

Certification Test Report

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IC: 10060A-FAS1526

FCC Rule Part: 15.209
IC Radio Standards Specification: RSS-210

ACS Report Number: 13-2146.W06.2A

Manufacturer: UltraClenz, LLC
Model(s): 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 ACLASS, 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.

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.

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: 125.6 kHz

Number of Channels: 1

Modulation: OOK

Data Rate: 2.4 kbps

Antenna: Coil Antenna

Input Voltage: 5 VDC USB

Manufacturer Information:

UltraClenz, LLC

1201 Jupiter Park Drive

Jupiter, FL 33458

Test Sample Serial Number(s): ACS#2

Test Sample Condition: Good

1.3 Test Methodology and Considerations

The EUT was evaluated for the 125 kHz 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 2405 MHz 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:

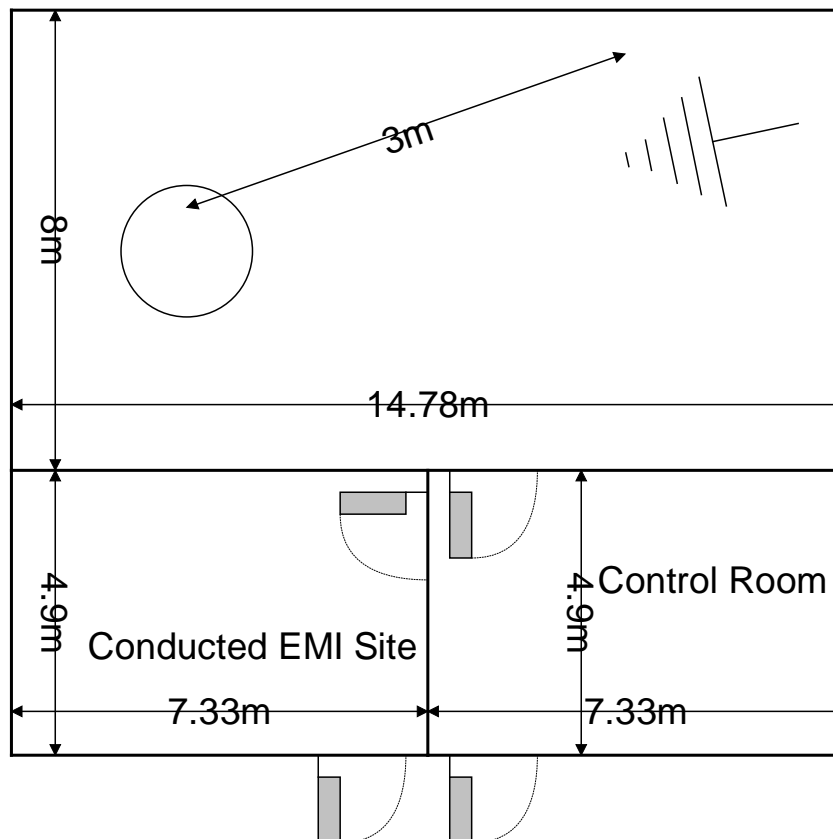


Figure 2.3.1-1: Semi-Anechoic Chamber Test Site

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:

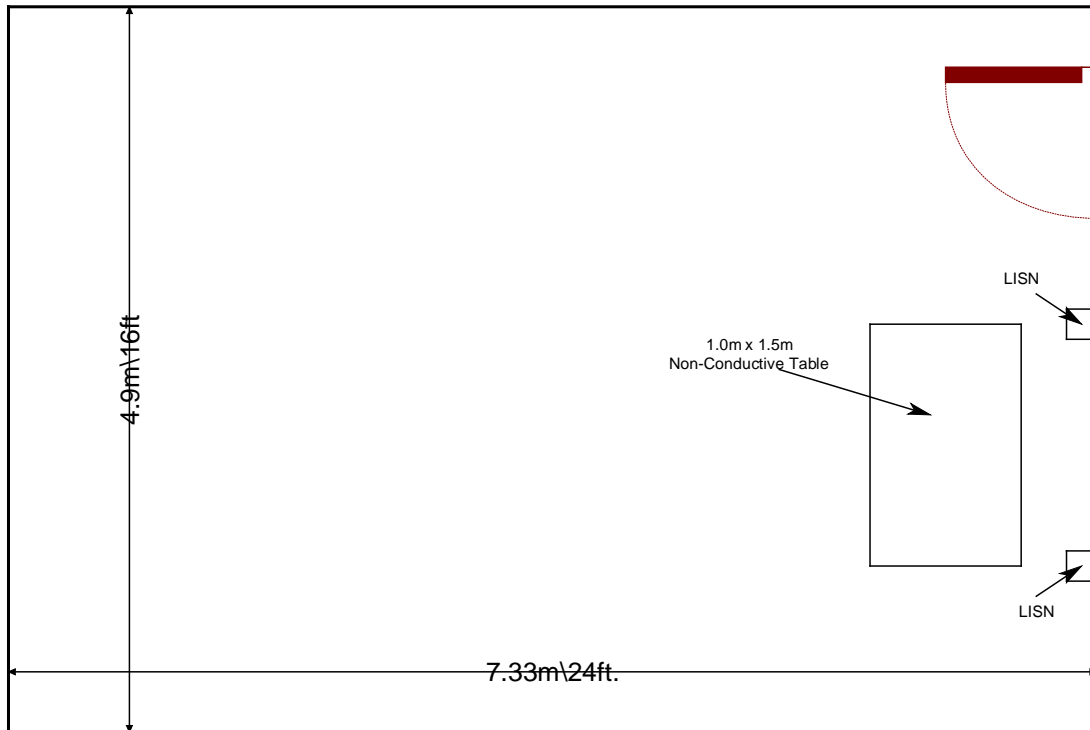


Figure 2.3.2-1: AC Mains Conducted EMI Site

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
78	EMCO	6502	Antennas	9104-2608	2/5/2013	2/5/2015
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
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
2045	ACS Boca	Conducted Cable Set	Cable Set	2045	1/1/2014	1/1/2015
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

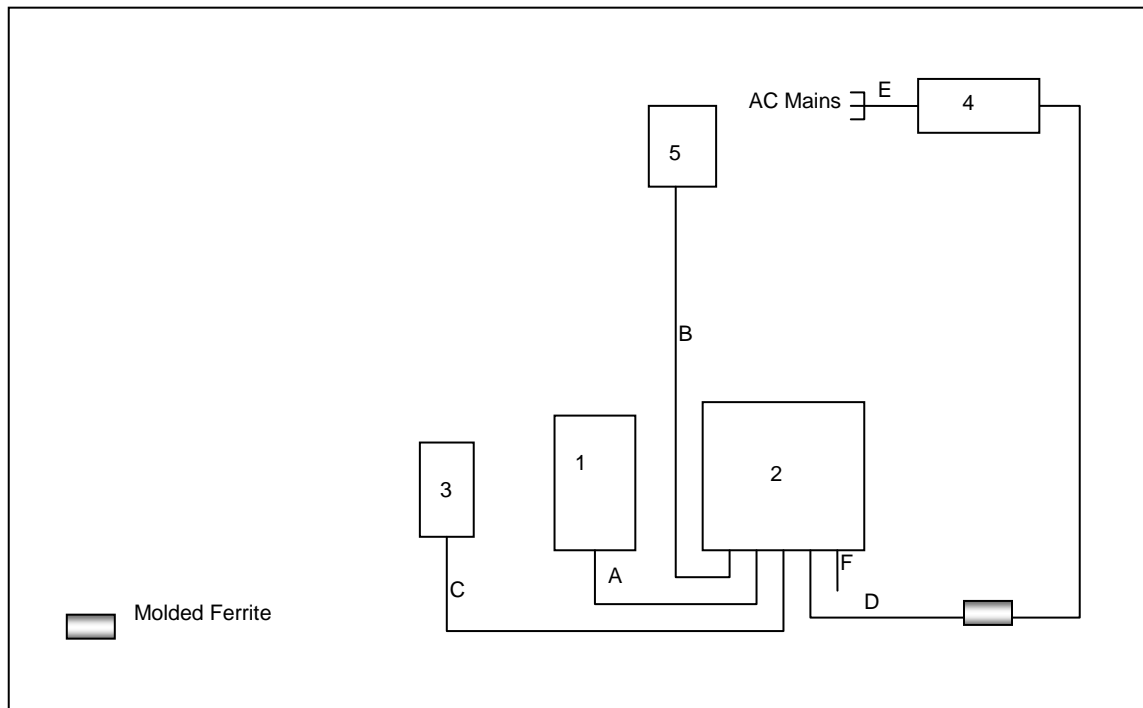
Table 5-1: EUT and Support Equipment Description

Item #	Type Device	Manufacturer	Model/Part #	Serial #
1	EUT	UltraClenz	FAS1526-00	ACS#2
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 loop antenna that is directly soldered to 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 / 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]
0.1256	14.00	24.25

Note: bandwidth measurements were performed at a test distance of 1m.

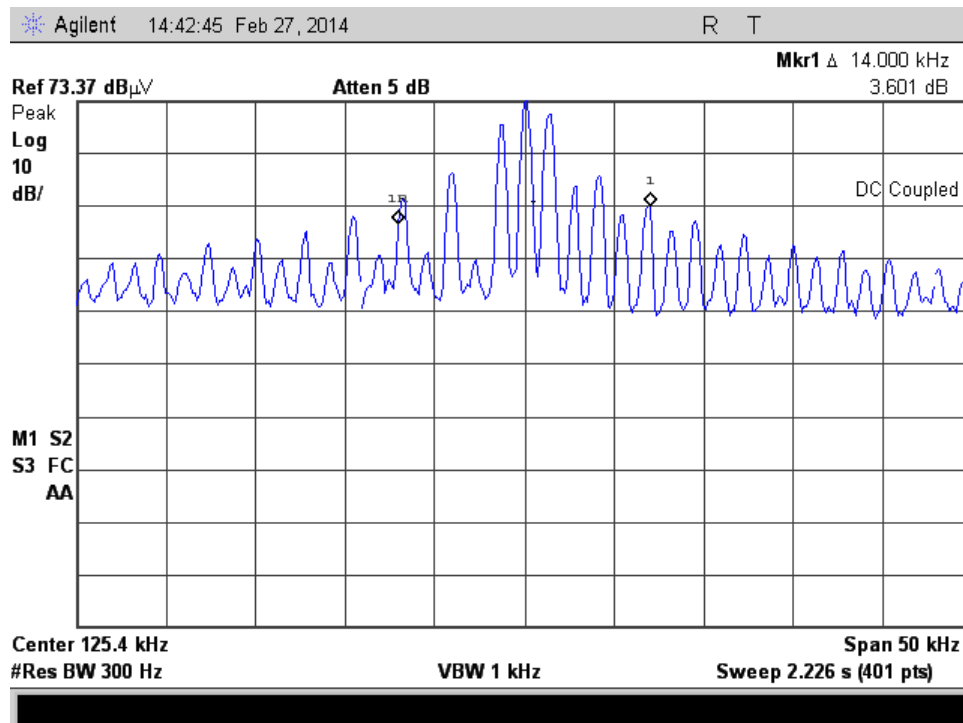


Figure 7.2.2-1: 20dB Bandwidth

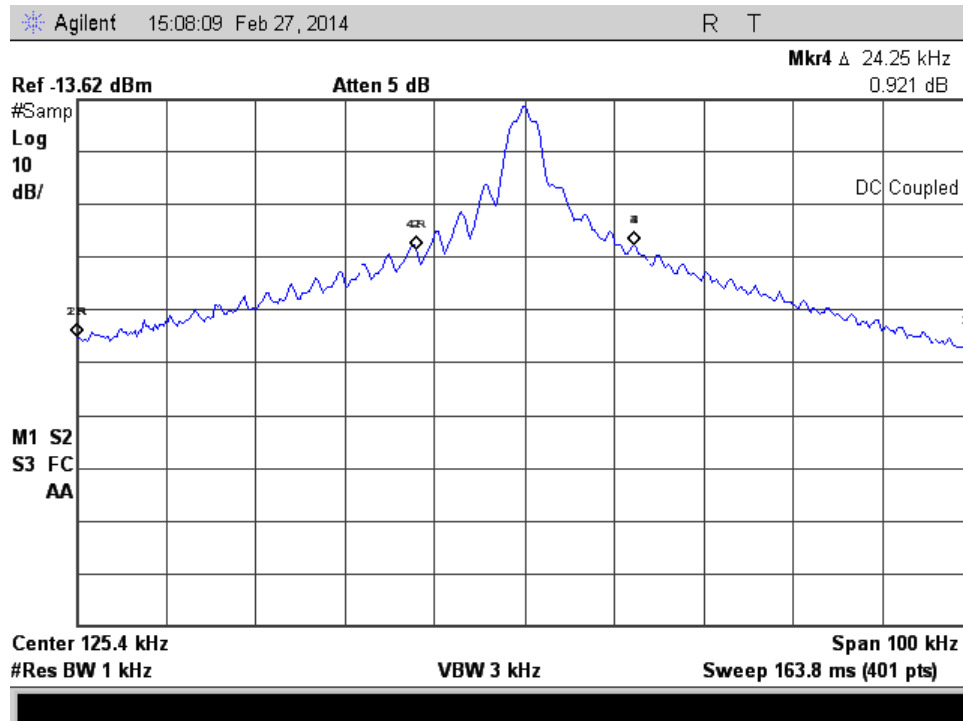


Figure 7.2.2-2: 99% OBW

7.3 Radiated Spurious Emissions – FCC: Section 15.209 / IC: RSS-210 2.5

7.3.1 Measurement Procedure

Radiated emissions tests were made over the frequency range of 10 kHz to 1 GHz. Section 15.33(a)(4) specifies, if the intentional radiator contains a digital device, regardless of whether this digital device controls the functions of the intentional radiator or the digital device is used for additional control or function purposes other than to enable the operation of the intentional radiator, the frequency range shall be investigated up to frequency specified in 15.33(b)(1) for unintentional radiators. The upper frequency range for the digital device is 1000MHz which greater than the 10th harmonic of the fundamental frequency. The upper frequency range measured was 1000MHz.

Measurements below 30MHz were performed in a semi-anechoic chamber with a 3 meter separation distance between the EUT and measurement antenna. The EUT was rotated 360 and the loop antenna rotated about the vertical axis to maximize each emission. The magnetic loop receiving antenna was positioned with its center 1 meter above the ground.

The spectrum analyzer's resolution and video bandwidth were set to 300 Hz and 1000 Hz respectively for frequencies below 150 kHz and 9 kHz and 30 kHz respectively for frequencies above 150 kHz and below 30 MHz. The fundamental levels were measured using a resolution bandwidth of 30 kHz which is greater than the measured emission bandwidth. For measurements in the frequency bands 9-90 kHz and 110-490 kHz, an average detector was used. When average measurements are specified, the peak emissions were also compared to a limit corresponding to 20 dB above the maximum permitted average limit according to Part 15.35. All other emissions were measured using a Quasi-peak detector. The final measurements were then corrected by antenna correction factors and cable loss for comparison to the limits.

Measurements above 30 MHz were performed in a semi-anechoic chamber with a 3 meter separation distance between the EUT and measurement antenna. 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 1000 MHz, quasi-peak measurements were made using a resolution bandwidth (RBW) of 120 kHz and a video bandwidth (VBW) of 300 kHz.

7.3.2 Distance Correction for Measurements Below 30 MHz – Part 15.31

Radiated measurements were performed at a distance closer than 300 meters and 30m as required, according to Part 15.209. Therefore a correction factor was applied to account for propagation loss at the specified distance. The propagation loss was determined by using the square of an inverse linear distance extrapolation factor (40dB/decade) according to 15.31. A sample calculation of the distance correction factor is shown below for limits expressed at a 300m measurement distance and a 30m measurement distance.

$$\begin{aligned}\text{Distance correction factor (300m Specified Test Distance)} &= 40 \cdot \log (\text{Test Distance}/300) \\ &= 40 \cdot \log (3/300) \\ &= - 80 \text{ dB}\end{aligned}$$

$$\begin{aligned}\text{Distance correction factor (30m Specified Test Distance)} &= 40 \cdot \log (\text{Test Distance}/30) \\ &= 40 \cdot \log (3/30) \\ &= - 40 \text{ dB}\end{aligned}$$

7.3.3 Measurement Results

Radiated spurious emissions found in the band of 10 kHz to 1 GHz are reported in the Table 7.3.3-1 below.

Table 7.3.3-1: 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	QP/Avg			PK	QP/Avg	PK	QP/Avg	PK	QP/Avg
Fundamental Frequency										
0.1256	72.02	64.05	V	10.95	82.97	75.00	125.6	105.6	42.6	30.6
Spurious Emissions below 30 MHz										
0.2512	44.93	32.22	V	11.17	56.10	43.39	119.6	99.6	63.5	56.2
0.3768	41.82	29.66	V	11.50	53.32	41.16	116.1	96.1	62.8	54.9
Emissions above 30 MHz										
73.77	-----	50.77	H	-18.11	-----	32.66	-----	40	-----	7.3
95.8175	-----	51.35	H	-17.63	-----	33.72	-----	43.5	-----	9.8
99.8588	-----	47.40	H	-16.96	-----	30.44	-----	43.5	-----	13.1
177.78	-----	42.46	H	-11.91	-----	30.55	-----	43.5	-----	13.0
335.985	-----	50.98	H	-10.42	-----	40.57	-----	46	-----	5.4
366.22	-----	51.13	H	-9.63	-----	41.50	-----	46	-----	4.5
907.145	-----	30.23	H	-0.20	-----	30.02	-----	46	-----	16.0
996.764	-----	39.58	H	2.39	-----	41.97	-----	54	-----	12.0
45.36	-----	52.17	V	-15.11	-----	37.06	-----	40	-----	2.9
73.7	-----	56.77	V	-18.10	-----	38.67	-----	40	-----	1.3
76.55	-----	54.57	V	-18.27	-----	36.30	-----	40	-----	3.7
150.686	-----	41.17	V	-13.00	-----	28.18	-----	43.5	-----	15.3
937.944	-----	37.46	V	1.14	-----	38.59	-----	46	-----	7.4
999.189	-----	37.67	V	2.63	-----	40.30	-----	54	-----	13.7

* Note: The fundamental emission was measured using a RBW of 30 kHz which is greater than the emission bandwidth.

7.3.4 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: $44.93 + 11.17 = 56.1 \text{ dB}\mu\text{V/m}$

Margin: $119.6 \text{ dB}\mu\text{V/m} - 56.1 \text{ dB}\mu\text{V/m} = 63.5 \text{ dB}$

Example Calculation: Average

Corrected Level: $32.22 + 11.17 - 0 = 43.39 \text{ dB}\mu\text{V/m}$

Margin: $99.6 \text{ dB}\mu\text{V/m} - 43.39 \text{ dB}\mu\text{V/m} = 56.2 \text{ dB}$

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.

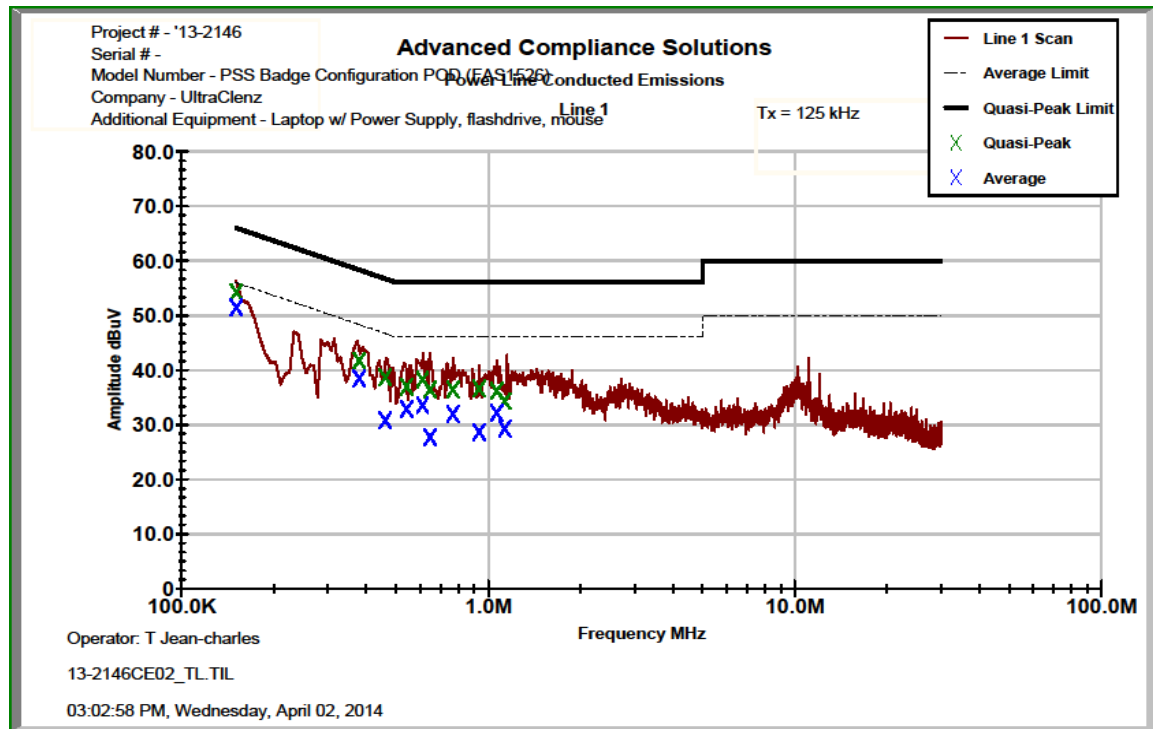


Figure 7.4.2-1: Conducted Emissions Results – Line 1

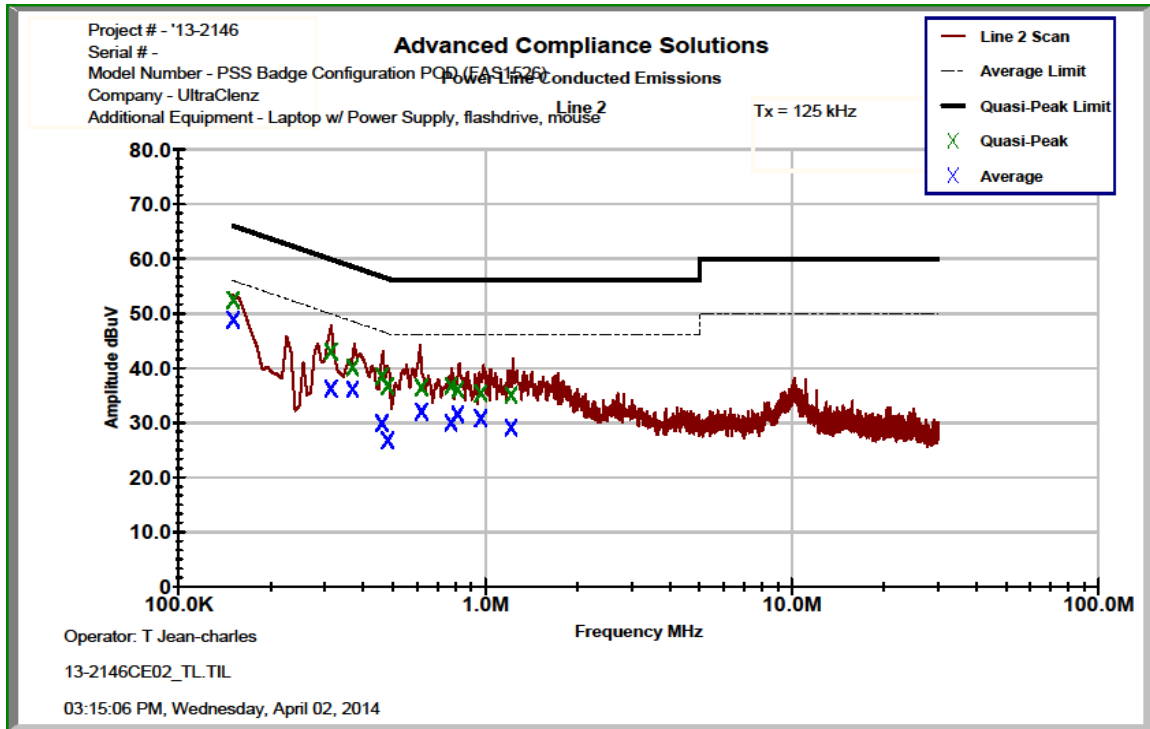


Figure 7.4.2-2: Conducted Emissions Results – Line 2

Table 7.4.2-1: Conducted EMI Results

<div><input checked="" type="checkbox"/> Line 1 <input checked="" type="checkbox"/> Line 2 <input type="checkbox"/> Line 3 <input type="checkbox"/> Line 4</div> <div><input checked="" type="checkbox"/> To Ground <input 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: 13-2146CE02</div> <div>Power Supply Description: 19.5 VDC</div>										
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										
0.150654	44.122	41.326	10.10	54.22	51.42	65.96	55.96	11.7	4.5	
0.378724	31.625	28.361	10.08	41.70	38.44	58.31	48.31	16.6	9.9	
0.460624	28.544	20.681	10.08	38.62	30.76	56.68	46.68	18.1	15.9	
0.541038	26.895	22.749	10.08	36.97	32.83	56.00	46.00	19.0	13.2	
0.609524	28.162	23.437	10.10	38.26	33.53	56.00	46.00	17.7	12.5	
0.645374	26.32	17.64	10.10	36.42	27.74	56.00	46.00	19.6	18.3	
0.765888	26.293	21.813	10.09	36.39	31.91	56.00	46.00	19.6	14.1	
0.932712	26.457	18.56	10.09	36.55	28.65	56.00	46.00	19.5	17.4	
1.06369	26.032	22.028	10.11	36.14	32.14	56.00	46.00	19.9	13.9	
1.12997	24.175	19.105	10.11	34.28	29.21	56.00	46.00	21.7	16.8	
Line 2										
0.150519	42.381	38.743	10.08	52.46	48.82	65.97	55.97	13.5	7.2	
0.312825	32.984	26.158	10.06	43.04	36.22	59.90	49.90	16.9	13.7	
0.368975	30.061	26.056	10.05	40.11	36.11	58.52	48.52	18.4	12.4	
0.460125	28.424	19.818	10.05	38.47	29.87	56.69	46.69	18.2	16.8	
0.479999	26.686	16.685	10.05	36.74	26.74	56.34	46.34	19.6	19.6	
0.618725	26.326	21.95	10.08	36.40	32.03	56.00	46.00	19.6	14.0	
0.771999	26.64	19.888	10.07	36.71	29.96	56.00	46.00	19.3	16.0	
0.812575	25.949	21.431	10.07	36.02	31.50	56.00	46.00	20.0	14.5	
0.965799	25.276	20.691	10.08	35.35	30.77	56.00	46.00	20.6	15.2	
1.21206	24.915	18.98	10.078	34.99	29.06	56.00	46.00	21.0	16.9	

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