

RF Maximum Permissible Exposure Measurement Report

of

E.U.T. : LANEscape

MODEL : WH2330

for

APPLICANT : Z-Com, Inc.

ADDRESS : 7F-2, No. 9, Prosperity 1st Rd., Science-Based Industrial
Park, Hsinchu, Taiwan, R.O.C.

Test Performed by

ELECTRONICS TESTING CENTER, TAIWAN

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Report Number : ET88R-06-056-02

TEST REPORT CERTIFICATION

Applicant : Z-Com, Inc.
7F-2, No. 9, Prosperity 1st Rd., Science-Based Industrial Park, Hsinchu,
Taiwan, R.O.C.

Manufacturer : Z-Com, Inc.
7F-2, No. 9, Prosperity 1st Rd., Science-Based Industrial Park, Hsinchu,
Taiwan, R.O.C.

Description of EUT :

- a) Type of EUT : LANEscape
- b) Trade Name : ----
- c) Model No. : WH2330
- d) Power Supply : From NoteBook PC

Regulation Applied : IEEE C95.1-1991

I HEREBY CERTIFY THAT: The data shown in this report were made in accordance with the procedures given in IEEE C95.1, and the energy emitted by the device was founded to be within the limits applicable. I assume full responsibility for accuracy and completeness of these data.

Note: 1. The result of the testing report relates only to the item tested.
2. The testing report shall not be reproduced expect in full, without the written approval of ETC.

Issued Date : AUG. 27, 1999

Test Engineer : 
(Chin Cheng Yeh)

Approve & Authorized Signer : 
Will Yaoo, Supervisor
EMI Test Site of ELECTRONICS
TESTING CENTER, TAIWAN

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1 GENERAL INFORMATION

1.1 Product Description

- a) Type of EUT : LANEscape
- b) Trade Name : ----
- c) Model No. : WH2330
- d) Power Supply : From Notebook PC

1.2 Characteristics of Device

The LANEscape designed with a transmitting method of frequency hopping spread spectrum is for local area network operation, which operates at 2.4 GHz ISM band and data rate up to 2Mbps. For operation of this device, it is asked for maintaining a minimum space of 20 cm from the operator or any bystanding in the user's manual. The on-air protocol and radio characteristic conform to the IEEE 802.11 standard (frequency hopping). The ethernet port is compatible with the IEEE 802.3-1993 and uses STP interface. Its nominal rated output power is 20 dBm.

For more details of specification, please see appendix A.

1.3 Test Methodology

The Maximum Permissible Exposure (MPE) was performed according to the procedures illustrated in IEEE C95.1-1991.

1.4 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on the roof top of Building at No.34, 5 Lirn, Din Fu Tsun, Lin Kou, Taipei, Taiwan, R.O.C.

This site has been fully described in a report submitted to the FCC, and accepted in a letter dated Feb. 10, 1997.

2 PROVISIONS APPLICABLE

2.1 Definition

MPE in Controlled Environments:

For human exposure in controlled environments to electromagnetic energy at radio frequencies from 3 kHz to 300 GHz, the MPE, in terms of rms electric (E) and magnetic (H) field strengths, the equivalent plane-wave freespace power densities (S) and the induced currents (I) in the body that can be associated with exposure to such fields or contact with objects exposed to such fields, is given in Table 1 as a function of frequency. Exposure associated with a controlled environment includes: exposure that may be incurred by persons who are aware of the potential for exposure as a concomitant of employment, exposure of other cognizant individuals, or exposure that is the incidental result of passage through areas where analysis shows the exposure levels may be above those shown in Table 2, but do not exceed those in Table 1, and where the induced currents may exceed the values in Table 2, Part B, but do not exceed the values in Table 1, Part B. of IEEE C95.1

MPE in Uncontrolled Environments:

For human exposure in uncontrolled environments to electromagnetic energy at radio frequencies from 3 kHz to 300 GHz, the MPE, in terms of rms electric (E) and magnetic (H) field strengths, the equivalent plane-wave free-space power densities (S) and the induced currents (I) in the body that can be associated with exposure to such fields or contact with objects exposed to such fields are given in Table 2 as a function of frequency.

Exposure associated with an uncontrolled environment is the exposure of individuals who have no knowledge or control of their exposure. The exposure may occur in living quarters or workplaces where there are no expectations that the exposure levels may exceed those shown in Table 2, and where the induced currents do not exceed those in Table 2, Part B. Transitory exposures are treated in 4.1.1. of IEEE C95.1

2.2 Relative Requirement for Compliance

(1) MPE for Controlled Enviroments

According to section 4.1.1 of IEEE C95.1 MPE Limits for controlled enviroment are as following:

Frequency Range (MHz)	Power Density (S) E-Field, H-Field (mW/cm ²)
0.003-0.1	(100, 1000000)
0.1-3.0	(100, 10000/f ²)
3-30	(900/f ² , 10000/f ²)
30-100	(1.0, 10000/f ²)
100-300	1.0
300-3000	f/300
3000-15000	10
15000-300000	10

(2) MPE for Uncontrolled Enviroments

According to section 4.1.2 of IEEE C95.1 MPE Limits for uncontrolled enviroment are as following:

Frequency Range (MHz)	Power Density (S) E-Field, H-Field (mW/cm ²)
0.003 - 0.1	(100, 1000000)
0.1 - 1.34	(100, 10000/f ²)
1.34 - 3.0	(180/f ² , 10000/f ²)
3 - 30	(180/f ² , 10000/f ²)
30 - 100	(0.2, 940000/f ^{3.336})
100 - 300	1.0
300 - 3000	f/15000
3000 - 15000	f/15000
15000 - 300000	10

3. SYSTEM TEST CONFIGURATION

3.1 Justification

The system was configured for testing in a typical fashion as a customer would normally use it. The peripherals other than EUT were connected in normally standing by situation. Measurement was performed under the condition that a computer program was exercised to simulate data communication of EUT, and the transmission rate was set to maximum allowed by EUT. So it could be sure that the measurement was taken on possible maximum radiated power from normal operation.

3.2 Devices for Tested System

Device	Manufacture	Model	Cable Description
LANEscape *	Z-Com, Inc.	WH2330	No any Cable
NoteBook	ACER	A350PC	1.8m Unshielded Power Cord Adaptor Cord 1.9m

Remark “*” means device under test.

4 Maximum Permissible Exposure Measurement

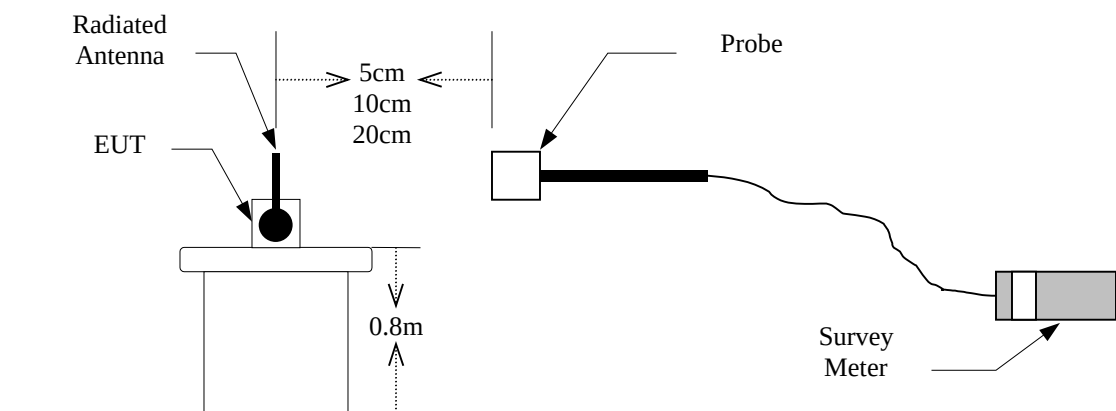
4.1 Applicable Standard

For this intentional radiator are used with any possible people, therefore the **Uncontrolled Enviroment Condition** is applied. And the MPE requirement is as descibed in section 2.2 of this test report.

4.2 Measurement Procedure

- (1) Set up the device under test (DUT) as its normal using configuration. Please see figure 1.
- (2) Calibrate the probe system so that the meter displays zero, and then power on the DUT.
- (3) Scan the antenna of DUT with a proper spacer of 5 cm in vertical axis and keep vertical scanning around the antenna, and pick up the maximum data with Max. Hold function.
- (4) Repeat step (3) by changing the spacer to 10 cm and then 20 cm till the field from DUT is too weak to be measured.
- (5) Record the maximum value appeared.

Figure 1 : Measurement configuration



4.3 Measurement Instrument

The following instrument are used for radiated emissions measurement :

Equipment	Manufacturer	Model No.	Next Cal. Due
Survey Meter	Narda	8712	Jan. 30, 2000
Probe	Narda	8721D	Jan. 30, 2000

4.4 Power Density Data

Operation Mode : Maximum Data Transmitting Rate

Transmitting Frequency : 2402 – 2480 MHz

Rated Maximum Output Power : 20 dBm

Test Date : Jun. 29, 1999

Temperature : 25

Humidity : 65%

Measured @ 5cm mW/cm ²	Measured @ 10cm mW/cm ²	Measured @ 20cm mW/cm ²	Limit mW/cm ²
0.06×0.815=0.049	---	---	1.60

Note :

1. Remark “---” means that the emission level is too low to be measured (the precise accuracy of the measurement system is 0.01 mW/ cm²).
2. Value 0.815 is a corrected factor of measurement instrument system.

Appendix A Specification of Device Under Test

WH2330 Specifications:

Interface	PCMCIA
Range	Over 150 meters line of sight / 50 meters in an office enviroment
Receiver Sensitivity	Typically -83dBm
Tx/Rx/Tx Switching Time	Maximum 224us
Channel Hopping Time	Maximum 224us
Data Rate	1Mbits/sec across air
MAC Protocol	GPSP CSMA/CA
Frequency Band	2.4-2.4835GHz(ISM band)
Typical Output Power	+17dBm
Supply Voltage	5V Opration
Size	PCMCIA type 2
Operating Temperature Range	0 to 55
Storage Temperature Range	-20 to 70