



**TEST REPORT OF A 2.4 GHz RLAN MINIPCI CARD,  
BRAND AGERE, TYPE MPC13A-20, BUILT INTO A  
NOTEBOOK, BRAND DELL, TYPE C810, IN  
CONFORMITY WITH FCC PART 15 AND  
ANSI C63.4-1992**

**TNO Certification EPS**

**P.O. Box 15  
9822 ZG Niekerk (NL)  
Smidshornerweg 18  
9822 TL Niekerk (NL)**

**Telephone: +31 594 505005  
Telefax: +31 594 504804  
E-mail: [robben@certi.tno.nl](mailto:robben@certi.tno.nl)**



Description of EUT: 2.4 GHz RLAN MiniPCI Card  
Manufacturer: Agere Systems Nederland B.V.  
Brand mark: Agere  
Type: MPC13A-20  
FCC ID: IMRMPCIDE2

## MEASUREMENT/TECHNICAL REPORT

**Agere Systems Nederland B.V.**

**Modelnumber: MPC13A-20**

**FCC ID: IMRMPCIDE2**

August 17, 2001

This report concerns (check one):		<input type="radio"/> Original grant	<input type="radio"/> Class II change
Equipment type: Direct Sequence Spread Spectrum Transceiver			
Report prepared by:	Name	: P.A.J.M. Robben, B.Sc.E.E.	
	Company name	: TNO Certification EPS	
	Address	: Smidshornerweg 18	
	Telephone number	: + 31 594 505005	
	Telefax number	: + 31 594 504804	
	Mailing address	: P.O. Box 15	
	City/Place/Postal code	: 9822 ZG NIEKERK	
	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. TNO Certification EPS 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: August 17, 2001

Signature:

P. de Beer  
TNO Certification EPS



Description of EUT: 2.4 GHz RLAN MiniPCI Card  
Manufacturer: Agere Systems Nederland B.V.  
Brand mark: Agere  
Type: MPCI3A-20  
FCC ID: IMRMPCIDE2

---

Table of Contents	Page
<b>1 General information</b>	<b>4</b>
1.1 <i>Product description</i>	4
1.2 <i>Related submittal(s)/grant(s)</i>	4
1.3 <i>Tested system details</i>	4
1.4 <i>Test methodology</i>	5
1.5 <i>Test facility</i>	5
1.6 <i>List of measurement equipment</i>	6
1.7 <i>Bandwidth and antenna factors</i>	7
<b>2 Product labelling</b>	<b>8</b>
2.1 <i>FCC ID label</i>	8
2.2 <i>Location of the FCC ID label on the EUT</i>	8
<b>3 System test configuration</b>	<b>9</b>
3.1 <i>Justification</i>	9
3.2 <i>EUT exercise software</i>	10
3.3 <i>Special accessories</i>	10
3.4 <i>Equipment modifications</i>	10
3.5 <i>Configuration of the tested system</i>	10
<b>4 Block diagram(s) of the tested model</b>	<b>10</b>
<b>5 Conducted emission data</b>	<b>11</b>
5.1 <i>Conducted emission data, notebook type C810, transmit mode</i>	11
5.2 <i>Conducted emission data, notebook type C810, receive mode</i>	15
<b>6 Radiated emission data</b>	<b>18</b>
6.1 <i>Radiated emissions below 1 GHz</i>	18
6.1.1 <i>Radiated emission data, notebook type C810, transmit/receive mode</i>	18
6.2 <i>Radiated emissions above 1 GHz</i>	18



Description of EUT: 2.4 GHz RLAN MiniPCI Card  
Manufacturer: Agere Systems Nederland B.V.  
Brand mark: Agere  
Type: MPC13A-20  
FCC ID: IMRMPCIDE2

# 1 General information.

## 1.1 Product description.

The Agere 2.4 GHz RLAN MiniPCI card, type MPC13A-20 (referred to as EUT for the purpose of this test report), functions as an extension of any ethernet network equipped with wireless access points.

Notebook computers equipped with an Agere 2.4 GHz RLAN MiniPCI card have full access to the wireless network from anywhere in the facility where wireless access points are installed. It fits into any notebook PC that has a MiniPCI extension bus and provides access to the wireless network through a small antenna which is integrated into the notebook computer. The MiniPCI card, type MPC13A-20 features high-speed wireless connections, up to 11 Mbps. It supports full mobility and seamless roaming from cell to cell (handover). The air interface is interoperable with IEEE 802.11.

The EUT is powered from the notebook computer and has no external power supply.

## 1.2 Related submittal(s)/grant(s).

FCC ID: IMRMPCIDE2

## 1.3 Tested system details.

In the following table are details given about the configurations which were tested.

### Tested configuration

Model	Serial nr.	FCC ID	Description	Cable Descriptions
2.4 GHz RLAN MiniPCI card (EUT).	n.a.	IMRMPCIDE2	2.4 GHz RLAN MiniPCI card.	Direct connection with notebook computer via MiniPCI extension slot.
Microsoft PS/2 mouse.	01673101	C3KKMP3	PS/2 mouse.	Shielded cable to PS/2 mouse port.
Dell notebook computer, type Latitude C810.	n.a.	n.a., FCC DoC	Notebook computer.	Power cord to AC/DC power adapter. Shielded cable to PS/2 mouse. Shielded printer cable to HP printer.
Antenna, brand Centurion, type 360YN, integrated into notebook	n.a.	n.a.	Omnidirectional (Planar Inverted F-antenna) antenna having a gain of 0 dBi.	Shielded cable to MiniPCI card.
AC/DC power adapter used for notebook computer Latitude C810.	CN-09364U-12761-0C4-007R	n.a.	AC/DC power adapter, 100-240 VAC 50-60 Hz/1.5 Amps., 20 VDC out/3.5 Amps.	DC power cable to notebook computer. AC mains cable to 120 VAC.
HP Deskjet 895Cxi.	ES8B42307H	n.a.	Color deskjet printer	Shielded printer cable to notebook computer. DC power cable to AC/DC power adapter.
AC/DC power adapter used for HP Deskjet 895Cxi printer.	9833 R00	n.a.	AC/DC power adapter, 100-240 VAC 50-60 Hz/1 Amps., 18 VDC out/1.1 Amps.	DC power cable to printer. AC mains cable to 240 VAC.



Description of EUT: 2.4 GHz RLAN MiniPCI Card  
Manufacturer: Agere Systems Nederland B.V.  
Brand mark: Agere  
Type: MPC13A-20  
FCC ID: IMRMPCIDE2

---

#### **1.4 Test methodology.**

The test methodology used has been based on the requirements of FCC Part 15, (October 1, 2000 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 meters.

Field strength measurements on frequencies above 1 GHz were measured with appropriate pre-amplifiers, antennas and a spectrum analyzer. On found frequencies the measured 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 actual field strength.

#### **1.5 Test facility.**

The test facility located at TNO Certification EPS (formerly known as NMi Certin B.V., department of EMC, Telecommunications and Electrical Safety), 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.



Description of EUT: 2.4 GHz RLAN MiniPCI Card  
 Manufacturer: Agere Systems Nederland B.V.  
 Brand mark: Agere  
 Type: MPCI3A-20  
 FCC ID: IMRMPCIDE2

## 1.6 List of measurement equipment.

TNO 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



Description of EUT: 2.4 GHz RLAN MiniPCI Card  
Manufacturer: Agere Systems Nederland B.V.  
Brand mark: Agere  
Type: MPCI3A-20  
FCC ID: IMRMPCIDE2

TNO number	Description	Brand	Type
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 section 1.6 of this test report. The bandwidth of the test receiver switches automatically to the right bandwidth in accordance with CISPR 16. This is implemented in the test receiver. Also the antenna factors are included in the test receiver. The test 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.



Description of EUT: 2.4 GHz RLAN MiniPCI Card  
Manufacturer: Agere Systems Nederland B.V.  
Brand mark: Agere  
Type: MPC13A-20  
FCC ID: IMRMPCIDE2

---

## **2 Product labelling.**

### **2.1 FCC ID label.**

A label stating the FCC ID shall be attached to a notebook computer containing the 2.4 GHz RLAN MiniPCI card, brand Agere, type MPC13A-20.

See attached documentation for detailed information about the FCC ID label.

### **2.2 Location of the FCC ID label on the EUT.**

The FCC ID label will be placed on the bottom of notebook computers containing the 2.4 GHz RLAN MiniPCI card, brand Agere, type MPC13A-20.

See attached documentation for detailed information about the location of the FCC ID label.





Description of EUT: 2.4 GHz RLAN MiniPCI Card  
Manufacturer: Agere Systems Nederland B.V.  
Brand mark: Agere  
Type: MPCI3A-20  
FCC ID: IMRMPCIDE2

---

### 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 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).

This test report must be considered as an addendum to test report number 56305-00323-1, issued by Senton GmbH EMI/EMC test center in Germany on July 27, 2000 (as attached to this test report). Due to the change in antenna configuration only, the selected tests as described and reported in this test report are sufficient to cover the current FCC regulations in combination with this forementioned test report of Senton GmbH EMI/EMC test center.

The results of tests not mentioned in this test report, but required by FCC Part 15.247, may be found in the forementioned test report of Senton GmbH EMI/EMC test center.

#### Operating frequencies

Channel	Operating frequencies (MHz)	Test performed
1	2412	yes
2	2417	no
3	2422	no
4	2427	no
5	2432	no
6	2437	yes
7	2442	no
8	2447	no
9	2452	no
10	2457	no
11	2462	yes

To complete the configuration required by the FCC, the transmitter was tested in a notebook computer.



Description of EUT: 2.4 GHz RLAN MiniPCI Card  
Manufacturer: Agere Systems Nederland B.V.  
Brand mark: Agere  
Type: MPCI3A-20  
FCC ID: IMRMPCIDE2

---

### **3.2 EUT exercise software.**

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

### **3.3 Special accessories.**

No special accessories were used to achieve FCC compliance.

### **3.4 Equipment modifications.**

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

### **3.5 Configuration of the tested system.**

See attached documentation for detailed information.

## **4 Block diagram(s) of the tested model.**

See attached documentation for detailed information.



Description of EUT: 2.4 GHz WLAN MiniPCI Card  
Manufacturer: Agere Systems Nederland B.V.  
Brand mark: Agere  
Type: MPC13A-20  
FCC ID: IMRMPCIDE2

## 5 Conducted emission data.

### 5.1 Conducted emission data, notebook type C810, transmit mode.

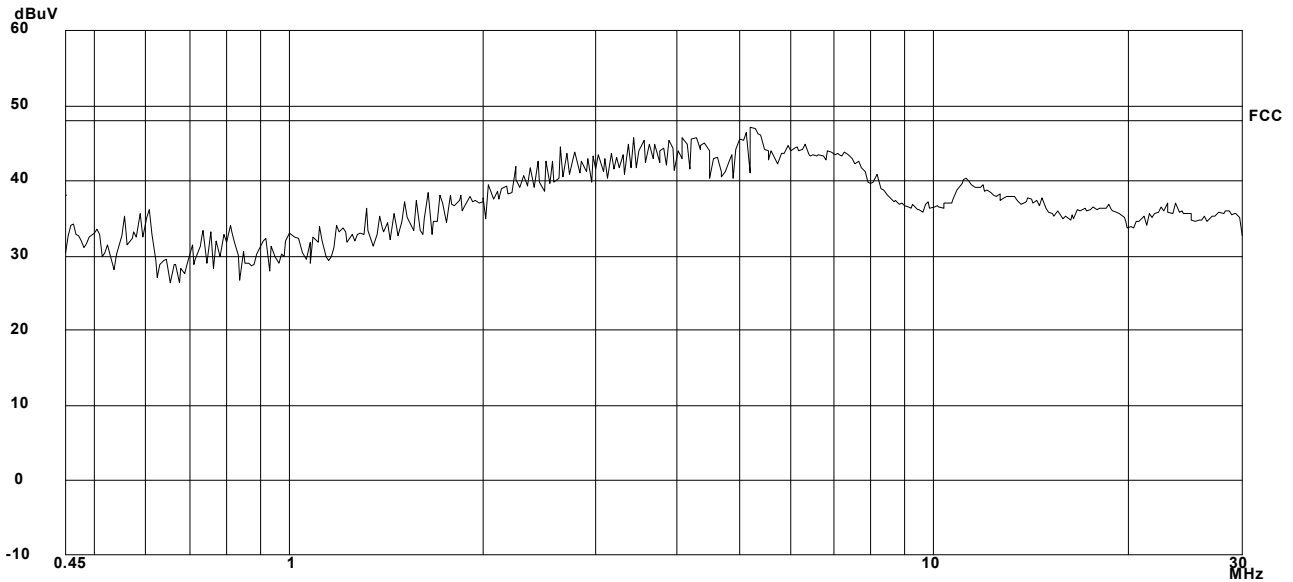


Figure 1 - Conducted emission on line 1 while operating on channel 1, notebook type C810.



Description of EUT: 2.4 GHz RLAN MiniPCI Card  
Manufacturer: Agere Systems Nederland B.V.  
Brand mark: Agere  
Type: MPCI3A-20  
FCC ID: IMRMPCIDE2

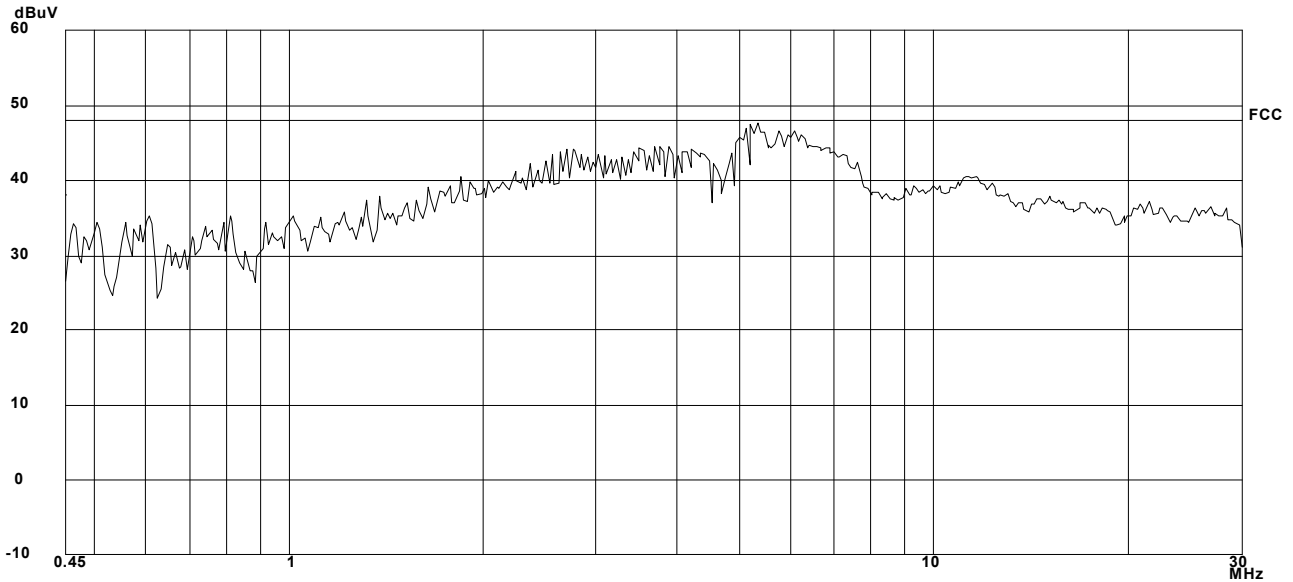


Figure 2 - Conducted emission on line 2 while operating on channel 1, notebook type C810.

The conducted emission measurements were carried out in accordance with FCC Part 15.207 and were performed with the EUT exercise program loaded and running. The EUT was continuously transmitting data on channel 1 (2412 MHz) during the conducted emission measurements. The conducted emission measurements have been carried out with an AC mains supply voltage of 120 V.

Test engineer:

Signature :

Date: August 17, 2001

Printed name : P.A.J.M. Robben



Description of EUT: 2.4 GHz WLAN MiniPCI Card  
Manufacturer: Agere Systems Nederland B.V.  
Brand mark: Agere  
Type: MPC13A-20  
FCC ID: IMRMPCIDE2

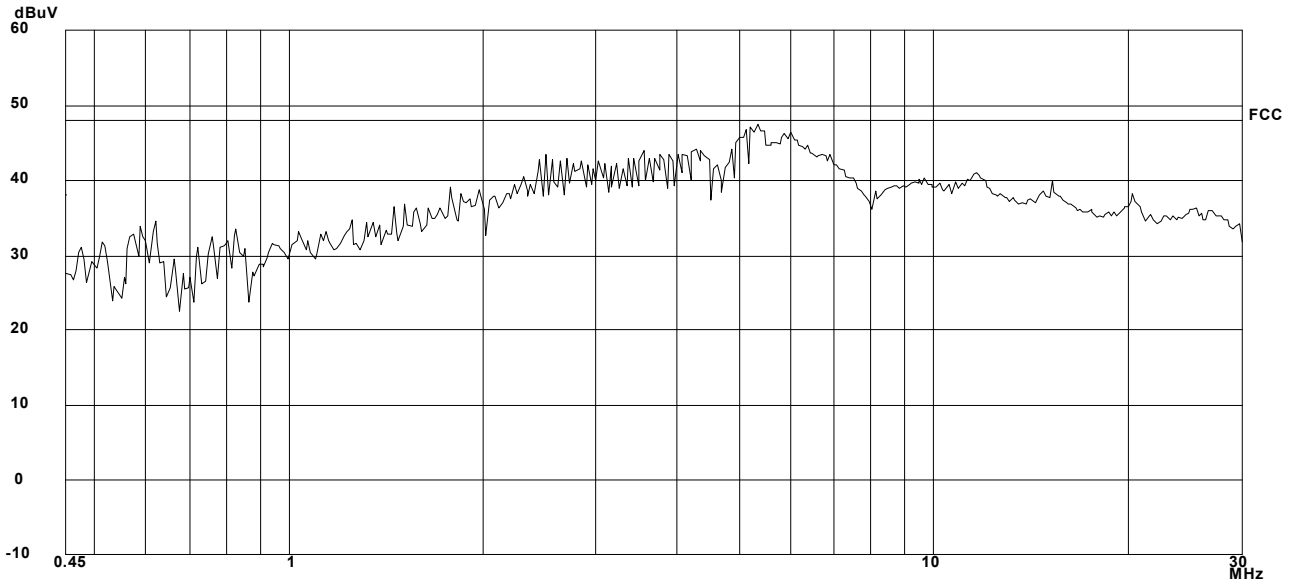


Figure 3 - Conducted emission on line 1 while operating on channel 6, notebook type C810.

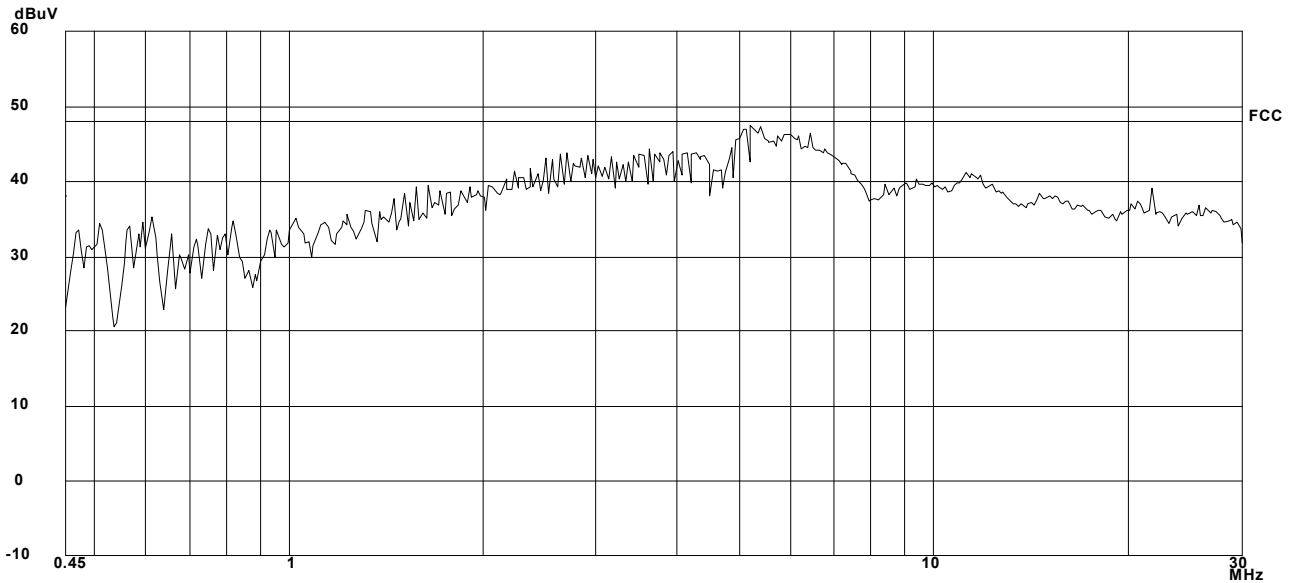


Figure 4 - Conducted emission on line 2 while operating on channel 6, notebook type C810.

The conducted emission measurements were carried out in accordance with FCC Part 15.207 and were performed with the EUT exercise program loaded and running. The EUT was continuously transmitting data on channel 6 (2437 MHz) during the conducted emission measurements. The conducted emission measurements have been carried out with an AC mains supply voltage of 120 V.

Test engineer:

Signature :

Date: August 17, 2001

Printed name : P.A.J.M. Robben



Description of EUT: 2.4 GHz RLAN MiniPCI Card  
Manufacturer: Agere Systems Nederland B.V.  
Brand mark: Agere  
Type: MPC13A-20  
FCC ID: IMRMPCIDE2

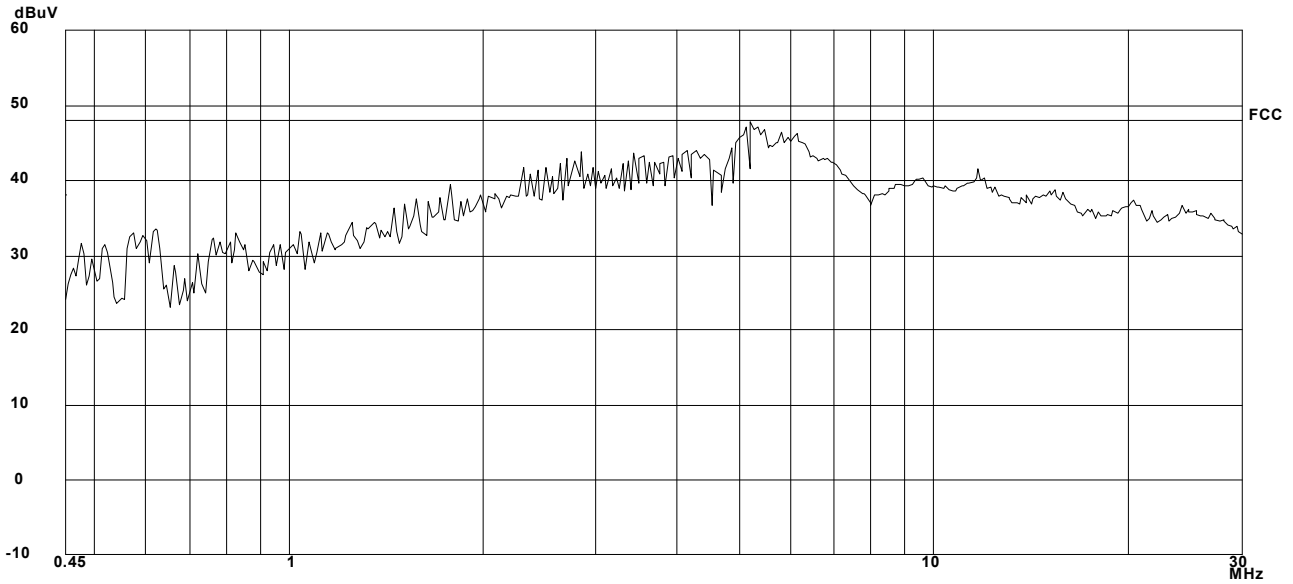


Figure 5 - Conducted emission on line 1 while operating on channel 11, notebook type C810.

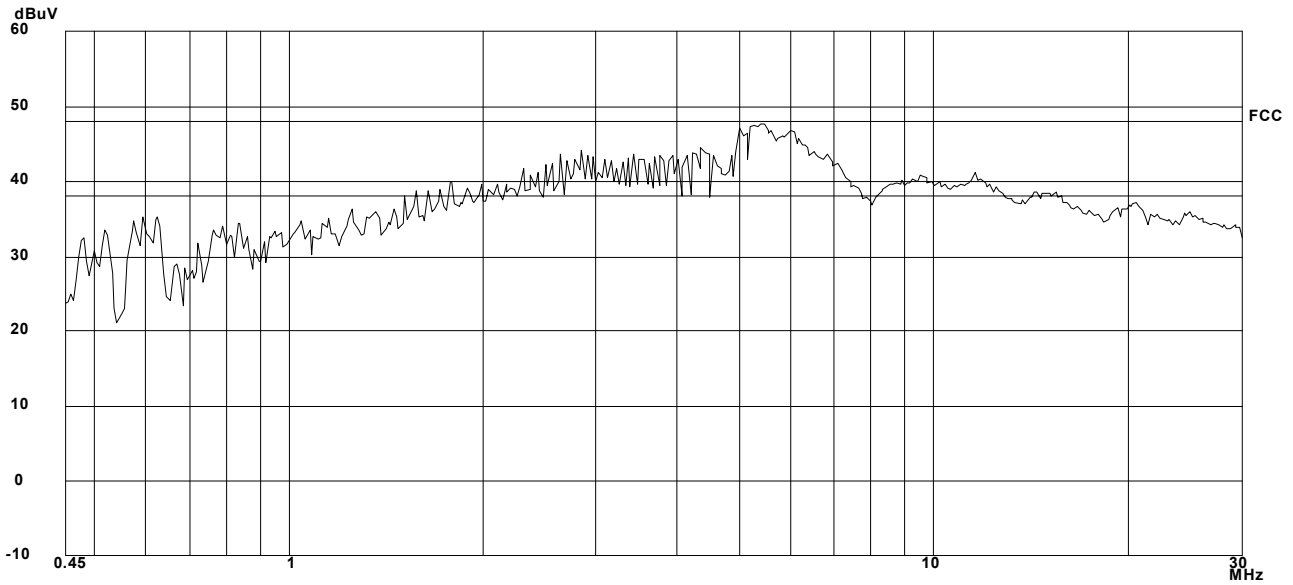


Figure 6 - Conducted emission on line 2 while operating on channel 11, notebook type C810.

The conducted emission measurements were carried out in accordance with FCC Part 15.207 and were performed with the EUT exercise program loaded and running. The EUT was continuously transmitting data on channel 11 (2462 MHz) during the conducted emission measurements. The conducted emission measurements have been carried out with an AC mains supply voltage of 120 V.

Test engineer:

Signature :

Date: August 17, 2001

Printed name : P.A.J.M. Robben



Description of EUT: 2.4 GHz RLAN MiniPCI Card  
Manufacturer: Agere Systems Nederland B.V.  
Brand mark: Agere  
Type: MPCI3A-20  
FCC ID: IMRMPCIDE2

## 5.2 Conducted emission data, notebook type C810, receive mode.

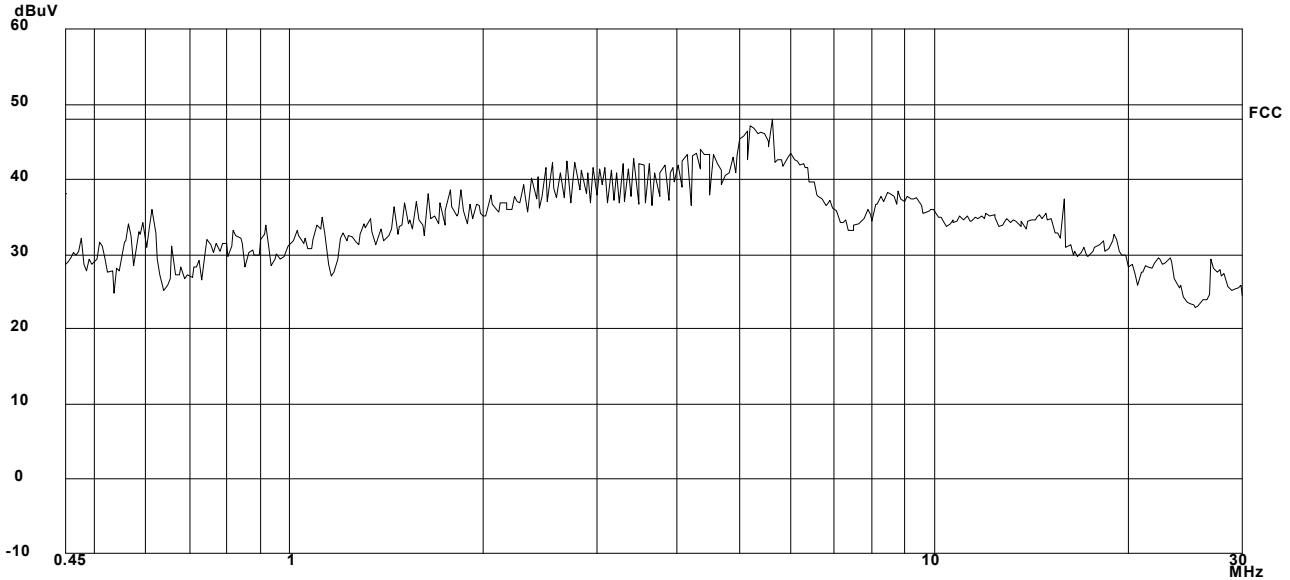


Figure 7 - Conducted emission on line 1 while operating on channel 1, notebook type C810.

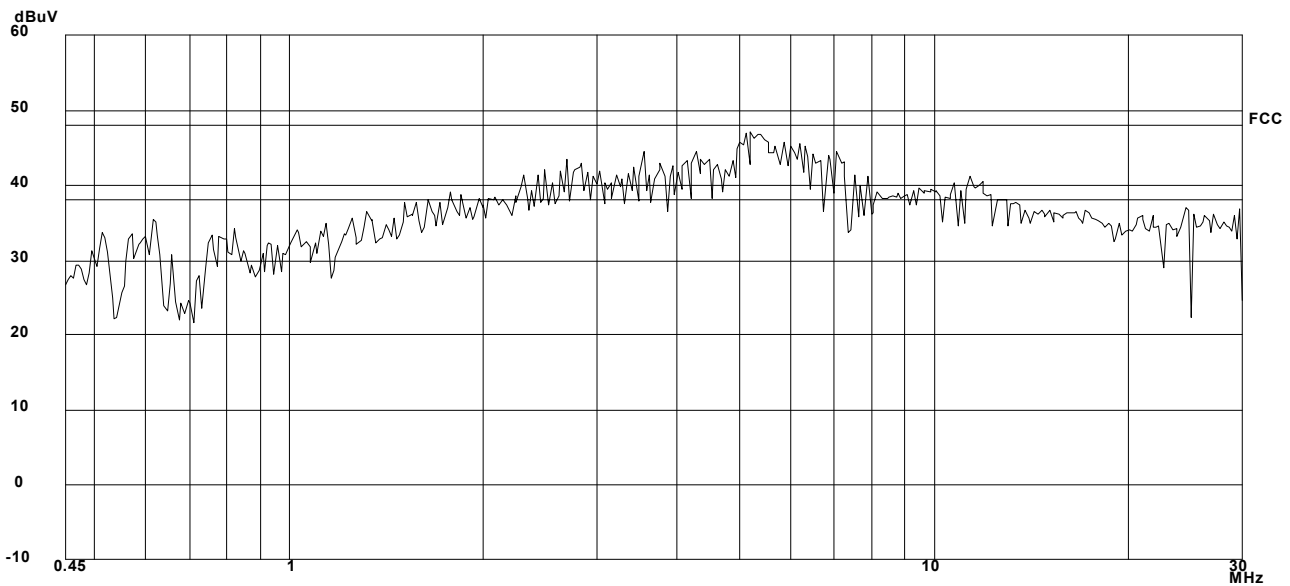


Figure 8 - Conducted emission on line 2 while operating on channel 1, notebook type C810.

The conducted emission measurements were carried out in accordance with FCC Part 15.207 and were performed with the EUT exercise program loaded and running. The EUT was continuously receiving data on channel 1 (2412 MHz) during the conducted emission measurements. The conducted emission measurements have been carried out with an AC mains supply voltage of 120 V.

Test engineer:

Signature :

Date: August 17, 2001

Printed name : P.A.J.M. Robben



Description of EUT: 2.4 GHz WLAN MiniPCI Card  
Manufacturer: Agere Systems Nederland B.V.  
Brand mark: Agere  
Type: MPC13A-20  
FCC ID: IMRMPCIDE2

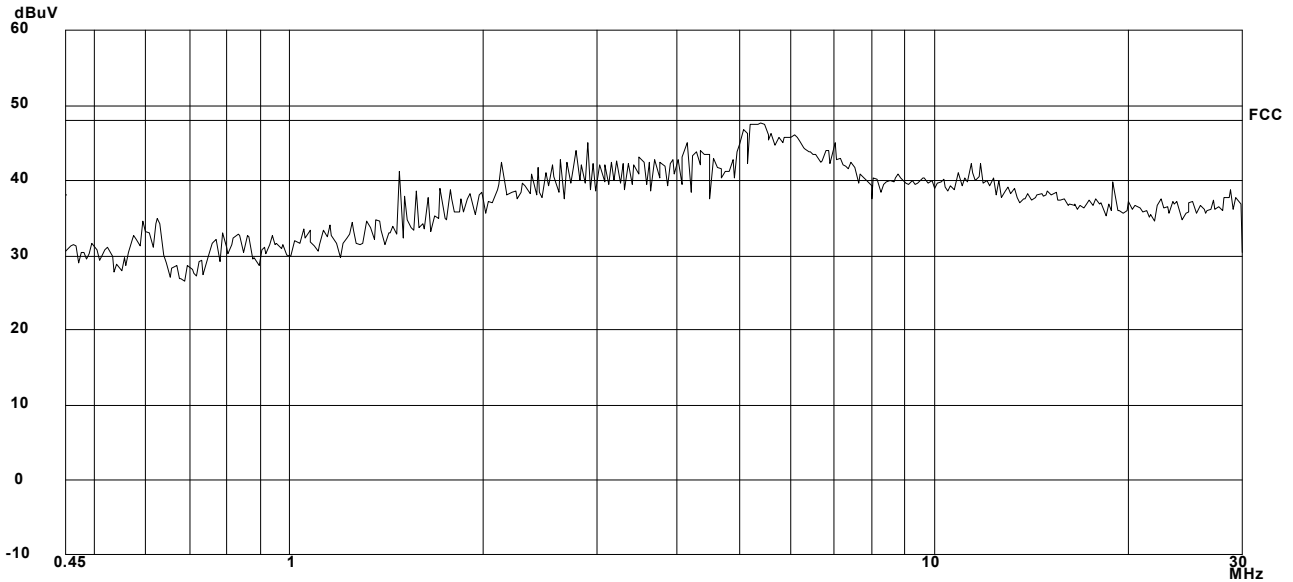


Figure 9 - Conducted emission on line 1 while operating on channel 6, notebook type C810.

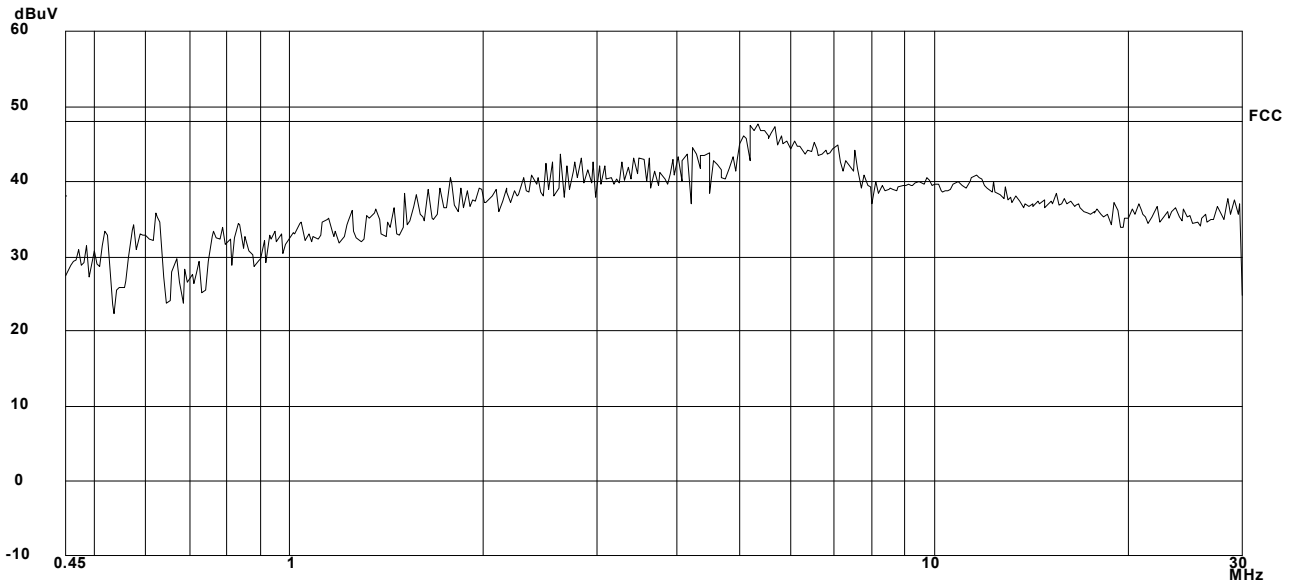


Figure 10 - Conducted emission on line 2 while operating on channel 6, notebook type C810.

The conducted emission measurements were carried out in accordance with FCC Part 15.207 and were performed with the EUT exercise program loaded and running. The EUT was continuously receiving data on channel 6 (2437 MHz) during the conducted emission measurements. The conducted emission measurements have been carried out with an AC mains supply voltage of 120 V.

Test engineer:

Signature :

Date: August 17, 2001

Printed name : P.A.J.M. Robben





Description of EUT: 2.4 GHz WLAN MiniPCI Card  
Manufacturer: Agere Systems Nederland B.V.  
Brand mark: Agere  
Type: MPC13A-20  
FCC ID: IMRMPCIDE2

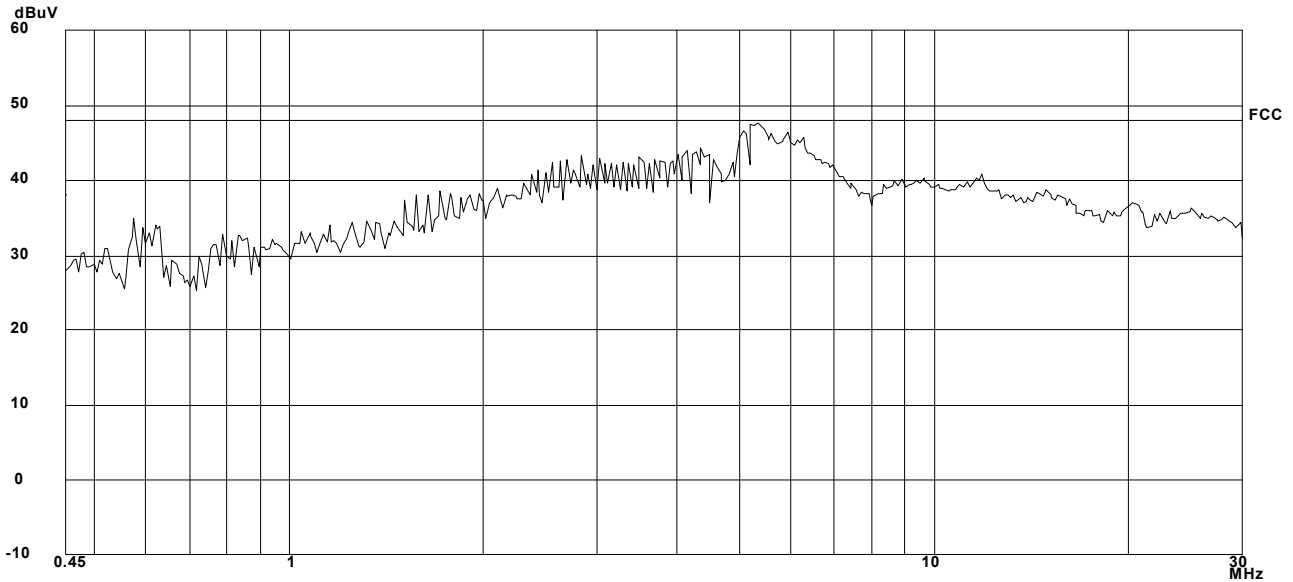


Figure 11 - Conducted emission on line 1 while operating on channel 11, notebook type C810.

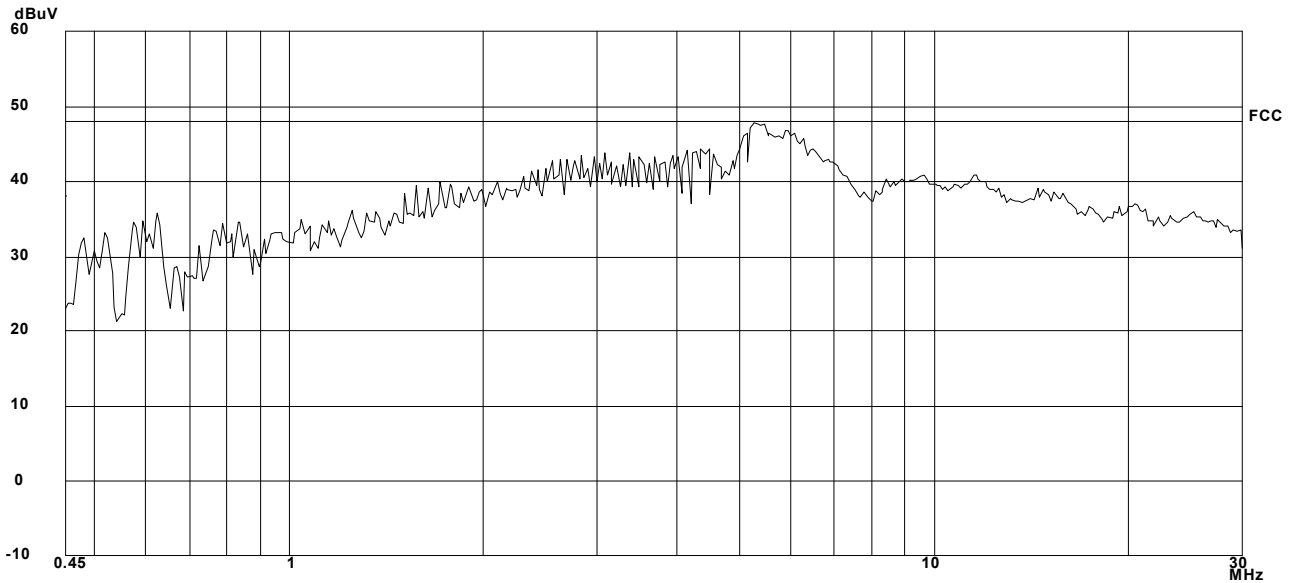


Figure 12 - Conducted emission on line 2 while operating on channel 11, notebook type C810.

The conducted emission measurements were carried out in accordance with FCC Part 15.207 and were performed with the EUT exercise program loaded and running. The EUT was continuously receiving data on channel 11 (2462 MHz) during the conducted emission measurements. The conducted emission measurements have been carried out with an AC mains supply voltage of 120 V.

Test engineer:

Signature :

Date: August 17, 2001

Printed name : P.A.J.M. Robben



## 6 Radiated emission data.

The following data lists the significant emission frequencies (worst case), measured levels in accordance with FCC 15.209. Measurements on channel 1 (2412 MHz), channel 6 (2437 MHz) and channel 11 (2462 MHz) showed that there was no significant difference in measurement results on the three channels in both transmit and receive mode. The results reported are similar for all three channels and operation modes.

### 6.1 Radiated emissions below 1 GHz.

#### 6.1.1 Radiated emission data, notebook type C810, transmit/receive mode.

Frequency (MHz)	Measurement results dB(µV)/m @ 3 metres Quasi-peak		Limits dB(µV)/m @ 3 metres Quasi-peak	Margin (dB) Quasi-peak		Result
	Vertical	Horizontal		Vertical	Horizontal	
167.280	28.5	34.0	43.5	-15.0	-9.5	PASS
405.000	32.0	27.6	46.5	-14.5	-18.9	PASS
420.000	32.9	27.9	46.5	-13.6	-18.6	PASS
454.900	35.1	30.7	46.5	-11.4	-15.8	PASS
703.990	36.4	37.8	46.5	-10.1	-8.7	PASS

Table 1 - Radiated emission data, notebook type C810

#### Notes:

All measured levels were obtained with the test receiver in quasi-peak mode, negative margin means the test result is below the limit. The levels of all other radiated emission components not reported were found to be more than 15 dB below the limits. The radiated emission measurements have been carried out with an AC mains supply voltage of 120 V.

Test engineer:

Signature : 

Date: August 17, 2001

Printed name : P.A.J.M. Robben

### 6.2 Radiated emissions above 1 GHz.

No significant spurious emissions were detected on frequencies above 1 GHz. Testing was performed on channel 1 (2412 MHz), channel 6 (2437 MHz) and channel 11 (2462 MHz) in both transmit and receive mode. Testing was performed on both configurations as described in section 1.3 of this test report.

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

Test engineer:

Signature : 

Date: August 17, 2001

Printed name : P.A.J.M. Robben