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May 7, 2014

Kent Britain
SmartStock LLC, Inc.
PO Box 337
1310 N. Sewell
Pawnee OK 74058
USA

Dear Kent:

Thank you for allowing Professional Testing (EMI), Inc. an opportunity to perform testing for SmartStock LLC. Enclosed is the Wireless Certification Report for the SSL-BOLUS. This report can be used to demonstrate compliance with FCC requirements for wireless devices in the United States.

If you have any questions, please contact me.

Sincerely,

Jeffrey A. Lenk
President

Attachment

Project 13662-15

SSL-BOLUS

Wireless Certification Report

Prepared for:

SmartStock LLC, Inc.

By

Professional Testing (EMI), Inc.
1601 North A.W. Grimes Blvd., Suite B
Round Rock, Texas 78665

May 7, 2014

Reviewed by



Larry Finn
Product Development Engineer

Written by



Eric Lifsey
Test Engineer

Revision History

Revision Number	Description	Date
00	Draft for review.	2014-03-06
01	Revised per Larry Finn comments.	2014-03-25
02	Revised per client comments.	2014-04-07
03	Revised section 1.2 by author.	2014-05-07

Wireless Certification Report for the SmartStock LLC SSL-BOLUS

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Certificate of Compliance

Applicant: SmartStock LLC, Inc.
 Applicant's Address: SmartStock LLC, Inc. (Kent Britain)
 PO Box 337
 1310 N. Sewell
 Pawnee OK 74058
 USA
 FCC ID: LPH-SSL001
 Model: SSL-Bolus
 Project Number: 13662-15

The **SSL-BOLUS** by **SmartStock LLC, Inc.**, a 315 MHz livestock alarm radio, was tested utilizing the following documents and found to be in compliance with the required criteria on the indicated test date.

47 CFR (USA), IC (Canada)		
Section Reference	Parameter	Date
15.231(a), RSS-210 A1.1	Fundamental Field Strength	2012-04-17
15.231(a), RSS-210 A1.1	Harmonic & Spurious Emissions	2012-04-17
15.203, RSS-Gen	Antenna Requirements	2014-03-06
15.231, RSS-Gen	Bandwidth	2012-04-30
15.231, RSS-210 A1.1	Timings	2012-04-30

I, Jeffrey A. Lenk, for Professional Testing (EMI), Inc., being familiar with the FCC rules and test procedures, have reviewed the test setup, measured data, and this report. I believe them to be true and accurate.

Jeffrey A. Lenk
President

This report has been reviewed and accepted by SmartStock LLC, Inc. The undersigned is responsible for ensuring that the SSL-BOLUS by SmartStock LLC, Inc., will continue to comply with the applicable rules.

Representative of SmartStock LLC, Inc.

1.0 Introduction

1.1 Scope

This report describes the extent to which the equipment under test (EUT) conformed to the intentional radiator requirements of the United States.

Professional Testing (EMI), Inc., (PTI) follows the guidelines of National Institute of Standards and Technology (NIST) for all uncertainty calculations, estimates, and expressions thereof for electromagnetic compatibility testing. The procedures of ANSI C63.4: 2009 were used for making all radiated enclosure and mains emission measurements.

1.2 EUT Description

This device is a wireless livestock monitor/alarm. It is composed of a RF transmitter on 315 MHz using pulsed modulation. The EUT, as tested, consisted of the following:

Table 1.2.1: Equipment Under Test

Manufacturer	Model	Serial #	Description
SmartStock LLC, Inc.	SSL-BOLUS	none	Wireless livestock alarm.

The device is composed of an approximately rectangular circuit board in a smooth plastic enclosure. It is delivered orally to the stomach of livestock to monitor the health of the animal and alarm the tenders of abnormal temperatures suggesting the animal is seriously ill.



Photograph 1.2.1: EUT

1.3 EUT Operation

The EUT was exercised in a manner consistent with normal operations.

1.4 Modifications to Equipment

No modifications were made to the EUT during the performance of the test program.

1.5 Test Site

Measurements were made at the PTI semi-anechoic facility designated Site 45 (FCC 459644, IC 3036B-1) in Austin, Texas. The site is registered with the FCC under Section 2.948 and Industry Canada per RSS-GEN, and is subsequently confirmed by laboratory accreditation (NVLAP). The test site is located at 11400 Burnet Road, Austin, Texas 78758, while the main office is located at 1601 North A.W. Grimes Boulevard, Suite B, Round Rock, Texas, 78665.

2.0 Applicable Documents and Clauses

This device operates on 315 MHz providing alarm functionality. As such the following relevant regulations apply.

Table 2.0.1: Applicable Documents

Document #	Title/Description
47 CFR (USA)	Part 15 – Section 15.231
IC (Canada)	RSS-210 Issue 8 – License Exempt Radio Apparatus (All Frequency Bands): Category I Equipment. Annex 1, Momentarily Operated Devices and Remote Control. Section A1.1 Momentarily Operated Devices RSS-Gen Issue 3 – General Requirements and Information for the Certification of Radio Apparatus
ANSI C63.4 2009	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low Voltage Electrical and Electronic Equipment

Table 2.0.2: Applicable Clauses

Clause Subject	Section References	Required?	Result
Radiated Output Power	15.231(a), RSS-210 A1.1 Table A	Yes	Pass
Occupied Bandwidth, 20 dB	15.231, 2.1049, RSS-Gen	Yes	Pass
Field Strength of Radiated Spurious/Harmonic Emissions (30 MHz to 3 GHz)	15.231(a), 15.209, RSS-210 A1.1 Table A, RSS-Gen	Yes	Pass
Antenna Construction	15.203, RSS-Gen	Yes	Pass

3.0 Fundamental Field Strength

Radiated peak output power measurements were made on the EUT.

3.1 Test Procedure

EUT is placed in a container filled with a solution to mimic the conditions in livestock. It is then placed on a non-conductive surface 80 cm above a reference plane and measurements of emissions are made to find maximum emission level. The device is operated within a stomach of the livestock and as such the three orthogonal positions were measured to capture the maximum emission.

3.2 Test Criteria

Section Reference	Parameter	Date(s)
15.231(a), 15.231(b)(2) RSS-210 A1.1	Fundamental Frequency 315 MHz Radiated Output Power, 6,041.67 μ V/m @ 3 m Restated as 75.6 dB μ V/m @ 3 m Or extrapolated as 65.1 dB μ V/m @ 10 m Average Detection of Pulsed Transmission	2012-04-17

3.3 Test Results

The EUT was found to be in compliance with the applicable criteria. The maximum emission is presented below and compared to the limit.

315 MHz per FCC 15.231 Field Strength of Fundamental, 10 Meter Measurement Distance						
Frequency (MHz)	EUT Orientation	Antenna Polarity for Maximum	Corrected Level (Measured Peak Level) (dB μ V/m)	Detector Mode	Duty Cycle Factor for Averaging (dB)	Corrected Level (Measured Average) (dB μ V/m)
314.9981	X	H	62.3	Peak	-20	42.3
314.9981	Y	H	62.7	Peak	-20	42.7
314.9981	Z	H	63.3	Peak	-20	43.3

Resolution bandwidth 120 kHz. Video bandwidth 120 kHz. Detector mode is peak.

Limit at 10 meters (dB μ V/m)	Corrected Level (Measured Average Level) (dB μ V/m)	Margin (dB)
65.1	43.3	-21.8

4.0 Transmitter Duty Cycle & Timings

4.1 Test Procedure

The EUT is placed in its normal operating position on a non-conducting table and positioned to produce a usable signal at an antenna located 1 meter away. The signal is recorded on a spectrum analyzer to measure the pulse width, view/count the train of pulses, and measure the time intervals at which the pulses occur.

The transmitter averaging duty cycle factor is determined for use elsewhere in the measurement of fundamental and spurious signals. The total transmit time during an hour window is calculated and compared to the limit.

4.2 Test Criteria

Standard	Clause	Criteria
FCC IC RSS-210	15.35(c) A1.1	Pulsed transmissions averaged in a period not to exceed 100 ms.
FCC IC RSS-210	15.231(a)(3) A1.1	Not to exceed 2 seconds of transmitting in one hour.

4.3 Test Results

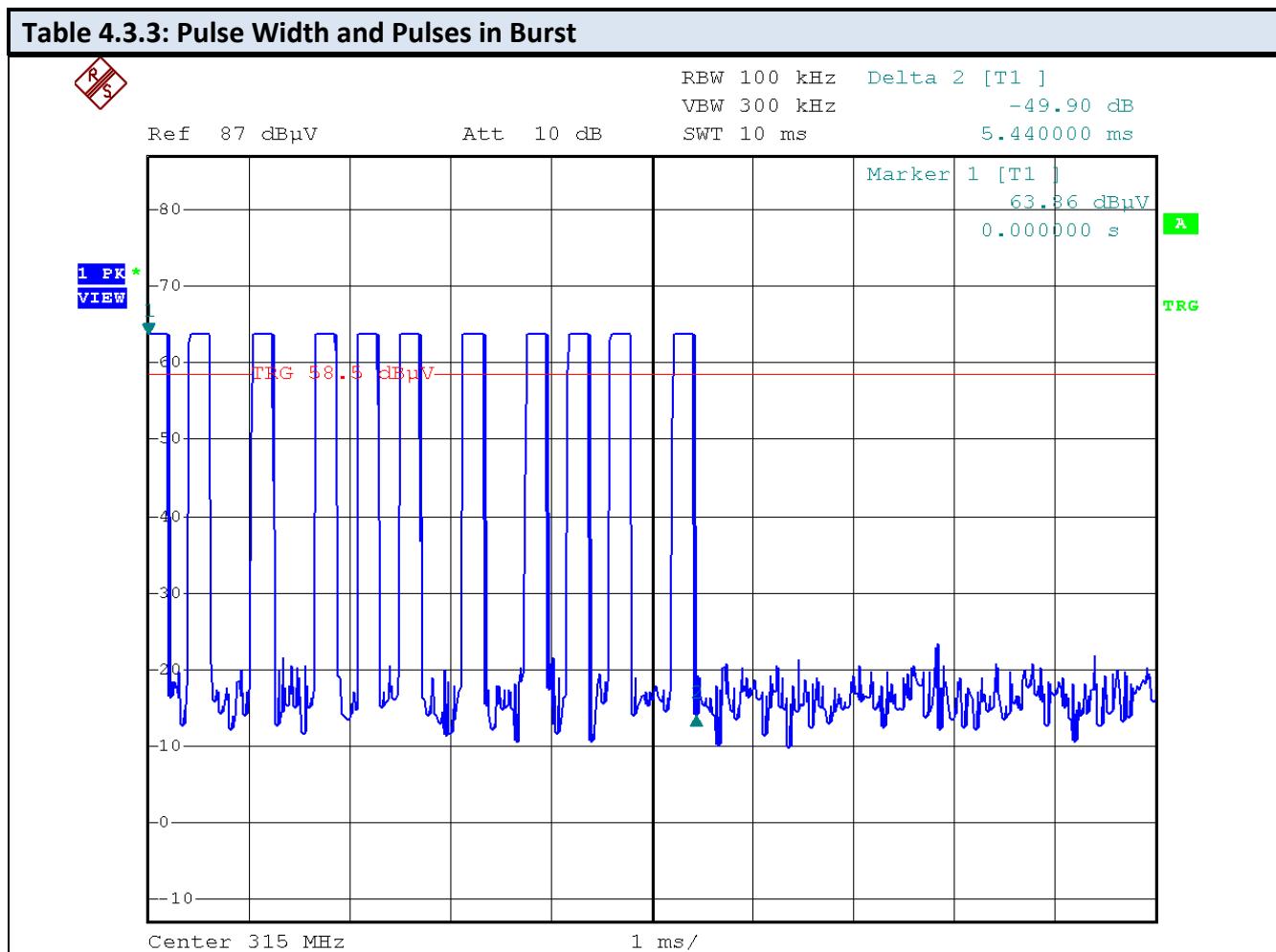
Table 4.3.1 Duty Cycle Factor (Averaging of Pulsed Transmission) per 15.35(c)				
Pulse Train Width (ms)	Period Applied (ms)	Duty Cycle %	Calculated Factor (dB)	Allowed Factor for Averaging of Peak Measurements (dB)*
5.44	100	5.44 / 100 = 0.0544	-25.29	-20

*This factor may only be applied outside of restricted bands and to peak emissions above 1 GHz.

Table 4.3.2 Timing Measurements

Pulse Width (μs)	# of Pulses in Burst	Transmit Time Per Burst (μs)	Time Between Bursts (seconds)	Bursts in One Hour	Transmit Time in One Hour (seconds)
245.0	11	11 * 245 μs = 2695.0	5	60*60 / 5 = 720	720 * 0.002695 = 1.9404 s

Measurements performed on 2012-04-30. The EUT satisfied the criteria.

Table 4.3.3: Pulse Width and Pulses in Burst

Counted 11 pulses in burst. Pulse width determined by taking a x-axis magnified inspection of the plot (see below) on a pixel basis to be $120/490$ or 0.245 ms.

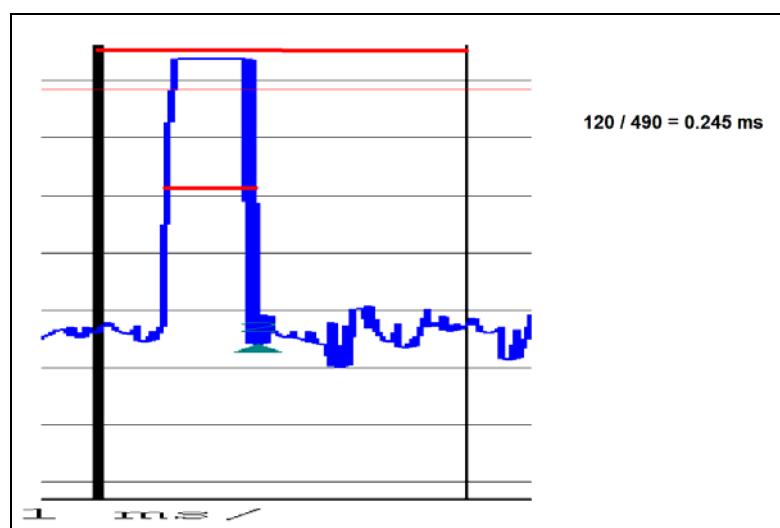
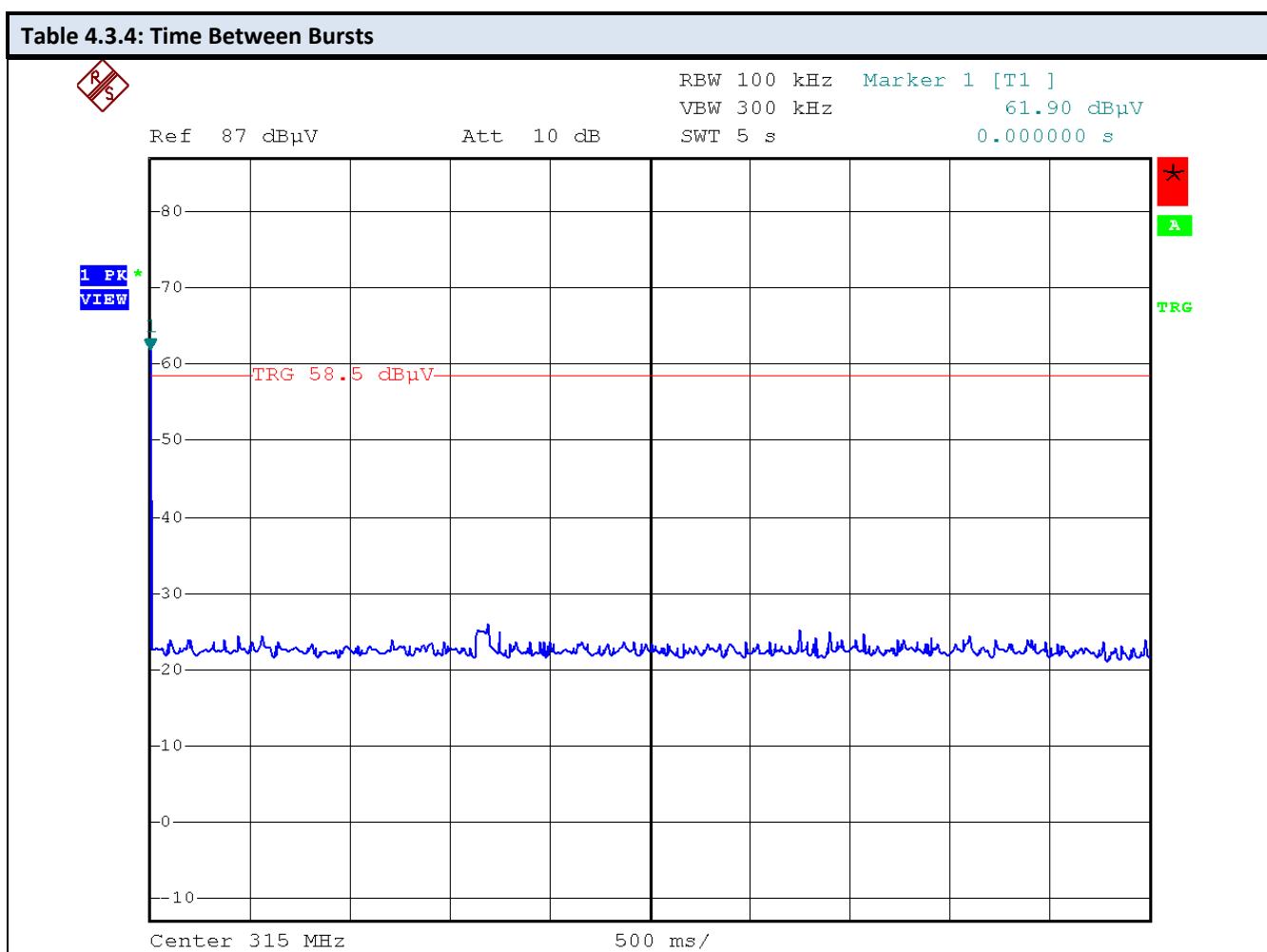


Table 4.3.4: Time Between Bursts

Time between bursts is at least five seconds.

5.0 Occupied Bandwidth

Occupied bandwidth measurement was made on the EUT.

5.1 Test Procedure

The EUT is configured for best signal/power and the bandwidth then is measured. A recording of the results is included.

5.2 Test Criteria

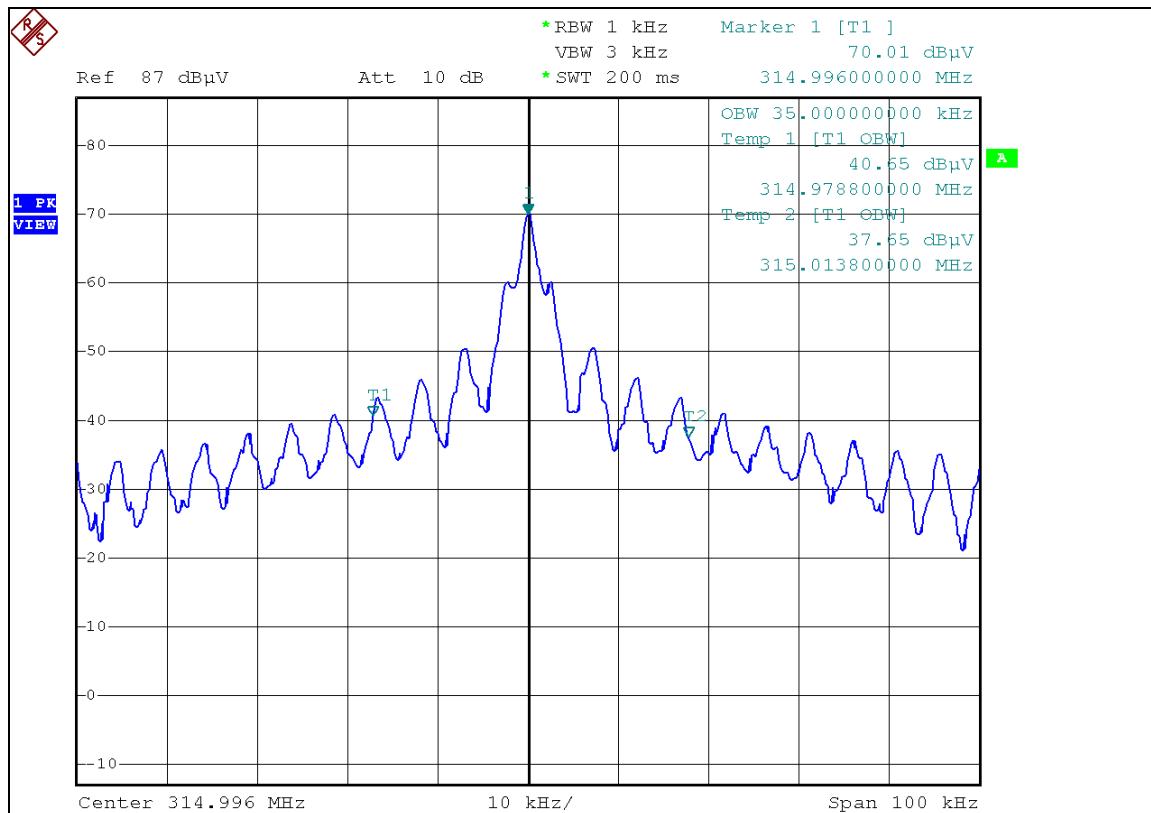
Section Reference	Parameter	Date(s)
15.231(c), 2.1049 RSS-Gen	Occupied Bandwidth	2012-04-30

5.3 Test Results

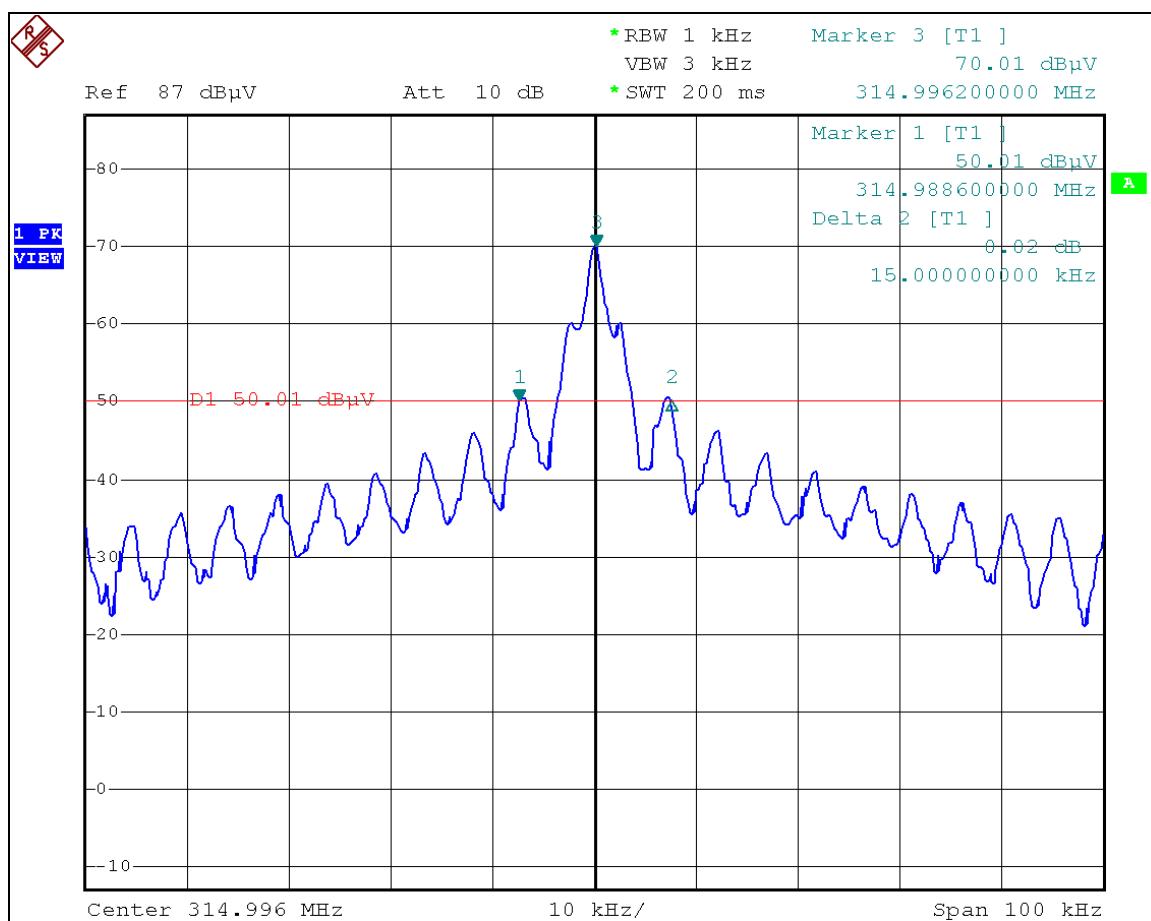
15.231(c) BW Limit For Fundamental = 315 MHz 0.25% of Fundamental kHz	Measured OBW kHz	Measured 20 dB kHz
787.5	35.0	15.0

The EUT satisfied the criteria. Plotted measurements appear below.

5.3.1 Bandwidth Plot, OBW



5.3.2 Bandwidth Plot, 20 dB



6.0 Radiated Spurious Emissions

Out of band spurious/harmonic emissions measurements were performed on the EUT to determine compliance to 47 CFR, Part 15.

6.1 Test Procedure

The EUT was placed on a non-conductive table 0.8 meters above the ground plane. The table was centered on a rotating turntable at a distance of 10 meters from the measurement antenna. The device is operated within a stomach of the livestock and as such the three orthogonal positions below 1 GHz were measured to capture the maximum emission. Above 1 GHz the orientation producing the highest fundamental emission was measured.

Spurious emissions below 1 GHz were measured with quasi-peak detection with a resolution bandwidth of 120 kHz. Transmitter products were measured with peak detection and the duty cycle factor applied to determine average. Spurious emissions above 1 GHz were measured with peak detection. A diagram showing the test setup is given as Figure 6.1.1.

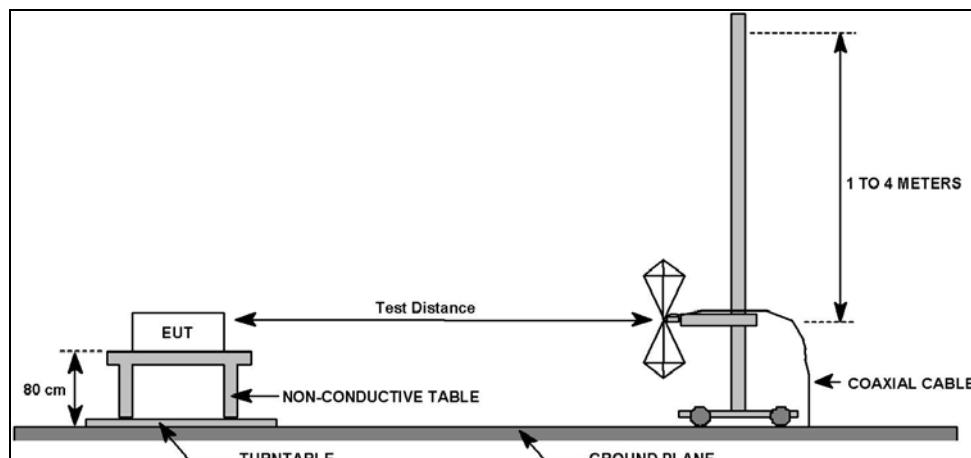


Figure 6.1.1: Field Strength of Spurious Emissions Test Setup

6.2 Test Criteria

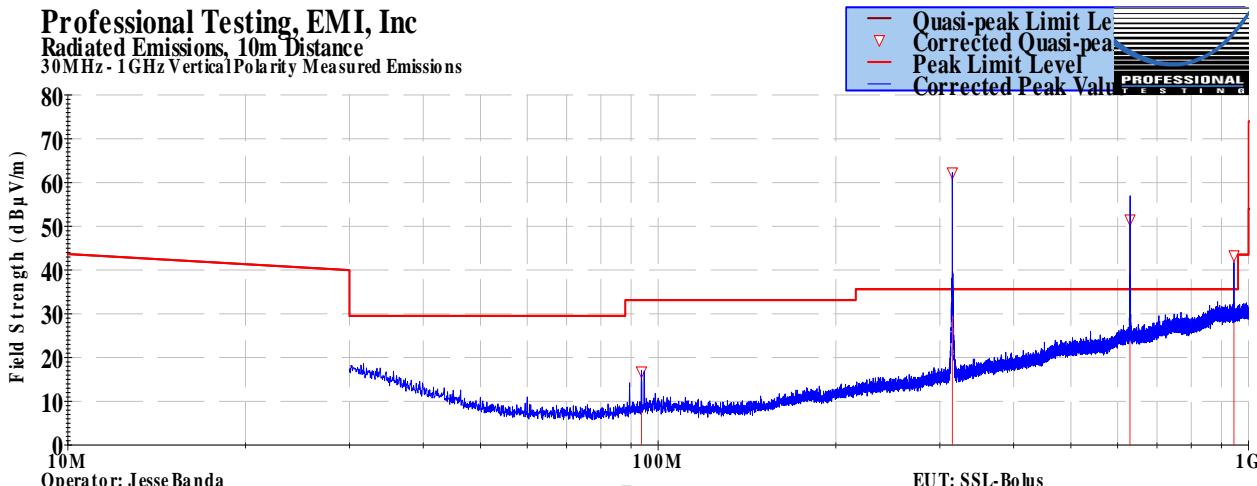
Section Reference	Parameter	Date
FCC 15.231(a), 15.209 RSS-210 A1.1	Based on 315 MHz Fundamental Limit for Radiated Spurious 604.17 μ V/m or 55.6 dB μ V/m at 3 m Or extrapolated as 45.1 dB μ V/m at 10 m Average Detection of Pulsed Transmission	2012-04-17

Emissions are measured as peak values with the averaging factor applied and then compared to the limit. This is for emissions outside of restricted bands.

6.3 Test Results

The EUT satisfied the criteria. Recorded data is presented below; note that it includes the fundamental and spurious signals. The limit line for 15.209 is included though no signals were found that applied to the general emission limit.

6.3.1 Test Results – X Orientation

Professional Testing, EMI, Inc.									
Test Method:	ANSI C63.4-2003: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference, see §15.38).								
In accordance with:	FCC Part 15.231, 15.209 - Code of Federal Regulations Part 47, Subpart C - Intentional Radiators, Radiated Emissions Limits								
Section:	15.231, 15.209								
Test Date(s):	4/17/2012		EUT Serial #:	None					
Customer:	Hitron Technologies Inc.		EUT Part #:	None					
Project Number:	13662-15		Test Technician:	Jesse Banda					
Purchase Order #:			Supervisor:	Rob McCollough					
Equip. Under Test:	SSL-Bolus		Witness' Name:	Kent Britain					
Radiated Emissions Test Results Data Sheet									
Page: 1 of 1									
EUT Line Voltage:	3	VDC	EUT Power Frequency:	N/A	N/A				
Antenna Orientation:	Vertical			Frequency Range:	30MHz to 1GHz				
EUT Mode of Operation:					Transmit Mode, Position X				
Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dB μ V)	Corrected Level (dB μ V/m)	Limit Level (dB μ V/m)	Margin (dB)	Test Results
315	10	0	1	Average	42.3	42.3	65.1	-22.8	Pass
630	10	0	1	Average	36.9	36.9	45.1	-8.2	Pass
945	10	0	1	Average	21.7	21.7	45.1	-23.4	Pass
Professional Testing, EMI, Inc Radiated Emissions, 10m Distance 30MHz - 1GHz Vertical Polarity Measured Emissions									
 <p>Graph showing Field Strength (dBμV/m) on the Y-axis (0 to 80) versus Frequency on the X-axis (10M to 1G). The graph displays measured data points (blue line) and compliance limits (red lines). The measured data points are generally below the limit levels, indicating compliance. The graph includes a legend for the limit levels and a 'PROFESSIONAL TESTING' logo.</p> <p>Operator: Jesse Banda RE_spurious X Axis.TIL 09:38:06 AM, Tuesday, April 17, 2012</p> <p>EUT Mode: 315 MHz TX, X-axis EUT Power: 3.6VDC</p> <p>EUT: SSL-Bolus Project Number: 13662-10 Client: TechTrol, Inc.</p>									
≤ 1GHz Vertical Antenna Polarity Measured Emissions									

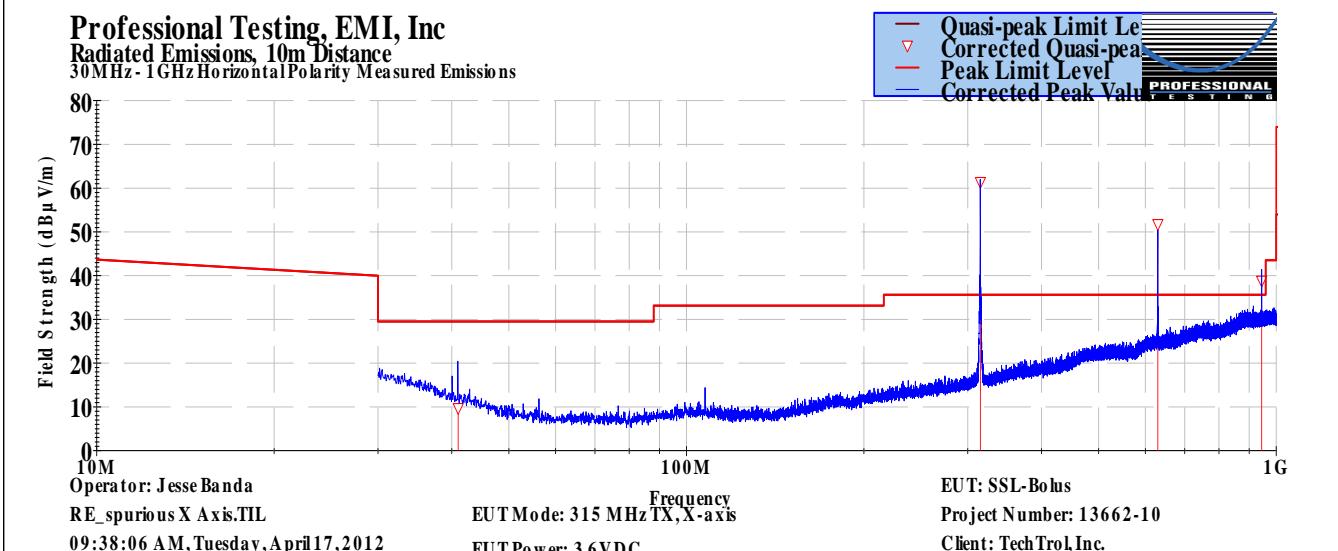
Professional Testing, EMI, Inc.

Test Method:	ANSI C63.4-2003: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference, see §15.38).		
In accordance with:	FCC Part 15.231, 15.209 - Code of Federal Regulations Part 47, Subpart C - Intentional Radiators, Radiated Emissions Limits		
Section:	15.231, 15.209		
Test Date(s):	4/17/2012	EUT Serial #:	None
Customer:	Hitron Technologies Inc.	EUT Part #:	None
Project Number:	13662-15	Test Technician:	Jesse Banda
Purchase Order #:		Supervisor:	Rob McCollough
Equip. Under Test:	SSL-Bolus	Witness' Name:	Kent Britain

Radiated Emissions Test Results Data Sheet

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EUT Line Voltage:	3	VDC	EUT Power Frequency:	N/A	N/A
Antenna Orientation:	Horizontal		Frequency Range:	30MHz to 1GHz	
EUT Mode of Operation:					Transmit Mode, Position X
Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dB μ V)
315	10	0	1	Average	41.9
630	10	0	1	Average	31.8
945	10	0	1	Average	18.8



≤ 1GHz Horizontal Antenna Polarity Measured Emissions

6.3.2 Test Results – Y Orientation

Professional Testing, EMI, Inc.									
Test Method:	ANSI C63.4-2003: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference, see §15.38).								
In accordance with:	FCC Part 15.231, 15.209 - Code of Federal Regulations Part 47, Subpart C - Intentional Radiators, Radiated Emissions Limits								
Section:	15.231, 15.209								
Test Date(s):	4/17/2012		EUT Serial #:	None					
Customer:	Hitron Technologies Inc.		EUT Part #:	None					
Project Number:	13662-15		Test Technician:	Jesse Banda					
Purchase Order #:			Supervisor:	Rob McCollough					
Equip. Under Test:	SSL-Bolus		Witness' Name:	Kent Britain					
Radiated Emissions Test Results Data Sheet									
Page: 1 of 1									
EUT Line Voltage:	3	VDC	EUT Power Frequency:	N/A	N/A				
Antenna Orientation:	Vertical			Frequency Range:	30MHz to 1GHz				
EUT Mode of Operation:					Transmit Mode, Position Y				
Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dB μ V)	Corrected Level (dB μ V/m)	Limit Level (dB μ V/m)	Margin (dB)	Test Results
315	10	0	1	Average	39.4	39.4	65.1	-25.7	Pass
630	10	0	1	Average	30.6	30.6	45.1	-14.5	Pass
945	10	0	1	Average	20.6	20.6	45.1	-24.5	Pass
Professional Testing, EMI, Inc Radiated Emissions, 10m Distance 30MHz - 1GHz Vertical Polarity Measured Emissions									
≤ 1GHz Vertical Antenna Polarity Measured Emissions									

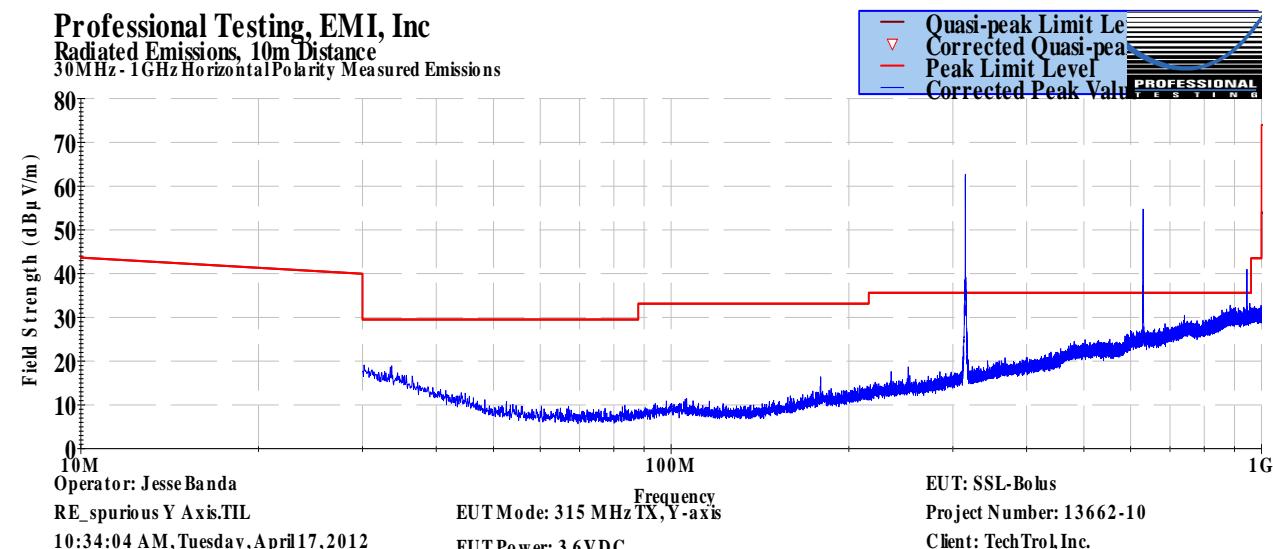
Professional Testing, EMI, Inc.

Test Method:	ANSI C63.4-2003: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference, see §15.38).		
In accordance with:	FCC Part 15.231, 15.209 - Code of Federal Regulations Part 47, Subpart C - Intentional Radiators, Radiated Emissions Limits		
Section:	15.231, 15.209		
Test Date(s):	4/17/2012	EUT Serial #:	None
Customer:	Hitron Technologies Inc.	EUT Part #:	None
Project Number:	13662-15	Test Technician:	Jesse Banda
Purchase Order #:		Supervisor:	Rob McCollough
Equip. Under Test:	SSL-Bolus	Witness' Name:	Kent Britain

Radiated Emissions Test Results Data Sheet

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EUT Line Voltage:	3	VDC	EUT Power Frequency:	N/A	N/A
Antenna Orientation:	Horizontal		Frequency Range:	30MHz to 1GHz	
EUT Mode of Operation:					Transmit Mode, Position Y
Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dB μ V)
315	10	0	1	Average	42.7
630	10	0	1	Average	34.7
945	10	0	1	Average	20.9



≤ 1GHz Horizontal Antenna Polarity Measured Emissions

6.3.3 Test Results – Z Orientation

Professional Testing, EMI, Inc.									
Test Method:	ANSI C63.4-2003: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference, see §15.38).								
In accordance with:	FCC Part 15.231, 15.209 - Code of Federal Regulations Part 47, Subpart C - Intentional Radiators, Radiated Emissions Limits								
Section:	15.231, 15.209								
Test Date(s):	4/17/2012		EUT Serial #:	None					
Customer:	Hitron Technologies Inc.			EUT Part #:	None				
Project Number:	13662-15			Test Technician:	Jesse Banda				
Purchase Order #:				Supervisor:	Rob McCollough				
Equip. Under Test:	SSL-Bolus			Witness' Name:	Kent Britain				
Radiated Emissions Test Results Data Sheet							Page:	1	of 1
EUT Line Voltage:	3	VDC	EUT Power Frequency:	N/A					
Antenna Orientation:	Vertical			Frequency Range:	30MHz to 1GHz				
EUT Mode of Operation:					Transmit Mode, Position Z				
Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dB μ V)	Corrected Level (dB μ V/m)	Limit Level (dB μ V/m)	Margin (dB)	Test Results
315	10	0	1	Average	40.5	40.5	65.1	-24.6	Pass
630	10	0	1	Average	30.4	30.4	45.1	-14.7	Pass
945	10	0	1	Average	18.2	18.2	45.1	-26.9	Pass
<p>Professional Testing, EMI, Inc Radiated Emissions, 10m Distance 30MHz - 1GHz Vertical Polarity Measured Emissions</p> <p>Field Strength (dBμV/m)</p> <p>Frequency</p> <p>10M 100M 1G</p> <p>Operator: Jesse Banda RE_spurious Z axis w/GHz,TIL 11:12:48 AM, Tuesday, April 17, 2012</p> <p>EUT Mode: 315 MHz TX, Z-axis EUT Power: 3.6 VDC</p> <p>EUT: SSL-Bolus Project Number: 13662-10 Client: TechTrol, Inc.</p>									
≤ 1GHz Vertical Antenna Polarity Measured Emissions									

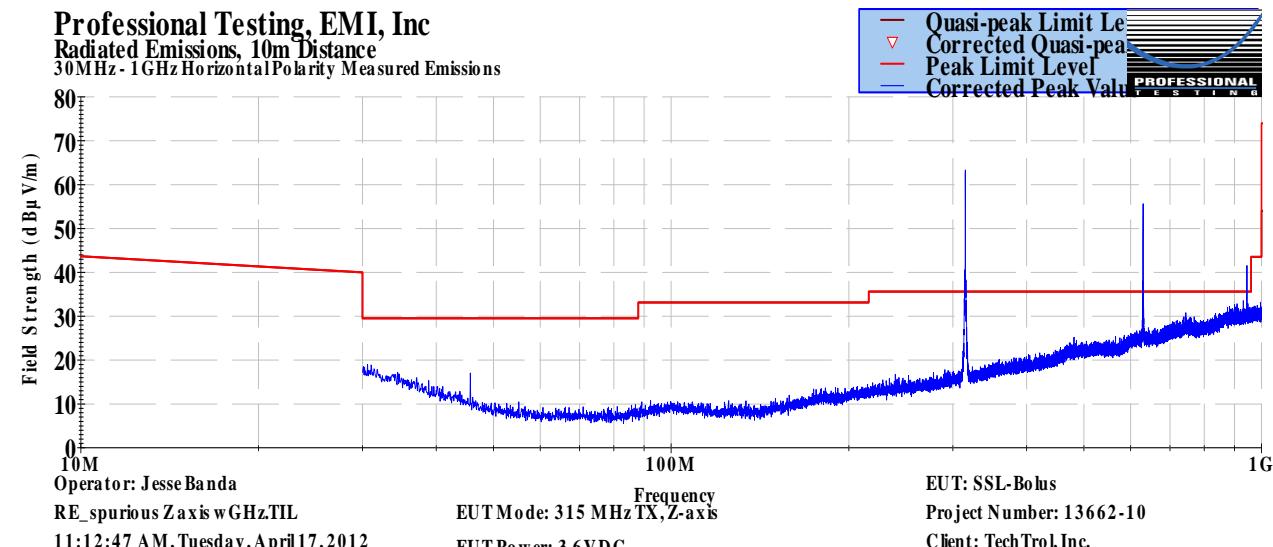
Professional Testing, EMI, Inc.

Test Method:	ANSI C63.4-2003: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference, see §15.38).		
In accordance with:	FCC Part 15.231, 15.209 - Code of Federal Regulations Part 47, Subpart C - Intentional Radiators, Radiated Emissions Limits		
Section:	15.231, 15.209		
Test Date(s):	4/17/2012	EUT Serial #:	None
Customer:	Hitron Technologies Inc.	EUT Part #:	None
Project Number:	13662-15	Test Technician:	Jesse Banda
Purchase Order #:		Supervisor:	Rob McCollough
Equip. Under Test:	SSL-Bolus	Witness' Name:	Kent Britain

Radiated Emissions Test Results Data Sheet

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EUT Line Voltage:	3	VDC	EUT Power Frequency:	N/A	N/A
Antenna Orientation:	Horizontal		Frequency Range:	30MHz to 1GHz	
EUT Mode of Operation:					Transmit Mode, Position Z
Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dB μ V)
315	10	0	1	Average	43.3
630	10	0	1	Average	35.6
945	10	0	1	Average	18.2



≤ 1GHz Horizontal Antenna Polarity Measured Emissions

Professional Testing, EMI, Inc.

Test Method:	ANSI C63.4-2003: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference, see §15.38).		
In accordance with:	FCC Part 15.231, 15.209 - Code of Federal Regulations Part 47, Subpart C - Intentional Radiators, Radiated Emissions Limits		
Section:	15.231, 15.209		
Test Date(s):	4/17/2012	EUT Serial #:	None
Customer:	Hitron Technologies Inc.	EUT Part #:	None
Project Number:	13662-15	Test Technician:	Jesse Banda
Purchase Order #:		Supervisor:	Rob McCollough
Equip. Under Test:	SSL-Bolus	Witness' Name:	Kent Britain

Radiated Emissions Test Results Data Sheet

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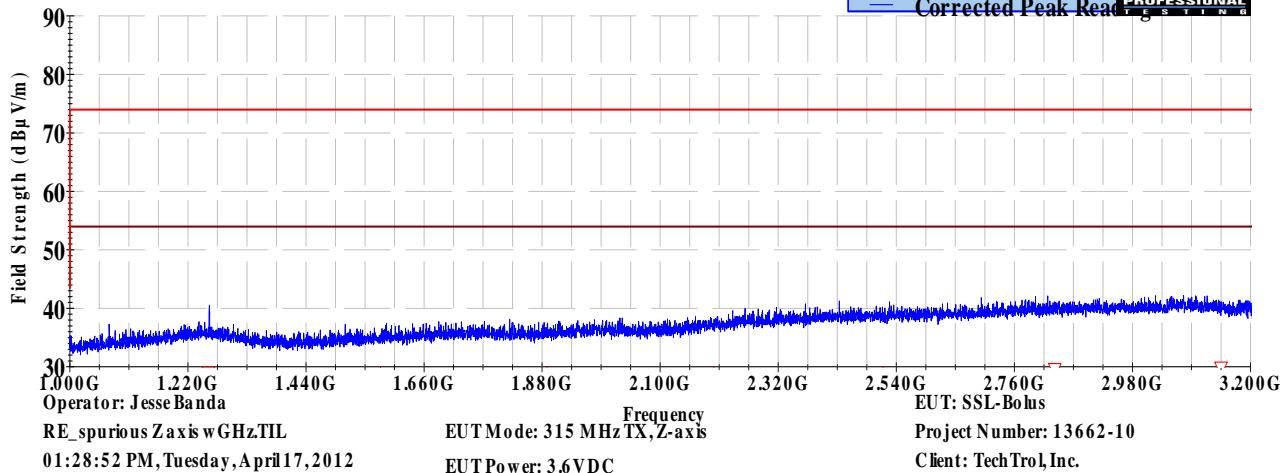
EUT Line Voltage:	3	VDC	EUT Power Frequency:	N/A	N/A
Antenna Orientation:	Vertical		Frequency Range:	Above 1GHz	

EUT Mode of Operation:

Transmit Mode, Position Z

Professional Testing, EMI, Inc

Radiated Emissions, 3m Distance
1-6 GHz Vertical Polarity Measured Emissions



> 1GHz Vertical Antenna Polarity Measured Emissions

Professional Testing, EMI, Inc.

Test Method:	ANSI C63.4-2003: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference, see §15.38).		
In accordance with:	FCC Part 15.231, 15.209 - Code of Federal Regulations Part 47, Subpart C - Intentional Radiators, Radiated Emissions Limits		
Section:	15.231, 15.209		
Test Date(s):	4/17/2012	EUT Serial #:	None
Customer:	Hitron Technologies Inc.	EUT Part #:	None
Project Number:	13662-15	Test Technician:	Jesse Banda
Purchase Order #:		Supervisor:	Rob McCollough
Equip. Under Test:	SSL-Bolus	Witness' Name:	Kent Britain

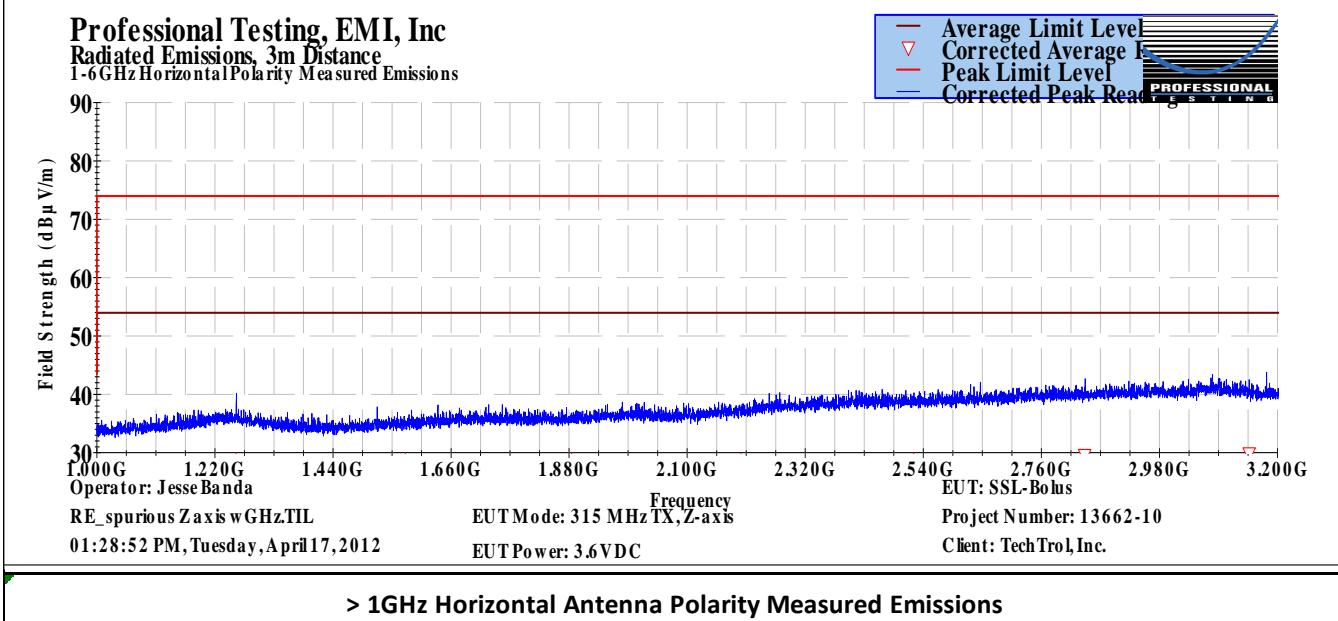
Radiated Emissions Test Results Data Sheet

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EUT Line Voltage:	3	VDC	EUT Power Frequency:	N/A	N/A
Antenna Orientation:	Horizontal		Frequency Range:	Above 1GHz	

EUT Mode of Operation:

Transmit Mode, Position Z



7.0 Antenna Construction Requirements

The design was investigated for meeting the antenna construction requirements of the applicable rules.

7.1 Procedure

A direct examination of the antenna construction is performed and compared to rule criteria that prevents wireless device antennas from being modified by end users in ways that would void their authorization to use the device.

7.2 Criteria

Clause Subject	Section Number	Date
Antenna Construction	15.203, RSS-Gen	2014-03-06

7.3 Results

Antenna for 315 MHz Antenna Manufacturer, Details	
SmartStock LLC Printed circuit trace antenna.	Antenna gain is estimated as 1.7 dBi (small loop).

- There is no antenna connector/port.
- The device is sealed to survive in a caustic environment.

The antenna design meets the requirements of the rules.

8.0 Equipment Lists

8.1 Equipment for Spurious Radiated Emissions

Professional Testing, EMI, Inc.					
Test Method:	ANSI C63.4-2003: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference,				
In accordance with:	FCC Part 15.231, 15.209 - Code of Federal Regulations Part 47, Subpart C - Intentional Radiators,				
Section:	Radiated Emissions Limits				
Test Date(s):	4/17/2012		EUT Serial #:	None	
Customer:	Hitron Technologies Inc.		EUT Part #:	None	
Project Number:	13662-15		Test Technician:	Jesse Banda	
Purchase Order #:			Supervisor:	Rob McCollough	
Equip. Under Test:	SSL-Bolus		Witness' Name:	Kent Britain	
Asset #	Manufacturer	Model	Equipment Nomenclature	Serial Number	Calibration Due Date
1509A	Braden	N/A	TDK 10M Chamber, NSA < 1 GHz	DAC-012915-005	8/7/2012
0586	HP	8447D	Preamplifier, 0.1-1300MHz, 26dB	1726A01364	12/21/2012
1930	Agilent	E4440A-239	Spectrum Analyzer, 3 Hz - 26.5 GHz	MY45304903	6/19/2013
Rental	ETS-Lindgren	3142D	Antenna, Biconilog, 26 MHz - 6 GHz	146493	5/8/2013
C027	N/A	RG214	Cable Coax, N-N, 25m	none	8/26/2012
1327	EMCO	1050	Controller, Antenna Mast	none	N/A
0942	EMCO	11968D	Turntable, 4ft.	9510-1835	N/A
1969	HP	11713A	Attenuator/Switch Driver	3748A04113	N/A
1509B	Braden	N/A	TDK 10M Chamber, VSWR > 1 GHz	DAC-012915-005	4/8/2013
1594	Miteq	AFS44-00102650	Amplifier, 1-26.5GHz, 42dB	none	2/14/2013
2004	Miteq	AFS44-00101800-2S-10P-44	Amplifier, 40dB, .1-18GHz	0	10/12/2012
C030	N/A	0	Cable Coax, N-N, 30m	none	8/26/2012
1780	ETS-Lindgren	3117	Antenna, Double Ridged Guide Horn, 1 - 18 GHz	00110313	1/19/2013
1325	EMCO	1050	Controller, Antenna Mast	9003-1461	N/A

8.2 Equipment for Timings and Bandwidth

Asset #	Manufacturer	Model #	Description	Calibration Due
0582	EMCO	3115	Ridge Guide Antenna	Not Required
ALN-077	Rohde & Schwarz	FSP-30	Spectrum Analyzer	2012-12-22

Appendix: Policy, Rationale, and Evaluation of EMC Measurement Uncertainty

All uncertainty calculations, estimates and expressions thereof shall be in accordance with NIST policy. Since PTI operates in accordance with NIST (NVLAP) Handbook 150-11: 2007, all instrumentation having an effect on the accuracy or validity of tests shall be periodically calibrated or verified traceable to national standards by a competent calibration laboratory. The certificates of calibration or verification on this instrumentation shall include estimates of uncertainty as required by NIST Handbook 150-11.

1. Rationale and Summary of Expanded Uncertainty.

Each piece of instrumentation at PTI that is used in making measurements for determining conformance to a standard (or limit), shall be assessed to evaluate its contribution to the overall uncertainty of the measurement in which it is used. The assessment of each item will be based on either a type A evaluation or a type B evaluation. Most of the evaluations will be type B, since they will be based on the manufacturer's statements or specifications of the calibration tolerances, or uncertainty will be stated along with a brief rationale for the type of evaluation and the resulting stated uncertainties.

The individual uncertainties included in the combined standard uncertainty for a specific test result will depend on the configuration in which the item of instrumentation is used. The combination will always be based on the law of propagation of uncertainty. Any systematic effects will be accommodated by including their uncertainties, in the calculation of the combined standard uncertainty; except that if the direction and amount of the systematic effect cannot be determined and separated from its uncertainty, the whole effect will be treated as uncertainty and combined along with the other elements of the test setup.

Type A evaluations of standard uncertainty will usually be based on calculating the standard deviation of the mean of a series of independent observations, but may be based on a least-squares curve fit or the analysis of variance for unusual situations. Type B evaluations of standard uncertainty will usually be based on manufacturer's specifications, data provided in calibration reports, and experience. The type of probability distribution used (normal, rectangular, a priori, or u-shaped) will be stated for each Type B evaluation.

In the evaluation of the uncertainty of each type of measurement, the uncertainty caused by the operator will be estimated. One notable operator contribution to measurement uncertainty is the manipulation of cables to maximize the measured values of radiated emissions. The operator contribution to measurement uncertainty is evaluated by having several operators independently repeat the same test. This results in a Type A evaluation of operator-contributed measurement uncertainty.

A summary of the expanded uncertainties of PTI measurements is shown as Table 1. These are the worst-case uncertainties considering all operative influence factors.

Table 1: Summary of Measurement Uncertainties for Site 45

Type of Measurement	Frequency Range	Meas. Dist.	Expanded Uncertainty U, dB (k=2)
Mains Conducted Emissions	150 kHz to 30 MHz	N/A	2.9
Telecom Conducted Emissions	150 kHz to 30 MHz	N/A	2.8
Radiated Emissions	30 to 1,000 MHz	10 m	4.8
	1 to 18 GHz	3 m	5.7

End of Report

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