Itron, Inc.

TEST REPORT FOR

AMR Transceiver Device For Communicating With Utility Meters
Model: IMR

Tested to The Following Standards:

FCC Part 15 Subpart C Section(s)

15.207 & 15.247
(FHSS 902-928 MHz)

Report No.: 99119--1

Date of issue: October 28, 2016

ACCREDITED
Testing Certificates:
803.01, 803.02, 803.05, 803.06

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 EMC 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: 107098

REPORT PREPARED BY:

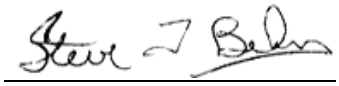
Terri Rayle
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Project Number: 99119

DATE OF EQUIPMENT RECEIPT: October 10, 2016
DATE(S) OF TESTING: October 10-14, 2016

Report Authorization

The test data contained in this report documents the observed testing parameters pertaining to and are relevant for only the sample equipment 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.
22116 23rd Drive S.E., Suite A
Bothell, WA 98021-4413

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.03.02

Site Registration & Accreditation Information

Location	CB #	TAIWAN	CANADA	FCC	JAPAN
Bothell	US0081	SL2-IN-E-1145R	3082C-1	US1022	A-0148

SUMMARY OF RESULTS

Standard / Specification: FCC Part 15 Subpart C - 15.247 (FHSS 902-928MHz)

Test Procedure	Description	Modifications	Results
15.247(a)(1)	Occupied Bandwidth	NA	Pass
15.247(a)(1)	Carrier Separation	NA	Pass
15.247(a)(1)(iii)	Number of Hopping Channels	NA	Pass
15.247(a)(1)(iii)	Average Time of Occupancy	NA	Pass
15.247(b)(2)	Output Power	NA	Pass
15.247(d)	RF Conducted Emissions & Band Edge	NA	Pass
15.247(d)	Radiated Emissions & Band Edge	NA	Pass
15.207	AC Conducted Emissions	NA	Pass

NA = Not Applicable

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
AMR transceiver device for communicating with utility meters	Itron, Inc.	IMR	00000005

Support Equipment:

Device	Manufacturer	Model #	S/N
Laptop	Dell	M6300	9KG4MF1
AC Adapter for Laptop	Dell	NADP-130AB D	NA

Configuration 2

Equipment Tested:

Device	Manufacturer	Model #	S/N
AMR transceiver device for communicating with utility meters	Itron, Inc	IMR	00000005

Support Equipment:

Device	Manufacturer	Model #	S/N
AC Adapter	Itron, Inc.	GUSB05	NA

General Product Information:

Product Information	Manufacturer-Provided Details
Equipment Type:	Stand-Alone Equipment
Type of Wideband System:	Proprietary FHSS
Operating Frequency Range:	908-923.8MHz
Number of Hopping Channels:	80
Modulation Type(s):	FSK
Maximum Duty Cycle:	45%
Number of TX Chains:	1
Antenna Type(s) and Gain:	Internal PIFA 1.5dB
Beamforming Type:	NA
Antenna Connection Type:	Integral (External connector provided to facilitate testing)
Nominal Input Voltage:	120VAC, 60Hz
Firmware / Software used for Test:	DPS Firmware 5.71 / MC3 Test v4.0.2.2

FCC Part 15 Subpart C

15.247(a) Transmitter Characteristics

Test Setup/Conditions			
Test Location:	Bothell Lab C3	Test Engineer:	M. Atkinson
Test Method:	ANSI C63.10 (2013)	Test Date(s):	10/10/16 to 10/13/16
Configuration:	1		
Test Setup:	Frequency Range: 908-923.8MHz Frequency tested: 908, 916, 923.8MHz Firmware power setting: Max User Allowed EUT Firmware: 5.71 Protocol /MCS/Modulation: FSK Antenna type: Internal PIFA Antenna Gain: 1.5 dBi. Duty Cycle: 100% (Test Mode) Test Mode: Continuously transmitting Test Setup: EUT is transmitting through a temporary antenna connector and is attached directly to the spectrum analyzer. Modifications Added: None		

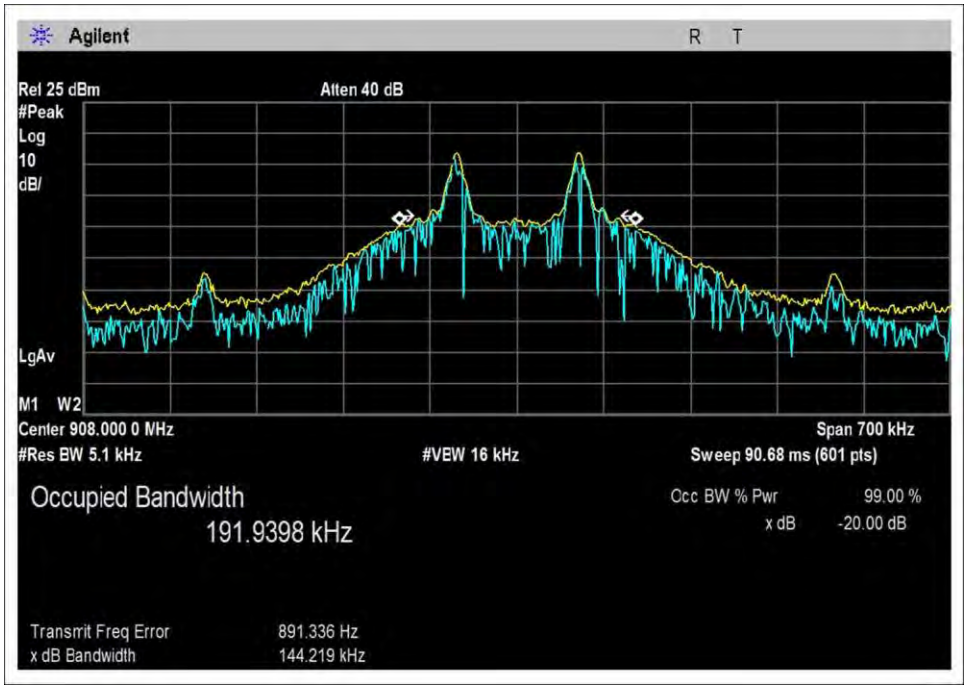
Environmental Conditions			
Temperature (ºC)	20-24	Relative Humidity (%):	32-45

Test Equipment					
Asset#	**Description**	**Manufacturer**	**Model**	**Cal Date**	**Cal Due**
02871	Spectrum Analyzer	Agilent	E4440A	8/25/2015	8/25/2017
P06503	Cable	Astrolab	32026-29801-29801-36	4/28/2016	4/28/2018
P06242	Attenuator	Weinschel	54A-10	3/28/2016	3/28/2018

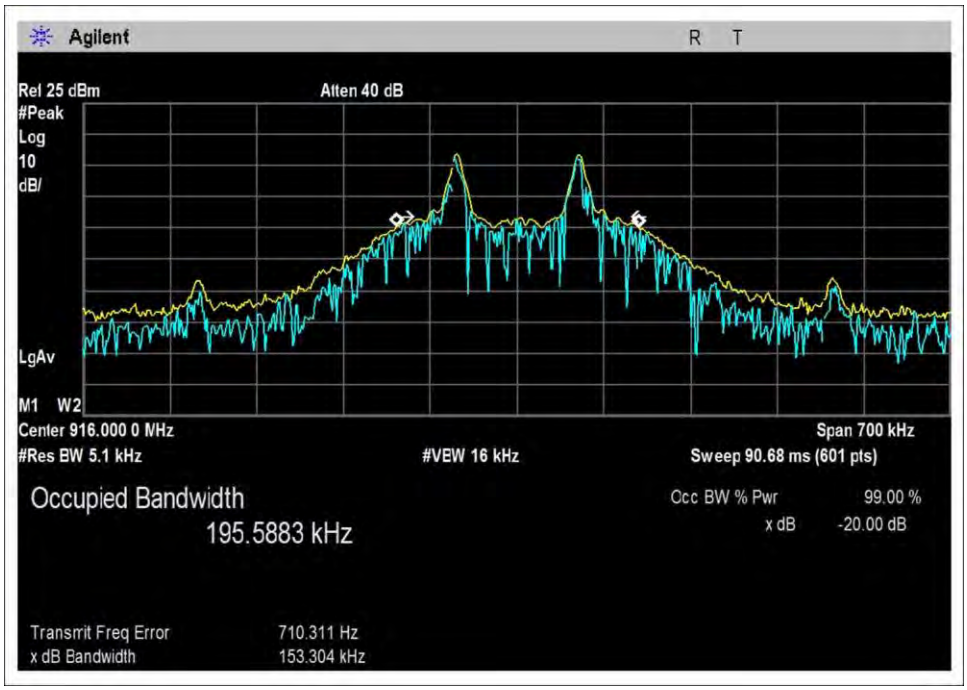
15.247(a)(1) 20 dB Bandwidth

Test Data Summary					
Frequency (MHz)	**Antenna Port**	**Modulation**	**Measured (kHz)**	**Limit (kHz)**	**Results**
908	1	FSK	144.2	≤500	Pass
916	1	FSK	153.3	≤500	Pass
923.8	1	FSK	180.6	≤500	Pass

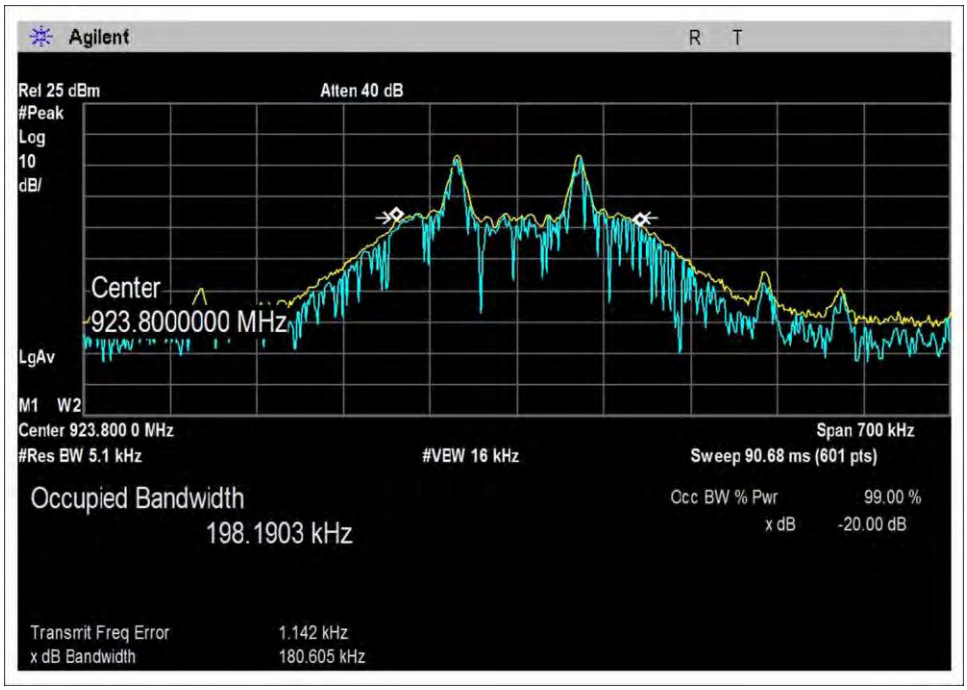
Plots



Low Channel



Middle Channel

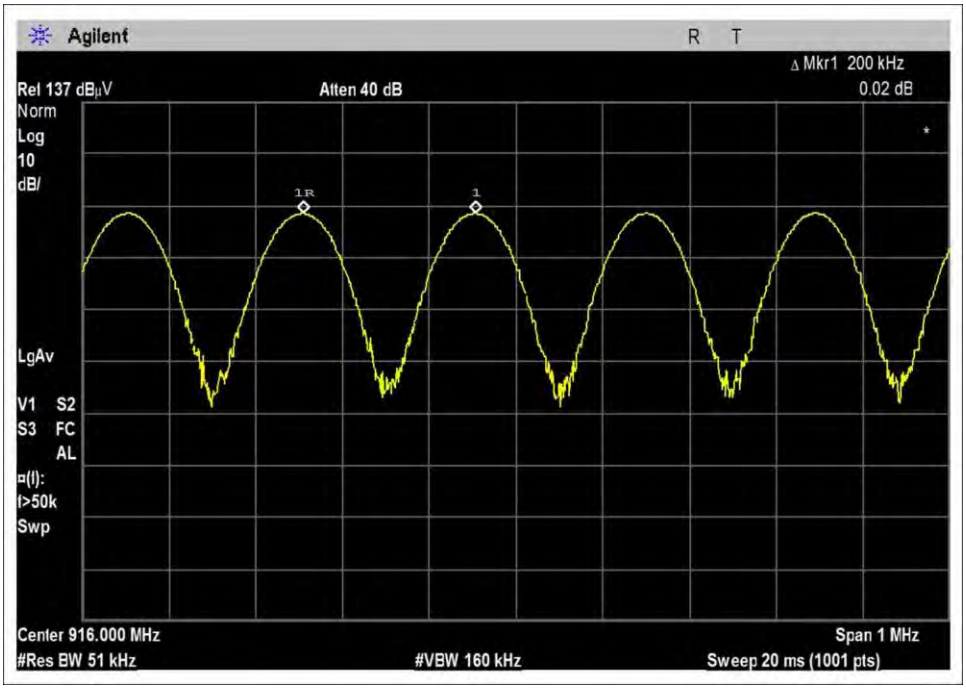


High Channel

15.247(a)(1) Carrier Separation

Test Data Summary				
Limit applied: 20dB bandwidth of the hopping channel.				
Antenna Port	**Operational Mode**	**Measured (kHz)**	**Limit (kHz)**	**Results**
1	Normal Hopping	200.0	>180.6	Pass

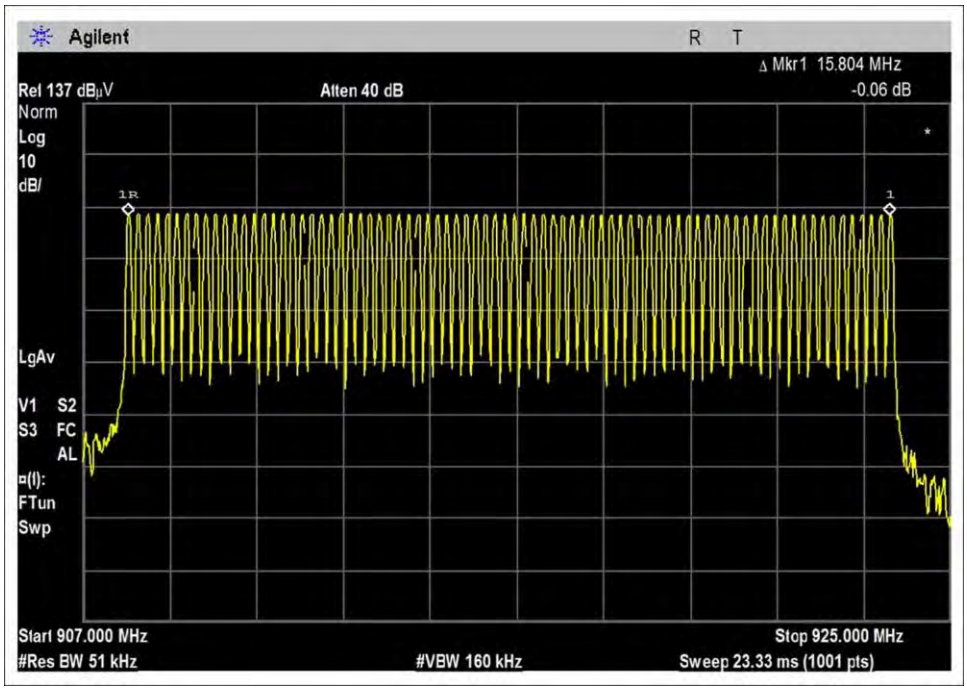
Plot



15.247(a)(1)(iii) Number of Hopping Channels

Test Data Summary				
$Limit = \begin{cases} 50\ Channels \mid 20\ dB\ BW < 250kHz \\ 25\ Channels \mid 20\ dB\ BW \geq 250kHz \end{cases}$				
Antenna Port	**Operational Mode**	**Measured (Channels)**	**Limit (Channels)**	**Results**
1	Normal Hopping	80	≥50	Pass

Plot



15.247(a)(1)(iii) Time of Occupancy

Test Data Summary				
Observation Period, P_{obs} is derived from the following: $P_{Obs} = \begin{cases} 20\ Seconds & \lvert 20\ dB\ BW < 250kHz \\ 10\ Seconds & \lvert 20\ dB\ BW \geq 250kHz \end{cases}$				
Antenna Port	**Operational Mode**	**Measured (ms)**	**Limit (ms/P_{obs})**	**Results**
1	Normal Hopping	365.04	≤400	Pass

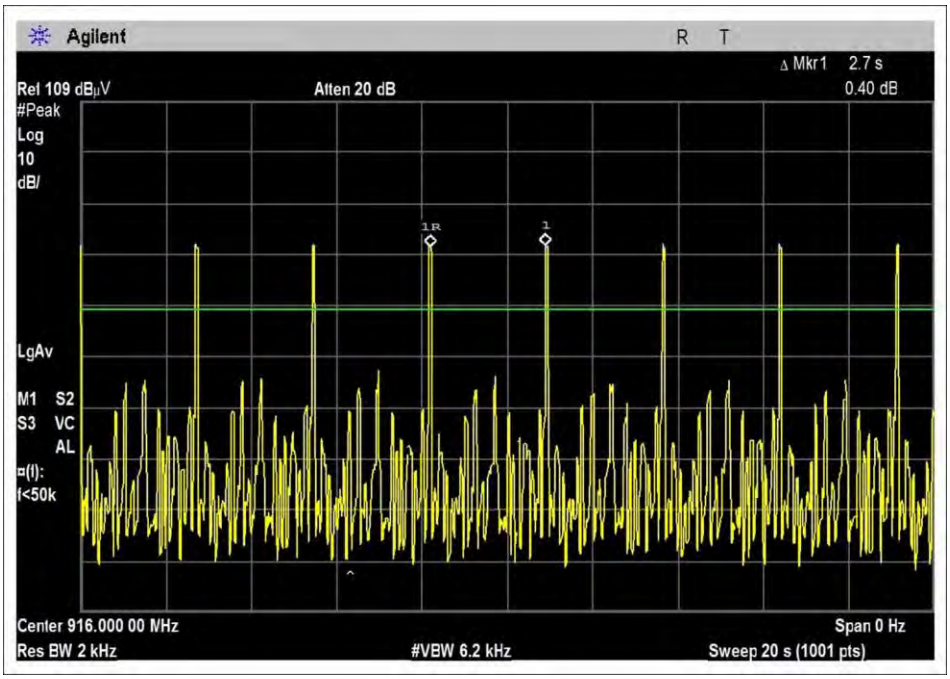
Measured results are calculated as follows:

$$Dwell\ time = \left(\sum_{Bursts} RF\ Burst\ On\ Time + \sum_{Control} Control\ Signal\ On\ time \right) \Big|_{P_{obs}}$$

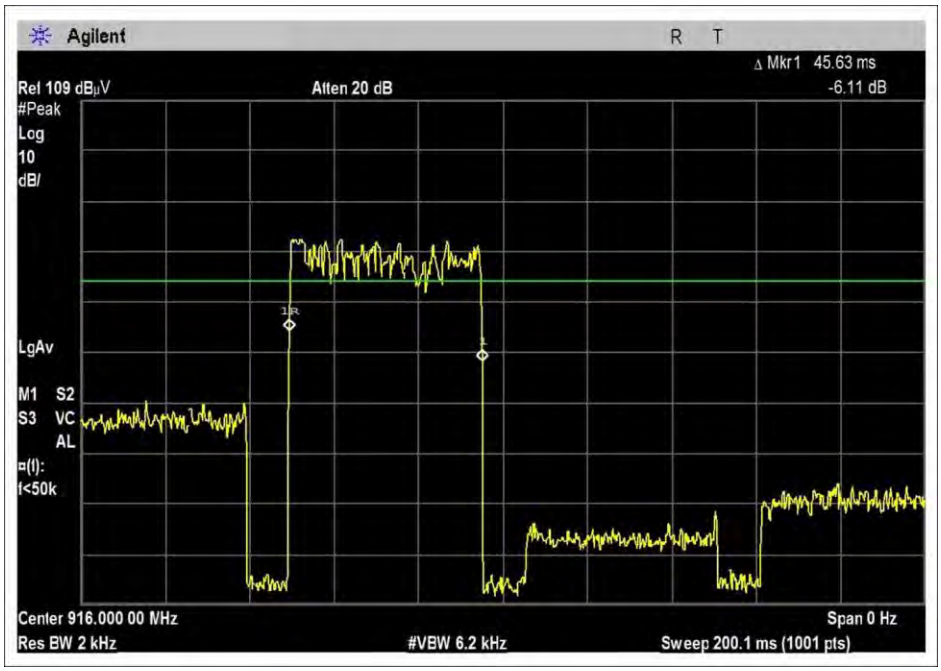
Actual Calculated Values:

Parameter	Value
Observation Period (P_{obs}):	20 s
Number of RF Bursts / P_{obs}:	8
On time of RF Burst:	45.63
Number of Control or other signals / P_{obs}:	0
On time of Control or other Signals:	0
Total Measured On Time:	365.04 ms

Plots



20 Second Window



Single Burst

Test Setup Photo

15.247(b)(1) Output Power

Test Data Summary - Voltage Variations					
Frequency (MHz)	**Modulation / Ant Port**	**$V_{Minimum}$ (dBm)**	**$V_{Nominal}$ (dBm)**	**$V_{Maximum}$ (dBm)**	**Max Deviation from $V_{Nominal}$ (dB)**
908	FSK	19.0	19.1	19.0	0.1
916	FSK	18.9	18.9	18.9	0.0
923.8	FSK	18.7	18.7	18.7	0.0

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

Parameter Definitions:

Measurements performed at input voltage Vnominal ± 15%.

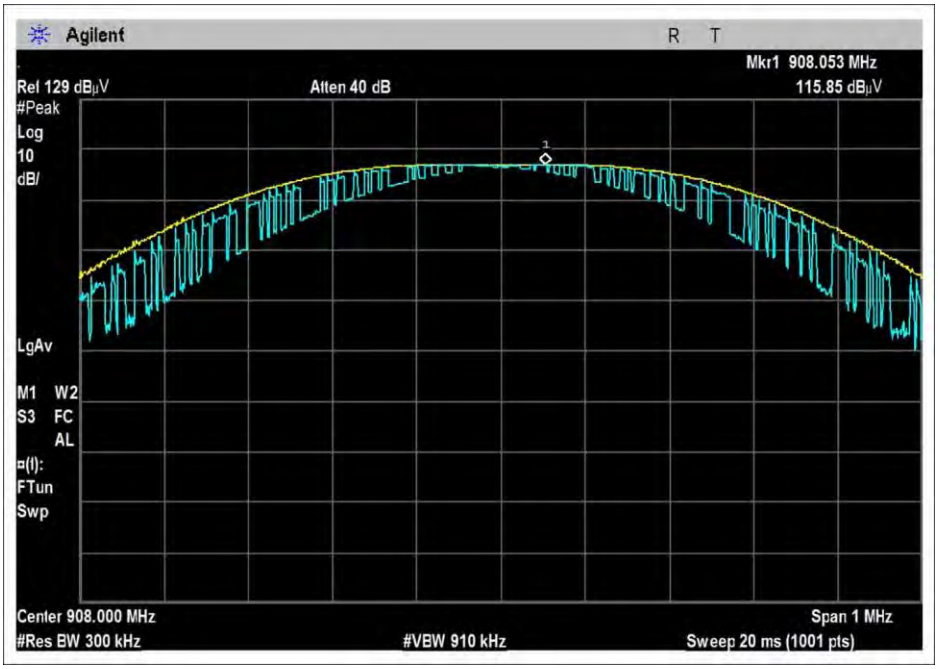
Parameter	Value
$V_{Nominal}$:	115VAC
$V_{Minimum}$:	97VAC
$V_{Maximum}$:	133VAC

Test Data Summary - RF Conducted Measurement
$Limit = \begin{cases} 30dBm\ Conducted/36dBm\ EIRP \mid \geq 50\ Channels \\ 24dBm\ Conducted/30dBm\ EIRP \mid < 50\ Channels\ (\min 25) \end{cases}$

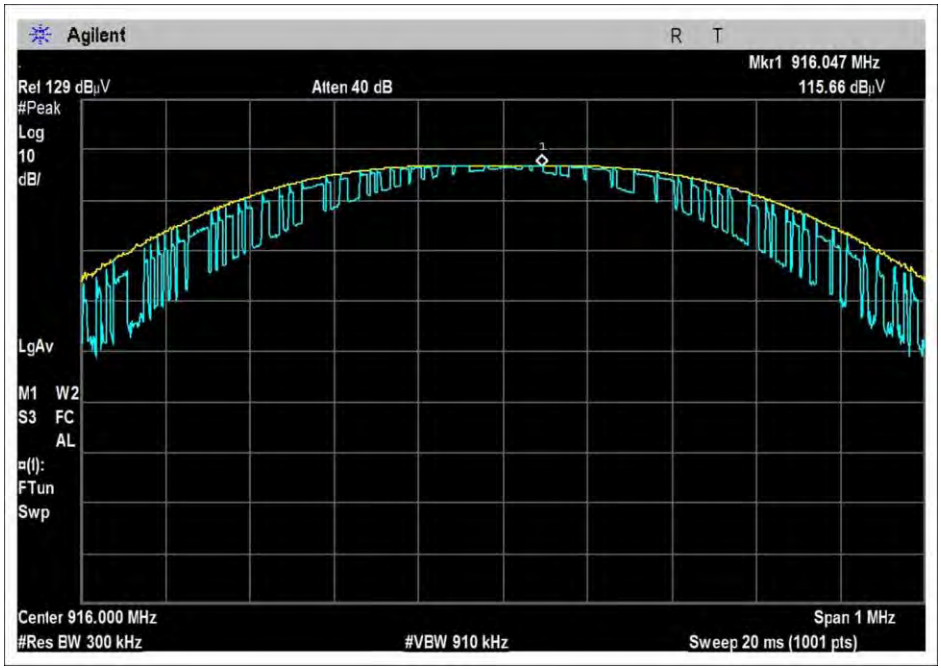
Frequency (MHz)	**Modulation**	**Ant. Type / Gain (dBi)**	**Measured (before correction)**	**Correction Factors (dB)**	**Corrected Measured Power**	**Limit (dBm)**	**Results**
908	FSK	Internal PIFA 1.5dBi	8.9dBm	10.2	19.1dBm	≤30	Pass
916	FSK	Internal PIFA 1.5dBi	8.7dBm	10.2	18.9dBm	≤30	Pass
923.8	FSK	Internal PIFA 1.5dBi	8.5dBm	10.2	18.7dBm	≤30	Pass

Note: The conducted measurements were recorded in dBuV and converted into dBm using a conversion factor for known system impedance of 50 ohms.

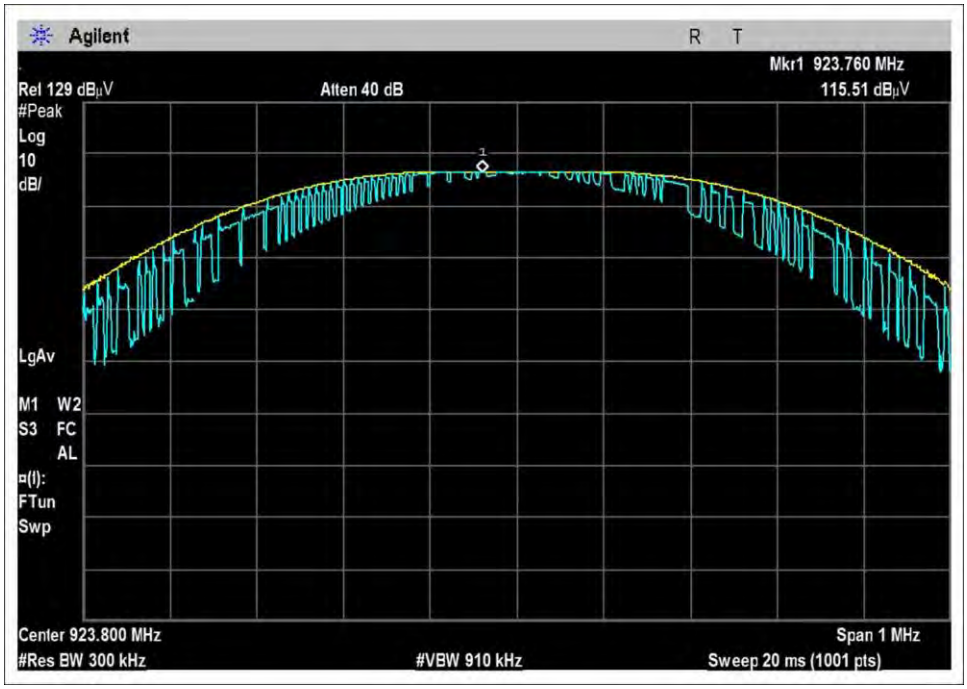
Plots



Low Channel



Middle Channel



High Channel

Test Setup / Conditions / Data

Test Location:	CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA. 98021 • 1-800-500-4EMC		
Customer:	**Itron, Inc**		
Specification:	**15.247(b) Power Output (902-928 MHz FHSS >50 Channels)**		
Work Order #:	**99119**	Date:	10/10/2016
Test Type:	**Maximized Emissions**	Time:	16:09:35
Tested By:	Michael Atkinson	Sequence#:	8
Software:	EMITest 5.03.02		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

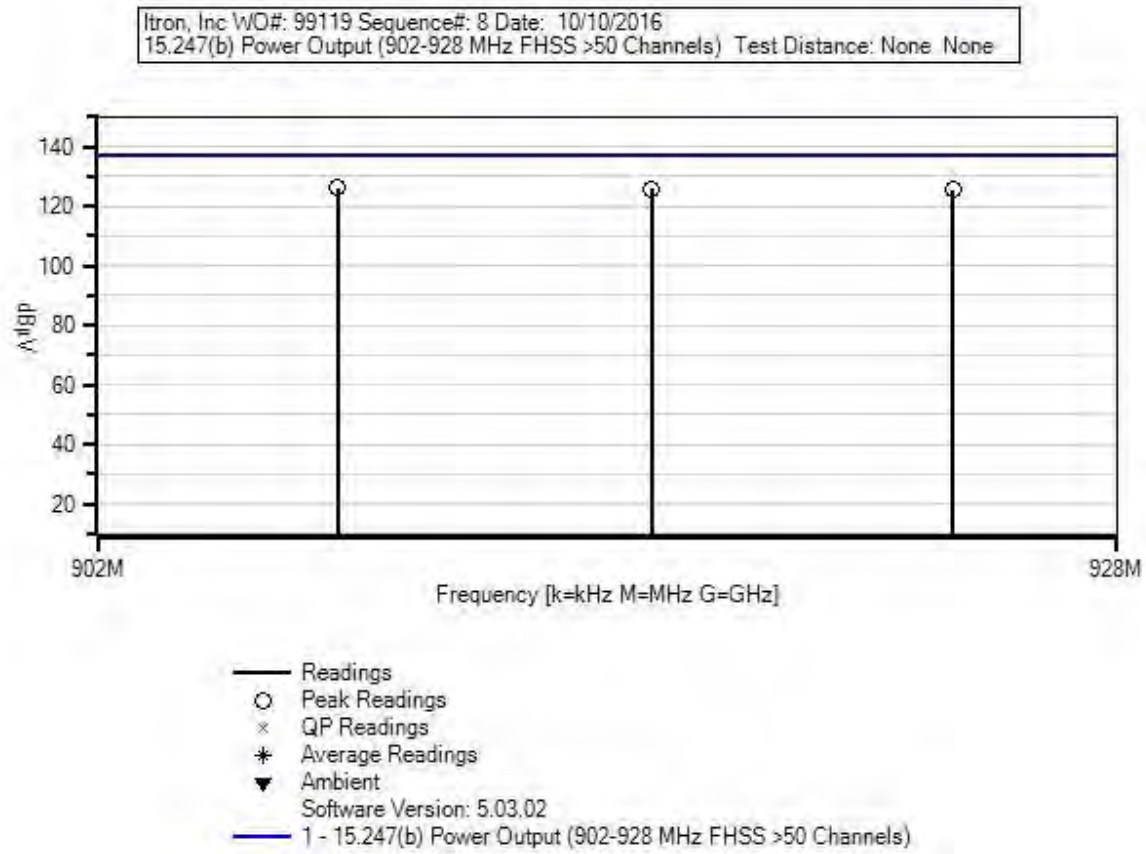
Temperature: 20-24°C
Relative Humidity: 32-45%

Frequency Range: 908-923.8MHz
Frequency tested: 908, 916, 923.8MHz
Firmware power setting: Max User Allowed
EUT Firmware: 5.71
Protocol /MCS/Modulation: FSK

Antenna type: Internal PIFA
Antenna Gain: 1.5 dBi.

Duty Cycle: 100% (Test Mode)

Test Mode: Continuously transmitting
Test Setup: EUT is transmitting through a temporary antenna connector and is attached directly to the spectrum analyzer.
Modifications Added: None
Test Method: ANSI C63.10 (2013)



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02871	Spectrum Analyzer	E4440A	8/25/2015	8/25/2017
T2	ANP06242	Attenuator	54A-10	3/28/2016	3/28/2018
T3	ANP06503	Cable	32026-29801-29801-36	4/28/2016	4/28/2018
	01315	AC Power Supply	NA	11/16/2015	11/16/2017

Measurement Data: Reading listed by margin. Test Distance: None

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	908.053M	115.9	+0.0	+9.8	+0.4		+0.0	126.1	137.0	-10.9	Vert
2	916.047M	115.7	+0.0	+9.8	+0.4		+0.0	125.9	137.0	-11.1	Vert
3	923.760M	115.5	+0.0	+9.8	+0.4		+0.0	125.7	137.0	-11.3	Vert

Test Setup Photo

15.35(c) Duty Cycle Correction Factor

Test Equipment					
Asset# / Serial#	**Description**	**Manufacturer**	**Model**	**Cal Date**	**Cal Due**
03530	RF Powerhead	ETS	7002-006	3/31/2015	3/31/2017

Test Data Summary			
Antenna Port	**Operational Mode**	**Measured On Time (mS / P_{obs})**	**Calculated DCCF (dB)**
1	Transmitting RF Bursts	45	-6.9

Observation Period, P_{obs} is the duration of the pulse train or maximum 100mS

Measured results are calculated as follows:

$$On\ Time = \left(\sum_{Bursts} RF\ Burst\ On\ Time + \sum_{Control} Control\ Signal\ On\ time \right) \Bigg|_{P_{obs}\ (\max 100ms)}$$

Measured Values:

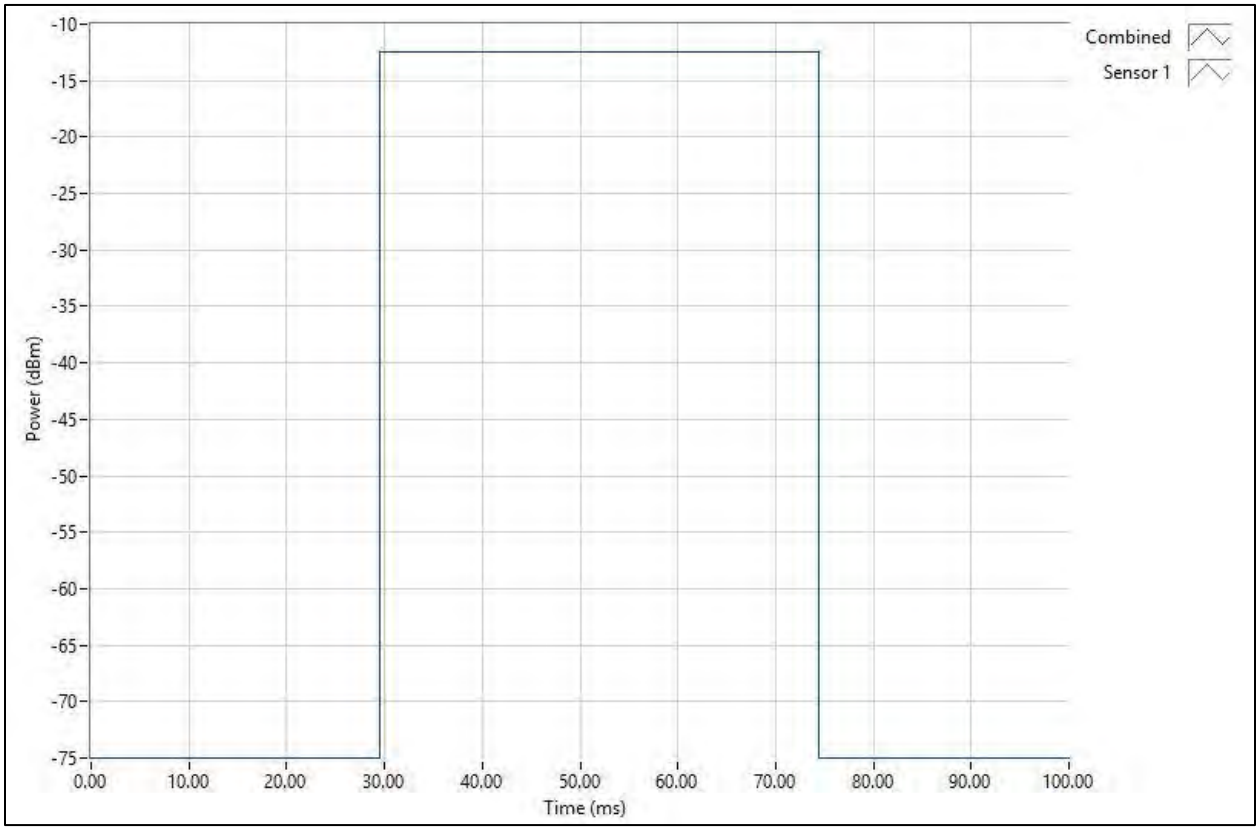
Parameter	**Value**
Observation Period (P_{obs}):	100ms
Number of RF Bursts / P_{obs}:	1
On time of RF Burst:	45ms
Number of Control or other signals / P_{obs}:	0
On time of Control or other Signals:	0
Total Measured On Time:	45mS

Duty Cycle Correction Factor (DCCF) is calculated in accordance with ANSI C63.10:

$$DCCF = 20 \cdot Log\left(\frac{On\ Time}{P_{obs}}\right)$$

Duty Cycle Correction Factor Test Data

Burst #	TxOff Time (ms)	TxOn Time (ms)
1	55.0298	44.9702



Test Setup Photo

15.247(d) RF Conducted Emissions & Band Edge

Test Setup / Conditions / Data

Test Location:	CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA. 98021 • 1-800-500-4EMC		
Customer:	**Itron, Inc.**		
Specification:	**15.247(d) Conducted Spurious Emissions**		
Work Order #:	**99119**	Date:	10/14/2016
Test Type:	**Maximized Emissions**	Time:	14:17:22
Tested By:	Michael Atkinson	Sequence#:	9
Software:	EMITest 5.03.02		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Temperature: 20 to 24°C
Humidity: 32 to 45%
Pressure: 101.3 to 103.5kPa

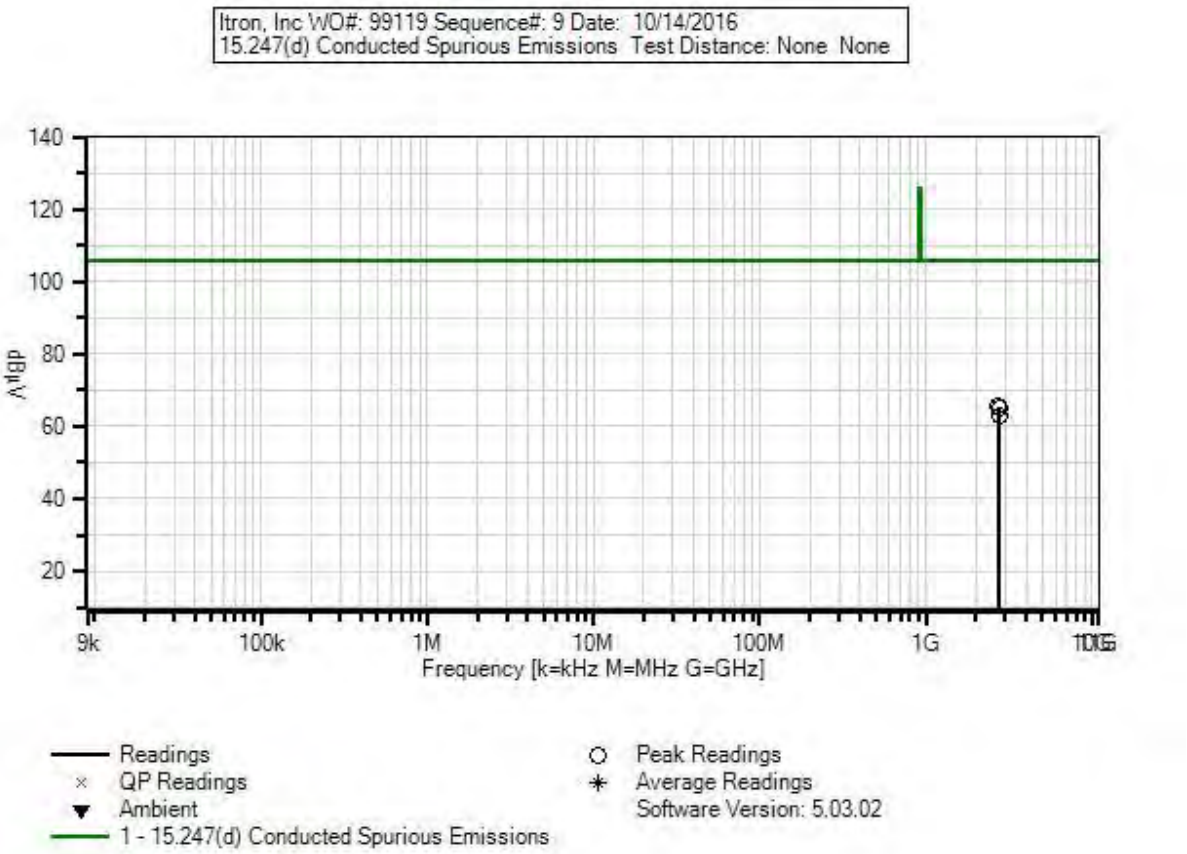
Frequency Range: 908-923.8MHz
Frequency tested: 908, 916, 923.8MHz
Firmware power setting: Max User Allowed
EUT Firmware: 5.71
Protocol /MCS/Modulation: Continuous FSK and Hopping FSK

Antenna type: Internal PIFA
Antenna Gain: 1.5 dBi.

Duty Cycle: 100% (Test Mode)

Test Mode: Continuously transmitting FSK on single channel and Hopping mode both investigated, worst case data reported.
Test Setup: EUT is transmitting through a temporary antenna connector and is attached directly to the spectrum analyzer.
Modifications Added: None
Test Method: ANSI C63.10 (2013)

Note: No emissions observed within 40dB of the limit 9kHz-2.7GHz and 2.8-10GHz.



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP06242	Attenuator	54A-10	3/28/2016	3/28/2018
T2	ANP06503	Cable	32026-29801-29801-36	4/28/2016	4/28/2018
	AN02871	Spectrum Analyzer	E4440A	8/25/2015	8/25/2017

Measurement Data: Reading listed by margin. Test Distance: None

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	2727.000M	55.0	+9.8	+0.8			+0.0	65.6	105.7	-40.1	Vert
2	2767.000M	54.5	+9.8	+0.8			+0.0	65.1	105.7	-40.6	Vert
3	2747.000M	52.5	+9.8	+0.8			+0.0	63.1	105.7	-42.6	Vert

Band Edge

Band Edge Summary				
Limit applied: Max Power/100kHz - 20dB.				
Frequency (MHz)	**Modulation**	**Measured (dBuV)**	**Limit (dBuV)**	**Results**
902	Continuously Transmitting FSK	58.0	<105.7	Pass
928	Continuously Transmitting FSK	60.9	<105.7	Pass
901.873	Hopping FSK	70.5	<105.7	Pass
928.733	Hopping FSK	78.2	<105.7	Pass

Test Setup / Conditions / Data

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA. 98021 • 1-800-500-4EMC
Customer: **Itron, Inc**
Specification: **15.247(d) Conducted Spurious Emissions**
Work Order #: **99119** Date: 10/14/2016
Test Type: **Maximized Emissions** Time: 14:17:22
Tested By: Michael Atkinson Sequence#: 9
Software: EMITest 5.03.02

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

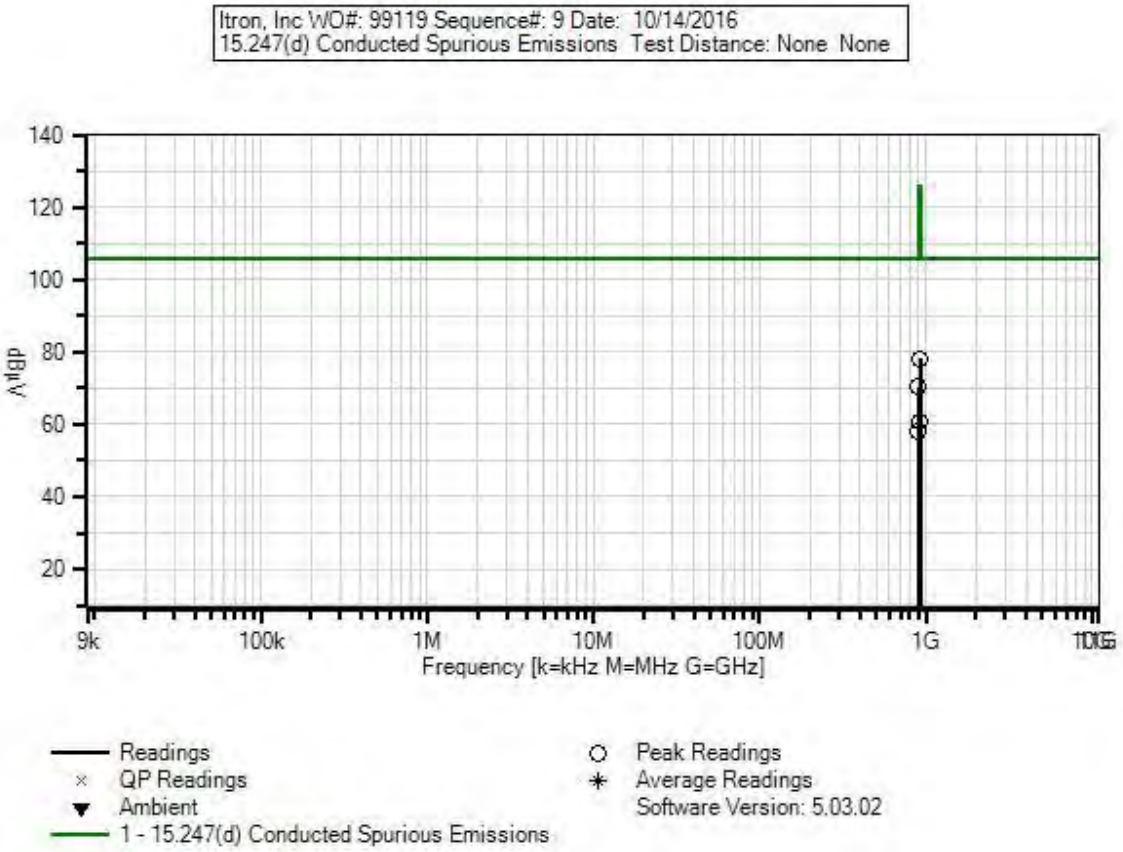
Temperature: 20 to 24°C
Humidity: 32 to 45%
Pressure: 101.3 to 103.5kPa

Frequency Range: 908-923.8MHz
Frequency tested: 908, 916, 923.8MHz
Firmware power setting: Max User Allowed
EUT Firmware: 5.71
Protocol /MCS/Modulation: Continuous FSK and Hopping FSK

Antenna type: Internal PIFA
Antenna Gain: 1.5 dBi.

Duty Cycle: 100% (Test Mode)

Test Mode: Continuously transmitting FSK on single channel and Hopping mode both investigated, worst case data reported.
Test Setup: EUT is transmitting through a temporary antenna connector and is attached directly to the spectrum analyzer.
Modifications Added: None
Test Method: ANSI C63.10 (2013)



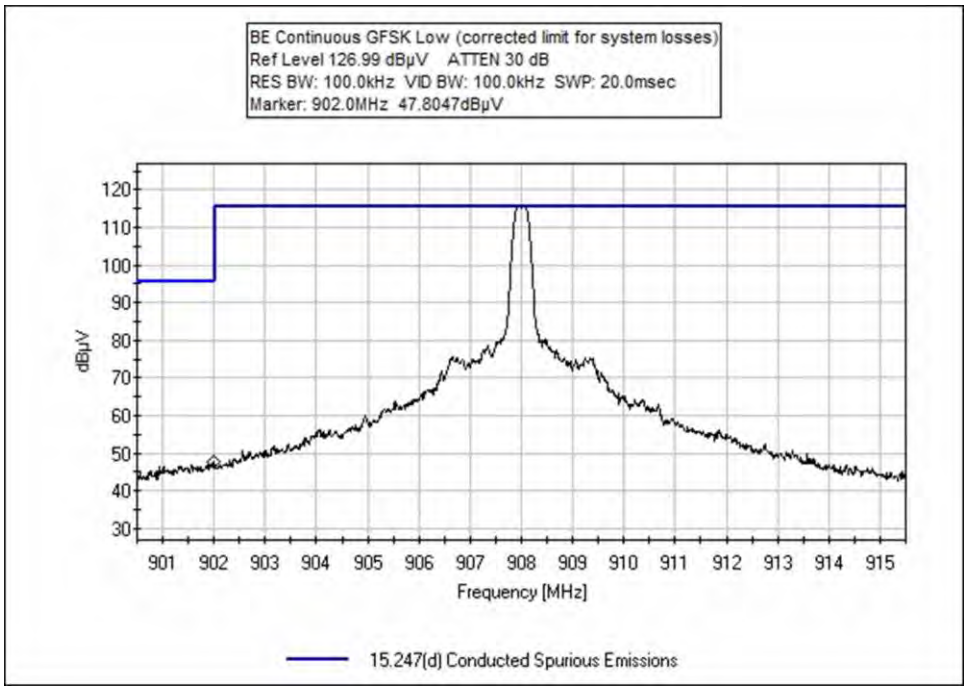
Test Equipment:

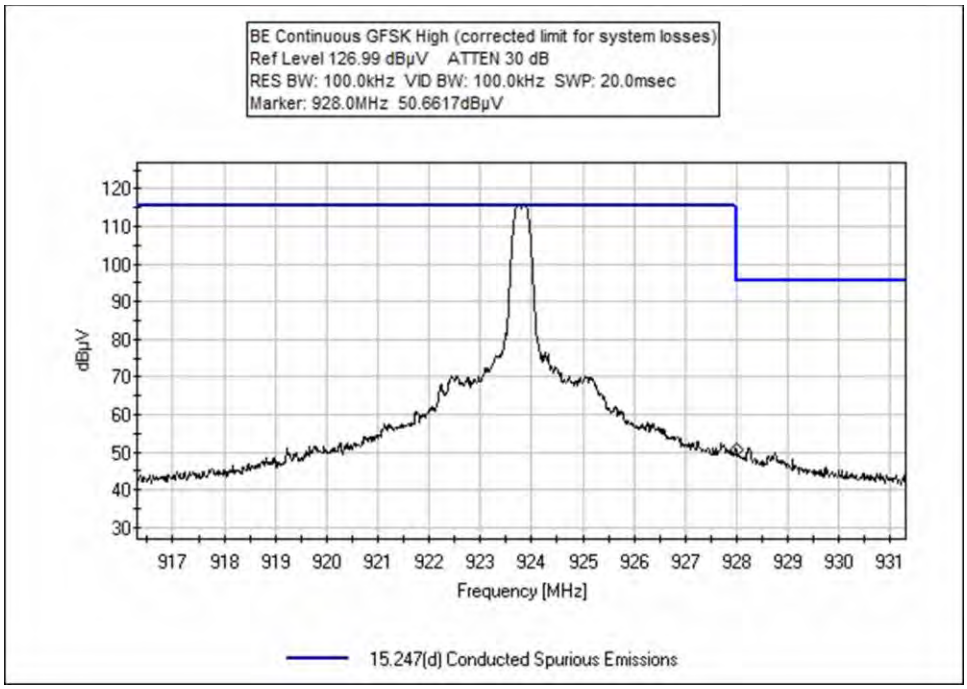
ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP06242	Attenuator	54A-10	3/28/2016	3/28/2018
T2	ANP06503	Cable	32026-29801-29801-36	4/28/2016	4/28/2018
	AN02871	Spectrum Analyzer	E4440A	8/25/2015	8/25/2017

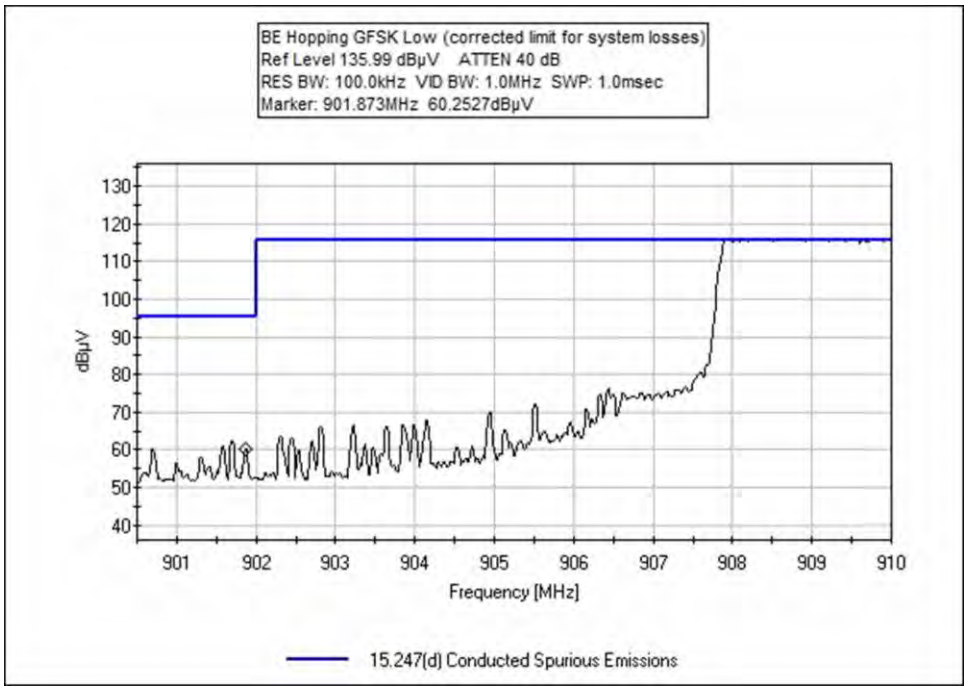
Measurement Data: Reading listed by margin. Test Distance: None

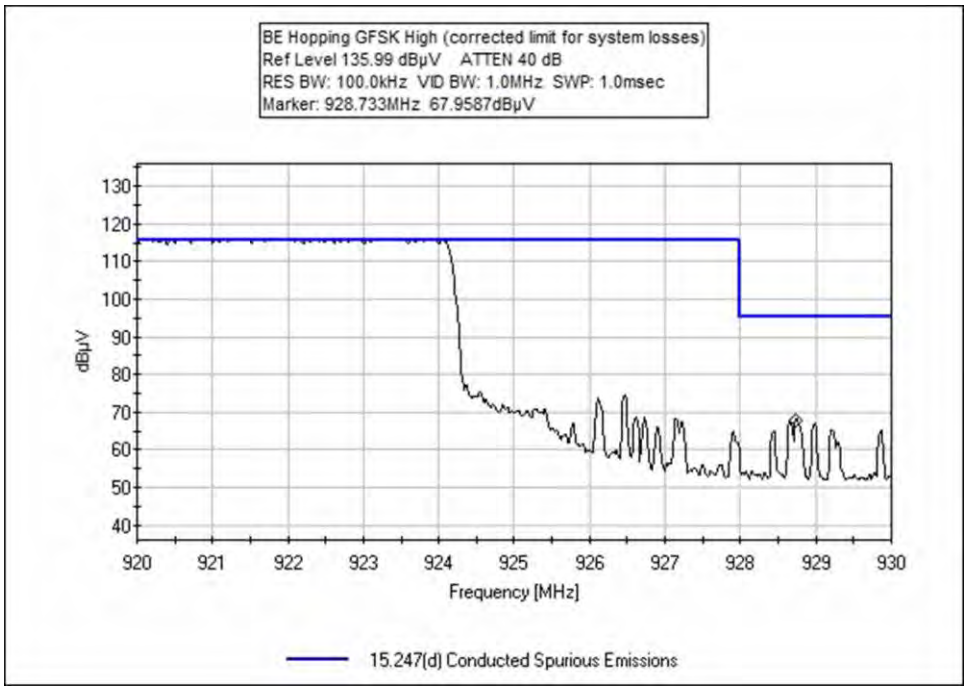
#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	928.733M	68.0	+9.8	+0.4			+0.0	78.2	105.7	-27.5	Vert
									BE Hopping FSK		
2	901.873M	60.3	+9.8	+0.4			+0.0	70.5	105.7	-35.2	Vert
									BE Hopping FSK		
3	928.000M	50.7	+9.8	+0.4			+0.0	60.9	105.7	-44.8	Vert
									BE Cont FSK		
4	902.000M	47.8	+9.8	+0.4			+0.0	58.0	105.7	-47.7	Vert
									BE Cont FSK		

Band Edge Plots






BE Hopping GFSK Low (corrected limit for system losses)
Ref Level 135.99 dBµV ATTEN 40 dB
RES BW: 100.0kHz VID BW: 1.0MHz SWP: 1.0msec
Marker: 901.873MHz 60.2527dBµV
dBµV
130
120
110
100
90
80
70
60
50
40
901
902
903
904
905
906
907
908
909
910
Frequency [MHz]
15.247(d) Conducted Spurious Emissions


BE Hopping GFSK High (corrected limit for system losses)
Ref Level 135.99 dBµV ATTEN 40 dB
RES BW: 100.0kHz VID BW: 1.0MHz SWP: 1.0msec
Marker: 928.733MHz 67.9587dBµV
dBµV
130
120
110
100
90
80
70
60
50
40
920
921
922
923
924
925
926
927
928
929
930
Frequency [MHz]
15.247(d) Conducted Spurious Emissions

Test Setup Photo

15.247(d) Radiated Emissions & Band Edge

Test Setup / Conditions / Data

Test Location:	CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA. 98021 • 1-800-500-4EMC		
Customer:	**Itron, Inc**		
Specification:	**15.247(d) / 15.209 Radiated Spurious Emissions**		
Work Order #:	**99119**	Date:	10/13/2016
Test Type:	**Maximized Emissions**	Time:	15:47:09
Tested By:	Michael Atkinson	Sequence#:	7
Software:	EMITest 5.03.02		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

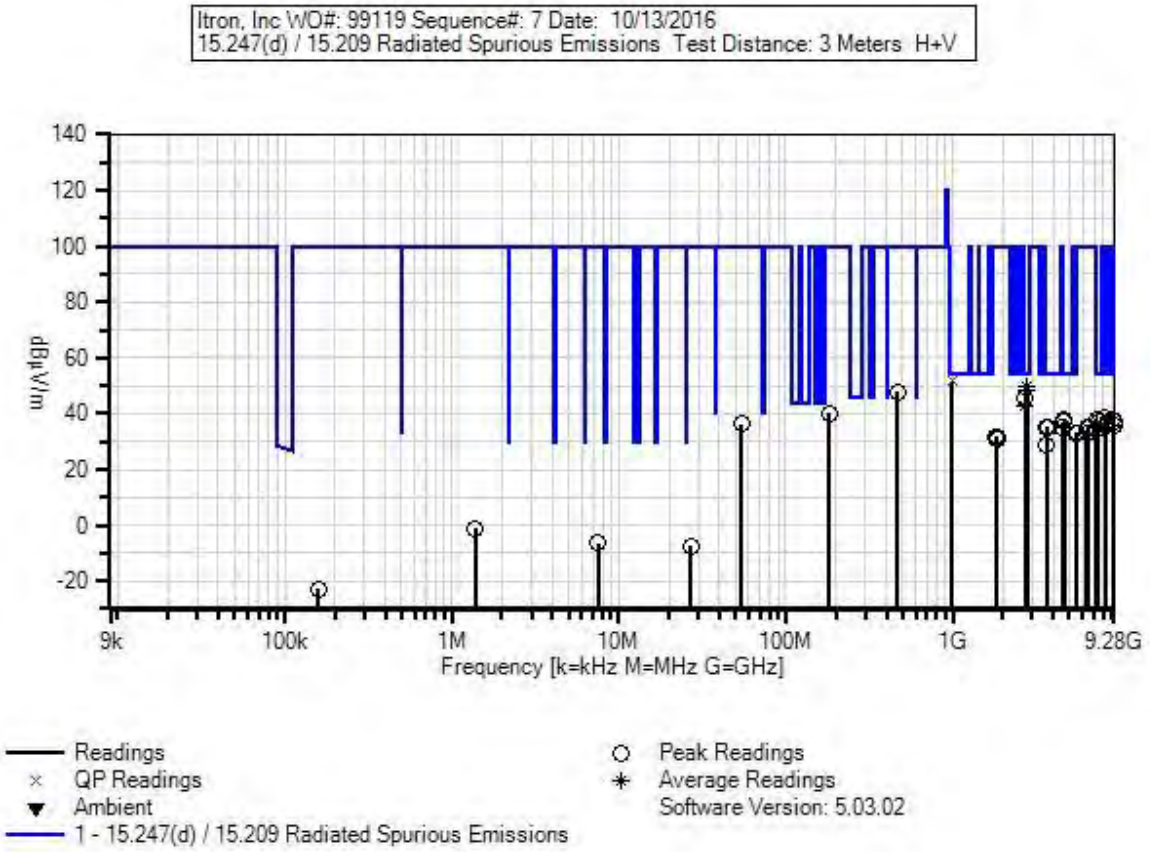
Temperature: 20 to 24°C
Humidity: 32 to 45%
Pressure: 101.3 to 103.5kPa

Frequency Range: 9kHz-9.28GHz
Frequency tested: 908, 916, 923.8MHz
Firmware power setting: Max User Allowed
EUT Firmware: 5.71
Protocol /MCS/Modulation: Continuous FSK and Hopping FSK

Antenna type: Internal PIFA
Antenna Gain: 1.5 dBi.

Duty Cycle: 100% (Test Mode)

Test Mode: Continuously transmitting FSK on single channel and Hopping mode both investigated, worst case data reported.
Test Setup: EUT is transmitting sitting on foam table 80cm high. X, Y, Z axis investigated, both antenna polarities investigated, worst case data reported.
Modifications Added: None
Test Method: ANSI C63.10 (2013)


Itron, Inc WO#: 99119 Sequence#: 7 Date: 10/13/2016
15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters H+V
140
120
100
80
60
40
20
0
-20
dBµV/m
9k
100k
1M
10M
100M
1G
9.28G
Frequency [k=kHz M=MHz G=GHz]
Readings
QP Readings
Ambient
1 - 15.247(d) / 15.209 Radiated Spurious Emissions
Peak Readings
Average Readings
Software Version: 5.03.02

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP06540	Cable	Heliax	10/29/2015	10/29/2017
T2	ANP05305	Cable	ETSI-50T	2/15/2016	2/15/2018
T3	AN03540	Preamp	83017A	4/30/2015	4/30/2017
T4	AN01467	Horn Antenna-ANSI C63.5 Calibration	3115	8/12/2015	8/12/2017
T5	ANP06935	Cable	32026-29801-29801-18	3/11/2016	3/11/2018
T6	AN03170	High Pass Filter	HM1155-11SS	12/17/2015	12/17/2017
	AN02871	Spectrum Analyzer	E4440A	8/25/2015	8/25/2017
T7	ANP05963	Cable	RG-214	2/15/2016	2/15/2018
T8	ANP05360	Cable	RG214	12/1/2014	12/1/2016
T9	AN02307	Preamp	8447D	2/15/2016	2/15/2018
T10	AN01991	Biconilog Antenna	CBL6111C	3/11/2016	3/11/2018
T11	ANP05657	Attenuator	PE7004-6	12/22/2015	12/22/2017
T12	AN00052	Loop Antenna	6502	4/8/2016	4/8/2018
T13	ANP05747	Attenuator	PE7004-20	1/29/2016	1/29/2018
T14	AN45% DCCF	Test Data Adjustment		10/11/2016	10/11/2018

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

#	Freq	Rdng	T1 T5 T9 T13	T2 T6 T10 T14	T3 T7 T11	T4 T8 T12	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	985.400M QP	22.4	+0.0 +0.0 -27.1 +20.0	+0.0 +0.0 +25.6 +0.0	+0.0 +2.5 +6.1	+0.0 +2.2 +0.0	+0.0	51.7	54.0	-2.3	H+V
^	985.400M	27.8	+0.0 +0.0 -27.1 +20.0	+0.0 +0.0 +25.6 +0.0	+0.0 +2.5 +6.1	+0.0 +2.2 +0.0	+0.0	57.1	54.0	+3.1	H+V
3	2771.425M Ave	57.5	+0.7 +0.4 +0.0 +0.0	+3.0 +0.4 +0.0 -6.9	-34.5 +0.0 +0.0	+28.9 +0.0 +0.0	+0.0	49.5	54.0 High	-4.5	H+V
^	2771.450M	59.3	+0.7 +0.4 +0.0 +0.0	+3.0 +0.4 +0.0 -6.9	-34.5 +0.0 +0.0	+28.9 +0.0 +0.0	+0.0	51.3	54.0 High	-2.7	H+V

5	2748.054M	56.4	+0.7	+3.0	-34.5	+28.8	+0.0	48.3	54.0	-5.7	H+V
	Ave		+0.4	+0.4	+0.0	+0.0			Mid		
			+0.0	+0.0	+0.0	+0.0					
			+0.0	-6.9							
^	2748.150M	58.0	+0.7	+3.0	-34.5	+28.8	+0.0	49.9	54.0	-4.1	H+V
			+0.4	+0.4	+0.0	+0.0			Mid		
			+0.0	+0.0	+0.0	+0.0					
			+0.0	-6.9							
7	2723.800M	53.4	+0.7	+3.0	-34.5	+28.7	+0.0	45.3	54.0	-8.7	H+V
			+0.4	+0.5	+0.0	+0.0			Low		
			+0.0	+0.0	+0.0	+0.0					
			+0.0	-6.9							
8	2723.950M	51.2	+0.7	+3.0	-34.5	+28.7	+0.0	43.1	54.0	-10.9	H+V
	Ave		+0.4	+0.5	+0.0	+0.0			Low		
			+0.0	+0.0	+0.0	+0.0					
			+0.0	-6.9							
9	8174.700M	36.2	+1.3	+5.3	-35.1	+36.7	+0.0	38.5	54.0	-15.5	H+V
			+0.7	+0.3	+0.0	+0.0			Low		
			+0.0	+0.0	+0.0	+0.0					
			+0.0	-6.9							
10	9079.900M	33.8	+1.3	+6.1	-34.7	+37.7	+0.0	38.2	54.0	-15.8	H+V
			+0.7	+0.2	+0.0	+0.0			Low		
			+0.0	+0.0	+0.0	+0.0					
			+0.0	-6.9							
11	7262.800M	36.8	+1.2	+4.6	-34.5	+35.9	+0.0	38.0	54.0	-16.0	H+V
			+0.6	+0.3	+0.0	+0.0			Low		
			+0.0	+0.0	+0.0	+0.0					
			+0.0	-6.9							
12	4618.850M	40.2	+0.9	+4.2	-34.1	+32.6	+0.0	37.9	54.0	-16.1	H+V
			+0.5	+0.5	+0.0	+0.0			High		
			+0.0	+0.0	+0.0	+0.0					
			+0.0	-6.9							
13	7390.250M	35.6	+1.3	+4.8	-34.7	+36.4	+0.0	37.3	54.0	-16.7	H+V
			+0.6	+0.2	+0.0	+0.0			High		
			+0.0	+0.0	+0.0	+0.0					
			+0.0	-6.9							
14	4580.250M	39.3	+0.9	+4.2	-34.1	+32.6	+0.0	36.9	54.0	-17.1	H+V
			+0.5	+0.4	+0.0	+0.0			Mid		
			+0.0	+0.0	+0.0	+0.0					
			+0.0	-6.9							
15	8314.050M	33.6	+1.4	+5.4	-35.0	+36.6	+0.0	36.1	54.0	-17.9	H+V
			+0.7	+0.3	+0.0	+0.0			High		
			+0.0	+0.0	+0.0	+0.0					
			+0.0	-6.9							
16	8244.400M	33.7	+1.3	+5.3	-35.0	+36.7	+0.0	36.1	54.0	-17.9	H+V
			+0.7	+0.3	+0.0	+0.0			Mid		
			+0.0	+0.0	+0.0	+0.0					
			+0.0	-6.9							
17	9160.400M	31.5	+1.4	+6.1	-34.7	+37.7	+0.0	36.0	54.0	-18.0	H+V
			+0.7	+0.2	+0.0	+0.0			Mid		
			+0.0	+0.0	+0.0	+0.0					
			+0.0	-6.9							

18	3695.400M	41.0	+0.7 +0.5 +0.0 +0.0	+3.7 +0.3 +0.0 -6.9	-34.1 +0.0 +0.0	+30.1 +0.0 +0.0	+0.0	35.3	54.0 High	-18.7	H+V
19	3632.500M	41.2	+0.7 +0.5 +0.0 +0.0	+3.7 +0.4 +0.0 -6.9	-34.2 +0.0 +0.0	+29.8 +0.0 +0.0	+0.0	35.2	54.0 Low	-18.8	H+V
20	4540.300M	37.6	+0.9 +0.5 +0.0 +0.0	+4.2 +0.3 +0.0 -6.9	-34.1 +0.0 +0.0	+32.5 +0.0 +0.0	+0.0	35.0	54.0 Low	-19.0	H+V
21	7328.400M	32.7	+1.2 +0.6 +0.0 +0.0	+4.7 +0.3 +0.0 -6.9	-34.6 +0.0 +0.0	+36.2 +0.0 +0.0	+0.0	34.2	54.0 Mid	-19.8	H+V
22	5447.500M	34.9	+1.0 +0.6 +0.0 +0.0	+4.5 +0.3 +0.0 -6.9	-34.2 +0.0 +0.0	+33.1 +0.0 +0.0	+0.0	33.3	54.0 Low	-20.7	H+V
23	3664.250M	35.0	+0.7 +0.5 +0.0 +0.0	+3.7 +0.3 +0.0 -6.9	-34.2 +0.0 +0.0	+29.9 +0.0 +0.0	+0.0	29.0	54.0 Mid	-25.0	H+V
24	463.600M	29.2	+0.0 +0.0 -28.0 +20.1	+0.0 +0.0 +17.4 +0.0	+0.0 +1.9 +6.0	+0.0 +1.3 +0.0	+0.0	47.9	100.0	-52.1	H+V
25	182.300M	30.0	+0.0 +0.0 -27.3 +20.1	+0.0 +0.0 +9.2 +0.0	+0.0 +1.4 +6.0	+0.0 +0.8 +0.0	+0.0	40.2	100.0	-59.8	H+V
26	9237.850M	32.7	+1.4 +0.7 +0.0 +0.0	+6.2 +0.2 +0.0 -6.9	-34.7 +0.0 +0.0	+37.6 +0.0 +0.0	+0.0	37.2	100.0 High	-62.8	H+V
27	54.200M	29.9	+0.0 +0.0 -27.9 +20.0	+0.0 +0.0 +7.3 +0.0	+0.0 +0.6 +6.0	+0.0 +0.4 +0.0	+0.0	36.3	100.0	-63.7	H+V
28	6412.400M	34.9	+1.2 +0.6 +0.0 +0.0	+4.7 +0.3 +0.0 -6.9	-34.2 +0.0 +0.0	+34.6 +0.0 +0.0	+0.0	35.2	100.0 Mid	-64.8	H+V
29	6466.450M	34.7	+1.2 +0.6 +0.0 +0.0	+4.6 +0.3 +0.0 -6.9	-34.2 +0.0 +0.0	+34.5 +0.0 +0.0	+0.0	34.8	100.0 High	-65.2	H+V
30	5496.250M	34.6	+1.0 +0.6 +0.0 +0.0	+4.5 +0.3 +0.0 -6.9	-34.1 +0.0 +0.0	+33.1 +0.0 +0.0	+0.0	33.1	100.0 Mid	-66.9	H+V

31	6355.500M	32.3	+1.3 +0.6 +0.0 +0.0	+4.7 +0.3 +0.0 -6.9	-34.2 +0.0 +0.0	+34.7 +0.0 +0.0	+0.0	32.8	100.0 Low	-67.2	H+V
32	5542.650M	34.0	+1.0 +0.6 +0.0 +0.0	+4.5 +0.3 +0.0 -6.9	-34.1 +0.0 +0.0	+33.3 +0.0 +0.0	+0.0	32.7	100.0 High	-67.3	H+V
33	1832.250M	43.4	+0.5 +0.3 +0.0 +0.0	+2.5 +0.3 +0.0 -6.9	-35.1 +0.0 +0.0	+26.9 +0.0 +0.0	+0.0	31.9	100.0 Mid	-68.1	H+V
34	1816.000M	43.0	+0.5 +0.3 +0.0 +0.0	+2.5 +0.4 +0.0 -6.9	-35.1 +0.0 +0.0	+26.9 +0.0 +0.0	+0.0	31.6	100.0 Low	-68.4	H+V
35	1847.650M	42.4	+0.5 +0.3 +0.0 +0.0	+2.5 +0.3 +0.0 -6.9	-35.1 +0.0 +0.0	+27.0 +0.0 +0.0	+0.0	31.0	100.0 High	-69.0	H+V
36	1.389M	29.0	+0.0 +0.0 +0.0 +0.0	+0.1 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0 +9.7	-40.0	-1.2	100.0	-101.2	Para+
37	7.477M	24.2	+0.0 +0.0 +0.0 +0.0	+0.2 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0 +9.3	-40.0	-6.3	100.0	-106.3	Para+
38	27.031M	25.9	+0.0 +0.0 +0.0 +0.0	+0.3 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0 +6.4	-40.0	-7.4	100.0	-107.4	Para+
39	159.000k	47.4	+0.0 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0 +9.7	-80.0	-22.9	100.0	-122.9	Para+
40	39.000k QP	35.3	+0.0 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0 +11.4	-80.0	-33.3	100.0	-133.3	Para+
^	39.000k	60.2	+0.0 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0 +11.4	-80.0	-8.4	100.0	-108.4	Para+

Band Edge

Band Edge Summary					
Frequency (MHz)	**Modulation**	**Ant. Type**	**Field Strength (dBuV/m @3m)**	**Limit (dBuV/m @3m)**	**Results**
614	Continuously Transmitting FSK	Integral	39.4	<46	Pass
902	Continuously Transmitting FSK	Integral	49.8	<100	Pass
928	Continuously Transmitting FSK	Integral	51.7	< 100	Pass
960	Continuously Transmitting GFS	Integral	46.3	<54	Pass
614	Hopping FSK	Integral	40.5	<46	Pass
902	Hopping FSK	Integral	60.3	<100	Pass
928	Hopping FSK	Integral	66.5	< 100	Pass
960	Hopping FSK	Integral	46.8	<54	Pass

Test Setup / Conditions / Data

Test Location:	CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA. 98021 • 1-800-500-4EMC		
Customer:	**Itron, Inc.**		
Specification:	**15.247(d) / 15.209 Radiated Spurious Emissions**		
Work Order #:	**99119**	Date:	10/13/2016
Test Type:	**Maximized Emissions**	Time:	15:47:09
Tested By:	Michael Atkinson	Sequence#:	7
Software:	EMITest 5.03.02		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

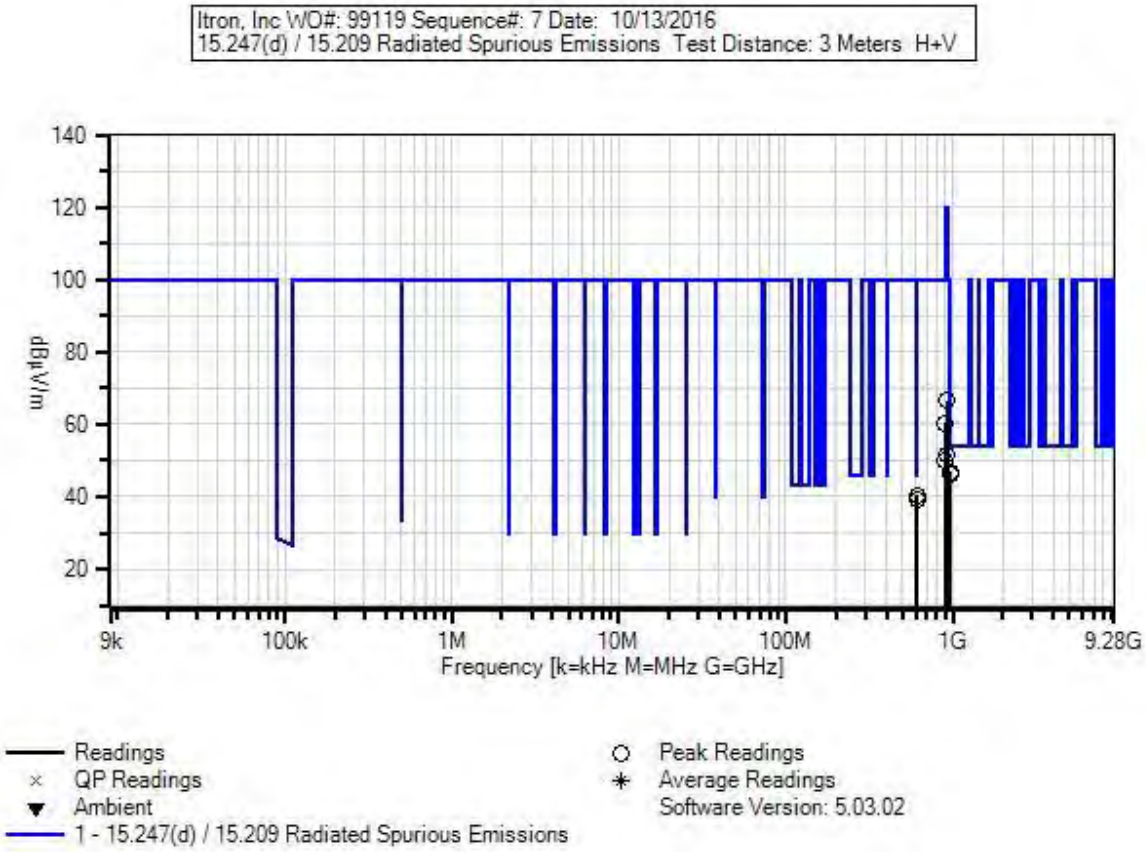
Temperature: 20 to 24°C
Humidity: 32 to 45%
Pressure: 101.3 to 103.5kPa

Frequency Range: Band Edge
Frequency tested: 908, 923.8MHz
Firmware power setting: Max User Allowed
EUT Firmware: 5.71
Protocol /MCS/Modulation: Continuous FSK and Hopping FSK

Antenna type: Internal PIFA
Antenna Gain: 1.5 dBi.

Duty Cycle: 100% (Test Mode)

Test Mode: Continuously transmitting FSK on single channel and Hopping mode both investigated, worst case data reported.
Test Setup: EUT is transmitting sitting on foam table 80cm high. X, Y, Z axis investigated, both antenna polarities investigated, worst case data reported.
Modifications Added: None
Test Method: ANSI C63.10 (2013)


Itron, Inc WO#: 99119 Sequence#: 7 Date: 10/13/2016
15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters H+V
140
120
100
80
60
40
20
dBµV/m
9k
100k
1M
10M
100M
1G
9.28G
Frequency [k=kHz M=MHz G=GHz]
Readings
QP Readings
Ambient
1 - 15.247(d) / 15.209 Radiated Spurious Emissions
Peak Readings
Average Readings
Software Version: 5.03.02

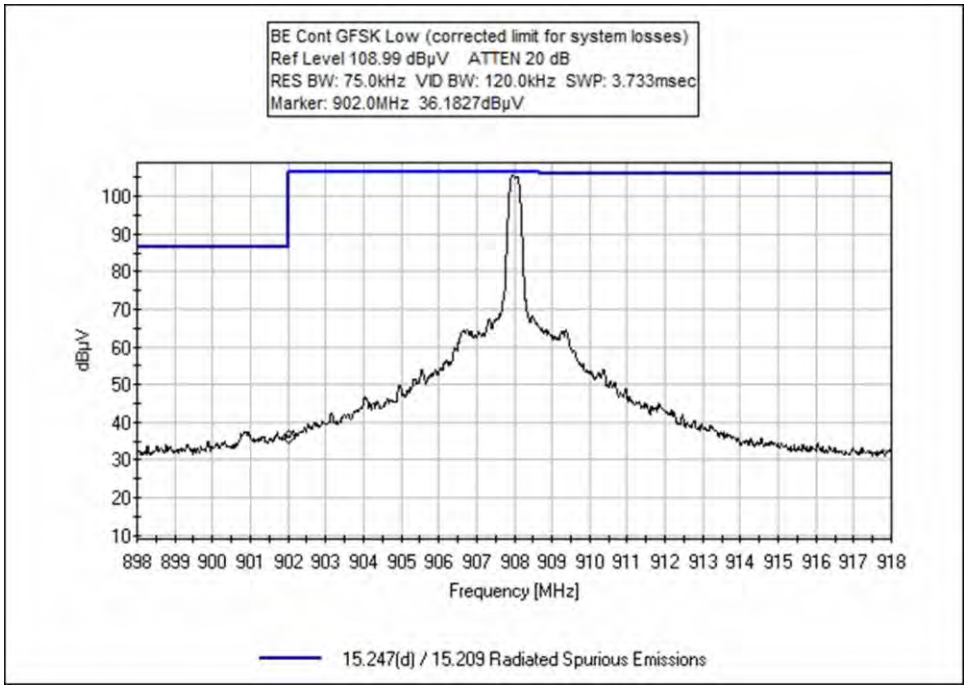
Test Equipment:

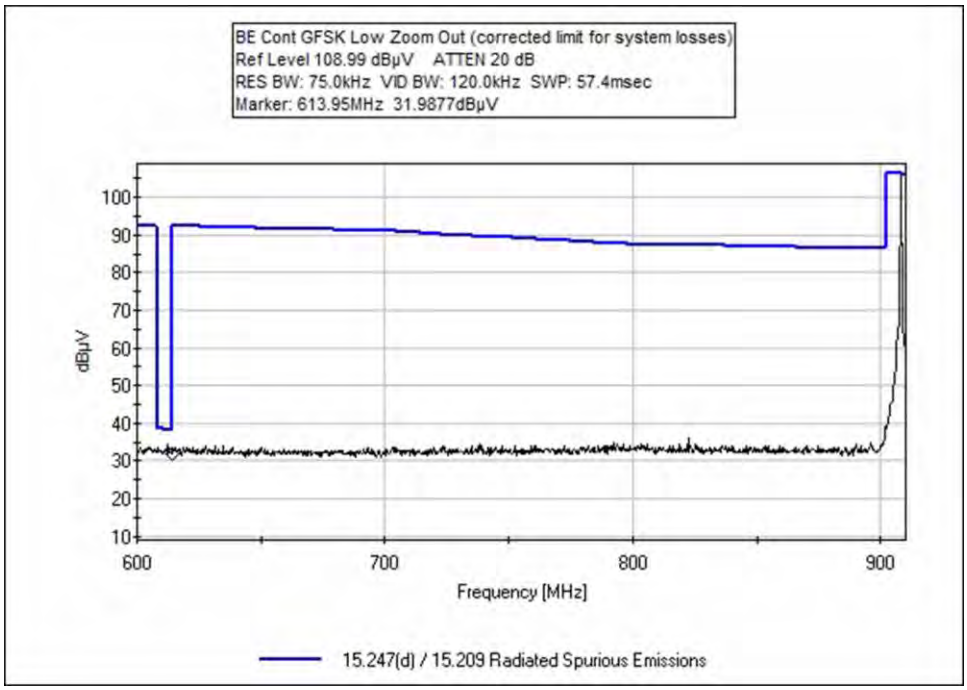
ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02871	Spectrum Analyzer	E4440A	8/25/2015	8/25/2017
T1	ANP05963	Cable	RG-214	2/15/2016	2/15/2018
T2	ANP05360	Cable	RG214	12/1/2014	12/1/2016
T3	AN02307	Preamp	8447D	2/15/2016	2/15/2018
T4	AN01991	Biconilog Antenna	CBL6111C	3/11/2016	3/11/2018
T5	ANP05657	Attenuator	PE7004-6	12/22/2015	12/22/2017
T6	ANP06124	Attenuator	18N-6	5/8/2015	5/8/2017

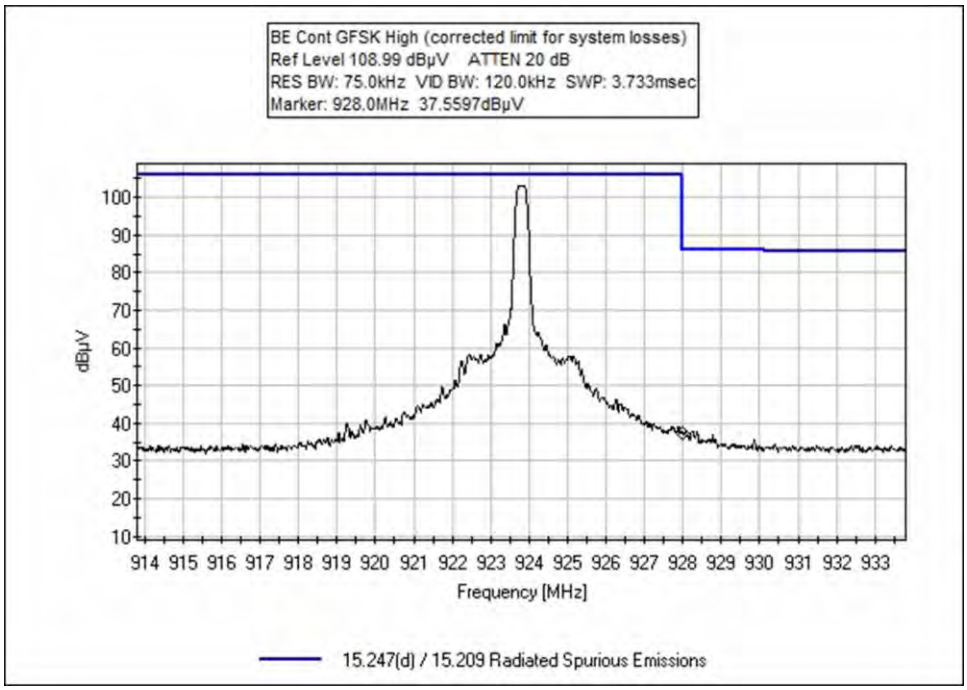
Measurement Data: Reading listed by margin. Test Distance: 3 Meters

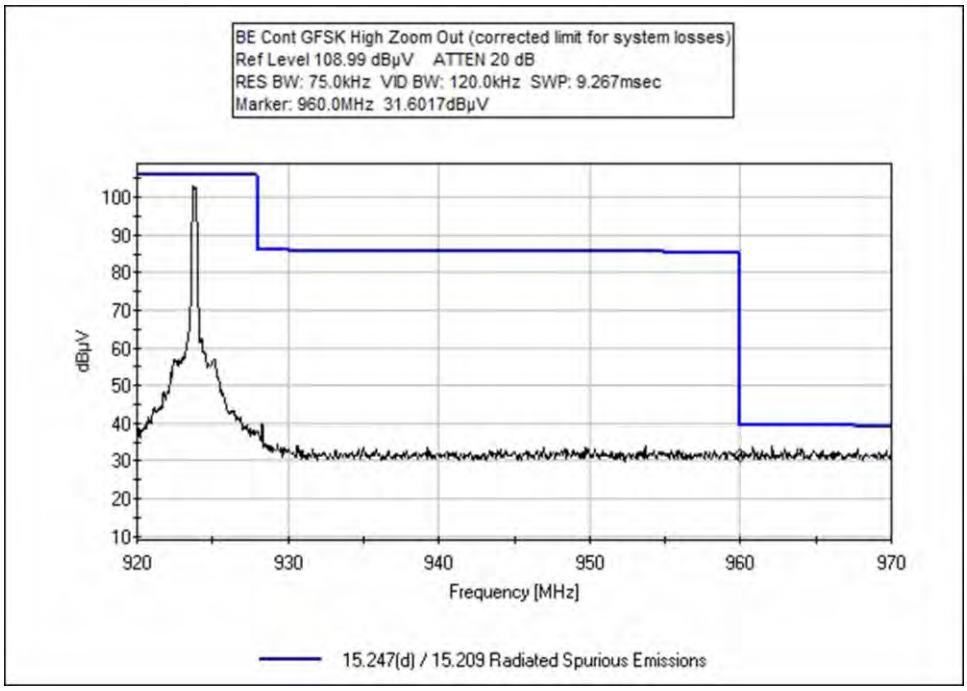
#	Freq	Rdng	T1 T5	T2 T6	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	614.000M	32.9	+2.1 +6.0	+1.6 +5.8	-28.1	+20.2	+0.0	40.5	46.0 Hopping FSK	-5.5	H+V
2	613.950M	31.8	+2.1 +6.0	+1.6 +5.8	-28.1	+20.2	+0.0	39.4	46.0 Continuous FSK	-6.6	H+V
3	960.064M	32.1	+2.5 +6.1	+2.1 +5.7	-27.1	+25.4	+0.0	46.8	54.0 Hopping FSK	-7.2	H+V
4	960.000M	31.6	+2.5 +6.1	+2.1 +5.7	-27.1	+25.4	+0.0	46.3	54.0 Continuous FSK	-7.7	H+V
5	928.084M	52.4	+2.4 +6.1	+2.1 +5.7	-27.3	+25.1	+0.0	66.5	100.0 Hopping FSK	-33.5	H+V
6	901.840M	46.7	+2.4 +6.0	+2.0 +5.7	-27.4	+24.9	+0.0	60.3	100.0 Hopping FSK	-39.7	H+V
7	928.000M	37.6	+2.4 +6.1	+2.1 +5.7	-27.3	+25.1	+0.0	51.7	100.0 Continuous FSK	-48.3	H+V
8	902.000M	36.2	+2.4 +6.0	+2.0 +5.7	-27.4	+24.9	+0.0	49.8	100.0 Continuous FSK	-50.2	H+V

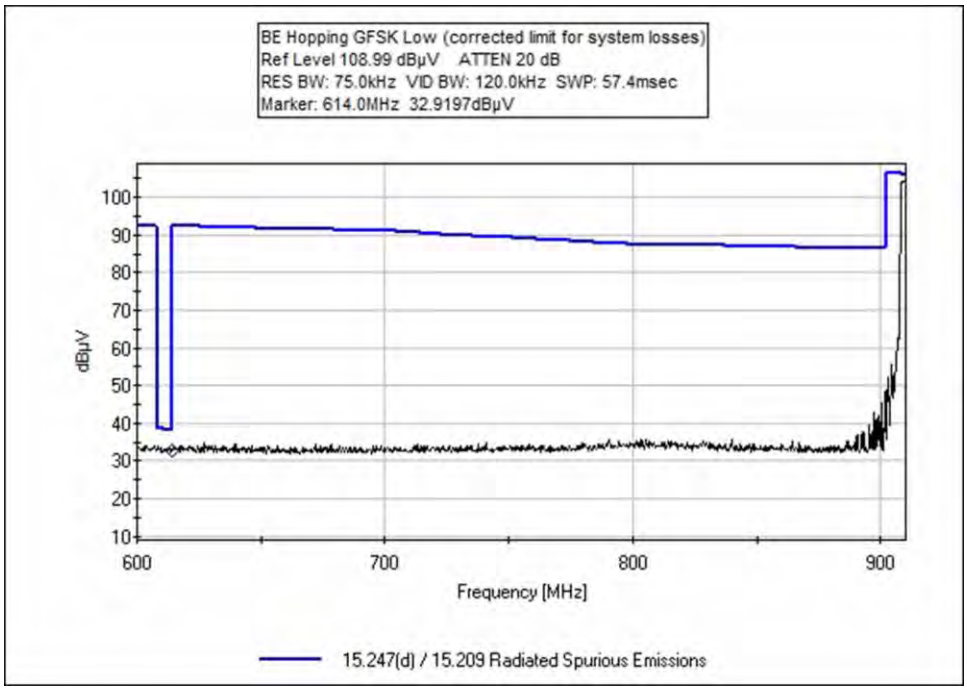
Band Edge Plots

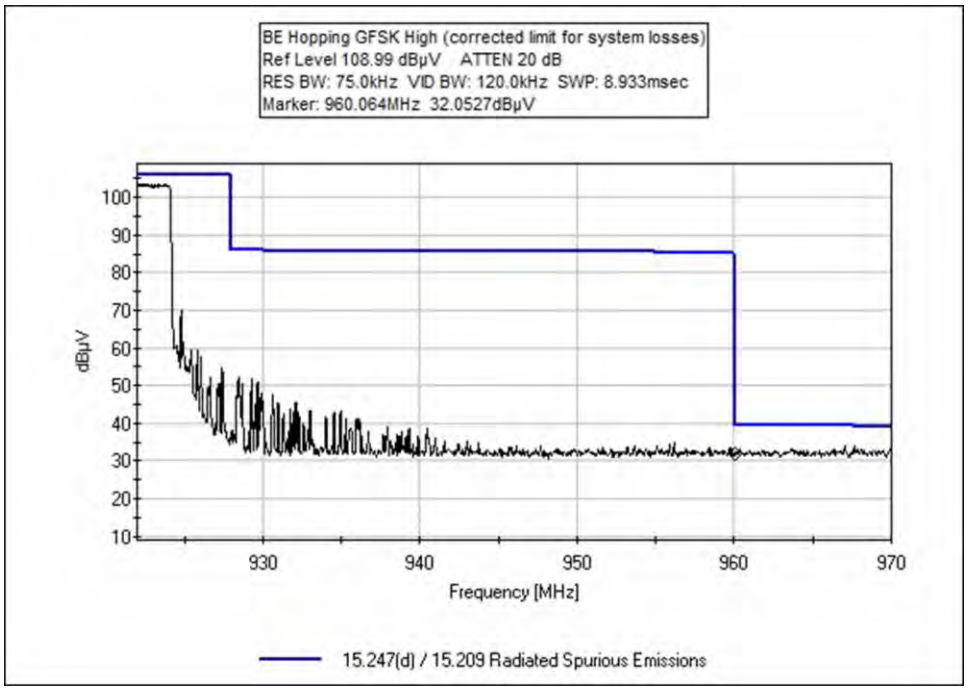





BE Cont GFSK High (corrected limit for system losses)
Ref Level 108.99 dBµV ATTEN 20 dB
RES BW: 75.0kHz VID BW: 120.0kHz SWP: 3.733msec
Marker: 928.0MHz 37.5597dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions


BE Cont GFSK High Zoom Out (corrected limit for system losses)
Ref Level 108.99 dBµV ATTEN 20 dB
RES BW: 75.0kHz VID BW: 120.0kHz SWP: 9.267msec
Marker: 960.0MHz 31.6017dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions


BE Hopping GFSK Low (corrected limit for system losses)
Ref Level 108.99 dBµV ATTEN 20 dB
RES BW: 75.0kHz VID BW: 120.0kHz SWP: 57.4msec
Marker: 614.0MHz 32.9197dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
600
700
800
900
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions


BE Hopping GFSK High (corrected limit for system losses)
Ref Level 108.99 dBµV ATTEN 20 dB
RES BW: 75.0kHz VID BW: 120.0kHz SWP: 8.933msec
Marker: 960.064MHz 32.0527dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
930
940
950
960
970
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

Test Setup Photos

9kHz – 1GHz

1 – 9.28GHz

X Axis

Y Axis

Z Axis

15.207 AC Conducted Emissions

Test Setup / Conditions / Data

Test Location:	CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA. 98021 • 1-800-500-4EMC		
Customer:	**Itron, Inc.**		
Specification:	**15.207 AC Mains - Average**		
Work Order #:	**99119**	Date:	10/11/2016
Test Type:	**Conducted Emissions**	Time:	16:09:00
Tested By:	Michael Atkinson	Sequence#:	1
Software:	EMITest 5.03.02		115V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 2			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 2			

Test Conditions / Notes:

Temperature: 20 to 24°C
Humidity: 32 to 45%
Pressure: 101.3 to 103.5kPa

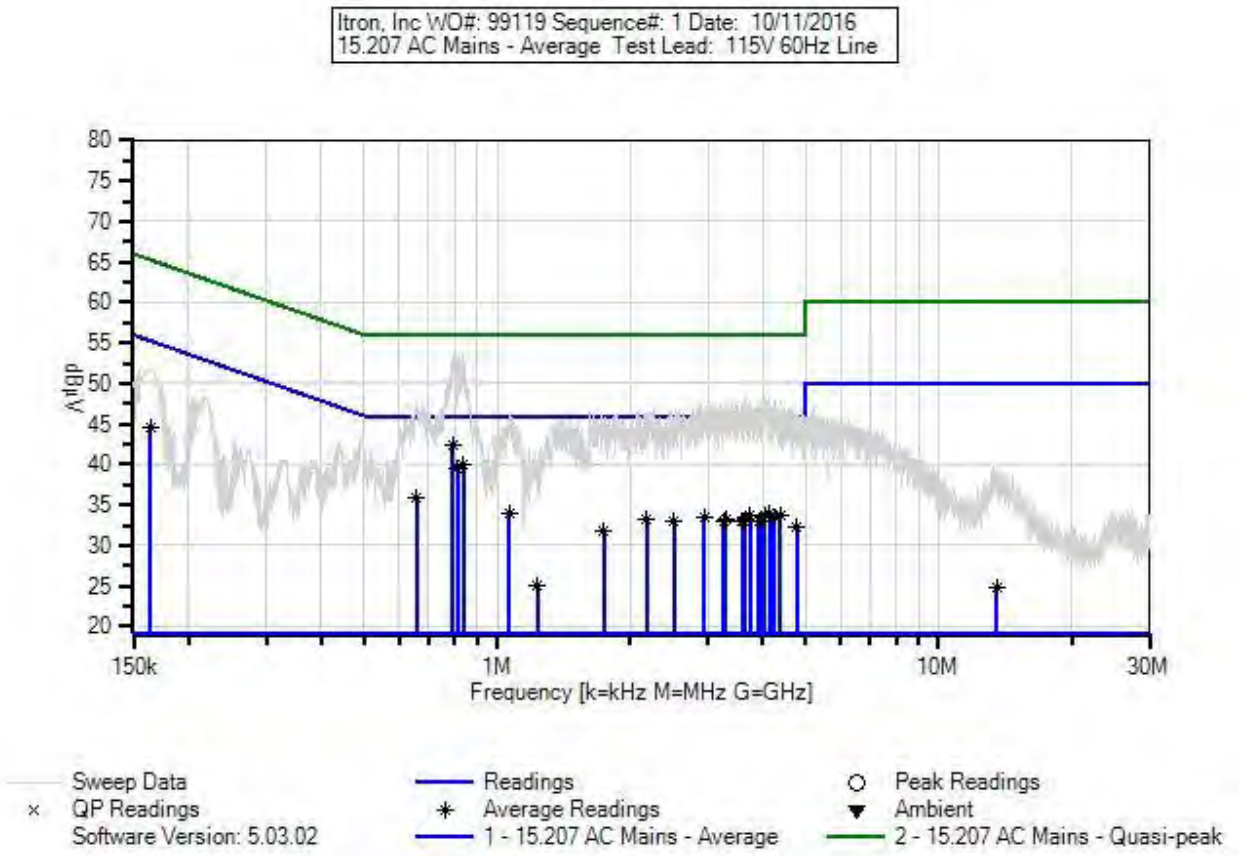
Frequency Range: 0.15-30MHz

Frequency tested: 916MHz
Firmware power setting: Max User Allowed
EUT Firmware: 5.71
Protocol /MCS/Modulation: FSK

Antenna type: Internal PIFA
Antenna Gain: 1.5 dBi.

Duty Cycle: 100% (Test Mode)

Test Mode: Continuously transmitting
Test Setup: EUT connected to USB Adapter via USB cable. AC Adapter connected to AC mains through LISN.
Modifications Added: None
Test Method: ANSI C63.10 (2013)


Itron, Inc WO#: 99119 Sequence#: 1 Date: 10/11/2016
15.207 AC Mains - Average Test Lead: 115V 60Hz Line
80
75
70
65
60
55
50
45
40
35
30
25
20
dBµV
150k
1M
10M
30M
Frequency [k=kHz M=MHz G=GHz]
Sweep Data
QP Readings
Software Version: 5.03.02
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
	AN02871	Spectrum Analyzer	E4440A	8/25/2015	8/25/2017
T1	AN02611	High Pass Filter	HE9615-150K-50-720B	2/18/2016	2/18/2018
T2	ANP06540	Cable	Heliax	10/29/2015	10/29/2017
T3	ANP05305	Cable	ETSI-50T	2/15/2016	2/15/2018
T4	ANP06219	Attenuator	768-10	4/12/2016	4/12/2018
T5	AN01492	50uH LISN-Line	3816/2NM	8/5/2015	8/5/2017
	AN01492	50uH LISN-Neutral	3816/2NM	8/5/2015	8/5/2017

Measurement Data: Reading listed by margin. Test Lead: Line

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV	dBµV	dB	Ant
1	793.746k	32.5	+0.2 +0.4	+0.0	+0.1	+9.1	+0.0	42.3	46.0	-3.7	Line
Ave											
^	793.745k	43.7	+0.2 +0.4	+0.0	+0.1	+9.1	+0.0	53.5	46.0	+7.5	Line
3	837.405k	30.2	+0.2 +0.4	+0.0	+0.1	+9.1	+0.0	40.0	46.0	-6.0	Line
Ave											
^	837.405k	43.8	+0.2 +0.4	+0.0	+0.1	+9.1	+0.0	53.6	46.0	+7.6	Line
5	812.751k	29.8	+0.2 +0.4	+0.0	+0.1	+9.1	+0.0	39.6	46.0	-6.4	Line
Ave											
6	812.414k	29.6	+0.2 +0.4	+0.0	+0.1	+9.1	+0.0	39.4	46.0	-6.6	Line
Ave											
^	812.750k	41.5	+0.2 +0.4	+0.0	+0.1	+9.1	+0.0	51.3	46.0	+5.3	Line
8	658.387k	26.1	+0.2 +0.4	+0.0	+0.1	+9.1	+0.0	35.9	46.0	-10.1	Line
Ave											
^	658.386k	37.9	+0.2 +0.4	+0.0	+0.1	+9.1	+0.0	47.7	46.0	+1.7	Line
10	164.167k	33.2	+0.5 +1.7	+0.0	+0.0	+9.1	+0.0	44.5	55.3	-10.8	Line
Ave											
^	165.590k	40.3	+0.5 +1.7	+0.0	+0.0	+9.1	+0.0	51.6	55.2	-3.6	Line
12	1.063M	24.2	+0.2 +0.4	+0.0	+0.1	+9.1	+0.0	34.0	46.0	-12.0	Line
Ave											
^	1.063M	35.8	+0.2 +0.4	+0.0	+0.1	+9.1	+0.0	45.6	46.0	-0.4	Line

14 Ave	4.142M	24.2	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	33.9	46.0	-12.1	Line
^	4.142M	39.0	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	48.7	46.0	+2.7	Line
16 Ave	4.381M	23.9	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	33.6	46.0	-12.4	Line
^	4.381M	38.3	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	48.0	46.0	+2.0	Line
18 Ave	3.742M	23.9	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	33.6	46.0	-12.4	Line
^	3.742M	38.4	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	48.1	46.0	+2.1	Line
20 Ave	4.036M	23.9	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	33.6	46.0	-12.4	Line
^	4.036M	38.6	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	48.3	46.0	+2.3	Line
22 Ave	4.248M	23.8	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	33.5	46.0	-12.5	Line
^	4.248M	38.4	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	48.1	46.0	+2.1	Line
24 Ave	2.946M	23.7	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	33.4	46.0	-12.6	Line
^	2.946M	37.0	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	46.7	46.0	+0.7	Line
26 Ave	2.180M	23.6	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	33.3	46.0	-12.7	Line
^	2.180M	38.0	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	47.7	46.0	+1.7	Line
28 Ave	3.300M	23.5	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	33.2	46.0	-12.8	Line
^	3.300M	37.8	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	47.5	46.0	+1.5	Line
30 Ave	3.644M	23.5	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	33.2	46.0	-12.8	Line
^	3.644M	38.7	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	48.4	46.0	+2.4	Line
32 Ave	3.260M	23.4	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	33.1	46.0	-12.9	Line
^	3.260M	37.8	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	47.5	46.0	+1.5	Line
34 Ave	3.913M	23.4	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	33.1	46.0	-12.9	Line
^	3.913M	38.0	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	47.7	46.0	+1.7	Line
36 Ave	3.603M	23.2	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	32.9	46.0	-13.1	Line
^	3.603M	38.1	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	47.8	46.0	+1.8	Line
38 Ave	3.951M	23.2	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	32.9	46.0	-13.1	Line
^	3.951M	38.1	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	47.8	46.0	+1.8	Line

40 Ave	2.518M	23.2	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	32.9	46.0	-13.1	Line
^	2.518M	38.0	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	47.7	46.0	+1.7	Line
42 Ave	3.589M	23.2	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	32.9	46.0	-13.1	Line
^	3.589M	37.9	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	47.6	46.0	+1.6	Line
44 Ave	4.763M	22.5	+0.1 +0.5	+0.0	+0.1	+9.1	+0.0	32.3	46.0	-13.7	Line
^	4.763M	37.4	+0.1 +0.5	+0.0	+0.1	+9.1	+0.0	47.2	46.0	+1.2	Line
46 Ave	1.747M	21.9	+0.2 +0.4	+0.0	+0.1	+9.1	+0.0	31.7	46.0	-14.3	Line
^	1.747M	37.3	+0.2 +0.4	+0.0	+0.1	+9.1	+0.0	47.1	46.0	+1.1	Line
48 Ave	1.234M	15.3	+0.2 +0.4	+0.0	+0.1	+9.1	+0.0	25.1	46.0	-20.9	Line
^	1.234M	34.9	+0.2 +0.4	+0.0	+0.1	+9.1	+0.0	44.7	46.0	-1.3	Line
50 Ave	13.520M	14.9	+0.1 +0.5	+0.0	+0.2	+9.1	+0.0	24.8	50.0	-25.2	Line
^	13.520M	28.8	+0.1 +0.5	+0.0	+0.2	+9.1	+0.0	38.7	50.0	-11.3	Line
52 Ave	25.900M	7.5	+0.1 +0.4	+0.0	+0.3	+9.1	+0.0	17.4	50.0	-32.6	Line
^	25.900M	23.5	+0.1 +0.4	+0.0	+0.3	+9.1	+0.0	33.4	50.0	-16.6	Line

Test Location:	CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA. 98021 • 1-800-500-4EMC		
Customer:	**Itron, Inc**		
Specification:	**15.207 AC Mains - Average**		
Work Order #:	**99119**	Date:	10/11/2016
Test Type:	**Conducted Emissions**	Time:	16:29:02
Tested By:	Michael Atkinson	Sequence#:	2
Software:	EMITest 5.03.02		115V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 2			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 2			

Test Conditions / Notes:

Temperature: 20 to 24°C
Humidity: 32 to 45%
Pressure: 101.3 to 103.5kPa

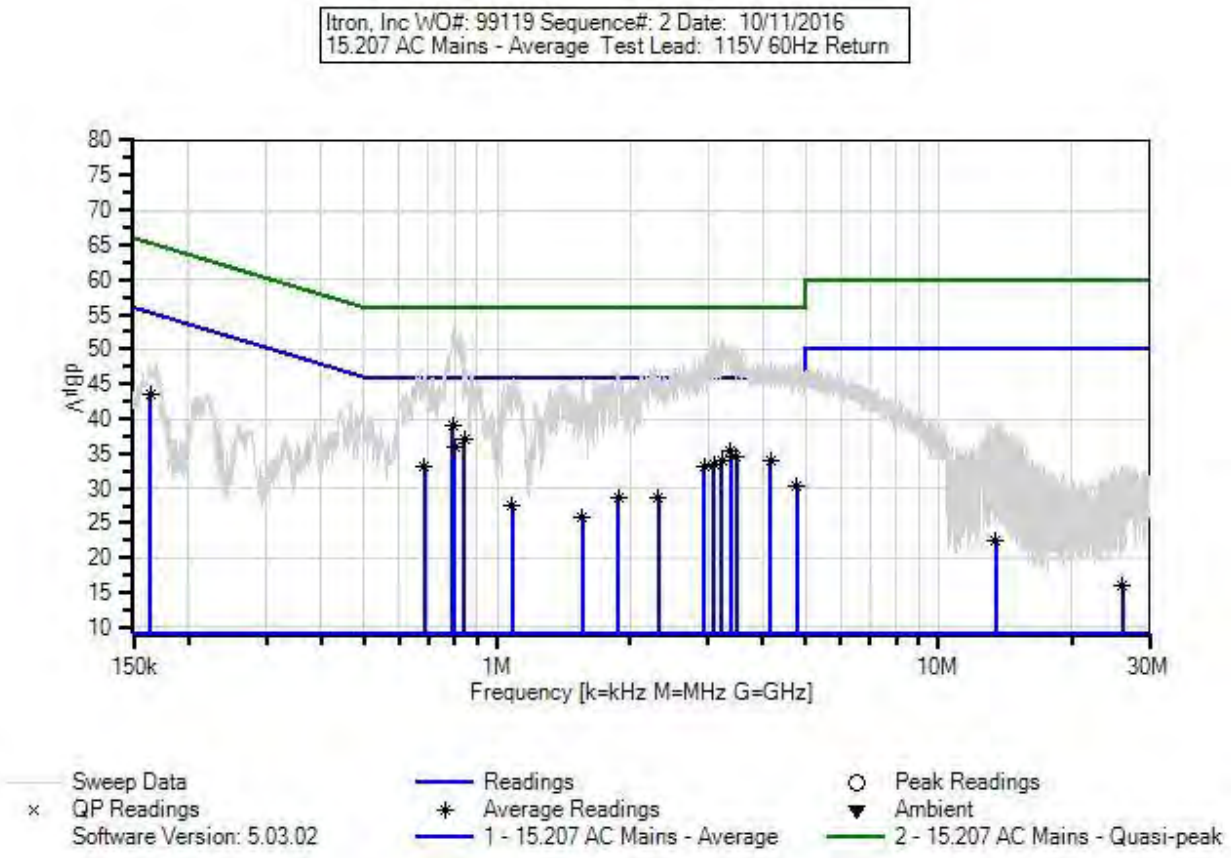
Frequency Range: 0.15-30MHz

Frequency tested: 916MHz
Firmware power setting: Max User Allowed
EUT Firmware: 5.71
Protocol /MCS/Modulation: FSK

Antenna type: Internal PIFA
Antenna Gain: 1.5 dBi.

Duty Cycle: 100% (Test Mode)

Test Mode: Continuously transmitting
Test Setup: EUT connected to USB Adapter via USB cable. AC Adapter connected to AC mains through LISN.
Modifications Added: None
Test Method: ANSI C63.10 (2013)


Itron, Inc WO#: 99119 Sequence#: 2 Date: 10/11/2016
15.207 AC Mains - Average Test Lead: 115V 60Hz Return
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
dBµV
150k
1M
10M
30M
Frequency [k=kHz M=MHz G=GHz]
Sweep Data
QP Readings
Software Version: 5.03.02
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
	AN02871	Spectrum Analyzer	E4440A	8/25/2015	8/25/2017
T1	AN02611	High Pass Filter	HE9615-150K-50-720B	2/18/2016	2/18/2018
T2	ANP06540	Cable	Heliax	10/29/2015	10/29/2017
T3	ANP05305	Cable	ETSI-50T	2/15/2016	2/15/2018
T4	ANP06219	Attenuator	768-10	4/12/2016	4/12/2018
	AN01492	50uH LISN-Line	3816/2NM	8/5/2015	8/5/2017
T5	AN01492	50uH LISN-Neutral	3816/2NM	8/5/2015	8/5/2017

Measurement Data: Reading listed by margin. Test Lead: Return

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV	dBµV	dB	Ant
1	791.848k	29.2	+0.2 +0.4	+0.0	+0.1	+9.1	+0.0	39.0	46.0	-7.0	Retur
	Ave										
2	843.569k	27.4	+0.2 +0.4	+0.0	+0.1	+9.1	+0.0	37.2	46.0	-8.8	Retur
	Ave										
^	843.569k	41.2	+0.2 +0.4	+0.0	+0.1	+9.1	+0.0	51.0	46.0	+5.0	Retur
4	799.910k	26.1	+0.2 +0.4	+0.0	+0.1	+9.1	+0.0	35.9	46.0	-10.1	Retur
	Ave										
^	799.909k	43.5	+0.2 +0.4	+0.0	+0.1	+9.1	+0.0	53.3	46.0	+7.3	Retur
6	3.373M	25.6	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	35.3	46.0	-10.7	Retur
	Ave										
^	3.373M	40.4	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	50.1	46.0	+4.1	Retur
8	3.483M	24.9	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	34.6	46.0	-11.4	Retur
	Ave										
^	3.483M	40.3	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	50.0	46.0	+4.0	Retur
10	3.225M	24.4	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	34.1	46.0	-11.9	Retur
	Ave										
^	3.225M	41.5	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	51.2	46.0	+5.2	Retur
12	163.800k	32.1	+0.5 +1.7	+0.0	+0.0	+9.1	+0.0	43.4	55.3	-11.9	Retur
	Ave										
^	163.800k	36.8	+0.5 +1.7	+0.0	+0.0	+9.1	+0.0	48.1	55.3	-7.2	Retur

14 Ave	4.168M	24.2	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	33.9	46.0	-12.1	Retur
^	4.168M	38.2	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	47.9	46.0	+1.9	Retur
16 Ave	3.091M	23.6	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	33.3	46.0	-12.7	Retur
^	3.091M	42.1	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	51.8	46.0	+5.8	Retur
18 Ave	683.100k	23.4	+0.2 +0.4	+0.0	+0.1	+9.1	+0.0	33.2	46.0	-12.8	Retur
^	683.100k	36.7	+0.2 +0.4	+0.0	+0.1	+9.1	+0.0	46.5	46.0	+0.5	Retur
20 Ave	2.942M	23.5	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	33.2	46.0	-12.8	Retur
^	2.942M	40.5	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	50.2	46.0	+4.2	Retur
22 Ave	4.772M	20.6	+0.1 +0.5	+0.0	+0.1	+9.1	+0.0	30.4	46.0	-15.6	Retur
^	4.772M	37.5	+0.1 +0.5	+0.0	+0.1	+9.1	+0.0	47.3	46.0	+1.3	Retur
24 Ave	2.322M	19.0	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	28.7	46.0	-17.3	Retur
^	2.322M	38.7	+0.1 +0.4	+0.0	+0.1	+9.1	+0.0	48.4	46.0	+2.4	Retur
26 Ave	1.887M	18.8	+0.2 +0.4	+0.0	+0.1	+9.1	+0.0	28.6	46.0	-17.4	Retur
^	1.887M	36.5	+0.2 +0.4	+0.0	+0.1	+9.1	+0.0	46.3	46.0	+0.3	Retur
28 Ave	1.082M	17.6	+0.2 +0.4	+0.0	+0.1	+9.1	+0.0	27.4	46.0	-18.6	Retur
^	1.082M	35.7	+0.2 +0.4	+0.0	+0.1	+9.1	+0.0	45.5	46.0	-0.5	Retur
30 Ave	1.562M	16.0	+0.2 +0.4	+0.0	+0.1	+9.1	+0.0	25.8	46.0	-20.2	Retur
^	1.562M	38.1	+0.2 +0.4	+0.0	+0.1	+9.1	+0.0	47.9	46.0	+1.9	Retur
32 Ave	13.450M	12.7	+0.1 +0.5	+0.0	+0.2	+9.1	+0.0	22.6	50.0	-27.4	Retur
^	13.450M	30.1	+0.1 +0.5	+0.0	+0.2	+9.1	+0.0	40.0	50.0	-10.0	Retur
34 Ave	26.150M	6.1	+0.1 +0.4	+0.0	+0.3	+9.1	+0.0	16.0	50.0	-34.0	Retur
^	26.150M	23.4	+0.1 +0.4	+0.0	+0.3	+9.1	+0.0	33.3	50.0	-16.7	Retur

Test Setup Photo

SUPPLEMENTAL INFORMATION

Measurement Uncertainty

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

Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k=2. Compliance is deemed to occur provided measurements are below the specified limits.

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.

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.