



Engineering Solutions & Electromagnetic Compatibility Services

**Class 2 Permissive Change Report
FCC Part 15.247 & Industry Canada RSS-210**

| | | | |
|--|---|--|----------------------------|
| Test Lab: Rhein Tech Laboratories, Inc. Tel: 703-689-0368 360 Herndon Parkway Fax: 703-689-2056 Suite 1400 www.rheintech.com Herndon, VA 20170 E-Mail: atcbinfo@rheintech.com | | Applicant: Alarm.com Incorporated Tel: 703-584-7319 8150 Leesburg Pike Suite 1400 Vienna, VA 22182 | |
| FCC ID: | YL6-143100ISGC | Test Report Date: | March 29, 2014 |
| IC: | 9111A-143100ISGC | RTL Work Order #: | 2014061 |
| Platform: | N/A | RTL Quote #: | QRTL14-061 |
| Model: | ADC-IS-100-GC | RTL Quote #: | QRTL14-061 |
| American National Standard Institute: | ANSI C63.4-2003: Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz | | |
| FCC Classification: | DSS – Part 15 Spread Spectrum Transmitter | | |
| FCC Rule Part(s)/ Guidance: | 15.247: Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz, and 24.0-24.25 GHz, October 1, 2013 (15C) | | |
| Industry Canada: | RSS-210 Issue 8: License-Exempt Radio Apparatus (All Frequency Bands): Category I Equipment | | |
| Digital Interface Information: | Digital Interface was found to be compliant | | |
| Frequency Range (MHz) | Original FCC Grant Output Power (W) | Frequency Tolerance | Emission Designator |
| 910.2-919.8 | 0.003 | N/A | N/A |

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

Signature: 

Date: March 29, 2014

Typed/Printed Name: Desmond A. Fraser

Position: President

This report may not be reproduced, except in full, without the written approval of Rhein Tech Laboratories, Inc. and Alarm.com. The test results relate only to the item(s) tested.

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

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1 General Information

1.1 Scope

This is a Class 2 Permissive Change Report.

Applicable Standards:

- FCC Part 15.247: Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz, and 24.0-24.25 GHz
- Industry Canada RSS-210: Low Power License-Exempt Communications Devices

1.2 Description of EUT

| | |
|-------------------------------|-----------------------|
| Equipment Under Test | Transceiver |
| Model | ADC-IS-100-GC |
| Power Supply | 2 - 1.5 VDC batteries |
| Modulation Type | FHSS |
| Frequency Range | 910.2 MHz – 919.8 MHz |
| Antenna Connector Type | None |
| Antenna Type | Internal Wire |

1.3 Test Facility

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

1.4 Related Submittal(s)/Grant(s)

This is a Class 2 Permissive Change request for Alarm.com Incorporated, Model: ADC-IS-100-GC, FCC ID: YL6-143100ISGC, IC: 9111A-143100ISGC. MET Laboratories, Inc. issued the original FCC grant 6/25/13 and the original IC Certificate 7/4/13.

The changes include:

- SiLabs RF chip replacement - Si1001-C-GM (obsolete) -> Si1001-E-GM
- Added ASIC LS6525-S to improve PIR detection and battery life
- Increased image storage - 1MB -> 16 MB
- Increased battery life - (exact value TBD, but close to 2x)

1.5 Modifications

No modifications were made to the equipment during testing in order to achieve compliance with these standards.

2 Test Information

2.1 Description of Test Modes

In accordance with FCC 15.31(m), and because the EUT utilizes an operating band greater than 10 MHz, the following frequencies were tested:

Table 2-1: Channels Tested

| Frequency (MHz) |
|-----------------|
| 910.2 |
| 915.0 |
| 919.8 |

2.2 Exercising the EUT

The EUT was programmed for continuous transmission at the three test channels. The EUT was tested in all three orthogonal planes in order to determine worst-case emissions. The carrier was also checked to verify that information was being transmitted.

2.3 Test Result Summary

Table 2-2: Test Result Summary – FCC Part 15, Subpart C (Section 15.249)

| Standard | Test | Pass/Fail or N/A |
|------------|---|------------------|
| FCC 15.209 | Radiated Emissions | Pass |
| FCC 15.247 | Field Strength of Fundamental and Harmonics | Pass |

2.4 Test System Details

The test sample was received on March 28, 2014. The FCC identifiers for all applicable equipment, plus descriptions of all cables used in the tested system, are identified in the following table.

Table 2-3: Equipment Under Test

| Part | Manufacturer | Model | Serial Number | FCC ID | Cable Description | RTL Bar Code |
|-------------|--------------|---------------|---------------|----------------|-------------------|--------------|
| Transmitter | Alarm.com | ADC-IS-100-GC | N/A | YL6-143100ISGC | N/A | 21118 |

2.5 Configuration of Tested System

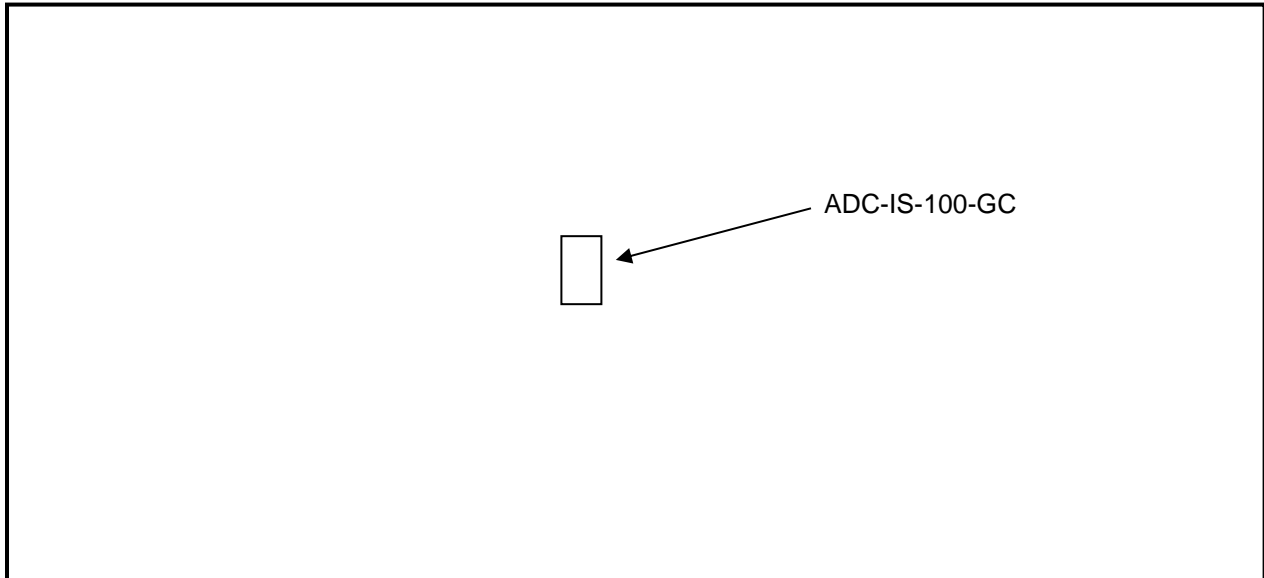


Figure 2-1: Configuration of System Under Test

3 Radiated Emissions – FCC 15.209, 15.249(a); RSS-210 A2.9; RSS-Gen

3.1 Limits of Radiated Emissions Measurement

| Frequency (MHz) | Field Strength (uV/m) | Measurement Distance (m) |
|-----------------|-----------------------|--------------------------|
| 0.009-0.490 | 2400/f (kHz) | 300 |
| 0.490-1.705 | 2400/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 |

As shown in 15.35(b), for frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any circumstances of modulation.

3.2 Radiated Emissions Measurement Test Procedure

Before final measurements of radiated emissions were made on the open-field three/ten meter range, the EUT was scanned indoors at one and three meter distances. This was done in order to determine its emissions spectrum signature. The physical arrangement of the test system and associated cabling was varied in order to determine the effect on the EUT's emissions in amplitude, direction and frequency. This process was repeated during final radiated emissions measurements on the open-field range, at each frequency, in order to ensure that maximum emission amplitudes were attained.

Final radiated emissions measurements were made on the three/ten-meter, open-field test site. The EUT was placed on a nonconductive turntable 0.8 meters above the ground plane. The spectrum was examined from 9 kHz to the 10th harmonic of the highest fundamental transmitter frequency (9.08 GHz).

At each frequency, the EUT was rotated 360°, and the antenna was raised and lowered from 1 to 4 meters in order to determine the emission's maximum level. Measurements were taken using both horizontal and vertical antenna polarizations. For frequencies between 30 and 1000 MHz, the spectrum analyzer's 6 dB bandwidth was set to 120 kHz, and the analyzer was operated in the CISPR quasi-peak detection mode. For emissions above 1000 MHz, emissions are measured using the average detector function with a minimum resolution bandwidth of 1 MHz. No video filter less than 10 times the resolution bandwidth was used. The highest emission amplitudes relative to the appropriate limit were measured and recorded in this report.

Table 3-1: Radiated Emissions Test Equipment

| RTL Asset # | Manufacturer | Model | Part Type | Serial Number | Calibration Due Date |
|-------------|-----------------------------------|------------------|---|-----------------|----------------------|
| 900151 | Rohde and Schwarz | HFH2-Z2 | Loop Antenna (9 kHz-30 MHz) | 827525/019 | 10/1/14 |
| 900932 | Hewlett Packard | 8449B OPT H02 | Preamplifier (1-26.5 GHz) | 3008A00505 | 8/27/14 |
| 900905 | Rhein Tech Laboratories | PR-1040 | OATS 1 Preamplifier 40dB (30 MHz-2 GHz) | 1006 | 9/4/14 |
| 900878 | Rhein Tech Laboratories | AM3-1197-0005 | 3 meter antenna mast, polarizing | Outdoor Range 1 | Not Required |
| 901593 | Insulated Wire Inc. | KPS-1503-360-KPR | SMK RF Cables 36" | NA | 8/27/14 |
| 901593 | Insulated Wire Inc. | KPS-1503-360-KPR | SMK RF Cables 36" | NA | 8/27/14 |
| 901242 | Rhein Tech Laboratories | WRT-000-0003 | Wood rotating table | N/A | Not Required |
| 900913 | Hewlett Packard | 85462A | EMI Receiver RF Section (9 kHz-6.5 GHz) | 3325A00159 | 11/14/14 |
| 900914 | Hewlett Packard | 85460A | RF Filter Section (100 kHz-6.5 GHz) | 3330A00107 | 11/14/14 |
| 900772 | EMCO | 3161-02 | Horn Antenna (2-4 GHz) | 9804-1044 | 4/19/14 |
| 900321 | EMCO | 3161-03 | Horn Antenna (4.0-8.2 GHz) | 9508-1020 | 4/19/14 |
| 900323 | EMCO | 3160-07 | Horn Antenna (8.2-12.4 GHz) | 9605-1054 | 4/19/14 |
| 900356 | EMCO | 3160-08 | Horn Antenna (12.4-18 GHz) | 9607-1044 | 4/19/14 |
| 900325 | EMCO | 3160-9 | Horn Antenna (18-26.5 GHz) | 9605-1051 | 4/19/14 |
| 901581 | Rohde & Schwarz | FSU | Spectrum Analyzer | 1166.1660.50 | 11/13/14 |
| 900724 | Antenna Research Associates, Inc. | LPB-2520 | BiLog Antenna (25-1000 MHz) | 1037 | 4/19/14 |

3.3 Radiated Emissions Test Results

Table 3-2: Radiated Emissions Test Data – Peak

| Emission Frequency (MHz) | Peak Detector Level (dBuV/m) (1 MHz RBW/VBW) | Site Correction Factor (dB/m) | Peak Corrected (dBuV/m) | Peak Limit 1W +20 dB (dBuV/m) | Peak Margin (dB) |
|--------------------------|--|-------------------------------|-------------------------|-------------------------------|------------------|
| 910.2 | 72.3 | 24.9 | 97.2 | 145.2 | -48.0 |
| 915.0 | 73.2 | 24.8 | 98.0 | 145.2 | -47.2 |
| 919.8 | 73.9 | 24.7 | 98.6 | 145.2 | -46.6 |

* testing performed at 3m

Table 3-3: Radiated Emissions Test Data – Average

| Emission Frequency (MHz) | Average Detector Level (dBuV/m) (1 MHz RBW/ 10 Hz VBW) | Site Correction Factor (dB/m) | Average Corrected (dBuV/m) | Average Limit 1 W (dBuV/m) | Average Margin (dB) |
|--------------------------|--|-------------------------------|----------------------------|----------------------------|---------------------|
| 910.2 | 72.3 | 24.9 | 97.2 | 125.2 | -28.0 |
| 915.0 | 73.2 | 24.8 | 98.0 | 125.2 | -27.2 |
| 919.8 | 73.8 | 24.7 | 98.5 | 125.2 | -26.7 |

* testing performed at 3m

3.4 Radiated Emissions Harmonics/Spurious Test Data

Table 3-4: Peak Radiated Emissions Harmonics/Spurious – 910.2 MHz

| Emission Frequency (MHz) | Peak Detector (dBuV/m) (1 MHz RBW/VBW) | Site Correction Factor (dB/m) | Peak Corrected (dBuV/m) | Peak Limit (dBuV/m) | Peak Margin (dB) |
|--------------------------|--|-------------------------------|-------------------------|---------------------|------------------|
| 2730.588 | 57.9 | -9.1 | 48.8 | 74.0 | -25.2 |
| 3640.784 | 59.5 | -5.4 | 54.1 | 74.0 | -19.9 |
| 4550.984 | 38.7 | -1.4 | 37.3 | 74.0 | -36.7 |
| 7281.572 | 37.5 | 0.9 | 38.4 | 74.0 | -35.6 |
| 8191.768 | 33.4 | 5.9 | 39.3 | 74.0 | -34.7 |
| 9101.964 | 31.7 | 6.4 | 38.1 | 74.0 | -35.9 |
| 2730.588 | 57.9 | -9.1 | 48.8 | 74.0 | -25.2 |

Table 3-5: Radiated Emissions Harmonics/Spurious – 910.2 MHz

| Emission Frequency (MHz) | Average Detector (dBuV/m) (1 MHz RBW/10 Hz VBW) | Site Correction Factor (dB/m) | Average Corrected (dBuV/m) | Average Limit (dBuV/m) | Average Margin (dB) |
|--------------------------|---|-------------------------------|----------------------------|------------------------|---------------------|
| 2730.588 | 57.7 | -9.1 | 48.6 | 54.0 | -5.4 |
| 3640.784 | 59.1 | -5.4 | 53.7 | 54.0 | -0.3 |
| 4550.984 | 37.6 | -1.4 | 36.2 | 54.0 | -17.8 |
| 7281.572 | 36.2 | 0.9 | 37.1 | 54.0 | -16.9 |
| 8191.768 | 30.7 | 5.9 | 36.6 | 54.0 | -17.4 |
| 9101.964 | 28.1 | 6.4 | 34.5 | 54.0 | -19.5 |

Table 3-6: Peak Radiated Emissions Harmonics/Spurious – 915 MHz

| Emission Frequency (MHz) | Peak Detector (dBuV/m) (1 MHz RBW/VBW) | Site Correction Factor (dB/m) | Peak Corrected (dBuV/m) | Peak Limit (dBuV/m) | Peak Margin (dB) |
|--------------------------|--|-------------------------------|-------------------------|---------------------|------------------|
| 2745.096 | 58.2 | -9.1 | 49.1 | 74.0 | -24.9 |
| 3660.126 | 59.5 | -5.2 | 54.3 | 74.0 | -19.7 |
| 4575.164 | 40.8 | -1.4 | 39.4 | 74.0 | -34.6 |
| 7320.265 | 38.8 | 0.9 | 39.7 | 74.0 | -34.3 |
| 8235.302 | 31.2 | 6.0 | 37.2 | 74.0 | -36.8 |
| 9150.332 | 31.4 | 6.4 | 37.8 | 74.0 | -36.2 |
| 2745.096 | 58.2 | -9.1 | 49.1 | 74.0 | -24.9 |

Table 3-7: Radiated Emissions Harmonics/Spurious – 915 MHz

| Emission Frequency (MHz) | Average Detector (dBuV/m) (1 MHz RBW/10 Hz VBW) | Site Correction Factor (dB/m) | Average Corrected (dBuV/m) | Average Limit (dBuV/m) | Average Margin (dB) |
|--------------------------|---|-------------------------------|----------------------------|------------------------|---------------------|
| 2745.096 | 58.0 | -9.1 | 48.9 | 54.0 | -5.1 |
| 3660.126 | 58.7 | -5.2 | 53.5 | 54.0 | -0.5 |
| 4575.164 | 39.7 | -1.4 | 38.3 | 54.0 | -15.7 |
| 7320.265 | 38.2 | 0.9 | 39.1 | 54.0 | -14.9 |
| 8235.302 | 27.8 | 6.0 | 33.8 | 54.0 | -20.2 |
| 9150.332 | 25.2 | 6.4 | 31.6 | 54.0 | -22.4 |

Table 3-8: Peak Radiated Emissions Harmonics/Spurious – 919.8 MHz

| Emission Frequency (MHz) | Peak Detector (dBuV/m) (1 MHz RBW/VBW) | Site Correction Factor (dB/m) | Peak Corrected (dBuV/m) | Peak Limit (dBuV/m) | Peak Margin (dB) |
|--------------------------|--|-------------------------------|-------------------------|---------------------|------------------|
| 2759.607 | 58.9 | -9.1 | 49.8 | 74.0 | -24.2 |
| 3679.476 | 58.5 | -5.0 | 53.5 | 74.0 | -20.5 |
| 4599.348 | 39.1 | -1.4 | 37.7 | 74.0 | -36.3 |
| 7358.955 | 35.8 | 1.0 | 36.8 | 74.0 | -37.2 |
| 8278.832 | 31.0 | 6.1 | 37.1 | 74.0 | -36.9 |
| 9198.701 | 30.7 | 6.4 | 37.1 | 74.0 | -36.9 |
| 2759.607 | 58.9 | -9.1 | 49.8 | 74.0 | -24.2 |

Table 3-9: Radiated Emissions Harmonics/Spurious – 919.8 MHz


| Emission Frequency (MHz) | Average Detector (dBuV/m) (1 MHz RBW/10 Hz VBW) | Site Correction Factor (dB/m) | Average Corrected (dBuV/m) | Average Limit (dBuV/m) | Average Margin (dB) |
|--------------------------|---|-------------------------------|----------------------------|------------------------|---------------------|
| 2759.607 | 58.5 | -9.1 | 49.4 | 54.0 | -4.6 |
| 3679.476 | 58.5 | -5.0 | 53.5 | 54.0 | -0.5 |
| 4599.348 | 38.1 | -1.4 | 36.7 | 54.0 | -17.3 |
| 7358.955 | 34.5 | 1.0 | 35.5 | 54.0 | -18.5 |
| 8278.832 | 27.2 | 6.1 | 33.3 | 54.0 | -20.7 |
| 9198.701 | 25.9 | 6.4 | 32.3 | 54.0 | -21.7 |

3.5 Radiated Emissions Digital Test Data

Table 3-10: Digital Radiated Emissions Test Data

| Temperature: 52°F Humidity: 90% | | | | | | | | | | |
|---------------------------------|---------------|------------------------|-------------------------|--------------------|-------------------------|-------------------------------|-------------------------|----------------|-------------|-----------|
| Emission Frequency (MHz) | Test Detector | Antenna Polarity (H/V) | Turntable Azimuth (deg) | Antenna Height (m) | Analyzer Reading (dBuV) | Site Correction Factor (dB/m) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Pass/Fail |
| 58.981 | Qp | V | 0 | 1.0 | 39.2 | -21.1 | 18.1 | 40.0 | -21.9 | Pass |
| 88.482 | Qp | V | 180 | 1.0 | 39.7 | -24.1 | 15.6 | 43.5 | -27.9 | Pass |
| 117.962 | Qp | V | 270 | 1.0 | 34.5 | -20.1 | 14.4 | 43.5 | -29.1 | Pass |
| 147.470 | Qp | V | 0 | 1.0 | 32.9 | -22.4 | 10.5 | 43.5 | -33.0 | Pass |
| 176.958 | Qp | H | 350 | 1.0 | 33.1 | -22.1 | 11.0 | 43.5 | -32.5 | Pass |
| 206.435 | Qp | V | 120 | 1.0 | 33.7 | -20.2 | 11.3 | 43.5 | -32.2 | Pass |

Test Personnel:

| | | |
|-------------------------------------|---|--------------------------------|
| Daniel W. Baltzell Test Engineer |  | March 29, 2014 Date of Test |
|-------------------------------------|---|--------------------------------|

4 Conclusion

The data in this measurement report shows that the EUT as tested, Alarm.com, Model: ADC-IS-100-GC, FCC ID: YL6-143100ISGC, IC: 9111A-143100ISGC, complies with all the applicable requirements of Parts 2 and 15 of the FCC Rules and Regulations, and IC RSS-210 and RSS-Gen.