FCC PART 15, SUBPART C
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TEST AND MEASUREMENT REPORT

For

SunPower Corporation

1414 Harbour Way South, Richmond, CA 94804, USA

FCC ID: YAW503252
IC: 8917A-503252

Report Type:	**Product Type:**
Original	Industrial Solar Tracker Controller

Test Engineer:	Wei Sun
Report Number:	R1301141-247
Report Date:	2013-08-14
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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1301141-247	Original Report	2013-08-14

1 General Information

1.1 Product Description for Equipment under Test (EUT)

This test and measurement report was prepared on behalf of SunPower Corporation, and their product: *FCC ID: YAW503252; IC: 8917A-503252*, model name: *DTMAC*, model number: *503252* or the "EUT" as referred to in this report. The EUT is an Industrial Solar Tracker Controller that contains a certified Zigbee module. The antenna used on DTMAC is the same as the antenna used on the certified Zigbee module.

1.2 Mechanical Description of EUT

The "EUT" measures approximately *488 mm (L) x 442 mm (W) x 227 mm (H)*, and weighs approximately *16 k*g.

The test data gathered are from typical production sample, serial number: 503068 assigned by BACL.

1.3 Objective

This report is prepared on behalf of *SunPower Corporation*. in accordance with Part 2, Subpart J, and Part 15, Subparts B and C of the Federal Communication Commission's rules and IC RSS-210 Issue 8, Dec 2010.

1.4 Related Submittal(s)/Grant(s)

N/A

1.5 Test Methodology

All measurements contained in this report were conducted in accordance with ANSI C63.4-2009, 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.

1.6 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in the field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on CISPR16-4-2:2007, The Treatment of Uncertainty in EMC Measurements, the values ranging from $\pm$2.0 dB for Conducted Emissions tests and $\pm$4.0 dB for Radiated Emissions tests are the most accurate estimates pertaining to uncertainty of EMC measurements at BACL Corp.

1.7 Test Facility

Bay Area Compliance Laboratories Corp. (BACL) is:

1- An independent Commercial Test Laboratory accredited to **ISO 17025: 2005** by **A2LA**, in the fields of: Electromagnetic Compatibility & Telecommunications covering Emissions, Immunity, Radio, RF Exposure, Safety and Telecom. This includes NEBS (Network Equipment Building System), Wireless RF, Telecommunications Terminal Equipment (TTE); Network Equipment; Information Technology Equipment (ITE); Medical Electrical Equipment; Industrial, Commercial, and Medical Test Equipment; Professional

Audio and Video Equipment; Electronic (Digital) Products; Industrial and Scientific Instruments; Cabled Distribution Systems and Energy Efficiency Lighting.

2- An ENERGY STAR Recognized Laboratory, for the LM80 Testing, a wide variety of Luminaires and Computers.

3- A NIST Designated Phase-I and Phase-II CAB including: ACMA (Australian Communication and Media Authority), BSMI (Bureau of Standards, Metrology and Inspection of Taiwan), IDA (Infocomm Development Authority of Singapore), IC (Industry Canada), Korea (Ministry of Communications Radio Research Laboratory), NCC (Formerly DGT; Directorate General of Telecommunication of Chinese Taipei) OFTA (Office of the Telecommunications Authority of Hong Kong), Vietnam, VCCI - Voluntary Control Council for Interference of Japan and a designated EU CAB (Conformity Assessment Body) (Notified Body) for the EMC and R&TTE Directives.

4 - A Product Certification Body accredited to **ISO Guide 65: 1996** by **A2LA** to certify:

1- Unlicensed, Licensed radio frequency devices and Telephone Terminal Equipment for the FCC. Scope A1, A2, A3, A4, B1, B2, B3, B4 & C.
2. Radio Standards Specifications (RSS) in the Category I Equipment Standards List and All Broadcasting Technical Standards (BETS) in Category I Equipment Standards List for Industry Canada.
3. Radio Communication Equipment for Singapore.
4. Radio Equipment Specifications, GMDSS Marine Radio Equipment Specifications, and Fixed Network Equipment Specifications for Hong Kong.
5. Japan MIC Telecommunication Business Law (A1, A2) and Radio Law (B1, B2 and B3).
6. Audio/Video, Battery Charging Systems, Computers, Displays, Enterprise Servers, Imaging Equipment, Set-Top Boxes, Telephony, Televisions, Ceiling Fans, CFLs (including GU24s), Decorative Light Strings, Integral LED Lamps, Luminaires, Residential Ventilating Fans.

The test site used by BACL Corp. to collect radiated and conducted emissions measurement data is located at its facility in Sunnyvale, California, USA.

The test site at BACL Corp. has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997, and Article 8 of the VCCI regulations on December 25, 1997. The test site also complies with the test methods and procedures set forth in CISPR 22:2008 §10.4 for measurements below 1 GHz and §10.6 for measurements above 1 GHz, as well as ANSI C63.4-2009, ANSI C63.4-2009, TIA/EIA-603 & CISPR 24: 2010.

The Federal Communications Commission and Voluntary Control Council for Interference have the reports on file and they are listed under FCC registration number: 90464 and VCCI Registration No.: A-0027. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL Corp. is an American Association for Laboratory Accreditation (A2LA) accredited laboratory (Lab Code 3297-02). The current scope of accreditations can be found at

http://www.a2la.org/scopepdf/3297-02.pdf?CFID=1132286&CFTOKEN=e42a3240dac3f6ba-6DE17DCB-1851-9E57-477422F667031258&jsessionid=8430d44f1f47cf2996124343c704b367816b

2 System Test Configuration

2.1 Justification

The EUT was configured for testing according to ANSI C63.4-2009.
The EUT was tested in a testing mode to represent worst-case results during the final qualification test.

The worst-case data rates are determined to be as follows for each mode based upon investigation by measuring the average power, peak power and PPSD across all data rates bandwidths, and modulations.

2.2 EUT Exercise Software

The test software used during the test was called TMACterm and was verified by Wei Sun from BACL.

2.3 Special Accessories

No modifications were made to the EUT.

2.4 Equipment Modifications

No modifications were made to the EUT.

2.5 Local Support Equipment

N/A

2.6 Internal Configuration

Manufacturers	Descriptions	Models	Serial Numbers
Unkermotoren	Motor	BG65X25MI	M6017535
Garmin	GPS Antenna	GPD16x-LVS	1A3022473
XBee	Zigbee Module	PRO52B	30010242-02
NetBurner	Network Card	M0D5282	0003F4069E5C
Sunpower	Daughter Card	TMA1509-043F	SY1309504342A0004
Stahlin	Enclosure	J18HW	-
Pulse Dimension	CT5 Power Supply	CT5.241	7041248
Pulse Dimension	QT Power Supply	QT40.241	7110030

2.7 Power Supply and Line Filters

N/A

2.8 Interface Ports and Cabling

Cable Descriptions	Length (m)	From	To
RJ45 x2	1	EUT	Termination
Communication Cable	1	EUT	Termination

3 Summary of Test Results

Results reported relate only to the product tested.

FCC & IC Rules	Description of Test	Results
FCC §15.247(i), §2.1091 IC RSS-102	RF Exposure	Note[1]
FCC §15.203 IC RSS-Gen §7.1.2	Antenna Requirement	Note[1]
FCC §15.207(a) IC RSS-Gen §7.2.4	AC Line Conducted Emissions	Compliant
FCC §15.209 IC RSS-210 §A8.5	Spurious Emissions at Antenna Port	Note[1]
FCC §15.205, §15.209, §15.247(d) IC RSS-210 §2.2, §A8.5	Radiated Spurious Emissions	Compliant
FCC §15.247(b)(3) IC RSS-210 §A8.4	Maximum Peak Output Power	Note[1]
FCC §15.247(a) (2) IC RSS-210 §A8.2(a)	6 dB Bandwidth & 99% Bandwidth	Note[1]
FCC §15.247(d) IC RSS-210 §A8.5	100 kHz Bandwidth of Frequency Band Edge	Note[1]
FCC §15.247 (e) IC RSS-210 §A8.2(b)	Power Spectral Density	Note[1]
IC RSS-Gen §4.10, §6	Receiver Spurious Emission	Compliant

Note 1: Please refer to XBee OEM module with FCC ID: MCQ-PROS2B and IC: 1846A-PROS2B.

4 FCC §15.207 & IC RSS-Gen §7.2.4 – AC Line Conducted Emissions

4.1 Applicable Standards

As per FCC §15.207 and IC RSS-Gen §7.2.4 Conducted limits:

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequencies ranges.

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

Decreases with the logarithm of the frequency.

4.2 Test Setup

The measurement was performed at shield room, using the setup per ANSI C63.4-2009 measurement procedure. The specification used was FCC §15.207 and IC RSS-Gen §7.2.4 limits.

External I/O cables were draped along the edge of the test table and bundle when necessary.

The AC/DC power adapter of the EUT was connected with LISN-1 which provided 120 V / 60 Hz AC power.

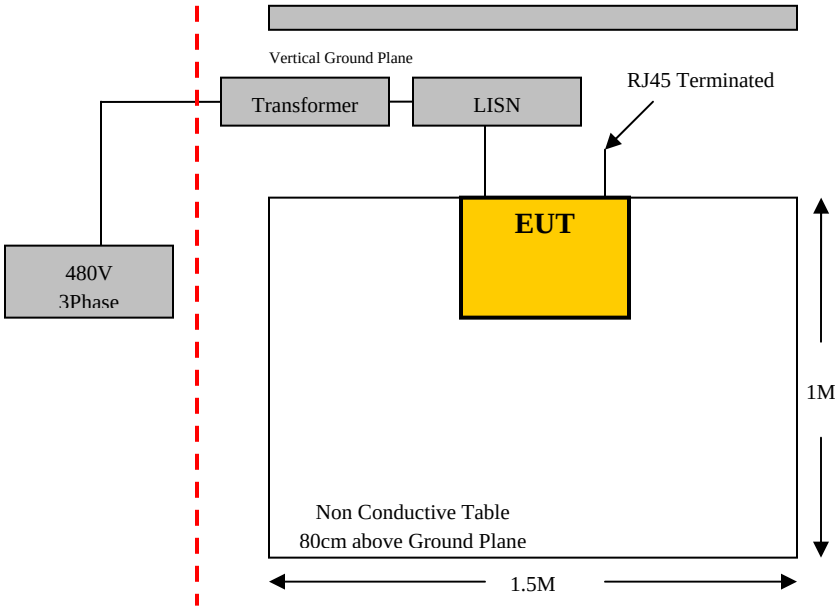
4.3 Test Procedure

During the conducted emissions test, the power cord of the EUT host system was connected to the mains outlet of the LISN-2.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the peak detection mode, quasi-peak and average. Quasi-Peak readings are distinguished with a “QP.” Average readings are distinguished with an “Ave.”

4.4 Test Setup Block Diagram



4.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude (CA) is calculated by adding the Cable Loss (CL), the Attenuator Factor (Atten) to indicated Amplitude (Ai) reading. The basic equation is as follows:

CA = Ai + CL + Atten

For example, a corrected amplitude of 46.2 dBuV = Indicated Reading (32.5 dBuV) + Cable Loss (3.7 dB) + Attenuator (10 dB)

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of -7 dB means the emission is 7 dB below the maximum limit. The equation for margin calculation is as follows:

Margin = Corrected Amplitude - Limit

4.6 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100337	2013-03-28	1 year
Solar Electronics	LISN	9252-50-R-24-N	511205	2012-06-25	1 year
TTE	Filter, High Pass	H962-150k-50-21378	K7133	2012-05-30	1 year

Statement of Traceability: BACL Corp. *attests that all calibrations have been performed per the A2LA requirements, traceable to the NIST.*

4.7 Test Environmental Conditions

Temperature:	21 ºC
Relative Humidity:	51%
ATM Pressure:	101.42 kPa

The testing was performed by Wei Sun on 2013-05-03 in 10 m chamber.

4.8 Summary of Test Results

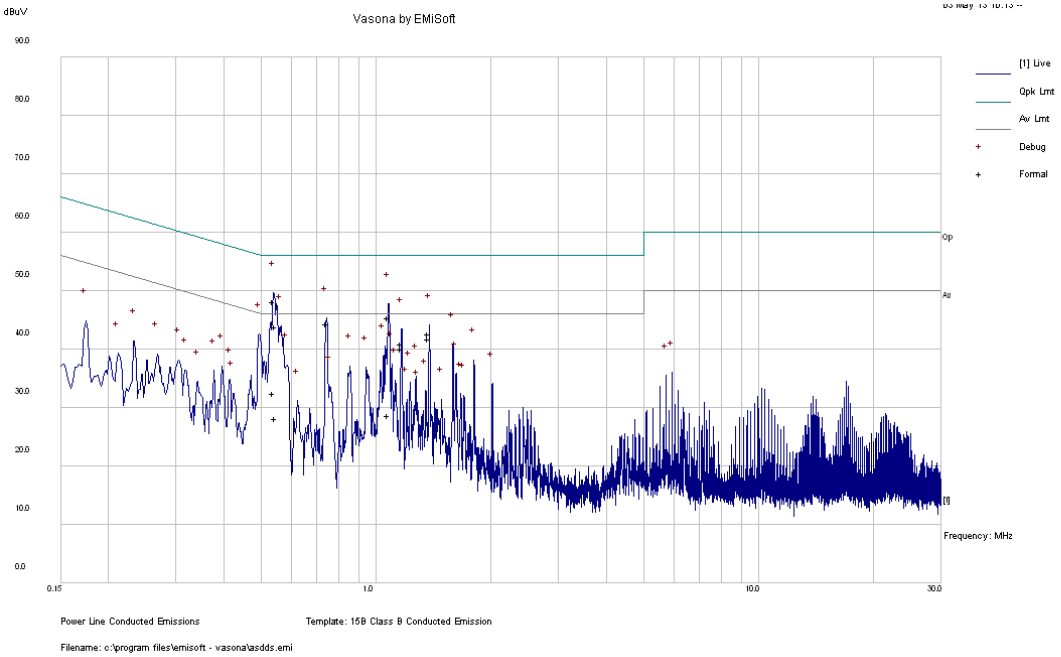
According to the recorded data in following table, the EUT complied with the FCC and IC standard's conducted emissions limits, with the margin reading of:

Transmitting Mode: Worst case: Low Channel

Connection: AC/DC adapter connected to 480 V/60 Hz, Three Phases AC			
Margin (dB)	**Frequency (MHz)**	**Conductor Mode (Line1/Line2/Line3)**	**Range (MHz)**
-0.48	0.740932	Line 2	0.15-30

4.9 Conducted Emissions Test Plots and Data

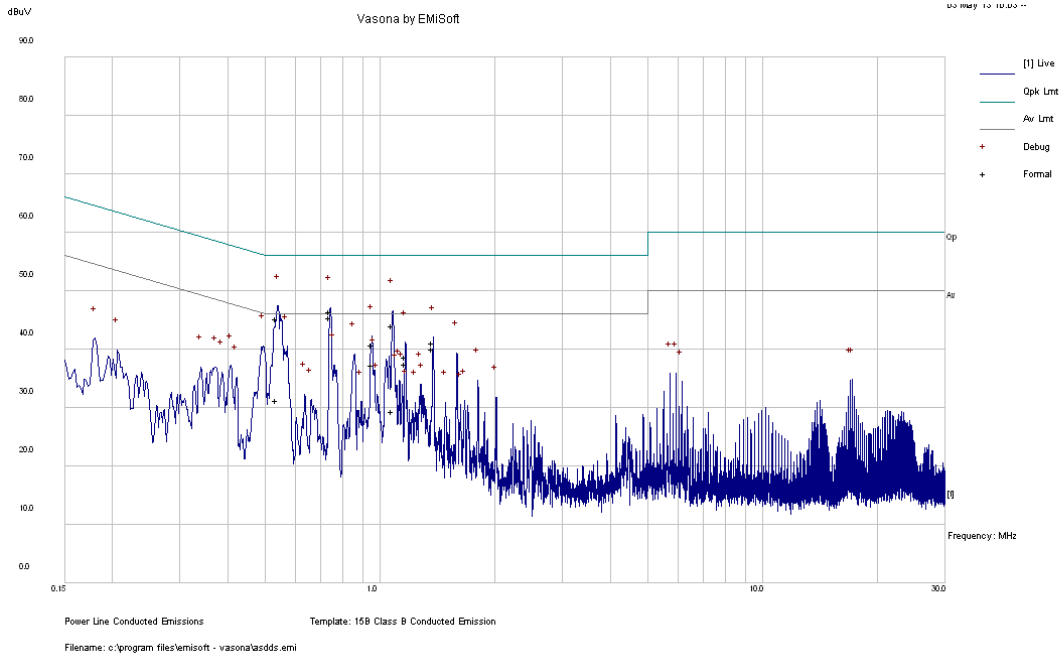
480 V Three Phases AC- Line 1



Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line1/Line2/Line3)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.539872	48.24	Line 1	56	-7.76	QP
1.07611	45.39	Line 1	56	-10.61	QP
0.74221	44.41	Line 1	56	-11.59	QP
0.546771	43.83	Line 1	56	-12.17	QP
1.376329	42.64	Line 1	56	-13.36	QP
1.165264	40.97	Line 1	56	-15.03	QP

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line1/Line2/Line3)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.74221	44.48	Line 1	46	-1.52	Ave.
1.376329	41.78	Line 1	46	-4.22	Ave.
1.165264	40.01	Line 1	46	-5.99	Ave.
0.539872	32.54	Line 1	46	-13.46	Ave.
1.07611	28.71	Line 1	46	-17.29	Ave.
0.546771	28.17	Line 1	46	-17.83	Ave.

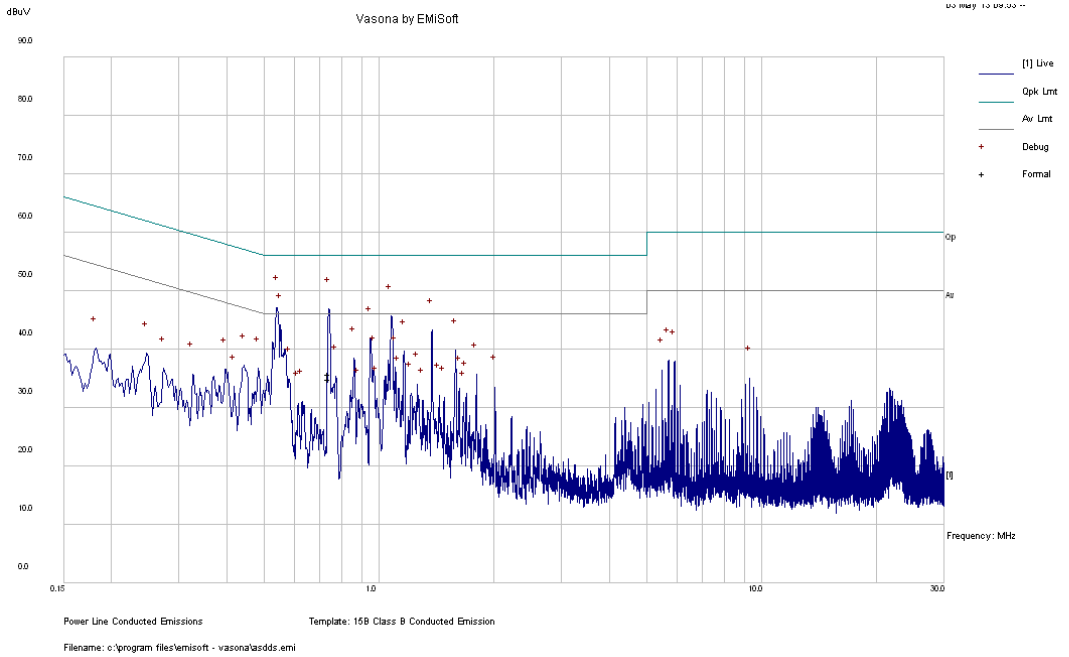
480 V Three Phases AC- Line 2



Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line1/Line2/Line3)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.740932	46.39	Line 2	56	-9.61	QP
0.537093	45.35	Line 2	56	-10.65	QP
1.078659	44.01	Line 2	56	-11.99	QP
1.374025	41.12	Line 2	56	-14.88	QP
0.951553	40.79	Line 2	56	-15.21	QP
1.16224	38.72	Line 2	56	-17.28	QP

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line1/Line2/Line3)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.740932	45.52	Line 2	46	-0.48	Ave.
1.374025	40.09	Line 2	46	-5.91	Ave.
1.16224	37.43	Line 2	46	-8.57	Ave.
0.951553	37.30	Line 2	46	-8.70	Ave.
0.537093	31.37	Line 2	46	-14.63	Ave.
1.078659	29.44	Line 2	46	-16.56	Ave.

480 V Three Phases AC- Line 3



Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line1/Line2/Line3)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.53862	45.92	Line 3	56	-10.08	QP
0.537327	45.43	Line 3	56	-10.57	QP
1.075709	43.73	Line 3	56	-12.27	QP
0.94994	41.44	Line 3	56	-14.56	QP
1.373336	41.43	Line 3	56	-14.57	QP
0.742	35.78	Line 3	56	-20.22	QP

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line1/Line2/Line3)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
1.373336	40.35	Line 3	46	-5.65	Ave.
0.94994	36.94	Line 3	46	-9.06	Ave.
0.742	34.94	Line 3	46	-11.06	Ave.
0.537327	30.87	Line 3	46	-15.13	Ave.
0.53862	30.59	Line 3	46	-15.41	Ave.
1.075709	29.53	Line 3	46	-16.47	Ave.

5 FCC §15.205, §15.209, §15.247(d) & IC RSS-210 §2.2, §2.6, §A8.5 – Spurious Radiated Emissions

As per FCC §15.35(d): Unless otherwise specified, on any frequency or frequencies above 1000 MHz, the radiated emission limits are based on the use of measurement instrumentation employing an average detector function. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1 MHz.

As per FCC §15.209(a): Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table

Frequency (MHz)	Field Strength (micro volts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100**	3
88 - 216	150**	3
216 - 960	200**	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

As Per FCC §15.205(a) except as show in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 – 0.110 0.495 – 0.505 2.1735 – 2.1905 4.125 – 4.128 4.17725 – 4.17775 4.20725 – 4.20775 6.215 – 6.218 6.26775 – 6.26825 6.31175 – 6.31225 8.291 – 8.294 8.362 – 8.366 8.37625 – 8.38675 8.41425 – 8.41475 12.29 – 12.293 12.51975 – 12.52025 12.57675 – 12.57725 13.36 – 13.41	16.42 – 16.423 16.69475 – 16.69525 25.5 – 25.67 37.5 – 38.25 73 – 74.6 74.8 – 75.2 108 – 121.94 123 – 138 149.9 – 150.05 156.52475 – 156.52525 156.7 – 156.9 162.0125 –167.17 167.72 – 173.2 240 – 285 322 – 335.4 399.9 – 410 608 – 614	960 – 1240 1300 – 1427 1435 – 1626.5 1645.5 – 1646.5 1660 – 1710 1718.8 – 1722.2 2200 – 2300 2310 – 2390 2483.5 – 2500 2690 – 2900 3260 – 3267 3.332 – 3.339 3 3458 – 3 358 3.600 – 4.400	4. 5 – 5. 15 5. 35 – 5. 46 7.25 – 7.75 8.025 – 8.5 9.0 – 9.2 9.3 – 9.5 10.6 – 12.7 13.25 – 13.4 14.47 – 14.5 15.35 – 16.2 17.7 – 21.4 22.01 – 23.12 23.6 – 24.0 31.2 – 31.8 36.43 – 36.5 Above 38.6

As per FCC §15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c).

5.1 Test Setup

The radiated emissions tests were performed in the 5-meter Chamber, using the setup in accordance with ANSI C63.4-2009. The specification used was the FCC 15C and IC RSS-210 limits.

The spacing between the peripherals was 10 centimeters.

External I/O cables were draped along the edge of the test table and bundle when necessary.

5.2 Test Procedure

For the radiated emissions test, the EUT host, and all support equipment power cords was connected to the AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

The EUT is set 3 meter away from the testing antenna, which is varied from 1-4 meter, and the EUT is placed on a turntable, which is 0.8 meter above ground plane, the table shall be rotated for 360 degrees to find out the highest emission. The receiving antenna should be changed the polarization both of horizontal and vertical.

The spectrum analyzer or receiver is set as:

Below 1000 MHz:

RBW = 100 kHz / VBW = 300 kHz / Sweep = Auto

Above 1000 MHz:

(1) Peak: RBW = 1MHz / VBW = 1MHz / Sweep = Auto
(2) Average: RBW = 1MHz / VBW = 10Hz / Sweep = Auto

5.3 Corrected Amplitude & Margin Calculation

The Corrected Amplitude (CA) is calculated by adding the Antenna Factor (AF), the Cable Loss (CL), the Attenuator Factor (Atten) and subtracting the Amplifier Gain (Ga) to the indicated Amplitude (Ai) reading. The basic equation is as follows:

CA = Ai + AF + CL + Atten – Ga

For example, the Corrected Amplitude (CA) of 40.3 dBuV/m = indicated Amplitude reading (Ai) 32.5 dBuV + Antenna Factor (AF) 23.5dB + Cable Loss (CL) 3.7 dB + Attenuator (Atten) 10 dB - Amplifier Gain (Ga) 29.4 dB

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of -7 dB means the emission is 7 dB below the maximum limit. The equation for margin calculation is as follows:

Margin (dB) = Corrected Amplitude (dBuV/m) - Limit (dBuV/m)

5.4 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Cycle
Agilent	Spectrum Analyzer	E4446A	US44300386	2012-09-29	1 year
Sunol Science Corp	System Controller	SC99V	122303-1	N/R	N/R
Sunol Science Corp	Combination Antenna	JB3	A020106-3	2012-06-18	1 Year
Hewlett Packard	Pre-amplifier	8447D	2944A10187	2013-03-08	1 Year
Mini-Circuits	Pre-amplifier	ZVA-183-S	667400960	2012-05-08	1 Year
Eaton	Horn antenna	96001	3/1/1907	2012-10-17	1 Year
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100337	2013-03-28	1 year

Statement of Traceability: BACL *attests that all calibrations have been performed per the A2LA requirements, traceable to NIST.*

5.5 Test Environmental Conditions

Temperature:	21-24°C
Relative Humidity:	43-46%
ATM Pressure:	101-103kPa

The testing was performed by Wei Sun on 2013-04-11 at 5 meter 3.

5.6 Summary of Test Results

According to the data hereinafter, the EUT complied with the FCC Part 15.205, 15.209 and 15.407 & IC RSS-210, RSS-Gen standard's radiated emissions limits, and had the worst margin (only based on the verification data only) of:

30-1000 MHz:

Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Channel**
-2.18	118.7368	Vertical	High Channel

1– 25 GHz:

Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Mode, Channel**
-2.22	2483.5	Vertical	High Channel (2480 MHz)

Please refer to the following table and plots for specific test result details

5.7 Radiated Emissions Test Results

Radiated Emission at 3 meters, 30 MHz–25 GHz

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC /IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel, 2405 MHz, measured at 3 meters											
2405	80.64	201	100	V	28.84	3.12	0	112.6	-	-	Fund/Peak
2405	33.24	201	100	V	28.84	3.12	0	65.2	-	-	Fund/Ave
2405	73.88	85	100	H	28.84	3.12	0	105.84	-	-	Fund/Peak
2405	34.77	85	100	H	28.84	3.12	0	66.73	-	-	Fund/Ave
4910	30	0	100	V	33.27	4.52	27.75	40.04	74	-33.96	Harm/Peak
4910	20	0	100	V	33.27	4.52	27.75	30.04	54	-23.96	Harm /Ave
4910	30	0	100	H	33.27	4.52	27.75	40.04	74	-33.96	Harm/Peak
4910	20	0	100	H	33.27	4.52	27.75	30.04	54	-23.96	Harm/Ave
7215	43.3	69	119	V	35.89	5.49	27.59	57.09	74	-16.91	Harm/Peak
7215	24.35	69	119	V	35.89	5.49	27.59	37.94	54	-16.06	Harm /Ave
7215	37.89	46	121	H	35.89	5.49	27.59	51.68	74	-22.32	Harm/Peak
7215	21.24	46	121	H	35.89	5.49	27.59	35.03	54	-18.97	Harm/Ave
9620	30	0	100	V	37.95	6.54	27.02	47.47	74	-26.53	Harm/Peak
9620	16	0	100	V	37.95	6.54	27.02	33.47	54	-20.53	Harm /Ave
9620	30	0	100	H	37.95	6.54	27.02	47.47	74	-26.53	Harm/Peak
9620	16	0	100	H	37.95	6.54	27.02	33.47	54	-20.53	Harm/Ave
2390	30	0	100	V	28.84	3.12	0	61.96	74	-12.04	Spur/Peak
2390	16	0	100	V	28.84	3.12	0	47.96	54	-6.04	Spur/Ave
2390	30	0	100	H	28.84	3.12	0	61.96	74	-12.04	Spur/Peak
2390	16	0	100	H	28.84	3.12	0	47.96	54	-6.04	Spur/Ave
118.7205	45.85	67	113	V	14.1	0.67	20.72	39.9	43.5	-3.60	Spur/QP
Middle Channel, 2440 MHz, measured at 3 meters											
2440	77.53	191	100	V	28.84	3.25	0	109.62	-	-	Fund/Peak
2440	31.63	191	100	V	28.84	3.25	0	63.72	-	-	Fund/Ave
2440	74.76	5	100	H	28.84	3.25	0	106.85	-	-	Fund/Peak
2440	30.1	5	100	H	28.84	3.25	0	62.19	-	-	Fund/Ave
4880	45.05	346	100	V	33.27	4.54	27.67	55.19	74	-18.81	Harm/Peak
4880	22.51	346	100	V	33.27	4.54	27.67	32.65	54	-21.35	Harm /Ave
4880	42.53	229	100	H	33.27	4.54	27.67	52.67	74	-21.33	Harm/Peak
4880	21.86	229	100	H	33.27	4.54	27.67	32	54	-22.00	Harm/Ave
7320	41.01	80	100	V	36.37	5.57	27.51	55.44	74	-18.56	Harm/Peak
7320	21.23	80	100	V	36.37	5.57	27.51	35.66	54	-18.34	Harm /Ave
7320	34.32	87	100	H	36.37	5.57	27.51	48.75	74	-25.25	Harm/Peak
7320	21.28	87	100	H	36.37	5.57	27.51	35.71	54	-18.29	Harm/Ave
9760	30	0	100	V	38.25	6.62	26.98	47.89	74	-26.11	Harm/Peak
9760	16	0	100	V	38.25	6.62	26.98	33.89	54	-20.11	Harm /Ave
9760	30	0	100	H	38.25	6.62	26.98	47.89	74	-26.11	Harm/Peak
9760	16	0	100	H	38.25	6.62	26.98	33.89	54	-20.11	Harm/Ave
118.743	45.84	59	123	V	14.1	0.67	20.72	39.89	43.5	-3.61	Spur/QP

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC /IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
High Channel, 2475 MHz, measured at 3 meters											
2475	70.54	39	143	V	29.07	3.25	0	102.86	-	-	Fund/Peak
2475	28.52	39	143	V	29.07	3.25	0	60.84	-	-	Fund/Ave
2475	66.55	19	134	H	29.07	3.25	0	98.87	-	-	Fund/Peak
2475	28.91	19	134	H	29.07	3.25	0	61.23	-	-	Fund/Ave
4950	30	0	100	V	33.51	4.52	27.7	40.33	74	-33.67	Harm/Peak
4950	16	0	100	V	33.51	4.52	27.7	26.33	54	-27.67	Harm /Ave
4950	30	0	100	H	33.51	4.52	27.7	40.33	74	-33.67	Harm/Peak
4950	16	0	100	H	33.51	4.52	27.7	26.33	54	-27.67	Harm/Ave
7425	34.66	89	114	V	36.57	5.66	27.53	49.36	74	-24.64	Harm/Peak
7425	21.71	89	114	V	36.57	5.66	27.53	36.41	54	-17.59	Harm /Ave
7425	33.81	177	123	H	36.57	5.66	27.53	48.51	74	-25.49	Harm/Peak
7425	22.08	177	123	H	36.57	5.66	27.53	36.78	54	-17.22	Harm/Ave
9900	30	0	100	V	38.46	6.67	27.01	48.12	74	-25.88	Harm/Peak
9900	16	0	100	V	38.46	6.67	27.01	34.12	54	-19.88	Harm /Ave
9900	30	0	100	H	38.46	6.67	27.01	48.12	74	-25.88	Harm/Peak
9900	16	0	100	H	38.46	6.67	27.01	34.12	54	-19.88	Harm/Ave
2483.5	23	0	100	V	29.07	3.25	0	55.32	74	-18.68	Spur/Peak
2483.5	12	0	100	V	29.07	3.25	0	44.32	54	-9.68	Spur/Ave
2483.5	23	0	100	H	29.07	3.25	0	55.32	74	-18.68	Spur/Peak
2483.5	12	0	100	H	29.07	3.25	0	44.32	54	-9.68	Spur/Ave
118.7368	47.27	98	100	V	14.1	0.67	20.72	41.32	43.5	-2.18	Spur/QP

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC /IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
High Channel, 2480 MHz, measured at 3 meters											
2480	68.12	69	143	V	28.84	3.25	0	100.21	-	-	Fund/Peak
2480	23.99	69	143	V	28.84	3.25	0	56.08	-	-	Fund/Ave
2480	59.15	286	169	H	28.84	3.25	0	91.24	-	-	Fund/Peak
2480	21.48	286	169	H	28.84	3.25	0	53.57	-	-	Fund/Ave
4960	38.12	60	112	V	33.51	4.52	27.7	48.45	74	-25.55	Harm/Peak
4960	20.77	60	112	V	33.51	4.52	27.7	31.1	54	-22.9	Harm /Ave
4960	37.88	329	112	H	33.51	4.52	27.7	48.21	74	-25.79	Harm/Peak
4960	20.32	329	112	H	33.51	4.52	27.7	30.65	54	-23.35	Harm/Ave
7440	30	0	100	V	36.57	5.66	27.53	44.7	74	-29.3	Harm/Peak
7440	18	0	100	V	36.57	5.66	27.53	32.7	54	-21.3	Harm /Ave
7440	30	0	100	H	36.57	5.66	27.53	44.7	74	-29.3	Harm/Peak
7440	18	0	100	H	36.57	5.66	27.53	32.7	54	-21.3	Harm/Ave
9920	30	0	100	V	38.46	6.67	27.01	48.12	74	-25.88	Harm/Peak
9920	16	0	100	V	38.46	6.67	27.01	34.12	54	-19.88	Harm /Ave
9920	30	0	100	H	38.46	6.67	27.01	48.12	74	-25.88	Harm/Peak
9920	16	0	100	H	38.46	6.67	27.01	34.12	54	-19.88	Harm/Ave
2483.5	39.46	69	143	V	29.07	3.25	0	71.78	74	-2.22	Spur/Peak
2483.5	16.04	69	143	V	29.07	3.25	0	48.36	54	-5.64	Spur/Ave
2483.5	32.98	286	169	H	29.07	3.25	0	65.3	74	-8.7	Spur/Peak
2483.5	13.91	286	169	H	29.07	3.25	0	46.23	54	-7.77	Spur/Ave
118.7368	45.21	60	100	V	14.1	0.67	20.72	39.32	43.5	-4.18	Spur/QP

6 IC RSS-210 §2.3 & RSS-Gen §6.1 – Receiver Spurious Radiated Emissions

6.1 Applicable Standards

According to IC RSS-Gen §6.1, spurious emissions from receivers shall not exceed the radiated limits shown in the table below.

Table 2: General Field Strength Limits for Transmitters and Receivers at Frequencies above 30 MHz

Frequency (MHz)	Field Strength (Microvolts/m at 3 meters)
30-88	100
88-216	150
216-960	200
Above 960	500

6.2 EUT Setup

The radiated emissions tests were performed in the 3 meter chamber, using the setup in accordance with ANSI C63.4-2009.

6.3 Test Procedure

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations.

All data were recorded in the peak detection mode. Quasi-peak readings was performed only when an emissions was found to be marginal (within -4 dB of specification limits), and are distinguished with a "**QP**" in the data table.

6.4 Corrected Amplitude & Margin Calculation

The Corrected Amplitude (CA) is calculated by adding the Antenna Factor (AF), the Cable Loss (CL), the Attenuator Factor (Atten) and subtracting the Amplifier Gain (Ga) to indicated Amplitude (Ai) reading. The basic equation is as follows:

CA = Ai + AF + CL + Atten – Ga

For example, a corrected amplitude of 40.3 dBuV/m = Indicated Reading (32.5 dBuV) + Antenna Factor (+23.5dB) + Cable Loss (3.7 dB) + Attenuator (10 dB) - Amplifier Gain (29.4 dB)

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of -7 dB means the emission is 7 dB below the maximum limit. The equation for margin calculation is as follows:

Margin = Corrected Amplitude - Limit

6.5 Test Equipment Lists and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Cycle
Agilent	Spectrum Analyzer	E4446A	US44300386	2012-09-29	1 year
Sunol Science Corp	System Controller	SC99V	122303-1	N/R	N/R
Sunol Science Corp	Combination Antenna	JB3	A020106-3	2012-06-18	1 Year
Hewlett Packard	Pre-amplifier	8447D	2944A10187	2012-06-08	1 Year
Mini-Circuits	Pre-amplifier	ZVA-183-S	667400960	2012-05-08	1 Year
Eaton	Horn antenna	96001	3/1/1907	2012-10-17	1 Year
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100337	2013-03-28	1 year

Statement of Traceability: *BACL attests that all calibrations have been performed per the A2LA requirements, traceable to NIST.*

6.6 Test Environmental Conditions

Temperature:	22°C
Relative Humidity:	45%
ATM Pressure:	102.1kPa

The testing was performed by Wei Sun on 2013-05-02 at 5 meter 3.

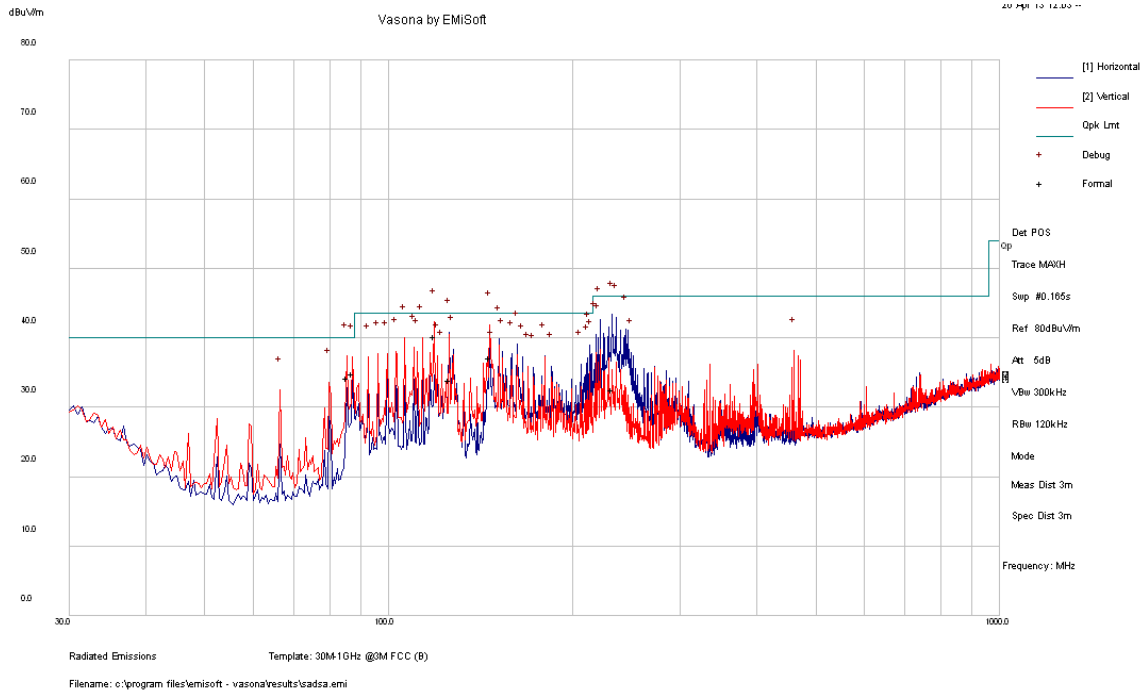
6.7 Summary of Test Results

According to the test data, the EUT complied with the RSS-210, with the closest margins from the limit listed below:

Mode: Receiving			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Frequency Range**
-3.28	118.7503	Vertical	30-1000 MHz

6.8 Test Results and Plots

1) 30 MHz to 1000 MHz



Frequency (MHz)	Corrected Amplitude (dBuV)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	IC Limit (dBuV)	Margin (dB)	Detector (PK/QP)
118.7503	40.22	114	V	61	43.5	-3.28	QP
87.3235	34.81	156	V	246	40	-5.19	QP
85.53025	34.25	128	V	180	40	-5.75	QP
146.646	37.25	151	V	114	43.5	-6.25	QP
125.739	33.91	213	H	0	43.5	-9.59	QP
232.357	32.57	261	H	206	46	-13.43	QP

Above 1 GHz

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
RX Mode, measured at 3 meters											
2680	22.69	14	100	V	28.99	3.29	27.84	27.13	54	-26.87	Ave
2680	22.14	139	100	V	28.99	3.29	27.84	26.58	54	-27.42	Ave