TEST REPORT

FROM



FOR

Zebra Technologies Corp.

Thermal Card Printer

Model: P430i

то

47 CFR 15.225:2006 & RSS-210 Issue 6:2005

Test Report Serial No.: SL07041702-ZBR-022/P430i

This report supersedes None

Remarks:

Equipment complied with the specification [X] Equipment did not comply with the specification ΓÎ

This Test Report is Issued Under the Authority of:

Tested by: Kerwinn Corpuz, Test Engineer

Snell leing

Reviewed by: Snell Leong, Reviewer

Issue date: 30 April 2007 Manufacturer: Zebra Technologies Corp.





Registration No. 4842

Industry Canada Industrie Canada



Lab Code: KR0032





Registration No. 2195





Lab Code : U S D 1 6 D

BSMI Code: SL2-IN-E-1130R

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Executive Summary

The purpose of this test programme was to demonstrate compliance of the Zebra Technologies Corp., Thermal Card Printer, model P430i against the current 47 CFR 15.225:2006 & RSS-210 Issue 6:2005. The Thermal Card Printer demonstrated compliance with the 47 CFR 15.225:2006 & RSS-210 Issue 6:2005.

Zebra Technologies Corp. is the applicant and claimed manufacturer of this tested product. For the detailed description of this product, please refer to the Thermal Card Printer User Manual.

The equipment under test operating frequency is 13.56 MHz.

Note 1: This EUT has two radios installed, one is RFID and the other is Mifare. The two radios installed will not be operating at the same time when marketed.

Note 2: Radiated emissions above 30 MHz, both RFID and Mifare was transmitting at the same time just for testing purpose.

The test has demonstrated that this unit complies with stipulated standards.



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1 Technical Details

Purpose

Applicant / Client

Manufacturer

Test location(s)

Laboratory performing the tests

Compliance testing of Thermal Card Printer with 47 CFR 15.225:2006 & RSS-210 Issue 6:2005

> Zebra Technologies Corp. 333 Corporate Woods Parkway Vernon Hills, IL 60061 USA

> > Zebra Technologies Corp.

SIEMIC Labs 2206 Ringwood Avenue San Jose, CA 95131

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Test report reference number Date EUT received Standard applied Dates of test (from – to) No of Units: Equipment Category: Trade/Product Name: Type/Model Name/No: Technical Variants:

FCC ID No. IC ID No. SL07041702-ZBR-022/P430i 25 April 2007 47 CFR 15.225:2006 & RSS-210 Issue 6:2005 25 April 2007 to 30 April 2007 1 DXX P430i P430i N/A

> I28-P430I-MIFARE 3798A-P430IMIF



2 Tests Required

The product was tested in accordance with the following specifications. The test results recorded in this Test Report are exclusively referred to the tested sample(s).

Test Sta	ndard	Description	Pass / Fail
47 CFR Part 15.225: 2006	RSS 210 Issue 6: 2005		
15.203		Antenna Requirement	Pass
15.207(a)	RSSGen(7.2.2)	Conducted Emissions Voltage	Pass
15.225(a)	RSS210(A2.6)	Limit in the band of 13.553 – 13.567 MHz	Pass
15.225(b)	RSS210(A2.6)	Limit in the band of 13.410 – 13.553 MHz and 13.567 – 13.710 MHz	Pass
15.225(c)	RSS210(A2.6)	Limit in the band of 13.110 – 13.410 MHz and 13.710 – 14.010 MHz	Pass
15.225(d)	RSS210(A2.6)	Limit outside the band of 13.110 – 14.010 MHz	Pass
15.225(e)	RSS210(A2.6)	Frequency Stability	Pass
15.209	RSS210(A8.5)	Radiated Emission Limits	Pass
ANSI C63.4: 2003 / RSS-Ge	n Issue 1: 2005		

Notes: Deviations to above standards are outlined in specific test sections if applicable. Cable loss and external attenuation are compensated for in the measurement system when applicable.



3 Antenna Requirement

Requirement(s): 47 CFR §15.203

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

Antenna requirement must meet at least one of the following:

- a) Antenna must be permanently attached to the device.
- b) Antenna must use a unique type of connector to attach to the device.
- c) Device must be professionally installed. Installer shall be responsible for ensuring that the correct antenna is employed with the device.
- 1) The RFID antenna is attached permanently to the device which meets the requirement.
- 2) The Mifare antenna has a unique connector and the antenna is installed inside on the chassis.



4 <u>Measurements, Examinations and Derived Results</u>

4.1 General observations

Equipment serial number(s)								
EUT: Model number: Serial number:								
Thermal Card Printer	P430i	none						



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4.2 Test Results

4.2.1 Conducted Emissions Voltage

Requirement(s): 47 CFR §15.207 & RSS-Gen Issue 1(7.2.2)

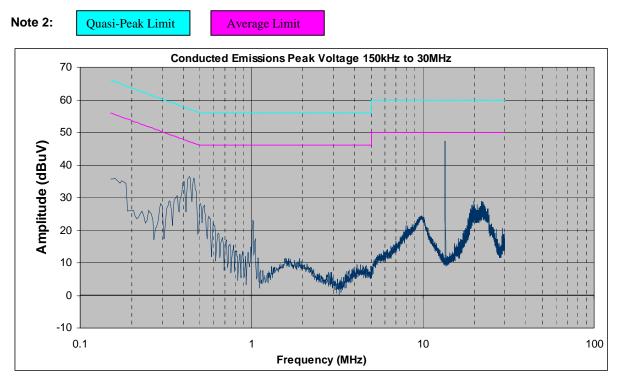
Procedures:

The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table. The power supply for the EUT was fed through a $50\Omega/50\mu$ H EUT LISN, connected to filtered mains. The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable. All other supporting equipment were powered separately from another mains.

The EUT was switched on and allowed to warm up to its normal operating condition. A scan was made on the NEUTRAL line over the required frequency range using an EMI test receiver. High peaks, relative to the limit line, were then selected. The EMI test receiver was then tuned to the selected frequencies and the necessary measurements made with a receiver bandwidth setting of 10kHz. Quasi-peak and Average measurements were made. The procedure was then repeated for the PHASE line.

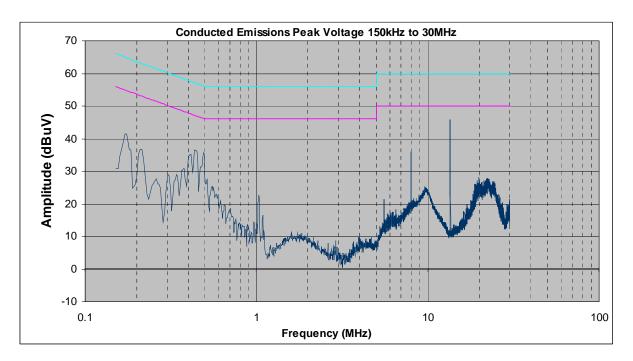
Results:

Note 1: Preliminary tests made with RFID then Mifare and reported the worse case. Below result is Mifare radio.



Neutral Line Plot at 120Vac, 60Hz





Phase Line Plot at 120Vac, 60Hz

LINE	FREQ (MHz)	Corrected Amplitude (dBµV) PK	Limit (dBµV) QP	Margin (dB) QP	Corrected Amplitude (dBµV) PK	Limit (dBµV) AVG	Margin (dB) AVG
Neutral	0.435	36.5	57.16	-20.66	36.5	47.16	-10.66
Neutral	13.56	47.4	60	-13	47.4	50	-3
Neutral	22.77	27.8	60	-32.2	27.8	50	-22.2
Phase	0.44	36.6	57.06	-20.46	36.3	47.06	-10.46
Phase	7.895	20.3	60	-39.7	20.3	50	-29.7
Phase	13.56	30.9	60	-29.1	30.9	50	-19.1

Conducted Emission Table

Note: PK = *peak; QP* = *quasi-peak; AVG* = *average detector.*

Tested By: Kerwinn Corpuz

Date Tested: 25 April 2007



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4.2.2 Radiated Emissions within the Band of 13.110 – 14.010 MHz

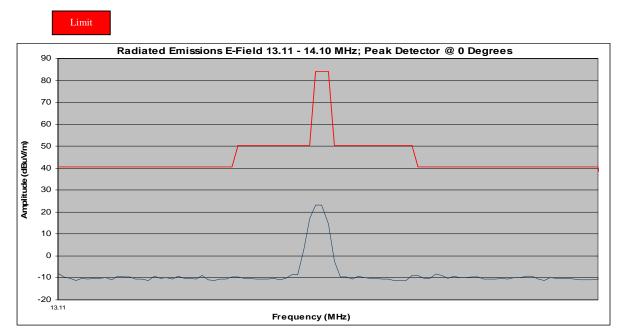
Requirement(s): 47 CFR §15.225(a) - (c) & RSS-210 (A2.6)

Procedures: Radiated emissions were measured according to ANSI C63.4. The EUT was set to transmit at the highest output power. The EUT was set 3 meter away from the measuring antenna. The loop antenna was positioned 1 meter above the ground from the center of the loop. The measuring bandwidth was set to 10 kHz.

The limit is converted from microvolts/meter to decibel microvolts/meter.

Sample Calculation: Corrected Amplitude = Raw Amplitude($dB\mu V/m$) + ACF(dB) + Cable Loss(dB) – Distance Correction Factor





Radiated Emissions Plot

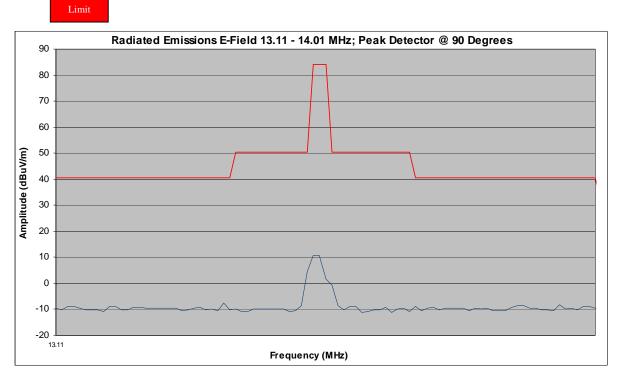
Frequency	Raw Amplitude @ 3m	Antenna Factor	Cable Loss	Distance Correction Factor	Corrected Amplitude @ 3m	Limit @ 30m	Margin
(MHz)	$(dB\mu V/m)$	(dB)	(dB)	(dB)	(dBµV/m)	$(dB\mu V/m)$	(dBµV/m)
13.56	27.2	35.62	0.28	40	23.1	84	-60.9

Radiated Emissions Table



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Results: Loop Antenna Positioned at 90 degrees with Mifare activated.



Radiated Emissions Plot

Frequency	Raw Amplitude @ 3m	Antenna Factor	Cable Loss	Distance Correction Factor	Corrected Amplitude @ 3m	Limit @ 30m	Margin
(MHz)	$(dB\mu V/m)$	(dB)	(dB)	(dB)	(dBµV/m)	$(dB\mu V/m)$	(dBµV/m)
13.56	14.9	35.62	0.28	40	10.8	84	-73.2

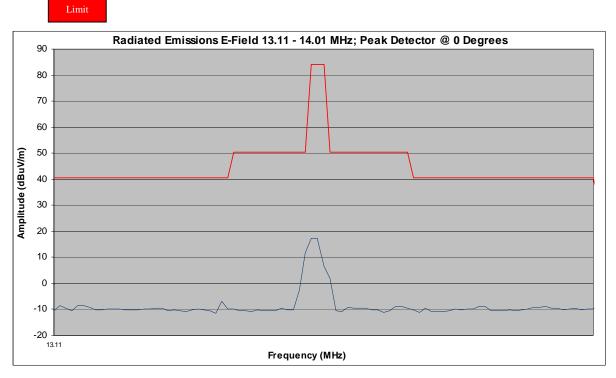


Zebra Technologies Corp. FCCID: I28-P430I-MIFARE 47 CFR 15.225:2006 & RSS-210 Issue 6:2005 Serial# Issue Date Page

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Results:

Loop Antenna Positioned at 0 degrees with RFID activated.



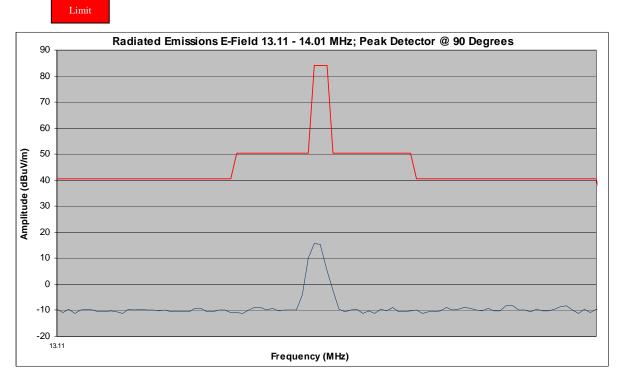
Radiated Emissions Plot

Frequency	Raw Amplitude @ 3m	Antenna Factor	Cable Loss	Distance Correction Factor	Corrected Amplitude @ 3m	Limit @ 30m	Margin
(MHz)	$(dB\mu V/m)$	(dB)	(dB)	(dB)	(dBµV/m)	$(dB\mu V/m)$	(dBµV/m)
13.56	21.4	35.62	0.28	40	17.3	84	-66.7



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Results: Loop Antenna Positioned at 90 degrees with RFID activated.



Radiated Emissions Plot

Frequency	Raw Amplitude @ 3m	Antenna Factor	Cable Loss	Distance Correction Factor	Corrected Amplitude @ 3m	Limit @ 30m	Margin
(MHz)	$(dB\mu V/m)$	(dB)	(dB)	(dB)	(dBµV/m)	$(dB\mu V/m)$	(dBµV/m)
13.56	19.7	35.62	0.28	40	15.6	84	-68.4

Radiated Emissions Table

Tested By: Kerwinn Corpuz

Date Tested: 26 April 2007



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4.2.3 Radiated Emissions < 30 MHz (outside 13.110 – 14.010 MHz)

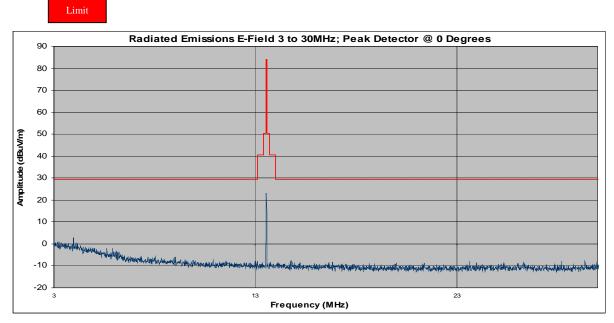
Requirement(s): 47 CFR §15.209; 47 CFR §15.225(d) & RSS-210 (A2.6)

Procedures: Radiated emissions were measured according to ANSI C63.4. The EUT was set to transmit at the highest output power. The EUT was set 3 meter away from the measuring antenna. The loop antenna was positioned 1 meter above the ground from the center of the loop. The measuring bandwidth was set to 10 kHz.

The limit is converted from microvolts/meter to decibel microvolts/meter.

Sample Calculation: Corrected Amplitude = Raw Amplitude($dB\mu V/m$) + ACF(dB) + Cable Loss(dB) – Distance Correction Factor

Results: Loop Antenna Positioned at 0 degrees with Mifare activated.



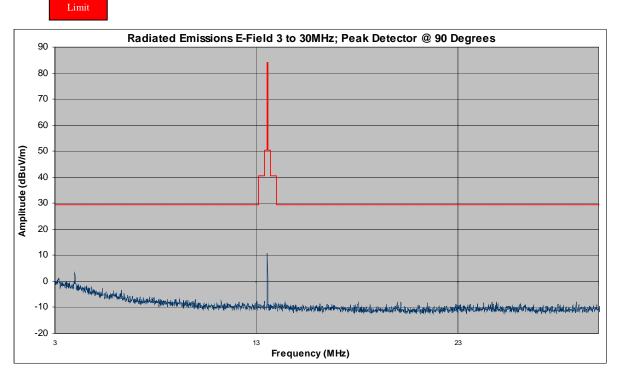
Radiated Emissions Plot

Frequency	Raw Amplitude @ 3m	Antenna Factor	Cable Loss	Distance Correction Factor	Corrected Amplitude @ 3m	Limit @ 30m	Margin
(MHz)	$(dB\mu V/m)$	(dB)	(dB)	(dB)	(dBµV/m)	$(dB\mu V/m)$	(dBµV/m)
3.97	-1.6	44.33	0.24	40	2.97	29.54	-26.57



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Results: Loop Antenna Positioned at 90 degrees with Mifare activated.



Radiated Emissions Plot

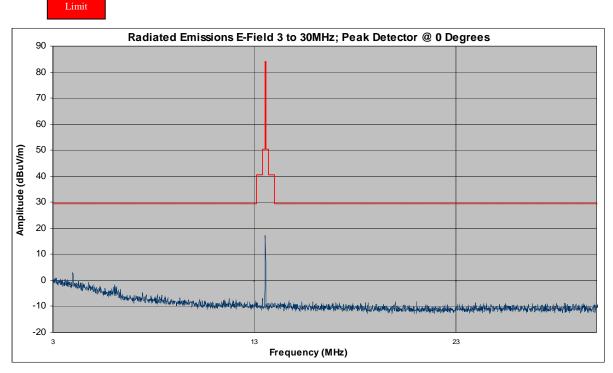
Frequency	Raw Amplitude @ 3m	Antenna Factor	Cable Loss	Distance Correction Factor	Corrected Amplitude @ 3m	Limit @ 30m	Margin
(MHz)	$(dB\mu V/m)$	(dB)	(dB)	(dB)	(dBµV/m)	$(dB\mu V/m)$	(dBµV/m)
3.99	-1.3	44.29	0.24	40	3.23	29.54	-26.31



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Results:

Loop Antenna Positioned at 0 degrees with RFID activated.



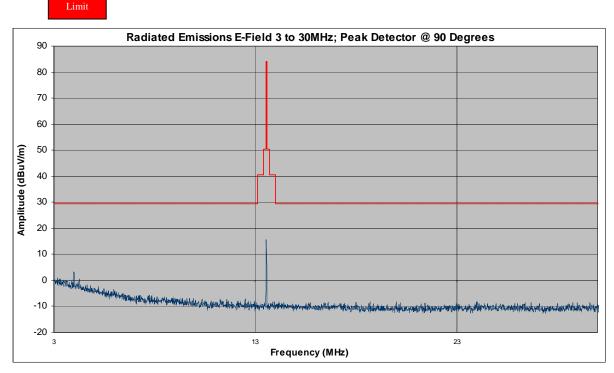
Radiated Emissions Plot

Frequency	Raw Amplitude @ 3m	Antenna Factor	Cable Loss	Distance Correction Factor	Corrected Amplitude @ 3m	Limit @ 30m	Margin
(MHz)	$(dB\mu V/m)$	(dB)	(dB)	(dB)	(dBµV/m)	$(dB\mu V/m)$	(dBµV/m)
3.99	-1.3	44.29	0.24	40	3.03	29.54	-26.51



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Results: Loop Antenna Positioned at 90 degrees with RFID activated.



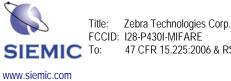
Radiated Emissions Plot

Frequency	Raw Amplitude @ 3m	Antenna Factor	Cable Loss	Distance Correction Factor	Corrected Amplitude @ 3m	Limit @ 30m	Margin
(MHz)	$(dB\mu V/m)$	(dB)	(dB)	(dB)	(dBµV/m)	$(dB\mu V/m)$	(dBµV/m)
3.99	-1	44.29	0.24	40	3.53	29.54	-26.01

Radiated Emissions Table

Tested By: Kerwinn Corpuz

Date Tested: 26 April 2007



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4.2.4 Radiated Emissions > 30 MHz

Requirement(s): 47 CFR §15.209; 47 CFR §15.225(d) & RSS-210 (A2.6)

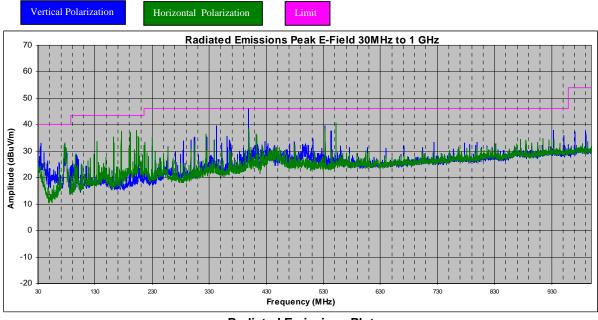
Radiated emissions were measured according to ANSI C63.4. The EUT was set to transmit Procedures: at the highest output power.

The limit is converted from microvolts/meter to decibel microvolts/meter.

Sample Calculation: Corrected Amplitude = Raw Amplitude(dBµV/m) + ACF(dB) + Cable Loss(dB)

Results:

Note: Both RFID and Mifare are transmitting at the same time for testing purpose only.



Radiated Emissions Plot



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Frequency	Azimuth	Detector	Antenna Polarization	Antenna Height	Raw Amplitude @ 3m	Antenna Factor	Cable Loss	Corrected Amplitude @ 3m	Limit @ 3m	Margin
(MHz)	(degrees)	(qp/pk)	(H/V)	(m)	$(dB\mu V/m)$	(dB)	(dB)	$(dB\mu V/m)$	$(dB\mu V/m)$	$(dB\mu V/m)$
400	350	QP	V	1.2	25.30	14.2	0.96	40.46	46	-5.54
551.96	0	РК	V	1.2	20.5	18.24	1.85	40.59	46	-5.41
551.96	352	РК	Н	1.67	20.3	18.58	1.85	40.73	46	-5.27
202.95	355	РК	Н	2	24.2	12.72	1.01	37.93	43.5	-5.57
175.99	348	РК	Н	2	25.1	11.56	0.98	37.64	43.5	-5.86
342.92	0	РК	V	1	23.5	14.43	1.56	39.49	46	-6.51

Radiated Emissions Table

Tested By: Kerwinn Corpuz

Date Tested: 26 April 2007



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4.2.5 Frequency Stability

Requirement(s): 47 CFR §15.225(e) & RSS-210 (A2.6)

Procedures: Frequency Stability was measured according to 47 CFR §2.1055. Measurement was taken with spectrum analyzer. The spectrum analyzer bandwidth and span was set to read in hertz. A voltmeter was used to monitor when varying the voltage.

Limit: ±0.01% of 13.56 MHz = 1356 Hz

Results: Mifare is activated

Frequency versus Temperature

Temperature	Measured Freq.	Freq. Drift	Freq. Drift
(Celsius)	(MHz)	(Hz)	(%)
50	13.559741	-142	-0.00105
40	13.559756	-127	-0.00094
30	13.559782	-101	-0.00074
20	F	Reference	
10	13.559792	-91	-0.00067
0	13.559792	-91	-0.00067
-10	13.559842	-41	-0.00030
-20	13.559850	-33	-0.00024
-30	13.559858	-25	-0.00018

Reference Frequency: measured 13.559883 MHz at 20°C

Frequency versus Voltage

Reference Frequency: measured 13.559883 MHz at 20°C with 120 Vac / 60 Hz

Measured Voltage ±15% of nominal (AC)	Measured Freq. (MHz)	Freq. Drift (Hz)	Freq. Drift (%)
138	13.559875	-8	-0.00006
102	13.559883	0	0.00000



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Results: RFID is activated

Frequency versus Temperature

Temperature	Measured Freq.	Freq. Drift	Freq. Drift
(Celsius)	(MHz)	(Hz)	(%)
50	13.558975	-108	-0.00080
40	13.559008	-75	-0.00055
30	13.559025	-58	-0.00043
20	I	Reference	
10	13.559025	-58	-0.00043
0	13.559017	-66	-0.00049
-10	13.559217	134	0.00099
-20	13.559325	242	0.00178
-30	13.559217	134	0.00099

Reference Frequency: measured 13.559083 MHz at 20°C

Frequency versus Voltage

Reference Frequency: measured 13.559083 MHz at 20°C with 120 Vac / 60 Hz

Measured Voltage ±15% of nominal (AC)	Measured Freq. (MHz)	Freq. Drift (Hz)	Freq. Drift (%)
138	13.559083	0	0.00000
102	13.559083	0	0.00000

Tested By: Kerwinn Corpuz

Date Tested: 30 April 2007



47 CFR 15.225:2006 & RSS-210 Issue 6:2005

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5 **TEST INSTRUMENTATION**

5.1 TEST INSTRUMENTATION

Instrument	Manufacturer	Model	CAL Due Date
Spectrum Analyzer	HP	8568B	04/26/2008
Quasi-Peak Adapter	HP	85650A	04/26/2008
RF Pre-Selector	HP	85685A	04/26/2008
Spectrum Analyzer	HP	8564E	05/01/2008
EMI Receiver	Rohde&Schwarz	ESIB 40	02/07/2008
Biconlog Antenna	Sunol Sciences, Inc.	JB1	09/11/2008
Loop Antenna	ETS-Lingren	6512	05/13/2008
Near Field Probe	Chase	MFP9150	See Note
Chamber	Lingren	3m	08/21/2008
DMM	Fluke	73111	07/04/2008
Variac	KRM	AEEC-2090	See Note
Environment Chamber	TestEquity	1007H	01/24/2009
DMM	Fluke	73111	05/01/2008

Note: Functional Verification



APPENDIX A: EUT TEST CONDITIONS

The following is the description of supporting equipment and details of cables used with the EUT.

Equipment Description (Including Brand Name)	Cable Description
Card Printer	1. DC power

EUT Description	:	Card Printer
Model No	:	P430i
Serial No	:	none

The following is the description of how the EUT is exercised during testing.

Test	Description Of Operation		
	The EUT was set to enter test mode automatically when powered.		



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APPENDIX B: EXTERNAL PHOTOS



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APPENDIX C: CIRCUIT/BLOCK DIAGRAMS



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APPENDIX D: INTERNAL PHOTOS



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APPENDIX E: PRODUCT DESCRIPTION

Detail description of this product is shown in the User's Guide.



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APPENDIX F: FCC LABEL LOCATION



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APPENDIX G: USER MANUAL



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END OF REPORT