SGS KES Co., Ltd. EMC Laboratory

705, Dongchun-Ri Sooji-Eub, Yongin-Shi Kyungki-Do, KOREA
TEL82-31-263-0409 FAX.82-31-263-0454

FCC TEST REPORT

Manufacture :

PHILTERA Co., Ltd.
3F, Samil Bldg, 656-282 Sungsoo-1Ga,
Sungdong-Gu, Seoul, Korea
Attn : Young-Kook, Lim

Dates of Tests : 18 to 20 March 2002
Test Report No. : 2002KESEMC-II-0080.FCC
Test Site : SGS KES Co., Ltd. EMC site,.Korea

TYPE of EUT
MODEL No.

DVR Card
PDV-S100

PHILTERA Co., Ltd.
3F, Samil Bldg, 656-282 Sungsoo-1Ga, Sungdong-Gu, Seoul, Korea

CONTACT PERSON

Young-Kook, Lim
Tel./Fax. 82-2-465-6461/82-2-467-6460

FCC Rule Part(s) :	Part 15 & 2
Classification :	FCC Class B Device
Port/Connector(s) :	Control(1~4, C), Sensor(1~4, C), Video Out Video (1~4) Input

The device bearing the trade name and model specified above has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4-1992.

I attest to the accuracy of data and all measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Kew – Seung, Lim
EMC Lab. Manager

TABLE OF CONTENTS

MEASUREMENT REPORT

Scope - Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission under FCC part 15 cerification.

Responsible Party* :	**PHILTERA Co., Ltd.**
Contact Person :	**Young-Kook, Lim**
	Tel./Fax. 82-2-465-6461/82-2-467-6460
Manufacturer :	**PHILTERA Co., Ltd.**
	3F, Samil Bldg, 656-282 Sungsoo-1Ga, Sungdong-Gu,
	Seoul, Korea

- Trade / Model: ***PDV-S100***
- Brand Name: PHILTERA Co., Ltd.
- EUT Type: DVR Card
- Port/Connectors: Control(1~4, C), Sensor(1~4, C), Video Out
  Video (1~4) Input
- Classification: FCC Class B
- Rule Part(s): FCC Part 15 & Part 2
- Test Procedure(s): ANSI C63.4 (1992)
- Dates of Test: 18 to 20 March 2003
- Place of Tests: SGS KES Co., Ltd.
- Test Report No.: 2002KESEMC-II-0080.FCC
- Order No. : SKI-02-0026/E
- Operating Mode for EUT : After connecting EUT to TV, CCD Camera and a monitor, Input image data from CCD Camera and then display it on the Monitor and TV.

INTRODUCTION

The measurement procedure described in American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz (ANSI C63.4-1992) was used in determining radiated and conducted emissions emanating from **PHILTERA Co., Ltd.** Model : **PDV-S100 DVR Card**
These measurement tests were conducted at ***SGS KES Co., Ltd. EMC Laboratory*** .
The site address is 705, Dongchun-Ri, Sooji-Eub, Yongin-Shi, Kyungki-Do, Korea.
The area of SGS KES Co., Ltd. EMC Test Site is located in a mountain area at 45 kilometers (28 miles) southeast and Seoul International Airport (Kimpo Airport), 23 kilometers (14miles) south-southeast from central Seoul.
It is located in the valley surrounded by mountains in all directions where ambient radio signal conditions are quiet and a favorable area to measure the radio frequency interference on open field test site for the computing and ISM devices manufactures.
The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4 on October 19, 1992.

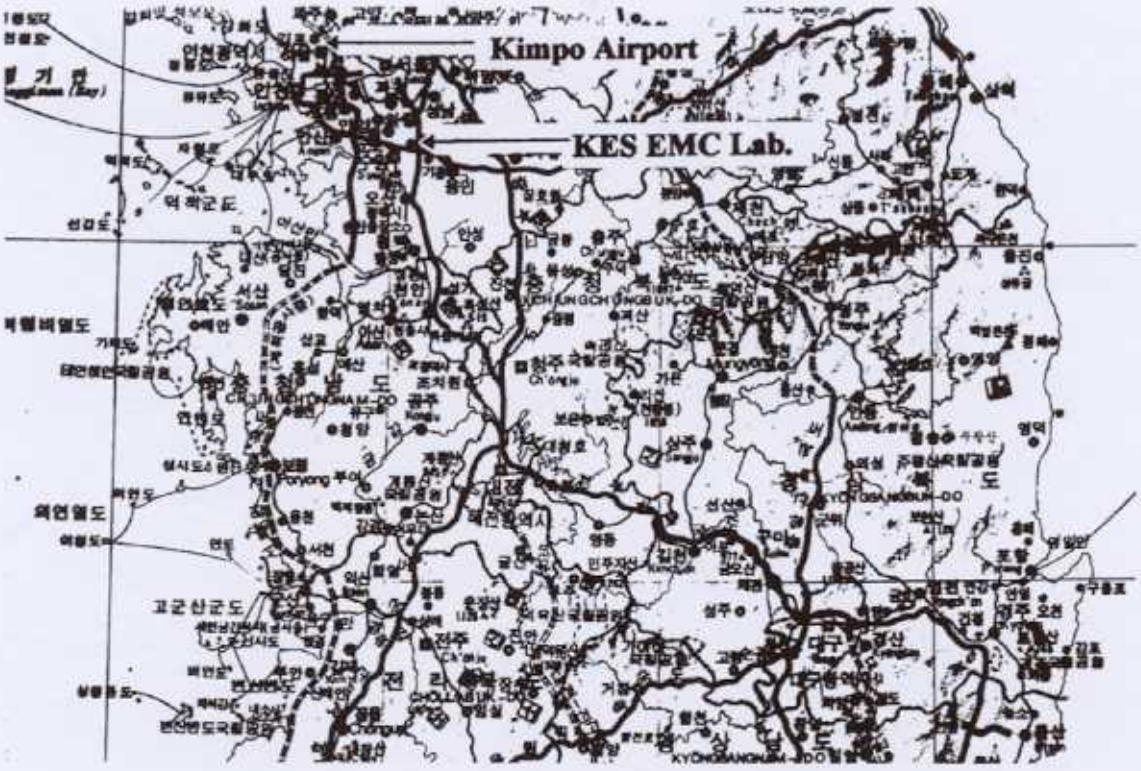


Fig. 1. The map above shows the Seoul in Korea vicinity area.
The map also shows SGS KES Co., Ltd. EMC Lab and Kimpo Airport.

PRODUCT INFORMATION

Equipment Description:

The Equipment Under Test (EUT) is the **PHILTERA Co., Ltd.**

Model : **PDV-S100** **DVR Card**

Clock :	28.63636MHz	
Port(s) :	Control(1~4, C), Sensor(1~4, C), Video Out Video (1~4) Input	
Power Consumption :	AC 110V, 60Hz	
Main Board :	Model : DVR4CH-DC-DC (PHILTERA Co., Ltd.)	S/N : N/A
Extended Board :	Model : DVR4CH_Extended (PHILTERA Co., Ltd.)	S/N : N/A

EMI suppression device(s) installed in production:

- see circuit diagram (Appendix B)

EMI suppression device(s) added and/or modified during testing:

- none

DESCRIPTION OF TESTS

Conducted Emissions

The line-conducted facility is located inside a 3.0x6.0x2.5 shielded enclosure. It is manufactured by Daeil EMC Engineering. The shielding effectiveness of the shielded room is in accordance with MIL-Std-285 or NSA 65-6. A 1mx1.5m. wooden table 0.8m. height is placed 0.4m. away from the vertical wall and 1.5m away from the side wall of the shielded room. PMM L3-25, L1-150 and EMCO Model 3825-2 (10kHz-30MHz) 50Ω /50 μH Line Impedance Stabilization Networks (LISNs) are bonded to the shielded room. The EUT is powered from the PMM LISN and the support equipment is powered from the EMCO LISN. Power to the LISNs are filtered by a high-current high-insertion loss Sangshin power line filters (100dB 14kHz-10GHz). The purpose of the filter is to attenuate ambient signal interference and this filter is also bonded to the shielded enclosure. All electrical cables are shielded by braided tinned copper zipper tubing with inner diameter of 1/2". If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply lines will be connected to the PMM LISN. LISN schematic diagram is shown in Figure 2. All interconnecting cables more than 1 meter were shortened by non-inductive bundling (serpentine fashion) to a 1-meter length. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer to determine the frequency producing the maximum EME from the EUT. The spectrum was scanned from 450 kHz to 30 MHz with 20 msec sweep time. The frequency producing the maximum level was reexamined using EMI/Field Intensity Meter and Quasi-Peak adapter. The detector function was set to CISPR quasi-peak mode. The bandwidth of the receiver was set to 10 kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each EME emission. Each emission was maximized by: switching power lines; varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and/or support equipment, and powering the monitor from the floor mounted outlet box and the computer aux AC outlet, if applicable; which ever determined the worst-case emission. Photographs of the worst-case emission can be seen in Appendix C. Each EME reported was calibrated using the R/S SMG signal generator.

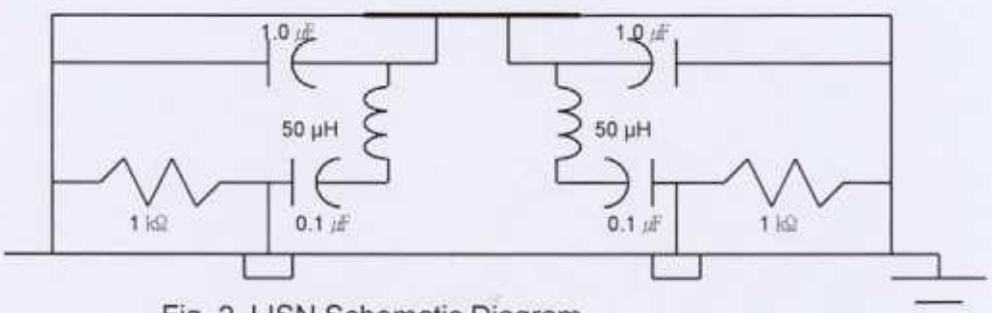


Fig. 2. LISN Schematic Diagram

Radiated Emissions

Preliminary measurements were made indoors at 1 meter using broadband antennas, broadband amplifier, and spectrum analyzer to determine the frequency producing the maximum EME. Appropriate precaution was taken to ensure that all EME from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, turntable azimuth with respect to the antenna were note for each frequency found. The spectrum was scanned from 30 to 300 MHz using biconical antenna and 300 to 1000 MHz using log-periodic antenna. Above 1 GHz, linearly polarized double ridge horn antennas were used.

Final measurements were made outdoors at 3or10 meter test range using EMCO Dipole antennas or horn antenna . The test equipment was placed on a wooden and plastic bench situated on a 1.5x2 meter area adjacent to measurement area. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. Each frequency found during pre-scan measurements was reexamined and investigated using EMI/Field Intensity Meter and Quasi-Peak Adapter. The detector function was set to CISPR quasi-peak mode and the bandwidth of the receiver was set to 100 kHz or 1 MHz depending on the frequency or type of signal.

The half-wave dipole antenna was tuned to the frequency found during preliminary radiated measurements. The EUT, support equipment and interconnecting cables were re-configured to the set-up producing the maximum emission for the frequency and were placed on top of a 0.8-meter high non-metallic 1x1.5 meter table. The EUT, support equipment, and interconnecting cables were re-arranged and manipulated to maximize each EME emission. The turntable containing the system was rotated; the antenna height was varied 1 to 4 meter and stopped at the azimuth or height producing the maximum emission. Each emission was maximized by: varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and/or support equipment, and powering the monitor from the floor mounted outlet box and the computer aux AC outlet, if applicable; and changing the polarity of the antenna, whichever determined the worst-case emission. Photographs of the worst-case emission can be seen in Appendix C. Each EME reported was calibrated using the R/S SMG signal generator.

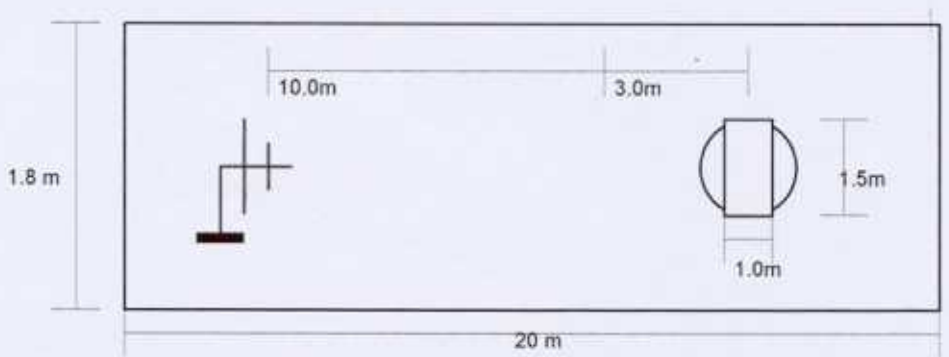


Fig. 3. Dimensions of Outdoor Test Site

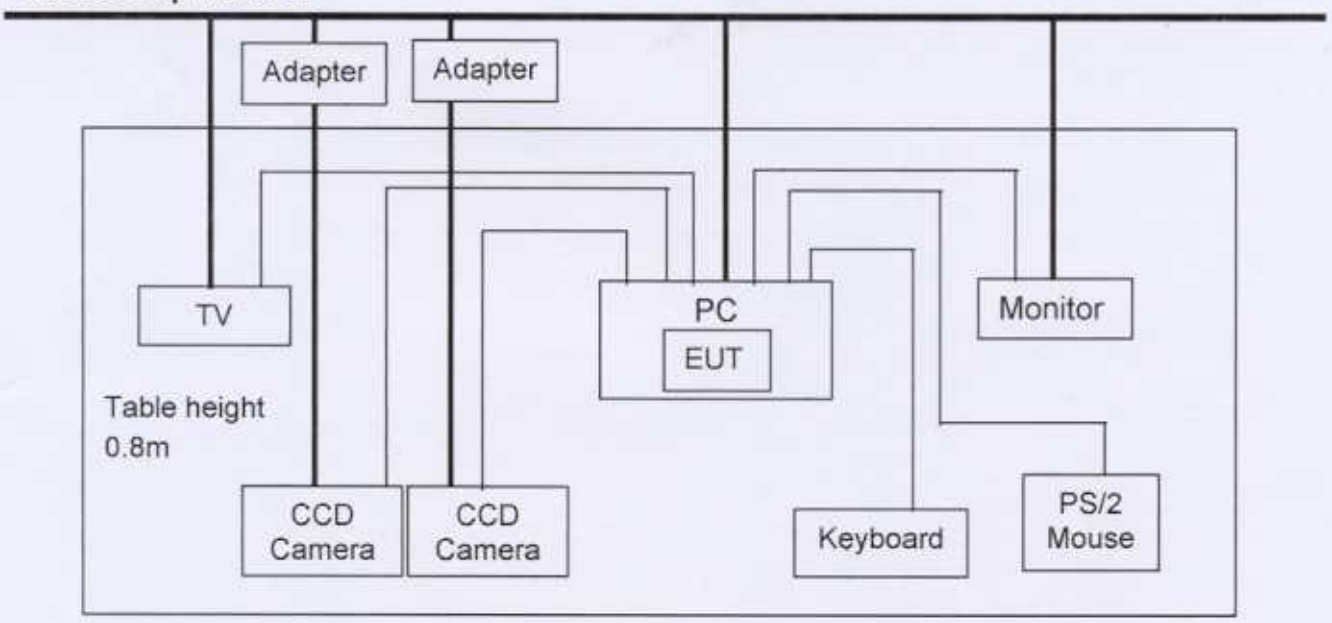
SUPPORT EQUIPMENT USED

Monitor :	Model : 950P(T) (SAMSUNG Electronics Co., Ltd.)	S/N : P029H3NR703096
Personal Computer :	Model : HP Pavilion 700_Missouri (TriGem Computer, Inc.)	S/N : N/A
PS/2 Mouse :	Model : M-S34 (LOGITECH)	S/N : LZB00207183
Keyboard :	Model : SEM-DT35 (SAMSUNG Electronics Co., Ltd)	S/N : 94040111
TV :	Model : CT-1413 (Samsung)	S/N : 933432FH801353
CCD Camera :	Model : 4400SCH (N/A)	S/N : N/A

- **User Interface Cable List**

Start		END		Cable Spec.	
Type	I/O Port	Type	I/O Port	Length (m)	Shield
PC	Video	Monitor	-	1.8	Shielded
	Keyboard	Keyboard	-	1.7	Shielded
	PS/2 Mouse	PS/2 Mouse	-	1.8	Shielded
	CH1	CCD Camera	Video Out	2.5	Unshielded
	CH2	CCD Camera	Video Out	2.5	Unshielded
	Video Out	TV	Video IN	1.5	Unshielded
	AC IN	LISN	-	1.0	Unshielded

- **Test set-up for test**



TEST DATA

Conducted Emissions

Model No. : PDV-S100
Date of Test : 18 March 2002
Measure Bandwidth : 9kHz
Temperature : 20.6℃ Humidity : 40% Atmospheric Pressure : 100.6kPa.

FREQ (MHz)	LEVEL(dBμV)	LINE	LIMIT(μV)	Result(μV)	MARGIN*(dB)
0.66	34.0	H	250	50.12	14.0
3.49	35.5	H	250	59.57	12.5
3.96	33.0	H	250	44.67	15.0
7.64	33.5	N	250	47.32	14.5
8.02	35.0	N	250	56.23	13.0
10.76	34.0	N	250	50.12	14.0

Table 1. Line Conducted Emissions Tabulated Data

NOTES:

1. ***All modes of operation were investigated and the worst -case emission are reported. See attached Plots.***
2. ***The limit for Class B digital device is 250 μV from 450 kHz to 30MHz.***
3. ***Line H = Hot Line N = Neutral***

* *Measurements using CISPR quasi-peak mode*

Tested by ***Eun – Ju, Choi***

TEST DATA

Radiated Emissions

Model No. : PDV-S100
Date of Test : 20 March 2002
Measure Bandwidth : 120kHz
Temperature : 8℃ Humidity : 40% Atmospheric Pressure : 101.2kPa.

Freq. (MHz)	Level (dBμV)	AF* (dB)	CL** (dB)	POL (H/V)	Limit (μV)	F/S (μV/m)	Margin*** (dB)
57.27	23.70	5.88	1.50	V	100	35.79	8.93
143.18	20.10	11.40	2.70	H	150	51.27	9.30
200.45	16.70	8.57	3.40	H	150	27.13	14.83
214.77	16.10	9.63	3.57	H	150	29.15	14.21
229.09	14.10	10.76	3.75	H	200	26.93	17.40
240.00	15.80	11.59	3.88	H	200	36.58	14.73

Table 2. Radiated Measurements at 3meters.

NOTES:

1. ***All modes of operation were investigated the worst-case emission are reported.***
2. ***The radiated limits are shown on Figure 4. Above 1GHz the limit is 500 μV/m.***

Fig. 4. Limits at 3 meters

* *AF = Antenna Factor.*

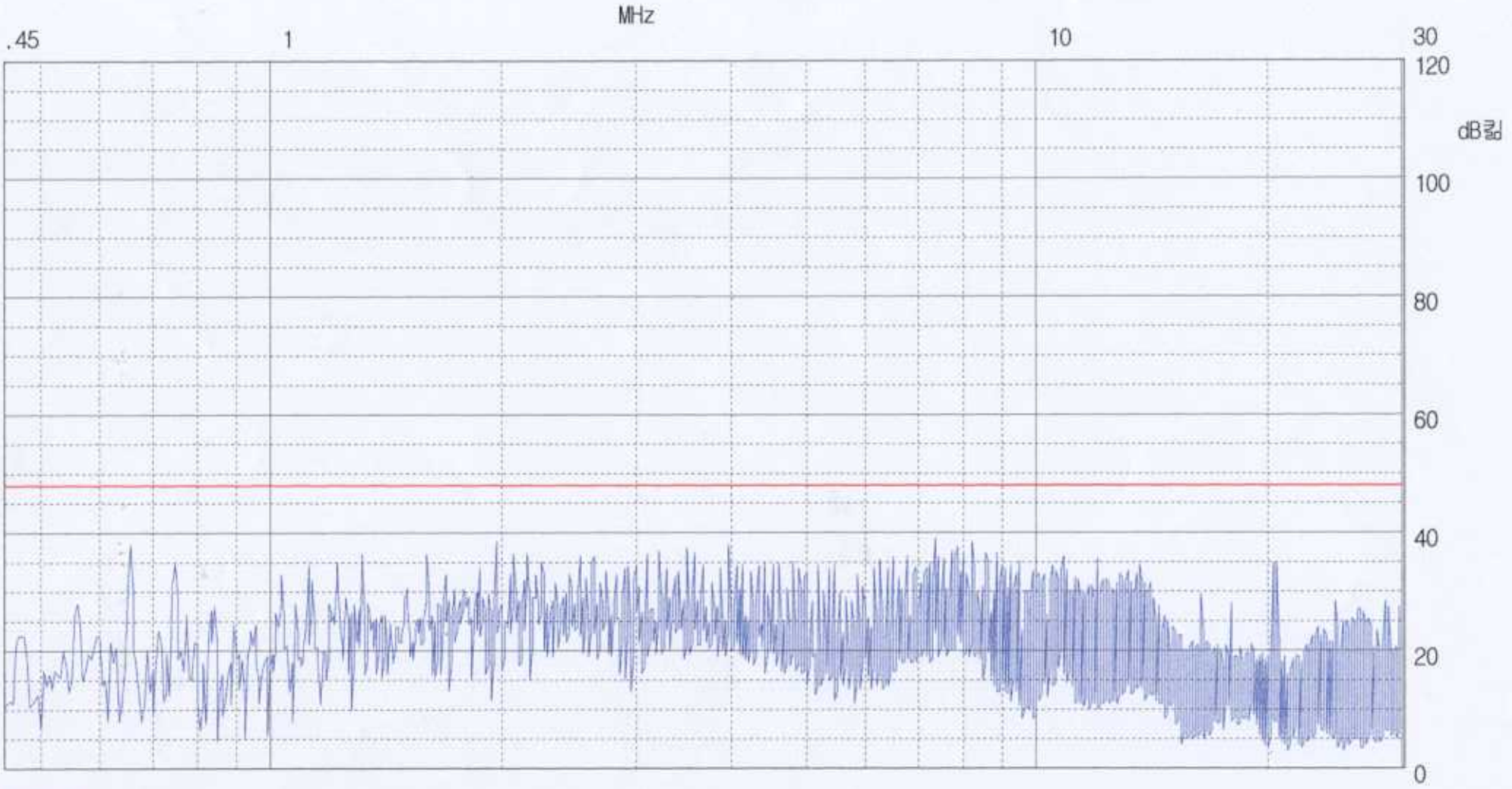
** *CL = Cable Loss.*

*** *Measurements using CISPR quasi-peak mode. Above 1GHz, peak detector function mode is used using a resolution bandwidth of 1MHz and a video bandwidth of 1MHz. The peak level complies with the average limit. Peak mode is used with linearly polarized horn antenna and low-loss microwave cable.*

Tested by **Eun – Ju, Choi**

PLOTS OF EMISSIONS

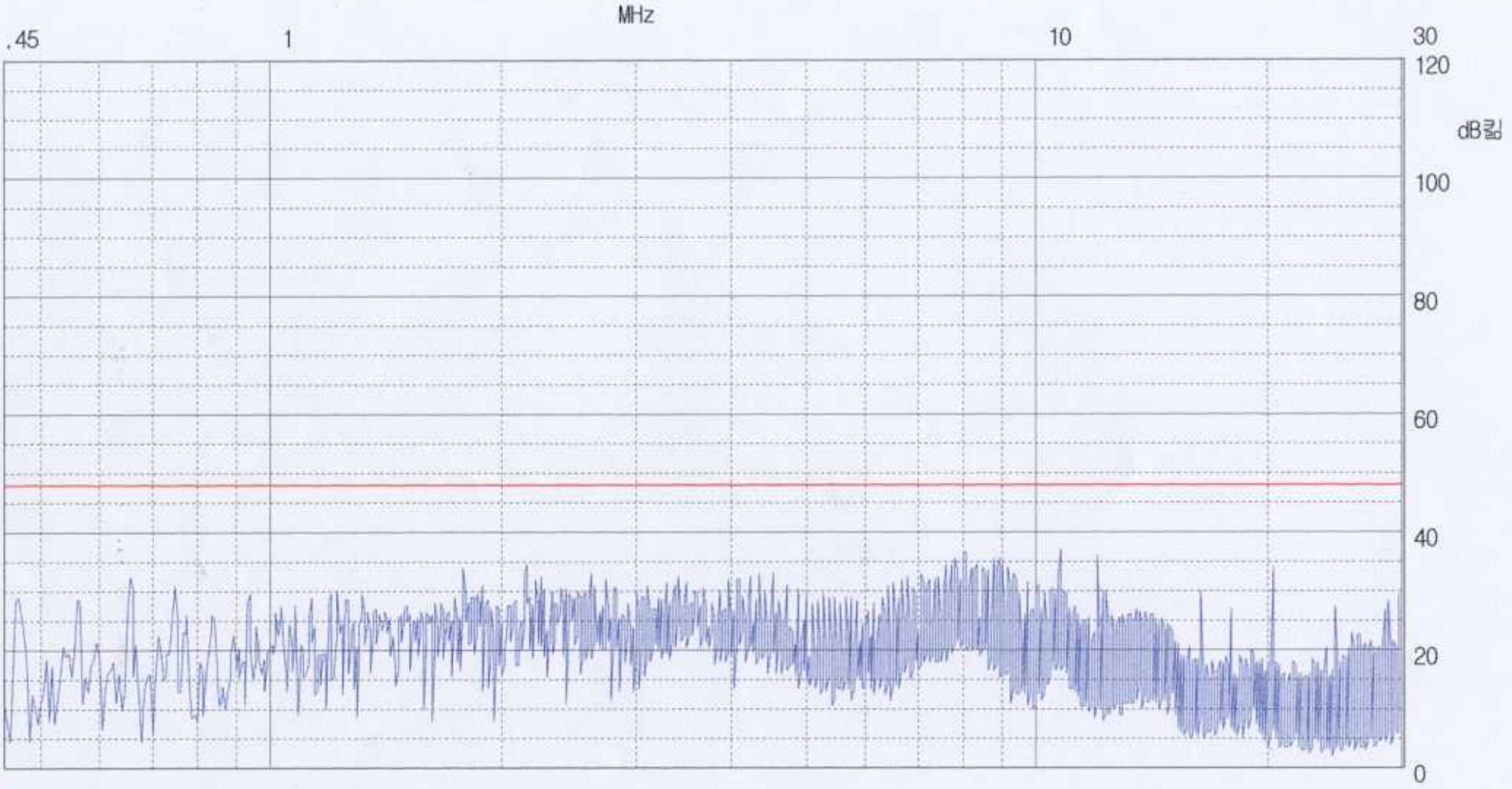
P M M 8 0 1 0 for Windows Name: Date: 02-03-18 Time: 17:57



Limit : Fcc_15_b Detector: Peak Input None

MODEL: PDV-S100
LINE: HOT
OPERATOR: E.J.CHO

P M M 8 0 1 0 for Windows Name: Date: 02-03-18 Time: 18:02



Limit : Fcc_15_b Detector: Peak Input None

MODEL: PDV-S100
LINE: NEUTRAL
OPERATOR: E.J.CHOI

SAMPLE CALCULATIONS

$$\text{dB } \mu N = 20 \log_{10} (\mu N/\text{m})$$

$$\mu N = 10^{(\text{dB } \mu N/20)}$$

EX. 1.

@20.3 MHz Class B limit = 250 μN = 48.0 dB μN

Reading = 40.8 dB μN (calibrated level)

$10^{(40.8/20)}$ = 109.64 μN

Margin = 48.0 - 40.8 = 7.2

7.2 dB below limit

EX. 2.

@57.7 MHz Class B limit = 100 μN/m = 40.0 dB μN/m

Reading = 19.1 dB μN(calibrated level)
Antenna factor + Cable Loss = 10.12 dB
Total = 29.22 dB μN/m

Margin = 40.0 - 29.22 = 10.78

10.78 dB below the limit

ACCURACY OF MEASUREMENT

The Measurement Uncertainties stated were calculated in accordance with the requirements of NIST Technical Note 1297 with the confidence level of 95%

Contribution	Distribution	Uncertainties	
		3 m	10 m
Field Strength Monitor	Gaussian (2s)	+/- 0.5	+/- 0.5
Field Strength Variation	Rectangular	+/- 1.2	+/- 1.5
Random	Gaussian (1s)	+/- 0.7	+/- 0.7
Total Uncertainty@95% min. confidence probability		+/- 1.91	+/- 2.11

Measurement Uncertainty Calculations:

$$U = 2\sqrt{S^2\ s1 + S^2\ s1... + S^2\ sr}$$

TEST EQUIPMENT

Conducted Emission

Equipment	Manufactory	Model	Cal. Date
Signal Analyzer	PMM	8010	Sep. 2001
LISN	EMCO	1409	Apr. 2001
LISN	EMCO	1289	Apr. 2001
Pulse Limiter	PMM	PL-01	Jul. 2001
Shielded Room	Daeil	N/A	-

Radiated Emission

Equipment	Manufactory	Model	Cal. Date
Test Receiver	R & S	ESVS30	Nov. 2001
Spectrum Analyzer	H.P	E4411A	Dec. 2001
RF Amplifier	H.P	8447F	May. 2001
Bilog Antenna	SCHAFFNER	CBL6111C	Apr. 2001
RF Select s/w	DAIWA	CS201	Apr. 2001

RECOMMENDATION/CONCLUSION

The data collected shows that the **PHILTERA Co., Ltd.** Model : **PDV-S100** **DVR Card** complies with § 15.107 and 15.109 of the FCC Rules. The highest emission observed was at 3.49MHz for conducted emissions with a margin of 12.5dB and at 57.27MHz for radiated emissions with a margin of 8.93dB.

APPENDIX A – SAMPLE LABEL

New Labelling Requirements

The sample label shown shall be *permanently affixed* at a conspicuous location on the device and be readily visible to the user at the time of purchase.

DVR Card **Model:PDV-S100** **FCC ID : P8VPDV-S100** **PHILTERA Co., Ltd.**
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.

APPENDIX B – CIRCUIT DIAGRAM

APPENDIX C – TEST PHOTOGRAPHS

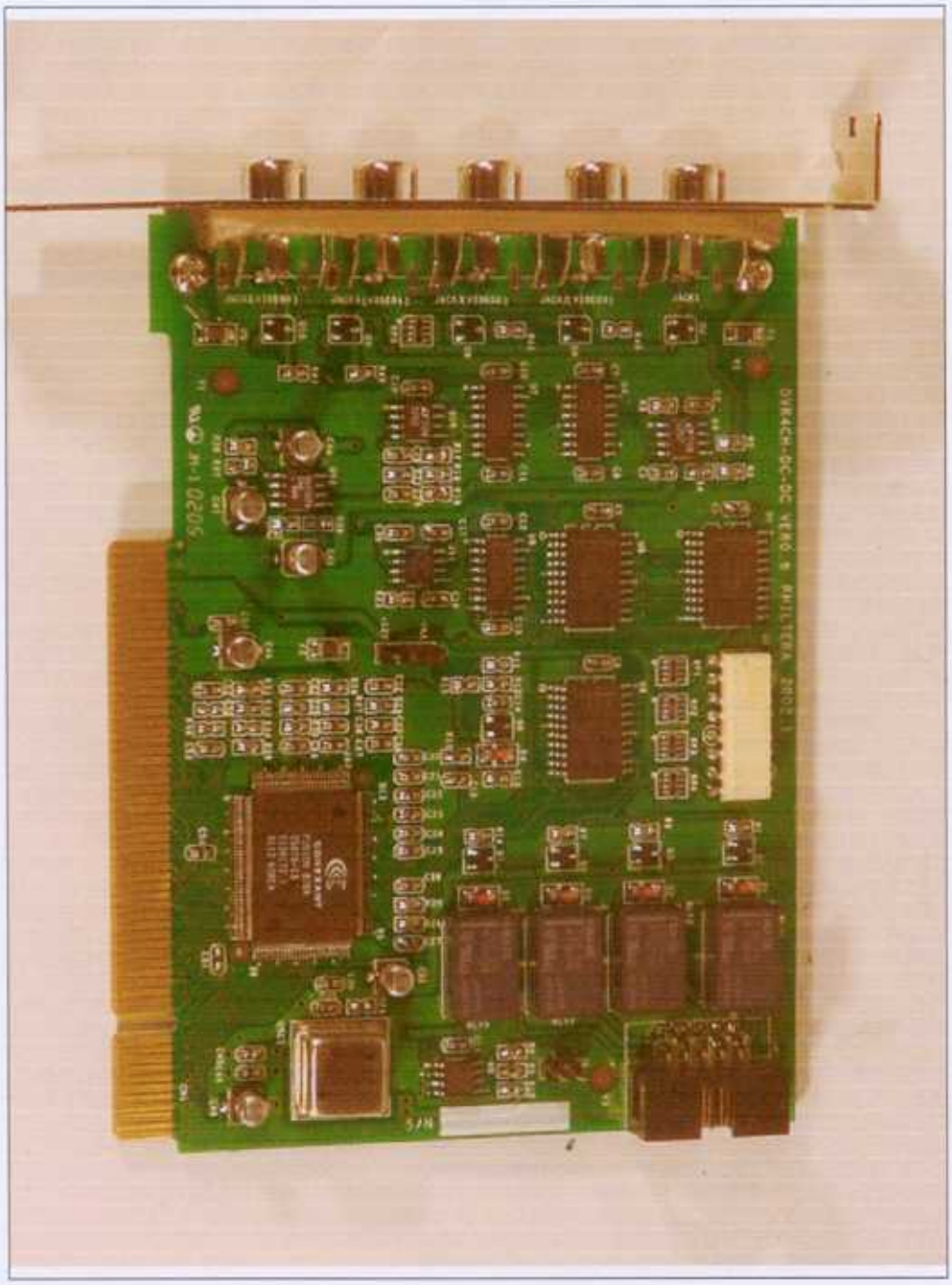
The **Line-Conducted** and **Radiated** and **Antenna Power Conducted Test Picture** show the worst-case configuration and cable placement.

- **Conducted Test Picture**

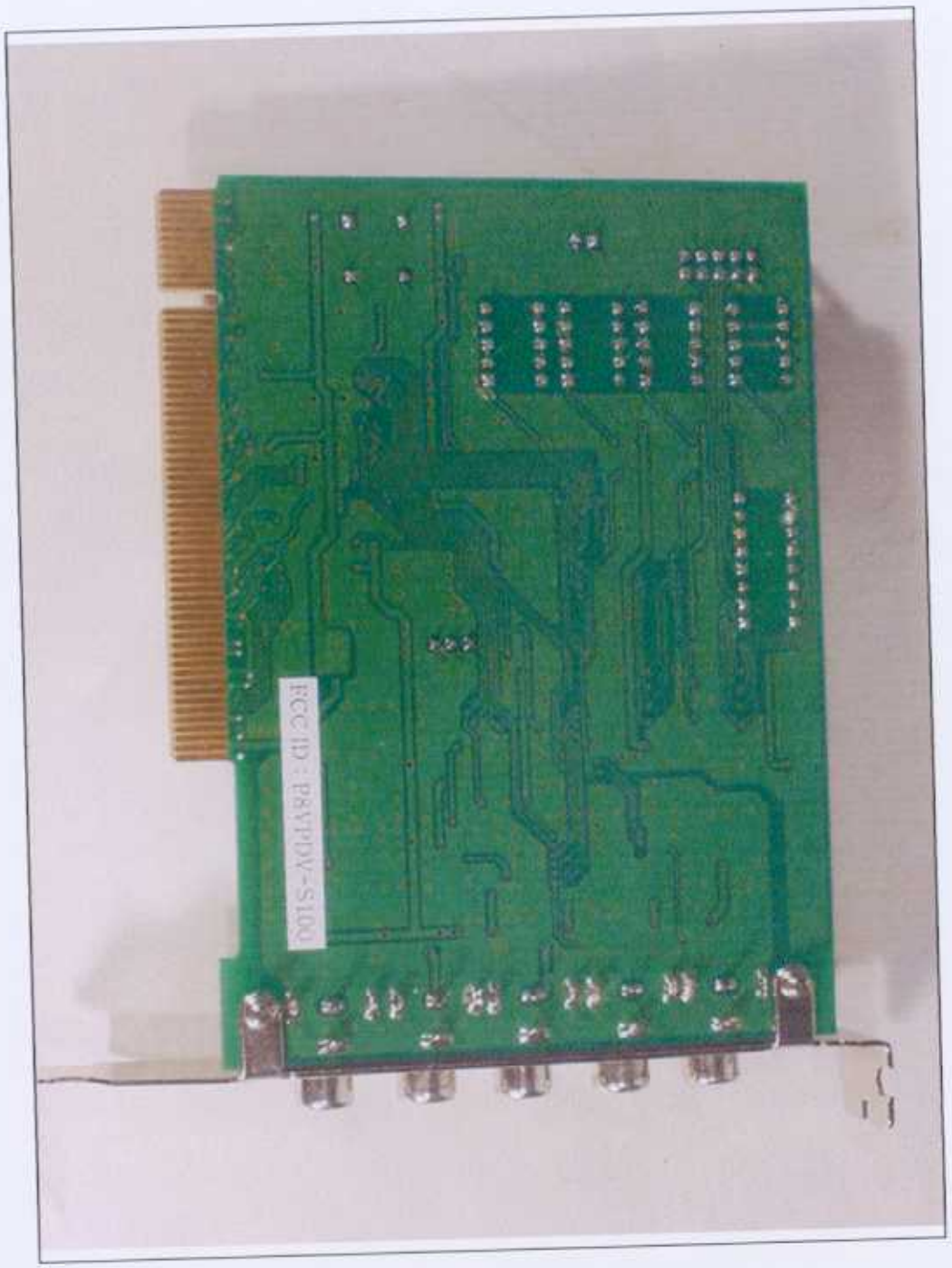
- **Radiated Test Picture**

APPENDIX D – EUT PHOTOGRAPHS

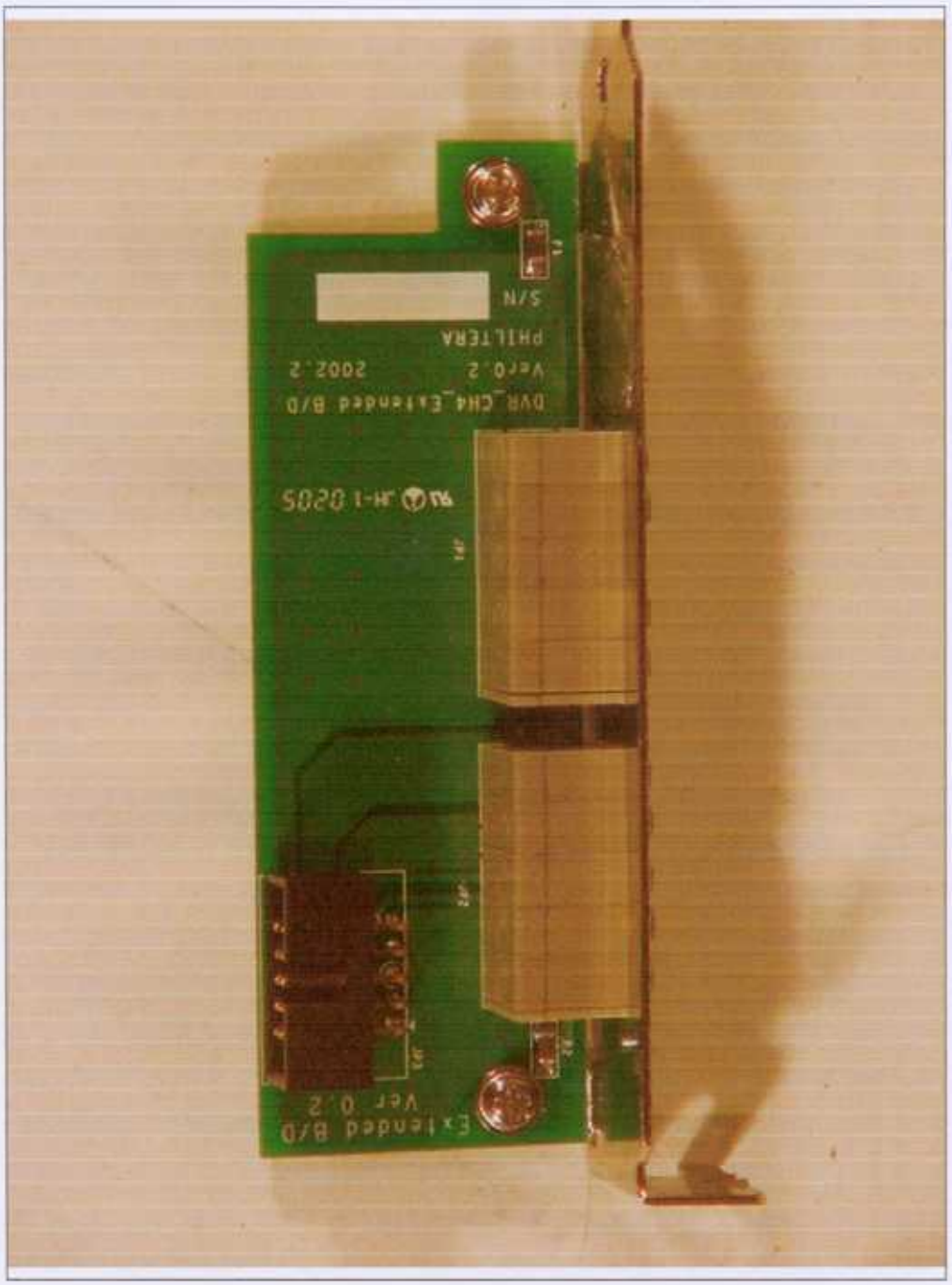
VIEW OF MAIN BOARD



VIEW OF MAIN BOARD WITH LABEL



VIEW OF EXTENDED BOARD



APPENDIX E – USER'S MANUAL