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Certification Test Report

FCC ID: Z9O-FAS1509
IC: 10060A-FAS1509

FCC Rule Part: 15.249
IC Radio Standards Specification: RSS-210

ACS Report Number: 11-2105.W06.1B

Manufacturer: UltraClenz, LLC
Model: FAS1509-02

Test Begin Date: **November 13, 2011**
Test End Date: **November 16, 2011**

Report Issue Date: September 4, 2012



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 ACLASS, ANSI, or any agency of the Federal Government.

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This report contains 13 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.

1.2 Product description

The FAS1509-02 is a badge that incorporates a 2.4 GHz transceiver. The unit also includes a 125 kHz receiver. The badge communicates with beacon series FAS1510 and FAS1511 via 2.4GHz and 125KHz.

Technical Details

Frequency of Operation: 2405 MHz

Number of Channels: 1

Modulation: GFSK

Data Rate: 2 Mbps

Antenna / Gain: Inverted-F PCB antenna / 6.3 dBi

Input Voltage: 3 VDC

Manufacturer Information:

UltraClenz, LLC

1440 W Indiantown Rd., Suite 350

Jupiter, FL 33435

Test Sample Serial Number(s): N/A

Test Sample Condition: Good

1.3 Test Methodology and Considerations

The unit was evaluated for radiated emissions in three orthogonal orientations corresponding to the XY, XZ and YZ planes. The unit was continuously pulsing during the evaluation.

The unintentional emissions evaluations is documented separately in a verification report.

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

FCC Test Firm Registration #: 587595
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 ACCLASS 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:

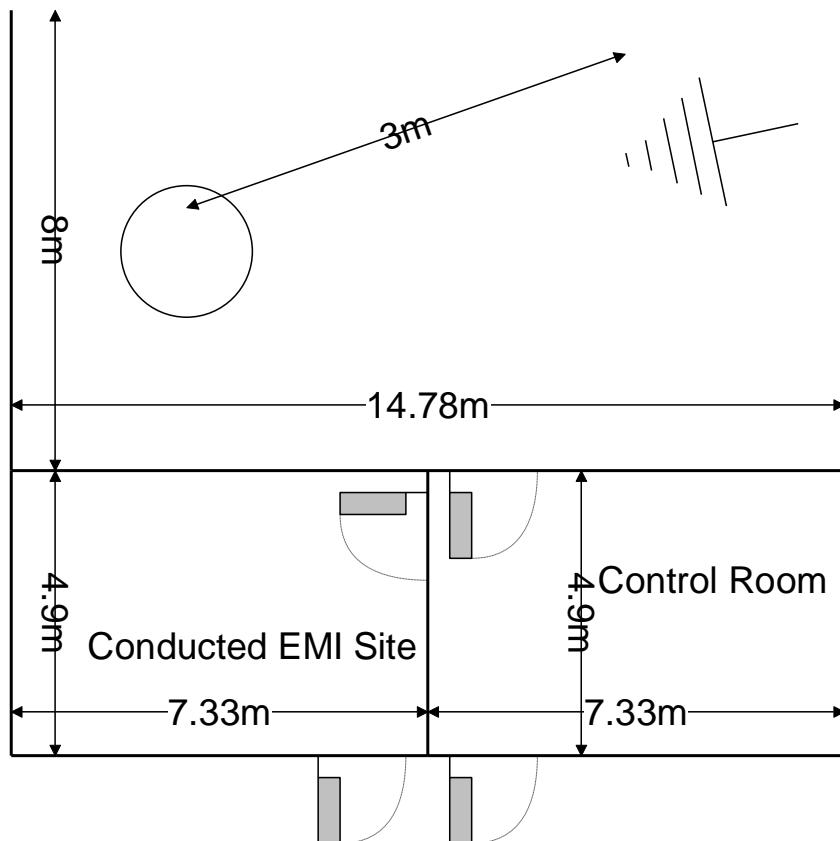


Figure 2.3.1-1: Semi-Anechoic Chamber Test Site

2.3.2 Conducted Emissions Test Site Description

The dimensions of the shielded conducted room are $7.3 \times 4.9 \times 3 \text{ m}^3$. As per ANSI C63.4 2003 requirements, the data were taken using two LISNs; a Solar Model 8028-50 50 Ω /50 μH 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:

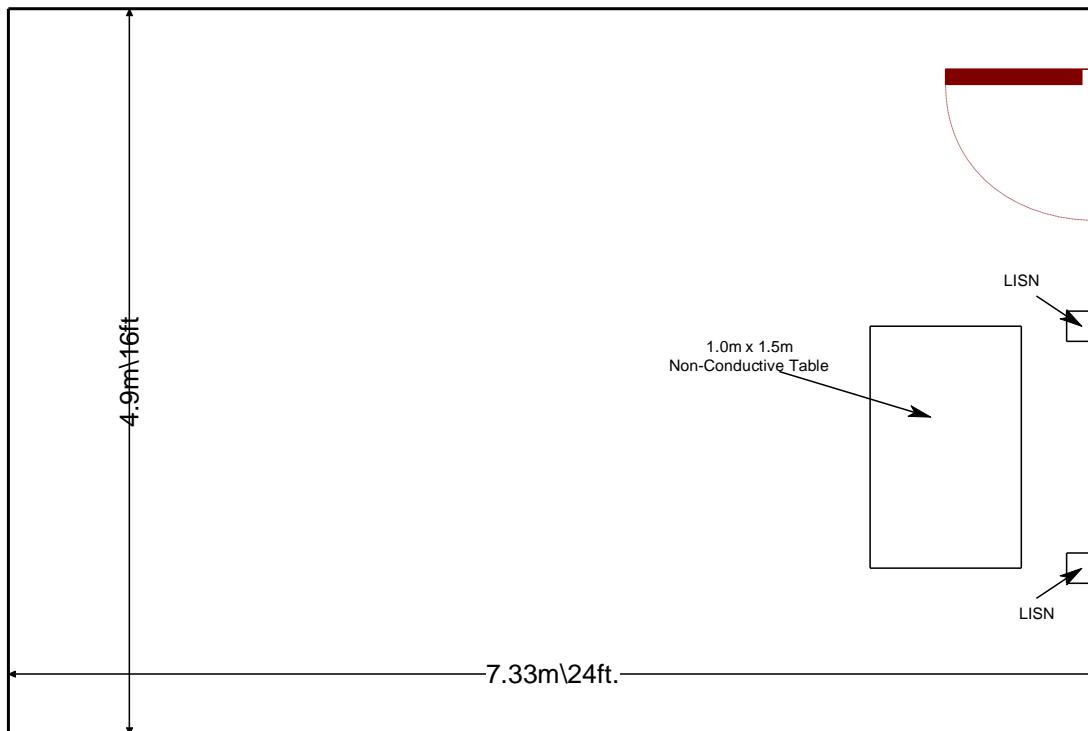


Figure 2.3.2-1: AC Mains Conducted EMI Site

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 9KHz to 40GHz
- ❖ US Code of Federal Regulations (CFR): Title 47, Part 2, Subpart J: Equipment Authorization Procedures, 2011
- ❖ US Code of Federal Regulations (CFR): Title 47, Part 15, Subpart C: Radio Frequency Devices, Intentional Radiators, 2011
- ❖ Industry Canada Radio Standards Specification: RSS-210 - Low-power License-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment, Issue 8 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	1/5/2011	1/5/2013
524	Chase	CBL6111	Antennas	1138	1/7/2011	1/7/2013
2006	EMCO	3115	Antennas	2573	3/2/2011	3/2/2013
2008	COM-Power	AH-826	Antennas	81009	NCR	NCR
2011	Hewlett-Packard	HP 8447D	Amplifiers	2443A03952	1/3/2011	1/3/2012
2037	ACS Boca	Chamber EMI Cable Set	Cable Set	2037	1/7/2011	1/7/2012
2044	QMI	N/A	Cables	2044	1/7/2011	1/7/2012
2076	Hewlett Packard	HP5061-5458	Cables	2076	2/2/2011	2/2/2012
RE586	Agilent Technologies, Inc.	83017A	Amplifiers	3123A00168	9/23/2011	9/23/2012

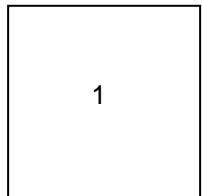
NCR=No Calibration Required

5 SUPPORT EQUIPMENT

Table 5-1: Support Equipment

Item	Equipment Type	Manufacturer	Model Number	Serial Number
There is no support equipment associated with this product				

6 EQUIPMENT UNDER TEST SETUP BLOCK DIAGRAM



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 FAS1509-02 uses an internal 6.3 dBi PCB inverted-F antenna, thus meeting the requirements of 15.203.

7.2 20dB / 99% Bandwidth: IC RSS-Gen 4.6.1

7.2.1 Measurement Procedure

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.

The spectrum analyzer span was set to 2 to 3 times the estimated bandwidth of the emission. The RBW was to $\geq 1\%$ of the estimated emission bandwidth. The trace was set to max hold with a peak detector active. The Delta function of the analyzer was utilized to determine the 20 dB bandwidth of the emission.

The 99% occupied bandwidth was measured with the spectrum analyzer span set to fully display the emission, including the emissions skirts. The RBW was greater or equal to 1% of the span. The occupied 99% bandwidth was measured by using a delta marker at the lower and upper frequencies leading to 0.5% of the total power.

7.2.2 Measurement Results

Results are shown below in Table 7.2.2-1 and Figures 7.2.2-1 through 7.2.2-2

Table 7.2.2-1: 20dB / 99% Bandwidth

Frequency [MHz]	20dB Bandwidth [kHz]	99% Bandwidth [kHz]
2405	2325	2400



Figure 7.2.2-1: 20dB BW



Figure 7.2.2-2: 99% OBW

7.3 Radiated Spurious Emissions - FCC Section 15.249 (a); IC: RSS-210 A2.9

7.3.1 Measurement Procedure

Radiated emissions tests were made over the frequency range of 30MHz to 26GHz, 10 times the highest fundamental frequency.

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 1000MHz, peak and average measurements made with RBW and VBW of 1 MHz and 3MHz respectively.

The unit was continuously pulsing. A Duty Cycle Correction of 0.864% corresponding to -41.27 dB was applied to the peak measurements for the average results. The justification of the duty cycle is provided in the customer's theory of operation document.

7.3.2 Measurement Results

Radiated spurious emissions found in the band of 30MHz to 26GHz are reported in the Table 7.3.2-1 below.

Table 7.3.2-1: Radiated Spurious Emissions Tabulated Data

Frequency (MHz)	Level (dBuV)		Antenna Polarity (H/V)	Correction Factors (dB)	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)			
	pk	avg			pk	avg	pk	avg	pk	avg		
XY Plane (Side)												
Fundamental Frequency												
2405	95.54	95.54	H	-10.25	85.29	44.02	114.0	94.0	28.7	50.0		
2405	104.20	104.20	V	-10.25	93.95	52.68	114.0	94.0	20.0	41.3		
Spurious Emissions												
2400	55.74	55.74	H	-10.27	45.47	4.20	74	54	28.50	49.80		
2400	62.93	62.93	V	-10.27	52.66	11.39	74	54	21.30	42.60		
4810	47.24	47.24	V	-2.74	44.50	3.23	74.0	54.0	29.5	50.8		
XZ Plane (Bottom)												
Fundamental Frequency												
2405	100.30	100.30	H	-10.25	90.05	48.78	114.0	94.0	23.9	45.2		
2405	96.89	96.89	V	-10.25	86.64	45.37	114.0	94.0	27.4	48.6		
Spurious Emissions												
2400	62.02	62.02	H	-10.27	51.75	10.48	74.0	54.0	22.2	43.5		
2400	57.14	57.14	V	-10.27	46.87	5.60	74.0	54.0	27.1	48.4		
YZ Plane (Flat)												
Fundamental Frequency												
2405	101.40	101.40	H	-10.25	91.15	49.88	114	94	22.8	44.1		
2405	94.42	94.42	V	-10.25	84.17	42.90	114	94	29.8	51.1		
Spurious Emissions												
2400	64.12	64.12	H	-10.27	53.85	12.58	74	54	20.10	41.40		
2400	58.89	58.89	V	-10.27	48.62	7.35	74	54	25.40	46.60		

* Notes:

- All emissions above 4810 MHz were attenuated below the permissible limits and the noise floor of the measurement equipment.
- The fundamental frequency was measured using a RBW of 3 MHz.

7.3.3 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: $47.24 + (-2.74) = 44.5\text{dBuV/m}$

Margin: $74\text{dBuV/m} - 44.5\text{dBuV/m} = 29.5\text{dB}$

Example Calculation: Average

Corrected Level: $47.24 + (-2.74) - 41.27 = 3.23\text{dBuV}$

Margin: $54\text{dBuV} - 3.23\text{dBuV} = 50.8\text{dB}$

8 CONCLUSION

In the opinion of ACS, Inc. the FAS1509-02, manufactured by UltraClenz, LLC meets the requirements of FCC Part 15 subpart C and Industry Canada's Radio Standards Specification RSS-210.

END REPORT