Itron, Inc.

REVISED TEST REPORT TO 100666-24

OpenWay Gas Remote Disconnect*
Model: OWGRD*

(*See Appendix A for Manufacturer Declaration)

Tested to The Following Standards:

FCC Part 15 Subpart C Section(s)

15.207 & 15.247
(FHSS 902-928 MHz)

Report No.: 100666-24A

Date of issue: February 13, 2019

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.

Test Certificate # 803.02

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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: 155869

REPORT PREPARED BY:

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

Project Number: 100666

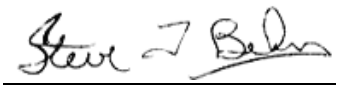
DATE OF EQUIPMENT RECEIPT: August 6, 2018
DATE(S) OF TESTING: August 6 - 13, 2018 and October 1, 2018

Revision History

Original: Testing of the OpenWay Gas Remote Disconnect* Model: OWGRD* (*See Appendix A for Manufacturer Declaration) to FCC Part 15 Subpart C Section(s**)** 15.207 & 15.247 (FHSS 902-928 MHz).
Revision A: Replaced section 15.247(b)(1) Output Power data to correct specification reference and added setup photos.

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.
110 Olinda Place
Brea, CA 92823

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.03.11

Site Registration & Accreditation Information

Location	NIST CB #	TAIWAN	CANADA	FCC	JAPAN
Brea A, CA	US0060	SL2-IN-E-1146R	3082D-1	US1025	A-0147

SUMMARY OF RESULTS

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

Test Procedure	Description	Modifications	Results
15.247(a)(1)(i)	Occupied Bandwidth	NA	NP
15.247(a)(1)	Carrier Separation	NA	NP
15.247(a)(1)(i)	Number of Hopping Channels	NA	NP
15.247(a)(1)(i)	Average Time of Occupancy	NA	NP
15.247(b)(2)	Output Power	NA	Pass
15.247(d)	RF Conducted Emissions & Band Edge	NA	NP
15.247(d)	Radiated Emissions & Band Edge	Mod. #1	Pass
15.207	AC Conducted Emissions	NA	NA1

NA = Not Applicable
NA1 = Not applicable because the EUT is battery powered.
NP = CKC Laboratories was not contracted to perform test – Evaluation for PCII/ Reassessment

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
Modification #1: A capacitor, resister and transistor were shifted for the power management IC of the low frequency emissions, for 15.247(d) Radiated Spurious Emissions testing at 9kHz-9280MHz only.

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
OpenWay Gas Remote Disconnect.	Itron, Inc.	OWGRD	091502005248

Support Equipment:

Device	Manufacturer	Model #	S/N
Laptop	Dell	E6410	CFGY2A00CET

General Product Information:

Product Information	Manufacturer-Provided Details
Equipment Type:	Stand-Alone Equipment
Type of Wideband System:	FHSS
Operating Frequency Range:	903 to 926.8MHz (OOK) 902.2 to 927.75MHz (GFSK 10kbps) 902.4 to 927.6MHz (GFSK 150kbps)
Number of Hopping Channels:	120 (903 to 926.8MHz (OOK)) 512 (902.2 to 927.75MHz (GFSK 10kbps)) 64 (902.4 to 927.6MHz (GFSK 150kbps))
Modulation Type(s):	OOK and GFSK
Maximum Duty Cycle:	Power level 3 for OOK is 56.1% Power level 1 for OOK is 12.7 % GFSK is 100%
Number of TX Chains:	2
Antenna Type(s) and Gain:	0 to 0.5dBi (vertical) and -1.6 to 1.1 dBi (horizontal)
Beamforming Type:	NA
Antenna Connection Type:	Integral (External connector provided to facilitate testing)
Nominal Input Voltage:	6.0V DC – battery
Firmware / Software used for Test:	CLI_Test_STM32_ALL_500GRD_Rev2_3_0_0_0.hex

FCC Part 15 Subpart C

15.247(b)(2) Output Power

Test Equipment					
Asset#	**Description**	**Manufacturer**	**Model**	**Cal Date**	**Cal Due**
02672	Spectrum Analyzer	Agilent	E4446A	3/2/2017	3/2/2019
03432	Attenuator	Aeroflex/Weinschel	90-30-34	10/27/2017	10/27/2019
P06664	Cable	Gore	PHASEFLEX FJR01N01036.0	3/31/2018	3/31/2020

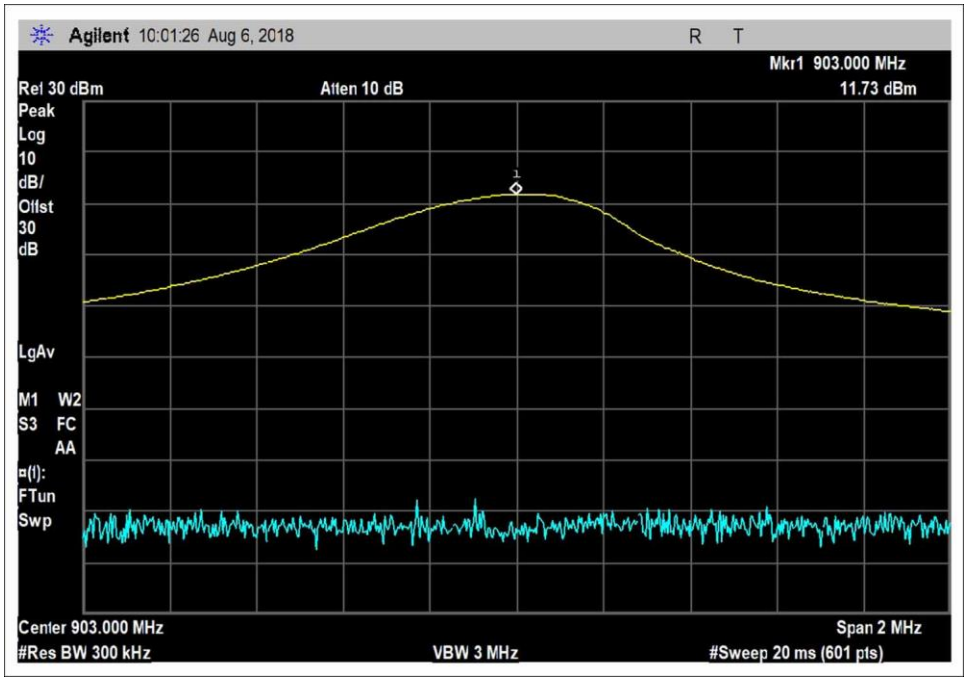
Test Data Summary - RF Conducted Measurement

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

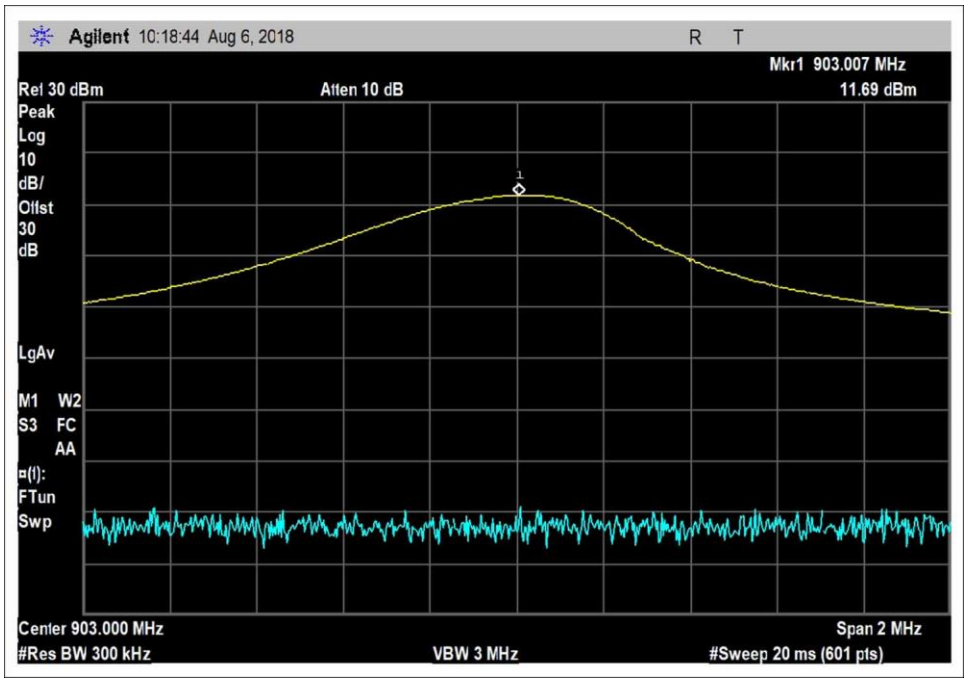
Frequency (MHz)	Modulation	Ant. Type / Gain (dBi)	Measured (dBm)	Limit (dBm)	Results
903	OOK pl1 / V	0.0	11.7	≤36	Pass
915	OOK pl1 / V	0.0	11.8	≤36	Pass
926.8	OOK pl1 / V	0.0	11.8	≤36	Pass
903	OOK pl3 / V	0.5	20.7	≤36	Pass
915	OOK pl3 / V	0.5	21.0	≤36	Pass
926.8	OOK pl3 / V	0.5	21.2	≤36	Pass
902.2	GFSK 10kbps pl3 / V	0.5	25.4	≤36	Pass
915	GFSK 10kbps pl3 / V	0.5	25.5	≤36	Pass
927.75	GFSK 10kbps pl3 / V	0.5	25.6	≤36	Pass
902.4	GFSK 150kbps pl3 / V	0.5	25.4	≤36	Pass
915.2	GFSK 150kbps pl3 / V	0.5	25.5	≤36	Pass
927.6	GFSK 150kbps pl3 / V	0.5	25.5	≤36	Pass
903	OOK pl1 / H	-1.6	11.7	≤36	Pass
915	OOK pl1 / H	-1.6	11.8	≤36	Pass
926.8	OOK pl1 / H	-1.6	11.9	≤36	Pass
903	OOK pl3 / H	1.1	20.9	≤36	Pass
915	OOK pl3 / H	1.1	21.2	≤36	Pass
926.8	OOK pl3 / H	1.1	21.5	≤36	Pass
902.2	GFSK 10kbps pl3 / H	1.1	25.5	≤36	Pass
915	GFSK 10kbps pl3 / H	1.1	25.6	≤36	Pass
927.75	GFSK 10kbps pl3 / H	1.1	25.6	≤36	Pass
902.4	GFSK 150kbps pl3 / H	1.1	25.4	≤36	Pass
915.2	GFSK 150kbps pl3 / H	1.1	**25.6**	≤36	Pass
927.6	GFSK 150kbps pl3 / H	1.1	25.5	≤36	Pass

This equipment is battery powered, and manufacturer declares the equipment cannot operate while charging. Power output tests were performed using a new battery.

Plots



OOK Power 1, Horizontal 903MHz



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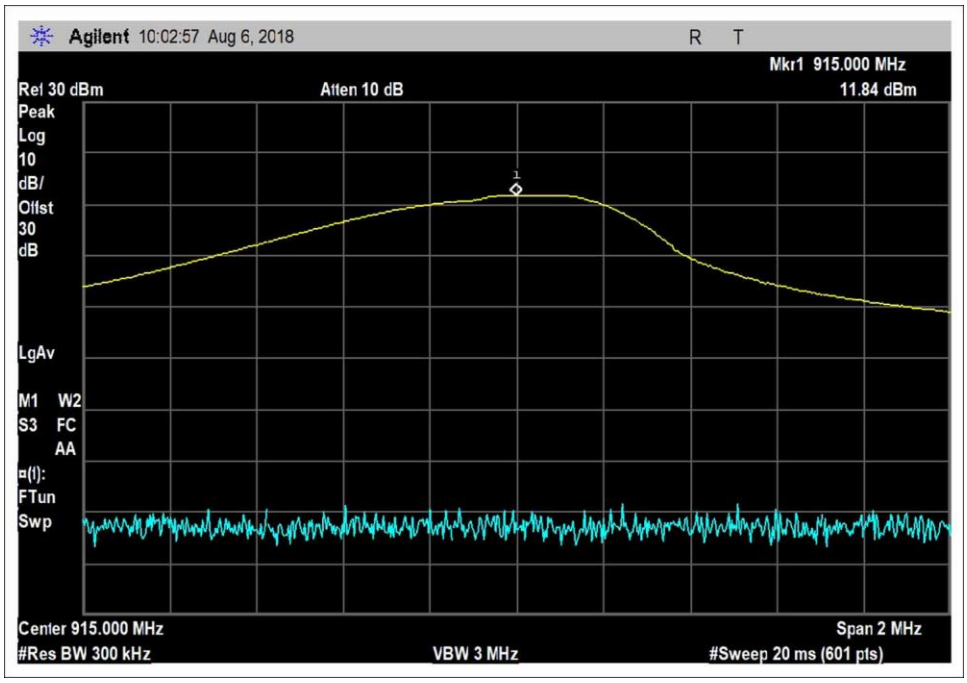

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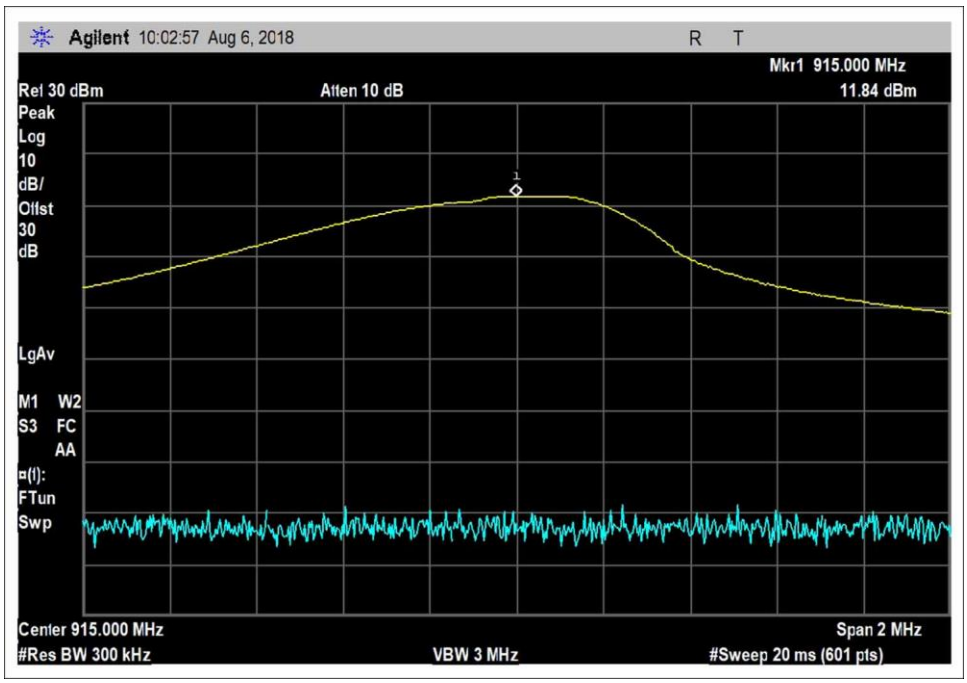

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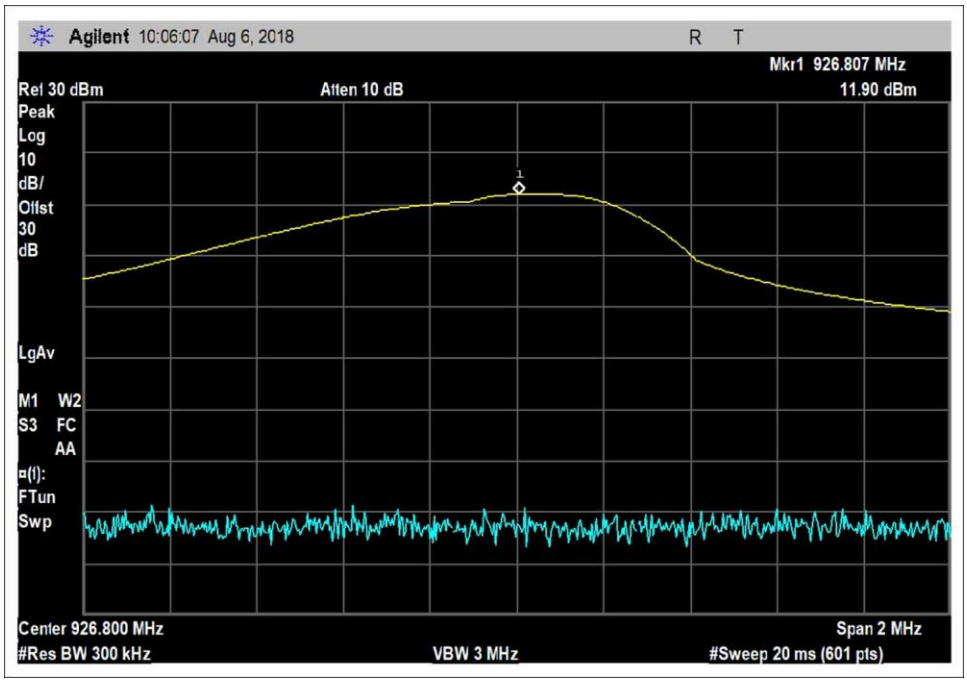

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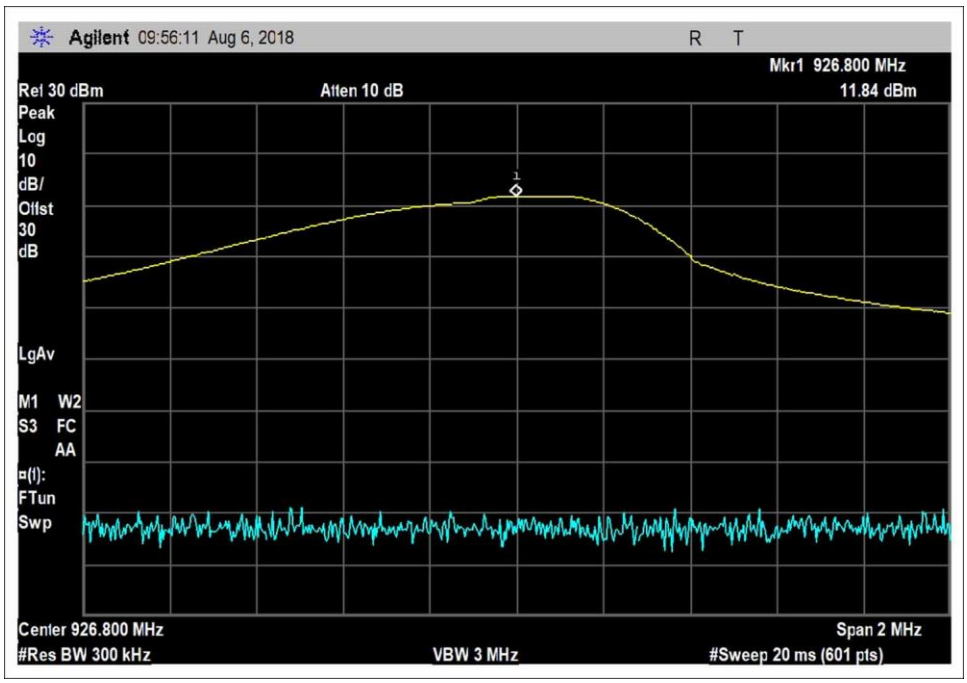

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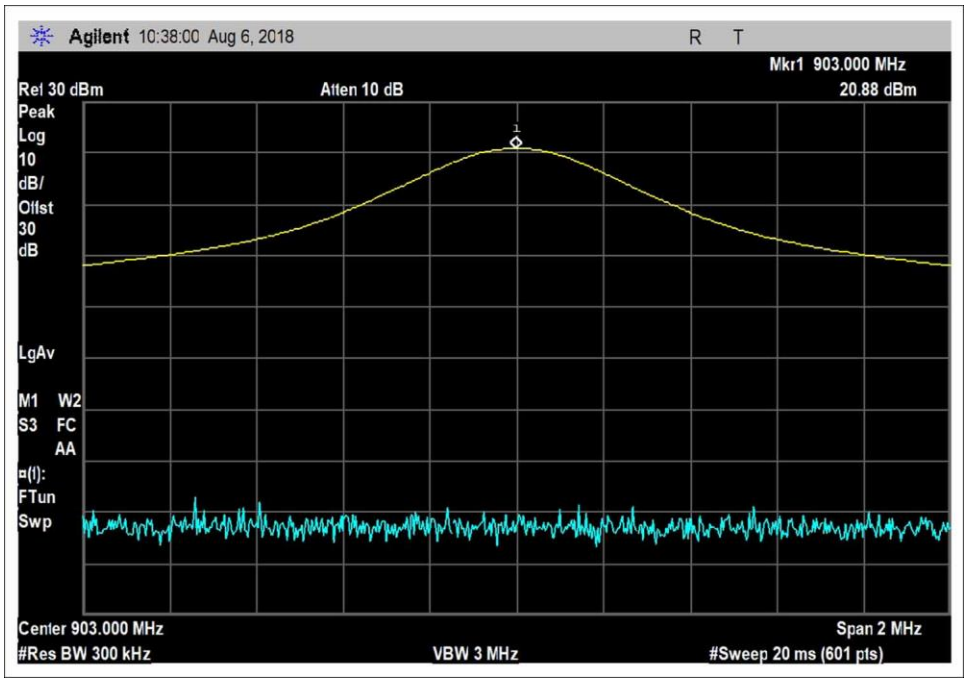

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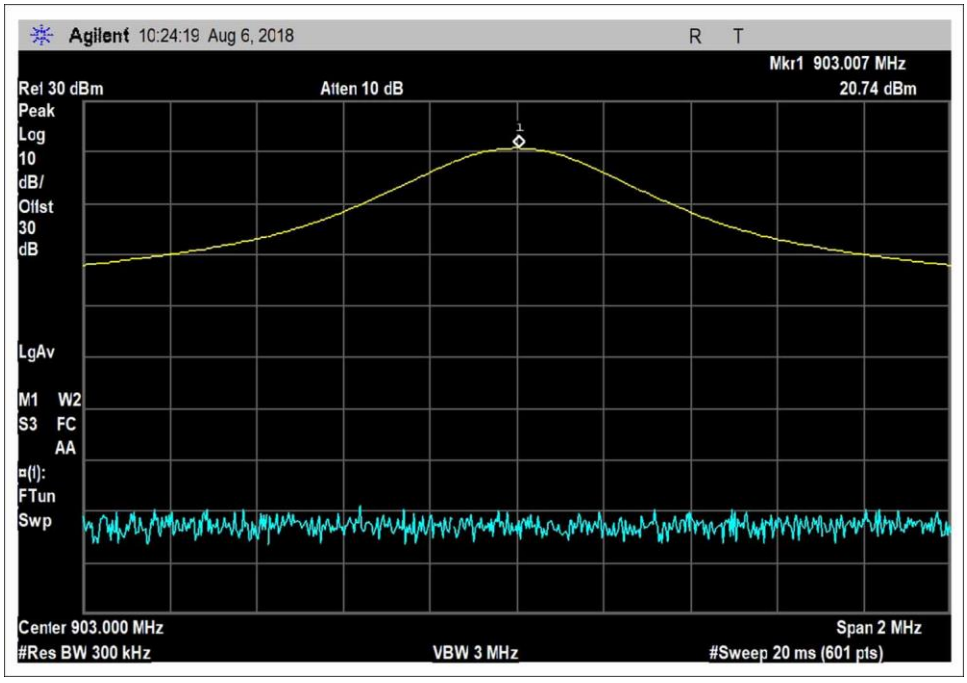

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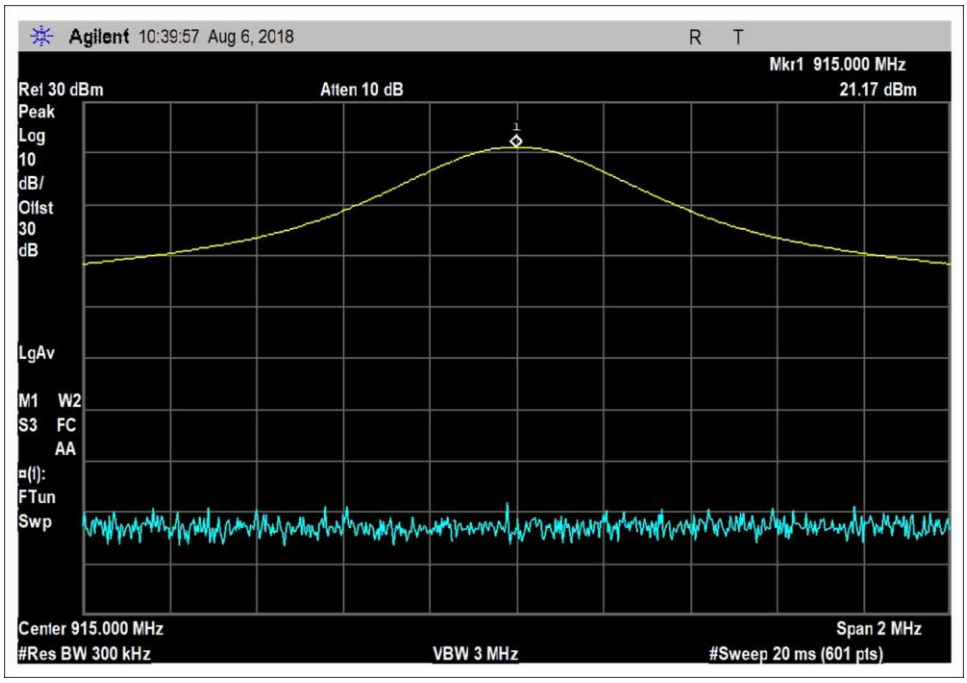

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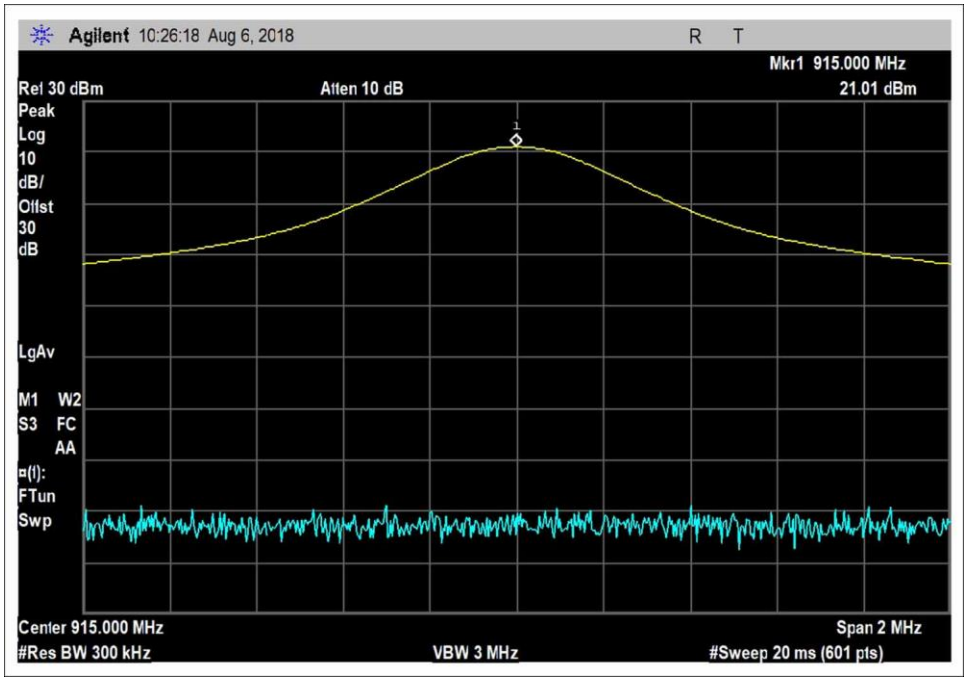

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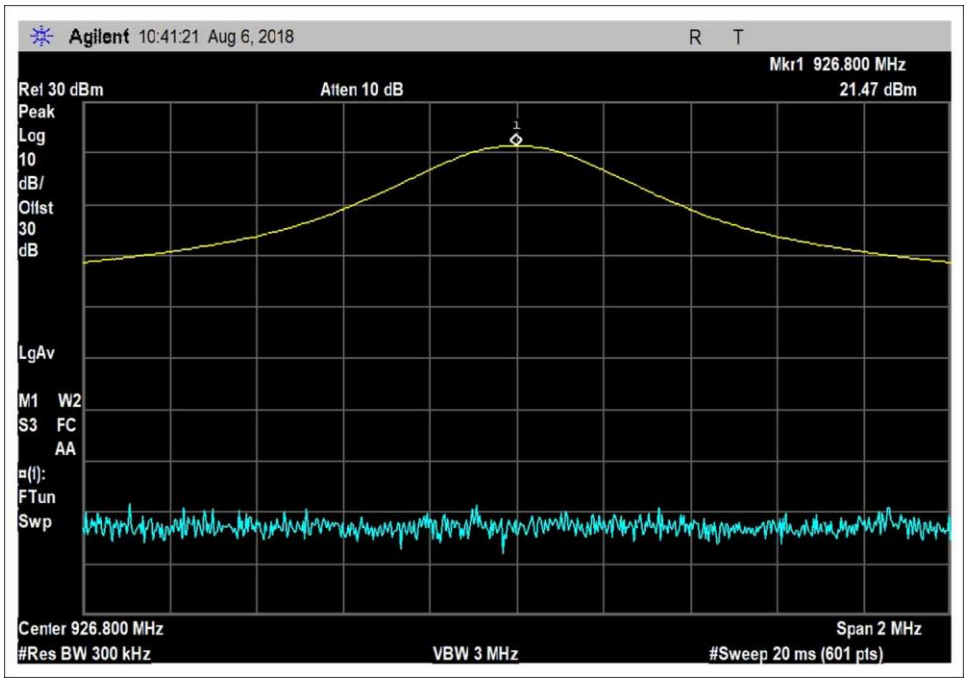

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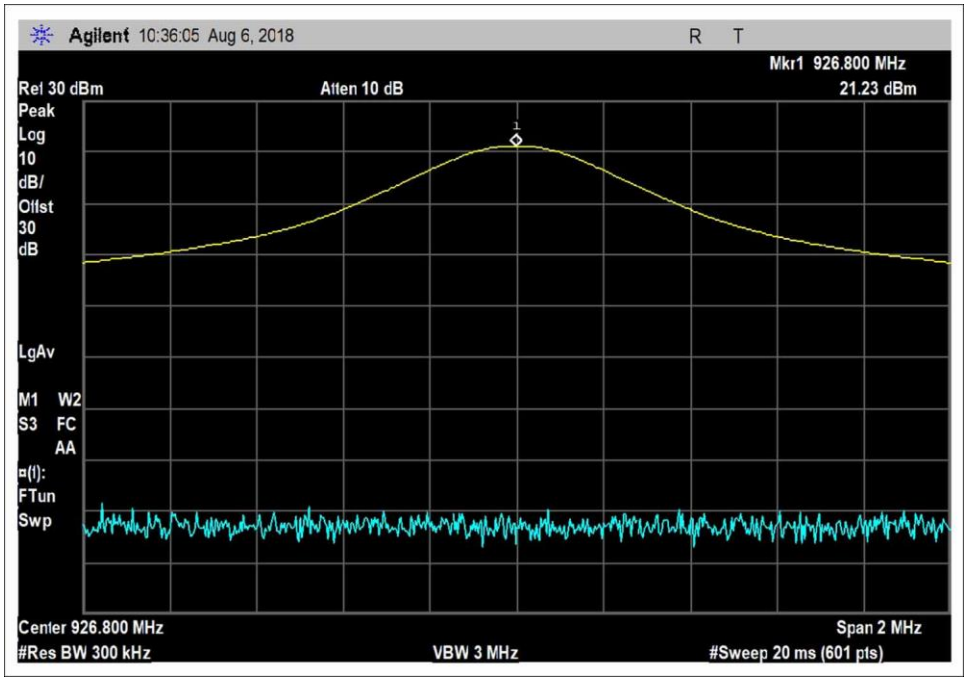

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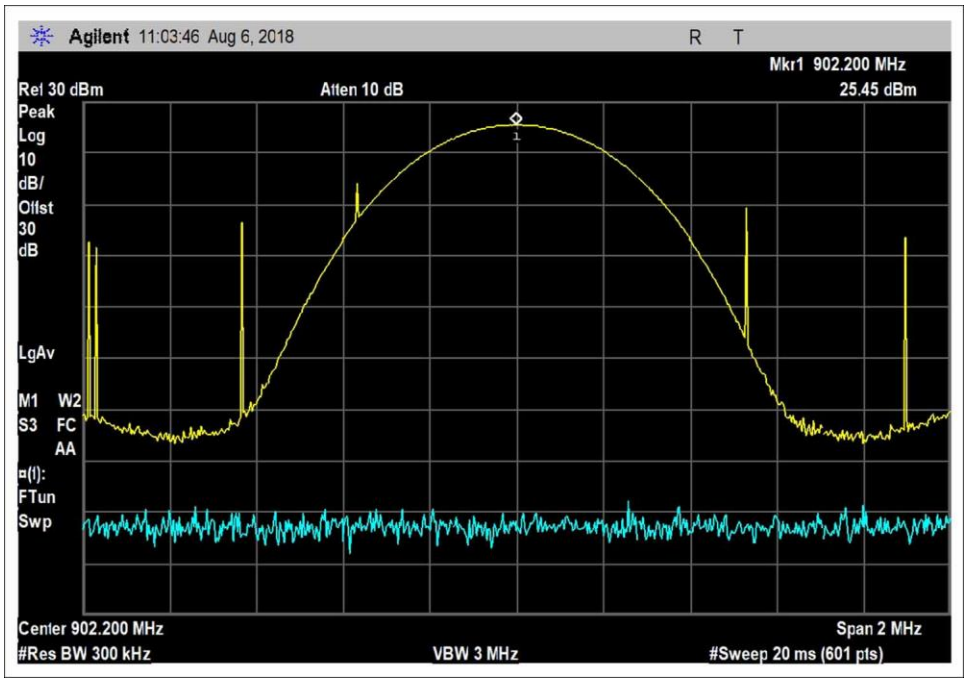
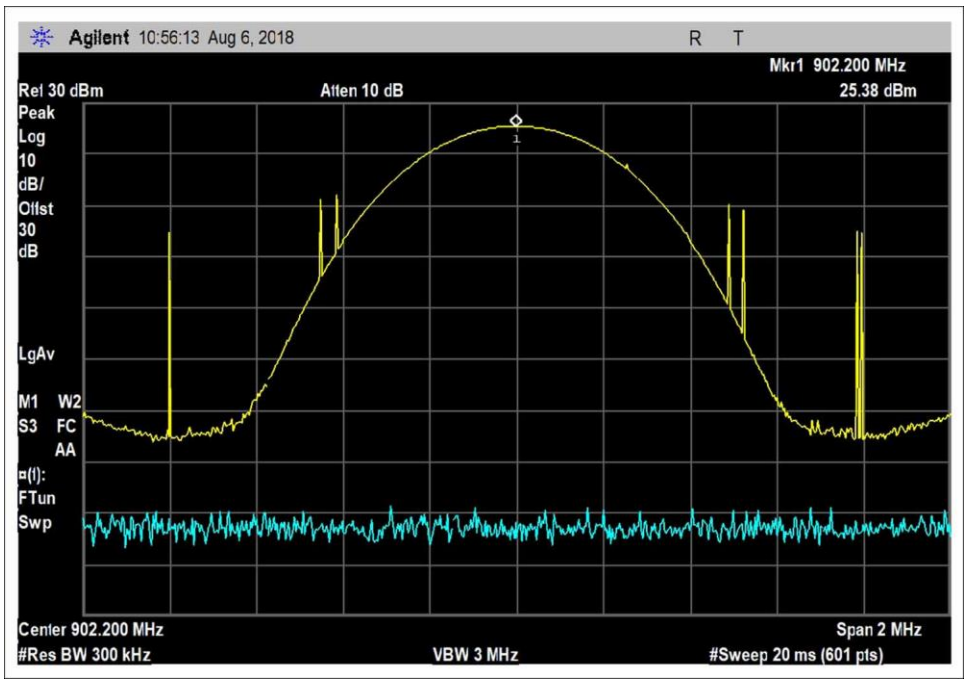
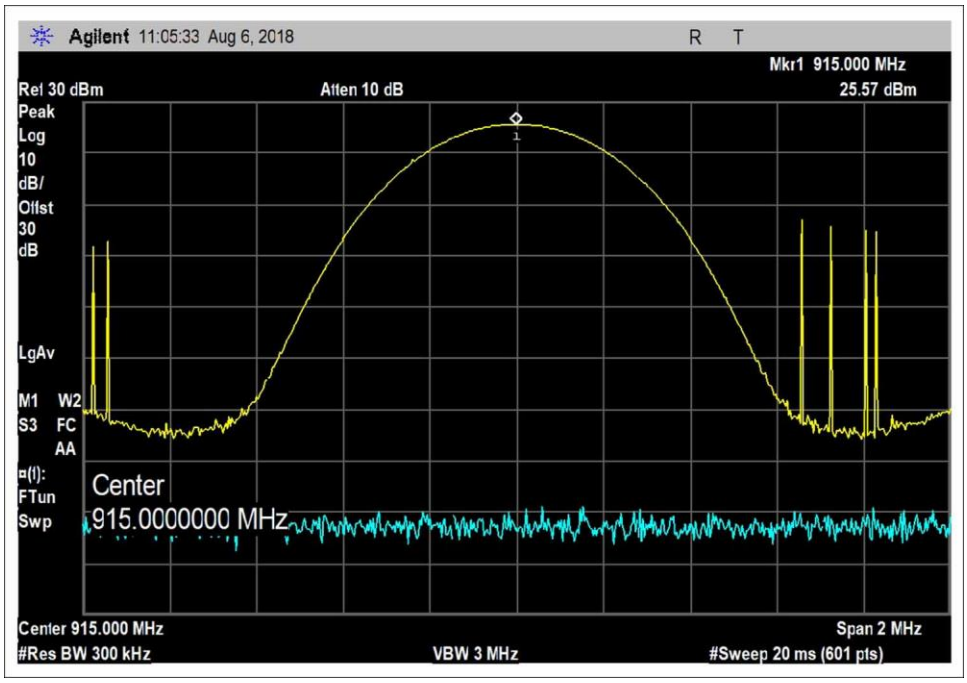


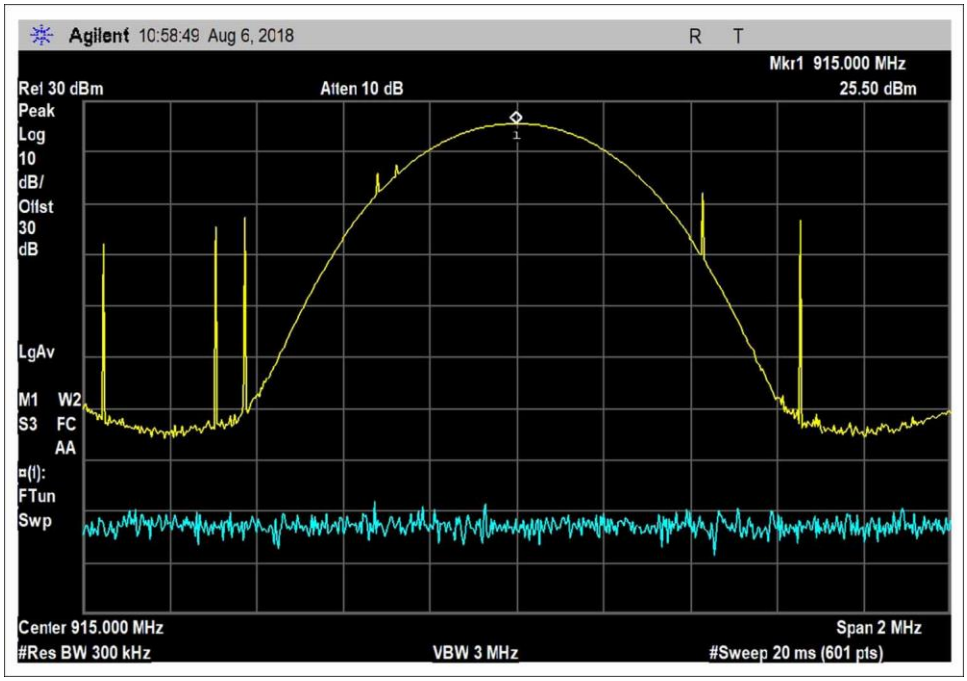
GFSK 10kbps, Power 3, Horizontal 902MHz



GFSK 10kbps, Power 3, Vertical 902MHz



GFSK 10kbps, Power 3, Horizontal 915MHz



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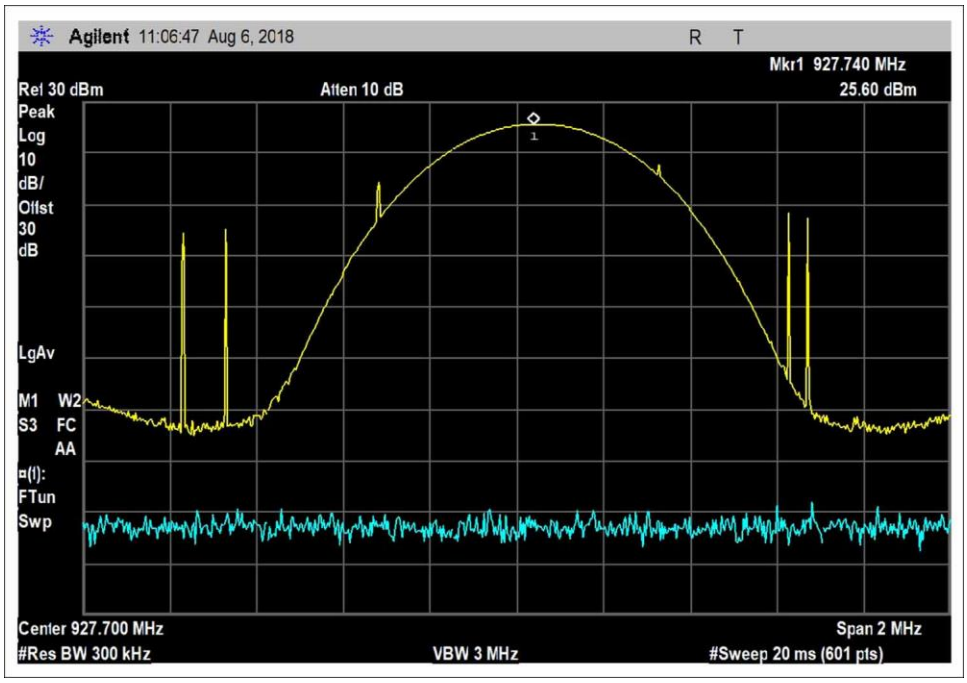
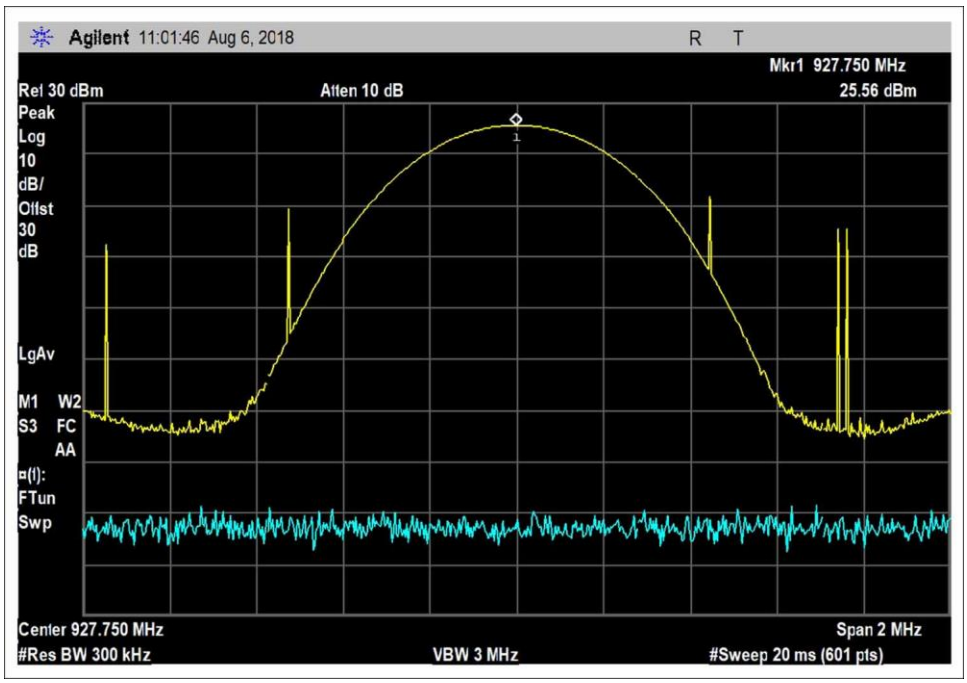
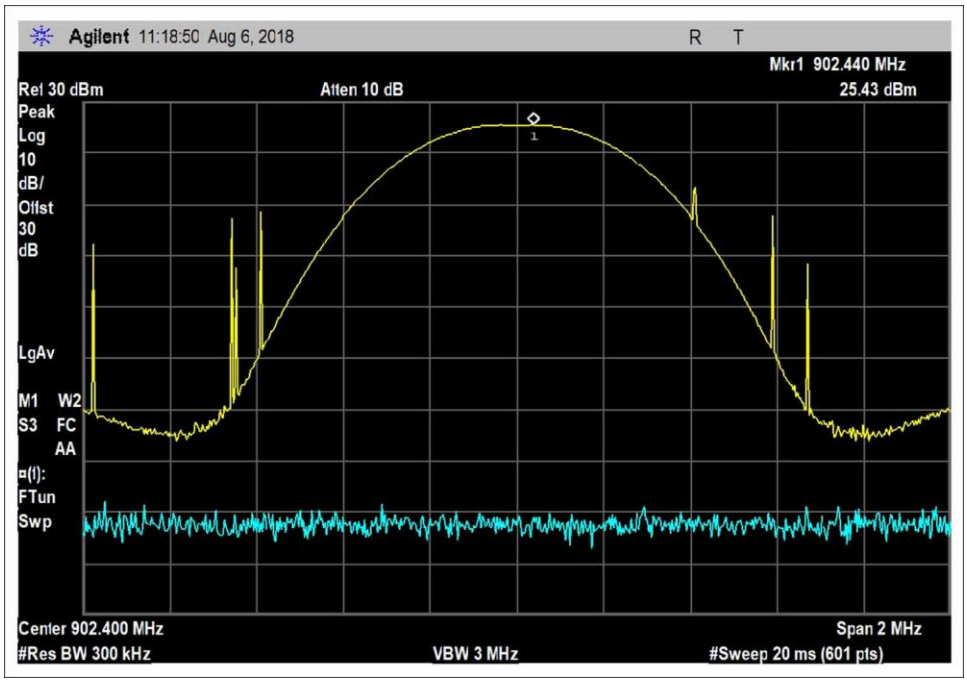


GFSK 10kbps, Power 3, Horizontal 927MHz



GFSK 10kbps, Power 3, Vertical 927MHz



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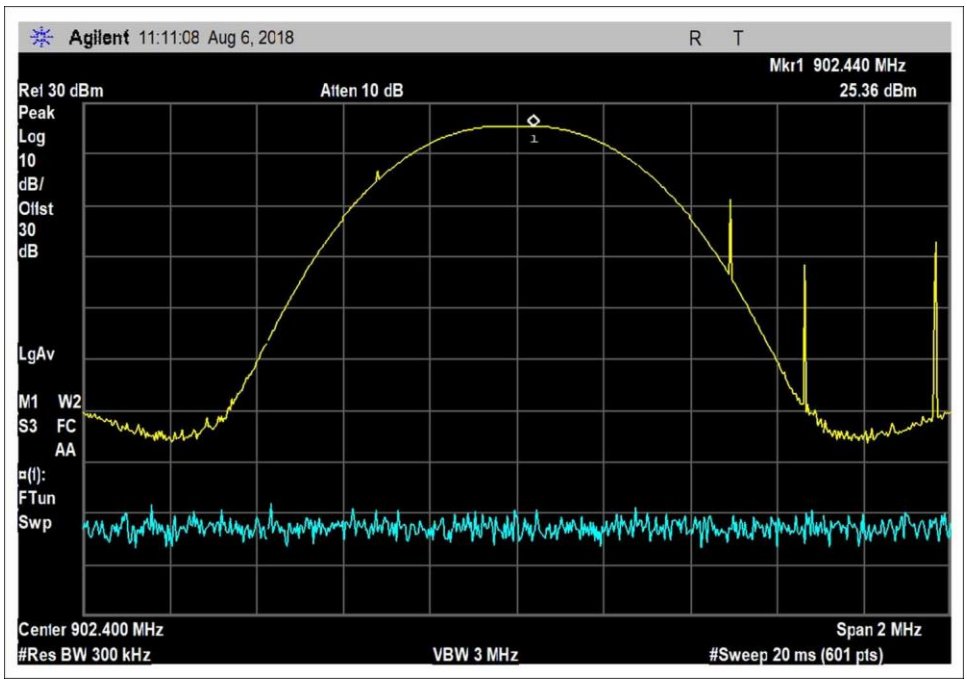
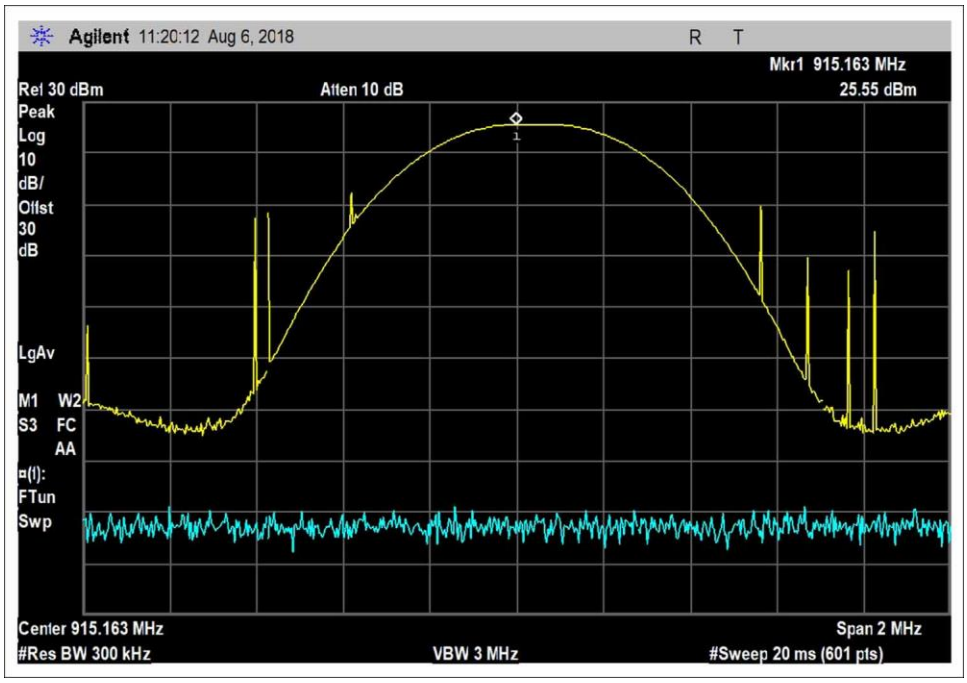
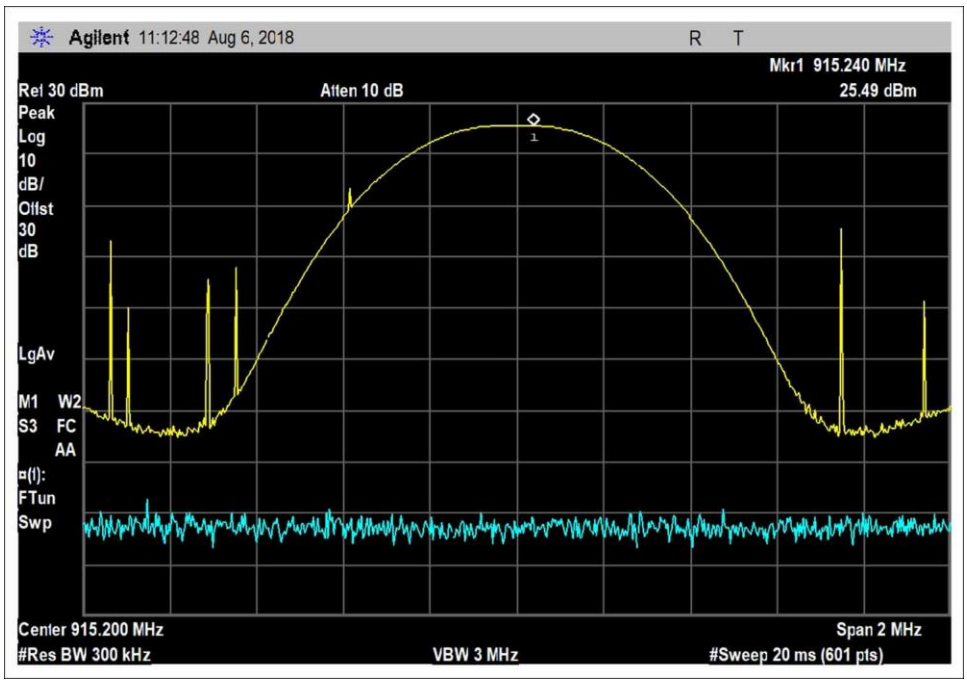


GFSK 150kbps, Power 3, Vertical 902MHz



GFSK 150kbps, Power 3, Horizontal 915MHz



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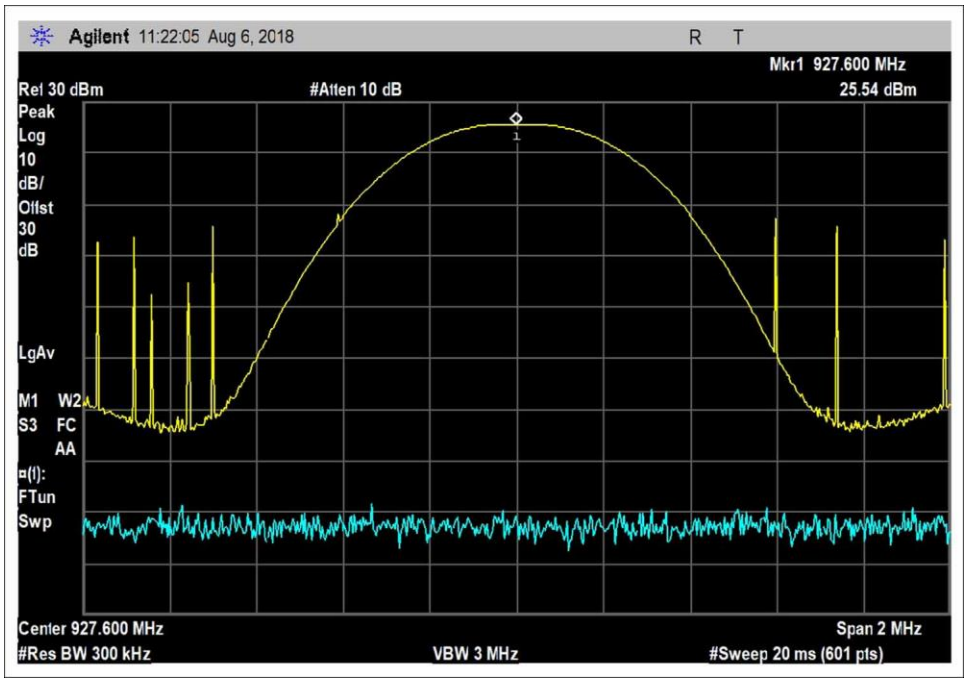
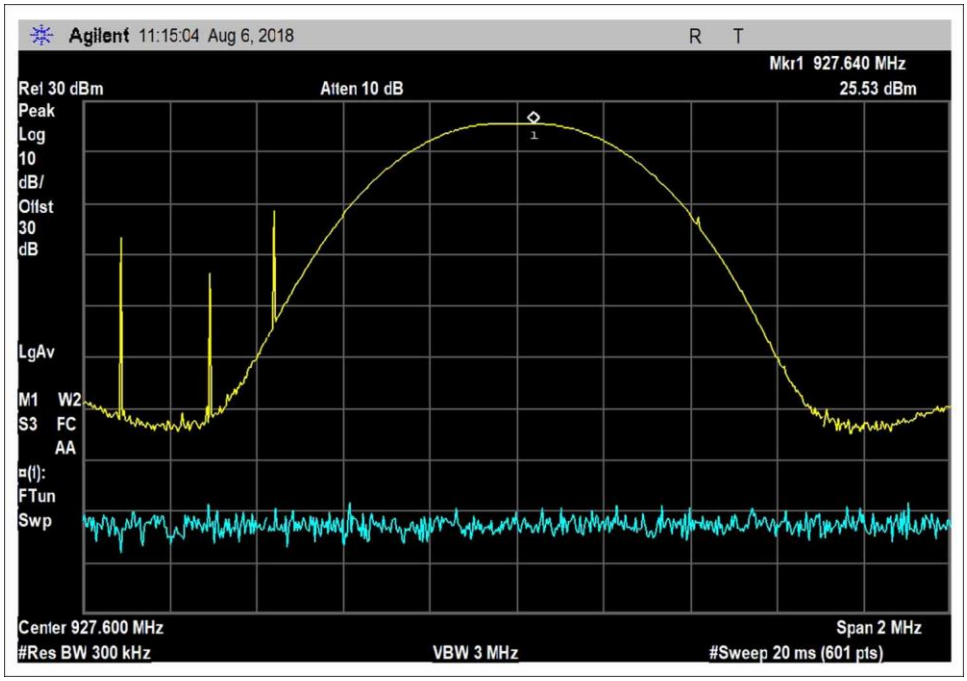


GFSK 150kbps, Power 3, Horizontal 927MHz



GFSK 150kbps, Power 3, Vertical 927MHz

Test Setup / Conditions / Data

Test Location:	CKC Laboratories, Inc • 110 N. Olinda Place • Brea, CA 92821 • 714 993 6112		
Customer:	**Itron, Inc.**		
Specification:	**15.247(b) Power Output (902-928 MHz FHSS >50 Channels)**		
Work Order #:	**100666**	Date:	8/6/2018
Test Type:	**Radiated Scan**	Time:	16:39:09
Tested By:	E. Wong	Sequence#:	3
Software:	EMITest 5.03.11		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

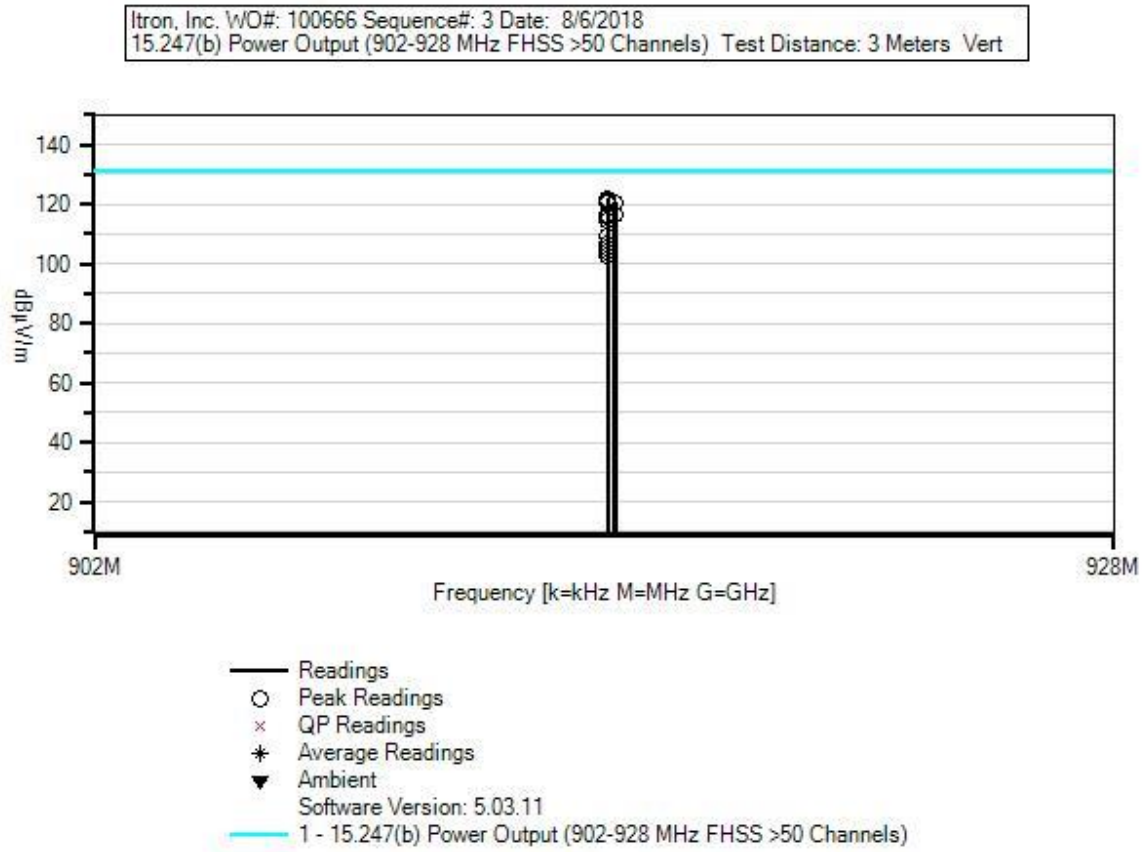
Test Conditions / Notes:

The equipment under test (EUT) is placed stand alone on the styrofoam table top. The EUT is turned on and placed in a continuous transmit mode. The EUT has fresh batteries installed. Nominal input voltage is 6.0Vdc.
The EUT is tested in orientations specified by the manufacturer: vertical pipe and horizontal pipe.
Operating frequency: 908.0-923.8MHz
Modulation: OOK. Firmware power: power level 0
EUT firmware: CLI_Test_STM32_ALL_500GRD_Rev2_3_0_0_0.hex
Antenna type integral

Frequencies tested: 908.0MHz, 915.0MHz, 923.8MHz
Frequency range of measurement = 908.0-923.8MHz. RBW=300 kHz, VBW=3MHz

Test environment conditions: Temperature: 29°C, 41% relative humidity, Pressure: 100kPa
Site A
Test Method: ANSI C63.10 (2013)

This measurement is for reference only. Reported power is conducted


Itron, Inc. WO#: 100666 Sequence#: 3 Date: 8/6/2018
15.247(b) Power Output (902-928 MHz FHSS >50 Channels) Test Distance: 3 Meters Vert
140
120
100
80
60
40
20
dBµV/m
902M
928M
Frequency [k=kHz M=MHz G=GHz]
Readings
Peak Readings
QP Readings
Average Readings
Ambient
Software Version: 5.03.11
1 - 15.247(b) Power Output (902-928 MHz FHSS >50 Channels)

Test Equipment:

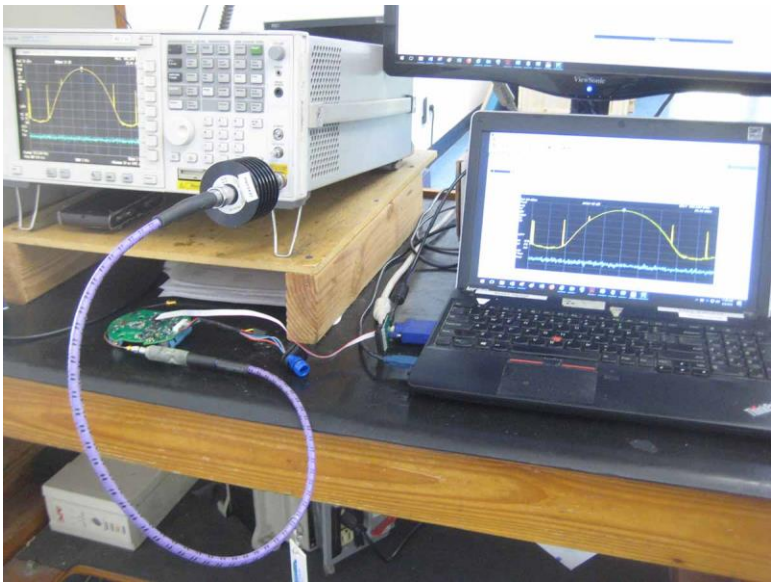
ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02672	Spectrum Analyzer	E4446A	3/2/2017	3/2/2019
T2	AN01995	Biconilog Antenna	CBL6111C	4/23/2018	4/23/2020
T3	ANP05275	Attenuator	1W	4/5/2018	4/5/2020
T4	ANP05198	Cable-Amplitude +15C to +45C (dB)	8268	12/7/2016	12/7/2018
T5	AN00309	Preamp	8447D	2/19/2018	2/19/2020
T6	ANP05050	Cable	RG223/U	1/20/2017	1/20/2019

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

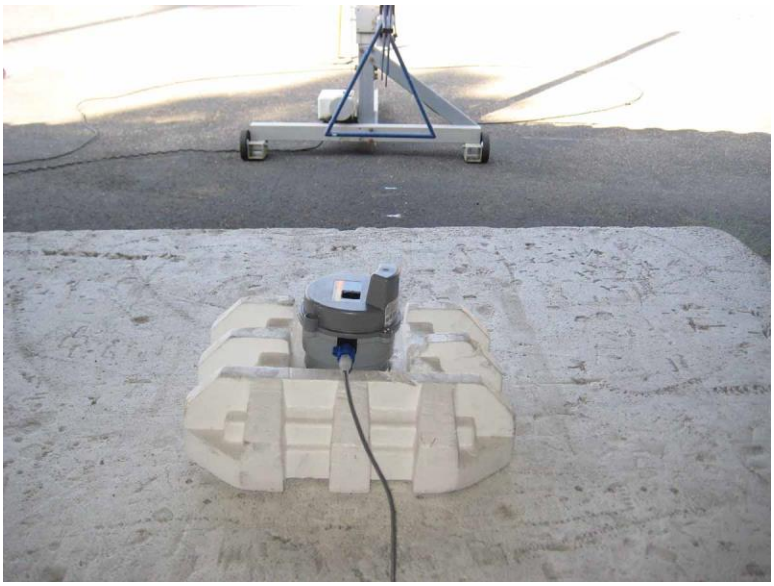
#	Freq	Rdng	T1 T5	T2 T6	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	915.000M	113.4	+0.0 -27.2	+23.0 +0.5	+6.1	+6.0	+0.0	121.8	131.2 GFSK_10kbps_P3_ Horiz Ant port	-9.4	Horiz
2	915.000M	112.7	+0.0 -27.2	+23.0 +0.5	+6.1	+6.0	+0.0	121.1	131.2 GFSK_10kbps_P3_ Vert Ant port	-10.1	Horiz
3	915.000M	112.4	+0.0 -27.2	+23.0 +0.5	+6.1	+6.0	+0.0	120.8	131.2 GFSK_10kbps_P3_ Vert Ant port	-10.4	Vert
4	915.200M	112.4	+0.0 -27.2	+23.0 +0.5	+6.1	+6.0	+0.0	120.8	131.2 GFSK_150kbps_P3 _Vert ant port	-10.4	Horiz
5	915.173M	112.1	+0.0 -27.2	+23.0 +0.5	+6.1	+6.0	+0.0	120.5	131.2 GFSK_150kbps_P3 _Horiz ant port	-10.7	Horiz
6	915.200M	111.8	+0.0 -27.2	+23.0 +0.5	+6.1	+6.0	+0.0	120.2	131.2 GFSK_150kbps_P3 _Vert ant port	-11.0	Vert
7	915.000M	108.3	+0.0 -27.2	+23.0 +0.5	+6.1	+6.0	+0.0	116.7	131.2 GFSK_10kbps_P3_ Horiz Ant port	-14.5	Vert
8	915.173M	108.1	+0.0 -27.2	+23.0 +0.5	+6.1	+6.0	+0.0	116.5	131.2 GFSK_150kbps_P3 _Horiz ant port	-14.7	Vert
9	915.000M	108.0	+0.0 -27.2	+23.0 +0.5	+6.1	+6.0	+0.0	116.4	131.2 OOK_P3_Vert ant port	-14.8	Vert
10	915.000M	107.6	+0.0 -27.2	+23.0 +0.5	+6.1	+6.0	+0.0	116.0	131.2 OOK_P3_Horiz_an t port	-15.2	Horiz
11	915.000M	106.0	+0.0 -27.2	+23.0 +0.5	+6.1	+6.0	+0.0	114.4	131.2 OOK_P3_Vert ant port	-16.8	Horiz
12	915.000M	101.1	+0.0 -27.2	+23.0 +0.5	+6.1	+6.0	+0.0	109.5	131.2 OOK_P3_Horiz_an t port	-21.7	Vert

13	915.000M	98.5	+0.0 -27.2	+23.0 +0.5	+6.1	+6.0	+0.0	106.9	131.2	-24.3	Vert OOK_P1_Vert Ant port
14	915.000M	96.9	+0.0 -27.2	+23.0 +0.5	+6.1	+6.0	+0.0	105.3	131.2	-25.9	Horiz OOK_P1_Horiz Ant port
15	915.000M	96.0	+0.0 -27.2	+23.0 +0.5	+6.1	+6.0	+0.0	104.4	131.2	-26.8	Horiz OOK_P1_Vert Ant port
16	915.000M	94.4	+0.0 -27.2	+23.0 +0.5	+6.1	+6.0	+0.0	102.8	131.2	-28.4	Vert OOK_P1_Horiz Ant port

Test Setup Photos

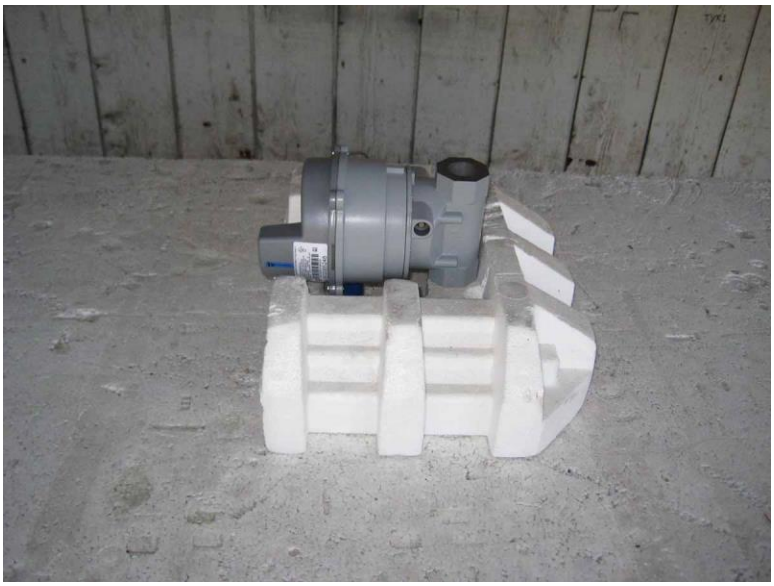


Conducted Power Setup

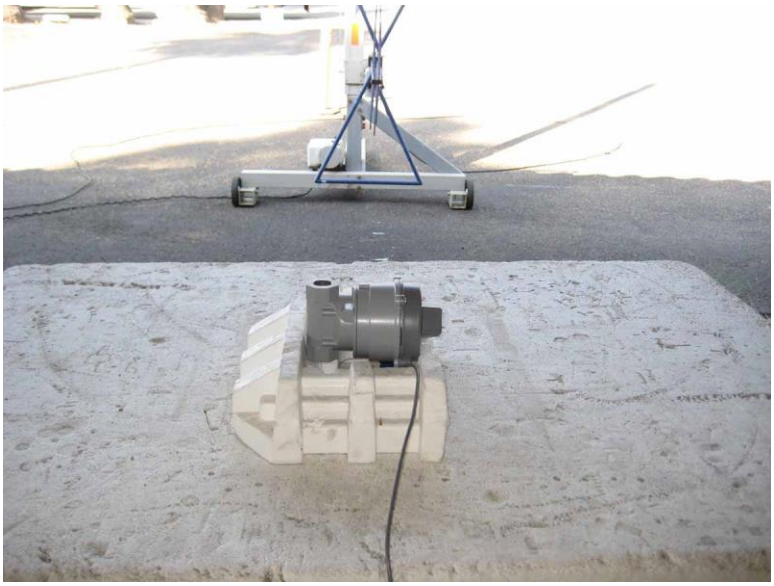


Horizontal Pipe

Horizontal Pipe



Vertical Pipe



Vertical Pipe

15.247(d) Radiated Emissions & Band Edge

Test Setup / Conditions / Data

Test Location:	CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92821 • 714 993 6112		
Customer:	**Itron, Inc.**		
Specification:	**15.247(d) / 15.209 Radiated Spurious Emissions**		
Work Order #:	**100666**	Date:	10/1/2018
Test Type:	**Maximized Emissions**	Time:	11:11:15
Tested By:	Don Nguyen	Sequence#:	7
Software:	EMITest 5.03.11		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

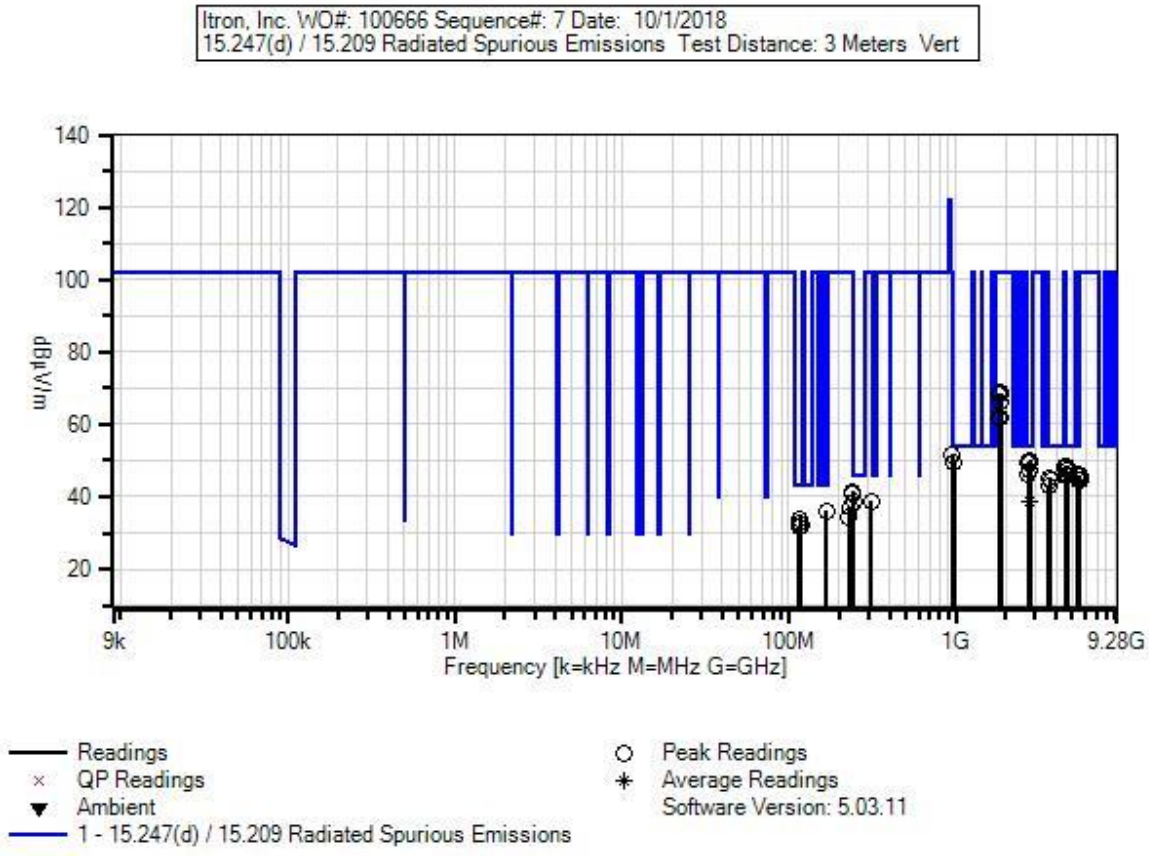
The equipment under test (EUT) is placed stand alone on the Styrofoam table top.
The EUT is turned on and placed in a continuous transmit mode.
The EUT has fresh batteries installed. Nominal input voltage is 6.0Vdc.
The EUT is tested in orientations specified by the manufacturer: vertical pipe and horizontal pipe.
Operating frequency: 902.2-927.75MHz
Modulation: GFSK 10kbps. Firmware power: power level 3
EUT firmware: CLI_Test_STM32_ALL_500GRD_Rev2_3_0_0_0.hex
Antenna type: Integral

Frequencies tested: 902.2MHz, 915.0MHz, 927.75MHz
Frequency range of measurement = 9kHz to 10000MHz.
9k-150kHz, RBW=200Hz, VBW=600Hz.
150k-30MHz, RBW=9kHz, VBW=27kHz.
30M-1000MHz, RBW=120kHz, VBW=360kHz
1000-10000MHz, RBW=1MHz, VBW=3MHz

Test environment conditions:
Temperature: 26.3°C
Relative Humidity: 56.8%
Pressure: 100kPa
Site A
Test Method: ANSI C63.10 (2013)

The evaluation if for PCII/ Reassessment. Worst case emission profile.

Modification #1 was in place during testing.


Itron, Inc. WO#: 100666 Sequence#: 7 Date: 10/1/2018
15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Vert
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: 5.03.11

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN00314	Loop Antenna	6502	5/13/2018	5/13/2020
T1	AN01995	Biconilog Antenna	CBL6111C	4/23/2018	4/23/2020
T2	ANP05275	Attenuator	1W	4/5/2018	4/5/2020
T3	ANP05198	Cable-Amplitude +15C to +45C (dB)	8268	12/7/2016	12/7/2018
T4	AN00309	Preamp	8447D	2/19/2018	2/19/2020
T5	ANP05050	Cable	RG223/U	1/20/2017	1/20/2019
T6	AN02672	Spectrum Analyzer	E4446A	3/2/2017	3/2/2019
T7	ANC00079	Attenuator		2/3/2017	2/3/2019
T8	AN00786	Preamp	83017A	5/12/2018	5/12/2020
T9	AN00849	Horn Antenna	3115	3/14/2018	3/14/2020
T10	AN02946	Cable	32022-2-2909K-36TC	12/12/2017	12/12/2019
T11	ANP07139	Cable	ANDL1-PNMNM-48	3/1/2017	3/1/2019
T12	AN03169	High Pass Filter	HM1155-11SS	6/15/2017	6/15/2019

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

#	Freq	Rdng	T1 T5 T9	T2 T6 T10	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	2783.250M	54.4	+0.0 +0.0 +29.5	+0.0 +0.0 +1.4	+0.0 +0.0 +3.3	+0.0 -38.6 +0.2	+0.0	50.2	54.0	-3.8	Horiz
2	2745.000M	54.0	+0.0 +0.0 +29.4	+0.0 +0.0 +1.4	+0.0 +0.0 +3.2	+0.0 -38.6 +0.2	+0.0	49.6	54.0	-4.4	Horiz
3	2706.600M	54.3	+0.0 +0.0 +29.1	+0.0 +0.0 +1.4	+0.0 +0.0 +3.2	+0.0 -38.6 +0.2	+0.0	49.6	54.0	-4.4	Vert
4	980.200M	30.3	+24.0 +0.5 +0.0	+6.1 +0.0 +0.0	+6.2 +9.8 +0.0	-27.4 +0.0 +0.0	+0.0	49.5	54.0	-4.5	Vert
5	240.125M	38.5	+12.2 +0.2 +0.0	+6.0 +0.0 +0.0	+2.7 +9.8 +0.0	-28.0 +0.0 +0.0	+0.0	41.4	46.0	-4.6	Horiz
6	241.300M	37.6	+12.3 +0.2 +0.0	+6.0 +0.0 +0.0	+2.7 +9.8 +0.0	-28.0 +0.0 +0.0	+0.0	40.6	46.0	-5.4	Horiz
7	4575.000M	47.1	+0.0 +0.0 +33.0	+0.0 +0.0 +1.8	+0.0 +0.0 +4.1	+0.0 -37.8 +0.1	+0.0	48.3	54.0	-5.7	Horiz
8	4511.000M	47.2	+0.0 +0.0 +32.9	+0.0 +0.0 +1.8	+0.0 +0.0 +4.1	+0.0 -37.8 +0.1	+0.0	48.3	54.0	-5.7	Vert
9	4511.000M	46.8	+0.0 +0.0 +32.9	+0.0 +0.0 +1.8	+0.0 +0.0 +4.1	+0.0 -37.8 +0.1	+0.0	47.9	54.0	-6.1	Horiz

10	4575.000M	46.0	+0.0	+0.0	+0.0	+0.0	+0.0	47.2	54.0	-6.8	Vert
			+0.0	+0.0	+0.0	-37.8					
			+33.0	+1.8	+4.1	+0.1					
11	2745.000M	51.5	+0.0	+0.0	+0.0	+0.0	+0.0	47.1	54.0	-6.9	Vert
			+0.0	+0.0	+0.0	-38.6					
			+29.4	+1.4	+3.2	+0.2					
12	245.100M	35.5	+12.6	+6.0	+2.8	-28.0	+0.0	38.9	46.0	-7.1	Horiz
			+0.2	+0.0	+9.8	+0.0					
			+0.0	+0.0	+0.0	+0.0					
13	2706.600M	50.9	+0.0	+0.0	+0.0	+0.0	+0.0	46.2	54.0	-7.8	Horiz
			+0.0	+0.0	+0.0	-38.6					
			+29.1	+1.4	+3.2	+0.2					
14	4638.750M	44.8	+0.0	+0.0	+0.0	+0.0	+0.0	46.1	54.0	-7.9	Horiz
			+0.0	+0.0	+0.0	-37.7					
			+32.8	+1.8	+4.2	+0.2					
15	5413.200M	42.8	+0.0	+0.0	+0.0	+0.0	+0.0	46.0	54.0	-8.0	Vert
			+0.0	+0.0	+0.0	-37.5					
			+33.9	+2.1	+4.6	+0.1					
16	4638.750M	44.6	+0.0	+0.0	+0.0	+0.0	+0.0	45.9	54.0	-8.1	Vert
			+0.0	+0.0	+0.0	-37.7					
			+32.8	+1.8	+4.2	+0.2					
17	5413.200M	42.2	+0.0	+0.0	+0.0	+0.0	+0.0	45.4	54.0	-8.6	Horiz
			+0.0	+0.0	+0.0	-37.5					
			+33.9	+2.1	+4.6	+0.1					
18	3660.000M	46.0	+0.0	+0.0	+0.0	+0.0	+0.0	45.1	54.0	-8.9	Vert
			+0.0	+0.0	+0.0	-38.3					
			+31.6	+1.8	+3.8	+0.2					
19	3711.000M	45.3	+0.0	+0.0	+0.0	+0.0	+0.0	44.7	54.0	-9.3	Vert
			+0.0	+0.0	+0.0	-38.3					
			+31.9	+1.8	+3.8	+0.2					
20	3711.000M	45.3	+0.0	+0.0	+0.0	+0.0	+0.0	44.7	54.0	-9.3	Horiz
			+0.0	+0.0	+0.0	-38.3					
			+31.9	+1.8	+3.8	+0.2					
21	117.000M	32.4	+11.5	+6.0	+1.8	-28.0	+0.0	33.6	43.5	-9.9	Vert
			+0.1	+0.0	+9.8	+0.0					
			+0.0	+0.0	+0.0	+0.0					
22	3660.000M	44.1	+0.0	+0.0	+0.0	+0.0	+0.0	43.2	54.0	-10.8	Horiz
			+0.0	+0.0	+0.0	-38.3					
			+31.6	+1.8	+3.8	+0.2					
23	3608.800M	44.6	+0.0	+0.0	+0.0	+0.0	+0.0	43.1	54.0	-10.9	Vert
			+0.0	+0.0	+0.0	-38.4					
			+31.1	+1.8	+3.8	+0.2					
24	117.000M	31.3	+11.5	+6.0	+1.8	-28.0	+0.0	32.5	43.5	-11.0	Horiz
			+0.1	+0.0	+9.8	+0.0					
			+0.0	+0.0	+0.0	+0.0					
25	118.200M	31.1	+11.6	+6.0	+1.8	-28.0	+0.0	32.4	43.5	-11.1	Horiz
			+0.1	+0.0	+9.8	+0.0					
			+0.0	+0.0	+0.0	+0.0					
26	3608.800M	44.2	+0.0	+0.0	+0.0	+0.0	+0.0	42.7	54.0	-11.3	Horiz
			+0.0	+0.0	+0.0	-38.4					
			+31.1	+1.8	+3.8	+0.2					

27	114.500M	31.0	+11.3	+6.0	+1.7	-28.0	+0.0	31.9	43.5	-11.6	Horiz
			+0.1	+0.0	+9.8	+0.0					
			+0.0	+0.0	+0.0	+0.0					
28	2783.250M	42.6	+0.0	+0.0	+0.0	+0.0	+0.0	38.4	54.0	-15.6	Vert
	Ave		+0.0	+0.0	+0.0	-38.6					
			+29.5	+1.4	+3.3	+0.2					
^	2783.250M	56.1	+0.0	+0.0	+0.0	+0.0	+0.0	51.9	54.0	-2.1	Vert
			+0.0	+0.0	+0.0	-38.6					
			+29.5	+1.4	+3.3	+0.2					
30	1855.500M	76.2	+0.0	+0.0	+0.0	+0.0	+0.0	68.6	102.0	-33.4	Vert
			+0.0	+0.0	+0.0	-38.9					
			+27.3	+1.1	+2.6	+0.3					
31	1804.400M	76.2	+0.0	+0.0	+0.0	+0.0	+0.0	68.2	102.0	-33.8	Vert
			+0.0	+0.0	+0.0	-38.9					
			+27.0	+1.1	+2.5	+0.3					
32	1830.000M	76.1	+0.0	+0.0	+0.0	+0.0	+0.0	68.2	102.0	-33.8	Vert
			+0.0	+0.0	+0.0	-38.9					
			+27.1	+1.1	+2.5	+0.3					
33	1855.500M	74.0	+0.0	+0.0	+0.0	+0.0	+0.0	66.4	102.0	-35.6	Horiz
			+0.0	+0.0	+0.0	-38.9					
			+27.3	+1.1	+2.6	+0.3					
34	1804.400M	69.9	+0.0	+0.0	+0.0	+0.0	+0.0	61.9	102.0	-40.1	Horiz
			+0.0	+0.0	+0.0	-38.9					
			+27.0	+1.1	+2.5	+0.3					
35	1830.000M	69.6	+0.0	+0.0	+0.0	+0.0	+0.0	61.7	102.0	-40.3	Horiz
			+0.0	+0.0	+0.0	-38.9					
			+27.1	+1.1	+2.5	+0.3					
36	954.200M	32.7	+23.6	+6.1	+6.1	-27.3	+0.0	51.5	102.0	-50.5	Vert
			+0.5	+0.0	+9.8	+0.0					
			+0.0	+0.0	+0.0	+0.0					
37	5566.500M	42.5	+0.0	+0.0	+0.0	+0.0	+0.0	45.9	102.0	-56.1	Horiz
			+0.0	+0.0	+0.0	-37.4					
			+33.9	+2.2	+4.6	+0.1					
38	5490.000M	42.2	+0.0	+0.0	+0.0	+0.0	+0.0	45.7	102.0	-56.3	Vert
			+0.0	+0.0	+0.0	-37.5					
			+34.1	+2.2	+4.6	+0.1					
39	5566.500M	41.3	+0.0	+0.0	+0.0	+0.0	+0.0	44.7	102.0	-57.3	Vert
			+0.0	+0.0	+0.0	-37.4					
			+33.9	+2.2	+4.6	+0.1					
40	5490.000M	41.1	+0.0	+0.0	+0.0	+0.0	+0.0	44.6	102.0	-57.4	Horiz
			+0.0	+0.0	+0.0	-37.5					
			+34.1	+2.2	+4.6	+0.1					

41	312.850M	33.8	+13.7 +0.2 +0.0	+6.0 +0.0 +0.0	+3.2 +9.8 +0.0	-28.0 +0.0 +0.0	+0.0	38.7	102.0	-63.3	Horiz
42	232.800M	34.6	+11.7 +0.2 +0.0	+6.0 +0.0 +0.0	+2.7 +9.8 +0.0	-28.0 +0.0 +0.0	+0.0	37.0	102.0	-65.0	Vert
43	167.400M	35.8	+10.1 +0.1 +0.0	+6.0 +0.0 +0.0	+2.2 +9.8 +0.0	-28.0 +0.0 +0.0	+0.0	36.0	102.0	-66.0	Horiz
44	227.900M	32.2	+11.3 +0.2 +0.0	+6.0 +0.0 +0.0	+2.6 +9.8 +0.0	-28.0 +0.0 +0.0	+0.0	34.1	102.0	-67.9	Vert

Test Location:	CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92821 • 714 993 6112		
Customer:	**Itron, Inc.**		
Specification:	**15.247(d) / 15.209 Radiated Spurious Emissions**		
Work Order #:	**100666**	Date:	10/1/2018
Test Type:	**Maximized Emissions**	Time:	10:33:47
Tested By:	Don Nguyen	Sequence#:	8
Software:	EMITest 5.03.11		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

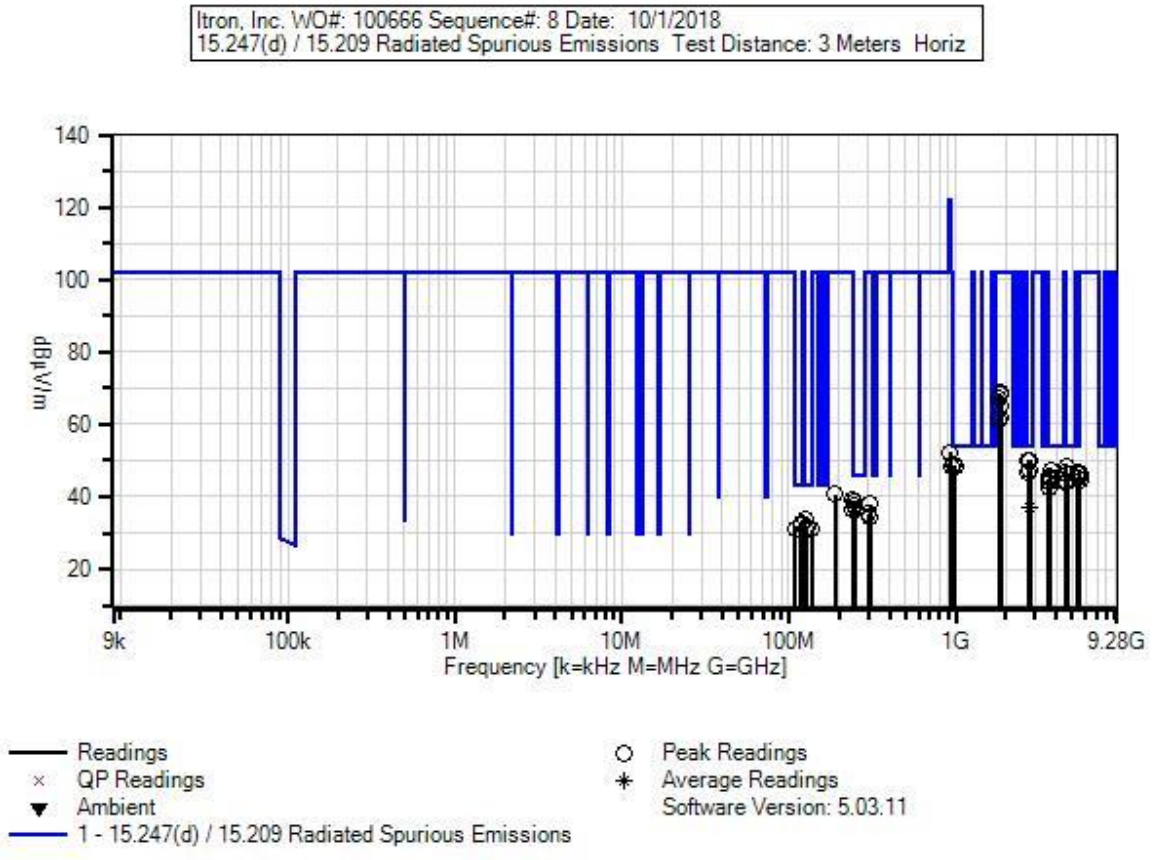
The equipment under test (EUT) is placed stand alone on the Styrofoam table top.
The EUT is turned on and placed in a continuous transmit mode.
The EUT has fresh batteries installed. Nominal input voltage is 6.0Vdc.
The EUT is tested in orientations specified by the manufacturer: vertical pipe and horizontal pipe.
Operating frequency: 902.4-927.6MHz
Modulation: GFSK 150kbps. **Firmware power: power level 3**
EUT firmware: CLI_Test_STM32_ALL_500GRD_Rev2_3_0_0_0.hex
Antenna type: Integral

Frequencies tested: 902.4MHz, 915.2MHz, 927.6MHz
Frequency range of measurement = 9kHz to 10000MHz.
9k-150kHz, RBW=200Hz, VBW=600Hz.
150k-30MHz, RBW=9kHz, VBW=27kHz.
30M-1000MHz, RBW=120kHz, VBW=360kHz
1000-10000MHz, RBW=1MHz, VBW=3MHz

Test environment conditions:
Temperature: 25.2°C
Relative Humidity: 58.0%
Pressure: 100kPa
Site A
Test Method: ANSI C63.10 (2013)

The evaluation if for PCII/ Reassessment. Worst case emission profile.

Modification #1 was in place during testing.


Itron, Inc. WO#: 100666 Sequence#: 8 Date: 10/1/2018
15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Horiz
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: 5.03.11

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN00314	Loop Antenna	6502	5/13/2018	5/13/2020
T1	AN01995	Biconilog Antenna	CBL6111C	4/23/2018	4/23/2020
T2	ANP05275	Attenuator	1W	4/5/2018	4/5/2020
T3	ANP05198	Cable-Amplitude +15C to +45C (dB)	8268	12/7/2016	12/7/2018
T4	AN00309	Preamp	8447D	2/19/2018	2/19/2020
T5	ANP05050	Cable	RG223/U	1/20/2017	1/20/2019
T6	AN02672	Spectrum Analyzer	E4446A	3/2/2017	3/2/2019
T7	ANC00079	Attenuator		2/3/2017	2/3/2019
T8	AN00786	Preamp	83017A	5/12/2018	5/12/2020
T9	AN00849	Horn Antenna	3115	3/14/2018	3/14/2020
T10	AN02946	Cable	32022-2-2909K-36TC	12/12/2017	12/12/2019
T11	ANP07139	Cable	ANDL1-PNMNM-48	3/1/2017	3/1/2019
T12	AN03169	High Pass Filter	HM1155-11SS	6/15/2017	6/15/2019

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

#	Freq	Rdng	T1 T5 T9	T2 T6 T10	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	2707.200M	54.7	+0.0 +0.0 +29.1	+0.0 +0.0 +1.4	+0.0 +0.0 +3.2	+0.0 -38.6 +0.2	+0.0	50.0	54.0	-4.0	Vert
2	2782.800M	54.2	+0.0 +0.0 +29.5	+0.0 +0.0 +1.4	+0.0 +0.0 +3.3	+0.0 -38.6 +0.2	+0.0	50.0	54.0	-4.0	Horiz
3	980.396M	29.5	+24.0 +0.5 +0.0	+6.1 +0.0 +0.0	+6.2 +9.8 +0.0	-27.4 +0.0 +0.0	+0.0	48.7	54.0	-5.3	Vert
4	4576.000M	47.2	+0.0 +0.0 +33.0	+0.0 +0.0 +1.8	+0.0 +0.0 +4.1	+0.0 -37.8 +0.1	+0.0	48.4	54.0	-5.6	Horiz
5	990.480M	28.7	+24.2 +0.5 +0.0	+6.1 +0.0 +0.0	+6.3 +9.8 +0.0	-27.4 +0.0 +0.0	+0.0	48.2	54.0	-5.8	Vert
6	4576.000M	47.0	+0.0 +0.0 +33.0	+0.0 +0.0 +1.8	+0.0 +0.0 +4.1	+0.0 -37.8 +0.1	+0.0	48.2	54.0	-5.8	Vert
7	3710.400M	47.9	+0.0 +0.0 +31.9	+0.0 +0.0 +1.8	+0.0 +0.0 +3.8	+0.0 -38.3 +0.2	+0.0	47.3	54.0	-6.7	Vert
8	2745.600M	51.7	+0.0 +0.0 +29.4	+0.0 +0.0 +1.4	+0.0 +0.0 +3.2	+0.0 -38.6 +0.2	+0.0	47.3	54.0	-6.7	Horiz
9	241.000M	36.0	+12.3 +0.2 +0.0	+6.0 +0.0 +0.0	+2.7 +9.8 +0.0	-28.0 +0.0 +0.0	+0.0	39.0	46.0	-7.0	Vert

10	4512.000M	45.9	+0.0	+0.0	+0.0	+0.0	+0.0	47.0	54.0	-7.0	Vert
			+0.0	+0.0	+0.0	-37.8					
			+32.9	+1.8	+4.1	+0.1					
11	2707.200M	51.5	+0.0	+0.0	+0.0	+0.0	+0.0	46.8	54.0	-7.2	Horiz
			+0.0	+0.0	+0.0	-38.6					
			+29.1	+1.4	+3.2	+0.2					
12	248.550M	35.1	+12.8	+6.0	+2.8	-28.0	+0.0	38.7	46.0	-7.3	Vert
			+0.2	+0.0	+9.8	+0.0					
			+0.0	+0.0	+0.0	+0.0					
13	4638.000M	44.7	+0.0	+0.0	+0.0	+0.0	+0.0	46.0	54.0	-8.0	Vert
			+0.0	+0.0	+0.0	-37.7					
			+32.8	+1.8	+4.2	+0.2					
14	3660.800M	46.8	+0.0	+0.0	+0.0	+0.0	+0.0	45.9	54.0	-8.1	Vert
			+0.0	+0.0	+0.0	-38.3					
			+31.6	+1.8	+3.8	+0.2					
15	246.200M	34.3	+12.6	+6.0	+2.8	-28.0	+0.0	37.7	46.0	-8.3	Horiz
			+0.2	+0.0	+9.8	+0.0					
			+0.0	+0.0	+0.0	+0.0					
16	3710.400M	45.9	+0.0	+0.0	+0.0	+0.0	+0.0	45.3	54.0	-8.7	Horiz
			+0.0	+0.0	+0.0	-38.3					
			+31.9	+1.8	+3.8	+0.2					
17	5414.400M	42.0	+0.0	+0.0	+0.0	+0.0	+0.0	45.2	54.0	-8.8	Vert
			+0.0	+0.0	+0.0	-37.5					
			+33.9	+2.1	+4.6	+0.1					
18	3609.600M	46.6	+0.0	+0.0	+0.0	+0.0	+0.0	45.1	54.0	-8.9	Vert
			+0.0	+0.0	+0.0	-38.4					
			+31.1	+1.8	+3.8	+0.2					
19	5414.400M	41.7	+0.0	+0.0	+0.0	+0.0	+0.0	44.9	54.0	-9.1	Horiz
			+0.0	+0.0	+0.0	-37.5					
			+33.9	+2.1	+4.6	+0.1					
20	124.350M	32.4	+11.9	+6.0	+1.8	-28.0	+0.0	34.0	43.5	-9.5	Horiz
			+0.1	+0.0	+9.8	+0.0					
			+0.0	+0.0	+0.0	+0.0					
21	251.200M	32.8	+12.9	+6.0	+2.8	-28.0	+0.0	36.5	46.0	-9.5	Horiz
			+0.2	+0.0	+9.8	+0.0					
			+0.0	+0.0	+0.0	+0.0					
22	242.450M	33.3	+12.4	+6.0	+2.7	-28.0	+0.0	36.4	46.0	-9.6	Horiz
			+0.2	+0.0	+9.8	+0.0					
			+0.0	+0.0	+0.0	+0.0					
23	124.246M	32.3	+11.9	+6.0	+1.8	-28.0	+0.0	33.9	43.5	-9.6	Vert
			+0.1	+0.0	+9.8	+0.0					
			+0.0	+0.0	+0.0	+0.0					
24	4512.000M	43.2	+0.0	+0.0	+0.0	+0.0	+0.0	44.3	54.0	-9.7	Horiz
			+0.0	+0.0	+0.0	-37.8					
			+32.9	+1.8	+4.1	+0.1					
25	4638.000M	42.7	+0.0	+0.0	+0.0	+0.0	+0.0	44.0	54.0	-10.0	Horiz
			+0.0	+0.0	+0.0	-37.7					
			+32.8	+1.8	+4.2	+0.2					
26	3660.800M	44.7	+0.0	+0.0	+0.0	+0.0	+0.0	43.8	54.0	-10.2	Horiz
			+0.0	+0.0	+0.0	-38.3					
			+31.6	+1.8	+3.8	+0.2					

27	117.900M	31.3	+11.5	+6.0	+1.8	-28.0	+0.0	32.5	43.5	-11.0	Vert
			+0.1	+0.0	+9.8	+0.0					
			+0.0	+0.0	+0.0	+0.0					
28	119.275M	31.0	+11.6	+6.0	+1.8	-28.0	+0.0	32.3	43.5	-11.2	Vert
			+0.1	+0.0	+9.8	+0.0					
			+0.0	+0.0	+0.0	+0.0					
29	3609.600M	44.0	+0.0	+0.0	+0.0	+0.0	+0.0	42.5	54.0	-11.5	Horiz
			+0.0	+0.0	+0.0	-38.4					
			+31.1	+1.8	+3.8	+0.2					
30	129.100M	30.1	+11.8	+6.0	+1.9	-28.0	+0.0	31.7	43.5	-11.8	Vert
			+0.1	+0.0	+9.8	+0.0					
			+0.0	+0.0	+0.0	+0.0					
31	109.300M	30.8	+10.9	+6.0	+1.7	-28.1	+0.0	31.2	43.5	-12.3	Vert
			+0.1	+0.0	+9.8	+0.0					
			+0.0	+0.0	+0.0	+0.0					
32	137.700M	29.4	+11.7	+6.0	+2.0	-28.0	+0.0	31.0	43.5	-12.5	Vert
			+0.1	+0.0	+9.8	+0.0					
			+0.0	+0.0	+0.0	+0.0					
33	125.375M	29.2	+11.9	+6.0	+1.9	-28.0	+0.0	30.9	43.5	-12.6	Vert
			+0.1	+0.0	+9.8	+0.0					
			+0.0	+0.0	+0.0	+0.0					
34	2782.800M	41.3	+0.0	+0.0	+0.0	+0.0	+0.0	37.1	54.0	-16.9	Vert
	Ave		+0.0	+0.0	+0.0	-38.6					
			+29.5	+1.4	+3.3	+0.2					
^	2782.800M	55.4	+0.0	+0.0	+0.0	+0.0	+0.0	51.2	54.0	-2.8	Vert
			+0.0	+0.0	+0.0	-38.6					
			+29.5	+1.4	+3.3	+0.2					
36	2745.600M	41.2	+0.0	+0.0	+0.0	+0.0	+0.0	36.8	54.0	-17.2	Vert
	Ave		+0.0	+0.0	+0.0	-38.6					
			+29.4	+1.4	+3.2	+0.2					
^	2745.600M	55.6	+0.0	+0.0	+0.0	+0.0	+0.0	51.2	54.0	-2.8	Vert
			+0.0	+0.0	+0.0	-38.6					
			+29.4	+1.4	+3.2	+0.2					
38	1830.400M	76.6	+0.0	+0.0	+0.0	+0.0	+0.0	68.7	102.0	-33.3	Vert
			+0.0	+0.0	+0.0	-38.9					
			+27.1	+1.1	+2.5	+0.3					
39	1855.200M	75.7	+0.0	+0.0	+0.0	+0.0	+0.0	68.1	102.0	-33.9	Vert
			+0.0	+0.0	+0.0	-38.9					
			+27.3	+1.1	+2.6	+0.3					
40	1804.800M	75.3	+0.0	+0.0	+0.0	+0.0	+0.0	67.3	102.0	-34.7	Vert
			+0.0	+0.0	+0.0	-38.9					
			+27.0	+1.1	+2.5	+0.3					
41	1855.200M	72.7	+0.0	+0.0	+0.0	+0.0	+0.0	65.1	102.0	-36.9	Horiz
			+0.0	+0.0	+0.0	-38.9					
			+27.3	+1.1	+2.6	+0.3					
42	1830.400M	69.6	+0.0	+0.0	+0.0	+0.0	+0.0	61.7	102.0	-40.3	Horiz
			+0.0	+0.0	+0.0	-38.9					
			+27.1	+1.1	+2.5	+0.3					
43	1804.800M	69.1	+0.0	+0.0	+0.0	+0.0	+0.0	61.1	102.0	-40.9	Horiz
			+0.0	+0.0	+0.0	-38.9					
			+27.0	+1.1	+2.5	+0.3					

44	928.396M	34.0	+23.2 +0.5 +0.0	+6.1 +0.0 +0.0	+6.0 +9.8 +0.0	-27.3 +0.0	+0.0	52.3	102.0	-49.7	Vert
45	954.396M	29.8	+23.6 +0.5 +0.0	+6.1 +0.0 +0.0	+6.1 +9.8 +0.0	-27.3 +0.0	+0.0	48.6	102.0	-53.4	Vert
46	5491.200M	43.5	+0.0 +0.0 +34.1	+0.0 +0.0 +2.2	+0.0 +0.0 +4.6	+0.0 -37.5 +0.1	+0.0	47.0	102.0	-55.0	Vert
47	5491.200M	42.9	+0.0 +0.0 +34.1	+0.0 +0.0 +2.2	+0.0 +0.0 +4.6	+0.0 -37.5 +0.1	+0.0	46.4	102.0	-55.6	Horiz
48	5565.600M	42.7	+0.0 +0.0 +33.9	+0.0 +0.0 +2.2	+0.0 +0.0 +4.6	+0.0 -37.4 +0.1	+0.0	46.1	102.0	-55.9	Vert
49	5565.600M	41.4	+0.0 +0.0 +33.9	+0.0 +0.0 +2.2	+0.0 +0.0 +4.6	+0.0 -37.4 +0.1	+0.0	44.8	102.0	-57.2	Horiz
50	188.350M	41.3	+9.1 +0.2 +0.0	+6.0 +0.0 +0.0	+2.3 +9.8 +0.0	-28.0 +0.0	+0.0	40.7	102.0	-61.3	Horiz
51	307.700M	33.4	+13.5 +0.2 +0.0	+6.0 +0.0 +0.0	+3.1 +9.8 +0.0	-28.0 +0.0	+0.0	38.0	102.0	-64.0	Vert
52	297.700M	31.0	+13.3 +0.2 +0.0	+6.0 +0.0 +0.0	+3.1 +9.8 +0.0	-28.0 +0.0	+0.0	35.4	102.0	-66.6	Vert
53	308.950M	29.8	+13.6 +0.2 +0.0	+6.0 +0.0 +0.0	+3.2 +9.8 +0.0	-28.0 +0.0	+0.0	34.6	102.0	-67.4	Horiz

Test Location:	CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92821 • 714 993 6112		
Customer:	**Itron, Inc.**		
Specification:	**15.247(d) / 15.209 Radiated Spurious Emissions**		
Work Order #:	**100666**	Date:	8/13/2018
Test Type:	**Maximized Emissions**	Time:	14:23:23
Tested By:	Don Nguyen	Sequence#:	5
Software:	EMITest 5.03.11		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

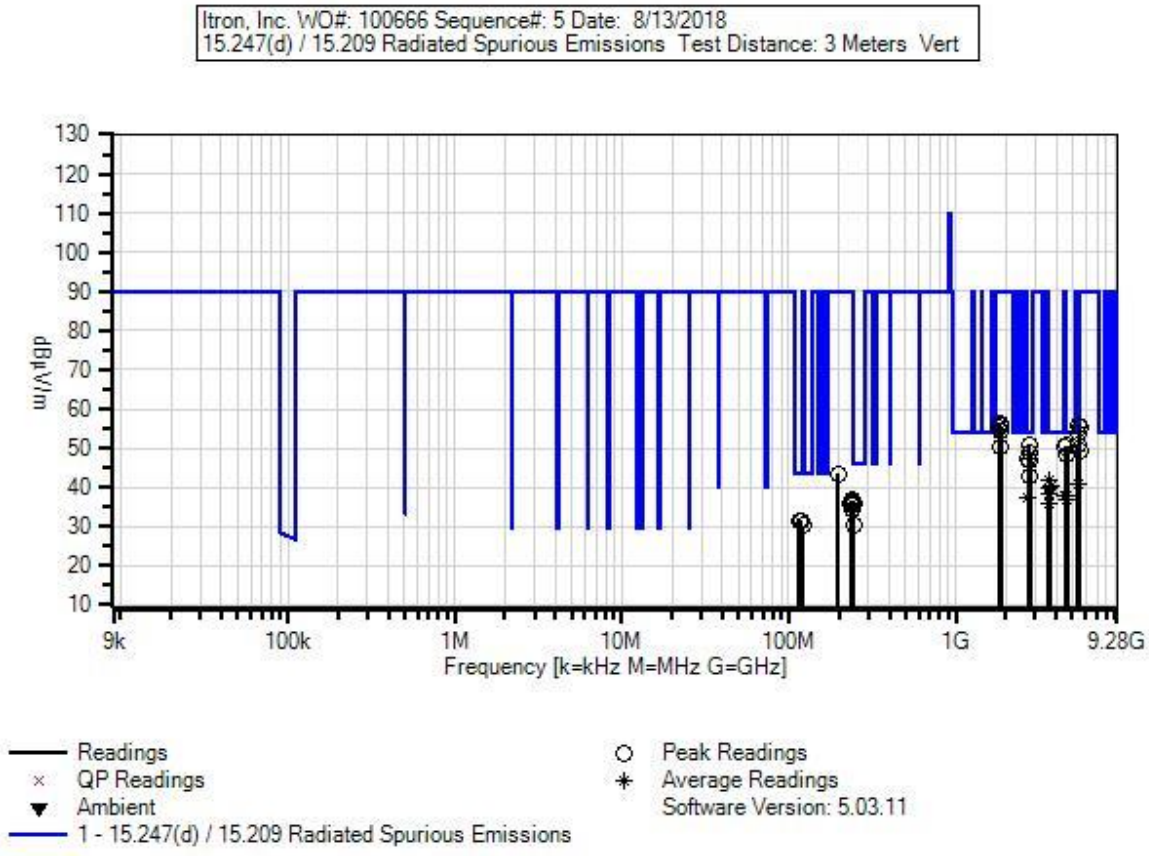
The equipment under test (EUT) is placed stand alone on the Styrofoam table top.
The EUT is turned on and placed in a continuous transmit mode.
The EUT has fresh batteries installed. Nominal input voltage is 6.0Vdc.
The EUT is tested in orientations specified by the manufacturer: vertical pipe and horizontal pipe.
Operating frequency: 903.0-926.8MHz
Modulation: OOK. Firmware power: power level 1
EUT firmware: CLI_Test_STM32_ALL_500GRD_Rev2_3_0_0_0.hex
Antenna type: Integral

Frequencies tested: 903.0MHz, 915.0MHz, 926.8MHz
Frequency range of measurement = 9kHz to 10000MHz.
9k-150kHz, RBW=200Hz, VBW=600Hz.
150k-30MHz, RBW=9kHz, VBW=27kHz.
30M-1000MHz, RBW=120kHz, VBW=360kHz
1000-10000MHz, RBW=1MHz, VBW=3MHz

Test environment conditions:
Temperature: 26.3°C
Relative Humidity: 56.8%
Pressure: 100kPa
Site A
Test Method: ANSI C63.10 (2013)

The evaluation if for PCII/ Reassessment. Worst case emission profile.

Modification #1 was in place during testing.


Itron, Inc. WO#: 100666 Sequence#: 5 Date: 8/13/2018
15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Vert
dBµV/m
130
120
110
100
90
80
70
60
50
40
30
20
10
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: 5.03.11

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN00314	Loop Antenna	6502	5/13/2018	5/13/2020
T1	AN01995	Biconilog Antenna	CBL6111C	4/23/2018	4/23/2020
T2	ANP05275	Attenuator	1W	4/5/2018	4/5/2020
T3	ANP05198	Cable-Amplitude +15C to +45C (dB)	8268	12/7/2016	12/7/2018
T4	AN00309	Preamp	8447D	2/19/2018	2/19/2020
T5	ANP05050	Cable	RG223/U	1/20/2017	1/20/2019
T6	AN02672	Spectrum Analyzer	E4446A	3/2/2017	3/2/2019
T7	AN00786	Preamp	83017A	5/12/2018	5/12/2020
T8	AN00849	Horn Antenna	3115	3/14/2018	3/14/2020
T9	AN02946	Cable	32022-2-2909K-36TC	12/12/2017	12/12/2019
T10	ANP07139	Cable	ANDL1-PNMNM-48	3/1/2017	3/1/2019
T11	AN03169	High Pass Filter	HM1155-11SS	6/15/2017	6/15/2019

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

#	Freq	Rdng	T1 T5 T9	T2 T6 T10	T3 T7 T11	T4 T8	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	2745.000M	55.2	+0.0 +0.0 +1.4	+0.0 +0.0 +3.2	+0.0 -38.6 +0.2	+0.0 +29.4	+0.0	50.8	54.0	-3.2	Vert
2	4634.000M	49.5	+0.0 +0.0 +1.8	+0.0 +0.0 +4.2	+0.0 -37.7 +0.2	+0.0 +32.8	+0.0	50.8	54.0	-3.2	Horiz
3	5418.067M	47.6	+0.0 +0.0 +2.1	+0.0 +0.0 +4.6	+0.0 -37.5 +0.1	+0.0 +33.9	+0.0	50.8	54.0	-3.2	Horiz
4	4515.067M	49.3	+0.0 +0.0 +1.8	+0.0 +0.0 +4.1	+0.0 -37.8 +0.1	+0.0 +32.9	+0.0	50.4	54.0	-3.6	Horiz
5	2780.433M	53.0	+0.0 +0.0 +1.4	+0.0 +0.0 +3.3	+0.0 -38.6 +0.2	+0.0 +29.5	+0.0	48.8	54.0	-5.2	Vert
6	4575.000M	47.1	+0.0 +0.0 +1.8	+0.0 +0.0 +4.1	+0.0 -37.8 +0.1	+0.0 +33.0	+0.0	48.3	54.0	-5.7	Horiz
7	2709.067M	52.1	+0.0 +0.0 +1.4	+0.0 +0.0 +3.2	+0.0 -38.6 +0.2	+0.0 +29.1	+0.0	47.4	54.0	-6.6	Horiz
8	2745.000M	51.1	+0.0 +0.0 +1.4	+0.0 +0.0 +3.2	+0.0 -38.6 +0.2	+0.0 +29.4	+0.0	46.7	54.0	-7.3	Horiz
9	241.600M	43.1	+12.3 +0.2 +0.0	+6.0 +0.0 +0.0	+2.7 +0.0 +0.0	-28.0 +0.0	+0.0	36.3	46.0	-9.7	Horiz

10	243.850M	42.2	+12.5	+6.0	+2.8	-28.0	+0.0	35.7	46.0	-10.3	Horiz
			+0.2	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0						
11	2780.400M	47.1	+0.0	+0.0	+0.0	+0.0	+0.0	42.9	54.0	-11.1	Horiz
			+0.0	+0.0	-38.6	+29.5					
			+1.4	+3.3	+0.2						
12	241.550M	41.0	+12.3	+6.0	+2.7	-28.0	+0.0	34.2	46.0	-11.8	Vert
			+0.2	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0						
13	118.350M	40.0	+11.6	+6.0	+1.8	-28.0	+0.0	31.5	43.5	-12.0	Horiz
			+0.1	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0						
14	115.850M	40.1	+11.4	+6.0	+1.8	-28.0	+0.0	31.4	43.5	-12.1	Horiz
			+0.1	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0						
15	3660.000M	42.6	+0.0	+0.0	+0.0	+0.0	+0.0	41.7	54.0	-12.3	Vert
	Ave		+0.0	+0.0	-38.3	+31.6					
			+1.8	+3.8	+0.2						
^	3660.000M	59.8	+0.0	+0.0	+0.0	+0.0	+0.0	58.9	54.0	+4.9	Vert
			+0.0	+0.0	-38.3	+31.6					
			+1.8	+3.8	+0.2						
17	5418.008M	37.9	+0.0	+0.0	+0.0	+0.0	+0.0	41.1	54.0	-12.9	Vert
	Ave		+0.0	+0.0	-37.5	+33.9					
			+2.1	+4.6	+0.1						
^	5418.008M	53.0	+0.0	+0.0	+0.0	+0.0	+0.0	56.2	54.0	+2.2	Vert
			+0.0	+0.0	-37.5	+33.9					
			+2.1	+4.6	+0.1						
19	121.600M	38.7	+11.8	+6.0	+1.8	-28.0	+0.0	30.4	43.5	-13.1	Horiz
			+0.1	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0						
20	3707.233M	41.2	+0.0	+0.0	+0.0	+0.0	+0.0	40.6	54.0	-13.4	Vert
	Ave		+0.0	+0.0	-38.3	+31.9					
			+1.8	+3.8	+0.2						
^	3707.233M	59.0	+0.0	+0.0	+0.0	+0.0	+0.0	58.4	54.0	+4.4	Vert
			+0.0	+0.0	-38.3	+31.9					
			+1.8	+3.8	+0.2						
22	3707.200M	41.0	+0.0	+0.0	+0.0	+0.0	+0.0	40.4	54.0	-13.6	Horiz
	Ave		+0.0	+0.0	-38.3	+31.9					
			+1.8	+3.8	+0.2						
^	3707.200M	53.1	+0.0	+0.0	+0.0	+0.0	+0.0	52.5	54.0	-1.5	Horiz
			+0.0	+0.0	-38.3	+31.9					
			+1.8	+3.8	+0.2						
24	3612.008M	41.3	+0.0	+0.0	+0.0	+0.0	+0.0	39.8	54.0	-14.2	Vert
	Ave		+0.0	+0.0	-38.4	+31.1					
			+1.8	+3.8	+0.2						
^	3612.008M	55.3	+0.0	+0.0	+0.0	+0.0	+0.0	53.8	54.0	-0.2	Vert
			+0.0	+0.0	-38.4	+31.1					
			+1.8	+3.8	+0.2						

26	3612.067M	40.0	+0.0	+0.0	+0.0	+0.0	+0.0	38.5	54.0	-15.5	Horiz
	Ave		+0.0	+0.0	-38.4	+31.1					
			+1.8	+3.8	+0.2						
^	3612.067M	57.8	+0.0	+0.0	+0.0	+0.0	+0.0	56.3	54.0	+2.3	Horiz
			+0.0	+0.0	-38.4	+31.1					
			+1.8	+3.8	+0.2						
28	243.550M	36.9	+12.5	+6.0	+2.8	-28.0	+0.0	30.4	46.0	-15.6	Vert
			+0.2	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0						
29	4515.008M	36.8	+0.0	+0.0	+0.0	+0.0	+0.0	37.9	54.0	-16.1	Vert
	Ave		+0.0	+0.0	-37.8	+32.9					
			+1.8	+4.1	+0.1						
^	4515.008M	50.5	+0.0	+0.0	+0.0	+0.0	+0.0	51.6	54.0	-2.4	Vert
			+0.0	+0.0	-37.8	+32.9					
			+1.8	+4.1	+0.1						
31	4575.000M	36.5	+0.0	+0.0	+0.0	+0.0	+0.0	37.7	54.0	-16.3	Vert
	Ave		+0.0	+0.0	-37.8	+33.0					
			+1.8	+4.1	+0.1						
^	4575.000M	50.7	+0.0	+0.0	+0.0	+0.0	+0.0	51.9	54.0	-2.1	Vert
			+0.0	+0.0	-37.8	+33.0					
			+1.8	+4.1	+0.1						
33	2709.008M	42.3	+0.0	+0.0	+0.0	+0.0	+0.0	37.6	54.0	-16.4	Vert
	Ave		+0.0	+0.0	-38.6	+29.1					
			+1.4	+3.2	+0.2						
^	2709.008M	58.1	+0.0	+0.0	+0.0	+0.0	+0.0	53.4	54.0	-0.6	Vert
			+0.0	+0.0	-38.6	+29.1					
			+1.4	+3.2	+0.2						
35	4634.033M	35.7	+0.0	+0.0	+0.0	+0.0	+0.0	37.0	54.0	-17.0	Vert
	Ave		+0.0	+0.0	-37.7	+32.8					
			+1.8	+4.2	+0.2						
^	4634.033M	52.7	+0.0	+0.0	+0.0	+0.0	+0.0	54.0	54.0	+0.0	Vert
			+0.0	+0.0	-37.7	+32.8					
			+1.8	+4.2	+0.2						
37	3660.000M	36.8	+0.0	+0.0	+0.0	+0.0	+0.0	35.9	54.0	-18.1	Horiz
	Ave		+0.0	+0.0	-38.3	+31.6					
			+1.8	+3.8	+0.2						
^	3660.000M	54.3	+0.0	+0.0	+0.0	+0.0	+0.0	53.4	54.0	-0.6	Horiz
			+0.0	+0.0	-38.3	+31.6					
			+1.8	+3.8	+0.2						
39	1830.000M	64.2	+0.0	+0.0	+0.0	+0.0	+0.0	56.3	90.0	-33.7	Horiz
			+0.0	+0.0	-38.9	+27.1					
			+1.1	+2.5	+0.3						
40	5490.000M	52.3	+0.0	+0.0	+0.0	+0.0	+0.0	55.8	90.0	-34.2	Vert
			+0.0	+0.0	-37.5	+34.1					
			+2.2	+4.6	+0.1						
41	1853.583M	63.3	+0.0	+0.0	+0.0	+0.0	+0.0	55.6	90.0	-34.4	Vert
			+0.0	+0.0	-38.9	+27.2					
			+1.1	+2.6	+0.3						
42	1806.008M	63.2	+0.0	+0.0	+0.0	+0.0	+0.0	55.2	90.0	-34.8	Vert
			+0.0	+0.0	-38.9	+27.0					
			+1.1	+2.5	+0.3						

43	1805.967M	63.2	+0.0 +0.0 +1.1	+0.0 +0.0 +2.5	+0.0 -38.9 +0.3	+0.0 +27.0	+0.0	55.2	90.0	-34.8	Horiz
44	5560.833M	51.7	+0.0 +0.0 +2.2	+0.0 +0.0 +4.6	+0.0 -37.4 +0.1	+0.0 +33.9	+0.0	55.1	90.0	-34.9	Vert
45	1830.000M	62.4	+0.0 +0.0 +1.1	+0.0 +0.0 +2.5	+0.0 -38.9 +0.3	+0.0 +27.1	+0.0	54.5	90.0	-35.5	Vert
46	5490.000M	50.4	+0.0 +0.0 +2.2	+0.0 +0.0 +4.6	+0.0 -37.5 +0.1	+0.0 +34.1	+0.0	53.9	90.0	-36.1	Horiz
47	1853.600M	58.2	+0.0 +0.0 +1.1	+0.0 +0.0 +2.6	+0.0 -38.9 +0.3	+0.0 +27.2	+0.0	50.5	90.0	-39.5	Horiz
48	5560.800M	45.9	+0.0 +0.0 +2.2	+0.0 +0.0 +4.6	+0.0 -37.4 +0.1	+0.0 +33.9	+0.0	49.3	90.0	-40.7	Horiz
49	196.350M	53.9	+9.1 +0.2 +0.0	+6.0 +0.0 +0.0	+2.4 +0.0 +0.0	-28.0 +0.0	+0.0	43.6	90.0	-46.4	Horiz
50	239.100M	43.7	+12.1 +0.2 +0.0	+6.0 +0.0 +0.0	+2.7 +0.0 +0.0	-28.0 +0.0	+0.0	36.7	90.0	-53.3	Horiz
51	235.800M	43.1	+11.9 +0.2 +0.0	+6.0 +0.0 +0.0	+2.7 +0.0 +0.0	-28.0 +0.0	+0.0	35.9	90.0	-54.1	Vert
52	239.050M	42.2	+12.1 +0.2 +0.0	+6.0 +0.0 +0.0	+2.7 +0.0 +0.0	-28.0 +0.0	+0.0	35.2	90.0	-54.8	Vert

Test Location:	CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92821 • 714 993 6112		
Customer:	**Itron, Inc.**		
Specification:	**15.247(d) / 15.209 Radiated Spurious Emissions**		
Work Order #:	**100666**	Date:	8/13/2018
Test Type:	**Maximized Emissions**	Time:	14:49:33
Tested By:	Don Nguyen	Sequence#:	6
Software:	EMITest 5.03.11		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

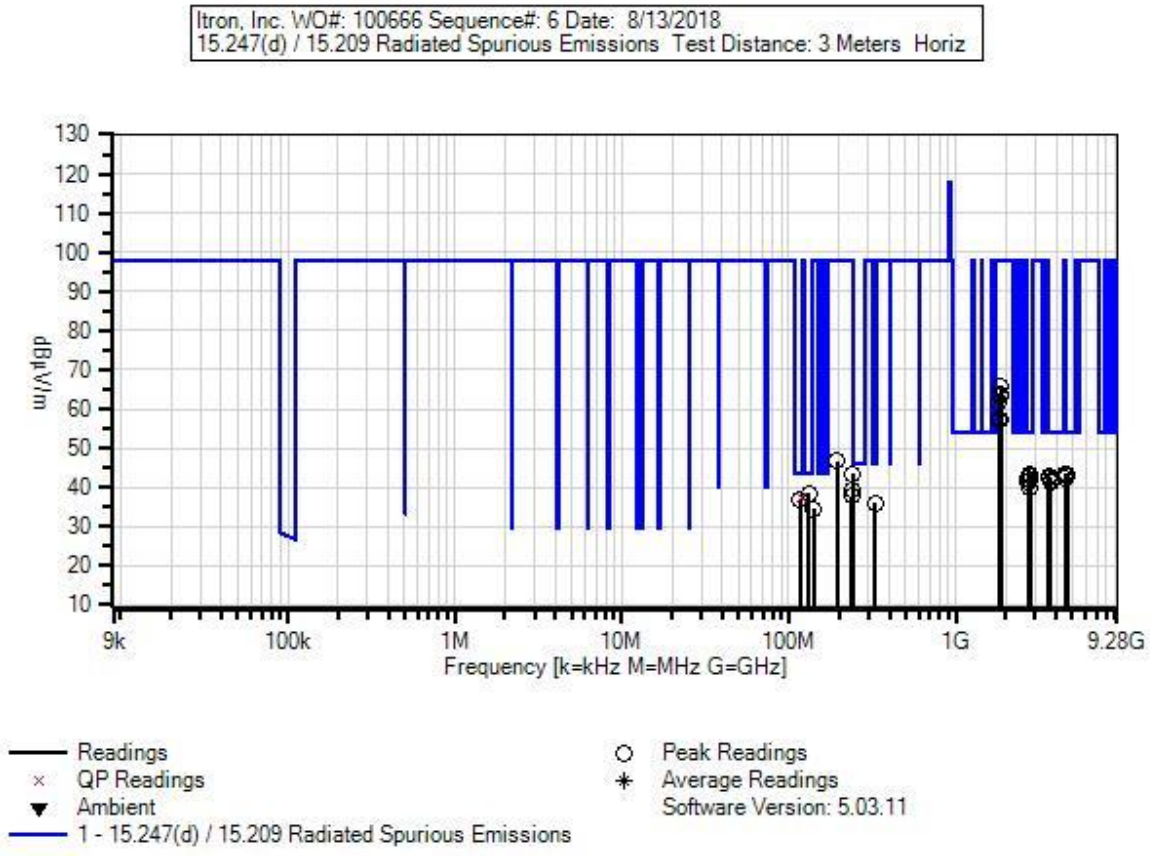
The equipment under test (EUT) is placed stand alone on the Styrofoam table top.
The EUT is turned on and placed in a continuous transmit mode.
The EUT has fresh batteries installed. Nominal input voltage is 6.0Vdc.
The EUT is tested in orientations specified by the manufacturer: vertical pipe and horizontal pipe.
Operating frequency: 903.0-926.8MHz
Modulation: OOK. Firmware power: power level 3
EUT firmware: CLI_Test_STM32_ALL_500GRD_Rev2_3_0_0_0.hex
Antenna type: Integral

Frequencies tested: 903.0MHz, 915.0MHz, 926.8MHz
Frequency range of measurement = 9kHz to 10000MHz.
9k-150kHz, RBW=200Hz, VBW=600Hz.
150k-30MHz, RBW=9kHz, VBW=27kHz.
30M-1000MHz, RBW=120kHz, VBW=360kHz
1000-10000MHz, RBW=1MHz, VBW=3MHz

Test environment conditions:
Temperature: 26.3°C
Relative Humidity: 56.8%
Pressure: 100kPa
Site A
Test Method: ANSI C63.10 (2013)

The evaluation if for PCII/ Reassessment. Worst case emission profile.

Modification #1 was in place during testing.


Itron, Inc. WO#: 100666 Sequence#: 6 Date: 8/13/2018
15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Horiz
dBµV/m
130
120
110
100
90
80
70
60
50
40
30
20
10
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: 5.03.11

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN00314	Loop Antenna	6502	5/13/2018	5/13/2020
T1	AN01995	Biconilog Antenna	CBL6111C	4/23/2018	4/23/2020
T2	ANP05275	Attenuator	1W	4/5/2018	4/5/2020
T3	ANP05198	Cable-Amplitude +15C to +45C (dB)	8268	12/7/2016	12/7/2018
T4	AN00309	Preamp	8447D	2/19/2018	2/19/2020
T5	ANP05050	Cable	RG223/U	1/20/2017	1/20/2019
T6	AN02672	Spectrum Analyzer	E4446A	3/2/2017	3/2/2019
T7	AN00786	Preamp	83017A	5/12/2018	5/12/2020
T8	AN00849	Horn Antenna	3115	3/14/2018	3/14/2020
T9	AN02946	Cable	32022-2-2909K-36TC	12/12/2017	12/12/2019
T10	ANP07139	Cable	ANDL1-PNMNM-48	3/1/2017	3/1/2019
T11	AN03169	High Pass Filter	HM1155-11SS	6/15/2017	6/15/2019

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

#	Freq	Rdng	T1 T5 T9	T2 T6 T10	T3 T7 T11	T4 T8	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	241.470M	50.3	+12.3 +0.2 +0.0	+6.0 +0.0 +0.0	+2.7 +0.0 +0.0	-28.0 +0.0	+0.0	43.5	46.0	-2.5	Horiz
2	131.300M	46.8	+11.8 +0.1 +0.0	+6.0 +0.0 +0.0	+1.9 +0.0 +0.0	-28.0 +0.0	+0.0	38.6	43.5	-4.9	Horiz
3	117.800M QP	45.8	+11.5 +0.1 +0.0	+6.0 +0.0 +0.0	+1.8 +0.0 +0.0	-28.0 +0.0	+0.0	37.2	43.5	-6.3	Horiz
^	117.800M	51.1	+11.5 +0.1 +0.0	+6.0 +0.0 +0.0	+1.8 +0.0 +0.0	-28.0 +0.0	+0.0	42.5	43.5	-1.0	Horiz
5	116.670M	45.5	+11.5 +0.1 +0.0	+6.0 +0.0 +0.0	+1.8 +0.0 +0.0	-28.0 +0.0	+0.0	36.9	43.5	-6.6	Vert
6	241.330M	46.0	+12.3 +0.2 +0.0	+6.0 +0.0 +0.0	+2.7 +0.0 +0.0	-28.0 +0.0	+0.0	39.2	46.0	-6.8	Vert
7	329.470M	40.3	+14.1 +0.2 +0.0	+6.0 +0.0 +0.0	+3.3 +0.0 +0.0	-27.9 +0.0	+0.0	36.0	46.0	-10.0	Horiz
8	2780.400M	47.8	+0.0 +0.0 +1.4	+0.0 +0.0 +3.3	+0.0 -38.6 +0.2	+0.0 +29.5	+0.0	43.6	54.0	-10.4	Vert
9	4634.000M	42.2	+0.0 +0.0 +1.8	+0.0 +0.0 +4.2	+0.0 -37.7 +0.2	+0.0 +32.8	+0.0	43.5	54.0	-10.5	Vert

10	4575.000M	42.2	+0.0	+0.0	+0.0	+0.0	+0.0	43.4	54.0	-10.6	Vert
			+0.0	+0.0	-37.8	+33.0					
			+1.8	+4.1	+0.1						
11	4515.000M	42.1	+0.0	+0.0	+0.0	+0.0	+0.0	43.2	54.0	-10.8	Vert
			+0.0	+0.0	-37.8	+32.9					
			+1.8	+4.1	+0.1						
12	3612.000M	44.5	+0.0	+0.0	+0.0	+0.0	+0.0	43.0	54.0	-11.0	Vert
			+0.0	+0.0	-38.4	+31.1					
			+1.8	+3.8	+0.2						
13	4575.000M	41.7	+0.0	+0.0	+0.0	+0.0	+0.0	42.9	54.0	-11.1	Horiz
			+0.0	+0.0	-37.8	+33.0					
			+1.8	+4.1	+0.1						
14	2745.000M	47.3	+0.0	+0.0	+0.0	+0.0	+0.0	42.9	54.0	-11.1	Vert
			+0.0	+0.0	-38.6	+29.4					
			+1.4	+3.2	+0.2						
15	4634.000M	41.5	+0.0	+0.0	+0.0	+0.0	+0.0	42.8	54.0	-11.2	Horiz
			+0.0	+0.0	-37.7	+32.8					
			+1.8	+4.2	+0.2						
16	3660.000M	43.6	+0.0	+0.0	+0.0	+0.0	+0.0	42.7	54.0	-11.3	Horiz
			+0.0	+0.0	-38.3	+31.6					
			+1.8	+3.8	+0.2						
17	3612.000M	44.1	+0.0	+0.0	+0.0	+0.0	+0.0	42.6	54.0	-11.4	Horiz
			+0.0	+0.0	-38.4	+31.1					
			+1.8	+3.8	+0.2						
18	2709.000M	47.1	+0.0	+0.0	+0.0	+0.0	+0.0	42.4	54.0	-11.6	Vert
			+0.0	+0.0	-38.6	+29.1					
			+1.4	+3.2	+0.2						
19	3660.000M	43.3	+0.0	+0.0	+0.0	+0.0	+0.0	42.4	54.0	-11.6	Vert
			+0.0	+0.0	-38.3	+31.6					
			+1.8	+3.8	+0.2						
20	4515.000M	41.1	+0.0	+0.0	+0.0	+0.0	+0.0	42.2	54.0	-11.8	Horiz
			+0.0	+0.0	-37.8	+32.9					
			+1.8	+4.1	+0.1						
21	2745.000M	46.1	+0.0	+0.0	+0.0	+0.0	+0.0	41.7	54.0	-12.3	Horiz
			+0.0	+0.0	-38.6	+29.4					
			+1.4	+3.2	+0.2						
22	3707.200M	42.3	+0.0	+0.0	+0.0	+0.0	+0.0	41.7	54.0	-12.3	Horiz
			+0.0	+0.0	-38.3	+31.9					
			+1.8	+3.8	+0.2						
23	2709.000M	46.0	+0.0	+0.0	+0.0	+0.0	+0.0	41.3	54.0	-12.7	Horiz
			+0.0	+0.0	-38.6	+29.1					
			+1.4	+3.2	+0.2						
24	3707.200M	41.9	+0.0	+0.0	+0.0	+0.0	+0.0	41.3	54.0	-12.7	Vert
			+0.0	+0.0	-38.3	+31.9					
			+1.8	+3.8	+0.2						
25	2780.400M	44.1	+0.0	+0.0	+0.0	+0.0	+0.0	39.9	54.0	-14.1	Horiz
			+0.0	+0.0	-38.6	+29.5					
			+1.4	+3.3	+0.2						
26	1853.600M	73.5	+0.0	+0.0	+0.0	+0.0	+0.0	65.8	98.0	-32.2	Vert
			+0.0	+0.0	-38.9	+27.2					
			+1.1	+2.6	+0.3						

27	1830.000M	71.5	+0.0 +0.0 +1.1	+0.0 +0.0 +2.5	+0.0 -38.9 +0.3	+0.0 +27.1	+0.0	63.6	98.0	-34.4	Vert
28	1853.600M	71.0	+0.0 +0.0 +1.1	+0.0 +0.0 +2.6	+0.0 -38.9 +0.3	+0.0 +27.2	+0.0	63.3	98.0	-34.7	Horiz
29	1806.000M	70.0	+0.0 +0.0 +1.1	+0.0 +0.0 +2.5	+0.0 -38.9 +0.3	+0.0 +27.0	+0.0	62.0	98.0	-36.0	Vert
30	1806.000M	65.5	+0.0 +0.0 +1.1	+0.0 +0.0 +2.5	+0.0 -38.9 +0.3	+0.0 +27.0	+0.0	57.5	98.0	-40.5	Horiz
31	1830.000M	65.1	+0.0 +0.0 +1.1	+0.0 +0.0 +2.5	+0.0 -38.9 +0.3	+0.0 +27.1	+0.0	57.2	98.0	-40.8	Horiz
32	194.970M	57.0	+9.1 +0.2 +0.0	+6.0 +0.0 +0.0	+2.4 +0.0 +0.0	-28.0 +0.0	+0.0	46.7	98.0	-51.3	Horiz
33	236.830M	44.9	+12.0 +0.2 +0.0	+6.0 +0.0 +0.0	+2.7 +0.0 +0.0	-28.0 +0.0	+0.0	37.8	98.0	-60.2	Vert
34	141.800M	42.8	+11.6 +0.1 +0.0	+6.0 +0.0 +0.0	+2.0 +0.0 +0.0	-28.0 +0.0	+0.0	34.5	98.0	-63.5	Horiz

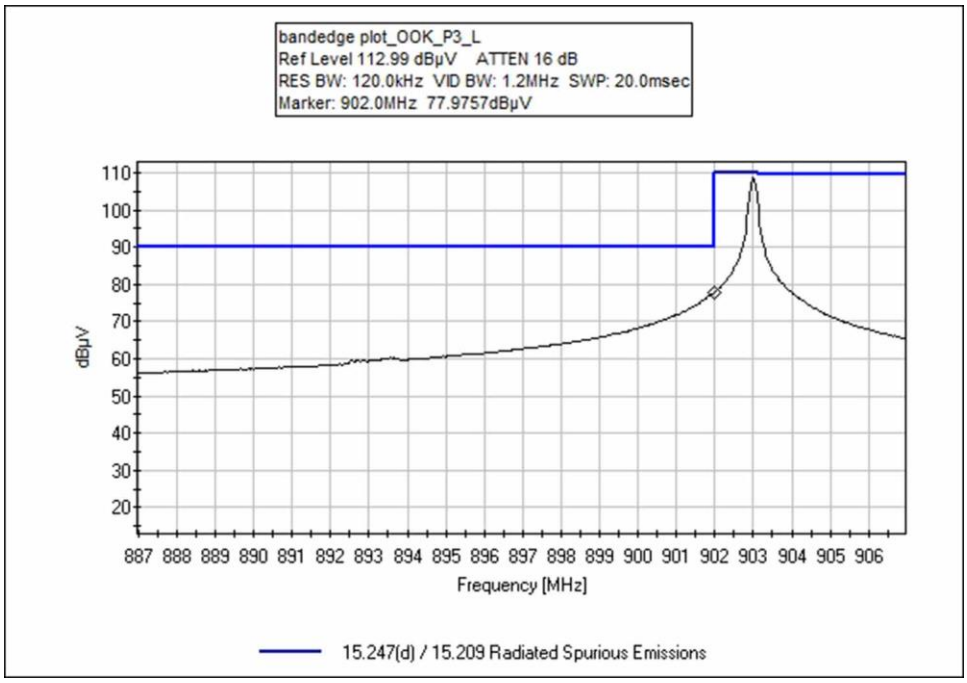
Band Edge

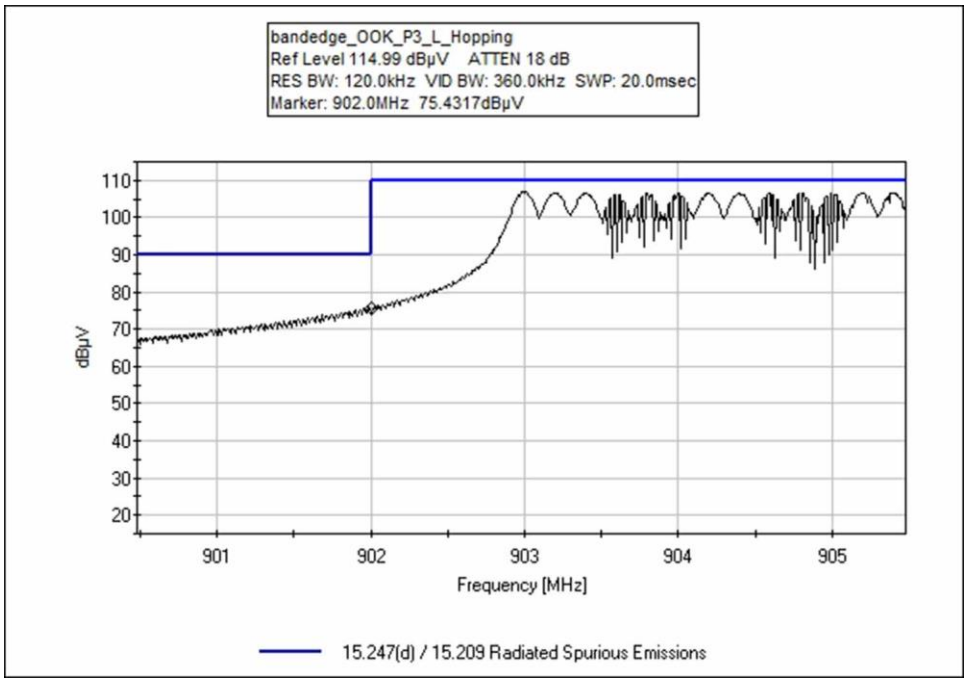
Band Edge Summary					
Frequency (MHz)	**Modulation**	**Ant. Type**	**Field Strength (dBuV/m @3m)**	**Limit (dBuV/m @3m)**	**Results**
902	OOK hop off L3	Integral / V	86.0	<98	Pass
928	OOK hop off_L3	Integral / V	83.3	<98	Pass
960	OOK hop off_L3	Integral / V	44.5*	<54	Pass
902	GFSK 10kbps hop off	Integral / V	83.9	<102	Pass
928	GFSK 10kbps hop off	Integral / V	74.9	<102	Pass
960	GFSK 10kbps hop off	Integral / V	42	<54	Pass
902	GFSK 150kbps hop off	Integral / V	64.3	<102	Pass
928	GFSK 150kbps hop off	Integral / V	68.3	<102	Pass
960	GFSK 150kbps hop off	Integral / V	43.9	<54	Pass
902	OOK hop on_L3	Integral / V	83.5	<98	Pass
928	OOK hop on_L3	Integral / V	80.5	<98	Pass
960	OOK hop on_L3	Integral / V	43.8*	<54	Pass
902	GFSK 10kbps hop on	Integral / V	89.6	<102	Pass
928	GFSK 10kbps hop on	Integral / V	76.0	<102	Pass
960	GFSK 10kbps hop on	Integral / V	44.6	<54	Pass
902	GFSK 150kbps hop on	Integral / V	64.6	<102	Pass
928	GFSK 150kbps hop on	Integral / V	66.5	<102	Pass
960	GFSK 150kbps hop on	Integral / V	44.0	<54	Pass

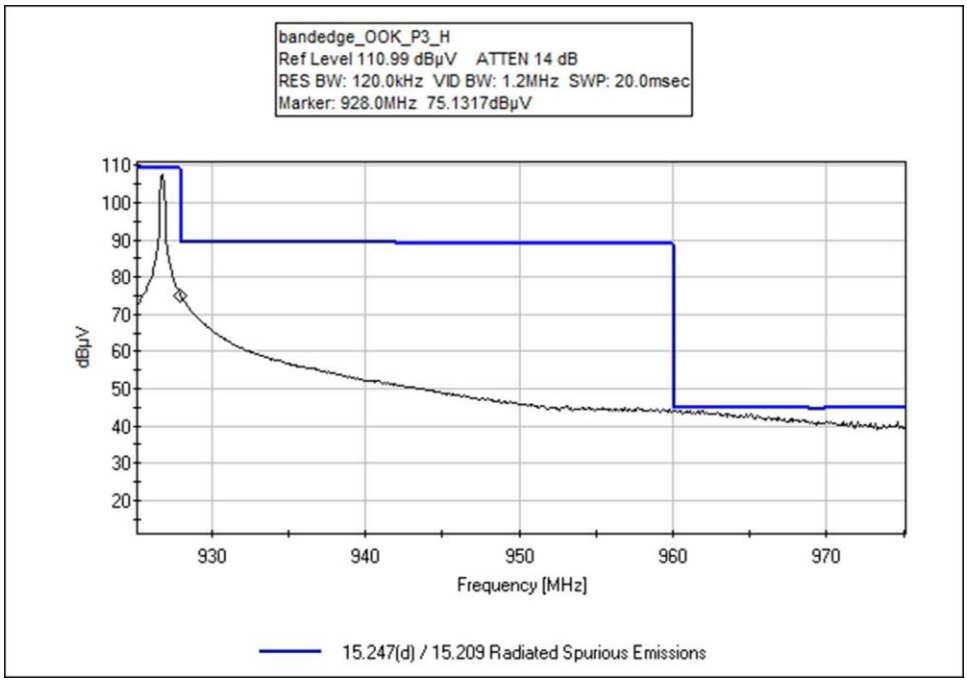
* = Quasi Peak (QP)

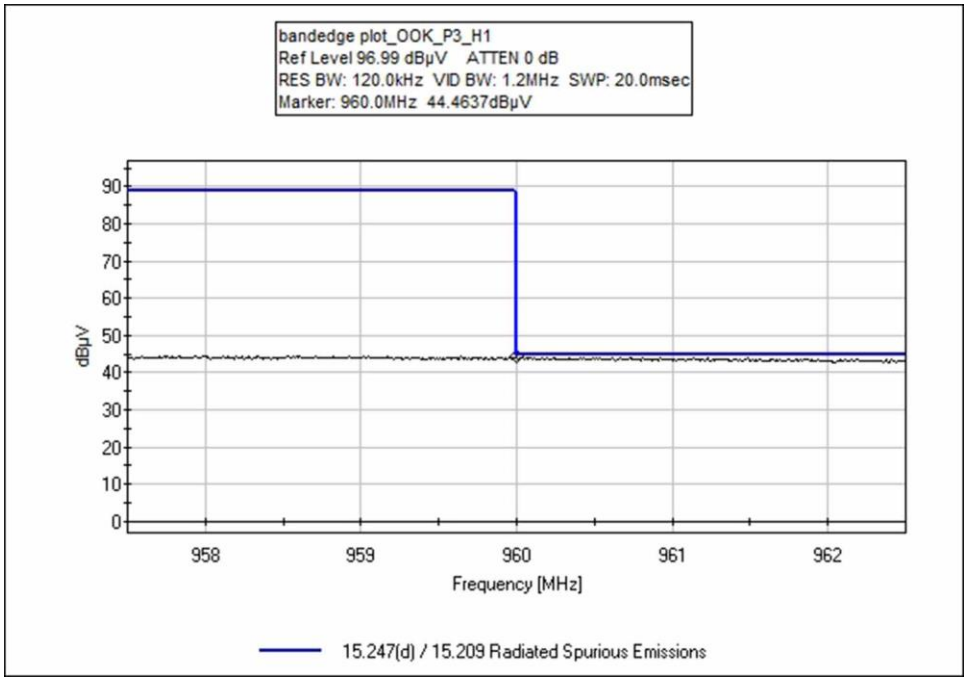
Band Edge Plots

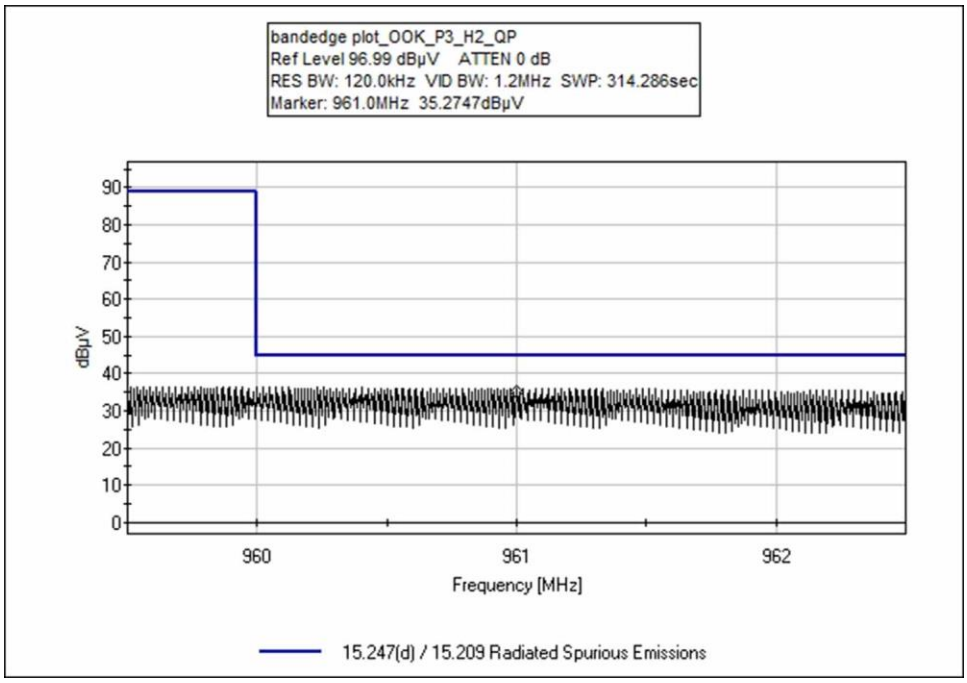
OOK

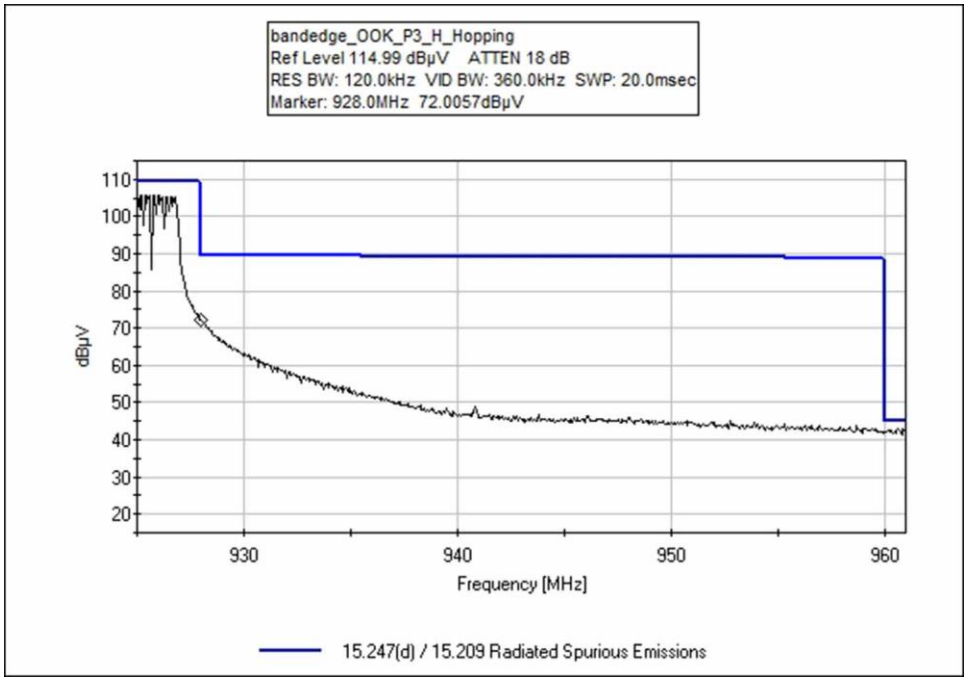




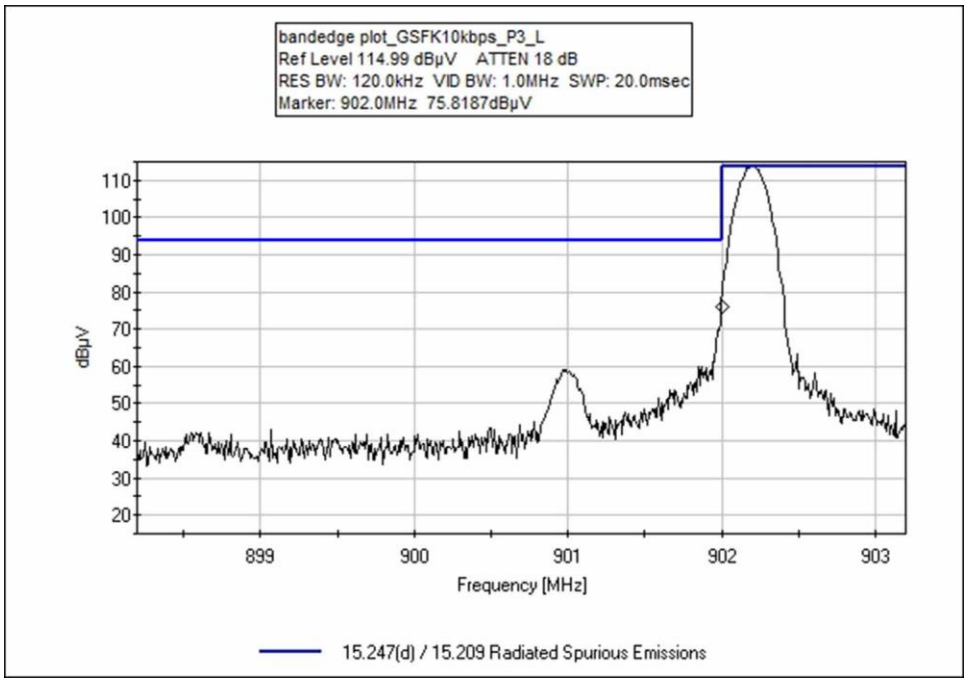

bandedge_OOK_P3_H
Ref Level 110.99 dBµV ATTEN 14 dB
RES BW: 120.0kHz VID BW: 1.2MHz SWP: 20.0msec
Marker: 928.0MHz 75.1317dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

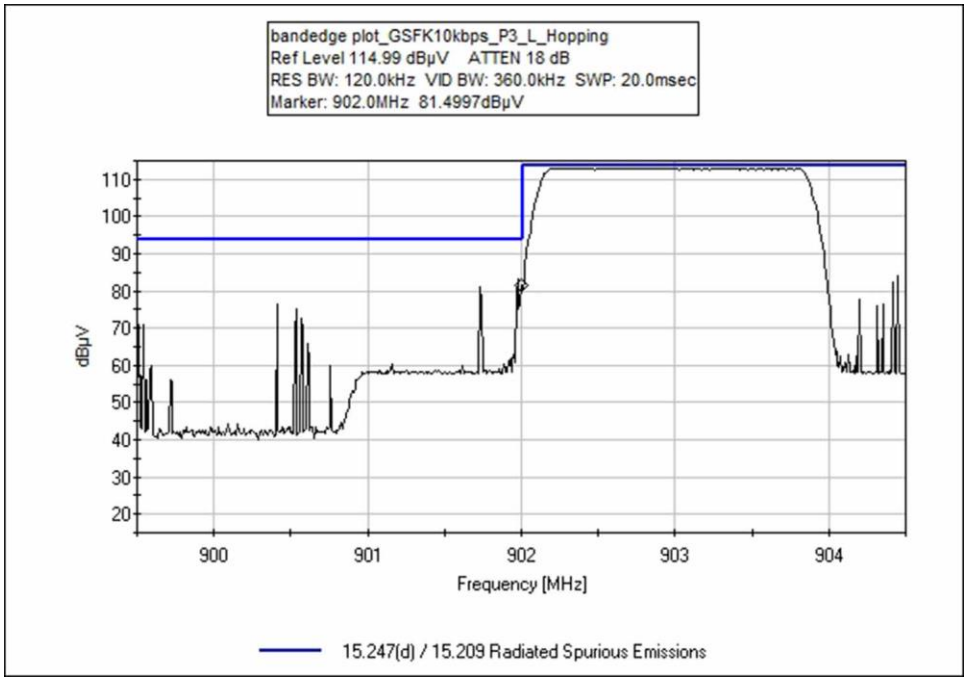

bandedge plot_OOK_P3_H1
Ref Level 96.99 dBµV ATTEN 0 dB
RES BW: 120.0kHz VID BW: 1.2MHz SWP: 20.0msec
Marker: 960.0MHz 44.4637dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

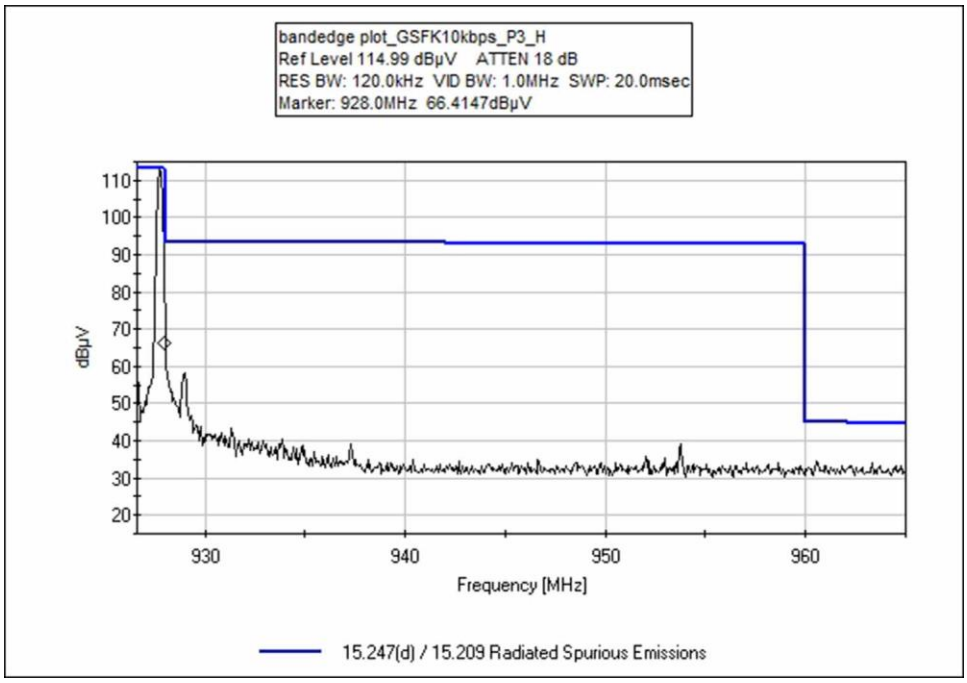

bandedge plot_OOK_P3_H2_QP
Ref Level 96.99 dBµV ATTEN 0 dB
RES BW: 120.0kHz VID BW: 1.2MHz SWP: 314.286sec
Marker: 961.0MHz 35.2747dBµV
dBµV
90
80
70
60
50
40
30
20
10
0
960
961
962
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

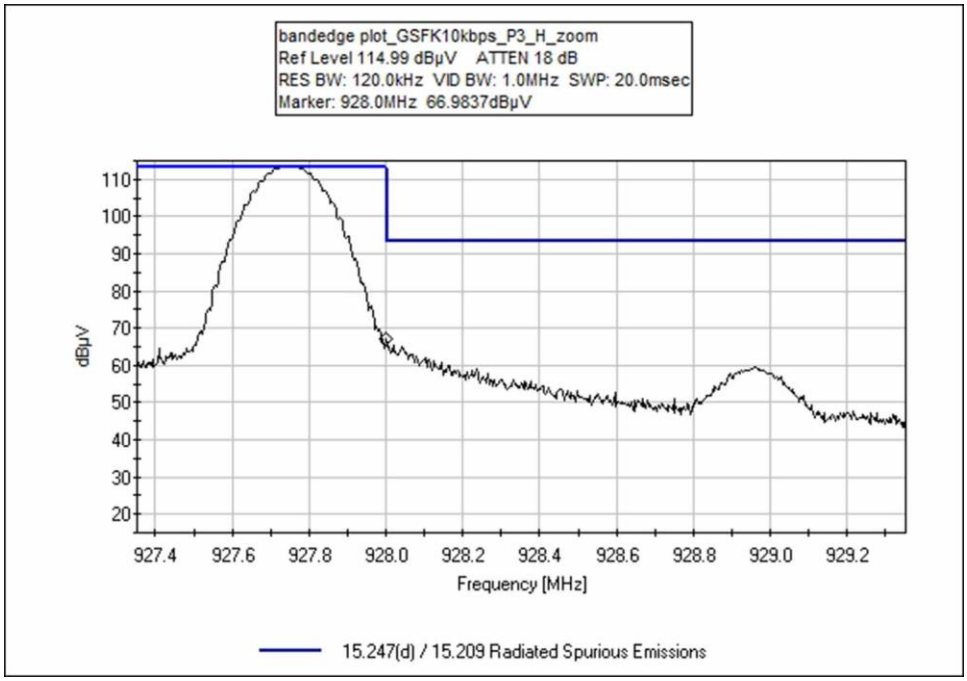

bandedge_OOK_P3_H_Hopping
Ref Level 114.99 dBµV ATTEN 18 dB
RES BW: 120.0kHz VID BW: 360.0kHz SWP: 20.0msec
Marker: 928.0MHz 72.0057dBµV
dBµV
110
100
90
80
70
60
50
40
30
20
930
940
950
960
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

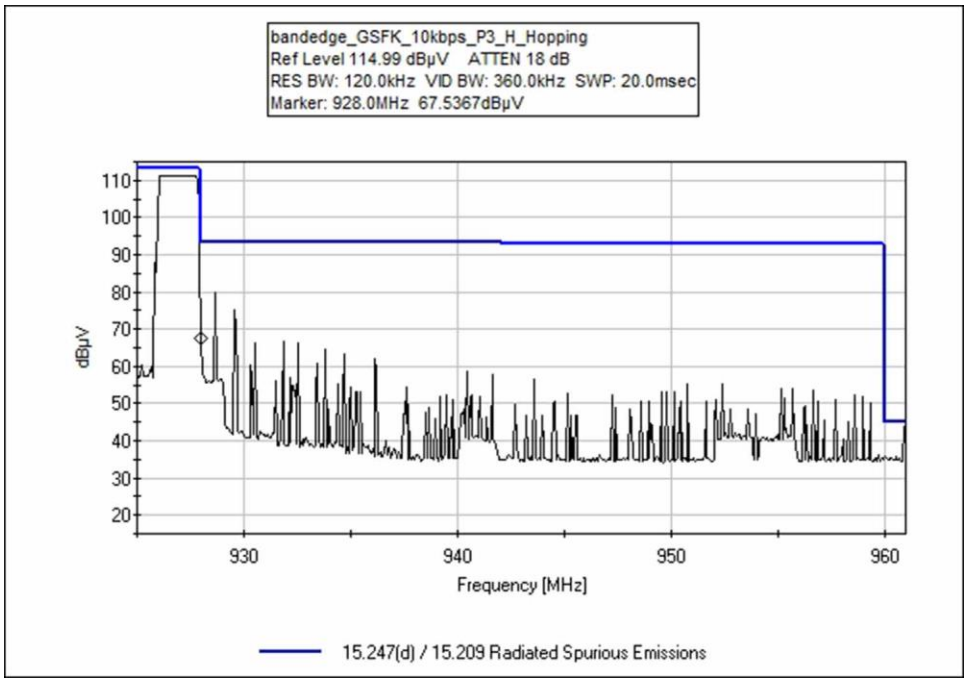
GFSK 10kbps

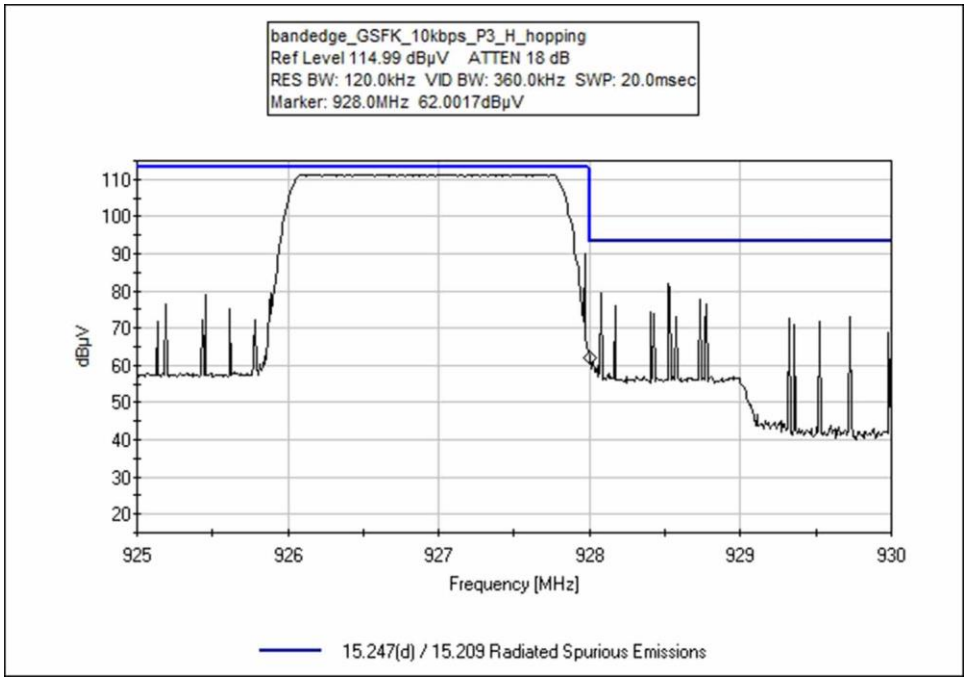

bandedge plot_GSFK10kbps_P3_L
Ref Level 114.99 dBµV ATTEN 18 dB
RES BW: 120.0kHz VID BW: 1.0MHz SWP: 20.0msec
Marker: 902.0MHz 75.8187dBµV
dBµV
110
100
90
80
70
60
50
40
30
20
899
900
901
902
903
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions


bandedge plot_GSFK10kbps_P3_L_Hopping
Ref Level 114.99 dBµV ATTEN 18 dB
RES BW: 120.0kHz VID BW: 360.0kHz SWP: 20.0msec
Marker: 902.0MHz 81.4997dBµV
dBµV
110
100
90
80
70
60
50
40
30
20
900
901
902
903
904
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

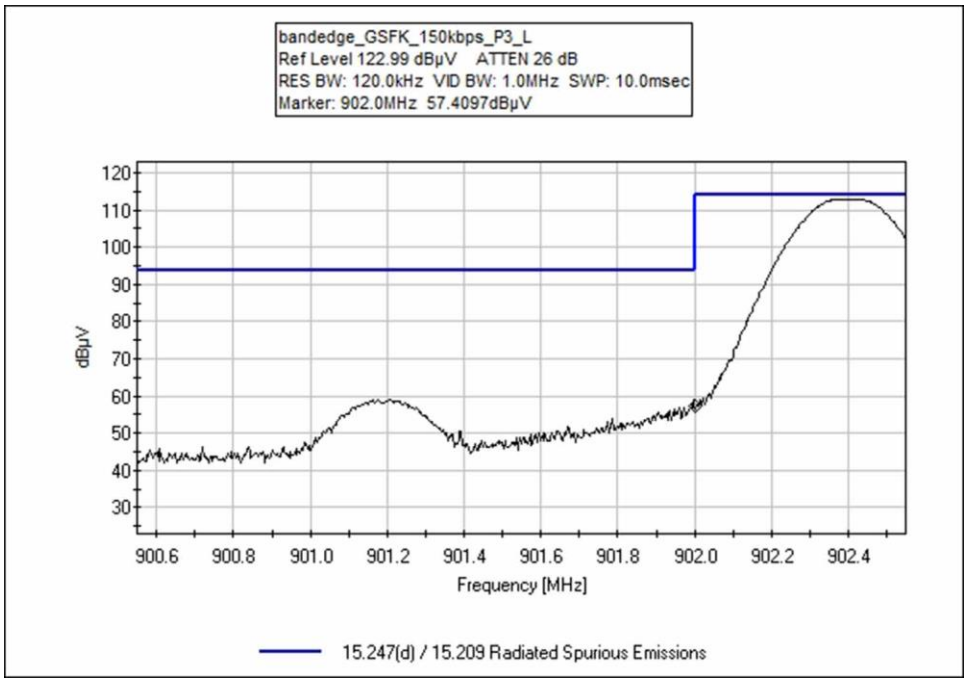

bandedge plot_GSFK10kbps_P3_H
Ref Level 114.99 dBµV ATTEN 18 dB
RES BW: 120.0kHz VID BW: 1.0MHz SWP: 20.0msec
Marker: 928.0MHz 66.4147dBµV
dBµV
110
100
90
80
70
60
50
40
30
20
930
940
950
960
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

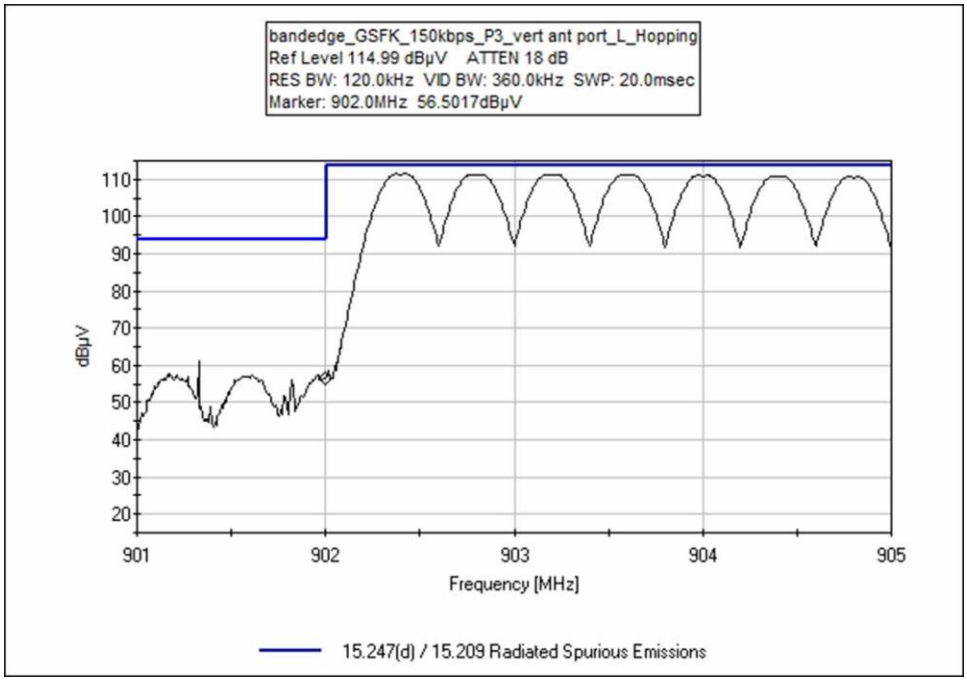

bandedge plot_GSFK10kbps_P3_H_zoom
Ref Level 114.99 dBµV ATTEN 18 dB
RES BW: 120.0kHz VID BW: 1.0MHz SWP: 20.0msec
Marker: 928.0MHz 66.9837dBµV
dBµV
110
100
90
80
70
60
50
40
30
20
927.4
927.6
927.8
928.0
928.2
928.4
928.6
928.8
929.0
929.2
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

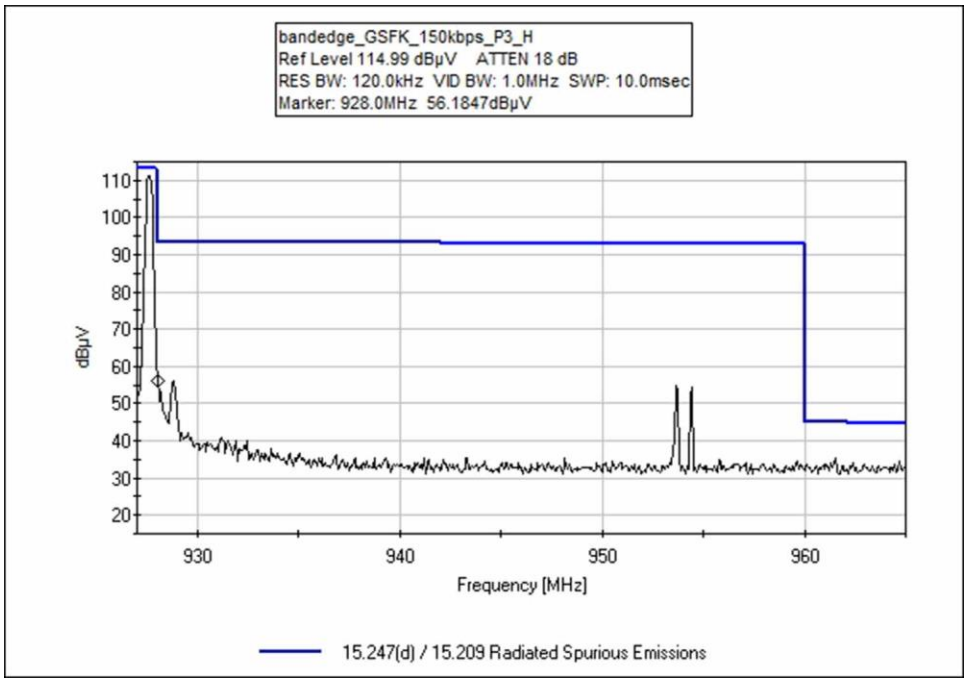

bandedge_GSFK_10kbps_P3_H_Hopping
Ref Level 114.99 dBµV ATTEN 18 dB
RES BW: 120.0kHz VID BW: 360.0kHz SWP: 20.0msec
Marker: 928.0MHz 67.5367dBµV
dBµV
110
100
90
80
70
60
50
40
30
20
930
940
950
960
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

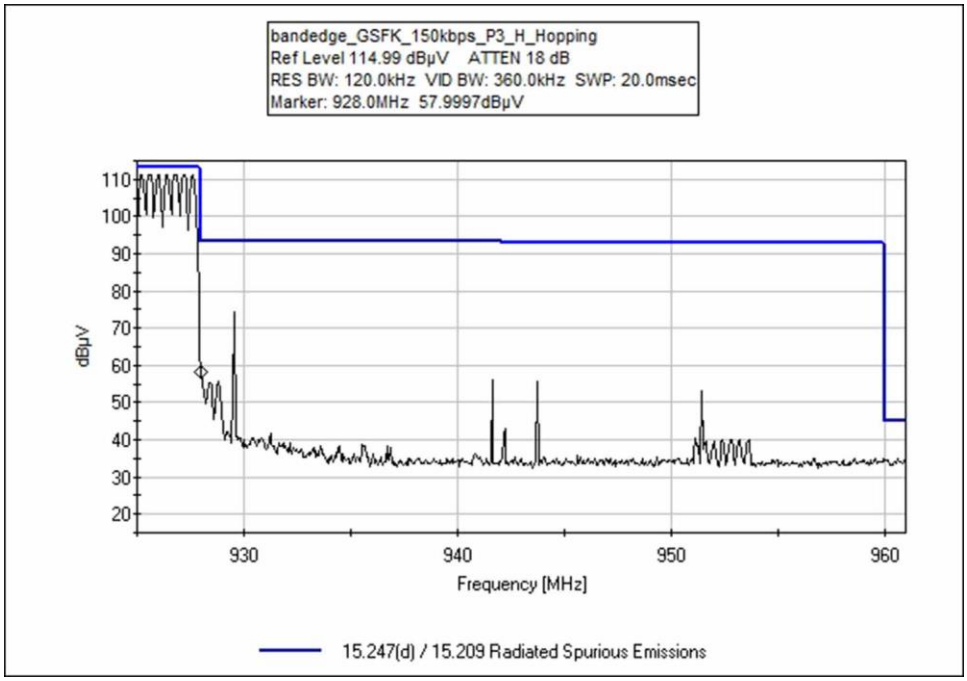

bandedge_GSFK_10kbps_P3_H_hopping
Ref Level 114.99 dBµV ATTEN 18 dB
RES BW: 120.0kHz VID BW: 360.0kHz SWP: 20.0msec
Marker: 928.0MHz 62.0017dBµV
dBµV
110
100
90
80
70
60
50
40
30
20
925
926
927
928
929
930
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

GFSK 150kbps






bandedge_GSFK_150kbps_P3_H
Ref Level 114.99 dBµV ATTEN 18 dB
RES BW: 120.0kHz VID BW: 1.0MHz SWP: 10.0msec
Marker: 928.0MHz 56.1847dBµV
dBµV
110
100
90
80
70
60
50
40
30
20
930
940
950
960
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions


bandedge_GSFK_150kbps_P3_H_Hopping
Ref Level 114.99 dBµV ATTEN 18 dB
RES BW: 120.0kHz VID BW: 360.0kHz SWP: 20.0msec
Marker: 928.0MHz 57.9997dBµV
dBµV
110
100
90
80
70
60
50
40
30
20
930
940
950
960
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

Test Setup / Conditions / Data

Test Location:	CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92821 • 714 993 6112		
Customer:	**Itron, Inc.**		
Specification:	**15.247(d) / 15.209 Radiated Spurious Emissions**		
Work Order #:	**100666**	Date:	8/7/2018
Test Type:	**Radiated Scan**	Time:	15:18:15
Tested By:	E. Wong	Sequence#:	4
Software:	EMITest 5.03.11		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

The equipment under test (EUT) is placed stand alone on the Styrofoam table top.
The EUT is turned on and placed in a continuous transmit mode.
The EUT has fresh batteries installed. Nominal input voltage is 6.0Vdc.
The EUT is tested in orientations specified by the manufacturer: vertical pipe and horizontal pipe.
Operating frequency: 908.0-923.8MHz
Modulation: OOK. **Firmware power**: **power level 0**
EUT firmware: CLI_Test_STM32_ALL_500GRD_Rev2_3_0_0_0.hex
Antenna type: Integral

Frequencies tested: 908.0MHz, 915.0MHz, 923.8MHz
Frequency range of measurement = 908.0-923.8MHz. RBW=120 kHz, VBW=360 kHz

Test environment conditions:
Temperature: 29°C
Relative Humidity: 41%
Pressure: 100kPa
Site A
Test Method: ANSI C63.10 (2013)

Modification #1 was in place during testing.

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02672	Spectrum Analyzer	E4446A	3/2/2017	3/2/2019
T2	AN01995	Biconilog Antenna	CBL6111C	4/23/2018	4/23/2020
T3	ANP05275	Attenuator	1W	4/5/2018	4/5/2020
T4	ANP05198	Cable-Amplitude +15C to +45C (dB)	8268	12/7/2016	12/7/2018
T5	AN00309	Preamp	8447D	2/19/2018	2/19/2020
T6	ANP05050	Cable	RG223/U	1/20/2017	1/20/2019

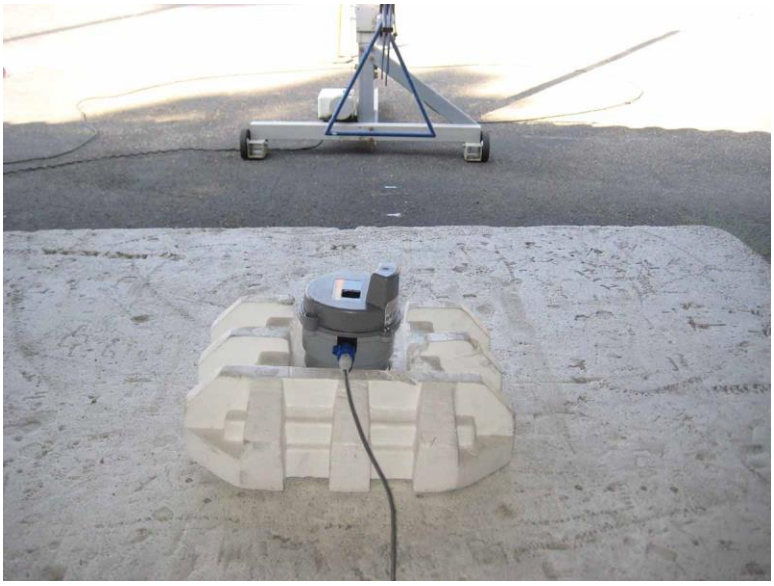
Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	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	74.5	+0.0 -27.2	+22.8 +0.5	+6.1	+5.9	+0.0	82.6	90.0 bandedge_OOK_P1_Vert Ant Port_L	-7.4	Vert
2	902.000M	74.2	+0.0 -27.2	+22.8 +0.5	+6.1	+5.9	+0.0	82.3	90.0 bandedge_OOK_P1_Vert Ant Port_L_Hop	-7.7	Vert
3	960.000M	35.5	+0.0 -27.3	+23.7 +0.5	+6.1	+6.1	+0.0	44.6	54.0 bandedge_GSFK_10kbps_P3_vert ant port_H2_hopping	-9.4	Horiz
4	960.000M QP	35.4	+0.0 -27.3	+23.7 +0.5	+6.1	+6.1	+0.0	44.5	54.0 bandedge_OOK_P3_VertAntport_H2	-9.5	Vert
5	960.000M	34.9	+0.0 -27.3	+23.7 +0.5	+6.1	+6.1	+0.0	44.0	54.0 bandedge_GSFK_150kbps_P3_vert ant port_H2_hopping	-10.0	Horiz
6	960.000M	34.8	+0.0 -27.3	+23.7 +0.5	+6.1	+6.1	+0.0	43.9	54.0 bandedge_GSFK_150kbps_P3_vert ant port_H2	-10.1	Horiz
7	960.000M QP	34.7	+0.0 -27.3	+23.7 +0.5	+6.1	+6.1	+0.0	43.8	54.0 bandedge_OOK_P3_H2_Vert ant Port_Hopping	-10.2	Vert
^	960.000M	43.5	+0.0 -27.3	+23.7 +0.5	+6.1	+6.1	+0.0	52.6	54.0 bandedge_OOK_P3_VertAntport_H2	-1.4	Vert
^	960.000M	42.2	+0.0 -27.3	+23.7 +0.5	+6.1	+6.1	+0.0	51.3	54.0 bandedge_OOK_P3_H2_Vert ant Port_Hopping	-2.7	Vert
^	960.000M	33.9	+0.0 -27.3	+23.7 +0.5	+6.1	+6.1	+0.0	43.0	54.0 bandedge_OOK_P1_Vert Ant Port_H2_Hop	-11.0	Vert

^	960.000M	31.4	+0.0 -27.3	+23.7 +0.5	+6.1	+6.1	+0.0	40.5	54.0 -13.5 bandedge_OOK_P1 _Vert Ant Port_H2	Vert
12	902.000M	77.9	+0.0 -27.2	+22.8 +0.5	+6.1	+5.9	+0.0	86.0	98.0 -12.0 bandedge_OOK_P3 _VertAntport_L	Vert
13	960.000M	32.9	+0.0 -27.3	+23.7 +0.5	+6.1	+6.1	+0.0	42.0	54.0 -12.0 bandedge_GSFK_1 0kbps_P3_vert ant port_H2	Horiz
14	902.000M	81.5	+0.0 -27.2	+22.8 +0.5	+6.1	+5.9	+0.0	89.6	102.0 -12.4 bandedge_GSFK_1 0kbps_P3_vert ant port_H_Hopping	Horiz
15	902.000M	75.4	+0.0 -27.2	+22.8 +0.5	+6.1	+5.9	+0.0	83.5	98.0 -14.5 bandedge_OOK_P3 _L_Vert ant Port_L_Hopping	Vert
16	928.000M	74.8	+0.0 -27.3	+23.2 +0.5	+6.1	+6.0	+0.0	83.3	98.0 -14.7 bandedge_OOK_P3 _VertAntport_H	Vert
17	928.000M	72.0	+0.0 -27.3	+23.2 +0.5	+6.1	+6.0	+0.0	80.5	98.0 -17.5 bandedge_OOK_P3 _H_Vert ant Port_Hopping	Vert
18	902.000M	75.8	+0.0 -27.2	+22.8 +0.5	+6.1	+5.9	+0.0	83.9	102.0 -18.1 bandedge_GSFK_1 0kbps_P3_vert ant port_L	Horiz
19	928.000M	61.2	+0.0 -27.3	+23.2 +0.5	+6.1	+6.0	+0.0	69.7	90.0 -20.3 bandedge_OOK_P1 _Vert Ant Port_H_Hop	Vert
20	928.000M	61.1	+0.0 -27.3	+23.2 +0.5	+6.1	+6.0	+0.0	69.6	90.0 -20.4 bandedge_OOK_P1 _Vert Ant Port_H	Vert
21	928.000M	67.5	+0.0 -27.3	+23.2 +0.5	+6.1	+6.0	+0.0	76.0	102.0 -26.0 bandedge_GSFK_1 0kbps_P3_vert ant port_H_hopping	Horiz
22	928.000M	66.4	+0.0 -27.3	+23.2 +0.5	+6.1	+6.0	+0.0	74.9	102.0 -27.1 bandedge_GSFK_1 0kbps_P3_vert ant port_H	Horiz

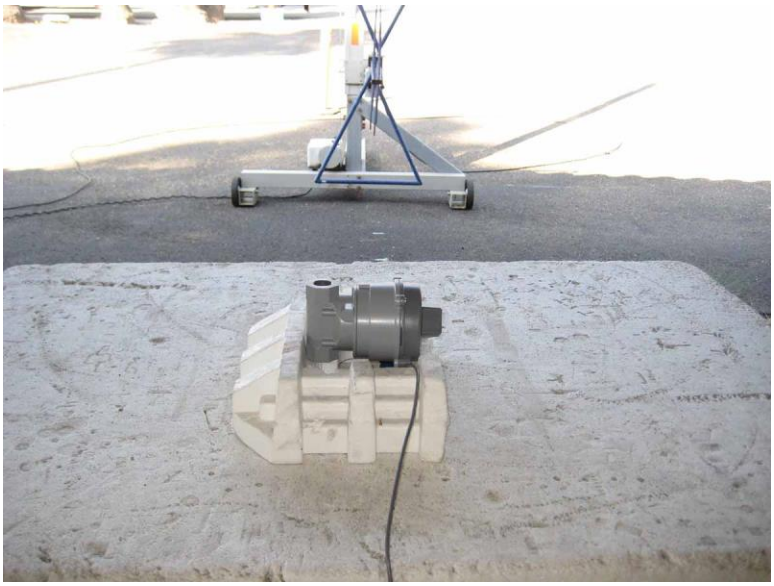
23	928.000M	59.8	+0.0 -27.3	+23.2 +0.5	+6.1	+6.0	+0.0	68.3	102.0	-33.7	Horiz bandedge_GSFK_150kbps_P3_vert antport_H
24	928.000M	58.0	+0.0 -27.3	+23.2 +0.5	+6.1	+6.0	+0.0	66.5	102.0	-35.5	Horiz bandedge_GSFK_150kbps_P3_vert antport_H_hopping
25	902.000M	56.5	+0.0 -27.2	+22.8 +0.5	+6.1	+5.9	+0.0	64.6	102.0	-37.4	Horiz bandedge_GSFK_150kbps_P3_vert antport_L_hopping
26	902.000M	56.2	+0.0 -27.2	+22.8 +0.5	+6.1	+5.9	+0.0	64.3	102.0	-37.7	Horiz bandedge_GSFK_150kbps_P3_vert antport_L

Test Setup Photos

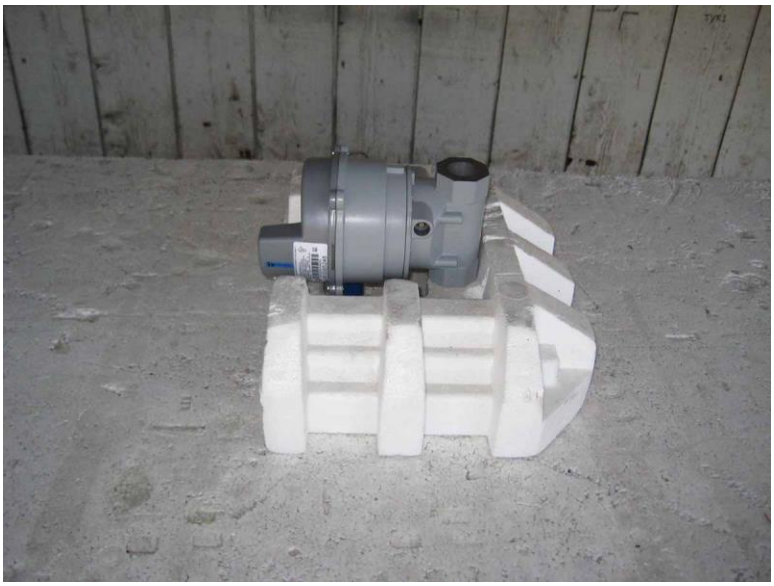


9kHz – 1GHz, Horizontal Pipe

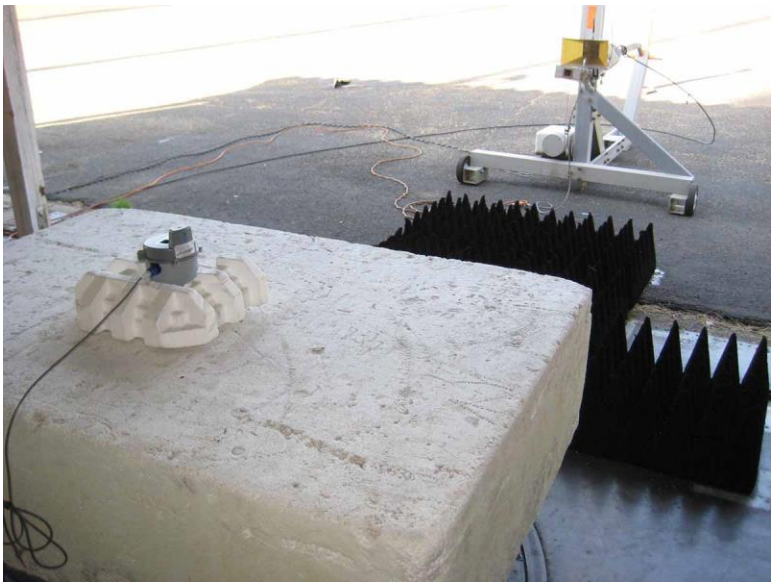
9kHz – 1GHz, Horizontal Pipe



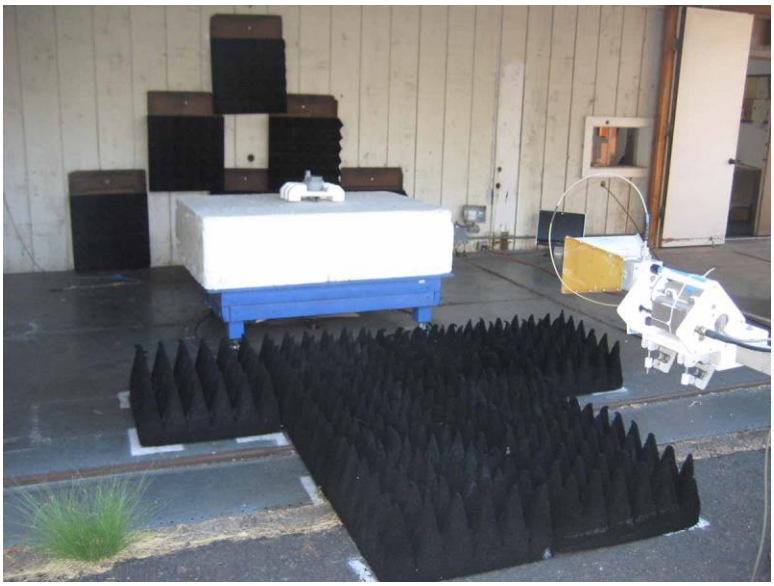
9kHz – 1GHz, Vertical Pipe



9kHz – 1GHz, Vertical Pipe



1 – 10GHz, Cone placement



1 – 10GHz, Cone placement

Appendix A: Manufacturer Declaration

The following device and model has been tested by CKC Laboratories:
Device: OpenWay Gas Remote Disconnect
Model: OWGRD

Since the time of testing, the manufacturer has chosen to use the following device and model name in its place. The manufacturer declares that any differences between the names does not affect their EMC characteristics and therefore meets the level of testing equivalent to the tested device and model name:
Device: OpenWay Riva Gas Remote Disconnect
Model: OWRGRD

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.

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.