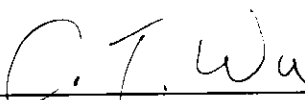


MEASUREMENT/TECHNICAL REPORT

APPLICANT: National Datacomm Corporation

MODEL NO.: SFH105A

FCC ID: IOUSFH1Ø5SØ1

This report concerns (check one) :	Original Grant	<input checked="" type="checkbox"/>
	Class II Change	<input type="checkbox"/>
Equipment type:	HUB	
Deferred grant requested per 47CFR 0.457(d)(1)(ii)? Yes _____ No <input checked="" type="checkbox"/> 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 <input checked="" type="checkbox"/>
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:	National Datacomm Corporation	
Address:	2F, 28, Industry East 9th Road, Science Park, Hsin-Chu, 30077, Taiwan, R. O. C.	
Applicant Signature :	 CHIN-TU WU/ Managing Director	

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) /CISPR22(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 Rules Part 15 , Subpart B/CISPR22(1996).

Prepared by : Cathy Wu

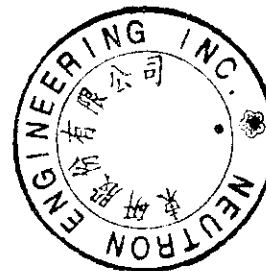
Reviewed by : Andy Chiu

Approved by : George Yao

Issued Date : July 07, 1998

Report No. : NEI-FCCB-98102

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

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1. GENERAL INFORMATION

1-1. Product Description

The National Datacomm Corporation Model : SFH105A (referred to as the EUT in this report) is a 5 ports 100Base-TX Fast Ethernet HUB , complies with IEEE802.3u , 100Base-TX Class II repeater standards.

A. The Front Panel

There are 5 LED groups on the front panel: Power (PWR), Collision (COL), Link/Activity, Error and Utilization.

B. The Rear Panel

On the rear panel are the DC power socket, 5 Shielded Twisted-Pair(RJ-45)ports, and one uplink slide switch.

The DC power socket accepts DC power input from +9V to +12V.

Any of the RJ-45 ports provided for connection to a 100Base-TX nod using Category 5 Twisted-Pair cabling.

The uplink port provides cascading capabilities to a second 100BaseTX Fast Ethernet HUB.

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 SFH105A 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
SFH105A	IOUSFH105S01	Ethernet HUB	Shielding(STP) Cable Un-Shielding Power Cord
93V	ANO6282	PC	Un-Shielded Power Cord.
NE64	KFBNE64	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
DFE-500TX	KA2QPC500X2	LAN Card	N/A

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 EUT was connected to support equipment-personal computer. Peripherals of PC, such as monitor, keyboard, modem, printer and LAN Card were contained in this system in order to comply with the ANSI C63.4(1992)/CISPR22(1996) requirement. The PC operated in the default 640x480 / 31.5 KHz VGA Graphic mode. This operating condition was tested and used to collect the included data.

A category 5 STP cable used for connection the EUT with Lan Card which plug in PC (the support equipment of tested system). In addition, a support test PC workstation also located at far away from the test site (so called as remote station in Fig 3.1 page 12/23), an additional category 5 STP cable connects the PC workstation with any of RJ-45 ports on EUT.

Each of 5 RJ-45 ports was evaluated per the requirements of ANSI C63.4 (1992), second paragraph/CISPR22(1996) one by one until they didn't effect measurement. The testing of those identical port did not take the system out of compliance.

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.

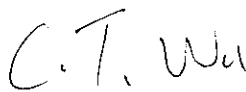
3-3. Special Accessories

No any other special accessory used for compliance testing.

3-4. Equipment Modifications

No any other special accessory used for compliance testing.

Applicant Signature :



Date :

July 07,1998

Type/Printed Name :

CHIN-TU WU

Position :

Managing Director

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	Monitor	Chern Yih	NE-64	VGA Port	KFBNE64	N/A	
E-2	PC	IBM	93V		ANO6282	960E200	
E-3	LAN Card	CNet	DFE-500TX	Add-On slot	KA2QPC500X2	N/A	
E-4	Mouse	Logitech	Series2 -7S	Mouse Port	DZL6QBS2	N/A	
E-5	Printer	HP	2225C Plus	Centronic Port	DSI6XU2225	2927S50245	
E-6	Modem	Datatronics	AT-1200CK	Com 1 Port	E2O5OV1200CK	06-240088/07-317665	
E-7	Keyboard	Forward	FDA-102A	PS/2 KB Port	F4Z4K3FDA-102A	20707	
E-8	HUB	NDC	SFH105A	LAN Card	IOUSFH1Ø5SØ1	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

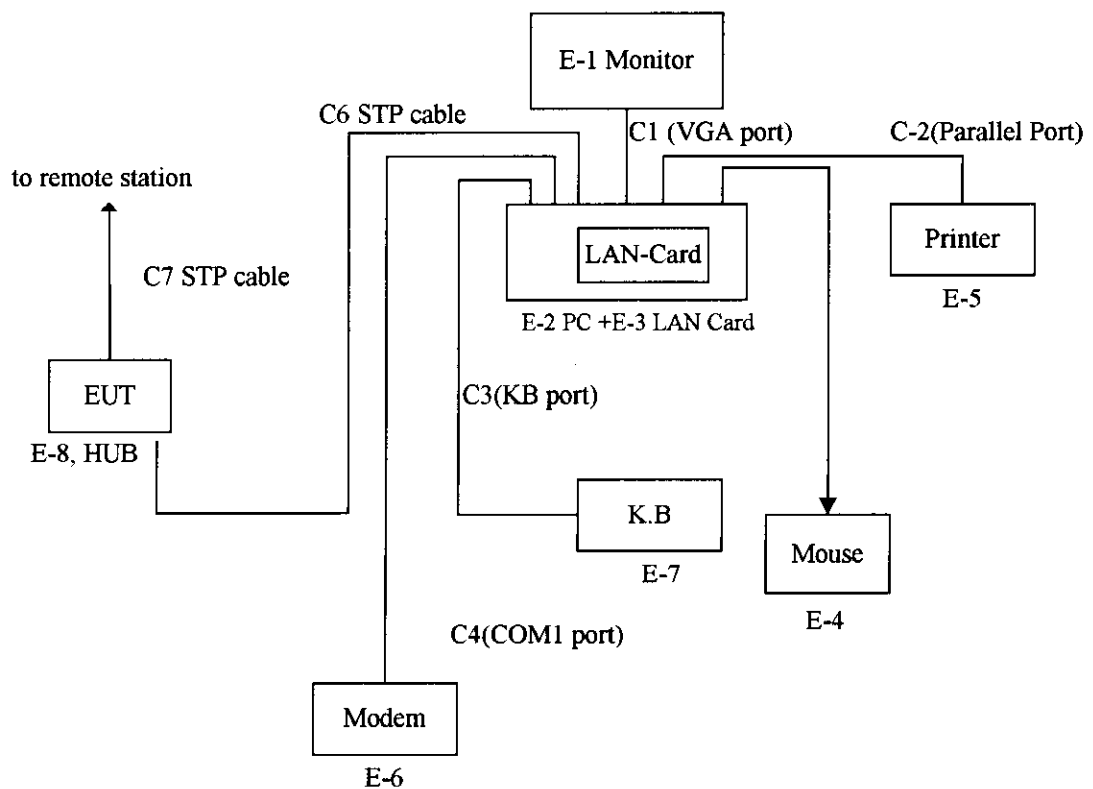
Item	I/O Cable	Device Connected	Shielded	Ferrite Core	Detachable/Permanently	Length	Note
C-1	Video Cable	PC-Monitor	Yes	No	Permanently attached on Monitor	150 cm	
C-2	Centronics Cable	PC-Printer	Yes	No	Part of Printer, Detachable	200 cm	
C-3	Keyboard Cable	PC-Keyboard	Yes	No	Permanently attached on KB	200 cm	
C-4	RS-232 Cable	PC-Modem	Yes	No	Part of Modem, Detachable	175 cm	
C-5	Mouse Cable	PC-Mouse	Yes	No	Permanently attached on Mouse	280 cm	
C-6	STP Data Cable	HUB-LAN Card	Yes	No	Detachable	100 cm	
C-7	STP Data Cable	HUB-Remote Station	Yes	No	Detachable	2000 cm	

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.

Figure 3.1 Configuration of Tested System

Fig. 3-1 Configuration of Tested System



Note : E-3 LAN Card , Model DFE-500TX , plug-in add-on slot inside E-2 PC

4. Block Diagram(s)

Figure 4.1 Block diagram of system, Page

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 **-12.31** dB in mode of Line terminal **0.84** MHz

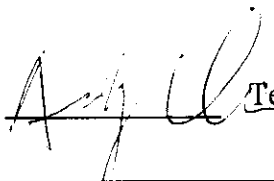
TEST MODE : The 2nd Port connected

Freq. (MHz)	Terminal L/N	Measured(dBuV)		Limits(dBuV)		Safe Margins (dBuV)	
		QP-Mode	AV-Mode	QP-Mode	AV-Mode		Note
0.64	Line	38.67	31.54	56.00	46.00	-14.46	(AV)
0.84	Line	43.69	*	56.00	46.00	-12.31	(QP)
1.73	Line	42.97	*	56.00	46.00	-13.03	(QP)
4.98	Line	30.54	*	56.00	46.00	-25.46	(QP)
21.72	Line	43.19	*	60.00	50.00	-16.81	(QP)
0.49	Neutral	45.52	16.92	56.19	46.19	-10.67	(QP)
0.60	Neutral	41.36	19.24	56.00	46.00	-14.64	(QP)
0.99	Neutral	36.94	30.58	56.00	46.00	-15.42	(AV)
1.72	Neutral	43.52	*	56.00	46.00	-12.48	(QP)
21.72	Neutral	37.98	*	60.00	50.00	-22.02	(QP)

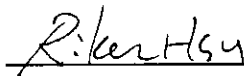
Remark :

- (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:

June 29, 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.

Judgement: Passed by **-10.13** dB in mode of Line terminal **0.63** Mhz

TEST MODE : The 3rd Port connected

Freq. (MHz)	Terminal L/N	Measured(dBuV)		Limits(dBuV)		Safe Margins (dBuV)	
		QP-Mode	AV-Mode	QP-Mode	AV-Mode		Note
0.45	Line	36.41	27.06	56.84	46.84	-19.78	(AV)
0.63	Line	45.87	*	56.00	46.00	-10.13	(QP)
0.85	Line	45.42	*	56.00	46.00	-10.58	(QP)
1.66	Line	42.93	*	56.00	46.00	-13.07	(QP)
21.18	Line	44.36	*	60.00	50.00	-15.64	(QP)
0.48	Neutral	43.86	15.34	56.32	46.32	-12.46	(QP)
0.65	Neutral	40.24	20.44	56.00	46.00	-15.76	(QP)
0.99	Neutral	45.49	*	56.00	46.00	-10.51	(QP)
1.66	Neutral	43.06	*	56.00	46.00	-12.94	(QP)
21.72	Neutral	39.33	*	60.00	50.00	-20.67	(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. : Riker Hsu Date: June 29, 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 -4.10 dB in polarity of Vertical 500.00 MHz

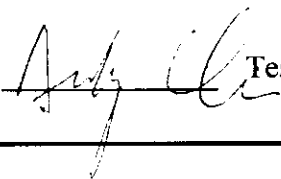
TEST MODE: The 2nd Port connected

Freq. (MHz)	Polar. H/V	Reading(RA) (dBuV)	Corr.Factor. (dB)	Corrected FS (dB)	Limits (QP) (dBuV/m)	Margins (dBuV/m)	Note (QP)
32.60	H	12.40	11.04	23.44	30.00	- 6.56	
69.10	V	16.60	7.83	24.43	30.00	- 5.57	
69.10	H	15.40	7.83	23.23	30.00	- 6.77	
113.30	V	11.30	13.33	24.63	30.00	- 5.37	
138.60	V	12.20	12.30	24.50	30.00	- 5.50	
148.50	H	10.60	12.85	23.45	30.00	- 6.55	
264.40	V	16.00	14.56	30.56	37.00	- 6.44	
429.00	H	12.00	18.60	30.60	37.00	- 6.40	
487.20	V	12.00	20.81	32.81	37.00	- 4.19	
487.20	H	11.00	20.81	31.81	37.00	- 5.19	
499.20	H	11.60	21.27	32.87	37.00	- 4.13	
500.00	V	11.60	21.30	32.90	37.00	- 4.10	

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 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. :

R. K. Hsu

Date:

June 22, 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 -3.13 dB in polarity of Horizon 499.20 Mhz

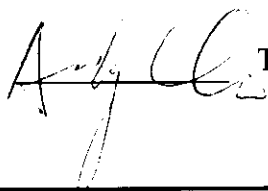
TEST MODE: The 3rd Port connected

Freq. (MHz)	Polar. H/V	Reading(RA) (dBuV)	Corr.Factor. (dB)	Corrected FS (dB)	Limits (QP) (dBuV/m)	Margins (dBuV/m)	Note (QP)
31.40	V	13.80	11.16	24.96	30.00	- 5.04	
31.40	H	11.90	11.16	23.06	30.00	- 6.94	
50.70	V	13.90	11.96	25.86	30.00	- 4.14	
50.90	H	11.60	11.89	23.49	30.00	- 6.51	
114.50	H	10.40	13.38	23.78	30.00	- 6.22	
122.00	V	10.70	13.50	24.20	30.00	- 5.80	
220.80	H	12.50	11.73	24.23	30.00	- 5.77	
228.10	V	13.90	11.86	25.76	30.00	- 4.24	
374.43	V	13.90	17.48	31.38	37.00	- 5.62	
441.60	H	11.50	19.08	30.58	37.00	- 6.42	
499.20	V	10.40	21.27	31.67	37.00	- 5.33	
499.20	H	12.60	21.27	33.87	37.00	- 3.13	

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. :

Pi-ker Hsu

Date:

June 25, 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	Rear View
Photo #	4	Unit Partially disassembled
Photo #	5	Unit Partially disassembled
Photo #	6	Unit Partially disassembled
Photo #	7	Unit Partially disassembled