TEST RESULT SUMMARY

FCC Part 15 Subpart C Section 15.247
Industry Canada RSS-210 Issue 7
Industry Canada RSS-Gen Issue 2

MANUFACTURER	Digi International 11001 Bren Road East Minnetonka MN 55343
PRODUCT NAME	Wi-EM 9210 a/b/g
MODEL NUMBER(S) TESTED	50001558-01 with 29000147 antenna
PRODUCT DESCRIPTION	802.11 a/b/g embedded radio module (802.11 a/b/g to a serial port converter module) with PCB antenna
TEST REPORT NUMBER	WC807706 Rev E
TEST DATE(S)	15 September – 14 November 2008

TÜV SÜD America Inc, as an independent testing laboratory, declares that the equipment tested as specified above conforms to the applicable 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"* and Industry Canada RSS-210 Issue 7 *"Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment"* and RSS-Gen Issue 2 *"General Requirements and Information for the Certification of Radiocommunication Equipment"*

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.

		Tested by:	Approved by:
Date:	13 November 2009		
Location:	Taylors Falls MN USA	Greg Jakubowski Senior EMC Technician	Joel T Schneider Senior EMC Engineer

Not Transferable

EMC TEST REPORT

Test Report No.	**WC807706 Rev E** Date of issue: 13 November 2009
Product Name	Wi-EM 9210 a/b/g
Model / Serial No(s) Tested	50001558-01 with 29000147 antenna / 0000x
Product Description	802.11 a/b/g embedded radio module (802.11 a/b/g to a serial port converter module) with PCB antenna
Manufacturer	Digi International 11001 Bren Road East Minnetonka MN 55343
Test Result	■ **Positive** ☐ **Negative**
Total pages including Appendices	**76**

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.

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REVISION RECORD

REVISION	TOTAL NUMBER OF PAGES	DATE	DESCRIPTION
	152	17 November 2008	Initial Release
A	152	19 November 2008	Revisions Include: ▪ TRS, Page 1 and Appendix B: Corrected EUT name to Wi-EM 9210 a/b/g.
B	81	10 February 2009	Revisions Include: ▪ Revised to reflect just 15.247 testing per TCB.
C	76	24 March 2009	Revisions Include: ▪ Added table of measurements to max pk output pwr ▪ Removed max pk output pwr plots ▪ Added manufacturer's duty cycle data
D	76	22 July 2009	Revisions Include: ▪ Corrected duty cycle calculations to match the manufacturer's data
E	76	13 November 2009	Revisions Include: ▪ Corrected duty cycle information for spurious emissions to reflect manufacturer's recommended 10% worst case duty cycle scenario.

TEST REPORT CONTENTS **Page(s)**

EMC TEST REGULATIONS:

The tests were performed according to the following regulations:

- FCC Part 15 Subpart C Section 15.247 Paragraphs (a)(2), (b)(3), (d), (e)
- Industry Canada RSS-210 Issue 7 Sections A8.2(a), A8.4(4), A8.5, A8.2(b), A9.2, A9.3
- Industry Canada RSS-Gen Issue 2 Section 4.6.1

ENVIRONMENTAL CONDITIONS IN THE LAB

	Actual
Temperature:	: 20-24°C
Atmospheric pressure	: 98-100kPa
Relative Humidity	: 28-62%

POWER SUPPLY UTILIZED

Power supply system	: 3.3VDC

TEST EQUIPMENT

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

SIGN EXPLANATIONS

☐ - not applicable
■ - applicable

6 dB Bandwidth
FCC 15.247(a)(2), IC RSS-210 A8.2(a)

Test summary
The requirements are: ■ - MET ☐ - NOT MET
Testing was performed in accordance with the test procedure of FCC KDB Publication 558074
The minimum 6 dB bandwidth = 9.54 MHz

Test location
☐ - Wild River Lab Large Test Site (Open Area Test Site)
☐ - Wild River Lab Small Test Site (Open Area Test Site)
■ - Wild River Lab Tech Area, conducted measurement

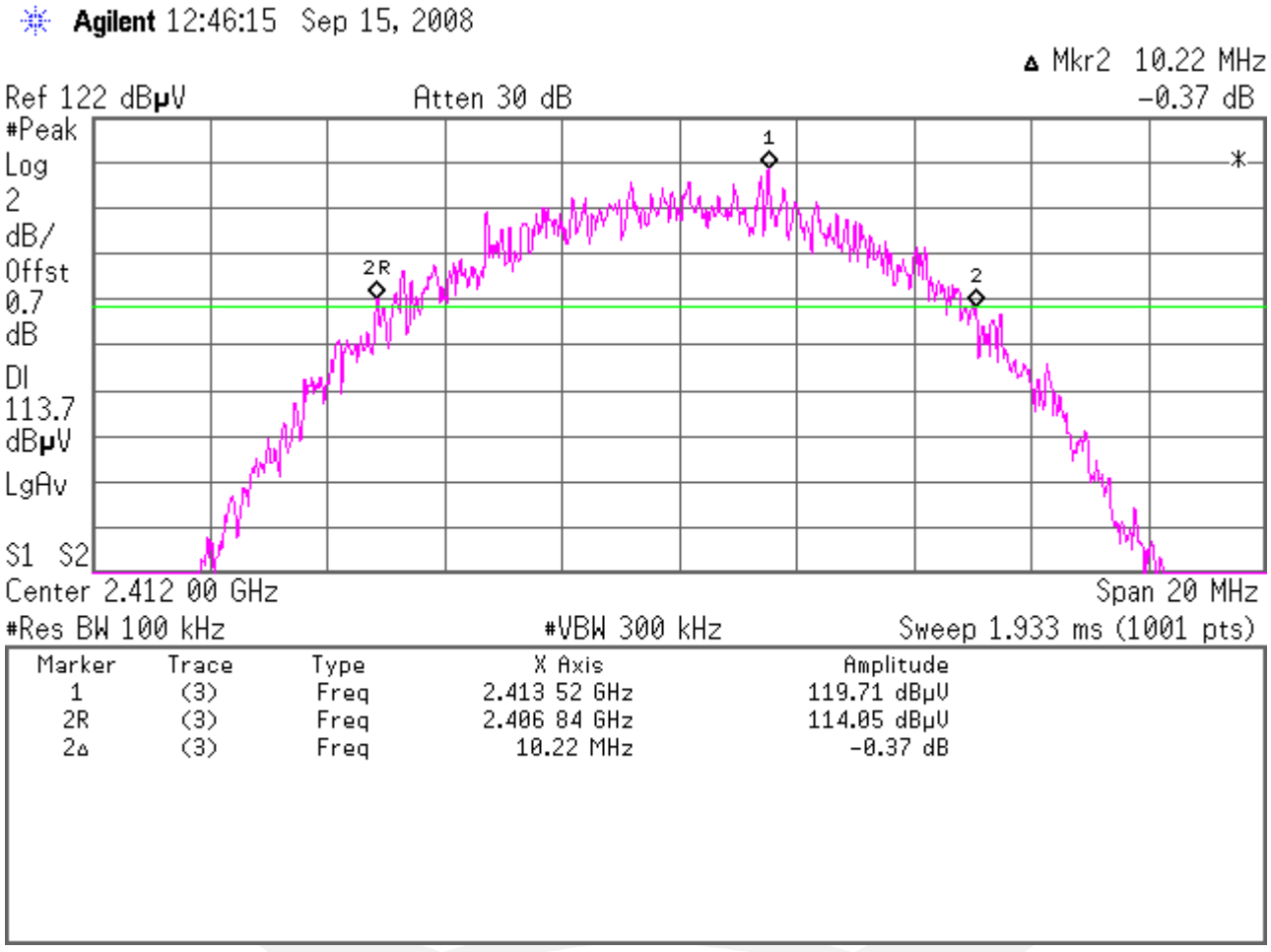
Test equipment

TUV ID	Model	Manufacturer	Description	Serial	Cal Due
WRLE03371	E4440A	Agilent	Spectrum Analyzer	MY43362222	11-Aug-10

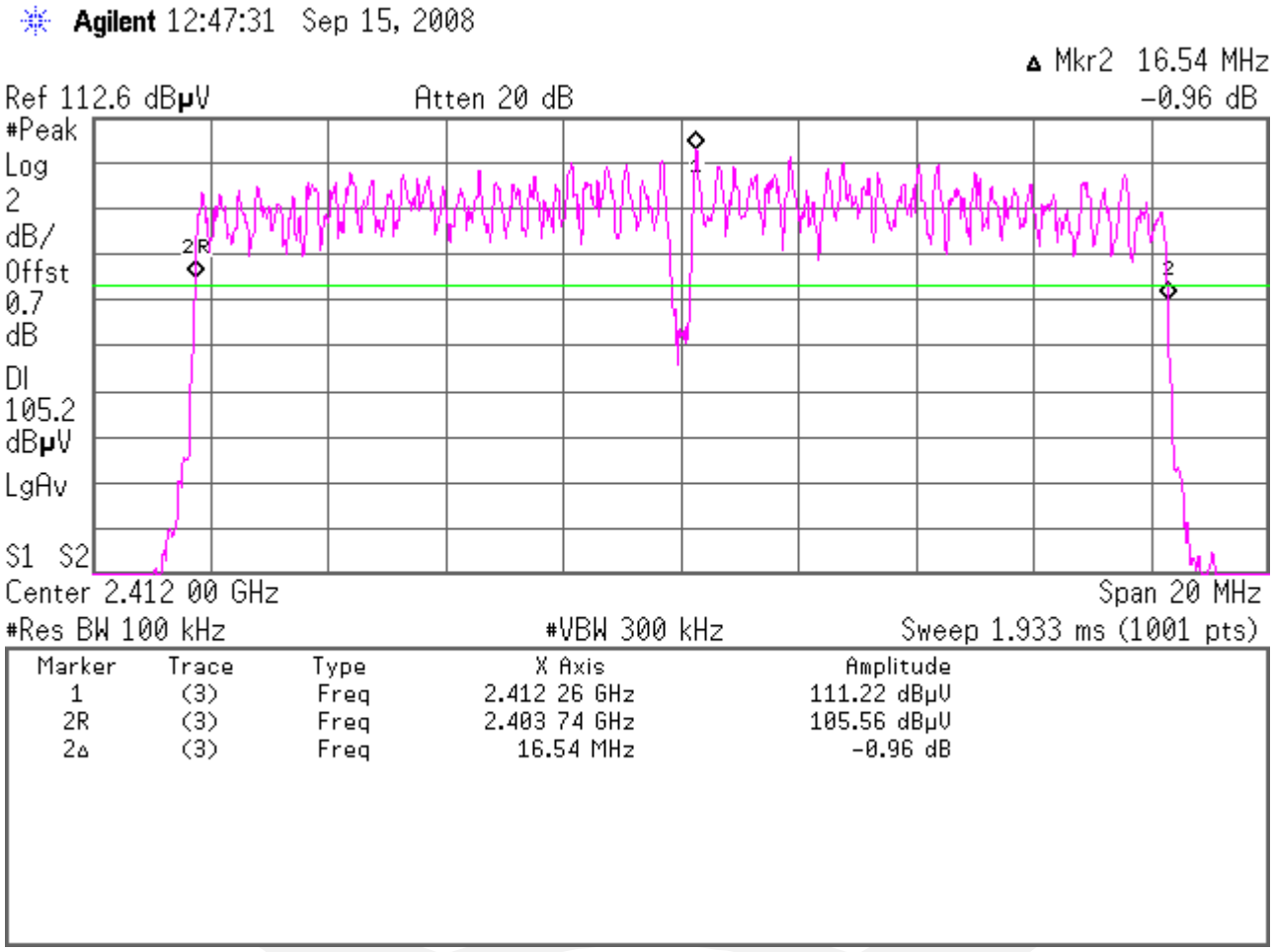
Test limit
500 kHz minimum

Test data
See following pages

6 dB Bandwidth
Channel 1, 11 Mbps

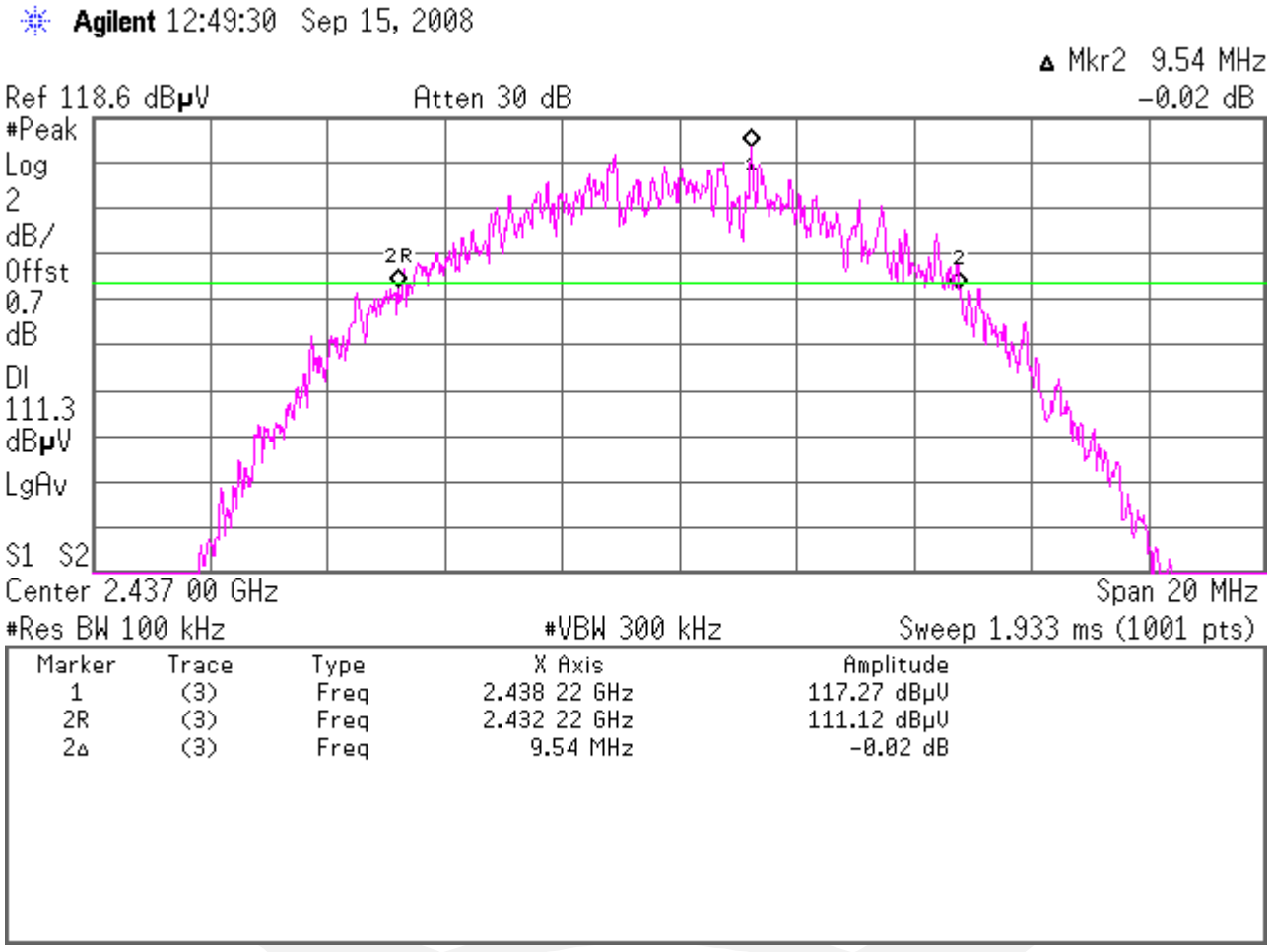


6 dB Bandwidth
Channel 1, 54 Mbps

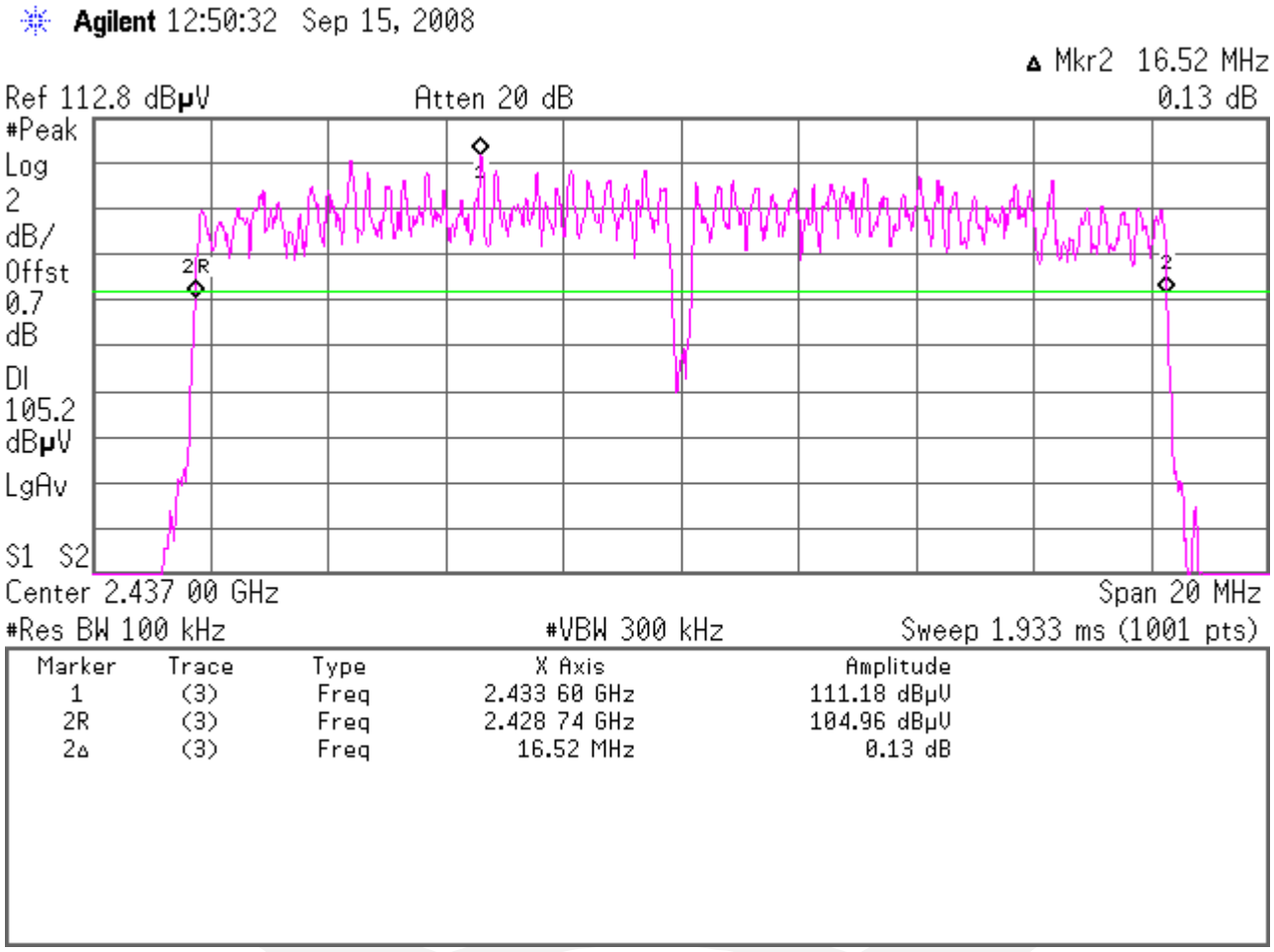


Marker	Trace	Type	X Axis	Amplitude
1	(3)	Freq	2.412 26 GHz	111.22 dBµV
2R	(3)	Freq	2.403 74 GHz	105.56 dBµV
2Δ	(3)	Freq	16.54 MHz	-0.96 dB

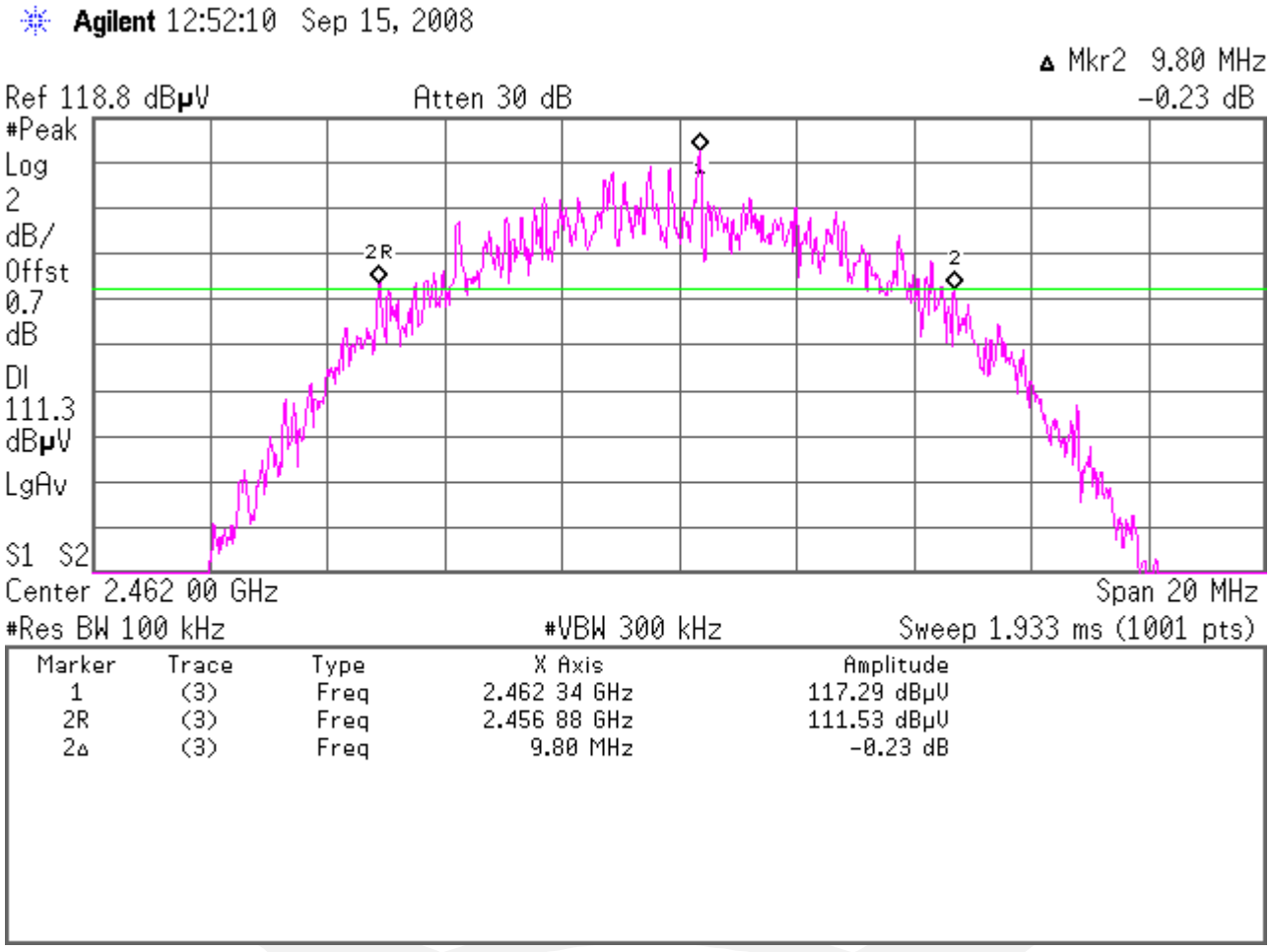
6 dB Bandwidth
Channel 6, 11 Mbps



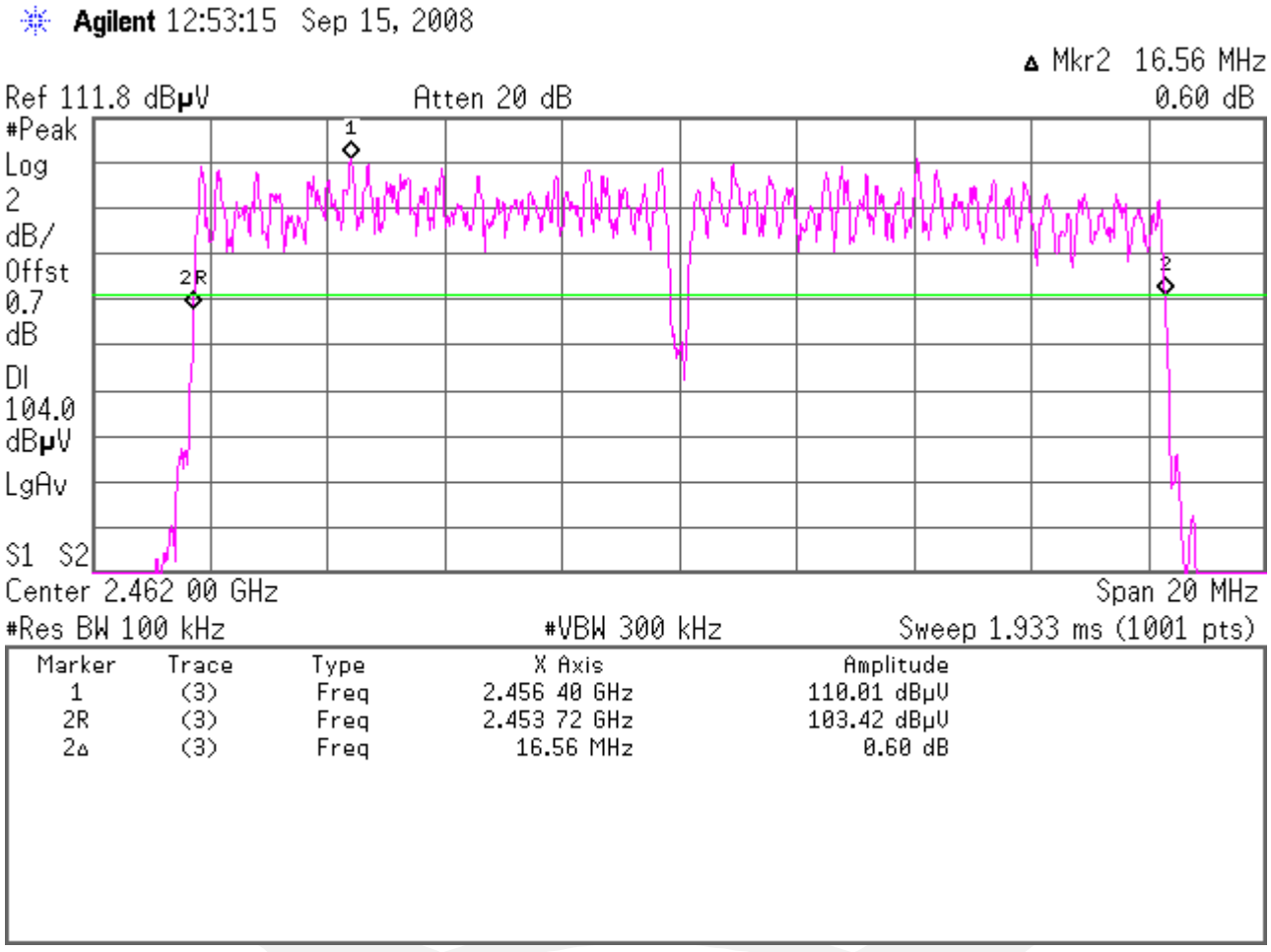
6 dB Bandwidth
Channel 6, 54 Mbps



6 dB Bandwidth
Channel 11, 11 Mbps



6 dB Bandwidth
Channel 11, 54 Mbps



Maximum peak output power
FCC 15.247(b)(3), IC RSS-210 A8.4(4)

Test summary
The requirements are: ■ - MET ☐ - NOT MET
Testing was performed in accordance with the test procedure of FCC KDB Publication 558074
Maximum peak output power is 19.6 dBm or 91.2 mW, as measured with a peak power meter
Minimum margin of compliance is 10.4 dB

Test location
☐ - Wild River Lab Large Test Site (Open Area Test Site)
☐ - Wild River Lab Small Test Site (Open Area Test Site)
■ - Wild River Lab Tech Area, conducted measurement

Test equipment

TUV ID	Model	Manufacturer	Description	Serial	Cal Due
WRLE03334	8542C	Giga-tronics	Peak Power Meter	1831096	18-Mar-10
WRLE03335	80350A	Giga-tronics	Peak Power Sensor	1828549	18-Mar-10

Test limit
1 watt

Test data

Ch	Freq (GHz)	Data rate (Mbps)	Power (dBm)	Limit (dBm)	Delta (dB)
1	2.412	11	19.6	30	-10.4
1	2.412	54	15.8	30	-14.2
6	2.437	11	19.4	30	-20.6
6	2.437	54	15.2	30	-14.8
11	2.462	11	19.0	30	-11.0
11	2.462	54	15.0	30	-15.0

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

Test summary
The requirements are: ■ - MET ☐ - NOT MET
Testing was performed in accordance with ANSI C63.4 2003, clause 8.3 and FCC KDB Publication 558074
Conducted spurious emission nearest the limit is -28.71 dBc at bandedge 2.4 GHz
Maximum radiated spurious emission in the restricted bands is 65.54 dBµV/m peak or 1892 µV/m at 3 meters at 4.924 GHz - minimum margin of compliance = 8.46 dB.
Some data includes measurements with higher gain antennas other than the 29000147 (PCB) antenna.
The data sheets for radiated measurements in the restricted bands below 1 GHz were initially taken with a 5 dBi gain whip antenna, whose compliant results are documented in a separate test report. Emissions with the 29000147 PCB antenna (referred to as "2dBi GAIN TYCO BOARD ANTENNA") were found to be lower, and not recorded.
Radiated bandedge measurements were taken with a 5 dBi gain whip antenna.
Average radiated values above 1 GHz measured with spectrum analyzer, 1 MHz RBW, 10 Hz VBW. Tx on 100%.
Corrected average values calculated by subtracting 20 dB duty cycle relaxation from peak readings.
Manufacturer's Tx on time data shows 5.72% duty cycle. Using 10% as worst case scenerio.

Test location
■ - Wild River Lab Large Test Site (Open Area Test Site)
■ - Wild River Lab Tech Area, conducted measurement

Test equipment

TUV ID	Model	Manufacturer	Description	Serial	Cal Due
WRLE03371	E4440A	Agilent	Spectrum Analyzer	MY43362222	11-Aug-10
WRLE03978	SL26-3010	Phase One Microwave	Amplifier 18-26.5 GHz	0005	14-May-10
WRLE06717	3116	EMCO	Ridge Guide Ant 18-40 GHz	2005	03-Apr-10
WRLE02682	85650A	Hewlett-Packard	Quasi-Peak Adapter	2811A01127	06-Jan-10
WRLE08052	8566B	Hewlett-Packard	Spectrum Analyzer	2115A00853	23-Apr-10
WRLE08051	85662A	Hewlett-Packard	Analyzer Display	2112A02220	23-Apr-10
WRLE03847	ZHL-1042J	Mini-Circuits	Preamplifier 10 - 3000 MHz	0607	Code B
WRLE010527	SL18B4020	Phase One Microwave	Preamplifier 1 – 18 GHz	0001	Code B
WRLE03995	EM-6917B	Electro-Metrics	Biconicalog Periodic	151	24-Apr-10
WRLE02075	3115	EMCO	Ridge Guide Ant. 1-18 GHz	9001-3275	13-Jan-10
WRLE03997	EWT-14-0066	EWT	2.4 GHz Notch filter	E2	Code B
WRLE02003	F550B1	Acronetics	4 – 8 GHz Bandpass Filter	010	Code B
WRLE03933	F551B-1	Acronetics	8 – 12 GHz Bandpass Filter	010	Code B
WRLE03934	F549B-1	Acronetics	2 – 4 GHz Bandpass Filter	010	Code B
WRLE03935	F548B-1	Acronetics	1 – 2 GHz Bandpass Filter	010	Code B

Cal Code B = Calibration verification performed internally.

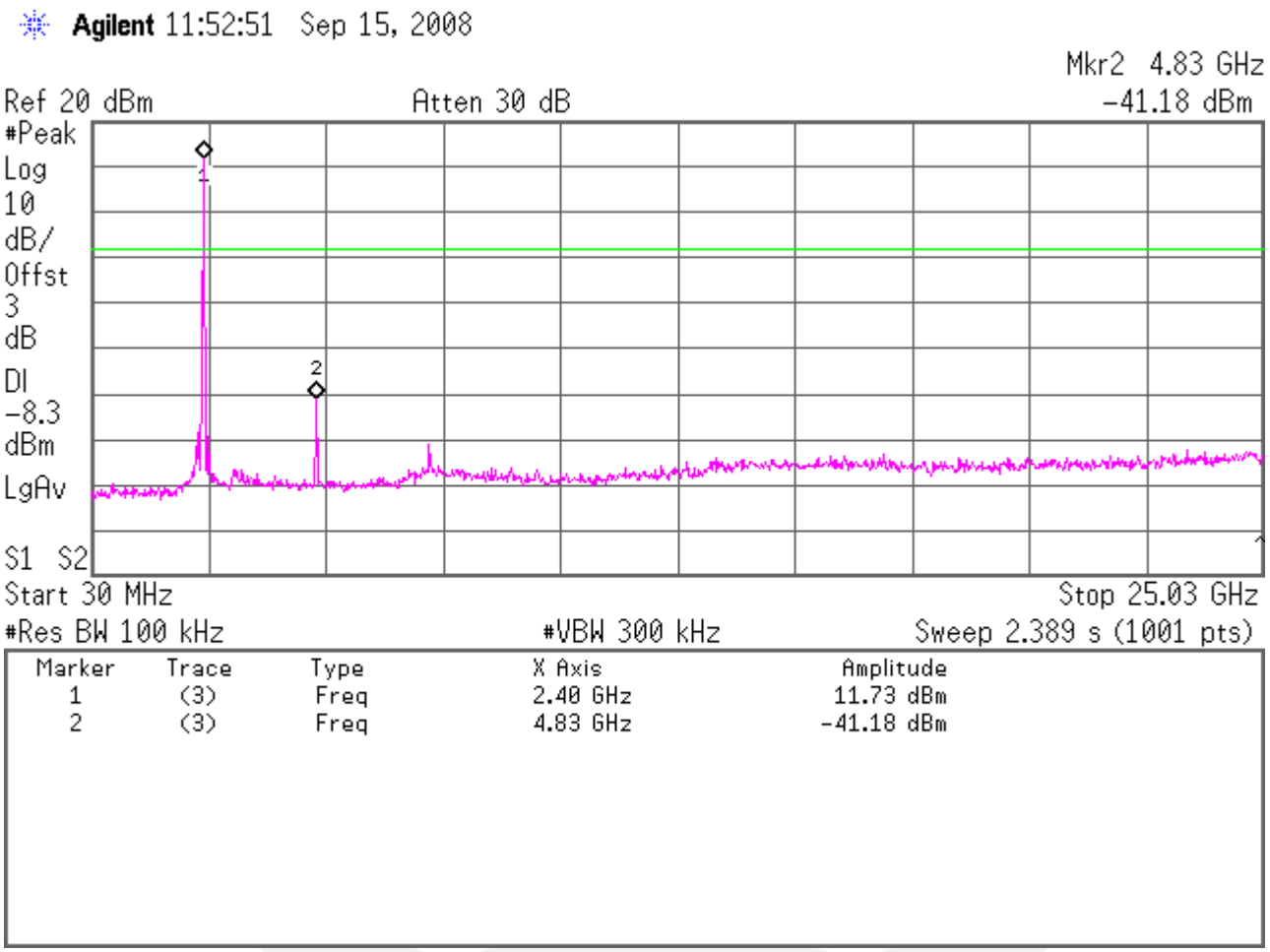
Test limit - conducted
-20 dBc

Test limit within restricted bands per 15.205 - radiated

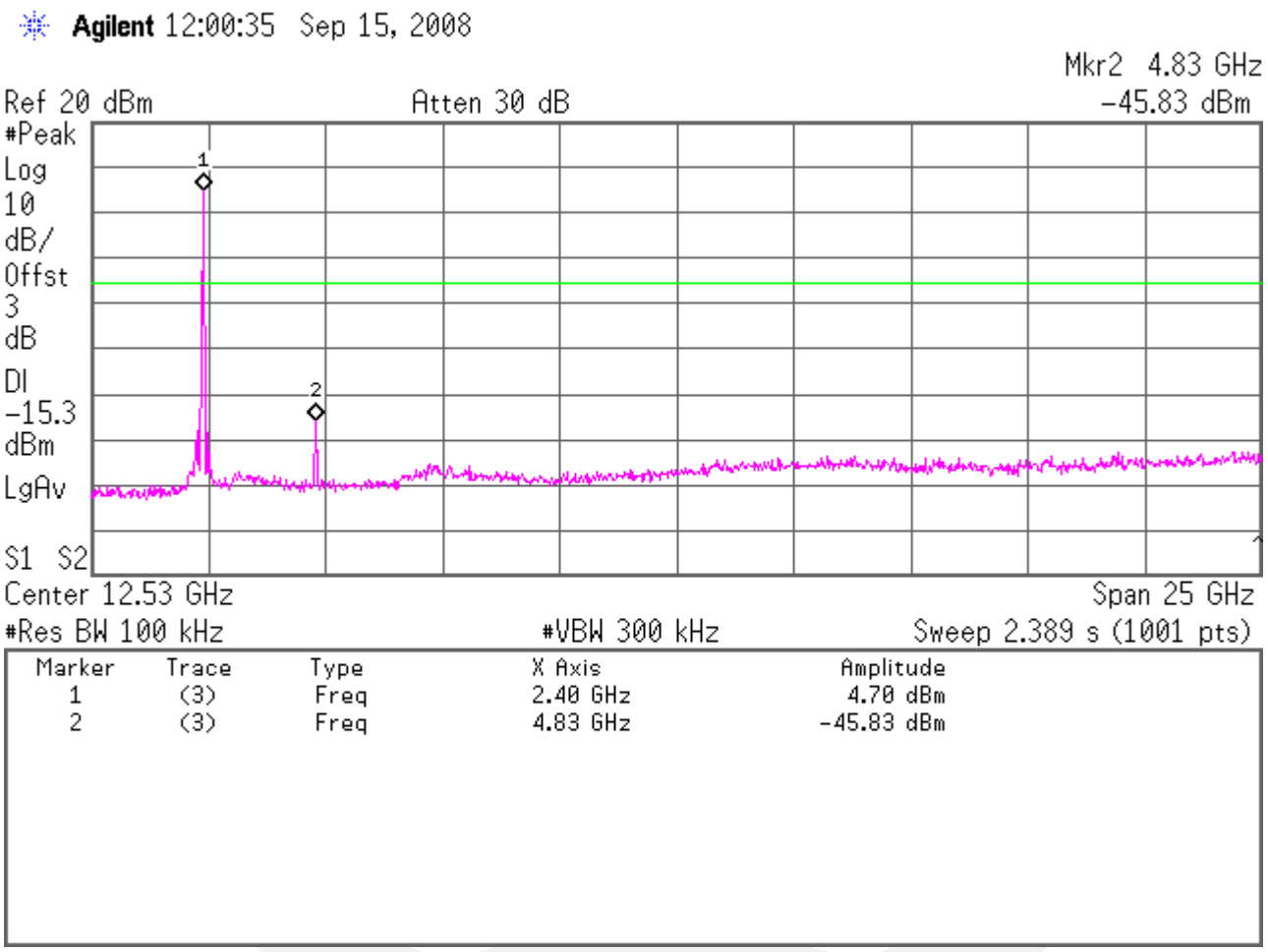
Frequncy (MHz)	Field strength (µV/meter)	Field strength (dBµV/meter)
30 - 88	100, QP	40.0
88 - 216	150, QP	43.5
216 - 960	200, QP	46.0
Above 960	500, QP	54.0
> 1000	500, AV 5000, PK	54.0 74.0

Test data, See following pages

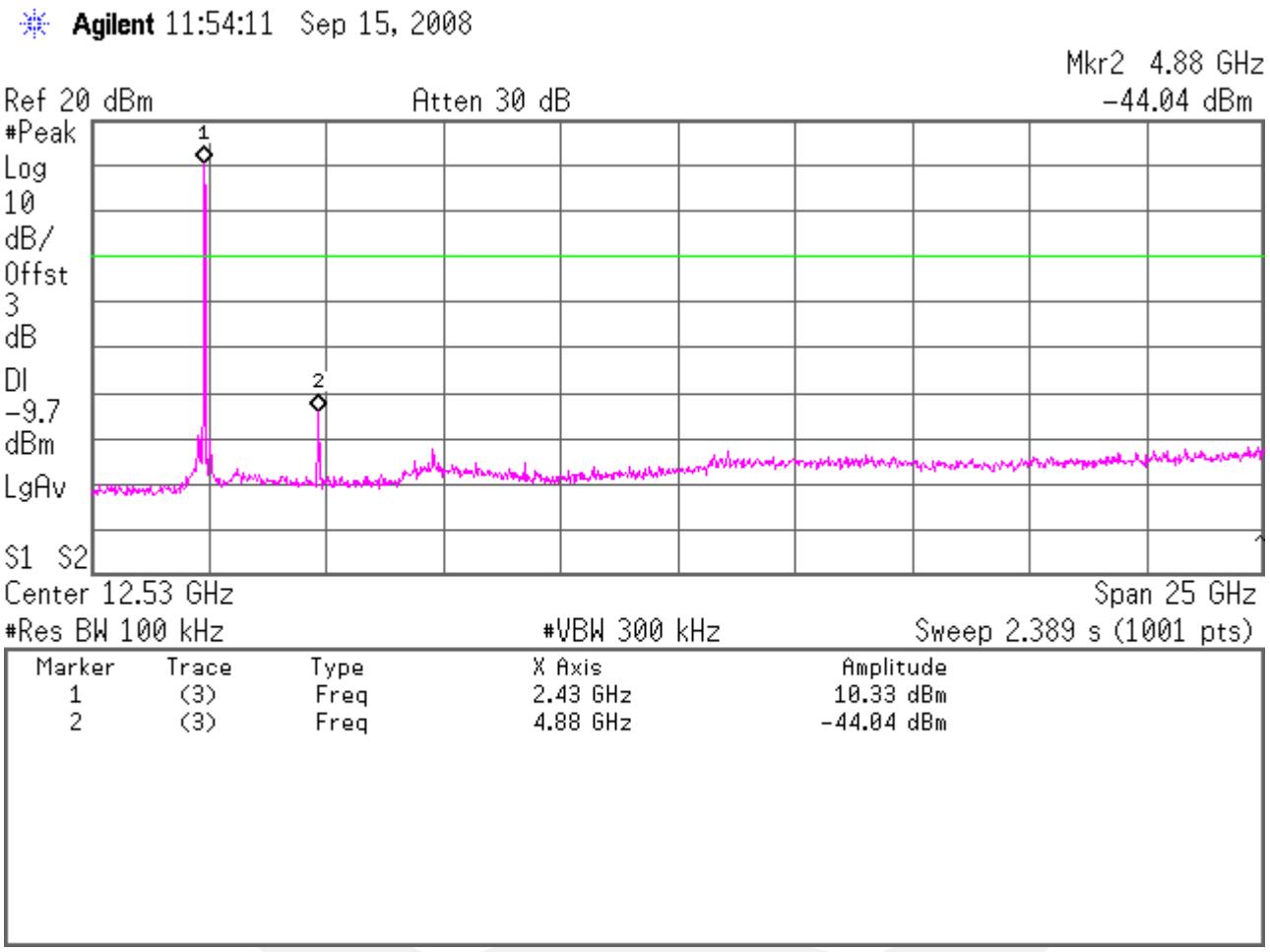
Conducted spurious emissions
Channel 1, 11 Mbps, power setting 55



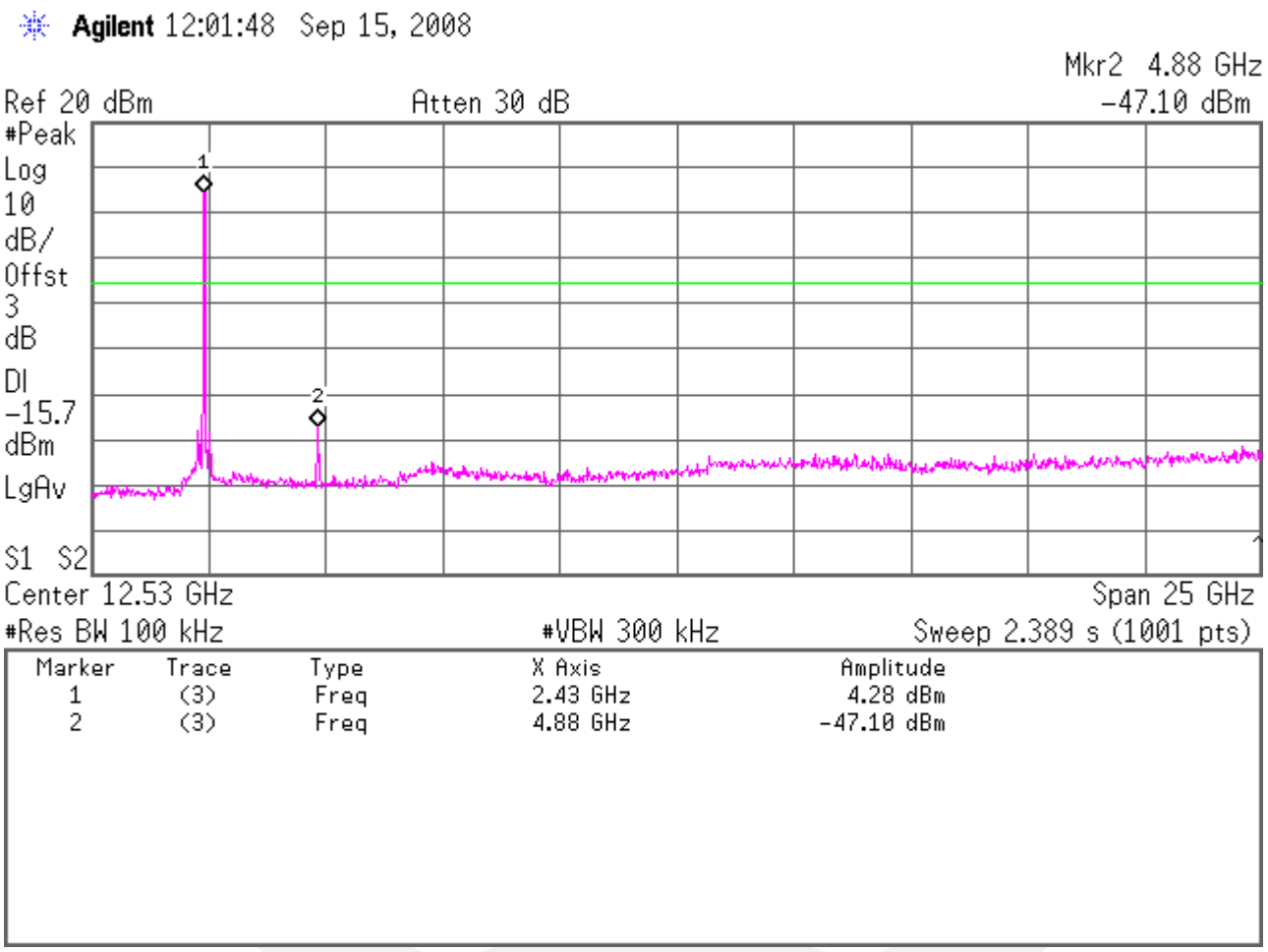
Conducted spurious emissions
Channel 1, 54 Mbps, power setting 55



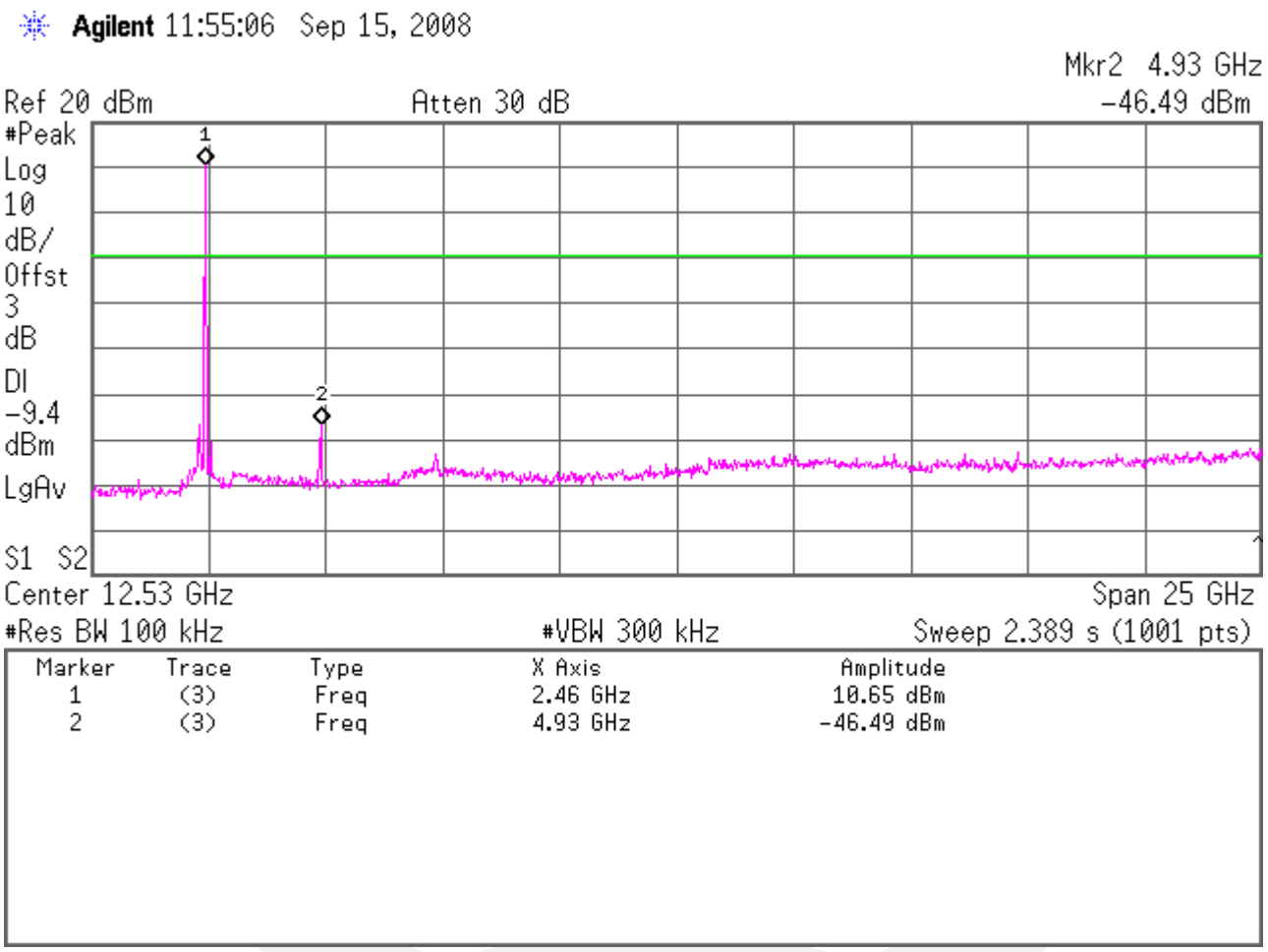
Conducted spurious emissions
Channel 6, 11 Mbps, power setting 55



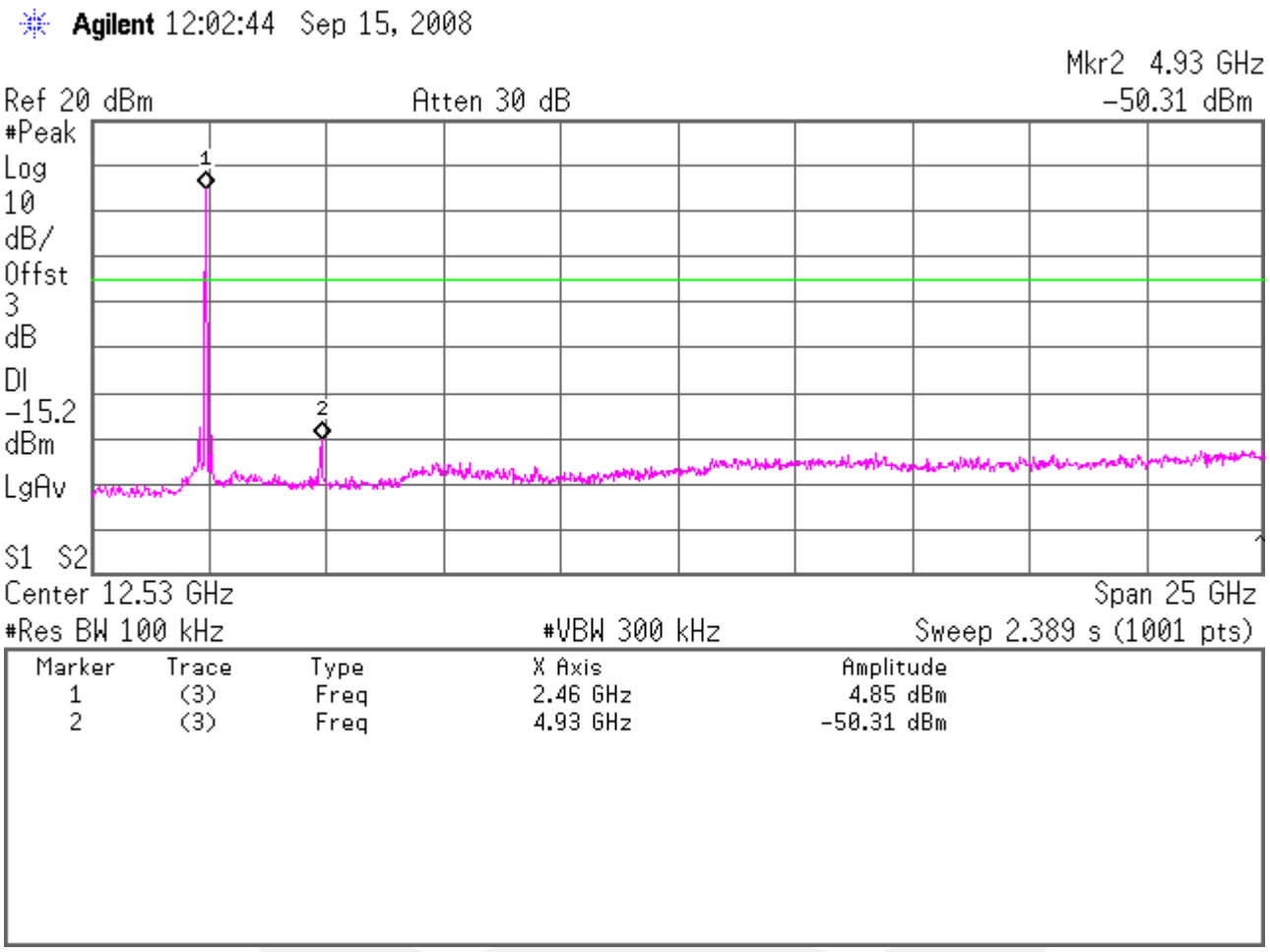
Conducted spurious emissions
Channel 6, 54 Mbps, power setting 55



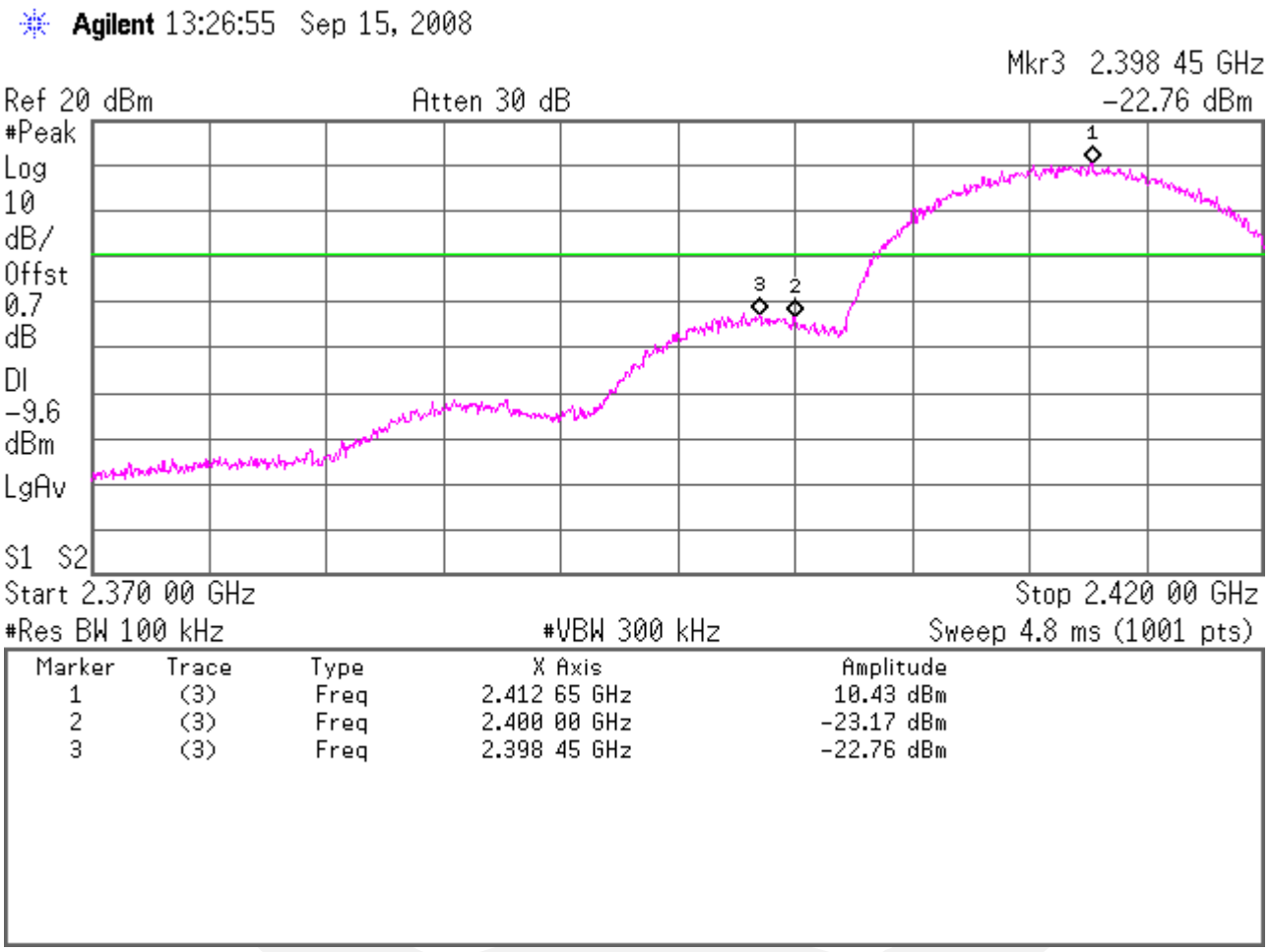
Conducted spurious emissions
Channel 11, 11 Mbps, power setting 55



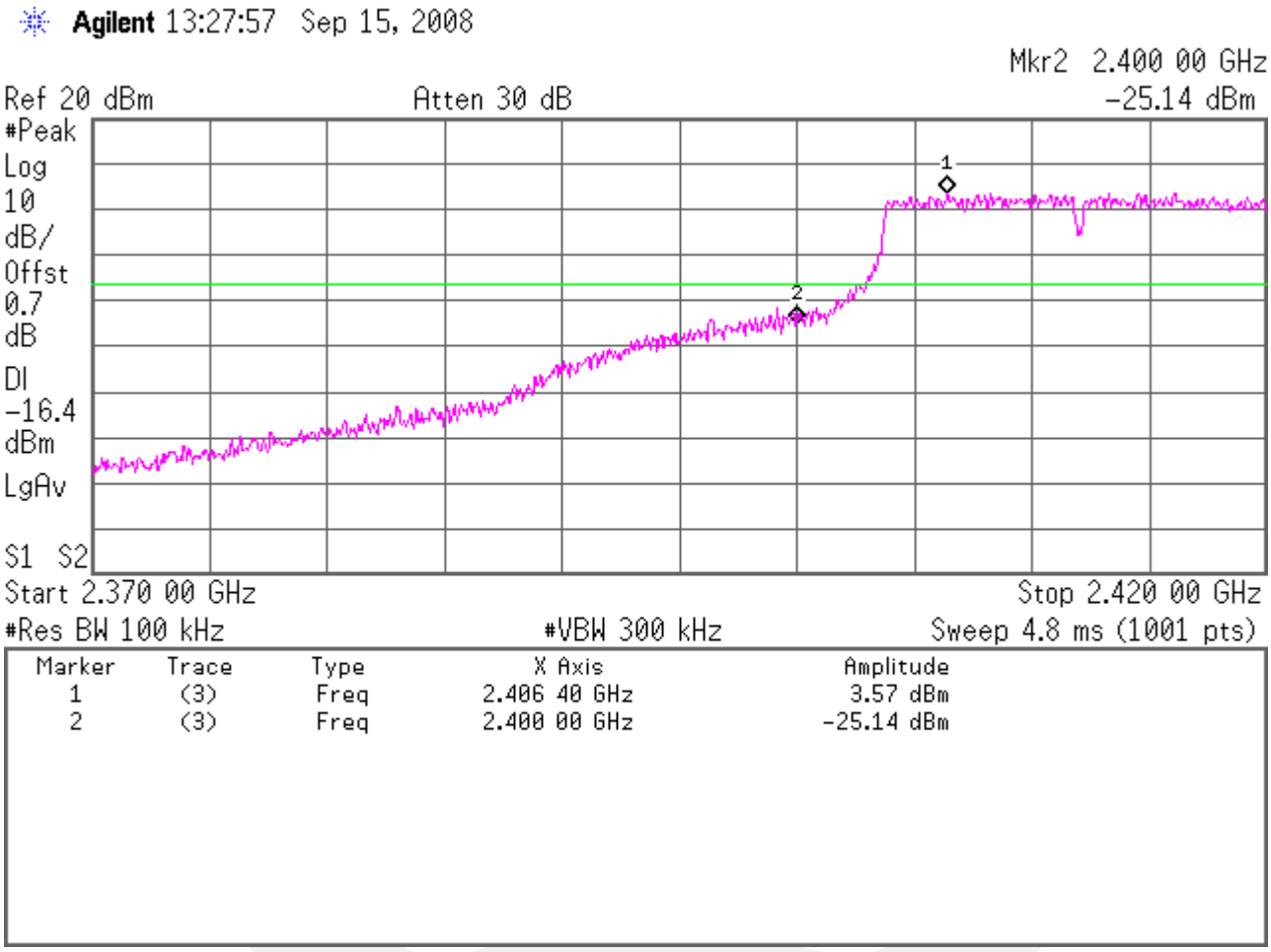
Conducted spurious emissions
Channel 11, 54 Mbps, power setting 55



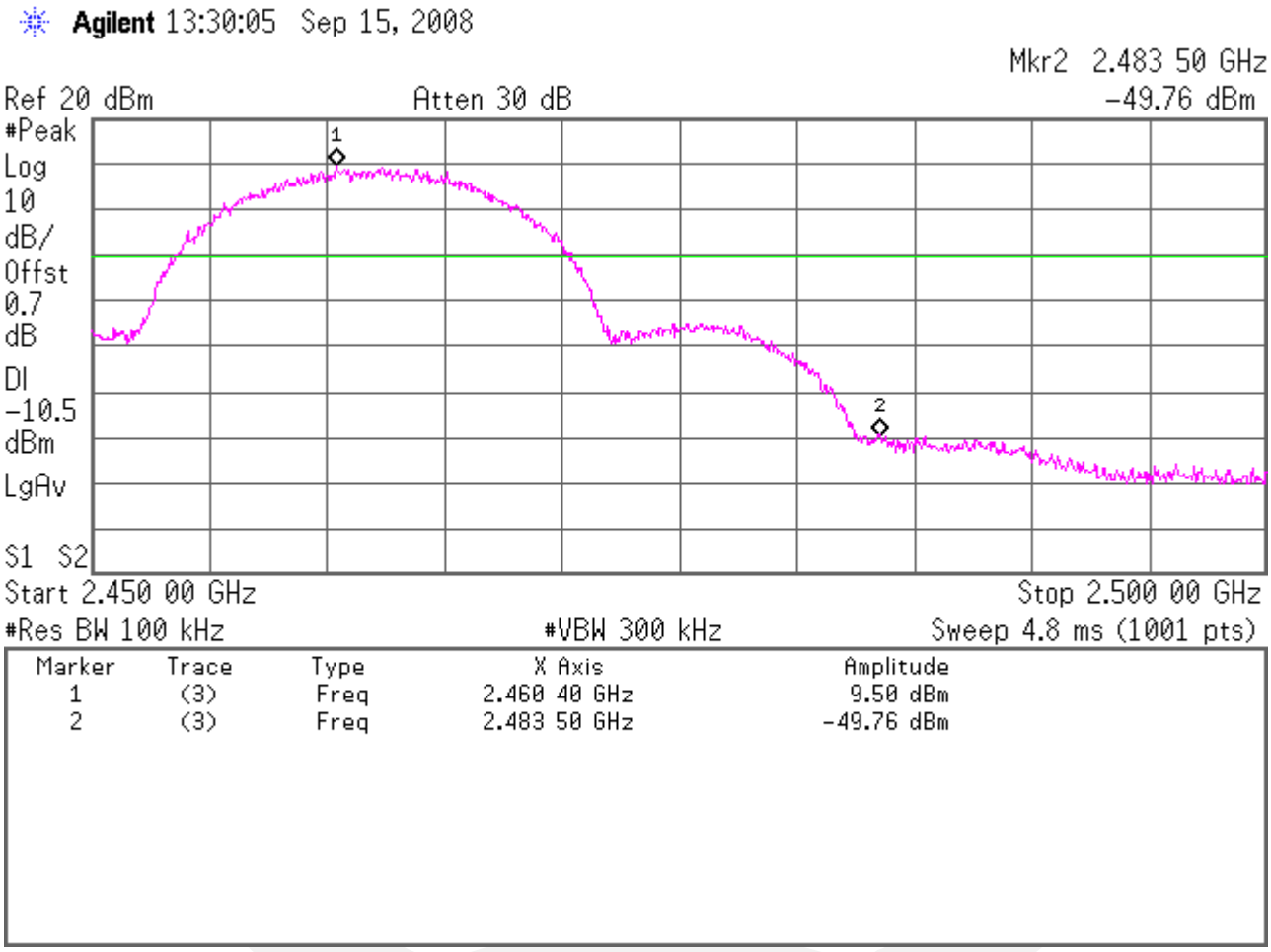
Conducted bandedge
Channel 1, 11 Mbps, power setting 55



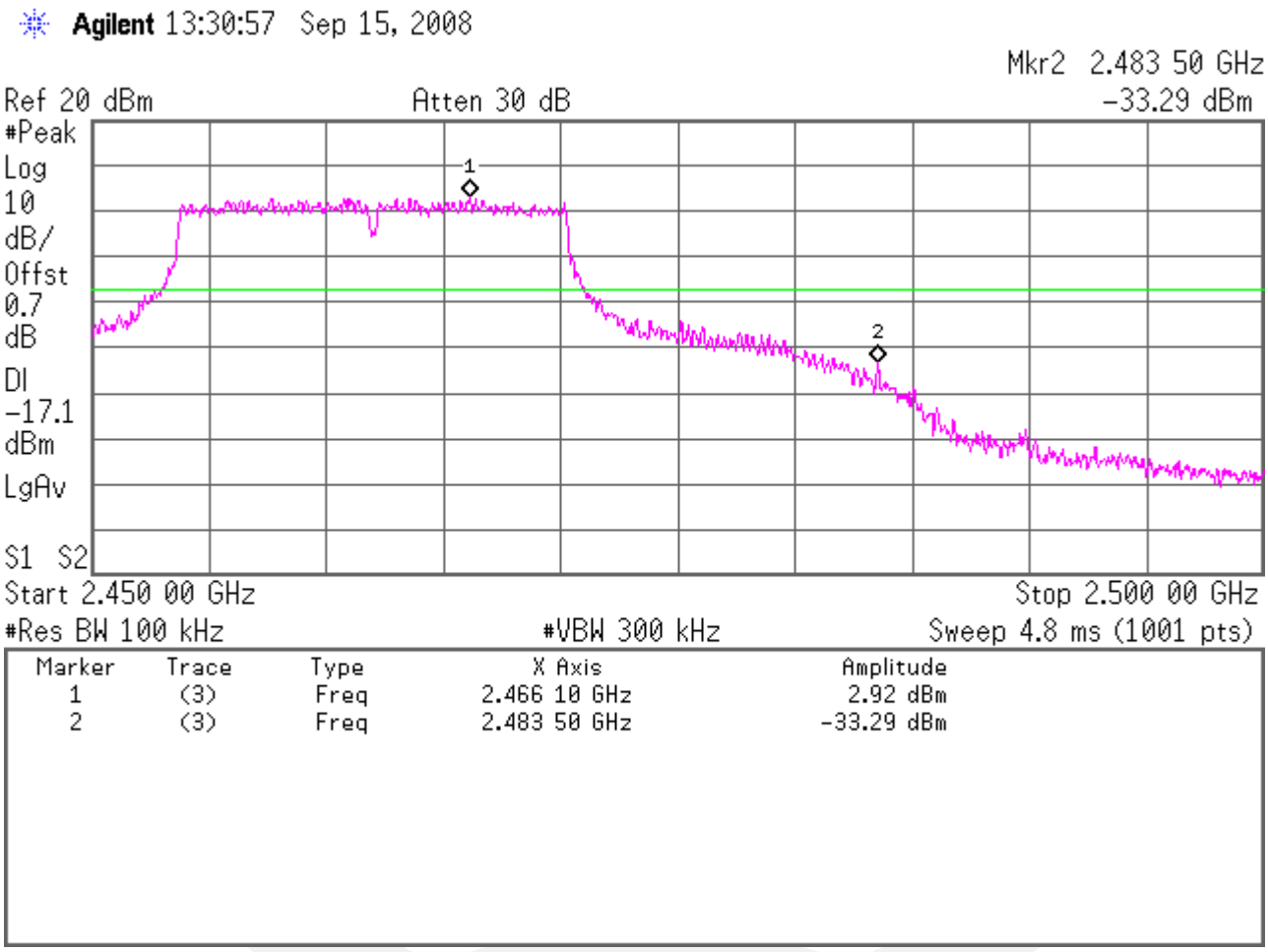
Conducted bandedge
Channel 1, 54 Mbps, power setting 55



Conducted bandedge
Channel 11, 11 Mbps, power setting 55



Conducted bandedge
Channel 11, 54 Mbps, power setting 55



RADIATED EMISSIONS

Test Report #:	WC807706 Run 1	Test Area:	LTS		
EUT Model #:	50001558-01	Date:	9/19/2008		
EUT Serial #:	0000x	EUT Power:	60Hz/120VAC	Temperature:	20.0 °C
Test Method:	FCC 15.247 SPURIOUS			Air Pressure:	98.0 kPa
Customer:	DIGI INT'L			Rel. Humidity:	50.0 %
EUT Description:	Connect Wi-EM (Embedded radio module)				
Notes:	2dBI GAIN TYCO BOARD ANTENNA 5dBi GAIN WHIP ANTENNA				
Data File Name:	7706.dat			Page:	1 of 5

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
START OF RESTRICTED BAND SCAN < 1GHz WITH 5dBi GAIN WHIP ANTENNA.						
LOW CHANNEL 2412MHz AT 11Mb DATA RATE.						
108.756 MHz	40.8 Qp	1.15 / 9.18 / 29.7 / 0.0	21.43	V / 1.00 / 0	-22.07	n/a
240.025 MHz	42.5 Qp	1.78 / 11.73 / 29.7 / 0.0	26.31	V / 1.00 / 0	-19.69	n/a
260.011 MHz	35.1 Qp	1.85 / 12.43 / 29.8 / 0.0	19.57	V / 1.00 / 0	-26.43	n/a
265.453 MHz	35.8 Qp	1.86 / 12.59 / 29.8 / 0.0	20.45	V / 1.00 / 0	-25.55	n/a
280.021 MHz	41.1 Qp	1.91 / 12.55 / 29.82 / 0.0	25.74	V / 1.00 / 0	-20.26	n/a
108.756 MHz	40.6 Qp	1.15 / 9.18 / 29.7 / 0.0	21.23	V / 1.00 / 90	-22.27	n/a
260.011 MHz	36.55 Qp	1.85 / 12.43 / 29.8 / 0.0	21.02	V / 1.00 / 180	-24.98	n/a
400.027 MHz	37.9 Qp	2.32 / 15.8 / 30.0 / 0.0	26.02	V / 1.00 / 180	-19.98	n/a
240.025 MHz	44.4 Qp	1.78 / 11.73 / 29.7 / 0.0	28.21	V / 1.00 / 270	-17.79	n/a
260.011 MHz	37.0 Qp	1.85 / 12.43 / 29.8 / 0.0	21.47	V / 1.00 / 270	-24.53	n/a
265.453 MHz	36.3 Qp	1.86 / 12.59 / 29.8 / 0.0	20.95	V / 1.00 / 270	-25.05	n/a
MAXIMIZED.						
240.025 MHz	44.8 Qp	1.78 / 11.73 / 29.7 / 0.0	28.61	V / 1.00 / 150	-17.39	n/a
END OF VERTICAL SCAN.						
400.027 MHz	39.5 Qp	2.32 / 15.8 / 30.0 / 0.0	27.62	H / 1.00 / 0	-18.38	n/a
121.656 MHz	43.3 Qp	1.21 / 8.97 / 29.7 / 0.0	23.77	H / 1.00 / 0	-19.73	n/a
MAXIMIZED.						
400.027 MHz	40.9 Qp	2.32 / 15.8 / 30.0 / 0.0	29.02	H / 2.56 / 320	-16.98	n/a

Tested by: Ross M Johnson (Printed) — Ross M Johnson (Signature)

Reviewed by: Joel T Schneider (Printed) — Joel T. Schneider (Signature)

RADIATED EMISSIONS

Test Report #:	WC807706 Run 1	Test Area:	LTS		
EUT Model #:	50001558-01	Date:	9/19/2008		
EUT Serial #:	0000x	EUT Power:	60Hz/120VAC	Temperature:	20.0 °C
Test Method:	FCC 15.247 SPURIOUS			Air Pressure:	98.0 kPa
Customer:	DIGI INT'L			Rel. Humidity:	50.0 %
EUT Description:	Connect Wi-EM (Embedded radio module)				
Notes:	2dBI GAIN TYCO BOARD ANTENNA 5dBi GAIN WHIP ANTENNA				
Data File Name:	7706.dat			Page:	2 of 5

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
LOW CHANNEL 2412MHz AT 54Mb DATA RATE.						
265.453 MHz	37.55 Qp	1.86 / 12.59 / 29.8 / 0.0	22.2	V / 1.00 / 0	-23.8	n/a
172.656 MHz	38.15 Qp	1.53 / 9.34 / 29.8 / 0.0	19.23	V / 1.00 / 180	-24.27	n/a
172.656 MHz	40.15 Qp	1.53 / 9.34 / 29.8 / 0.0	21.23	V / 1.00 / 270	-22.27	n/a
MAXIMIZED.						
108.756 MHz	41.8 Qp	1.15 / 9.18 / 29.7 / 0.0	22.43	V / 1.00 / 52	-21.07	n/a
END OF VERTICAL SCAN.						
260.011 MHz	42.6 Qp	1.85 / 12.43 / 29.8 / 0.0	27.07	H / 1.00 / 0	-18.93	n/a
265.453 MHz	42.65 Qp	1.86 / 12.59 / 29.8 / 0.0	27.3	H / 1.00 / 0	-18.7	n/a
280.021 MHz	49.75 Qp	1.91 / 12.55 / 29.82 / 0.0	34.39	H / 1.00 / 0	-11.61	n/a
400.027 MHz	42.4 Qp	2.32 / 15.8 / 30.0 / 0.0	30.52	H / 1.00 / 0	-15.48	n/a
240.025 MHz	46.6 Qp	1.78 / 11.73 / 29.7 / 0.0	30.41	H / 1.00 / 180	-15.59	n/a
260.011 MHz	43.3 Qp	1.85 / 12.43 / 29.8 / 0.0	27.77	H / 1.00 / 180	-18.23	n/a
265.453 MHz	43.7 Qp	1.86 / 12.59 / 29.8 / 0.0	28.35	H / 1.00 / 180	-17.65	n/a
MAXIMIZED						
280.021 MHz	52.6 Qp	1.91 / 12.55 / 29.82 / 0.0	37.24	H / 1.00 / 200	-8.76	n/a
400.027 MHz	49.4 Qp	2.32 / 15.8 / 30.0 / 0.0	37.52	H / 1.00 / 322	-8.48	n/a
240.025 MHz	51.7 Qp	1.78 / 11.73 / 29.7 / 0.0	35.51	H / 1.00 / 205	-10.49	n/a
END OF HORIZONTAL SCAN.						

Tested by: Ross M Johnson (Printed) _____ (Signature)

Reviewed by: Joel T Schneider (Printed) _____ (Signature)

RADIATED EMISSIONS

Test Report #:	WC807706 Run 1	Test Area:	LTS		
EUT Model #:	50001558-01	Date:	9/19/2008		
EUT Serial #:	0000x	EUT Power:	60Hz/120VAC	Temperature:	20.0 °C
Test Method:	FCC 15.247 SPURIOUS			Air Pressure:	98.0 kPa
Customer:	DIGI INT'L			Rel. Humidity:	50.0 %
EUT Description:	Connect Wi-EM (Embedded radio module)				
Notes:	2dBI GAIN TYCO BOARD ANTENNA 5dBi GAIN WHIP ANTENNA				
Data File Name:	7706.dat			Page:	3 of 5

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
MID CHANNEL 2437MHz 11Mb DATA RATE.						
MID CHANNEL 2437MHz 54Mb DATA RATE.						
HIGH CHANNEL 2484MHz 11Mb DATA RATE.						
HIGH CHANNEL 2484MHz 54Mb DATA RATE.						
NO HIGHER EMISSIONS FOUND WITH V OR H POLARIZATION WITH MID OR HIGH CHANNELS.						
CHANGED TO 2dBi GAIN TYCO BOARD ANTENNA						
NO HIGHER EMISSIONS FOUND V OR H POLARIZATION W/ 2dBi GAIN BOARD ANTENNA ON LOW,MID & HIGH CHANNELS.						
WITH BOTH 11 & 54MB DATA RATES.						
END OF SCAN 30 - 1000MHz.						

Tested by: Ross M Johnson (Printed) _____ (Signature)

Reviewed by: Joel T Schneider (Printed) _____ (Signature)

RADIATED EMISSIONS

Test Report #:	WC807706 Run 1	Test Area:	LTS		
EUT Model #:	50001558-01	Date:	9/19/2008		
EUT Serial #:	0000x	EUT Power:	60Hz/120VAC	Temperature:	20.0 °C
Test Method:	FCC 15.247 SPURIOUS			Air Pressure:	98.0 kPa
Customer:	DIGI INT'L			Rel. Humidity:	50.0 %
EUT Description:	Connect Wi-EM (Embedded radio module)				
Notes:	2dBI GAIN TYCO BOARD ANTENNA 5dBi GAIN WHIP ANTENNA				
Data File Name:	7706.dat			Page:	4 of 5

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
400.027 MHz	49.4 Qp	2.32 / 15.8 / 30.0 / 0.0	37.52	H / 1.00 / 322	-8.48
280.021 MHz	52.6 Qp	1.91 / 12.55 / 29.82 / 0.0	37.24	H / 1.00 / 200	-8.76
240.025 MHz	51.7 Qp	1.78 / 11.73 / 29.7 / 0.0	35.51	H / 1.00 / 205	-10.49
265.453 MHz	43.7 Qp	1.86 / 12.59 / 29.8 / 0.0	28.35	H / 1.00 / 180	-17.65
260.011 MHz	43.3 Qp	1.85 / 12.43 / 29.8 / 0.0	27.77	H / 1.00 / 180	-18.23
121.656 MHz	43.3 Qp	1.21 / 8.97 / 29.7 / 0.0	23.77	H / 1.00 / 0	-19.73
108.756 MHz	41.8 Qp	1.15 / 9.18 / 29.7 / 0.0	22.43	V / 1.00 / 52	-21.07
172.656 MHz	40.15 Qp	1.53 / 9.34 / 29.8 / 0.0	21.23	V / 1.00 / 270	-22.27

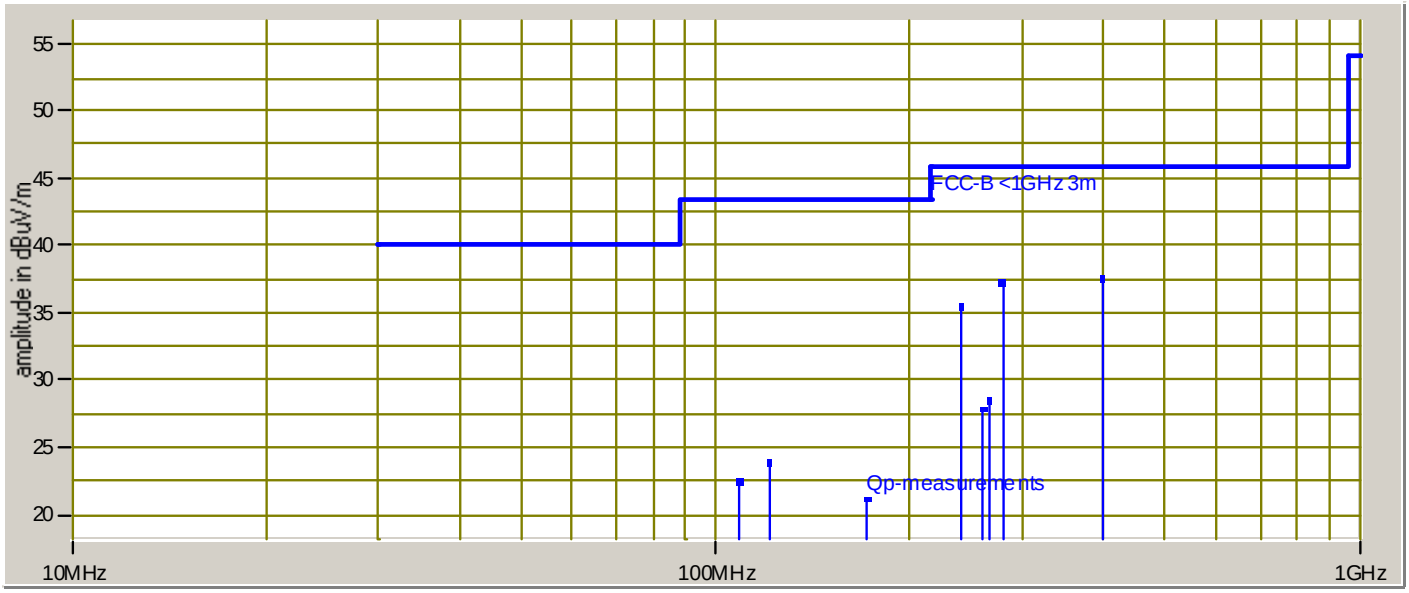
Tested by: Ross M Johnson (Printed) _____ (Signature)

Reviewed by: Joel T Schneider (Printed) _____ (Signature)

RADIATED EMISSIONS

Test Report #:	WC807706 Run 1	Test Area:	LTS		
EUT Model #:	50001558-01	Date:	9/19/2008		
EUT Serial #:	0000x	EUT Power:	60Hz/120VAC	Temperature:	20.0 °C
Test Method:	FCC 15.247 SPURIOUS			Air Pressure:	98.0 kPa
Customer:	DIGI INT'L			Rel. Humidity:	50.0 %
EUT Description:	Connect Wi-EM (Embedded radio module)				
Notes:	2dBI GAIN TYCO BOARD ANTENNA 5dBi GAIN WHIP ANTENNA				
Data File Name:	7706.dat			Page:	5 of 5

Graph:



Tested by: Ross M Johnson (Printed) _____ (Signature)

Reviewed by: Joel T Schneider (Printed) _____ (Signature)

RADIATED EMISSIONS

Test Report #:	WC807706 Run 1 PCB	Test Area:	LTS		
EUT Model #:	50001558-01 & 29000147	Date:	10/6/2008		
EUT Serial #:	0000x	EUT Power:	3.3 VDC	Temperature:	23.0 °C
Test Method:	FCC 15.247 spurious			Air Pressure:	99.0 kPa
Customer:	Digi International			Rel. Humidity:	37.0 %
EUT Description:	Connect WiEM 9210 a/b/g, 802.11 a/b/g embedded radio module with 29000147 PCB antenna				
Notes:					
Data File Name:	7706 PCB.dat			Page:	1 of 5

List of measurements for run #: 1

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA1 FCC 15.247 >1GHz 3m avg.	DELTA2 FCC 15.247 >1G 3m pk.
Begin scan 1-18GHz in restricted bands						
Average measurements calculated by subtracting 20 dB from peak readings. 10% duty cycle correction worst case						
Power setting 55, 11 Mbps, PCB antenna						
Trying 3 orthogonal axis to determine max gain at fundamental						
ch 6						
Antenna flat						
2.437 GHz	73.55 Pk	6.17 / 28.63 / 0.0 / 0.0	108.35	V / 1.00 / 107	n/a	-16.85
On its side						
2.437 GHz	72.5 Pk	6.17 / 28.63 / 0.0 / 0.0	107.3	V / 1.00 / 90	n/a	-17.9
upright						
2.437 GHz	73.35 Pk	6.17 / 28.63 / 0.0 / 0.0	108.15	V / 1.00 / 107	n/a	-17.05
Antenna lying flat for remainder of testing						
Power setting 55, 11 Mbps (worst case), PCB antenna						
ch 1						
4.824 GHz	57.14 Av	9.54 / 32.81 / 43.57 / 0.59	56.51	V / 1.45 / 111	2.51	n/a
4.824 GHz	65.35 Pk	9.54 / 32.81 / 43.57 / 0.59	64.72	V / 1.45 / 111	n/a	-9.28
7.236 GHz	47.07 Av	13.1 / 36.06 / 43.13 / 1.26	54.36	V / 1.45 / 230	0.36	n/a
7.236 GHz	55.2 Pk	13.1 / 36.06 / 43.13 / 1.26	62.49	V / 1.45 / 230	n/a	-11.51
ch 6						
4.874 GHz	55.38 Av	9.62 / 32.92 / 43.61 / 0.62	54.93	V / 1.87 / 251	0.93	n/a
4.874 GHz	65.65 Pk	9.62 / 32.92 / 43.61 / 0.62	65.2	V / 1.87 / 251	n/a	-8.8
7.311 GHz	48.47 Av	13.18 / 36.16 / 43.18 / 1.21	55.84	V / 1.70 / 232	1.84	n/a
7.311 GHz	56.85 Pk	13.18 / 36.16 / 43.18 / 1.21	64.22	V / 1.70 / 232	n/a	-9.78

Tested by: Greg Jakubowski (Printed) — G Jakubowski (Signature)

Reviewed by: Joel T Schneider (Printed) — Joel T. Schneider (Signature)

RADIATED EMISSIONS

Test Report #:	WC807706 Run 1 PCB	Test Area:	LTS		
EUT Model #:	50001558-01 & 29000147	Date:	10/6/2008		
EUT Serial #:	0000x	EUT Power:	3.3 VDC	Temperature:	23.0 °C
Test Method:	FCC 15.247 spurious			Air Pressure:	99.0 kPa
Customer:	Digi International			Rel. Humidity:	37.0 %
EUT Description:	Connect WiEM 9210 a/b/g, 802.11 a/b/g embedded radio module with 29000147 PCB antenna				
Notes:					
Data File Name:	7706 PCB.dat			Page:	2 of 5

List of measurements for run #: 1

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA1 FCC 15.247 >1GHz 3m avg.	DELTA2 FCC 15.247 >1G 3m pk.
ch 11						
4.924 GHz	58.85 Av	9.7 / 33.03 / 43.64 / 0.65	58.59	V / 1.41 / 109	4.59	n/a
4.924 GHz	65.8 Pk	9.7 / 33.03 / 43.64 / 0.65	65.54	V / 1.41 / 109	n/a	-8.46
7.386 GHz	48.34 Av	13.27 / 36.25 / 43.17 / 1.24	55.94	V / 1.61 / 50	1.94	n/a
7.386 GHz	57.65 Pk	13.27 / 36.25 / 43.17 / 1.24	65.25	V / 1.61 / 50	n/a	-8.75
Rotated 0-360 degrees, measurement antenna 1-4 meters high, vertical & horizontal						
No other significant emissions detected						
End scan 1 - 18 GHz						

Tested by: Greg Jakubowski (Printed) _____ (Signature)

Reviewed by: Joel T Schneider (Printed) _____ (Signature)

RADIATED EMISSIONS

Test Report #:	WC807706 Run 1 PCB	Test Area:	LTS		
EUT Model #:	50001558-01 & 29000147	Date:	10/6/2008		
EUT Serial #:	0000x	EUT Power:	3.3 VDC	Temperature:	23.0 °C
Test Method:	FCC 15.247 spurious			Air Pressure:	99.0 kPa
Customer:	Digi International			Rel. Humidity:	37.0 %
EUT Description:	Connect WiEM 9210 a/b/g, 802.11 a/b/g embedded radio module with 29000147 PCB antenna				
Notes:					
Data File Name:	7706 PCB.dat			Page:	3 of 5

Original average measurements without duty cycle relaxation. Tx on 100%

Measurement summary for limit1: FCC 15.247 >1GHz 3m avg. (Av)

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA1 FCC 15.247 >1GHz 3m avg.
4.924 GHz	58.85 Av	9.7 / 33.03 / 43.64 / 0.65	58.59	V / 1.41 / 109	4.59
4.824 GHz	57.14 Av	9.54 / 32.81 / 43.57 / 0.59	56.51	V / 1.45 / 111	2.51
7.386 GHz	48.34 Av	13.27 / 36.25 / 43.17 / 1.24	55.94	V / 1.61 / 50	1.94
7.311 GHz	48.47 Av	13.18 / 36.16 / 43.18 / 1.21	55.84	V / 1.70 / 232	1.84
4.874 GHz	55.38 Av	9.62 / 32.92 / 43.61 / 0.62	54.93	V / 1.87 / 251	0.93
7.236 GHz	47.07 Av	13.1 / 36.06 / 43.13 / 1.26	54.36	V / 1.45 / 230	0.36

Calculated average. Peak - 20 dB duty cycle relaxation, 10% worst case duty cycle

Measurement summary for limit1: FCC 15.247 >1GHz 3m avg. (Av)

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN / CORRECTION (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA1 FCC 15.247 >1GHz 3m avg.
4.924 GHz	65.8 Pk	9.7 / 33.03 / 43.64 / 0.65 / 20	45.54	V / 1.41 / 109	-8.46
7.386 GHz	57.65 Pk	13.27 / 36.25 / 43.17 / 1.24 / 20	45.25	V / 1.45 / 111	-8.75
4.874 GHz	65.65 Pk	9.62 / 32.92 / 43.61 / 0.62 / 20	45.2	V / 1.61 / 50	-8.8
4.824 GHz	65.35 Pk	9.54 / 32.81 / 43.57 / 0.59 / 20	44.72	V / 1.70 / 232	-9.28
7.311 GHz	56.85 Pk	13.18 / 36.16 / 43.18 / 1.21 / 20	44.22	V / 1.87 / 251	-9.78
7.236 GHz	55.2 Pk	13.1 / 36.06 / 43.13 / 1.26 / 20	42.49	V / 1.45 / 230	-11.51

Tested by: Greg Jakubowski (Printed) — G Jakubowski (Signature)

Reviewed by: Joel T Schneider (Printed) — Joel T. Schneider (Signature)

RADIATED EMISSIONS

Test Report #:	WC807706 Run 1 PCB	Test Area:	LTS		
EUT Model #:	50001558-01 & 29000147	Date:	10/6/2008		
EUT Serial #:	0000x	EUT Power:	3.3 VDC	Temperature:	23.0 °C
Test Method:	FCC 15.247 spurious			Air Pressure:	99.0 kPa
Customer:	Digi International			Rel. Humidity:	37.0 %
EUT Description:	Connect WiEM 9210 a/b/g, 802.11 a/b/g embedded radio module with 29000147 PCB antenna				
Notes:					
Data File Name:	7706 PCB.dat			Page:	4 of 5

Measurement summary for limit2: FCC 15.247 >1G 3m pk. (Pk)

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA2 FCC 15.247 >1G 3m pk.
4.924 GHz	65.8 Pk	9.7 / 33.03 / 43.64 / 0.65	65.54	V / 1.41 / 109	-8.46
7.386 GHz	57.65 Pk	13.27 / 36.25 / 43.17 / 1.24	65.25	V / 1.61 / 50	-8.75
4.874 GHz	65.65 Pk	9.62 / 32.92 / 43.61 / 0.62	65.2	V / 1.87 / 251	-8.8
4.824 GHz	65.35 Pk	9.54 / 32.81 / 43.57 / 0.59	64.72	V / 1.45 / 111	-9.28
7.311 GHz	56.85 Pk	13.18 / 36.16 / 43.18 / 1.21	64.22	V / 1.70 / 232	-9.78
7.236 GHz	55.2 Pk	13.1 / 36.06 / 43.13 / 1.26	62.49	V / 1.45 / 230	-11.51
2.437 GHz	73.55 Pk	6.17 / 28.63 / 0.0 / 0.0	108.35	V / 1.00 / 107	-16.85

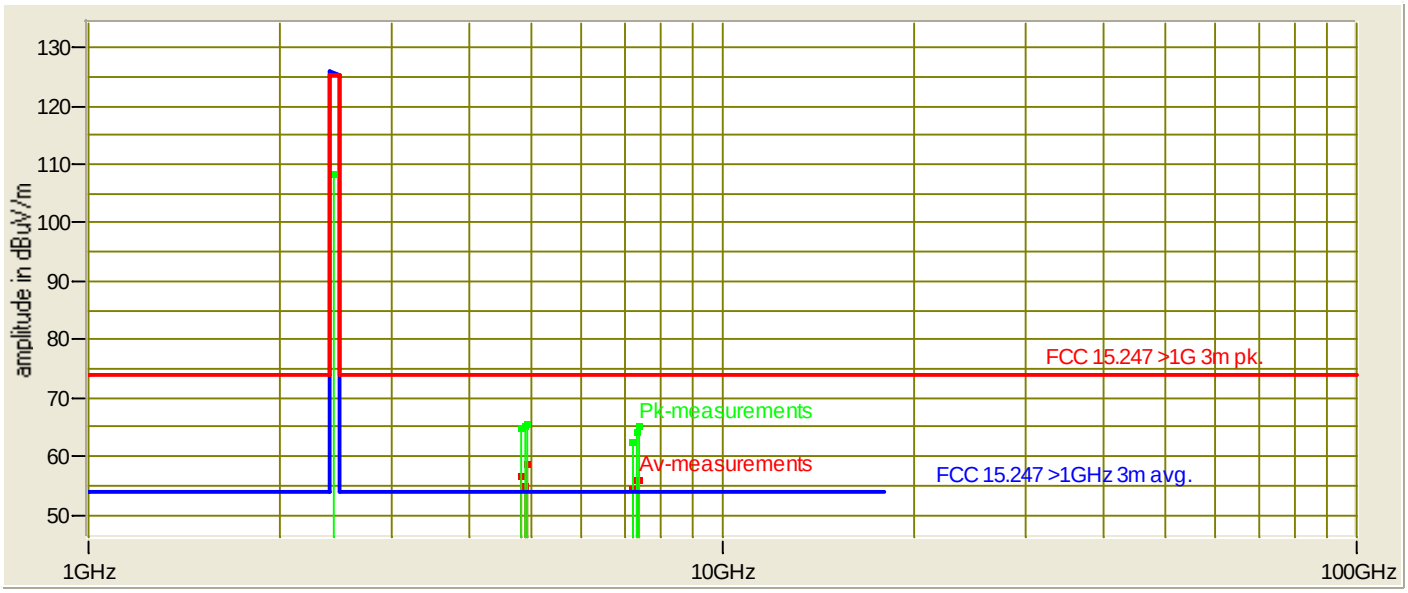
Tested by: Greg Jakubowski (Printed) _____ (Signature)

Reviewed by: Joel T Schneider (Printed) _____ (Signature)

RADIATED EMISSIONS

Test Report #:	WC807706 Run 1 PCB	Test Area:	LTS		
EUT Model #:	50001558-01 & 29000147	Date:	10/6/2008		
EUT Serial #:	0000x	EUT Power:	3.3 VDC	Temperature:	23.0 °C
Test Method:	FCC 15.247 spurious			Air Pressure:	99.0 kPa
Customer:	Digi International			Rel. Humidity:	37.0 %
EUT Description:	Connect WiEM 9210 a/b/g, 802.11 a/b/g embedded radio module with 29000147 PCB antenna				
Notes:					
Data File Name:	7706 PCB.dat			Page:	5 of 5

Graph:



Tested by: Greg Jakubowski — Printed

G Jakubowski — Signature

Reviewed by: Joel T Schneider — Printed

Joel T. Schneider — Signature

RADIATED EMISSIONS

Test Report #:	WC807706 Run 2	Test Area:	LTS		
EUT Model #:	50001558-01	Date:	10/7/2008		
EUT Serial #:	0000x	EUT Power:	3.3 VDC	Temperature:	23.0 °C
Test Method:	FCC 15.247 spurious			Air Pressure:	99.0 kPa
Customer:	Digi International			Rel. Humidity:	45.0 %
EUT Description:	Connect WiEM 9210 a/b/g, 802.11 a/b/g embedded radio module				
Notes:					
Data File Name:	7706.dat			Page:	1 of 1

List of measurements for run #: 2

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA1	DELTA2
Begin scan 18-25 GHz						
Power setting 55, 11 Mbps, 2 dBi antenna, channel 1						
EUT rotated 360 degrees, measurement antenna 1-4 meters high, vertical & horizontal						
No significant emissions detected						
Repeat at 54 Mbps						
No significant emissions detected						
Repeat all of the above with channels 6 and 11						
No significant emissions detected						
Repeat all of the above with #29000147 PCB and 5 dBi antennas						
No significant emissions detected						
End scan 18-25 GHz						

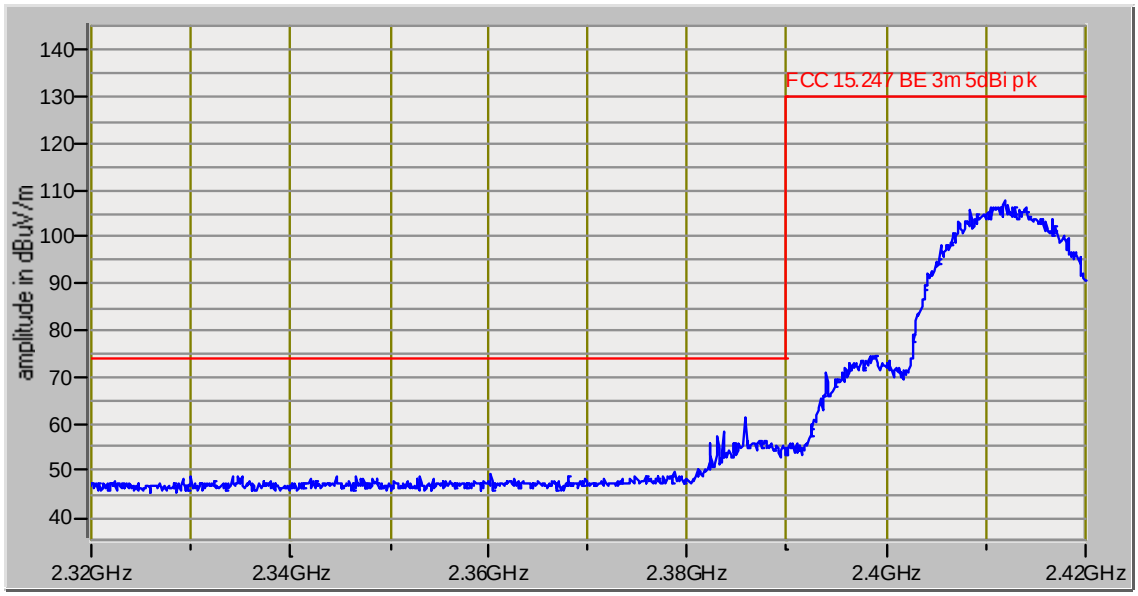
Tested by: Greg Jakubowski (Printed) — G Jakubowski (Signature)

Reviewed by: Joel T Schneider (Printed) — Joel T. Schneider (Signature)

Radiated Band Edge

Test Report #:	WC807706	Test Area:	LTS		
EUT Model #:	50001558-01	Date:	9/22/2008		
EUT Serial #:	0000x	EUT Power:	3.3 VDC	Temperature:	24.0 °C
Test Method:	FCC 15.247			Air Pressure:	99.0 kPa
Customer:	Digi			Rel. Humidity:	62.0 %
EUT Description:	Connect Wi-EM (Embedded radio module)				
Notes:	Fundamental signal maximized, power setting 55, highest gain antenna (5 dBi), channels 1 & 11, data rates 11 & 54 Mbps.				
Data File Name:	7706.dat			Page:	1 of 8

Ch 1, 11 Mbps
Peak



RBW 1 MHz VBW 1 MHz

Tested by: Greg Jakubowski
Printed

Signature

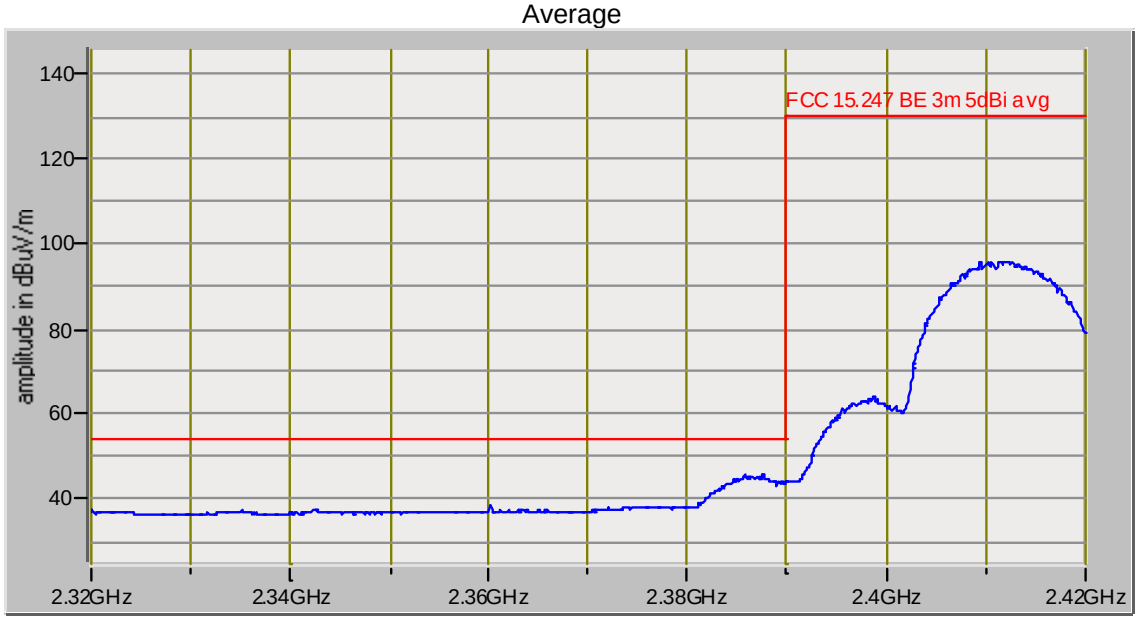
Reviewed by: Joel T Schneider
Printed

Signature

Radiated Band Edge

Test Report #:	WC807706	Test Area:	LTS		
EUT Model #:	50001558-01	Date:	9/22/2008		
EUT Serial #:	0000x	EUT Power:	3.3 VDC	Temperature:	24.0 °C
Test Method:	FCC 15.247			Air Pressure:	99.0 kPa
Customer:	Digi			Rel. Humidity:	62.0 %
EUT Description:	Connect Wi-EM (Embedded radio module)				
Notes:	Fundamental signal maximized, power setting 55, highest gain antenna (5 dBi), channels 1 & 11, data rates 11 & 54 Mbps.				
Data File Name:	7706.dat			Page:	2 of 8

Ch 1, 11 Mbps
Average



RBW 1 MHz VBW 10 Hz

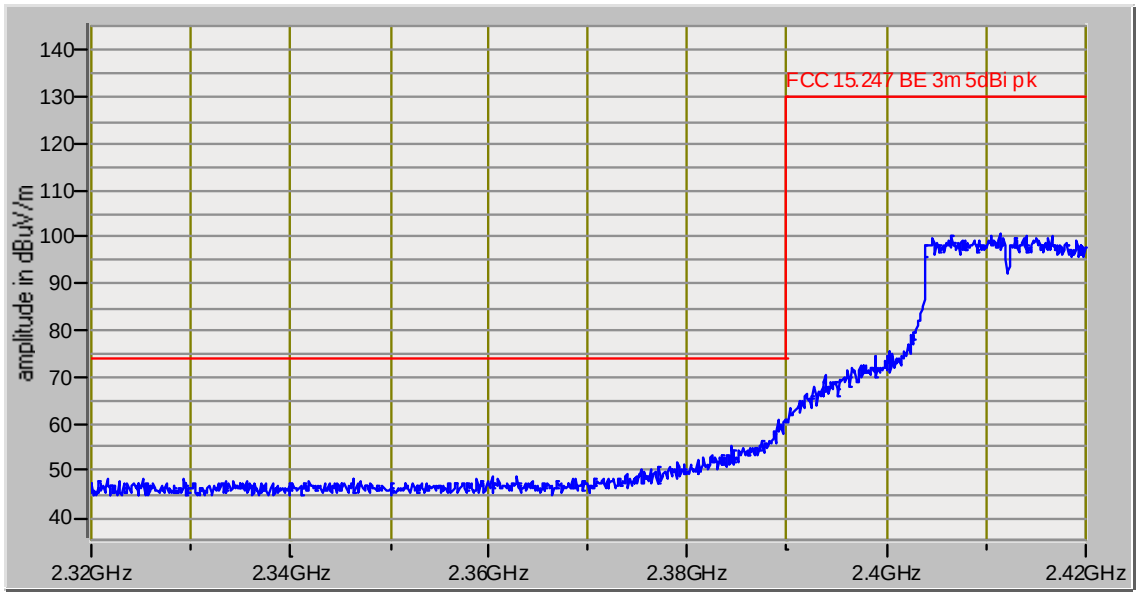
Tested by: Greg Jakubowski (Printed) _____ (Signature)

Reviewed by: Joel T Schneider (Printed) _____ (Signature)

Radiated Band Edge

Test Report #:	WC807706	Test Area:	LTS		
EUT Model #:	50001558-01	Date:	9/22/2008		
EUT Serial #:	0000x	EUT Power:	3.3 VDC	Temperature:	24.0 °C
Test Method:	FCC 15.247			Air Pressure:	99.0 kPa
Customer:	Digi			Rel. Humidity:	62.0 %
EUT Description:	Connect Wi-EM (Embedded radio module)				
Notes:	Fundamental signal maximized, power setting 55, highest gain antenna (5 dBi), channels 1 & 11, data rates 11 & 54 Mbps.				
Data File Name:	7706.dat			Page:	3 of 8

Ch 1, 54 Mbps
Peak



RBW 1 MHz VBW 1 MHz

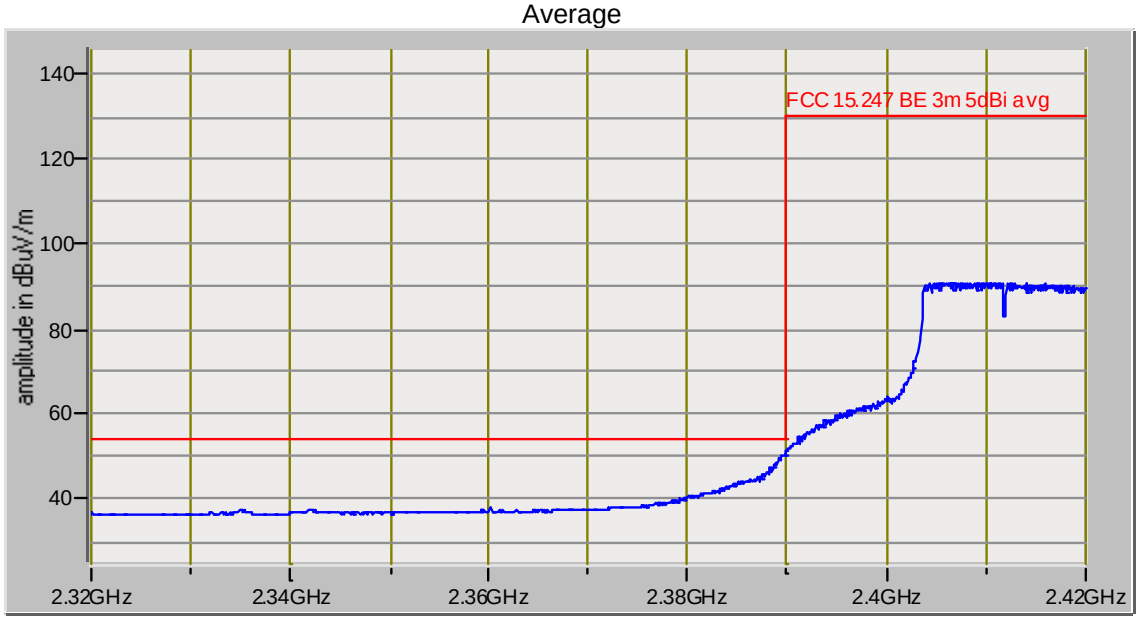
Tested by: Greg Jakubowski (Printed) _____ (Signature)

Reviewed by: Joel T Schneider (Printed) _____ (Signature)

Radiated Band Edge

Test Report #:	WC807706	Test Area:	LTS		
EUT Model #:	50001558-01	Date:	9/22/2008		
EUT Serial #:	0000x	EUT Power:	3.3 VDC	Temperature:	24.0 °C
Test Method:	FCC 15.247			Air Pressure:	99.0 kPa
Customer:	Digi			Rel. Humidity:	62.0 %
EUT Description:	Connect Wi-EM (Embedded radio module)				
Notes:	Fundamental signal maximized, power setting 55, highest gain antenna (5 dBi), channels 1 & 11, data rates 11 & 54 Mbps.				
Data File Name:	7706.dat			Page:	4 of 8

Ch 1, 54 Mbps
Average



RBW 1 MHz VBW 10 Hz

Tested by: Greg Jakubowski
Printed

Signature

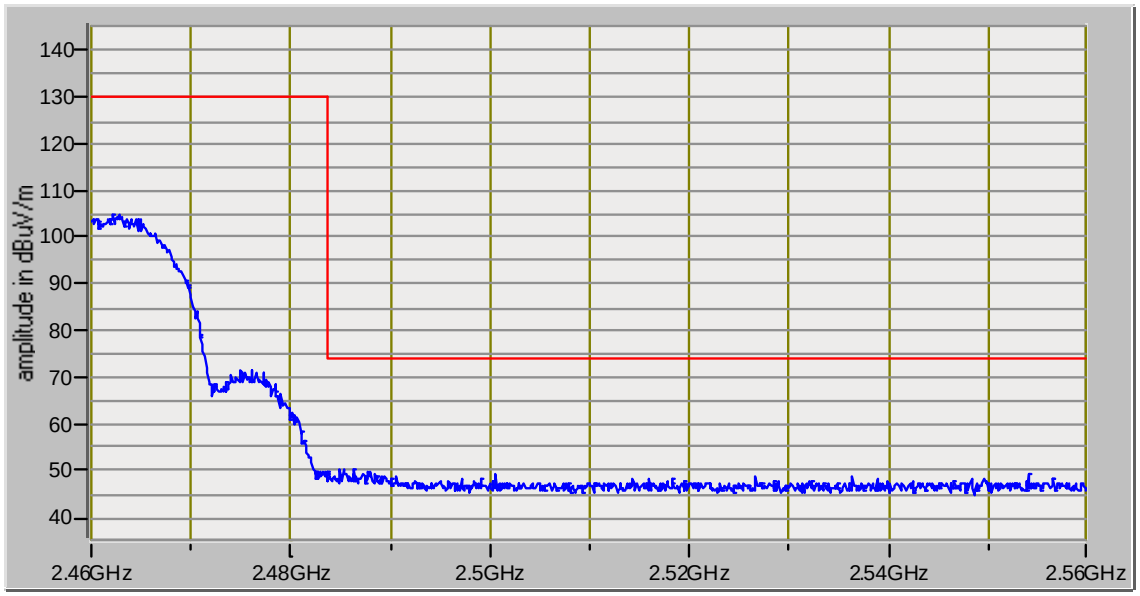
Reviewed by: Joel T Schneider
Printed

Signature

Radiated Band Edge

Test Report #:	WC807706	Test Area:	LTS		
EUT Model #:	50001558-01	Date:	9/22/2008		
EUT Serial #:	0000x	EUT Power:	3.3 VDC	Temperature:	24.0 °C
Test Method:	FCC 15.247			Air Pressure:	99.0 kPa
Customer:	Digi			Rel. Humidity:	62.0 %
EUT Description:	Connect Wi-EM (Embedded radio module)				
Notes:	Fundamental signal maximized, power setting 55, highest gain antenna (5 dBi), channels 1 & 11, data rates 11 & 54 Mbps.				
Data File Name:	7706.dat			Page:	5 of 8

Ch 11, 11 Mbps
Peak



RBW 1 MHz VBW 1 MHz

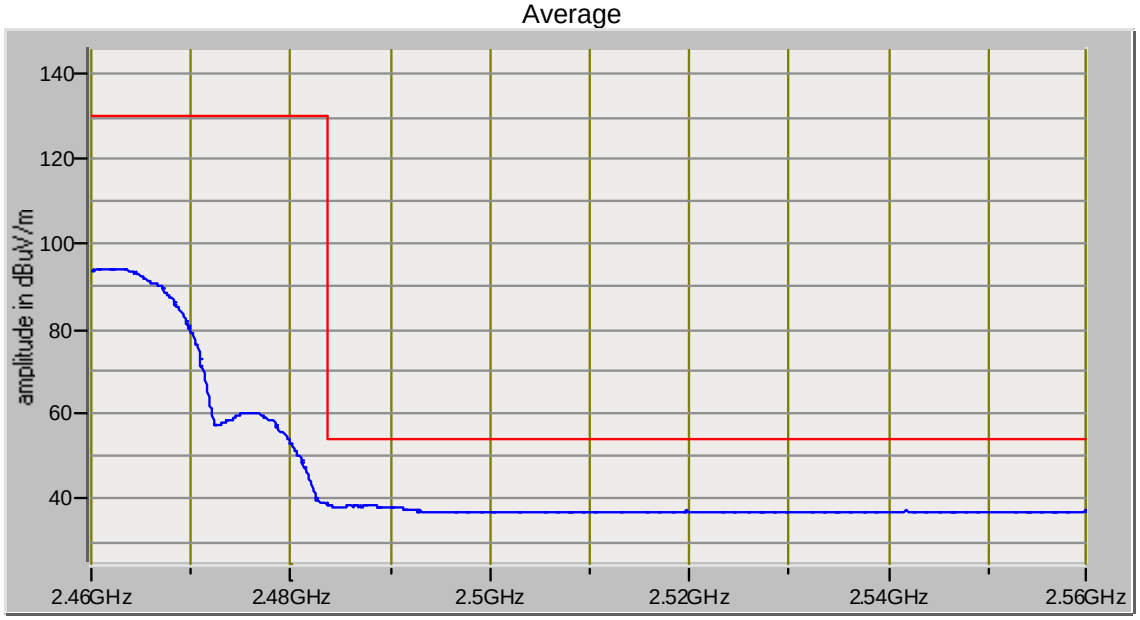
Tested by: Greg Jakubowski (Printed) _____ (Signature)

Reviewed by: Joel T Schneider (Printed) _____ (Signature)

Radiated Band Edge

Test Report #:	WC807706	Test Area:	LTS		
EUT Model #:	50001558-01	Date:	9/22/2008		
EUT Serial #:	0000x	EUT Power:	3.3 VDC	Temperature:	24.0 °C
Test Method:	FCC 15.247			Air Pressure:	99.0 kPa
Customer:	Digi			Rel. Humidity:	62.0 %
EUT Description:	Connect Wi-EM (Embedded radio module)				
Notes:	Fundamental signal maximized, power setting 55, highest gain antenna (5 dBi), channels 1 & 11, data rates 11 & 54 Mbps.				
Data File Name:	7706.dat			Page:	6 of 8

Ch 11, 11 Mbps
Average



RBW 1 MHz VBW 10 Hz

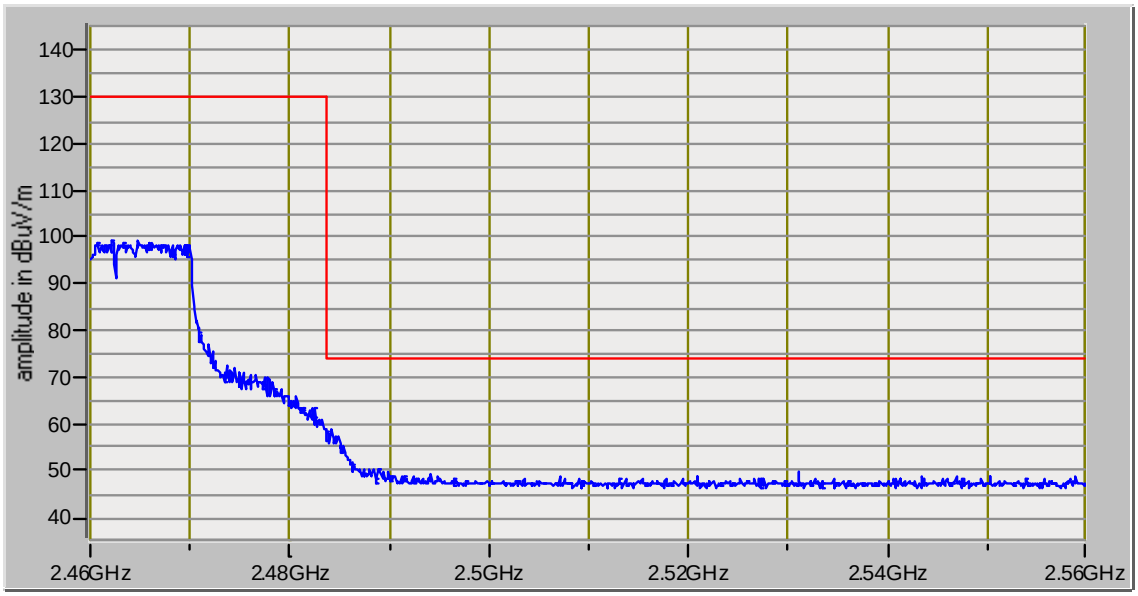
Tested by: Greg Jakubowski (Printed) — G Jakubowski (Signature)

Reviewed by: Joel T Schneider (Printed) — Joel T. Schneider (Signature)

Radiated Band Edge

Test Report #:	WC807706	Test Area:	LTS		
EUT Model #:	50001558-01	Date:	9/22/2008		
EUT Serial #:	0000x	EUT Power:	3.3 VDC	Temperature:	24.0 °C
Test Method:	FCC 15.247			Air Pressure:	99.0 kPa
Customer:	Digi			Rel. Humidity:	62.0 %
EUT Description:	Connect Wi-EM (Embedded radio module)				
Notes:	Fundamental signal maximized, power setting 55, highest gain antenna (5 dBi), channels 1 & 11, data rates 11 & 54 Mbps.				
Data File Name:	7706.dat			Page:	7 of 8

Ch 11, 54 Mbps
Peak



RBW 1 MHz VBW 1 MHz

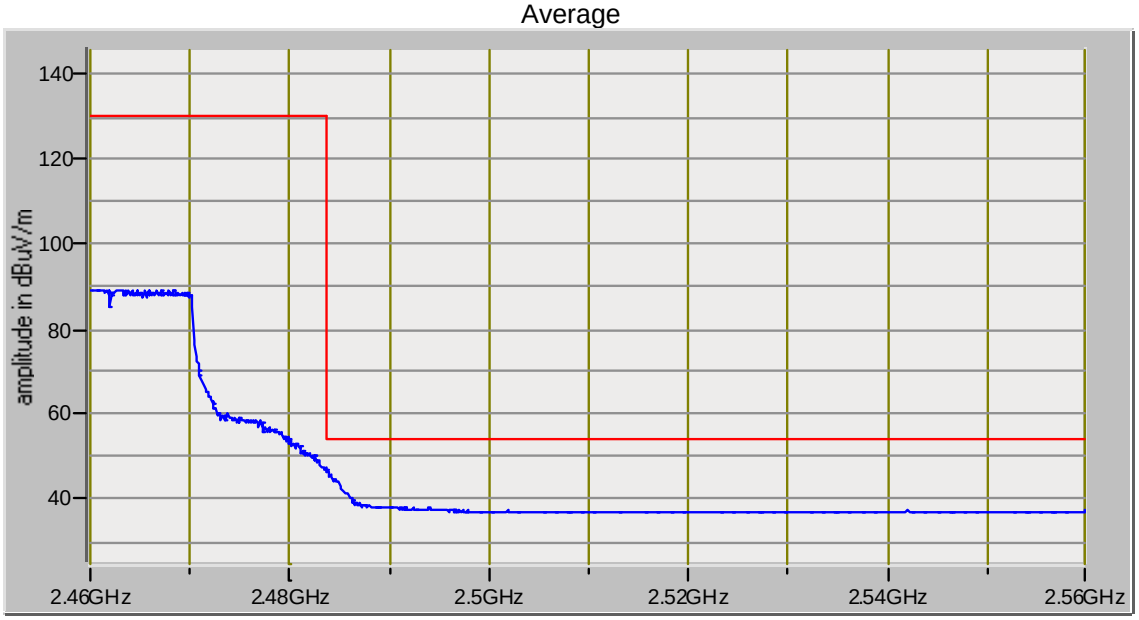
Tested by: Greg Jakubowski (Printed) _____ (Signature)

Reviewed by: Joel T Schneider (Printed) _____ (Signature)

Radiated Band Edge

Test Report #:	WC807706	Test Area:	LTS		
EUT Model #:	50001558-01	Date:	9/22/2008		
EUT Serial #:	0000x	EUT Power:	3.3 VDC	Temperature:	24.0 °C
Test Method:	FCC 15.247			Air Pressure:	99.0 kPa
Customer:	Digi			Rel. Humidity:	62.0 %
EUT Description:	Connect Wi-EM (Embedded radio module)				
Notes:	Fundamental signal maximized, power setting 55, highest gain antenna (5 dBi), channels 1 & 11, data rates 11 & 54 Mbps.				
Data File Name:	7706.dat			Page:	8 of 8

Ch 11, 54 Mbps
Average



RBW 1 MHz VBW 10 Hz

Tested by: Greg Jakubowski
Printed

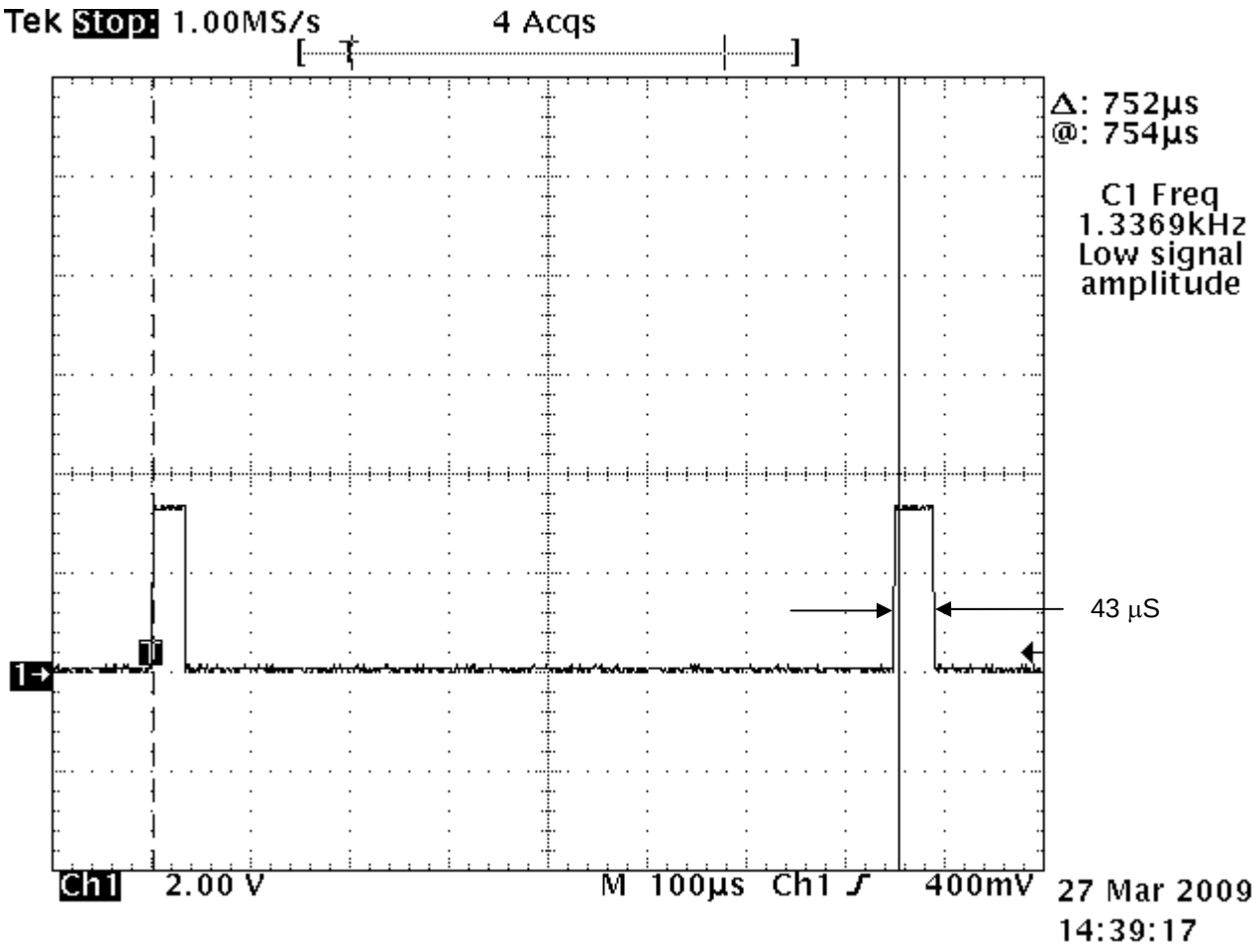
Signature

Reviewed by: Joel T Schneider
Printed

Signature

Duty Cycle

Test summary
Manufacturer's data.
Pulses are 43 μS every 752 μS. 43/752 = 5.72 % duty cycle
Use 10% duty cycle as worst case scenario



Power spectral density
FCC 15.247(e), IC RSS-210 A8.2(b)

Test summary
The requirements are: ■ - MET ☐ - NOT MET
Test was performed in accordance with the test procedure of FCC KDB Publication 558074
Maximum power spectral density is –3.24 dBm / 3 kHz

Test location
☐ - Wild River Lab Large Test Site (Open Area Test Site)
☐ - Wild River Lab Small Test Site (Open Area Test Site)
■ - Wild River Lab Tech Area, conducted measurement

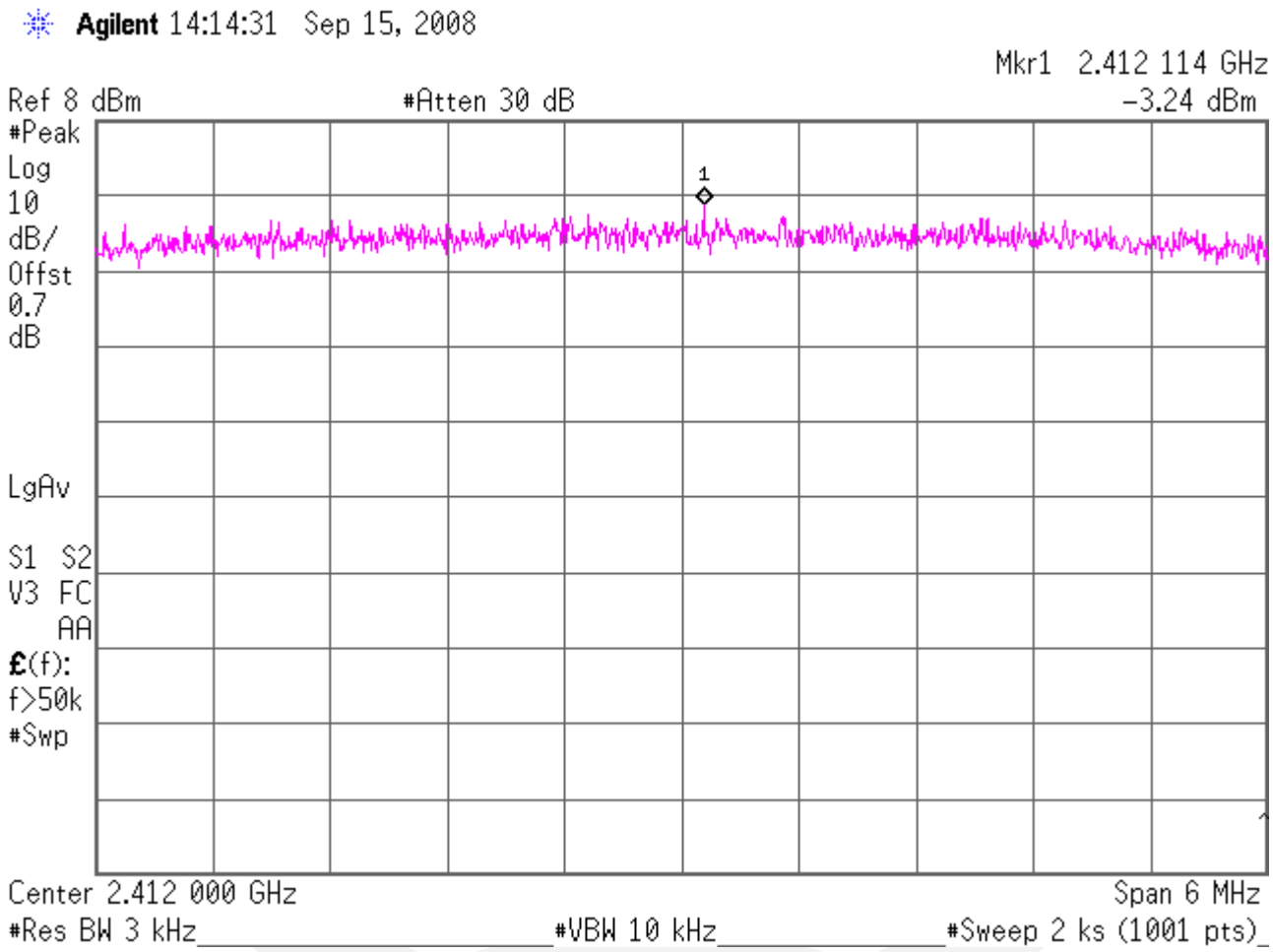
Test equipment

TUV ID	Model	Manufacturer	Description	Serial	Cal Due
WRLE03371	E4440A	Agilent	Spectrum Analyzer	MY43362222	11-Aug-10

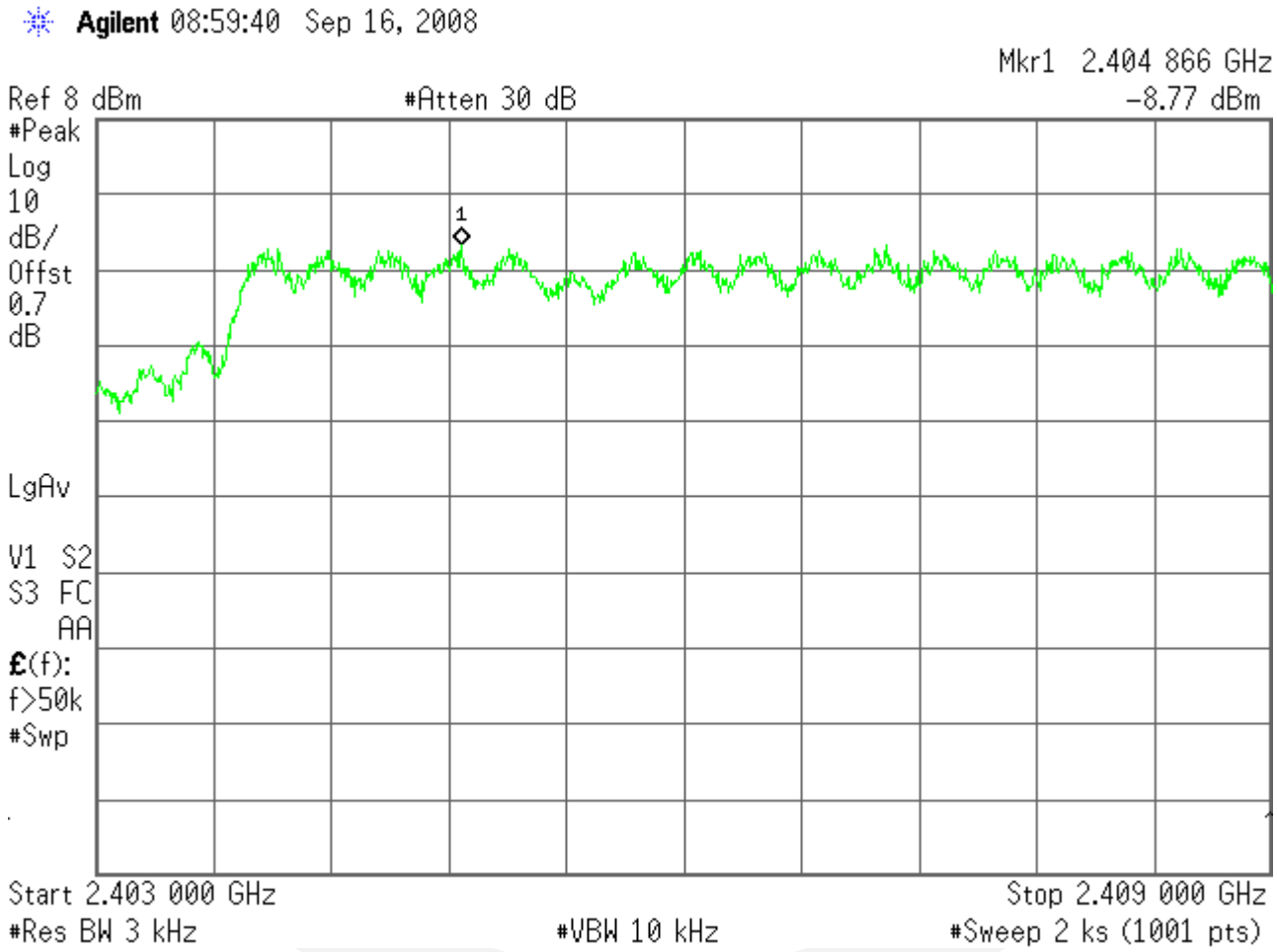
Test limit
No greater than 8 dBm in any 3 kHz band

Test data
See following pages.

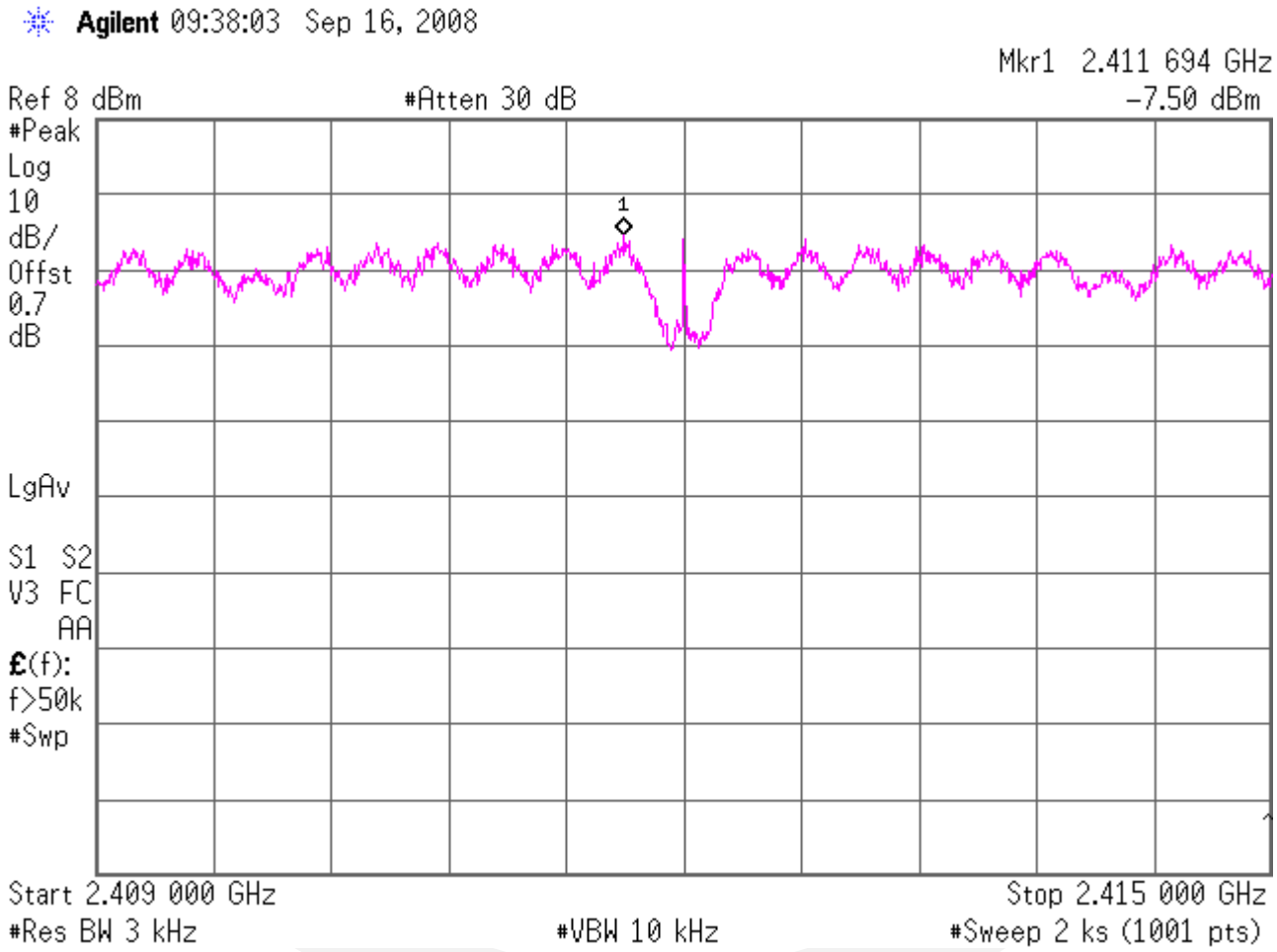
Power spectral density
Channel 1, 11 Mbps, power setting 55



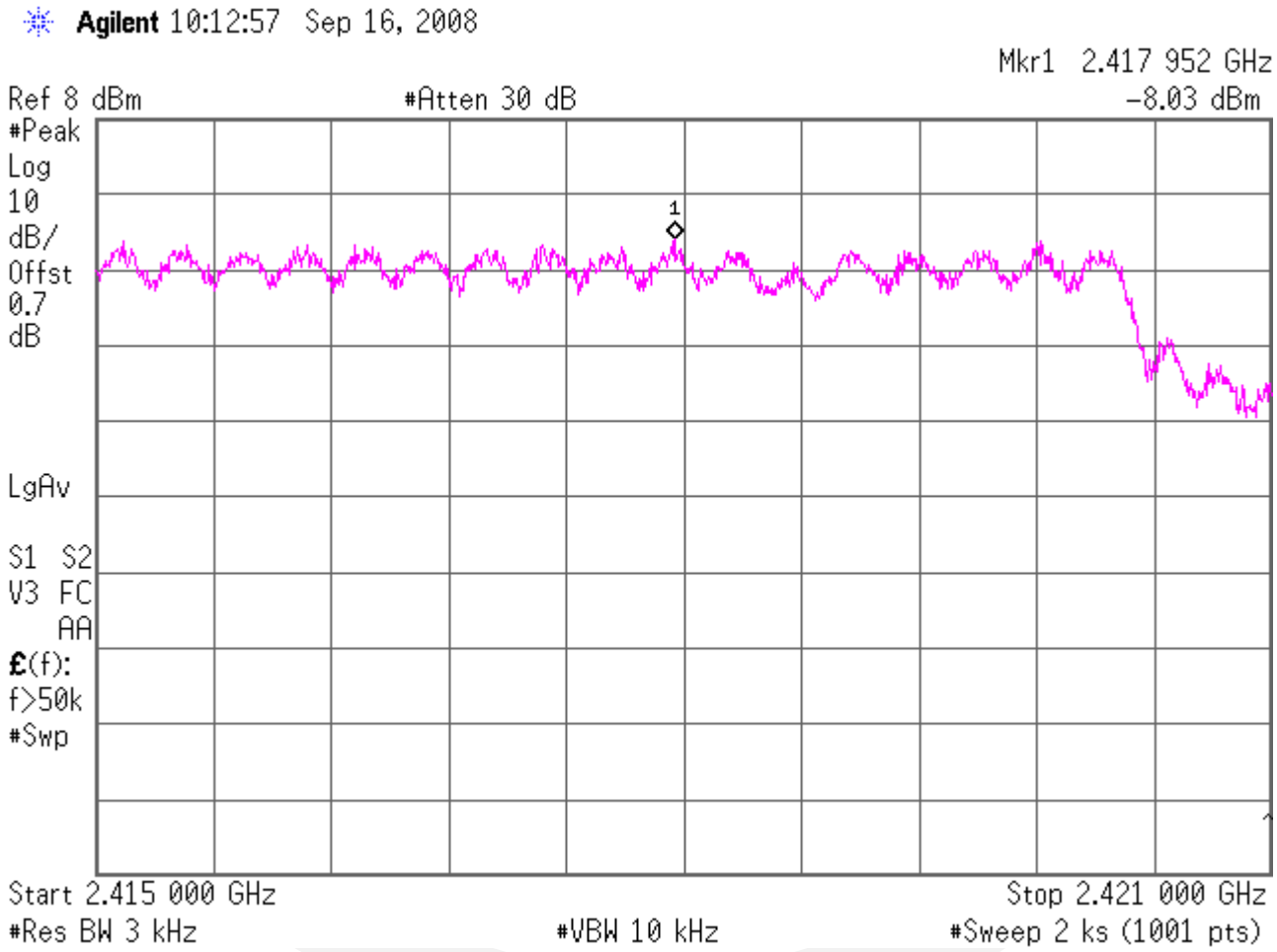
Power spectral density
Channel 1, 54 Mbps, power setting 55
1 of 3



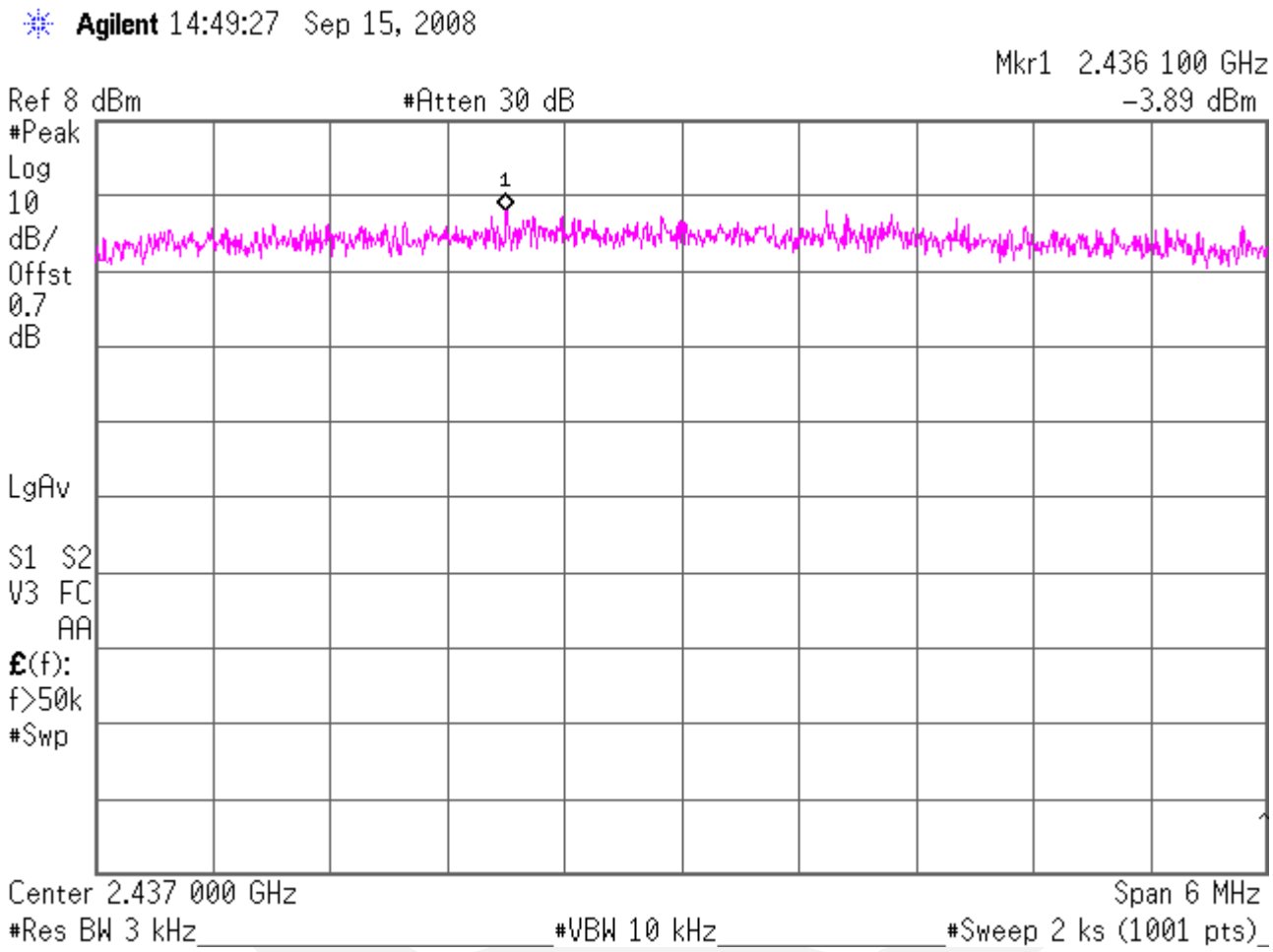
Power spectral density
Channel 1, 54 Mbps, power setting 55
2 of 3



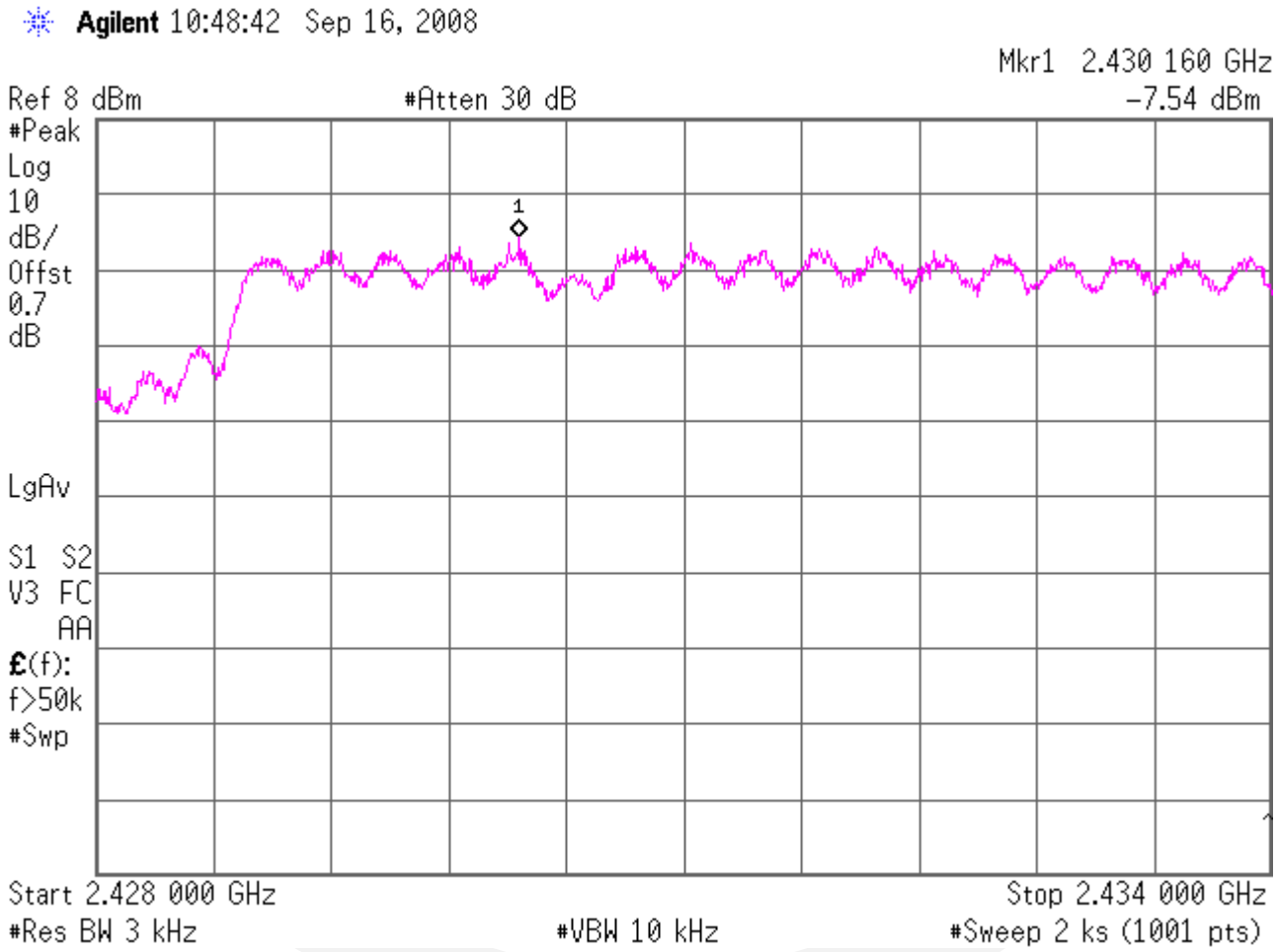
Power spectral density
Channel 1, 54 Mbps, power setting 55
3 of 3



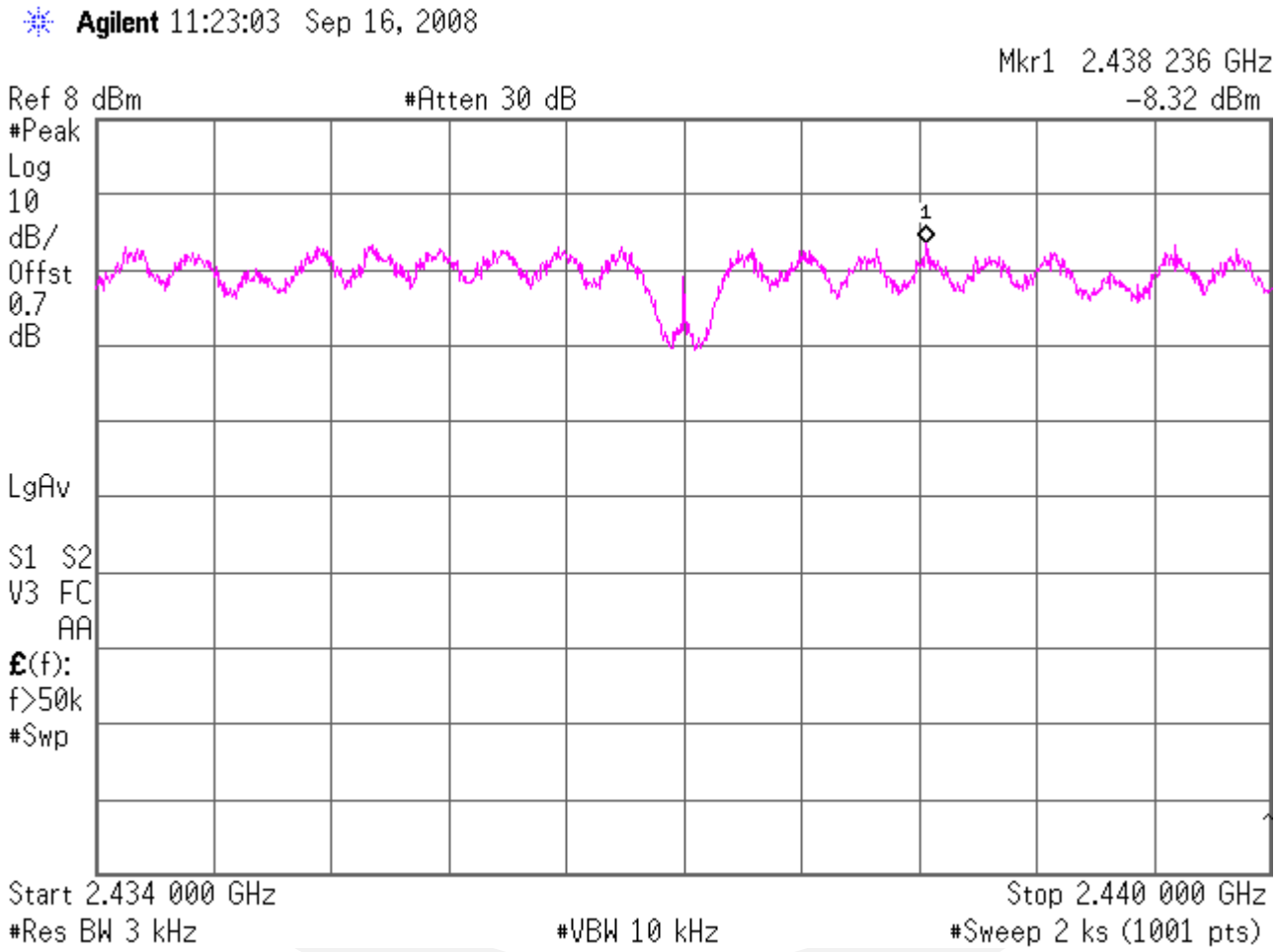
Power spectral density
Channel 6, 11 Mbps, power setting 55



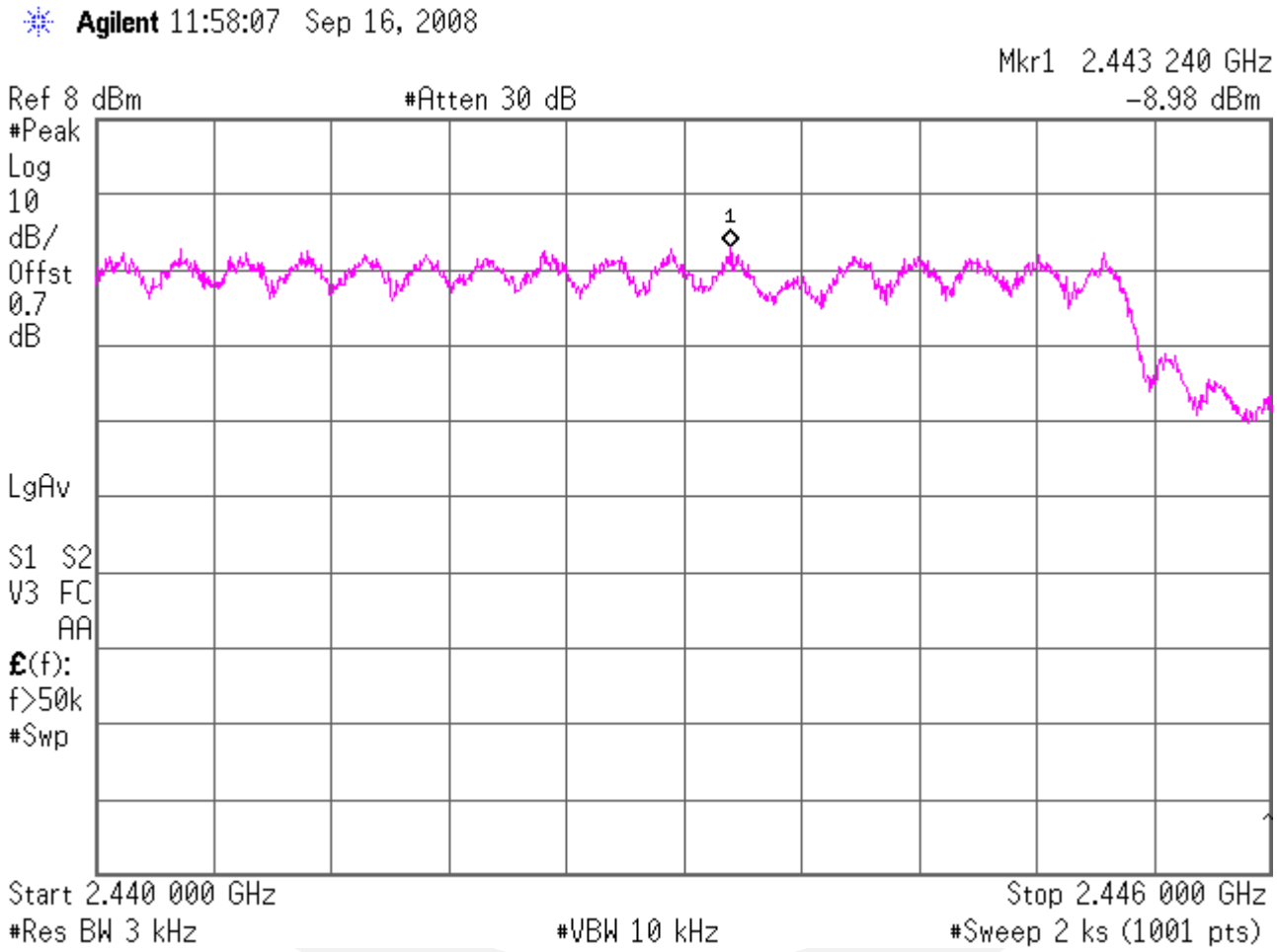
Power spectral density
Channel 6, 54 Mbps, power setting 55
1 of 3



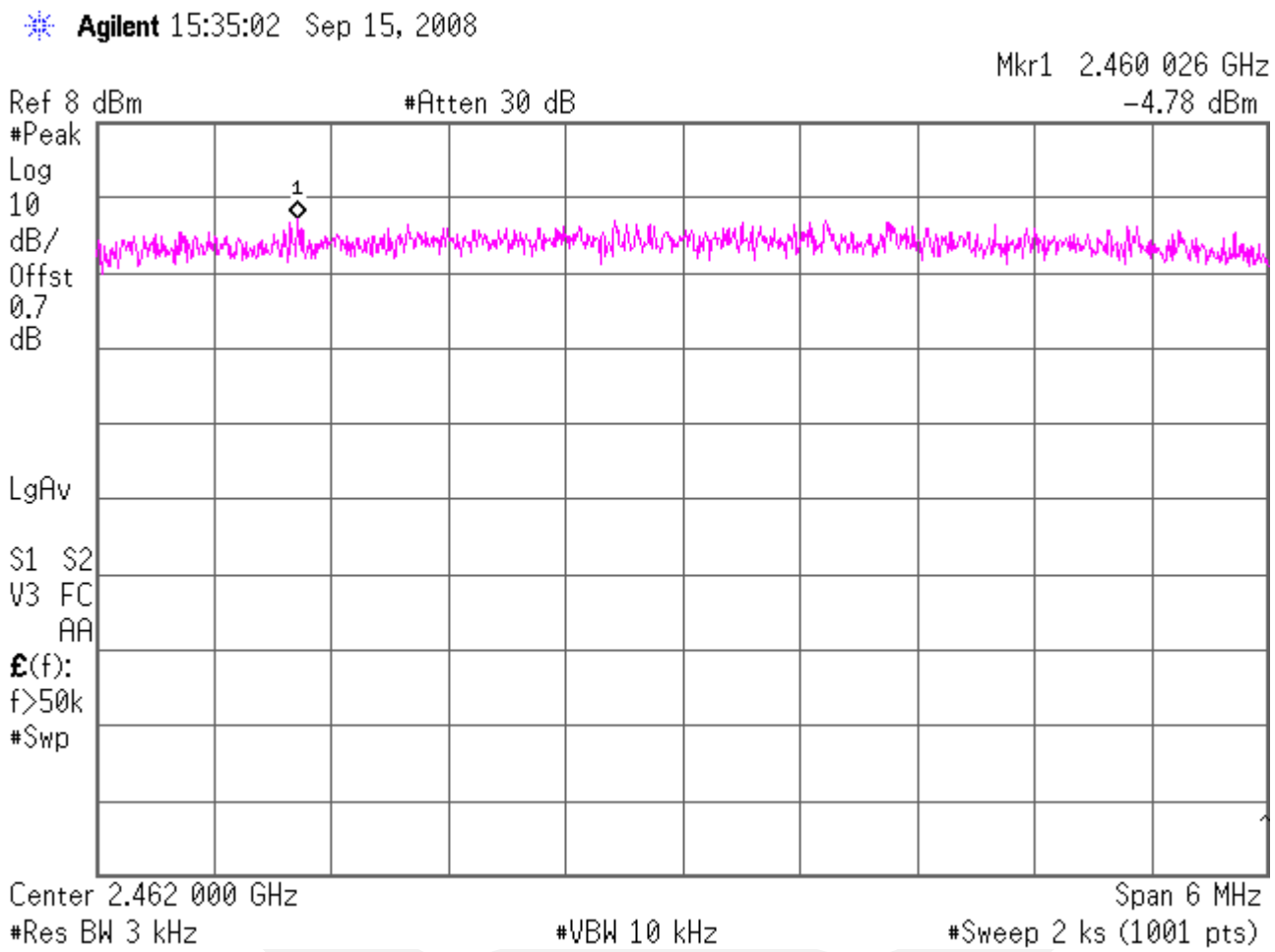
Power spectral density
Channel 6, 54 Mbps, power setting 55
2 of 3



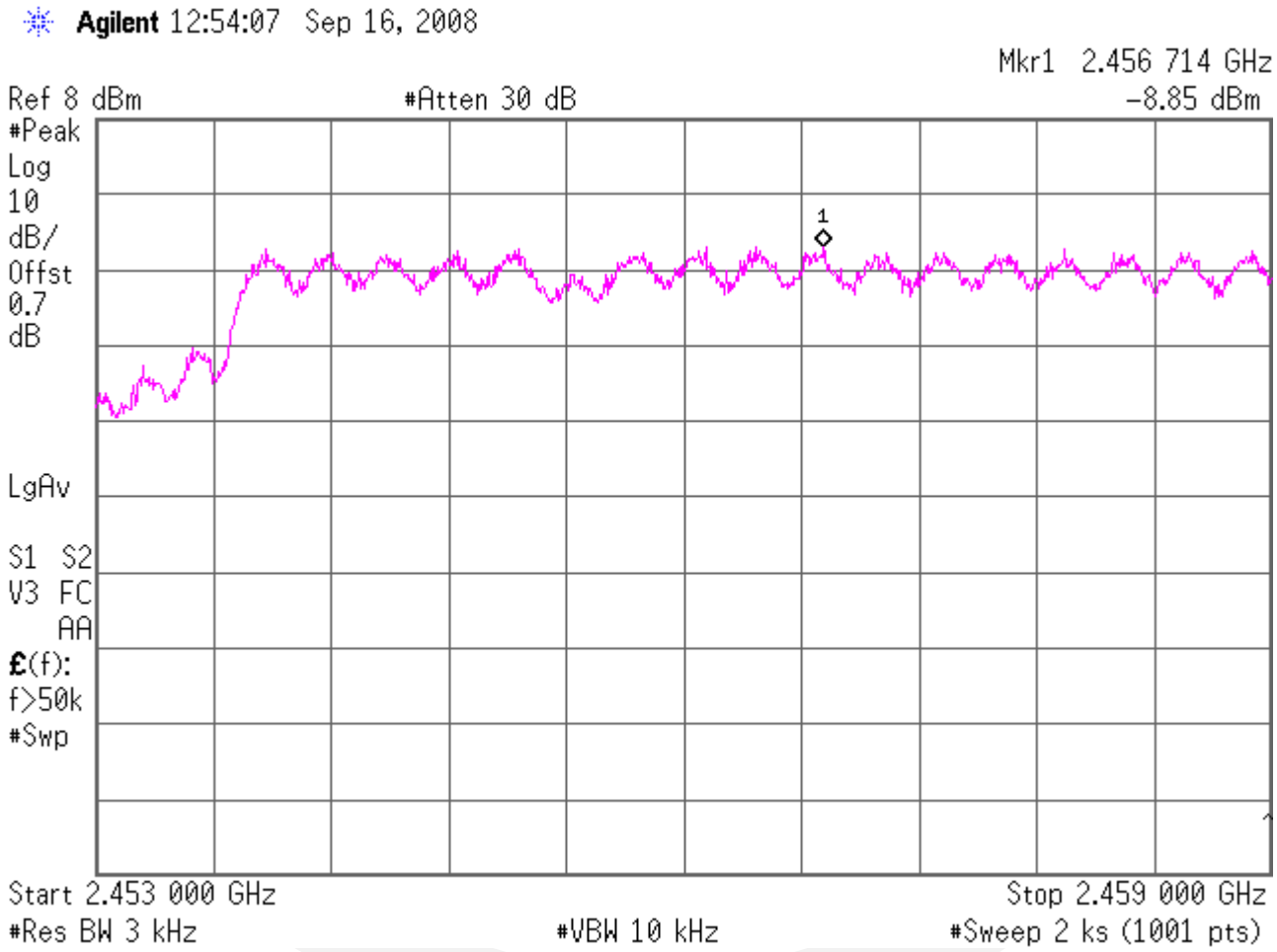
Power spectral density
Channel 6, 54 Mbps, power setting 55
3 of 3



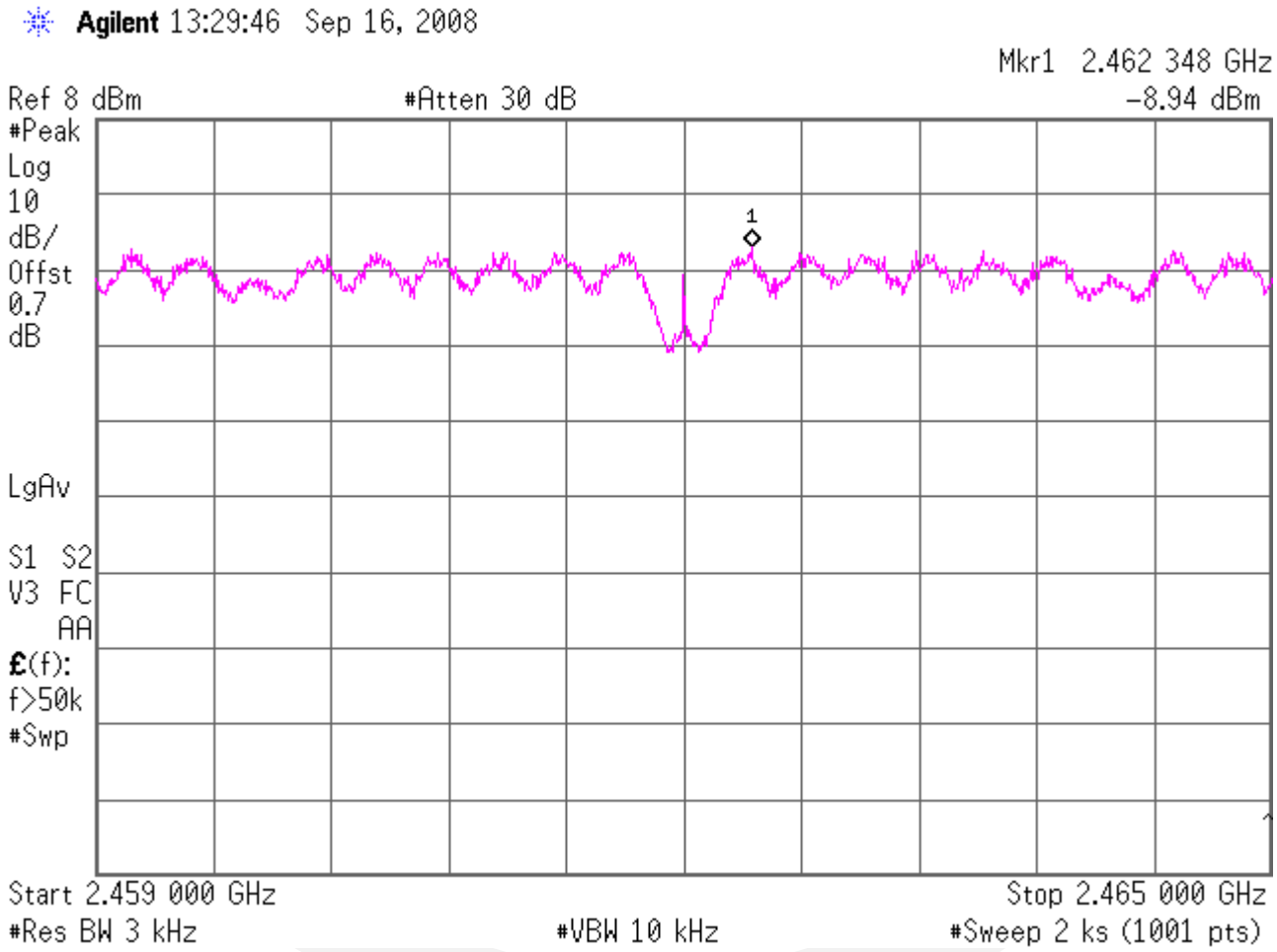
Power spectral density
Channel 11, 11 Mbps, power setting 55



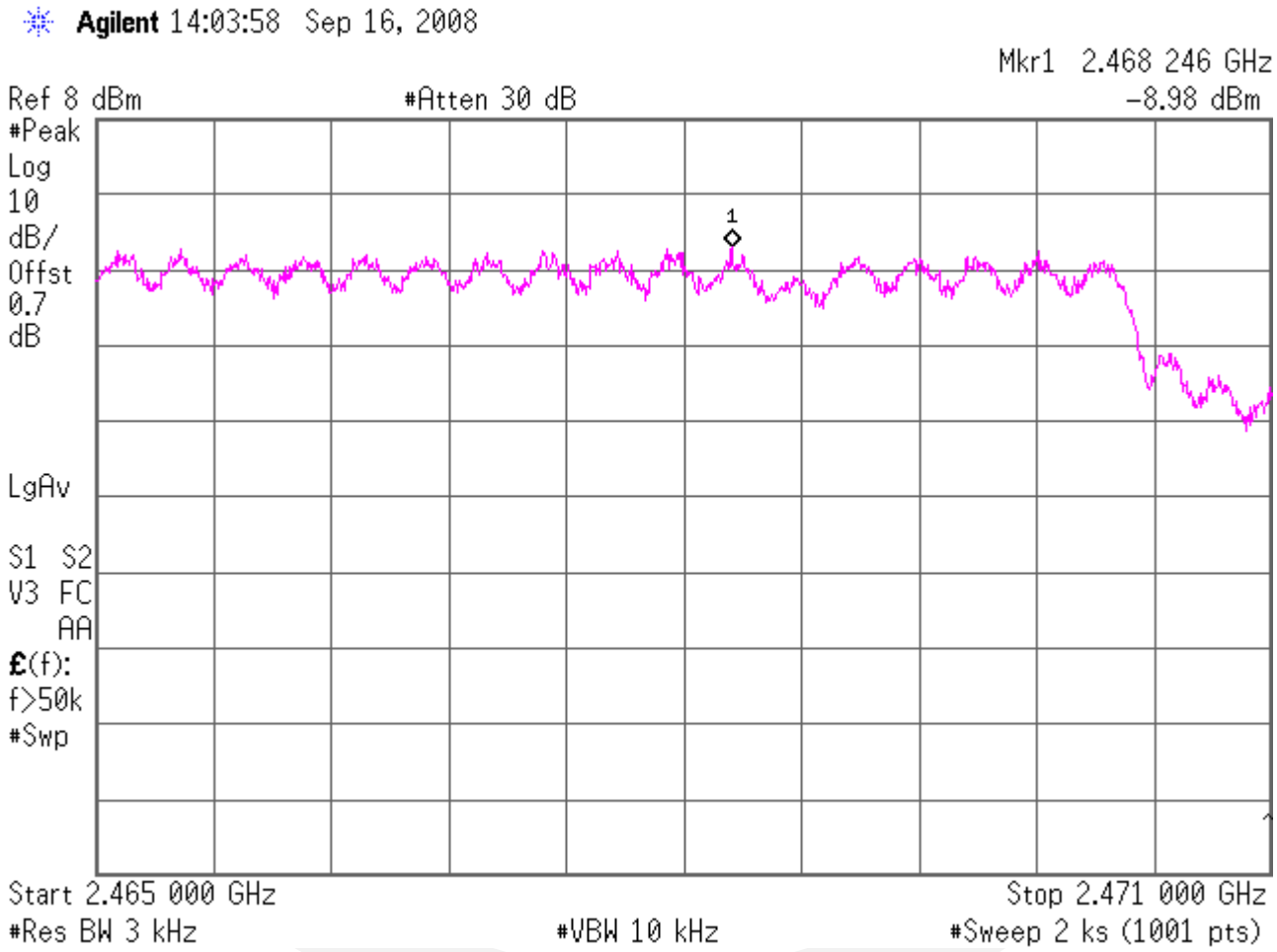
Power spectral density
Channel 11, 54 Mbps, power setting 55
1 of 3



Power spectral density
Channel 11, 54 Mbps, power setting 55
2 of 3



Power spectral density
Channel 11, 54 Mbps, power setting 55
3 of 3



99% Bandwidth
IC RSS-GEN 4.6

Test summary
The requirements are: ■ - MET ☐ - NOT MET
Test was performed in accordance with the article “The Measurement of Occupied Bandwidth” by Industry Canada’s certification bureau
99% Occupied bandwidth range is from 11.2 MHz to 16.3 MHz.

Test location
☐ - Wild River Lab Large Test Site (Open Area Test Site)
☐ - Wild River Lab Small Test Site (Open Area Test Site)
■ - Wild River Lab Tech Area, conducted measurement

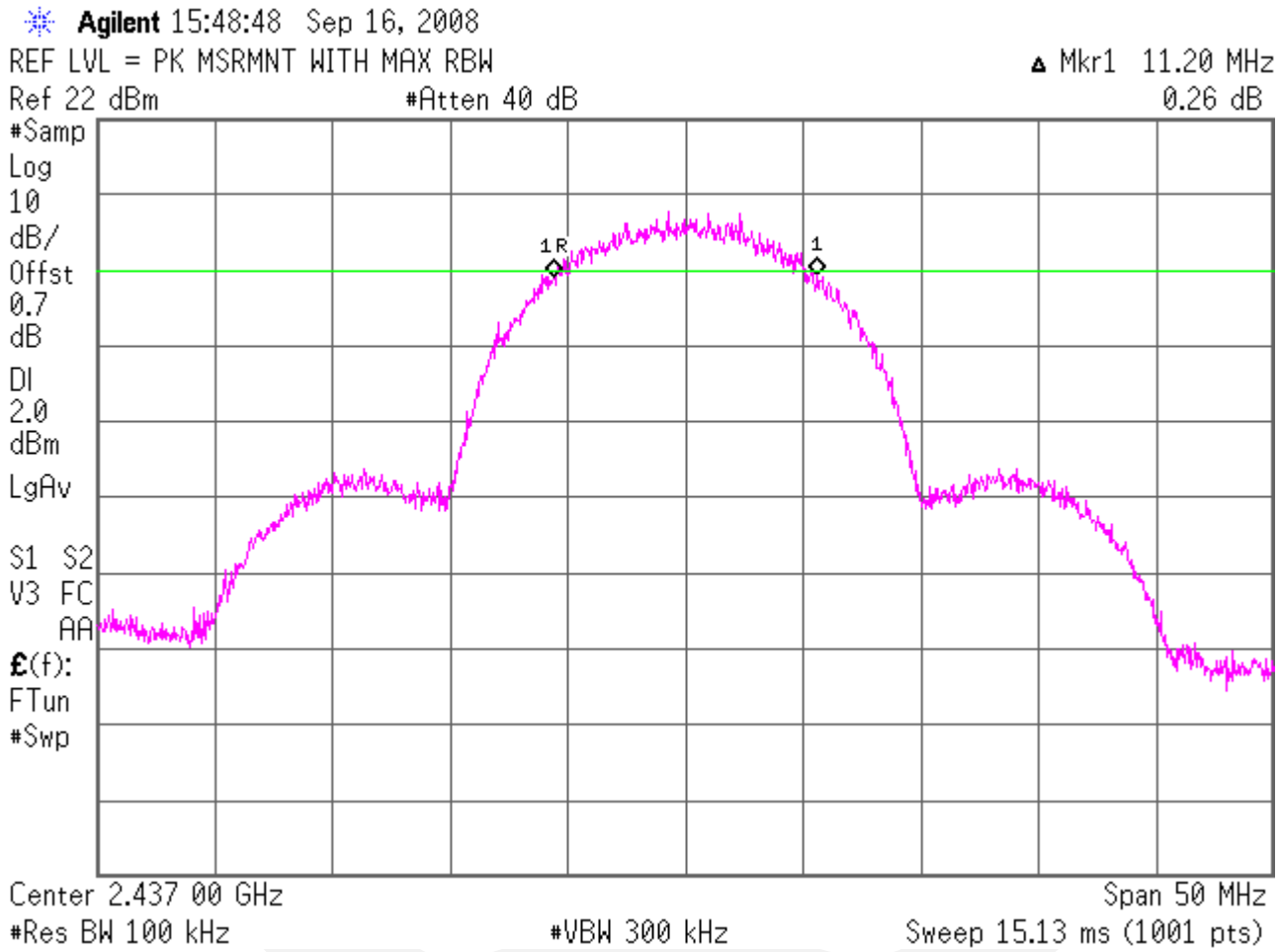
Test equipment

TUV ID	Model	Manufacturer	Description	Serial	Cal Due
WRLE03371	E4440A	Agilent	Spectrum Analyzer	MY43362222	11-Aug-10

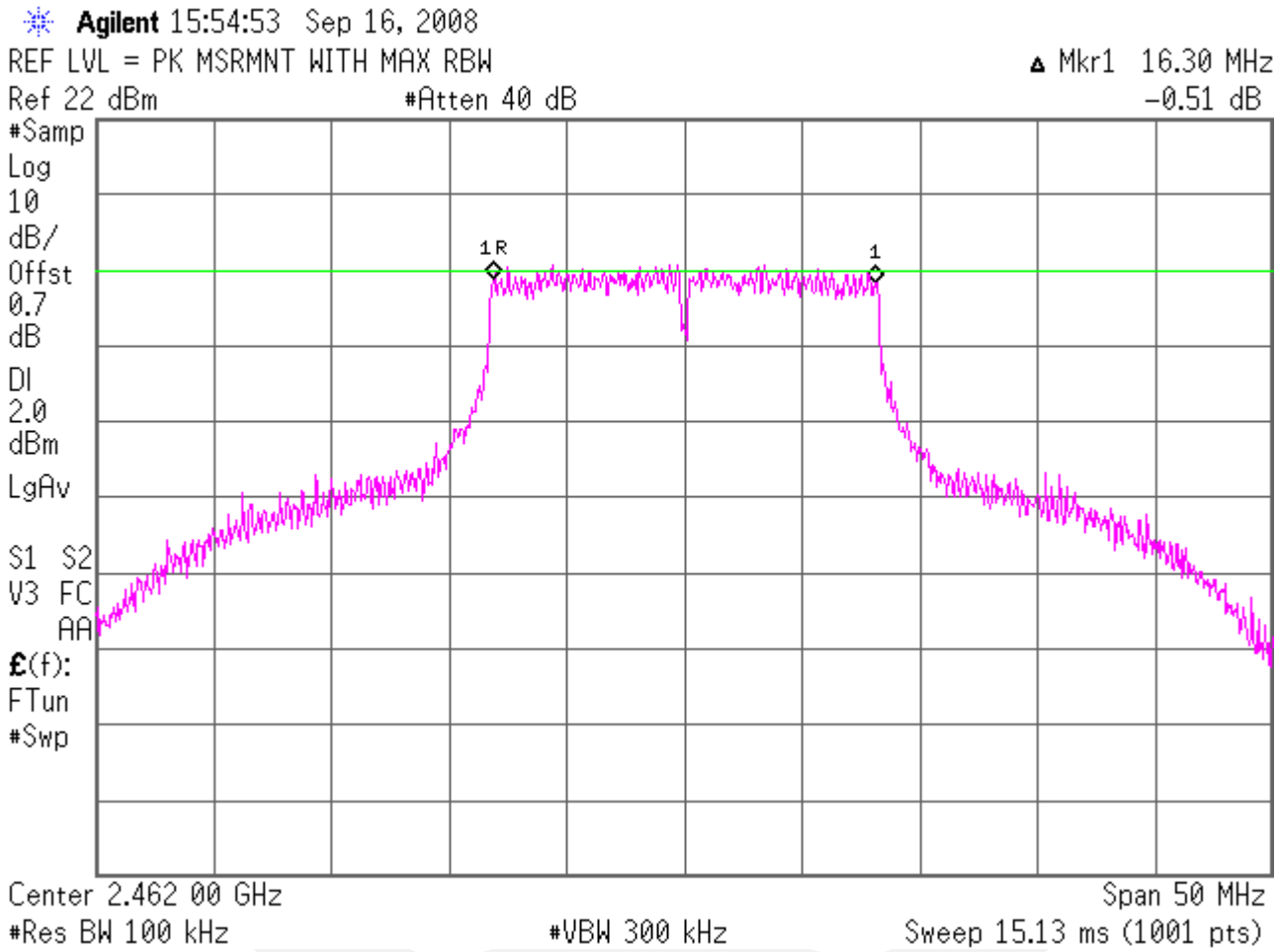
Test limit
Not applicable

Test data
See following pages

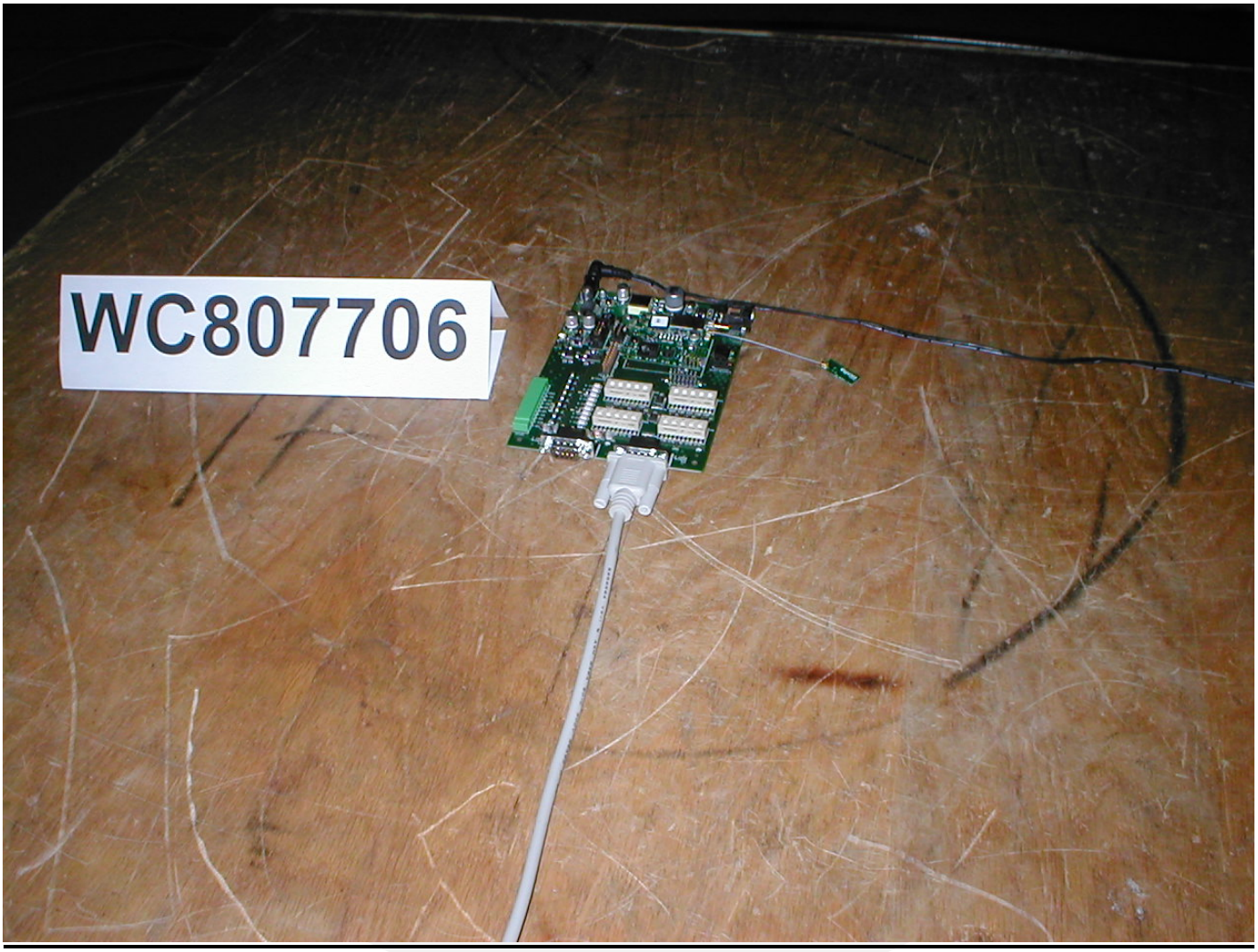
99% Occupied bandwidth
11 Mbps



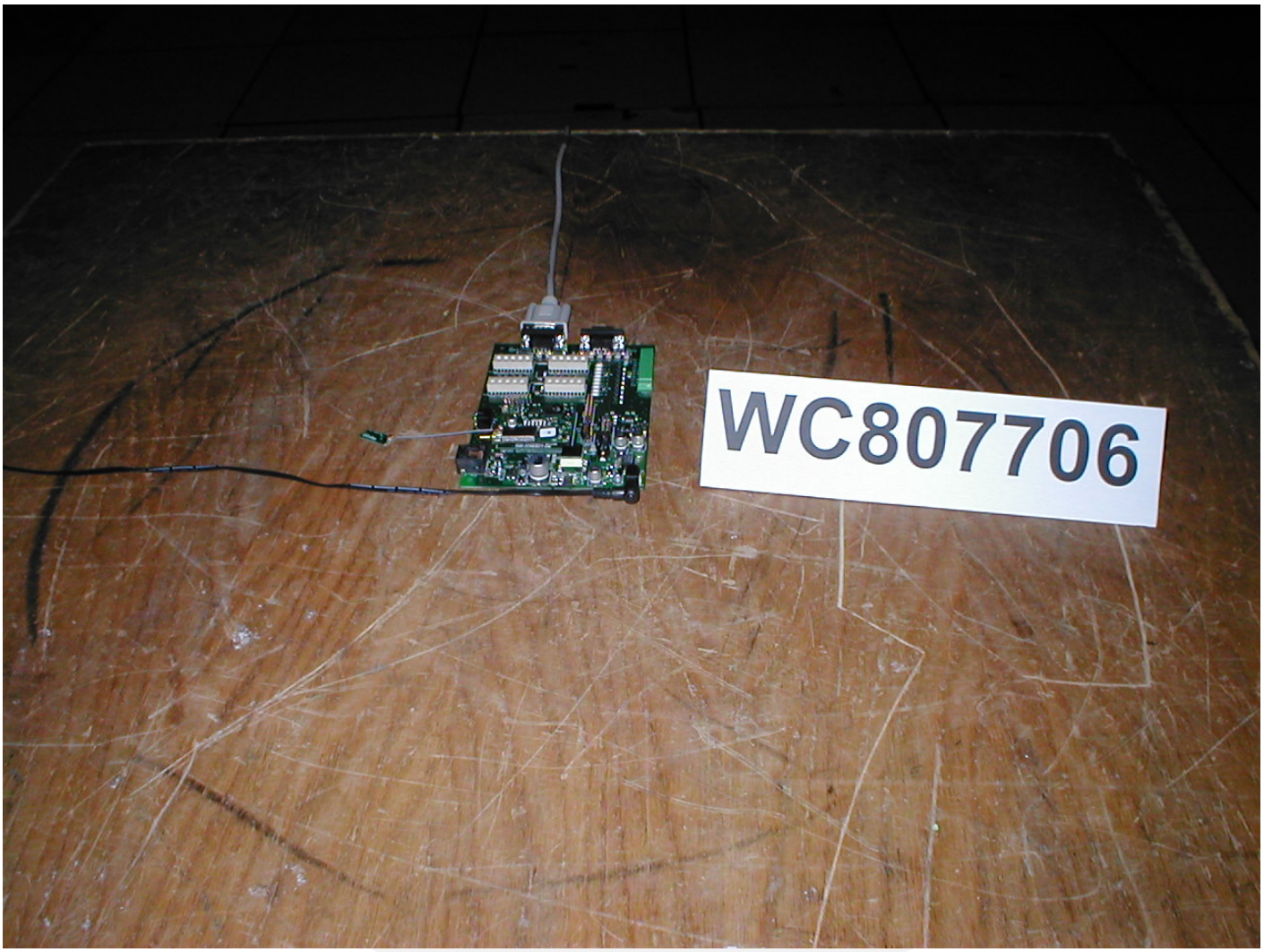
99% Occupied bandwidth
54 Mbps



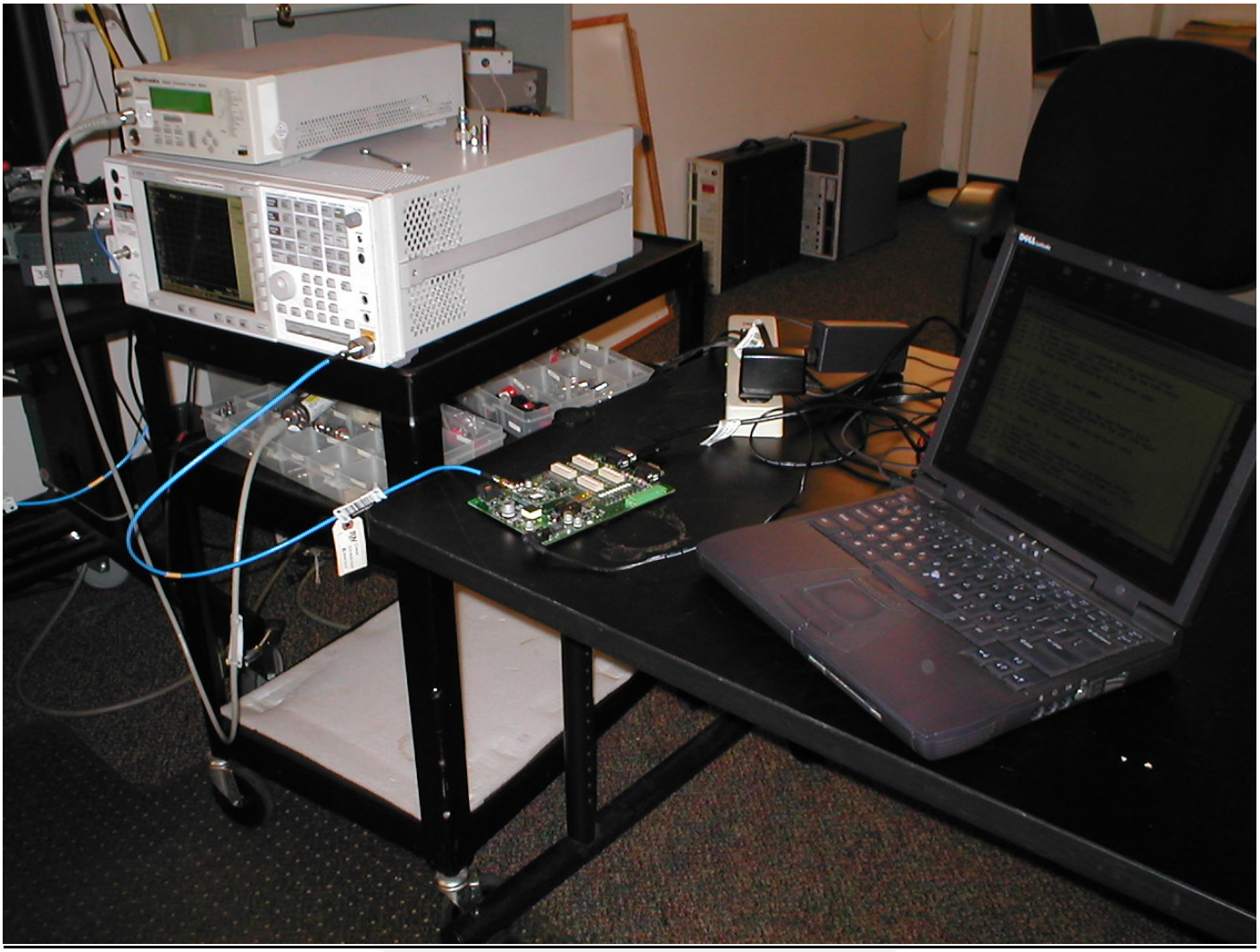
Test-setup photo(s):
Radiated measurements



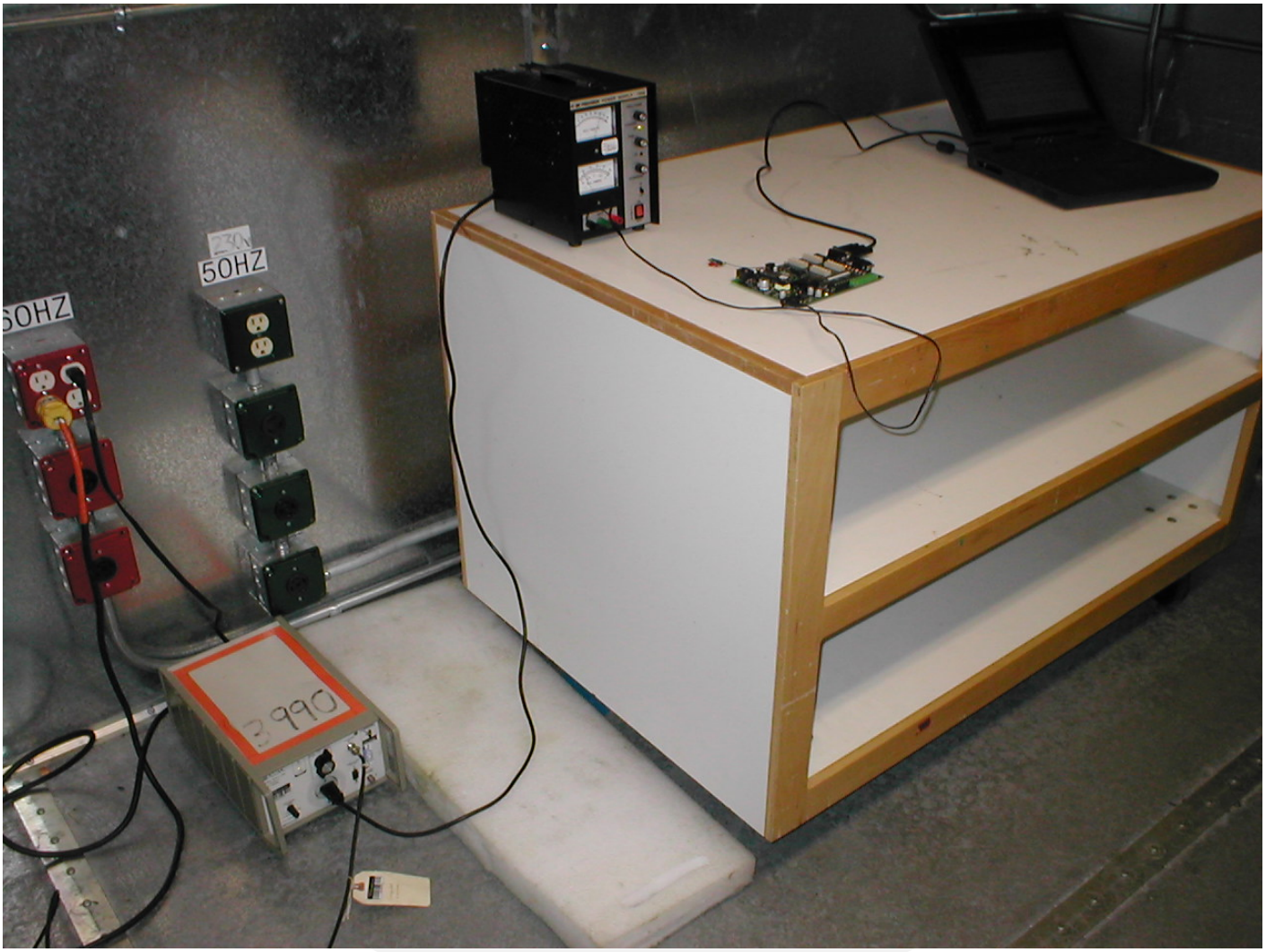
Test-setup photo(s):
Radiated measurements



Test-setup photo(s):
Conducted measurements



Test-setup photo(s):
Conducted measurements – AC power lines



Equipment Under Test (EUT) 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

☐ - Normal Operating Mode

■ - See Software and/or Operating Modes in Appendix A

Configuration of the device under test:

■ - See Constructional Data Form and Block Diagram in Appendix A

☐ - See Product Information Form in Appendix B

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

EUT Received Date:	15 September 2008
Condition of EUT:	Normal
Testing Start Date:	15 September 2008
Testing End Date:	14 November 2008

TÜV SÜD AMERICA INC

Tested by:

Greg S Jakubowski
Senior EMC Technician

Approved by:

Joel T 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: Digi International
Address: 11001 Bren Road East
Minnetonka, MN 55343

Contact: Slava Gekht Position: Hardware Engineer
Phone: 952-912-3245 Fax:
E-mail Address: slava.gekht@digi.com

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

EUT Description: 802.11 a/b/g embedded radio module (802.11 a/b/g to a serial port converter module)
EUT Name: WiEM 9210 a/b/g
Model No.: 50001558-01 Serial No.: 0000x
Product Options: Antenna options: 29000147
Configurations to be tested: 29000147

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:
Modifications made during test:

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

- ☒ EMC Directive 2004/108/EC (EMC) Std:
- ☐ Machinery Directive 89/392/EEC (EMC) Std:
- ☐ Medical Device Directive 93/42/EEC (EMC) Std:
- ☐ Vehicle Directive: ☐ 2001/3/EC (EMC) ☐ 2004/104/EC (EMC) ☐ Other Vehicle Std:
- ☐ FDA Reviewers Guidance for Premarket Notification Submissions (EMC)

- ☒ FCC: Class ☐ A ☒ B Part
- ☐ VCCI: Class ☐ A ☐ B
- ☐ BSMI: Class ☐ A ☐ B (Separate Report)
- ☐ Canada: Class ☐ A ☐ B
- ☐ Australia: Class ☐ A ☐ B
- ☒ Other: RTTE 1999/5/EC

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

- ☐ Attestation of Conformity (AoC)*
- ☐ Certificate of Conformity (CoC)*
- 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.)
- ☒ FCC / TCB Certification
- ☐ E-Mark Certification
- ☐ EMC Certification (used with Octagon Mark)*
- ☐ Compliance Document*
- ☐ Industry Canada / FCB Certification
- ☐ Taiwan Certification

EMC Test Plan and Constructional Data Form

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 SÜD 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: 1.935" Width: 1.855" Height: 0.0653" 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: 3.3V (If battery powered, make sure battery life is sufficient to complete testing.)

# of Phases: 1

Current (Amps/phase(max)): 0.62 Current (Amps/phase(nominal)): 0.4

Other _____

Other Special Requirements

Run radiated and conducted immunity at 10 V/m.

Typical Installation and/or Operating Environment

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

Industrial and small business

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	☐	☒	☐	☒	2	☒	☐	Foil over braid	Connector Shell			1	☒	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
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	☐	☐	☐	☐		☐	☐						☐	☐
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	☐	☐	☐	☐		☐	☐						☐	☐
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	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐

EMC Test Plan and Constructional Data Form

EUT Software.

Revision Level: A

Description: FCC Software - transmits data over wireless interface

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. Immunity - UUT associated to Cisco Access Point. Laptop connected to AP through hub, and sending constant 'ping' to radio.

2. Radiated emissions - UUT running code to transmit continuously over wireless interface.

3. Conducted emissions - UUT running FCC code to transmit continuously over wireless interface. Spectrum analyzer connected to primary antenna port.

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 #*
Access Point	Cisco Aironet 1130AG		
Network Hub	Digi Personal Hub 510H		
Latptop	Micron Transport GX+		
Digi WiEM Development Board	55001095-01 Rev B		

Oscillator Frequencies

Manufacturer	*Frequency*	*Derived Frequency*	*Component # / Location*	*Description of Use*
	20.000 MHz		20000202 / Y1	Baseband processor, RF transceiver
	29.4912 MHz		21000188 / X1	Microprocessor
	2.4 GHz (PLL)			Radio frequency
	5.0 GHz (PLL)			Radio frequency

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 ENTER NAMES BELOW (INSERT ELECTRONIC SIGNATURE IF POSSIBLE)

Authorization (Signature Required if a Third Party Certification is checked on pg 1)

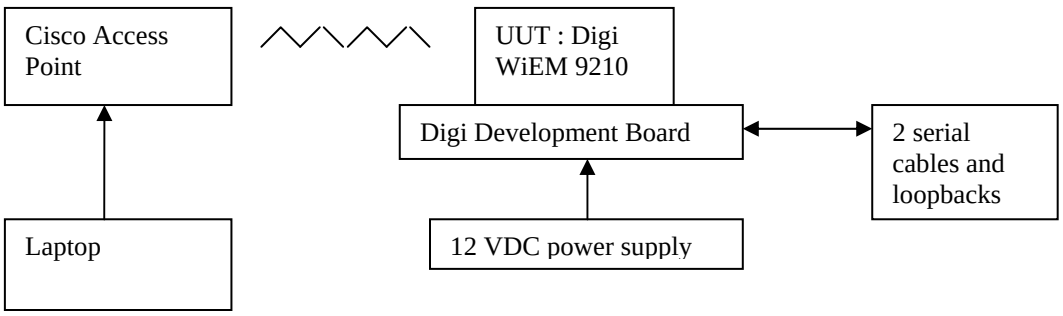
Customer authorization to perform tests according to this test plan. — Date

Test Plan/CDF Prepared By (please print) — Date

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.

NOTE: Cisco Access Point and laptop are only for Immunity test.



Authorization Signatures

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, FCC KDB Publication 558074, the article “The Measurement of Occupied Bandwidth” by Industry Canada’s certification bureau, & FCC Public Notice DA 02-2138.

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

Final measurement levels are determined by connecting the antenna port of the DUT to a spectrum analyzer input via coaxial adapters, high frequency coax, and attenuators as necessary. The loss created by the interconnect apparatus is offset by settings within the analyzer. Specific analyzer settings are determined by the procedures throughout this report.

Radiated Emissions

Radiated emissions from the EUT are measured in the frequency range of 30 to 1000 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 and average detection. The antenna is positioned 3 meters horizontally from the EUT. The antenna height is positioned 1-4 meters above the ground plane. Measurement scans are made with both horizontal and vertical antenna polarizations. Average measurements above 1 GHz are achieved using a peak detector with 1 MHz RBW and 10 Hz VBW with Tx on 100%. Corrected average values calculated by subtracting 20 dB duty cycle relaxation from peak readings based on a 10% worst case duty cycle.

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. 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) (dB/m) (dB)			FINAL (dBuV/m)		POL/HGT/AZ (m) (deg)		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.