Certification of Compliance

CFR 47 Part 15 Subpart B

Test Report File No. : 04-IST-0161 Date of Issue : June 17, 2004

Model(s) : E17XE

Kind of Product : LCD Monitor

Applicant : HIKARI INNOVISION Co., Ltd

Address : #410 BI Center Daegu Polytechnic College,
San 395 Manchon3-dong, Susung-gu, Daegu, Korea

Manufacturer : HIKARI INNOVISION Co., Ltd

Address : #410 BI Center Daegu Polytechnic College,
San 395 Manchon3-dong, Susung-gu, Daegu, Korea

Test Result ■ **Positive** ☐ **Negative**

Reviewed By

J. H. Lee / EMC Group Manager

Approved By

G. Chung / Chief

- Investigations requested : Measurement to the relevant clauses of F.C.C rules and regulations Part 15 Subpart B (Unintentional Radiators, Class B) – Class B PC Peripherals
  The test report with appendix consists of 17 pages.
- The test result only responds to the tested sample.
- It is not allowed to copy this report even partly without the allowance of IST EMC Laboratory.
- This equipment as for has been shown to be capable of continued compliance 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 2001.

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TEST REGULATIONS

The tests were performed according to the following regulations ;

FCC Part 15, Subpart B (Unintentional Radiators, Class B)

INFORMATIONS OF TEST LABORATORY

EMC LABORATORY of IST Co., Ltd. ***(FCC Filing Lab.)***
San 21-8, Goan-Ri, Baekam-Myun, Yongin-City
Kyonggi-Do, 449-860, Korea
TEL : +82 31 333 4093 FAX : +82 31 333 4094

ENVIRONMENTAL CONDITIONS

Temperature	22 ℃
Humidity	44 %
Atmospheric pressure	1014 mbar

MEASUREMENT UNCERTAINTY

The measurement uncertainty was evaluated for all test items listed in this report. Also it, " The evaluation and treatment of uncertainty ", is described in IST Quality Manual according to ISO17025 Guide. The data and results described in this report are true and include evaluated uncertainty. It may cause some deviation of uncertainty by change component or process of the test for similar products.

POWER SUPPLY SYSTEM USED

Power supply system	AC 120Vac, 60Hz (Refer to the product information)

PRODUCT INFORMATION

LCD	Type: 17” a-si TFT LCD (liquid crystal display)
	Pixel pitch (mm): 0.264(H) x 0.264(V)
	Brightness: 500cd (Typical)
	Display Size: 337.92(H) x 270.336(V)
Max/Recommended Resolution	1280 x 1024 @ 75Hz /1280 x 1024 @ 60Hz
Frequency	Horizontal: 30~80KHz
	Vertical: 55~75Hz
Display Color	16.7M
Input Signal	Analog 0.714Vp-p Positive (75½)
Energy Consumption	Regular Mode: Maximum 35W
	Power Saving Mode: Below 2W
Dimensions	Excluding Base: 65mm X 370mm X 330mm(W x D x H)
	Including Base: 169mm X 370mm X 419mm(W x D x H)
Weight	Net: 5Kg
	Gross: 6.3Kg
Electrical Ratings	AC 100~240V, 50/60Hz, 1.0A

- EMC suppression device is not used during the test.

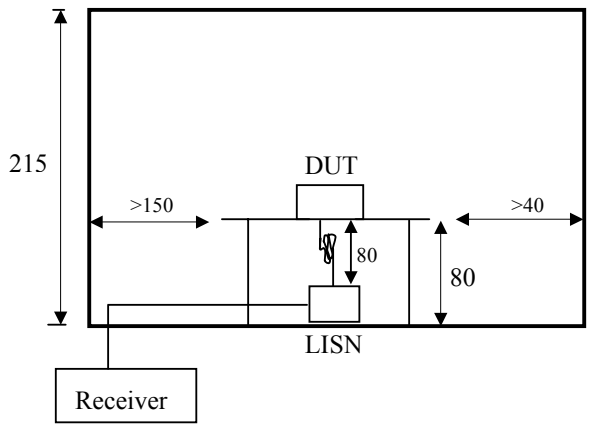
DESCRIPTIONS OF TEST

Conducted Emissions:

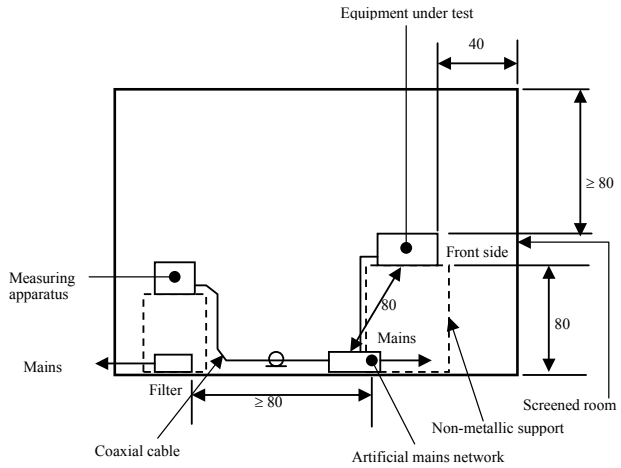
The measurement were performed over the frequency range of 0.15MHz to 30MHz using a 50Ω/50uH LISN as the input transducer to a Spectrum Analyzer or a Field Intensity Meter. The measurements were made with the detector set for "Peak" amplitude within a bandwidth of 10KHz or for "quasi-peak" & "Average" within a bandwidth of 9KHz.

-Procedure of Test

The line-conducted facility is located inside a shielded room No.1. A 1m X 1.5m wooden table 80cm height is placed 40cm away from the vertical wall and 1.5m away from the other wall of the shielded room. The R/S ESH3-Z5 and EMCO 3825/2 LISN are bonded to bottom of the shielded room. The EUT is located on the wooden table with distance more than 80cm from the LISN and powered from the EMCO LISN .The peripheral equipment is powered from the other LISN. Power to the LISNs are filtered by a noise cut power line filters. All electrical cables are shielded by braided tinned steel tubing with inner ϕ 1.2cm. 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 EMCO LISN. All interconnecting cables more than 1m were shortened by non-inductive bundling to a 1m length. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating conditions. The RF output of the LISN was connected to the R/S receiver to determine the frequency producing the maximum emission from the EUT. The frequency producing the maximum level was reexamined using Quasi-Peak mode by manual measurement, after scanned by automatic Peak mode for frequency range from 0.15 to 30MHz. The bandwidth of the receiver was set to 10kHz. The EUT, peripheral equipment, and interconnecting cables were arranged and manipulated to maximize each EME emission.



< Side View >



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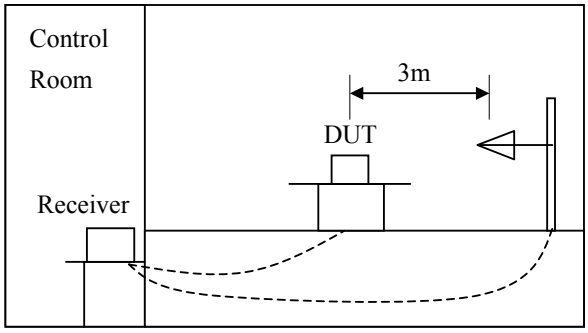
DESCRIPTION OF TEST

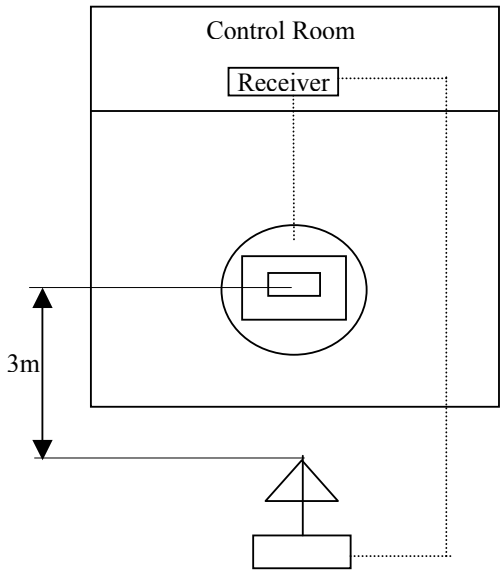
Radiated Emissions:

The measurement was performed over the frequency range of 30MHz to 1GHz using antenna as the input transducer to a Spectrum analyzer or a Field Intensity Meter. The measurement was made with the detector set for "quasi-peak" within a bandwidth of 120KHz.

-Procedure of Test

Preliminary measurements were made at 3 meter using bi-conical and log-periodic antennas, and spectrum analyzer to determine the frequency producing the max. emission in anechoic chamber. Appropriate precaution was taken to ensure that all emission from the EUT were maximized and investigated. The system configuration, mode of operation, turn-table azimuth and height with respect to the antenna were noted for each frequency found. The spectrum was scanned from 30MHz to 300MHz using S/B bi-conical antenna and 300 to 1000MHz using S/B log-periodic antenna. Above 1GHz, linearly polarized double ridge horn antennas were used. Final measurements were made at open site with 3-meters test distance using S/B bi-log antenna or horn antenna. The OATS have been verified in regular for its normalized site attenuation. The test equipment was placed on a wooden table. Sufficient time for the EUT, peripheral 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 re-examined by manual. 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 of type of signal. The EUT, peripheral equipment and interconnecting cables were re-configured to the set-up producing the max. emission for the frequency and were placed on top of a 0.8-meter high nonmetallic 1 x 1.5 meter table. The EUT, peripheral equipment, and interconnecting cables were re-arranged and manipulated to maximize each emission. The turntable containing the system was rotated; the antenna height was varied 1 to 4 meters and stopped at the azimuth or height producing the maximum emission. Each emission was maximized by: varying the mode of operation to the EUT and/or peripheral equipment and changing the polarity of the antenna, whichever determined the worst-case emission.





Equipment Under Test

EUT Type :

■ Table-Top. ☐ Floor-Standing.
☐ Table-Top and Floor-Standing(Combination).

Operation – mode of the E.U.T. :

The equipment under test was operated during the measurement under following conditions :

☐ Standby Mode
■ Operational Condition : 1280x1024, 75Hz
1024x768, 75Hz
800x600, 75Hz
640x480, 75Hz

The test results of followings are the representative of worst case emissions for the available resolution can be adjusted

Configuration of the equipment under test :

Following peripheral devices and interface cables were connected during the measurement :

Equipment	Type	Brand	Serial No.
PC	Brio BA600/550	HP	SG01301176
Keyboard	SK-2502C	HP	M000375059
PS/2 Mouse	M-S48A	HP	LZA00850320
Printer	A0302384	Northern Telecom	26633S60168
Serial Mouse	M-M28	Logitech	LCA53305547

Connecting Interface Cables :
- Unshielded AC power cable : 1.8 m
- Shielded monitor's signal cable (with two ferrite core) : 1.8 m
- Shielded Printer's signal cable (with two ferrite core) : 1.8 m

Note :

SUMMARY

Emissions

■ Conducted Emission

The requirements are (●) MET ( ) Not MET

Minimum limit margin 5.3 dB 8.575 MHz

Maximum limit exceeding

Remarks : **Limits are kept with more than 3dB margin**

With Neutral phase

Find the test data in following pages 10 to 11

■ Radiated Emission

The requirements are (●) MET ( ) Not MET

Minimum limit margin 6.1 dB 176.9 MHz

Maximum limit exceeding

Remarks : **Limits are kept with more than 3dB margin**

Operational Condition : 800 x 600, 75Hz Mode

Find the test data in following page 13

Test Date

Begin of Testing : June 7, 2004.

End of Testing : June 11, 2004.

Prepared By

Note :

- ■ means the test is applicable,
- □ is not applicable.

S.J.Oh / Research Engineer

TEST CONDITIONS AND DATA

Conducted Emissions

[Applicable]

◆ Test Equipment Used

Model Name	Description	Manufacture	Calibration Date	Serial Number
ESH 3	Test Receiver	Rohde & Schwarz	Jul. 22, 2003	892108/018
3725/2	LISN	EMCO	Jul. 23, 2003	9101-2068
KNW-407	LISN	Hyup-Rip	Jul. 23, 2003	8-883-10
ESH 3-Z2	Pulse Limiter	Rohde & Schwarz	Jul. 23, 2003	357.8810.52

◆ Test Accessories Used

Type	Manufacturer
Aneroid Barometer	Sato
Hygrometer	Sato

◆ Test Program Scrolling "H" Patterns on the windows

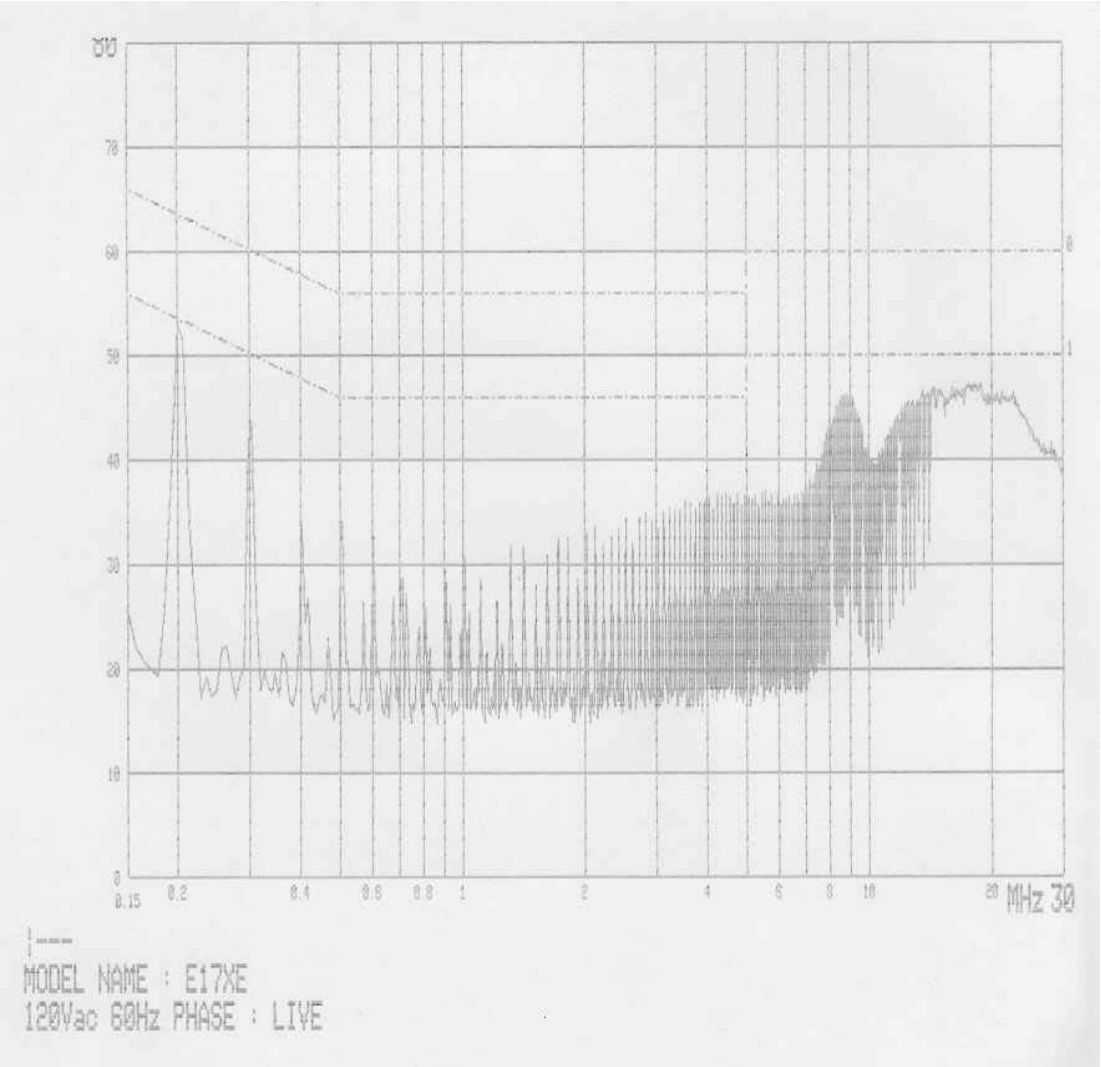
◆ Test Date June 8, 2004

◆ Test Area Shielded room No.1

Note : The equipment used is calibrated in regular for every year.

Conducted Emissions

Scrolling "H" Pattern LIVE Line

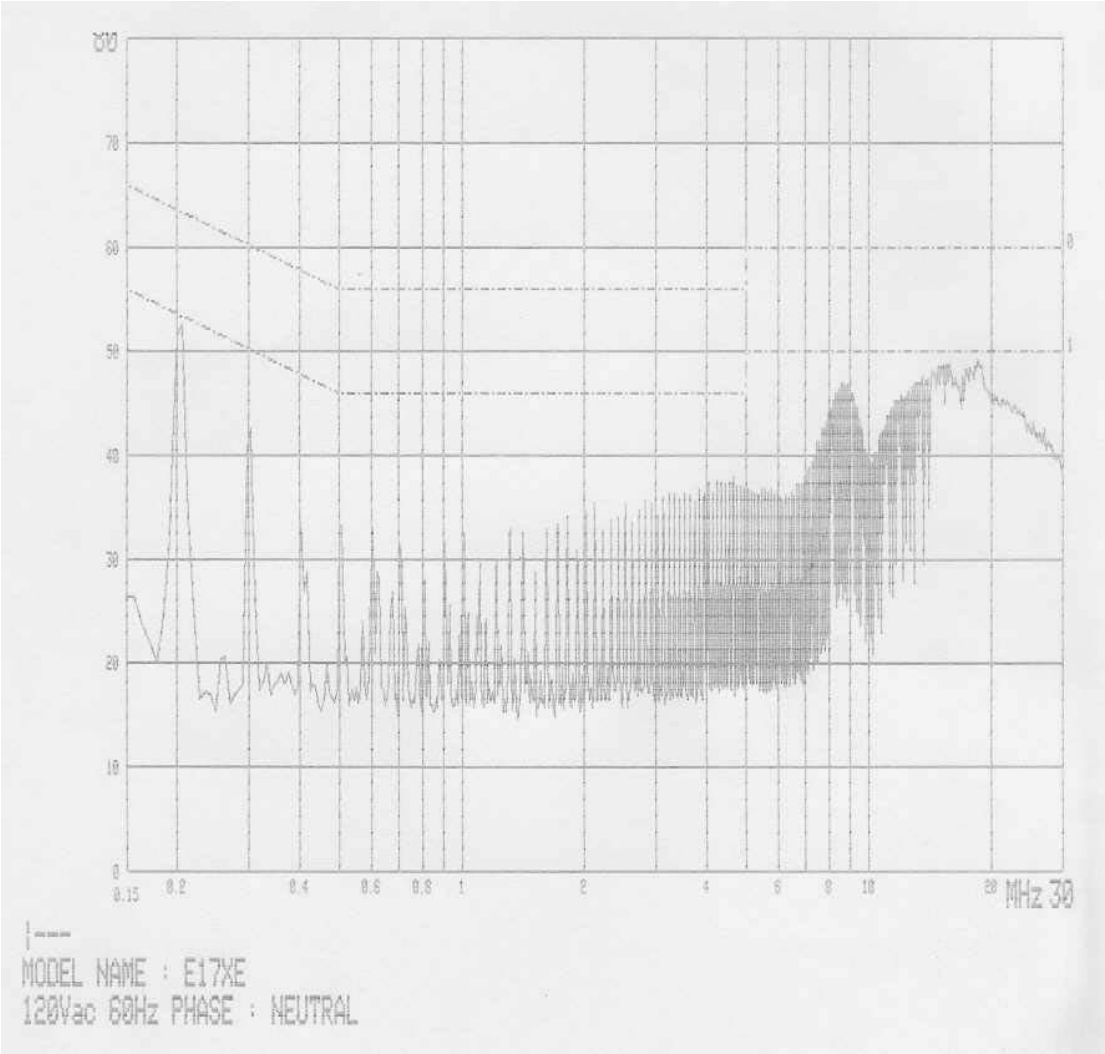


Freq. [MHz]	Measurement [dB μV]		Limit [dB μV]		Insertion Loss	Cable Loss	Result [dB μV]		Margin [dB]	
	Q-peak	Average	Q-peak	Average	[dB]	[dB μV]	Q-peak	Average	Q-peak	Average
0.200	51.9	41.0	63.6	53.6	0.2	0.5	52.6	41.7	11.0	11.9
0.302	41.2	33.7	60.2	50.2	0.2	0.5	41.8	34.3	18.3	15.8
3.530	34.5	32.9	56.0	46.0	0.1	0.4	35.0	33.4	21.0	12.6
4.439	35.4	31.3	56.0	46.0	0.1	0.4	35.9	31.8	20.1	14.2
8.779	44.4	42.7	60.0	50.0	0.1	0.6	45.1	43.4	14.9	6.6
18.762	41.3	40.8	60.0	50.0	0.1	0.7	42.1	41.6	17.9	8.4

Note :

Conducted Emissions

Scrolling "H" Pattern NEUTRAL Line



Freq. [MHz]	Measurement [dB μV]		Limit [dB μV]		Insertion Loss	Cable Loss	Result [dB μV]		Margin [dB]	
	Q-peak	Average	Q-peak	Average	[dB]	[dB μV]	Q-peak	Average	Q-peak	Average
0.200	52.0	41.3	63.6	53.6	0.1	0.5	52.6	41.9	11.0	11.7
0.302	41.0	34.3	60.2	50.2	0.1	0.5	41.6	34.9	18.6	15.3
2.118	33.7	33.1	56.0	46.0	0.1	0.5	34.3	33.7	21.7	12.3
4.640	35.7	33.2	56.0	46.0	0.1	0.4	36.2	33.7	19.8	12.3
8.575	45.3	44.0	60.0	50.0	0.1	0.6	46.0	44.7	14.0	5.3
18.563	46.0	40.9	60.0	50.0	0.2	0.7	46.9	41.8	13.1	8.2

Note :

TEST CONDITIONS AND DATA

Radiated Emission

[Applicable]

◆ Test Equipment Used

Name	Type	Manufacturer	Calibration. Date	Serial Number
ESVP	Test Receiver	Rohde & Schwarz	Jul. 22, 2003	861744/004
VULB 9160	Antenna	Schwarzbeck	Jul. 09, 2003	3048

◆ Test Accessories Used

Type	Manufacturer
Aneroid Barometer	Sato
Hygrometer	Sato

◆ Test Program Scrolling "H" Patterns on the windows

◆ Test Date June 10, 2004

◆ Test Area Open site No.1

Note : The equipment used is calibrated in regular for every year.

Radiated Emissions

Mode	Freq. [MHz]	Reading [dBuV]	Antenna Factor [dB/m]	Cable Loss [dB]	Polar. [H/V]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]
1280x1024, 75Hz	60.5	20.2	11.3	1.4	V	32.9	40.0	7.1
	80.0	22.4	7.7	1.6	V	31.7	40.0	8.3
	176.6	21.5	11.1	2.4	V	35.0	43.5	8.5
	214.5	23.0	8.3	2.5	V	33.8	43.5	9.7
	353.1	21.3	11.7	3.6	V	36.6	46.0	9.4
	475.0	21.0	14.2	4.6	V	39.8	46.0	6.2
1024x768, 75Hz	141.7	19.3	11.6	2.2	V	33.1	43.5	10.4
	176.9	23.3	11.1	2.4	V	36.8	46.0	6.7
	218.4	22.6	8.4	2.7	V	33.7	46.0	12.3
	237.4	24.8	9.9	2.8	V	37.5	46.0	8.5
	415.4	21.0	13.4	4.3	V	38.7	46.0	7.3
	490.5	17.0	14.8	4.8	V	36.6	46.0	9.4
800x600, 75Hz	59.5	17.7	11.2	1.3	V	30.2	40.0	9.8
	80.0	21.9	7.7	1.6	V	31.2	40.0	8.8
	176.9	23.9	11.1	2.4	V	37.4	43.5	6.1
	215.0	22.8	8.3	2.5	V	33.6	43.5	9.9
	474.8	17.2	14.2	4.6	V	36.0	46.0	10.0
640x480, 75Hz	59.4	19.5	11.2	1.3	V	32.0	40.0	8.0
	215.0	23.0	8.4	2.6	V	34.0	43.5	9.5
	237.3	24.0	9.9	2.8	V	36.7	46.0	9.3
	413.0	20.5	13.4	4.3	V	38.2	46.0	7.8
	474.9	16.8	14.2	4.6	V	35.6	46.0	10.4
	486.8	17.0	14.5	4.8	V	36.3	46.0	9.7

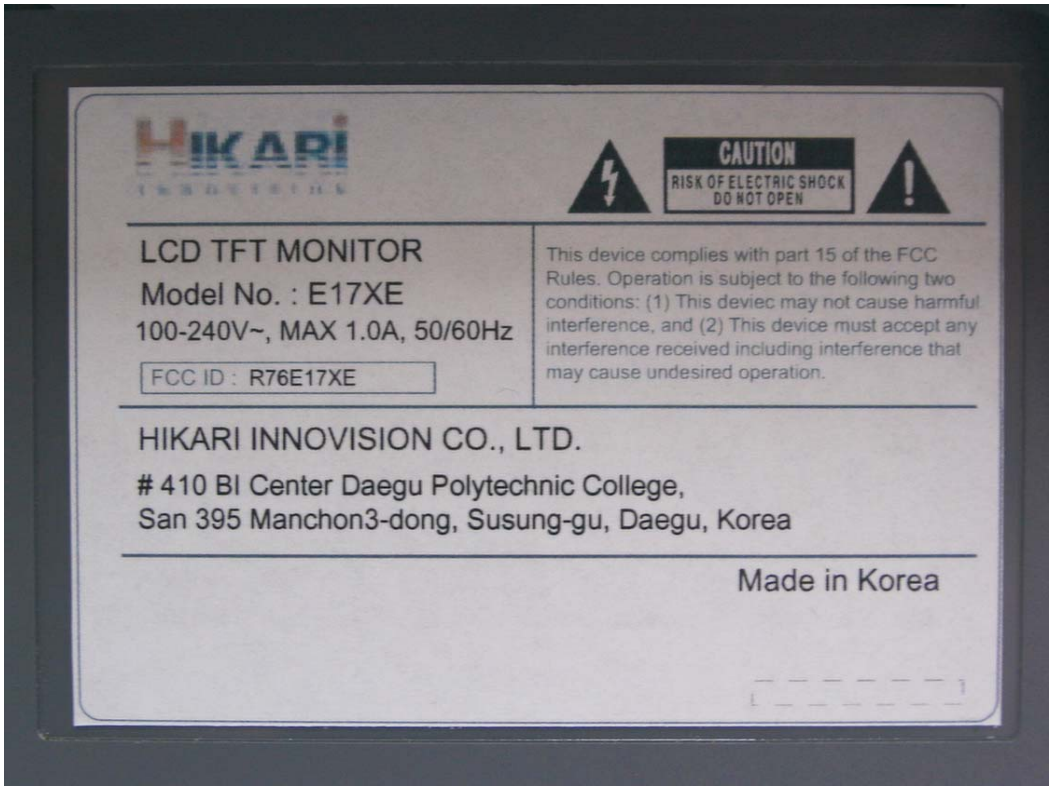
Note:

Appendix A. The EUT Photos

Front View

Rear View

Appendix A. The EUT Photos



Label

Appendix B. The Test Setup Photos

Conducted Emissions - Front View

Conducted Emissions - Rear View

Appendix B. The Test Setup Photos

Radiated Emissions – Front View

Radiated Emissions – Rear View