UNISYS

PCTC
Product Compliance Test Center
2476 Swedesford Road, Malvern, PA 19355

ELECTROMAGNETIC INTERFERENCE TEST REPORT

Doc. 20060319R/Project No. 1303

TEST STANDARDS: 47 CFR PART 15 (USA)
RSS-GEN, RSS-210 ISSUE 6, ICES-003 (CANADA)

ISO ILS OPEN PLUS PATRON SELF CHECKOUT STATION
FCC ID: DO4FISOCKS / IC ID: 3356B-FISOCKS

CHECKPOINT SYSTEMS, INC.
THOROFARE, NJ 08086

TEST DATES: March 9th to March 21st, 2006
ISSUE: April 12th, 2006

Prepared by: _____
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ACCREDITED

AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION

Certificate No: 1028.01

PREFACE

This report documents product testing conducted to verify compliance of the specified EUT with applicable standards and requirements as identified herein. EUT, test instrument configurations, test procedures and recorded data are generally described in this report. The reader is referred to the applicable test standards for detailed procedures. The following table summarizes the test results obtained during this evaluation.

SUMMARY

The ISO ILS Open Plus Patron Self Checkout Station was tested to the standards listed below, and found to have the following characteristics:

TEST	STANDARDS		Frequency Range	RESULT
	FCC	Industry Canada		
Radiated Emissions Intentional Radiator, Fundamental	Part 15.225	RSS-210, A2.6	13.110 to 14.010 MHz	Below Max. Permissible Limit
Radiated Emissions Intentional Radiator, Harmonics	Part 15.209	RSS-210, 2.7	9 kHz to 4 GHz	Below Max. Permissible Limit
Radiated Emissions Unintentional Radiator (Related to Digital Circuitry)	Part 15.109	ICES-003	30 MHz to 4 GHz	Below Max. Permissible Limit
Conducted Emissions Unintentional & Intentional Radiators	Part 15.207	RSS-Gen 7.2.2 ICES-0003	150 kHz to 30 MHz	Below Max. Permissible Limit
Frequency Stability	Part 15.225	RSS-GEN 4.5 RSS-210, A2.6	13.110 to 14.010 MHz	Below Max. Permissible Limit

EUT Modifications:

Modifications were not necessary to comply with the specified standards.

TABLE OF CONTENTS

1.0 Description of the Equipment Under Test (EUT)

Equipment Identification	ISO ILS Open Plus Patron Self Checkout Station
Serial Number	7419104B0A00346005
Manufacturer	Checkpoint Systems, Inc.
Technical Contact	John Paranzino Bayode Olabisi
Condition Received	Acceptable for Test
Date Received	8 March 2006
Sample Type	Prototype
Equipment Classification	Non-residential, Information Technology Equipment (ITE)
Unisys Test Personnel	Paul Banker, Itamar Gonen

1.1 General Description

The Patron Self Checkout Station provides an individual the means to self-check out library materials. Additionally, the system may report item information and status if there is a problem checking out any library items. A typical scenario for a patron to check out a book would be as follows: The patron comes to the Patron Self Checkout Station, identifies himself to the system and confirms his eligibility to carry out a transaction by using his patron identification card which is read by a barcode scanner or a Wiegand card reader. The patron is then led through the transaction process by communication with the system through a touch screen monitor. The patron can check out items by passing them one at a time over a short-range interrogator, which is located on the Patron Self Checkout Station. The short-range interrogator generates a magnetic field, which activates and interrogates the tagged item. The interrogated item passes its information to the application server. The application server determines the item status and actions that can be taken via communications with the library circulation system. Then the Intelligent Library System application server updates the Patron Self Checkout Station, which notifies the patron about his transaction.

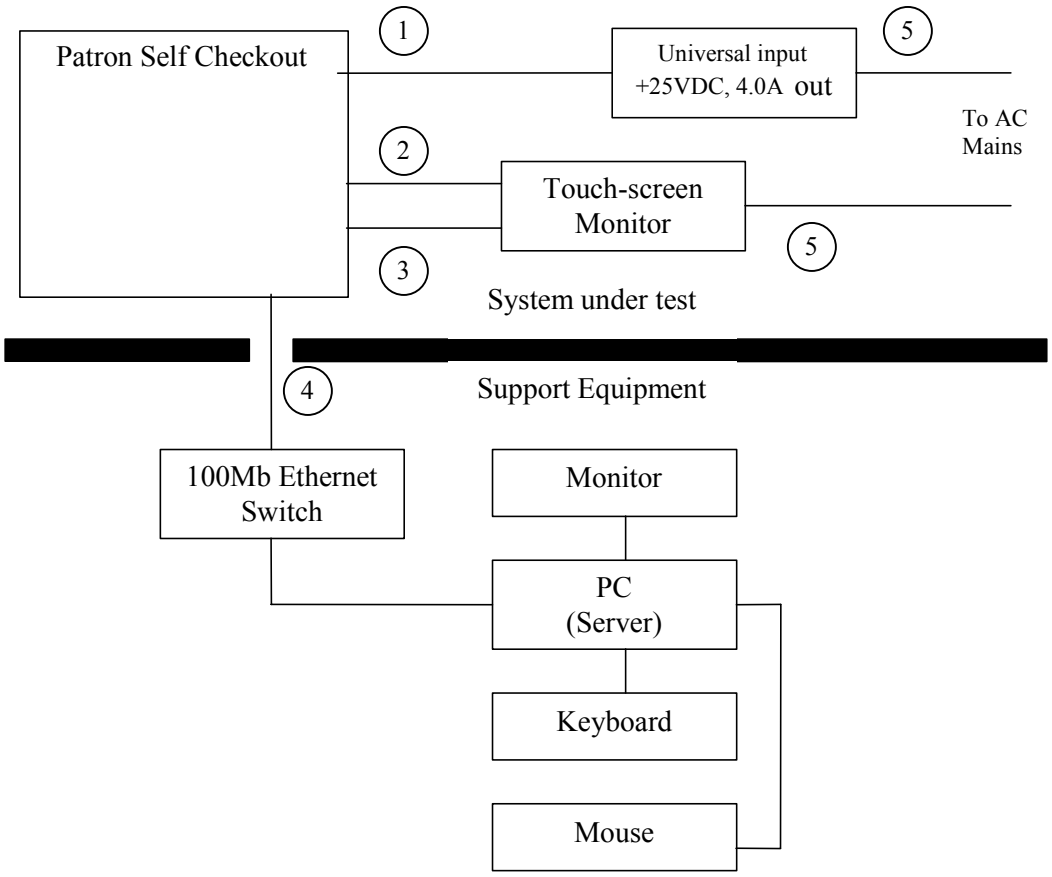
The Patron Self Checkout Station is composed of a single board computer (SBC), an ISO 15693 reader module, a printer, a hard drive, an antenna, and, optionally, an internal or external barcode reader. The touch screen monitor is external to the Patron Self Checkout Station System Unit.

The reader module continuously drives the antenna at a carrier frequency of 13.56 MHz. The RFID tag is powered by the antenna field. Once the tag has power, it sends out information by amplitude modulating the carrier. The reader module receives this signal using AM detection, applies gain, and filters the signal. The received signal is then decoded and sent to the SBC over an RS-232 serial link. The SBC in turn sends the data to an application server over a 10base-T Ethernet link.

In addition to the RS-232 communications to the reader module, the SBC provides RS-232 communications to an external barcode scanner. The barcode scanner is used to enter patron information, which is associated with tag data that is scanned in over the Patron Self Checkout Station's antenna area. This patron information and associated tag data is sent to the circulation system's database and to the application server.

1.2 Test Configurations

The ISO ILS Open Plus Patron Self Checkout Station will be tested as a typical unit operating in the field. All I/O ports will be connected and functional or have representative termination. An RFID tag will be used to stimulate a response from the Checkout Station.



#	Description	Length	Shielding
1	DC Power line	10’	None
2	Video Cable	60”	Braid/foil
3	Touch Screen Cable	60”	Braid/foil
4	Ethernet Cable	25’	Braid/foil
5	AC Line Cord	6’	Braid/foil

EMI Test Setup Block Diagram of ISO ILS Open Plus Patron Self Checkout Station

EUT Hardware:

Description	Manufacturer	Model#	Serial#
ISO ILS Open Plus Patron Self Checkout Station	Checkpoint	ILS OP Patron Self –Check Station	7419104B0A00346005
Video/Touch Screen Terminal	Elo Touchsystems	Et1527L-85WC-1	723121615C
Power Supply	Deltron	11794XA	358013

Support Equipment Hardware:

Description	Manufacturer	Model#	Serial#
Laptop PC	IBM	2384-EHU	KM-0792K 0408
PC AC Adaptor	IBM	02K7085	11S02K708Z1Z6C048S0BR
Ethernet Hub	Linksys	EZXS88W	RA3405B008921
Ethernet Hub AC Adapter	Linksys	AD 9/8	R051110018059

1.3 Rationale for the Chosen Configuration

This configuration represents a typical unit, under normal operation.

1.4 EUT Modifications

Modifications were not necessary to comply with the specified standards.

2.0 Operation of the EUT During Testing

2.1 General

Climatic Environment

The following were the ambient conditions in the laboratory during testing:
Temperature: 22^{o} C ± 5^{o} C Relative Humidity 50% ± 10% RH

Selection of AC Power Voltage/Frequencies

The radiated and conducted emissions tests were performed with the EUT operating at 120 Vac / 60Hz.

2.2 Operating Mode

The reader module is designed for reading ISO 15693 tags at an operating frequency of 13.56 MHz. It supplies power in the form of a sinusoidal wave at 13.56 MHz to drive the RFID short-range interrogator antenna. This generates a field that induces sufficient power on an ISO 15693 RFID tag to turn its IC on at a maximum distance of 12 inches.

2.3 Rationale for the Chosen Mode of Operation

The chosen operating mode exercises and duplicates all normal activity that may be expected by a user.

3.0 Applicable Requirements, Methods and Procedures

The results of the measurement of the radio disturbance characteristics of the EUT described herein may be applied, and where appropriate provide a presumption of compliance to one or more of the following requirements or to other requirement at the discretion of the client, regulatory agencies, or other entities.

USA

47 CFR, Part 15, Subpart B, "Unintentional Radiators, General Rules and Regulations"

CANADA

RSS-210, Issue 6, September 2005, “Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment”

RSS-GEN, Issue 1, September 2005, “General Requirements and Information for the Certification of Radiocommunication Equipment.”

ICES-003, Issue 4, February 2004, “Spectrum Management and Telecommunications Policy, Interference Causing Equipment Standard, Digital Apparatus.”

Basic Test Methods and Procedures

The applicable regulatory product family or generic standards require that radio disturbance/ interference and immunity tests be performed in accordance with the following:

Canadian Standards Association Standard C108.8-M1983, "Electromagnetic Emissions from Data Processing Equipment and Electronic Office Machines.”

Canadian Standards Association Standard CAN/CSA-CISPR 22-2002, "Limits and Methods of Measurement of Radio Disturbance Characteristics of Information Technology Equipment."

Industry Canada RSS-212, Issue 1 (Provisional), February 27, 1999, Spectrum Management and Telecommunications Policy, Radio Standards Specification, “Test Facilities and Test Methods for Radio Equipment”

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”.

CISPR 22: 1993, A1/1995,A2/1996 “Limits and Methods of Measurement of Radio Disturbance Characteristics of Information Technology Equipment.”

Deviations or Exclusions from the Requirements and Standards

The low temperature for the frequency stability test was –30°C. USA 47 CFR Part 15.225 requires –20°C. Industry Canada RSS-Gen 4.5 requires –30°C.

4.0 Test Results

4.1 Radiated Emissions

Test Standard:	USA: 47 CFR Parts 15 B, 15C; Canada: RSS 210
Frequency Range:	9 kHz to 4 GHz
Test Distances:	3 and 30 Meters
Antenna Polarity and Height:	9 kHz – 30 MHz: Three orthogonal axes @ 1 meter 30MHz-4 GHz: Vertical and Horizontal @ 1 to 4 Meters
AC Power:	120 Vac, 60 Hz
EUT Type:	Table top
Highest Oscillator Frequency:	400 MHz
Measurement Uncertainty:	4.3 dB (CISPR 16-4: 2002)
Field Strength Calculations:	Field Strength (dBµV/m) = meter reading (dBµV) + antenna factor (dB/m)+ Cable Loss (dB)

4.1.1 Radiated Emissions Test Results (3/17/06)

Radiated Emissions 9 kHz – 30 MHz (FCC 15.209, 15.225; IC RSS-210 A2.6)

Measurement Distance is 30 meters. Vert | is antenna perpendicular, Vert = is antenna parallel

Frequency (MHz)	Description	Polarity (H / V)	Azimuth (degrees)	Indicated Level (dBuV)	Ant. Factor (dB 1/m)	Cable Loss (dB)	Corrected Level (dBuV/m)	Limit (dBuV/m)	Δ
13.56	Fundamental	Vert ^	0	28.66	17.60	0.65	46.91	84	-37.09
		Vert =	116	17.56			35.81	84	-48.19
		Horiz	206	12.3			30.55	84	-53.45
27.12	2nd Harmonic	Vert ^	0	3.39	17.55	1.00	21.94	29.54	-7.60
		Vert =	0	3.39			21.94	29.54	-7.60
		Horiz	0	3.39			21.94	29.54	-7.60

Overall Results: Measurements of the fundamental and second harmonic signals are below the specified 30-meter limit. The second harmonic signals are noise floor levels. The emissions from the EUT were below this level of detection. No other signals were detected from the EUT. The band restrictions of the fundamental signal are met by examining the bandwidth plot. The level of the fundamental signal drops more than 50 dB at +/- 5 kHz. This level is below the maximum levels provided by the applicable standards.

Spurious Emissions: 30 MHz - 4 GHz (FCC 15.209; IC RSS-210 2.7)

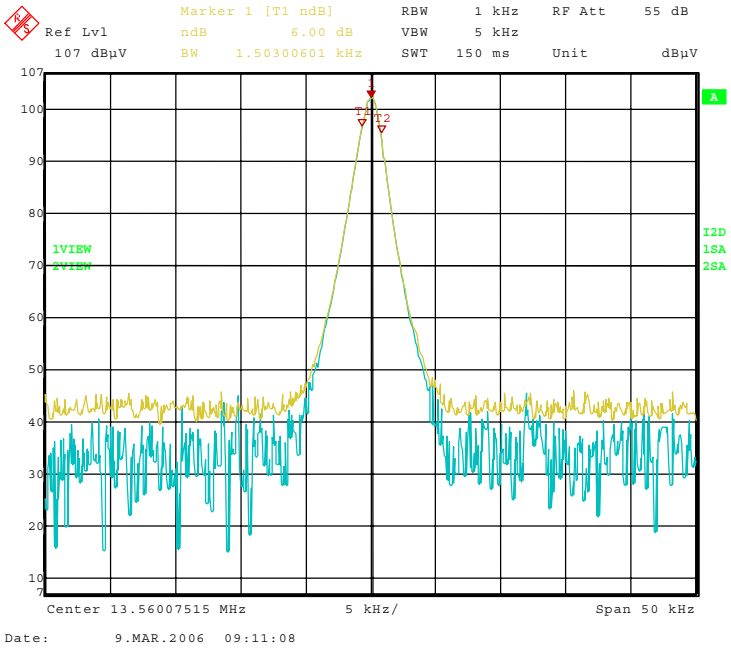
The tables below show the highest amplitude quasi-peak detected field strengths of spurious and digital emissions measured from the EUT over the frequency range from 30 MHz to 1000 MHz, at a distance of 3 meters compared to the maximum permissible 47 CFR Part 15C / RSS-210 2.7 limit at 3 meters.

Freq [MHz]	Pk [dBuV/m]	Q-Pk [dBuV/m]	Pol [H/V]	Angle [deg]	Ht [cm]	CF [dB]	Limit [dBuV/m]	Delta [dB]
67.236	39.79	25.38	V	230	224	9.29	39	-13.62
133.1	27.54	21.04	V	129	100	13.39	43.5	-22.46
133.1	24.33	15.72	H	360	100	13.39	43.5	-27.78
200.1	36.97	23.64	V	33	265	12.55	43.5	-19.86
200.1	42.04	27.11	H	99	398	12.55	43.5	-16.39
266.19	27.57	23.13	V	74	100	16.18	46.4	-23.27
299.47	31.57	28.83	V	105	114	17.4	46.4	-17.57
332.74	39.69	38.22	V	216	100	17.6	46.4	-8.18
399.29	35.59	33.75	V	46	100	18.27	46.4	-12.65
399.29	47.43	36.27	H	227	193	18.27	46.4	-10.13
499.14	41.2	39.6	V	160	269	20.1	46.4	-6.8
499.14	44.41	42.37	H	86	171	20.1	46.4	-4.03
898.35	36.74	31.55	V	220	112	26.03	46.4	-14.85

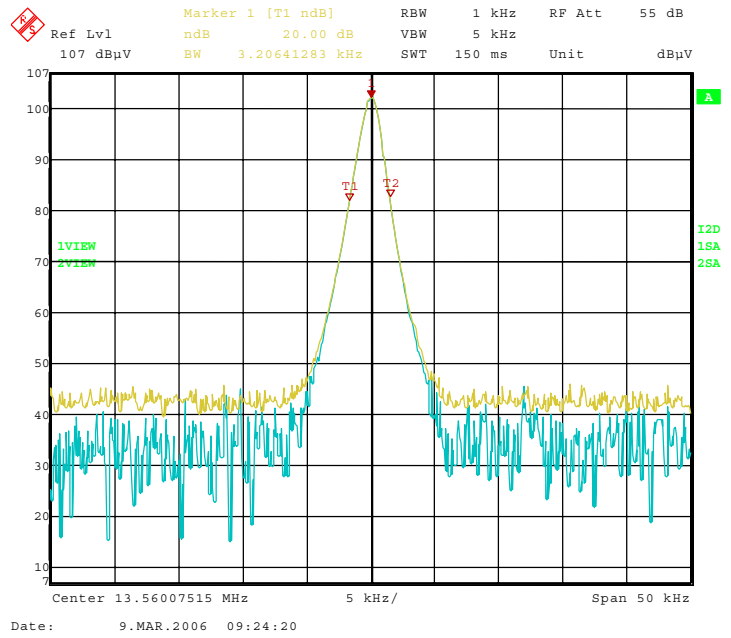
Overall Results: All radiated emissions, spurious and non-spurious, recorded at a distance of 3 meters from the ISO ILS Open Plus Patron Self Checkout Station are below the FCC Class B limit @ 3 meters.

4.1.2 Occupied Bandwidth (3/9/06)

Occupied Bandwidth Plots (FCC, IC)



6 dB Bandwidth

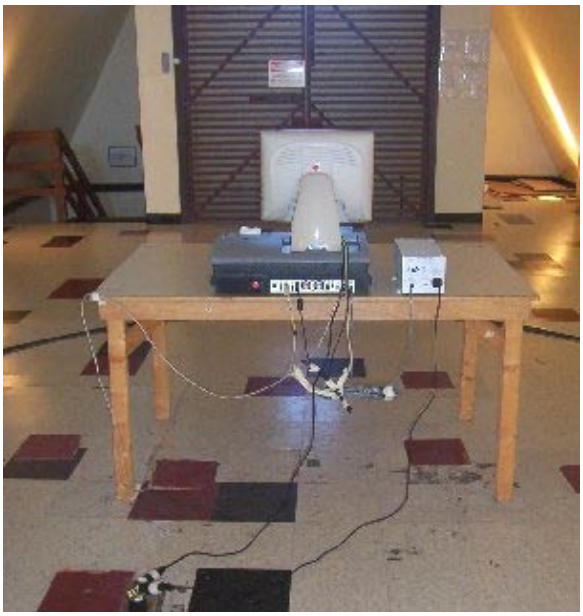


20 dB Bandwidth

Overall Results: 6 dB bandwidth: 1.503 kHz, 20 dB bandwidth: 3.206 kHz

Test Setup Photos

ISO ILS Open Plus Patron Self Checkout Station: Front View



ISO ILS Open Plus Patron Self Checkout Station: Rear View

4.2 Conducted Emissions

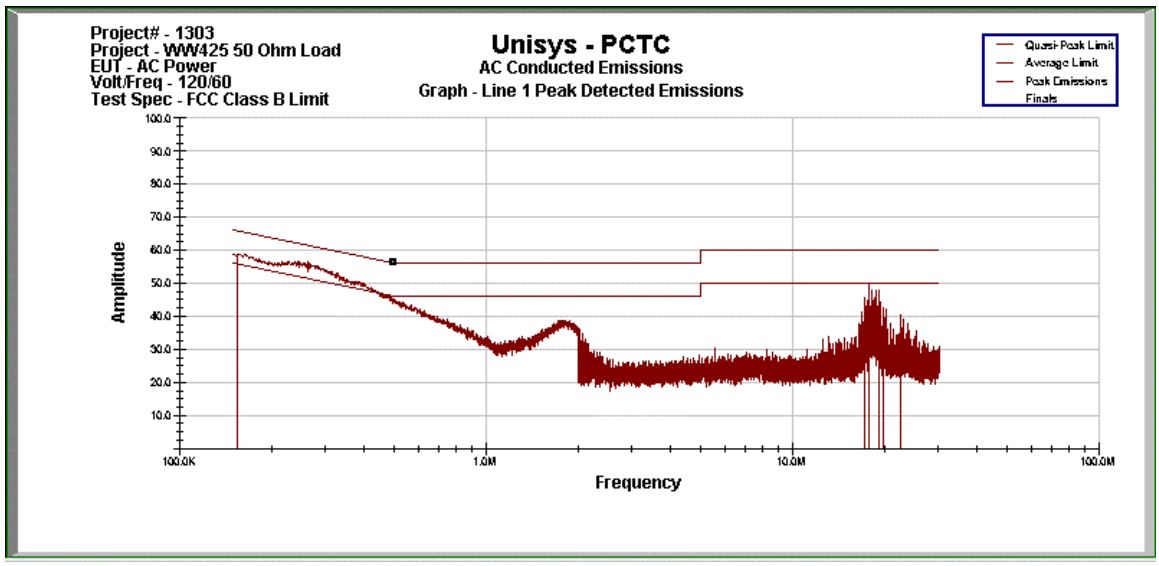
Test Standards:	USA: 47 CFR Part 15.207 Canada: RSS-GEN 7.2.2
Frequency Range:	150kHz to 30 MHz
AC Power:	120 Vac, 60 Hz
EUT Type:	Table top
Highest Oscillator Frequency:	400 MHz
Measurement Uncertainty:	5.0 dB (CISPR 16-4: 2002)
Conducted Emission Calculation:	Peak Emission (dBuV Peak) = Meter reading (dBuV) + cable loss (dB) + Limiter loss (dB)

4.2.1 Conducted Emission Test Results (3/16/06)

The conducted emissions recorded on the EUT AC power cord (s), displayed against the limits for CISPR 22, Class B devices are presented on the following pages. Conducted emission amplitudes (dBµV PK) measured with a peak detector are compared with CISPR 22, Class B average limit and displayed on the graph. Where the measured peak detector emission exceeded the average limit, or found to be within 1 dB of average limit, re-measurement using quasi-peak and average detector functions was made. The re-measured emissions are presented in a table below the appropriate table of peak detector emissions, which displays quasi-peak measurements vs. the quasi-peak limit and the average measurements vs. the average limit. A 50-ohm terminator was substituted for the EUT loop antenna in order to eliminate coupling of the fundamental signal onto the AC conductors.

Conducted Emission Test Results (FCC 15.207; IC RSS-GEN 7.2.2)

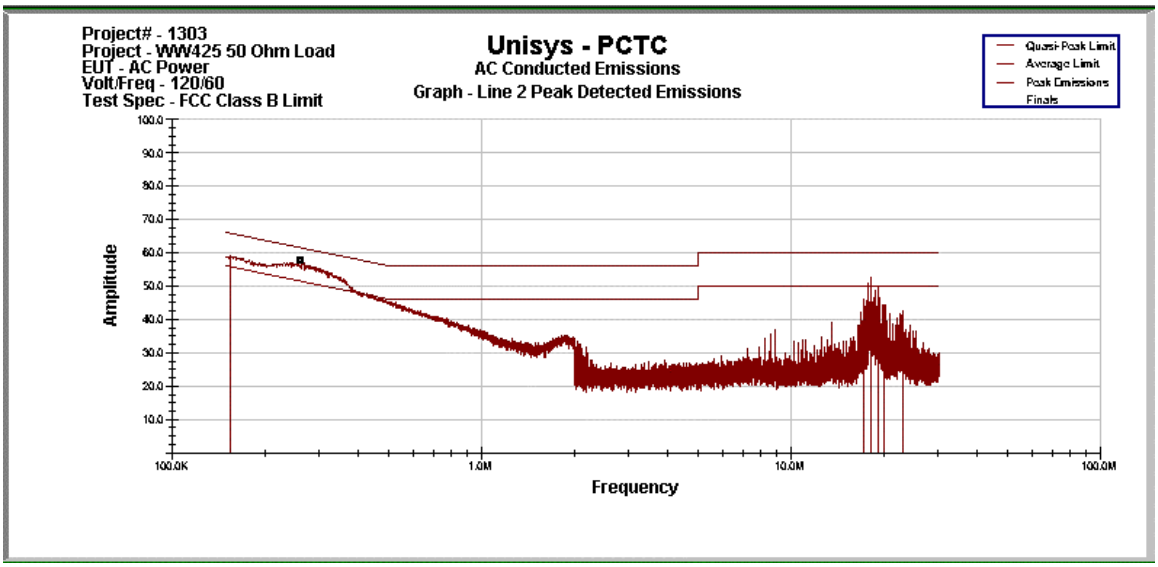
ISO ILS Open Plus Patron Self Checkout Station, 120 Vac / 60 Hz, Neutral Line



Unisys - PCTC
Line 1 Conducted Emissions
03:05:15 PM, Thursday, March 16, 2006

	1	2	3	4	5	6	7
Frequency	AVG	AVG	AVG	QP	QP	QP	Corr
MHz	dBuV	Limit	Margin	dBuV	Limit	Margin	Factor
155.000 KHz	30.43	55.86	-25.43	51.97	65.86	-13.88	13.337
17.131 MHz	42.61	50.00	-7.39	44.45	60.00	-15.55	10.445
17.792 MHz	45.55	50.00	-4.45	48.16	60.00	-11.84	10.472
19.110 MHz	44.08	50.00	-5.92	46.32	60.00	-13.68	10.524
19.768 MHz	39.18	50.00	-10.82	41.26	60.00	-18.74	10.551
22.402 MHz	33.11	50.00	-16.89	36.19	60.00	-23.81	10.694
Project# - 1303							
Project - WW425 50 Ohm Load							
EUT - AC Power							
Volt/Freq - 120/60							
Test Spec - FCC Class B Limit							

ISO ILS Open Plus Patron Self Checkout Station, 120 Vac / 60 Hz, Phase Line

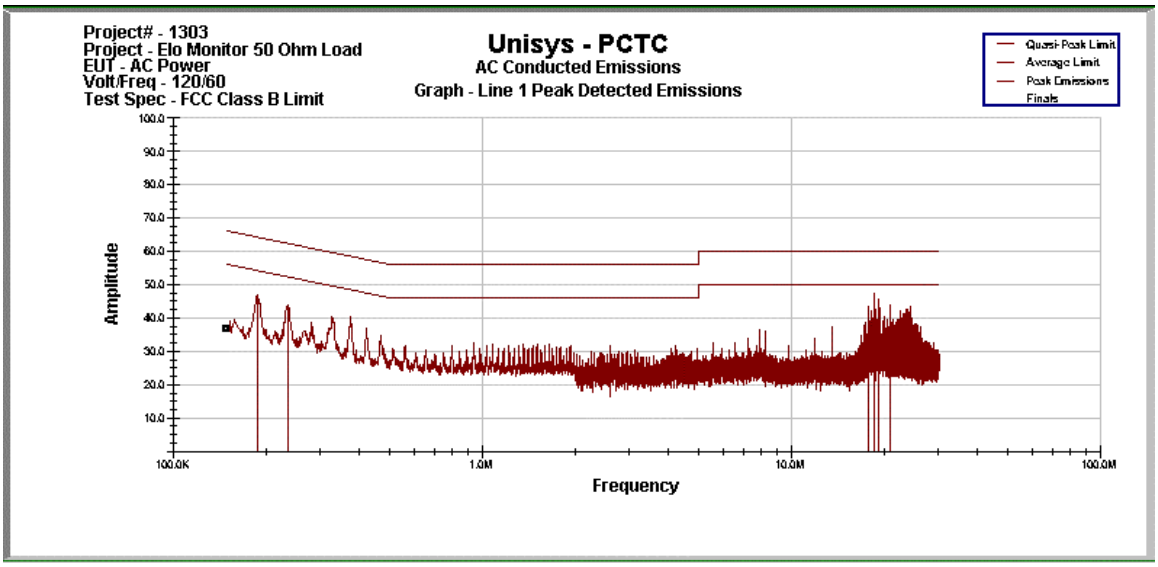


Unisys - PCTC
Line 2 Conducted Emissions
03:11:04 PM, Thursday, March 16, 2006

	1	2	3	4	5	6	7
Frequency	AVG	AVG	AVG	QP	QP	QP	Corr
MHz	dBuV	Limit	Margin	dBuV	Limit	Margin	Factor
155.000 KHz	29.845	55.857	-26.012	51.889	65.857	-13.968	13.337
17.129 MHz	43.909	50.000	-6.091	45.611	60.000	-14.389	10.445
18.119 MHz	44.749	50.000	-5.251	47.467	60.000	-12.533	10.485
19.106 MHz	47.534	50.000	-2.466	49.591	60.000	-10.409	10.524
20.094 MHz	38.548	50.000	-11.452	43.627	60.000	-16.373	10.565
23.059 MHz	40.015	50.000	-9.985	42.171	60.000	-17.829	10.731
Project# - 1303							
Project - WW425 50 Ohm Load							
EUT - AC Power							
Volt/Freq - 120/60							
Test Spec - FCC Class B Limit							

Overall Results: The conducted emissions measured of the input AC power lines of the ISO ILS Open Plus Patron Self Checkout Station are below the specified limit.

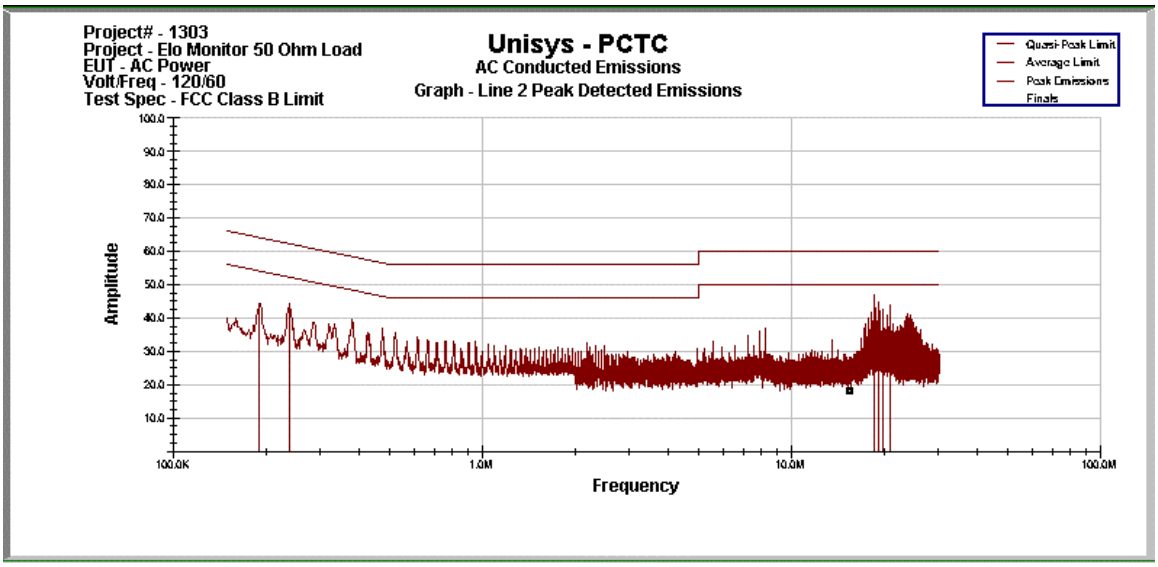
ELO Touch Screen Monitor, 120 Vac / 60 Hz, Neutral Line



Unisys - PCTC
Line 1 Conducted Emissions
03:25:01 PM, Thursday, March 16, 2006

	1	2	3	4	5	6	7	
Frequency	AVG	AVG	AVG	QP	QP	QP	Corr	
MHz	dBuV	Limit	Margin	dBuV	Limit	Margin	Factor	
187.000 KHz	35.74	54.94	-19.20	42.81	64.94	-22.13	12.102	
235.000 KHz	33.93	53.57	-19.64	41.17	63.57	-22.40	10.984	
17.785 MHz	40.32	50.00	-9.68	42.55	60.00	-17.45	10.471	
18.446 MHz	43.94	50.00	-6.06	46.27	60.00	-13.73	10.498	
19.103 MHz	42.52	50.00	-7.48	44.38	60.00	-15.62	10.524	
20.750 MHz	40.04	50.00	-9.96	42.23	60.00	-17.77	10.602	
Project# - 1303								
Project - Elo Monitor 50 Ohm Load								
EUT - AC Power								
Volt/Freq - 120/60								
Test Spec - FCC Class B Limit								

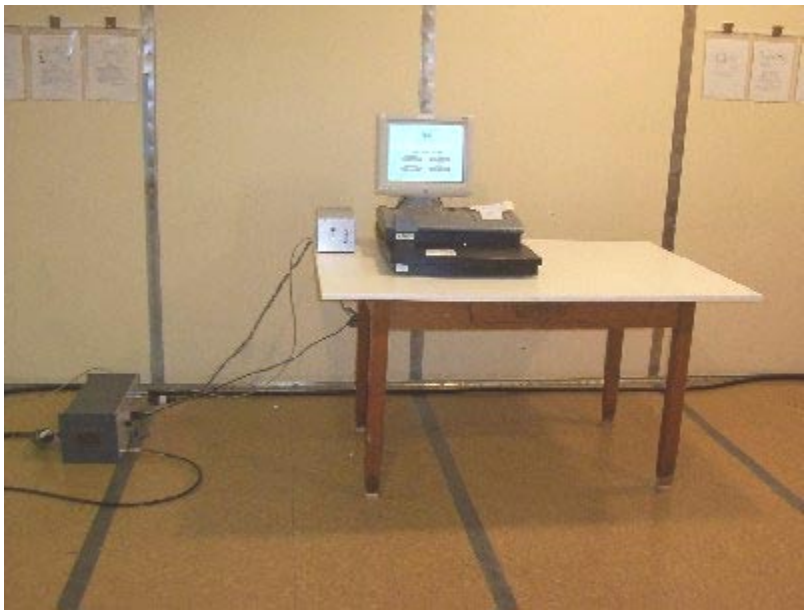
ELO Touch Screen Monitor, 120 Vac / 60 Hz, Phase Line



Unisys - PCTC
Line 2 Conducted Emissions
03:30:54 PM, Thursday, March 16, 2006

	1	2	3	4	5	6	7	
Frequency	AVG	AVG	AVG	QP	QP	QP	Corr	
MHz	dBuV	Limit	Margin	dBuV	Limit	Margin	Factor	
190.000 KHz	33.290	54.857	-21.568	41.950	64.857	-22.907	11.986	
237.000 KHz	33.285	53.514	-20.229	40.294	63.514	-23.221	10.949	
18.444 MHz	43.550	50.000	-6.450	45.814	60.000	-14.186	10.498	
19.103 MHz	42.236	50.000	-7.764	44.266	60.000	-15.734	10.524	
19.763 MHz	39.250	50.000	-10.750	41.263	60.000	-18.737	10.551	
20.750 MHz	40.046	50.000	-9.954	42.421	60.000	-17.579	10.602	
Project# - 1303								
Project - Elo Monitor 50 Ohm Load								
EUT - AC Power								
Volt/Freq - 120/60								
Test Spec - FCC Class B Limit								

Overall Results: The conducted emissions measured of the input AC power lines of the ELO Touch Screen Monitor are below the specified limit.



ISO ILS Open Plus Patron Self Checkout Station: Conducted Emission Test Setup

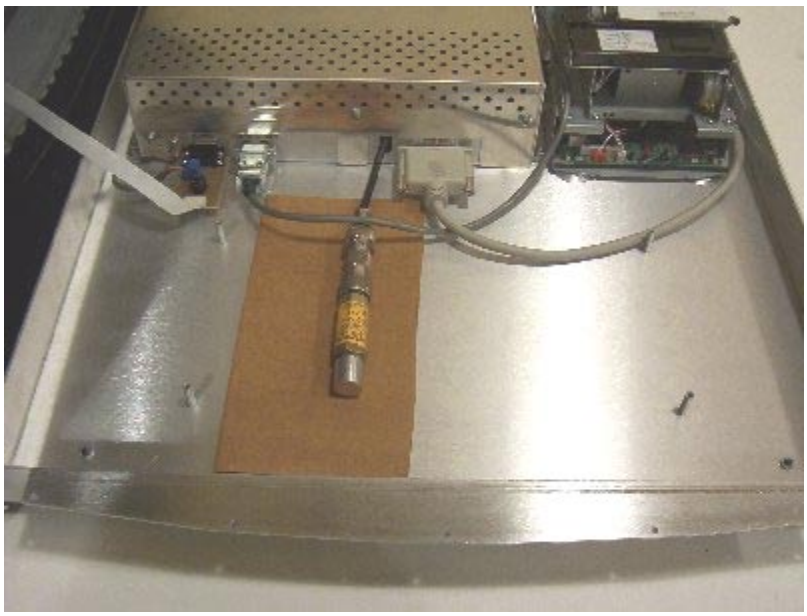


Photo of 50-ohm load substituted for loop antenna

4.3 Frequency Stability (3/20/06)

Test Standards:	USA: 47 CFR Part 15.225 Canada: RSS-210 A2.6
Frequency Range:	13.110 – 14.010
Temperature Range:	-30°C, +20°C and +50°C
AC Power:	102, 120 and 138 Vac/60 Hz 204, 240 and 276 Vac/60Hz
EUT Type:	Table top
Maximum Fundamental Frequency Change:	.01% (+/- 1.356 kHz)

The tables below show the variation of transmitter frequency at temperature extremes of -20° C +20°C and +55°C at nominal AC voltage. Variation is also shown for +/- 15% of AC input voltage at +20°C.

+50°C

Elapsed Time (minutes)	Frequency (Hz)	Deviation (Hz)	Deviation %
0	13,559,953.0	0.0	
2	13,559,956.0	3.0	0.00002
5	13,559,926.0	-27.0	0.00020
10	13,559,934.0	-19.0	0.00014

+20oC

0	13,559,849.0	0.0	
2	13,559,848.0	-1.0	0.00001
5	13,559,847.0	-2.0	0.00001
10	13,559,848.0	-1.0	0.00001

-30°C

0	13,559,826.0	0.0	
2	13,559,824.0	-2.0	0.00001
5	13,559,810.0	-16.0	0.00012
10	13,559,822.0	-4.0	0.00003

120 Vac / 60 Hz @ +20°C

Elapsed Time (minutes)	Frequency (Hz)	Deviation (Hz)	Deviation %
0	13,559,958.0	0.0	
2	13,559,955.0	-3.0	0.00002
5	13,559,950.0	-8.0	0.00006
10	13,559,955.0	-3.0	0.00002

240 Vac / 60 Hz @ +20°C

Elapsed Time (minutes)	Frequency (Hz)	Deviation (Hz)	Deviation %
0	13,559,970.0	0.0	
2	13,559,971.0	1.0	0.00001
5	13,559,975.0	5.0	0.00004
10	13,559,965.0	-5.0	0.00004

102 Vac / 60 Hz @ +20°C

0	13,559,959.0	0.0	
2	13,559,964.0	5.0	0.00004
5	13,559,967.0	8.0	0.00006
10	13,559,972.0	13.0	0.00010

276 Vac / 60 Hz @ +20°C

0	13,559,952.0	0.0	
2	13,559,956.0	4.0	0.00003
5	13,559,949.0	-3.0	0.00002
10	13,559,952.0	0.0	0.00000

138 Vac / 60 Hz @ +20°C

0	13,559,988.0	0.0	
2	13,559,984.0	-4.0	0.00003
5	13,559,981.0	-7.0	0.00005
10	13,559,981.0	-7.0	0.00005

204 Vac / 60 Hz @ +20°C

0	13,559,977.0	0.0	
2	13,559,976.0	-1.0	0.00001
5	13,559,972.0	-5.0	0.00004
10	13,559,969.0	-8.0	0.00006

Overall Results: The ISO ILS Open Plus Patron Self Checkout Station exhibited a fundamental transmitter frequency variation of 27 Hz or .002% during high temperature exposure. This was the highest variation noted in the stability tests and complies with the requirements of the specified standard.

4.4 SAR Requirements

The output power of the ISO ILS Open Plus Patron Self Checkout Station is less than 2.5 watts. This level complies with the minimum power allowed by Industry Canada RSS-102, Section 2.5.2. The EUT are exempt from SAR requirements.

Appendix A – Test Equipment List

Emission Test Equipment

Description	Freq Range (Hz)	Model Number	Manufacturer	ID / SN	Last Cal Date
EMI Test Receiver	20 – 40 G	ESIB40	Rohde & Schwarz	C-062	12/19/05
Antenna	25 M – 2 G	LPB-2520/A	ARA	B-965	9/26/05
Antenna, Active Loop	1 k – 30 M	6507	EMCO	D-244	4/20/05
Controller, Tower and Turntable	NA	2090	EMCO	B-812	NA
EMI Test Receiver	20 – 26.5 G	ESIB26	Rohde & Schwarz	C-232	3/18/05
Filter, Bandpass	0.15 M – 30 M	NA	Unisys	NA	NA
Limiter, Pulse	DC – 30 M	ESH3-Z2	Polarad	NA	NA
LISN	9 k – 30 M	8012-50-R-24-BNC	Chase	U776	10/19/05
Power Supply	NA	5001ix	California Instruments	A-116	8/4/05
Temperature/Humidity Chamber	NA	SM32C	Thermotron	V733	12/12/05