

**FCC CLASS II PERMISSIVE CHANGE
TEST REPORT OF 2.4 GHz RADIOLAN
TRANSCIVERS, BRAND NO WIRES NEEDED
IN CONFORMITY WITH
FCC PART 15 AND ANSI C63.4-1992;
-MODEL WB-S1100; WIRELESS BRIDGE SERVER,
-MODEL WB-C1100; WIRELESS BRIDGE CLIENT**

FCC report layout endorsed by the FCC by Public
Notice of March 11, 1992.

Accredited by	:	STERLAB accreditation number L029 D.A.R., TTI-P-G.127/96-00
Competent body	:	Article 10-2 EMC Directive
Notified body	:	Article 10-5 EMC Directive Low Voltage Directive Number 0122 TTE Directive
Designated laboratory	:	TTE Directive
Notified test service	:	Automotive Directive
FCC listed	:	31040/SIT
VCCI listed	:	R 592 and C 507
Certification body	:	Electrical Products Safety Regulation Hong Kong

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NMi International B.V. (27239176)

FCC CLASS II PERMISSIVE CHANGE MEASUREMENT / TECHNICAL REPORT

NoWiresNeeded B.V.

Model Numbers : WB-S1100, WB-C1100

FCC ID: OGD 10310308

March 27, 2001

This report concerns (check one):		☐ Original grant	☐ Class II change
Equipment type: Direct Sequence Spread Spectrum Transceiver			
Deferred grant requested per 47 CFR 0.457(d)(1)(ii)?		☒ yes	☐ no
If yes defer until:		_____	
NoWiresNeeded B.V., Rembrandtlaan 1a, 3723 BG Bilthoven, The Netherlands, agrees to notify the Commission by _____ of the intended date of announcement of the product so that the grant can be issued on that date.			
Transition Rules Request per 15.37		☒ yes	☐ no
If no, assumed Part 15, Subpart B for unintentional radiators – the new 47 CFR (10-1-90 Edition) provision.			
Report prepared by:	Name	: O.H. Hoekstra	
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	Country	: The Netherlands	

The data taken for this test and report herein was done in accordance with FCC Part 15 and measurement Procedures of ANSI C63.4-1992.. NMI Certin B.V. at Niekerk, The Netherlands, certifies that the data is accurate and contains a true representation of the emission-profile of the Equipment Under Test (EUT) on the date of the test noted in the test report. I have reviewed the test report and find it to be an accurate description of the test(s) performed and the EUT so tested.

Date: March 27, 2001

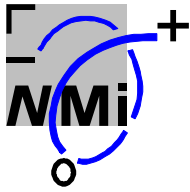
Signature:
P. de Beer



Department EMC and Telecommunication

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1 General

1.1 Permissive change request

This test report is issued in support of the Class II Permissive Change request for NoWiresNeeded models WB-S1100 and WB-C1100 RLAN Transceivers. This report addendum will add three new antennas to the current FCC grant. For this purpose the Radiated emission test were repeated for each antenna configuration to demonstrate continued compliance.

The following antennas are to be added:

Model number	Gain, description
Turbowave QUAD3	3dBi, circular polarization, Quadrifilar Helix Antenna
Turbowave SLH10	10dBi, circular polarization, Patented Stub Loaded Helix Smart Antenna
Turbowave SLH12	12dBi, circular polarization, Stub Loaded Helix Antenna with Reflector

These antennas can only be connected to the Transceiver by means of non-standard antenna connector.

1.2 Tested system Details

The FCC ID's for all equipment, plus descriptions of all cables used in the tested system (included inserted cards, which have Grants) are:

Model	Serial #	FCC ID	Description	Cable Descriptions
EUT: WB-S1100	-	OGD 10310308	2.4 GHz RLAN Wireless Bridge Server	- unshielded connection with adapter
Fujitsu Lifebook 780 Tx laptop PC	S/N R8600528	n.a.	Laptop PC	- unshielded power cord to adapter
Sunpower MA 15-090	n.a.	n.a.	AC Mains Adapter for WB-S1100	- permanently attached unshielded power cord to WB-S1100 - * direct connection to AC Mains
HP Deskjet 500	3228S37407	B94C2106X	Printer	- printer cable to Laptop PC - power cord to adapter
3CCFE574BT,	S/N HHL19C1ACA	-	Ethernet PC card (10/100mbps)	- Cross UTP cable connected to LAN PC Card - Cross UTP connection to EUT with unshielded cable
Microsoft Mouse	n.a.	C3K7PN9937	Mouse	- mouse cable to laptop PC

1.3 Test methodology

The test methodology used has been based on the requirements of FCC Part 15 (10-1-97 Edition), relevant clauses 15.109, 15.203, 15.205, 15.207, 15.209 and 15.247. The used measuring methods are based on the ANSI C63.4-1992 document. Radiated tests above 30 MHz were performed at a distance of 3 meter. Below 30 MHz the measurement was carried out on a distance of 10 meter. The eventual found results will be calculated to values for the required measuring distance of 30/300 meter. Field strength measurements on frequencies above 1 GHz were measured with appropriate pre-amplifiers, antennas and a spectrum analyzer. On found frequencies the actual level at the input of the pre-amplifier was generated with the aid of a signal generator. The output level of the signal generator was increased with the antenna-factor to obtain the field strength.

1.4 Test Facility

The FCC has per Public Notice declared that the measurement facilities located at the NMI Certin B.V. Testsite Niekerk, Smidshornerweg 18, The Netherlands, has been reviewed and found to be in compliance with the requirements of section 2.948 (previously section 15.38) of the FCC rules per August 2, 1994.

The description of the measuring facilities have been filed with reference 31040/SIT, 1300B3 at the FCC's Offices.

1.5 List of measurement equipment.

NMI number	Description	Brand	Type
12471	Biconical antenna 20MHz-200MHz	EATON	94455-1
12473	Log-per antenna 200-1000MHz	EATON	96005
12475	Loop antenna	EMCO	6502/2
12476	Antenna mast	EMCO	TR3
12477	Antenna mast 1-4 mtr	Poelstra	--
12478	Control unit / portable turn table	NMi	DFO
12483	Guidehorn	EMCO	3115
12484	Guidehorn	EMCO	3115
12486	Spectrum analyzer	Anritsu	MS2601A
12488	Guidehorn 18-26.5 GHz	EMCO	RA42-K-F-4B-C
12491	Measuring receiver 0.01Mhz-30MHz	R&S	ESH3
12492	Measuring receiver 20MHz-1300MHz	R&S	ESVP-
12493	EZM Spectrum Monitor	R&S	EZM
12494	Measuring receiver 20MHz-1000 MHz	R&S	ESV-
12497	Spectrum analyzer	HP	8592A
12498	Rejectfilter	K&L	3TNF-100/200-N
12499	Rejectfilter	K&L	3TNF-50/100-N
12500	Rejectfilter	K&L	3TNF-250/500-N
12501	Rejectfilter	K&L	3TNF-25/50-N
12507	Artificial mains network 3-phase	R&S	ESH2-Z5
12516	Signalgenerator 100kHz-1000MHz	R&S	SMX
12519	RF amplifier	ENI	603L
12524	Signalgenerator	R&S	SMHU
12525	POCSAG generator	NMi	SMF-3
12527	Signalgenerator 100kHz-1000 MHz	R&S	SMG
12528	ERMES generator	NMi	--

12533	Signalgenerator	MARCONI	2032
12538	Attenuator 100W/20dB	Bird electronic	8340-200
12545	Directional coupler	HP	HP778D
12546	Measuring cable to plateau	--	RG 213
12548	Meas.cable 2 metre, color:green	Radiall	R287571005
12549	Oscilloscope 20 MHz	KENWOOD	CS-8010
12553	Communication Analyzer	R&S	CMTA 84
12558	Communication Analyzer	R&S	CMTA 54
12559	Digital storage oscilloscope	Le Croy	9310M
12560	DC Power Supply 20A/60V	DELTA	SM6020
12561	DC Power Supply 20A/70V	DELTA	SM7020D
12567	Plotter	HP	7440A
12605	calibrated dipole 28MHz-1GHz	Emco	3121c
12607	Calibrated attenuator set	HP	HP11581a
12608	HF milliwattmeter	HP	HP435a
12609	Power sensor 10MHz-18GHz	HP	HP8481A
12620	Spectrum analyzer	Advantest	R4131B
12635	Measurement platform	WOLFF	--
12636	Plastic measurement room	Polyforce	--
12640	Temperature chamber	Heraeus	VEM03/500
13078	Wideband Pre-Amplifier (1GHz-5GHz)	Miteq	AMF3D0100503010
13313	Impuls limiter	R&S	ESH3Z2.357...
13452	Digital multi meter	HP	34401A
13664	Spectrum analyzer	HP	HP8593E
13886	Open Area Test Site	Comtest	--
14051	Anechoic room	Comtest	--
14277	Antennamast 4m	Heinrich Deisel	HD100
14278	Controller OATS	Heinrich Deisel	MA240
14340	Biconilog antenna 20MHz - 1100MHz	EMCO	3143
14351	Biconilog	EMCO	9143
14450	2.4 GHz bandrejectfilter	BSc	xn-1783
14987	Stripline cell	Marconi	TC5010
15232	Tektronics storage scope	Tektronics	--
15453	Magnetic loop	Chase	--
15633	Biconilog Testantenna	Chase	CBL 6111B
15667	Measuring receiver 9kHz - 2750MHz	R&S	ESCS30
99012	ITU-R recomm. 559-2 noise generator	NMi	--
99040	Attenuator 25W/20dB	Bird electronic	8340-200
99041	Attenuator 25W/10dB	BIRD	8340-100
99042	Attenuator 10W/3dB	Bird electronic	8304-030-N
99043	Attenuator 25W/20dB	Bird electronic	8340-200
99044	Attenuator 10W/3dB	Bird electronic	8304-030-N
99045	DC Power Supply 3A/30V	DELTA	E030/3
99046	Fluke Multimeter	John Fluke	12
99050	Wideband Pre-Amplifier (5GHz-10GHz)	Miteq	AMF3D0501004010
99055	Non-conducting support	NMi	--
99056	Isolating transformer 1:1	NMi	--
99061	Non-conducting support 150cm	NMi	--
99068	Detector N-F/BNC-F	Radiall	R451576000
99069	Cable 5m RG214	NMi	--
99070	Cable 15m RG214	NMi	--
99071	Cable 10m RG214	NMi	--
99076	Bandpassfilter 4-10GHz	Reactel	7AS-7G-6G-511
99077	Regulating trafo	RFT	LTS006
99079	RF Combiner	R&S	DVU 4
99108	Turntable OATS	Heinrich Deisel	HD050
99111	magnetic loop power supply	Chase	--
99112	Tripod	Chase	--
99115	Voltage probe	Schwarzbeck	TK9416

1.6 Bandwidth and antenna factors.

The utilized measuring equipment is stated in § 1.6. The bandwidth of the receiver switches automatically to the right bandwidth in accordance with CISPR 16. This is implemented in the receiver. Also the antenna factors are included in the test receiver. The receiver automatically calculates the appropriate correction factor for the utilized antenna and also the appropriate correction factor for the cable loss. The total correction is automatically added to the measured value.

2 System test configuration

2.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it).

The justification of cables and equipment has been carried out as prescribed in the ANSI C63.4-1992 document.

Unless otherwise stated, the measurements were performed on the lowest-, center- and highest operating frequency (resp. channel 1: 2412 MHz, channel 6: 2437 MHz and channel 11: 2462 MHz) at 1 Mbps and 11 Mbps.

2.2 Operating frequencies and rated output power levels

channel	operating frequencies (MHz)	Rated RF output power (dBm) at antenna connector	test performed
1	2412	<20	yes
2	2417	<20	no
3	2422	<20	no
4	2427	<20	no
5	2432	<20	no
6	2437	<20	yes
7	2442	<20	no
8	2447	<20	no
9	2452	<20	no
10	2457	<20	no
11	2462	<20	yes

Table 2.1: Operating frequencies and rated RF output power levels

To complete the configuration required by the FCC, the transmitter was tested with a laptop PC as network server.

2.3 EUT exercise software

The EUT was enabled to continuously transmit, which was verified by a receiving unit during testing. The carrier was also checked to verify that the information was being transmitted.

3 Transmitter radiated emission data (< 1 GHz)

The following data lists the significant emission frequencies (worst case), measured levels in accordance with FCC 15.109 and 15.209. Photographs of test set ups used are included in an annex attached to this report.

3.1 Test configuration: WB-S1100 connected to Turbo wave SLH10 antenna

Vertical polarization			
Frequency	Measured Value QP (3m)	FCC limit	FCC margin
MHz	dBuV/m	dBuV/m	dB
64.0	38.1	40.0	-1.9
96.0	34.9	43.5	-8.6
128.0	37.2	43.5	-6.3
160.0	42.6	43.5	-0.9
192.0	35.4	43.5	-8.1
224.0	37.7	46.0	-8.3
288.0	37.8	46.0	-8.2
320.0	38.7	46.0	-7.3
540.0	37.8	46.0	-8.2
620.0	42.5	46.0	-3.5
640.0	39.9	46.0	-6.1

Table 3.1.1: Radiated emissions with WB-S1100 connected to Turbo wave SLH10 antenna

Horizontal polarization			
Frequency	Measured Value QP (3m)	FCC limit	FCC margin
MHz	dBuV/m	dBuV/m	dB
64.0	26.9	40.0	-13.1
96.0	23.8	43.5	-19.7
128.0	37.5	43.5	-6.0
160.0	38.3	43.5	-5.2
192.0	36.0	43.5	-7.5
224.0	37.0	46.0	-9.0
288.0	41.4	46.0	-4.6
320.0	42.1	46.0	-3.9
540.0	45.3	46.0	-0.7
620.0	45.1	46.0	-0.9
640.0	43.9	46.0	-2.1

Table 3.1.2: Radiated emissions with WB-S1100 connected to Turbo wave SLH10 antenna

Notes:

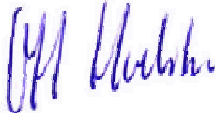
All measured levels in quasi-peak (QP) mode, polarization refers to measuring antenna, negative margin means it is below the limit.

Above measurement results are valid for channels 1, 6 and 11 for both 1.0 Mbps and 11.0 Mbps, as the emission levels are not operating frequency and not bit rate dependent.

The radiated emission measurement has been carried out with AC supply voltage of 120 V.

Test personnel:

Date : March 27, 2001

Tester signature : 

Name : Onno H. Hoekstra

3.2 Test configuration: WB-S1100 connected to Turbo wave SLH12 antenna

Vertical polarization			
Frequency	Measured Value QP (3m)	FCC limit	FCC margin
MHz	dBuV/m	dBuV/m	dB
64.0	36.6	40.0	-3.4
96.0	33.2	43.5	-10.3
128.0	34.1	43.5	-9.4
160.0	40.7	43.5	-2.8
192.0	32.6	43.5	-10.9
224.0	33.7	46.0	-12.3
288.0	35.2	46.0	-10.8
320.0	38.9	46.0	-7.1
540.0	40.0	46.0	-6.0
620.0	42.9	46.0	-3.1
640.0	39.9	46.0	-6.1

Table 3.2.1: Radiated emissions with WB-S1100 connected to Turbo wave SLH12 antenna

Horizontal polarization			
Frequency	Measured Value QP (3m)	FCC limit	FCC margin
MHz	dBuV/m	dBuV/m	dB
64.0	26.5	40.0	-13.5
96.0	33.2	43.5	-10.3
128.0	34.7	43.5	-8.8
160.0	34.7	43.5	-8.8
192.0	35.4	43.5	-8.1
224.0	37.5	46.0	-8.5
288.0	37.2	46.0	-8.8
320.0	42.4	46.0	-3.6
540.0	43.0	46.0	-3.0
620.0	45.8	46.0	-0.2
640.0	45.0	46.0	-1.0

Table 3.2.2: Radiated emissions with WB-S1100 connected to Turbo wave SLH12 antenna

Notes:

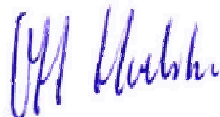
All measured levels in quasi-peak (QP) mode, polarization refers to measuring antenna, negative margin means it is below the limit.

Above measurement results are valid for channels 1, 6 and 11 for both 1.0 Mbps and 11.0 Mbps, as the emission levels are not operating frequency nor bit rate dependent.

The radiated emission measurement has been carried out with AC supply voltage of 120 V.

Test personnel:

Date : March 27, 2001

Tester signature : 

Name : Onno H. Hoekstra

3.3 Test configuration: WB-S1100 connected to Turbo wave QUAD3 antenna

Vertical polarization			
Frequency	Measured Value QP (3m)	FCC limit	FCC margin
MHz	dBuV/m	dBuV/m	dB
64.0	38.0	40.0	-2.0
96.0	35.9	43.5	-7.6
128.0	33.8	43.5	-9.7
160.0	42.9	43.5	-0.6
192.0	36.0	43.5	-7.5
224.0	33.8	46.0	-12.2
288.0	33.9	46.0	-12.1
320.0	36.4	46.0	-9.6
540.0	39.9	46.0	-6.1
620.0	42.7	46.0	-3.3
640.0	38.0	46.0	-8.0

Table 3.3.1: Radiated emissions with WB-S1100 connected to Turbo wave QUAD3 antenna

Horizontal polarization			
Frequency	Measured Value QP (3m)	FCC limit	FCC margin
MHz	dBuV/m	dBuV/m	dB
64.0	32.9	40.0	-7.1
96.0	33.9	43.5	-9.6
128.0	31.0	43.5	-12.5
160.0	40.9	43.5	-2.6
192.0	36.4	43.5	-7.1
224.0	38.0	46.0	-8.0
288.0	39.4	46.0	-6.6
320.0	41.8	46.0	-4.2
540.0	40.4	46.0	-5.6
620.0	45.5	46.0	-0.5
640.0	45.6	46.0	-0.4

Table 3.3.2: Radiated emissions with WB-S1100 connected to Turbo wave QUAD3 antenna

Notes:

All measured levels in quasi-peak (QP) mode, polarization refers to measuring antenna, negative margin means it is below the limit.

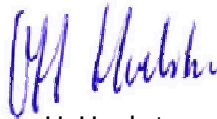
Above measurement results are valid for channels 1, 6 and 11 for both 1.0 Mbps and 11.0 Mbps, as the emission levels are not operating frequency nor bit rate dependent.

The radiated emission measurement has been carried out with AC supply voltage of 120 V.

Test personnel:

Date : March 27, 2001

Tester signature :



Name : Onno H. Hoekstra

4 Transmitter radiated emission data (≥ 1 GHz)

The following data lists the significant emission frequencies (worst case), measured levels in accordance with FCC 15.109 and 15.209. Photographs of test set ups used are included in an annex attached to this report.

4.1 Test configuration: WB-S1100 connected to Turbo wave SLH10 antenna

Vertical polarization			
Frequency	Measured Value Peak(3m)	FCC limit	FCC margin
MHz	dBuV/m	dBuV/m	dB
>1000	<44.0	54.0	<-10.0

Table 4.1.1: Radiated emissions with WB-S1100 on ch 1 connected to Turbo wave SLH10 antenna

Horizontal polarization			
Frequency	Measured Value Peak(3m)	FCC limit	FCC margin
MHz	dBuV/m	dBuV/m	dB
>1000	<44.0	54.0	<-10.0

Table 4.1.2: Radiated emissions with WB-S1100 on ch 1 connected to Turbo wave SLH10 antenna

Vertical polarization			
Frequency	Measured Value Peak(3m)	FCC limit	FCC margin
MHz	dBuV/m	dBuV/m	dB
>1000	<44.0	54.0	<-10.0

Table 4.1.3: Radiated emissions with WB-S1100 on ch 6 connected to Turbo wave SLH10 antenna

Horizontal polarization			
Frequency	Measured Value Peak(3m)	FCC limit	FCC margin
MHz	dBuV/m	dBuV/m	dB
>1000	<44.0	54.0	<-10.0

Table 4.1.4: Radiated emissions with WB-S1100 on ch 6 connected to Turbo wave SLH10 antenna

Vertical polarization			
Frequency	Measured Value Peak(3m)	FCC limit	FCC margin
MHz	dBuV/m	dBuV/m	dB
>1000	<44.0	54.0	<-10.0

Table 4.1.5: Radiated emissions with WB-S1100 on ch 11 connected to Turbo wave SLH10 antenna

Horizontal polarization			
Frequency	Measured Value Peak(3m)	FCC limit	FCC margin
MHz	dBuV/m	dBuV/m	dB
>1000	<44.0	54.0	<-10.0

Table 4.1.6: Radiated emissions with WB-S1100 on ch 11 connected to Turbo wave SLH10 antenna

Notes:

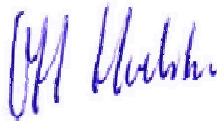
Emission values above 1 GHz are measured with the Peak detector. All radiated harmonic emissions were found to be more than 10dB below the limits. Polarization refers to measuring antenna, negative margin means it is below the limit. The radiated emission measurement has been carried out with AC supply voltage of 120 V.

Above measurement results are valid for both 1.0 Mbps and 11.0 Mbps, as the emission levels are not bit rate dependent.

Test personnel:

Date : March 27, 2001

Tester signature :



Name : Onno H. Hoekstra

4.2 Test configuration: WB-S1100 connected to Turbo wave SLH12 antenna

Vertical polarization			
Frequency	Measured Value Peak(3m)	FCC limit	FCC margin
MHz	dBuV/m	dBuV/m	dB
>1000	<44.0	54.0	<-10.0

Table 4.2.1: Radiated emissions with WB-S1100 on ch 1 connected to Turbo wave SLH12 antenna

Horizontal polarization			
Frequency	Measured Value Peak(3m)	FCC limit	FCC margin
MHz	dBuV/m	dBuV/m	dB
>1000	<44.0	54.0	<-10.0

Table 4.2.2: Radiated emissions with WB-S1100 on ch 1 connected to Turbo wave SLH12 antenna

Vertical polarization			
Frequency	Measured Value Peak(3m)	FCC limit	FCC margin
MHz	dBuV/m	dBuV/m	dB
>1000	<44.0	54.0	<-10.0

Table 4.2.3: Radiated emissions with WB-S1100 on ch 6 connected to Turbo wave SLH12 antenna

Horizontal polarization			
Frequency	Measured Value Peak(3m)	FCC limit	FCC margin
MHz	dBuV/m	dBuV/m	dB
>1000	<44.0	54.0	<-10.0

Table 4.2.4: Radiated emissions with WB-S1100 on ch 6 connected to Turbo wave SLH12 antenna

Vertical polarization			
Frequency	Measured Value Peak(3m)	FCC limit	FCC margin
MHz	dBuV/m	dBuV/m	dB
>1000	<44.0	54.0	<-10.0

Table 4.2.5: Radiated emissions with WB-S1100 on ch 11 connected to Turbo wave SLH12 antenna

Horizontal polarization			
Frequency	Measured Value Peak(3m)	FCC limit	FCC margin
MHz	dBuV/m	dBuV/m	dB
>1000	<44.0	54.0	<-10.0

Table 4.2.6: Radiated emissions with WB-S1100 on ch 11 connected to Turbo wave SLH12 antenna

Notes:

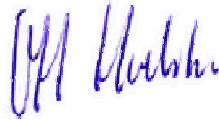
Emission values above 1 GHz are measured with the Peak detector. All radiated harmonic emissions were found to be more than 10dB below the limits. Polarization refers to measuring antenna, negative margin means it is below the limit. The radiated emission measurement has been carried out with AC supply voltage of 120 V.

Above measurement results are valid for both 1.0 Mbps and 11.0 Mbps, as the emission levels are not bit rate dependent.

Test personnel:

Date : March 27, 2001

Tester signature :



Name : Onno H. Hoekstra

4.3 Test configuration: WB-S1100 connected to Turbo wave QUAD3 antenna

Vertical polarization			
Frequency	Measured Value Peak(3m)	FCC limit	FCC margin
MHz	dBuV/m	dBuV/m	dB
>1000	<44.0	54.0	<-10.0

Table 4.3.1: Radiated emissions with WB-S1100 on ch 1 connected to Turbo wave QUAD3 antenna

Horizontal polarization			
Frequency	Measured Value Peak(3m)	FCC limit	FCC margin
MHz	dBuV/m	dBuV/m	dB
>1000	<44.0	54.0	<-10.0

Table 4.3.2: Radiated emissions with WB-S1100 on ch 1 connected to Turbo wave QUAD3 antenna

Vertical polarization			
Frequency	Measured Value Peak(3m)	FCC limit	FCC margin
MHz	dBuV/m	dBuV/m	dB
>1000	<44.0	54.0	<-10.0

Table 4.3.3: Radiated emissions with WB-S1100 on ch 6 connected to Turbo wave QUAD3 antenna

Horizontal polarization			
Frequency	Measured Value Peak(3m)	FCC limit	FCC margin
MHz	dBuV/m	dBuV/m	dB
>1000	<44.0	54.0	<-10.0

Table 4.3.4: Radiated emissions with WB-S1100 on ch 6 connected to Turbo wave QUAD3 antenna

Vertical polarization			
Frequency	Measured Value Peak(3m)	FCC limit	FCC margin
MHz	dBuV/m	dBuV/m	dB
>1000	<44.0	54.0	<-10.0

Table 4.3.5: Radiated emissions with WB-S1100 on ch 11 connected to Turbo wave QUAD3 antenna

Horizontal polarization			
Frequency	Measured Value Peak(3m)	FCC limit	FCC margin
MHz	dBuV/m	dBuV/m	dB
>1000	<44.0	54.0	<-10.0

Table 4.3.6: Radiated emissions with WB-S1100 on ch 11 connected to Turbo wave QUAD3 antenna

Notes:

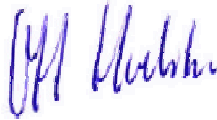
Emission values above 1 GHz are measured with the Peak detector. All radiated harmonic emissions were found to be more than 10dB below the limits. Polarization refers to measuring antenna, negative margin means it is below the limit. The radiated emission measurement has been carried out with AC supply voltage of 120 V.

Above measurement results are valid for both 1.0 Mbps and 11.0 Mbps, as the emission levels are not bit rate dependent.

Test personnel:

Date : March 27, 2001

Tester signature :

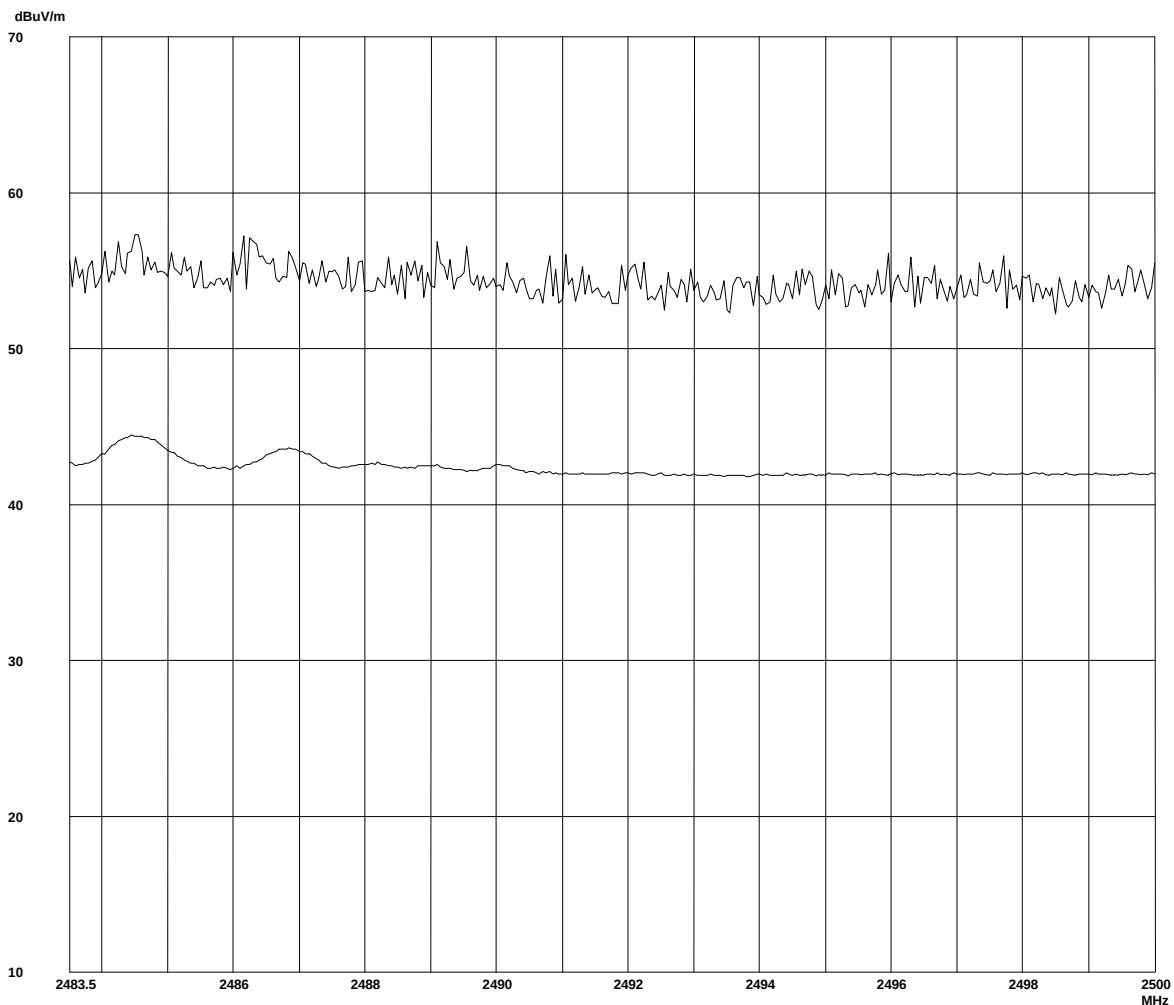


Name : Onno H. Hoekstra

5 Restricted bands of operation

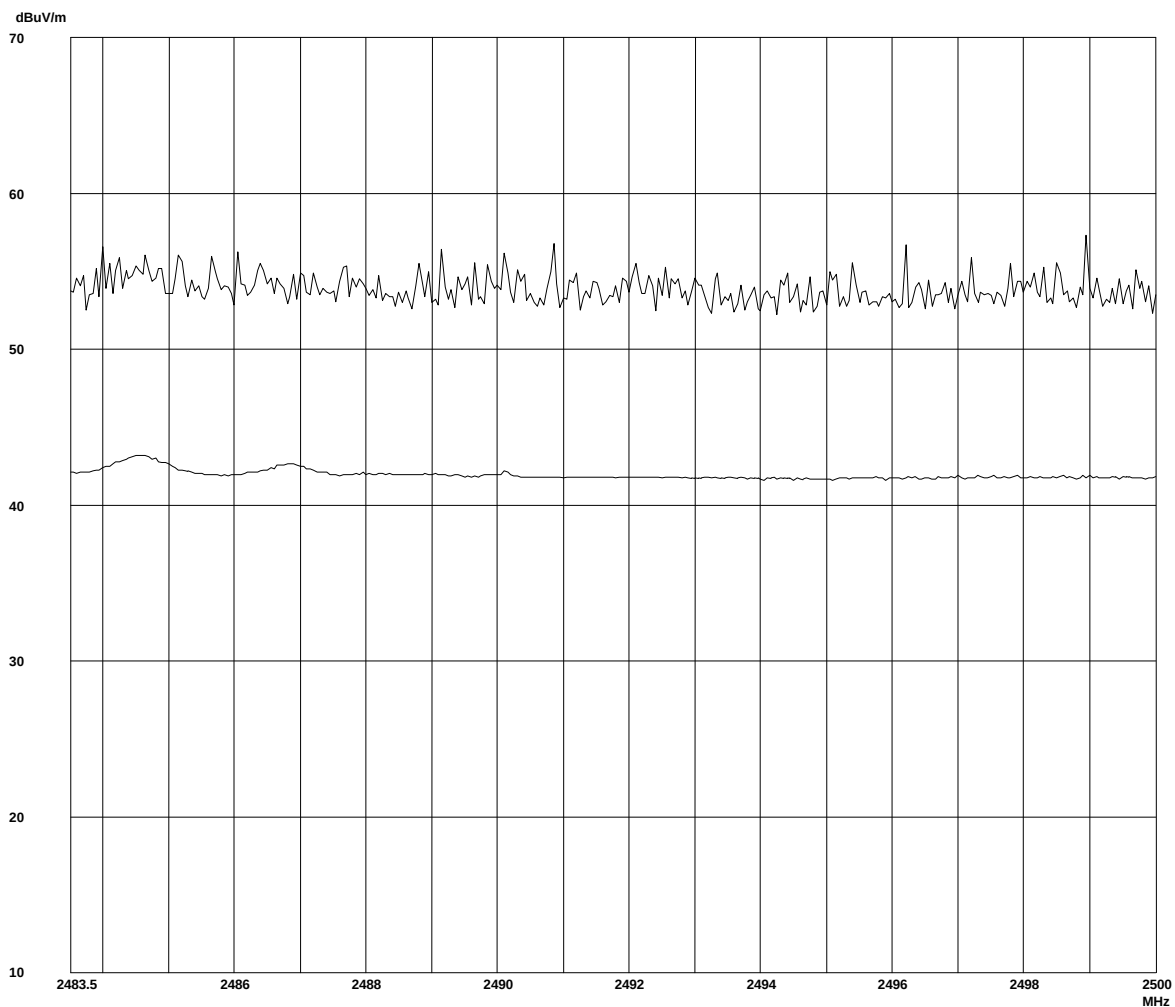
The following plots show the maximum emissions at the band edges. The measurement was performed in accordance with FCC 15.247 (a)

5.1 Test configuration: WB-S1100 connected to Turbo wave SLH10 antenna



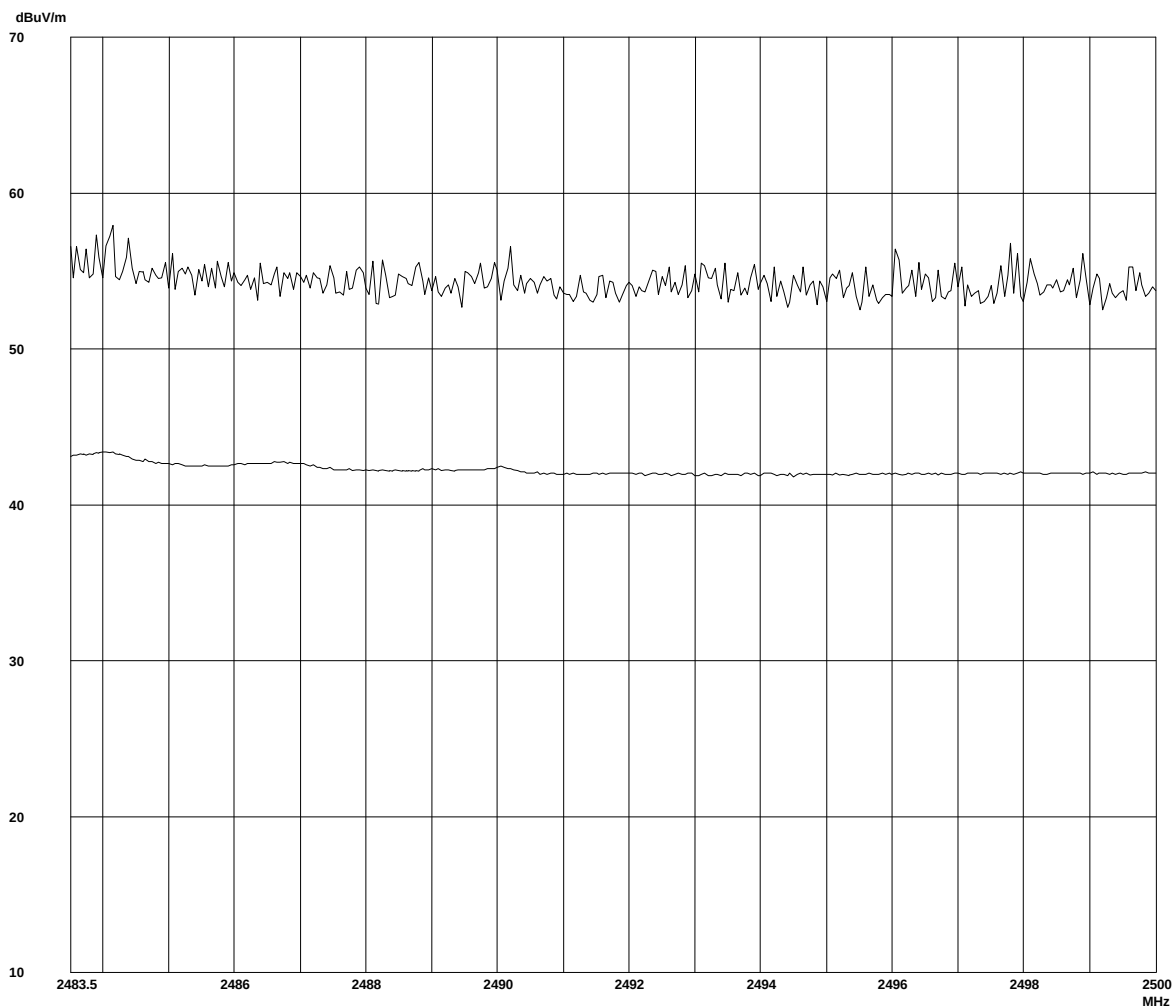
Plot 5.1.1: Vertical polarization Emissions at 2483.5MHz to 2500MHz at 1 Mbps

Note: Upper trace are Peak values, lower trace are Average values.



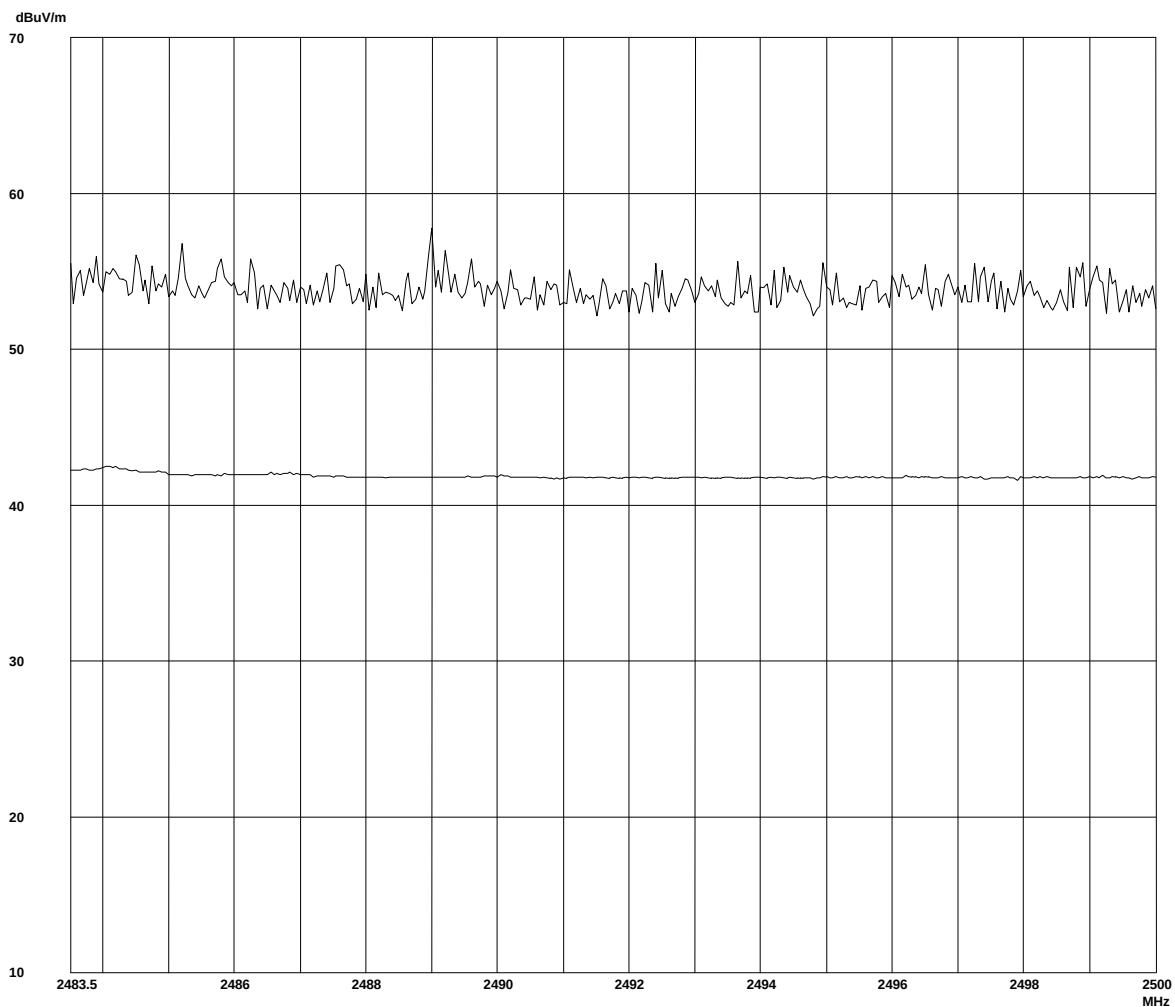
Plot 5.1.2: Horizontal polarization Emissions at 2483.5MHz to 2500MHz at 1 Mbps

Note: Upper trace are Peak values, lower trace are Average values.



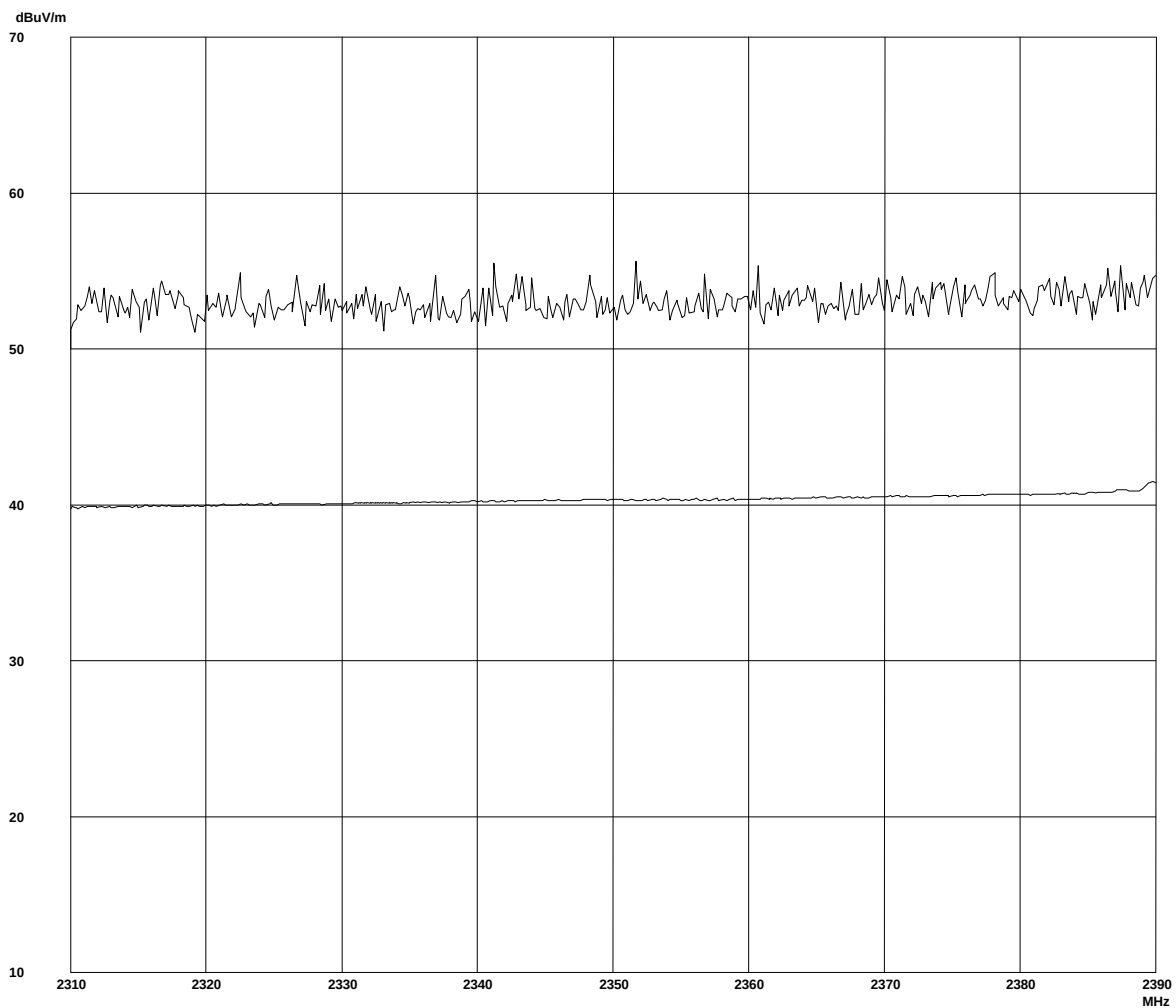
Plot 5.1.3: Vertical polarization Emissions at 2483.5MHz to 2500MHz at 11 Mbps

Note: Upper trace are Peak values, lower trace are Average values.



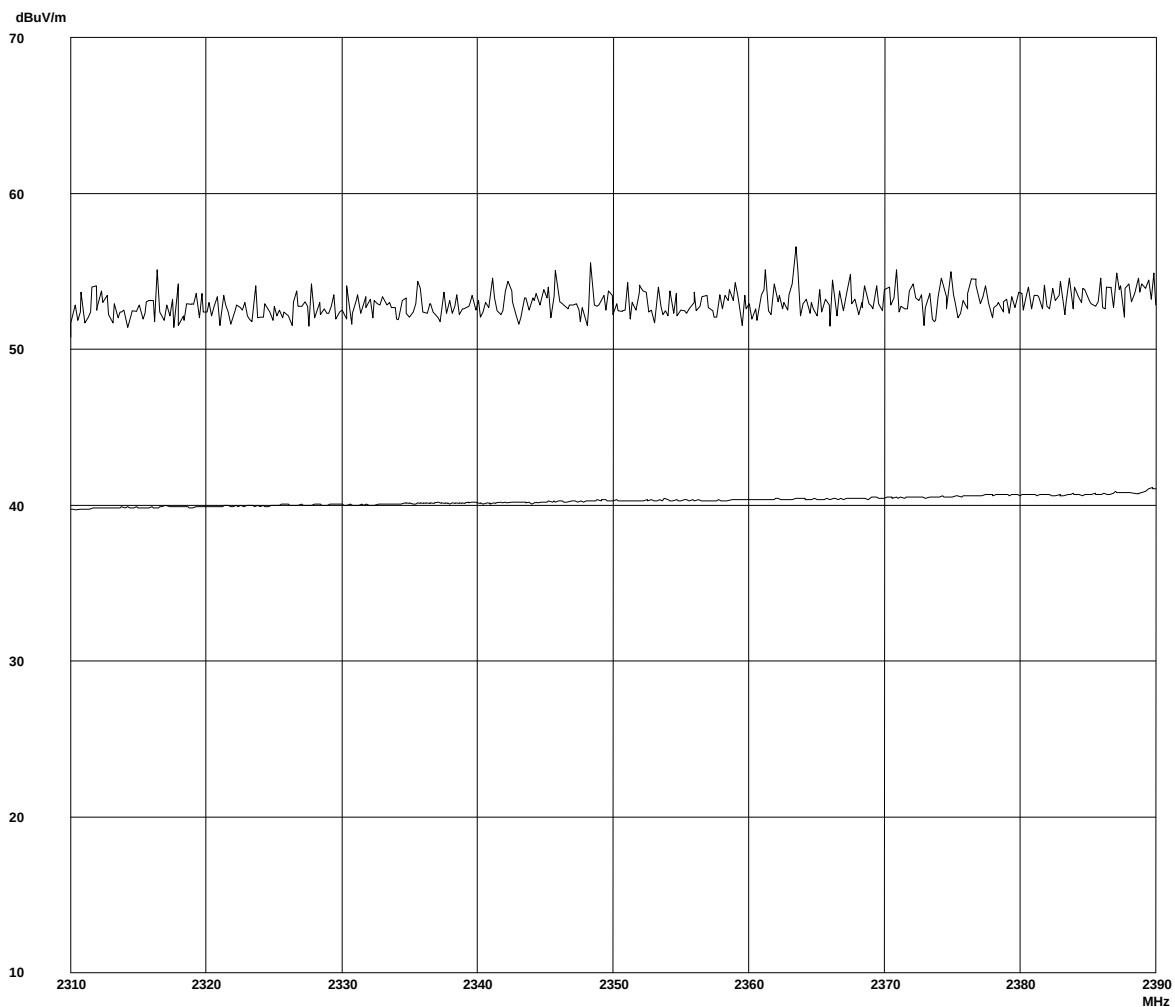
Plot 5.1.4: Horizontal polarization Emissions at 2483.5MHz to 2500MHz at 11 Mbps

Note: Upper trace are Peak values, lower trace are Average values.



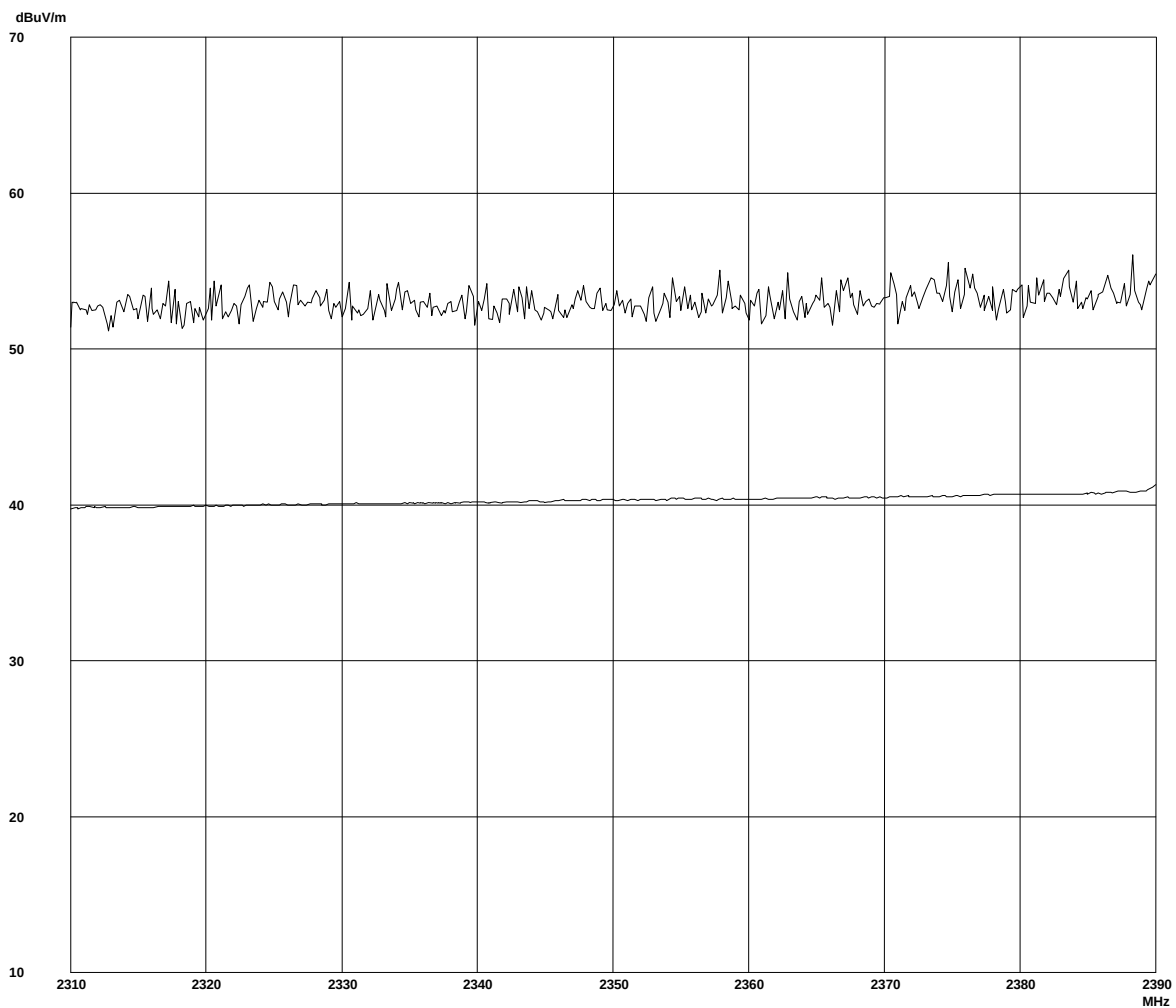
Plot 5.1.5: Vertical polarization Emissions at 2310MHz to 2390MHz at 1Mbps

Note: Upper trace are Peak values, lower trace are Average values.



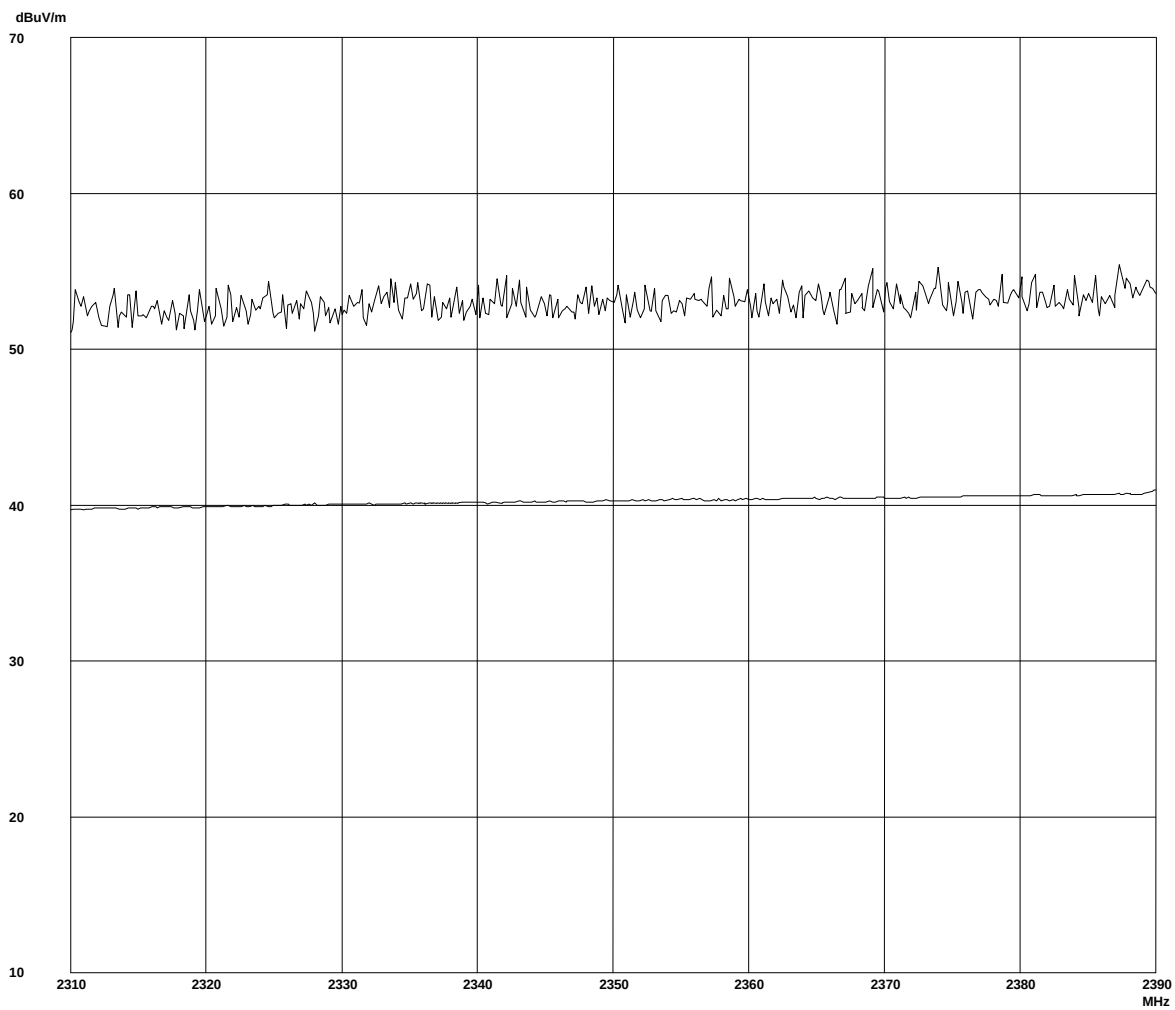
Plot 5.1.6: Horizontal polarization Emissions at 2310MHz to 2390MHz at 1Mbps

Note: Upper trace are Peak values, lower trace are Average values.



Plot 5.1.7: Vertical polarization Emissions at 2310MHz to 2390MHz at 11 Mbps

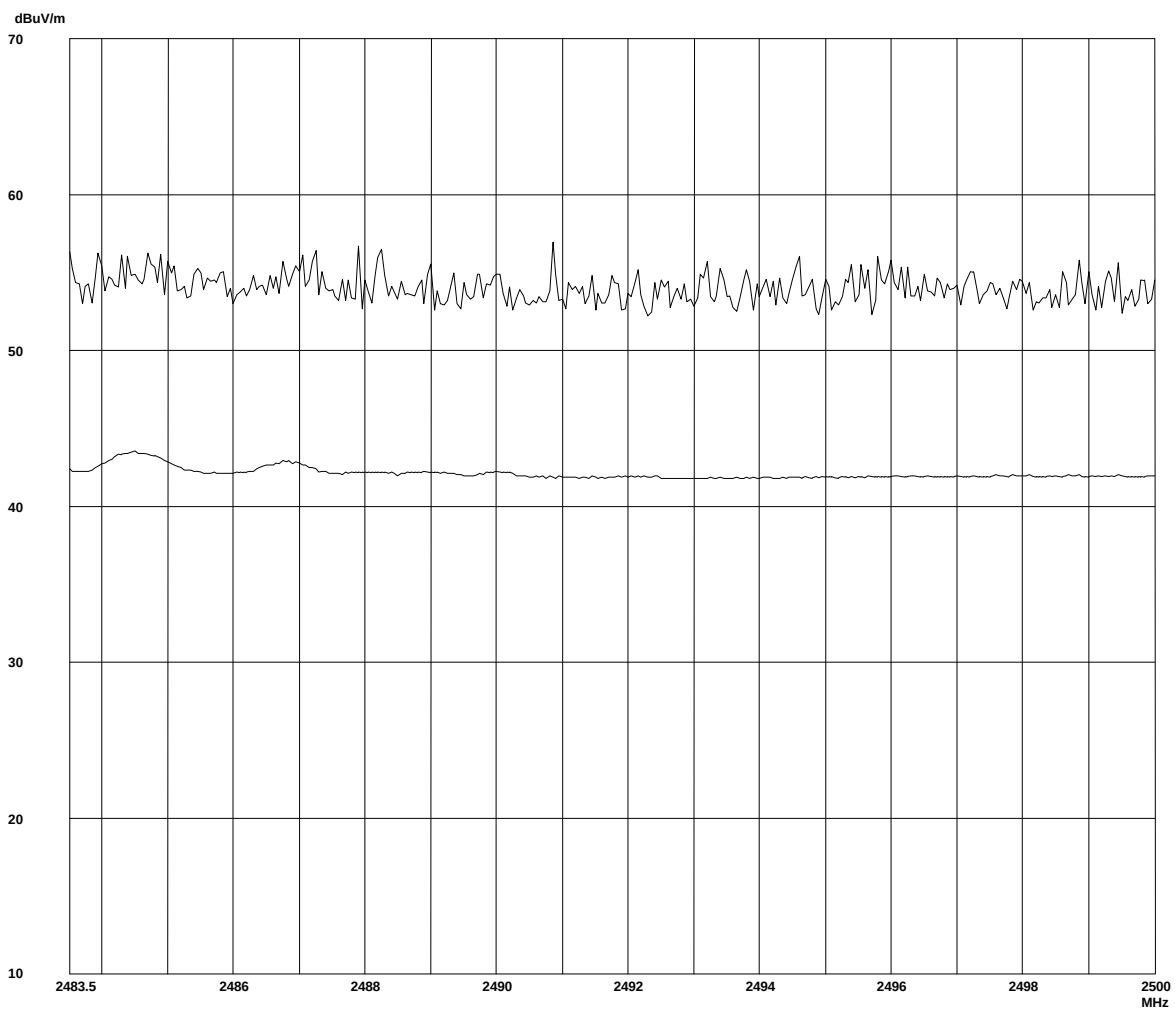
Note: Upper trace are Peak values, lower trace are Average values.



Plot 5.1.8: Horizontal polarization Emissions at 2310MHz to 2390MHz at 11 Mbps

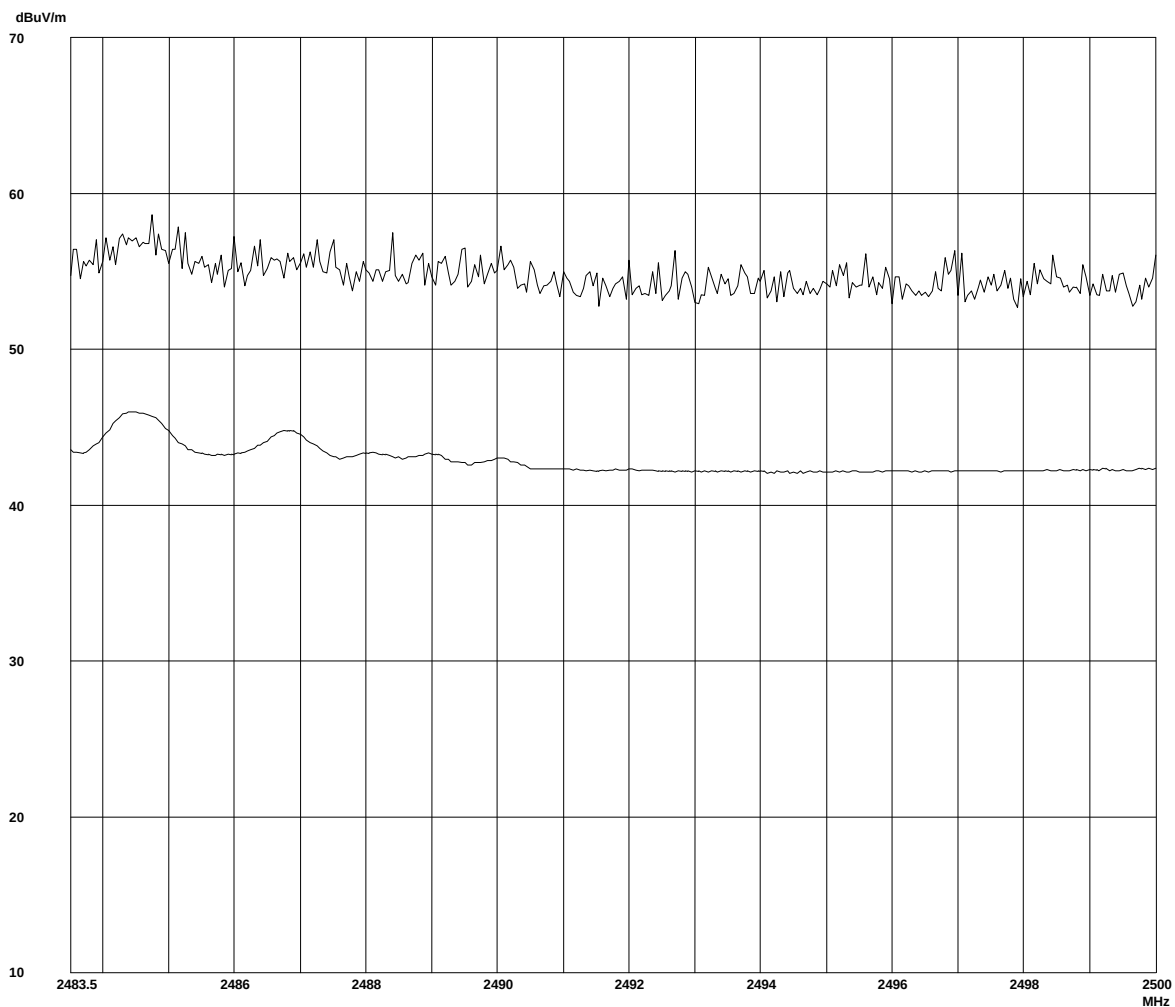
Note: Upper trace are Peak values, lower trace are Average values.

5.2 Test configuration: WB-S1100 connected to Turbo wave SLH12 antenna



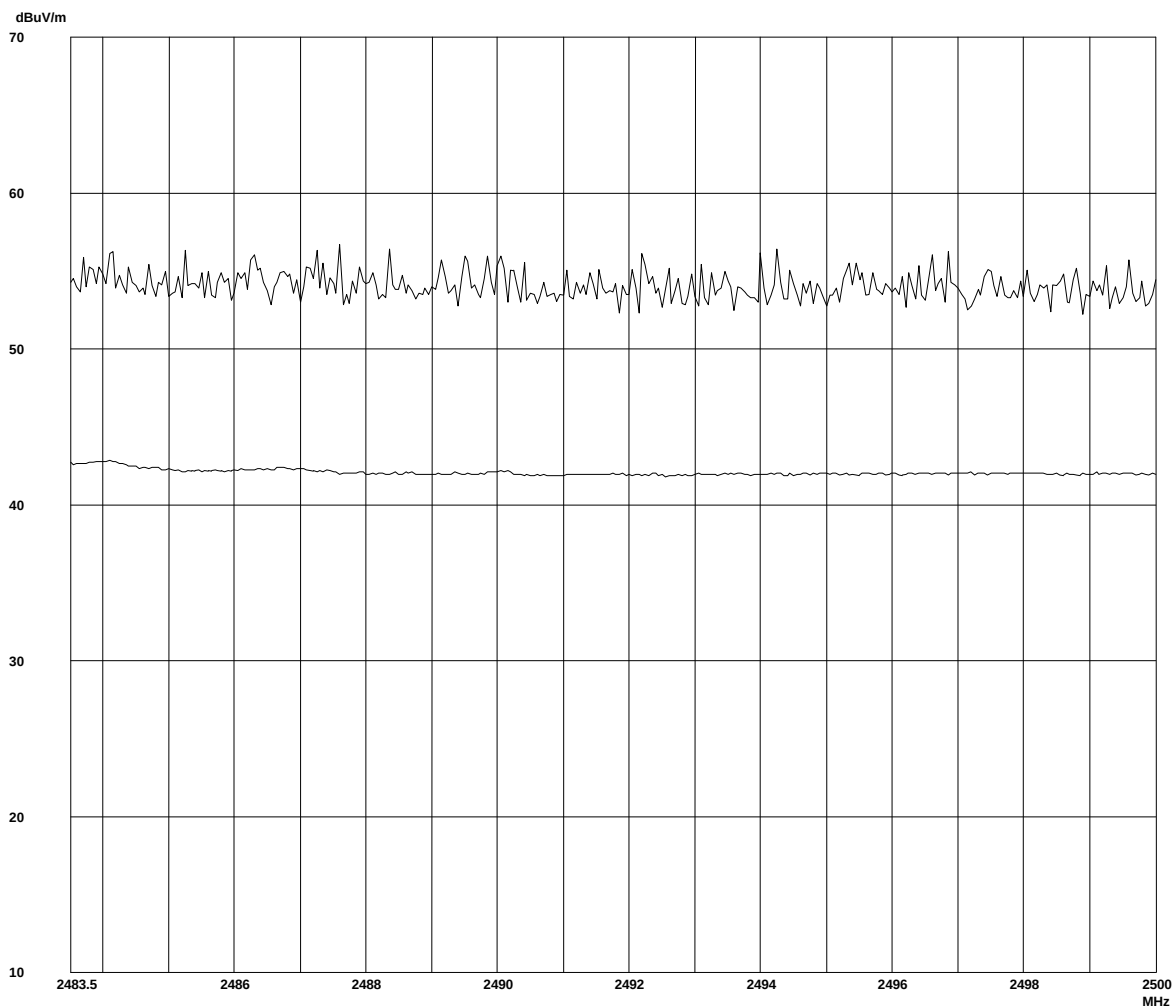
Plot 5.2.1: Vertical polarization Emissions at 2483.5MHz to 2500MHz at 1 Mbps

Note: Upper trace are Peak values, lower trace are Average values.



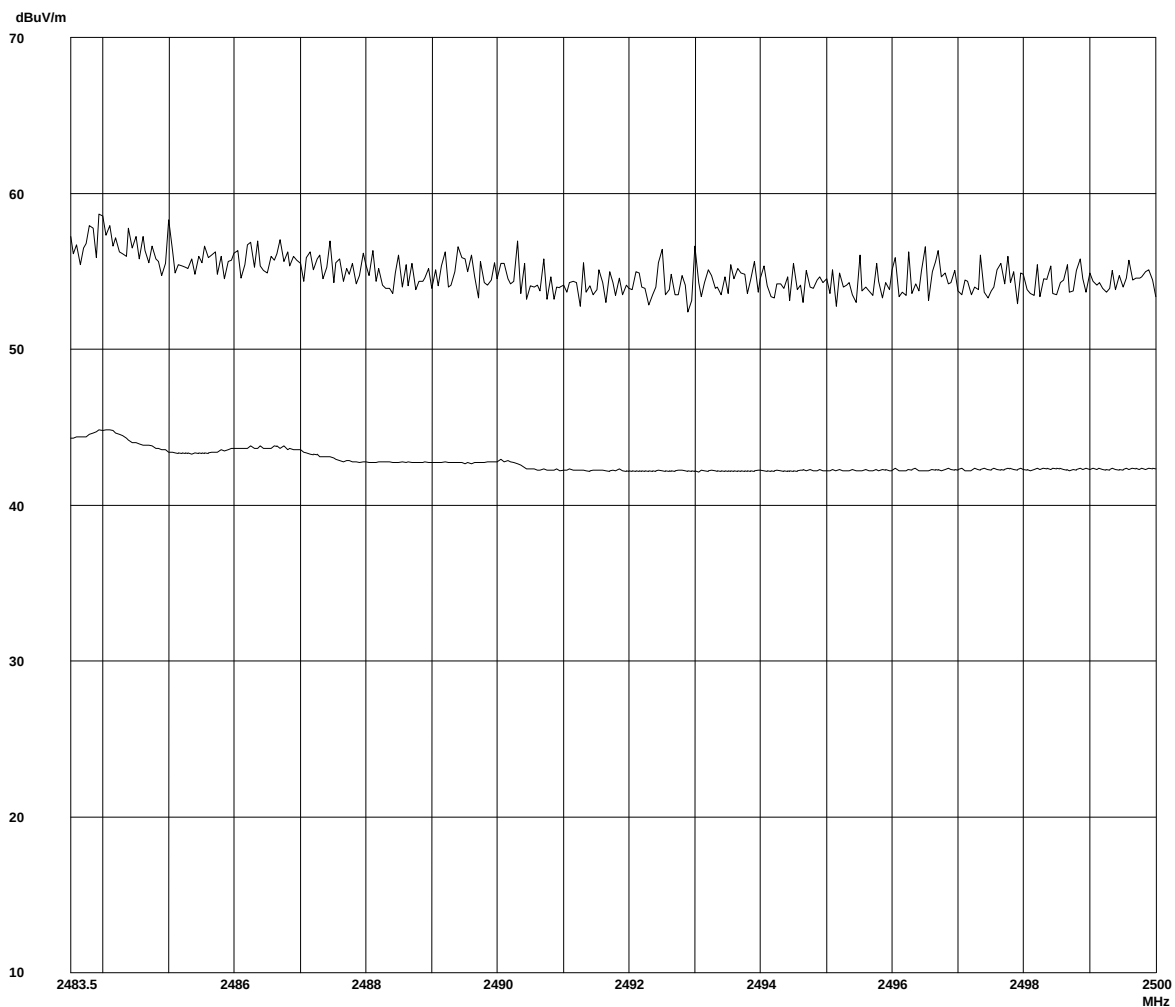
Plot 5.2.2: Horizontal polarization Emissions at 2483.5MHz to 2500MHz at 1 Mbps

Note: Upper trace are Peak values, lower trace are Average values.



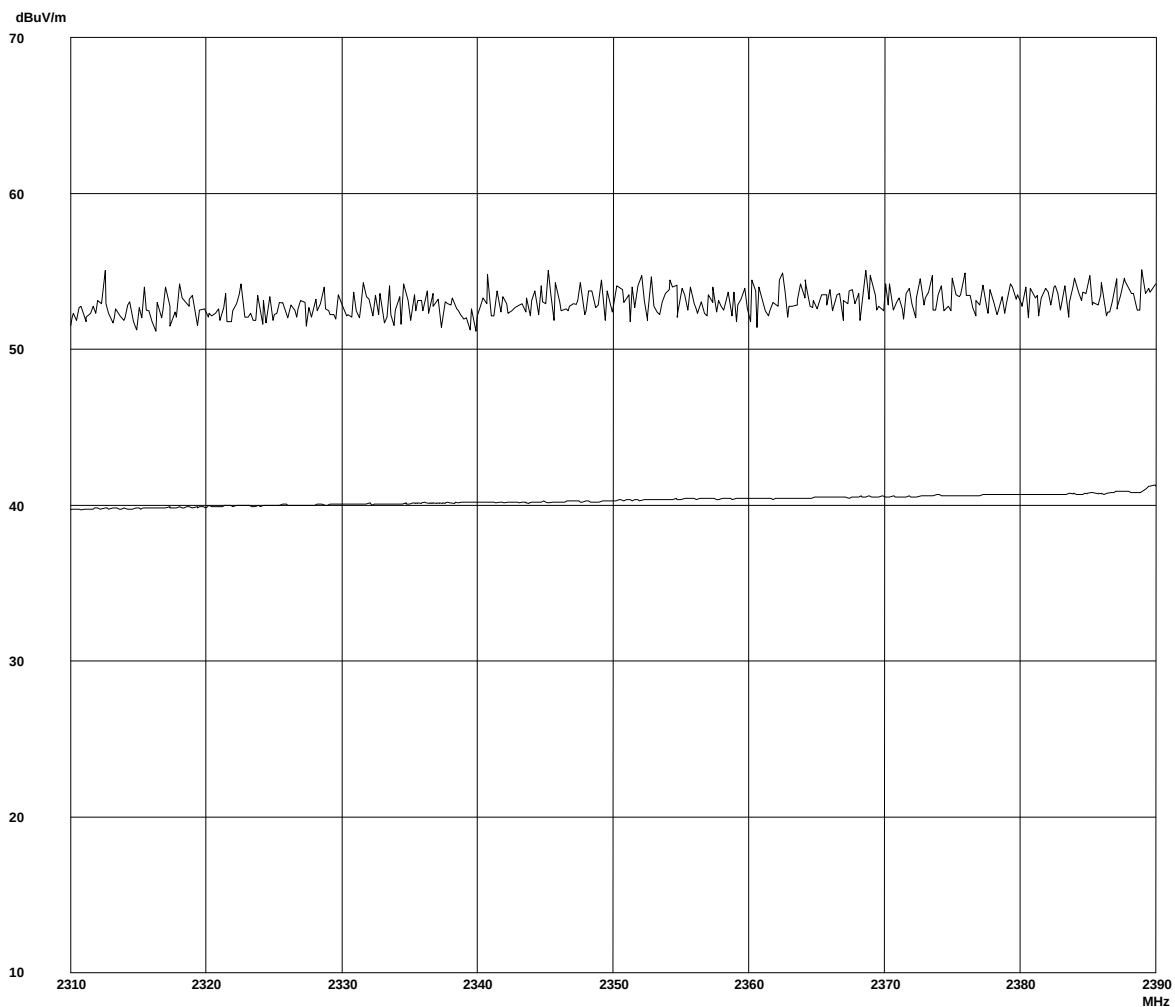
Plot 5.2.3: Vertical polarization Emissions at 2483.5MHz to 2500MHz at 11 Mbps

Note: Upper trace are Peak values, lower trace are Average values.



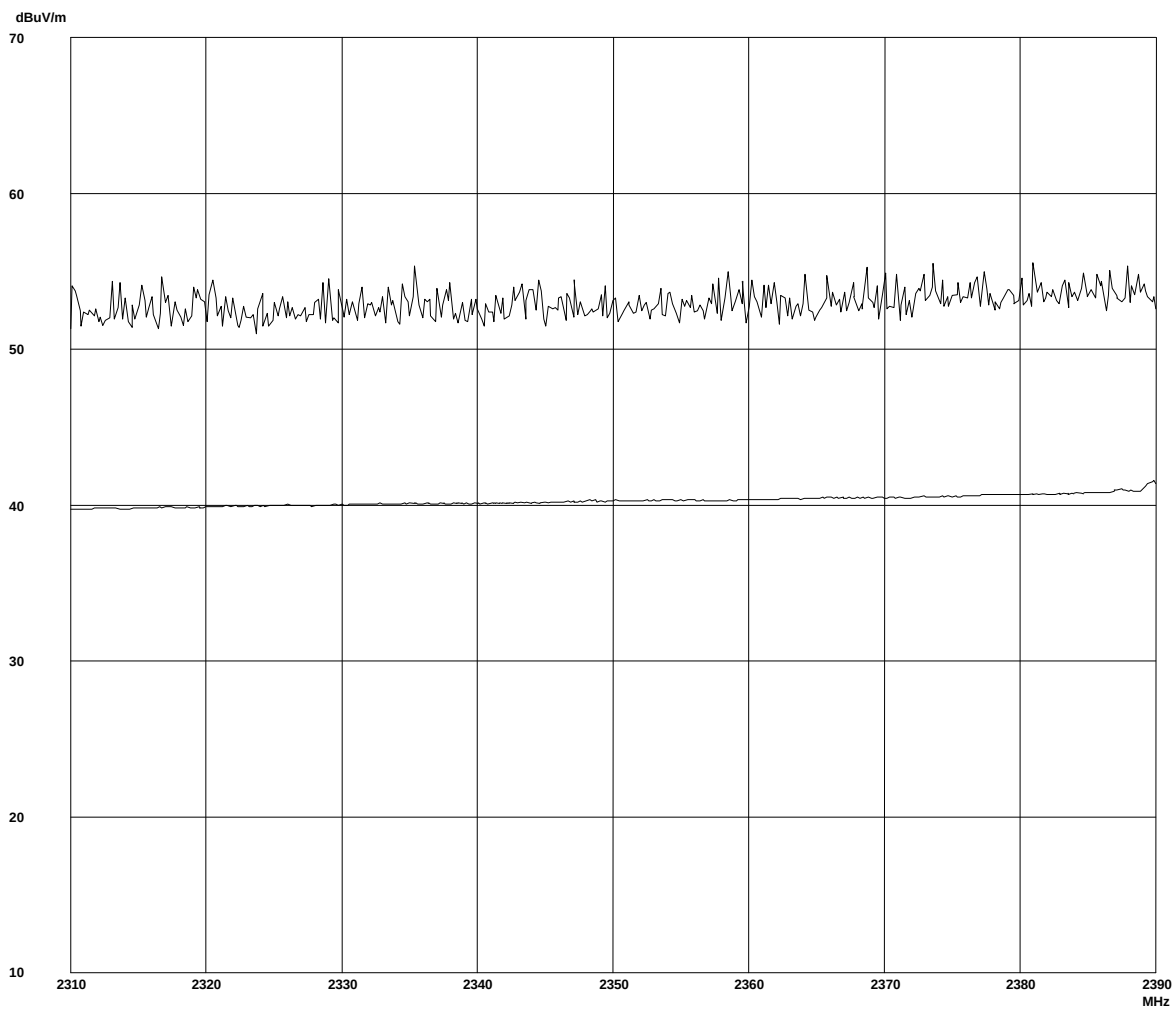
Plot 5.2.4: Horizontal polarization Emissions at 2483.5MHz to 2500MHz at 11 Mbps

Note: Upper trace are Peak values, lower trace are Average values.



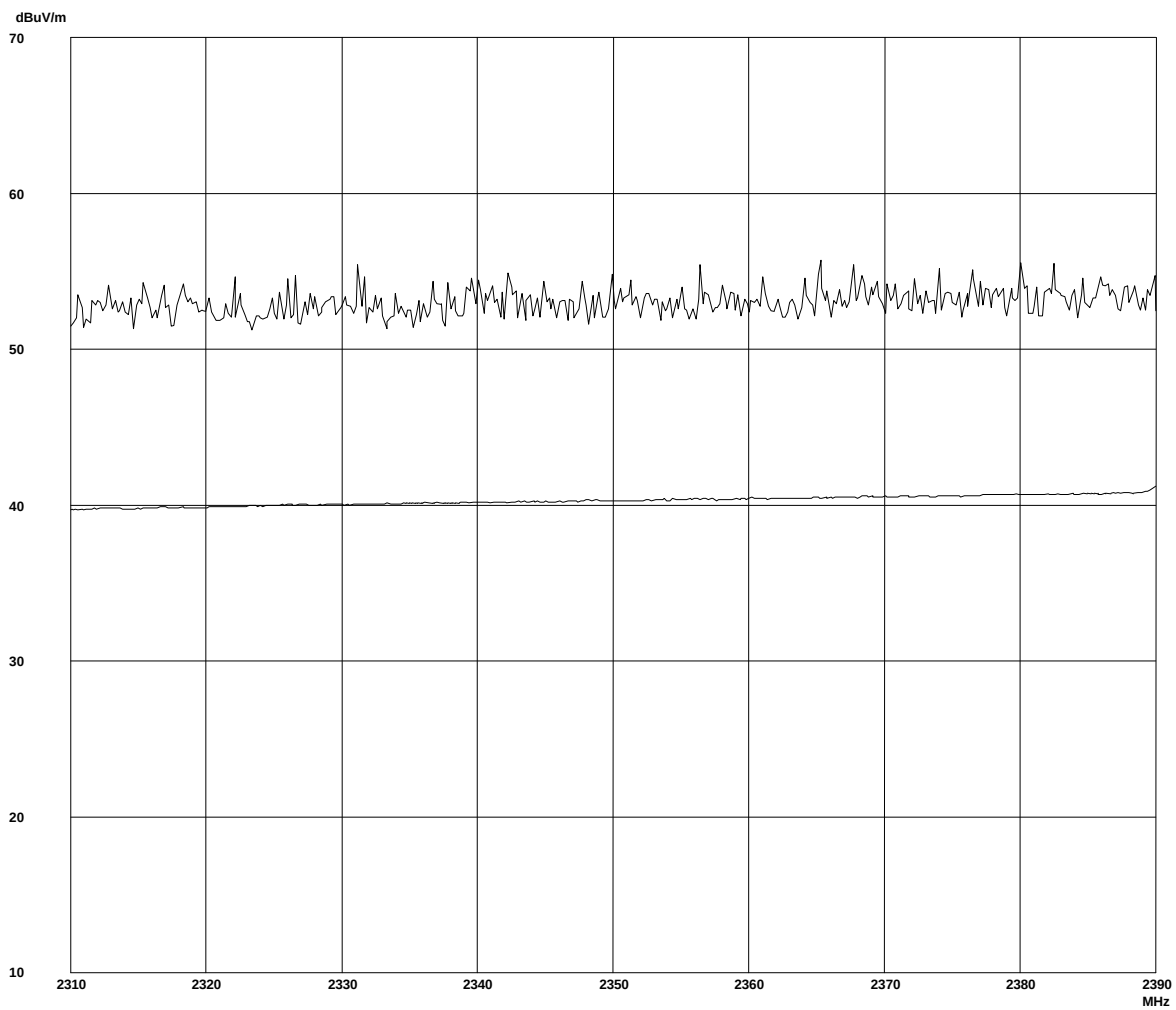
Plot 5.2.5: Vertical polarization Emissions at 2310MHz to 2390MHz at 1Mbps

Note: Upper trace are Peak values, lower trace are Average values.



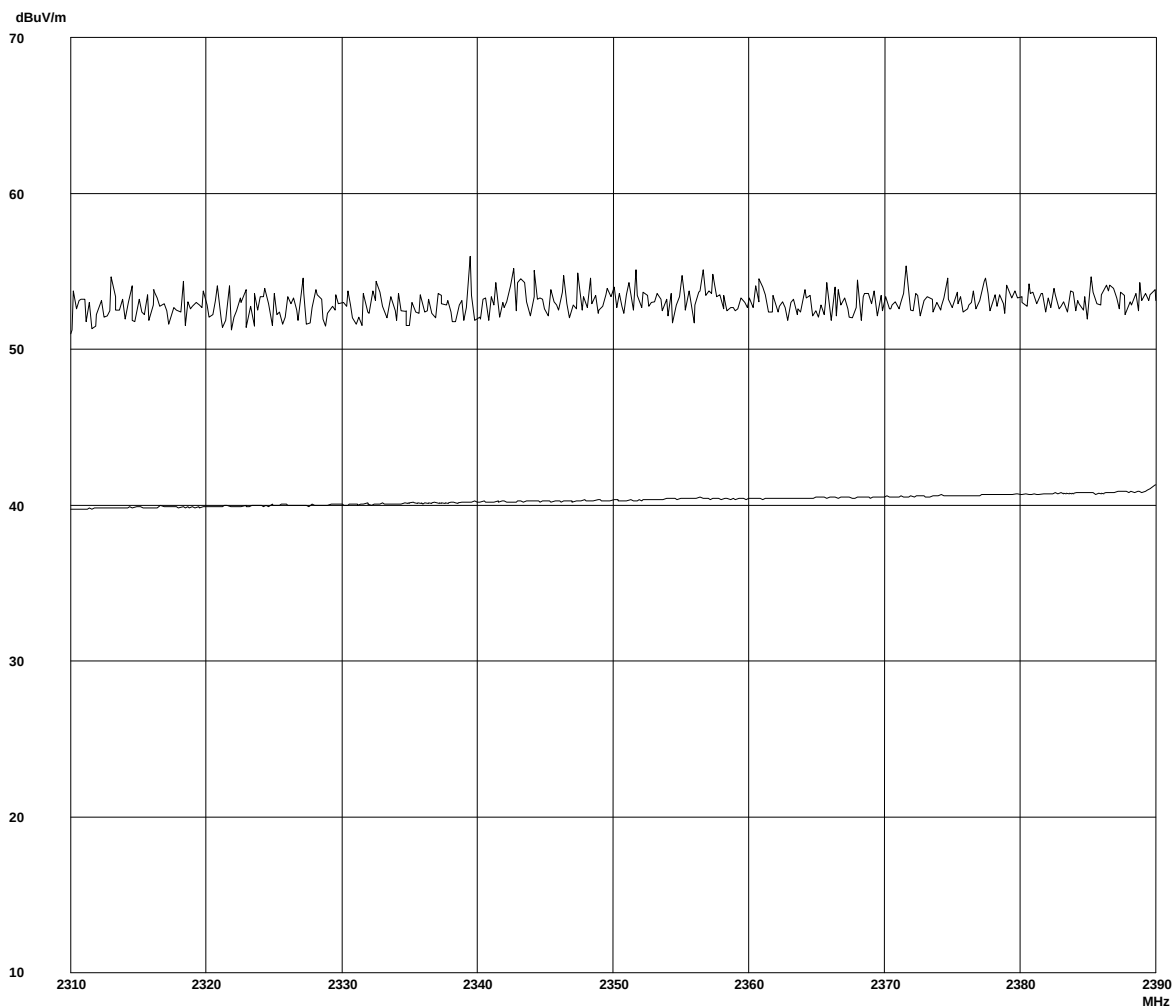
Note: Upper trace are Peak values, lower trace are Average values.

Plot 5.2.6: Horizontal polarization Emissions at 2310MHz to 2390MHz at 1Mbps



Note: Upper trace are Peak values, lower trace are Average values.

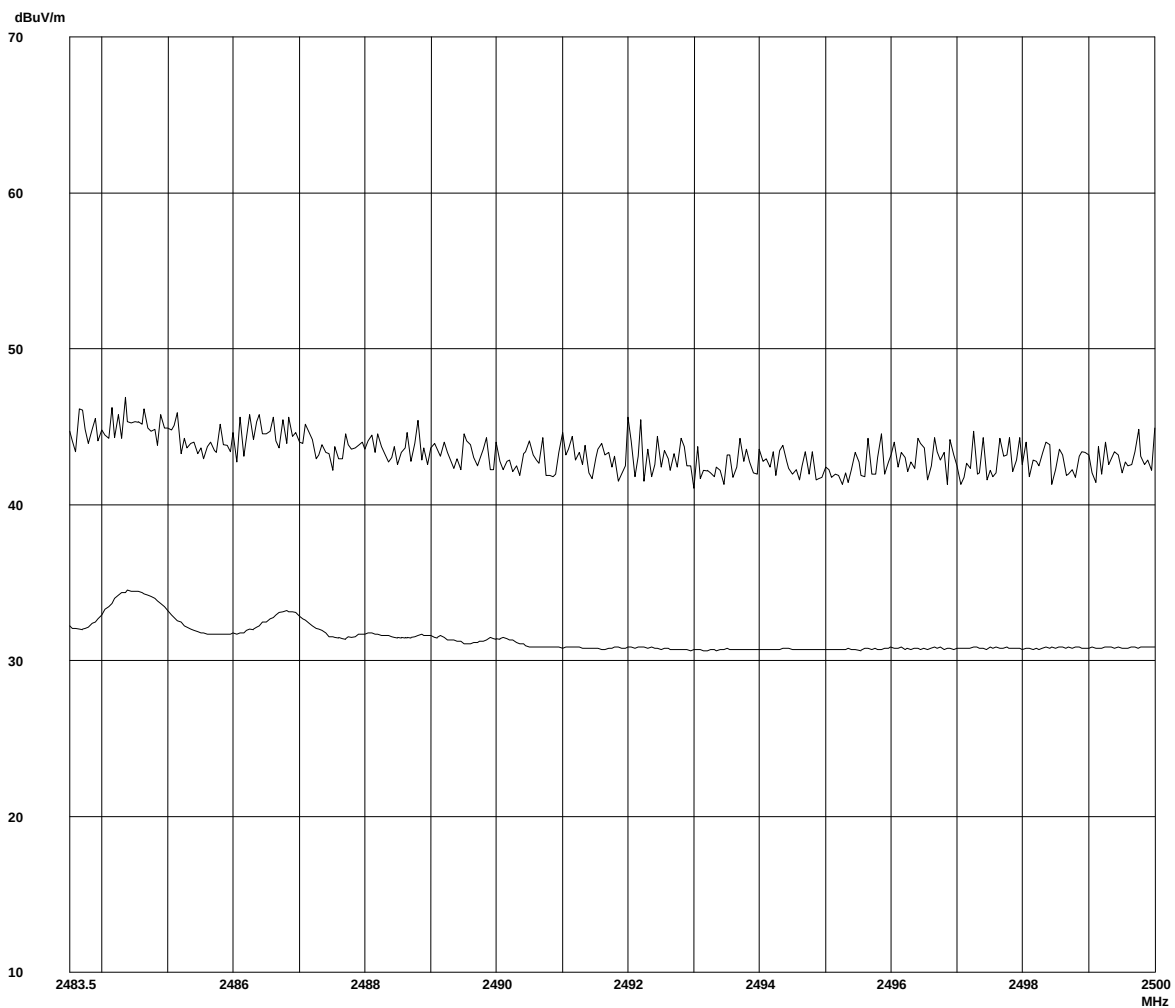
Plot 5.2.7: Vertical polarization Emissions at 2310MHz to 2390MHz at 11 Mbps



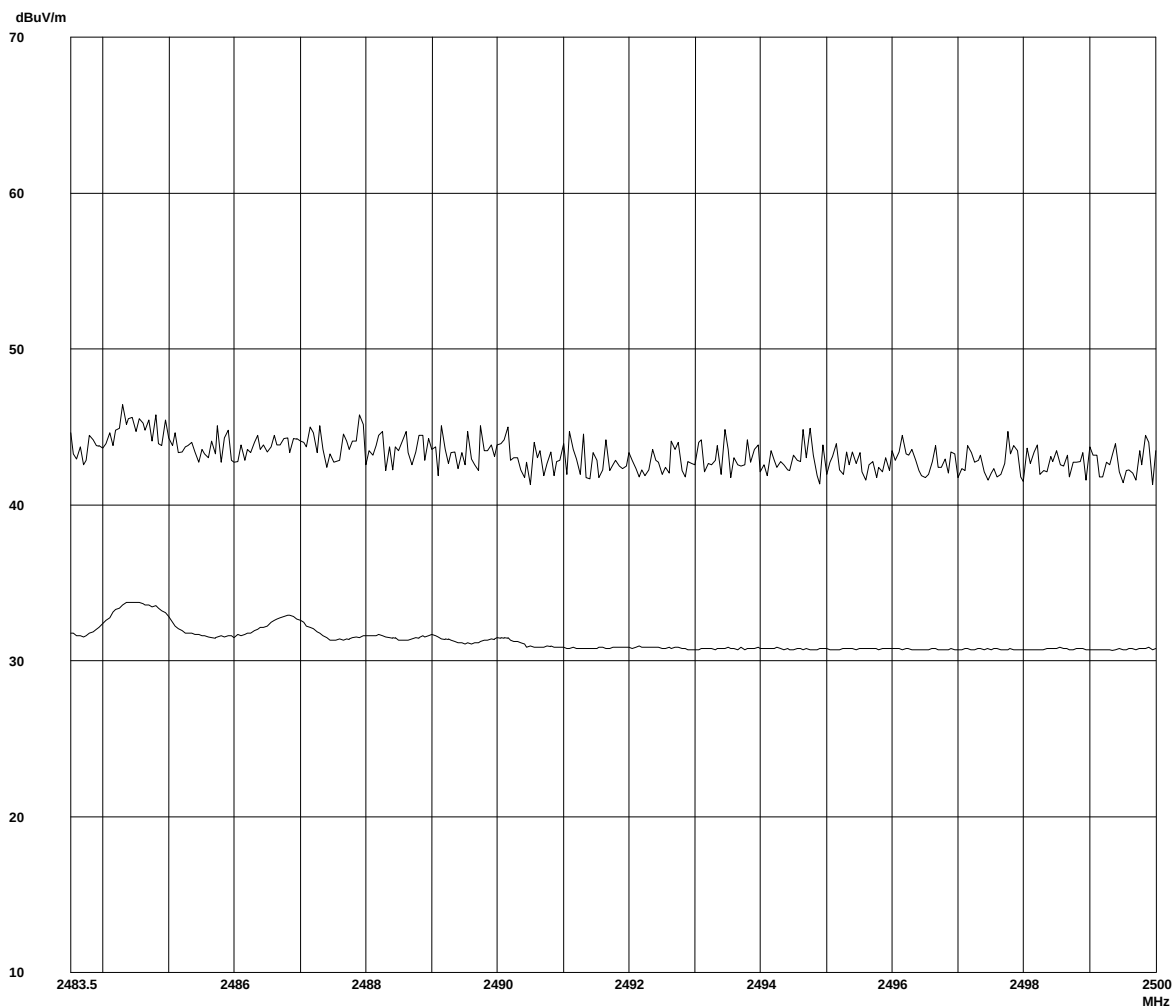
Plot 5.2.8: Horizontal polarization Emissions at 2310MHz to 2390MHz at 11 Mbps

Note: Upper trace are Peak values, lower trace are Average values.

5.3 Test configuration: WB-S1100 connected to Turbo wave QUAD3 antenna

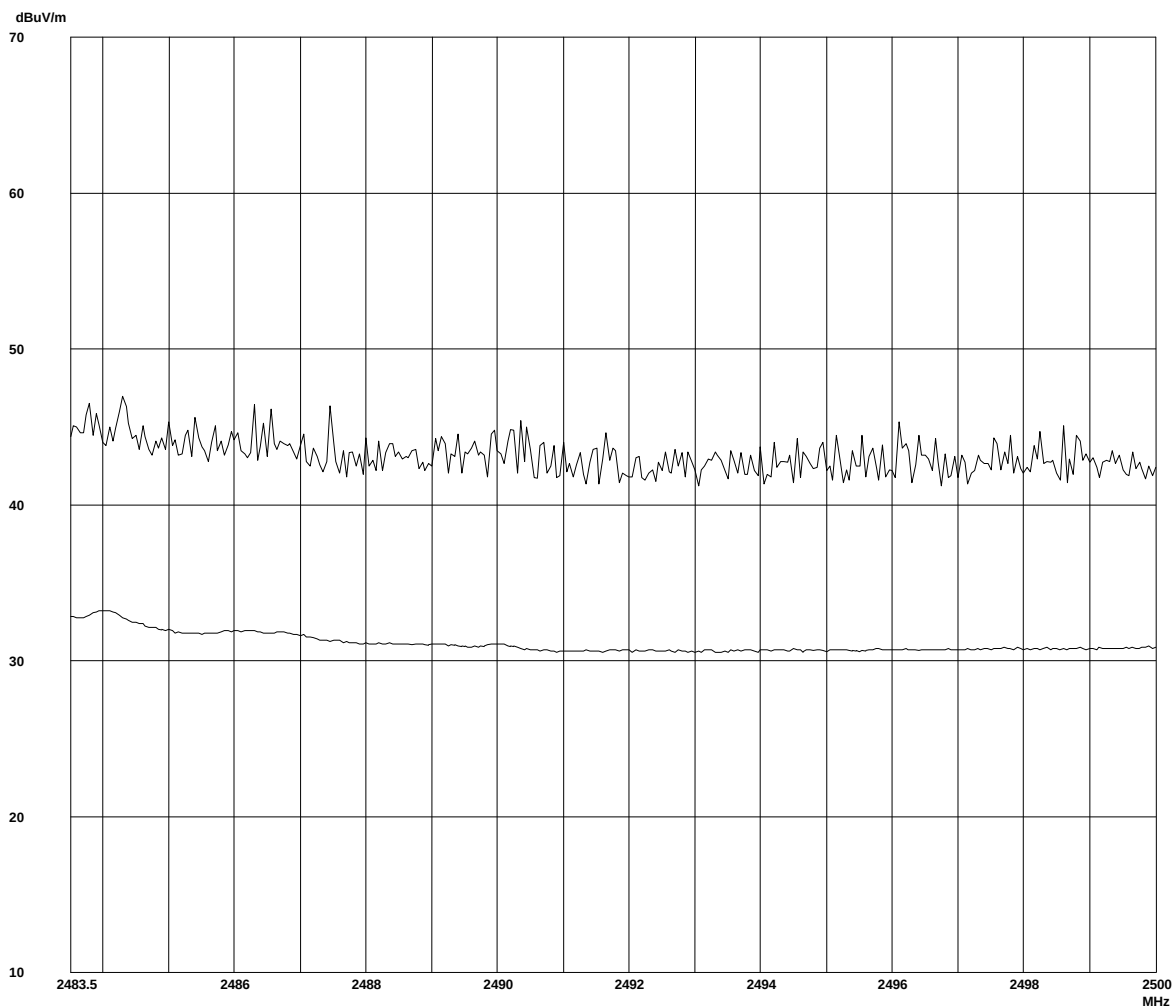


Plot 5.3.1: Vertical polarization Emissions at 2483.5MHz to 2500MHz at 1 Mbps

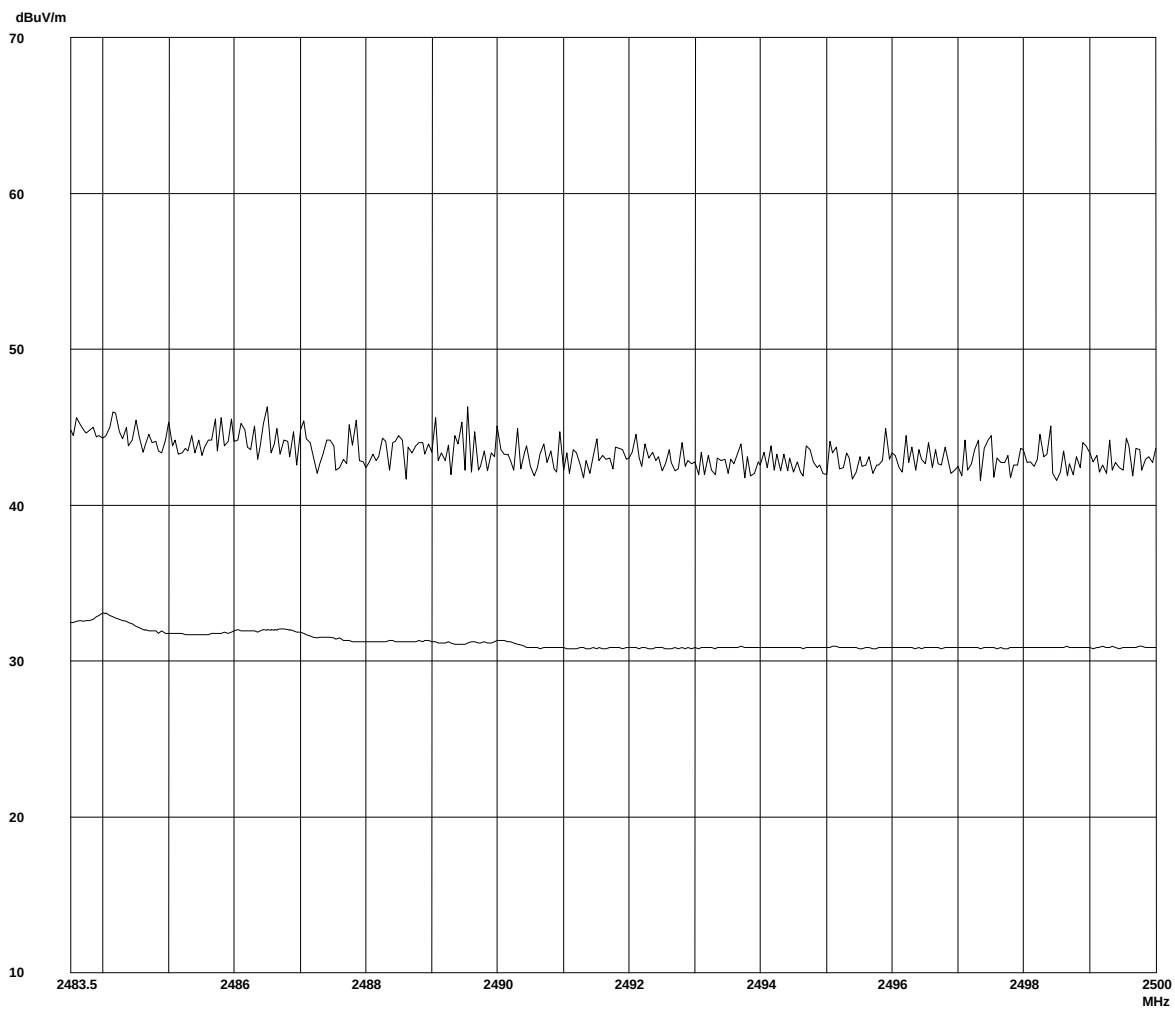


Plot 5.3.2: Horizontal polarization Emissions at 2483.5MHz to 2500MHz at 1 Mbps

Note: Upper trace are Peak values, lower trace are Average values.

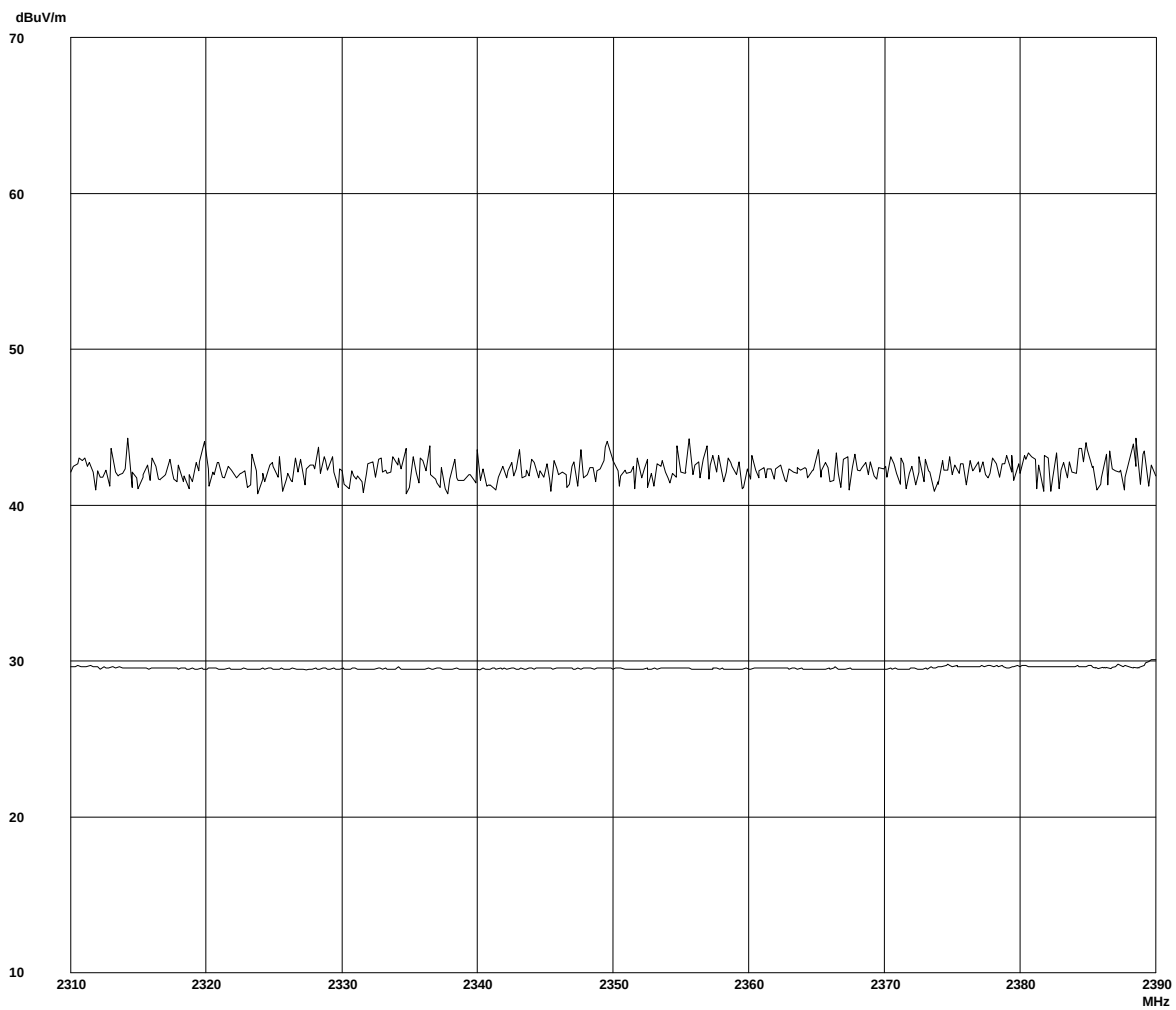


Plot 5.3.3: Vertical polarization Emissions at 2483.5MHz to 2500MHz at 11 Mbps

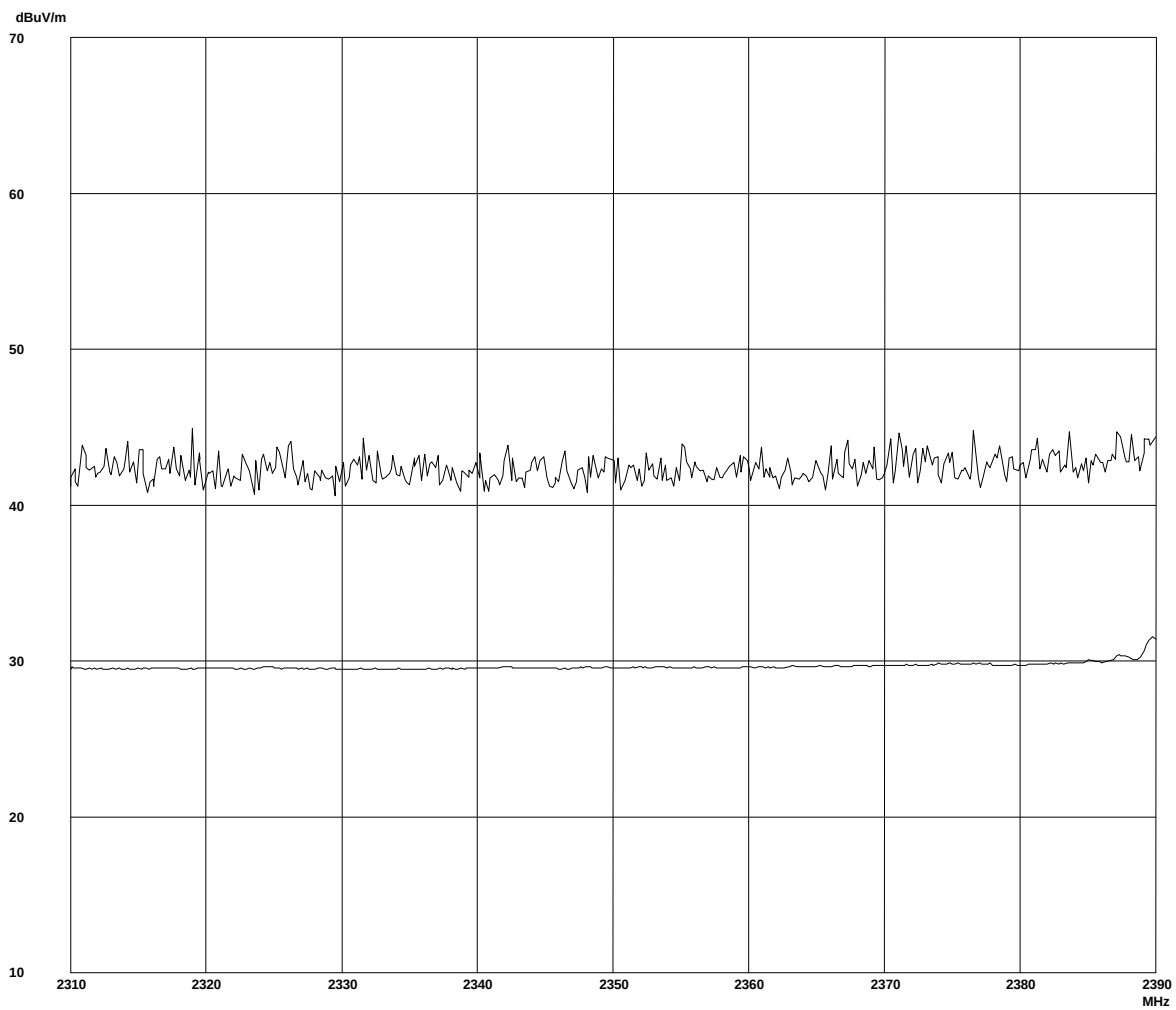


Plot 5.3.4: Horizontal polarization Emissions at 2483.5MHz to 2500MHz at 11 Mbps

Note: Upper trace are Peak values, lower trace are Average values.

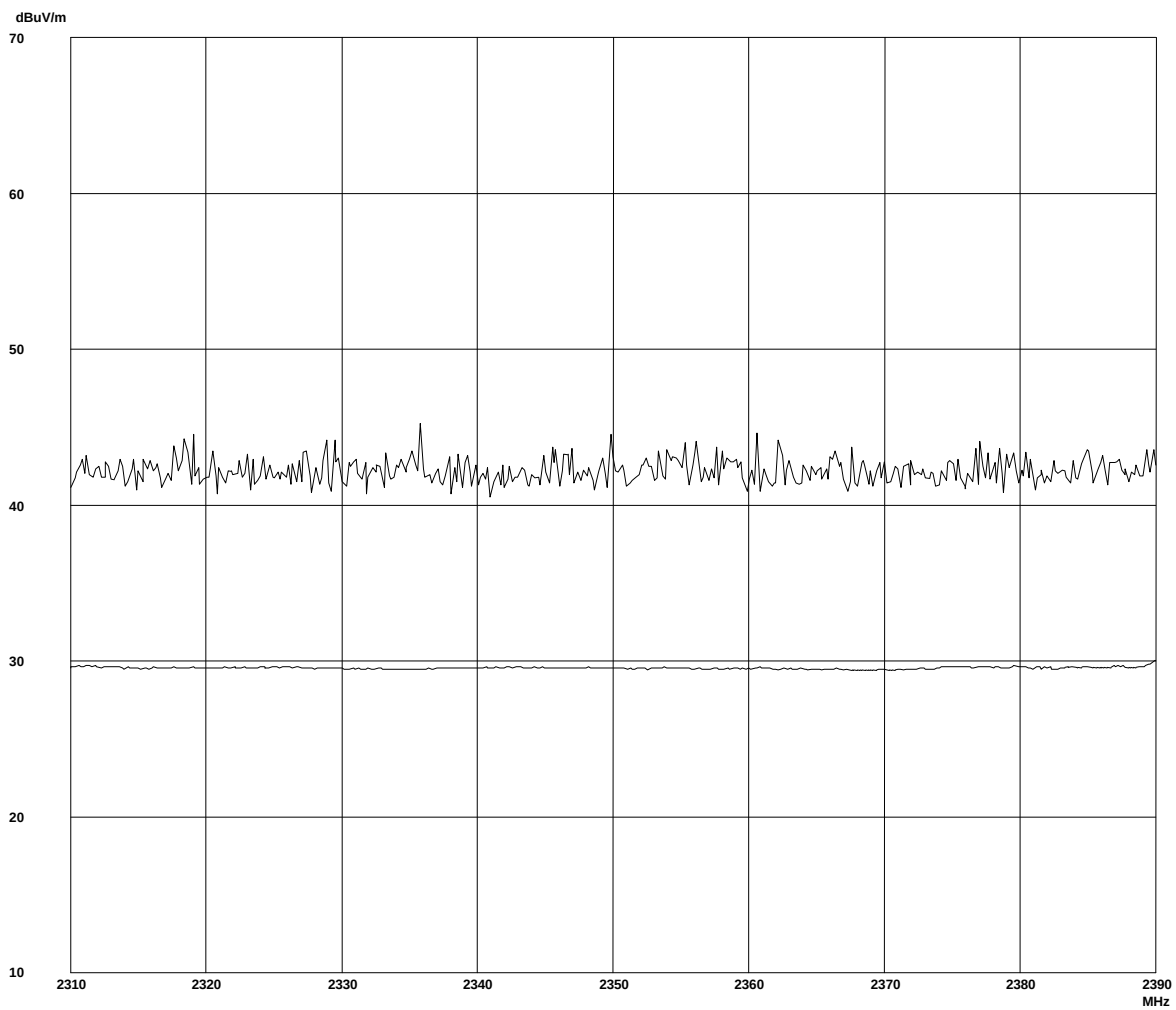


Plot 5.3.5: Vertical polarization Emissions at 2310MHz to 2390MHz at 1Mbps



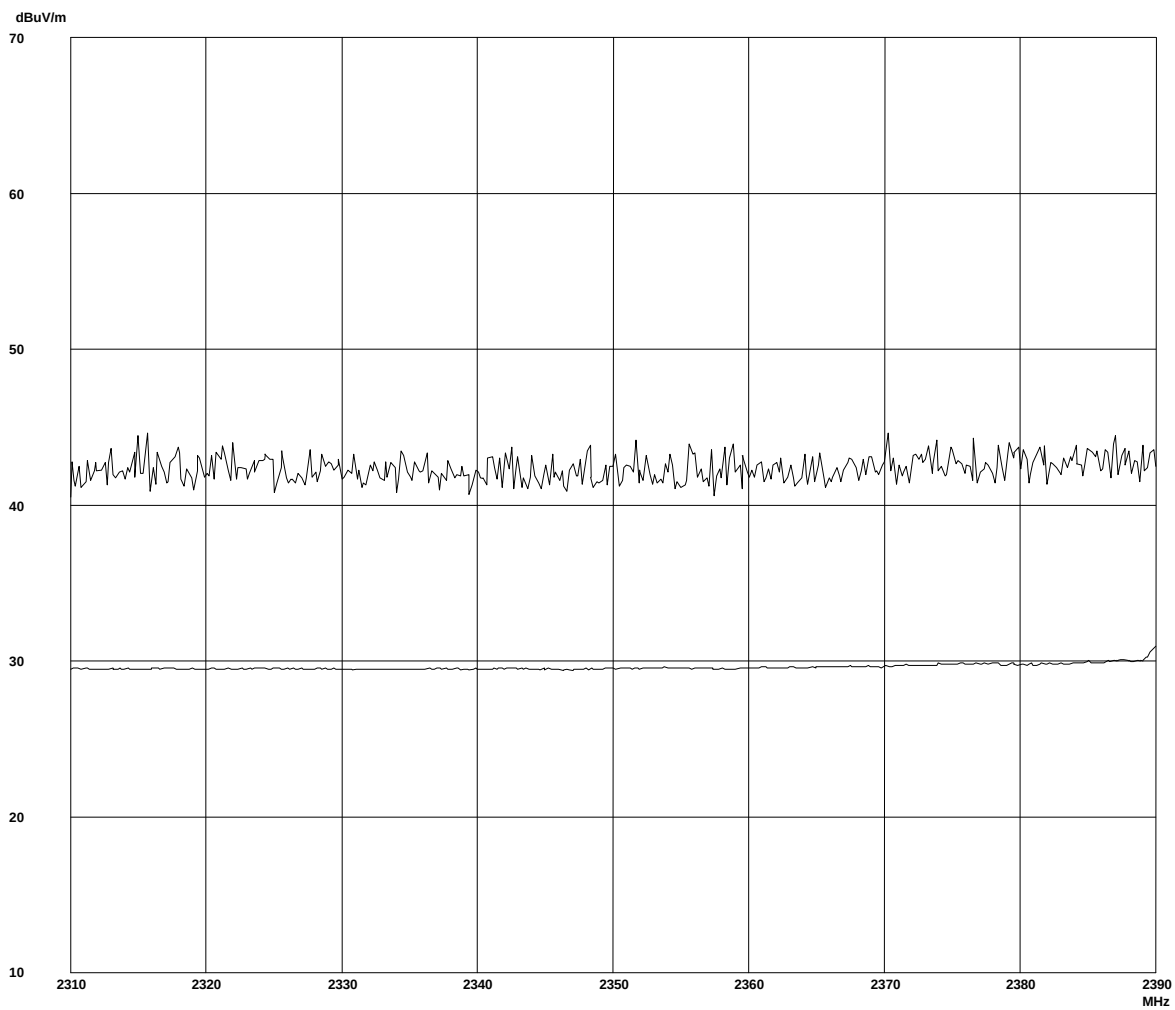
Plot 5.3.6: Horizontal polarization Emissions at 2310MHz to 2390MHz at 1Mbps

Note: Upper trace are Peak values, lower trace are Average values.



Plot 5.3.7: Vertical polarization Emissions at 2310MHz to 2390MHz at 11 Mbps

Note: Upper trace are Peak values, lower trace are Average values.



Plot 5.3.8: Horizontal polarization Emissions at 2310MHz to 2390MHz at 11 Mbps

Note: Upper trace are Peak values, lower trace are Average values.

6 Receiver radiated emission data (<1 GHz)

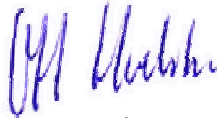
The transmitter radiated emission measurement results listed in paragraph 3 are also valid for Receive mode for channels 1, 6 and 11 for both 1.0 Mbps and 11.0 Mbps, as the emission levels are not operating frequency nor bit rate dependent.

The radiated emission measurement has been carried out with AC supply voltage of 120 V.

Test personnel:

Date : March 27, 2001

Tester signature :

A handwritten signature in blue ink, appearing to read 'Onno H. Hoekstra'.

Name : Onno H. Hoekstra

7 Receiver radiated emission data ($\geq 1\text{GHz}$)

The following data lists the significant emission frequencies (worst case), measured levels in accordance with FCC 15.109 and 15.209. Photographs of test set ups used are included in annex attached to this report.

7.1 Test configuration: WB-S1100 connected to Turbo wave SLH10 antenna

Vertical polarization			
Frequency	Measured Value Peak(3m)	FCC limit	FCC margin
MHz	dBuV/m	dBuV/m	dB
>1000	<44.0	54.0	<-10.0

Table 7.1.1: Radiated emissions with WB-S1100 on ch 1 connected to Turbo wave SLH10 antenna

Horizontal polarization			
Frequency	Measured Value Peak(3m)	FCC limit	FCC margin
MHz	dBuV/m	dBuV/m	dB
>1000	<44.0	54.0	<-10.0

Table 7.1.2: Radiated emissions with WB-S1100 on ch 1 connected to Turbo wave SLH10 antenna

Vertical polarization			
Frequency	Measured Value Peak(3m)	FCC limit	FCC margin
MHz	dBuV/m	dBuV/m	dB
>1000	<44.0	54.0	<-10.0

Table 7.1.3: Radiated emissions with WB-S1100 on ch 6 connected to Turbo wave SLH10 antenna

Horizontal polarization			
Frequency	Measured Value Peak(3m)	FCC limit	FCC margin
MHz	dBuV/m	dBuV/m	dB
>1000	<44.0	54.0	<-10.0

Table 7.1.4: Radiated emissions with WB-S1100 on ch 6 connected to Turbo wave SLH10 antenna

Vertical polarization			
Frequency	Measured Value Peak(3m)	FCC limit	FCC margin
MHz	dBuV/m	dBuV/m	dB
>1000	<44.0	54.0	<-10.0

Table 7.1.5: Radiated emissions with WB-S1100 on ch 11 connected to Turbo wave SLH10 antenna

Horizontal polarization			
Frequency	Measured Value Peak(3m)	FCC limit	FCC margin
MHz	dBuV/m	dBuV/m	dB
>1000	<44.0	54.0	<-10.0

Table 7.1.6: Radiated emissions with WB-S1100 on ch 11 connected to Turbo wave SLH10 antenna

Notes:

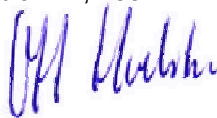
Emission values above 1 GHz are measured with the Peak detector. Polarization refers to measuring antenna, negative margin means it is below the limit. The radiated emission measurement has been carried out with AC supply voltage of 120 V.

Above measurement results are valid for both 1.0 Mbps and 11.0 Mbps, as the emission levels are not bit rate dependent.

Test personnel:

Date : March 27, 2001

Tester signature :



Name : Onno H. Hoekstra

7.2 Test configuration: WB-S1100 connected to Turbo wave SLH12 antenna

Vertical polarization			
Frequency	Measured Value Peak(3m)	FCC limit	FCC margin
MHz	dBuV/m	dBuV/m	dB
>1000	<44.0	54.0	<-10.0

Table 7.2.1: Radiated emissions with WB-S1100 on ch 1 connected to Turbo wave SLH12 antenna

Horizontal polarization			
Frequency	Measured Value Peak(3m)	FCC limit	FCC margin
MHz	dBuV/m	dBuV/m	dB
>1000	<44.0	54.0	<-10.0

Table 7.2.2: Radiated emissions with WB-S1100 on ch 1 connected to Turbo wave SLH12 antenna

Vertical polarization			
Frequency	Measured Value Peak(3m)	FCC limit	FCC margin
MHz	dBuV/m	dBuV/m	dB
>1000	<44.0	54.0	<-10.0

Table 7.2.3: Radiated emissions with WB-S1100 on ch 6 connected to Turbo wave SLH12 antenna

Horizontal polarization			
Frequency	Measured Value Peak(3m)	FCC limit	FCC margin
MHz	dBuV/m	dBuV/m	dB
>1000	<44.0	54.0	<-10.0

Table 7.2.4: Radiated emissions with WB-S1100 on ch 6 connected to Turbo wave SLH12 antenna

Vertical polarization			
Frequency	Measured Value Peak(3m)	FCC limit	FCC margin
MHz	dBuV/m	dBuV/m	dB
>1000	<44.0	54.0	<-10.0

Table 7.2.5: Radiated emissions with WB-S1100 on ch 11 connected to Turbo wave SLH12 antenna

Horizontal polarization			
Frequency	Measured Value Peak(3m)	FCC limit	FCC margin
MHz	dBuV/m	dBuV/m	dB
>1000	<44.0	54.0	<-10.0

Table 7.2.6: Radiated emissions with WB-S1100 on ch 11 connected to Turbo wave SLH12 antenna

Notes:

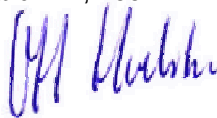
Emission values above 1 GHz are measured in Peak mode. Polarization refers to measuring antenna, negative margin means it is below the limit. The radiated emission measurement has been carried out with AC supply voltage of 120 V.

Above measurement results are valid for both 1.0 Mbps and 11.0 Mbps, as the emission levels are not bit rate dependent.

Test personnel:

Date : March 27, 2001

Tester signature :



Name : Onno H. Hoekstra

7.3 Test configuration: WB-S1100 connected to Turbo wave QUAD3 antenna

Vertical polarization			
Frequency	Measured Value Peak(3m)	FCC limit	FCC margin
MHz	dBuV/m	dBuV/m	dB
>1000	<44.0	54.0	<-10.0

Table 7.3.1: Radiated emissions with WB-S1100 on ch 1 connected to Turbo wave QUAD3 antenna

Horizontal polarization			
Frequency	Measured Value Peak(3m)	FCC limit	FCC margin
MHz	dBuV/m	dBuV/m	dB
>1000	<44.0	54.0	<-10.0

Table 7.3.2: Radiated emissions with WB-S1100 on ch 1 connected to Turbo wave QUAD3 antenna

Vertical polarization			
Frequency	Measured Value Peak(3m)	FCC limit	FCC margin
MHz	dBuV/m	dBuV/m	dB
>1000	<44.0	54.0	<-10.0

Table 7.3.3: Radiated emissions with WB-S1100 on ch 6 connected to Turbo wave QUAD3 antenna

Horizontal polarization			
Frequency	Measured Value Peak(3m)	FCC limit	FCC margin
MHz	dBuV/m	dBuV/m	dB
>1000	<44.0	54.0	<-10.0

Table 7.3.4: Radiated emissions with WB-S1100 on ch 6 connected to Turbo wave QUAD3 antenna

Vertical polarization			
Frequency	Measured Value Peak(3m)	FCC limit	FCC margin
MHz	dBuV/m	dBuV/m	dB
>1000	<44.0	54.0	<-10.0

Table 7.3.5: Radiated emissions with WB-S1100 on ch 11 connected to Turbo wave QUAD3 antenna

Horizontal polarization			
Frequency	Measured Value Peak(3m)	FCC limit	FCC margin
MHz	dBuV/m	dBuV/m	dB
>1000	<44.0	54.0	<-10.0

Table 7.3.6: Radiated emissions with WB-S1100 on ch 11 connected to Turbo wave QUAD3 antenna

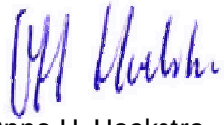
Notes:

Emission values above 1 GHz are measured with the Peak detector. Polarization refers to measuring antenna, negative margin means it is below the limit. The radiated emission measurement has been carried out with AC supply voltage of 120 V.

Above measurement results are valid for both 1.0 Mbps and 11.0 Mbps, as the emission levels are not bit rate dependent.

Test personnel:

Date : March 27, 2001

Tester signature : 

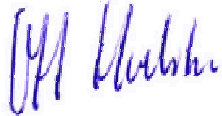
Name : Onno H. Hoekstra

8 Antenna requirement

All antennas use a unique non-standard coupling for the connection to the intentional radiator. This shall be considered sufficient to comply with the provisions of Section 15.203.

Test personnel:

Date : March 27, 2001

Tester signature : 

Name : Onno H. Hoekstra