



TEST REPORT

Report Number: 3187290MIN-002

Project Number: 3181459

Testing performed on the
Ribbon RFID

FCC ID: JZ2X001800

Industry Canada ID: 6019A-X001800

to

47 CFR Part 15. 225:2008

RSS- 210, Issue 7, 2007

For

Fargo Electronics Inc.

Test Performed by:
Intertek Testing Services NA, Inc.
7250 Hudson Blvd., Suite 100
Oakdale, MN 55128

Test Authorized by:
Fargo Electronics, Inc.
6533 Flying Cloud Drive, Suite 100
Eden Prairie, MN 55344

Prepared by: Uri Spector
Uri Spector

Date: August 21, 2009

Reviewed by: Simon Khazon
Simon Khazon

Date: August 21, 2009

This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to copy or distribute this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program. This report must not be used to claim product endorsement by A2LA, NIST nor any other agency of the U.S. Government.



TABLE OF CONTENTS

1.0 GENERAL DESCRIPTION.....3

1.1 Product Description; Test Facility 4

1.3 Environmental conditions..... 5

1.4 Measurement uncertainty 6

1.5 Field Strength Calculation..... 6

2.0 TEST SUMMARY..... 7

3.0 TEST CONDITIONS AND RESULTS..... 8

3.1 Field strength within the band of operation..... 8

3.2 Field strength outside of the band of operation 11

3.3 Frequency Tolerance 15

3.4 Bandwidth of Emissions..... 16

3.5 Transmitter power line conducted emissions 19

4.0 TEST EQUIPMENT.....22

1.0 GENERAL DESCRIPTION

Model:	Ribbon RFID
Type of EUT:	Printer with RFID
Serial Number:	N/A
FCC ID:	JZ2X001800
Industry Canada ID:	6019A-X001800
Related Submittal(s) Grants:	None
Company:	Fargo Electronics Inc.
Customer:	Mr. Leon Gershenovich
Address:	6533 Flying Cloud Drive, Suite 100 Eden Prairie, MN 55344
Phone:	(952) 918-8622
Fax:	(952) 826-7949
Test Standards:	☒ 47 CFR, Part 15:2008, §15.225 ☒ RSS-210, Issue 7, 2007 ☒ RSS-Gen, Issue 2, 2007 ☐ 47 CFR, Part 15:2008, §15.107 and §15.109, Class ☐ Other
Type of radio:	☐ Stand -alone ☒ Module ☐ Hybrid
Date Sample Submitted:	August 18, 2009
Test Work Started:	August 18, 2009
Test Work Completed:	August 21, 2009
Test Sample Conditions:	☐ Damaged ☐ Poor (Usable) ☒ Good



1.1 Product Description; Test Facility

Product Description:	RFID Transmitter
Operating Frequency	13.56MHz
Modulation:	ASK
Emission Designator:	10K0A1D
Antenna(s) Info:	PCB Antenna with 4 wires
Antenna Installation:	☐ User ☐ Professional ☒ Factory
Transmitter Power Configuration:	☐ Internal battery ☐ External power source ☒ 100-240VAC ☐ 230VAC ☐ 400VAC ☐ [REDACTED] VDC ☐ Other: [REDACTED] [REDACTED] Amp. ☒ 50-60Hz
Special Test Arrangement:	The transmitter was tested as a part of the printer/host unit as a worst case, Conducted Emissions testing was performed at the printer AC port. Fargo Electronics HostControl Lite Test software was used to run transmitter continuously.
Test Facility Accreditation:	A2LA (Certificate No. 1427.01)
Test Methodology:	Measurements performed according to the procedures in ANSI C63.4-2003

1.2 EUT Configuration

The equipment under test was operated during the measurement under the following conditions:

- ☐ - Standby
- ☒ - Continuous
- ☐ - Test program (customer specific)
- ☐ -

Operating modes of the EUT:

No.	Description
1	The EUT was operated using Fargo Electronics HostControl Lite Test software
2	

Cables:

No.	Type	Length	Designation	Note
1	USB cable	1'	USB connection to the Remote PC	
2				

Support equipment/Services:

No.	Item	Description
1	Laptop PC model Dell Latitude D610	Remote PC
2		

1.3 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

☒ Normal

Temperature: 15-35°C

Humidity: 30-60%

Atmospheric pressure: 86-106kPa

☒ Extreme

Temperature: -20 to +50°C

Primary Supply Voltage: + 15%

1.4 Measurement uncertainty

The expanded uncertainty ($k = 2$) for radiated emissions from 30 to 1000 MHz has been determined to be: ± 4 dB at 10m and ± 5.4 dB at 3m

The expanded uncertainty ($k = 2$) for conducted emissions from 150 kHz to 30 MHz has been determined to be:
 ± 2.6 dB

1.5 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured emissions reading on the EMI Receiver.

The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF - AG$$

Where: FS = Field Strength in dB(μ V/m)

RA = Receiver Amplitude in dB(μ V)

CF = Cable Attenuation Factor in dB

AF = Antenna Factor in dB(m^{-1})

AG = Amplifier Gain in dB

Assume a receiver reading of 48.1 dB(μ V) is obtained. The antenna factor of 7.4 dB(m^{-1}) and cable factor of 1.6 dB is added and amplifier gain of 16.0 dB is subtracted giving field strength of 41.1 dB(μ V/m).

$$RA = 48.1 \text{ dB}(\mu\text{V})$$

$$AF = 7.4 \text{ dB}(m^{-1})$$

$$CF = 1.6 \text{ dB}$$

$$AG = 16.0 \text{ dB}$$

$$FS = RA + AF + CF - AG$$

$$FS = 48.1 + 7.4 + 1.6 - 16.0$$

$$FS = 41.1 \text{ dB}(\mu\text{V}/\text{m})$$

General notes: None



2.0 TEST SUMMARY

Referring to the performance criteria and the operating mode during the tests specified in this report, the equipment complies with the requirements according to the following standards.

TEST SPECIFICATION	TEST PARAMETERS	RESULT
15.225(a)(b)(c) / RSS-210 A2.6(a)(b)(c)	Field strength within the band of operation	Pass
15.225(d) / RSS-210 A2.6(d)	Out of band emissions	Pass
15.215(c) / RSS- Gen 4.6.1	Bandwidth of the emission	Pass
15.225(e) / RSS-210 A2.6	Frequency tolerance	Pass
15.207/RSS-Gen 7.2.2	Transmitter Power Line conducted emissions	Pass



3.0 TEST CONDITIONS AND RESULTS

3.1 Field strength within the band of operation

Test location: ☒ OATS ☐ Anechoic Chamber ☐ Other

Test distance: ☒ 10 meters ☐ 3 meters

Test result: **Pass**

Max. Emissions margin: 19.9dB below the limits

Notes: None



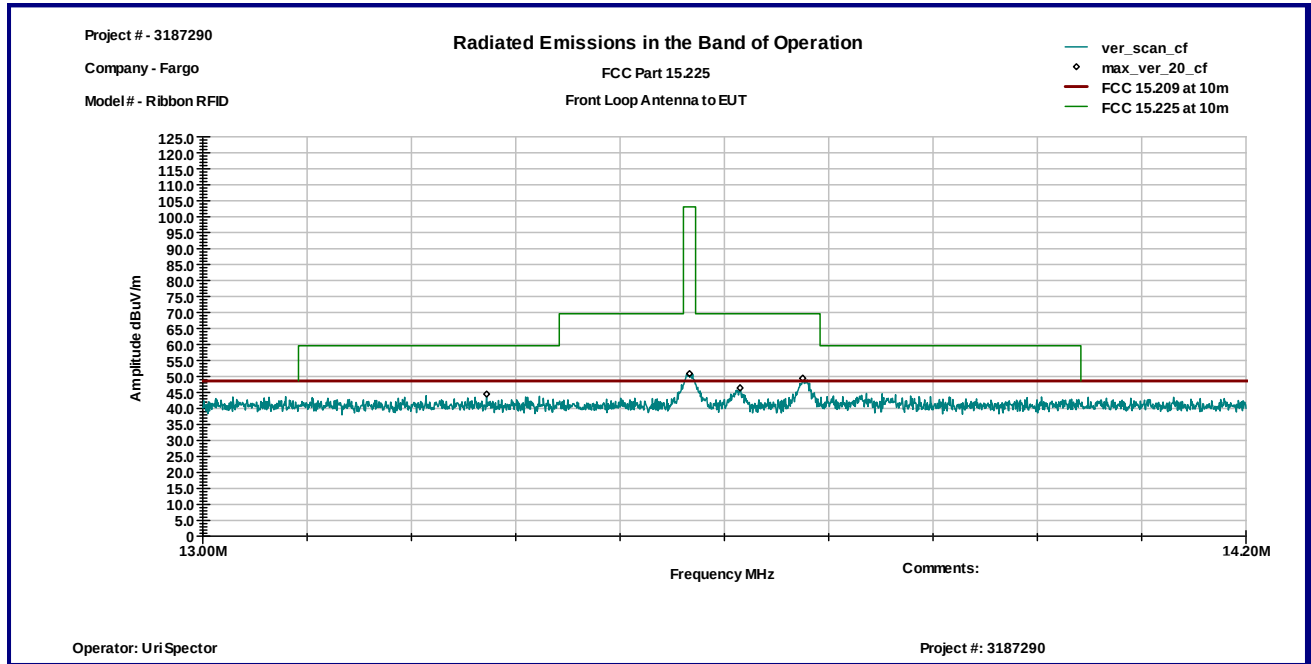
Date:	August 19, 2009	Result: Pass
Standard:	FCC 15.225(a)(b)(c) / RSS-210 A2.6(a)(b)(c)	
Tested by:	Uri Spector	
Test Point:	Enclosure with antenna	
Operation mode:	See Page 5	
Note:		

Table 3.1.1

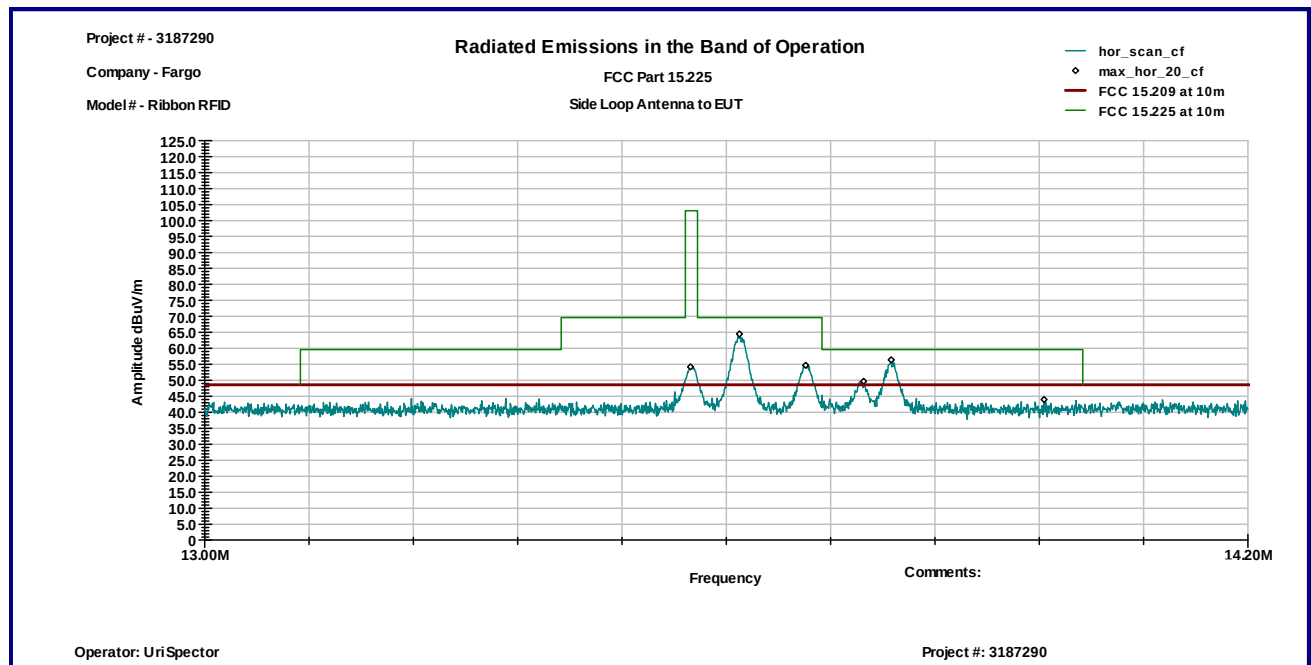
Frequency	Ant. Orientation	Peak Reading dBμV	Ant.Factor dB1/m	Total at 10m dBμV/m	QP Limit dBμV/m	Margin dB
13.110 MHz	Front	3.5	34.4	37.9	59.6	-21.7
13.560 MHz	Front	17.8	34.5	52.3	103.1	-50.8
13.703 MHz	Front	2.3	34.5	36.8	69.6	-32.8
13.875 MHz	Front	4.8	34.5	39.3	59.6	-20.3
13.110 MHz	Side	5.2	34.5	39.7	59.6	-19.9
13.560 MHz	Side	18.5	34.5	53.0	103.1	-50.1
13.703 MHz	Side	6.0	34.5	40.5	69.6	-29.1
13.875 MHz	Side	3.2	34.5	37.7	59.6	-21.9

Graph 3.1.1

Front antenna orientation



Side antenna orientation





3.2 Field strength outside of the band of operation

Test location: ☒ OATS ☒ Anechoic Chamber ☐ Other

Test distance: ☒ 10 meters ☒ 3 meters

Frequency range of measurements: 0.15MHz-1000MHz

Test result: **Pass**

Max. margin of spurious emissions: 1.8dB below the limits

Notes: The Emissions pre-test in frequency range from 150kHz to 30MHz was performed in the Anechoic chamber at 3m measurement distance (see Graphs 3.2.1); final measurements were performed in the Open Area Test Site at 10m measurement distance: no emissions above the ambient were detected.
The Emissions test in frequency range from 30MHz to 1GHz was performed in the Anechoic chamber at 3m measurement distance (see Table 3.2.1 and Graphs 3.2.2).

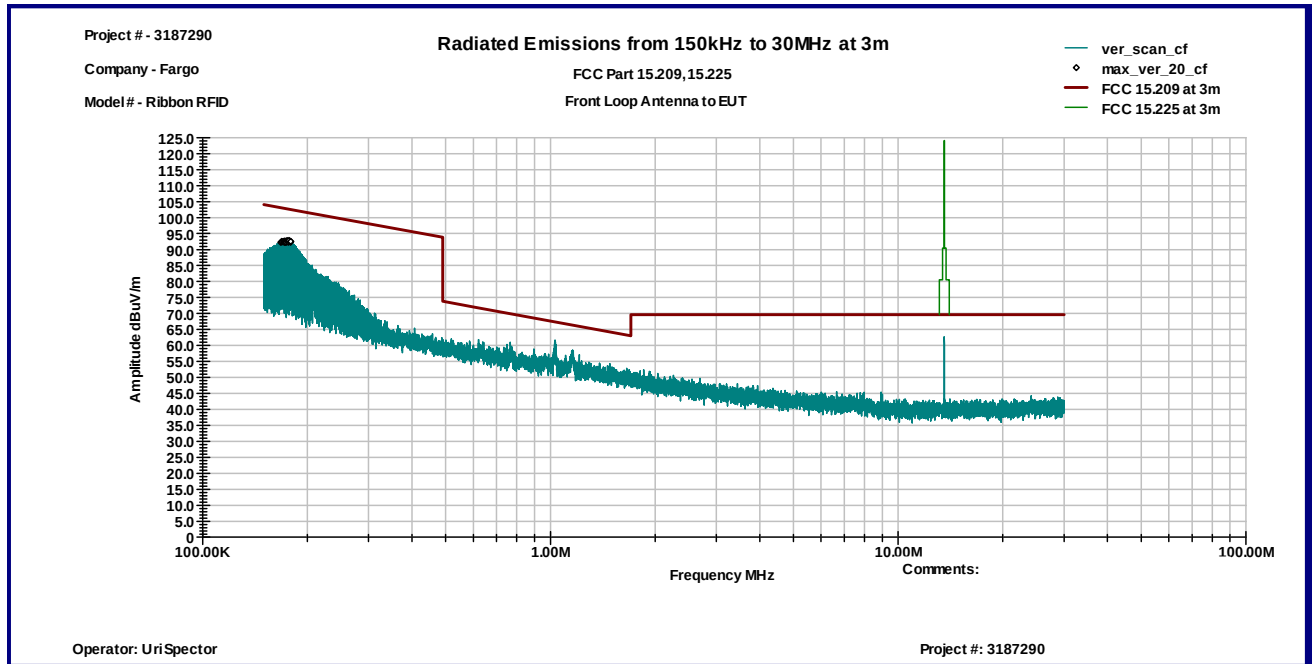
Date:	August 18-19, 2009	Result: Pass
Standard:	FCC 15.225(d) / RSS-210 A2.6(d)	
Tested by:	Uri Spector	
Test Point:	Enclosure with antenna	
Operation mode:	See Page 5	
Note:	Frequency range 30-1000MHz	

Table 3.2.1

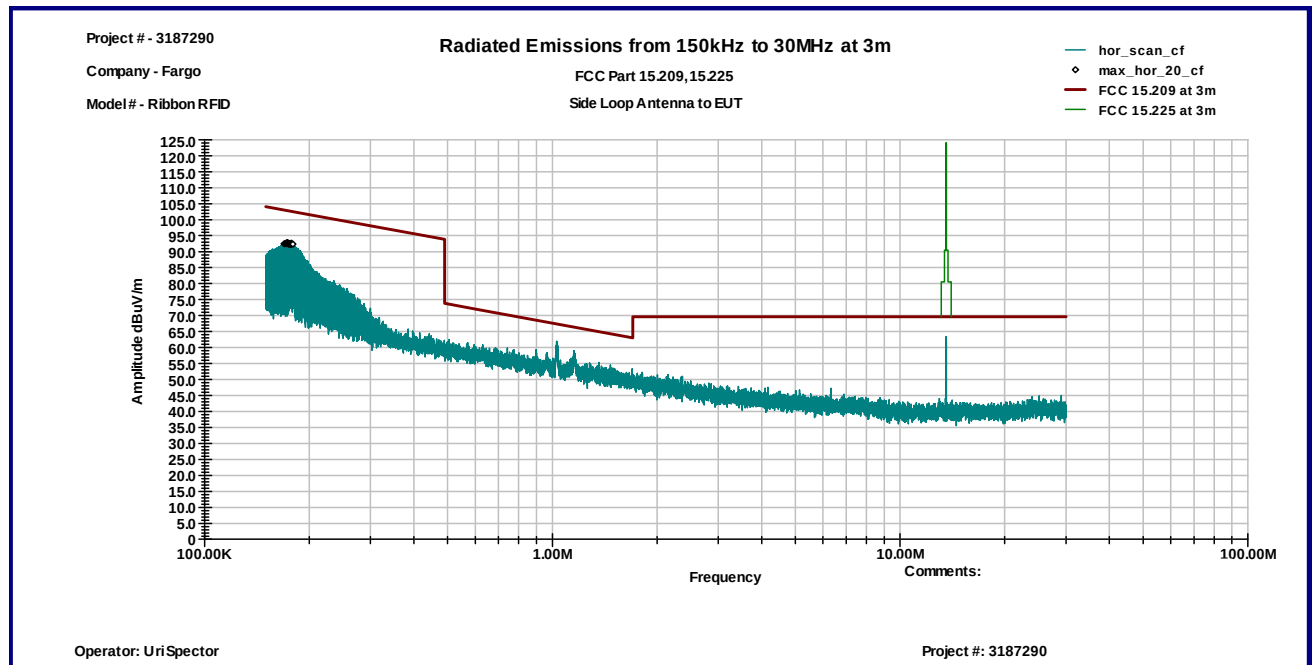
Frequency	Ant. Orientation	Peak Reading dBμV	Ant.Factor dB1/m	Total at 3m dBμV/m	QP Limit dBμV/m	Margin dB
40.704 MHz	V	20.6	15.0	35.7	40.0	-4.3
121.95 MHz	V	23.4	13.9	37.3	43.5	-6.2
135.64 MHz	V	23.8	13.8	37.5	43.5	-6.0
149.19 MHz	V	24.2	12.9	37.1	43.5	-6.4
206.78 MHz	V	21.6	12.5	34.1	43.5	-9.5
213.2 MHz	V	22.4	12.4	34.8	43.5	-8.8
244.2 MHz	V	20.8	14.3	35.2	46.0	-10.9
297.34 MHz	V	21.7	15.9	37.6	46.0	-8.4
336.15 MHz	V	25.8	17.0	42.8	46.0	-3.2
381.07 MHz	V	18.4	18.5	36.9	46.0	-9.2
420.02 MHz	V	16.5	19.9	36.4	46.0	-9.6
528.86 MHz	V	17.4	21.2	38.6	46.0	-7.4
587.82 MHz	V	18.1	22.2	40.3	46.0	-5.8
924.1 MHz	V	15.2	25.6	40.8	46.0	-5.2
203.24 MHz	H	24.8	12.3	37.1	43.5	-6.4
251.95 MHz	H	26.1	15.0	41.1	46.0	-4.9
297.34 MHz	H	25.2	15.9	41.2	46.0	-4.9
336.15 MHz	H	23.6	17.0	40.7	46.0	-5.3
374.75 MHz	H	21.6	18.3	39.9	46.0	-6.1
381.07 MHz	H	21.9	18.5	40.3	46.0	-5.7
587.82 MHz	H	16.9	22.2	39.1	46.0	-7.0
626.75 MHz	H	18.5	22.5	41.1	46.0	-5.0
664.57 MHz	H	17.7	22.9	40.6	46.0	-5.4
691.83 MHz	H	17.8	23.2	41.0	46.0	-5.0
704.62 MHz	H	17.6	23.3	40.9	46.0	-5.1
710.74 MHz	H	20.8	23.4	44.2	46.0	-1.8
717.41 MHz	H	20.2	23.5	43.6	46.0	-2.4
719.08 MHz	H	19.4	23.5	42.9	46.0	-3.2
724.09 MHz	H	17.7	23.5	41.2	46.0	-4.8
924.1 MHz	H	16.3	25.6	41.9	46.0	-4.2

Graph 3.2.1

Front antenna orientation

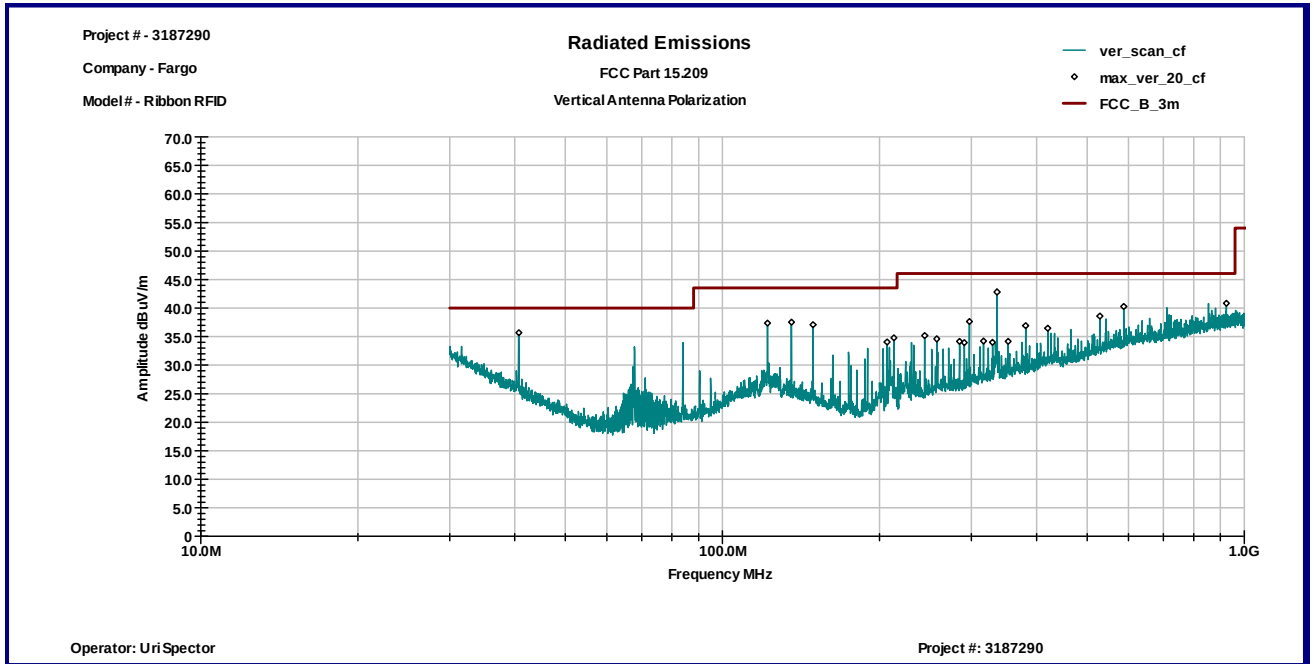


Side antenna orientation

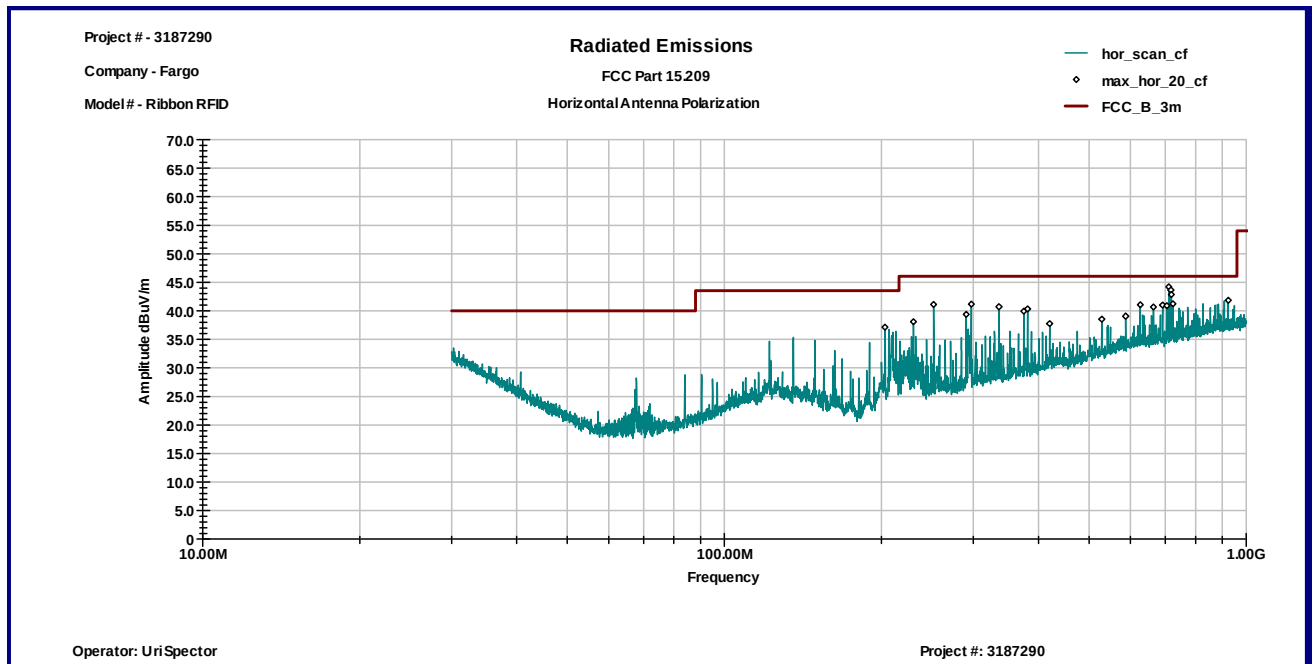


Graph 3.2.2

Vertical antenna polarization



Horizontal antenna polarization





3.3 Frequency Tolerance

Test location: ☐ OATS ☐ Anechoic Chamber ☐ Other

Test date: August 21, 2009

Tested by: Uri Spector

Test result: Pass

Test Parameter		Measured Deviation (Hz)	Maximum Allowed Deviation (Hz)	Test Results
Temperature °C	Voltage V			
-20	120	108	1356	Pass
-10		89.8	1356	Pass
0		70.6	1356	Pass
10		57.8	1356	Pass
20		0	1356	Pass
35		32.6	1356	Pass
55		63	1356	Pass
20	102	0	1356	Pass
	108	0	1356	Pass
	114	0	1356	Pass
	120	0	1356	Pass
	126	0	1356	Pass
	132	0	1356	Pass
	138	0	1356	Pass

Notes: None



3.4 Bandwidth of Emissions

Test location: ☐ OATS ☐ Anechoic Chamber ☐ Other

Test distance: ☐ 10 meters ☐ 3 meters

Test result: Pass

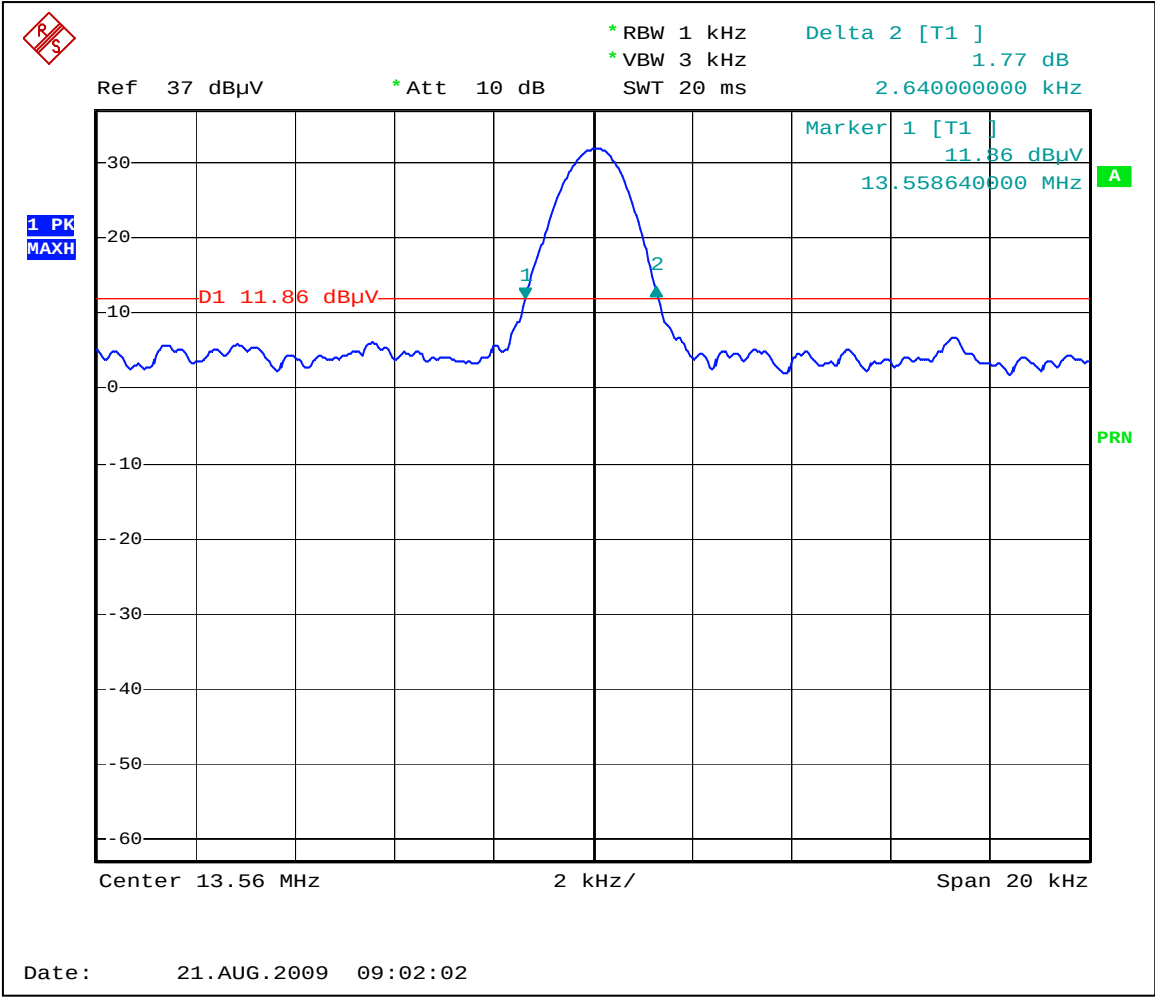
Center Frequency of operation MHz	Measured 20dB bandwidth kHz	Measured 99% bandwidth kHz
13.56	2.64	12.00

Graphs 3-4-1 and 3-4-2 are show bandwidth of emissions

Notes: The bandwidth of emissions is contained within the frequency band of operation

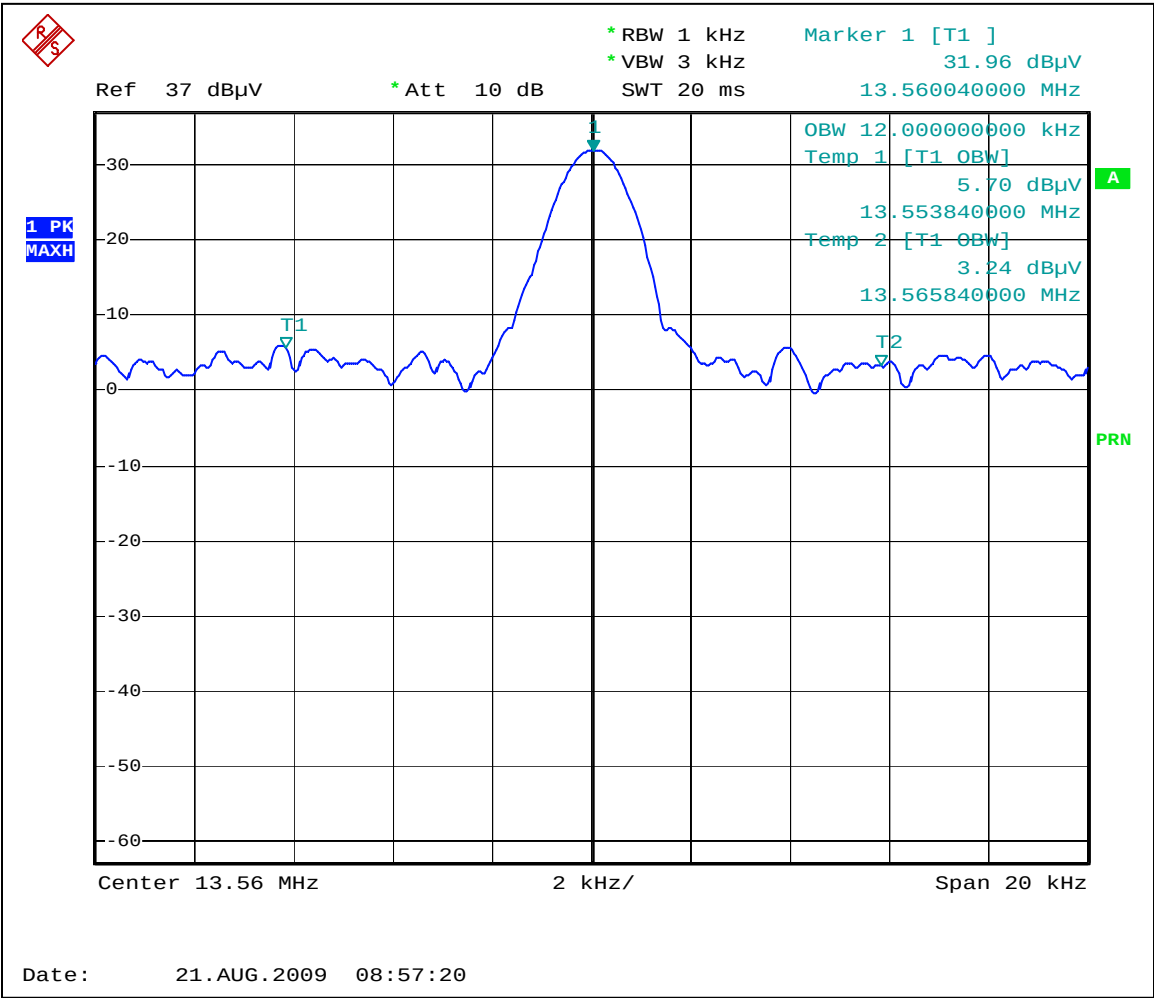


Graph 3.4.1





Graph 3.4.2





3.5 Transmitter power line conducted emissions

Test location: ☐ OATS ☒ Anechoic Chamber ☐ Other

Test result: **Pass**

Frequency range: 0.15MHz-30MHz

Max. Emissions margin: 4.6dB below the limits

Notes: None

Date:	August 20, 2009	Result: Pass
Standard:	FCC Part 15.207	
Tested by:	Uri Spector	
Test Point:	AC Port of the Printer	
Operation mode:	See Page 5	
Note:		

Table 3.5.1

Line 1

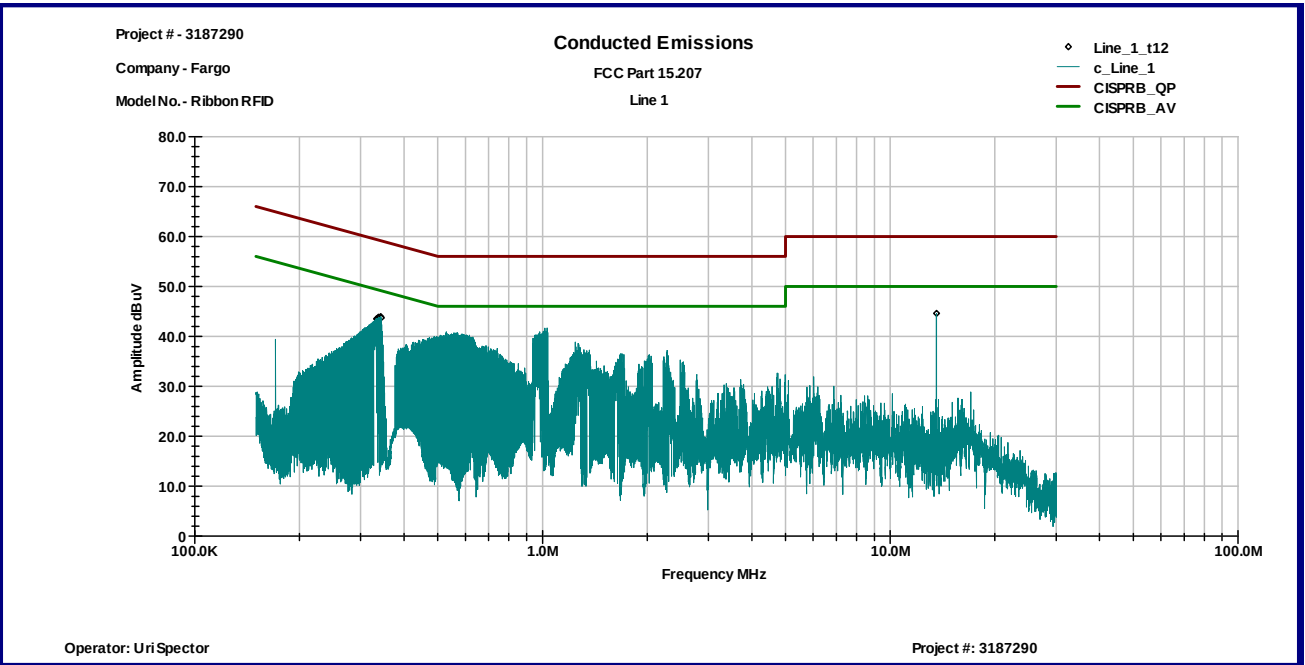
Frequency	Peak dBμV	QP Limit dBμV	AVG Limit dBμV	QP Margin dB	AVG Margin dB
333.54 KHz	43.5	59.4	49.4	-15.9	-5.9
338.81 KHz	43.8	59.2	49.2	-15.4	-5.4
339.74 KHz	43.8	59.2	49.2	-15.4	-5.4
341.14 KHz	43.8	59.2	49.2	-15.4	-5.4
342.38 KHz	44.0	59.2	49.2	-15.2	-5.2
343.62 KHz	43.7	59.1	49.1	-15.4	-5.4
13.562 MHz	44.6	60.0	50.0	-15.4	-5.4

Line 2

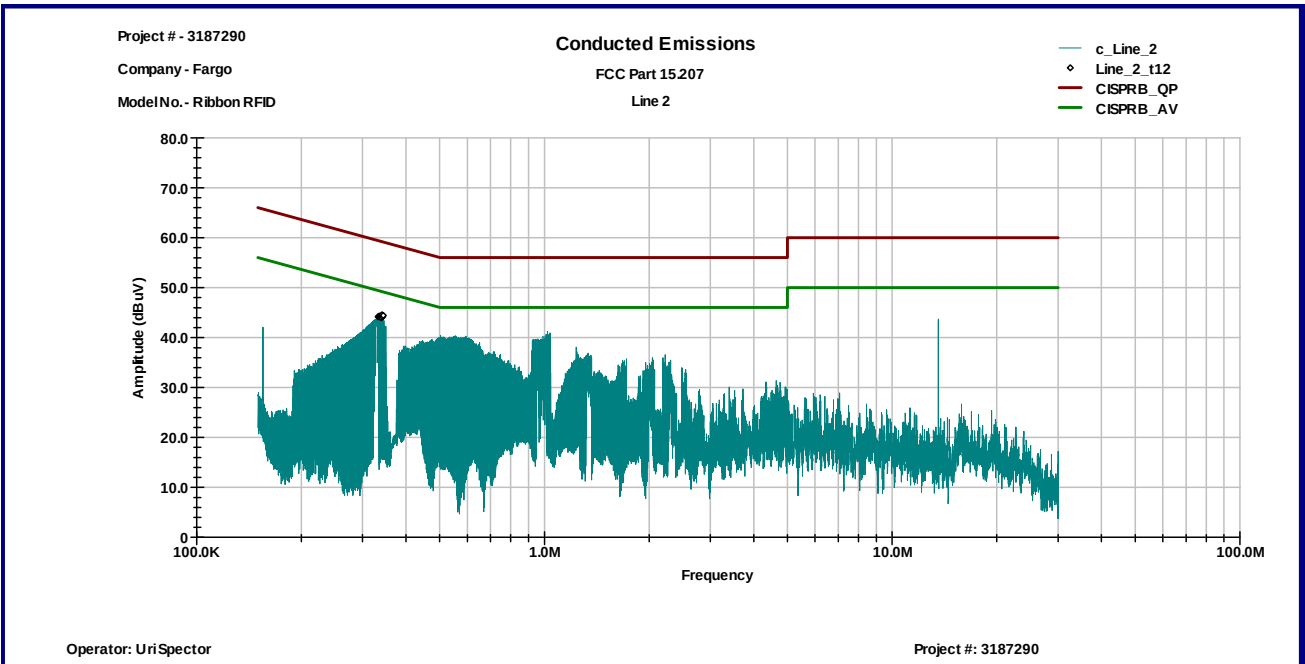
Frequency	Peak dBμV	QP Limit dBmV	AVG Limit dBmV	QP Margin dB	AVG Margin dB
333.85 KHz	44.2	59.4	49.4	-15.1	-5.1
338.19 KHz	44.3	59.3	49.3	-15.0	-5.0
339.43 KHz	44.0	59.2	49.2	-15.2	-5.2
340.05 KHz	44.0	59.2	49.2	-15.2	-5.2
341.29 KHz	44.6	59.2	49.2	-14.6	-4.6
342.53 KHz	44.2	59.1	49.1	-15.0	-5.0
343.93 KHz	44.4	59.1	49.1	-14.7	-4.7

Graph 3.5.1

Line 1



Line 2





4.0 TEST EQUIPMENT

DESCRIPTION	MANUFACTURER	MODEL	SERIAL NO.	INTERTEK ID	CAL DUE	USED
Receiver RF Section	HP	85462A	3549A00306	9995	02/27/2010	☒
RF Filter Section	HP	85460A	3448A00276	9937	02/27/2010	☒
Spectrum Analyzer	R & S	ESCI	100358	12909	05/18/2010	☒
Bicono-Log Antenna	Schaffner-Chase	CBL 6112 B	2468	14459	08/27/2009	☒
Bicono-Log Antenna	Schaffner-Chase	CBL 6112 B	2630	14459	09/26/2009	☒
Loop Antenna	ETS	6512	00060486	19942	08/10/2010	☒
LISN	Fischer Custom Communications	FCC-LISN-2 MOD.SD	316	9945	10/28/2009	☒
System	TILE! Instrument Control		Ver. 3.4.K.29	15259	VBU	☒

