FCC Part 15.231 & IC RSS-210 Certification Application Report
Limited Modular Approval

Test Lab:	Applicant:
Rhein Tech Laboratories, Inc. Tel: 703-689-0368 360 Herndon Parkway Fax: 703-689-2056 Suite 1400 Web: www.rheintech.com Herndon, VA 20170	Safety Technology International, Inc. (STI) 2306 Airport Road Waterford, MI 48327 Contact: John Taylor

FCC ID **IC**	TXL34080 6335A-34080	**Test Report Date**	December 20, 2013
Platform	N/A	**RTL Work Order Number**	2013282
Model	STI-34080	**RTL Quote Number**	QRTL13-282

FCC Classification	DSC – Part 15 Security/Remote Control Transmitter
FCC Rule Part(s)	Part 15.231: Periodic operation in the band 40.66 – 40.70 MHz and above 70 MHz (10-01-12)
IC Standard	RSS-210 Issue 8: Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment
Procedure or Other Guidance	ANSI C63.4-2003 Standard for Methods of Measurement of Radio-Noise Emissions
Digital Interface Information	N/A

Frequency Range (MHz)	Output Power (W)	Frequency Tolerance	Emission Designator
433.92	N/A	N/A	55K4P1D

I, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described in this test report. Modifications made to the equipment during testing in order to achieve compliance with these standards are listed in the report. Furthermore, there was no deviation from, additions to, or exclusions from the applicable parts of FCC Part 2, FCC Part 15, IC RSS-210 and ANSI C63.4.

Signature: _____ Date: December 20, 2013

Typed/Printed Name: Desmond A. Fraser Position: President

These tests are accredited and meet the requirements of ISO/IEC 17025 as verified by ANSI-ASQ National Accreditation Board/ACLASS. Refer to certificate and scope of accreditation AT-1445.

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1 General Information

1.1 Scope

FCC Rules Part 15.231: Periodic operation in the band 40.66–40.70 MHz and above 70 MHz (Part 15.231(b) limits).

IC RSS-210 Issue 8: Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment

1.2 Modifications

N/A

1.3 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located at Rhein Tech Laboratories, Inc. (RTL), 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report and approved by the Federal Communications Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4 2003).

1.4 Related Submittal(s)/Grant(s)

This is an original certification application for **Limited Modular Approval** for Safety Technology International, Inc. Model STI-34080, FCC ID: TXL34080, IC: 6335A-34080.

2 Test Information

2.1 Test Justification

The EUT was tested in all three orthogonal planes in order to determine worst-case emissions. The EUT's frequencies were tested and investigated from 9 kHz to the 10^{th} harmonic. The test results relate only to the item that was tested.

The antenna transmits, receives, and is internal. The IF, LO, and up to the 2^{nd} LO, were investigated and tested, and found to be compliant for unintentional emissions compliance.

2.2 Exercising the EUT

The EUT was adapted to continuously transmit for testing purposes. The carrier was also checked to verify that the information was being transmitted. The unit was reprogrammed for normal operation for the duty cycle and timing plots. Note that the EUT is a manually activated transmitter.

There were no deviations from the test standard(s) and/or methods.

2.3 Test Result Summary

Table 2-1: Test Result Summary

FCC	IC	Test	Pass/Fail or N/A
FCC 15.207	RSS-Gen 7.2.4	AC Conducted Emissions	N/A
FCC 15.231(a)	RSS-210 A1.1.1	Timing Requirements	Pass
FCC 15.231(b)	RSS-210 A1.1.2	Radiated Emissions	Pass
FCC 15.231(c)	N/A	20 dB Bandwidth	Pass
N/A	RSS-210 A1.1.3	99% Bandwidth	Pass

2.4 Test System Details

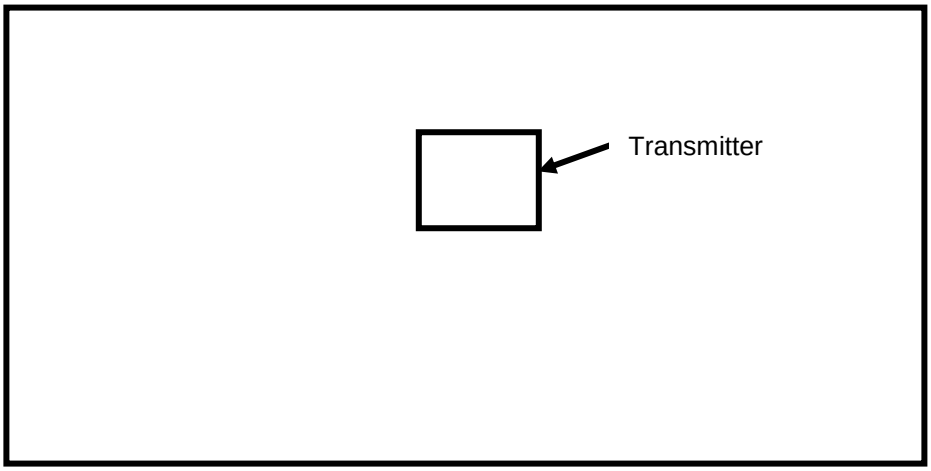
The test samples were received on November 12, 2013. The FCC Identifiers for all equipment, plus descriptions of all cables used in the tested system, are shown in the following table.

Table 2-2: Equipment Under Test (EUT)

Part	Manufacturer	Model	Serial Number	FCC ID	Cable Description	RTL Bar Code
STI Stopper Cover	Safety Technology International, Inc.	34080	N/A	TXL34080	N/A	21106

2.5 Configuration of Tested System

Figure 2-1: Worst Case Configuration of System under Test

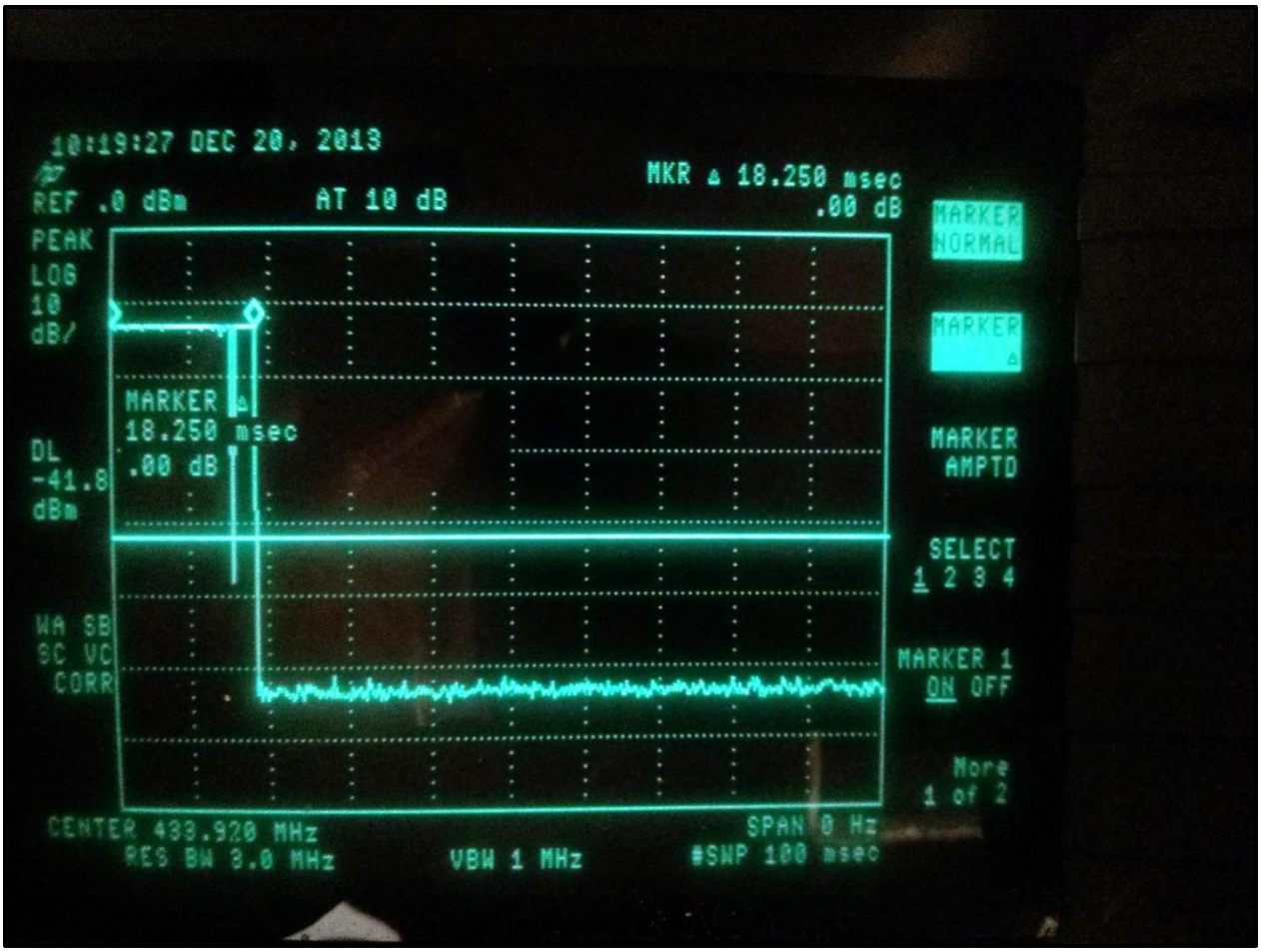


3 Duty Cycle Calculation - FCC 15.35(c)

A worst-case standard transmission in 100 ms consists of a "Transmit on-time" of 18.2 ms, when measured in a 100 msec window, consisting of one packet. Each packet is composed of 64 bits of 150us each or 9.6 ms.

20 log (9.6/100) = -20.4 dB

Plot 3-1: Transmit On in 100 ms Window



Plot 3-2: Data Packet Detail

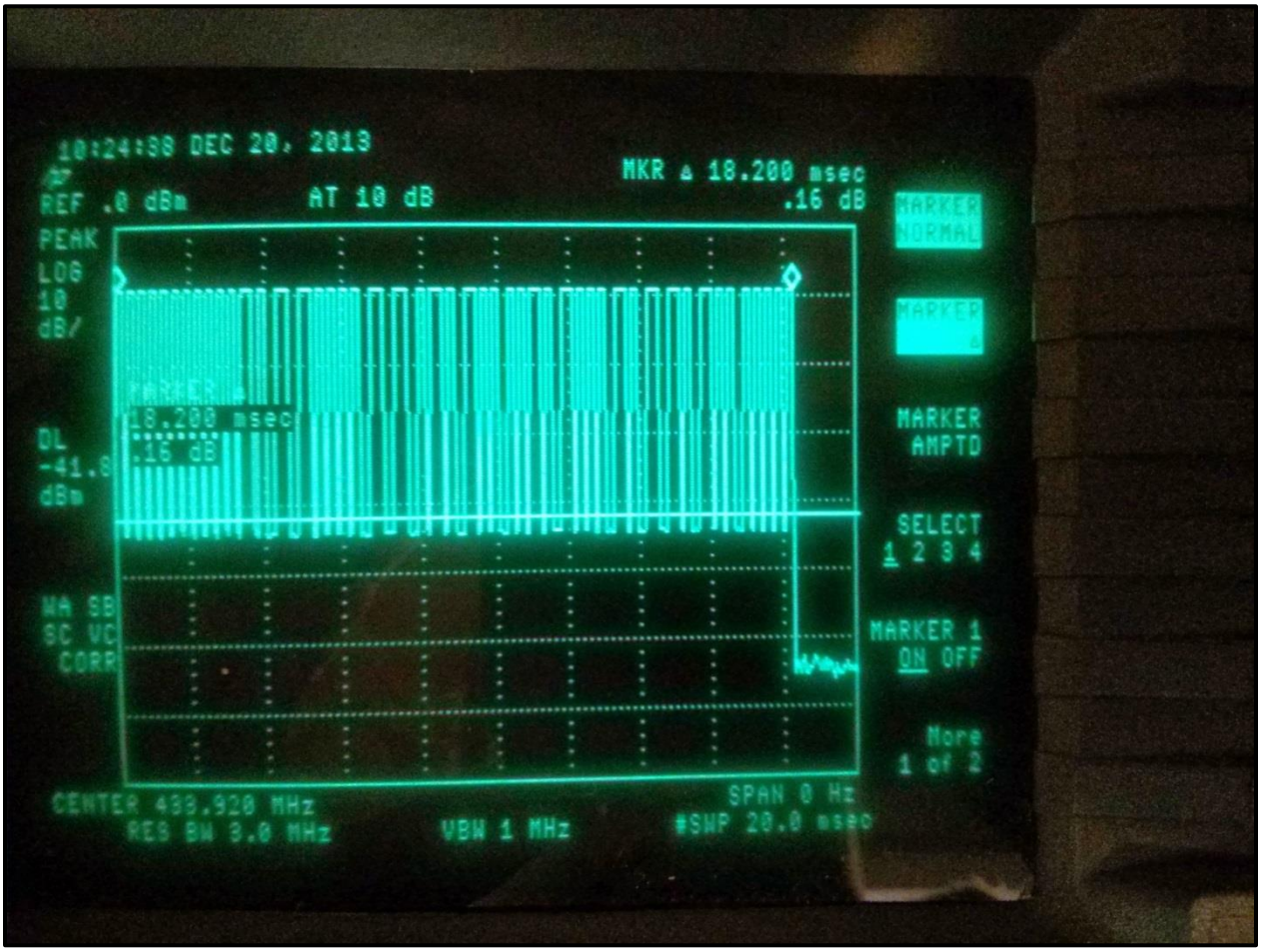


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Table 3-1: Duty Cycle Test Equipment

Manufacturer	Model	Part Type	Serial Number
HP	8594E	Spectrum Analyzer	3810A05583

4 Transmitter Deactivation – FCC 15.231(a)(1)

A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

Plot 4-1: Transmitter Deactivation

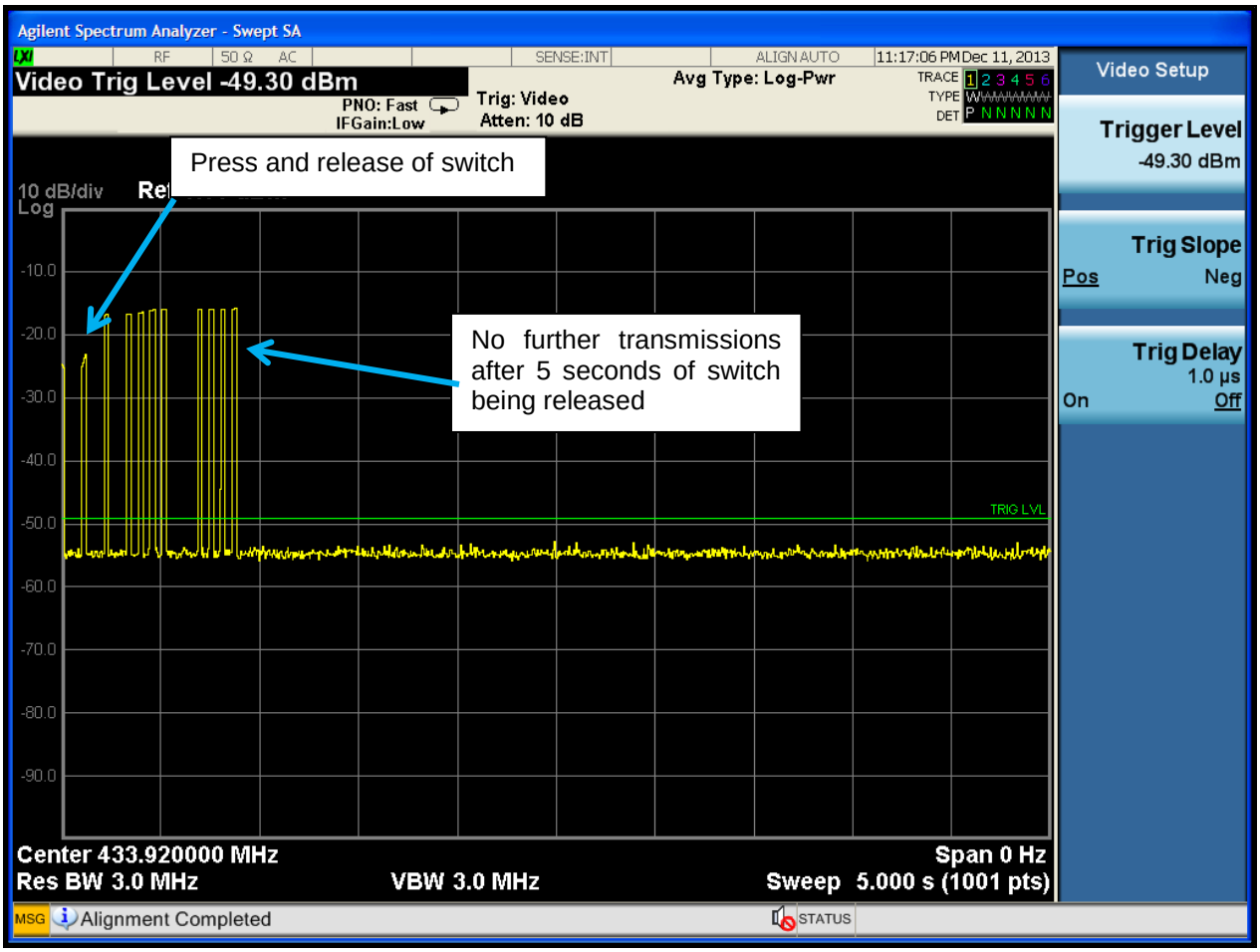

Table 4-1: Transmitter Deactivation Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901583	Agilent Technologies	N9010A	EXA Signal Analyzer (10 Hz - 26.5 GHz)	MY51250846	4/16/14

Test Personnel:

Dan Baltzell		December 11, 2013
Test Engineer	Signature	Date of Test

5 Modulated Bandwidth – FCC 15.231(c), RSS-210 A1.1.3

5.1 Modulated Bandwidth Test Procedure

The minimum 20 dB bandwidth was measured using a 50 ohm spectrum analyzer with the resolution bandwidth set at 10 kHz and the video bandwidth set at 100 kHz. The spectrum analyzer's display markers were set to -20 dB using max hold until the spectrum was filled and a plot taken.

5.2 FCC 15.231(c) Limits

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

5.3 Modulated Bandwidth Test Data

Table 5-1: 20 dB Modulated Bandwidths

Frequency (MHz)	20 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)
433.97	55.4	0.25% of 433970 = 1085	-1029.6

Table 5-2: 99% Modulated Bandwidth (RSS-210 A1.1.3)

Frequency (MHz)	99% Bandwidth (kHz)	Limit (kHz)	Margin (kHz)
433.97	156.5	0.25% of 433970 = 1085	-928.5

Plot 5-1: Modulated Bandwidth

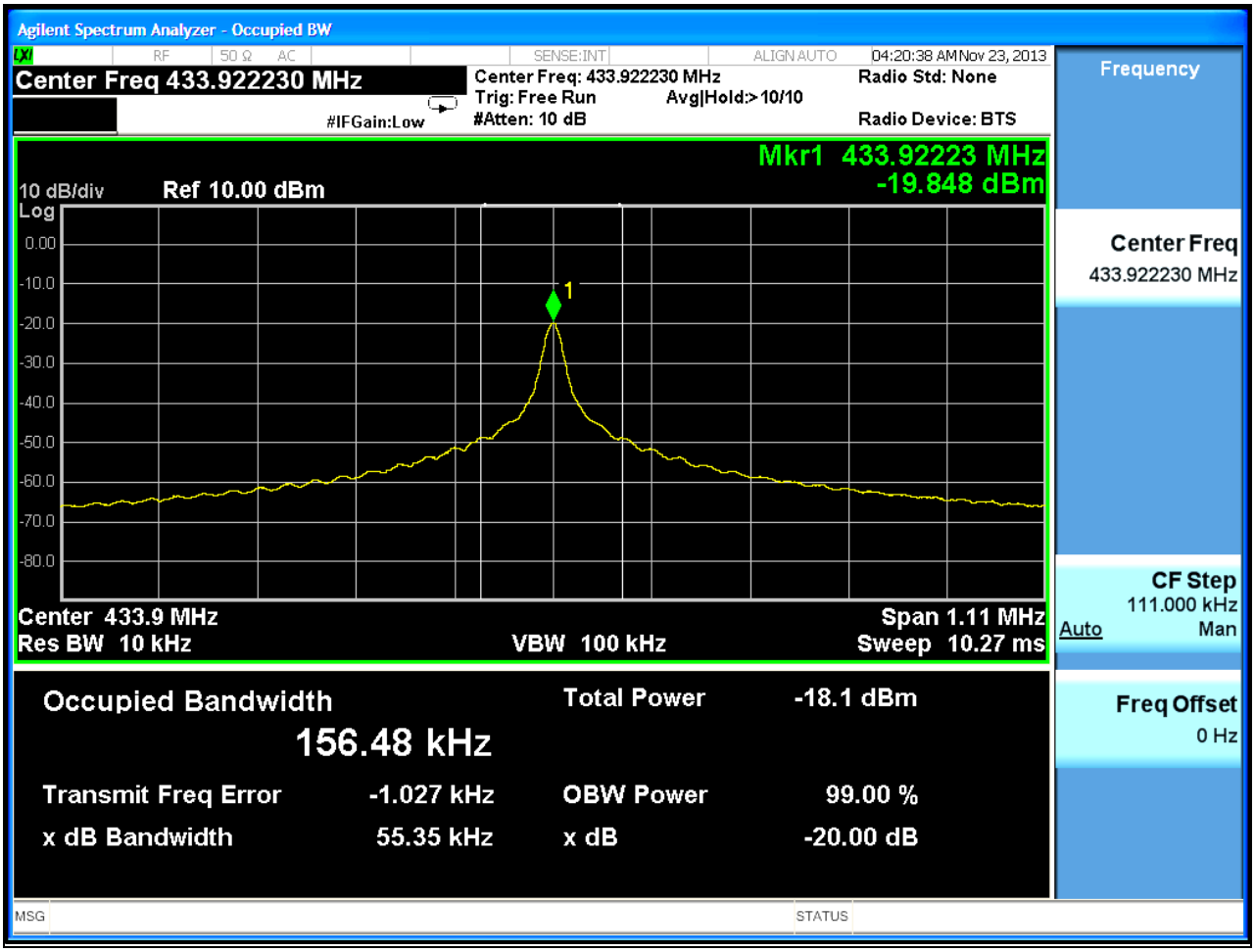

Table 5-3: Modulated Bandwidth Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901583	Agilent Technologies	N9010A	EXA Signal Analyzer (10 Hz - 26.5 GHz)	MY51250846	4/16/14

Test Personnel:

Dan Baltzell		November 23, 2013
Test Engineer	Signature	Date of Test

6 Radiated Emissions – FCC 15.209, 15.231(b)

6.1 Radiated Fundamental Emissions Test Procedure

Radiated emissions of the fundamentals were tested at three meters, and meet the requirements of average mode, and 20 dB higher in peak mode. The limit is calculated from a linear interpolation between 3,750 and 12,500 uV/m, and from 260-470 MHz, or 10,997 uV/m at 433.92 MHz. The EUT was tested in all three orthogonal planes. Measurement was based on a peak detector and an average level was calculated. The average level was compared to the average limit as per 15.231(b) and the peak level was compared to the average limit +20 dB per 15.35(b).

6.1.1 Radiated Fundamental Emissions Limits Test Data

Table 6-1: Radiated Fundamental Emissions

Frequency (MHz)	Peak Analyzer Reading (dBuV)	Site Correction Factor (dBm)	Peak Level Corrected (dBuV/m)	Peak Limit (dBuV/m)	Peak Margin (dB)	Duty Cycle Correction (dB)	Calculated Average Level (dBuV/m)	Average Limit (dBuV/m)	Average Margin (dB)
433.92	81.5	18.4	99.9	100.8	-0.9	-20.4	77.9	80.8	-2.9

6.2 Radiated Harmonics/Spurious Emissions – FCC 15.231(b)

6.2.1 Radiated Emissions Harmonics/Spurious Test Procedure

Radiated emissions of the harmonics were tested at three meters. The EUT was tested in the three orthogonal planes with the receive antenna in both polarities. The emissions were maximized per ANSI C63.4:2003 8.3.1.2; that is, the measurement antenna height was varied between 1 and 4 m, and the EUT was rotated through 360° on a rotating turntable until the maximum emissions were found. Both horizontal and vertical measurement antenna polarizations were used. A resolution bandwidth of 100 kHz was used for frequencies less than 1000 MHz, and a resolution bandwidth of 1 MHz was used for frequencies greater than or equal to 1000 MHz.

Table 6-2: Radiated Spurious Harmonics

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pass/ Fail
433.920	Peak	H	81.5	18.4	99.9	100.8	-0.9	Pass
568.100	QP	V	45.2	-6.7	38.5	46.0	-7.5	Pass
867.840	Peak	H	59.4	-4.2	55.3	80.8	-25.6	Pass
1301.763	Peak	H	47.0	0.9	47.9	74.0	-26.1	Pass
1735.688	Peak	H	41.4	3.1	44.5	80.8	-36.3	Pass
2169.590	Peak	V	80.8	-22.3	58.5	80.8	-22.3	Pass
2603.510	Peak	V	67.5	-20.9	46.6	80.8	-34.2	Pass
3037.430	Peak	V	67.5	-20.2	47.3	80.8	-33.5	Pass
3471.350	Peak	H	66.2	-18.7	47.5	80.8	-33.3	Pass
3905.270	Peak	V	61.6	-18.8	42.8	74.0	-31.2	Pass
4339.190	Peak	H	58.0	-14.5	43.5	74.0	-30.5	Pass

Table 6-3: Radiated Spurious Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901334	RF Depot	N/A	RF cable, 30'	N/A	11/20/14
901336	RF Depot	N/A	RF cable, 3'	N/A	11/20/14
900905	Rhein Tech Laboratories, Inc.	PR-1040	Amplifier (20 MHz - 2 GHz)	900905	8/20/14
900791	Schaffner Chase	CBL6112	Bilog Periodic Antenna (25 MHz - 2 GHz)	2099	2/2/14
900913	Hewlett Packard	85462A	EMI Receiver RF Section (9 kHz - 6.5 GHz)	3325A00159	11/4/14
900914	Hewlett Packard	85460A	RF Filter Section (100 kHz - 6.5 GHz)	3330A00107	11/4/14
901364	Rhein Tech Laboratories, Inc.	PR-1042	Amplifier (1 GHz – 26.0 GHz)	N/A	9/4/14
900772	EMCO	3161-02	Horn Antenna (2.0 - 4.0 GHz)	9804-1044	4/20/17
900321	EMCO	3161-03	Horn Antenna (4.0 - 8.2 GHz)	9508-1020	4/20/17
901215	Hewlett Packard	8596EM	Spectrum Analyzer (9 kHz - 12.8 GHz)	3826A00144	3/15/14
901364	Rhein Tech Laboratories, Inc.	N/A	Amplifier (0.1 - 26 GHz)	N/A	9/4/14

Test Personnel:

Jon Wilson		November 21, 2013
Test Engineer	Signature	Date of Test

Table 6-4: Radiated Digital Unintentional Emissions

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pass/ Fail
31.920	Qp	H	30.0	-15.8	14.2	40.0	-25.8	Pass
65.100	Qp	H	29.5	-25.7	3.8	40.0	-36.2	Pass
119.900	Qp	H	29.1	-19.7	9.4	43.5	-34.1	Pass
149.800	Qp	H	28.9	-21.4	7.5	43.5	-36.0	Pass
182.700	Qp	H	28.8	-22.2	6.6	43.5	-36.9	Pass
261.600	Qp	H	28.4	-17.0	11.4	46.0	-34.6	Pass

Table 6-5: Radiated Digital Unintentional Emissions Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900905	Rhein Tech Laboratories, Inc.	PR-1040	OATS 1 Preamplifier 40dB (30 MHz – 2 GHz)	1006	9/4/14
900878	Rhein Tech Laboratories, Inc.	AM3-1197-0005	4 meter antenna mast, polarizing	Outdoor Range 1	Not Required
901242	Rhein Tech Laboratories, Inc.	WRT-000-0003	Polystyrene rotating table	N/A	Not Required
900913	Hewlett Packard	85462A	EMI Receiver RF Section (9 kHz – 6.5 GHz)	3325A00159	11/4/14
900914	Hewlett Packard	8546OA	RF Filter Section, (100 kHz - 6.5 GHz)	3330A00107	11/4/14
900791	Chase	CBL6111B	Bilog Antenna (30 MHz – 2000 MHz)	N/A	2/2/14
Emissions Testing Software	Rhein Tech Laboratories, Inc.	Automated Emission Tester	Rev. 14.0.2	N/A	N/A

Test Personnel:

Dan Baltzell		December 11, 2013
Test Engineer	Signature	Date of Test

7 Conducted Emissions

7.1 Site and Test Description

The power line conducted emissions measurements were performed in a Series 81 type shielded enclosure manufactured by Rayproof. The EUT was assembled on a wooden table 80 centimeters high. Power was fed to the EUT through a 50 ohm/50 microhenry Line Impedance Stabilization Network (LISN). The EUT LISN was fed power through an A.C. filter box on the outside of the shielded enclosure. The filter box and EUT LISN housing are bonded to the ground plane of the shielded enclosure. A second LISN, the peripheral LISN, provides isolation for the EUT test peripherals. This peripheral LISN was also fed A.C. power. A metal power outlet box, which is bonded to the ground plane and electrically connected to the peripheral LISN, powers the EUT host peripherals.

The spectrum analyzer was connected to the A.C. line through an isolation transformer. The 50 ohm output of the EUT LISN was connected to the spectrum analyzer input through a Solar 100 kHz high-pass filter. The filter is used to prevent overload of the spectrum analyzer from noise below 100 kHz. Conducted emission levels were measured on each current-carrying line with the spectrum analyzer operating in the CISPR quasi-peak mode (or peak mode if applicable). The analyzer's 6 dB bandwidth was set to 9 kHz. Video filter less than 10 times the resolution bandwidth is not used. Average measurements are performed in linear mode using a 10 kHz resolution bandwidth, a 1 Hz video bandwidth, by increasing the sweep time in order to obtain a calibrated measurement. The emission spectrum was scanned from 150 kHz to 30 MHz. The highest emission amplitudes relative to the appropriate limits were measured and have been recorded. The limits for Class A and Class B are contained therein.

7.2 Test Limits

Class A Line-Conducted Emissions		
	Limit (dBµV)	
Frequency (MHz)	Quasi-Peak	Average
0.15 to 0.50	79	66
0.50 to 30.0	73	60

Class B Line-Conducted Emissions		
	Limit (dBµV)	
Frequency (MHz)	Quasi-Peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5.00	56	46
5.00 to 30.00	60	50

7.3 Conducted Emissions Test Results

Testing is N/A – the EUT is battery powered.

8 Conclusion

The data in this measurement report shows that Safety Technology International, Inc. Model STI-34080, FCC ID: TXL34080 IC: 6335A-34080, complies with all the applicable requirements of Parts 2 and 15 of the FCC Rules and IC RSS-210 for Limited Modular Approval.