

FCC Part 15 Subpart B

EMI TEST REPORT

of

E.U.T. : MOUSE

MODEL : NewScroll Wireless

FCC ID.: FSUGMZFQ

Working Frequency : CH1: 26.59 MHz
CH2: 26.69 MHz

for

APPLICANT : KYE SYSTEMS CORP.

ADDRESS : NO. 492, SEC. 5, CHUNG HSIN RD., SAN CHUNG,
TAIPEI HSIN, 241, TAIWAN, R.O.C.

Test Performed by

ELECTRONICS TESTING CENTER, TAIWAN

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Report Number : ET87R-09-099-02

Issued Date : OCT. 19, 1998

TEST REPORT CERTIFICATION

Applicant : KYE SYSTEMS CORP.
NO. 492, SEC. 5, CHUNG HSIN RD., SAN CHUNG,
TAIPEI HSIN, 241, TAIWAN, R.O.C.

Manufacturer : KYE SYSTEMS CORP.
NO. 492, SEC. 5, CHUNG HSIN RD., SAN CHUNG,
TAIPEI HSIN, 241, TAIWAN, R.O.C.

Description of EUT :

- a) Type of EUT : MOUSE
- b) Trade Name : KYE SYSTEMS CORP.
- c) Model No. : NewScroll Wireless
- d) FCC ID. : FSUGMZFQ
- e) Working Frequencies: CH1: 26.59 MHz CH2: 26.69 MHz
- f) Power Supply : from PC

Regulation Applied: FCC Rules and Regulations Part 15 Subpart B (1996)

I HEREBY CERTIFY THAT; The data shown in this report were made in accordance with the procedures given in ANSI C63.4 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 results of the testing report relate only to the items tested.
 2. The testing report shall not be reproduced except in full, without the written approval of ETC.

Test Date : OCT. 03, 1998

Test Engineer : Tien Lu Liao
(Tien Lu Liao)

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

Table of Contents Page

1 GENERAL INFORMATION	1
1.1 PRODUCT DESCRIPTION	1
1.2 CHARACTERISTICS OF DEVICE	1
1.3 TESTED SYSTEM DETAILS.....	1
1.4 TEST METHODOLOGY	2
1.5 TEST FACILITY	2
2 DEFINITION AND LIMITS.....	3
2.1 DEFINITION.....	3
2.2 LIMITATION	3
2.3 LABELING REQUIREMENT	4
2.4 USER INFORMATION	4
3 RADIATED EMISSION MEASUREMENT.....	5
3.1 DESCRIPTION.....	5
3.2 RADIATED EMISSION DATA	5
3.2.1 <i>Fundamental Frequency</i>	5
3.2.2 <i>Harmonics and Spurious</i>	6
3.3 FIELD STRENGTH CALCULATION	7
3.4 MEASURING INSTRUMENT	7
3.5 OPEN FIELD TEST SITE SETUP DIAGRAM	8
3.6 RADIATED MEASUREMENT PHOTOS	9
4 CONDUCTED EMISSION MEASUREMENT	10
4.1 DESCRIPTION	10
4.2 CONDUCTED EMISSION DATA.....	10
4.3 RESULT DATA CALCULATION.....	11
4.4 PHOTOS OF CONDUCTION MEASURING SETUP	16
4.5 CONDUCTED MEASURING SETUP DIAGRAM	17
4.6 CONDUCTED MEASUREMENT EQUIPMENT	17

1 GENERAL INFORMATION

1.1 Product Description

- a) Type of EUT : MOUSE
- b) Trade Name : KYE SYSTEMS CORP.
- c) Model No. : NewScroll Wireless
- d) FCC ID. : FSUGMZFQ
- e) Working Frequency: CH1: 26.59 MHz CH2: 26.69 MHz
- f) Power Supply : from PC

1.2 Characteristics of Device

The EUT is the receiver portion of wireless Mouse. The EUT has to be connected to a personal computer while working and it can receive RF signal emitted from the transmitter portion of wireless Mouse. The whole wireless Mouse system can perform all functions that a traditional keyboard can do.

1.3 Tested System Details

The Tested System Detail equipment, plus description of all cables used in the tested system are :

Description	Model No.	FCC ID.	Manufacturer	Cable
Mouse *1	NewScroll Wireless	FSUGMZFQ	KYE SYSTEMS CORP.	1.5m Shielded Cable
PC	VL5/133	DTPC-01	Hewlett-Packard	Unshielded AC Power Cord
Monitor	JC-1743UMA	A3DJC-1743UMA	NEC	1.6m Shielded Cable
Modem	1200AT	EF56A51200AT	Smar TEAM Co..	2.0m Shielded Cable
Printer	2225C+	DSI6XU2225	Hewlett-Packard	1.2m Shielded Cable
Keyboard	E03786USRETI	CIGE03786	Microsoft	1.8m Unshielded Cable
Mouse	NewScroll Wireless	FSUGMZFQ	KYE SYSTEMS CORP.	1.8m Unshielded Cable

*1 EUT submitted for test.

1.4 Test Methodology

Both conducted and radiated testing were performed according to the procedures in section 12.1 of ANSI C63.4(1992).

The field strength measurements of the receiver under test which was placed on an wooden turntable 0.8 meter in height. The receiving antenna polarized horizontally was varied from 1 to 4 meters and the wooden turntable was rotated through 360 degrees to obtain the highest reading on the field strength meter or on the display of the spectrum analyzer. And also, each emission was to be maximized by changing the orientation of the RECEIVER under test.

These measurements were repeated with the receiving antenna polarized vertically.

1.5 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 Lin, Din Fu Tsun, Lin Kou, Taipei, Taiwan, R.O.C.

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

2 DEFINITION AND LIMITS

2.1 Definition

Unintentional radiator:

A device that intentionally generates and radio frequency energy for use within the device, or that sends radio frequency signals by conduction to associated equipment via connecting wiring, but which is not intended to emit RF energy by radiation or induction.

2.2 Limitation

(1) Conducted Emission Limits :

According to 15.107 , Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 450 kHz to 30 MHz shall not exceed 250 microvolts. Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminals.

Class B Line Conducted Emission Limits :

Frequency MHz	Emissions μV	Emissions dB μV
0.45 - 30.0	250	48.0

(2) Radiated Emission Limits :

According to 15.109 ,Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Class B Radiated Emission Limits :

Frequency MHz	Distance Meters	Radiated dB $\mu V/m$	Radiated $\mu V/m$
1.705 - 30	30	29.5	30
30 - 88	3	40.0	100
88 - 216	3	43.5	150
216 - 960	3	46.0	200
above 960	3	54.0	500

2.3 Labeling Requirement

The device shall bear the following statement in a conspicuous location on the device :

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

2.4 User Information

The users manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

3 RADIATED EMISSION MEASUREMENT

3.1 Description

The following data lists the significant emission frequencies, measured levels, correction factor (includes cable and antenna corrections), the corrected reading, the limit, and margin. Explanation of the Correction Factor is given in paragraph 5.4.

3.2 Radiated Emission Data

3.2.1 Fundamental Frequency

a.

Temperature : 21 °C

Humidity : 63 %

Operated mode : Rx (CH1)

Test Date : OCT. 03, 1998

Frequency (MHz)	Reading (dBuV)		Factor (dB) Corr.	Result @3m (dBuV/m)	Limit @3m (dBuV/m) Q.P.	Margin (dB)	Table Degree (Deg.)	Ant. High (m)
	H	V						
26.591	32.2	22.9	-8.3	23.9	69.5	-45.6	109	1.80

b.

Temperature : 21 °C

Humidity : 63 %

Operated mode : Rx (CH2)

Test Date : OCT. 03, 1998

Frequency (MHz)	Reading (dBuV)		Factor (dB) Corr.	Result @3m (dBuV/m)	Limit @3m (dBuV/m) Q.P.	Margin (dB)	Table Degree (Deg.)	Ant. High (m)
	H	V						
26.692	28.7	22.8	-8.3	20.4	69.5	-49.1	109	1.80

3.2.2 Harmonics and Spurious**a.**

Temperature : 21 °C

Humidity : 63 %

Operated mode : Rx (CH1)

Test Date : OCT. 03, 1998

Frequency (MHz)	Ant-Pol H/V	Meter Reading (dBuV)	Corrected Factor (dB)	Result @3m (dBuV/m)	Limit @3m (dBuV/m)	Margin (dB)	Table Degree (Deg.)	Ant. High (m)
106.363	H	47.8	-12.5	35.3	43.5	-8.2	90	4.00
186.135	H	41.9	-8.7	33.2	43.5	-10.3	270	3.20
212.726	H	38.6	-6.3	32.3	43.5	-11.2	270	3.20
265.907	H	39.3	-3.7	35.6	46.0	-10.4	90	3.00
319.088	H	29.3	-6.8	22.5	46.0	-23.5	270	3.00
398.861	H	33.6	-6.4	27.2	46.0	-18.8	90	1.00

*Note: All test values in harmonics and spurious are Quasi Peak.***b.**

Temperature : 21 °C

Humidity : 63 %

Operated mode : Rx (CH2)

Test Date : OCT. 03, 1998

Frequency (MHz)	Ant-Pol H/V	Meter Reading (dBuV)	Corrected Factor (dB)	Result @3m (dBuV/m)	Limit @3m (dBuV/m)	Margin (dB)	Table Degree (Deg.)	Ant. High (m)
106.768	H	48.3	-12.4	35.9	43.5	-7.6	90	4.00
160.153	H	35.4	-9.5	25.9	43.5	-17.6	270	3.20
186.845	H	42.8	-8.6	34.2	43.5	-9.3	270	3.20
213.537	H	39.4	-6.3	33.1	43.5	-10.4	90	3.00
266.921	H	40.0	-3.7	36.3	46.0	-9.7	270	3.00
400.382	H	33.9	-6.4	27.5	46.0	-18.5	90	1.00

Note: All test values in harmonics and spurious are Quasi Peak.

Explanation of measuring instrument setup in frequency band measured is as following :

Frequency Band (MHz)	Instrument	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	RF Test Receiver	Quasi Peak	120 kHz	N/A
	Spectrum Analyzer	Peak	100 kHz	100 kHz

3.3 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$\text{RESULT} = \text{READING} + \text{CORR. FACTOR}$$

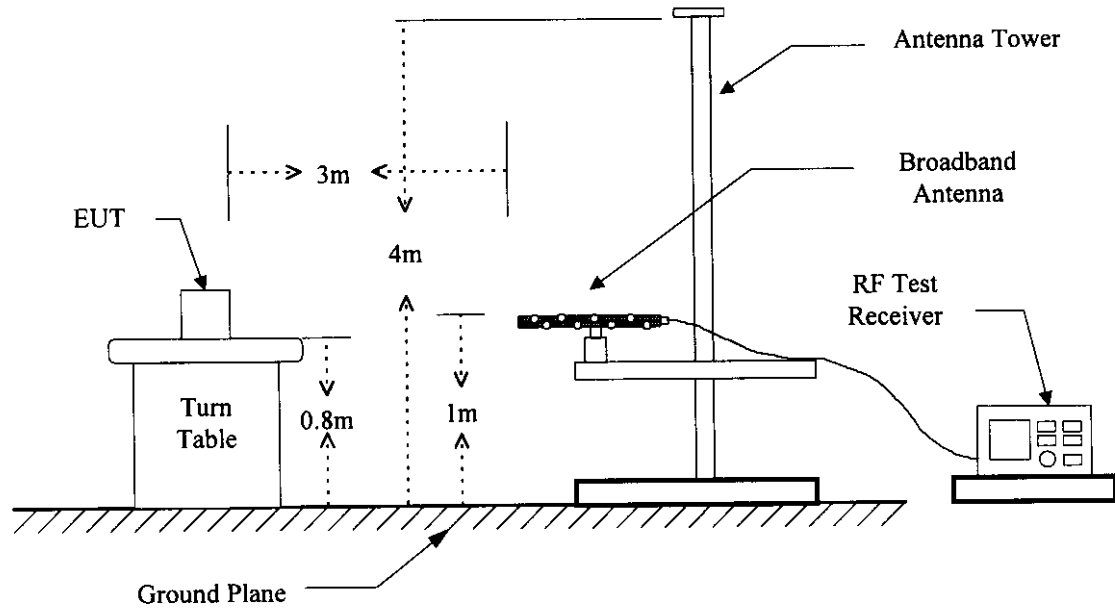
where CORR. FACTOR = Antenna FACTOR + Cable FACTOR – Amplifier Gain

3.4 Measuring Instrument

The following test equipment are used during the radiated test .

Equipment	Manufacturer	Model No.	Next Cal. Date
RF Test Receiver	Rohde and Schwarz	ESVS 30	DEC. 19, 1998
Spectrum Analyzer	Hewlett-Packard	8568B	OCT. 16, 1999
Pre-selector	Hewlett-Packard	85685A	OCT. 16, 1999
Quasi Peak Detector	Hewlett-Packard	85650A	OCT. 07, 1999
Log periodic Antenna	EMCO	3146	DEC. 10, 1999
Preamplifier	Hewlett-Packard	8447D	DEC. 23, 1998
Biconical Antenna	EMCO	3110	AUG. 05, 1999

3.5 Open Field Test Site Setup Diagram



4 CONDUCTED EMISSION MEASUREMENT

4.1 Description

The initial setup in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on following data pages, and these signals are the quasi-peaked.

4.2 Conducted Emission Data

a.

Test Date : OCT. 02, 1998 Temperature : 23 °C Humidity: 50%

Operation Condition : Rx (CH1)

Frequency (MHz)	Reading (dBuV)		Factor (dB)	Result (dBuV)		Limit (dBuV)	Margin (dB)
	Va	Vb		Va	Vb		
0.497	23.6	23.3	0.2	23.8	23.5	48.0	-24.2
5.983	27.6	27.7	0.4	28.0	28.1	48.0	-19.9
11.967	31.2	31.1	0.6	31.8	31.7	48.0	-16.2
14.694	30.7	30.0	0.8	31.5	30.8	48.0	-16.5
24.004	23.9	22.5	1.0	24.9	23.5	48.0	-23.1
27.136	35.5	34.8	1.0	36.5	35.8	48.0	-11.5

b.

Test Date : OCT. 02, 1998 Temperature : 23 °C Humidity: 50%

Operation Condition : Rx (CH2)

Frequency (MHz)	Reading (dBuV)		Factor (dB)	Result (dBuV)		Limit (dBuV)	Margin (dB)
	Va	Vb		Va	Vb		
0.497	23.8	23.4	0.2	24.0	23.6	48.0	-24.0
1.846	25.5	25.2	0.3	25.8	25.5	48.0	-22.2
11.967	31.6	31.5	0.6	32.2	32.1	48.0	-15.8
14.694	31.0	30.3	0.8	31.8	31.1	48.0	-16.2
24.004	24.5	23.1	1.0	25.5	24.1	48.0	-22.5
27.136	35.6	35.1	1.0	36.6	36.1	48.0	-11.4

4.3 Result Data Calculation

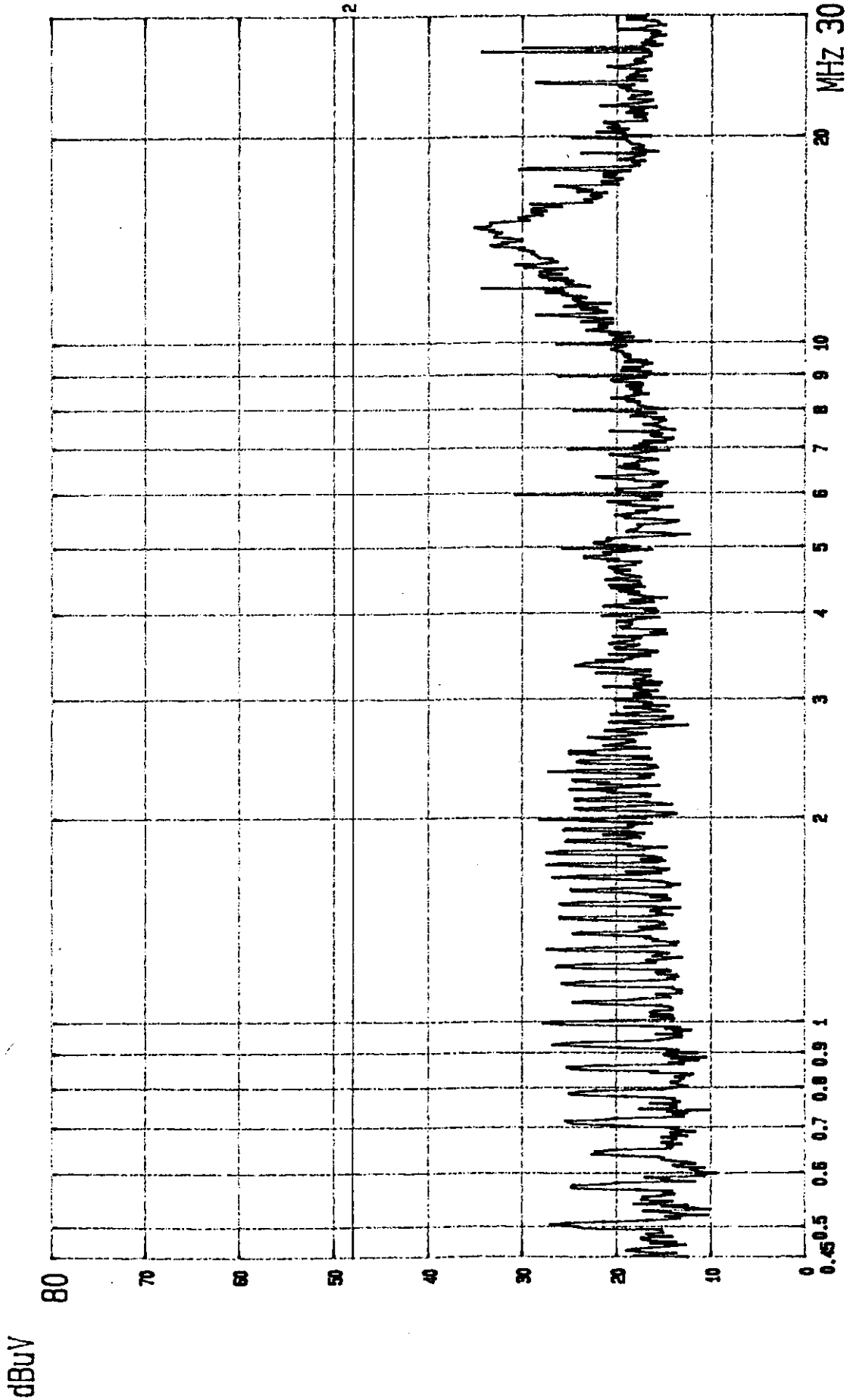
The result data is calculated by adding the LISN Factor to the measured reading. The basic equation with a sample calculation is as follows:

$$\mathbf{RESULT = READING + LISN FACTOR}$$

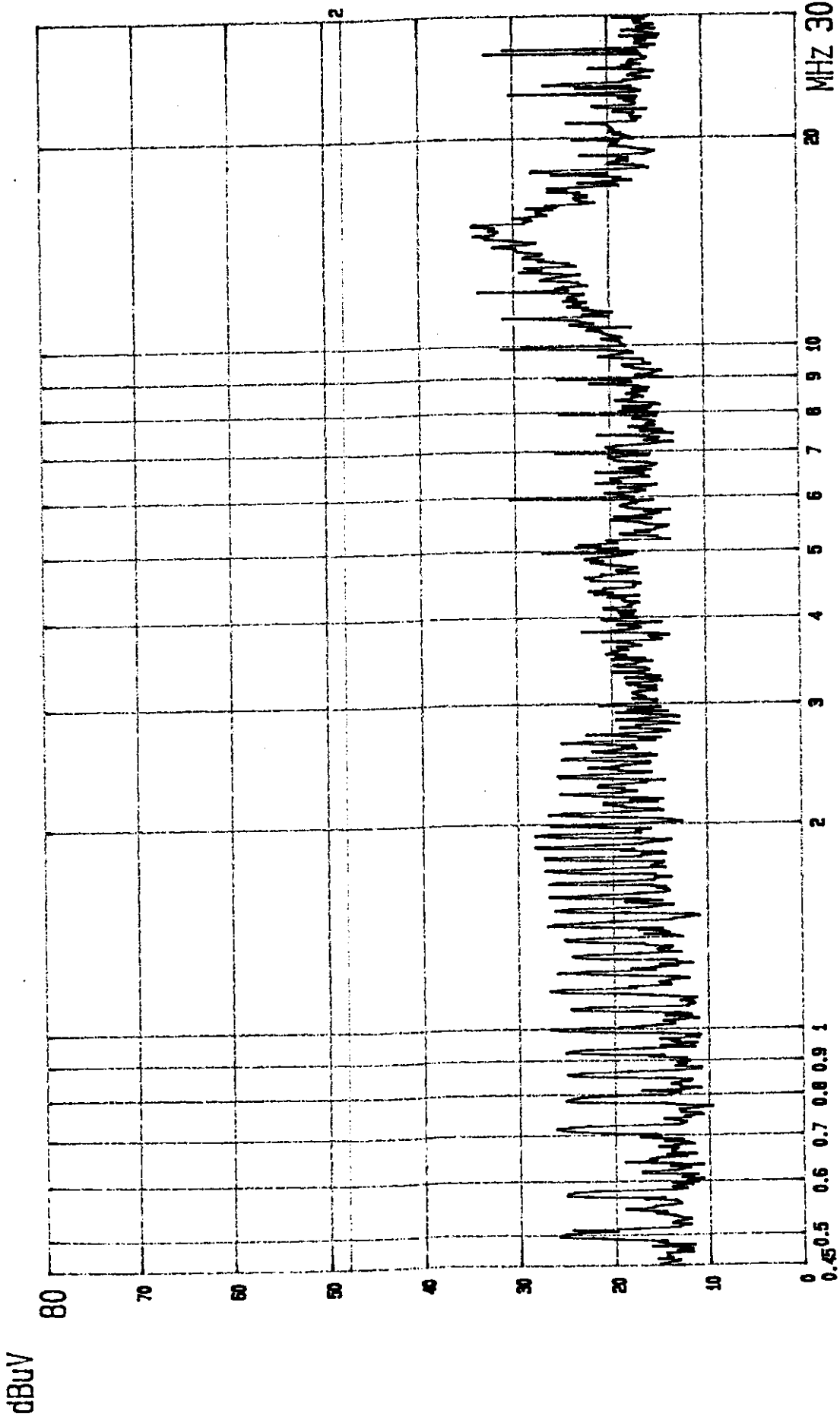
Assume a receiver reading of 22.5 dB μ V is obtained, and LISN Factor is 0.1 dB, then the total of field strength is 22.6 dB μ V.

$$\text{RESULT} = 22.5 + 0.1 = 22.6 \text{ dB } \mu \text{ V}$$

$$\begin{aligned} \text{Level in } \mu \text{ V} &= \text{Common Antilogarithm}[(22.6 \text{ dB } \mu \text{ V})/20] \\ &= 13.48 \mu \text{ V} \end{aligned}$$



FCC CONDUCTED TEST EUT: WIRELESS MOUSE (RECEIVER) 2: QP.. CLASS B LIMIT
MODEL: NewScroll Wireless MODE: CH1 POWER: FROM PC LISN: Va ETC EMI LAB.

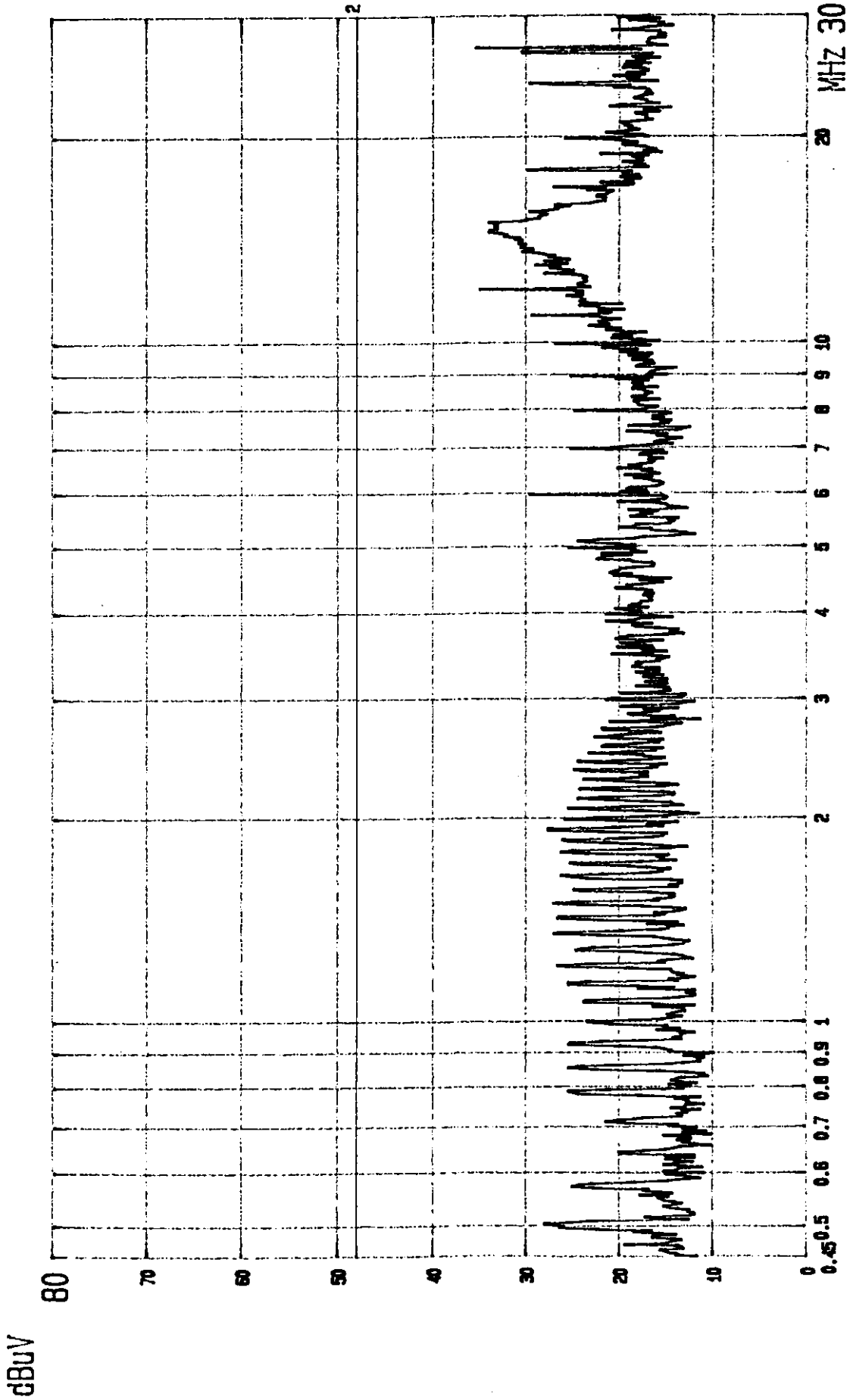


CLASS B LIMIT
ETC EMI LAB.

2: QP.,
LISN: V0

EUT: WIRELESS MOUSE (RECEIVER)
MODE: CH1 POWER: FROM PC

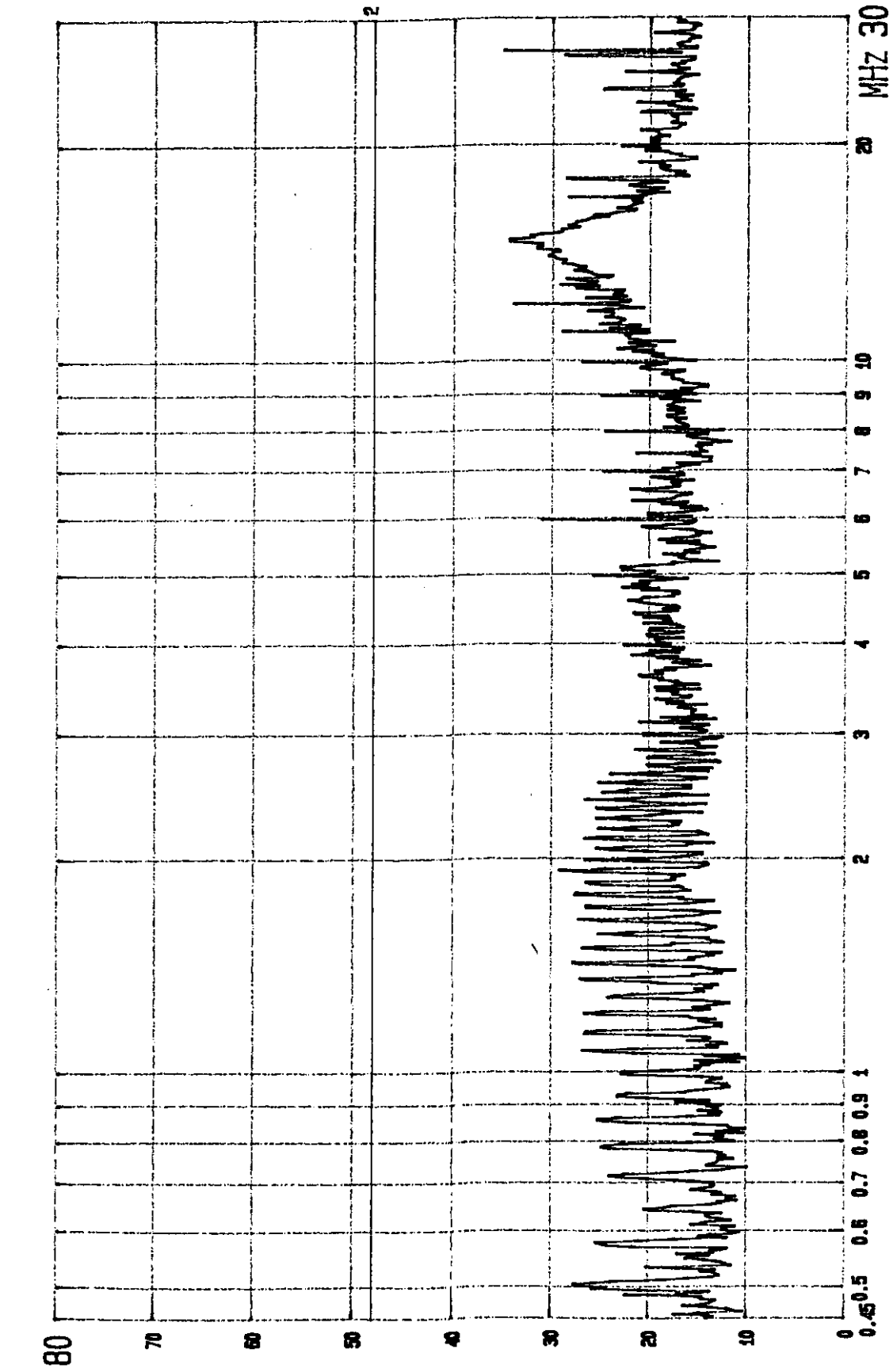
FCC CONDUCTED TEST
MODEL: NewScroll Wireless



CLASS B LIMIT
ETC EMI LAB.
LISN: Va
2: QP.,

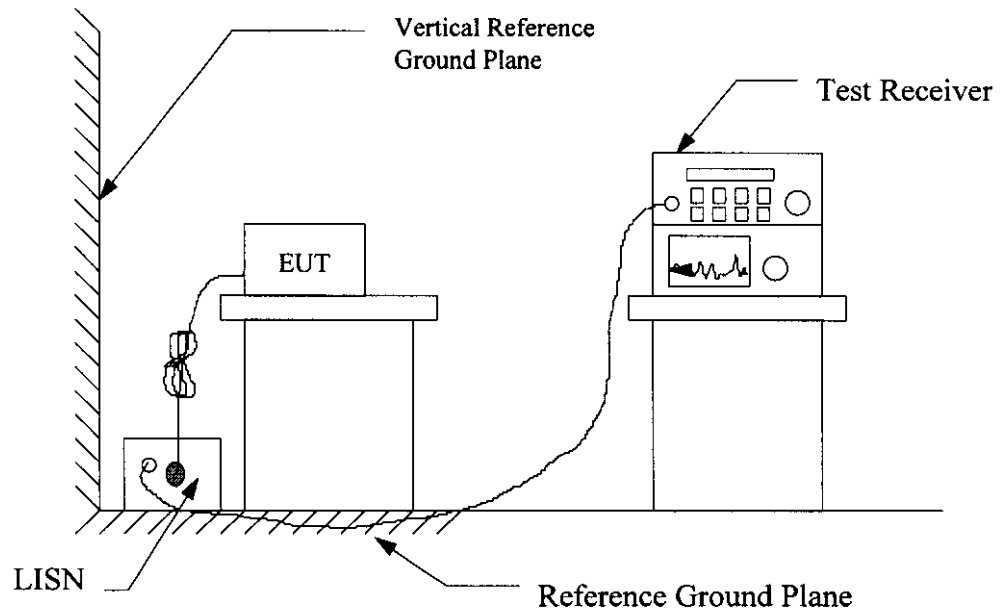
EUT: WIRELESS MOUSE (RECEIVER)
POWER: FROM PC
MODE: CH2

FCC CONDUCTED TEST
MODEL: NewScroll Wireless



FCC CONDUCTED TEST EUT: WIRELESS MOUSE (RECEIVER) 2: QP CLASS B LIMIT
MODEL: NewScroll Wireless MODE: CH2 POWER: FROM PC LISN: Yb ETC EMI LAB.

4.5 Conducted Measuring Setup Diagram



4.6 Conducted Measurement Equipment

The following test equipment are used during the conducted test .

Equipment	Manufacturer	Model No.	Next Cal. Date
RF Test Receiver	Rohde and Schwarz	ESH3	JAN. 04, 1999
Spectrum Monitor	Rohde and Schwarz	EZM	N.C.R.
Line Impedance Stabilization network	Rohde and Schwarz	ESH2-Z5	AUG. 18, 1999
Line Impedance Stabilization network	Kyoritsu	KNW-407	DEC. 01, 1998
Plotter	Hewlett-Packard	7440A	N/A
Shielded Room	Riken	----	N.C.R.