

Nemko Korea CO., Ltd.

300-2, Osan-Ri, Mohyun-Myun, Yongin-City, Kyungki-Do, KOREA

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FCC PART 15 Class II Permissive Change

Applicant :

DIGITAL CYNOS CO., LTD.
3-906, DaeRyung Technotown, 448,
Gasan-dong, Geumcheon-Gu, Seoul, Korea
Attn : Mr. Hyun Chul Choi

Dates of Issue : September 24, 2003
Test Report No. : NK2DE569
Test Site : Nemko Korea Co., Ltd.
EMC site, Korea

FCC ID

QEWDPCM-17WT

Brand Name

CYNOS

CONTACT PERSON

Digital Cynos Co., Ltd.
3-906, DaeRyung Technotown 448, Gasan-dong
Geumcheon-gu, Seoul, Korea
Mr. Hyun Chul Choi
Telephone No. : +82 2 2107 3450

Applied Standard:

FCC 47 CFR Part 15, Subpart B : 2000

Classification :

FCC Class B Device

EUT Type:

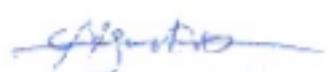
17" Wide TFT-LCD TV Monitor

The device bearing the brand name and FCC ID 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.



Tested By : S. H. Baek
Senior Engineer



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

TABLE OF CONTENTS

SCOPE	3
INTRODUCTION (Site Description)	4
TEST CONDITIONS & EUT INFORMATION	5
SUMMARY OF TEST RESULTS	7
RECOMMANDATION / CONCLUSION	7
SAMPLE CALCULATION	7
DESCRIPTION OF TESTS (Conducted Emissions)	8
DESCRIPTION OF TESTS (Radiated Emissions)	9
DESCRIPTION OF TEST (Antenna-conducted Power Emissions)	10
TEST DATA (Conducted Emissions)	11
TEST DATA (Radiated Emissions)	12
TEST DATA (Antenna-conducted Power Emissions)	13
PLOT OF EMISSIONS (Conducted Emissions Diagram)	15
ACCURACY OF MEASUREMENT	17
TEST EQUIPMENT	18
APPENDIX A - LABELLING REQUIREMENTS	19
APPENDIX B - CIRCUIT DIAGRAM	20
APPENDIX C - PHOTOGRAPHS OF TEST SET-UP	21
APPENDIX D - EUT PHOTOGRAPHS	24
APPENDIX E - USER'S MANUAL	42
APPENDIX F - SCHEMATIC DIAGRAM	43

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 :	Digital Cynos Co., Ltd.
Contact Person :	Mr. Hyun Chul Choi
	Tel No.: +82 2 2107 3450
	Fax No.: +82 2 2107 3454
Manufacturer :	Digital Cynos Co., Ltd. 3-906, DaeRyung Technotown 448, Gasan-dong Geumcheon-gu, Seoul, Korea Tel : +82 2 2107 3450 / Fax : +82 2 2107 3454

- FCC ID: QEWDCM-17WT
- Basic Model: (1) DCM-17WT
- Alternate Model: (2) HTL-1702
- Brand Name: (1) CYNOS (2) HYUNDAI
- EUT Type: 17" Wide TFT-LCD TV Monitor
- Adapter Voltage: Input : 100-240V AC, 50/60Hz
Output : 12V DC, 4.16A
- Classification: FCC Class B
- Applied Standard: FCC 47 CFR Part 15 , Subpart B
- Test Procedure(s): ANSI C63.4 (1992)
- Dates of Test: September 01, 2003 to September 23, 2003
- Place of Tests: Nemko Korea Co., Ltd. EMC Site
- Test Report No.: NK2DE569

Description of the Changes according to FCC part 2.1043

1. Add the Main Board (DCMP-60E Ver 1.3, Digital Cynos Co., Ltd.)
2. Add the Tuner Board (TCPN9082DA27D(T), Samsung Electro-Mechanics Co., Ltd.)
3. Add the LCD Panel (LM171W01, LG Philips LCD Co., Ltd.)

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 **Digital Cynos Co., Ltd.**

FCC ID : **QEWDCM-17WT, 17" Wide TFT-LCD TV Monitor.**

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 80 kilometers (48 miles) southeast and Incheon International Airport (Incheon 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.



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Fig. 1. The map above shows the Seoul in Korea vicinity area.

The map also shows Nemko Korea Corporation Ltd. EMC Lab. and Incheon Airport.

TEST CONDITIONS & EUT INFORMATION

Operating During Test

The EUT was operated by the software. The PC sent "H" pattern to monitor(EUT) and The monitor displayed "H" pattern on screen. It also sent "H" pattern to printer, then the printer printed it out. This software had above all functions conduct in order.

The receiver was tuned to the output frequency of color bar signal generator, with a pattern defined as 100/0/75/0 in the CCIR recommendation 471.

Support Equipment

PC	Dell computer, M/N: Dimension 450 1.8m unshielded AC power cable	S/N: B56481S
17" Wide TFT-LCD TV Monitor (EUT)	Digital Cynos Co., Ltd., FCC ID: QEWD-17WT 1.5m shielded Dsub cable	S/N: N/A
AC/DC Adaptor (Monitor)	L.S.E., M/N: LSE9901B1250 1.8m unshielded AC power cord 1.5m Shielded DC power cable	S/N: 12097-0000
Keyboard	Silitek Yet Foundate, M/N: SK-1688 1.8m unshielded Din cable	S/N: N/A
PS/2 Mouse	Logitech, M/N : 851028-1000 1.5m unshielded Din cable	S/N: HCA11814927
USB Mouse	Immanuel Elec., M/N: OMS3CE 1.5m Shielded USB cable	S/N: N/A
Serial Mouse	IO.TEC , M/N: LASER MOUSE 1.5m unshielded Dsub cable	S/N: N/A
Printer	H.P., M/N: C4562K 1.8m Shielded Dsub cable	S/N: SG74T1C206
AC/DC Adaptor (Printer)	NMB, M/N: C2182A 1.8m unshielded AC power cord 1.5m unshielded DC power cable	S/N: 230597
Speaker	Gounsori, M/N: DS.9802 1.2m unshielded stereo jack cable	S/N: N/A

EUT Information

Clock	14.318MHz(X301), 24.576MHz(X701)
Chipset(s)	AD9883(IC4), SAA7114(IC701), PW165A(IC301)
Sync frequency	Vertical 56-85Hz
	Horizontal 30 - 61 KHz
LCD Panel	LTM171W01 / LG Philips LCD Co., Ltd.
TV Receiving Channel	VHF 2- 13 CH
	UHF 14-69 CH
Power consumption	40W (Max.)
Port(s)	VGA, S-Video, Composite Video In, Audio L, R In/Out, TV antenna

Description of Test Modes

The EUT was pre-tested under the following resolutions mode:

1. 1280 X 768 (60.015Hz/ 47.712kHz), clock frequency 80.136MHz
2. 1024 X 768 (75.029Hz/ 60.023kHz), clock frequency 78.75MHz
3. 800 X 600 (75Hz/ 46.875kHz), clock frequency 49.5MHz
4. 640 X 480 (75Hz/ 37.5kHz), clock frequency 31.5MHz

The worst emission level was found when the EUT was tested under 1280 X 768 resolution, therefore, the test data of this mode was recorded in the report.

SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specification:

Name of Test	Paragraph No.	Result	Remark
Conducted Emission	15.107	Complies	
Radiated Emission	15.109	Complies	
Radiated Emission	15.111	Complies	

RECOMMENDATION/CONCLUSION

The data collected shows that the **Digital Cynos Co., Ltd.**

FCC ID : **QEWDPCM-17WT, LCD Monitor.** complies with § 15.107 ,15.109 and 15.111 of the FCC Rules.

The highest emission observed was at **0.18 MHz** for conducted emissions with a margin of **14.1 dB**, at **540.00 MHz** for radiated emissions with a margin of **3.2 dB** and at **1598.00 MHz** for antenna power conducted emissions with a margin of **15.9 dB**.

SAMPLE CALCULATION

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

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

EX. 1.

@57.7 MHz

Class B limit = 100 $\mu\text{V}/\text{m}$ = 40.0 dB $\mu\text{V}/\text{m}$

Reading = 19.1 dB μV (calibrated level)

Antenna factor + Cable Loss = 10.12 dB

Total = 29.22 dB $\mu\text{V}/\text{m}$

Margin = 40.0 - 29.22 = 10.78

10.78 dB below the limit

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 1m X 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 (ESH3-Z5) and Kyoritsu (KNW-407) of the 50ohm/50uH Line Impedance Stabilization Network(LISN) are bonded to the shielded room.

The EUT is powered from the Rohde & Schwarz LISN and the support equipment is powered from the Kyoritsu 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 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 150kHz 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 were set to CISPR quasi-peak mode & average 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 outlet box 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.

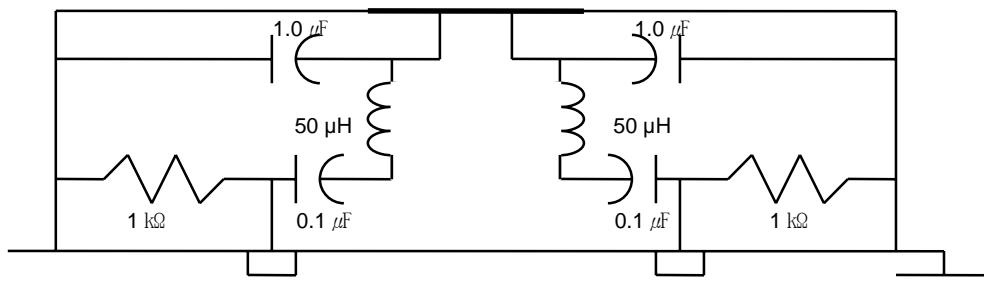


Fig. 2. LISN Schematic Diagram

DESCRIPTION OF TESTS

Radiated Emissions

Preliminary measurement were made indoors at 3 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 Technology 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 1000MHz using Biconical log Antenna(ARA, LPB-2520/A). 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 or Average 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 Technology 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 outlet box 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.

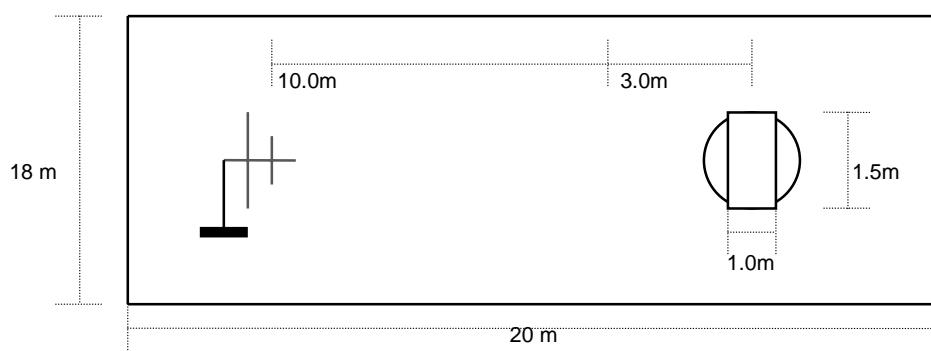


Fig. 3. Dimensions of Outdoor Test Site

DESCRIPTION OF TESTS

Antenna-Conducted Power Measurements

Power on the receive antenna terminals was to be determined by measurement of the voltage present at these terminals.

Antenna –conducted power measurements was performed with the EUT antenna terminals connected directly to measuring instrument (Rohde&Schwarz, ESCS 30) using a impedance-matching network(Rohde&Schwarz, RAM358.5414.02) to connect the measurement instrument to the antenna terminals of the EUT. Losses in decibels in impedance-matching network used was added to the measured values in dBuV.

With the receiver tuned to one of the number of frequency and voltage present at the antenna input terminals over the frequency range specified in the individual equipment requirements.

The measurements was repeated with the receiver tuned to another frequency until the number of frequencies had been successively measured.

Power on the receive antenna terminals in the ratio of V^2/R , where V is the loss-corrected voltage measured at the antenna terminals, and R is the impedance of the measuring instrument.

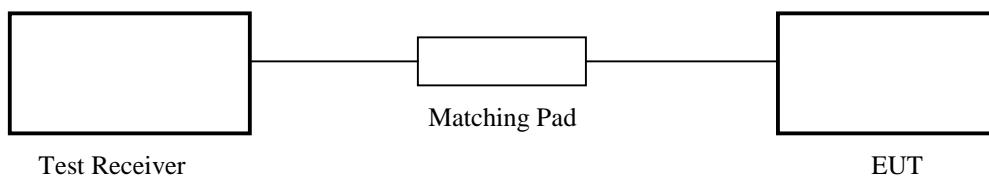


Fig. 4. Description of Test

TEST DATA

Conducted Emissions

FCC ID : QEWDCM-17WT

Frequency (MHz)	Level(dB μ N)		Line	Limit(dB μ N)		Margin(dB)	
	Q-Peak	Average		Q-Peak	Average	Q-Peak	Average
0.15	39.1	5.0	L	66.0	56.0	26.9	51.0
0.18	50.4	42.5	N	64.5	54.5	14.1	12.0
3.77	41.0	35.8	L	56.0	46.0	15.0	10.2
3.87	40.7	35.4	N	56.0	46.0	15.3	10.6
4.13	39.0	34.7	L	56.0	46.0	17.0	11.3
4.17	38.5	31.6	N	56.0	46.0	17.5	14.4

Table 1. Line Conducted Emissions Tabulated Data

NOTES:

Baek Sung-hun

Tested by S. H. Baek

TEST DATA

Radiated Emissions

FCC ID : QEWDPCM-17WT

Frequency (MHz)	Reading (dB μ W)	Pol* (H/V)	AF+CL+Amp (dB)**	Result (dB μ W/m)	Limit (dB μ W/m)	Margin (dB)
190.37	49.5	H	-13.5	36.0	43.5	7.5
224.57	45.3	H	-13.1	32.2	46.0	13.8
540.00	48.0	H	-5.2	42.8	46.0	3.2
647.97	34.7	V	-2.3	32.4	46.0	13.6
701.96	32.9	H	-0.9	32.0	46.0	14.0
756.02	31.1	V	0.5	31.6	46.0	14.4

Table 2. Radiated Measurements at 3meters

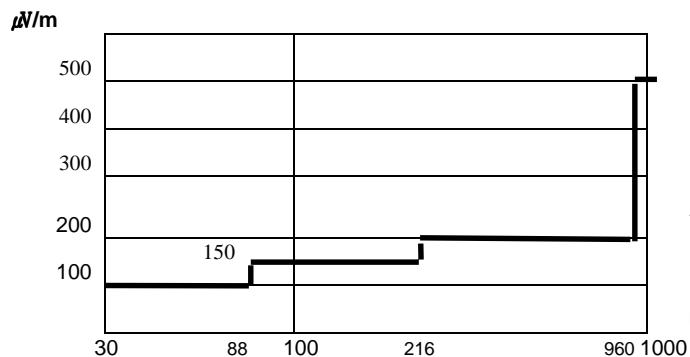


Fig. 5. Limits at 3 meters

NOTES:

1. All modes of operation were investigated the worst-case emission are reported.
2. The radiated limits are shown on Figure 5. Above 1GHz the limit is 500 μ V/m.

NOTES:

1. *Pol. H =Horizontal V=Vertical
2. **AF+CL+Amp. = Antenna Factor + Cable Loss + Amplifier.
3. The limit for Class B device is on the FCC Part section 15.109(a).
4. 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.

Baek Sungkun

Tested by **S. H. Baek**

TEST DATA

Antenna-Conducted Power Measurements

FCC ID : QEWDCM-17WT

CHANNEL	Frequency (MHz)	Reading (dB μ W)	MPL ** (dB)	Result (dB μ W)	Limit		Margin (dB)
					(nW)	(dB μ W)	
2	101.00	3.2	7.8	11.0	2.0	50.0	39.0
	202.00	3.0	7.8	10.8	2.0	50.0	39.2
3	107.00	3.6	7.8	11.4	2.0	50.0	38.6
	214.00	3.0	7.8	10.8	2.0	50.0	39.2
4	113.00	4.0	7.8	11.8	2.0	50.0	38.2
	226.00	3.5	7.8	11.3	2.0	50.0	38.7
5	123.00	5.0	7.8	12.8	2.0	50.0	37.2
	246.00	3.6	7.8	11.4	2.0	50.0	38.6
6	129.00	5.6	7.8	13.4	2.0	50.0	36.6
	258.00	3.6	7.8	11.4	2.0	50.0	38.6
7	221.00	8.0	7.8	15.8	2.0	50.0	34.2
	442.00	6.7	7.8	14.5	2.0	50.0	35.5
8	227.00	8.0	7.8	15.8	2.0	50.0	34.2
	454.00	8.3	7.8	16.1	2.0	50.0	33.9
9	233.00	7.8	7.8	15.6	2.0	50.0	34.4
	466.00	10.8	7.8	18.6	2.0	50.0	31.4
10	239.00	7.7	7.8	15.5	2.0	50.0	34.5
	478.00	13.8	7.8	21.6	2.0	50.0	28.4
11	245.00	7.4	7.8	15.2	2.0	50.0	34.8
	490.00	16.0	7.8	23.8	2.0	50.0	26.2
12	251.00	7.3	7.8	15.1	2.0	50.0	34.9
	502.00	16.4	7.8	24.2	2.0	50.0	25.8
13	257.00	7.2	7.8	15.0	2.0	50.0	35.0
	514.00	15.4	7.8	23.2	2.0	50.0	26.8
14	517.00	7.9	7.8	15.7	2.0	50.0	34.3
	1034.00	20.7	7.8	28.5	2.0	50.0	21.5
19	547.00	8.1	7.8	15.9	2.0	50.0	34.1
	1094.00	25.9	7.8	33.7	2.0	50.0	16.3
28	601.00	8.5	7.8	16.3	2.0	50.0	33.7
	1202.00	25.3	7.8	33.1	2.0	50.0	16.9
36	649.00	9.3	7.8	17.1	2.0	50.0	32.9
	1298.00	25.2	7.8	33.0	2.0	50.0	17.0
44	697.00	11.1	7.8	18.9	2.0	50.0	31.1
	1394.00	24.4	7.8	32.2	2.0	50.0	17.8
53	751.00	18.1	7.8	25.9	2.0	50.0	24.1
	1502.00	25.8	7.8	33.6	2.0	50.0	16.4
61	799.00	17.0	7.8	24.8	2.0	50.0	25.2
	1598.00	26.3	7.8	34.1	2.0	50.0	15.9
69	847.00	22.1	7.8	29.9	2.0	50.0	20.1
	1694.00	24.6	7.8	32.4	2.0	50.0	17.6

Table 3. Antenna-Conducted Power Measurements

NOTES:

1. ****MPL = Impedance Matching Network Loss**
2. **Measurements using CISPR quasi-peak mode. The limits is 2.0 nanowatts as the FCC part section 15.111.**
3. **The Antenna-conducted power test data isn't related to application for Certification, only this data was recorded as manufacturer's request**



Tested by **S. H. Baek**

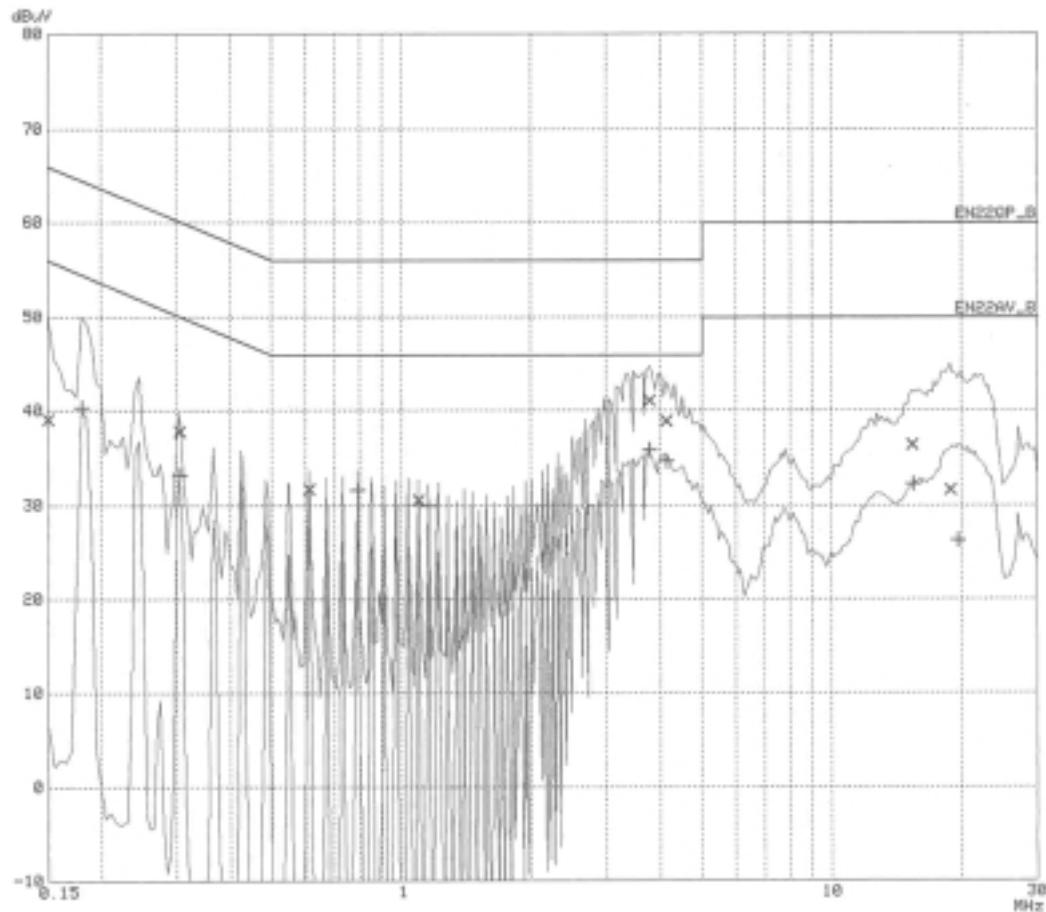
PLOTS OF EMISSIONS

- Conducted Emission at the Mains port (Line)

Scan Settings (1 Range)
----- Frequencies -----|----- Receiver Settings -----!
Start Stop Step IF BW Detector M-Time Atten Preamp
150k 30M 5k 9k PK+AV 20ms AUTO LN OFF

Transducer No. Start Stop Name
20 9k 30M LISN_RS

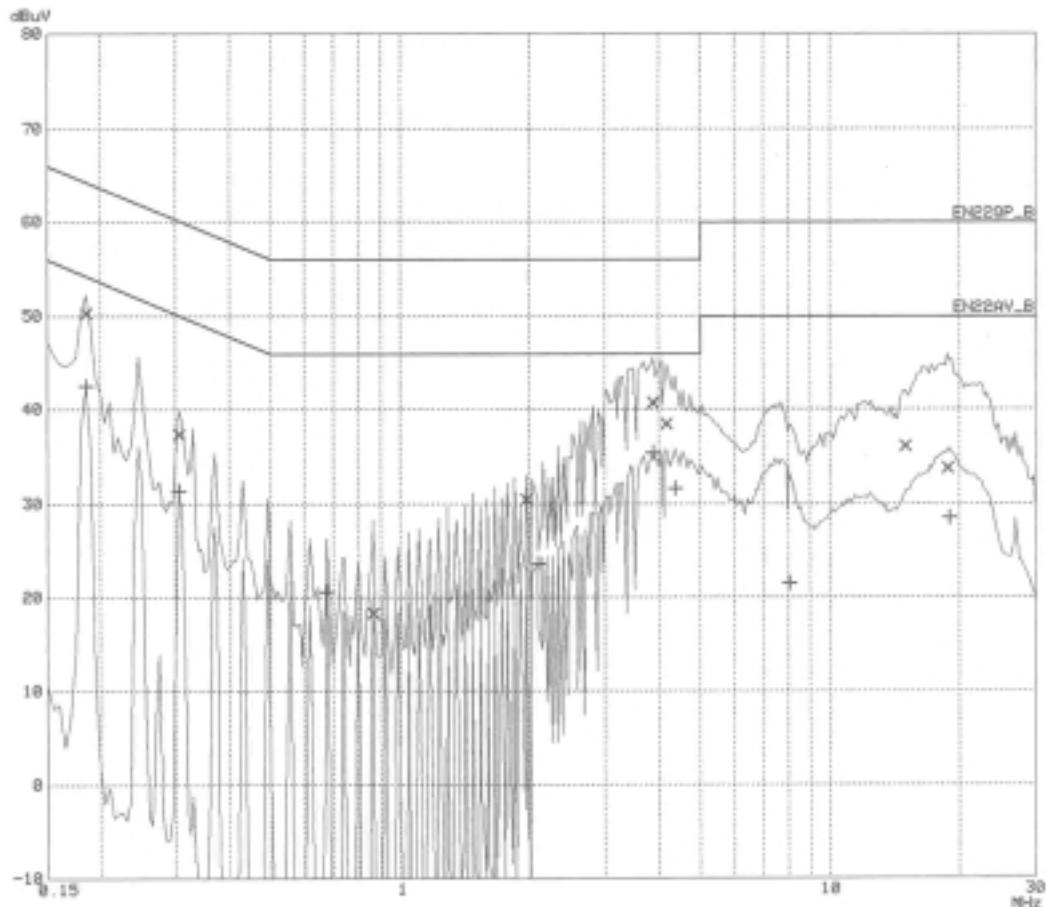
Final Measurement: x QP / + AV
Meas Time: 200 ms
Subranges: 8
Acc Margin: 50dB



PLOTS OF EMISSIONS

- Conducted Emission at the Mains port (Neutral)

Scan Settings (1 Range)
----- Frequencies -----|----- Receiver Settings -----|
Start Stop Step IF BW Detector M-Time Atten Preamp
150k 30M 5k 9k PK+AV 20ms AUTO LN OFF
Transducer No. Start Stop Name
20 9k 30M LISN_RS
Final Measurement: x QP / + AV
Meas Time: 200 ms
Subranges: 8
Acc Margin: 50dB



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 Imperfections	Rectangular	± 2.0
Mismatch:Receiver VRC ri=0.3	U-Shaped	+ 0.25 / - 0.26
Antenna VRC rR=0.1(Bi)0.4(Lp)		
Uncertainty Limits 20Log(1+/-ri rR)		
System Repeatability	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	U-Shaped	± 0.26
LISN vrc rg=0.1		
Uncertainty Limits 20Log(1+/-ri rR)		
System Repeatability	Std.deviation	± 0.68
Repeatability of EUT	-	-
Combined Standard Uncertainty	Normal	± 1.18
Expended Uncertainty U	Normal (k=2)	± 2.4

TEST EQUIPMENT

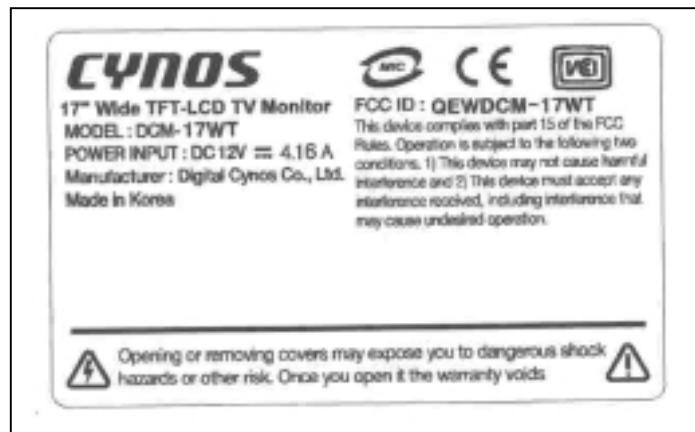
No.	Instrument	Manufacturer	Model	Calibration Date
1	*Test Receiver	R & S	ESCS 30	2003.09
2	Test Receiver	PMM	PMM9000	2003.06
3	Amplifier	HP	8447F	2003.07
4	*Amplifier	HP	8447F	2002.11
5	*Amplifier	HP	8447F	2003.01
6	*Spectrum Analyzer	Advantest	R4136	2003.03
7	Spectrum Analyzer	H.P	8566B	2003.03
8	*Logbicon Super Antenna	Schwarzbeck	VULB9166	2003.05
9	Log-Periodic Antenna	R & S	HL025	2003.01
10	Dipole Antenna	R & S	VHA9103	2003.05
11	Dipole Antenna	R & S	UHA9105	2003.05
12	*Biconical Log Antenna	ARA	LPB-2520/A	2003.05
13	Asorbing Clamp	R & S	MDS21	2003.06
14	High Voltage Probe	R & S	ESH2-Z3	2002.10
15	Signal Generater	R & S	SMP02	2002.12
16	*Matching Pad	R & S	RAM358.5414.02	2003.05
17	*LISN	R & S	ESH3-Z5	2002.10
18	LISN	Kyoritsu	KNW-408	2002.12
19	*LISN	Kyoritsu	KNW-407	2003.04
20	*Position Controller	EM Eng.	N/A	N/A
21	*Turn Table	EM Eng.	N/A	N/A
22	*Antenna Mast	EM Eng.	N/A	N/A
23	*Anechoic Chamber	EM Eng.	N/A	N/A
24	*Shielded Room	EM Eng.	N/A	N/A

*) Test equipment used during the test

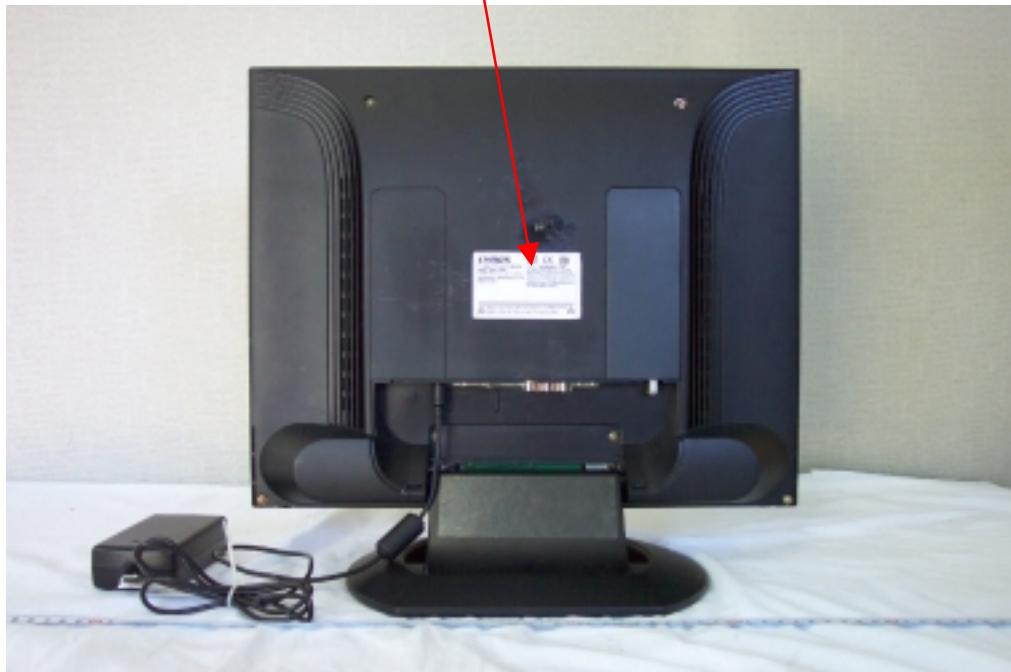
APPENDIX A – LABELLING REQUIREMENTS

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.



● FCC ID Location of EUT



APPENDIX B – CIRCUIT DIAGRAM

APPENDIX E – USER'S MANUAL

APPENDIX F – SCHEMATIC DIAGRAM
