

**ELECTROMAGNETIC INTERFERENCE TEST REPORT**


**Doc. 20060320R/Project# 1304**

**TEST STANDARDS: 47 CFR PART 15, RSS-210 ISSUE 6, ICS-003**

**ISO ILS OPEN PLUS STAFF STATION READER  
AND STAFF STATION READER SERIAL VERSION  
FCC ID: DO4FISOTP / IC ID: 3356B-FISOTP**

**CHECKPOINT SYSTEMS, INC.  
THOROFARE, NJ 08086**

**TEST DATES: March 9<sup>th</sup> to March 20<sup>th</sup>, 2006  
ISSUE: April 12<sup>th</sup>, 2006**

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**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 Staff Station Reader 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 15.223	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	10 MHz to 2 GHz	Below Max. Permissible Limit
Radiated Emissions Unintentional Radiator (Related to Digital Circuitry)	Part 15.109	ICES-003	30 MHz to 2 GHz	Below Max. Permissible Limit
Conducted Emissions Unintentional & Intentional Radiators	Part 15.207	RSS-Gen, 4.5 RSS-210, A2.6	13.110 to 14.010 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:

A clip-on ferrite (Fair-Rite p/n 044164151) was added to the DC line of the Staff Station Reader and the Serial Version. The DC line passes through the ferrite core six times. The Staff Station Reader also required the addition of Schlegel EMI gasket (p/n E9013T) around the perimeter of the junction between the top metal plate and the reader base.

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**1.0 Description of the Equipment Under Test (EUT)**

Equipment Identification	ISO ILS Open Plus Staff Station Reader	
	Network Version	Serial Version
Serial Number	7591344B0P00416010	7403475B0P00416001
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 Staff Station Reader's function is to read ISO 15693 RFID tags, which contain product information. The Staff Station Reader reads ISO 15693 RFID tag data within twelve inches above the Staff Station Reader's surface.

The RFID Staff Station Reader is composed of a single board computer (SBC), an Interface/Power Supply board, a reader module, and an antenna.

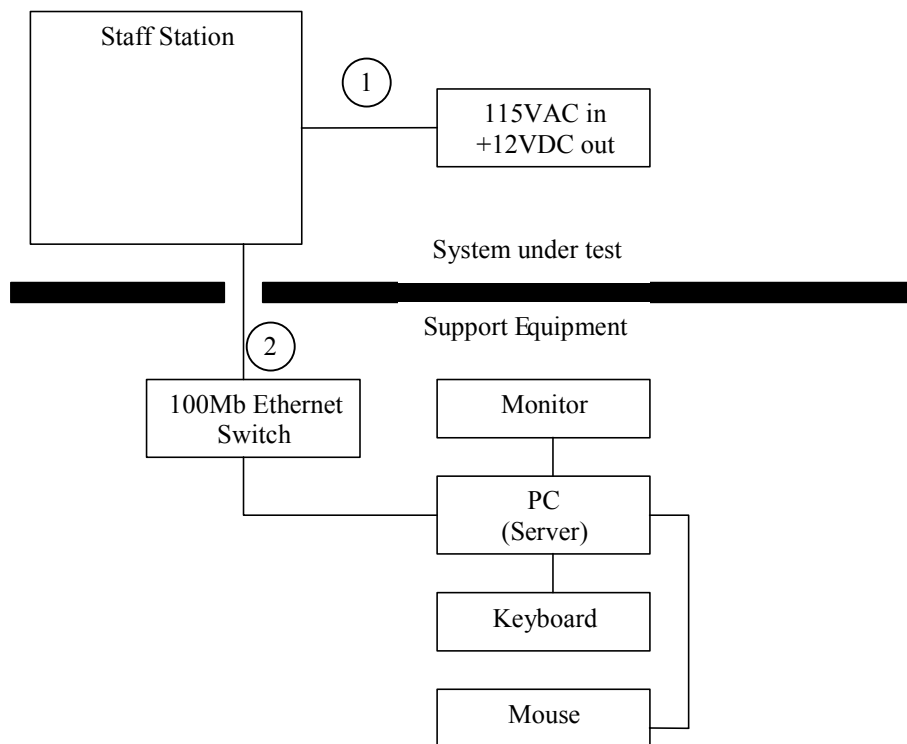
The reader module continuously drives the antenna at a carrier frequency of 13.56MHz. The RFID tag is powered by the antenna field. Both reader-to-tag and tag-to reader communication is accomplished by amplitude modulation, according to the air-interface protocol dictated in the ISO15693 standard. Decoded tag data is sent to the SBC via RS-232 communications.

In addition to the RS-232 communications to the reader module, the SBC provides RS-232 communications to an external bar code scanner and a circulation system computer (as in a library system data base). The bar code scanner is used to enter patron information, which is associated with tag data that is "scanned" in using the Staff Station Reader. This patron information and associated tag data is sent to the circulation system computer's data base using RS-232 and to the security server using 10base-T Ethernet Station's antenna area. This patron information and associated tag data is sent to the circulation system's database and to the application server.

The RFID Staff Station Reader Serial Version, a subset of the Staff Station Reader, is composed of an Interface/Power Supply board, a reader module, and an antenna. In this report, the term "Staff Station Reader" refers to the unit with network capability. The term "Serial Version" refers to the unit without network capability.

## 1.2 Test Configurations

The ISO ILS Open Plus Staff Station Reader 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. The ISO ILS Open Plus Staff Station Reader Serial Version configuration includes only the Staff Station and Power Supply.



#	Description	Length	Shielding
1	DC Power line	6'	None
2	Ethernet Cable	25'	Braid/foil

**EMI Test Setup Block Diagram of ISO ILS Open Plus Staff Station Reader**

**EUT Hardware:**

Description	Manufacturer	Model#	Serial#
ISO ILS Open Plus Staff Station Reader	Checkpoint	ISO ILS RFID TAG PAD READER	7591344B0P00416010
ISO ILS Open Plus Staff Station Reader Serial Version	Checkpoint	SERIAL RDR ISO ILS TAG PAD	7403475B0P00416001
AC Adaptor	Checkpoint	112103	0233

**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**

A clip-on ferrite (Fair-Rite p/n 044164151) was added to the DC line of the Staff Station Reader and the Serial Version. The DC line passes through the ferrite core six times. The Staff Station Reader also required the addition of Schlegel EMI gasket (p/n E9013T) around the perimeter of the junction between the top metal plate and the reader base.

**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:  $22^{\circ}\text{C} \pm 5^{\circ}\text{C}$       Relative Humidity  $50\% \pm 10\% \text{ RH}$

**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  $-30^{\circ}\text{C}$ . USA 47 CFR Part 15.225 requires  $-20^{\circ}\text{C}$ . Industry Canada RSS-Gen 4.5 requires  $-30^{\circ}\text{C}$ .

### 4.0 Test Results

#### 4.1 Radiated Emissions

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

##### 4.1.1 Radiated Emissions Test Results (3/16/06)

#### 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

#### ISO ILS Open Plus Staff Station Reader

Frequency (MHz)	Description	Polarity (H / V)	Azimuth (degrees)	Indicated Level (dB $\mu\text{V}$ )	Ant. Factor (dB 1/m)	Cable Loss (dB)	Corrected Level (dB $\mu\text{V}/\text{m}$ )	Limit (dB $\mu\text{V}/\text{m}$ )	$\Delta$
13.56	Fundamental	Vert ^	29	31.17	17.60	0.65	49.42	84	-34.58
		Vert =	297	18.7			36.95	84	-47.05
		Horiz	192	16.26			34.51	84	-49.49
27.12	2nd Harmonic	Vert ^	139.5	8.77	17.55	1.00	27.32	29.54	-2.22
		Vert =	360	3.39			21.94	29.54	-7.60
		Horiz	76	4.55			23.10	29.54	-6.44



**ISO ILS Open Plus Staff Station Reader (Serial Version)**

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 ^	360	32.12	17.60	0.65	50.37	84	-33.63
		Vert =	100	14.71			32.96	84	-51.04
		Horiz	0	15.13			33.38	84	-50.62
27.12	2nd Harmonic	Vert ^	16	9.09	17.55	1.00	27.64	29.54	-1.90
		Vert =	289	4.82			23.37	29.54	-6.17
		Horiz	0	3.99			22.54	29.54	-7.00

**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.

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

The table below shows the highest amplitude quasi-peak detected field strengths of digital emissions measured from the EUT over the frequency range from 30 MHz to 1000 MHz, at a distance of 10 meters compared to the maximum permissible 47 CFR Part 15C/RSS-210 2.7 limit at 10 meters. The signals listed in the table below were determined to be emissions not associated with the transmitter by removing power from the transmitter circuit; no change in emission level was noted without transmitter power. No spurious signals were detected.

**ISO ILS Open Plus Staff Station Reader**

Freq [MHz]	Pk [dBuV/m]	Q-Pk [dBuV/m]	Pol [H/V]	Angle [deg]	Ht [cm]	CF [dB]	Limit [dBuV/m]	Delta [dB]
56.411	38.63	32.37	V	325	112	12.73	39	-6.63
68.939	42.1	36.5	V	61	202	8.85	39	-2.5
75.214	46.77	36.82	V	18	167	8.36	39	-2.18
75.214	25.18	23.72	H	359	395	8.36	39	-15.28
81.484	39.81	32.83	V	336	132	8.37	39	-6.17
125.358	36.76	35.17	V	330	100	14.32	43.5	-8.33
137.893	38.86	38.43	V	53	102	12.59	43.5	-5.07
150.429	45.47	36.58	V	192	100	11.51	43.5	-6.92
162.963	45.28	35.36	V	12	200	12.06	43.5	-8.14
175.501	43.57	31.13	V	14	221	11.85	43.5	-12.37
175.501	28.42	27	H	293	397	11.85	43.5	-16.5
200.573	30.35	28.8	H	123	393	12.59	43.5	-14.7
200.573	40.87	30.93	V	22	100	12.59	43.5	-12.57
219.374	43.15	31.97	V	317	188	14.18	46.4	-14.43
225.642	38.19	31.24	V	123	100	14.66	46.4	-15.16

The table below shows the highest amplitude quasi-peak detected field strengths of spurious 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.

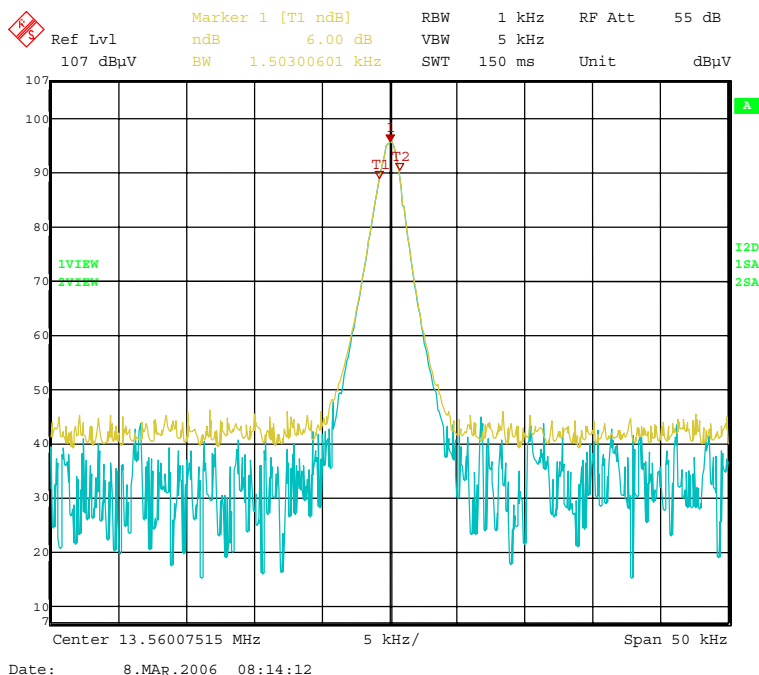
#### ISO ILS Open Plus Staff Station Reader (Serial Version)

Freq	Pk	Q-Pk	Pol	Angle	Ht	CF	Limit	Delta
[MHz]	[dBuV/m]	[dBuV/m]	[H/V]	[deg]	[cm]	[dB]	[dBuV/m]	[dB]
40.685	31.78	24.82	V	343	101	17.97	40	-15.18
54.236	32.85	23.56	V	346	107	13.79	40	-16.44
216.967	27.29	23.69	V	316	104	13.42	46	-22.31
244.091	25.77	21.31	V	334	100	14.58	46	-24.69
271.206	30.76	26.65	V	327	100	15.46	46	-19.35
298.323	31.27	28.06	V	336	100	16.26	46	-17.94

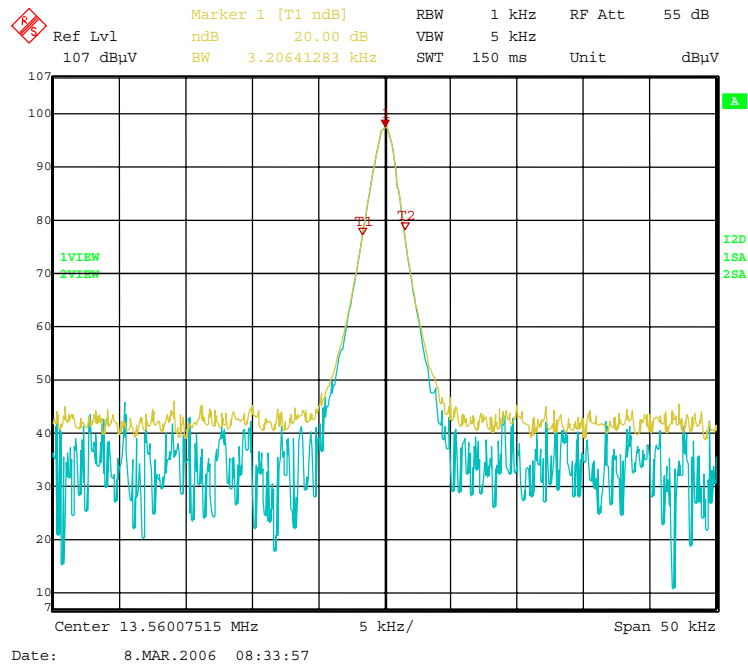
**Overall Results:** Spurious radiated emissions, recorded at a distance of 3 meters from the ISO ILS Open Plus Staff Station Serial Version, are compliant to the specified limit.

#### 4.1.2 Occupied Bandwidth (3/8/06)

#### ISO ILS Open Plus Staff Station Reader

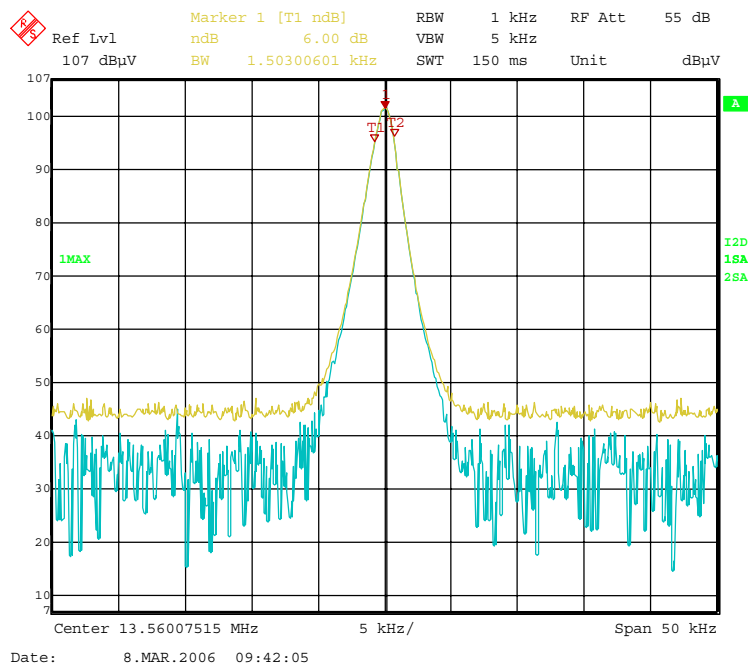


#### Staff Station Reader, Network Version, 6 dB Bandwidth Plot

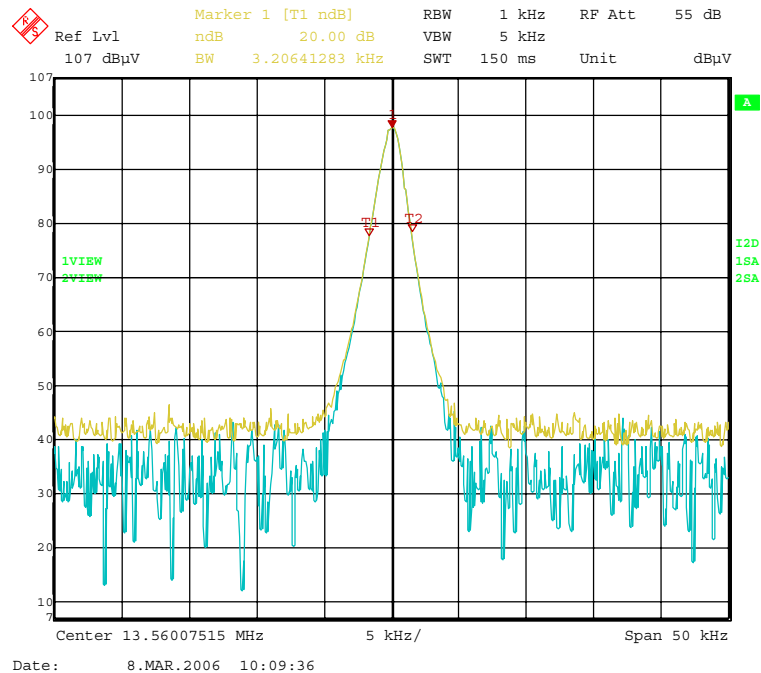


Staff Station Reader, Network Version, 20 dB Bandwidth Plot

## ISO ILS Open Plus Staff Station Reader (Serial Version)



Staff Station Reader, Serial Version, 6 dB Bandwidth Plot



### Staff Station Reader, Serial Version, 20 dB Bandwidth Plot

**Overall Results:** The 6-dB bandwidth of the Staff Station, Network and Serial Version is 1.503 kHz and the 20 dB bandwidth is 3.206 kHz.

### Test Setup Photos



Staff Station Front View



Staff Station Rear View



**Staff Station (Serial Version) Front**



**Staff Station (Serial Version) Rear**

## 4.2 Conducted Emissions

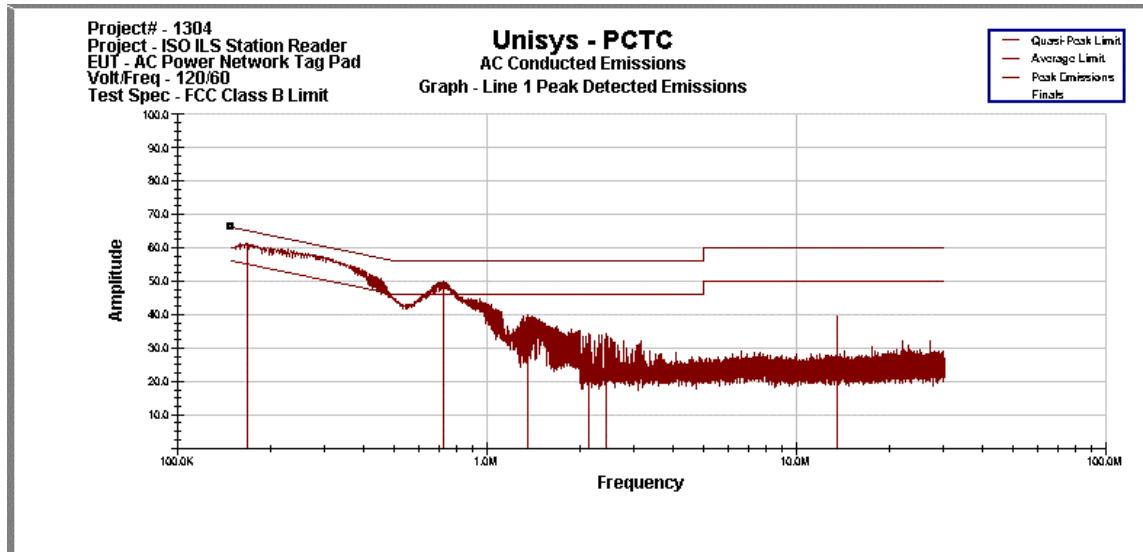
<b>Test Standards:</b>	USA: 47 CFR Part 15.207 Canada: RSS-GEN 7.2.2
<b>Frequency Range:</b>	150kHz to 30 MHz
<b>AC Power:</b>	120 Vac, 60 Hz
<b>EUT Type:</b>	Table top
<b>Highest Oscillator Frequency:</b>	400 MHz
<b>Measurement Uncertainty:</b>	5.0 dB (CISPR 16-4: 2002)
<b>Conducted Emission Calculation:</b>	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 (dBuV 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 of the Serial Version of the Staff Station Reader.

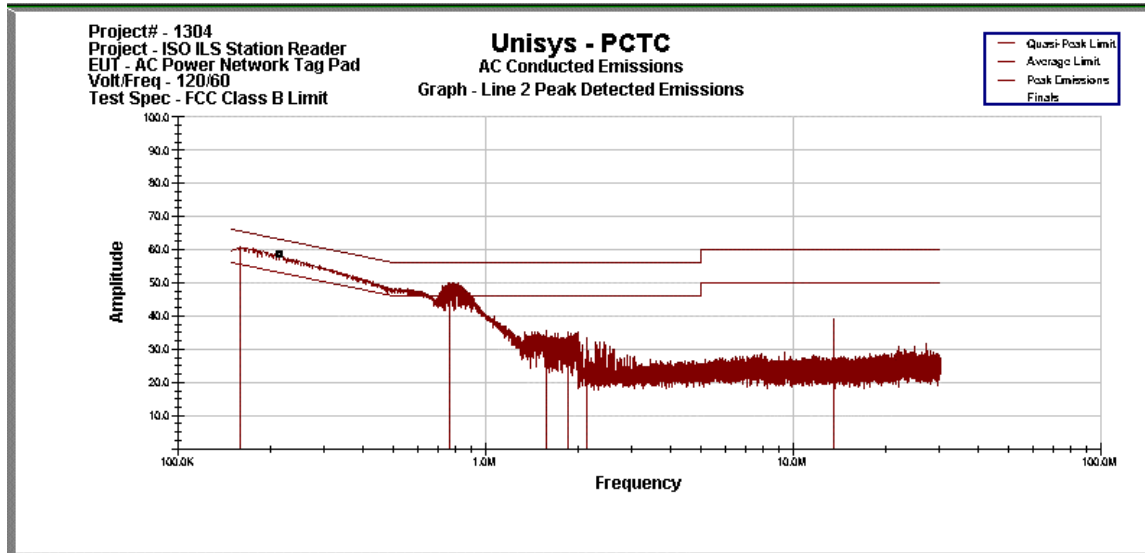
### Conducted Emission Test Results (FCC 15.207; IC RSS-GEN 7.2.2, ICES-003)

## ISO ILS Open Plus Staff Station Reader, 120 Vac / 60 Hz, Neutral Line



Unisys - PCTC Line 1 Conducted Emissions 03:20:41 PM, Thursday, March 09, 2006							
	1	2	3	4	5	6	7
Frequency	AVG	AVG	AVG	QP	QP	QP	Corr
MHz	dBuV	Limit	Margin	dBuV	Limit	Margin	Factor
169.000 KHz	29.01	55.46	-26.45	53.34	65.46	-12.12	12.797
720.000 KHz	17.42	46.00	-28.58	41.29	56.00	-14.71	10.290
1.350 MHz	13.81	46.00	-32.19	28.22	56.00	-27.78	10.162
2.137 MHz	14.09	46.00	-31.91	21.39	56.00	-34.61	10.110
2.434 MHz	14.10	46.00	-31.90	22.84	56.00	-33.16	10.110
13.561 MHz	36.22	50.00	-13.78	39.06	60.00	-20.94	10.331
Project# - 1304							
Project - ISO ILS Station Reader							
EUT - AC Power Network Tag Pad							
Volt/Freq - 120/60							
Test Spec - FCC Class B Limit							

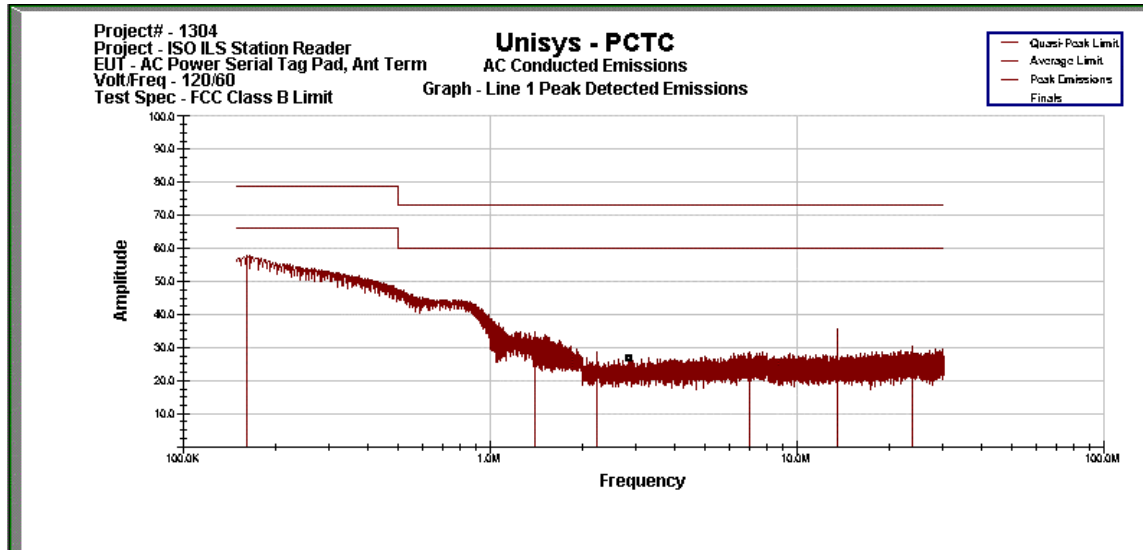
**ISO ILS Open Plus Staff Station Reader, 120 Vac / 60 Hz, Phase Line**



Unisys - PCTC							
Line 2 Conducted Emissions							
03:25:53 PM, Thursday, March 09, 2006							
	1	2	3	4	5	6	7
Frequency	AVG	AVG	AVG	QP	QP	QP	Corr
MHz	dBuV	Limit	Margin	dBuV	Limit	Margin	Factor
159.000 KHz	31.535	55.743	-24.208	53.849	65.743	-11.894	13.183
765.000 KHz	16.550	46.000	-29.450	39.759	56.000	-16.241	10.267
1.570 MHz	13.367	46.000	-32.633	21.814	56.000	-34.186	10.144
1.853 MHz	13.519	46.000	-32.481	22.161	56.000	-33.839	10.122
2.140 MHz	14.055	46.000	-31.945	21.393	56.000	-34.607	10.110
13.560 MHz	37.262	50.000	-12.738	40.249	60.000	-19.751	10.331
Project# - 1304							
Project - ISO ILS Station Reader							
EUT - AC Power Network Tag Pad							
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 Staff Station Reader are below the specified limit.

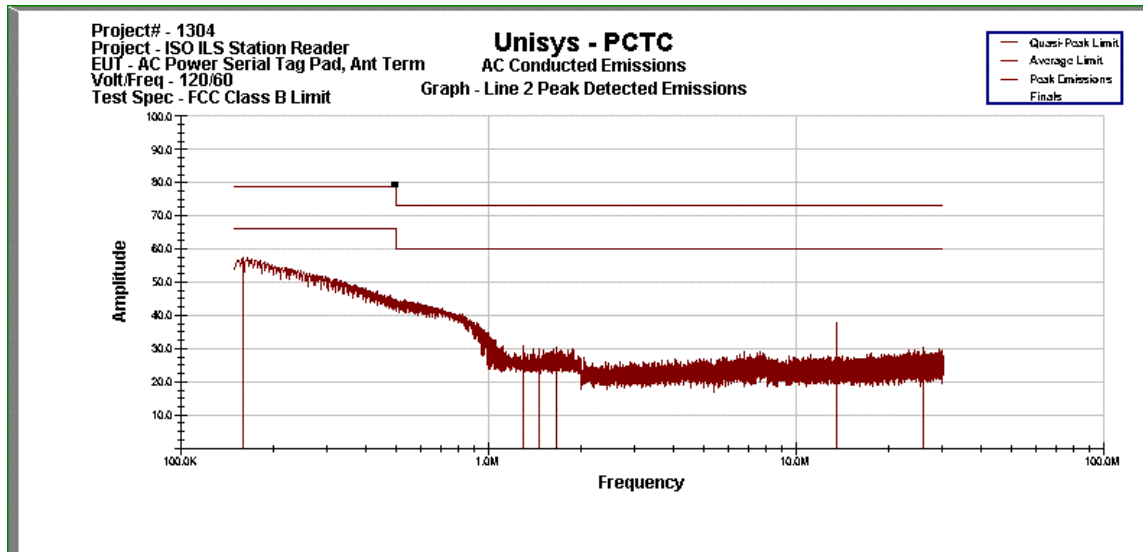
ISO ILS Open Plus Staff Station Reader (Serial Version), 120 Vac / 60 Hz, Neutral Line



Unisys - PCTC							
Line 1 Conducted Emissions							
09:46:49 AM, Friday, March 10, 2006							
	1	2	3	4	5	6	7
Frequency	AVG	AVG	AVG	QP	QP	QP	Corr
MHz	dBuV	Limit	Margin	dBuV	Limit	Margin	Factor
162.000 KHz	32.29	66.00	-33.71	50.45	79.00	-28.55	13.067
1.404 MHz	13.57	60.00	-46.43	21.83	73.00	-51.17	10.158
2.237 MHz	13.88	60.00	-46.12	18.07	73.00	-54.93	10.110
7.010 MHz	15.99	60.00	-44.01	20.66	73.00	-52.34	10.206
13.560 MHz	31.72	60.00	-28.28	34.41	73.00	-38.59	10.331
23.694 MHz	16.71	60.00	-43.29	21.22	73.00	-51.78	10.767
Project# - 1304							
Project - ISO ILS Station Reader							
EUT - AC Power Serial Tag Pad, Ant Term							
Volt/Freq - 120/60							
Test Spec - FCC Class B Limit							



ISO ILS Open Plus Staff Station Reader (Serial Version), 120 Vac / 60 Hz, Phase Line



Unisys - PCTC							
Line 2 Conducted Emissions							
09:52:06 AM, Friday, March 10, 2006							
	1	2	3	4	5	6	7
Frequency	AVG	AVG	AVG	QP	QP	QP	Corr
MHz	dBuV	Limit	Margin	dBuV	Limit	Margin	Factor
159.000 KHz	33.235	66.000	-32.765	50.020	79.000	-28.980	13.183
1.292 MHz	13.267	60.000	-46.733	18.123	73.000	-54.877	10.167
1.454 MHz	13.244	60.000	-46.756	17.511	73.000	-55.489	10.154
1.662 MHz	13.231	60.000	-46.769	18.654	73.000	-54.346	10.137
13.560 MHz	32.975	60.000	-27.025	35.594	73.000	-37.406	10.331
25.806 MHz	18.861	60.000	-41.139	20.445	73.000	-52.555	10.905
Project# - 1304							
Project - ISO ILS Station Reader							
EUT - AC Power Serial Tag Pad, Ant Term							
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 Staff Station Reader (Serial Version), are below the specified limit.



**Staff Station Reader: Conducted Emission Test Setup**



**Staff Station Reader (Serial Version): Conducted Emission Test Setup**



**Staff Station Reader (Serial Version): 50-ohm load on transmitter**

### 4.3 Frequency Stability (3/21/06)

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

The tables below show the variation of transmitter frequency at temperature extremes of -30° C, +20°C and +50°C and +/- 15% of 120Vac input voltage @ +20°C.

#### Staff Station, Network Version

50°C

Elapsed Time (minutes)	Frequency (Hz)	Deviation (Hz)	Deviation %
0	13,559,858.0	0.0	
2	13,559,816.0	-42.0	0.00031
5	13,559,818.0	-40.0	0.00029
10	13,559,821.0	-37.0	0.00027

+20°C

0	13,559,994.0	0.0	
2	13,559,997.0	3.0	0.00002
5	13,559,997.0	3.0	0.00002
10	13,560,003.0	9.0	0.00007

-30°C

0	13,559,994.0	0.0	
2	13,559,997.0	3.0	0.00002
5	13,559,997.0	3.0	0.00002
10	13,560,003.0	9.0	0.00007

120 Vac / 60 Hz @ +20°C

Elapsed Time (minutes)	Frequency (Hz)	Deviation (Hz)	Deviation %
0	13,560,003.0	0.0	
2	13,560,001.0	-2.0	0.00001
5	13,560,002.0	-1.0	0.00001
10	13,560,007.0	4.0	0.00003

102 Vac / 60 Hz @ +20°C

0	13,560,005.0	0.0	
2	13,560,009.0	4.0	0.00003
5	13,560,007.0	2.0	0.00001
10	13,560,003.0	-2.0	0.00001

138 Vac / 60 Hz @ +20°C

0	13,560,001.0	0.0	
2	13,560,007.0	6.0	0.00004
5	13,560,009.0	8.0	0.00006
10	13,560,002.0	1.0	0.00001

**Overall Results:** The ISO ILS Open Plus Staff Station Reader, Network Version, exhibited a fundamental transmitter frequency variation of 42 Hz or .00031 % during high temperature exposure. This was the highest variation noted in the stability tests and complies with the requirements of the specified standard.

### Staff Station, Network Version

50°C

Elapsed Time (minutes)	Frequency (Hz)	Deviation (Hz)	Deviation %
0	13,560,003.0	0.0	
2	13,559,978.0	-25.0	0.00018
5	13,559,958.0	-45.0	0.00033
10	13,559,948.0	-55.0	0.00041

+20°C

0	13,559,991.0	0.0	
2	13,559,992.0	1.0	0.00001
5	13,559,994.0	3.0	0.00002
10	13,560,004.0	13.0	0.00010

-20°C

0	13,560,265.0	0.0	
2	13,560,260.0	-5.0	0.00004
5	13,560,240.0	-25.0	0.00018
10	13,560,235.0	-30.0	0.00022

## 120 Vac / 60 Hz

Elapsed Time (minutes)	Frequency (Hz)	Deviation (Hz)	Deviation %
0	13,559,968.0	0.0	
2	13,559,965.0	-3.0	0.00002
5	13,559,967.0	-1.0	0.00001
10	13,559,966.0	-2.0	0.00001

## 102 Vac / 60 Hz

0	13,559,969.0	0.0	
2	13,559,964.0	-5.0	0.00004
5	13,559,968.0	-1.0	0.00001
10	13,559,964.0	-5.0	0.00004

## 138 Vac / 60 Hz

0	13,559,969.0	0.0	
2	13,559,961.0	-8.0	0.00006
5	13,559,966.0	-3.0	0.00002
10	13,559,969.0	0.0	0.00000

**Overall Results:** The ISO ILS Open Plus Staff Station Reader, Serial Version, exhibited a fundamental transmitter frequency variation of 55 Hz or .00041 % 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 Staff Station Reader and Serial Version are 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**

<b>Description</b>	<b>Freq Range (Hz)</b>	<b>Model Number</b>	<b>Manufacturer</b>	<b>ID / SN</b>	<b>Last Cal Date</b>
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