



# LSRESEARCH, LLC

Wireless Product Development

W66 N220 Commerce Court • Cedarburg, WI 53012 USA • Phone: 262.375.4400 • Fax: 262.375.4248 • www.lsr.com

## ENGINEERING TEST REPORT # 311272 (V3)

**LSR Job #: C-1426**

### Compliance Testing of:

SAL-BLEMOD1

### Test Date(s):

March 23, 28, 30 2012

### Prepared For:

Salutron, Inc.

40979 Encyclopedia Circle

Fremont, CA 94538

### **In accordance with:**

**Federal Communications Commission (FCC)**

**Part 15, Subpart C, Section 15.247**

**Industry Canada (IC) RSS-210 Annex 8**

**Digital Transmission System (DTS) Operating**

**In the Frequency Band 2400-2483.5 MHz**

### **Intentional Radiators**

### **This Test Report is issued under the Authority of:**

Signature:

Date: 4-17-12

### **Test Report Reviewed by:**

Khairul Aidi Zainal, Senior EMC Engineer

Signature:

Date: 4/16/12

### **Report by:**

Adam Alger

Signature:

Date: 4-04-12

*This Test Report may not be reproduced, except in full, without written approval of LS Research, LLC.*

Prepared For: Salutron, Inc.

Report: TR 311272 A FCCICTX V3

LSR: C-1426

Name: SAL-BLEMOD1

Model: SAL-BLEMOD1

Serial: RF Conducted: 12060022; Radiated: 12060028

## **Table of Contents**

i.	Title Page .....	1
ii.	Table of Contents .....	2
iii.	LS Research, LLC Review .....	3
1.0	Summary of Test Report.....	4
2.0	Test Facilities .....	4
3.0	Client Information.....	5
3.1	Equipment Under Test (EUT) Information.....	5
3.2	Product Description .....	5
3.3	Modifications Incorporated In the EUT for Compliance Purposes .....	6
4.0	Conditions of Test.....	6
5.0	Additional Information .....	6
6.0	Test Equipment .....	6
7.0	Declaration of Conformity .....	7
Appendix A – Test Equipment .....		8
Appendix B – Setup Photos .....		9
Appendix C – Test Data.....		11
C.1 – RF Conducted Emissions .....		11
C.2 – Radiated Emissions .....		17
C.3 – Power Line Conducted Emissions.....		25
Appendix D - Uncertainty Summary .....		28
Appendix E - References .....		29
Appendix F – RF Exposure Exemption .....		30

## LS Research, LLC in Review

As an EMC Testing Laboratory, our Accreditation and Assessments are recognized through the following:

---



TESTING CERT #1255.01

A2LA – American Association for Laboratory Accreditation

Accreditation based on ISO/IEC 17025: 2005 with Electrical (EMC) Scope of Accreditation  
A2LA Certificate Number: 1255.01

---



Federal Communications Commission (FCC) – USA

Listing of 3 Meter Semi-Anechoic Chamber based on Title 47 CFR – Part 2.948  
FCC Registration Number: 90756

---



**Canada**

Industry Canada

On file, 3 Meter Semi-Anechoic Chamber based on RSS-212 – Issue 1  
File Number: IC 3088-A  
On file, 3 and 10 Meter OATS based on RSS-212 – Issue 1  
File Number: IC 3088

---



U. S. Conformity Assessment Body (CAB) Validation

Validated by the European Commission as a U. S. Competent Body operating under the U. S./EU, Mutual Recognition Agreement (MRA) operating under the European Union Electromagnetic Compatibility – Council Directive 2004/108/EC (formerly 89/336/EEC, Article 10.2).  
Date of Validation: January 16, 2001

Validated by the European Commission as a U.S. Notified Body operating under the U.S. /EU, Mutual Recognition Agreement (MRA) operating under the European Union Telecommunication Equipment – Council Directive 99/5/EC, Annex V.  
Date of Validation: November 20, 2002  
Notified Body Identification Number: 1243

Prepared For: Salutron, Inc.	Name: SAL-BLEMOD1
Report: TR 311272 A FCCICTX V3	Model: SAL-BLEMOD1
LSR: C-1426	Serial: RF Conducted: 12060022; Radiated: 12060028

## 1.0 Summary of Test Report

In March 2012 the SAL-BLEMOD1 was tested and MEETS the following requirements.

Rule	Description	Procedure	Compliant	Note
FCC: 15.247(a)(2) IC: RSS-210 A8.2(a)	Emission Bandwidth 20dB, 6dB, & 99%	ANSI C63.4-2003 FCC KDB558074	Yes	2
FCC: 15.247(b) IC: RSS-210 A8.4	Maximum Output Power	ANSI C63.4-2003 FCC KDB558074	Yes	2
FCC: 15.247(e) IC: RSS-210 A8.2(b)	Peak Power Spectral Density	ANSI C63.4-2003 FCC KDB558074	Yes	2
FCC: 15.247(d) IC: RSS-210 A8.5	Band-edge	ANSI C63.4-2003 FCC KDB558074	Yes	2
FCC: 15.247(d) IC: RSS-210 A8.5	Spurious Emissions	ANSI C63.4-2003 FCC KDB558074	Yes	2
FCC: 15.247(d) IC: RSS-210 A8.5	Radiated Maximum Output Power	ANSI C63.4-2003 FCC KDB558074	Yes	1
FCC: 15.247(d) IC: RSS-210 A8.5	Radiated Emissions at Band-edge	ANSI C63.4-2003 FCC KDB558074	Yes	1
FCC: 15.247(d) IC: RSS-210 A8.5	Radiated Harmonics	ANSI C63.4-2003 FCC KDB558074	Yes	1
FCC: 15.247(d) IC: RSS-210 A8.5	Radiated Emissions	ANSI C63.4-2003 FCC KDB558074	Yes	1
FCC: 15.207 IC: RSS-GEN 7.2.2	Power Line Conducted Emissions	ANSI C63.4-2003	Yes	3
FCC: 2.1091 IC: RSS-102 2.5.1	RF Exemption Calculation	FCC KDB447498 RSS-102	Yes	None
FCC: 15.109 IC: RSS-GEN	Receiver radiated Emissions	ANSI C63.4-2003	Yes	1

Note 1: Tested in three orthogonal positions with battery power and AC-DC adapter.

Note 2: RF Conducted measurement at antenna terminal.

Note 3: Device operates at 120VAC 60Hz.

## 2.0 Test Facilities

All testing was performed at:

LS Research, LLC  
W66 N220 Commerce Court  
Cedarburg, Wisconsin, 53012 USA

LS Research, LLC is accredited by A2LA (American Association for Laboratory Accreditation) to the requirements of ISO/IEC 17025, 2005 "General Requirements for the Competence of Calibration and Testing Laboratories".

LS Research, LLC's scope of accreditation includes all test methods listed herein, unless otherwise noted. Accreditation status can be verified at A2LA's web site: [www.a2la.net](http://www.a2la.net).

Prepared For: Salutron, Inc.	Name: SAL-BLEMOD1
Report: TR 311272 A FCCICTX V3	Model: SAL-BLEMOD1
LSR: C-1426	Serial: RF Conducted: 12060022; Radiated: 12060028

### 3.0 Client Information

<b>Manufacturer Name:</b>	Salutron, Inc.
<b>Address:</b>	40979 Encyclopedia Circle Fremont, CA
<b>Contact Person:</b>	TC Yen

### 3.1 Equipment Under Test (EUT) Information

*The following information has been supplied by the applicant.*

<b>Product Name:</b>	SAL-BLEMOD1
<b>Model Number:</b>	SAL-BLEMOD1
<b>Serial Number:</b>	RF Conducted: 12060022; Radiated: 12060028
<b>FCC ID</b>	N7P-BLEMOD1
<b>IC Number</b>	10274A-BLEMOD1

### 3.2 Product Description

The Salutron module is a Bluetooth Low Energy (BLE) device for use in sports fitness equipment. It is intended to be powered from a single 3 volt lithium coin cell in heart rate monitor chest straps or display devices.

Frequency Range (MHz)	2402-2480
RF Power In Watts (conducted)	Max: 0.00115; Min:0.0007
Max Conducted Output Power (dBm)	0.63
Field Strength at 3 meters (dB $\mu$ V/m)	91.51
Occupied Bandwidth 99%	1.08 MHz
Type of Modulation	GFSK
Emission Designator	1M08F1D
Transmitter Spurious (worst case) at 3 meters	46.7 dB $\mu$ V/m average (extrapolated)
Stepped (Y/N)	No
Step Value	N/A
Frequency Tolerance %,Hz, ppm	Better than 100 ppm
Microprocessor Model #	CC2541
Antenna: Detachable / Non-detachable	Non-Detachable
Antenna: Type	Trace
Antenna Gain (Measured over ground plane)	-3.7 dBi
FCC Rule Part	Title 47 Part 15.247
Industry Canada Rule Part	RSS-210 Issue 8 2010
Modular Filing	Limited single-modular
RF Exposure Type	Portable
Receiver Spurious (worst case) at 3 meters	43.35dB $\mu$ V/m average (extrapolated)

Prepared For: Salutron, Inc.	Name: SAL-BLEMOD1
Report: TR 311272 A FCCICTX V3	Model: SAL-BLEMOD1
LSR: C-1426	Serial: RF Conducted: 12060022; Radiated: 12060028

### 3.3 Modifications Incorporated In the EUT for Compliance Purposes

None noted at time of test.

### 3.4 Deviations & Exclusions from Test Specifications

Tested in continuous transmit or receive for all tests in three orthogonal positions with battery power and power from AC to DC supply.

### 4.0 Conditions of Test

Environmental:

Temperature: 20-25° C  
Relative Humidity: 30-60%  
Atmospheric Pressure: 86-106 kPa

Mains Voltage:

120VAC 60Hz to power supply  
Or  
3.0VDC battery operated (2 AA Batteries)

### 5.0 Additional Information

The EUT was programmed from a USB cable connected from a computer running Texas Instruments Smart RF Studio 7 (1.7.2) to the Texas Instruments Smart RF05 Evaluation Board Rev1.8.1

Off-the-shelf AC to DC power supply: Enercell AC Adapter CAT No: 273-316 Serial 09A09

### 6.0 Test Equipment

All test equipment is calibrated by a calibration laboratory accredited by A2LA to the requirements of ISO 17025. For a complete list of test equipment and calibration dates, see Appendix A. Unless otherwise noted, resolution bandwidth of measuring instrument used during testing for given frequency range, see below. For average measurements above 1000MHz the video bandwidth is set at 10Hz.

Frequency Range	Resolution Bandwidth
9 kHz – 150 kHz	200 Hz
150 kHz – 30 MHz	9 kHz
30 MHz – 1000 MHz	120 kHz
Above 1000 MHz	1 MHz

Prepared For: Salutron, Inc.	Name: SAL-BLEMOD1
Report: TR 311272 A FCCICTX V3	Model: SAL-BLEMOD1
LSR: C-1426	Serial: RF Conducted: 12060022; Radiated: 12060028

## 7.0 Declaration of Conformity

The EUT was found to MEET the requirements as described within the specification of FCC Title 47, CFR Part 15.247 (2011) and Industry Canada RSS-210, Issue 8 (2010)

If some emissions are seen to be within 3 dB of their respective limits:

As these levels are within the tolerances of the test equipment and site employed, there is a possibility that this unit, or a similar unit selected out of production may not meet the required limit specification if tested by another agency.

LS Research, LLC certifies that the data contained herein was taken under conditions that meet or exceed the requirements of the test specifications. The results in this Test Report apply only to the item(s) tested on the above-specified dates. Any modifications made to the EUT subsequent to the indicated test date(s) will invalidate the data herein, and void this certification.

Prepared For: Salutron, Inc.	Name: SAL-BLEMOD1
Report: TR 311272 A FCCICTX V3	Model: SAL-BLEMOD1
LSR: C-1426	Serial: RF Conducted: 12060022; Radiated: 12060028

## Appendix A – Test Equipment



Date : 23-Mar-2012

Type Test : Equipment List

Job # : C-1426

Prepared By: Adam A

Customer : Telesis

Quote #: 311272

No.	Asset #	Description	Manufacturer	Model #	Serial #	Cal Date	Cal Due Date	Equipment Status
1	EE 960157	3Hz-13.2GHz Spectrum Analyzer	Agilent	E4445A	MY48250225	6/6/2011	6/6/2012	Active Calibration
2	EE 960158	RF Preselector	Agilent	N9039A	MY46520110	6/11/2011	6/11/2012	Active Calibration
3	AA 960005	Biconical Antenna	EMCO	93110B	9601-2280	6/10/2011	6/10/2012	Active Calibration
4	AA 960078	Log Periodic Antenna	EMCO	93146	9701-4855	11/15/2011	11/15/2012	Active Calibration
5	AA 960007	Double Ridge Horn Antenna	EMCO	3115	9311-4138	4/27/2011	4/27/2012	Active Calibration
6	EE 960160	0.8-21GHz LNA	Mini-Circuits	ZVA-213K-S+	977711030	4/27/2011	4/27/2012	Active Calibration
7	AA 960081	Double Ridge Horn Antenna	EMCO	3115	6907	1/6/2012	1/6/2013	Active Calibration
8	EE 960147	Pre-Amp	Adv. Micro	VLA612	123101	1/6/2012	1/6/2013	Active Calibration
9	AA 960154	2.4GHz High Pass Filter	KVM	HPF-L-14186	7272-02	6/10/2011	6/10/2012	Active Calibration
10	EE 960014	EMI Receiver-filter section	HP	85460A	3448A00296	11/22/2011	11/22/2012	Active Calibration
11	EE 960013	EMI Receiver	HP	8546A System	3617A00320,3448A	11/22/2011	11/22/2012	Active Calibration
12	AA 960072	Transient Limiter	HP	11947A	3107A02515	11/2/2011	11/2/2012	Active Calibration
13	AA 960075	LISN	EMCO	3810/2NIM	9612-1710	9/19/2011	9/19/2012	Active Calibration
14	EE 960073	Spectrum Analyzer	Agilent	E4446A	US45300564	4/25/2011	4/25/2012	Active Calibration
15	EE 960146	Std. Gain Horn Ant. w/preamp	Adv. Micro	VLA622-4	123001	11/3/2011	11/3/2012	Active Calibration

Project Engineer:

*Adam A*

Quality Assurance:

*Adam A*

Prepared For: Salutron, Inc.

Report: TR 311272 A FCCICTX V3

LSR: C-1426

Name: SAL-BLEMOD1

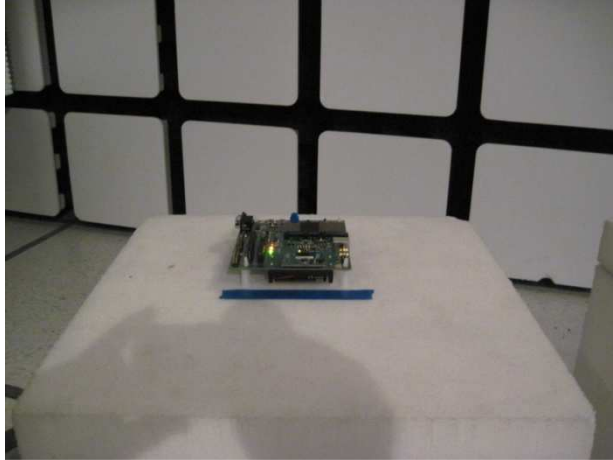
Model: SAL-BLEMOD1

Serial: RF Conducted: 12060022; Radiated: 12060028

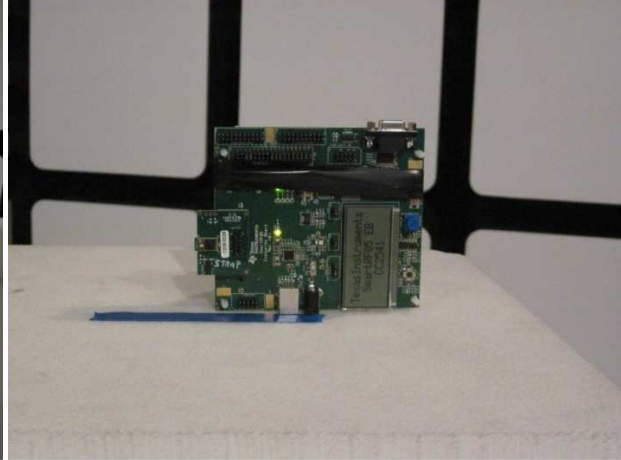


## Appendix B – Setup Photos

Radiated Emissions Battery Powered (Flat)



Radiated Emissions Battery Powered (Side)



Radiated Emissions Battery Powered (Vertical)



Radiated Emissions AC Powered (Flat)



Radiated Emissions AC Powered (Side)

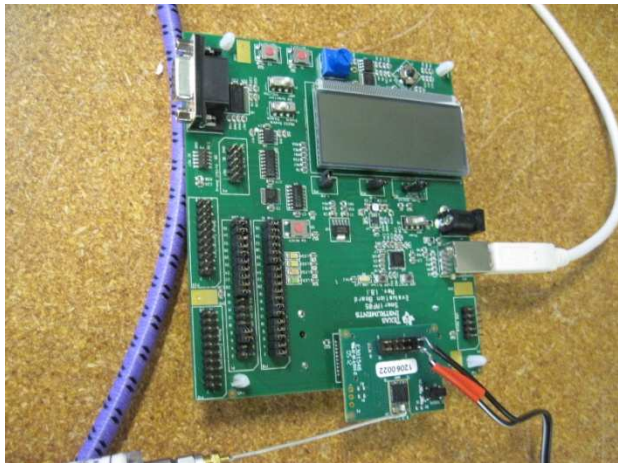


Radiated Emissions AC Powered (Vertical)



Appendix B – Setup Photos

RF Conducted Emissions AC Power



RF Conducted Emissions Battery Power



AC Power Conducted Emissions



Prepared For: Salutron, Inc.	Name: SAL-BLEMOD1
Report: TR 311272 A FCCICTX V3	Model: SAL-BLEMOD1
LSR: C-1426	Serial: RF Conducted: 12060022; Radiated: 12060028

## Appendix C – Test Data

### C.1 – RF Conducted Emissions

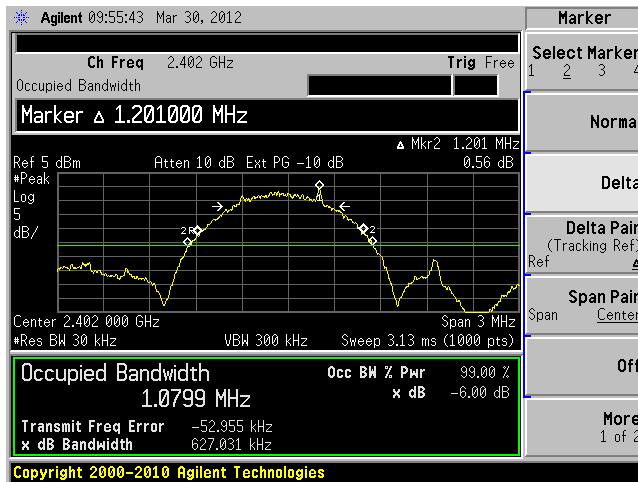
A direct measurement of the transmitted signal was performed at the antenna port of the EUT via a cable connection to a spectrum analyzer. An attenuator was placed in series with the cable to protect the spectrum analyzer. The loss from the cable and the attenuator were added on the analyzer as gain offset settings there by allowing direct measurements, without the need for any further corrections. The EUT was configured to run in a continuous transmit mode, while being supplied with typical data as a modulation source.

The measurements were made using FCC KDB 558074 D01 DTS Meas Guidance v01 1-18-2012

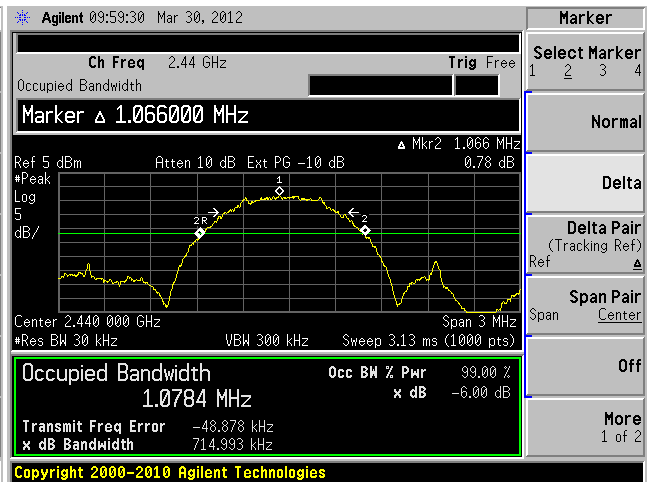
#### Summary of Results

Channel	Frequency MHz	EBW 20 dB (MHz)	EBW 6 dB (kHz)	EBW 99% (MHz)	Power (*PK1) dBm	PKPSD (100kHz) dBm	PKPSD (3kHz) dBm	Band- edge	Spurious
37	2402	1.2	627	1.08	0.63	0.7	-14.5	Pass	Pass
17	2440	1.1	715	1.08	-0.16	-0.24	-15.44	Pass	Pass
39	2480	0.988	652	1.06	-1.42	-1.18	-16.38	Pass	Pass

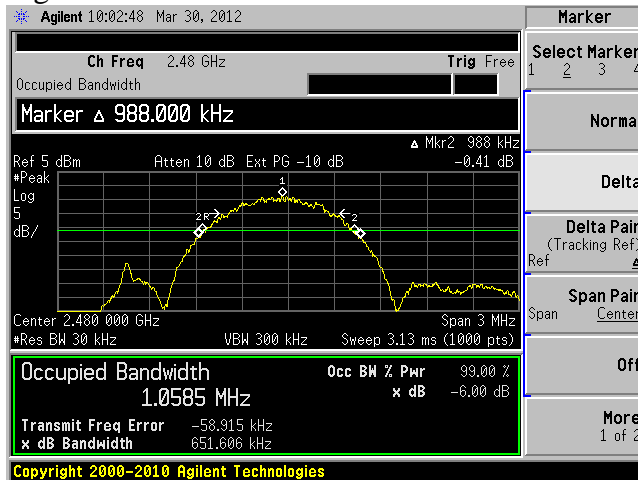
## Emission Band-width Low Channel



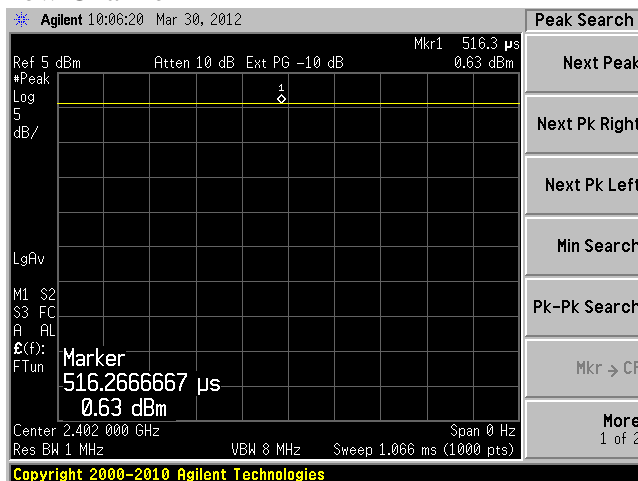
## Mid Channel



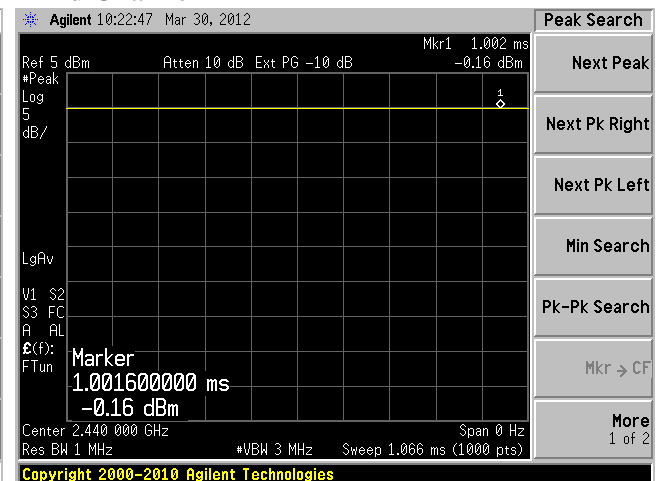
## High Channel



## Output Power Low Channel



## Mid Channel



Prepared For: Salutron, Inc.

Report: TR 311272 A FCCICTX V3

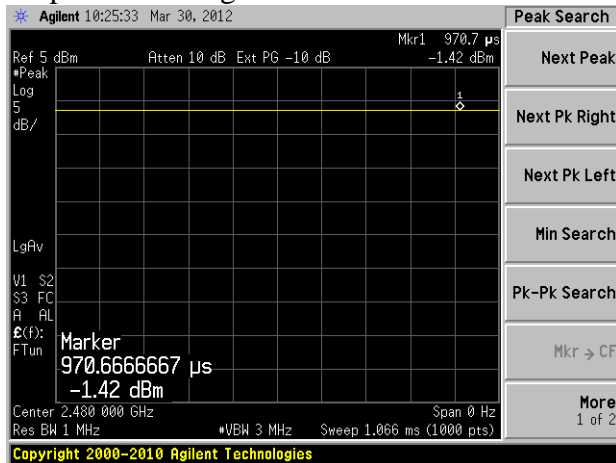
LSR: C-1426

Name: SAL-BLEMOD1

Model: SAL-BLEMOD1

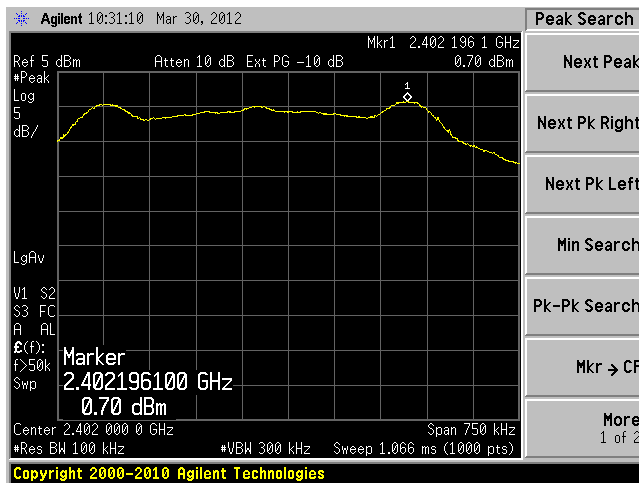
Serial: RF Conducted: 12060022; Radiated: 12060028

## Output Power High Channel

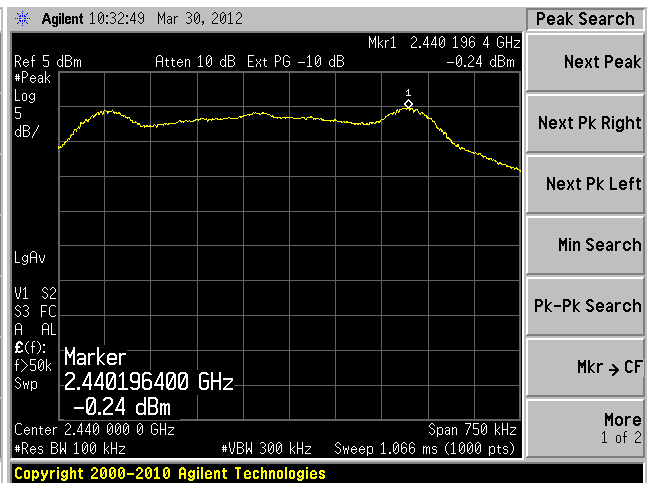


## Peak Power Spectral Density

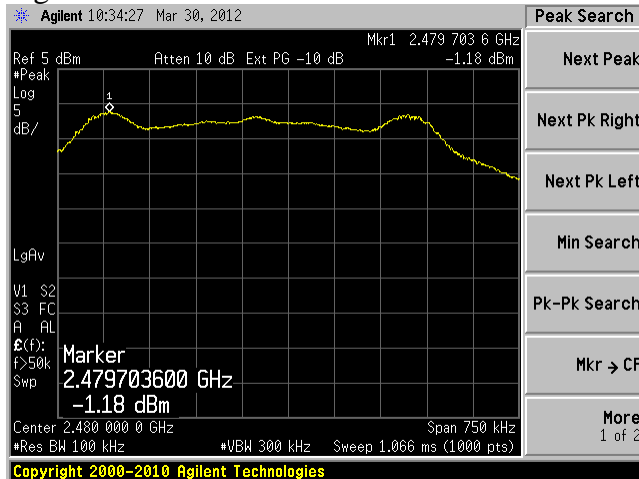
### Low Channel



### Mid Channel



### High Channel



Prepared For: Salutron, Inc.

Report: TR 311272 A FCCICTX V3

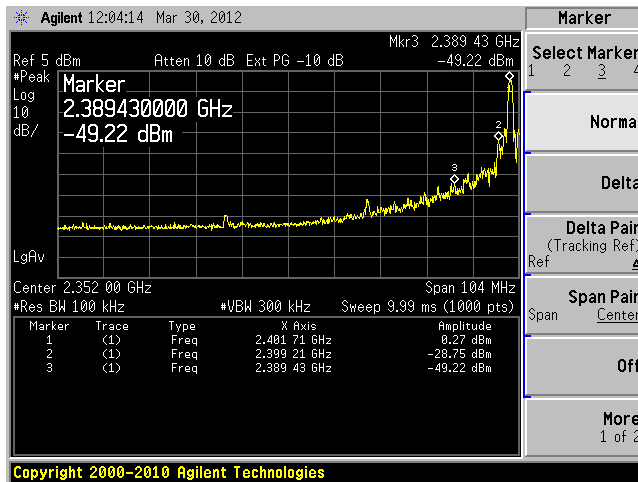
LSR: C-1426

Name: SAL-BLEMOD1

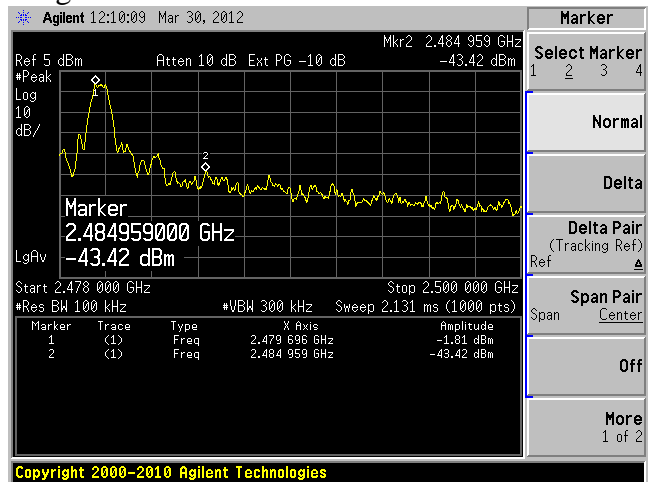
Model: SAL-BLEMOD1

Serial: RF Conducted: 12060022; Radiated: 12060028

## Band-edge Low Channel

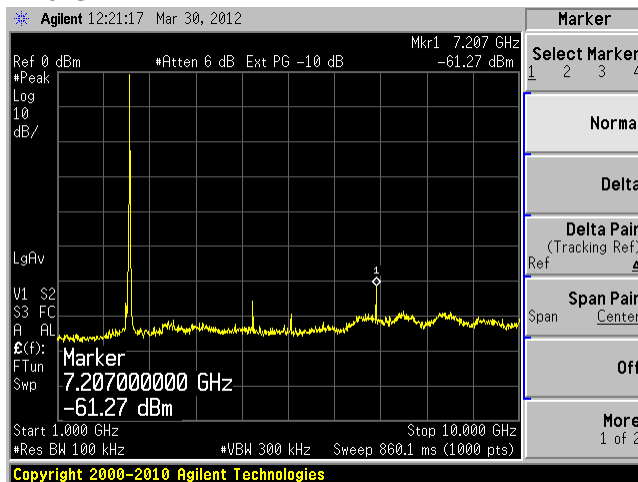


## High Channel

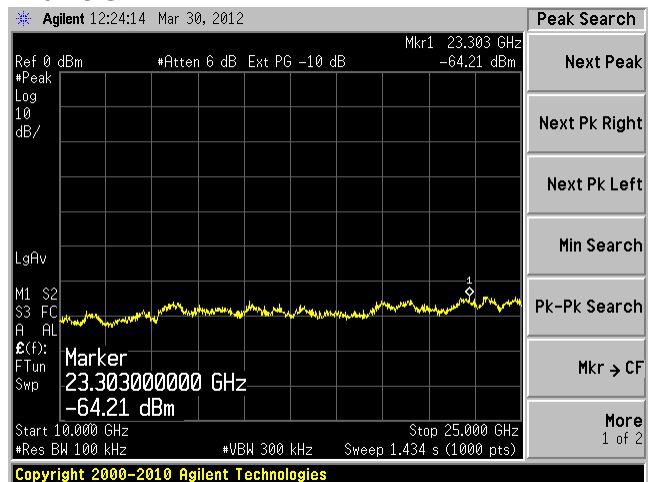


## Spurious Conducted Emissions Low Channel

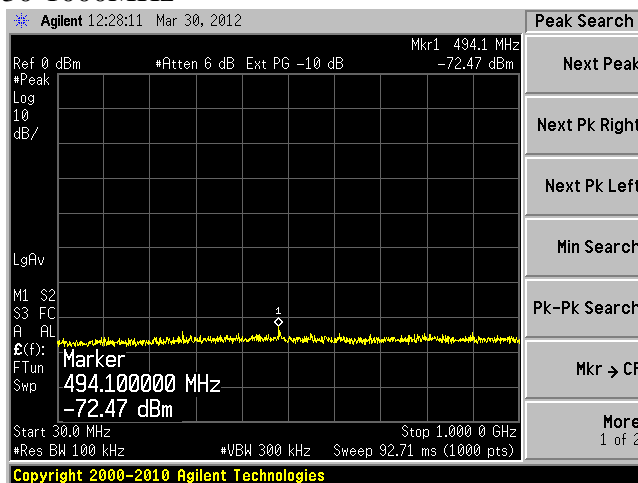
### 1-10 GHz



### 10-25GHz

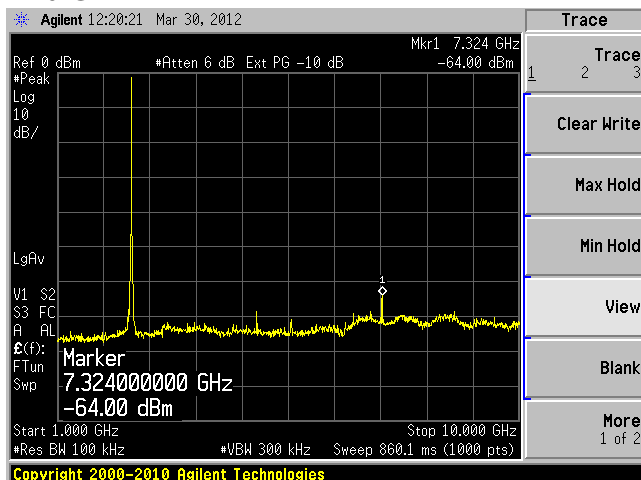


### 30-1000MHz

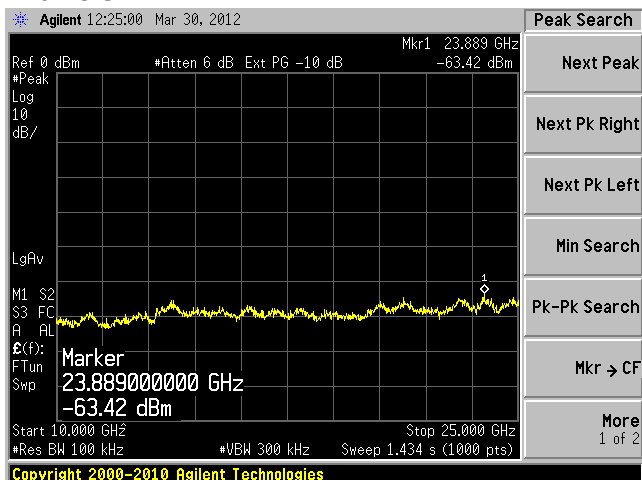


## Mid Channel

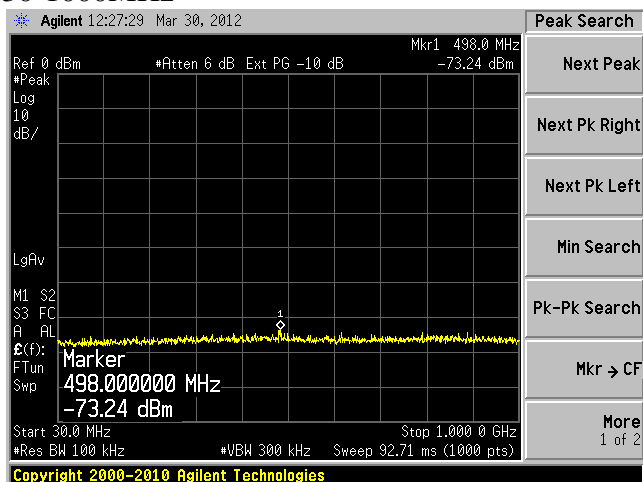
### 1-10 GHz



### 10-25GHz

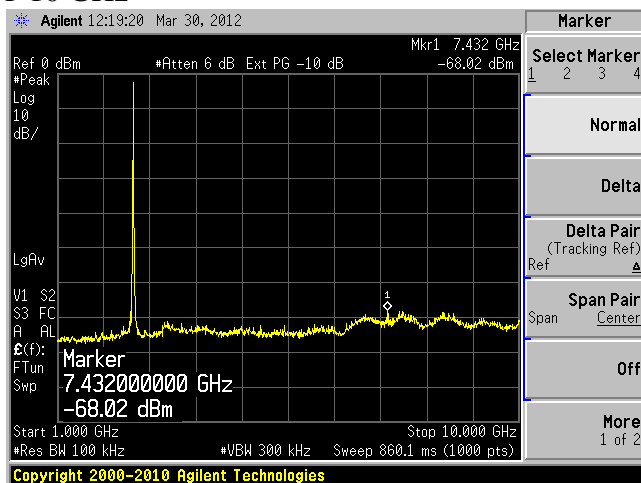


### 30-1000MHz

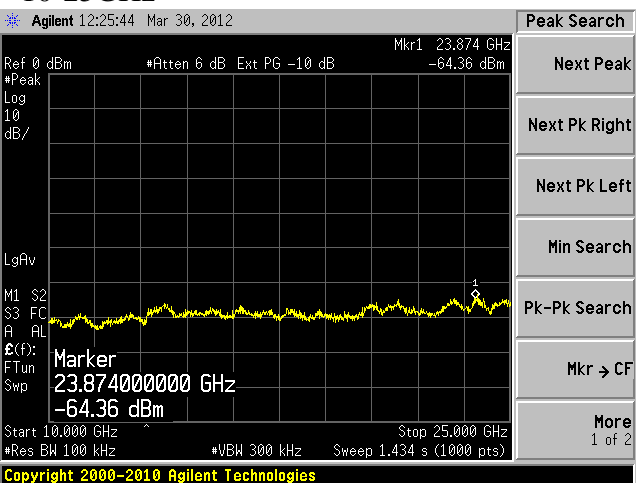


## High Channel

### 1-10 GHz



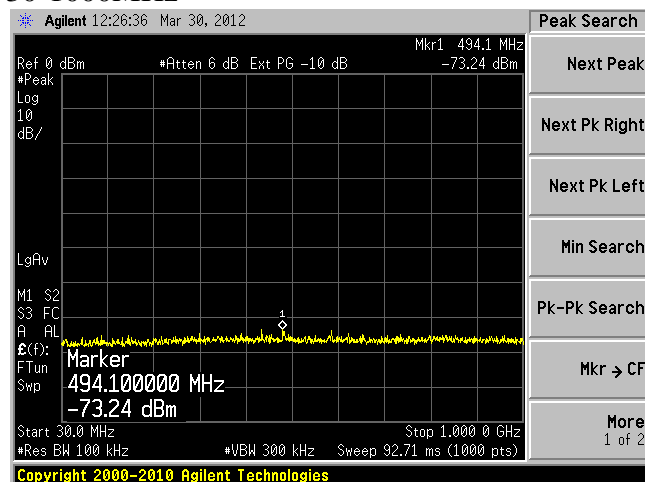
### 10-25GHz



Prepared For: Salutron, Inc.  
Report: TR 311272 A FCCICTX V3  
LSR: C-1426

Name: SAL-BLEMOD1  
Model: SAL-BLEMOD1  
Serial: RF Conducted: 12060022; Radiated: 12060028

## 30-1000MHz



## Frequency and Power Stability over Voltage Variations

	2.55 VDC		3.0 VDC		3.45 VDC		
Channel	Power (dBm)	Frequency (Hz)	Power (dBm)	Frequency (Hz)	Power (dBm)	Frequency (Hz)	Maximum Variation (Hz)
Low	0.61	2401814814	0.63	2401866866	0.60	2401980980	166166
Mid	-0.18	2439876876	-0.16	2440015015	-0.14	2440107017	230141
High	-1.42	2479814814	-1.42	2479992992	-1.41	2480021021	206207

The power and frequency stability of the device was examined as a function of the input voltage available to the EUT. A Spectrum Analyzer was used to measure the power and frequency at the appropriate frequency markers. Power was supplied by a variable DC power supply and was varied  $\pm 15\%$  from the nominal.

The power was then cycled On/Off to observe system response. No unusual response was observed, the emission characteristics were well behaved, and the system returned to the same state of operation as before the power cycle.



## C.2 – Radiated Emissions

The test setup was assembled in accordance with Title 47, CFR FCC Part 15, RSS GEN and ANSI C63.4-2003. The EUT was placed on an 80cm high non-conductive pedestal, centered on a flush mounted 2-meter diameter turntable inside a 3 meter Semi-Anechoic, FCC listed Chamber.

The applicable limits apply at a 3 meter distance. Measurements above 4 GHz were performed at a 1.0 meter separation distance. The calculations to determine these limits are detailed in the following pages.

For both fundamental and spurious emissions measurement, the data reported includes all necessary correction factors. These correction factors are loaded onto the EMI receiver when measurements are performed.

Reported Measurement data = Raw receiver measurement (dB $\mu$ V/m) + Antenna correction Factor + Cable factor (dB) + Miscellaneous factors when applicable (dB) – amplification factor when applicable (dB).

Generic example of reported data at 200 MHz:

Reported Measurement data = 18.2 (raw receiver measurement) + 15.8 (antenna factor) + 1.45 (cable factor) = 35.45 (dB $\mu$ V/m).

As specified in 15.247 (d) and RSS 210 A8.2 (b), radiated emissions that fall within the restricted band described in 15.205(c) for FCC and section 2.2, 2.6 and 2.7 of RSS 210 for IC, must comply with the general emissions limit.

The following table depicts the general radiated emission limits above 30 MHz. These limits are obtained from Title 47 CFR, Part 15.209, for radiated emissions measurements. These limits were applied to any signals found in the 15.205 restricted bands. The mentioned limits correspond to those limits listed in RSS 210 section 2.7.

Frequency (MHz)	3 m Limit ( $\mu$ V/m)	3 m Limit (dB $\mu$ V/m)
30-88	100	40.0
88-216	150	43.5
216-960	200	46.0
960-10,000	500	54.0

Note: Limits are rounded to the nearest tenth of a dB.

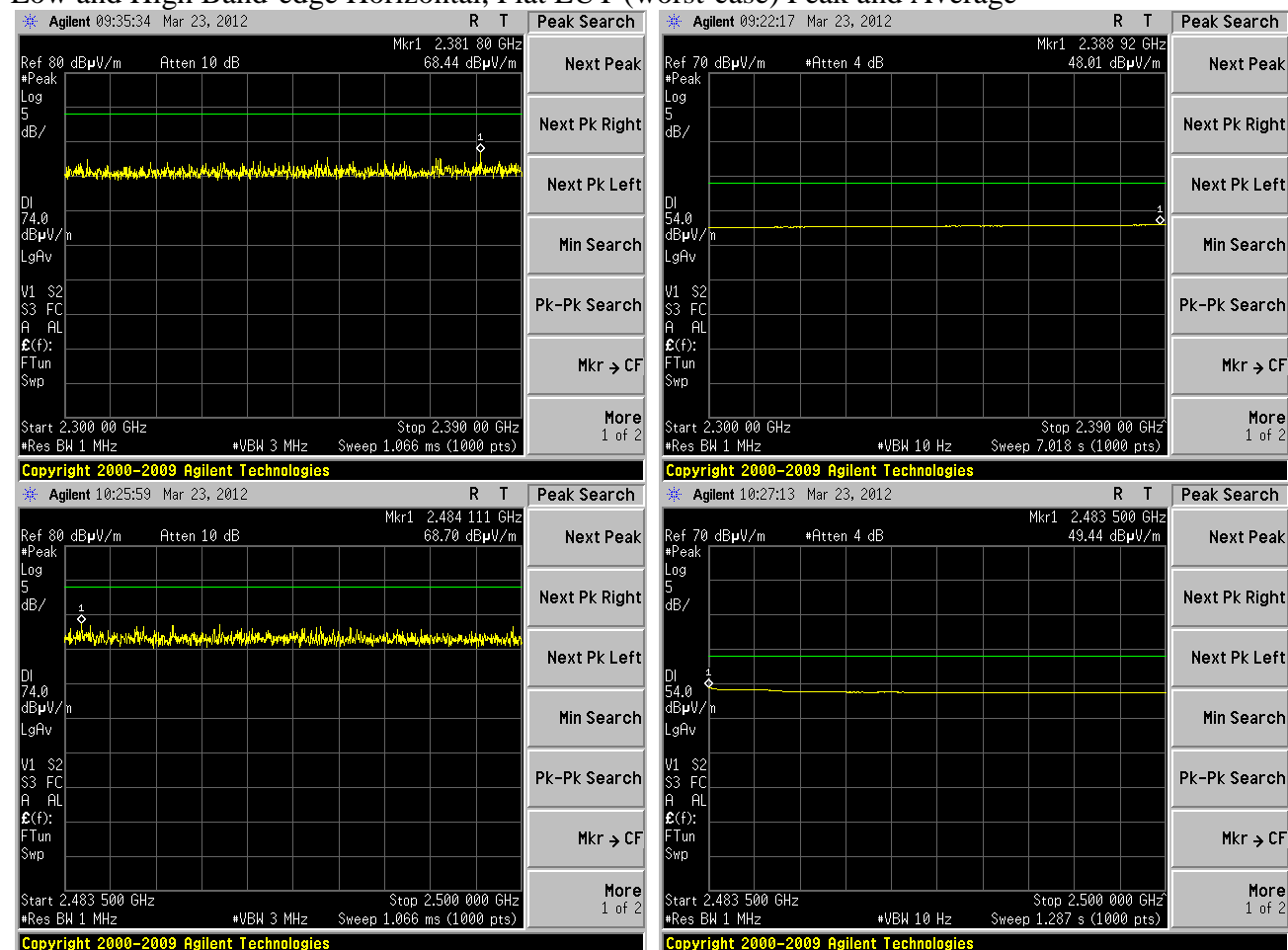
Prepared For: Salutron, Inc.	Name: SAL-BLEMOD1
Report: TR 311272 A FCCICTX V3	Model: SAL-BLEMOD1
LSR: C-1426	Serial: RF Conducted: 12060022; Radiated: 12060028

## Radiated Fundamental

Frequency (MHz)	Antenna	Height (m)	Azimuth (degree)	Peak (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin	EUT
2402	H	1.10	220	91.51	130	38.5	Flat
2402	V	1.03	195	88.40	130	41.6	Flat
2402	H	1.09	66	91.12	130	38.9	Side
2402	V	1.00	108	87.21	130	42.8	Side
2402	H	1.22	331	91.05	130	39.0	Vertical
2402	V	1.29	238	88.86	130	41.1	Vertical
2480	H	1.08	220	90.27	130	39.7	Flat
2480	V	1.00	186	85.84	130	44.2	Flat
2480	H	1.03	67	89.98	130	40.0	Side
2480	V	1.00	107	81.61	130	48.4	Side
2480	H	1.18	49	89.85	130	40.2	Vertical
2480	V	1.02	220	87.03	130	43.0	Vertical

## Radiated Band-edge

### Low and High Band-edge Horizontal, Flat EUT (worst-case) Peak and Average



Prepared For: Salutron, Inc.

Report: TR 311272 A FCCICTX V3

LSR: C-1426

Name: SAL-BLEMOD1

Model: SAL-BLEMOD1

Serial: RF Conducted: 12060022; Radiated: 12060028

Radiated Harmonics 4-25GHz tested at 1 meter  
Battery Powered

Highest Emission

Frequency (MHz)	Height (m)	Azimuth (degree)	Peak Reading (dBµV/m)	Avg Reading (dBµV/m)	Avg Limit (dBµV/m)	Margin (dB)	Antenna Polarity	EUT orientation
2402								
4804	1	12	57.8	53.5	63.5	10.0	Vertical	Vertical
7206	1.11	30	55.5	45.3	63.5	18.2	Vertical	Flat
9608			53.57		63.5		Noise Floor	
12010			55.32		63.5		Noise Floor	
14412			60.05		63.5		Noise Floor	
16814			61.18		63.5		Noise Floor	
19216			55.3		63.5		Noise Floor	
21618			55.67		63.5		Noise Floor	
24020			58.87		63.5		Noise Floor	

Frequency (MHz)	Height (m)	Azimuth (degree)	Peak Reading (dBµV/m)	Avg Reading (dBµV/m)	Avg Limit (dBµV/m)	Margin (dB)	Antenna Polarity	EUT orientation
2440								
4880	1.19	169	55.0	51.5	63.5	12.0	Vertical	Flat
7320			53.22		63.5		Noise Floor	
9760			53.12		63.5		Noise Floor	
12200			56.2		63.5		Noise Floor	
14640			60.09		63.5		Noise Floor	
17080			62.77		63.5		Noise Floor	
19520			53.7		63.5		Noise Floor	
21960			56.2		63.5		Noise Floor	
24400			57.5		63.5		Noise Floor	

Frequency (MHz)	Height (m)	Azimuth (degree)	Peak Reading (dBµV/m)	Avg Reading (dBµV/m)	Avg Limit (dBµV/m)	Margin (dB)	Antenna Polarity	EUT orientation
4960	1.18	174	56.0	52.9	63.5	10.7	Vertical	Flat
7440			52.16		63.5		Noise Floor	
9920			54.21		63.5		Noise Floor	
12400			56.62		63.5		Noise Floor	
14880			59.81		63.5		Noise Floor	
17360			64.25	51.5	63.5		Noise Floor	
19840			53.9		63.5		Noise Floor	
22320			54.6		63.5		Noise Floor	
24800			58.3		63.5		Noise Floor	

Prepared For: Salutron, Inc.

Name: SAL-BLEMOD1

Report: TR 311272 A FCCICTX V3

Model: SAL-BLEMOD1

LSR: C-1426

Serial: RF Conducted: 12060022; Radiated: 12060028

Radiated Harmonics 4-25GHz tested at 1 meter  
AC Powered

Highest Emission

Frequency (MHz)	Height (m)	Azimuth (degree)	Peak Reading (dBµV/m)	Avg Reading (dBµV/m)	Avg Limit (dBµV/m)	Margin (dB)	Antenna Polarity	EUT orientation
4804	1.15	344	60.7	56.3	63.5	7.2	Horizontal	Vertical
7206			53.6		63.5		Noise Floor	
9608			53.57		63.5		Noise Floor	
12010			55.32		63.5		Noise Floor	
14412			60.05		63.5		Noise Floor	
16814			61.18		63.5		Noise Floor	
19216			55.3		63.5		Noise Floor	
21618			55.67		63.5		Noise Floor	
24020			58.87		63.5		Noise Floor	

Frequency (MHz)	Height (m)	Azimuth (degree)	Peak Reading (dBµV/m)	Avg Reading (dBµV/m)	Avg Limit (dBµV/m)	Margin (dB)	Antenna Polarity	EUT orientation
4880	1.04	0	59.1	54.9	63.5	8.6	Horizontal	Side
7320			53.22		63.5		Noise Floor	
9760			53.12		63.5		Noise Floor	
12200			56.2		63.5		Noise Floor	
14640			60.09		63.5		Noise Floor	
17080			62.77		63.5		Noise Floor	
19520			53.7		63.5		Noise Floor	
21960			56.2		63.5		Noise Floor	
24400			57.5		63.5		Noise Floor	

Frequency (MHz)	Height (m)	Azimuth (degree)	Peak Reading (dBµV/m)	Avg Reading (dBµV/m)	Avg Limit (dBµV/m)	Margin (dB)	Antenna Polarity	EUT orientation
4960	1.11	181	55.1	51.0	63.5	12.5	Vertical	Flat
7440			52.16		63.5		Noise Floor	
9920			54.21		63.5		Noise Floor	
12400			56.62		63.5		Noise Floor	
14880			59.81		63.5		Noise Floor	
17360			64.25	51.5	63.5		Noise Floor	
19840			53.9		63.5		Noise Floor	
22320			54.6		63.5		Noise Floor	
24800			58.3		63.5		Noise Floor	

Prepared For: Salutron, Inc.

Name: SAL-BLEMOD1

Report: TR 311272 A FCCICTX V3

Model: SAL-BLEMOD1

LSR: C-1426

Serial: RF Conducted: 12060022; Radiated: 12060028

## Radiated Emissions 30-1000MHz

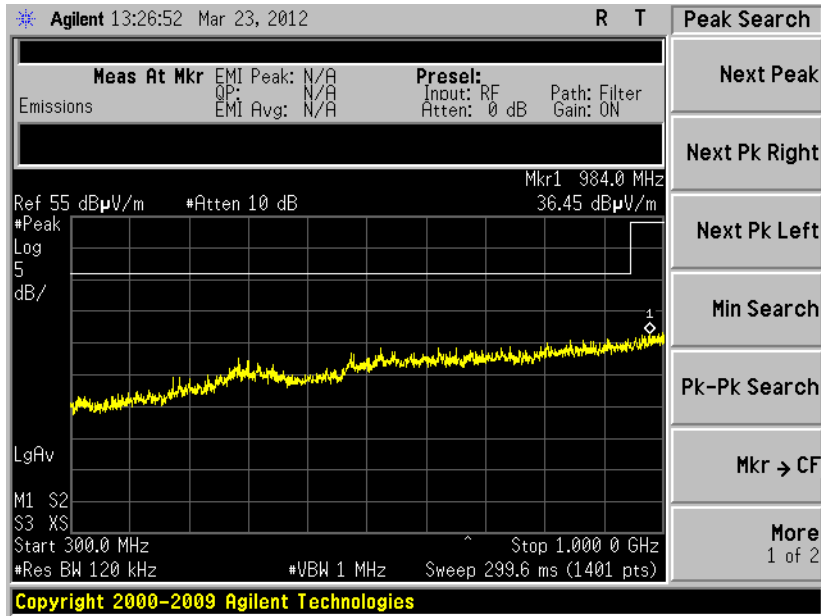
Manufacturer	Salutron, Inc.
Date	3-23-12
Operator	Adam A
Temperature	20 - 25° C
Humidity	30 – 60%
Test Voltage	120VAC 60Hz and 3VDC battery power
Test Location	LS Research, LLC - FCC Listed 3 meter Semi-Anechoic Chamber
Test Distance	3 meter
EUT Placement	80 cm height non-conductive table
Measurements	Final
Detectors	Quasi-Peak
Additional Notes	Peak Emission Compared to quasi-peak limit Tested in transmit and receive mode low, mid, and high channel. Tested in 3 orthogonal orientations. No noticeable difference in emissions between transmit or receive or low, mid, high channel.

Frequency (MHz)	Height (m)	Azimuth (degree)	Peak Reading (dBµV/m)	Quasi Peak Limit (dBµV/m)	Margin (dB)	Antenna Polarity	EUT orientation
984.0	1.00	0	36.45	54.0	17.6	Vertical	Side
373.5	1.00	89	32.4	46.0	13.6	Horizontal	Flat
289.5	1.15	296	36.12	46.0	9.9	Horizontal	Flat
299.0	1.00	353	32.16	46.0	13.8	Vertical	Vertical

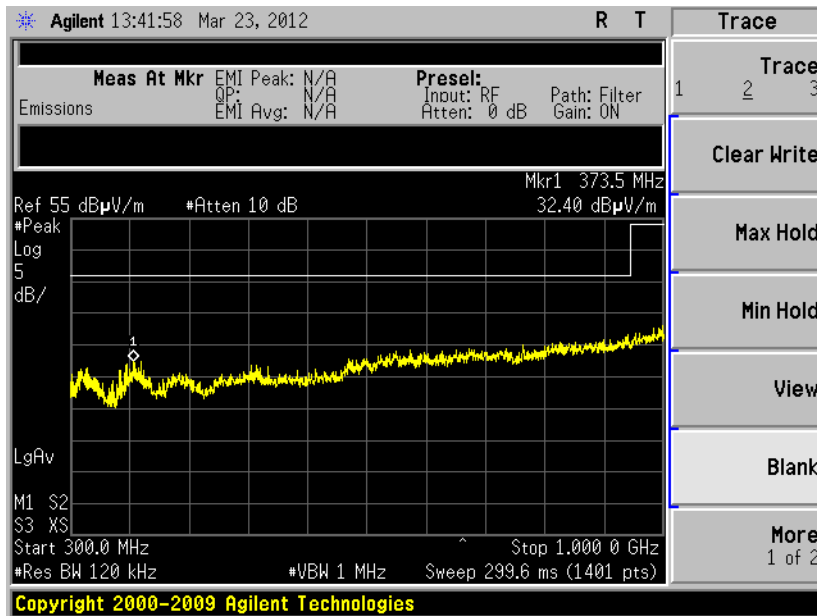
Prepared For: Salutron, Inc.	Name: SAL-BLEMOD1
Report: TR 311272 A FCCICTX V3	Model: SAL-BLEMOD1
LSR: C-1426	Serial: RF Conducted: 12060022; Radiated: 12060028

## C.2 Radiated Emissions 30-1000MHz

### Vertical 300-1000MHz



### Horizontal 300-1000MHz



Prepared For: Salutron, Inc.

Report: TR 311272 A FCCICTX V3

LSR: C-1426

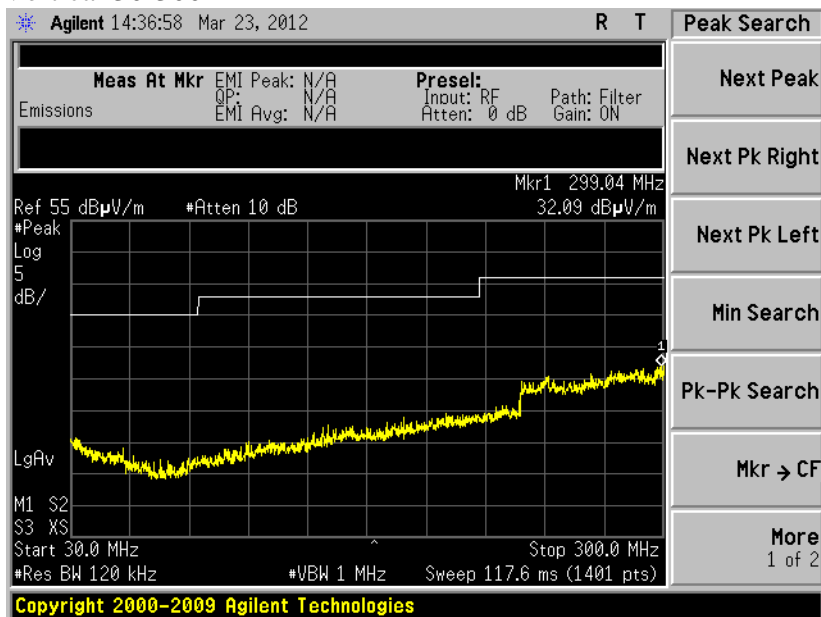
Name: SAL-BLEMOD1

Model: SAL-BLEMOD1

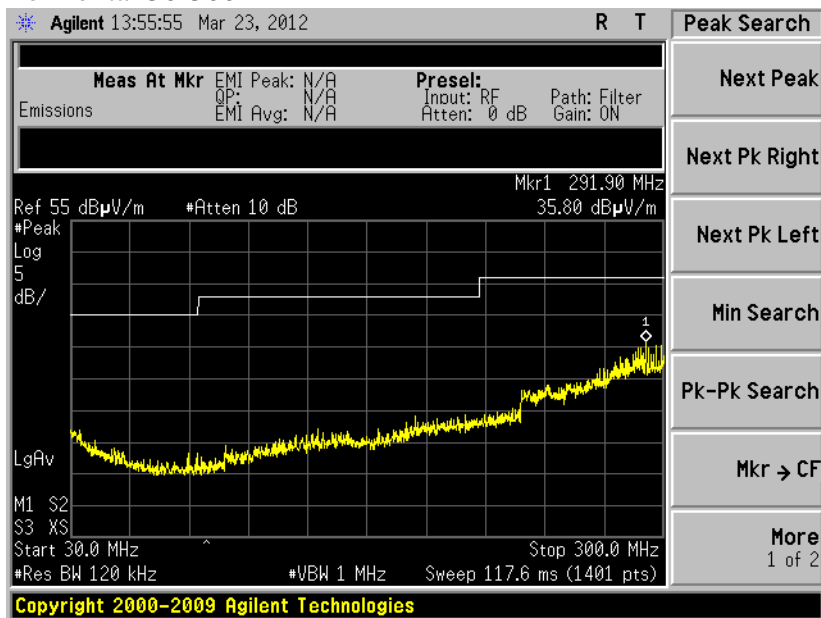
Serial: RF Conducted: 12060022; Radiated: 12060028

## C.2 Radiated Emissions 30-1000MHz

### Vertical 30-300MHz



### Horizontal 30-300MHz



Prepared For: Salutron, Inc.

Report: TR 311272 A FCCICTX V3

LSR: C-1426

Name: SAL-BLEMOD1

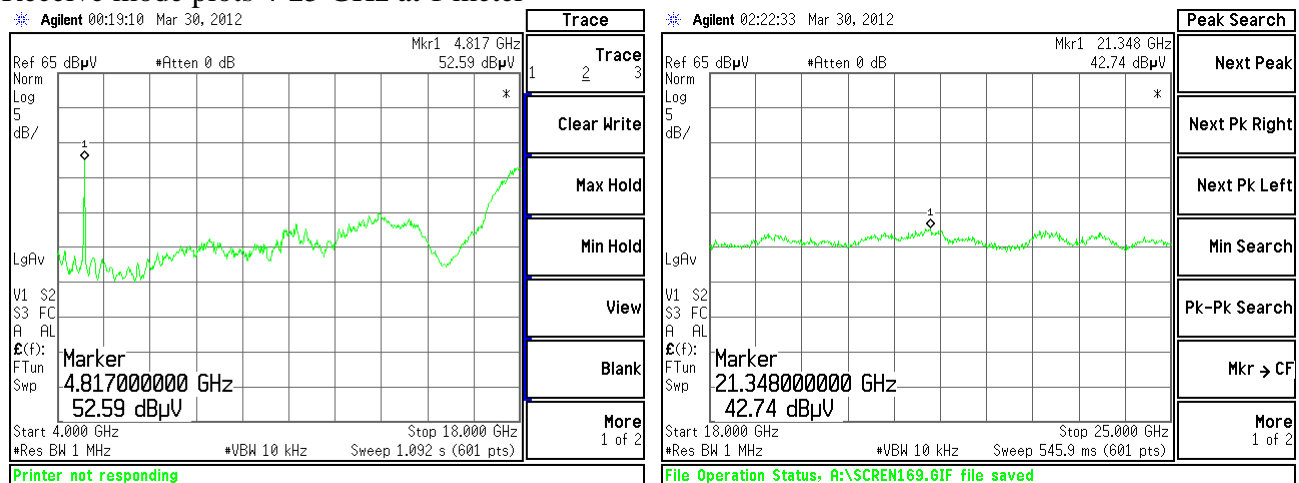
Model: SAL-BLEMOD1

Serial: RF Conducted: 12060022; Radiated: 12060028

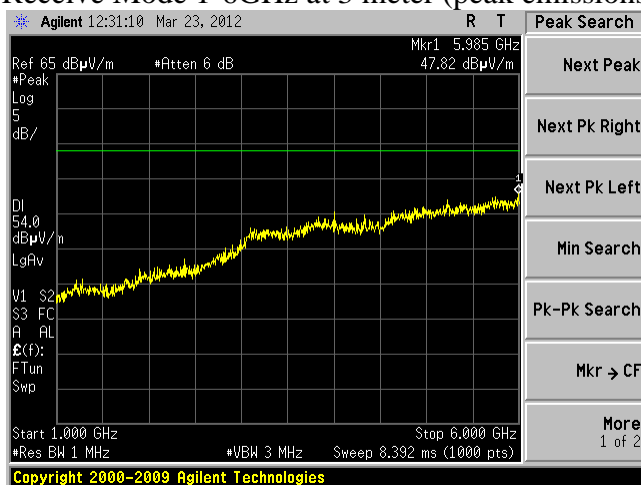
## Radiated Emissions Receive Mode 1-25GHz

Frequency (GHz)	Height (m)	Azimuth (degree)	Peak Reading (dBμV/m)	Average Reading (dBμV/m)	Average Limit (dBμV/m)	Margin (dB)	Antenna Polarity	EUT orientation	EUT Channel
4.806	1.24	341	54.04	48.10	63.5	15.4	H	V	Low
4.806	1.03	19	55.61	50.33	63.5	13.2	V	V	Low
4.806	1.00	65	56.21	52.74	63.5	10.8	H	S	Low
4.882	1.04	324	52.74	48.26	63.5	15.2	H	V	Mid
4.882	1.00	359	53.54	50.2	63.5	13.3	V	V	Mid
4.882	1.07	333	55.52	52.89	63.5	10.6	H	S	Mid
4.882	1.22	170	55.44	52.29	63.5	11.2	V	F	Mid
4.960	1.09	59	54.21	50.35	63.5	13.2	H	V	High
4.960	1.03	34	54.36	50.97	63.5	12.5	V	V	High
4.960	1.00	339	55.1	51.19	63.5	12.3	H	S	High
4.960	1.21	181	54.87	51.23	63.5	12.3	V	F	High

## Receive mode plots 4-25 GHz at 1 meter



## Receive Mode 1-6GHz at 3 meter (peak emissions meet average limit)



Prepared For: Salutron, Inc.

Report: TR 311272 A FCCICTX V3

LSR: C-1426

Name: SAL-BLEMOD1

Model: SAL-BLEMOD1

Serial: RF Conducted: 12060022; Radiated: 12060028



### C.3 – Power Line Conducted Emissions

The test area and setup are in accordance with ANSI C63.4 per the requirements of Title 47 CFR, FCC Part 15, and RSS-GEN. The EUT was placed on a non-conductive wooden table, with a height of 80 cm above the reference ground plane. The EUT's power cable was plugged into a  $50\Omega$  (ohm), 50/250  $\mu$ H Line Impedance Stabilization Network (LISN). The AC power supply of 110V was provided via an appropriate broadband EMI Filter, and then to the LISN line input. Final readings were then taken and recorded. After the EUT was setup and connected to the LISN, the RF Sampling Port of the LISN was connected to a 10 dB Attenuator-Limiter, and then to the EMI System.

A list of the test equipment and accessories utilized for the Conducted Emissions test, including calibration information and equipment descriptions, is provided in Appendix A. All equipment is calibrated and used according to the operation manuals supplied by the manufacturers. All cables are calibrated and verified periodically for conformance. The emissions are measured on an EMI System, which has automatic correction for all factors stored in memory and allows direct readings to be taken.

Limits of Conducted Emissions at the AC Mains Ports  
FCC Part 15.207 / RSS-GEN

Frequency Range (MHz)	Class B Limits (dBμV)		Measuring Bandwidth
	Quasi-Peak	Average	
0.150 -0.50 *	66-56	56-46	RBW = 9 kHz VBW ≥ 9 kHz for QP VBW = 1 Hz for Average
0.5 – 5.0	56	46	
5.0 – 30	60	50	
* The limit decreases linearly with the logarithm of the frequency in this range.			

### C.3 – Conducted Emissions

Manufacturer	Salutron, Inc.
Date	3-28-12
Operator	Adam A
Temperature	20 - 25° C
Humidity	30 – 60%
Test Voltage	120VAC 60Hz
Test Location	LS Research, LLC – Conducted Emissions Area
Test Distance	40 cm from vertical conductive wall
EUT Placement	80 cm height non-conductive table
Measurements	Final
Detectors	Quasi-Peak, Average
Additional Notes	Continuous transmit determined worst case over receive mode.

Frequency (MHz)	Line	Quasi-Peak			Average		
		Q-Peak Reading (dBμV)	Q-Peak Limit (dBμV)	Quasi- Peak Margin (dB)	Average Reading (dBμV)	Average Limit (dBμV)	Average Margin (dB)
0.618	L1	27.6	56	28.4	22.6	46	23.4
0.304	L1	24.4	60.12886	35.728861	21.8	50.128861	28.3289
22.140	L1	15.7	60	44.3	9.7	50	40.3
0.618	L2	27.9	56	28.1	22.9	46	23.1
0.303	L2	23.7	60.15346	36.453464	22.5	50.153464	27.6535
29.140	L2	12	60	48	6	50	44

Prepared For: Salutron, Inc.	Name: SAL-BLEMOD1
Report: TR 311272 A FCCICTX V3	Model: SAL-BLEMOD1
LSR: C-1426	Serial: RF Conducted: 12060022; Radiated: 12060028

## L1 150k-30MHz Transmit Continuous

22:13:38 MAR 28, 2012

STOP  
30.00 MHz

FREQ 601.3 kHz  
PEAK 30.9 dBμV  
QP 27.6 dBμV  
AVC 23.0 dBμV

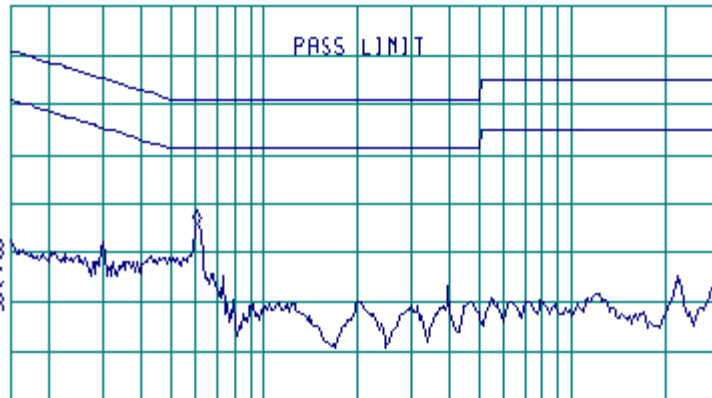
Last Hrd  
Key Menu

SPAN

LOG REF 75 0 dBμV

10  
dB/  
#ATTN  
0 dB

VA SB  
SC FC  
ACORR



START 150 kHz

RL #1F BW 9.0 kHz

AVC BW 30 kHz

STOP 30.00 MHz

SWP 2.49 sec

TUNE  
SLD FAST

MARKER  
TUNE SPN

FAD SCAN  
DN OFF

MEASURE  
AT MKR

ADD TO  
LIST

More  
1 of 3

## L2 150k-30MHz Transmit Continuous

21:58:37 MAR 28, 2012

STOP  
30.00 MHz

FREQ 618.7 kHz  
PEAK 31.7 dBμV  
QP 26.9 dBμV  
AVC 23.1 dBμV

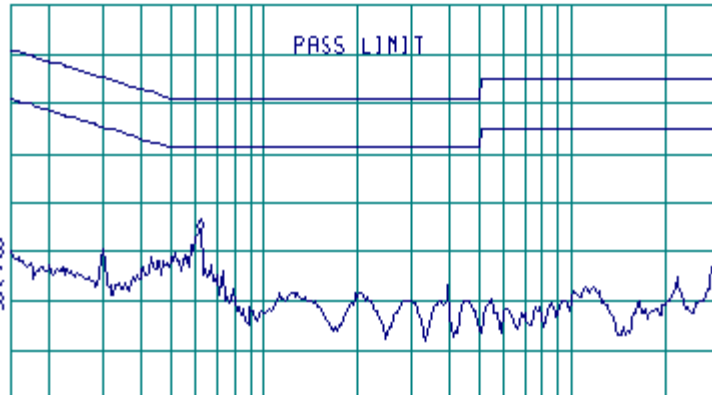
Last Hrd  
Key Menu

SPAN

LOG REF 75 0 dBμV

10  
dB/  
#ATTN  
0 dB

VA SB  
SC FC  
ACORR



START 150 kHz

RL #1F BW 9.0 kHz

AVC BW 30 kHz

STOP 30.00 MHz

SWP 2.49 sec

TUNE  
SLD FAST

MARKER  
TUNE SPN

FAD SCAN  
DN OFF

MEASURE  
AT MKR

ADD TO  
LIST

More  
1 of 3

## Appendix D - Uncertainty Summary

This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level, using a coverage factor of  $k=2$ .

*Table of Expanded Uncertainty Values, (K=2) for Specified Measurements*

Measurement Type	Particular Configuration	Uncertainty Values
Radiated Emissions	3 – Meter chamber, Biconical Antenna	4.82 dB
Radiated Emissions	3-Meter Chamber, Log Periodic Antenna	4.88 dB
Radiated Emissions	3-Meter Chamber, Horn Antenna	4.85 dB
Radiated Emissions	10-Meter OATS, Biconical Antenna	4.32 dB
Radiated Emissions	10-Meter OATS, Log Periodic Antenna	3.63 dB
Absolute Conducted Emissions	Agilent PSA/ESA Series	1.38 dB
AC Line Conducted Emissions	Shielded Room/EMCO LISN	3.20 dB
Radiated Immunity	3 Volts/Meter in 3-Meter Chamber	2.05 Volts/Meter
Conducted Immunity	3 Volts level	2.33 V
EFT Burst, Surge, VDI	230 VAC	54.4 V
ESD Immunity	Discharge at 15kV	3200 V
Temperature/Humidity	Thermo-hygrometer	0.64° / 2.88 %RH

## Appendix E - References

Publication	Year	Title
FCC CFR Parts 0-15	2011	Code of Federal Regulations – Telecommunications
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.
RSS-210 Annex 8	2010	Low-power License-exempt Radio communication Devices (All Frequency Bands): Category I Equipment
RSS-GEN Issue 3	2010	General Requirements and Information for the Certification of Radio Apparatus
ANSI C63.10	2009	American National Standard for Testing Unlicensed Wireless Devices
FCC KDB 558074 D01 DTS Meas Guidance v01	1-18-2012	Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247

Prepared For: Salutron, Inc.	Name: SAL-BLEMOD1
Report: TR 311272 A FCCICTX V3	Model: SAL-BLEMOD1
LSR: C-1426	Serial: RF Conducted: 12060022; Radiated: 12060028

## Appendix F – RF Exposure Exemption

The following exemption calculations are based on a RF Conducted measurement of 0.63dBm.

Output power dBm (conducted): 0.63dBm = 1.15mW

The output power is much lower than the  $60/f$  (GHz) mW threshold as defined in FCC KDB 447498.

$60/2.405 \text{ GHz} = 24.95\text{mW}$

The output power is less than 20mW and exempt from evaluation as stated in Industry Canada RSS-102 section 2.5.1.

Prepared For: Salutron, Inc.	Name: SAL-BLEMOD1
Report: TR 311272 A FCCICTX V3	Model: SAL-BLEMOD1
LSR: C-1426	Serial: RF Conducted: 12060022; Radiated: 12060028

## END OF REPORT

Date	Version	Comments	Person
4-4-12	V0	Initial Draft Release	Adam A
4-17-12	V1	Updated product description and IC ID	Adam A
4-20-12	V2	Corrected typo on page 20 and updated Tx Spurious worst case on page 5	Adam A
5-7-12	V3	Changed FCC ID on page 5	Adam A

Prepared For: Salutron, Inc.	Name: SAL-BLEMOD1
Report: TR 311272 A FCCICTX V3	Model: SAL-BLEMOD1
LSR: C-1426	Serial: RF Conducted: 12060022; Radiated: 12060028