

MEASUREMENT/TECHNICAL REPORT

APPLICANT: Sunrex Technology Corp.

MODEL NO.: HB8703

FCC ID: J759803

[illegible]

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) 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.

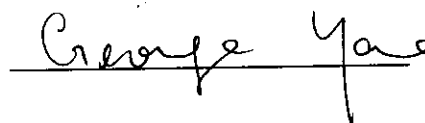
Prepared by : Cathy Wu



Reviewed by : Andy Chiu



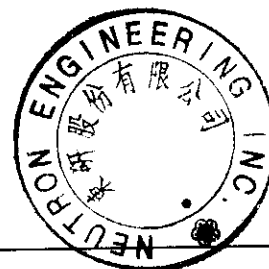
Approved by : George Yao



Issued Date : July 13, 1998

Report No. : NEI-FCCB-98068

Company Stamp :



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1. GENERAL INFORMATION

1-1. Product Description

The Sunrex Technology Corp. Model: HB8703 (referred to as the EUT in this report) is a Pentium Multimedia Notebook PC based on the Intel Pentium MMX series microprocessor.

The summarized features of EUT are described as following:

A. CPU Information

The EUT is designed to accept interchangeable CPU Processor which the user may purchase either together with a system or separately. At the time of testing, only Pentium-233 MMX of CPU was available for model HB8703 Notebook Computer System.

The following lists the CPU processor may be alternated:

CPU Processor	CPU Speed	Clock Speed/Osc Freq
Intel Pentium-133MMX	133 MHz	66 MHz
Intel Pentium-166MMX	166 MHz	66 MHz
Intel Pentium-233MMX	233 MHz	66 MHz

B. Storage Device:

- (1). Removable and user upgradable 2.5" Enhanced IDE hard disk drive (HDD)
- (2). 3.5" 1.44MB FDD.
- (3). Removable DVD/CD-ROM drive with Enhanced IDE interface.

C. LCD display panel

A 14.1" TFT color LCD panel provides 64K color displaying compatible with SVGA or XGA (1024x768) resolution.

D. Power Supply

An ILAN brand, model F1650I, AC/DC Adaptor supplies external power to EUT. The adaptor has an autoswitching design that can connect to any 100Vac~240Vac power outlets.

Meantime, the EUT provides a permanently connected DC power cord which incorporated with a ferrite core.

A more detailed and/or technical information is attached in **Attachment-G**

1-2. Connecting I/O Port(s)

- (1). Serial Port : One DB-9 pin connector as serial port for mouse/Fax modem.
- (2). Parallel Port : One DB-25 pin connector as a centronic printer port.
- (3). Ext. K/B Port : One PS/2 KB connector provided as PS/2 port for a KB device
- (4). Audio Ports : Three provided for audio Lin-In, Line-Out, Microphone in respectively.
- (5). PCMCIA Slot : Two Provided, for type II, III.
- (6). MIDI/Game Port : One 15-pin D-connector provides for external PC game joystick or MIDI adaptor.
- (7). Video I/F Port : One 15-pin D-connector provides for external VGA CRT monitor with up to 1024x768 resolution at Hsync 48KHz.
- (8). I/O Replicator Port : Expansion connector provided for a special designed port Replicator. It is not available during this report measurement.
- (9). TV Port : A RCA jack provided for VGA output display to TV system.
- (10). USB Port : Two provided for connecting with USB devices which supports USB interface standard.

1-3. Related Submittal(s)/Grant(s)

Only the EUT, Model HB8703, is submitted for FCC ID filing.

1-4. 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
HB8703	J7598Ø3	Notebook PC	Shielded Power Cord
NE64	KFBNE64	Monitor	Shielded Data Cable ⁽²⁾ Un-Shielded Power Cord
HP2225C+	DSI6XU2225	Printer, Parallel I/F	Shielded Parallel Data Cable Un-Shielded Power Cord
AT-1200CK	E2O5OV1200CK	Modem, Serial I/F	Shielded Serial Data Cable Un-Shielded Power Cord
KT-V860	N/A	Walkman	Un-Shielded Audio Singal Cable
KA-309K	N/A	Microphone	
GRS-455	N/A	Speakers	
8257	N/A	Joystick	Shielded Data Cable
PVM-1390	AK896APVM1390	TV Monitor	Unshielded Power Cable
FDA-102A	F4Z4K3FDA-102A	Keyboard	Shielded Data Cable
FDA-104U	F4ZFD104U	Keyboard	Shielded Data Cable
MOSXU	EMJØØØØØØ1	Mouse	Shielded Data Cable

Notes:

(1) EUT submitted for grant.

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

1-5. Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 (1992)/CISPR 22.

1-6. 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). A typical memory card was added in PCMCIA slot in addition a music DVD disc was placed in DVD-ROM drive compartment as the peripherals of PCMCIA and DVD-ROM connection. Other peripherals of EUT external device connection such as keyboard, modem, printer, CRT monitor, TV as well as the Audio I/O jack, microphone, walkman and speakers were also contained in this system in order to comply with the ANSI C63.4/CISPR 22(1996) Rules requirement. Further, two USB interface standard devices (keyboard, mouse) which were used to connect the USB port during the measuring.

Since the EUT is a notebook PC with video display output on motherboard which provides a video resolution output from 640x480 mode to 1024x768 mode for both LCD panel and external CRT monitor simultaneously. The final measurements then performed at the system connected with LCD and external CRT monitor simultaneously in the resolution mode of 1024x768/48KHz in conjunction with CPU speed 233MHz as it was found to be the worst case operating condition.

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 from the storage device (DVD-ROM).
2. Send Voice to LINE-OUT device (Speakers).
3. Repeated from 1 to 2 continuously during to "H" pattern exercised each system component from 4 to 7 simultaneously.
4. Read (Write) from (to) the storage devices (HDD, FDD).
5. Send "H" pattern to the video port device (Monitor).
6. Send "H" pattern to the parallel port device (Printer).
7. Send "H" pattern to the Serial port device (Modem).
8. Repeated from 4 to 7 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 the user's manual, a power cord of AC-DC adaptor used for compliance testing are shielded as normally supplied by the manufacturer to the end user, and appeared on the applicant's related supplied to customers (end user). In addition, the use of DC power supply cord permanently with the AC/DC Adaptor is a shielded type, incorporated with a ferrite core as the modification report item A shown.

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 :**

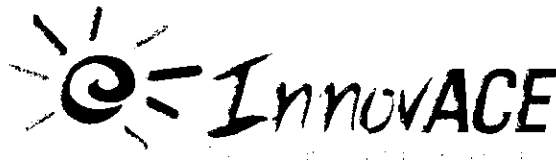
July 13, 1998

Type/Printed Name :

Kueir Lee

Position :

Manager



Modification Report

Company: Surnex Technology Corp.

Model No.: HB8703

Page 1 of 1

FCC ID: J579803

Date: July 13, 1998

- A. Add a toroid core on the DC power line.
- B. Add a toroid core on the LCD data cable.
- C. Add gaskets on the chassis ground to connect the chassis ground of LCD panel.
- D. Add a metal plane on the LCD panel to improve the grounding.
- E. Add a gasket on the metal plane to connect internal keyboard.
- F. Add a gasket on the internal floppy to connect the chassis ground.
- G. Add a gasket on the analog ground to connect the chassis ground of floppy.
- H. Add gasket on the chassis ground to connect the digital ground of I/O port.

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

Surnex Technology Corp.

Kueir Lee
Manager

10.A

精元電腦股份有限公司
台北縣新店市中正路535號 9F
Sunrex Technology Corp.

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	Notebook PC	Sunrex	HB8703		N/A	N/A	EUT
E-2	Monitor	Chern-Yih	NE64	VGA Port	KFBNE64	N/A	
E-3	Printer, Parallel I/F	HP	HP2225C+	Printer Port	DSI6XU2225	2927S50245	
E-4	Modem, Serial I/F	Datatronics	AT-1200CK	Com Port	E2O5OV1200CK	06-240088	
E-5	Keyboard	Forward	FDA-102A	PS/2 Port	F4Z4K3FDA-102A	20707	
E-6	Walkman	N/A	KT-V860	LINE IN	N/A	N/A	
E-7	Microphone	N/A	KA-309K	MIC IN	N/A	N/A	
E-8	Speakers	N/A	GRS-455	SPK OUT	N/A	N/A	
E-9	Joystick	N/A	8257	DB-25 Port	N/A	N/A	
E-10	TV Set	SONY	PVM-1390	Video Port	AK896APVM1390	N/A	
E-11	USB KB	Forward	FDA-104U	USB Port	F4ZFDA-104U	N/A	
E-12	USB Mouse	PRIMAX	MOSXU	USB Port	EMJ00000001	--	

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.

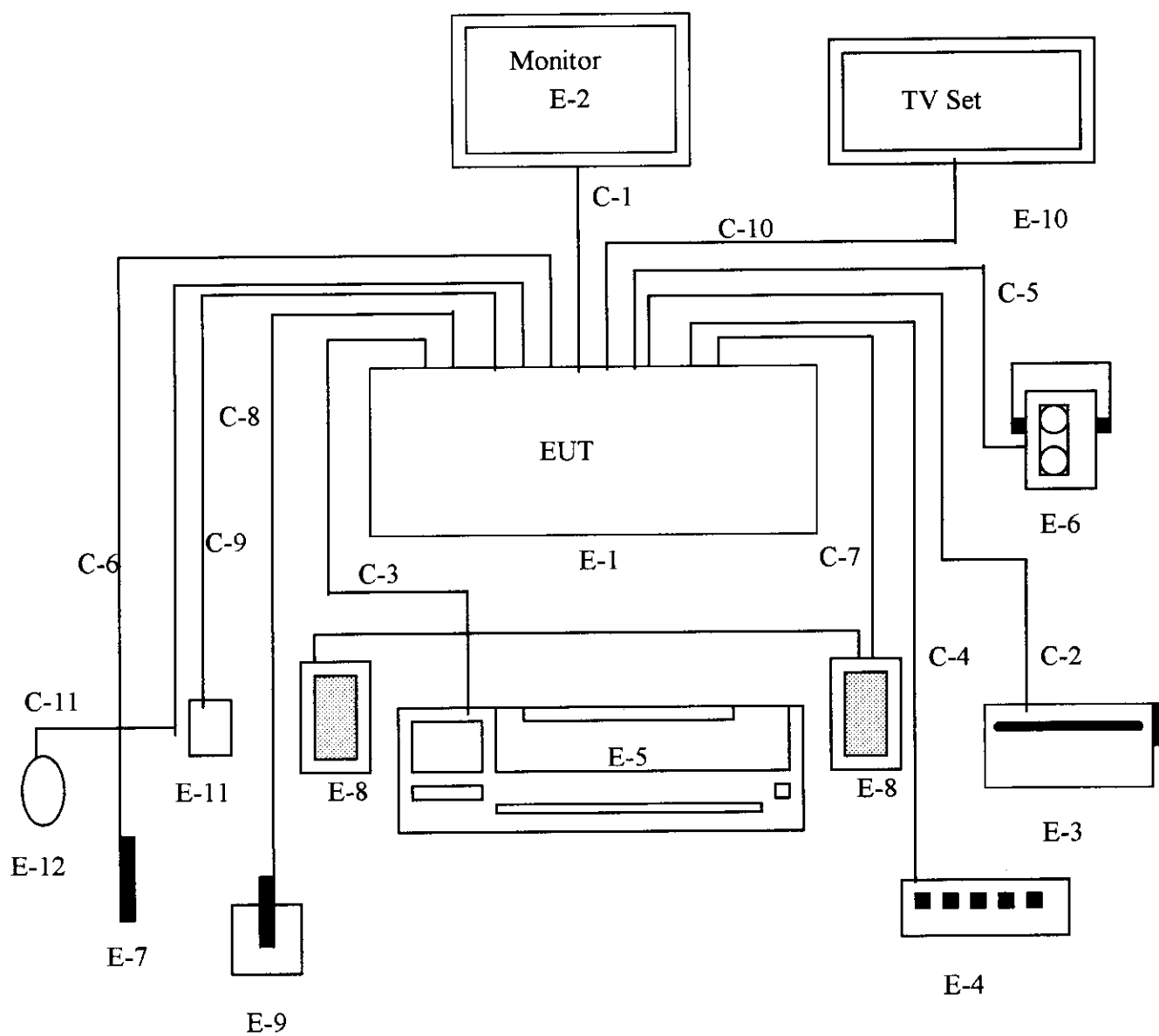
Table B. - Informations Cable Information

Item	I/O Cable	Device Connected	Shielded	Ferrite Core	Detachable/Permanently	Length	Note
C-1	Video Cable	EUT -Monitor	Yes	No	Permanently attached on Monitor	150cm	
C-2	Centronics Cable	EUT -Printer	Yes	No	Detachable type	200cm	
C-3	Keyboard Cable	EUT -Keyboard	Yes	No	Permanently attached on KB	200cm	
C-4	RS-232 Cable	EUT -Modem	Yes	No	Detachable type	120cm	
C-5	Walkman Cable	EUT-Walkman	No	No	Detachable type	180cm	
C-6	Microphone Cable	EUT-Microphone	No	No	Permanently attached on Mic	600cm	
C-7	Speaker Cable	EUT-Speakers	No	No	Detachable type	120cm	
C-8	Joystick Cable	EUT-Joystick	Yes	No	Permanently attached on Joystick	100cm	
C-9	Keyboard Cable	EUT-Keyboard	Yes	No	Permanently attached on KB	200cm	
C-10	Video Cable	EUT -TV	No	No	Detachable type	120cm	
C-11	Mouse Cable	EUT -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



4. Block Diagram(s)

Figure 4.1 Block diagram of system, Page 14.A

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 **-16.03 dB** in mode of **Line** terminal **15.80 MHz**

Freq. (MHz)	Terminal L/N	Measured(dBuV)		Limits(dBuV)		Safe Margins (dBuV)	
		QP-Mode	AV-Mode	QP-Mode	AV-Mode		Note
0.28	Line	39.29	*	60.94	50.94	-21.65	(QP)
1.68	Line	32.70	*	56.00	46.00	-23.30	(QP)
2.41	Line	34.27	*	56.00	46.00	-21.73	(QP)
3.57	Line	33.33	*	56.00	46.00	-22.67	(QP)
15.80	Line	43.97	*	60.00	50.00	-16.03	(QP)
21.60	Line	36.16	*	60.00	50.00	-23.84	(QP)
0.28	Neutral	39.10	*	60.94	50.94	-21.84	(QP)
1.69	Neutral	32.31	*	56.00	46.00	-23.69	(QP)
2.41	Neutral	34.41	*	56.00	46.00	-21.59	(QP)
3.62	Neutral	33.41	*	56.00	46.00	-22.59	(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 :

Andy Chen

Test Personnel :

Riker Hsu

Date:

June 04, 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 **-2.27 dB** in polarity of **Horizon 157.70 MHz**

Freq. (MHz)	Polar. H/V	Reading(RA) (dBuV)	Corr.Factor (dB)	Corrected FS (dBuV)	Limits (QP) (dBuV/m)	Margins (dBuV/m)	Note (QP)
30.90	H	15.20	11.21	26.41	30.00	- 3.59	
49.90	H	13.30	12.19	25.49	30.00	- 4.51	
157.70	V	13.70	14.03	27.73	30.00	- 2.27	
161.90	V	10.80	14.82	25.62	30.00	- 4.38	
194.10	H	7.30	18.78	26.08	30.00	- 3.92	
194.40	V	6.70	18.77	25.47	30.00	- 4.53	
213.60	V	14.40	11.96	26.36	30.00	- 3.64	
219.20	H	12.50	11.79	24.29	30.00	- 5.71	
221.60	V	14.70	11.71	26.41	30.00	- 3.59	
228.89	V	14.10	11.93	26.03	30.00	- 3.97	
233.60	H	17.90	12.32	30.22	37.00	- 6.78	
302.40	H	14.10	16.80	30.90	37.00	- 6.10	

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 colum of 『Note』 . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measure-ment 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 :

[Signature]

Test Personnel :

Riker Hsu

Date:

May 20, 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.

Judgement: Passed by **-15.53 dB** in polarity of **Horizon 1108.00 MHz**

Freq. (MHz)	Polar. H/V	Reading(RA) (dBuV)	Corr.Factor (dB)	Corrected FS (dBuV)	Limits (QP) (dBuV/m)	Margins (dBuV/m)	Note (QP)
1014.00	H	39.70	- 3.54	36.16	54.00	- 17.84	
1016.00	V	42.00	- 3.56	38.44	54.00	- 15.56	
1048.00	V	37.10	- 3.05	34.05	54.00	- 19.95	
1056.00	H	40.40	- 3.04	37.36	54.00	- 16.64	
1056.00	V	39.30	- 3.04	36.26	54.00	- 17.74	
1108.00	H	41.10	- 2.63	38.47	54.00	- 15.53	
1108.00	V	40.50	- 2.63	37.87	54.00	- 16.13	
1204.00	H	39.20	- 1.48	37.72	54.00	- 16.28	

Remark :

- (1) Reading in which marked as Peak means measurements by using are Peak Mode with instrument setting in RBW=1 MHz, VBW=1MHz, Swp. Time = 0.3 sec./MHz.
- (2) 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.
- (3) Measuring frequency range from 1000MHz to 2000MHz.
- (4) All readings are Peak unless otherwise stated AV in column of 'Note'. ※ marked denotes that the Peak reading compliance with the Average Limits in FCC 15.109 and then the AV Mode measurement didn't perform.
- (5) If the peak scan value lower limit more than 20dB, then this signal data does not show in table

Review :

Test Personnel. :

Date:

May 20, 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 + CF - 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 dBuV. Then:

1. The Correction Factor will be calculated by

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

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:

1. Photo # 1. Front View
2. Photo # 2. Rear View
3. Photo # 3. Side View
4. Photo # 4. - 28. Unit Partially Disassembled