

Straubing, December 8, 1995

TEST-REPORT**No. 56305-51298****for****WaveLAN AT Rel. 4.0 (2.4 GHz)****RF-modem****Applicant: AT & T GIS WCND Utrecht BV****Purpose of testing: To show compliance with****FCC Code of Federal Regulations,
Part 15 Subpart C, Section §15.247
(Radiated Emission)****Note:**

The test data of this report relate only to the individual item which has been tested. This report shall not be reproduced except in full extent without the written approval of the testing laboratory.

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EXHIBIT

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1.0 Administrative Data

Equipment Under Test (EUT): WaveLAN AT Rel. 4.0 (2.4 GHz)

Type of equipment: RF-modem using DSSS technology for wireless communication (LAN connection) for personal computers with Industry Standard Architecture (ISA or AT interface)

Parts/accessories: with antenna (2.4 GHz)

FCC-ID: IMR24HAT

Applicant: AT & T Global Information Solutions
(full address) WCND Utrecht BV
Zadelstede 1-10
3431 JZ Nieuwegein
The Netherlands

Contract identification: ---

Contact person: Mr. Bert Vos

Manufacturer: AT & T GIS WCND Utrecht BV

Receipt of EUT: November 30, 1995

Date of test: Dezember 1 to 6, 1995

Note: ---

Responsible for testing: Rainer Heller

Responsible for test report: Rainer Heller

FCC-ID: IMR24HAT

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2.0 Summary of Test Results

The tested sample fully complies with the requirements for conducted and radiated emission set forth in the Code of Regulations Part 15 Subpart C, Section §15.247 (intentional radiators) of the Federal Communication Commission (FCC).



Johann Roidt
Technical Manager



Rainer Heller
Test Engineer

3.0 Operation Mode of EUT

Transmit-mode (TX):

Operating frequency [GHz]	Rated output power (conducted) [dBm]	Test performed
2.412	+ 12	X
2.422	+ 15	
2.432	+ 15	
2.442	+ 15	X
2.452	+ 15	
2.462	+ 12	X

Receive-mode (RX):

Operating frequency [GHz]	Test performed
2.412	
2.422	
2.432	
2.442	X
2.452	
2.462	

4.0 Configuration of EUT and Peripheral Devices

Configuration of cables of EUT

- Unshielded power lines for AC-power supply of PC and monitor
- Shielded antenna cable (coaxial)
- Shielded data cables connected to serial and parallel interface

Configuration of peripheral devices connected to EUT

- Personal computer HP Vectra 386s/20:
Serial no.: 3216F15324 FCC-ID: B94VECTRA386S-20
- VGA monitor Siemens S26361-K203-V311:
Serial no.: 17569281 FCC-ID: ASIC3X2
- PS/2-mouse HP C1413A:
Serial no.: 3227M01197 FCC-ID: B94C1413X
- Parallel printer HP ThinkJet 2225C +:
Serial no.: 3006S68236 FCC-ID: DSI6XU2225
- Modem Hayes Smartmodem 2400:
Serial no.: A064310833691 FCC-ID: BFI9D93108US

5.0 Photographs of EUT and Peripheral Devices

Photo No. 5.1

Top view of ISA board with modem module

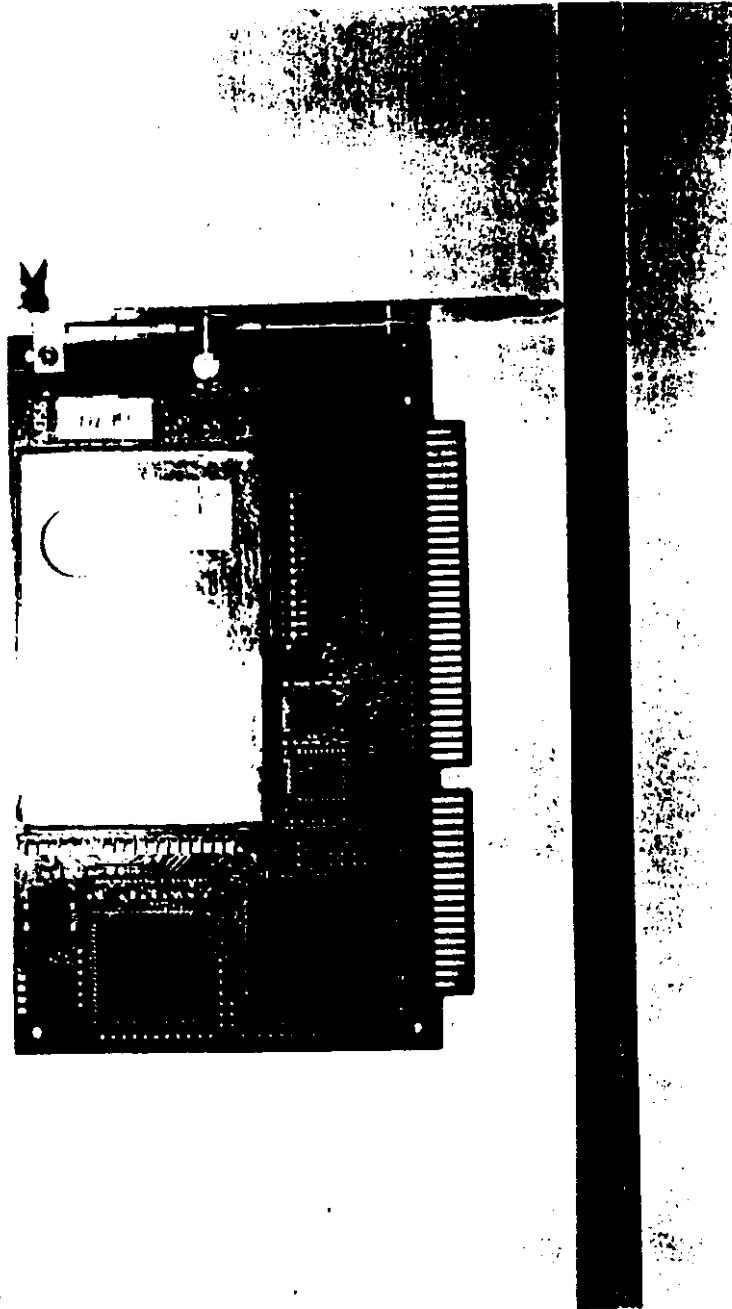


Photo No. 5.2

Back view of ISA board with modem module

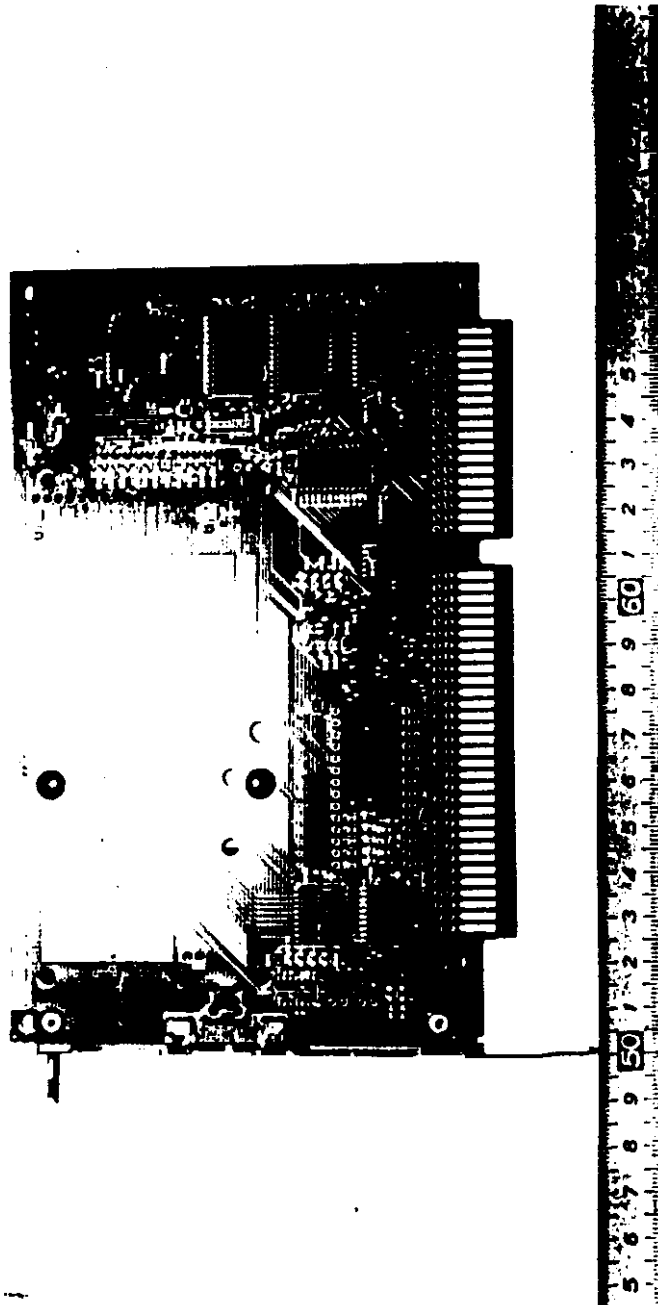


Photo No. 5.3

Top view of antenna (2.4 GHz)

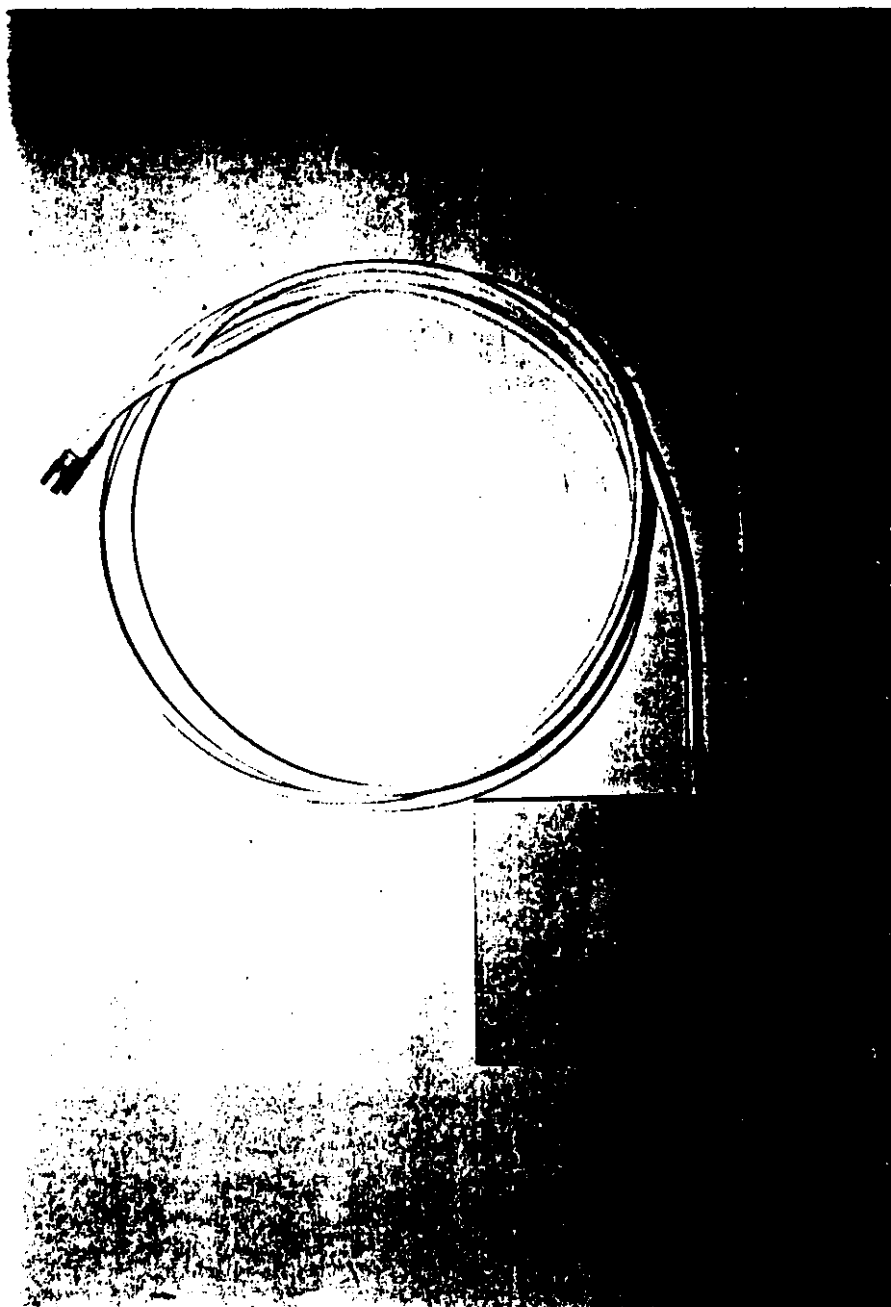
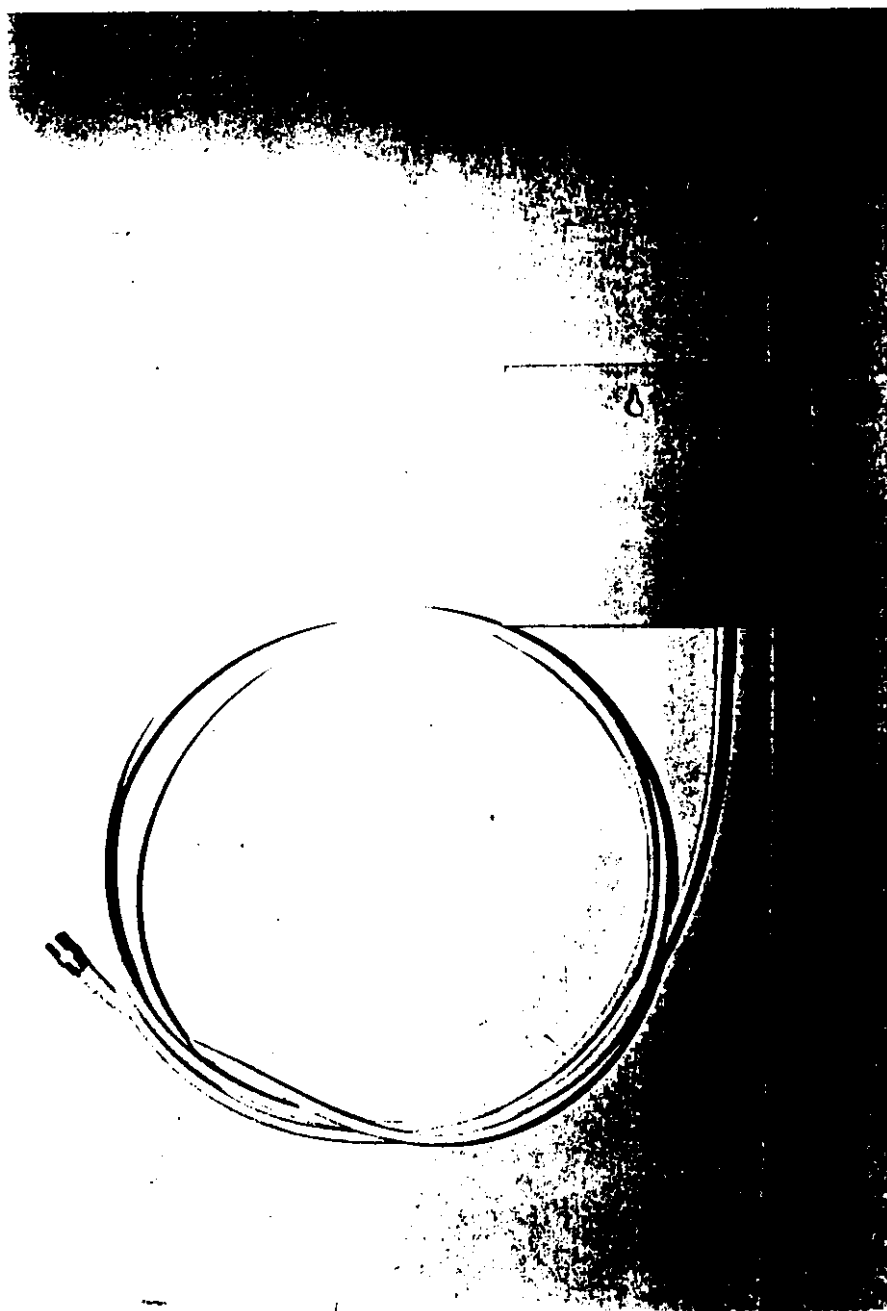


Photo No. 5.4

Back view of antenna (2.4 GHz)



Top view of printed board of antenna (2.4 GHz)

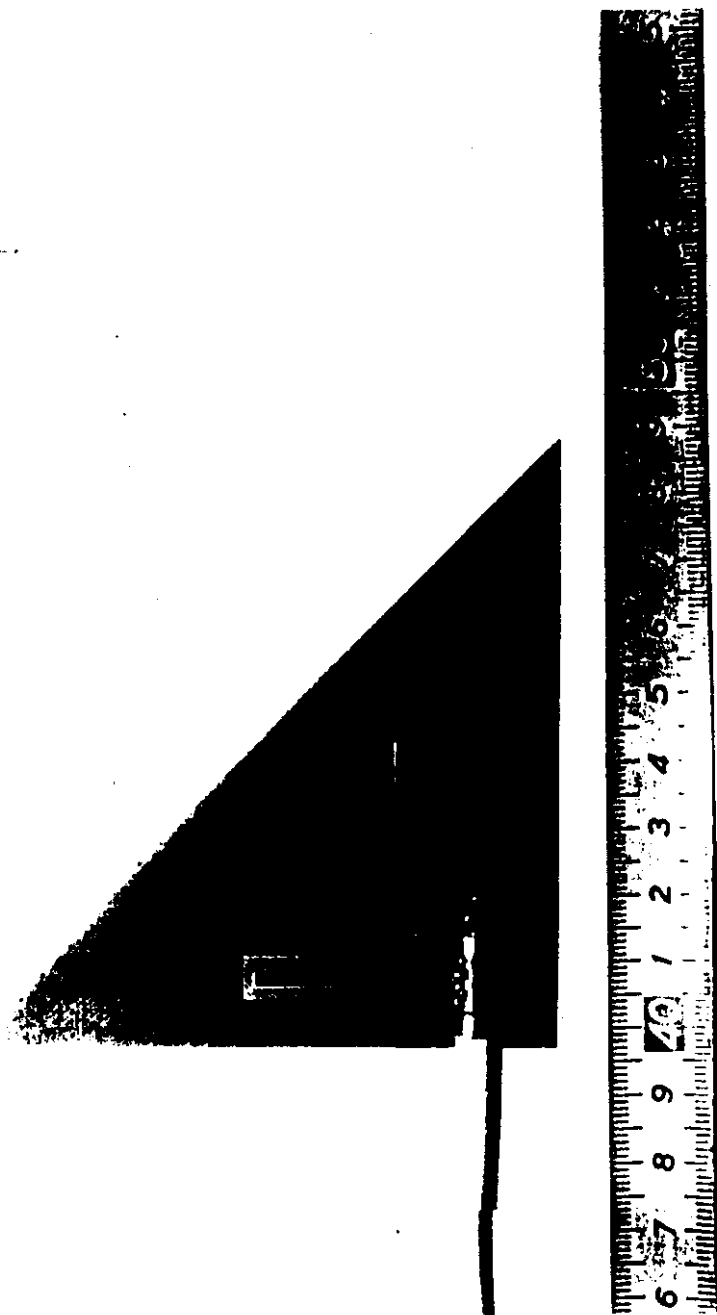


Photo No. 3.6

Back view of printed board of antenna (2.4 GHz)

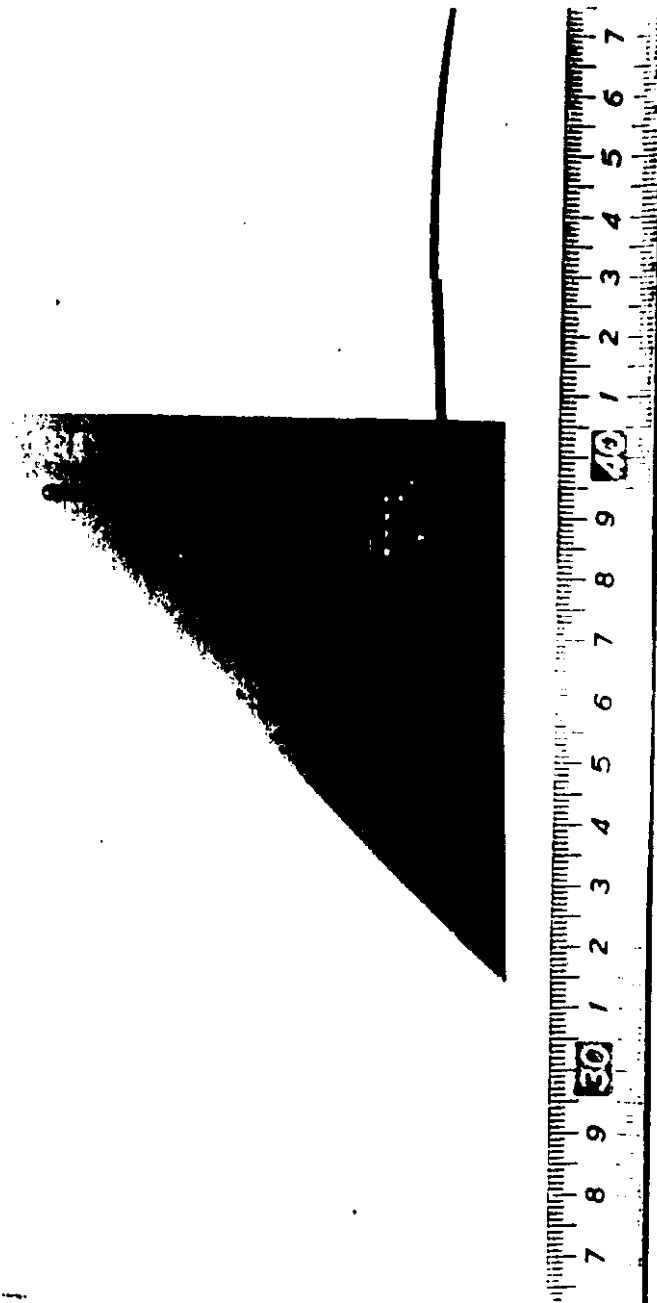


Photo No. 5.7

Personal computer (host equipment) - front view

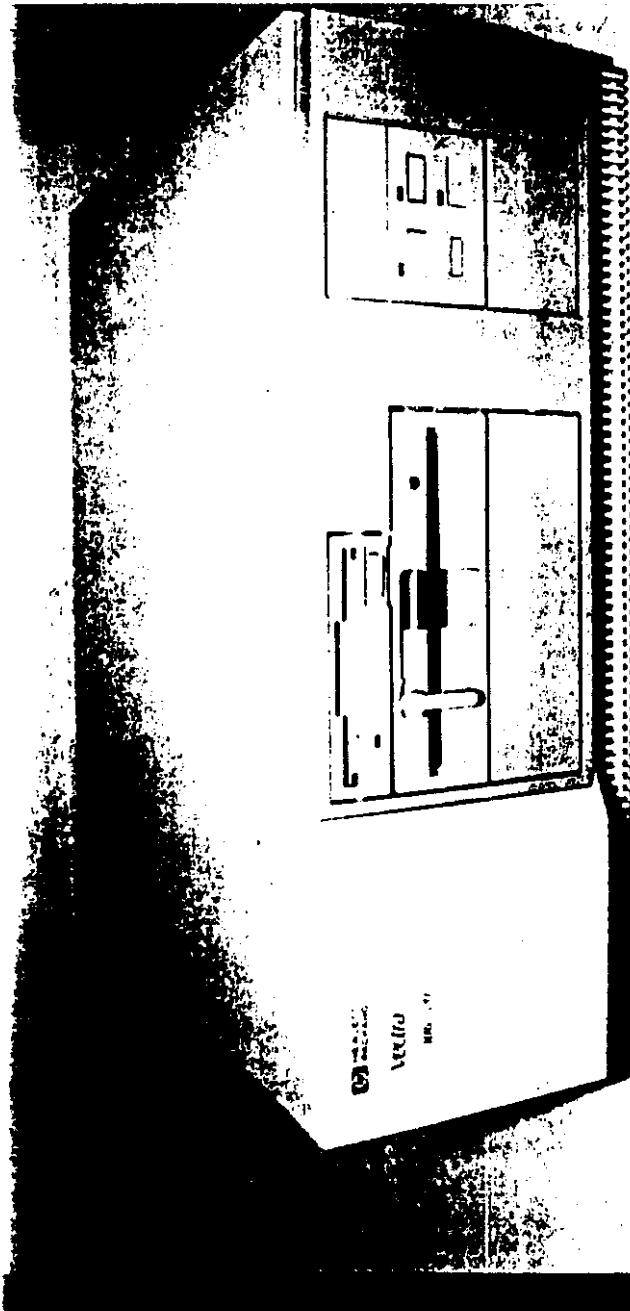
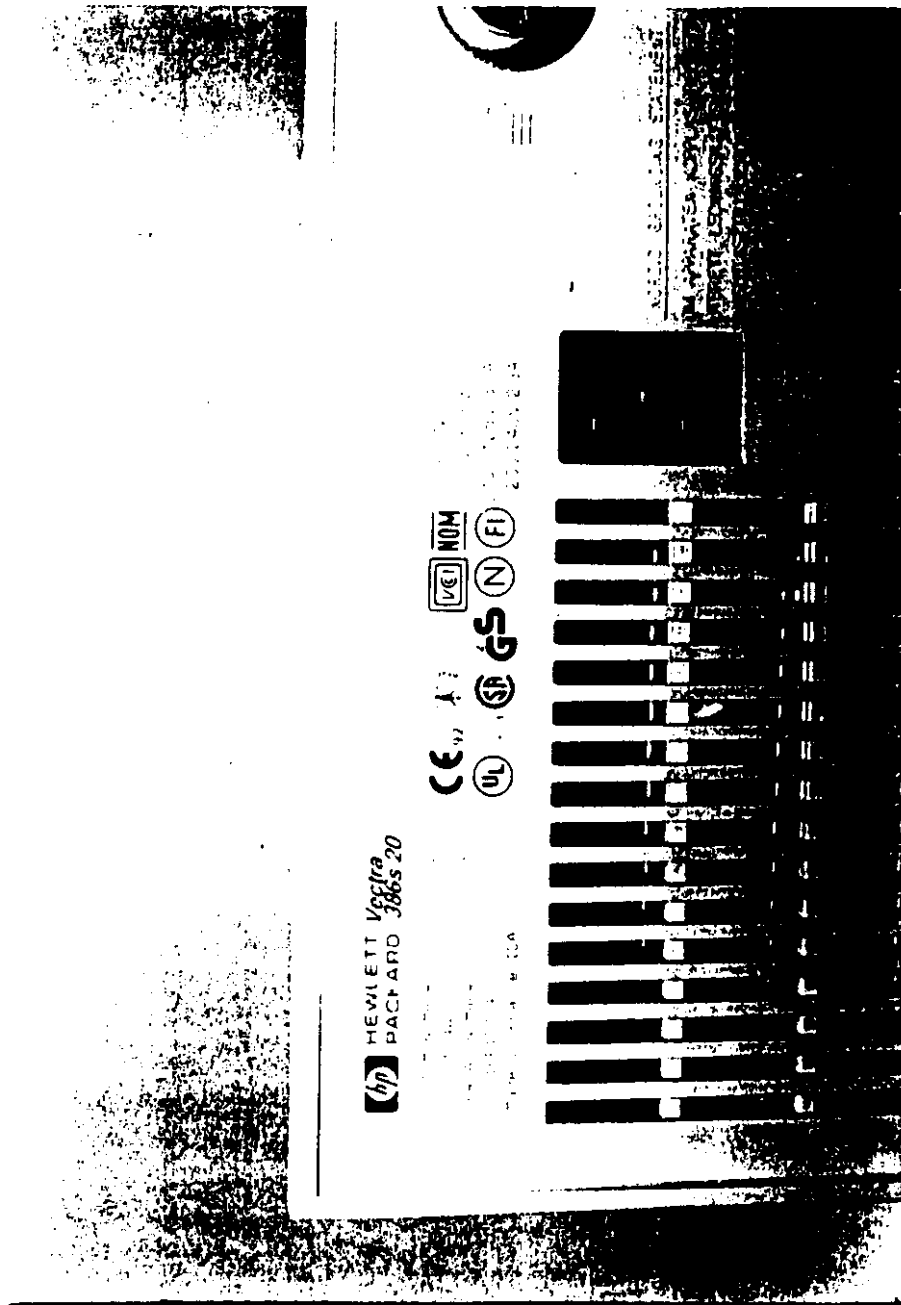


Photo No. 5.8

Personal computer (host equipment) - FCC-ID

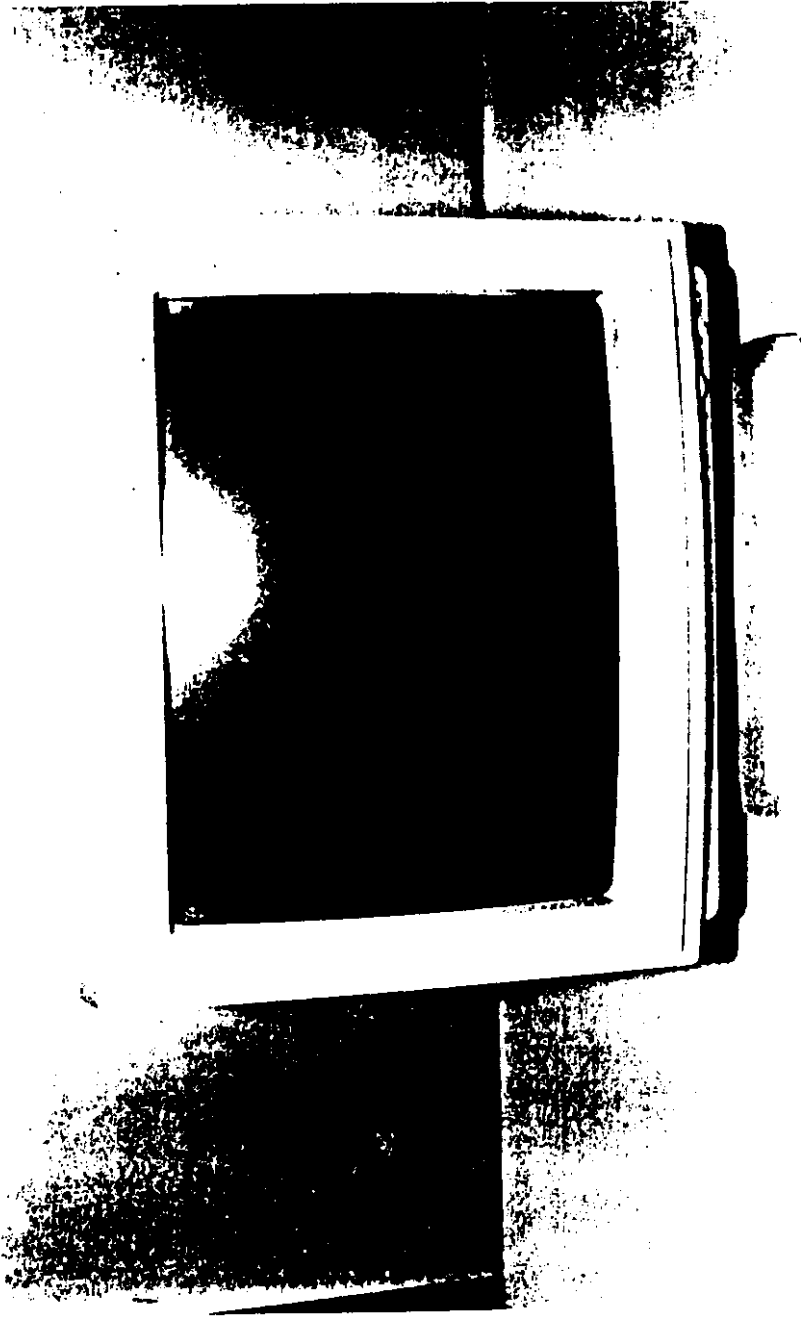


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Photo No. 5.9

Monitor - front view



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Monitor - FCC-ID

Photo No. 5.11

Parallel printer - front view



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Photo No. 5.12

Parallel printer - FCC-ID



Photo No. 5.13

Modem - front view



Modem - FCC-ID



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Photo No. 5.15

Mouse - top view

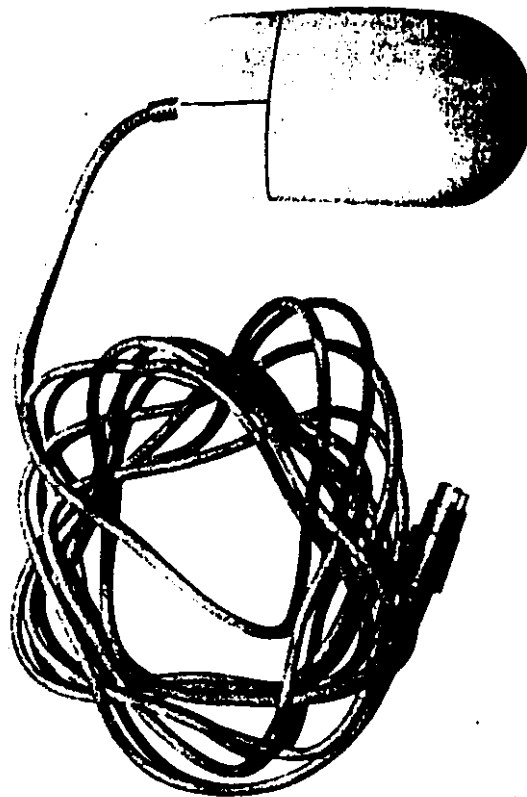


Photo No. 5.16

Mouse - FCC-ID



FCC-ID: IMR24HAT

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6.0 Measuring Methods

6.1 Minimum 6 dB Bandwidth (§ 15.247.a2)

The minimum 6 dB bandwidth was measured with a spectrum analyzer connected to the antenna connector (conducted measurement) while EUT was operating in transmit mode at the appropriate center frequency.

The spectrum analyzer was set to:

RBW = 100 kHz, VBW = 100 kHz, span = 100 MHz, sweep = 50 ms

See Figure 1 for the measurement setup.

Test equipment used (see equipment list for details):

02, 57, 67, 68

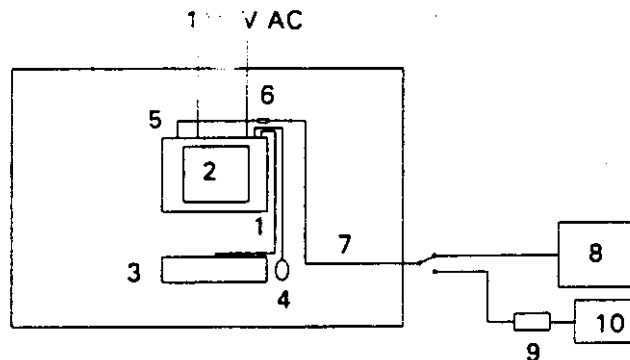


Figure 1: Measurement setup for testing on antenna connector

- | | |
|-------------------------------|---------------------|
| 1 Personal computer incl. EUT | 6 DC-block |
| 2 Monitor | 7 Test cable |
| 3 Keyboard | 8 Spectrum analyzer |
| 4 Mouse | 9 Power sensor |
| 5 Antenna cable (EUT) | 10 Power meter |

6.2 Maximum Peak Output Power (§ 15.247.b)

The maximum peak output power was measured with a power meter connected to the antenna connector (conducted measurement) while EUT was operating in transmit mode at the appropriate center frequency. See Figure 1 for the measurement setup.

Test equipment used (see equipment list for details):
08, 09, 67, 68

6.3 Average Power Density (§ 15.247.d)

The average power density was measured with a spectrum analyzer connected to the antenna connector (conducted measurement) while EUT was operating in transmit mode at the appropriate center frequency. The spectrum analyzer was set to:
RBW = 3 kHz, VBW = 100 kHz, span = 300 kHz, sweep = 100 s
See Figure 1 for the measurement setup.

Test equipment used (see equipment list for details):
02, 57, 67, 68

6.4 Conducted Emissions 0.45 MHz - 30 MHz (§15.207)

Conducted emissions were measured in the frequency range 0.45 MHz to 30 MHz. The bandwidth of the EMI-Receiver was set to 9 kHz and the detector-function was set to CISPR quasi-peak.

The test setup was made in accordance with ANSI C63.4-1991.

Measurements were performed on phase and neutral lines of the power-cords of the tested system. Preliminary scans were taken with the detector-function of the EMI-receiver set to peak to determine the conducted EMI-profile of the EUT. At the final test the cables and equipment were placed and moved within the range of positions likely to find their maximum emissions. See Figure 2 for the measurement setup.

Test equipment used (see equipment list for details):
04, 22, 23, 59, 63

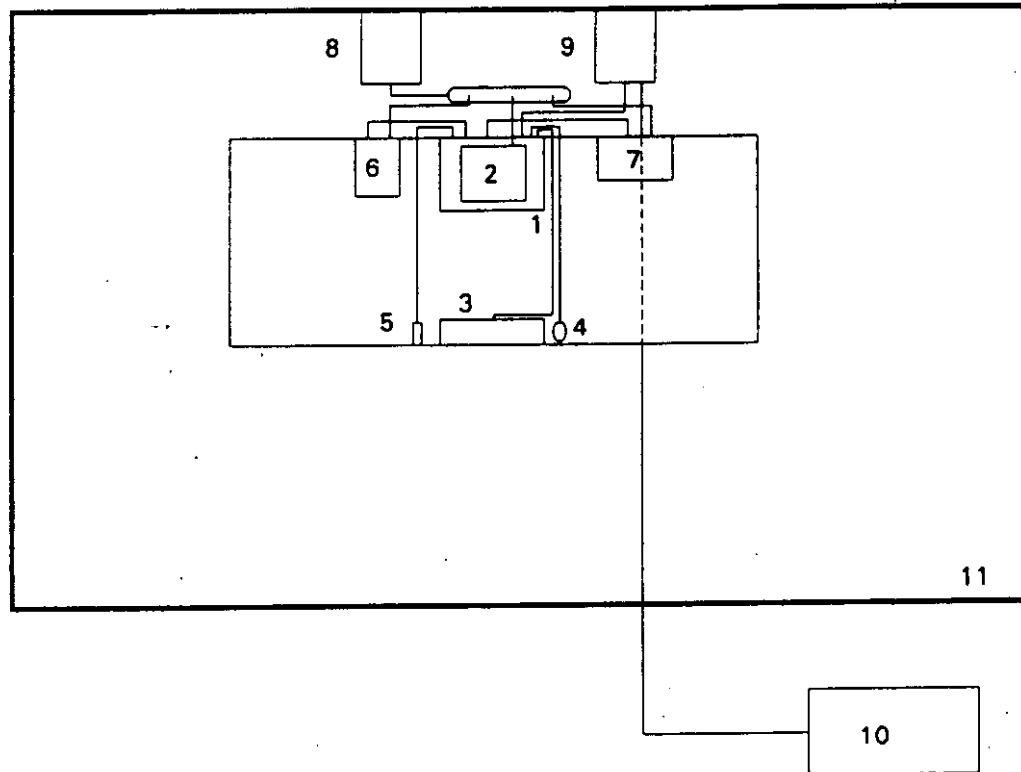


Figure 2: Measurement setup for conducted emission test

- | | |
|-------------------------------|-------------------------------|
| 1 Personal computer incl. EUT | 8 LISN for EUT |
| 2 Monitor | 9 LISN for peripheral devices |
| 3 Keyboard | 10 Test receiver |
| 4 Mouse | 11 Shielded room |
| 5 Antenna (2.4 GHz) | |
| 6 Modem | |
| 7 Printer | |

6.5 Radiated Emissions 30 MHz - 1 GHz (§15.209, §15.247.c, §15.205.a,b)

Radiated emissions were measured over the frequency range from 30 MHz to 1 GHz. The bandwidth of the EMI-receiver was set to 120 kHz and the detector-function was set to CISPR quasi-peak.

The test setup was made in accordance with ANSI C63.4-1991.

Measurements were made in both the horizontal and vertical planes of polarization. Preliminary scans were taken in a semi-anechoic room using a spectrum analyzer with the detector function set to peak. All tests were performed at a test-distance of 3 meters. For final testing an open-area test-site was used. During the tests the EUT was rotated all around and the receiving-antenna was raised and lowered from 1 meter to 4 meters to find the maximum levels of emissions. The cables and equipment were placed and moved within the range of position likely to find their maximum emissions. See Figure 3 for the measurement setup.

Test equipment used (see equipment list for details):

02, 06, 12, 38, 39, 40, 41, 58, 61, 64, 66

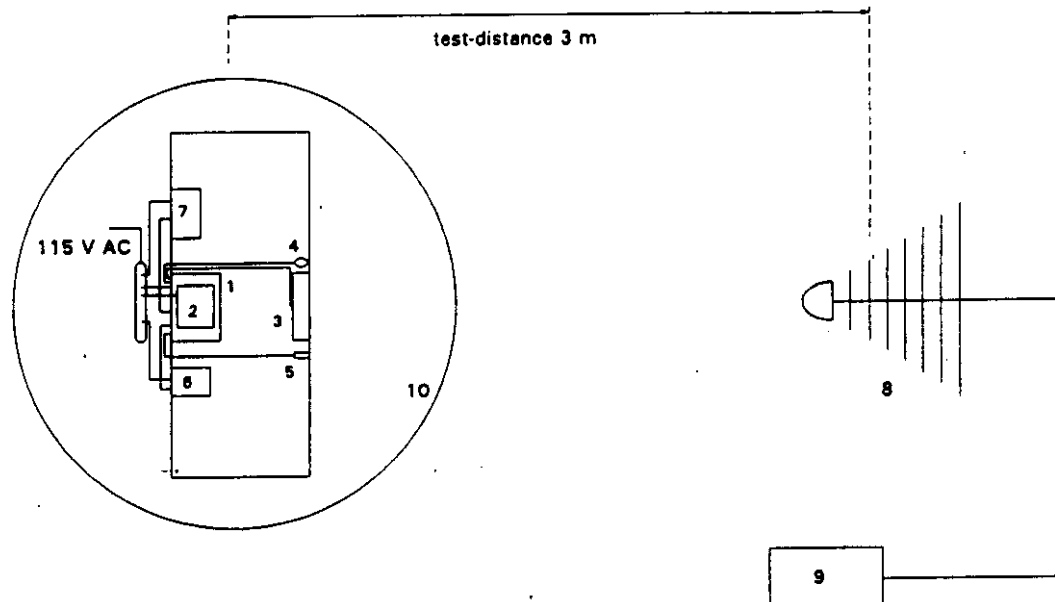


Figure 3: Measurement setup for radiated emission test below 1 GHz

- | | |
|-------------------------------|-----------------------|
| 1 Personal computer incl. EUT | 8 Measurement antenna |
| 2 Monitor | 9 Test receiver |
| 3 Keyboard | 10 Turn table |
| 4 Mouse | |
| 5 Antenna (2.4 GHz) | |
| 6 Modem | |
| 7 Printer | |

6.6 Radiated Emissions 1 GHz - 25 GHz

Radiated emissions were measured in the frequency range 1 GHz to 25 GHz in transmit mode and 1 GHz to 12.75 GHz in receive mode. The resolution bandwidth of the spectrum analyzer was set to 1 MHz. Scans for the whole frequency range were taken with video bandwidth set to 1 MHz to check out the highest peak levels. In case of less margin to average limit additional prescans were made with video bandwidth reduced from 1 MHz to 100 kHz or 10 kHz. Final measurements were performed at the critical frequencies with video bandwidth of the spectrum analyzer set to 100 Hz (average mode). EUT was rotated all around and receiving antenna was raised and lowered to find the maximum levels of emission. The cables and equipment were placed and moved within the range of position likely to find their maximum emissions.

All tests were performed in a semi-anechoic chamber with a test-distance of 3 meters.

To avoid overload in transmit-mode no preamplifier was used between 1 GHz and 3.95 GHz and in the frequency range of 3.95 GHz to 5.85 GHz a high pass filter was connected to the input of the preamplifier. Therefore a signal generator was used for substitution to eliminate the influence of filter and preamplifier.

Substitution was performed in the following steps:

- antenna cable was disconnected from receiving antenna and connected to signal generator output
- level of signal generator was increased until the reading value of the analyzer was the same as caused by EUT
- level of signal generator was noted
- final value was calculated by converting the signal generator level to dB μ V/m and adding the antenna correction factor.

Test equipment used (see equipment list for details):

02, 13, 14, 16, 41, 42, 43, 44, 45, 46, 47, 48, 57, 64, 69

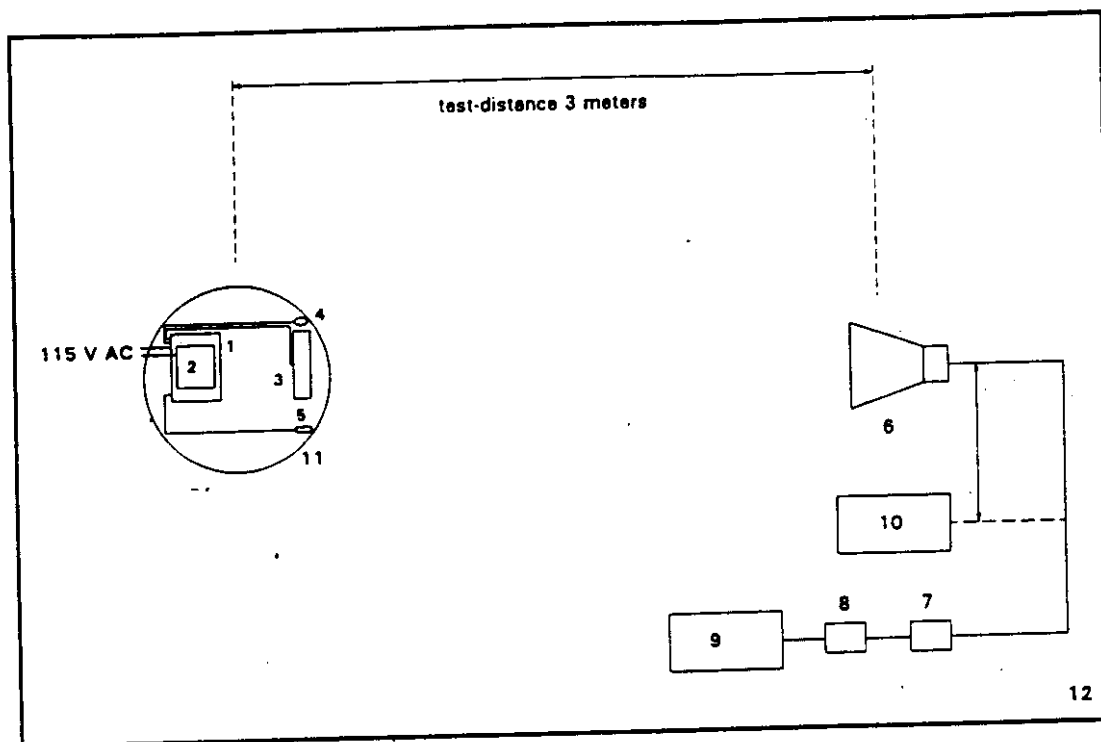


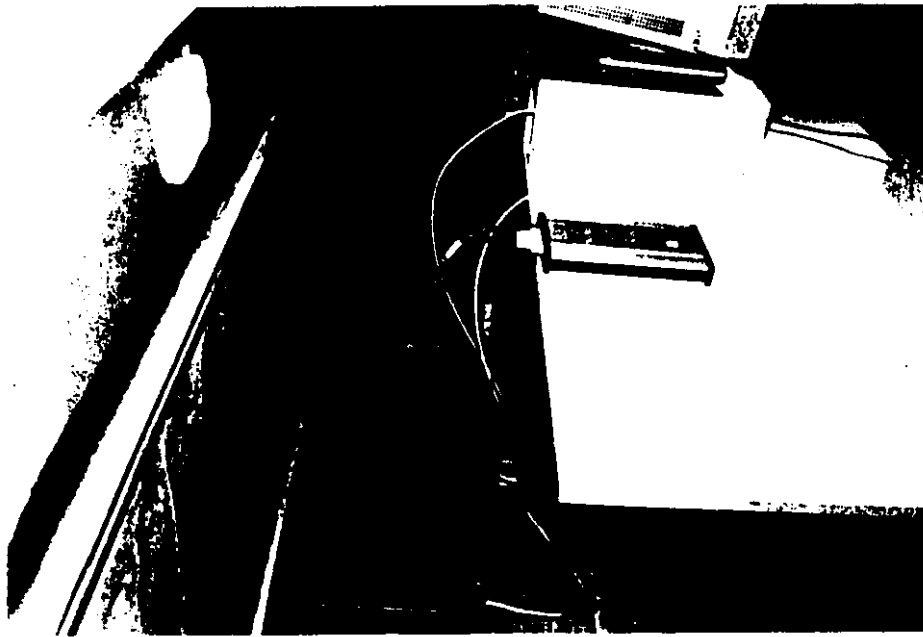
Figure 4: Measurement setup for radiated emission test above 1 GHz

- | | |
|-------------------------------|-----------------------|
| 1 Personal computer incl. EUT | 6 Measurement antenna |
| 2 Monitor | 7 High pass filter |
| 3 Keyboard | 8 Preamplifier |
| 4 Mouse | 9 Spectrum analyzer |
| 5 Antenna (2.4 GHz) | 10 Signal generator |
| | 11 Turn table |
| | 12 Semi-anechoic room |

7.0 Photographs Taken During Testing

Photos No. 7.3

Test setup for conducted emission test 450 kHz - 30 MHz



Photos No. 7.4 - 7.5

Test setup for radiated emission test 30 MHz - 1 GHz

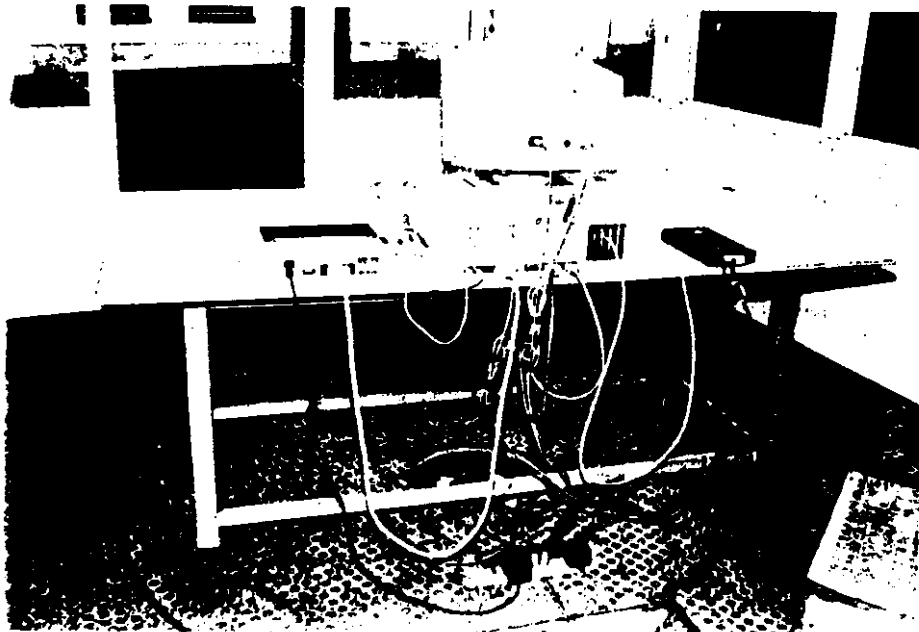


Photo No. 7.6 - 7.7

Test setup for radiated emission test 1 GHz - 25 GHz

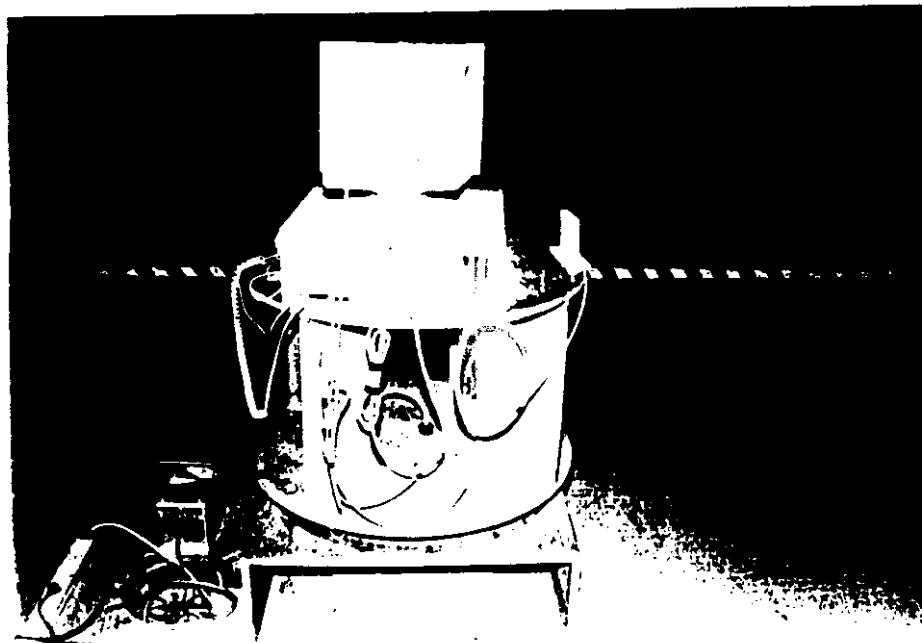
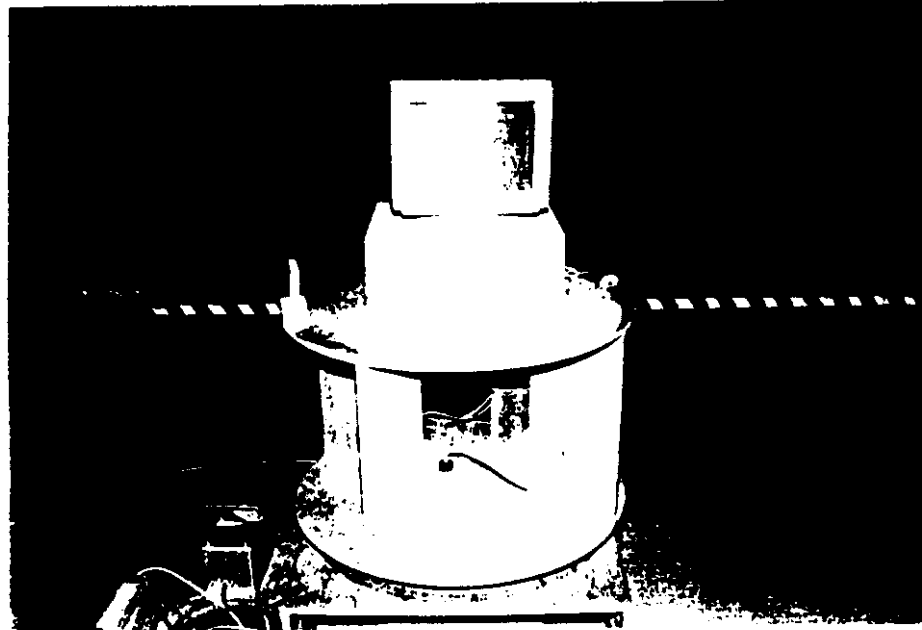
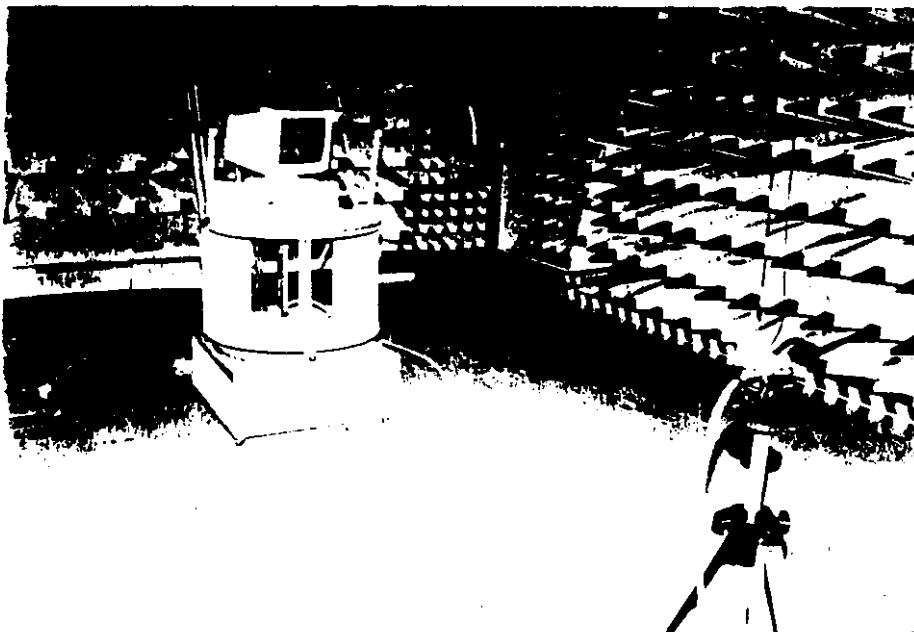


Photo No. 7.8

Test setup for radiated emission test 1 GHz - 25 GHz



8.0 List of Measurements

FCC Part 15 Subpart C			
Section(s):	Test	Page	Result
Transmit-mode (TX):			
§15.247.a2	Minimum 6 dB bandwidth	40	passed
§15.247.b	Maximum peak output power	43	passed
§15.247.d	Average power density	44	passed
§15.247.c §15.209 §15.205.a,b	Radiated emission test 9 kHz - 30 MHz	---	not applicable (acc. to §15.33)
§15.207	Conducted emission test 450 kHz - 30 MHz	47	passed
§15.247.c §15.209 §15.205.a,b	Radiated emission test 30 MHz - 1 GHz	95	passed
§15.247.c §15.209 §15.205.a,b	Radiated emission test 1 GHz - 25 GHz	113	passed
Receive-mode (RX):			
§15.207	Conducted emission test 450 kHz - 30 MHz	120	passed
§15.209	Radiated emission test 9 kHz - 30 MHz	---	not applicable (acc. to §15.33)
§15.209	Radiated emission test 30 MHz - 1 GHz	136	passed
§15.209	Radiated emission test 1 GHz - 12.75 GHz	142	passed

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9.0 Test Results**FCC-ID: IMR24HAT****Test Report No. 56305-51298****Page 38 of 145 Pages**

Test results

Transmit (TX) mode

Minimum bandwidth according to FCC Part 15 Subpart C (conducted)

MINIMUM BANDWIDTH

REF 10.0 dBm
10dB/

Δ MKR
10.1 MHz

REF OFS
1.4 dB
DL 0.7 dBm

RBW 100 KHZ
VBW 100 KHZ
SWP 50 ms

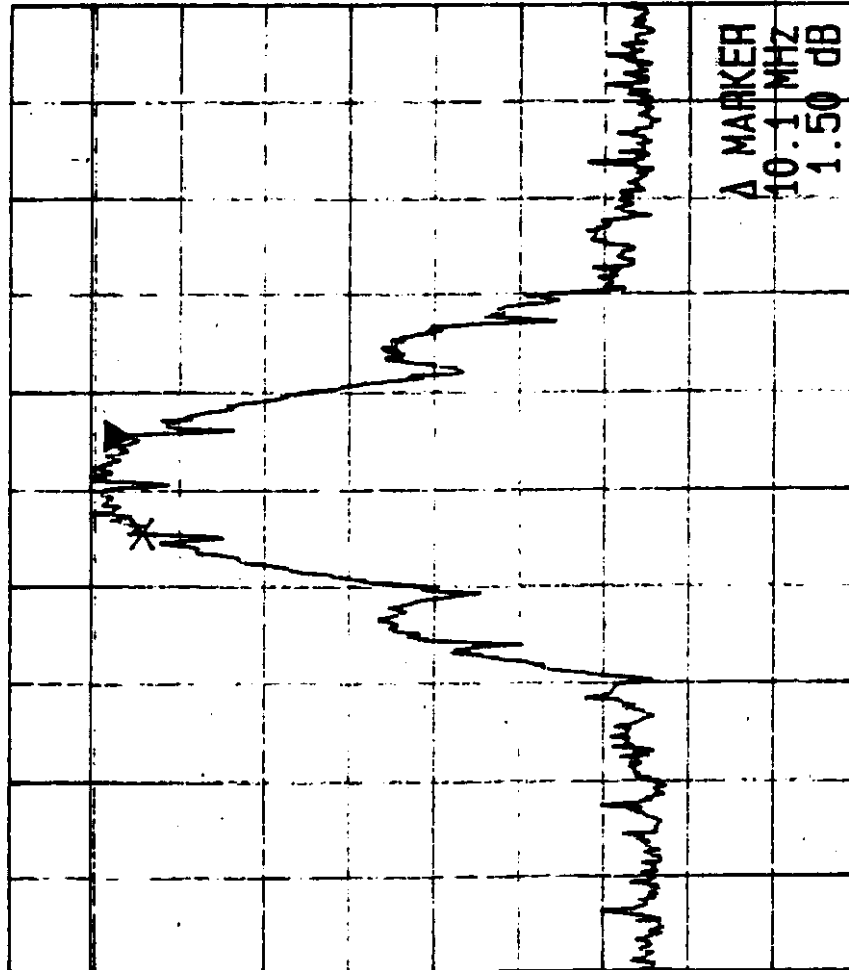
ATT 20 dB A view B blank

Model: WaveLAN AT Rel. 4.0
(2.4 GHz)
Serial-No.: 172/#1
Applicant: AT & T WCND Utrecht B.V.

Mode:
- FCC test setup
(EUT mounted in HP Vectra 386s/20)
- TX mode with $f = 2.412$ GHz

Tested on:
Antenna connector

Result: Limit kept



CENTER 2.4120 GHz SPAN 100.0 MHz

Minimum bandwidth according to FCC Part 15 Subpart C (conducted)

MINIMUM BANDWIDTH

REF 10.0 dBm
10dB/

Δ MKR
10.3 MHz

REF: OFS
1.4 dB
DL 2.2 dBm

RBW 100 kHz
VBW 100 kHz
SWP 50 ms

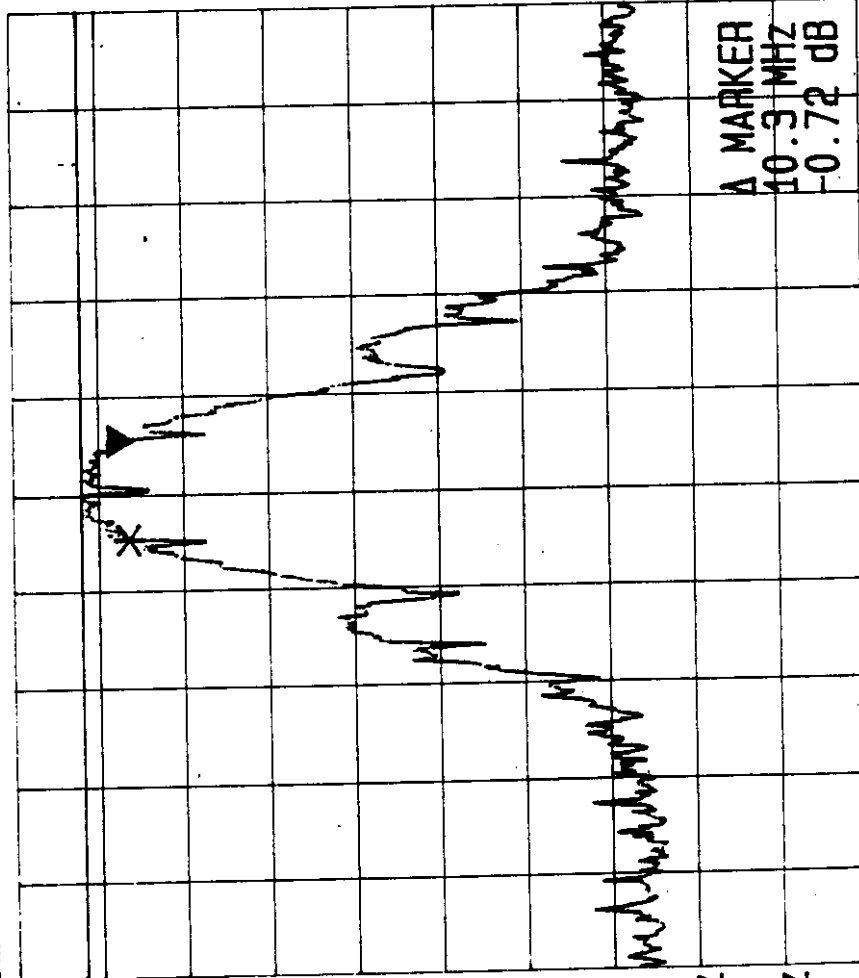
Model: WaveLAN AT Rel. 4.0
(2.4 GHz)
Serial-No.: 172/#1
Applicant: AT & T WCND Utrecht B.V.
Mode:
- FCC test setup
(EUT mounted in HP Vectra 386s/20)
- TX mode with $f = 2.442$ GHz

Tested on:
Antenna connector

Result: Limit kept

A view B blank

ATT 20 dB



CENTER 2.4420 GHz SPAN 100.0 MHz

Minimum bandwidth according to FCC Part 15 Subpart C (conducted)

MINIMUM BANDWIDTH

REF 10.0 dBm
10dB/

Δ MKR
10.3 MHz

REF. OFS
1.4 dB
DL -0.7 dBm

RBW 100 KHZ
VBW 100 KHZ
SWP 50 ms

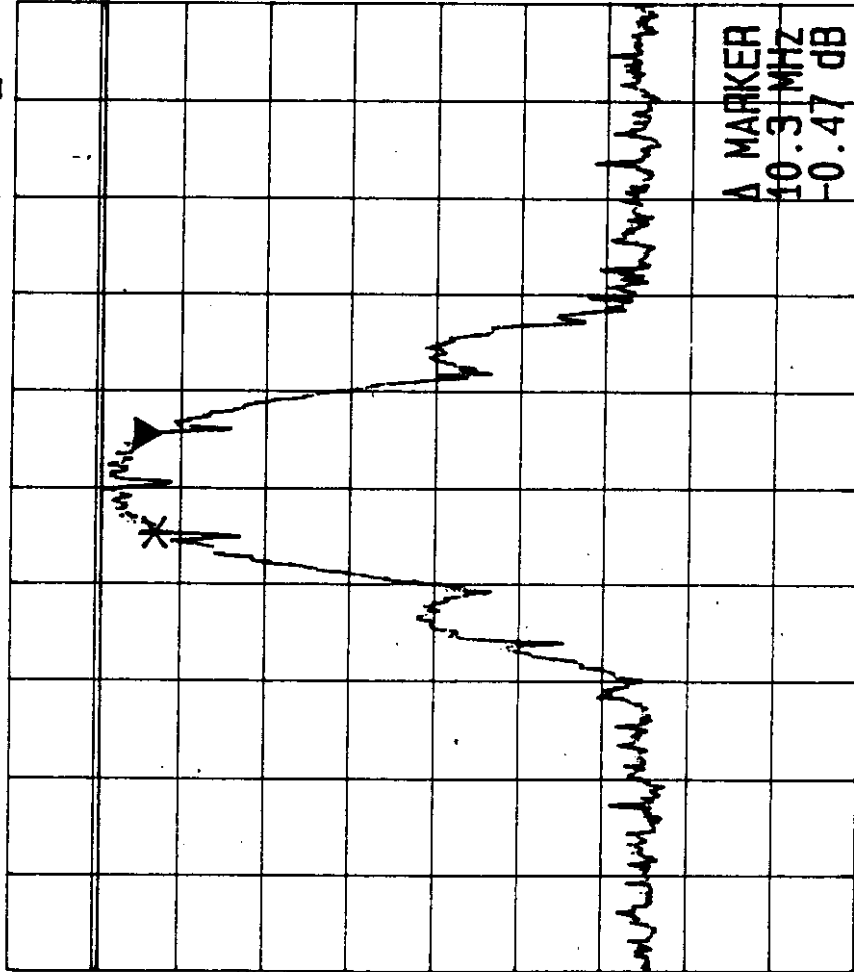
ATT 20 dB A_view B_blank

Model: WavelAN AT Rel. 4.0
(2.4 GHz)
Serial-No.: 172/#1
Applicant: AT & T WCND Utrecht B.V.

Mode:
- FCC test setup
(EUT mounted in HP Vectra 386s/20)
- TX mode with $f = 2.462$ GHz

Tested on:
Antenna connector

Result: Limit kept



CENTER 2.4620 GHz SPAN 100.0 MHz

Δ MARKER
10.3 MHz
-0.47 dB

**Maximum Peak Output Power
according to FCC Part 15 Subpart C, §15.247b**

Model: WaveLAN AT Rel. 4.0 (2.4 GHz)
Type: RF-modem
Serial No.: 172/#1
Applicant: AT & T WCND Utrecht B.V.
Test-site: Semi anechoic room
Test distance: 3 metres
Date of test: 12/01/1995
Operator: R. Heller

Mode: - FCC test setup
(EUT mounted in HP Vectra 386s/20)

TX-Mode

Tested on: Antenna connector

Operating frequency [GHz]	Power meter reading [dBm]	Correction- factor [dB]	Output power [dBm]	Limit [dBm]
2.412	11.6	0.6	12.2	30
2.442	13.9	0.6	14.5	30
2.462	10.5	0.6	11.1	30

Result: The limit is kept.

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Average power density according to FCC Part 15 Subpart C (conducted)

AV POWER DENSITY
REF 10.0 dBm
10dB/

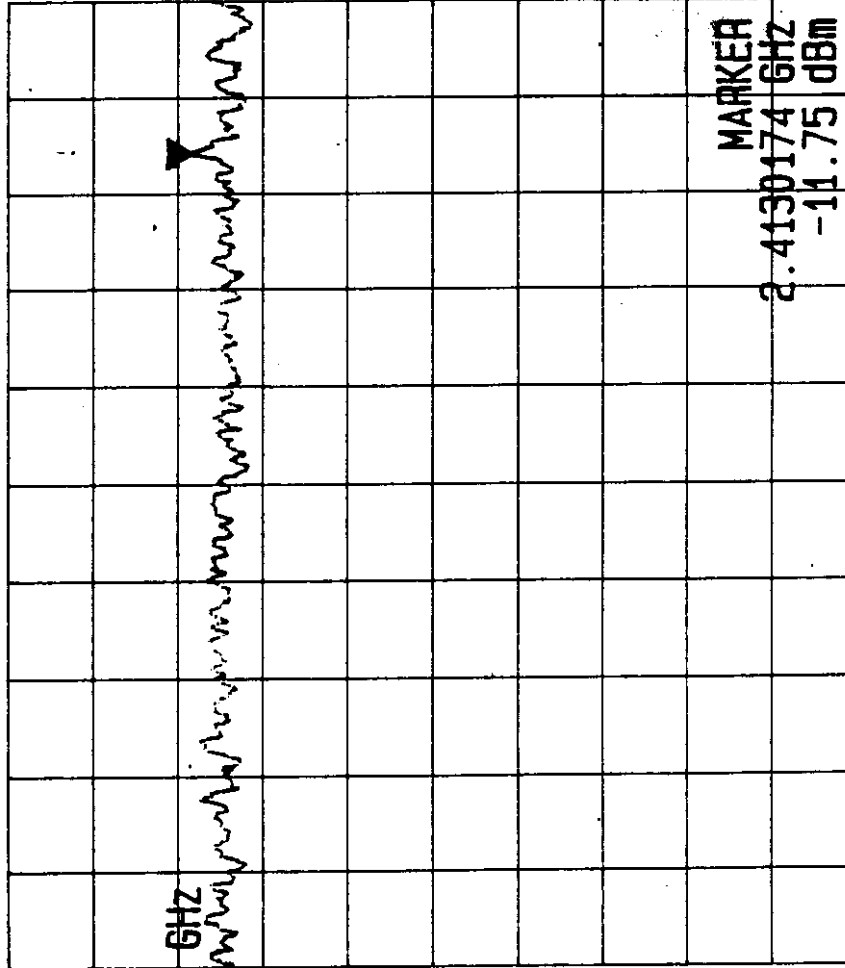
Model: WaveLAN AT Rel. 4.0
(2.4 GHz)
Serial-No.: 172/#1
Applicant: AT & T WCND Utrecht B.V.

Mode:
- FCC test setup
(EUT mounted in HP Vectra 386s/20)
- TX mode with $f = 2.412$ GHz

Tested on:
Antenna connector

Result: Limit kept

ATT 20 dB A_view B_blank



MKR

2.4130174 GHz

REF. OFS
1.4 dB

RBW 3 KHZ
VBW 100 KHZ
SWP 100 S

CENTER 2.4129150 GHZ SPAN 300.0 KHZ

Average power density according to FCC Part 15 Subpart C (conducted)

AV POWER DENSITY

REF 10.0 dBm

10dB/

A View B blank

ATT 20 dB

Model: WaveLAN AT Rel. 4.0
(2.4 GHz)

Serial-No.: 172/#1

Applicant: AT & T WCND Utrecht B.V.

Mode:

- FCC test setup
(EUT mounted in HP Vectra 386s/20)

- TX mode with $f = 2.442$ GHz

Tested on:

Antenna connector

Result: Limit kept

MKR

2.4426924 GHz

REF OFS

1.4 dB

RBW

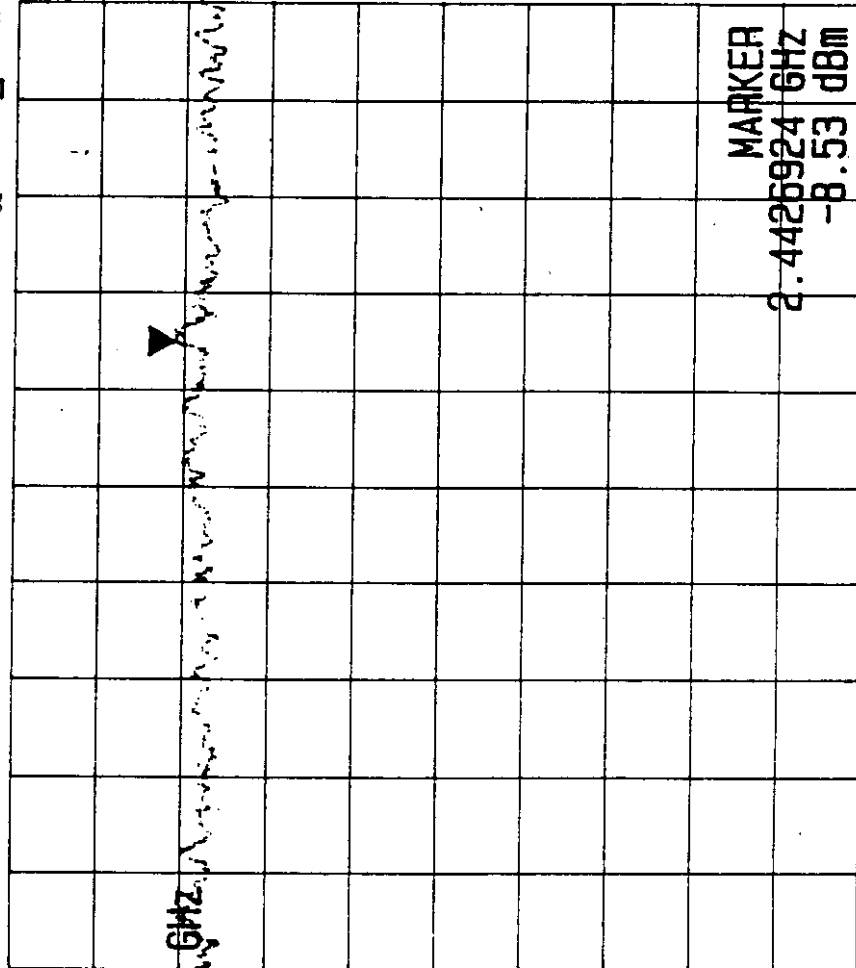
3 kHz

VBW

100 kHz

SWP

100 s



START 2.4424979 GHz STOP 2.4427979 GHz

Average power density according to FCC Part 15 Subpart C (conducted)

AV POWER DENSITY

REF 10.0 dBm
10dB/

MKR

2.4611607 GHz

REF OFS
1.4 dB

RBW 3 kHz
VBW 100 kHz
SWP 100 S

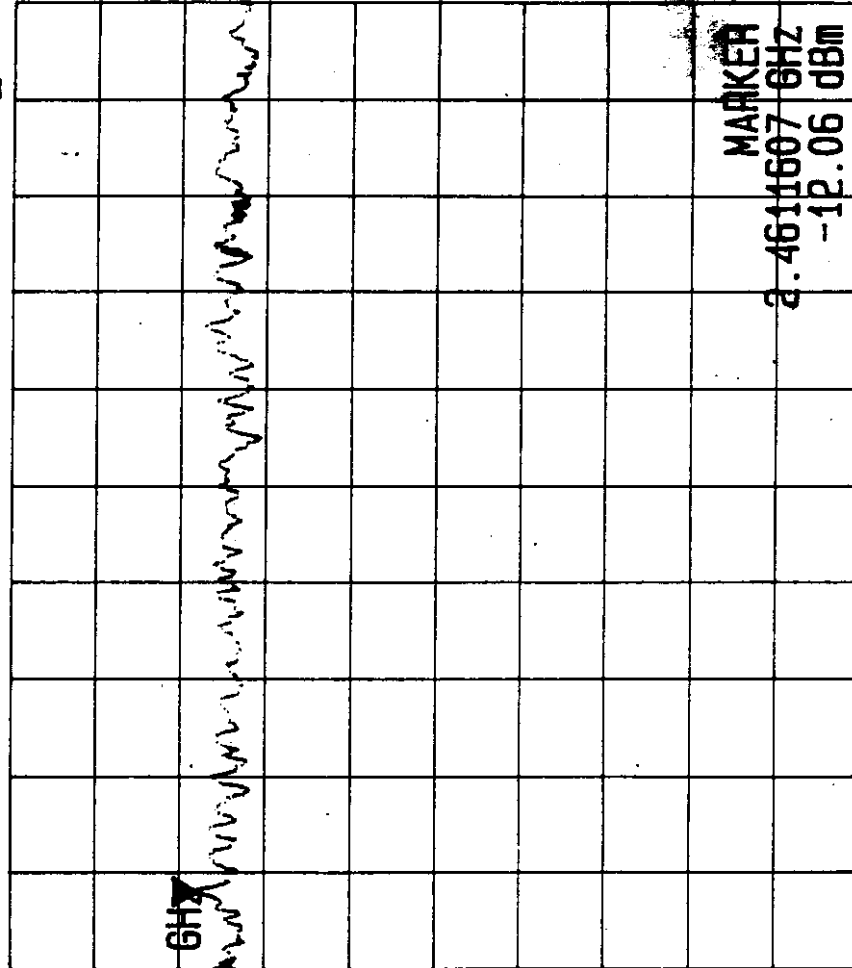
ATT 20 dB A view B blank

Model: WaveLAN AT Rel. 4.0
(2.4 GHz)
Serial-No.: 172/#1
Applicant: AT & T WCND Utrecht B.V.

Mode:
- FCC test setup
(EUT mounted in HP Vebra 386s/20)
- TX mode with $f = 2.462$ GHz

Tested on:
Antenna connector

Result: Limit kept



CENTER 2.4612867 GHz SPAN 300.0 kHz

Conducted Emission Test 450 kHz - 30 MHz
according to FCC Part 15 Subpart C

Model:
WaveLAN AT Rel. 4.0 (2.4 GHz)

Serial No.:
172/#1

Applicant:
AT & T WCND Utrecht B.V.

Test-site:
Shielded room, cabin 2

Tested on:
Linecord PC
Phase L1

Date of test:
12/04/1995

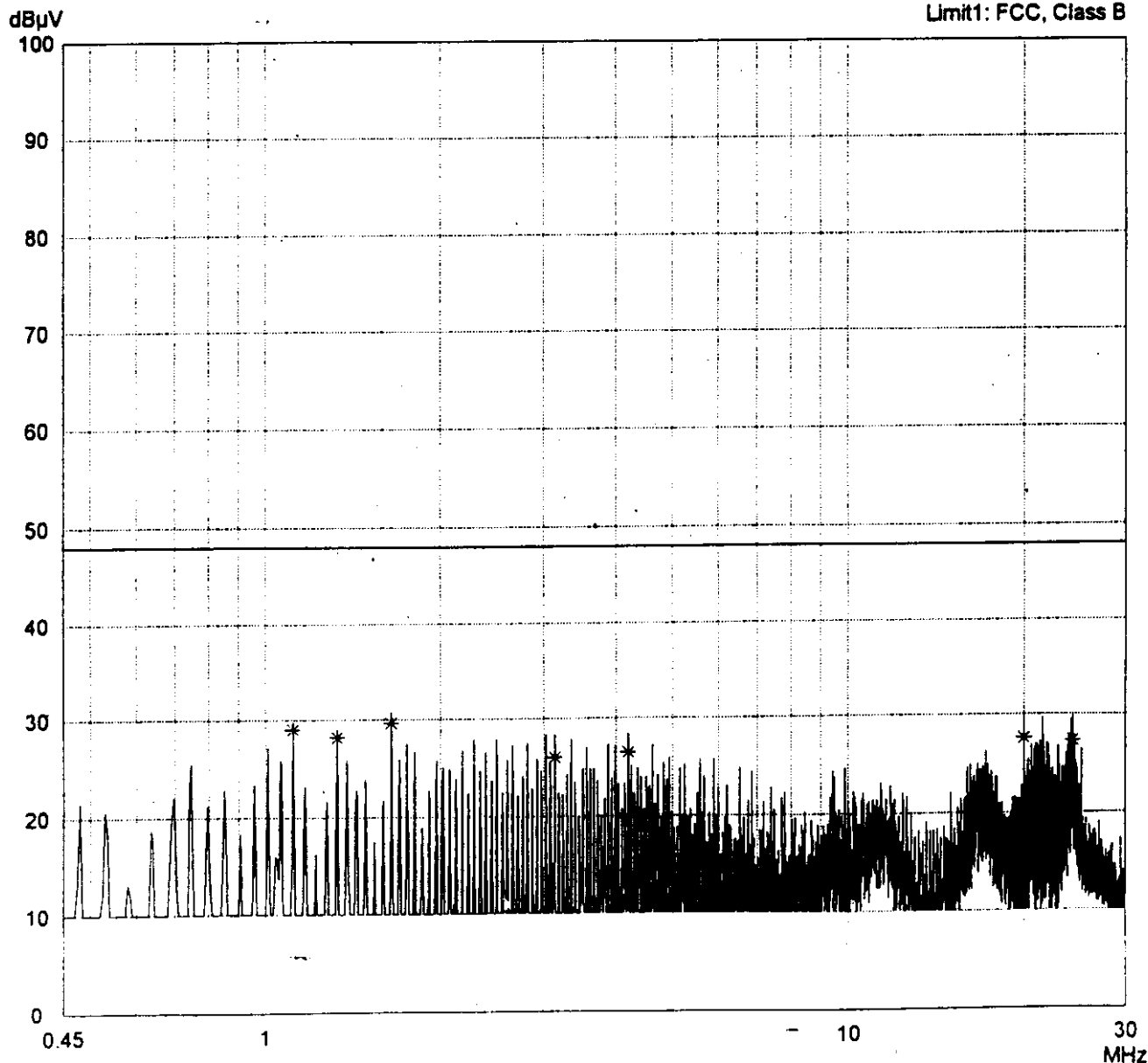
Operator:
R. Heller

Mode:
- FCC test setup
(EUT mounted in HP Vectra 386s/20)

- TX mode with $f = 2.412$ GHz

Detector:
Peak / Final Results: QP

Final Results:
20 dB Margin 25 Subranges



Result:
Limit kept

Project-File:
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Conducted Emission Test 450 kHz - 30 MHz
according to FCC Part 15 Subpart C

Model:
WaveLAN AT Rel. 4.0 (2.4 GHz)

Serial No.:
172/#1

Applicant:
AT & T WCND Utrecht B.V.

Test-site:
Shielded room, cabin 2

Tested on:
Linecord PC
Phase N

Date of test:
12/04/1995

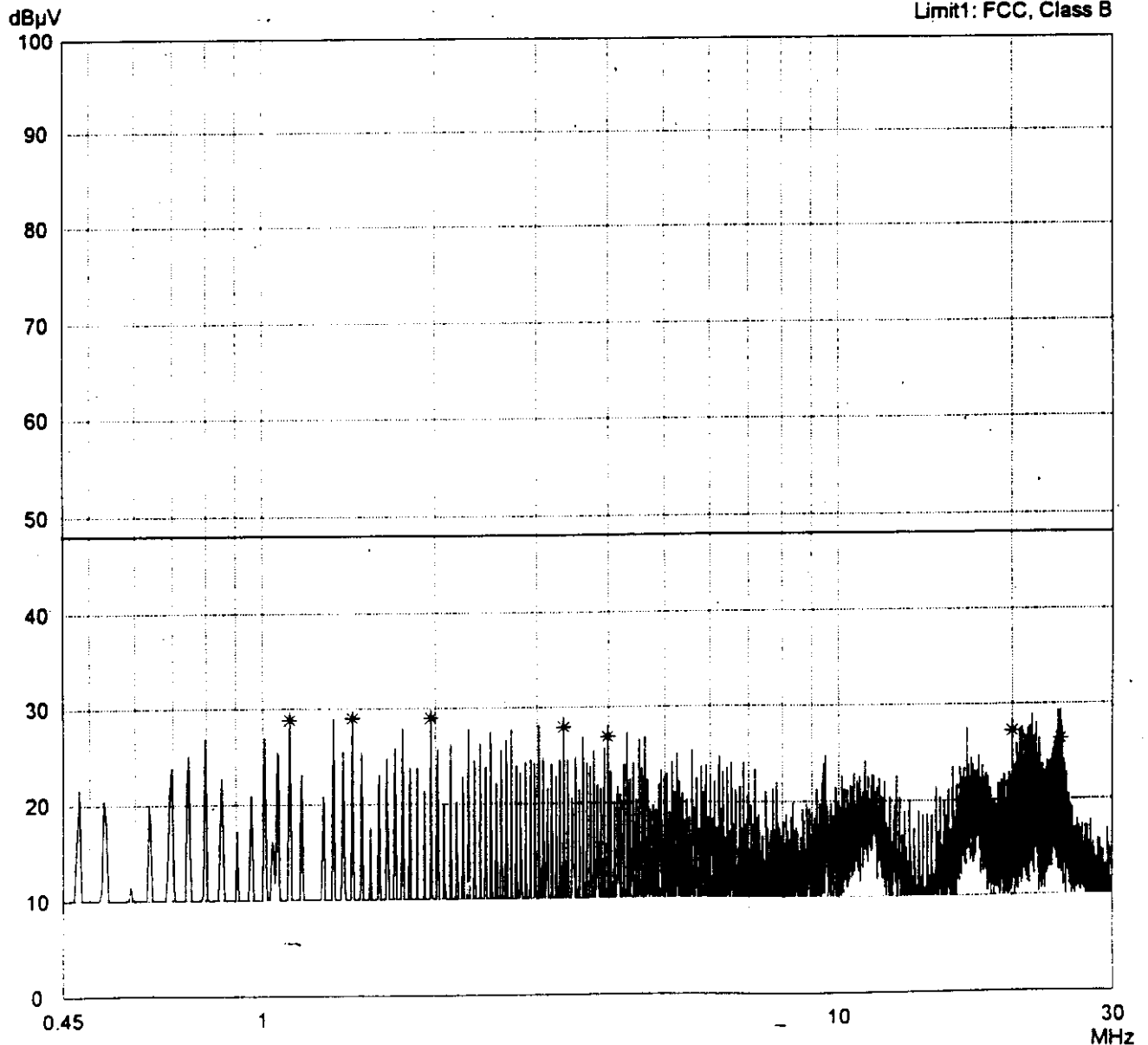
Operator:
R. Heller

Mode:
- FCC test setup
(EUT mounted in HP Vectra 386s/20)

- TX mode with $f = 2.412$ GHz

Detector:
Peak / Final Results: QP

Final Results:
20 dB Margin 25 Subranges



Result:
Limit kept

Project-File:
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Conducted Emission Test 450 kHz - 30 MHz
according to FCC Part 15 Subpart C

Model:
WaveLAN AT Rel. 4.0 (2.4 GHz)

Serial No.:
172/#1

Applicant:
AT & T WCND Utrecht B.V.

Test-site:
Shielded room, cabin 2

Tested on:
Linecord monitor
Phase L1

Date of test:
12/04/1995

Operator:
R. Heller

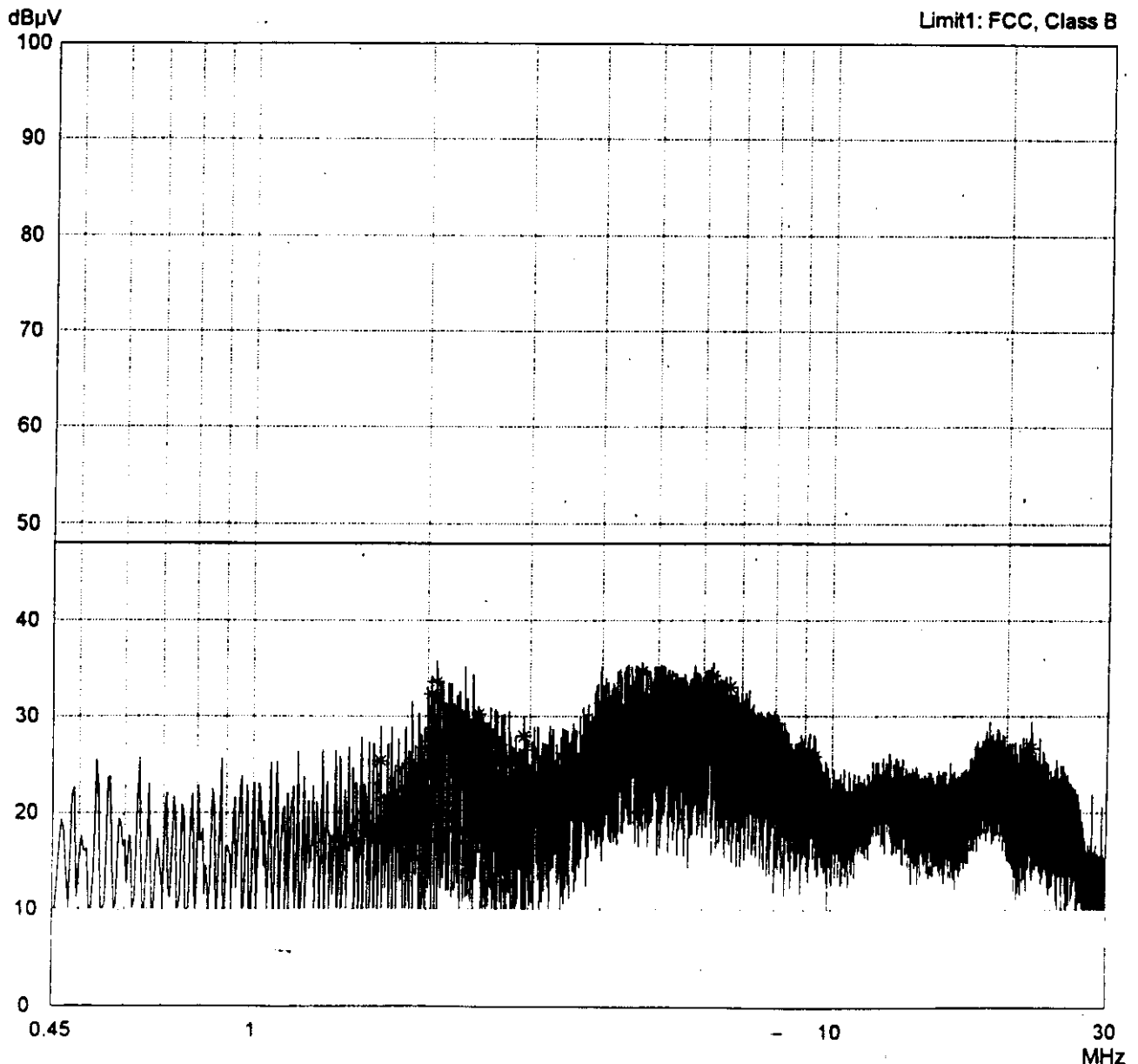
Mode:
- FCC test setup
(EUT mounted in HP Vectra 386s/20)

- TX mode with $f = 2.412$ GHz

Detector:
Peak / Final Results: QP

Final Results:
20 dB Margin

25 Subranges



Result:
Limit kept

Project-File:
56305-51298

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Model: WaveLAN AT Rel. 4.0 (2.4 GHz)	
Serial No.: 172/#1	
Applicant: AT & T WCND Utrecht B.V.	
Test-site: Shielded room, cabin 2	
Tested on: Linecord monitor Phase L1	
Date of test: 12/04/1995	Operator: R. Heller

Final Results:
20 dB Margin 25 Subranges

<i>Frequency MHz</i>	<i>Value dBμV</i>	<i>Limit dBμV</i>	<i>limit exceeded</i>
1.6600	25.33	48.00	
2.0300	32.32	48.00	
2.0750	33.53	48.00	
2.4450	30.20	48.00	
2.9300	27.88	48.00	
3.9800	31.32	48.00	
4.6900	34.63	48.00	
5.0550	33.83	48.00	
6.2300	34.13	48.00	
6.6700	32.97	48.00	
7.9650	29.14	48.00	
9.3100	25.86	48.00	
18.6600	26.37	48.00	
22.0300	26.64	48.00	

Frequency MHz	Value dB μ V	Limit dB μ V	limit exceeded

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Conducted Emission Test 450 kHz - 30 MHz
according to FCC Part 15 Subpart C

Model:
WaveLAN AT Rel. 4.0 (2.4 GHz)

Serial No.:
172/#1

Applicant:
AT & T WCND Utrecht B.V.

Test-site:
Shielded room, cabin 2

Tested on:
Linecord monitor
Phase N

Date of test:
12/04/1995

Operator:
R. Heller

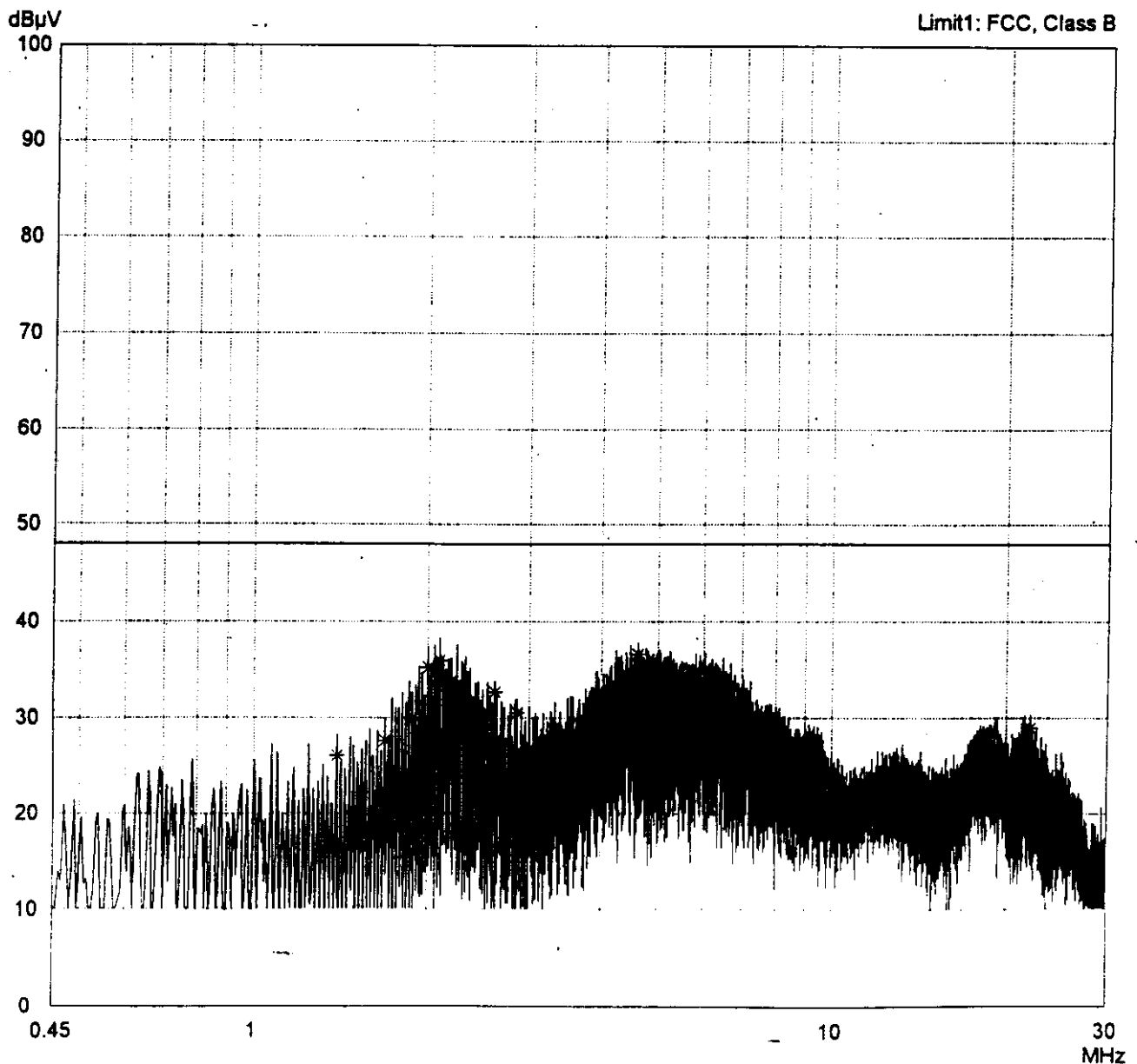
Mode:
- FCC test setup
(EUT mounted in HP Vectra 386s/20)

- TX mode with $f = 2.412$ GHz

Detector:
Peak / Final Results: QP

Final Results:
20 dB Margin

25 Subranges



Result:
Limit kept

Project-File:
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Conducted Emission Test 450 kHz - 30 MHz
according to FCC Part 15 Subpart C

Model:
WaveLAN AT Rel. 4.0 (2.4 GHz)

Serial No.:
172/#1

Applicant:
AT & T WCND Utrecht B.V.

Test-site:
Shielded room, cabin 2

Tested on:
Linecord printer
Phase L1

Date of test:
12/04/1995

Operator:
R. Heller

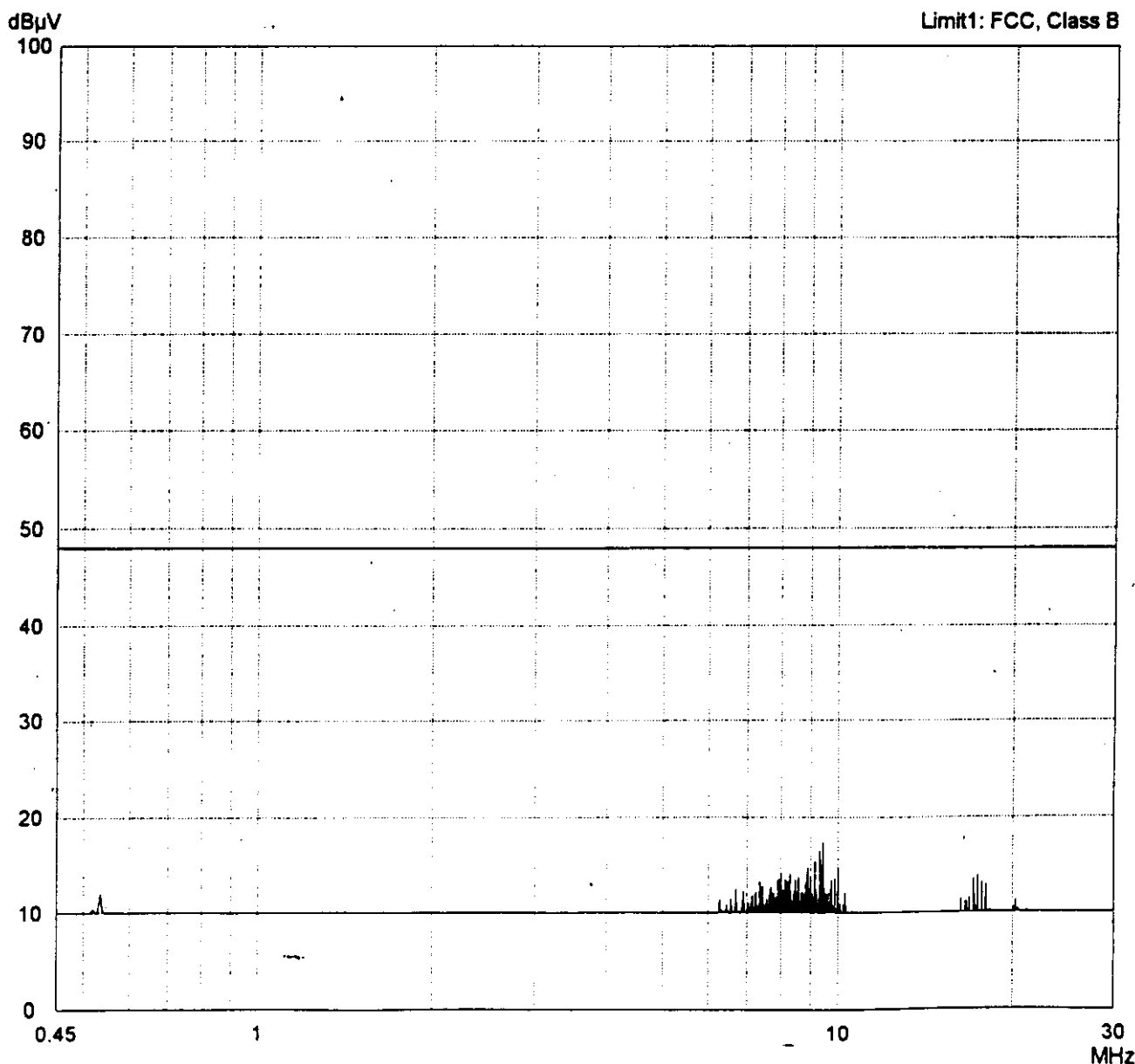
Mode:
- FCC test setup
(EUT mounted in HP Vectra 386s/20)

- TX mode with $f = 2.412$ GHz

Detector:
Peak / Final Results: QP

Final Results:
20 dB Margin

25 Subranges



Result:
Limit kept

Project-File:
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Conducted Emission Test 450 kHz - 30 MHz
according to FCC Part 15 Subpart C

Model: WaveLAN AT Rel. 4.0 (2.4 GHz)	
Serial No.: 172/#1	
Applicant: AT & T WCND Utrecht B.V.	
Test-site: Shielded room, cabin 2	
Tested on: Linecord printer Phase L1	
Date of test: 12/04/1995	Operator: R. Heller

Mode:

- FCC test setup
(EUT mounted in HP Vectra 386s/20)
- TX mode with $f = 2.412 \text{ GHz}$

Detector:
Peak / Final Results: QP

Final Results:	
20 dB Margin	25 Subranges

<i>Frequency MHz</i>	<i>Value dBµV</i>	<i>Limit dBµV</i>	<i>limit exceeded</i>
no results			

<i>Frequency MHz</i>	<i>Value dBμV</i>	<i>Limit dBμV</i>	<i>limit exceeded</i>

Result:	
Limit kept	

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Conducted Emission Test 450 kHz - 30 MHz
according to FCC Part 15 Subpart C

Model:
WaveLAN AT Rel. 4.0 (2.4 GHz)

Serial No.:
172/#1

Applicant:
AT & T WCND Utrecht B.V.

Test-site:
Shielded room, cabin 2

Tested on:
Linecord printer
Phase N

Date of test:
12/04/1995

Operator:
R. Heller

Mode:
- FCC test setup
(EUT mounted in HP Vectra 386s/20)
- TX mode with $f = 2.412$ GHz

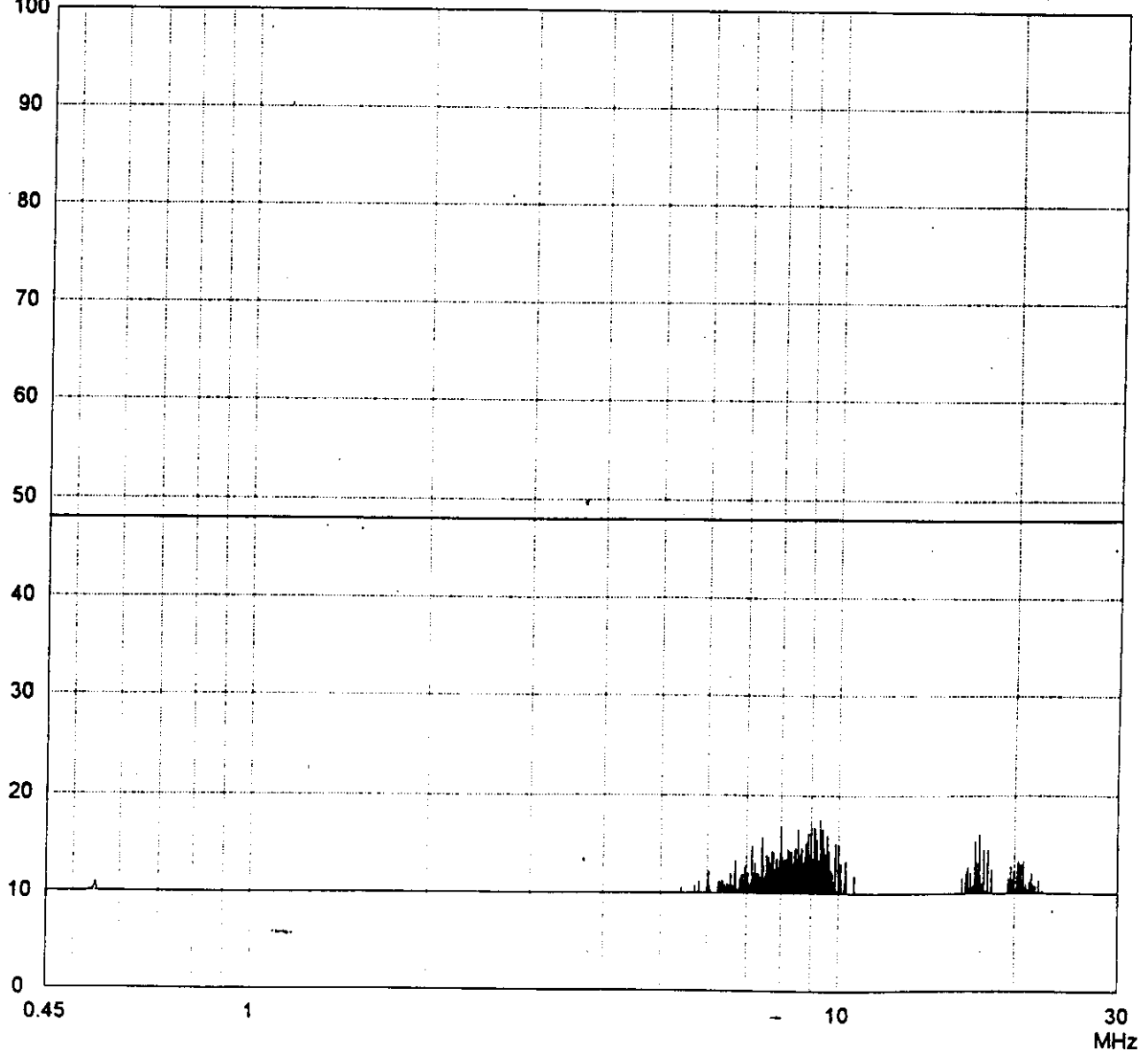
Detector:
Peak / Final Results: QP

Final Results:
20 dB Margin

25 Subranges

dB μ V
100

Limit1: FCC, Class B



Result:
Limit kept

Project-File:
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Conducted Emission Test 450 kHz - 30 MHz
according to FCC Part 15 Subpart C

Model: WaveLAN AT Rel. 4.0 (2.4 GHz)	
Serial No.: 172/#1	
Applicant: AT & T WCND Utrecht B.V.	
Test-site: Shielded room, cabin 2	
Tested on: Linacord printer Phase N	
Date of test: 12/04/1995	Operator: R. Heller

Mode: -

- FCC test setup
(EUT mounted in HP Vectra 386s/20)
- TX mode with $f = 2.412$ GHz

Detector:
Peak / Final Results: QP

Final Results: 20 dB Margin	25 Subranges
--	---------------------

<i>Frequency MHz</i>	<i>Value dBμV</i>	<i>Limit dBμV</i>	<i>limit exceeded</i>
no results			

<i>Frequency MHz</i>	<i>Value dBµV</i>	<i>Limit dBµV</i>	<i>limit exceeded</i>

Result:
Limit kept

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Conducted Emission Test 450 kHz - 30 MHz
according to FCC Part 15 Subpart C

Model:

WaveLAN AT Rel. 4.0 (2.4 GHz)

Serial No.:

172/#1

Applicant:

AT & T WCND Utrecht B.V.

Test-site:

Shielded room, cabin 2

Tested on:

Linecord modem

Phase L1

Date of test:

12/04/1995

Operator:

R. Heller

Mode:

- FCC test setup
(EUT mounted in HP Vectra 386s/20)

- TX mode with $f = 2.412$ GHz

Detector:

Peak / Final Results: QP

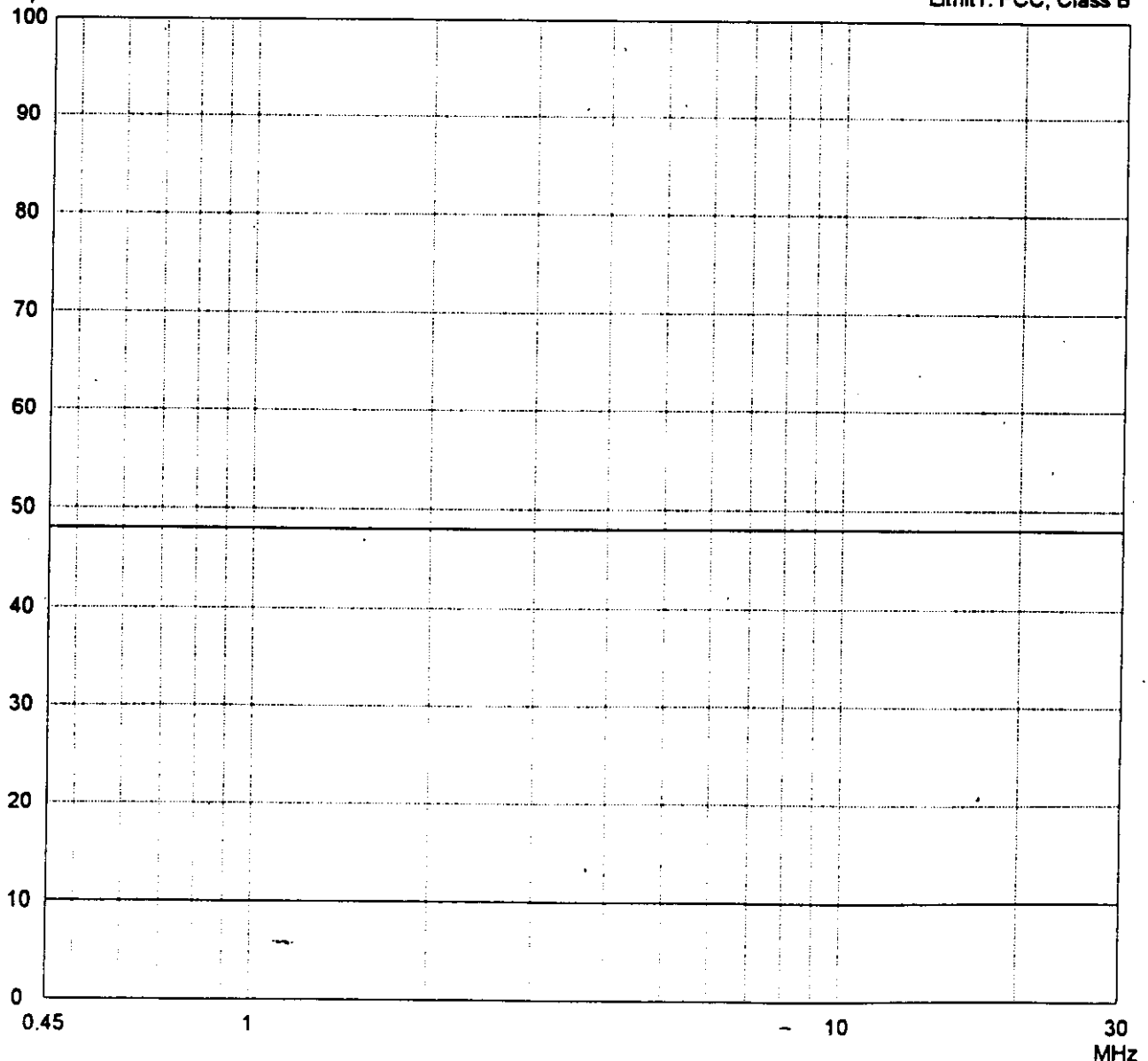
Final Results:

20 dB Margin

25 Subranges

dB μ V

Limit1: FCC, Class B



Result:

Limit kept

Project-File:

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Conducted Emission Test 450 kHz - 30 MHz
according to FCC Part 15 Subpart C

Model:
WaveLAN AT Rel. 4.0 (2.4 GHz)

Serial No.:
172/#1

Applicant:
AT & T WCND Utrecht B.V.

Test-site:
Shielded room, cabin 2

Tested on:
Linecord printer
Phase N

Date of test:
12/04/1995

Operator:
R. Heller

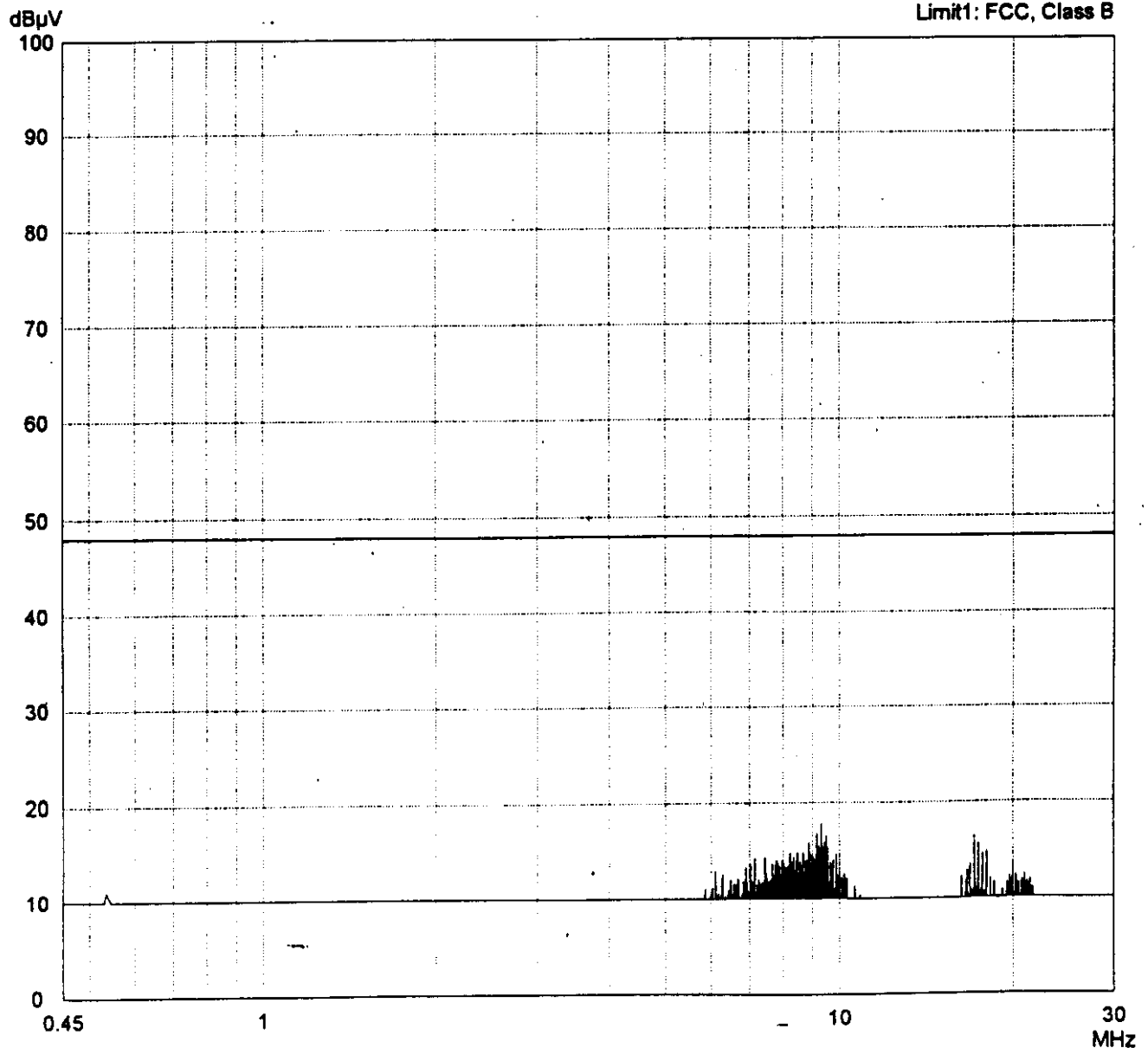
Mode:
- FCC test setup
(EUT mounted in HP Vectra 386s/20)

- TX mode with $f = 2.442$ GHz

Detector:
Peak / Final Results: QP

Final Results:
20 dB Margin

25 Subranges



Result:
Limit kept

Project-File:
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**Conducted Emission Test 450 kHz - 30 MHz
according to FCC Part 15 Subpart C**

Model: WaveLAN AT Rel. 4.0 (2.4 GHz)	
Serial No.: 172/#1	
Applicant: AT & T WCND Utrecht B.V.	
Test-site: Shielded room, cabin 2	
Tested on: Linecord printer Phase N	
Date of test: 12/04/1995	Operator: R. Heller

Mode: - FCC test setup (EUT mounted in HP Vectra 386s/20) - TX mode with $f = 2.442$ GHz
--

Detector: Peak / Final Results: QP
--

Final Results: 20 dB Margin	25 Subranges
---------------------------------------	--------------

Frequency MHz	Value dBμV	Limit dBμV	limit exceeded
no results			

Frequency MHz	Value dBμV	Limit dBμV	limit exceeded

Result: Limit kept

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**Conducted Emission Test 450 kHz - 30 MHz
according to FCC Part 15 Subpart C**

Model:
WaveLAN AT Rel. 4.0 (2.4 GHz)

Serial No.:
172/#1

Applicant:
AT & T WCND Utrecht B.V.

Test-site:
Shielded room, cabin 2

Tested on:
Linecord modem
Phase L1

Date of test:
12/04/1995

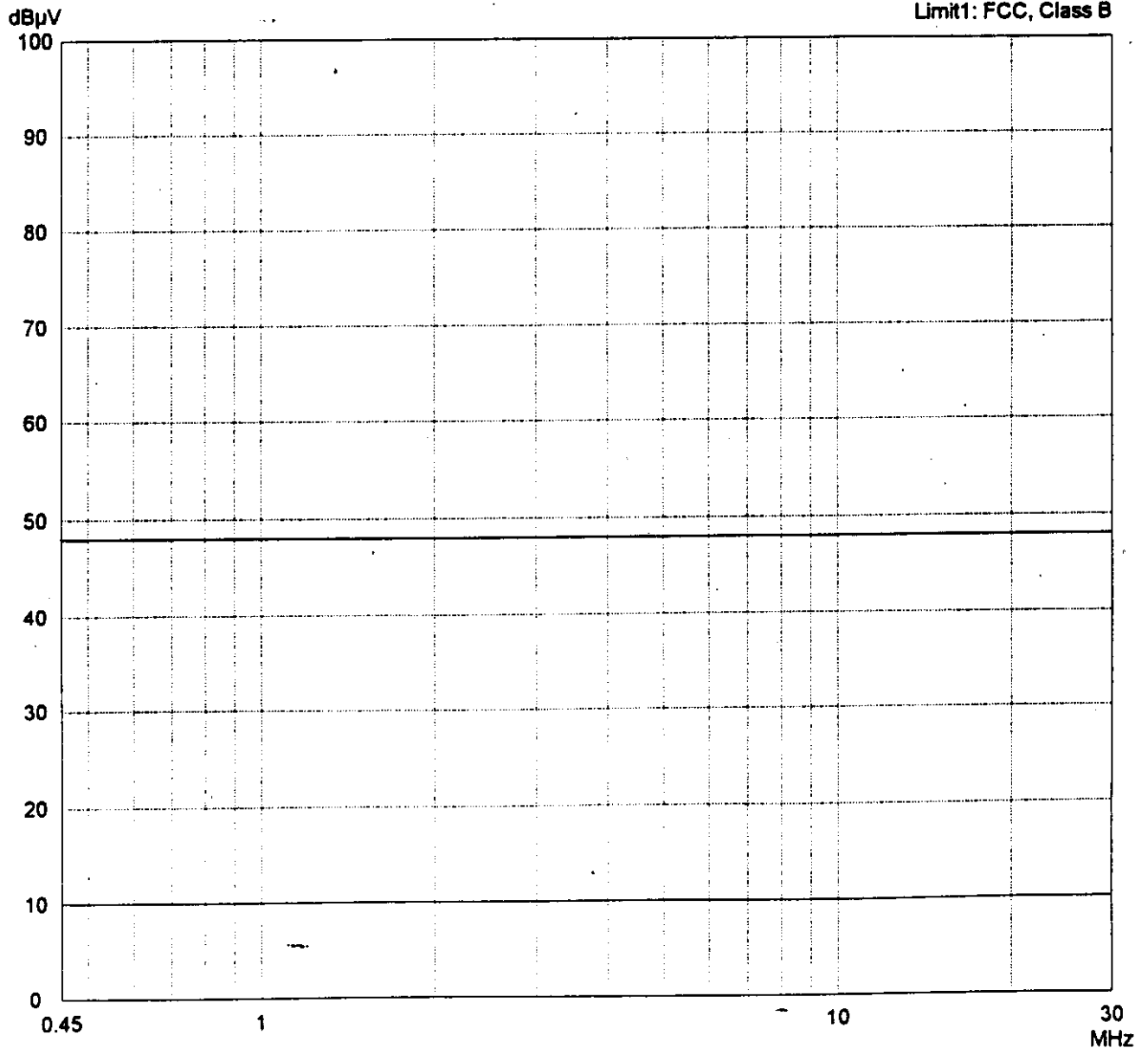
Operator:
R. Heller

Mode:
- FCC test setup
(EUT mounted in HP Vectra 386s/20)

- TX mode with $f = 2.442$ GHz

Detector:
Peak / Final Results: QP

Final Results:
20 dB Margin 25 Subranges



Result:
Limit kept

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Conducted Emission Test 450 kHz - 30 MHz according to FCC Part 15 Subpart C

Model: WaveLAN AT Rel. 4.0 (2.4 GHz)	
Serial No.: 172/#1	
Applicant: AT & T WCND Utrecht B.V.	
Test-site: Shielded room, cabin 2	
Tested on: Linecord modem Phase L1	
Date of test: 12/04/1995	Operator: R. Heller

Mode:
 - FCC test setup
 (EUT mounted in HP Vectra 386s/20)
 - TX mode with $f = 2.442$ GHz

Detector: Peak / Final Results: QP
--

Final Results: 20 dB Margin	25 Subranges
---------------------------------------	--------------

Frequency MHz	Value dBµV	Limit dBµV	limit exceeded
no results			

Frequency MHz	Value dBµV	Limit dBµV	limit exceeded

Result: Limit kept

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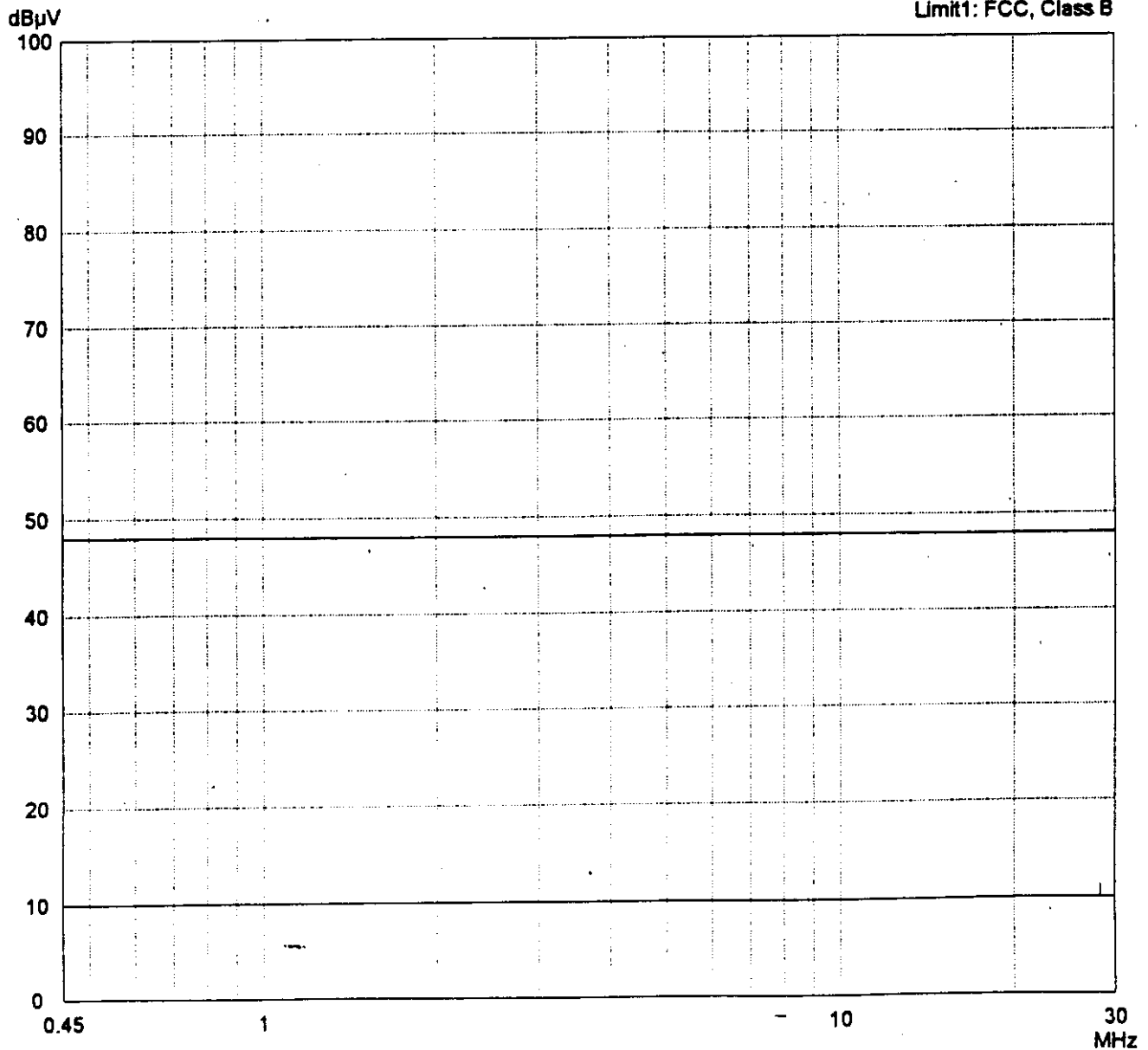
Conducted Emission Test 450 kHz - 30 MHz
according to FCC Part 15 Subpart C

Model: WaveLAN AT Rel. 4.0 (2.4 GHz)	
Serial No.: 172/#1	
Applicant: AT & T WCND Utrecht B.V.	
Test-site: Shielded room, cabin 2	
Tested on: Linecord modem Phase N	
Date of test: 12/04/1995	Operator: R. Heller

Mode: - FCC test setup (EUT mounted in HP Vectra 386s/20) - TX mode with $f = 2.442$ GHz

Detector: Peak / Final Results: QP

Final Results: 20 dB Margin	25 Subranges
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Result: Limit kept

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Conducted Emission Test 450 kHz - 30 MHz
according to FCC Part 15 Subpart C

Model:

WaveLAN AT Rel. 4.0 (2.4 GHz)

Serial No.:

172/#1

Applicant:

AT & T WCND Utrecht B.V.

Test-site:

Shielded room, cabin 2

Tested on:

Linecord PC
Phase L1

Date of test:

12/04/1995

Operator:

R. Heller

Mode:

- FCC test setup
(EUT mounted in HP Vectra 386s/20)

- TX mode with $f = 2.462$ GHz

Detector:

Peak / Final Results: QP

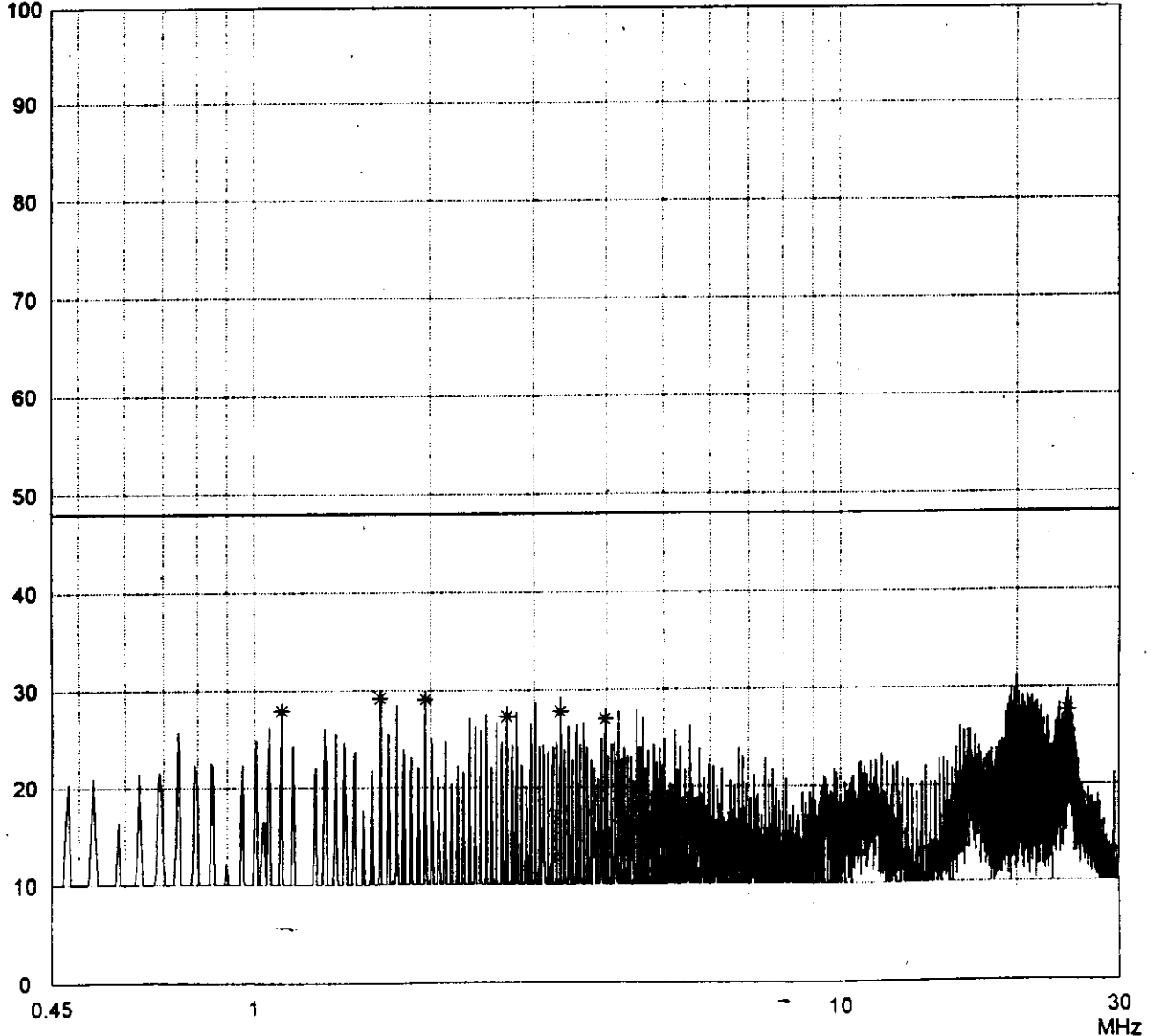
Final Results:

20 dB Margin

25 Subranges

dB μ V
100

Limit1: FCC, Class B



Result:

Limit kept

Project-File:

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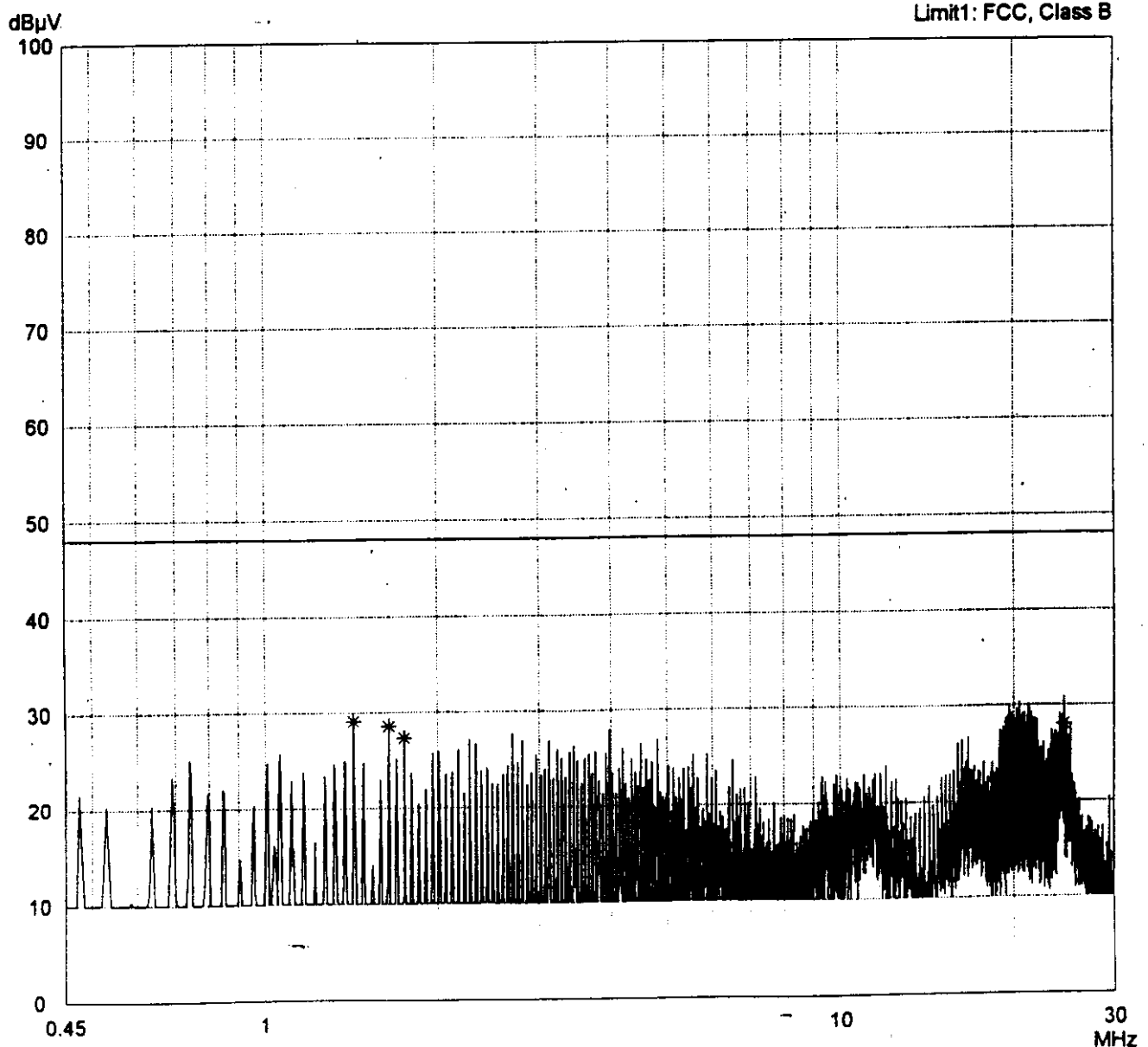
Conducted Emission Test 450 kHz - 30 MHz
according to FCC Part 15 Subpart C

Model: WaveLAN AT Rel. 4.0 (2.4 GHz)	
Serial No.: 172/#1	
Applicant: AT & T WCND Utrecht B.V.	
Test-site: Shielded room, cabin 2	
Tested on: Linecord PC Phase N	
Date of test: 12/04/1995	Operator: R. Heller

Mode: - FCC test setup (EUT mounted in HP Vectra 386s/20)	
- TX mode with $f = 2.462$ GHz	

Detector: Peak / Final Results: QP

Final Results: 20 dB Margin	25 Subranges
--------------------------------	--------------



Result: Limit kept

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Conducted Emission Test 450 kHz - 30 MHz
according to FCC Part 15 Subpart C

Model:
WaveLAN AT Rel. 4.0 (2.4 GHz)

Serial No.:
172/#1

Applicant:
AT & T WCND Utrecht B.V.

Test-site:
Shielded room, cabin 2

Tested on:
Linecord monitor
Phase L1

Date of test:
12/04/1995

Operator:
R. Heller

Mode:
- FCC test setup
(EUT mounted in HP Vectra 386s/20)

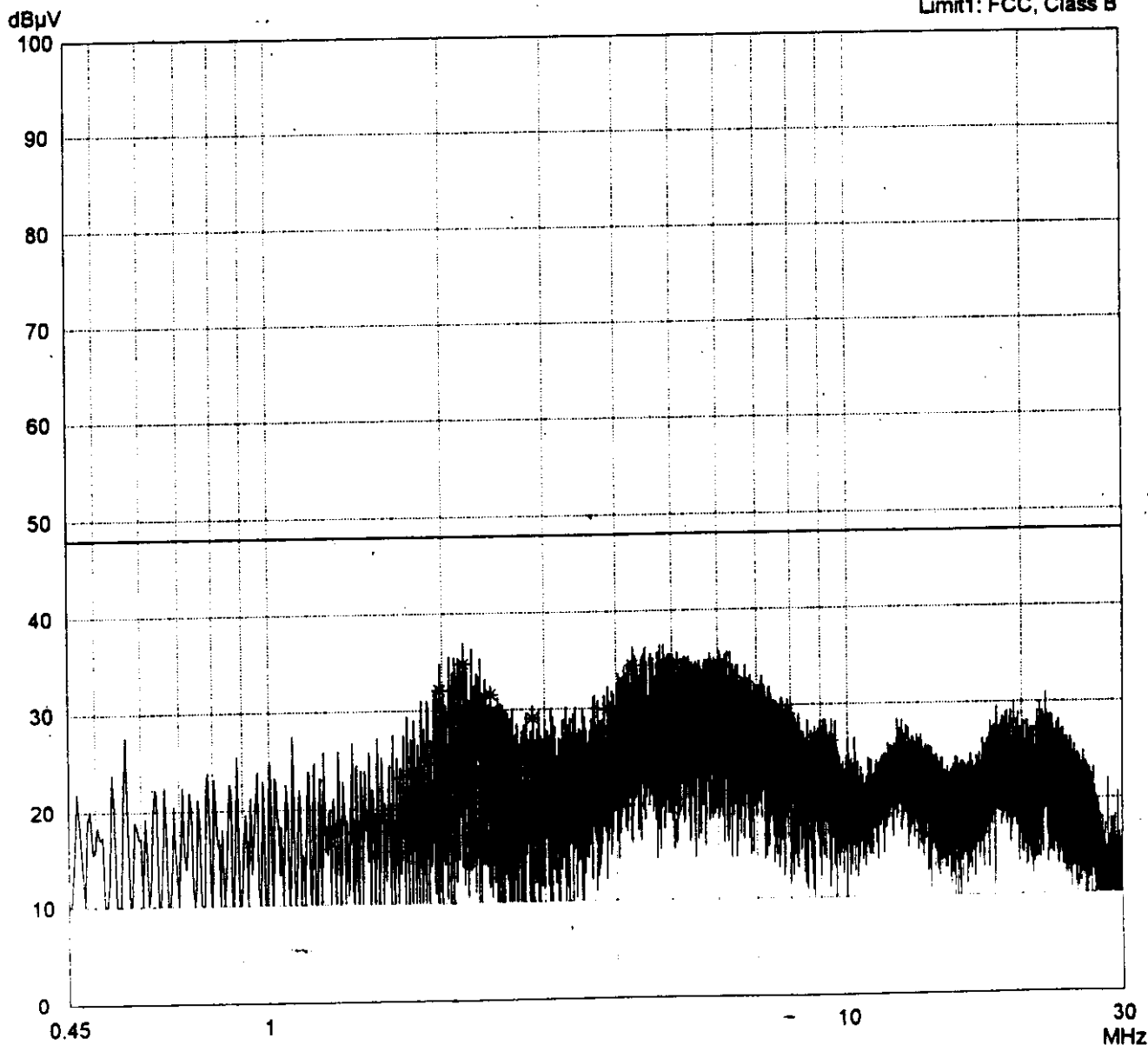
- TX mode with $f = 2.462$ GHz

Detector:
Peak / Final Results: QP

Final Results:
20 dB Margin

25 Subranges

Limit1: FCC, Class B



Result:
Limit kept

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Conducted Emission Test 450 kHz - 30 MHz
according to FCC Part 15 Subpart C

Model:

WaveLAN AT Rel. 4.0 (2.4 GHz)

Serial No.:

172/#1

Applicant:

AT & T WCND Utrecht B.V.

Test-site:

Shielded room, cabin 2

Tested on:

Linecord monitor

Phase N

Date of test:

12/04/1995

Operator:

R. Heller

Mode:

- FCC test setup
(EUT mounted in HP Vectra 386s/20)

- TX mode with $f = 2.462$ GHz

Detector:

Peak / Final Results: QP

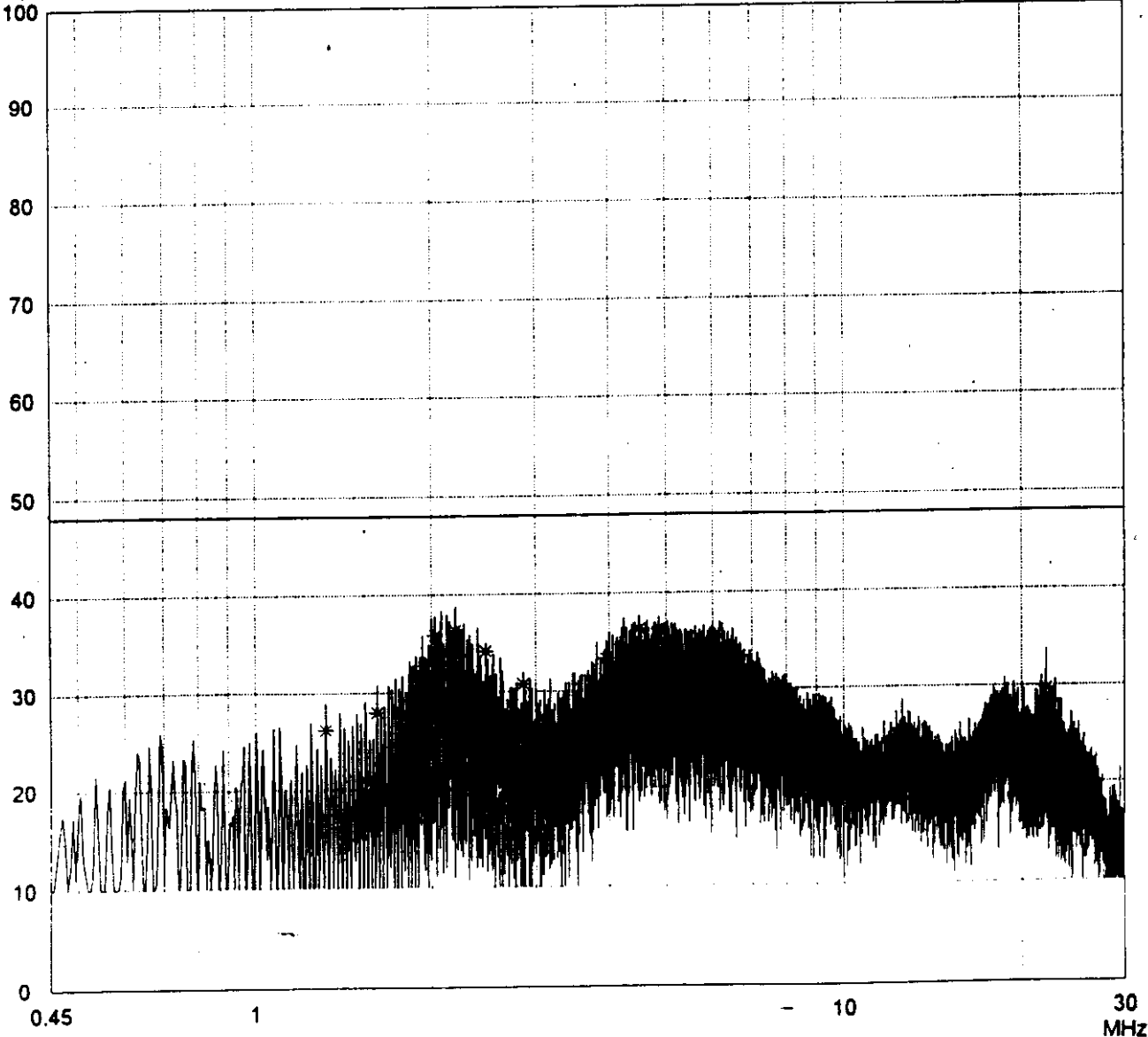
Final Results:

20 dB Margin

25 Subranges

Limit1: FCC, Class B

dB μ V
100



Result:

Limit kept

Project-File:

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Conducted Emission Test 450 kHz - 30 MHz
according to FCC Part 15 Subpart C

Model:
WaveLAN AT Rel. 4.0 (2.4 GHz)

Serial No.:
172/#1

Applicant:
AT & T WCND Utrecht B.V.

Test-site:
Shielded room, cabin 2

Tested on:
Linecord printer
Phase L1

Date of test:
12/04/1995

Operator:
R. Heller

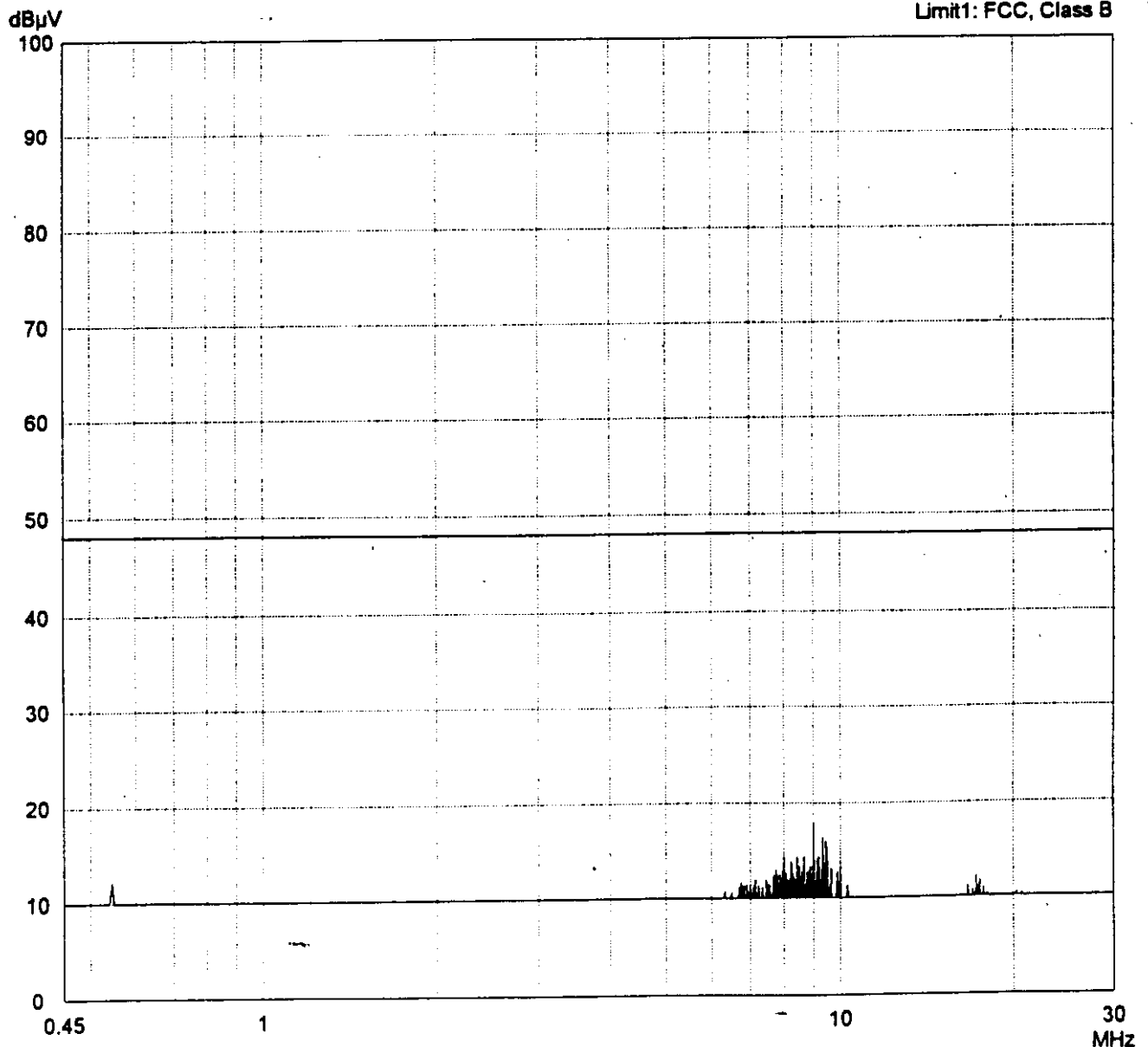
Mode:
- FCC test setup
(EUT mounted in HP Vectra 386s/20)

- TX mode with $f = 2.462$ GHz

Detector:
Peak / Final Results: QP

Final Results:
20 dB Margin

25 Subranges



Result:
Limit kept

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Conducted Emission Test 450 kHz - 30 MHz
according to FCC Part 15 Subpart C

Model: WaveLAN AT Rel. 4.0 (2.4 GHz)	
Serial No.: 172/#1	
Applicant: AT & T WCND Utrecht B.V.	
Test-site: Shielded room, cabin 2	
Tested on: Linecord printer Phase L1	
Date of test: 12/04/1995	Operator: R. Heller

Mode:

- FCC test setup
(EUT mounted in HP Vectra 386s/20)
- TX mode with $f = 2.462$ GHz

Detector:
Peak / Final Results: QP

Final Results:
20 dB Margin 25 Subranges

Frequency MHz	Value dB μ V	Limit dB μ V	limit exceeded
no results			

<i>Frequency MHz</i>	<i>Value dBμV</i>	<i>Limit dBμV</i>	<i>limit exceeded</i>

Result:
Limit kept

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Conducted Emission Test 450 kHz - 30 MHz
according to FCC Part 15 Subpart C

Model:
WaveLAN AT Rel. 4.0 (2.4 GHz)

Serial No.:
172/#1

Applicant:
AT & T WCND Utrecht B.V.

Test-site:
Shielded room, cabin 2

Tested on:
Linecord printer
Phase N

Date of test:
12/04/1995

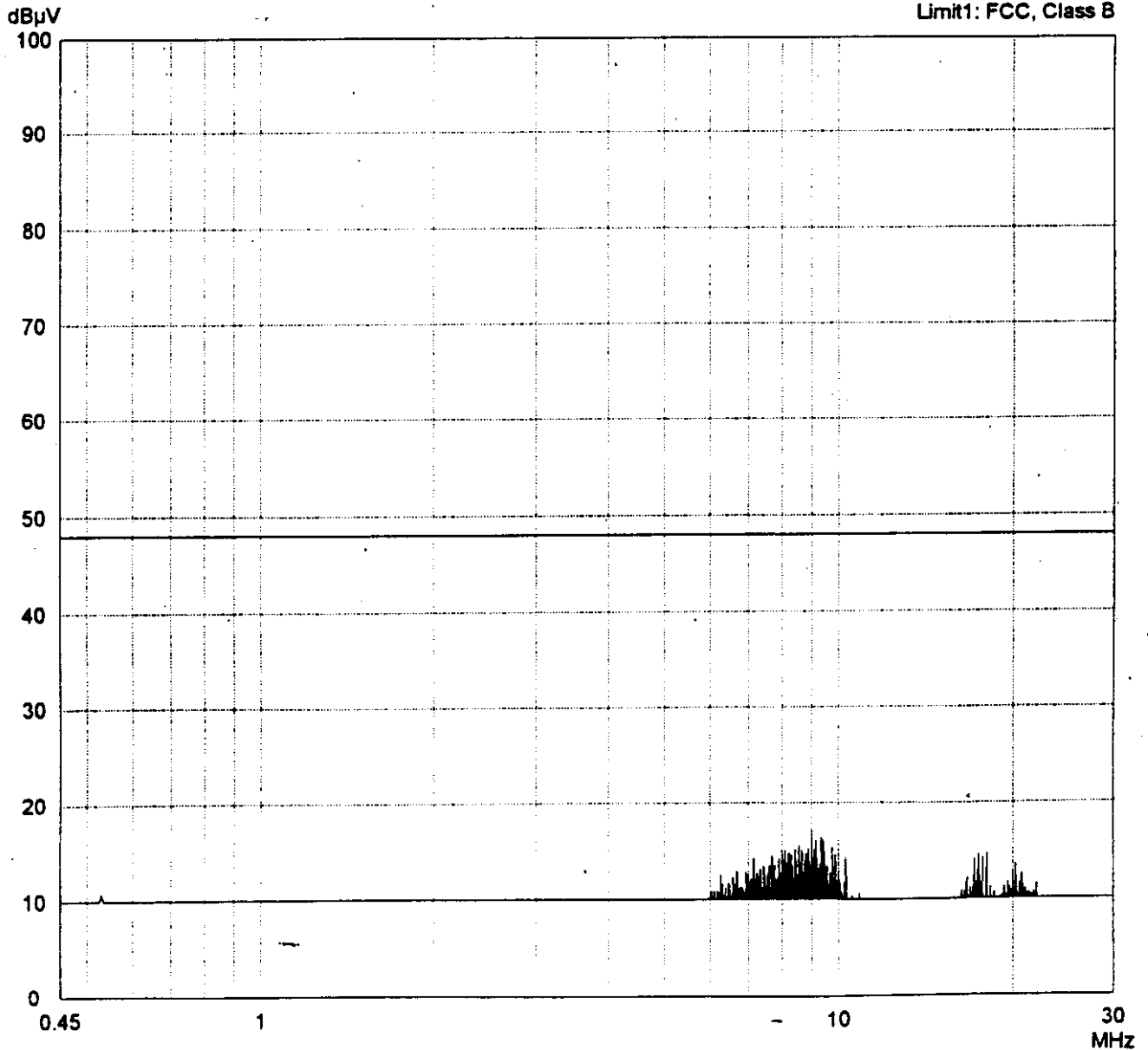
Operator:
R. Heller

Mode:
- FCC test setup
(EUT mounted in HP Vectra 386s/20)

- TX mode with $f = 2.462$ GHz

Detector:
Peak / Final Results: QP

Final Results:
20 dB Margin 25 Subranges



Result:
Limit kept

Project-File:
56305-51298

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**Conducted Emission Test 450 kHz - 30 MHz
according to FCC Part 15 Subpart C**

Model: WaveLAN AT Rel. 4.0 (2.4 GHz)	
Serial No.: 172/#1	
Applicant: AT & T WCND Utrecht B.V.	
Test-site: Shielded room, cabin 2	
Tested on: Linecord printer Phase N	
Date of test: 12/04/1995	Operator: R. Heller

Mode:
- FCC test setup
(EUT mounted in HP Vectra 386s/20)

- TX mode with $f = 2.462$ GHz

Detector: Peak / Final Results: QP
--

Final Results:
20 dB Margin 25 Subranges

Frequency MHz	Value dB μ V	Limit dB μ V	limit exceeded
no results			

Frequency MHz	Value dB μ V	Limit dB μ V	limit exceeded

Result:
Limit kept

Project-File:
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Conducted Emission Test 450 kHz - 30 MHz
according to FCC Part 15 Subpart C

Model:
WaveLAN AT Rel. 4.0 (2.4 GHz)

Serial No.:
172/#1

Applicant:
AT & T WCND Utrecht B.V.

Test-site:
Shielded room, cabin 2

Tested on:
Linecord modem
Phase L1

Date of test:
12/04/1995

Operator:
R. Heller

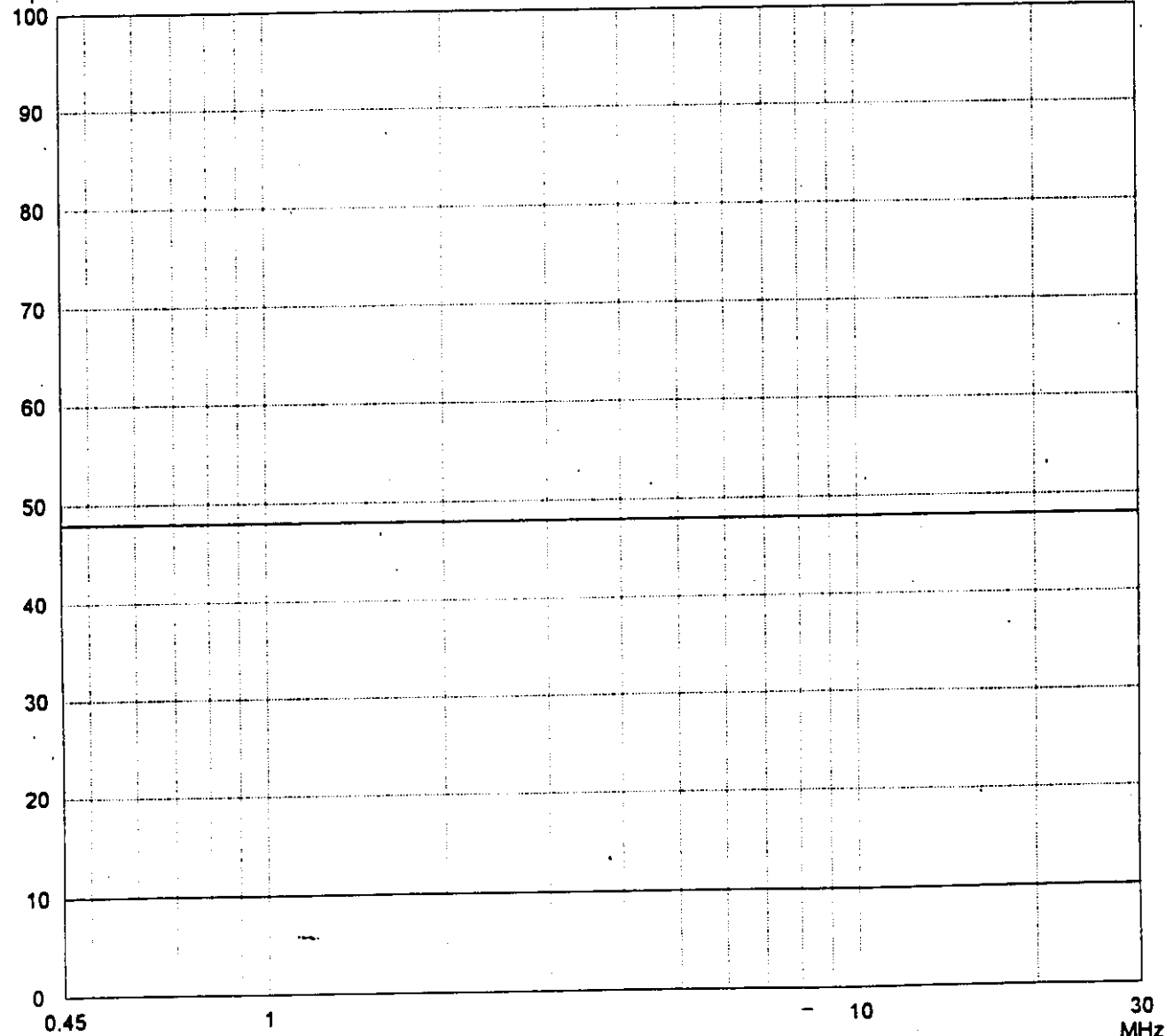
Mode:
- FCC test setup
(EUT mounted in HP Vectra 386s/20)
- TX mode with $f = 2.462$ GHz

Detector:
Peak / Final Results: QP

Final Results:
20 dB Margin 25 Subranges

dB μ V

Limit1: FCC, Class B



Result:
Limit kept

Project-File:
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Conducted Emission Test 450 kHz - 30 MHz
according to FCC Part 15 Subpart C

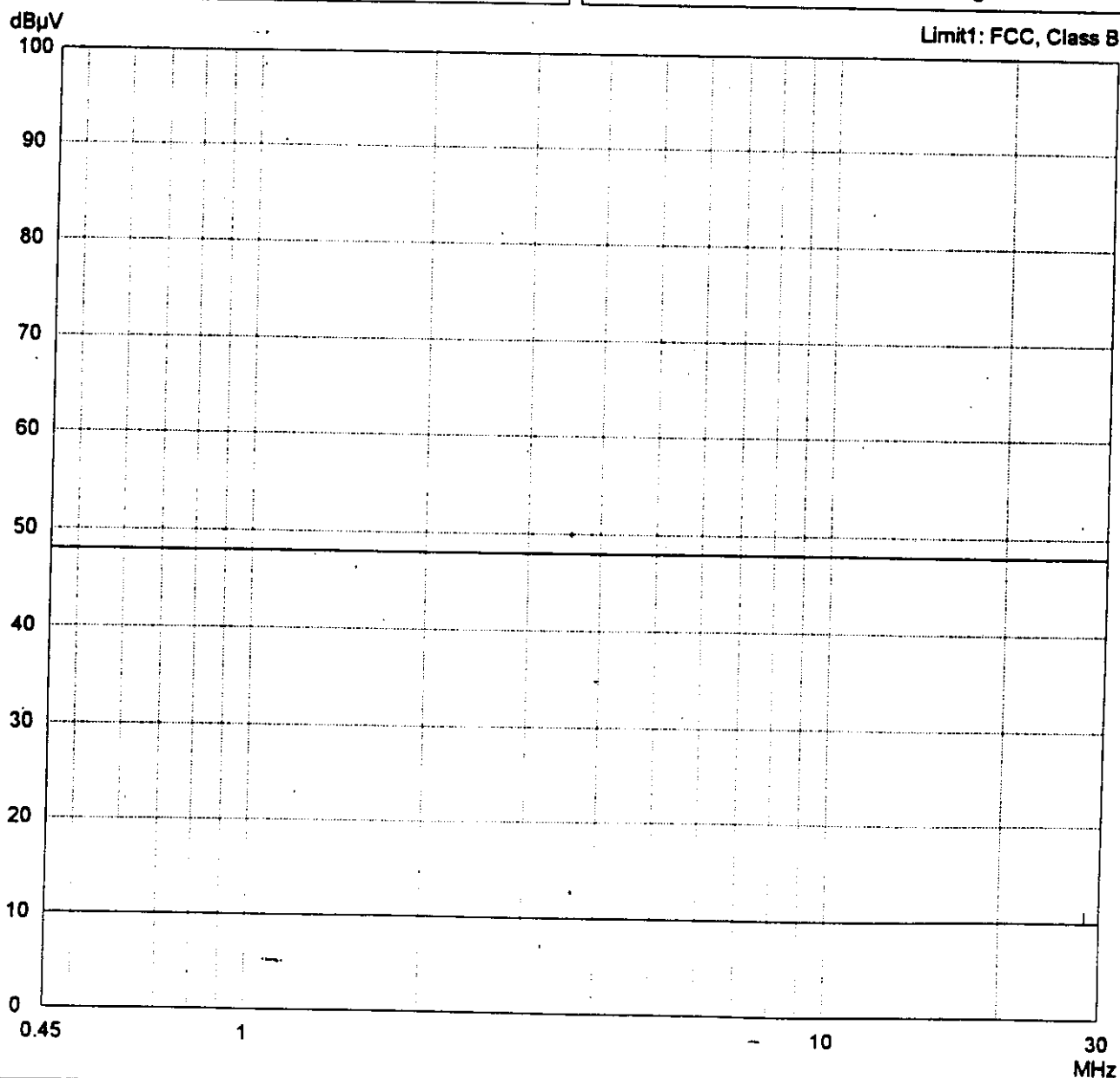
Conducted Emission Test 450 kHz - 30 MHz
according to FCC Part 15 Subpart C

Model: WaveLAN AT Rel. 4.0 (2.4 GHz)	
Serial No.: 172/#1	
Applicant: AT & T WCND Utrecht B.V.	
Test-site: Shielded room, cabin 2	
Tested on: Linecord modem Phase N	
Date of test: 12/04/1995	Operator: R. Heller

Mode: - FCC test setup (EUT mounted in HP Vectra 386s/20) - TX mode with $f = 2.462$ GHz

Detector: Peak / Final Results: QP

Final Results: 20 dB Margin	25 Subranges
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Result: Limit kept

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**Conducted Emission Test 450 kHz - 30 MHz
according to FCC Part 15 Subpart C**

Model:
WaveLAN AT Rel. 4.0 (2.4 GHz)

Serial No.:
172/#1

Applicant:
AT & T WCND Utrecht B.V.

Test-site:
Shielded room, cabin 2

Tested on:
Linecord modem
Phase N

Date of test: 12/04/1995
Operator: R. Heller

Mode:
- FCC test setup
(EUT mounted in HP Vectra 386s/20)

- TX mode with $f = 2.462$ GHz

Detector:
Peak / Final Results: QP

Final Results:
20 dB Margin 25 Subranges

Frequency MHz	Value dB μ V	Limit dB μ V	limit exceeded
no results			

Frequency MHz	Value dB μ V	Limit dB μ V	limit exceeded

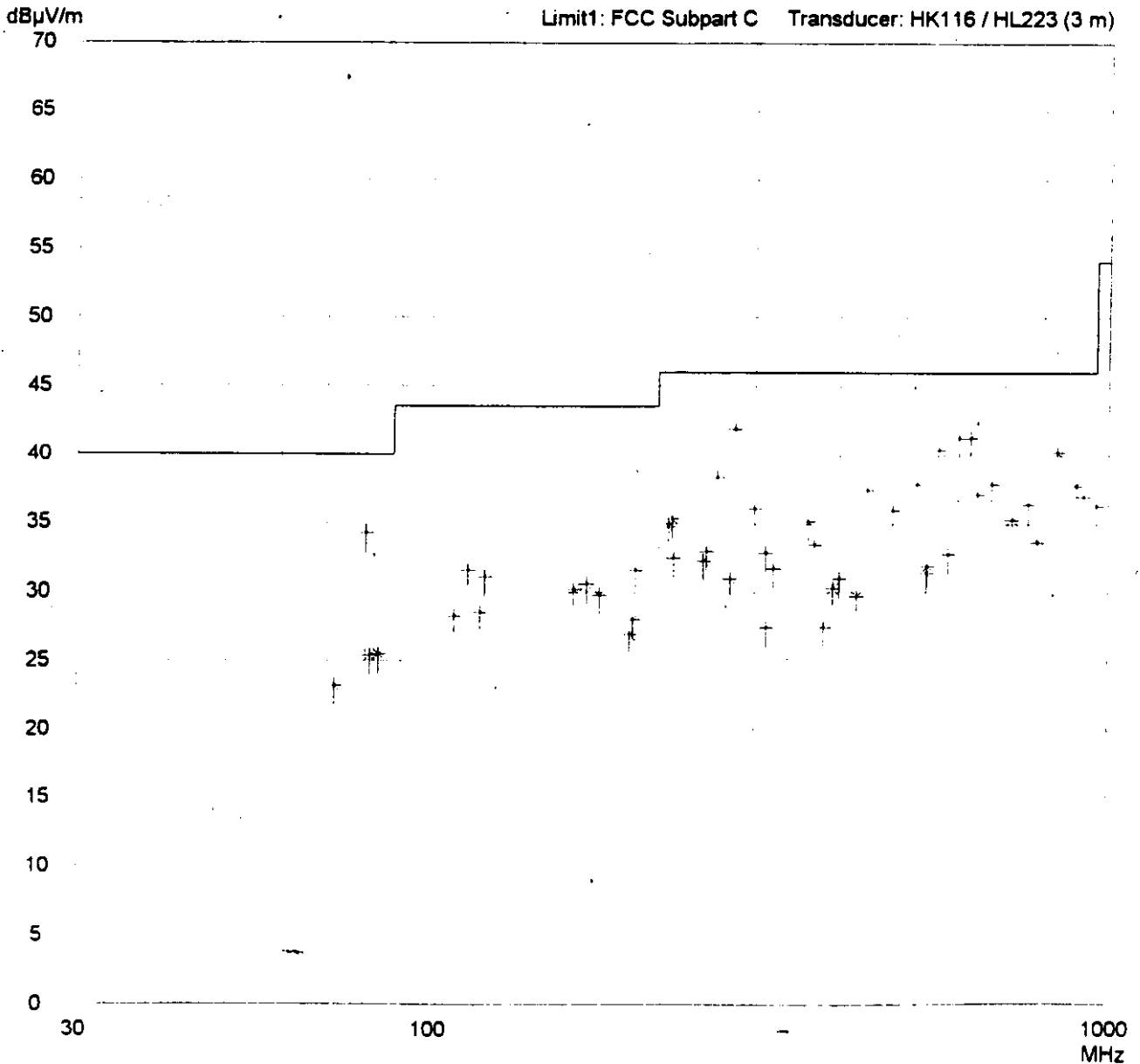
Result:
Limit kept

Project-File:
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Radiated Emission Test 30 MHz - 1 GHz according to FCC Part 15 Subpart C

Model: WaveLAN AT Rel. 4.0 (2.4 GHz)	Mode: - FCC test setup (EUT mounted in HP Vectra 386s/20)
Serial No.: 172/#1	- TX mode with $f = 2.412$ GHz
Applicant: AT & T WCND Utrecht B.V.	
Test-site: Open area test-site I	
Tested on: Test distance 3 meters Horizontal Polarization	
Date of test: 12/05/1995	Operator: R. Heller
Detector: Quasi-Peak	List of values: Selected by hand



Radiated Emission Test 30 MHz - 1 GHz according to FCC Part 15 Subpart C

Model: WaveLAN AT Rel. 4.0 (2.4 GHz)	Mode: - FCC test setup (EUT mounted in HP Vectra 386s/20)
Serial No.: 172/#1	- TX mode with $f = 2.412$ GHz
Applicant: AT & T WCND Utrecht B.V.	
Test-site: Open area test-site I	
Tested on: Test distance 3 meters Horizontal Polarization	
Date of test: 12/05/1995	Operator: R. Heller
Detector: Quasi-Peak	List of values: Selected by hand

Frequency MHz	Reading dB μ V	Correction factor dB	Value dB μ V/m	Limit dB μ V/m	Limit exceeded
72.0	13.0	10.2	23.2	40.0	
80.0	24.0	10.3	34.3	40.0	
81.1	15.0	10.4	25.4	40.0	
83.6	15.0	10.5	25.5	40.0	
108.1	16.0	12.2	28.2	43.5	
113.3	19.0	12.6	31.6	43.5	
118.0	15.5	13.0	28.5	43.5	
120.0	18.0	13.1	31.1	43.5	
162.2	15.0	15.2	30.2	43.5	
169.6	15.0	15.6	30.6	43.5	
176.9	14.0	15.8	29.8	43.5	
196.0	10.0	16.9	26.9	43.5	
198.2	11.0	17.0	28.0	43.5	
200.0	14.5	17.1	31.6	43.5	
224.0	17.0	17.8	34.8	46.0	
226.6	17.5	17.9	35.4	46.0	
228.0	14.5	18.0	32.5	46.0	
252.0	13.5	18.8	32.3	46.0	
254.9	14.0	19.0	33.0	46.0	
264.0	18.5	19.9	38.4	46.0	
276.0	10.0	21.0	31.0	46.0	
280.0	20.5	21.4	41.9	46.0	
300.0	13.0	23.1	36.1	46.0	
311.5	15.5	17.4	32.9	46.0	
312.0	10.0	17.4	27.4	46.0	
320.0	14.0	17.7	31.7	46.0	
360.0	16.0	19.2	35.2	46.0	
368.2	14.0	19.5	33.5	46.0	
380.0	7.5	19.9	27.4	46.0	
392.0	10.0	20.3	30.3	46.0	
400.0	10.5	20.5	31.0	46.0	
424.8	8.5	21.2	29.7	46.0	
440.0	16.0	21.5	37.5	46.0	
480.0	13.5	22.5	36.0	46.0	
520.0	14.5	23.4	37.9	46.0	
538.1	7.5	23.9	31.4	46.0	
540.0	8.0	23.9	31.9	46.0	
560.0	16.0	24.4	40.4	46.0	
580.0	8.0	24.8	32.8	46.0	

Result: Limit kept	Project-File: 56305-51298
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Radiated Emission Test 30 MHz - 1 GHz according to FCC Part 15 Subpart C

Model: WaveLAN AT Rel. 4.0 (2.4 GHz)	Mode: - FCC test setup (EUT mounted in HP Vectra 386s/20)
Serial No.: 172/#1	- TX mode with f = 2.412 GHz
Applicant: AT & T WCND Utrecht B.V.	
Test-site: Open area test-site I	
Tested on: Test distance 3 meters Horizontal Polarization	
Date of test: 12/05/1995	Operator: R. Heller
Detector: Quasi-Peak	List of values: Selected by hand

Frequency MHz	Reading dBµV	Correction factor dB	Value dBµV/m	Limit dBµV/m	Limit exceeded
600.0	16.0	25.3	41.3	46.0	
624.0	15.5	25.8	41.3	46.0	
640.0	11.0	26.2	37.2	46.0	
672.0	11.0	26.9	37.9	46.0	
720.0	7.5	27.8	35.3	46.0	
760.0	8.0	28.4	36.4	46.0	
784.0	5.0	28.7	33.7	46.0	
840.0	10.5	29.7	40.2	46.0	
896.0	7.0	30.8	37.8	46.0	
920.0	6.0	31.0	37.0	46.0	
960.0	5.0	31.3	36.3	46.0	

Radiated Emission Test 30 MHz - 1 GHz according to FCC Part 15 Subpart C

Model:
WaveLAN AT Rel. 4.0 (2.4 GHz)

Serial No.:
172/#1

Applicant:
AT & T WCND Utrecht B.V.

Test-site:
Open area test-site I

Tested on:
Test distance 3 meters
Vertical Polarization

Date of test:
12/05/1995

Operator:
R. Heller

Detector:
Quasi-Peak

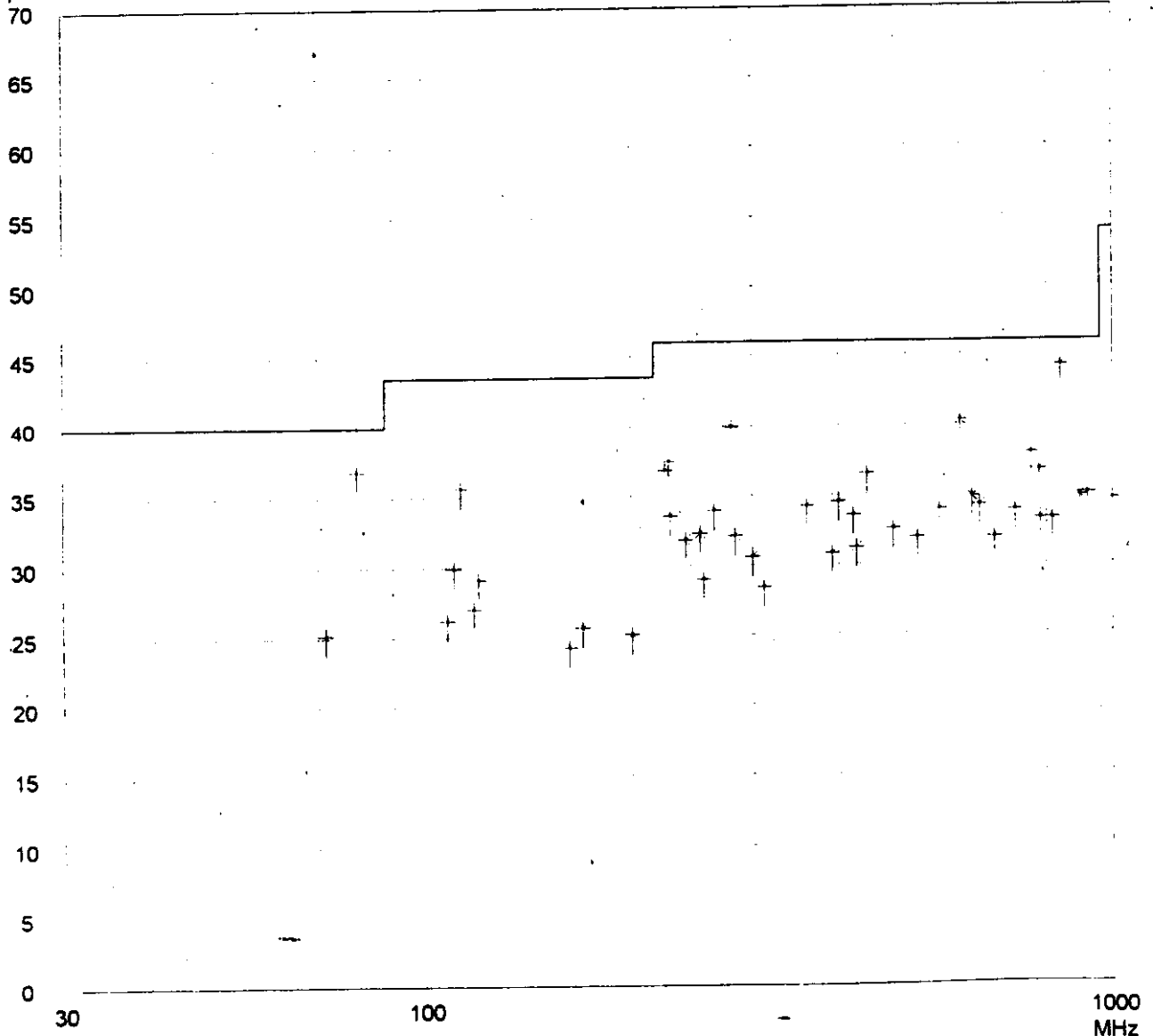
Mode:
- FCC test setup
(EUT mounted in HP Vectra 386s/20)

- TX mode with $f = 2.412$ GHz

List of values:
Selected by hand

dB μ V/m

Limit1: FCC Subpart C Transducer: HK116 / HL223 (3 m)



Result:
Limit kept

Project-File:
56305-51298

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Radiated Emission Test 30 MHz - 1 GHz according to FCC Part 15 Subpart C

Model: WaveLAN AT Rel. 4.0 (2.4 GHz)		Mode: - FCC test setup (EUT mounted in HP Vectra 386s/20) - TX mode with $f = 2.412$ GHz	
Serial No.: 172#1			
Applicant: AT & T WCND Utrecht B.V.			
Test-site: Open area test-site I			
Tested on: Test distance 3 meters Vertical Polarization			
Date of test: 12/05/1995	Operator: R. Heller		
Detector: Quasi-Peak		List of values: Selected by hand	

Frequency MHz	Reading dBμV	Correction factor dB	Value dBμV/m	Limit dBμV/m	Limit exceeded
72.0	15.0	10.2	25.2	40.0	
80.0	26.5	10.3	36.8	40.0	
108.1	14.0	12.2	26.2	43.5	
110.6	17.5	12.4	29.9	43.5	
113.3	23.0	12.6	35.6	43.5	
118.0	14.0	13.0	27.0	43.5	
120.0	16.0	13.1	29.1	43.5	
162.2	9.0	15.2	24.2	43.5	
169.6	10.0	15.6	25.6	43.5	
200.0	8.0	17.1	25.1	43.5	
224.0	19.0	17.8	36.8	46.0	
226.6	19.5	17.9	37.4	46.0	
228.0	15.5	18.0	33.5	46.0	
240.0	13.5	18.3	31.8	46.0	
252.0	13.5	18.8	32.3	46.0	
254.9	10.0	19.0	29.0	46.0	
264.0	14.0	19.9	33.9	46.0	
280.0	18.5	21.4	39.9	46.0	
283.2	10.5	21.6	32.1	46.0	
300.0	7.5	23.1	30.6	46.0	
311.5	11.0	17.4	28.4	46.0	
360.0	15.0	19.2	34.2	46.0	
392.0	10.5	20.3	30.8	46.0	
400.0	14.0	20.5	34.5	46.0	
420.0	12.5	21.0	33.5	46.0	
424.8	10.0	21.2	31.2	46.0	
440.0	15.0	21.5	36.5	46.0	
480.0	10.0	22.5	32.5	46.0	
520.0	8.5	23.4	31.9	46.0	
560.0	9.5	24.4	33.9	46.0	
600.0	15.0	25.3	40.3	46.0	
624.0	9.0	25.8	34.8	46.0	
640.0	8.0	26.2	34.2	46.0	
672.0	5.0	26.9	31.9	46.0	
720.0	6.0	27.8	33.8	46.0	
760.0	9.5	28.4	37.9	46.0	
780.8	8.0	28.7	36.7	46.0	
784.0	4.5	28.7	33.2	46.0	
816.0	4.0	29.2	33.2	46.0	

Result: Limit kept	Project-File: 56305-51298
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**Radiated Emission Test 30 MHz - 1 GHz
according to FCC Part 15 Subpart C**

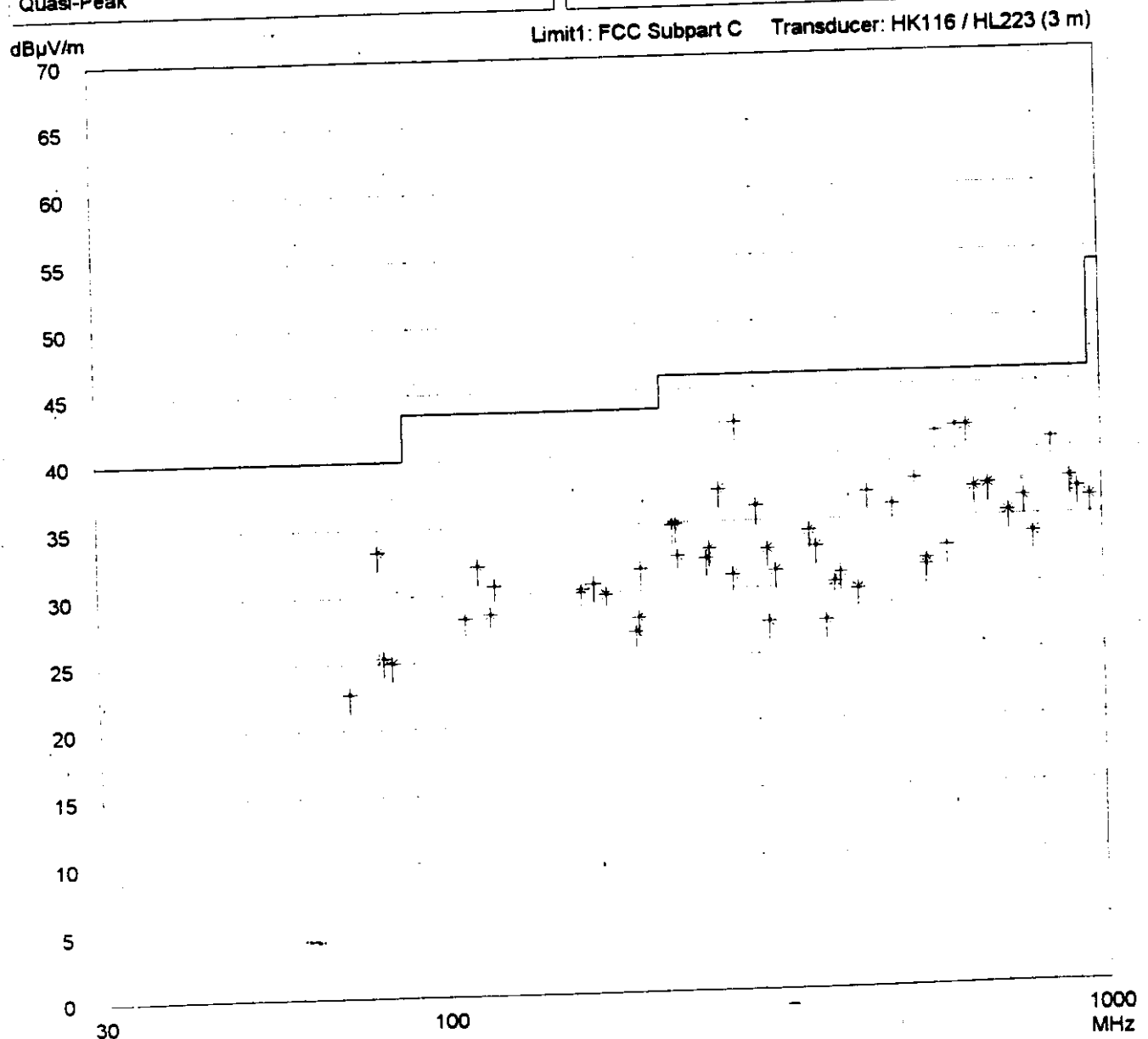
Model: WaveLAN AT Rel. 4.0 (2.4 GHz)	Mode: - FCC test setup (EUT mounted in HP Vectra 386s/20)
Serial No.: 172/#1	- TX mode with $f = 2.412$ GHz
Applicant: AT & T WCND Utrecht B.V.	
Test-site: Open area test-site I	
Tested on: Test distance 3 meters Vertical Polarization	
Date of test: 12/05/1995	Operator: R. Heller
Detector: Quasi-Peak	List of values: Selected by hand

Frequency MHz	Reading dBμV	Correction factor dB	Value dBμV/m	Limit dBμV/m	Limit exceeded
840.0	14.5	29.7	44.2	46.0	
896.0	4.0	30.8	34.8	46.0	
920.0	4.0	31.0	35.0	46.0	
1000.0	3.0	31.6	34.6	54.0	

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Radiated Emission Test 30 MHz - 1 GHz according to FCC Part 15 Subpart C

Model: WaveLAN AT Rel. 4.0 (2.4 GHz)	Mode: - FCC test setup (EUT mounted in HP Vectra 386s/20) - TX mode with $f = 2.442$ GHz
Serial No.: 172/#1	
Applicant: AT & T WCND Utrecht B.V.	
Test-site: Open area test-site I	
Tested on: Test distance 3 meters Horizontal Polarization	
Date of test: 12/05/1995	Operator: R. Heller
Detector: Quasi-Peak	List of values: Selected by hand



Result:
Limit kept

Project-File:
56305-51298

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Radiated Emission Test 30 MHz - 1 GHz according to FCC Part 15 Subpart C

Model: WaveLAN AT Rel. 4.0 (2.4 GHz)	Mode: - FCC test setup (EUT mounted in HP Vectra 386s/20)
Serial No.: 172/#1	- TX mode with $f = 2.442$ GHz
Applicant: AT & T WCND Utrecht B.V.	
Test-site: Open area test-site I	
Tested on: Test distance 3 meters Horizontal Polarization	
Date of test: 12/05/1995	Operator: R. Heller
Detector: Quasi-Peak	List of values: Selected by hand

Frequency MHz	Reading dBμV	Correction factor dB	Value dBμV/m	Limit dBμV/m	Limit exceeded
72.0	12.5	10.2	22.7	40.0	
80.0	23.0	10.3	33.3	40.0	
81.1	15.0	10.4	25.4	40.0	
83.6	14.5	10.5	25.0	40.0	
108.1	16.0	12.2	28.2	43.5	
113.3	19.5	12.6	32.1	43.5	
118.0	15.5	13.0	28.5	43.5	
120.0	17.5	13.1	30.6	43.5	
162.2	15.0	15.2	30.2	43.5	
169.6	15.0	15.6	30.6	43.5	
176.9	14.0	15.8	29.8	43.5	
196.0	10.0	16.9	26.9	43.5	
198.2	11.0	17.0	28.0	43.5	
200.0	14.5	17.1	31.6	43.5	
224.0	17.0	17.8	34.8	46.0	
226.6	17.0	17.9	34.9	46.0	
228.0	14.5	18.0	32.5	46.0	
252.0	13.5	18.8	32.3	46.0	
254.9	14.0	19.0	33.0	46.0	
264.0	17.5	19.9	37.4	46.0	
276.0	10.0	21.0	31.0	46.0	
280.0	21.0	21.4	42.4	46.0	
300.0	13.0	23.1	36.1	46.0	
311.5	15.5	17.4	32.9	46.0	
312.0	10.0	17.4	27.4	46.0	
320.0	13.5	17.7	31.2	46.0	
360.0	15.0	19.2	34.2	46.0	
368.2	13.5	19.5	33.0	46.0	
380.0	7.5	19.9	27.4	46.0	
392.0	10.0	20.3	30.3	46.0	
400.0	10.5	20.5	31.0	46.0	
424.8	8.5	21.2	29.7	46.0	
440.0	15.5	21.5	37.0	46.0	
480.0	13.5	22.5	36.0	46.0	
520.0	14.5	23.4	37.9	46.0	
538.1	7.5	23.9	31.4	46.0	
540.0	8.0	23.9	31.9	46.0	
560.0	17.0	24.4	41.4	46.0	
580.0	8.0	24.8	32.8	46.0	

Result: Limit kept	Project-File: 56305-51298
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Radiated Emission Test 30 MHz - 1 GHz according to FCC Part 15 Subpart C

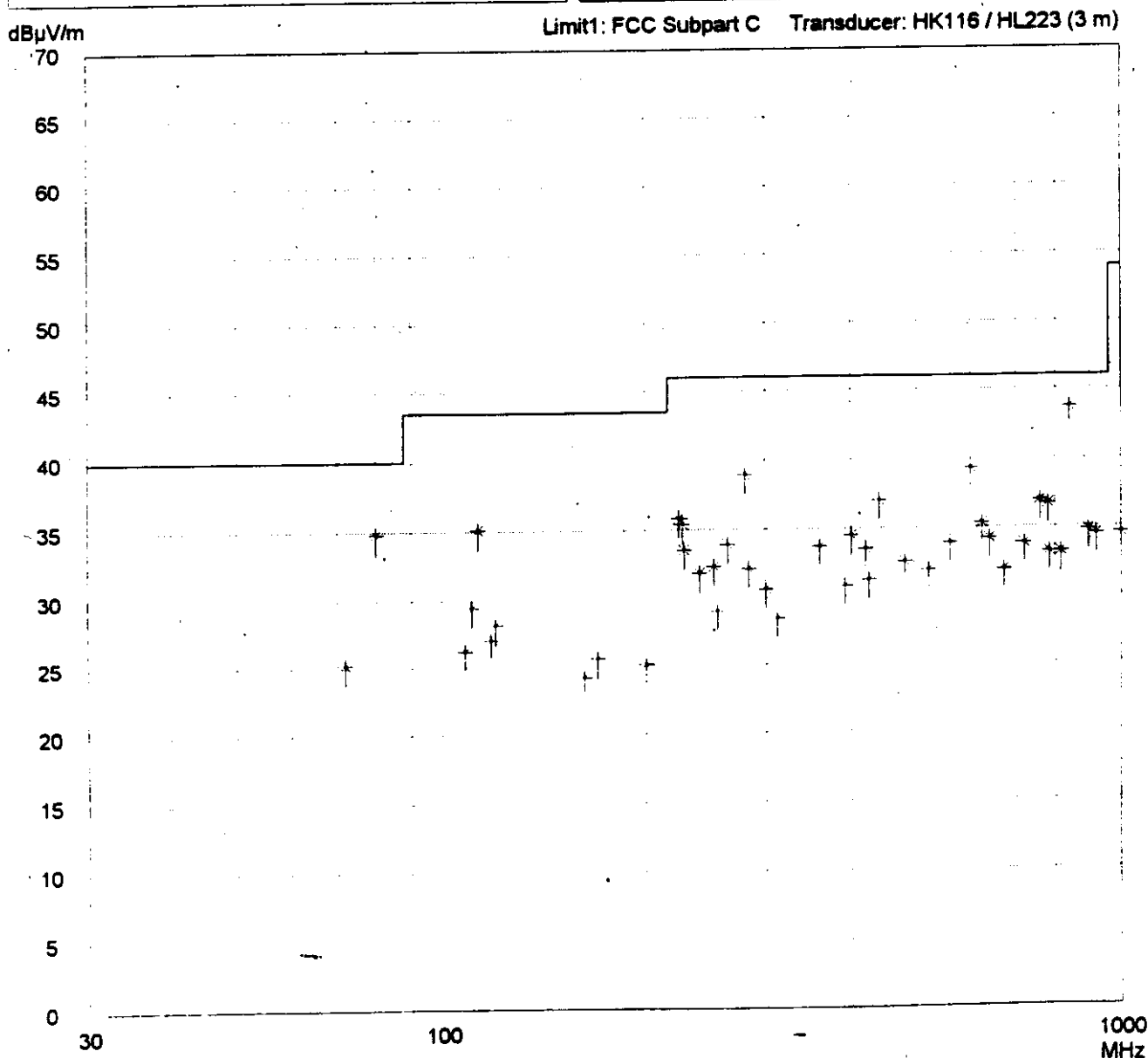
Model: WaveLAN AT Rel. 4.0 (2.4 GHz)	Mode: - FCC test setup (EUT mounted in HP Vectra 386s/20) - TX mode with $f = 2.442$ GHz
Serial No.: 172/#1	
Applicant: AT & T WCND Utrecht B.V.	
Test-site: Open area test-site I	
Tested on: Test distance 3 meters Horizontal Polarization	
Date of test: 12/05/1995	Operator: R. Heller
Detector: Quasi-Peak	List of values: Selected by hand

Frequency MHz	Reading dB μ V	Correction factor dB	Value dB μ V/m	Limit dB μ V/m	Limit exceeded
600.0	16.5	25.3	41.8	46.0	
624.0	16.0	25.8	41.8	46.0	
640.0	11.0	26.2	37.2	46.0	
672.0	10.5	26.9	37.4	46.0	
720.0	7.5	27.8	35.3	46.0	
760.0	8.0	28.4	36.4	46.0	
784.0	5.0	28.7	33.7	46.0	
840.0	11.0	29.7	40.7	46.0	
896.0	7.0	30.8	37.8	46.0	
920.0	6.0	31.0	37.0	46.0	
960.0	5.0	31.3	36.3	46.0	

Result: Limit kept	Project-File: 56305-51298
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Radiated Emission Test 30 MHz - 1 GHz according to FCC Part 15 Subpart C

Model: WaveLAN AT Rel. 4.0 (2.4 GHz)	Mode: - FCC test setup (EUT mounted in HP Vectra 386s/20) - TX mode with $f = 2.442$ GHz
Serial No.: 172/#1	
Applicant: AT & T WCND Utrecht B.V.	
Test-site: Open area test-site I	
Tested on: Test distance 3 meters Vertical Polarization	
Date of test: 12/05/1995	Operator: R. Heller
Detector: Quasi-Peak	List of values: Selected by hand



Result:
Limit kept

Project-File:
56305-51298

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Radiated Emission Test 30 MHz - 1 GHz according to FCC Part 15 Subpart C

Model: WaveLAN AT Rel. 4.0 (2.4 GHz)	Mode: - FCC test setup (EUT mounted in HP Vectra 386s/20)
Serial No.: 172/#1	- TX mode with $f = 2.442$ GHz
Applicant: AT & T WCND Utrecht B.V.	
Test-site: Open area test-site I	
Tested on: Test distance 3 meters Vertical Polarization	
Date of test: 12/05/1995	Operator: R. Heller
Detector: Quasi-Peak	List of values: Selected by hand

Frequency MHz	Reading dBµV	Correction factor dB	Value dBµV/m	Limit dBµV/m	Limit exceeded
72.0	15.0	10.2	25.2	40.0	
80.0	24.5	10.3	34.8	40.0	
108.1	14.0	12.2	26.2	43.5	
110.6	17.0	12.4	29.4	43.5	
113.3	22.5	12.6	35.1	43.5	
118.0	14.0	13.0	27.0	43.5	
120.0	15.0	13.1	28.1	43.5	
162.2	9.0	15.2	24.2	43.5	
169.6	10.0	15.6	25.6	43.5	
200.0	8.0	17.1	25.1	43.5	
224.0	18.0	17.8	35.8	46.0	
226.6	17.5	17.9	35.4	46.0	
228.0	15.5	18.0	33.5	46.0	
240.0	13.5	18.3	31.8	46.0	
252.0	13.5	18.8	32.3	46.0	
254.9	10.0	19.0	29.0	46.0	
264.0	14.0	19.9	33.9	46.0	
280.0	17.5	21.4	38.9	46.0	
283.2	10.5	21.6	32.1	46.0	
300.0	7.5	23.1	30.6	46.0	
311.5	11.0	17.4	28.4	46.0	
360.0	14.5	19.2	33.7	46.0	
392.0	10.5	20.3	30.8	46.0	
400.0	14.0	20.5	34.5	46.0	
420.0	12.5	21.0	33.5	46.0	
424.8	10.0	21.2	31.2	46.0	
440.0	15.5	21.5	37.0	46.0	
480.0	10.0	22.5	32.5	46.0	
520.0	8.5	23.4	31.9	46.0	
560.0	9.5	24.4	33.9	46.0	
600.0	14.0	25.3	39.3	46.0	
624.0	9.5	25.8	35.3	46.0	
640.0	8.0	26.2	34.2	46.0	
672.0	5.0	26.9	31.9	46.0	
720.0	6.0	27.8	33.8	46.0	
760.0	8.5	28.4	36.9	46.0	
780.8	8.0	28.7	36.7	46.0	
784.0	4.5	28.7	33.2	46.0	
816.0	4.0	29.2	33.2	46.0	

Result: Limit kept	Project-File: 56305-51298
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Radiated Emission Test 30 MHz - 1 GHz according to FCC Part 15 Subpart C

Model: WaveLAN AT Rel. 4.0 (2.4 GHz)	Mode: - FCC test setup (EUT mounted in HP Vectra 386s/20)
Serial No.: 172/#1	- TX mode with $f = 2.442$ GHz
Applicant: AT & T WCND Utrecht B.V.	
Test-site: Open area test-site I	
Tested on: Test distance 3 meters Vertical Polarization	
Date of test: 12/05/1995	Operator: R. Heller
Detector: Quasi-Peak	List of values: Selected by hand

Frequency MHz	Reading dBµV	Correction factor dB	Value dBµV/m	Limit dBµV/m	Limit exceeded
840.0	14.0	29.7	43.7	46.0	
896.0	4.0	30.8	34.8	46.0	
920.0	3.5	31.0	34.5	46.0	
1000.0	3.0	31.6	34.6	54.0	

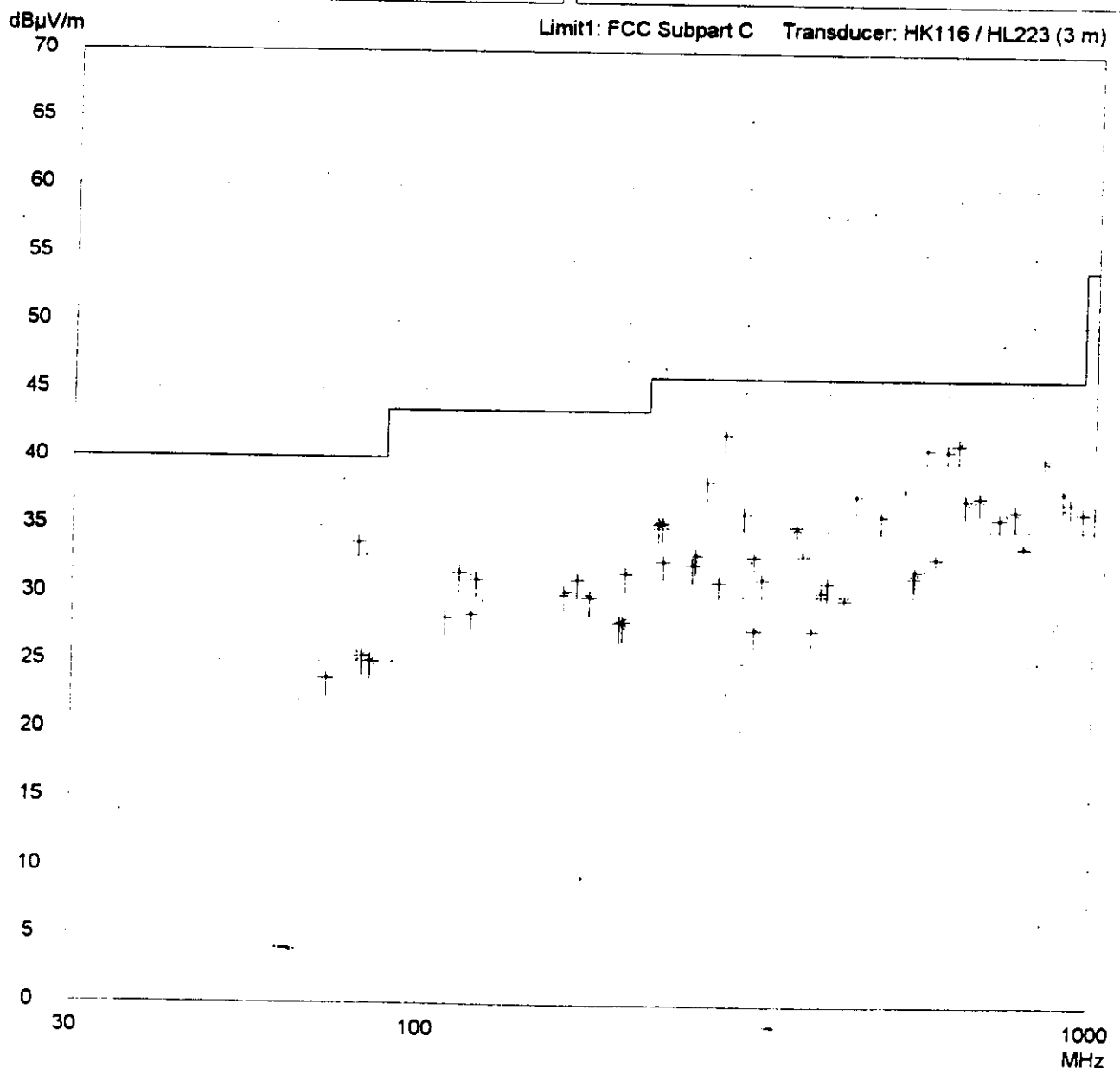
Result:
Limit kept

Project-File:
56305-51298

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Radiated Emission Test 30 MHz - 1 GHz according to FCC Part 15 Subpart C

Model: WaveLAN AT Rel. 4.0 (2.4 GHz)		Mode: - FCC test setup (EUT mounted in HP Vectra 386s/20)	
Serial No.: 172/#1		- TX mode with $f = 2.462$ GHz	
Applicant: AT & T WCND Utrecht B.V.			
Test-site: Open area test-site I			
Tested on: Test distance 3 meters Horizontal Polarization			
Date of test: 12/05/1995	Operator: R. Heller		
Detector: Quasi-Peak		List of values: Selected by hand	



Result: Limit kept	Project-File: 56305-51298
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Radiated Emission Test 30 MHz - 1 GHz according to FCC Part 15 Subpart C

Model: WaveLAN AT Rel. 4.0 (2.4 GHz)	Mode: - FCC test setup (EUT mounted in HP Vectra 386s/20)
Serial No.: 172/#1	- TX mode with $f = 2.462$ GHz
Applicant: AT & T WCND Utrecht B.V.	
Test-site: Open area test-site I	
Tested on: Test distance 3 meters Horizontal Polarization	
Date of test: 12/05/1995	Operator: R. Heller
Detector: Quasi-Peak	List of values: Selected by hand

Frequency MHz	Reading dBµV	Correction factor dB	Value dBµV/m	Limit dBµV/m	Limit exceeded
72.0	13.5	10.2	23.7	40.0	
80.0	23.5	10.3	33.8	40.0	
81.1	15.0	10.4	25.4	40.0	
83.6	14.5	10.5	25.0	40.0	
108.1	16.0	12.2	28.2	43.5	
113.3	19.0	12.6	31.6	43.5	
118.0	15.5	13.0	28.5	43.5	
120.0	18.0	13.1	31.1	43.5	
162.2	15.0	15.2	30.2	43.5	
169.6	15.5	15.6	31.1	43.5	
176.9	14.0	15.8	29.8	43.5	
196.0	11.0	16.9	27.9	43.5	
198.2	11.0	17.0	28.0	43.5	
200.0	14.5	17.1	31.6	43.5	
224.0	17.5	17.8	35.3	46.0	
226.6	17.5	17.9	35.4	46.0	
228.0	14.5	18.0	32.5	46.0	
252.0	13.5	18.8	32.3	46.0	
254.9	14.0	19.0	33.0	46.0	
264.0	18.5	19.9	38.4	46.0	
276.0	10.0	21.0	31.0	46.0	
280.0	20.5	21.4	41.9	46.0	
300.0	13.0	23.1	36.1	46.0	
311.5	15.5	17.4	32.9	46.0	
312.0	10.0	17.4	27.4	46.0	
320.0	13.5	17.7	31.2	46.0	
360.0	16.0	19.2	35.2	46.0	
368.2	13.5	19.5	33.0	46.0	
380.0	7.5	19.9	27.4	46.0	
392.0	10.0	20.3	30.3	46.0	
400.0	10.5	20.5	31.0	46.0	
424.8	8.5	21.2	29.7	46.0	
440.0	16.0	21.5	37.5	46.0	
480.0	13.5	22.5	36.0	46.0	
520.0	14.5	23.4	37.9	46.0	
538.1	7.5	23.9	31.4	46.0	
540.0	8.0	23.9	31.9	46.0	
560.0	16.5	24.4	40.9	46.0	
580.0	8.0	24.8	32.8	46.0	

Result:
Limit kept

Project-File:
56305-51298

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Radiated Emission Test 30 MHz - 1 GHz according to FCC Part 15 Subpart C

Model: WaveLAN AT Rel. 4.0 (2.4 GHz)	Mode: - FCC test setup (EUT mounted in HP Vectra 386s/20)
Serial No.: 172/#1	- TX mode with $f = 2.462$ GHz
Applicant: AT & T WCND Utrecht B.V.	
Test-site: Open area test-site I	
Tested on: Test distance 3 meters Horizontal Polarization	
Date of test: 12/05/1995	Operator: R. Heller
Detector: Quasi-Peak	List of values: Selected by hand

Frequency MHz	Reading dB μ V	Correction factor dB	Value dB μ V/m	Limit dB μ V/m	Limit exceeded
600.0	15.5	25.3	40.8	46.0	
624.0	15.5	25.8	41.3	46.0	
640.0	11.0	26.2	37.2	46.0	
672.0	10.5	26.9	37.4	46.0	
720.0	8.0	27.8	35.8	46.0	
760.0	8.0	28.4	36.4	46.0	
784.0	5.0	28.7	33.7	46.0	
840.0	10.5	29.7	40.2	46.0	
896.0	7.0	30.8	37.8	46.0	
920.0	6.0	31.0	37.0	46.0	
960.0	5.0	31.3	36.3	46.0	

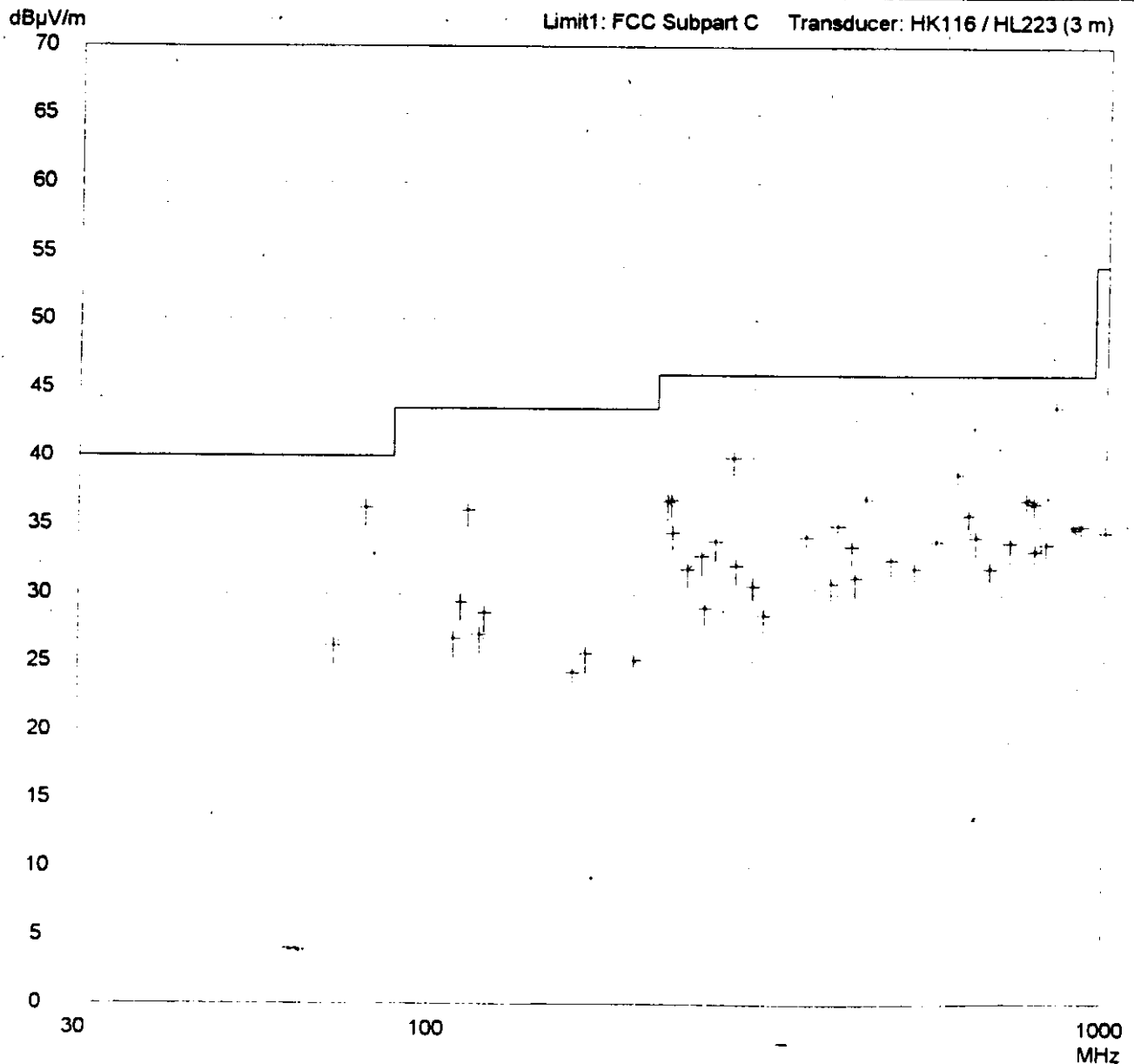
Result:
Limit kept

Project-File:
56305-51298

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Radiated Emission Test 30 MHz - 1 GHz according to FCC Part 15 Subpart C

Model: WaveLAN AT Rel. 4.0 (2.4 GHz)	Mode: - FCC test setup (EUT mounted in HP Vectra 386s/20) - TX mode with $f = 2.462$ GHz
Serial No.: 172/#1	
Applicant: AT & T WCND Utrecht B.V.	
Test-site: Open area test-site I	
Tested on: Test distance 3 meters Vertical Polarization	
Date of test: 12/05/1995	Operator: R. Heller
Detector: Quasi-Peak	List of values: Selected by hand



Result: Limit kept	Project-File: 56305-51298
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Radiated Emission Test 30 MHz - 1 GHz according to FCC Part 15 Subpart C

Model:
WaveLAN AT Rel. 4.0 (2.4 GHz)

Serial No.:
172/#1

Applicant:
AT & T WCND Utrecht B.V.

Test-site:
Open area test-site I

Tested on:
Test distance 3 meters
Vertical Polarization

Date of test: 12/05/1995
Operator: R. Heller

Mode:
- FCC test setup
(EUT mounted in HP Vectra 386s/20)

- TX mode with $f = 2.462$ GHz

Detector:
Quasi-Peak

List of values:
Selected by hand

Frequency MHz	Reading dB μ V	Correction factor dB	Value dB μ V/m	Limit dB μ V/m	Limit exceeded
72.0	16.0	10.2	26.2	40.0	
80.0	26.0	10.3	36.3	40.0	
108.1	14.5	12.2	26.7	43.5	
110.6	17.0	12.4	29.4	43.5	
113.3	23.5	12.6	36.1	43.5	
118.0	14.0	13.0	27.0	43.5	
120.0	15.5	13.1	28.6	43.5	
162.2	9.0	15.2	24.2	43.5	
169.6	10.0	15.6	25.6	43.5	
200.0	8.0	17.1	25.1	43.5	
224.0	19.0	17.8	36.8	46.0	
226.6	19.0	17.9	36.9	46.0	
228.0	16.5	18.0	34.5	46.0	
240.0	13.5	18.3	31.8	46.0	
252.0	14.0	18.8	32.8	46.0	
254.9	10.0	19.0	29.0	46.0	
264.0	14.0	19.9	33.9	46.0	
280.0	18.5	21.4	39.9	46.0	
283.2	10.5	21.6	32.1	46.0	
300.0	7.5	23.1	30.6	46.0	
311.5	11.0	17.4	28.4	46.0	
360.0	15.0	19.2	34.2	46.0	
392.0	10.5	20.3	30.8	46.0	
400.0	14.5	20.5	35.0	46.0	
420.0	12.5	21.0	33.5	46.0	
424.8	10.0	21.2	31.2	46.0	
440.0	15.5	21.5	37.0	46.0	
480.0	10.0	22.5	32.5	46.0	
520.0	8.5	23.4	31.9	46.0	
560.0	9.5	24.4	33.9	46.0	
600.0	13.5	25.3	38.8	46.0	
624.0	10.0	25.8	35.8	46.0	
640.0	8.0	26.2	34.2	46.0	
672.0	5.0	26.9	31.9	46.0	
720.0	6.0	27.8	33.8	46.0	
760.0	8.5	28.4	36.9	46.0	
780.8	8.0	28.7	36.7	46.0	
784.0	4.5	28.7	33.2	46.0	
816.0	4.5	29.2	33.7	46.0	

Result:
Limit kept

Project-File:
56305-51298

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Radiated Emission Test 30 MHz - 1 GHz according to FCC Part 15 Subpart C

Model:
WaveLAN AT Rel. 4.0 (2.4 GHz)

Serial No.:
172/#1

Applicant:
AT & T WCND Utrecht B.V.

Test-site:
Open area test-site I

Tested on:
Test distance 3 meters
Vertical Polarization

Date of test:
12/05/1995

Operator:
R. Heller

Mode:
- FCC test setup
(EUT mounted in HP Vectra 386s/20)

- TX mode with $f = 2.462$ GHz

Detector:
Quasi-Peak

List of values:
Selected by hand

Frequency MHz	Reading dB μ V	Correction factor dB	Value dB μ V/m	Limit dB μ V/m	Limit exceeded
840.0	14.0	29.7	43.7	46.0	
896.0	4.0	30.8	34.8	46.0	
920.0	4.0	31.0	35.0	46.0	
1000.0	3.0	31.6	34.6	54.0	

Result:
Limit kept

Project-File:
56305-51298

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**Radiated Emission 1 GHz - 25 GHz
according to FCC Part 15 Subpart C**

Model: WaveLAN AT Rel. 4.0 (2.4 GHz)
Type: RF-modem
Serial No.: 172/#1
Applicant: AT & T WCND Utrecht B.V.
Test-site: Semi anechoic room
Test distance: 3 metres
Date of test: 12/03/1995
Operator: R. Heller

Mode: - FCC test setup
(EUT mounted in HP Vectra 386s/20)

TX-mode with $f = 2.412$ GHz

Detector: Peak

Frequency [GHz]	Polarization	Analyzer- reading [dB μ V]	Generator- level [dBm]	Antenna- correction [dB]	Fieldstrength [dB μ V/m]	Limit [dB μ V/m]
1.209	horizontal	56.8	-75.5	24.9	56.4	74
2.413	horizontal	100.4	-28.8	20.7	98.9	OB
4.824	vertical	47.7	-87.4	27.3	46.9	74

Note: OB means "operation band" (2400 - 2483.5 MHz); in this case limit is 1 W (measured conducted with power meter).
NRB means "non restricted band"; in this case limit is 20 dB below maximum in-band-power equivalent to 98.9 dB μ V/m.

Result: The limits are kept.

Test Report No. 56305-51298 / Page 13. of 15. Pages

**Radiated Emission 1 GHz - 25 GHz
according to FCC Part 15 Subpart C**

Model: WaveLAN AT Rel. 4.0 (2.4 GHz)
Type: RF-modem
Serial No.: 172/#1
Applicant: AT & T WCND Utrecht B.V.
Test-site: Semi anechoic room
Test distance: 3 metres
Date of test: 12/03/1995
Operator: R. Heller

Mode: - FCC test setup
(EUT mounted in HP Vectra 386s/20)

TX-mode with $f = 2.412$ GHz

Detector: Average

Frequency [GHz]	Polarization	Analyzer- reading [dB μ V]	Generator- level [dBm]	Antenna- correction [dB]	Fieldstrength [dB μ V/m]	Limit [dB μ V/m]
1.206	horizontal	48.0	-82.9	24.9	49.0	54
2.390	horizontal	40.3	-87.5	20.7	40.2	54
2.396	horizontal	53.6	-74.0	20.7	53.7	NRB
2.398	horizontal	61.5	-65.9	20.7	61.8	NRB
2.410	horizontal	95.6	-31.7	20.7	96.0	OB
4.824	vertical	44.2	-90.7	27.3	43.5	54

Note: OB means "operation band" (2400 - 2483.5 MHz); in this case limit is 1 W (measured conducted with power meter).
NRB means "non restricted band"; in this case limit is 20 dB below maximum in-band-power equivalent to 96.0 dB μ V/m.

Result: The limits are kept.

Test Report No. 56305-51298 / Page ~~114~~ of ~~145~~ Pages

**Radiated Emission 1 GHz - 25 GHz
according to FCC Part 15 Subpart C**

Model: WaveLAN AT Rel. 4.0 (2.4 GHz)
Type: RF-modem
Serial No.: 172/#1
Applicant: AT & T WCND Utrecht B.V.
Test-site: Semi anechoic room
Test distance: 3 metres
Date of test: 12/03/1995
Operator: R. Heller

Mode: - FCC test setup
(EUT mounted in HP Vectra 386s/20)

TX-mode with $f = 2.442$ GHz

Detector: Peak

Frequency [GHz]	Polarization	Analyzer- reading [dB μ V]	Generator- level [dBm]	Antenna- correction [dB]	Fieldstrength [dB μ V/m]	Limit [dB μ V/m]
1.224	horizontal	56.6	-75.8	25.0	56.3	74
2.443	horizontal	102.8	-26.5	20.7	101.2	OB
4.884	vertical	53.4	-82.2	27.3	52.1	74

Note: OB means "operation band" (2400 - 2483.5 MHz); in this case limit is 1 W (measured conducted with power meter).
NRB means "non restricted band"; in this case limit is 20 dB below maximum in-band-power equivalent to 101.2 dB μ V/m.

Result: The limits are kept.

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**Radiated Emission 1 GHz - 25 GHz
according to FCC Part 15 Subpart C**

Model: WaveLAN AT Rel. 4.0 (2.4 GHz)
Type: RF-modem
Serial No.: 172/#1
Applicant: AT & T WCND Utrecht B.V.
Test-site: Semi anechoic room
Test distance: 3 metres
Date of test: 12/03/1995
Operator: R. Heller

Mode: - FCC test setup
(EUT mounted in HP Vectra 386s/20)

TX-mode with $f = 2.442$ GHz

Detector: Average

Frequency [GHz]	Polarization	Analyzer- reading [dB μ V]	Generator- level [dBm]	Antenna- correction [dB]	Fieldstrength [dB μ V/m]	Limit [dB μ V/m]
1.221	horizontal	48.8	-82.5	25.0	49.6	54
2.443	horizontal	97.9	-29.2	20.7	98.5	OB
4.884	vertical	50.8	-84.7	27.3	49.6	54

Note: OB means "operation band" (2400 - 2483.5 MHz); in this case limit is 1 W (measured conducted with power meter).
NRB means "non restricted band"; in this case limit is 20 dB below maximum in-band-power equivalent to 98.5 dB μ V/m.

Result: The limits are kept.

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**Radiated Emission 1 GHz - 25 GHz
according to FCC Part 15 Subpart C**

Model: WaveLAN AT Rel. 4.0 (2.4 GHz)
Type: RF-modem
Serial No.: 172/#1
Applicant: AT & T WCND Utrecht B.V.
Test-site: Semi anechoic room
Test distance: 3 metres
Date of test: 12/03/1995
Operator: R. Heller

Mode: - FCC test setup
(EUT mounted in HP Vectra 386s/20)

TX-mode with $f = 2.462$ GHz

Detector: Peak

Frequency [GHz]	Polarization	Analyzer- reading [dB μ V]	Generator- level [dBm]	Antenna- correction [dB]	Fieldstrength [dB μ V/m]	Limit [dB μ V/m]
1.234	horizontal	58.0	-75.2	25.1	56.9	74
2.464	horizontal	99.2	-30.0	20.7	97.7	OB
4.924	vertical	49.4	-86.2	27.3	48.1	74

Note: OB means "operation band" (2400 - 2483.5 MHz); in this case limit is 1 W (measured conducted with power meter).
NRB means "non restricted band"; in this case limit is 20 dB below maximum in-band-power equivalent to 97.7 dB μ V/m.

Result: The limits are kept.

Test Report No. 56305-51298 / Page 17 of 145 Pages

**Radiated Emission 1 GHz - 25 GHz
according to FCC Part 15 Subpart C**

Model: WaveLAN AT Rel. 4.0 (2.4 GHz)
Type: RF-modem
Serial No.: 172/#1
Applicant: AT & T WCND Utrecht B.V.
Test-site: Semi anechoic room
Test distance: 3 metres
Date of test: 12/03/1995
Operator: R. Heller

Mode: - FCC test setup
(EUT mounted in HP Vectra 386s/20)

TX-mode with $f = 2.462$ GHz

Detector: Average

Frequency [GHz]	Polarization	Analyzer- reading [dB μ V]	Generator- level [dBm]	Antenna- correction [dB]	Fieldstrength [dB μ V/m]	Limit [dB μ V/m]
1.231	horizontal	51.4	-79.9	25.1	52.2	54
2.463	horizontal	94.7	-32.3	20.7	95.4	OB
2.476	horizontal	59.2	-67.9	20.7	59.8	OB
2.478	horizontal	53.9	-73.2	20.7	54.5	OB
2.483	horizontal	40.0	-87.2	20.7	40.5	54
2.500	horizontal	39.6	-87.5	20.7	40.2	54
4.924	vertical	45.5	-89.8	27.3	44.5	54

Note: OB means "operation band" (2400 - 2483.5 MHz); in this case limit is 1 W (measured conducted with power meter).
NRB means "non restricted band"; in this case limit is 20 dB below maximum in-band-power equivalent to 95.4 dB μ V/m.

Result: The limits are kept.

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Test results

Receive (RX) mode

FCC-ID: IMR24HAT

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Conducted Emission Test 450 kHz - 30 MHz
according to FCC Part 15 Subpart C

Model:
WaveLAN AT Rel. 4.0 (2.4 GHz)

Serial No.:
172/#1

Applicant:
AT & T WCND Utrecht B.V.

Test-site:
Shielded room, cabin 2

Tested on:
Linecord PC
Phase L1

Date of test:
12/04/1995

Operator:
R. Heller

Mode:
- FCC test setup
(EUT mounted in HP Vectra 386s/20)

- RX mode with $f = 2.442$ GHz

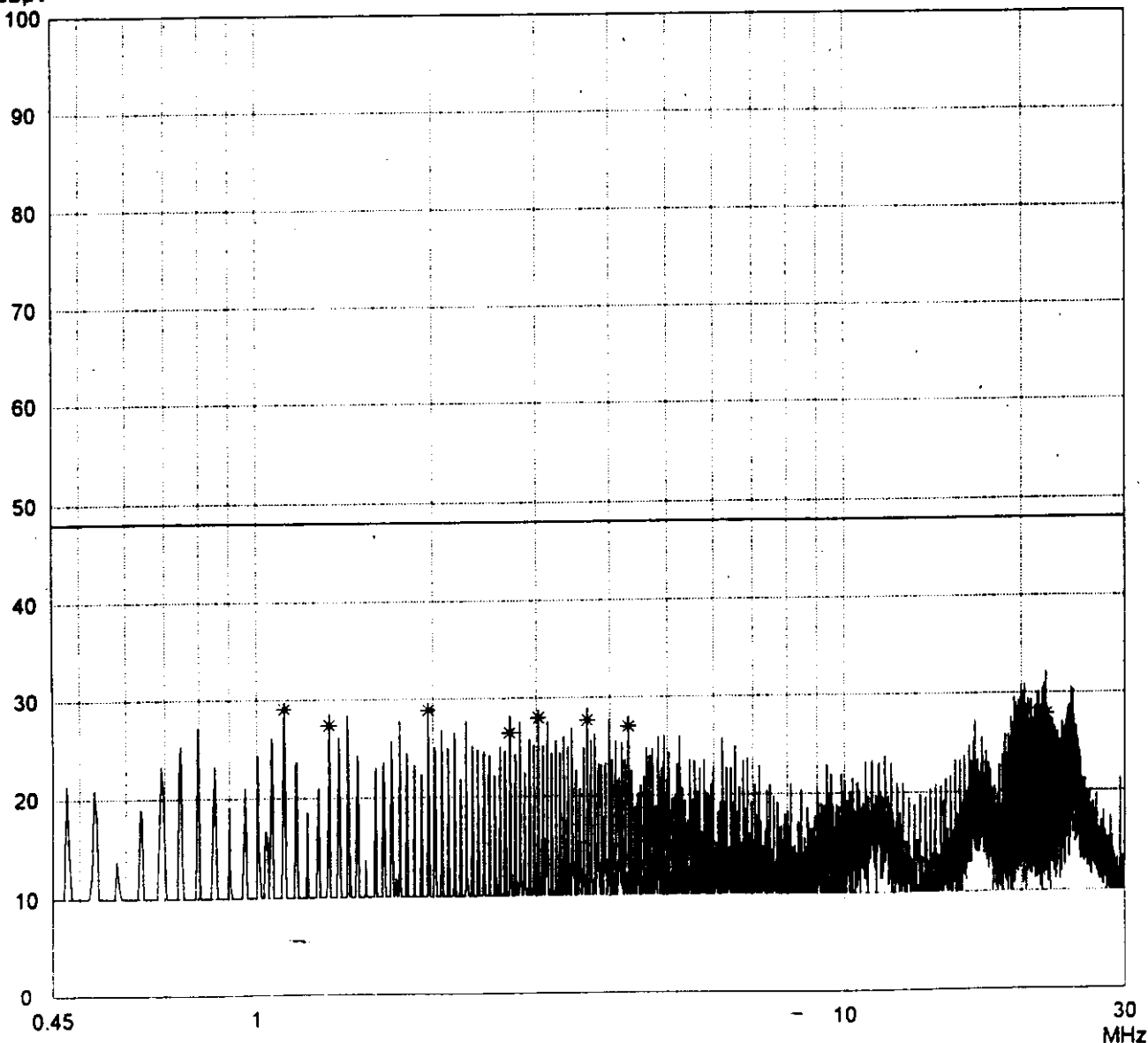
Detector:
Peak / Final Results: QP

Final Results:
20 dB Margin

25 Subranges

dB μ V
100

Limit1: FCC, Class B



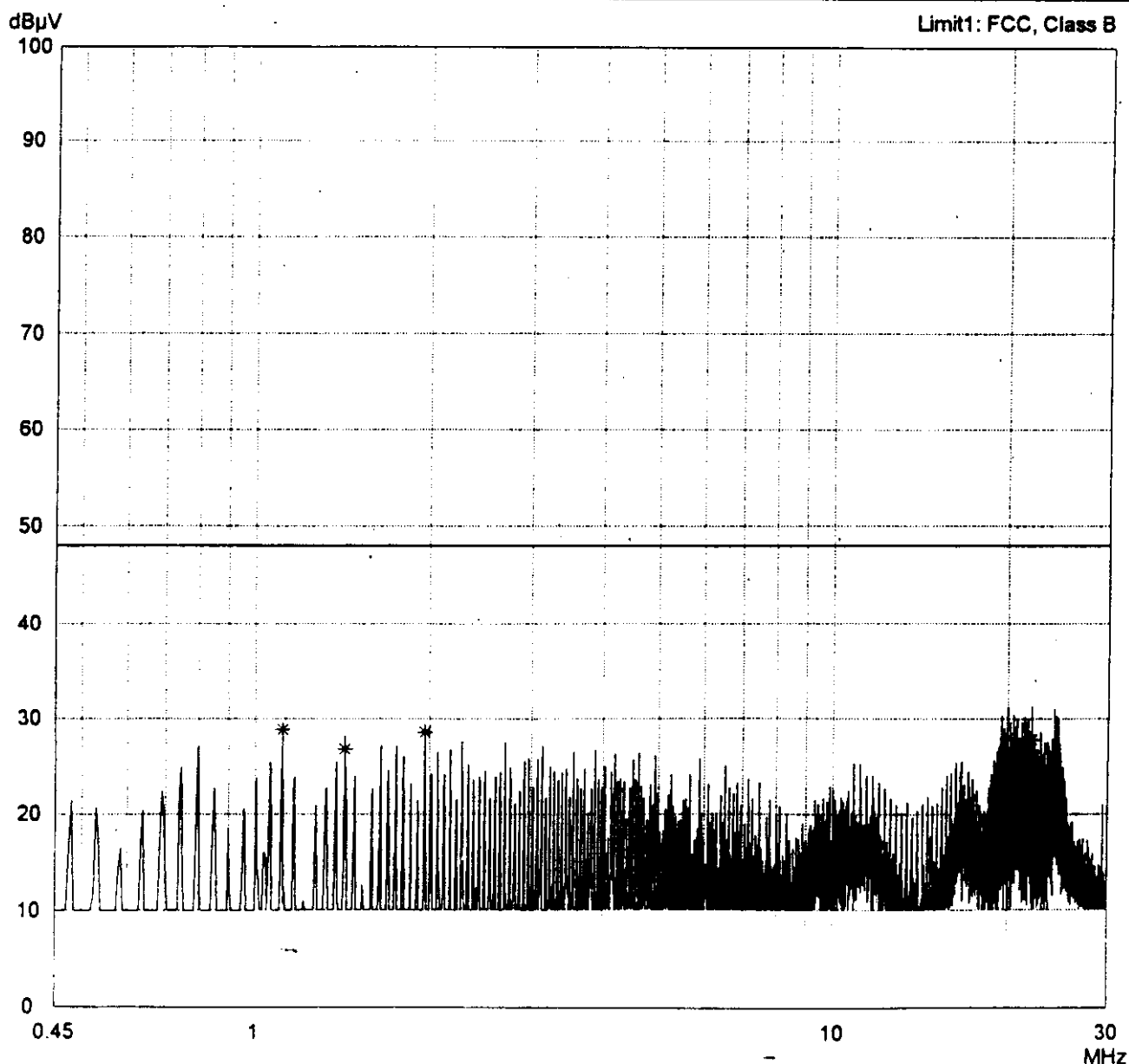
Result:
Limit kept

Project-File:
56305-51298

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**Conducted Emission Test 450 kHz - 30 MHz
according to FCC Part 15 Subpart C**

Model: WaveLAN AT Rel. 4.0 (2.4 GHz)		Mode: - FCC test setup (EUT mounted in HP Vectra 386s/20)	
Serial No.: 172/#1		- RX mode with $f = 2.442$ GHz	
Applicant: AT & T WCND Utrecht B.V.			
Test-site: Shielded room, cabin 2			
Tested on: Linecord PC Phase N			
Date of test: 12/04/1995	Operator: R. Heller		
Detector: Peak / Final Results: QP		Final Results: 20 dB Margin 25 Subranges	



Result:
Limit kept

Project-File:
56305-51298

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Conducted Emission Test 450 kHz - 30 MHz
according to FCC Part 15 Subpart C

Model:
WaveLAN AT Rel. 4.0 (2.4 GHz)

Serial No.:
172/#1

Applicant:
AT & T WCND Utrecht B.V.

Test-site:
Shielded room, cabin 2

Tested on:
Linecord PC
Phase N

Date of test: 12/04/1995	Operator: R. Heller
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Mode:

- FCC test setup
(EUT mounted in HP Vectra 386s/20)
- RX mode with $f = 2.442$ GHz

Detector:
Peak / Final Results: QP

Final Results:
20 dB Margin 25 Subranges

<i>Frequency MHz</i>	<i>Value dBμV</i>	<i>Limit dBμV</i>	<i>limit exceeded</i>
1.1150	28.82	48.00	
1.4300	26.84	48.00	
1.9650	28.57	48.00	
20.0150	27.98	48.00	
22.0250	27.79	48.00	

Frequency MHz	Value dB μ V	Limit dB μ V	limit exceeded

Result:
Limit kept

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Conducted Emission Test 450 kHz - 30 MHz
according to FCC Part 15 Subpart C

Model:
WaveLAN AT Rel. 4.0 (2.4 GHz)

Serial No.:
172/#1

Applicant:
AT & T WCND Utrecht B.V.

Test-site:
Shielded room, cabin 2

Tested on:
Linecord monitor
Phase L1

Date of test:
12/04/1995

Operator:
R. Heller

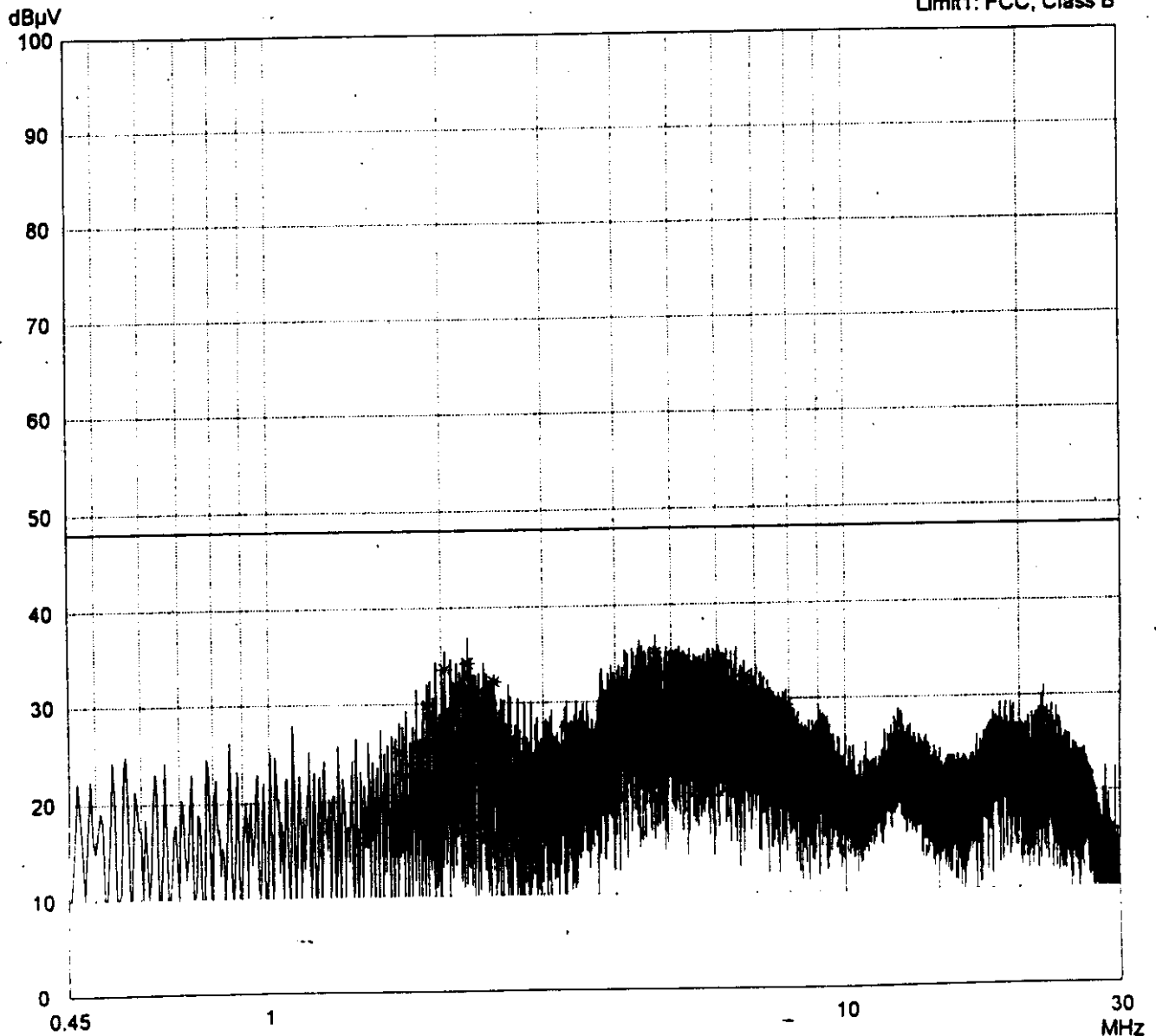
Mode:
- FCC test setup
(EUT mounted in HP Vectra 386s/20)
- RX mode with $f = 2.442$ GHz

Detector:
Peak / Final Results: QP

Final Results:
20 dB Margin

25 Subranges

Limit1: FCC, Class B



Result:
Limit kept

Project-File:
56305-51298

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Conducted Emission Test 450 kHz - 30 MHz
according to FCC Part 15 Subpart C

Model:
WaveLAN AT Rel. 4.0 (2.4 GHz)

Serial No.:
172/#1

Applicant:
AT & T WCND Utrecht B.V.

Test-site:
Shielded room, cabin 2

Tested on:
Linecord monitor
Phase N

Date of test:
12/04/1995

Operator:
R. Heller

Mode:
- FCC test setup
(EUT mounted in HP Vectra 386s/20)
- RX mode with $f = 2.442$ GHz

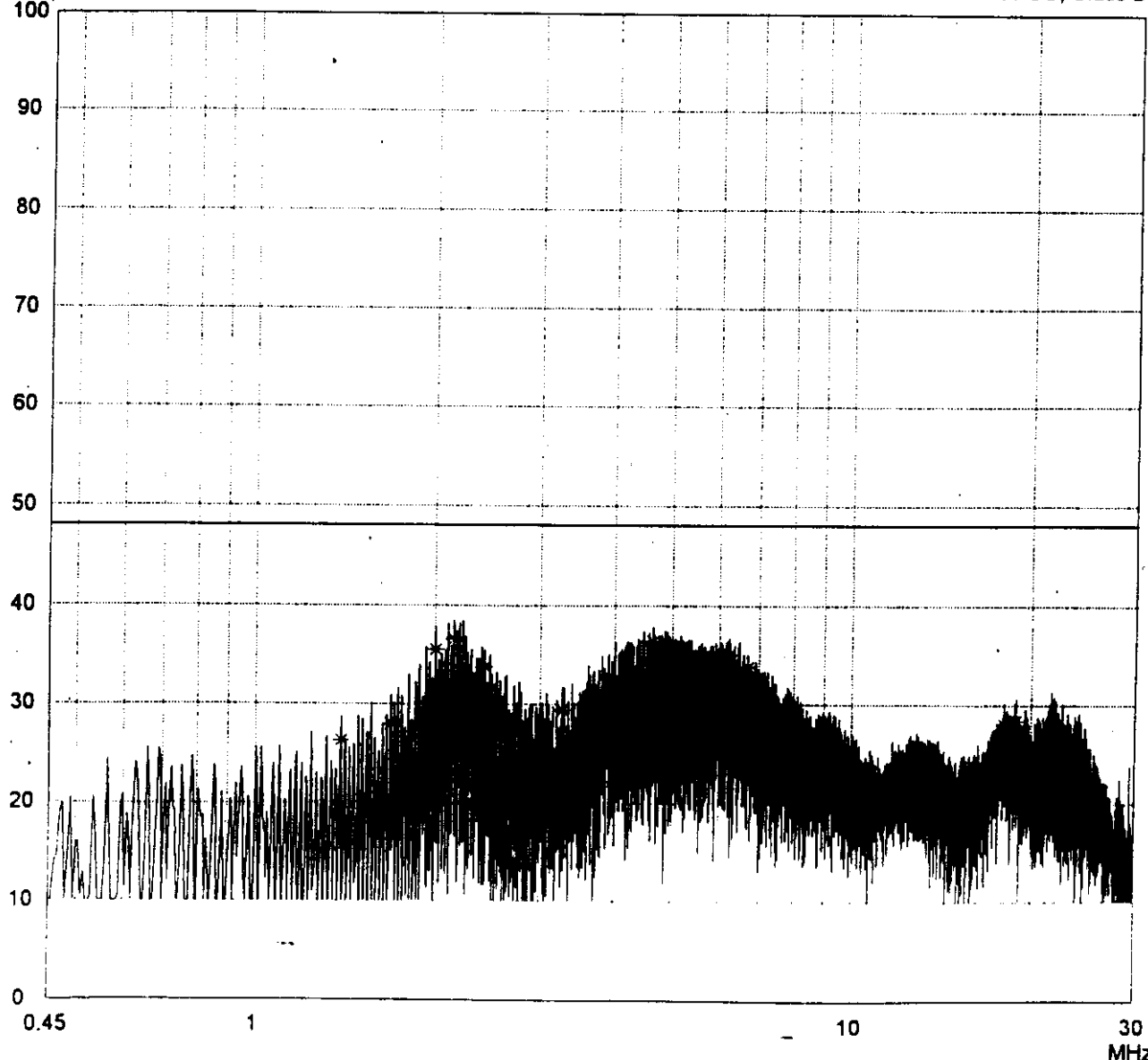
Detector:
Peak / Final Results: QP

Final Results:
20 dB Margin

25 Subranges

dB μ V
100

Limit1: FCC, Class B



Result:
Limit kept

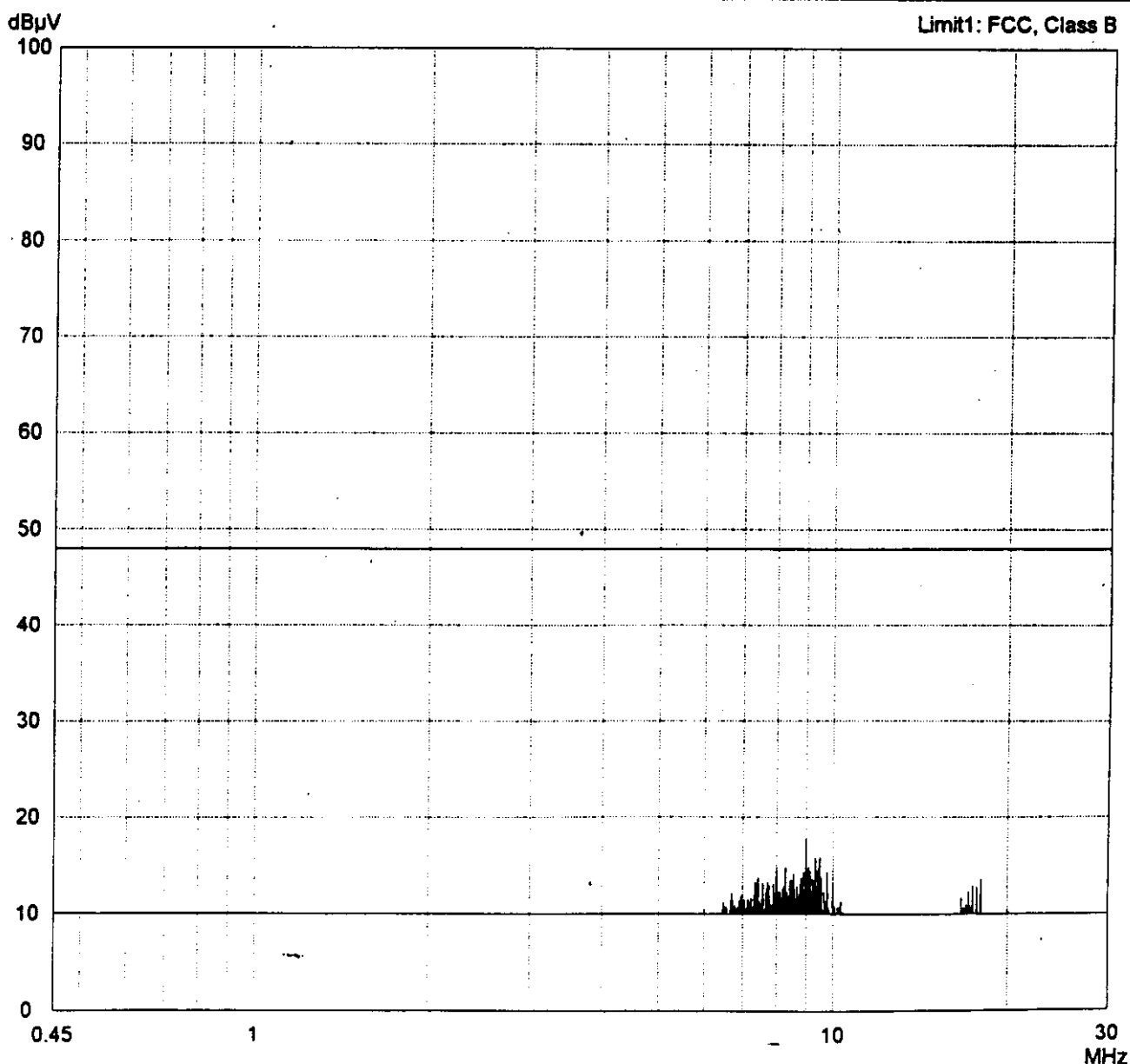
Project-File:
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Conducted Emission Test 450 kHz - 30 MHz
according to FCC Part 15 Subpart C

Conducted Emission Test 450 kHz - 30 MHz according to FCC Part 15 Subpart C

Model: WaveLAN AT Rel. 4.0 (2.4 GHz)		Mode: - FCC test setup (EUT mounted in HP Vectra 386s/20)	
Serial No.: 172/#1		- RX mode with $f = 2.442$ GHz	
Applicant: AT & T WCND Utrecht B.V.			
Test-site: Shielded room, cabin 2			
Tested on: Linecord printer Phase L1			
Date of test: 12/04/1995	Operator: R. Heller		
Detector: Peak / Final Results: QP		Final Results: 20 dB Margin	25 Subranges



Result: Limit kept	Project-File: 56305-51298	Page 123 of 145 Pages
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Conducted Emission Test 450 kHz - 30 MHz
according to FCC Part 15 Subpart C

Model: WaveLAN AT Rel. 4.0 (2.4 GHz)	
Serial No.: 172/#1	
Applicant: AT & T WCND Utrecht B.V.	
Test-site: Shielded room, cabin 2	
Tested on: Linecord printer Phase L1	
Date of test: 12/04/1995	Operator: R. Heller

Mode:

- FCC test setup
(EUT mounted in HP Vectra 386s/20)
- RX mode with $f = 2.442$ GHz

Detector:
Peak / Final Results: QP

Final Results:
20 dB Margin 25 Subranges

<i>Frequency MHz</i>	<i>Value dBμV</i>	<i>Limit dBμV</i>	<i>limit exceeded</i>
no results			

Frequency MHz	Value dBμV	Limit dBμV	limit exceeded

Result:
Limit kept

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Conducted Emission Test 450 kHz - 30 MHz according to FCC Part 15 Subpart C

Model:
WaveLAN AT Rel. 4.0 (2.4 GHz)

Serial No.:
172/#1

Applicant:
AT & T WCND Utrecht B.V.

Test-site:
Shielded room, cabin 2

Tested on:
Linecord printer
Phase N

Date of test:
12/04/1995

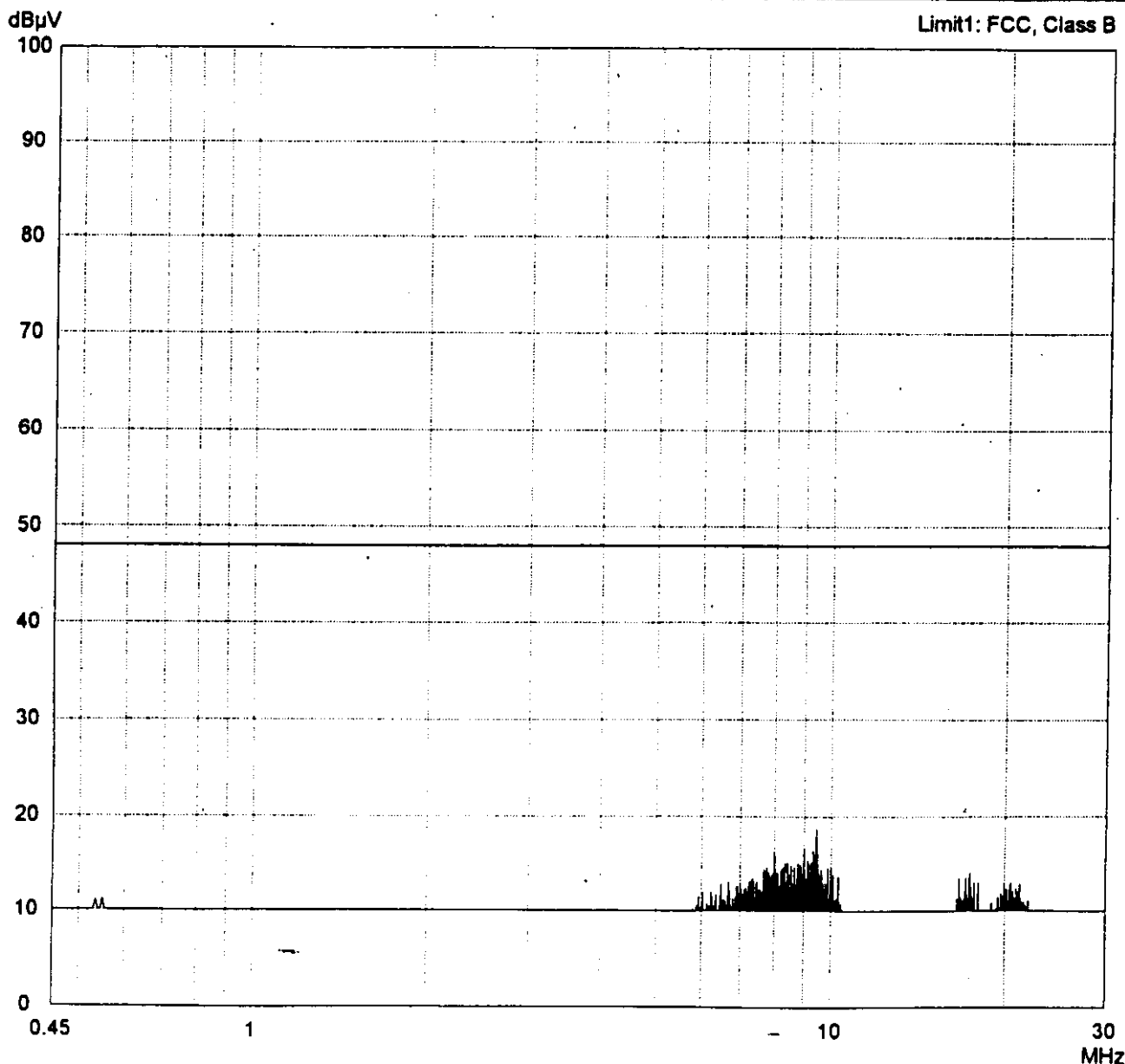
Operator:
R. Heiler

Mode:
- FCC test setup
(EUT mounted in HP Vectra 386s/20)

- RX mode with $f = 2.442$ GHz

Detector:
Peak / Final Results: QP

Final Results:
20 dB Margin 25 Subranges



Result:
Limit kept

Project-File:
56305-51298

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**Conducted Emission Test 450 kHz - 30 MHz
according to FCC Part 15 Subpart C**

Model: WaveLAN AT Rel. 4.0 (2.4 GHz)	
Serial No.: 172/#1	
Applicant: AT & T WCND Utrecht B.V.	
Test-site: Shielded room, cabin 2	
Tested on: Linecord printer Phase N	
Date of test: 12/04/1995	Operator: R. Heller

Mode: - FCC test setup (EUT mounted in HP Vectra 386s/20) - RX mode with $f = 2.442$ GHz
--

Detector: Peak / Final Results: QP
--

Final Results: 20 dB Margin	25 Subranges
---------------------------------------	--------------

Frequency MHz	Value dB μ V	Limit dB μ V	limit exceeded
no results			

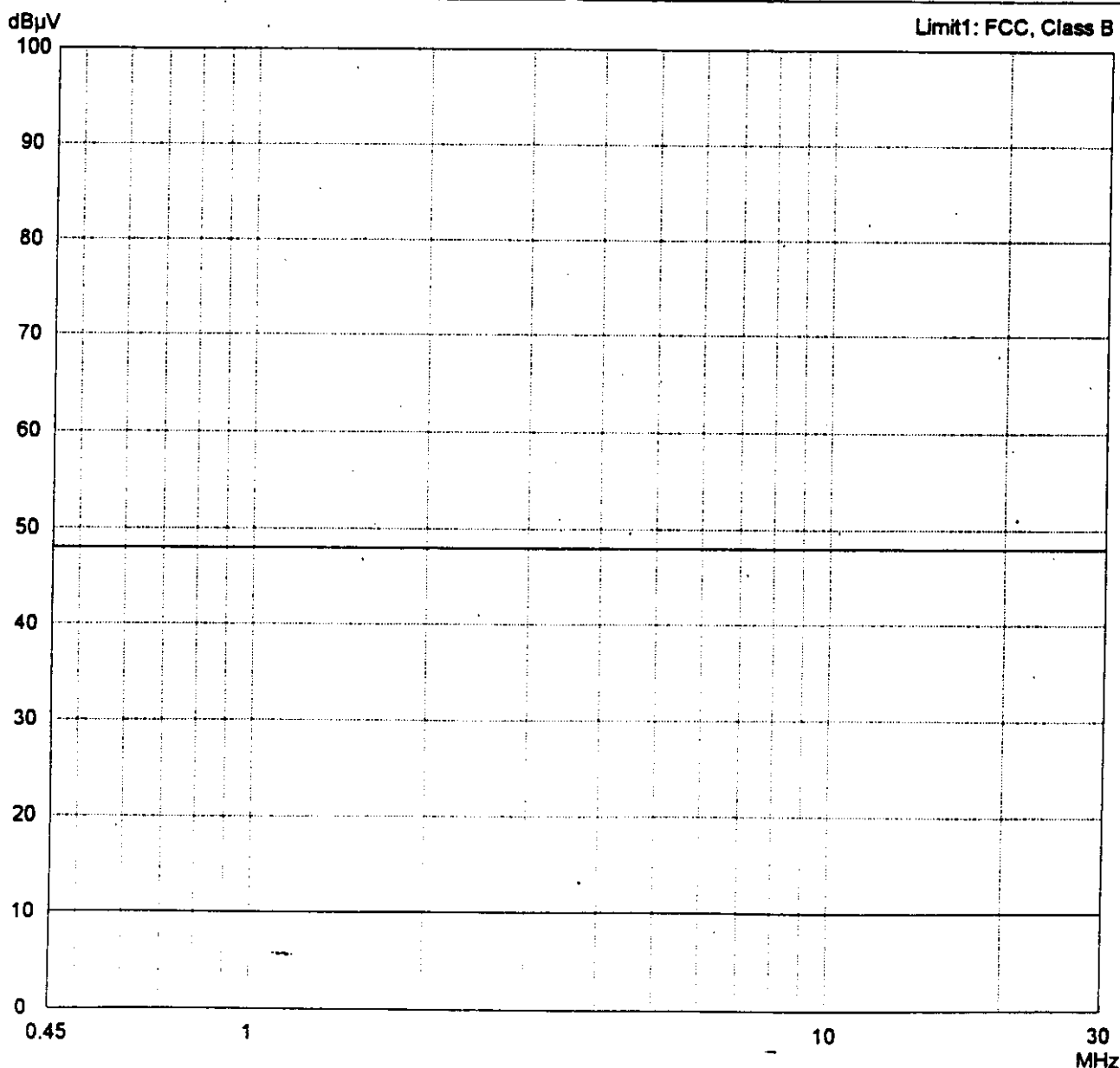
Frequency MHz	Value dB μ V	Limit dB μ V	limit exceeded

Result: Limit kept

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Conducted Emission Test 450 kHz - 30 MHz
according to FCC Part 15 Subpart C

Model: WaveLAN AT Rel. 4.0 (2.4 GHz)		Mode: - FCC test setup (EUT mounted in HP Vectra 386s/20) - RX mode with $f = 2.442$ GHz
Serial No.: 172/#1		
Applicant: AT & T WCND Utrecht B.V.		
Test-site: Shielded room, cabin 2		
Tested on: Linecord modem Phase L1		
Date of test: 12/04/1995	Operator: R. Heller	
Detector: Peak / Final Results: QP		Final Results: 20 dB Margin
		25 Subranges



Result: Limit kept	Project-File: 56305-51298	Page 132 of 145 Pages
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**Conducted Emission Test 450 kHz - 30 MHz
according to FCC Part 15 Subpart C**

Model: WaveLAN AT Rel. 4.0 (2.4 GHz)	
Serial No.: 172/#1	
Applicant: AT & T WCND Utrecht B.V.	
Test-site: Shielded room, cabin 2	
Tested on: Linecord modem Phase L1	
Date of test: 12/04/1995	Operator: R. Hellier

Mode: - FCC test setup (EUT mounted in HP Vectra 386s/20) - RX mode with $f = 2.442$ GHz
--

Detector: Peak / Final Results: QP
--

Final Results: 20 dB Margin	25 Subranges
---------------------------------------	--------------

Frequency MHz	Value dBµV	Limit dBµV	limit exceeded
no results			

Frequency MHz	Value dBµV	Limit dBµV	limit exceeded

Result: Limit kept

Project-File: 56305-51298	Page 133 of 145 Pages
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Conducted Emission Test 450 kHz - 30 MHz
according to FCC Part 15 Subpart C

Model:
WaveLAN AT Rel. 4.0 (2.4 GHz)

Serial No.:
172/#1

Applicant:
AT & T WCND Utrecht B.V.

Test-site:
Shielded room, cabin 2

Tested on:
Linecord modem
Phase N

Date of test:
12/04/1995

Operator:
R. Heller

Mode:
- FCC test setup
(EUT mounted in HP Vectra 386s/20)

- RX mode with $f = 2.442$ GHz

Detector:
Peak / Final Results: QP

Final Results:
20 dB Margin

25 Subranges

Limit1: FCC, Class B

dB μ V
100

90

80

70

60

50

40

30

20

10

0
0.45

1

10

30
MHz

Result:
Limit kept

Project-File:
56305-51298

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Conducted Emission Test 450 kHz - 30 MHz
according to FCC Part 15 Subpart C

Model: WaveLAN AT Rel. 4.0 (2.4 GHz)	
Serial No.: 172/#1	
Applicant: AT & T WCND Utrecht B.V.	
Test-site: Shielded room, cabin 2	
Tested on: Linacord modem Phase N	
Date of test: 12/04/1995	Operator: R. Hellier

Mode:

- FCC test setup
(EUT mounted in HP Vectra 386s/20)
- RX mode with $f = 2.442$ GHz

Detector:
Peak / Final Results: QP

Final Results:
20 dB Margin 25 Subranges

<i>Frequency MHz</i>	<i>Value dBμV</i>	<i>Limit dBμV</i>	<i>limit exceeded</i>
no results			

Frequency MHz	Value dBμV	Limit dBμV	limit exceeded

Result:
Limit kept

Project-File: 56305-51298 Page 135 of 145 Pages

Radiated Emission Test 30 MHz - 1 GHz according to FCC Part 15 Subpart C

Model:
WaveLAN AT Rel. 4.0 (2.4 GHz)

Serial No.:
172/#1

Applicant:
AT & T WCND Utrecht B.V.

Test-site:
Open area test-site I

Tested on:
Test distance 3 meters
Horizontal Polarization

Date of test:
12/05/1995

Operator:
R. Heller

Detector:
Quasi-Peak

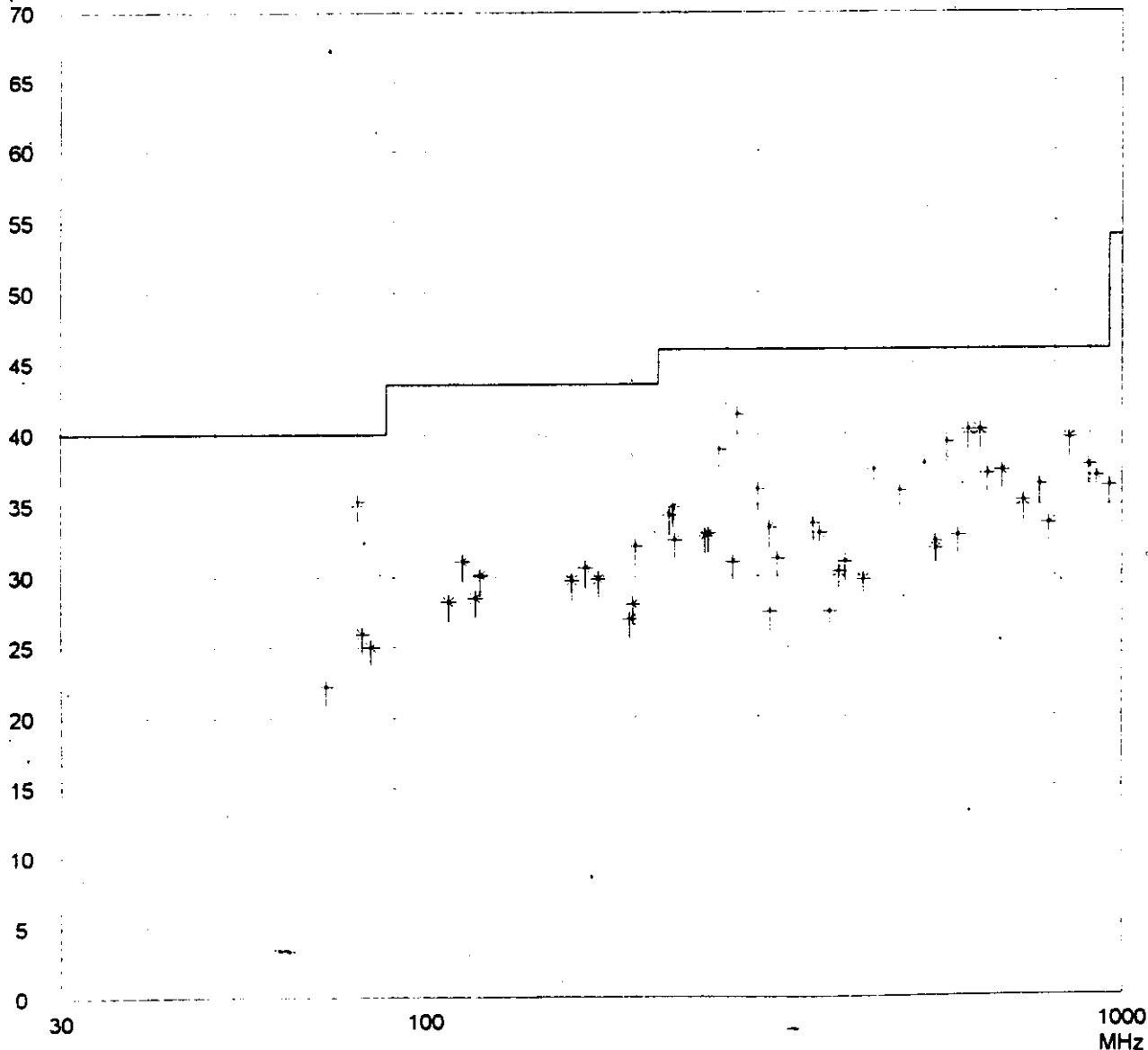
Mode:
- FCC test setup
(EUT mounted in HP Vectra 386s/20)

- RX mode with $f = 2.442$ GHz

List of values:
Selected by hand

dB μ V/m
70

Limit1: FCC Subpart C Transducer: HK116 / HL223 (3 m)



Result:
Limit kept

Project-File:
56305-51298

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Radiated Emission Test 30 MHz - 1 GHz according to FCC Part 15 Subpart C

Model:
WaveLAN AT Rel. 4.0 (2.4 GHz)

Serial No.:
172/#1

Applicant:
AT & T WCND Utrecht B.V.

Test-site:
Open area test-site I

Tested on:
Test distance 3 meters
Horizontal Polarization

Date of test: 12/05/1995
Operator: R. Heller

Mode:
- FCC test setup
(EUT mounted in HP Vectra 386s/20)

- RX mode with $f = 2.442$ GHz

Detector:
Quasi-Peak

List of values:
Selected by hand

Frequency MHz	Reading dBμV	Correction factor dB	Value dBμV/m	Limit dBμV/m	Limit exceeded
600.0	15.0	25.3	40.3	46.0	
624.0	14.5	25.8	40.3	46.0	
640.0	11.0	26.2	37.2	46.0	
672.0	10.5	26.9	37.4	46.0	
720.0	7.5	27.8	35.3	46.0	
760.0	8.0	28.4	36.4	46.0	
784.0	5.0	28.7	33.7	46.0	
840.0	10.0	29.7	39.7	46.0	
896.0	7.0	30.8	37.8	46.0	
920.0	6.0	31.0	37.0	46.0	
960.0	5.0	31.3	36.3	46.0	

Result:
Limit kept

Project-File:
56305-51298

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Radiated Emission Test 30 MHz - 1 GHz according to FCC Part 15 Subpart C

Model:
WaveLAN AT Rel. 4.0 (2.4 GHz)

Serial No.
172/#1

Applicant:
AT & T WCND Utrecht B.V.

Test-site:
Open area test-site I

Tested on:
Test distance 3 meters
Horizontal Polarization

Date of test:
12/05/1995

Operator:
R. Heller

Mode:
- FCC test setup
(EUT mounted in HP Vectra 386s/20)

- RX mode with $f = 2.442$ GHz

Detector:
Quasi-Peak

List of values:
Selected by hand

Frequency MHz	Reading dBμV	Correction factor dB	Value dBμV/m	Limit dBμV/m	Limit exceeded
72.0	12.0	10.2	22.2	40.0	
80.0	25.0	10.3	35.3	40.0	
81.1	15.5	10.4	25.9	40.0	
83.6	14.5	10.5	25.0	40.0	
108.1	16.0	12.2	28.2	43.5	
113.3	18.5	12.6	31.1	43.5	
118.0	15.5	13.0	28.5	43.5	
120.0	17.0	13.1	30.1	43.5	
162.2	14.5	15.2	29.7	43.5	
169.6	15.0	15.6	30.6	43.5	
176.9	14.0	15.8	29.8	43.5	
196.0	10.0	16.9	26.9	43.5	
198.2	11.0	17.0	28.0	43.5	
200.0	15.0	17.1	32.1	43.5	
224.0	16.5	17.8	34.3	46.0	
226.6	17.0	17.9	34.9	46.0	
228.0	14.5	18.0	32.5	46.0	
252.0	14.0	18.8	32.8	46.0	
254.9	14.0	19.0	33.0	46.0	
264.0	19.0	19.9	38.9	46.0	
276.0	10.0	21.0	31.0	46.0	
280.0	20.0	21.4	41.4	46.0	
300.0	13.0	23.1	36.1	46.0	
311.5	16.0	17.4	33.4	46.0	
312.0	10.0	17.4	27.4	46.0	
320.0	13.5	17.7	31.2	46.0	
360.0	14.5	19.2	33.7	46.0	
368.2	13.5	19.5	33.0	46.0	
380.0	7.5	19.9	27.4	46.0	
392.0	10.0	20.3	30.3	46.0	
400.0	10.5	20.5	31.0	46.0	
424.8	8.5	21.2	29.7	46.0	
440.0	16.0	21.5	37.5	46.0	
480.0	13.5	22.5	36.0	46.0	
520.0	14.5	23.4	37.9	46.0	
538.1	8.5	23.9	32.4	46.0	
540.0	8.0	23.9	31.9	46.0	
560.0	15.0	24.4	39.4	46.0	
580.0	8.0	24.8	32.8	46.0	

Result:
Limit kept

Project-File:
56305-51298

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Radiated Emission Test 30 MHz - 1 GHz according to FCC Part 15 Subpart C

Model:
WaveLAN AT Rel. 4.0 (2.4 GHz)

Serial No.:
172/#1

Applicant:
AT & T WCND Utrecht B.V.

Test-site:
Open area test-site I

Tested on:
Test distance 3 meters
Vertical Polarization

Date of test:
12/05/1995

Operator:
R. Heller

Detector:
Quasi-Peak

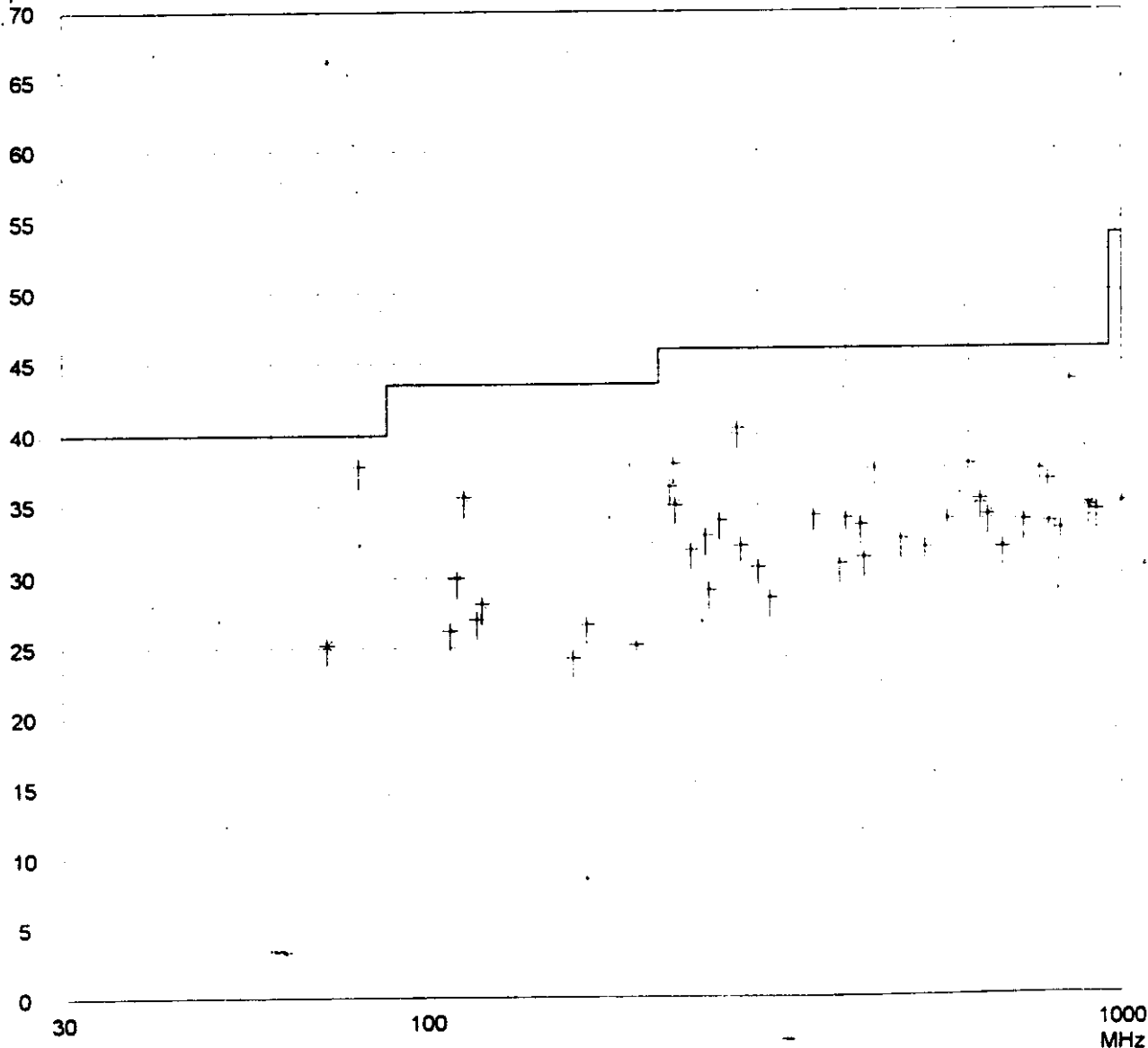
Mode:
- FCC test setup
(EUT mounted in HP Vectra 386s/20)

- RX mode with $f = 2.442$ GHz

List of values:
Selected by hand

dB μ V/m

Limit1: FCC Subpart C Transducer: HK116 / HL223 (3 m)



Result:
Limit kept

Project-File:
56305-51298

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Radiated Emission Test 30 MHz - 1 GHz according to FCC Part 15 Subpart C

Model:
WaveLAN AT Rel. 4.0 (2.4 GHz)

Serial No.:
172/#1

Applicant:
AT & T WCND Utrecht B.V.

Test-site:
Open area test-site I

Tested on:
Test distance 3 meters
Vertical Polarization

Date of test: 12/05/1995
Operator: R. Heller

Detector:
Quasi-Peak

Mode:
- FCC test setup
(EUT mounted in HP Vectra 386s/20)

- RX mode with $f = 2.442$ GHz

List of values:
Selected by hand

Frequency MHz	Reading dBμV	Correction factor dB	Value dBμV/m	Limit dBμV/m	Limit exceeded
72.0	15.0	10.2	25.2	40.0	
80.0	27.5	10.3	37.8	40.0	
108.1	14.0	12.2	26.2	43.5	
110.6	17.5	12.4	29.9	43.5	
113.3	23.0	12.6	35.6	43.5	
118.0	14.0	13.0	27.0	43.5	
120.0	15.0	13.1	28.1	43.5	
162.2	9.0	15.2	24.2	43.5	
169.6	11.0	15.6	26.6	43.5	
200.0	8.0	17.1	25.1	43.5	
224.0	18.5	17.8	36.3	46.0	
226.6	20.0	17.9	37.9	46.0	
228.0	17.0	18.0	35.0	46.0	
240.0	13.5	18.3	31.8	46.0	
252.0	14.0	18.8	32.8	46.0	
254.9	10.0	19.0	29.0	46.0	
264.0	14.0	19.9	33.9	46.0	
280.0	19.0	21.4	40.4	46.0	
283.2	10.5	21.6	32.1	46.0	
300.0	7.5	23.1	30.6	46.0	
311.5	11.0	17.4	28.4	46.0	
360.0	15.0	19.2	34.2	46.0	
392.0	10.5	20.3	30.8	46.0	
400.0	13.5	20.5	34.0	46.0	
420.0	12.5	21.0	33.5	46.0	
424.8	10.0	21.2	31.2	46.0	
440.0	16.0	21.5	37.5	46.0	
480.0	10.0	22.5	32.5	46.0	
520.0	8.5	23.4	31.9	46.0	
560.0	9.5	24.4	33.9	46.0	
600.0	12.5	25.3	37.8	46.0	
624.0	9.5	25.8	35.3	46.0	
640.0	8.0	26.2	34.2	46.0	
672.0	5.0	26.9	31.9	46.0	
720.0	6.0	27.8	33.8	46.0	
760.0	9.0	28.4	37.4	46.0	
780.8	8.0	28.7	36.7	46.0	
784.0	5.0	28.7	33.7	46.0	
816.0	4.0	29.2	33.2	46.0	

Result:
Limit kept

Project-File:
56305-51298

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Senton GmbH / EMI/EMC Laboratories / Aeussere Fruhlingstrasse 45 / 94315 Straubing / Tel. 09421 42081

**Radiated Emission 1 GHz - 12.75 GHz
according to FCC Part 15 Subpart C**

Model: WaveLAN AT Rel. 4.0 (2.4 GHz)
Type: RF-modem
Serial No.: 172/#1
Applicant: AT & T WCND Utrecht B.V.
Test-site: Semi anechoic room
Test distance: 3 metres
Date of test: 12/03/1995
Operator: R. Heller

Mode: - FCC test setup
(EUT mounted in HP Vectra 386s/20)

RX-mode with $f = 2.442$ GHz

Detector: Peak

Frequency [GHz]	Polarization	Analyzer- reading [dB μ V]	Generator- level [dBm]	Antenna- correction [dB]	Fieldstrength [dB μ V/m]	Limit [dB μ V/m]
1.291	horizontal	39.7	-92.7	25.6	39.9	74
1.803	vertical	35.0	-92.6	20.5	34.9	74
6.277	horizontal	37.6	-98.4	29.9	38.5	74

Result: The limits are kept.

**Radiated Emission 1 GHz - 12.75 GHz
according to FCC Part 15 Subpart C**

Model: WaveLAN AT Rel. 4.0 (2.4 GHz)
Type: RF-modem
Serial No.: 172/#1
Applicant: AT & T WCND Utrecht B.V.
Test-site: Semi anechoic room
Test distance: 3 metres
Date of test: 12/03/1995
Operator: R. Heller

Mode: - FCC test setup
(EUT mounted in HP Vectra 386s/20)

RX-mode with $f = 2.442$ GHz

Detector: Average

Frequency [GHz]	Polarization	Analyzer- reading [dB μ V]	Generator- level [dBm]	Antenna- correction [dB]	Fieldstrength [dB μ V/m]	Limit [dB μ V/m]
6.270	horizontal	32.6	-103.2	29.9	33.7	54

Result: The limits are kept.

10.0 Equipment List

To facilitate reference to test equipment used for related tests, each item of test equipment and ancillaries such as cables are identified (numbered) by the Test Laboratory.

No.	Type	Model	Serial Number	Manufacturer
01	Spectrum Analyzer	R 3261 A	91720155	Advantest
02	Spectrum Analyzer	R 3271	05050023	Advantest
03	Test Receiver	ESH 3	880112/032	Rohde & Schwarz
04	Test Receiver	ESHS 10	860043/016	Rohde & Schwarz
05	Test Receiver	ESV	881414/009	Rohde & Schwarz
06	Test Receiver	ESVP	881120/024	Rohde & Schwarz
07	Audio Analyzer	UPA	862954	Rohde & Schwarz
08	Power Meter	NRVS	836856/015	Rohde & Schwarz
09	Power Sensor	NRV-Z52	837901/030	Rohde & Schwarz
10	Power Sensor	NRV-Z4	863828/015	Rohde & Schwarz
11	Preamplifier	ESV-Z3	860907/004	Rohde & Schwarz
12	Preamplifier	R14601		Advantest
13	Preamplifier	ACX/080-3030	32640	CTT
14	Preamplifier	ACO/180-3530	32641	CTT
15	Signal Generator	SMS	872166/039	Rohde & Schwarz
16	Signal Generator	HP 8673 D	2930A00966	Hewlett Packard
17	Waveform Generator	HP 33120 A	US34005375	Hewlett Packard
18	UHF Attenuator Set	DPU	300771/075	Rohde & Schwarz
19	UHF Attenuator Set	DPU	300788/006	Rohde & Schwarz
20	Pulse Limiter	ESH 3-Z2	1144	Rohde & Schwarz
21	Pulse Limiter	11947 A	3107A00566	Hewlett Packard
22	V-Network	ESH 3-Z5	862770/018	Rohde & Schwarz
23	V-Network	ESH 3-Z5	894785/005	Rohde & Schwarz
24	V-Network	ESH 3-Z5	830952/025	Rohde & Schwarz
25	V-Network	ESH 3-Z6	830722/010	Rohde & Schwarz
26	V-Network	NSLK 8127	8127152	Schwarzbeck
27	V-Network	NNLA 8119	8119148	Schwarzbeck
28	V-Network	SE 01	01	Senton
29	T-Network	ESH 3-Z4	890602/011	Rohde & Schwarz
30	T-Network	ESH 3-Z4	890602/012	Rohde & Schwarz
31	High Impedance Probe	TK 9416	01	Schwarzbeck
32	High Impedance Probe	TK 9416	02	Schwarzbeck
33	Current Probe	ESH 2-Z1	863366/18	Rohde & Schwarz
34	Current Probe	ESV-Z1	862553/3	Rohde & Schwarz

No.	Type	Model	Serial Number	Manufacturer
35	Absorbing Clamp	MDS 21	80911	Lüthi
36	Absorbing Clamp	MDS 21	79690	Lüthi
37	Loop Antenna	HFH2-Z2	882964/1	Rohde & Schwarz
38	Biconical Antenna	HK 116	836239/02	Rohde & Schwarz
39	Biconical Antenna	3110	8812-1005	Emco
40	Log. Periodic Antenna	HL 223	834408/12	Rohde & Schwarz
41	Log. Periodic Antenna	3147	9112-1054	Emco
42	Horn Antenna	3160-03	9112-1003	Emco
43	Horn Antenna	3160-04	9112-1001	Emco
44	Horn Antenna	3160-05	9112-1001	Emco
45	Horn Antenna	3160-06	9112-1001	Emco
46	Horn Antenna	3160-07	9112-1008	Emco
47	Horn Antenna	3160-08	9112-1002	Emco
48	Horn Antenna	3160-09	9403-1025	Emco
49	Digital multimeter	199	463386	Keithley
50	Multimeter	HP E2373A	2927J03345	Hewlett Packard
51	DC Power Supply	NGSM 32/10	203	Rohde & Schwarz
52	DC Power Supply	NGB	2455	Rohde & Schwarz
53	DC Power Supply	NGA	386	Rohde & Schwarz
54	Temperature Test Chamber	HT4010	07065550	Heraeus
55	Cable	RG214	1309	Senton
56	Cable	200CM_001	1357	Rosenberger
57	Cable	150CM_001	1479	Rosenberger
58	Cable Set EG1	RG214	1189 - 1191	Senton
59	Cable Set Cabine 1	RG214		Senton
60	Cable Set Cabine 2	RG214		Senton
61	Cable Set Cabine 3	RG214		Senton
62	Shielded Room	No. 1	1451	Senton
63	Shielded Room	No. 2	1452	Senton
64	Semi-anechoic Chamber	No. 3	1453	Siemens
65	Shielded Room	No. 4	1454	Euroshield
66	Open Area Test Site	EG 1		Senton
67	Cable for Antenna Connector			AT & T
68	DC Block 0.01-18GHz		8037	Inmet Corp.
69	High pass filter			AT & T

EXHIBIT 6

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FCC-ID: IMR24HAT

Test Report No. 56305-51298

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WAVELAN AT 2.4 GHz DESCRIPTION

The WavelAN AT product provides a WavelAN compatible wireless connection for personal computers with Industry Standard Architecture (ISA or AT interface). This product operates in the ISM band 2400-2483.5 MHz

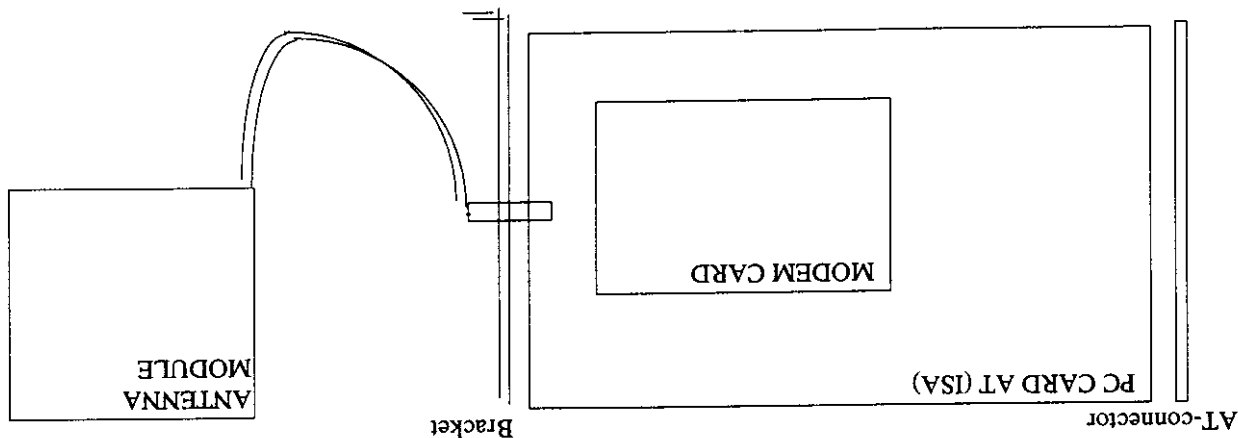
The product consist of 3 parts:

1. PC card ("Host Interface"); it interconnects to the PC via an AT-interface, to the antenna module via a special connector and to a "modem" card.
- It contains a) the interface element between the AT host and the LAN controller, b) the LAN controller, c) hardware for transmit and receive buffering and d) the interface to the "modem" card. Optionally a BootRom can be placed for start-up procedure of workstation without hard disk.

2. "Modem" card; it is fixed to the PC card via 2 pcb-connectors. This card contains oscillator circuits, RF-modem signal processing ASIC (Daedalus), modulation/demodulation, spread spectrum technology. Optionally it can also contain a factory installable data encryption chip.

3. Antenna module; it is connected to the PC via a coaxial cable. It contains a board with Tx and Rx antenna.

Assembly Diagram



The technical specification complies with that of the WavelAN cards already in production and is as follows on the next page.

WAVELAN AT 2.4 GHz TECHNICAL SPECIFICATION FCC

Data Signalling Rate:	2 Mbit/s
Media Access Protocol:	CSMA/CA (Collision Avoidance)
Bit Error Rate:	Better than 10 ⁻⁸
Base-Band Modulation: (before spreading)	Differential Quadrature Phase Shift Keying (DQPSK) 2 bits/symbol
Spread Spectrum:	Direct Sequence with 11 chips/symbol interval. Pseudo random Barker code sequence: { 1 - 1 1 1 - 1 1 1 1 - 1 - 1 }
Operating frequency band:	2400 - 2483.5 MHz (ISM band)
Carrier Frequency:	Selectable from factory pre-programmed set: 2412, 2422, 2432, 2442, 2452 and 2462 MHz
Peak Output Power:	< 50 mW
RF Power Density:	< 8 dBm/3kHz
Antenna (indoors):	Omni-Directional: - Gain 0 dBi - Polarization diversity Hor/Vert.
Spurious Emissions etc:	Satisfies the USA Federal Comm. Commission (FCC) rules Part 15.247

EXHIBIT H

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407-0031610

1	006-0085004	5	22pF;1%	C27	C34	C42	C236
3	006-0085061	5	12pF;5%	C11	C25	C55	C98
4	006-0085062	2	15pF;5%	C86	C93		
5	006-0085067	7	39pF;5%	C13	C57	C63	C88
6	006-0085071	13	82pF;5%	C2	C10	C41	C43
				C48	C53	C54	C60
				C66	C79	C87	C200
7	006-0085184	1	2.2nF;+80/-20%	C217			
8	006-0085349	1	BAS16	D203			
9	006-1066590	1	BAV99	D204			
10	006-1508556	1	NFM614R4.7nF	CF1			
11	006-2000830	1	LP2951CM	U204			
12	006-2001927	1	74HC02	U9			
13	006-2002301	1	0.5%	R39			
14	006-2002452	13	10.0;1%	R15	R29	R36	R46
				R52	R60	R73	R200
				R213	R214	R215	R223
15	006-2002517	1	47.5;1%	R59			
16	006-2002536	2	75.0;1%	R65	R69		
18	006-2002555	8	118;1%	R8	R11	R16	R20
				R57	R67	R209	R224
19	006-2002565	6	150;1%	R2	R5	R7	R33
				R47	R63		
20	006-2002575	6	191;1%	R22	R25	R44	R48
				R53	R62		
21	006-2002598	6	332;1%	R18	R38	R56	R71
				R17	R21		
23	006-2002613	9	475;1%	R9	R23	R27	R45
				R49	R58	R206	R207
24	006-2002628	1	681;1%	R244			
25	006-2002644	17	1.00K;1%	R1	R3	R37	R201
				R221	R222	R229	R230
				R231	R232	R233	R235
				R236	R239	R241	R243
26	006-2002661	2	1.50K;1%	R61	R68		
27	006-2002681	2	2.43K;1%	R32	R43		
28	006-2002694	4	3.32K;1%	R28	R42	R64	R228
29	006-2002701	6	3.92K;1%	R19	R26	R31	R40
30	006-2002709	4	4.75K;1%	R6	R30	R227	R240
32	006-2002740	15	10.0K;1%	R10	R12	R13	R14
				R24	R34	R35	R205
				R66	R70	R72	
33	006-2002757	5	15.0K;1%	R203	R220	R225	R226
				R238			
34	006-2002769	2	20.0K;1%	R218	R245		

EXHIBIT A
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WIND-UTRECHT	407-0031610	UNIT : WaveMODEM/2.4GHz	SCALE:	CODE:	NAME : ASSY, BOARD LEVEL
THE NETHERLANDS		REV. F			SHEET 3 OF 6

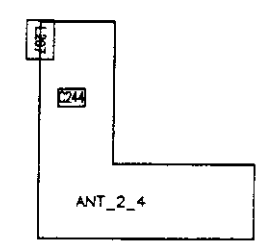
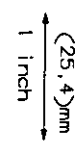
35	006-2002782	1	27.4K;1%	R202	
36	006-2002797	2	39.2K;1%	R216	R217
37	006-2002805	2	47.5K;1%	R204	R210
38	006-2002836	1	100K;1%	R211	
38-a	006-2002949	1	4.7nH;10%	L207	
39	006-2003148	2	1.0pF;+/-25PF	C26	C244
40	006-2003151	1	1.8pF;+/-25PF	C74	
41	006-2003152	1	2.2pF;+/-25PF	C206	
42	006-2003156	8	4.7pF;+/-25PF	C21	C28 C33
43	006-2003157	2	5.6pF;+/-25PF	C6	C24
43-a	006-2003158	1	6.8pF;+/-25PF	C23	
44	006-2003160	9	10pF;+/-25PF	C8	C9 C15 C50
				C51	C58 C59 C64
45	006-2003307	13	150pF;5%	C73	C82 C83 C84
				C89	C90 C91 C97
				C100	C102 C222 C228
46	006-2003317	17	1nF;5%	C12	C14 C18 C20
				C32	C81 C85 C92
				C101	C105 C106 C201
				C203	C225 C229
				C232	
47	006-2003319	2	1.5nF;5%	C47	C62
48	006-2003333	11	18pF;10%	C16	C19 C44 C65
				C68	C70 C80 C104
48-a	006-2003338	14	47pF;10%	C1	C4 C7 C22
				C30	C37 C46 C61
				C67	C75 C76 C95
				C96	C230
49	006-2003384	5	10nF;10%	C39	C72 C103 C209
				C221	
50	006-2003602	1	OPTION SOCKET	U212	
51	006-2003725	2	2.2;5%	R54	R234
52	006-2003967	1	15nH;10%	L201	
53	006-2003968	7	18nH;10%	L1	L10 L17 L20
				L200	L204 L205
54	006-2003975	2	68nH;5%	L15	L202
55	006-2005292	5	CF750	Q1	Q2 Q7 Q8
				Q200	
56	006-2005324	1	SG 615 P 22	U201	
57	006-2005964	1	S1953DY	U208	
58	006-2005970	1	PMB2330	U11	
59	006-2005973	2	CXD1179Q	U2	U5
60	006-2006037	1	.68uH;20%	L18	
61	006-2006051	4	10uH;10%	L5	L8 L12 L14
62	006-2006053	2	15uH;10%	L4	L7
63	006-2006447	1	CA3080	U202	
64	006-2006542	10	BLM21B10	L2	L3 L6 L9
				L11	L13 L16 L19
				L203	L206
65	006-2006747	1	UMA1020M	U206	
66	006-2006748	1	NE5200D	U13	

EXHIBIT 14
Page 5 of 15
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NAME : ASSY, BOARD LEVEL		CODE:		SHEET 4 OF 6
UNIT : WaveMODEM/2.4GHZ		SCALE:		REV. F
WCND-UTRECHT THE NETHERLANDS		407-0031610		

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EXHIBIT A

67	006-2006750	1	NE630D	U6
68	006-2006752	1	BBY51 03W	D206
69	006-2006754	1	RF2422	U1
72	006-2006765	1	W1575AAJ	U209
73	006-2006787	2	LFM35 11C0352B014	U8 U10
74	006-2006795	1	MFA2450B01	U7
75	006-2006861	1	UMA1017M	U203
76	006-2006918	1	RF2128	U3
77	006-2006919	2	RF2304	U4 U12
78	006-2006941	1	NM93CS56M8	U211
79	006-2006945	2	BAR80	D2 D3
80	006-2006946	2	BAR63 03W	D4 D5
81	006-2006951	1	MQE041 1225	U200
82	006-2007079	1	MQG002 2098	U205
83	006-2007114	1	MS 136	J202
84	006-2007137	1	3.9pF; +/-1PF	C45
84-a	006-3502854	1	.22uF; +80/-20%	C35
85	006-8600102	3	GREEN LED	D200 D201 D202
86	007-1155121	3	2.2uF; 20%	C202 C223 C239
87	008-0127012	1	BAT17 04	D205
88	008-0127019	1	BAT17	D1
89	008-0127021	7	BSR17A	Q3 Q4 Q5 Q6
90	008-0127237	1	DAEDALUS QFP	U207
91	008-0127329	1	ARIADNE	U14
92	008-0216068	25	.1uF; +80/-20%	C3 C5 C17 C31 C36 C38 C49 C52 C56 C71 C77 C78 C99 C204 C212 C213 C216 C219 C220 C224 C226 C231 C240 C241 C242
110	407-0031195	REF	MULTI PANEL	
111	407-0031611	REF	SCHEMATIC	
112	407-0031615	REF	MASTER SOLDER PASTE A	
113	407-0031616	REF	MASTER SOLDER PASTE B	
114	407-0031617	REF	FILE TEST POINT LIST	
115	407-0031618	REF	FILE COMP. CENTER LIST	
116	407-0031619	REF	FILE NEUTRAL	
117	407-0031620	1	BOARD PRINTED WIRING	
118	407-0031408	1	LABEL BOARDLEVEL	
119	407-0031578	REF	REWORK INSTRUCTION	
125	407-0031827	REF	CONDITIONAL REWORK INSTRUCTIONS	



NOTES

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 **ARI**
WOND SYSTEMS ENG. B.V.
NIEUWEGEIN, THE NETHERLANDS

UNIT: WaveMODEM/2 2.4GHZ

NAME: ASSY BOARD LEVEL

SHEET 5 OF 6

SCALE:

407-0031610

	B					
CHRG.	REV	RELEASE NO.	DFTS	DATE		

EXHIBIT

407-0031610

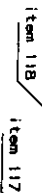
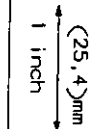


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407-0031610

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UNIT: WavEMODEM/2 2.4GHz	 WOOD SYSTEMS B.V. NIEUWEDIJN, THE NETHERLANDS
NAME: ASSY BOARD LEVEL	
SHEET 6 OF 6	
SCALE:	
407-0031610	

SUBJECT: PROCESSING GAIN AT&T WAVE Mode

REF: FCC RULES 47CFR PART 15, SECTION 5.247d

Nedim Erkocevic
Name

Leopoldo Rodin

11.12.1995
Date

1. GROUP LEADER:

Bruce Tuch Name

Bruce Stief

11.12.1995
Date

Name _____

By Appointment

Date _____

11 Dec 1965

AT&T CONFIDENTIAL

A

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1. Introduction

The way of measuring the Processing Gain of spread spectrum systems was discussed in meetings with the FCC (contact between D. Means (FCC) and B. Tuch (at the time NCR WCND, nowadays AT&T WCND). A proposal to measure the Processing Gain for Wavelan has been described in a FAX letter dated April 14, 1993 prepared by A. Karmann.

Here is the measurement method summary.

The Processing Gain of the Wavelan (spread spectrum) receiver can be evaluated through the measurement of its "jamming margin".

In order to achieve the BER of 10^{-5} , receiver of an unspread system with the Wavelan-like modulation (DQPSK modulation) requires signal-to-noise ratio (SNR) of at least 18 dB.

If a spread spectrum technique (in case of Wavelan DSSS - Direct Sequence Spread Spectrum) is implemented in the system (what means adding the Processing Gain), the receiver should be able to cope (without degradation of BER) with a jammer (interferer), which degrades the SNR (required by unspread system) for the number of dB-s equivalent to the added Processing Gain.

In our case, 10 dB of Processing Gain implemented in the Wavelan system, translates in to the requirement for the Wavelan receiver to be able to receive with the same BER of 10^{-5} the Wavelan signal in presence of an interferer with SIR of 8 dB. Interferer is allowed to appear at any frequency within the Wavelan signal occupied frequency band (in our case it is 2433 - 2452 MHz since the central frequency of the Wavelan 2.4 GHz transmitter to be tested is 2442 MHz).

The procedure for the Processing Gain measurement/evaluation, derived from discussions between AT&T and FCC prescribes: that the CW interferer from a signal generator should sweep slowly moving up 1 KHz in 1 sec (covering 1 MHz in 1000 sec); in parallel the registration of the correctly received frames out of 400,000 transmitted 576 byte long frames should take place, while the CW interferer with a level of 8 dB below the Wavelan signal level moves from 2433 to 2434 MHz in 1000 sec; and this procedure should be repeated for each 1 MHz interval up to 2452 MHz; if each of the 19 error count values is less than 16, then there has been proven that Wavelan 2.4 GHz system met the minimum required Processing Gain requirement of 10 dB, since for an unspread system a BER of 10^{-5} corresponds SNR of 18 dB.

40000 frames each 576 bytes long, handled during each 1000 sec. error count, has to do with the 2 Mbit/sec bit rate of the WavelAN system (40000 frames * 576 byte/frame * 8 bit/byte nearly equals 2 Mbit/sec WavelAN bit rate * 1000 sec single error count duration). Criterion of less than 16 (frame) errors allowed per error count, comes from the equivalence between the BER of 10^{-4} and frame error rate (FER) of up to 16 per 400000 (for the case of 576 byte long frames)

2. Measurement setup

Measurement setup for evaluation of the Processing Gain of the WavelAN 2.4 GHz radio modem is presented in fig. 1.

Spread spectrum signal coming from the WavelAN 2.4 GHz transmitter (1) and the interferer generated by the synthesized sweeper (4) are added by means of the two way combiner (3) and delivered to the receiver (6). Step attenuator (2) is used to adjust the WavelAN signal level at the receiver input to -55 dBm. CW generator (synthesized sweeper) level is adjusted so, to appear at the receiver input with -63 dBm (providing the receiver with 8 dB SIR). Fixed attenuator (5) is in place for more even distribution of attenuation throughout the test setup. The receiver (6) is placed in the RF shielded room to avoid any influence of other random interferes on the measurement.

WavelAN 2.4 GHz receiver signal level of -55 dBm is chosen since it is at least 18 dB above thermal noise, thus eliminating any errors occurring due to it (errors have to be caused by jammer, not other noise sources).

Dedicated WavelAN test application program (WTT1.17) is used to control the measurement. Transmitter is set to generate frame transmissions with the length of 576 byte and a minimum interframe spacing (in our case approx. 78% duty cycle limited by the speed of NCR notebook computers used for testing). The CW interferer from the signal generator is swept slowly, moving up 1 kHz in 1.2 sec (1 MHz in 1200 sec). Software takes care of registration of the correctly received frames out of 400,000 transmitted frames while the CW interferer moves from 2433 to 2434 MHz in 1200 sec. This is repeated for the CW interferer movement from 2434 to 2435 MHz, 2435 to 2436 MHz, etc. up to 2451 to 2452 MHz. The number of errors (error frames) per error count is presented in the table in the Results chapter.

One could notice the difference between actual measurement parameters and those prescribed in introduction (actual measurement took longer CW sweeps). This difference arises from the fact that test PCs were too slow to support 99 % duty cycle (actual duty cycle was 78%). And 400000 transmissions consequently required longer CW sweep (1200 sec instead of 1000 sec). However this does not affect the correctness of the method, only takes more time to complete the testing.

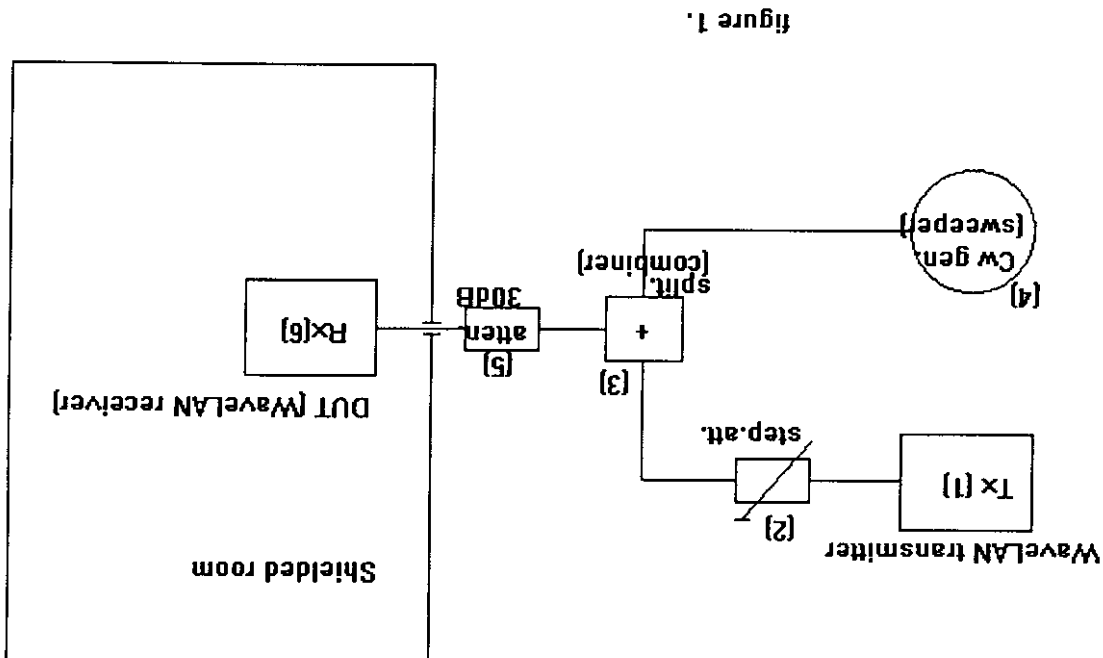


figure 1.

- (1) WavelAN 2.4 GHz modem U170/ #008, used as PCMCIA controlled modem, together with NCR 3170 notebook computer
 - (2) step attenuator MIDWEST MICROWAVE, model 1044
 - (3) two way splitter/combiner ARRA 3-9200-2
 - (4) GIGATRONICS synthesized sweeper, model 7200
 - (5) Fixed attenuator of 30 dB INMET. Corp.
 - (6) WavelAN 2.4 GHz modem U170/ #012, used as PCMCIA controlled modem , together with NCR 3170 notebook computer
- Note: WTT 1.17 (WavelAN Test Tool) software used as a dedicated software controlling the Tx and Rx as well as counting transmitted frames and error/lost frames.

3. Measurement results

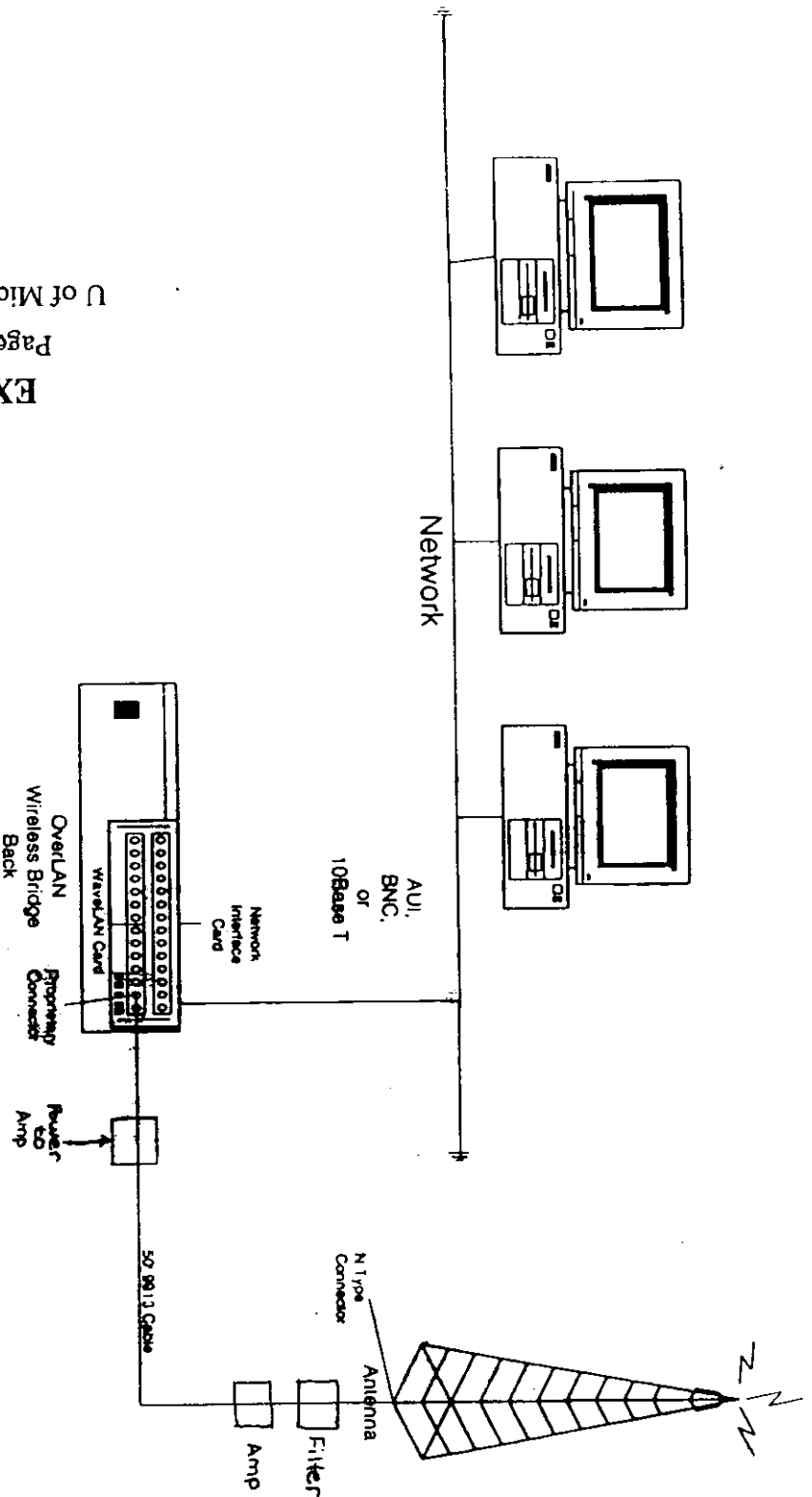
The number of incorrect received frames out of 400.000 are:

frequency band (MHz)	num. of errors
2433 - 2434	0
2434 - 2435	0
2435 - 2436	0
2436 - 2437	0
2437 - 2438	0
2438 - 2439	0
2439 - 2440	0
2440 - 2441	1
2441 - 2442	1
2442 - 2443	3
2443 - 2444	0
2444 - 2445	0
2445 - 2446	0
2446 - 2447	0
2447 - 2448	0
2448 - 2449	0
2449 - 2450	0
2450 - 2451	0
2451 - 2452	0

As one can see the prescribed target on number of errors has been met. And the most of errors occurred in the middle of the DSSS signal bandwidth, what is logical since this part of the band contains the highest power density (and carries the most of information)

EXHIBIT H

OverLAN® Wireless Bridge Configuration



C-SPEC
Corporation
Dayton, Ohio

EXHIBIT I

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