

Ittron, Inc.

TEST REPORT FOR

500C

Models: WPITC, WRMTC, and GRMTC

Tested to The Following Standards:

FCC Part 15 Subpart C Section(s)

15.249

Report No.: 105380-18

Date of issue: August 13, 2021



Test Certificate # 803.01

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

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

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ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

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

Representative: Jay Holcomb
Customer Reference Number: 240357

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

Kim Romero
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

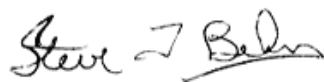
Project Number: 105380

June 6, 2021

June 6, 7, 9, and 11, 2021

Report Authorization

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

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

Steve Behm
Director of Quality Assurance & Engineering Services
CKC Laboratories, Inc.

Test Facility Information



Our laboratories are configured to effectively test a wide variety of product types. CKC utilizes first class test equipment, anechoic chambers, data acquisition and information services to create accurate, repeatable and affordable test results.

TEST LOCATION(S):
CKC Laboratories, Inc.
110 Olinda Place
Brea, CA 92823

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.03.19

Site Registration & Accreditation Information

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

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

SUMMARY OF RESULTS

Standard / Specification: FCC Part 15 Subpart C - 15.249

Test Procedure	Description	Modifications*	Results
15.215(c)	Occupied Bandwidth	NA	PASS
15.249(a)	Field Strength of Fundamental	NA	PASS
15.249(a)	Field Strength of Spurious Emissions	NA	PASS
15.207	AC Conducted Emissions	NA	NA1

NA = Not Applicable

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

ISO/IEC 17025 Decision Rule

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

Modifications During Testing

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

Summary of Conditions

No modifications were made during testing.

Modifications listed above must be incorporated into all production units.

Conditions During Testing

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

Summary of Conditions

None

EQUIPMENT UNDER TEST (EUT)

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

Configuration 1

Equipment Tested:

Device	Manufacturer	Model #	S/N
500C	Itron, Inc.	GRMTC	RAD2

Support Equipment:

Device	Manufacturer	Model #	S/N
Laptop	Dell	Latitude E6420	8P954R1
Laptop Power Supply	Dell	NA	NA
Power Supply	Extech Instruments	382225	P99250026

Configuration 2

Equipment Tested:

Device	Manufacturer	Model #	S/N
500C	Itron, Inc.	WRMTC	RAD2

Support Equipment:

Device	Manufacturer	Model #	S/N
Laptop	Dell	Latitude E6420	8P954R1
Power Supply	Extech Instruments	382225	P99250026

Configuration 3

Equipment Tested:

Device	Manufacturer	Model #	S/N
500C	Itron, Inc.	WPITC	RAD2

Support Equipment:

Device	Manufacturer	Model #	S/N
Laptop	Dell	Latitude E6420	8P954R1
Laptop Power Supply	Dell	ADP-65JB	NA
Power Supply	Extech Instruments	382225	P99250026

Configuration 4

Equipment Tested:

Device	Manufacturer	Model #	S/N
500C	Itron, Inc.	WPITC	CON2

Support Equipment:

Device	Manufacturer	Model #	S/N
Power Supply	Extech Instruments	382225	P99250026
Laptop	Dell	Latitude E6420	8P954R1
Laptop Power Supply	Dell	ADP-65JB	NA
Power Supply	Extech Instruments	382225	P99250026

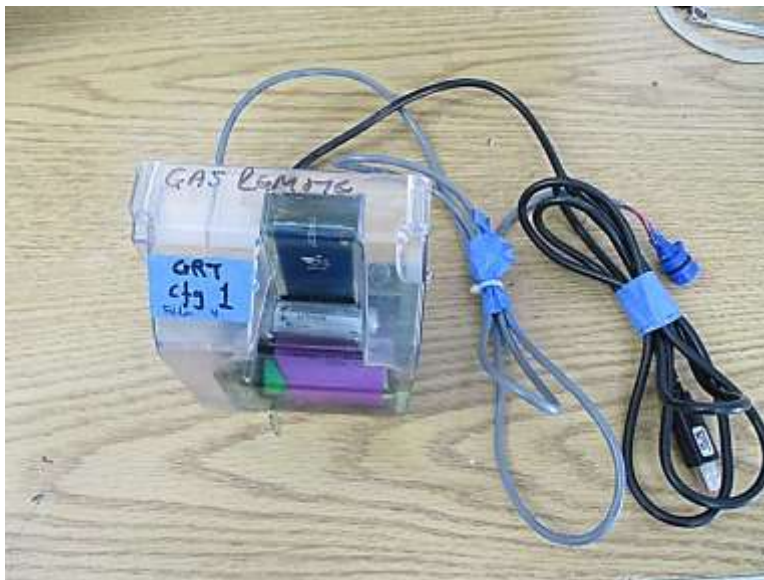
General Product Information:

Product Information	Manufacturer-Provided Details
Equipment Type:	Stand-Alone Equipment
Operating Frequency Range:	908 – 923.8MHz
Modulation Type(s):	OOK (LV0)
Maximum Duty Cycle:	100%
Antenna Type(s) and Gain:	PCB trace antenna / 1.1dBi
Antenna Connection Type:	Integral (External connector provided to facilitate testing)
Nominal Input Voltage:	3.6VDC battery
Firmware / Software used for Test:	App Version: 0.0.25.0, CSL version: 8.1.3.0 Hardware Rev: 12

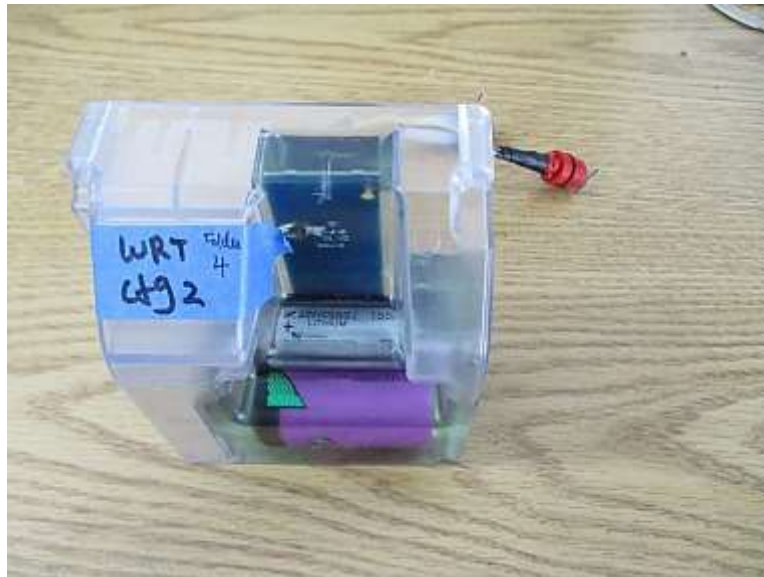
EUT Photo(s)



Configuration 1; View 1



Configuration 1; View 2



Configuration 2; View 1



Configuration 2; View 2



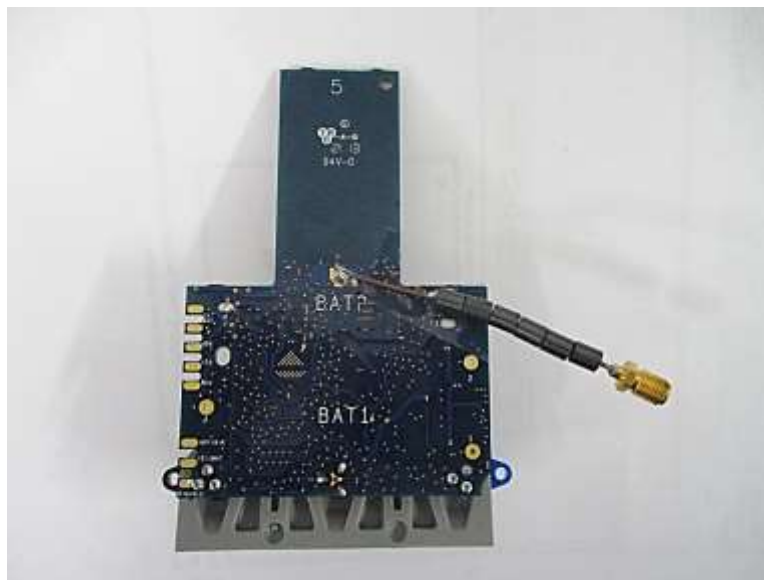
Configuration 3, View 1



Configuration 3; View 2



Configuration 4, View 1

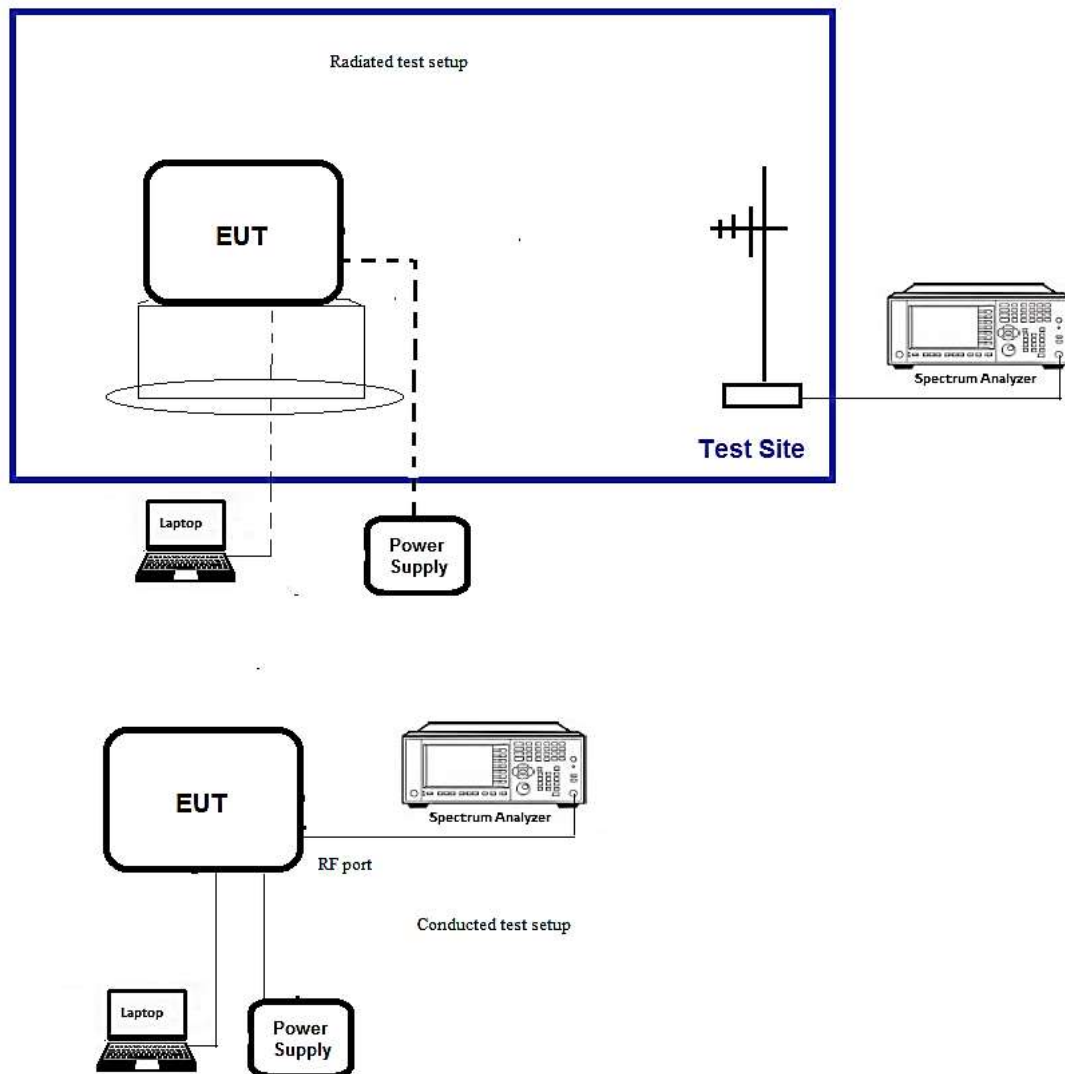


Configuration 4, View 2

Support Equipment Photo(s)



Block Diagram of Test Setup(s)



FCC Part 15 Subpart C

15.215(c) Occupied Bandwidth (20dB BW)

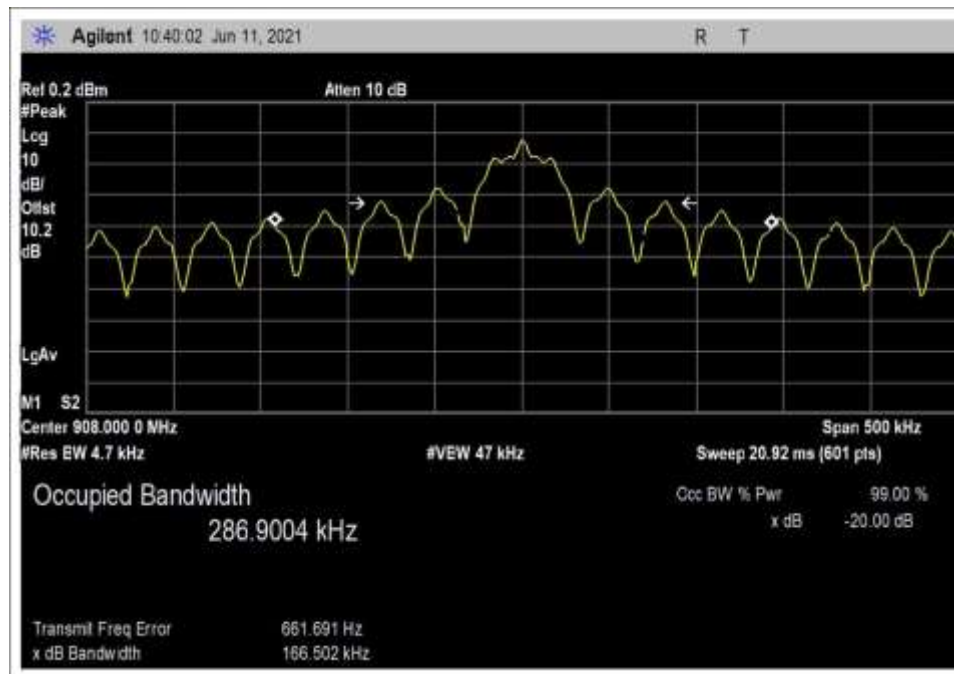
Test Setup/Conditions			
Test Location:	Brea Lab A	Test Engineer:	E. Wong
Test Method:	ANSI C63.10 (2013)	Test Date(s):	6/11/2021
Configuration:	4		
Test condition	<p>The EUT is placed on test bench and the Blue port receives power from remotely located support power supply set 3.6Vdc to simulate a fresh battery. The EUT's data port is connected to a remote located laptop running CLI Tool ver.2.0.1.24 via USB cable for configuration purposes.</p> <p>Note: Three EUTs have the same internal hardware. Conducted data measured on one EUT represents for all three EUTs.</p>		

Environmental Conditions			
Temperature (°C)	21.5	Relative Humidity (%):	41

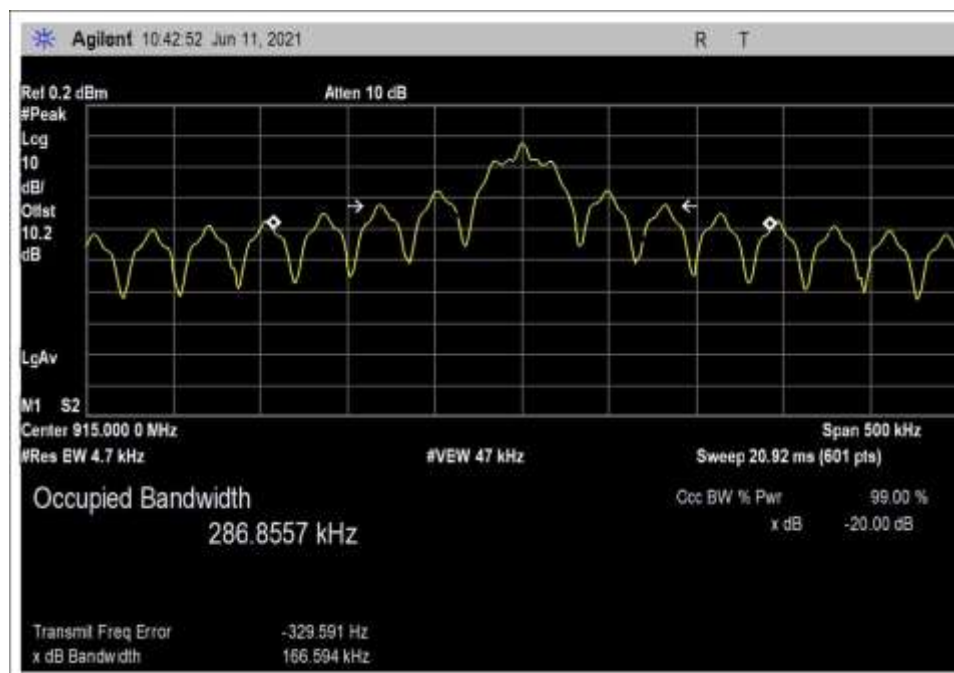
Test Equipment					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
02672	Spectrum Analyzer	Agilent	E4446A	4/29/2020	4/29/2022
03430	Attenuator	Aeroflex/ Weinschel	75A-10-12	12/20/2019	12/20/2021
07659	Cable	Astrolab, Inc.	32022-29094K- 29094K-24TC	7/30/2020	7/30/2022

Test Data Summary					
Frequency (MHz)	Antenna Port	Modulation	Measured (kHz)	Limit (kHz)	Results
908.0	1	OOK LV0	166.502	None	NA
915.0	1	OOK LV0	166.594	None	NA
923.8	1	OOK LV0	166.666	None	NA
Folder 3					

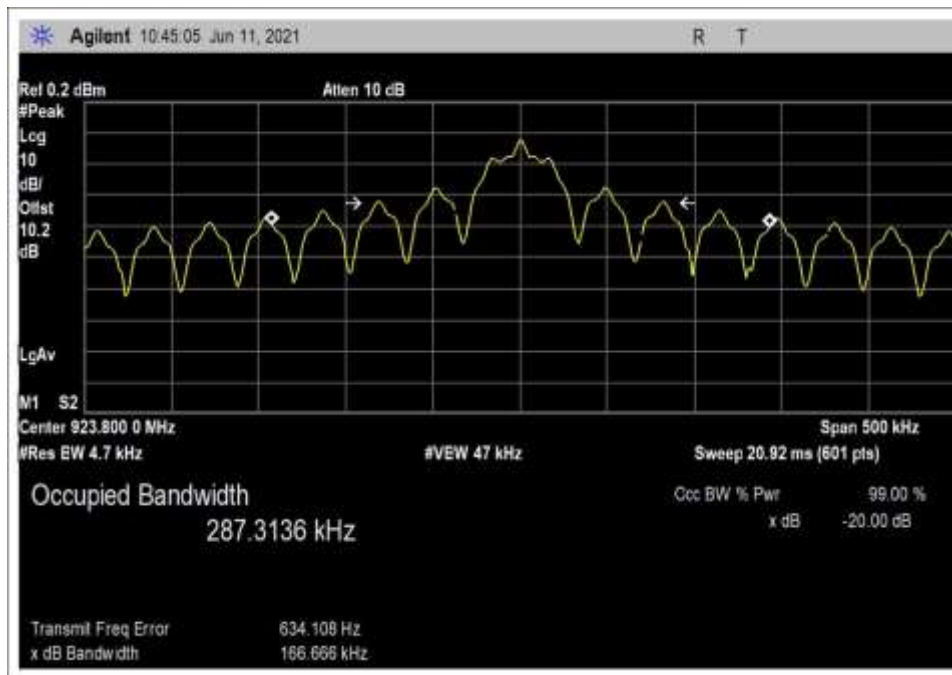
Plot(s)



Low Channel

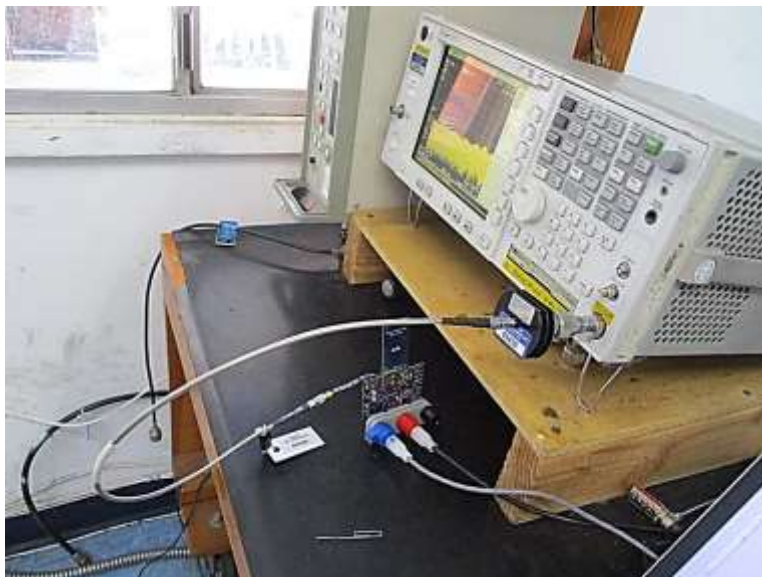


Middle Channel



High Channel

Test Setup Photo(s)



15.249(a) Field Strength of Fundamental

Test Equipment					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
02672	Spectrum Analyzer	Agilent	E4446A	4/29/2020	4/29/2022
00852	Biconilog antenna	Schaffner	CBL 6111C	4/14/2020	4/14/2022
05505	Cable	Pasternack	RG223/U	12/24/2020	12/24/2022
05198	Cable	Belden	8268	12/21/2020	12/21/2022
00309	Preamplifier	HP	8447D	12/24/2019	12/24/2021
05050	Attenuator	Mini-Circuits	NAT-6	5/26/2021	5/26/2023

Test Data Summary - Voltage Variations

This equipment is battery powered. Power output tests were performed using a fresh battery directly or simulated fresh battery with support DC power supply at 3.6V DC

Test Data Summary – Radiated Field Strength Measurement Configuration 1 GRT

Folder 4

Frequency (MHz)	Modulation	Ant. Type	Measured (dBuV/m @ 3m)	Limit (dBuV/m @ 3m)	Results
908.0	OOK LV0	PCB Trace	90.1	≤94	Pass
915.0	OOK LV0	PCB Trace	91.1	≤94	Pass
923.8	OOK LV0	PCB Trace	90.6	≤94	Pass

Test Data Summary – Radiated Field Strength Measurement Configuration 2 WRT

Folder4

Frequency (MHz)	Modulation	Ant. Type	Measured (dBuV/m @ 3m)	Limit (dBuV/m @ 3m)	Results
908.0	OOK LV0	PCB Trace	92.3	≤94	Pass
915.0	OOK LV0	PCB Trace	91.1	≤94	Pass
923.8	OOK LV0	PCB Trace	92.8	≤94	Pass

Test Data Summary – Radiated Field Strength Measurement Configuration 3 PIT

Folder 3

Frequency (MHz)	Modulation	Ant. Type	Measured (dBuV/m @ 3m)	Limit (dBuV/m @ 3m)	Results
908.0	OOK LV0	PCB Trace	92.2	≤94	Pass
915.0	OOK LV0	PCB Trace	93.3	≤94	Pass
923.8	OOK LV0	PCB Trace	91.4	≤94	Pass

Test Setup / Conditions / Data

Test Location: CKC Laboratories Inc. • 110 N. Olinda Pl. • Brea, CA 92823 • 714-993-6112
 Customer: **Itron, Inc.**
 Specification: **15.249 Carrier and Spurious Emissions (902-928 MHz Transmitter)**
 Work Order #: **105380** Date: 6/6/2021
 Test Type: **Radiated Scan** Time: 11:13:21
 Tested By: E. Wong Sequence#: 14
 Software: EMITest 5.03.19

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

The EUT is placed on Styrofoam platform and the Blue port is connected to a section of wire with a shorting tip to activate internal battery. The EUT's data port is connected to a remote located laptop running CLI Tool ver.2.0.1.24 via USB cable for configuration purposes, once configured, the laptop is removed from remote connection during course of testing. Fresh battery is used.

EUT has fixed orientation per manufacture's specification.

Operating Frequency / Mode:

908.0MHz, 915MHz, 923.8MHz, 200kHz steps, 80channels 384 kbps OOK LV0 Folder 4

Frequency of Measurement: 9k-9280MHz

9kHz to 150kHz RBW=0.2kHz, VBW=0.6kHz

150kHz to 30MHz RBW=9kHz, VBW=27kHz

30-1000MHz, RBW=120kHz, VBW=360kHz

1000-9280MHz, RBW=1MHz, VBW=3MHz

-20dBc limit, RBW=100kHz, VBW=300kHz

Note: The manufacturer declares the duty cycle is 100% in application.

Test environment conditions:

Temperature: 22°C

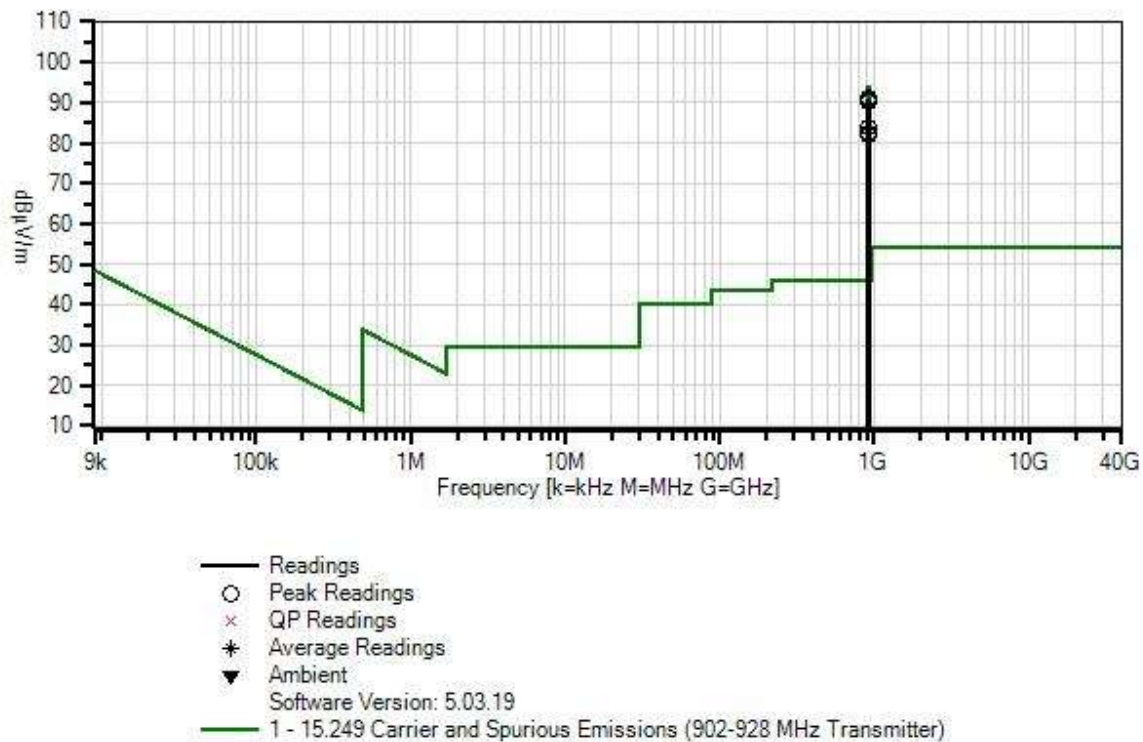
Relative Humidity 39%

Pressure: 100kPa

Site A

Test Method: ANSI C63.10-2013

Itron, Inc. W/O#: 105380 Sequence#: 14 Date: 6/6/2021
15.249 Carrier and Spurious Emissions (902-928 MHz Transmitter) Test Distance: 3 Meters Vert



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02672	Spectrum Analyzer	E4446A	4/29/2020	4/29/2022
T2	AN00851	Biconilog Antenna	CBL6111C	4/14/2020	4/14/2022
T3	ANP05505	Attenuator	NAT-6	5/26/2021	5/26/2023
T4	ANP05198	Cable-Amplitude +15C to +45C (dB)	8268	12/21/2020	12/21/2022
T5	AN00309	Preamp	8447D	12/24/2019	12/24/2021
T6	ANP05050	Cable	RG223/U	12/24/2020	12/24/2022

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	915.000M	82.3	+0.0 -27.1	+23.3 +0.5	+6.3	+5.8	+0.0 245	91.1	94.0 Fundamental_M	-2.9	Vert 112
2	923.800M	81.6	+0.0 -27.1	+23.5 +0.5	+6.3	+5.8	+0.0 270	90.6	94.0 Fundamental_H	-3.4	Vert 108
3	908.002M	81.4	+0.0 -27.1	+23.2 +0.5	+6.3	+5.8	+0.0 236	90.1	94.0 Fundamental_L	-3.9	Vert 105
4	923.803M	75.1	+0.0 -27.1	+23.5 +0.5	+6.3	+5.8	+0.0 213	84.1	94.0 Fundamental_H	-9.9	Horiz 158
5	915.000M	73.7	+0.0 -27.1	+23.3 +0.5	+6.3	+5.8	+0.0 81	82.5	94.0 Fundamental_M	-11.5	Horiz 110
6	908.017M	73.4	+0.0 -27.1	+23.2 +0.5	+6.3	+5.8	+0.0 50	82.1	94.0 Fundamental L	-11.9	Horiz 110



Test Location: CKC Laboratories Inc. • 110 N. Olinda Pl. • Brea, CA 92823 • 714-993-6112
 Customer: **Itron, Inc.**
 Specification: **15.249 Carrier and Spurious Emissions (902-928 MHz Transmitter)**
 Work Order #: **105380** Date: 6/9/2021
 Test Type: **Radiated Scan** Time: 14:10:14
 Tested By: E. Wong Sequence#: 24
 Software: EMITest 5.03.19

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 2			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 2			

Test Conditions / Notes:

The EUT is placed on Styrofoam platform and the Blue port is connected to a section of wire with a shorting tip to activate internal battery. The EUT's data port is connected to a remote located laptop running CLI Tool ver.2.0.1.24 via USB cable for configuration purposes, once configured, the laptop is removed from remote connection during course of testing. Fresh battery is used.
 EUT has fixed orientation per manufacture's specification.

Operating Frequency / Mode:

908.0MHz, 915MHz, 923.8MHz, 200kHz steps, 80channels 384 kbps OOK LV0 Folder 4

Frequency of Measurement: 9k-9280MHz

9kHz to 150kHz RBW=0.2kHz, VBW=0.6kHz

150kHz to 30MHz RBW=9kHz, VBW=27kHz

30-1000MHz, RBW=120kHz, VBW=360kHz

1000-9280MHz, RBW=1MHz, VBW=3MHz

-20dBc limit, RBW=100kHz, VBW=300kHz

Note: The manufacturer declares the duty cycle is 100% in application.

Test Environment Conditions:

Temperature: 22°C

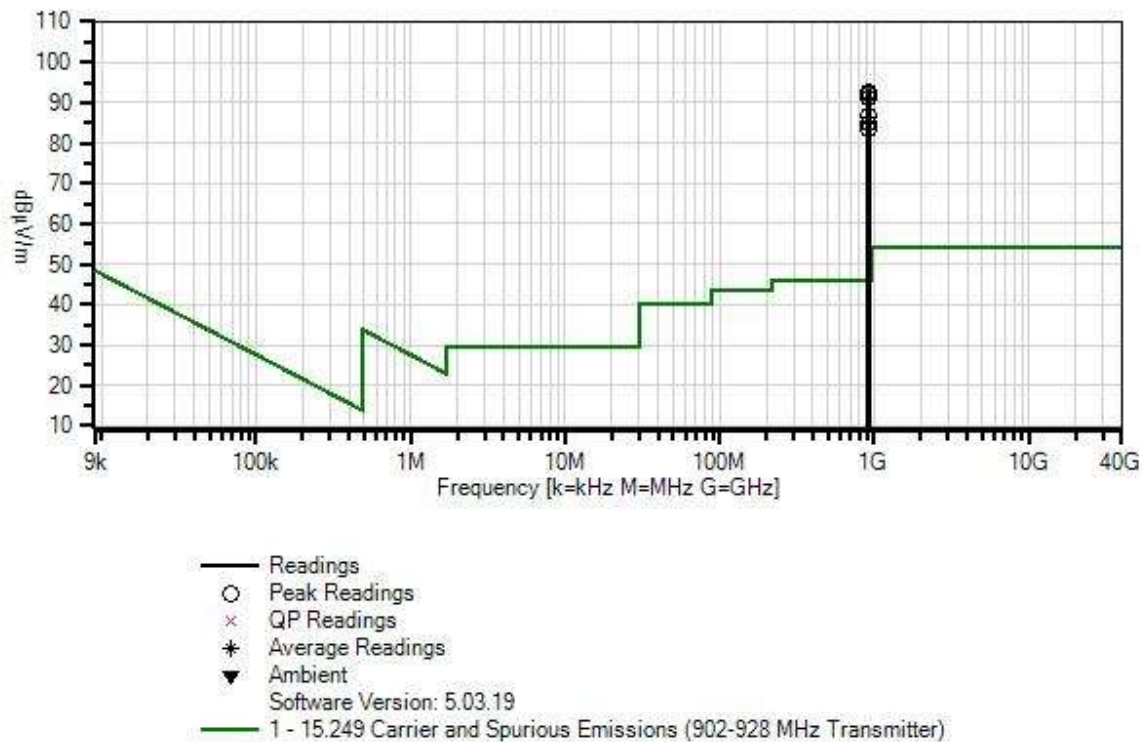
Relative Humidity 39%

Pressure: 100kPa

Site A

Test Method: ANSI C63.10-2013

Ittron, Inc. W/O#: 105380 Sequence#: 24 Date: 6/9/2021
15.249 Carrier and Spurious Emissions (902-928 MHz Transmitter) Test Distance: 3 Meters Vert



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02672	Spectrum Analyzer	E4446A	4/29/2020	4/29/2022
T2	AN00851	Biconilog Antenna	CBL6111C	4/14/2020	4/14/2022
T3	ANP05505	Attenuator	NAT-6	5/26/2021	5/26/2023
T4	ANP05198	Cable-Amplitude +15C to +45C (dB)	8268	12/21/2020	12/21/2022
T5	AN00309	Preamp	8447D	12/24/2019	12/24/2021
T6	ANP05050	Cable	RG223/U	12/24/2020	12/24/2022

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	923.800M	83.8	+0.0 -27.1	+23.5 +0.5	+6.3	+5.8	+0.0 290	92.8	94.0 Fundamental_H	-1.2	Vert 130
2	908.000M	83.6	+0.0 -27.1	+23.2 +0.5	+6.3	+5.8	+0.0 286	92.3	94.0 Fundamental_L	-1.7	Vert 143
3	915.000M	82.3	+0.0 -27.1	+23.3 +0.5	+6.3	+5.8	+0.0 90	91.1	94.0 Fundamental_M	-2.9	Vert 128
4	915.000M	78.1	+0.0 -27.1	+23.3 +0.5	+6.3	+5.8	+0.0 229	86.9	94.0 Fundamental_M	-7.1	Horiz 148
5	923.800M	75.9	+0.0 -27.1	+23.5 +0.5	+6.3	+5.8	+0.0 233	84.9	94.0 Fundamental_H	-9.1	Horiz 139
6	908.000M	74.6	+0.0 -27.1	+23.2 +0.5	+6.3	+5.8	+0.0 243	83.3	94.0 Fundamental_L	-10.7	Horiz 148



Test Location: CKC Laboratories Inc. • 110 N. Olinda Pl. • Brea, CA 92823 • 714-993-6112
 Customer: **Itron, Inc.**
 Specification: **15.249 Carrier and Spurious Emissions (902-928 MHz Transmitter)**
 Work Order #: **105380** Date: 6/7/2021
 Test Type: **Radiated Scan** Time: 11:05:23
 Tested By: E. Wong Sequence#: 15
 Software: EMITest 5.03.19

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 3			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 3			

Test Conditions / Notes:

The EUT is placed on Styrofoam platform and the Blue port receives power from remotely located support power supply set 3.6Vdc to simulate a fresh battery. The EUT's data port is connected to a remote located laptop running CLI Tool ver.2.0.1.24 via USB cable for configuration purposes, once configured, the laptop is removed from remote connection during course of testing. Black port is connected to a section of unterminated cable. EUT has fixed orientation per manufacture's specification.

Operating Frequency / Mode:

908.0MHz, 915MHz, 923.8MHz, 200kHz steps, 80channels 384 kbps OOK LV0 Folder 3

Frequency of Measurement: 9k-9280MHz

9kHz to 150kHz RBW=0.2kHz, VBW=0.6kHz

150kHz to 30MHz RBW=9kHz, VBW=27kHz

30-1000MHz, RBW=120kHz, VBW=360kHz

1000-9280MHz, RBW=1MHz, VBW=3MHz

-20dBc limit, RBW=100kHz, VBW=300kHz

Note: The manufacturer declares the duty cycle is 100% in application.

Test Environment Conditions:

Temperature: 22°C

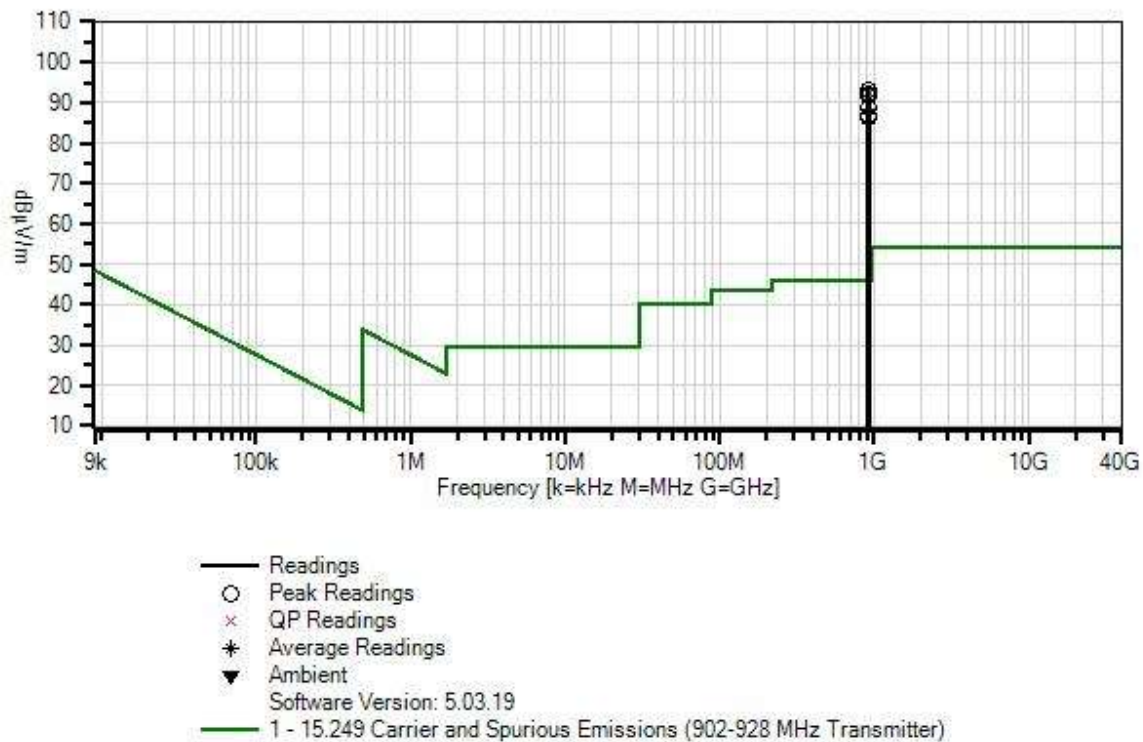
Relative Humidity: 39%

Pressure: 100kPa

Site A

Test Method: ANSI C63.10-2013

Itron, Inc. WO#: 105380 Sequence#: 15 Date: 6/7/2021
15.249 Carrier and Spurious Emissions (902-928 MHz Transmitter) Test Distance: 3 Meters Vert



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02672	Spectrum Analyzer	E4446A	4/29/2020	4/29/2022
T2	AN00851	Biconilog Antenna	CBL6111C	4/14/2020	4/14/2022
T3	ANP05505	Attenuator	NAT-6	5/26/2021	5/26/2023
T4	ANP05198	Cable-Amplitude +15C to +45C (dB)	8268	12/21/2020	12/21/2022
T5	AN00309	Preamp	8447D	12/24/2019	12/24/2021
T6	ANP05050	Cable	RG223/U	12/24/2020	12/24/2022

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	915.000M	84.5	+0.0 -27.1	+23.3 +0.5	+6.3	+5.8	+0.0 179	93.3	94.0 Fundamental_M	-0.7	Vert 100
2	908.000M	83.5	+0.0 -27.1	+23.2 +0.5	+6.3	+5.8	+0.0 208	92.2	94.0 Fundamental_L	-1.8	Vert 100
3	923.800M	82.4	+0.0 -27.1	+23.5 +0.5	+6.3	+5.8	+0.0 184	91.4	94.0 Fundamental_H	-2.6	Vert 100
4	923.800M	79.6	+0.0 -27.1	+23.5 +0.5	+6.3	+5.8	+0.0 119	88.6	94.0 Fundamental_H	-5.4	Horiz 107
5	908.000M	77.9	+0.0 -27.1	+23.2 +0.5	+6.3	+5.8	+0.0 276	86.6	94.0 Fundamental_L	-7.4	Horiz 100
6	915.000M	77.3	+0.0 -27.1	+23.3 +0.5	+6.3	+5.8	+0.0 115	86.1	94.0 Fundamental_M	-7.9	Horiz 135

Test Setup Photo(s)



Configuration 1; Below 1GHz, View 1



Configuration 1; Below 1GHz, View 2



Configuration 2; Below 1GHz, View 1



Configuration 2; Below 1GHz, View 2



Configuration 3; Below 1GHz, View 1



Configuration 3; Below 1GHz, View 2

15.249(a) Radiated Emissions and Band Edge

Test Setup / Conditions / Data

Test Location: CKC Laboratories Inc. • 110 N. Olinda Pl. • Brea, CA 92823 • 714-993-6112
 Customer: **Itron, Inc.**
 Specification: **15.249 Carrier and Spurious Emissions (902-928 MHz Transmitter)**
 Work Order #: **105380** Date: 6/6/2021
 Test Type: **Radiated Scan** Time: 11:13:21
 Tested By: E. Wong Sequence#: 14
 Software: EMITest 5.03.19

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

The EUT is placed on Styrofoam platform and the Blue port is connected to a section of wire with a shorting tip to activate internal battery. The EUT's data port is connected to a remote located laptop running CLI Tool ver.2.0.1.24 via USB cable for configuration purposes, once configured, the laptop is removed from remote connection during course of testing. Fresh battery is used.

EUT has fixed orientation per manufacture's specification.

Operating Frequency / Mode:

908.0MHz, 915MHz, 923.8MHz, 200kHz steps, 80channels 384 kbps OOK LV0 Folder 4

Frequency of Measurement: 9k-9280MHz

9kHz to 150kHz RBW=0.2kHz, VBW=0.6kHz

150kHz to 30MHz RBW=9kHz, VBW=27kHz

30-1000MHz, RBW=120kHz, VBW=360kHz

1000-9280MHz, RBW=1MHz, VBW=3MHz

-20dBc limit, RBW=100kHz, VBW=300kHz

Note: The manufacturer declares the duty cycle is 100% in application.

Test Environment Conditions:

Temperature: 22°C

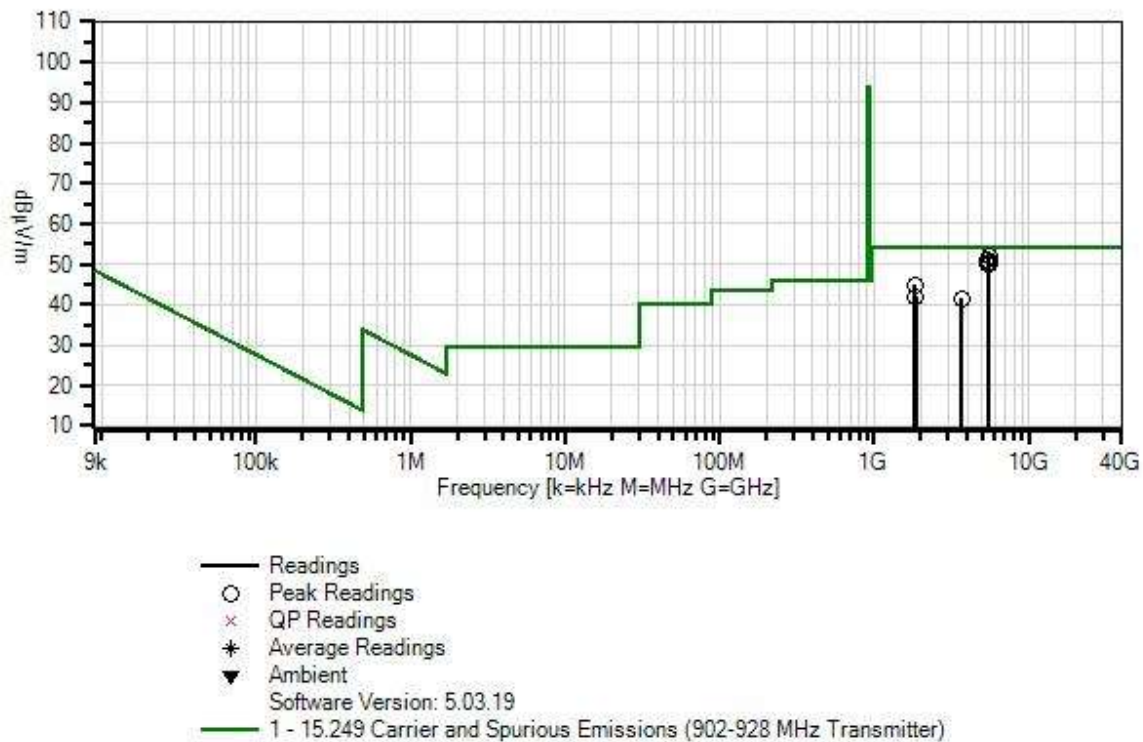
Relative Humidity: 39%

Pressure: 100kPa

Site A

Test Method: ANSI C63.10-2013

Ittron, Inc. W/O#: 105380 Sequence#: 14 Date: 6/6/2021
15.249 Carrier and Spurious Emissions (902-928 MHz Transmitter) Test Distance: 3 Meters Vert



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02672	Spectrum Analyzer	E4446A	4/29/2020	4/29/2022
T2	AN00849	Horn Antenna	3115	3/17/2020	3/17/2022
T3	ANP07659	Cable	32022-29094K-29094K-24TC	7/30/2020	7/30/2022
T4	AN00786	Preamp	83017A	5/20/2020	5/20/2022
T5	ANP06360	Cable	L1-PNMNM-48	8/8/2019	8/8/2021
T6	AN02749	High Pass Filter	9SH10-1000/T10000-O/O	7/15/2019	7/15/2021
	AN00851	Biconilog Antenna	CBL6111C	4/14/2020	4/14/2022
	ANP05505	Attenuator	NAT-6	5/26/2021	5/26/2023
	ANP05198	Cable-Amplitude +15C to +45C (dB)	8268	12/21/2020	12/21/2022
	AN00309	Preamp	8447D	12/24/2019	12/24/2021
	ANP05050	Cable	RG223/U	12/24/2020	12/24/2022
	AN00314	Loop Antenna	6502	4/13/2020	4/13/2022

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dBμV	T1 T5 dB	T2 T6 dB	T3 dB	T4 dB	Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	5490.000M	49.0	+0.0 +5.1	+34.1 +0.4	+0.7	-37.2	+0.0 95	52.1	54.0 M	-1.9	Vert 183
2	5542.800M	48.9	+0.0 +5.1	+34.1 +0.4	+0.7	-37.3	+0.0 133	51.9	54.0 H	-2.1	Vert 171
3	5448.000M	47.9	+0.0 +5.1	+34.1 +0.5	+0.7	-37.2	+0.0 266	51.1	54.0 L	-2.9	Vert 142
4	5490.000M	47.6	+0.0 +5.1	+34.1 +0.4	+0.7	-37.2	+0.0 175	50.7	54.0 M	-3.3	Horiz 172
5	5448.000M	46.7	+0.0 +5.1	+34.1 +0.5	+0.7	-37.2	+0.0 249	49.9	54.0 L	-4.1	Horiz 103
6	5542.800M	46.9	+0.0 +5.1	+34.1 +0.4	+0.7	-37.3	+0.0 270	49.9	54.0 H	-4.1	Horiz 128
7	1830.000M	53.4	+0.0 +2.8	+26.9 +0.4	+0.3	-38.8	+0.0 161	45.0	54.0 M	-9.0	Vert 191
8	1816.000M	53.3	+0.0 +2.8	+26.8 +0.4	+0.3	-38.8	+0.0 149	44.8	54.0 L	-9.2	Vert 182
9	1847.600M	50.2	+0.0 +2.8	+27.0 +0.4	+0.3	-38.8	+0.0 230	41.9	54.0 H	-12.1	Vert 100
10	3660.000M	42.6	+0.0 +4.0	+32.0 +0.4	+0.5	-38.1	+0.0 72	41.4	54.0 M	-12.6	Vert 191



Test Location: CKC Laboratories Inc. • 110 N. Olinda Pl. • Brea, CA 92823 • 714-993-6112
 Customer: **Itron, Inc.**
 Specification: **15.249 Carrier and Spurious Emissions (902-928 MHz Transmitter)**
 Work Order #: **105380** Date: 6/9/2021
 Test Type: **Radiated Scan** Time: 14:10:14
 Tested By: E. Wong Sequence#: 24
 Software: EMITest 5.03.19

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 2			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 2			

Test Conditions / Notes:

The EUT is placed on Styrofoam platform and the Blue port is connected to a section of wire with a shorting tip to activate internal battery. The EUT's data port is connected to a remote located laptop running CLI Tool ver.2.0.1.24 via USB cable for configuration purposes, once configured, the laptop is removed from remote connection during course of testing. Fresh battery is used.
 EUT has fixed orientation per manufacture's specification.

Operating Frequency / Mode:

908.0MHz, 915MHz, 923.8MHz, 200kHz steps, 80channels 384 kbps OOK LV0 Folder 4

Frequency of Measurement: 9k-9280MHz

9kHz to 150kHz RBW=0.2kHz, VBW=0.6kHz

150kHz to 30MHz RBW=9kHz, VBW=27kHz

30-1000MHz, RBW=120kHz, VBW=360kHz

1000-9280MHz, RBW=1MHz, VBW=3MHz

-20dBc limit, RBW=100kHz, VBW=300kHz

Note: The manufacturer declares the duty cycle is 100% in application.

Test Environment Conditions:

Temperature: 22°C

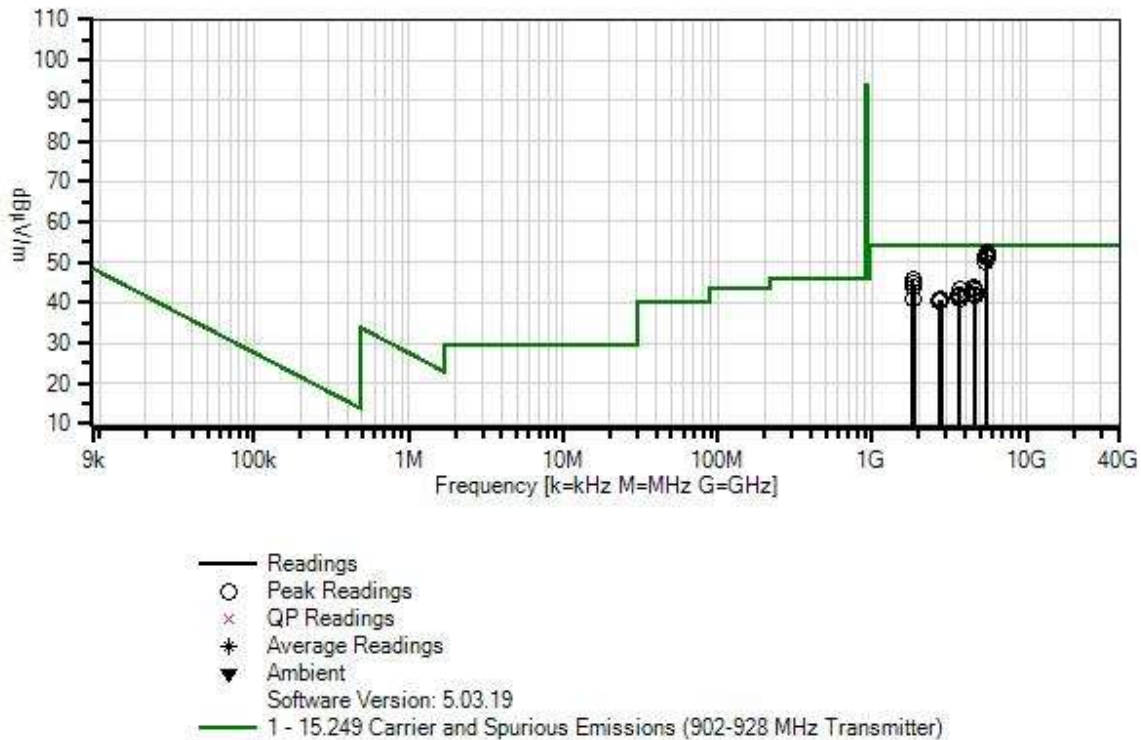
Relative Humidity: 39%

Pressure: 100kPa

Site A

Test Method: ANSI C63.10-2013

Ittron, Inc. W/O#: 105380 Sequence#: 24 Date: 6/9/2021
15.249 Carrier and Spurious Emissions (902-928 MHz Transmitter) Test Distance: 3 Meters Vert



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02672	Spectrum Analyzer	E4446A	4/29/2020	4/29/2022
T2	AN00849	Horn Antenna	3115	3/17/2020	3/17/2022
T3	ANP07659	Cable	32022-29094K-29094K-24TC	7/30/2020	7/30/2022
T4	AN00786	Preamp	83017A	5/20/2020	5/20/2022
T5	ANP06360	Cable	L1-PNMNM-48	8/8/2019	8/8/2021
T6	AN02749	High Pass Filter	9SH10-1000/T10000-O/O	7/15/2019	7/15/2021
	AN00851	Biconilog Antenna	CBL6111C	4/14/2020	4/14/2022
	ANP05505	Attenuator	NAT-6	5/26/2021	5/26/2023
	ANP05198	Cable-Amplitude +15C to +45C (dB)	8268	12/21/2020	12/21/2022
	AN00309	Preamp	8447D	12/24/2019	12/24/2021
	ANP05050	Cable	RG223/U	12/24/2020	12/24/2022
	AN00314	Loop Antenna	6502	4/13/2020	4/13/2022

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dBμV	T1 T5 dB	T2 T6 dB	T3 dB	T4 dB	Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	5542.800M	49.5	+0.0 +5.1	+34.1 +0.4	+0.7	-37.3	+0.0 120	52.5	54.0 H	-1.5	Vert 156
2	5489.950M	49.0	+0.0 +5.1	+34.1 +0.4	+0.7	-37.2	+0.0 135	52.1	54.0 M	-1.9	Vert 205
3	5542.742M	48.6	+0.0 +5.1	+34.1 +0.4	+0.7	-37.3	+0.0 286	51.6	54.0 H	-2.4	Horiz 127
4	5448.017M	48.3	+0.0 +5.1	+34.1 +0.5	+0.7	-37.2	+0.0 268	51.5	54.0 L	-2.5	Vert 155
5	5490.183M	48.1	+0.0 +5.1	+34.1 +0.4	+0.7	-37.2	+0.0 144	51.2	54.0 M	-2.8	Horiz 182
6	5448.017M	46.8	+0.0 +5.1	+34.1 +0.5	+0.7	-37.2	+0.0 48	50.0	54.0 L	-4.0	Horiz 147
7	1829.967M	54.0	+0.0 +2.8	+26.9 +0.4	+0.3	-38.8	+0.0 131	45.6	54.0 M	-8.4	Vert 203
8	1847.600M	53.0	+0.0 +2.8	+27.0 +0.4	+0.3	-38.8	+0.0 254	44.7	54.0 H	-9.3	Vert 120
9	1815.867M	52.4	+0.0 +2.8	+26.8 +0.4	+0.3	-38.8	+0.0 109	43.9	54.0 L	-10.1	Vert 172
10	4540.117M	43.3	+0.0 +4.5	+32.6 +0.3	+0.5	-37.4	+0.0 6	43.8	54.0 L	-10.2	Horiz 189
11	4574.917M	42.8	+0.0 +4.5	+32.6 +0.3	+0.5	-37.4	+0.0 17	43.3	54.0 M	-10.7	Vert 178
12	3695.142M	44.3	+0.0 +4.0	+32.2 +0.4	+0.5	-38.1	+0.0 360	43.3	54.0 H	-10.7	Horiz 141
13	4619.000M	42.1	+0.0 +4.5	+32.7 +0.3	+0.5	-37.4	+0.0 238	42.7	54.0 H	-11.3	Vert 100
14	4618.942M	41.5	+0.0 +4.5	+32.7 +0.3	+0.5	-37.4	+0.0 178	42.1	54.0 H	-11.9	Horiz 141
15	3631.600M	43.5	+0.0 +4.0	+31.9 +0.3	+0.5	-38.1	+0.0 125	42.1	54.0 L	-11.9	Vert 182
16	3695.200M	42.9	+0.0 +4.0	+32.2 +0.4	+0.5	-38.1	+0.0	41.9	54.0 H	-12.1	Vert 100
17	3659.933M	43.0	+0.0 +4.0	+32.0 +0.4	+0.5	-38.1	+0.0 229	41.8	54.0 M	-12.2	Vert 169
18	4574.967M	41.2	+0.0 +4.5	+32.6 +0.3	+0.5	-37.4	+0.0 348	41.7	54.0 M	-12.3	Horiz 162
19	3632.217M	42.9	+0.0 +4.0	+31.9 +0.3	+0.5	-38.1	+0.0 338	41.5	54.0 L	-12.5	Horiz 189
20	3659.983M	42.3	+0.0 +4.0	+32.0 +0.4	+0.5	-38.1	+0.0 312	41.1	54.0 M	-12.9	Horiz 162
21	1847.542M	49.0	+0.0 +2.8	+27.0 +0.4	+0.3	-38.8	+0.0 91	40.7	54.0 H	-13.3	Horiz 141
22	2771.400M	44.9	+0.0 +3.5	+29.7 +0.8	+0.3	-38.5	+0.0 176	40.7	54.0 H	-13.3	Vert 100
23	2771.342M	44.9	+0.0 +3.5	+29.7 +0.8	+0.3	-38.5	+0.0 4	40.7	54.0 H	-13.3	Horiz 141
24	2744.950M	44.8	+0.0 +3.4	+29.7 +0.9	+0.3	-38.5	+0.0	40.6	54.0 M	-13.4	Vert 203

25	2723.700M	44.8	+0.0 +3.4	+29.6 +0.9	+0.3	-38.5	+0.0 172	40.5	54.0 L	-13.5	Vert 171
26	2745.000M	44.6	+0.0 +3.4	+29.7 +0.9	+0.3	-38.5	+0.0 201	40.4	54.0 M	-13.6	Horiz 162
27	2724.317M	44.6	+0.0 +3.4	+29.6 +0.9	+0.3	-38.5	+0.0 143	40.3	54.0 L	-13.7	Horiz 166



Test Location: CKC Laboratories Inc. • 110 N. Olinda Pl. • Brea, CA 92823 • 714-993-6112
 Customer: **Itron, Inc.**
 Specification: **15.249 Carrier and Spurious Emissions (902-928 MHz Transmitter)**
 Work Order #: **105380** Date: 6/7/2021
 Test Type: **Radiated Scan** Time: 11:05:23
 Tested By: E. Wong Sequence#: 15
 Software: EMITest 5.03.19

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 3			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 3			

Test Conditions / Notes:

The EUT is placed on Styrofoam platform and the Blue port receives power from remotely located support power supply set 3.6Vdc to simulate a fresh battery. The EUT's data port is connected to a remote located laptop running CLI Tool ver.2.0.1.24 via USB cable for configuration purposes, once configured, the laptop is removed from remote connection during course of testing. Black port is connected to a section of unterminated cable. EUT has fixed orientation per manufacture's specification.

Operating Frequency / Mode:

908.0MHz, 915MHz, 923.8MHz, 200kHz steps, 80channels 384 kbps OOK LV0 Folder 3

Frequency of Measurement: 9k-9280MHz

9kHz to 150kHz RBW=0.2kHz, VBW=0.6kHz

150kHz to 30MHz RBW=9kHz, VBW=27kHz

30-1000MHz, RBW=120kHz, VBW=360kHz

1000-9280MHz, RBW=1MHz, VBW=3MHz

-20dBc limit, RBW=100kHz, VBW=300kHz

Note: The manufacturer declares the duty cycle is 100% in application.

Test Environment Conditions:

Temperature: 22°C

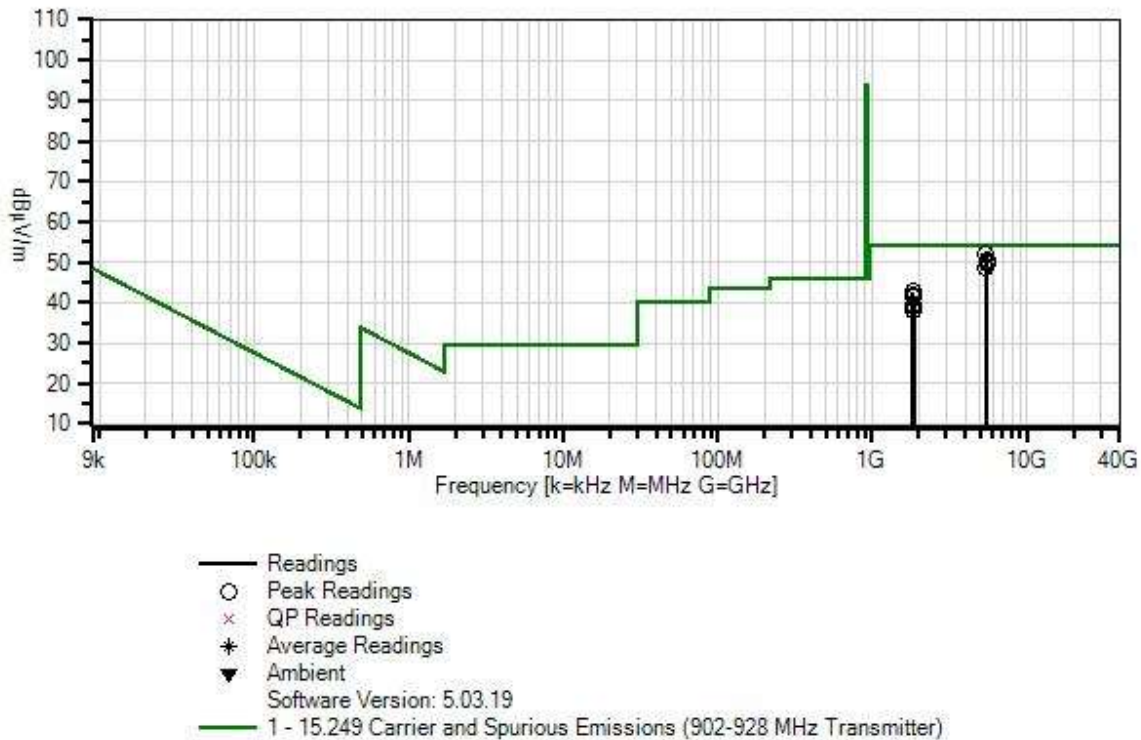
Relative Humidity 39%

Pressure: 100kPa

Site A

Test Method: ANSI C63.10-2013

Ittron, Inc. WO#: 105380 Sequence#: 15 Date: 6/7/2021
15.249 Carrier and Spurious Emissions (902-928 MHz Transmitter) Test Distance: 3 Meters Vert



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02672	Spectrum Analyzer	E4446A	4/29/2020	4/29/2022
T2	AN00849	Horn Antenna	3115	3/17/2020	3/17/2022
T3	ANP07659	Cable	32022-29094K-29094K-24TC	7/30/2020	7/30/2022
T4	AN00786	Preamp	83017A	5/20/2020	5/20/2022
T5	ANP06360	Cable	L1-PNMNM-48	8/8/2019	8/8/2021
T6	AN02749	High Pass Filter	9SH10-1000/T10000-O/O	7/15/2019	7/15/2021
	AN00851	Biconilog Antenna	CBL6111C	4/14/2020	4/14/2022
	ANP05505	Attenuator	NAT-6	5/26/2021	5/26/2023
	ANP05198	Cable-Amplitude +15C to +45C (dB)	8268	12/21/2020	12/21/2022
	AN00309	Preamp	8447D	12/24/2019	12/24/2021
	ANP05050	Cable	RG223/U	12/24/2020	12/24/2022
	AN00314	Loop Antenna	6502	4/13/2020	4/13/2022

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	5448.000M	48.6	+0.0 +5.1	+34.1 +0.5	+0.7	-37.2	+0.0 133	51.8	54.0 L	-2.2	Vert 183
2	5490.000M	47.5	+0.0 +5.1	+34.1 +0.4	+0.7	-37.2	+0.0 124	50.6	54.0 M	-3.4	Vert 176
3	5542.800M	47.4	+0.0 +5.1	+34.1 +0.4	+0.7	-37.3	+0.0 344	50.4	54.0 H	-3.6	Vert 172
4	5490.000M	47.0	+0.0 +5.1	+34.1 +0.4	+0.7	-37.2	+0.0 250	50.1	54.0 M	-3.9	Horiz 148
5	5542.800M	46.8	+0.0 +5.1	+34.1 +0.4	+0.7	-37.3	+0.0 134	49.8	54.0 H	-4.2	Horiz 150
6	5448.150M	45.5	+0.0 +5.1	+34.1 +0.5	+0.7	-37.2	+0.0 148	48.7	54.0 L	-5.3	Horiz 164
7	1830.000M	51.0	+0.0 +2.8	+26.9 +0.4	+0.3	-38.8	+0.0 245	42.6	54.0 M	-11.4	Vert 134
8	1847.600M	50.0	+0.0 +2.8	+27.0 +0.4	+0.3	-38.8	+0.0 262	41.7	54.0 H	-12.3	Vert 207
9	1816.000M	50.1	+0.0 +2.8	+26.8 +0.4	+0.3	-38.8	+0.0 211	41.6	54.0 L	-12.4	Vert 161
10	1847.600M	47.6	+0.0 +2.8	+27.0 +0.4	+0.3	-38.8	+0.0 236	39.3	54.0 H	-14.7	Horiz 187
11	1830.000M	47.2	+0.0 +2.8	+26.9 +0.4	+0.3	-38.8	+0.0 155	38.8	54.0 M	-15.2	Horiz 176
12	1816.150M	46.5	+0.0 +2.8	+26.8 +0.4	+0.3	-38.8	+0.0 209	38.0	54.0 L	-16.0	Horiz 183

Band Edge

Band Edge Summary Configuration 1 GRT

Frequency (MHz)	Modulation	Ant. Type	Field Strength (dBuV/m @3m)	Limit (dBuV/m @3m)	Results
902	OOK LV0	PCB Trace	42.1 PK	<46	Pass
928	OOK LV0	PCB Trace	39.4 QP	<46	Pass
Folder 4					

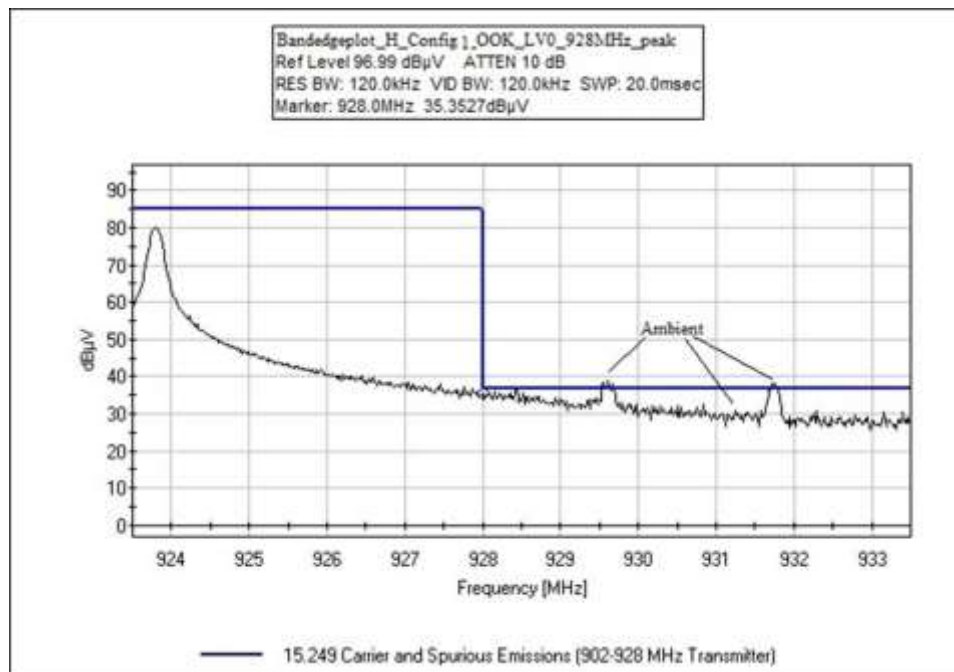
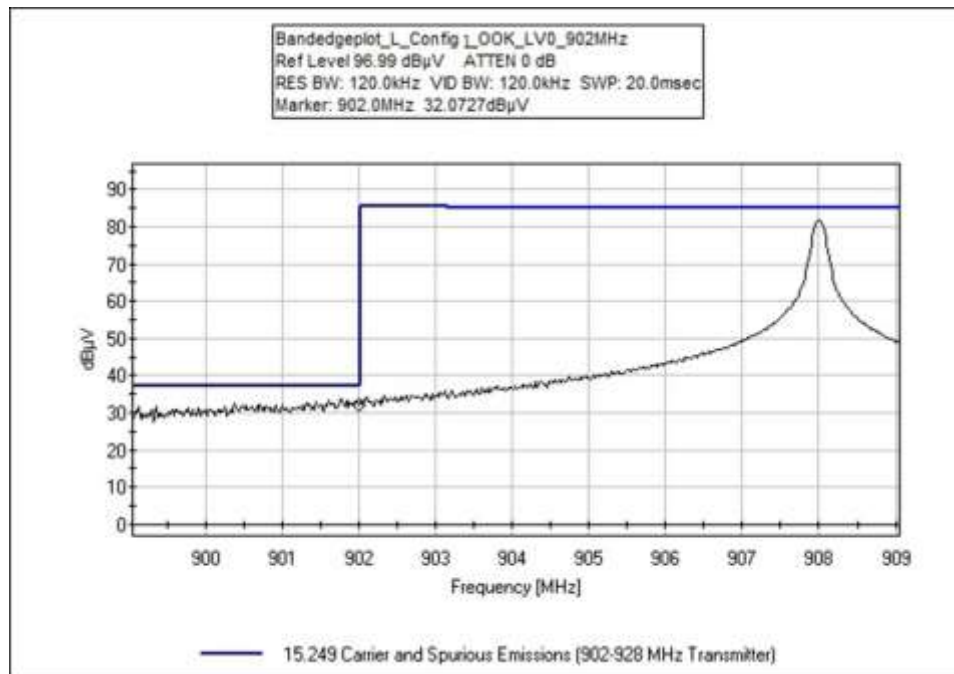
Band Edge Summary Configuration 2 WRT

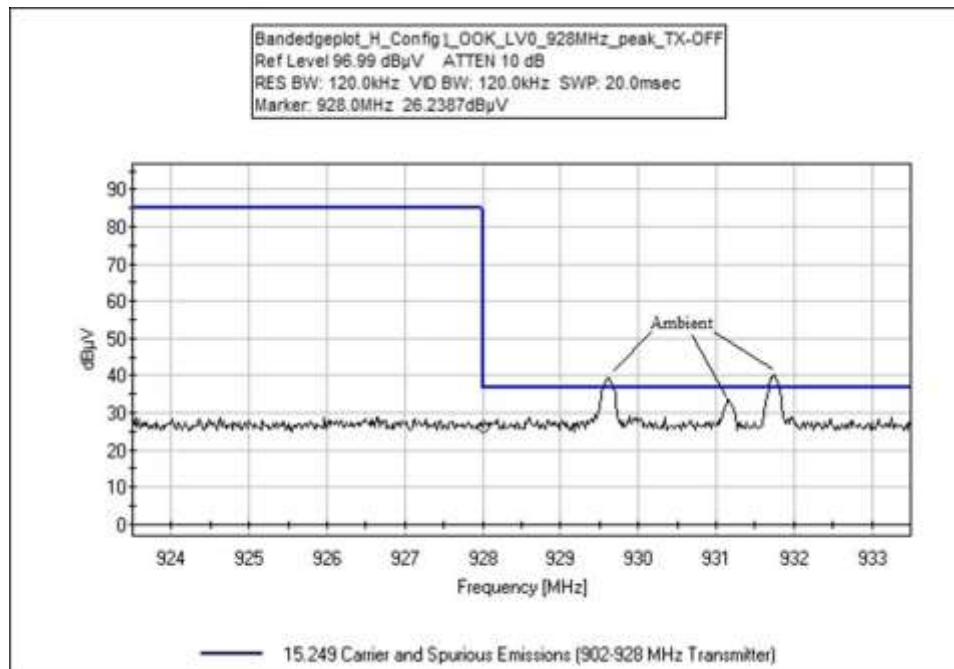
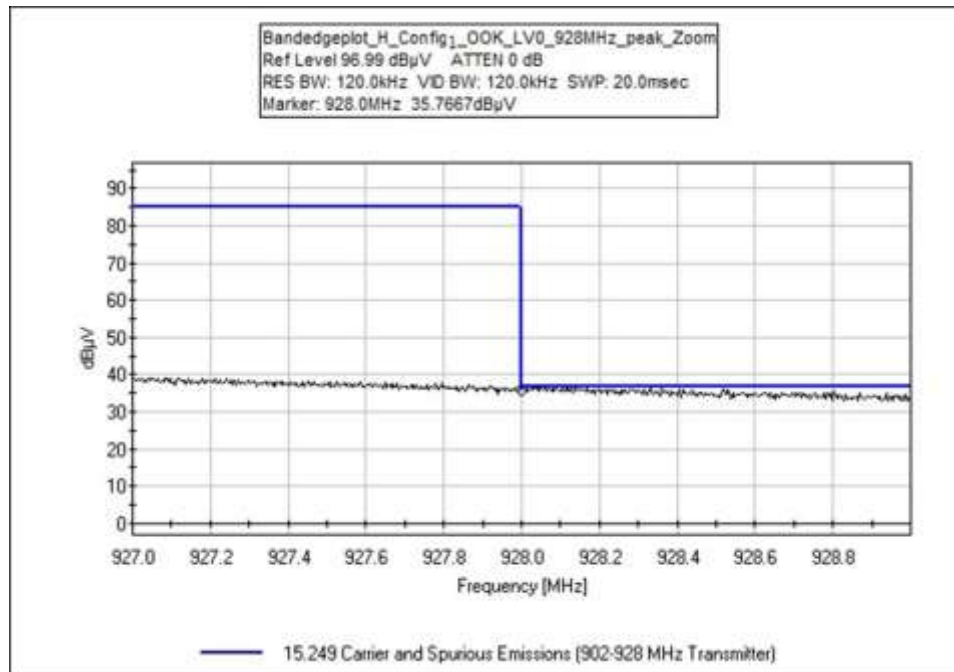
Frequency (MHz)	Modulation	Ant. Type	Field Strength (dBuV/m @3m)	Limit (dBuV/m @3m)	Results
902	OOK LV0	PCB Trace	42.9	<46	Pass
928	OOK LV0	PCB Trace	40.3 QP	<46	Pass
Folder 4					

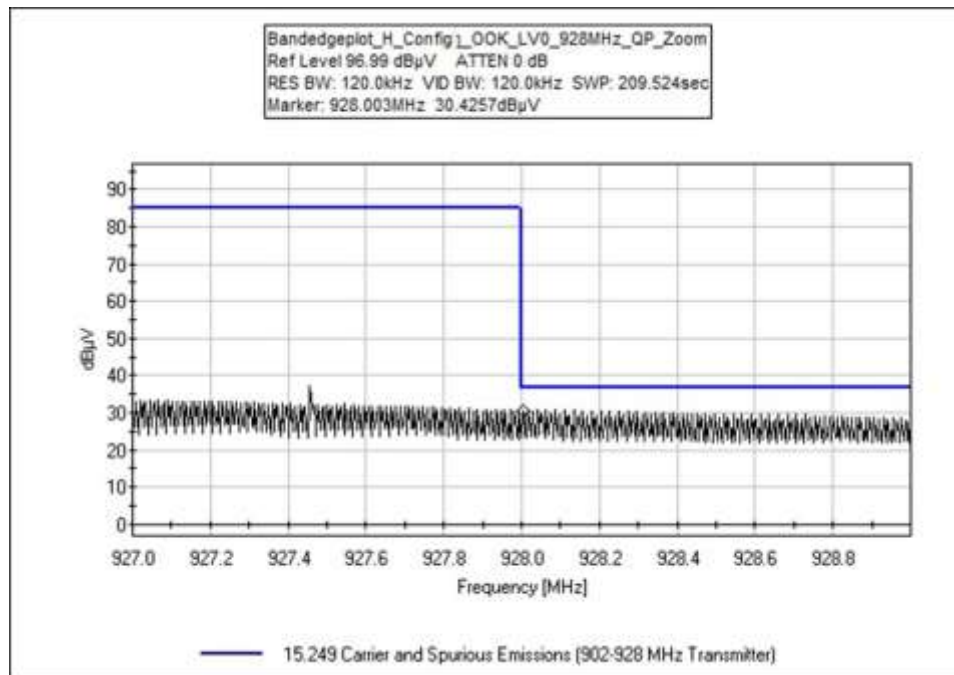
Band Edge Summary Configuration 3 PIT

Frequency (MHz)	Modulation	Ant. Type	Field Strength (dBuV/m @3m)	Limit (dBuV/m @3m)	Results
902	OOK LV0	PCB Trace	37.3 PK	<46	Pass
928	OOK LV0	PCB Trace	38.8 QP	<46	Pass
Folder 3					

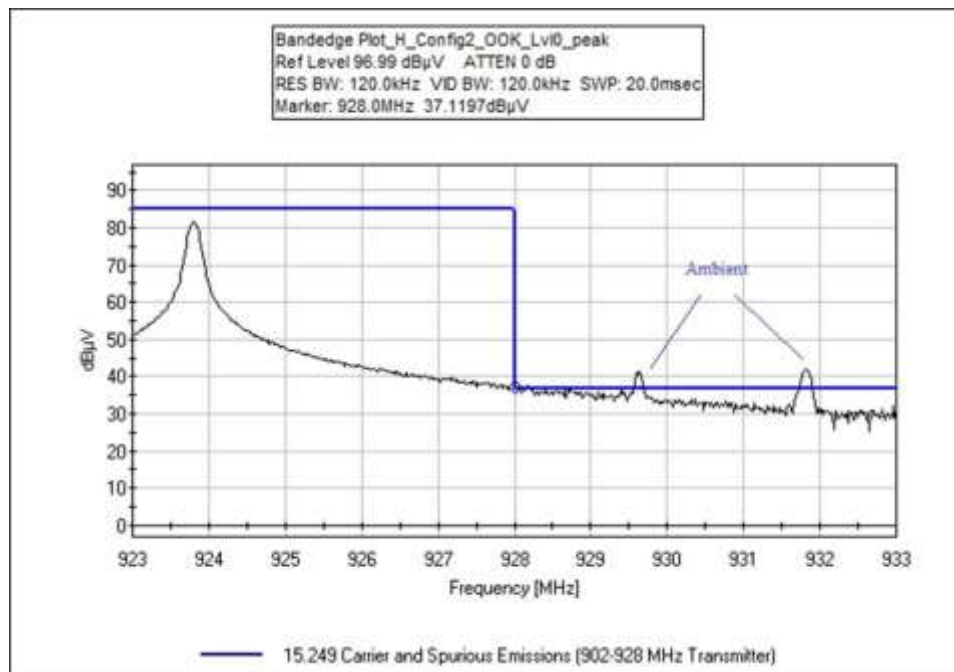
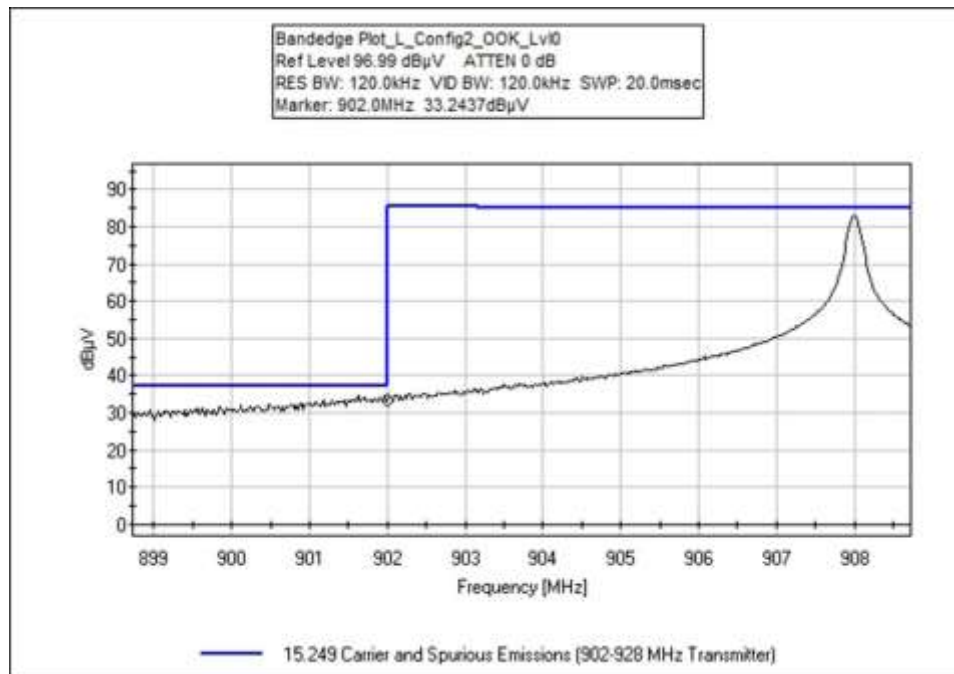
Configuration 1 Band Edge Plots

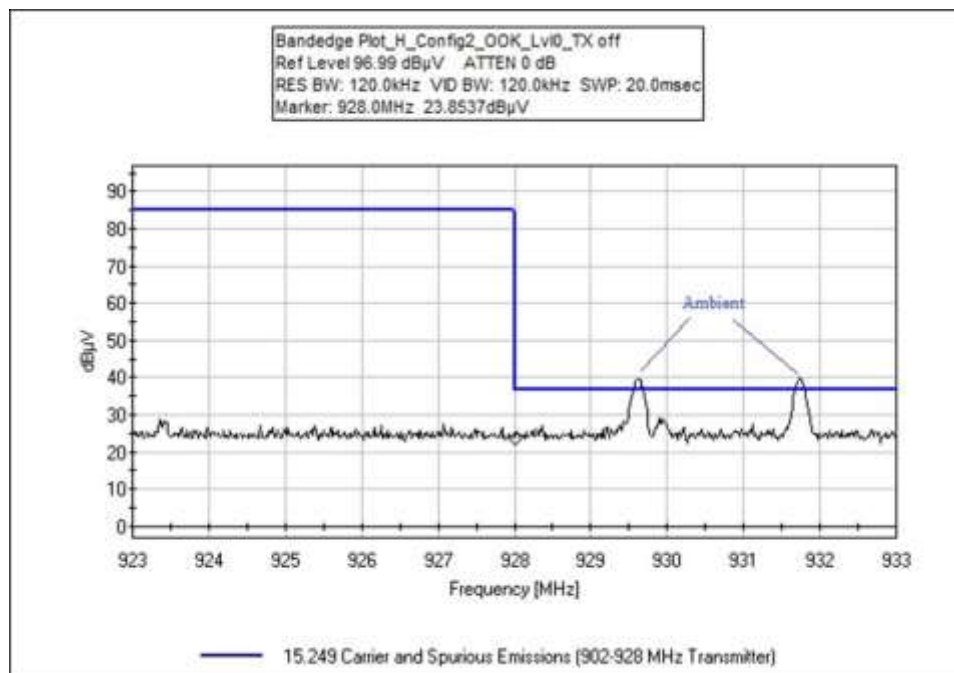
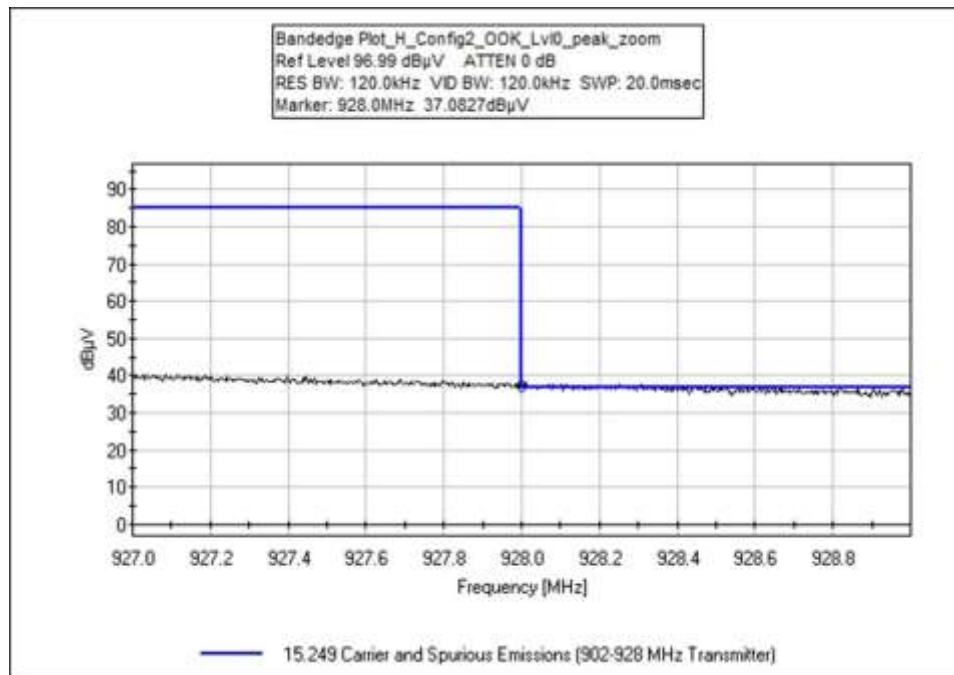


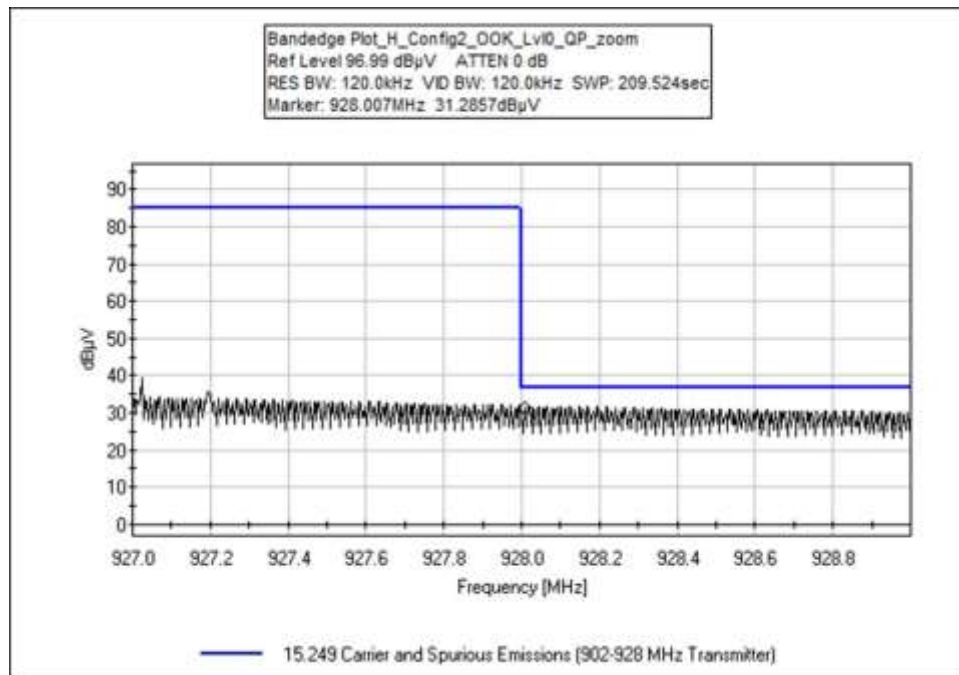




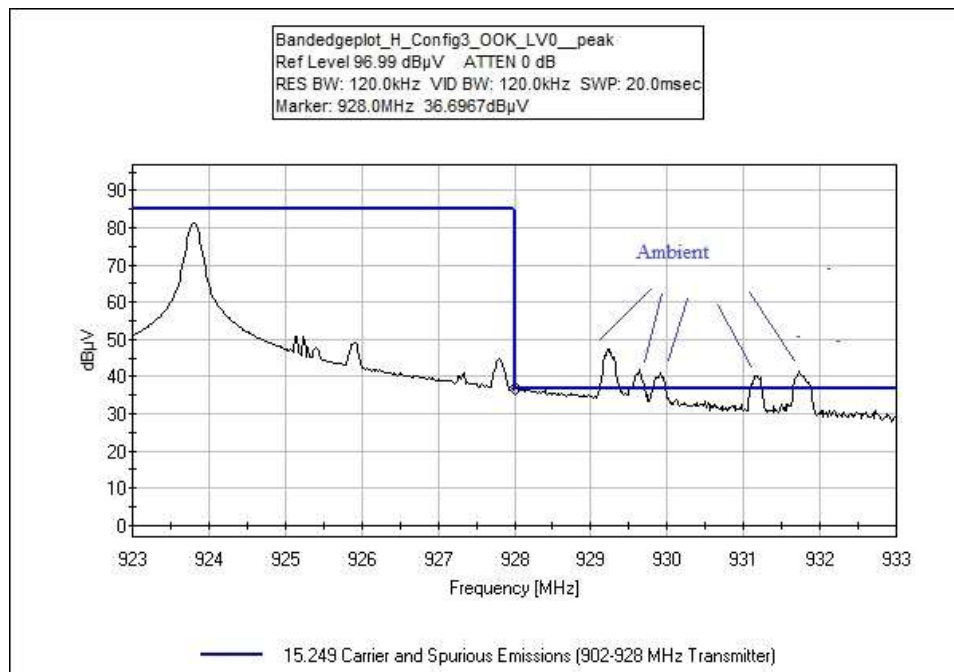
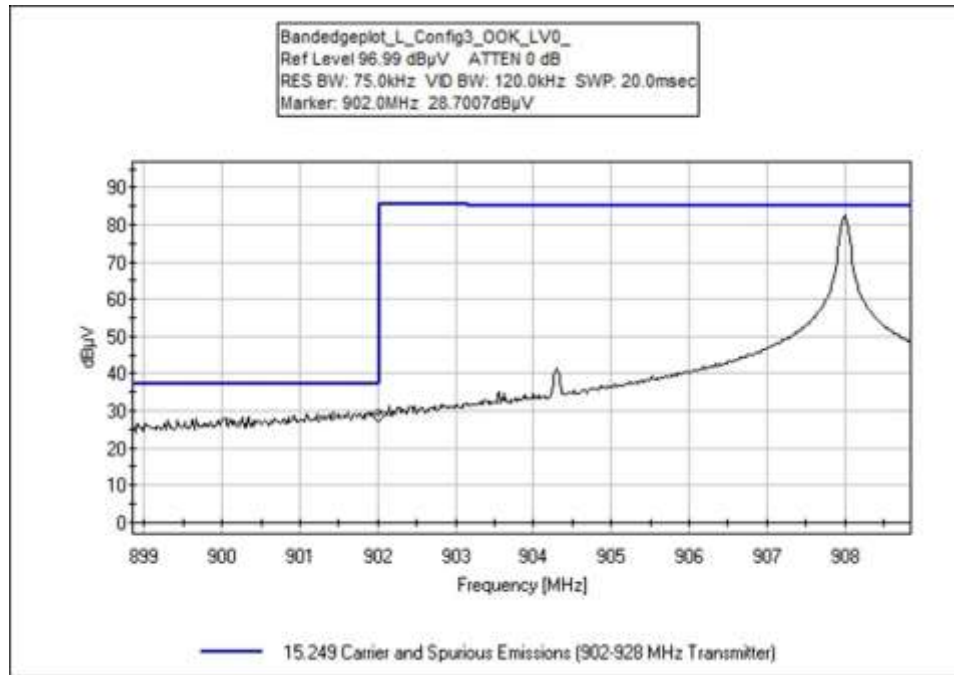
Configuration 2 Band Edge Plots

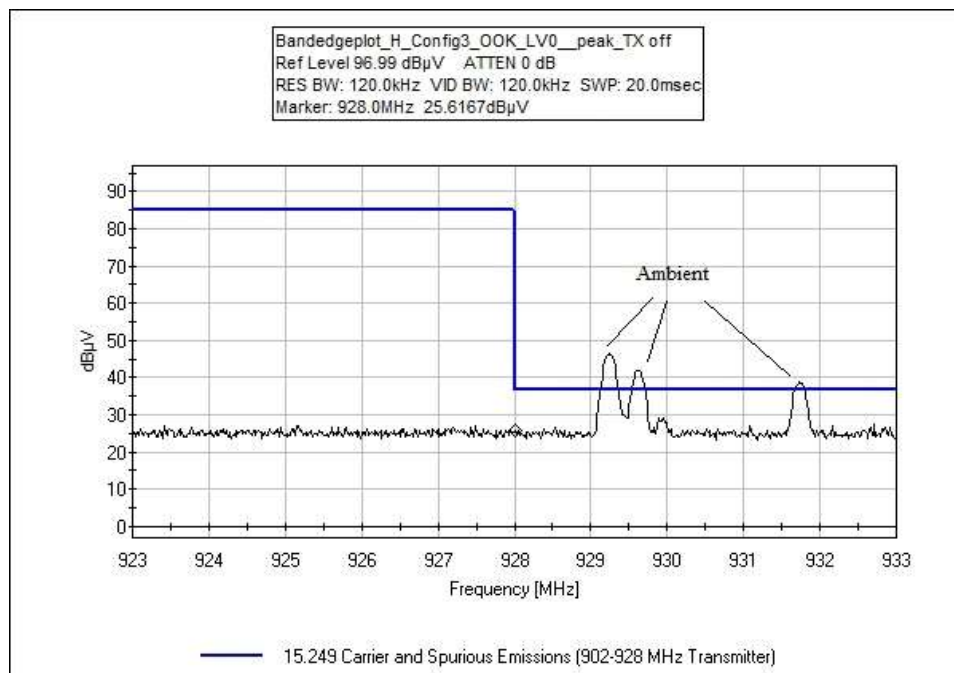
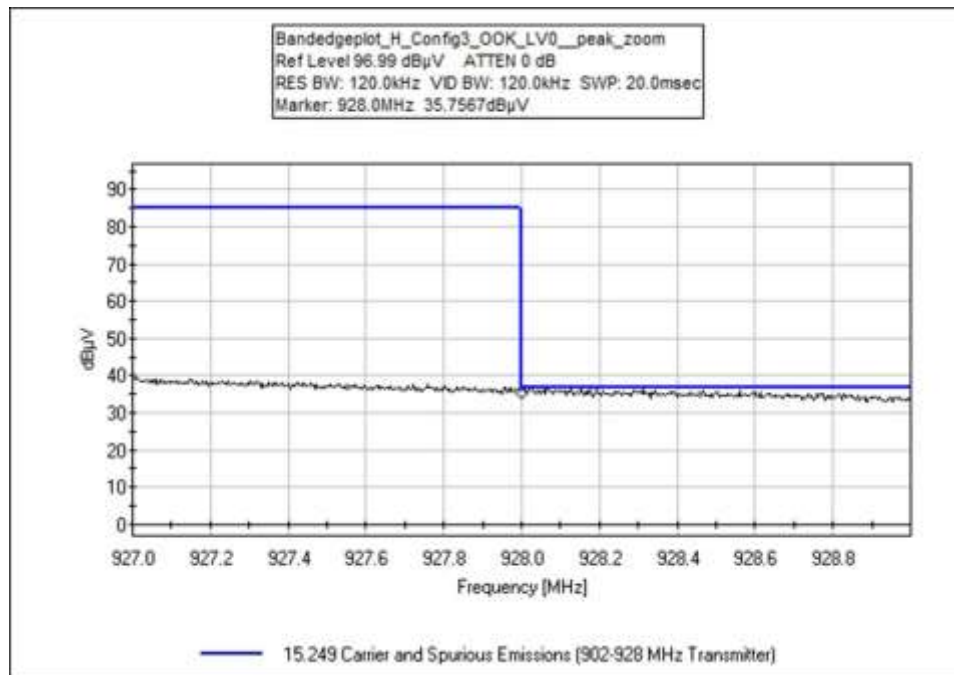


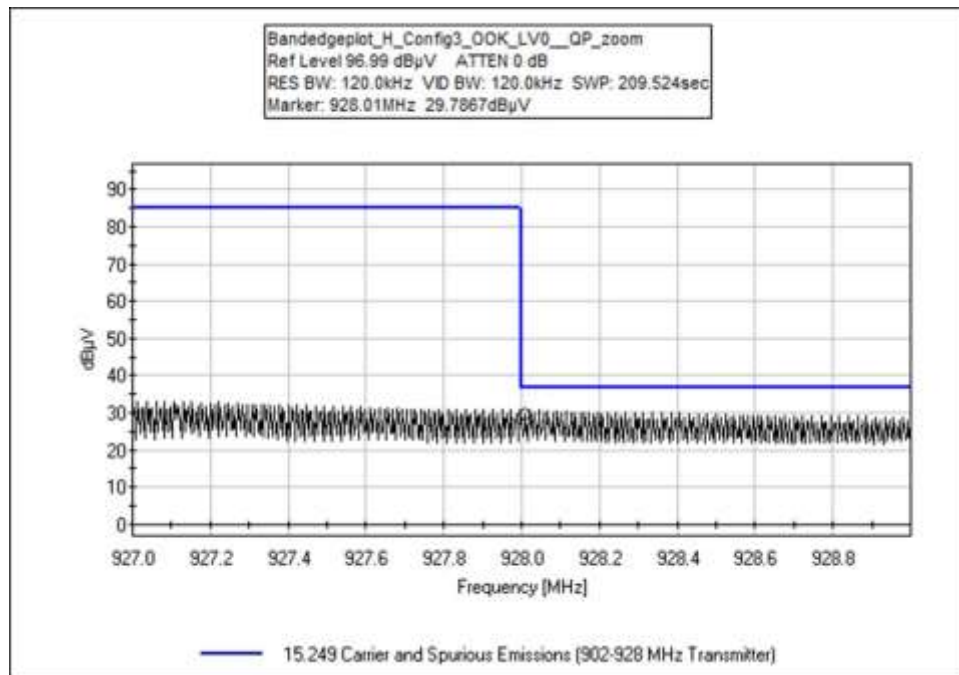




Configuration 3 Band Edge Plots







Test Setup / Conditions / Data

Test Location: CKC Laboratories Inc. • 110 N. Olinda Pl. • Brea, CA 92823 • 714-993-6112
 Customer: **Itron, Inc.**
 Specification: **15.249 Carrier and Spurious Emissions (902-928 MHz Transmitter)**
 Work Order #: **105380** Date: 6/6/2021
 Test Type: **Radiated Scan** Time: 11:13:21
 Tested By: E. Wong Sequence#: 14
 Software: EMITest 5.03.19

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

The EUT is placed on Styrofoam platform and the Blue port is connected to a section of wire with a shorting tip to activate internal battery. The EUT's data port is connected to a remote located laptop running CLI Tool ver.2.0.1.24 via USB cable for configuration purposes, once configured, the laptop is removed from remote connection during course of testing. Fresh battery is used.

EUT has fixed orientation per manufacture's specification.

Operating Frequency / Mode:

908.0MHz, 915MHz, 923.8MHz, 200kHz steps, 80channels 384 kbps OOK LV0 Folder 4

Frequency of Measurement: 9k-9280MHz

9kHz to 150kHz RBW=0.2kHz, VBW=0.6kHz

150kHz to 30MHz RBW=9kHz, VBW=27kHz

30-1000MHz, RBW=120kHz, VBW=360kHz

1000-9280MHz, RBW=1MHz, VBW=3MHz

-20dBc limit, RBW=100kHz, VBW=300kHz

Note: The manufacturer declares the duty cycle is 100% in application.

Test Environment Conditions:

Temperature: 22°C

Relative Humidity: 39%

Pressure: 100kPa

Site A

Test Method: ANSI C63.10-2013

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02672	Spectrum Analyzer	E4446A	4/29/2020	4/29/2022
	AN00849	Horn Antenna	3115	3/17/2020	3/17/2022
	ANP07659	Cable	32022-29094K- 29094K-24TC	7/30/2020	7/30/2022
	AN00786	Preamp	83017A	5/20/2020	5/20/2022
	ANP06360	Cable	L1-PNMMN-48	8/8/2019	8/8/2021
	AN02749	High Pass Filter	9SH10- 1000/T10000- O/O	7/15/2019	7/15/2021
T2	AN00851	Biconilog Antenna	CBL6111C	4/14/2020	4/14/2022
T3	ANP05505	Attenuator	NAT-6	5/26/2021	5/26/2023
T4	ANP05198	Cable-Amplitude +15C to +45C (dB)	8268	12/21/2020	12/21/2022
T5	AN00309	Preamp	8447D	12/24/2019	12/24/2021
T6	ANP05050	Cable	RG223/U	12/24/2020	12/24/2022
	AN00314	Loop Antenna	6502	4/13/2020	4/13/2022

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2 T6	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBμV	dB	dB	dB	dB	Table	dBμV/m	dBμV/m	dB	Ant
1	902.000M	33.5	+0.0 -27.1	+23.1 +0.5	+6.3	+5.8	+0.0 237	42.1	46.0 Bandedge_L	-3.9	Vert 105
2	928.000M QP	30.4	+0.0 -27.2	+23.5 +0.5	+6.3	+5.9	+0.0 245	39.4	46.0 Bandedge_H	-6.6	Vert 112
^	928.000M	36.7	+0.0 -27.2	+23.5 +0.5	+6.3	+5.9	+0.0 245	45.7	46.0 Bandedge_H	-0.3	Vert 112



Test Location: CKC Laboratories Inc. • 110 N. Olinda Pl. • Brea, CA 92823 • 714-993-6112
 Customer: **Itron, Inc.**
 Specification: **15.249 Carrier and Spurious Emissions (902-928 MHz Transmitter)**
 Work Order #: **105380** Date: 6/9/2021
 Test Type: **Radiated Scan** Time: 14:10:14
 Tested By: E. Wong Sequence#: 24
 Software: EMITest 5.03.19

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 2			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 2			

Test Conditions / Notes:

The EUT is placed on Styrofoam platform and the Blue port is connected to a section of wire with a shorting tip to activate internal battery. The EUT's data port is connected to a remote located laptop running CLI Tool ver.2.0.1.24 via USB cable for configuration purposes, once configured, the laptop is removed from remote connection during course of testing. Fresh battery is used.
 EUT has fixed orientation per manufacture's specification.

Operating Frequency / Mode:

908.0MHz, 915MHz, 923.8MHz, 200kHz steps, 80channels 384 kbps OOK LV0 Folder 4

Frequency of Measurement: 9k-9280MHz

9kHz to 150kHz RBW=0.2kHz, VBW=0.6kHz

150kHz to 30MHz RBW=9kHz, VBW=27kHz

30-1000MHz, RBW=120kHz, VBW=360kHz

1000-9280MHz, RBW=1MHz, VBW=3MHz

-20dBc limit, RBW=100kHz, VBW=300kHz

Note: The manufacturer declares the duty cycle is 100% in application.

Test Environment Conditions:

Temperature: 22°C

Relative Humidity: 39%

Pressure: 100kPa

Site A

Test Method: ANSI C63.10-2013

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02672	Spectrum Analyzer	E4446A	4/29/2020	4/29/2022
	AN00849	Horn Antenna	3115	3/17/2020	3/17/2022
	ANP07659	Cable	32022-29094K- 29094K-24TC	7/30/2020	7/30/2022
	AN00786	Preamplifier	83017A	5/20/2020	5/20/2022
	ANP06360	Cable	L1-PNMM-48	8/8/2019	8/8/2021
	AN02749	High Pass Filter	9SH10- 1000/T10000- O/O	7/15/2019	7/15/2021
T2	AN00851	Biconilog Antenna	CBL6111C	4/14/2020	4/14/2022
T3	ANP05505	Attenuator	NAT-6	5/26/2021	5/26/2023
T4	ANP05198	Cable-Amplitude +15C to +45C (dB)	8268	12/21/2020	12/21/2022
T5	AN00309	Preamplifier	8447D	12/24/2019	12/24/2021
T6	ANP05050	Cable	RG223/U	12/24/2020	12/24/2022
	AN00314	Loop Antenna	6502	4/13/2020	4/13/2022

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2 T6	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBμV	dB	dB	dB	dB	Table	dBμV/m	dBμV/m	dB	Ant
1	902.000M	34.3	+0.0 -27.1	+23.1 +0.5	+6.3	+5.8	+0.0 299	42.9	46.0 Bandedge_L	-3.1	Vert 125
2	928.007M QP	31.3	+0.0 -27.2	+23.5 +0.5	+6.3	+5.9	+0.0 294	40.3	46.0 Bandedge_H	-5.7	Vert 122
^	928.000M	38.1	+0.0 -27.2	+23.5 +0.5	+6.3	+5.9	+0.0 294	47.1	46.0 Bandedge_H	+1.1	Vert 122



Test Location: CKC Laboratories Inc. • 110 N. Olinda Pl. • Brea, CA 92823 • 714-993-6112
 Customer: **Itron, Inc.**
 Specification: **15.249 Carrier and Spurious Emissions (902-928 MHz Transmitter)**
 Work Order #: **105380** Date: 6/7/2021
 Test Type: **Radiated Scan** Time: 11:05:23
 Tested By: E. Wong Sequence#: 15
 Software: EMITest 5.03.19

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 3			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 3			

Test Conditions / Notes:

The EUT is placed on Styrofoam platform and the Blue port receives power from remotely located support power supply set 3.6Vdc to simulate a fresh battery. The EUT's data port is connected to a remote located laptop running CLI Tool ver.2.0.1.24 via USB cable for configuration purposes, once configured, the laptop is removed from remote connection during course of testing. Black port is connected to a section of unterminated cable. EUT has fixed orientation per manufacture's specification.

Operating Frequency / Mode:

908.0MHz, 915MHz, 923.8MHz, 200kHz steps, 80channels 384 kbps OOK LV0 Folder 3

Frequency of Measurement: 9k-9280MHz

9kHz to 150kHz RBW=0.2kHz, VBW=0.6kHz

150kHz to 30MHz RBW=9kHz, VBW=27kHz

30-1000MHz, RBW=120kHz, VBW=360kHz

1000-9280MHz, RBW=1MHz, VBW=3MHz

-20dBc limit, RBW=100kHz, VBW=300kHz

Note: The manufacturer declares the duty cycle is 100% in application.

Test Environment Conditions:

Temperature: 22°C

Relative Humidity: 39%

Pressure: 100kPa

Site A

Test Method: ANSI C63.10-2013

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02672	Spectrum Analyzer	E4446A	4/29/2020	4/29/2022
	AN00849	Horn Antenna	3115	3/17/2020	3/17/2022
	ANP07659	Cable	32022-29094K- 29094K-24TC	7/30/2020	7/30/2022
	AN00786	Preamp	83017A	5/20/2020	5/20/2022
	ANP06360	Cable	L1-PNMM-48	8/8/2019	8/8/2021
	AN02749	High Pass Filter	9SH10- 1000/T10000- O/O	7/15/2019	7/15/2021
T2	AN00851	Biconilog Antenna	CBL6111C	4/14/2020	4/14/2022
T3	ANP05505	Attenuator	NAT-6	5/26/2021	5/26/2023
T4	ANP05198	Cable-Amplitude +15C to +45C (dB)	8268	12/21/2020	12/21/2022
T5	AN00309	Preamp	8447D	12/24/2019	12/24/2021
T6	ANP05050	Cable	RG223/U	12/24/2020	12/24/2022
	AN00314	Loop Antenna	6502	4/13/2020	4/13/2022

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	928.000M	29.8	+0.0	+23.5	+6.3	+5.9	+0.0	38.8	46.0	-7.2	Vert
	QP		-27.2	+0.5			269		Bandedge_H		121
^	928.000M	35.8	+0.0	+23.5	+6.3	+5.9	+0.0	44.8	46.0	-1.2	Vert
			-27.2	+0.5			269		Bandedge_H		121
3	902.000M	28.7	+0.0	+23.1	+6.3	+5.8	+0.0	37.3	46.0	-8.7	Vert
			-27.1	+0.5			269		Bandedge_L		121

Test Setup Photo(s)



Configuration 1; Below 1GHz, View 1



Configuration 1; Below 1GHz, View 2



Configuration 1; Above 1GHz, View 1



Configuration 1; Above 1GHz, View 2



Configuration 2, Below 1GHz, View 1



Configuration 2, Below 1GHz, View 2



Configuration 2; Above 1GHz, View 1



Configuration 2; Above 1GHz, View 2



Configuration 3; Below 1GHz, View 1



Configuration 3; Below 1GHz, View 2



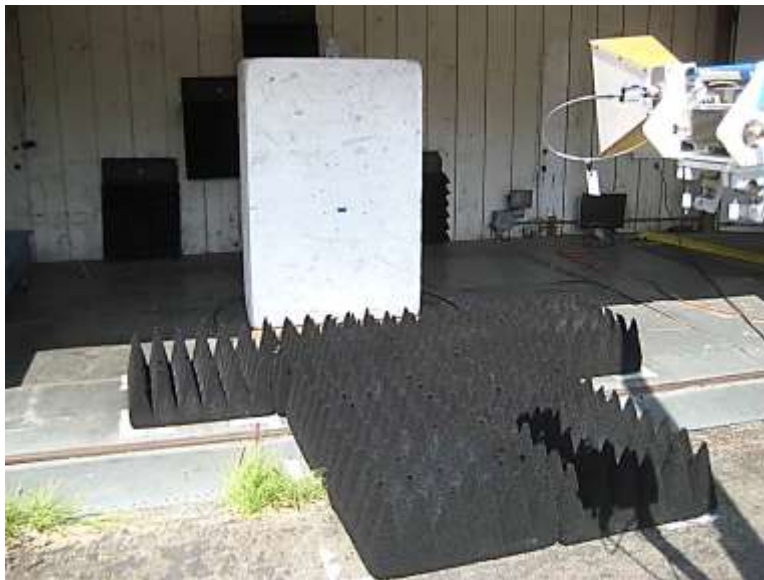
Configuration 3; Above 1GHz, View 1



Configuration 3; Above 1GHz, View 2



Above 1GHz; View 1



Above 1GHz; View 2

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.