

Certification Test Report

FCC ID: Z9O-FAS1526
IC: 10060A-FAS1526

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

ACS Report Number: 13-2146.W06.1A

Manufacturer: UltraClenz, LLC
Model: FAS1526-00

Test Begin Date: February 24, 2014
Test End Date: April 2, 2014

Report Issue Date: May 7, 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:

A handwritten signature in blue ink, appearing to read "Thierry Jean-Charles".

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Advanced Compliance Solutions, Inc.

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Kirby Munroe
Director, Wireless Certifications
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This report contains 18 pages

TABLE OF CONTENTS

1	GENERAL	3
1.1	Purpose	3
1.2	Product description	3
1.3	Test Methodology and Considerations	3
2	TEST FACILITIES	4
2.1	Location	4
2.2	Laboratory Accreditations/Recognitions/Certifications	4
2.3	Radiated & Conducted Emissions Test Site Description	5
3	APPLICABLE STANDARD REFERENCES.....	7
4	LIST OF TEST EQUIPMENT	8
5	SUPPORT EQUIPMENT	9
6	EQUIPMENT UNDER TEST SETUP BLOCK DIAGRAM	9
7	SUMMARY OF TESTS	10
7.1	Antenna Requirement – FCC: Section 15.203	10
7.2	20dB / 99% Bandwidth: FCC: Section 15.215 (c), IC: RSS-Gen 4.6.1.....	10
7.3	Radiated Spurious Emissions - FCC Section 15.249 (a); IC: RSS-210 A2.9.....	12
7.4	Power Line Conducted Emissions – FCC: Section 15.207 IC: RSS-Gen 7.2.4.....	14
8	CONCLUSION.....	17

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 Ultraclenz Badge Configuration POD, model FAS1526-00, is a USB powered device for the configuration of the Ultraclenz patient safeguard system (PSS) badges. The product connects to a PC via USB and includes a 125 kHz and a 2405 MHz transceiver.

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: 5 VDC USB

Manufacturer Information:

UltraClenz, LLC

1201 Jupiter Park Drive

Jupiter, FL 33458

Test Sample Serial Number(s): ACS#1

Test Sample Condition: Good

1.3 Test Methodology and Considerations

The EUT was evaluated for the 2405 MHz radio. Radiated and power line conducted emissions measurements were performed for the EUT powered through a laptop computer. The EUT was set in the orientation of typical use.

The 125 kHz and 2405 MHz radios do not transmit simultaneously per the manufacturer. Therefore, the EUT was not evaluated for intermodulation products of the co-located radios. The 125 kHz radio was also evaluated and the results are reported in a separate report.

Compliance for the unintentional emission requirements is documented in a Declaration of Conformity/Verification test 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 #: 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:

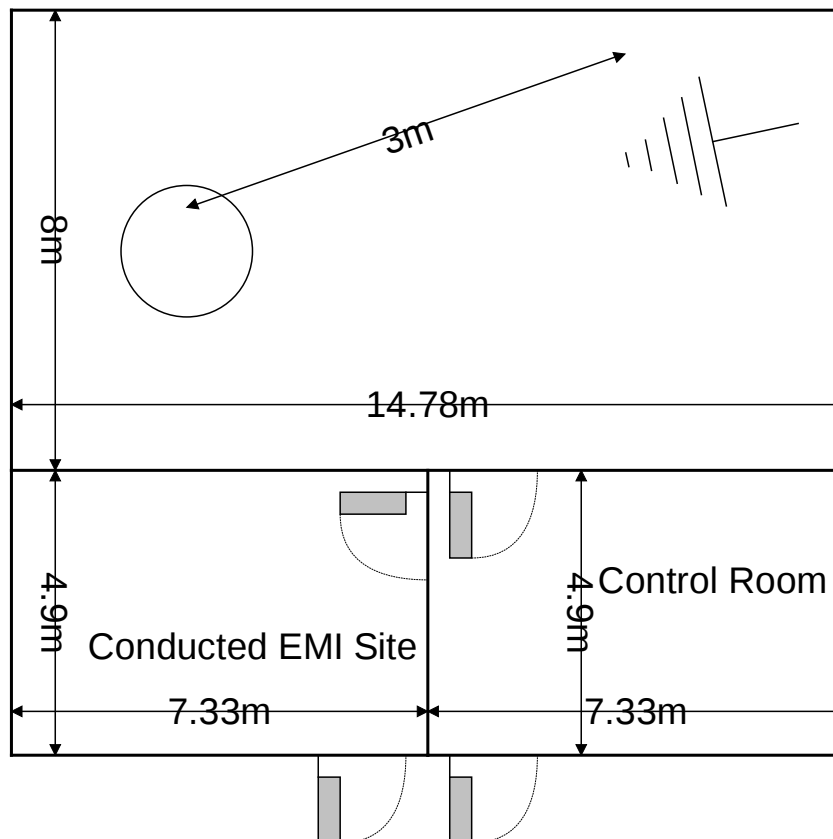


Figure 2.3.1-1: Semi-Anechoic Chamber Test Site

2.3.2 Conducted Emissions Test Site Description

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

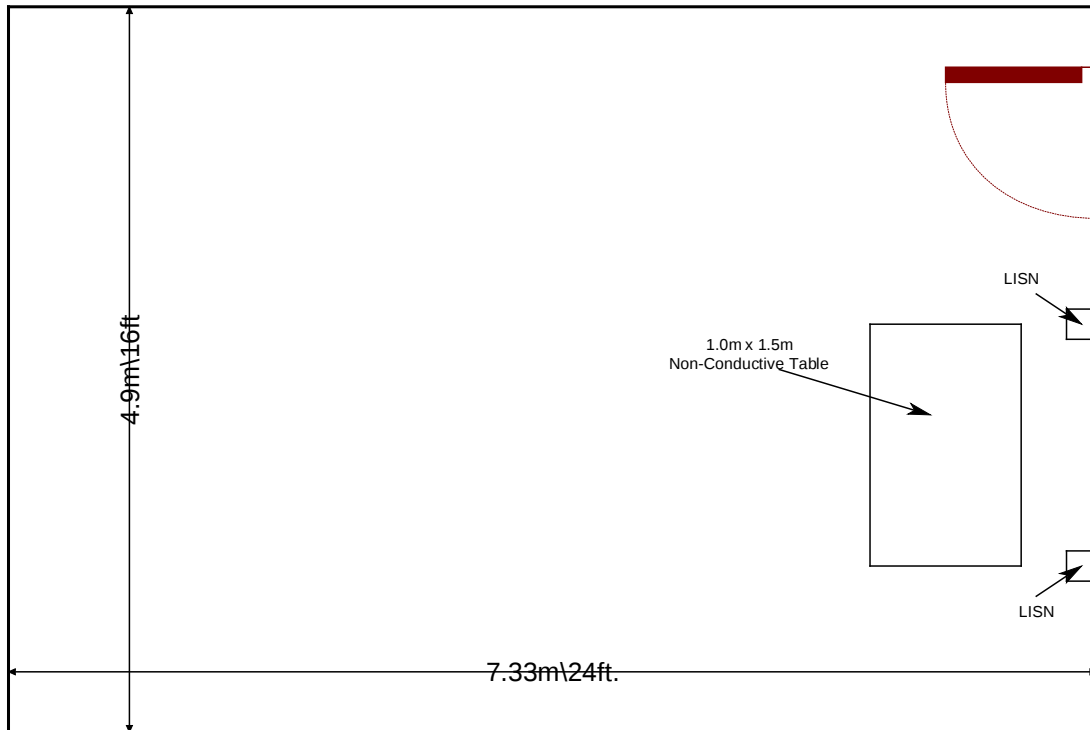


Figure 2.3.2-1: AC Mains Conducted EMI Site

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 9KHz to 40GHz
- ❖ 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
- ❖ 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 Radio communication 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	1/1/2014	1/1/2015
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

Notes:

- NCR=No Calibration Required
- The calibration information for asset 2037 is provided to cover the entire test period. Maintenance was performed on the asset requiring calibration before the end of the previous cycle.

5 SUPPORT EQUIPMENT

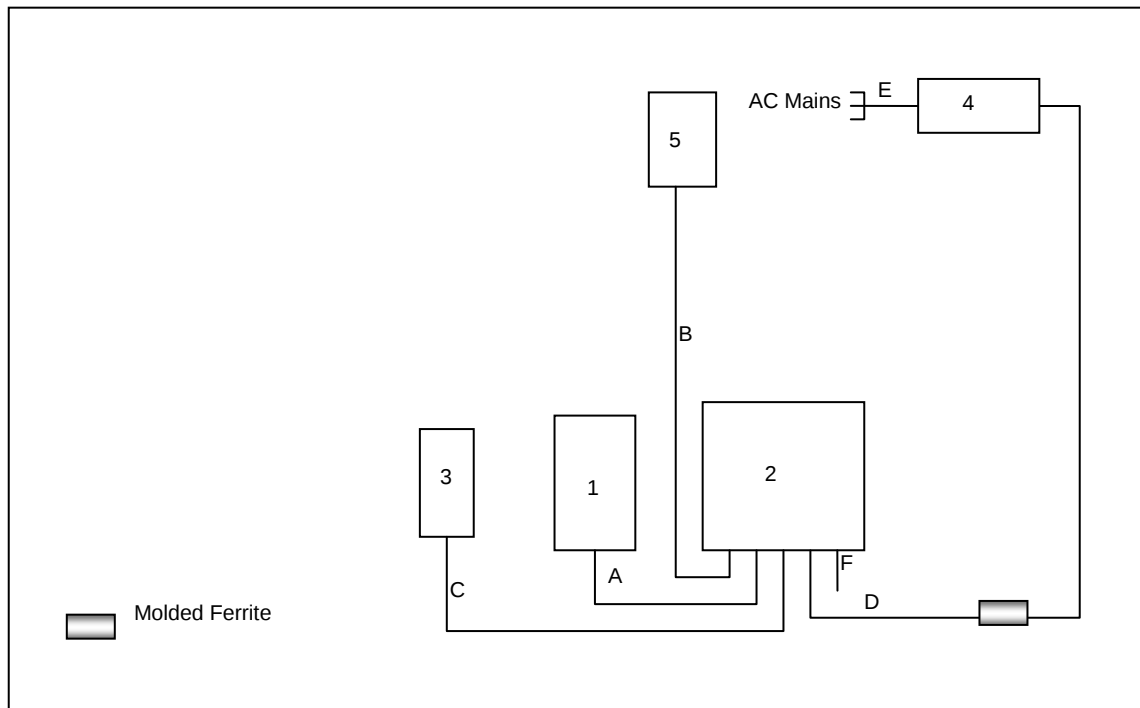
Table 5-1: EUT and Support Equipment Description

Item #	Type Device	Manufacturer	Model/Part #	Serial #
1	EUT	UltraClenz	FAS1526-00	ACS#1
2	Laptop	Dell	Latitude D620	CN-0TD761-12961-68G-3106
3	USB jump drive	PQI	SII256MB	D33311
4	Laptop Power Supply	Dell	PA-1900-02D	CN-09T215-71615-5AM-02AA
5	Mouse	Dell	M-UAR DEL7	LZ9440C43W5

Table 5-2: Cable Description

Cable #	Cable Type	Length	Shield	Termination
A	USB Data Cable	1 m	No	EUT to Laptop
B	USB Cable	1.8 m	No	Laptop to Mouse
C	USB Extension cable	3.09 m	No	Laptop to Jump Drive
D	Power Cable	1.74 m	No	Laptop to Power Supply
E	Power Cord	0.9 m	No	Power Supply to AC Mains
F	Serial Cable	1.84m	No	None

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 model FAS1526-00 uses an internal inverted-F antenna that is printed on the PCB. The antenna cannot be removed without damaging the product, thus meeting the requirements of FCC Section 15.203.

7.2 20dB / 99% Bandwidth: FCC: Section 15.215 (c), 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 5 times the estimated 20 dB bandwidth of the signal. The RBW was to $\geq 1\%$ to 5% of the estimated emission bandwidth. The trace was set to max hold using a peak detector and the reference level was set to the highest amplitude observed. The bandwidth was measured 20 dB down from the reference level using the delta function of the analyzer.

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	2400	2700

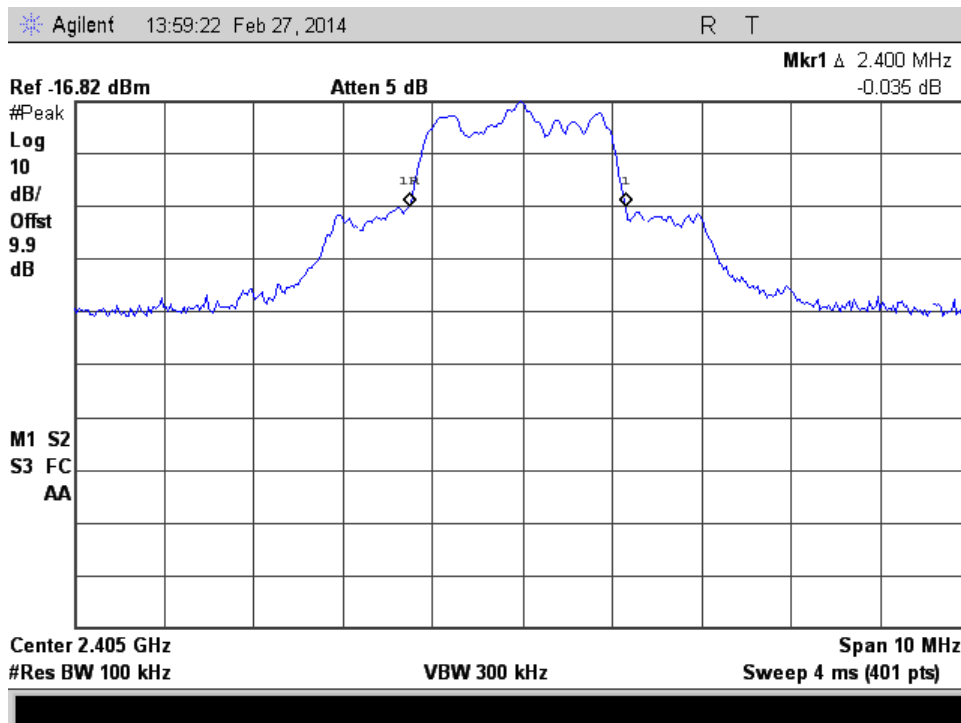


Figure 7.2.2-1: 20dB BW

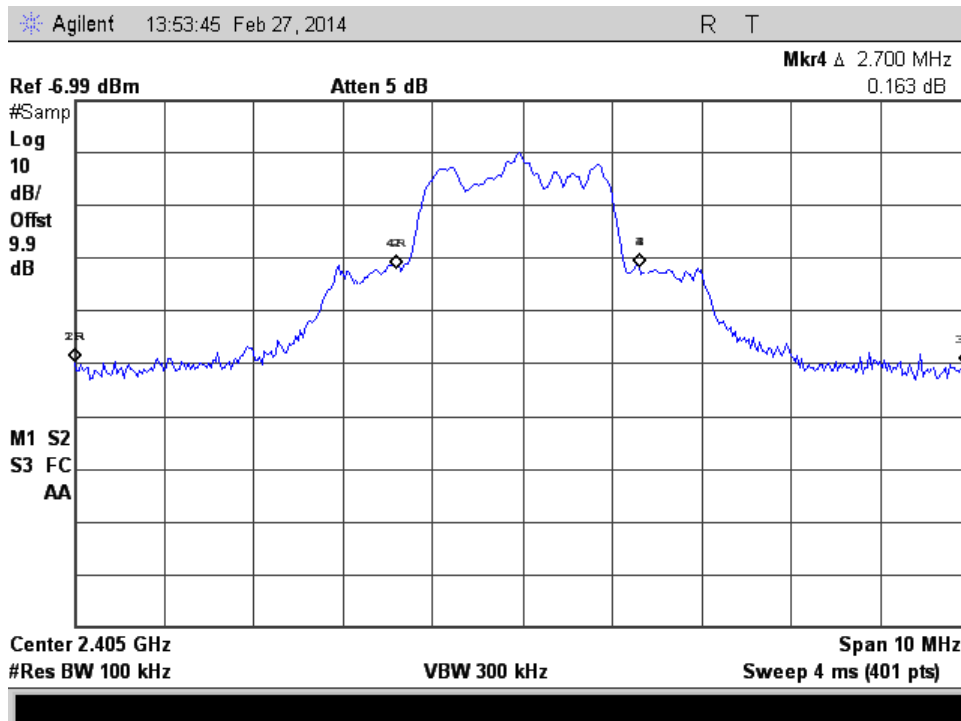


Figure 7.2.2-2: 99% OBW

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 0.72% corresponding to -42.85 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
Fundamental Frequency										
2405	94.33	94.33	H	-7.94	86.39	43.54	114	94	27.6	50.5
2405	97.68	97.68	V	-7.94	89.74	46.89	114	94	24.3	47.1
Spurious Emissions										
2390	66.87	66.87	H	-8.00	58.87	16.02	74	54	15.1	38.0
2390	69.18	69.18	V	-8.00	61.18	18.33	74	54	12.8	35.7
2400	75.10	75.10	H	-7.96	67.14	24.29	74	54	6.9	29.7
2400	77.60	77.60	V	-7.96	69.64	26.79	74	54	4.4	27.2
2420.5	67.58	67.58	H	-7.87	59.71	16.86	74	54	14.3	37.1
2420.5	68.93	68.93	V	-7.87	61.06	18.21	74	54	12.9	35.8
4810	46.92	46.92	H	-0.64	46.28	3.43	74	54	27.7	50.6
4810	47.12	47.12	V	-0.64	46.48	3.63	74	54	27.5	50.4

*** 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: $66.87 + (-8.00) = 58.87 \text{ dB}\mu\text{V/m}$

Margin: $74\text{dB}\mu\text{V/m} - 58.87 \text{ dB}\mu\text{V/m} = 15.1 \text{ dB}$

Example Calculation: Average

Corrected Level: $66.87 + (-8.00) - 42.85 = 16.02 \text{ dB}\mu\text{V}$

Margin: $54\text{dB}\mu\text{V/m} - 16.02 \text{ dB}\mu\text{V/m} = 38.0 \text{ dB}$

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

7.4.1 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

7.4.2 Measurement Results

Results are shown below.

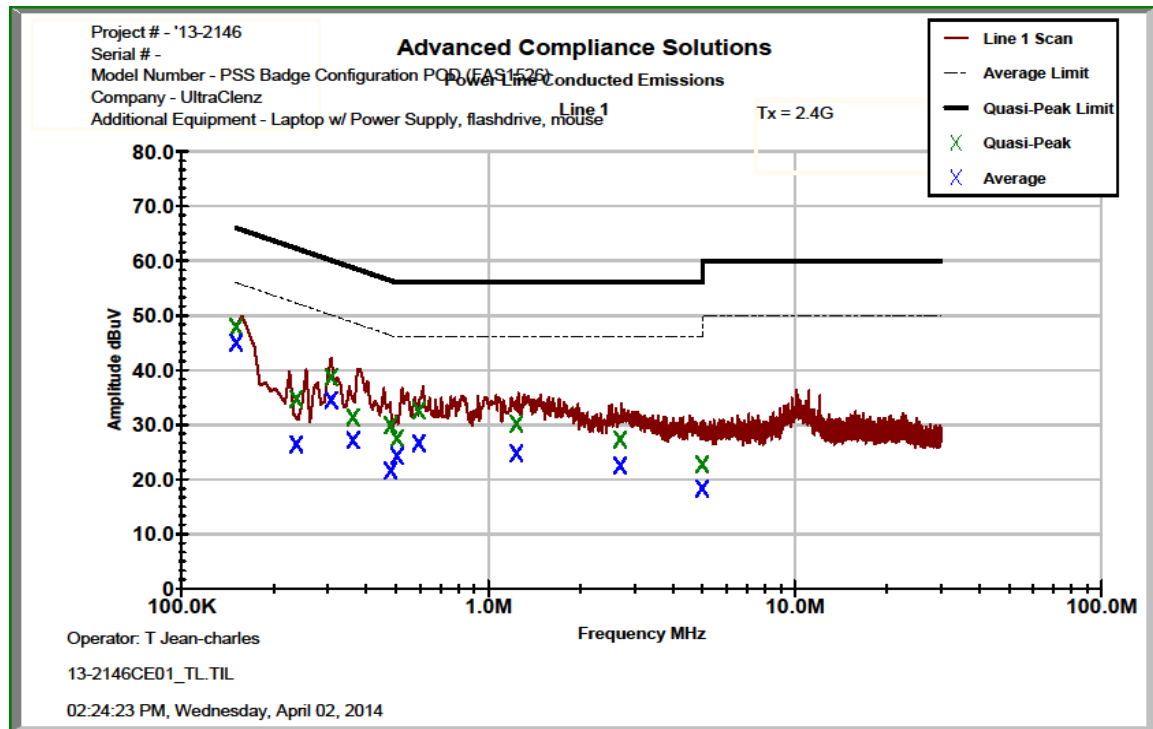


Figure 7.4.2-1: Conducted Emissions Results – Line 1

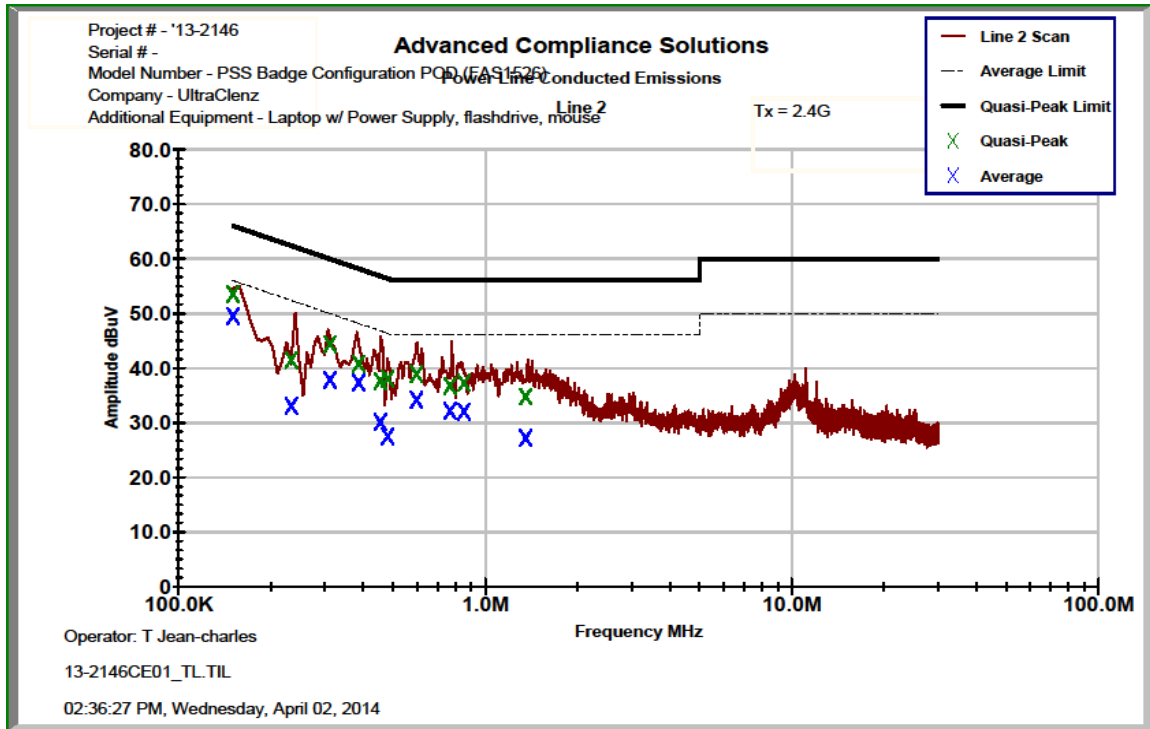


Figure 7.4.2-2: Conducted Emissions Results – Line 2

Table 7.4.2-1: Conducted EMI Results

☒ Line 1
☒ Line 2
☐ Line 3
☐ Line 4

☒ To Ground
☐ Floating

☐ Telecom Port

☒ dBµV
☐ dBµA

Plot Number: **13-2146CE01**
Power Supply Description: **19.5 VDC**

Frequency (MHz)	Uncorrected Reading		Total Correction Factor (dB)	Corrected Level		Limit		Margin (dB)	
	Quasi-Peak	Average		Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
Line 1									
0.150382	37.757	34.901	10.10	47.85	45.00	65.98	55.98	18.1	11.0
0.236474	24.601	16.358	10.10	34.70	26.45	62.22	52.22	27.5	25.8
0.306762	28.623	24.412	10.09	38.71	34.50	60.06	50.06	21.3	15.6
0.361338	21.243	17.064	10.08	31.32	27.14	58.70	48.70	27.4	21.6
0.48	19.768	11.511	10.08	29.85	21.59	56.34	46.34	26.5	24.7
0.503124	17.402	14.209	10.07	27.48	24.28	56.00	46.00	28.5	21.7
0.592674	22.488	16.527	10.08	32.57	26.61	56.00	46.00	23.4	19.4
1.23445	20.038	14.633	10.11	30.15	24.74	56.00	46.00	25.9	21.3
2.68964	17.095	12.278	10.18	27.28	22.46	56.00	46.00	28.7	23.5
4.98	12.362	7.924	10.28	22.64	18.20	56.00	46.00	33.4	27.8
Line 2									
0.150056	43.466	39.44	10.08	53.54	49.52	66.00	56.00	12.5	6.5
0.23275	31.373	22.962	10.08	41.46	33.04	62.35	52.35	20.9	19.3
0.311313	34.32	27.759	10.06	44.38	37.82	59.94	49.94	15.6	12.1
0.385788	30.744	27.319	10.05	40.79	37.37	58.15	48.15	17.4	10.8
0.454112	27.609	19.996	10.05	37.66	30.05	56.80	46.80	19.1	16.8
0.48	27.951	17.437	10.05	38.00	27.49	56.34	46.34	18.3	18.8
0.5961	28.785	24.053	10.06	38.85	34.11	56.00	46.00	17.2	11.9
0.76655	26.665	22.069	10.07	36.74	32.14	56.00	46.00	19.3	13.9
0.85145	27.142	21.968	10.07	37.21	32.04	56.00	46.00	18.8	14.0
1.35385	24.671	17.054	10.078	34.75	27.13	56.00	46.00	21.3	18.9

8 CONCLUSION

In the opinion of ACS, Inc. the FAS1526-00, manufactured by UltraClenz, LLC meets the requirements of FCC Part 15 subpart C and Industry Canada's Radio Standards Specification RSS-210.

END REPORT