GUMI COLLEGE
EMC CENTER

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FCC EVALUATION REPORT FOR CERTIFICATION

Manufacturer: KOREA DATA SYSTEMS Co., Ltd.

170, Gongdan-Dong, Gumi-Si

Gyeongsangbuk-Do, Korea

Attn: Dong-Hyeon Shin / General Manager

Date of Issue : December 15, 2006

Test Report No. : GETEC-E3-06-072

Test Site : Gumi College EMC Center
(Registration No.: 100749)

FCC ID.: EVOKLT4202

Applicant: KOREA DATA SYSTEMS Co., Ltd.

Rule Part(s)	**: FCC Part 15 Subpart B**
Equipment Class	**: Class B computing device peripheral (JBP)**
EUT Type	**: 42" LCD TV/Monitor**
Type of Authority	**: Certification**
Model No.	**: KLT4202LA, KLT4202LB**
Trade Name	**: KDS**

This equipment has been shown to be in compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4-2003 / Canadian standard ICES-003

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the vest 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,

Jae-Hoon Jeong, Senior Engineer
GUMI College EMC center

Reviewed by,

Tae-Sig Park, Technical Manager
GUMI College EMC center

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Scope: *Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and / or unintentional radiators for compliance with technical rules and regulations of the Federal Communications Commission.*

1. General Information

Applicant: KOREA DATA SYSTEMS Co., Ltd.
Applicant Address: 170, Gongdan-Dong, Gumi-Si, Gyeongsangbuk-do, Korea
Manufacturer: KOREA DATA SYSTEMS Co., Ltd.
Manufacturer Address: 170, Gongdan-Dong, Gumi-Si, Gyeongsangbuk-do, Korea
Contact Person: Dong-Hyeon Shin / General Manager
Tel. & Fax No.: Tel No.: +82-54-468-3272, Fax No.: +82-54-461-8720

- **FCC ID** EVOKLT4202
- **EUT Type** 42” LCD TV/Monitor
- **Model No.** KLT4202LA, KLT4202LB
- **Trade Name** KDS
- **Serial No.** Prototype
- **Rule Part(s)** FCC Part 15 Subpart B
- **Type of Authority** Certification
- **Test Procedure(s)** ANSI C63.4 (2003) / Canadian standard ICES-003
- **Dates of Test** November 17 ~ 29, 2006
- **Place of Test** **Gumi College EMC Center** (FCC Registration No.: 100749)
  407, Bugok-Dong, Gumi-si, Gyeongsangbuk-Do, Korea
- **Test Report No.** GETEC-E3-06-072
- **Dates of Issue** December 15, 2006

2. Introduction

The measurement procedure described in American National Standard for Methods of Measurement of Radio-Nose Emissions From Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz (ASNI C63.4-2003) was used in determining radiated and conducted emissions emanating from **KOREA DATA SYSTEMS Co., Ltd. 42" LCD TV/Monitor (Model No.: KLT4202LA)**

These measurement tests were conducted at **Gumi College EMC Center**.
The site address is 407, Bugok-Dong, Gumi-si, Gyeongsangbuk-Do, Korea
This test site is one of the highest point of Gumi 1 college at about 200 kilometers away from Seoul city and 40 kilometers away from Daege city. 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

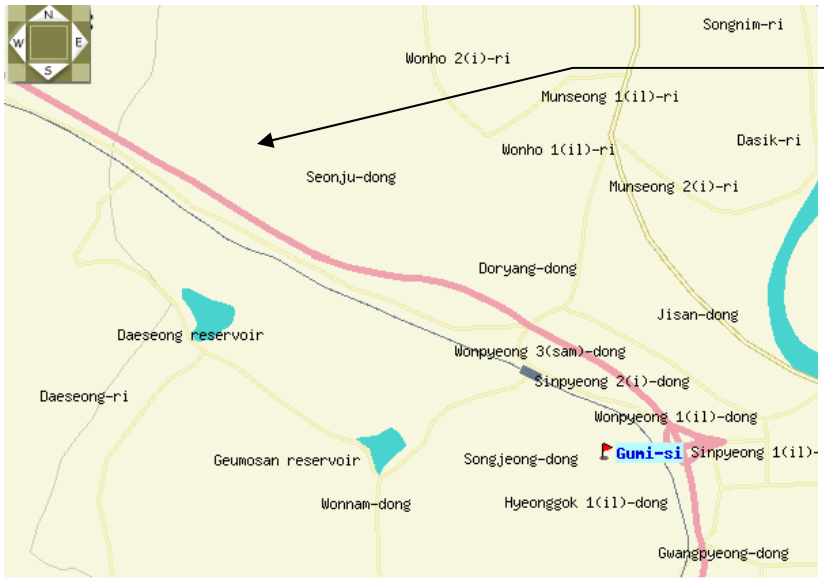

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Fig 1. The map above shows the Gumi College in vicinity area.

3. Product Information

3.1 Description of EUT

The Equipment Under Test (EUT) is the **KOREA DATA SYSTEMS Co., Ltd.**
42" LCD TV/Monitor (Model No.: KLT4202LA)
FCC ID.: EVOKLT4202

Sync Input	Horizontal Freq.: 31.469 ~ 60.241kHz Vertical Freq.: 56.250 ~ 75.087Hz
Power Input	AC 100-240V, 50/60Hz, 250W
Dimension	1070*315*850mm
LCD Panel	LC420W02 (LG Philips LCD)
TV Tuner	TCSN3081DE29A (Samsung)

3.2 Support Equipment / Cables used

3.2.1 Used Support Equipment

Description	**Manufacturer**	**Model No.**	**S/N & FCC ID**
PC	Hewlett Packard	D530	S/N: CNG34800PY FCC ID: DoC
Video card	ATI	ATI RV360(9600)	S/N: SN0402017176 FCC ID: DoC
Printer	Hewlett Packard	970CXI	S/N: MY9B01F1FG FCC ID: DoC
Serial Mouse	LOGITECH	M-S69	S/N: 334684-108 FCC ID: JNZ211443
Key-board	COMPAQ	166516-AD6	S/N: B13BBOR391006D FCC ID: AQ6-23K15
Joy stick	MICROSOFT	X05-92626	S/N: 9262600296169 FCC ID: DoC
TV signal generator	FLUKE	54200	S/N: 831011 FCC ID: DoC
Monitor	LG Electronics	RZ-13LA60	S/N: Prototype FCC ID: DoC

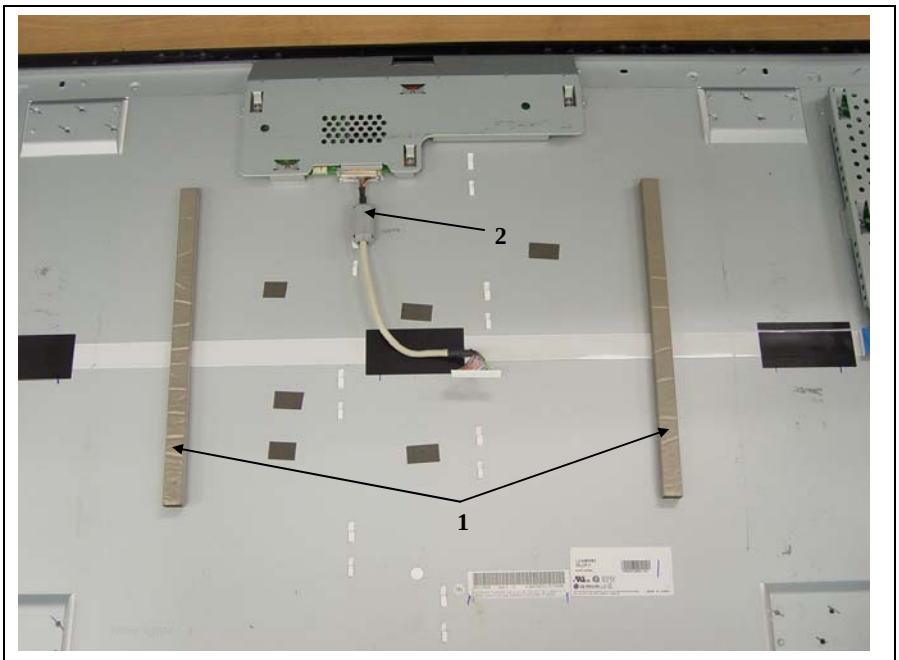
See "Appendix E – Test Setup Photographs" for actual system test set-up

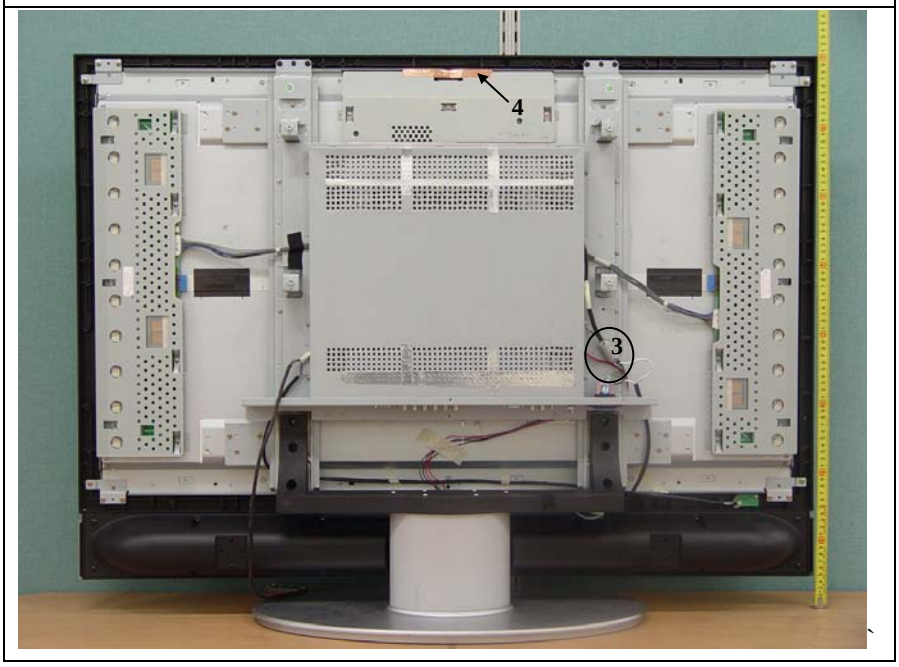
3.2.2 Used Cable(s)

Cable No.	Condition	Description
Power cable	Connected to the EUT	1.8m unshielded
Video cable(D-sub)	Connected to the EUT and PC	1.8m shielded with two ferrite cores
Component cable	Connected to the EUT and DVD Player	3.0m Shielded
Component sound cable	Connected to the EUT and DVD Player	3.0m Shielded
PC sound input cable	Connected to the EUT and PC	1.5m Shielded
AV input cable	Open	1.8m Shielded
AV output cable	Connected to the EUT and Monitor	1.8m Shielded
ANT cable	Connected to the EUT and signal generator	10.0m Shielded

3.3 Modification Item(s)

1. Attached 2 conductive gaskets on the rear side of the LCD panel
2. Added a clamp type ferrite core (TDK: ZCAT2035) on the LVDS cable
3. Added a clamp type ferrite core (FEELUX: BNF-14) on the power switch cable
4. Attached a copper tape in the point





4. Description of tests

4.1 Test Condition

The EUT was installed, arranged and operated in a manner that is most representative of equipment as typically used. The measurements were carried out while varying operating modes and cable positions within typically arrangement to determine maximum emission level.
The representative and worst test mode(s) were noted in the test report.

- Test Voltage / Frequency : AC 120V / 60Hz
- Test Mode(s)

  -. Monitor mode
  Radiated emission : 1024*768/75Hz (Analog)
  Conducted emission : 1024*768/75Hz (Analog), 800*600/75Hz (Analog), 640*480/60Hz (Analog)

  -. AV mode

  -. DTV mode
- Operating test pattern

  Monitor mode:
  -. “H” character scrolling mode (Font size: 10)
  -. Black background white character
  -. Brightness and contrast was adjusted as maximum level
  -. 1kHz sound tone with winamp player

  AV & DTV mode
  -. Color bar signal with 1kHz audio signal

4.2 Conducted Emission

The Line conducted emission test facility is inside a 4×8×2.5 meter shielded enclosure.
The EUT was placed on a non-conducting 1.0 by 1.5 meter table, which is 0.8 meters in height and 0.4 meters away from the vertical wall of the shielded enclosure.
The EUT is powered from the Rohde & Schwarz LISN (ESH2-Z5) and the support equipment is powered from the Rohde & Schwarz LISN (ESH3-Z5). Powers to the LISN are filtered by high-current high insertion loss power line filter.
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 EMI test receiver (Rohde & Schwarz, ESCS30).
The EMI test receiver was scanned from 150kHz to 30MHz with 20msec sweep time to determine the frequency producing the maximum EME from the EUT. The frequency producing the maximum level was re-examined using Quasi-Peak mode of the EMI test receiver.
The bandwidth of Quasi-peak mode was set to 9kHz. Each emission was maximized consistent with typical applications by varying the configuration of the test sample. Interface cables were connected to the available interface ports of the test unit. The effect of varying the position of cables was investigated to find the configuration that produces maximum diagram emission. Excess cable lengths were bundled at center with 30 – 40 centi-meters.
Each EME reported was calibrated using the R/S signal generator

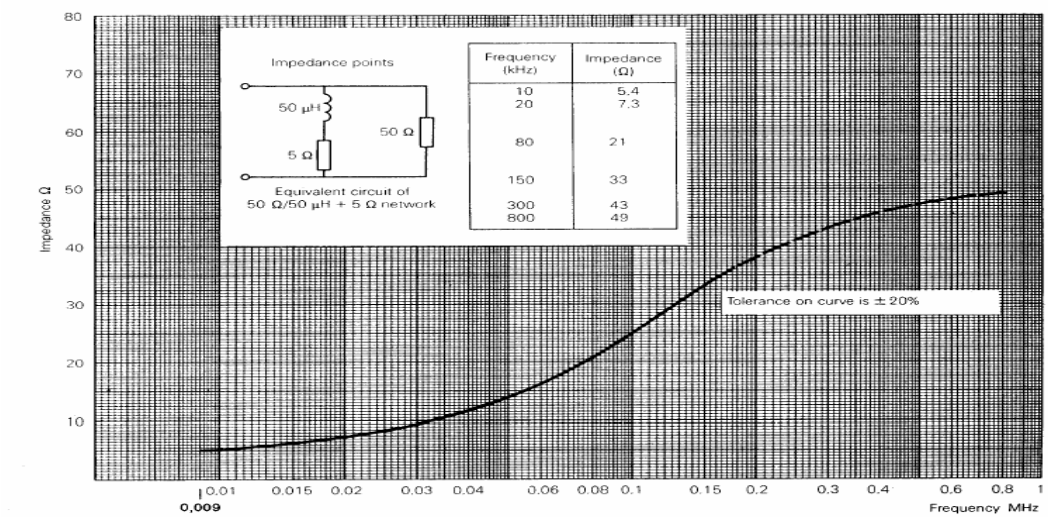


Fig 2. Impedance of LISN

4.3 Radiated Emission

Preliminary measurements were conducted 3m semi anechoic chamber using broadband antennas 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, mode of operation and turntable azimuth with respect to antenna was note for each frequency found.

The spectrum was scanned from 30 to 1000MHz using bicornical log antenna (Schwarzbeck, VULB9160). Above 1GHz, horn antenna (Schwarzbeck, BBHA9120D) was used.

Final measurements were made outdoors at 3m/10m-test range.

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 re-examined and investigated using EMI test receiver. The detector function was set to CISPR quasi-peak mode average mode and the bandwidth of the receiver was set to 120kHz or 1MHz depending on the frequency or type of signal.

The EUT, support equipment and interconnecting cables were reconfigured to the setup producing the maximum emission for the frequency and were placed on top of a 0.8m high non-metallic 1.0×1.5 meter table.

The turntable containing the test sample was rotated; the antenna height was varied 1 to 4 meter and stopped at the azimuth or height producing the maximum emission.

Each EME reported was calibrated using the R/S signal generator

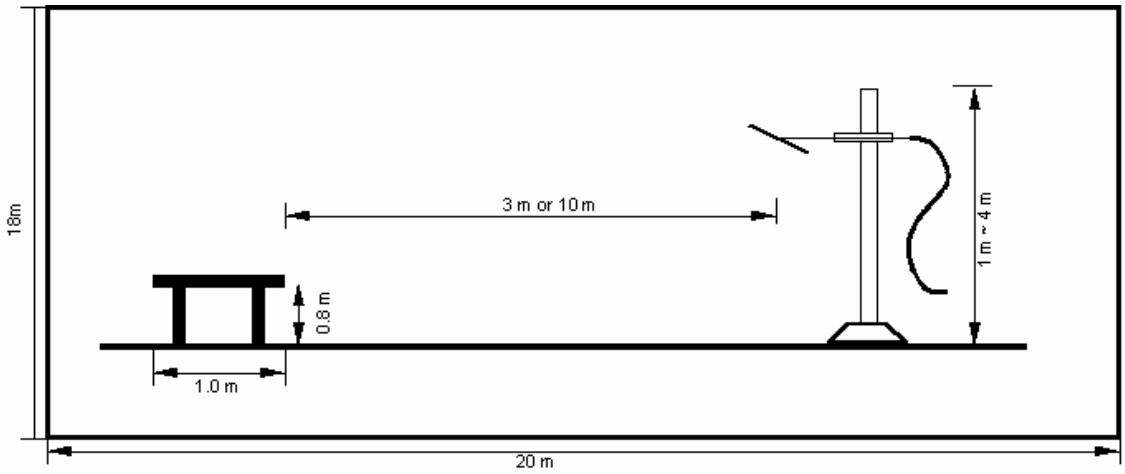


Fig 3. Dimensions of Open Site Test Area

5. Conducted Emission

5.1 Operating environment

Temperature : 21℃
Relative humidity : 39 %

5.2 Test set-up

The conducted emission measurements were performed in the shielded room.
The EUT was placed on wooden table, 0.8m heights above the floor, 0.4m from the reference ground plane (GRP) wall and 0.8m from AMN.
AMN is bonded on horizontal reference ground plane.
The ground plane, which was electrically bonded to the shield room, ground system and all power lines entering the shield room, were filtered.

5.3 Measurement uncertainty

The measurement uncertainty was calculated in accordance with ISO “Guide to the expression of uncertainty in measurement”.
The measurement uncertainty was given with a confidence of 95%.

Contribution	Probability Distribution	Uncertainty (±dB)	
		Power Port	Communication port
Receiver specification	Rectangular	0.50	0.50
LISN coupling specification	Rectangular	1.50	
ISN coupling specification	Rectangular		1.50
Mismatch LISN VRC : Γl= 0.20 ISN VRC : Γl= 0.20 ATT VRC(IN) : Γg= 0.03 Uncertainty limits 20log(1± Γl Γg)	U-shaped	0.05 -0.05	0.05 -0.05
Mismatch Receiver VRC : Γl= 0.09 ATT VRC : Γg= 0.11 Uncertainty limits 20log(1± Γl Γg)	U-shaped	0.09 -0.09	0.09 -0.09
System repeatability	Std Deviation	0.55	0.55
Cable and input attenuator calibration	Normal (k=2)	0.08	0.08
Repeatability of EUT			
Combined standard uncertainty Uc(y)	Normal	1.07 -1.07	1.07 -1.07
Extended uncertainty U	Normal (k=2)	2.15 -2.15	2.15 -2.15

5.4 Limit

RFI Conducted	FCC Limit(dB) Class B	
Freq. Range	Quasi-Peak	Average
150kHz – 0.5MHz	66 – 56*	56 – 46*
0.5MHz – 5MHz	56	46
5MHz – 30MHz	60	50
*Limits decreases linearly with the logarithm of frequency.		

5.5 Test equipment used

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	Model Number	Manufacturer	Description	Serial Number	Due to calibration
■ -	ESCS30	Rohde & Schwarz	EMI test receiver	839809/003	12. 14. 2006
■ -	ESH3-Z5	Rohde & Schwarz	Artificial mains network	838979/020	12. 16. 2006
■ -	ESH2-Z5	Rohde & Schwarz	Artificial mains network	829991/009	12. 16. 2006

5.6 Test data for power line conducted emission

5.6.1 Test mode: Monitor mode

-. Test Date : November 17, 2006
-. Resolution bandwidth : 9kHz
-. Frequency range : 0.15MHz ~ 30MHz

♦ **Test resolution: 1024*768/75Hz (Analog)**

Frequency (MHz)	Insertion Loss	Cable Loss	Pol.	Quasi-Peak[dBuV]			Average[dBuV]			Margin[dBuV]	
				Limit	Reading	Result	Limit	Reading	Result	Quasi	Average
0.195	0.11	-0.22	N	63.82	35.6	35.49	53.82	32.3	32.19	28.34	21.64
0.260	0.11	-0.20	N	61.43	33.7	33.62	51.43	33.6	33.52	27.82	17.92
0.390	0.12	-0.13	N	58.06	34.1	34.09	48.06	33.3	33.29	23.97	14.77
0.500	0.14	-0.18	L1	56.00	27.9	27.87	46.00	23.1	23.07	28.14	22.94
0.695	0.15	-0.23	L1	56.00	27.6	27.52	46.00	24.2	24.12	28.48	21.88
1.095	0.15	-0.24	L1	56.00	29.4	29.32	46.00	24.8	24.72	26.68	21.28
2.085	0.19	-0.30	L1	56.00	28.6	28.49	46.00	24.6	24.49	27.51	21.51
3.570	0.24	-0.14	L1	56.00	32.1	32.20	46.00	27.9	28.00	23.80	18.00
4.760	0.27	-0.16	L1	56.00	36.0	36.12	46.00	31.3	31.42	19.88	14.58
5.685	0.30	-0.17	N	60.00	36.7	36.83	50.00	32.2	32.33	23.17	17.67
6.860	0.34	-0.10	N	60.00	34.9	35.13	50.00	29.6	29.83	24.87	20.17
8.525	0.37	0.00	N	60.00	33.0	33.37	50.00	26.9	27.27	26.63	22.73
15.090	0.61	0.05	N	60.00	34.4	35.07	50.00	28.0	28.67	24.93	21.33
18.225	0.66	0.00	N	60.00	35.2	35.86	50.00	31.0	31.66	24.14	18.34
21.525	0.74	0.10	L1	60.00	34.1	34.94	50.00	27.9	28.74	25.06	21.26
24.290	0.60	0.02	N	60.00	33.8	34.42	50.00	27.7	28.32	25.58	21.68

*Comment : Pol : L1 (Live), N(Neut)
Insertion Loss : Insertion Loss of LISN
Cable Loss : Cable Loss + Pulse Limiter Insertion loss value

♦ **Test resolution: 800*600/75Hz (Analog)**

Frequency (MHz)	Insertion Loss	Cable Loss	Pol.	Quasi-Peak[dBuV]			Average[dBuV]			Margin[dBuV]	
				Limit	Reading	Result	Limit	Reading	Result	Quasi	Average
0.195	0.12	-0.22	L1	63.82	36.0	35.89	53.82	32.5	32.39	27.93	21.43
0.260	0.12	-0.20	L1	61.43	34.5	34.43	51.43	34.2	34.13	27.00	17.30
0.390	0.13	-0.13	L1	58.06	35.2	35.21	48.06	33.7	33.71	22.86	14.36
0.515	0.14	-0.18	L1	56.00	29.2	29.16	46.00	25.3	25.26	26.84	20.74
0.685	0.15	-0.23	L1	56.00	27.5	27.42	46.00	23.7	23.62	28.58	22.38
0.900	0.14	-0.23	N	56.00	25.7	25.61	46.00	22.4	22.31	30.39	23.69
1.270	0.16	-0.25	L1	56.00	28.6	28.51	46.00	24.9	24.81	27.49	21.19
2.250	0.20	-0.28	L1	56.00	28.2	28.12	46.00	24.4	24.32	27.88	21.68
3.520	0.24	-0.14	L1	56.00	31.2	31.30	46.00	27.1	27.20	24.70	18.80
4.400	0.26	-0.15	L1	56.00	34.9	35.01	46.00	30.3	30.41	20.99	15.59
5.575	0.30	-0.17	N	60.00	36.5	36.63	50.00	31.8	31.93	23.37	18.07
6.850	0.34	-0.10	N	60.00	35.0	35.23	50.00	29.6	29.83	24.77	20.17
8.415	0.36	0.00	N	60.00	32.4	32.76	50.00	27.1	27.46	27.24	22.54
14.770	0.60	0.07	N	60.00	34.6	35.27	50.00	28.3	28.97	24.73	21.03
18.795	0.66	0.00	N	60.00	37.6	38.26	50.00	31.0	31.66	21.74	18.34
22.695	0.63	0.08	N	60.00	42.9	43.62	50.00	35.7	36.42	16.38	13.58
25.120	0.71	0.06	L1	60.00	37.8	38.58	50.00	30.6	31.38	21.42	18.62

*Comment : Pol : L1 (Live), N(Neut)
Insertion Loss : Insertion Loss of LISN
Cable Loss : Cable Loss + Pulse Limiter Insertion loss value

♦ **Test resolution: 640*480/60Hz (Analog)**

Frequency (MHz)	Insertion Loss	Cable Loss	Pol.	Quasi-Peak[dBuV]			Average[dBuV]			Margin[dBuV]	
				Limit	Reading	Result	Limit	Reading	Result	Quasi	Average
0.195	0.11	-0.22	N	63.82	36.5	36.39	53.82	32.4	32.29	27.44	21.54
0.390	0.13	-0.13	L1	58.06	24.9	24.91	48.06	20.8	20.81	33.16	27.26
0.485	0.12	-0.17	N	56.25	27.0	26.95	46.25	21.5	21.45	29.30	24.80
0.680	0.13	-0.23	N	56.00	28.4	28.30	46.00	22.4	22.30	27.70	23.70
0.895	0.14	-0.23	N	56.00	29.5	29.41	46.00	26.1	26.01	26.59	19.99
1.460	0.16	-0.27	N	56.00	29.6	29.49	46.00	25.4	25.29	26.51	20.71
2.140	0.18	-0.29	N	56.00	28.8	28.69	46.00	23.6	23.49	27.31	22.51
3.695	0.24	-0.14	N	56.00	27.6	27.70	46.00	22.7	22.80	28.30	23.20
4.770	0.27	-0.16	N	56.00	26.8	26.92	46.00	22.8	22.92	29.08	23.08
6.810	0.33	-0.11	N	60.00	28.9	29.13	50.00	23.9	24.13	30.87	25.87
10.120	0.40	0.00	N	60.00	32.9	33.30	50.00	27.9	28.30	26.70	21.70
15.765	0.62	0.01	N	60.00	32.8	33.43	50.00	28.6	29.23	26.57	20.77
18.775	0.72	0.00	L1	60.00	39.9	40.62	50.00	34.4	35.12	19.38	14.88
20.040	0.75	0.00	L1	60.00	36.8	37.55	50.00	31.2	31.95	22.45	18.05
24.420	0.71	0.02	L1	60.00	33.7	34.44	50.00	25.1	25.84	25.56	24.16

*Comment : Pol : L1 (Live), N(Neut)
Insertion Loss : Insertion Loss of LISN
Cable Loss : Cable Loss + Pulse Limiter Insertion loss value

5.6.2 Test mode: DTV mode

-. Test Date : November 17, 2006
-. Resolution bandwidth : 9kHz
-. Frequency range : 0.15MHz ~ 30MHz

Frequency (MHz)	Insertion Loss	Cable Loss	Pol.	Quasi-Peak[dBuV]			Average[dBuV]			Margin[dBuV]	
				Limit	Reading	Result	Limit	Reading	Result	Quasi	Average
0.195	0.11	-0.22	N	63.82	36.5	36.39	53.82	32.4	32.29	27.44	21.54
0.490	0.12	-0.17	N	56.17	25.5	25.45	46.17	20.2	20.15	30.72	26.02
0.585	0.14	-0.22	L1	56.00	23.9	23.82	46.00	21.1	21.02	32.18	24.98
0.895	0.14	-0.23	N	56.00	29.0	28.91	46.00	25.6	25.51	27.09	20.49
1.460	0.16	-0.27	N	56.00	29.6	29.49	46.00	25.2	25.09	26.51	20.91
2.240	0.19	-0.28	N	56.00	29.1	29.01	46.00	23.8	23.71	26.99	22.29
3.700	0.24	-0.14	L1	56.00	26.0	26.10	46.00	21.0	21.10	29.90	24.90
4.480	0.26	-0.15	N	56.00	27.2	27.31	46.00	22.7	22.81	28.69	23.19
8.185	0.36	0.00	L1	60.00	26.9	27.26	50.00	22.5	22.86	32.74	27.14
12.560	0.50	0.03	N	60.00	33.1	33.64	50.00	27.7	28.24	26.36	21.76
13.500	0.54	0.09	L1	60.00	38.5	39.13	50.00	38.4	39.03	20.87	10.97
18.120	0.70	0.00	L1	60.00	41.6	42.30	50.00	35.5	36.20	17.70	13.80
24.355	0.72	0.02	L1	60.00	30.7	31.43	50.00	27.1	27.83	28.57	22.17

*Comment : Pol : L1 (Live), N(Neut)
Insertion Loss : Insertion Loss of LISN
Cable Loss : Cable Loss + Pulse Limiter Insertion loss value

5.6.3 Test mode: AV mode

-. Test Date : November 17, 2006
-. Resolution bandwidth : 9kHz
-. Frequency range : 0.15MHz ~ 30MHz

Frequency (MHz)	Insertion Loss	Cable Loss	Pol.	Quasi-Peak[dBuV]			Average[dBuV]			Margin[dBuV]	
				Limit	Reading	Result	Limit	Reading	Result	Quasi	Average
0.195	0.11	-0.22	N	63.82	36.6	36.49	53.82	32.4	32.29	27.34	21.54
0.390	0.13	-0.13	L1	58.06	24.7	24.71	48.06	20.8	20.81	33.36	27.26
0.485	0.14	-0.17	L1	56.25	26.1	26.07	46.25	20.9	20.87	30.18	25.38
0.585	0.14	-0.22	L1	56.00	23.9	23.82	46.00	21.3	21.22	32.18	24.78
0.895	0.15	-0.23	L1	56.00	28.9	28.82	46.00	25.7	25.62	27.18	20.38
1.265	0.15	-0.25	N	56.00	29.9	29.80	46.00	25.1	25.00	26.20	21.00
2.240	0.19	-0.28	N	56.00	28.9	28.81	46.00	23.6	23.51	27.19	22.49
3.210	0.22	-0.14	N	56.00	26.4	26.48	46.00	21.8	21.88	29.52	24.12
4.865	0.28	-0.16	N	56.00	27.3	27.42	46.00	23.1	23.22	28.58	22.78
8.270	0.36	0.00	N	60.00	29.6	29.96	50.00	25.3	25.66	30.04	24.34
10.315	0.40	0.00	N	60.00	32.2	32.60	50.00	27.4	27.80	27.40	22.20
12.750	0.51	0.05	L1	60.00	30.7	31.26	50.00	25.7	26.26	28.74	23.74
18.400	0.71	0.00	L1	60.00	38.7	39.41	50.00	33.9	34.61	20.59	15.39
19.660	0.74	0.00	L1	60.00	36.3	37.04	50.00	30.8	31.54	22.96	18.46
24.335	0.72	0.02	L1	60.00	35.5	36.23	50.00	25.7	26.43	23.77	23.57

*Comment : Pol : L1 (Live), N(Neut)
Insertion Loss : Insertion Loss of LISN
Cable Loss : Cable Loss + Pulse Limiter Insertion loss value

6. Radiated Emission

6.1 Operating environment

Temperature : 16℃
Relative humidity : 48 %

6.2 Test set-up

A preliminary scan with peak mode was performed in the semi anechoic chamber and found frequency for open area test site.
The formal radiated emission was measured at 3m/10m-distance open area test site.
The EUT was placed on a non-conductive turntable approximately 0.8 meters above the ground plane.
The turntable with EUT was rotated 360°, and the antenna was varied in height between 1.0 and 4.0 meters in order to determine the maximum emission levels.
This procedure was performed for both horizontal and vertical polarization of the receiving antenna.

6.3 Measurement uncertainty

The measurement uncertainty was calculated in accordance with ISO “Guide to the expression of uncertainty in measurement”.
The measurement uncertainty was given with a confidence of 95%.

Contribution	Probability Distribution	Uncertainty (dB)			
		Biconical Ant.		Log-periodic Ant.	
		3m	10m	3m	10m
Ambient signal					
Antenna factor calibration	Normal (k=2)	0.50	0.50	0.50	0.50
Receiver specification	Rectangular	0.50	0.50	0.50	0.50
Antenna directivity	Rectangular	0.25	0.00	1.50	0.25
Antenna phase center variation	Rectangular	0.00	0.00	1.00	0.20
Antenna factor frequency interpolation	Rectangular	0.25	0.25	0.25	0.25
Measure distance variation	Rectangular	0.60	0.40	0.60	0.40
Site imperfections	Rectangular	-2.00	-2.40	2.50	2.40
Mismatch Receiver VRC : Γl= 0.09 Antenna VRC : Γg= 0.43 (Bi) 0.23 (Lp) Uncertainty limits 20log(1± Γl Γg)	U-shaped	0.33 -0.35	0.33 -0.35	0.18 -0.18	0.18 -0.18
System repeatability	Std Deviation	0.82	0.82	0.79	0.79
Cable loss calibration	Normal (k=2)	0.09	0.09	0.09	0.09
Combined standard uncertainty Uc(y)	Normal	1.54 -1.54	1.70 -1.70	2.03 -2.03	1.68 -1.68
Extended uncertainty U	Normal (k=2)	3.09 -3.09	3.39 -3.40	4.05 -4.05	3.36 -3.36

6.4 Limit

Frequency (MHz)	FCC Limit @ 3m. dB μV/m	CISPR Limit @ 10m. dB μV/m
30 – 88	40.0	30.0
88 – 216	43.5	30.0
216 – 230	46.0	30.0
230 – 960	46.0	37.0
960 – 1000	54.0	37.0

6.5 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Due to Calibration
■ -	ESI	Rohde & Schwarz	EMI test receiver	830482/010	12. 02. 2006
■ -	HK116	Rohde & Schwarz	Biconical ANT	832639/007	12. 13. 2006
■ -	HL223	Rohde & Schwarz	Log-periodic antenna	835998/004	12. 13. 2006
■ -	HD100	HD GmbH	Position Controller	100/692/01	N/A
■ -	DS415S	HD GmbH	Turntable	415/657/01	N/A
■ -	MA240	HD GmbH	Antenna Mast	240/565/01	N/A
■	87405A	Agilent	Preamplifier	MY39500777	N/A

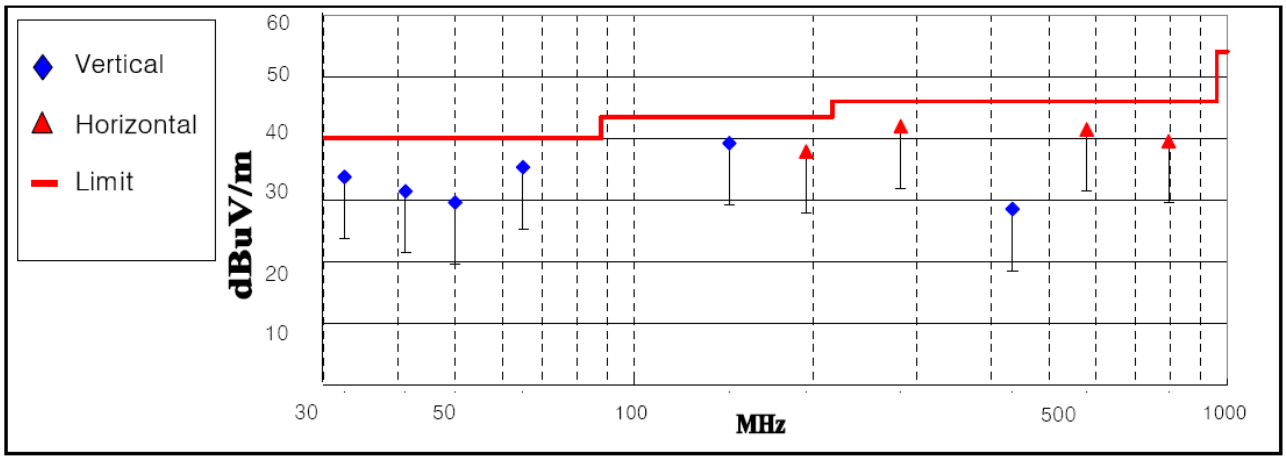
6.6 Test data for radiated emission

6.6.1 Test mode: Monitor mode

-. Test Date : November 28, 2006
-. Resolution bandwidth : 120kHz
-. Frequency range : 30MHz ~ 1000MHz
-. Measurement distance : 3m

♦ Operating Condition: 1024*768/75Hz(Analog)
Detector mode: Quasi- peak detector mode

Frequency (MHz)	Measurement Level				Limit (dBuV/m)	Margin (dBuV/m)	Positioning System		
	Reading Value(dBuV)	Antenna Factor(dB)	Cable Loss(dB)	Test Result (dBuV/m)			Pol. (H/V)	Height (cm)	Angle (deg)
32.50	19.1	12.96	1.70	33.8	40.0	6.2	V	128	256
41.21	18.9	10.72	1.82	31.4	40.0	8.6	V	106	292
49.92	18.3	9.35	2.00	29.6	40.0	10.4	V	101	100
64.96	25.3	7.89	2.15	35.3	40.0	4.7	V	100	114
144.76	23.9	12.01	3.31	39.2	43.5	4.3	V	102	12
194.90	20.4	13.66	3.82	37.9	43.5	5.6	H	400	280
281.42	19.1	17.98	4.88	42.0	46.0	4.0	H	101	263
434.21	5.9	16.40	6.27	28.6	46.0	17.4	V	100	0
578.92	15.9	18.30	7.23	41.4	46.0	4.6	H	103	255
795.93	9.9	21.16	8.48	39.5	46.0	6.5	H	397	199



< Fig 4. Radiated emission result >

6.6.2 Test mode: DTV mode

-. Test Date : November 28, 2006
-. Resolution bandwidth : 120kHz
-. Frequency range : 30MHz ~ 1000MHz
-. Measurement distance : 3m

♦ Radiated Emission due to the local oscillator
Fundamental frequency

Ch. Frequency (MHz)	Harmonics	Measuring Frequency(MHz)	Emission Level(dBuV/m)	Limits (dBuV/m)	Margin (dB)
2(57.0)	1	101.0	-	43.5	<<
3(63.0)	1	107.0	-	43.5	<<
4(69.0)	1	113.0	-	43.5	<<
5(79.0)	1	123.0	-	43.5	<<
6(85.0)	1	129.0	-	43.5	<<
7(177.0)	1	221.0	-	46.0	<<
8(183.0)	1	227.0	-	46.0	<<
9(189.0)	1	233.0	-	46.0	<<
10(195.0)	1	239.0	-	46.0	<<
11(201.0)	1	245.0	-	46.0	<<
12(207.0)	1	251.0	-	46.0	<<
13(213.0)	1	257.0	-	46.0	<<
14(473.0)	1	517.0	-	46.0	<<
19(503.0)	1	547.0	-	46.0	<<
24(533.0)	1	577.0	-	46.0	<<
29(563.0)	1	607.0	-	46.0	<<
34(593.0)	1	637.0	-	46.0	<<
39(623.0)	1	667.0	-	46.0	<<
44(653.0)	1	697.0	-	46.0	<<
49(683.0)	1	727.0	-	46.0	<<
54(713.0)	1	757.0	-	46.0	<<
59(743.0)	1	787.0	-	46.0	<<
64(773.0)	1	817.0	-	46.0	<<
69(803.0)	1	847.0	-	46.0	<<
74(833.0)	1	877.0	-	46.0	<<
79(863.0)	1	907.0	-	46.0	<<

"<<" : The margin is more than 30dB

♦ Radiated Emission due to the local oscillator
Harmonic frequency

Ch. Frequency (MHz)	Harmonics	Measuring Frequency(MHz)	Emission Level(dBuV/m)	Limits (dBuV/m)	Margin (dB)
All frequencies	-	-	-	-	<<

"<<" : The margin is more than 30dB

♦ Radiated Emission due to the other source than local oscillator

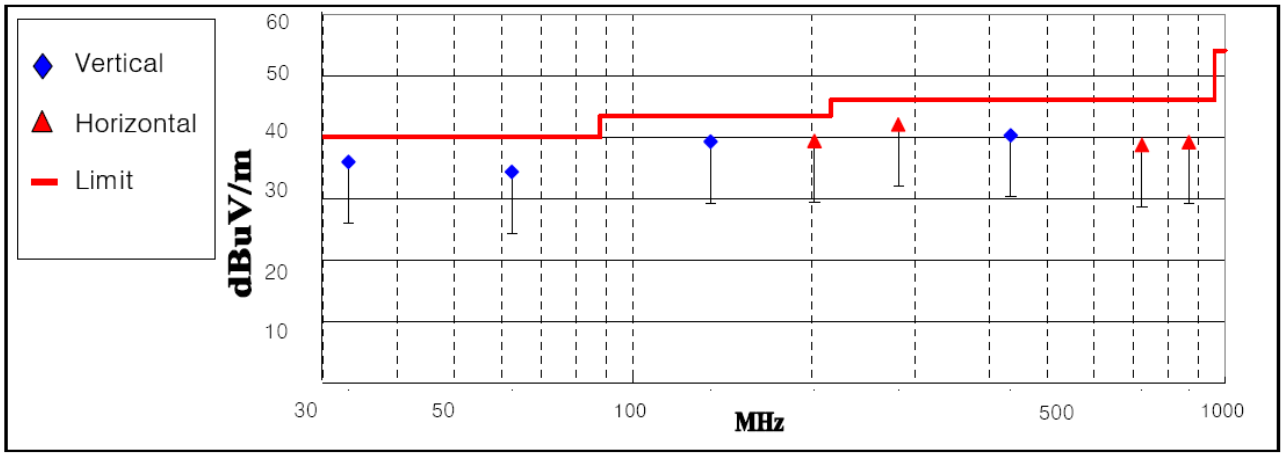
Ch. Frequency (MHz)	Harmonics	Measuring Frequency(MHz)	Emission Level(dBuV/m)	Limits (dBuV/m)	Margin (dB)
2(57.0)	--	32.84	36.0	40.0	4.0
		50.00	36.1	40.0	3.9
		62.43	35.0	40.0	5.0
		150.08	37.4	43.5	6.1
		199.94	36.8	43.5	6.7
		281.83	41.9	46.0	4.1
		434.20	38.6	46.0	7.4
		796.12	37.2	46.0	8.8

6.6.3 Test mode: AV mode

-. Test Date : November 28, 2006
-. Resolution bandwidth : 120kHz
-. Frequency range : 30MHz ~ 1000MHz
-. Measurement distance : 3m

♦ Detector mode: Quasi- peak detector mode

Frequency (MHz)	Measurement Level				Limit (dBuV/m)	Margin (dBuV/m)	Positioning System		
	Reading Value(dBuV)	Antenna Factor(dB)	Cable Loss(dB)	Test Result (dBuV/m)			Pol. (H/V)	Height (cm)	Angle (deg)
33.10	21.5	12.77	1.72	36.0	40.0	4.0	V	100	185
62.42	24.3	7.94	2.12	34.4	40.0	5.6	V	113	11
135.24	24.5	11.59	3.17	39.3	43.5	4.2	V	124	228
202.53	21.5	13.95	3.93	39.4	43.5	4.1	H	103	268
280.64	19.3	17.87	4.87	42.0	46.0	4.0	H	107	253
434.20	17.6	16.40	6.27	40.3	46.0	5.7	V	100	0
723.62	9.9	20.79	8.04	38.7	46.0	7.3	H	100	180
868.22	7.9	22.36	8.91	39.2	46.0	6.8	H	102	187



< Fig 5. Radiated emission result >

7. Antenna power conduction

7.1 Operating environment

Temperature : 24℃
Relative humidity : 38 %

7.2 Test set-up

The Antenna power conduction measurements were performed in the shielded room.
The EUT was placed on wooden table, 0.8m heights above the floor, 0.4m from the reference ground plane (GRP) wall
The ground plane, which was electrically bonded to the shield room, ground system and all power lines entering the shield room, were filtered.

7.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Due to Calibration
■ -	ESI	Rohde & Schwarz	EMI test receiver	830482/010	12. 02. 2006
■ -	11852B	Hewlett Packard	Matching Pad(50-75Ω)	03313	N/A

7.4 Test data for Antenna power conduction

-. Test Date : November 29, 2006
-. Resolution bandwidth : 120kHz
-. Frequency range : 30MHz ~ 2000MHz

7.4.1 Test mode: DTV mode

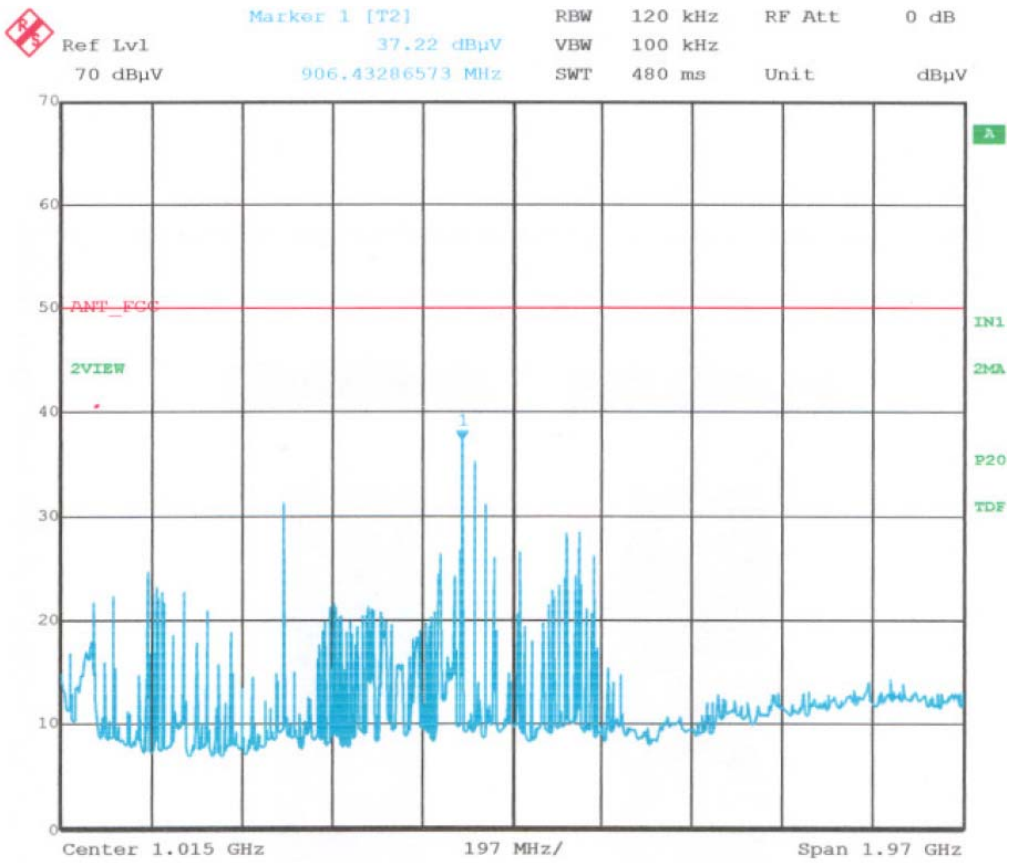
♦ Antenna power conduction due to the local oscillator (Fundamental frequency)

Ch. Frequency (MHz)	Harmonics	Measuring Frequency(MHz)	Emission Level(dBuV)	Limits (dBuV)	Margin (dB)
2(57.0)	1	101.0	-	50.0	<<
3(63.0)	1	107.0	-	50.0	<<
4(69.0)	1	113.0	-	50.0	<<
5(79.0)	1	123.0	-	50.0	<<
6(85.0)	1	129.0	-	50.0	<<
7(177.0)	1	221.0	-	50.0	<<
8(183.0)	1	227.0	-	50.0	<<
9(189.0)	1	233.0	-	50.0	<<
10(195.0)	1	239.0	-	50.0	<<
11(201.0)	1	245.0	-	50.0	<<
12(207.0)	1	251.0	-	50.0	<<
13(213.0)	1	257.0	21.47	50.0	28.53
14(473.0)	1	517.0	-	50.0	<<
15(479.0)	1	523.0	-	50.0	<<
16(485.0)	1	529.0	-	50.0	<<
17(491.0)	1	535.0	-	50.0	<<
18(497.0)	1	541.0	-	50.0	<<
19(503.0)	1	547.0	-	50.0	<<
24(533.0)	1	577.0	-	50.0	<<
29(563.0)	1	607.0	18.61	50.0	31.39
31(575.0)	1	619.0	20.12	50.0	29.88
32(581.0)	1	625.0	20.55	50.0	29.45
33(587.0)	1	631.0	19.44	50.0	30.56
34(593.0)	1	637.0	20.57	50.0	29.43
39(623.0)	1	667.0	18.88	50.0	31.12
44(653.0)	1	697.0	19.65	50.0	30.35
49(683.0)	1	727.0	18.91	50.0	31.09
54(713.0)	1	757.0	-	50.0	<<
59(743.0)	1	787.0	-	50.0	<<
64(773.0)	1	817.0	-	50.0	<<
69(803.0)	1	847.0	-	50.0	<<
74(833.0)	1	877.0	-	50.0	<<
79(863.0)	1	907.0	-	50.0	<<

“<<” : The margin is more than 30dB

♦ Antenna power conduction due to the local oscillator
Harmonic frequency

Ch. Frequency (MHz)	Harmonics	Measuring Frequency(MHz)	Emission Level(dBuV)	Limits (dBuV)	Margin (dB)
3(63.0)	8	856.0	25.49	50.0	24.51
4(69.0)	8	904.0	27.42	50.0	22.58
5(79.0)	7	861.0	22.63	50.0	27.37
6(85.0)	7	903.0	21.96	50.0	28.04
7(177.0)	4	884.0	38.10	50.0	11.90
8(183.0)	4	908.0	37.10	50.0	12.90
9(189.0)	4	932.0	35.32	50.0	14.68
10(195.0)	4	956.0	31.42	50.0	18.58
11(201.0)	4	980.0	26.03	50.0	23.97
12(207.0)	4	1004.0	22.35	50.0	27.65
14(473.0)	2	1034.0	19.28	50.0	30.72
15(479.0)	2	1046.0	18.80	50.0	31.20
16(485.0)	2	1058.0	16.30	50.0	33.70
17(491.0)	2	1070.0	17.00	50.0	33.0
18(497.0)	2	1082.0	17.52	50.0	32.48
19(503.0)	2	1094.0	17.33	50.0	32.67
24(533.0)	2	1154.0	20.16	50.0	29.84



< Fig 6. Antenna power conduction result >

8. Noise Figure

8.1 Operating environment

Temperature : 24℃
Relative humidity : 38 %

8.2 Test set-up

The Noise Figure measurements were performed in the shielded room.
The EUT was placed on wooden table, 0.8m heights above the floor, 0.4m from the reference ground plane (GRP) wall.
The ground plane, which was electrically bonded to the shield room, ground system and all power lines entering the shield room, were filtered.

8.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Due to Calibration
■ -	N8973A	Hewlettpackard	Noise Figure Analyzer	GB42151318	12. 16. 2006
■ -	N4000A	Hewlettpackard	Noise Source	US41120227	NCR
■ -	11852B	Hewlettpackard	MIN LOSS PAD	03313	NCR
■ -	11852B	Hewlettpackard	MIN LOSS PAD	03309	NCR

8.4 Test data for Noise Figure

-. Test Date : November 29, 2006
-. Test Channel : 2 ~ 69CH

VHF				UHF			
Ch.No.	Ch. Freq. (MHz)	Noise Figure (dB)	Limit (dB)	Ch.No.	Ch. Freq. (MHz)	Noise Figure (dB)	Limit (dB)
2	55.25	9.0	14.0	14	471.25	9.1	14.0
3	61.25	9.3		19	501.25	9.2	
4	67.25	9.1		24	531.25	9.2	
5	77.25	8.6		29	561.25	9.1	
6	83.25	9.0		34	591.25	9.3	
7	175.25	9.2		39	621.25	10.0	
8	181.25	9.1		44	651.25	9.0	
9	187.25	8.6		49	681.25	9.1	
10	193.25	9.9		54	711.25	8.7	
11	199.25	9.8		59	741.25	9.5	
12	205.25	9.2		64	771.25	9.7	
13	211.25	9.1		69	801.25	9.1	

9. Sample Calculations

$$dB\mu V = 20 \text{ Log}_{10}(\mu V/m)$$
$$dB\mu V = dBm + 107$$
$$\mu V = 10^{(dB\mu V/20)}$$

9.1 Example 1 :

■ 20.3 MHz

Class B Limit	=	250 μV	=	48 dBμV
Reading	= - 67.8 dBm(Calibrated level)			
Convert to dBμV	= - 67.8 dBm + 107		=	39.2 dBμV
$10^{(39.2dB\mu V/20)}$	=	91.2 μV		
Margin	=	39.2 – 48	=	-8.8
	=	8.8 dB below Limit		

9.2 Example 2 :

■ 66.7 MHz

Class B Limit	=	100 μV/m	=	40.0 dBμV/m
Reading	= - 76.0 dBm(Calibrated level)			
Convert to dBμV/m	= - 67.8 dBm + 107		=	31.0 dBμV/m
Antenna Factor + Cable Loss		=	5.8 dB	
	Total	=	36.8 dBμV/m	
Margin	=	36.8 – 40.0	=	-3.2
	=	3.2 dB below Limit		

10. Recommendation & conclusion

The data collected shows that the **KOREA DATA SYSTEMS Co., Ltd. 42" LCD TV/Monitor (Model No.: KLT4202LA)** was complies with §15.107, §15.109, §15.111, and §15.117 of the FCC Rules.