The output power measurement meathod

There might be some confusion with the test report 56305-00323-1(Senton TP) and therefore likely misinterpreation.

On page 39 of the report the header says "Maximum Peak Output Power according to .....para 15.247b".
The output power levels were measured with **a wideband power meter**, not with a spectrum analyzer.

In normal operation of the measurement with a spectrum analyzer, the RBV and VBW shall be set to greater than the 6 dB bandwidth of the signal.
But these measurements in this report have nothing to do with the inband power level measurement as required on page 39. They are needed to determine if the TX spurious/harmonic emission levels are 20dB down from the highest emission level within the authorized band as measured with a 100kHz RBW. FCC requirement para 15.247 (c).
This implies that in band level as well as the out of band levels have to be measured with an RBW of 100 kHz to do the right calculation.

SENTON

▪ EMV-Prüfzentrum ▪ EMI/EMC-Testcenter ▪

Straubing, July 27, 2000

TEST-REPORT

No. 56305-00323-1

for

MPCI3A-20

RF-modem for wireless LAN

Applicant:	Lucent Technologies Nederland B.V.
Purpose of testing:	To show compliance with FCC Code of Federal Regulations, Part 15 Subpart C, Section §15.247

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1. Administrative Data

Equipment Under Test (EUT):	MPCI3A-20
Serial number(s):	00UT28300000 (RF-modem) Sample no. 4 (external antenna)
Type of equipment:	RF-modem using DSSS technology for wireless connection for e.g. portable and mobile computers which have a Mini-PCI-bus.
Parts/accessories:	see "Configuration of EUT and Peripheral Devices" on page 7
FCC-ID:	--- (EUT will be integrated into computers of OEM partners using their own FCC IDs)

Applicant:	Lucent Technologies Nederland B.V.
(full address)	Zadelstede 1-10 NL-3431 JZ Nieuwegein The Netherlands
Contract identification:	---
Contact person:	Mr. Wout Kerkhof
Manufacturer:	Lucent Technologies Nederland B.V.

Receipt of EUT:	July 10, 2000
Date of test:	July 11 to 19, 2000
Note:	During testing EUT was called "OriNOCO MiniPCI Card"

Responsible for testing:	Rainer Heller
Responsible for test report:	Rainer Heller

2. Identification of Test Laboratory

Test Laboratory: (full address):	Senton GmbH EMI/EMC Test Center Aeussere Fruehlingstrasse 45 D-94315 Straubing Germany	
Contact person:	Mr. Johann Roidt	
Communication:	Telephone Fax eMail:	(+49) 0 94 21 / 55 22-0 (+49) 0 94 21 / 55 22-99 Office@senton.de
FCC file number:	31040/SIT 1300F2	
Industry Canada file number:	IC 3050	

3. Summary of Test Results

The tested sample (including accessories) complies with the requirements 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

4. Operation Mode of EUT

All tests were performed using the "WaveLAN-II Engineering Test Program", Version v01.21 (Oct 11 1999). According to applicant three different kinds of modulation are used for transmission specified by the appropriate bit rate:

Transmit mode (TX):

Operating frequency [GHz]	Rated output power (conducted) [dBm]			Test performed [1]
	Bit rate 2 Mbps	Bit rate 5.5 Mbps	Bit rate 11 Mbps	
2.412	+15	+15	+15	X
2.417	+15	+15	+15	
2.422	+15	+15	+15	
2.427	+15	+15	+15	
2.432	+15	+15	+15	
2.437	+15	+15	+15	
2.442	+15	+15	+15	X
2.447	+15	+15	+15	
2.452	+15	+15	+15	
2.457	+15	+15	+15	
2.462	+15	+15	+15	X

Receive mode (RX):

Operating frequency [GHz]	Test performed
2.412	
2.417	
2.422	
2.427	
2.432	
2.437	
2.442	X
2.447	
2.452	
2.457	
2.462	

[1] Full testing with bit rate 11 Mbps only

7.2. 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.
A spectrum analyzer (set to RBW = 100 kHz, VBW = 100 kHz, span = 100 MHz, sweep = 40 ms) was used to record the shape of the transmit signal.
See figure 1 for the measurement setup.

Test equipment used (see equipment list for details):
02, 08, 09, 18, 67, 68

7.3. Peak Power Density (§ 15.247.d)

The peak 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 max hold with
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, 18, 57, 67, 68

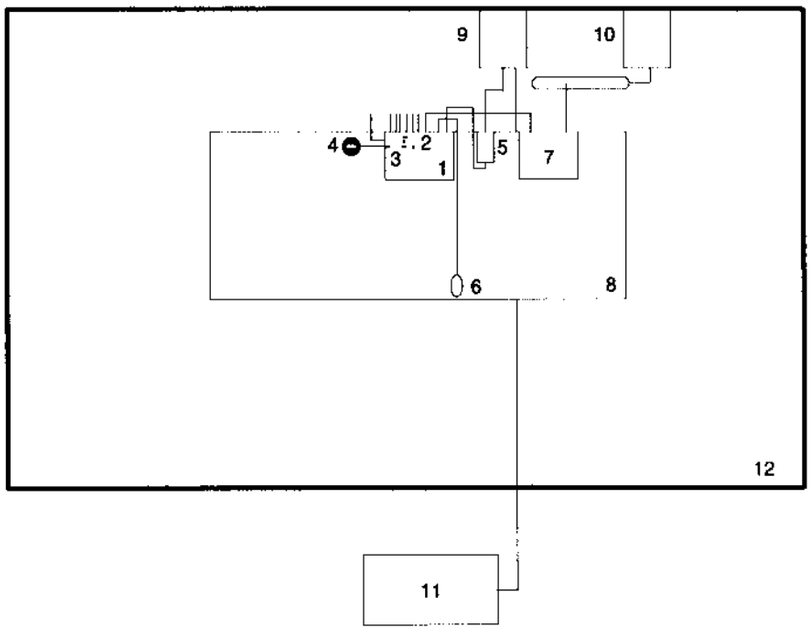


Figure 2: Measurement setup for conducted emission test

1 Notebook (host)
2 RF-modem
3 Antenna cable mounted in PC-card
4 External antenna
5 AC adapter for notebook
6 Mouse
7 Parallel Printer
8 Wooden table
9 LISN for EUT
10 LISN for peripheral device(s)
11 Test receiver
12 Shielded room

8. Equipment List

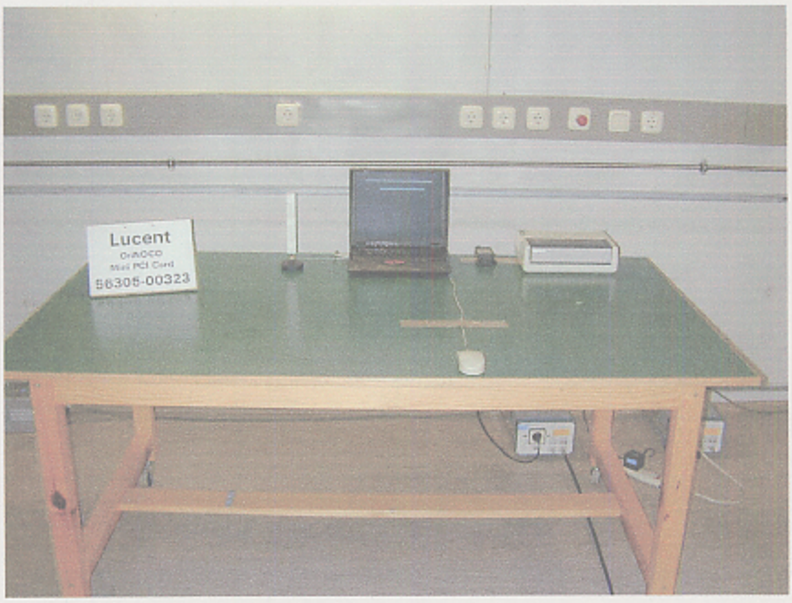
To facilitate reference to test equipment used for related tests, each item of test equipment and ancillaries such as cables are identified (numbered) by the Test Laboratory.

No.	Type	Model	Serial Number	Manufacturer
01	Spectrum Analyzer	R 3271	05050023	Advantest
02	EMI Test Receiver	ESMI	839379/013 839587/006	Rohde & Schwarz
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	Attenuator 20 dB	4776-20	9503	Narda
19	Attenuator 10 dB	4776-10	9412	Narda
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	842204/001	Rohde & Schwarz
39	Biconical Antenna	HK 116	836239/02	Rohde & Schwarz
40	Log. Periodic Antenna	HL 223	841516/023	Rohde & Schwarz
41	Log. Periodic Antenna	HL 223	834408/12	Rohde & Schwarz
42	Horn Antenna	3115	9508-4553	Emco
43	Horn Antenna	3160-03	9112-1003	Emco
44	Horn Antenna	3160-04	9112-1001	Emco
45	Horn Antenna	3160-05	9112-1001	Emco
46	Horn Antenna	3160-06	9112-1001	Emco
47	Horn Antenna	3160-07	9112-1008	Emco
48	Horn Antenna	3160-08	9112-1002	Emco
49	Horn Antenna	3160-09	9403-1025	Emco
50	Digital multimeter	199	463386	Keithley
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			Lucent Technologies
68	DC Block 0.01-18GHz		8037	Inmet Corp.
69	High pass filter			Lucent Technologies

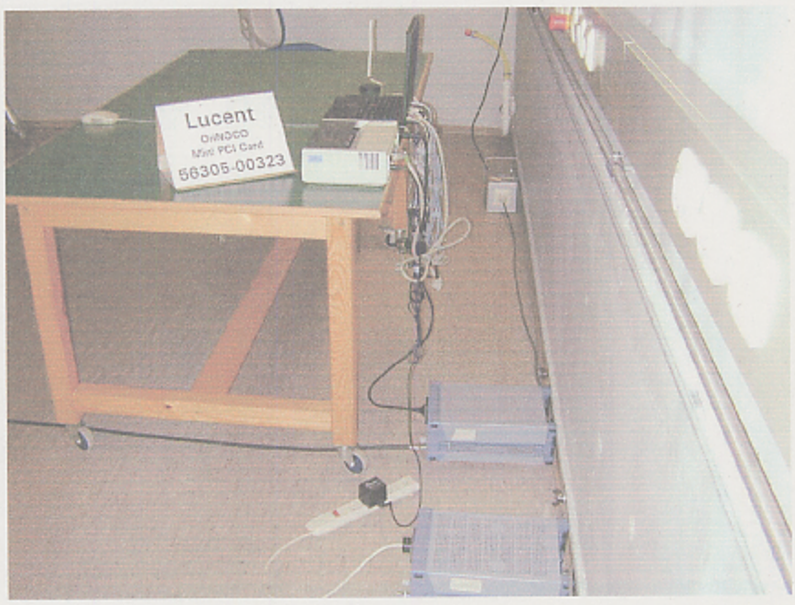
Photo No. 9.1

Test setup for conducted emission test 450 kHz - 30 MHz



Photos No. 9.2 - 9.3

Test setup for conducted emission test 450 kHz - 30 MHz
(continued)



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

Model: MPCI3A-20
Type: RF-modem for wireless LAN
Serial No.: 00UT28300000
Applicant: Lucent Technologies Nederland B.V.
Date of test: 07/19/2000
Operator: R. Heller

Mode: - RF-modem mounted in IBM ThinkPad 1171-370
- FCC test setup
- supply voltage 115 V AC

- TX mode

Tested on: Antenna connector

Selected bit rate	Operating frequency [GHz]	Power meter reading [dBm]	Correction-factor [dB]	Output power [dBm]	Limit [dBm]
11 Mbps	2.412	14.6	0.3	14.9	30
	2.442	14.5	0.3	14.8	30
	2.462	14.5	0.3	14.8	30
5.5 Mbps	2.412	14.7	0.3	15.0	30
	2.442	14.5	0.3	14.8	30
	2.462	14.6	0.3	14.9	30
2 Mbps	2.412	14.5	0.3	14.8	30
	2.442	14.4	0.3	14.7	30
	2.462	14.4	0.3	14.7	30

Result: The limit is kept