TEST RESULT SUMMARY

FCC Part 15 Subpart C Section 15.247
IC RSS-210 Issue 6
Emissions Requirements

MANUFACTURER	Digi International
NAME OF EQUIPMENT	Digi Connect WiEM Updated to use an alternate external PCB antenna
MODEL NUMBER	50000879-xx
MANUFACTURER'S ADDRESS	11001 Bren Road E. Minnetonka, MN 55343
TEST REPORT NUMBER	WC600852
TEST DATES	16 February 2006

According to testing performed at TÜV America Inc, the above-mentioned unit is in compliance with the applicable electromagnetic compatibility (EMC) portions of the requirements defined in FCC 15.247 & IC RSS-210.

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 America Inc, as an independent testing laboratory, declares that the equipment tested as specified above conforms to the applicable EMC requirements of FCC Section 15 “Radio Frequency Devices” Subpart C “Intentional Radiators” Section 15.247 “Operation within the bands 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz” and Industry Canada’s RSS-210 Issue 6 “Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment” Annex 8 “Frequency Hopping and Digital Modulation Systems Operating in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz Bands”.

Date: 20 February 2006

Tested By	Technical Writer
Joe Sausen	Greg Jakubowski

Nontransferable

EMC Emission - T E S T R E P O R T

Test Report File No.	:	**WC600852** Date of issue: 20 February 2006
Model / Serial Nos.	:	50000879-xx / n/a
Product Names	:	Digi Connect WiEM
Applicant	:	Digi International
Manufacturer	:	Digi International
Address	:	11001 Bren Road E. Minnetonka, MN 55343
Test Result	:	■ **Positive** ☐ **Negative**
Test Project Number Reference(s)	:	**WC600852**
Total pages including Appendices		29

TÜV 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 America Inc shall have no liability for any deductions, inferences or generalizations drawn by the client or others from TÜV 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 America Inc and its professional staff hold government and professional organization certifications and are members of AAMI, ACIL, AEA, ANSI, IEEE, NVLAP, and VCCI

TÜV AMERICA INC 19333 Wild Mountain Road Taylors Falls MN 55084-1758 Tel: 651 638 0297 Fax: 651 638 0298 112205

D I R E C T O R Y

Sign Explanations:
☐ - not applicable
■ - applicable

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EMISSIONS TEST REGULATIONS :

The emissions tests were performed according to following regulations:

☐ - EN 50081-1 / 1991

☐ - EN 55011 / 1991 ☐ - Group 1 ☐ - Group 2
☐ - Class A ☐ - Class B

☐ - EN 55013 / 1990

☐ - EN 55014 / 1987 ☐ - Household appliances and similar
☐ - Portable tools
☐ - Semiconductor devices

☐ - EN 55014 / A2:1990

☐ - EN 55014 / 1993 ☐ - Household appliances and similar
☐ - Portable tools
☐ - Semiconductor devices

☐ - EN 55015 / 1987

☐ - EN 55015 / A1:1990

☐ - EN 55015 / 1993

☐ - EN 55022 / 1987 ☐ - Class A ☐ - Class B

☐ - EN 55022 / 1991 ☐ - Class A ☐ - Class B

☐ - EN 300 330-2 V1.1.1

☐ - BS

☐ - VCCI ☐ - Class A ☐ - Class B

☐ - FCC Part 22 Subpart H

☐ - FCC Part 15 Subpart B ☐ - Class A ☐ - Class B

■ - FCC Part 15 Subpart C

☐ - CISPR 11 (1990) ☐ - Group 1 ☐ - Group 2
☐ - Class A ☐ - Class B

☐ - CISPR 22 (1993) ☐ - Class A ☐ - Class B

☐ - IC RSS-Gen Issue 1

■ - IC RSS-210 Issue 6

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Radiated emissions – spurious / harmonics (FCC 15.247, RSS-210 A8.5)

Test summary
The requirements are: ■ - MET ☐ - NOT MET
Minimum margin of compliance in the restricted bands is 5.5 dB at 331.795 MHz

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

Distance
■ - 3 meters
■ - 10 meters

Equipment

TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
3204	EM-6917B	Electro-Metrics	Biconicalog Periodic	102	19-Oct-06
2075	3115	Electro-Mechanics (EMCO)	Ridge Guide Ant. 1-18 GHz	9001-3275	07-Dec-06
3961	ZHL-1042J	Mini-Circuits	Preamplifier	D120403-1	Code B
3958	SL18B4020	Phase One Microwave	Preamplifier 1 – 18 GHz	0002	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
3808	NLP-1750	Mini-Circuits	10 – 1750 MHz LPF	1 0338	Code B
2680	85650A	Hewlett-Packard	Quasi-Peak Adapter	2043A00343	01-Jun-06
8052	8566B	Hewlett-Packard	Spectrum Analyzer	2115A00853	24-Mar-06
8051	85662A	Hewlett-Packard	Analyzer Display	2112A02220	24-Mar-06

Cal Code B = Calibration verification performed internally. Cal Code Y = Calibration not required when used with other calibrated equipment

Limit

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009–0.490	2400/F(kHz)	300
0.490–1.705	24000/F(kHz)	30
1.705–30.0	30	30
30–88	100 **	3
88–216	150 **	3
216–960	200 **	3
Above 960	500	3

Data
See pages A2 – A9

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See TR Set-ups Exhibit for photos

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T

Test Operation Mode:

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

☐ - Standby

☐ - Test program (H - Pattern)

☐ - Test program (color bar)

☐ - Test program (customer specific)

☐ - Practice operation

■ - FCC software -- "H"'s out of serial port and across radio link.

Configuration of the device under test:

■ - See block diagram, page B8

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DEVIATIONS FROM STANDARD:

None.

GENERAL REMARKS:

EUT was updated to use an alternate external PCB antenna.

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
☐ - **not** met.

The device under test does
■ - fulfill the general approval requirements mentioned on page 3.
☐ - **not** fulfill the general approval requirements mentioned on page 3.

EUT Received Date	16 February 2006
Condition of EUT	Normal
Testing Start Date	16 February 2006
Testing End Date	16 February 2006

- TÜV AMERICA INC -

Tested By:

Joe Sausen

Reviewed By:

Greg Jakubowski

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Appendix A

Test Data

TÜV AMERICA INC 19333 Wild Mountain Road Taylors Falls MN 55084-1758 Tel: 651 638 0297 Fax: 651 638 0298 112205

RADIATED EMISSIONS

Test Report #:	WC600852 Run 1	Test Area:	LTS		
EUT Model #:	50000879-xx Rev 1P	Date:	2/16/2006		
EUT Serial #:	n/a	EUT Power:	12 DC via p/s	Temperature:	20.0 °C
Test Method:	FCC 15.247, RSS-210			Air Pressure:	99.0 kPa
Customer:	Digi International			Rel. Humidity:	20.0 %
EUT Description:	Digi Connect Wi-EM				
Notes:	Updated to use an alternate external PCB antenna.				
Data File Name:	0852-1-RE - TR.dat			Page:	1 of 8

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 10m (3m - 10dB)	DELTA2 FCC B >1GHz 3m
66.426 MHz	38.9 Qp	1.18 / 9.5 / 27.0 / 0.0	22.57	V / 1.00 / 0	-7.43	n/a
66.624 MHz	39.25 Qp	1.18 / 9.47 / 27.0 / 0.0	22.89	V / 1.00 / 0	-7.11	n/a
132.762 MHz	40.85 Qp	1.66 / 7.58 / 27.0 / 0.0	23.09	V / 1.00 / 0	-10.41	n/a
133.278 MHz	42.15 Qp	1.67 / 7.56 / 27.0 / 0.0	24.38	V / 1.00 / 0	-9.12	n/a
497.69 MHz	33.45 Qp	3.41 / 17.11 / 27.94 / 0.0	26.03	V / 1.00 / 0	-9.97	n/a
75.876 MHz	35.4 Qp	1.26 / 8.02 / 26.98 / 0.0	17.71	V / 1.00 / 0	-12.29	n/a
165.912 MHz	33.7 Qp	1.87 / 8.41 / 27.0 / 0.0	16.99	V / 1.00 / 0	-16.51	n/a
331.789 MHz	33.7 Qp	2.75 / 13.4 / 27.55 / 0.0	22.29	V / 1.00 / 0	-13.71	n/a
332.899 MHz	30.0 Qp	2.75 / 13.44 / 27.56 / 0.0	18.64	V / 1.00 / 0	-17.36	n/a
387.091 MHz	31.3 Qp	2.97 / 15.8 / 27.75 / 0.0	22.32	V / 1.00 / 0	-13.68	n/a
Transmitter ON:						
Changed to shorter serial cable from screen room to EUT.						
66.426 MHz	30.8 Qp	1.18 / 9.5 / 27.0 / 0.0	14.47	V / 1.00 / 0	-15.53	n/a
75.876 MHz	35.65 Qp	1.26 / 8.02 / 26.98 / 0.0	17.96	V / 1.00 / 0	-12.04	n/a
132.762 MHz	27.25 Qp	1.66 / 7.58 / 27.0 / 0.1	9.59	V / 1.00 / 0	-23.91	n/a
133.278 MHz	27.3 Qp	1.67 / 7.56 / 27.0 / 0.1	9.63	V / 1.00 / 0	-23.87	n/a
165.912 MHz	35.75 Qp	1.87 / 8.41 / 27.0 / 0.1	19.14	V / 1.00 / 0	-14.36	n/a
331.789 MHz	28.25 Qp	2.75 / 13.4 / 27.55 / 0.1	16.94	V / 1.00 / 0	-19.06	n/a
332.899 MHz	28.2 Qp	2.75 / 13.44 / 27.56 / 0.1	16.94	V / 1.00 / 0	-19.06	n/a
387.091 MHz	33.15 Qp	2.97 / 15.8 / 27.75 / 0.17	24.35	V / 1.00 / 0	-11.65	n/a
497.69 MHz	28.8 Qp	3.41 / 17.11 / 27.94 / 0.2	21.58	V / 1.00 / 0	-14.42	n/a
497.69 MHz	30.55 Qp	3.41 / 17.11 / 27.94 / 0.2	23.33	V / 1.00 / 90	-12.67	n/a
165.912 MHz	34.95 Qp	1.87 / 8.41 / 27.0 / 0.1	18.34	V / 1.00 / 180	-15.16	n/a

Tested by: J. C. Sausen — Printed — Signature

Reviewed by: Greg Jakubowski — Printed — Signature

RADIATED EMISSIONS

Test Report #:	WC600852 Run 1	Test Area:	LTS		
EUT Model #:	50000879-xx Rev 1P	Date:	2/16/2006		
EUT Serial #:	n/a	EUT Power:	12 DC via p/s	Temperature:	20.0 °C
Test Method:	FCC 15.247, RSS-210			Air Pressure:	99.0 kPa
Customer:	Digi International			Rel. Humidity:	20.0 %
EUT Description:	Digi Connect Wi-EM				
Notes:	Updated to use an alternate external PCB antenna.				
Data File Name:	0852-1-RE - TR.dat			Page:	2 of 8

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 10m (3m - 10dB)	DELTA2 FCC B >1GHz 3m
331.789 MHz	39.35 Qp	2.75 / 13.4 / 27.55 / 0.1	28.04	V / 1.00 / 180	-7.96	n/a
332.899 MHz	32.85 Qp	2.75 / 13.44 / 27.56 / 0.1	21.59	V / 1.00 / 180	-14.41	n/a
308.005 MHz	33.65 Qp	2.64 / 12.84 / 27.5 / 0.1	21.72	V / 1.00 / 180	-14.28	n/a
303.577 MHz	32.95 Qp	2.62 / 12.61 / 27.5 / 0.1	20.77	V / 1.00 / 180	-15.23	n/a
314.847 MHz	32.7 Qp	2.67 / 13.19 / 27.5 / 0.1	21.16	V / 1.00 / 180	-14.84	n/a
343.066 MHz	31.8 Qp	2.8 / 13.89 / 27.6 / 0.1	20.99	V / 1.00 / 180	-15.01	n/a
348.724 MHz	33.2 Qp	2.82 / 14.13 / 27.6 / 0.1	22.65	V / 1.00 / 180	-13.35	n/a
387.1 MHz	31.3 Qp	2.97 / 15.8 / 27.75 / 0.17	22.5	V / 1.00 / 180	-13.5	n/a
343.066 MHz	32.5 Qp	2.8 / 13.89 / 27.6 / 0.1	21.69	V / 1.00 / 270	-14.31	n/a
348.724 MHz	35.7 Qp	2.82 / 14.13 / 27.6 / 0.1	25.15	V / 1.00 / 270	-10.85	n/a
387.091 MHz	31.55 Qp	2.97 / 15.8 / 27.75 / 0.17	22.75	V / 3.00 / 180	-13.25	n/a
348.724 MHz	33.55 Qp	2.82 / 14.13 / 27.6 / 0.1	23.0	V / 3.00 / 50	-13.0	n/a
303.577 MHz	37.1 Qp	2.62 / 12.61 / 27.5 / 0.1	24.92	H / 3.00 / 50	-11.08	n/a
308.005 MHz	36.15 Qp	2.64 / 12.84 / 27.5 / 0.1	24.22	H / 3.00 / 50	-11.78	n/a
314.847 MHz	34.4 Qp	2.67 / 13.19 / 27.5 / 0.1	22.86	H / 3.00 / 50	-13.14	n/a
343.066 MHz	36.45 Qp	2.8 / 13.89 / 27.6 / 0.1	25.64	H / 3.00 / 50	-10.36	n/a
348.724 MHz	39.0 Qp	2.82 / 14.13 / 27.6 / 0.1	28.45	H / 3.00 / 50	-7.55	n/a
497.69 MHz	33.05 Qp	3.41 / 17.11 / 27.94 / 0.2	25.83	H / 3.00 / 50	-10.17	n/a
352.003 MHz	38.95 Qp	2.83 / 14.28 / 27.6 / 0.1	28.56	H / 3.00 / 50	-7.44	n/a
347.599 MHz	35.7 Qp	2.82 / 14.08 / 27.6 / 0.1	25.1	H / 3.00 / 50	-10.9	n/a
337.441 MHz	36.4 Qp	2.77 / 13.64 / 27.58 / 0.1	25.34	H / 3.00 / 50	-10.66	n/a
331.795 MHz	39.5 Qp	2.75 / 13.4 / 27.55 / 0.1	28.19	H / 3.00 / 50	-7.81	n/a
307.999 MHz	36.25 Qp	2.64 / 12.84 / 27.5 / 0.1	24.32	H / 3.00 / 50	-11.68	n/a
261.819 MHz	33.9 Qp	2.43 / 11.76 / 27.22 / 0.1	20.97	H / 3.00 / 50	-15.03	n/a

Tested by: J. C. Sausen

Printed

Signature

Reviewed by: Greg Jakubowski

Printed

Signature

RADIATED EMISSIONS

Test Report #:	WC600852 Run 1	Test Area:	LTS		
EUT Model #:	50000879-xx Rev 1P	Date:	2/16/2006		
EUT Serial #:	n/a	EUT Power:	12 DC via p/s	Temperature:	20.0 °C
Test Method:	FCC 15.247, RSS-210			Air Pressure:	99.0 kPa
Customer:	Digi International			Rel. Humidity:	20.0 %
EUT Description:	Digi Connect Wi-EM				
Notes:	Updated to use an alternate external PCB antenna.				
Data File Name:	0852-1-RE - TR.dat			Page:	3 of 8

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 10m (3m - 10dB)	DELTA2 FCC B >1GHz 3m
387.091 MHz	35.7 Qp	2.97 / 15.8 / 27.75 / 0.17	26.9	H / 3.00 / 90	-9.1	n/a
307.999 MHz	36.95 Qp	2.64 / 12.84 / 27.5 / 0.1	25.02	H / 3.00 / 270	-10.98	n/a
331.795 MHz	40.6 Qp	2.75 / 13.4 / 27.55 / 0.1	29.29	H / 3.00 / 270	-6.71	n/a
332.899 MHz	34.3 Qp	2.75 / 13.44 / 27.56 / 0.1	23.04	H / 3.00 / 270	-12.96	n/a
497.69 MHz	34.35 Qp	3.41 / 17.11 / 27.94 / 0.2	27.13	H / 3.00 / 270	-8.87	n/a
497.69 MHz	34.5 Qp	3.41 / 17.11 / 27.94 / 0.2	27.28	H / 3.00 / 270	-8.72	n/a
303.577 MHz	36.05 Qp	2.62 / 12.61 / 27.5 / 0.1	23.87	H / 3.00 / 270	-12.13	n/a
497.69 MHz	35.6 Qp	3.41 / 17.11 / 27.94 / 0.2	28.38	H / 1.00 / 270	-7.62	n/a
553.004 MHz	31.4 Qp	3.61 / 18.47 / 28.09 / 0.2	25.6	H / 1.00 / 270	-10.4	n/a
497.69 MHz	35.9 Qp	3.41 / 17.11 / 27.94 / 0.2	28.68	H / 1.00 / 270	-7.32	n/a
553.004 MHz	31.5 Qp	3.61 / 18.47 / 28.09 / 0.2	25.7	H / 1.00 / 270	-10.3	n/a
553.004 MHz	32.45 Qp	3.61 / 18.47 / 28.09 / 0.2	26.65	H / 1.00 / 180	-9.35	n/a
331.8 MHz maxed:						
331.795 MHz	41.8 Qp	2.75 / 13.4 / 27.55 / 0.1	30.49	H / 2.76 / 232	-5.51	n/a
332.899 MHz	36.6 Qp	2.75 / 13.44 / 27.56 / 0.1	25.34	H / 2.76 / 232	-10.66	n/a
337.441 MHz	37.0 Qp	2.77 / 13.64 / 27.58 / 0.1	25.94	H / 2.76 / 232	-10.06	n/a
343.066 MHz	38.15 Qp	2.8 / 13.89 / 27.6 / 0.1	27.34	H / 2.76 / 232	-8.66	n/a
347.599 MHz	36.4 Qp	2.82 / 14.08 / 27.6 / 0.1	25.8	H / 2.76 / 232	-10.2	n/a
348.724 MHz	40.0 Qp	2.82 / 14.13 / 27.6 / 0.1	29.45	H / 2.76 / 232	-6.55	n/a
387.091 MHz	37.85 Qp	2.97 / 15.8 / 27.75 / 0.17	29.05	H / 2.76 / 232	-6.95	n/a
331 Mhz maxed:						
331.795 MHz	36.65 Qp	2.75 / 13.4 / 27.55 / 0.1	25.34	V / 3.58 / 236	-10.66	n/a

Tested by: J. C. Sausen

Printed | Signature

Reviewed by: Greg Jakubowski

Printed | Signature

RADIATED EMISSIONS

Test Report #:	WC600852 Run 1	Test Area:	LTS		
EUT Model #:	50000879-xx Rev 1P	Date:	2/16/2006		
EUT Serial #:	n/a	EUT Power:	12 DC via p/s	Temperature:	20.0 °C
Test Method:	FCC 15.247, RSS-210			Air Pressure:	99.0 kPa
Customer:	Digi International			Rel. Humidity:	20.0 %
EUT Description:	Digi Connect Wi-EM				
Notes:	Updated to use an alternate external PCB antenna.				
Data File Name:	0852-1-RE - TR.dat			Page:	4 of 8

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 10m (3m - 10dB)	DELTA2 FCC B >1GHz 3m
remaxed at 1 M ant ht:						
331.795 MHz	40.0 Qp	2.75 / 13.4 / 27.55 / 0.1	28.69	V / 1.00 / 143	-7.31	n/a
1.051 GHz	30.39 Av	2.71 / 25.18 / 49.12 / 0.0	9.17	V / 1.00 / 143	n/a	-44.83
1.88 GHz	32.85 Av	4.05 / 27.28 / 49.9 / 0.0	14.27	V / 1.00 / 143	n/a	-39.73
1.88 GHz	34.6 Pk	4.05 / 27.28 / 49.9 / 0.0	16.02	V / 1.00 / 143	n/a	-37.98*
1.051 GHz	34.3 Pk	2.71 / 25.18 / 49.12 / 0.0	13.08	V / 1.00 / 143	n/a	-40.92*
1.962 GHz	30.33 Av	4.06 / 27.77 / 49.75 / 0.0	12.41	V / 1.00 / 143	n/a	-41.59
1.962 GHz	40.35 Pk	4.06 / 27.77 / 49.75 / 0.0	22.43	V / 1.00 / 143	n/a	-31.57*
1.962 GHz	30.72 Av	4.06 / 27.77 / 49.75 / 0.0	12.8	V / 1.00 / 143	n/a	-41.2
No spurious emissions or transmitter harmonics detected above 1.96 GHz, vert and hor ant.						
Noise floor:						
4.8 GHz	37.9 Pk	6.17 / 32.49 / 45.27 / 0.4	31.69	V / 1.00 / 143	n/a	-22.31*
4.8 GHz	29.16 Av	6.17 / 32.49 / 45.27 / 0.4	22.95	V / 1.00 / 143	n/a	-31.05
4.847 GHz	29.58 Av	6.2 / 32.56 / 45.07 / 0.4	23.67	H / 1.00 / 143	n/a	-30.33
4.847 GHz	37.55 Pk	6.2 / 32.56 / 45.07 / 0.4	31.64	H / 1.00 / 143	n/a	-22.36*
7.247 GHz	41.8 Pk	8.03 / 35.71 / 45.89 / 0.9	40.55	H / 1.00 / 143	n/a	-13.45*
9.647 GHz	44.15 Pk	9.88 / 37.69 / 44.95 / 0.56	47.34	H / 1.00 / 143	n/a	-6.66*
12.0 GHz	39.05 Pk	10.98 / 39.0 / 44.61 / 0.7	45.12	H / 1.00 / 143	n/a	-8.88*
14.4 GHz	31.3 Pk	12.44 / 42.21 / 43.86 / 0.0	42.08	H / 1.00 / 143	n/a	-11.92*
16.8 GHz	31.6 Pk	13.96 / 41.34 / 44.97 / 0.0	41.93	H / 1.00 / 143	n/a	-12.07*
Fundamental:						
2.462 GHz	49.14 Av	4.17 / 28.88 / 0.0 / 0.0	82.19	H / 1.41 / 214	n/a	28.19

Tested by: J. C. Sausen — Printed — Signature

Reviewed by: Greg Jakubowski — Printed — Signature

RADIATED EMISSIONS

Test Report #:	WC600852 Run 1	Test Area:	LTS		
EUT Model #:	50000879-xx Rev 1P	Date:	2/16/2006		
EUT Serial #:	n/a	EUT Power:	12 DC via p/s	Temperature:	20.0 °C
Test Method:	FCC 15.247, RSS-210			Air Pressure:	99.0 kPa
Customer:	Digi International			Rel. Humidity:	20.0 %
EUT Description:	Digi Connect Wi-EM				
Notes:	Updated to use an alternate external PCB antenna.				
Data File Name:	0852-1-RE - TR.dat			Page:	5 of 8

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 10m (3m - 10dB)	DELTA2 FCC B >1GHz 3m
2.462 GHz	36.86 Av	4.17 / 28.88 / 0.0 / 0.0	69.91	V / 1.41 / 214	n/a	15.91
End of measurements.						

Tested by: J. C. Sausen — Printed — Signature

Reviewed by: Greg Jakubowski — Printed — Signature

RADIATED EMISSIONS

Test Report #:	WC600852 Run 1	Test Area:	LTS		
EUT Model #:	50000879-xx Rev 1P	Date:	2/16/2006		
EUT Serial #:	n/a	EUT Power:	12 DC via p/s	Temperature:	20.0 °C
Test Method:	FCC 15.247, RSS-210			Air Pressure:	99.0 kPa
Customer:	Digi International			Rel. Humidity:	20.0 %
EUT Description:	Digi Connect Wi-EM				
Notes:	Updated to use an alternate external PCB antenna.				
Data File Name:	0852-1-RE - TR.dat			Page:	6 of 8

Measurement summary for limit1: FCC-B <1GHz 10m (3m - 10dB) (Qp)

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA1 FCC-B <1GHz 10m (3m - 10dB)
331.795 MHz	41.8 Qp	2.75 / 13.4 / 27.55 / 0.1	30.49	H / 2.76 / 232	-5.51
348.724 MHz	40.0 Qp	2.82 / 14.13 / 27.6 / 0.1	29.45	H / 2.76 / 232	-6.55
387.091 MHz	37.85 Qp	2.97 / 15.8 / 27.75 / 0.17	29.05	H / 2.76 / 232	-6.95
66.624 MHz	39.25 Qp	1.18 / 9.47 / 27.0 / 0.0	22.89	V / 1.00 / 0	-7.11
497.69 MHz	35.9 Qp	3.41 / 17.11 / 27.94 / 0.2	28.68	H / 1.00 / 270	-7.32
66.426 MHz	38.9 Qp	1.18 / 9.5 / 27.0 / 0.0	22.57	V / 1.00 / 0	-7.43
352.003 MHz	38.95 Qp	2.83 / 14.28 / 27.6 / 0.1	28.56	H / 3.00 / 50	-7.44
343.066 MHz	38.15 Qp	2.8 / 13.89 / 27.6 / 0.1	27.34	H / 2.76 / 232	-8.66
133.278 MHz	42.15 Qp	1.67 / 7.56 / 27.0 / 0.0	24.38	V / 1.00 / 0	-9.12
553.004 MHz	32.45 Qp	3.61 / 18.47 / 28.09 / 0.2	26.65	H / 1.00 / 180	-9.35
337.441 MHz	37.0 Qp	2.77 / 13.64 / 27.58 / 0.1	25.94	H / 2.76 / 232	-10.06
347.599 MHz	36.4 Qp	2.82 / 14.08 / 27.6 / 0.1	25.8	H / 2.76 / 232	-10.2
132.762 MHz	40.85 Qp	1.66 / 7.58 / 27.0 / 0.0	23.09	V / 1.00 / 0	-10.41
332.899 MHz	36.6 Qp	2.75 / 13.44 / 27.56 / 0.1	25.34	H / 2.76 / 232	-10.66
307.999 MHz	36.95 Qp	2.64 / 12.84 / 27.5 / 0.1	25.02	H / 3.00 / 270	-10.98
303.577 MHz	37.1 Qp	2.62 / 12.61 / 27.5 / 0.1	24.92	H / 3.00 / 50	-11.08
75.876 MHz	35.65 Qp	1.26 / 8.02 / 26.98 / 0.0	17.96	V / 1.00 / 0	-12.04
314.847 MHz	34.4 Qp	2.67 / 13.19 / 27.5 / 0.1	22.86	H / 3.00 / 50	-13.14
165.912 MHz	35.75 Qp	1.87 / 8.41 / 27.0 / 0.1	19.14	V / 1.00 / 0	-14.36
261.819 MHz	33.9 Qp	2.43 / 11.76 / 27.22 / 0.1	20.97	H / 3.00 / 50	-15.03

Tested by: J. C. Sausen — Printed — Signature

Reviewed by: Greg Jakubowski — Printed — Signature

RADIATED EMISSIONS

Test Report #:	WC600852 Run 1	Test Area:	LTS		
EUT Model #:	50000879-xx Rev 1P	Date:	2/16/2006		
EUT Serial #:	n/a	EUT Power:	12 DC via p/s	Temperature:	20.0 °C
Test Method:	FCC 15.247, RSS-210			Air Pressure:	99.0 kPa
Customer:	Digi International			Rel. Humidity:	20.0 %
EUT Description:	Digi Connect Wi-EM				
Notes:	Updated to use an alternate external PCB antenna.				
Data File Name:	0852-1-RE - TR.dat			Page:	7 of 8

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

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA2 FCC B >1GHz 3m
4.847 GHz	29.58 Av	6.2 / 32.56 / 45.07 / 0.4	23.67	H / 1.00 / 143	-30.33
4.8 GHz	29.16 Av	6.17 / 32.49 / 45.27 / 0.4	22.95	V / 1.00 / 143	-31.05
1.88 GHz	32.85 Av	4.05 / 27.28 / 49.9 / 0.0	14.27	V / 1.00 / 143	-39.73
1.962 GHz	30.72 Av	4.06 / 27.77 / 49.75 / 0.0	12.8	V / 1.00 / 143	-41.2
1.051 GHz	30.39 Av	2.71 / 25.18 / 49.12 / 0.0	9.17	V / 1.00 / 143	-44.83
1.88 GHz	34.6 Pk	4.05 / 27.28 / 49.9 / 0.0	16.02	V / 1.00 / 143	-37.98*
1.051 GHz	34.3 Pk	2.71 / 25.18 / 49.12 / 0.0	13.08	V / 1.00 / 143	-40.92*
1.962 GHz	40.35 Pk	4.06 / 27.77 / 49.75 / 0.0	22.43	V / 1.00 / 143	-31.57*
4.8 GHz	37.9 Pk	6.17 / 32.49 / 45.27 / 0.4	31.69	V / 1.00 / 143	-22.31*
4.847 GHz	37.55 Pk	6.2 / 32.56 / 45.07 / 0.4	31.64	H / 1.00 / 143	-22.36*
7.247 GHz	41.8 Pk	8.03 / 35.71 / 45.89 / 0.9	40.55	H / 1.00 / 143	-13.45*
9.647 GHz	44.15 Pk	9.88 / 37.69 / 44.95 / 0.56	47.34	H / 1.00 / 143	-6.66*
12.0 GHz	39.05 Pk	10.98 / 39.0 / 44.61 / 0.7	45.12	H / 1.00 / 143	-8.88*
14.4 GHz	31.3 Pk	12.44 / 42.21 / 43.86 / 0.0	42.08	H / 1.00 / 143	-11.92*
16.8 GHz	31.6 Pk	13.96 / 41.34 / 44.97 / 0.0	41.93	H / 1.00 / 143	-12.07*

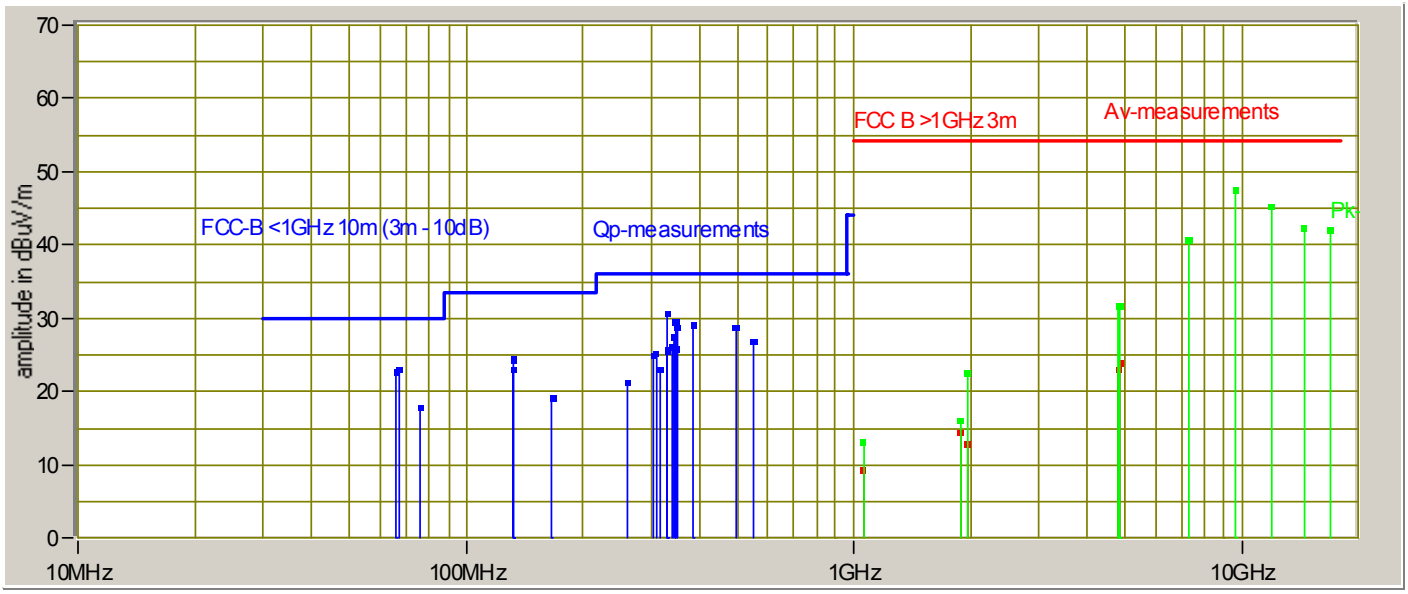
Tested by: J. C. Sausen — Printed — Signature

Reviewed by: Greg Jakubowski — Printed — Signature

RADIATED EMISSIONS

Test Report #:	WC600852 Run 1	Test Area:	LTS		
EUT Model #:	50000879-xx Rev 1P	Date:	2/16/2006		
EUT Serial #:	n/a	EUT Power:	12 DC via p/s	Temperature:	20.0 °C
Test Method:	FCC 15.247, RSS-210			Air Pressure:	99.0 kPa
Customer:	Digi International			Rel. Humidity:	20.0 %
EUT Description:	Digi Connect Wi-EM				
Notes:	Updated to use an alternate external PCB antenna.				
Data File Name:	0852-1-RE - TR.dat			Page:	8 of 8

Graph:



Tested by: J. C. Sausen

Printed | Signature

Reviewed by: Greg Jakubowski

Printed | Signature

Appendix B

Constructional Data Form

and

Block Diagram

TÜV AMERICA INC 19333 Wild Mountain Road Taylors Falls MN 55084-1758 Tel: 651 638 0297 Fax: 651 638 0298 112205

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: Digi International

Address: 11001 Bren Road E.
Minnetonka, MN 55343

Contact: Trinh Huynh Position: Engineering Services

Phone: (515) 257-4120 Fax:

E-mail Address: trinh.huynh@digi.com

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

EUT Description: 802.11b radio to 2 serial ports converter module.

EUT Name: Digi Connect WiEM

Model No.: 50000879-xx Serial No.:

Product Options: external antenna - PCB

Configurations to be tested:

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: Addition of an external antenna option

Modifications made during test:

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

- ☐ EMC Directive 89/336/EEC (EMC) Std:
- ☐ Machinery Directive 89/392/EEC (EMC Std:
- ☐ Medical Device Directive 93/42/EEC (EMC) Std:
- ☐ Vehicle Directive 72/245/EEC (EMC) Std:
- ☐ FDA Reviewers Guidance for Premarket Notification Submissions (EMC)

- ☐ FCC: Class ☐ A ☐ B Part
- ☐ VCCI: Class ☐ A ☐ B
- ☐ BSMI: Class ☐ A ☐ B
- ☐ Canada: Class ☐ A ☐ B
- ☐ Australia: Class ☐ A ☐ B
- ☐ Other: FCC Part 15 Subpart C Section 15.247 Radiated emmision test/RSS 210

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

- ☐ Attestation of Conformity (AoC)*
- ☐ Certificate of Conformity (CoC)*
- ☐ EMC Certification (used with Octagon Mark)*
- ☐ Compliance Document*

Protection Class (N/A for vehicles) ☐ Class I ☐ Class II ☐ Class III

(Press **F1** when field is selected to show additional information on Protection Class.)

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: _____ Width: _____ Height: _____ 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: N/A (If battery powered, make sure battery life is sufficient to complete testing.)

# of Phases: _____

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

Other _____

Other Special Requirements

Typical Installation and/or Operating Environment

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

EUT Power Cable

☐ Permanent OR ☐ Removable Length (in meters): _____
☐ Shielded OR ☐ Unshielded
☐ Not Applicable

EMC Test Plan and Constructional Data Form

EUT Interface Ports and Cables

Type	Analog	Digital	During Test: Active	During Test: Passive	Qty	Shielding: Yes	Shielding: No	Shielding: Type	Termination	Connector Type	Port Termination	Length tested (in meters)	Removable	Permanent
EXAMPLE: *RS232*	☐	☒	☒	☐	*2*	☒	☐	*Foil over braid*	*Coaxial*	*Metallized 9-pin D-Sub*	*Characteristic Impedance*	*6*	☒	☐
Serial Cable	☐	☒	☐	☐	1	☒	☐	Foil		Metallized DB9		2	☒	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
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	☐	☐	☐	☐		☐	☐						☐	☐

EMC Test Plan and Constructional Data Form

EUT Software.

Revision Level:

Description: Production release

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. FCC software -- "H"'s out of serial port and across radio link.

2.

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 #

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 #*
Linksys access point	WAP11	G3110304780	07JGL2411AP
IBM Think Pad PC	2611	AA-DVBCD	

Oscillator Frequencies

Frequency	*Derived Frequency*	*Component # / Location*	*Description of Use*
18.432MHz			
44MHz			
2.4GHz			

Power Supply

Manufacturer	*Model #*	*Serial #*	*Type*
			☐ Switched-mode: (Frequency) _____ ☐ Linear ☐ Other: _____
			☐ Switched-mode: (Frequency) _____ ☐ Linear ☐ 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)

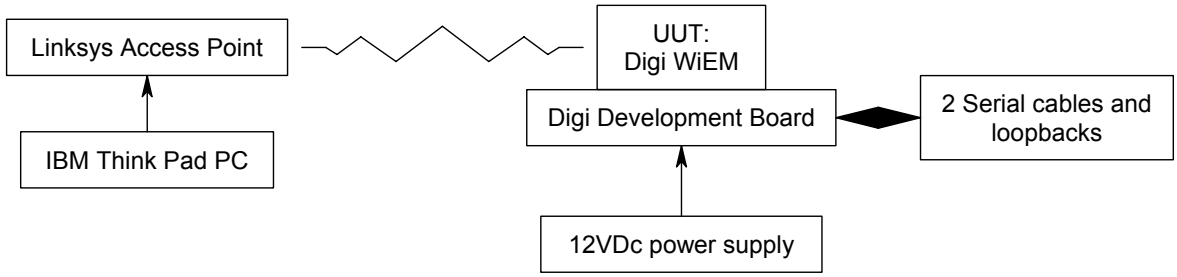
Authorization Signatures (Signature Required for Certifications checked on pg 1)

Customer authorization to perform tests according to this test plan.	Date
Test Plan/CDF Prepared By (please print)	Date

Form

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

Customer authorization to perform tests according to this test plan.	Date
Test Plan/CDF Prepared By (please print)	Date

Appendix C

Measurement Protocol

TÜV AMERICA INC 19333 Wild Mountain Road Taylors Falls MN 55084-1758 Tel: 651 638 0297 Fax: 651 638 0298 112205

MEASUREMENT PROTOCOL
GENERAL INFORMATION

Environmental conditions in the lab,
Temperature: 20°C
Relative Humidity: 20%
Atmospheric pressure: 99.0 kPa
Power supply system: Internal DC battery

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.

Radiated Emissions
The final level, in dBμV/m, equals the reading from the spectrum analyzer (Level dBμV), 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.

Example:

FREQ	LEVEL		CABLE/ANT/PREAMP			FINAL	POL/HGT/AZ			DELTA1
(MHz)	(dBuV)		(dB)	(dB/m)	(dB)	(dBuV/m)		(m)	(deg)	
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.

TÜV AMERICA INC 19333 Wild Mountain Road Taylors Falls MN 55084-1758 Tel: 651 638 0297 Fax: 651 638 0298 112205