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Electromagnetic Emissions Test Report
and
Application for Grant of Equipment Authorization
pursuant to

Industry Canada RSS-Gen Issue 1 / RSS 210 Issue 6
FCC Part 15 Subpart C

on the
Savi Technology, Inc.
Transmitter
Model: ST-662-001

UPN:	2404A-662T1
FCC ID:	KL7-662T-V2
GRANTEE:	Savi Technology, Inc. 615 Tasman Drive Sunnyvale, CA 94089-1707
TEST SITE:	Elliott Laboratories, Inc. 684 W. Maude Ave Sunnyvale, CA 94086
REPORT DATE:	January 9, 2007
FINAL TEST DATE:	December 13, December 14 and December 21, 2006

AUTHORIZED SIGNATORY: _____

Juan Martinez
Senior EMC Engineer

ACCREDITED
2016-01

REVISION HISTORY

Revision #	Date	Comments	Modified By
1	April 5, 2007	Initial Release	David Guidotti

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SCOPE

An electromagnetic emissions test has been performed on the Savi Technology, Inc. model ST-662-001 pursuant to the following rules:

Industry Canada RSS-Gen Issue 1
RSS 210 Issue 6 "Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment"
FCC Part 15 Subpart C

Conducted and radiated emissions data has been collected, reduced, and analyzed within this report in accordance with measurement guidelines set forth in the following reference standards and as outlined in Elliott Laboratories test procedures:

ANSI C63.4:2003
RSS-212 Issue 1 Test Facilities and Test Methods for Radio Equipment

The intentional radiator above has been tested in a simulated typical installation to demonstrate compliance with the relevant Industry Canada performance and procedural standards.

Final system data was gathered in a mode that tended to maximize emissions by varying orientation of EUT, orientation of power and I/O cabling, antenna search height, and antenna polarization.

Every practical effort was made to perform an impartial test using appropriate test equipment of known calibration. All pertinent factors have been applied to reach the determination of compliance.

The test results recorded herein are based on a single type test of the Savi Technology, Inc. model ST-662-001 and therefore apply only to the tested sample. The sample was selected and prepared by Eugene Schlindwein of Savi Technology, Inc.

OBJECTIVE

The primary objective of the manufacturer is compliance with the regulations outlined in the previous section.

Prior to marketing in the USA, all unlicensed transmitters and transceivers require certification. Receive-only devices operating between 30 MHz and 960 MHz are subject to either certification or a manufacturer's declaration of conformity, with all other receive-only devices exempt from the technical requirements.

Prior to marketing in Canada, Class I transmitters, receivers and transceivers require certification. Class II devices are required to meet the appropriate technical requirements but are exempt from certification requirements.

Certification is a procedure where the manufacturer submits test data and technical information to a certification body and receives a certificate or grant of equipment authorization upon successful completion of the certification body's review of the submitted documents. Once the equipment authorization has been obtained, the label indicating compliance must be attached to all identical units, which are subsequently manufactured.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product which may result in increased emissions should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different line filter, different power supply, harnessing or I/O cable changes, etc.).

STATEMENT OF COMPLIANCE

The tested sample of Savi Technology, Inc. model ST-662-001 complied with the requirements of the following regulations:

Industry Canada RSS-Gen Issue 1
RSS 210 Issue 6 "Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment"
FCC Part 15 Subpart C

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product which may result in increased emissions should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different line filter, different power supply, harnessing or I/O cable changes, etc.).

TEST RESULTS SUMMARY

MOMENTARILY OPERATED DEVICES – CONTROL SIGNALS

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.231 (a) (1)	RSS 210 A1.1.1 (1)	Duration of manually activated transmissions	No manually activated transmissions	< 5 seconds	Complies
15.231 (a) (2)	RSS 210 A1.1.1 (2)	Duration of automatically activated transmissions	Response to Hello: 10ms Read response: 5s or less	< 5 seconds	Complies
15.231 (a) (3)	RSS 210 A1.1.1 (3)	Transmissions at predetermined / regular intervals	No predetermined transmissions	Such transmissions are not permitted	Complies
15.231 (a) (4)	RSS 210 A1.1.1 (4)	Pendency of transmissions used during emergencies	Not applicable		Complies
15.231 (b)	RSS 210 Table 4	Fundamental Signal Strength	78.5dBµV/m (8414.0µV/m) @ 433.893MHz (-2.3dB)	Refer to table in limits section	Complies
15.231 (b) / 15.209	RSS 210 Table 2 / 4	Radiated Spurious Emissions, 30 – 4339.2 MHz	42.4dBµV/m (131.8µV/m) @ 2169.5MHz (-11.6dB)	Refer to table in limits section	Complies
15.231 (c)	RSS 210 A1.1.3	Bandwidth	442 kHz	< 0.5% of operating frequency	Complies
15.231 (d)	RSS 210 A1.1.4	Frequency Stability - 40.66 – 40.70 MHz band	Not applicable to this device as it does not operate in the 40.66-40.70 MHz sub-band.		N/A

Note 1 – Refer to the operational description included with this application for detailed description and timing diagrams for transmission duration.
Note 2 – As the device is intended for hand-held operation it was tested in all three orthogonal orientations.

MOMENTARILY OPERATED DEVICES – DATA SIGNALS OR SIGNALS AT PREDETERMINED INTERVALS

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.231 (e)	RSS 210 A1.1.5	Duration of transmissions	All transmissions are less than 1 second in duration	< 1 second	Complies
15.231 (e)	RSS 210 A1.1.5	Period between transmissions	Beacon mode and short read mode: 10ms duration and quiet period of 10s Long read mode 1s duration and quiet period of 30s or more	> 30 times duration of signal and > 10s	Complies
15.231 (e)	RSS 210 Table 5	Fundamental Signal Strength	70.5dBµV/m (3349.7µV/m) @ 433.893MHz (-2.4dB)	Refer to table in limits section	Complies
15.231 (e) / 15.209	RSS 210 Table 5	Radiated Spurious Emissions, 30 – 4339.2 MHz	39.2dBµV/m (91.2µV/m) @ 867.778MHz (-6.8dB)	Refer to table in limits section	Complies
15.231 (c)	RSS 210 A1.1.3	Bandwidth	442 kHz	< 0.5% of operating frequency	Complies
15.231 (d)	RSS 210 A1.1.4	Frequency Stability - 40.66 – 40.70 MHz band	Not applicable to this device as it does not operate in the 40.66-40.70 MHz sub-band.		N/A

Note 1 – Refer to the operational description included with this application for detailed description and timing diagrams for transmission duration.
Note 2 – As the device is intended for hand-held operation it was tested in all three orthogonal orientations.

RFID DEVICES OPERATING IN THE 433.5 – 434.5MHz BANDS

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.240 (a)	RSS 210 A5	Location of operation	The tag is triggered by a reader to send transmissions under 15.240. User information and location of these Readers is applicable to the Readers and not the Tag.	Must be limited to commercial and industrial areas	Complies
15.240 (f)	-	Information to user		Notification of geographic limitations	Complies
15.240 (b)	RSS 210 A5 (1)	Duration of transmissions	Tag read response: 60s or less with 10s silent period between transmissions	< 60s with 10s silent period	Complies
15.240 (b)	RSS 210 A5 (2)	Fundamental Signal Strength	90.5dBµV/m (33496.5µV/m) @ 433.893MHz (-4.3dB)	11000uV/m avg 55000uV/m pk	Complies
15.240 (c) / 15.209	RSS 210 Table 2	Radiated Spurious Emissions, 30 MHz – 4339 MHz	39.2dBµV/m (91.2µV/m) @ 867.778MHz (-6.8dB)	Table 2	Complies
	RSP 100 RSS GEN 4.4.1	99% Bandwidth	147 kHz	Information only	N/A

GENERAL REQUIREMENTS APPLICABLE TO ALL BANDS

FCC Rule Part	RSS GEN	Description	Measured Value / Comments	Limit / Requirement	Result (margin)
15.205	7.1.4	RF Connector	Antenna is permanently attached to PCB		Complies
15.109	4.8 & 6	Receiver spurious emissions	33.3dBµV/m (46.2µV/m) @ 433.780MHz		Complies (-12.7 dB)
15.207	7.2.2	AC Conducted Emissions	Not applicable unit operates from batteries	Refer to standard	Complies

MEASUREMENT UNCERTAINTIES

ISO Guide 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level and were calculated in accordance with UKAS document LAB 34.

Measurement Type	Frequency Range (MHz)	Calculated Uncertainty (dB)
Conducted Emissions	0.15 to 30	± 2.4
Radiated Emissions	0.015 to 30	± 3.0
Radiated Emissions	30 to 1000	± 3.6
Radiated Emissions	1000 to 40000	± 6.0

EQUIPMENT UNDER TEST (EUT) DETAILS

GENERAL

The Savi Technology, Inc. model ST-662-001 is an RF Tagging device which is designed to identify the container to which it is attached to the Savi System. Normally, the EUT would be mounted to a container or similar piece of equipment. The EUT was treated as table-top equipment during testing to simulate the end user environment.
A response from the EUT is initiated by a 123 kHz signal from a Savi SignPost or 433.92 MHz signal from a Savi Reader. Upon receiving the initiation signal the EUT transmits a signal at 433.92 MHz. This signal is comprised of SignPost ID and Tag ID.
A response from the EUT is initiated by a 433.92 MHz Savi Reader signal. Upon receiving the initiation signal the EUT transmits a signal at 433.92 MHz. This signal is comprised of Tag ID.

The sample was received on December 13, 2006 and tested on December 13, December 14 and December 21, 2006. The EUT consisted of the following component(s):

Manufacturer	Model	Description	Serial Number	FCC ID
Savi Technology	ST-662-001	RFID tag	5800680	KL7-662T-V2

ANTENNA SYSTEM

The antenna is integral to the device.

ENCLOSURE

The EUT enclosure is primarily constructed of plastic. Model ST-662-001 measures approximately 7 cm wide by 3.2 cm deep by 6.5 cm high.

MODIFICATIONS

The EUT did not require modifications during testing in order to comply with emissions specifications.

SUPPORT EQUIPMENT

No support equipment was used during emissions testing.

EUT INTERFACE PORTS

The I/O cabling configuration during emissions testing was as follows:

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
None	-	-	-	-

EUT OPERATION

Receive Mode: The EUT was in a stand-by/receive mode, with the circuits active but not transmitting.

Transmit Mode: The EUT was configured to transmit continuously.

TEST SITE

GENERAL INFORMATION

Final test measurements were taken on December 13, December 14 and December 21, 2006at the Elliott Laboratories Open Area Test Site #2 located at 684 West Maude Avenue, Sunnyvale, California. Pursuant to section 2.948 of the FCC's Rules and section 3.3 of RSP-100, construction, calibration, and equipment data has been filed with the Commission.

ANSI C63.4:2003 recommends that ambient noise at the test site be at least 6 dB below the allowable limits. Ambient levels are below this requirement with the exception of predictable local TV, radio, and mobile communications traffic. The test site contains separate areas for radiated and conducted emissions testing. Considerable engineering effort has been expended to ensure that the facilities conform to all pertinent requirements of ANSI C63.4:2003 and RSS 212.

CONDUCTED EMISSIONS CONSIDERATIONS

Conducted emissions testing is performed in conformance with ANSI C63.4:2003 and RSS 212. Measurements are made with the EUT connected to the public power network through a nominal, standardized RF impedance, which is provided by a line impedance stabilization network, known as a LISN. A LISN is inserted in series with each current-carrying conductor in the EUT power cord.

RADIATED EMISSIONS CONSIDERATIONS

The FCC has determined that radiation measurements made in a shielded enclosure are not suitable for determining levels of radiated emissions. Radiated measurements are performed in an open field environment or in a semi-anechoic chamber. The test sites are maintained free of conductive objects within the CISPR defined elliptical area incorporated in ANSI C63.4:2003 guidelines and meet the Normalized Site Attenuation (NSA) requirements of ANSI C63.4:2003 / RSS 212.

MEASUREMENT INSTRUMENTATION

RECEIVER SYSTEM

An EMI receiver as specified in CISPR 16-1 is used for emissions measurements. The receivers used can measure over the frequency range of 9 kHz up to 2000 MHz. These receivers allow both ease of measurement and high accuracy to be achieved. The receivers have Peak, Average, and CISPR (Quasi-peak) detectors built into their design so no external adapters are necessary. The receiver automatically sets the required bandwidth for the CISPR detector used during measurements. If the repetition frequency of the signal being measured is below 20Hz, peak measurements are made in lieu of Quasi-Peak measurements.

For measurements above the frequency range of the receivers, a spectrum analyzer is utilized because it provides visibility of the entire spectrum along with the precision and versatility required to support engineering analysis. Average measurements above 1000MHz are performed on the spectrum analyzer using the linear-average method with a resolution bandwidth of 1 MHz and a video bandwidth of 10 Hz, unless the signal is pulsed in which case the average (or video) bandwidth of the measuring instrument is reduced to onset of pulse desensitization and then increased.

INSTRUMENT CONTROL COMPUTER

The receivers utilize either a Rohde & Schwarz EZM Spectrum Monitor/Controller or contain an internal Spectrum Monitor/Controller to view and convert the receiver measurements to the field strength at an antenna or voltage developed at the LISN measurement port, which is then compared directly with the appropriate specification limit. This provides faster, more accurate readings by performing the conversions described under Sample Calculations within the Test Procedures section of this report. Results are printed in a graphic and/or tabular format, as appropriate. A personal computer is used to record all measurements made with the receivers.

The Spectrum Monitor provides a visual display of the signal being measured. In addition, the controller or a personal computer run automated data collection programs which control the receivers. This provides added accuracy since all site correction factors, such as cable loss and antenna factors are added automatically.

LINE IMPEDANCE STABILIZATION NETWORK (LISN)

Line conducted measurements utilize a fifty microhenry Line Impedance Stabilization Network as the monitoring point. The LISN used also contains a 250 uH CISPR adapter. This network provides for calibrated radio frequency noise measurements by the design of the internal low pass and high pass filters on the EUT and measurement ports, respectively.

FILTERS/ATTENUATORS

External filters and precision attenuators are often connected between the receiving antenna or LISN and the receiver. This eliminates saturation effects and non-linear operation due to high amplitude transient events.

ANTENNAS

A loop antenna is used below 30 MHz. For the measurement range 30 MHz to 1000 MHz either a combination of a biconical antenna and a log periodic or a bi-log antenna is used. Above 1000 MHz, horn antennas are used. The antenna calibration factors to convert the received voltage to an electric field strength are included with appropriate cable loss and amplifier gain factors to determine an overall site factor, which is then programmed into the test receivers or incorporated into the test software.

ANTENNA MAST AND EQUIPMENT TURNTABLE

The antennas used to measure the radiated electric field strength are mounted on a non-conductive antenna mast equipped with a motor-drive to vary the antenna height. Measurements below 30 MHz are made with the loop antenna at a fixed height of 1m above the ground plane.

ANSI C63.4:2003 and RSS 212 specify that the test height above ground for table mounted devices shall be 80 centimeters. Floor mounted equipment shall be placed on the ground plane if the device is normally used on a conductive floor or separated from the ground plane by insulating material from 3 to 12 mm if the device is normally used on a non-conductive floor. During radiated measurements, the EUT is positioned on a motorized turntable in conformance with this requirement.

INSTRUMENT CALIBRATION

All test equipment is regularly checked to ensure that performance is maintained in accordance with the manufacturer's specifications. All antennas are calibrated at regular intervals with respect to tuned half-wave dipoles. An exhibit of this report contains the list of test equipment used and calibration information.

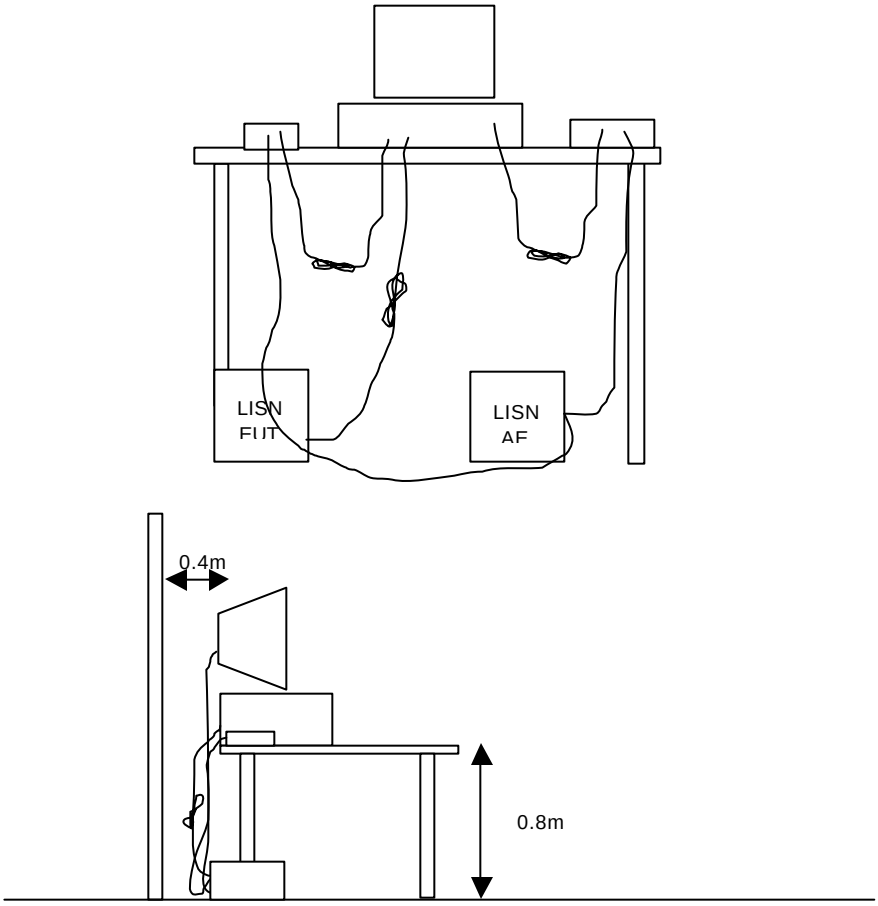
TEST PROCEDURES

EUT AND CABLE PLACEMENT

The regulations require that interconnecting cables be connected to the available ports of the unit and that the placement of the unit and the attached cables simulate the worst case orientation that can be expected from a typical installation, so far as practicable. To this end, the position of the unit and associated cabling is varied within the guidelines of ANSI C63.4:2003, and the worst-case orientation is used for final measurements.

CONDUCTED EMISSIONS

Conducted emissions are measured at the plug end of the power cord supplied with the EUT. Excess power cord length is wrapped in a bundle between 30 and 40 centimeters in length near the center of the cord. Preliminary measurements are made to determine the highest amplitude emission relative to the specification limit for all the modes of operation. Placement of system components and varying of cable positions are performed in each mode. A final peak mode scan is then performed in the position and mode for which the highest emission was noted on all current carrying conductors of the power cord.

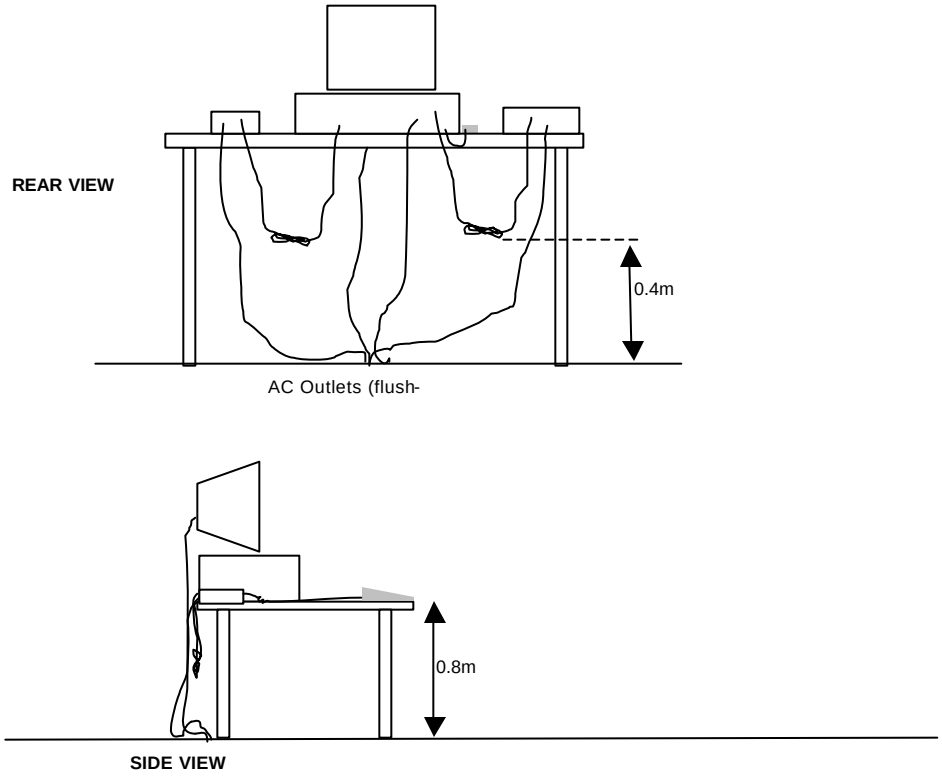


RADIATED EMISSIONS

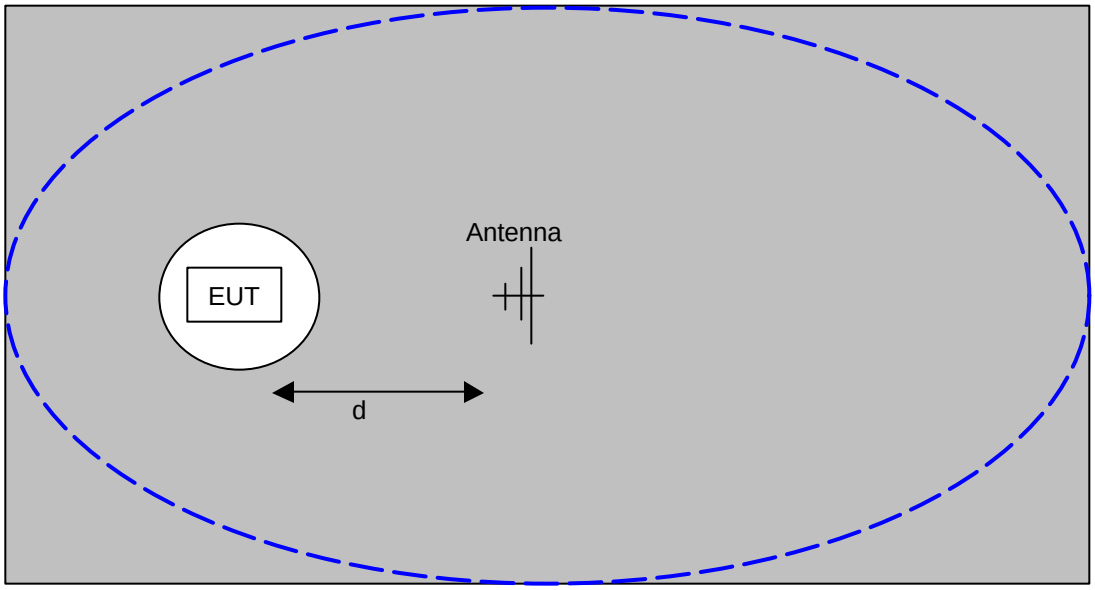
A preliminary scan of the radiated emissions is perfromed in which all significant EUT frequencies are identified with the system in a nominal configuration. At least two scans are performed, one scan for each antenna polarization (horizontal and vertical; loop parallel and perpendicular to the EUT). During the preliminary scans, the EUT is rotated through 360°, the antenna height is varied (for measurements above 30 MHz) and cable positions are varied to determine the highest emission relative to the limit. Preliminary scans may be performed in a fully anechoic chamber for the purposes of identifying the frequencies of the highest emissions from the EUT.

A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

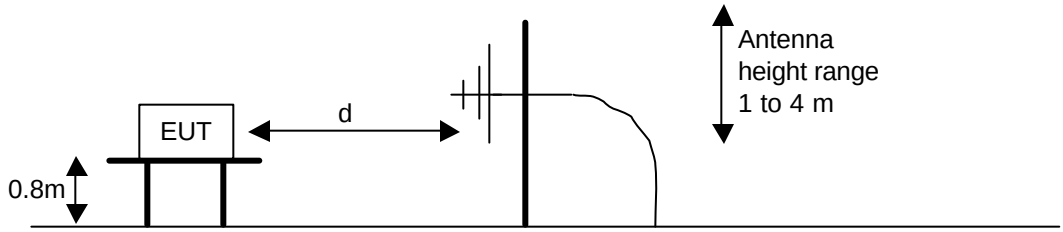
Final maximization is a phase in which the highest amplitude emissions identified in the spectral search are viewed while the EUT azimuth angle is varied from 0 to 360 degrees relative to the receiving antenna. The azimuth, which results in the highest emission is then maintained while varying the antenna height from one to four meters (for measurements above 30 MHz, measurements below 30 MHz are made with the loop antenna at a fixed height of 1m). The result is the identification of the highest amplitude for each of the highest peaks. Each recorded level is corrected in the receiver using appropriate factors for cables, connectors, antennas, and preamplifier gain.



Typical Test Configuration for Radiated Field Strength Measurements



The ground plane extends beyond the ellipse defined in CISPR 16 / CISPR 22 / ANSI C63.4 and is large enough to accommodate test distances (d) of 3m and 10m. Refer to the test data tables for the actual measurement distance.



Test Configuration for Radiated Field Strength Measurements
OATS- Plan and Side Views

BANDWIDTH MEASUREMENTS

The 6dB, 20dB and/or 26dB signal bandwidth is measured in using the bandwidths recommended by ANSI C63.4. When required, the 99% bandwidth is measured using the methods detailed in RSS GEN.

SPECIFICATION LIMITS AND SAMPLE CALCULATIONS

The limits for conducted emissions are given in units of microvolts, and the limits for radiated emissions are given in units of microvolts per meter at a specified test distance. Data is measured in the logarithmic form of decibels relative to one microvolt, or dB microvolts (dBuV). For radiated emissions, the measured data is converted to the field strength at the antenna in dB microvolts per meter (dBuV/m). The results are then converted to the linear forms of uV and uV/m for comparison to published specifications.

For reference, converting the specification limits from linear to decibel form is accomplished by taking the base ten logarithm, then multiplying by 20. These limits in both linear and logarithmic form are as follows:

GENERAL TRANSMITTER RADIATED EMISSIONS SPECIFICATION LIMITS

The table below shows the limits for both the fundamental and spurious emissions for control signals. The limits for data signals, or signals with predetermined transmissions, are given in the second table

Operating Frequency (MHz)	Fundamental Field Strength (microvolts/m)	Spurious Emissions (microvolts/m)
70 - 130	1250	125
130 - 174	1250 - 3750	125 - 375
174 – 260	3750	375
260 – 470	3750 – 12,500	375 - 1250
Above 470	12,500	1250

Spurious Emissions Limits – Control Signals

Operating Frequency (MHz)	Fundamental Field Strength (microvolts/m)	Spurious Emissions (microvolts/m)
70 - 130	500	50
130 - 174	500 - 1500	50 - 150
174 – 260	1500	150
260 – 470	1500 – 5000	150 - 500
Above 470	5000	500

Spurious Emissions Limits – Data Signals

SAMPLE CALCULATIONS - CONDUCTED EMISSIONS

Receiver readings are compared directly to the conducted emissions specification limit (decibel form) as follows:

$$R_r - S = M$$

where:

R_r = Receiver Reading in dBuV

S = Specification Limit in dBuV

M = Margin to Specification in +/- dB

SAMPLE CALCULATIONS - RADIATED EMISSIONS

Receiver readings are compared directly to the specification limit (decibel form). The receiver internally corrects for cable loss, preamplifier gain, and antenna factor. The calculations are in the reverse direction of the actual signal flow, thus cable loss is added and the amplifier gain is subtracted. The Antenna Factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements.

A distance factor, when used for electric field measurements above 30MHz, is calculated by using the following formula:

$$F_d = 20*LOG_{10} (D_m/D_s)$$

where:

F_d = Distance Factor in dB

D_m = Measurement Distance in meters

D_s = Specification Distance in meters

For electric field measurements below 30MHz the extrapolation factor is either determined by making measurements at multiple distances or a theoretical value is calculated using the formula:

$$F_d = 40*LOG_{10} (D_m/D_s)$$

Measurement Distance is the distance at which the measurements were taken and Specification Distance is the distance at which the specification limits are based. The antenna factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements.

The margin of a given emission peak relative to the limit is calculated as follows:

$$R_C = R_r + F_d$$

and

$$M = R_C - L_S$$

where:

R_r = Receiver Reading in dBuV/m

F_d = Distance Factor in dB

R_C = Corrected Reading in dBuV/m

L_S = Specification Limit in dBuV/m

M = Margin in dB Relative to Spec

SAMPLE CALCULATIONS - FIELD STRENGTH TO EIRP CONVERSION

Where the radiated electric field strength is expressed in terms of the equivalent isotropic radiated power (eirp), or where a field strength measurement of output power is made in lieu of a direct measurement, the following formula is used to convert between eirp and field strength at a distance of 3m from the equipment under test:

$$E = \frac{1000000 \text{ v } 30\ P}{3} \quad \text{microvolts per meter}$$

where P is the eirp (Watts)

EXHIBIT 1: Test Equipment Calibration Data

1 Page

Radiated Emissions, 30 - 4,400 MHz, 15-Dec-06
Engineer: Rafael Varelas

Manufacturer	Description	Model #	Asset #	Cal Due
Elliott Laboratories	Biconical Antenna, 30-300 MHz	EL30.300	54	07-Mar-07
Hewlett Packard	EMC Spectrum Analyzer, 9 kHz - `6.5 GHz	8595EM	780	05-Sep-07
Filtek	Filter, 1 GHz High Pass	HP12/1000-5BA	957	24-Apr-07
EMCO	Log Periodic Antenna, 0.2-1 GHz	3146	1294	25-May-07
Rohde & Schwarz	Test Receiver, 0.009-2750 MHz	ESN	1332	21-Nov-07
EMCO	Antenna, Horn, 1-18 GHz (SA40)	3115	1386	11-Jul-08
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	1780	15-Nov-07

Radiated Emissions, 0.009 - 4,400 MHz, 21-Dec-06
Engineer: Mehran Birgani

Manufacturer	Description	Model #	Asset #	Cal Due
Elliott Laboratories	Log Periodic Antenna 300-1000 MHz	EL300.1000	55	28-Dec-06
Hewlett Packard	EMC Spectrum Analyzer, 9 kHz - 6.5 GHz	8595EM	780	05-Sep-07
Hewlett Packard	Microwave Preamplifier 0.5-26.5 GHz	83017A	1257	28-Dec-06
EMCO	Magnetic Loop Antenna, 10 kHz-30 MHz	6502	1299	20-Jan-07
EMCO	Biconical Antenna, 30-300 MHz	3110B	1498	03-Mar-07
EMCO	Antenna, Horn, 1-18 GHz	3117	1662	07-Apr-07
Hewlett Packard	Preamplifier	8447D OPT 010	1826	02-May-07

EXHIBIT 2: Test Measurement Data

17 Pages

Elliott

EMC Test Data

Client:	Savi	Job Number:	J65855
Model:	ST-662-001	T-Log Number:	T66442
		Account Manager:	Tommy Wong
Contact:	Eugene Schlindwein		
Emissions Spec:	FCC 15.231(a/e); FCC 15.240	Class:	-
Immunity Spec:	-	Environment:	-

EMC Test Data

For The

Savi

Model

ST-662-001

Date of Last Test: 4/5/2007

Client:	Savi	Job Number:	J65855
Model:	ST-662-001	T-Log Number:	T66442
		Account Manager:	Tommy Wong
Contact:	Eugene Schlindwein		
Emissions Spec:	FCC 15.231(a/e); FCC 15.240	Class:	-
Immunity Spec:	-	Environment:	-

EUT INFORMATION

General Description

The EUT is an RF Tagging device which is designed to identify the container to which it is attached to the Savi System. Normally, the EUT would be mounted to a container or similar piece of equipment. The EUT was treated as table-top equipment during testing to simulate the end user environment.

A response from the EUT is initiated by a 123 kHz signal from a Savi SignPost or 433.92 MHz signal from a Savi Reader. Upon receiving the initiation signal the EUT transmits a signal at 433.92 MHz. This signal is comprised of SignPost ID and Tag ID.

A response from the EUT is initiated by a 433.92 MHz Savi Reader signal. Upon receiving the initiation signal the EUT transmits a signal at 433.92 MHz. This signal is comprised of Tag ID.

Equipment Under Test

Manufacturer	Model	Description	Serial Number	FCC ID
Savi Technology	ST-662-001	RFID tag	5800680	KL7-662T-V2

EUT Antenna (Intentional Radiators Only)

The antenna is integral to the device.

EUT Enclosure

The EUT enclosure is primarily constructed of plastic. Model ST-662-001 measures approximately 7 cm wide by 3.2 cm deep by 6.5 cm high.

Client:	Savi	Job Number:	J65855
Model:	ST-662-001	T-Log Number:	T66442
		Account Manager:	Tommy Wong
Contact:	Eugene Schlindwein		
Emissions Spec:	FCC 15.231(a/e); FCC 15.240	Class:	-
Immunity Spec:	-	Environment:	-

Test Configuration #1

Local Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
None	-	-	-	-

Remote Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
None	-	-	-	-

Interface Cabling and Ports

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
None	-	-	-	-

EUT Operation During Emissions Tests

Receive Mode: The EUT was in a stand-by/receive mode, with the circuits active but not transmitting.
Transmit Mode: The EUT was configured to transmit continuously.

Client:	Savi	Job Number:	J65855
Model:	ST-662-001	T-Log Number:	T66442
		Account Manager:	Tommy Wong
Contact:	Eugene Schlindwein		
Standard:	FCC 15.231(a/e); FCC 15.240	Class:	N/A

FCC 15.109/ RSS GEN Receiver Radiated Emissions - ST-662-001

Test Specifics

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 12/14/2006
Test Engineer: Rafael Varelas
Test Location: SVOATS #2
Config. Used: 1
Config Change: None
EUT Voltage: Battery

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated emissions testing.

The test distance and extrapolation factor (if used) are detailed under each run description.

Ambient Conditions:

Temperature: 12 °C
Rel. Humidity: 75 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	RE, 30 - 1300MHz, Maximized Emissions	FCC 15.109	Pass	33.3dBµV/m (46.2µV/m) @ 433.780MHz (-12.7dB)

Modifications Made During Testing:

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Elliott

EMC Test Data

Client:	Savi	Job Number:	J65855
Model:	ST-662-001	T-Log Number:	T66442
		Account Manager:	Tommy Wong
Contact:	Eugene Schlindwein		
Standard:	FCC 15.231(a/e); FCC 15.240	Class:	N/A

Run #1: Preliminary Radiated Emissions, 30-1300 MHz
ST-662-001

Frequency Range	Test Distance	Limit Distance	Extrapolation Factor
30 - 1000 MHz	3	3	0

Receiver LO

Frequency	Level	Pol	15.109		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
433.780	33.3	V	46.0	-12.7	QP	195	1.3	Upright
433.780	28.0	H	46.0	-18.0	QP	290	1.0	Upright
867.560	33.4	V	46.0	-12.6	QP	345	1.3	Upright
867.560	30.7	H	46.0	-15.3	QP	50	1.2	Upright
1301.910	24.6	V	54.0	-29.4	AVG	209	1.0	Upright
1301.910	35.3	V	74.0	-38.7	PK	209	1.0	Upright
1302.060	24.6	H	54.0	-29.4	AVG	191	1.0	Upright
1302.060	35.9	H	74.0	-38.1	PK	191	1.0	Upright
433.780	31.8	V	46.0	-14.2	QP	120	1.3	Flat
433.780	30.8	H	46.0	-15.2	QP	195	1.0	Flat
867.560	31.4	V	46.0	-14.6	QP	50	1.3	Flat
867.560	33.7	H	46.0	-12.3	QP	200	1.0	Flat
1300.140	24.6	H	54.0	-29.4	AVG	132	1.0	Flat
1300.140	35.1	H	74.0	-38.9	PK	132	1.0	Flat
1302.460	24.6	V	54.0	-29.4	AVG	247	1.0	Flat
1302.460	35.0	V	74.0	-39.0	PK	247	1.0	Flat
433.780	22.4	V	46.0	-23.6	QP	290	1.0	Side
433.780	33.4	H	46.0	-12.6	QP	165	1.0	Side
867.560	30.1	V	46.0	-15.9	QP	250	1.4	Side
867.560	33.6	H	46.0	-12.4	QP	345	1.0	Side
1299.970	24.6	V	54.0	-29.4	AVG	342	1.0	Side
1299.970	35.1	V	74.0	-38.9	PK	342	1.0	Side
1301.050	24.6	H	54.0	-29.4	AVG	360	1.0	Side
1301.050	36.1	H	74.0	-37.9	PK	360	1.0	Side

Client:	Savi	Job Number:	J65855
Model:	ST-662-001	T-Log Number:	T66442
		Account Manager:	Tommy Wong
Contact:	Eugene Schlindwein		
Spec:	FCC 15.231(a/e); FCC 15.240	Class:	-

Radiated Emissions (ST-662-001)

Test Specifics

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 12/13/2006
Test Engineer: Rafael varelas
Test Location: SVOATS #2
Config. Used: 1
Config Change: None
EUT Voltage: Battery

General Test Configuration

The EUT was located on the turntable for radiated emissions testing.

Note, **preliminary** testing indicates that the emissions were maximized by orientation of the EUT and elevation of the measurement antenna. **Maximized** testing indicated that the emissions were maximized by orientation of the EUT, elevation of the measurement antenna, and manipulation of the EUT's interface cables.

Note, for testing above 1 GHz, the FCC specifies the limit as an average measurement. In addition, the FCC states that the peak reading of any emission above 1 GHz, can not exceed the average limit by more than 20 dB.

Ambient Conditions:

Temperature: 11 °C
Rel. Humidity: 86 %

Modifications Made During Testing:

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Client:	Savi	Job Number:	J65855
Model:	ST-662-001	T-Log Number:	T66442
		Account Manager:	Tommy Wong
Contact:	Eugene Schlindwein		
Spec:	FCC 15.231(a/e); FCC 15.240	Class:	-

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	RE, 433.92MHz, Fundamental	15.231(e) / RSS 210	Pass	70.5dBµV/m (3349.7µV/m) @ 433.893MHz (-2.4dB)
2	RE, Tx Spurious Emissions	15.231(e) / RSS 210	Pass	39.2dBµV/m (91.2µV/m) @ 867.778MHz (-6.8dB)
3	RE, 433.92MHz, Fundamental	15.231(a) / RSS 210	Pass	78.5dBµV/m (8414.0µV/m) @ 433.893MHz (-2.3dB)
4	RE, Tx Spurious Emissions	15.231(a) / RSS 210	Pass	42.4dBµV/m (131.8µV/m) @ 2169.5MHz (-11.6dB)
5	Transmitter 20dB Bandwidth	15.231/ RSS 210	Pass	442kHz
5	99% Bandwidth	RSS GEN	Pass	147kHz

Run #1: Fundamental Mesaurement of 433.88
Operation under 15.231(e)

Frequency	Level	Pol	FCC 15.231(e)		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
433.893	70.5	V	72.9	-2.4	Avg	0	1.2	Upright
433.893	90.5	V	92.9	-2.4	Pk	0	1.2	Upright
433.893	69.9	V	72.9	-3.0	Avg	295	1.2	Flat
433.893	89.9	V	92.9	-3.0	Pk	295	1.2	Flat
433.893	68.5	H	72.9	-4.4	Avg	265	1.0	Side
433.893	88.5	H	92.9	-4.4	Pk	265	1.0	Side
433.893	66.5	H	72.9	-6.4	Avg	95	1.0	Upright
433.893	86.5	H	92.9	-6.4	Pk	95	1.0	Upright
433.893	64.6	H	72.9	-8.3	Avg	15	1.0	Flat
433.893	84.6	H	92.9	-8.3	Pk	15	1.0	Flat
433.893	60.5	V	72.9	-12.4	Avg	120	1.0	Side
433.893	80.5	V	92.9	-12.4	Pk	120	1.0	Side

Note 1:	Duty cycle is 10% . A -20dB correction was used to determine the average level from the peak reading

Client:	Savi	Job Number:	J65855
Model:	ST-662-001	T-Log Number:	T66442
		Account Manager:	Tommy Wong
Contact:	Eugene Schlindwein		
Spec:	FCC 15.231(a/e); FCC 15.240	Class:	-

Run #2: Spurious Emissions, 30-4400 MHz (Tx Mode)
Operation under 15.231(e)

Frequency	Level	Pol	FCC 15.231(e)		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
867.778	39.2	H	46.0	-6.8	Pk	165	1.0	Side
867.778	33.9	V	46.0	-12.1	Pk	10	1.1	Side
867.778	31.7	H	46.0	-14.3	Pk	40	1.0	Upright
867.778	38.5	V	46.0	-7.5	Pk	240	1.2	Upright
867.778	39.9	H	46.0	-6.1	Pk	20	1.0	Flat
867.778	36.2	V	46.0	-9.8	Pk	300	1.5	Flat
1301.620	23.8	H	54.0	-30.2	AVG	46	1.6	Flat
1301.620	43.8	H	74.0	-30.2	PK	46	1.6	Flat
1735.590	29.6	H	54.0	-24.4	AVG	2	1.6	Flat
1735.590	49.6	H	74.0	-24.4	PK	2	1.6	Flat
2169.480	34.4	H	54.0	-19.6	AVG	183	2.0	Flat
2169.480	54.4	H	74.0	-19.6	PK	183	2.0	Flat
2603.360	26.5	H	54.0	-27.5	AVG	157	1.9	Flat
2603.360	46.5	H	74.0	-27.5	PK	157	1.9	Flat
3037.280	35.7	H	54.0	-18.3	AVG	360	1.0	Noise Floor
3037.280	46.4	H	74.0	-27.6	PK	360	1.0	Noise Floor
3472.490	36.8	H	54.0	-17.2	AVG	342	1.0	Noise Floor
3472.490	47.1	H	74.0	-26.9	PK	342	1.0	Noise Floor
3905.320	38.4	H	54.0	-15.6	AVG	220	1.0	Noise Floor
3905.320	48.8	H	74.0	-25.2	PK	220	1.0	Noise Floor
4337.600	38.8	H	54.0	-15.2	AVG	0	1.0	Noise Floor
4337.600	48.7	H	74.0	-25.3	PK	0	1.0	Noise Floor
1301.620	20.6	V	54.0	-33.4	AVG	357	1.0	Flat
1301.620	40.6	V	74.0	-33.4	PK	357	1.0	Flat
1735.630	26.2	V	54.0	-27.8	AVG	226	1.4	Flat
1735.630	46.2	V	74.0	-27.8	PK	226	1.4	Flat
2169.470	28.3	V	54.0	-25.7	AVG	162	1.0	Flat
2169.470	48.3	V	74.0	-25.7	PK	162	1.0	Flat
2603.250	25.6	V	54.0	-28.4	AVG	136	1.0	Flat
2603.250	45.6	V	74.0	-28.4	PK	136	1.0	Flat
3037.450	25.7	V	54.0	-18.5	AVG	289	1.0	Noise Floor
3037.450	45.7	V	74.0	-28.3	PK	289	1.0	Noise Floor
1301.650	26.1	V	54.0	-27.9	AVG	146	1.1	Upright
1301.650	46.1	V	74.0	-27.9	PK	146	1.1	Upright

Client:	Savi	Job Number:	J65855
Model:	ST-662-001	T-Log Number:	T66442
		Account Manager:	Tommy Wong
Contact:	Eugene Schlindwein		
Spec:	FCC 15.231(a/e); FCC 15.240	Class:	-

Run #2: Continued

Frequency	Level	Pol	FCC 15.209		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
1735.550	32.2	V	54.0	-21.8	AVG	272	2.1	Upright
1735.550	52.2	V	74.0	-21.8	PK	272	2.1	Upright
2169.450	33.0	V	54.0	-21.0	AVG	273	1.6	Upright
2169.450	53.0	V	74.0	-21.0	PK	273	1.6	Upright
2603.380	27.0	V	54.0	-27.0	AVG	350	1.0	Upright
2603.380	47.0	V	74.0	-27.0	PK	350	1.0	Upright
1301.660	18.6	H	54.0	-35.4	AVG	211	1.0	Upright
1301.660	38.6	H	74.0	-35.4	PK	211	1.0	Upright
1735.550	27.2	H	54.0	-26.8	AVG	343	1.9	Upright
1735.550	47.2	H	74.0	-26.8	PK	343	1.9	Upright
2169.460	29.1	H	54.0	-24.9	AVG	311	2.0	Upright
2169.460	49.1	H	74.0	-24.9	PK	311	2.0	Upright
2603.330	26.4	H	54.0	-27.6	AVG	360	2.0	Upright
2603.330	46.4	H	74.0	-27.6	PK	360	2.0	Upright
1301.690	22.2	H	54.0	-31.8	AVG	131	1.6	Side
1301.690	42.2	H	74.0	-31.8	PK	131	1.6	Side
1735.560	31.6	H	54.0	-22.4	AVG	176	1.9	Side
1735.560	51.6	H	74.0	-22.4	PK	176	1.9	Side
2169.330	24.4	H	54.0	-29.6	AVG	169	1.0	Side
2169.330	44.4	H	74.0	-29.6	PK	169	1.0	Side
2603.310	28.8	H	54.0	-25.2	AVG	219	2.0	Side
2603.310	48.8	H	74.0	-25.2	PK	219	2.0	Side
3037.950	25.6	H	54.0	-28.4	AVG	290	1.0	Noise Floor
3037.950	45.6	H	74.0	-28.4	PK	290	1.0	Noise Floor

Note 1:	Duty cycle is 10% . A -20dB correction was used to determine the average level from the peak reading. All three orientations evaluated and all readings within 20dB of the limit were recorded.

Client:	Savi	Job Number:	J65855
Model:	ST-662-001	T-Log Number:	T66442
		Account Manager:	Tommy Wong
Contact:	Eugene Schlindwein		
Spec:	FCC 15.231(a/e); FCC 15.240	Class:	-

Run #3: Fundamental Mesaurement of 433.88
Operation under 15.231(a)

Frequency	Level	Pol	FCC 15.231(a)		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
433.893	78.5	H	80.8	-2.3	Avg	95	1.0	Upright
433.893	90.5	V	100.8	-10.3	Pk	0	1.2	Upright
433.893	89.9	V	100.8	-10.9	Pk	295	1.2	Flat
433.893	76.5	H	80.8	-4.3	Avg	265	1.0	Side
433.893	88.5	H	100.8	-12.3	Pk	265	1.0	Side
433.893	86.5	H	100.8	-14.3	Pk	95	1.0	Upright
433.893	84.6	H	100.8	-16.2	Pk	15	1.0	Flat
433.893	80.5	V	100.8	-20.3	Pk	120	1.0	Side
433.893	-48.0	V	80.8	-128.8	Avg	295	1.2	Flat
433.893	-36.0	V	80.8	-116.8	Avg	0	1.2	Upright
433.893	-24.0	H	80.8	-104.8	Avg	15	1.0	Flat
433.893	-12.0	V	80.8	-92.8	Avg	120	1.0	Side

Note 1:	Duty cycle is 25% . A -12dB correction was used to determine the average level from the peak reading

Client:	Savi	Job Number:	J65855
Model:	ST-662-001	T-Log Number:	T66442
		Account Manager:	Tommy Wong
Contact:	Eugene Schlindwein		
Spec:	FCC 15.231(a/e); FCC 15.240	Class:	-

Run #4: Spurious Emissions, 30-4400 MHz (Tx Mode)
Operation under 15.231(a)

Frequency	Level	Pol	FCC 15.231(a)		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2169.480	42.4	H	54.0	-11.6	AVG	183	2.0	Flat
2169.480	54.4	H	74.0	-19.6	PK	183	2.0	Flat
867.778	39.2	H	60.8	-21.6	Pk	165	1.0	Side
867.778	33.9	V	60.8	-26.9	Pk	10	1.1	Side
867.778	31.7	H	60.8	-29.1	Pk	40	1.0	Upright
867.778	38.5	V	60.8	-22.3	Pk	240	1.2	Upright
867.778	39.9	H	60.8	-20.9	Pk	20	1.0	Flat
867.778	36.2	V	60.8	-24.6	Pk	300	1.5	Flat
1301.620	31.8	H	54.0	-22.2	AVG	46	1.6	Flat
1301.620	43.8	H	74.0	-30.2	PK	46	1.6	Flat
1735.590	37.6	H	54.0	-16.4	AVG	2	1.6	Flat
1735.590	49.6	H	74.0	-24.4	PK	2	1.6	Flat
2603.360	34.5	H	54.0	-19.5	AVG	157	1.9	Flat
2603.360	46.5	H	74.0	-27.5	PK	157	1.9	Flat
3037.280	35.7	H	54.0	-18.3	AVG	360	1.0	Noise Floor
3037.280	46.4	H	74.0	-27.6	PK	360	1.0	Noise Floor
3472.490	36.8	H	54.0	-17.2	AVG	342	1.0	Noise Floor
3472.490	47.1	H	74.0	-26.9	PK	342	1.0	Noise Floor
3905.320	38.4	H	54.0	-15.6	AVG	220	1.0	Noise Floor
3905.320	48.8	H	74.0	-25.2	PK	220	1.0	Noise Floor
4337.600	38.8	H	54.0	-15.2	AVG	0	1.0	Noise Floor
4337.600	48.7	H	74.0	-25.3	PK	0	1.0	Noise Floor
1301.620	28.6	V	54.0	-25.4	AVG	357	1.0	Flat
1301.620	40.6	V	74.0	-33.4	PK	357	1.0	Flat
1735.630	34.2	V	54.0	-19.8	AVG	226	1.4	Flat
1735.630	46.2	V	74.0	-27.8	PK	226	1.4	Flat
2169.470	36.3	V	54.0	-17.7	AVG	162	1.0	Flat
2169.470	48.3	V	74.0	-25.7	PK	162	1.0	Flat
2603.250	33.6	V	54.0	-20.4	AVG	136	1.0	Flat
2603.250	45.6	V	74.0	-28.4	PK	136	1.0	Flat
3037.450	33.7	V	54.0	-18.5	AVG	289	1.0	Noise Floor
3037.450	45.7	V	74.0	-28.3	PK	289	1.0	Noise Floor
1301.650	34.1	V	54.0	-19.9	AVG	146	1.1	Upright
1301.650	46.1	V	74.0	-27.9	PK	146	1.1	Upright

Client:	Savi	Job Number:	J65855
Model:	ST-662-001	T-Log Number:	T66442
		Account Manager:	Tommy Wong
Contact:	Eugene Schlindwein		
Spec:	FCC 15.231(a/e); FCC 15.240	Class:	-

Run #4: Continued

Frequency	Level	Pol	FCC 15.231(a)		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
1735.550	40.2	V	54.0	-13.8	AVG	272	2.1	Upright
1735.550	52.2	V	74.0	-21.8	PK	272	2.1	Upright
2169.450	41.0	V	54.0	-13.0	AVG	273	1.6	Upright
2169.450	53.0	V	74.0	-21.0	PK	273	1.6	Upright
2603.380	35.0	V	54.0	-19.0	AVG	350	1.0	Upright
2603.380	47.0	V	74.0	-27.0	PK	350	1.0	Upright
1301.660	26.6	H	54.0	-27.4	AVG	211	1.0	Upright
1301.660	38.6	H	74.0	-35.4	PK	211	1.0	Upright
1735.550	35.2	H	54.0	-18.8	AVG	343	1.9	Upright
1735.550	47.2	H	74.0	-26.8	PK	343	1.9	Upright
2169.460	37.1	H	54.0	-16.9	AVG	311	2.0	Upright
2169.460	49.1	H	74.0	-24.9	PK	311	2.0	Upright
2603.330	34.4	H	54.0	-19.6	AVG	360	2.0	Upright
2603.330	46.4	H	74.0	-27.6	PK	360	2.0	Upright
1301.690	30.2	H	54.0	-23.8	AVG	131	1.6	Side
1301.690	42.2	H	74.0	-31.8	PK	131	1.6	Side
1735.560	39.6	H	54.0	-14.4	AVG	176	1.9	Side
1735.560	51.6	H	74.0	-22.4	PK	176	1.9	Side
2169.330	32.4	H	54.0	-21.6	AVG	169	1.0	Side
2169.330	44.4	H	74.0	-29.6	PK	169	1.0	Side
2603.310	36.8	H	54.0	-17.2	AVG	219	2.0	Side
2603.310	48.8	H	74.0	-25.2	PK	219	2.0	Side
3037.950	33.6	H	54.0	-20.4	AVG	290	1.0	Noise Floor
3037.950	45.6	H	74.0	-28.4	PK	290	1.0	Noise Floor

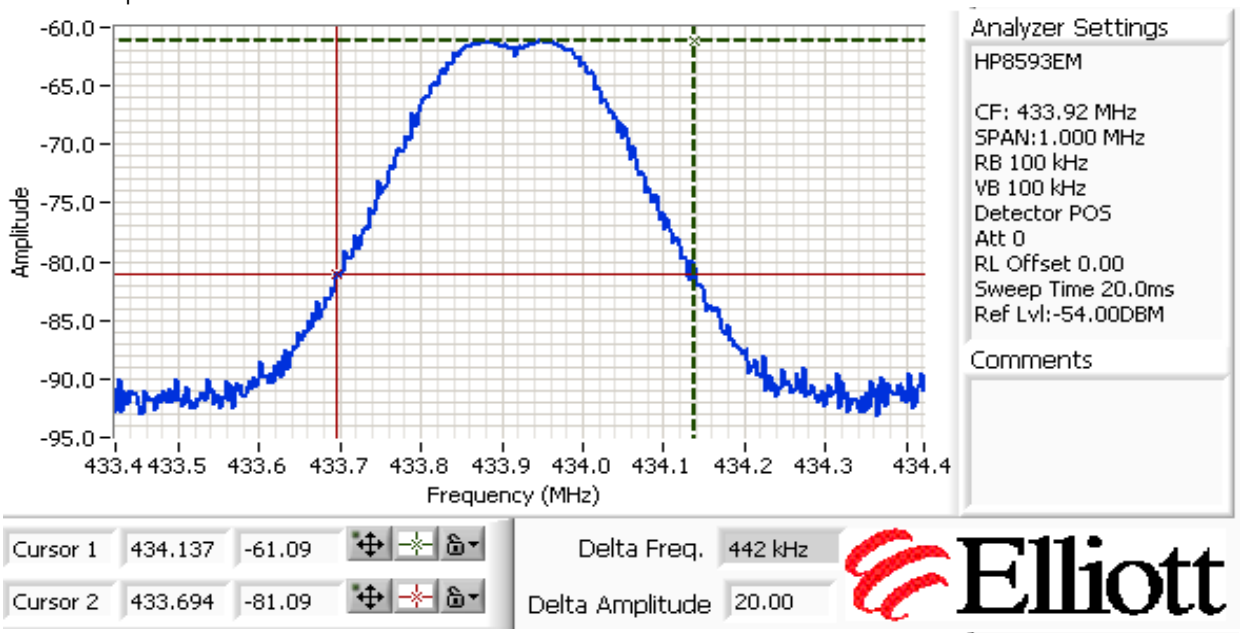
Note 1:	Duty cycle is 25% . A -12dB correction was used to determine the average level from the peak reading. All three orientations evaluated and all readings within 20dB of the limit were recorded.

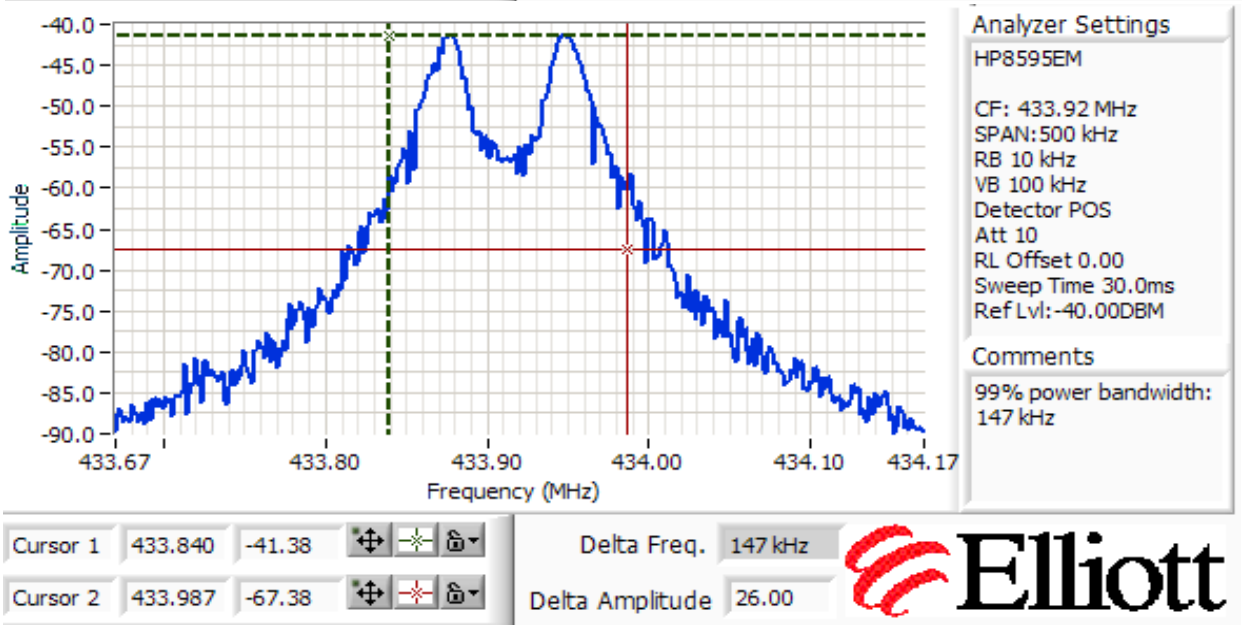
Client:	Savi	Job Number:	J65855
Model:	ST-662-001	T-Log Number:	T66442
		Account Manager:	Tommy Wong
Contact:	Eugene Schlindwein		
Spec:	FCC 15.231(a/e); FCC 15.240	Class:	-

Run #5: Transmit Mode (433.92 MHz) - Bandwidth

Signal bandwidth was measured to be 442kHz (see graph below - RB=VB=100kHz).

The maximum permitted bandwidth is 0.25% of the fundamental = 108.5MHz





Client:	Savi	Job Number:	J65855
Model:	ST-662-001	T-Log Number:	T66442
		Account Manager:	Tommy Wong
Contact:	Eugene Schlindwein		
Spec:	FCC 15.231(a/e); FCC 15.240	Class:	-

Radiated Emissions (ST-662-001)

Test Specifics

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 12/13/2006
Test Engineer: Rafael Varelas
Test Location: SVOATS #2
Config. Used: 1
Config Change: None
EUT Voltage: Battery

General Test Configuration

The EUT was located on the turntable for radiated emissions testing.

Note, **preliminary** testing indicates that the emissions were maximized by orientation of the EUT and elevation of the measurement antenna. **Maximized** testing indicated that the emissions were maximized by orientation of the EUT, elevation of the measurement antenna, and manipulation of the EUT's interface cables.

Note, for testing above 1 GHz, the FCC specifies the limit as an average measurement. In addition, the FCC states that the peak reading of any emission above 1 GHz, can not exceed the average limit by more than 20 dB.

Ambient Conditions:

Temperature: 11 °C
Rel. Humidity: 86 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	RE, 433.92MHz, Fundamental	15.240	Pass	90.5dBµV/m (33496.5µV/m) @ 433.893MHz (-4.3dB)
2	RE, Tx Spurious Emissions	15.240	Pass	39.2dBµV/m (91.2µV/m) @ 867.778MHz (-6.8dB)

Modifications Made During Testing:

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Client:	Savi	Job Number:	J65855
Model:	ST-662-001	T-Log Number:	T66442
		Account Manager:	Tommy Wong
Contact:	Eugene Schlindwein		
Spec:	FCC 15.231(a/e); FCC 15.240	Class:	-

Run #1: Fundamental Mesaurement of 433.88
Operation under 15.240

Frequency	Level	Pol	15.240		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
433.893	90.5	V	94.8	-4.3	Pk	0	1.2	Upright
433.893	89.9	V	94.8	-4.9	Pk	295	1.2	Flat
433.893	88.5	H	94.8	-6.3	Pk	265	1.0	Side
433.893	86.5	H	94.8	-8.3	Pk	95	1.0	Upright
433.893	84.6	H	94.8	-10.2	Pk	15	1.0	Flat
433.893	70.5	V	80.8	-10.3	Avg	0	1.2	Upright
433.893	69.9	V	80.8	-10.9	Avg	295	1.2	Flat
433.893	68.5	H	80.8	-12.3	Avg	265	1.0	Side
433.893	80.5	V	94.8	-14.3	Pk	120	1.0	Side
433.893	66.5	H	80.8	-14.3	Avg	95	1.0	Upright
433.893	64.6	H	80.8	-16.2	Avg	15	1.0	Flat
433.893	60.5	V	80.8	-20.3	Avg	120	1.0	Side

Note 1:	Duty cycle is 10% . A -20dB correction was used to determine the average level from the peak reading

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Run #2: Spurious Emissions, 30-4400 MHz (Tx Mode)

Frequency	Level	Pol	15.240		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
867.778	39.2	H	46.0	-6.8	Pk	165	1.0	Side
867.778	33.9	V	46.0	-12.1	Pk	10	1.1	Side
867.778	31.7	H	46.0	-14.3	Pk	40	1.0	Upright
867.778	38.5	V	46.0	-7.5	Pk	240	1.2	Upright
867.778	39.9	H	46.0	-6.1	Pk	20	1.0	Flat
867.778	36.2	V	46.0	-9.8	Pk	300	1.5	Flat
1301.620	23.8	H	54.0	-30.2	AVG	46	1.6	Flat
1301.620	43.8	H	74.0	-30.2	PK	46	1.6	Flat
1735.590	29.6	H	54.0	-24.4	AVG	2	1.6	Flat
1735.590	49.6	H	74.0	-24.4	PK	2	1.6	Flat
2169.480	34.4	H	54.0	-19.6	AVG	183	2.0	Flat
2169.480	54.4	H	74.0	-19.6	PK	183	2.0	Flat
2603.360	26.5	H	54.0	-27.5	AVG	157	1.9	Flat
2603.360	46.5	H	74.0	-27.5	PK	157	1.9	Flat
3037.280	35.7	H	54.0	-18.3	AVG	360	1.0	Noise Floor
3037.280	46.4	H	74.0	-27.6	PK	360	1.0	Noise Floor
3472.490	36.8	H	54.0	-17.2	AVG	342	1.0	Noise Floor
3472.490	47.1	H	74.0	-26.9	PK	342	1.0	Noise Floor
3905.320	38.4	H	54.0	-15.6	AVG	220	1.0	Noise Floor
3905.320	48.8	H	74.0	-25.2	PK	220	1.0	Noise Floor
4337.600	38.8	H	54.0	-15.2	AVG	0	1.0	Noise Floor
4337.600	48.7	H	74.0	-25.3	PK	0	1.0	Noise Floor
1301.620	20.6	V	54.0	-33.4	AVG	357	1.0	Flat
1301.620	40.6	V	74.0	-33.4	PK	357	1.0	Flat
1735.630	26.2	V	54.0	-27.8	AVG	226	1.4	Flat
1735.630	46.2	V	74.0	-27.8	PK	226	1.4	Flat
2169.470	28.3	V	54.0	-25.7	AVG	162	1.0	Flat
2169.470	48.3	V	74.0	-25.7	PK	162	1.0	Flat
2603.250	25.6	V	54.0	-28.4	AVG	136	1.0	Flat
2603.250	45.6	V	74.0	-28.4	PK	136	1.0	Flat
3037.450	25.7	V	54.0	-18.5	AVG	289	1.0	Noise Floor
3037.450	45.7	V	74.0	-28.3	PK	289	1.0	Noise Floor

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Model:	ST-662-001	T-Log Number:	T66442
		Account Manager:	Tommy Wong
Contact:	Eugene Schlindwein		
Spec:	FCC 15.231(a/e); FCC 15.240	Class:	-

Run #1b: Continued

Frequency	Level	Pol	FCC 15.209		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
1301.650	26.1	V	54.0	-27.9	AVG	146	1.1	Upright
1301.650	46.1	V	74.0	-27.9	PK	146	1.1	Upright
1735.550	32.2	V	54.0	-21.8	AVG	272	2.1	Upright
1735.550	52.2	V	74.0	-21.8	PK	272	2.1	Upright
2169.450	33.0	V	54.0	-21.0	AVG	273	1.6	Upright
2169.450	53.0	V	74.0	-21.0	PK	273	1.6	Upright
2603.380	27.0	V	54.0	-27.0	AVG	350	1.0	Upright
2603.380	47.0	V	74.0	-27.0	PK	350	1.0	Upright
1301.660	18.6	H	54.0	-35.4	AVG	211	1.0	Upright
1301.660	38.6	H	74.0	-35.4	PK	211	1.0	Upright
1735.550	27.2	H	54.0	-26.8	AVG	343	1.9	Upright
1735.550	47.2	H	74.0	-26.8	PK	343	1.9	Upright
2169.460	29.1	H	54.0	-24.9	AVG	311	2.0	Upright
2169.460	49.1	H	74.0	-24.9	PK	311	2.0	Upright
2603.330	26.4	H	54.0	-27.6	AVG	360	2.0	Upright
2603.330	46.4	H	74.0	-27.6	PK	360	2.0	Upright
1301.690	22.2	H	54.0	-31.8	AVG	131	1.6	Side
1301.690	42.2	H	74.0	-31.8	PK	131	1.6	Side
1735.560	31.6	H	54.0	-22.4	AVG	176	1.9	Side
1735.560	51.6	H	74.0	-22.4	PK	176	1.9	Side
2169.330	24.4	H	54.0	-29.6	AVG	169	1.0	Side
2169.330	44.4	H	74.0	-29.6	PK	169	1.0	Side
2603.310	28.8	H	54.0	-25.2	AVG	219	2.0	Side
2603.310	48.8	H	74.0	-25.2	PK	219	2.0	Side
3037.950	25.6	H	54.0	-28.4	AVG	290	1.0	Noise Floor
3037.950	45.6	H	74.0	-28.4	PK	290	1.0	Noise Floor

Note 1:	Duty cycle is 10% . A -20dB correction was used to determine the average level from the peak reading

EXHIBIT 3: Photographs of Test Configurations

1 Page

EXHIBIT 4: Proposed FCC ID Label & Label Location

EXHIBIT 5: Detailed Photographs of Savi Technology, Inc. Model ST-662-001Construction

5 Pages

EXHIBIT 6: Operator's Manual for Savi Technology, Inc. Model ST-662-001

User Manual	16 Pages
Compliance Notice	1 Page
User manual statements	3 Pages
User manual statements 2	3 Pages

EXHIBIT 7: Block Diagram of Savi Technology, Inc. Model ST-662-001

1 Page

EXHIBIT 8: Schematic Diagrams for Savi Technology, Inc. Model ST-662-001

4 Pages

EXHIBIT 9: Theory of Operation for Savi Technology, Inc. Model ST-662-001

14 Pages

EXHIBIT 10: Advertising Literature

2 Pages