

Ittron, Inc.

TEST REPORT FOR

AMR Transceiver Device for Communicating with Utility Meters Models: IMRC-INTand IMRC-EXT

Tested to The Following Standards:

FCC Part 15 Subpart C Section(s)

15.207 & 15.231a
(PERIODIC OPERATION >70MHZ)

Report No.: 103955-28

Date of issue: August 5, 2020



Test Certificate # 803.01

This test report bears the accreditation symbol indicating that the testing performed herein meets the test and reporting requirements of ISO/IEC 17025 under the applicable scope of testing for CKC Laboratories, Inc.

We strive to create long-term, trust based relationships by providing sound, adaptive, customer first testing services. We embrace each of our customers' unique EMC challenges, not as an interruption to set processes, but rather as the reason we are in business.

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ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

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

Representative: Jay Holcomb
Customer Reference Number: 208224

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

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

Project Number: 103955

June 12, 2020

June 12-23, 2020

Report Authorization

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

A handwritten signature in black ink, reading "Steve Behm", is written over 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	5.03.12

Site Registration & Accreditation Information

Location	*NIST CB #	FCC	Japan
Canyon Park, Bothell, WA	US0081	US1022	A-0136
Brea, CA	US0060	US1025	A-0136
Fremont, CA	US0082	US1023	A-0136
Mariposa, CA	US0103	US1024	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 - 15.231a

Test Procedure	Description	Modifications	Results
15.231(c)	Occupied Bandwidth	NA	Pass
15.231(b)	Field Strength of Fundamental	NA	Pass
15.231(a)	Periodic Operation Requirements	NA	Pass
15.231(b)	Field Strength of Spurious Emissions	NA	Pass
15.207	AC Conducted Emissions	NA	Pass

NA = Not Applicable

ISO/IEC 17025 Decision Rule

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

Modifications During Testing

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

Summary of Conditions

No modifications were made during testing.

Modifications listed above must be incorporated into all production units.

Conditions During Testing

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

Summary of Conditions

None

EQUIPMENT UNDER TEST (EUT)

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

Configuration 3

Equipment Tested:

Device	Manufacturer	Model #	S/N
AMR transceiver device for communicating with utility meters	Itron, Inc.	IMRC-INT	66034283
10" Tablet	Panasonic	FZ-G1	NA
5Vdc AC Adapter	zip	SG-511	NA

Support Equipment:

Device	Manufacturer	Model #	S/N
None			

Configuration 4

Equipment Tested:

Device	Manufacturer	Model #	S/N
10" Tablet	Panasonic	FZ-G1	NA
AMR transceiver device for communicating with utility meters	Itron, Inc.	IMRC-EXT	66034368
3dBi Rubber Duck Antenna	Generic	NA	NA
12Vdc AC Adapter	Husky	FW 1288	NA

Support Equipment:

Device	Manufacturer	Model #	S/N
None			

Configuration 5

Equipment Tested:

Device	Manufacturer	Model #	S/N
AMR transceiver device for communicating with utility meters	Itron, Inc.	IMRC-INT	66034283
Power Distribution Box	Itron, Inc.	Generic	NA
10" Tablet	Panasonic	FZ-G1	NA
Automobile Adapter	Lind Electronics, Inc.	PA1555-2155 FB	NA
5Vdc AC Adapter	zip	SG-511	NA

Support Equipment:

Device	Manufacturer	Model #	S/N
Power Supply	Topward	6306D	988614

Configuration 6

Equipment Tested:

Device	Manufacturer	Model #	S/N
AMR transceiver device for communicating with utility meters	Itron, Inc.	IMRC-EXT	66034368
3dBi Rubber Duck Antenna	Generic	NA	NA
Power Distribution Box	Itron, Inc.	Generic	NA
Automobile Adapter	Lind Electronics, Inc.	PA1555-2155 FB	NA
10" Tablet	Panasonic	FZ-G1	NA

Support Equipment:

Device	Manufacturer	Model #	S/N
Power Supply	Topward	6306D	988614

Configuration 7

Equipment Tested:

Device	Manufacturer	Model #	S/N
AMR transceiver device for communicating with utility meters	Itron, Inc.	IMRC-EXT	66034368
Power Distribution Box	Itron, Inc.	Generic	NA
Automobile Adapter	Lind Electronics, Inc.	PA1555-2155 FB	NA
10" Tablet	Panasonic	FZ-G1	NA
5dBi Antenna	PCTEL	Generic	NA

Support Equipment:

Device	Manufacturer	Model #	S/N
Power Supply	Topward	6306D	988614

Configuration 8

Equipment Tested:

Device	Manufacturer	Model #	S/N
AMR transceiver device for communicating with utility meters	Itron, Inc.	IMRC-INT	66034283
Power Distribution Box	Itron, Inc.	Generic	NA
Automobile Adapter	Lind Electronics, Inc.	PA1555-2155 FB	NA
5Vdc AC Adapter	zip	SG-511	NA
7" Tablet	Panasonic	FZ-M1	NA

Support Equipment:

Device	Manufacturer	Model #	S/N
Power Supply	Topward	6306D	988614

Configuration 9

Equipment Tested:

Device	Manufacturer	Model #	S/N
AMR transceiver device for communicating with utility meters	Itron, Inc.	IMRC-EXT	66034368
3dBi Rubber Duck Antenna	Generic	NA	NA
Power Distribution Box	Itron, Inc.	Generic	NA
Automobile Adapter	Lind Electronics, Inc.	PA1555-2155 FB	NA
7" Tablet	Panasonic	FZ-M1	NA

Support Equipment:

Device	Manufacturer	Model #	S/N
Power Supply	Topward	6306D	988614

Configuration 10

Equipment Tested:

Device	Manufacturer	Model #	S/N
AMR transceiver device for communicating with utility meters	Itron, Inc.	IMRC-EXT	66034368
Power Distribution Box	Itron, Inc.	Generic	NA
Automobile Adapter	Lind Electronics, Inc.	PA1555-2155 FB	NA
5dBi Antenna	PCTEL	Generic	NA
7" Tablet	Panasonic	FZ-M1	NA

Support Equipment:

Device	Manufacturer	Model #	S/N
Power Supply	Topward	6306D	988614

General Product Information:

Product Information	Manufacturer-Provided Details
Equipment Type:	Stand-Alone Equipment
Modulation Type(s):	OOK
Maximum Duty Cycle:	100% tested as worst case
Antenna Type(s) and Gain:	Internal, directional 2dBi External, Vehicular mount 5dBi monopole, 3dBi Rubber Duck
Antenna Connection Type:	Integral/External Connector
Operational Trigger Type:	Manually Activated Trigger
Nominal Input Voltage:	Internal antenna unit: 5VDC Adapter External antenna unit: 13.8VDC (7 to 18VDC)
Firmware / Software used for Test:	Arm Version: 7.73.00.01 DSP Version: 5.76.00.07 FPGA Version: 3.02 MC3 SuperRaptor Test ver.4.0.3.5
Tablets FCC ID:	7" tablet – Panasonic FZ-M1 FCC ID: ACJ9TGWL15B IC: 216A-CFWL15B contains: FCC ID: ACJ9TGWW13B3 IC: 216A-CFWW13B 10" tablet – Panasonic FZ-G1 FCC ID: ACJ9TGWL15A IC: 216A-CFWL15A contains: FCC ID: ACJ9TGWW13B1 IC: 216A-CFWW13B

EUT and Accessory Photo(s)



IMRC-INT



IMRC-EXT



3dBi Antenna



5dBi Antenna



5VDC Adapter



12VDC Adapter



Power Distribution



Tablet Power Adapter



Tablet #1



Tablet #2

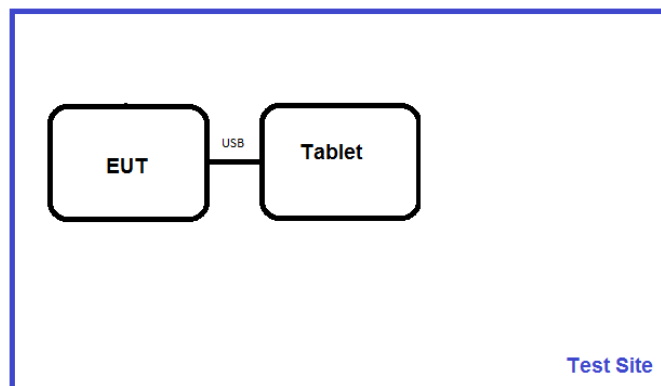
Support Equipment Photo(s)



12VDC Power Supply

Block Diagram of Test Setup(s)

Test Setup Block Diagram



FCC Part 15 Subpart C

15.231(c) Occupied Bandwidth (20dB BW)

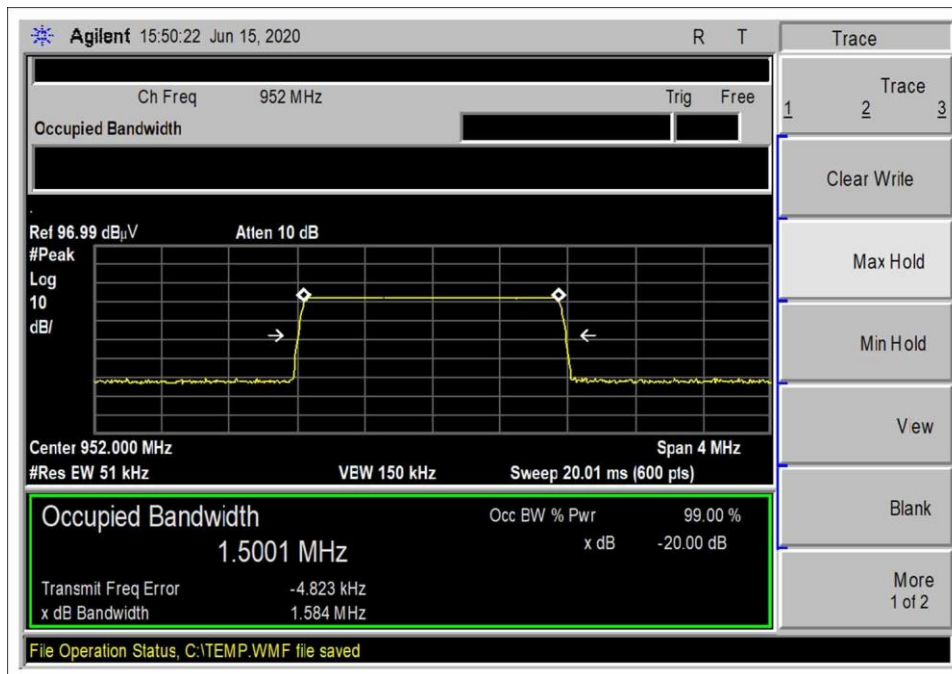
Test Setup/Conditions			
Test Location:	Brea Lab A	Test Engineer:	Don Nguyen
Test Method:	ANSI C63.10 (2013)	Test Date(s):	6/15/2020
Configuration:	5		
Test Setup:	<p>The EUT is placed on Styrofoam platform. USB port is connected to a touchscreen tablet. The EUT is connected to external power supply. The computer is sending command to the EUT using software MC3 SuperRaptor Test ver.4.0.3.5.</p> <p>The EUT is set to continuously transmit.</p> <p>Operating frequency: 952MHz</p> <p>Frequency of measurement: 952MHz</p> <p>RBW=51kHz, VBW=150MHz</p>		

Environmental Conditions			
Temperature (°C)	25	Relative Humidity (%):	50

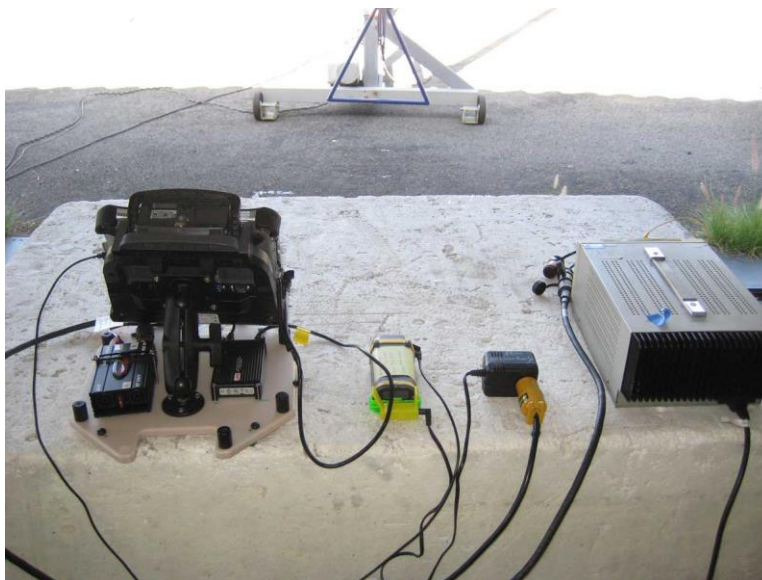
Test Equipment					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
00309	Preamp	HP	8447D	12/24/2019	12/24/2021
P05050	Cable	Pasternack	RG223/U	12/24/2018	12/24/2020
P05198	Cable	Belden	8268	12/4/2018	12/4/2020
02869	Spectrum Analyzer	Agilent	E4440A	7/25/2019	7/25/2020
01993	Biconilog Antenna	Chase	CBL6111C	6/11/2019	6/11/2021
P05281	Attenuator	Weinschel	1B	4/7/2020	4/7/2022

Test Data Summary					
$Limit = \begin{cases} 0.25\% f_c & 70 \text{ MHz} < f_c < 900 \text{ MHz} \\ 0.5\% f_c & f_c > 900 \text{ MHz} \end{cases}$					
Frequency (MHz)	Antenna Port	Modulation	Measured (kHz)	Limit (kHz)	Results
952	NA	OOK	1584	≤4760	Pass

Plot(s)



Test Setup Photo(s)





15.231(b) Field Strength of Fundamental

Test Setup/Conditions			
Test Location:	Brea Lab A	Test Engineer:	Don Nguyen
Test Method:	ANSI C63.10 (2013)	Test Date(s):	6/16/2020
Configuration:	5, 6 and 7		
Test Setup:	<p>The EUT is placed on Styrofoam platform. USB port is connected to a touchscreen tablet. The EUT is connected to DC power supply. The computer is sending command to the EUT using software MC3 SuperRaptor Test ver.4.0.3.5. The EUT is set to continuously transmit. Operating frequency: 952MHz Frequency of measurement: 952MHz RBW=2MHz, VBW=6MHz</p> <p>Note: The EUT is rotated in 3 orthogonal axis. Only the worst-case emissions are recorded. Measurement was performed with 10" tablet. Results were verified with 7" tablet and no change was observed.</p>		

Environmental Conditions			
Temperature (°C)	24	Relative Humidity (%):	49

Test Data Summary - Voltage Variations					
Configuration 6					
Frequency (MHz)	Modulation	V _{Minimum} (dBuV/m@3m)	V _{Nominal} (dBuV/m@3m)	V _{Maximum} (dBuV/m@3m)	Max Deviation from V _{Nominal} (dB)
952	OOK	77.4	77.4	77.5	0.1

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

Parameter Definitions:

Measurements performed at input voltage V_{Nominal} ± 15%. (AC Input)

Measurements performed at input voltage according to manufacturer specification. (DC Input)

Parameter	Value
V _{Nominal} :	115VAC / 13.8VDC
V _{Minimum} :	97VAC / 7VDC
V _{Maximum} :	133VAC / 18VDC

Test Data Summary – Radiated Field Strength Measurement					
Configuration 5 - (Integral antenna+10in tablet)					
Frequency (MHz)	Modulation	Ant. Type	Measured (dBuV/m @ 3m)	Limit (dBuV/m @ 3m)	Results
952	OOK	Integral directional	80.5	≤81.9	Pass

Test Data Summary – Radiated Field Strength Measurement					
Configuration 6 - (3dBi external antenna+10in tablet)					
Frequency (MHz)	Modulation	Ant. Type	Measured (dBuV/m @ 3m)	Limit (dBuV/m @ 3m)	Results
952	OOK	3dbi external Rubber Duck	77.4	≤81.9	Pass

Test Data Summary – Radiated Field Strength Measurement					
Configuration 7- (5dBi external antenna+10in tablet)					
Frequency (MHz)	Modulation	Ant. Type	Measured (dBuV/m @ 3m)	Limit (dBuV/m @ 3m)	Results
952	OOK	5dbi external Monopole	77.7	≤81.9	Pass

Test Setup / Conditions / Data

Test Location: CKC Laboratories Inc. • 110 N. Olinda Pl. • Brea, CA 92823 • 714-993-6112
 Customer: **Itron, Inc.**
 Specification: **15.231(b) Fundamental Field Strength**
 Work Order #: **103955** Date: 6/16/2020
 Test Type: **Maximized Emissions** Time: 08:17:18
 Tested By: Don Nguyen Sequence#: 1
 Software: EMITest 5.03.12

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 5			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 5			

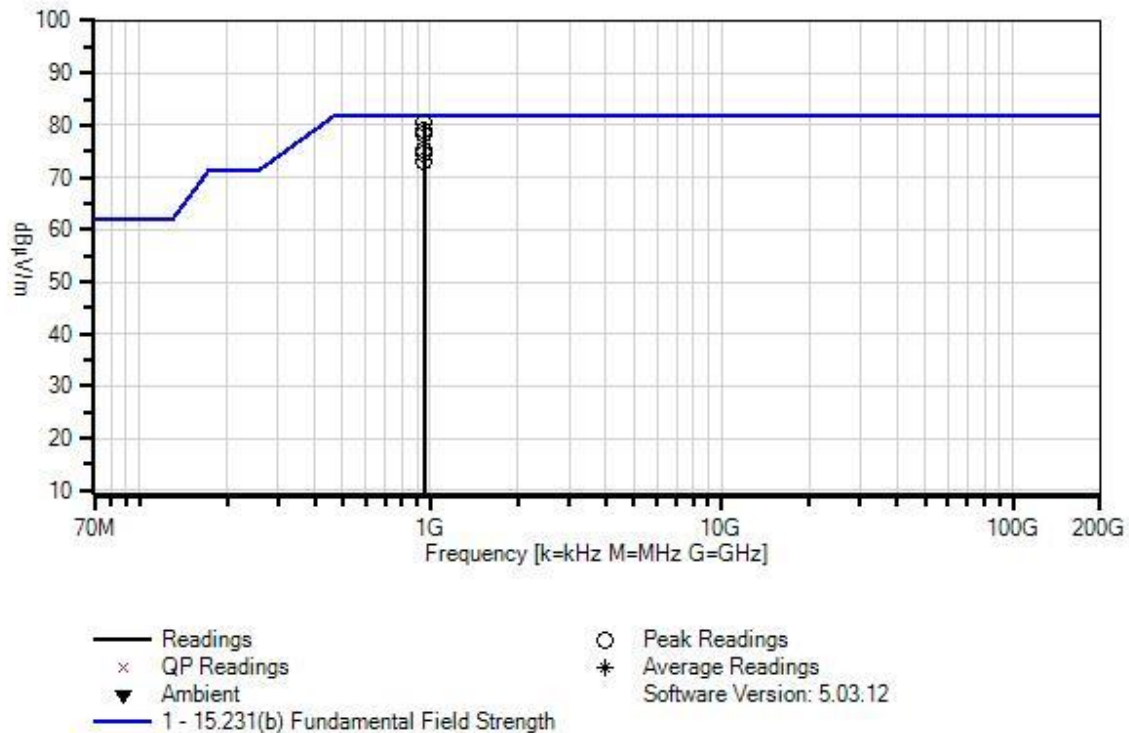
Test Conditions / Notes:

The EUT is placed on Styrofoam platform. USB port is connected to a touchscreen tablet. The EUT is connected to 5Vdc charger. The computer is sending command to the EUT using software MC3 SuperRaptor Test ver.4.0.3.5. The EUT is set to continuously transmit.

Operating frequency: 952MHz
 Frequency of measurement: 952MHz
 RBW=2MHz, VBW=6MHz

Note: The EUT is rotated in 3 orthogonal axis. Only the worst-case emissions are recorded.
 The worst case emission were verified with power supply on and off the table. No change in emission level was observed.

Itron, Inc. WD#: 103955 Sequence#: 1 Date: 6/16/2020
15.231(b) Fundamental Field Strength Test Distance: 3 Meters Horiz



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN00309	Preamplifier	8447D	12/24/2019	12/24/2021
T2	ANP05050	Cable	RG223/U	12/24/2018	12/24/2020
T3	ANP05198	Cable-Amplitude +15C to +45C (dB)	8268	12/4/2018	12/4/2020
	AN02869	Spectrum Analyzer	E4440A	7/25/2019	7/25/2020
T4	AN01993	Biconilog Antenna	CBL6111C	6/11/2019	6/11/2021
T5	ANP05281	Attenuator	1B	4/7/2020	4/7/2022

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dB μ V	dB	dB	dB	dB	Table	dB μ V/m	dB μ V/m	dB	Ant
1	951.317M	71.0	-27.2 +6.0	+0.4	+6.0	+24.3	+0.0	80.5	81.9 Y	-1.4	Vert
2	951.433M	69.5	-27.2 +6.0	+0.4	+6.0	+24.3	+0.0	79.0	81.9 Z	-2.9	Vert
3	951.467M	68.7	-27.2 +6.0	+0.4	+6.0	+24.3	+0.0	78.2	81.9 Z	-3.7	Horiz
4	952.750M	65.8	-27.2 +6.0	+0.4	+6.0	+24.3	+0.0	75.3	81.9 Y	-6.6	Horiz
5	952.650M	64.9	-27.2 +6.0	+0.4	+6.0	+24.3	+0.0	74.4	81.9 X	-7.5	Vert
6	951.550M	63.6	-27.2 +6.0	+0.4	+6.0	+24.3	+0.0	73.1	81.9 X	-8.8	Horiz

Test Location: CKC Laboratories Inc. • 110 N. Olinda Pl. • Brea, CA 92823 • 714-993-6112
 Customer: **Itron, Inc.**
 Specification: **15.231(b) Fundamental Field Strength**
 Work Order #: **103955** Date: 6/16/2020
 Test Type: **Maximized Emissions** Time: 08:51:08
 Tested By: Don Nguyen Sequence#: 2
 Software: EMITest 5.03.12

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 6			

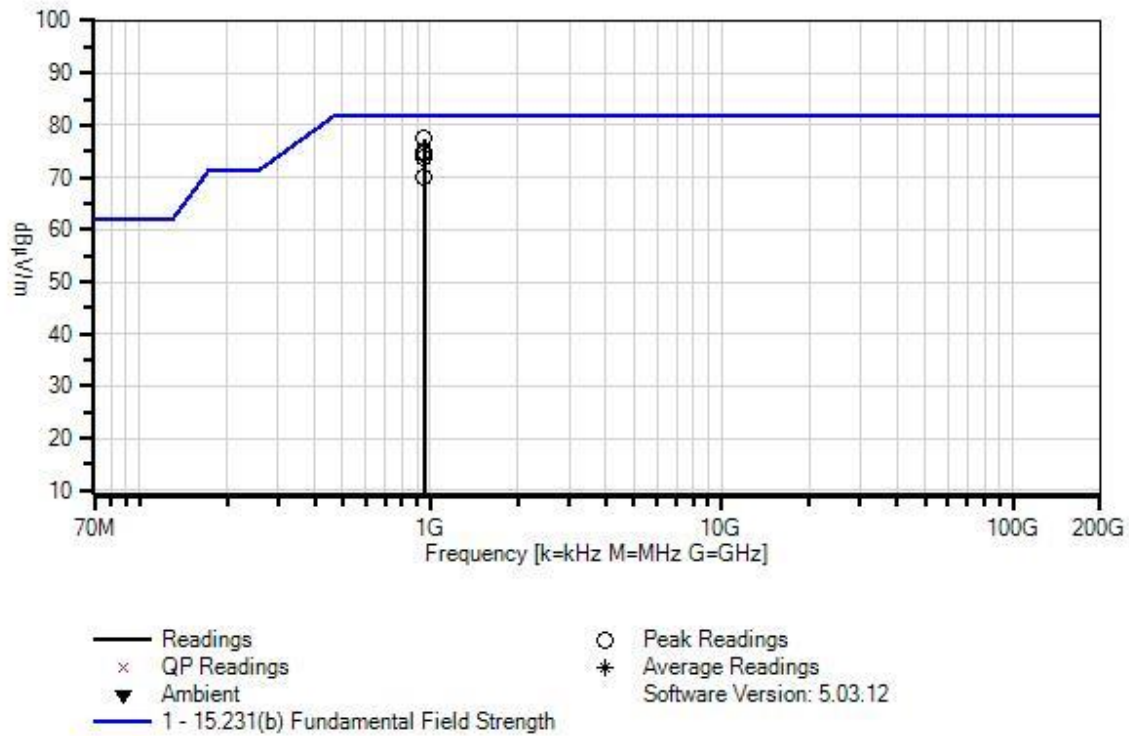
Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 6			

Test Conditions / Notes:

<p>The EUT is placed on Styrofoam platform. USB port is connected to a touchscreen tablet. The EUT is connected to 13.8Vdc external power supply. The computer is sending command to the EUT using software MC3 SuperRaptor Test ver.4.0.3.5.</p> <p>The EUT is set to continuously transmit.</p> <p>Operating frequency: 952MHz Frequency of measurement: 952MHz RBW=2MHz, VBW=6MHz</p> <p>Note: The EUT is rotated in 3 orthogonal axis. Only the worst-case emissions are recorded.</p>
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Ittron, Inc. WD#: 103955 Sequence#: 2 Date: 6/16/2020
15.231(b) Fundamental Field Strength Test Distance: 3 Meters Vert



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN00309	Preamp	8447D	12/24/2019	12/24/2021
T2	ANP05050	Cable	RG223/U	12/24/2018	12/24/2020
T3	ANP05198	Cable-Amplitude +15C to +45C (dB)	8268	12/4/2018	12/4/2020
T4	AN02869	Spectrum Analyzer	E4440A	7/25/2019	7/25/2020
T5	AN01993	Biconilog Antenna	CBL6111C	6/11/2019	6/11/2021
T6	ANP05281	Attenuator	1B	4/7/2020	4/7/2022

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2 T6	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dB μ V	dB	dB	dB	dB	Table	dB μ V/m	dB μ V/m	dB	Ant
1	951.350M	67.9	-27.2 +24.3	+0.4 +6.0	+6.0	+0.0	+0.0	77.4	81.9 Y	-4.5	Vert
2	951.317M	65.4	-27.2 +24.3	+0.4 +6.0	+6.0	+0.0	+0.0	74.9	81.9 X	-7.0	Horiz
3	951.350M	65.3	-27.2 +24.3	+0.4 +6.0	+6.0	+0.0	+0.0	74.8	81.9 Z	-7.1	Horiz
4	951.383M	64.9	-27.2 +24.3	+0.4 +6.0	+6.0	+0.0	+0.0	74.4	81.9 Z	-7.5	Vert
5	951.367M	64.1	-27.2 +24.3	+0.4 +6.0	+6.0	+0.0	+0.0	73.6	81.9 X	-8.3	Vert
6	951.417M	60.4	-27.2 +24.3	+0.4 +6.0	+6.0	+0.0	+0.0	69.9	81.9 Y	-12.0	Horiz

Test Location: CKC Laboratories Inc. • 110 N. Olinda Pl. • Brea, CA 92823 • 714-993-6112
 Customer: **Itron, Inc.**
 Specification: **15.231(b) Fundamental Field Strength**
 Work Order #: **103955** Date: 6/16/2020
 Test Type: **Maximized Emissions** Time: 10:35:26
 Tested By: Don Nguyen Sequence#: 3
 Software: EMITest 5.03.12

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 7			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 7			

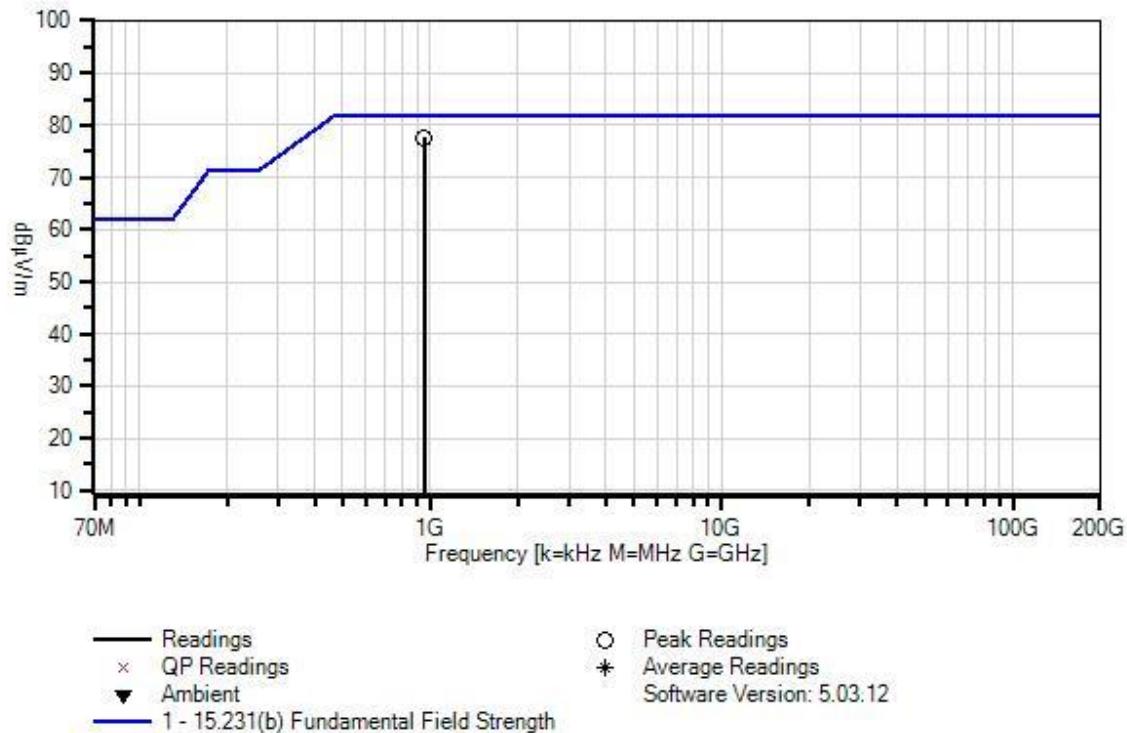
Test Conditions / Notes:

The EUT is placed on Styrofoam platform. USB port is connected to a touchscreen tablet. The EUT is connected to 13.8Vdc external power supply. The computer is sending command to the EUT using software MC3 SuperRaptor Test ver.4.0.3.5.
 The EUT is set to continuously transmit.

Operating frequency: 952MHz
 Frequency of measurement: 952MHz
 RBW=2MHz, VBW=6MHz

Note: The EUT is rotated in 3 orthogonal axis. Only the worst-case emissions are recorded.

Ittron, Inc. W/O#: 103955 Sequence#: 3 Date: 6/16/2020
15.231(b) Fundamental Field Strength Test Distance: 3 Meters Vert



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN00309	Preamp	8447D	12/24/2019	12/24/2021
T2	ANP05050	Cable	RG223/U	12/24/2018	12/24/2020
T3	ANP05198	Cable-Amplitude +15C to +45C (dB)	8268	12/4/2018	12/4/2020
T4	AN02869	Spectrum Analyzer	E4440A	7/25/2019	7/25/2020
T5	AN01993	Biconilog Antenna	CBL6111C	6/11/2019	6/11/2021
T6	ANP05281	Attenuator	1B	4/7/2020	4/7/2022

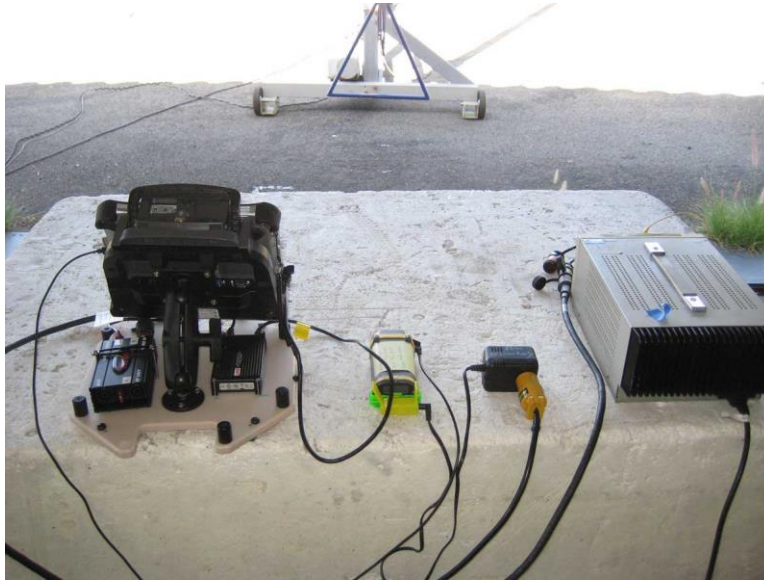
Measurement Data:

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	951.283M	68.2	-27.2	+0.4	+6.0	+0.0	+0.0	77.7	81.9	-4.2	Vert
			+24.3	+6.0							

Test Setup Photo(s)



X Axis, Configuration 5



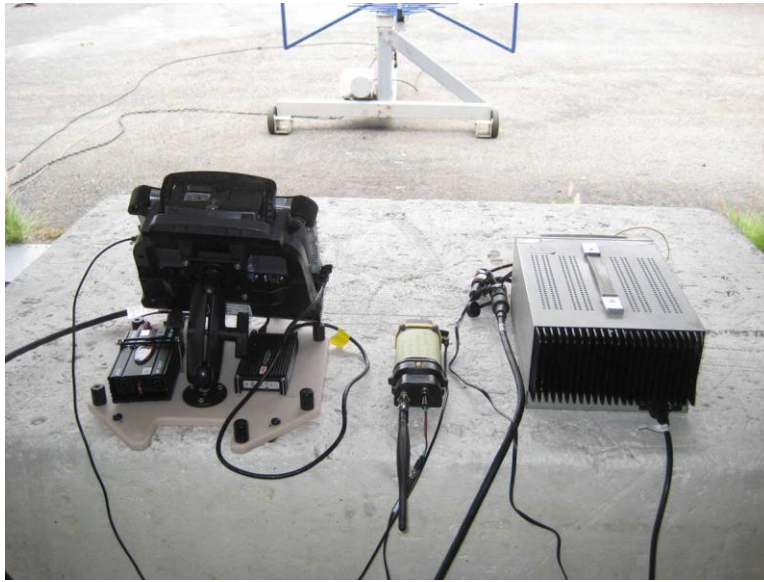
X Axis, Configuration 5



Y Axis, Configuration 5



Z Axis, Configuration 5



X Axis, Configuration 6



X Axis, Configuration 6



Y Axis, Configuration 6



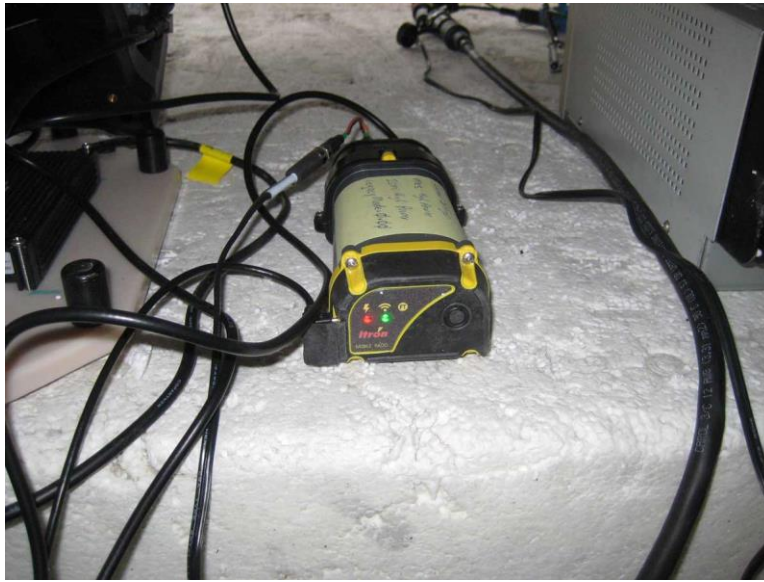
Z Axis, Configuration 6



Configuration 7



Configuration 7



X Axis, Configuration 7



Y Axis, Configuration 7



Z Axis, Configuration 7

15.225(a) Periodic Operation Requirements

Test Setup/Conditions			
Test Location:	Brea Lab A	Test Engineer:	Don Nguyen
Test Method:	ANSI C63.10 (2013)	Test Date(s):	6/22/2020
Configuration:	5		
Test Setup:	<p>The EUT is placed on Styrofoam platform. USB port is connected to a touchscreen tablet. The EUT is connected to DC power supply. The computer sending command to the EUT using software MC3 SuperRaptor Test ver.4.0.3.5.</p> <p>Operating frequency: 952MHz Frequency of measurement: 952MHz RBW=1MHz, VBW=3MHz</p>		

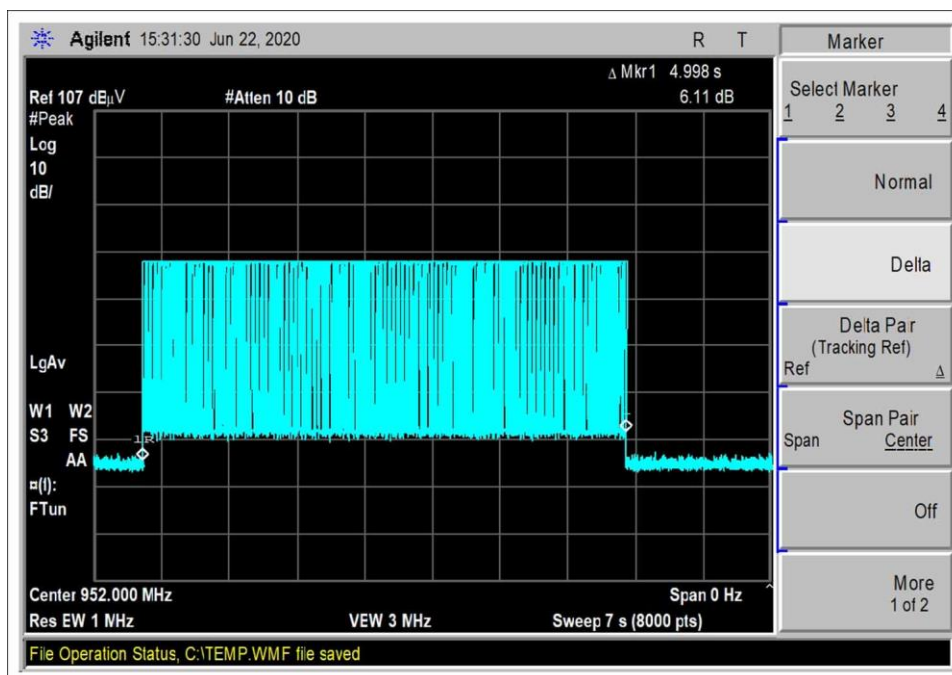
Environmental Conditions			
Temperature (°C)	25	Relative Humidity (%):	51

Test Equipment					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
00309	Preamplifier	HP	8447D	12/24/2019	12/24/2021
P05050	Cable	Pasternack	RG223/U	12/24/2018	12/24/2020
P05198	Cable	Belden	8268	12/4/2018	12/4/2020
02869	Spectrum Analyzer	Agilent	E4440A	7/25/2019	7/25/2020
01993	Biconilog Antenna	Chase	CBL6111C	6/11/2019	6/11/2021
P05281	Attenuator	Weinschel	1B	4/7/2020	4/7/2022

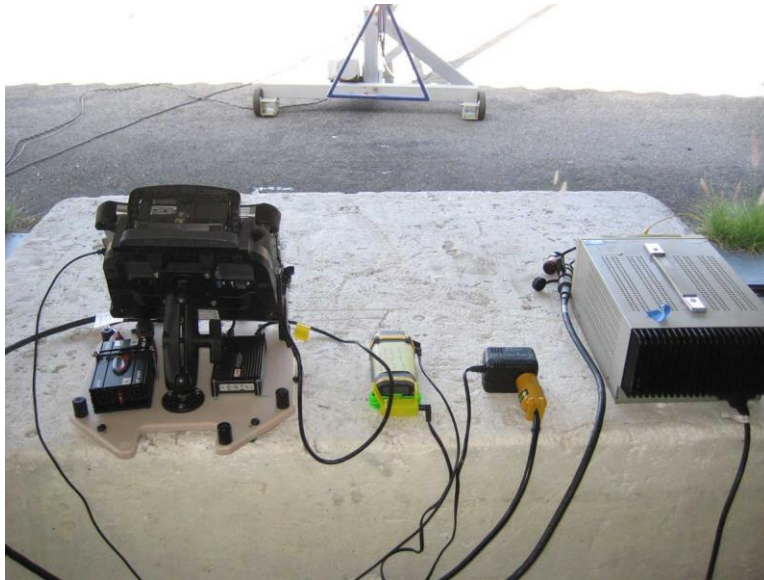
15.231(a)(1) Manual Triggered Deactivation Time

Test Data Summary					
Frequency (MHz)	Antenna Port	Modulation	Measured (s)	Limit (s)	Results
952	Integral	OOK	4.998	≤5	Pass

Plot(s)



Test Setup Photo(s)



15.231(a)(2) Automatic Triggered Deactivation Time

Test Summary
NA = Not applicable because the EUT cannot be activated automatically.

15.231(a)(3) Polling or Supervision Transmission Duration

Test Summary
NA = Not applicable because the EUT has no polling or supervision transmission mode.

15.231(a)(4) Alarm Condition Transmission Duration

Test Summary
NA = Not applicable because the EUT has no alarm condition transmission mode.

15.231(a)(5) Setup Transmission Duration

Test Summary
NA = Not applicable because the EUT has no alarm condition transmission mode.

15.231(b) Radiated Emissions

Test Setup / Conditions / Data

Test Location: CKC Laboratories Inc. • 110 N. Olinda Pl. • Brea, CA 92823 • 714-993-6112
 Customer: **Itron, Inc.**
 Specification: **15.231(b) Spurious Field Strength (>470 MHz Transmitter)**
 Work Order #: **103955** Date: 6/23/2020
 Test Type: **Maximized Emissions** Time: 13:11:57
 Tested By: Don Nguyen Sequence#: 2
 Software: EMITest 5.03.12

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 5			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 5			

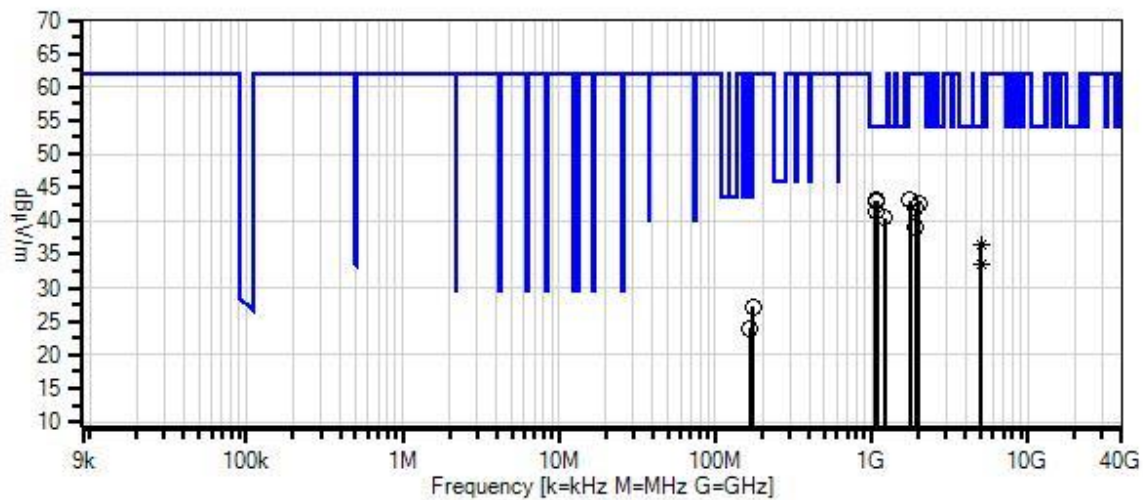
Test Conditions / Notes:

The EUT is placed on Styrofoam platform. USB port is connected to a touchscreen tablet. The EUT is connected to 5Vdc charger. The computer is sending command to the EUT using software MC3 SuperRaptor Test ver.4.0.3.5. The EUT is set to continuously transmit.
 The EUT is rotated in 3 orthogonal axis. Only the worst-case emissions are recorded
 Operating frequency: 952MHz
 Frequency of measurement: 9kHz-9.28GHz
 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
 Site A
 Temperature: 24.7°C
 Relative Humidity: 49%

The worst case emission were verified with power supply on and off the table. No change in emission level was observed.

Ittron, Inc. WO#: 103955 Sequence#: 2 Date: 6/23/2020
15.231(b) Spurious Field Strength (>470 MHz Transmitter) Test Distance: 3 Meters Vert



— Readings
○ Peak Readings
× QP Readings
* Average Readings
▼ Ambient
Software Version: 5.03.12
— 1 - 15.231(b) Spurious Field Strength (>470 MHz Transmitter)

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN00309	Preamp	8447D	12/24/2019	12/24/2021
T2	ANP05050	Cable	RG223/U	12/24/2018	12/24/2020
T3	ANP05198	Cable-Amplitude +15C to +45C (dB)	8268	12/4/2018	12/4/2020
T4	AN01993	Biconilog Antenna	CBL6111C	6/11/2019	6/11/2021
T5	ANP05281	Attenuator	1B	4/7/2020	4/7/2022
T6	AN02672	Spectrum Analyzer	E4446A	3/13/2019	3/13/2021
T7	AN00786	Preamp	83017A	5/20/2020	5/20/2022
T8	AN00849	Horn Antenna	3115	3/17/2020	3/17/2022
T9	ANP06360	Cable	L1-PNMNM-48	8/8/2019	8/8/2021
T10	ANP07243	Cable	32022-29094K- 29094K-24TC	5/29/2020	5/29/2022

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1 T5 T9	T2 T6 T10	T3 T7	T4 T8	Dist	Corr	Spec	Margin	Polar
	MHz	dB μ V	dB	dB	dB	dB	Table	dB μ V/m	dB μ V/m	dB	Ant
1	1067.500M	56.4	+0.0 +0.0 +2.1	+0.0 +0.0 +0.3	+0.0 -40.6	+0.0 +24.9	+0.0	43.1	54.0	-10.9	Horiz
2	1085.000M	56.0	+0.0 +0.0 +2.1	+0.0 +0.0 +0.3	+0.0 -40.5	+0.0 +25.0	+0.0	42.9	54.0	-11.1	Horiz
3	1073.500M	54.6	+0.0 +0.0 +2.1	+0.0 +0.0 +0.3	+0.0 -40.6	+0.0 +24.9	+0.0	41.3	54.0	-12.7	Vert
4	1210.000M	52.5	+0.0 +0.0 +2.2	+0.0 +0.0 +0.4	+0.0 -39.9	+0.0 +25.3	+0.0	40.5	54.0	-13.5	Horiz
5	4994.000M Ave	35.2	+0.0 +0.0 +4.5	+0.0 +0.0 +0.7	+0.0 -37.5	+0.0 +33.5	+0.0	36.4	54.0	-17.6	Vert
^	4994.000M	54.1	+0.0 +0.0 +4.5	+0.0 +0.0 +0.7	+0.0 -37.5	+0.0 +33.5	+0.0	55.3	54.0	+1.3	Vert
7	1751.000M	52.3	+0.0 +0.0 +2.8	+0.0 +0.0 +0.4	+0.0 -38.8	+0.0 +26.4	+0.0	43.1	61.9	-18.8	Vert
8	2010.000M	50.0	+0.0 +0.0 +3.0	+0.0 +0.0 +0.5	+0.0 -38.7	+0.0 +27.8	+0.0	42.6	61.9	-19.3	Horiz
9	168.200M	33.5	-28.0 +5.9 +0.0	+0.2 +0.0 +0.0	+2.4 +0.0	+9.9 +0.0	+0.0	23.9	43.5	-19.6	Horiz
10	1917.500M	49.8	+0.0 +0.0 +2.9	+0.0 +0.0 +0.5	+0.0 -38.7	+0.0 +27.4	+0.0	41.9	61.9	-20.0	Horiz
11	4995.000M Ave	32.3	+0.0 +0.0 +4.5	+0.0 +0.0 +0.7	+0.0 -37.5	+0.0 +33.5	+0.0	33.5	54.0	-20.5	Horiz
^	4995.000M	50.3	+0.0 +0.0 +4.5	+0.0 +0.0 +0.7	+0.0 -37.5	+0.0 +33.5	+0.0	51.5	54.0	-2.5	Horiz
13	1913.500M	47.2	+0.0 +0.0 +2.9	+0.0 +0.0 +0.5	+0.0 -38.7	+0.0 +27.3	+0.0	39.2	61.9	-22.7	Vert
14	173.800M	37.2	-28.0 +5.9 +0.0	+0.2 +0.0 +0.0	+2.4 +0.0	+9.5 +0.0	+0.0	27.2	61.9	-34.7	Vert

Test Location: CKC Laboratories Inc. • 110 N. Olinda Pl. • Brea, CA 92823 • 714-993-6112
 Customer: **Itron, Inc.**
 Specification: **15.231(b) Spurious Field Strength (>470 MHz Transmitter)**
 Work Order #: **103955** Date: 6/22/2020
 Test Type: **Maximized Emissions** Time: 13:47:42
 Tested By: Don Nguyen Sequence#: 3
 Software: EMITest 5.03.12

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 6			

Support Equipment:

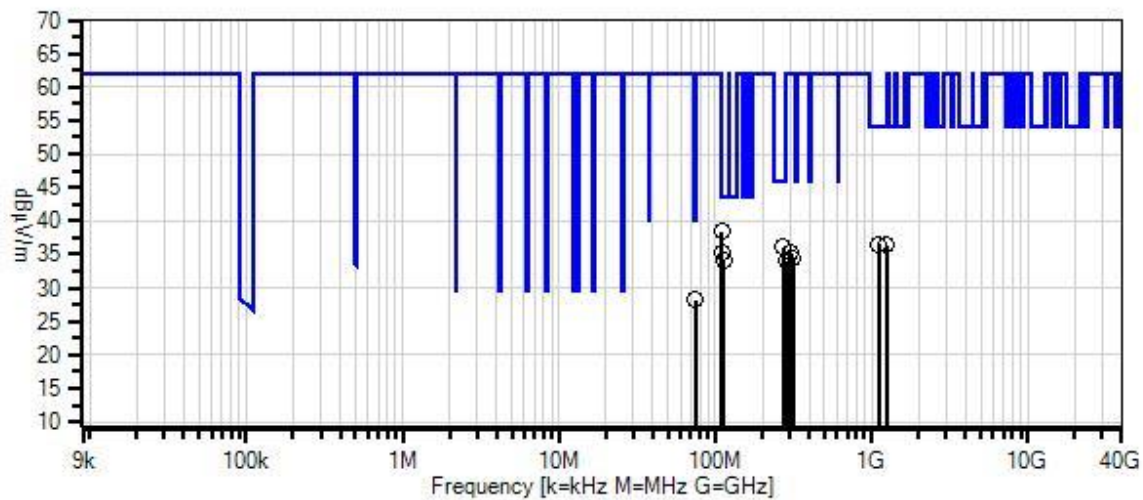
Device	Manufacturer	Model #	S/N
Configuration 6			

Test Conditions / Notes:

The EUT is placed on Styrofoam platform. USB port is connected to a touchscreen tablet. The EUT is connected to DC power supply. The computer is sending command to the EUT using software MC3 SuperRaptor Test ver.4.0.3.5.
 The EUT is set to continuously transmit.
 The EUT is rotated in 3 orthogonal axis. Only the worst-case emissions are recorded
 Operating frequency: 952MHz
 Frequency of measurement: 9kHz-9.28GHz
 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
 Site A
 Temperature: 24.7°C
 Relative Humidity: 49%

Ittron, Inc. WO#: 103955 Sequence#: 3 Date: 6/22/2020
15.231(b) Spurious Field Strength (>470 MHz Transmitter) Test Distance: 3 Meters Vert



— Readings
○ Peak Readings
× QP Readings
* Average Readings
▼ Ambient
Software Version: 5.03.12
— 1 - 15.231(b) Spurious Field Strength (>470 MHz Transmitter)

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN00314	Loop Antenna	6502	4/13/2020	4/13/2022
T1	AN00309	Preamp	8447D	12/24/2019	12/24/2021
T2	ANP05050	Cable	RG223/U	12/24/2018	12/24/2020
T3	ANP05198	Cable-Amplitude +15C to +45C (dB)	8268	12/4/2018	12/4/2020
T4	AN01993	Biconilog Antenna	CBL6111C	6/11/2019	6/11/2021
T5	ANP05281	Attenuator	1B	4/7/2020	4/7/2022
T6	AN02672	Spectrum Analyzer	E4446A	3/13/2019	3/13/2021
T7	AN00786	Preamp	83017A	5/20/2020	5/20/2022
T8	AN00849	Horn Antenna	3115	3/17/2020	3/17/2022
T9	ANP06360	Cable	L1-PNMNM-48	8/8/2019	8/8/2021
T10	ANP07243	Cable	32022-29094K- 29094K-24TC	5/29/2020	5/29/2022

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1 T5 T9	T2 T6 T10	T3 T7	T4 T8	Dist	Corr	Spec	Margin	Polar
	MHz	dB μ V	dB	dB	dB	dB	Table	dB μ V/m	dB μ V/m	dB	Ant
1	109.900M	47.9	-28.0 +5.9 +0.0	+0.1 +0.0 +0.0	+1.9 +0.0 +0.0	+10.6 +0.0	+0.0	38.4	43.5	-5.1	Vert
2	110.500M	44.8	-28.0 +5.9 +0.0	+0.1 +0.0 +0.0	+1.9 +0.0 +0.0	+10.7 +0.0	+0.0	35.4	43.5	-8.1	Vert
3	113.500M	43.3	-28.0 +5.9 +0.0	+0.1 +0.0 +0.0	+1.9 +0.0 +0.0	+10.8 +0.0	+0.0	34.0	43.5	-9.5	Vert
4	271.750M	42.0	-27.9 +5.9 +0.0	+0.2 +0.0 +0.0	+3.0 +0.0 +0.0	+12.8 +0.0	+0.0	36.0	46.0	-10.0	Horiz
5	74.850M	41.7	-28.1 +5.9 +0.0	+0.1 +0.0 +0.0	+1.6 +0.0 +0.0	+7.0 +0.0	+0.0	28.2	40.0	-11.8	Horiz
6	283.480M	39.6	-27.9 +5.9 +0.0	+0.3 +0.0 +0.0	+3.1 +0.0 +0.0	+13.0 +0.0	+0.0	34.0	46.0	-12.0	Vert
7	1112.500M	49.4	+0.0 +0.0 +2.1	+0.0 +0.0 +0.3	+0.0 -40.3 +25.0	+0.0 +25.0	+0.0	36.5	54.0	-17.5	Horiz
8	1255.000M	48.0	+0.0 +0.0 +2.3	+0.0 +0.0 +0.4	+0.0 -39.7 +25.4	+0.0 +25.4	+0.0	36.4	61.9	-25.5	Vert
9	302.480M	40.5	-27.9 +5.9 +0.0	+0.3 +0.0 +0.0	+3.2 +0.0 +0.0	+13.4 +0.0	+0.0	35.4	61.9	-26.5	Vert
10	312.742M	39.2	-27.9 +5.9 +0.0	+0.3 +0.0 +0.0	+3.3 +0.0 +0.0	+13.7 +0.0	+0.0	34.5	61.9	-27.4	Horiz

Test Location: CKC Laboratories Inc. • 110 N. Olinda Pl. • Brea, CA 92823 • 714-993-6112
 Customer: **Itron, Inc.**
 Specification: **15.231(b) Spurious Field Strength (>470 MHz Transmitter)**
 Work Order #: **103955** Date: 6/22/2020
 Test Type: **Maximized Emissions** Time: 09:33:28
 Tested By: Don Nguyen Sequence#: 4
 Software: EMITest 5.03.12

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 7			

Support Equipment:

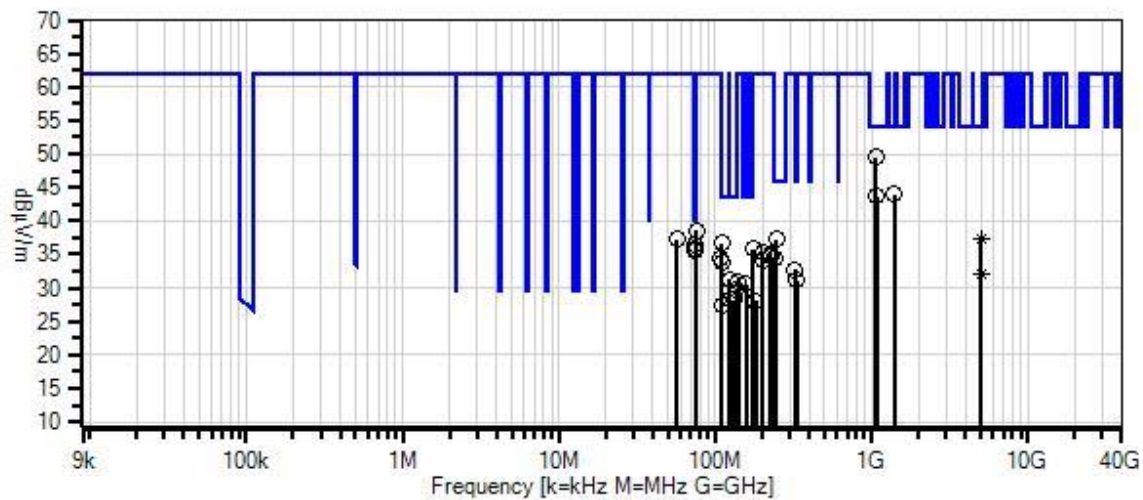
Device	Manufacturer	Model #	S/N
Configuration 7			

Test Conditions / Notes:

The EUT is placed on Styrofoam platform. USB port is connected to a touchscreen tablet. The EUT is connected to DC power supply. The computer is sending command to the EUT using software MC3 SuperRaptor Test ver.4.0.3.5.
 The EUT is set to continuously transmit.
 The EUT is rotated in 3 orthogonal axis. Only the worst-case emissions are recorded
 Operating frequency: 952MHz
 Frequency of measurement: 9kHz-9.28GHz
 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
 Site A
 Temperature: 24.7°C
 Relative Humidity: 49%

Itron, Inc. WO#: 103955 Sequence#: 4 Date: 6/22/2020
15.231(b) Spurious Field Strength (>470 MHz Transmitter) Test Distance: 3 Meters Horiz



— Readings
○ Peak Readings
× QP Readings
* Average Readings
▼ Ambient
Software Version: 5.03.12
— 1 - 15.231(b) Spurious Field Strength (>470 MHz Transmitter)

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN00314	Loop Antenna	6502	4/13/2020	4/13/2022
T1	AN00309	Preamp	8447D	12/24/2019	12/24/2021
T2	ANP05050	Cable	RG223/U	12/24/2018	12/24/2020
T3	ANP05198	Cable-Amplitude +15C to +45C (dB)	8268	12/4/2018	12/4/2020
T4	AN01993	Biconilog Antenna	CBL6111C	6/11/2019	6/11/2021
T5	ANP05281	Attenuator	1B	4/7/2020	4/7/2022
T6	AN02672	Spectrum Analyzer	E4446A	3/13/2019	3/13/2021
T7	AN00786	Preamp	83017A	5/20/2020	5/20/2022
T8	AN00849	Horn Antenna	3115	3/17/2020	3/17/2022
T9	ANP06360	Cable	L1-PNMNM-48	8/8/2019	8/8/2021
T10	ANP07243	Cable	32022-29094K- 29094K-24TC	5/29/2020	5/29/2022

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1 T5 T9	T2 T6 T10	T3 T7	T4 T8	Dist	Corr	Spec	Margin	Polar
	MHz	dB μ V	dB	dB	dB	dB	Table	dB μ V/m	dB μ V/m	dB	Ant
1	74.950M	49.4	-28.1 +5.9 +0.0	+0.1 +0.0 +0.0	+1.6 +0.0 +0.0	+7.0 +0.0 +0.0	+0.0	35.9	40.0	-4.1	Horiz
2	1071.000M	62.8	+0.0 +0.0 +2.1	+0.0 +0.0 +0.3	+0.0 -40.6 +24.9	+0.0 +0.0 +0.0	+0.0	49.5	54.0	-4.5	Horiz
3	110.780M	46.1	-28.0 +5.9 +0.0	+0.1 +0.0 +0.0	+1.9 +0.0 +0.0	+10.7 +0.0 +0.0	+0.0	36.7	43.5	-6.8	Vert
4	246.750M	44.0	-27.9 +5.9 +0.0	+0.2 +0.0 +0.0	+2.9 +0.0 +0.0	+12.1 +0.0 +0.0	+0.0	37.2	46.0	-8.8	Horiz
5	108.780M	43.9	-28.0 +5.9 +0.0	+0.1 +0.0 +0.0	+1.8 +0.0 +0.0	+10.6 +0.0 +0.0	+0.0	34.3	43.5	-9.2	Vert
6	110.380M	43.3	-28.0 +5.9 +0.0	+0.1 +0.0 +0.0	+1.9 +0.0 +0.0	+10.7 +0.0 +0.0	+0.0	33.9	43.5	-9.6	Vert
7	1400.500M	54.8	+0.0 +0.0 +2.5	+0.0 +0.0 +0.4	+0.0 -39.3 +25.6	+0.0 +0.0 +0.0	+0.0	44.0	54.0	-10.0	Horiz
8	1075.000M	57.0	+0.0 +0.0 +2.1	+0.0 +0.0 +0.3	+0.0 -40.6 +24.9	+0.0 +0.0 +0.0	+0.0	43.7	54.0	-10.3	Vert
9	240.520M	41.8	-27.9 +5.9 +0.0	+0.2 +0.0 +0.0	+2.8 +0.0 +0.0	+11.7 +0.0 +0.0	+0.0	34.5	46.0	-11.5	Vert
10	124.080M	40.1	-28.0 +5.9 +0.0	+0.1 +0.0 +0.0	+1.9 +0.0 +0.0	+11.3 +0.0 +0.0	+0.0	31.3	43.5	-12.2	Vert
11	136.680M	38.1	-28.0 +5.9 +0.0	+0.2 +0.0 +0.0	+2.1 +0.0 +0.0	+11.4 +0.0 +0.0	+0.0	29.7	43.5	-13.8	Vert
12	330.720M	35.2	-27.9 +5.9 +0.0	+0.3 +0.0 +0.0	+3.4 +0.0 +0.0	+14.2 +0.0 +0.0	+0.0	31.1	46.0	-14.9	Vert
13	131.750M	36.8	-28.0 +5.9 +0.0	+0.2 +0.0 +0.0	+2.0 +0.0 +0.0	+11.3 +0.0 +0.0	+0.0	28.2	43.5	-15.3	Horiz

14	109.650M	36.9	-28.0 +5.9 +0.0	+0.1 +0.0 +0.0	+1.9 +0.0 +0.0	+10.6 +0.0 +0.0	+0.0	27.4	43.5	-16.1	Horiz
15	4998.000M Ave	36.2	+0.0 +0.0 +4.5	+0.0 +0.0 +0.7	+0.0 -37.5 +33.5	+0.0 +0.0 +0.0	+0.0	37.4	54.0	-16.6	Vert
^	4998.000M	56.0	+0.0 +0.0 +4.5	+0.0 +0.0 +0.7	+0.0 -37.5 +33.5	+0.0 +0.0 +0.0	+0.0	57.2	54.0	+3.2	Vert
17	4988.000M Ave	31.0	+0.0 +0.0 +4.5	+0.0 +0.0 +0.7	+0.0 -37.5 +33.5	+0.0 +0.0 +0.0	+0.0	32.2	54.0	-21.8	Horiz
^	4988.000M	53.4	+0.0 +0.0 +4.5	+0.0 +0.0 +0.7	+0.0 -37.5 +33.5	+0.0 +0.0 +0.0	+0.0	54.6	54.0	+0.6	Horiz
19	75.380M	52.1	-28.1 +5.9 +0.0	+0.1 +0.0 +0.0	+1.6 +0.0 +0.0	+7.0 +0.0 +0.0	+0.0	38.6	61.9	-23.3	Vert
20	56.525M	50.8	-28.1 +5.9 +0.0	+0.1 +0.0 +0.0	+1.3 +0.0 +0.0	+7.2 +0.0 +0.0	+0.0	37.2	61.9	-24.7	Vert
21	74.680M	50.2	-28.1 +5.9 +0.0	+0.1 +0.0 +0.0	+1.5 +0.0 +0.0	+6.9 +0.0 +0.0	+0.0	36.5	61.9	-25.4	Vert
22	173.250M	45.8	-28.0 +5.9 +0.0	+0.2 +0.0 +0.0	+2.4 +0.0 +0.0	+9.5 +0.0 +0.0	+0.0	35.8	61.9	-26.1	Horiz
23	75.300M	49.2	-28.1 +5.9 +0.0	+0.1 +0.0 +0.0	+1.6 +0.0 +0.0	+7.0 +0.0 +0.0	+0.0	35.7	61.9	-26.2	Horiz
24	201.880M	45.7	-28.0 +5.9 +0.0	+0.2 +0.0 +0.0	+2.6 +0.0 +0.0	+9.0 +0.0 +0.0	+0.0	35.4	61.9	-26.5	Vert
25	225.325M	43.3	-27.9 +5.9 +0.0	+0.2 +0.0 +0.0	+2.8 +0.0 +0.0	+10.7 +0.0 +0.0	+0.0	35.0	61.9	-26.9	Vert
26	226.000M	42.8	-27.9 +5.9 +0.0	+0.2 +0.0 +0.0	+2.8 +0.0 +0.0	+10.8 +0.0 +0.0	+0.0	34.6	61.9	-27.3	Horiz
27	201.750M	44.3	-28.0 +5.9 +0.0	+0.2 +0.0 +0.0	+2.6 +0.0 +0.0	+9.0 +0.0 +0.0	+0.0	34.0	61.9	-27.9	Horiz
28	321.320M	37.1	-27.9 +5.9 +0.0	+0.3 +0.0 +0.0	+3.3 +0.0 +0.0	+14.0 +0.0 +0.0	+0.0	32.7	61.9	-29.2	Vert
29	141.450M	39.4	-28.0 +5.9 +0.0	+0.2 +0.0 +0.0	+2.1 +0.0 +0.0	+11.4 +0.0 +0.0	+0.0	31.0	61.9	-30.9	Horiz
30	158.780M	39.4	-28.0 +5.9 +0.0	+0.2 +0.0 +0.0	+2.3 +0.0 +0.0	+10.7 +0.0 +0.0	+0.0	30.5	61.9	-31.4	Vert

31	122.950M	37.2	-28.0 +5.9 +0.0	+0.1 +0.0 +0.0	+1.9 +0.0 +0.0	+11.3 +0.0 +0.0	+0.0	28.4	61.9	-33.5	Horiz
32	181.180M	38.5	-28.0 +5.9 +0.0	+0.2 +0.0 +0.0	+2.4 +0.0 +0.0	+9.1 +0.0 +0.0	+0.0	28.1	61.9	-33.8	Vert

Test Location: CKC Laboratories Inc. • 110 N. Olinda Pl. • Brea, CA 92823 • 714-993-6112
 Customer: **Itron, Inc.**
 Specification: **15.231(b) Spurious Field Strength (>470 MHz Transmitter)**
 Work Order #: **103955** Date: 6/23/2020
 Test Type: **Maximized Emissions** Time: 13:06:35
 Tested By: Don Nguyen Sequence#: 3
 Software: EMITest 5.03.12

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 8			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 8			

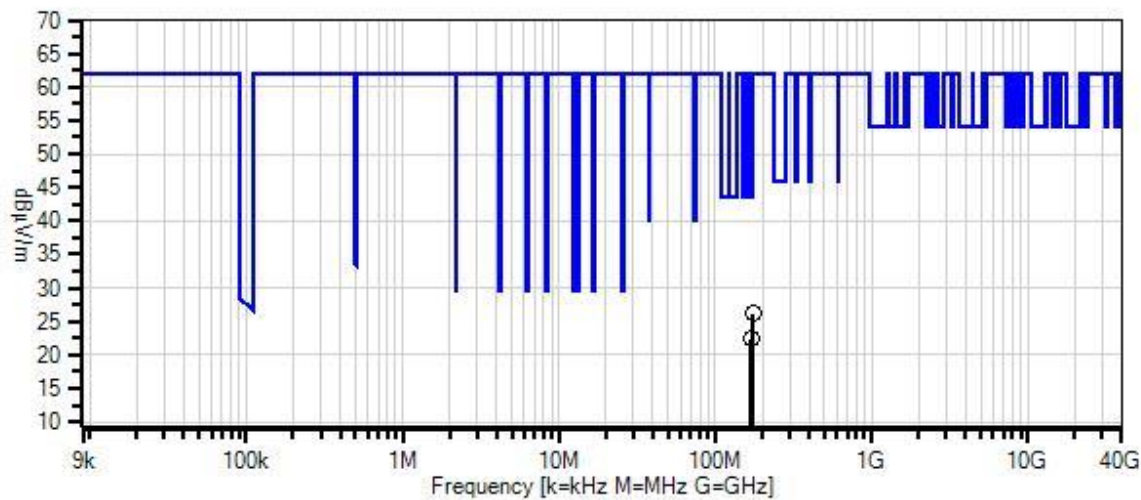
Test Conditions / Notes:

The EUT is placed on Styrofoam platform. USB port is connected to a touchscreen tablet. The EUT is connected to 5Vdc charger. The computer is sending command to the EUT using software MC3 SuperRaptor Test ver.4.0.3.5. The EUT is set to continuously transmit.
 The EUT is rotated in 3 orthogonal axis. Only the worst-case emissions are recorded
 Operating frequency: 952MHz
 Frequency of measurement: 9kHz-9.28GHz
 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
 Site A
 Temperature: 24.7°C
 Relative Humidity: 49%

 The worst case emission were verified with power supply on and off the table. No change in emission level was observed.
No emission is detected above 1GHz.

Itron, Inc. WO#: 103955 Sequence#: 3 Date: 6/23/2020
15.231(b) Spurious Field Strength (>470 MHz Transmitter) Test Distance: 3 Meters Vert



— Readings
○ Peak Readings
× QP Readings
* Average Readings
▼ Ambient
Software Version: 5.03.12
— 1 - 15.231(b) Spurious Field Strength (>470 MHz Transmitter)

Test Equipment:

ID	Asset #	Description	Model	Cal Date	Cal Due Date
T1	AN00309	Preamp	8447D	12/24/2019	12/24/2021
T2	ANP05050	Cable	RG223/U	12/24/2018	12/24/2020
T3	ANP05198	Cable-Amplitude +15C to +45C (dB)	8268	12/4/2018	12/4/2020
T4	AN01993	Biconilog Antenna	CBL6111C	6/11/2019	6/11/2021
T5	ANP05281	Attenuator	1B	4/7/2020	4/7/2022
T6	AN02672	Spectrum Analyzer	E4446A	3/13/2019	3/13/2021
	AN00786	Preamp	83017A	5/20/2020	5/20/2022
	AN00849	Horn Antenna	3115	3/17/2020	3/17/2022
	ANP06360	Cable	L1-PNMNM-48	8/8/2019	8/8/2021
	ANP07243	Cable	32022-29094K- 29094K-24TC	5/29/2020	5/29/2022

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2 T6	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dB μ V	dB	dB	dB	dB	Table	dB μ V/m	dB μ V/m	dB	Ant
1	168.410M	32.0	+2.4 +0.2	+5.9 +0.0	+9.9	-28.0	+0.0	22.4	43.5	-21.1	Horiz
2	173.800M	36.1	- 28.0 +5.9	+0.2 +0.0	+2.4	+9.5	+0.0	26.1	61.9	-35.8	Vert

Test Location: CKC Laboratories Inc. • 110 N. Olinda Pl. • Brea, CA 92823 • 714-993-6112
 Customer: **Itron, Inc.**
 Specification: **15.231(b) Spurious Field Strength (>470 MHz Transmitter)**
 Work Order #: **103955** Date: 6/18/2020
 Test Type: **Maximized Emissions** Time: 16:05:11
 Tested By: Don Nguyen Sequence#: 4
 Software: EMITest 5.03.12

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 9			

Support Equipment:

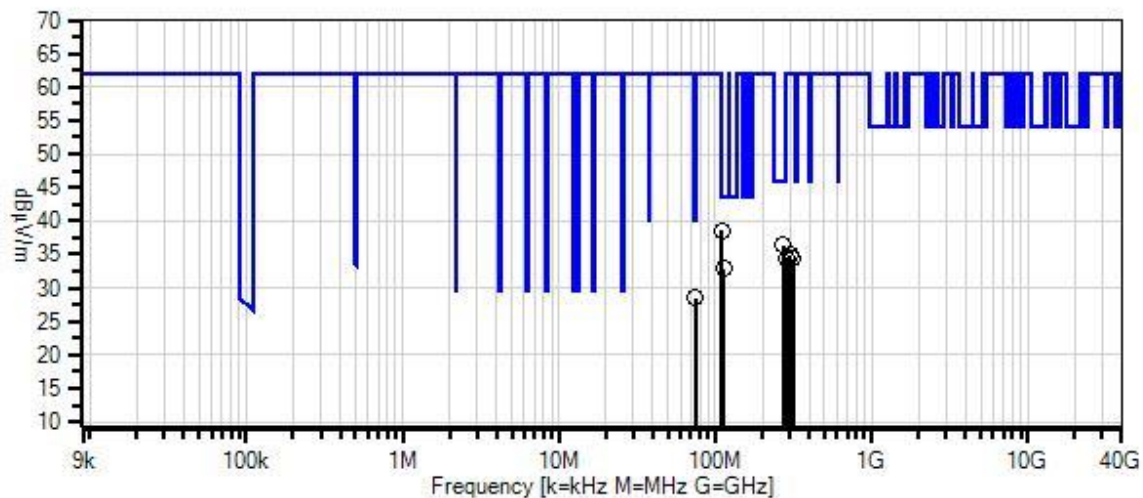
Device	Manufacturer	Model #	S/N
Configuration 9			

Test Conditions / Notes:

The EUT is placed on Styrofoam platform. USB port is connected to a touchscreen tablet. The EUT is connected to DC power supply. The computer is sending command to the EUT using software MC3 SuperRaptor Test ver.4.0.3.5.
 The EUT is set to continuously transmit.
 The EUT is rotated in 3 orthogonal axis. Only the worst-case emissions are recorded
 Operating frequency: 952MHz
 Frequency of measurement: 9kHz-9.28GHz
 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
 Site A
 Temperature: 24.7°C
 Relative Humidity: 49%
Note: No emission is detected above 1GHz.

Ittron, Inc. WO#: 103955 Sequence#: 4 Date: 6/18/2020
15.231(b) Spurious Field Strength (>470 MHz Transmitter) Test Distance: 3 Meters Vert



— Readings
○ Peak Readings
× QP Readings
* Average Readings
▼ Ambient
Software Version: 5.03.12
— 1 - 15.231(b) Spurious Field Strength (>470 MHz Transmitter)

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN00314	Loop Antenna	6502	4/13/2020	4/13/2022
T1	AN00309	Preamp	8447D	12/24/2019	12/24/2021
T2	ANP05050	Cable	RG223/U	12/24/2018	12/24/2020
T3	ANP05198	Cable-Amplitude +15C to +45C (dB)	8268	12/4/2018	12/4/2020
T4	AN01993	Biconilog Antenna	CBL6111C	6/11/2019	6/11/2021
T5	ANP05281	Attenuator	1B	4/7/2020	4/7/2022
T6	AN02672	Spectrum Analyzer	E4446A	3/13/2019	3/13/2021
	AN00786	Preamp	83017A	5/20/2020	5/20/2022
	AN00849	Horn Antenna	3115	3/17/2020	3/17/2022
	ANP06360	Cable	L1-PNMNM-48	8/8/2019	8/8/2021
	ANP07243	Cable	32022-29094K- 29094K-24TC	5/29/2020	5/29/2022

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2 T6	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dB μ V	dB	dB	dB	dB	Table	dB μ V/m	dB μ V/m	dB	Ant
1	110.000M	48.0	-28.0 +5.9	+0.1 +0.0	+1.9	+10.6	+0.0	38.5	43.5	-5.0	Vert
2	272.000M	42.4	-27.9 +5.9	+0.2 +0.0	+3.0	+12.8	+0.0	36.4	46.0	-9.6	Horiz
3	113.900M	42.0	-28.0 +5.9	+0.1 +0.0	+1.9	+10.9	+0.0	32.8	43.5	-10.7	Vert
4	74.900M	42.0	-28.1 +5.9	+0.1 +0.0	+1.6	+7.0	+0.0	28.5	40.0	-11.5	Horiz
5	283.500M	40.0	-27.9 +5.9	+0.3 +0.0	+3.1	+13.0	+0.0	34.4	46.0	-11.6	Vert
6	302.600M	40.0	-27.9 +5.9	+0.3 +0.0	+3.2	+13.4	+0.0	34.9	61.9	-27.0	Vert
7	312.800M	39.0	-27.9 +5.9	+0.3 +0.0	+3.3	+13.7	+0.0	34.3	61.9	-27.6	Horiz

Test Location: CKC Laboratories Inc. • 110 N. Olinda Pl. • Brea, CA 92823 • 714-993-6112
 Customer: **Itron, Inc.**
 Specification: **15.231(b) Spurious Field Strength (>470 MHz Transmitter)**
 Work Order #: **103955** Date: 6/22/2020
 Test Type: **Maximized Emissions** Time: 09:48:01
 Tested By: Don Nguyen Sequence#: 5
 Software: EMITest 5.03.12

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 10			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 10			

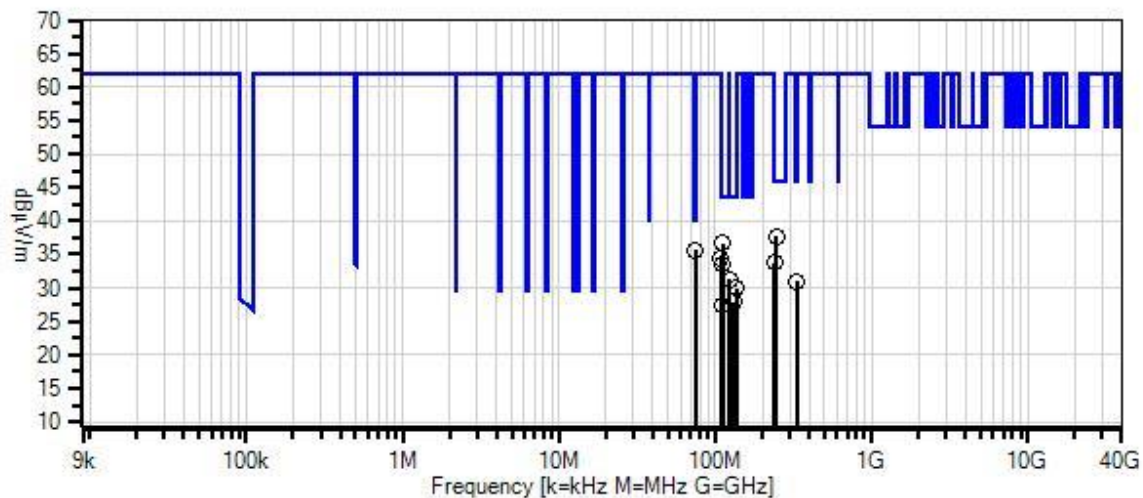
Test Conditions / Notes:

The EUT is placed on Styrofoam platform. USB port is connected to a touchscreen tablet. The EUT is connected to DC power supply. The computer is sending command to the EUT using software MC3 SuperRaptor Test ver.4.0.3.5.
 The EUT is set to continuously transmit.
 The EUT is rotated in 3 orthogonal axis. Only the worst-case emissions are recorded
 Operating frequency: 952MHz
 Frequency of measurement: 9kHz-9.28GHz
 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
 Site A
 Temperature: 24.7°C
 Relative Humidity: 49%

Note: No emission above 1GHz is detected.

Itron, Inc. WO#: 103955 Sequence#: 5 Date: 6/22/2020
15.231(b) Spurious Field Strength (>470 MHz Transmitter) Test Distance: 3 Meters Horiz



— Readings
○ Peak Readings
× QP Readings
* Average Readings
▼ Ambient
Software Version: 5.03.12
— 1 - 15.231(b) Spurious Field Strength (>470 MHz Transmitter)

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN00314	Loop Antenna	6502	4/13/2020	4/13/2022
T1	AN00309	Preamp	8447D	12/24/2019	12/24/2021
T2	ANP05050	Cable	RG223/U	12/24/2018	12/24/2020
T3	ANP05198	Cable-Amplitude +15C to +45C (dB)	8268	12/4/2018	12/4/2020
T4	AN01993	Biconilog Antenna	CBL6111C	6/11/2019	6/11/2021
T5	ANP05281	Attenuator	1B	4/7/2020	4/7/2022
T6	AN02672	Spectrum Analyzer	E4446A	3/13/2019	3/13/2021
	AN00786	Preamp	83017A	5/20/2020	5/20/2022
	AN00849	Horn Antenna	3115	3/17/2020	3/17/2022
	ANP06360	Cable	L1-PNMNM-48	8/8/2019	8/8/2021
	ANP07243	Cable	32022-29094K- 29094K-24TC	5/29/2020	5/29/2022
	AN01413	Horn Antenna- ANSI C63.5 (dB/m)	84125-80008	10/17/2018	10/17/2020
	AN03158A	Horn Antenna	GH-28-25	8/15/2019	8/15/2021
	AN03367	Horn Antenna	62-GH-62-25.	8/1/2019	8/1/2021

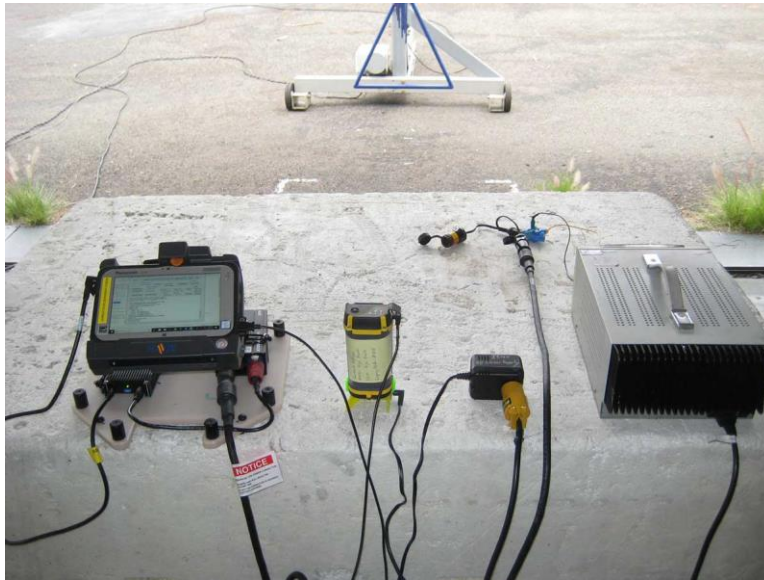
Measurement Data:

Reading listed by margin.

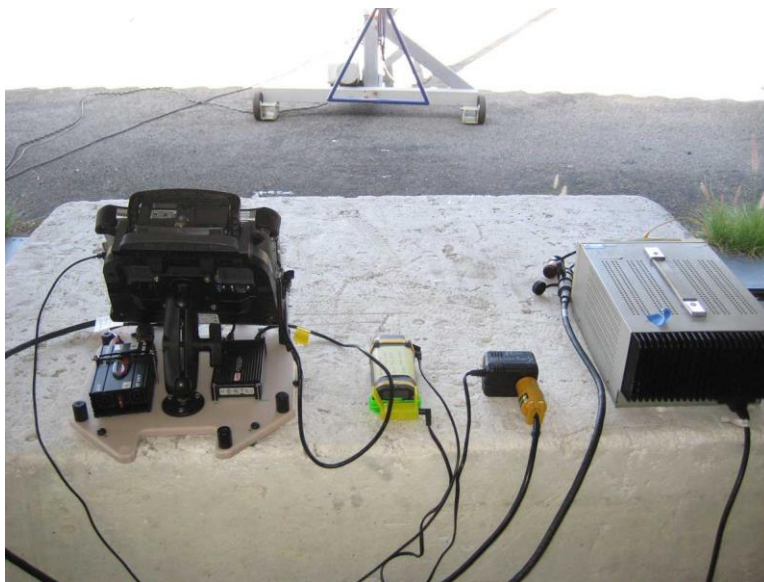
Test Distance: 3 Meters

#	Freq MHz	Rdng dB μ V	T1 T5 dB	T2 T6 dB	T3 dB	T4 dB	Dist Table	Corr dB μ V/m	Spec dB μ V/m	Margin dB	Polar Ant
1	75.000M	49.1	-28.1 +5.9	+0.1 +0.0	+1.6	+7.0	+0.0	35.6	40.0	-4.4	Horiz
2	111.000M	46.0	-28.0 +5.9	+0.1 +0.0	+1.9	+10.7	+0.0	36.6	43.5	-6.9	Vert
3	246.900M	44.5	-27.9 +5.9	+0.2 +0.0	+2.9	+12.1	+0.0	37.7	46.0	-8.3	Horiz
4	108.800M	44.0	-28.0 +5.9	+0.1 +0.0	+1.8	+10.6	+0.0	34.4	43.5	-9.1	Vert
5	110.340M	43.0	-28.0 +5.9	+0.1 +0.0	+1.9	+10.6	+0.0	33.5	43.5	-10.0	Vert
6	124.000M	40.0	-28.0 +5.9	+0.1 +0.0	+1.9	+11.3	+0.0	31.2	43.5	-12.3	Vert
7	240.600M	41.0	-27.9 +5.9	+0.2 +0.0	+2.8	+11.7	+0.0	33.7	46.0	-12.3	Vert
8	136.700M	38.4	-28.0 +5.9	+0.2 +0.0	+2.1	+11.4	+0.0	30.0	43.5	-13.5	Vert
9	330.800M	35.0	-27.9 +5.9	+0.3 +0.0	+3.4	+14.3	+0.0	31.0	46.0	-15.0	Vert
10	131.800M	36.5	-28.0 +5.9	+0.2 +0.0	+2.0	+11.3	+0.0	27.9	43.5	-15.6	Horiz
11	109.600M	37.0	-28.0 +5.9	+0.1 +0.0	+1.9	+10.6	+0.0	27.5	43.5	-16.0	Horiz

Test Setup Photo(s)



7" Tablet



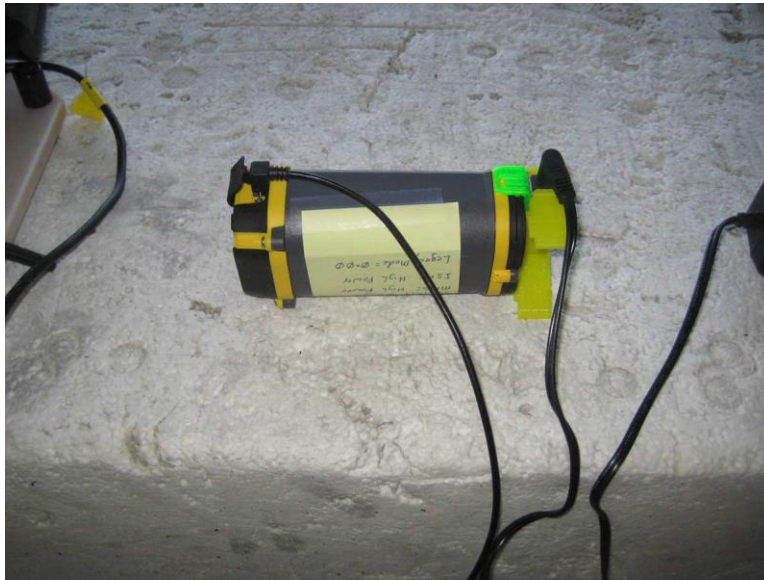
X Axis, IMRC-INT



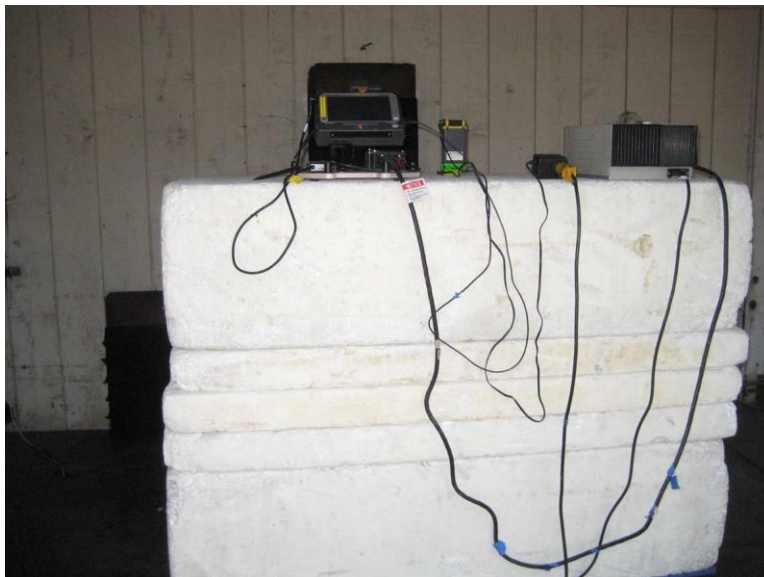
X Axis, IMRC-INT



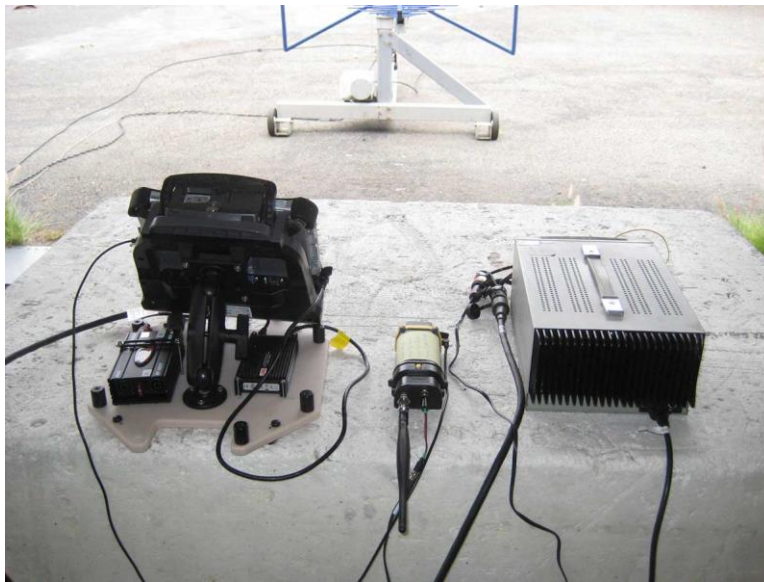
Y Axis, IMRC-INT



Z Axis, IMRC-INT



Above 1GHz, IMRC-INT



X Axis, IMRC-EXT 3dBi



X Axis, IMRC-EXT 3dBi



Y Axis, IMRC-EXT 3dBi



Z Axis, IMRC-EXT 3dBi



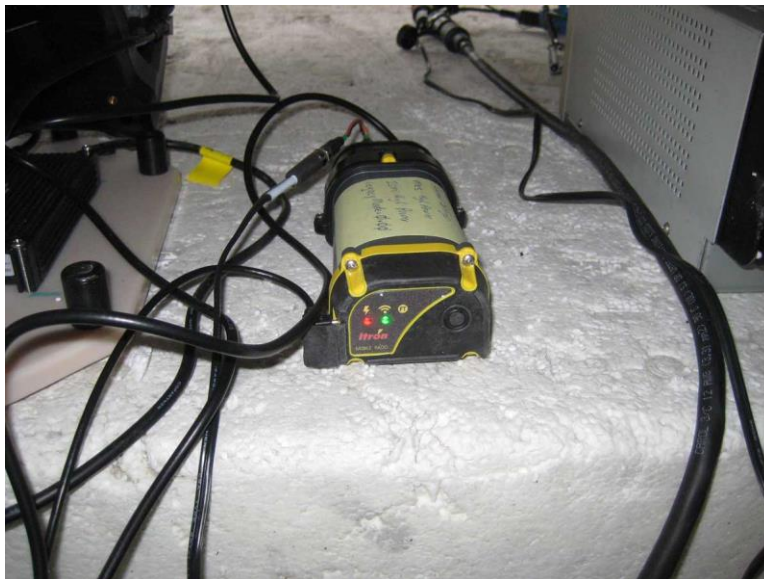
Above 1GHz, IMRC-EXT 3dBi



IMRC-EXT 5dBi



IMRC-EXT 5dBi



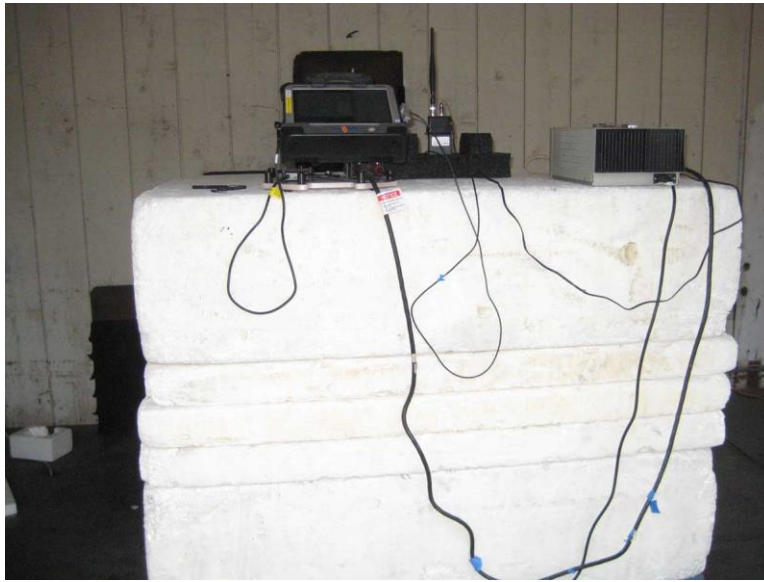
X Axis, IMRC-EXT 5dBi



Y Axis, IMRC-EXT 5dBi



Z Axis, IMRC-EXT 5dBi



Above 1GHz, IMRC-EXT 5dBi

15.207 AC Conducted Emissions

Test Setup / Conditions / Data

Test Location: CKC Laboratories Inc. • 110 N. Olinda Pl. • Brea, CA 92823 • 714-993-6112
 Customer: **Itron, Inc.**
 Specification: **15.207 AC Mains - Average**
 Work Order #: **103955** Date: 6/12/2020
 Test Type: **Conducted Emissions** Time: 10:03:30
 Tested By: Don Nguyen Sequence#: 7
 Software: EMITest 5.03.12 120V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 3			

Support Equipment:

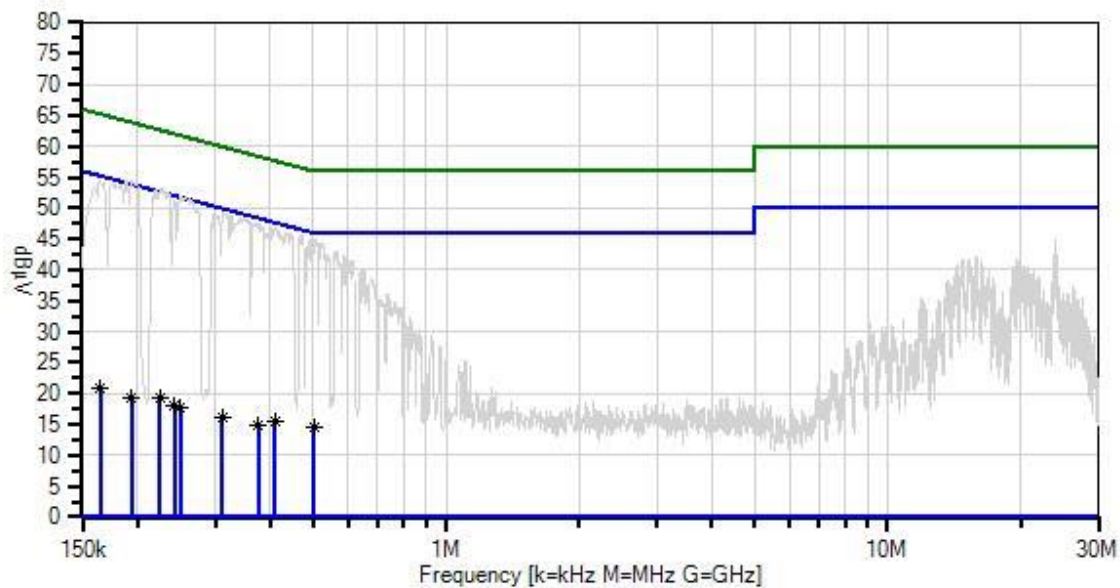
Device	Manufacturer	Model #	S/N
Configuration 3			

Test Conditions / Notes:

The EUT is placed on test bench. USB port is connected to a touchscreen tablet. The EUT is connected to 5Vdc charger. The computer is sending command to the EUT using software MC3 SuperRaptor Test ver.4.0.3.5. The EUT is set into transmitting mode.

Operating frequency: 952 MHz
 Frequency of measurement: 150kHz-30MHz
 RBW=9kHz, VBW=30kHz
 Site A
 Temperature: 25°C
 Relative Humidity: 46%
 Test Method: ANSI C63.10:2013

Itron, Inc. WO#: 103955 Sequence#: 7 Date: 6/12/2020
15.207 AC Mains - Average Test Lead: 120V 60Hz L1-Line



— Sweep Data
× QP Readings
Software Version: 5.03.12
— Readings
* Average Readings
— 1 - 15.207 AC Mains - Average
○ Peak Readings
▼ Ambient
— 2 - 15.207 AC Mains - Quasi-peak

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP07545	Attenuator	SA18N10W-06	1/18/2019	1/18/2021
T2	ANP07338	Cable	2249-Y-240	12/24/2019	12/24/2021
	AN02869	Spectrum Analyzer	E4440A	7/25/2019	7/25/2020
T3	AN02610	High Pass Filter	HE9615-150K-50-720B	10/22/2019	10/22/2021
T4	AN00847.1	50uH LISN-(L) Line 1	3816/2NM	3/10/2020	3/10/2021
	AN00847.1	50uH LISN-(N) Line 2	3816/2NM	3/10/2020	3/10/2021
T5	ANP06986	Cable-Line L1(dB)	90cm-extcord	3/31/2020	3/31/2022
	ANP06986	Cable-Neutral L2(dB)	90cm-extcord	3/31/2020	3/31/2022

Measurement Data:

Reading listed by margin.

Test Lead: L1-Line

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dB μ V	dB	dB	dB	dB	Table	dB μ V	dB μ V	dB	Ant
1	501.240k	8.6	+5.8	+0.0	+0.3	+0.0	+0.0	14.7	46.0	-31.3	L1-Li
	Ave		+0.0								
^	501.240k	39.0	+5.8	+0.0	+0.3	+0.0	+0.0	45.1	46.0	-0.9	L1-Li
			+0.0								
3	408.885k	9.4	+5.8	+0.0	+0.2	+0.0	+0.0	15.4	47.7	-32.3	L1-Li
	Ave		+0.0								
^	408.885k	40.8	+5.8	+0.0	+0.2	+0.0	+0.0	46.8	47.7	-0.9	L1-Li
			+0.0								
5	375.434k	9.0	+5.8	+0.0	+0.2	+0.0	+0.0	15.0	48.4	-33.4	L1-Li
	Ave		+0.0								
^	375.433k	41.6	+5.8	+0.0	+0.2	+0.0	+0.0	47.6	48.4	-0.8	L1-Li
			+0.0								
7	224.902k	13.2	+5.8	+0.0	+0.2	+0.0	+0.0	19.2	52.6	-33.4	L1-Li
	Ave		+0.0								
^	224.902k	47.1	+5.8	+0.0	+0.2	+0.0	+0.0	53.1	52.6	+0.5	L1-Li
			+0.0								
9	311.440k	10.2	+5.8	+0.0	+0.1	+0.0	+0.0	16.1	49.9	-33.8	L1-Li
	Ave		+0.0								
^	311.439k	43.4	+5.8	+0.0	+0.1	+0.0	+0.0	49.3	49.9	-0.6	L1-Li
			+0.0								
11	243.082k	12.0	+5.8	+0.0	+0.2	+0.0	+0.0	18.0	52.0	-34.0	L1-Li
	Ave		+0.0								
^	243.082k	45.3	+5.8	+0.0	+0.2	+0.0	+0.0	51.3	52.0	-0.7	L1-Li
			+0.0								
13	250.354k	11.7	+5.8	+0.0	+0.1	+0.0	+0.0	17.6	51.7	-34.1	L1-Li
	Ave		+0.0								
^	250.354k	46.2	+5.8	+0.0	+0.1	+0.0	+0.0	52.1	51.7	+0.4	L1-Li
			+0.0								
15	194.360k	13.4	+5.8	+0.0	+0.2	+0.0	+0.0	19.4	53.8	-34.4	L1-Li
	Ave		+0.0								
^	194.359k	48.4	+5.8	+0.0	+0.2	+0.0	+0.0	54.4	53.8	+0.6	L1-Li
			+0.0								
17	164.544k	14.6	+5.8	+0.0	+0.4	+0.0	+0.0	20.8	55.2	-34.4	L1-Li
	Ave		+0.0								
^	164.544k	48.1	+5.8	+0.0	+0.4	+0.0	+0.0	54.3	55.2	-0.9	L1-Li
			+0.0								

Test Location: CKC Laboratories Inc. • 110 N. Olinda Pl. • Brea, CA 92823 • 714-993-6112
 Customer: **Itron, Inc.**
 Specification: **15.207 AC Mains - Average**
 Work Order #: **103955** Date: 6/12/2020
 Test Type: **Conducted Emissions** Time: 10:07:56
 Tested By: Don Nguyen Sequence#: 8
 Software: EMITest 5.03.12 120V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 3			

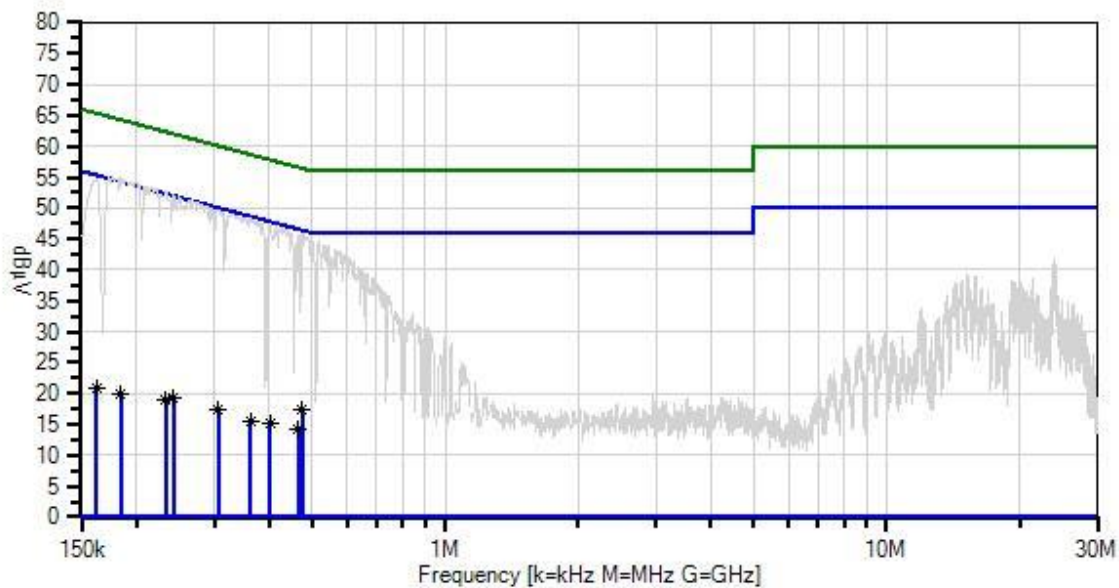
Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 3			

Test Conditions / Notes:

<p>The EUT is placed on test bench. USB port is connected to a touchscreen tablet. The EUT is connected to 5Vdc charger. The computer is sending command to the EUT using software MC3 SuperRaptor Test ver.4.0.3.5. The EUT is set into transmitting mode.</p> <p> Operating frequency: 952 MHz Frequency of measurement: 150kHz-30MHz RBW=9kHz, VBW=30kHz Site A Temperature: 25°C Relative Humidity: 46% Test Method: ANSI C63.10:2013 </p>
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Itron, Inc. WO#: 103955 Sequence#: 8 Date: 6/12/2020
15.207 AC Mains - Average Test Lead: 120V 60Hz L2-Neutral



— Sweep Data
× QP Readings
Software Version: 5.03.12

— Readings
* Average Readings
— 1 - 15.207 AC Mains - Average

○ Peak Readings
▼ Ambient
— 2 - 15.207 AC Mains - Quasi-peak

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP07545	Attenuator	SA18N10W-06	1/18/2019	1/18/2021
T2	ANP07338	Cable	2249-Y-240	12/24/2019	12/24/2021
	AN02869	Spectrum Analyzer	E4440A	7/25/2019	7/25/2020
T3	AN02610	High Pass Filter	HE9615-150K-50-720B	10/22/2019	10/22/2021
	AN00847.1	50uH LISN-(L) Line 1	3816/2NM	3/10/2020	3/10/2021
T4	AN00847.1	50uH LISN-(N) Line 2	3816/2NM	3/10/2020	3/10/2021
	ANP06986	Cable-Line L1(dB)	90cm-extcord	3/31/2020	3/31/2022
T5	ANP06986	Cable-Neutral L2(dB)	90cm-extcord	3/31/2020	3/31/2022

Measurement Data:

Reading listed by margin.

Test Lead: L2-Neutral

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dB μ V	dB	dB	dB	dB	Table	dB μ V	dB μ V	dB	Ant
1	474.334k	11.3	+5.8	+0.0	+0.3	+0.0	+0.0	17.4	46.4	-29.0	L2-Ne
	Ave		+0.0								
^	474.333k	39.8	+5.8	+0.0	+0.3	+0.0	+0.0	45.9	46.4	-0.5	L2-Ne
			+0.0								
3	464.153k	8.2	+5.8	+0.0	+0.3	+0.0	+0.0	14.3	46.6	-32.3	L2-Ne
	Ave		+0.0								
^	464.152k	39.5	+5.8	+0.0	+0.3	+0.0	+0.0	45.6	46.6	-1.0	L2-Ne
			+0.0								
5	306.349k	11.6	+5.8	+0.0	+0.1	+0.0	+0.0	17.5	50.1	-32.6	L2-Ne
	Ave		+0.0								
^	306.349k	44.0	+5.8	+0.0	+0.1	+0.0	+0.0	49.9	50.1	-0.2	L2-Ne
			+0.0								
7	401.613k	9.2	+5.8	+0.0	+0.2	+0.0	+0.0	15.2	47.8	-32.6	L2-Ne
	Ave		+0.0								
^	401.613k	41.2	+5.8	+0.0	+0.2	+0.0	+0.0	47.2	47.8	-0.6	L2-Ne
			+0.0								
9	242.355k	13.2	+5.8	+0.0	+0.2	+0.0	+0.0	19.2	52.0	-32.8	L2-Ne
	Ave		+0.0								
^	242.355k	46.4	+5.8	+0.0	+0.2	+0.0	+0.0	52.4	52.0	+0.4	L2-Ne
			+0.0								
11	361.617k	9.4	+5.8	+0.0	+0.2	+0.0	+0.0	15.4	48.7	-33.3	L2-Ne
	Ave		+0.0								
^	361.616k	42.4	+5.8	+0.0	+0.2	+0.0	+0.0	48.4	48.7	-0.3	L2-Ne
			+0.0								
13	232.901k	12.9	+5.8	+0.0	+0.2	+0.0	+0.0	18.9	52.3	-33.4	L2-Ne
	Ave		+0.0								
^	232.901k	46.9	+5.8	+0.0	+0.2	+0.0	+0.0	52.9	52.3	+0.6	L2-Ne
			+0.0								
15	184.179k	13.8	+5.8	+0.0	+0.3	+0.0	+0.0	19.9	54.3	-34.4	L2-Ne
	Ave		+0.0								
^	184.178k	48.9	+5.8	+0.0	+0.3	+0.0	+0.0	55.0	54.3	+0.7	L2-Ne
			+0.0								
17	162.363k	14.5	+5.8	+0.0	+0.5	+0.0	+0.0	20.8	55.3	-34.5	L2-Ne
	Ave		+0.0								
^	162.362k	48.5	+5.8	+0.0	+0.5	+0.0	+0.0	54.8	55.3	-0.5	L2-Ne
			+0.0								

Test Location: CKC Laboratories Inc. • 110 N. Olinda Pl. • Brea, CA 92823 • 714-993-6112
 Customer: **Itron, Inc.**
 Specification: **15.207 AC Mains - Average**
 Work Order #: **103955** Date: 6/12/2020
 Test Type: **Conducted Emissions** Time: 10:34:18 AM
 Tested By: Don Nguyen Sequence#: 15
 Software: EMITest 5.03.12 120V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 4			

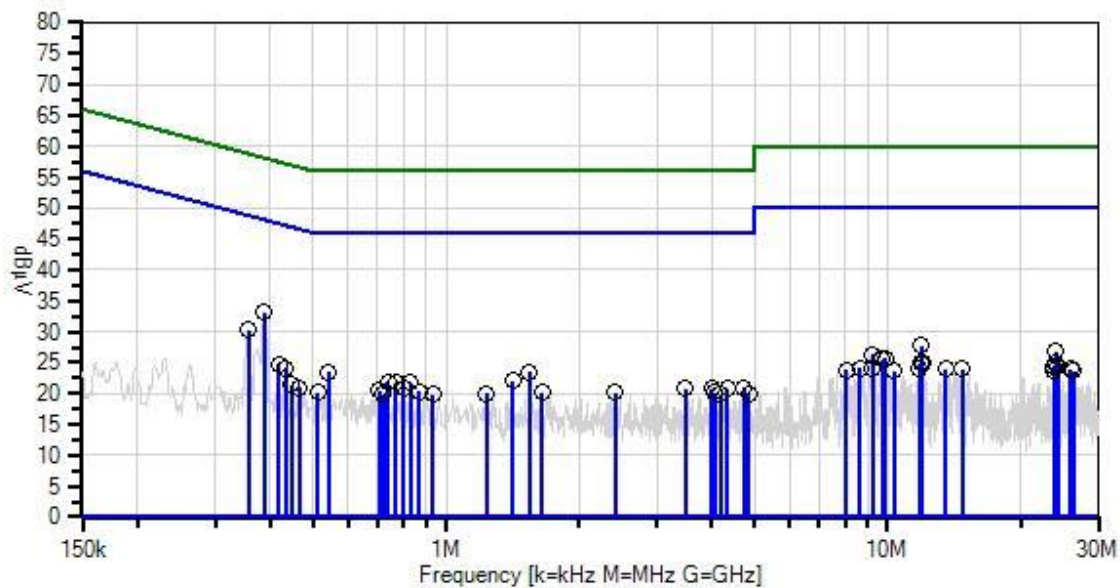
Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 4			

Test Conditions / Notes:

<p>The EUT is placed on test bench. USB port is connected to a touchscreen tablet. The EUT is connected to 12Vdc charger. The computer is sending command to the EUT using software MC3 SuperRaptor Test ver.4.0.3.5. The EUT is set into transmitting mode.</p> <p>Operating frequency: 952MHz. Frequency of measurement: 150kHz-30MHz RBW=9kHz, VBW=30kHz Site A Temperature: 25°C Relative Humidity: 46% Test Method: ANSI C63.10:2013</p>

Itron, Inc. WO#: 103955 Sequence#: 15 Date: 6/12/2020
15.207 AC Mains - Average Test Lead: 120V 60Hz L1-Line



— Sweep Data
× QP Readings
Software Version: 5.03.12
— Readings
* Average Readings
— 1 - 15.207 AC Mains - Average
○ Peak Readings
▼ Ambient
— 2 - 15.207 AC Mains - Quasi-peak

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP07545	Attenuator	SA18N10W-06	1/18/2019	1/18/2021
T2	ANP07338	Cable	2249-Y-240	12/24/2019	12/24/2021
T3	AN02869	Spectrum Analyzer	E4440A	7/25/2019	7/25/2020
T4	AN02610	High Pass Filter	HE9615-150K-50-720B	10/22/2019	10/22/2021
T5	AN00847.1	50uH LISN-(L) Line 1	3816/2NM	3/10/2020	3/10/2021
	AN00847.1	50uH LISN-(N) Line 2	3816/2NM	3/10/2020	3/10/2021
T6	ANP06986	Cable-Line L1(dB)	90cm-extcord	3/31/2020	3/31/2022
	ANP06986	Cable-Neutral L2(dB)	90cm-extcord	3/31/2020	3/31/2022

Measurement Data:

Reading listed by margin.

Test Lead: L1-Line

#	Freq MHz	Rdng dB μ V	T1 T5 dB	T2 T6 dB	T3 dB	T4 dB	Dist Table	Corr dB μ V	Spec dB μ V	Margin dB	Polar Ant
1	386.341k	27.2	+5.8 +0.0	+0.0 +0.0	+0.0	+0.2	+0.0	33.2	48.1	-14.9	L1-Li
2	356.527k	24.3	+5.8 +0.0	+0.0 +0.0	+0.0	+0.2	+0.0	30.3	48.8	-18.5	L1-Li
3	11.950M	21.1	+5.8 +0.1	+0.3 +0.3	+0.0	+0.2	+0.0	27.8	50.0	-22.2	L1-Li
4	541.964k	17.4	+5.8 +0.0	+0.0 +0.0	+0.0	+0.3	+0.0	23.5	46.0	-22.5	L1-Li
5	1.541M	17.4	+5.8 +0.0	+0.1 +0.0	+0.0	+0.2	+0.0	23.5	46.0	-22.5	L1-Li
6	417.611k	18.7	+5.8 +0.0	+0.0 +0.0	+0.0	+0.2	+0.0	24.7	47.5	-22.8	L1-Li
7	432.155k	18.1	+5.8 +0.0	+0.0 +0.0	+0.0	+0.2	+0.0	24.1	47.2	-23.1	L1-Li
8	23.998M	19.5	+5.8 +0.2	+0.4 +0.7	+0.0	+0.2	+0.0	26.8	50.0	-23.2	L1-Li
9	9.238M	19.8	+5.8 +0.1	+0.3 +0.2	+0.0	+0.2	+0.0	26.4	50.0	-23.6	L1-Li
10	1.413M	15.9	+5.8 +0.0	+0.1 +0.0	+0.0	+0.2	+0.0	22.0	46.0	-24.0	L1-Li
11	736.855k	15.7	+5.8 +0.0	+0.1 +0.0	+0.0	+0.3	+0.0	21.9	46.0	-24.1	L1-Li
12	771.033k	15.6	+5.8 +0.0	+0.1 +0.0	+0.0	+0.3	+0.0	21.8	46.0	-24.2	L1-Li
13	832.119k	15.6	+5.8 +0.0	+0.1 +0.0	+0.0	+0.3	+0.0	21.8	46.0	-24.2	L1-Li
14	9.860M	19.0	+5.8 +0.2	+0.3 +0.2	+0.0	+0.2	+0.0	25.7	50.0	-24.3	L1-Li
15	9.743M	18.9	+5.8 +0.2	+0.3 +0.2	+0.0	+0.2	+0.0	25.6	50.0	-24.4	L1-Li
16	4.730M	14.6	+5.8 +0.1	+0.2 +0.2	+0.0	+0.1	+0.0	21.0	46.0	-25.0	L1-Li
17	24.046M	17.7	+5.8 +0.2	+0.4 +0.7	+0.0	+0.2	+0.0	25.0	50.0	-25.0	L1-Li
18	801.576k	14.7	+5.8 +0.0	+0.1 +0.0	+0.0	+0.3	+0.0	20.9	46.0	-25.1	L1-Li
19	11.887M	18.2	+5.8 +0.1	+0.3 +0.3	+0.0	+0.2	+0.0	24.9	50.0	-25.1	L1-Li
20	11.977M	18.2	+5.8 +0.1	+0.3 +0.3	+0.0	+0.2	+0.0	24.9	50.0	-25.1	L1-Li
21	3.480M	14.6	+5.8 +0.1	+0.1 +0.1	+0.0	+0.1	+0.0	20.8	46.0	-25.2	L1-Li
22	3.994M	14.5	+5.8 +0.1	+0.2 +0.1	+0.0	+0.1	+0.0	20.8	46.0	-25.2	L1-Li
23	4.343M	14.5	+5.8 +0.1	+0.2 +0.1	+0.0	+0.1	+0.0	20.8	46.0	-25.2	L1-Li
24	447.427k	15.4	+5.8 +0.0	+0.0 +0.0	+0.0	+0.3	+0.0	21.5	46.9	-25.4	L1-Li

25	23.833M	17.2	+5.8 +0.2	+0.4 +0.7	+0.0	+0.2	+0.0	24.5	50.0	-25.5	L1-Li
26	704.858k	14.3	+5.8 +0.0	+0.1 +0.0	+0.0	+0.3	+0.0	20.5	46.0	-25.5	L1-Li
27	24.279M	17.1	+5.8 +0.2	+0.4 +0.7	+0.0	+0.2	+0.0	24.4	50.0	-25.6	L1-Li
28	464.880k	14.8	+5.8 +0.0	+0.0 +0.0	+0.0	+0.3	+0.0	20.9	46.6	-25.7	L1-Li
29	870.661k	14.1	+5.8 +0.0	+0.1 +0.0	+0.0	+0.3	+0.0	20.3	46.0	-25.7	L1-Li
30	24.189M	17.0	+5.8 +0.2	+0.4 +0.7	+0.0	+0.2	+0.0	24.3	50.0	-25.7	L1-Li
31	512.875k	14.1	+5.8 +0.0	+0.0 +0.0	+0.0	+0.3	+0.0	20.2	46.0	-25.8	L1-Li
32	1.651M	14.1	+5.8 +0.0	+0.1 +0.0	+0.0	+0.2	+0.0	20.2	46.0	-25.8	L1-Li
33	2.421M	14.1	+5.8 +0.0	+0.1 +0.0	+0.0	+0.2	+0.0	20.2	46.0	-25.8	L1-Li
34	8.634M	17.6	+5.8 +0.1	+0.3 +0.2	+0.0	+0.1	+0.0	24.1	50.0	-25.9	L1-Li
35	4.058M	13.8	+5.8 +0.1	+0.2 +0.1	+0.0	+0.1	+0.0	20.1	46.0	-25.9	L1-Li
36	11.815M	17.4	+5.8 +0.1	+0.3 +0.3	+0.0	+0.2	+0.0	24.1	50.0	-25.9	L1-Li
37	9.256M	17.5	+5.8 +0.1	+0.3 +0.2	+0.0	+0.2	+0.0	24.1	50.0	-25.9	L1-Li
38	1.234M	13.9	+5.8 +0.0	+0.1 +0.0	+0.0	+0.2	+0.0	20.0	46.0	-26.0	L1-Li
39	13.553M	17.2	+5.8 +0.1	+0.3 +0.4	+0.0	+0.2	+0.0	24.0	50.0	-26.0	L1-Li
40	4.182M	13.6	+5.8 +0.1	+0.2 +0.1	+0.0	+0.1	+0.0	19.9	46.0	-26.1	L1-Li
41	14.797M	17.1	+5.8 +0.1	+0.3 +0.4	+0.0	+0.2	+0.0	23.9	50.0	-26.1	L1-Li
42	25.930M	16.5	+5.8 +0.2	+0.4 +0.8	+0.0	+0.2	+0.0	23.9	50.0	-26.1	L1-Li
43	932.490k	13.7	+5.8 +0.0	+0.1 +0.0	+0.0	+0.2	+0.0	19.8	46.0	-26.2	L1-Li
44	721.583k	13.6	+5.8 +0.0	+0.1 +0.0	+0.0	+0.3	+0.0	19.8	46.0	-26.2	L1-Li
45	4.836M	13.4	+5.8 +0.1	+0.2 +0.2	+0.0	+0.1	+0.0	19.8	46.0	-26.2	L1-Li
46	23.819M	16.5	+5.8 +0.2	+0.4 +0.7	+0.0	+0.2	+0.0	23.8	50.0	-26.2	L1-Li
47	8.067M	17.4	+5.8 +0.1	+0.2 +0.2	+0.0	+0.1	+0.0	23.8	50.0	-26.2	L1-Li
48	8.049M	17.3	+5.8 +0.1	+0.2 +0.2	+0.0	+0.1	+0.0	23.7	50.0	-26.3	L1-Li
49	10.319M	17.0	+5.8 +0.2	+0.3 +0.2	+0.0	+0.2	+0.0	23.7	50.0	-26.3	L1-Li
50	26.396M	16.3	+5.8 +0.2	+0.4 +0.8	+0.0	+0.2	+0.0	23.7	50.0	-26.3	L1-Li

Test Location: CKC Laboratories Inc. • 110 N. Olinda Pl. • Brea, CA 92823 • 714-993-6112
 Customer: **Itron, Inc.**
 Specification: **15.207 AC Mains - Average**
 Work Order #: **103955** Date: 6/12/2020
 Test Type: **Conducted Emissions** Time: 10:36:50 AM
 Tested By: Don Nguyen Sequence#: 16
 Software: EMITest 5.03.12 120V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 4			

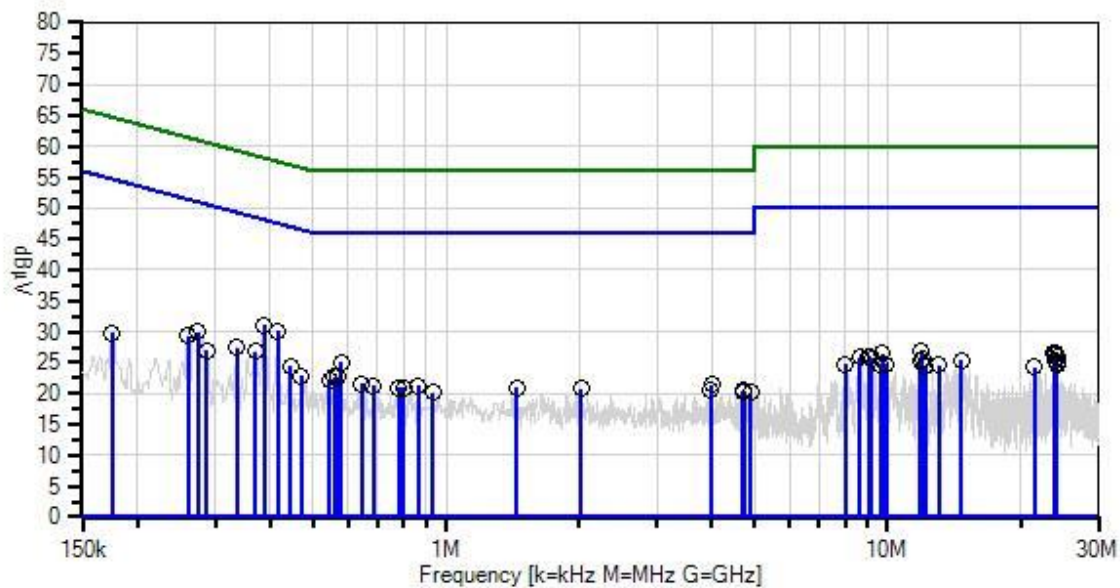
Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 4			

Test Conditions / Notes:

<p>The EUT is placed on test bench. USB port is connected to a touchscreen tablet. The EUT is connected to 12Vdc charger. The computer is sending command to the EUT using software MC3 SuperRaptor Test ver.4.0.3.5. The EUT is set into transmitting mode.</p> <p>Operating frequency: 952MHz. Frequency of measurement: 150kHz-30MHz RBW=9kHz, VBW=30kHz Site A Temperature: 25°C Relative Humidity: 46% Test Method: ANSI C63.10:2013</p>

Itron, Inc. WO#: 103955 Sequence#: 16 Date: 6/12/2020
15.207 AC Mains - Average Test Lead: 120V 60Hz L2-Neutral



— Sweep Data
× QP Readings
Software Version: 5.03.12
— Readings
* Average Readings
— 1 - 15.207 AC Mains - Average
○ Peak Readings
▼ Ambient
— 2 - 15.207 AC Mains - Quasi-peak

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP07545	Attenuator	SA18N10W-06	1/18/2019	1/18/2021
T2	ANP07338	Cable	2249-Y-240	12/24/2019	12/24/2021
	AN02869	Spectrum Analyzer	E4440A	7/25/2019	7/25/2020
T3	AN02610	High Pass Filter	HE9615-150K-50-720B	10/22/2019	10/22/2021
	AN00847.1	50uH LISN-(L) Line 1	3816/2NM	3/10/2020	3/10/2021
T4	AN00847.1	50uH LISN-(N) Line 2	3816/2NM	3/10/2020	3/10/2021
	ANP06986	Cable-Line L1(dB)	90cm-extcord	3/31/2020	3/31/2022
T5	ANP06986	Cable-Neutral L2(dB)	90cm-extcord	3/31/2020	3/31/2022

Measurement Data:

Reading listed by margin.

Test Lead: L2-Neutral

#	Freq MHz	Rdng dB μ V	T1 T5 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dB μ V	Spec dB μ V	Margin dB	Polar Ant
1	386.341k	25.0	+5.8 +0.0	+0.0	+0.2	+0.0	+0.0	31.0	48.1	-17.1	L2-Ne
2	415.430k	24.1	+5.8 +0.0	+0.0	+0.2	+0.0	+0.0	30.1	47.5	-17.4	L2-Ne
3	578.324k	18.9	+5.8 +0.0	+0.1	+0.3	+0.0	+0.0	25.1	46.0	-20.9	L2-Ne
4	274.352k	24.0	+5.8 +0.0	+0.0	+0.1	+0.0	+0.0	29.9	51.0	-21.1	L2-Ne
5	369.616k	20.8	+5.8 +0.0	+0.0	+0.2	+0.0	+0.0	26.8	48.5	-21.7	L2-Ne
6	335.437k	21.6	+5.8 +0.0	+0.0	+0.1	+0.0	+0.0	27.5	49.3	-21.8	L2-Ne
7	259.808k	23.4	+5.8 +0.0	+0.0	+0.1	+0.0	+0.0	29.3	51.4	-22.1	L2-Ne
8	443.791k	18.5	+5.8 +0.0	+0.0	+0.2	+0.0	+0.0	24.5	47.0	-22.5	L2-Ne
9	11.905M	20.0	+5.8 +0.4	+0.3	+0.2	+0.2	+0.0	26.9	50.0	-23.1	L2-Ne
10	557.235k	16.5	+5.8 +0.0	+0.1	+0.3	+0.0	+0.0	22.7	46.0	-23.3	L2-Ne
11	568.870k	16.5	+5.8 +0.0	+0.1	+0.3	+0.0	+0.0	22.7	46.0	-23.3	L2-Ne
12	23.956M	19.2	+5.8 +0.8	+0.4	+0.2	+0.3	+0.0	26.7	50.0	-23.3	L2-Ne
13	23.813M	19.1	+5.8 +0.8	+0.4	+0.2	+0.3	+0.0	26.6	50.0	-23.4	L2-Ne
14	9.743M	19.7	+5.8 +0.3	+0.3	+0.2	+0.2	+0.0	26.5	50.0	-23.5	L2-Ne
15	470.697k	16.8	+5.8 +0.0	+0.0	+0.3	+0.0	+0.0	22.9	46.5	-23.6	L2-Ne
16	287.441k	21.0	+5.8 +0.0	+0.0	+0.1	+0.0	+0.0	26.9	50.6	-23.7	L2-Ne
17	544.872k	16.1	+5.8 +0.0	+0.0	+0.3	+0.0	+0.0	22.2	46.0	-23.8	L2-Ne
18	23.977M	18.7	+5.8 +0.8	+0.4	+0.2	+0.3	+0.0	26.2	50.0	-23.8	L2-Ne
19	9.058M	19.2	+5.8 +0.3	+0.3	+0.2	+0.2	+0.0	26.0	50.0	-24.0	L2-Ne
20	8.670M	19.2	+5.8 +0.3	+0.3	+0.1	+0.1	+0.0	25.8	50.0	-24.2	L2-Ne
21	9.166M	19.0	+5.8 +0.3	+0.3	+0.2	+0.2	+0.0	25.8	50.0	-24.2	L2-Ne
22	24.189M	18.3	+5.8 +0.8	+0.4	+0.2	+0.3	+0.0	25.8	50.0	-24.2	L2-Ne
23	9.211M	18.9	+5.8 +0.3	+0.3	+0.2	+0.2	+0.0	25.7	50.0	-24.3	L2-Ne
24	642.318k	15.4	+5.8 +0.0	+0.1	+0.3	+0.0	+0.0	21.6	46.0	-24.4	L2-Ne

25	11.977M	18.6	+5.8 +0.4	+0.3	+0.2	+0.2	+0.0	25.5	50.0	-24.5	L2-Ne
26	3.994M	15.0	+5.8 +0.2	+0.2	+0.1	+0.1	+0.0	21.4	46.0	-24.6	L2-Ne
27	14.697M	18.4	+5.8 +0.5	+0.3	+0.2	+0.2	+0.0	25.4	50.0	-24.6	L2-Ne
28	24.046M	17.8	+5.8 +0.8	+0.4	+0.2	+0.3	+0.0	25.3	50.0	-24.7	L2-Ne
29	864.116k	14.9	+5.8 +0.1	+0.1	+0.3	+0.0	+0.0	21.2	46.0	-24.8	L2-Ne
30	685.950k	15.0	+5.8 +0.0	+0.1	+0.3	+0.0	+0.0	21.2	46.0	-24.8	L2-Ne
31	24.025M	17.7	+5.8 +0.8	+0.4	+0.2	+0.3	+0.0	25.2	50.0	-24.8	L2-Ne
32	11.887M	18.3	+5.8 +0.4	+0.3	+0.2	+0.2	+0.0	25.2	50.0	-24.8	L2-Ne
33	175.452k	23.7	+5.8 +0.0	+0.0	+0.3	+0.0	+0.0	29.8	54.7	-24.9	L2-Ne
34	24.210M	17.6	+5.8 +0.8	+0.4	+0.2	+0.3	+0.0	25.1	50.0	-24.9	L2-Ne
35	800.122k	14.7	+5.8 +0.1	+0.1	+0.3	+0.0	+0.0	21.0	46.0	-25.0	L2-Ne
36	780.487k	14.6	+5.8 +0.1	+0.1	+0.3	+0.0	+0.0	20.9	46.0	-25.1	L2-Ne
37	1.443M	14.7	+5.8 +0.1	+0.1	+0.2	+0.0	+0.0	20.9	46.0	-25.1	L2-Ne
38	8.022M	18.3	+5.8 +0.3	+0.2	+0.1	+0.1	+0.0	24.8	50.0	-25.2	L2-Ne
39	2.021M	14.6	+5.8 +0.1	+0.1	+0.2	+0.0	+0.0	20.8	46.0	-25.2	L2-Ne
40	9.905M	18.0	+5.8 +0.3	+0.3	+0.2	+0.2	+0.0	24.8	50.0	-25.2	L2-Ne
41	9.634M	18.0	+5.8 +0.3	+0.3	+0.2	+0.2	+0.0	24.8	50.0	-25.2	L2-Ne
42	3.977M	14.3	+5.8 +0.2	+0.2	+0.1	+0.1	+0.0	20.7	46.0	-25.3	L2-Ne
43	13.040M	17.6	+5.8 +0.5	+0.3	+0.2	+0.2	+0.0	24.6	50.0	-25.4	L2-Ne
44	24.231M	17.1	+5.8 +0.8	+0.4	+0.2	+0.3	+0.0	24.6	50.0	-25.4	L2-Ne
45	12.184M	17.6	+5.8 +0.4	+0.3	+0.2	+0.2	+0.0	24.5	50.0	-25.5	L2-Ne
46	4.700M	14.0	+5.8 +0.2	+0.2	+0.1	+0.1	+0.0	20.4	46.0	-25.6	L2-Ne
47	4.730M	13.9	+5.8 +0.2	+0.2	+0.1	+0.1	+0.0	20.3	46.0	-25.7	L2-Ne
48	932.490k	14.0	+5.8 +0.1	+0.1	+0.2	+0.0	+0.0	20.2	46.0	-25.8	L2-Ne
49	21.454M	16.8	+5.8 +0.8	+0.4	+0.2	+0.2	+0.0	24.2	50.0	-25.8	L2-Ne
50	4.909M	13.7	+5.8 +0.2	+0.2	+0.1	+0.1	+0.0	20.1	46.0	-25.9	L2-Ne

Test Setup Photo(s)



Configuration 3



Configuration 3



Configuration 4



Configuration 4

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.