TEST REPORT

For

Guard RFID Solutions Inc.

#140 – 766 Cliveden Place
Delta, British Columbia
V3M 6C7, Canada

Date:	June 04, 2014
Report No.:	10580-1E
Revision No.:	3
Project No.:	105802
Equipment:	RFID Tag Exiter
FCC ID:	VZKTE
IC ID:	9937A-TE

ONE STOP GLOBAL CERTIFICATION SOLUTIONS

3133-20800 Westminster Hwy, Richmond, BC
V6V 2W3, Canada
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TEST REPORT

FCC15:2010 / RSS-210, Issue 8

Report reference No.....:	10580-1E
Report Revision History:	✓ Rev. 0: July 13, 2012 ✓ Rev. 1: July 26, 2012, revised limit level of Fundamental and Spurious. ✓ Rev. 2: Aug. 10, 2012, added the test results of FCC 15.207 ✓ Rev. 3: June 04, 2014, changed modulation type PSK to ASK
Tested by (printed name and signature) .....:	Jeremy Lee 
Approved by (printed name and signature) .....:	Kavinder Dhillon, Eng.L 
Date of issue .....:	June 04, 2014
Note: By signing this report, both the Testing Technician and the Reviewer hereby declare to abide by the applicable LabTest policies: **1.) Statement of Independence # 3014 (LabTest Employees),** **2.) Independence, Impartiality, and Integrity #1039, clause 11 (Engineering Service Subcontractors), or** **3.) Independence, Impartiality, and Integrity #1019, clause 3.5 (Testing Subcontractors).**	
Testing Laboratory Name .....:	LabTest Certification Inc.
Address .....:	3133 – 20800 Westminster Hwy, Richmond, B.C. V6V-2W3
FCC Site Registration No......:	373387
IC Site Registration No. .....:	5970A-2
OATS Test Location Name .....:	LabTest Certification Inc.
Address .....:	3133-20800 Westminster Hwy, Richmond, BC, V6V 2W3, Canada
Applicant's Name .....:	Guard RFID Solutions Inc.
Address .....:	#140-766 Cliveden Place, Delta, BC, V3M 6C7, Canada
Manufacturer's Name .....:	Same as Applicant
Address .....:	Same as Applicant
Test specification	
Standards .....:	FCC15.207 & 209:2010 / RSS-210, Issue 8, December 2010
Testing	
Date of receipt of test item .....:	May 25, 2012
Date(s) of performance of test .....:	May 25 to 29, 2012 & Aug. 10, 2012
Test item description .....:	
Trademark .....:	Guard RFID

FCC ID ..... :	VZKTE
IC ID ..... :	9937A-TE
Serial numbers ..... :	0067E0
Electrical Rating(s) ..... :	12VDC, 0.7A max.

Product descriptions	
DUT Description ..... :	125 kHz Transmitter
FCC ID..... :	VZKTE
IC ID ..... :	9937A-TE
Model Number ..... :	Tag Exciter
Application for ..... :	RFID Tag solution
Operating Frequency Range..... :	125 kHz
No. of Channels..... :	1
Type of Antenna..... :	Integral(Loop coil antenna)
Max. Output Power..... :	N/A
Modulation..... :	ASK
Nominal Voltages for ..... :	_X_ stand-alone equipment ___ combined (or host) equipment __ test jig
Supply Voltage ..... :	_____ AC _____ Amps ____Hz ___12V___ DC ____Amps
If DC Power ..... :	____ Internal Power Supply _X__ Host system is supplied the DC power ____ Battery
Size of equipment(Diameter X Height, mm) :	230 X 38
Mass of equipment (g)..... :	500
Operating Temperature Range ..... :	-10 °C to + 50 °C
Equipment mobility ..... :	No
Mounting ..... :	Wall or Ceiling (Non-metallic surface only)
Coverage Area ..... :	2 ~ 20 ft. radius (selectable)
Test case verdicts	
Test case does not apply to the test object :	N/A
Test item does meet the requirement ..... :	Pass
Test item does not meet the requirement .. :	Fail

General remarks

"This report is not valid as a CB Test Report unless appended by an approved CB Testing Laboratory and appended to a CB Test Certificate.

The test result presented in this report relate only to the object(s) tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.

"(see Enclosure #)" refers to additional information appended to the report.
"(see appended table)" refers to a table appended to the report.

☐ Throughout this report a comma is used as the decimal separator.

☒ Throughout this report a period is used as the decimal separator.

General product information:

The EUT, Tag Exciter creates a 125 KHz radio frequency (RF) zone with a unique ID that allows instant and accurate location of GuardRFID's Active Tags equipped with 125KHz Receivers. When such an active tag enters the zone, it immediate transmits the zone's unique ID to the system. This real-time tag location information can then be used by GuardRFID's Argus network for various response activities, such as to secure portals by automatically locking doors through which the tag has no access privileges. The field strength of the Exciter's LF field can be adjusted from 2' to 20', creating the defined detection zone. By adjusting the LF field the Exciter can tightly define a specified area such as a single exit point, up to a large area or zone such as a corridor. The Tag Exciter also has a UHF transceiver, so that it can communicate with the network.
When used in combination with a Tag Reader Controller, this real-time tag location information is processed to secure portals or notify the system that at tag has entered or left an area. The Tag Reader/Controller can automatically lock doors through which the tag has no access privileges or trigger other actions.

Frequencies

Module	Description	Frequences
Crystal, Y1	Clock	16MHz

List of ancillary and/or support equipment provided by the applicant

Model No.	Description	Manufacturer	Approvals/Standards
AL1012ULM	Poweer Supply, 12VDC	Altronix	N/A

Description of Interface Cables for Testing

Description	Cable Type	Cable length	Ferrite
DC 12V Power Cable	Unshielded, 2 wires power cable	6 ft.	No

ARRANGEMENT OF INTERFACE CABLES: All interface cables were positioned for worst-case maximum emissions within the manner assumed to be a typical operation condition (please reference photographs).

Software and Firmware

Description	Version
None	

Worst-case configuration and mode of operation during testing

The EUT was placed in continuous transmit mode of operation, and the output setting was selected “A”.

Modifications Required for Compliance

Add a Ferrite, BF1835 by API Delevan Inc. for reducing radiated emission.

Test Equipment Verified for function

Model #	Description	Checked Function	Results
E7405	Spectrum Analyzer	Frequency and Amplitude	Connected 50MHz and -20dBm Cal_siganl and checked OK.
PA-103	Pre-Amplifier, 1 to 1,000MHz	Gain at 30 and 1,000Mhz	Gains are normal.
JB1	Anatenna, 30 to 2000MHz	Checked structure	Normal – no damage.
AL-130	Antenna, 10kHz to 30MHz	Checked structure and power LED	Normal – no damage.
Onset HOBO	Humidity/ Temperature Logger	Compared room Temp. and Hum. with another data logger	Working normally
27-AGM	12VDC Battery	Checked Voltage	15.5VDC

Measurement Uncertainty

Where relevant, the folllowing measurement uncertainty levels have been estimated for tests:

Parameter	Uncertainty(dB)
Radiated Emission, 10kHz to 30MHz	4.94
Radiated Emission, 30 to 300MHz	4.94
Radiated Emission, 300 to 1,000MHz	5.05
Conducted Measurements	2.86

Uncertainty figures are valid to a confidence level of 95%.

Markings

You should refer to the clause of FCC Part 2 Section 2.295 & 2.296 and FCC Part 15 Section 15.19 for information to be contained on the label as well as information about the label. Any other statements or labelling requirements may appear on a separate label at the option of the applicant/grantee. The label has to be including FCC IC/IC ID, Product Number and Manufacturer Info.

According to FCC Section 2.925(a),
(a) Each equipment covered in an application for equipment authorization shall bear a nameplate or label listing the following:
(1) FCC Identifier consisting of the two elements in the exact order specified in §2.926. The FCC Identifier shall be preceded by the term *FCC ID* in capital letters on a single line, and shall be a type size large enough to be legible without the aid of magnification.
Example: FCC ID XXX123. XXX-Grantee Code 123-Equipment Product Code"

According to FCC Section 15.19(a)(3),
This device shall bear the following statement in a conspicuous location on the device:
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Note: Some jurisdictions in Canada require Cautions and Warnings to also be in French. It is the responsibility of the Customer to provide bilingual marking, where applicable, in accordance with the requirements of the local regulatory authorities. It is the responsibility of the Customer to determine this requirement and have bilingual wording added to the "Markings".

Test Summary

When configured and operated as specified in this report, the product was found to comply with the requirements as indicated below.

Test Type	Regulation	Measurement Method	Result
Antenna Requirement	15.203 & RSS-210	N/A	PASS
AC Power Line Conducted Emissions	15.207 & RSS-Gen	ANSI C63.4:2009 & ANSI C63.10:2009	PASS
Field Strength of Fundamental	15.209 & RSS-210	ANSI C63.4:2009 & ANSI C63.10:2009	PASS
Radiated Emissions	15.209 & RSS-210	ANSI C63.4:2009 & ANSI C63.10:2009	PASS
20dB Bandwidth	15.215 & RSS-210	N/A	PASS

Antenna Requirement

Test Date	June 15, 2012
Sample Number	1026692
Tested By	Jeremy Lee

Test Limits

15.203

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of § 15.211, § 15.213, § 15.217, § 15.219, or § 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with § 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

Test Results:

The EUT has an integral Loop Coil Antenna. Please reference APPENDIX B: EUT photos.

X Pass **Fail** **N/A**

AC Power line Conducted Emission

Temperature	25.3 °C
Relative Humidity	55.0 %
Barometric Pressure:	101.83 kPa
Test Date	Aug. 10, 2012
Sample Number	1026692
Calibrated Test Equipment (ID)	127, 128, 266, 272
Reference Equipment (ID) (Calibration not required)	N/A
Tested Voltages	110VAC, 60Hz, Single Phase
Tested By	Jeremy LEE

Use the barometric pressure reported at: http://www.theweathernetwork.com/weather/cabc0248

Test Limits

FCC 15.207(a):
(a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50

*Decreases with the logarithm of the frequency.

Test Setup

The test was performed in accordance with **FCC 15.107:2010 and ANSI C63.4, 2009.**

The EUT was placed on the table, referenced by ANSI C63.4, shown in Figure-1, and 0.4 meters from the conducting wall with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.

The EUT was set up as per the test configuration to simulate typical actual usage per the user's manual. The DC power line of EUT was connected to DC Power Supply, AL1012ULM, which was connected to LISN for maximum conducted interference.
The EUT was set on the maximum operating; the EUT was setup to continuing operating as a worst case.

Initially a scan was made with an EMC Analyzer from 150 kHz to 30 MHz on each phase with the receiver in the peak mode. The measuring bandwidth was set up 9 kHz. Measurements were then made using CISPR16-1 quasi peak and averaging detectors when the peak readings were within 20dB of the Quasi-peak limit line.

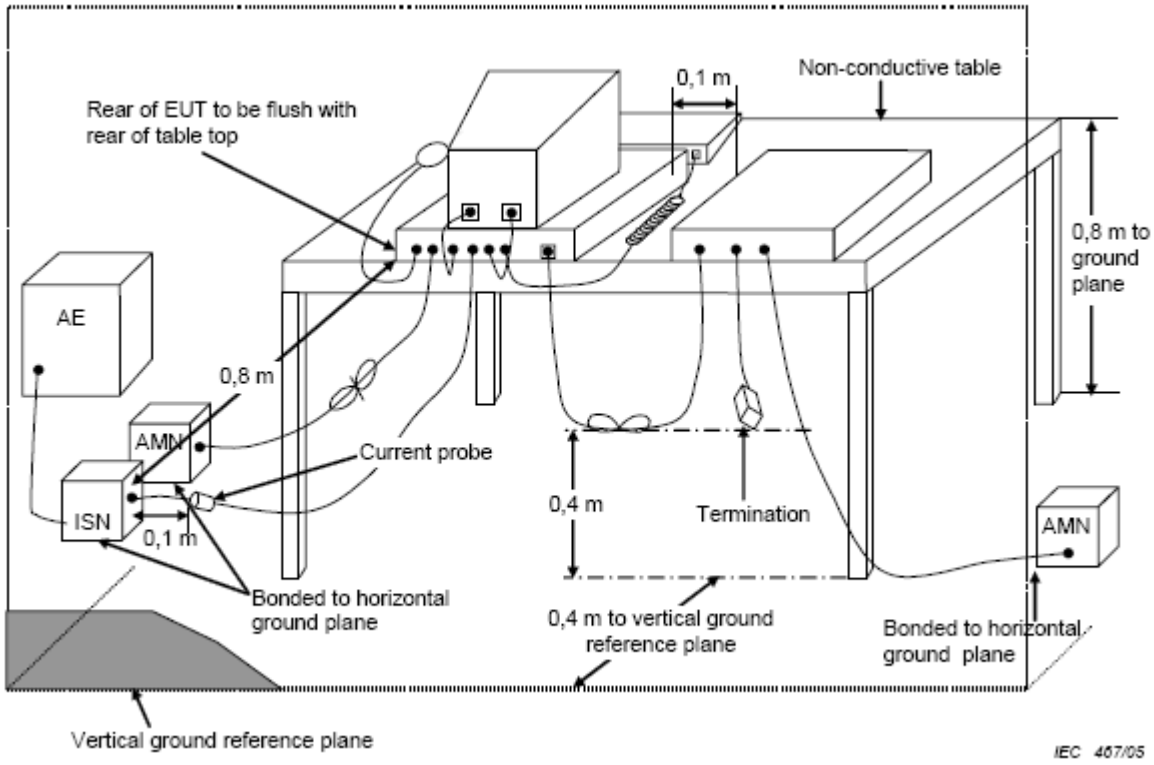
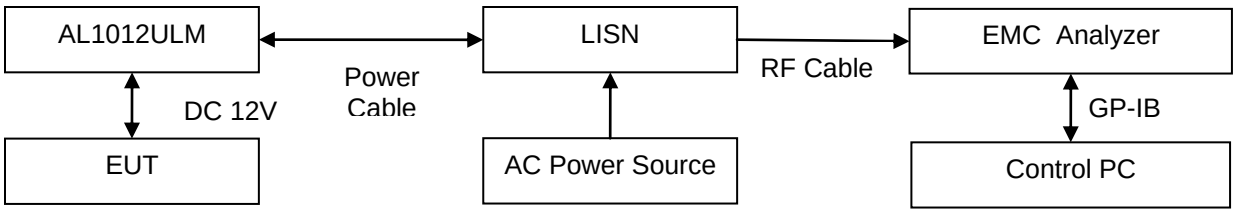


Figure – 1 Test setup for Conducted emissions

Setup Block Diagram



Test Result

Conducted Emission (dBuV) = Measured Emission (dBuV) + Cable Loss(dB)+LISN(dB)

X Pass **Fail** **N/A**

- Table of Conducted Emissions: Hot Line

LabTest Certification Inc.
Conducted Emission
FCC 15.207, Class B, QP_Hot_110Vac/60Hz

Operator: Jeremy LEE

12:46:38 PM, Friday, August 10, 2012

FCC ID: VZKTE
Contact: Dalibor Pokrajac
Company: Guard RFID Solutions Inc.

Frequency	Measured_QP	CableLoss	LISN	Emission_QP	Limit_QP	Margin_QP
MHz	dBuV	dB	dB	dBuV	dBuV	dB
13.090 MHz	39.81	0.20	0.26	50.33	60.00	9.67
13.658 MHz	40.78	0.24	0.26	51.35	60.00	8.65
14.090 MHz	43.19	0.26	0.26	53.79	60.00	6.21
14.161 MHz	40.58	0.26	0.26	51.18	60.00	8.82
14.940 MHz	40.66	0.28	0.26	51.28	60.00	8.72
15.261 MHz	40.35	0.27	0.26	50.97	60.00	9.03

Project #: 10580, Sample #: 1026692
Temp.: 25.3 C, Hum.: 55.0 %
Barometer Pres.: 101.83 kPa

LabTest Certification Inc.
Conducted Emission
FCC 15.207, Class B, AVG_Hot_110Vac/60Hz

Operator: Jeremy LEE

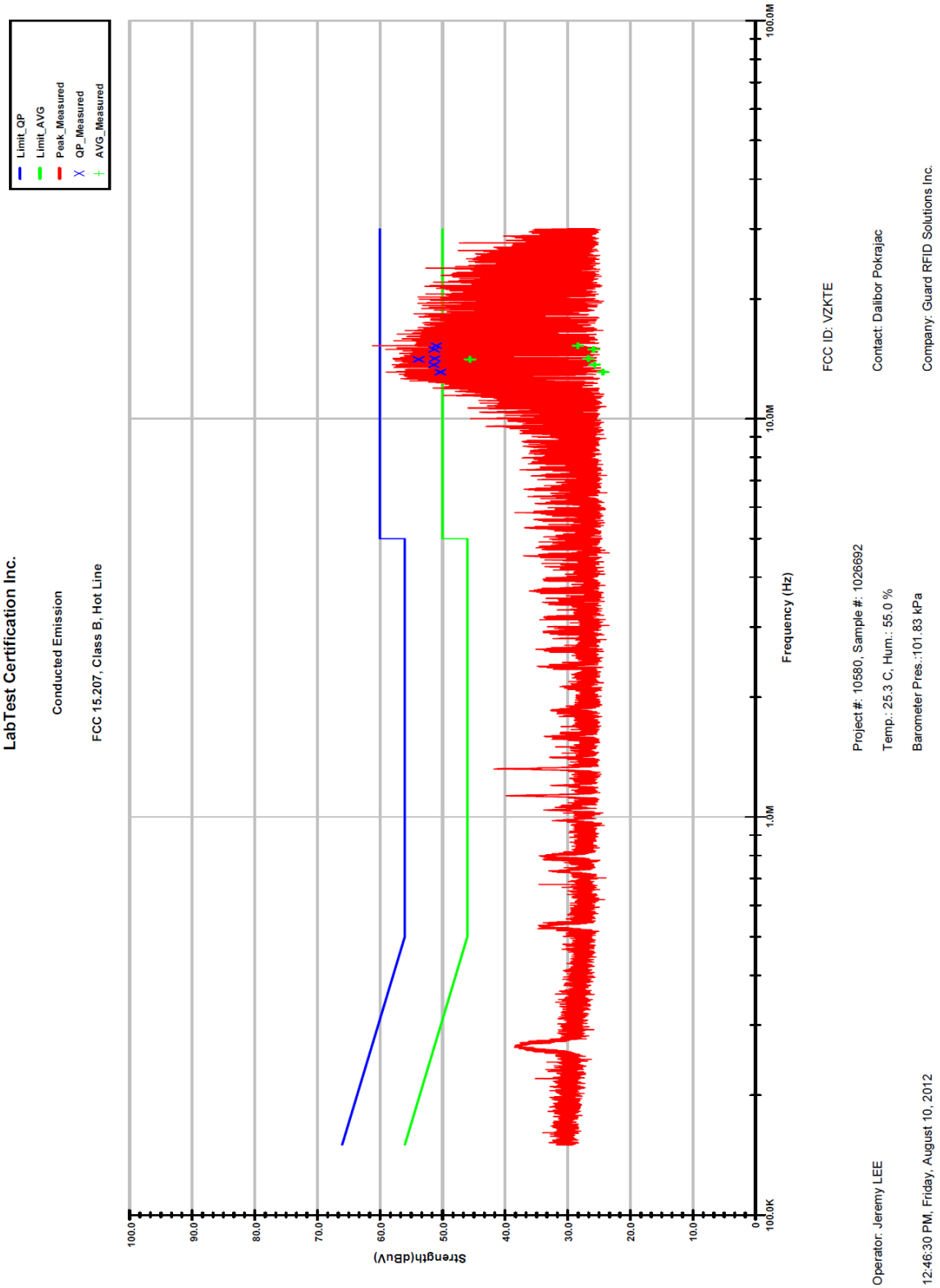
12:46:38 PM, Friday, August 10, 2012

FCC ID: VZKTE
Contact: Dalibor Pokrajac
Company: Guard RFID Solutions Inc.

Frequency	Measured_AVG	CableLoss	LISN	Emission_AVG	Limit_AVG	Margin_AVG
MHz	dBuV	dB	dB	dBuV	dBuV	dB
13.090 MHz	13.84	0.20	0.26	24.36	50.00	25.64
13.658 MHz	15.12	0.24	0.26	25.69	50.00	24.31
14.090 MHz	34.98	0.26	0.26	45.58	50.00	4.42
14.161 MHz	16.09	0.26	0.26	26.69	50.00	23.31
14.940 MHz	15.24	0.28	0.26	25.86	50.00	24.14
15.261 MHz	17.74	0.27	0.26	28.36	50.00	21.64

Project #: 10580, Sample #: 1026692
Temp.: 25.3 C, Hum.: 55.0 %
Barometer Pres.: 101.83 kPa

- Graph of Conducted Emissions: Hot Line



- Table of Conducted Emissions: Neutral Line

LabTest Certification Inc.
Conducted Emission
FCC 15.207, Class B, QP_Neutral_110Vac/60Hz

Operator: Jeremy LEE

12:46:38 PM, Friday, August 10, 2012

FCC ID: VZKTE
Contact: Dalibor Pokrajac
Company: Guard RFID Solutions Inc.

Frequency	Measured_QP	CableLoss	LISN	Emission_QP	Limit_QP	Margin_QP
MHz	dBuV	dB	dB	dBuV	dBuV	dB
12.889 MHz	42.08	0.19	0.27	52.59	60.00	7.41
13.562 MHz	42.07	0.23	0.27	52.64	60.00	7.36
13.723 MHz	41.72	0.24	0.27	52.30	60.00	7.70
14.060 MHz	42.94	0.26	0.27	53.55	60.00	6.45
14.246 MHz	41.09	0.26	0.27	51.70	60.00	8.30
14.331 MHz	42.18	0.27	0.27	52.79	60.00	7.21

Project #: 10580, Sample #: 1026692
Temp.: 25.3 C, Hum.: 55.0 %
Barometer Pres.: 101.83 kPa

LabTest Certification Inc.
Conducted Emission
FCC 15.207, Class B, AVG_Neutral_110Vac/60Hz

Operator: Jeremy LEE

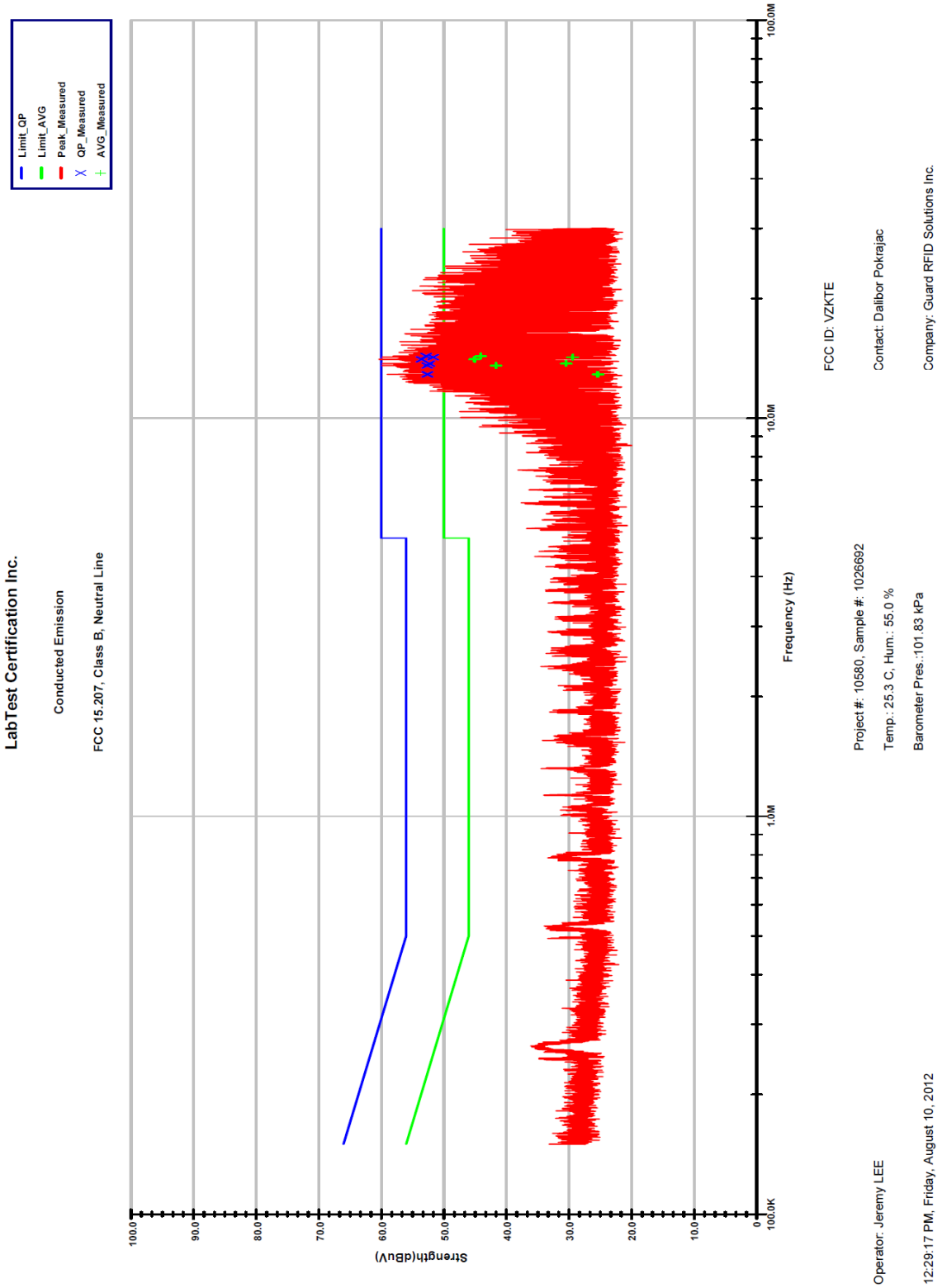
12:46:38 PM, Friday, August 10, 2012

FCC ID: VZKTE
Contact: Dalibor Pokrajac
Company: Guard RFID Solutions Inc.

Frequency	Measured_AVG	CableLoss	LISN	Emission_AVG	Limit_AVG	Margin_AVG
MHz	dBuV	dB	dB	dBuV	dBuV	dB
12.889 MHz	14.89	0.19	0.27	25.40	50.00	24.60
13.562 MHz	31.08	0.23	0.27	41.65	50.00	8.35
13.723 MHz	19.86	0.24	0.27	30.44	50.00	19.56
14.060 MHz	34.47	0.26	0.27	45.08	50.00	4.92
14.246 MHz	18.76	0.26	0.27	29.37	50.00	20.63
14.331 MHz	33.48	0.27	0.27	44.09	50.00	5.91

Project #: 10580, Sample #: 1026692
Temp.: 25.3 C, Hum.: 55.0 %
Barometer Pres.: 101.83 kPa

- Graph of Conducted Emissions: Neutral Line



Field Strength of Fundamental

Temperature	21.4 ℃
Relative Humidity	43.0 %
Barometric Pressure:	102.18 kPa
Test Date	May 29, 2012
Sample Number	1026692
Calibrated Test Equipment (ID)	241, 266, 272, 371
Reference Equipment (ID) (Calibration not required)	124, 374, N1
Tested By	Jeremy Lee

Use the barometric pressure reported at: http://www.theweathernetwork.com/weather/cabc0284

Test Limits

FCC 15.209:

(a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009–0.490	2400/F(kHz)	300
0.490–1.705	24000/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

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54–72 MHz, 76–88 MHz, 174–216 MHz or 470–806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.

(d) The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

Limit : 2400/125=19.2uV/m @ 300m
Distance Correction Factor = 40log(test distance /specific distance)

Test Setup

The test was performed in accordance with **FCC 15.209:2010, FCC 15.31:2010, FCC 15.33:2010, FCC 15.35:2010, and ANSI C63.4:2009, and ANSI C63.10:2009.**

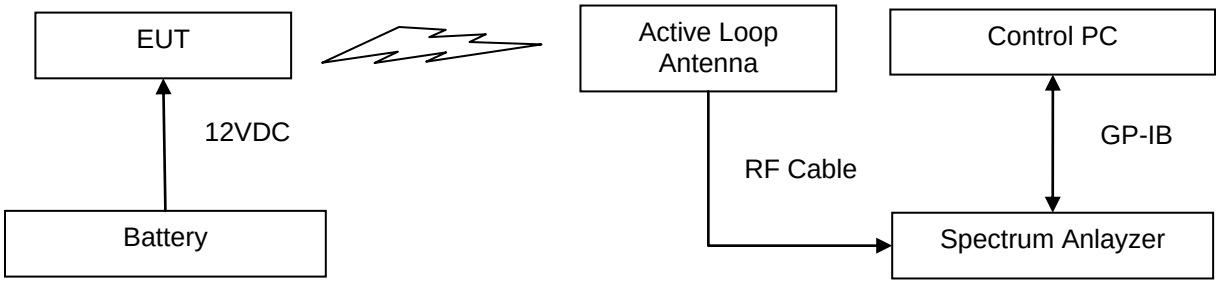
Test procedure is based on the FCC15.31(a)(3) – Other intentional and unintentional radiators are to be measured for compliance using the following procedure excluding sections 4.1.5.2, 5.7, 9 and 14: ANSI C63.4–2009: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference, see § 15.38). This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR Part 51.
NOTE to Paragraph (a)(3): Digital devices tested to show compliance with the provisions of §§ 15.107(e) and 15.109(g) must be tested following the ANSI C63.4 procedure described in paragraph (a)(3) of this section.[As stated in the adopting R&O, ANSI C63.4 is not used for measurements below 30 MHz.]

The EUT was placed on a 1 meter by 1.5 meters wide and 0.8-meter high nonconductive table that was placed directly onto a flush mounted turntable. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna supporter. It is measured with a receiver – the spectrum analyzer, was software controlled. The antennas was used an Active Loop Antenna.

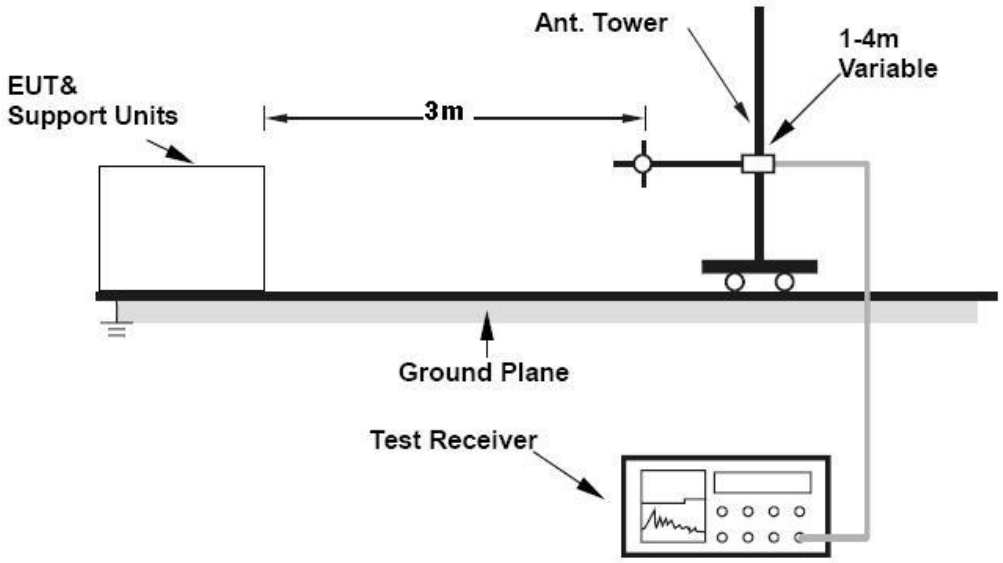
The EUT was positioned the emissions from the unit were maximized by manipulating the cables, and by adjusting the polarization and height of the receive antenna and rotating the EUT on the turntable.

- The EUT was set-up at Channel "A".
- The following measurements were made with
  - Span = wide enough to fully capture the emission being measured.
  - RBW = 200Hz.
  - VBW = 300Hz
  - Sweep = Auto
  - Detector Function = peak
  - Trace = Single trace up to capturing the whole range of signal
  - Detecting Method = Average and Peak.

Setup Block Diagram



Test Setup in Chamber



Test Result

Radiated Emission (dBuV/m) = Measured Emission (dBuV) + Antenna Factor(1/m) + Cable Loss(dB)– Pre-Amplifier Gain(dB)

Frequency (kHz)	Detector	Measured (dBuV)	AF (dB/m)	Path Loss (dB)	Radiated Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	POL	Results
123.084	Average	66.68	10.81	0.22	77.71	105.80	28.09	N/A	PASS
123.084	Peak	96.61	10.81	0.22	107.64	125.80	18.16	N/A	PASS

X Pass Fail N/A

- Table of Field Strength of Fundamental, Average Detecting, Antenna was used AL-130.

LabTest Certification Inc.
Intentional Radiated Emissions
FCC15.209, 3 meters, Averaging and QP Detector

Operator: Jeremy Lee
RE_Intentional_123kHz.TIL
11:06:17 AM, Thursday, July 26, 2012

FCC ID: VZKTE
Contact: Dalibor Pokarajac
Company: Guard RFID Solutions Inc.

Frequency	Measured	AntFactor	PathLoss	Emission	Limit	Margin	T/T	Tower	POL
MHz	dBuV	dB/m	dB	dBuV/m	dBuV/m	dB	Degree	cm	
123.084 KHz	66.68	10.81	0.22	77.71	105.80	28.09	302.3	100.0	H

- Table of Field Strength of Fundamental, Peak Detecting, Antenna was used AL-130

LabTest Certification Inc.
Intentional Radiated Emissions
FCC15.209, 3 meters, Peak Detector

Operator: Jeremy Lee
RE_Intentional_123kHz.TIL
11:06:17 AM, Thursday, July 26, 2012

FCC ID: VZKTE
Contact: Dalibor Pokarajac
Company: Guard RFID Solutions Inc.

Frequency	Measured_PK	AntFactor	PathLoss	Emission_PK	Limit_PK	Margin_PK	T/T	Tower	POL
MHz	dBuV	dB/m	dB	dBuV/m	dBuV/m	dB	Degree	cm	
123.084 KHz	96.61	10.81	0.22	107.64	125.80	18.16	302.3	100.0	H

Radiated Emissions

Temperature	21.3 to 21.8 ℃
Relative Humidity	43.0 to 460 %
Barometric Pressure:	101.38 to 102.18 kPa
Test Date	May 25 & 29, 2012
Sample Number	1026692
Calibrated Test Equipment (ID)	241, 266, 272, 371
Reference Equipment (ID) (Calibration not required)	124, 374, N1
Tested By	Jeremy Lee

Use the barometric pressure reported at: http://www.theweathernetwork.com/weather/cabc0284

Test Limits

FCC 15.209:

(c) The level of any unwanted emissions from an intentional radiator operating under these general provisions shall not exceed the level of the fundamental emission. For intentional radiators which operate under the provisions of other sections within this part and which are required to reduce their unwanted emissions to the limits specified in this table, the limits in this table are based on the frequency of the unwanted emission and not the fundamental frequency. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009–0.490	2400/F(kHz)	300
0.490–1.705	24000/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

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54–72 MHz, 76–88 MHz, 174–216 MHz or 470–806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.

(d) The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

Test Setup

The test was performed in accordance with **FCC 15.247:2010, FCC 15.31:2010, FCC 15.33:2010, FCC 15.35:2010, and ANSI C63.4:2009, and ANSI C63.10:2009.**

Test procedure is based on the FCC15.31(a)(3) – Other intentional and unintentional radiators are to be measured for compliance using the following procedure excluding sections 4.1.5.2, 5.7, 9 and 14: 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" (incorporated by reference, see § 15.38). This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR Part 51.
NOTE to Paragraph (a)(3): Digital devices tested to show compliance with the provisions of §§ 15.107(e) and 15.109(g) must be tested following the ANSI C63.4 procedure described in paragraph (a)(3) of this section.[As stated in the adopting R&O, ANSI C63.4 is not used for measurements below 30 MHz.]

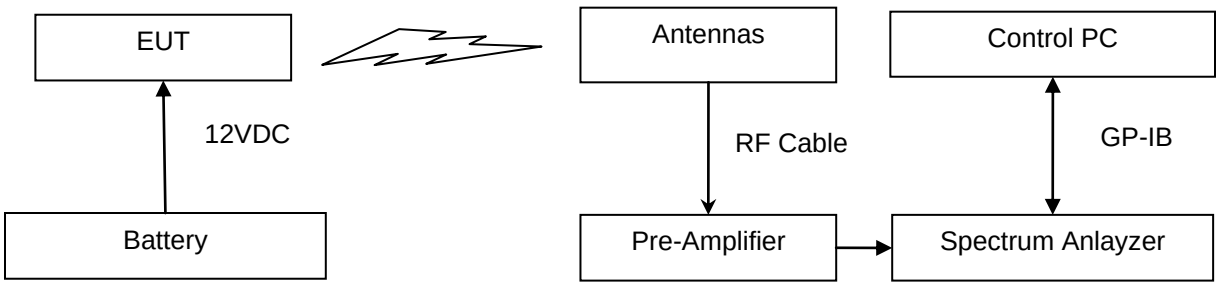
The EUT was placed on a 1 meter by 1.5 meters wide and 0.8-meter high nonconductive table that was placed directly onto a flush mounted turntable. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna supporter. It is measured with a receiver – the spectrum analyzer, was software controlled. The antennas were balanced dipoles. For frequencies of 80 MHz or above, the antennas were resonant in length, and for frequencies below 80 MHz it had a length equal to the 80 MHz resonant length.

The EUT was placed on a 1 meter by 1.5 meters wide and 0.8-meter high nonconductive table that was placed directly onto a flush mounted turntable. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna supporter. It is measured with a receiver – the spectrum analyzer, was software controlled. The antennas was used an Active Loop Antenna.

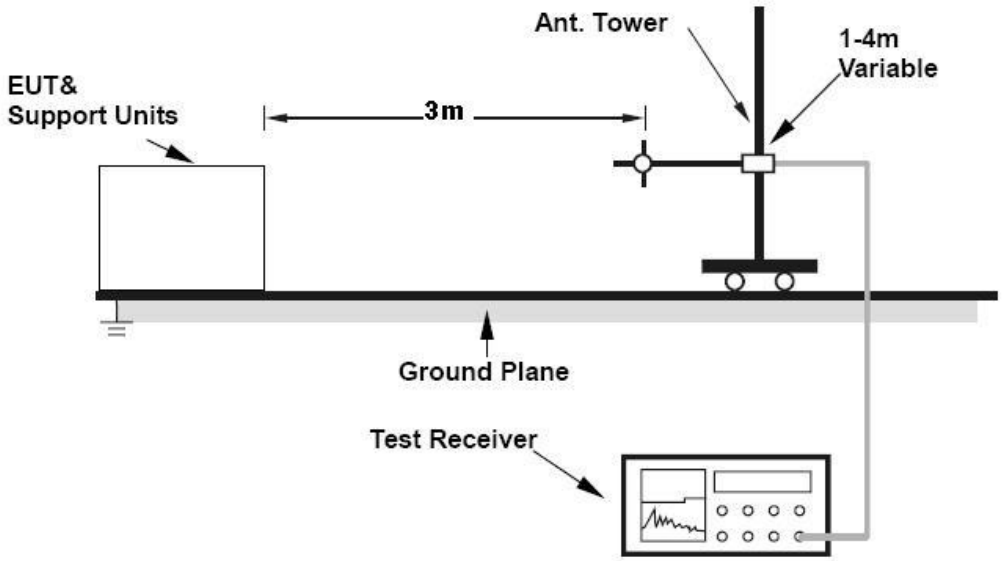
The EUT was positioned the emissions from the unit were maximized by manipulating the cables, and by adjusting the polarization and height of the receive antenna and rotating the EUT on the turntable.

- The EUT was set-up at Channel "A".
- The following measurements were made with
  - Span = wide enough to fully capture the emission being measured.
  - RBW = 200Hz, 9kHz, and 120kHz.
  - VBW ≥ RBW
  - Sweep = Auto
  - Detector Function = peak
  - Trace = Single trace up to capturing the whole range of signal
  - Detecting Method = Average, Quasi-Peak and Peak.

Setup Block Diagram



Test Setup



Test Result

Radiated Emission (dBuV/m) = Measured Emission (dBuV) + Antenna Factor(1/m) + Cable Loss(dB)– Pre-Amplifier Gain(dB)

Frequency (MHz)	Detector	Measured (dBuV)	AF (dB/m)	Path Loss (dB)	Radiated Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	POL	Results
0.246140	Average	37.16	10.53	0.24	47.93	99.78	51.85	N/A	PASS
0.246140	Peak	49.58	10.53	0.24	60.35	119.78	59.43	N/A	PASS
0.366375	Average	34.74	10.60	0.26	45.60	96.33	50.73	N/A	PASS
0.366375	Peak	54.85	10.60	0.26	65.71	116.33	50.62	N/A	PASS
0.491560	QP	37.59	10.55	0.27	48.41	73.77	25.37	N/A	PASS
0.612245	QP	38.34	10.69	0.27	49.30	71.87	22.57	N/A	PASS
0.740377	QP	33.42	10.79	0.12	44.32	70.22	25.89	N/A	PASS

0.862930	QP	33.51	10.96	0.13	44.60	68.88	24.29	N/A	PASS
0.985256	QP	30.64	10.94	0.12	41.70	67.73	26.03	N/A	PASS
1.106	QP	30.36	10.95	0.13	41.44	66.73	25.29	N/A	PASS
1.230	QP	28.76	10.97	0.13	39.86	65.80	25.94	N/A	PASS

X Pass Fail N/A

- Table of Intentional Radiated Emissions: Average or Quasi-peak Detecting, Antenna was used AL-130.

LabTest Certification Inc.
Intentional Radiated Emissions
FCC15.209, 3 meters, Averaging and QP Detector

Operator: Jeremy Lee
RE_Intentional_123kHz.TIL
11:06:17 AM, Thursday, July 26, 2012

FCC ID: VZKTE
Contact: Dalibor Pokarajac
Company: Guard RFID Solutions Inc.

Frequency	Measured	AntFactor	PathLoss	Emission	Limit	Margin	T/T	Tower	POL
MHz	dBuV	dB/m	dB	dBuV/m	dBuV/m	dB	Degree	cm	
123.084 KHz	66.68	10.81	0.22	77.71	105.80	28.09	302.3	100.0	H
246.140 KHz	37.16	10.53	0.24	47.93	99.78	51.85	152.0	100.0	H
366.375 KHz	34.74	10.60	0.26	45.60	96.33	50.73	209.8	100.0	H
491.560 KHz	37.59	10.55	0.27	48.41	73.77	25.37	291.0	100.0	H
612.245 KHz	38.34	10.69	0.27	49.30	71.87	22.57	276.5	100.0	H
740.377 KHz	33.42	10.79	0.12	44.32	70.22	25.89	299.5	100.0	H
862.930 KHz	33.51	10.96	0.13	44.60	68.88	24.29	327.3	100.0	H
985.256 KHz	30.64	10.94	0.12	41.70	67.73	26.03	220.3	100.0	H
1.106 MHz	30.36	10.95	0.13	41.44	66.73	25.29	232.3	100.0	H
1.230 MHz	28.76	10.97	0.13	39.86	65.80	25.94	150.0	100.0	H

Project # : 10580, Sample #: 1026692
Temp.: 21.4 C, Hum.: 43.0 %
Barometer Pres.: 102.18 kPa

- Table of Intentional Radiated Emissions: Peak Detecting, Antenna was used AL-130

LabTest Certification Inc.
Intentional Radiated Emissions
FCC15.209, 3 meters, Peak Detector

Operator: Jeremy Lee
RE_Intentional_123kHz.TIL
11:06:17 AM, Thursday, July 26, 2012

FCC ID: VZKTE
Contact: Dalibor Pokarajac
Company: Guard RFID Solutions Inc.

Frequency	Measured_PK	AntFactor	PathLoss	Emission_PK	Limit_PK	Margin_PK	T/T	Tower	POL
MHz	dBuV	dB/m	dB	dBuV/m	dBuV/m	dB	Degree	cm	
123.084 KHz	96.61	10.81	0.22	107.64	125.80	18.16	302.3	100.0	H
246.140 KHz	49.58	10.53	0.24	60.35	119.78	59.43	152.0	100.0	H
366.375 KHz	54.85	10.60	0.26	65.71	116.33	50.62	209.8	100.0	H

Project # : 10580, Sample #: 1026692
Temp.: 21.4 C, Hum.: 43.0 %
Barometer Pres.: 102.18 kPa

- Table of Intentional Radiated Emissions: Quasi-Peak Detecting, Antenna was used JB1, Horizontal

LabTest Certification Inc.
Iintentional Radiated Emissions
FCC15.209, 3 meters, with a Ferrite on DC Power Cable,Horizontal

Operator: Jeremy Lee

02:45:06 PM, Thursday, July 26, 2012

FCC ID: VZKTE
Contact: Dalibor Pokarajac
Company: Guard RFID Solutions Inc.

Frequency	Measured	AntFactor	PathLoss	Emission	Limit	Margin	T/T	Tower	POL
MHz	dBuV	dB/m	dB	dBuV/m	dBuV/m	dB	Degree	cm	
59.9713 MHz	35.65	7.50	-32.53	10.62	40.00	29.38	9.8	185.8	H
111.4632 MHz	58.21	12.83	-32.08	38.97	43.52	4.55	268.0	138.8	H
114.1962 MHz	58.26	13.27	-32.06	39.47	43.52	4.05	100.0	245.2	H
179.3906 MHz	54.02	11.34	-31.68	33.68	43.52	9.84	120.0	356.0	H
247.3499 MHz	52.96	12.15	-31.05	34.06	46.02	11.96	49.8	158.3	H
412.9686 MHz	35.25	16.66	-30.13	21.78	46.02	24.24	250.3	311.2	H

Project # : 10580, Sample #: 1026692
Temp.: 21.8 C, Hum.: 46.0 %
Barometer Pres.: 101.38 kPa

- Table of Intentional Radiated Emissions: Quasi-Peak Detecting, Antenna was used JB1, Vertical

LabTest Certification Inc.
Intentional Radiated Emissions
FCC15.209, 3 meters, with a Ferrite on DC Power Cable, Vertical

Operator: Jeremy Lee

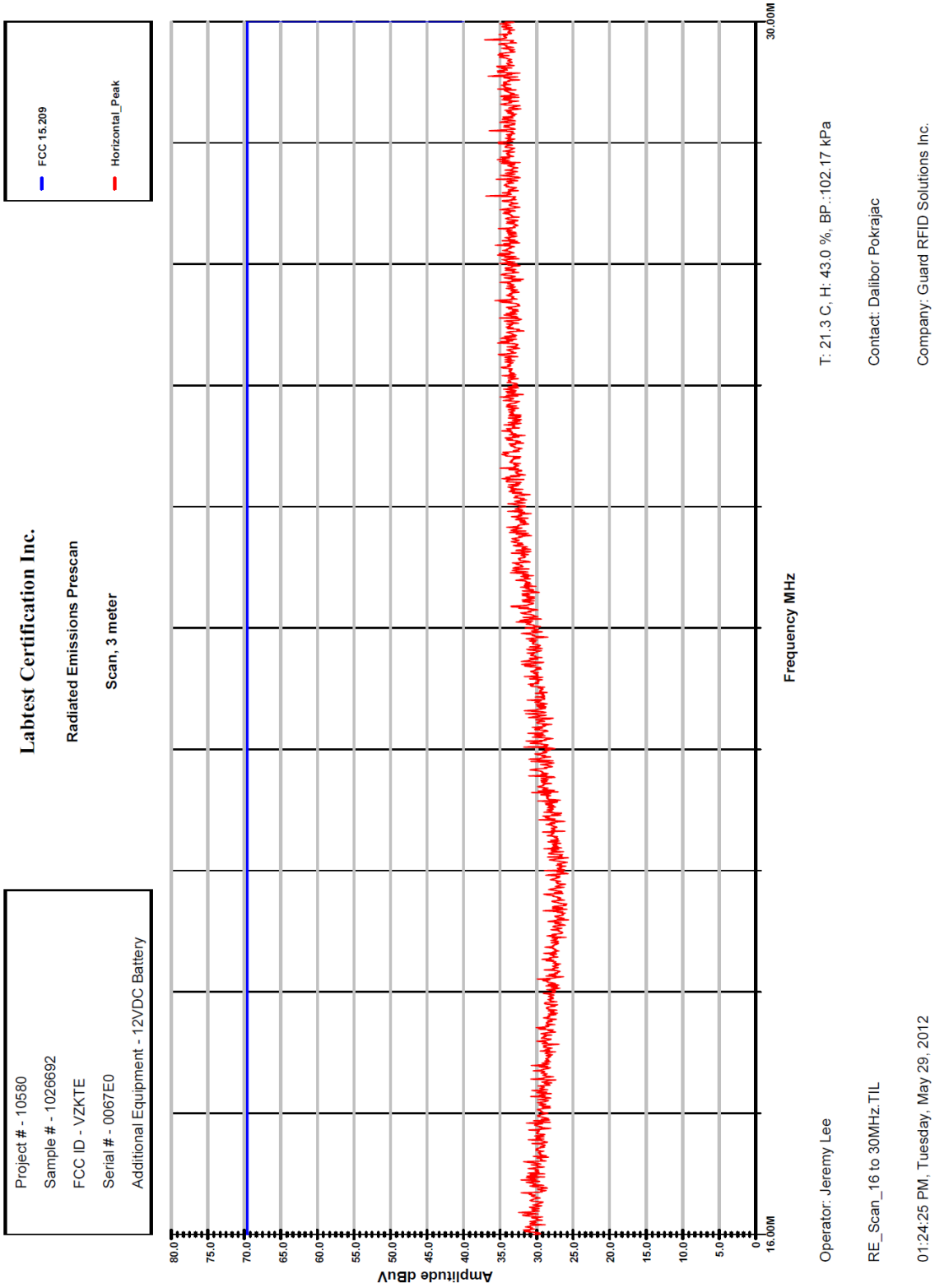
02:45:06 PM, Thursday, July 26, 2012

FCC ID: VZKTE
Contact: Dalibor Pokarajac
Company: Guard RFID Solutions Inc.

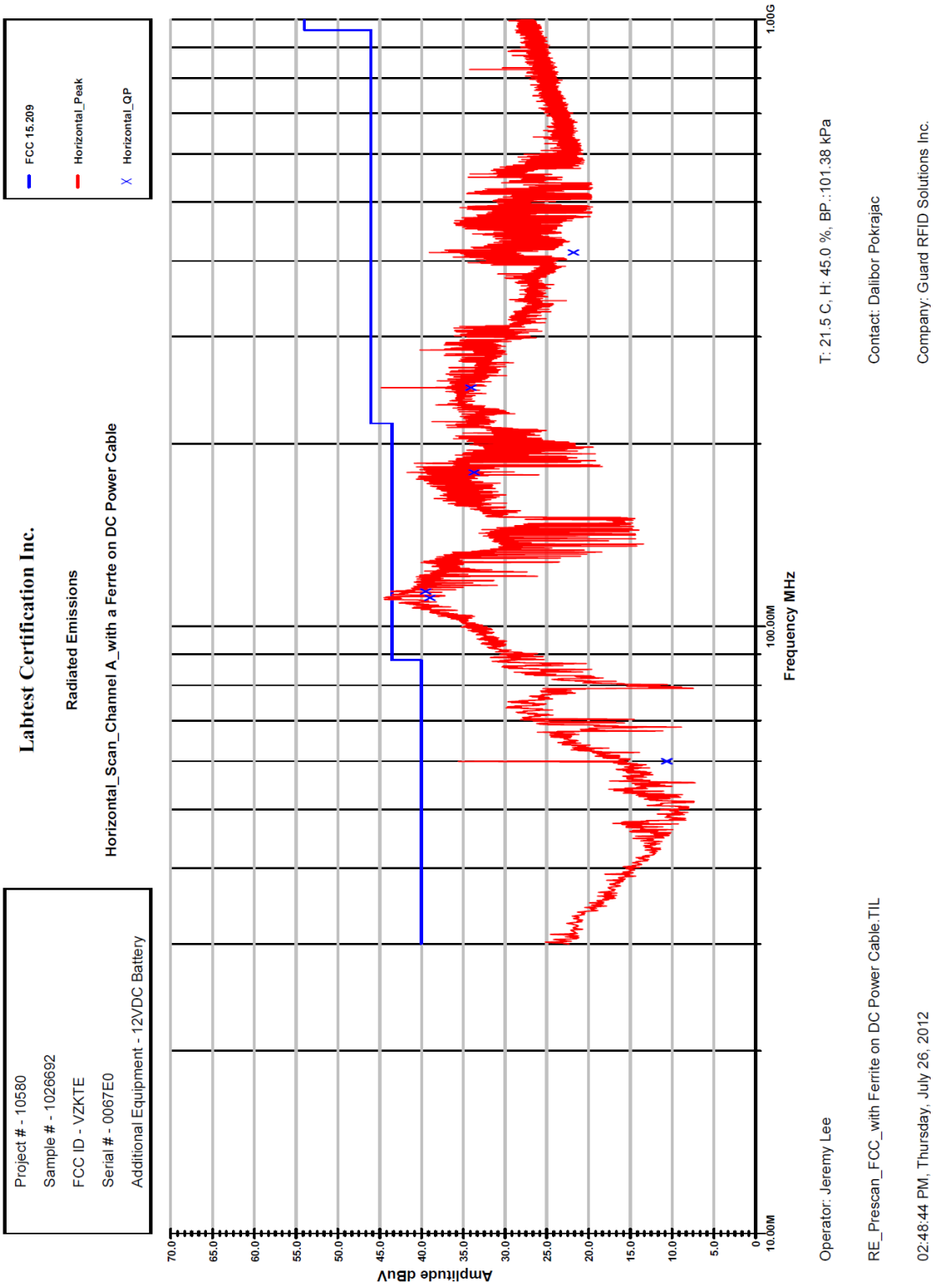
Frequency	Measured	AntFactor	PathLoss	Emission	Limit	Margin	T/T	Tower	POL
MHz	dBuV	dB/m	dB	dBuV/m	dBuV/m	dB	Degree	cm	
53.2977 MHz	55.53	7.30	-32.67	30.17	40.00	9.83	92.0	100.0	V
76.6297 MHz	56.01	7.80	-32.50	31.31	40.00	8.69	31.5	101.2	V
90.6681 MHz	52.55	8.97	-32.41	29.10	43.52	14.42	249.8	128.5	V
115.3751 MHz	50.91	13.75	-32.06	32.60	43.52	10.92	95.3	139.5	V
140.4664 MHz	49.25	13.37	-31.94	30.68	43.52	12.84	92.0	102.0	V
233.5081 MHz	49.34	12.01	-31.19	30.16	46.02	15.86	239.5	102.0	V

Project # : 10580, Sample #: 1026692
Temp.: 21.8 C, Hum.: 46.0 %
Barometer Pres.: 101.38 kPa

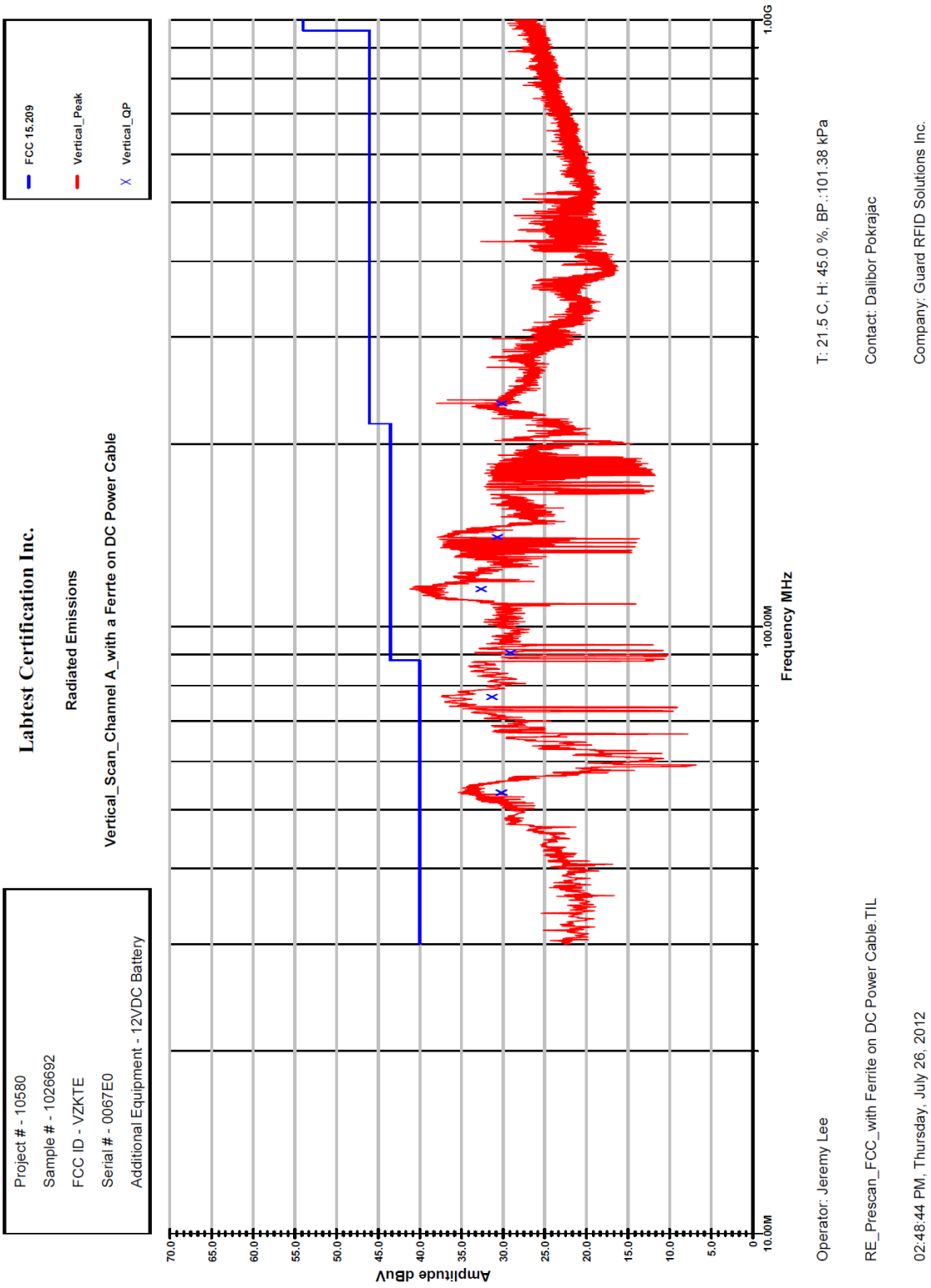
- Graph of Intentional Radiated Emissions: 16 to 30MHz, Peak Detecting, Antenna was used AL-130



- Graph of Intentional Radiated Emissions: 30 to 1,000MHz, Peak Detecting, Antenna was used JB1, Horizontal.



- Graph of Intentional Radiated Emissions: 30 to 1,000MHz, Peak Detecting, Antenna was used JB1, Vertical.



20dB Bandwidth

Test Date	May 29, 2012
Sample Number	1026692
Calibrated Test Equipment (ID)	272
Reference Equipment (ID) (Calibration not required)	N/A
Tested By	Jeremy Lee

Use the barometric pressure reported at: http://www.theweathernetwork.com/weather/cabc0248

Test Limits

15.215:

(c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

Test Setup

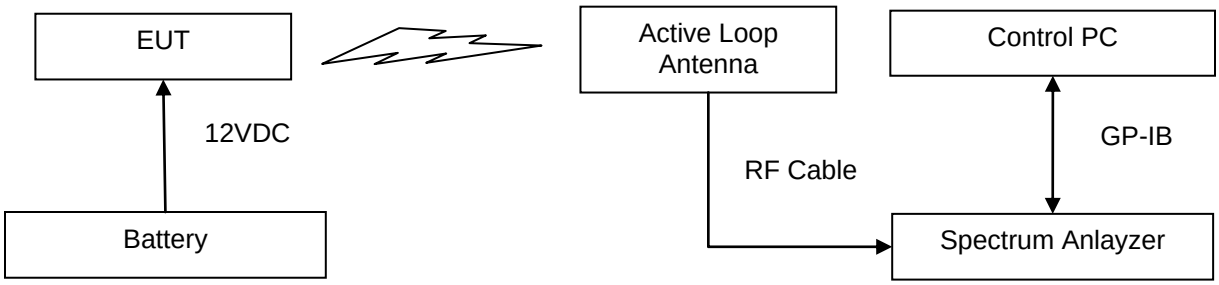
The test was performed in accordance with **FCC 15.215:2010 and ANSI C63.10:2009.**

- The signal of the EUT was radiated to the RF input port of the Spectrum Analyzer via Active Loop Antenna.
- The bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the unlicensed wireless device at either the fundamental frequency or the first-order modulation products in all typical modes of operation, including the un-modulated carrier, even if atypical. Once the reference level is established, the equipment is conditioned with typical modulating signals to produce the worst-case (i.e., the widest) bandwidth. Unless otherwise specified for an unlicensed wireless device, measure the bandwidth at the –20 dB levels with respect to the reference level.
- To measure the modulated signal properly, a resolution bandwidth that is small compared with the bandwidth required by the procuring or regulatory agency shall be used on the measuring instrument.
    1) The span range for the SA display shall be between two times and five times the OBW.
    2) The nominal IF filter bandwidth (3 dB RBW) should be approximately 1 % to 5 % of the OBW, unless otherwise specified, depending on the applicable requirement.
    3) The dynamic range of the SA at the selected RBW shall be more than 10 dB below the target “dB down” (attenuation) requirement, i.e., if the requirement calls for measuring the –20 dB OBW, the SA noise floor at the selected RBW shall be at least 30 dB below the largest measured value on the display
- Supply the EUT with nominal ac voltage, or install a new or fully charged battery in the EUT. Turn the EUT on, and set it to a frequency within its operating range and within regulatory requirements. Set a reference level on the measuring instrument at any level that will allow measuring the specified bandwidth (e.g., –20 dB below the un-modulated carrier).
- Supply the EUT with modulation. Devices modulated from internal sources shall be tested with typical modulation applied. If a device is equipped with input connectors for external modulation,

typical modulating signals shall be applied at the maximum-rated input level for the device. Observe and record with plotted graphs or photographs the worst-case (i.e., widest) occupied bandwidth produced by these different modulation sources.

- Set a reference level on the measuring instrument equal to the highest amplitude signal observed from the unlicensed wireless device at either the fundamental frequency or the first-order modulation products in all typical modes of operation, including the un-modulated carrier, even if atypical.
- Measure the frequencies of the modulated signal from the EUT, where it is the specified number of decibels below the reference level. The result is the occupied bandwidth.

Setup Block Diagram

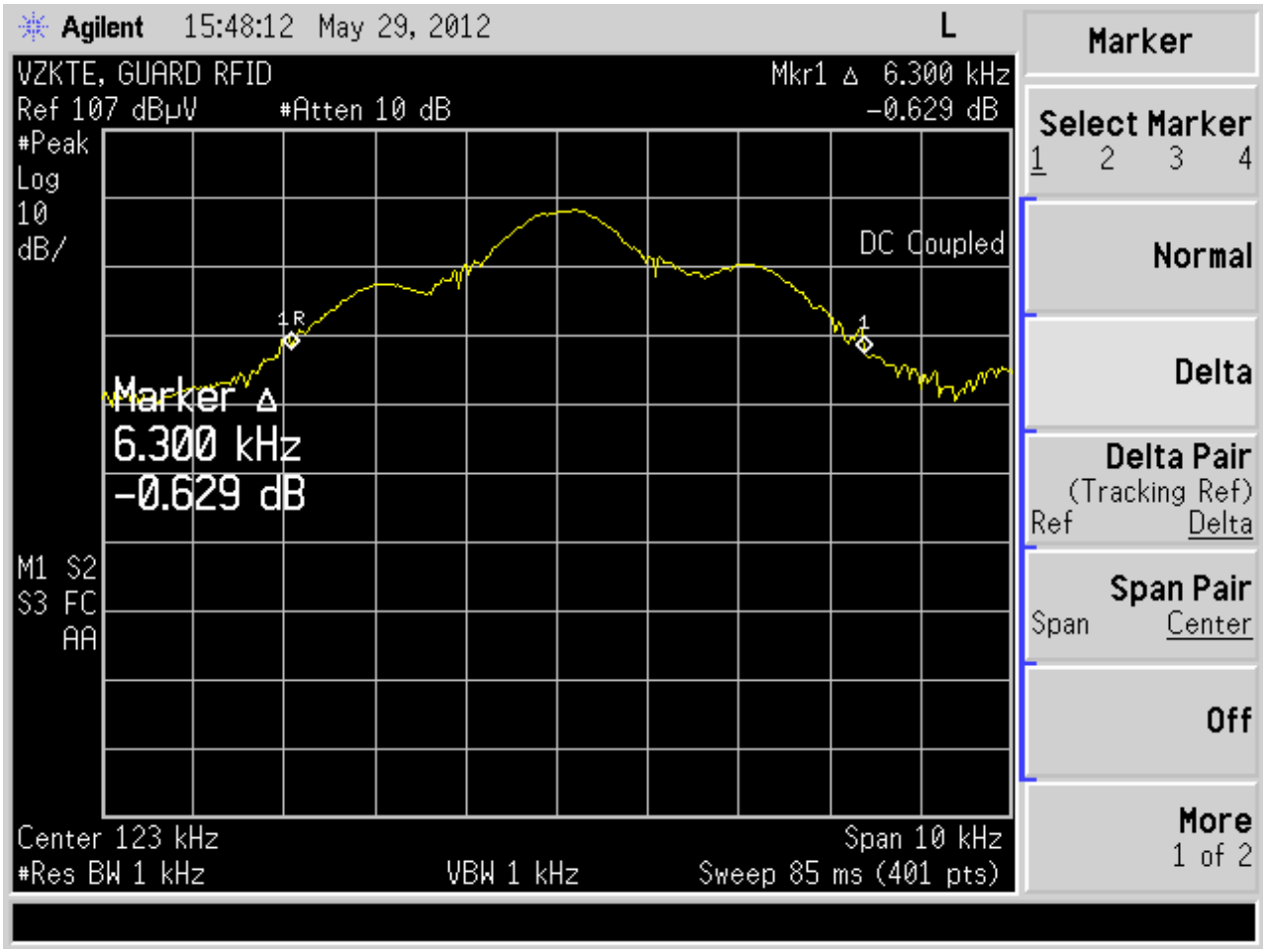


Test Results:

Carrier Frequency(kHz)	20dB BW(kHz)	Limit(kHz)	Pass/Fail
125	6.3	N/A	N/A

X Pass Fail N/A

- 20dB BW



APPENDIX A: Test Equipment Used

ID No.	Description	Manufacturer	Model	Serial No.	Calibration Date	Calibration Due Date	Calibration Certificate No:	Calibration Laboratory
124	Pre-Amplifier	Com-Power	PA-103	161118	N/A	N/A	N/A	N/A
127	LISN	Com-Power	LI-200	12054	30-Sep-2011	28-Sep-2012	CX19714:1317 365300	CMC
128	LISN	Com-Power	LI-200	12216	30-Sep-2011	28-Sep-2012	CX19713:1317 363688	CMC
241	Active Loop Antenna	Com-Power	AL-130	17075	01-Nov2011	01-Nov-2012	071075A	Com-Power
266	Humidity/ Temperature Logger	Onset HOBO	U14-001	2436907	19-Dec-2011	19-Dec-2012	327420	Wescan
272	EMC Analyzer	Agilent	E7405A	US41110263	11-May-2012	11-May-2013	1-4321111743-1	Agilent
371	EMC Broadband Antenna	Sunol	JB1	A022012	07-Mar-2012	07-Mar-2013	2012022808	Liberty Labs
374	EMC Shielded Enclosure	USC	USC-26	111811	N/A	N/A	N/A	N/A
N1	12VDC Battery	Trojan	27-AGM	N/A	N/A	N/A	N/A	N/A

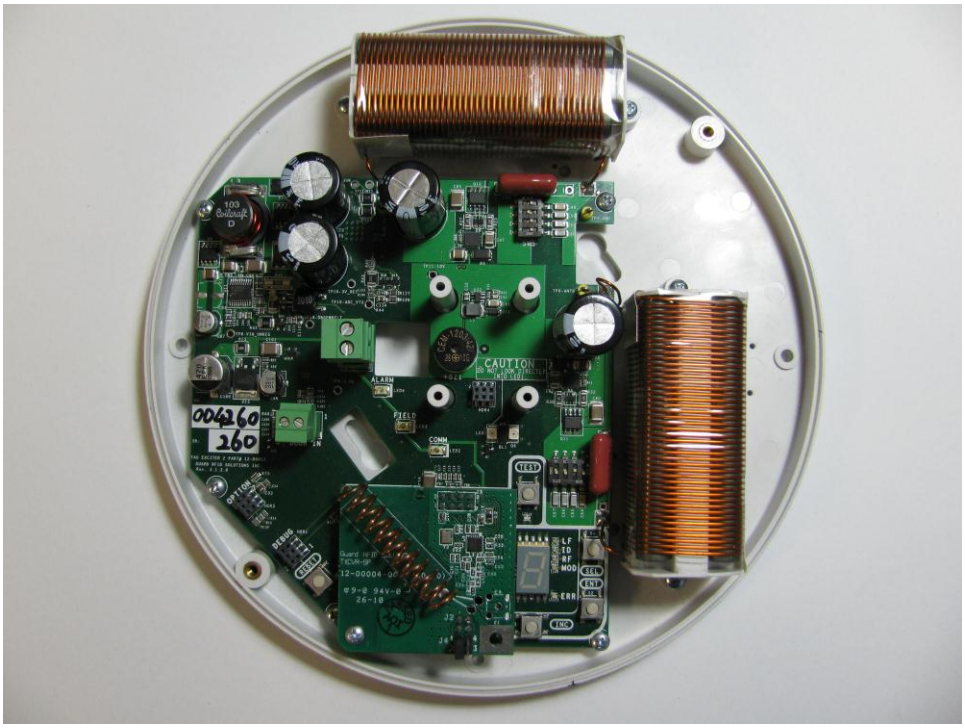
APPENDIX B: EUT photos

- EUT: Top View

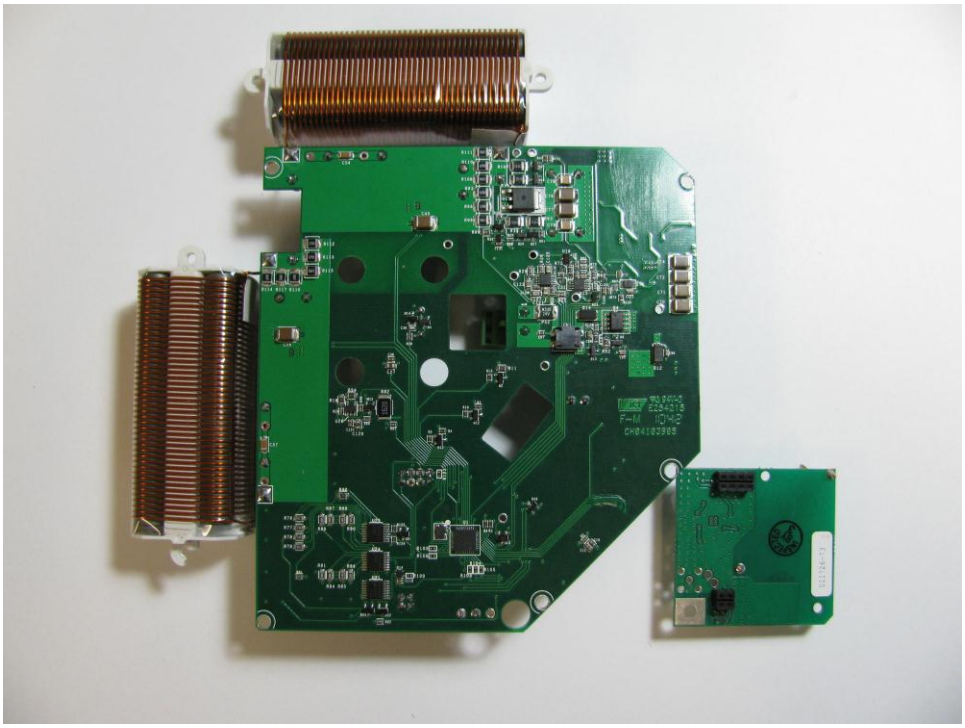
- EUT: Bottom View

- EUT: Side View

- EUT: Top View of Inside



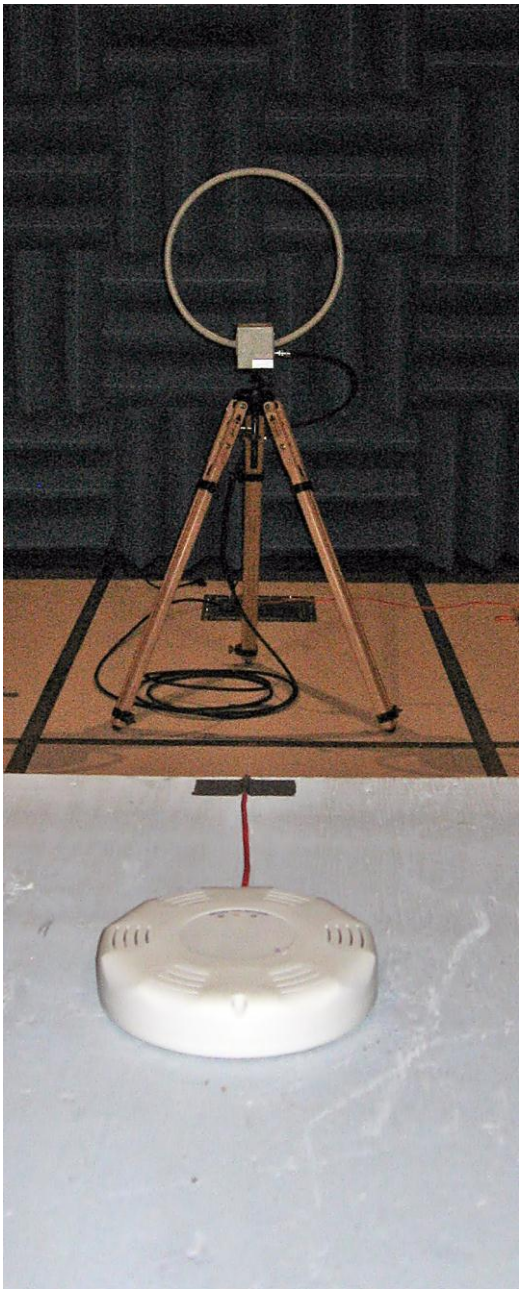
- EUT: Bottom View of Inside



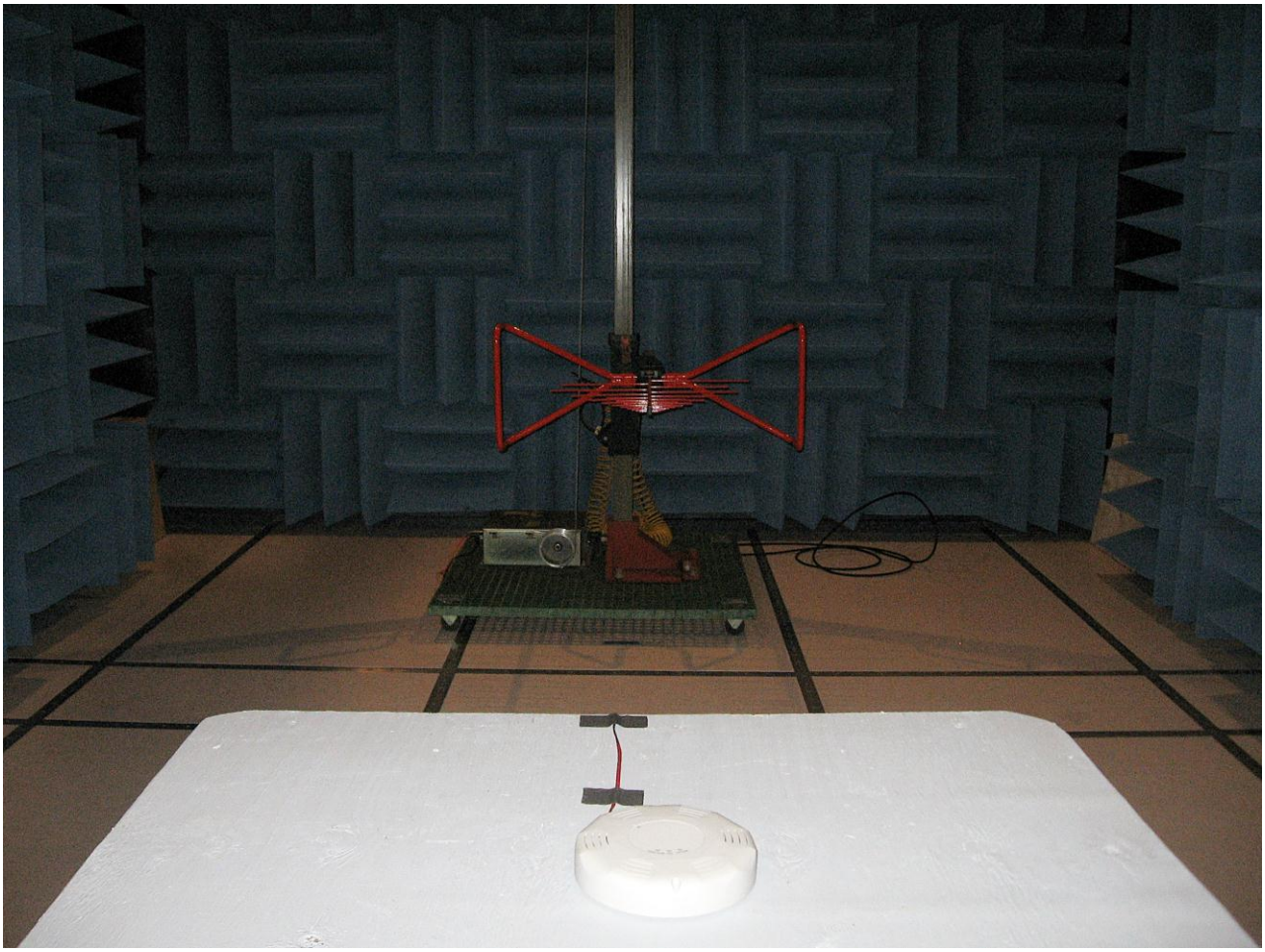
APPENDIX C: Test setup photos

- Test configuration for AC Power Line conducted emission

- Test configuration for LF Testing, 125kHz to 30MHz



- Test configuration for Radiated Emission, 30 MHz to 1GHz



- Test setup on Table

APPENDIX D: ISO 17025:2005 Accreditation Certificate

International Accreditation Service

CERTIFICATE OF ACCREDITATION

This is to signify that

LABTEST CERTIFICATION, INC.
3133-20800 WESTMINSTER HIGHWAY
RICHMOND, BRITISH COLUMBIA V6V 2W3
CANADA

Testing Laboratory TL-367
(Revised May 9, 2012)

has met the requirements of the IAS Accreditation Criteria for Testing Laboratories (AC89), has demonstrated compliance with ANS/ISO/IEC Standard 17025:2005, *General requirements for the competence of testing and calibration laboratories*, and has been accredited, commencing May 5, 2011, for the test methods listed in the approved scope of accreditation.

Patrick V. McCullen
Vice President

C. P. Ramani, P.E.
President

ilac-MRA

IAS ACCREDITED

(see attached scope of accreditation for fields of testing and accredited test methods)

Print Date: 05/23/2012

Page 1 of 4

This accreditation certificate supersedes any IAS accreditation certificate bearing an earlier date. The certificate becomes invalid upon suspension, cancellation or revocation of accreditation. See the IAS Accreditation Listings on the web at www.iasonline.org for current accreditation information, or contact IAS directly at (562) 364-8201.

11-04577

International Accreditation Service

SCOPE OF ACCREDITATION

LabTest Certification, Inc. TL-367
(Revised May 9, 2012)

LabTest Certification, Inc.
3133-20800 Westminster Hwy.
Richmond, British Columbia V6V 2W3
Canada

Kavinder Dhillon
QMS Manager
(604) 247-0444

FIELDS OF TESTING	ACCREDITED TEST METHODS
Gas and Plumbing	ANSI Standards Z21.1, Z21.15, Z21.19/1.6, Z21 50, Z21.57, Z21.58. Z21.97 and Z21.89/CGA1.18; CSA Standards B45 Series, B125, B140.0, B140.1, B140.3, B140.4, B140.8 and B140.9.3; CGA 1.16; AS 4551/Ag101, AS 4553/AG 103, AS 4563 and AS 2658; EN Standards 30-1-1, 30-1-2, 30-1-3, 30-1-4, 30-2-1 and 30-2-2
Electrical, EMC and Electro-mechanical	AS 4268.1, 4268.2; AS/NZS 1044, 1053, 2064, 3548, 3652, 4051, 4251.1, 4251.2, 62040.2; 60335.1; AS/NZS 60598.1, AS/NZS 60950.1, AS/NZS 60745.1, AS/NZS 60730.1; CISPR 11 / EN55011; CISPR 14 / EN55014, CISPR 15 / EN55015, CISPR 22 / EN55022, CISPR 24 / EN55024, EN 12895, 301 489, 300 386, 50083-2, 50090-2-2, 50091-2, 50121-1, 50121-2, 50121-3-1, 50121-3-2, 50121-4, 50121-5, 50130-4, 50263, 50270, 50293, 50295, 50370-1, 50370-2, 50428, 50470-1, 55012, 55013, 55103-1, 55103-1, 55103-2, 55103-2, 60204-31, 60439-1, 60669-2-1, 60669-2-1, 60669-2-2, 60669-2-3, 60730-1, 60730-2-11, 60730-2-13, 60730-2-14, 60730-2-18, 60730-2-5, 60730-2-6, 60730-2-7, 60730-2-8, 60730-2-9, 60870-2-1, 60945, 61204-3, 61326, 61347-1 Part 1, 61543, 61547, 61547, 617:2001, 618, 619, 620 and 62040-2; FCC Part 15, 18; GB 13837 (CISPR 13); GB 4943, 9254, 7000.1, 7000.10, 7000.11, 7000.12, 2313, 8898, 15143, 14045, 17743, 13836 and 13837; GB/T 9383; GB/T 17618; GB 17625.1, 2; GB/T 17626.2 and 17626.4 and 17626.5

May 5, 2011
Commencement Date

ACCREDITED

C. P. Ramani, P.E.
President

Print Date: 05/23/2012

Page 2 of 4

This accreditation certificate supersedes any IAS accreditation certificate bearing an earlier date. The certificate becomes invalid upon suspension, cancellation or revocation of accreditation. See the IAS Accreditation Listings on the web at www.iasonline.org for current accreditation information, or contact IAS directly at (562) 364-8201.

11-04680

International Accreditation Service

SCOPE OF ACCREDITATION

LabTest Certification, Inc. TL-367
(Revised May 9, 2012)

FIELDS OF TESTING	ACCREDITED TEST METHODS
Electrical, EMC and Electro-mechanical (cont)	GB/T 176262.6, 176262.8, 176262.11; GB 4343.1 (CISPR 14.1), 4343.2 (CISPR 14.2), GB 4824; HKTA 1001, 1005, 1007 and 1022; ICES-001, 003; JIS T 0601-1-2; IEC/EN/AS/KN: 60601-1-2; IEC/EN/AS/KN/JIS C: 61000-3-2, 61000-3-3, 61000-4-2, 61000-4-3, 61000-4-4, 61000-4-5, 61000-4-6, 61000-4-8, 61000-4-9, 61000-4-11, 61000-4-12, 61000-4-13, 61000-6-1, 61000-6-2, 61000-6-3 and 61000-6-4; IEC/EN/AS/KN: 61326; RSS-130, 136, 138, 182, 187, 210, 213, 215, 243 and 310; MIL-STD-461E; MIL-STD-462D; KN60601-1-2; KN301 489; KN22, 24; YD 1032; YD/T 965, 968, 993, 1103; CSA Standards C22.2 No. 0, .1, .17, .4, 6, 8, 9, 10, 12, 14, 15, 18, 24, 36, 37, 40, 43, 53, 61, 66-1-06, 63, 64, 66.1, 66.2, 66.3, 68, 71.1, 71.2, 72, 73, 81, 85, 89, 94, 99, 100, 101, 104, 107.1, 107.2, 108, 109, 110, 112, 113, 114, 117, 122, 125, 139, 141, 147, 148, 149, 156, 157, 158, 164, 166, 167, 168, 169, 173, 177, 184, 187, 191, 195, 205, 207, 213, 217, 218.1, 218.2, 223, 224, 225, 231, 234, 236, 243, 247, 250 and 60065; CSA Standards E60079-0, -1 (except Explosión Proof Test), -6, -11, -15, E60335-1, -2, E60730-1, -2, E60745-1, -2, E61010-1, -2, E742, Z240 RV Series 08; IEC/EN Standards 60335-1, -2, 60730-1, -2, 60745-1, -2; 61010-1, -2, 60601-1, -2, 60065, 60079-0, -6, -11, -15 and 60950-1, -2; IEC/EN 60529; 60945, 60598-1, -2, 61347-1; UL Standards 48, 50, 73, 197, 499, 507, 508, 508A, 676, 745-1, 751, 763, 778, 858, 867, 875, 924, 935, 982, 987, 998, 1004, 1012, 1026, 1261, 1310, 1431, 1472, 5085-2_1; 5085-3; 1563, 1564, 1585, 1598, 1647, 1795, 1993, 1995, UL/CSA 5085-1_1

May 5, 2011
Commencement Date

ACCREDITED

C. P. Ramani, P.E.
President

Print Date: 05/23/2012

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11-04680

International Accreditation Service

SCOPE OF ACCREDITATION

LabTest Certification, Inc. TL-367
(Revised May 9, 2012)

FIELDS OF TESTING	ACCREDITED TEST METHODS
Electrical, EMC and Electro-mechanical (cont)	6500, 8750, 2388; 60079-0, 60079-1, 60079-6, 60079-11, 60079-15, 60335-1, 60335-2, 60601-1, 60601-2, 60730-1, 60730-2, 60745-1, 60745-2, 60950-1, 61010-1 and 61010-2; ISO EN Standards 60601-1-2 Part 1-2, 61000-3-2 (Equipment input current less than or equal to 16 Amps/Phase) and 61000-4-3; ANSI Standards C63.4 and C63.7 (only to 26.5GHz)
Environmental and Energy	IEC/EN Standards 60068-2-1, 2-2, 2-6, 2-30, 2-27, 2-14, 2-64, 60092-101, 60695-2-2; MIL-STD-810: Method 500.4, 501.4, 502.4, 503.4, 506.4, 507.4, 510.4, 512.4 and 514.5; RTCA-DO-160E: Section 4, 5, 6, 7.2, 8, 10, 12, 16, 17 and 25; CSA Standard P4; CAN/CSA Standards C-300 and C-814; Qualification Criteria for Bottled Water Cooler Version 1.1 - May 2004; Qualification Criteria for Compact Fluorescent Lamps Version 3.0 - October 2003; Qualification Criteria for Decorative Light Strings Version 1.3 - March 9, 2007; Qualification Criteria for Residential Light Fixtures Version 4.0; Qualification Criteria for Home Audio and DVD Equipment; ISO Standards 9806-1, 9806-2 and 9806-3; SRCC 100-08, SRCC TM-1, SRCC-150; CSA Standards F378 and F379, EN Standards 12975-1 and 12975-2
Maritime	ABYC Standards A-3, A-7, A-26, A-27, A-28, A-30, A-31, E-2, E-11, H-2, P-14, P-17, P-18, P-21, P-22, P-24 and P-27; EN Standards 28846, 28848, 28849, 29775, 60092-507; EN ISO 10133, 12216, 13297, 13929, 14895, 15083, 8847, 8849, 10239, 10240, 10592: 1995/A1, 11105, 11192 and 9097:1994/A1; IACS E1 – E21; 21005; DNV 2.4, BV: Rules for Classification of Steel Ships – Part C, Chapter 3, Section 6.2 Type Approval; ABS Part 4, Chapter 9, Section 7, Lloyds Type Approval Systems – Test Specification Number 1; GL VI-Part 7 Section 3 – Section – B Test Requirements, Chapter 2
Appliances	CSA Standard B 140.0-3

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