

# Ittron, Inc.

## EMC TEST REPORT FOR

**MC3 & MC4Max**

**Model: MC3C\***

\*(See Appendix A for Manufacturer's Declaration)

### Tested to The Following Standards:

**FCC Part 101 Subpart C**

**Report No.: 107795-3**

**Date of issue: January 26, 2023**



**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: Jack McPeck  
Customer Reference Number: 269629

**REPORT PREPARED BY:**

Viviana Prado  
CKC Laboratories, Inc.  
5046 Sierra Pines Drive  
Mariposa, CA 95338

Project Number: 107795

**DATE OF EQUIPMENT RECEIPT:**

December 14, 2022

**DATE(S) OF TESTING:**

December 14 and 16-23, 2022

### Report Authorization

The test data contained in this report documents the observed testing parameters pertaining to and are relevant for only the equipment provided by the client, tested in the agreed upon operational mode(s) and configuration(s) as identified herein. Compliance assessment remains the client's responsibility. This report may not be used to claim product endorsement by A2LA or any government agencies. This test report has been authorized for release under quality control from CKC Laboratories, Inc.

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.  
 Canyon Park  
 22116 23rd Drive S.E., Suite A  
 Bothell, WA 98021

## Software Versions

| CKC Laboratories Proprietary Software | Version |
|---------------------------------------|---------|
| EMITest Emissions                     | 5.03.19 |
| EMITest Immunity                      | 5.03.10 |

## 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 2 / 101

| Test Procedure          | Description                       | Modifications | Results |
|-------------------------|-----------------------------------|---------------|---------|
| 2.1055 / 101.107(a)     | Frequency Tolerance               | NA            | NP      |
| 2.1049 / 101.109(c)     | Bandwidth                         | NA            | NP      |
| 2.1051 / 101.111 (a)(5) | Emissions Limitations - Conducted | NA            | Pass    |
| 2.1053 / 101.111 (a)(5) | Emissions Limitations- Radiated   | NA            | Pass    |
| 2.1046 / 101.113(a)     | Transmitter Power Limitations     | NA            | Pass    |
| 2.1047                  | Modulation Characteristics        | NA            | NA1     |

NA = Not Applicable

NA1 = Not applicable because the equipment does not support voice communication.

NP = CKC Laboratories was not contracted to perform test.

#### ISO/IEC 17025 Decision Rule

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

## Modifications During Testing

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

| Summary of Conditions                      |
|--------------------------------------------|
| No modifications were made during testing. |

Modifications listed above must be incorporated into all production units.

## Conditions During Testing

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

| Summary of Conditions |
|-----------------------|
| None                  |

## EQUIPMENT UNDER TEST (EUT)

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

### Configuration 1 (Radiated Laptop)

#### Equipment Tested:

| Device       | Manufacturer | Model # | S/N      |
|--------------|--------------|---------|----------|
| MC3 & MC4Max | Itron, Inc.  | MC3C    | 74008263 |

#### Support Equipment:

| Device             | Manufacturer | Model #        | S/N        |
|--------------------|--------------|----------------|------------|
| 12VDC Power Supply | Lamda        | LUS-10A-12     | 91K121691  |
| 5dBi Antenna       | PCTEL        | Generic        | NA         |
| Receiver Antenna   | PCTEL        | SUB-0275-001/H | S15180005  |
| Laptop             | Panasonic    | CF-33          | 1GTSA65082 |

### Configuration 2 (Radiated Tablet)

#### Equipment Tested:

| Device       | Manufacturer | Model # | S/N      |
|--------------|--------------|---------|----------|
| MC3 & MC4Max | Itron, Inc.  | MC3C    | 74008263 |

#### Support Equipment:

| Device             | Manufacturer | Model #        | S/N             |
|--------------------|--------------|----------------|-----------------|
| 12VDC Power Supply | Lamda        | LUS-10A-12     | 91K121691       |
| 5dBi Antenna       | PCTEL        | Generic        | NA              |
| Receiver Antenna   | PCTEL        | SUB-0275-001/H | S15180005       |
| Tablet             | Panasonic    | FZ-G1          | 990005071111034 |

### Configuration 3 (Conducted Laptop)

#### Equipment Tested:

| Device       | Manufacturer | Model # | S/N      |
|--------------|--------------|---------|----------|
| MC3 & MC4Max | Itron, Inc.  | MC3C    | 74008263 |

#### Support Equipment:

| Device             | Manufacturer | Model #    | S/N        |
|--------------------|--------------|------------|------------|
| 12VDC Power Supply | Lamda        | LUS-10A-12 | 91K121691  |
| Laptop             | Panasonic    | CF-33      | 1GTSA65082 |

## General Product Information:

| Product Information                | Manufacturer-Provided Details                                                                                                                          |
|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| Equipment Type:                    | Stand-Alone Equipment                                                                                                                                  |
| Type of Wideband System:           | Land-Mobile Transmitter and Receiver (27.41-960 MHz) (MAS transmitter)                                                                                 |
| Operating Frequency Range:         | 952.0-959.85MHz                                                                                                                                        |
| Number of Hopping Channels:        | NA                                                                                                                                                     |
| Modulation Type(s):                | 24.76-57.78Hz AM                                                                                                                                       |
| Maximum Duty Cycle:                | Tested as 100% worst case                                                                                                                              |
| Number of TX Chains:               | 1                                                                                                                                                      |
| Antenna Gain:                      | 5dbi                                                                                                                                                   |
| Beamforming Type:                  | NA                                                                                                                                                     |
| Antenna Connection Type:           | External Connector                                                                                                                                     |
| Nominal Input Voltage:             | 13.8VDC from vehicle battery                                                                                                                           |
| Firmware / Software used for Test: | ARM version: 7.73.00.09<br>DSP version: 5.76.00.13<br>FPGA version: 3.02<br>TX version: 1.03<br>PSoC version: 3.01<br><br>MC3 Test 4.2.0.0 and 4.0.2.3 |

## EUT Photo(s)



**Support Equipment Photo(s)**



Laptop



Tablet



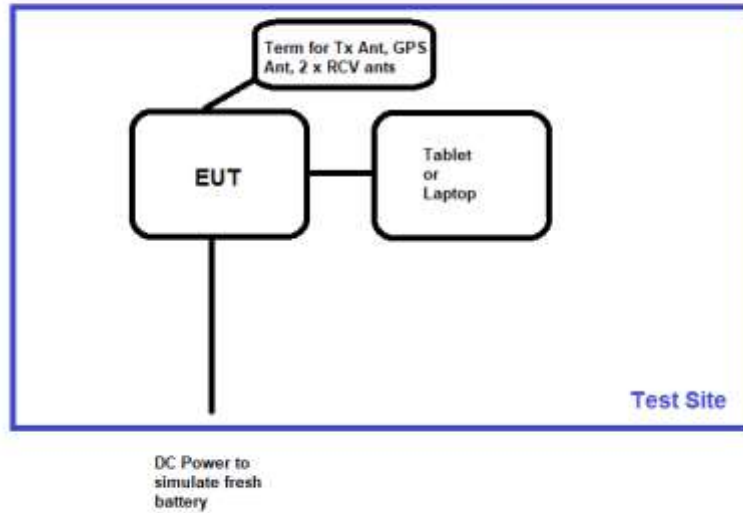
2xReceiver Antenna



5dBi and GPS Antenna

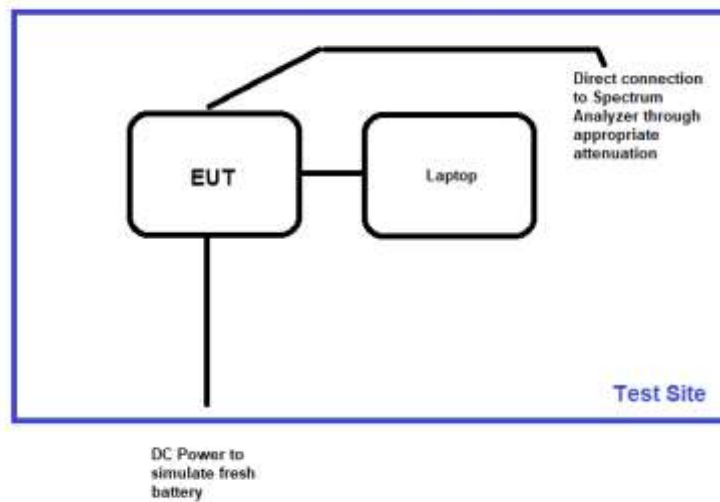
## Block Diagram(s) of Test Setup

**Test Setup Block Diagram**



Radiated (Configuration 1 and 2)

**Test Setup Block Diagram**



RF Conducted (Configuration 3)

## FCC PART(S) 101 Subpart C

### 2.1051 / 101.111(a)(5) Emissions Limitations – Conducted

| Test Setup/Conditions |                                                                                                                                                                                                                                               |                |             |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-------------|
| Test Location:        | Bothell Lab C3                                                                                                                                                                                                                                | Test Engineer: | M. Atkinson |
| Test Method:          | FCC CFR 47 Part 101.111, ANSI C63.26 (2015)                                                                                                                                                                                                   | Test Date(s):  | 12/14/2022  |
| Configuration:        | 3                                                                                                                                                                                                                                             |                |             |
| Test Setup:           | The EUT is placed on test bench. Powered from external power supply. USB port is connected to support computer. The EUT is continuously transmitting. The EUT is connected to a spectrum analyzer through appropriate cables and attenuation. |                |             |

| Test Data Summary                                                                                                                                                                                                                                                                                               |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Limit applied: Part 101.111 (a) (2) (i)</p> <p>Max Power – <math>(35 + 0.8(P - 50) + 10\log_{10} B)</math> down to -13dBm</p> <p>P = Percent removed from the center frequency of the transmitter bandwidth.</p> <p>B = Authorized bandwidth in MHz</p> <p>Conversion to Limit (dBμV) = Limit (dBm) +107</p> |

### Test Setup / Conditions / Data

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • (425) 402-1717  
 Customer: **Itron, Inc.**  
 Specification: **101.111(a)(5) Antenna Conducted Emissions (Low Channel)**  
 Work Order #: **107795** Date: 12/14/2022  
 Test Type: **Conducted Emissions** Time: 15:37:07  
 Tested By: Michael Atkinson Sequence#: 20  
 Software: EMITest 5.03.20 13.8VDC

#### Equipment Tested:

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

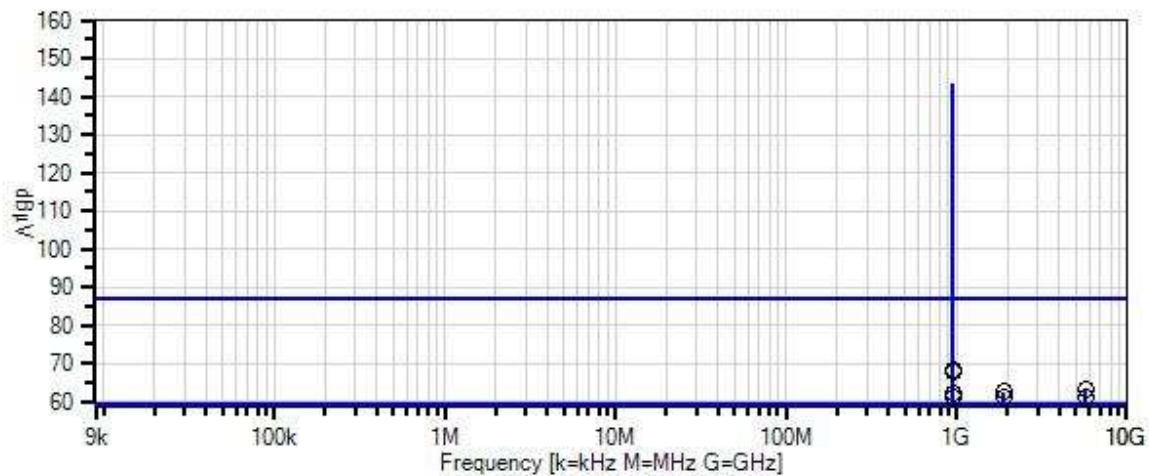
#### Support Equipment:

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

#### Test Conditions / Notes:

|                                                                                                                                                         |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Environment Conditions:<br>Temperature: 21°C<br>Humidity: 39%<br>Pressure: 102.7<br><br>Mask was created assuming worst case 35.7dBm output power. |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|

Ittron, Inc. W/O#: 107795 Sequence#: 20 Date: 12/14/2022  
101.111(a)(5) Antenna Conducted Emissions (Low Channel) Test Lead: 13.8VDC RF Port



— Sweep Data  
— Readings  
○ Peak Readings  
● QP Readings  
\* Average Readings  
▼ Ambient  
Software Version: 5.03.20  
1 - 101.111(a)(5) Antenna Conducted Emissions (Low Channel)

**Test Equipment:**

| ID | Asset #  | Description       | Model    | Calibration Date | Cal Due Date |
|----|----------|-------------------|----------|------------------|--------------|
|    | AN02673  | Spectrum Analyzer | E4446A   | 2/3/2021         | 2/3/2023     |
| T1 | ANP07623 | Attenuator        | 47-20-34 | 3/16/2022        | 3/16/2024    |
| T2 | ANP07746 | Attenuator        | PE7004-6 | 2/11/2021        | 2/11/2023    |

**Measurement Data:**

Reading listed by margin.

Test Lead: RF Port

| # | Freq<br>MHz | Rdng<br>dBμV | T1<br>dB | T2<br>dB |  |  | Dist<br>Table | Corr<br>dBμV | Spec<br>dBμV  | Margin<br>dB | Polar<br>Ant |
|---|-------------|--------------|----------|----------|--|--|---------------|--------------|---------------|--------------|--------------|
| 1 | 952.015M    | 42.5         | +19.7    | +5.8     |  |  | +0.0          | 68.0         | 71.8<br>24.76 | -3.8         | RF Po        |
| 2 | 951.985M    | 42.1         | +19.7    | +5.8     |  |  | +0.0          | 67.6         | 71.8<br>24.76 | -4.2         | RF Po        |
| 3 | 951.985M    | 36.4         | +19.7    | +5.8     |  |  | +0.0          | 61.9         | 71.8<br>57.78 | -9.9         | RF Po        |
| 4 | 952.015M    | 35.5         | +19.7    | +5.8     |  |  | +0.0          | 61.0         | 71.8<br>57.78 | -10.8        | RF Po        |
| 5 | 5712.005M   | 37.0         | +19.9    | +6.0     |  |  | +0.0          | 62.9         | 87.0          | -24.1        | RF Po        |
| 6 | 1904.002M   | 36.7         | +19.8    | +5.9     |  |  | +0.0          | 62.4         | 87.0<br>24.76 | -24.6        | RF Po        |
| 7 | 1903.997M   | 35.6         | +19.8    | +5.9     |  |  | +0.0          | 61.3         | 87.0          | -25.7        | RF Po        |
| 8 | 5712.025M   | 35.4         | +19.9    | +6.0     |  |  | +0.0          | 61.3         | 87.0<br>24.76 | -25.7        | RF Po        |



Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • (425) 402-1717  
Customer: **Itron, Inc.**  
Specification: **101.111(a)(5) Antenna Conducted Emissions (High Channel)**  
Work Order #: **107795** Date: 12/14/2022  
Test Type: **Conducted Emissions** Time: 15:38:04  
Tested By: Michael Atkinson Sequence#: 21  
Software: EMITest 5.03.20 13.8VDC

***Equipment Tested:***

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

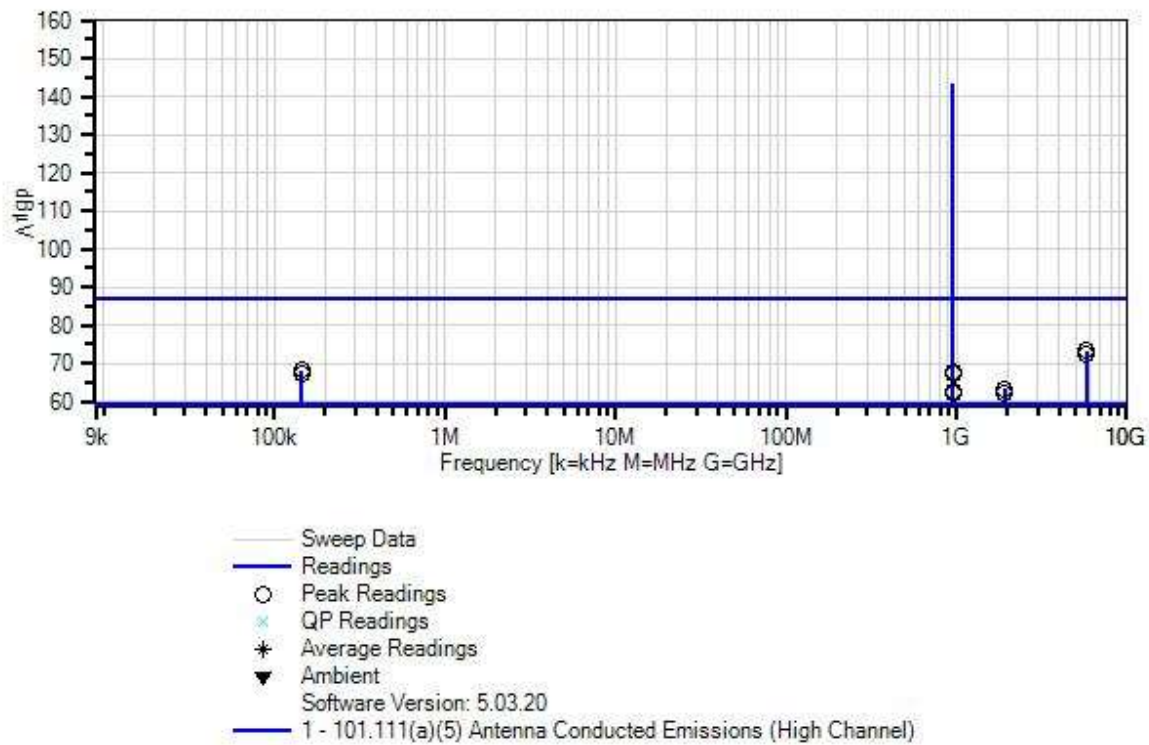
***Support Equipment:***

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

***Test Conditions / Notes:***

|                                                                                                                                                         |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Environment Conditions:<br>Temperature: 21°C<br>Humidity: 39%<br>Pressure: 102.7<br><br>Mask was created assuming worst case 35.7dBm output power. |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|

Itron, Inc. W/O#: 107795 Sequence#: 21 Date: 12/14/2022  
101.111(a)(5) Antenna Conducted Emissions (High Channel) Test Lead: 13.8VDC RF Port



**Test Equipment:**

| ID | Asset #  | Description       | Model    | Calibration Date | Cal Due Date |
|----|----------|-------------------|----------|------------------|--------------|
|    | AN02673  | Spectrum Analyzer | E4446A   | 2/3/2021         | 2/3/2023     |
| T1 | ANP07623 | Attenuator        | 47-20-34 | 3/16/2022        | 3/16/2024    |
| T2 | ANP07746 | Attenuator        | PE7004-6 | 2/11/2021        | 2/11/2023    |

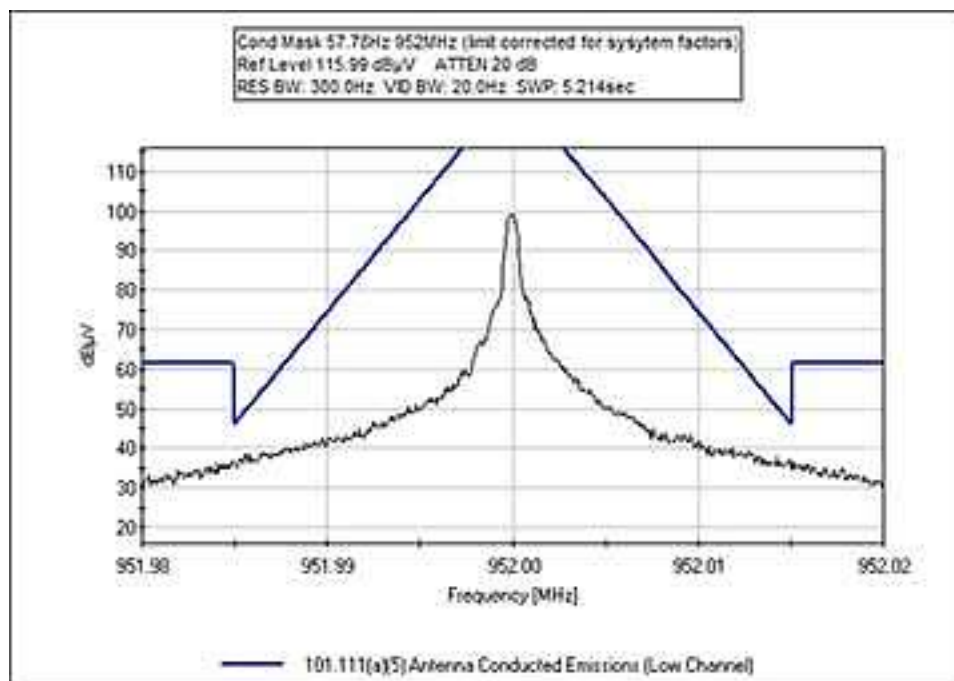
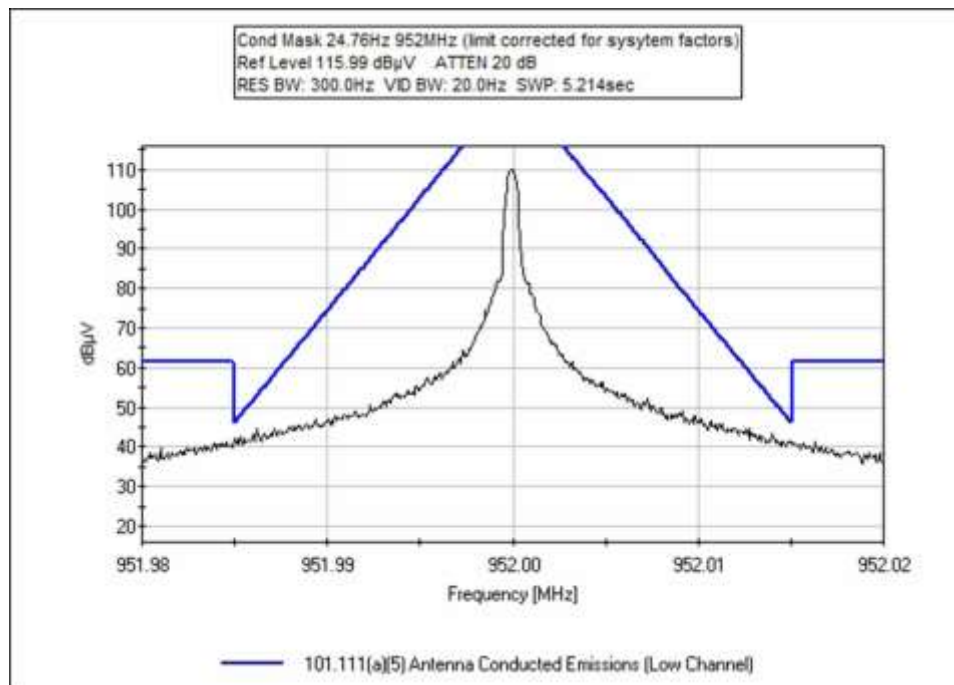
**Measurement Data:**

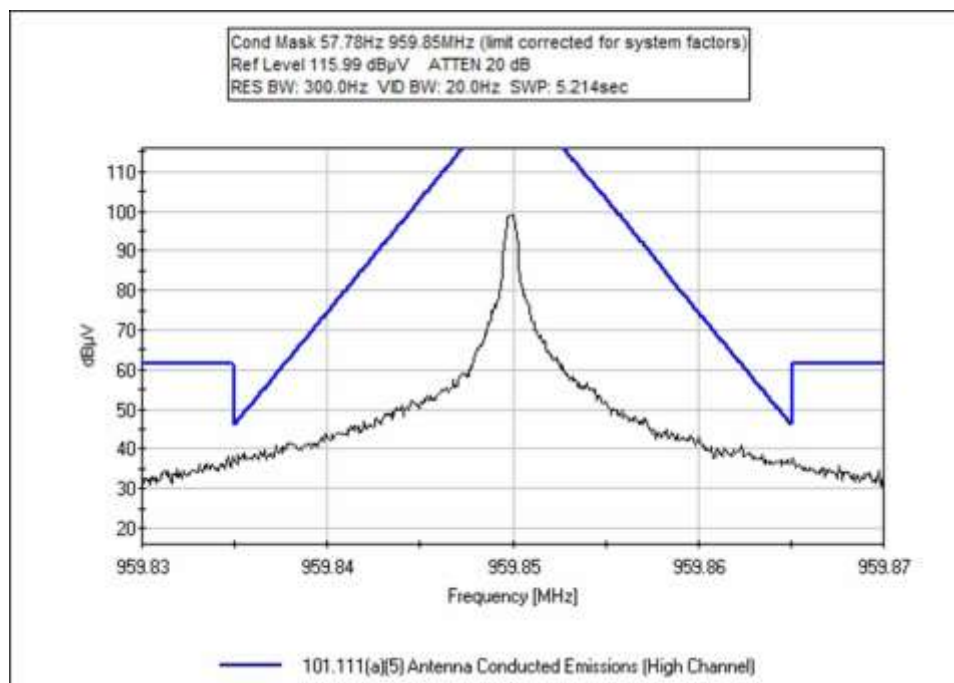
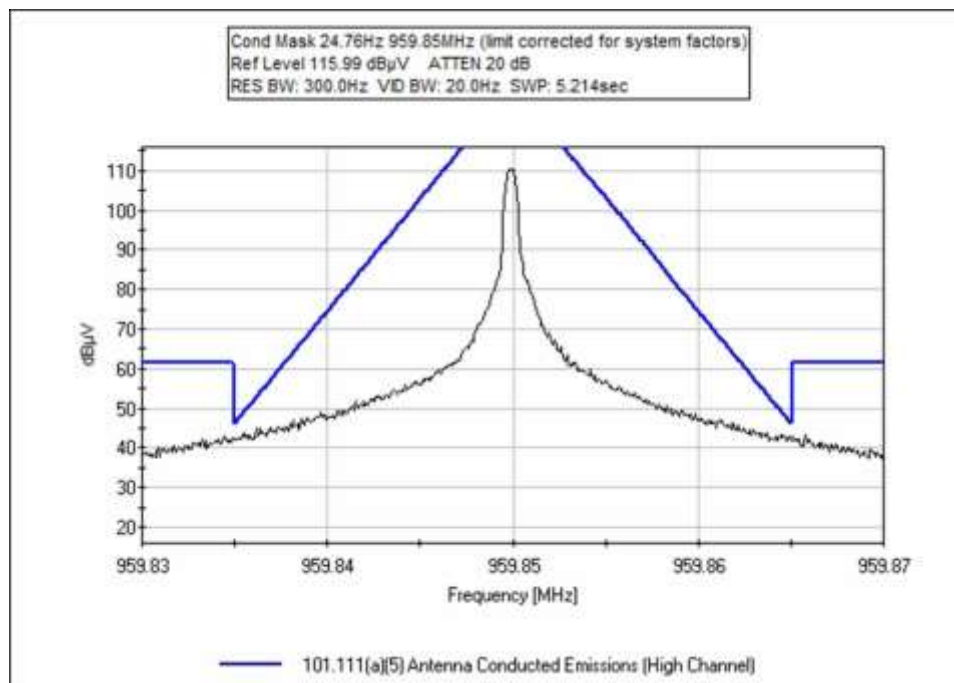
Reading listed by margin.

Test Lead: RF Port

| #  | Freq<br>MHz | Rdng<br>dBμV | T1<br>dB | T2<br>dB |  |  | Dist<br>Table | Corr<br>dBμV | Spec<br>dBμV  | Margin<br>dB | Polar<br>Ant |
|----|-------------|--------------|----------|----------|--|--|---------------|--------------|---------------|--------------|--------------|
| 1  | 959.835M    | 42.3         | +19.7    | +5.8     |  |  | +0.0          | 67.8         | 71.8<br>24.76 | -4.0         | RF Po        |
| 2  | 959.865M    | 41.8         | +19.7    | +5.8     |  |  | +0.0          | 67.3         | 71.8<br>24.76 | -4.5         | RF Po        |
| 3  | 959.835M    | 37.0         | +19.7    | +5.8     |  |  | +0.0          | 62.5         | 71.8<br>57.78 | -9.3         | RF Po        |
| 4  | 959.865M    | 36.6         | +19.7    | +5.8     |  |  | +0.0          | 62.1         | 71.8<br>57.78 | -9.7         | RF Po        |
| 5  | 5759.100M   | 47.3         | +19.9    | +6.0     |  |  | +0.0          | 73.2         | 87.0<br>57.78 | -13.8        | RF Po        |
| 6  | 5759.100M   | 46.5         | +19.9    | +6.0     |  |  | +0.0          | 72.4         | 87.0<br>24.76 | -14.6        | RF Po        |
| 7  | 144.600k    | 42.8         | +19.5    | +5.8     |  |  | +0.0          | 68.1         | 87.0          | -18.9        | RF Po        |
| 8  | 145.600k    | 41.8         | +19.5    | +5.8     |  |  | +0.0          | 67.1         | 87.0          | -19.9        | RF Po        |
| 9  | 1919.700M   | 37.5         | +19.9    | +5.9     |  |  | +0.0          | 63.3         | 87.0<br>24.76 | -23.7        | RF Po        |
| 10 | 1919.703M   | 36.4         | +19.9    | +5.9     |  |  | +0.0          | 62.2         | 87.0<br>57.78 | -24.8        | RF Po        |

## Plot(s)





Test Setup Photo(s)



## 2.1053 / 101.111(a)(5) Emission limitations - Radiated emission

| Test Setup/Conditions |                                                                                                                                                                                                                                                                                |                |                          |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|--------------------------|
| Test Location:        | Bothell Lab C3                                                                                                                                                                                                                                                                 | Test Engineer: | Michael Atkinson         |
| Test Method:          | ANSI C63.26 (2015), section 5.5                                                                                                                                                                                                                                                | Test Date(s):  | 12/16/2022 to 12/23/2022 |
| Configuration:        | 1 and 2                                                                                                                                                                                                                                                                        |                |                          |
| Test Setup:           | The EUT is placed on turntable. Input voltage is 13.8Vdc from external power supply. GPS port is connected to an external antenna. Main antenna port is terminated with 50-ohm load. USB port is connected to a support laptop or tablet. The EUT is continuously transmitting |                |                          |

| Test Data Summary                                                                                      |
|--------------------------------------------------------------------------------------------------------|
| Limit applied for Radiated Emissions outside of mask:                                                  |
| -20dBm worst case at any power level                                                                   |
| Conversion to EIRP limit                                                                               |
| $E(\text{dBuV/m}) = P(\text{dBm}) - 20\log(3) + 104.77 = -20 - 20\log(3) + 104.77 = 75.2\text{dBuV/m}$ |

## Test Setup / Conditions / Data

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • (425) 402-1717  
 Customer: **Itron, Inc.**  
 Specification: **101.111(a)(5) Radiated Emissions (non-mask)**  
 Work Order #: **107795** Date: 12/21/2022  
 Test Type: **Maximized Emissions** Time: 18:02:58  
 Tested By: Michael Atkinson Sequence#: 51  
 Software: EMITest 5.03.20

### Equipment Tested:

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

### Support Equipment:

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

### Test Conditions / Notes:

Test Environment Conditions:  
 Temperature: 20°C  
 Humidity: 37%  
 Pressure: 102.2kPa

Test Method: ANSI C63.26 (2015)

Frequency: 9kHz-10GHz

Test Setup: EUT is continuously transmitting with modulation; antenna port is terminated. Horizontal and vertical measurement antenna polarities investigated above 30MHz, 3 x orthogonal axes investigated below 30MHz, worst-case reported. EUT XYZ axes investigated, worst-case reported. Investigated with received boards removed, fully loaded unit is representative of worst-case.

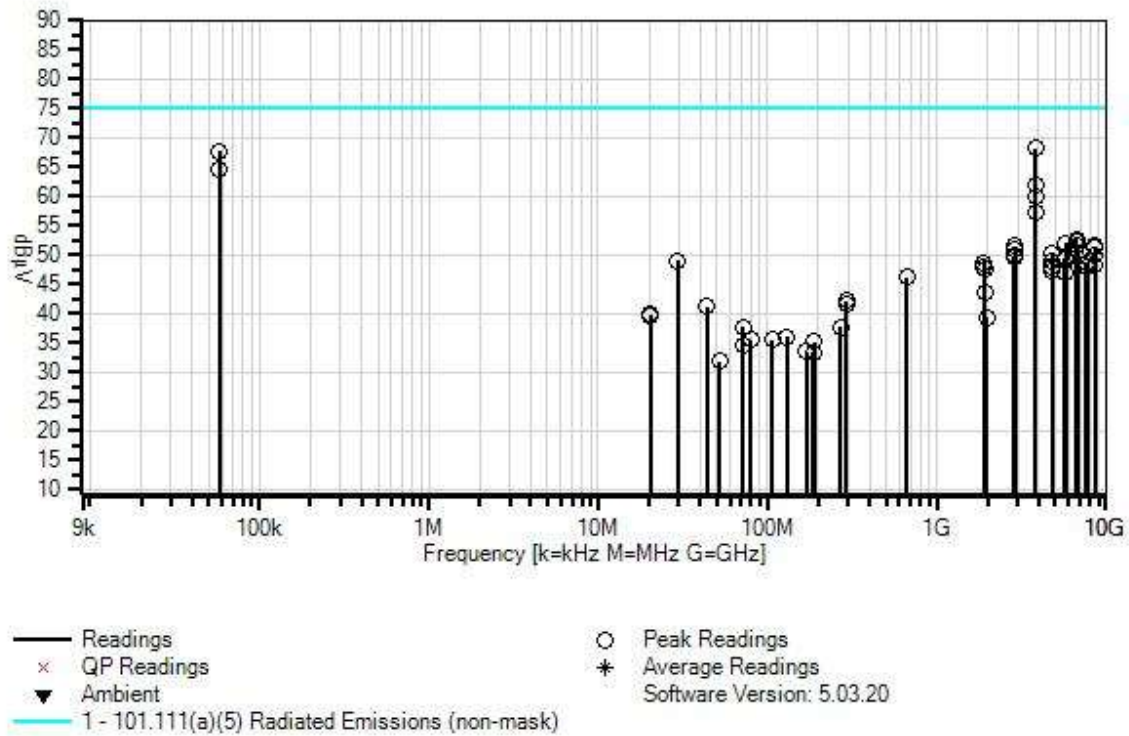
Power supply is remotely located outside of chamber with filter caps at chamber wall.

Investigated with antennas at 1.5m height, as well as moving the entire setup so the EUT is at 1.5m height, worst-case reported. Left the Tx antenna in chamber as the antenna based is shared with the EUT's GPS antenna.

Investigated 24.76 and 57.78Hz modulation, worst-case reported.

**MC4Max with Laptop**

Ittron, Inc. WO#: 107795 Sequence#: 51 Date: 12/21/2022  
101.111(a)(5) Radiated Emissions (non-mask) Test Distance: 3 Meters Horiz



**Test Equipment:**

| ID  | Asset #     | Description       | Model             | Calibration Date | Cal Due Date |
|-----|-------------|-------------------|-------------------|------------------|--------------|
| T1  | AN02872     | Spectrum Analyzer | E4440A            | 11/29/2021       | 11/29/2023   |
| T2  | ANP06540    | Cable             | Heliac            | 1/17/2022        | 1/17/2024    |
| T3  | ANP05305    | Cable             | ETSI-50T          | 9/15/2021        | 9/15/2023    |
| T4  | ANP05360    | Cable             | RG214             | 2/4/2022         | 2/4/2024     |
| T5  | AN03628     | Biconilog Antenna | 3142E             | 6/3/2021         | 6/3/2023     |
| T6  | AN00052     | Loop Antenna      | 6502              | 5/11/2022        | 5/11/2024    |
| T7  | AN03170     | High Pass Filter  | HM1155-11SS       | 9/16/2021        | 9/16/2023    |
| T8  | AN03540     | Preamp            | 83017A            | 5/14/2021        | 5/14/2023    |
| T9  | ANP07504    | Cable             | CLU40-KMKM-02.00F | 1/26/2021        | 1/26/2023    |
| T10 | AN02374ANSI | Horn Antenna      | RGA-60            | 5/25/2021        | 5/25/2023    |

**Measurement Data:**

Reading listed by margin.

Test Distance: 3 Meters

| #  | Freq      | Rdng | T1<br>T5<br>T9       | T2<br>T6<br>T10       | T3<br>T7     | T4<br>T8      | Dist  | Corr | Spec           | Margin | Polar |
|----|-----------|------|----------------------|-----------------------|--------------|---------------|-------|------|----------------|--------|-------|
|    | MHz       | dBμV | dB                   | dB                    | dB           | dB            | Table | dBμV | dBμV           | dB     | Ant   |
| 1  | 3808.030M | 65.2 | +0.0<br>+0.0<br>+0.3 | +0.6<br>+0.0<br>+32.4 | +3.3<br>+0.3 | +0.0<br>-33.8 | +0.0  | 68.3 | 75.2<br>952    | -6.9   | Vert  |
| 2  | 57.597k   | 57.9 | +0.0<br>+0.0<br>+0.0 | +0.1<br>+9.7<br>+0.0  | +0.0<br>+0.0 | +0.0<br>+0.0  | +0.0  | 67.7 | 75.2           | -7.5   | Para  |
| 3  | 57.597k   | 55.0 | +0.0<br>+0.0<br>+0.0 | +0.1<br>+9.7<br>+0.0  | +0.0<br>+0.0 | +0.0<br>+0.0  | +0.0  | 64.8 | 75.2           | -10.4  | Groun |
| 4  | 3839.440M | 58.9 | +0.0<br>+0.0<br>+0.3 | +0.6<br>+0.0<br>+32.5 | +3.3<br>+0.3 | +0.0<br>-33.8 | +0.0  | 62.1 | 75.2<br>959.85 | -13.1  | Vert  |
| 5  | 3807.920M | 57.0 | +0.0<br>+0.0<br>+0.3 | +0.6<br>+0.0<br>+32.4 | +3.3<br>+0.3 | +0.0<br>-33.8 | +0.0  | 60.1 | 75.2<br>952    | -15.1  | Horiz |
| 6  | 3839.440M | 54.2 | +0.0<br>+0.0<br>+0.3 | +0.6<br>+0.0<br>+32.5 | +3.3<br>+0.3 | +0.0<br>-33.8 | +0.0  | 57.4 | 75.2<br>959.85 | -17.8  | Horiz |
| 7  | 6664.100M | 44.7 | +0.0<br>+0.0<br>+0.6 | +0.9<br>+0.0<br>+35.4 | +4.6<br>+0.7 | +0.0<br>-34.1 | +0.0  | 52.8 | 75.2<br>952    | -22.4  | Vert  |
| 8  | 6664.010M | 44.3 | +0.0<br>+0.0<br>+0.6 | +0.9<br>+0.0<br>+35.4 | +4.6<br>+0.7 | +0.0<br>-34.1 | +0.0  | 52.4 | 75.2<br>952    | -22.8  | Horiz |
| 9  | 5759.060M | 45.3 | +0.0<br>+0.0<br>+0.5 | +0.8<br>+0.0<br>+34.4 | +4.1<br>+0.5 | +0.0<br>-33.6 | +0.0  | 52.0 | 75.2<br>959.85 | -23.2  | Vert  |
| 10 | 6718.840M | 43.4 | +0.0<br>+0.0<br>+0.5 | +0.9<br>+0.0<br>+35.5 | +4.6<br>+1.0 | +0.0<br>-34.1 | +0.0  | 51.8 | 75.2<br>959.85 | -23.4  | Vert  |
| 11 | 2879.480M | 52.1 | +0.0<br>+0.0<br>+0.4 | +0.5<br>+0.0<br>+29.5 | +2.8<br>+0.4 | +0.0<br>-34.1 | +0.0  | 51.6 | 75.2<br>959.85 | -23.6  | Vert  |
| 12 | 8568.000M | 40.1 | +0.0<br>+0.0<br>+0.7 | +1.1<br>+0.0<br>+38.7 | +5.2<br>+0.6 | +0.0<br>-34.9 | +0.0  | 51.5 | 75.2<br>952    | -23.7  | Vert  |
| 13 | 8638.760M | 40.4 | +0.0<br>+0.0<br>+0.7 | +1.0<br>+0.0<br>+38.7 | +5.1<br>+0.5 | +0.0<br>-34.9 | +0.0  | 51.5 | 75.2<br>959.85 | -23.7  | Vert  |
| 14 | 2879.600M | 51.5 | +0.0<br>+0.0<br>+0.4 | +0.5<br>+0.0<br>+29.5 | +2.8<br>+0.4 | +0.0<br>-34.1 | +0.0  | 51.0 | 75.2<br>959.85 | -24.2  | Horiz |
| 15 | 4760.120M | 45.7 | +0.0<br>+0.0<br>+0.5 | +0.6<br>+0.0<br>+33.2 | +3.6<br>+0.3 | +0.0<br>-33.6 | +0.0  | 50.3 | 75.2<br>952    | -24.9  | Vert  |

|    |           |      |                      |                       |              |               |      |      |                |       |       |
|----|-----------|------|----------------------|-----------------------|--------------|---------------|------|------|----------------|-------|-------|
| 16 | 2856.180M | 50.6 | +0.0<br>+0.0<br>+0.4 | +0.5<br>+0.0<br>+29.5 | +2.7<br>+0.4 | +0.0<br>-34.1 | +0.0 | 50.0 | 75.2<br>952    | -25.2 | Horiz |
| 17 | 8567.970M | 38.5 | +0.0<br>+0.0<br>+0.7 | +1.1<br>+0.0<br>+38.7 | +5.2<br>+0.6 | +0.0<br>-34.9 | +0.0 | 49.9 | 75.2<br>952    | -25.3 | Horiz |
| 18 | 6718.970M | 41.2 | +0.0<br>+0.0<br>+0.5 | +0.9<br>+0.0<br>+35.5 | +4.6<br>+1.0 | +0.0<br>-34.1 | +0.0 | 49.6 | 75.2<br>959.85 | -25.6 | Horiz |
| 19 | 2856.010M | 50.2 | +0.0<br>+0.0<br>+0.4 | +0.5<br>+0.0<br>+29.5 | +2.7<br>+0.4 | +0.0<br>-34.1 | +0.0 | 49.6 | 75.2<br>952    | -25.6 | Vert  |
| 20 | 5759.140M | 42.8 | +0.0<br>+0.0<br>+0.5 | +0.8<br>+0.0<br>+34.4 | +4.1<br>+0.5 | +0.0<br>-33.6 | +0.0 | 49.5 | 75.2<br>959.85 | -25.7 | Horiz |
| 21 | 5712.100M | 42.8 | +0.0<br>+0.0<br>+0.5 | +0.8<br>+0.0<br>+34.3 | +4.1<br>+0.6 | +0.0<br>-33.6 | +0.0 | 49.5 | 75.2<br>952    | -25.7 | Vert  |
| 22 | 29.565M   | 44.9 | +0.0<br>+0.0<br>+0.0 | +0.1<br>+3.8<br>+0.0  | +0.3<br>+0.0 | +0.0<br>+0.0  | +0.0 | 49.1 | 75.2           | -26.1 | Groun |
| 23 | 4799.250M | 44.4 | +0.0<br>+0.0<br>+0.5 | +0.6<br>+0.0<br>+33.2 | +3.6<br>+0.3 | +0.0<br>-33.6 | +0.0 | 49.0 | 75.2<br>959.85 | -26.2 | Vert  |
| 24 | 7678.820M | 39.0 | +0.0<br>+0.0<br>+0.6 | +1.4<br>+0.0<br>+37.4 | +4.7<br>+0.6 | +0.0<br>-34.9 | +0.0 | 48.8 | 75.2<br>959.85 | -26.4 | Horiz |
| 25 | 1904.090M | 51.9 | +0.0<br>+0.0<br>+0.3 | +0.4<br>+0.0<br>+28.0 | +2.2<br>+0.5 | +0.0<br>-34.6 | +0.0 | 48.7 | 75.2<br>952    | -26.5 | Horiz |
| 26 | 7616.080M | 39.0 | +0.0<br>+0.0<br>+0.6 | +1.4<br>+0.0<br>+37.4 | +4.6<br>+0.6 | +0.0<br>-34.9 | +0.0 | 48.7 | 75.2<br>952    | -26.5 | Horiz |
| 27 | 8638.670M | 37.1 | +0.0<br>+0.0<br>+0.7 | +1.0<br>+0.0<br>+38.7 | +5.1<br>+0.5 | +0.0<br>-34.9 | +0.0 | 48.2 | 75.2<br>959.85 | -27.0 | Horiz |
| 28 | 7678.690M | 38.4 | +0.0<br>+0.0<br>+0.6 | +1.4<br>+0.0<br>+37.4 | +4.7<br>+0.6 | +0.0<br>-34.9 | +0.0 | 48.2 | 75.2<br>959.85 | -27.0 | Vert  |
| 29 | 1903.970M | 51.3 | +0.0<br>+0.0<br>+0.3 | +0.4<br>+0.0<br>+28.0 | +2.2<br>+0.5 | +0.0<br>-34.6 | +0.0 | 48.1 | 75.2<br>952    | -27.1 | Vert  |
| 30 | 4799.350M | 43.5 | +0.0<br>+0.0<br>+0.5 | +0.6<br>+0.0<br>+33.2 | +3.6<br>+0.3 | +0.0<br>-33.6 | +0.0 | 48.1 | 75.2<br>959.85 | -27.1 | Horiz |
| 31 | 7616.100M | 38.4 | +0.0<br>+0.0<br>+0.6 | +1.4<br>+0.0<br>+37.4 | +4.6<br>+0.6 | +0.0<br>-34.9 | +0.0 | 48.1 | 75.2<br>952    | -27.1 | Vert  |
| 32 | 1919.680M | 50.8 | +0.0<br>+0.0<br>+0.3 | +0.4<br>+0.0<br>+28.1 | +2.2<br>+0.5 | +0.0<br>-34.6 | +0.0 | 47.7 | 75.2<br>959.85 | -27.5 | Vert  |

|    |           |      |                       |                       |              |               |      |      |                |       |       |
|----|-----------|------|-----------------------|-----------------------|--------------|---------------|------|------|----------------|-------|-------|
| 33 | 4759.990M | 42.6 | +0.0<br>+0.0<br>+0.5  | +0.6<br>+0.0<br>+33.2 | +3.6<br>+0.3 | +0.0<br>-33.6 | +0.0 | 47.2 | 75.2<br>952    | -28.0 | Horiz |
| 34 | 5712.020M | 40.4 | +0.0<br>+0.0<br>+0.5  | +0.8<br>+0.0<br>+34.3 | +4.1<br>+0.6 | +0.0<br>-33.6 | +0.0 | 47.1 | 75.2<br>952    | -28.1 | Horiz |
| 35 | 663.400M  | 15.5 | +0.0<br>+27.1<br>+0.0 | +0.3<br>+0.0<br>+0.0  | +1.2<br>+0.0 | +2.1<br>+0.0  | +0.0 | 46.2 | 75.2           | -29.0 | Horiz |
| 36 | 1919.730M | 46.9 | +0.0<br>+0.0<br>+0.3  | +0.4<br>+0.0<br>+28.1 | +2.2<br>+0.5 | +0.0<br>-34.6 | +0.0 | 43.8 | 75.2<br>959.85 | -31.4 | Horiz |
| 37 | 292.900M  | 21.8 | +0.0<br>+18.1<br>+0.0 | +0.2<br>+0.0<br>+0.0  | +0.9<br>+0.0 | +1.2<br>+0.0  | +0.0 | 42.2 | 75.2           | -33.0 | Horiz |
| 38 | 291.900M  | 21.3 | +0.0<br>+18.1<br>+0.0 | +0.2<br>+0.0<br>+0.0  | +0.8<br>+0.0 | +1.2<br>+0.0  | +0.0 | 41.6 | 75.2           | -33.6 | Horiz |
| 39 | 43.600M   | 26.0 | +0.0<br>+14.3<br>+0.0 | +0.1<br>+0.0<br>+0.0  | +0.3<br>+0.0 | +0.5<br>+0.0  | +0.0 | 41.2 | 75.2           | -34.0 | Vert  |
| 40 | 20.459M   | 33.4 | +0.0<br>+0.0<br>+0.0  | +0.1<br>+6.3<br>+0.0  | +0.2<br>+0.0 | +0.0<br>+0.0  | +0.0 | 40.0 | 75.2           | -35.2 | Groun |
| 41 | 20.372M   | 33.2 | +0.0<br>+0.0<br>+0.0  | +0.1<br>+6.3<br>+0.0  | +0.2<br>+0.0 | +0.0<br>+0.0  | +0.0 | 39.8 | 75.2           | -35.4 | Para  |
| 42 | 1968.000M | 42.5 | +0.0<br>+0.0<br>+0.3  | +0.4<br>+0.0<br>+28.3 | +2.2<br>+0.4 | +0.0<br>-34.6 | +0.0 | 39.5 | 75.2           | -35.7 | Horiz |
| 43 | 71.700M   | 23.8 | +0.0<br>+12.9<br>+0.0 | +0.1<br>+0.0<br>+0.0  | +0.4<br>+0.0 | +0.5<br>+0.0  | +0.0 | 37.7 | 75.2           | -37.5 | Vert  |
| 44 | 271.500M  | 16.5 | +0.0<br>+19.1<br>+0.0 | +0.2<br>+0.0<br>+0.0  | +0.8<br>+0.0 | +1.1<br>+0.0  | +0.0 | 37.7 | 75.2           | -37.5 | Horiz |
| 45 | 130.900M  | 21.2 | +0.0<br>+13.5<br>+0.0 | +0.1<br>+0.0<br>+0.0  | +0.5<br>+0.0 | +0.7<br>+0.0  | +0.0 | 36.0 | 75.2           | -39.2 | Vert  |
| 46 | 106.600M  | 20.2 | +0.0<br>+14.2<br>+0.0 | +0.1<br>+0.0<br>+0.0  | +0.5<br>+0.0 | +0.6<br>+0.0  | +0.0 | 35.6 | 75.2           | -39.6 | Vert  |
| 47 | 79.500M   | 21.8 | +0.0<br>+12.6<br>+0.0 | +0.1<br>+0.0<br>+0.0  | +0.4<br>+0.0 | +0.6<br>+0.0  | +0.0 | 35.5 | 75.2           | -39.7 | Vert  |
| 48 | 189.100M  | 18.2 | +0.0<br>+15.4<br>+0.0 | +0.1<br>+0.0<br>+0.0  | +0.7<br>+0.0 | +0.9<br>+0.0  | +0.0 | 35.3 | 75.2           | -39.9 | Vert  |
| 49 | 71.700M   | 20.7 | +0.0<br>+12.9<br>+0.0 | +0.1<br>+0.0<br>+0.0  | +0.4<br>+0.0 | +0.5<br>+0.0  | +0.0 | 34.6 | 75.2           | -40.6 | Horiz |

|    |          |      |                       |                      |              |              |      |      |      |       |       |
|----|----------|------|-----------------------|----------------------|--------------|--------------|------|------|------|-------|-------|
| 50 | 168.700M | 16.8 | +0.0<br>+15.3<br>+0.0 | +0.1<br>+0.0<br>+0.0 | +0.6<br>+0.0 | +0.9<br>+0.0 | +0.0 | 33.7 | 75.2 | -41.5 | Horiz |
| 51 | 186.200M | 16.2 | +0.0<br>+15.5<br>+0.0 | +0.1<br>+0.0<br>+0.0 | +0.7<br>+0.0 | +0.9<br>+0.0 | +0.0 | 33.4 | 75.2 | -41.8 | Horiz |
| 52 | 52.300M  | 18.8 | +0.0<br>+12.3<br>+0.0 | +0.1<br>+0.0<br>+0.0 | +0.3<br>+0.0 | +0.5<br>+0.0 | +0.0 | 32.0 | 75.2 | -43.2 | Vert  |



Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • (425) 402-1717  
Customer: **Itron, Inc.**  
Specification: **101.111(a)(5) Radiated Emissions (non-mask)**  
Work Order #: **107795** Date: 12/21/2022  
Test Type: **Maximized Emissions** Time: 17:16:26  
Tested By: Michael Atkinson Sequence#: 52  
Software: EMITest 5.03.20

***Equipment Tested:***

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

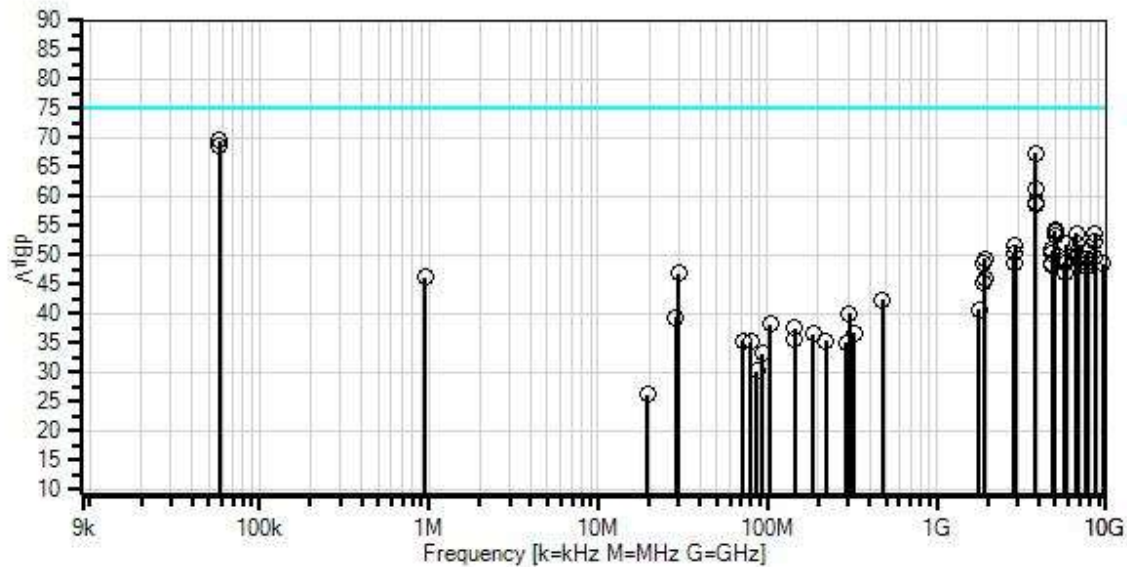
***Support Equipment:***

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

***Test Conditions / Notes:***

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Environment Conditions:<br>Temperature: 20°C<br>Humidity: 37%<br>Pressure: 102.2kPa<br><br>Test Method: ANSI C63.26 (2015)<br><br>Frequency: 9kHz-10GHz<br><br>Test Setup: EUT is continuously transmitting with modulation; antenna port is terminated. Horizontal and vertical measurement antenna polarities investigated above 30MHz, 3 x orthogonal axes investigated below 30MHz, worst-case reported. EUT XYZ axes investigated, worst-case reported. Investigated with received boards removed, fully loaded unit is representative of worst-case.<br><br>Power supply is remotely located outside of chamber with filter caps at chamber wall.<br><br>Investigated with antennas at 1.5m height, as well as moving the entire setup so the EUT is at 1.5m height, worst-case reported. Left the Tx antenna in chamber as the antenna based is shared with the EUT's GPS antenna.<br><br>Investigated 24.76 and 57.78Hz modulation, worst-case reported.<br><br><b>MC4Max with Tablet</b> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Ittron, Inc. WO#: 107795 Sequence#: 52 Date: 12/21/2022  
101.111(a)(5) Radiated Emissions (non-mask) Test Distance: 3 Meters Horiz



— Readings  
× QP Readings  
▼ Ambient  
○ Peak Readings  
\* Average Readings  
Software Version: 5.03.20  
1 - 101.111(a)(5) Radiated Emissions (non-mask)

#### Test Equipment:

| ID  | Asset #     | Description       | Model             | Calibration Date | Cal Due Date |
|-----|-------------|-------------------|-------------------|------------------|--------------|
| T1  | AN02872     | Spectrum Analyzer | E4440A            | 11/29/2021       | 11/29/2023   |
| T2  | ANP06540    | Cable             | Heliac            | 1/17/2022        | 1/17/2024    |
| T3  | ANP05305    | Cable             | ETSI-50T          | 9/15/2021        | 9/15/2023    |
| T4  | ANP05360    | Cable             | RG214             | 2/4/2022         | 2/4/2024     |
| T5  | AN03628     | Biconilog Antenna | 3142E             | 6/3/2021         | 6/3/2023     |
| T6  | AN00052     | Loop Antenna      | 6502              | 5/11/2022        | 5/11/2024    |
| T7  | AN03170     | High Pass Filter  | HM1155-11SS       | 9/16/2021        | 9/16/2023    |
| T8  | AN03540     | Preamp            | 83017A            | 5/14/2021        | 5/14/2023    |
| T9  | ANP07504    | Cable             | CLU40-KMKM-02.00F | 1/26/2021        | 1/26/2023    |
| T10 | AN02374ANSI | Horn Antenna      | RGA-60            | 5/25/2021        | 5/25/2023    |

**Measurement Data:**

Reading listed by margin.

Test Distance: 3 Meters

| #  | Freq      | Rdng | T1<br>T5<br>T9       | T2<br>T6<br>T10       | T3<br>T7     | T4<br>T8      | Dist  | Corr | Spec              | Margin | Polar |
|----|-----------|------|----------------------|-----------------------|--------------|---------------|-------|------|-------------------|--------|-------|
|    | MHz       | dBμV | dB                   | dB                    | dB           | dB            | Table | dBμV | dBμV              | dB     | Ant   |
| 1  | 57.597k   | 59.8 | +0.0<br>+0.0<br>+0.0 | +0.1<br>+9.7<br>+0.0  | +0.0<br>+0.0 | +0.0<br>+0.0  | +0.0  | 69.6 | 75.2              | -5.6   | Groun |
| 2  | 57.597k   | 58.9 | +0.0<br>+0.0<br>+0.0 | +0.1<br>+9.7<br>+0.0  | +0.0<br>+0.0 | +0.0<br>+0.0  | +0.0  | 68.7 | 75.2              | -6.5   | Para  |
| 3  | 3808.000M | 64.3 | +0.0<br>+0.0<br>+0.3 | +0.6<br>+0.0<br>+32.4 | +3.3<br>+0.3 | +0.0<br>-33.8 | +0.0  | 67.4 | 75.2<br>952 57.78 | -7.8   | Vert  |
| 4  | 3808.050M | 64.1 | +0.0<br>+0.0<br>+0.3 | +0.6<br>+0.0<br>+32.4 | +3.3<br>+0.3 | +0.0<br>-33.8 | +0.0  | 67.2 | 75.2<br>952 24.76 | -8.0   | Vert  |
| 5  | 3839.400M | 58.2 | +0.0<br>+0.0<br>+0.3 | +0.6<br>+0.0<br>+32.5 | +3.3<br>+0.3 | +0.0<br>-33.8 | +0.0  | 61.4 | 75.2<br>959.85    | -13.8  | Vert  |
| 6  | 3808.020M | 55.9 | +0.0<br>+0.0<br>+0.3 | +0.6<br>+0.0<br>+32.4 | +3.3<br>+0.3 | +0.0<br>-33.8 | +0.0  | 59.0 | 75.2<br>952 24.76 | -16.2  | Horiz |
| 7  | 3839.370M | 55.4 | +0.0<br>+0.0<br>+0.3 | +0.6<br>+0.0<br>+32.5 | +3.3<br>+0.3 | +0.0<br>-33.8 | +0.0  | 58.6 | 75.2<br>959.85    | -16.6  | Horiz |
| 8  | 4977.180M | 48.0 | +0.0<br>+0.0<br>+0.7 | +0.7<br>+0.0<br>+33.8 | +3.8<br>+0.6 | +0.0<br>-33.4 | +0.0  | 54.2 | 75.2              | -21.0  | Vert  |
| 9  | 4992.410M | 47.9 | +0.0<br>+0.0<br>+0.7 | +0.7<br>+0.0<br>+33.7 | +3.8<br>+0.6 | +0.0<br>-33.3 | +0.0  | 54.1 | 75.2              | -21.1  | Horiz |
| 10 | 6664.020M | 45.7 | +0.0<br>+0.0<br>+0.6 | +0.9<br>+0.0<br>+35.4 | +4.6<br>+0.7 | +0.0<br>-34.1 | +0.0  | 53.8 | 75.2<br>952 24.76 | -21.4  | Vert  |
| 11 | 8568.140M | 42.4 | +0.0<br>+0.0<br>+0.7 | +1.1<br>+0.0<br>+38.7 | +5.2<br>+0.6 | +0.0<br>-34.9 | +0.0  | 53.8 | 75.2<br>952 24.76 | -21.4  | Vert  |
| 12 | 4991.340M | 47.1 | +0.0<br>+0.0<br>+0.7 | +0.7<br>+0.0<br>+33.8 | +3.8<br>+0.6 | +0.0<br>-33.4 | +0.0  | 53.3 | 75.2              | -21.9  | Vert  |
| 13 | 8638.550M | 41.3 | +0.0<br>+0.0<br>+0.7 | +1.0<br>+0.0<br>+38.7 | +5.1<br>+0.5 | +0.0<br>-34.9 | +0.0  | 52.4 | 75.2<br>959.85    | -22.8  | Vert  |
| 14 | 5759.100M | 45.3 | +0.0<br>+0.0<br>+0.5 | +0.8<br>+0.0<br>+34.4 | +4.1<br>+0.5 | +0.0<br>-33.6 | +0.0  | 52.0 | 75.2<br>959.85    | -23.2  | Vert  |
| 15 | 6664.000M | 43.8 | +0.0<br>+0.0<br>+0.6 | +0.9<br>+0.0<br>+35.4 | +4.6<br>+0.7 | +0.0<br>-34.1 | +0.0  | 51.9 | 75.2<br>952 24.76 | -23.3  | Horiz |

|    |           |      |                      |                       |              |               |      |      |                   |       |       |
|----|-----------|------|----------------------|-----------------------|--------------|---------------|------|------|-------------------|-------|-------|
| 16 | 6719.060M | 43.5 | +0.0<br>+0.0<br>+0.5 | +0.9<br>+0.0<br>+35.5 | +4.6<br>+1.0 | +0.0<br>-34.1 | +0.0 | 51.9 | 75.2<br>959.85    | -23.3 | Vert  |
| 17 | 2879.580M | 52.1 | +0.0<br>+0.0<br>+0.4 | +0.5<br>+0.0<br>+29.5 | +2.8<br>+0.4 | +0.0<br>-34.1 | +0.0 | 51.6 | 75.2<br>959.85    | -23.6 | Vert  |
| 18 | 4799.240M | 46.3 | +0.0<br>+0.0<br>+0.5 | +0.6<br>+0.0<br>+33.2 | +3.6<br>+0.3 | +0.0<br>-33.6 | +0.0 | 50.9 | 75.2<br>959.85    | -24.3 | Vert  |
| 19 | 7678.750M | 40.8 | +0.0<br>+0.0<br>+0.6 | +1.4<br>+0.0<br>+37.4 | +4.7<br>+0.6 | +0.0<br>-34.9 | +0.0 | 50.6 | 75.2<br>959.85    | -24.6 | Vert  |
| 20 | 2856.020M | 50.9 | +0.0<br>+0.0<br>+0.4 | +0.5<br>+0.0<br>+29.5 | +2.7<br>+0.4 | +0.0<br>-34.1 | +0.0 | 50.3 | 75.2<br>952 24.76 | -24.9 | Vert  |
| 21 | 4760.010M | 45.7 | +0.0<br>+0.0<br>+0.5 | +0.6<br>+0.0<br>+33.2 | +3.6<br>+0.3 | +0.0<br>-33.6 | +0.0 | 50.3 | 75.2<br>952 24.76 | -24.9 | Vert  |
| 22 | 6718.970M | 41.4 | +0.0<br>+0.0<br>+0.5 | +0.9<br>+0.0<br>+35.5 | +4.6<br>+1.0 | +0.0<br>-34.1 | +0.0 | 49.8 | 75.2<br>959.85    | -25.4 | Horiz |
| 23 | 8638.680M | 38.4 | +0.0<br>+0.0<br>+0.7 | +1.0<br>+0.0<br>+38.7 | +5.1<br>+0.5 | +0.0<br>-34.9 | +0.0 | 49.5 | 75.2<br>959.85    | -25.7 | Horiz |
| 24 | 1919.820M | 52.6 | +0.0<br>+0.0<br>+0.3 | +0.4<br>+0.0<br>+28.1 | +2.2<br>+0.5 | +0.0<br>-34.6 | +0.0 | 49.5 | 75.2<br>959.85    | -25.7 | Vert  |
| 25 | 5759.230M | 42.8 | +0.0<br>+0.0<br>+0.5 | +0.8<br>+0.0<br>+34.4 | +4.1<br>+0.5 | +0.0<br>-33.6 | +0.0 | 49.5 | 75.2<br>959.85    | -25.7 | Horiz |
| 26 | 7616.020M | 39.6 | +0.0<br>+0.0<br>+0.6 | +1.4<br>+0.0<br>+37.4 | +4.6<br>+0.6 | +0.0<br>-34.9 | +0.0 | 49.3 | 75.2<br>952 24.76 | -25.9 | Vert  |
| 27 | 4759.960M | 44.2 | +0.0<br>+0.0<br>+0.5 | +0.6<br>+0.0<br>+33.2 | +3.6<br>+0.3 | +0.0<br>-33.6 | +0.0 | 48.8 | 75.2<br>952 24.76 | -26.4 | Horiz |
| 28 | 1903.870M | 51.9 | +0.0<br>+0.0<br>+0.3 | +0.4<br>+0.0<br>+28.0 | +2.2<br>+0.5 | +0.0<br>-34.6 | +0.0 | 48.7 | 75.2<br>952 24.76 | -26.5 | Vert  |
| 29 | 2856.120M | 49.3 | +0.0<br>+0.0<br>+0.4 | +0.5<br>+0.0<br>+29.5 | +2.7<br>+0.4 | +0.0<br>-34.1 | +0.0 | 48.7 | 75.2<br>952 24.76 | -26.5 | Horiz |
| 30 | 5712.130M | 42.0 | +0.0<br>+0.0<br>+0.5 | +0.8<br>+0.0<br>+34.3 | +4.1<br>+0.6 | +0.0<br>-33.6 | +0.0 | 48.7 | 75.2<br>952 24.76 | -26.5 | Vert  |
| 31 | 7616.130M | 38.9 | +0.0<br>+0.0<br>+0.6 | +1.4<br>+0.0<br>+37.4 | +4.6<br>+0.6 | +0.0<br>-34.9 | +0.0 | 48.6 | 75.2<br>952 24.76 | -26.6 | Horiz |
| 32 | 9598.590M | 36.4 | +0.0<br>+0.0<br>+0.8 | +1.0<br>+0.0<br>+38.5 | +5.1<br>+0.8 | +0.0<br>-34.1 | +0.0 | 48.5 | 75.2<br>959.85    | -26.7 | Vert  |

|    |           |      |                       |                       |              |               |      |      |                   |       |       |
|----|-----------|------|-----------------------|-----------------------|--------------|---------------|------|------|-------------------|-------|-------|
| 33 | 2879.500M | 49.0 | +0.0<br>+0.0<br>+0.4  | +0.5<br>+0.0<br>+29.5 | +2.8<br>+0.4 | +0.0<br>-34.1 | +0.0 | 48.5 | 75.2<br>959.85    | -26.7 | Horiz |
| 34 | 4799.350M | 43.6 | +0.0<br>+0.0<br>+0.5  | +0.6<br>+0.0<br>+33.2 | +3.6<br>+0.3 | +0.0<br>-33.6 | +0.0 | 48.2 | 75.2<br>959.85    | -27.0 | Horiz |
| 35 | 7678.820M | 38.1 | +0.0<br>+0.0<br>+0.6  | +1.4<br>+0.0<br>+37.4 | +4.7<br>+0.6 | +0.0<br>-34.9 | +0.0 | 47.9 | 75.2<br>959.85    | -27.3 | Horiz |
| 36 | 5712.100M | 40.2 | +0.0<br>+0.0<br>+0.5  | +0.8<br>+0.0<br>+34.3 | +4.1<br>+0.6 | +0.0<br>-33.6 | +0.0 | 46.9 | 75.2<br>952 24.76 | -28.3 | Horiz |
| 37 | 29.971M   | 42.9 | +0.0<br>+0.0<br>+0.0  | +0.1<br>+3.6<br>+0.0  | +0.3<br>+0.0 | +0.0<br>+0.0  | +0.0 | 46.9 | 75.2              | -28.3 | Groun |
| 38 | 950.100k  | 36.5 | +0.0<br>+0.0<br>+0.0  | +0.1<br>+9.5<br>+0.0  | +0.1<br>+0.0 | +0.0<br>+0.0  | +0.0 | 46.2 | 75.2              | -29.0 | Para  |
| 39 | 1919.790M | 49.1 | +0.0<br>+0.0<br>+0.3  | +0.4<br>+0.0<br>+28.1 | +2.2<br>+0.5 | +0.0<br>-34.6 | +0.0 | 46.0 | 75.2<br>959.85    | -29.2 | Horiz |
| 40 | 1903.900M | 48.7 | +0.0<br>+0.0<br>+0.3  | +0.4<br>+0.0<br>+28.0 | +2.2<br>+0.5 | +0.0<br>-34.6 | +0.0 | 45.5 | 75.2<br>952 24.76 | -29.7 | Horiz |
| 41 | 478.100M  | 15.7 | +0.0<br>+23.9<br>+0.0 | +0.2<br>+0.0<br>+0.0  | +1.1<br>+0.0 | +1.5<br>+0.0  | +0.0 | 42.4 | 75.2              | -32.8 | Vert  |
| 42 | 1776.000M | 45.3 | +0.0<br>+0.0<br>+0.3  | +0.4<br>+0.0<br>+26.8 | +2.1<br>+0.6 | +0.0<br>-34.8 | +0.0 | 40.7 | 75.2              | -34.5 | Horiz |
| 43 | 303.500M  | 19.0 | +0.0<br>+18.7<br>+0.0 | +0.2<br>+0.0<br>+0.0  | +0.9<br>+0.0 | +1.2<br>+0.0  | +0.0 | 40.0 | 75.2              | -35.2 | Horiz |
| 44 | 28.840M   | 35.0 | +0.0<br>+0.0<br>+0.0  | +0.1<br>+4.1<br>+0.0  | +0.2<br>+0.0 | +0.0<br>+0.0  | +0.0 | 39.4 | 75.2              | -35.8 | Para  |
| 45 | 103.700M  | 22.9 | +0.0<br>+14.1<br>+0.0 | +0.1<br>+0.0<br>+0.0  | +0.5<br>+0.0 | +0.6<br>+0.0  | +0.0 | 38.2 | 75.2              | -37.0 | Vert  |
| 46 | 145.400M  | 22.1 | +0.0<br>+14.0<br>+0.0 | +0.1<br>+0.0<br>+0.0  | +0.5<br>+0.0 | +0.8<br>+0.0  | +0.0 | 37.5 | 75.2              | -37.7 | Vert  |
| 47 | 324.900M  | 15.3 | +0.0<br>+19.2<br>+0.0 | +0.2<br>+0.0<br>+0.0  | +0.9<br>+0.0 | +1.2<br>+0.0  | +0.0 | 36.8 | 75.2              | -38.4 | Horiz |
| 48 | 187.100M  | 19.4 | +0.0<br>+15.5<br>+0.0 | +0.1<br>+0.0<br>+0.0  | +0.7<br>+0.0 | +0.9<br>+0.0  | +0.0 | 36.6 | 75.2              | -38.6 | Vert  |
| 49 | 145.400M  | 20.2 | +0.0<br>+14.0<br>+0.0 | +0.1<br>+0.0<br>+0.0  | +0.5<br>+0.0 | +0.8<br>+0.0  | +0.0 | 35.6 | 75.2              | -39.6 | Horiz |

|    |          |      |                       |                      |              |              |      |      |      |       |       |
|----|----------|------|-----------------------|----------------------|--------------|--------------|------|------|------|-------|-------|
| 50 | 71.700M  | 21.5 | +0.0<br>+12.9<br>+0.0 | +0.1<br>+0.0<br>+0.0 | +0.4<br>+0.0 | +0.5<br>+0.0 | +0.0 | 35.4 | 75.2 | -39.8 | Vert  |
| 51 | 221.100M | 17.0 | +0.0<br>+16.6<br>+0.0 | +0.1<br>+0.0<br>+0.0 | +0.7<br>+0.0 | +1.0<br>+0.0 | +0.0 | 35.4 | 75.2 | -39.8 | Vert  |
| 52 | 79.500M  | 21.5 | +0.0<br>+12.6<br>+0.0 | +0.1<br>+0.0<br>+0.0 | +0.4<br>+0.0 | +0.6<br>+0.0 | +0.0 | 35.2 | 75.2 | -40.0 | Vert  |
| 53 | 292.900M | 14.7 | +0.0<br>+18.1<br>+0.0 | +0.2<br>+0.0<br>+0.0 | +0.9<br>+0.0 | +1.2<br>+0.0 | +0.0 | 35.1 | 75.2 | -40.1 | Vert  |
| 54 | 93.000M  | 19.0 | +0.0<br>+13.0<br>+0.0 | +0.1<br>+0.0<br>+0.0 | +0.5<br>+0.0 | +0.6<br>+0.0 | +0.0 | 33.2 | 75.2 | -42.0 | Vert  |
| 55 | 86.300M  | 16.7 | +0.0<br>+12.4<br>+0.0 | +0.1<br>+0.0<br>+0.0 | +0.4<br>+0.0 | +0.6<br>+0.0 | +0.0 | 30.2 | 75.2 | -45.0 | Horiz |
| 56 | 19.415M  | 19.5 | +0.0<br>+0.0<br>+0.0  | +0.1<br>+6.5<br>+0.0 | +0.2<br>+0.0 | +0.0<br>+0.0 | +0.0 | 26.3 | 75.2 | -48.9 | Para  |

Test Setup Photo(s)



Below 1GHz; Laptop



Above 1GHz; Laptop



Below 1GHz; Tablet



Above 1GHz; Tablet

## 2.1046 / 101.113(a) Transmitter Power Limitations

### Test Setup/Conditions

|                |                                                                                                                                                                                                                                               |                |                         |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-------------------------|
| Test Location: | Brea Lab D                                                                                                                                                                                                                                    | Test Engineer: | Michael Atkinson        |
| Test Method:   | ANSI C63.26 (2015), section 5.2                                                                                                                                                                                                               | Test Date(s):  | 12/2/2022 to 12/12/2022 |
| Configuration: | 3                                                                                                                                                                                                                                             |                |                         |
| Test Setup:    | The EUT is placed on test bench. Powered from external power supply. USB port is connected to support computer. The EUT is continuously transmitting. The EUT is connected to a spectrum analyzer through appropriate cables and attenuation. |                |                         |

### Environmental Conditions

|                  |      |                        |       |
|------------------|------|------------------------|-------|
| Temperature (°C) | 20.5 | Relative Humidity (%): | 31-41 |
|------------------|------|------------------------|-------|

### Test Equipment

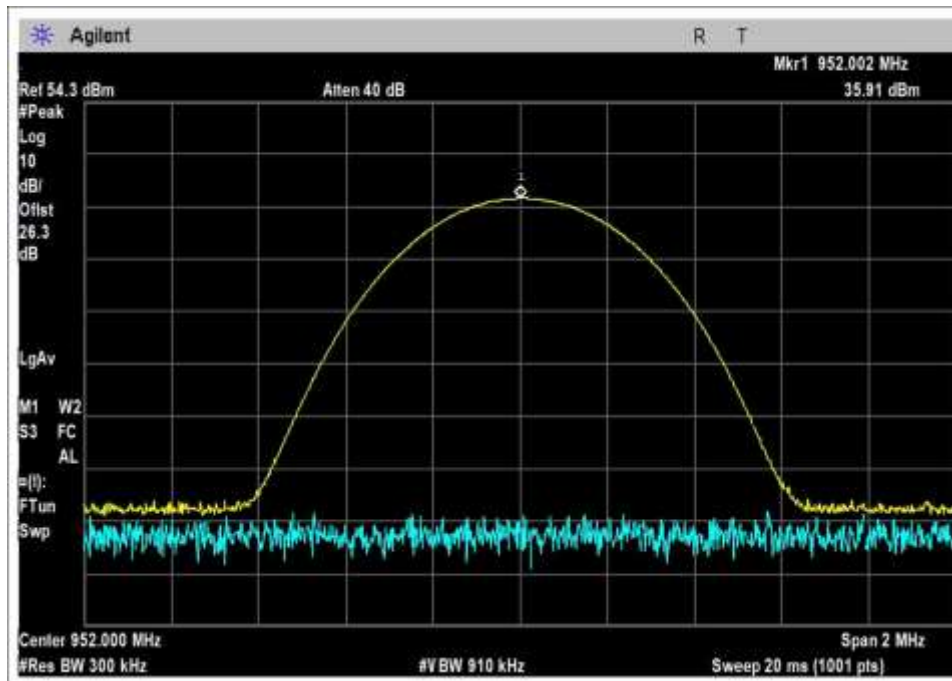
| Asset# | Description       | Manufacturer  | Model    | Cal Date   | Cal Due    |
|--------|-------------------|---------------|----------|------------|------------|
| 02872  | Spectrum Analyzer | Agilent       | E4440A   | 11/29/2021 | 11/29/2023 |
| P07746 | Attenuator        | Pasternack    | PE7004-6 | 2/11/2021  | 2/11/2023  |
| P07623 | Attenuator        | API Weinschel | 47-20-34 | 3/16/2022  | 3/16/2024  |
| P06452 | Cable             | Andrews       | Helix    | 1/17/2022  | 1/17/2024  |

### Test Data Summary - RF Conducted Measurement

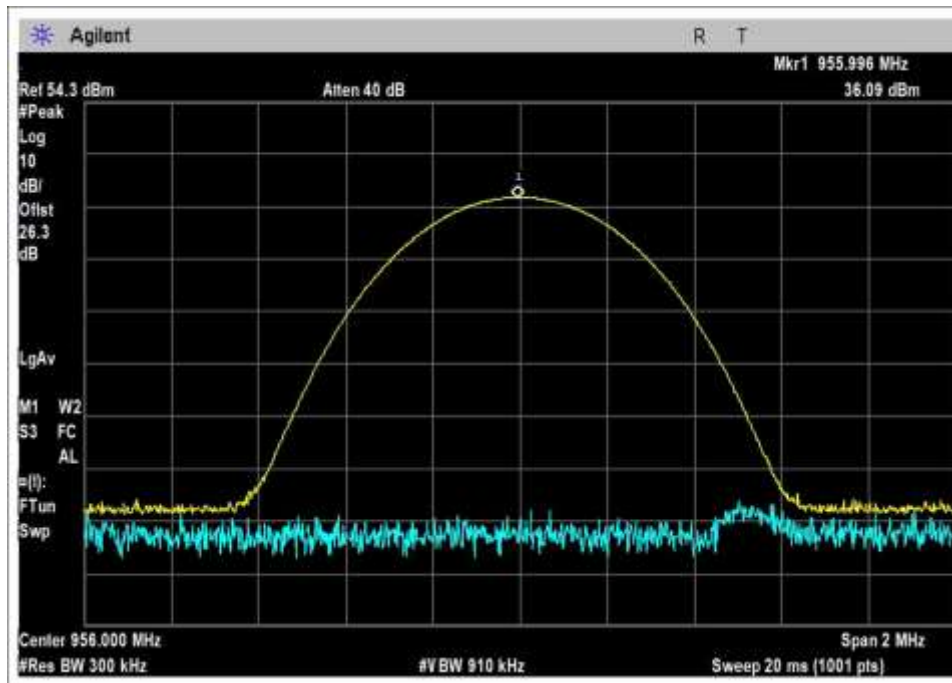
| Frequency (MHz) | Modulation  | Ant. Gain (dBi) | Measured (dBm) | EIRP (dBm) | Limit (dBm) | Limit (dBW) | Results |
|-----------------|-------------|-----------------|----------------|------------|-------------|-------------|---------|
| 952.0           | 24.76 Hz AM | 5               | 35.91          | 40.91      | ≤44         | ≤14         | Pass    |
| 956.0           | 24.76 Hz AM | 5               | 36.09          | 41.09      | ≤44         | ≤14         | Pass    |
| 959.85          | 24.76 Hz AM | 5               | 36.13          | 41.13      | ≤44         | ≤14         | Pass    |
| 952.0           | 57.78 Hz AM | 5               | 35.67          | 40.67      | ≤44         | ≤14         | Pass    |
| 956.0           | 57.78 Hz AM | 5               | 35.86          | 40.86      | ≤44         | ≤14         | Pass    |
| 959.85          | 57.78 Hz AM | 5               | 36.26          | 41.26      | ≤44         | ≤14         | Pass    |

Plot(s)

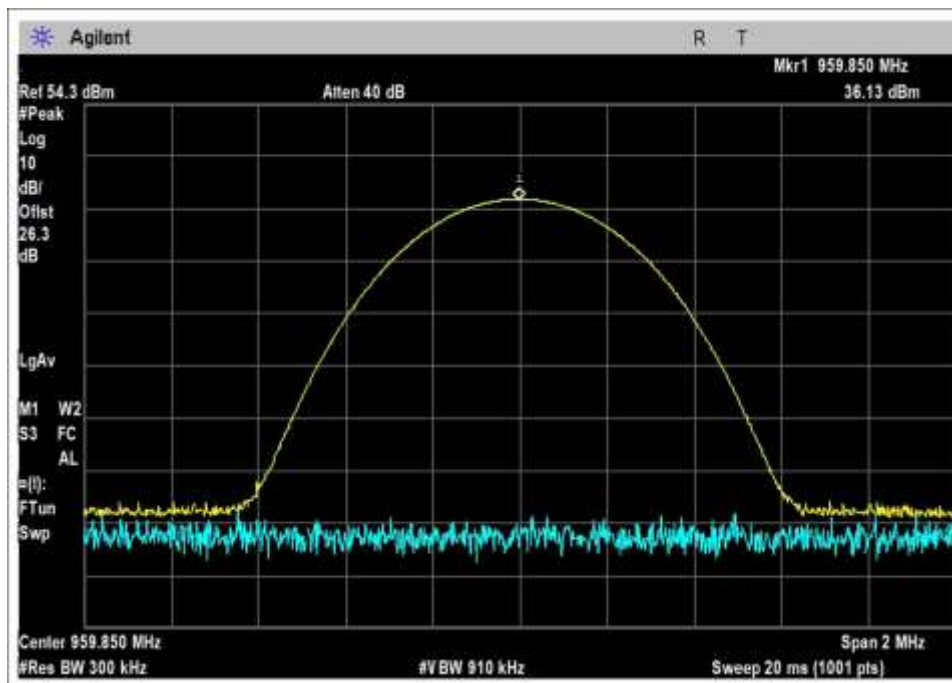
24.76Hz AM Mod



Low Channel

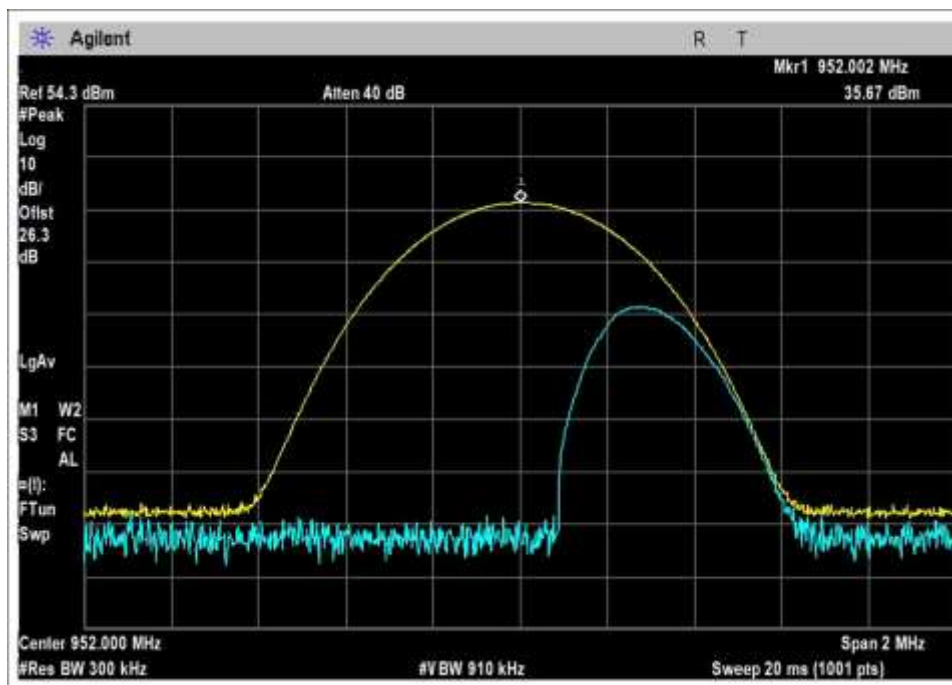


Middle Channel

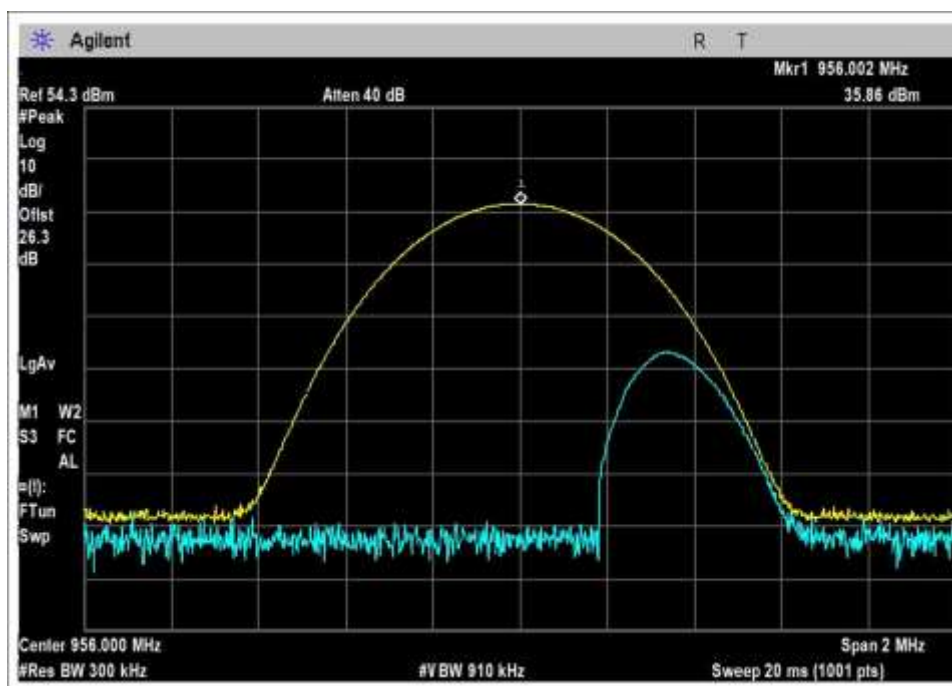


High Channel

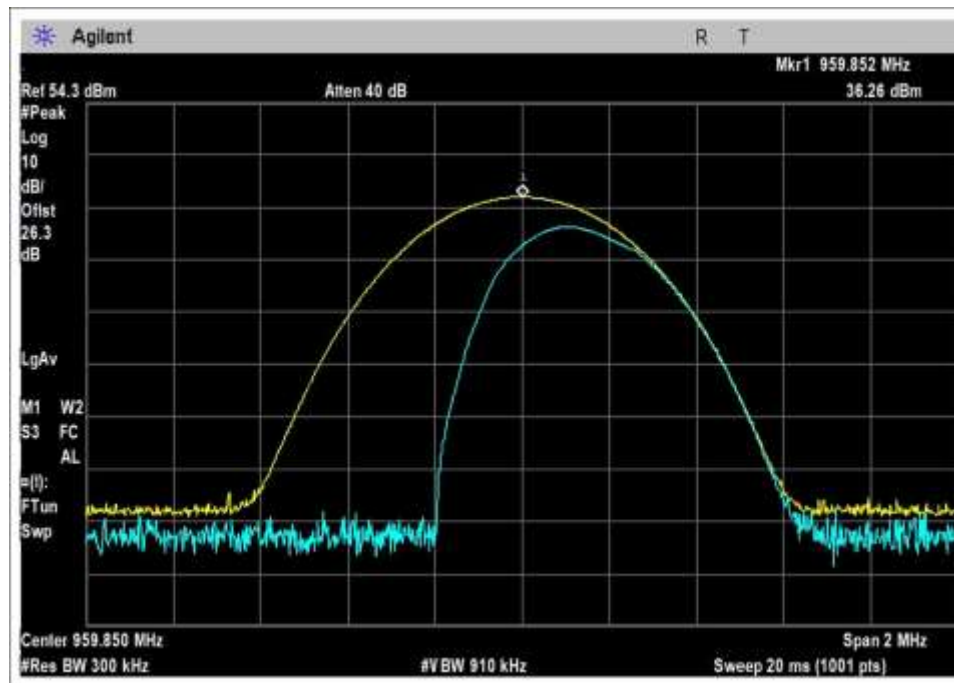
### 57.78Hz AM Mod



Low Channel



Middle Channel



High Channel

### Test Setup Photo(s)



## Appendix A: Manufacturer Declaration

The manufacturer declares that the **MC3C** model applies to device names: **MC3** and **MC4Max**.

These are identical hardware configurations and the only difference is in the name. Testing on the **MC3C** is representative of testing on the following model(s):

**MC3C1 (device name MC3Lite)**

## APPENDIX B: MEASUREMENT UNCERTAINTIES

| Uncertainty Parameter             | Actual | Limit | Unit of Measure |
|-----------------------------------|--------|-------|-----------------|
| Occupied Channel Bandwidth        | 1      | 5     | %               |
| RF output power, conducted        | 0.67   | 1.5   | dB              |
| Power Spectral Density, conducted | 0.67   | 3     | dB              |
| Unwanted Emissions, conducted     | 0.67   | 3     | dB              |
| All emissions, radiated           | 3.73   | 6     | dB              |
| Temperature                       | 1      | 3     | °C              |
| Humidity                          | 3.4    | 5     | %               |
| DC and low frequency voltages     | 2      | 3     | %               |
| Time                              | 1.1    | 5     | %               |

Reported uncertainties 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.

## 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      | ( $\text{dB}/\text{m}$ )            |
| +                   | Cable Loss          | ( $\text{dB}$ )                     |
| -                   | Distance Correction | ( $\text{dB}$ )                     |
| -                   | Preamplifier Gain   | ( $\text{dB}$ )                     |
| =                   | 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.