

MEASUREMENT/TECHNICAL REPORT

APPLICANT: QTRONIX CORPORATION

MODEL NO.: LYNX 98 PLUS

FCC ID: F2Q4NEDMP4

[illegible]

Equipment type: Mouse

Deferred grant requested per 47CFR 0.457(d)(1)(ii)?

Yes _____ No ✓ If yes, defer until: _____ (date)

We, the undersigned, agree to notify the Commission by (date) _____ / _____ / _____ of the intended date of announce ment of the product so that the grant can be issued on that date.

Transiyion Rules Request per 15.37? Yes _____ No ✓
If no, assumed Part 15, Subpart B for unintentional radiator the new 47 CFR (10-1-90 Edition) provision.

Report Prepared

by Testing House : Neutron Engineering Inc.

for Company :

Name QTRONIX CORPORATION

Address 9F, #75, Sec. 1, Hsin Tai Wu Rd., Hsichih, Taipei Hsien, Taiwan,
R.O.C.

Applicant Signature : Ken Tian
Ken Tian / Product Management and R&D Division

CERTIFICATION

We hereby certify that:

The test data , data evaluation , test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (1992)/CISPR 22(1996) and the energy emitted by the sample EUT tested as described in this report is in compliance with CLASS B conducted and radiated emission limits of FCC Part 15, Subpart B/CISPR 22(1996).

Prepared by : Carol Chen

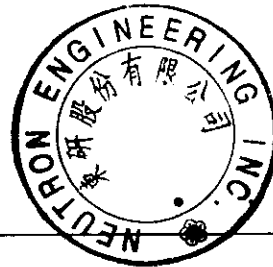
Reviewed by : Andy Chiu

Approved by : George Yao

Issued Date : July 31, 1998

Report No. : NEI-FCCB-98128

Company Stamp :



NEUTRON ENGINEERING INC.

20, Alley 50, Lane 119, Dong Hwu Rd.,

P.O. Box 6-158, Nei Hwu,

Taipei, Taiwan

TEL : (02) 2633-6872 FAX : (02) 2633-4578

Table of Contents

1. General Information	
1-1 Product Description	4
1-2 Related Submittal(s)/Grant(s)	4
1-3 Tested System Details	5
1-4 Test Methodology	6
1-5 Test Facility	6
2. Product Labelling	
Figure 2-1 FCC ID Label	7
Figure 2-2 Location of Label on EUT	7
3. System Test Configuration	
3-1 Justification	8
3-2 EUT Exercise Software	8
3-3 Special Accessories	9
3-4 Equipment Modifications	9
3-5 Configuration of Tested System	10
Figure 3-1 Configuration of Tested System	12
4. Block Diagram(s)	13
5. Conducted and Radiated Measurement Photos	14
Figure 5-1. Conducted Measurement Photos	14
Figure 5-2 Radiated Emission Data	15
6. Conducted Emission Datas	16
7. Radiated Emission Datas	18
7-1 Reaiated Emission Data	18
7-2 Field Strength Calculation	20
7-3 Correction Factor Table VS Frequency	21
8. Attachment	
Photos of Tested EUT	22
User's Manual	23

1. GENERAL INFORMATION**1-1. Product Description**

The QTRONIX CORPORATION Model: LYNX 98 PLUS(referred to as the EUT in this report) is a Microsoft Windows 95/98/NT plug and play mouse which designed as an "Input Device" for use with IBM PC AT and PS/2 compatible Computer.

The summarized feature of EUT are described as following:

- 1). Oscillator Frequency: 12MHz
- 2). InterfacePort: It provides a permanently attached D-Sub (RS-232, Serial interface) type cable connector to connect with PC. Also, a RS-232C to PS/2 interface adaptor is provided. Those interface cables are shielded type, without ferrite attached.

1-2. Related Submittal(s) / Grant (s)**1-2-1. Models Covered**

LYNX 98 PLUS

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
LYNX 98 PLUS	F2Q4NEDMP4	Mouse	Shielded Data Cable
NE64	KFBNE64	Monitor	Shielded Data Cable ⁽²⁾ Shielded Power Cord
93V	ANO6282	PC	Unshielded Power Cord
HP2225C+	DSI6XU2225	Printer	Shielded Parallel Data Cable Un-Shielded Power Cord
AT-1200CK	E2O5OV1200CK	Modem	Shielded Serial 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)/CISPR 22 (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 ANSI C63.4/CISPR 22 (1996) Rules requirement. The PC operated in the default 640X480/31.515KHz 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 5 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

As shown in Figure 3-1, all interface cables used for compliance testing are shielded type except the power cord which marked as shielded. All cable connectors are integrated by metal hoods for shielding. This equipment is required to use a shielded type interface cable without a ferrite attached in order to comply with FCC requirements.

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 :

Ken Tian

Date :

July 31, 1998

Type/Printed Name :

Ken Tian

Position :

Product Management and R&D Division



Qtronix Corporation

Head-Quarters

9F, #75, Sec. 1, Hsin Tai Wu Rd., Hsichih, Taipei Hsien, Taiwan, R.O.C. (Far East World Center, Bldg. A)
Tel: (886-2) 698-2566 Fax: (886-2) 698-3133

Modification Report

Company: QTRONIX CORPORATION

Model No.: LYNX 98 PLUS

Page 1 of 1

FCC ID: F2Q4NEDMP4

Date: July 31, 1998

A. Add a Capacitor (C=104pf) on the pin 5 of SEC 9821.

B. Add a Capacitor (C=104pf) on the Vcc.

All the above modification will be implemented and relayout in the mass production to meet the FCC Class B requirements.

QTRONIX CORPORATION.

Ken Tian

Product Management and R&D Division

9A/23

U.S.A. (San Jose) Office

Tel: (408) 467-1888 Fax: (408) 467-1880

Germany (Düsseldorf) Office

Tel: (211) 30-40-51/4 Fax: (211) 39-29-93

Hong Kong (Kowloon) Office

(852) 2672-6632 Fax: (852) 2307-0390

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.	Model/Type No.	I/O Port	FCC ID	Remark
E-1	Mouse	QTRONIX	LYNX 98 PLUS	COM Port PS/2 Port	F2Q4NEDMP4	EUT
E-2	Monitor	Chern-Yih	NE64	VGA Port	KFBNE64	
E-3	PC	IBM	93V		ANO6282	
E-4	Printer	HP	HP2225C+	Centronic Port	DSI6XU2225	
E-5	Modem	Datatronics	AT-1200CK	Com 2 Port	E2O5OV1200CK	
E-6	Keyboard	Forward	FDA-102A	KB DIN Port	F4Z4K3FDA-102A	

Remark:

- (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 supporting equipment(s) to the tested system.

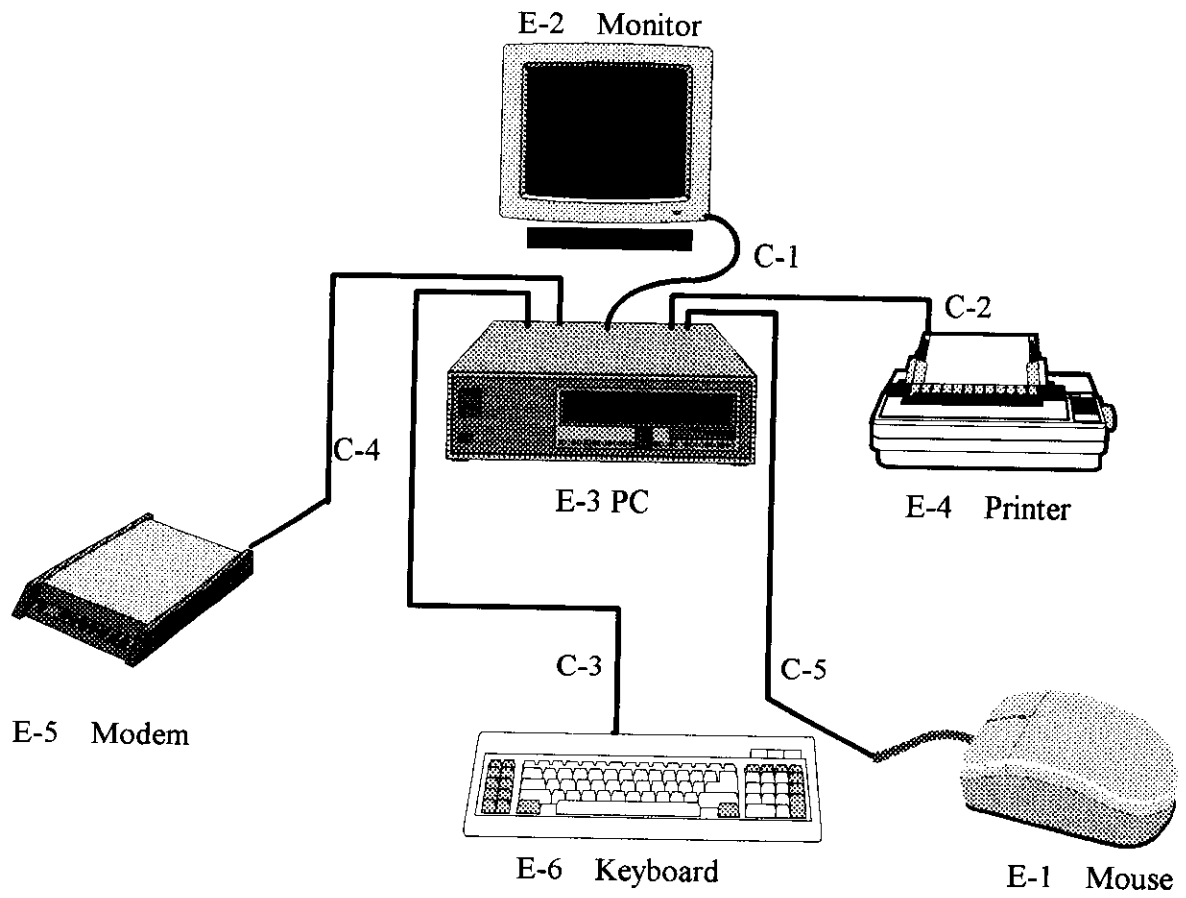
Table B. - Informations Cable Information

Item	I/O Cable	Device Connected	Shielded	Ferrite Core	Detachable/Permanently	Length	Note
C-1	Video Cable	PC-Monitor	Yes	No	Permanently attached on Monitor	200 cm	
C-2	Centronics Cable	PC-Printer	Yes	No	Part of Printer, Detachable	200 cm	
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	280cm	※

Note:

- (1) Unless otherwise marked as ※ in 「Remark」 column, Neutron consigns the supporting equipment(s) to the tested system.

Figure 3.1 Configuration of Tested System



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.

Mode : COM Port

Judgement: Passed by **-20.73 dB** in mode of **Neutral** terminal **0.40 MHz**

Freq. (MHz)	Terminal L/N	Measured(dBuV)		Limits(dBuV)		Safe Margins	
		QP-Mode	AV-Mode	QP-Mode	AV-Mode	(dBuV)	Note
0.15	Line	43.78	*	65.89	55.89	-22.11	(QP)
0.24	Line	36.31	*	62.13	52.13	-25.82	(QP)
0.40	Line	36.36	*	57.85	47.85	-21.49	(QP)
5.99	Line	28.66	*	60.00	50.00	-31.34	(QP)
12.12	Line	34.33	*	60.00	50.00	-25.67	(QP)
0.16	Neutral	41.33	*	65.67	55.67	-24.34	(QP)
0.23	Neutral	36.52	*	62.31	52.31	-25.79	(QP)
0.40	Neutral	37.12	*	57.85	47.85	-20.73	(QP)
5.01	Neutral	26.99	*	60.00	50.00	-33.01	(QP)
12.12	Neutral	34.90	*	60.00	50.00	-25.10	(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 column of 『Note』 . If the QP Mode Measured value compliance with the QP Limits and lower than AVG Limits, the EUT shall be deemed 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 column of Interference Voltage Measured .
- (3) Measuring frequency range from 150KHz to 30MHz .

Review :

Test Personnel :

Date:

July 30 , 1998

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.

Mode : PS/2 Port

Judgement: Passed by **-20.70 dB** in mode of **Line** terminal **15.80 MHz**

Freq. (MHz)	Terminal L/N	Measured(dBuV)		Limits(dBuV)		Safe Margins	
		QP-Mode	AV-Mode	QP-Mode	AV-Mode	(dBuV)	Note
0.16	Line	40.07	*	65.41	55.41	-25.34	(QP)
0.28	Line	34.57	*	60.94	50.94	-26.37	(QP)
0.40	Line	36.01	*	57.94	47.94	-21.93	(QP)
6.09	Line	27.13	*	60.00	50.00	-32.87	(QP)
15.80	Line	39.30	*	60.00	50.00	-20.70	(QP)
0.15	Neutral	40.71	*	66.00	56.00	-25.29	(QP)
0.23	Neutral	36.36	*	62.45	52.45	-26.09	(QP)
0.40	Neutral	37.14	*	57.85	47.85	-20.71	(QP)
5.93	Neutral	28.49	*	60.00	50.00	-31.51	(QP)
15.72	Neutral	36.53	*	60.00	50.00	-23.47	(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 deemed 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 :

Test Personnel :

Date:

July 30 , 1998

7. Radiated Emission Datas

- 7.1 The following data lists the significant emission frequency, 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.

Mode : COM Port

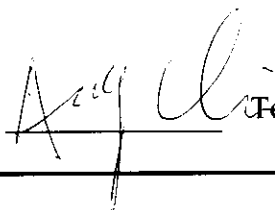
Judgement: Passed by **-4.26 dB** in polarity of **Horizon 34.60 MHz**

Freq. (MHz)	Polar. H/V	Reading(RA) (dBuV)	Corr.Factor (dB)	Corrected F (dB)	Limits (QP) (dBuV/m)	Margins (dBuV/m)	Note (QP)
34.60	H	14.90	10.84	25.74	30.00	- 4.26	
50.70	H	11.00	11.96	22.96	30.00	- 7.04	
76.90	V	17.60	6.63	24.23	30.00	- 5.77	
129.80	V	11.80	13.01	24.81	30.00	- 5.19	
148.00	H	12.10	12.80	24.90	30.00	- 5.10	
149.30	V	12.70	12.93	25.63	30.00	- 4.37	
215.20	H	8.60	11.91	20.51	30.00	- 9.49	
215.20	V	10.80	11.91	22.71	30.00	- 7.29	
222.40	H	8.10	11.68	19.78	30.00	- 10.22	
347.20	V	11.30	16.52	27.82	37.00	- 9.18	
420.80	H	11.90	18.34	30.24	37.00	- 6.76	
424.80	V	13.40	18.44	31.84	37.00	- 5.16	

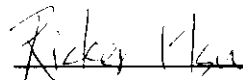
Remark :

- (1) Reading in which 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 column 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:

July 28, 1998

7. Radiated Emission Datas

- 7.1 The following data lists the significant emission frequency, 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.

Mode : PS/2 Port

Judgement: Passed by **-4.54 dB** in polarity of **Horizon** **464.80 MHz**

Freq. (MHz)	Polar. H/V	Reading(RA) (dBuV)	Corr.Factor. (dB)	Corrected F (dB)	Limits (QP) (dBuV/m)	Margins (dBuV/m)	Note (QP)
32.20	H	10.60	11.08	21.68	30.00	- 8.32	
50.40	V	11.80	12.06	23.86	30.00	- 6.14	
118.10	V	11.90	13.52	25.42	30.00	- 4.58	
119.80	H	9.20	13.59	22.79	30.00	- 7.21	
126.90	V	9.30	13.22	22.52	30.00	- 7.48	
148.20	H	12.40	12.82	25.22	30.00	- 4.78	
214.40	V	10.00	11.94	21.94	30.00	- 8.06	
215.20	V	10.40	11.91	22.31	30.00	- 7.69	
464.80	V	11.80	19.96	31.76	37.00	- 5.24	
464.80	H	12.50	19.96	32.46	37.00	- 4.54	
479.20	H	11.10	20.51	31.61	37.00	- 5.39	
487.20	H	10.80	20.81	31.61	37.00	- 5.39	

Remark :

- (1) Reading in which 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 column 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:

July 28, 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(Cable Loss) (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