

**TEST REPORT OF 2.4 GHz RADIOLAN
TRANSCIVERS, BRAND NO WIRES NEEDED
IN CONFORMITY WITH FCC PART 15
AND ANSI C63.4-1992;
-TYPE PARROT 1100; WIRELESS ACCESS POINT,
-TYPE PELICAN 1100; WIRELESS STATION ADAPTER,
-TYPE WB-S1100; WIRELESS BRIDGE SERVER,
-TYPE 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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MEASUREMENT/TECHNICAL REPORT

No Wires Needed B.V.

Models : Parrot 1100, Pelican 1100, WB-S1100, WB-C1100

FCC ID: OGD 10310308

July 7, 1999

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: _____			
No Wires Needed B.V., Jan Steen Laan 5, 3723 BS 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	: Jan S. Sikkema B.Sc. E.E.	
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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 and were relevant the procedures as specified in the sheets from the FCC attached to this test report. 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: July 7, 1999

Signature:

P.A.J.M. Robben
 Department EMC and Telecommunication

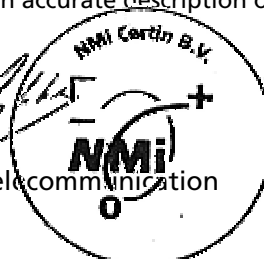


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1 General information.

1.1 Product description.

The No Wires Needed 2.4 GHz Transceiver units add wireless functionality to existing Ethernet LANs. Standard Ethernet LAN Stations are wired to a common bus. When one of the stations sends a message, it assigns a destination address to the message and sends the message on the bus. All stations on the bus "hear" the message, but only the station with the proper address processes the message.

The 2.4 GHz transceiver range can be sub-divided in the following products:

- Wireless Access Point, type Parrot 1100
- Wireless Station Adapter, type Pelican 1100
- Wireless Bridge Server, type WB-S1100
- Wireless Bridge Client, type WB-C1100

The radio part of these products are identical. The digital front-end however differs and determines the functionality of the product. Each product, with its special functionality can operate with one or more external antenna's. The products, with a short explanation and the possible external antenna's are stated below.

Wireless Access Point, type Parrot 1100

Laptop PC's equipped with No Wires Needed Swallow 1100 Wireless LAN PC Cards have full access to the enterprise network from anywhere in the facility where Parrot 1100 Access Points (referred to as EUT1 in this report) are installed. EUT1 is an Access Point to the Local Area Network. Each EUT1 provides an area of coverage of 50-300 square meters, in which PCs and Laptops equipped with the No Wires Needed Swallow 1100 PC Cards can roam freely, whilst maintaining high-speed access to the company's servers and other facilities, such as internet. The air interface is interoperable with IEEE 802.11. The EUT1 is powered from the included external 9V power supply.

The following antennas can be used with this system:

antenna model number	description	declared gain
--	standard omni antenna	1.9 dBi

These antennas can only be connected to the Parrot 1100 by means of dedicated antenna connector.

Wireless Station Adapter, type Pelican 1100

Ethernet-based devices such as printer, iMac and workstations can be connected to the Pelican 1100 Station Adapter (referred to as EUT2 in this report), giving them full access to the enterprise network from anywhere in the facility where No Wires Needed Parrot 1100 Access Points are installed. Using standard RJ-45 connectors any Ethernet-based device can be connected to the Pelican 1100 providing access to the wireless LAN through external antennas. The Pelican 1100 features high-speed wireless connection, up to 11 Mbps. The air interface is interoperable with IEEE 802.11. The EUT2 is powered from the included external 9V power supply.

The following antennas can be used with this system:

antenna model number	description	declared gain
--	standard omni antenna	1.9 dBi

These antennas can only be connected to the Pelican 1100 by means of dedicated antenna connector.

Wireless Bridge Server, type WB-S1100

The No Wires Needed Wireless bridge server, type WB-S1100 (referred to as EUT3 in this report), functions as an extension of any Ethernet network. Any second network with-in the range of the EUT3 and equipped with the WB-C1100 can be wireless linked with the network where the EUT3 is connected. The EUT3 features a high-speed connection of 11Mbps and the AirLock™ security system. The air interface is interoperable with IEEE802.11 and the Ethernet interface interoperable with IEEE802.3. The EUT3 is powered by an external power supply. Multiple antennas are available with the unit that varies in directivity and gain. The highest gain antenna available is 18dBi. The antennas are coupled via a unique connector to the EUT3.

The following antennas can be used with this system:

antenna model number	description	declared antenna assembly gain
103-80-103	high gain, dish antenna	18.0 dBi
103-80-114	medium gain, sector antenna	10.0 dBi
103-80-125	standard, omni antenna	2.0 dBi

These antennas can only be connected to the WB-S1100 by means of dedicated antenna connector.

Wireless Bridge Client, type WB-C1100

The No Wires Needed Wireless Bridge Client, type WB-C1100 (referred to as EUT4 in this report), functions as an extension of any Ethernet network. Any second network with-in the range of the WB-S1100 and equipped with EUT4 can be wireless linked with the network where the WB-S1100 is connected. The EUT4 features a high-speed connection of 11Mbps and the AirLock™ security system. The air interface is interoperable with IEEE802.11 and the Ethernet interface interoperable with IEEE802.3. Ethernet interface interoperable with IEEE802.3. The EUT4 is powered by an external power supply. Multiple antennas are available with the unit that varies in directivity and gain. The highest gain antenna available is 18dBi. The antennas are coupled via a unique connector to the EUT4.

The following antennas can be used with this system:

antenna model number	description	declared antenna assembly gain
103-80-103	high gain, dish antenna	18.0 dBi
103-80-114	medium gain, sector antenna	10.0 dBi
103-80-125	standard, omni antenna	2.0 dBi

These antennas can only be connected to the WB-C1100 by means of dedicated antenna connector.

1.2 Related Submittal(s)/Grant(s).

Not applicable.

1.3 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
EUT2*: Pelican 1100	-	OGD 10310308	2.4 GHz RLAN Station Adapter	- unshielded connection with adapter
EUT4*: WB-C1100	-	OGD 10310308	2.4 GHz RLAN Wireless Bridge Client	- unshielded connection with adapter
Toshiba PA1224E YV	11615720	n.a.	Laptop PC	- unshielded power cord to adapter
Sunpower MA 15-090	n.a.	n.a.	AC Mains Adapter for WB-C1100 or Pelican 1100*	- permanently attached unshielded power cord to WB-C1100 or Pelican 1100 - * direct connection to AC Mains
HP Deskjet 500	3228S37407	B94C2106X	Printer	- printer cable to Laptop PC - power cord to adapter
3Com Combo	3C-PC-Combo-CBL	-	PC Card LAN Cable for 10Base-T and Coax	- coax connected to LAN PC Card - BNC connection to EUT with coax
Etherlink III	3C589D-Combo 6kJ2BAC9AD	DF63C589D	LAN PC Card	- connection to PC Card LAN cable
Microsoft Mouse	n.a.	C3K7PN9937	Mouse	- mouse cable to laptop PC

* EUT4 will represent all possible products, mentioned under § 1.1, with the exception of external antenna ?? (1.9 dBi Gain). These antennas can only be connected to product Parrot 1100 and Pelican 1100. Pre-tests showed EUT4 to be the worst case.

*To demonstrate compliance for the OMNI antenna type ?? (1.9 dBi Gain), only the significant part of the test-results with EUT2 has been reported.

1.4 Test Methodology.

The test methodology used has been based on the requirements of FCC Part 15 (10-1-97 Edition), relevant clauses 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.

Fieldstrength 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 aid of a signal generator. The output level of the signal generator was increased with the antenna-factor to obtain the fieldstrength.

1.5 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.

1.6 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

1.7 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 Product labelling.

2.1 FCC ID Label

The following label shall be attached to the device under test.

FCC ID: OGD 10310308

This Device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

Figure 2.1. FCC ID Caller

The dimensions of the label, the location of the label and the type of font can be found in the FCC regulation book CFR 47, parts 0 to 19, revised as per October 1, 1993.

2.2 Location of the FCC ID Label on the EUT

The FCC ID Label will be placed on the backside of the Radio LAN Transceiver products

See attached documentation-sheet for more detailed information.

3 System test configuration.

3.1 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.

The products mentioned under § 1.1 uses the same RF part. Only the digital front-end differs. Pre-tests on all the products showed that the testresults are the same within a margin. These pre-tests have been carried out to find the worst-case. The worst-case product, EUT4, will represent all possible products, mentioned under § 1.1, with the exception of the external antenna type ?? (1.9 dBi Gain). These antennas can only be connected to product Parrot 1100 and Pelican 1100. To demonstrate compliance for the antenna type ? (1.9 dBi Gain), the significant part of the test-results with EUT2 has been reported.

Unless otherwise stated, the measurements were performed on the lowest operating frequency (channel 1: 2412 MHz), the operating frequency in the middle of the specified frequency band (channel 6: 2437 MHz) and the highest operating frequency (channel 11: 2462 MHz).

Operating frequencies and rated output power levels

channel	operating frequencies (MHz)	Rated output power (dBm)	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 3.1: Operating frequencies and rated output power levels

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

3.2 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.

3.3 Special accessories.

No special accessories are used to achieve FCC compliance.

3.4 Equipment modifications.

No modifications have been made to the equipment to achieve compliance.

Applicant Signature	: n.a.	Date	: n.a.
Typed/Printed Name	: n.a.	Position	: n.a.

3.5 Configuration of the tested system.

Blockdiagrams of the tested system are included in Annex 3 attached to this report.

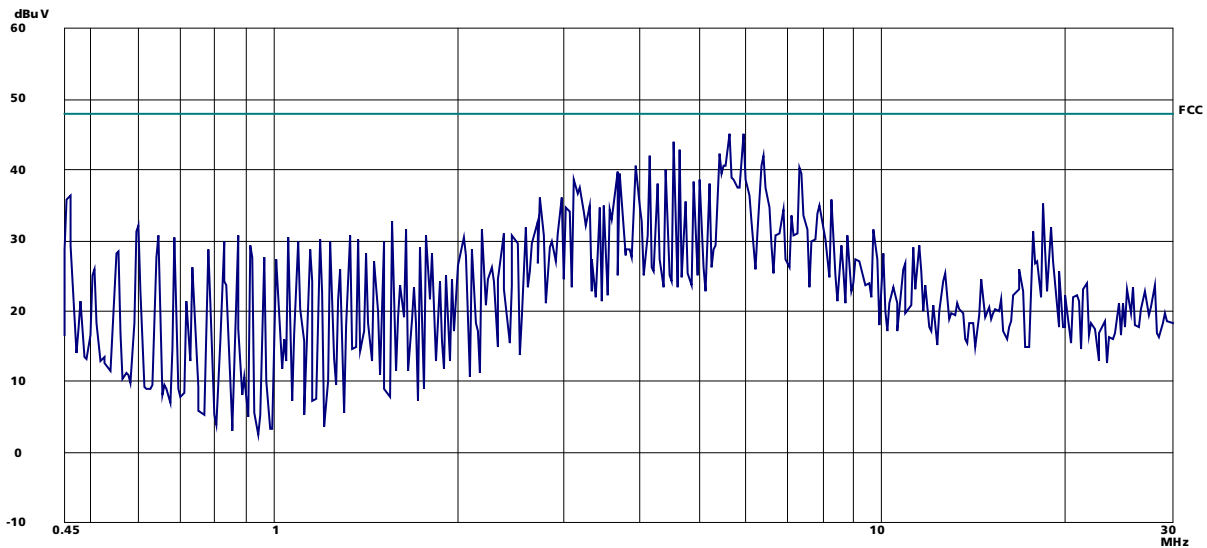
4 Block diagram(s) of the tested model.

Information is annexed in the technical documentation supplied by the applicant.

5 Conducted emission data.

The initial step in collecting data is a scan of the measurement range. Significant signals are then marked and these signals are then measured using quasi-peak.

Line 1

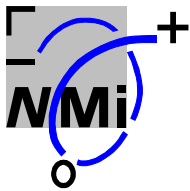


Plot 5.1: Conducted emissions on channel 6.

The following table lists worst case conducted emission data in accordance with FCC 15.207. The conducted test was performed with the EUT exercise program loaded. Photographs of test setups used are included in annex 1 attached to this report.

Frequency (MHz)	Measurements results QP (dB μ V)	Margin (dB μ V)	Limits (dB μ V)
0.46	31.8	16.2	48.0
3.12	35.0	13.0	48.0
3.65	40.2	7.8	48.0
4.15	34.3	13.7	48.0
4.54	37.0	11.0	48.0
5.63	43.4	4.6	48.0
5.91	36.9	11.1	48.0
6.34	39.9	8.1	48.0
7.32	38.4	9.6	48.0
18.44	29.8	18.2	48.0
other frequencies	<<	> 20	48.0

Table 5.1: Conducted emissions on channel 6
<< means that the measured value is more than 20 dB below limit. // QP means Quasi-Peak



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FCC ID: OGD 10310308
Description of EUT: 2.4 GHz RLAN Transceivers
Manufacturer: No Wires Needed B.V.
Brand mark: No Wires Needed B.V.
Types: Parrot 1100, Pelican 1100,
WB-S1100, WB-C1100

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

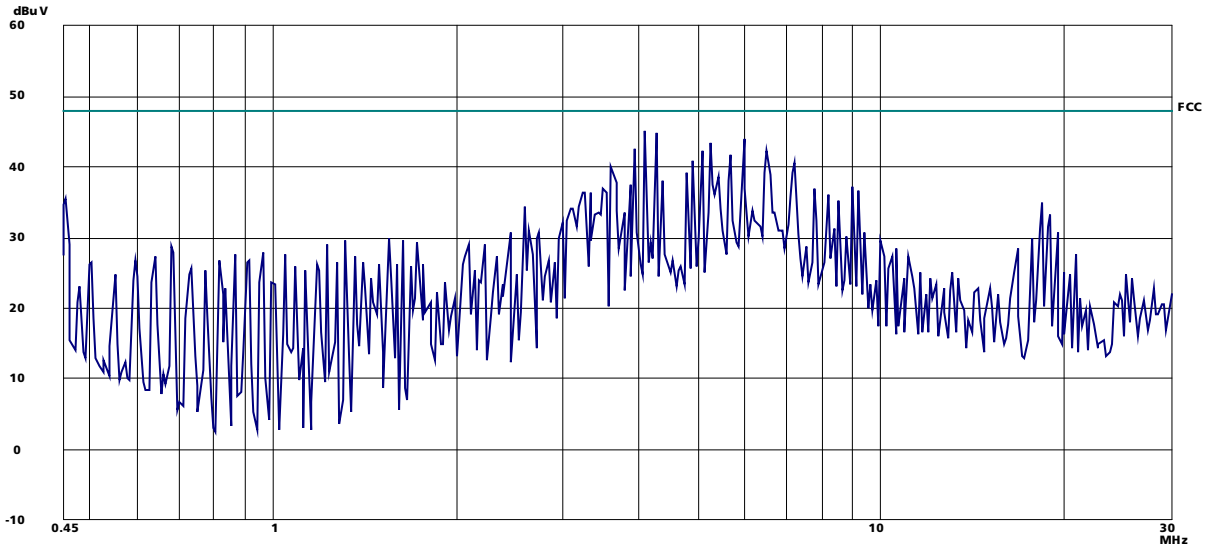
Test personnel:

Tester signature :

Date: May 23, 1999

Typed/Printed name : Jan S. Sikkema

Neutral L2



Plot 5.2: Conducted emissions on channel 6.

The following table lists worst case conducted emission data in accordance with FCC 15.207. The conducted test was performed with the EUT exercise program loaded. Photographs of testsetups used are included in annex 1 attached to this report.

Frequency (MHz)	Measurements results QP (dB μ V)	Margin (dB μ V)	Limits (dB μ V)
0.46	36.0	12.0	48.0
2.59	32.1	15.9	48.0
3.22	36.1	11.9	48.0
3.60	40.2	7.8	48.0
4.09	46.1	1.9	48.0
4.26	44.3	3.7	48.0
5.24	43.7	4.3	48.0
5.67	44.2	3.8	48.0
5.95	43.0	5.0	48.0
6.49	41.6	6.4	48.0
9.00	35.5	12.5	48.0
18.44	29.8	18.2	48.0
other frequencies	<<	> 20	48.0

Table 5.2: Conducted emissions on channel 6

<< means that the measured value is more than 20 dB below limit // QP means Quasi-Peak

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

Test personnel:

Tester signature :

Date: May 23, 1999

Typed/Printed name : Jan S. Sikkema

6 Radiated emission data

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

6.1 Testconfiguration: WB-C1100 connected to 103-80-103 high gain dish (18 dBi) antenna

Vertical polarization			
Frequency	Measured Value QP (3m)	FCC limit	FCC margin
MHz	dbuV/m	dbuV/m	dB
32	28.6	40	-11.4
33.21	26.4	40	-13.6
50	30.9	40	-9.1
63.98	23.4	40	-16.6
71.6	20.8	40	-19.2
72	24.3	40	-15.7
85.5	27.6	40	-12.4
107.95	31.5	43.5	-12
118	31	43.5	-12.5
128	31	43.5	-12.5
133.23	24.3	43.5	-19.2
140	25.8	43.5	-17.7
157.49	27.3	43.5	-16.2
193.53	30.4	43.5	-13.1
216.04	32.9	46	-13.1
220.5	35.4	46	-10.6
301.48	37.9	46	-8.1
310.48	33.9	46	-12.1
2157.2	34.6	54	-19.4

Table 6.1: Radiated emissions on channel 6 with WB-C1100 connected to 103-80-103 High Gain Dish (18dBi) antenna

Notes:

All measured levels in quasi-peak mode, polarization refers to measuring antenna, negative margin means it is below the limit. All radiated harmonic emissions were found to be > 25dB below limits.

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

Test personnel:

Tester signature :

Date: July 5, 1999

Typed/Printed name : Jan S. Sikkema

Horizontal polarization			
Frequency	Measured Value QP (3m)	FCC limit	FCC margin
MHz	dbuV/m	dbuV/m	dB
32	29.8	40	-10.2
33.21	30.4	40	-9.6
50	26.8	40	-13.2
63.98	21.5	40	-18.5
71.6	23	40	-17
72	25.2	40	-14.8
85.5	26.6	40	-13.4
107.95	27.7	43.5	-15.8
118	27.4	43.5	-16.1
128	26.6	43.5	-16.9
133.23	26.1	43.5	-17.4
140	25.5	43.5	-18
157.49	32.6	43.5	-10.9
193.53	27.4	43.5	-16.1
216.04	29.2	46	-16.8
220.5	31.7	46	-14.3
301.48	36.9	46	-9.1
310.48	30.5	46	-15.5
2157.2	38	54	-16

Table 6.2: Radiated emissions on channel 6 with WB-C1100 connected to 103-80-103 High Gain Dish (18dBi) antenna

Notes:

All measured levels in quasi-peak mode, polarization refers to measuring antenna, negative margin means it is below the limit. All radiated harmonic emissions were found to be > 25dB below limits.

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

Test personnel:

Tester signature :

Date: July 5, 1999

Typed/Printed name : Jan S. Sikkema

6.2 Testconfiguration: WB-C1100 connected to 103-80-114 Medium Gain, Sector (10dBi) antenna

Vertical polarization			
Frequency	Measured Value QP (3m)	FCC limit	FCC margin
MHz	dbuV/m	dbuV/m	dB
32	30.9	40	-9.1
33.21	26.3	40	-13.7
50	26.8	40	-13.2
63.98	23.5	40	-16.5
71.6	22.4	40	-17.6
72	30.4	40	-9.6
85.5	29.7	40	-10.3
107.95	34.7	43.5	-8.8
118	31	43.5	-12.5
128	33.7	43.5	-9.8
133.23	24.4	43.5	-19.1
140	26.9	43.5	-16.6
157.49	27.7	43.5	-15.8
193.53	30.2	43.5	-13.3
216.04	34.9	46	-11.1
220.5	38.4	46	-7.6
301.48	39.6	46	-6.4
310.48	31.3	46	-14.7
2157.2	38.4	54	-15.6

Table 6.3: Radiated emissions on channel 6 with WB-C1100 connected to 103-80-114 Medium Gain Sector (10dBi) antenna

Notes:

All measured levels in quasi-peak mode, polarization refers to measuring antenna, negative margin means it is below the limit. All radiated harmonic emissions were found to be > 25dB below limits.

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

Test personnel:

Tester signature :

Date: July 5, 1999

Typed/Printed name : Jan S. Sikkema

Horizontal polarization			
Frequency	Measured Value QP (3m)	FCC limit	FCC margin
MHz	dbuV/m	dbuV/m	dB
32	30.3	40	-9.7
33.21	24.7	40	-15.3
50	25.2	40	-14.8
63.98	21.2	40	-18.8
71.6	23.1	40	-16.9
72	26.3	40	-13.7
85.5	29.1	40	-10.9
107.95	33.5	43.5	-10
118	30.1	43.5	-13.4
128	23.7	43.5	-19.8
133.23	24.8	43.5	-18.7
140	27.9	43.5	-15.6
157.49	31.2	43.5	-12.3
193.53	31.2	43.5	-12.3
216.04	32.3	46	-13.7
220.5	35.4	46	-10.6
301.48	38.5	46	-7.5
310.48	34.5	46	-11.5
2157.2	38.1	54	-15.9

Table 6.4: Radiated emissions on channel 6 with WB-C1100 connected to 103-80-114 Medium Gain Sector (10dBi) antenna

Notes:

All measured levels in quasi-peak mode, polarization refers to measuring antenna, negative margin means it is below the limit. All radiated harmonic emissions were found to be > 25dB below limits.

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

Test personnel:

Tester signature :

Date: July 5, 1999

Typed/Printed name : Jan S. Sikkema

6.3 Testconfiguration: WB-C1100 connected to 103-80-125 Standard Omni (2 dBi) antenna

Vertical polarization			
Frequency	Measured Value QP (3m)	FCC limit	FCC margin
MHz	dbuV/m	dbuV/m	dB
32	27.6	40	-12.4
33.21	24.7	40	-15.3
50	30.8	40	-9.2
63.98	25.2	40	-14.8
71.6	24	40	-16
72	25.6	40	-14.4
85.5	28.4	40	-11.6
107.95	34	43.5	-9.5
118	26.8	43.5	-16.7
128	31	43.5	-12.5
133.23	25.1	43.5	-18.4
140	30.9	43.5	-12.6
157.49	28.2	43.5	-15.3
193.53	29.6	43.5	-13.9
216.04	34.6	46	-11.4
220.5	35.9	46	-10.1
301.48	32.7	46	-13.3
310.48	32.7	46	-13.3
2157.2	37.4	54	-16.6

Table 6.5: Radiated emissions on channel 6 with WB-C1100 connected to 103-80-125 Standard Omni (2dBi) antenna

Notes:

All measured levels in quasi-peak mode, polarization refers to measuring antenna, negative margin means it is below the limit. All radiated harmonic emissions were found to be > 25dB below limits.

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

Test personnel:

Tester signature :

Date: July 5, 1999

Typed/Printed name : Jan S. Sikkema

Horizontal polarization			
Frequency	Measured Value QP (3m)	FCC limit	FCC margin
MHz	dbuV/m	dbuV/m	dB
32	28	40	-12
33.21	24.7	40	-15.3
50	25.9	40	-14.1
63.98	25.5	40	-14.5
71.6	24.9	40	-15.1
72	22.4	40	-17.6
85.5	27.1	40	-12.9
107.95	29.3	43.5	-14.2
118	26	43.5	-17.5
128	29.6	43.5	-13.9
133.23	24.4	43.5	-19.1
140	25.6	43.5	-17.9
157.49	28	43.5	-15.5
193.53	28.9	43.5	-14.6
216.04	35.2	46	-10.8
220.5	33.1	46	-12.9
301.48	30.7	46	-15.3
310.48	32.2	46	-13.8
2157.2	36.7	54	-17.3

Table 6.6: Radiated emissions on channel 6 with WB-C1100 connected to 103-80-125 Standard Omni (2dBi) antenna

Notes:

All measured levels in quasi-peak mode, polarization refers to measuring antenna, negative margin means it is below the limit. All radiated harmonic emissions were found to be > 25dB below limits.

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

Test personnel:

Tester signature :

Date: July 5, 1999

Typed/Printed name : Jan S. Sikkema

6.4 Testconfiguration: Pelican 1100 connected to 1.9 dBi antenna

Vertical polarization			
Frequency	Measured Value QP (3m)	FCC limit	FCC margin
MHz	dbuV/m	dbuV/m	dB
32	27.4	40	-12.6
33.21	23.3	40	-16.7
50	30	40	-10
63.98	27.3	40	-12.7
71.6	23.3	40	-16.7
72	26.7	40	-13.3
85.5	29.7	40	-10.3
107.95	34.5	43.5	-9
118	25.4	43.5	-18.1
128	32.8	43.5	-10.7
133.23	23.5	43.5	-20
140	31.2	43.5	-12.3
157.49	29.1	43.5	-14.4
193.53	30.6	43.5	-12.9
216.04	35.2	46	-10.8
220.5	36.6	46	-9.4
301.48	34.3	46	-11.7
310.48	30.9	46	-15.1
2157.2	34.1	54	-19.9

Table 6.7: Radiated emissions on channel 6 with WB-C1100 connected to 1.9 dBi antenna

Notes:

All measured levels in quasi-peak mode, polarization refers to measuring antenna, negative margin means it is below the limit. All radiated harmonic emissions were found to be > 25dB below limits.

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

Test personnel:

Tester signature :

Date: July 5, 1999

Typed/Printed name : Jan S. Sikkema

Horizontal polarization			
Frequency	Measured Value QP (3m)	FCC limit	FCC margin
MHz	dbuV/m	dbuV/m	dB
32	26.8	40	-13.2
33.21	23	40	-17
50	23.9	40	-16.1
63.98	23.5	40	-16.5
71.6	24.4	40	-15.6
72	20.3	40	-19.7
85.5	27.6	40	-12.4
107.95	27.6	43.5	-15.9
118	24.8	43.5	-18.7
128	30.7	43.5	-12.8
133.23	22.3	43.5	-21.2
140	26.4	43.5	-17.1
157.49	26.9	43.5	-16.6
193.53	29.3	43.5	-14.2
216.04	36.9	46	-9.1
220.5	34.4	46	-11.6
301.48	29.3	46	-16.7
310.48	29.4	46	-16.6
2157.2	33	54	-21

Table 6.8: Radiated emissions on channel 6 with WB-C1100 connected to 1.9 dBi antenna

Notes:

All measured levels in quasi-peak mode, polarization refers to measuring antenna, negative margin means it is below the limit. All radiated harmonic emissions were found to be > 25dB below limits.

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

Test personnel:

Tester signature :

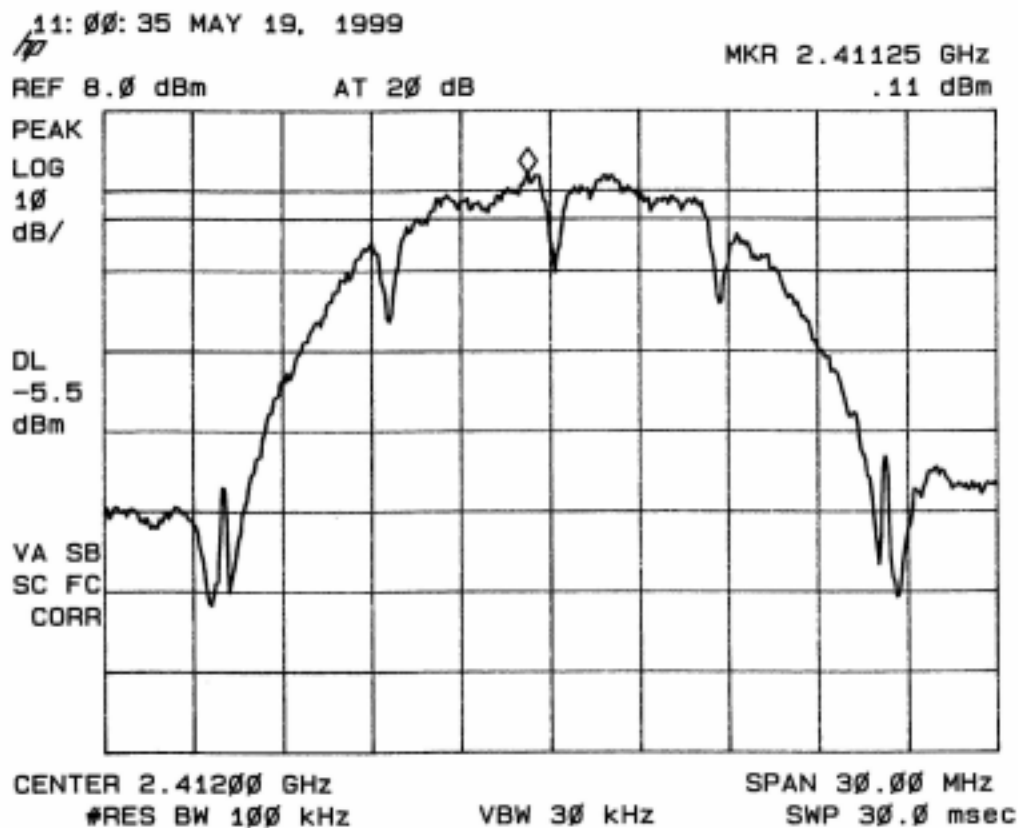
Date: July 5, 1999

Typed/Printed name : Jan S. Sikkema

7 -6 dB Bandwidth measurements.

The minimum 6 dB bandwidth measurement was performed in accordance with FCC 15.247 (a)

7.1 Channel 1



Plot 7.1: -6 dB bandwidth plot of channel 1

Modulation = 11 Mbps

The minimum 6 dB modulated bandwidth is on channel 1 : 9.5 MHz.

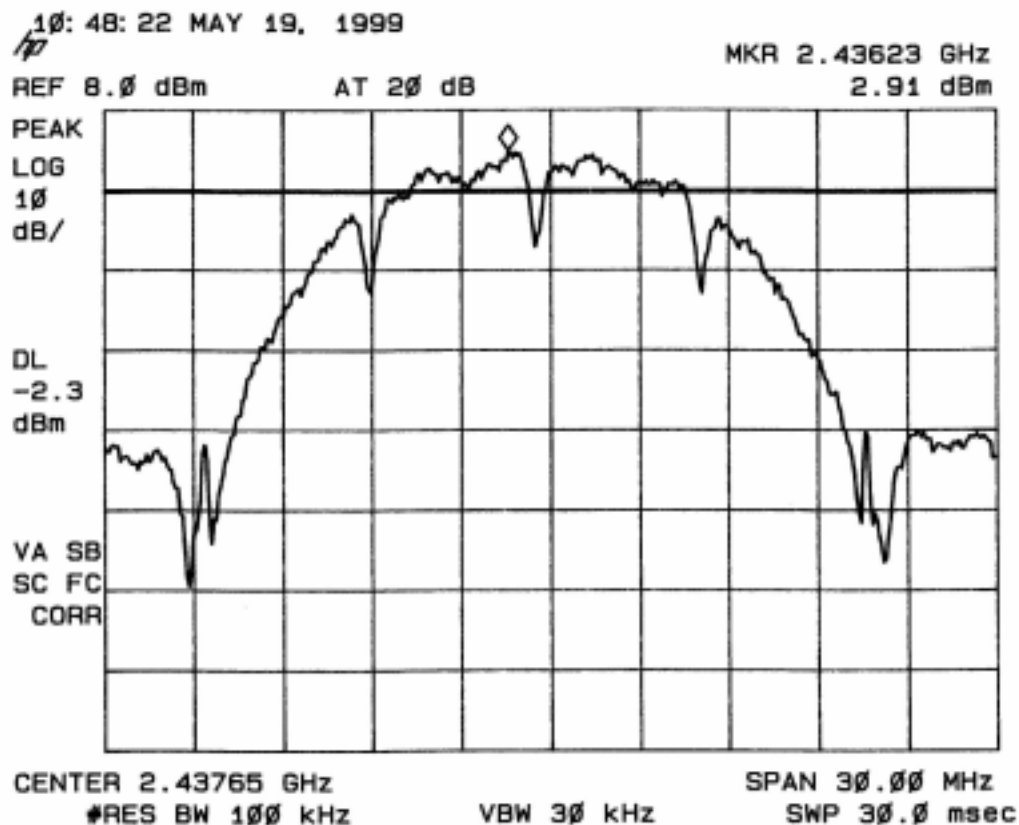
Test personnel:

Tester signature :

Date: May 19, 1999

Typed/Printed name : Jan S. Sikkema

7.2 Channel 6



Plot 7.2: -6 dB bandwidth plot of channel 6

Modulation = 11 Mbps

The minimum 6 dB modulated bandwidth is on channel 6 : 9.9 MHz.

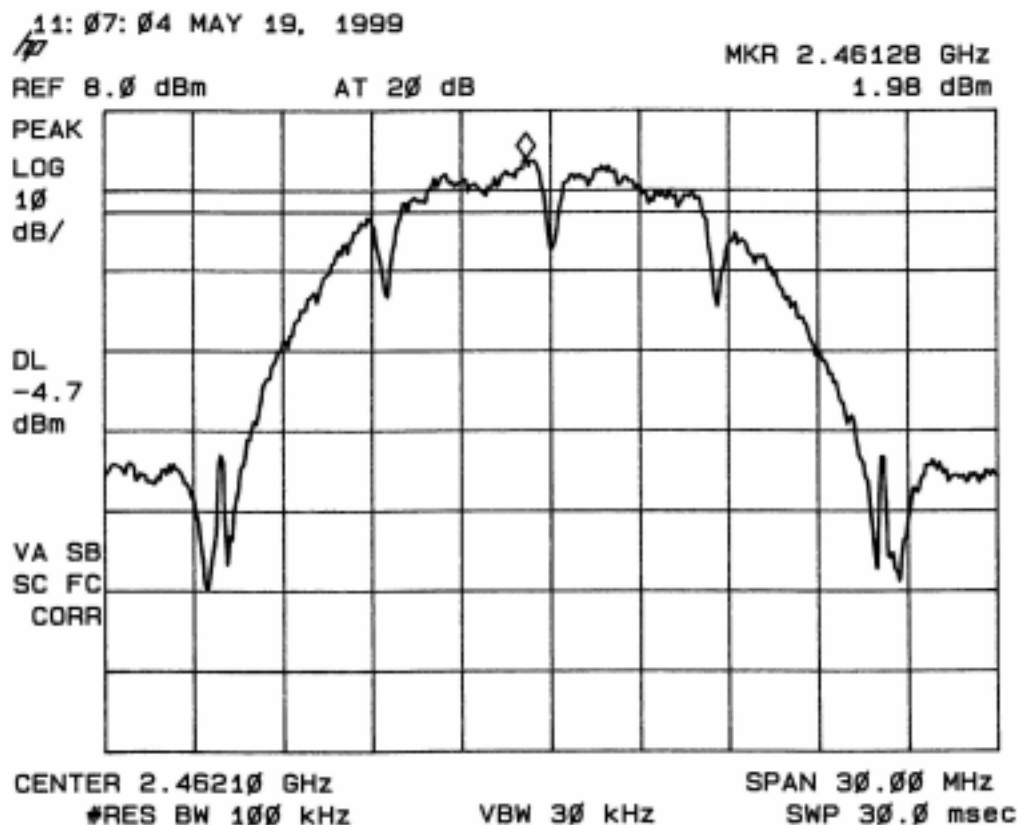
Test personnel:

Tester signature :

Date: May 19, 1999

Typed/Printed name : Jan S. Sikkema

7.3 Channel 11



Plot 7.3: -6 dB bandwidth plot of channel 11

Modulation = 11 Mbps

The minimum 6 dB modulated bandwidth is on channel 11 : 9.9 MHz.

Test personnel:

Tester signature :

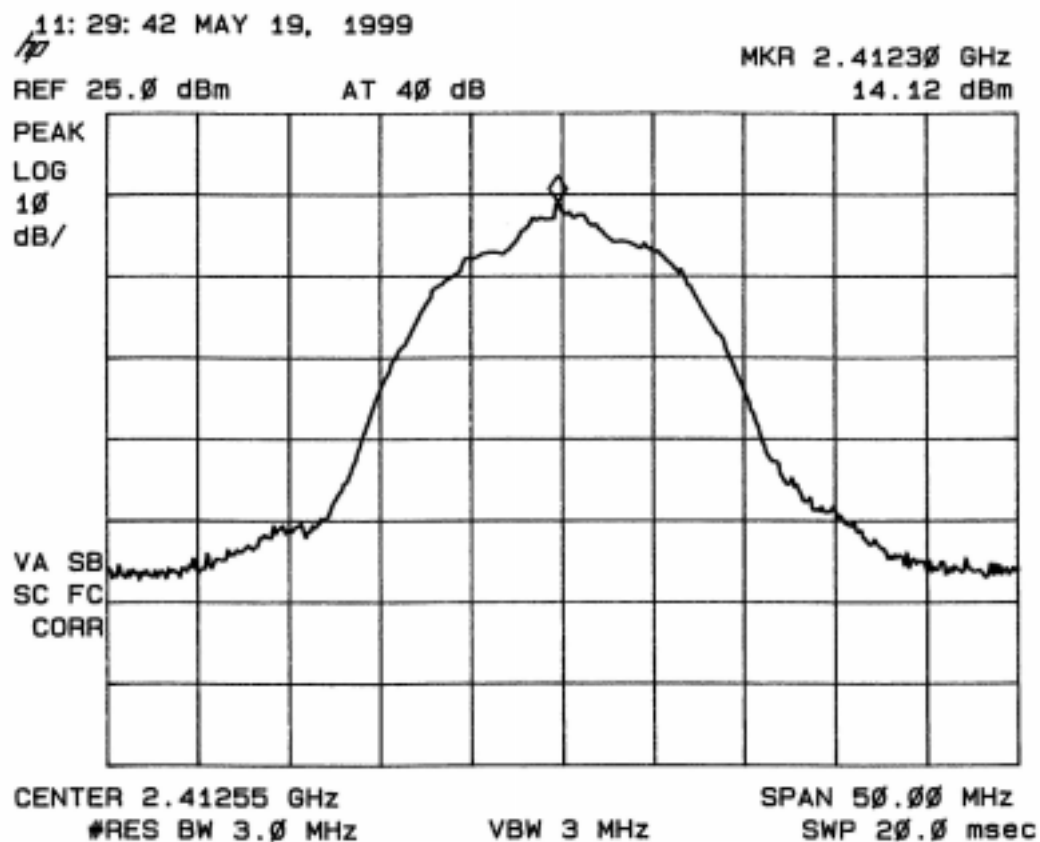
Date: May 19, 1999

Typed/Printed name : Jan S. Sikkema

8 Peak power

The peak power measurement was performed in accordance with FCC 15.247 (b). The plot is made with the highest bandwidth being the worst case. The maximum value is then marked and the peak value of this signal is measured using a wideband diode detector.

8.1 Channel 1



Plot 8.1: Peak power plot of channel 1

Modulation = 11 Mbps

The maximum measured peak power on channel 1 : 14.8 dBm.

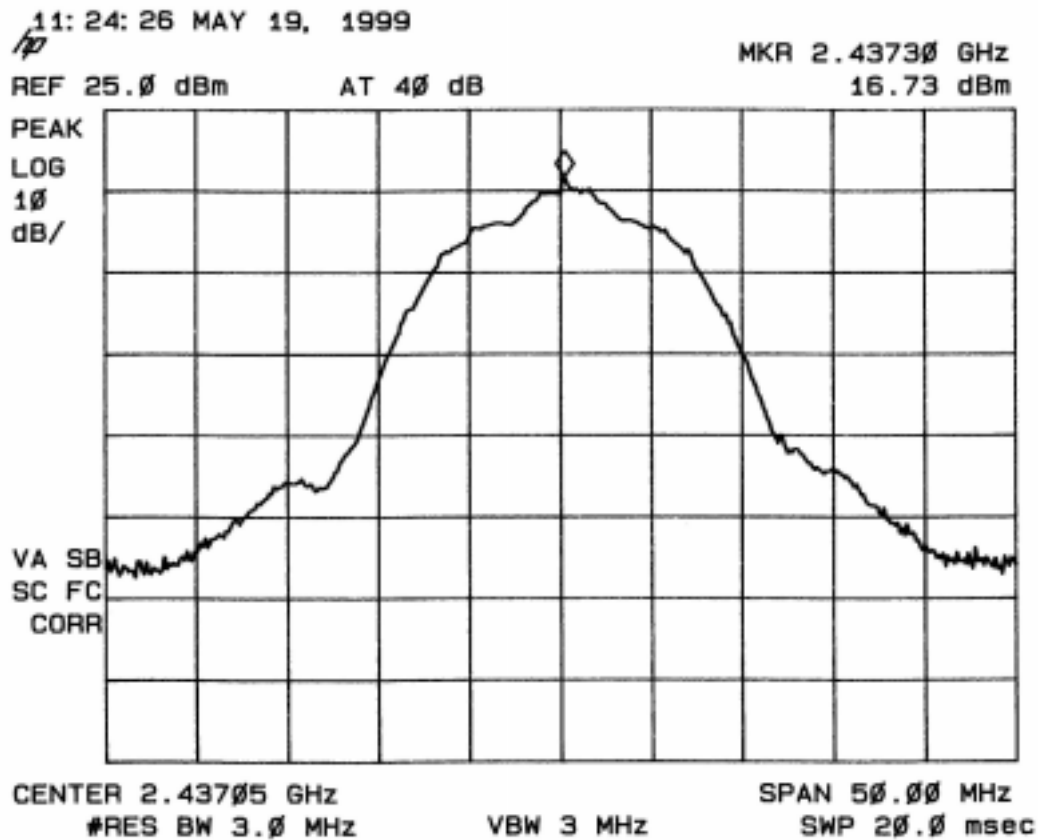
Test personnel:

Tester signature :

Date: May 19, 1999

Typed/Printed name : Jan S. Sikkema

8.2 Channel 6



Plot 8.2: Peak power plot of channel 6

Modulation = 11 Mbps

The maximum measured peak power on channel 6 : 17.3 dBm.

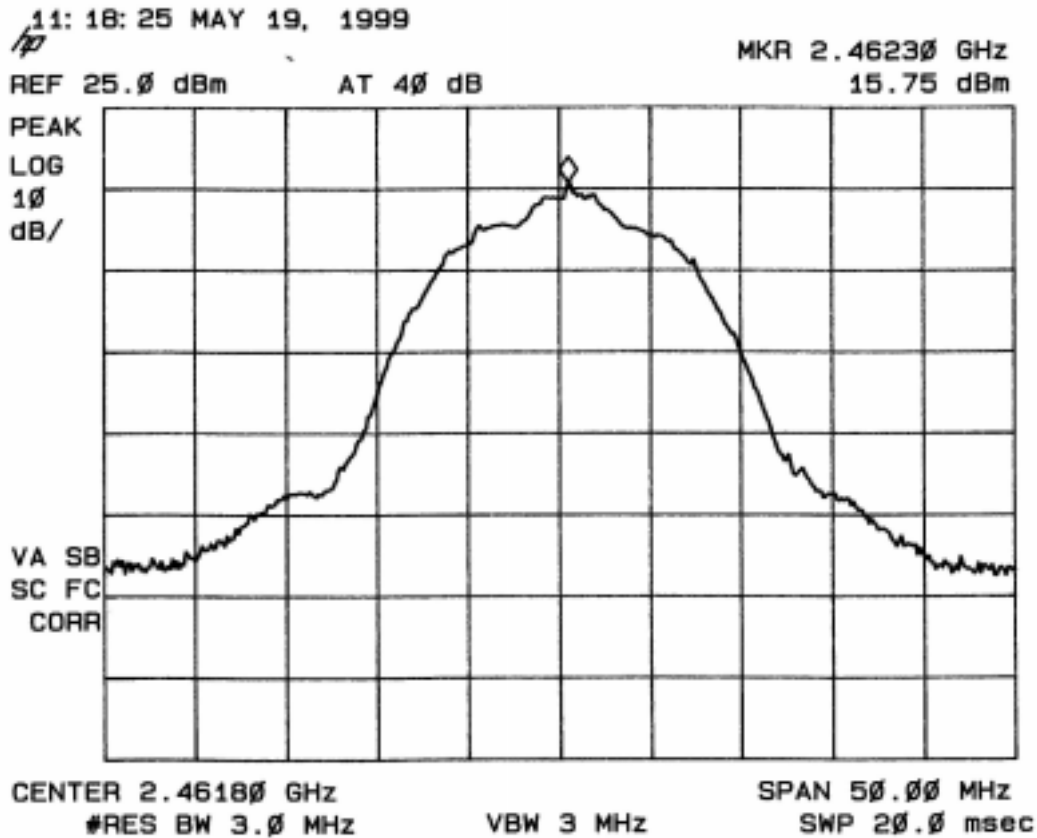
Test personnel:

Tester signature :

Date: May 19, 1999

Typed/Printed name : Jan S. Sikkema

8.3 Channel 11



Plot 8.3: Peak power plot of channel 11

Modulation = 11 Mbps

The maximum measured peak power on channel 11 : 16.5 dBm.

Test personnel:

Tester signature :

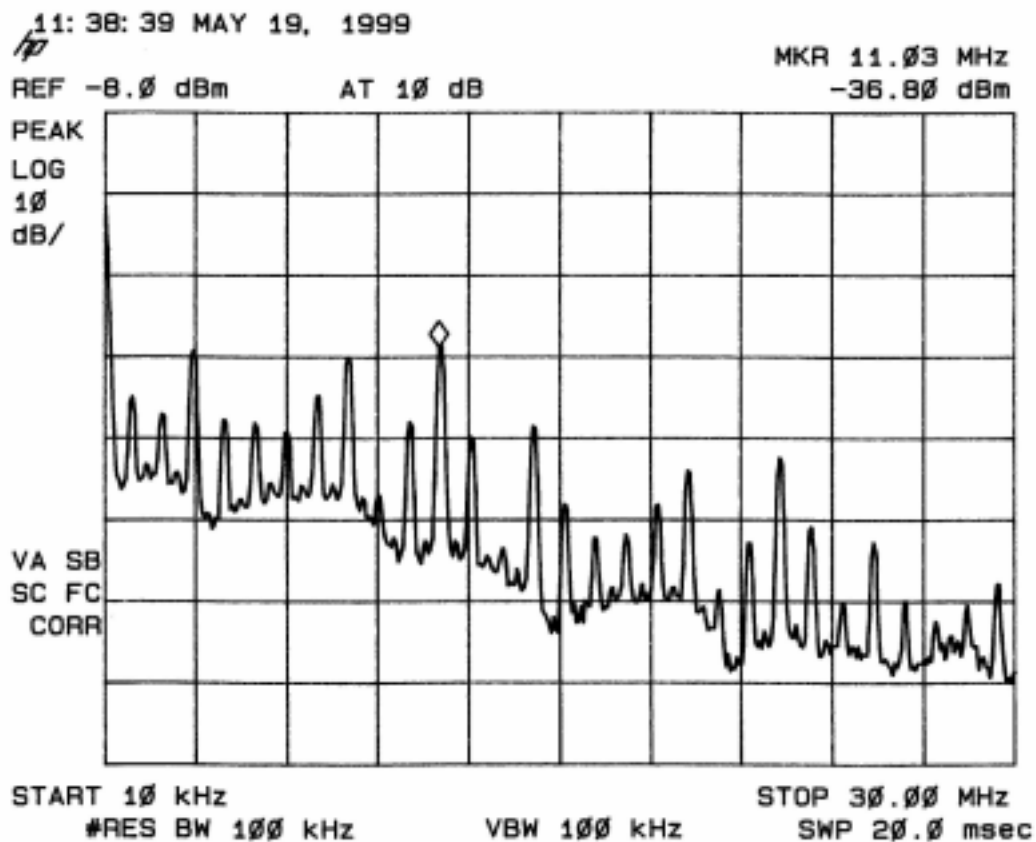
Date: May 19, 1999

Typed/Printed name : Jan S. Sikkema

9 Conducted emissions at the antenna output

Antenna spurious emission per FCC 15.247(c) was measured from the EUT antenna port using a 50 Ohm spectrum analyzer with the resolution/video bandwidth set at 100 kHz. The worst case values are plot below.

9.1 Channel 6



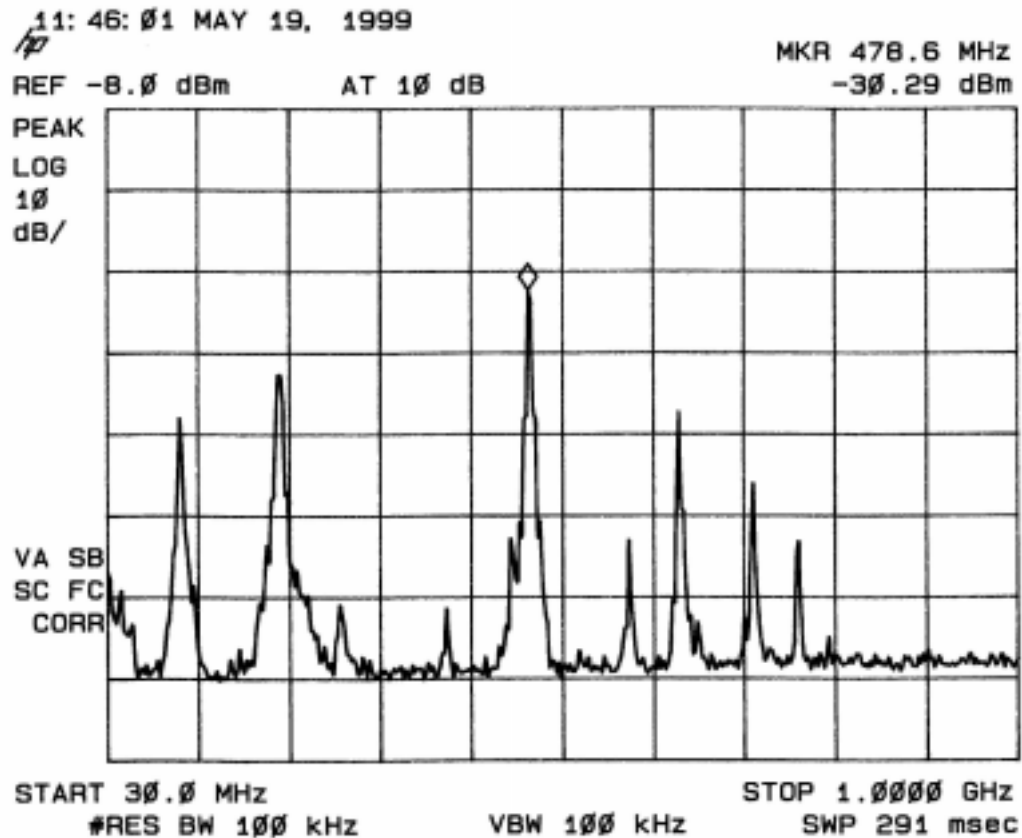
Plot 9.1: Conducted emissions 10.0 kHz – 30.0 MHz

Test personnel:

Tester signature :

Date: May 19, 1999

Typed/Printed name : Jan S. Sikkema



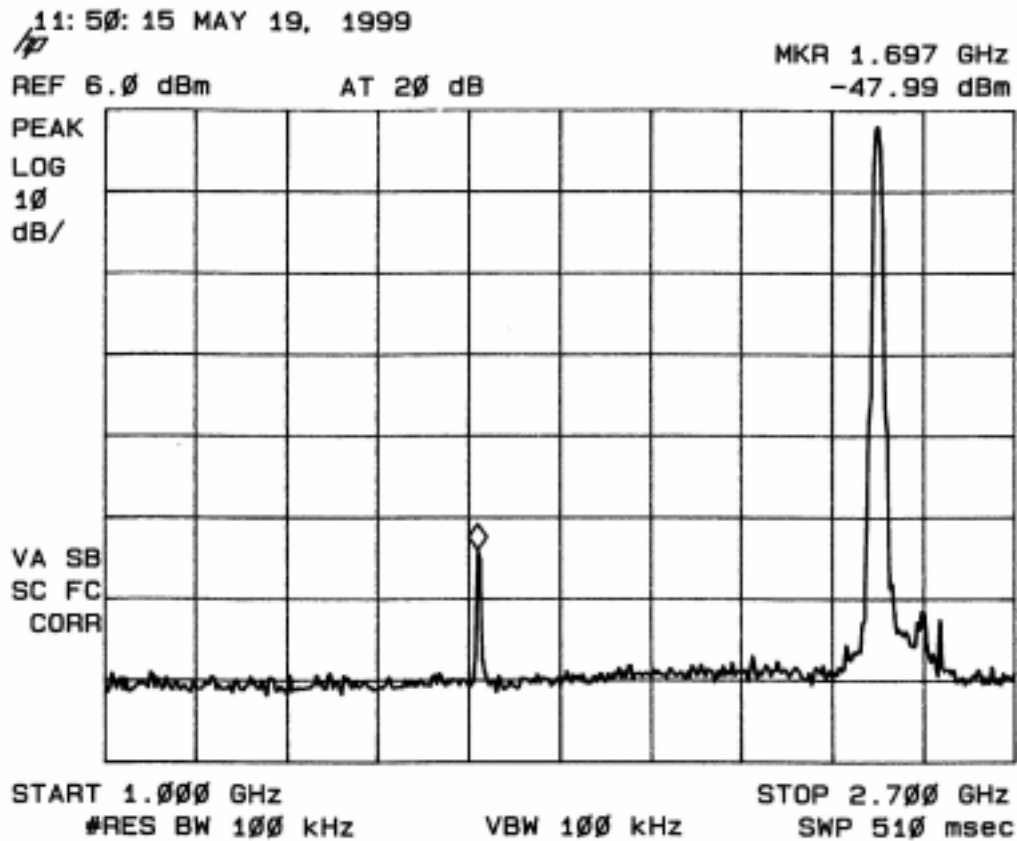
Plot 9.2: Conducted emissions 30 MHz – 1.0 GHz

Test personnel:

Tester signature :

Date: May 19, 1999

Typed/Printed name : Jan Sikkema



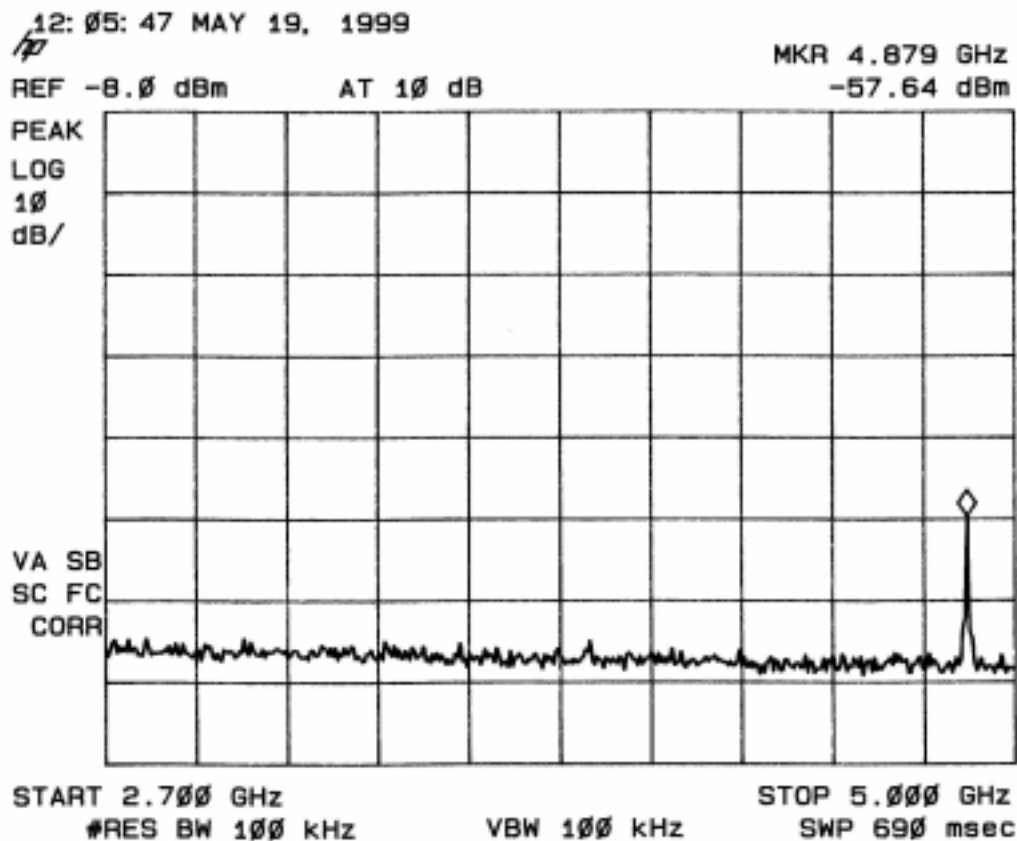
Plot 9.3: Conducted emissions 1.0 GHz – 2.7 GHz

Test personnel:

Tester signature :

Date: May 19, 1999

Typed/Printed name : Jan S. Sikkema



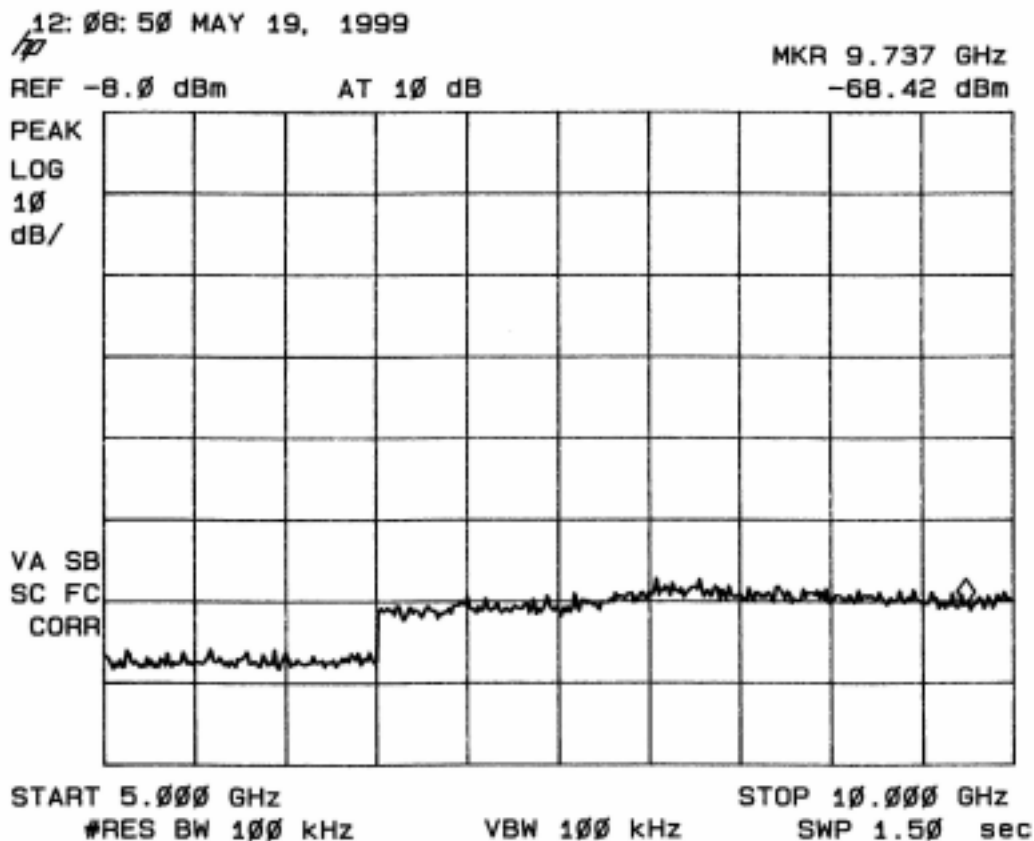
Plot 9.4: Conducted emissions 2.7 GHz – 5.0 GHz

Test personnel:

Tester signature :

Date: May 19, 1999

Typed/Printed name : Jan S. Sikkema



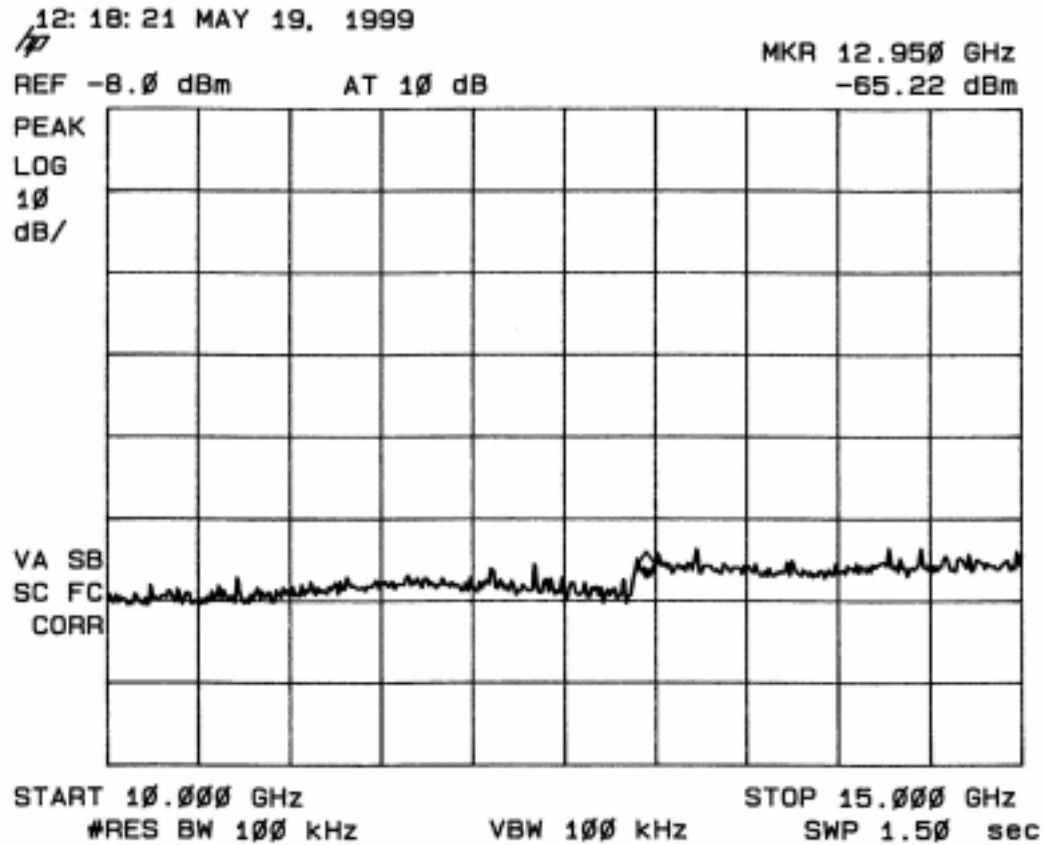
Plot 9.5: Conducted emissions 5.0 GHz – 10.0 GHz

Test personnel:

Tester signature :

Date: May 19, 1999

Typed/Printed name : Jan S. Sikkema



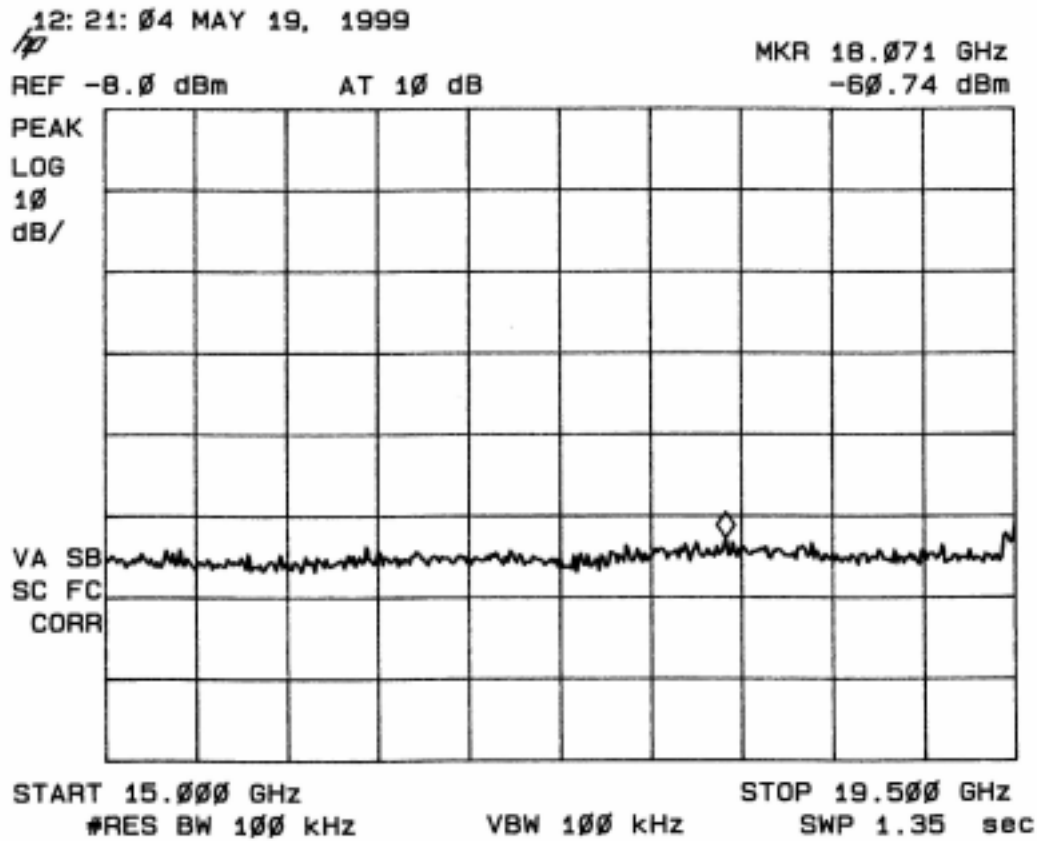
Plot 9.6: Conducted emissions 10.0 – 15.0 GHz

Test personnel:

Tester signature :

Date: May 19, 1999

Typed/Printed name : Jan S. Sikkema



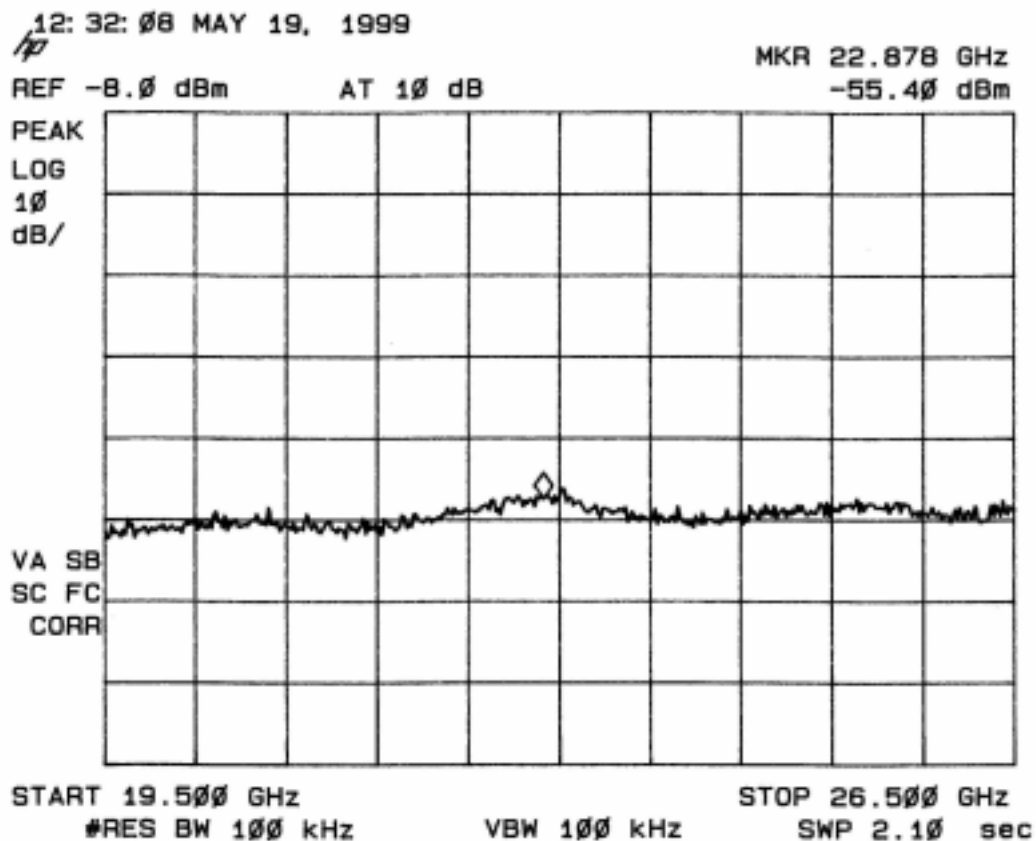
Plot 9.7: Conducted emissions 15.0 – 19.5 GHz

Test personnel:

Tester signature :

Date: May 19, 1999

Typed/Printed name : Jan S. Sikkema



Plot 9.8: Conducted emissions 19.5 – 26.5 GHz

Test personnel:

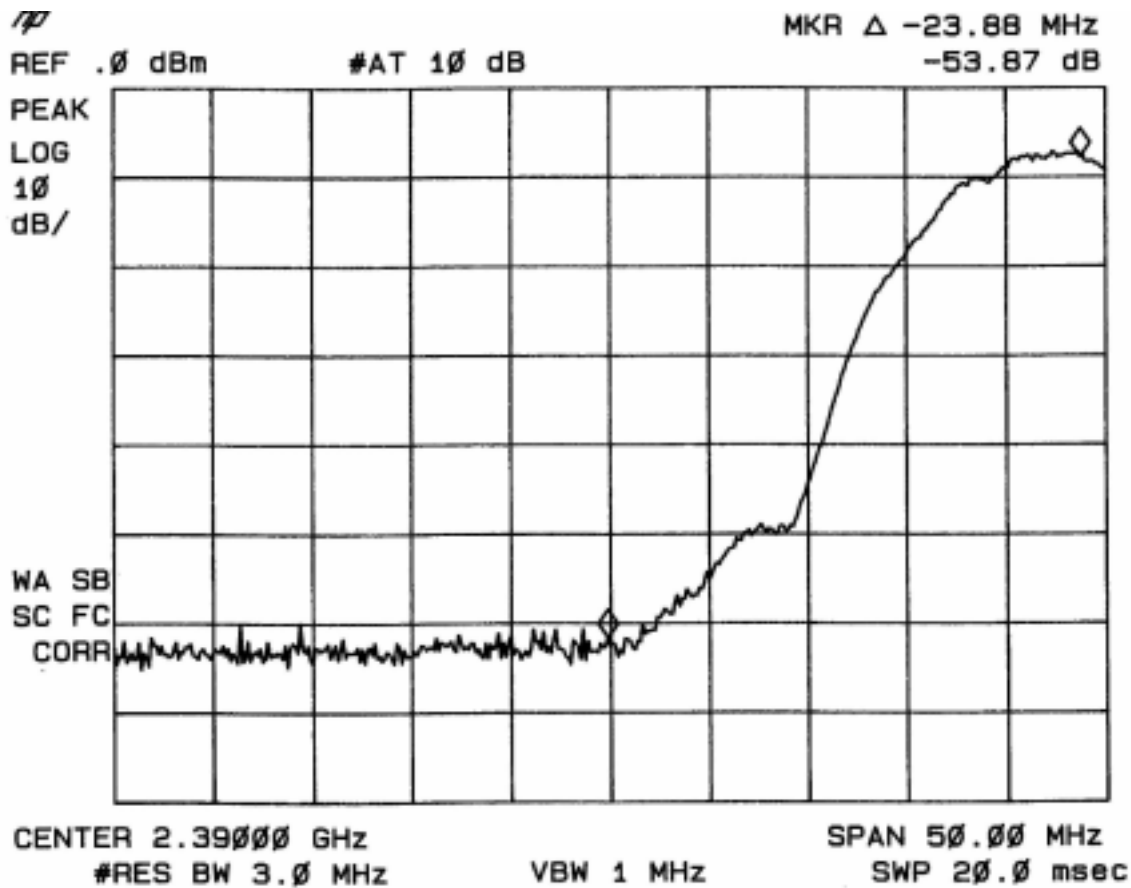
Tester signature :

Date: May 19, 1999

Typed/Printed name : Jan S. Sikkema

10 Restricted bands of operation.

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



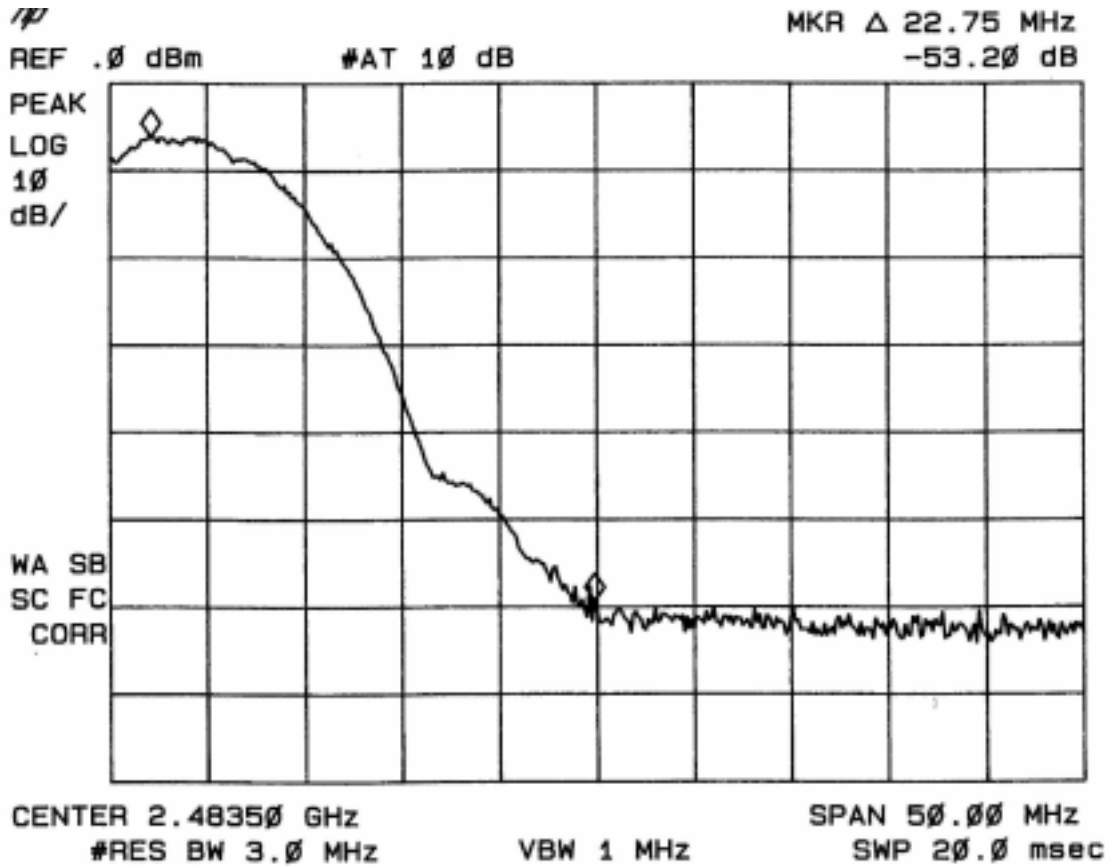
Plot 10.1: Conducted emissions at 2.390 GHz centre frequency

Test personnel:

Tester signature :

Date: June 17 , 1999

Typed/Printed name : Jan S. Sikkema



Plot 10.2: Conducted emissions at 2.4835 GHz centre frequency

Test personnel:

Tester signature :

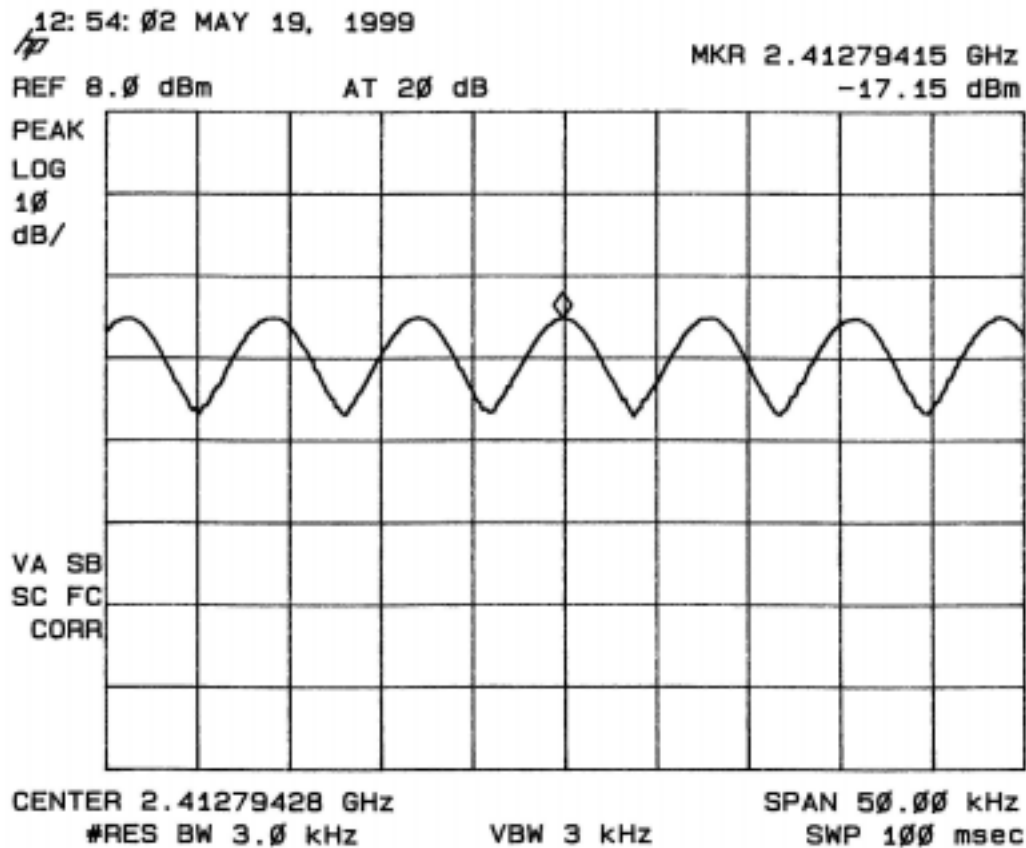
Date: June 17, 1999

Typed/Printed name : Jan S. Sikkema

11 Peak power density

The peak power measurement was performed in accordance with FCC 15.247 (d)

11.1 Channel 1



Plot 11.1: Peak Power Spectral Density plot of channel 1

Modulation = 11 Mbps

The peak power spectral density on channel 1 : -17.15 dBm.

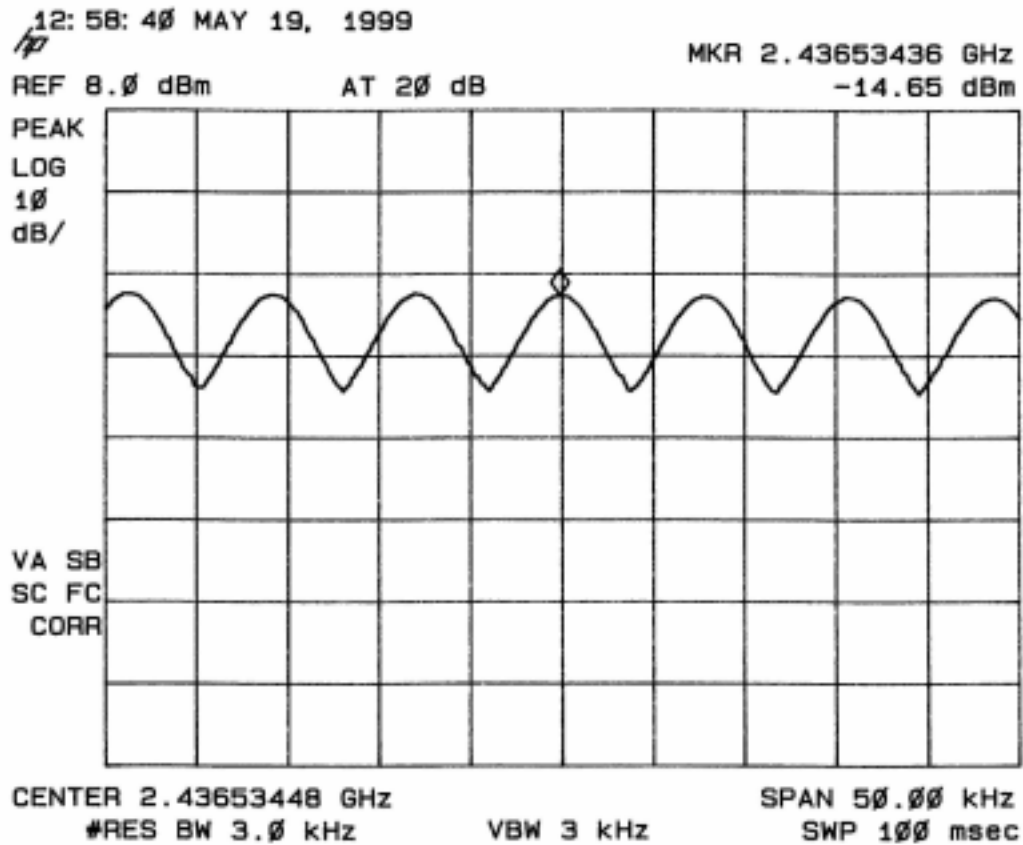
Test personnel:

Tester signature :

Date: May 19, 1999

Typed/Printed name : Jan S. Sikkema

11.2 Channel 6



Plot 11.2: Peak Power Spectral Density plot of channel 6

Modulation = 11 Mbps

The peak power spectral density on channel 6 : -14.65 dBm.

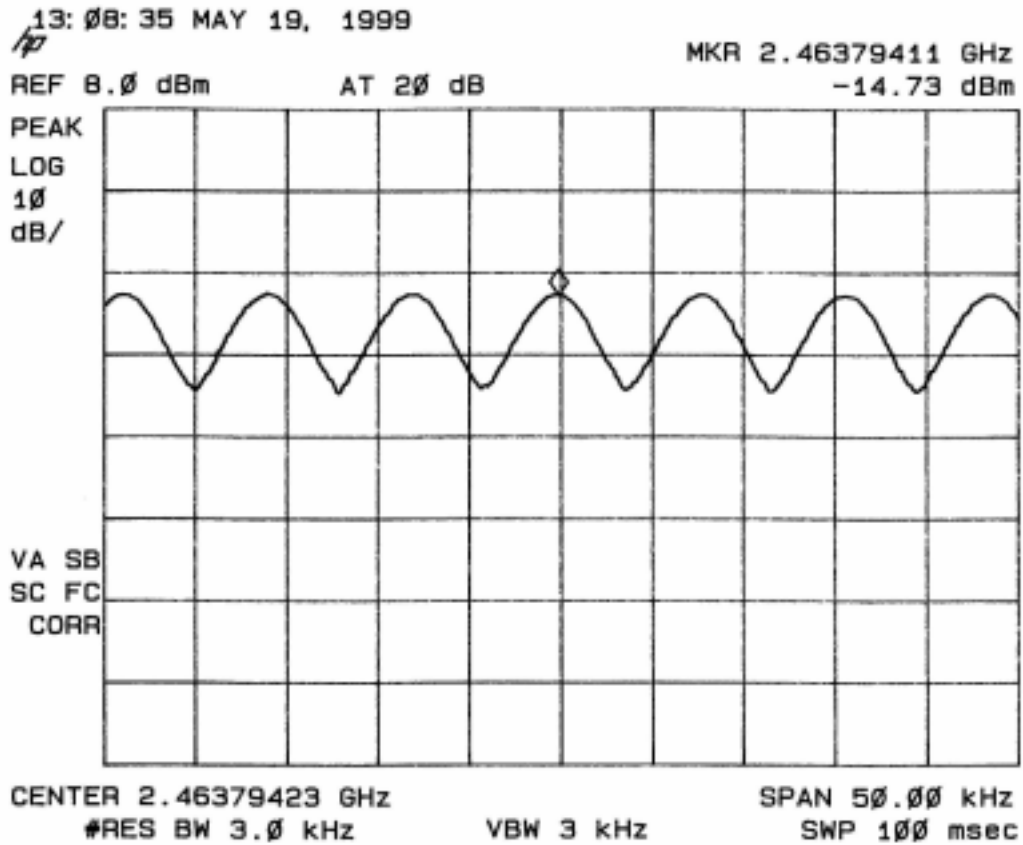
Test personnel:

Tester signature :

Date: May 19, 1999

Typed/Printed name : Jan S. Sikkema

11.3 Channel 11



Plot 11.3: Peak Power Spectral Density plot of channel 11

Modulation = 11 Mbps

The peak power spectral density on channel 11 : -14.73 dBm.

Test personnel:

Tester signature :

Date: May 19, 1999

Typed/Printed name : Jan S. Sikkema

12 Processing gain

The processing gain is measured using the CW jamming margin method. A signal generator is stepped in 50 kHz increments across the passband of the system. At each point the generator level required to produce a Bit Error Rate equivalent to $BER=1.0 \times 10^{-5}$ is recorded as the Jammer level (J). The output power of the transmitter is measured at the same point and recorded as Signal (S). The Jammer to Signal ratio (J/S) is then calculated with 20% of the worst datapoints discarded. The lowest remaining J/S ratio is used to calculate the processing gain using formula:

$$G_p = E_s/N_o + M_j + L_{sys}$$

with:

$E_s/N_o = 18.7$ dB for 11Mb/s (obtained from manufacturer's specification of spreading processor Harris semiconductor model HFA3860B)

$L_{sys} = 2$ dB

Measured lowest remaining J/S = $M_j = -10.6$ dB

$$G_p = 18.7 \text{ dB} + (-10.6 \text{ dB}) + 2 \text{ dB} = 10.1 \text{ dB}$$

12.1 Blockdiagram CW Jamming testsetup:

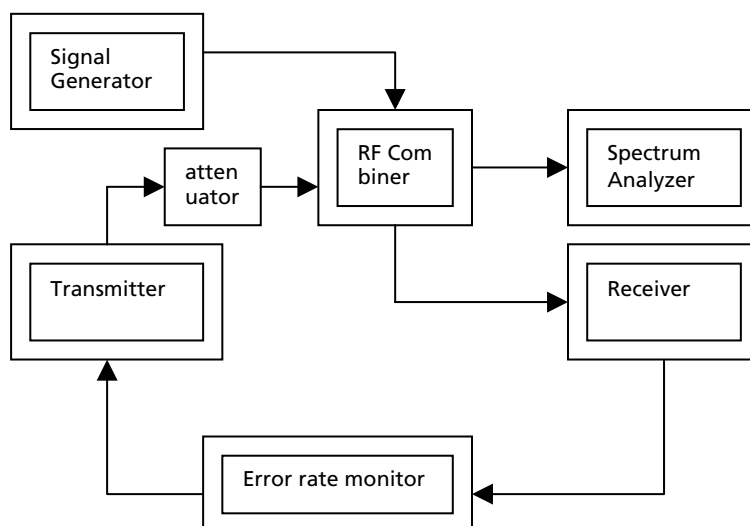


figure 12.1: blockdiagram of testsetup

12.2 Processing Gain testresults tables

pass band = $f_o \pm 5\text{MHz}$ (5000 kHz = 100 x 50 kHz)

channel: 07 = 2441.7 MHz 1 of 4 (Parrot 1100 to Pelican 1100)

Frequency (MHz)	frequency offset (kHz)	J (dBm)	S (dBm)	J/S (dB)
2446.95	+100 x 50	-59.3	-51.0	-8.3
2446.90	+99 x 50	-59.2	-51.0	-8.2
2446.85	+98 x 50	-59.3	-51.0	-8.3
2446.80	+97 x 50	-59.2	-51.0	-8.2
2446.75	+96 x 50	-58.8	-51.0	-7.8
2446.70	+95 x 50	-58.8	-51.0	-7.8
2446.65	+94 x 50	-57.8	-51.0	-6.8
2446.60	+93 x 50	-57.9	-51.0	-6.9
2446.55	+92 x 50	-57.5	-51.0	-6.5
2446.50	+91 x 50	-57.2	-51.0	-6.2
2446.45	+90 x 50	-57.2	-51.0	-6.2
2446.40	+89 x 50	-57.1	-51.0	-6.1
2446.35	+88 x 50	-58.7	-51.0	-7.7
2446.30	+87 x 50	-58.6	-51.0	-7.6
2446.25	+86 x 50	-59.6	-51.0	-8.6
2446.15	+85 x 50	-59.7	-51.0	-8.7
2446.10	+84 x 50	-60.1	-51.0	-9.1
2446.05	+83 x 50	-60.7	-51.0	-9.7
2446.00	+82 x 50	-61.1	-51.0	-10.1
2445.95	+81 x 50	-61.1	-51.0	-10.1
2445.90	+80 x 50	-61.2	-51.0	-10.2
2445.85	+79 x 50	-61.5	-51.0	-10.5
2445.80	+78 x 50	-61.4	-51.0	-10.4
2445.75	+77 x 50	-62.3	-51.0	-11.3
2445.70	+76 x 50	-62.5	-51.0	-11.5
2445.65	+75 x 50	-61.2	-51.0	-10.2
2445.60	+74 x 50	-61.0	-51.0	-10
2445.55	+73 x 50	-58.9	-51.0	-7.9
2445.50	+72 x 50	-58.8	-51.0	-7.8
2445.45	+71 x 50	-60.5	-51.0	-9.5
2445.40	+70 x 50	-60.4	-51.0	-9.4
2445.35	+69 x 50	-59.2	-51.0	-8.2
2445.30	+68 x 50	-59.1	-51.0	-8.1
2445.25	+67 x 50	-60.6	-51.0	-9.6
2445.15	+66 x 50	-60.2	-51.0	-9.2
2445.10	+65 x 50	-61.0	-51.0	-10
2445.05	+64 x 50	-61.2	-51.0	-10.2
2445.00	+63 x 50	-60.8	-51.0	-9.8
2444.95	+62 x 50	-60.3	-51.0	-9.3
2444.90	+61 x 50	-60.0	-51.0	-9
2444.85	+60 x 50	-59.4	-51.0	-8.4
2444.80	+59 x 50	-59.5	-51.0	-8.5
2444.75	+58 x 50	-59.5	-51.0	-8.5
2444.70	+57 x 50	-59.3	-51.0	-8.3
2444.65	+56 x 50	-59.0	-51.0	-8
2444.60	+55 x 50	-58.6	-51.0	-7.6
2444.55	+54 x 50	-58.2	-51.0	-7.2
2444.50	+53 x 50	-58.1	-51.0	-7.1
2444.45	+52 x 50	-58.1	-51.0	-7.1
2444.40	+51 x 50	-57.7	-51.0	-6.7
2444.35	+50 x 50	-57.9	-51.0	-6.9

Table 12.1 : J/S values for $f_o(+50 \times 50\text{kHz})$ to $f_o(+100 \times 50\text{kHz})$

pass band = $f_o \pm 5\text{MHz}$ (5000 kHz = 100 x 50 kHz)

channel: 07 = 2441.7 MHz 2 of 4 (Parrot 1100 to Pelican 1100)

Frequency (MHz)	frequency offset (kHz)	J (dBm)	S (dBm)	J/S (dB)
2444.35	+50 x 50	-57.9	-51.0	-6.9
2444.30	+49 x 50	-57.9	-51.0	-6.9
2444.25	+48 x 50	-57.7	-51.0	-6.7
2444.15	+47 x 50	-57.9	-51.0	-6.9
2444.10	+46 x 50	-58.0	-51.0	-7
2444.05	+45 x 50	-57.8	-51.0	-6.8
2444.00	+44 x 50	-57.5	-51.0	-6.5
2443.95	+43 x 50	-58.0	-51.0	-7
2443.90	+42 x 50	-58.3	-51.0	-7.3
2443.85	+41 x 50	-59.1	-51.0	-8.1
2443.80	+40 x 50	-59.0	-51.0	-8
2443.75	+39 x 50	-59.8	-51.0	-8.8
2443.70	+38 x 50	-61.1	-51.0	-10.1
2443.65	+37 x 50	-62.3	-51.0	-11.3
2443.60	+36 x 50	-62.4	-51.0	-11.4
2443.55	+35 x 50	-61.9	-51.0	-10.9
2443.50	+34 x 50	-61.5	-51.0	-10.5
2443.45	+33 x 50	-61.3	-51.0	-10.3
2443.40	+32 x 50	-61.2	-51.0	-10.2
2443.35	+31 x 50	-61.9	-51.0	-10.9
2443.30	+30 x 50	-62.7	-51.0	-11.7
2443.25	+29 x 50	-61.9	-51.0	-10.9
2443.15	+28 x 50	-61.6	-51.0	-10.6
2443.10	+27 x 50	-61.6	-51.0	-10.6
2443.05	+26 x 50	-61.5	-51.0	-10.5
2443.00	+25 x 50	-62.1	-51.0	-11.1
2442.95	+24 x 50	-62.6	-51.0	-11.6
2442.90	+23 x 50	-63.1	-51.0	-12.1
2442.85	+22 x 50	-63.5	-51.0	-12.5
2442.80	+21 x 50	-63.7	-51.0	-12.7
2442.75	+20 x 50	-63.8	-51.0	-12.8
2442.70	+19 x 50	-64.0	-51.0	-13
2442.65	+18 x 50	-64.3	-51.0	-13.3
2442.60	+17 x 50	-63.0	-51.0	-12
2442.55	+16 x 50	-63.1	-51.0	-12.1
2442.50	+15 x 50	-61.8	-51.0	-10.8
2442.45	+14 x 50	-60.3	-51.0	-9.3
2442.40	+13 x 50	-60.9	-51.0	-9.9
2442.35	+12 x 50	-61.0	-51.0	-10
2442.30	+11 x 50	-60.9	-51.0	-9.9
2442.25	+10 x 50	-60.9	-51.0	-9.9
2442.15	+09 x 50	-59.6	-51.0	-8.6
2442.10	+08 x 50	-59.4	-51.0	-8.4
2442.05	+07 x 50	-58.6	-51.0	-7.6
2442.00	+06 x 50	-58.1	-51.0	-7.1
2441.95	+05 x 50	-59.0	-51.0	-8
2441.90	+04 x 50	-59.8	-51.0	-8.8
2441.85	+03 x 50	-60.3	-51.0	-9.3
2441.80	+02 x 50	-60.9	-51.0	-9.9
2441.75	+01 x 50	-61.3	-51.0	-10.3
2441.70	+00 x 50	-61.5	-51.0	-10.5

Table 12.2 : J/S values for $f_o(+0x50\text{kHz})$ to $f_o(+50x50\text{kHz})$

pass band = $f_o \pm 5\text{MHz}$ (5000 kHz = 100 x 50 kHz)

channel: 07 = 2441.7 MHz 3 of 4 (Parrot 1100 to Pelican 1100)

Frequency (MHz)	frequency offset (kHz)	J (dBm)	S (dBm)	J/S (dB)
2436.70	-100 x 50	-55.8	-51.0	-4.8
2436.75	-99 x 50	-55.9	-51.0	-4.9
2436.80	-98 x 50	-55.8	-51.0	-4.8
2436.85	-97 x 50	-55.9	-51.0	-4.9
2436.90	-96 x 50	-55.8	-51.0	-4.8
2436.95	-95 x 50	-55.8	-51.0	-4.8
2437.00	-94 x 50	-55.9	-51.0	-4.9
2437.05	-93 x 50	-55.9	-51.0	-4.9
2437.10	-92 x 50	-56.0	-51.0	-5
2437.15	-91 x 50	-56.0	-51.0	-5
2437.20	-90 x 50	-56.8	-51.0	-5.8
2437.25	-89 x 50	-57.2	-51.0	-6.2
2437.30	-88 x 50	-57.5	-51.0	-6.5
2437.35	-87 x 50	-57.8	-51.0	-6.8
2437.40	-86 x 50	-58.0	-51.0	-7
2437.45	-85 x 50	-58.2	-51.0	-7.2
2437.50	-84 x 50	-58.5	-51.0	-7.5
2437.55	-83 x 50	-58.8	-51.0	-7.8
2437.60	-82 x 50	-58.3	-51.0	-7.3
2437.65	-81 x 50	-58.2	-51.0	-7.2
2437.70	-80 x 50	-59.1	-51.0	-8.1
2437.75	-79 x 50	-59.7	-51.0	-8.7
2437.80	-78 x 50	-60.3	-51.0	-9.3
2437.85	-77 x 50	-61.5	-51.0	-10.5
2437.90	-76 x 50	-61.0	-51.0	-10
2437.95	-75 x 50	-60.4	-51.0	-9.4
2438.00	-74 x 50	-60.6	-51.0	-9.6
2438.05	-73 x 50	-60.5	-51.0	-9.5
2438.10	-72 x 50	-61.0	-51.0	-10
2438.15	-71 x 50	-61.1	-51.0	-10.1
2438.20	-70 x 50	-61.1	-51.0	-10.1
2438.25	-69 x 50	-61.2	-51.0	-10.2
2438.30	-68 x 50	-61.1	-51.0	-10.1
2438.35	-67 x 50	-61.0	-51.0	-10
2438.40	-66 x 50	-61.2	-51.0	-10.2
2438.45	-65 x 50	-61.8	-51.0	-10.8
2438.50	-64 x 50	-62.1	-51.0	-11.1
2438.55	-63 x 50	-62.5	-51.0	-11.5
2438.60	-62 x 50	-62.0	-51.0	-11
2438.65	-61 x 50	-61.2	-51.0	-10.2
2438.70	-60 x 50	-61.0	-51.0	-10
2438.75	-59 x 50	-60.7	-51.0	-9.7
2438.80	-58 x 50	-61.0	-51.0	-10
2438.85	-57 x 50	-61.2	-51.0	-10.2
2438.90	-56 x 50	-61.0	-51.0	-10
2438.95	-55 x 50	-61.5	-51.0	-10.5
2439.00	-54 x 50	-61.1	-51.0	-10.1
2439.05	-53 x 50	-61.4	-51.0	-10.4
2439.10	-52 x 50	-61.0	-51.0	-10
2439.15	-51 x 50	-60.5	-51.0	-9.5
2439.20	-50 x 50	-60.3	-51.0	-9.3

Table 12.3 : J/S values for $f_o(-50 \times 50\text{kHz})$ to $f_o(-100 \times 50\text{kHz})$

pass band = $f_o \pm 5\text{MHz}$ (5000 kHz = 100 x 50 kHz)
channel: 07 = 2441.7 MHz 4 of 4 (Parrot 1100 to Pelican 1100)

Frequency (MHz)	frequency offset (kHz)	J (dBm)	S (dBm)	J/S (dB)
2439.20	-50 x 50	-60.4	-51.0	-9.4
2439.25	-49 x 50	-59.6	-51.0	-8.6
2439.30	-48 x 50	-58.9	-51.0	-7.9
2439.35	-47 x 50	-57.8	-51.0	-6.8
2439.40	-46 x 50	-57.9	-51.0	-6.9
2439.45	-45 x 50	-57.8	-51.0	-6.8
2439.50	-44 x 50	-57.9	-51.0	-6.9
2439.55	-43 x 50	-58.6	-51.0	-7.6
2439.60	-42 x 50	-59.1	-51.0	-8.1
2439.65	-41 x 50	-58.3	-51.0	-7.3
2439.70	-40 x 50	-58.0	-51.0	-7
2439.75	-39 x 50	-59.0	-51.0	-8
2439.80	-38 x 50	-59.8	-51.0	-8.8
2439.85	-37 x 50	-60.5	-51.0	-9.5
2439.90	-36 x 50	-60.7	-51.0	-9.7
2439.95	-35 x 50	-60.4	-51.0	-9.4
2440.00	-34 x 50	-60.3	-51.0	-9.3
2440.05	-33 x 50	-60.8	-51.0	-9.8
2440.10	-32 x 50	-61.2	-51.0	-10.2
2440.15	-31 x 50	-60.9	-51.0	-9.9
2440.20	-30 x 50	-60.7	-51.0	-9.7
2440.25	-29 x 50	-60.5	-51.0	-9.5
2440.30	-28 x 50	-60.3	-51.0	-9.3
2440.35	-27 x 50	-60.1	-51.0	-9.1
2440.40	-26 x 50	-60.8	-51.0	-9.8
2440.45	-25 x 50	-60.9	-51.0	-9.9
2440.50	-24 x 50	-61.6	-51.0	-10.6
2440.55	-23 x 50	-62.4	-51.0	-11.4
2440.60	-22 x 50	-62.2	-51.0	-11.2
2440.65	-21 x 50	-62.1	-51.0	-11.1
2440.70	-20 x 50	-62.2	-51.0	-11.2
2440.75	-19 x 50	-62.1	-51.0	-11.1
2440.80	-18 x 50	-62.2	-51.0	-11.2
2440.85	-17 x 50	-62.4	-51.0	-11.4
2440.90	-16 x 50	-62.0	-51.0	-11
2440.95	-15 x 50	-61.6	-51.0	-10.6
2441.00	-14 x 50	-62.0	-51.0	-11
2441.05	-13 x 50	-62.4	-51.0	-11.4
2441.10	-12 x 50	-62.1	-51.0	-11.1
2441.15	-11 x 50	-62.0	-51.0	-11
2441.20	-10 x 50	-61.5	-51.0	-10.5
2441.25	-09 x 50	-61.6	-51.0	-10.6
2441.30	-08 x 50	-61.6	-51.0	-10.6
2441.35	-07 x 50	-61.5	-51.0	-10.5
2441.40	-06 x 50	-61.9	-51.0	-10.9
2441.45	-05 x 50	-61.6	-51.0	-10.6
2441.50	-04 x 50	-61.9	-51.0	-10.9
2441.55	-03 x 50	-62.0	-51.0	-11
2441.60	-02 x 50	-61.6	-51.0	-10.6
2441.65	-01 x 50	-61.5	-51.0	-10.5
2441.70	-00 x 50	-61.5	-51.0	-10.5

Table 12.4 : J/S values for $f_o(-0x50\text{kHz})$ to $f_o(-50x50\text{kHz})$

12.3 Summary of J/S values

J/S table 1	J/S table 2	J/S table 3	J/S table 4
-11.5	-13.3	-11.5	-11.4
-11.3	-13	-11.1	-11.4
-10.5	-12.8	-11	-11.4
-10.4	-12.7	-10.8	-11.2
-10.2	-12.5	-10.5	-11.2
-10.2	-12.1	-10.5	-11.2
-10.2	-12.1	-10.4	-11.1
-10.1	-12	-10.2	-11.1
-10.1	-11.7	-10.2	-11.1
-10	-11.6	-10.2	-11
-10	-11.4	-10.2	-11
-9.8	-11.3	-10.1	-11
-9.7	-11.1	-10.1	-11
-9.6	-10.9	-10.1	-10.9
-9.5	-10.9	-10.1	-10.9
-9.4	-10.9	-10	<i>J/S=-10.6</i>
-9.3	-10.8	-10	-10.6
-9.2	-10.6	-10	-10.6
-9.1	-10.6	-10	-10.6
-9	-10.5	-10	-10.6
-8.7	-10.5	-10	-10.6
-8.6	-10.5	-10	-10.5
-8.5	-10.3	-9.7	-10.5
-8.5	-10.3	-9.6	-10.5
-8.4	-10.2	-9.5	-10.5
-8.3	-10.1	-9.5	-10.2
-8.3	-10	-9.4	-9.9
-8.3	-9.9	-9.3	-9.9
-8.2	-9.9	-9.3	-9.8
-8.2	-9.9	-8.7	-9.8
-8.2	-9.9	-8.1	-9.7
-8.1	-9.3	-7.8	-9.7
-8	-9.3	-7.5	-9.5
-7.9	-8.8	-7.3	-9.5
-7.8	-8.8	-7.2	-9.4
-7.8	-8.6	-7.2	-9.4
-7.8	-8.4	-7	-9.3
-7.7	-8.1	-6.8	-9.3
-7.6	-8	-6.5	-9.1
-7.6	-8	-6.2	-8.8
-7.2	-7.6	-5.8	-8.6
-7.1	-7.3	-5	-8.1
-7.1	-7.1	-5	-8
-6.9	-7	-4.9	-7.9
-6.9	-7	-4.9	-7.6
-6.8	-6.9	-4.9	-7.3
-6.7	-6.9	-4.9	-7
-6.5	-6.9	-4.8	-6.9
-6.2	-6.8	-4.8	-6.9
-6.2	-6.7	-4.8	-6.8
-6.1	-6.5	-4.8	-6.8

Table 12.5: J/S values sorted in descending order

Note: Values in bold font are 20% worst case discarded. J/S = **-10.6** (italics)

12.4 Photograph of testsetup



Photograph 12.1: testsetup