TEST RESULT SUMMARY

FCC PART 15 SUBPART C
Section 15.247
FCC PART 15 SUBPART C
Section 15.207 Conducted Emission Requirements

MANUFACTURER'S NAME	Digi International
NAME OF EQUIPMENT	Wi-ME 802.11b radio to serial converter module
TYPE OF EQUIPMENT	802.11B 11 Mbit 2.4 GHz radio transceiver to single TTL serial port converter
MODEL NUMBER	**50000880-xx Rev 1P**
MANUFACTURER'S ADDRESS	11001 Bren Road East Minnetonka, MN 55343
TEST REPORT NUMBER	WC401600
TEST DATE	16 & 24 April 2004 03 May 2004 29 June 2004

According to testing performed at TÜV Product Service Inc, the above-mentioned unit is in compliance with the electromagnetic compatibility requirements defined in FCC Part 15 Subpart C Sections 15.207 and 15.247.

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 Product Service Inc, as an independent testing laboratory, declares that the equipment tested as specified above conforms to the requirements of FCC Part 15 Subpart C Sections 15.207 and 15.247.

Date: 08 July 2004

Location: Taylors Falls MN USA

J. C. Sausen
Tested By

J. T. Schneider
Reviewed By

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

Test Report File No.	:	**WC401600**	Date of issue:	08 July 2004

Model No.	:	**50000880-xx Rev 1P**
Product Name	:	Wi-ME 802.11b radio to serial converter module
Product Type	:	802.11B 11 Mbit 2.4 GHz radio transceiver to single TTL serial port converter
Applicant	:	Digi International
Manufacturer	:	Digi International
License holder	:	Digi International
Address	:	11001 Bren Road East
	:	Minnetonka, MN 55343
Test Result	:	■ **Positive** ☐ **Negative**
Test Project Number Reference(s)	:	**WC401600**
Total pages including Appendices		59

TÜV Product Service Inc is a subcontractor to TÜV Product Service, GmbH according to the principles outlined in ISO/IEC Guide 25 and EN 45001.

TÜV Product Service 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 Product Service Inc shall have no liability for any deductions, inferences or generalizations drawn by the client or others from TÜV Product Service 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 or any agency of the US government.

TÜV Product Service Inc and its professional staff hold government and professional organization certifications and are members of AAMI, ACIL, AEA, ANSI, IEEE, NVLAP, and VCCI

TÜV PRODUCT SERVICE INC 19333 Wild Mountain Road Taylors Falls MN 55084-1758 Tel: 651 638 0297 Fax: 651 638 0298 Rev.No 1.0

D I R E C T O R Y - EMISSIONS

TÜV PRODUCT SERVICE INC 19333 Wild Mountain Road Taylors Falls MN 55084-1758 Tel: 651 638 0297 Fax: 651 638 0298 Rev.No 1.0

EMISSIONS TEST REGULATIONS :

The emissions tests were performed according to following regulations:

☐ - EN 50081-1 / 1991

☐ - EN 55011 / 1998 w/Amendment A1:1999 ☐ - 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

■ - FCC Part 15 Subpart C Section 15.247

■ - FCC Part 15 Subpart C Section 15.207 Conducted Emission Requirements

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Environmental conditions in the lab:

	Actual
Temperature	: 14 - 23 °C
Relative Humidity	: 26 - 44 %
Atmospheric pressure	: 97.0 - 100.0 kPa
Power supply system	: 60 Hz – 115 VAC – 1 Phase

Sign Explanations:

☐ - not applicable
■ - applicable

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Emissions Test Conditions: CONDUCTED EMISSIONS (Interference Voltage)

The *CONDUCTED EMISSIONS (INTERFERENCE VOLTAGE*) measurements were performed at the following test location:

☐ - Test not applicable

■ - Wild River Lab Large Test Site (Open Area Test Site)
☐ - Wild River Lab Small Test Site (Open Area Test Site)
☐ - Oakwood Lab (Open Area Test Site)
☐ - Wild River Lab Screen Room
☐ - New Brighton Lab Shielded Room

Test equipment used:

	TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
■ -	2416	3825/2	Electro-Mechanics (EMCO)	50 Ω LISN	8812-1437	Code B
■ -	2534	ESHS-20	Rhode & Schwarz	EMI Receiver	837055/003	1-14-05

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST) and is calibrated annually.

Emissions Test Conditions: RADIATED EMISSIONS (Magnetic Field)

The *RADIATED EMISSIONS (MAGNETIC FIELD*) measurements were performed at the following test location:

■ - Test not applicable

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

at a test distance of :

☐ - 3 meters
☐ - 30 meters

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Emissions Test Conditions: RADIATED EMISSIONS (Electric Field)

The *RADIATED EMISSIONS (ELECTRIC FIELD)* measurements, in the frequency range of 30 MHz-1000 MHz, were tested in a horizontal and vertical polarization at the following test location:

☐ - Test not applicable

☐ - Wild River Lab Large Test Site (Open Area Test Site)
■ - Wild River Lab Small Test Site (Open Area Test Site) – NSA measurements made 2-03, due 2-05.
☐ - Oakwood Lab (Open Area Test Site)

at a test distance of :

■ - 3 meters
☐ - 10 meters
☐ - 30 meters

Test equipment used:

	TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
■ -	3203	EM-6917B	Electro-Metrics	Biconicalog Periodic	106	3-30-05
■-	2690	8566B	Hewlett-Packard	Spectrum Analyzer (Unit F)	2430A00930	1-28-05
■ -	2673	85662A	Hewlett-Packard	Analyzer Display (Unit A)	2152A03687	1-28-05
■	2681	85650A	Hewlett-Packard	Quasi-Peak Adapter	2430A00562	2-23-05
■ -	2671	8447D	Electro-Mechanics (EMCO)	Preamplifier	2648A04942	Code B

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

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST) and is calibrated annually.

Emissions Test Conditions: INTERFERENCE POWER

The *INTERFERENCE POWER* measurements were performed by using the absorbing clamp on the mains and interface cables in the frequency range 30 MHz - 300 MHz at the following test location :

■ - Test not applicable

☐ - Wild River Lab Large Test Site (Open Area Test Site)
☐ - Wild River Lab Small Test Site (Open Area Test Site)
☐ - Oakwood Lab (Open Area Test Site)
☐ - Wild River Lab Screen Room
☐ - New Brighton Lab Shielded Room

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Emissions Test Conditions: RADIATED EMISSIONS (Electric Field)

The *EQUIVALENT RADIATED EMISSIONS* measurements in the frequency range 1 GHz – 25 GHz were performed in a horizontal and vertical polarization at the following test location:

☐ **- Test not applicable**

■ - Wild River Lab Large Test Site (Open Area Test Site)
☐ - Wild River Lab Small Test Site (Open Area Test Site)
☐ - Oakwood Lab (Open Area Test Site)
☐ - Wild River Lab Screen Room

at a test distance of:

☐ - 1 meters
■ - 3 meters
☐ - 10 meters

Test equipment used:

	TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
■-	8052	8566B	Hewlett-Packard	Spectrum Analyzer	2115a00853	10-17-04
■ -	8051	85662A	Hewlett-Packard	Analyzer Display	2112A02220	10-17-04
■ -	3204	EM-6917B	Electro-Metrics	Biconicalog Periodic	102	10-24-04
■ -	2075	3115	Electro-Mechanics (EMCO)	Ridge Guide Ant. 1-18 GHz	9001-3275	11-19-04
■ -	2788	3116	Electro-Mechanics (EMCO)	Ridge Guide Ant 18-40 GHz	2005	7-11-04
■ -	2662	11970K	Hewlett-Packard	Harm Mixer – 18-26.5 GHz	2332A01170	7-11-04
■ -	2127	11975A	Hewlett Packard	Amplifier 2- 8 GHz	2738A01200	Code B
■-	3957	SL18B4020	Phase One Microwave	Preamplifier 1 – 18 GHz	0001	Code B

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

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST) and is calibrated annually.

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Equipment Under Test (EUT) Test Operation Mode - Emission tests :

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

☐ - Normal Operating Mode

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

Configuration of the device under test:

☐ - See Constructional Data Form in Appendix B - Page B2

■ - See Product Information Form in Appendix B - beginning on Page B3

The following peripheral devices and interface cables were connected during the measurement:

☐ - _____ Type : _____

☐ - _____ Type : _____

☐ - _____ Type : _____

☐ - _____ Type : _____

☐ - _____ Type : _____

☐ - _____ Type : _____

☐ - _____ Type : _____

☐ - _____ Type : _____

■ - unshielded power cable

☐ - unshielded cables

■ - shielded cables MPS.No.: _____

☐ - customer specific cables

☐ - _____

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Emission Test Results:

6 dB Bandwidth [15.247 (a)(2)]

The requirements are ■ - MET ☐ - NOT MET

The minimum 6 dB bandwidth shall be at least 500 kHz.

Remarks: See plots on pages A4 – A6. Bandwidths are shown to be 9.4 to 9.5 MHz.

Duty Cycle

Remarks: See plots on pages A7 and A8. Duty cycle correction factor is –12dB and is applied on page A36 for a spurious emission at 2.389 GHz.

Peak Power Out [15.247 (b)]

The requirements are ■ - MET ☐ - NOT MET

Maximum peak power output shall be 1 watt.

Remarks: See plots on pages A9 - A14. Max peak output power is shown to be 0.26 W (24.14 dBm when unit is on Channel 6).

Antenna Directional Gain [15.247 (b)(4)(i)]

The requirements are ■ - MET ☐ - NOT MET

The antenna directional gain is less than 6 dBi. For antennas with directional gain greater than 6 dBi the maximum peak output power is reduced by 1 dB for every 3 dB that the directional gain is over 6 dBi.

Remarks: The antenna directional gain is 2 dBi.

Peak Power Spectral Density – [15.247 (d)]

The requirements are ■ - MET ☐ - NOT MET

Peak power spectral density shall not be greater than 8 dBm in any 3 kHz band.

Remarks: See plots on pages A9 – A11. Maximum peak power spectral density is –13.8 dBm/3 kHz.

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Emission Test Results Continued:

FCC 15.207 - Conducted emissions 150 kHz - 30 MHz

The requirements are ■ - MET ☐ - NOT MET

Minimum margin of compliance 17 dB at 150.0 kHz

Maximum margin of non-compliance _____ dB at _____ MHz

Remarks: See Data on pages A23 – A26.

Spurious radiated emissions (electric field) 30 MHz - 1000 MHz (restricted bands)

The requirements are ■ - MET ☐ - NOT MET

Minimum margin of compliance 14 dB at 165.8 MHz

Maximum margin of non-compliance _____ dB at _____ MHz

Remarks: See data on pages A27 – A35.

Spurious conducted emissions 30 MHz – 25 GHz

The requirements are ■ - MET ☐ - NOT MET

Minimum margin of compliance >10 dB at _____ MHz

Maximum margin of non-compliance _____ dB at _____ MHz

Remarks: See data on pages A15 – A22. The limit is –20 dBc in any 100 kHz band outside the operating band. Special attention is paid to ensure band edge compliance.

Equivalent Radiated emissions 1 GHz – 25 GHz (restricted bands)

The requirements are ■ - MET ☐ - NOT MET

Minimum margin of compliance 1 dB at 2389.0 MHz

Maximum margin of non-compliance _____ dB at _____ MHz

Remarks: See data on pages A36 – A39. Duty cycle correction factor of –12 dB is applied at 2389.0 MHz. Emission at 4822.0 MHz has a minimum margin of compliance of 0.7 dB without the duty cycle correction factor and a margin of 12 dB with the duty cycle correction factor applied.

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DEVIATIONS FROM STANDARD:

None

GENERAL REMARKS:

The EUT was tested with the antenna connected directly to the rf module and with a 12” extension cable between the rf module and the antenna.

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.

Testing Start Date: 16 April 2004

Testing End Date: 29 June 2004

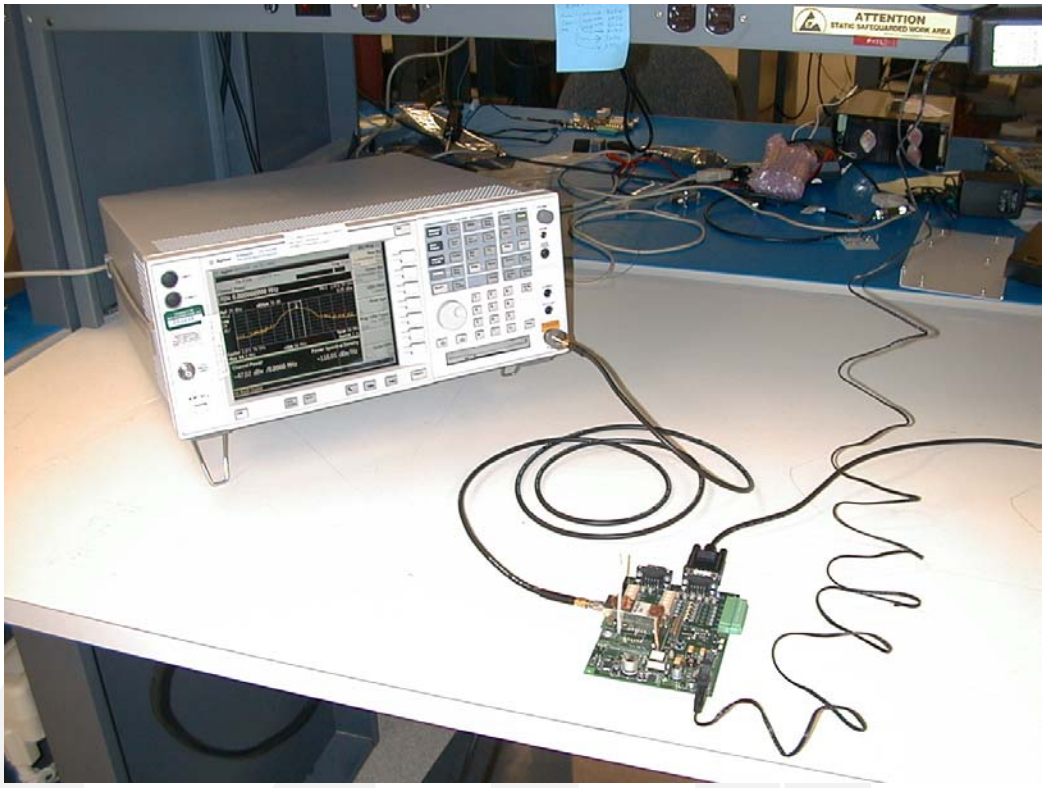
- TÜV PRODUCT SERVICE INC -

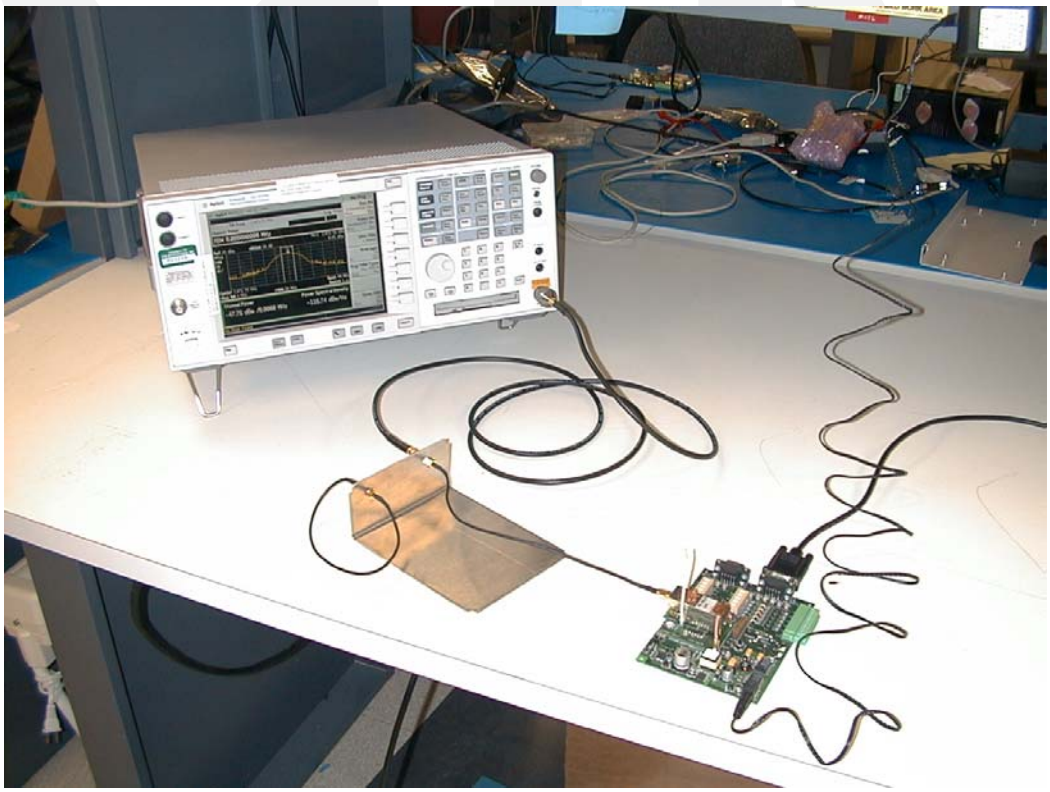
J. T. Schneider
Chief Engineer

Tested By:
J. C. Sausen

TÜV PRODUCT SERVICE INC 19333 Wild Mountain Road Taylors Falls MN 55084-1758 Tel: 651 638 0297 Fax: 651 638 0298 Rev.No 1.0

Test-setup photo(s):
Conducted emission 30 MHz - 25 GHz





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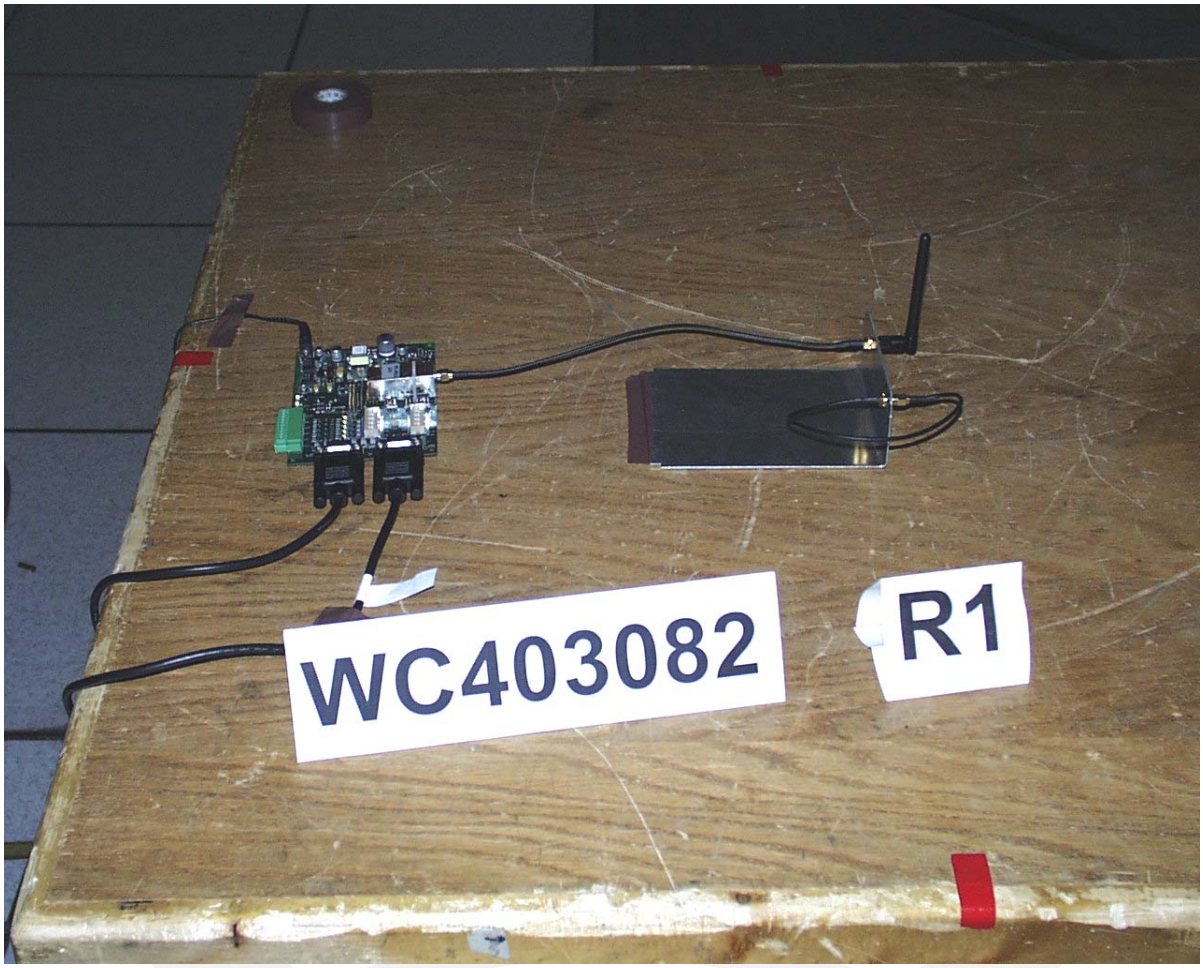
Test-setup photo(s):
Radiated emission 30 MHz - 25000 MHz with 12” extension cable with antenna



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Appendix A

Test Data Sheets

and

Test Setup Drawing(s)

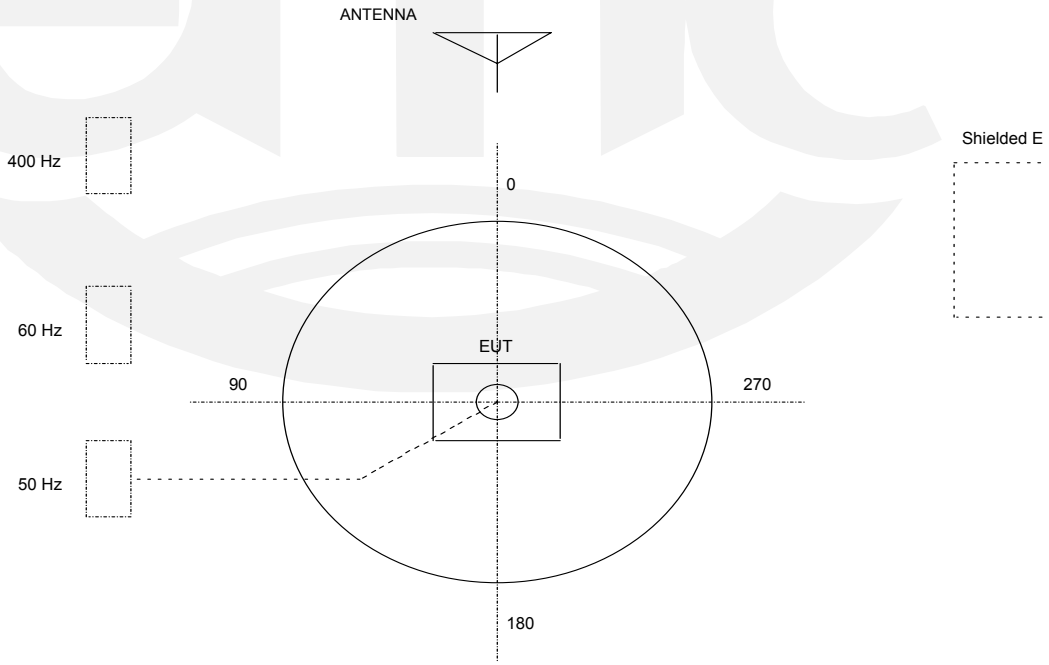
TÜV PRODUCT SERVICE INC 19333 Wild Mountain Road Taylors Falls MN 55084-1758 Tel: 651 638 0297 Fax: 651 638 0298 Rev.No 1.0

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.



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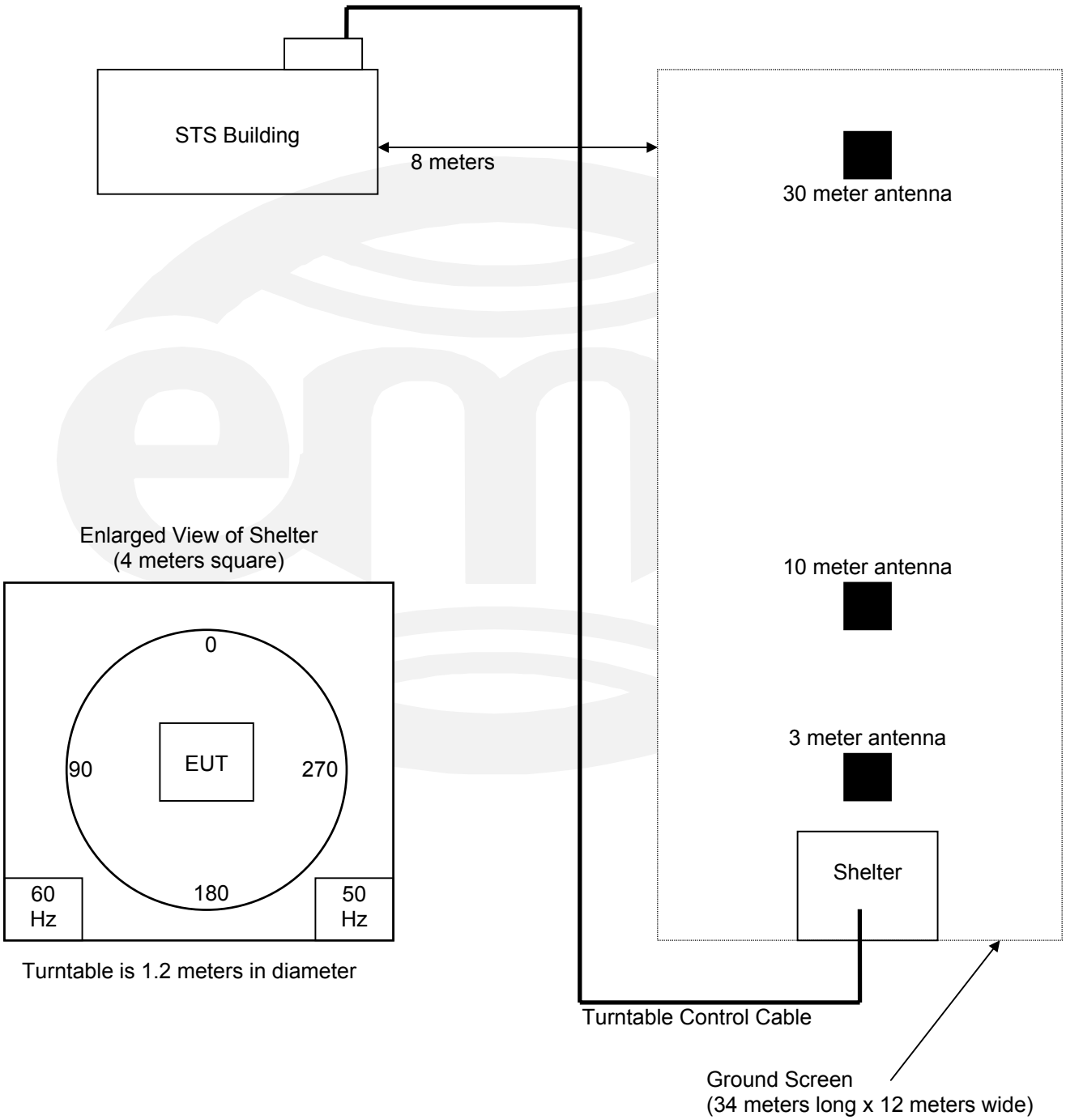
TEST SETUP FOR EMISSIONS TESTING

WILD RIVER LAB
Small Test Site (STS)



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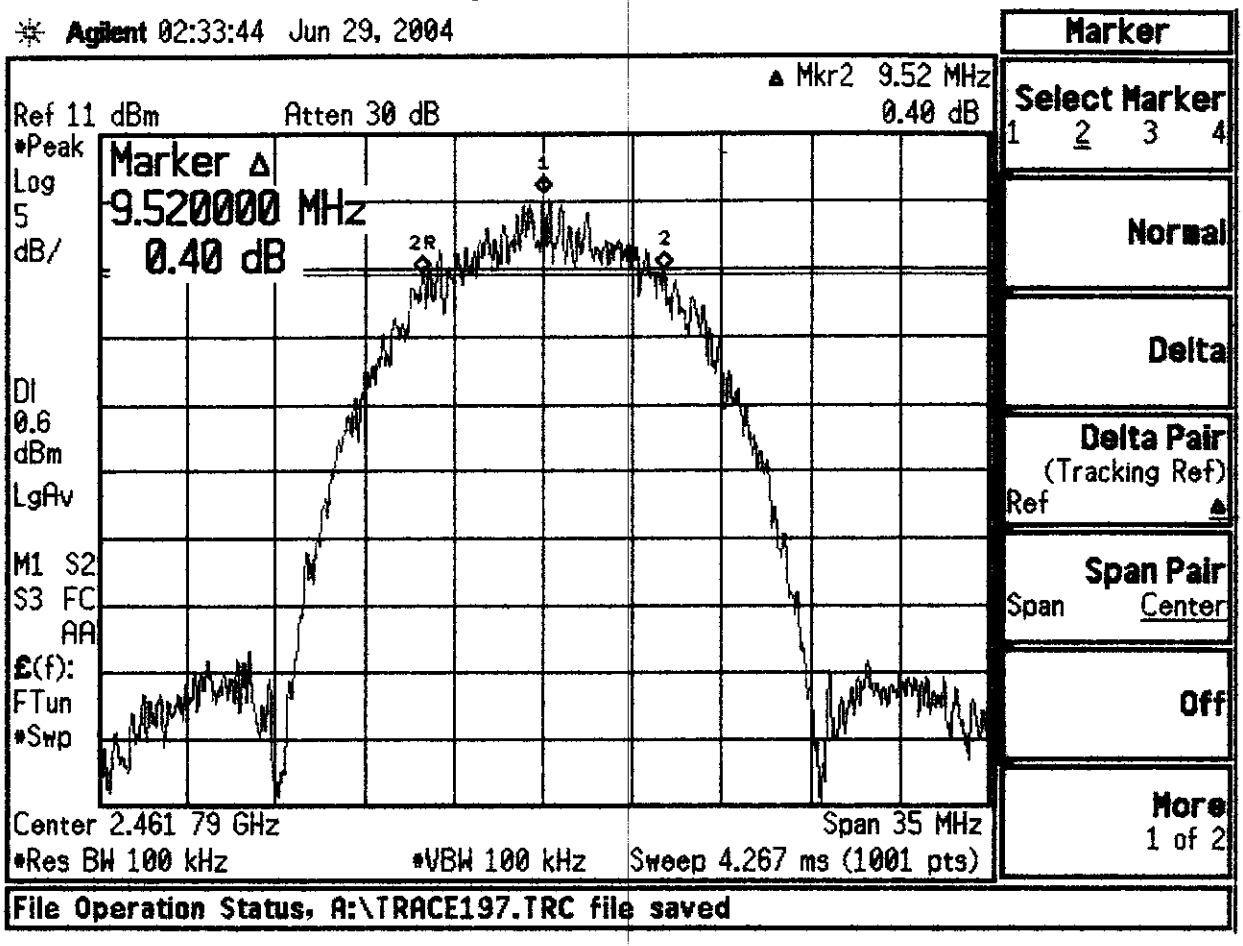
-6 db BW

Plot #3

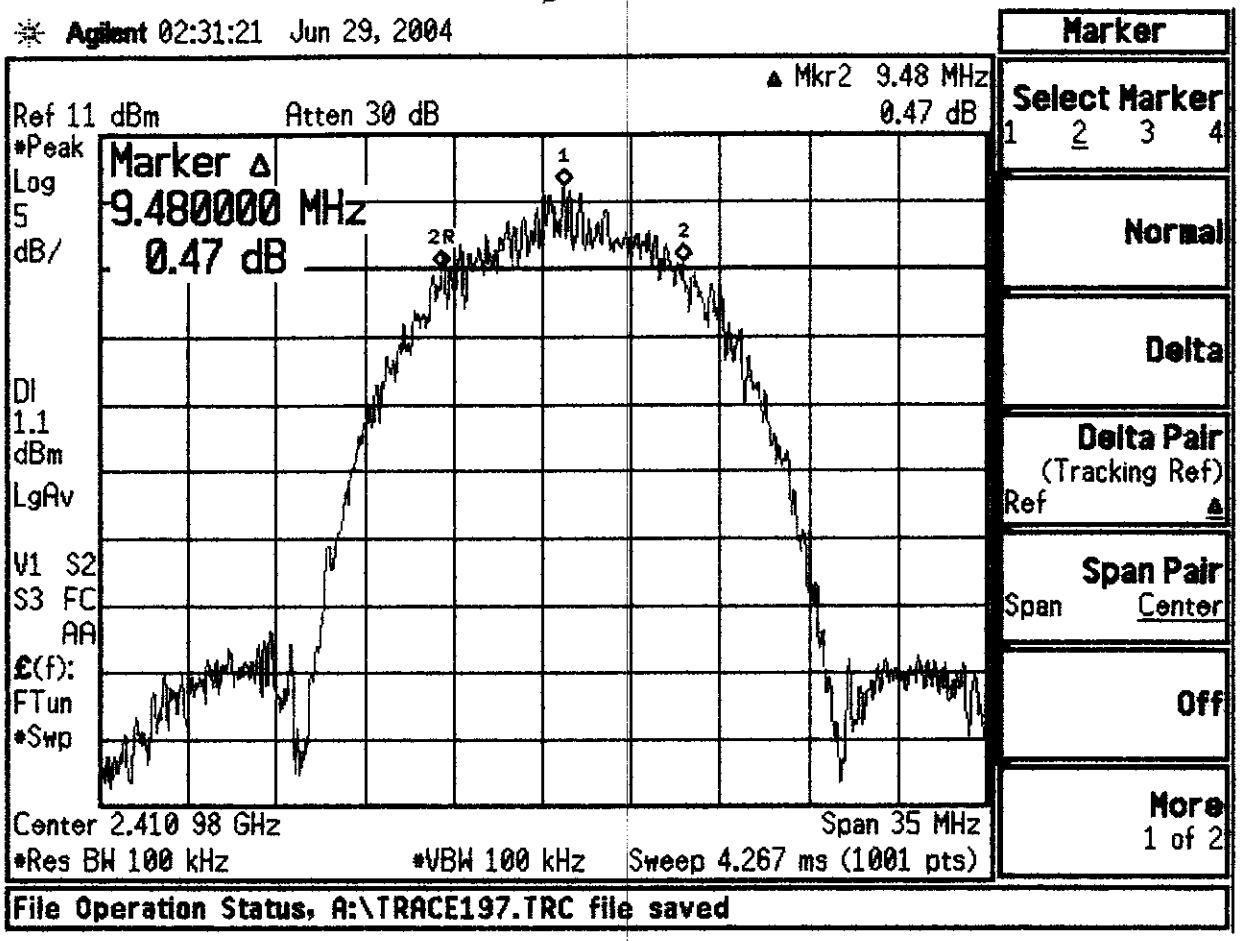


Wi Mp w/ 29000050 12" Ant extention Cable

Chan = 11 -6dB BW = 9.52 mHz

PWR = 15

-6dB BW Plot #2

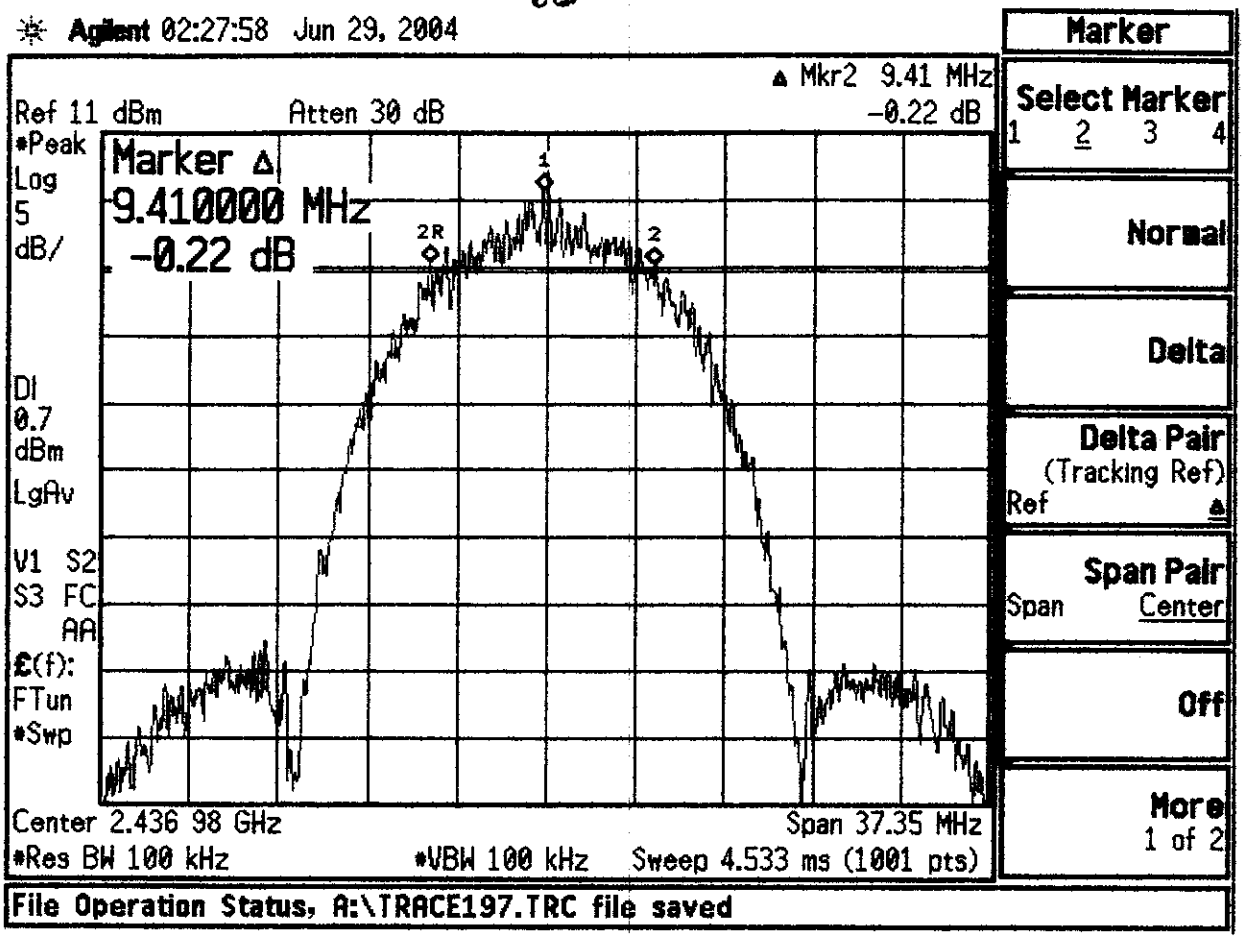


WiMo w/ 12" 29000 050 12" Ant extention cable

Chan = 1 -6db BW = 9.48 MHz

PWR = 15

-6db BW Plot #1

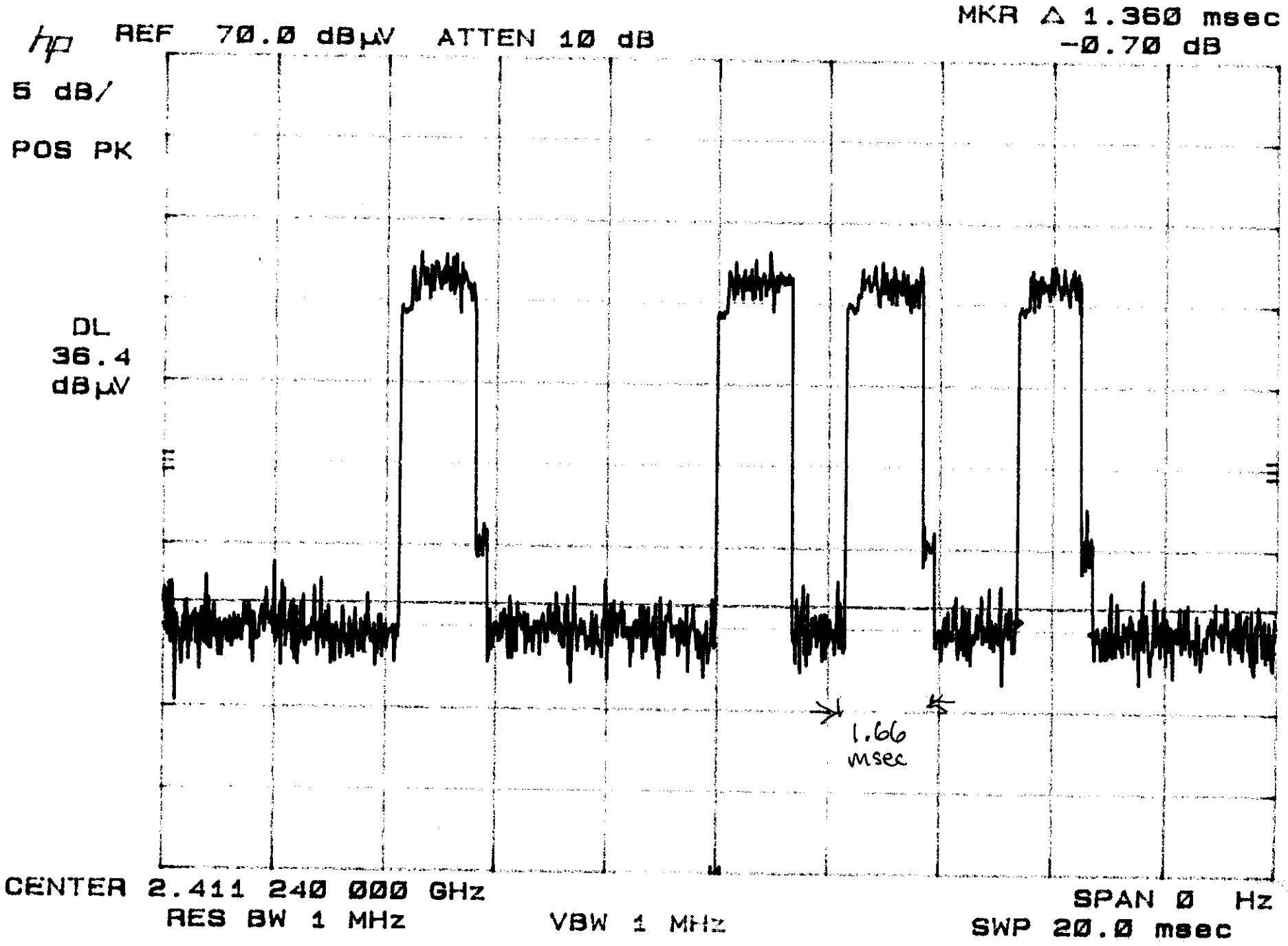


WiMe w/ 29000250 12" ANT extention Cable

Chan: 6 -6db BW = 9.41 MHz

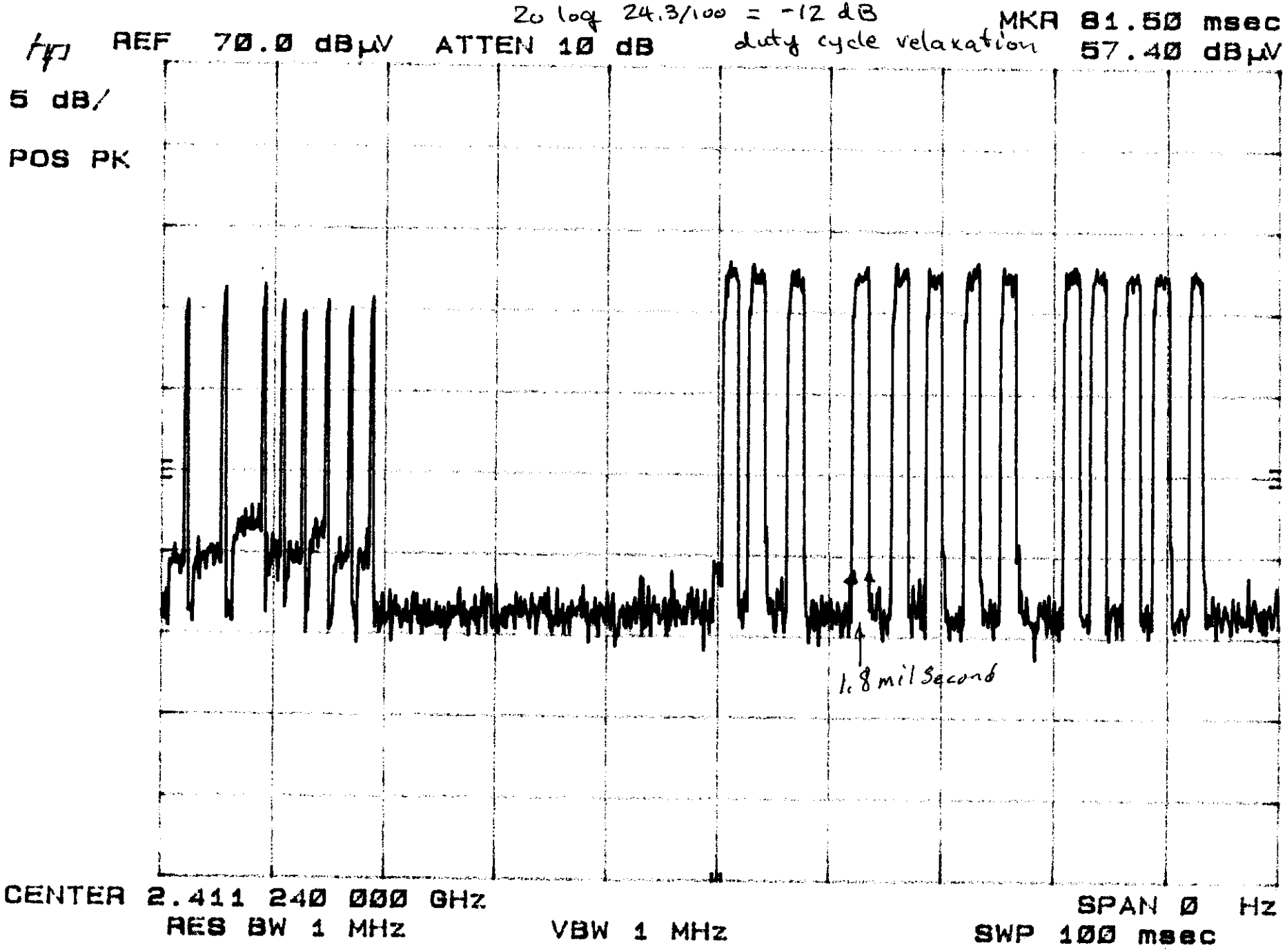
PWR = 15

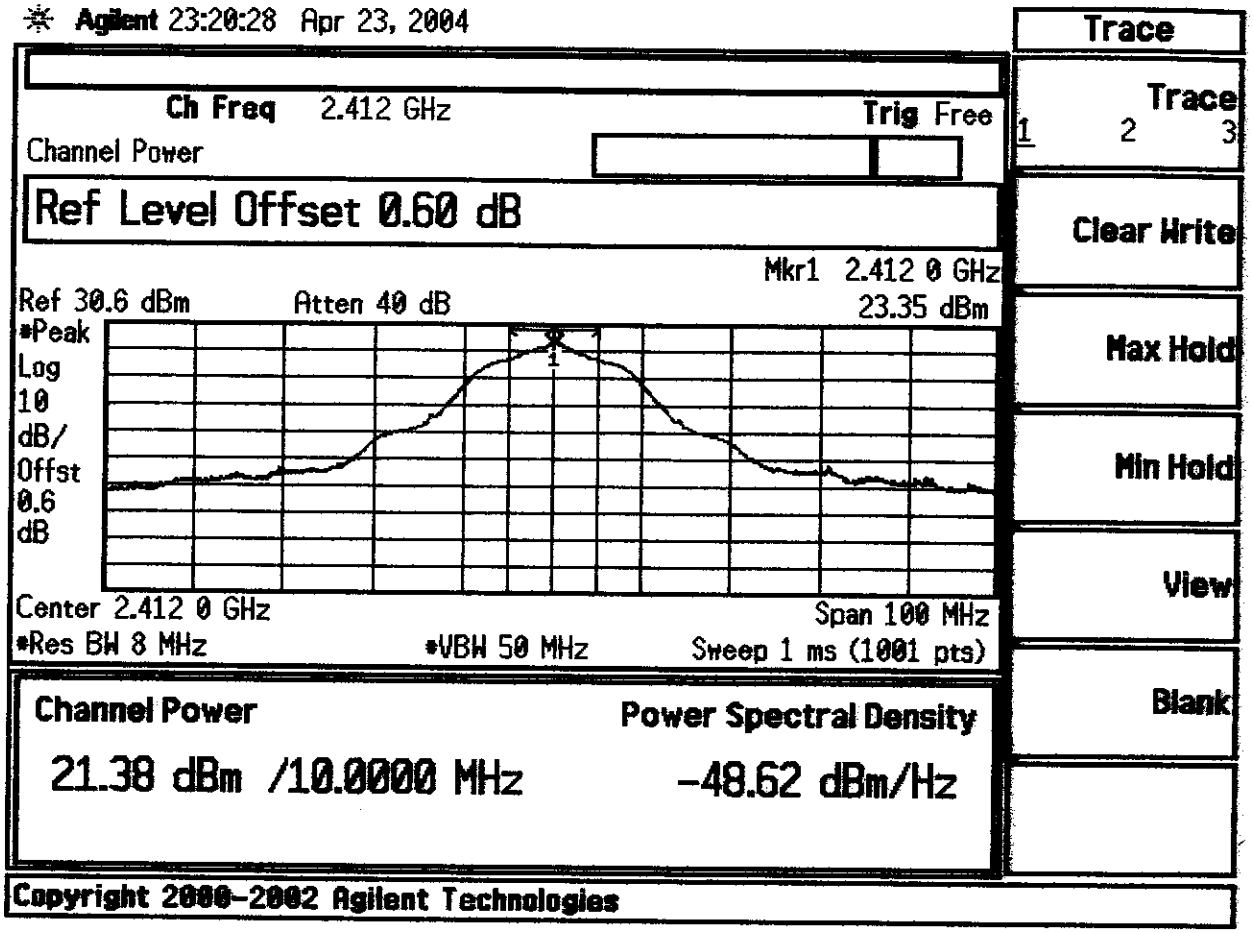
Same with/without 12" extension cable



same w/ + w/o 12" extension cable

13 x 1.66 + 8 x .34
21.58 + 2.72
= 24.3 msec on time
20 log 24.3/100 = -12 dB duty cycle velaxation





Ch.1 - max peak output power - 1 W - PASS
(15.247)

Power setting 15

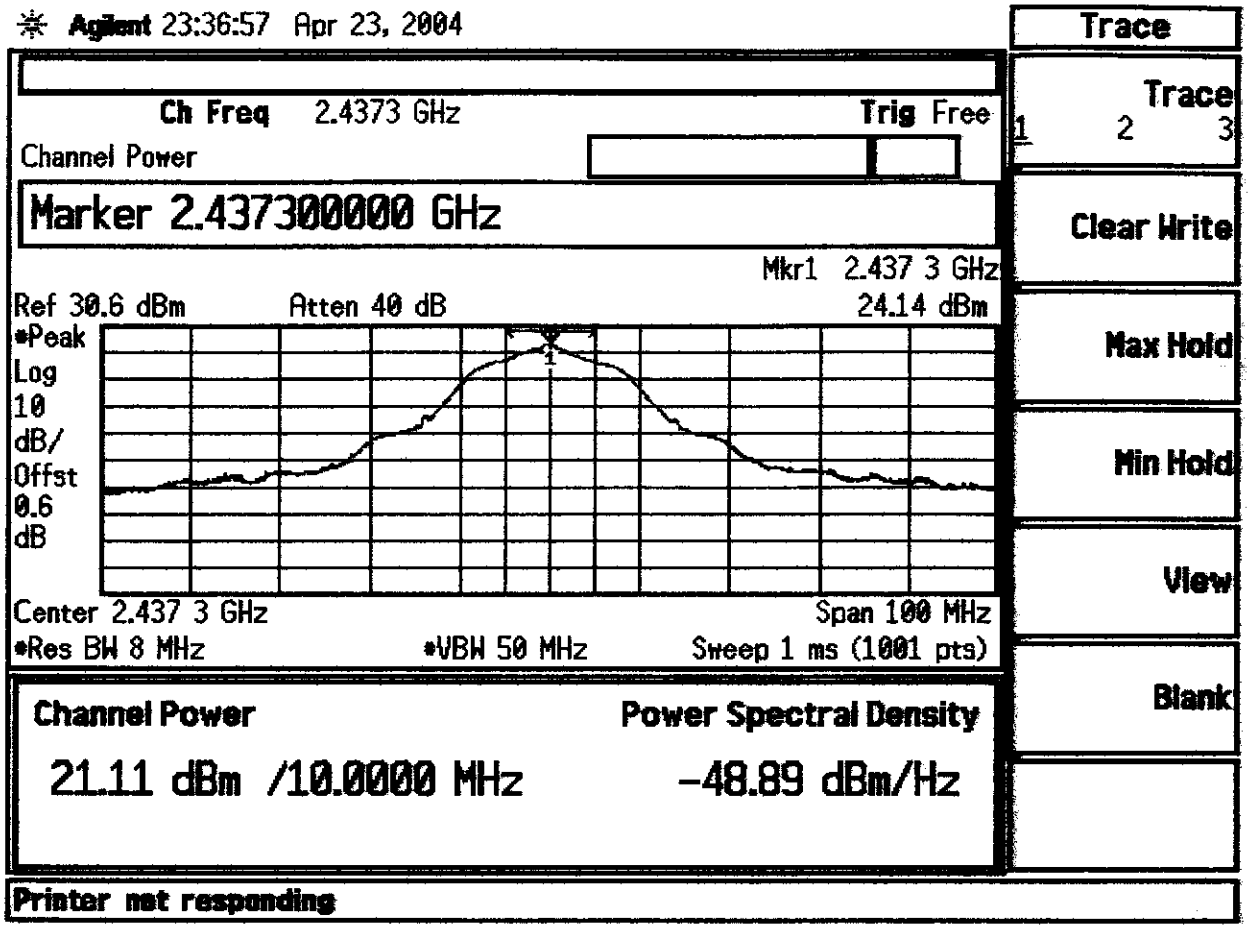
peak power spectral density = -48.62 + 34.8 =

= -13.8 dBm / 3 KHz

15.247 limit = +8dBm/3KHz

PASS

w/o 12" extension cable



Ch. 6 - max peak output power - 1 W - PASS
(15.247)

power setting 15

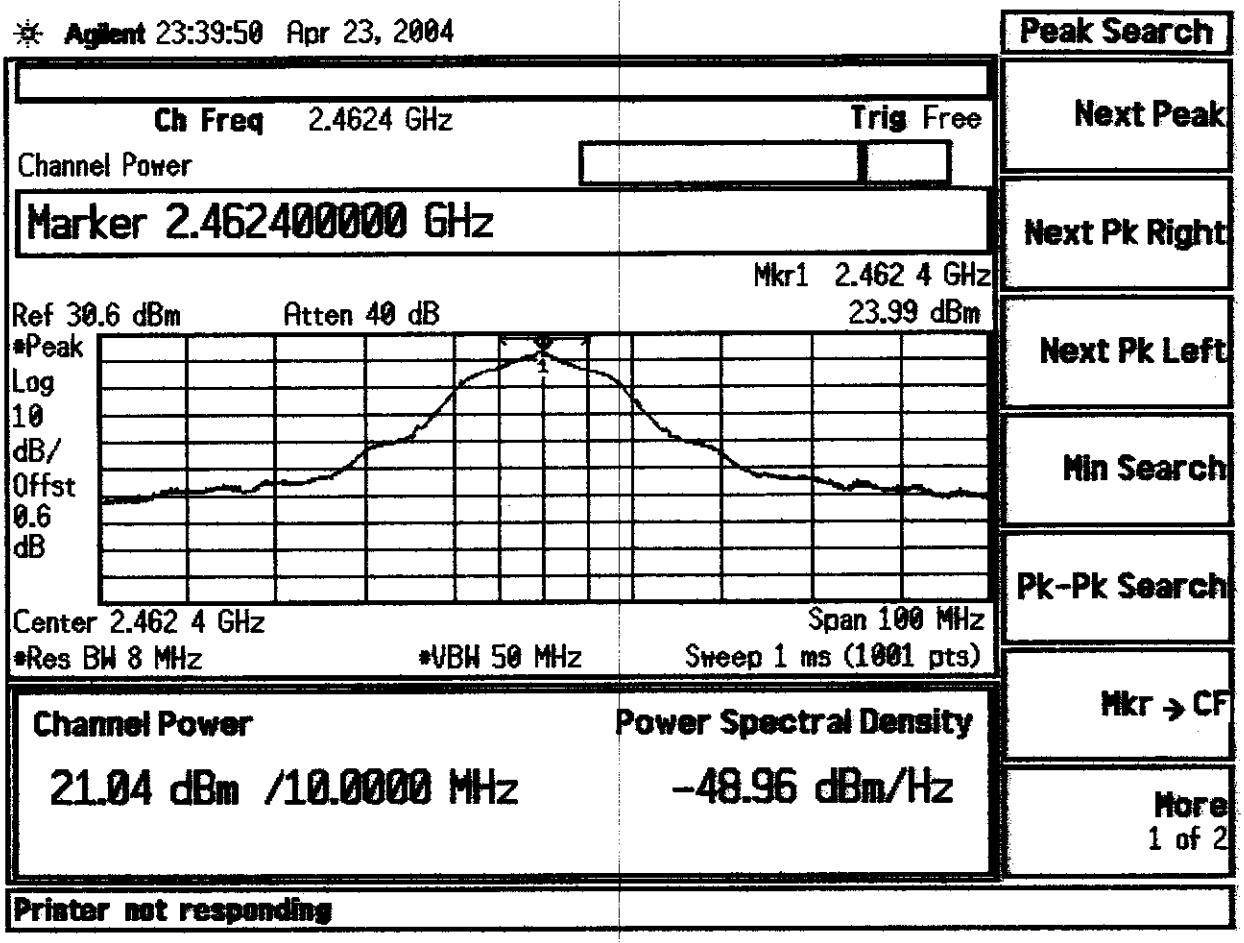
peak power spectral density = -48.89 + 34.8 =

= -14.09 dBm/3KHz

15.247 limit = +8dBm/3KHz

PASS

w/o 12" extension cable



Ch. 11 - max peak output power - 1W (15.247) - PASS

power setting 15

peak power spectral density = -48.96 + 34.8

= -14.1 dBm/3KHz

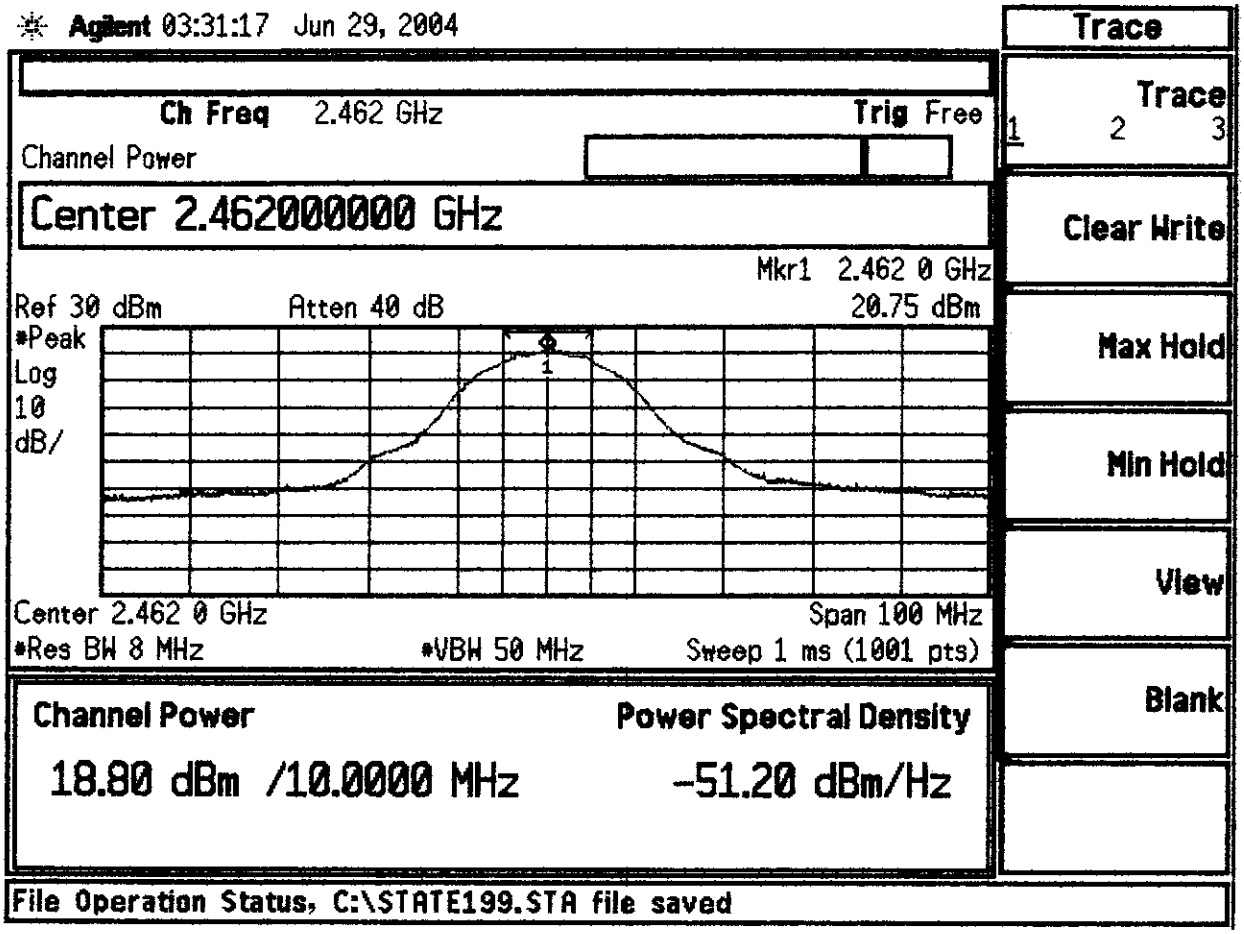
15.247 limit = +8 dBm/3KHz

PASS

w/o 12" Extension Cable

Power

Plot 9

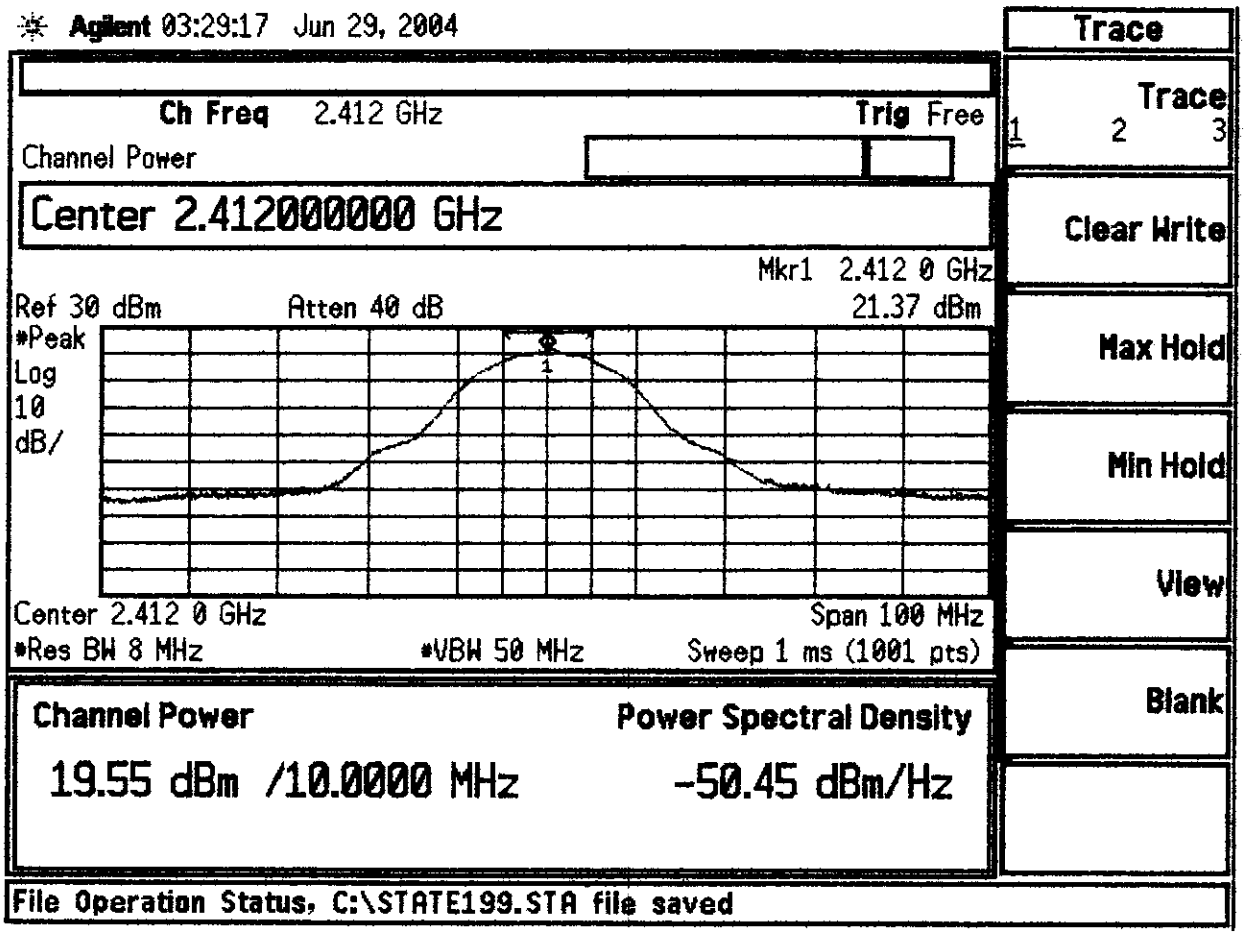


WiMp w/ 26000050 Cable

~~Chan~~ Chan 11 Power = 20.75dbm

PWR = 15

Power Plots



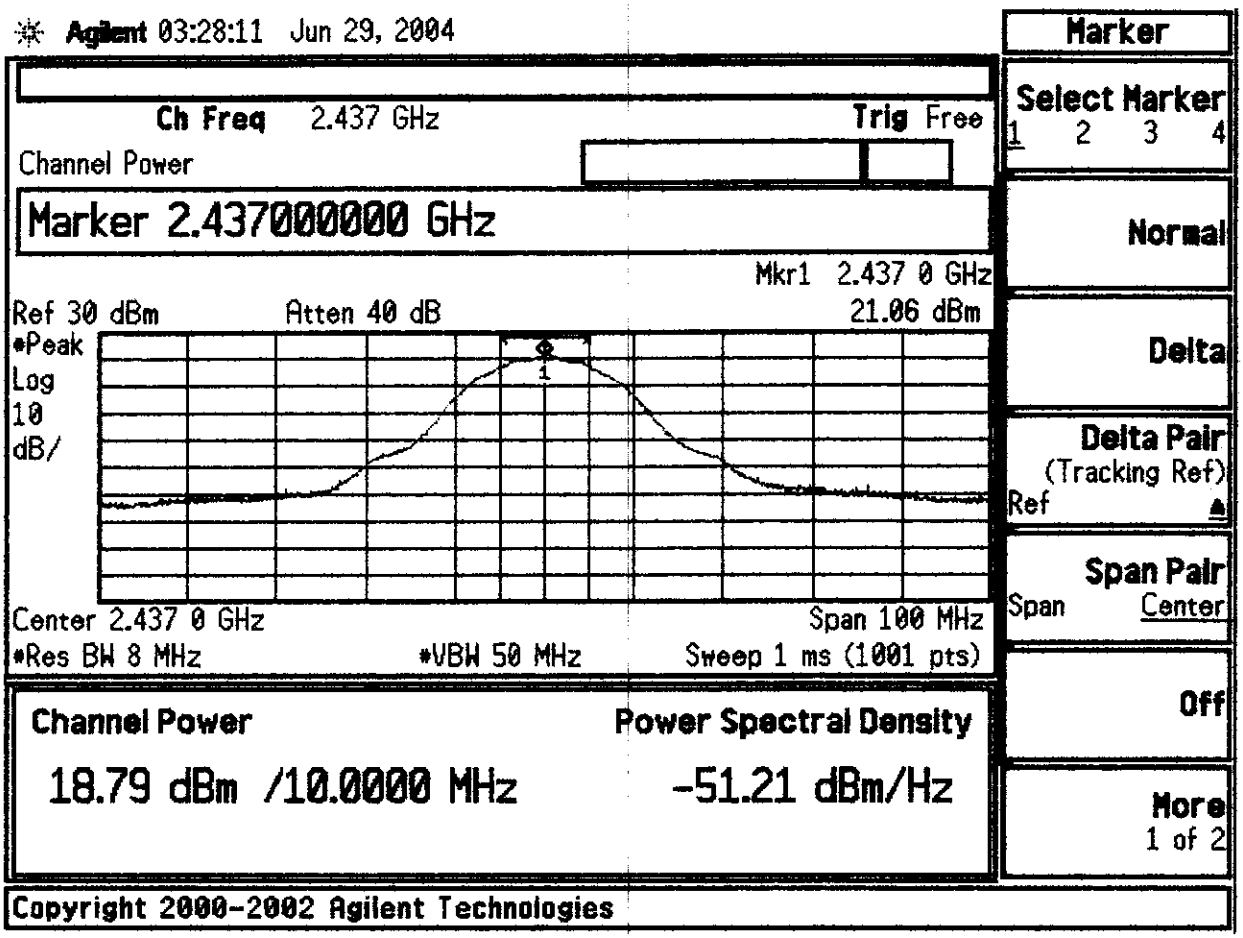
WiMp w/ 26000 050 Cable

Chan 1 Power = 21.37 dBm

PWR = 15

Power

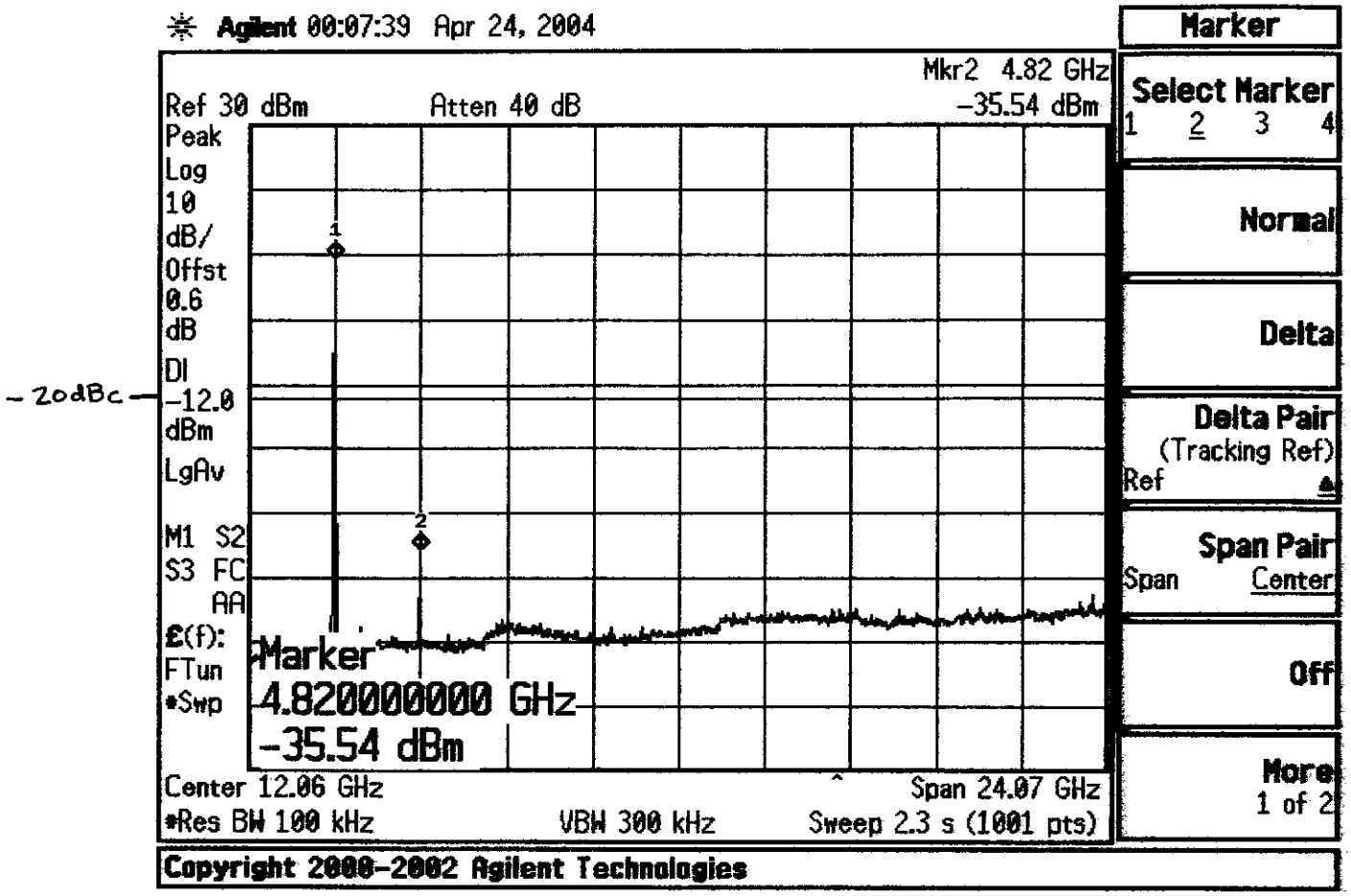
P107



w/ MP w/ 29 000 050 12" Ant Extention Cable

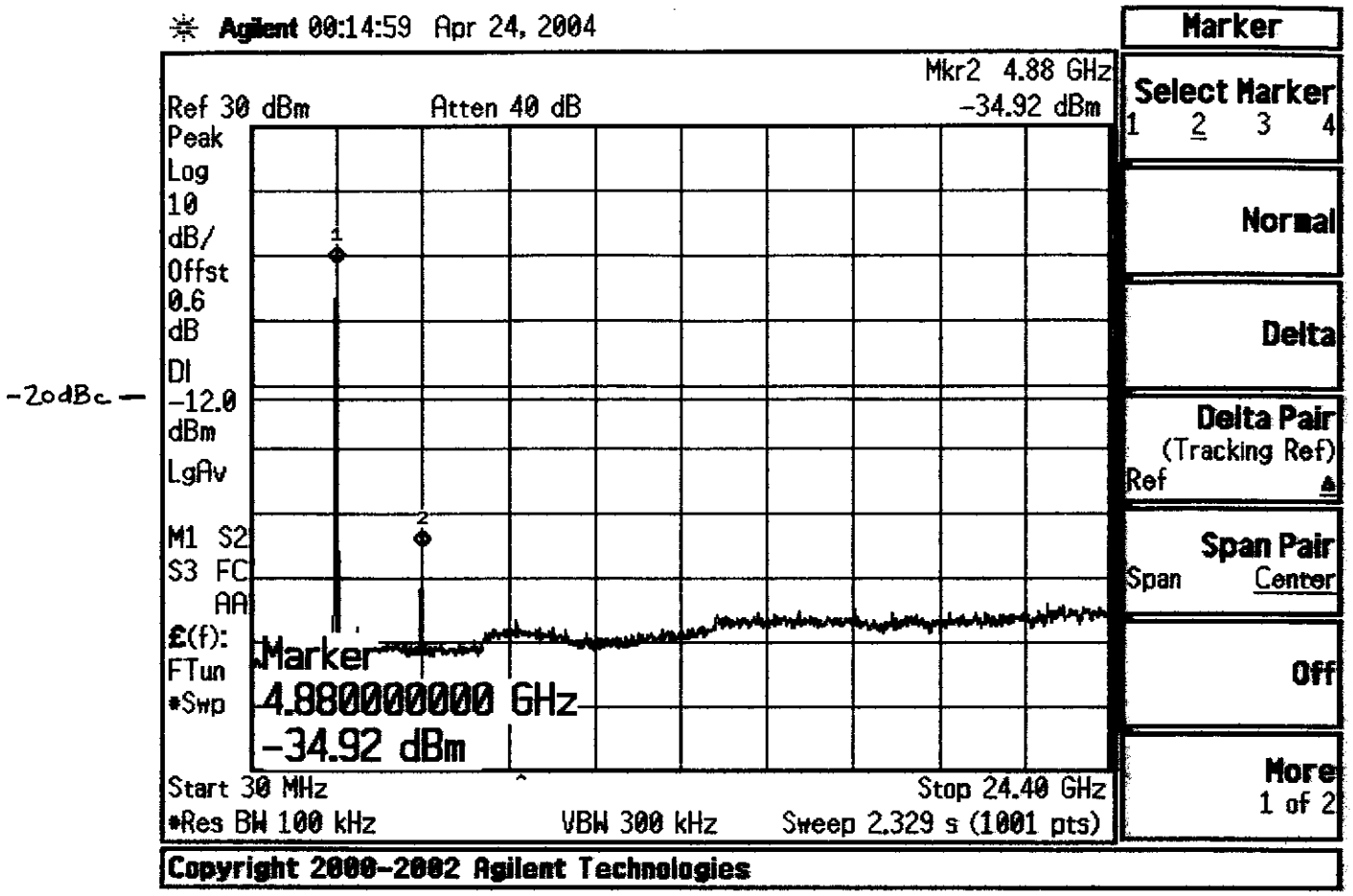
Chan 6 Power = 21.06dbm

PWR = 15



Ch. 1 - conducted Spurious - -20dBC - PASS
(15.247)

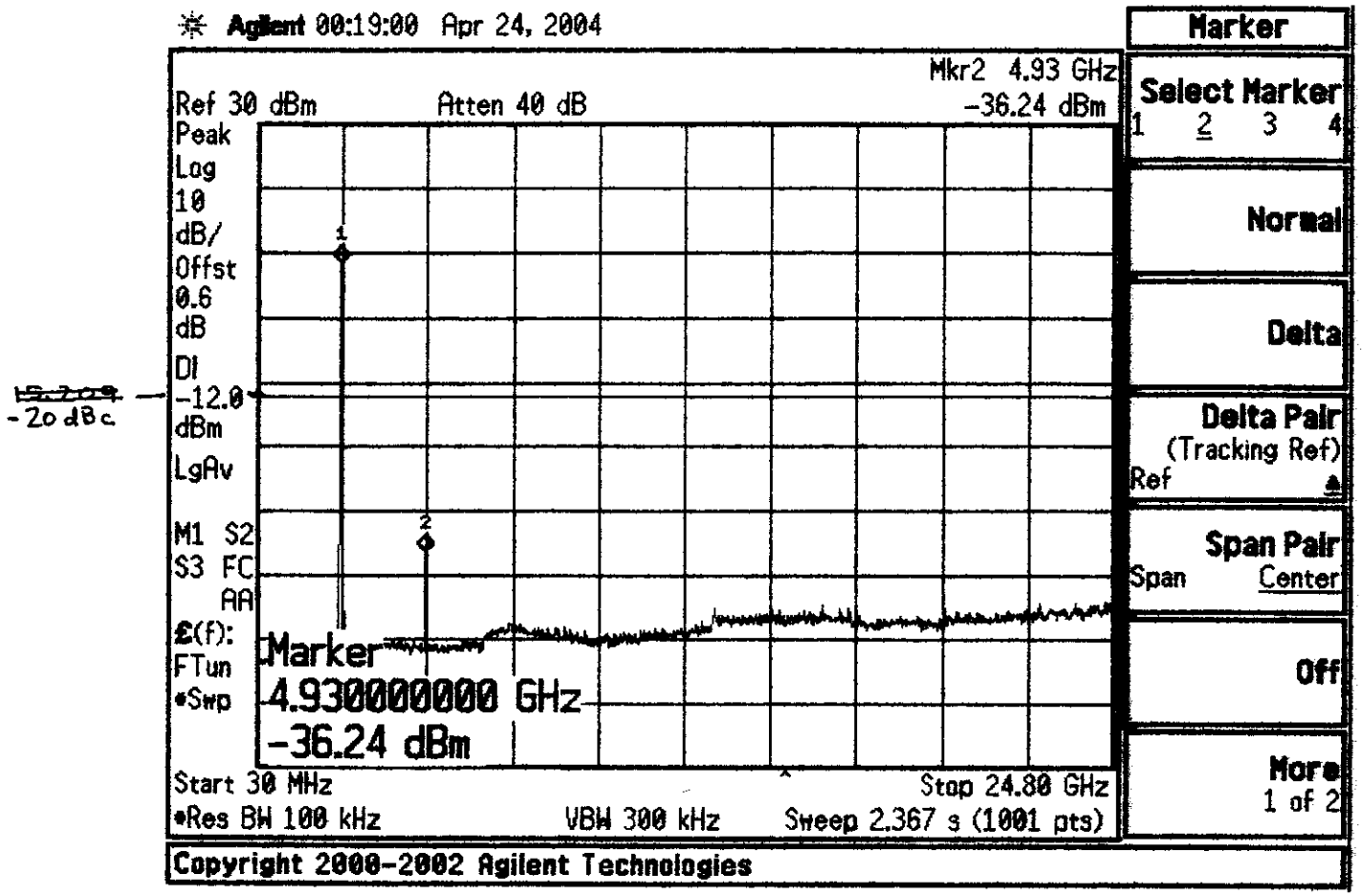
w/o 12" extension cable



-20dBc

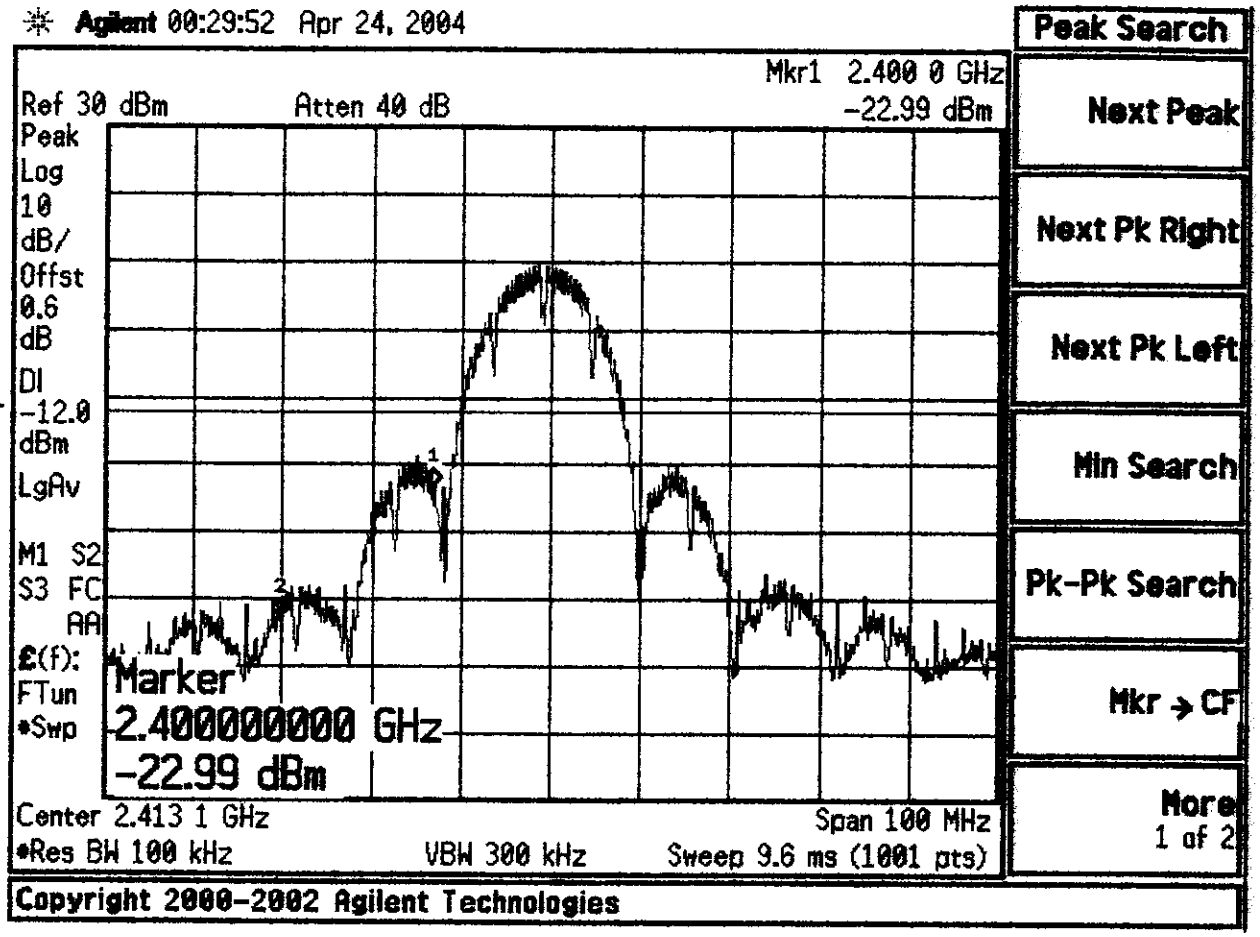
Ch. 6 - conducted spurious - -20dBc - PASS
(15.247)

w/o 12" extension cable



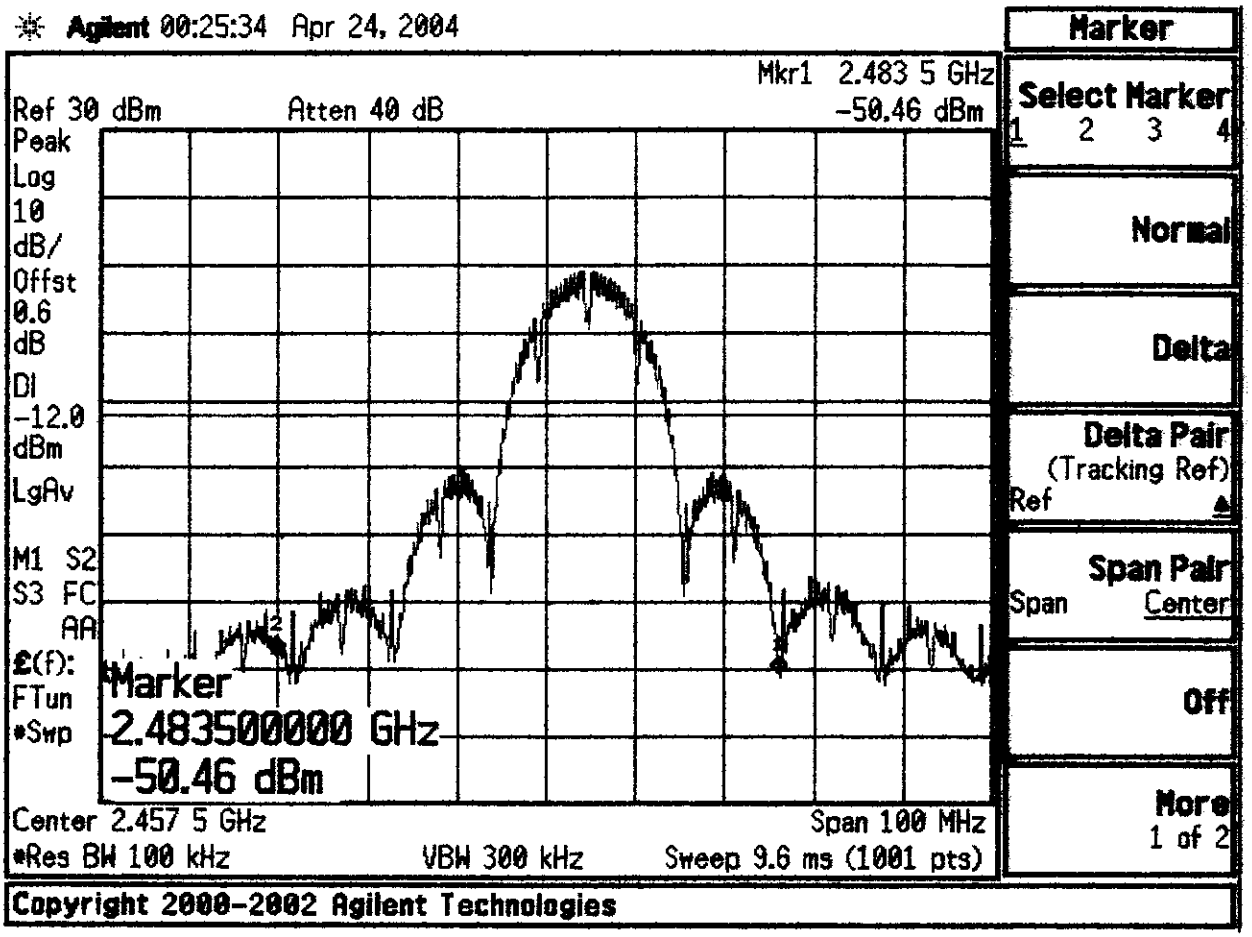
Ch. 11 - cond. spurious - -20 dBc - PASS
(15.247)

w/o 12" extension cable



Ch. 1 - cond. Spurious band edge - -20dBc - PASS
(15.247)

w/o 12" extension cable

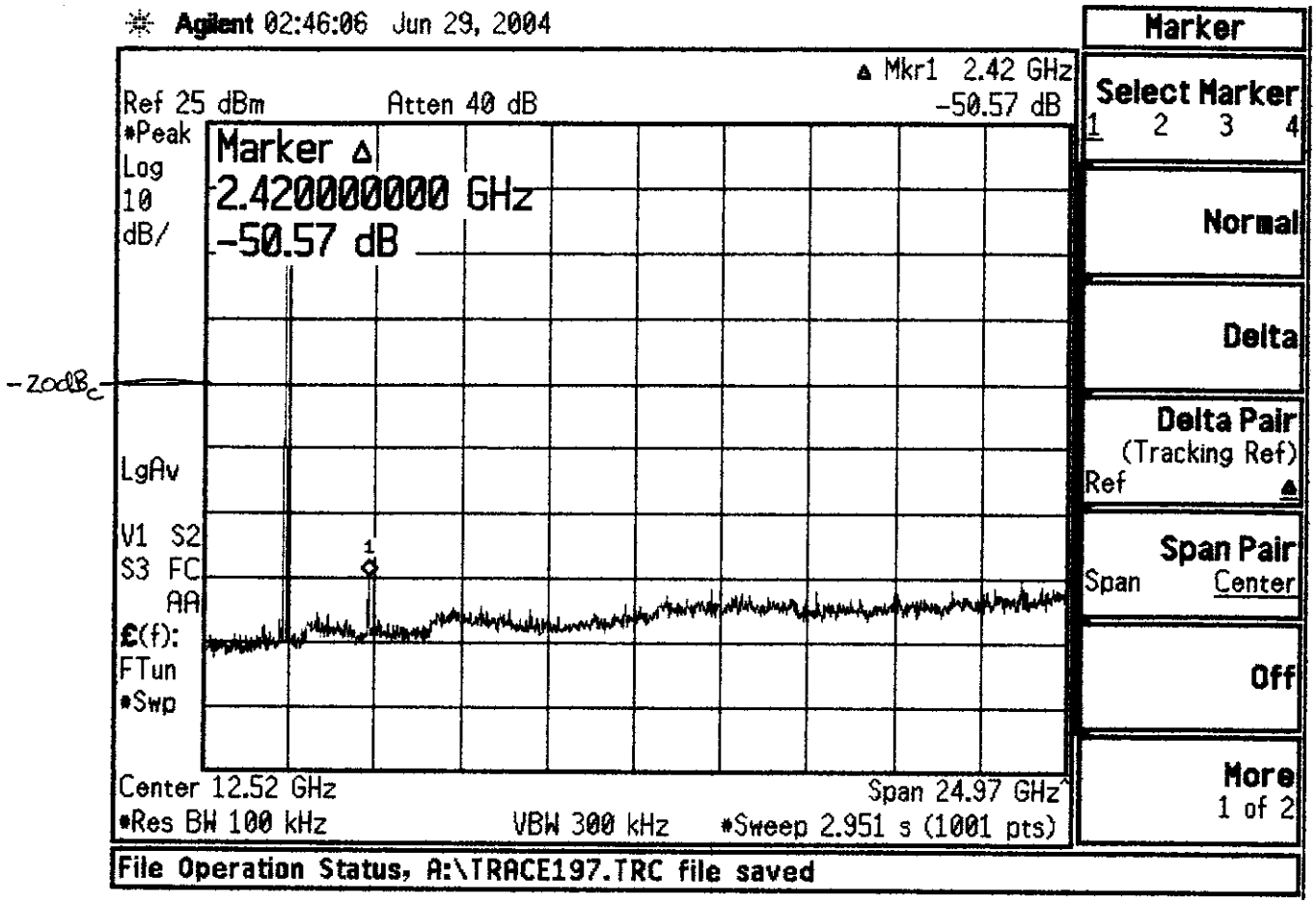


-20dBc

Ch. 11 - cond. spurious band edge - -20dBc - PASS
(15.247)

w/o 12" extension cable

Spurs Plot #5

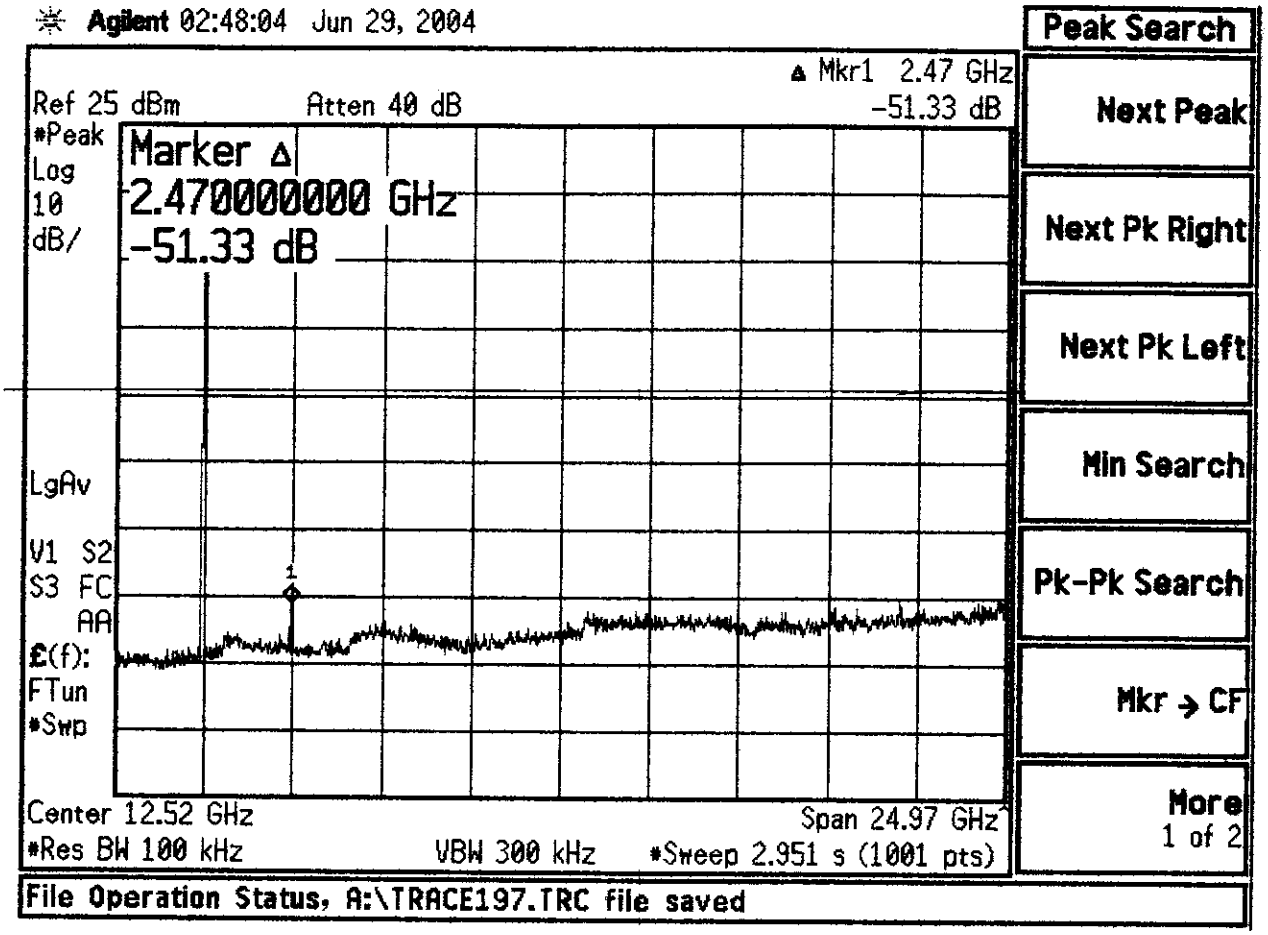


WiMo w/ 29000050 12" Ant extention Cable

Chan 1 2nd = -50.57 db = Level of second harmonic

PWR 15

Spur P/o FMG



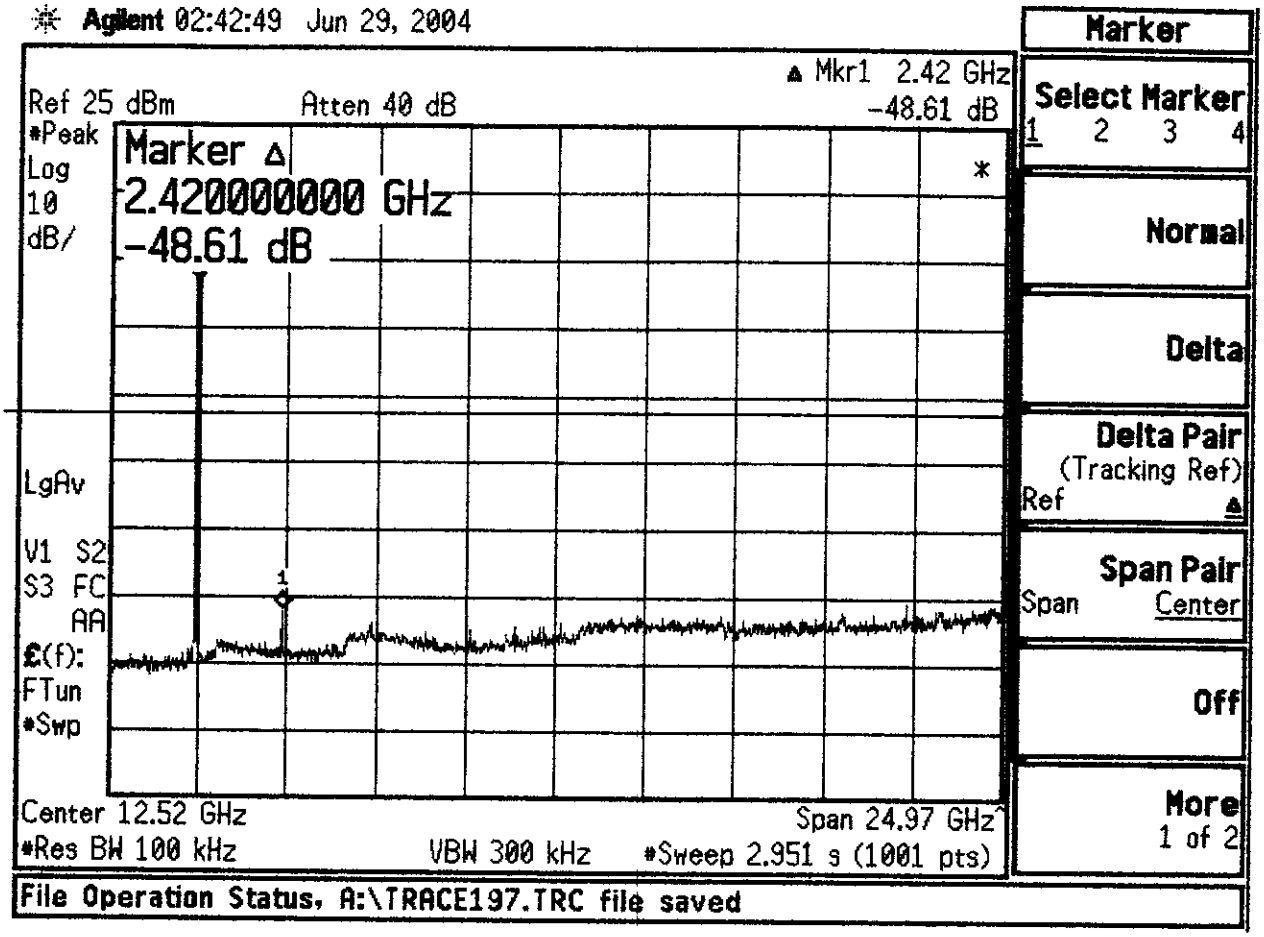
WiMP w/ 29000050 12" Ant extention cable

Chan 11 2nd = -51.33db = Level of second harmonic

PWR = 15

Spurs

R10174



-20dBc

WiMe w/ 29000050 12" ANT extention cable

chan:6
PWR=15

spurs ⇒ 2nd = -48.6dBc = Level of second harmonic

CONDUCTED EMISSIONS

Test Report #:	WC401600 Run 9	Test Area:	LTS		
EUT Model #:	WiME	Date:	5/3/04		
EUT Serial #:		EUT Power:	60HZ/110VAC	Temperature:	22.0 °C
Test Method:	EN55022 B / FCC B			Air Pressure:	98.0 kPa
Customer:	DIGI INT'L			Rel. Humidity:	31.0 %
EUT Description:	802.11b transceiver to 1 serial port				
Notes:	Same levels with and without the 12" antenna extension cable				
Data File Name:	1600-9-cond.dat			Page:	1 of 4

List of measurements for run #: 9

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	EUT Lead	DELTA1 EN55022 B Qp	DELTA2 EN55022 B Avg
150.0 kHz	45.87 Qp	0.1 / 3.0 / 0.0 / 0.0	48.97	L1	-17.03	n/a
150.0 kHz	15.02 Av	0.1 / 3.0 / 0.0 / 0.0	18.12	L1	n/a	-37.88
200.0 kHz	43.99 Qp	0.1 / 2.0 / 0.0 / 0.0	46.09	L1	-17.52	n/a
200.0 kHz	13.23 Av	0.1 / 2.0 / 0.0 / 0.0	15.33	L1	n/a	-38.28
400.0 kHz	38.71 Qp	0.1 / 1.0 / 0.0 / 0.0	39.81	L1	-18.04	n/a
400.0 kHz	8.28 Av	0.1 / 1.0 / 0.0 / 0.0	9.38	L1	n/a	-38.47
800.0 kHz	27.22 Qp	0.1 / 0.05 / 0.0 / 0.0	27.37	L1	-28.63	n/a
800.0 kHz	-0.63 Av	0.1 / 0.05 / 0.0 / 0.0	-0.48	L1	n/a	-46.48
1.0 MHz	26.52 Qp	0.1 / 0.05 / 0.0 / 0.0	26.67	L1	-29.33	n/a
1.0 MHz	-1.02 Av	0.1 / 0.05 / 0.0 / 0.0	-0.87	L1	n/a	-46.87
5.648 MHz	9.37 Qp	0.5 / 0.05 / 0.0 / 0.0	9.92	L1	-50.08	n/a
5.648 MHz	6.87 Av	0.5 / 0.05 / 0.0 / 0.0	7.42	L1	n/a	-42.58
30.0 MHz	7.98 Qp	1.25 / 0.1 / 0.0 / 0.0	9.33	L1	-50.67	n/a
30.0 MHz	-1.19 Av	1.25 / 0.1 / 0.0 / 0.0	0.16	L1	n/a	-49.84
150.0 kHz	45.6 Qp	0.1 / 3.0 / 0.0 / 0.0	48.7	N	-17.3	n/a
150.0 kHz	14.94 Av	0.1 / 3.0 / 0.0 / 0.0	18.04	N	n/a	-37.96
200.0 kHz	43.46 Qp	0.1 / 2.0 / 0.0 / 0.0	45.56	N	-18.05	n/a
200.0 kHz	12.75 Av	0.1 / 2.0 / 0.0 / 0.0	14.85	N	n/a	-38.76
400.0 kHz	36.63 Qp	0.1 / 1.0 / 0.0 / 0.0	37.73	N	-20.12	n/a
400.0 kHz	6.6 Av	0.1 / 1.0 / 0.0 / 0.0	7.7	N	n/a	-40.15
800.0 kHz	22.55 Qp	0.1 / 0.05 / 0.0 / 0.0	22.7	N	-33.3	n/a
1.0 MHz	20.67 Qp	0.1 / 0.05 / 0.0 / 0.0	20.82	N	-35.18	n/a
1.0 MHz	-4.21 Av	0.1 / 0.05 / 0.0 / 0.0	-4.06	N	n/a	-50.06
5.648 MHz	10.84 Qp	0.5 / 0.05 / 0.0 / 0.0	11.39	N	-48.61	n/a
5.648 MHz	7.43 Av	0.5 / 0.05 / 0.0 / 0.0	7.98	N	n/a	-42.02
30.0 MHz	5.25 Qp	1.25 / 0.1 / 0.0 / 0.0	6.6	N	-53.4	n/a

Tested by: J. C. Sausen — Printed

J C Sausen — Signature

Reviewed by: T. K. Swanson — Printed

Thomas K. Swanson — Signature

CONDUCTED EMISSIONS

Test Report #:	WC401600 Run 9	Test Area:	LTS		
EUT Model #:	WiME	Date:	5/3/04		
EUT Serial #:		EUT Power:	60HZ/110VAC	Temperature:	22.0 °C
Test Method:	EN55022 B / FCC B			Air Pressure:	98.0 kPa
Customer:	DIGI INT'L			Rel. Humidity:	31.0 %
EUT Description:	802.11b transceiver to 1 serial port				
Notes:	Same levels with and without the 12" antenna extension cable				
Data File Name:	1600-9-cond.dat			Page:	2 of 4

List of measurements for run #: 9

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	EUT Lead	DELTA1 EN55022 B Qp	DELTA2 EN55022 B Avg
30.0 MHz	-1.67 Av	1.25 / 0.1 / 0.0 / 0.0	-0.32	N	n/a	-50.32

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Reviewed by: T. K. Swanson — Printed

Thomas K. Swanson — Signature

CONDUCTED EMISSIONS

Test Report #:	WC401600 Run 9	Test Area:	LTS		
EUT Model #:	WiME	Date:	5/3/04		
EUT Serial #:		EUT Power:	60HZ/110VAC	Temperature:	22.0 °C
Test Method:	EN55022 B / FCC B			Air Pressure:	98.0 kPa
Customer:	DIGI INT'L			Rel. Humidity:	31.0 %
EUT Description:	802.11b transceiver to 1 serial port				
Notes:	Same levels with and without the 12" antenna extension cable				
Data File Name:	1600-9-cond.dat			Page:	3 of 4

Measurement summary for limit1: EN55022 B Qp (Qp)

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	EUT Lead	DELTA1 EN55022 B Qp
150.0 kHz	45.87 Qp	0.1 / 3.0 / 0.0 / 0.0	48.97	L1	-17.03
200.0 kHz	43.99 Qp	0.1 / 2.0 / 0.0 / 0.0	46.09	L1	-17.52
400.0 kHz	38.71 Qp	0.1 / 1.0 / 0.0 / 0.0	39.81	L1	-18.04
800.0 kHz	27.22 Qp	0.1 / 0.05 / 0.0 / 0.0	27.37	L1	-28.63
1.0 MHz	26.52 Qp	0.1 / 0.05 / 0.0 / 0.0	26.67	L1	-29.33
5.648 MHz	10.84 Qp	0.5 / 0.05 / 0.0 / 0.0	11.39	N	-48.61
30.0 MHz	7.98 Qp	1.25 / 0.1 / 0.0 / 0.0	9.33	L1	-50.67

Measurement summary for limit2: EN55022 B Avg (Av)

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	EUT Lead	DELTA2 EN55022 B Avg
150.0 kHz	15.02 Av	0.1 / 3.0 / 0.0 / 0.0	18.12	L1	-37.88
200.0 kHz	13.23 Av	0.1 / 2.0 / 0.0 / 0.0	15.33	L1	-38.28
400.0 kHz	8.28 Av	0.1 / 1.0 / 0.0 / 0.0	9.38	L1	-38.47
5.648 MHz	7.43 Av	0.5 / 0.05 / 0.0 / 0.0	7.98	N	-42.02
800.0 kHz	-0.63 Av	0.1 / 0.05 / 0.0 / 0.0	-0.48	L1	-46.48
1.0 MHz	-1.02 Av	0.1 / 0.05 / 0.0 / 0.0	-0.87	L1	-46.87
30.0 MHz	-1.19 Av	1.25 / 0.1 / 0.0 / 0.0	0.16	L1	-49.84

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J C Sausen — Signature

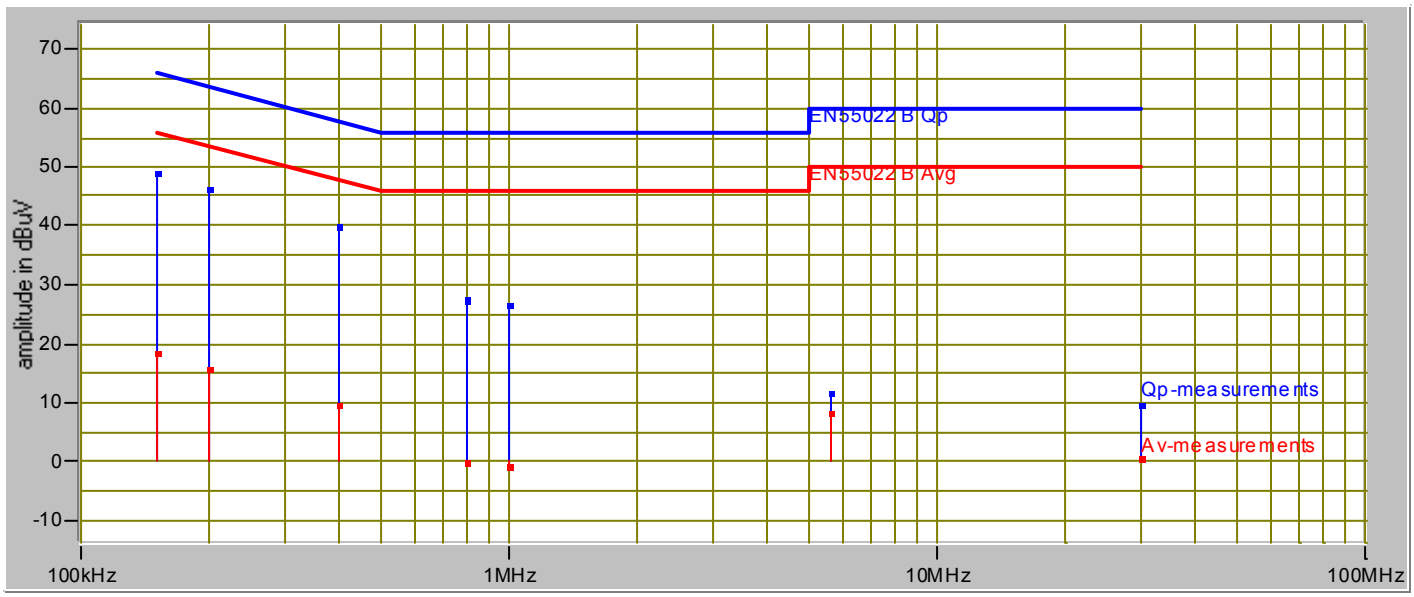
Reviewed by: T. K. Swanson — Printed

Thomas K. Swanson — Signature

CONDUCTED EMISSIONS

Test Report #:	WC401600 Run 9	Test Area:	LTS		
EUT Model #:	WiME	Date:	5/3/04		
EUT Serial #:		EUT Power:	60HZ/110VAC	Temperature:	22.0 °C
Test Method:	EN55022 B / FCC B			Air Pressure:	98.0 kPa
Customer:	DIGI INT'L			Rel. Humidity:	31.0 %
EUT Description:	802.11b transceiver to 1 serial port				
Notes:	Same levels with and without the 12" antenna extension cable				
Data File Name:	1600-9-cond.dat			Page:	4 of 4

Graph:



Tested by: J. C. Sausen

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Signature

Reviewed by: T. K. Swanson

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RADIATED EMISSIONS

Test Report #:	WC401600 Run 1	Test Area:	STS		
EUT Model #:	WiME	Date:	4/16/04		
EUT Serial #:		EUT Power:	60HZ/110VAC	Temperature:	14.0 °C
Test Method:	FCC B			Air Pressure:	97.0 kPa
Customer:	DIGI INT'L			Rel. Humidity:	26.0 %
EUT Description:	WIme (2.4 GHz SPREAD SPECTRUM TRANSMITTER)				
Notes:	Without 12" antenna extension cable				
Data File Name:	1600-8-rad.dat			Page:	1 of 9

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
124.973 MHz	40.15 Qp	1.64 / 8.24 / 26.88 / 0.0	23.15	V / 1.00 / 0	-20.35	n/a
131.981 MHz	40.1 Qp	1.7 / 8.0 / 26.8 / 0.0	23.0	V / 1.00 / 0	-20.5	n/a
132.755 MHz	40.7 Qp	1.7 / 8.0 / 26.8 / 0.0	23.6	V / 1.00 / 0	-19.9	n/a
133.265 MHz	41.0 Qp	1.7 / 7.98 / 26.8 / 0.0	23.88	V / 1.00 / 0	-19.62	n/a
165.869 MHz	45.13 Qp	1.85 / 8.5 / 26.83 / 0.0	28.65	V / 1.00 / 0	-14.85	n/a
169.271 MHz	37.75 Qp	1.88 / 8.58 / 26.86 / 0.0	21.35	V / 1.00 / 0	-22.15	n/a
175.247 MHz	39.15 Qp	1.9 / 8.74 / 26.9 / 0.0	22.89	V / 1.00 / 0	-20.61	n/a
175.979 MHz	42.4 Qp	1.9 / 8.77 / 26.9 / 0.0	26.17	V / 1.00 / 0	-17.33	n/a
182.039 MHz	37.9 Qp	1.9 / 9.16 / 26.9 / 0.0	22.06	V / 1.00 / 0	-21.44	n/a
197.976 MHz	34.7 Qp	2.01 / 10.3 / 26.9 / 0.0	20.11	V / 1.00 / 0	-23.39	n/a
199.979 MHz	37.05 Qp	2.02 / 10.3 / 26.9 / 0.0	22.47	V / 1.00 / 0	-21.03	n/a
219.98 MHz	44.9 Qp	2.16 / 10.6 / 26.94 / 0.0	30.72	V / 1.00 / 0	-15.28	n/a
221.165 MHz	47.77 Qp	2.17 / 10.6 / 26.94 / 0.0	33.59	V / 1.00 / 0	-12.41	n/a
224.981 MHz	34.75 Qp	2.19 / 10.6 / 26.97 / 0.0	20.57	V / 1.00 / 0	-25.43	n/a
263.981 MHz	34.7 Qp	2.32 / 12.07 / 27.1 / 0.0	21.99	V / 1.00 / 0	-24.01	n/a
276.467 MHz	33.65 Qp	2.39 / 12.41 / 27.17 / 0.0	21.28	V / 1.00 / 0	-24.72	n/a
307.979 MHz	37.4 Qp	2.6 / 12.77 / 27.3 / 0.0	25.47	V / 1.00 / 0	-20.53	n/a
387.053 MHz	42.65 Qp	2.87 / 15.39 / 27.55 / 0.0	33.37	V / 1.00 / 0	-12.63	n/a
395.975 MHz	38.85 Qp	2.91 / 15.88 / 27.58 / 0.0	30.05	V / 1.00 / 0	-15.95	n/a
412.595 MHz	39.85 Qp	2.97 / 16.4 / 27.6 / 0.0	31.61	V / 1.00 / 0	-14.39	n/a
426.191 MHz	40.85 Qp	3.01 / 16.7 / 27.6 / 0.0	32.96	V / 1.00 / 0	-13.04	n/a
442.361 MHz	39.2 Qp	3.07 / 16.81 / 27.64 / 0.0	31.44	V / 1.00 / 0	-14.56	n/a
483.981 MHz	35.5 Qp	3.2 / 17.67 / 27.77 / 0.0	28.59	V / 1.00 / 0	-17.41	n/a
497.655 MHz	38.35 Qp	3.27 / 17.37 / 27.8 / 0.0	31.19	V / 1.00 / 0	-14.81	n/a
718.841 MHz	31.95 Qp	4.03 / 20.34 / 27.8 / 0.0	28.53	V / 1.00 / 0	-17.47	n/a

Tested by: RMJ

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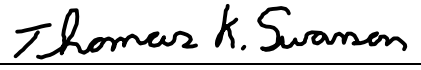

Signature

RADIATED EMISSIONS

Test Report #:	WC401600 Run 1	Test Area:	STS		
EUT Model #:	WiME	Date:	4/16/04		
EUT Serial #:		EUT Power:	60HZ/110VAC	Temperature:	14.0 °C
Test Method:	FCC B			Air Pressure:	97.0 kPa
Customer:	DIGI INT'L			Rel. Humidity:	26.0 %
EUT Description:	WIme (2.4 GHz SPREAD SPECTRUM TRANSMITTER)				
Notes:	Without 12" antenna extension cable				
Data File Name:	1600-8-rad.dat			Page:	2 of 9

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
MAXED.						
221.165 MHz	49.79 Qp	2.17 / 10.6 / 26.94 / 0.0	35.61	V / 1.00 / 96	-10.39	n/a
219.98 MHz	45.35 Qp	2.16 / 10.6 / 26.94 / 0.0	31.17	V / 1.00 / 90	-14.83	n/a
276.467 MHz	34.8 Qp	2.39 / 12.41 / 27.17 / 0.0	22.43	V / 1.00 / 90	-23.57	n/a
387.053 MHz	47.5 Qp	2.87 / 15.39 / 27.55 / 0.0	38.22	V / 1.00 / 90	-7.78	n/a
497.655 MHz	41.65 Qp	3.27 / 17.37 / 27.8 / 0.0	34.49	V / 1.00 / 90	-11.51	n/a
718.841 MHz	32.45 Qp	4.03 / 20.34 / 27.8 / 0.0	29.03	V / 1.00 / 90	-16.97	n/a
452.288 MHz	40.05 Qp	3.1 / 16.42 / 27.68 / 0.0	31.89	V / 1.00 / 90	-14.11	n/a
219.98 MHz	48.35 Qp	2.16 / 10.6 / 26.94 / 0.0	34.17	V / 1.00 / 180	-11.83	n/a
221.165 MHz	51.75 Qp	2.17 / 10.6 / 26.94 / 0.0	37.57	V / 1.00 / 180	-8.43	n/a
395.975 MHz	40.2 Qp	2.91 / 15.88 / 27.58 / 0.0	31.4	V / 1.00 / 270	-14.6	n/a
426.191 MHz	43.35 Qp	3.01 / 16.7 / 27.6 / 0.0	35.46	V / 1.00 / 270	-10.54	n/a
442.361 MHz	41.95 Qp	3.07 / 16.81 / 27.64 / 0.0	34.19	V / 1.00 / 270	-11.81	n/a
483.981 MHz	37.55 Qp	3.2 / 17.67 / 27.77 / 0.0	30.64	V / 1.00 / 270	-15.36	n/a
497.655 MHz	43.45 Qp	3.27 / 17.37 / 27.8 / 0.0	36.29	V / 3.00 / 270	-9.71	n/a
718.841 MHz	36.1 Qp	4.03 / 20.34 / 27.8 / 0.0	32.68	V / 3.00 / 270	-13.32	n/a
395.975 MHz	40.75 Qp	2.91 / 15.88 / 27.58 / 0.0	31.95	V / 3.00 / 270	-14.05	n/a
417.977 MHz	38.2 Qp	2.98 / 16.8 / 27.6 / 0.0	30.38	V / 3.00 / 270	-15.62	n/a
431.305 MHz	37.75 Qp	3.03 / 16.89 / 27.61 / 0.0	30.06	V / 3.00 / 270	-15.94	n/a

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Reviewed by: TKS

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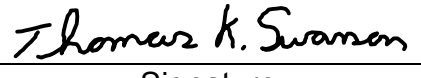

Signature

RADIATED EMISSIONS

Test Report #:	WC401600 Run 1	Test Area:	STS		
EUT Model #:	WiME	Date:	4/16/04		
EUT Serial #:		EUT Power:	60HZ/110VAC	Temperature:	14.0 °C
Test Method:	FCC B			Air Pressure:	97.0 kPa
Customer:	DIGI INT'L			Rel. Humidity:	26.0 %
EUT Description:	WIme (2.4 GHz SPREAD SPECTRUM TRANSMITTER)				
Notes:	Without 12" antenna extension cable				
Data File Name:	1600-8-rad.dat			Page:	3 of 9

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
435.559 MHz	37.5 Qp	3.04 / 16.8 / 27.62 / 0.0	29.72	V / 3.00 / 270	-16.28	n/a
431.305 MHz	39.25 Qp	3.03 / 16.89 / 27.61 / 0.0	31.56	V / 3.00 / 90	-14.44	n/a
435.559 MHz	38.05 Qp	3.04 / 16.8 / 27.62 / 0.0	30.27	V / 3.00 / 90	-15.73	n/a
442.361 MHz	42.9 Qp	3.07 / 16.81 / 27.64 / 0.0	35.14	V / 3.00 / 90	-10.86	n/a
483.981 MHz	38.05 Qp	3.2 / 17.67 / 27.77 / 0.0	31.14	V / 3.00 / 90	-14.86	n/a
497.655 MHz	45.25 Qp	3.27 / 17.37 / 27.8 / 0.0	38.09	V / 3.00 / 90	-7.91	n/a
483.981 MHz	38.7 Qp	3.2 / 17.67 / 27.77 / 0.0	31.79	V / 3.00 / 0	-14.21	n/a
MAXIMIZED.						
221.165 MHz	53.46 Qp	2.17 / 10.6 / 26.94 / 0.0	39.28	V / 1.00 / 213	-6.72	n/a
219.98 MHz	50.47 Qp	2.16 / 10.6 / 26.94 / 0.0	36.29	V / 1.00 / 220	-9.71	n/a
387.053 MHz	50.2 Qp	2.87 / 15.39 / 27.55 / 0.0	40.92	V / 1.00 / 333	-5.08	n/a
497.655 MHz	48.95 Qp	3.27 / 17.37 / 27.8 / 0.0	41.79	V / 1.00 / 333	-4.21	n/a
165.869 MHz	42.34 Qp	1.85 / 8.5 / 26.83 / 0.0	25.86	V / 1.00 / 200	-17.64	n/a
426.191 MHz	43.46 Qp	3.01 / 16.7 / 27.6 / 0.0	35.57	V / 1.00 / 275	-10.43	n/a
442.361 MHz	45.82 Qp	3.07 / 16.81 / 27.64 / 0.0	38.06	V / 1.00 / 63	-7.94	n/a
MAXED ANTENNA AND ROTATED EUT 360 DEGREES.						
276.467 MHz	41.25 Qp	2.39 / 12.41 / 27.17 / 0.0	28.88	H / 3.00 / 0	-17.12	n/a
307.979 MHz	38.85 Qp	2.6 / 12.77 / 27.3 / 0.0	26.92	H / 3.00 / 0	-19.08	n/a
435.559 MHz	39.65 Qp	3.04 / 16.8 / 27.62 / 0.0	31.87	H / 3.00 / 90	-14.13	n/a

Tested by: RMJ

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Reviewed by: TKS

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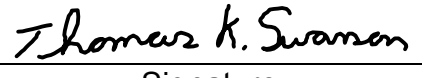

Signature

RADIATED EMISSIONS

Test Report #:	WC401600 Run 1	Test Area:	STS		
EUT Model #:	WiME	Date:	4/16/04		
EUT Serial #:		EUT Power:	60HZ/110VAC	Temperature:	14.0 °C
Test Method:	FCC B			Air Pressure:	97.0 kPa
Customer:	DIGI INT'L			Rel. Humidity:	26.0 %
EUT Description:	WIme (2.4 GHz SPREAD SPECTRUM TRANSMITTER)				
Notes:	Without 12" antenna extension cable				
Data File Name:	1600-8-rad.dat			Page:	4 of 9

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
307.979 MHz	39.15 Qp	2.6 / 12.77 / 27.3 / 0.0	27.22	H / 3.00 / 180	-18.78	n/a
307.979 MHz	41.25 Qp	2.6 / 12.77 / 27.3 / 0.0	29.32	H / 3.00 / 270	-16.68	n/a
431.305 MHz	41.4 Qp	3.03 / 16.89 / 27.61 / 0.0	33.71	H / 3.00 / 270	-12.29	n/a
435.559 MHz	41.1 Qp	3.04 / 16.8 / 27.62 / 0.0	33.32	H / 3.00 / 270	-12.68	n/a
483.981 MHz	39.35 Qp	3.2 / 17.67 / 27.77 / 0.0	32.44	H / 3.00 / 270	-13.56	n/a
718.841 MHz	40.3 Qp	4.03 / 20.34 / 27.8 / 0.0	36.88	H / 1.00 / 270	-9.12	n/a
718.841 MHz	40.7 Qp	4.03 / 20.34 / 27.8 / 0.0	37.28	H / 1.00 / 90	-8.72	n/a
MAXIMIZED.						
718.841 MHz	41.4 Qp	4.03 / 20.34 / 27.8 / 0.0	37.98	H / 1.36 / 120	-8.02	n/a
1.493 GHz	34.27 Av	6.0 / 25.59 / 27.4 / 0.0	38.46	V / 1.00 / 0	n/a	-15.54
1.548 GHz	34.89 Av	6.1 / 25.83 / 27.45 / 0.0	39.37	V / 1.00 / 0	n/a	-14.63
1.604 GHz	37.13 Av	6.21 / 26.1 / 27.5 / 0.0	41.94	V / 1.00 / 0	n/a	-12.06
1.493 GHz	34.65 Av	6.0 / 25.59 / 27.4 / 0.0	38.84	V / 1.00 / 180	n/a	-15.16
MAXIMIZED.						
1.493 GHz	36.79 Av	6.0 / 25.59 / 27.4 / 0.0	40.98	V / 1.00 / 209	n/a	-13.02

Tested by: RMJ

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Reviewed by: TKS

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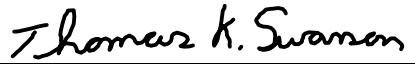


Signature

RADIATED EMISSIONS

Test Report #:	WC401600 Run 1	Test Area:	STS		
EUT Model #:	WiME	Date:	4/16/04		
EUT Serial #:		EUT Power:	60HZ/110VAC	Temperature:	14.0 °C
Test Method:	FCC B			Air Pressure:	97.0 kPa
Customer:	DIGI INT'L			Rel. Humidity:	26.0 %
EUT Description:	WIme (2.4 GHz SPREAD SPECTRUM TRANSMITTER)				
Notes:	Without 12" antenna extension cable				
Data File Name:	1600-8-rad.dat			Page:	5 of 9

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
MAXED ANTENNA AND ROTATED EUT 360 DEGREES.						
1.161 GHz	32.07 Av	5.25 / 24.92 / 27.44 / 0.0	34.8	H / 1.00 / 0	n/a	-19.2
MAXIMIZED.						
1.161 GHz	32.56 Av	5.25 / 24.92 / 27.44 / 0.0	35.29	H / 1.00 / 25	n/a	-18.71
MAXED ANTENNA AND ROTATED EUT 360 DEGREES.						
END OF SCAN.						

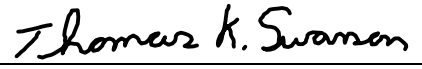
Tested by: RMJ

Printed

Signature

Reviewed by: TKS

Printed



Signature

RADIATED EMISSIONS

Test Report #:	WC401600 Run 1	Test Area:	STS		
EUT Model #:	WiME	Date:	4/16/04		
EUT Serial #:		EUT Power:	60HZ/110VAC	Temperature:	14.0 °C
Test Method:	FCC B			Air Pressure:	97.0 kPa
Customer:	DIGI INT'L			Rel. Humidity:	26.0 %
EUT Description:	WIme (2.4 GHz SPREAD SPECTRUM TRANSMITTER)				
Notes:	Without 12" antenna extension cable				
Data File Name:	1600-8-rad.dat			Page:	6 of 9

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
497.655 MHz	48.95 Qp	3.27 / 17.37 / 27.8 / 0.0	41.79	V / 1.00 / 333	-4.21
387.053 MHz	50.2 Qp	2.87 / 15.39 / 27.55 / 0.0	40.92	V / 1.00 / 333	-5.08
221.165 MHz	53.46 Qp	2.17 / 10.6 / 26.94 / 0.0	39.28	V / 1.00 / 213	-6.72
442.361 MHz	45.82 Qp	3.07 / 16.81 / 27.64 / 0.0	38.06	V / 1.00 / 63	-7.94
718.841 MHz	41.4 Qp	4.03 / 20.34 / 27.8 / 0.0	37.98	H / 1.36 / 120	-8.02
219.98 MHz	50.47 Qp	2.16 / 10.6 / 26.94 / 0.0	36.29	V / 1.00 / 220	-9.71
426.191 MHz	43.46 Qp	3.01 / 16.7 / 27.6 / 0.0	35.57	V / 1.00 / 275	-10.43
431.305 MHz	41.4 Qp	3.03 / 16.89 / 27.61 / 0.0	33.71	H / 3.00 / 270	-12.29
435.559 MHz	41.1 Qp	3.04 / 16.8 / 27.62 / 0.0	33.32	H / 3.00 / 270	-12.68
483.981 MHz	39.35 Qp	3.2 / 17.67 / 27.77 / 0.0	32.44	H / 3.00 / 270	-13.56
395.975 MHz	40.75 Qp	2.91 / 15.88 / 27.58 / 0.0	31.95	V / 3.00 / 270	-14.05
452.288 MHz	40.05 Qp	3.1 / 16.42 / 27.68 / 0.0	31.89	V / 1.00 / 90	-14.11
412.595 MHz	39.85 Qp	2.97 / 16.4 / 27.6 / 0.0	31.61	V / 1.00 / 0	-14.39
165.869 MHz	45.13 Qp	1.85 / 8.5 / 26.83 / 0.0	28.65	V / 1.00 / 0	-14.85
417.977 MHz	38.2 Qp	2.98 / 16.8 / 27.6 / 0.0	30.38	V / 3.00 / 270	-15.62
307.979 MHz	41.25 Qp	2.6 / 12.77 / 27.3 / 0.0	29.32	H / 3.00 / 270	-16.68
276.467 MHz	41.25 Qp	2.39 / 12.41 / 27.17 / 0.0	28.88	H / 3.00 / 0	-17.12
175.979 MHz	42.4 Qp	1.9 / 8.77 / 26.9 / 0.0	26.17	V / 1.00 / 0	-17.33
133.265 MHz	41.0 Qp	1.7 / 7.98 / 26.8 / 0.0	23.88	V / 1.00 / 0	-19.62
132.755 MHz	40.7 Qp	1.7 / 8.0 / 26.8 / 0.0	23.6	V / 1.00 / 0	-19.9
124.973 MHz	40.15 Qp	1.64 / 8.24 / 26.88 / 0.0	23.15	V / 1.00 / 0	-20.35
131.981 MHz	40.1 Qp	1.7 / 8.0 / 26.8 / 0.0	23.0	V / 1.00 / 0	-20.5
175.247 MHz	39.15 Qp	1.9 / 8.74 / 26.9 / 0.0	22.89	V / 1.00 / 0	-20.61
199.979 MHz	37.05 Qp	2.02 / 10.3 / 26.9 / 0.0	22.47	V / 1.00 / 0	-21.03

Tested by: RMJ

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Reviewed by: TKS

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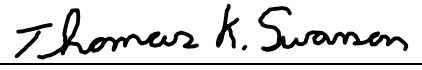

Signature

RADIATED EMISSIONS

Test Report #:	WC401600 Run 1	Test Area:	STS		
EUT Model #:	WiME	Date:	4/16/04		
EUT Serial #:		EUT Power:	60HZ/110VAC	Temperature:	14.0 °C
Test Method:	FCC B			Air Pressure:	97.0 kPa
Customer:	DIGI INT'L			Rel. Humidity:	26.0 %
EUT Description:	WIme (2.4 GHz SPREAD SPECTRUM TRANSMITTER)				
Notes:	Without 12" antenna extension cable				
Data File Name:	1600-8-rad.dat			Page:	7 of 9

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
182.039 MHz	37.9 Qp	1.9 / 9.16 / 26.9 / 0.0	22.06	V / 1.00 / 0	-21.44
169.271 MHz	37.75 Qp	1.88 / 8.58 / 26.86 / 0.0	21.35	V / 1.00 / 0	-22.15
197.976 MHz	34.7 Qp	2.01 / 10.3 / 26.9 / 0.0	20.11	V / 1.00 / 0	-23.39
263.981 MHz	34.7 Qp	2.32 / 12.07 / 27.1 / 0.0	21.99	V / 1.00 / 0	-24.01
224.981 MHz	34.75 Qp	2.19 / 10.6 / 26.97 / 0.0	20.57	V / 1.00 / 0	-25.43

Tested by: RMJ

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Signature

Reviewed by: TKS

Printed

Signature

RADIATED EMISSIONS

Test Report #:	WC401600 Run 1	Test Area:	STS		
EUT Model #:	WiME	Date:	4/16/04		
EUT Serial #:		EUT Power:	60HZ/110VAC	Temperature:	14.0 °C
Test Method:	FCC B			Air Pressure:	97.0 kPa
Customer:	DIGI INT'L			Rel. Humidity:	26.0 %
EUT Description:	WIme (2.4 GHz SPREAD SPECTRUM TRANSMITTER)				
Notes:	Without 12" antenna extension cable				
Data File Name:	1600-8-rad.dat			Page:	8 of 9

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
1.604 GHz	37.13 Av	6.21 / 26.1 / 27.5 / 0.0	41.94	V / 1.00 / 0	-12.06
1.493 GHz	36.79 Av	6.0 / 25.59 / 27.4 / 0.0	40.98	V / 1.00 / 209	-13.02
1.548 GHz	34.89 Av	6.1 / 25.83 / 27.45 / 0.0	39.37	V / 1.00 / 0	-14.63
1.161 GHz	32.56 Av	5.25 / 24.92 / 27.44 / 0.0	35.29	H / 1.00 / 25	-18.71

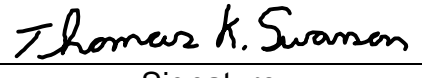
Tested by: RMJ

Printed

Signature

Reviewed by: TKS

Printed

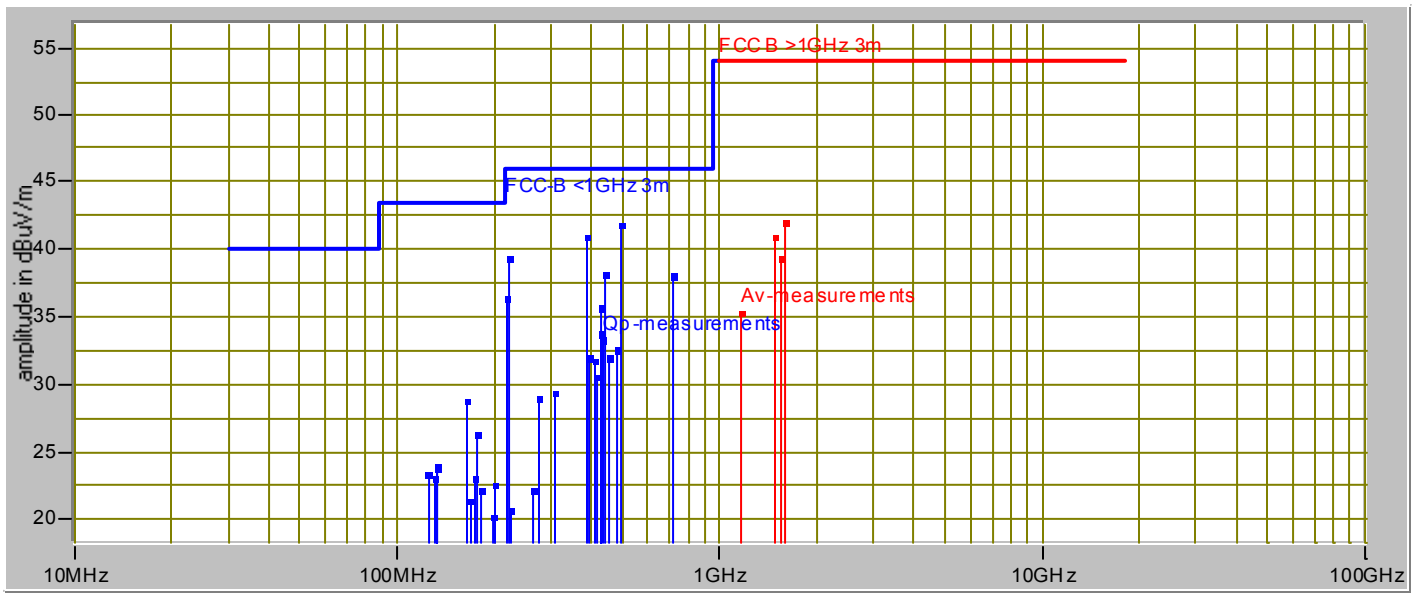


Signature

RADIATED EMISSIONS

Test Report #:	WC401600 Run 1	Test Area:	STS		
EUT Model #:	WiME	Date:	4/16/04		
EUT Serial #:		EUT Power:	60HZ/110VAC	Temperature:	14.0 °C
Test Method:	FCC B			Air Pressure:	97.0 kPa
Customer:	DIGI INT'L			Rel. Humidity:	26.0 %
EUT Description:	WIme (2.4 GHz SPREAD SPECTRUM TRANSMITTER)				
Notes:	Without 12" antenna extension cable				
Data File Name:	1600-8-rad.dat			Page:	9 of 9

Graph:



Tested by: RMJ

Printed

Signature

Reviewed by: TKS

Printed

Signature

RADIATED EMISSIONS

Test Report #:	WC401600 Run 6	Test Area:	LTS		
EUT Model #:	WiME	Date:	5/3/04		
EUT Serial #:		EUT Power:	60HZ/110VAC	Temperature:	22.0 °C
Test Method:	EN55022 B			Air Pressure:	98.0 kPa
Customer:	DIGI INT'L			Rel. Humidity:	31.0 %
EUT Description:	802.11b transceiver to 1 serial port				
Notes:	Without 12" antenna extension cable				
Data File Name:	1600-6-rad.dat			Page:	1 of 2

List of measurements for run #: 6

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA1 FCC B >1GHz 3m	DELTA2
Continuous transmit mode						
4.822 GHz	56.45 Av	6.34 / 34.6 / 44.09 / 0.0	53.3	V / 1.60 / 107	-0.7	n/a
4.824 GHz	55.66 Av	6.34 / 34.61 / 44.09 / 0.0	52.52	V / 1.30 / 340	-1.48	n/a
4.824 GHz	38.86 Av	6.34 / 34.61 / 44.09 / 0.0	35.72	H / 1.30 / 340	-18.28	n/a
NO FURTHER EMISSIONS FROM 4-25 GHZ.						
2.389 GHz	57.05 Av	4.3 / 30.46 / 43.66 / 0.0	48.15	V / 1.20 / 300	-5.85	n/a
2.389 GHz	66.99 Av	4.3 / 30.46 / 43.66 / 0.0	58.09	V / 1.80 / 300	4.09	n/a
FOLLOWING READING WITHOUT PREAMP						
2.389 GHz	29.41 Av	4.3 / 30.46 / 0.0 / 0.0	64.17	V / 1.80 / 300	10.17	n/a
2.389 GHz	50.72 Av	8.3 / 30.46 / 43.66 / 0.0	45.82	V / 1.80 / 300	-8.18	n/a
End of scan 2 to 25 GHz.						
Duty cycle correction factor is –12 dB (See plot on page A). Summary on following page includes the duty cycle correction factor.						

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

Reviewed by: T. K. Swanson — Printed — Thomas K. Swanson — Signature

RADIATED EMISSIONS

Test Report #:	WC401600 Run 6	Test Area:	LTS		
EUT Model #:	WiME	Date:	5/3/04		
EUT Serial #:		EUT Power:	60HZ/110VAC	Temperature:	22.0 °C
Test Method:	EN55022 B			Air Pressure:	98.0 kPa
Customer:	DIGI INT'L			Rel. Humidity:	31.0 %
EUT Description:	802.11b transceiver to 1 serial port				
Notes:	Without 12" antenna extension cable				
Data File Name:	1600-6-rad.dat			Page:	2 of 2

Measurement summary for limit1: FCC B >1GHz 3m (Av)

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA1 FCC B >1GHz 3m
4.822 GHz	56.45 Av	6.34 / 34.6 / 44.09 / 0.0	53.3	V / 1.60 / 107	-11.3
2.389 GHz	17.4 Av	4.3 / 30.46 / 0.0 / 0.0	52.17	V / 1.60 / 107	-1.83

Tested by: J. C. Sausen — Printed

J C Sausen — Signature

Reviewed by: T. K. Swanson — Printed

Thomas K. Swanson — Signature

RADIATED EMISSIONS

Test Report #:	3082 Run 1	Test Area:	LTS		
EUT Model #:	26000050 (with Wi-ME converter)	Date:	6/29/04		
EUT Serial #:		EUT Power:	60	Temperature:	23.0 °C
Test Method:				Air Pressure:	100.0 kPa
Customer:	Digi International			Rel. Humidity:	44.0 %
EUT Description:	12 " extension cable with standard whip antenna.				
Notes:					
Data File Name:	3082.dat			Page:	1 of 2

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
4.819 GHz	48.4 Pk	6.34 / 34.59 / 44.1 / 0.36	45.6	V / 1.00 / 130	-8.4*	n/a
4.82 GHz	40.63 Av	6.34 / 34.6 / 44.09 / 0.36	37.83	V / 1.00 / 130	-16.17	n/a
No 4.8 GHz signal detected with horizontal antenna polarization.						
No EUT signal detected at 7.2 GHz, vert and hor ant.						
No EUT signal detected at 14.4 GHz, vert and hor ant.						
If 19.29 GHz harmonic detected during direct measurement, this frequency will be rechecked.						
No EUT emissions detected in other restricted bands.						
End of scan 1 to 25 GHz.						

*denotes peak measurement compared to average limit

Tested by: J. C. Sausen — Printed

J C Sausen — Signature

Reviewed by: TKS — Printed

Thomas K. Swanson — Signature

RADIATED EMISSIONS

Test Report #:	3082 Run 1	Test Area:	LTS			
EUT Model #:	26000050 (with Wi-ME converter)	Date:	6/29/04			
EUT Serial #:		EUT Power:	60	Temperature:	23.0	°C
Test Method:				Air Pressure:	100.0	kPa
Customer:	Digi International			Rel. Humidity:	44.0	%
EUT Description:	12 " extension cable with standard whip antenna.					
Notes:						
Data File Name:	3082.dat			Page:	2 of 2	

Measurement summary for limit1: FCC B >1GHz 3m (Av)

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA1 FCC B >1GHz 3m
4.82 GHz	40.63 Av	6.34 / 34.6 / 44.09 / 0.36	37.83	V / 1.00 / 130	-16.17
4.819 GHz	48.4 Pk	6.34 / 34.59 / 44.1 / 0.36	45.6	V / 1.00 / 130	-8.4*

*denotes peak measurement compared to average limit

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

Reviewed by: TKS — Printed — Signature

Appendix B

Constructional Data Form(s)

and/or

Product Information Form(s)

TÜV PRODUCT SERVICE INC 19333 Wild Mountain Road Taylors Falls MN 55084-1758 Tel: 651 638 0297 Fax: 651 638 0298 Rev.No 1.0

EMC TEST - PRODUCT INFORMATION FORM

Company Address: 11001 Bren Road East
Minnetonka, MN 55343
Ph: (952) 912-3444 Fax: (952) 912-4955

Digi Engineering Contact: Bill Kumpf **Phone:** 952-912-3444

Digi Homologation Contact: Nick Melnick **Phone:** 952-912-3444

Equipment Under Test: Wi-ME 802.11b radio to serial converter module.

Model Number: 50000880-01 **Rev:** 1P
(do not use 30m p/n)
Serial Number: 00001

Test Laboratory: _____ **Test Date:** _____

Type of Test:

☐ Development	X EN55022:1998/FCC Class B Emissions
X Initial Design Verification	☐ EN55022:1998/FCC Class A Emissions
☐ Design Change	☐ Korea No. 1996-18 (based on CISPR 22)
☐ Production Sample (Audit Test)	☐ Taiwan CNS 13438:1997
☐ Other	☐ EN55024:1998 IT & Telecom Immunity
	☐ EN61000-3-2,3 Supply Harmonics/Flicker
	☐ ETS 301 489-3
EMC – Wireless (Intentional)	**EMC – Wireless (Unintentional)**
x ETS 300 328 (Europe)	x ETS 300 826 (Europe)
X FCC Part 15.247, 15.249 / RSS 139, 210	X FCC Part 15, Class B / ICES 003, Class B
☐ ARIB T66 (RCR STD-33) - Japan	☐ VCCI, Class B - Japan

Documentation Requested:

X EN55022:1998 Test Report (FCC Style)	☐ Austel EMC Report
☐ International EMC Report	X FCC Test Report
☐ VCCI Test Report	☐ EN55024: 1998 Test Report
☐ Taiwan CNS 13438:1997 Test Report	☐ Korea No. 1996-18 Report
☐ EN61000-3-2, 3:1995	☐ Test Results Summary
☐ ETS 300 328 (Europe)	☐ ETS 301 489-3 Immunity
X FCC Part 15.247, 15.249/RSS 139, 210	

Equipment Description: 802.11B 11 Mbit 2.4 GHz radio transceiver to single TTL serial port converter

Design Changes Made (if applicable)**:** _____

Oscillator Frequencies: 18.432 MHz, 44Mhz, 2.4GHz pll

Power Interface	AC Power Cable	DC Power Cable
	☐ Hardwired ☐ Flexible ☐ Shielded ☐ Unshielded ☐ Attached ☐ Removable	☐ Hardwired ☐ Flexible ☐ Shielded ☐ Unshielded ☐ Attached ☐ Removable
Frequency: _____ Hz Voltage: _____ V Current _____ A # of Phases:	Gauge ____ AWG Length ____ Ft.	Gauge ____ AWG Length ____ Ft.

Power Line Filter: **Manufacturer:** **Model Number:**

Power Supply:

Description: N/A

Manufacturer: N/A

Model Number: N/A

Switching Frequency: N/A

If a Ferrite Bead is used on the AC line cord, give location on cable:

N/A

If a Ferrite Bead is used on the DC line cord, give location on cable:

N/A

Housing or Cabinet Type: Plastic ☐ Metallized ☐ Metal **x** Other ☐
Host Board Only, Housed in PC ☐

Cabinet Shielding Provision : N/A

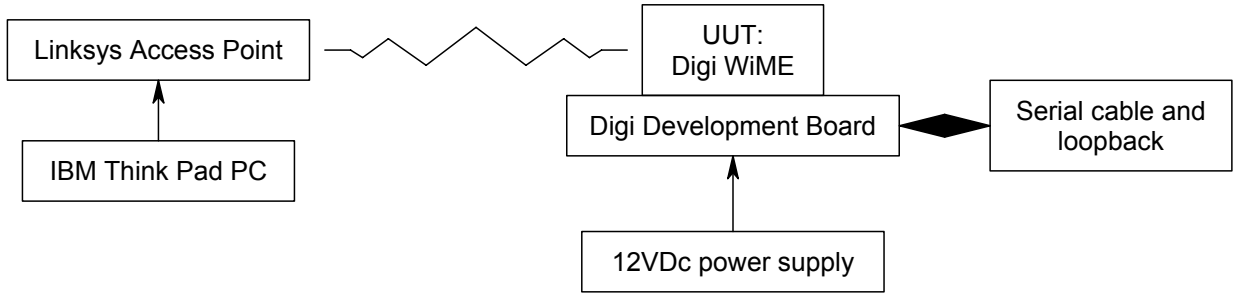
Interfacing Equipment or Simulators

Description	Model Number	Serial Number	FCC ID#
Digi development board	50000808-02	v34647584	na
Linksys access point	WAP11	G3110304780	07JGL2411AP
IBM Think Pad PC	Type 2611	AA-DVBCD	7K85E145483 3872B567

I/O Cables

Function	Length	Quantity	Location	Type	Shield Termination
SERIAL CABLE	1M	1	ON DEV. BOARD	SHIELDED	CONNECTOR SHELL

Block Diagram:



Software and/or Operating Modes: **FCC software -- "H"'s out of serial port and across radio link.**

Further Notes:

Constructional Data Form for EMC-certificate testing

TÜV Product Service Inc
1775 Old Highway 8
New Brighton MN 55112-1891

Telephone 612 631 2487
Telefax 612 631 3515

General equipment description *for EMC-certificate testing*

Applicant: Digi International
Address: 11001 Bren Road East
Minnetonka MN 55343

Type of equipment	802.11B 11 Mbit 2.4 GHz radio transceiver to single TTL serial port converter	Rated voltage	3.3VDc
Type No./model	WiME 50000880-01	Rated input power	3W Max
		Protection class	na

Check the appropriate:

Kind of interference:
☐ Broadband interference x Narrowband interference ☐ Click interference

Repetition frequency:
☐ <10 kHz x >10 kHz

Sources of interference
(e.g. motor, switch mode power supply, quartz oscillator)
Quartz oscillator

[1]) Internal frequencies: 18.432 MHz, 44Mhz, 2.4GHz pll
(e.g. clock frequency, deflection frequency, switching frequency)

[1]) Devices used for RFI suppression (include manufacturer and model no.): na

[1]) Measures for electromagnetic shielding (include type, manufacturer and model no.): na

[1]) External interfaces and connections (include manufacturer and model no.): Digi development board 50000808-02

[1]) Description of modes or operation during test: FCC software -- "H"'s on serial port and across radio link

[1]) Please include detailed information and if applicable, refer to the appropriate Product Information Form or attachment

date _____ date _____
TÜV Product Service Inc Seal and signature of applicant

Appendix C

MEASUREMENT PROTOCOL

GENERAL INFORMATION

Test Methodology

Conducted and radiated emission testing is performed according to the procedures in International Special Committee on Radio Interference (CISPR) Publication 22 (1993), European Standard EN 55022 and Australian Standard AS 3548 (which are based on CISPR 22).

The Japanese standard, "Voluntary Control Council for Interference (VCCI) by Data Processing Equipment and Electronic Office Machines, Technical Requirements" is technically equivalent to CISPR 22 (1993). For official compliance, a conformance report must be sent to and accepted by the VCCI.

In compliance with FCC Docket 92-152, "Harmonization of Rules for Digital Devices Incorporate International Standards", testing for FCC compliance may be done following the ANSI C63.4-1992 procedures and using the CISPR 22 Limits.

Measurement Uncertainty

The test system for conducted emissions is defined as the LISN, tuned receiver or spectrum analyzer, and coaxial cable. The test system for radiated emissions is defined as the antenna, the pre-amplifier, the spectrum analyzer and the coaxial cable. These test systems have a measurement uncertainty of ±4.5 dB. The equipment comprising the test systems are 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 it's 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, expressed in dBμV, is arrived at by taking the reading directly from the EMI receiver. This level is compared directly to the CISPR limit.

To convert between dBμV and μV, the following conversions apply:

dBμV = 20(log μV)

μV = Inverse log(dBμV/20)

RADIATED EMISSIONS

The final level, expressed in dBμV/m, is arrived at by taking the reading from the spectrum analyzer (Level dBμV), adding the antenna correction factor and cable loss factor (Factor dB) to it, then subtracting the preamp gain. This result then has the CISPR limit subtracted from it to provide the Delta which gives the tabular data as shown in the data sheets in Attachment A.

Example:

FREQ (MHz)	LEVEL (dBuV)		CABLE/ANT/PREAMP (dB)	(dB/m)	(dB)		FINAL (dBuV/m)		POL/HGT/AZ (m)	(deg)	DELTA1 EN 55022 A
60.80	42.5Qp	+	1.2	+ 10.9	- 25.5	=	29.1	V	1.0	0.0	-10.9

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DETAILS OF TEST PROCEDURES

General Standard Information

The test methods used comply with ANSI C63.4-1992 - "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz."

Conducted Emissions

Conducted emissions on the 50 Hz and/or 60 Hz power interface of the EUT are measured in the frequency range of 150 kHz to 30 MHz. The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi-peak detection, and a Line Impedance Stabilization Network (LISN), with 50 Ω/50 μH (CISPR 16) characteristics. Table top equipment is placed on a non-conducting table 80 centimeters above the floor and is positioned 40 centimeters from the vertical ground plane (wall) of the screen room. In some cases, a pre-scan using a spectrum analyzer is initially performed on the units comprising the system under test to locate the highest emissions. If the minimum passing margin appears to be less than 20 dB with a peak mode measurement, the emissions are re-measured using a tuned receiver or spectrum analyzer with quasi-peak and average detection and recorded on the data sheets.

Radiated Emissions

Radiated emissions from the EUT are measured in the frequency range of 30 to 25000 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 detection. Table top 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. The transmitter is rotated through 3 orthogonal axes in order to determine the maximum emission levels.

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