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FCC/ Certification Test Report
For the
Strata Safety Products
Communication Node
FCCID:Y68C201

WLL JOB# **10755-01 Rev 0**
July 11, 2011

Prepared for:

Strata Safety Products LLC
8995 Rosell Road Ste 200
Sandy Springs, GA 30350

Prepared By:

Washington Laboratories, Ltd.
7560 Lindbergh Drive
Gaithersburg, Maryland 20879

ACLASS ACCREDITED TESTING

Testing Certificate AT 1448-01

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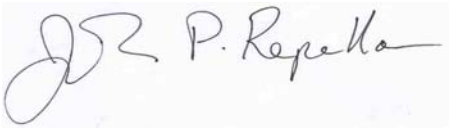

John P. Repella
Compliance Engineer

Reviewed by:

Steven D. Koster
EMC Operations Manager

Abstract

This report has been prepared on behalf of Strata Safety Products to support the attached Application for Equipment Authorization. The test report and application are submitted for an Intentional Radiator under Part 15.249 (10/2009) of the FCC Rules. This Certification Test Report documents the test configuration and test results for a Strata Safety Products Communication Node.

Testing was performed on an Open Area Test Site (OATS) of Washington Laboratories, Ltd, 7560 Lindbergh Drive, Gaithersburg, MD 20879. Site description and site attenuation data have been placed on file with the FCC's Sampling and Measurements Branch at the FCC laboratory in Columbia, MD. The Industry Canada OATS numbers are 3035A-1 and 3035A-2 for Washington Laboratories, Ltd. Site 1 and Site 2, respectively. Washington Laboratories, Ltd. has been accepted by the FCC and approved by ACLASS under Certificate AT-1448 as an independent FCC test laboratory.

The Strata Safety Products Communication Node complies with the limits for an Intentional Radiator device under FCC Part 15.249.

Revision History	Reason	Date
Rev 0	Initial Release	July 11, 2011

Table of Contents

List of Tables

List of Figures

1 Introduction

1.1 Compliance Statement

The Strata Safety Products Communications Node complies with the limits for an Intentional Radiator device under FCC Part 15.249 (10/2009) and Industry Canada RSS-210.

1.2 Test Scope

Tests for radiated and conducted emissions were performed. All measurements were performed in accordance with the 2003 version of ANSI C63.4. The measurement equipment conforms to ANSI C63.2 Specifications for Electromagnetic Noise and Field Strength Instrumentation.

1.3 Contract Information

Customer:	Strata Safety Products 8995 Rosell Road Ste 200 Sandy Springs, GA 30350
Purchase Order Number:	01104
Quotation Number:	65917

1.4 Test Dates

Testing was performed on the following date(s):	12/09/10 & 12/10/10

1.5 Test and Support Personnel

Washington Laboratories, LTD	John P. Repella
Customer Representative	Tom Michaud

1.6 Abbreviations

A	**A**mpere
ac	**a**lternating **c**urrent
AM	Amplitude Modulation
Amps	**Amp**ere**s**
b/s	**b**its per **s**econd
BW	**B**and**W**idth
CE	**C**onducted **E**mission
cm	**c**enti**m**eter
CW	**C**ontinuous **W**ave
dB	**d**eci**B**el
dc	**d**irect **c**urrent
EMI	**E**lectro**m**agnetic **I**nterference
EUT	**E**quipment **U**nder **T**est
FM	**F**requency **M**odulation
G	**g**iga - prefix for 10^9 multiplier
Hz	**H**ertz
IF	**I**ntermediate **F**requency
k	**k**ilo - prefix for 10^3 multiplier
LISN	**L**ine **I**mpedance **S**tabilization **N**etwork
M	**M**ega - prefix for 10^6 multiplier
m	**m**eter
µ	**m**icro - prefix for 10^{-6} multiplier
NB	**N**arrow**b**and
QP	**Q**uasi-**P**eak
RE	**R**adiated **E**missions
RF	**R**adio **F**requency
rms	**r**oot-**m**ean-**s**quare
SN	**S**erial **N**umber
S/A	**S**pectrum **A**nalyzer
V	**V**olt

2 Equipment Under Test

2.1 EUT Identification & Description

The Strata Safety Products Communications Node is part of a messaging system designed to deliver data and information in a mining applications. The node is intended to be deployed in a fixed location providing a link to base station applications.

Table 1: Device Summary

ITEM	DESCRIPTION
Manufacturer:	Strata Safety Products
FCC ID:	Y68C201
Model(s):	Communications Node
FCC Rule Parts:	§15.249
Frequency Range:	915
Maximum Output Power:	45791.5 µV/m @ 3m
Modulation:	F1D
Occupied Bandwidth:	534kHz
Keying:	Manual
Type of Information:	Data
Number of Channels:	1
Power Output Level	Fixed
Antenna Connector	Soldered Wire
Antenna Type	Internal
Interface Cables:	None
Power Source & Voltage:	Battery Powered 6.0VDC
TX spurious	293.3 µV/m @ 3m
RX Spurious	28.9 µV/m @ 3m

2.2 Test Configuration

The Communications Node was configured in a stand alone condition. The required three orthogonals were evaluated during pre-scan testing and the vertical position was deemed to be the worst case.

2.3 Testing Algorithm

The Node was configured in a stand alone condition transmitting on a single channel during test. The node was set to transmit continuously at 915MHz

Worst case emission levels are provided in the test results data.

2.4 Test Location

All measurements herein were performed at Washington Laboratories, Ltd. test center in Gaithersburg, MD. Site description and site attenuation data have been placed on file with the FCC's Sampling and Measurements Branch at the FCC laboratory in Columbia, MD. The Industry Canada OATS numbers are 3035A-1 and 3035A-2 for Washington Laboratories, Ltd. Site 1 and Site 2, respectively. Washington

Laboratories, Ltd. has been accepted by the FCC and approved by ACLASS under Certificate AT-1448 as an independent FCC test laboratory.

2.5 Measurements

2.5.1 References

ANSI C63.2 Specifications for Electromagnetic Noise and Field Strength Instrumentation

ANSI C63.4 American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

2.6 Measurement Uncertainty

All results reported herein relate only to the equipment tested. For the purposes of the measurements performed by Washington Laboratories, the measurement uncertainty is ±2.3 dB. This has been calculated for a *worst-case situation* (radiated emissions measurements performed on an open area test site).

The following measurement uncertainty calculation is provided:

$$\text{Total Uncertainty} = (A^2 + B^2 + C^2)^{1/2}/(n-1)$$

Where:

A = Antenna calibration uncertainty, in dB = 2 dB

B = Spectrum Analyzer uncertainty, in dB = 1 dB

C = Site uncertainty, in dB = 4 dB

n = number of factors in uncertainty calculation = 3

Thus, Total Uncertainty = $0.5\ (2^2 + 1^2 + 4^2)^{1/2} = \pm 2.3$ dB.

3 Test Equipment

Table 2 shows a list of the test equipment used for measurements and support along with the calibration information.

Table 2: Test Equipment List

Test Name: **Conducted Emissions Voltage**		Test Date:	**12/10/2010**
Asset #	**Manufacturer/Model**	**Description**	**Cal. Due**
68	HP - 85650A	ADAPTER QP	6/22/2011
70	HP - 85685A	PRESELECTOR RF W/OPT 8ZE	6/22/2011
72	HP - 8568B	ANALYZER SPECTRUM	6/22/2011
125	SOLAR - 8028-50-TS-24-BNC	LISN	7/10/2011
126	SOLAR - 8028-50-TS-24-BNC	LISN	7/10/2011
360	GLOBAL SPECIALTIES - 1337	SUPPLY POWER DC	CNR
641	HQ POWER - NONE	0-50V 5AMP DC SUPPLY	CNR
45	FLUKE - 73	MULTIMETER DIGITAL	9/28/2011

Test Name: **Radiated Emissions**		Test Date:	**12/09/2010**
Asset #	**Manufacturer/Model**	**Description**	**Cal. Due**
68	HP - 85650A	ADAPTER QP	6/22/2011
70	HP - 85685A	PRESELECTOR RF W/OPT 8ZE	6/22/2011
72	HP - 8568B	ANALYZER SPECTRUM	6/22/2011
528	AGILENT - E4446A	ANALYZER SPECTRUM	9/27/2011
4	ARA - DRG-118/A	ANTENNA DRG 1-18GHZ	2/6/2011
627	AGILENT - 8449B	AMPLIFIER 1-26GHZ	5/7/2011
732	MEGAPHASE - TM40 K1K5 36	RF CABLE 1M 2-9M TO 2-9M RA ONE END	5/13/2011
667	MEGAPHASE - EM18-S1NK5-600	CABLE OATS TESTING DC TO 18 GHZ SMA MALE	5/7/2011

4 Test Results

4.1 Duty Cycle Correction

Measurements may be adjusted where pulsed RF is utilized to find the average level associated with a quantity. This calculation is applied to limits for pulsed licensed and unlicensed devices.

- For Unlicensed Intentional Radiators under 47CFR Part 15, all duty cycle measurements compared to a 100 millisecond period
- duty cycle = on time/100 milliseconds

Duty Cycle Correction was not required for this device, plot is provided for reference only.

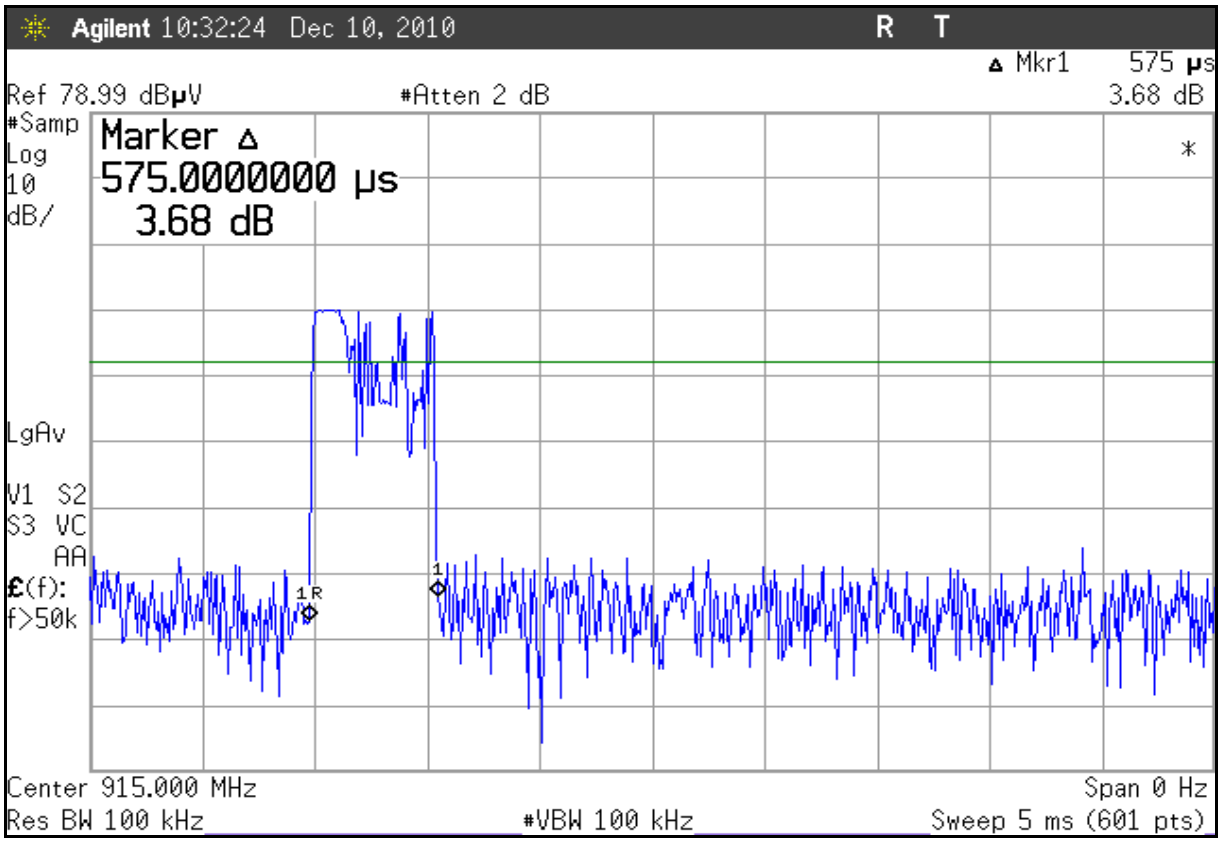

Figure 1: Duty Cycle Plot TX @ 915MHz

4.2 Occupied Bandwidth: (FCC Part §2.1049 and RSS-210 A1.1.3)

Occupied bandwidth was performed by coupling the output of the EUT to the input of a spectrum analyzer.

At full modulation, the occupied bandwidth was measured as shown:

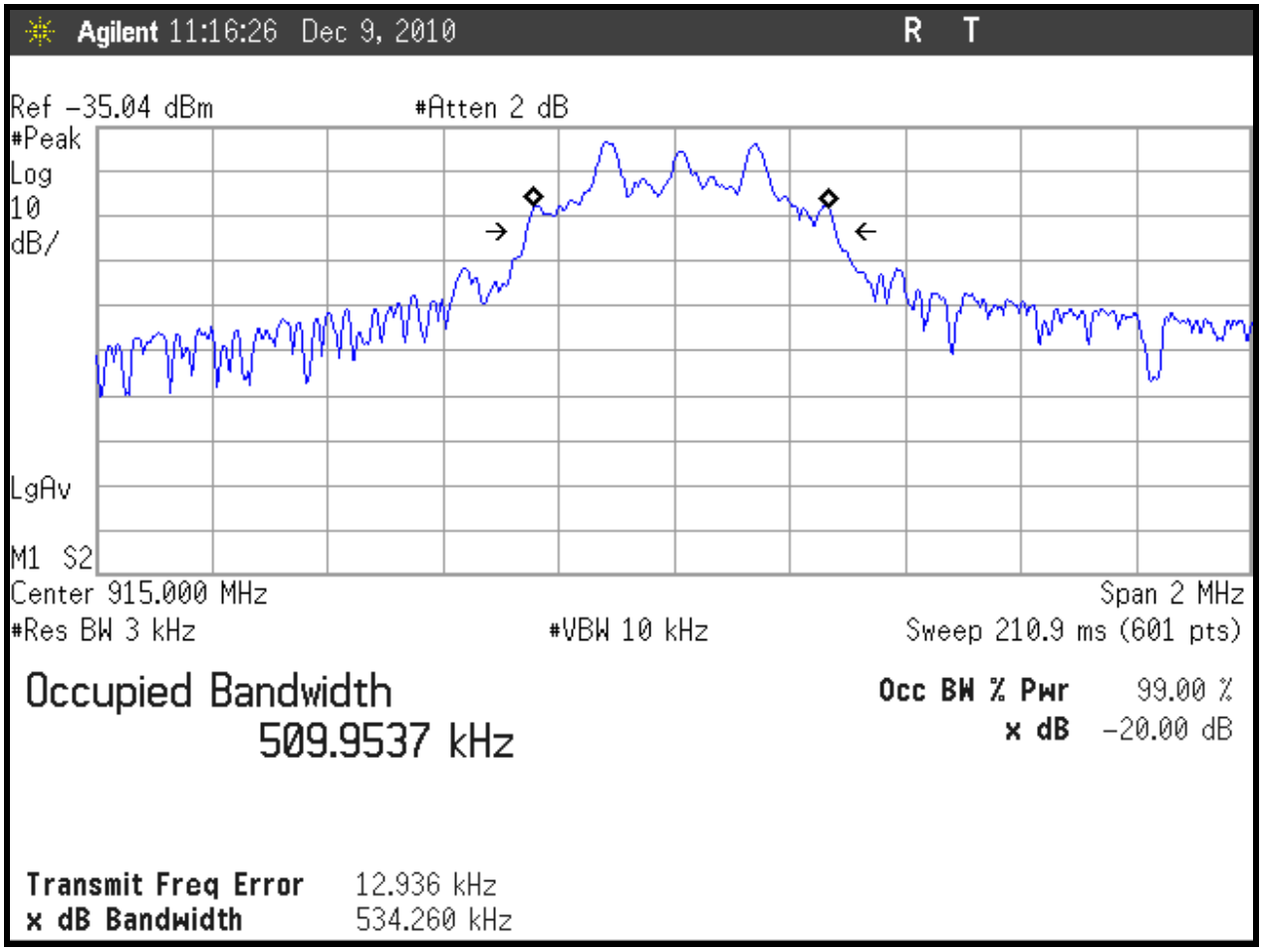

Figure 2: Communication Node, Occupied Bandwidth TX @ 915MHz

Table 3 provides a summary of the Occupied Bandwidth Results for the Communications Node.

Table 3: Occupied Bandwidth Results

Frequency	Communication Node Bandwidth	Limit	Pass/Fail
915MHz	534.26 kHz	1 MHz	Pass

4.3 Radiated Emissions: (FCC Part §2.1053, RSS210 A2.9)

The EUT must comply with the radiated emission limits of 15.249(a) & RSS210 A2.9. The limits are as shown in the following table.

Table 4: Radiated Emissions Limits

Fundamental Frequency	Field Strength of Fundamental (µV/m)	Field Strength of Harmonics (µV/m)
902 – 928 MHz	50,000	500
2400 – 2483.5 MHz	50,000	500
5725 – 5875 MHz	50,000	500
24.00 – 24.25 GHz	250,000	2500

4.3.1 Test Procedure

The requirements of FCC Part 15 (10/2009) and ICES-003 call for the EUT to be placed on an 80 cm high 1 X 1.5 meters non-conductive motorized turntable for radiated testing on a 10-meter open field test site. The emissions from the EUT were measured continuously at every azimuth by rotating the turntable. Bi-conical and log periodic broadband antennas were mounted on an antenna mast to determine the height of maximum emissions. The height of the antenna was varied between 1 and 4 meters. The output of the antenna was connected to the input of the spectrum analyzer and the emissions in the frequency range of 30 MHz to 1 GHz were measured. The peripherals were placed on the table in accordance with ANSI C63.4-2003. Cables were varied in position to produce maximum emissions. Both the horizontal and vertical field components were measured.

The output from the antenna was connected, via a preamplifier, to the input of the spectrum analyzer. The detector function was set to peak. The measurement bandwidth of the spectrum analyzer system was set to at least 120 kHz, with all post-detector filtering no less than 10 times the measurement bandwidth.

Above 1GHz, peak measurements are compared to both the average and peak emission limits. Frequencies above 1GHz were performed using a measurement bandwidth of 1MHz with a video bandwidth setting of 1MHz for the measurement. The EUT was placed on motorized turntable for

radiated testing on a 3-meter open field test site. The emissions from the EUT were measured continuously at every azimuth by rotating the turntable. Receiving antennas were mounted on an antenna mast to determine the height of maximum emissions. The height of the antenna was varied between 1 and 4 meters. The peripherals were placed on the table in accordance with ANSI C63.4-2003. Cables were varied in position to produce maximum emissions. Both the horizontal and vertical field components were measured.

The emissions were measured using the following resolution bandwidths:

Frequency Range	Resolution Bandwidth	Video Bandwidth
30MHz-1000 MHz	120kHz	>100 kHz
>1000 MHz	1 MHz	<30 Hz (Avg.) 1MHz (Peak)

Emissions were measured to the 10th harmonic of the transmit frequency. Worst case emission levels are shown.

The following is a sample calculation used in the data tables for calculating the final field strength of spurious emissions and comparing these levels to the specified limits.

Sample Calculation:

Spectrum Analyzer Voltage (SA Level): V dBµV

Antenna Factor (Ant Corr): AfdB/m

Cable Loss Correction (Cable Corr): CCdB

Duty Cycle Correction (Average) DCCdB

Amplifier Gain: GdB

Electric Field (Corr Level): EdBµV/m = VdBµV + AfdB/m + CCdB + DCCdB – GdB

Table 5: Radiated Emission Test Data

Frequency (MHz)	Polarity H/V	Azimuth (Degree)	Ant. Height (m)	SA Level (dBuV)	Corr Factors (dB)	Corr. Level (uV/m)	Limit (uV/m)	Margin (dB)	Comments
39.56	V	0.00	1.00	12.90	14.3	22.9	100.0	-12.8	
48.00	V	0.00	1.00	10.70	9.3	9.9	100.0	-20.0	
50.38	V	0.00	1.00	13.90	8.4	13.0	100.0	-17.7	
52.03	V	0.00	1.00	14.50	8.2	13.6	100.0	-17.3	
55.91	V	0.00	1.00	12.00	7.9	9.8	100.0	-20.1	
114.41	V	0.00	1.00	9.40	14.8	16.2	150.0	-19.3	
143.66	V	270.00	1.00	14.00	14.6	27.0	150.0	-14.9	
148.46	V	270.00	1.00	11.10	14.5	19.0	150.0	-17.9	
182.03	V	270.00	1.00	7.00	12.4	9.3	150.0	-24.1	
224.01	V	270.00	1.00	8.00	13.7	12.2	200.0	-24.3	
899.61	V	90.00	1.00	10.80	27.2	79.3	200.0	-8.0	
915.00	V	90.00	1.00	66.00	27.2	45791.5	50000.0	-0.8	Fundamental
926.23	V	90.00	1.00	15.70	27.4	142.1	200.0	-3.0	
39.56	H	270.00	3.80	3.00	14.3	7.3	100.0	-22.7	
48.00	H	270.00	3.80	5.40	9.3	5.4	100.0	-25.3	
52.03	H	270.00	3.80	9.30	8.2	7.5	100.0	-22.5	
114.41	H	270.00	3.80	9.00	14.8	15.5	150.0	-19.7	
143.66	H	270.00	3.80	9.30	14.6	15.7	150.0	-19.6	
148.46	H	225.00	3.80	15.20	14.5	30.5	150.0	-13.8	
915.00	H	45.00	3.80	59.70	27.2	22171.0	50000.0	-7.1	Fundamental
926.23	H	45.00	3.80	3.50	27.4	34.9	200.0	-15.2	

Frequency (MHz)	Polarity H/V	Azimuth (Degree)	Ant. Height (m)	SA Level (dBuV)	Corr Factors (dB)	Corr. Level (uV/m)	Limit (uV/m)	Margin (dB)	Comments
1830.00	V	90.00	1.00	53.03	-4.9	253.7	500.0	-5.9	AVE
2745.00	V	90.00	1.00	42.80	-1.5	116.2	500.0	-12.7	AVE
3660.00	V	90.00	1.00	41.15	0.6	121.8	500.0	-12.3	AVE
4575.00	V	90.00	1.00	42.22	2.4	170.9	500.0	-9.3	AVE
1830.00	V	90.00	1.00	59.20	-4.9	516.1	5000.0	-19.7	PEAK
2745.00	V	90.00	1.00	48.50	-1.5	224.0	5000.0	-27.0	PEAK
3660.00	V	90.00	1.00	47.30	0.6	247.2	5000.0	-26.1	PEAK
4575.00	V	90.00	1.00	48.50	2.4	352.1	5000.0	-23.0	PEAK
1830.00	H	45.00	1.20	54.29	-4.9	293.3	500.0	-4.6	AVE
2745.00	H	45.00	1.20	44.18	-1.5	136.2	500.0	-11.3	AVE
3660.00	H	45.00	1.20	41.26	0.6	123.3	500.0	-12.2	AVE
4575.00	H	45.00	1.20	41.36	2.4	154.8	500.0	-10.2	AVE
1830.00	H	45.00	1.20	60.40	-4.9	592.6	5000.0	-18.5	PEAK
2745.00	H	45.00	1.20	59.80	-1.5	822.6	5000.0	-15.7	PEAK
3660.00	H	45.00	1.20	47.20	0.6	244.3	5000.0	-26.2	PEAK
4575.00	H	45.00	1.20	56.60	2.4	894.7	5000.0	-14.9	PEAK

Receiver Radiated Emissions

Frequency (MHz)	Polarity H/V	Azimuth (Degree)	Ant. Height (m)	SA Level (dBuV)	Corr Factors (dB)	Corr. Level (uV/m)	Limit (uV/m)	Margin (dB)	Comments
40.00	V	180.00	1.00	12.20	14.0	20.4	100.0	-13.8	
48.00	V	180.00	1.00	13.50	9.3	13.7	100.0	-17.2	
50.38	V	180.00	1.00	21.70	8.4	31.8	100.0	-9.9	
52.03	V	180.00	1.00	16.50	8.2	17.2	100.0	-15.3	
56.02	V	45.00	1.00	18.10	7.9	19.9	100.0	-14.0	
72.02	V	45.00	1.00	20.60	8.6	28.9	100.0	-10.8	
143.66	V	45.00	1.00	13.50	14.6	25.5	150.0	-15.4	
148.46	V	45.00	1.00	12.60	14.5	22.6	150.0	-16.4	
182.03	V	180.00	1.00	7.10	12.4	9.4	150.0	-24.0	
224.01	V	180.00	1.00	6.20	13.7	9.9	200.0	-26.1	
228.07	V	225.00	1.00	9.10	13.7	13.8	200.0	-23.2	
40.00	H	270.00	3.80	3.00	14.0	7.1	100.0	-23.0	
48.00	H	270.00	3.80	5.60	9.3	5.5	100.0	-25.1	
50.65	H	270.00	3.80	11.70	8.3	10.0	100.0	-20.0	
52.03	H	270.00	3.80	12.10	8.2	10.3	100.0	-19.7	
56.02	H	270.00	3.80	6.80	7.9	5.4	100.0	-25.3	
72.02	H	225.00	3.80	6.40	8.6	5.6	100.0	-25.0	
143.66	H	45.00	3.80	13.60	14.6	25.8	150.0	-15.3	
148.46	H	45.00	3.80	9.30	14.5	15.5	150.0	-19.7	
182.03	H	45.00	3.80	12.10	12.4	16.7	150.0	-19.0	

4.4 Conducted Emissions (AC Power Line)

The EUT was placed on an 80 cm high 1 x 1.5 m non-conductive table above a ground plane. Power to the EUT was provided through a Solar Corporation 50 Ω/50 µH Line Impedance Stabilization Network bonded to a 3 x 2 meter ground plane. The LISN has its AC input supplied from a filtered AC power source. Power and data cables were moved about to obtain maximum emissions.

The 50 Ω output of the LISN was connected to the input of the spectrum analyzer and the emissions in the frequency range of 150 kHz to 30 MHz were measured. The detector function was set to quasi-peak or peak, as appropriate, and the resolution bandwidth during testing was at least 9 kHz, with all post-detector filtering no less than 10 times the resolution bandwidth.

The units do not transmit while they are charging so the conducted data is for the charge mode only. AC Power Line conducted emissions test data are included in Table 6.

Table 6: AC Power Line Conducted Emissions Test Data Sheet

NEUTRAL

Frequency (MHz)	Level QP (dBµV)	Level AVG (dBµV)	Cable Loss (dB)	LISN Corr (dB)	Level QP Corr (dBµV)	Level Corr Avg (dBµV)	Limit QP (dBµV)	Limit AVG (dBµV)	Margin QP (dB)	Margin AVG (dB)
13.880	21.4	10.9	11.2	1.1	33.8	23.3	60.0	50.0	-26.2	-26.7
15.850	26.9	17.0	11.3	1.3	39.6	29.7	60.0	50.0	-20.4	-20.3
17.250	22.4	13.4	11.4	1.4	35.2	26.2	60.0	50.0	-24.8	-23.8
18.480	23.3	13.3	11.4	1.5	36.3	26.3	60.0	50.0	-23.7	-23.7
19.460	25.6	14.8	11.5	1.6	38.7	27.9	60.0	50.0	-21.3	-22.1
20.480	26.2	16.1	11.5	1.7	39.5	29.4	60.0	50.0	-20.5	-20.6

PHASE

Frequency (MHz)	Level QP (dBµV)	Level AVG (dBµV)	Cable Loss (dB)	LISN Corr (dB)	Level QP Corr (dBµV)	Level Corr Avg (dBµV)	Limit QP (dBµV)	Limit AVG (dBµV)	Margin QP (dB)	Margin AVG (dB)
13.760	21.3	10.9	11.2	1.7	34.2	23.8	60.0	50.0	-25.8	-26.2
15.844	26.4	16.9	11.3	1.9	39.7	30.2	60.0	50.0	-20.3	-19.8
17.340	22.5	13.4	11.4	2.1	36.0	26.9	60.0	50.0	-24.0	-23.1
18.540	23.7	13.5	11.4	2.2	37.4	27.2	60.0	50.0	-22.6	-22.8
19.490	24.7	14.7	11.5	2.3	38.5	28.5	60.0	50.0	-21.5	-21.5
20.510	27.7	16.3	11.5	2.5	41.7	30.3	60.0	50.0	-18.3	-19.7