

EMC TEST REPORT For FCC



Test Report No. : CTK02-F025

Date of Issue : March 7, 2002

Model/Type No: : B15CL

Kind of Product : CRT Monitor

Applicant : Hansol Electronics Inc.

Applicant Address : 27-29, Hanchon-Ri, Ducksan-Myun, Jinchon-Gun, Chungbuk,
365-840, Korea

Manufacturer : Hansol Electronics Inc.

Manufacturer Address : 27-29, Hanchon-Ri, Ducksan-Myun, Jinchon-Gun, Chungbuk,
365-840, Korea

Contact Person : Mr. S. P. Yang

Telephone : +82-43-530-8503

Received Date : February 5, 2002

Test period : Start: Feb. 6, 2002 End: Mar. 7, 2002

Test Results : ☒ In Compliance ☐ Not in Compliance

The test results presented in this report relate only to the object tested.

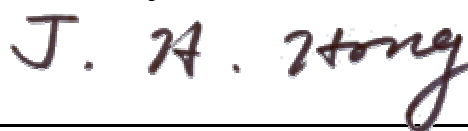
CERTITEK Standards Laboratory Co., Ltd. is accredited by Korea Laboratory Accreditation Scheme (KOLAS) which signed the International Laboratory Accreditation Cooperation (ILAC) Mutual Recognition Arrangement (MRA) for the above test item(s) and test method(s).

Tested by



Michael Jang
EMC Test Engineer
Date: March 7, 2002

Reviewed by



James Hong
EMC Technical Manager
Date: March 7, 2002



CERTITEK Standards Laboratory Co., Ltd.

386-1, Ho-Dong, Yongin-City, Kyungki-Do, Korea 449-100

Tel: +82-31-339-9970 Fax: +82-31-339-9855

<http://www.certitek.com/>



REPORT REVISION HISTORY

Date	Revision	Page No
Mar. 7, 2002	(CTK02-F025) Issued	All

This report shall not be reproduced except in full, without the written approval of CERTITEK Standards Laboratory Co., Ltd. This document may be altered or revised by CERTITEK Standards Laboratory Co., Ltd. personnel only, and shall be noted in the revision section of the document. Any alteration of this document not carried out by CERTITEK Standards Laboratory Co., Ltd. will constitute fraud and shall nullify the document.

TABLE OF CONTENTS

1.0 General Product Description	4
1.1 Model Differences	4
1.2 Device Modifications	4
1.3 EUT Configuration(s)	5
1.6 Calibration Details of Equipment Used for Measurement	6
1.7 Test Facility	6
1.8 Measurement Procedure	6
1.9 Laboratory Accreditations and Listings	7
2.0 Emissions Test Regulations	8
2.1 Conducted Voltage Emissions	9
2.2 Radiated Electric Field Emissions	10
Configurations	11
APPENDIX A - TEST DATA	12
Conducted Voltage Emissions (Quasi-Peak reading)	12
Radiated Electric Field Emissions (Quasi-Peak reading)	15

1.0 General Product Description

The product is a CRT Monitor.

1.0.1 Tested Equipment

- ☒ Unless otherwise indicated, all tests were conducted on Model B15CL.
- ☐ Tests performed on Model _____ were considered to be representative of Model(s) _____.

1.0.2 Equipment Size, Mobility and Identification

Dimensions: 371 by 398 by 375 ☒ mm ☐ in
Mobility: ☐ Hand-Held ☒ Table-top ☐ Floor-standing
Serial No.: -

1.0.3 Electrical Ratings

Input: AC100-240V, 1.3A
Output: Not applicable

1.0.4 Test Voltage & Frequency

Unless indicated otherwise on the individual data sheet or test results, the test voltage and frequency was as indicated below.

Voltage: 120VAC
Frequency: 60Hz

1.0.5 Clock & Other Frequencies Utilized

1. Switching IC : 150kHz
2. Pre-Amp : 110MHz
3. Video output : 75MHz
4. OSD (On Screen Display) IC : 96MHz
5. Sync Processor : 15-150kHz (Horizontal), 35-200Hz (Vertical),
50-180Hz (Autosync.)
6. MICRO Controller : 8-12MHz

1.1 Model Differences

Not applicable

1.2 Device Modifications

The following modifications were necessary for compliance:

Addition to the capacitor – C433 (0.01uF/2kV)

1.3 EUT Configuration(s)

See Appendix A for individual test set-up configuration(s). The following peripheral devices and/or interface cables were connected during the measurement:

☒ Peripheral Devices

Device	Manufacturer	Model No.	Serial No.	FCC ID or DoC
PC	Hewlett Packard	DTPC-17	SG01501776	DOC
MOUSE (Serial type)	Microsoft	BASM1	4475951-20000	DOC
MOUSE (PS/2 type)	PANWEST	Cyber Beetle	PM1F184045737	DOC
MOUSE (USB type)	PANWEST	Cyber Beetle	PM1F154000055	DOC
MOUSE (USB type)	PANWEST	Cyber Beetle	PM1F144009945	DOC
KEYBOARD	World Com Mart	KB120	-	D840902 MIC
Game Pad	Microsoft	Sidewinder game pad	03426853	C3KMGP1
HEADSET	CAMAC	CMK-C3	-	-
PRINTER	Seiko Epson	Stylus Color 460	BWCE136524	DOC

☒ Cable Description

#	Description	Ferrited	Length (m)	Other Details
1	AC Power, Unshielded	No	1.8	Connect to AC Power from EUT
2	AC Power, Unshielded	No	1.8	Connect to AC Power from PC
3	AC Power, Unshielded	No	1.8	Connect to AC Power from printer
4	Monitor cable, Shielded	Yes	1.8	Connect to PC
5	Printer cable, Shielded	Yes	1.8	Connect to PC
6	Mouse cable, Shielded	No	2.0	USB Type
7	Mouse cable, Shielded	No	2.0	USB Type
8	Mouse cable, Shielded	No	2.0	PS/2 Type
9	Mouse cable, Shielded	No	2.0	Serial Type
10	Keyboard cable, Shielded	No	2.0	-
11	Line in cable, Unshielded	No	1.5	-
12	Headset cable, Unshielded	No	2.0	-
13	Game Pad cable, Unshielded	No	2.0	-

n/a = not available

1.4 Test Software

☐ Pinging

☒ Name / Manufacturer / Version / Type of Pattern

- EMC Test / Compaq Computer / 1.0 / Scrolling 'H'

1.5 EUT Operating Mode(s)

Equipment under test was operated during the measurement under the following conditions:

☒ Test program (H-Pattern)

☐ Test program (color bar)

☐ Standby

☐ Test program (customer specific)

☐ Practice operation

☒ Resolution / Refresh Rate - 800 x 600 / optimum and 1280 x 1024 / 60Hz

1.6 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less. All test equipment calibrations are traceable to the Korea Research Institute of Standards and Science (KRISS), therefore, all test data recorded in this report is traceable to KRISS.

1.7 Test Facility

The measurement facility is located at 386-1, Ho-Dong, Yongin-City, Kyungki-Do, Korea 449-100. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

1.8 Measurement Procedure

Preliminary AC power line conducted emissions tests were performed shielded room. To find worst mode, several typical mode and typical cable position were tested. Final AC power line conducted emissions test was performed shielded room. (location is same as Preliminary test)





Based on the preliminary tests of the EUT, final test was proceeded worst case test mode and cable configuration.

Preliminary radiated emissions test were performed anechoic chamber (Distance of antenna and EUT was 3 m). To find worst mode, several typical mode and typical cable position were tested and peak level and frequency were recorded.

Final radiated emissions test was performed Open Area Test Site. Based on the preliminary tests of the EUT, final test was proceeded worst case test mode and cable configuration.

* Measurement procedures was In accordance with ANSI C63.4-1992 7.2.3, 7.2.4, 8.3.1.1, 8.3.1.2

1.9 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Logo
USA	FCC	3 and 10 meter Open Area Test Sites to perform FCC Part 15/18 measurements.	 93250
JAPAN	VCCI	10 meter Open Area Test Site and one conducted site.	 R-948, C-986
KOREA	MIC	EMI (CE, RE) EMS (ESD, Burst, RS, Surge, CS, Power-Frequency Susceptibility, Voltage Dips and Short Interruptions)	 No. 51, KR0025
International	KOLAS	EMC	 NO. 119

2.0 Emissions Test Regulations

The emissions tests were performed according to following regulations:

- | | | |
|--|---|---|
| <input type="checkbox"/> EN 50081-1 /1992 | | |
| <input type="checkbox"/> EN 55011 /1998 | <input type="checkbox"/> Group 1 | <input type="checkbox"/> Group 2 |
| | <input type="checkbox"/> Class A | <input type="checkbox"/> Class B |
| <input type="checkbox"/> EN 55013 /A12:1994 | | |
| <input type="checkbox"/> EN 55014 /1987 | <input type="checkbox"/> Household appliances and similar | |
| | <input type="checkbox"/> Portable tools | |
| | <input type="checkbox"/> Semiconductor devices | |
| <input type="checkbox"/> EN 55014 /A2:1990 | | |
| <input type="checkbox"/> EN 55014 /1993 | <input type="checkbox"/> Household appliances and similar | |
| | <input type="checkbox"/> Portable tools | |
| | <input type="checkbox"/> Semiconductor devices | |
| <input type="checkbox"/> EN 55015 /1987 | | |
| <input type="checkbox"/> EN 55015 /A1:1990 | | |
| <input type="checkbox"/> EN 55015 /1993 | | |
| <input type="checkbox"/> EN 55022 /A1:1995 | <input type="checkbox"/> Class A | <input type="checkbox"/> Class B |
| <input type="checkbox"/> EN 55022 /1998 | <input type="checkbox"/> Class A | <input type="checkbox"/> Class B |
| <input type="checkbox"/> EN 61000-3-2 Ed.2:2001; IEC 61000-3-2 Ed.2:2000 | | |
| <input type="checkbox"/> EN 61000-3-3 /1995 (EN 60555 Part 3 /4.87) | | |
| <input type="checkbox"/> BS | | |
| <input type="checkbox"/> VCCI V-3/99.05 : 1999 | <input type="checkbox"/> Class A | <input type="checkbox"/> Class B |
| <input checked="" type="checkbox"/> FCC Part 15 SUBPART B | <input type="checkbox"/> Class A | <input checked="" type="checkbox"/> Class B |
| <input type="checkbox"/> AS 3548 (1992) | <input type="checkbox"/> Class A | <input type="checkbox"/> Class B |
| <input type="checkbox"/> CISPR 11 (1990) | <input type="checkbox"/> Group 1 | <input type="checkbox"/> Group 2 |
| | <input type="checkbox"/> Class A | <input type="checkbox"/> Class B |
| <input checked="" type="checkbox"/> CISPR 22 (1993) | <input type="checkbox"/> Class A | <input checked="" type="checkbox"/> Class B |

2.1 Conducted Voltage Emissions

Test Date

March 7, 2002

Test Location

EMI-CE: Shielded Room

Test Instruments

<input checked="" type="checkbox"/> Field Strength Meter	Rohde Schwarz	ESHS30	828144/002
--	---------------	--------	------------

Test Accessories

<input type="checkbox"/> LISN	EMCO	3825/2	9206-1971
<input checked="" type="checkbox"/> LISN	EMCO	3825/2	9409-2246
<input checked="" type="checkbox"/> LISN	EMCO	3825/2	9607-2574
<input checked="" type="checkbox"/> Control PC	HP	Vectra 500	SG72000192

Frequency Range of Measurement

☒ 150 kHz to 30 MHz
☐ 450 kHz to 30 MHz
☐ _____

Instrument Settings

IF Band Width: 9 kHz

Test Results

The requirements are:

<input checked="" type="checkbox"/> MET	minimum margin is 3.6 dB μ V at 0.15 MHz
<input type="checkbox"/> NOT MET	limit exceeded by maximum of _____ dB μ V at _____ MHz
<input type="checkbox"/> NOT APPLICABLE	

Remarks

See Appendix A for test data.

2.2 Radiated Electric Field Emissions

Test Date

March 7, 2002

Test Location

- ☒ EMI-OATS: Testing was performed at a test distance of 10 m
☐ EMI-OATS: Testing was performed at a test distance of 3 m

Test Instruments

☒ Field Strength Meter Rohde Schwarz ESVS30 826638/008

Test Accessories

<input checked="" type="checkbox"/> ULTRA Broadband Antenna	R & S	HL562	361324/014
<input type="checkbox"/> Biconical Antenna	Schwarzbeck	BBA9106	41-00201
<input type="checkbox"/> Biconical Antenna	EMCO	3110B	9607-2564
<input type="checkbox"/> Log-periodic Antenna	EMCO	3146	9607-4567

Frequency Range of Measurement

30 MHz to 2 GHz

Instrument Settings

IF Band Width: 120 kHz

Test Results

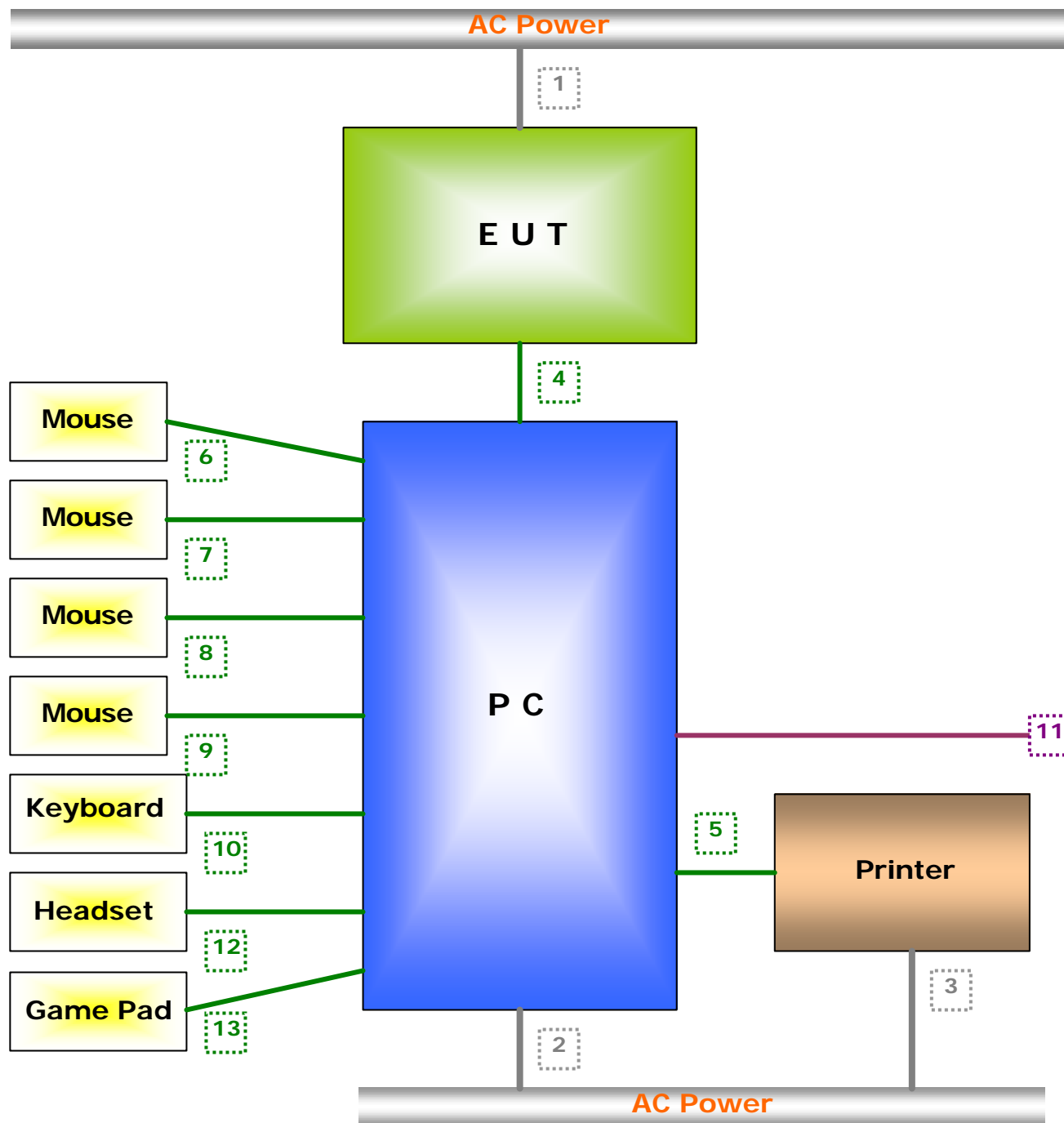
The requirements are:

- ☒ MET minimum margin is 3.00 dB ($\mu\text{V/m}$) at 161.0 MHz
☐ NOT MET limit exceeded by maximum of ____ dB($\mu\text{V/m}$) at ____ MHz
☐ NOT APPLICABLE

Remarks

See Appendix A for test data

Configuration



APPENDIX A – TEST DATA

Conducted Voltage Emissions (Quasi-Peak reading)

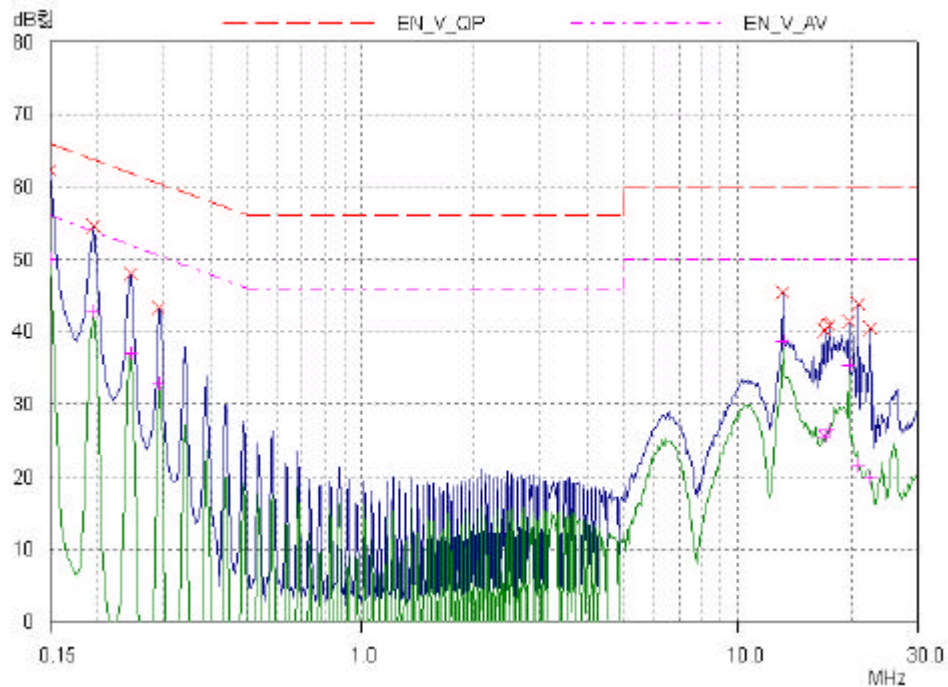
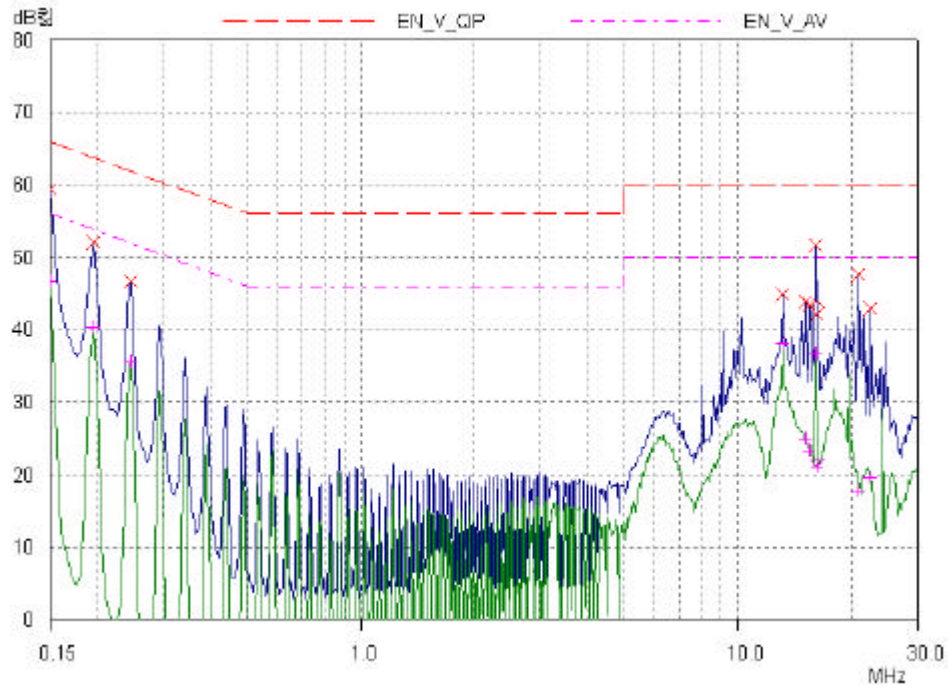
800 x 600 / optimum

Frequency [MHz]	Correction Factor		Line	Quasi-peak				Average			
				Limit	Reading	Result	Margin	Limit	Reading	Result	Margin
	LISN	Cable		[dBuV]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dB]
0.15	3.0	0.1	N	66.0	59.3	62.4	3.6	56.0	46.9	50.0	6.0
0.20	2.3	0.1	N	63.8	52.2	54.6	9.2	53.8	40.3	42.7	11.1
0.25	1.5	0.1	N	61.9	46.4	48.0	14.0	51.9	35.5	37.1	14.8
13.08	0.4	0.2	N	60.0	44.8	45.4	14.6	50.0	38.2	38.8	11.3
16.00	0.4	0.2	L	60.0	51.0	51.6	8.4	50.0	36.0	36.6	13.4
20.80	0.6	0.4	L	60.0	46.7	47.7	12.3	50.0	16.8	17.8	32.2
22.40	0.6	0.3	L	60.0	41.9	42.8	17.2	50.0	18.8	19.7	30.3

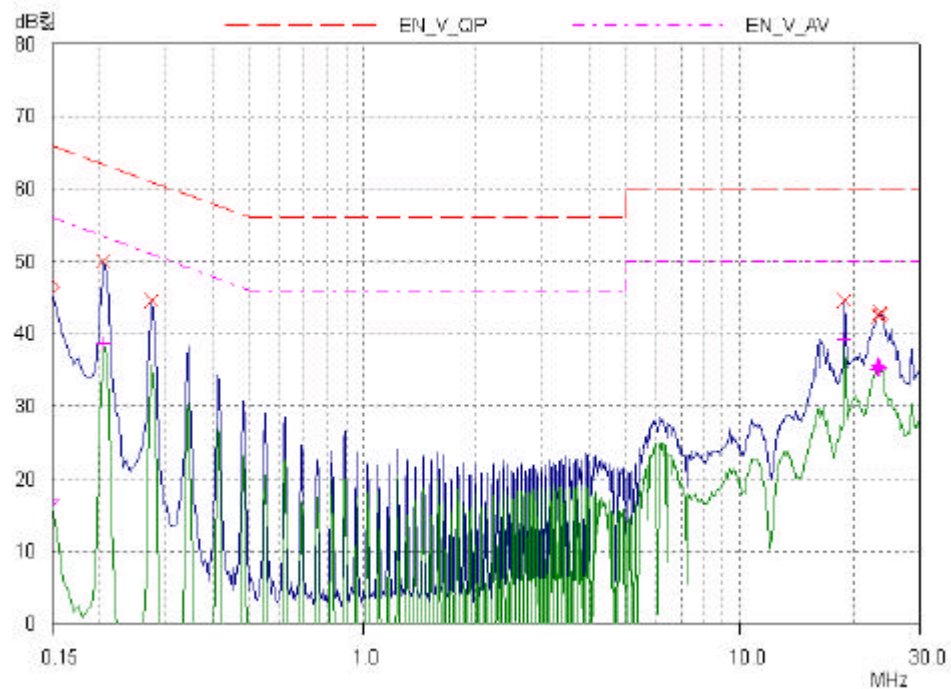
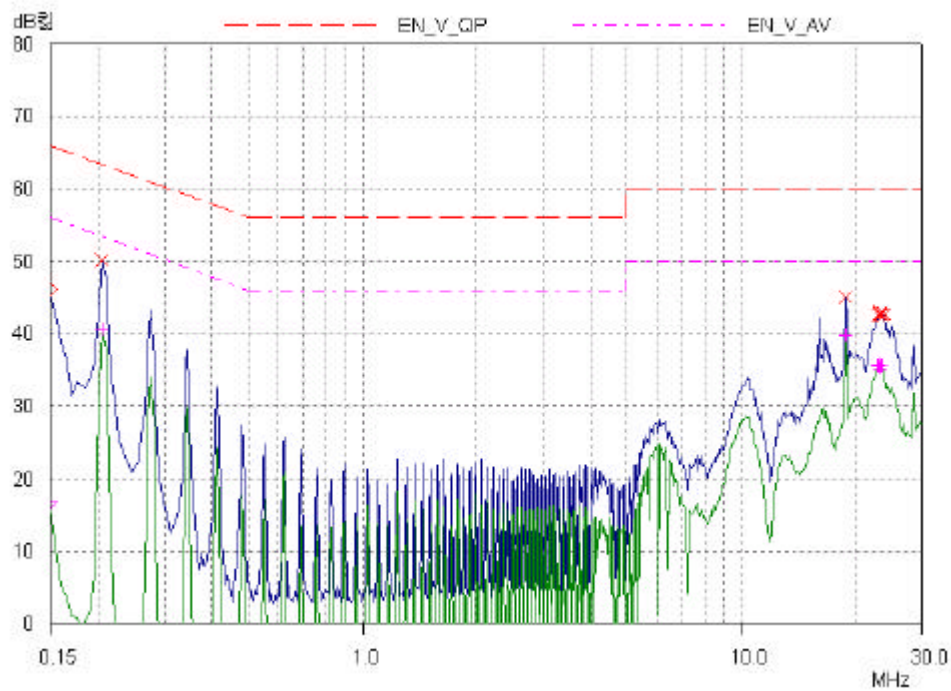
1280 x 1024 / 60Hz

Frequency [MHz]	Correction Factor		Line	Quasi-peak				Average			
				Limit	Reading	Result	Margin	Limit	Reading	Result	Margin
	LISN	Cable		[dBuV]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dB]
0.21	2.3	0.1	L	63.4	47.8	50.2	13.2	53.4	38.2	40.6	12.8
18.89	0.6	0.2	L	60.0	44.4	45.2	14.9	50.0	39.1	39.9	10.1
22.94	0.6	0.4	L					50.0	34.5	35.5	14.5
23.15	0.6	0.4	L	60.0	41.6	42.6	17.4	50.0	34.8	35.8	14.3
23.22	0.6	0.4	N	60.0	41.4	42.4	17.7	50.0	34.6	35.6	14.4
		</									

800 x 600 / optimum



1280 x 1024 / 60Hz



**CERTITEK Standards Laboratory Co., Ltd.**

386-1, Ho-Dong, Yongin-City, Kyungki-Do, Korea 449-100

Tel: +82-31-339-9970 Fax: +82-31-339-9855

<http://www.certitek.com/>**CERTITEK****Radiated Electric Field Emissions (Quasi-Peak reading)****800 x 600 / optimum**

Frequency [MHz]	Reading [dBuV/m]	Pol.	Height [m]	Correction Factor		Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
				Antenna	Cable			
136.00	16.2	H	4.0	8.40	2.30	30.0	26.90	3.10
140.00	14.8	V	1.1	8.00	2.40	30.0	25.18	4.82
156.90	11.8	V	1.0	7.40	2.50	30.0	21.74	8.26
252.10	13.7	H	3.8	9.50	3.10	37.0	26.33	10.67
291.90	14.9	H	3.8	10.75	3.60	37.0	29.24	7.76
297.30	12.9	H	4.0	10.90	3.60	37.0	27.41	9.59
762.00	6.3	V	1.2	19.00	6.10	37.0	31.40	5.60
799.00	6.8	H	3.8	19.50	6.60	37.0	32.91	4.09
808.00	7.1	V	1.0	19.60	6.60	37.0	33.27	3.73
1110.00	0.7	V	1.0	22.70	7.40	37.0	30.80	6.20

1280 x 1024 / 60Hz

Frequency [MHz]	Reading [dBuV/m]	Pol.	Height [m]	Correction Factor		Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
				Antenna	Cable			
142.10	16.6	H	4.0	7.90	2.40	30.0	26.90	3.10
161.00	17.1	H	3.8	7.30	2.60	30.0	27.00	3.00
170.40	16.7	H	4.0	7.10	2.60	30.0	26.43	3.57
255.50	21.1	H	3.5	9.60	3.30	37.0	33.96	3.04
264.90	19.7	H	3.5	9.90	3.30	37.0	32.85	4.15
283.80	20.1	H	4.0	10.50	3.40	37.0	33.99	3.01
398.00	9.9	V	1.0	13.50	4.10	37.0	27.49	9.51
660.50	7.1	V	1.2	18.30	5.50	37.0	30.90	6.10