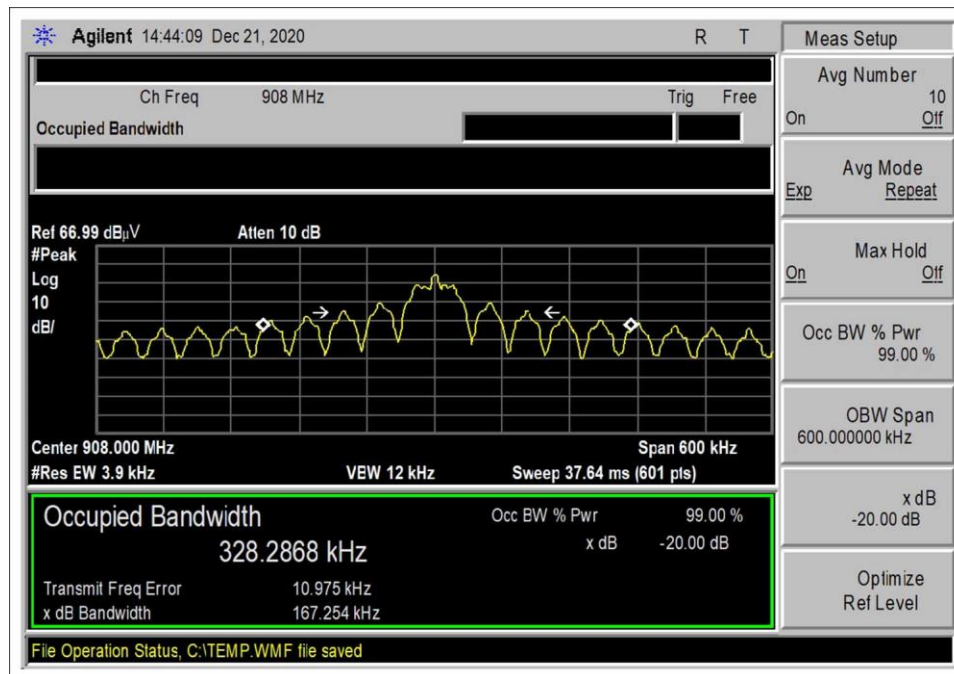
| Environmental Conditions | | | |
|--------------------------|------|------------------------|----|
| Temperature (°C) | 25.1 | Relative Humidity (%): | 27 |

| Test Equipment | | | | | |
|----------------|-------------------|--------------|----------|-----------|-----------|
| Asset# | Description | Manufacturer | Model | Cal Date | Cal Due |
| AN03643 | Spectrum Analyzer | Agilent | E4440A | 5/20/2020 | 5/20/2022 |
| ANP01911 | Cable | Pasternack | RG214/U | 1/2/2020 | 1/2/2022 |
| ANP05281 | Attenuator | Weinschel | 1B | 4/7/2020 | 4/7/2022 |
| AN01993 | Biconilog Antenna | Chase | CBL6111C | 6/11/2019 | 6/11/2021 |

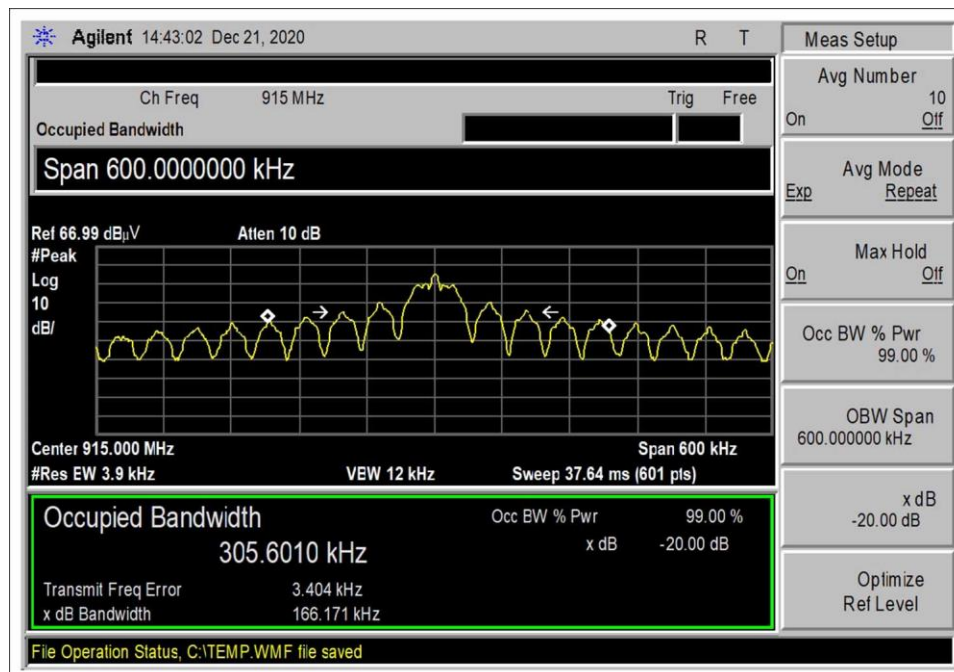
| Test Data Summary | | | | |
|-------------------|------------|----------------|-------------|---------|
| Frequency (MHz) | Modulation | Measured (kHz) | Limit (kHz) | Results |
| 908.0 | OOK LVO | 167.254 | None | NA |
| 915.0 | OOK LVO | 166.171 | None | NA |
| 923.8 | OOK LVO | 165.675 | None | NA |

NA = Not applicable, because FCC 15.215 does not give any limits so there is no criteria for pass or fail.

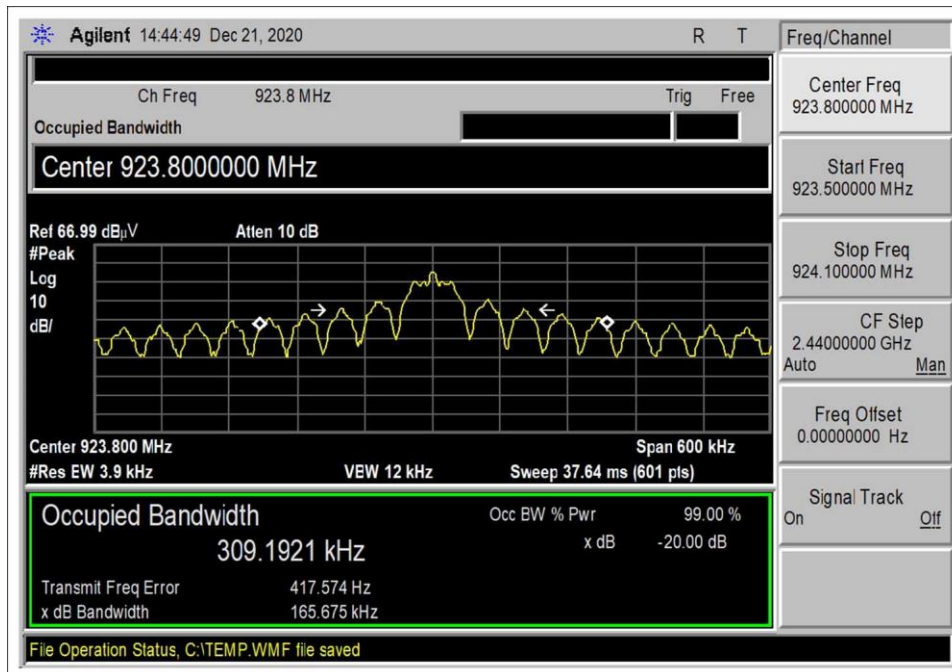
Plot(s)



Low Channel



Middle Channel



High Channel

Test Setup Photo(s)



15.249(a) Field Strength of Fundamental

Test Data Summary - Voltage Variations

| Frequency (MHz) | Modulation / Ant Port | V _{Minimum} (dBuV/m) | V _{Nominal} (dBuV/m) | V _{Maximum} (dBuV/m) | Max Deviation from V _{Nominal} (dB) |
|-----------------|-----------------------|-------------------------------|-------------------------------|-------------------------------|--|
| 908.0 | OOK LV0 | NA | NA | NA | NA |
| 915.0 | OOK LV0 | NA | NA | NA | NA |
| 923.8 | OOK LV0 | NA | NA | NA | NA |

NA = Test performed using a fresh battery.

Parameter Definitions:

Measurements performed at input voltage according to manufacturer specification.

| Parameter | Value |
|------------------------|--------|
| V _{Nominal} : | 3.6Vdc |
| V _{Minimum} : | 3.6Vdc |
| V _{Maximum} : | 3.6Vdc |

Test Data Summary - Voltage Variations

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

Test Data Summary – Radiated Field Strength Measurement Configuration 1

| Frequency (MHz) | Modulation | Ant. Type | Measured (dBuV/m @ 3m) | Limit (dBuV/m @ 3m) | Results |
|-----------------|------------|-----------|------------------------|---------------------|---------|
| 908.0 | OOK LV0 | PCB Trace | 92.2 | ≤94 | Pass |
| 915.0 | OOK LV0 | PCB Trace | 91.3 | ≤94 | Pass |
| 923.8 | OOK LV0 | PCB Trace | 92.7 | ≤94 | Pass |

Test Data Summary – Radiated Field Strength Measurement Configuration 2

| Frequency (MHz) | Modulation | Ant. Type | Measured (dBuV/m @ 3m) | Limit (dBuV/m @ 3m) | Results |
|-----------------|------------|-----------|------------------------|---------------------|---------|
| 908.0 | OOK LV0 | PCB Trace | 92.1 | ≤94 | Pass |
| 915.0 | OOK LV0 | PCB Trace | 91.3 | ≤94 | Pass |
| 923.8 | OOK LV0 | PCB Trace | 91.4 | ≤94 | Pass |

Test Data Summary – Radiated Field Strength Measurement Configuration 3

| Frequency (MHz) | Modulation | Ant. Type | Measured (dBuV/m @ 3m) | Limit (dBuV/m @ 3m) | Results |
|-----------------|------------|-----------|------------------------|---------------------|---------|
| 908.0 | OOK LV0 | PCB Trace | 92.5 | ≤94 | Pass |
| 915.0 | OOK LV0 | PCB Trace | 93.0 | ≤94 | Pass |
| 923.8 | OOK LV0 | PCB Trace | 92.9 | ≤94 | Pass |

Test Setup / Conditions / Data

Test Location: CKC Laboratories Inc. • 110 N. Olinda Pl. • Brea, CA 92823 • 714-993-6112
 Customer: **Itron, Inc.**
 Specification: **15.249 Carrier and Spurious Emissions (902-928 MHz Transmitter)**
 Work Order #: **104621** Date: 12/21/2020
 Test Type: **Radiated Emissions** Time: 13:43:07
 Tested By: Don Nguyen Sequence#: 1
 Software: EMITest 5.03.19

Equipment Tested:

| Device | Manufacturer | Model # | S/N |
|-----------------|--------------|---------|-----|
| Configuration 1 | | | |

Support Equipment:

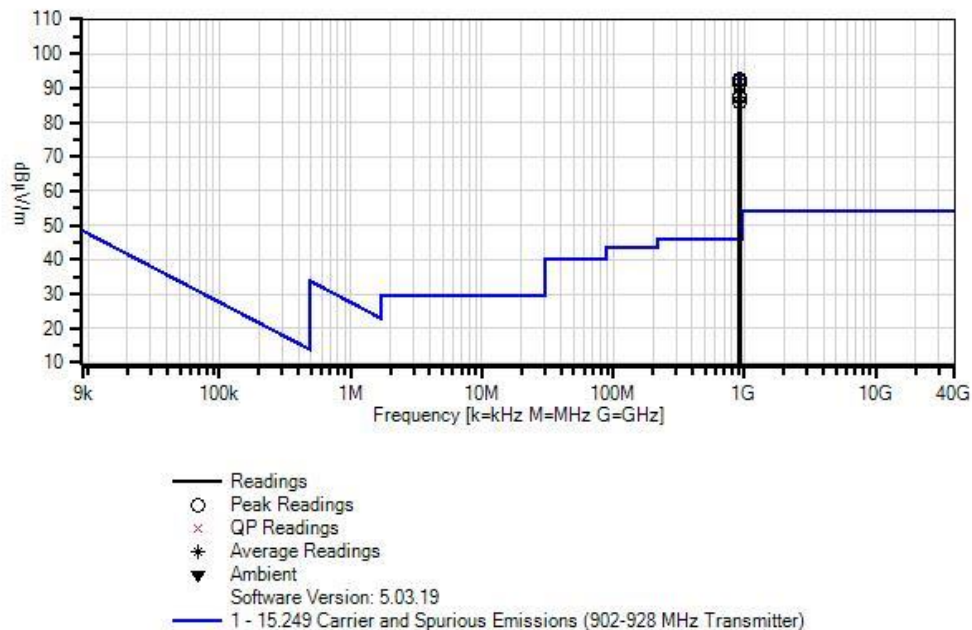
| Device | Manufacturer | Model # | S/N |
|-----------------|--------------|---------|-----|
| Configuration 1 | | | |

Test Conditions / Notes:

The EUT is placed on Styrofoam platform and powered from 3.6V fresh battery. The EUT is connected to a remote located laptop running CLI Tool ver.2.0.1.24.
 EUT has fixed orientation per manufacture's specification.
 Operating frequency range/ mode
 908 - 923.8MHz, 200kHz steps, 80 channels, 16384 OOK LV0
 Frequency of measurement: 908-923.8MHz
 RBW=1MHz, VBW=3MHz

 Test Method: ANSI C63.10 (2013)
 Temperature (°C): 25.1
 Relative Humidity (%): 27

Itron, Inc. W/O#: 104621 Sequence#: 1 Date: 12/21/2020
15.249 Carrier and Spurious Emissions (902-928 MHz Transmitter) Test Distance: 3 Meters Horiz



Test Equipment:

| ID | Asset # | Description | Model | Calibration Date | Cal Due Date |
|----|----------|--------------------------------------|----------|------------------|--------------|
| | AN03643 | Spectrum Analyzer | E4440A | 5/20/2020 | 5/20/2022 |
| T1 | ANP01911 | Cable-Amplitude +15C to +45C (dB) | RG214/U | 1/2/2020 | 1/2/2022 |
| T2 | ANP05281 | Attenuator | 1B | 4/7/2020 | 4/7/2022 |
| T3 | AN01993 | Biconilog Antenna | CBL6111C | 6/11/2019 | 6/11/2021 |

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

| # | Freq MHz | Rdng dBμV | T1 dB | T2 dB | T3 dB | Dist dB | Table | Corr dBμV/m | Spec dBμV/m | Margin dB | Polar Ant |
|---|-------------|--------------|----------|----------|----------|------------|-------|----------------|----------------|--------------|--------------|
| 1 | 923.755M | 59.6 | +3.2 | +6.0 | +23.9 | +0.0 | | 92.7 | 94.0 | -1.3 | Vert |
| 2 | 907.967M | 59.4 | +3.2 | +6.0 | +23.6 | +0.0 | | 92.2 | 94.0 | -1.8 | Vert |
| 3 | 914.955M | 58.4 | +3.2 | +6.0 | +23.7 | +0.0 | | 91.3 | 94.0 | -2.7 | Vert |
| 4 | 915.000M | 54.7 | +3.2 | +6.0 | +23.7 | +0.0 | | 87.6 | 94.0 | -6.4 | Horiz |
| 5 | 908.000M | 54.5 | +3.2 | +6.0 | +23.6 | +0.0 | | 87.3 | 94.0 | -6.7 | Horiz |
| 6 | 923.800M | 52.8 | +3.2 | +6.0 | +23.9 | +0.0 | | 85.9 | 94.0 | -8.1 | Horiz |

Test Location: CKC Laboratories Inc. • 110 N. Olinda Pl. • Brea, CA 92823 • 714-993-6112
 Customer: **Itron, Inc.**
 Specification: **15.249 Carrier and Spurious Emissions (902-928 MHz Transmitter)**
 Work Order #: **104621** Date: 12/21/2020
 Test Type: **Radiated Emissions** Time: 14:05:08
 Tested By: Don Nguyen Sequence#: 2
 Software: EMITest 5.03.19

Equipment Tested:

| Device | Manufacturer | Model # | S/N |
|-----------------|--------------|---------|-----|
| Configuration 2 | | | |

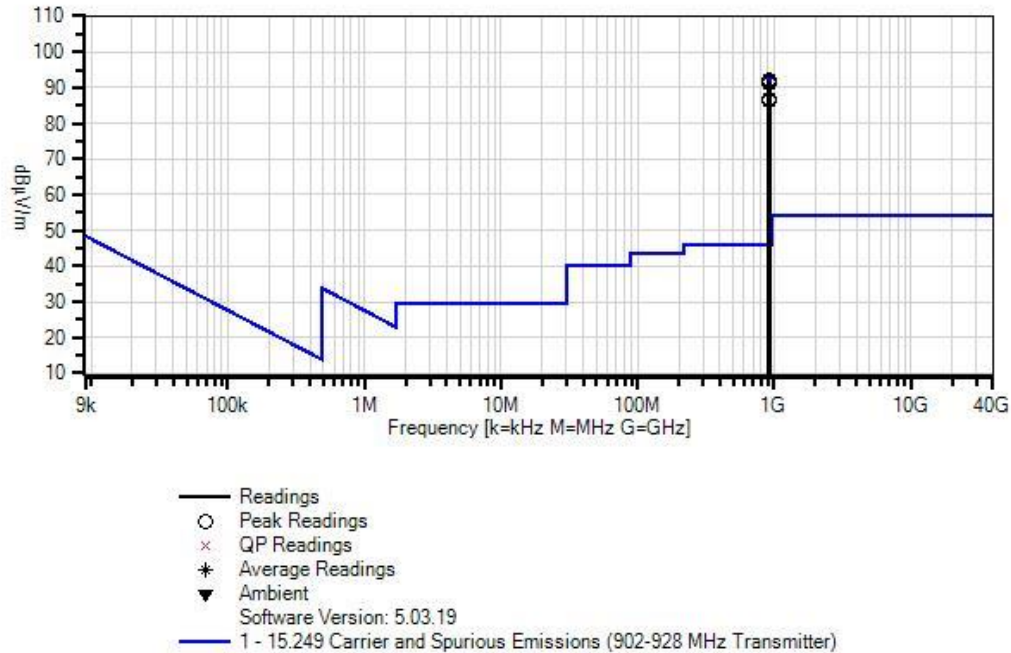
Support Equipment:

| Device | Manufacturer | Model # | S/N |
|-----------------|--------------|---------|-----|
| Configuration 2 | | | |

Test Conditions / Notes:

| |
|---|
| <p>The EUT is placed on Styrofoam platform and powered from 3.6V fresh battery. The EUT is connected to a remote located laptop running CLI Tool ver.2.0.1.24.</p> <p>EUT has fixed orientation per manufacture's specification.</p> <p>Operating frequency range/ mode</p> <p>908 - 923.8MHz, 200kHz steps, 80 channels, 16384 OOK LV0</p> <p>Frequency of measurement: 908-923.8MHz</p> <p>RBW=1MHz, VBW=3MHz</p> <p>Test Method: ANSI C63.10 (2013)</p> <p>Temperature (°C): 25.1</p> <p>Relative Humidity (%): 27</p> |
|---|

Ittron, Inc. WO#: 104621 Sequence#: 2 Date: 12/21/2020
15.249 Carrier and Spurious Emissions (902-928 MHz Transmitter) Test Distance: 3 Meters Vert



Test Equipment:

| ID | Asset # | Description | Model | Calibration Date | Cal Due Date |
|----|----------|--------------------------------------|----------|------------------|--------------|
| | AN03643 | Spectrum Analyzer | E4440A | 5/20/2020 | 5/20/2022 |
| T1 | ANP01911 | Cable-Amplitude +15C to +45C (dB) | RG214/U | 1/2/2020 | 1/2/2022 |
| T2 | ANP05281 | Attenuator | 1B | 4/7/2020 | 4/7/2022 |
| T3 | AN01993 | Biconilog Antenna | CBL6111C | 6/11/2019 | 6/11/2021 |

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

| # | Freq MHz | Rdng dBμV | T1 dB | T2 dB | T3 dB | Dist Table | Corr dBμV/m | Spec dBμV/m | Margin dB | Polar Ant |
|---|-------------|--------------|----------|----------|----------|---------------|----------------|----------------|--------------|--------------|
| 1 | 907.977M | 59.3 | +3.2 | +6.0 | +23.6 | +0.0 | 92.1 | 94.0 | -1.9 | Vert |
| 2 | 923.800M | 58.3 | +3.2 | +6.0 | +23.9 | +0.0 | 91.4 | 94.0 | -2.6 | Vert |
| 3 | 915.033M | 58.4 | +3.2 | +6.0 | +23.7 | +0.0 | 91.3 | 94.0 | -2.7 | Vert |
| 4 | 923.833M | 53.8 | +3.2 | +6.0 | +23.9 | +0.0 | 86.9 | 94.0 | -7.1 | Horiz |
| 5 | 907.953M | 53.7 | +3.2 | +6.0 | +23.6 | +0.0 | 86.5 | 94.0 | -7.5 | Horiz |
| 6 | 915.040M | 53.6 | +3.2 | +6.0 | +23.7 | +0.0 | 86.5 | 94.0 | -7.5 | Horiz |

Test Location: CKC Laboratories Inc. • 110 N. Olinda Pl. • Brea, CA 92823 • 714-993-6112
 Customer: **Itron, Inc.**
 Specification: **15.249 Carrier and Spurious Emissions (902-928 MHz Transmitter)**
 Work Order #: **104621** Date: 12/21/2020
 Test Type: **Radiated Emissions** Time: 14:27:06
 Tested By: Don Nguyen Sequence#: 3
 Software: EMITest 5.03.19

Equipment Tested:

| Device | Manufacturer | Model # | S/N |
|-----------------|--------------|---------|-----|
| Configuration 3 | | | |

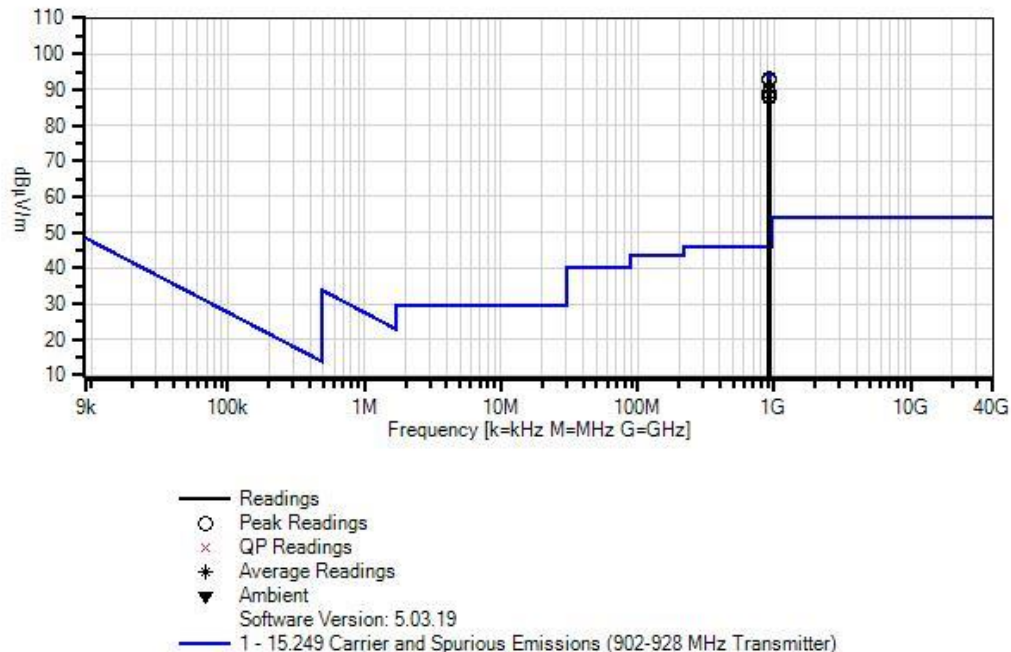
Support Equipment:

| Device | Manufacturer | Model # | S/N |
|-----------------|--------------|---------|-----|
| Configuration 3 | | | |

Test Conditions / Notes:

| |
|---|
| <p>The EUT is placed on Styrofoam platform and powered from 3.6V fresh battery. The EUT is connected to a remote located laptop running CLI Tool ver.2.0.1.24.</p> <p>EUT has fixed orientation per manufacture's specification.</p> <p>Operating frequency range/ mode</p> <p>908 - 923.8MHz, 200kHz steps, 80 channels, 16384 OOK LV0</p> <p>Frequency of measurement: 908-923.8MHz</p> <p>RBW=1MHz, VBW=3MHz</p> <p>Test Method: ANSI C63.10 (2013)</p> <p>Temperature (°C): 25.1</p> <p>Relative Humidity (%): 27</p> |
|---|

Itron, Inc. WO#: 104621 Sequence#: 3 Date: 12/21/2020
15.249 Carrier and Spurious Emissions (902-928 MHz Transmitter) Test Distance: 3 Meters Horiz



Test Equipment:

| ID | Asset # | Description | Model | Calibration Date | Cal Due Date |
|----|----------|--------------------------------------|----------|------------------|--------------|
| | AN03643 | Spectrum Analyzer | E4440A | 5/20/2020 | 5/20/2022 |
| T1 | ANP01911 | Cable-Amplitude +15C to +45C (dB) | RG214/U | 1/2/2020 | 1/2/2022 |
| T2 | ANP05281 | Attenuator | 1B | 4/7/2020 | 4/7/2022 |
| T3 | AN01993 | Biconilog Antenna | CBL6111C | 6/11/2019 | 6/11/2021 |
| | AN00309 | Preamp | 8447D | 12/24/2019 | 12/24/2021 |
| | ANP05050 | Cable | RG223/U | 12/24/2018 | 12/24/2020 |

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

| # | Freq MHz | Rdng dBμV | T1 dB | T2 dB | T3 dB | Dist Table | Corr dBμV/m | Spec dBμV/m | Margin dB | Polar Ant |
|---|-------------|--------------|----------|----------|----------|---------------|----------------|----------------|--------------|--------------|
| 1 | 914.943M | 60.1 | +3.2 | +6.0 | +23.7 | +0.0 | 93.0 | 94.0 | -1.0 | Vert |
| 2 | 923.800M | 59.8 | +3.2 | +6.0 | +23.9 | +0.0 | 92.9 | 94.0 | -1.1 | Vert |
| 3 | 907.983M | 59.7 | +3.2 | +6.0 | +23.6 | +0.0 | 92.5 | 94.0 | -1.5 | Vert |
| 4 | 915.000M | 56.1 | +3.2 | +6.0 | +23.7 | +0.0 | 89.0 | 94.0 | -5.0 | Horiz |
| 5 | 908.000M | 55.4 | +3.2 | +6.0 | +23.6 | +0.0 | 88.2 | 94.0 | -5.8 | Horiz |
| 6 | 923.800M | 54.9 | +3.2 | +6.0 | +23.9 | +0.0 | 88.0 | 94.0 | -6.0 | Horiz |

Test Setup Photo(s)



Configuration 1



Configuration 1



Configuration 2



Configuration 2



Configuration 3



Configuration 3

15.249(a) Radiated Emissions and Bandedge

Test Setup / Conditions / Data

Test Location: CKC Laboratories Inc. • 110 N. Olinda Pl. • Brea, CA 92823 • 714-993-6112
 Customer: **Itron, Inc.**
 Specification: **15.249 Carrier and Spurious Emissions (902-928 MHz Transmitter)**
 Work Order #: **104621** Date: 1/7/2021
 Test Type: **Maximized Emissions** Time: 11:49:12
 Tested By: Don Nguyen Sequence#: 8
 Software: EMITest 5.03.19

Equipment Tested:

| Device | Manufacturer | Model # | S/N |
|-----------------|--------------|---------|-----|
| Configuration 1 | | | |

Support Equipment:

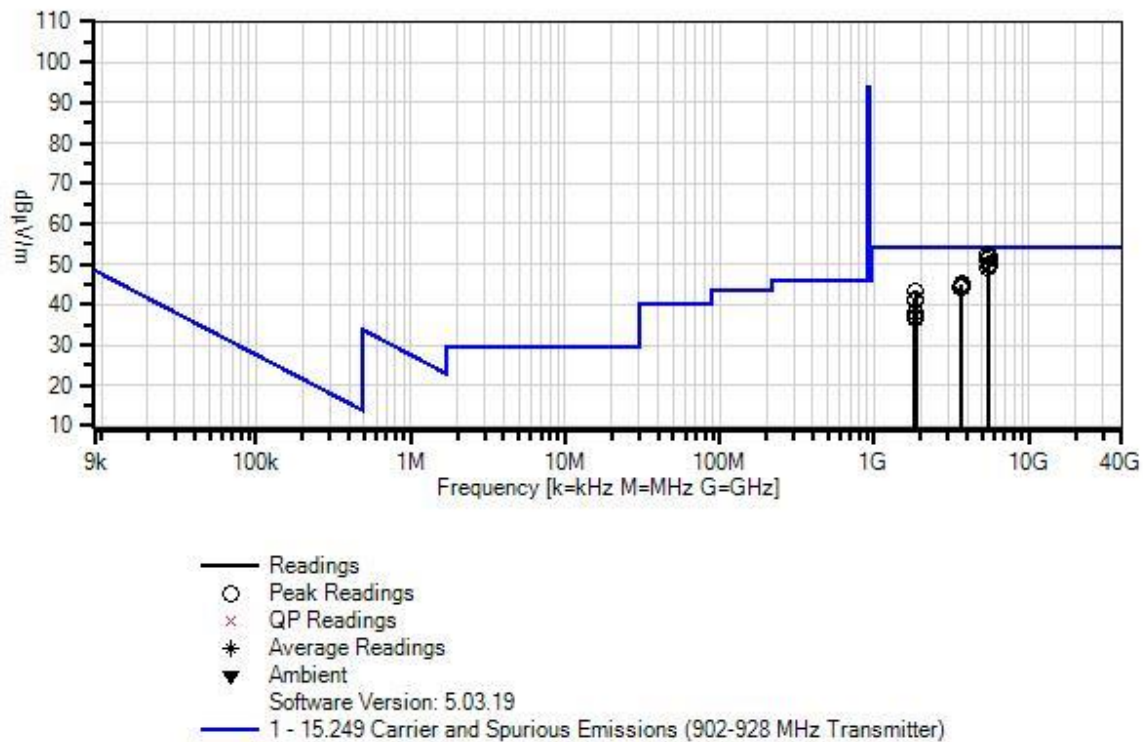
| Device | Manufacturer | Model # | S/N |
|-----------------|--------------|---------|-----|
| Configuration 1 | | | |

Test Conditions / Notes:

The EUT is placed on Styrofoam platform and powered from 3.6V fresh battery. The EUT is connected to a remote located laptop running CLI Tool ver.2.0.1.24.
 EUT has fixed orientation per manufacture's specification.
 Operating frequency range/ mode
 908 - 923.8MHz, 200kHz steps, 80 channels, 16384 OOK LV0
 Frequency of measurement: 9k-9280MHz
 9kHz to 150kHz RBW=0.2kHz, VBW=0.6kHz
 150kHz to 30MHz RBW=9kHz, VBW=27kHz
 30-1000MHz, RBW=120kHz, VBW=360kHz
 1000-9280MHz, RBW=1MHz, VBW=3MHz

 Test Method: ANSI C63.10 (2013)
 Temperature (°C): 25.1
 Relative Humidity (%): 27

Ittron, Inc. WO#: 104621 Sequence#: 8 Date: 1/7/2021
15.249 Carrier and Spurious Emissions (902-928 MHz Transmitter) Test Distance: 3 Meters Vert



Test Equipment:

| ID | Asset # | Description | Model | Calibration Date | Cal Due Date |
|----|----------|--------------------------------------|------------------------------|------------------|--------------|
| | AN00314 | Loop Antenna | 6502 | 4/13/2020 | 4/13/2022 |
| | ANP01911 | Cable-Amplitude +15C to +45C (dB) | RG214/U | 1/2/2020 | 1/2/2022 |
| | ANP05281 | Attenuator | 1B | 4/7/2020 | 4/7/2022 |
| | AN01993 | Biconilog Antenna | CBL6111C | 6/11/2019 | 6/11/2021 |
| | AN00309 | Preamplifier | 8447D | 12/24/2019 | 12/24/2021 |
| | ANP05050 | Cable | RG223/U | 12/14/2020 | 12/14/2022 |
| | AN03643 | Spectrum Analyzer | E4440A | 5/20/2020 | 5/20/2022 |
| T1 | AN00786 | Preamplifier | 83017A | 5/20/2020 | 5/20/2022 |
| T2 | AN00849 | Horn Antenna | 3115 | 3/17/2020 | 3/17/2022 |
| T3 | ANP06360 | Cable | L1-PNMNM-48 | 8/8/2019 | 8/8/2021 |
| T4 | ANP07246 | Cable | 32022-29094K- 29094K-24TC | 5/29/2020 | 5/29/2022 |
| T5 | AN03169 | High Pass Filter | HM1155-11SS | 5/8/2019 | 5/8/2021 |

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

| # | Freq MHz | Rdng dB μ V | T1 T5 dB | T2 dB | T3 dB | T4 dB | Dist Table | Corr dB μ V/m | Spec dB μ V/m | Margin dB | Polar Ant |
|----|-------------|--------------------|----------------|----------|----------|----------|---------------|----------------------|----------------------|--------------|--------------|
| 1 | 5448.033M | 49.4 | -37.2 +0.2 | +34.1 | +5.1 | +0.7 | +0.0 | 52.3 | 54.0 | -1.7 | Horiz |
| 2 | 5489.983M | 49.1 | -37.2 +0.2 | +34.1 | +5.1 | +0.7 | +0.0 | 52.0 | 54.0 | -2.0 | Horiz |
| 3 | 5542.758M | 48.6 | -37.3 +0.2 | +34.1 | +5.1 | +0.7 | +0.0 | 51.4 | 54.0 | -2.6 | Horiz |
| 4 | 5447.992M | 48.1 | -37.2 +0.2 | +34.1 | +5.1 | +0.7 | +0.0 | 51.0 | 54.0 | -3.0 | Vert |
| 5 | 5542.758M | 47.1 | -37.3 +0.2 | +34.1 | +5.1 | +0.7 | +0.0 | 49.9 | 54.0 | -4.1 | Vert |
| 6 | 5490.017M | 46.6 | -37.2 +0.2 | +34.1 | +5.1 | +0.7 | +0.0 | 49.5 | 54.0 | -4.5 | Vert |
| 7 | 5447.983M | 46.2 | -37.2 +0.2 | +34.1 | +5.1 | +0.7 | +0.0 | 49.1 | 54.0 | -4.9 | Vert |
| 8 | 3695.158M | 46.1 | -38.1 +0.2 | +32.2 | +4.0 | +0.7 | +0.0 | 45.1 | 54.0 | -8.9 | Vert |
| 9 | 3695.158M | 45.7 | -38.1 +0.2 | +32.2 | +4.0 | +0.7 | +0.0 | 44.7 | 54.0 | -9.3 | Horiz |
| 10 | 3632.017M | 45.8 | -38.1 +0.2 | +31.9 | +4.0 | +0.7 | +0.0 | 44.5 | 54.0 | -9.5 | Vert |
| 11 | 3659.958M | 45.5 | -38.1 +0.2 | +32.0 | +4.0 | +0.7 | +0.0 | 44.3 | 54.0 | -9.7 | Horiz |
| 12 | 3659.958M | 45.4 | -38.1 +0.2 | +32.0 | +4.0 | +0.7 | +0.0 | 44.2 | 54.0 | -9.8 | Vert |
| 13 | 1847.558M | 51.5 | -38.8 +0.2 | +27.0 | +2.8 | +0.4 | +0.0 | 43.1 | 54.0 | -10.9 | Vert |
| 14 | 1816.017M | 49.9 | -38.8 +0.2 | +26.8 | +2.8 | +0.4 | +0.0 | 41.3 | 54.0 | -12.7 | Vert |
| 15 | 1829.958M | 49.3 | -38.8 +0.2 | +26.9 | +2.8 | +0.4 | +0.0 | 40.8 | 54.0 | -13.2 | Vert |
| 16 | 1815.983M | 46.7 | -38.8 +0.2 | +26.8 | +2.8 | +0.4 | +0.0 | 38.1 | 54.0 | -15.9 | Horiz |
| 17 | 1829.958M | 45.6 | -38.8 +0.2 | +26.9 | +2.8 | +0.4 | +0.0 | 37.1 | 54.0 | -16.9 | Horiz |
| 18 | 1847.558M | 45.0 | -38.8 +0.2 | +27.0 | +2.8 | +0.4 | +0.0 | 36.6 | 54.0 | -17.4 | Horiz |

Test Location: CKC Laboratories Inc. • 110 N. Olinda Pl. • Brea, CA 92823 • 714-993-6112
 Customer: **Itron, Inc.**
 Specification: **15.249 Carrier and Spurious Emissions (902-928 MHz Transmitter)**
 Work Order #: **104621** Date: 12/30/2020
 Test Type: **Maximized Emissions** Time: 12:50:09
 Tested By: Don Nguyen Sequence#: 6
 Software: EMITest 5.03.19

Equipment Tested:

| Device | Manufacturer | Model # | S/N |
|-----------------|--------------|---------|-----|
| Configuration 2 | | | |

Support Equipment:

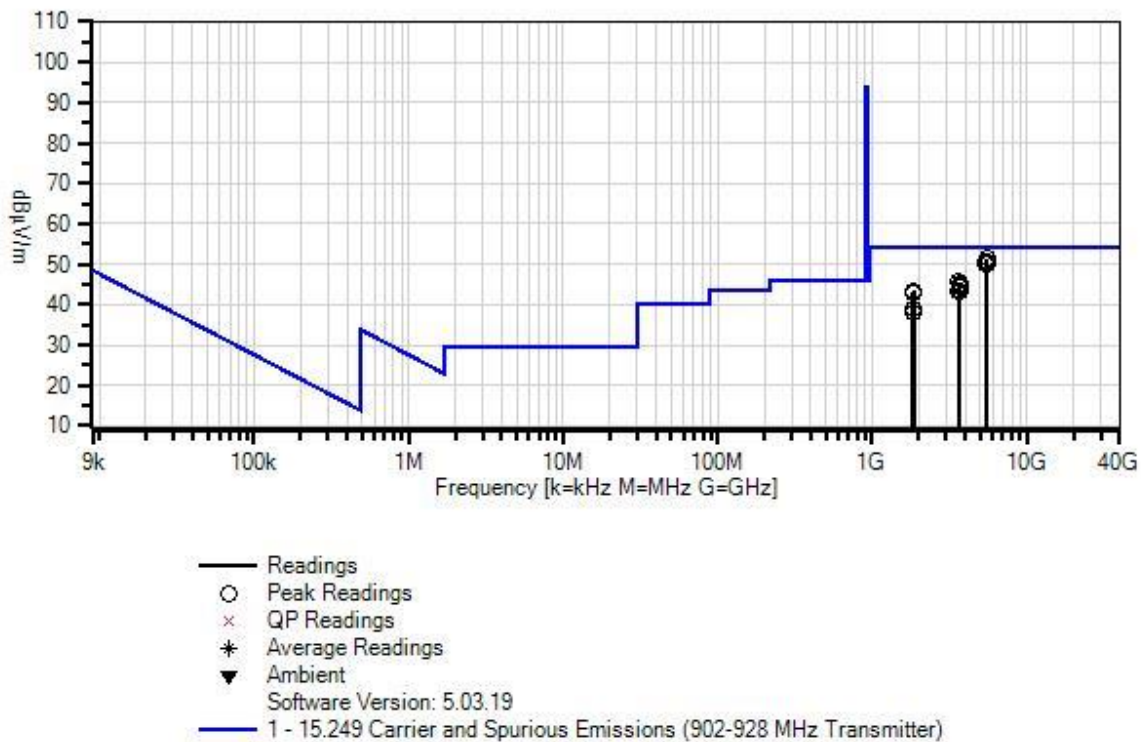
| Device | Manufacturer | Model # | S/N |
|-----------------|--------------|---------|-----|
| Configuration 2 | | | |

Test Conditions / Notes:

The EUT is placed on Styrofoam platform and powered from 3.6V fresh battery. The EUT is connected to a remote located laptop running CLI Tool ver.2.0.1.24.
 EUT has fixed orientation per manufacture's specification.
 Operating frequency range/ mode
 908 - 923.8MHz, 200kHz steps, 80 channels, 16384 OOK LV0
 Frequency of measurement: 9k-9280MHz
 9kHz to 150kHz RBW=0.2kHz, VBW=0.6kHz
 150kHz to 30MHz RBW=9kHz, VBW=27kHz
 30-1000MHz, RBW=120kHz, VBW=360kHz
 1000-9280MHz, RBW=1MHz, VBW=3MHz

 Test Method: ANSI C63.10 (2013)
 Temperature (°C): 25.1
 Relative Humidity (%): 27

Ittron, Inc. WO#: 104621 Sequence#: 6 Date: 12/30/2020
15.249 Carrier and Spurious Emissions (902-928 MHz Transmitter) Test Distance: 3 Meters Horiz



Test Equipment:

| ID | Asset # | Description | Model | Calibration Date | Cal Due Date |
|----|----------|--------------------------------------|------------------------------|------------------|--------------|
| | AN00314 | Loop Antenna | 6502 | 4/13/2020 | 4/13/2022 |
| | ANP01911 | Cable-Amplitude +15C to +45C (dB) | RG214/U | 1/2/2020 | 1/2/2022 |
| | ANP05281 | Attenuator | 1B | 4/7/2020 | 4/7/2022 |
| | AN01993 | Biconilog Antenna | CBL6111C | 6/11/2019 | 6/11/2021 |
| | AN00309 | Preamp | 8447D | 12/24/2019 | 12/24/2021 |
| | ANP05050 | Cable | RG223/U | 12/14/2020 | 12/14/2022 |
| | AN03643 | Spectrum Analyzer | E4440A | 5/20/2020 | 5/20/2022 |
| T1 | AN00786 | Preamp | 83017A | 5/20/2020 | 5/20/2022 |
| T2 | AN00849 | Horn Antenna | 3115 | 3/17/2020 | 3/17/2022 |
| T3 | ANP06360 | Cable | L1-PNMNM-48 | 8/8/2019 | 8/8/2021 |
| T4 | ANP07246 | Cable | 32022-29094K- 29094K-24TC | 5/29/2020 | 5/29/2022 |
| T5 | AN03169 | High Pass Filter | HM1155-11SS | 5/8/2019 | 5/8/2021 |

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

| # | Freq MHz | Rdng dB μ V | T1 T5 dB | T2 dB | T3 dB | T4 dB | Dist Table | Corr dB μ V/m | Spec dB μ V/m | Margin dB | Polar Ant |
|----|-------------|--------------------|----------------|----------|----------|----------|---------------|----------------------|----------------------|--------------|--------------|
| 1 | 5542.800M | 48.5 | -37.3 +0.2 | +34.1 | +5.1 | +0.7 | +0.0 | 51.3 | 54.0 | -2.7 | Vert |
| 2 | 5542.800M | 48.0 | -37.3 +0.2 | +34.1 | +5.1 | +0.7 | +0.0 | 50.8 | 54.0 | -3.2 | Horiz |
| 3 | 5448.000M | 47.5 | -37.2 +0.2 | +34.1 | +5.1 | +0.7 | +0.0 | 50.4 | 54.0 | -3.6 | Horiz |
| 4 | 5448.000M | 47.3 | -37.2 +0.2 | +34.1 | +5.1 | +0.7 | +0.0 | 50.2 | 54.0 | -3.8 | Vert |
| 5 | 5490.000M | 47.3 | -37.2 +0.2 | +34.1 | +5.1 | +0.7 | +0.0 | 50.2 | 54.0 | -3.8 | Vert |
| 6 | 5490.000M | 47.3 | -37.2 +0.2 | +34.1 | +5.1 | +0.7 | +0.0 | 50.2 | 54.0 | -3.8 | Horiz |
| 7 | 3632.000M | 46.8 | -38.1 +0.2 | +31.9 | +4.0 | +0.7 | +0.0 | 45.5 | 54.0 | -8.5 | Vert |
| 8 | 3695.200M | 46.3 | -38.1 +0.2 | +32.2 | +4.0 | +0.7 | +0.0 | 45.3 | 54.0 | -8.7 | Horiz |
| 9 | 3695.200M | 45.8 | -38.1 +0.2 | +32.2 | +4.0 | +0.7 | +0.0 | 44.8 | 54.0 | -9.2 | Vert |
| 10 | 3660.000M | 45.6 | -38.1 +0.2 | +32.0 | +4.0 | +0.7 | +0.0 | 44.4 | 54.0 | -9.6 | Vert |
| 11 | 1847.600M | 51.9 | -38.8 +0.2 | +27.0 | +2.8 | +0.4 | +0.0 | 43.5 | 54.0 | -10.5 | Vert |
| 12 | 3632.000M | 44.6 | -38.1 +0.2 | +31.9 | +4.0 | +0.7 | +0.0 | 43.3 | 54.0 | -10.7 | Horiz |
| 13 | 3660.000M | 44.5 | -38.1 +0.2 | +32.0 | +4.0 | +0.7 | +0.0 | 43.3 | 54.0 | -10.7 | Horiz |
| 14 | 1830.000M | 51.5 | -38.8 +0.2 | +26.9 | +2.8 | +0.4 | +0.0 | 43.0 | 54.0 | -11.0 | Vert |
| 15 | 1816.000M | 51.3 | -38.8 +0.2 | +26.8 | +2.8 | +0.4 | +0.0 | 42.7 | 54.0 | -11.3 | Vert |
| 16 | 1847.600M | 47.6 | -38.8 +0.2 | +27.0 | +2.8 | +0.4 | +0.0 | 39.2 | 54.0 | -14.8 | Horiz |
| 17 | 1816.000M | 47.4 | -38.8 +0.2 | +26.8 | +2.8 | +0.4 | +0.0 | 38.8 | 54.0 | -15.2 | Horiz |
| 18 | 1830.000M | 46.5 | -38.8 +0.2 | +26.9 | +2.8 | +0.4 | +0.0 | 38.0 | 54.0 | -16.0 | Horiz |

Test Location: CKC Laboratories Inc. • 110 N. Olinda Pl. • Brea, CA 92823 • 714-993-6112
 Customer: **Itron, Inc.**
 Specification: **15.249 Carrier and Spurious Emissions (902-928 MHz Transmitter)**
 Work Order #: **104621** Date: 12/31/2020
 Test Type: **Maximized Emissions** Time: 09:24:35
 Tested By: Don Nguyen Sequence#: 7
 Software: EMITest 5.03.19

Equipment Tested:

| Device | Manufacturer | Model # | S/N |
|-----------------|--------------|---------|-----|
| Configuration 3 | | | |

Support Equipment:

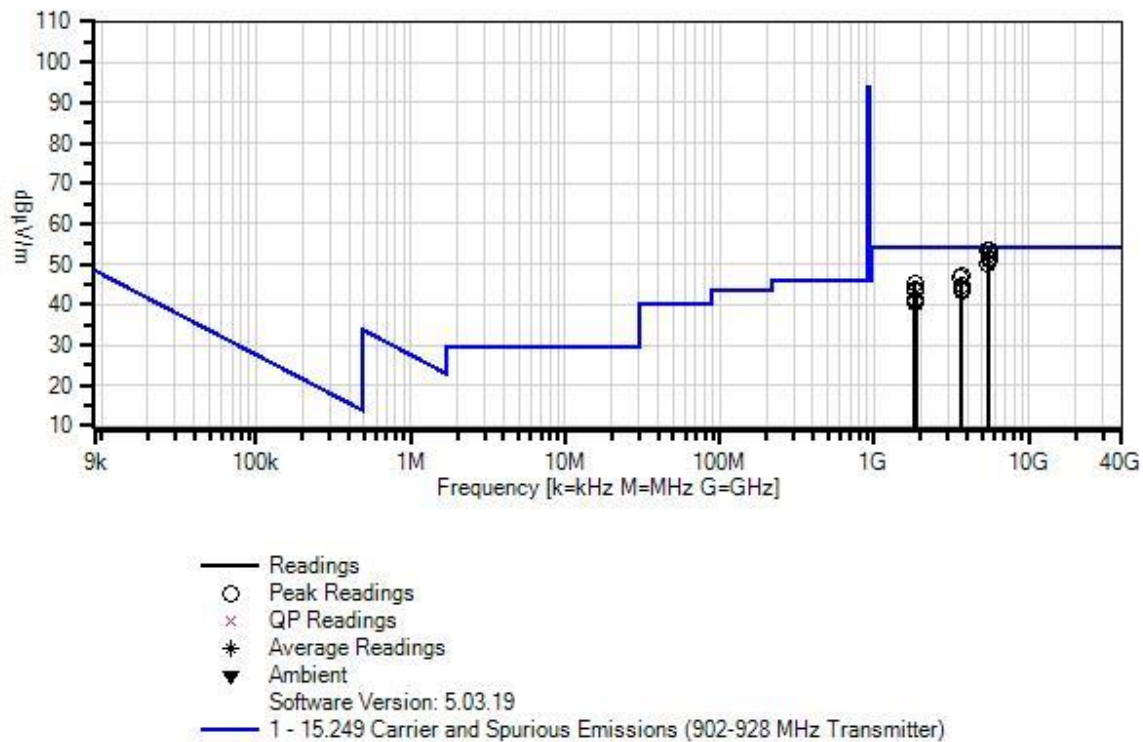
| Device | Manufacturer | Model # | S/N |
|-----------------|--------------|---------|-----|
| Configuration 3 | | | |

Test Conditions / Notes:

The EUT is placed on Styrofoam platform and powered from 3.6V fresh battery. The EUT is connected to a remote located laptop running CLI Tool ver.2.0.1.24.
 EUT has fixed orientation per manufacture's specification.
 Operating frequency range/ mode
 908 - 923.8MHz, 200kHz steps, 80 channels, 16384 OOK LV0
 Frequency of measurement: 9k-9280MHz
 9kHz to 150kHz RBW=0.2kHz, VBW=0.6kHz
 150kHz to 30MHz RBW=9kHz, VBW=27kHz
 30-1000MHz, RBW=120kHz, VBW=360kHz
 1000-9280MHz, RBW=1MHz, VBW=3MHz

 Test Method: ANSI C63.10 (2013)
 Temperature (°C): 25.1
 Relative Humidity (%): 27

Ittron, Inc. W/O#: 104621 Sequence#: 7 Date: 12/31/2020
15.249 Carrier and Spurious Emissions (902-928 MHz Transmitter) Test Distance: 3 Meters Vert



Test Equipment:

| ID | Asset # | Description | Model | Calibration Date | Cal Due Date |
|----|----------|--------------------------------------|------------------------------|------------------|--------------|
| | AN00314 | Loop Antenna | 6502 | 4/13/2020 | 4/13/2022 |
| | ANP01911 | Cable-Amplitude +15C to +45C (dB) | RG214/U | 1/2/2020 | 1/2/2022 |
| | ANP05281 | Attenuator | 1B | 4/7/2020 | 4/7/2022 |
| | AN01993 | Biconilog Antenna | CBL6111C | 6/11/2019 | 6/11/2021 |
| | AN00309 | Preamp | 8447D | 12/24/2019 | 12/24/2021 |
| | ANP05050 | Cable | RG223/U | 12/14/2020 | 12/14/2022 |
| | AN03643 | Spectrum Analyzer | E4440A | 5/20/2020 | 5/20/2022 |
| T1 | AN00786 | Preamp | 83017A | 5/20/2020 | 5/20/2022 |
| T2 | AN00849 | Horn Antenna | 3115 | 3/17/2020 | 3/17/2022 |
| T3 | ANP06360 | Cable | L1-PNMNM-48 | 8/8/2019 | 8/8/2021 |
| T4 | ANP07246 | Cable | 32022-29094K- 29094K-24TC | 5/29/2020 | 5/29/2022 |
| T5 | AN03169 | High Pass Filter | HM1155-11SS | 5/8/2019 | 5/8/2021 |

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

| # | Freq MHz | Rdng dB μ V | T1 T5 dB | T2 dB | T3 dB | T4 dB | Dist Table | Corr dB μ V/m | Spec dB μ V/m | Margin dB | Polar Ant |
|----|-------------|--------------------|----------------|----------|----------|----------|---------------|----------------------|----------------------|--------------|--------------|
| 1 | 5448.000M | 50.7 | -37.2 +0.2 | +34.1 | +5.1 | +0.7 | +0.0 | 53.6 | 54.0 | -0.4 | Vert |
| 2 | 5490.000M | 50.5 | -37.2 +0.2 | +34.1 | +5.1 | +0.7 | +0.0 | 53.4 | 54.0 | -0.6 | Vert |
| 3 | 5542.800M | 49.8 | -37.3 +0.2 | +34.1 | +5.1 | +0.7 | +0.0 | 52.6 | 54.0 | -1.4 | Vert |
| 4 | 5542.800M | 48.8 | -37.3 +0.2 | +34.1 | +5.1 | +0.7 | +0.0 | 51.6 | 54.0 | -2.4 | Horiz |
| 5 | 5490.000M | 48.0 | -37.2 +0.2 | +34.1 | +5.1 | +0.7 | +0.0 | 50.9 | 54.0 | -3.1 | Horiz |
| 6 | 5448.000M | 47.1 | -37.2 +0.2 | +34.1 | +5.1 | +0.7 | +0.0 | 50.0 | 54.0 | -4.0 | Horiz |
| 7 | 3660.000M | 48.2 | -38.1 +0.2 | +32.0 | +4.0 | +0.7 | +0.0 | 47.0 | 54.0 | -7.0 | Vert |
| 8 | 3632.000M | 48.0 | -38.1 +0.2 | +31.9 | +4.0 | +0.7 | +0.0 | 46.7 | 54.0 | -7.3 | Vert |
| 9 | 1830.000M | 53.7 | -38.8 +0.2 | +26.9 | +2.8 | +0.4 | +0.0 | 45.2 | 54.0 | -8.8 | Vert |
| 10 | 3695.200M | 45.9 | -38.1 +0.2 | +32.2 | +4.0 | +0.7 | +0.0 | 44.9 | 54.0 | -9.1 | Vert |
| 11 | 1816.000M | 52.5 | -38.8 +0.2 | +26.8 | +2.8 | +0.4 | +0.0 | 43.9 | 54.0 | -10.1 | Vert |
| 12 | 3660.000M | 44.8 | -38.1 +0.2 | +32.0 | +4.0 | +0.7 | +0.0 | 43.6 | 54.0 | -10.4 | Horiz |
| 13 | 3695.200M | 44.5 | -38.1 +0.2 | +32.2 | +4.0 | +0.7 | +0.0 | 43.5 | 54.0 | -10.5 | Horiz |
| 14 | 1847.600M | 51.8 | -38.8 +0.2 | +27.0 | +2.8 | +0.4 | +0.0 | 43.4 | 54.0 | -10.6 | Vert |
| 15 | 1816.000M | 49.8 | -38.8 +0.2 | +26.8 | +2.8 | +0.4 | +0.0 | 41.2 | 54.0 | -12.8 | Horiz |
| 16 | 1830.000M | 49.4 | -38.8 +0.2 | +26.9 | +2.8 | +0.4 | +0.0 | 40.9 | 54.0 | -13.1 | Horiz |
| 17 | 1847.600M | 48.7 | -38.8 +0.2 | +27.0 | +2.8 | +0.4 | +0.0 | 40.3 | 54.0 | -13.7 | Horiz |

Band Edge

Band Edge Summary GAS REMOTE - Configuration 1

| Frequency (MHz) | Modulation | Ant. Type | Field Strength (dBuV/m @3m) | Limit (dBuV/m @3m) | Results |
|-----------------|------------|-----------|-----------------------------|--------------------|---------|
| 902 | OOK LV0 | PCB Trace | 43.3 | <46 | Pass |
| 928 | OOK LV0 | PCB Trace | 42.8* | <46 | Pass |

*QP detector

Band Edge Summary WATER REMOTE - Configuration 2

| Frequency (MHz) | Modulation | Ant. Type | Field Strength (dBuV/m @3m) | Limit (dBuV/m @3m) | Results |
|-----------------|------------|-----------|-----------------------------|--------------------|---------|
| 902 | OOK LV0 | PCB Trace | 41.1 | <46 | Pass |
| 928 | OOK LV0 | PCB Trace | 40.9* | <46 | Pass |

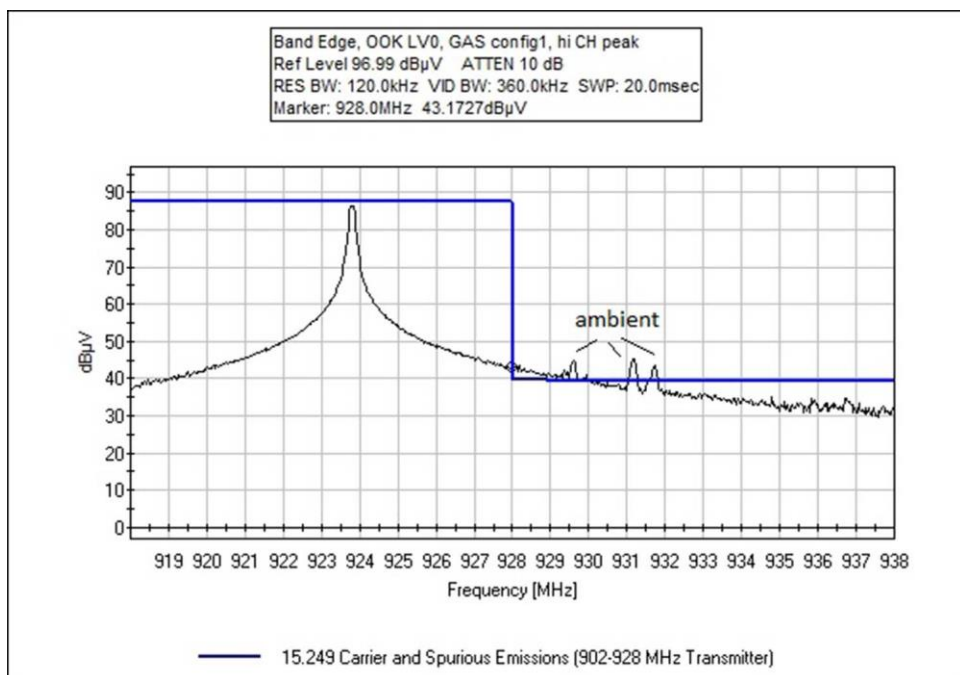
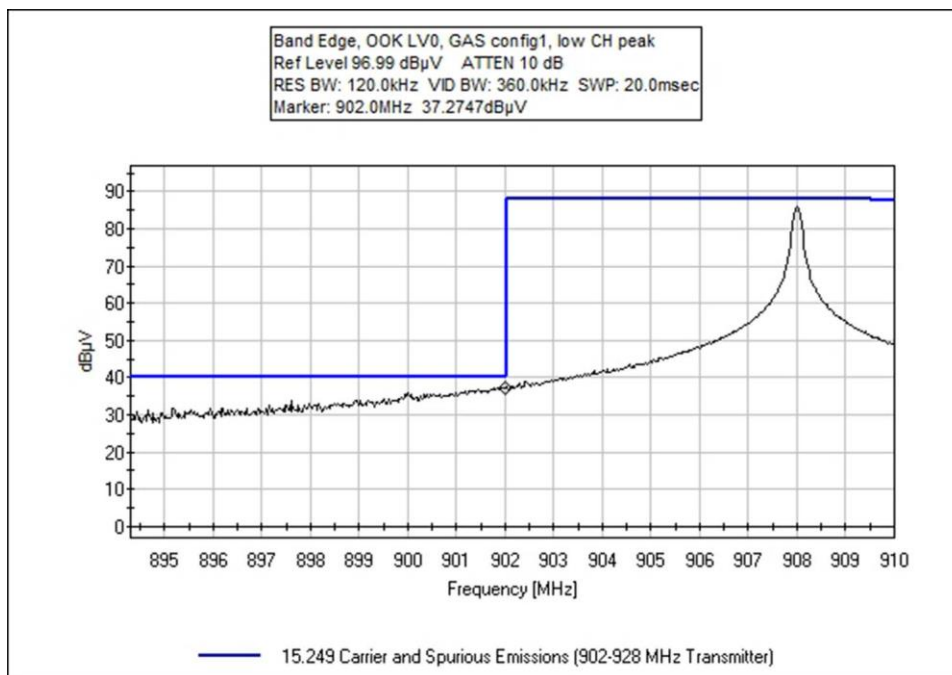
*QP detector

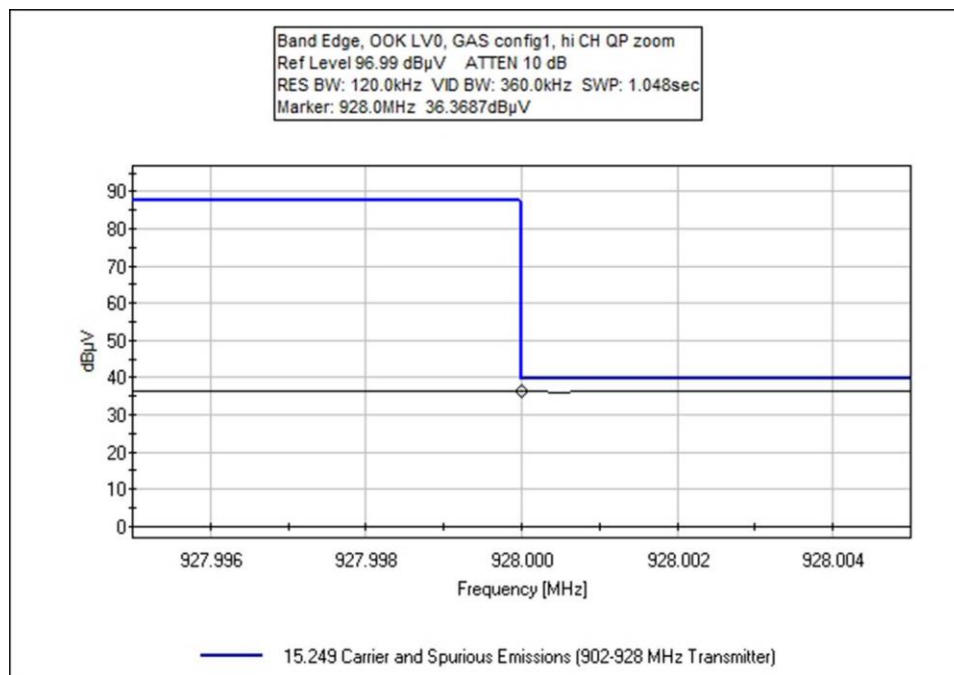
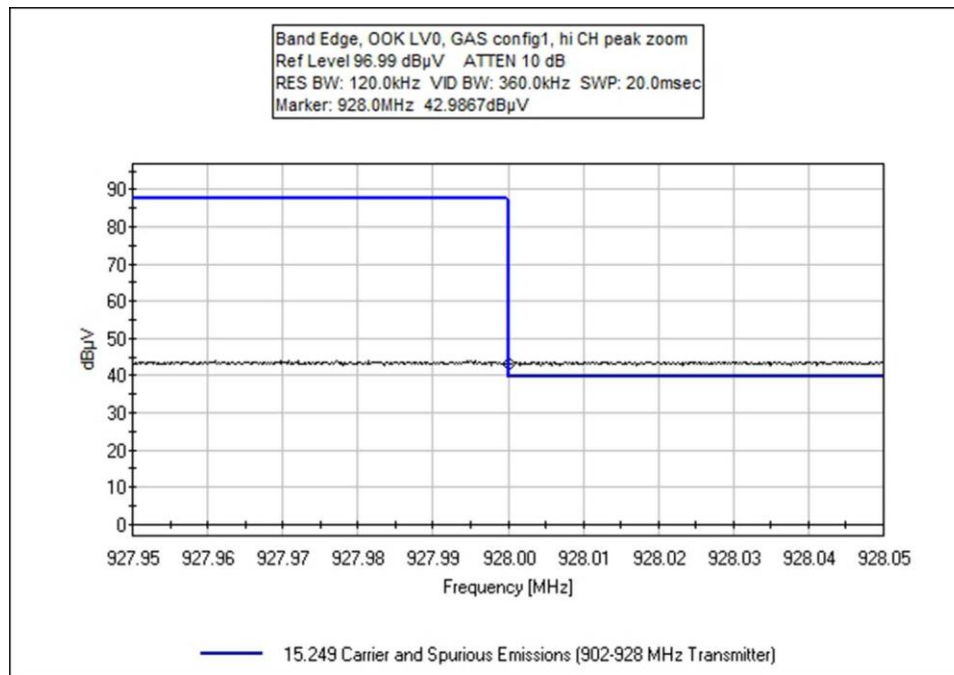
Band Edge Summary PIT - Configuration 3

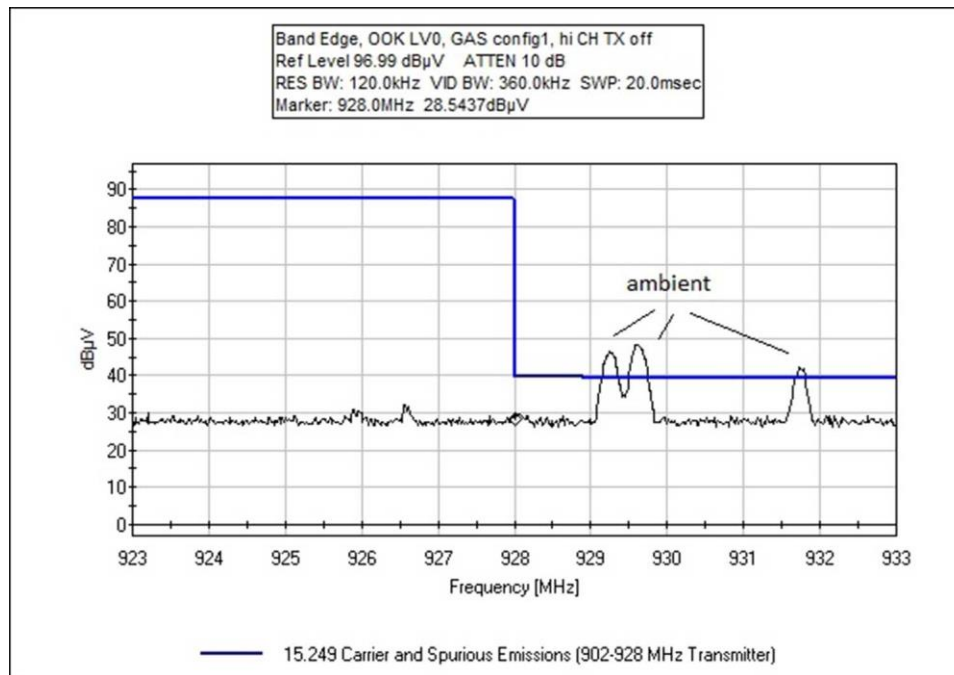
| Frequency (MHz) | Modulation | Ant. Type | Field Strength (dBuV/m @3m) | Limit (dBuV/m @3m) | Results |
|-----------------|------------|-----------|-----------------------------|--------------------|---------|
| 902 | OOK LV0 | PCB Trace | 43.7 | <46 | Pass |
| 928 | OOK LV0 | PCB Trace | 42.2* | <46 | Pass |

*QP detector

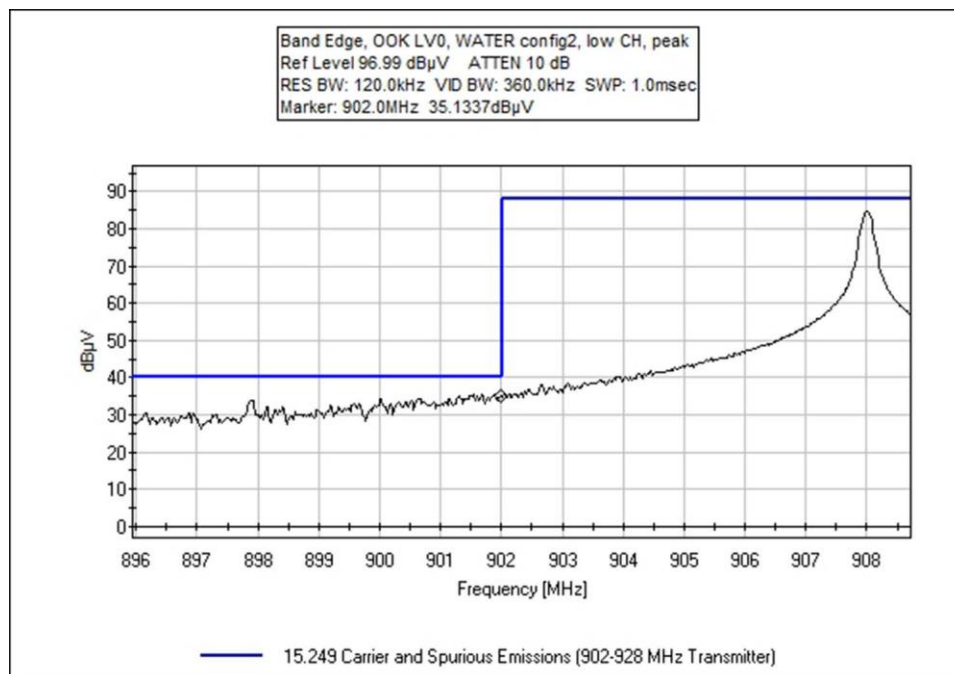
Band Edge Plots, Configuration 1

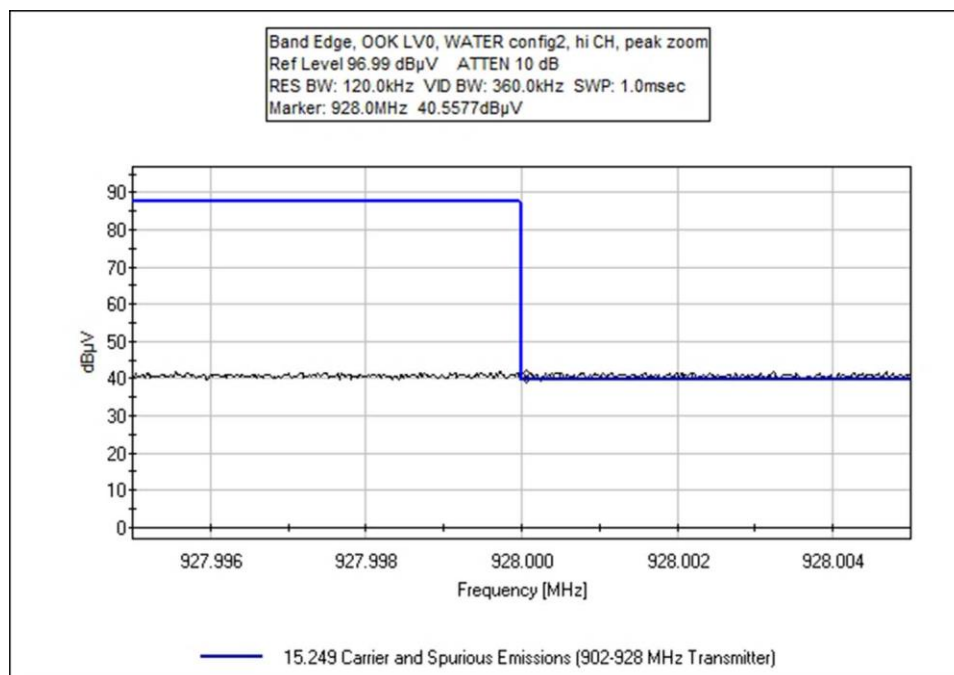
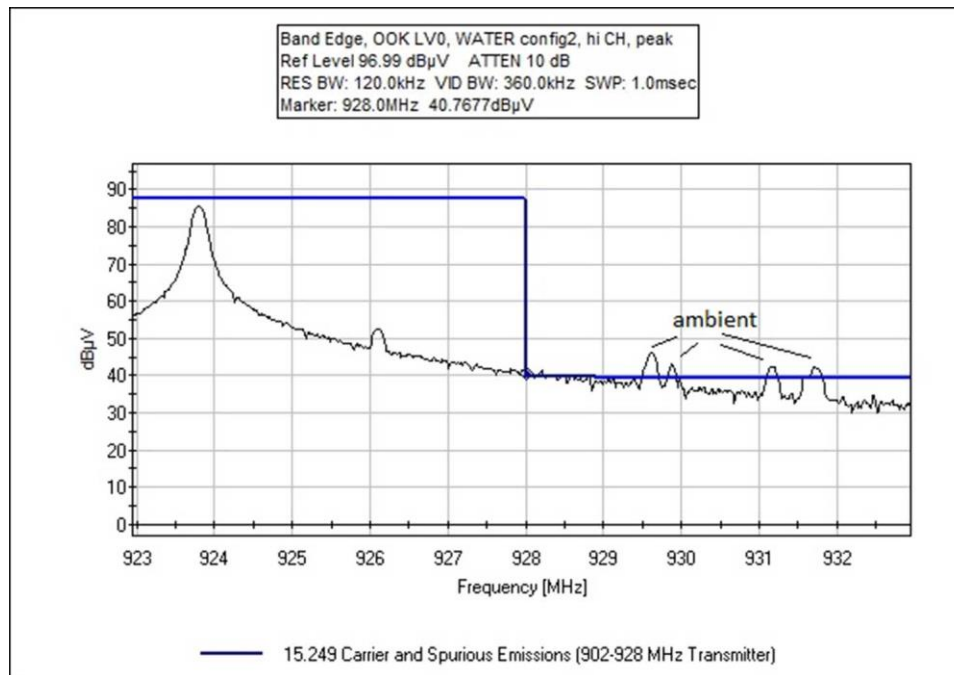


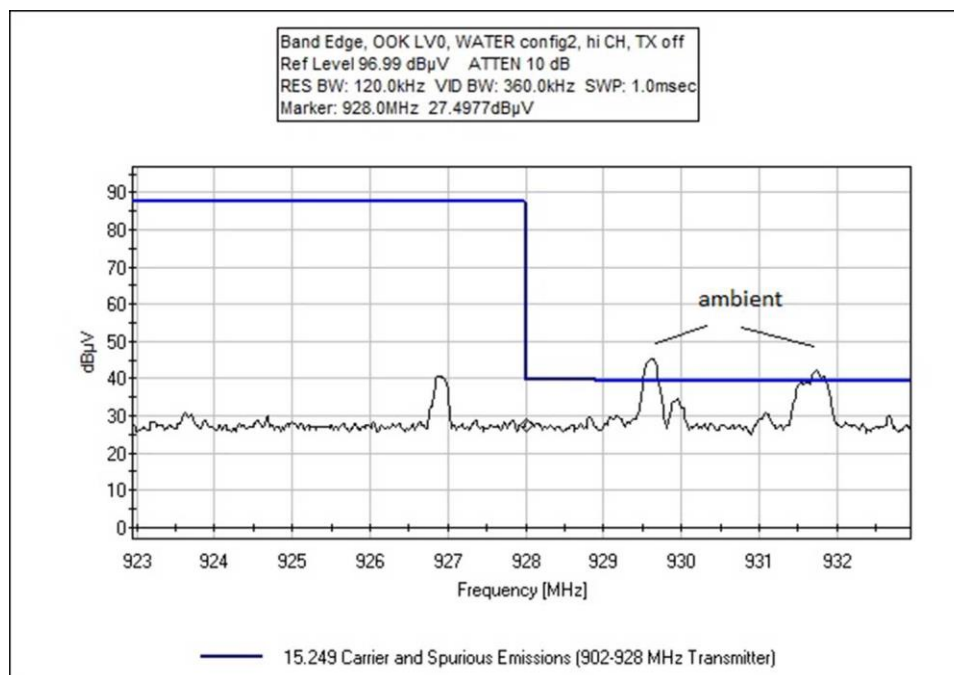
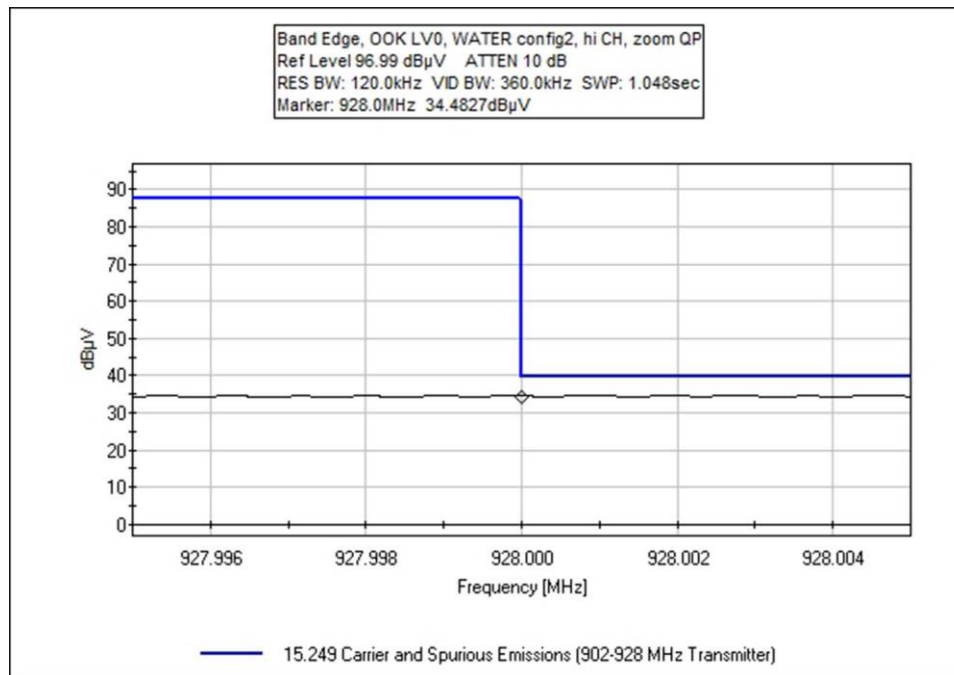




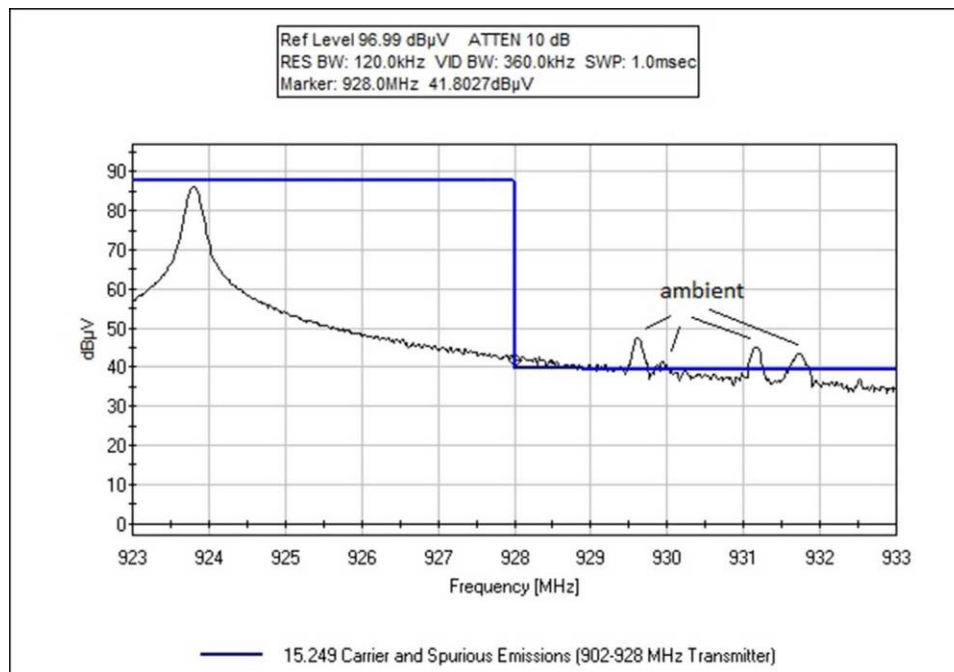
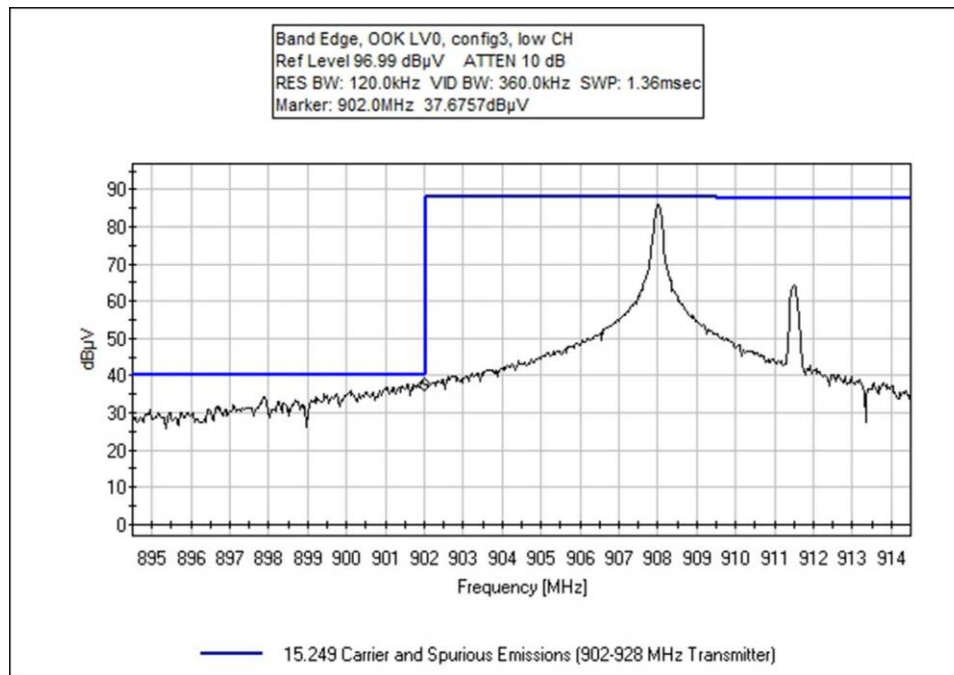
Band Edge Plots, Configuration 2

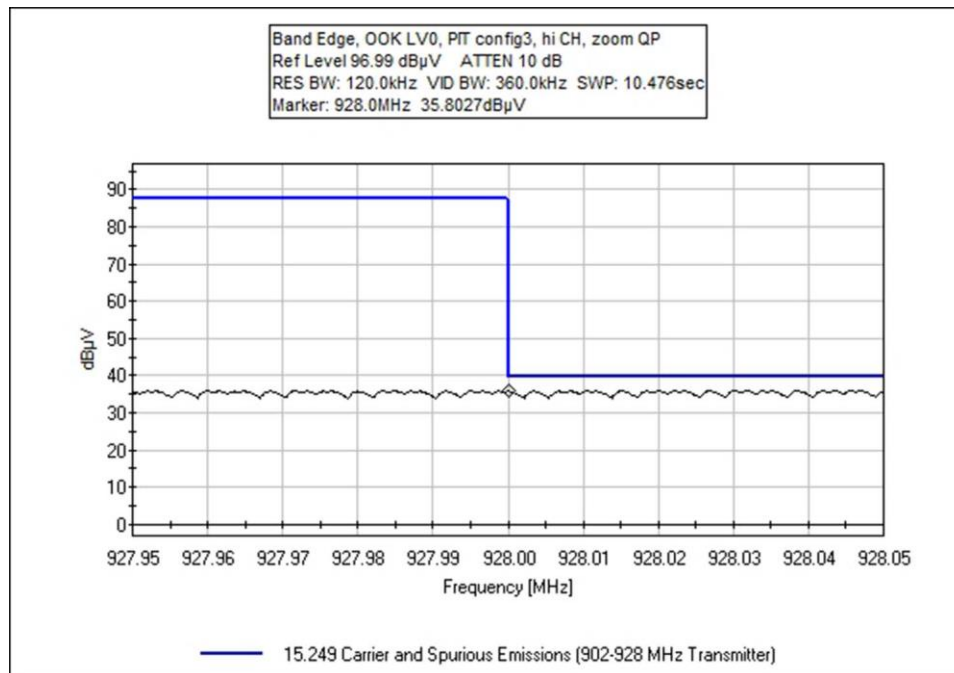
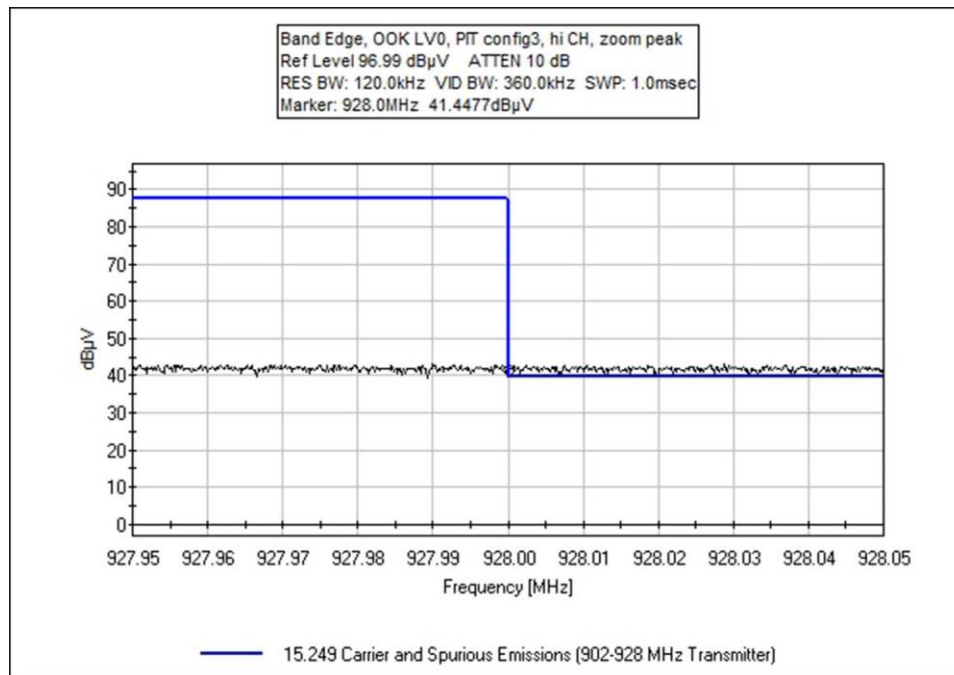


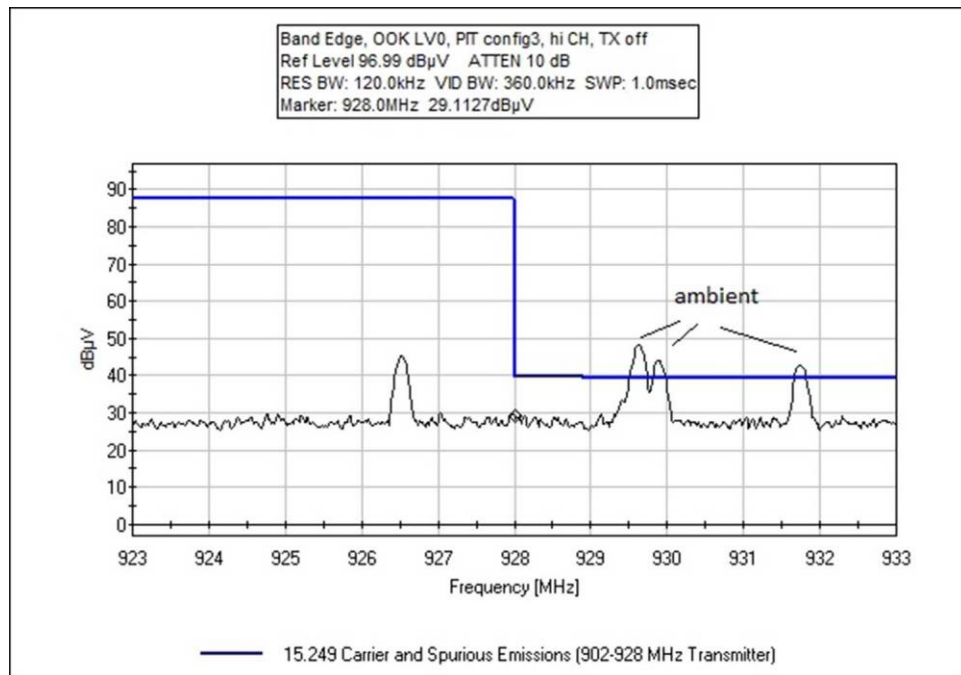




Band Edge Plots, Configuration 3







Test Setup / Conditions / Data

Test Location: CKC Laboratories Inc. • 110 N. Olinda Pl. • Brea, CA 92823 • 714-993-6112
 Customer: **Itron, Inc.**
 Specification: **15.249 Carrier and Spurious Emissions (902-928 MHz Transmitter)**
 Work Order #: **104621** Date: 12/22/2020
 Test Type: **Radiated Emissions** Time: 08:25:45
 Tested By: Don Nguyen Sequence#: 6
 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:

The EUT is placed on Styrofoam platform and powered from 3.6V fresh battery. The EUT is connected to a remote located laptop running CLI Tool ver.2.0.1.24.
 EUT has fixed orientation per manufacture's specification.
 Operating frequency range/ mode
 908 - 923.8MHz, 200kHz steps, 80 channels, 16384 OOK LV0
 Frequency of measurement: 902-928
 RBW=120kHz, VBW=360kHz
 Test Method: ANSI C63.10 (2013)
 Temperature (°C): 25.1
 Relative Humidity (%): 27

Test Equipment:

| ID | Asset # | Description | Model | Calibration Date | Cal Due Date |
|----|----------|--------------------------------------|----------|------------------|--------------|
| T1 | AN03643 | Spectrum Analyzer | E4440A | 5/20/2020 | 5/20/2022 |
| T2 | ANP01911 | Cable-Amplitude +15C to +45C (dB) | RG214/U | 1/2/2020 | 1/2/2022 |
| T3 | ANP05281 | Attenuator | 1B | 4/7/2020 | 4/7/2022 |
| T4 | AN01993 | Biconilog Antenna | CBL6111C | 6/11/2019 | 6/11/2021 |
| T5 | AN00309 | Preamp | 8447D | 12/24/2019 | 12/24/2021 |
| T6 | ANP05050 | Cable | RG223/U | 12/24/2018 | 12/24/2020 |

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

| # | Freq | Rdng | T1 T5 | T2 T6 | T3 | T4 | Dist | Corr | Spec | Margin | Polar |
|---|----------|------|---------------|--------------|------|-------|-------|--------|--------|--------|-------|
| | MHz | dBμV | dB | dB | dB | dB | Table | dBμV/m | dBμV/m | dB | Ant |
| 1 | 902.000M | 37.3 | +0.0 -27.1 | +3.2 +0.4 | +6.0 | +23.5 | +0.0 | 43.3 | 46.0 | -2.7 | Vert |
| 2 | 928.000M | 36.4 | +0.0 -27.2 | +3.3 +0.4 | +6.0 | +23.9 | +0.0 | 42.8 | 46.0 | -3.2 | Vert |
| ^ | 928.000M | 43.0 | +0.0 -27.2 | +3.3 +0.4 | +6.0 | +23.9 | +0.0 | 49.4 | 46.0 | +3.4 | Vert |

Test Location: CKC Laboratories Inc. • 110 N. Olinda Pl. • Brea, CA 92823 • 714-993-6112
 Customer: **Itron, Inc.**
 Specification: **15.249 Carrier and Spurious Emissions (902-928 MHz Transmitter)**
 Work Order #: **104621** Date: 12/21/2020
 Test Type: **Radiated Emissions** Time: 15:48:07
 Tested By: Don Nguyen Sequence#: 5
 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:

The EUT is placed on Styrofoam platform and powered from 3.6V fresh battery. The EUT is connected to a remote located laptop running CLI Tool ver.2.0.1.24.
 EUT has fixed orientation per manufacture's specification.
 Operating frequency range/ mode
 908 - 923.8MHz, 200kHz steps, 80 channels, 16384 OOK LV0
 Frequency of measurement: 902-928
 RBW=120kHz, VBW=360kHz

 Test Method: ANSI C63.10 (2013)
 Temperature (°C): 25.1
 Relative Humidity (%): 27

Test Equipment:

| ID | Asset #/Serial # | Description | Model | Calibration Date | Cal Due Date |
|----|------------------|--------------------------------------|----------|------------------|--------------|
| T1 | AN03643 | Spectrum Analyzer | E4440A | 5/20/2020 | 5/20/2022 |
| T2 | ANP01911 | Cable-Amplitude +15C to +45C (dB) | RG214/U | 1/2/2020 | 1/2/2022 |
| T3 | ANP05281 | Attenuator | 1B | 4/7/2020 | 4/7/2022 |
| T4 | AN01993 | Biconilog Antenna | CBL6111C | 6/11/2019 | 6/11/2021 |
| T5 | AN00309 | Preamp | 8447D | 12/24/2019 | 12/24/2021 |
| T6 | ANP05050 | Cable | RG223/U | 12/24/2018 | 12/24/2020 |

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

| # | Freq | Rdng | T1 | T2 | T3 | T4 | Dist | Corr | Spec | Margin | Polar |
|---|----------|------|---------------|--------------|------|-------|-------|--------|--------|--------|-------|
| | MHz | dBμV | T5 | T6 | | | | | | | |
| | | | dB | dB | dB | dB | Table | dBμV/m | dBμV/m | dB | Ant |
| 1 | 902.000M | 35.1 | +0.0 -27.1 | +3.2 +0.4 | +6.0 | +23.5 | +0.0 | 41.1 | 46.0 | -4.9 | Vert |
| 2 | 928.000M | 34.5 | +0.0 -27.2 | +3.3 +0.4 | +6.0 | +23.9 | +0.0 | 40.9 | 46.0 | -5.1 | Vert |
| ^ | 928.000M | 40.6 | +0.0 -27.2 | +3.3 +0.4 | +6.0 | +23.9 | +0.0 | 47.0 | 46.0 | +1.0 | Vert |

Test Location: CKC Laboratories Inc. • 110 N. Olinda Pl. • Brea, CA 92823 • 714-993-6112
 Customer: **Itron, Inc.**
 Specification: **15.249 Carrier and Spurious Emissions (902-928 MHz Transmitter)**
 Work Order #: **104621** Date: 12/21/2020
 Test Type: **Radiated Emissions** Time: 15:30:56
 Tested By: Don Nguyen Sequence#: 4
 Software: EMITest 5.03.19

Equipment Tested:

| Device | Manufacturer | Model # | S/N |
|-----------------|--------------|---------|-----|
| Configuration 3 | | | |

Support Equipment:

| Device | Manufacturer | Model # | S/N |
|-----------------|--------------|---------|-----|
| Configuration 3 | | | |

Test Conditions / Notes:

The EUT is placed on Styrofoam platform and powered from 3.6V fresh battery. The EUT is connected to a remote located laptop running CLI Tool ver.2.0.1.24.
 EUT has fixed orientation per manufacture's specification.
 Operating frequency range/ mode
 908 - 923.8MHz, 200kHz steps, 80 channels, 16384 OOK LV0
 Frequency of measurement: 902-928
 RBW=120kHz, VBW=360kHz
 Test Method: ANSI C63.10 (2013)
 Temperature (°C): 25.1
 Relative Humidity (%): 27

Test Equipment:

| ID | Asset #/Serial # | Description | Model | Calibration Date | Cal Due Date |
|----|------------------|--------------------------------------|----------|------------------|--------------|
| T1 | AN03643 | Spectrum Analyzer | E4440A | 5/20/2020 | 5/20/2022 |
| T2 | ANP01911 | Cable-Amplitude +15C to +45C (dB) | RG214/U | 1/2/2020 | 1/2/2022 |
| T3 | ANP05281 | Attenuator | 1B | 4/7/2020 | 4/7/2022 |
| T4 | AN01993 | Biconilog Antenna | CBL6111C | 6/11/2019 | 6/11/2021 |
| T5 | AN00309 | Preamp | 8447D | 12/24/2019 | 12/24/2021 |
| T6 | ANP05050 | Cable | RG223/U | 12/24/2018 | 12/24/2020 |

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

| # | Freq | Rdng | T1 T5 | T2 T6 | T3 | T4 | Dist | Corr | Spec | Margin | Polar |
|---|----------------|------|---------------|--------------|------|-------|-------|--------|--------|--------|-------|
| | MHz | dBμV | dB | dB | dB | dB | Table | dBμV/m | dBμV/m | dB | Ant |
| 1 | 902.000M | 37.7 | +0.0 -27.1 | +3.2 +0.4 | +6.0 | +23.5 | +0.0 | 43.7 | 46.0 | -2.3 | Vert |
| 2 | 928.000M QP | 35.8 | +0.0 -27.2 | +3.3 +0.4 | +6.0 | +23.9 | +0.0 | 42.2 | 46.0 | -3.8 | Vert |
| ^ | 928.000M | 41.4 | +0.0 -27.2 | +3.3 +0.4 | +6.0 | +23.9 | +0.0 | 47.8 | 46.0 | +1.8 | Vert |

Test Setup Photo(s)



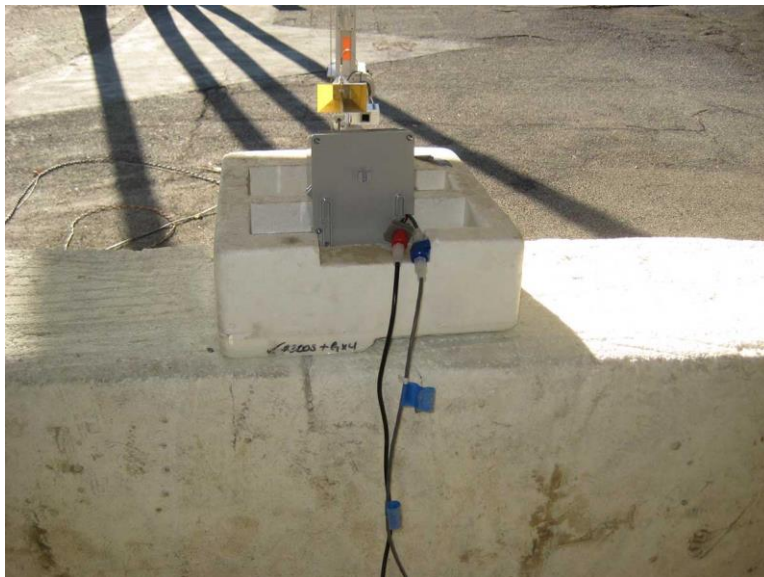
Configuration 1, Below 1GHz



Configuration 1, Below 1GHz



Configuration 1, Above 1GHz



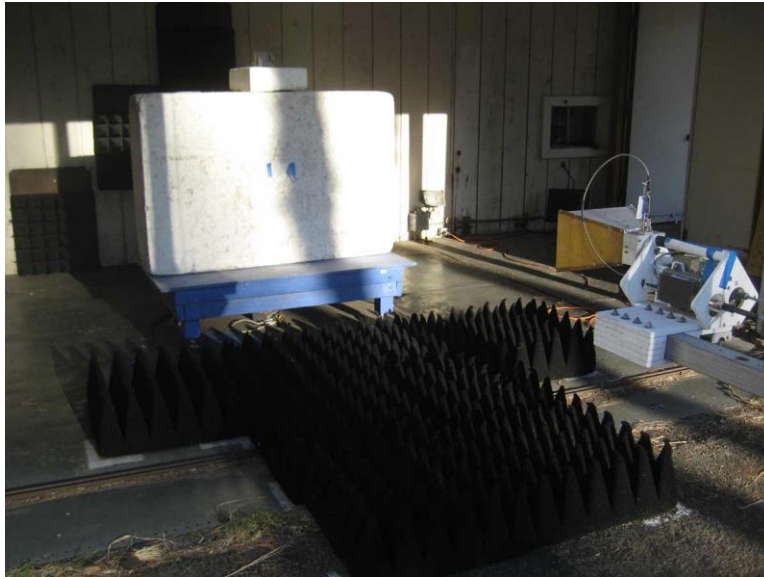
Configuration 1, Above 1GHz



Configuration 2, Below 1GHz



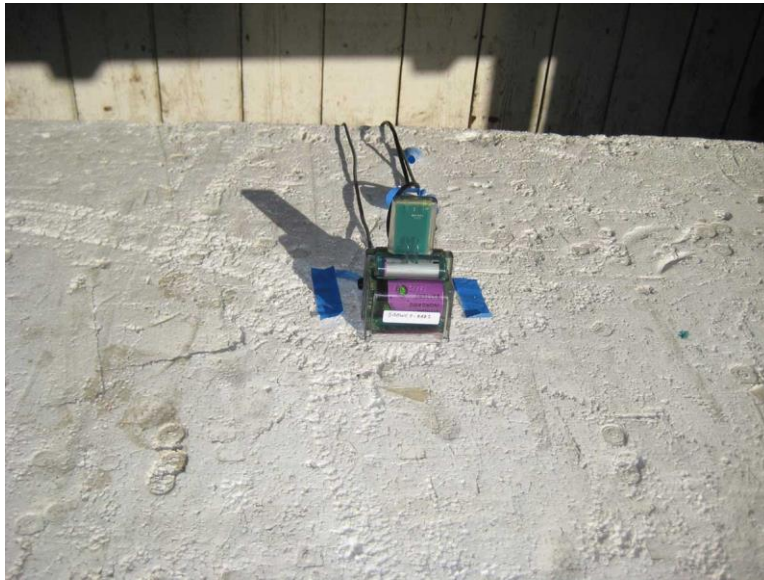
Configuration 2, Below 1GHz



Configuration 2, Above 1GHz



Configuration 2, Above 1GHz



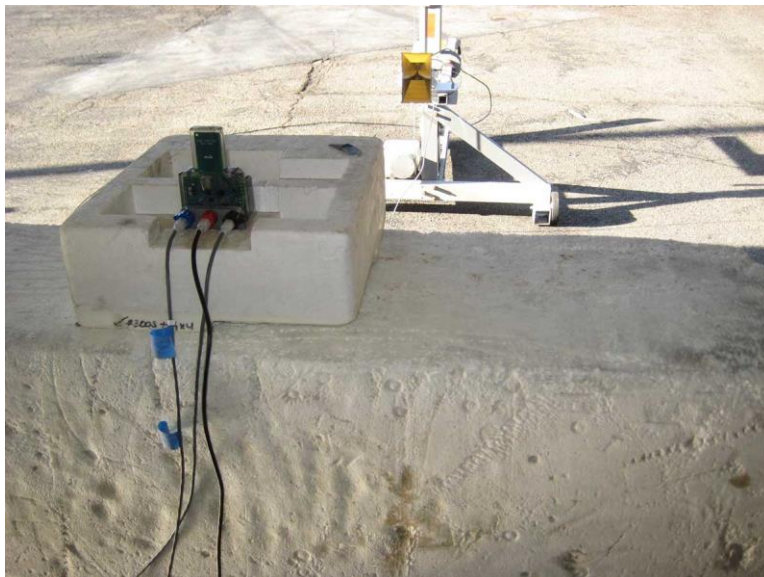
Configuration 3, Below 1GHz



Configuration 3, Below 1GHz



Configuration 3, Above 1GHz



Configuration 3, Above 1GHz

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.