

TEST RESULT SUMMARY

FCC Part 15 Subpart C Section 15.247

Industry Canada IC RSS-210 Issue 7

Industry Canada IC RSS-Gen Issue 2

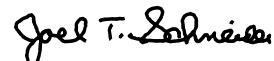
MANUFACTURER'S NAME	John Deere Intelligent Vehicle Systems
MANUFACTURER'S ADDRESS	4140 114 th Street Urbandale IA 50322
NAME OF EQUIPMENT	John Deere RFID
MODEL NUMBER(S) TESTED	90-176181-01-P (Part Number)
TEST REPORT NUMBER	WC800186 Rev A
TEST DATE(S)	09,10,11 January 2008

According to testing performed at TÜV SÜD America Inc, the above mentioned unit is in compliance with the applicable electromagnetic compatibility (EMC) portions of the requirements defined in FCC Part 15 Subpart C Section 15.247 and Industry Canada RSS-210 Issue 7.

It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical characteristics. Any modifications necessary for compliance made during testing on the above mentioned date(s) must be implemented in all production units for compliance to be maintained.

TÜV SÜD America Inc, as an independent testing laboratory, declares that the equipment tested as specified above conforms to the applicable EMC requirements of FCC Part 15 Subpart C Section 15.247 *"Operation within the bands 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz; General requirements."* and IC RSS-210 Issue 7 *"Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment"* and IC RSS-Gen Issue 2 *"General Requirements and Information for the Certification of Radiocommunication Equipment"*.

Date: 25 July 2008

Location: Taylors Falls MN
USA

Ross M Johnson
Senior EMC Technician

Joel Schneider
Senior EMC Engineer

Not Transferable

EMC TEST REPORT

Test Report File No. : **WC800186 Rev A** Date of issue: 25 July 2008

Model / Serial No(s) Tested : 90-176181-01-P (Part Number)/ PCRFCIDX00012

Product Type : John Deere RFID

Applicant : John Deere Intelligent Vehicle Systems

Manufacturer : John Deere Intelligent Vehicle Systems

License holder : John Deere Intelligent Vehicle Systems

Address : 4140 114th Street
Urbandale IA 50322

Test Result : **Positive** **Negative**

Test Project Number
References : WC800186 Rev A

Total pages including
Appendices : 48

TÜV SÜD AMERICA Inc reports apply only to the specific samples tested under stated test conditions. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. TÜV SÜD America Inc shall have no liability for any deductions, inferences or generalizations drawn by the client or others from TÜV SÜD America Inc issued reports.

This report is the confidential property of the client. As a mutual protection to our clients, the public and ourselves, extracts from the test report shall not be reproduced except in full without our written approval. This report shall not be used by the client to claim product endorsement by NVLAP, NIST, or any agency of the US government.

*TÜV SÜD AMERICA Inc and its professional staff hold government and professional organization certifications and are members of
AAMI, ACIL, AEA, ANSI, IEEE, NARTE, and VCCI.*

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Measurement Protocol	<u>47 - 48</u>
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Sign Explanations:

- not applicable
 - applicable

REVISION RECORD

REVISION	TOTAL NUMBER OF PAGES	DATE	DESCRIPTION
	48	12 February 2008	Initial Release
A	48	25 July 2008	Revisions include: ▪ Pages 4, 6, 8, 11, 15, 17 & 21: Corrected the test procedures used.

EMC TEST REGULATIONS:

The tests were performed according to the following regulations :

- EN 50081-1 / 1991
- EN 55014-2: 1997 + Amendment A1: 2001 - Category __
- EN 55024: 1998 + Amendments A1: 2001 + A2: 2003
- EN 60601-1-2: 2001
- EN 61000-6-1: 2001
- EN 61000-6-2: 2001
- EN 61326: 1997 + Amendments A1: 1998 + A2: 2001 + A3: 2003
- EN 61800-3: 1996 + Amendment A11: 2000
- ETS 300 683: 1997
- ETS 300 683: 1997
- ETSI EN 301 489-3 V1.4.1: 2002
- EN 300 220-3 V1.1.1
- EN 300 330-2 V1.1.1
- FCC Part 15 Subpart C Section 15.207
- FCC Part 15 Subpart C Section 15.209
- FCC Part 15 Subpart C Section 15.247
- FCC Part 15 Subpart C Section 15.249
- IC RSS-210 Issue 7
- IC RSS-Gen Issue 2
- IC RSS-Gen Issue 1

ENVIRONMENTAL CONDITIONS IN THE LAB

Temperature:	<u>Actual</u>
Atmospheric pressure	: 23 °C
Relative Humidity	: 99 kPa
	: 21 %

POWER SUPPLY UTILIZED

Power supply system : 12 VDC

Carrier frequency separation FCC 15.247(a)(1), IC RSS-210 A8.1(b)

Test summary

The requirements are: - MET - NOT MET

Carrier frequency separation = 500 kHz

Testing was done per FCC Public Notice DA 00-705 - Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems. It was performed as a radiated measurement with the EUT in its normal hopping mode and with normal modulation.

Test location

- Wild River Lab Large Test Site (Open Area Test Site)
- Wild River Lab Small Test Site (Open Area Test Site)

Test equipment

TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
3371	E4440A	Agilent	Spectrum Analyzer	MY43362222	19-Dec-08
3202	EM-6917B	Electro-Metrics	Biconicalog Periodic	101	10-May-08

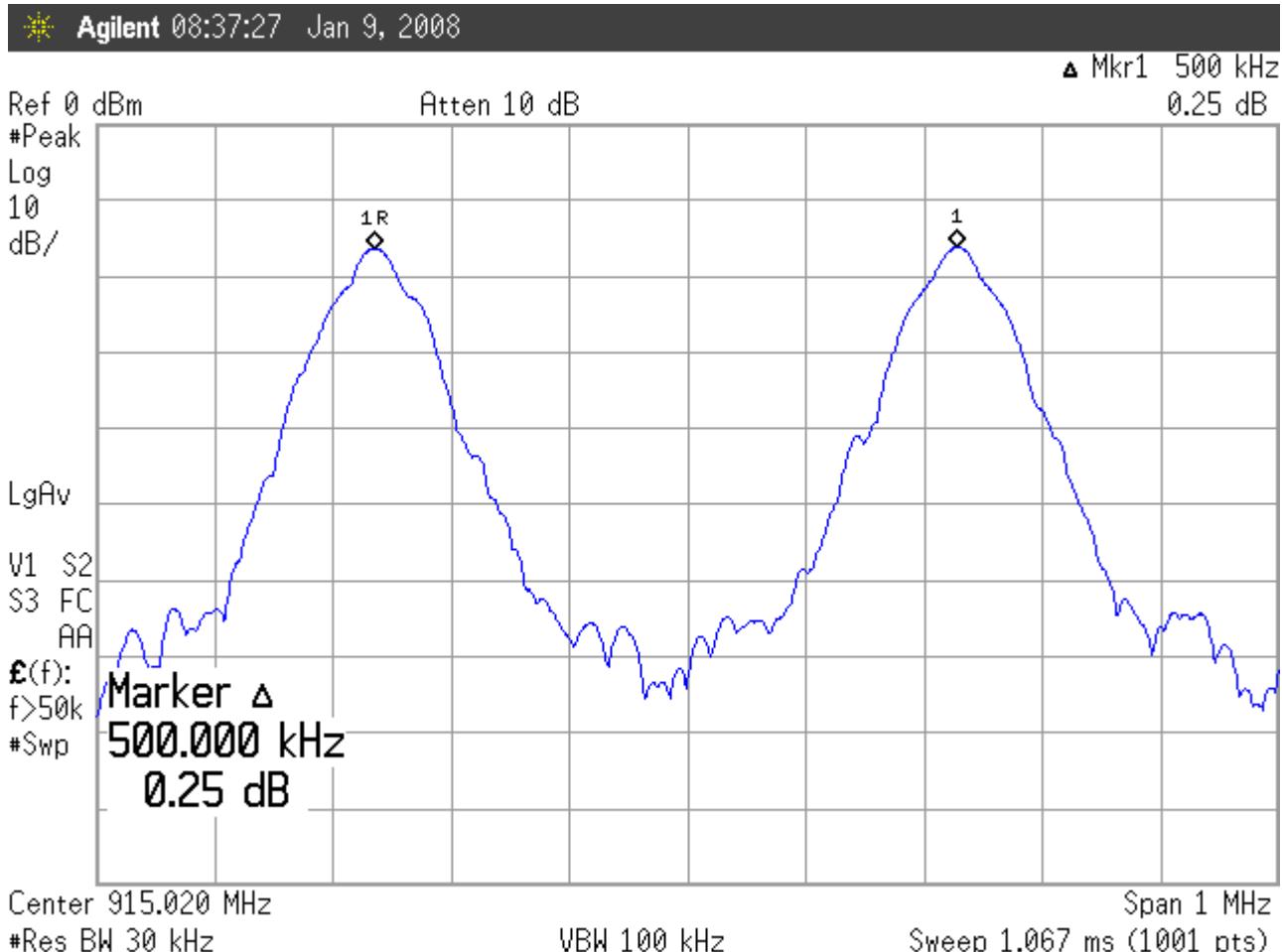
Test limit

139.9 kHz

Test data

See following pages.

Carrier Frequency Separation



Number of hopping frequencies

FCC 15.247(a)(1)(i), IC RSS-210 A8.1(c)

Test summary

The requirements are: - MET - NOT MET

Number of hopping frequencies = 50

Testing was done per FCC Public Notice DA 00-705 - Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems. It was performed as a radiated measurement in the EUT's normal hopping mode and with normal modulation.

Test location

- Wild River Lab Large Test Site (Open Area Test Site)
- Wild River Lab Small Test Site (Open Area Test Site)

Test equipment

TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
3371	E4440A	Agilent	Spectrum Analyzer	MY43362222	19-Dec-08
3202	EM-6917B	Electro-Metrics	Biconicalog Periodic	101	10-May-08

Test limit

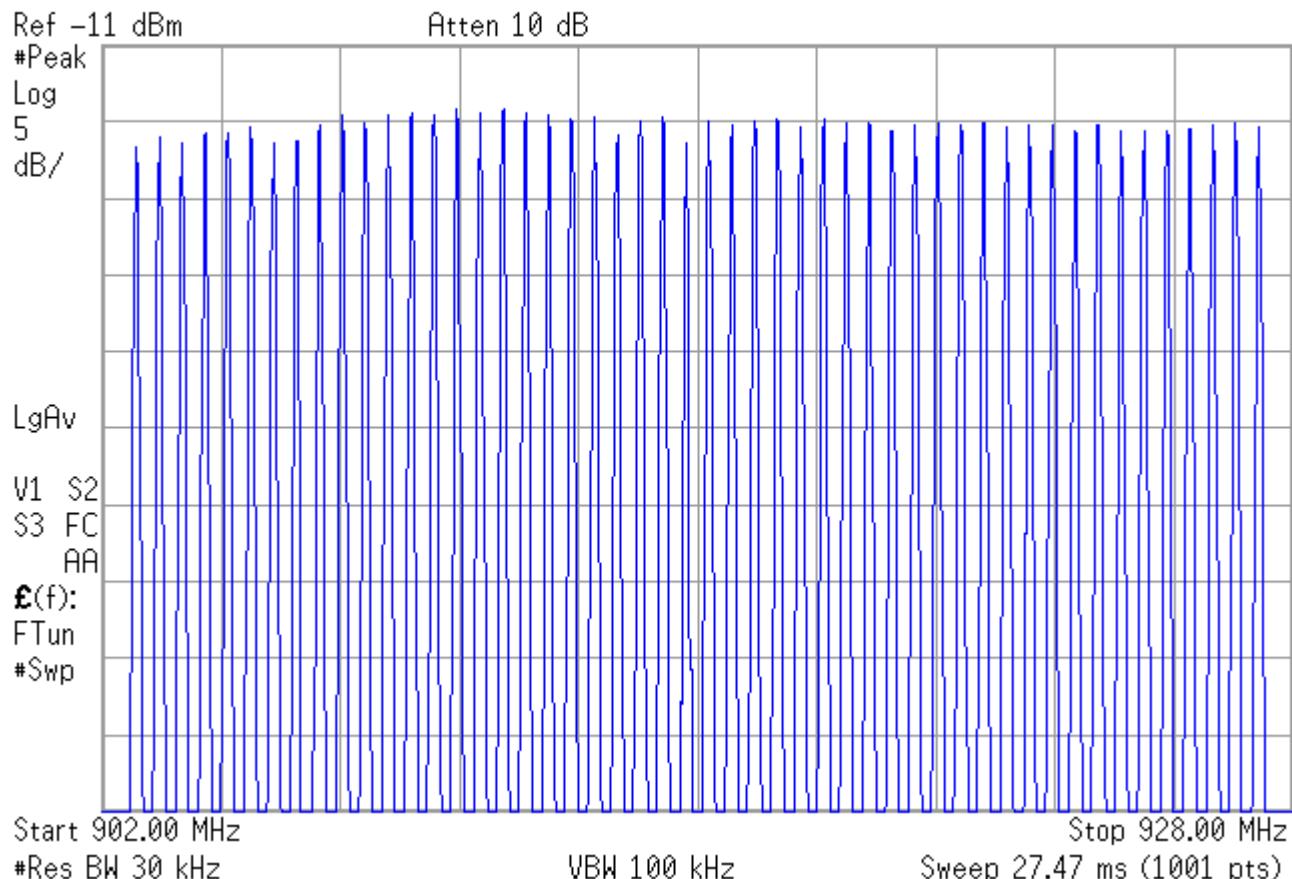
Minimum 50

Test data

See following pages.

Number of hopping frequencies = 50

Agilent 09:01:50 Jan 9, 2008



Time of occupancy
FCC 15.247(a)(1)(i), IC RSS-210 A8.1(c)

Test summary

The requirements are: - MET - NOT MET

Average time of occupancy within a 20 second period = 67.32 mS

Testing was done per FCC Public Notice DA 00-705 - Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems. It was performed as a radiated measurement with the EUT in its normal hopping mode and with normal modulation.

Test location

- Wild River Lab Large Test Site (Open Area Test Site)
- Wild River Lab Small Test Site (Open Area Test Site)

Test equipment

TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
3371	E4440A	Agilent	Spectrum Analyzer	MY43362222	19-Dec-08
3202	EM-6917B	Electro-Metrics	Biconicalog Periodic	101	10-May-08

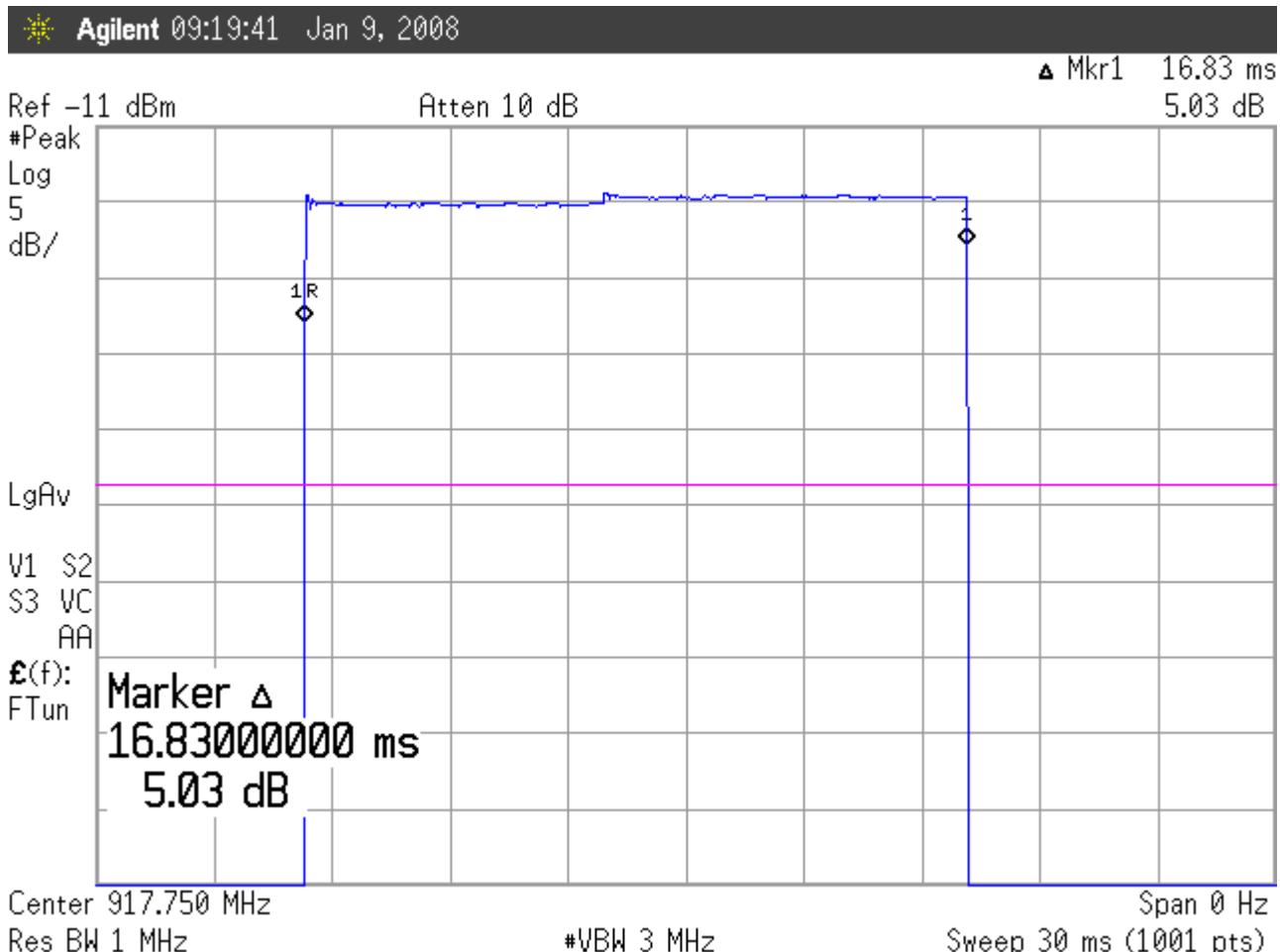
Test limit

No greater than 0.4 seconds within a 20 second period

Test data

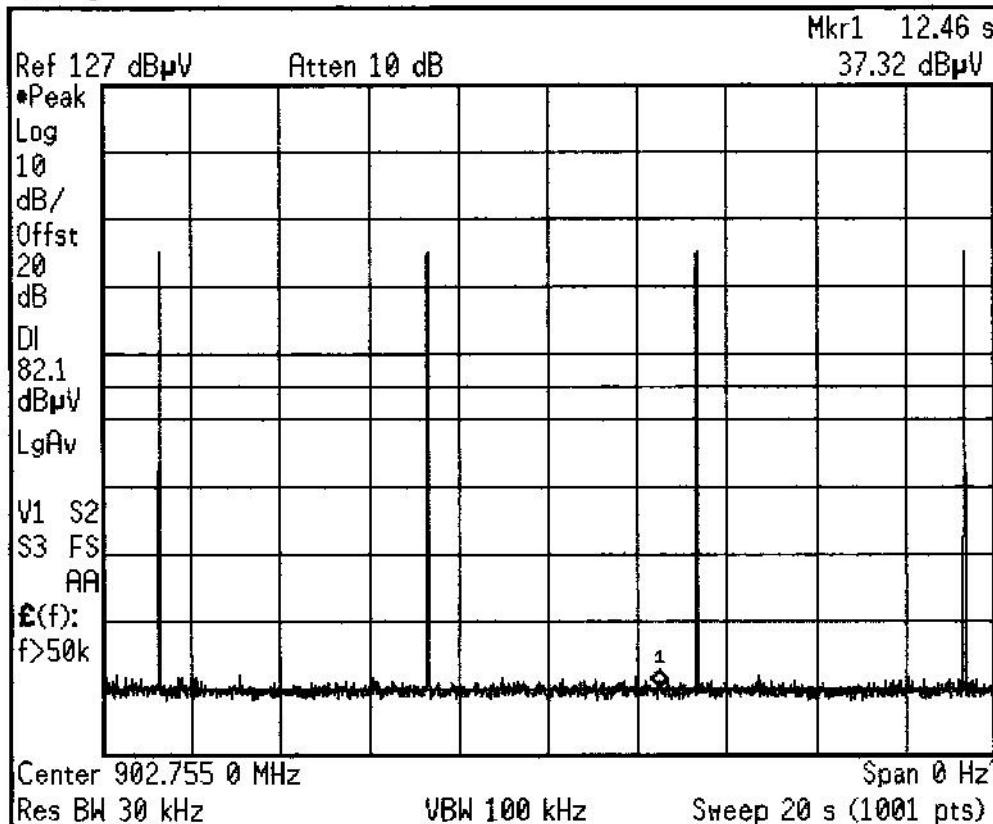
See following pages.

Individual pulse



4 pulses within 20 seconds

* Agilent 16:38:50 Jan 10, 2008



Title
Change Title
Clear Title

Printer not responding

20 dB Bandwidth

FCC 15.247(a)(1)(i), IC RSS-210 A8.1(c)

Test summary

The requirements are: - MET - NOT MET

The maximum 20 dB bandwidth = 139.9 kHz

Testing was done per FCC Public Notice DA 00-705 - Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems. It was done as a radiated measurement, with the EUT in a test mode that allows selection of just the low, middle or high channel with normal modulation.

Test location

- Wild River Lab Large Test Site (Open Area Test Site)
- Wild River Lab Small Test Site (Open Area Test Site)

Test equipment

TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
3371	E4440A	Agilent	Spectrum Analyzer	MY43362222	19-Dec-08
3202	EM-6917B	Electro-Metrics	Biconicalog Periodic	101	10-May-08

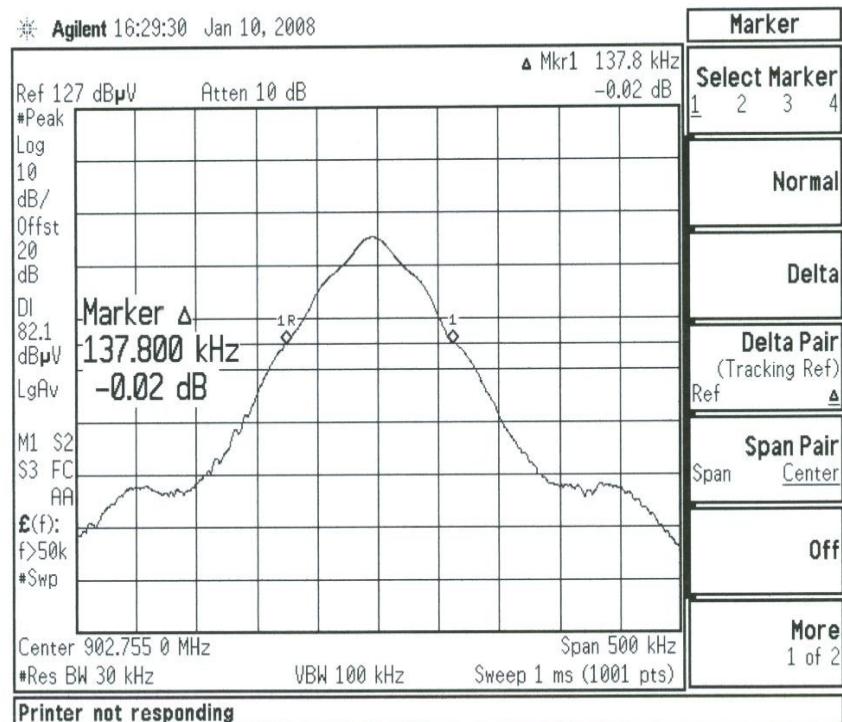
Test limit

Maximum 500 kHz

Test data

See following pages.

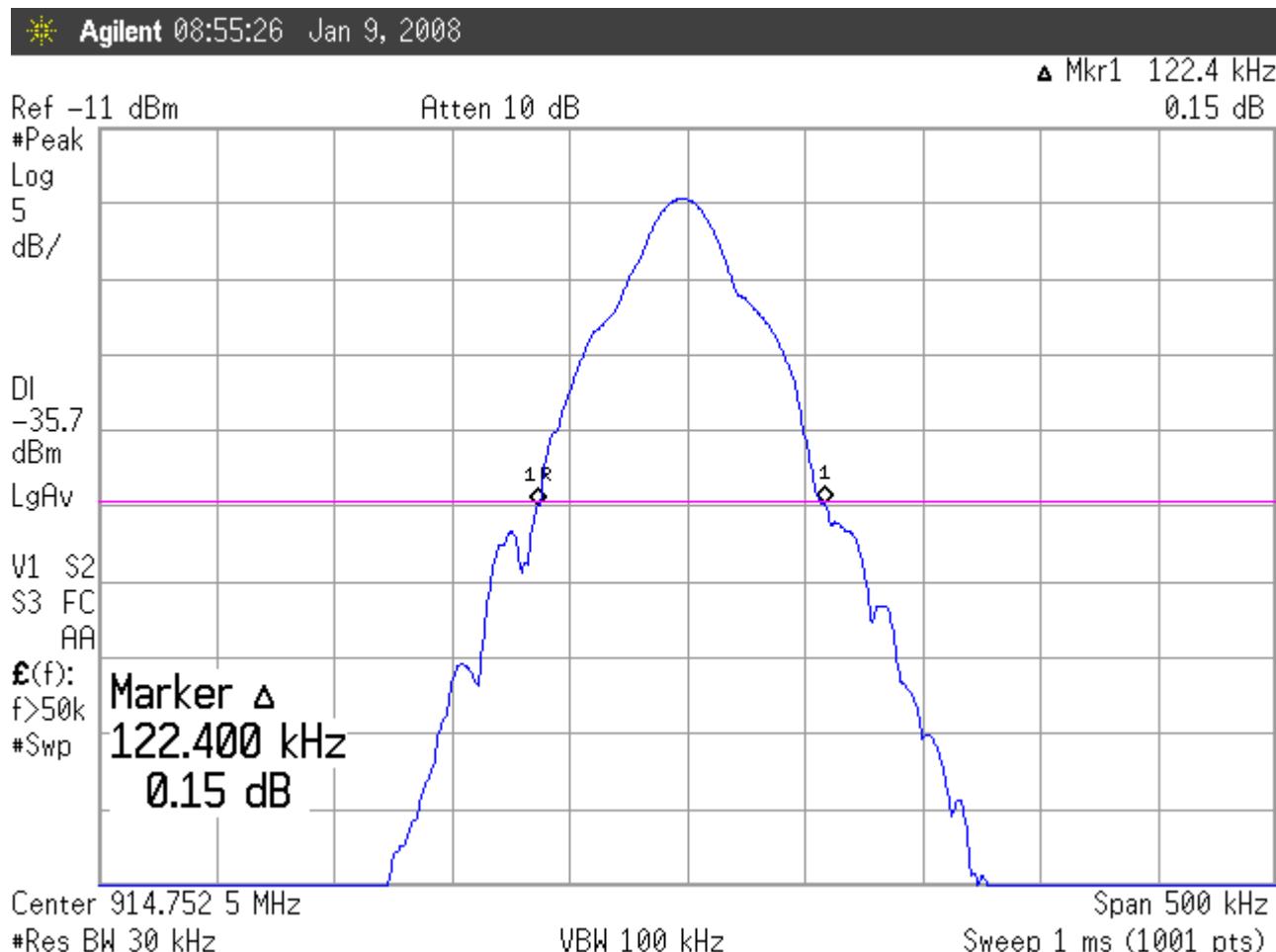
20 dB Bandwidth - Low Channel



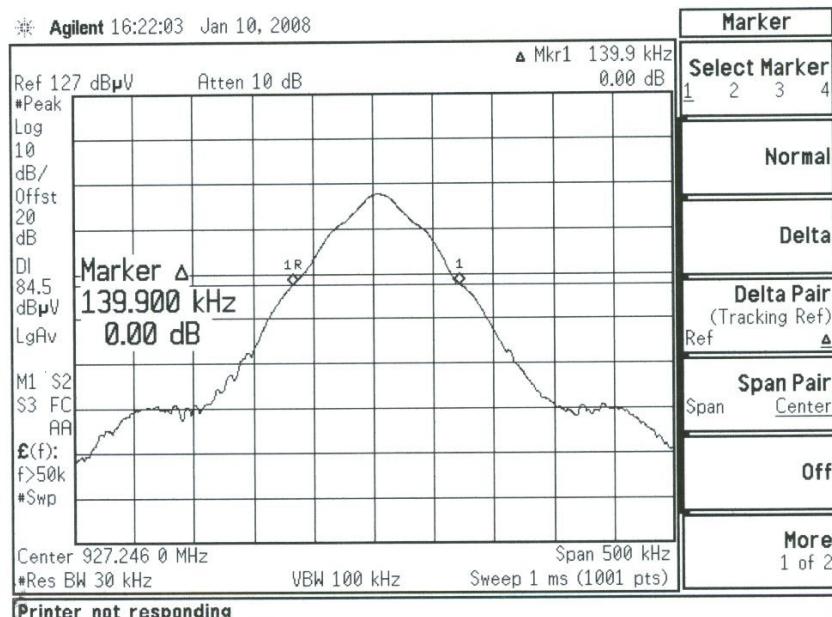
WC800186

low channel 20dB bw

20 dB BW – Middle Channel



20 dB Bandwidth, High Channel



WC800186

John Deere RFID reader
high channel 20 dB BW

Maximum peak output power

FCC 15.247(b)(2), IC RSS-210 A8.4(1)

Test summary

The requirements are: ■ - MET / □ - NOT MET

Maximum peak field strength is 133.25dB μ V/m at 3 meters

The Peak Output Power = .905 Watts

The transmitter's peak power is calculated using the following equation:

$$P = \frac{(E \cdot d)^2}{30G}$$

Where: **E** is the measured maximum fundamental field strength in V/m, utilizing a RBW \geq the 20 dB bandwidth of the emission, $VBW > RBW$, peak detector function. **(4.597V/m)**

G is the numeric gain of the transmitting antenna with reference to an isotropic radiator. **(7)**

d is the distance in meters from which the field strength was measured. **(3)**

P is the power in watts for which you are solving: **(.905 W)**

$$P = \frac{(E \cdot d)^2}{30G} \quad .905W = \frac{(4.597 \cdot 3)^2}{30 \cdot 7}$$

Testing was done per FCC Public Notice DA 00-705 - Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems. It was done as a radiated measurement, with the EUT in a test mode that allows selection of just the low, middle or high channels with normal modulation.

Test location

- - Wild River Lab Large Test Site (Open Area Test Site)
- - Wild River Lab Small Test Site (Open Area Test Site)

Test equipment

TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
3294	8566B	Hewlett-Packard	Spectrum Analyzer	2349A03098	16-May-08
3295	85662A	Hewlett-Packard	Analyzer Display	2349A06144	16-May-08
3202	EM-6917B	Electro-Metrics	Biconicalog Periodic	101	10-May-08

Test limits

1 watt

Test data

See following pages.

List of measurements for run #: 1

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA1 FCC-B <1GHz 3m	DELTA2 FCC B >1GHz 3m av
Maximized , Low channel						
EUT on its back						
902.78 MHz	93.69 Pk	2.99 / 23.14 / 0.0 / 0.0	119.83	V / 1.30 / 47	73.83*	n/a
902.78 MHz 104.93 Pk 2.99 / 23.14 / 0.0 / 0.0 131.07 H / 1.33 / 0 85.07* n/a						
On edge, connector vertical						
On edge, connector horizontal						
902.78 MHz	106.7 Pk	2.99 / 23.14 / 0.0 / 0.0	132.84	V / 1.08 / 0	86.84*	n/a
High channel						
On edge, connector horizontal						
927.25 MHz	107.36 Pk	3.02 / 22.87 / 0.0 / 0.0	133.25	V / 1.00 / 0	87.25*	n/a
On edge, connector vertical						
927.25 MHz	106.06 Pk	3.02 / 22.87 / 0.0 / 0.0	131.95	H / 1.25 / 0	85.95*	n/a
Mid channel						
On edge, connector horizontal						
915.253 MHz	107.11 Pk	3.01 / 22.89 / 0.0 / 0.0	133.01	V / 1.00 / 0	87.01*	n/a

Spurious emissions

FCC 15.247(d), IC RSS-210 A8.5

Test summary

The requirements are: ■ - MET □ - NOT MET
Minimum margin of compliance = .5dB at 3.709GHz.

Testing was done per FCC Public Notice DA 00-705 - Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems. It was done as a radiated measurement, with the EUT in a test mode that allows selection of just the low, middle or high channels with normal modulation.

Test location

- - Wild River Lab Large Test Site (Open Area Test Site)
- - Wild River Lab Small Test Site (Open Area Test Site)

Test equipment

TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
10435	E4440A	Agilent	Spectrum Analyzer	MY44304483	27 Feb 08
3294	8566B	Hewlett-Packard	Spectrum Analyzer	2349A03098	16-May-08
3295	85662A	Hewlett-Packard	Analyzer Display	2349A06144	16-May-08
2681	85650A	Hewlett-Packard	Quasi-Peak Adapter	2430A00562	23-Mar-08
2075	3115	EMCO	Ridge Guide Ant. 1-18 GHz	9001-3275	16-Jan-09
3958	SL18B4020	Phase One Microwave	Preamplifier 1 – 18 GHz	0002	Code B
3997	EWT-14-0066	EWT	2.4 GHz Notch filter	E2	Code B
2003	F550B1	Acronetics	4 – 8 GHz Bandpass Filter	010	Code B
3933	F551B-1	Acronetics	8 – 12 GHz Bandpass Filter	010	Code B
3202	EM-6917B	Electro-Metrics	Biconicalog Periodic	101	10-May-08
3847	ZHL-1042J	Mini-Circuits	Preamplifier 10 - 3000 MHz	0607	Code B

Cal Code B = Calibration verification performed internally.

Test limit

-20 dBc

Test limit (in restricted bands)

Frequency (MHz)	Field strength (µV/meter)	Field strength (dBµV/meter)
30 - 88	100, QP	40.0
88 - 216	150, QP	43.5
216 - 960	200, QP	46.0
Above 960	500, QP	54.0
> 1000	500, AV 5000, PK	54.0 74.0

Test data

See following pages

RADIATED EMISSIONS



Test Report #: WC800186 Run 1

Test Area: LTS

EUT Model #: 90-176181-01-P (Part Number)

Date: 1/9/2008

EUT Serial #: PCRFCIDX00012

EUT Power: 12 VDC

Temperature: 23.0 °C

Test Method: FCC 15.247

Air Pressure: 99.0 kPa

Customer: John Deere

Rel. Humidity: 21.0 %

EUT Description: John Deere RFID - (North America)

Notes: Peak Power Measurement

Data File Name: 0186.dat

Page: 1 of 4

List of measurements for run #: 1

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA1 FCC-B <1GHz 3m	DELTA2 FCC B >1GHz 3m av
Maximized , Low channel						
EUT on its back						
902.78 MHz	93.69 Pk	2.99 / 23.14 / 0.0 / 0.0	119.83	V / 1.30 / 47	73.83*	n/a
902.78 MHz 104.93 Pk 2.99 / 23.14 / 0.0 / 0.0 131.07 H / 1.33 / 0 85.07* n/a						
On edge, connector vertical						
On edge, connector horizontal						
902.78 MHz	106.7 Pk	2.99 / 23.14 / 0.0 / 0.0	132.84	V / 1.08 / 0	86.84*	n/a
927.25 MHz 107.36 Pk 3.02 / 22.87 / 0.0 / 0.0 133.25 V / 1.00 / 0 87.25* n/a						
On edge, connector vertical						
927.25 MHz	106.06 Pk	3.02 / 22.87 / 0.0 / 0.0	131.95	H / 1.25 / 0	85.95*	n/a
915.253 MHz 107.11 Pk 3.01 / 22.89 / 0.0 / 0.0 133.01 V / 1.00 / 0 87.01* n/a						
Begin spurious emission scan in restricted bands < 1 GHz						
Low channel						
400.051 MHz	43.6 Qp	2.01 / 15.74 / 29.93 / 0.0	31.42	V / 1.00 / 0	-14.58	n/a
Maximized						
400.051 MHz	47.05 Qp	2.01 / 15.74 / 29.93 / 0.0	34.87	V / 1.36 / 50	-11.13	n/a

Tested by: Greg Jakubowski

Printed

Signature

Reviewed by: J. T. Schneider

Printed

Signature

RADIATED EMISSIONS



Test Report #: WC800186 Run 1

Test Area: LTS

EUT Model #: 90-176181-01-P (Part Number)

Date: 1/9/2008

EUT Serial #: PCRFCIDX00012

EUT Power: 12 VDC

Temperature: 23.0 °C

Test Method: FCC 15.247

Air Pressure: 99.0 kPa

Customer: John Deere

Rel. Humidity: 21.0 %

EUT Description: John Deere RFID - (North America)

Notes: Peak Power Measurement

Data File Name: 0186.dat

Page: 2 of 4

List of measurements for run #: 1

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA1 FCC-B <1GHz 3m	DELTA2 FCC B >1GHz 3m av
Mid channel						
400.045 MHz	44.05 Qp	2.01 / 15.74 / 29.93 / 0.0	31.87	V / 1.36 / 0	-14.13	n/a
Maxed						
400.045 MHz	49.05 Qp	2.01 / 15.74 / 29.93 / 0.0	36.87	V / 1.36 / 35	-9.13	n/a
High channel						
399.997 MHz	40.45 Qp	2.01 / 15.74 / 29.93 / 0.0	28.27	V / 1.00 / 0	-17.73	n/a
Maxed						
399.997 MHz	47.58 Qp	2.01 / 15.74 / 29.93 / 0.0	35.4	V / 1.31 / 37	-10.6	n/a

Tested by: Greg Jakubowski

Printed

Signature

Reviewed
by: J. T. Schneider

Printed

Signature

RADIATED EMISSIONS



Test Report #: WC800186 Run 1

Test Area: LTS

EUT Model #: 90-176181-01-P (Part Number)

Date: 1/9/2008

EUT Serial #: PCRFCIDX00012

EUT Power: 12 VDC

Temperature: 23.0 °C

Test Method: FCC 15.247

Air Pressure: 99.0 kPa

Customer: John Deere

Rel. Humidity: 21.0 %

EUT Description: John Deere RFID - (North America)

Notes: Peak Power Measurement

Data File Name: 0186.dat

Page: 3 of 4

Measurement summary for limit1: FCC-B <1GHz 3m (Qp)

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA1 FCC-B <1GHz 3m
400.045 MHz	49.05 Qp	2.01 / 15.74 / 29.93 / 0.0	36.87	V / 1.36 / 35	-9.13
902.78 MHz	106.7 Pk	2.99 / 23.14 / 0.0 / 0.0	132.84	V / 1.08 / 0	86.84*
927.25 MHz	107.36 Pk	3.02 / 22.87 / 0.0 / 0.0	133.25	V / 1.00 / 0	87.25*
915.253 MHz	107.11 Pk	3.01 / 22.89 / 0.0 / 0.0	133.01	V / 1.00 / 0	87.01*

* Fc, peak measurements against an average limit, n/a

Tested by: Greg Jakubowski

Printed

Signature

Reviewed by: J. T. Schneider

Printed

Signature

RADIATED EMISSIONS



Test Report #: WC800186 Run 1 Test Area: LTS

EUT Model #: 90-176181-01-P (Part Number) Date: 1/9/2008

EUT Serial #: PCRFCIDX00012 EUT Power: 12 VDC Temperature: 23.0 °C

Test Method: FCC 15.247 Air Pressure: 99.0 kPa

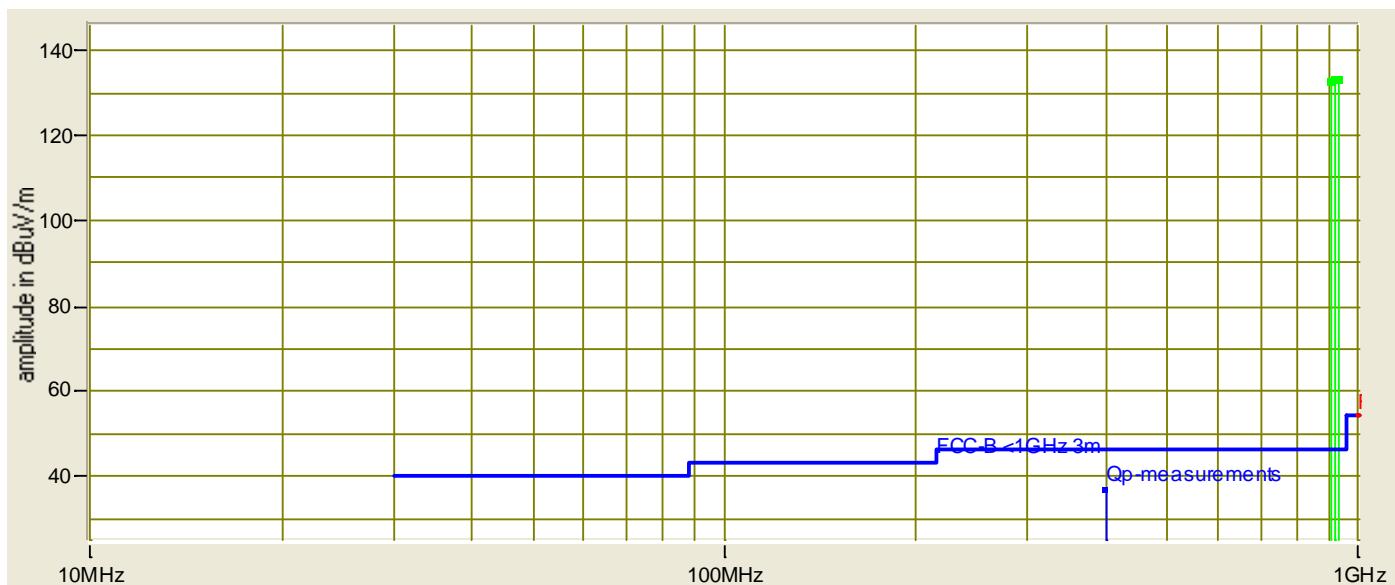
Customer: John Deere Rel. Humidity: 21.0 %

EUT Description: John Deere RFID - (North America)

Notes: Peak Power Measurement

Data File Name: 0186.dat Page: 4 of 4

Graph:



Tested by: Greg Jakubowski
Printed

Signature

Reviewed
by: J. T. Schneider
Printed

Signature

RADIATED EMISSIONS



Test Report #: WC800186 Run 2

Test Area: LTS

EUT Model #: 90-176181-01-P (Part Number)

Date: 1/9/2008

EUT Serial #: PCRFCIDX00012

EUT Power: 12 VDC

Temperature: 23.0 °C

Test Method: FCC 15.247

Air Pressure: 99.0 kPa

Customer: John Deere

Rel. Humidity: 21.0 %

EUT Description: RFID - North America

Notes: spurious emissions 1-10 GHz

Data File Name: 0186.dat

Page: 1 of 3

List of measurements for run #: 2

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA1 FCC B >1G 3 M pk	DELTA2 FCC B >1GHz 3m av
mid channel						
3.661 GHz	65.3 Pk	6.43 / 32.45 / 43.61 / 0.56	61.14	V / 1.14 / 240	-12.86	
3.661 GHz	49.73 Av	6.43 / 32.45 / 43.61 / 0.56	45.57	V / 1.14 / 240	n/a	-8.43
2.334 GHz	58.1 Pk	4.93 / 29.14 / 43.74 / 0.25	48.68	V / 1.00 / 0	-25.32	-5.32*
low channel						
3.61 GHz	65.1 Pk	6.39 / 32.33 / 43.65 / 0.56	60.72	V / 1.00 / 240	-13.28	
3.611 GHz	49.8 Av	6.39 / 32.33 / 43.65 / 0.56	45.42	V / 1.00 / 240	n/a	-8.58
high channel						
3.708 GHz	60.3 Pk	6.47 / 32.57 / 43.61 / 0.52	56.25	V / 1.00 / 240	-17.75	
3.708 GHz	45.6 Av	6.47 / 32.57 / 43.61 / 0.52	41.55	V / 1.00 / 240	n/a	-12.45
mid channel						
5.491 GHz	47.2 Pk	8.11 / 34.06 / 43.72 / 0.68	46.33	V / 1.00 / 240	-27.67	-7.67*
noise level						
1.83 GHz	92.6 Pk	4.32 / 27.52 / 43.16 / 0.62	81.89	V / 1.10 / 0	n/a	n/a
not in restricted band, >20 dB below fundamental						
1.248 GHz	57.0 Pk	3.59 / 25.34 / 42.17 / 0.3	44.06	V / 1.10 / 0	-29.94	-9.94*
low channel						
1.805 GHz	82.1 Pk	4.29 / 27.4 / 43.04 / 0.64	71.4	V / 1.10 / 0	n/a	n/a
high channel						
1.854 GHz	94.3 Pk	4.33 / 27.63 / 43.18 / 0.65	83.74	V / 1.10 / 0	n/a	n/a
no other signals up to 10 GHz						

Tested by: J. T. Schneider

Printed

Signature

Reviewed
by: G. S. Jakubowski

Printed

Signature

RADIATED EMISSIONS



Test Report #: WC800186 Run 2

Test Area: LTS

EUT Model #: 90-176181-01-P (Part Number)

Date: 1/9/2008

EUT Serial #: PCRFCIDX00012

EUT Power: 12 VDC

Temperature: 23.0 °C

Test Method: FCC 15.247

Air Pressure: 99.0 kPa

Customer: John Deere

Rel. Humidity: 21.0 %

EUT Description: RFID - North America

Notes: spurious emissions 1-10 GHz

Data File Name: 0186.dat

Page: 2 of 3

Measurement summary for limit1: FCC B >1G 3 M pk (Pk)

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA1 15.209 >1G 3 M pk
1.854 GHz	94.3 Pk	4.33 / 27.63 / 43.18 / 0.65	83.74	V / 1.10 / 0	>20 dBc
1.83 GHz	92.6 Pk	4.32 / 27.52 / 43.16 / 0.62	81.89	V / 1.10 / 0	>20 dBc
1.805 GHz	82.1 Pk	4.29 / 27.4 / 43.04 / 0.64	71.4	V / 1.10 / 0	>20 dBc
3.661 GHz	65.3 Pk	6.43 / 32.45 / 43.61 / 0.56	61.14	V / 1.14 / 240	-12.86
3.61 GHz	65.1 Pk	6.39 / 32.33 / 43.65 / 0.56	60.72	V / 1.00 / 240	-13.28
3.708 GHz	60.3 Pk	6.47 / 32.57 / 43.61 / 0.52	56.25	V / 1.00 / 240	-17.75
2.334 GHz	58.1 Pk	4.93 / 29.14 / 43.74 / 0.25	48.68	V / 1.00 / 0	-25.32
5.491 GHz	47.2 Pk	8.11 / 34.06 / 43.72 / 0.68	46.33	V / 1.00 / 240	-27.67
1.248 GHz	57.0 Pk	3.59 / 25.34 / 42.17 / 0.3	44.06	V / 1.10 / 0	-29.94

Tested by: J. T. Schneider

Printed

Signature

Reviewed
by: G. S. Jakubowski

Printed

Signature

RADIATED EMISSIONS



Test Report #: WC800186 Run 2

Test Area: LTS

EUT Model #: 90-176181-01-P (Part Number)

Date: 1/9/2008

EUT Serial #: PCRFCIDX00012

EUT Power: 12 VDC

Temperature: 23.0 °C

Test Method: FCC 15.247

Air Pressure: 99.0 kPa

Customer: John Deere

Rel. Humidity: 21.0 %

EUT Description: RFID - North America

Notes: spurious emissions 1-10 GHz

Data File Name: 0186.dat

Page: 3 of 3

Measurement summary for limit2: FCC B >1GHz 3m av (Av)

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA2 FCC B >1GHz 3m av
3.661 GHz	49.73 Av	6.43 / 32.45 / 43.61 / 0.56	45.57	V / 1.14 / 240	-8.43
3.611 GHz	49.8 Av	6.39 / 32.33 / 43.65 / 0.56	45.42	V / 1.00 / 240	-8.58
3.708 GHz	45.6 Av	6.47 / 32.57 / 43.61 / 0.52	41.55	V / 1.00 / 240	-12.45
2.334 GHz	58.1 Pk	4.93 / 29.14 / 43.74 / 0.25	48.68	V / 1.00 / 0	-5.32*
5.491 GHz	47.2 Pk	8.11 / 34.06 / 43.72 / 0.68	46.33	V / 1.00 / 240	-7.67*
1.248 GHz	57.0 Pk	3.59 / 25.34 / 42.17 / 0.3	44.06	V / 1.10 / 0	-9.94*

Tested by: J. T. Schneider

Joel T. Schneider

Printed

Signature

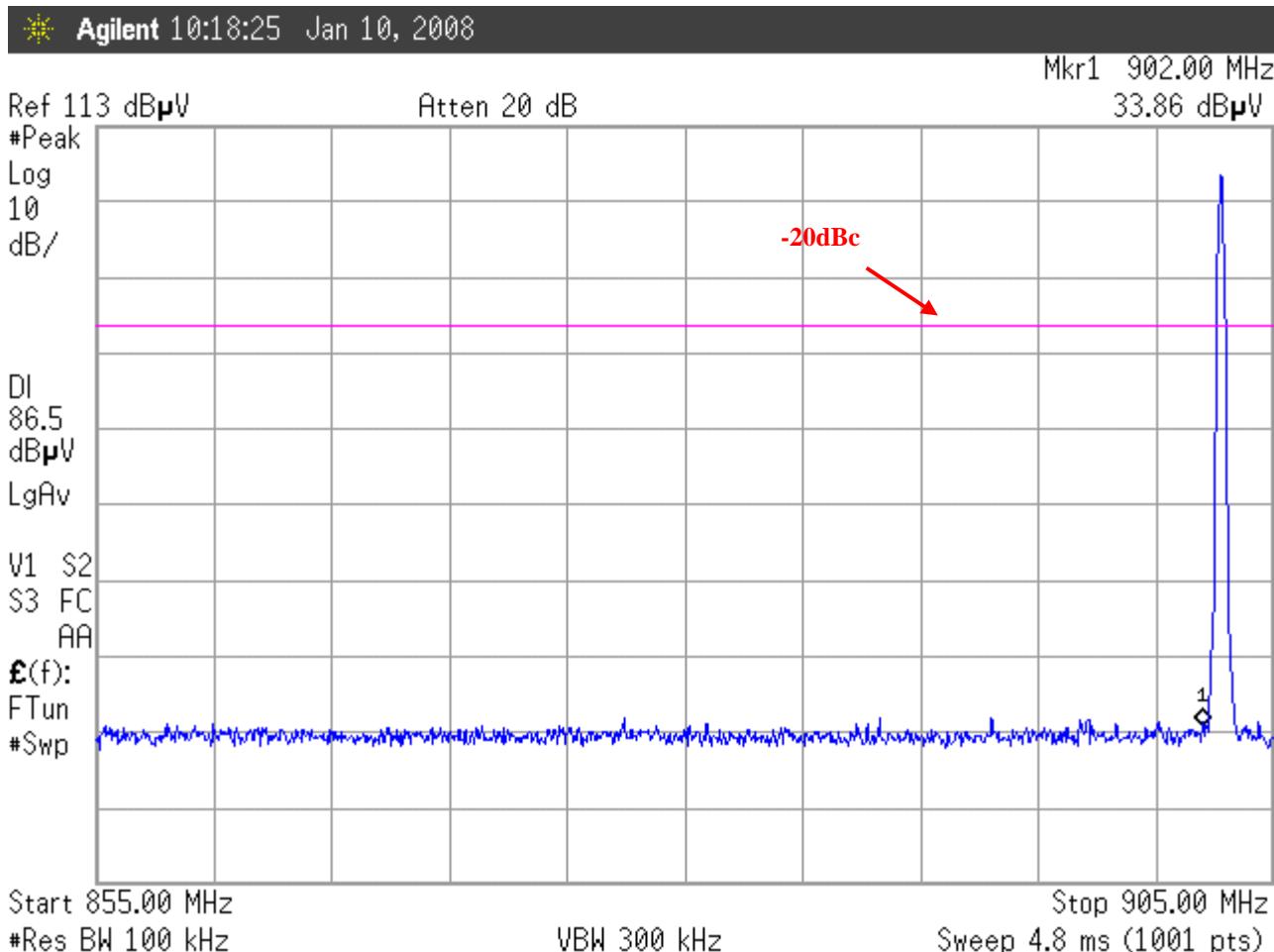
Reviewed
by: G. S. Jakubowski

G. S. Jakubowski

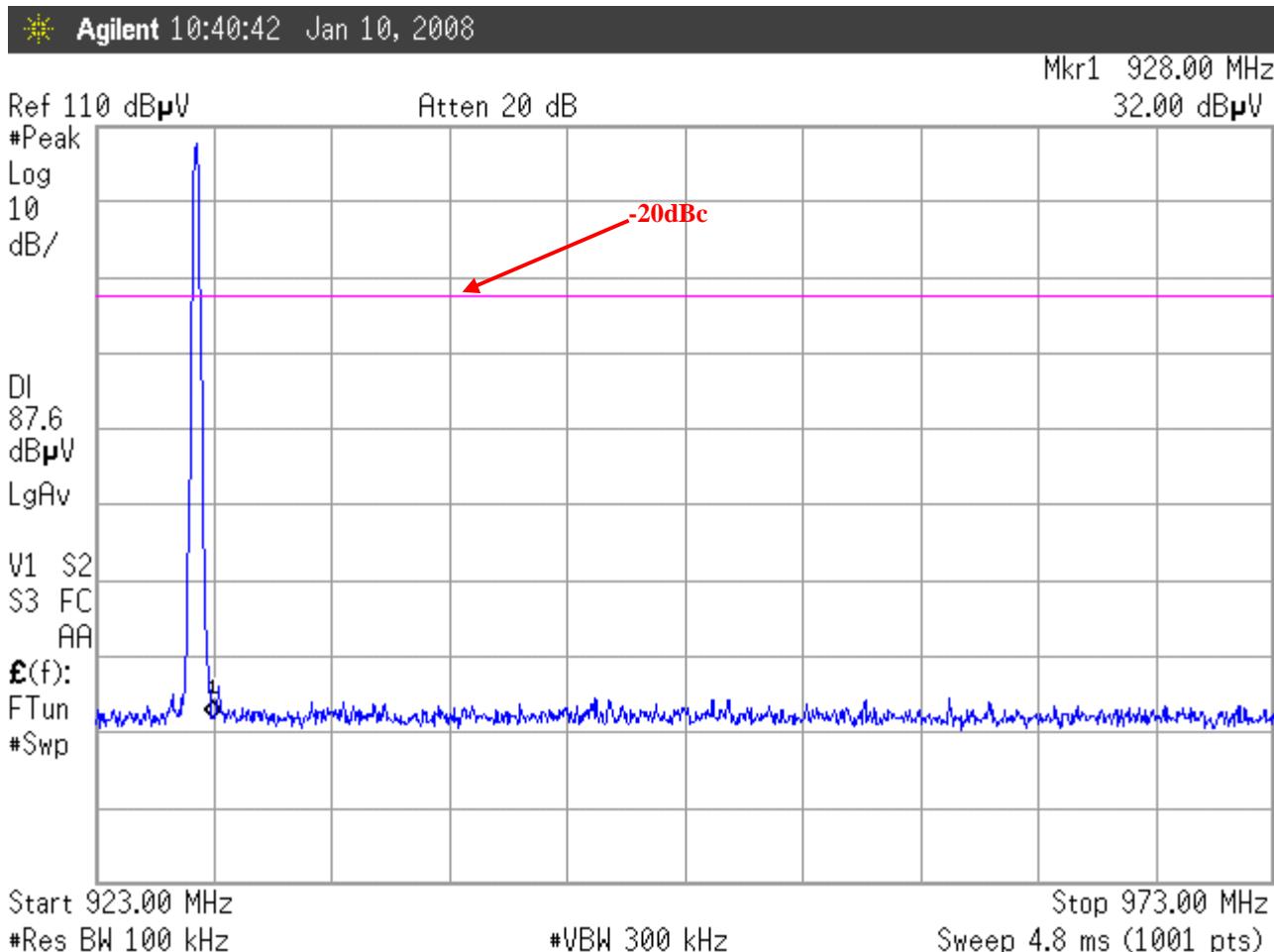
Printed

Signature

Band edge Low Channel



Band edge High Channel



Occupied Bandwidth

IC RSS-Gen 4.6.1

Test summary

The requirements are: - MET - NOT MET

99% bandwidth of the low channel = 124 kHz

99% bandwidth of the mid channel = 138 kHz

99% bandwidth of the hi channel = 148 kHz

Test was performed in accordance with "A Discussion on the Measurement of Occupied Bandwidth" by Brian Kasper. It was done as a radiated measurement, with the EUT in a test mode that allows selection of just the low, middle or highest channels with normal modulation.

Test location

- Wild River Lab Large Test Site (Open Area Test Site)
- Wild River Lab Small Test Site (Open Area Test Site)

Test equipment

TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
3371	E4440A	Agilent	Spectrum Analyzer	MY43362222	19-Dec-08
3202	EM-6917B	Electro-Metrics	Biconicalog Periodic	101	10-May-08

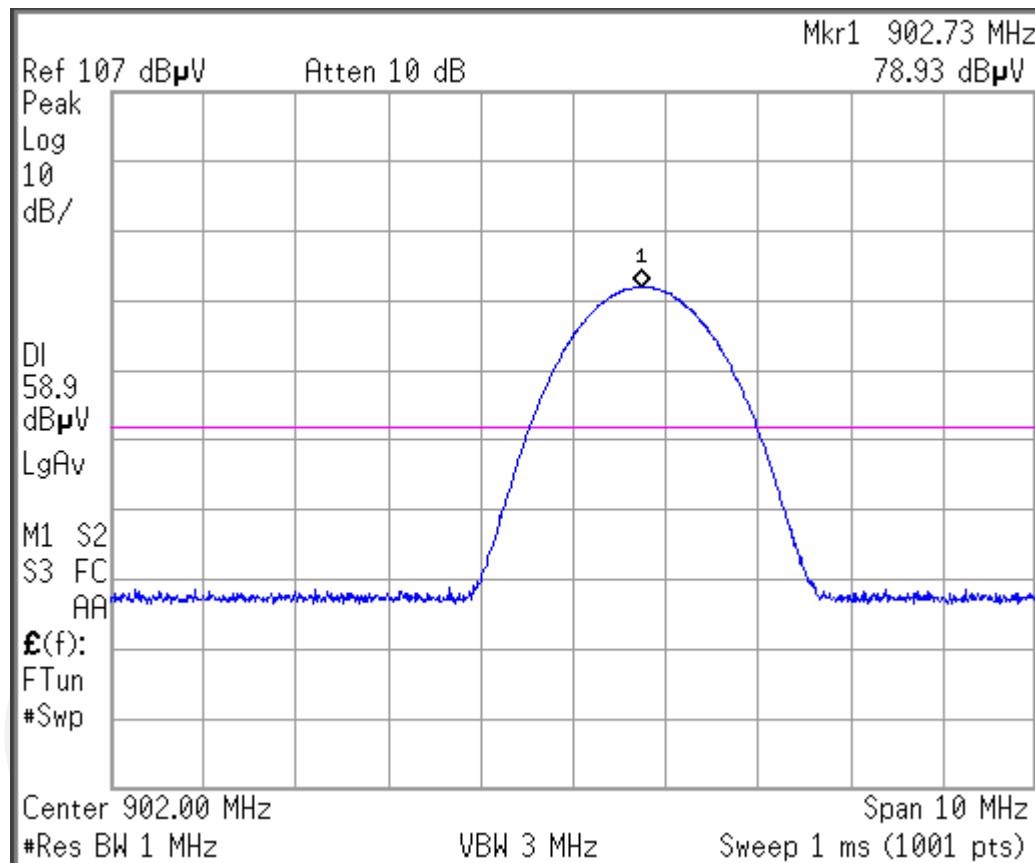
Test limit

No limit specified

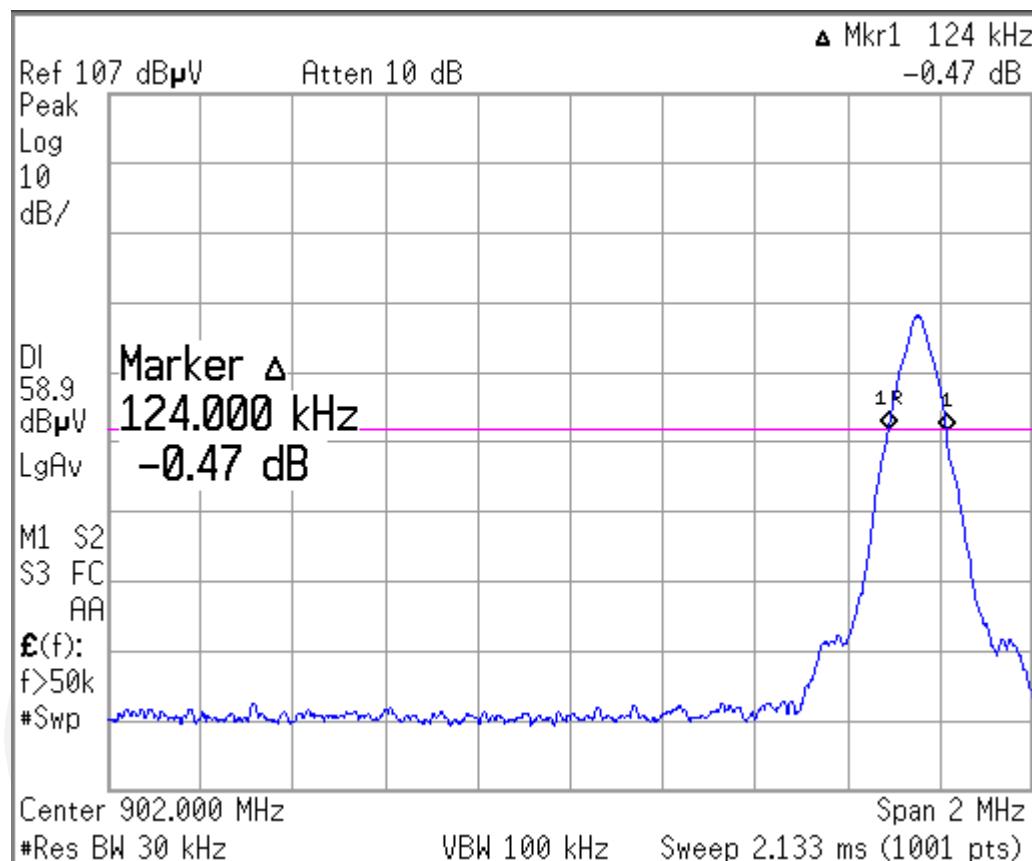
Test data

See following pages.

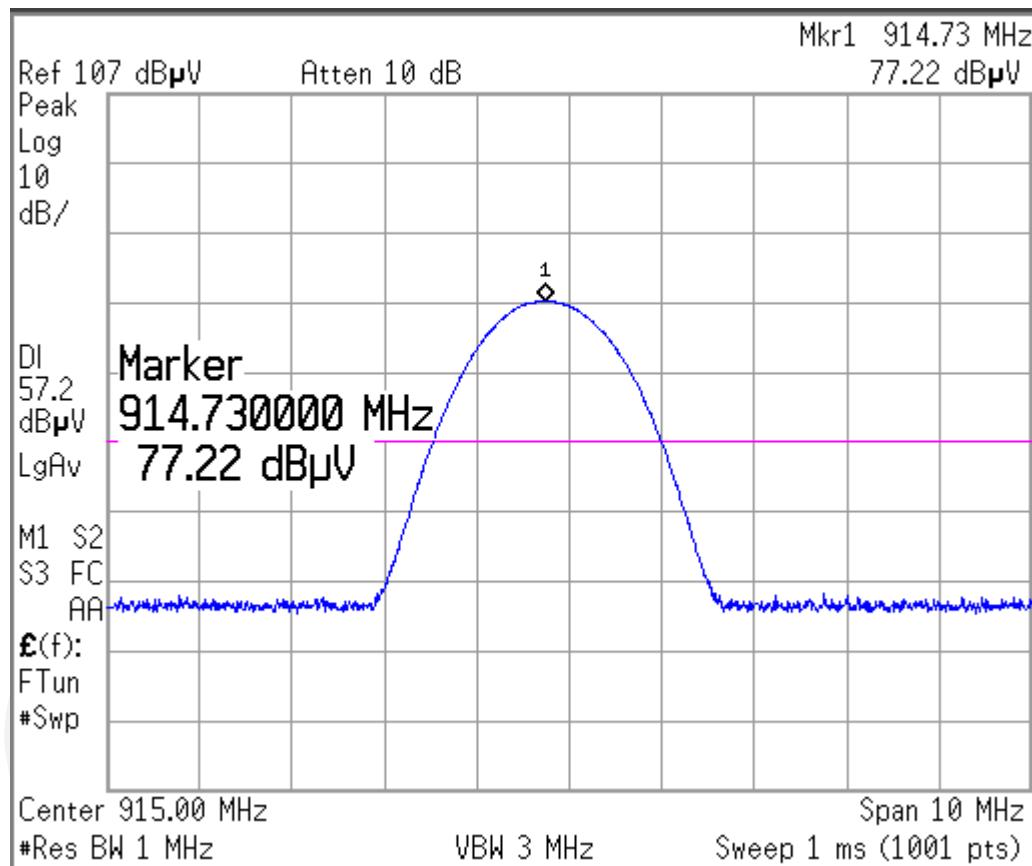
Low Channel – Amplitude Measurement



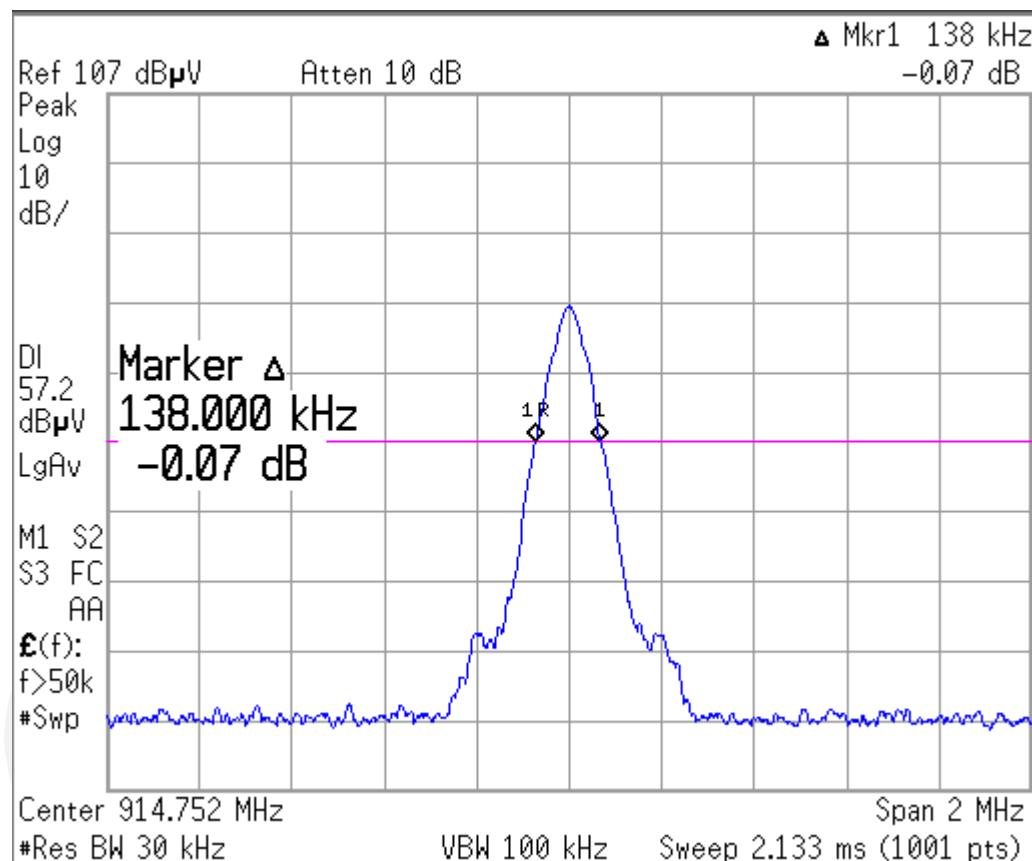
Low Channel - 99% Bandwidth Measurement



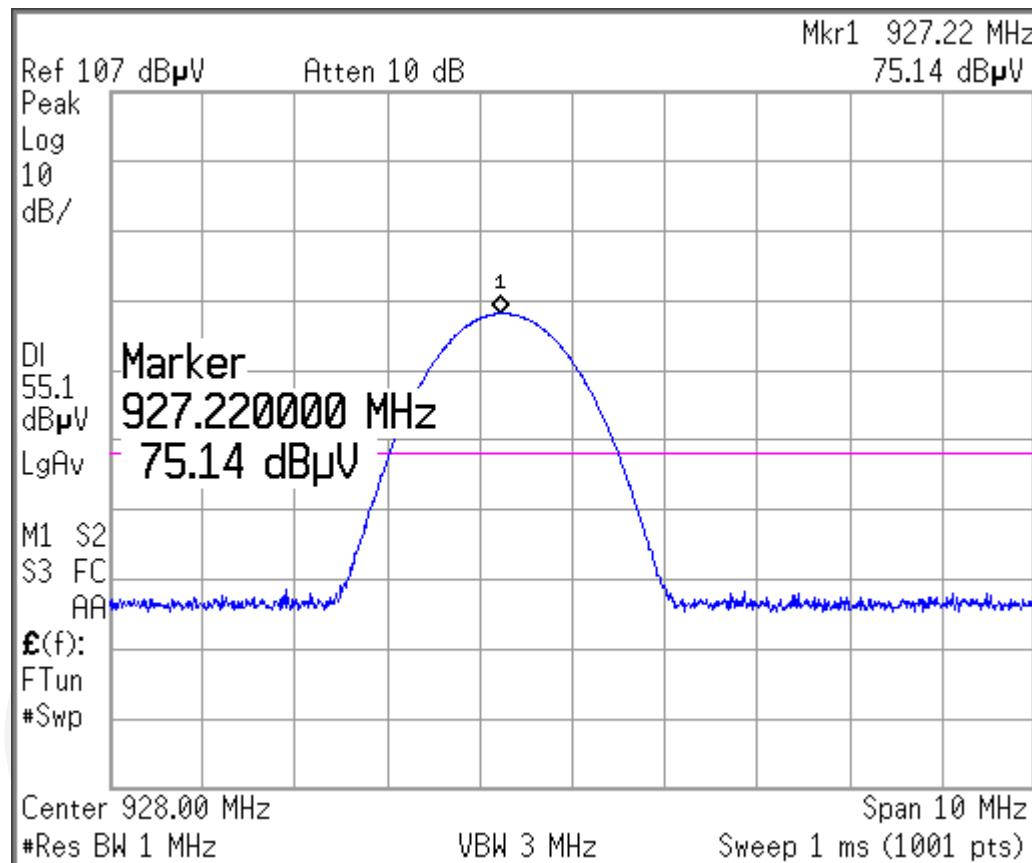
Middle Channel Amplitude Measurement



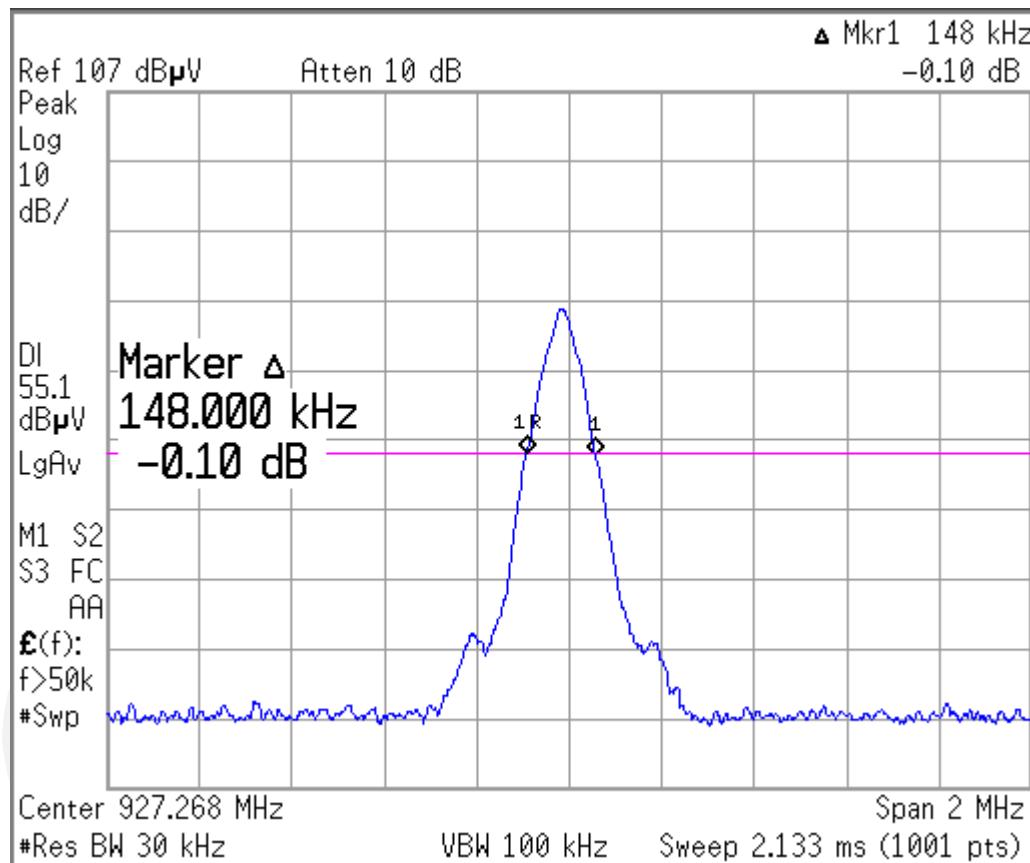
Middle Channel 99% Bandwidth Measurement



High Channel Amplitude Measurement



High Channel 99% Bandwidth Measurement

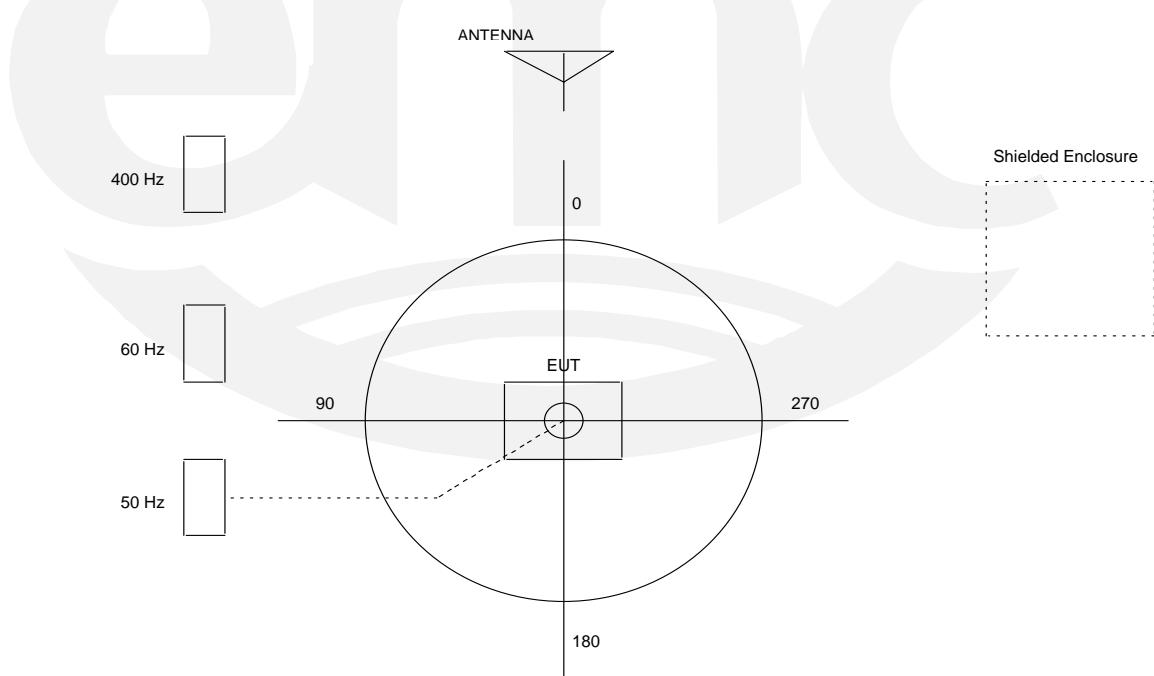


TEST SETUP FOR EMISSIONS TESTING

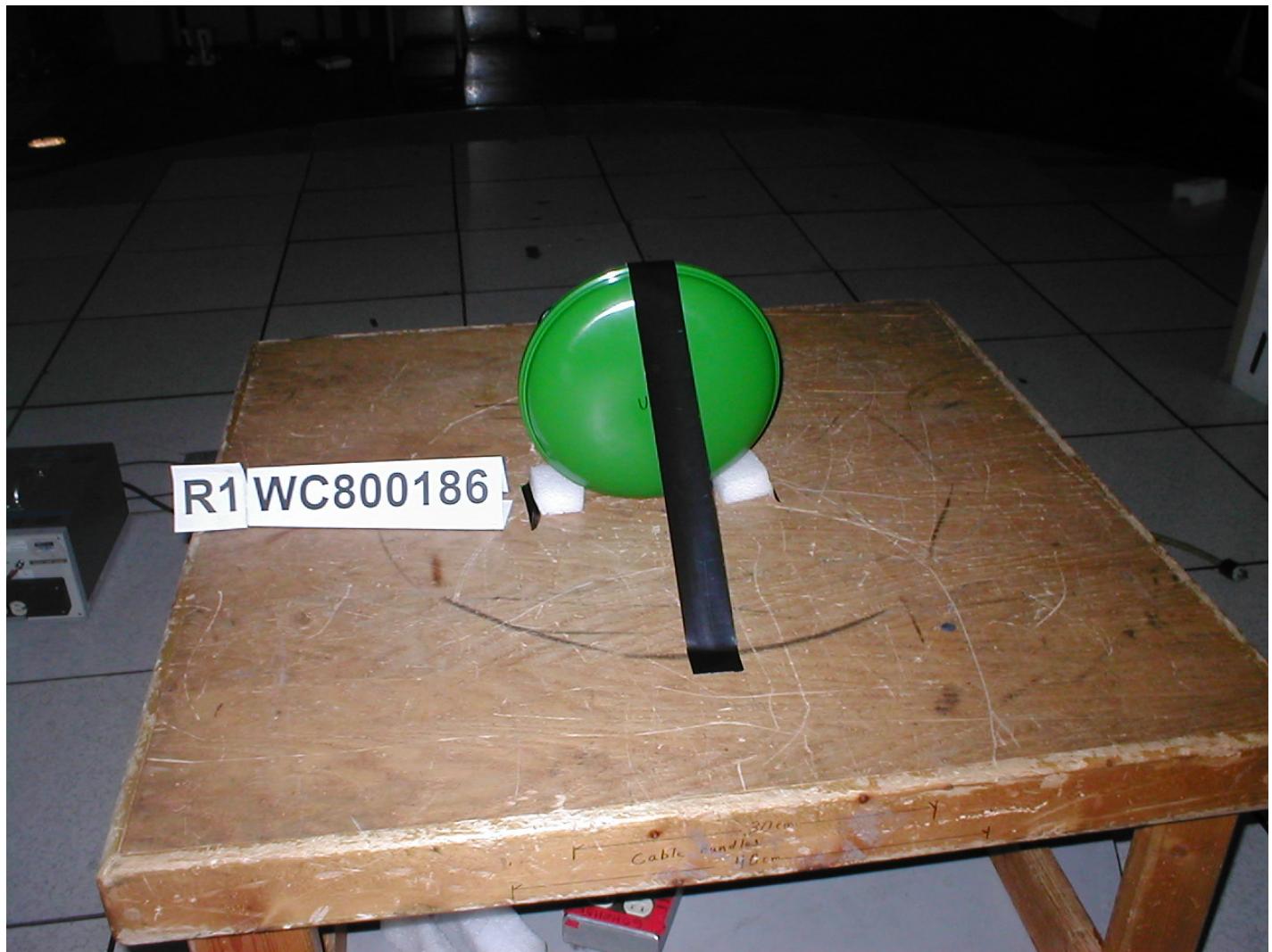
WILD RIVER LAB Large Test Site

Notes:

1. Items shown in dotted lines are located on the floor below the test area. It is 5 meters vertically from the ground floor to the test area.
2. 50 Hz, 60 Hz, and 400 Hz are power panels for alternating current.
3. The antenna may be positioned horizontally 3, 10 or 30 meters from the center of the turntable.
4. The circle is a 6.7 meter diameter turntable.
5. A ground plane is in the plane of this sheet.
6. The test sample is shown in the azimuthal position representing zero degrees.



Test-setup photo(s):



Test-setup photo(s):



Equipment Under Test (EUT) Test Operation Mode:

The device under test was operated under the following conditions during testing:

- Standby
- Test program (H - Pattern)
- Test program (color bar)
- Test program (customer specific)
- Practice operation
- Normal operating mode
- Frequency hopping or static low, mid, & high frequencies

Configuration of the device under test:

- See Appendix A and test setup photo(s)
- See Product Information Form(s) in Appendix B

DEVIATIONS FROM STANDARD:

None.

GENERAL REMARKS:

None

Modifications required to pass:

- None
- As indicated on the data sheet(s)

Test Specification Deviations: Additions to or Exclusions from:

- None
- As indicated in the Test Plan

SUMMARY:

The requirements according to the technical regulations are

- met and the device under test does fulfill the general approval requirements.
- **not** met and the device under test does **not** fulfill the general approval requirements..

EUT Received Date: 09 January 2008

Condition of EUT: Normal

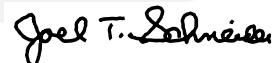
Testing Start Date: 09 January 2008

Testing End Date: 11 January 2008

TÜV SÜD AMERICA INC



Ross M Johnson
Senior EMC Technician



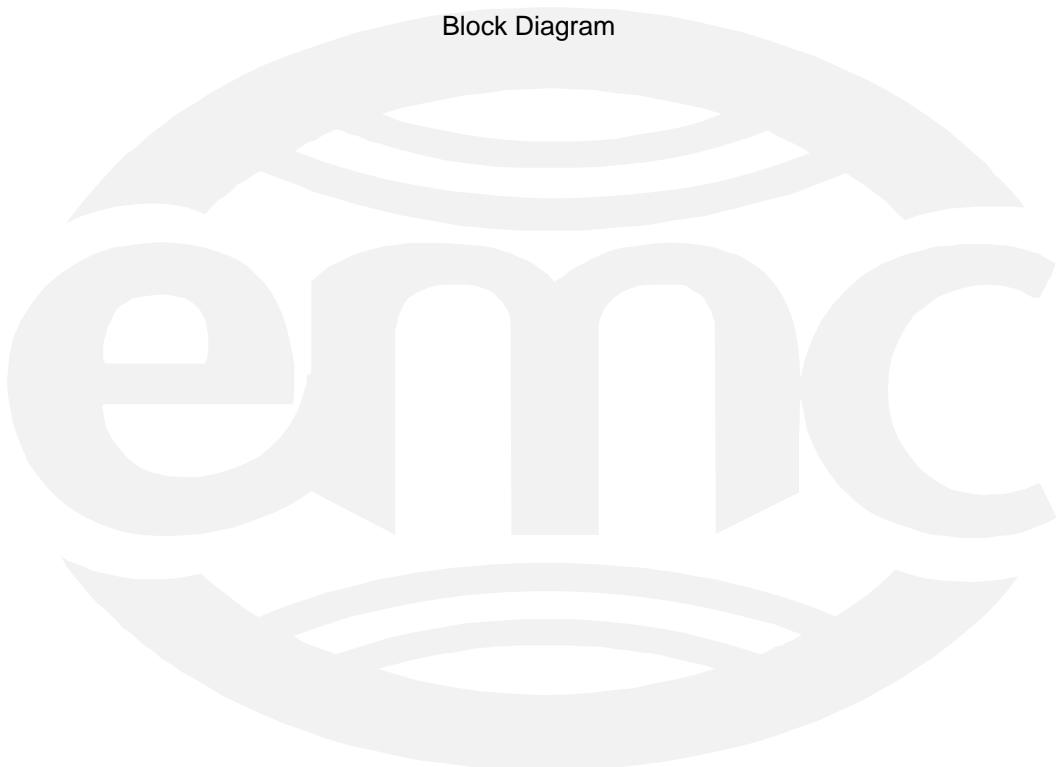
Joel Schneider
Senior EMC Engineer

Appendix A

Constructional Data Form

and

Block Diagram



Form



EMC Test Plan and Constructional Data Form

PLEASE COMPLETE THIS DOCUMENT IN FULL, ENTERING N/A IF THE FIELD IS NOT APPLICABLE. IF TESTING RESULTS IN MODIFICATIONS TO THE EQUIPMENT, PLEASE SUBMIT A REVISED TP/CDF INDICATING THOSE MODIFICATIONS.
NOTE: This information will be input into your test report as shown below. Press the F1 key at any time to get HELP for the current field selected.

Company: John Deere Intelligent Vehicle Systems
Address: 4140 114th St
Urbandale, IA 50322

Contact: Adam Bogenrief Position: Engineer
Phone: 515-331-4086 Fax: 515-331-4642
E-mail Address: BogenriefAdamE@JohnDeere.com

General Equipment Description -- **NOTE: This information will be input into your test report as shown below.**

EUT Description Round Green plastic unit that internally has a 902-928MHZ rf engine attached to a patch antenna.
EUT Name John Deere RFID
Model No.: See Product Serial No.: See Product
Product Options: NA
Configurations to be tested: 1) 4W EIRP for use in North America 2) 4W EIRP for use in Australia

Equipment Modification (If applicable, indicate modifications since EUT was last tested. If modifications are made during this testing, submit revised TP/CDF after testing is complete.)

Modifications since last test: NA
Modifications made during test: NA

Test Objective(s): Please indicate the tests to be performed, entering the applicable standard(s) where noted.

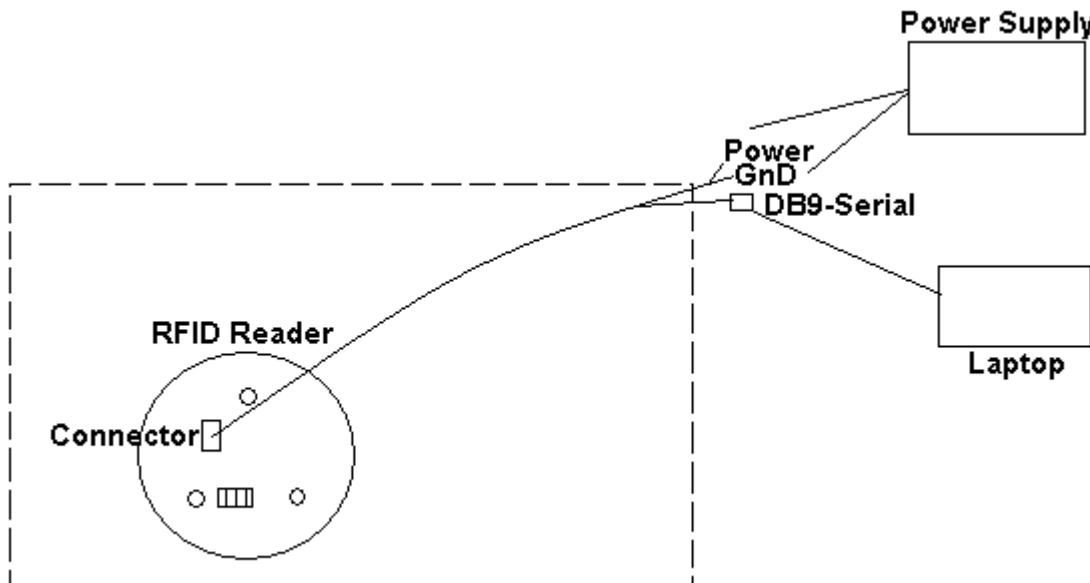
<input type="checkbox"/> EMC Directive 2004/108/EC (EMC) Std: _____	<input checked="" type="checkbox"/> FCC: Class A <input checked="" type="checkbox"/> B Part 15 <input type="checkbox"/> VCCI: Class A <input type="checkbox"/> B
<input type="checkbox"/> Machinery Directive 89/392/EEC (EMC) Std: _____	<input type="checkbox"/> BSMI: Class A <input type="checkbox"/> B (Separate Report) <input type="checkbox"/> Canada: Class A <input type="checkbox"/> B
<input type="checkbox"/> Medical Device Directive 93/42/EEC (EMC) Std: _____	<input type="checkbox"/> Australia: Class A <input type="checkbox"/> B <input type="checkbox"/> Other: _____
<input type="checkbox"/> Vehicle Directive: <input type="checkbox"/> 2001/3/EC (EMC) <input type="checkbox"/> 2004/104/EC (EMC) <input type="checkbox"/> Other Vehicle Std: _____	
<input type="checkbox"/> FDA Reviewers Guidance for Premarket Notification Submissions (EMC)	

Third Party Certification, if applicable (*Signature on Page 6 Required)

<input type="checkbox"/> Attestation of Conformity (AoC)* <input type="checkbox"/> Certificate of Conformity (CoC)* Protection Class (N/A for vehicles)	<input type="checkbox"/> EMC Certification (used with Octagon Mark)* <input type="checkbox"/> Compliance Document* <input type="checkbox"/> Class I <input type="checkbox"/> Class II <input type="checkbox"/> Class III (Press F1 when field is selected to show additional information on Protection Class.)
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EMC Block Diagram Form

System Configuration Block Diagram -- Provide a line drawing identifying the EUT, simulators, support equipment, I/O cables, power cables, and any other pertinent components to be used during testing. Use a dashed line to separate the equipment in the testing field versus equipment outside testing field.

**Authorization Signatures**

Adam Bogenrief

1-11-2008

Customer authorization to perform tests
according to this test plan.

Date

Test Plan/CDF Prepared By (please print)

Date

Form



EMC Test Plan and Constructional Data Form

FCC / TCB Certification
 E-Mark Certification

Industry Canada / FCB Certification
 Taiwan Certification

Attendance

Test will be: Attended by the customer Unattended by the customer

Failure - Complete this section if testing will not be attended by the customer.

If a failure occurs, TÜV America should:

Call contact listed above, if not available then stop testing. (After hrs phone): _____
 Continue testing to complete test series.
 Continue testing to define corrective action.
 Stop testing.

EUT Specifications and Requirements

Length: 11.25in Width: 11.25in Height: 3.5in Weight: _____

Power Requirements

Regulations require testing to be performed at typical power ratings in the countries of intended use. (i.e., European power is typically 230 VAC 50 Hz or 400 VAC 50 Hz, single and three phase, respectively)

Voltage: 12V DC (If battery powered, make sure battery life is sufficient to complete testing.)

of Phases: _____

Current (Amps/phase(max)): 2 amps Current (Amps/phase(nominal)): _____

Other _____

Other Special Requirements

Typical Installation and/or Operating Environment

(ie. Hospital, Small Business, Industrial/Factory, etc.)

Farm Equipment - Cotton Picker

EUT Power Cable

Permanent OR Removable Length (in meters): 10ft
 Shielded OR Unshielded
 Not Applicable

Form



EMC Test Plan and Constructional Data Form

Type	EUT Interface Ports and Cables				Termination	Connector Type	Port Termination	Length tested (in meters)	Removable	Permanent						
	Analog	Digital	During Test													
			Active	Passive												
EXAMPLE: RS232	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>Foil over braid</i>	Coaxial	<i>Metallized 9-pin D-Sub</i>						
RS232	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>Foil over braid</i>		<i>Characteristic Impedance</i>						
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EMC Test Plan and Constructional Data Form

EUT Software.

Revision Level: A

Description: New Product at beginning of Life Cycle

Equipment Under Test (EUT) Operating Modes to be Tested -- list the operating modes to be used during test. It is recommended the equipment be tested while operating in a typical operation mode. FCC testing of personal computers and/or peripherals requires that a simple program generate a complete line of upper case H's. Provide a general description of all software, firmware, and PLD algorithms used in the equipment. List all code modules as described above, with the revision level used during testing. Consult with your TÜV Product Service Representative if additional assistance is required.

1. Frequency Hopping
2. Static Frequency - Low, Medium, High
- 3.

Equipment Under Test (EUT) System Components -- List and describe all components which are part of the EUT. For FCC & Taiwan testing a minimum configuration is required. (ie. Mouse, Printer, Monitor, External Disk Drive, Motherboard, etc)

Description	Model #	Serial #	FCC ID #
John Deere RFID Reader	See Product	See Product	



EMC Test Plan and Constructional Data Form

Support Equipment -- List and describe all support equipment which is not part of the EUT. (i.e. peripherals, simulators, etc)
This information is required for FCC & Taiwan testing.

Description	Model #	Serial #	FCC ID #

Oscillator Frequencies

Manufacturer	Frequency	Derived Frequency	Component # / Location	Description of Use

Power Supply

Manufacturer	Model #	Serial #	Type
			<input type="checkbox"/> Switched-mode: (Frequency) _____ <input type="checkbox"/> Linear <input type="checkbox"/> Other: _____
			<input type="checkbox"/> Switched-mode: (Frequency) _____ <input type="checkbox"/> Linear <input type="checkbox"/> Other: _____

Power Line Filters

Manufacturer	Model #	Location in EUT



EMC Test Plan and Constructional Data Form

Critical EMI Components (Capacitors, ferrites, etc.)

Description	Manufacturer	Part # or Value	Qty	Component #/Location

EMC Critical Detail -- Describe other EMC Design details used to reduce high frequency noise.

(PLEASE INSERT "ELECTRONIC SIGNATURE" BELOW IF POSSIBLE)

Authorization Signatures (Signature Required for Certifications checked on pg 1)

Adam Bogenrief

1-11-2008

Customer authorization to perform tests
according to this test plan.

Date

Test Plan/CDF Prepared By (please print)

Date

Appendix B

Measurement Protocol



MEASUREMENT PROTOCOL

GENERAL INFORMATION

Test Methodology

Emissions testing is performed according to the procedures in ANSI C63.4-2003.

Measurement Uncertainty

The test system for conducted emissions is defined as the LISN, tuned receiver or spectrum analyzer, and coaxial cable. The test system has a measurement uncertainty of ± 1.8 dB. The test system for radiated emissions is defined as the antenna, the pre-amplifier, the spectrum analyzer and the coaxial cable. The test system has a measurement uncertainty of ± 4.8 dB. The equipment comprising the test systems is calibrated on an annual basis.

Justification

The Equipment Under Test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions. A cable is connected to each available port and either terminated with a peripheral into its characteristic impedance or left unterminated. When appropriate, the cables are manually manipulated with respect to each other to obtain maximum emissions from the unit.

Conducted Emissions

The final level, in $\text{dB}\mu\text{V}$, equals the EMI receiver level plus the cable loss and LISN factor.

Radiated Emissions

The final level, in $\text{dB}\mu\text{V/m}$, equals the reading from the spectrum analyzer (Level $\text{dB}\mu\text{V}$), adding the antenna correction factor and cable loss factor (Factor dB) to it, and subtracting the preamp gain (and duty cycle correction factor, if applicable). This result then has the limit subtracted from it to provide the Delta, which gives the tabular data as shown in the data sheets in Attachment A. Intentional radiators are rotated through 3 orthogonal axes to determine the test position yielding the maximum emission levels.

Example:

FREQ (MHz)	LEVEL (dBuV)	CABLE/ANT/PREAMP (dB)	FINAL (dB)	POL/HGT/AZ (m)	DELTA1
60.80	42.5Qp +	1.2 + 10.9 - 25.5 =	29.1	V 1.0 0.0	-10.9

Test Equipment

All measurement instrumentation is traceable to the National Institute of Standards and Technology and is calibrated according to internal procedure.

Radiated Emissions

Radiated emissions from the EUT are measured in the frequency range of 30 to 24500 MHz using a spectrum analyzer and appropriate broadband linearly polarized antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and quasi-peak detection and measurements above 1000 MHz are made with a 1 MHz/6 dB bandwidth and peak/average detection. Average detection is indicated by using 1 MHz rbw/ 10 Hz vbw. Tabletop equipment is placed on a 1.0 X 1.5 meter non-conducting table 80 centimeters above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. Interface cables that are closer than 40 centimeters to the ground plane are bundled in the center in a serpentine fashion so they are at least 40 centimeters from the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screen room located outside the test area. The antenna is positioned 3, 10 or 30 meters horizontally from the EUT. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 meters, measurement scans are made with both horizontal and vertical antenna polarizations and the EUT are rotated 360 degrees. ANSI C63.4:2003 is reference document used.