

15.247(d) RF Conducted Emissions & Band Edge

Test Setup / Conditions / Data

Test Location: CKC Laboratories, Inc • 110 N. Olinda Place • Brea, CA 92823 • 714-993-6112
 Customer: **Itron, Inc**
 Specification: **15.247(d) Conducted Spurious Emissions**
 Work Order #: **100666** Date: 12/8/2017
 Test Type: **Conducted Emissions** Time: 18:58:17
 Tested By: S. Yamamoto Sequence#: 6
 Software: EMITest 5.03.11 6V Battery

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

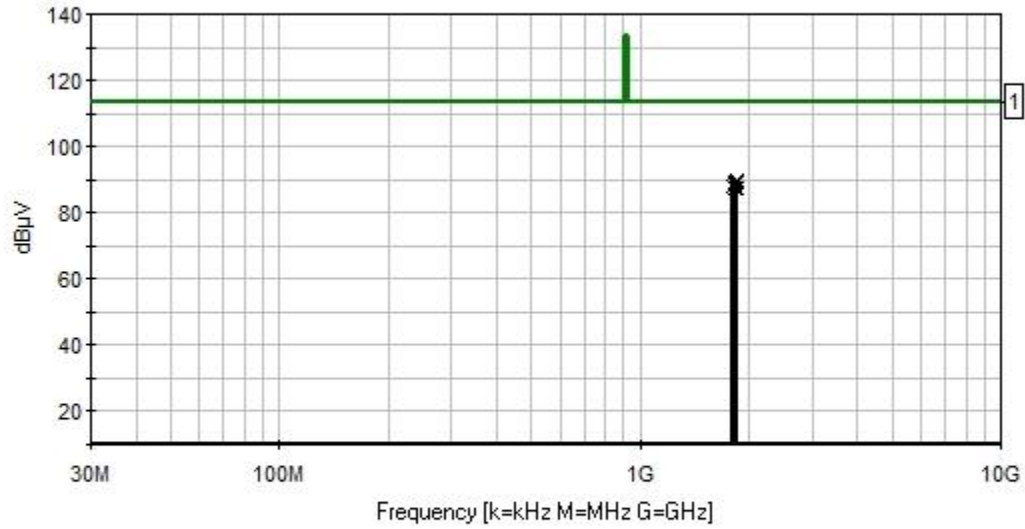
Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

The equipment under test (EUT) is placed stand alone on the table top. The EUT is turned on and placed in a continuous transmit mode. The EUT has new batteries installed. Nominal input voltage is 6.0Vdc.
 The EUT vertical antenna port is connected to the spectrum analyzer using coaxial cable and attenuator.
 Operating frequency:
 pwr lvl 1 - OOK 903-926.8MHz
 pwr lvl 3 - OOK 903 - 926.8MHz
 pwr lvl 3 - 10kpbs GFSK 902.2 - 927.75MHz
 pwr lvl 3 - 150kbps GFSK 902.4 - 927.6MHz
 Frequencies tested:
 pwr lvl 1 - OOK 903, 915, 926.8MHz
 pwr lvl 3 - OOK 903, 915, 926.8MHz
 pwr lvl 3 - 10kpbs GFSK 902.2, 915, 927.75MHz
 pwr lvl 3 - 150kbps GFSK 902.4, 915.2, 927.6MHz
 Frequency range of measurement = 30MHz to 10GHz. RBW=100 kHz, VBW=300 kHz
 Test environment conditions: 20°C, 30%, 101kPa, Site A
 Test Method: ANSI C63.10 (2013)
 Limit -20dB
 EUT firmware 2.0.10.0
 Antenna type integral
 Antenna gain 2.3 dBi (vertical) and 0.1 dBi (horizontal)
 For pl1 OOK, no emissions found within 20dB of the limit line.

Ittron, Inc WO#: 100666 Sequence#: 6 Date: 12/8/2017
15.247(d) Conducted Spurious Emissions Test Lead: 6V Battery Antenna Port



— Readings
 1 - 15.247(d) Conducted Spurious Emissions
 x Peak Readings
 Software Version: 5.03.11

Test Equipment:

ID	Asset #/Serial #	Description	Model	Calibration Date	Cal Due Date
T1	ANP06664	Cable	PHASEFLEX FJR01N01036.0	4/5/2016	4/5/2018
	AN02672	Spectrum Analyzer	E4446A	3/2/2017	3/2/2019
T2	AN03432	Attenuator	90-30-34	10/27/2017	10/27/2019

Measurement Data:

Reading listed by order taken.

Test Lead: Antenna Port

#	Freq MHz	Rdng dB μ V	T1 dB	T2 dB	dB	dB	Dist Table	Corr dB μ V	Spec dB μ V	Margin dB	Polar Ant
1	1805.997M	57.7	+0.6	+29.7			+0.0	88.0	109.2 pl3 OOK	-21.2	Anten
2	1829.997M	57.2	+0.6	+29.7			+0.0	87.5	109.2 pl3 OOK	-21.7	Anten
3	1853.603M	57.0	+0.6	+29.7			+0.0	87.3	109.2 pl3 OOK	-21.9	Anten
4	1804.402M	58.0	+0.6	+29.7			+0.0	88.3	113.1 pl3 GFSK 10kbps	-24.8	Anten
5	1830.002M	58.8	+0.6	+29.7			+0.0	89.1	113.1 pl3 GFSK 10kbps	-24.0	Anten
6	1855.505M	59.8	+0.6	+29.7			+0.0	90.1	113.1 pl3 GFSK 10kbps	-23.0	Anten
7	1804.835M	57.4	+0.6	+29.7			+0.0	87.7	113.1 pl3 GFSK 150kbps	-25.4	Anten
8	1830.363M	58.2	+0.6	+29.7			+0.0	88.5	113.1 pl3 GFSK 150kbps	-24.6	Anten
9	1855.242M	59.1	+0.6	+29.7			+0.0	89.4	113.1 pl3 GFSK 150kbps	-23.7	Anten

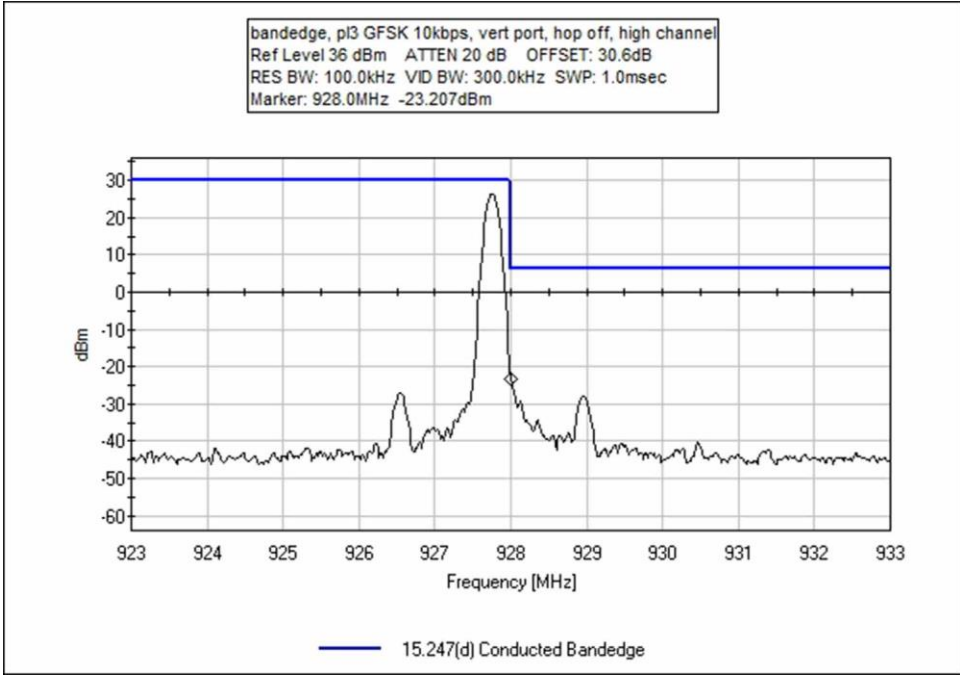
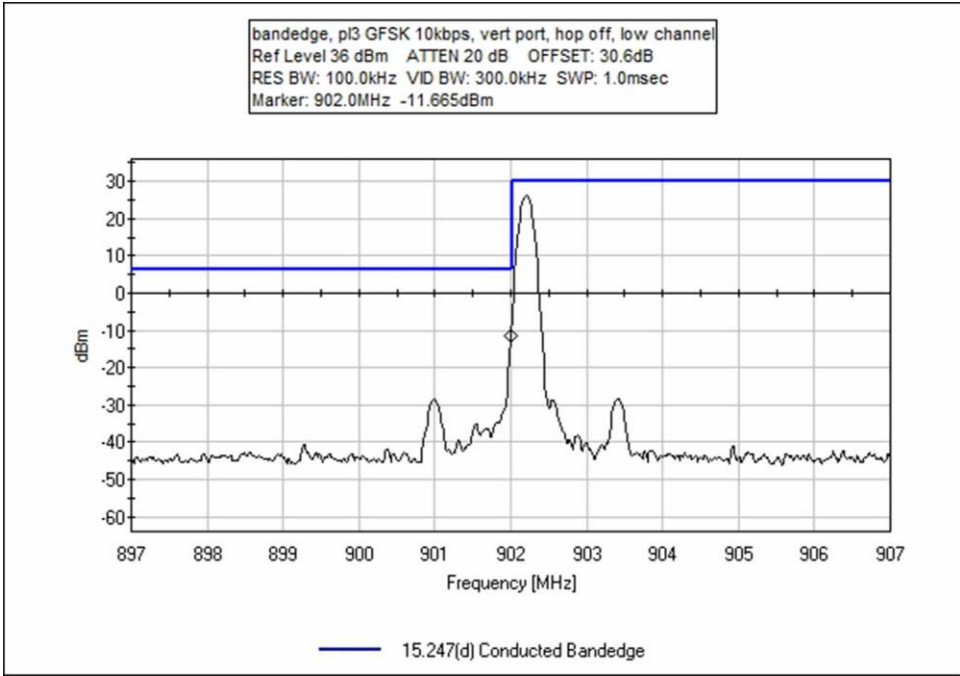
Band Edge

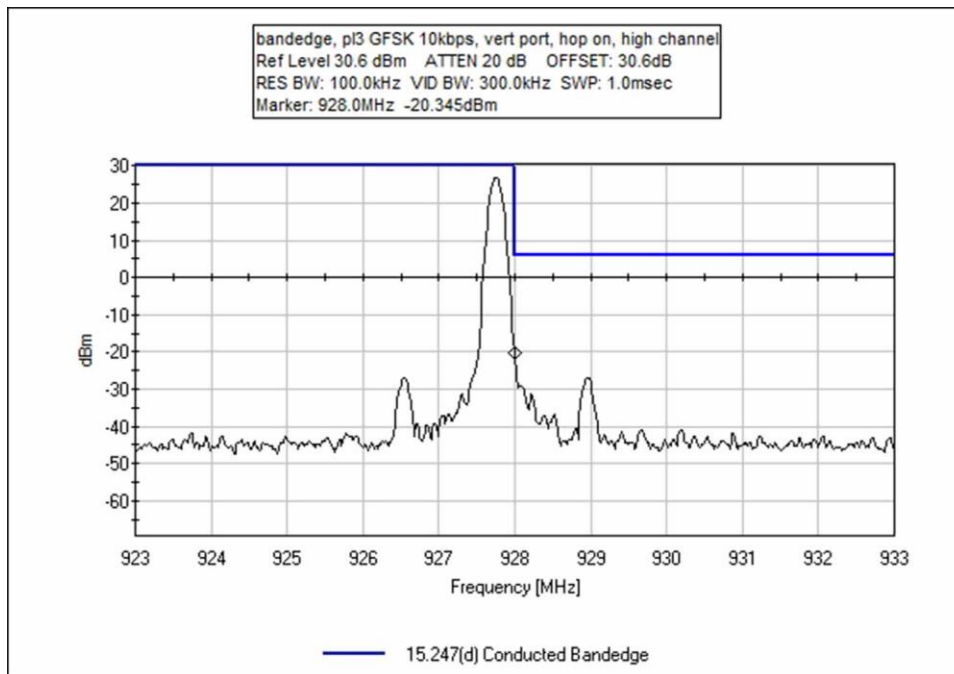
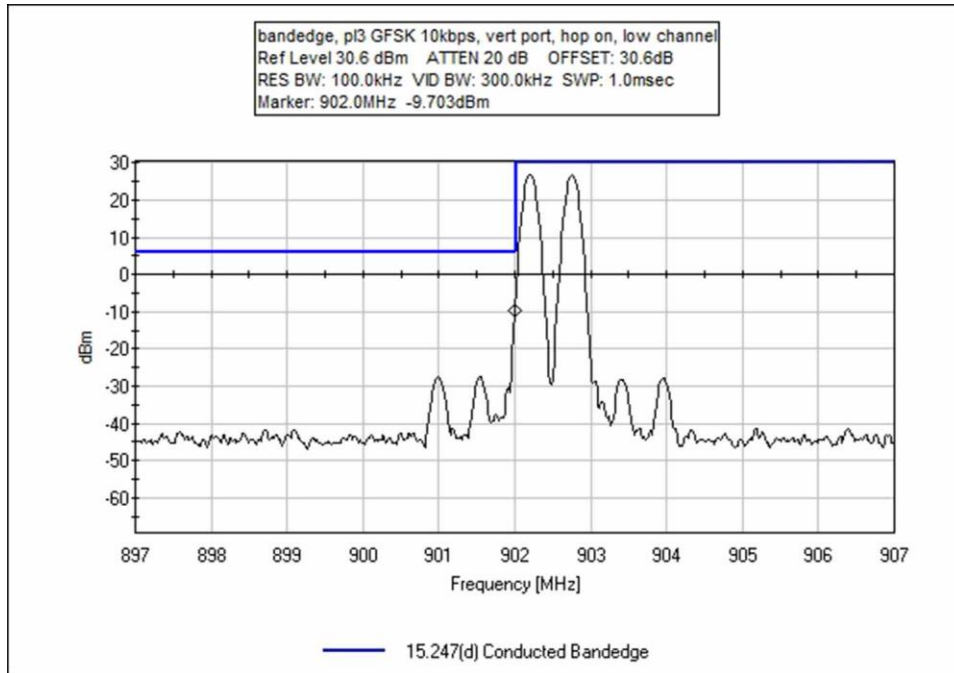
Band Edge Summary

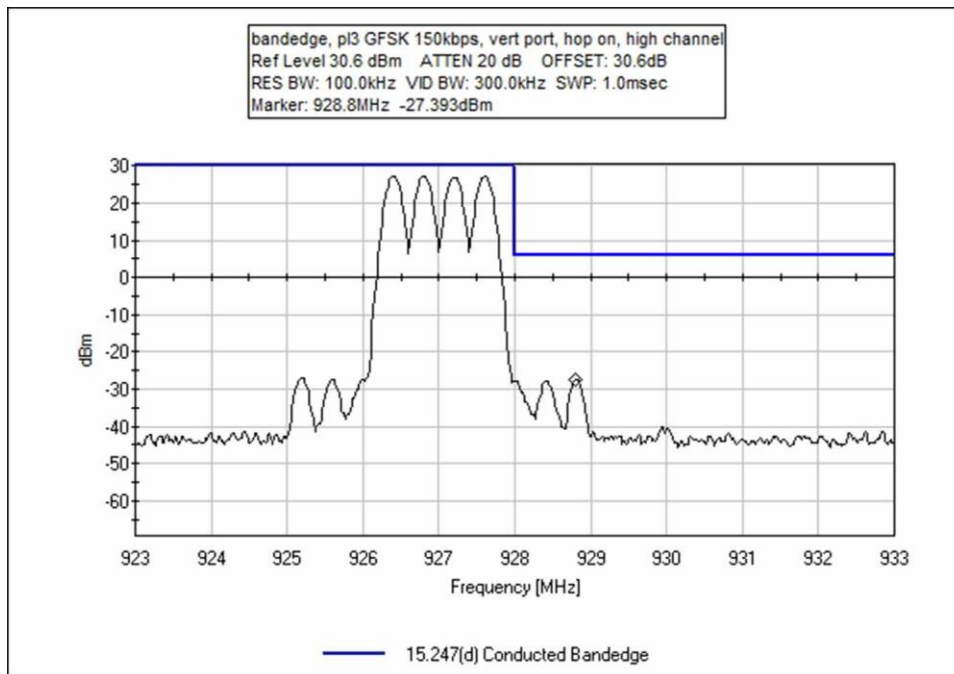
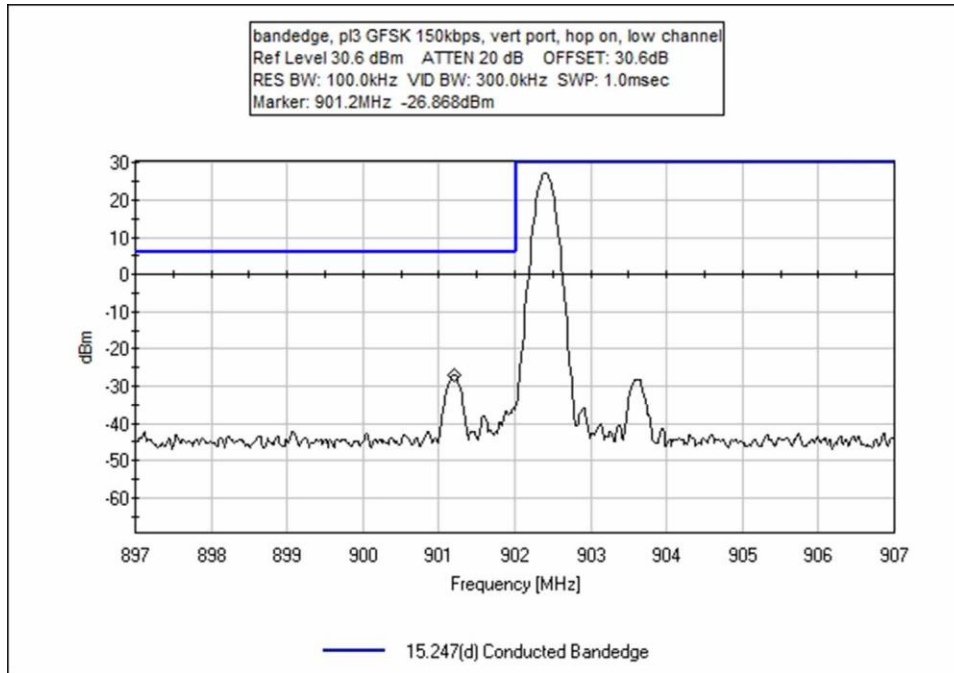
Limit applied: Max Power/100kHz - 20dB.

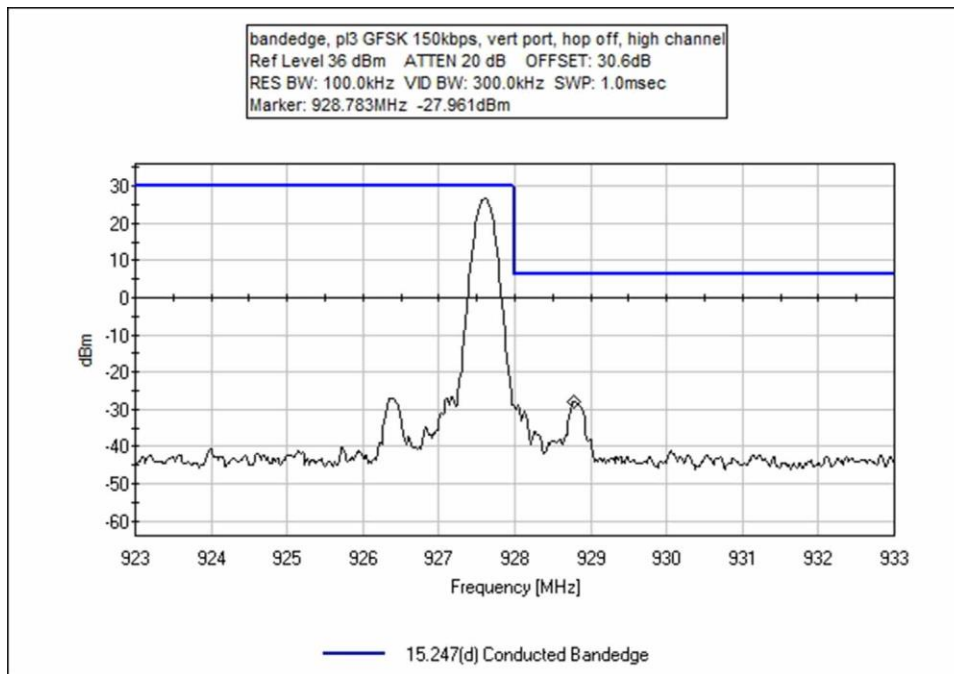
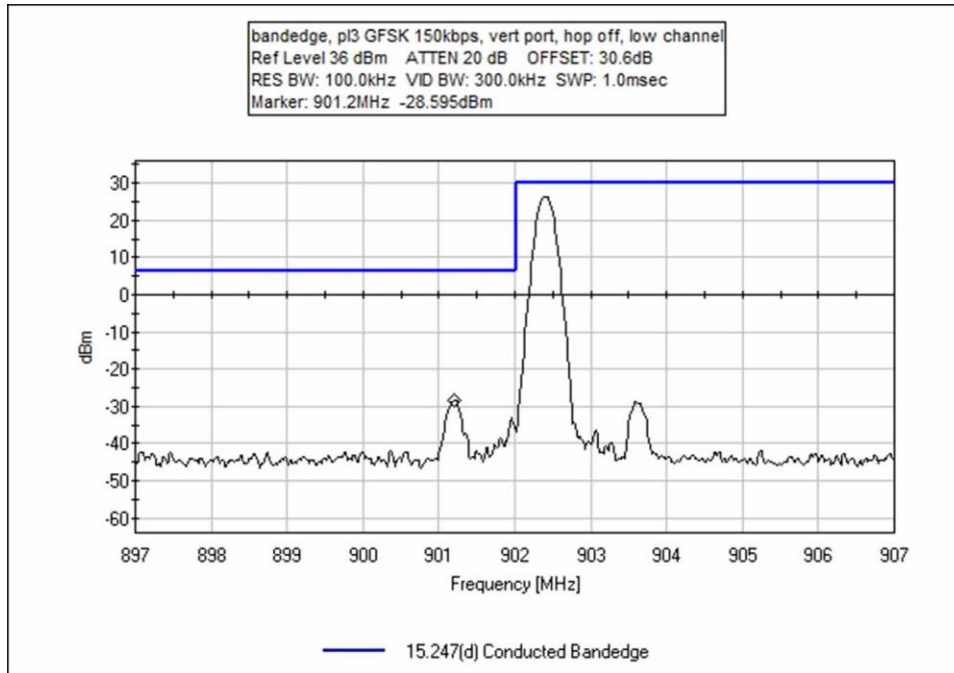
Frequency (MHz)	Modulation	Measured (dBm)	Limit (dBm)	Results
902	OOK hop off	-10.2	<2.9	Pass
928	OOK hop off	-11.4	<2.9	Pass
902	GFSK 10kbps hop off	-11.7	<5.4	Pass
928	GFSK 10kbps hop off	-23.2	<5.4	Pass
902	GFSK 150kbps hop off	-28.6	<5.4	Pass
928	GFSK 150kbps hop off	-28.0	<5.4	Pass
902	OOK hop on	-10.6	<2.9	Pass
928	OOK hop on	-11.7	<2.9	Pass
902	GFSK 10kbps hop on	-9.7	<5.4	Pass
928	GFSK 10kbps hop on	-20.3	<5.4	Pass
902	GFSK 150kbps hop on	-26.9	<5.4	Pass
928	GFSK 150kbps hop on	-27.4	<5.4	Pass

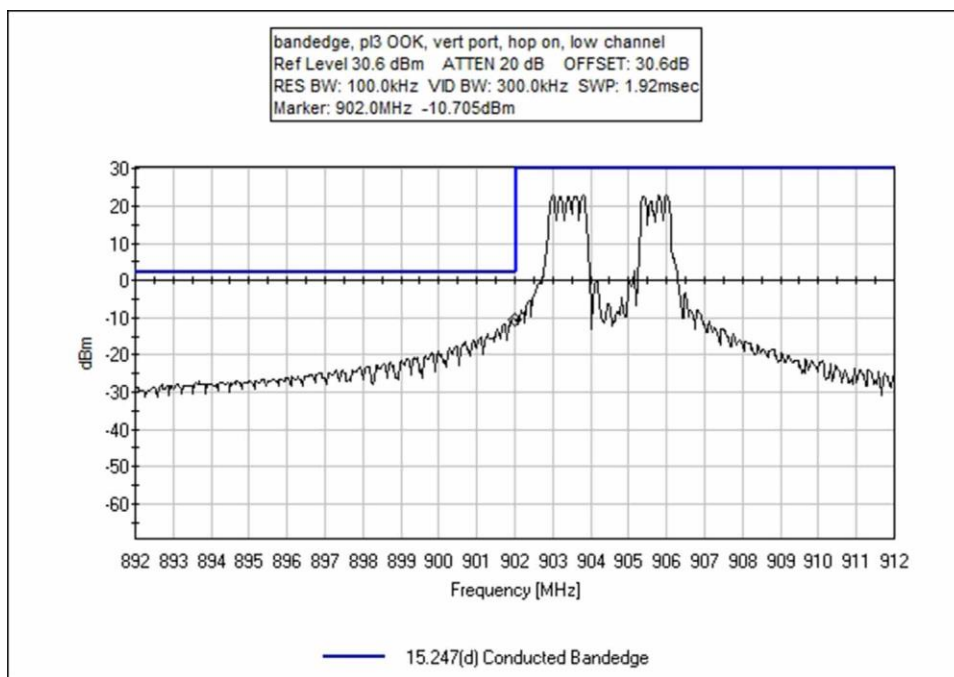
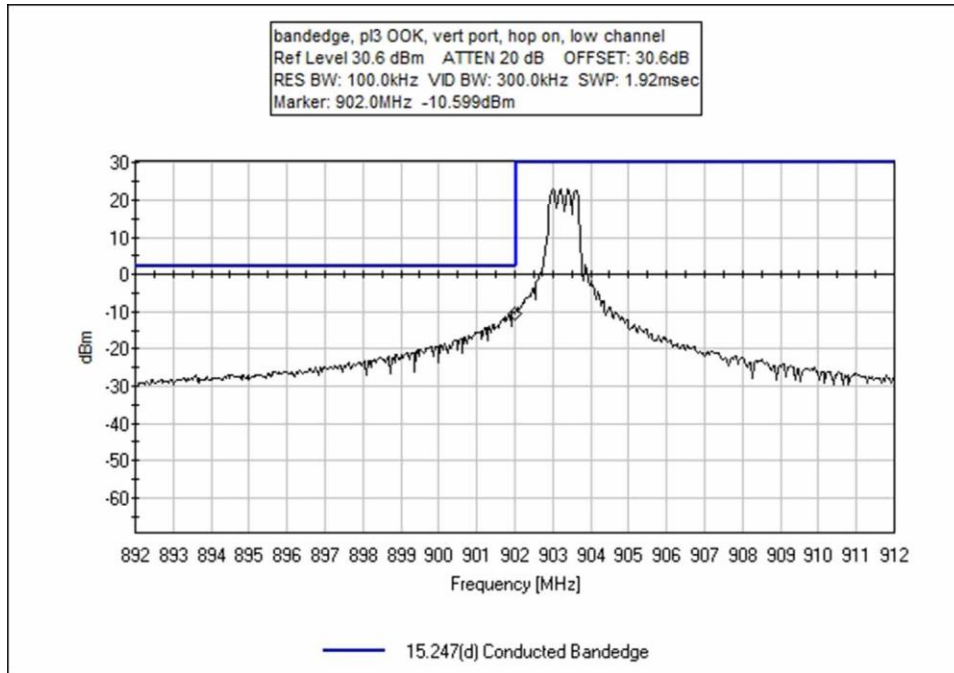
Band Edge Plots

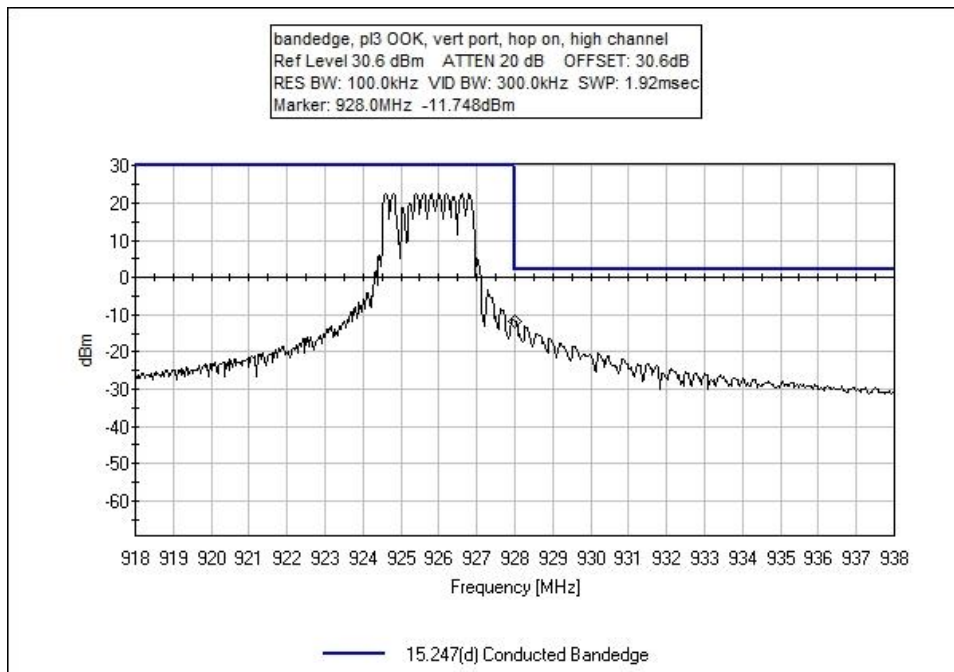
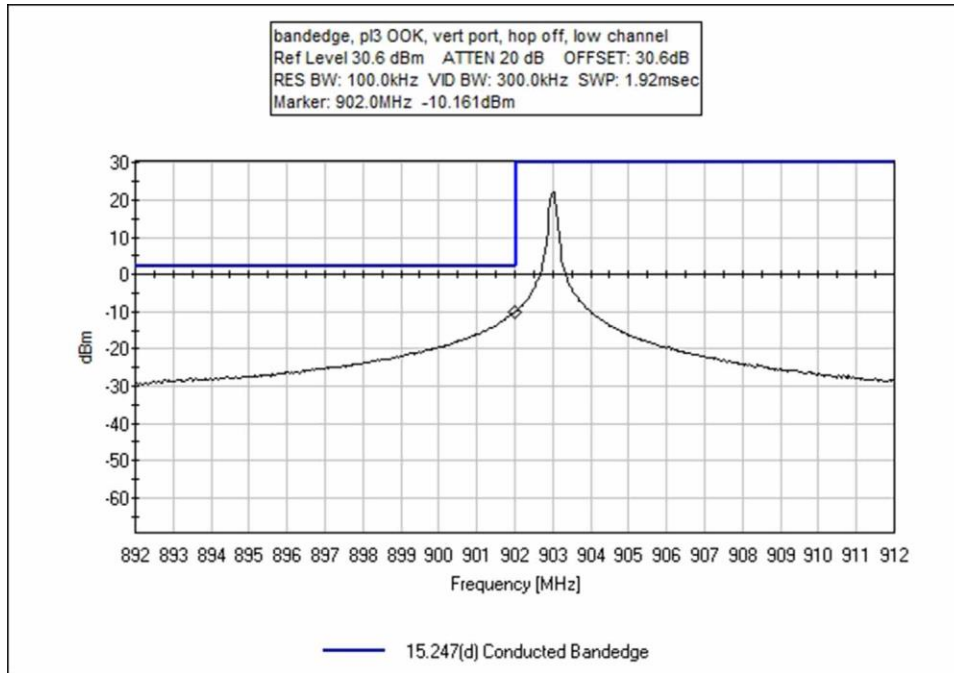




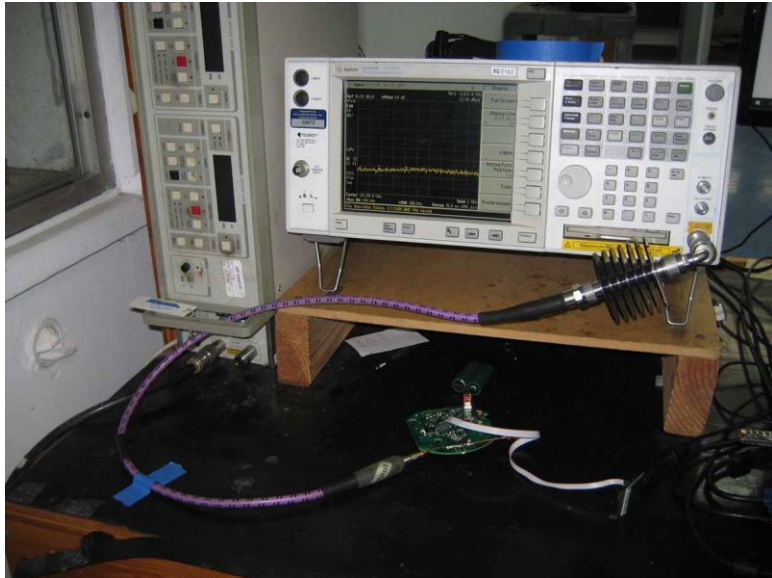








Test Setup Photo(s)



15.247(d) Radiated Emissions & Band Edge

Test Setup / Conditions / Data

Test Location: CKC Laboratories, Inc • 110 N. Olinda Place • Brea, CA 92823 • 714-993-6112
 Customer: **Itron, Inc**
 Specification: **15.247(d) / 15.209 Radiated Spurious Emissions**
 Work Order #: **100666** Date: 12/12/2017
 Test Type: **Maximized Emissions** Time: 15:58:48
 Tested By: S. Yamamoto Sequence#: 11
 Software: EMITest 5.03.11

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

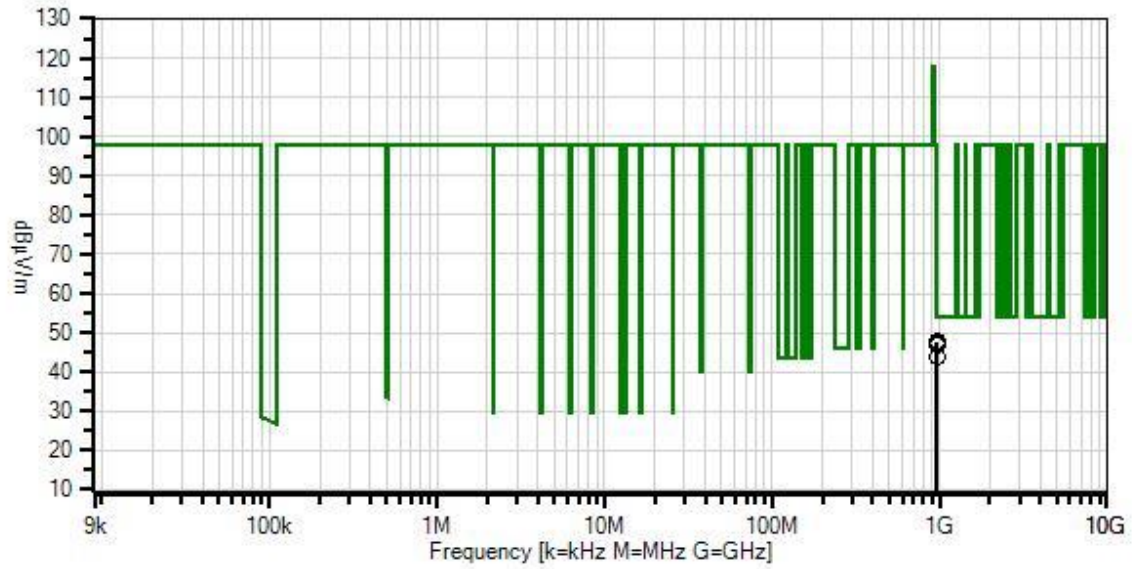
Support Equipment:

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 new 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:
 pwr lvl 1 - OOK 903 - 926.8MHz
 Frequencies tested: (903,915,926.8)
 Frequency range of measurement = 9kHz to 1000MHz. 9k-150kHz, RBW=200Hz, VBW=300Hz. 150k-30MHz, RBW=9kHz, VBW=30kHz. 30M-1000MHz, RBW=120kHz, VBW=300kHz
 Test environment conditions: 23°C, 30%, 100kPa, Site A
 Test Method: ANSI C63.10 (2013)
 EUT firmware 2.0.10.0
 Antenna type integral
 Antenna gain 2.3 dBi (vertical) and 0.1 dBi (horizontal)

Iron, Inc W/O#: 100666 Sequence#: 11 Date: 12/12/2017
 15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Vert



- 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 #/Serial #	Description	Model	Calibration Date	Cal Due Date
	AN02672	Spectrum Analyzer	E4446A	3/2/2017	3/2/2019
T1	ANP05050	Cable	RG223/U	1/20/2017	1/20/2019
T2	AN00309	Preamp	8447D	3/14/2016	3/14/2018
T3	ANP05198	Cable-Amplitude +15C to +45C (dB)	8268	12/7/2016	12/7/2018
T4	ANP05275	Attenuator	1W	5/5/2016	5/5/2018
T5	AN01995	Biconilog Antenna	CBL6111C	5/10/2016	5/10/2018
	AN00314	Loop Antenna	6502	5/20/2016	5/20/2018

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dB μ V	T1 T5 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dB μ V/m	Spec dB μ V/m	Margin dB	Polar Ant
1	961.870M	38.3	+0.5 +24.2	-27.4	+6.1	+6.1	+0.0	47.8	54.0	-6.2	Vert
2	960.870M	38.2	+0.5 +24.2	-27.4	+6.1	+6.1	+0.0	47.7	54.0	-6.3	Vert
3	960.000M	38.1	+0.5 +24.2	-27.4	+6.1	+6.1	+0.0	47.6	54.0	-6.4	Vert
4	964.530M	37.7	+0.5 +24.3	-27.4	+6.2	+6.1	+0.0	47.4	54.0	-6.6	Vert
5	966.470M	37.3	+0.5 +24.3	-27.4	+6.2	+6.1	+0.0	47.0	54.0	-7.0	Vert
6	960.000M	34.6	+0.5 +24.2	-27.4	+6.1	+6.1	+0.0	44.1	54.0	-9.9	Vert

Test Location: CKC Laboratories, Inc • 110 N. Olinda Place • Brea, CA 92823 • 714-993-6112
 Customer: **Itron, Inc**
 Specification: **15.247(d) / 15.209 Radiated Spurious Emissions**
 Work Order #: **100666** Date: 12/11/2017
 Test Type: **Maximized Emissions** Time: 14:38:15
 Tested By: S. Yamamoto Sequence#: 9
 Software: EMITest 5.03.11

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

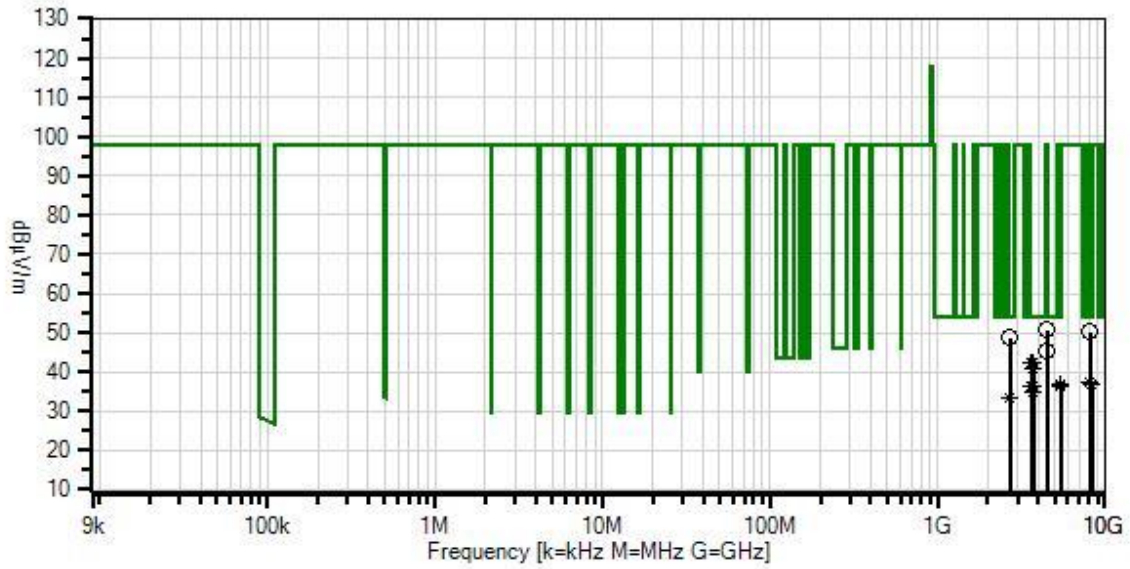
Support Equipment:

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 new 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:
 pwr lvl 1 - OOK 903 - 926.8MHz
 Frequencies tested: (903,915,926.8)
 Frequency range of measurement = 1000MHz to 10000MHz. RBW=1 MHz, VBW=3 MHz
 Test environment conditions: 22°C, 30%, 101kPa, Site A
 Test Method: ANSI C63.10 (2013)
 EUT firmware 2.0.10.0
 Antenna type integral
 Antenna gain 2.3 dBi (vertical) and 0.1 dBi (horizontal)

Itron, Inc W/O#: 100666 Sequence#: 9 Date: 12/11/2017
 15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Horiz



- 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 #/Serial #	Description	Model	Calibration Date	Cal Due Date
T1	AN02672	Spectrum Analyzer	E4446A	3/2/2017	3/2/2019
T2	ANP06661	Cable	LDF1-50	5/6/2016	5/6/2018
T3	AN00786	Preamp	83017A	5/9/2016	5/9/2018
T4	AN03169	High Pass Filter	HM1155-11SS	6/15/2017	6/15/2019
T5	ANP06977	Cable	PHASEFLEX EJR01N01036.0	4/5/2016	4/5/2018
T6	AN00849	Horn Antenna	3115	3/4/2016	3/4/2018

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dB μ V	T1 T5 dB	T2 T6 dB	T3 dB	T4 dB	Dist Table	Corr dB μ V/m	Spec dB μ V/m	Margin dB	Polar Ant
1	4515.007M	53.5	+0.0 +0.5	+5.4 +28.9	-37.6	+0.1	+0.0	50.8	54.0	-3.2	Vert
2	8127.012M	44.7	+0.0 +0.8	+8.2 +33.5	-37.2	+0.2	+0.0	50.2	54.0	-3.8	Horiz
3	2709.000M	56.4	+0.0 +0.4	+4.1 +25.8	-38.1	+0.2	+0.0	48.8	54.0	-5.2	Horiz
4	4515.035M	48.2	+0.0 +0.5	+5.4 +28.9	-37.6	+0.1	+0.0	45.5	54.0	-8.5	Horiz
5	3612.000M Ave	47.7	+0.0 +0.6	+4.5 +27.5	-38.0	+0.2	+0.0	42.5	54.0	-11.5	Horiz
^	3612.000M	66.6	+0.0 +0.6	+4.5 +27.5	-38.0	+0.2	+0.0	61.4	54.0	+7.4	Horiz
7	3660.000M Ave	47.1	+0.0 +0.6	+4.6 +27.7	-37.9	+0.2	+0.0	42.3	54.0	-11.7	Horiz
^	3660.000M	65.7	+0.0 +0.6	+4.6 +27.7	-37.9	+0.2	+0.0	60.9	54.0	+6.9	Horiz
9	3707.200M Ave	45.6	+0.0 +0.6	+4.7 +27.8	-37.9	+0.2	+0.0	41.0	54.0	-13.0	Horiz
^	3707.200M	64.1	+0.0 +0.6	+4.7 +27.8	-37.9	+0.2	+0.0	59.5	54.0	+5.5	Horiz
11	8127.000M Ave	31.7	+0.0 +0.8	+8.2 +33.5	-37.2	+0.2	+0.0	37.2	54.0	-16.8	Vert
^	8127.000M	49.0	+0.0 +0.8	+8.2 +33.5	-37.2	+0.2	+0.0	54.5	54.0	+0.5	Vert
13	5418.000M Ave	36.1	+0.0 +0.7	+6.3 +31.2	-37.4	+0.1	+0.0	37.0	54.0	-17.0	Vert
^	5418.000M	53.7	+0.0 +0.7	+6.3 +31.2	-37.4	+0.1	+0.0	54.6	54.0	+0.6	Vert
15	8341.200M Ave	30.6	+0.0 +0.8	+8.2 +34.0	-36.8	+0.2	+0.0	37.0	54.0	-17.0	Vert
^	8341.200M	46.6	+0.0 +0.8	+8.2 +34.0	-36.8	+0.2	+0.0	53.0	54.0	-1.0	Vert
17	8235.000M Ave	30.9	+0.0 +0.8	+8.2 +33.7	-37.0	+0.2	+0.0	36.8	54.0	-17.2	Vert
^	8235.000M	47.7	+0.0 +0.8	+8.2 +33.7	-37.0	+0.2	+0.0	53.6	54.0	-0.4	Vert

19	3612.000M	41.8	+0.0	+4.5	-38.0	+0.2	+0.0	36.6	54.0	-17.4	Vert
	Ave		+0.6	+27.5							
^	3612.000M	59.7	+0.0	+4.5	-38.0	+0.2	+0.0	54.5	54.0	+0.5	Vert
			+0.6	+27.5							
21	5418.000M	35.6	+0.0	+6.3	-37.4	+0.1	+0.0	36.5	54.0	-17.5	Horiz
	Ave		+0.7	+31.2							
^	5418.000M	53.1	+0.0	+6.3	-37.4	+0.1	+0.0	54.0	54.0	+0.0	Horiz
			+0.7	+31.2							
23	3660.028M	41.2	+0.0	+4.6	-37.9	+0.2	+0.0	36.4	54.0	-17.6	Vert
	Ave		+0.6	+27.7							
^	3660.028M	59.0	+0.0	+4.6	-37.9	+0.2	+0.0	54.2	54.0	+0.2	Vert
			+0.6	+27.7							
25	3707.200M	39.5	+0.0	+4.7	-37.9	+0.2	+0.0	34.9	54.0	-19.1	Vert
	Ave		+0.6	+27.8							
^	3707.200M	57.3	+0.0	+4.7	-37.9	+0.2	+0.0	52.7	54.0	-1.3	Vert
			+0.6	+27.8							
27	2709.000M	41.1	+0.0	+4.1	-38.1	+0.2	+0.0	33.5	54.0	-20.5	Vert
	Ave		+0.4	+25.8							
^	2709.000M	58.6	+0.0	+4.1	-38.1	+0.2	+0.0	51.0	54.0	-3.0	Vert
			+0.4	+25.8							

Test Location: CKC Laboratories, Inc • 110 N. Olinda Place • Brea, CA 92823 • 714-993-6112
 Customer: **Itron, Inc**
 Specification: **15.247(d) / 15.209 Radiated Spurious Emissions**
 Work Order #: **100666** Date: 12/12/2017
 Test Type: **Maximized Emissions** Time: 15:31:15
 Tested By: S. Yamamoto Sequence#: 10
 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 new batteries installed. Nominal input voltage is 6.0Vdc. The EUT is tested in orientations specified by the manufacturer: vertical pipe and horizontal pipe.

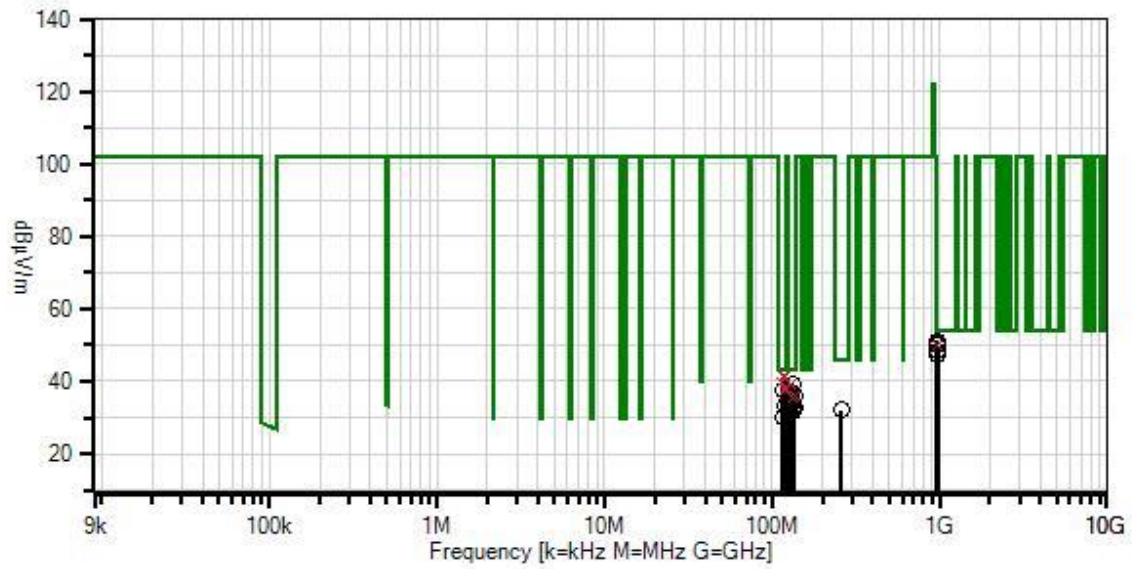
Operating frequency:
 pwr lvl 3 - OOK 903 - 926.8MHz (903, 915,926.8)
 pwr lvl 3 - 10kpbs 902.2 - 927.75MHz (902.2, 915, 927.75)
 pwr lvl 3 - 150kbps 902.4 - 927.6MHz (902.4, 915.2,927.6)

Frequencies tested:
 pwr lvl 3 - OOK (903, 915,926.8)
 pwr lvl 3 - 10kpbs (902.2, 915, 927.75)
 pwr lvl 3 - 150kbps (902.4, 915.2,927.6)

Frequency range of measurement = 9kHz to 1000MHz. 9k-150kHz, RBW=200Hz, VBW=300Hz. 150k-30MHz, RBW=9kHz, VBW=30kHz. 30M-1000MHz, RBW=120kHz, VBW=300kHz

Test environment conditions: 23°C, 30%, 100kPa, Site A
 Test Method: ANSI C63.10 (2013)
 EUT firmware 2.0.10.0
 Antenna type integral
 Antenna gain 2.3 dBi (vertical) and 0.1 dBi (horizontal)

Iron, Inc W/O#: 100666 Sequence#: 10 Date: 12/12/2017
 15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Vert



- 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 #/Serial #	Description	Model	Calibration Date	Cal Due Date
T1	AN02672	Spectrum Analyzer	E4446A	3/2/2017	3/2/2019
T2	ANP05050	Cable	RG223/U	1/20/2017	1/20/2019
T3	AN00309	Preamp	8447D	3/14/2016	3/14/2018
T4	ANP05198	Cable-Amplitude +15C to +45C (dB)	8268	12/7/2016	12/7/2018
T5	ANP05275	Attenuator	1W	5/5/2016	5/5/2018
T6	AN01995	Biconilog Antenna	CBL6111C	5/10/2016	5/10/2018
	AN00314	Loop Antenna	6502	5/20/2016	5/20/2018

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dB μ V	T1 T5 dB	T2 T6 dB	T3 dB	T4 dB	Dist Table	Corr dB μ V/m	Spec dB μ V/m	Margin dB	Polar Ant
1	118.562M QP	49.9	+0.0 +6.0	+0.1 +11.5	-28.1	+1.8	+0.0	41.2	43.5	-2.3	Horiz
2	119.825M QP	49.8	+0.0 +6.0	+0.1 +11.6	-28.1	+1.8	+0.0	41.2	43.5	-2.3	Horiz
^	119.825M	57.4	+0.0 +6.0	+0.1 +11.6	-28.1	+1.8	+0.0	48.8	43.5	+5.3	Horiz
^	119.783M	43.2	+0.0 +6.0	+0.1 +11.6	-28.1	+1.8	+0.0	34.6	43.5	-8.9	Horiz
5	117.425M QP	50.0	+0.0 +6.0	+0.1 +11.4	-28.1	+1.8	+0.0	41.2	43.5	-2.3	Horiz
^	117.425M	57.7	+0.0 +6.0	+0.1 +11.4	-28.1	+1.8	+0.0	48.9	43.5	+5.4	Horiz
^	117.333M	47.3	+0.0 +6.0	+0.1 +11.4	-28.1	+1.8	+0.0	38.5	43.5	-5.0	Horiz
8	121.056M QP	49.7	+0.0 +6.0	+0.1 +11.6	-28.1	+1.8	+0.0	41.1	43.5	-2.4	Horiz
9	961.870M	41.8	+0.0 +6.1	+0.5 +24.2	-27.4	+6.1	+0.0	51.3	54.0	-2.7	Vert
10	961.000M	41.5	+0.0 +6.1	+0.5 +24.2	-27.4	+6.1	+0.0	51.0	54.0	-3.0	Vert
11	960.400M	41.0	+0.0 +6.1	+0.5 +24.2	-27.4	+6.1	+0.0	50.5	54.0	-3.5	Horiz
12	960.000M QP	40.7	+0.0 +6.1	+0.5 +24.2	-27.4	+6.1	+0.0	50.2	54.0	-3.8	Vert
^	960.000M	46.0	+0.0 +6.1	+0.5 +24.2	-27.4	+6.1	+0.0	55.5	54.0	+1.5	Vert
^	960.000M	41.6	+0.0 +6.1	+0.5 +24.2	-27.4	+6.1	+0.0	51.1	54.0	-2.9	Vert
15	962.870M	40.5	+0.0 +6.1	+0.5 +24.3	-27.4	+6.2	+0.0	50.2	54.0	-3.8	Horiz
16	114.863M QP	48.4	+0.0 +6.0	+0.1 +11.3	-28.1	+1.8	+0.0	39.5	43.5	-4.0	Vert
^	114.863M	50.0	+0.0 +6.0	+0.1 +11.3	-28.1	+1.8	+0.0	41.1	43.5	-2.4	Vert

18	134.333M	47.4	+0.0 +6.0	+0.1 +11.7	-28.1	+1.9	+0.0	39.0	43.5	-4.5	Vert
19	128.311M QP	47.4	+0.0 +6.0	+0.1 +11.7	-28.1	+1.9	+0.0	39.0	43.5	-4.5	Horiz
^	128.311M	51.5	+0.0 +6.0	+0.1 +11.7	-28.1	+1.9	+0.0	43.1	43.5	-0.4	Horiz
21	118.574M QP	47.0	+0.0 +6.0	+0.1 +11.5	-28.1	+1.8	+0.0	38.3	43.5	-5.2	Horiz
^	118.562M	57.6	+0.0 +6.0	+0.1 +11.5	-28.1	+1.8	+0.0	48.9	43.5	+5.4	Horiz
^	118.574M	50.8	+0.0 +6.0	+0.1 +11.5	-28.1	+1.8	+0.0	42.1	43.5	-1.4	Horiz
^	118.570M	47.1	+0.0 +6.0	+0.1 +11.5	-28.1	+1.8	+0.0	38.4	43.5	-5.1	Horiz
25	960.000M	39.0	+0.0 +6.1	+0.5 +24.2	-27.4	+6.1	+0.0	48.5	54.0	-5.5	Horiz
26	120.990M QP	46.2	+0.0 +6.0	+0.1 +11.6	-28.1	+1.8	+0.0	37.6	43.5	-5.9	Horiz
^	121.056M	55.7	+0.0 +6.0	+0.1 +11.6	-28.1	+1.8	+0.0	47.1	43.5	+3.6	Horiz
^	120.990M	49.7	+0.0 +6.0	+0.1 +11.6	-28.1	+1.8	+0.0	41.1	43.5	-2.4	Horiz
29	116.143M	46.5	+0.0 +6.0	+0.1 +11.3	-28.1	+1.8	+0.0	37.6	43.5	-5.9	Horiz
30	129.483M	45.6	+0.0 +6.0	+0.1 +11.7	-28.1	+1.9	+0.0	37.2	43.5	-6.3	Vert
31	977.330M	37.6	+0.0 +6.0	+0.5 +24.5	-27.5	+6.2	+0.0	47.3	54.0	-6.7	Horiz
32	135.550M	44.4	+0.0 +6.0	+0.1 +11.7	-28.1	+2.0	+0.0	36.1	43.5	-7.4	Horiz
33	136.761M QP	44.2	+0.0 +6.0	+0.1 +11.7	-28.1	+2.0	+0.0	35.9	43.5	-7.6	Horiz
^	136.761M	50.9	+0.0 +6.0	+0.1 +11.7	-28.1	+2.0	+0.0	42.6	43.5	-0.9	Horiz
35	130.700M	44.0	+0.0 +6.0	+0.1 +11.7	-28.1	+1.9	+0.0	35.6	43.5	-7.9	Vert
36	134.333M QP	43.9	+0.0 +6.0	+0.1 +11.7	-28.1	+1.9	+0.0	35.5	43.5	-8.0	Horiz
^	134.333M	49.1	+0.0 +6.0	+0.1 +11.7	-28.1	+1.9	+0.0	40.7	43.5	-2.8	Horiz
38	128.175M	42.9	+0.0 +6.0	+0.1 +11.7	-28.1	+1.9	+0.0	34.5	43.5	-9.0	Horiz
39	130.300M	41.5	+0.0 +6.0	+0.1 +11.7	-28.1	+1.9	+0.0	33.1	43.5	-10.4	Vert
40	118.243M	41.8	+0.0 +6.0	+0.1 +11.5	-28.1	+1.8	+0.0	33.1	43.5	-10.4	Vert
41	136.625M	41.2	+0.0 +6.0	+0.1 +11.7	-28.1	+2.0	+0.0	32.9	43.5	-10.6	Horiz
42	131.500M	40.9	+0.0 +6.0	+0.1 +11.7	-28.1	+1.9	+0.0	32.5	43.5	-11.0	Vert
43	132.725M	40.3	+0.0 +6.0	+0.1 +11.7	-28.1	+1.9	+0.0	31.9	43.5	-11.6	Vert

44	126.950M	39.7	+0.0 +6.0	+0.1 +11.7	-28.1	+1.9	+0.0	31.3	43.5	-12.2	Horiz
45	117.053M	38.7	+0.0 +6.0	+0.1 +11.4	-28.1	+1.8	+0.0	29.9	43.5	-13.6	Vert
46	259.875M	38.4	+0.0 +6.0	+0.2 +12.6	-28.0	+2.9	+0.0	32.1	46.0	-13.9	Horiz

Test Location: CKC Laboratories, Inc • 110 N. Olinda Place • Brea, CA 92823 • 714-993-6112
 Customer: **Itron, Inc**
 Specification: **15.247(d) / 15.209 Radiated Spurious Emissions**
 Work Order #: **100666** Date: 12/11/2017
 Test Type: **Maximized Emissions** Time: 12:14:31
 Tested By: S. Yamamoto 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:

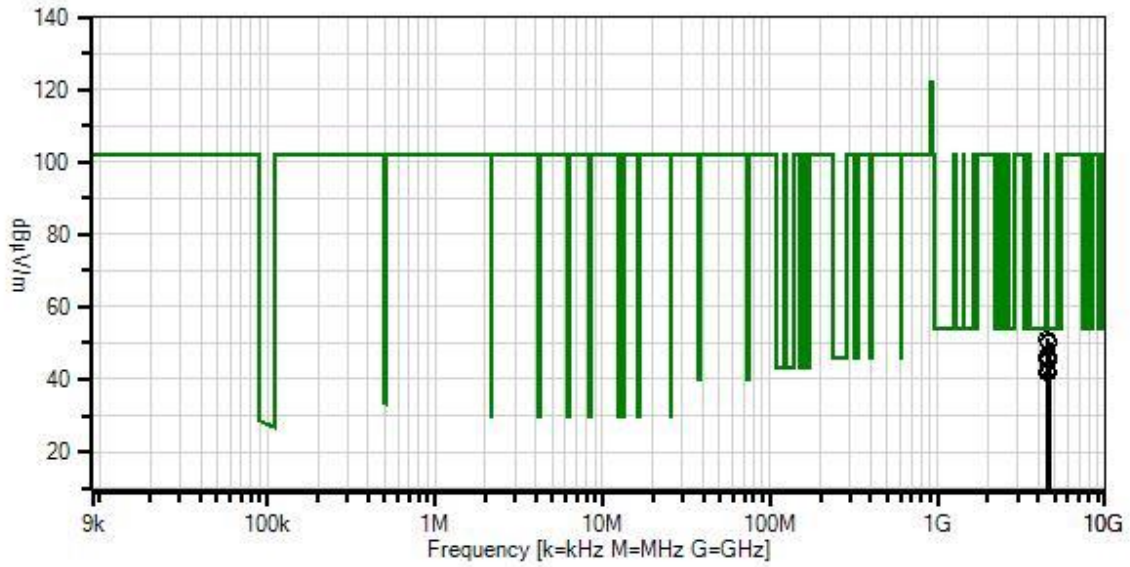
The equipment under test (EUT) is placed stand alone on the Styrofoam table top. The EUT is turned on and placed in a continuous transmit mode. The EUT has fresh batteries installed. Nominal input voltage is 6.0Vdc. The EUT is tested in orientations specified by the manufacturer: vertical pipe horizontal pipe.

Operating frequency:
 pwr lvl 3 - OOK 903 - 926.8MHz (903, 915,926.8)
 pwr lvl 3 - 10kpbs 902.2 - 927.75MHz (902.2, 915, 927.75)
 pwr lvl 3 - 150kpbs 902.4 - 927.6MHz (902.4, 915.2,927.6)

Frequencies tested:
 pwr lvl 3 - OOK (903, 915,926.8)
 pwr lvl 3 - 10kpbs (902.2, 915, 927.75)
 pwr lvl 3 - 150kpbs (902.4, 915.2,927.6)

Frequency range of measurement = 1000MHz to 10000MHz. RBW=1 MHz, VBW=3 MHz
 Test environment conditions: 22°C, 30%, 101kPa, Site A
 Test Method: ANSI C63.10 (2013)
 EUT firmware 2.0.10.0
 Antenna type integral
 Antenna gain 2.3 dBi (vertical) and 0.1 dBi (horizontal)

Itron, Inc W/O#: 100666 Sequence#: 8 Date: 12/11/2017
 15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Horiz



- 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 #/Serial #	Description	Model	Calibration Date	Cal Due Date
T1	AN02672	Spectrum Analyzer	E4446A	3/2/2017	3/2/2019
T2	ANP06661	Cable	LDF1-50	5/6/2016	5/6/2018
T3	AN00786	Preamp	83017A	5/9/2016	5/9/2018
T4	AN03169	High Pass Filter	HM1155-11SS	6/15/2017	6/15/2019
T5	ANP06977	Cable	PHASEFLEX EJR01N01036.0	4/5/2016	4/5/2018
T6	AN00849	Horn Antenna	3115	3/4/2016	3/4/2018

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

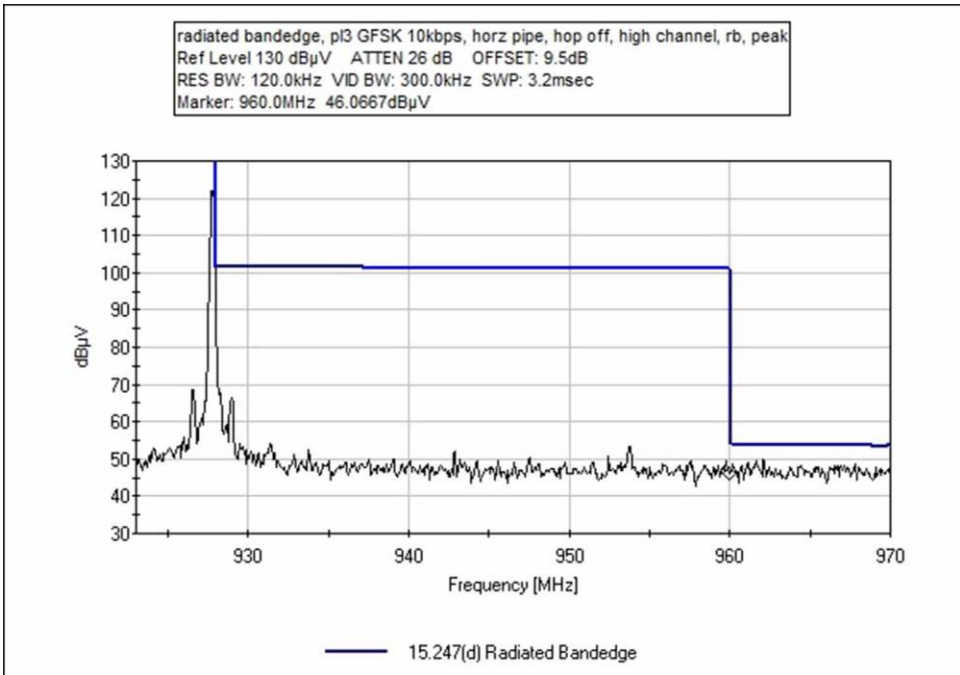
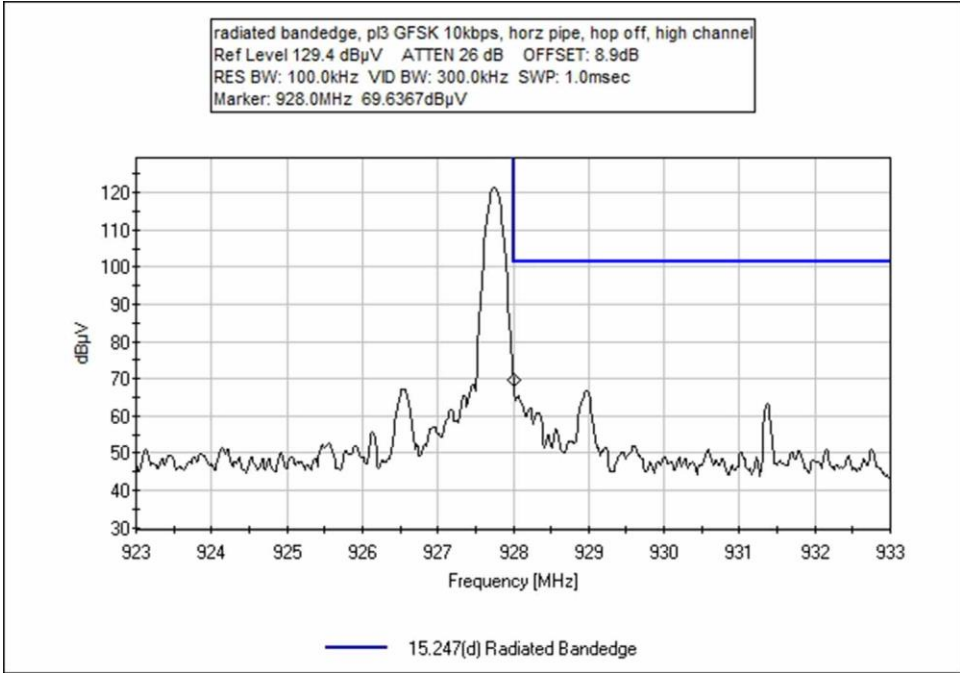
#	Freq MHz	Rdng dB μ V	T1 T5 dB	T2 T6 dB	T3 dB	T4 dB	Dist Table	Corr dB μ V/m	Spec dB μ V/m	Margin dB	Polar Ant
1	4512.010M	53.8	+0.0 +0.5	+5.4 +28.9	-37.6	+0.1	+0.0	51.1	54.0	-2.9	Horiz
2	4575.000M	52.8	+0.0 +0.5	+5.5 +29.1	-37.6	+0.1	+0.0	50.4	54.0	-3.6	Horiz
3	4576.035M	52.6	+0.0 +0.5	+5.5 +29.1	-37.6	+0.1	+0.0	50.2	54.0	-3.8	Horiz
4	4638.750M	52.2	+0.0 +0.6	+5.6 +29.2	-37.6	+0.2	+0.0	50.2	54.0	-3.8	Horiz
5	4637.855M	52.1	+0.0 +0.6	+5.6 +29.2	-37.6	+0.2	+0.0	50.1	54.0	-3.9	Horiz
6	4575.000M	48.4	+0.0 +0.5	+5.5 +29.1	-37.6	+0.1	+0.0	46.0	54.0	-8.0	Vert
7	4512.020M	48.7	+0.0 +0.5	+5.4 +28.9	-37.6	+0.1	+0.0	46.0	54.0	-8.0	Vert
8	4515.058M	48.6	+0.0 +0.5	+5.4 +28.9	-37.6	+0.1	+0.0	45.9	54.0	-8.1	Horiz
9	4637.767M	47.5	+0.0 +0.6	+5.6 +29.2	-37.6	+0.2	+0.0	45.5	54.0	-8.5	Vert
10	4511.003M	48.2	+0.0 +0.5	+5.4 +28.9	-37.6	+0.1	+0.0	45.5	54.0	-8.5	Vert
11	4638.750M	47.5	+0.0 +0.6	+5.6 +29.2	-37.6	+0.2	+0.0	45.5	54.0	-8.5	Vert
12	4575.008M	47.9	+0.0 +0.5	+5.5 +29.1	-37.6	+0.1	+0.0	45.5	54.0	-8.5	Horiz
13	4633.903M	47.4	+0.0 +0.6	+5.6 +29.2	-37.6	+0.2	+0.0	45.4	54.0	-8.6	Horiz
14	4575.700M	47.7	+0.0 +0.5	+5.5 +29.1	-37.6	+0.1	+0.0	45.3	54.0	-8.7	Vert
15	4574.858M	44.3	+0.0 +0.5	+5.5 +29.1	-37.6	+0.1	+0.0	41.9	54.0	-12.1	Vert

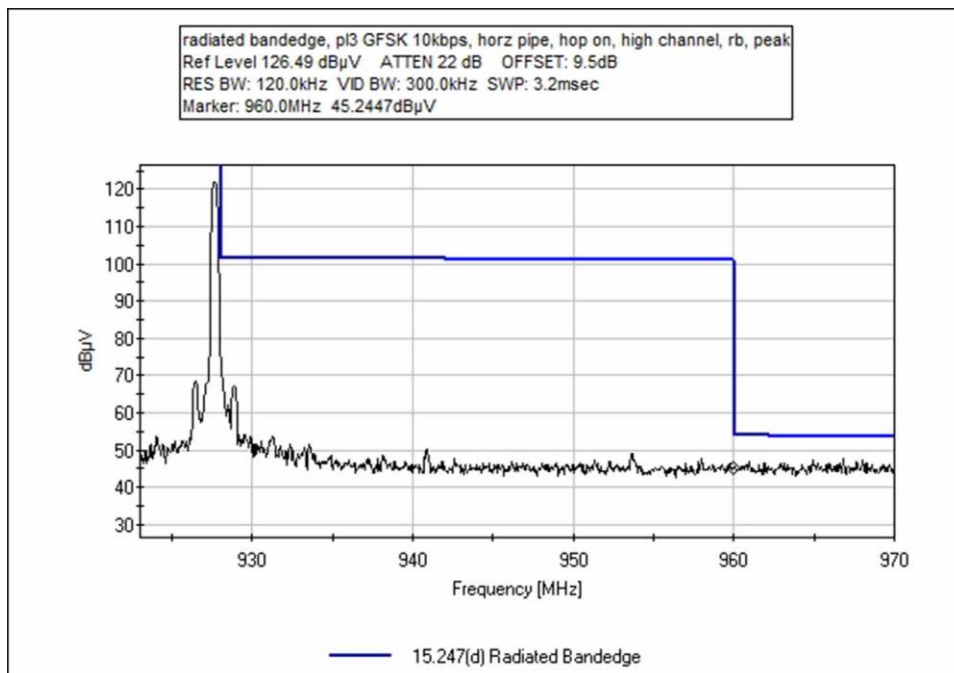
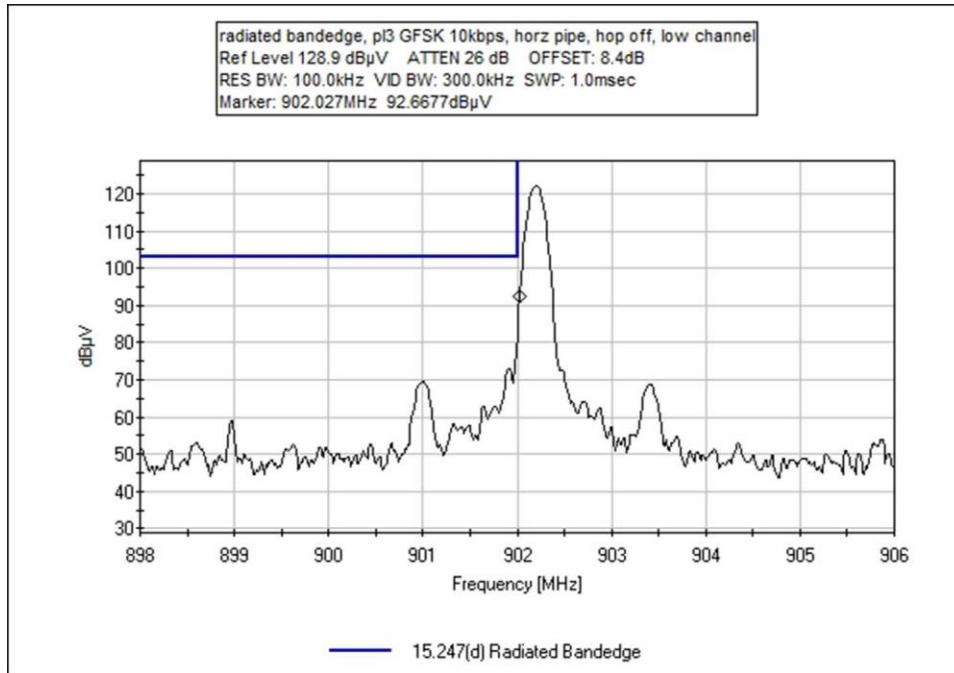
16	4515.004M	44.5	+0.0 +0.5	+5.4 +28.9	-37.6	+0.1	+0.0	41.8	54.0	-12.2	Vert
17	4634.045M	43.7	+0.0 +0.6	+5.6 +29.2	-37.6	+0.2	+0.0	41.7	54.0	-12.3	Vert
18	4511.003M Ave	44.1	+0.0 +0.5	+5.4 +28.9	-37.6	+0.1	+0.0	41.4	54.0	-12.6	Horiz
^	4511.003M	53.3	+0.0 +0.5	+5.4 +28.9	-37.6	+0.1	+0.0	50.6	54.0	-3.4	Horiz

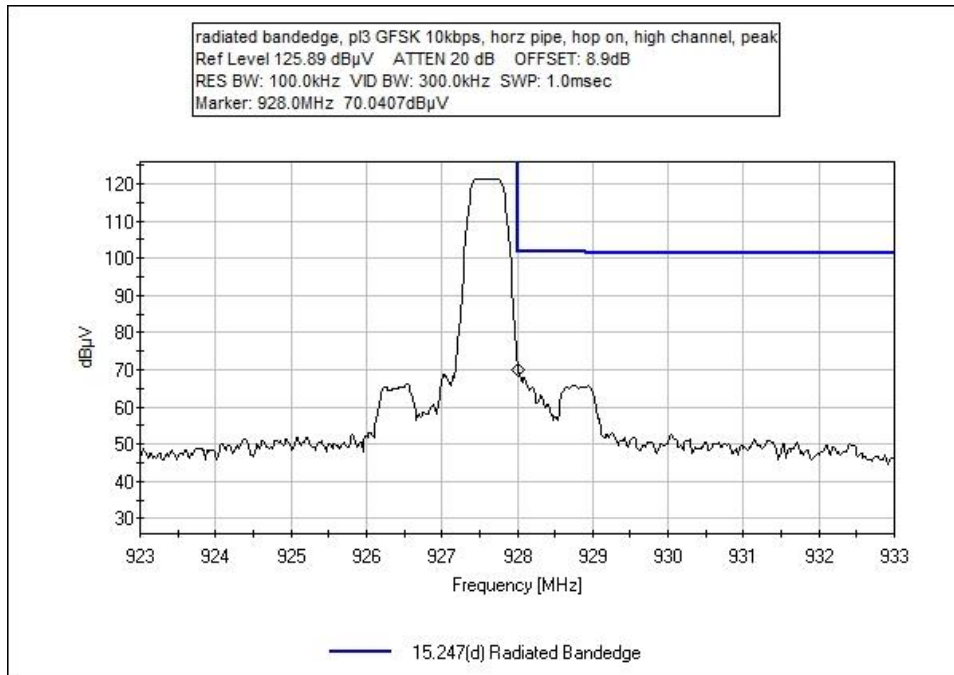
Band Edge

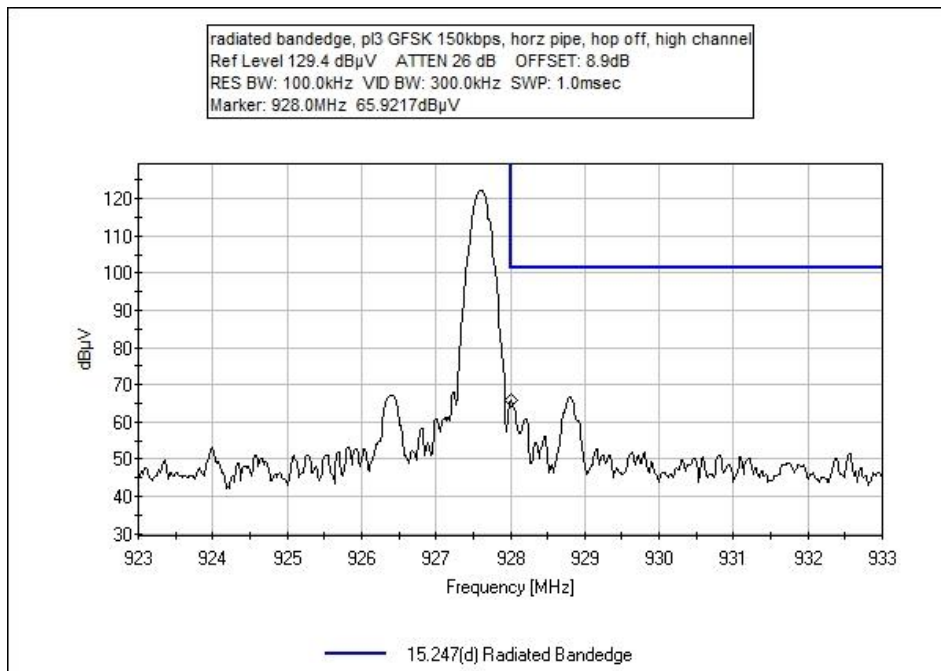
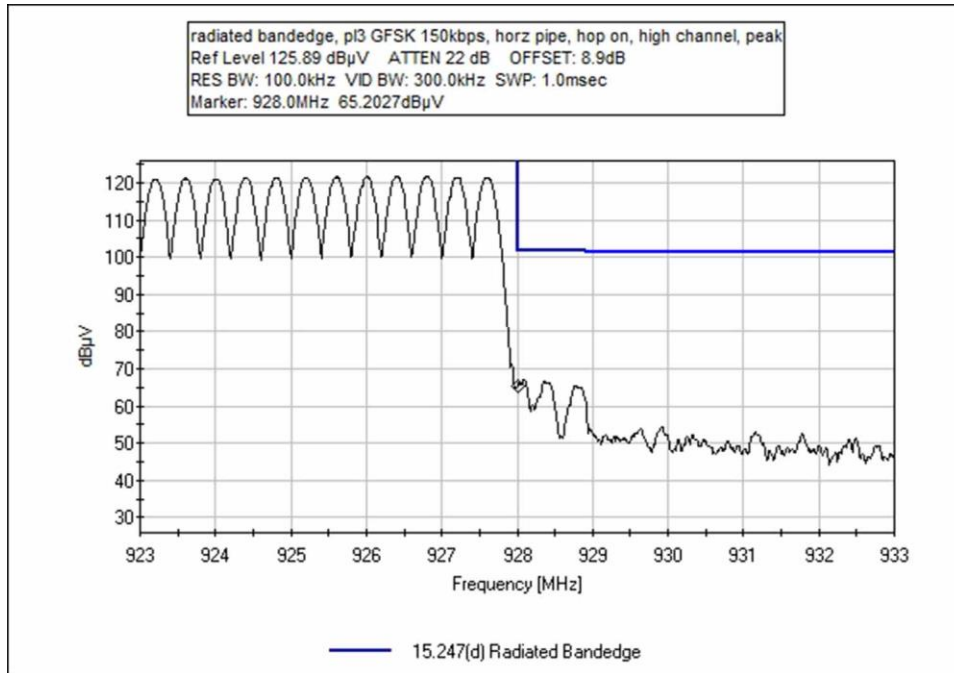
Band Edge Summary					
Frequency (MHz)	Modulation	Ant. Type	Field Strength (dBuV/m @3m)	Limit (dBuV/m @3m)	Results
902	OOK hop off	Integral / V	84.9	<98	Pass
928	OOK hop off	Integral / V	84.5	<98	Pass
960	OOK hop off	Integral / V	47.3	<54	Pass
902	GFSK 10kbps hop off	Integral / V	92.7	<102	Pass
928	GFSK 10kbps hop off	Integral / V	69.6	<102	Pass
960	GFSK 10kbps hop off	Integral / V	46.1	<54	Pass
902	GFSK 150kbps hop off	Integral / V	63.0	<102	Pass
928	GFSK 150kbps hop off	Integral / V	65.9	<102	Pass
960	GFSK 150kbps hop off	Integral / V	45.4	<54	Pass
902	OOK hop on	Integral / V	83.1	<98	Pass
928	OOK hop on	Integral / V	84.0	<98	Pass
960	OOK hop on	Integral / V	46.6	<54	Pass
902	GFSK 10kbps hop on	Integral / V	80.2	<102	Pass
928	GFSK 10kbps hop on	Integral / V	70.0	<102	Pass
960	GFSK 10kbps hop on	Integral / V	45.2	<54	Pass
902	GFSK 150kbps hop on	Integral / V	62.4	<102	Pass
928	GFSK 150kbps hop on	Integral / V	65.2	<102	Pass
960	GFSK 150kbps hop on	Integral / V	46.8	<54	Pass

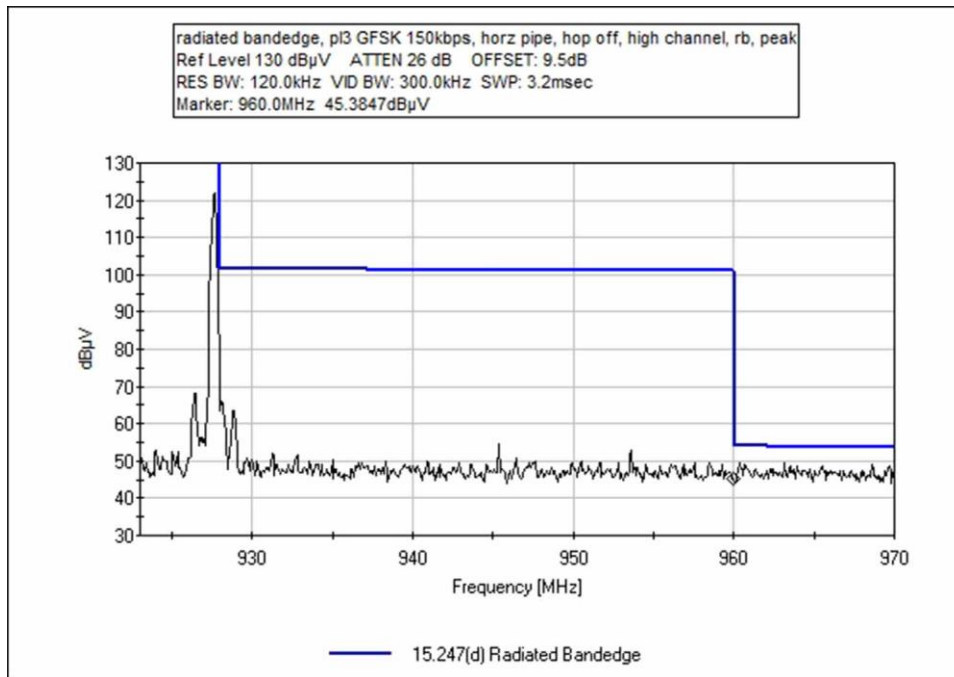
Band Edge Plots

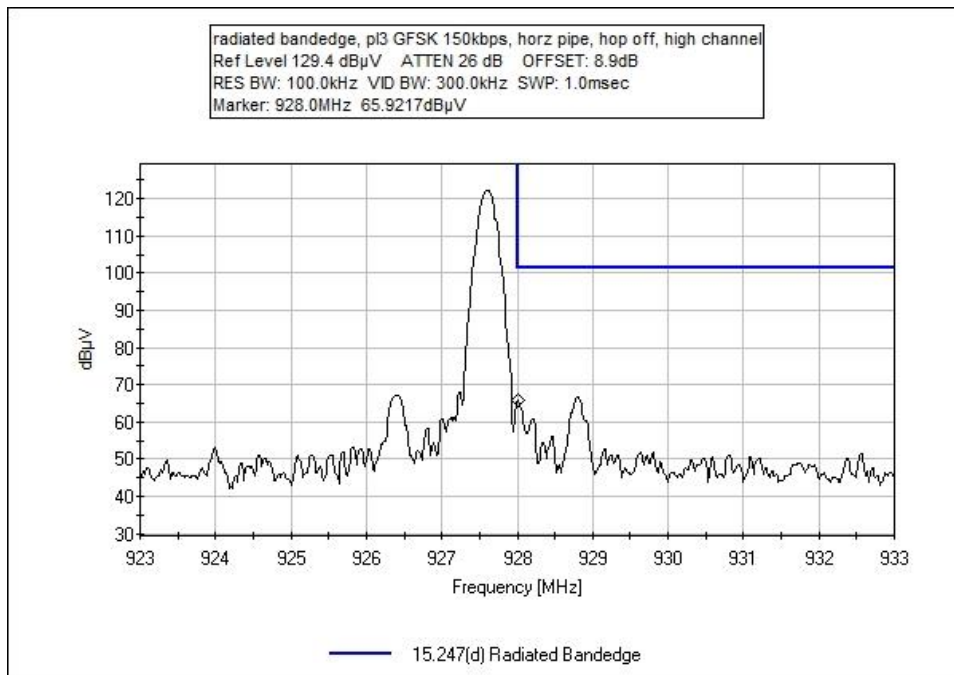
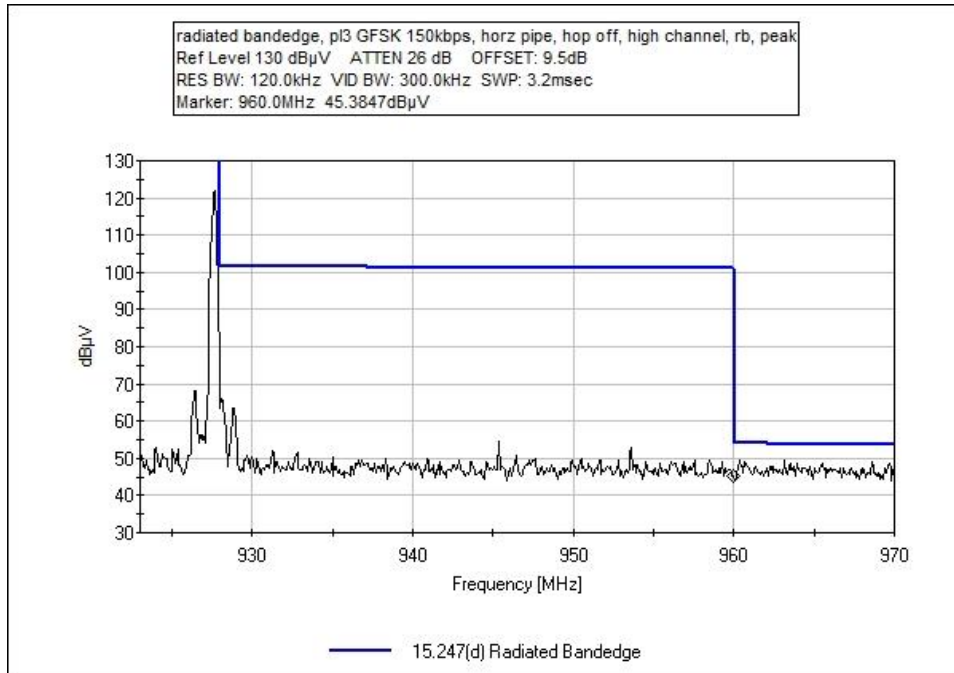


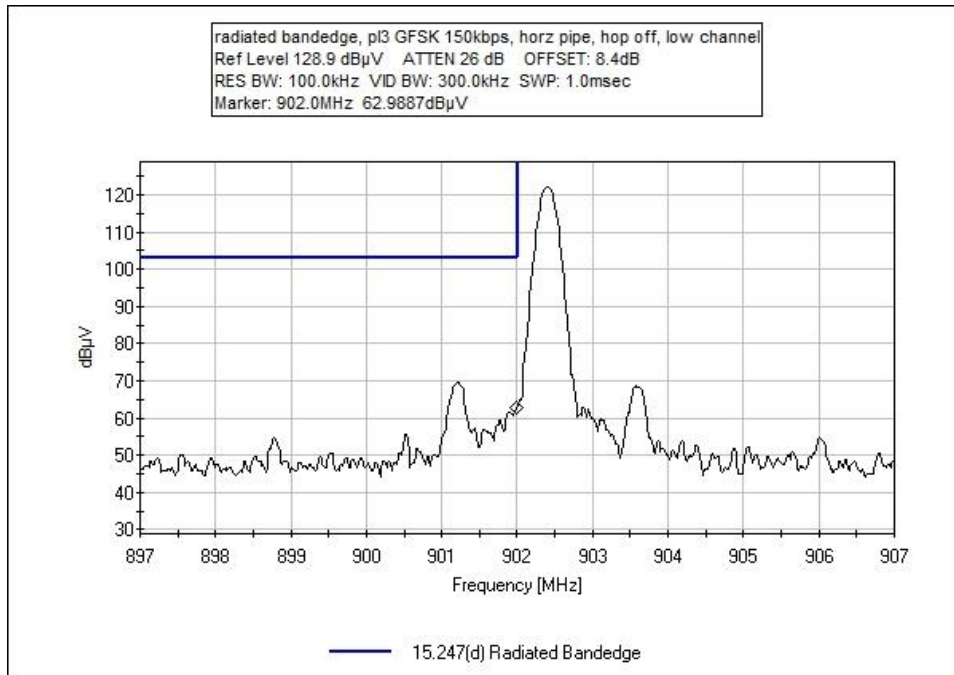


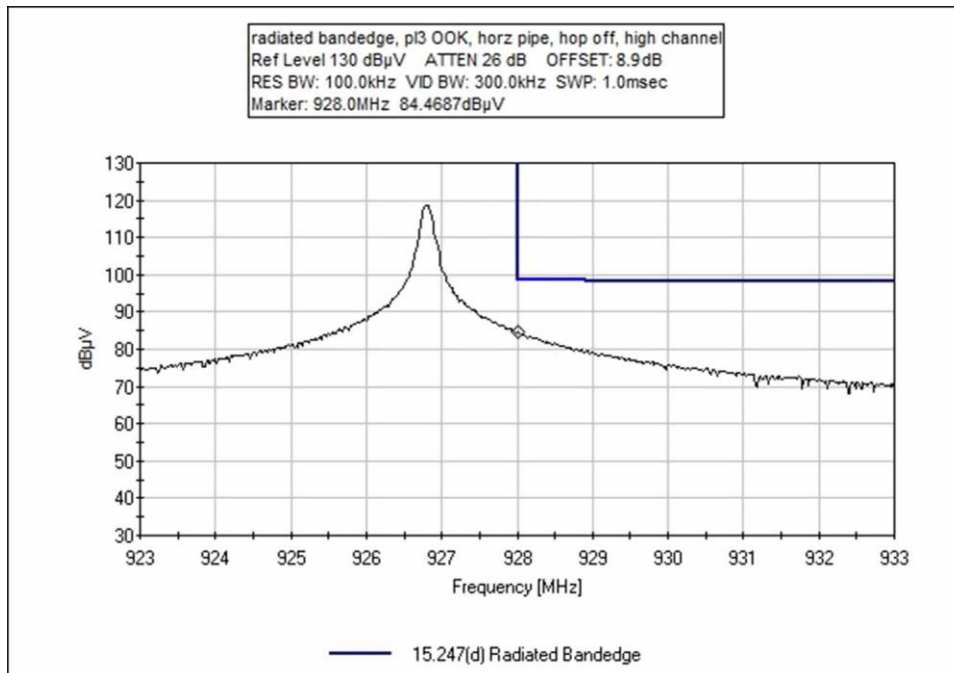
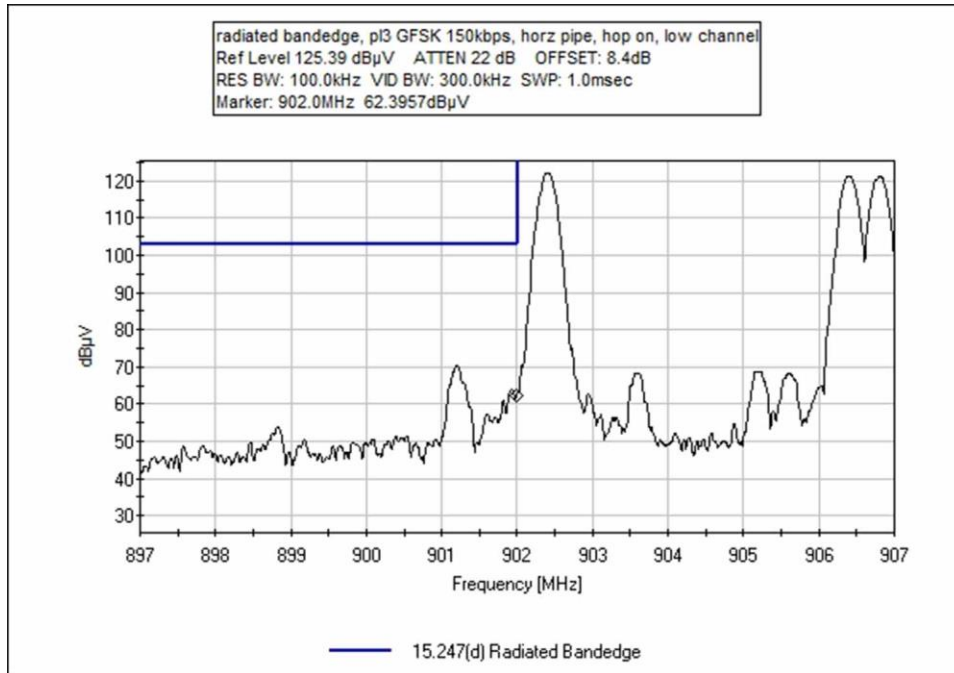


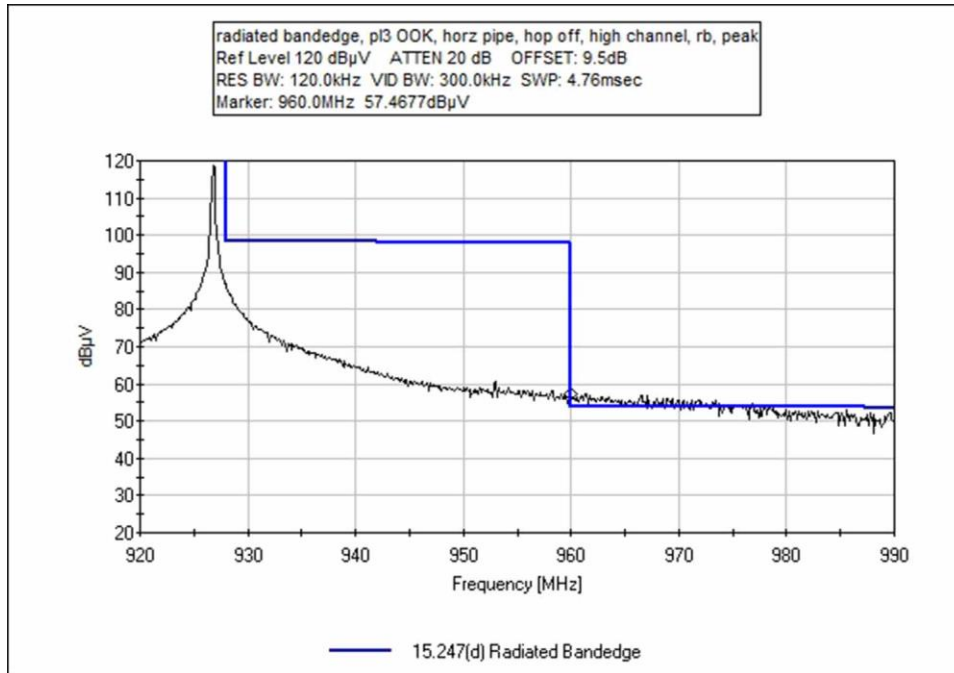


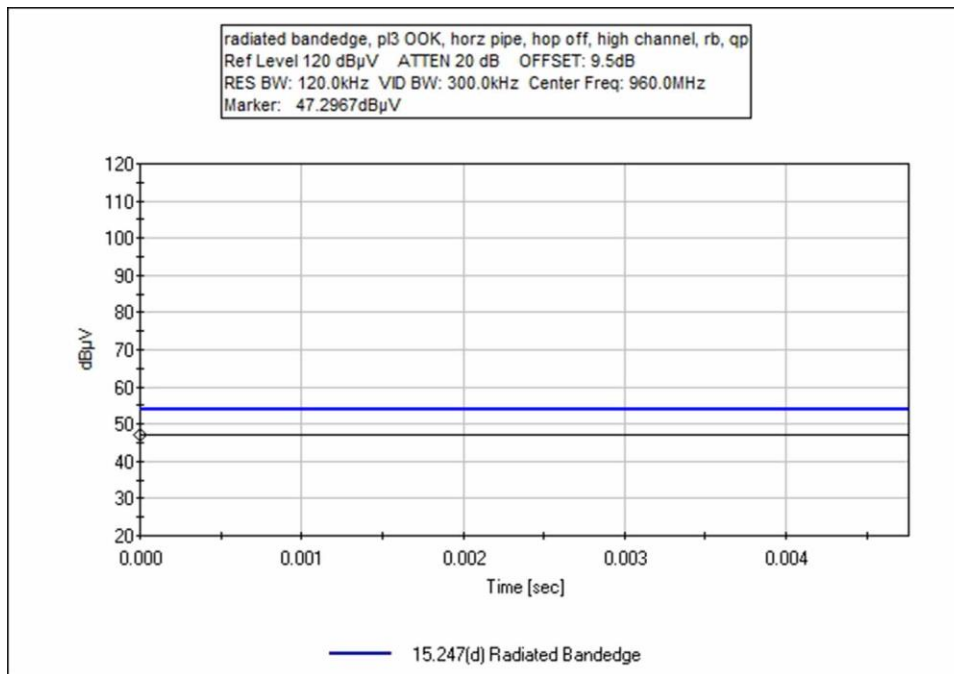
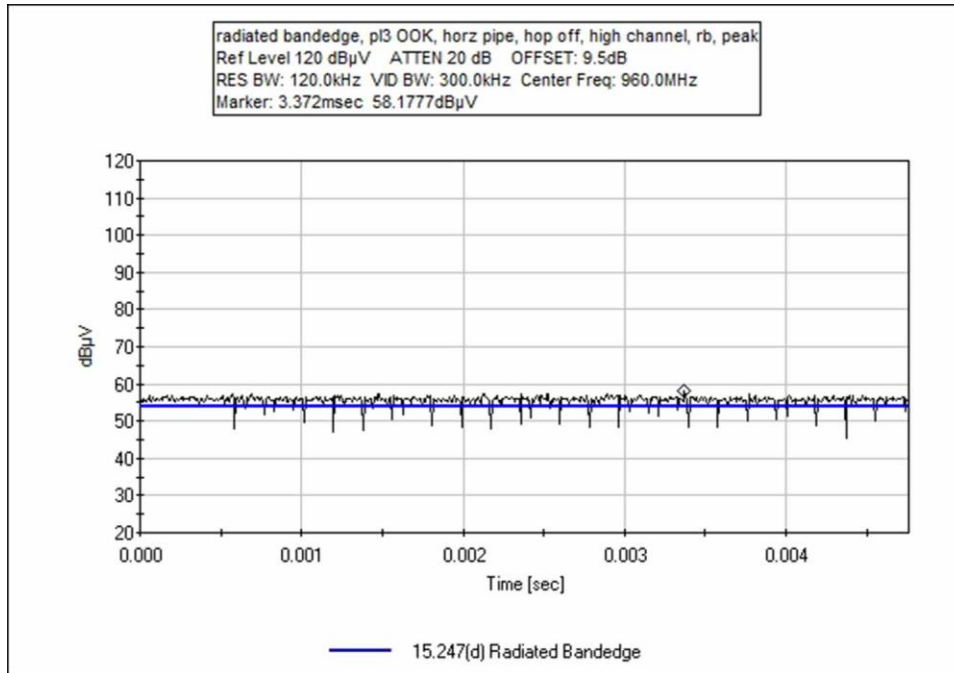


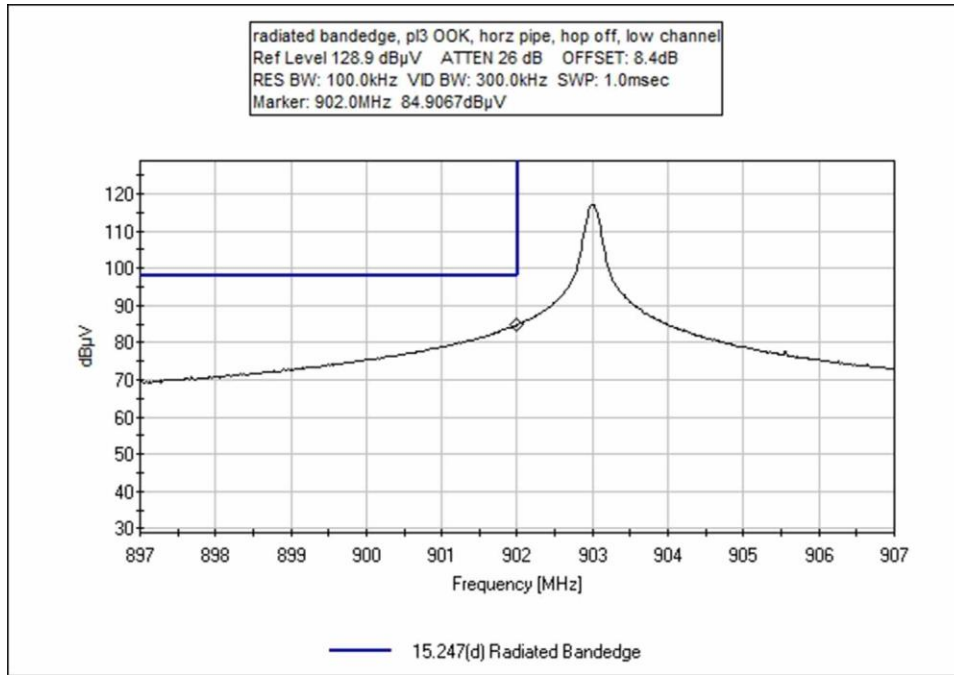


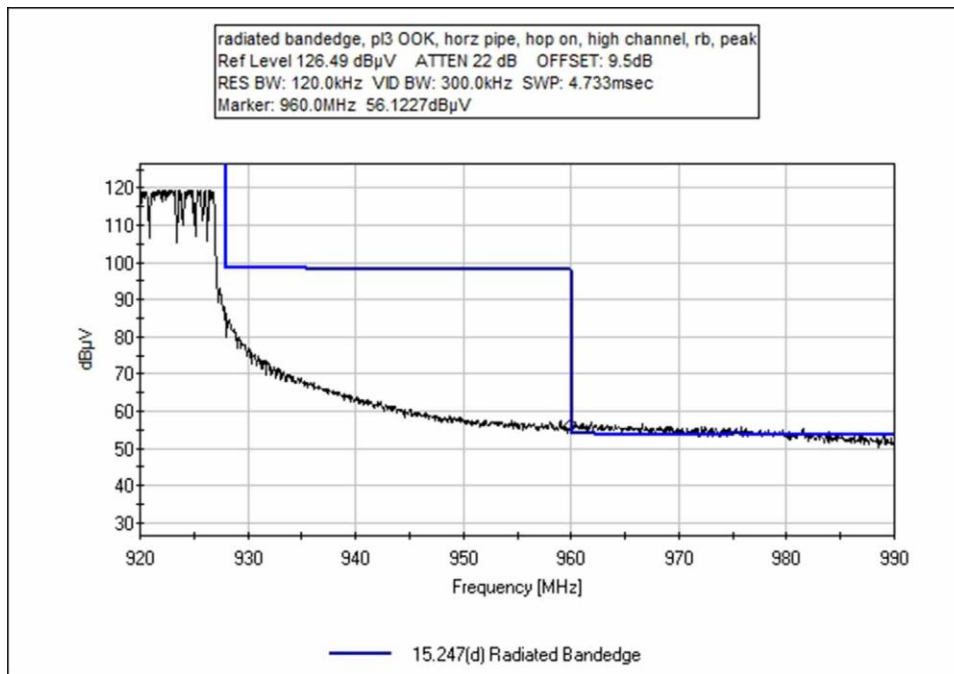
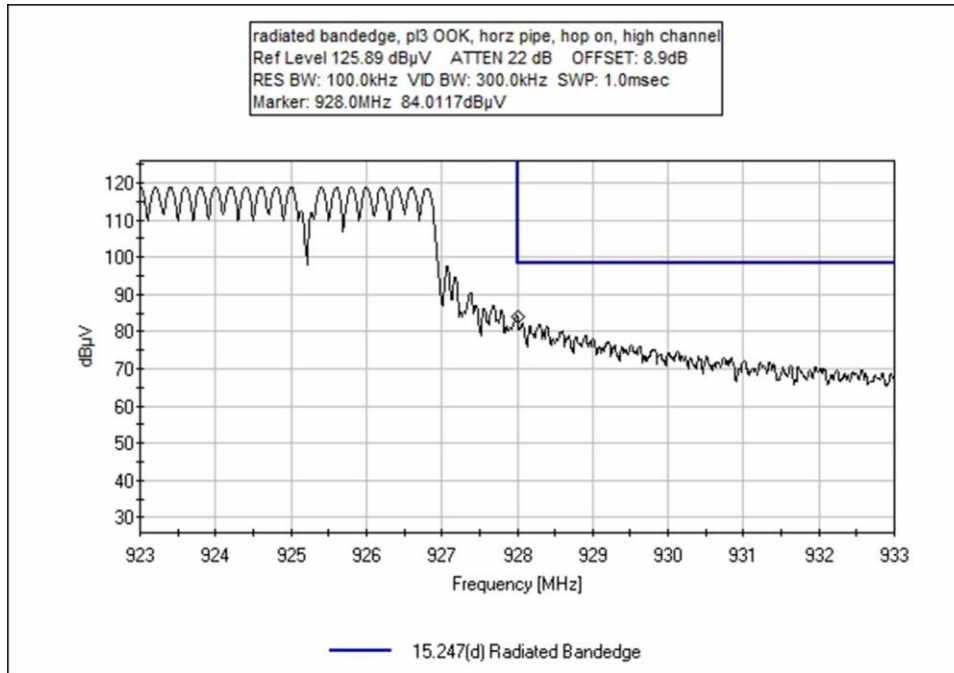


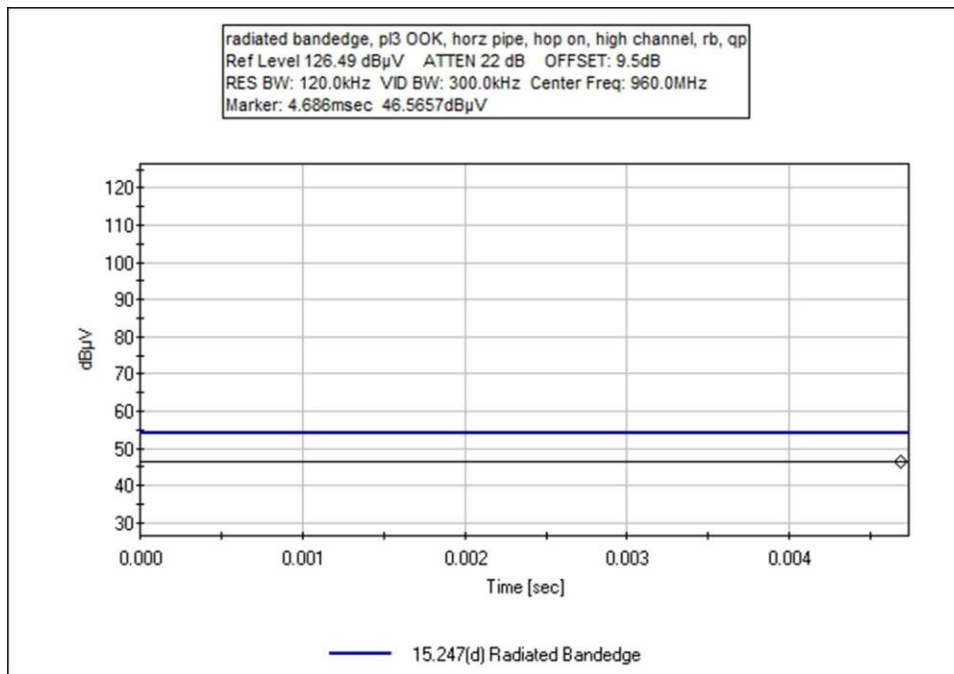
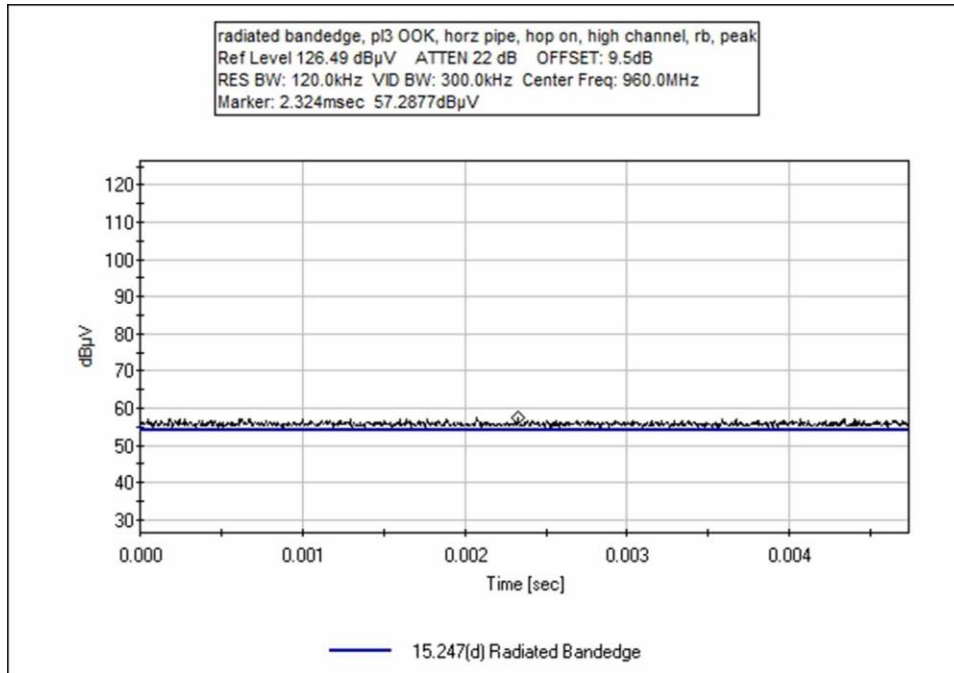


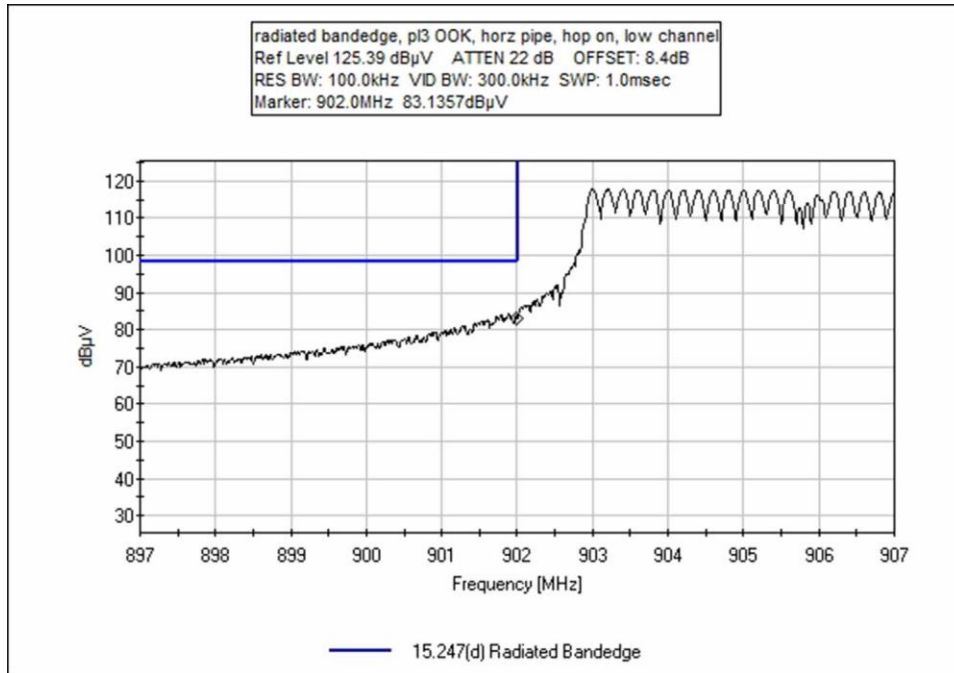












Test Setup Photo(s)





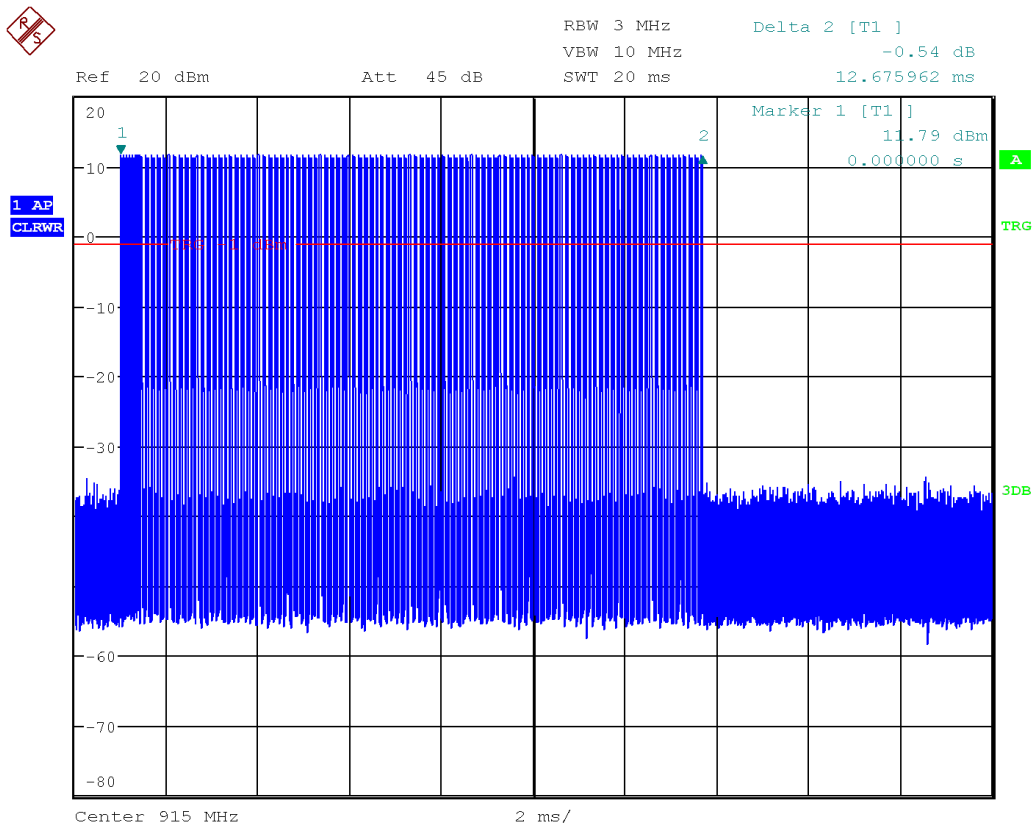
Above GHz Cone Placement

APPENDIX A: CUSTOMER PROVIDED INFORMATION

Manufacturer's Declaration: 15.247(a)(1)(i) Average Time of Occupancy

See supplemental report.

DCCF Plot Data



Date: 16.JAN.2018 23:59:01

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.