Certification Test Report

Certification Test Report for Checkpoint Systems Inc.
FCC ID: D04IUSR07000
IC ID: 3356B-IUSR07K

February 28, 2006

Prepared for:

Checkpoint Systems Inc.
101 Wolf Drive
Thorofare, NJ 08086

Prepared By:

Washington Laboratories, Ltd.
7560 Lindbergh Drive
Gaithersburg, Maryland 20879

Certification Test Report
for the
Checkpoint Systems Inc.
Intelligent Unlocking System
FCC ID: D04IUSR07000
IC ID: 3356B-IUSR07K

February 28, 2006

WLL JOB# 9084/5

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Reviewed by: Michael F. Violette
President

Abstract

This report has been prepared on behalf of Checkpoint Systems Inc. to support the attached Application for Equipment Authorization. The test report and application are submitted for an Intentional Radiator under FCC Part 15.225 and Industry Canada RSS-210. This Certification Test Report documents the test configuration and test results for a Checkpoint Systems Inc. Intelligent Unlocking System.

Testing was performed on an Open Area Test Site (OATS) of Washington Laboratories, Ltd, 7560 Lindbergh Drive, Gaithersburg, MD 20879. Site description and site attenuation data have been placed on file with the FCC's Sampling and Measurements Branch at the FCC laboratory in Columbia, MD. Washington Laboratories, Ltd. has been accepted by the FCC and Industry Canada (Industry Canada file numbers IC 3035-1 [Site 1] and IC 3035-2 [Site 2]) and approved by NIST NVLAP (NVLAP Lab Code 200066-0) as an independent laboratory. The application was prepared by Washington Laboratories Ltd. in Gaithersburg, MD.

The Intelligent Unlocking Station (IUS) is an automated unlocking unit that library patrons use at a Self-Checkout Station to check out CD/DVD media without staff assistance.

The Intelligent Unlocking Station complies with the limits for an Intentional Radiator device under FCC Part 15.225 and Industry Canada RSS-210.

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1 Introduction

1.1 Compliance Statement

The Checkpoint Systems Inc. Intelligent Unlocking System complies with the limits for an Intentional Radiator device under FCC Part 15.225 and Industry Canada RSS-210.

1.2 Test Scope

Tests for radiated and conducted emissions were performed. All measurements were performed according to the 2003 version of ANSI C63.4. The measurement equipment conforms to ANSI C63.2 Specifications for Electromagnetic Noise and Field Strength Instrumentation.

1.3 Contract Information

Customer:	Checkpoint Systems Inc. 101 Wolf Drive Thorofare, NJ 08086
Purchase Order Number:	282662/288521
Quotation Number:	62379/62809

1.4 Test Dates

Testing was performed from June 6 to June 9, 2005, and February 16, 2006.

1.5 Test and Support Personnel

Washington Laboratories, LTD	James Ritter, John Rapella
Customer	Bayode Olabisi

1.6 Abbreviations

A	Ampere
Ac	alternating current
AM	Amplitude Modulation
Amps	Amperes
b/s	bits per second
BW	Bandwidth
CE	Conducted Emission
Cm	centimeter
CW	Continuous Wave
DB	decibel
Dc	direct current
EMI	Electromagnetic Interference
EUT	Equipment Under Test
FM	Frequency Modulation
G	giga - prefix for 10^9 multiplier
Hz	Hertz
IF	Intermediate Frequency
K	kilo - prefix for 10^3 multiplier
M	Mega - prefix for 10^6 multiplier
M	Meter
μ	micro - prefix for 10^{-6} multiplier
NB	Narrowband
LISN	Line Impedance Stabilization Network
RE	Radiated Emissions
RF	Radio Frequency
Rms	root-mean-square
SN	Serial Number
S/A	Spectrum Analyzer
V	Volt

2 Equipment Under Test

2.1 EUT Identification & Description

The Checkpoint Systems Inc. Intelligent Unlocking System (IUS) is an automated unlocking unit that library patrons use at the Self-Checkout Station to checkout CD/DVD media without staff assistance.

The EUT is powered by 12Vdc via 120 VAC power supply.

Table 1: Device Summary

ITEM	DESCRIPTION
Manufacturer:	Checkpoint Systems Inc.
FCC ID Number	D04IUSR07000
Industry Canada Number	3356B-IUSR07K
EUT Name:	RFID System
Model:	Intelligent Unlocking System
FCC Rule Parts:	§15.225
Frequency Range:	13.557 MHz Fixed
Maximum Output Power: (Radiated Electric Field)	860 μV/m at 10 meters
Modulation:	None
Occupied Bandwidth:	95Hz
Type of Information:	Data
Number of Channels:	1
Power Output Level	Fixed
Antenna Type	Internal - PCB
Frequency Tolerance:	>±0.01% (±100 ppm)
Interface Cables:	Power
Power Source & Voltage:	12Vdc from 120Vac

2.2 Test Configuration

The Intelligent Unlocking System was configured with a Deltron, Inc. Model 11985A 120VAC >12VDC AC/DC converter, and a support laptop PC.

Port ID	Connector Type	Cable Length (m)	Shielded (Y/N)	Connected To/From
RS-232	DB9	5m	Y	EUT to support laptop
Power input	Miniplug	1.5m		EUT to AC/DC converter
120 Vac input	Standard 3 prong		N	Wall 120VAC to AC/DC converter

The testing laboratory was supplied with four units for evaluation designated as S/N 233662, S/N 233663, S/N: 225636 with a molded housing and the 4th unit had a machined housing. All units use the same RF circuitry and the main differences as discussed below were evaluated for the emissions testing.

The variations are minor and are as follows:

S/N 233662: This covers a version that has minor hand modifications to a relay power source on the circuit board. S/N 233663: This is the final version of the product which incorporates the hand modifications into the PC board.

S/N 233663: This covers the final version of the product that incorporates the hand modifications into final production. The hand modifications are integrated into the PCB artwork. These 2 samples were used for the Occupied Bandwidth measurements.

The machined unit is the same as S/N 233663 except that antenna PCB in S/N 233662, and S/N 233663 units is replaced with new L-shaped antenna PCB (with kidney-shaped antenna etched to this pcb). The transformer on this new pcb has a larger inductor coil and more turns, and there is a matching antenna R-C circuit.

The S/N 225636 (Molded unit) has the same L-shaped antenna PCB as the Machined unit. There are other minor mechanical differences including: a shorter magnetic contact strip underneath the top cover, and larger vent holes in rear of unit.

The radiated and conducted emissions measurements were evaluated on the molded housing and machined housing samples.

Both units contain two ferrite snap-on cores (Fair-Rite P/N: 0444167281), each with three wraps of cable on the power cord 2 inches from the power entry point as shown in the test setup figure. Additionally, a filtered power cord (IMX-14) was used during the conducted emissions testing for both units. A model IMX-04 was also evaluated to show compliance. Both versions comply with the emission requirements.

IMX-14 or IMX-04 →

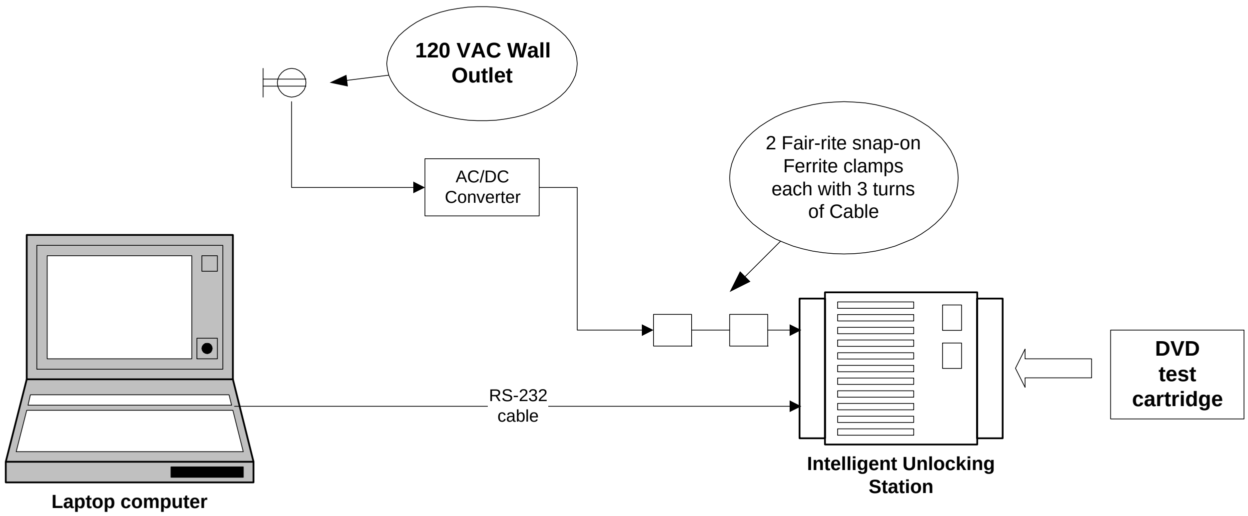

Figure 1. IUS Test Setup

2.3 Testing Algorithm

A test program called "Detacher Driver" received data from the unlocking station and sent unlock commands via a RS-232 connection. A test DVD cartridge was placed in unit to activate Radio transmitter section.

Worst-case emission levels are provided in the test results data.

2.4 Test Location

All measurements herein were performed at Washington Laboratories, Ltd. test center in Gaithersburg, MD. Site description and site attenuation data have been placed on file with the FCC's Sampling and Measurements Branch at the FCC laboratory in Columbia, MD. Washington Laboratories, Ltd. has been accepted by the FCC and approved by NIST NVLAP (NVLAP Lab Code: 200066-0) as an independent FCC test laboratory.

2.5 Measurements

2.5.1 References

ANSI C63.2 Specifications for Electromagnetic Noise and Field Strength Instrumentation

ANSI C63.4 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

2.6 Measurement Uncertainty

All results reported herein relate only to the equipment tested. For the purposes of the measurements performed by Washington Laboratories, the measurement uncertainty is ±2.3 dB. This has been calculated for a *worst-case situation* (radiated emissions measurements performed on an open area test site).

The following measurement uncertainty calculation is provided:

$$\text{Total Uncertainty} = (A^2 + B^2 + C^2)^{1/2}/(n-1)$$

where:

A = Antenna calibration uncertainty, in dB = 2 dB

B = Spectrum Analyzer uncertainty, in dB = 1 dB

C = Site uncertainty, in dB = 4 dB

n = number of factors in uncertainty calculation = 3

Thus, Total Uncertainty = $0.5\,(2^2 + 1^2 + 4^2)^{1/2} = \pm 2.3$ dB.

3 Test Equipment

Table 2 shows a list of the test equipment used for measurements along with the calibration information.

Table 2: Test Equipment List

Test Name:	**Conducted Emissions Voltage**	Test Date:	
Asset #	**Manufacturer/Model**	**Description**	**Cal. Due**
00124	SOLAR, 8012-50-R-24-BNC	LISN	5/9/2006
00068	HP, 85650A	ADAPTER, QP	7/5/2006
00070	HP, 85685A	PRESELECTOR, RF W/OPT 8ZE	7/5/2006
00072	HP, 8568B	ANALYZER, SPECTRUM	7/5/2006

Test Name:	**Radiated Emissions**	Test Date:	**2/16/2006**
Asset #	**Manufacturer/Model**	**Description**	**Cal. Due**
00031	EMCO, 6502	ANTENNA, ACTIVE LOOP	1/10/2006
00382	SUNOL, JB1	BICONLOG	1/25/2007
00068	HP, 85650A	ADAPTER, QP	7/5/2006
00070	HP, 85685A	PRESELECTOR, RF W/OPT 8ZE	7/5/2006
00072	HP, 8568B	ANALYZER, SPECTRUM	7/5/2006

00545	WASHINGTON LABORATORIES, LTD. RG214	COAXIAL CABLE, SET, SITE 1, 10-METER	10/4/2006

4 Test Results

4.1 Occupied Bandwidth

Occupied bandwidth measurement was performed by coupling the output of the EUT to the input of a spectrum analyzer.

The occupied bandwidth for each unit was measured as shown:

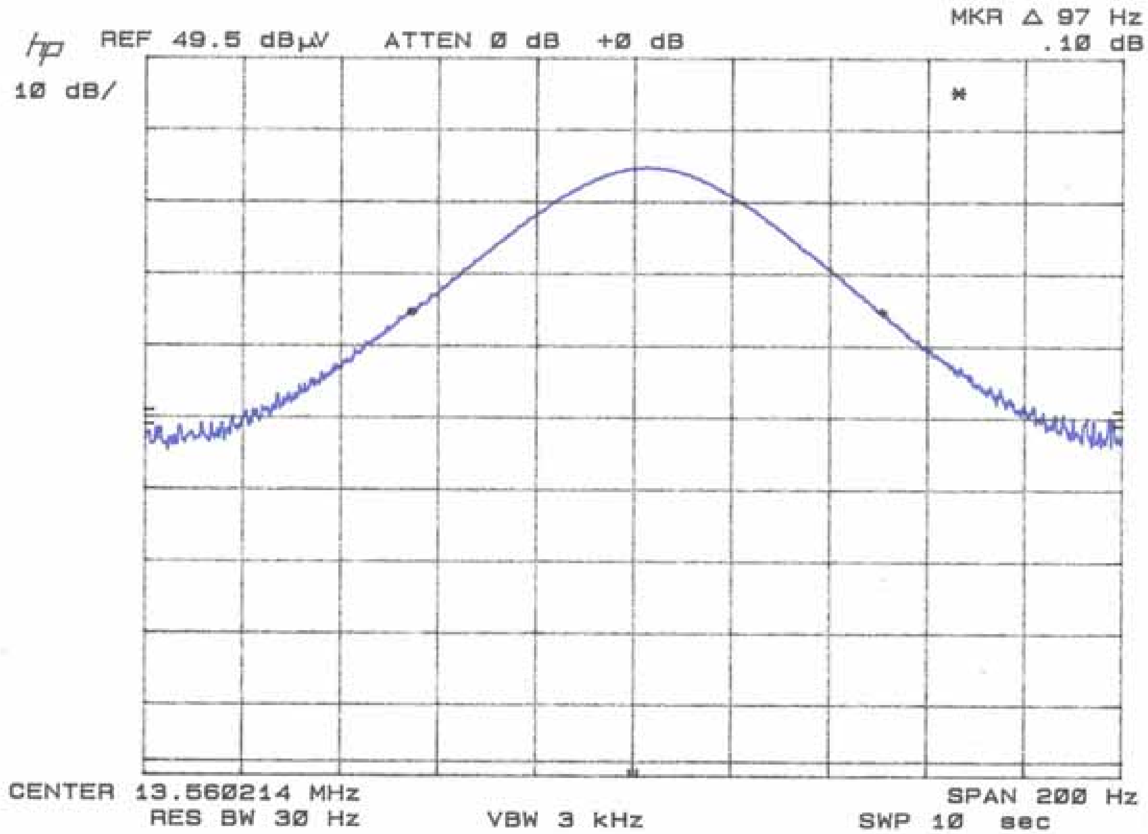

Figure 2. Occupied Bandwidth, S/N: 233662

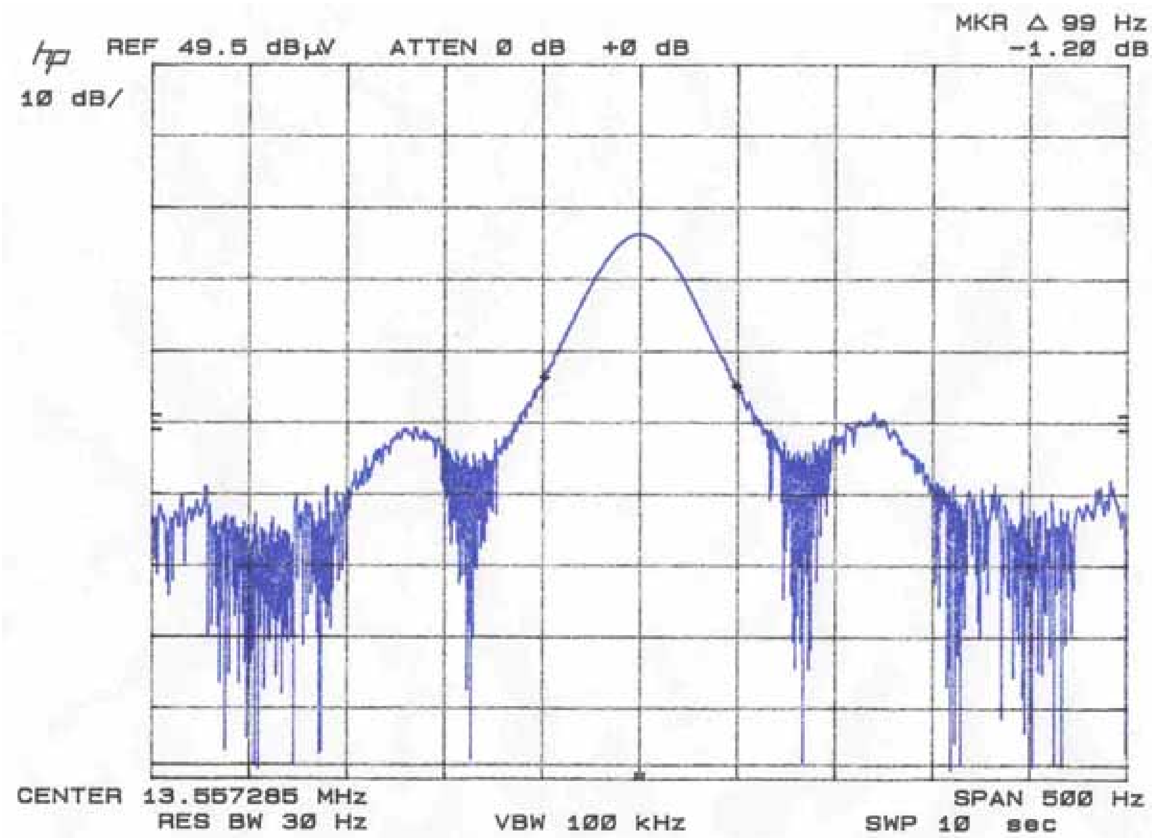

Figure 3. Occupied Bandwidth, S/N: 233663

Table 3 provides a summary of the Occupied Bandwidth Results.

Table 3: Occupied Bandwidth Results

Frequency	Bandwidth	Limit	Pass/Fail
S/N: 233662	97Hz	N/A	Pass
S/N: 233663	99 Hz	N/A	Pass

4.2 Radiated Spurious Emissions, §15.225, §15.209, and RSS-210

Radiated emissions from the EUT must comply with the field strength limits as specified in FCC Part 15.225 and 15.209 and Industry Canada RSS-210. The limits for the radiated emissions are as shown in the following table.

Table 4: Radiated Spurious Emissions Limits

Frequency (MHz)	Limit (µV/m)	Rule Part Reference
13.553 - 13.567	15,848 (@ 30m)	§15.225(a), RSS-210 A2.6
13.410 – 13.553	334 (@ 30m)	§15.225(b), RSS-210 A2.6
13.567 – 13.710	334 (@ 30m)	§15.225(b), RSS-210 A2.6
13.110 – 13.410	106 (@ 30m)	§15.225(c), RSS-210 A2.6
13.710 – 14.010	106 (@ 30m)	§15.225(c), RSS-210 A2.6
1.705 – 13.110 14.010 – 30.0	30 (@ 30m)	§15.225(d), §15.209, RSS-210 A2.6
30 - 88	100 (@ 3m)	§15.225(d), §15.209, RSS-210 2.7
88 - 216	150 (@ 3m)	§15.225(d), §15.209, RSS-210 2.7
216 - 960	200 (@ 3m)	§15.225(d), §15.209, RSS-210 2.7
Above 960	500 (@ 3m)	§15.225(d), §15.209, RSS-210 2.7

4.2.1 Test Procedure

The EUT was placed on motorized turntable for radiated testing on an Open Area Test Site. The emissions from the EUT were measured continuously at every azimuth by rotating the turntable. Receiving antennas were mounted on an antenna mast to determine the height of maximum emissions. The height of the antenna was varied between 1 and 4 meters. The peripherals were placed on the table in accordance with ANSI C63.4-2003. Cables were varied in position to produce maximum emissions. Both the horizontal and vertical field components were measured

Testing at frequencies below 30 MHz was performed at ten meters with a loop antenna. Limits were interpolated from the 30 meter limit to the equivalent at 10 meters. Three orientations of the loop antenna were tested.

Emissions were scanned up to 2 GHz. Only the 2nd harmonic of the fundamental frequency was detected. No other emissions were detected that were related to the RFID Transmitter. All other emissions detected were related to digital emissions of the IUS electronics. Since the EUT is used in a commercial application, these digital emissions were compared to the Class A limit of §15.109(b). For emissions up to 30 MHz and above 1 GHz peak levels were recorded. Emissions from 30 MHz to 1000 MHz were measured using a Quasi-peak detector. Worst-case emissions are reported in the data table.

The following is a sample calculation used in the data tables for calculating the final field strength of spurious emissions and comparing these levels to the specified limits.

Sample Calculation:

Spectrum Analyzer Voltage (SA Level): VdBμV

Antenna Factor (Ant Corr): AFdB/m

Cable Loss Correction (Cable Corr): CCdB

Amplifier Gain: GdB (if applicable)

Electric Field (Corr Level): EdBμV/m = VdBμV + AFdB/m + CCdB - GdB

To convert to linear units: EμV/m = antilog (EdBμV/m/20)

4.2.2 Test Results

The EUT complies with the radiated emission requirements of §15.225 and RSS-210 A2.6. Test data for spurious emissions are included in Table 5.

Table 5: Radiated Spurious Emissions, §15.225, §15.209 and RSS-210

CLIENT:	Checkpoint	DATE:	2/16/2006
TESTER:	John Rapella	JOB #:	9084
EUT Information:		**Test Requirements:**	
EUT:	Intelligent Unlocking Station	TEST STANDARD:	FCC Part 15
DISTANCE:	3m		
CLOCKS:	13.56MHz	30 MHz	
CLASS:	15.225		

Based on 40 db/decade from Part 15.31 =19.085dB (correction 30 to10m)

	Frequency	Limit @30m (uV/m)	Limit @ 10m (uV/m)	Limit @ 10m (dBuV/m)
	1.705-13.110	30.000	270.005	48.627
	13.110-13.410	106.000	954.016	59.591
	13.410-13.553	334.000	3006.052	69.560
	13.553-13.567	15848.000	142634.460	103.084
	13.567-13.710	334.000	3006.052	69.560
	13.710-14.010	106.000	954.016	59.591
	14.010-30	30.000	270.005	48.627
Canada	13.553-13.567	15500.000	139502.406	102.892

Test Equipment/Limit:

ANTENNA:	A_00031 <30 MHz	A0007 >30 MHz	
LIMIT:	LFCC_3m_Class_B		
CABLE:	CSITE2_10m	AMPLIFIER (dB)	None

Molded Unit

Frequency (MHz)	Polarity H/V	Az Dege	Ant. Hght (m)	SA Level (QP) (dBμV)	Ant. Corr. (dB/m)	Cable Corr. dB)	Corr. Level (dBμV/m)	Corr. Level (μV/m)	Limit (μV/m)	Margin (dB)
13.557	X	0.0	1.0	49.8	10.7	1.1	61.7	1211.2	142634.460	-41.4
27.113	X	0.0	1.0	12.8	9.2	1.5	23.5	15.0	270.1	-25.1
13.557	Y	270.0	1.0	61.3	10.7	1.1	73.2	4552.0	142634.460	-29.9
27.113	Y	270.0	1.0	14.0	9.2	1.5	24.7	17.2	270.1	-23.9
13.557	Z	0.0	1.0	44.1	10.7	1.1	56.0	628.4	142634.460	-47.1
27.113	Z	270.0	1.0	12.8	9.2	1.5	23.5	15.0	270.1	-25.1

Frequency (MHz)	**Polarity H/V**	**Az Deg**	**Ant. Hght (m)**	**SA Level (QP) (dBμV)**	**Ant. Corr. (dB/m)**	**Cable Corr. (dB)**	**Corr. Level (dBμV/m)**	**Corr. Level (μV/m)**	**Limit (μV/m)**	**Margin (dB)**
40.698	V	270.0	1.0	14.6	12.8	1.2	28.6	27.0	100.0	-11.4
49.860	V	90.0	1.0	17.6	7.7	1.3	26.6	21.3	100.0	-13.4
54.243	V	0.0	1.0	13.2	7.1	1.4	21.7	12.1	100.0	-18.3
108.485	V	0.0	1.0	4.4	12.4	1.9	18.7	8.6	150.0	-24.8
135.570	V	180.0	1.0	6.8	13.5	2.2	22.5	13.4	150.0	-21.0 **a**
149.159	V	345.0	1.0	11.2	12.5	2.3	26.0	20.0	150.0	-17.5
189.827	V	223.0	1.0	6.0	11.3	2.5	19.8	9.8	150.0	-23.7
216.944	V	200.0	1.0	6.6	10.7	2.8	20.0	10.0	200.0	-26.0
230.505	V	45.0	1.5	7.7	11.2	2.9	21.8	12.3	200.0	-24.2
311.847	V	45.0	1.0	5.2	13.8	3.4	22.5	13.3	200.0	-23.6
393.191	V	174.0	1.0	9.0	15.4	3.9	28.3	25.9	200.0	-17.8
420.305	V	287.0	1.5	9.2	16.3	4.0	29.5	30.0	200.0	-16.5
433.860	V	306.0	1.2	2.9	16.7	4.1	23.7	15.3	200.0	-22.3
447.423	V	90.0	1.0	10.2	16.8	4.2	31.2	36.5	200.0	-14.8
501.650	V	180.0	1.0	8.8	17.8	4.5	31.1	35.9	200.0	-14.9
40.698	H	180.0	2.8	20.6	12.8	1.2	34.6	53.9	100.0	-5.4
49.860	H	90.0	2.8	17.8	7.7	1.3	26.8	21.8	100.0	-13.2
54.257	H	0.0	3.0	8.2	7.1	1.4	16.6	6.8	100.0	-23.4
108.485	H	90.0	3.0	4.4	12.4	1.9	18.7	8.6	150.0	-24.8
135.570	H	225.0	2.5	10.1	13.5	2.2	25.8	19.5	150.0	-17.7
149.159	H	270.0	2.5	11.6	12.5	2.3	26.4	21.0	150.0	-17.1
189.827	H	270.0	2.5	12.0	11.3	2.5	25.8	19.6	150.0	-17.7 **a**
216.944	H	200.0	2.7	9.2	10.7	2.8	22.6	13.5	200.0	-23.4
230.505	H	45.0	2.0	16.2	11.2	2.9	30.3	32.7	200.0	-15.7
311.847	H	45.0	2.0	7.4	13.8	3.4	24.7	17.1	200.0	-21.4
393.191	H	200.0	2.5	7.9	15.4	3.9	27.2	22.8	200.0	-18.9
420.305	H	267.0	2.0	10.0	16.3	4.0	30.3	32.9	200.0	-15.7
433.860	H	300.0	2.0	5.8	16.7	4.1	26.6	21.4	200.0	-19.4
447.423	H	90.0	2.5	11.3	16.8	4.2	32.3	41.4	200.0	-13.7
501.650	H	180.0	2.5	6.5	17.8	4.5	28.8	27.6	200.0	-17.2

a = 10th harmonic of transmit frequency

Machined Unit

Frequency (MHz)	Polarity H/V	Az Deg	Ant. Height (m)	SA Level (QP) (dBµV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Corr. Level (dBµV/m)	Corr. Level (µV/m)	Limit (µV/m)	Margin (dB)
13.557	X	180.0	1.0	50.9	10.7	1.1	62.8	1374.7	142634.460	-40.3
27.113	X	180.0	1.0	18.5	9.2	1.5	29.2	28.9	270.1	-19.4
13.557	Y	270.0	1.0	62.1	10.7	1.1	74.0	4991.2	142634.460	-29.1
27.113	Y	270.0	1.0	26.0	9.2	1.5	36.7	68.6	270.1	-11.9
13.557	Z	0.0	1.0	49.3	10.7	1.1	61.2	1143.4	142634.460	-41.9
27.113	Z	270.0	1.0	21.4	9.2	1.5	32.1	40.4	270.1	-16.5

Frequency (MHz)	Polarity H/V	Az Deg	Ant. Hght (m)	SA Level (QP) (dBµV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Corr. Level (dBµV/m)	Corr. Level (µV/m)	Limit (µV/m)	Margin (dB)
40.698	V	270.0	1.0	15.9	12.8	1.8	30.5	33.5	100.0	-9.5
49.860	V	90.0	1.0	18.4	7.7	1.9	28.0	25.0	100.0	-12.0
54.243	V	0.0	1.0	17.8	7.1	2.0	26.9	22.1	100.0	-13.1
108.485	V	0.0	1.0	5.0	12.4	2.8	20.2	10.2	150.0	-23.3
135.570	V	180.0	1.0	7.9	13.5	3.2	24.7	17.1	150.0	-18.9
149.159	V	0.0	1.0	4.5	12.5	3.4	20.4	10.5	150.0	-23.1
189.827	V	270.0	1.5	6.5	11.3	3.8	21.6	12.0	150.0	-21.9
216.944	V	200.0	1.5	5.6	10.7	4.1	20.4	10.5	200.0	-25.6
230.505	Y	45.0	1.5	6.0	11.2	4.3	21.5	11.9	200.0	-24.5
311.847	V	45.0	1.5	4.2	13.8	5.1	23.2	14.4	200.0	-22.9
393.191	V	90.0	1.5	6.4	15.4	5.8	27.5	23.8	270.1	-21.1
420.305	V	300.0	1.5	13.2	16.3	6.0	35.5	59.7	200.0	-10.5
433.860	V	320.0	1.5	5.9	16.7	6.1	28.7	27.3	200.0	-17.3
447.423	V	300.0	1.5	9.0	16.8	6.3	32.1	40.3	200.0	-13.9
501.650	V	270.0	1.5	12.0	17.8	6.7	36.5	67.1	200.0	-9.5
40.698	H	270.0	2.0	20.7	12.8	1.8	35.3	58.2	100.0	-4.7
49.860	H	90.0	2.0	13.2	7.7	1.9	22.8	13.7	100.0	-17.2
54.243	H	0.0	2.0	9.1	7.1	2.0	18.2	8.1	100.0	-21.8
108.485	H	0.0	1.0	4.2	12.4	2.8	19.4	9.3	150.0	-24.1
135.570	H	241.0	2.0	8.4	13.5	3.2	25.2	18.1	150.0	-18.4
149.159	H	143.0	2.0	5.9	12.5	3.4	21.8	12.4	150.0	-21.7
189.827	H	270.0	2.0	7.8	11.3	3.8	22.9	14.0	150.0	-20.6
216.944	H	270.0	2.0	10.4	10.7	4.1	25.2	18.2	200.0	-20.8
230.505	H	80.0	1.8	11.0	11.2	4.3	26.5	21.2	200.0	-19.5
311.847	H	80.0	1.8	4.8	13.8	5.1	23.8	15.4	200.0	-22.3
393.191	H	90.0	2.5	9.9	15.4	5.8	31.0	35.7	200.0	-15.0
420.305	H	45.0	2.5	16.3	16.3	6.0	38.6	85.3	200.0	-7.4
433.860	H	300.0	2.5	5.2	16.7	6.1	28.0	25.2	200.0	-18.0
447.423	H	300.0	2.5	13.4	16.8	6.3	36.5	66.9	200.0	-9.5
501.650	H	275.0	2.0	9.3	17.8	6.7	33.8	49.2	200.0	-12.2

4.3 AC Powerline Conducted Emissions: (FCC Part §15.207, RSS-210)

The EUT was placed on an 80 cm high 1 x 1.5 m non-conductive table above a ground plane. Power to the EUT was provided through a Solar Corporation 50 Ω/50 μH Line Impedance Stabilization Network bonded to a 3 x 2 meter ground plane. The LISN has its AC input supplied from a filtered AC power source. Power and data cables were moved about to obtain maximum emissions.

The 50 Ω output of the LISN was connected to the input of the spectrum analyzer and the emissions in the frequency range of 150 kHz to 30 MHz were measured. The detector function was set to quasi-peak or peak, as appropriate, and the resolution bandwidth during testing was at least 9 kHz, with all post-detector filtering no less than 10 times the resolution bandwidth. Both Quasi-peak and Average measurements were made during the conducted emissions testing.

In addition to the IMX-14 cable set, an IMX-04 set was tested with the molded unit. Data are recorded in the following tables.

Table 6: Conducted Emissions Test Data: Molded Unit, IMX-14 Cable Set

CLIENT:	Checkpoint	DATE:	2/16/06
MODEL:	Intelligent Unlocking Station	JOB #:	9084
TEST STANDARD:	FCC Part 15	CLASS:	FCC_B
TESTER:	John Rapella	TEST SITE:	CSITE2_CE
TEST VOLTAGE:	120 VAC		

LINE 1 - NEUTRAL

Frequency (MHz)	Level QP (dBμV)	Cable Loss (dB)	LISN Corr (dB)	Limit QP (dBμV)	Level Corr (dBμV)	Margin QP (dB)	Level AVG (dBμV)	Cable Loss (dB)	Level Corr (dBμV)	Limit AVG (dBμV)	Margin AVG (dB)
0.183	38.6	10.2	1.0	64.3	59.1	-15.5	30.7	10.2	41.9	54.3	-13.4
0.245	31.1	10.2	0.6	61.9	51.4	-20.7	29.9	10.2	40.7	51.9	-11.9
0.306	18.8	10.1	0.5	60.1	39.0	-31.2	18.6	10.1	29.2	50.1	-21.4
0.369	14.9	10.1	0.5	58.5	35.2	-33.5	14.9	10.1	25.5	48.5	-23.5
0.431	13.9	10.2	0.5	57.2	34.2	-33.2	13.9	10.2	24.5	47.2	-23.2
13.557	28.6	11.4	0.5	60.0	51.5	-20.0	28.4	11.4	40.3	50.0	-10.2

LINE 2 - PHASE

Frequency (MHz)	Level QP (dBμV)	Cable Loss (dB)	LISN Corr (dB)	Limit QP (dBμV)	Level Corr (dBμV)	Margin QP (dB)	Level AVG (dBμV)	Cable Loss (dB)	Level Corr (dBμV)	Limit AVG (dBμV)	Margin AVG (dB)
0.184	39.5	10.2	0.9	64.3	50.6	-14.5	37.6	10.2	48.7	54.3	-6.5
0.245	32.0	10.2	0.7	61.9	42.9	-19.8	29.6	10.2	40.5	51.9	-12.2
0.307	19.6	10.1	0.3	60.1	30.0	-30.3	19.6	10.1	30.0	50.1	-20.3
0.369	15.4	10.1	0.3	58.5	25.9	-33.0	15.4	10.1	25.9	48.5	-23.0
0.431	16.3	10.2	0.3	57.2	26.8	-30.8	16.3	10.2	26.8	47.2	-20.8
13.557	28.1	11.4	0.4	60.0	39.9	-20.5	27.5	11.4	39.4	50.0	-11.1

Table 7: Comparison of IMX-14 and IMX-04 Cable Sets

LINE 1 - NEUTRAL

Frequency (MHz)	Level QP (dBμV)	Cable Loss (dB)	LISN Corr (dB)	Limit QP (dBμV)	Level Corr (dBμV)	Margin QP (dB)	Level AVG (dBμV)	Cable Loss (dB)	Level Corr (dBμV)	Limit AVG (dBμV)	Margin AVG (dB)
IMX-14 13.557	31.8	11.4	0.5	60.0	54.7	-16.7	30.8	11.4	42.7	50.0	-7.8
IMX-04 13.557	30.5	11.4	0.5	60.0	53.4	-18.0	29.9	11.4	41.8	50.0	-8.7

LINE 2 - PHASE

Frequency (MHz)	Level QP (dBμV)	Cable Loss (dB)	LISN Corr (dB)	Limit QP (dBμV)	Level Corr (dBμV)	Margin QP (dB)	Level AVG (dBμV)	Cable Loss (dB)	Level Corr (dBμV)	Limit AVG (dBμV)	Margin AVG (dB)
IMX-14 13.557	30.5	11.4	0.4	60.0	42.4	-18.0	30.4	11.4	42.3	50.0	-8.2
IMX-04 13.557	30.1	11.4	0.4	60.0	42.0	-18.5	29.6	11.4	41.4	50.0	-9.0

Table 8: Conducted Emissions Test Data: Machined Unit, IMX-14 Cable Set

LINE 1 - NEUTRAL

Frequency (MHz)	Level QP (dBµV)	Cable Loss (dB)	LISN Corr (dB)	Limit QP (dBµV)	Level Corr (dBµV)	Margin QP (dB)	Level AVG (dBµV)	Cable Loss (dB)	Level Corr (dBµV)	Limit AVG (dBµV)	Margin AVG (dB)
0.184	38.9	10.2	1.0	64.3	59.3	-15.2	30.2	10.2	41.4	54.3	-13.9
0.245	29.2	10.2	0.6	61.9	49.5	-22.6	23.8	10.2	34.6	51.9	-18.0
0.307	18.6	10.1	0.5	60.1	38.8	-31.4	15.5	10.1	26.1	50.1	-24.5
0.368	16.0	10.1	0.5	58.5	36.3	-32.4	16.0	10.1	26.6	48.5	-22.4
0.431	13.3	10.2	0.5	57.2	33.6	-33.8	13.3	10.2	23.9	47.2	-23.8
13.557	31.8	11.4	0.5	60.0	54.7	-16.7	30.8	11.4	42.7	50.0	-7.8

LINE 2 - PHASE

Frequency (MHz)	Level QP (dBµV)	Cable Loss (dB)	LISN Corr (dB)	Limit QP (dBµV)	Level Corr (dBµV)	Margin QP (dB)	Level AVG (dBµV)	Cable Loss (dB)	Level Corr (dBµV)	Limit AVG (dBµV)	Margin AVG (dB)
0.184	36.6	10.2	0.9	64.3	47.7	-17.5	28.6	10.2	39.7	54.3	-15.5
0.246	29.5	10.2	0.7	61.9	40.4	-22.3	24.3	10.2	35.2	51.9	-17.5
0.307	18.6	10.1	0.3	60.1	29.0	-31.3	15.8	10.1	26.2	50.1	-24.1
0.369	14.8	10.1	0.3	58.5	25.3	-33.6	14.8	10.1	25.3	48.5	-23.6
0.431	15.0	10.2	0.3	57.2	25.5	-32.1	15.0	10.2	25.5	47.2	-22.1
13.557	30.5	11.4	0.4	60.0	42.4	-18.0	30.4	11.4	42.3	50.0	-8.2

4.4 Frequency Stability, §15.225(e) and RSS-GEN

Frequency as a function of temperature and voltage variation shall be maintained within the FCC and Industry Canada prescribed tolerances.

The temperature stability was measured with the unit in an environmental chamber used to vary the temperature of the sample. The sample was held at each temperature step to allow the temperature of the sample to stabilize.

The EUT is powered by AC voltage supplied externally. The manufacturer's power requirements for the EUT are 120 VAC. Testing was performed at 85% (102 VAC) and 115% (138 VAC) of the rated voltage.

The frequency stability of the transmitter was examined at the voltage extremes and for the temperature range of -20°C to +50°C. The carrier frequency was measured while the EUT was in the temperature chamber. The reference frequency of the EUT was measured at the ambient room temperature with the frequency counter.

The following tables are the results of the frequency stability testing.

Table 9. Frequency Deviation as a Function of Temperature

Temperature Degrees C	Frequency MHz	Difference Hz	Deviation (%)
Ambient	13.5573266	0.0	0
-20*	13.5574276	101.0	0.000745
-10	13.5574277	101.1	0.000746
0	13.5574218	95.2	0.000702
10	13.5574030	76.4	0.000564
20*	13.5573750	48.4	0.000357
30	13.5573165	-10.1	0.000074
40	13.5572789	-47.7	0.000352
50*	13.5572589	-67.7	0.000499

*IC required measurement

Table 10. Frequency Deviation as a Function of Voltage

Voltage Volts	Frequency MHz	Difference Hz	Deviation (%)	Voltage Volts
At rated	13.5573230	0	0.0	120.0
At 85%	13.5573203	3	0.000020	102.0
At 115%	13.5573173	6	0.000042	138.0