

HYUNDAI CALIBRATION & CERTIFICATION TECH. CO., LTD.

Product Compliance Division, EMC Team
SAN 136-1, AMI-RI, BUBAL-EUP, ICHEON-SI, KYOUNKI-DO, 467-701, KOREA
TEL : +82 31 639 8518 FAX : +82 31 639 8525

TEST REPORT

License Holder;
LG Electronics Inc.
50 Hyangjeong-dong, Heungdeok-gu,
Cheongju-si, Chungcheongbuk-do,
361-480, KOREA.

LG Electronics Inc FRN : 0012281820

Date of Issue : June 27, 2006

Test Report No.: HCT-F06-0602

Test Site: HYUNDAI CALIBRATION & CERTIFICATION
TECHNOLOGIES CO., LTD.

HCT FRN : 0005-8664-21

FCC ID :

SSNUBIV

MODEL :

UBIV

Rule Part(s): Part 15
Equipment Class: FCC Class B Peripheral Device (JBP)
Standard(s): FCC Class B: (CISPR 22)
EUT Type: USB Drive
Model(s): UBIV
Port/Connector(s): USB

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

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 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.



Report prepared by
: Gyeong Seon KIM
Test engineer of EMC Tech.Part



Approved by
: Sang Jun LEE
Manager of EMC Tech.Part



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MEASUREMENT REPORT

1.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.

Applicant Name:	LG Electronics CO., LTD.
Address:	50,Hyangjeong-Dong, Heungdeok-Gu, Cheongju-Si, ChungcheongBuk-Do, 361-480,KOREA

- FCC ID : SSNUBIV
- Equipment Class: FCC Class B Peripheral Device (JBP)
- EUT Type: UBIV
- Interface: USB Spec 2.0/1.1
- Power : USB bus-powered(4.5V~5.5V)
- Dates of Tests: May 24, 2006
- Place of Tests: 254-1,MAEKOK-RI,HOBUP-MYUN,ICHON-SI,KYOUNGKI-DO,467-701,KOREA

2.1 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 C63.4-2003) was used in determining radiated and conducted emissions emanating from **LG Electronics CO., LTD. USB Drive FCC ID : SSNUBIV**

The open area test site and conducted measurement facility used to collect the radiated data are located at the 254-1, MAEKOK-RI, HOBUP-MYUN, ICHON-SI, KYOUNGKI-DO, 467-701, KOREA. The site is constructed in conformance with the requirements of ANSI C63.4 and CISPR Publication 22. Detailed description of test facility was submitted to the Commission and accepted dated July 23, 2003 (Confirmation Number: EA90661)

3.1 PRODUCT INFORMATION

3.2 Equipment Description

Equipment Under Test (EUT) is the **LG Electronics CO., LTD. (Model : UBIV) USB Drive**

FCC ID : **SSNUBIV**

Storage capacity : **512MB/1GB/2GB**

Maximum data rate : **480Mbps/**

Operating Temperature Storage Humidity : **0 °C ~ 45°C / 5% ~ 95%**

Dimensions (Including cabinet) : **61mm x 17.5mm x 9mm**

Weight (Including cabinet) : **9g**

Description

	Capacity	Model Differences
Basic Model	UBIV (2GB)	Worst Case
Multiple Model	UBIV (512MB) UBIV (1GB)	Only type designation by a memory size of the EUT.

EMI Suppression Devices:

None

4.1 Description of Tests(Conducted)

4.2 Powerline Conducted RFI (150kHz- 30MHz)

The power line conducted RFI measurements were performed according to CISPR 22.

The EUT was placed on a non-conducting 1.0 by 1.5 meter table which is 0.8 meters in height and 0.40 meters away from the vertical wall of the shielded enclosure. Power to the EUT is provided through a Rohde & Schwarz 50 Ω / 50 μ H Line Impedance Stabilization Network (LISN) and the support equipment through a separate Solar 50 Ω / 50 μ H Line- Conducted Test Facility LISN. Sufficient time for the EUT, support equipment, and test equipment were 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. The spectrum was scanned from 150kHz to 30 MHz. Each maximum EME was remeasured using an EMI receiver. The detector function of the receiver was set to CISPR quasi- peak and average mode with the bandwidth set to 9 kHz. Each emission was maximized consistent with the 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 the center with 30- 40cm. in length. The worst-case configuration is noted in the test report and the photographs are attached.

RFI CONDUCTED	CISPR 22 CLASS B	
	Limits dB(uV/m)	
Freq. Range	CISPR 22 Quasi-Peak	CISPR 22 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		

Table 1. RFI Conducted Limits

4.3 Description of Tests(Radiated)

Radiated Emissions

Preliminary measurements were made indoors at 1 meter using broadband 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 spectrum was scanned from 30 to 300 MHz using biconical antenna, 300 to 1000 MHz using log- periodic antenna, and above 1 GHz using linearly polarized horn antennas. Final measurements were made outdoors at 10-meter test range using Dipole antennas and EMI receiver. For frequencies above 1 GHz, horn antennas were used. Sufficient time for the EUT, support equipment, and test equipment were allowed in order for them to warm up to their normal operating condition. The EMI receiver detector function was set to CISPR quasi-peak mode and the bandwidth of the receiver was set to 120 kHz. The EUT, support equipment, and interconnecting cables were arranged to the configuration that produces the maximum EME emission found during preliminary scan. 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. Horizontal and vertical antenna polarizations were checked. Each emission was maximized by: varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and/ or support equipment, and powering the monitor the computer aux AC outlet, if applicable; and changing the polarity of the antenna, whichever determined the worst-case emission.

ITE Radiated Limits			
Frequency (MHz)	FCC Limit @ 3m. Quasi-Peak dB[μV/m]	FCC Limit @ 10m.* Quasi – Peak dB [μV/m]	CISPR Limit @ 10m. Quasi-Peak dB [μV/m]
30-88	40.0	29.5	30.0
88-216	43.5	33.0	30.0
216-230	46.0	35.6	30.0
230-960	46.0	35.6	37.0
960-1000	54.0	43.5	37.0
> 1000	54.0	43.5	No Specified Limit
* Limit extrapolated 20 dB/decade			

Table 2. Radiated Class B limits @ 10-meters

5.1 Support Equipment Used

DEVICE TYPE	MANUFACTURER	TYPE NUMBER	FCC ID / DoC	CONNECTED TO
USB Drive (EUT)	LG Electronics CO., LTD.	UBIV	SSNUBIV	P.C END

DEVICE TYPE	MANUFACTURER	MODEL NUMBER	FCC ID / DoC	CONNECTED TO
USB Drive	LG Electronics CO., LTD.	-	-	EUT
Mouse	Microsoft	3902B008	DoC	PC END
Printer	H.P	SG27D1400V	DoC	PC END
NoteBookPC	TOSHIBA	84035087P	DoC	EUT END
NoteBookPC Adapter	DELTA ELECTRONICS(JIANG SU), LTD.	0610699	DoC	NoteBook PC END

5.2 Cable Description

Product Name	Port	Power Cord Shielded (Y/N)	I/O Cable Shielded (Y/N)	Length (M)
NoteBook	USB	N/A	Y	1.8
	Parallel	N/A	Y	1.8
	DC In	N	N/A	1.8
Printer	AC In	N	N/A	1.8

The marked "(D)" means the Data Cable and "(P)" means the Power Cable.

5.3 Noise Suppression Parts on Cable. (I/O CABLE)

		Ferrite Bead (Y/N)	Location	Metal Hood (Y/N)	Location
Mouse	USB	Y	NoteBook end	Y	NoteBook End
Printer	Parallel	N	N/A	Y	Both End

6.1 LINE-CONDUCTED TEST DATA

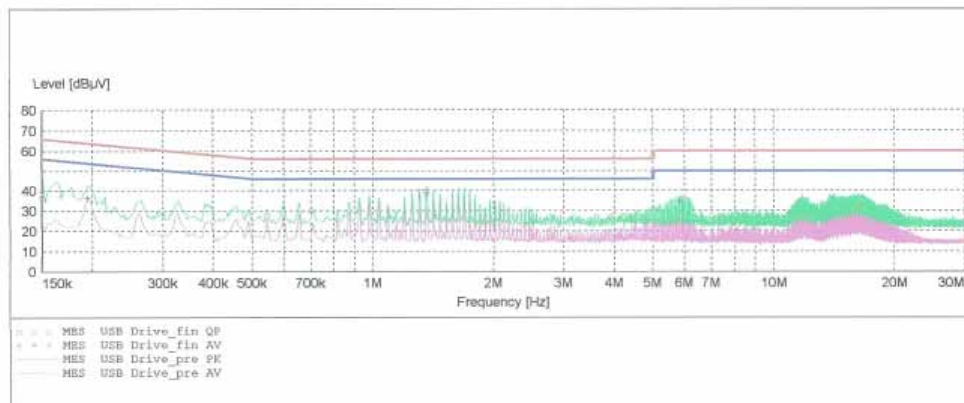
HCT

EMC TEST LAB

EUT: UBIV
 Manufacturer: LG ELECTRONICS
 Operating Condition: NORMAL
 Test Site: SHIELD ROOM
 Operator: GS,KIM
 Test Specification: CISPR 22 CLASS B
 Comment: N

SCAN TABLE: "CISPR 22 Voltage"

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
150.1 kHz	500.0 kHz	2.5 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			
500.0 kHz	5.0 MHz	5.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			
5.0 MHz	30.0 MHz	5.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			



MEASUREMENT RESULT: "USB Drive_fin QP"

5/24/2006 10:01AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.150100	39.10	10.1	66	26.9	---	---
1.365000	39.70	10.2	56	16.3	---	---
16.295000	32.30	10.5	60	27.7	---	---

MEASUREMENT RESULT: "USB Drive_fin AV"

5/24/2006 10:01AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.195100	36.30	10.1	54	17.5	---	---
1.365000	39.00	10.2	46	7.0	---	---
5.835000	34.50	10.3	50	15.5	---	---

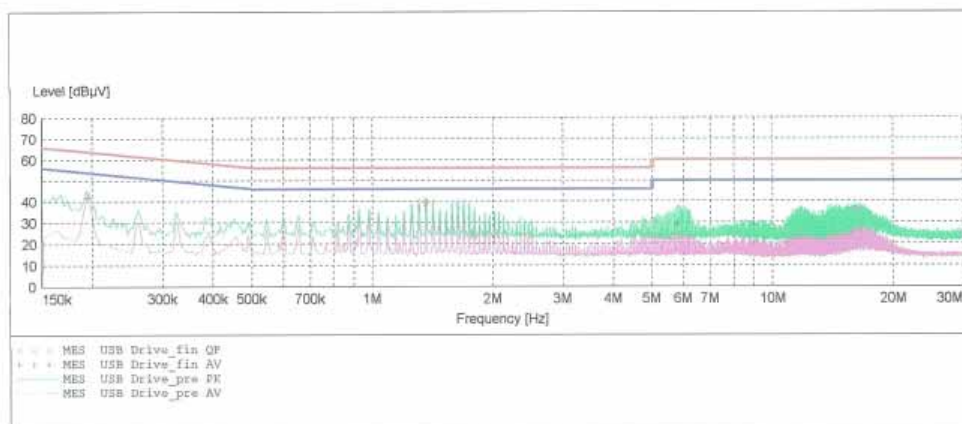
HCT

EMC TEST LAB

EUT: UBIV
 Manufacturer: LG ELECTRONICS
 Operating Condition: NORMAL
 Test Site: SHIELD ROOM
 Operator: GS,KIM
 Test Specification: CISPR 22 CLASS B
 Comment: H

SCAN TABLE: "CISPR 22 Voltage"

Short Description:		CISPR 22 Voltage					
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer	
Frequency	Frequency	Width					
150.1 kHz	500.0 kHz	2.5 kHz	MaxPeak	10.0 ms	9 kHz	None	
			Average				
500.0 kHz	5.0 MHz	5.0 kHz	MaxPeak	10.0 ms	9 kHz	None	
			Average				
5.0 MHz	30.0 MHz	5.0 kHz	MaxPeak	10.0 ms	9 kHz	None	
			Average				


MEASUREMENT RESULT: "USB Drive_fin QP"

5/24/2006 9:58AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.195100	43.80	10.1	64	20.1	---	---
1.365000	40.10	10.2	56	15.9	---	---
16.185000	36.70	10.5	60	23.3	---	---

MEASUREMENT RESULT: "USB Drive_fin AV"

5/24/2006 9:58AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.195100	41.80	10.1	54	12.1	---	---
1.365000	39.20	10.2	46	6.8	---	---
5.780000	29.20	10.3	50	20.8	---	---

NOTES:

1. All modes of operation were investigated and the worst-case emissions are reported.
2. The CISPR RFI conducted limits are listed on Table 1 (Page 6).
3. Line H = Phase Line N = Neutral Line

** Measurements using CISPR quasi-peak mode.

7.1 RADIATED TEST DATA

Frequency MHz	Reading dBuV	Ant. Factor dB/m	Cable Loss Db	ANT POL (H/V)	Total dBuV/m	Limit dBuV/m	Margin dB
64.0	9.8	10.8	1.8	V	22.4	30.0	7.6
120.0	7.2	11.0	2.4	H	20.6	30.0	9.4
127.1	9.2	11.6	2.6	V	23.4	30.0	6.6
190.2	7.3	10.1	3.1	H	20.5	30.0	9.5
253.1	15.3	11.2	3.6	H	30.1	37.0	6.9
362.0	12.8	14.0	4.4	V	31.2	37.0	5.8
481.0	7.8	16.6	5.0	V	29.4	37.0	7.6
641.0	4.3	19.6	5.8	H	29.7	37.0	7.3

Radiated Measurements at 10-meters.

NOTES:

1. All modes of operation were investigated, and the worst-case emissions are reported.
2. The radiated limits are listed on Table 2 (Page 7).

*** 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.

8.1 Sample Calculations

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

8.2 Example 1:

@ 1.365MHz

Class B limit	= 46.0 dB μV
Reading	= 39.20 dB μV (calibrated level)

Margin	= 46.0 – 39.2 = 6.8 dB μV
	= 6.8 dB below limit

8.3 Example 2:

@362.0MHz

Class A limit	= 37.0 dB $\mu\text{V/m}$
Reading	= 12.8 dB $\mu\text{V/m}$ (calibrated level)
Antenna Factor + Cable Loss	= 18.4 dB
Total	= 31.2 dB $\mu\text{V/m}$

Margin	= 37.0 – 31.2 = 5.8 dB $\mu\text{V/m}$
	= 5.8 dB below limit

9.1 Test Equipment

<u>Type</u>	<u>Manufacture</u>	<u>Model Number</u>	<u>CAL Due Date</u>
EMI Test Receiver	Rohde & Schwarz	ESI40	2006.11.16
EMI Test Receiver	Rohde & Schwarz	ESCI	2006.09.13
LISN	Rohde & Schwarz	ESH2-Z5	2007.04.26
LISN	EMCO	703125	2007.04.26
TRILOG Antenna	Schwarzbeck	VULB 9160	2007.04.17
Antenna Position Tower	HD	MA240	N/A
Turn Table	EMCO	1050	N/A
Power Analyzer	Voltech	PM 3300	2007.03.22
Reference Network Impedance	Voltech	IEC 555	N/A
AC Power Source	PACIFIC	Magnetic Module	N/A
AC Power Source	PACIFIC	360-AMX	2006.11.25
Controller	HD GmbH	HD 100	N/A
SlideBar	HD GmbH	KMS 560	N/A
PULSE LIMITER	Rohde & Schwarz	ESH3-Z2	2006.11.16

10.1 Test Software Used

The EUT exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use. The software, contained on a 3-1/2 inch disc, was inserted into drive A and is auto starting on power-up. Once loaded, the program sequentially exercises each system component in turn. The sequence used is : (1) Display test, (2) RS 232 test, (3) Key board test, (4) Printer test, (5) FDD test, (6) HDD test. The complete cycle takes about 20 seconds and is repeated continuously. As the keyboard and mouse are strictly input devices, no data is transmitted to them during test. They are however, continuously scanned for data input activity. The video resolution modes setup and change program was used during the radiated and conducted emission testing.

11.1 Conclusion

The data collected shows that the **LG Electronics CO., LTD.** USB Drive
MODEL:UBIV complies with §15.107 and §15.109 of the FCC Rules.