

# Itron, Inc.

## TEST REPORT FOR

**Gas Endpoint  
Model: Intelis-Gas**

### Tested to The Following Standards:

**FCC Part 15 Subpart C Section(s)**

**15.249**

**Report No.: 105334-4**

**Date of issue: May 4, 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:**

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

Representative: Jay Holcomb  
Customer Reference Number: 235535

**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: 105334

April 8, 2021

April 8, 12, and 22, 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.



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

## Test Facility Information



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

TEST LOCATION(S):  
CKC Laboratories, Inc.  
Canyon Park  
22116 23rd Drive S.E., Suite A

## Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.03.19

## Site Registration & Accreditation Information

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

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

## SUMMARY OF RESULTS

### Standard / Specification: FCC Part 15 Subpart C - 15.249

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

NA = Not Applicable

NA1 = The manufacturer declares the EUT is battery powered.

#### 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
Gas Endpoint	Itron, Inc.	Intelis-Gas	105334-cond

**Support Equipment:**

Device	Manufacturer	Model #	S/N
Power Supply	Maxtra	MA-305D	P07354
Laptop	HP	14-dq1033cl	NA
AC Adapter (for Laptop)	HP	L25296-002	NA
USB Hub	Insignia	NS-PCH5420	NA
USB Interface Board	Itron, Inc.	PCB-TEMP-0007 Rev3	NA

### Configuration 2

**Equipment Tested:**

Device	Manufacturer	Model #	S/N
Gas Endpoint	Itron, Inc.	Intelis-Gas	105334-rad

**Support Equipment:**

Device	Manufacturer	Model #	S/N
None			

### General Product Information:

Product Information	Manufacturer-Provided Details
Equipment Type:	Stand-Alone Equipment
Modulation Type(s):	OOK (Power Level 0, 16384 datarate)
Maximum Duty Cycle:	Test 100% as worst case
Antenna Type(s) and Gain:	Internal Trace, 3.9dBi for Power Level 0
Antenna Connection Type:	Integral (External connector provided to facilitate testing)
Nominal Input Voltage:	6VDC
Firmware / Software used for Test:	CLI Tool (2.0.1.24) App Version 7.0.16.0 CSL Version 8.1.11.0

EUT Photo(s)



Configuration 1



Configuration 2

**Support Equipment Photo(s)**



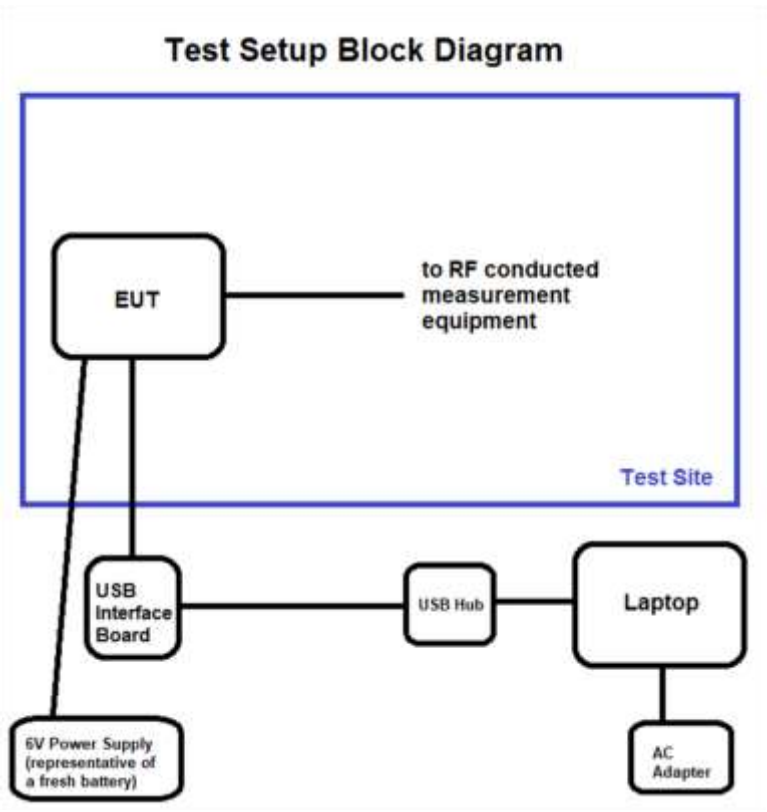
Laptop, Hub and Interface



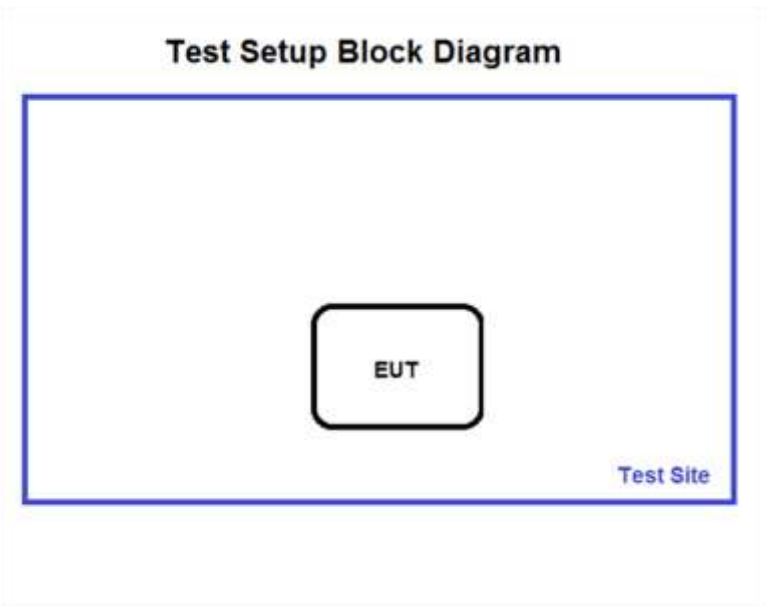
Power Supply



**Block Diagram of Test Setup(s)**



Configuration 1



Configuration 2

## FCC Part 15 Subpart C

### 15.215(c) Occupied Bandwidth (20dB BW)

#### Test Setup/Conditions

Test Location:	Canyon Park Bench	Test Engineer:	M. Atkinson
Test Method:	ANSI C63.10 (2013)	Test Date(s):	4/8/2021
Configuration:	1		
Test Conditions:	EUT has temporary antenna connector attached. EUT directly connected to spectrum analyzer through appropriate cables and attenuators. EUT is continuously transmitting with modulation.		

#### Environmental Conditions

Temperature (°C)	22	Relative Humidity (%):	32
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#### Test Equipment

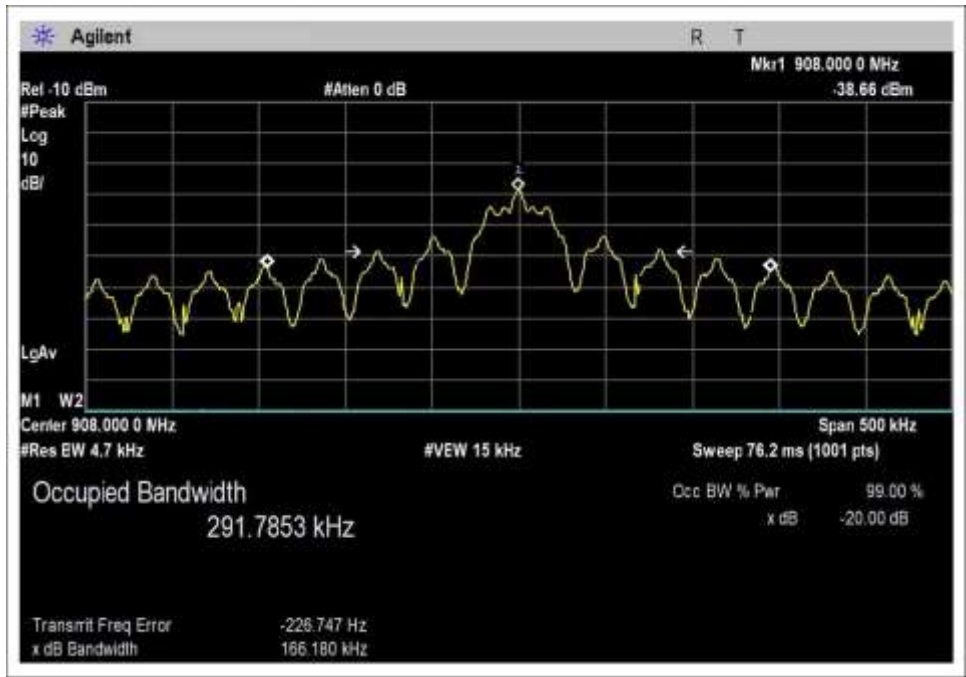
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
02871	Spectrum Analyzer	Agilent	E4440A	3/12/2020	3/12/2022
P07227	Attenuator	Pasternack	PE7004-6	10/2/2019	10/2/2021
P05748	Attenuator	Pasternack	PE7004-20	3/4/2020	3/4/2022
P06008	Cable	Andrew	Heliac	2/1/2021	2/1/2023

#### Test Data Summary

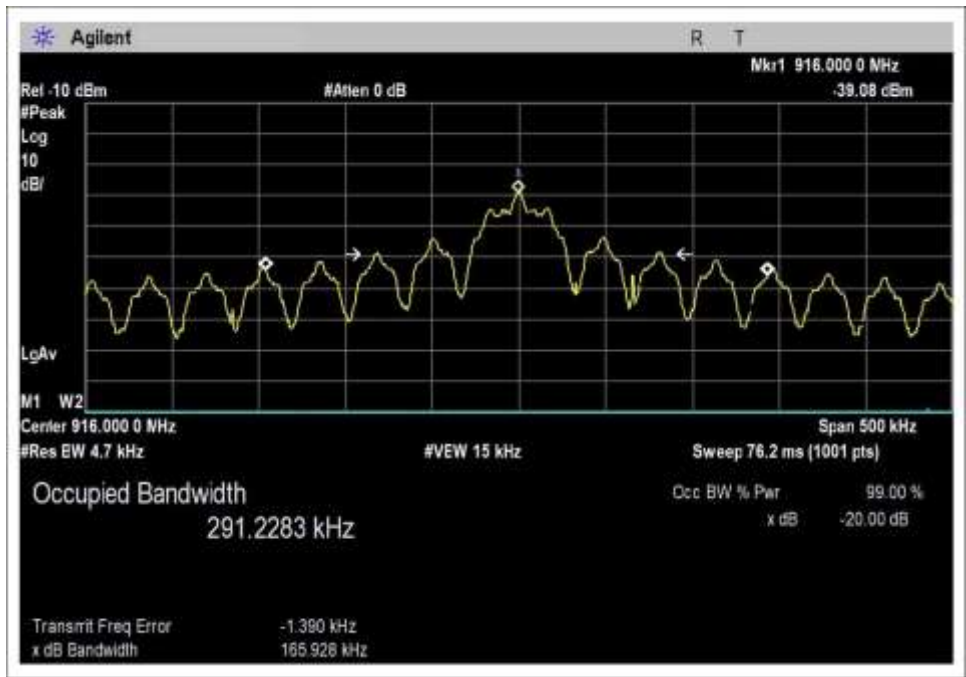
Frequency (MHz)	Antenna Port	Modulation	Measured (kHz)	Limit (kHz)	Results
908	1	OOK PLO	166.180	None	NA
916	1	OOK PLO	165.928	None	NA
923.8	1	OOK PLO	165.868	None	NA

NA = Not applicable, because FCC 15.215 does not give any limits so there isn't criteria for pass or fail.

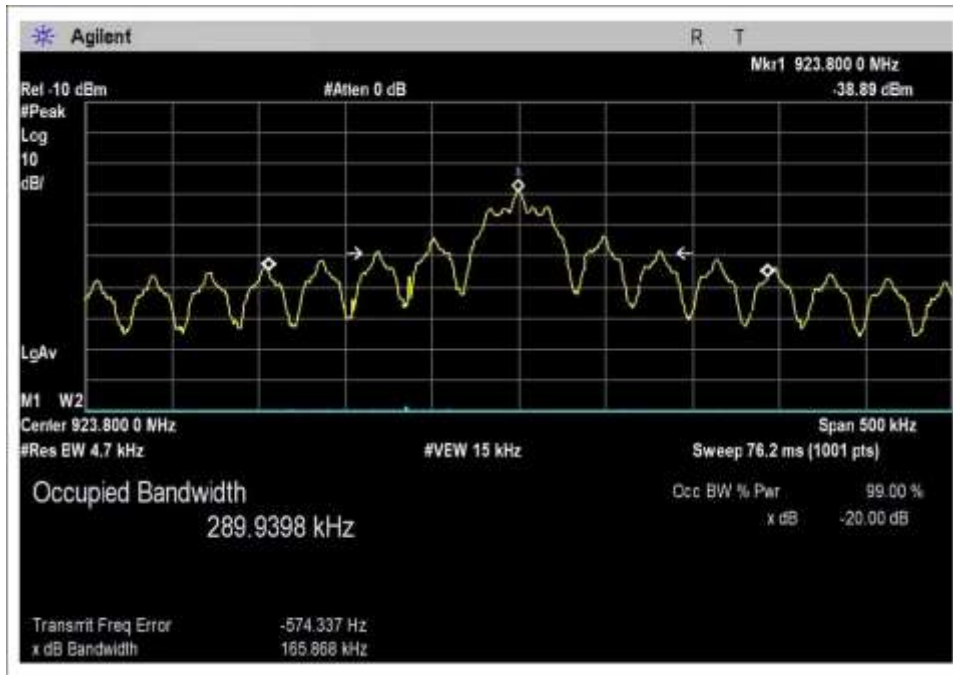
Plot(s)



Low Channel



Middle Channel



High Channel

Test Setup Photo(s)



## 15.249(a) Field Strength of Fundamental

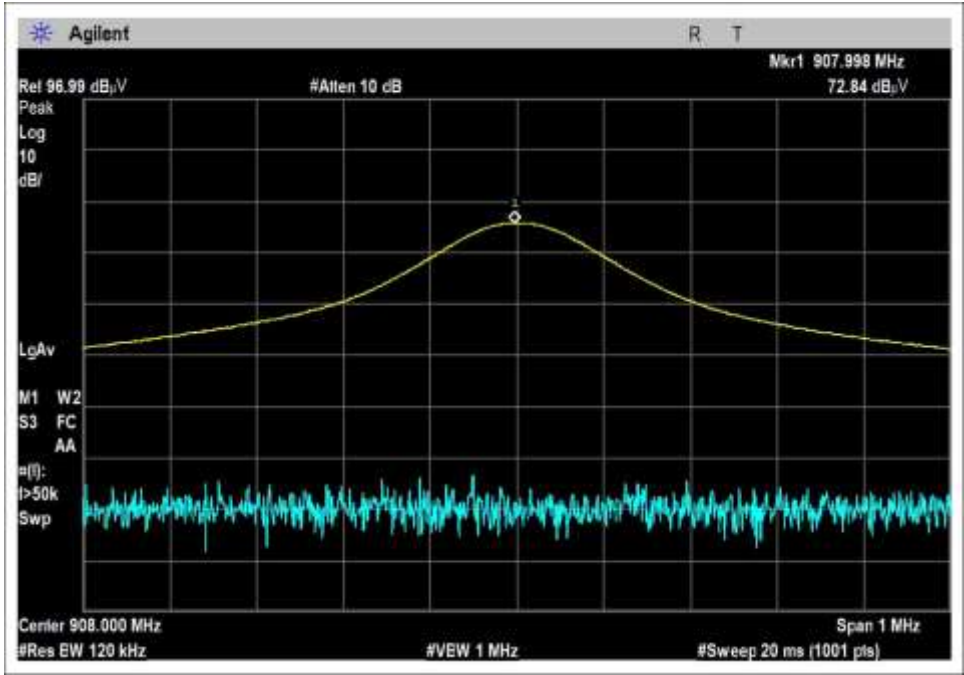
### Test Data Summary - Voltage Variations

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

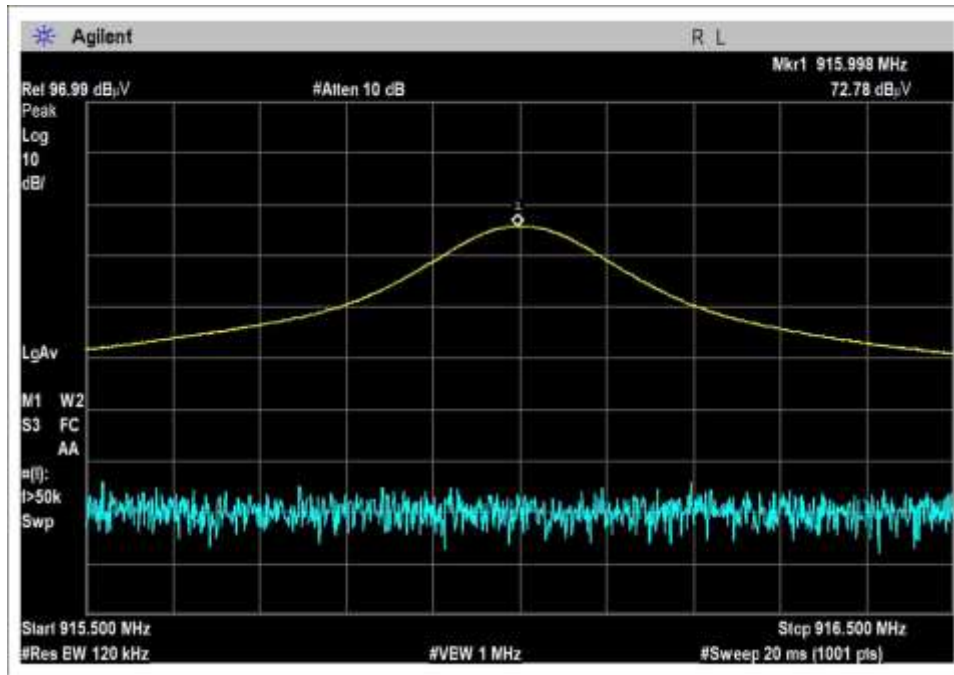
### Test Data Summary – Radiated Field Strength Measurement

Frequency (MHz)	Modulation	Ant. Type	Measured (dBuV/m @ 3m)	Limit (dBuV/m @ 3m)	Results
908.0	OOK PLO	Trace, 3.9dBi	92.2	≤94	Pass
916.0	OOK PLO	Trace, 3.9dBi	92.0	≤94	Pass
923.8	OOK PLO	Trace, 3.9dBi	90.8	≤94	Pass

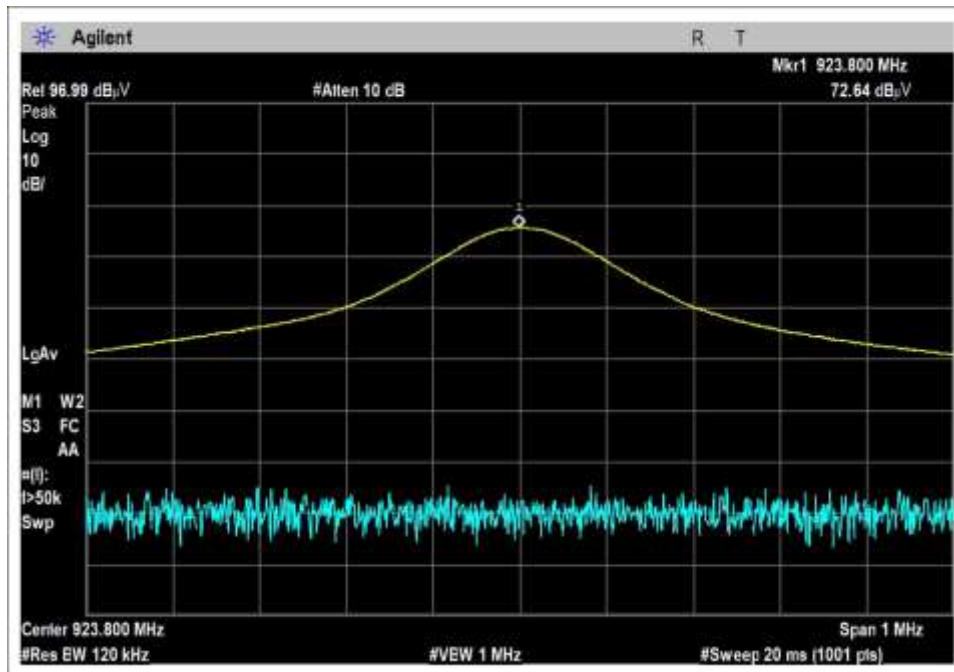
### Plot(s)



Low Channel



Middle Channel



High Channel

**Test Setup / Conditions / Data**

Test Location: CKC Laboratories • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 1-800-500-4EMC (4362)  
 Customer: **Itron, Inc.**  
 Specification: **15.249 Carrier and Spurious Emissions (902-928 MHz Transmitter)**  
 Work Order #: **105334** Date: 4/12/2021  
 Test Type: **Radiated Scan** Time: 15:51:21  
 Tested By: Michael Atkinson Sequence#: 3  
 Software: EMITest 5.03.19

***Equipment Tested:***

Device	Manufacturer	Model #	S/N
Configuration 2			

***Support Equipment:***

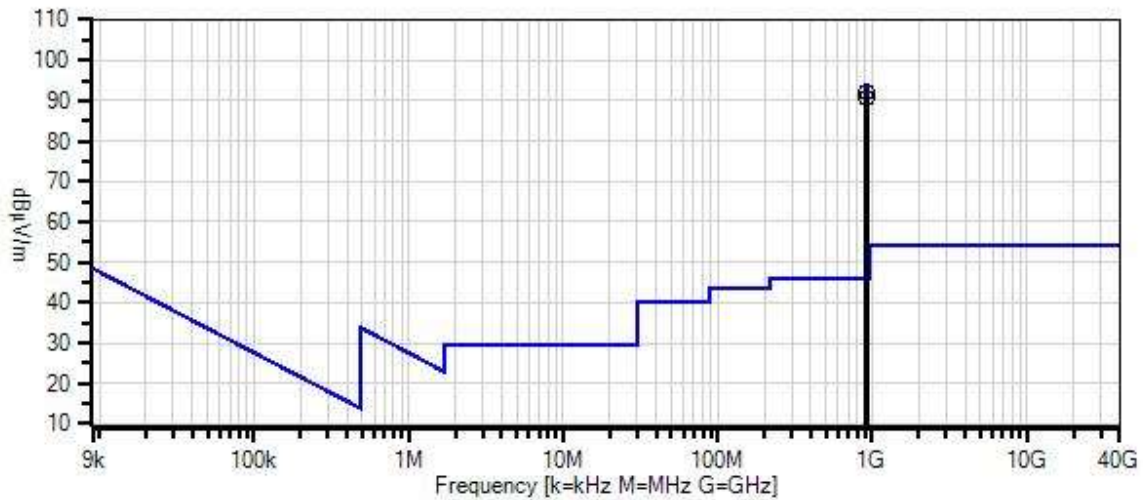
Device	Manufacturer	Model #	S/N
Configuration 2			

***Test Conditions / Notes:***

Frequency: Fundamental  
 Test Location: Canyon Park Lab C3  
 Test Method: ANSI C63.10 (2013)  
 Temperature (°C): 21  
 Relative Humidity (%): 33  
 Setup: EUT is continuously transmitting with modulation on lab selected channel.  
 EUT is battery powered with a fresh battery installed.  
 Horizontal and Vertical polarities investigated, worst case reported.



Ittron, Inc. WO#: 105334 Sequence#: 3 Date: 4/12/2021  
 15.249 Carrier and Spurious Emissions (902-928 MHz Transmitter) Test Distance: 3 Meters Vert



- Readings
- Peak Readings
- × QP Readings
- \* Average Readings
- ▼ Ambient
- Software Version: 5.03.19
- 1 - 15.249 Carrier and Spurious Emissions (902-928 MHz Transmitter)

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02871	Spectrum Analyzer	E4440A	3/12/2020	3/12/2022
T1	ANP06540	Cable	Heliac	8/23/2019	8/23/2021
T2	ANP05305	Cable	ETSI-50T	9/6/2019	9/6/2021
T3	ANP05360	Cable	RG214	2/3/2020	2/3/2022
T4	ANP06123	Attenuator	18N-6	4/2/2021	4/2/2023
T5	AN03628	Biconilog Antenna	3142E	6/11/2019	6/11/2021

**Measurement Data:**

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	T5				Table	dBµV/m	dBµV/m	dB	Ant
1	908.001M	58.7	+0.3 +23.9	+1.4	+2.1	+5.8	+0.0	92.2	94.0	-1.8	Vert
2	916.001M	58.2	+0.4 +24.0	+1.5	+2.1	+5.8	+0.0	92.0	94.0	-2.0	Vert
3	923.800M	56.8	+0.4 +24.1	+1.5	+2.2	+5.8	+0.0	90.8	94.0	-3.2	Vert



Test Setup Photo(s)



## 15.249(a) Radiated Emissions and Band Edge

### Test Setup / Conditions / Data

Test Location: CKC Laboratories • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 1-800-500-4EMC (4362)  
 Customer: **Itron, Inc.**  
 Specification: **15.209 Radiated Emissions**  
 Work Order #: **105334** Date: 4/22/2021  
 Test Type: **Radiated Scan** Time: 15:41:10  
 Tested By: Michael Atkinson Sequence#: 12  
 Software: EMITest 5.03.19

#### *Equipment Tested:*

Device	Manufacturer	Model #	S/N
Configuration 2			

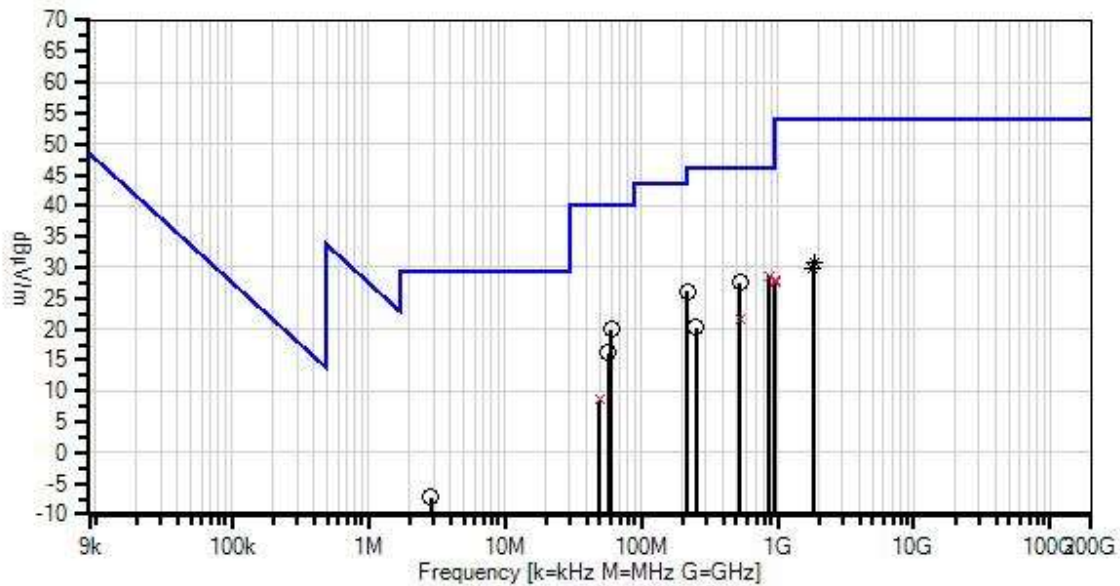
#### *Support Equipment:*

Device	Manufacturer	Model #	S/N
Configuration 2			

#### *Test Conditions / Notes:*

Frequency: 9kHz to 10GHz  
  
 Test Location: Canyon Park Lab C3  
  
 Test Method: ANSI C63.10 (2013)  
 Temperature (°C): 20-21  
 Relative Humidity (%): 30-33  
  
 Setup: EUT is continuously transmitting with modulation on lab selected channel.  
 EUT is battery powered with a fresh battery installed.  
 Horizontal and Vertical polarities investigated above 30MHz, worst case reported.  
 3 x orthogonal axes investigated below 30MHz, worst case reported.

Itron, Inc. WO#: 105334 Sequence#: 12 Date: 4/22/2021  
 15.209 Radiated Emissions Test Distance: 3 Meters Various



— Readings                      ○ Peak Readings                      × QP Readings  
 \* Average Readings                      ▼ Ambient  
 — 1 - 15.209 Radiated Emissions                      Software Version: 5.03.19

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02871	Spectrum Analyzer	E4440A	3/12/2020	3/12/2022
T2	ANP06540	Cable	Heliac	8/23/2019	8/23/2021
T3	ANP06515	Cable	Heliac	7/1/2020	7/1/2022
T4	AN00052	Loop Antenna	6502	5/4/2020	5/4/2022
T5	AN03170	High Pass Filter	HM1155-11SS	10/23/2019	10/23/2021
T6	AN03540	Preamp	83017A	5/13/2019	5/13/2021
T7	ANP07505	Cable	CLU40-KMKM-02.00F	1/26/2021	1/26/2023
T8	AN01467	Horn Antenna-ANSI C63.5 Calibration	3115	7/5/2019	7/5/2021
T9	ANP05305	Cable	ETSI-50T	9/6/2019	9/6/2021
T10	AN02307	Preamp	8447D	1/10/2020	1/10/2022
T11	ANP05360	Cable	RG214	2/3/2020	2/3/2022
T12	ANP06123	Attenuator	18N-6	4/2/2021	4/2/2023
T13	AN03628	Biconilog Antenna	3142E	6/11/2019	6/11/2021

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

#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
			T5	T6	T7	T8					
			T9	T10	T11	T12					
	MHz	dB $\mu$ V	T13				Table	dB $\mu$ V/m	dB $\mu$ V/m	dB	Ant
			dB	dB	dB	dB					
1	874.400M	22.8	+0.0	+0.3	+0.0	+0.0	+0.0	28.7	46.0	-17.3	Vert
	QP		+0.0	+0.0	+0.0	+0.0					
			+1.4	-27.4	+2.0	+5.8					
			+23.8								
^	874.400M	27.6	+0.0	+0.3	+0.0	+0.0	+0.0	33.5	46.0	-12.5	Vert
			+0.0	+0.0	+0.0	+0.0					
			+1.4	-27.4	+2.0	+5.8					
			+23.8								
3	952.553M	20.6	+0.0	+0.4	+0.0	+0.0	+0.0	27.8	46.0	-18.2	Vert
	QP		+0.0	+0.0	+0.0	+0.0					
			+1.5	-27.2	+2.2	+5.8					
			+24.5								
^	952.600M	26.3	+0.0	+0.4	+0.0	+0.0	+0.0	33.5	46.0	-12.5	Vert
			+0.0	+0.0	+0.0	+0.0					
			+1.5	-27.2	+2.2	+5.8					
			+24.5								
5	957.400M	20.2	+0.0	+0.4	+0.0	+0.0	+0.0	27.6	46.0	-18.4	Horiz
	QP		+0.0	+0.0	+0.0	+0.0					
			+1.5	-27.1	+2.2	+5.8					
			+24.6								
^	957.400M	26.7	+0.0	+0.4	+0.0	+0.0	+0.0	34.1	46.0	-11.9	Horiz
			+0.0	+0.0	+0.0	+0.0					
			+1.5	-27.1	+2.2	+5.8					
			+24.6								
7	529.730M	27.7	+0.0	+0.3	+0.0	+0.0	+0.0	27.5	46.0	-18.5	Horiz
			+0.0	+0.0	+0.0	+0.0					
			+1.1	-28.2	+1.5	+5.8					
			+19.3								
8	218.650M	34.9	+0.0	+0.2	+0.0	+0.0	+0.0	26.1	46.0	-19.9	Horiz
			+0.0	+0.0	+0.0	+0.0					
			+0.7	-27.2	+0.9	+5.8					
			+10.8								
9	60.800M	33.4	+0.0	+0.1	+0.0	+0.0	+0.0	20.0	40.0	-20.0	Horiz
			+0.0	+0.0	+0.0	+0.0					
			+0.4	-27.8	+0.4	+5.8					
			+7.7								
10	1847.650M	35.5	+0.0	+0.5	+2.4	+0.0	+0.0	30.9	54.0	-23.1	Vert
	Ave		+0.4	-34.7	+0.3	+26.5			923.8		
			+0.0	+0.0	+0.0	+0.0					
			+0.0								
^	1847.670M	46.6	+0.0	+0.5	+2.4	+0.0	+0.0	42.0	54.0	-12.0	Vert
			+0.4	-34.7	+0.3	+26.5			923.8		
			+0.0	+0.0	+0.0	+0.0					
			+0.0								

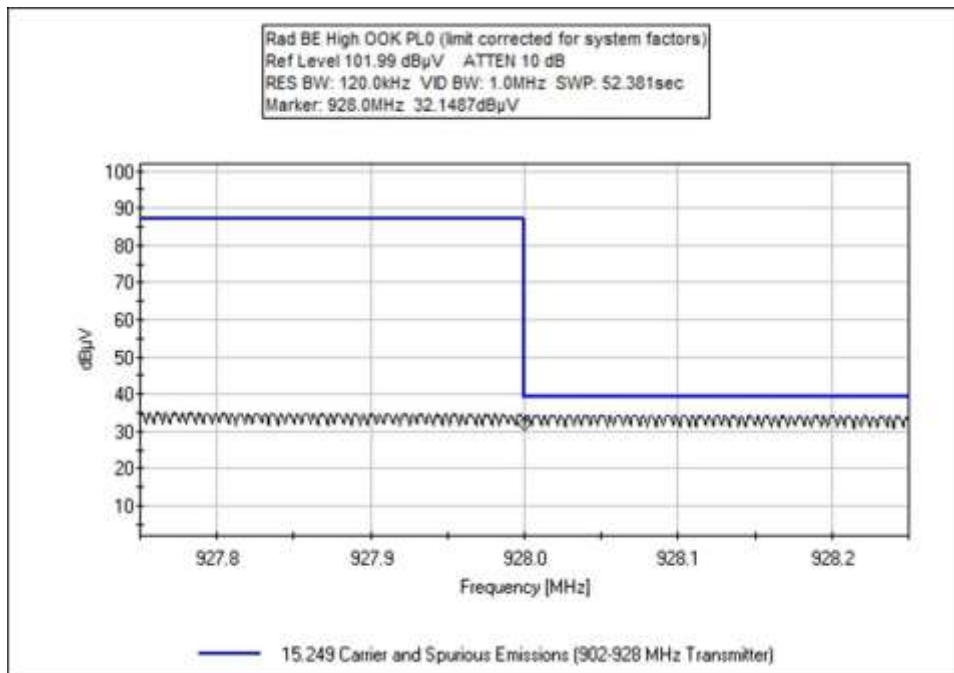
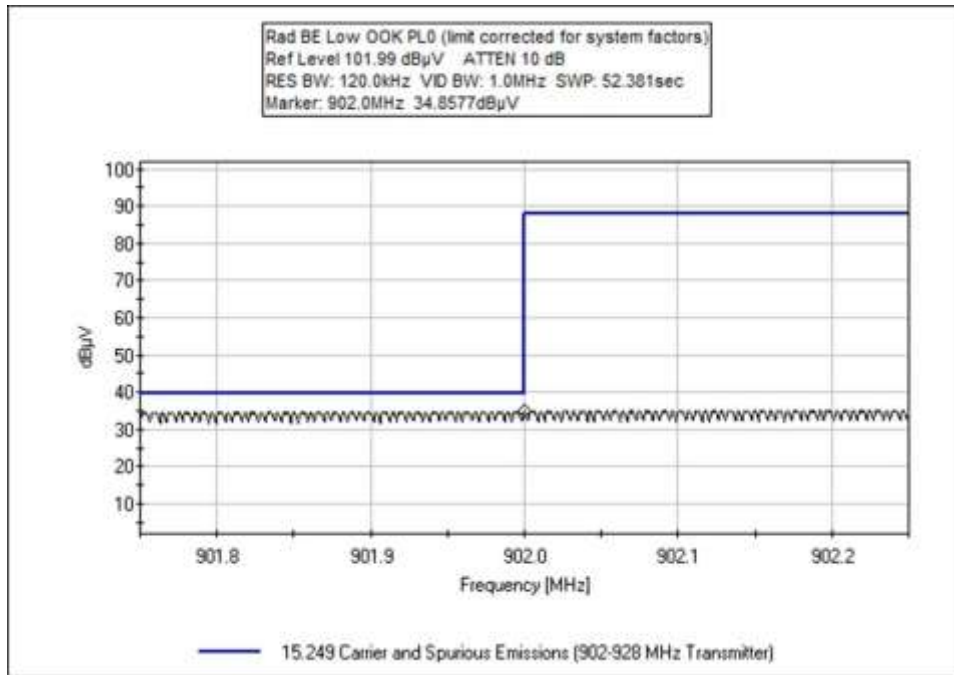
12	1853.620M Ave	35.4	+0.0 +0.4 +0.0 +0.0	+0.5 -34.7 +0.0	+2.4 +0.3 +0.0	+0.0 +26.5 +0.0	+0.0	30.8	54.0 926.8	-23.2	Vert
^	1853.620M	48.1	+0.0 +0.4 +0.0 +0.0	+0.5 -34.7 +0.0	+2.4 +0.3 +0.0	+0.0 +26.5 +0.0	+0.0	43.5	54.0 926.8	-10.5	Vert
14	57.720M	29.8	+0.0 +0.0 +0.4 +7.6	+0.1 +0.0 -27.9	+0.0 +0.0 +0.4	+0.0 +0.0 +5.8	+0.0	16.2	40.0	-23.8	Horiz
15	1816.020M Ave	34.9	+0.0 +0.4 +0.0 +0.0	+0.5 -34.8 +0.0	+2.4 +0.3 +0.0	+0.0 +26.2 +0.0	+0.0	29.9	54.0 908	-24.1	Vert
^	1816.020M	44.9	+0.0 +0.4 +0.0 +0.0	+0.5 -34.8 +0.0	+2.4 +0.3 +0.0	+0.0 +26.2 +0.0	+0.0	39.9	54.0 908	-14.1	Vert
17	1831.955M Ave	34.6	+0.0 +0.4 +0.0 +0.0	+0.5 -34.8 +0.0	+2.4 +0.3 +0.0	+0.0 +26.3 +0.0	+0.0	29.7	54.0 916	-24.3	Vert
^	1831.940M	46.4	+0.0 +0.4 +0.0 +0.0	+0.5 -34.8 +0.0	+2.4 +0.3 +0.0	+0.0 +26.3 +0.0	+0.0	41.5	54.0 916	-12.5	Vert
19	529.730M QP	21.8	+0.0 +0.0 +1.1 +19.3	+0.3 +0.0 -28.2	+0.0 +0.0 +1.5	+0.0 +0.0 +5.8	+0.0	21.6	46.0	-24.4	Vert
20	254.840M	27.2	+0.0 +0.0 +0.8 +12.3	+0.2 +0.0 -27.0	+0.0 +0.0 +1.0	+0.0 +0.0 +5.8	+0.0	20.3	46.0	-25.7	Horiz
21	49.720M QP	22.3	+0.0 +0.0 +0.4 +7.4	+0.1 +0.0 -27.9	+0.0 +0.0 +0.4	+0.0 +0.0 +5.8	+0.0	8.5	40.0	-31.5	Vert
^	49.720M	34.0	+0.0 +0.0 +0.4 +7.4	+0.1 +0.0 -27.9	+0.0 +0.0 +0.4	+0.0 +0.0 +5.8	+0.0	20.2	40.0	-19.8	Vert
23	2.856M	23.3	+0.0 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0	+0.1 +0.0 +0.0	+9.4 +0.0 +0.0	-40.0	-7.2	29.5	-36.7	Para

**Band Edge**

**Band Edge Summary**

Frequency (MHz)	Modulation	Ant. Type	Field Strength (dBuV/m @3m)	Limit (dBuV/m @3m)	Results
902	OOK PL0	Trace, 3.9dBi	41.0	<46	Pass
928	OOK PL0	Trace, 3.9dBi	39.0	<46	Pass

## Band Edge Plots



**Test Setup / Conditions / Data**

Test Location: CKC Laboratories • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 1-800-500-4EMC (4362)  
 Customer: **Itron, Inc.**  
 Specification: **15.249 Carrier and Spurious Emissions (902-928 MHz Transmitter)**  
 Work Order #: **105334** Date: 4/12/2021  
 Test Type: **Radiated Scan** Time: 16:55:50  
 Tested By: Michael Atkinson Sequence#: 4  
 Software: EMITest 5.03.19

**Equipment Tested:**

Device	Manufacturer	Model #	S/N
Configuration 2			

**Support Equipment:**

Device	Manufacturer	Model #	S/N
Configuration 2			

**Test Conditions / Notes:**

Frequency: Band Edge  
 Test Location: Canyon Park Lab C3  
 Test Method: ANSI C63.10 (2013)  
 Temperature (°C): 20-21  
 Relative Humidity (%): 30-33  
 Setup: EUT is continuously transmitting with modulation on lab selected channel.  
 EUT is battery powered with a fresh battery installed.  
 Horizontal and Vertical polarities investigated, worst case reported.

**Test Equipment:**

ID	Asset #/Serial #	Description	Model	Calibration Date	Cal Due Date
	AN02871	Spectrum Analyzer	E4440A	3/12/2020	3/12/2022
T1	ANP06540	Cable	Heliac	8/23/2019	8/23/2021
T2	ANP05305	Cable	ETSI-50T	9/6/2019	9/6/2021
T3	ANP05360	Cable	RG214	2/3/2020	2/3/2022
T4	ANP06123	Attenuator	18N-6	4/2/2021	4/2/2023
T5	AN03628	Biconilog Antenna	3142E	6/11/2019	6/11/2021
T6	AN02307	Preamp	8447D	1/10/2020	1/10/2022

**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	Table	dBµV/m	dBµV/m	dB	Ant
1	902.000M	34.9	+0.3	+1.4	+2.1	+5.8	+0.0	41.0	46.0	-5.0	Vert
	QP		+23.8	-27.3							
2	928.000M	32.1	+0.4	+1.5	+2.2	+5.8	+0.0	39.0	46.0	-7.0	Vert
	QP		+24.2	-27.2							



Test Setup Photo(s)



Below 1GHz



Above 1GHz

# SUPPLEMENTAL INFORMATION

## Measurement Uncertainty

Uncertainty Value	Parameter
4.73 dB	Radiated Emissions
3.34 dB	Mains Conducted Emissions
3.30 dB	Disturbance Power

Uncertainties reported are worst case for all CKC Laboratories’ sites and represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k=2. Compliance is deemed to occur provided measurements are below the specified limits.

## Emissions Test Details

**TESTING PARAMETERS**

Unless otherwise indicated, the following configuration parameters are used for equipment setup: The cables were routed consistent with the typical application by varying the configuration of the test sample. Interface cables were connected to the available ports of the test unit. The effect of varying the position of the cables was investigated to find the configuration that produced maximum emissions. Cables were of the type and length specified in the individual requirements. The length of cable that produced maximum emissions was selected.

The equipment under test (EUT) was set up in a manner that represented its normal use, as shown in the setup photographs. Any special conditions required for the EUT to operate normally are identified in the comments that accompany the emissions tables.

The emissions data was taken with a spectrum analyzer or receiver. Incorporating the applicable correction factors for distance, antenna, cable loss and amplifier gain, the data was reduced as shown in the table below. The corrected data was then compared to the applicable emission limits. Preliminary and final measurements were taken in order to ensure that all emissions from the EUT were found and maximized.

**CORRECTION FACTORS**

The basic spectrum analyzer reading was converted using correction factors as shown in the highest emissions readings in the tables. For radiated emissions in dBμV/m, the spectrum analyzer reading in dBμV 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	(dBμV)
+	Antenna Factor	(dB/m)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	(dBμV/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.

<b>MEASURING EQUIPMENT BANDWIDTH SETTINGS PER FREQUENCY RANGE</b>			
<b>TEST</b>	<b>BEGINNING FREQUENCY</b>	<b>ENDING FREQUENCY</b>	<b>BANDWIDTH SETTING</b>
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.