

## **Certification Test Report**

**FCC ID: Z4D173503**  
**IC: 9973A-173503**

**FCC Rule Part: 15.247**  
**IC Radio Standards Specification: RSS-210**

**ACS Report Number: 14-2052.W04.1A**

**Applicant: Sunbeam Products, Inc. d/b/a Jarden Consumer Solutions**  
**Model(s): 173503**

**Test Begin Date: May 12, 2014**  
**Test End Date: May 17, 2014**

**Report Issue Date: May 20, 2014**



FOR THE SCOPE OF ACCREDITATION UNDER CERTIFICATE NUMBER AT-1533

This report must not be used by the client to claim product certification, approval, or endorsement by ACCLASS, ANSI, or any agency of the Federal Government.

**Project Manager:**

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**Thierry Jean-Charles**  
**EMC Engineer**  
**Advanced Compliance Solutions, Inc.**

**Reviewed by:**

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**Kirby Munroe**  
**Director, Wireless Certifications**  
**Advanced Compliance Solutions, Inc.**

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**This report contains 19 pages**

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## 1 GENERAL

### 1.1 Purpose

The purpose of this report is to demonstrate compliance with Part 15 Subpart C of the FCC's Code of Federal Regulations and Industry Canada's Radio Standards Specification RSS-210 for a for a permissive change.

The purpose of the permissive change is to add new host configuration for the Model 173503. There are no hardware/software changes on the module.

### 1.2 Applicant Information

Sunbeam Products, Inc. d/b/a Jarden Consumer Solutions  
2381 NW Executive ctr dr.  
Boca Raton, FL 33433

### 1.3 Product Description

The model 173503, WeMo SMART module, is an 2.4 GHz IEEE 802.11b/g/n transceiver. The device is designed to provide some wireless functionality to appliances using Belkin's WASP (WeMo Appliance Software Protocol).

#### Technical Details

|                     |                                                                                                              |
|---------------------|--------------------------------------------------------------------------------------------------------------|
| Mode of Operation:  | WLAN 802.11b/g/n                                                                                             |
| Frequency Range:    | 802.11b/g: 2412 MHz - 2462 MHz<br>802.11n 20 MHz: 2412 MHz - 2462 MHz<br>802.11n 40 MHz: 2422 MHz - 2452 MHz |
| Number of Channels: | 802.11b/g: 11<br>802.11n 20 MHz: 11<br>802.11n 40 MHz: 7                                                     |
| Channel Separation: | 5 MHz                                                                                                        |
| Modulations:        | 802.11b: CCK<br>802.11g/n: OFDM                                                                              |
| Antenna Type/Gain:  | Printed Inverted F Antenna, 1.4 dBi                                                                          |
| Input Power:        | 5 VDC                                                                                                        |
| Model Number:       | 173503                                                                                                       |

Test Sample Serial Number(s): 221351S0000062

Test Sample Condition: The equipment was provided in good condition without any physical damage.

### 1.4 Test Methodology and Considerations

The EUT was configured with an RS232 and a LAN cable adapter for programming purposes.

The EUT was evaluated for radiated and power line conducted emissions for all modes of operations using the worst data rate configuration determined during the original certification effort.

The radiated and power line conducted emissions evaluations were performed with the equipment integrated inside of a humidifier, as described in this document. The digital circuit of the humidifier was in the idle state during the evaluation.

The EUT was programmed through the RS232 cable addapter using Hyperterminal communication. The settings and configurations for the final evaluation are provided below.

**Table 1.4-1: 802.1b/g/n Radio Test Configuration**

| Mode of Operation | Frequency (MHz) | Channel | Test Software Power Setting | Data Rate Setting) |
|-------------------|-----------------|---------|-----------------------------|--------------------|
| 802.11b           | 2412            | 1       | 14                          | MCS 3              |
|                   | 2437            | 6       |                             |                    |
|                   | 2462            | 11      |                             |                    |
| 802.11g           | 2412            | 1       | 15                          | MCS 0              |
|                   | 2437            | 6       |                             |                    |
|                   | 2462            | 11      |                             |                    |
| 802.11n 20 MHz    | 2412            | 1       | 10                          |                    |
|                   | 2437            | 6       |                             |                    |
|                   | 2462            | 11      |                             |                    |
| 802.11n 40 MHz    | 2422            | 3       |                             |                    |
|                   | 2437            | 6       |                             |                    |
|                   | 2452            | 9       |                             |                    |

Per the original filing, the integration of the module is limited to appliances exclusively. Therefore, the equipment is exempted from the requirements of FCC 15.109 and Industry Canada ICES-003, in accordance to FCC Section 15.103(d) and ICES-003 Section 4(d), respectively.

## 2 TEST FACILITIES

### 2.1 Location

The radiated and conducted emissions test sites are located at the following address:

Advanced Compliance Solutions, Inc.  
3998 FAU Blvd, Suite 310  
Boca Raton, Florida 33431  
Phone: (561) 961-5585  
Fax: (561) 961-5587  
[www.acstestlab.com](http://www.acstestlab.com)

FCC Test Firm Registration #: 475089  
Industry Canada Lab Code: 4175C

### 2.2 Laboratory Accreditations/Recognitions/Certifications

ACS is accredited to ISO/IEC 17025 by ANSI-ASQ National Accreditation Board under their ACLASS program and has been issued certificate number AT-1533 in recognition of this accreditation. Unless otherwise specified, all test methods described within this report are covered under the ISO/IEC 17025 scope of accreditation.

## 2.3 Radiated & Conducted Emissions Test Site Description

### 2.3.1 Semi-Anechoic Chamber Test Site

The EMC radiated test facility consists of an RF-shielded enclosure. The interior dimensions of the indoor semi-anechoic chamber are approximately 48 feet (14.6 m) long by 36 feet (10.8 m) wide by 24 feet (7.3 m) high and consist of rigid, 1/8 inch (0.32 cm) steel-clad, wood core modular panels with steel framing. In the shielded enclosure, the faces of the panels are galvanized and the chamber is self-supporting. 8-foot RF absorbing cones are installed on 4 walls and the ceiling. The steel-clad ground plane is covered with vinyl floor.

The turntable is driven by pneumatic motor, which is capable of supporting a 2000 lb. load. The turntable is flushed with the chamber floor which it is connected to, around its circumference, with a continuous metallic loaded spring. An EMCO Model 1050 Multi-device Controller controls the turntable position.

A pneumatic motor is used to control antenna polarizations and height relative to the ground. The height information is displayed on the control unit EMCO Model 1050.

The control room is an RF shielded enclosure attached to the semi-anechoic chamber with two bulkhead panels for connecting RF, and control cables. The dimension of the room is 7.3 m x 4.9 m x 3 m high and the entrance doors of both control and conducted rooms are 3 feet (0.91 m) by 7 feet (2.13 m).

A diagram of the Semi-Anechoic Chamber Test Site is shown in Figure 2.3.1-1 below:

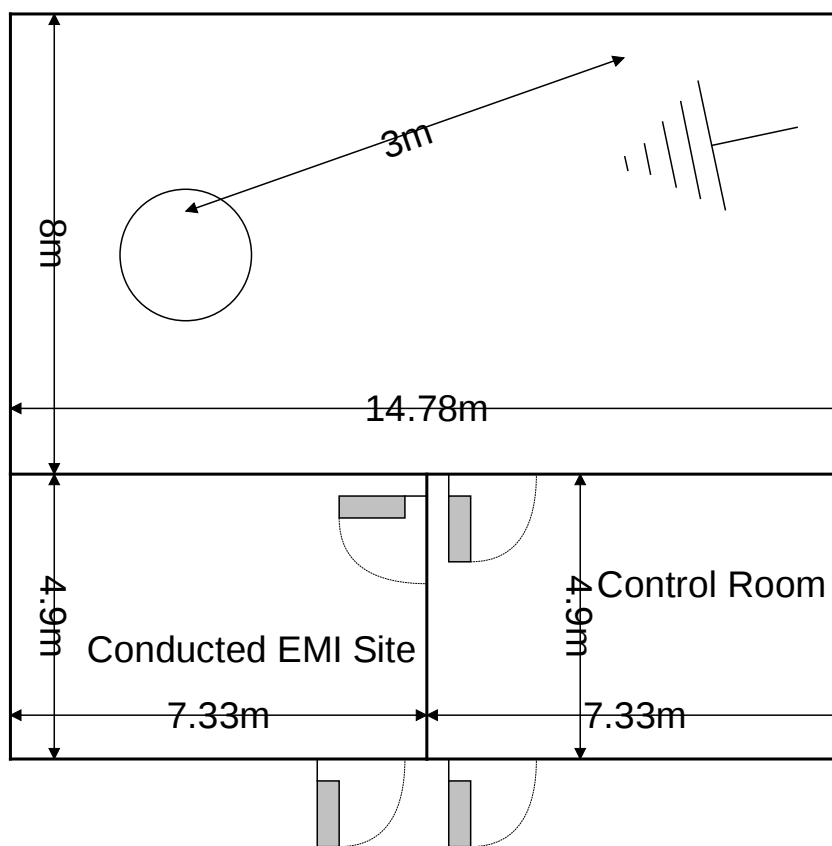


Figure 2.3.1-1: Semi-Anechoic Chamber Test Site

### 2.3.2 Conducted Emissions Test Site Description

The dimensions of the shielded conducted room are 7.3 x 4.9 x 3 m<sup>3</sup>. As per ANSI C63.4 2003 requirements, the data were taken using two LISNs; a Solar Model 8028-50 50  $\Omega$ /50  $\mu$ H and an EMCO Model 3825, which are installed as shown in Photograph 3. For 220 V, 50 Hz, a Polarad LISN (S/N 879341/048) is used in conjunction with a 1 kVA, 50 Hz/220 V EDGAR variable frequency generator, Model 1001B, to filter conducted noise from the generator.

A diagram of the room is shown below in figure 2.3.2-1:

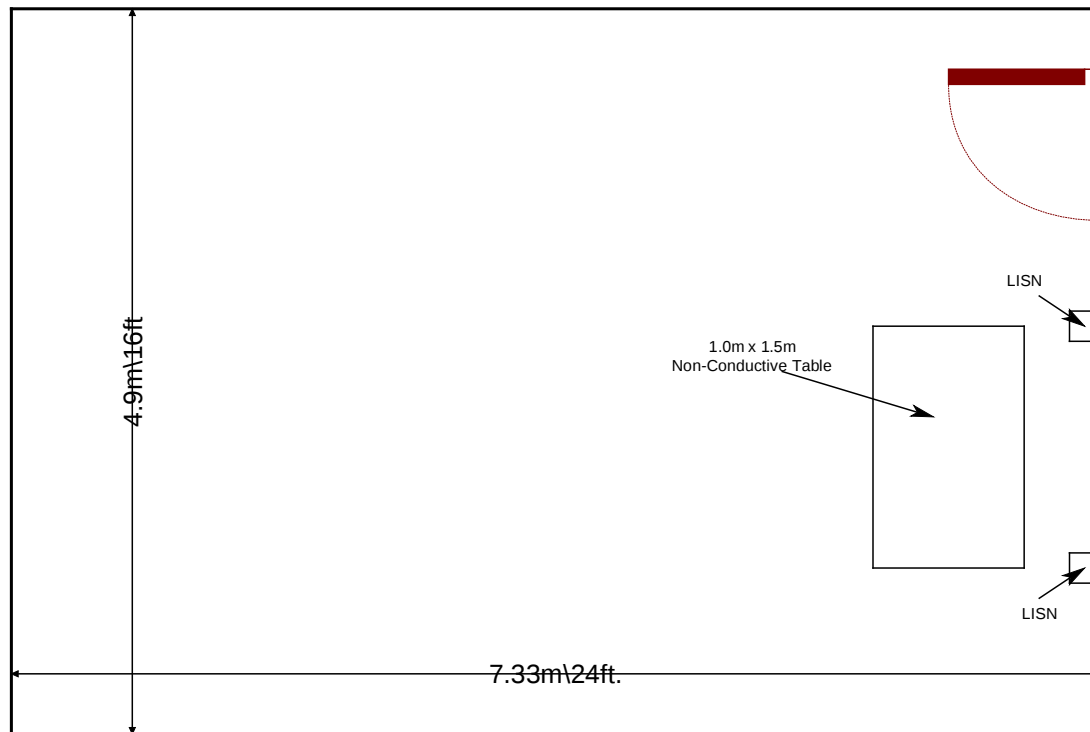


Figure 2.3.2-1: AC Mains Conducted EMI Site

### 3 APPLICABLE STANDARD REFERENCES

The following standards were used:

- ❖ ANSI C63.4-2003: Method of Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the 9 kHz to 40 GHz.
- ❖ ANSI C63.10-2009: American National Standard for Testing Unlicensed Wireless Devices.
- ❖ US Code of Federal Regulations (CFR): Title 47, Part 2, Subpart J: Equipment Authorization Procedures, 2014.
- ❖ US Code of Federal Regulations (CFR): Title 47, Part 15, Subpart C: Radio Frequency Devices, Intentional Radiators, 2014
- ❖ KDB Publication No. 558074 D01 DTS Meas Guidance v03r01 – Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247, April 9, 2013.
- ❖ Industry Canada Radio Standards Specification: RSS-210 - Low-power License-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment, Issue 8 December 2010.
- ❖ Industry Canada Radio Standards Specification: RSS-GEN – General Requirements and Information for the Certification of Radiocommunication Equipment, Issue 3, December 2010.

#### 4 LIST OF TEST EQUIPMENT

The calibration interval of test equipment is annually or the manufacturer's recommendations. Where the calibration interval deviates from the annual cycle based on the instrument manufacturer's recommendations, it shall be stated below.

**Table 4-1: Test Equipment**

| AssetID | Manufacturer               | Model #                | Equipment Type     | Serial #   | Last Calibration Date | Calibration Due Date |
|---------|----------------------------|------------------------|--------------------|------------|-----------------------|----------------------|
| 523     | Agilent                    | E7405                  | Spectrum Analyzers | MY45103293 | 1/8/2013              | 1/8/2015             |
| 2002    | EMCO                       | 3108                   | Antennas           | 2147       | 11/22/2013            | 11/22/2015           |
| 2004    | EMCO                       | 3146                   | Antennas           | 1385       | 11/22/2013            | 11/22/2015           |
| 2006    | EMCO                       | 3115                   | Antennas           | 2573       | 4/24/2013             | 4/24/2015            |
| 2008    | COM-Power                  | AH-826                 | Antennas           | 81009      | NCR                   | NCR                  |
| 2011    | Hewlett-Packard            | HP 8447D               | Amplifiers         | 2443A03952 | 12/31/2013            | 12/31/2014           |
| 2022    | EMCO                       | LISN3825/2R            | LISN               | 1095       | 9/9/2013              | 9/9/2015             |
| 2037    | ACS Boca                   | Chamber EMI Cable Set  | Cable Set          | 2037       | 2/27/2014             | 2/27/2015            |
| 2044    | QMI                        | N/A                    | Cables             | 2044       | 12/31/2013            | 12/31/2014           |
| 2045    | ACS Boca                   | Conducted Cable Set    | Cable Set          | 2045       | 1/1/2014              | 1/1/2015             |
| 2070    | Mini Circuits              | VHF-8400+              | Filter             | 2070       | 1/1/2014              | 1/1/2015             |
| 2072    | Mini Circuits              | VHF-3100+              | Filter             | 30737      | 1/1/2014              | 1/1/2015             |
| 2076    | Hewlett Packard            | HP5061-5458            | Cables             | 2076       | 12/31/2013            | 12/31/2014           |
| 2086    | Merrimac                   | FAN-6-10K              | Attenuators        | 23148-83-1 | 12/31/2013            | 12/31/2014           |
| 2089    | Agilent Technologies, Inc. | 83017A                 | Amplifiers         | 3123A00214 | 12/16/2013            | 12/16/2014           |
| 2095    | ETS Lindgren               | TILE4! - Version 4.2.A | Software           | 85242      | NCR                   | NCR                  |
| 3004    | Teseq                      | CFL 9206A              | Attenuators        | 34720      | 10/21/2013            | 10/21/2015           |

**NCR = No Calibration Required**

## 5 SUPPORT EQUIPMENT

**Table 5-1: EUT and Support Equipment – Radiated and Power Line Emission Setup**

| Item # | Type Device           | Manufacturer or Responsible Party | Model/Part # | Serial #       |
|--------|-----------------------|-----------------------------------|--------------|----------------|
| 1      | EUT                   | Belkin                            | 173503       | 221351S0000062 |
| 2      | Humidifier (Host)     | Jarden Consumer Solutions         | HCM3888-U    | ACS#2          |
| 3      | Ethernet Jack         | Mikroelektronika                  | HW Rev. 1.02 | N/A            |
| 4      | Isolation Transformer | Tripp-Lite                        | IS250        | A420102B2      |

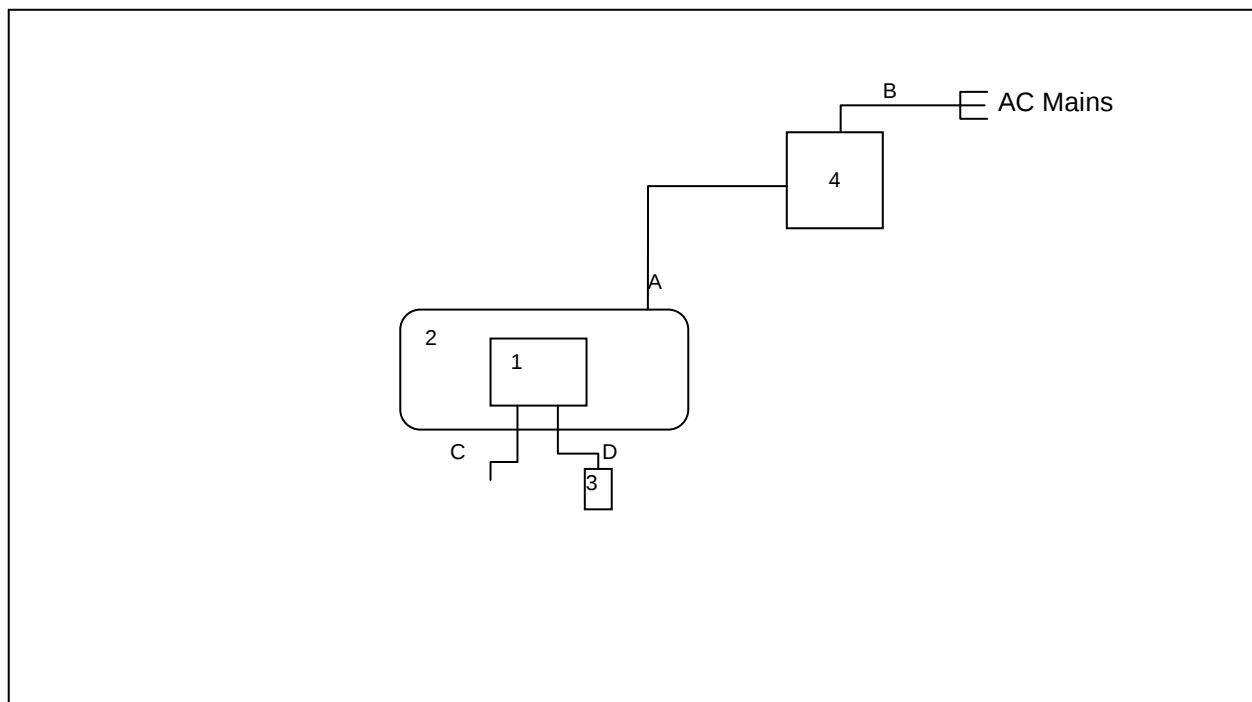
**Notes:**

The isolation transformer was used per the manufacturer request to allow programming of the module in the host configuration. For the power line conducted emissions of evaluation, the isolation transformer was on the AC mains input side of the LISN.

**Table 5-2: Cable Description – Radiated and Power Line Emission Setup**

| Cable # | Cable Type             | Length | Shield | Termination                       |
|---------|------------------------|--------|--------|-----------------------------------|
| A       | Power Cord             | 1.83 m | No     | EUT to Isolation Transformer      |
| B       | Power Cord             | 2 m    | No     | Isolation Transformer to AC Mains |
| C       | RS232 3-Wire cable     | 0.07 m | No     | None                              |
| D       | Ethernet Adapter Wires | 0.1 m  | No     | EUT to Ethernet Jack              |

Note: Cable C and D were implemented on the EUT for programming purposes only. They are not a representative configuration of the equipment.

**6 EQUIPMENT UNDER TEST SETUP BLOCK DIAGRAM****Figure 6-1: Radiated and Power Line Emission Setup**

## 7 SUMMARY OF TESTS

Along with the tabular data shown below, plots were taken of all signals deemed important enough to document.

### 7.1 Antenna Requirement – FCC: Section 15.203

The model 173503 uses a printed inverted F antenna that is etched on the PCB. The antenna cannot be removed without permanently damaging the unit, thus meeting the requirements of FCC section 15.203.

### 7.2 Band-Edge Compliance and Spurious Emissions-FCC 15.247(d) IC: RSS-210 A8.5

#### 7.2.1 Radiated Spurious Emissions into Restricted Frequency Bands - FCC 15.205, 15.209; IC: RSS-210 2.2, RSS-Gen 7.2.2, 7.2.5

##### 7.2.1.1 Measurement Procedure

Radiated emissions tests were made over the frequency range of 30 MHz to 26 GHz, 10 times the highest fundamental frequency. Each emission found to be in a restricted band as defined by section 15.205, including any emission at the operational band-edge, was compared to the radiated emission limits as defined in section 15.209.

The EUT was rotated through 360° and the receive antenna height was varied from 1m to 4m so that the maximum radiated emissions level would be detected. For frequencies below 1000MHz, quasi-peak measurements were made using a resolution bandwidth RBW of 120 kHz and a video bandwidth VBW of 300 kHz. For frequencies above 1000 MHz, peak measurements are made with RBW of 1 MHz and VBW of 3 MHz. Average measurements are performed in the linear scale using VBW of 30 Hz over a 5 second sweep.

##### 7.2.1.2 Measurement Results

Radiated band-edge and spurious emissions found in the restricted frequency bands of 30MHz to 26 GHz are reported in the tables below.

**Table 7.2.1.2-1: Radiated Emissions below 1 GHz**

| Frequency (MHz) | Level (dBuV) |         | Antenna Polarity (H/V) | Correction Factors (dB) | Corrected Level (dBuV/m) |         | Limit (dBuV/m) |         | Margin (dB) |         |
|-----------------|--------------|---------|------------------------|-------------------------|--------------------------|---------|----------------|---------|-------------|---------|
|                 | pk           | Qpk/Avg |                        |                         | pk                       | Qpk/Avg | pk             | Qpk/Avg | pk          | Qpk/Avg |
| 169.45          | 52.38        | 49.54   | H                      | -12.23                  | -----                    | 37.31   | -----          | 43.5    | -----       | 6.2     |
| 129.1           | 52.65        | 50.54   | V                      | -13.54                  | -----                    | 37.00   | -----          | 43.5    | -----       | 6.5     |
| 403.5           | 53.34        | 49.03   | H                      | -9.06                   | -----                    | 39.97   | -----          | 46.0    | -----       | 6.0     |
| 403.5           | 44.33        | 41.39   | V                      | -9.06                   | -----                    | 32.33   | -----          | 46.0    | -----       | 13.7    |
| 960             | 44.41        | 43.31   | H                      | 1.31                    | -----                    | 44.62   | -----          | 46.0    | -----       | 1.4     |
| 960             | 41.21        | 40.04   | V                      | 1.31                    | -----                    | 41.35   | -----          | 46.0    | -----       | 4.7     |

**Note:** These emissions found in the restricted bands below 1 GHz were observed to be independent of the mode of operation of the module.

## 802.11b

Table 7.2.1.2-2: Radiated Spurious Emissions Tabulated Data

| Frequency<br>(MHz)        | Level<br>(dBuV) |         | Antenna<br>Polarity<br>(H/V) | Correction<br>Factors<br>(dB) | Corrected Level<br>(dBuV/m) |         | Limit<br>(dBuV/m) |         | Margin<br>(dB) |         |
|---------------------------|-----------------|---------|------------------------------|-------------------------------|-----------------------------|---------|-------------------|---------|----------------|---------|
|                           | pk              | Qpk/Avg |                              |                               | pk                          | Qpk/Avg | pk                | Qpk/Avg | pk             | Qpk/Avg |
| Low Channel (2412 MHz)    |                 |         |                              |                               |                             |         |                   |         |                |         |
| 2390                      | 64.29           | 50.78   | H                            | -8.00                         | 56.29                       | 42.78   | 74.0              | 54.0    | 17.7           | 11.2    |
| 2390                      | 62.89           | 50.31   | V                            | -8.00                         | 54.89                       | 42.31   | 74.0              | 54.0    | 19.1           | 11.7    |
| 4824                      | 56.41           | 42.05   | H                            | -0.21                         | 56.20                       | 41.84   | 74.0              | 54.0    | 17.8           | 12.2    |
| 4824                      | 51.74           | 37.74   | V                            | -0.21                         | 51.53                       | 37.53   | 74.0              | 54.0    | 22.5           | 16.5    |
| Middle Channel (2437 MHz) |                 |         |                              |                               |                             |         |                   |         |                |         |
| 4874                      | 56.60           | 41.66   | H                            | -0.06                         | 56.54                       | 41.60   | 74.0              | 54.0    | 17.5           | 12.4    |
| 4874                      | 53.79           | 39.39   | V                            | -0.06                         | 53.73                       | 39.33   | 74.0              | 54.0    | 20.3           | 14.7    |
| High Channel (2462 MHz)   |                 |         |                              |                               |                             |         |                   |         |                |         |
| 2483.5                    | 63.18           | 50.26   | H                            | -7.61                         | 55.57                       | 42.65   | 74.0              | 54.0    | 18.4           | 11.3    |
| 2483.5                    | 62.44           | 49.59   | V                            | -7.61                         | 54.83                       | 41.98   | 74.0              | 54.0    | 19.2           | 12.0    |
| 4924                      | 54.66           | 39.93   | H                            | 0.09                          | 54.75                       | 40.02   | 74.0              | 54.0    | 19.2           | 14.0    |
| 4924                      | 52.94           | 38.79   | V                            | 0.09                          | 53.03                       | 38.88   | 74.0              | 54.0    | 21.0           | 15.1    |

Note: All emissions above 4924 MHz were attenuated below the limits and the noise floor of the measurement equipment.

## 802.11g

Table 7.2.1.2-3: Radiated Spurious Emissions Tabulated Data

| Frequency<br>(MHz)        | Level<br>(dBuV) |         | Antenna<br>Polarity<br>(H/V) | Correction<br>Factors<br>(dB) | Corrected Level<br>(dBuV/m) |         | Limit<br>(dBuV/m) |         | Margin<br>(dB) |         |
|---------------------------|-----------------|---------|------------------------------|-------------------------------|-----------------------------|---------|-------------------|---------|----------------|---------|
|                           | pk              | Qpk/Avg |                              |                               | pk                          | Qpk/Avg | pk                | Qpk/Avg | pk             | Qpk/Avg |
| Low Channel (2412 MHz)    |                 |         |                              |                               |                             |         |                   |         |                |         |
| 2390                      | 71.95           | 49.89   | H                            | -8.00                         | 63.95                       | 41.89   | 74.0              | 54.0    | 10.0           | 12.1    |
| 2390                      | 70.98           | 49.60   | V                            | -8.00                         | 62.98                       | 41.60   | 74.0              | 54.0    | 11.0           | 12.4    |
| 4824                      | 54.95           | 40.03   | H                            | -0.21                         | 54.74                       | 39.82   | 74.0              | 54.0    | 19.3           | 14.2    |
| 4824                      | 50.98           | 36.63   | V                            | -0.21                         | 50.77                       | 36.42   | 74.0              | 54.0    | 23.2           | 17.6    |
| Middle Channel (2437 MHz) |                 |         |                              |                               |                             |         |                   |         |                |         |
| 4874                      | 53.17           | 38.52   | H                            | -0.06                         | 53.11                       | 38.46   | 74.0              | 54.0    | 20.9           | 15.5    |
| 4874                      | 50.60           | 36.39   | V                            | -0.06                         | 50.54                       | 36.33   | 74.0              | 54.0    | 23.5           | 17.7    |
| High Channel (2462 MHz)   |                 |         |                              |                               |                             |         |                   |         |                |         |
| 2483.5                    | 73.80           | 54.34   | H                            | -7.61                         | 66.19                       | 46.73   | 74.0              | 54.0    | 7.8            | 7.3     |
| 2483.5                    | 72.32           | 53.23   | V                            | -7.61                         | 64.71                       | 45.62   | 74.0              | 54.0    | 9.3            | 8.4     |
| 4924                      | 52.58           | 37.72   | H                            | 0.09                          | 52.67                       | 37.81   | 74.0              | 54.0    | 21.3           | 16.2    |
| 4924                      | 48.29           | 35.01   | V                            | 0.09                          | 48.38                       | 35.10   | 74.0              | 54.0    | 25.6           | 18.9    |

Note: All emissions above 4924 MHz were attenuated below the limits and the noise floor of the measurement equipment.

## 802.11n 20 MHz

Table 7.2.1.2-4: Radiated Spurious Emissions Tabulated Data

| Frequency<br>(MHz)        | Level<br>(dBuV) |         | Antenna<br>Polarity<br>(H/V) | Correction<br>Factors<br>(dB) | Corrected Level<br>(dBuV/m) |         | Limit<br>(dBuV/m) |         | Margin<br>(dB) |         |
|---------------------------|-----------------|---------|------------------------------|-------------------------------|-----------------------------|---------|-------------------|---------|----------------|---------|
|                           | pk              | Qpk/Avg |                              |                               | pk                          | Qpk/Avg | pk                | Qpk/Avg | pk             | Qpk/Avg |
| Low Channel (2412 MHz)    |                 |         |                              |                               |                             |         |                   |         |                |         |
| 2390                      | 66.64           | 48.24   | H                            | -8.00                         | 58.64                       | 40.24   | 74.0              | 54.0    | 15.4           | 13.8    |
| 2390                      | 66.24           | 47.85   | V                            | -8.00                         | 58.24                       | 39.85   | 74.0              | 54.0    | 15.8           | 14.1    |
| 4824                      | 49.74           | 35.66   | H                            | -0.21                         | 49.53                       | 35.45   | 74.0              | 54.0    | 24.5           | 18.6    |
| 4824                      | 46.26           | 33.58   | V                            | -0.21                         | 46.05                       | 33.37   | 74.0              | 54.0    | 28.0           | 20.6    |
| Middle Channel (2437 MHz) |                 |         |                              |                               |                             |         |                   |         |                |         |
| 4874                      | 49.77           | 34.99   | H                            | -0.06                         | 49.71                       | 34.93   | 74.0              | 54.0    | 24.3           | 19.1    |
| 4874                      | 46.75           | 33.53   | V                            | -0.06                         | 46.69                       | 33.47   | 74.0              | 54.0    | 27.3           | 20.5    |
| High Channel (2462 MHz)   |                 |         |                              |                               |                             |         |                   |         |                |         |
| 2483.5                    | 69.36           | 50.46   | H                            | -7.61                         | 61.75                       | 42.85   | 74.0              | 54.0    | 12.2           | 11.1    |
| 2483.5                    | 68.68           | 49.74   | V                            | -7.61                         | 61.07                       | 42.13   | 74.0              | 54.0    | 12.9           | 11.9    |
| 4924                      | 48.17           | 33.96   | H                            | 0.09                          | 48.26                       | 34.05   | 74.0              | 54.0    | 25.7           | 19.9    |
| 4924                      | 46.69           | 33.10   | V                            | 0.09                          | 46.78                       | 33.19   | 74.0              | 54.0    | 27.2           | 20.8    |

Note: All emissions above 4924 MHz were attenuated below the limits and the noise floor of the measurement equipment.

## 802.11n 40 MHz

Table 7.2.1.2-5: Radiated Spurious Emissions Tabulated Data

| Frequency<br>(MHz)        | Level<br>(dBuV) |         | Antenna<br>Polarity<br>(H/V) | Correction<br>Factors<br>(dB) | Corrected Level<br>(dBuV/m) |         | Limit<br>(dBuV/m) |         | Margin<br>(dB) |         |
|---------------------------|-----------------|---------|------------------------------|-------------------------------|-----------------------------|---------|-------------------|---------|----------------|---------|
|                           | pk              | Qpk/Avg |                              |                               | pk                          | Qpk/Avg | pk                | Qpk/Avg | pk             | Qpk/Avg |
| Low Channel (2422 MHz)    |                 |         |                              |                               |                             |         |                   |         |                |         |
| 2390                      | 72.39           | 53.00   | H                            | -8.00                         | 64.39                       | 45.00   | 74.0              | 54.0    | 9.6            | 9.0     |
| 2390                      | 71.92           | 52.72   | V                            | -8.00                         | 63.92                       | 44.72   | 74.0              | 54.0    | 10.1           | 9.3     |
| 4844                      | 46.39           | 33.61   | H                            | -0.15                         | 46.24                       | 33.46   | 74.0              | 54.0    | 27.8           | 20.5    |
| 4844                      | 45.90           | 33.38   | V                            | -0.15                         | 45.75                       | 33.23   | 74.0              | 54.0    | 28.3           | 20.8    |
| Middle Channel (2437 MHz) |                 |         |                              |                               |                             |         |                   |         |                |         |
| 4874                      | 47.34           | 34.52   | H                            | -0.06                         | 47.28                       | 34.46   | 74.0              | 54.0    | 26.7           | 19.5    |
| 4874                      | 45.16           | 33.23   | V                            | -0.06                         | 45.10                       | 33.17   | 74.0              | 54.0    | 28.9           | 20.8    |
| High Channel (2452 MHz)   |                 |         |                              |                               |                             |         |                   |         |                |         |
| 2483.5                    | 74.15           | 56.54   | H                            | -7.61                         | 66.54                       | 48.93   | 74.0              | 54.0    | 7.5            | 5.1     |
| 2483.5                    | 73.40           | 55.72   | V                            | -7.61                         | 65.79                       | 48.11   | 74.0              | 54.0    | 8.2            | 5.9     |
| 4904                      | 47.00           | 34.30   | H                            | 0.03                          | 47.03                       | 34.33   | 74.0              | 54.0    | 27.0           | 19.7    |
| 4904                      | 46.54           | 33.11   | V                            | 0.03                          | 46.57                       | 33.14   | 74.0              | 54.0    | 27.4           | 20.9    |

Note: All emissions above 4924 MHz were attenuated below the limits and the noise floor of the measurement equipment.

**7.2.1.3 Sample Calculation:**

$$R_C = R_U + CF_T$$

Where:

|        |   |                                                                   |
|--------|---|-------------------------------------------------------------------|
| $CF_T$ | = | Total Correction Factor (AF+CA+AG)-DC (Average Measurements Only) |
| $R_U$  | = | Uncorrected Reading                                               |
| $R_C$  | = | Corrected Level                                                   |
| AF     | = | Antenna Factor                                                    |
| CA     | = | Cable Attenuation                                                 |
| AG     | = | Amplifier Gain                                                    |
| DC     | = | Duty Cycle Correction Factor                                      |

**Example Calculation: Peak**

Corrected Level:  $64.29 + (-8.0) = 56.29$  dB $\mu$ V/m

Margin:  $74$  dB $\mu$ V/m –  $56.29$  dB $\mu$ V/m =  $17.7$  dB

**Example Calculation: Average**

Corrected Level:  $50.78 + (-8.0) = 42.78$  dB $\mu$ V/m

Margin:  $54$  dB $\mu$ V/m –  $42.78$  dB $\mu$ V/m =  $11.2$  dB

### 7.3 Power Line Conducted Emissions – FCC: Section 15.207 IC: RSS-Gen 7.2.4

#### 7.3.1 Measurement Procedure

ANSI C63.4 sections 6 and 7 were the guiding documents for this evaluation. Conducted emissions were performed from 150 kHz to 30 MHz with the spectrum analyzer's resolution bandwidth set to 9 kHz and the video bandwidth set to 30 kHz. The calculation for the conducted emissions is as follows:

**Corrected Reading = Analyzer Reading + LISN Loss + Cable Loss**

**Margin = Applicable Limit - Corrected Reading**

#### 7.3.2 Measurement Results

Results are shown below.

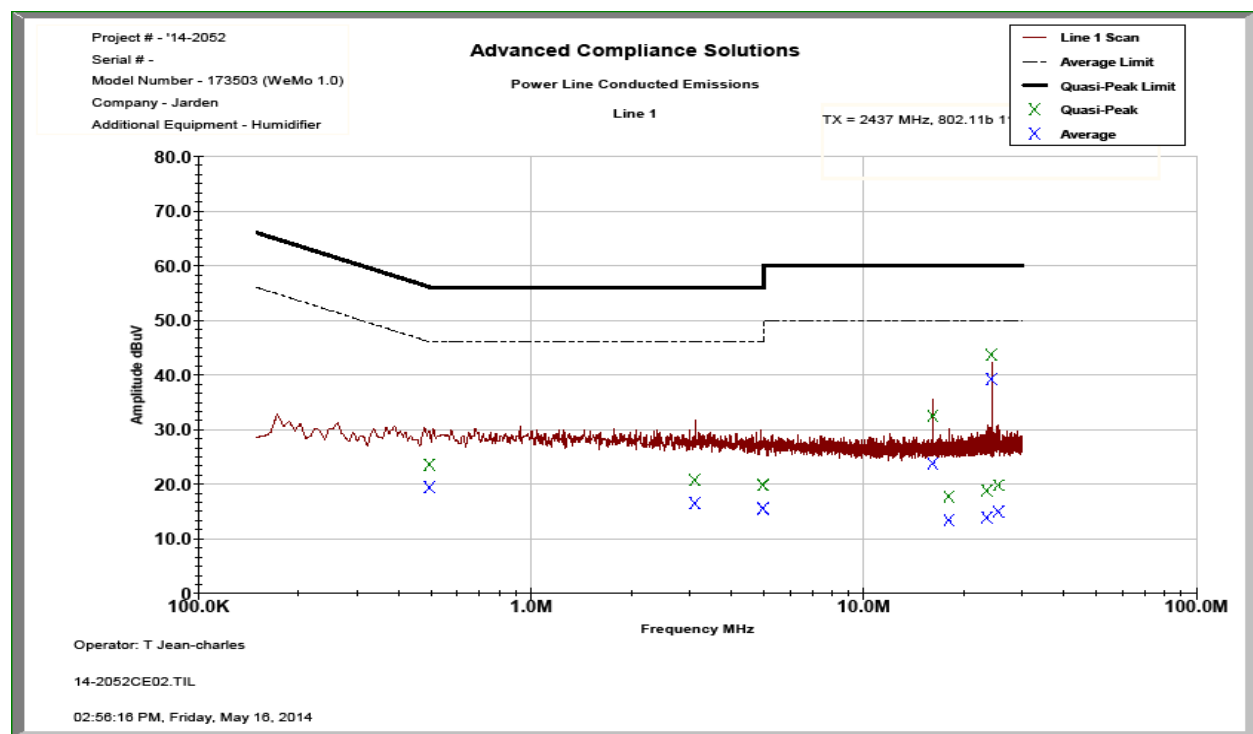


Figure 7.3.2-1: Conducted Emissions Results – Line 1

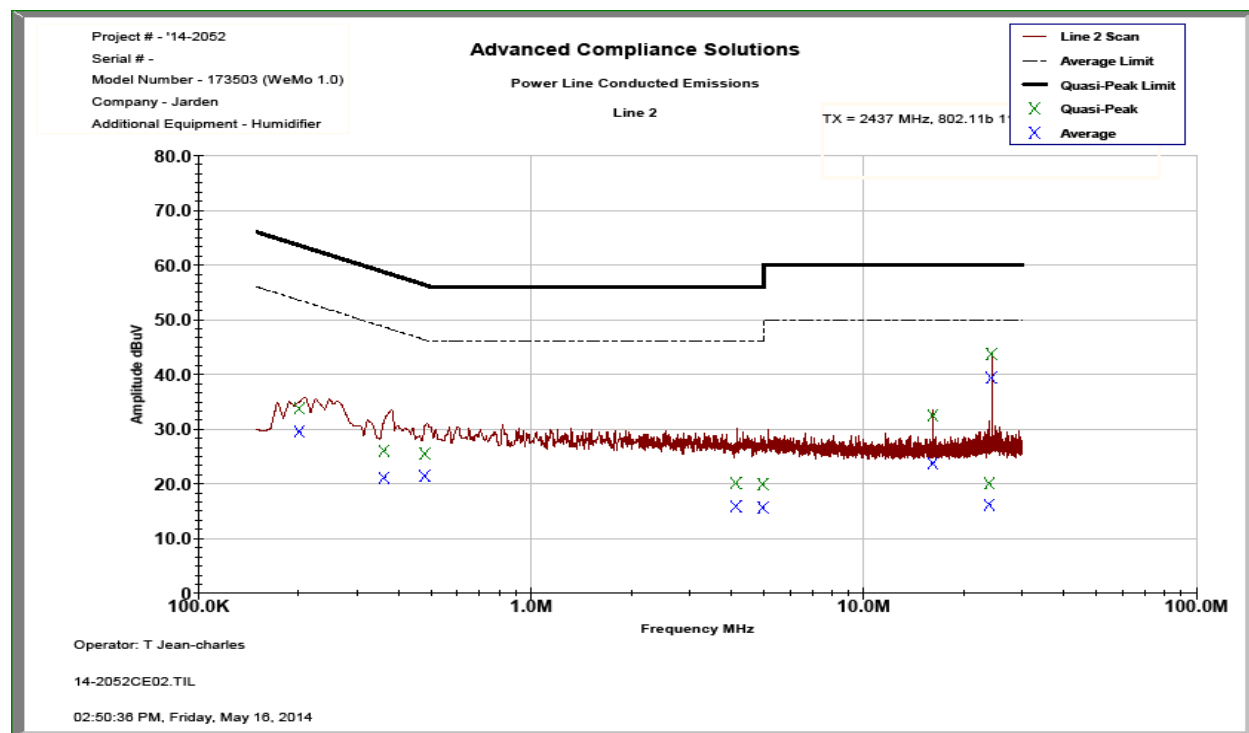


Figure 7.3.2-2: Conducted Emissions Results – Line 2

Table 7.3.2-1: Conducted EMI Results

| <div><input checked="" type="checkbox"/> Line 1   <input checked="" type="checkbox"/> Line 2   <input type="checkbox"/> Line 3</div> <div><input type="checkbox"/> Line 4</div> <div><input type="checkbox"/> To Ground   <input checked="" type="checkbox"/> Floating</div> <div><input type="checkbox"/> Telecom Port _____</div> <div><input checked="" type="checkbox"/> dBµV   <input type="checkbox"/> dBµA</div> <div>Plot Number: <u>14-2052CE02</u></div> <div>Power Supply Description: <u>N/A</u></div> |                        |         |                                       |                 |         |            |         |             |         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------|---------------------------------------|-----------------|---------|------------|---------|-------------|---------|
| Frequency<br>(MHz)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Uncorrected<br>Reading |         | Total<br>Correction<br>Factor<br>(dB) | Corrected Level |         | Limit      |         | Margin (dB) |         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Quasi-<br>Peak         | Average |                                       | Quasi-Peak      | Average | Quasi-Peak | Average | Quasi-Peak  | Average |
| Line 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                        |         |                                       |                 |         |            |         |             |         |
| 0.4954                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 13.57                  | 9.32    | 10.08                                 | 23.65           | 19.40   | 56.08      | 46.08   | 32.4        | 26.7    |
| 3.10754                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 10.504                 | 6.277   | 10.23                                 | 20.73           | 16.50   | 56.00      | 46.00   | 35.3        | 29.5    |
| 4.98                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 9.446                  | 5.242   | 10.28                                 | 19.72           | 15.52   | 56.00      | 46.00   | 36.3        | 30.5    |
| 4.9801                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 9.529                  | 5.193   | 10.28                                 | 19.81           | 15.47   | 56.00      | 46.00   | 36.2        | 30.5    |
| 16.1399                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 21.7                   | 12.96   | 10.77                                 | 32.47           | 23.73   | 60.00      | 50.00   | 27.5        | 26.3    |
| 18.0251                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 6.897                  | 2.515   | 10.80                                 | 17.70           | 13.32   | 60.00      | 50.00   | 42.3        | 36.7    |
| 23.4429                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 7.758                  | 2.794   | 11.05                                 | 18.81           | 13.85   | 60.00      | 50.00   | 41.2        | 36.2    |
| 24.2084                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 32.552                 | 28.121  | 11.08                                 | 43.64           | 39.21   | 60.00      | 50.00   | 16.4        | 10.8    |
| 25.4129                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 8.64                   | 3.738   | 11.13                                 | 19.77           | 14.87   | 60.00      | 50.00   | 40.2        | 35.1    |
| Line 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                        |         |                                       |                 |         |            |         |             |         |
| 0.201                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 23.7                   | 19.494  | 10.08                                 | 33.78           | 29.58   | 63.57      | 53.57   | 29.8        | 24.0    |
| 0.361338                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 16.062                 | 11.108  | 10.05                                 | 26.11           | 21.16   | 58.70      | 48.70   | 32.6        | 27.5    |
| 0.48                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 15.49                  | 11.381  | 10.05                                 | 25.54           | 21.43   | 56.34      | 46.34   | 30.8        | 24.9    |
| 4.1299                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 9.863                  | 5.643   | 10.24                                 | 20.10           | 15.88   | 56.00      | 46.00   | 35.9        | 30.1    |
| 4.98                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 9.659                  | 5.374   | 10.24                                 | 19.90           | 15.61   | 56.00      | 46.00   | 36.1        | 30.4    |
| 16.1399                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 21.74                  | 12.97   | 10.74                                 | 32.48           | 23.71   | 60.00      | 50.00   | 27.5        | 26.3    |
| 23.8533                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 8.992                  | 5.158   | 11.00                                 | 19.99           | 16.16   | 60.00      | 50.00   | 40.0        | 33.8    |
| 24.2096                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 32.652                 | 28.273  | 11.01                                 | 43.66           | 39.29   | 60.00      | 50.00   | 16.3        | 10.7    |

## **8 CONCLUSION**

In the opinion of ACS, Inc., the model 173503 meets the requirements of FCC Part 15 subpart C and Industry Canada's Radio Standards Specification RSS-210 for the test procedures documented in the test report.

**END REPORT**