TEST REPORT

Report Number: 3181459MIN-002
Project Number: 3181459

Testing performed on the
X001700-1 with Omnikey 5121+ RF Encoder
FCC ID: JZ2OMNI5121P
Industry Canada ID: 6019A-OMNI5121P

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: _____ Date: July 9, 2009
Norman Shpilsher

Reviewed by: _____ Date: July 9, 2009
Simon Khazon

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1.0 GENERAL DESCRIPTION

Model:	X001700-1 with Omnikey 5121+ RF Encoder
Type of EUT:	Printer with RF Encoder
Serial Number:	N/A
FCC ID:	JZ2OMNI5121P
Industry Canada ID:	6019A-OMNI5121P
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:	June 29, 2009
Test Work Started:	June 29, 2009
Test Work Completed:	July 8, 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:	Integral Antenna
Antenna Installation:	☐ User ☐ Professional ☒ Factory
Transmitter Power Configuration:	☐ Internal battery ☐ External power source ☒ 100-240VAC ☐ 230VAC ☐ 400VAC ☐ VDC ☐ Other: Amp. ☒ 50-60Hz
Special Test Arrangement:	The transmitter was tested without a printer/host unit as a worst case, Conducted Emissions testing was performed at the printer AC port. Fargo Electronics Omnikey Test software v. 1.0.0 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	
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(µV/m)
RA = Receiver Amplitude in dB(µV)
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(µV) 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(µV/m).

RA = 48.1 dB(µV)
AF = 7.4 dB(m^{-1})
CF = 1.6 dB
AG = 16.0 dB
FS = RA + AF + CF - AG
FS = 48.1 + 7.4 + 1.6 – 16.0
FS = 41.1 dB(µV/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: 19.7dB below the limits

Notes: None

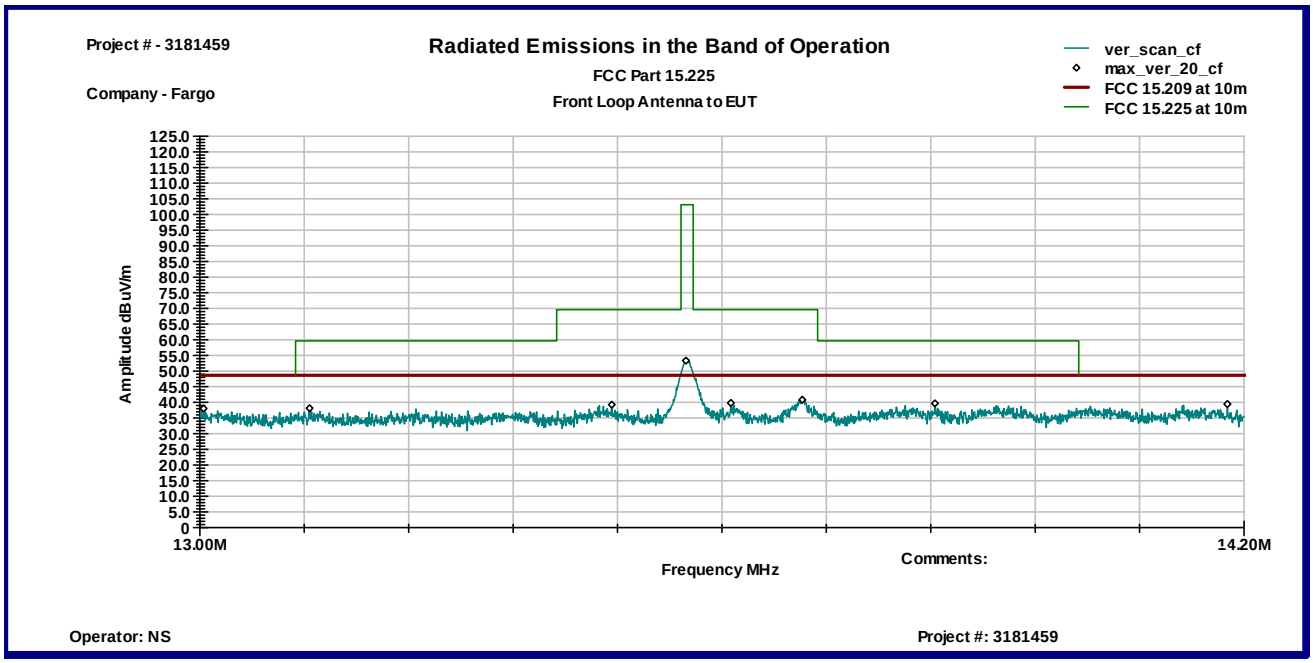
Date:	June 29, 2009	**Result:** **Pass**
Standard:	FCC 15.225(a)(b)(c) / RSS-210 A2.6(a)(b)(c)	
Tested by:	Norman Shpilsher	
Test Point:	Enclosure with antenna	
Operation mode:	See Page 5	
Note:		

Table 3.1.1

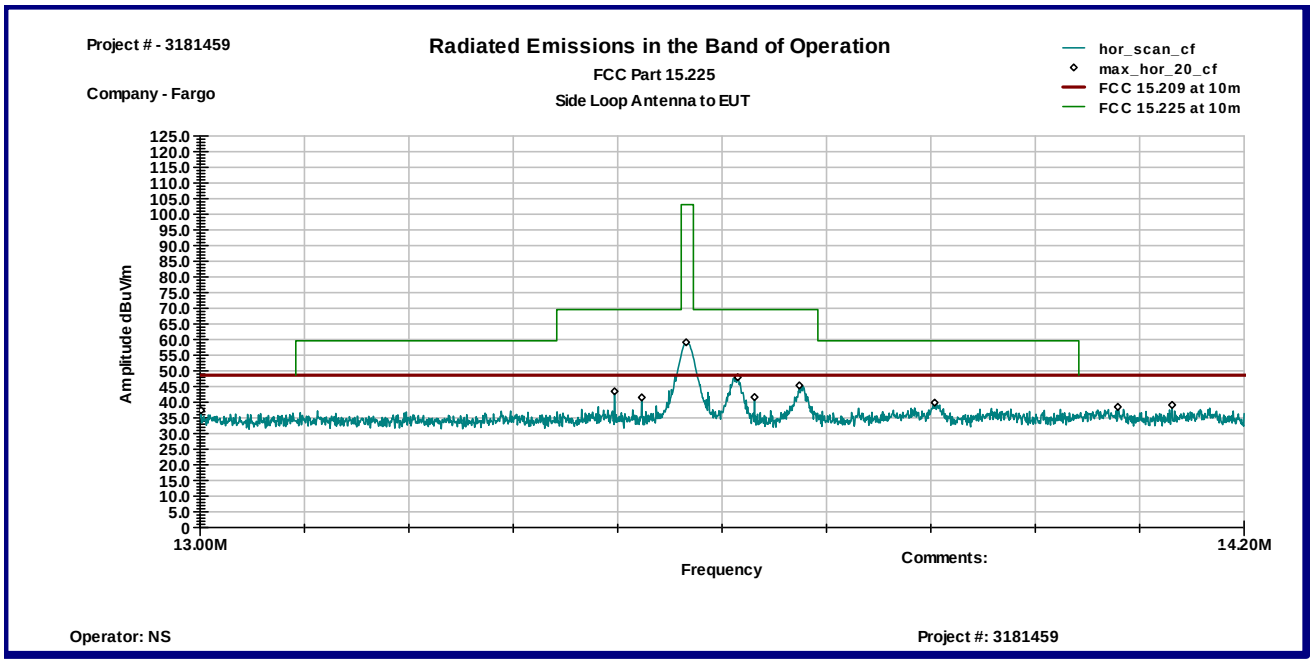
Frequency	Ant. Orientation	Peak Reading dBµV	Ant.Factor dB1/m	Total at 10m dBµV/m	QP Limit dBµV/m	Margin dB
13.126 MHz	Front	3.7	34.4	38.1	59.6	-21.5
13.473 MHz	Front	4.8	34.5	39.3	69.6	-30.3
13.559 MHz	Front	18.8	34.5	53.3	103.1	-49.8
13.61 MHz	Front	5.3	34.5	39.8	69.6	-29.8
13.692 MHz	Front	6.3	34.5	40.8	69.6	-28.7
13.845 MHz	Front	5.2	34.5	39.7	59.6	-19.9
13.476 MHz	Side	9.0	34.5	43.5	69.6	-26.1
13.508 MHz	Side	7.0	34.5	41.5	69.6	-28.0
13.559 MHz	Side	24.6	34.5	59.1	103.1	-44.0
13.618 MHz	Side	13.5	34.5	48.0	69.6	-21.6
13.637 MHz	Side	7.1	34.5	41.6	69.6	-28.0
13.689 MHz	Side	10.9	34.5	45.4	69.6	-24.2
13.844 MHz	Side	5.4	34.5	39.9	59.6	-19.7

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: 2.6dB 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).

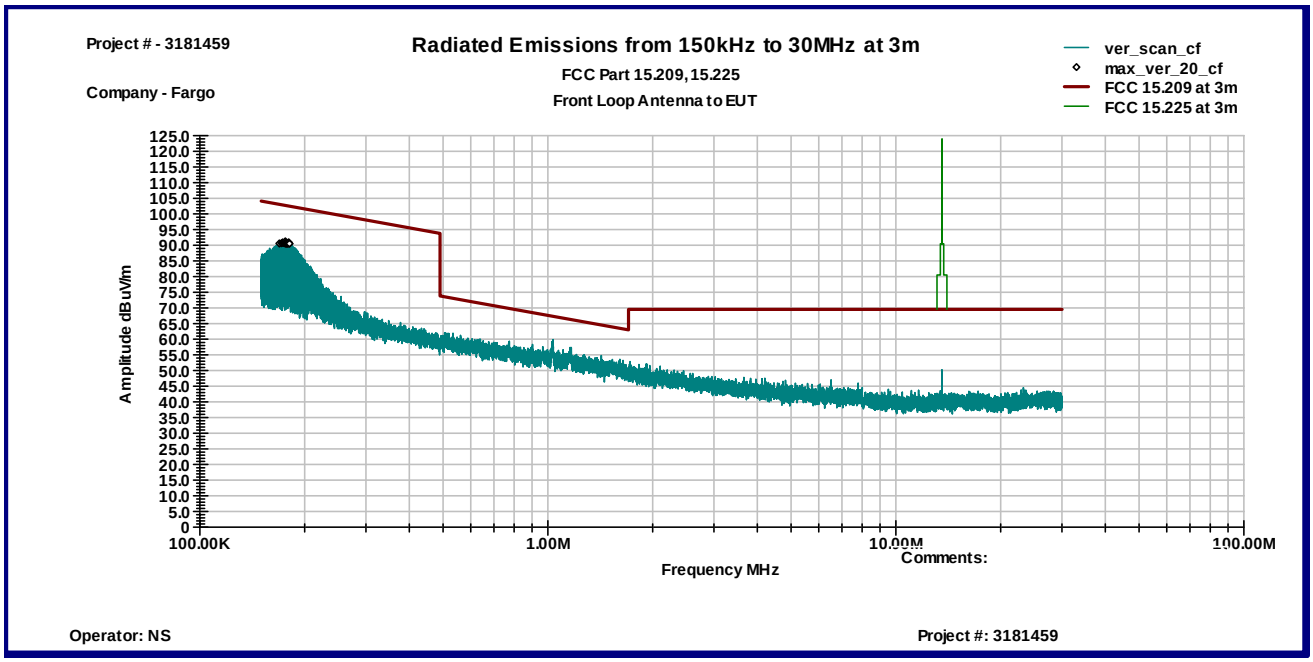
Date:	July 2, 2009	**Result:** **Pass**
Standard:	FCC 15.225(d) / RSS-210 A2.6(d)	
Tested by:	Norman Shpilsher	
Test Point:	Enclosure with antenna	
Operation mode:	See Page 5	
Note:	Frequency range 30-1000MHz	

Table 3.2.1

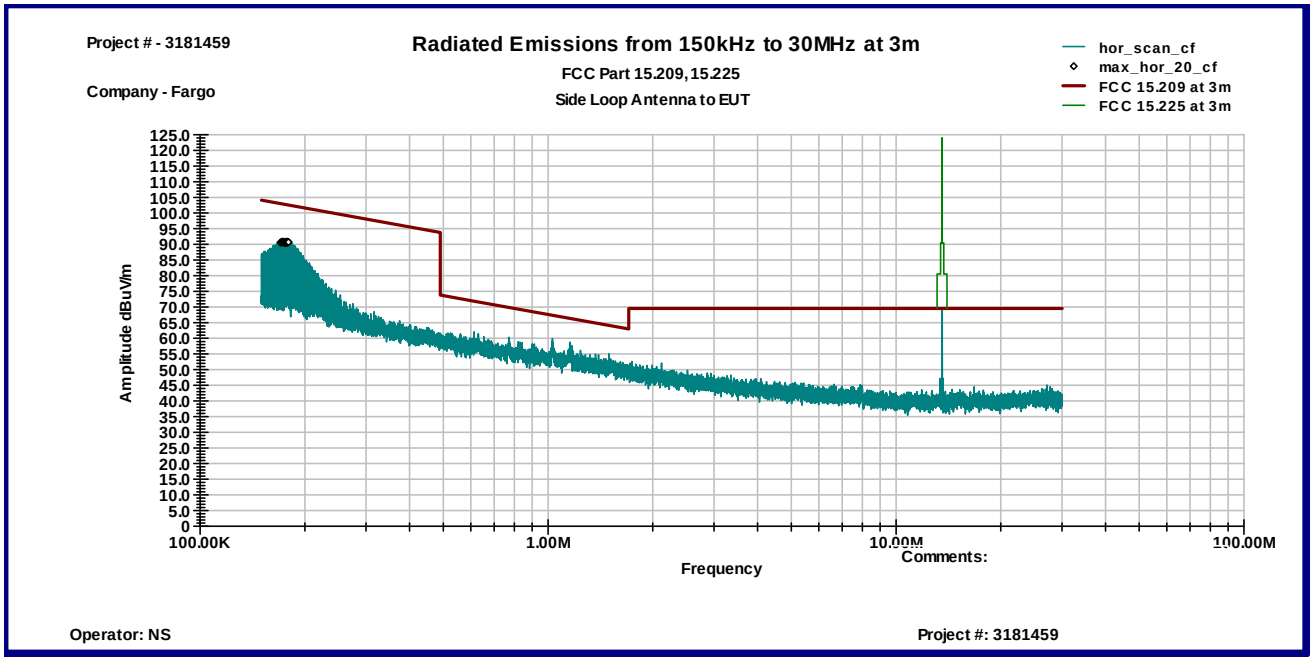
Frequency	Ant. Orientation	Peak Reading dBµV	Ant.Factor dB1/m	Total at 3m dBµV/m	QP Limit dBµV/m	Margin dB
30.772 MHz	V	12.7	20.6	33.3	40.0	-6.7
40.704 MHz	V	22.4	15.0	37.4	40.0	-2.6
54.221 MHz	V	23.8	8.9	32.6	40.0	-7.4
116.79 MHz	V	16.8	14.0	30.7	43.5	-12.8
125.72 MHz	V	17.9	13.9	31.8	43.5	-11.7
139.55 MHz	V	20.8	13.5	34.3	43.5	-9.2
149.19 MHz	V	19.5	12.9	32.4	43.5	-11.1
249.96 MHz	V	22.7	14.9	37.5	46.0	-8.5
274.31 MHz	V	16.0	15.6	31.6	46.0	-14.4
797.92 MHz	V	17.4	24.3	41.8	46.0	-4.3
824.54 MHz	V	17.2	24.7	41.9	46.0	-4.1
30.702 MHz	H	12.5	20.7	33.1	40.0	-6.9
40.668 MHz	H	16.1	15.1	31.1	40.0	-8.9
54.221 MHz	H	18.2	8.9	27.1	40.0	-12.9
81.351 MHz	H	19.3	9.2	28.5	40.0	-11.5
94.926 MHz	H	19.4	11.3	30.7	43.5	-12.9
108.5 MHz	H	19.9	13.5	33.3	43.5	-10.2
121.95 MHz	H	18.0	13.9	31.9	43.5	-11.6
135.5 MHz	H	19.0	13.8	32.8	43.5	-10.7
144.02 MHz	H	21.1	13.2	34.3	43.5	-9.2
149.19 MHz	H	21.0	12.9	33.9	43.5	-9.7
165.26 MHz	H	18.3	12.0	30.3	43.5	-13.2
176.29 MHz	H	21.2	11.5	32.7	43.5	-10.8
189.73 MHz	H	20.8	11.5	32.3	43.5	-11.2
249.96 MHz	H	25.9	14.9	40.7	46.0	-5.3
266.79 MHz	H	15.4	16.0	31.4	46.0	-14.6
797.92 MHz	H	17.5	24.3	41.9	46.0	-4.2

Graph 3.2.1

Front antenna orientation

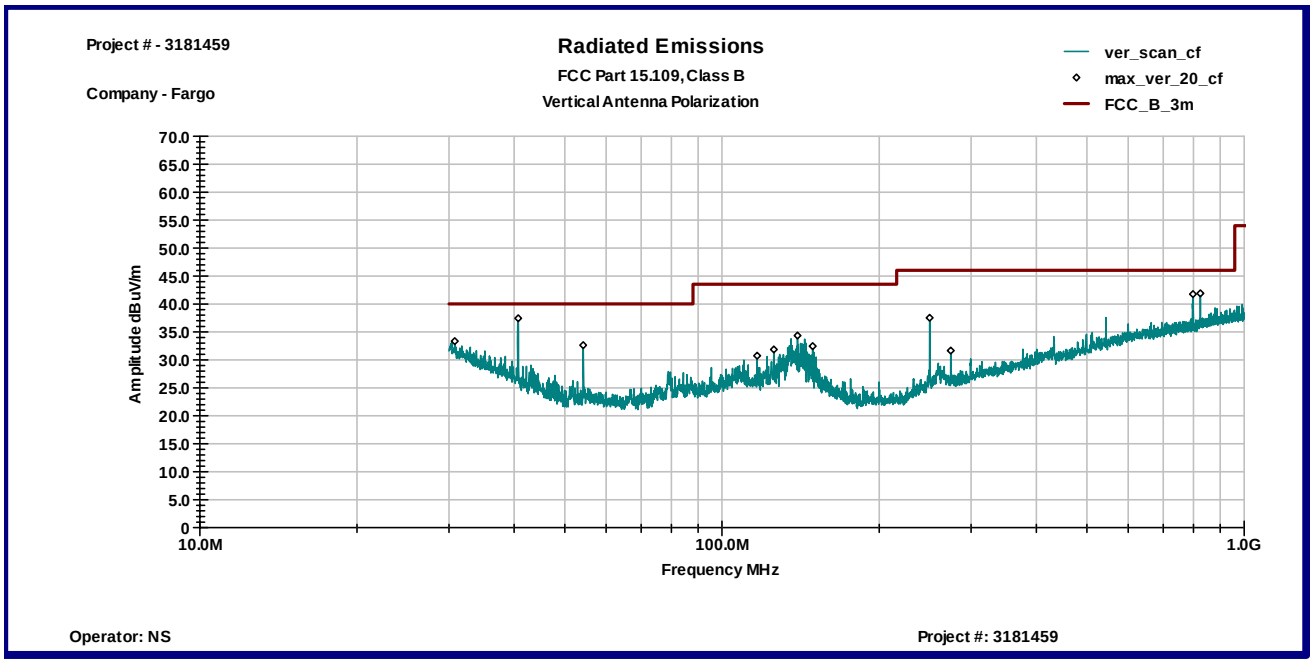


Side antenna orientation

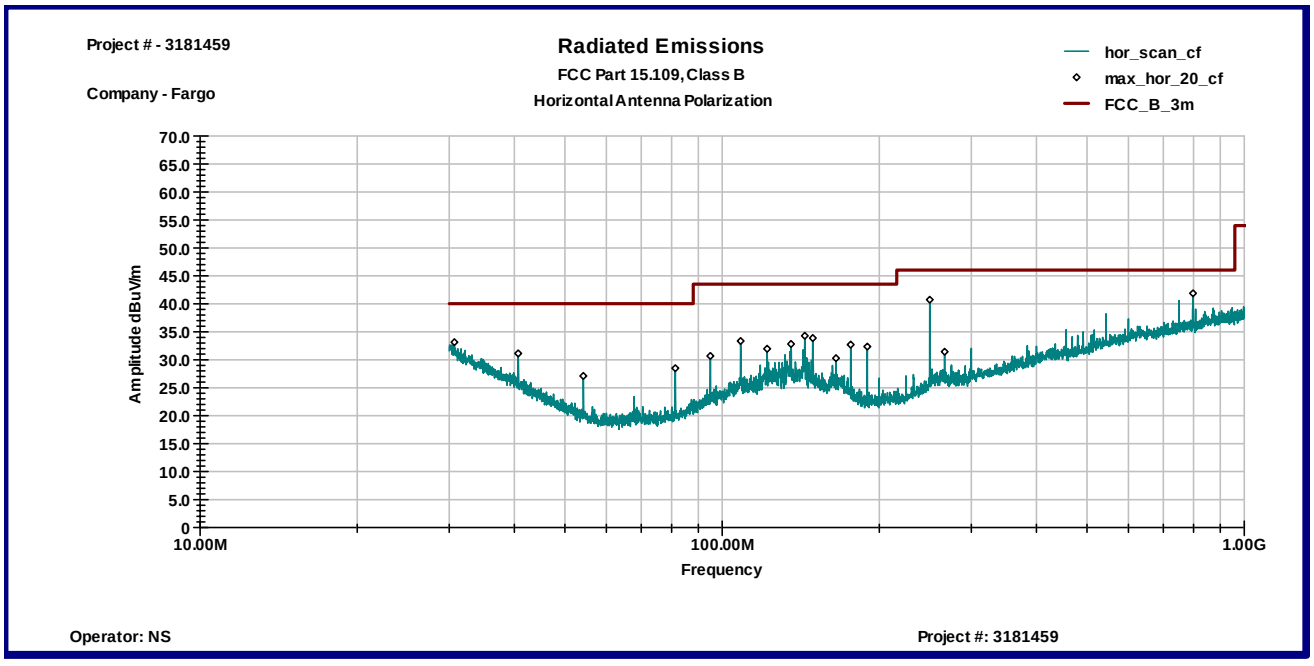


Graph 3.2.2

Vertical antenna polarization



Horizontal antenna polarization



3.3 Frequency Tolerance

Test location: ☐ OATS ☐ Anechoic Chamber ☐ Other

Test date: July 8, 2009

Tested by: Norman Shpilsher

Test result: **Pass**

Test Parameter		Measured Deviation (Hz)	Maximum Allowed Deviation (Hz)	Test Results
Temperature °C	Voltage V			
-20	120	330	1356	**Pass**
-10		210	1356	**Pass**
0		75	1356	**Pass**
10		54	1356	**Pass**
20		0	1356	**Pass**
30		24	1356	**Pass**
40		58	1356	**Pass**
55		131	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

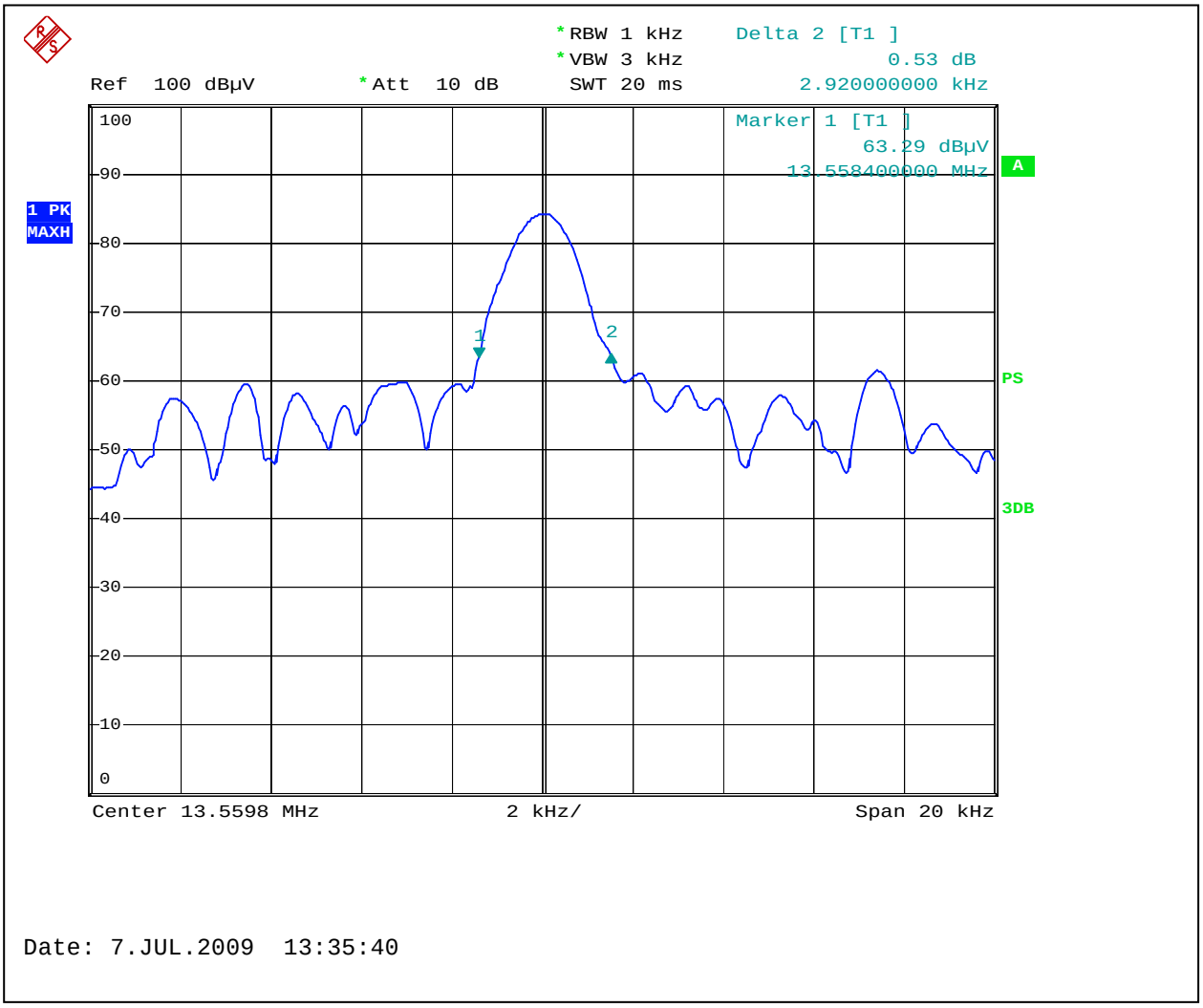
Test result: **Pass**

Center Frequency of operation MHz	Measured 20dB bandwidth kHz	Measured 99% bandwidth kHz
13.56	2.92	3.68

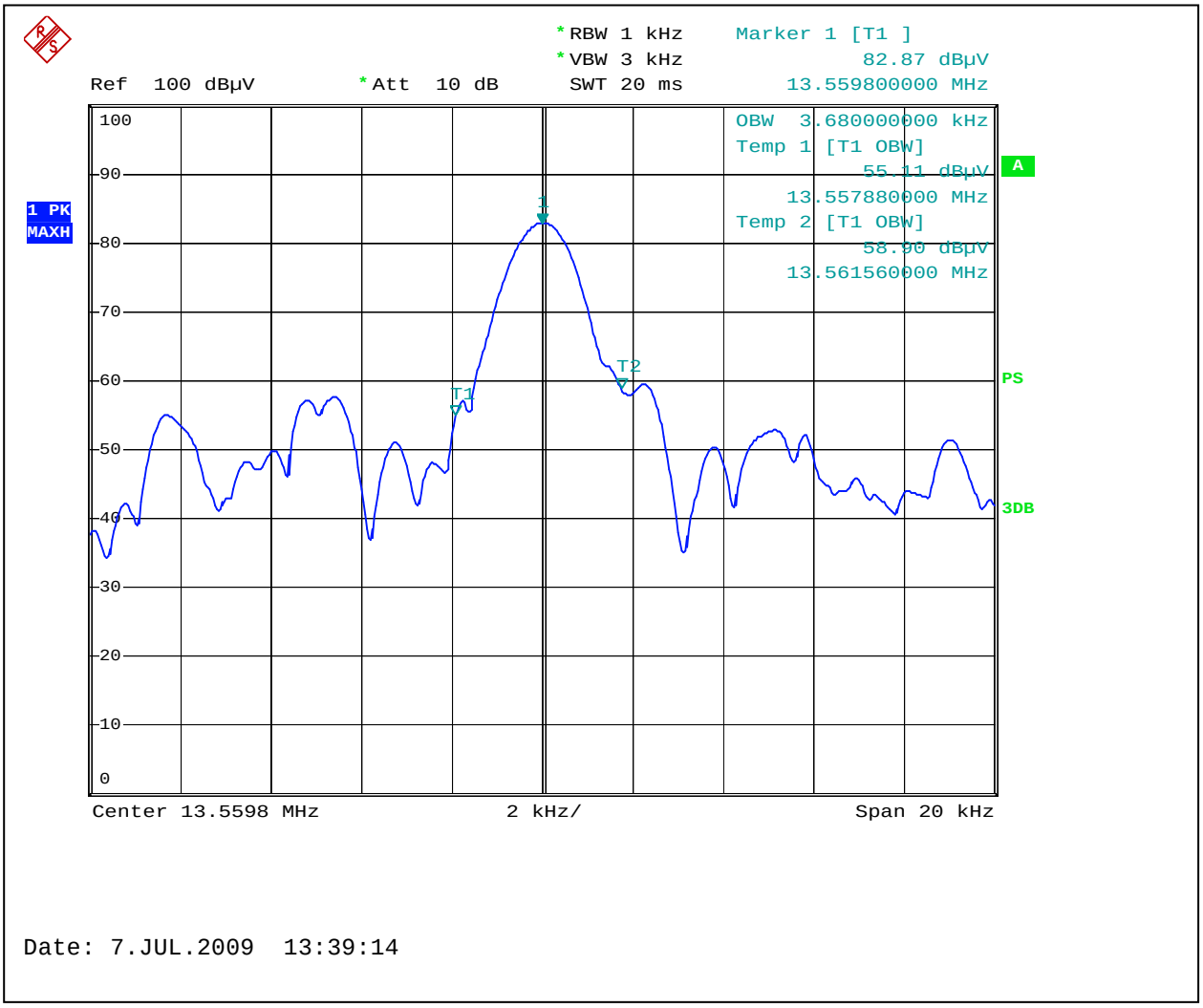
Graphs 3-4-1 and 3-4-2 are show bandwidth of emissions

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

Graph 3.4.1


*RBW 1 kHz
*VBW 3 kHz
Ref 100 dBµV
*Att 10 dB
SWT 20 ms
Delta 2 [T1]
0.53 dB
2.920000000 kHz
Marker 1 [T1]
63.29 dBµV
13.558400000 MHz
1 PK
MAXH
A
PS
3DB
100
90
80
70
60
50
40
30
20
10
0
Center 13.5598 MHz
2 kHz/
Span 20 kHz
Date: 7.JUL.2009 13:35:40

Graph 3.4.2


*RBW 1 kHz
*VBW 3 kHz
Ref 100 dBµV
*Att 10 dB
SWT 20 ms
Marker 1 [T1]
82.87 dBµV
13.559800000 MHz
OBW 3.680000000 kHz
Temp 1 [T1 OBW]
55.11 dBµV
13.557880000 MHz
Temp 2 [T1 OBW]
58.90 dBµV
13.561560000 MHz
1 PK
MAXH
A
PS
3DB
T1
T2
100
90
80
70
60
50
40
30
20
10
0
Center 13.5598 MHz
2 kHz/
Span 20 kHz
Date: 7.JUL.2009 13:39:14

3.5 Transmitter power line conducted emissions

Test location: ☐ OATS ☒ Anechoic Chamber ☐ Other

Test result: **Pass**

Frequency range: 0.15MHz-30MHz

Max. Emissions margin: 2.5dB below the limits

Notes: None

Standard:	FCC Part 15.207	**Result:** **Pass**
Tested by:	Norman Shpilsher	
Test Point:	AC Port of the Printer	
Operation mode:	See Page 5	
Note:		

Table 3.5.1

Line 1

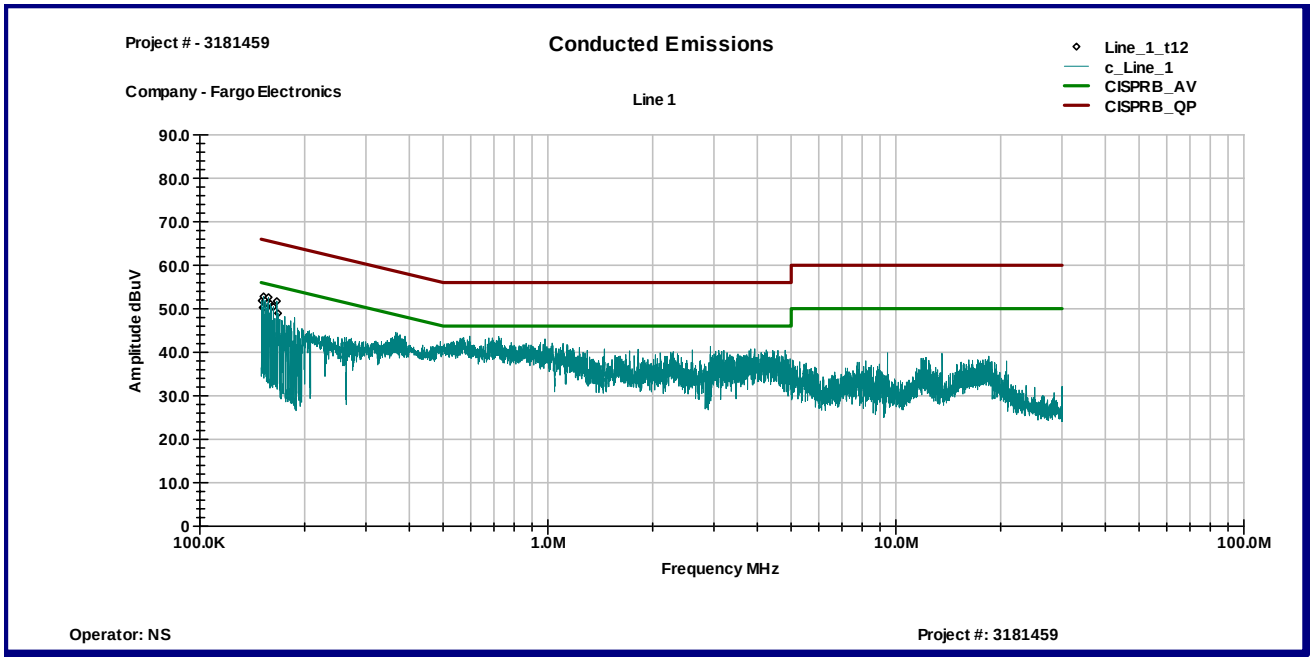
Frequency MHz	Peak dBµV	QP Limit dBµV	AVG Limit dBµV	QP Margin dB	AVG Margin dB
0.151	51.9	66.0	56.0	-14.1	-4.1
0.152	50.3	65.9	55.9	-15.6	-5.6
0.155	50.1	65.7	55.7	-15.6	-5.6
0.156	51.3	65.7	55.7	-14.4	-4.4
0.160	51.1	65.5	55.5	-14.4	-4.4
0.161	50.4	65.4	55.4	-15.0	-5.0
0.163	50.5	65.3	55.3	-14.9	-4.9
0.168	48.9	65.1	55.1	-16.1	-6.1

Line 2

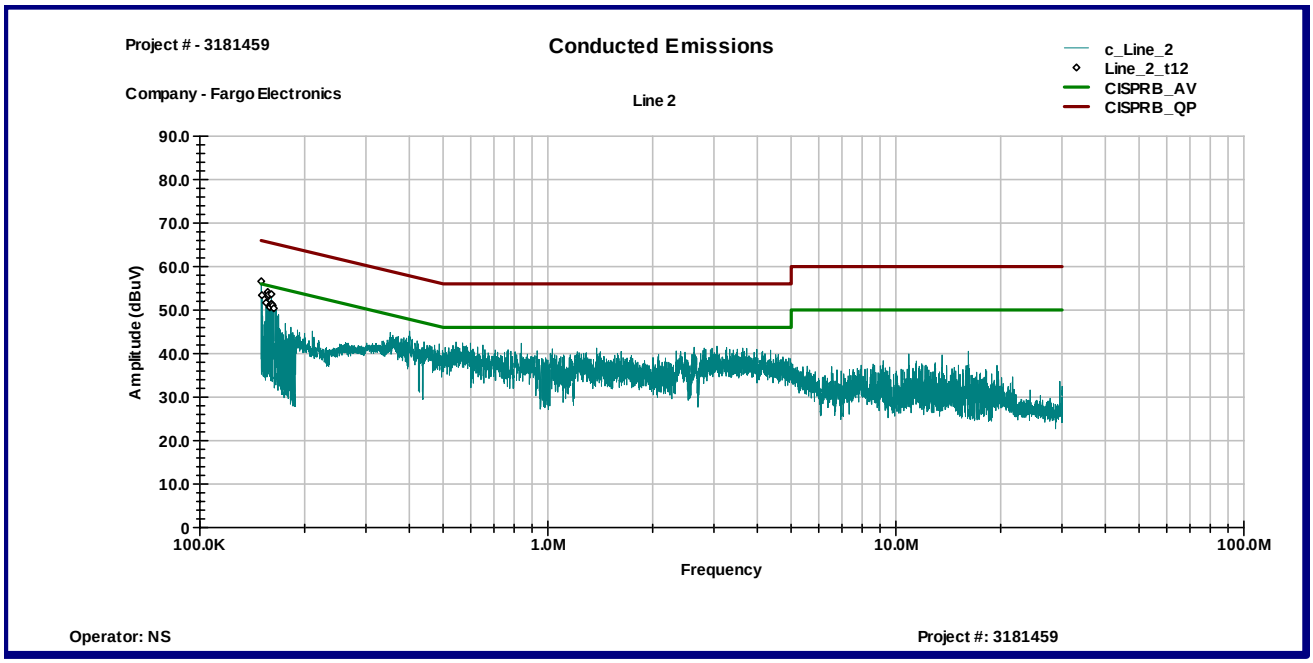
Frequency	Peak dBµV	QP Limit dBmV	AVG Limit dBmV	QP Margin dB	AVG Margin dB
0.155	51.7	65.7	55.7	-14.0	-4.0
0.157	53.1	65.6	55.6	-12.5	-2.5
0.159	50.6	65.5	55.5	-14.9	-4.9
0.160	51.4	65.5	55.5	-14.1	-4.1
0.161	51.4	65.4	55.4	-14.0	-4.0
0.162	51.1	65.4	55.4	-14.3	-4.3
0.163	50.4	65.3	55.3	-14.9	-4.9

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	FSP 40	100024	12559	08/22/2009	☐
Spectrum Analyzer	R & S	ESCI	100358	12909	05/18/2010	☒
Spectrum Analyzer	Agilent	E7402A	MY44212200	12660	11/13/2009	☐
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	☐
Horn Antenna	EMCO	3115	9507-4513	9936	03/04/2010	☐
Horn Antenna	EMCO	3115	6579	15580	04/03/2010	☐
Waveguide Horn Antenna	EMCO	3116	9904-2423	9705	08/12/2009	☐
Loop Antenna	ETS	6512	00060486	19942	08/05/2009	☒
Monopole Antenna	ETS-Lindgren	3310B	0071915	MIN-0054	11/14/2009	☐
LISN	Fischer Custom Communications	FCC-LISN-2 MOD.SD	316	9945	10/28/2009	☐
LISN	Fischer Custom Communications	FCC-LISN-50-25-2	2014	9665	11/06/2009	☐
Pre-Amplifier	MITEQ	AMF-5D-00501800-28-13P	1122951	13475	08/05/2009	☐
Pre-Amplifier	MITEQ	AMF-6F-16002600-25-10P	1222383	MIN-0065	08/12/2009	☐
Pre-Amplifier	MITEQ	AMF-6F-26004000-40-8P	13224444	MIN-0064	11/13/2009	☐
Pre-Amplifier	HP	8447F OPT H64	3113A04974	9934	05/21/2010	☐
System	TILE! Instrument Control		Ver. 3.4.K.29	15259	VBU	☒