Nemko Korea CO., Ltd.

300-2, Osan-Ri, Mohyun-Myun, Yongin-City, Kyungki-Do, KOREA
TEL(031)322-2333 FAX(031)322-2332

FCC EVALUATION REPORT FOR CERTIFICATION

Manufacture :

Thomson Multimedia Hong Kong Ltd.
13/F,Ever Gain Centre, 28 On Muk Street,
Siu Lek, Yuen, Shatin, Hong Kong.

Attn : B. H. Chiu

Dates of Tests : July 08 – July 24, 2002
Test Report No. : *NK 2C E 511.FCC*
Test Site : Nemko Korea Co., Ltd.
EMC site, Korea.

FCC ID	***PYPDPC-5R3***
MODEL	*DPC-5.3*
BRAND NAME	***Integra***
CONTACT PERSON	***Thomson Multimedia Hong Kong Ltd.***
	13/F,Ever Gain Centre, 28 On Muk Street, Siu Lek
	Yuen,Shatin, Hong Kong.
	Mr. Bit Hon Chiu
	Telephone No. : + 852-2686-2408

FCC Rule Part(s)	**:**	*Part 15 & 2*
Classification	**:**	FCC Class B Device (*5 DVD Changer Player*)
Port/Connector(s)	**:**	Audio OUT (2), Video OUT (1), Component Video OUT (1), IR IN/OUT (2), S-Video OUT (1), Digital Coaxial OUT (1) RS-232 (1)

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.

The test results of this report are deemed satisfactory evidence of compliance with Industry Canada Interference-Causing Equipment Standard ICES-003.

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.

Test By : J. Y. YU
Engineer

Reviewed By : H.H. Kim
Manager & Chief Engineer

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.

Responsible Party* :	***Thomson Multimedia Hong Kong Ltd.***
Contact Person :	**Mr. Bit Hon Chiu**
	Tel No.: +852-2686-2408 Fax No.: +852-2686-2450
Manufacturer :	**Thomson Multimedia Hong Kong Ltd.**
	13/F,Ever Gain Centre, 28 On Muk Street, Siu Lek Yuen, Shatin, Hong Kong
	Tel No.: +852-2686-2408

- FCC ID: ***PYPDPC-5R3***
- Trade / Model: ***DPC-5.3***
- Brand Name: ***Integra***
- EUT Type: ***5 DCD Changer Player***
- Port/Connectors: Audio OUT (2), Video OUT (1), Component Video OUT (1), S-Video OUT (1), IR IN/OUT (2), Digital Coaxial OUT (1), RS-232 (1)

- Classification: ***FCC Class B***
- Rule Part(s): ***FCC Part 15 & Part 2, ICES-003***
- Test Procedure(s): ANSI C63.4 (1992)
- Dates of Test: July 08 – July 24 , 2002
- Place of Tests: Nemko Korea Co., Ltd. EMC Site
- Test Report No.: ***NK 2C E 511. FCC***

** NOTE: Please refer to the duties and responsibilities of the Responsible Party attached.*

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 ***Thomson Multimedia Hong Kong Ltd.***
FCC ID : PYPDPC-5R3, 5 DVD Changer Player.

These measurement tests were conducted at ***Nemko Korea Co., Ltd. EMC Laboratory*** .
The site address is 300-2, Osan-Ri, Mohyun-Myun, Yongin-City, Kyungki-Do, KOREA
The area of Nemko Korea Corporation LTD. EMC Test Site is located in a mountain area at 50 kilometers (30 miles) southeast and Seoul International Airport (Kimpo Airport), 30 kilometers (18miles) 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.

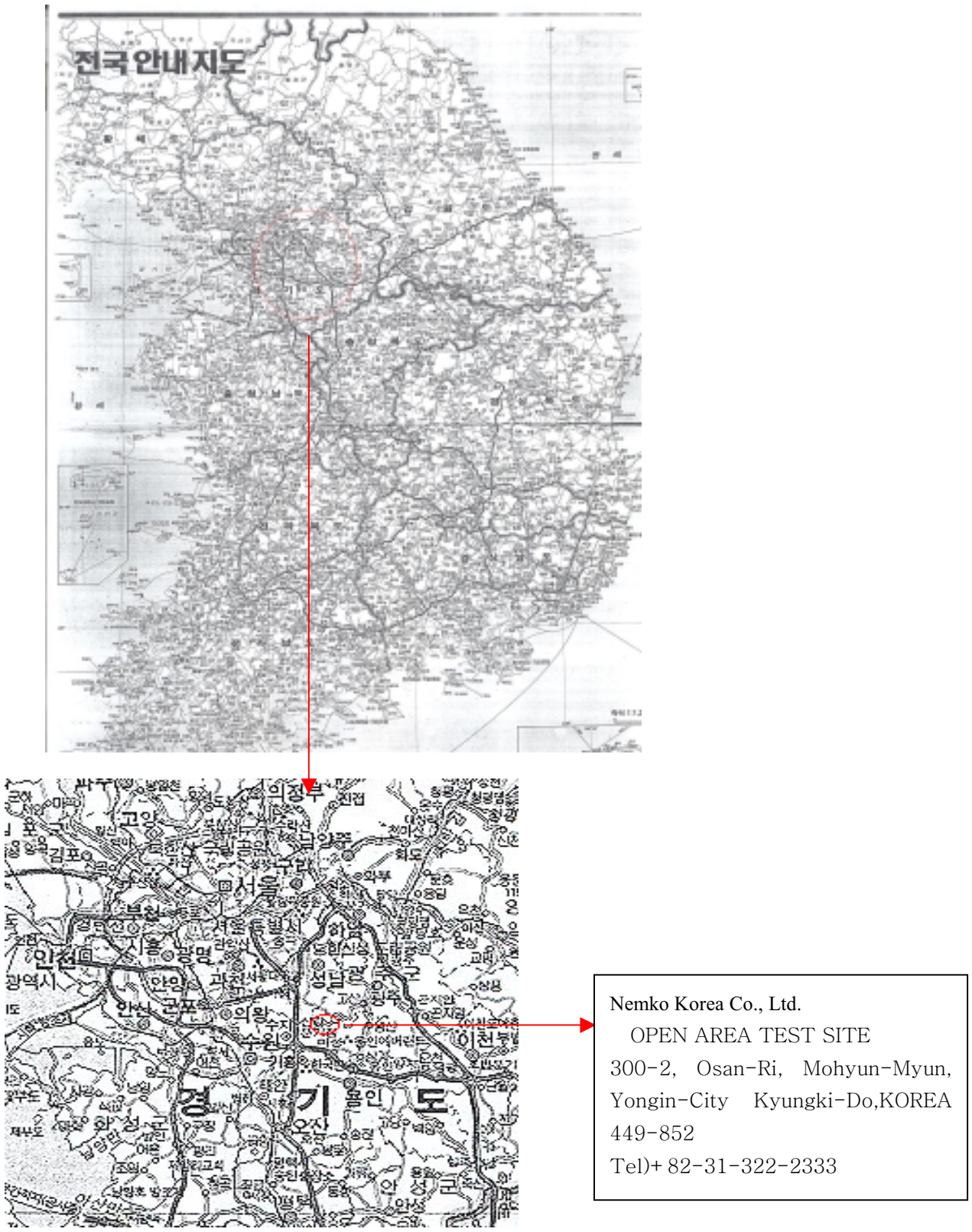


Fig. 1. The map above shows the Seoul in Korea vicinity area.
The map also shows Nemko Korea Corporation Ltd. EMC Lab and Kimpo Airport.

PRODUCT INFORMATION

Equipment Description:

The Equipment Under Test (EUT) is the *Thomson Multimedia Hong Kong Ltd.*
FCC ID: **PYPDPC-5R3, 5 DVD Changer Player.**

Clock :	27.0 MHz (X501) 10.0 MHz (X901)
Chipset(s) :	74HCU04 (IC51), CXP82324 (IC901)
Port(s) :	Audio OUT (2), Video OUT (1), Component Video OUT (1), S-Video OUT (1), IR IN/OUT (2), Digital Coaxial OUT (1), RS-232 (1),
Power Consumption :	AC 120V/60Hz 20W

PWB Description

Board Name	Part No.	Manufacture	S/N.	Remark
Main	55414400XX	Thomson Audio Dongguam	N/A	
Front	55386040XX	Thomson Audio Dongguam	N/A	
Rear Output	55388440XX	Thomson Audio Dongguam	N/A	
Mecha Control	55156840XX	Thomson Audio Dongguam	N/A	
SMPS Power	55332110XX	Orientech Co., Ltd.	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 emission test facility is located inside a 4 X 7 X 2.5 meter shielded enclosure.
It is manufactured by EM engineering. The shielding effectiveness of the shielded room is in accordance with MIL-STD-285 or NSA 65-6.
A 1mX 1.5M wooden table 0.8m height is placed 0.4m away from the vertical wall and 1.5m away from the side of wall of the shielded room
Rohde & Schwarz LISN and PMM lisn L3-32 50ohm/50uH line impedance stabilization network are bonded to the shielded room
The EUT is powered from the Rohde & Schwarz LISN and the support equipment is powered from the PMM LISN. Power to the LISN s are filtered by high-current high insertion loss
Power line filters. The purpose of filter is to attenuate ambient signal interference and this filter is also bonded to shielded enclosure. All electrical cables are shielded by tinned copper zipper tubing with inner diameter of 1/2".
If DC power 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 LISNs,
All interconnecting cables more than 1 meter were shortened by non inductive bundling (serpentine fashion) to a 1 meter length.
Sufficient time for EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF out put of the LISN was connected to the spectrum analyzer to determine the frequency producing the maximum EME from the EUT.
The spectrum was scanned from450KHz to 30MHz with 20msec sweep time.
The frequency producing the maximum level was re-examined using the EMI test receiver .(Rohde & Schwarz ESCS30).
The detector function was set to CISPR quasi-peak mode.
The bandwidth of receiver was set to 9KHz. 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 of support equipment, and powering the monitor from the floor mounted outletbox and computer aux AC outlet, if applicable; which ever determined the worst case emission.
Each EME reported was calibrated using the R&S signal generator.

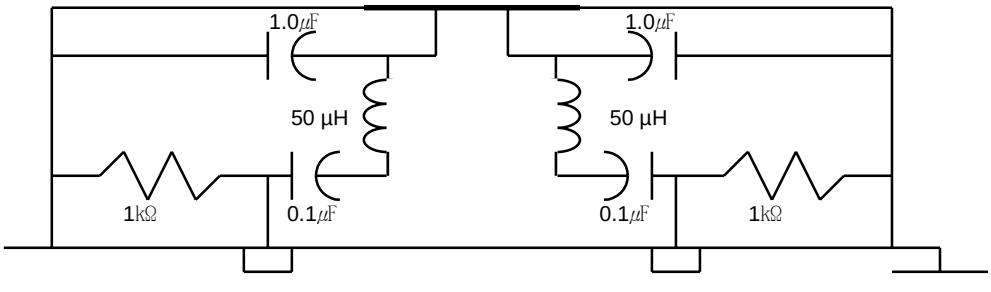


Fig. 2. LISN Schematic Diagram

Radiated Emissions

Preliminary measurement were made indoors at 1 meter using broad band 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 was note for each frequency found. The spectrum was scanned from 30 to 300MHz using biconical antenna and 30 to 1000MHz using log-eriodic antenna.
Above 1GHz, log periodic antenna (Rohde Schwarz HL025:upto 18GHz) was used.
Final Measurements were made outdoors at 3 or 10m test range using Logbicon Super Antenna(Schwarzbeck, VULB9166) or log periodic antenna.(Rohde Schwarz HL025).
The test equipment was placed on a wooden table.
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 test receiver.(ESCS30)
The detector function was set to CISPR quasi-peak mode and the bandwidth of the receiver was set to 120KHz or 1MHz 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 setup producing the maximum emission for the frequency and were placed on top of a 0.8m high non-metallic 1.0X 1.5 meter table.
The EUT, support equipment and interconnecting cables were re-arranged and manipulated to maximize each EME emission.
The turn table containing the system was rotated; the antenna height was varied 1 to 4meter and stopped at the azimuth or height producing the maximum 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 of support equipment, and powering the monitor from the floor mounted outletbox and computer aux AC outlet,if applicable; which ever determined the worst case emission.
Each EME reported was calibrated using the R/S signal generator.

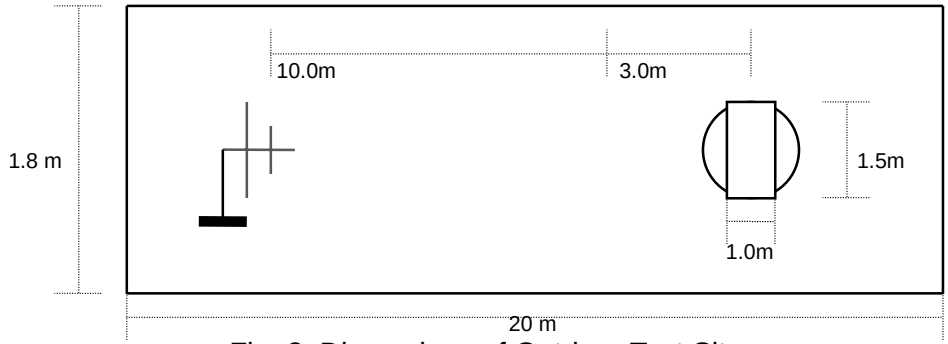


Fig. 3. Dimensions of Outdoor Test Site

SUPPORT EQUIPMENT USED

Description	Model No.	Spec.	Manufacture	S/N	Remark
DVD Player (EUT)	PYPDPC-5R3	120V/60Hz	Thomson	N/A	1.5 M Non Shield Cable
RCA Cable	-	-	-	N/A	1.2 M Shield Cable
S-Video Cable	-	-	-	N/A	1.5 M Shield Cable
Component Video	-	-	-	N/A	1.5 M Shield Cable
Television	TLV-1491XKT	NTSC/PAL	ANAM	N/A	
Notebook	CM2080	P-III	Compaq	5Y12FP74KC49	
Printer	HP692C		HP	SG74TIC206	1.2m Shield D-sub cable
RS-232C	-	-	-	-	1.5m Shielded
Keyboard	SDM4500P	-	Samsung	-	1.8m shield Din cable
PS/2 Mouse	Intellimouse	-	Microsoft Co.	5299	1.8m shield Din cable
Test Disc	TDV-540	-	ABEX	N/A	

TEST DATA

Conducted Emissions

FCC ID : PYPDPC-5R3

1. Test Mode : DVD Play (*Test DVD Disc 1kHz Signal & Color Bar: RS-232 Port Control*)

FREQ (MHz)	LEVEL(dBμV)	LINE	LIMIT(μV)	(μV)	MARGIN*(dB)
0.45	33.5	L1	250	47.32	14.5
0.86	33.7	L1	250	48.42	14.3
1.81	32.9	N	250	44.16	15.1
4.42	32.0	N	250	39.81	16.0
10.96	35.7	N	250	60.95	12.3
18.40	35.4	N	250	58.88	12.6

2. Test Mode : DVD Play (*Test DVD Disc 1kHz Signal & Color Bar*)

FREQ (MHz)	LEVEL(dBμV)	LINE	LIMIT(μV)	(μV)	MARGIN*(dB)
0.45	40.2	L1	250	102.33	7.8
0.65	40.2	L1	250	102.45	7.8
1.36	40.5	N	250	105.93	7.5
3.76	44.0	N	250	158.49	4.0
10.29	39.2	L1	250	91.20	8.8
18.06	35.9	N	250	62.37	12.1

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 device is 250μV from 450 kHz to 30MHz.***
3. ***Line L1 = Hot Line N = Neutral***

* *Measurements using CISPR quasi-peak mode*

Tested by ***Jae Young, Yu***

TEST DATA

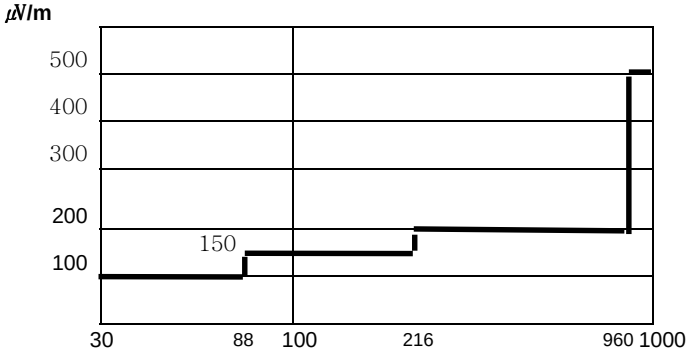
Radiated Emissions

FCC ID : PYPDPC-5R3
Test Mode : DVD Play (*Test DVD Disc 1kHz Signal & Color Bar: RS-232 Port Control)*

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	AFCL+ Amp. (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
110.18	47.6	H	-18.3	29.3	43.5	14.2
121.50	56.7	H	-18.0	38.7	43.5	4.8
184.32	49.9	H	-14.4	35.5	43.5	8.0
210.05	48.1	V	-14.5	33.6	43.5	9.9
225.07	53.2	V	-14.1	39.1	46.0	6.9
240.07	51.9	V	-13.7	38.2	46.0	7.8
242.56	48.9	V	-13.7	35.2	46.0	10.8
270.08	50.7	V	-13.0	37.7	46.0	8.3
482.31	43.1	V	-7.5	35.6	46.0	10.4
607.52	43.9	V	-4.2	39.7	46.0	6.3
729.02	43.5	V	-1.0	42.5	46.0	3.5
854.68	34.4	V	2.1	36.5	46.0	9.5

* Above 1GHz : Not significant or detectable.

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 500μV/m.***

Fig. 4. Limits at 3 meters

* ***Pol. H =Horizontal V=Vertical***

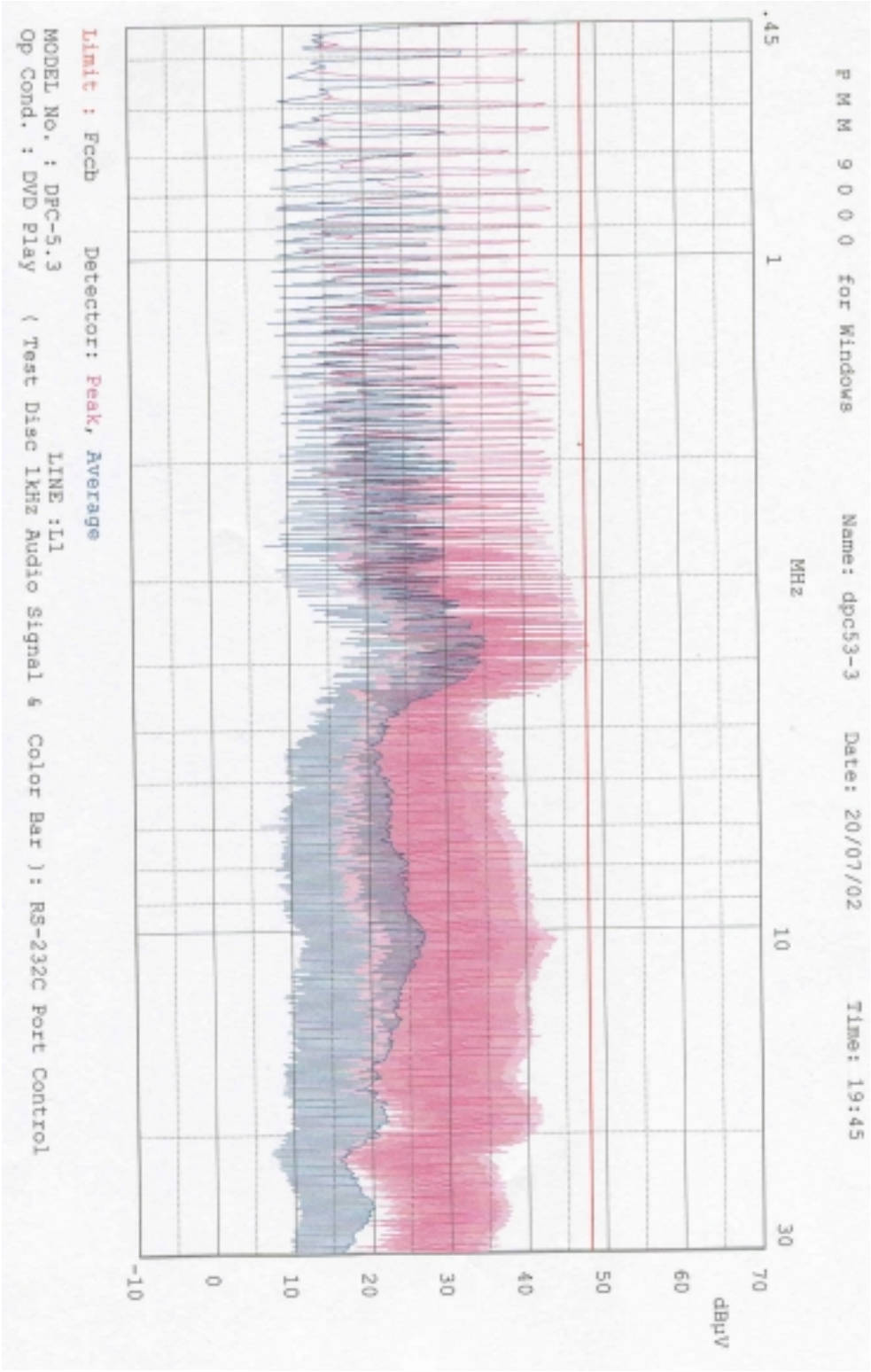
** ***AFCL+Amp. = Antenna Factor + Cable Loss + Amplifier.***

*** ***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 **Jae Young, Yu**

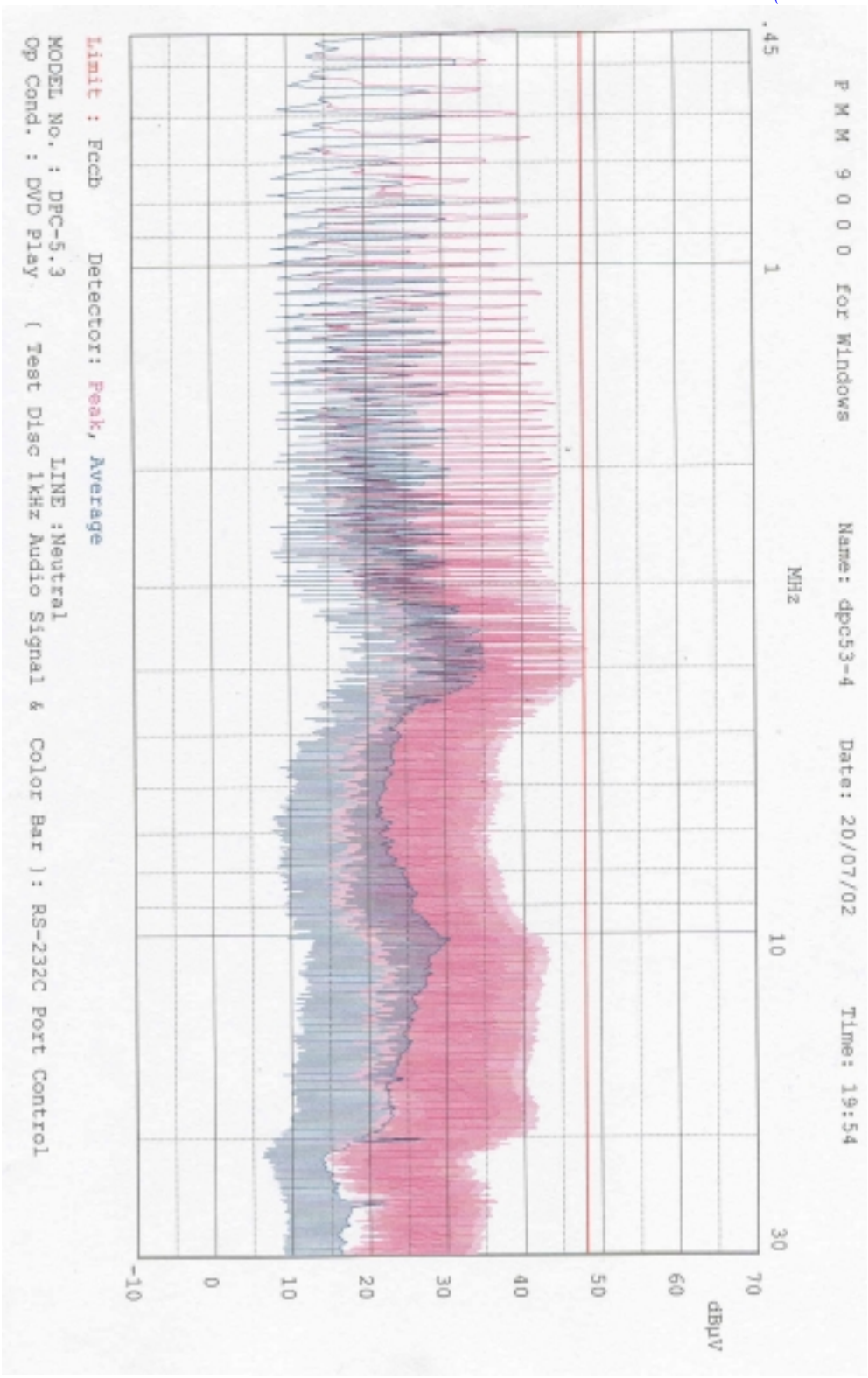
PLOTS OF EMISSIONS

1-1. DVD Play (L1)
(RS-232 Port Controlled)



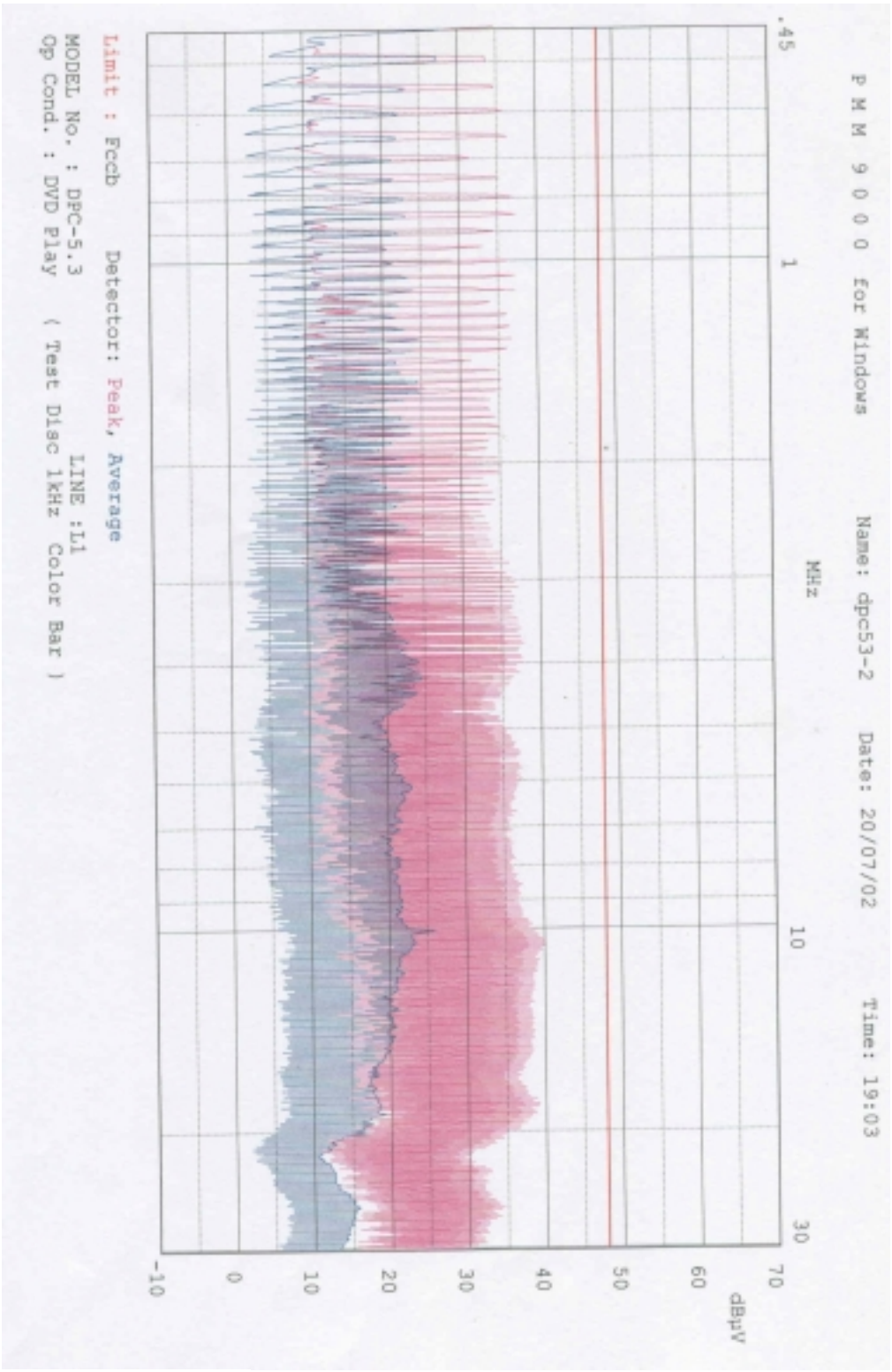
Tested **Jae-Young, Yu**

1-2. DVD Play (Neutral)
(RS-232 Port Controlled)



Tested **Jae-Young, Yu**

2-1. DVD Play (L1)



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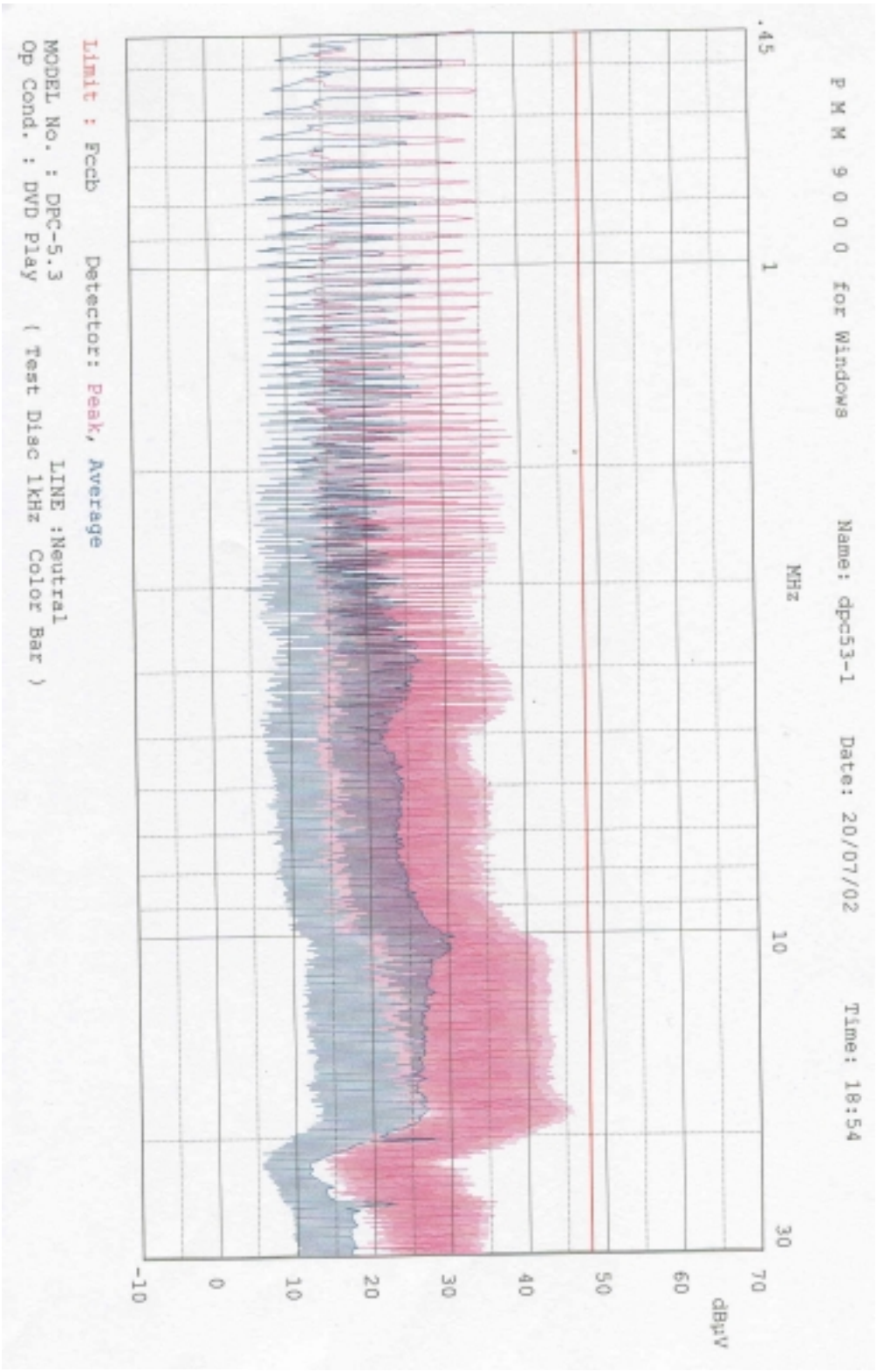
2-2. DVD Play (Neutral)



Tested **Jae-Young, Yu**

SAMPLE CALCULATIONS

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

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

EX. 1.

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

Reading = 40.8 dBμN (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 dBμN/m

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

1. Radiation Uncertainty Calculation

Contribution	Probability Distribution	Uncertainty(+/-dB)
Antenna Factor	Normal (k=2)	± 0.5
Cable Loss	Normal (k=2)	± 0.04
Receiver Specification	Rectangular	± 2.0
Antenna directivity	Rectangular	± 1.0
Antenna Factor variation with Height		
Antenna Phase Center Variation		
Antenna Factor Frequency Interpolation		
Measurement Distance Variation		
Site Inperfections	Rectangular	± 2.0
Mismatch:Receiver VRC ri=0.3 Antenna VRC rR=0.1(Bi)0.4(Lp) Uncertainty Limits 20Log(1+/-ri rR)	U-Shaped	+ 0.25 / - 0.26
System Repeatibilty	Std.deviation	± 0.05
Repeatability of EUT	-	-
Combined Standard Uncertainty	Normal	± 1.77
Expended Uncertainty U	Normal (k=2)	± 3.5

2. Conducted Uncertainty Calculation

Contribution	Probability Distribution	Uncertainty(+/-dB)
Receiver Specification	Normal (k=2)	± 2.0
LISN coupling spec.	Normal (k=2)	± 0.4
Cable and input attenuator cal.	Rectangular	± 0.4
Mismatch:Receiver VRC ri=0.3 LISN vrc rg=0.1 Uncertainty Limits 20Log(1+/-ri rR)	U-Shaped	± 0.26
System Repeatibilty	Std.deviation	± 0.68
Repeatability of EUT	-	-
Combined Standard Uncertainty	Normal	± 1.18
Expended Uncertainty U	Normal (k=2)	± 2.4

TEST EQUIPMENT

No.	Instrument	Manufacturer	Model	Due to Calibration
1. EMI TEST SYSTEM				
1	* Test Receiver	R & S	ESCS 30	2003. 02
2	* Test Receiver	PMM	PMM9000	2003. 06
3	* Amplifier	HP	8447F	2002. 11
4	* Amplifier	HP	8447F	2002. 08
5	Spectrum Analyzer	Advantest	R4136	2003. 03
6	* Logbicon Super Antenna	Schwarzbeck	VULB9166	2003. 02
7	Log-Periodic Antenna	R & S	HL025	2004. 02
8	Dipole Antenna	Schwarzbeck	VHA9103	2003. 05
9	Dipole Antenna	Schwarzbeck	UHA9105	2003. 05
10	Biconical Log Antenna	ARA	LPB-2520/A	2004. 01
11	Asorbing Clamp	R & S	MDS21	2002. 03
12	High Voltage Probe	R & S	ESH2-Z3	2002. 09
13	Signal Generater	R & S	SMP02	2002. 12
14	* Matching Pad	R & S	RAM358_5414.02	2003. 05
15	* LISN	R & S	ESH3-Z5	2002. 10
16	* LISN	PMM	L3-9103	2002. 06
17	LISN	Kyoritsu	KNW-407	2003. 04
18	LISN	Kyoritsu	KNW-407	2003. 04
19	* Position Controller	EM Eng.	N/A	N/A
20	* Turn Table	EM Eng.	N/A	N/A
21	* Antenna Mast	EM Eng.	N/A	N/A
22	* Anechoic Chamber	EM Eng.	N/A	N/A
23	* Shielded Room	EM Eng.	N/A	N/A

*) Test Equipment used during the test.

No.	Instrument	Manufacturer	Model	Due to Calibration
2. RADIATED IMMUNITY SYSTEM				
1	Signal Generator	R & S	SMY01	2003. 04
2	Function Generator	HP	33.20A	2003. 04
3	Power Amplifier	Noiseken	NA25MF1G2010C	2002. 11
4	Power Sensor	HP	8482A	2003. 04
5	Power Meter	HP	E4419B	2003. 04
6	Biconical Antenna	EMCO	3109	2003. 05
7	Biconical log Antenna	ARA	LPB-2520/A	2003. 05
8	Wideband field probe	CHASE	EMC-20	2003. 03
3. CONDUCTED IMMUNITY SYSTEM				
1	Power Amplifier	Noiseken	NA01K80M5C	2002. 11
2	Current Monitor Probe	FCC	NMP-33-1	2003. 03
3	Attenuator	TME	CFA-10NPJ-20	
4	Attenuator	TME	CFA-100ANJJ-3	
5	CDN	FCC	NCDN-M1-16A	2002. 06
6	CDN	FCC	NCDN-M2-16A	2002. 06
7	CDN	FCC	NCDN-M3-16A	2002. 06
8	CDN	FCC	NCD-T2	2002. 06
9	CDN	FCC	NCD-T4	2002. 06
10	150-50ohm adapter	FCC	NCDN-150-50-CF	2002. 09
11	Termination	TME	CT-01BP	N/A
12	Termination	TME	CT-10NP	N/A
13	EM Clamp	FCC	NEM-32mm EM Clamp	2002. 09

*) Test Equipment used during the test.

RECOMMENDATION/CONCLUSION

The data collected shows that the ***Thomson Multimedia Hong Kong Ltd.*** **FCC ID: PYPDPC-5R2, 5 DVD Changer Player.** complies with §15.107 and 15.109 and 15.111 of the FCC Rules. The highest emission observed was at **3.76 MHz** for conducted emissions with a margin of **4.0 dB** and at **729.02 MHz** for radiated emissions with a margin of **3.5 dB**.

APPENDIX E – USER'S MANUAL

APPENDIX F – Schematic Diagrams