Lab Code: 200167-0

FCC PART 15.225

IC RSS-210, ISSUE 7, JUNE 2007

TEST AND MEASUREMENT REPORT

For

Coulomb Technologies, Inc.

1692 Dell Avenue, Campbell, CA 95008, USA

FCC ID: W38-CT21002000-01
IC: 8854A-21002000

Report Type:	**Product Type:**
Original Report	Electric Vehicle Charging Station

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1008093-225	Original Report	2010-09-24

1 GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

The *Coulomb Technologies Inc.'s* product model: CT2100 and CT2000, FCC ID: W38-CT21002000-01, IC: 8854A-21002000 is an Electric Vehicle Charging Station with remote monitoring and control via ZigBee/CDMA/GSM backhaul. It contains an internal RFID reader. Integrated RFID reader recognizes and identifies subscriber key fobs and smart cards.

1.2 Mechanical Description of EUT

The EUT (CT2100) measures approximately 210 mm (L) x 310 mm (W) x 1280 mm (H).

The test data gathered is from production samples, serial number: R1008093*-1, assigned by BACL.*

1.3 Objective

This Type approval report is prepared on behalf of *Coulomb Technologies, Inc.* in accordance with Part 2, Subpart J, and Part 15 Subpart C of the Federal Communication Commissions rules and IC RSS-210 Issue 7, June 2007.

The objective of the manufacturer is to demonstrate compliance with FCC rules, Part 15, sec 15.35, sec 15.203, sec 15.205, sec 15.207, sec 15.209 and sec 15.225 and IC RSS-210 Issue 7, June 2007.

1.4 Related Submittal(s)/Grant(s)

No Related Submittals.

1.5 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All radiated and conducted emissions measurements were performed at Bay Area Compliance Laboratory, Corp.

1.6 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the values range from $\pm$2.0 for Conducted Emissions tests and $\pm$4.0 dB for Radiated Emissions tests are the most accurate estimates pertaining to uncertainty of EMC measurements at BACL.

Detailed instrumentation measurement uncertainties can be found in BACL report QAP-018.

1.7 Test Facility

The test site used by BACL Corp. to collect radiated and conducted emissions measurement data is located at its facility in Sunnyvale, California, USA.

The test sites at BACL have been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission, Industry Canada, and Voluntary Control Council for Interference has the reports on file and is listed under FCC registration number: 90464, IC registration number: 3062A, and VCCI Registration Number: C-2463 and R-2698. The test site has been approved by the FCC, IC, and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200167-0). The current scope of accreditations can be found at http://ts.nist.gov/Standards/scopes/2001670.htm

2 SYSTEM TEST CONFIGURATION

2.1 Justification

The EUT was configured for testing according to ANSI C63.4-2003.

2.2 EUT Exercise Software

N/A

2.3 Special Accessories

N/A

2.4 Equipment Modifications

No modifications were made to the EUT

2.5 Remote Support Equipment

N/A

2.6 Local Support Equipment

N/A

2.7 Internal Configurations

Cable Description	Manufacture	Model No.	Serial No.
RFID Board	Uniform Industrial Corp.	UIC681SGREVA	00005698
VF Display Board	Coulomb Technologies Inc	CL28-001012-04LFREV :4	CTS0610CL4378
Main Board	Coulomb Technologies Inc	CL28-001062-05LF REV : 1	CTS0910CL4838
Zigbee Module	CEL	AZLM-301-1	016490
Safety Supervisor Module	Coulomb Technologies Inc	CL28-001152-03LFR REV : 4	CTS1410CL5536

2.8 Interface Ports and Cabling

Cable Description	Length (m)	From	To
J1772	6	EUT	Load
Power Cable	< 3 m	EUT	AC line Power Source

3 SUMMARY OF TEST RESULTS

FCC & IC Rules	Description of Test	Results
FCC §15.203 IC RSS-Gen §7.1.4	Antenna Requirement	Compliant
FCC §15.205, §15.209 & § 15.225 IC RSS-210 §2.2, §2.6 & §A2.6	Radiated Emission	Compliant
FCC §15.207 IC RSS-Gen §7.2.2	AC Power Line Conducted Emissions	Compliant
FCC §15.225(e) IC RSS-210 §A.2.6	Frequency Stability	Compliant

4 FCC §15.203 & IC RSS-Gen §7.1.4 – ANTENNA REQUIREMENT

4.1 Applicable Standard

According to FCC §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.

According to IC RSS-Gen §7.1.4, A transmitter can only be sold or operated with antennas with which it was certified. A transmitter may be certified with multiple antenna types. An antenna type comprises antennas having similar in-band and out-of-band radiation patterns. Testing shall be performed using the highest-gain antenna of each combination of transmitter and antenna type for which certification is being sought, with the transmitter output power set at the maximum level. Any antenna of the same type and having equal or lesser gain as an antenna that had been successfully tested for certification with the transmitter, will also be considered certified with the transmitter, and may be used and marketed with the transmitter. The manufacturer shall include with the application for certification a list of acceptable antenna types to be used with the transmitter.

Result

Refer to statement below for compliance.

“The antenna for this device is an integral antenna that the end user cannot access. Furthermore the device is for indoor/outdoor use as detailed in the Users Manual and Operational Description”.

5 FCC §15.205, §15.209, §15.225 & IC RSS-210 §2.6, §A2.6 - RADIATED EMISSION TEST

5.1 Applicable Standard

As per FCC §15.225 and IC RSS-210 §2.6, §A2.6:

(a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/ meter at 30 meters.

(b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

(c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

(d) The field strength of any emissions appearing outside of the 13.110–14.010 MHz band shall not exceed the general radiated emission limits in § 15.209.

(e) The frequency tolerance of the carrier signal shall be maintained within }0.01% of the operating frequency over a temperature variation of ¥20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

(f) In the case of radio frequency powered tags designed to operate with a device authorized under this section, the tag may be approved with the device or be considered as a separate device subject to its own authorization. Powered tags approved with a device under a single application shall be labeled with the same identification number as the device.

5.2 EUT Setup

The radiated emission tests were performed in the open area 3-meter test site, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC 15 Subpart C and IC RSS-210 limits.

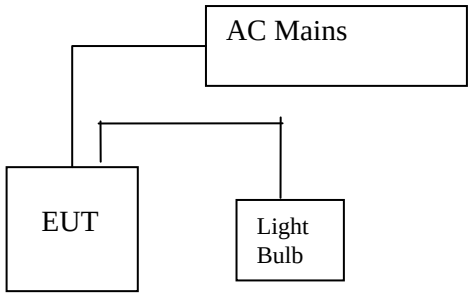
The spacing between the peripherals was 10 centimeters.

External I/O cables were draped along the edge of test table and bundle when necessary.

The EUT was placed on the turn table

The EUT was connected to a 208 V, 60 Hz 3-Phase AC line power source.
.

5.3 Test Setup Block Diagram



Note: EUT is floor standing equipment

5.4 Test Procedure

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT is compliant with all installation combination.

All data was recorded in the peak detection mode. Quasi-peak readings performed only when an emission was found to be marginal (within -4 dB of specification limitation), and are distinguished with a "**QP**" in the data table.

The EUT was operating at normal to represent worst case during final qualification test. Therefore, this configuration was used for final test data recorded in the following table of this report.

5.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corrected Amplitude = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7 dB means the emission is 7 dB below the maximum limit for Class B. The equation for margin calculation is as follows:

Margin = Corrected Amplitude – Limit

5.6 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Hewlett Packard	Pre amplifier	8447D	2944A07030	2010-04-16
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100338	2010-06-24
Sunol Science Corp	System Controller	SC99V	122303-1	N/R
Sunol Science Corp	Combination Antenna	JB1	A020106-1	2010-05-28
COM-POWER	Loop Antenna	AL-130	17043	2010-06-01
A.R.A Inc	Horn antenna	DRG-1181A	1132	2009-10-27
Agilent	Spectrum Analyzer	E4440A	MY44303352	2010-05-09
HP	Pre Amplifier	8449B	3147A00400	2010-02-01

* **Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

5.7 Test Environmental Conditions

Temperature:	22.3 °C
Relative Humidity:	42 %
ATM Pressure:	100.7 kPa

**The testing was performed by Kevin Li from 2010-08-24 to 2010-08-27 in 5 meter chamber 3.*

5.8 Summary of Test Results

According to the data in the following table, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.225 and IC RSS-210, RSS-Gen. The EUT had the worst margin reading of:

-23.44 dB at **113.56 MHz Vertical** polarization 9 kHz to 1 GHz

Co-location with CDMA Modem and 802.15.4 Radio:

-10.62 dB at **1190 MHz** in the **Horizontal** polarization 30 MHz to 25 GHz

Co-location with GPRS Modem and 802.15.4 Radio:

-10.33 dB at **1180 MHz** in the **Vertical** polarization 30 MHz to 25 GHz

5.9 Radiated Emissions Test Result Data

9 kHz to 30 MHz

Frequency (MHz)	S.A. Reading (dBuV/m)	Turntable Degrees	Antenna		Cable Loss (dB)	Distance Factor (dB)	Cord. Amp. (dBuV/m)	FCC/IC	
			Height (m)	Factor (dB/m)				Limit (dBuV/m)	Margin (dB)
10.95	26.21	28	1	11.6	0.1	40	-2.09	29.5	-31.59
13.35	27.59	15	1	11.3	0.1	40	-1.01	40.51	-41.52
13.72	28.1	113	1	11.3	0.1	40	-0.5	40.51	-41.01
13.63	35.64	152	1	11.3	0.1	40	7.04	50.5	-43.46
13.48	32.15	147	1	11.3	0.1	40	3.55	50.5	-46.95
13.56	52.87	156	1	11.3	0.1	40	24.27	84	-59.73

30 to 1000 MHz:

Frequency (MHz)	Corrected Amplitude (dB)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Limit (dBµV/m)	Margin (dB)
545.63	22.56	208	V	72	46	-23.44

Co-location with CDMA 850, RFID and Zigbee:

30 to 1000 MHz:

Frequency (MHz)	Corrected Amplitude (dB)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Limit (dBµV/m)	Margin (dB)
545.672	23.56	208	V	72	46	-22.44
606.891	19.59	383	H	68	46	-26.51
605.186	28.12	251	H	58	46	-17.88

Above 1 G Hz

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Amp. (dBµV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
1180	70.99	203	100	V	24.65	3.66	37.53	61.77	74	-12.23	peak
1180	72.36	94	100	H	24.65	3.66	37.53	63.14	74	-10.86	peak
1180	43.78	203	100	V	24.65	3.66	37.53	34.56	54	-19.44	Ave
1180	44.03	62	151	H	24.65	3.66	37.53	34.81	54	-19.19	Ave

Co-location with CDMA 1900, RFID and Zigbee:

30 to 1000 MHz:

Frequency (MHz)	Corrected Amplitude (dB)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Limit (dBµV/m)	Margin (dB)
543.9663	25.74	310	V	36	46	-19.26
603.1305	27.06	237	H	62	46	-18.94

Above 1 G Hz:

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Amp. (dBµV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
1190	73.56	183	100	V	24.65	3.66	37.53	64.34	74	-9.66	peak
1190	72.60	93	100	H	24.65	3.66	37.53	63.38	74	-10.62	peak
1190	45.53	183	100	V	24.65	3.66	37.53	36.31	54	-17.69	Ave
1190	44.52	93	100	H	24.65	3.66	37.53	35.30	54	-18.7	Ave

Co-location with GPRS Cellular 850, RFID and Zigbee:

30 to 1000 MHz:

Frequency (MHz)	Corrected Amplitude (dB)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Limit (dBµV/m)	Margin (dB)
540.5673	26.98	289	V	52	46	-19.02
606.0180	18.72	201	H	76	46	-27.28
602.5813	26.36	131	H	101	46	-19.64

Above 1 G Hz:

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Amp. (dBµV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
1180	72.89	192	100	V	24.65	3.66	37.53	63.67	74	-10.33	peak
1180	71.94	97	100	H	24.65	3.66	37.53	62.72	74	-11.28	peak
1180	44.12	192	100	V	24.65	3.66	37.53	34.90	54	-19.10	Ave
1180	43.57	97	100	H	24.65	3.66	37.53	34.35	54	-19.65	Ave

Co-location with GPRS PCS 1900, RFID and Zigbee:

30 to 1000 MHz:

Frequency (MHz)	Corrected Amplitude (dB)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Limit (dBµV/m)	Margin (dB)
534.5135	22.25	103	H	172	46	-23.75
296.3708	32.97	155	H	191	46	-13.03

Above 1 G Hz:

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Amp. (dBµV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
1180	71.08	198	100	V	24.65	3.66	37.53	61.86	74	-12.14	peak
1180	72.56	96	100	H	24.65	3.66	37.53	63.34	74	-10.66	peak
1180	43.32	198	100	V	24.65	3.66	37.53	34.10	54	-19.90	Ave
1180	44.77	96	151	H	24.65	3.66	37.53	35.55	54	-18.45	Ave

6 FCC §15.207 & IC RSS-GEN – AC LINE CONDUCTED EMISSIONS

6.1 Applicable Standard

FCC §15.207 & IC RSS-Gen §7.2.2 Conducted limits:

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 frequencies 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*

According to "New Policies for Part 15 Devices" release on May 10-13, 2005:
AC line-conducted emissions measurements conducted emissions measurements of Part 15 transmitters that operate < 30 MHz

Although ANSI C63.4-2003 is designed for Part 15 transmitters that operate above 30 MHz with a detachable antenna, we are willing to accept measurements on a 13.56 MHz transmitter done with a dummy load under the following conditions:

1) First, perform the AC line conducted tests with the antenna attached to make sure the device complies with the §15.207 limits outside the transmitter's fundamental emission band.

2) Second, retest with a dummy load to make sure the device complies with the 15.207 limits inside the transmitter's fundamental emission band. Only the fundamental TX emission band needs to be retested.

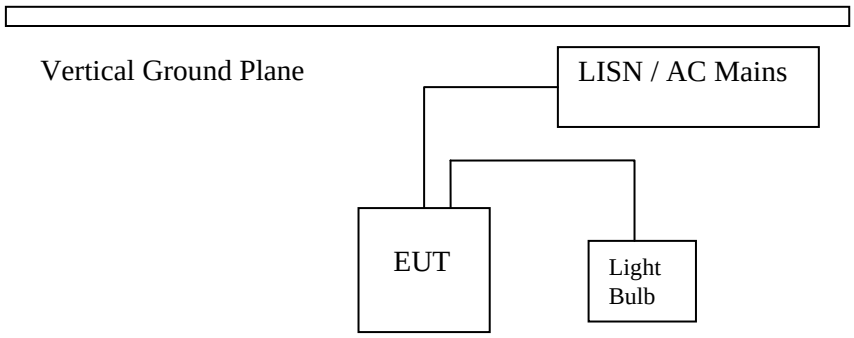
6.2 Test Setup

The measurement was performed at shield room, using the setup per ANSI C63.4 – 2003 measurement procedure. The specification used was FCC §15.207 and IC RSS-Gen limits.

External I/O cables were draped along the edge of the test table and bundle when necessary.

The host of EUT was connected with LISN-1.

6.3 Test Setup Block Diagram



Note: EUT is floor standing equipment

6.4 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
TTE	Filter, High Pass	H9962-150K-50-21378	K7133	2010-06-10
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100338	2010-06-24
Solar Electronics	LISN	9252-R-24-BNC	511205	2010-06-25

**** Statement of Traceability: BACL Corp.*** *attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.*

6.5 Test Procedure

During the conducted emissions test, the power cord of the host was connected to the mains outlet of the LISN-1.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the peak detection mode, quasi-peak and average. Quasi-Peak readings are distinguished with a “QP”. Average readings are distinguished with an “Ave”.

6.6 Test Environmental Conditions

Temperature:	22.3 °C
Relative Humidity:	42 %
ATM Pressure:	100.7 kPa

**The testing was performed by Kevin Li on 08-27-2010 in 5 meter chamber 3.*

6.7 Summary of Test Results

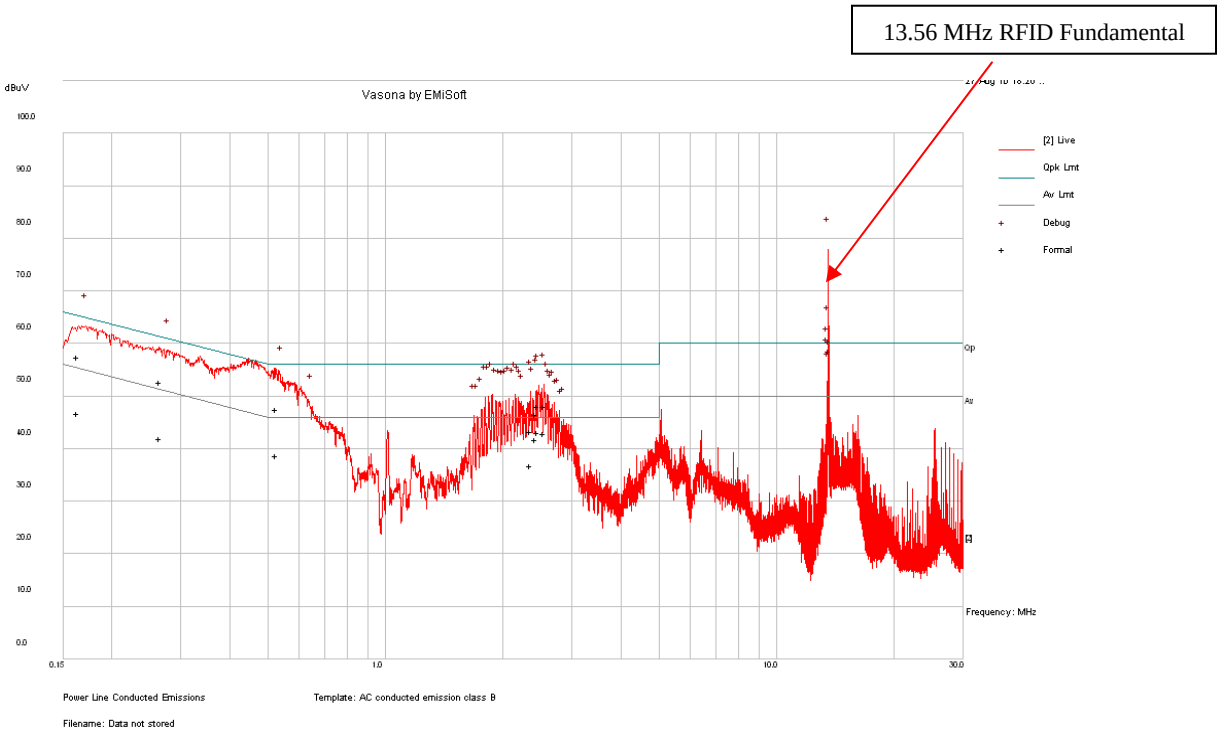
According to the recorded data in following table, the EUT complied with the FCC Part 15.207 and IC RSS-Gen standard's conducted emissions limits, with the *worst* margin reading of:

-0.33 dB at 0.33744 **MHz** in the **Line 2** Conductor mode

Please refer to the following plots and tables for complete test results

13.56 MHz RFID Antenna Attached:

208 V, 60 Hz-Line 1



Quasi-Peak Measurement:

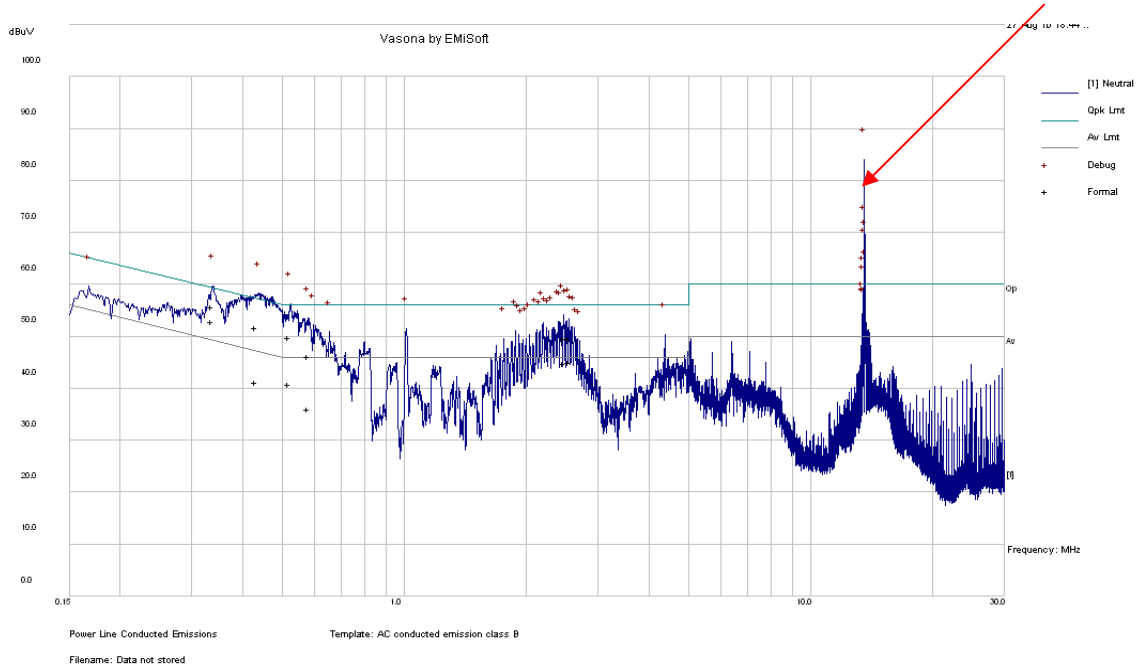
Frequency (MHz)	Corrected Amplitude (dBuV)	Measurement Type	Line/Neutral	Limit (dBuV)	Margin (dB)
0.163665	57.51	Quasi Peak	Line-1	65.28	-7.77
2.463110	48.15	Quasi Peak	Line-1	56.00	-7.85
2.544065	48.07	Quasi Peak	Line-1	56.00	-7.93
0.526749	47.52	Quasi Peak	Line-1	56.00	-8.48
0.265398	52.59	Quasi Peak	Line-1	61.26	-8.67
2.424235	46.47	Quasi Peak	Line-1	56.00	-9.53

Average Measurements:

Frequency (MHz)	Corrected Amplitude (dBuV)	Measurement Type	Line/Neutral	Limit (dBuV)	Margin (dB)
2.463110	43.14	Average	Line-1	46.00	-2.86
2.544065	42.98	Average	Line-1	46.00	-3.02
2.424235	41.81	Average	Line-1	46.00	-4.19
0.526749	38.75	Average	Line-1	46.00	-7.25
0.163665	46.66	Average	Line-1	55.28	-8.61
0.265398	41.89	Average	Line-1	51.26	-9.37

208 V, 60 Hz-Line 2

13.56 MHz RFID Fundamental



Quasi-Peak Measurements:

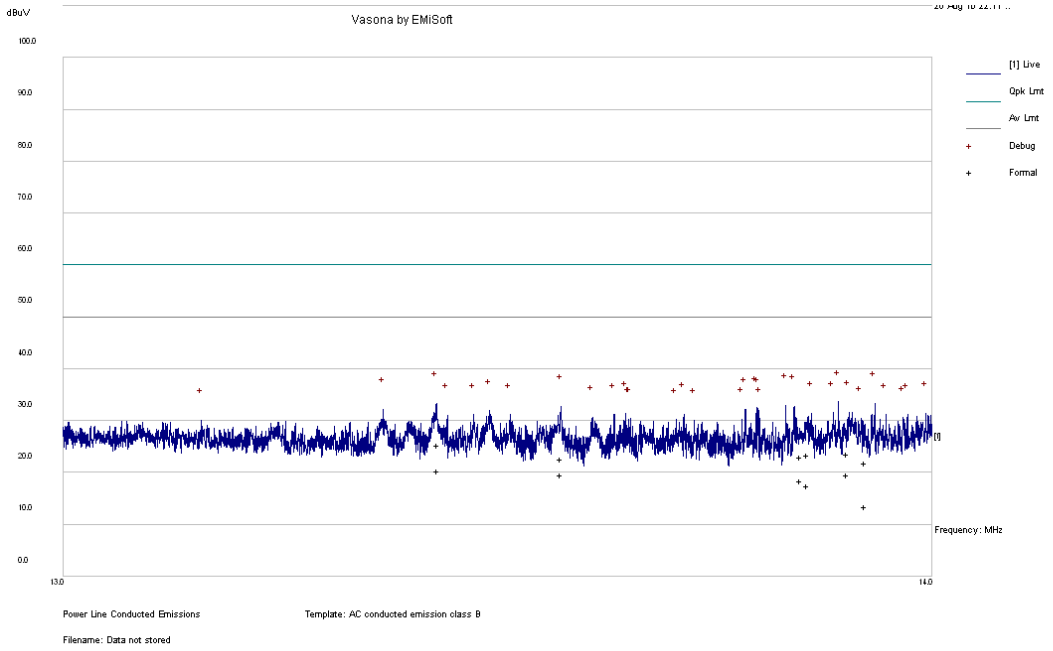
Frequency (MHz)	Corrected Amplitude (dBuV)	Measurement Type	Line/Neutral	Limit (dBuV)	Margin (dB)
0.432264	51.72	Quasi Peak	Line-2	57.21	-5.49
0.337440	55.68	Quasi Peak	Line-2	59.27	-3.59
0.521736	49.75	Quasi Peak	Line-2	56.00	-6.25
2.463449	49.54	Quasi Peak	Line-2	56.00	-6.46
0.581517	46.16	Quasi Peak	Line-2	56.00	-9.84
2.542316	49.67	Quasi Peak	Line-2	56.00	-6.33

Average Measurements:

Frequency (MHz)	Corrected Amplitude (dBuV)	Measurement Type	Line/Neutral	Limit (dBuV)	Margin (dB)
0.432264	41.29	Average	Line-2	47.21	-5.92
0.337440	48.94	Average	Line-2	49.27	-0.33
0.521736	40.75	Average	Line-2	46.00	-5.25
2.463449	44.80	Average	Line-2	46.00	-1.20
0.581517	36.13	Average	Line-2	46.00	-9.87
2.542316	44.95	Average	Line-2	46.00	-1.05

13.56 MHz RFID with Dummy Load TX band:

208 V, 60 Hz – Line 1 (13 to 14 MHz)



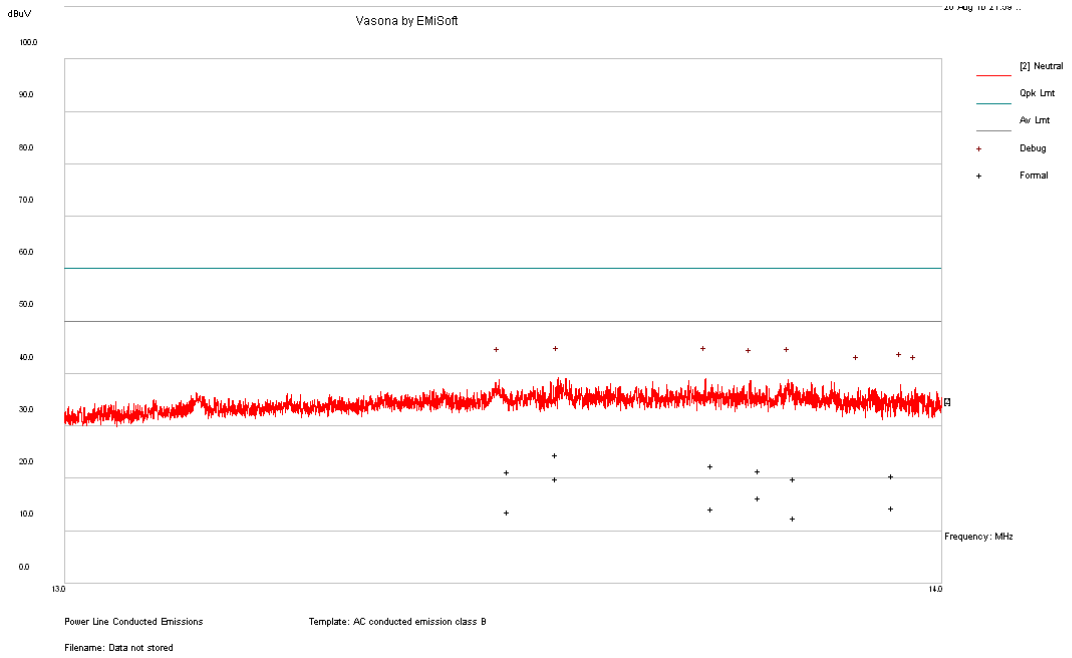
Quasi-Peak Measurements:

Frequency (MHz)	Corrected Amplitude (dBuV)	Measurement Type	Line/Neutral	Limit (dBuV)	Margin (dB)
13.42300	25.25	Quasi Peak	Line-1	60	-34.75
13.89947	23.62	Quasi Peak	Line-1	60	-36.38
13.85196	23.50	Quasi Peak	Line-1	60	-36.50
13.84386	22.98	Quasi Peak	Line-1	60	-37.02
13.56439	22.56	Quasi Peak	Line-1	60	-37.44
13.92103	21.83	Quasi Peak	Line-1	60	-38.17

Average Measurements:

Frequency (MHz)	Corrected Amplitude (dBuV)	Measurement Type	Line/Neutral	Limit (dBuV)	Margin (dB)
13.42300	20.26	Average	Line-1	50	-29.74
13.89947	19.52	Average	Line-1	50	-30.48
13.56439	19.49	Average	Line-1	50	-30.51
13.84386	18.44	Average	Line-1	50	-31.56
13.85196	17.49	Average	Line-1	50	-32.51
13.92103	13.50	Average	Line-1	50	-36.50

208 V, 60 Hz – Line 2 (13 to 14 MHz)



Quasi-Peak Measurements:

Frequency (MHz)	Corrected Amplitude (dBuV)	Measurement Type	Line/Neutral	Limit (dBuV)	Margin (dB)
13.55221	24.47	Quasi Peak	Line-2	60	-35.53
13.73123	22.39	Quasi Peak	Line-2	60	-37.61
13.78556	21.52	Quasi Peak	Line-2	60	-38.48
13.49686	21.32	Quasi Peak	Line-2	60	-38.68
13.94190	20.47	Quasi Peak	Line-2	60	-39.53
13.82604	20.05	Quasi Peak	Line-2	60	-39.95

Average Measurements:

Frequency (MHz)	Corrected Amplitude (dBuV)	Measurement Type	Line/Neutral	Limit (dBuV)	Margin (dB)
13.55221	20.04	Average	Line-2	50	-29.96
13.78556	16.29	Average	Line-2	50	-33.71
13.94190	14.39	Average	Line-2	50	-35.61
13.73123	14.31	Average	Line-2	50	-35.69
13.49686	13.57	Average	Line-2	50	-36.43
13.82604	12.57	Average	Line-2	50	-37.43

7 FCC §15.225(e) & IC RSS-210 §A2.6 - FREQUENCY STABILITY MEASUREMENT

7.1 Standard Applicable

According to FCC §15.225(e), the frequency tolerance of the carrier signal shall be maintained within ± 0.01% of the operating frequency over a temperature variation of –20 degrees to + 50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

According to RSS 210 §A2.6, Carrier frequency stability shall be maintained to ±0.01% (±100 ppm).

7.2 Frequency stability versus environmental temperature

The equipment under test was connected to an external AC power supply and the RF output was connected to a frequency counter via feed through attenuators. The EUT was placed inside the temperature chamber.

After the temperature stabilized for approximately 20 minutes, the frequency of the output signal was recorded from the counter.

7.3 Frequency Stability versus Input Voltage

At room temperature (25±5°C), an external variable DC power supply was connected to the EUT. The frequency of the transmitter was measured for 115%, 100% and 85% of the nominal operating input voltage.

7.4 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Agilent	Series Spectrum Analyzer	E4440A	US45303156	2010-08-09
Espec	Chamber, Temperature	ESL-4CA	18010	2009-12-15

*** Statement of Traceability: BACL Corp**. attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

7.5 Test Environmental Conditions

Temperature:	22.3 °C
Relative Humidity:	42 %
ATM Pressure:	100.7 kPa

The testing was performed by Kevin Li on 2010-08-27 at RF Site.

7.6 Test Results

Test Environment		Reference Frequency (Hz)	Measured Frequency (Hz)	Frequency Error (Hz)	Limit* (Hz)
Voltage (Vac)	Temperature (^{O}C)				
208	-30	13560000	13560696	696	1356
208	-20	13560000	13560732	732	1356
208	-10	13560000	13560960	960	1356
208	0	13560000	13560561	561	1356
208	10	13560000	13560375	375	1356
208	20	13560000	13560636	636	1356
208	30	13560000	13560487	487	1356
208	50	13560000	13560658	658	1356
177	20	13560000	13560549	549	1356
239	20	13560000	13560793	793	1356

Note: The limit is ± 0.01% of the operating frequency, the fundamental of EUT is 13.56 MHz.

8 EXHIBIT A - FCC ID & IC LABEL INFORMATION

8.1 FCC ID Label Requirements

As per FCC §2.925,

(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 of a type size large enough to be legible without the aid of magnification.

Example: FCC ID XXX123. XXX—Grantee Code 123—Equipment Product Code

As per FCC §15.19,

(a) In addition to the requirements in part 2 of this chapter, a device subject to certification, or verification shall be labeled as follows:

(3) All other devices 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.

(4) Where a device is constructed in two or more sections connected by wires and marketed together, the statement specified above is required to be affixed only to the main control unit. If the EUT is integrated within another device then a label affixed to the host shall also state, “Contains FCC ID: XXXXXX”

(5) When the device is so small or for such use that it is not practicable to place the statement specified under paragraph (a) of this section on it, the information required by this paragraph shall be placed in a prominent location in the instruction manual or pamphlet supplied to the user or, alternatively, shall be placed on the container in which the device is marketed. However, the FCC identifier or the unique identifier, as appropriate, must be displayed on the device.

8.2 IC Label Requirements

As per IC RSS-Gen § 5, the certification number shall appear as follows:

IC: XXXXXX-YYYYYYYY

Where:

- "XXXXXX-YYYYYYYY" is the certification number
- "XXXXXX" is the Certificate Holder Number (CHN), made of at most 6 alphanumeric characters (A-Z, 0-9), assigned by Industry Canada; and
- "YYYYYYYY" is the Unique Product Number (UPN), made of at most 11 alphanumeric characters (A-Z, 0-9) assigned by the applicant.
- Note 1: The term "IC" before the equipment certification number only signifies that the Industry Canada technical specifications were met.
- Note 2: Note 1 shall be conspicuously placed in the equipment user manual.
- Note 3: Permitted alphanumeric characters used in the CHN and UPN are limited to capital letters (A-Z) and digits (0-9). Other characters, such as "#", "/" or "-", shall not be used.

As per RSS-Gen §5.2 Equipment Labeling:

Equipment subject to certification under the applicable RSS, shall be permanently labeled on each item, or as an inseparable combination. The label must contain the following information for full compliance:
(a) the certification number, prefixed by the term "IC:";
(b) the manufacturer's name, trade name or brand name; and
(c) a model name or number.
Equipment for which a certificate has been issued is not considered certified if it is not properly labeled.
The information on the Canadian label can be combined with the manufacturer's other labeling requirements.
If the device size is too small to put a label, the label can be included in the user's manual, upon agreement with Industry Canada.

8.3 FCC ID & IC Label Contents

Model: CT2000

Coulomb Technologies, Inc.
FCC ID: W38-CT21002000-01 CONTAINS FCC ID: W38-17-001002-01, W38-17-001003-01
IC: 8854A-21002000 CONTAINS IC: 5969A-APEXLT, IC: 125A-0010
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. This Class A digital device complies with Canadian ICES-003.
Cet appareil numérique de la classe A conforme es à la NMB-003 du Canada.

Coulomb Technologies, Inc.
FCC ID: W38-CT21002000-01 CONTAINS FCC ID: W38-17-001002-01, W38-17-001004-01
IC: 8854A-21002000 CONTAINS IC: 5969A-APEXLT, IC: 125A-0027
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. This Class A digital device complies with Canadian ICES-003.
Cet appareil numérique de la classe A conforme es à la NMB-003 du Canada.

Model: CT2100

Coulomb Technologies, Inc.
FCC ID: W38-CT21002000-01 CONTAINS FCC ID: W38-17-001002-01, W38-17-001003-01
IC: 8854A-21002000 CONTAINS IC: 5969A-APEXLT, IC: 125A-0010
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. This Class A digital device complies with Canadian ICES-003.
Cet appareil numérique de la classe A conforme es à la NMB-003 du Canada.

Coulomb Technologies, Inc.
FCC ID: W38-CT21002000-01 CONTAINS FCC ID: W38-17-001002-01, W38-17-001004-01
IC: 8854A-21002000 CONTAINS IC: 5969A-APEXLT, IC: 125A-0027
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. This Class A digital device complies with Canadian ICES-003.
Cet appareil numérique de la classe A conforme es à la NMB-003 du Canada.

Specifications: Text is black or white in color and is left justified. Labels are silk-screened and shall be "permanently affixed" at a conspicuous location on the EUT.

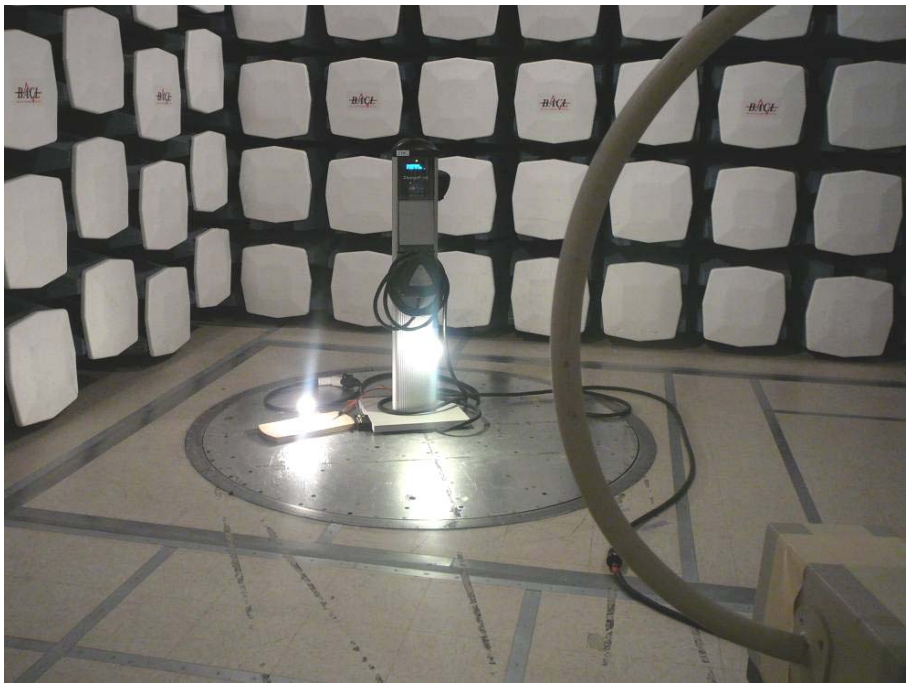
8.4 Proposed FCC ID & IC Label Location on EUT

Model: CT2000

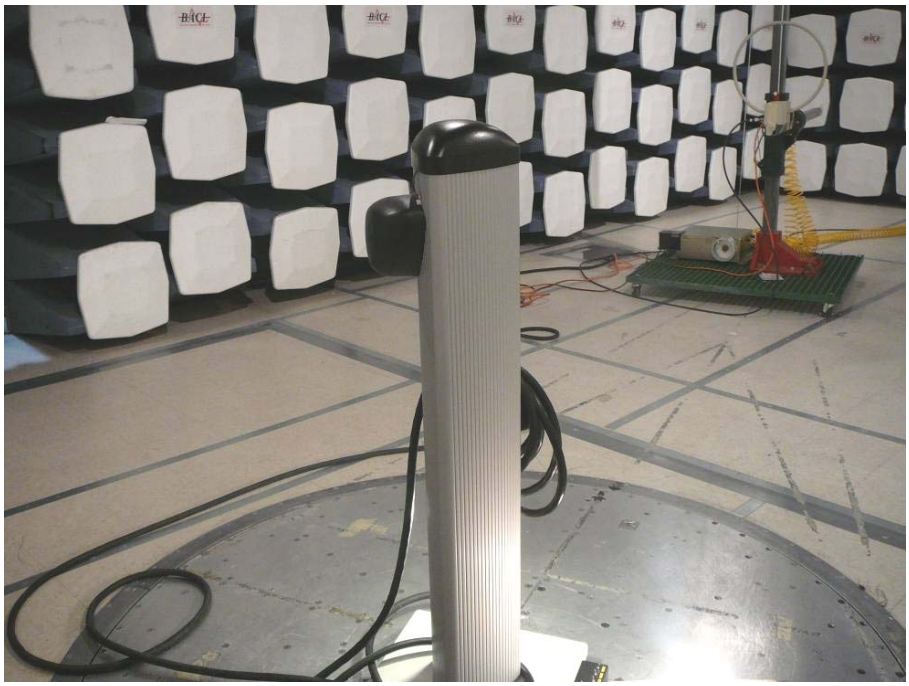
Model: CT2100

9 EXHIBIT B - TEST SETUP PHOTOGRAPHS

9.1 Radiated Emission below 30 MHz – Front View

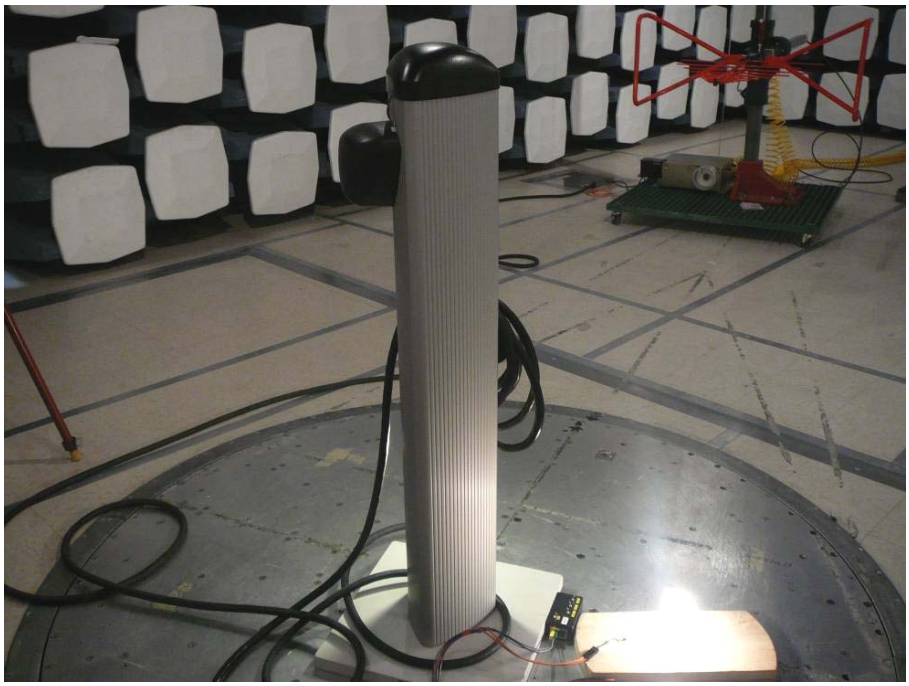


9.2 Radiated Emission below 30 MHz – Rear View

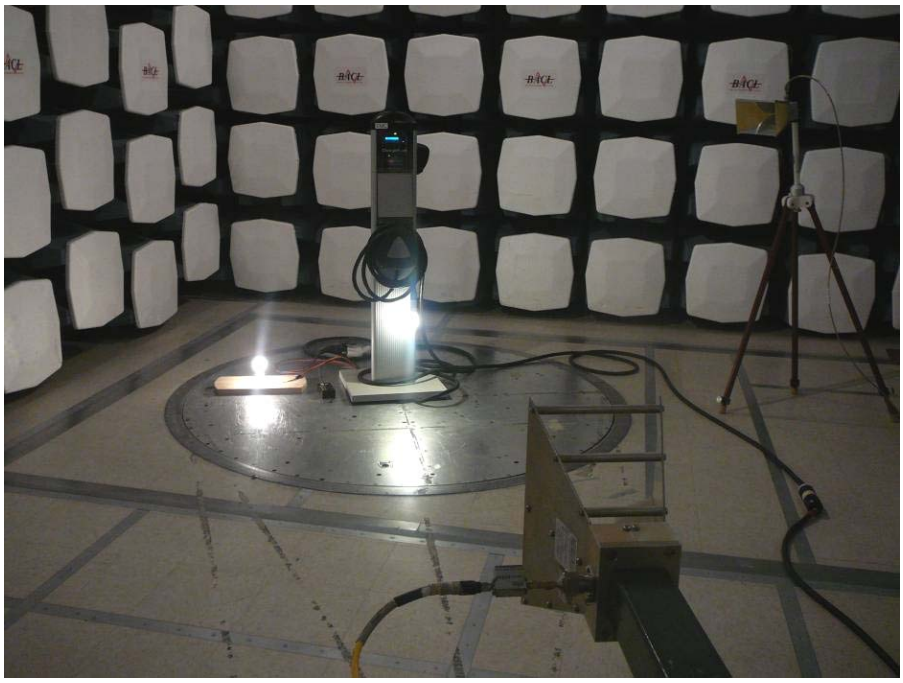


9.3 Radiated Emission above 30 MHz – Front View

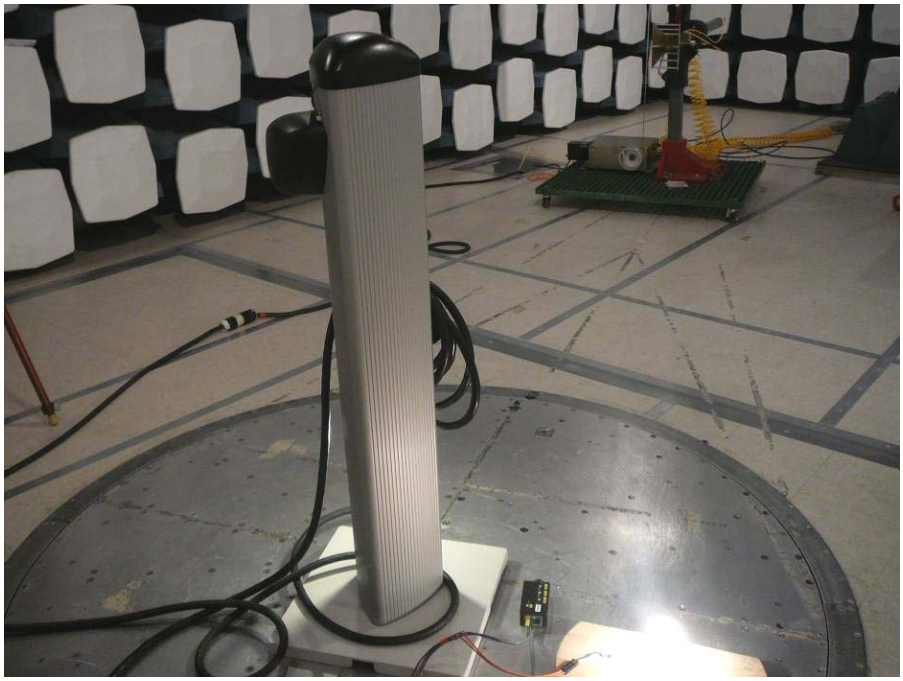
9.4 Radiated Emission above 30 MHz – Rear View



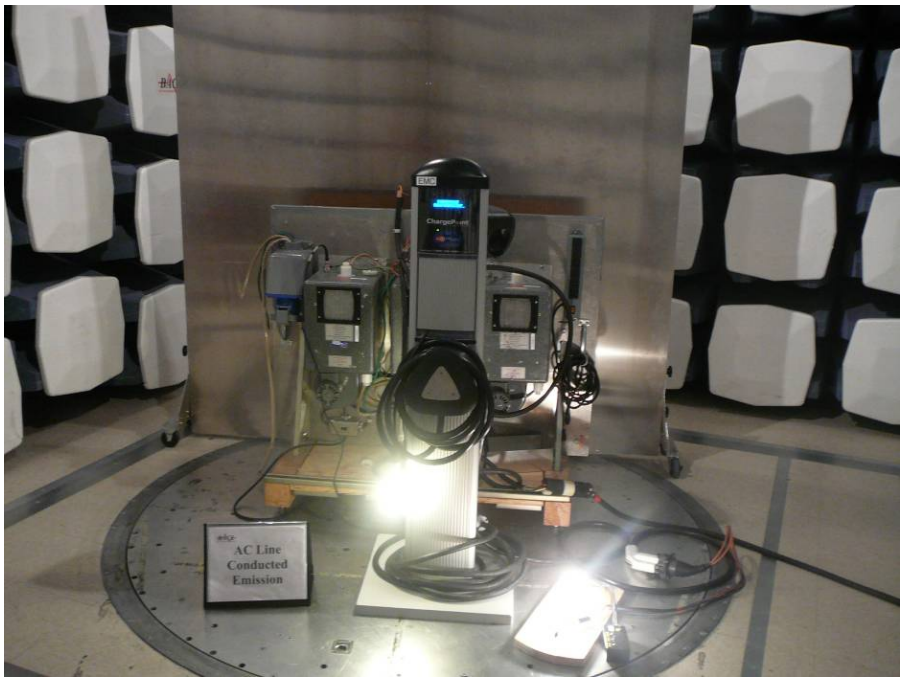
9.5 Radiated Emission above 1 GHz- Front View



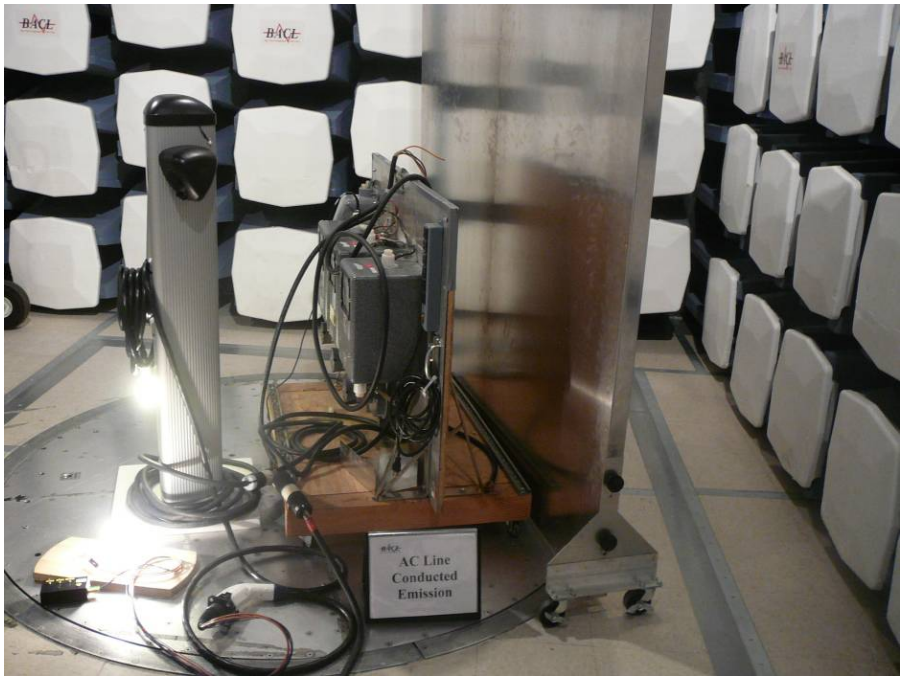
9.6 Radiated Emission above 1 GHz – Rear View



9.7 Conducted Emission – Front View



9.8 Conducted Emission – Side View



9.9 Frequency Stability Testing

10 EXHIBIT C - EUT PHOTOGRAPHS

10.1 EUT - Front View (CT2100)

10.2 EUT - Back View (CT2100)

10.3 EUT - Side View (CT2100)

10.4 EUT - Stand View (CT2100)

10.5 EUT - Front View with Pilot (CT2000)

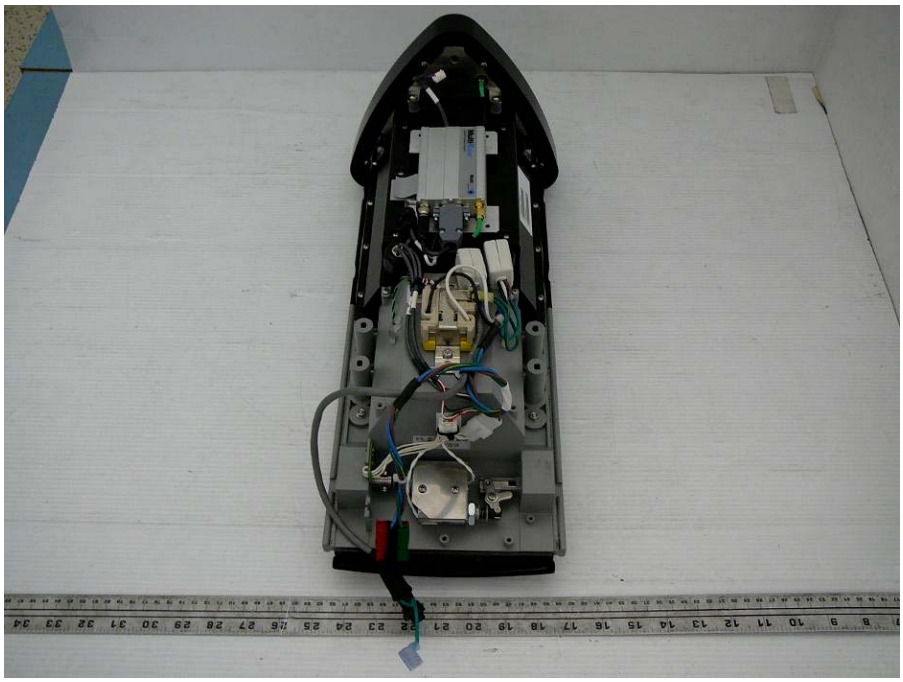
10.6 EUT – Head View (CT2000)

10.7 EUT - Side View (CT2000)

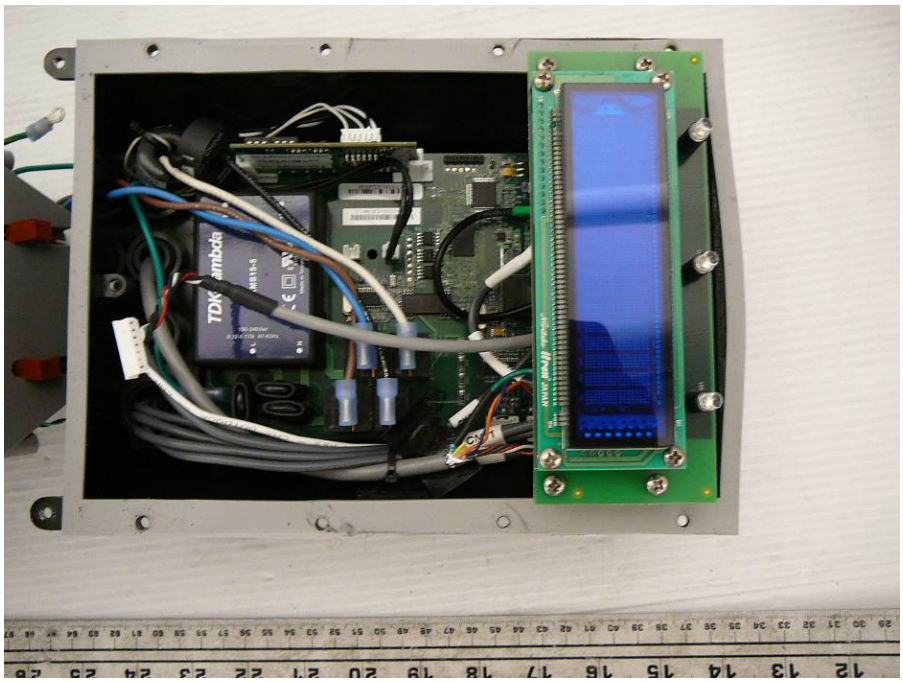
10.8 EUT - Stand View (CT2100)

10.9 EUT – Main Body Front View

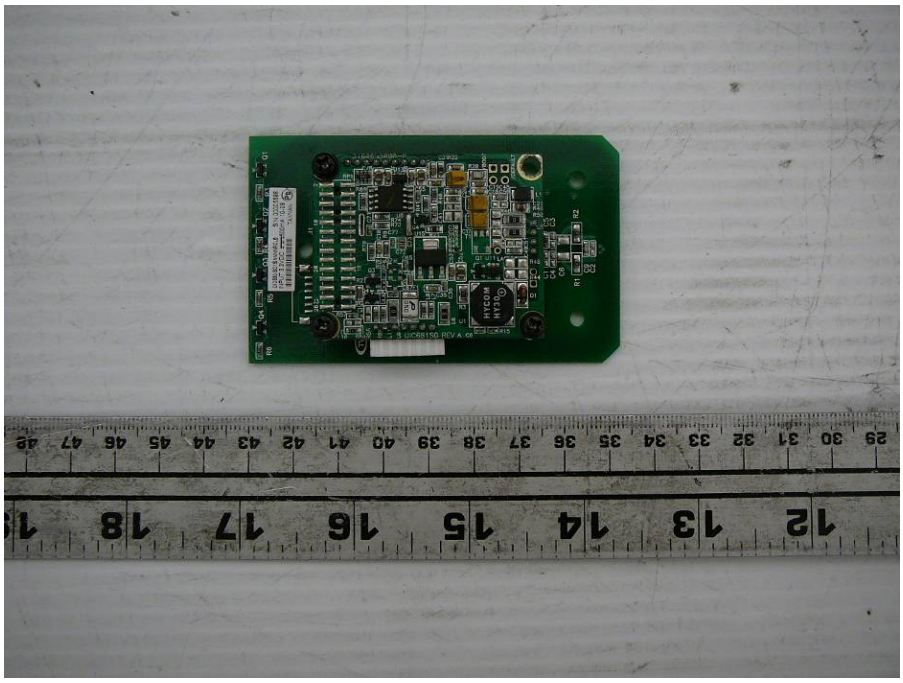
10.10 EUT - Main Body Back View



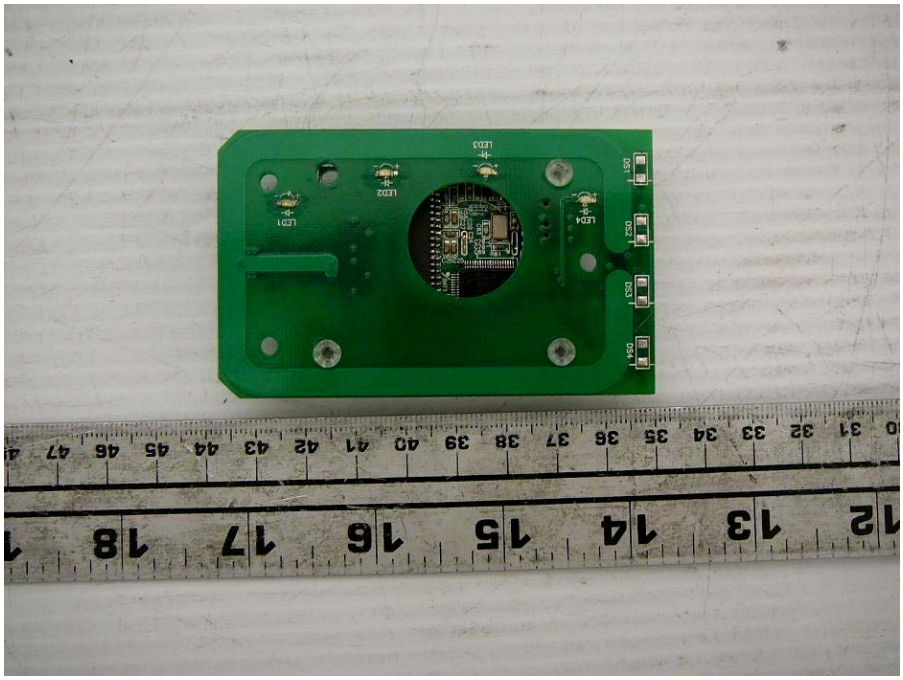
10.11 EUT - Main Body Cover off View



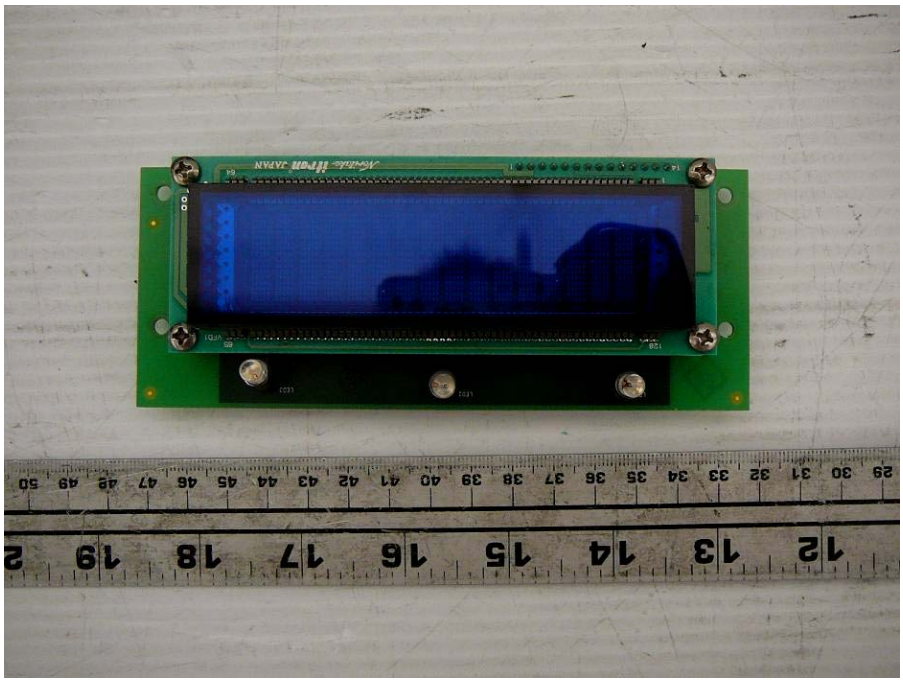
10.12 EUT – RFID Board Front View



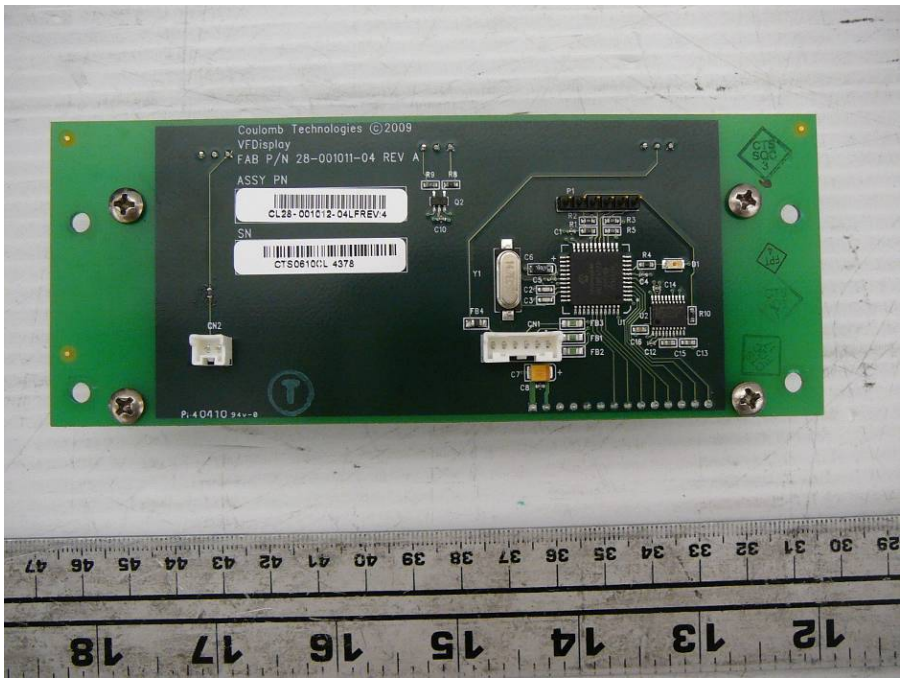
10.13 EUT – RFID Board Back View



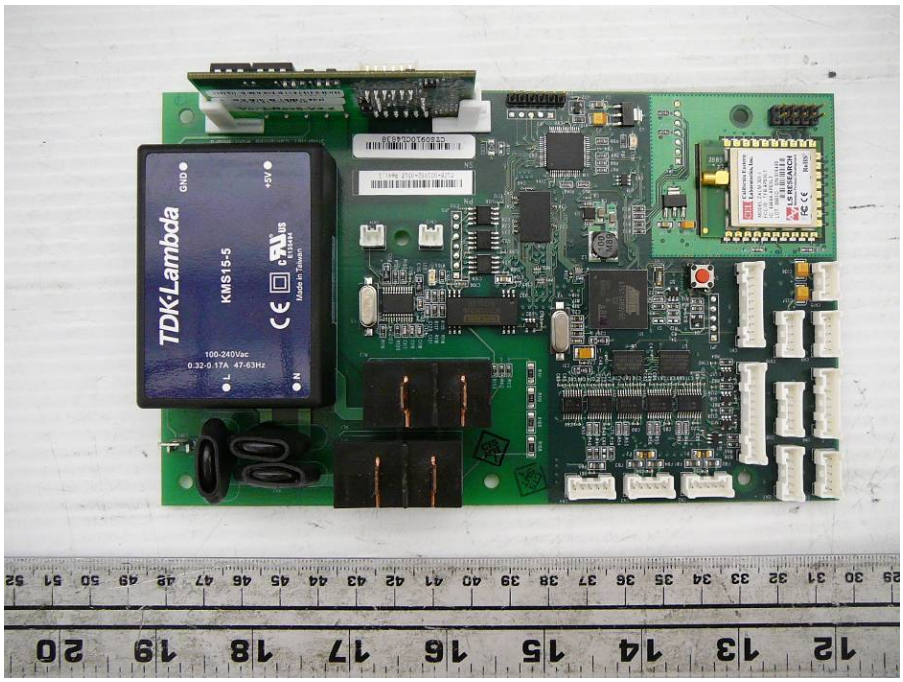
10.14 EUT – Display Board Front View



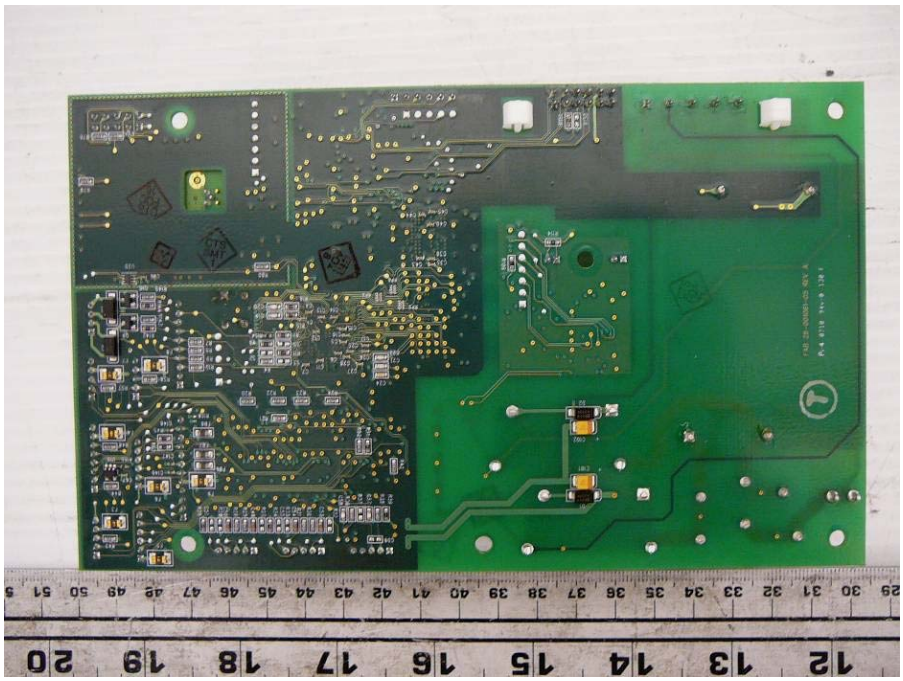
10.15 EUT – Display Board Back View



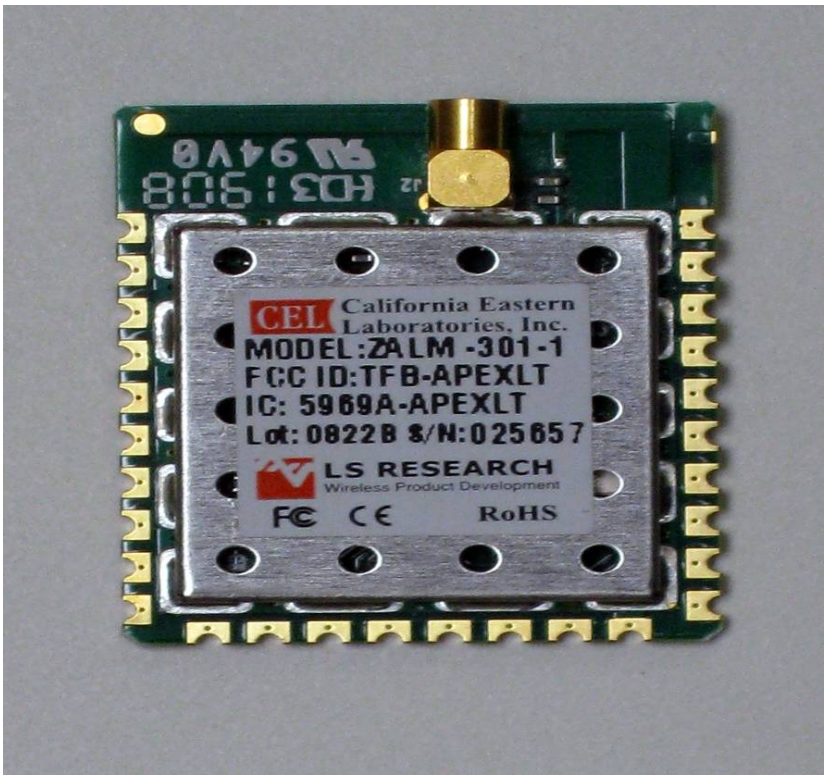
10.16 EUT – Main Board Front View



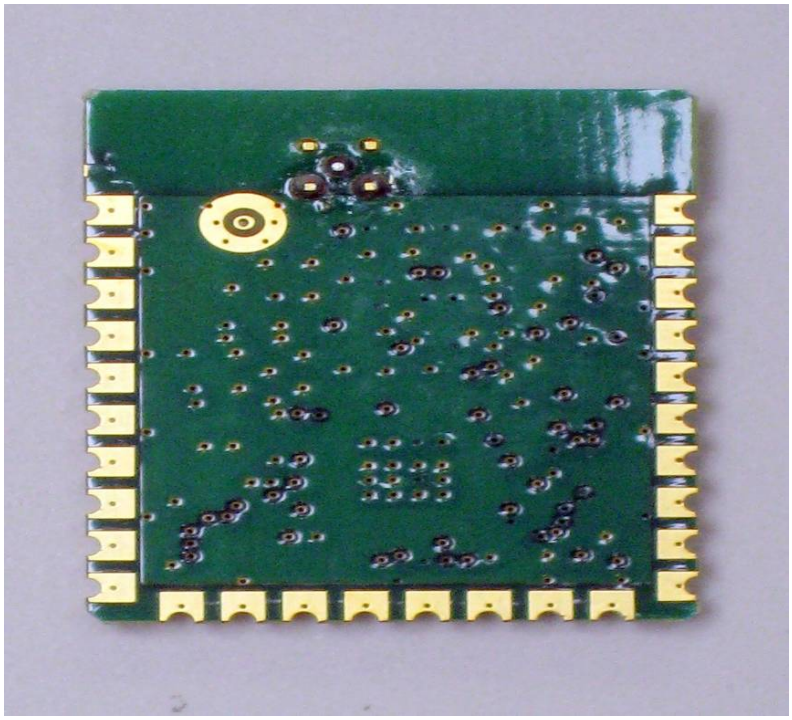
10.17 EUT – Main Board Back View



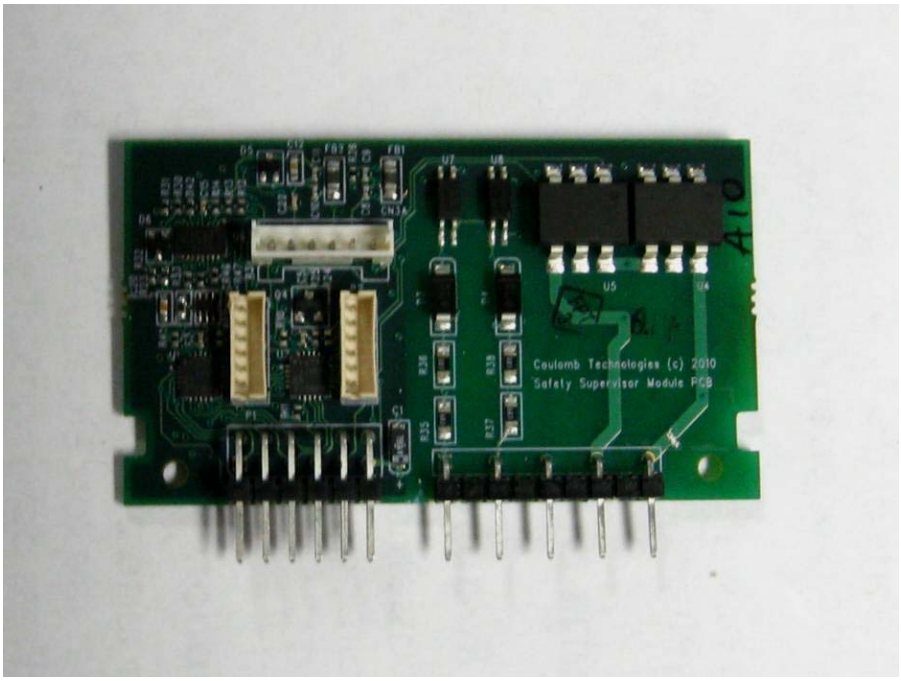
10.18 EUT – Zigbee Module Front View



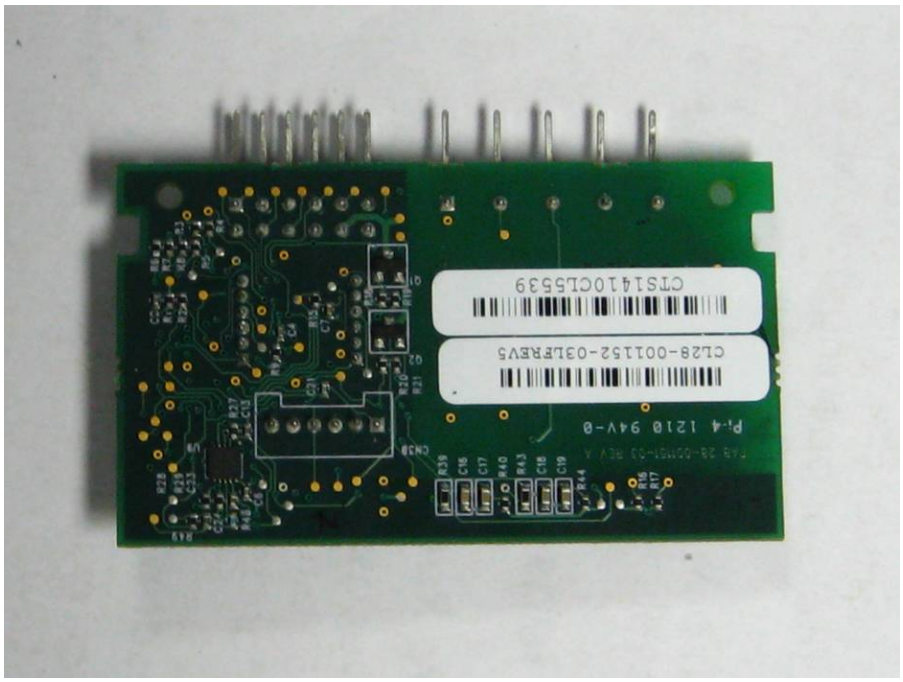
10.19 EUT – Zigbee Module Back View



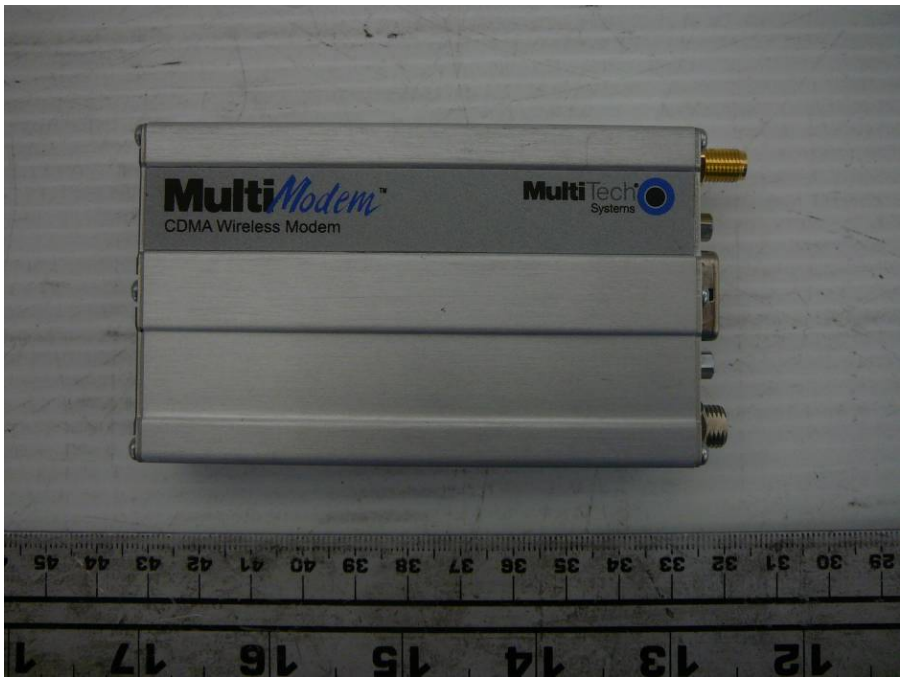
10.20 EUT –Safety Supervisor Board Front View



10.21 EUT – Safety Supervisor Board Back View



10.22 EUT –CDMA Modem Front View



10.23 EUT -CDMA Modem Back View

10.24 EUT –GPRS Modem Front View

10.25 EUT -GPRS Modem Back View

10.26 CDMA/GPRS Module Antenna View

******* End of Report *******