

1. GENERAL INFORMATION

1-1. Product Description

The QTRONIX CORPORATION Model: LIBRA 90 NET (referred to as the EUT in this report) is a three button-USB trackball designed for use with the Pentium above compatible PC which supports USB interface protocols. Two buttons (left or right) emulate the two buttons of a Microsoft Mouse or PS/2 Mouse and the middle button acts as special function selector.

A more detailed and/or technical description of EUT is attached in **User's Manual**.

1-2. Related Submittal(s) / Grant (s)

1-2-1. Models Covered

Only the EUT model LIBRA 90 NET is submitted for FCC ID filing.

1-2-2. Models Difference

N/A

1-3. Tested System Details

The FCC IDs for all equipments, plus descriptions of all cables used in the tested system (including inserted cards, which have grants) are:

Model No.	FCC ID	Equipment	Cable
LIBRA 90 NET	F2Q4NE90TBNET	Trackball	Shielded Data Cable
93V	ANO6282	PC	Un-Shielded Power Cord.
4500DC-E	GWGMULTI82	Monitor	Shielded Data Cable ⁽²⁾ Un-Shielded Power Cord
SERIES2-7S	DZL6QBS2	Mouse	Shielded Data Cable
HP2225C+	DSI6XU2225	Printer	Shielded Data Cable Un-Shielded Power Cord
AT-1200CK	E2O5OV1200CK	Modem	Shielded Data Cable Un-Shielded Power Cord
FDA-102A	F4Z4K3FDA-102A	Keyboard	Shielded Data Cable

Notes:

(1) EUT submitted for grant.

(2) Monitor's attached video cable without ferrite core.

1-4. Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 (1992)/CISPR22 (1996). Radiated testing was performed at an antenna to EUT distance 10 meters.

1-5. Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on the address of No. 5, All 2, Lane 220, Kang Lo St., Nei Hwu, Taipei, Taiwan, R.O.C. of NEUTRON ENGINEERING INC. This site has been fully described in report dated Feb.4,1998, Submitted to your office, and accepted in a letter dated March 28, 1998 (31040/SIT-1300F2).

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 Mouse was connected to support equipment-personal computer. Peripherals of PC, such as monitor, keyboard, modem and printer were contained in this system in order to comply with the CISPR22(1996) Rules requirement. The PC operated in the default 640 x 480 / 31.5 KHz VGA Graphic mode. This operating condition was tested and used to collect the included data.

3-2. EUT Exercise Software

The EUT exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use. The software, contained on a 3-1/2 inch disk, was inserted into driver A and is auto-starting on power-up. Once loaded, the program sequentially exercises each system component in turn. The sequence used is:

1. Read(write) from(to) mass storage device(Disk).
2. Send "H" pattern to video port device(Monitor).
3. Send " H " pattern to parallel port device(Printer).
4. Send " H " pattern to serial port device (Modem).
5. Repeated from 2 to 4 continuously.

As the Keyboard and mouse are strictly input devices, no data is transmitted to (from) them during test. They are, however, continuously scanned for data input activity.

3-3. Special Accessories

No any other special accessory used for compliance testing.

3-4. Equipment Modifications

In order to achieve in compliance with Class B levels, the following change(s) were made by NEUTRON test house during the compliance testing:

Please refer to the next page as the modifications described and cross reference of photos of tested EUT.

The above modifications will be implemented in all product models of this equipment.

Applicant Signature :



Date :

Sep. 04, 1998

Type/Printed Name :

Ken Tian Director

Position :

Product Management and R&D Division

3.5 Configuration of Tested System

The configuration of tested system is described as the block diagram shown in next page Figure 3.1 and details information of I/O cable and power cord connection are tabulated as Table A and B. The monitor is powered from a floor mounted receptacle (referred to as the wall outlet in the previous described) was tested.

TABLE A - Test Equipment

Item	Equipment	Mfr/Brand	Model/Type No.	Port Connected	FCC ID	Series No.	Note
E-1	PC	IBM	93V		ANO6282	960E200	
E-2	Monitor	Optquest	4500DC-E	VGA Port	GWGMULTI82	3650200046	
E-3	Mouse	Logitech	Series2 -7S	PS/2 Port	DZL6QBS2	LT268801007	
E-4	Printer	HP	2225C Plus	Centronic Port	DSI6XU2225	2927S50245	
E-5	Modem	Datatronics	AT-1200CK	Com Port	E2O5OV1200CK	06-240088-07-317665	
E-6	Keyboard	Forward	FDA-102A	KB DIN Port	F4Z4K3FDA102A	20707	
E-7	Trackball	QTRONIX	LIBRA 90 NET	USB Port	F2Q4NE90TBNET	N/A	EUT

Note:

- (1) Unless otherwise denoted as EUT in 'Remark' column, device(s) used in tested system is a support equipment.
- (2) Unless otherwise marked as ※ in 'Remark' column, Neutron consigns the support equipment(s) to the tested system.

Table B. - Informations Cable Information

Item	I/O Cable	Device Connected	Shielded	Ferrite Core	Detachable/Permanently	Length	Note
C-1	VGA Cable	PC-Monitor	Yes	No	Permanently attached on Monitor	150cm	
C-2	Centronics Cable	PC-Printer	Yes	No	Part of Printer, Detachable	200cm	
C-3	Keyboard Cable	PC-Keyboard	Yes	No	Permanently attached on Keyboard	200cm	
C-4	RS-232C Cable	PC-Modem	Yes	No	Part of Modem, Detachable	180cm	
C-5	Mouse Cable	PC-Mouse	Yes	No	Permanently attached on Mouse	180cm	
C-6	USB Trackball Cable	PC-Trackball	Yes	No	Permanently attached on Mouse	180cm	※

Note:

- (1) Unless otherwise marked as ※ in 『Remark』 column, Neutron consigns the supporting equipment(s) to the tested system.
- (2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.

6. Conducted Emission Datas

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

Judgement: Passed by -12.67 dB in mode of Line terminal 0.80 MHz

Freq. (MHz)	Terminal L/N	Measured(dBuV)		Limits(dBuV)		Safe Margins (dBuV)	Note
		QP-Mode	AV-Mode	QP-Mode	AV-Mode		
0.28	L	45.96	*	60.91	50.91	-14.95	(QP)
0.52	L	40.16	*	56.00	46.00	-15.84	(QP)
0.80	L	43.33	*	56.00	46.00	-12.67	(QP)
1.19	L	39.71	*	56.00	46.00	-16.29	(QP)
15.72	L	37.93	*	60.00	50.00	-22.07	(QP)
0.28	N	45.68	*	60.91	50.91	-15.23	(QP)
0.40	N	43.01	*	57.94	47.94	-14.93	(QP)
0.67	N	42.90	*	56.00	46.00	-13.10	(QP)
0.80	N	42.90	*	56.00	46.00	-13.10	(QP)
15.72	N	43.16	*	60.00	50.00	-16.84	(QP)

Remark :

- (1) Reading in which marked as QP means measurements by using are Quasi-Peak Mode with Detector BW=9KHz ; SPA setting in RBW=100KHz, VBW =100KHz, Swp. Time = 0.3 sec./MHz ◦ Reading in which marked as AV means measurements by using are Average Mode with instrument setting in RBW=1MHz, VBW=10Hz, Swp. Time =0.3 sec./MHz ◦
- (2) All readings are QP Mode value unless otherwise stated AVG in colum of 『Note』 . If the QP Mode Measured value compliance with the QP Limits and lower than AVG Limits, the EUT shall be deemd to meet both QP & AVG Limits and then only QP Mode was measured, but AVG Mode didn't perform ◦ In this case, a " *" marked in AVG Mode colum of Interference Voltage Measured ◦
- (3) Measuring frequency range from 150KHz to 30MHz ◦

Review : A. M. U. Test Personnel : R. D. L. A. L. V. Date: Aug. 31, 1998

7. Radiated Emission Datas

7.1 The following data lists the significant emission frequencise, measured levels, correction factor (includes cable and antenna corrections), the corrected reading, as well as the limit. Explanation of the Correction Factor is given in paragraph 7.2.

Judgement: Passed by -4.42 dB in polarity of Horizontal 465.32 MHz

Freq. (MHz)	Polar. H/V	Reading(RA) (dBuV)	Corr.Factor. (dB)	Corrected F (dBuV)	Limits (QP) (dBuV/m)	Margins (dBuV/m)	Note (QP)
32.40	H	12.70	11.06	23.76	30.00	- 6.24	
65.70	V	16.70	8.72	25.42	30.00	- 4.58	
65.90	H	16.80	8.67	25.47	30.00	- 4.53	
70.10	V	16.00	7.59	23.59	30.00	- 6.41	
118.10	H	10.50	13.52	24.02	30.00	- 5.98	
133.20	V	10.80	12.71	23.51	30.00	- 6.49	
296.00	V	12.90	16.63	29.53	37.00	- 7.47	
363.20	V	12.00	17.08	29.08	37.00	- 7.92	
392.00	H	12.90	17.70	30.60	37.00	- 6.40	
424.80	V	11.80	18.44	30.24	37.00	- 6.76	
427.20	H	11.40	18.53	29.93	37.00	- 7.07	
465.32	H	12.60	19.98	32.58	37.00	- 4.42	

Remark :

- (1) Reading inwhich marked as QP or Peak means measurements by using are Quasi-Peak Mode or Peak Mode with Detector BW=120KHz ; SPA setting in RBW=1MHz, VBW =1MHz, Swp. Time = 0.3 sec./MHz ◦
- (2) All readings are Peak unless otherwise stated QP in colum of 『Note 』. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform ◦
- (3) Measuring frequency range from 30MHz to 1000MHz ◦
- (4) If the peak scan value lower limit more than 20dB, then this signal data does not show in table ◦

Review :

Test Personnel. :

Date:

Aug. 31, 1998

7-2. 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:

$$FS = RA + AF + CL - AG$$

Where **FS = Field Strength**

RA = Receiver Amplitude

AF = Antenna Factor (1)

CL = Cable Attenuation Factor (1)

AG = Amplifier Gain (1) (2)

Remark :

(1) The Correction Factor = $AF + CL - AG$, as shown in the data tables' Correction Factor column.

(2) AG is not available for Neutron's Open Site Facility

Example of Calculation:

Assume a Receiver Reading of 23.7 dBuV is obtained with an Antenna Factor of 7.2 dB and a Cable Factor of 1.1 dB. Then:

1. The Correction Factor will be calculated by

$$\text{Correction Factor} = AF + CL - AG = 7.2 + 1.1 - 0 = 8.3 \text{ (dB)}$$

as shown in the data tables' Correction Factor column.

2. The Field Strength will be calculated by

$$FS = RA + \text{Correction Factor} = 23.7 + 8.3 = 32 \text{ (dBuV/m)}.$$

FS is the value shown in the data tables' Corrected Reading column and RA is the value shown in the data tables' Receiver Reading column. The 32 dBuV/m value was mathematically converted to its corresponding level in uV/m as:

$$\text{Log}^{-1} \left[(32.0 \text{ dBuV/m}) / 20 \right] = 39.8 \text{ (uV/m)}$$

7-3. Correction Factor VS Frequency

Frequency (MHz)	Antenna Factor (dB)	Cable Loss (dB)
30.00	11.10	0.20
35.00	10.80	0.00
40.00	11.20	0.40
45.00	11.50	0.40
50.00	11.30	0.90
55.00	10.50	0.00
60.00	9.90	0.00
65.00	8.70	0.20
70.00	7.60	0.00
75.00	6.40	0.50
80.00	6.10	0.10
85.00	7.00	0.80
90.00	8.00	0.30
95.00	10.00	0.40
100.00	11.20	0.60
110.00	12.60	0.60
120.00	13.00	0.60
130.00	12.50	0.50
140.00	12.00	0.20
150.00	12.00	1.00
160.00	13.20	1.20
170.00	14.80	1.60
180.00	16.30	1.90
190.00	17.00	1.90
200.00	17.30	1.40
225.00	10.50	1.10
250.00	11.70	2.00
275.00	12.80	2.40
300.00	14.50	2.40
325.00	14.00	1.90
350.00	14.20	2.40
375.00	14.60	2.90
400.00	15.10	2.70
450.00	16.20	3.20
500.00	17.60	3.70
550.00	17.80	3.90
600.00	18.40	4.30
650.00	19.50	4.00
700.00	20.80	4.10
750.00	20.50	5.30
800.00	21.10	5.90
850.00	22.40	5.80
900.00	23.50	5.50
950.00	24.00	6.30
1000.00	24.80	5.20

8. Photos of Tested EUT:

Photo #	1	Front View
Photo #	2	Rear View
Photo #	3	Unit Partially disassembled
Photo #	4	Unit Partially disassembled
Photo #	5	Unit Partially disassembled
Photo #	6	Unit Partially disassembled